BRAKES

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GENERAL INFORMATION

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GENERAL INFORMATION

GENERAL VEHICLE SERVICE CAUTIONS

CAUTION: At no time when servicing a vehicle, can a sheet metal screw, bolt or other metal fastener be installed in the shock tower to take the place of an original plastic clip. Also, NO holes can be drilled into the front shock tower in the area shown in (Fig. 1), for the installation of any metal fasteners into the shock tower. Because of the minimum clearance in this area (Fig. 1), installation of metal fasteners could damage the coil spring coating and lead to a corrosion failure of the spring. If a plastic clip is missing, or is lost or broken during servicing a vehicle, replace only with the equivalent part listed in the Mopar parts catalog.

CAUTION: Only the recommended jacking or hoisting positions for this vehicle are to be used whenever it is necessary to lift a vehicle. Failure to raise a vehicle from the recommended locations could result in lifting a vehicle by the hydraulic control unit mounting bracket. Lifting a vehicle by the hydraulic control unit mounting bracket will result in damage to the mounting bracket and the hydraulic control unit.

BASE BRAKE SYSTEM COMPONENT DESCRIPTION

The standard brake system on this vehicle consists of the following components:

- Double pin floating caliper disc front brakes.
- Double pin floating caliper rear disc brakes on all wheel drive applications.

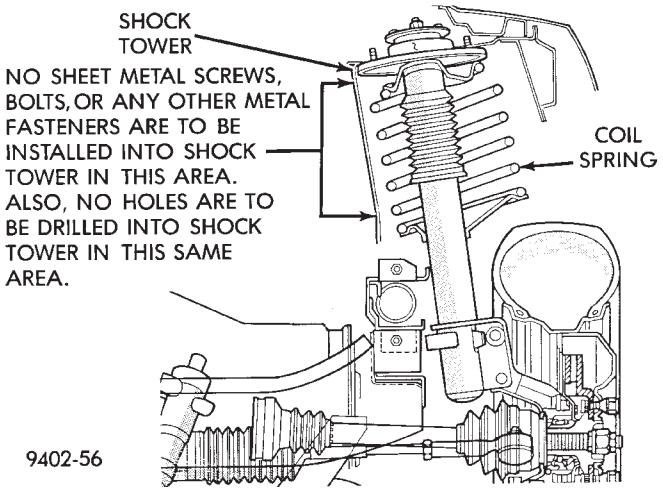

Fig. 1 Shock Tower To Spring Minimum Clearance Area

- Rear automatic adjusting drum brakes.
- Master cylinder with brake fluid level sensor.
- Vacuum booster.
- Height sensing proportioning valve (non-antilock brake applications)
- Non-height sensing proportioning valve (antilock brake applications)

The brakes hydraulic system on both non-antilock and antilock brake systems is diagonally split (Fig. 2) (Fig. 3). A diagonally split brake system means the left front and right rear brakes on one hydraulic system and the right front and left rear on the other.

GENERAL INFORMATION (Continued)

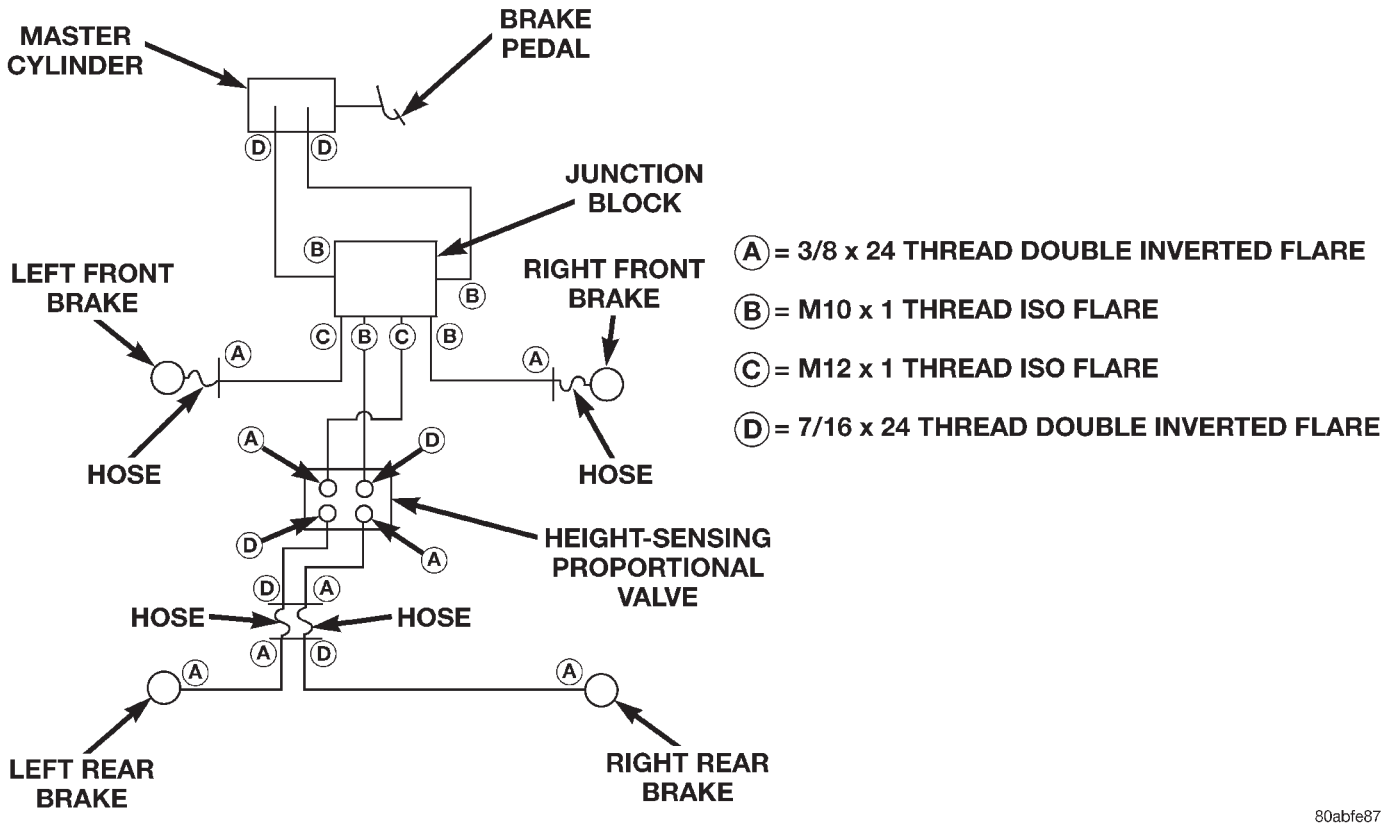

Fig. 2 Non-Antilock Brakes Hydraulic Brake Tube Routing And Fitting Locations

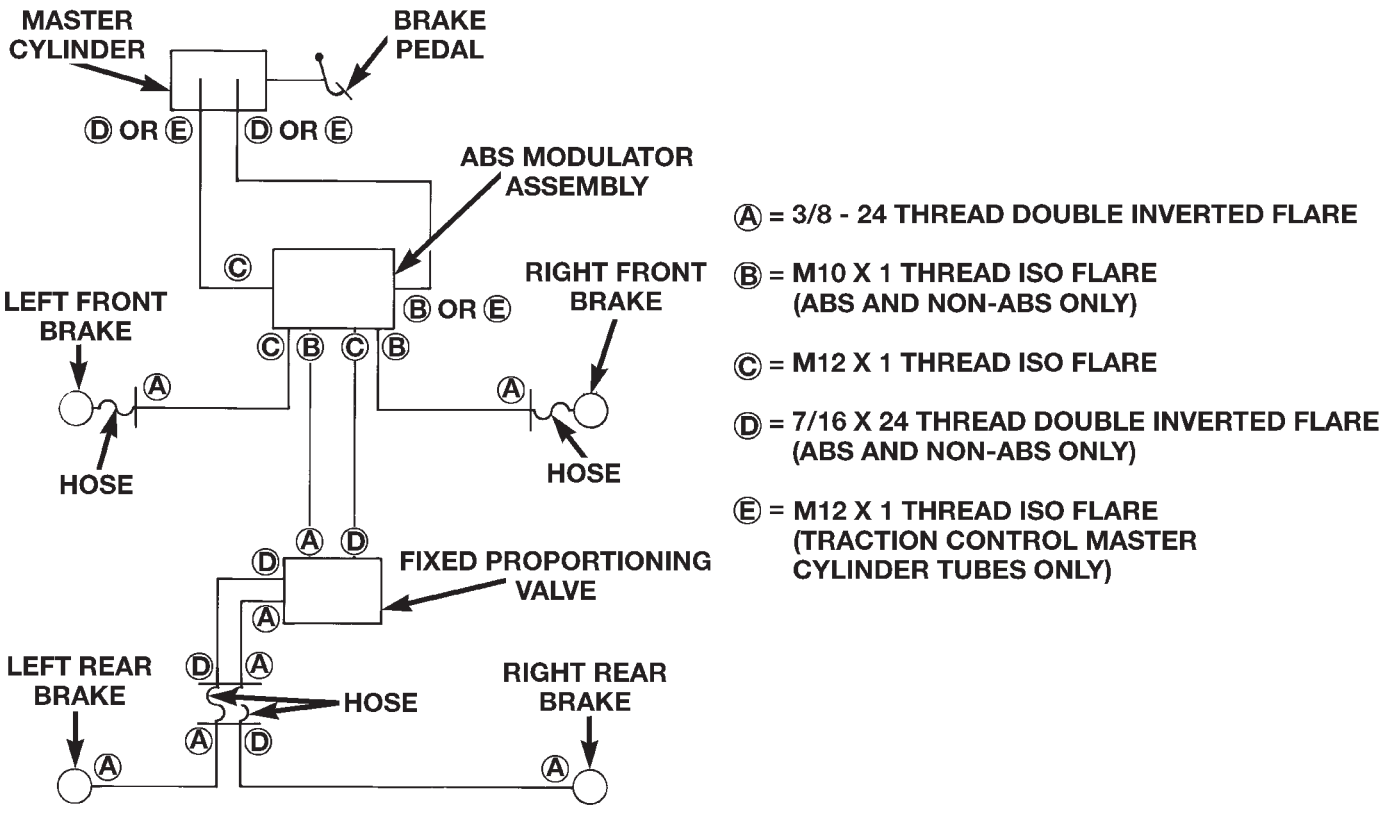

Fig. 3 Antilock Brakes/Traction Control Hydraulic Brake Tube Routing And Fitting Locations

BASE BRAKE SYSTEM

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DESCRIPTION AND OPERATION

FRONT DISC BRAKE SYSTEM

The single piston, floating caliper disc brake assembly (Fig. 1) and (Fig. 2) consists of:

- The driving hub.
- Braking disc (rotor).
- Caliper assembly.
- Shoes and linings.

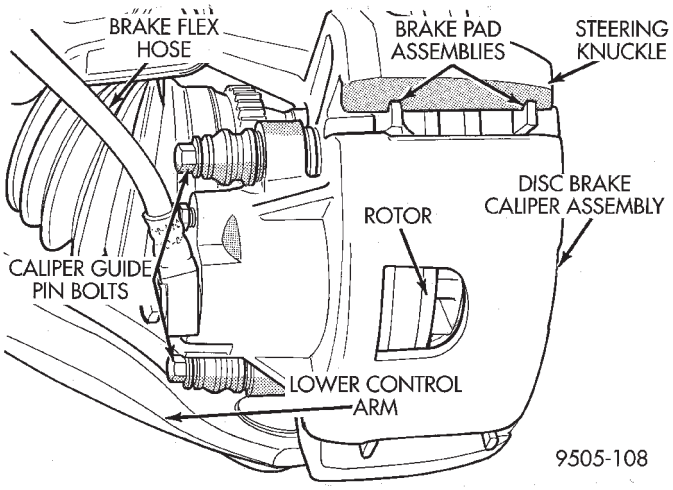


Fig. 1 Front Disc Brake System Components

The double pin Kelsey-Hayes caliper is mounted directly to the steering knuckle, using bushings, sleeves, and 2 caliper guide pin bolts which thread directly into the steering knuckle (Fig. 3).

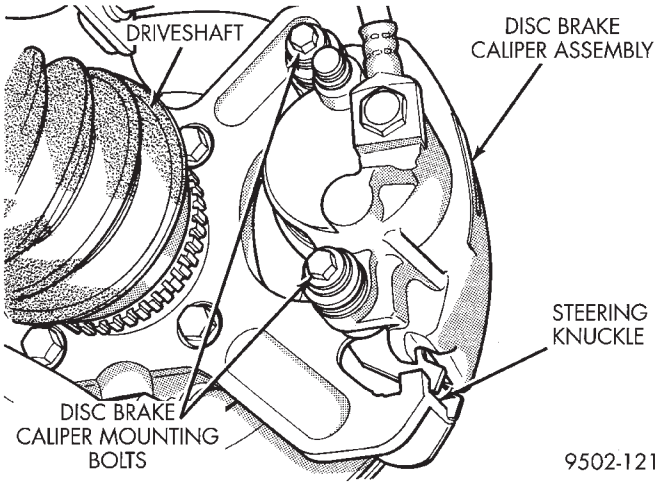


Fig. 3 Disc Brake Caliper Mounting To Steering Knuckle

The two machined abutments on the steering knuckle, position and align the caliper fore and aft. The guide pin bolts, sleeves, and bushings control the side to side movement of the caliper. The piston seal is designed to assist in maintaining the proper brake shoe to rotor clearance.

All the front brake forces generated during braking of the vehicle are taken up directly by the steering knuckles of the vehicle.

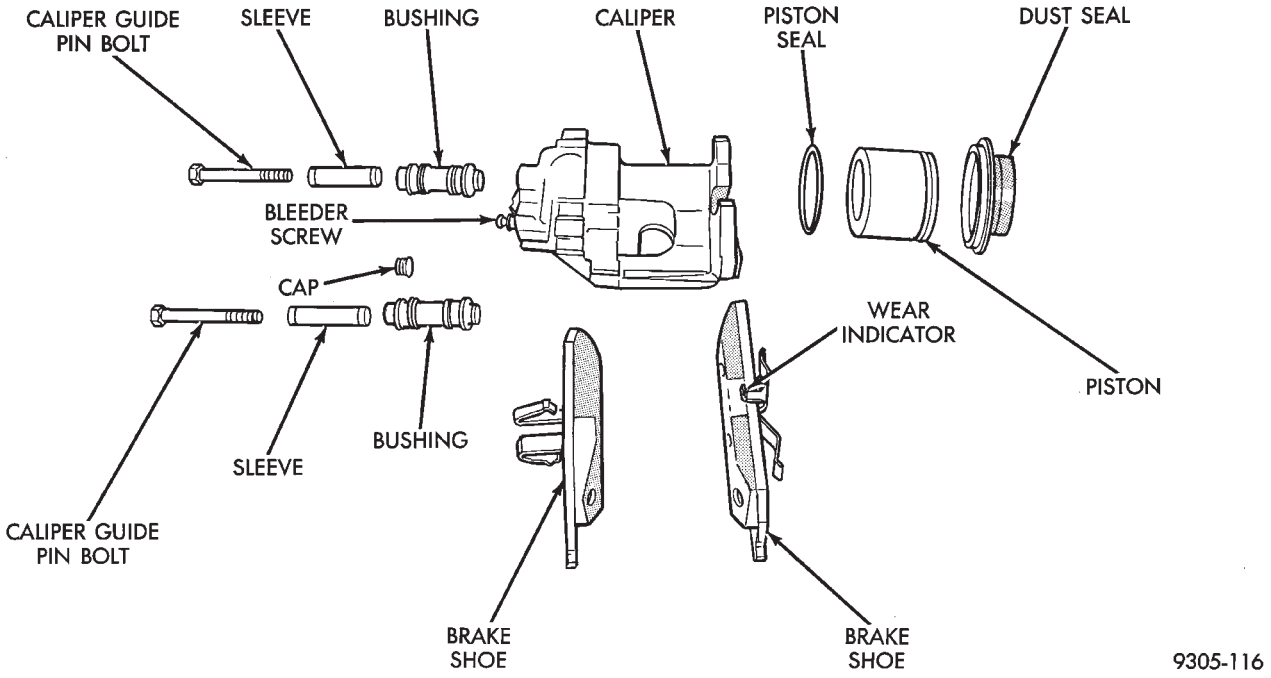


Fig. 2 Front Disc Brake Caliper Assembly (Exploded View)

DESCRIPTION AND OPERATION (Continued)

The caliper is a one piece casting with the inboard side containing a single piston cylinder bore.

The phenolic piston is 60 mm (2.36 inch) in diameter.

A square cut rubber piston seal is located in a machined groove in the cylinder bore. It provides a hydraulic seal between the piston and the cylinder wall (Fig. 4).

The molded rubber dust boot mounts in a counter bore of the cylinder bore opening and in a groove which is machined in the outer surface of the piston (Fig. 4). This prevents contamination of the piston and the bore area.

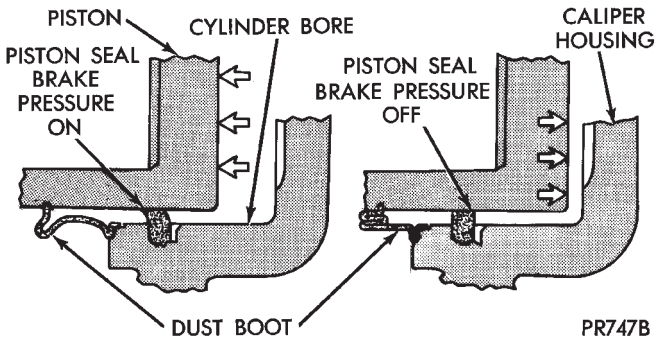


Fig. 4 Caliper Piston Seal Function For Automatic Adjustment

As lining wears, reservoir level will go down. If fluid has been added, reservoir overflow may occur when the piston is pushed back into the new lining position. Overflowing can be avoided by removing a small amount of fluid from the master cylinder reservoir.

REAR DRUM BRAKES

The rear wheel drum brakes are a two shoe, internal expanding type with an automatic adjuster screw. The automatic adjuster screw is actuated each time the brakes are applied. The automatic adjuster screw is located directly below the wheel cylinder.

REAR DISC BRAKES

The rear disc brakes are similar to front disc brakes, however, there are several distinctive features that require different service procedures. The single piston, floating caliper rear disc brake system includes a hub and bearing assembly, adapter, rotor, caliper, and brake shoes. The parking brake system on vehicles equipped with rear disc brakes, consists of a small duo-servo drum brake mounted to the caliper adapter. The drum brake shoes expand out against a braking surface (hat section) on the inside area of the rotor.

This vehicle is equipped with a caliper having a 42 mm (1.65 in.) piston and uses a 15 inch solid non-vented rotor.

The disc brake caliper floats on rubber bushings using threaded guide pin bolts which are attached to the back side of the adapter.

The adapter and rotor shield are mounted to the rear axle. The adapter is used to mount the brake shoes and actuating cables for the parking brake system. The adapter is also used to mount the rear caliper. The adapter has two machined abutments which are used to position and align the caliper and brake shoes for movement inboard and outboard (Fig. 5).

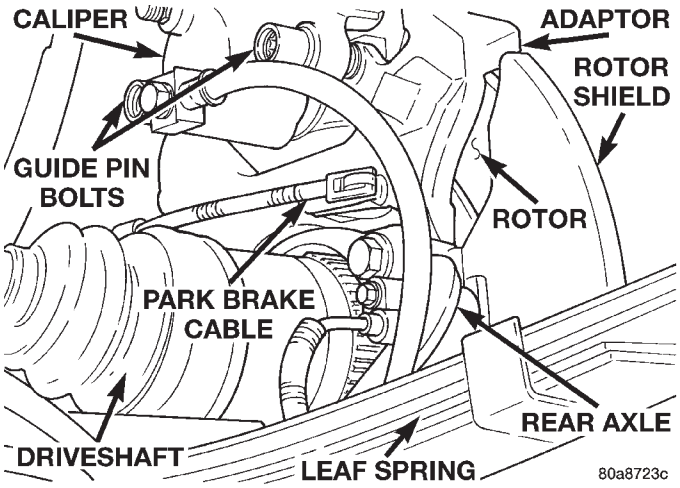


Fig. 5 Rear Disc Brake Components

PARKING BRAKE SYSTEM OPERATION

The rear wheel service brakes also act as parking brakes. The brake shoes are mechanically operated by an internal lever and strut connected to a flexible steel cable. The rear cables and intermediate cable are connected to the front cable by an equalizer. The front cable extends to the parking brake foot pedal assembly.

PROPORTIONING VALVES

FIXED PROPORTIONING VALVE

The hydraulic brake system on all vehicles is diagonally split. This means that the left front and right rear brakes are on one hydraulic circuit with the right front and left rear brakes on the other hydraulic circuit.

On vehicles equipped with ABS brakes, the brake systems hydraulic control unit (HCU) is mounted to the front suspension crossmember on the driver's side of the vehicle. The (HCU) acts as the hydraulic system junction block, diagonally splitting the brakes hydraulic system.

All vehicles equipped with ABS brakes use 2 fixed proportioning valves. The fixed proportioning valves are mounted in a common bracket on the left frame rail at the rear of the vehicle (Fig. 6).

DESCRIPTION AND OPERATION (Continued)

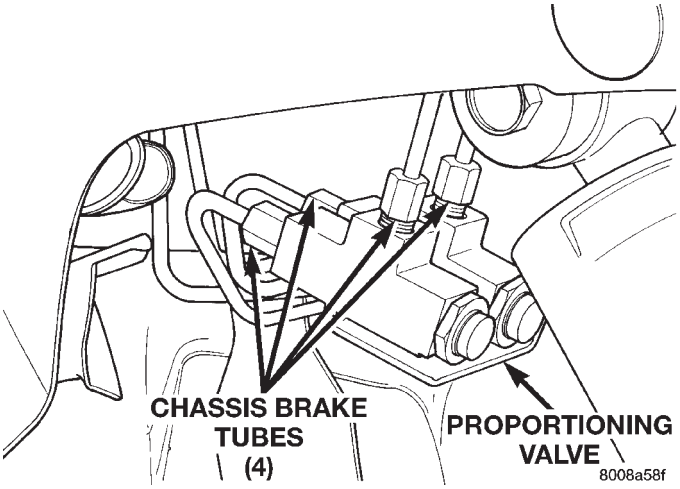


Fig. 6 Fixed Proportioning Valve Location

FIXED PROPORTIONING VALVE OPERATION

The fixed proportioning valve is made out of aluminum and has an integral mounting bracket. The fixed proportioning valve is non-serviceable component and must be replaced as an assembly if found to be functioning improperly.

The fixed proportioning valve is mounted to the bottom of the left rear frame rail, just forward of the rear shock absorber to frame rail mounting location (Fig. 6). The proportioning valve has 2 inlet ports for brake fluid coming from the ABS modulator, and 2 outlet ports for brake fluid going to the rear wheel brakes.

The fixed proportioning valve operates by allowing full hydraulic pressure to the rear brakes up to a set point, called the valve's split point. Beyond this split point the proportioning valve reduces the amount of hydraulic pressure to the rear brakes according to a certain ratio.

Thus, on light brake pedal applications the proportioning valve allows approximately equal brake hydraulic pressure to be supplied to both the front and rear brakes. On heavier brake pedal applications though, the proportioning valve will control hydraulic pressure to the rear brakes, so that hydraulic pressure at the rear brakes will be lower than that at the front brakes. This controlled hydraulic pressure to the rear brakes prevents excessive rear wheel ABS cycling during moderate stops.

HEIGHT SENSING PROPORTIONING VALVE

CAUTION: The use of after-market load leveling or load capacity increasing devices on this vehicle are prohibited. Using air shock absorbers or helper springs on this vehicle will cause the height sensing proportioning valve to inappropriately reduce the hydraulic pressure to the rear brakes. This inappropriate reduction in hydraulic pressure potentially could result in increased stopping distance of the vehicle.

On vehicles not equipped with ABS brakes, the brake systems hydraulic control unit (HCU) is replaced by a junction block (Fig. 7). The junction block is made of aluminum and is mounted to the front suspension crossmember on the drivers side of the vehicle in the same location as the (HCU) on an ABS equipped vehicle. The junction block is permanently attached to its mounting bracket and must be replaced as an assembly with its mounting bracket. The junction block is used for diagonally splitting the brake's hydraulic system.

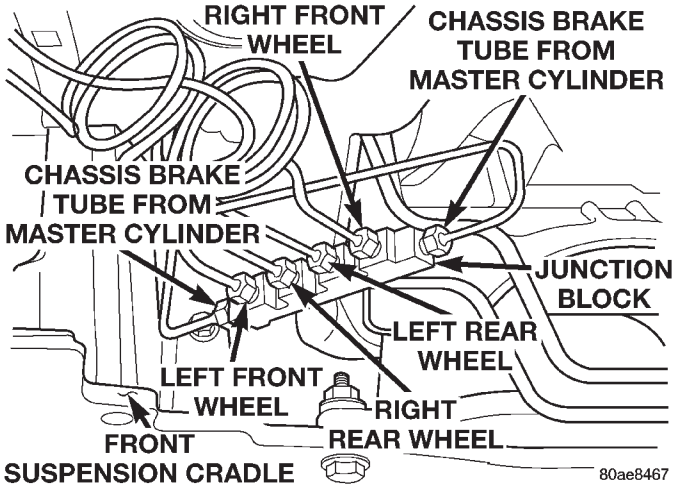


Fig. 7 Junction Block Location

Vehicles not equipped with ABS brakes use a height sensing proportioning valve. The height sensing proportioning valve is mounted on the left frame rail at the rear of the vehicle (Fig. 8). The height sensing proportioning valve uses an actuator assembly (Fig. 8) to attach the proportioning valve to the left rear spring for sensing changes in vehicle height.

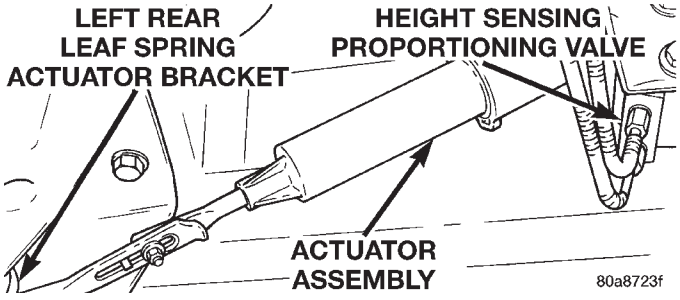


Fig. 8 Height Sensing Proportioning Valve

HEIGHT SENSING PROPORTIONING VALVE OPERATION

The height sensing proportioning valve regulates the hydraulic pressure to the rear brakes. The proportioning valve regulates the pressure by sensing the load condition of the vehicle through the movement of the proportioning valve actuator assembly

DESCRIPTION AND OPERATION (Continued)

(Fig. 8). The actuator assembly is mounted between the height sensing proportioning valve and the actuator bracket on the left rear leaf spring (Fig. 8). As the rear height of the vehicle changes depending on the load the vehicle is carrying the height change is transferred to the height sensing proportioning valve. This change in vehicle height is transferred through the movement of the left rear leaf spring. As the position of the left rear leaf spring changes this movement is transferred through the actuator bracket (Fig. 8) to the actuator assembly (Fig. 8) and then to the proportioning valve.

Thus, the height sensing proportioning valve allows the brake system to maintain the optimal front to rear brake balance regardless of the vehicle load condition. Under a light load condition, hydraulic pressure to the rear brakes is minimized. As the load condition of the vehicle increases, so does the hydraulic pressure to the rear brakes.

The proportioning valve section of the valve operates by transmitting full input hydraulic pressure to the rear brakes up to a certain point, called the split point. Beyond the split point the proportioning valve reduces the amount of hydraulic pressure to the rear brakes according to a certain ratio. Thus, on light brake applications, approximately equal hydraulic pressure will be transmitted to the front and rear brakes. At heavier brake applications, the hydraulic pressure transmitted to the rear brakes will be lower then the front brakes. This will prevent premature rear wheel lock-up and skid.

The height sensing section of the valve thus changes the split point of the proportioning valve, based on the rear suspension height of the vehicle. When the height of the rear suspension is low, the proportioning valve interprets this as extra load and the split point of the proportioning valve is raised to allow more rear braking. When the height of the rear suspension is high, the proportioning valve interprets this as a lightly loaded vehicle and the split point of the proportioning valve is lowered and rear braking is reduced.

CHASSIS TUBES AND HOSES

The purpose of the chassis brake tubes and flex hoses is to transfer the pressurized brake fluid developed by the master cylinder to the wheel brakes of the vehicle. The chassis tubes are steel with a corrosion resistant coating applied to the external surfaces and the flex hoses are made of reinforced rubber. The rubber flex hoses allow for the movement of the vehicles suspension.

MASTER CYLINDER

The master cylinder (Fig. 9) consists of the following components. The body of the master cylinder is an anodized aluminum casting. It has a machined bore to accept the master cylinder piston and threaded ports with seats for the hydraulic brake line connections. The brake fluid reservoir of the master cylinder assembly is made of a see through polypropylene type plastic. A low fluid switch is also part of the reservoir assembly.

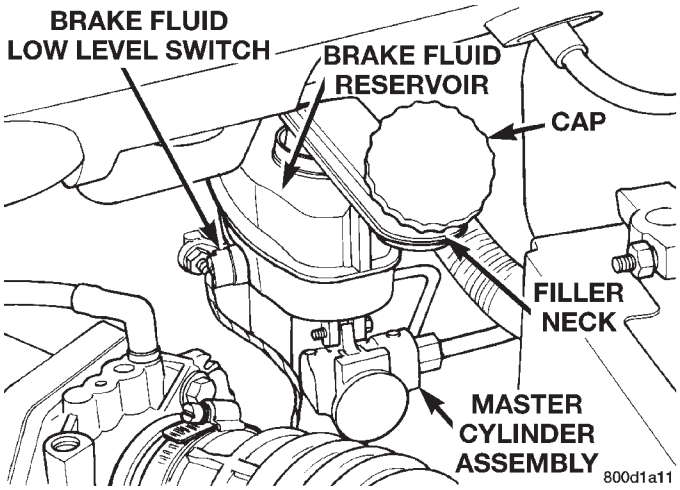


Fig. 9 Master Cylinder Assembly

This vehicle uses 3 different master cylinders. Master cylinder usage depends on what type of brake system the vehicle is equipped with. If a vehicle is not equipped with antilock brakes, or is equipped with antilock brakes without traction control, a conventional compensating port master cylinder is used. If a vehicle is equipped with antilock brakes with traction control, a dual center port master cylinder is used.

The third master cylinder used on this vehicle is unique to vehicles equipped with four wheel disc brakes. The master cylinder used for this brake application has a different bore diameter and stroke then the master cylinder used for the other available brake applications.

The master cylinders used on front wheel drive applications (non four wheel disc brake vehicles) have a master cylinder piston bore diameter of 23.8 mm. The master cylinder used on the all wheel drive applications (four wheel disc brake vehicles) have a master cylinder piston bore diameter of 25.4 mm. **When replacing a master cylinder, be sure to use the correct master cylinder for the type of brake system the vehicle is equipped with.**

The master cylinder is not a repairable component and must be replaced if diagnosed to be functioning improperly

CAUTION: Do not hone the bore of the cylinder as this will remove the anodized surface from the bore.

The master cylinder primary outlet port supplies hydraulic pressure to the right front and left rear

DESCRIPTION AND OPERATION (Continued)

brakes. The secondary outlet port supplies hydraulic pressure to the left front and right rear brakes.

POWER BRAKE VACUUM BOOSTER OPERATION

All vehicles use a 270 mm single diaphragm power brake vacuum booster.

The power brake booster can be identified if required, by the tag attached to the body of the booster assembly (Fig. 10). This tag contains the following information: The production part number of the power booster assembly, the date it was built, and who was the manufacturer of the power brake vacuum booster.

NOTE: The power brake booster assembly is not a repairable component and must be replaced as a complete assembly if it is found to be faulty in any way. The check valve located in the power brake booster (Fig. 10) is not repairable but it can be replaced as an assembly separate from the power brake booster.

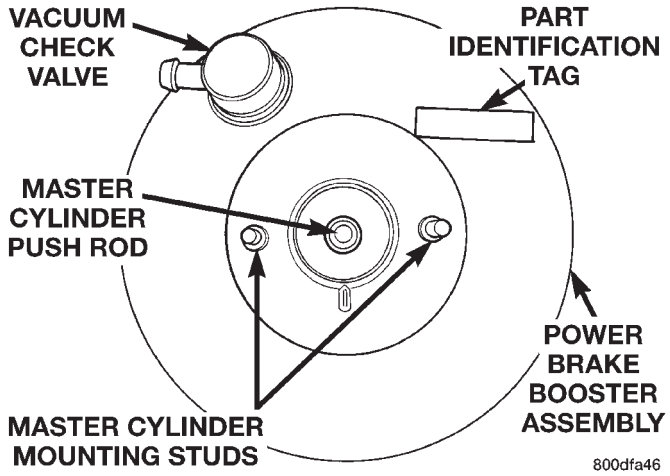


Fig. 10 Power Brake Booster Identification

The power brake booster reduces the amount of force required by the driver to obtain the necessary hydraulic pressure to stop vehicle.

The power brake booster is vacuum operated. The vacuum is supplied from the intake manifold on the engine through the power brake booster check valve (Fig. 10) and (Fig. 11).

As the brake pedal is depressed, the power brake boosters input rod moves forward (Fig. 11). This opens and closes valves in the power booster, allowing atmospheric pressure to enter on one side of a diaphragm. Engine vacuum is always present on the other side. This difference in pressure forces the output rod of the power booster (Fig. 11) out against the primary piston of the master cylinder. As the pistons in the master cylinder move forward this creates the hydraulic pressure in the brake system.

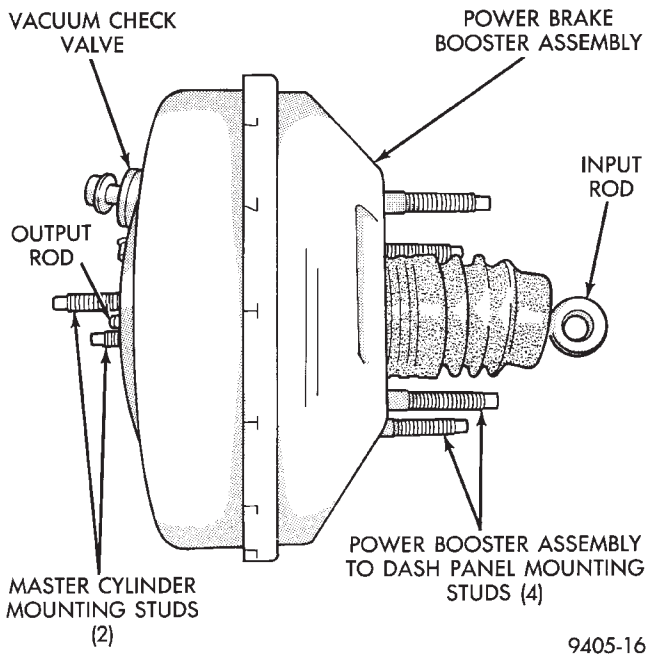


Fig. 11 Power Brake Booster Assembly

The different engine combinations used on this vehicle require that different vacuum hose routings to the power brake vacuum booster be used.

All vacuum hoses must be routed from the engine to the power brake vacuum booster without kinks, excessively tight bends or potential for damage to the vacuum hose.

The power brake vacuum booster assembly mounts on the engine side of the dash panel, and is connected to the brake pedal by the input push rod (Fig. 11). A vacuum line connects the power booster to the intake manifold. The master cylinder is bolted to the front of the power brake vacuum booster assembly.

RED BRAKE WARNING LAMP OPERATION

The red Brake warning lamp is located in the instrument panel cluster and is used to indicate a low brake fluid condition or that the parking brake is applied. In addition, the brake warning lamp is turned on as a bulb check by the ignition switch every time the ignition switch is turned to the crank position.

The warning lamp bulb is supplied a 12 volt ignition feed anytime the ignition switch is on. The bulb is then illuminated by completing the ground circuit either through the park brake switch, the fluid level sensor in the master cylinder reservoir, or the ignition switch when it is turned to the crank position.

The Brake Fluid Level sensor is located in the brake fluid reservoir of the master cylinder assembly. The purpose of the sensor is to provide the driver with an early warning that brake fluid level in the master cylinder fluid reservoir has dropped to below

DESCRIPTION AND OPERATION (Continued)

normal. This may indicate: **(1)** Abnormal loss of brake fluid in the master cylinder fluid reservoir resulting from a leak in the hydraulic system. **(2) Brake shoe linings which have worn to a point requiring replacement.**

As the brake fluid drops below the minimum level, the brake fluid level sensor closes to ground the brake warning light circuit. This will turn on the red brake warning light. At this time, master cylinder fluid reservoir should be checked and filled to the full mark with DOT 3 brake fluid. **If brake fluid level has dropped below the add line in the master cylinder fluid reservoir, the entire brake hydraulic system should be checked for evidence of a leak.**

STOP LAMP SWITCH

The stop lamp switch controls operation of the vehicles stop lamps. Also, if the vehicle is equipped with speed control, the stop lamp switch will deactivate speed control when the brake pedal is depressed.

The stop lamp switch controls operation of the right and left tail, stop and turn signal lamp and CHMSL lamp, by supplying battery current to these lamps.

The stop lamp switch controls the lamp operation by opening and closing the electrical circuit to the stop lamps.

HUB/BEARING REAR WHEEL

The rear hub and bearing assembly used on this vehicle is serviceable only as a complete assembly. No attempt should be made to disassemble a rear hub and bearing assembly in an effort to repair it.

The rear hub and bearing assembly is attached to the rear axle using 4 mounting bolts that are removable from the back of the rear hub/bearing.

DIAGNOSIS AND TESTING

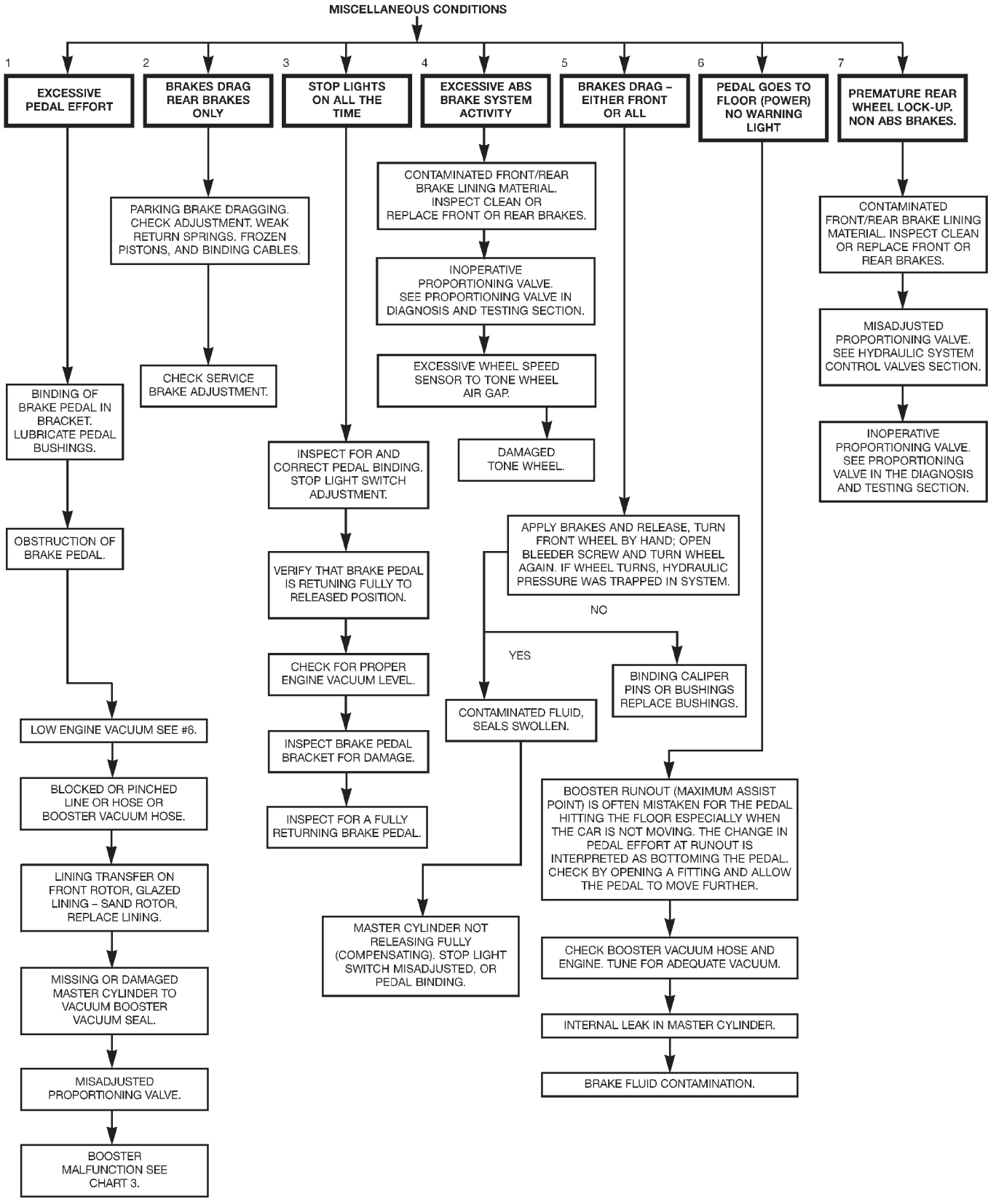
BRAKE SYSTEM BASIC DIAGNOSIS GUIDE

SYMPTOM	CHART 1 MISC. COND.	CHART 2 WARNING LIGHT	CHART 3 POWER BRAKES	CHART 4 BRAKE NOISE	CHART 5 WHEEL BRAKES
Brake Warning Light On		X	NO	NO	
Excessive Pedal Travel	6	X	NO		O
Pedal Goes To The Floor	6	X			
Stop Light On Without Brakes	3				
All Brakes Drag	5				
Rear Brakes Drag	2	NO	NO		
Grabby Brakes			O		X
Spongy Brake Pedal		X	NO		
Premature Rear Brake Lockup	4	NO	NO		O
Excessive Pedal Effort	1		O		
Rough Engine Idle		NO	O		
Brake Chatter (Rough)		NO	NO		X
Surge During Braking		NO	NO		X
Noise During Braking		NO	NO	X	
Rattle Or Clunking Noise		NO	NO	X	
Pedal Pulsates During Braking		NO	NO		X
Pull To Right Or Left		NO	NO		X
No: Not A Possible Cause		X: Most Likely Cause		O: Possible Cause	

DIAGNOSIS AND TESTING (Continued)

BRAKE SYSTEM DIAGNOSIS CHARTS

MISCELLANEOUS BRAKE SYSTEM CONDITIONS



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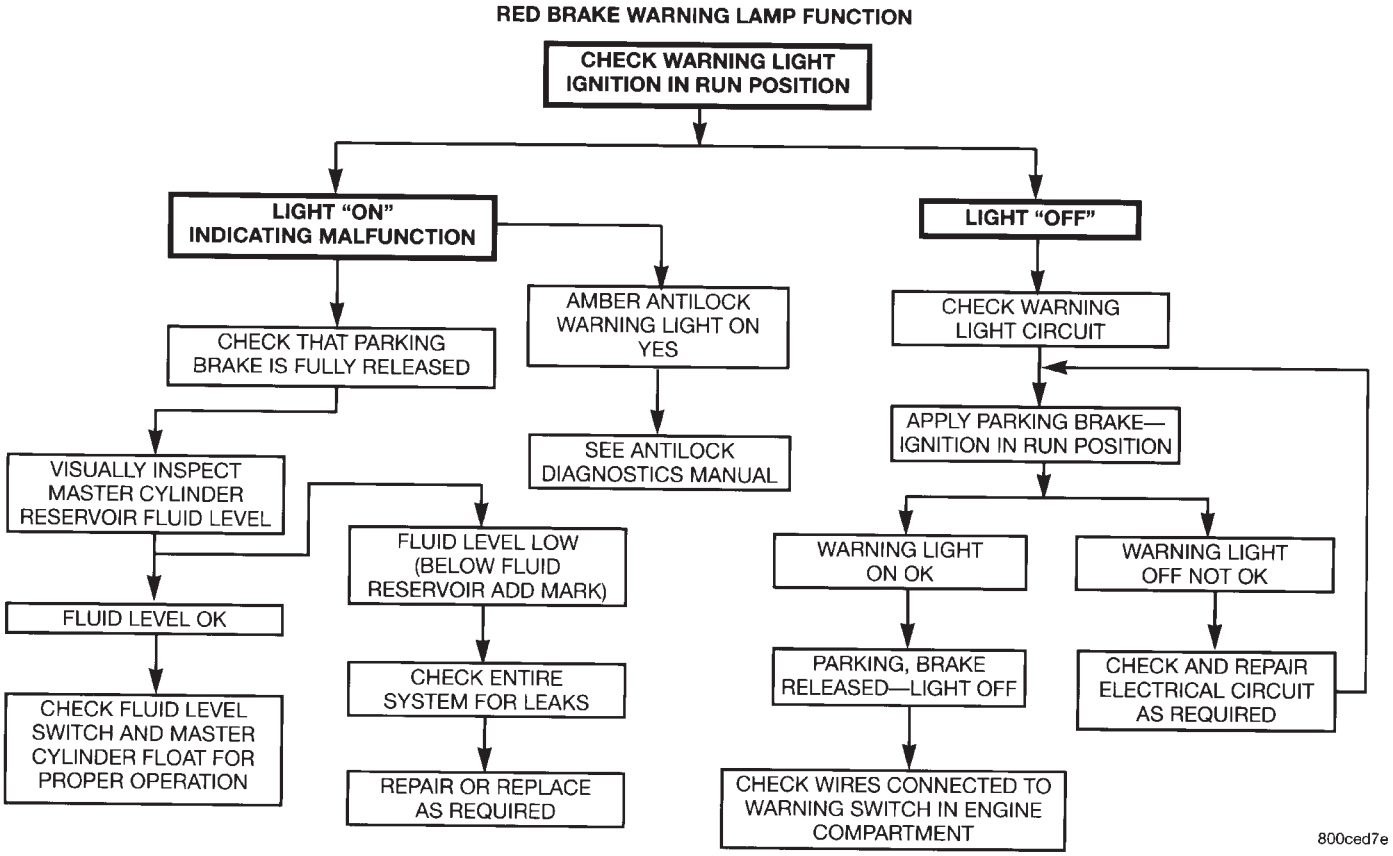
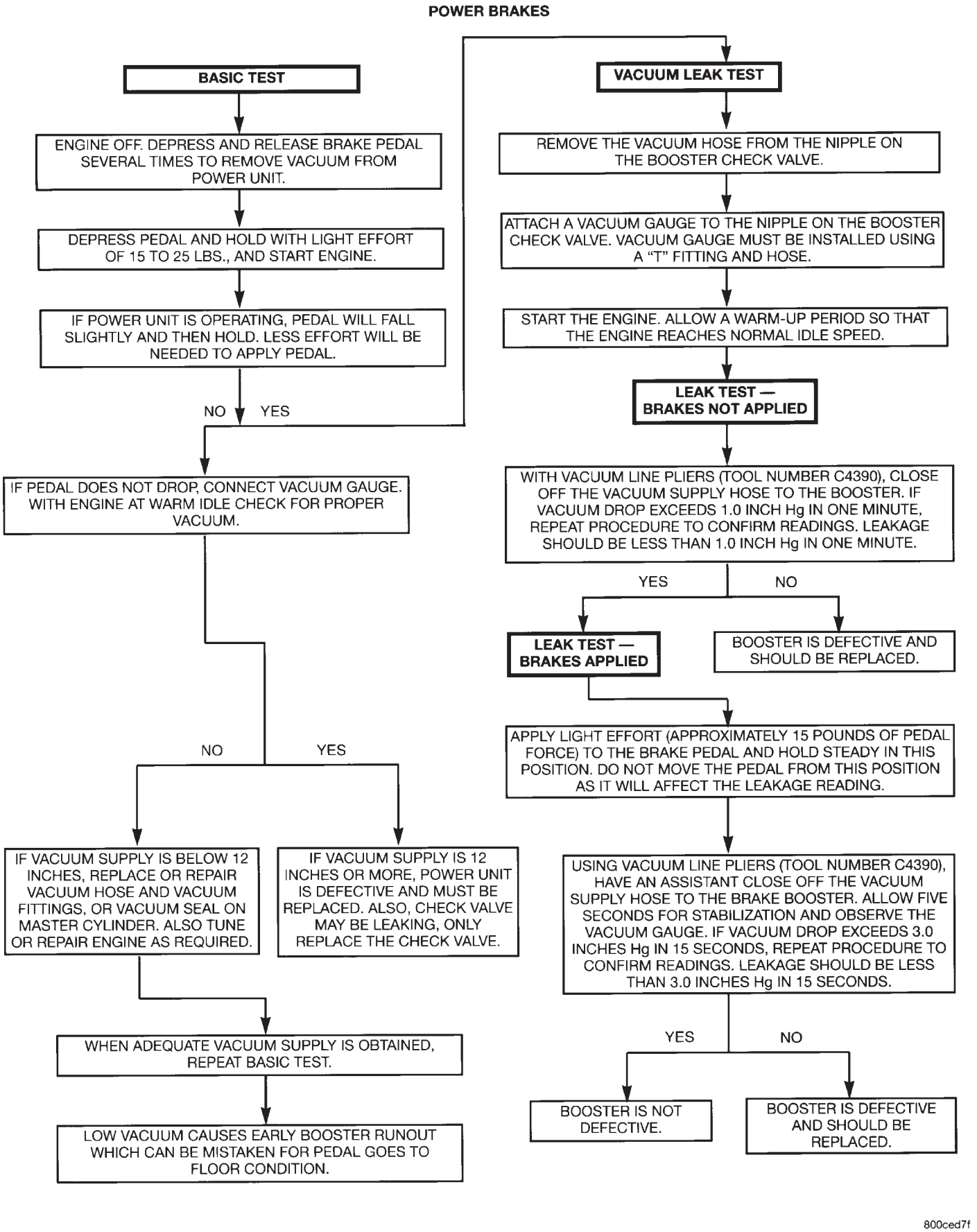
DIAGNOSIS AND TESTING (Continued)

RED BRAKE WARNING LAMP FUNCTION



DIAGNOSIS AND TESTING (Continued)

POWER BRAKE SYSTEM DIAGNOSTICS



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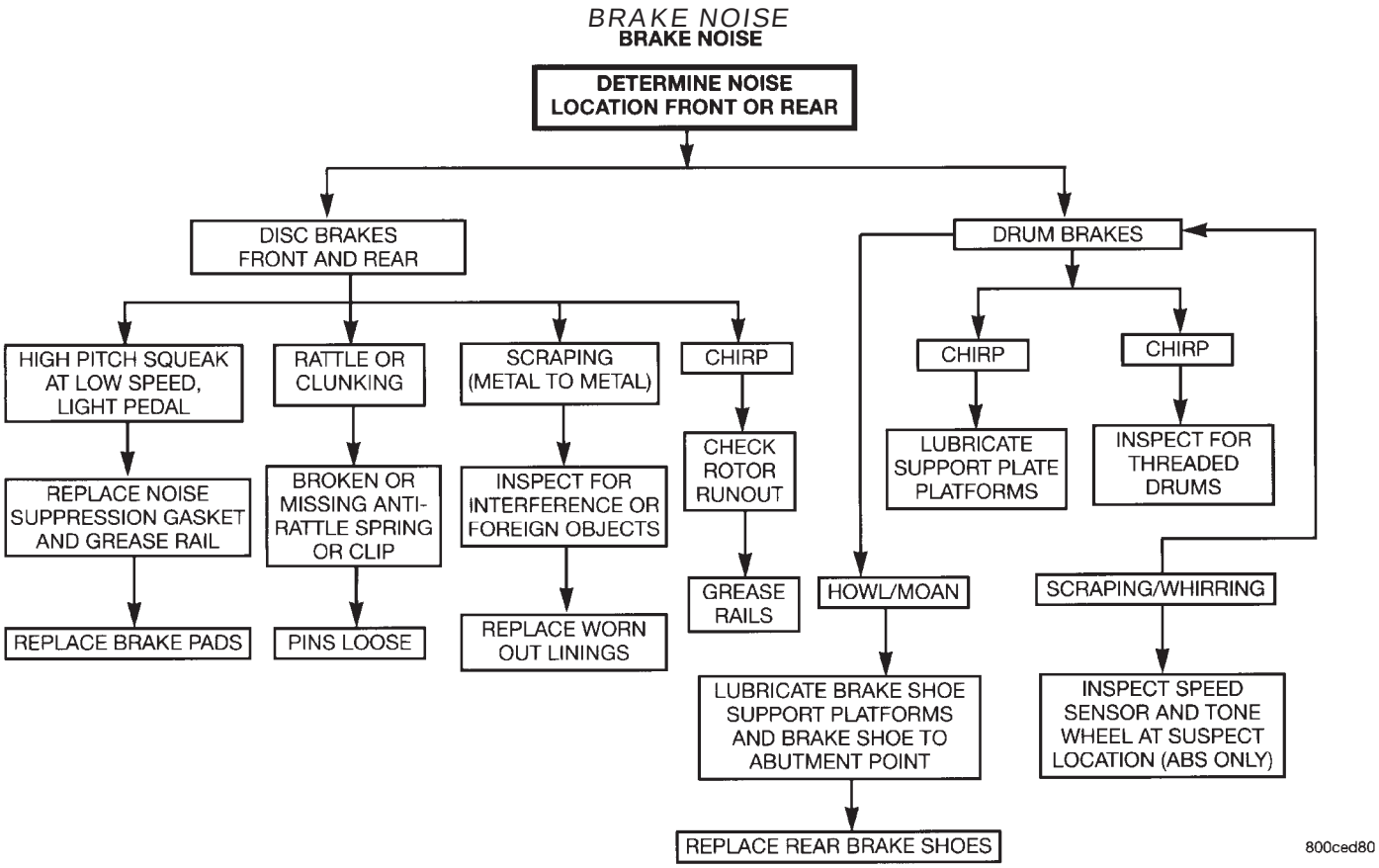
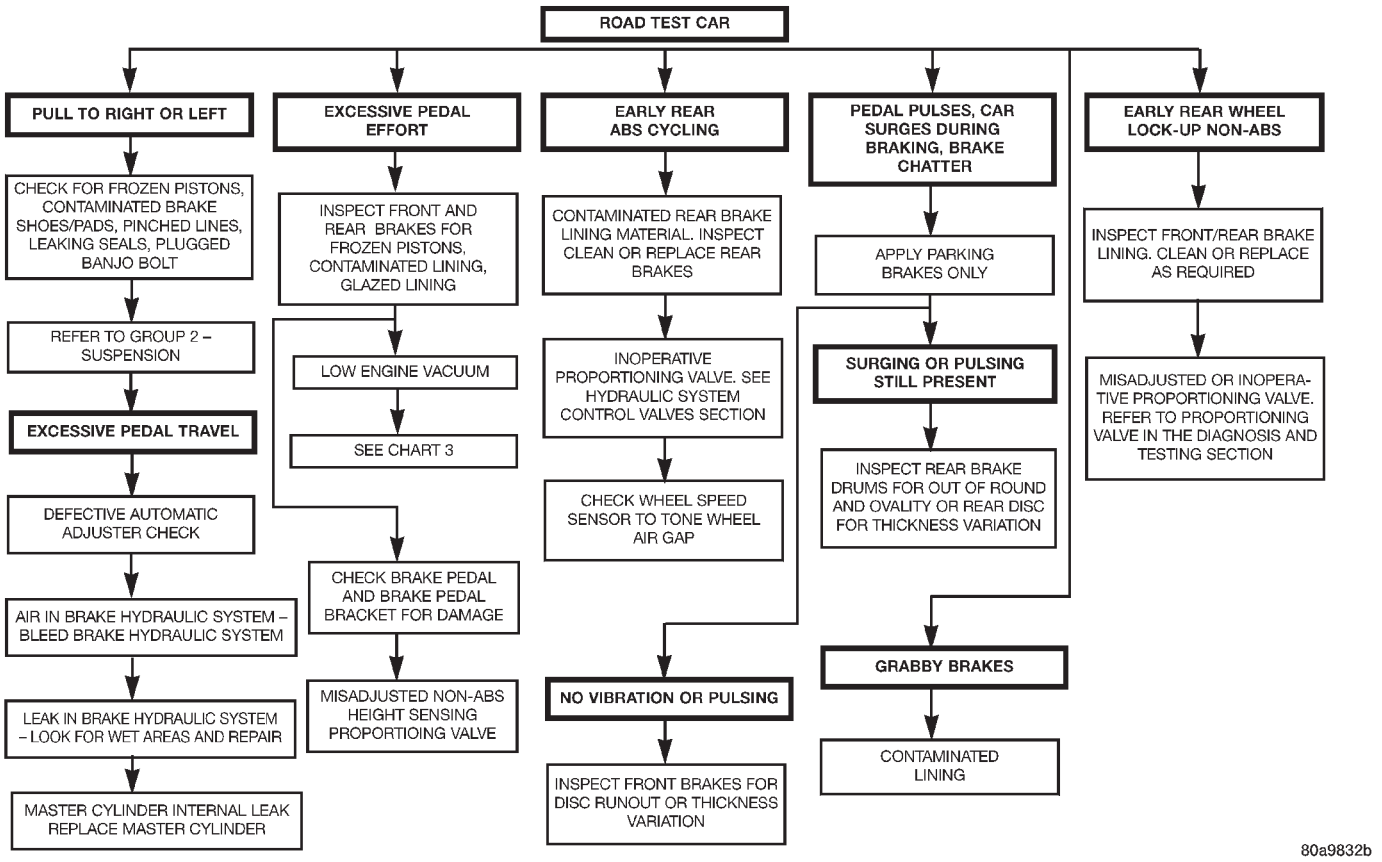
DIAGNOSIS AND TESTING (Continued)

BRAKE NOISE



VEHICLE ROAD TEST



DIAGNOSIS AND TESTING (Continued)

ADJUSTER REAR DRUM BRAKE (AUTOMATIC)

The rear drum brakes on this vehicle automatically adjust, when required, during the normal operation of the vehicle every time the brakes are applied. Use the following procedure to test the operation of the automatic adjuster.

Place the vehicle on a hoist with a helper in the driver's seat to apply the brakes. Remove the access plug from the adjustment hole in each brake support plate to provide visual access of the brake adjuster star wheel.

Remove the park brake cable, for the wheel of the vehicle that is being worked on, from the park brake cable equalizer (Fig. 12). This is required to gain access to the star wheel. If the cable is not removed from the equalizer, the cable and spring inside of the brake drum is in the way of the star wheel.

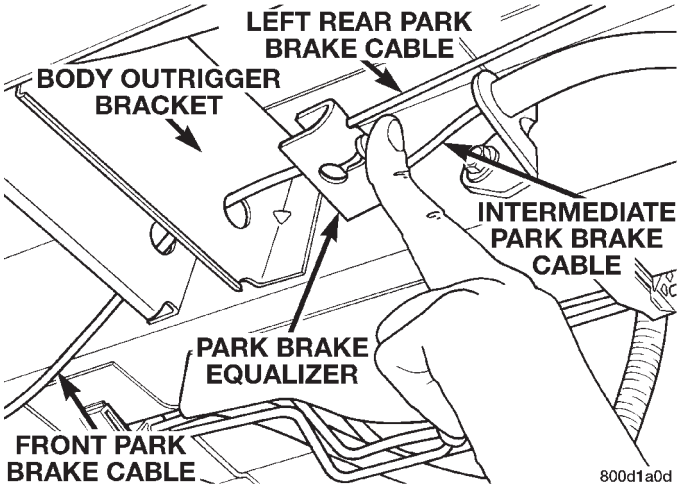


Fig. 12 Park Brake Cable Equlizer

To eliminate the condition where maximum adjustment of the rear brake shoes, does not allow the automatic adjuster to operate when tested, back the star wheel off approximately 30 notches. It will be necessary to hold the adjuster lever away from the star wheel to permit this adjustment.

Have the helper apply the brakes. Upon application of the brake pedal, the adjuster lever lever should move down, turning the adjuster star wheel. Thus, a definite rotation of the adjuster star wheel can be observed if the automatic adjuster is working properly. If one or more adjusters do not function properly, the respective drum must be removed for adjuster servicing.

BRAKE ROTOR

Any servicing of the rotor requires extreme care to maintain the rotor to within service tolerances to ensure proper brake action.

Before refinishing or refacing a rotor, the rotor should be checked and inspected for the following conditions:

Braking surface scoring, rust, impregnation of lining material and worn ridges.

Excessive rotor lateral runout or wobble.

Thickness variation in braking surface of the rotor (Parallelism).

Dishing or distortion in braking surface of the rotor (Flatness).

If a vehicle has not been driven for a period of time, the rotors will rust in the area not covered by the brake lining and cause noise and chatter when the brakes are applied.

Excessive wear and scoring of the rotor can cause temporary improper lining contact if ridges are not removed from braking surface of rotor before installation of new brake shoe assemblies.

Some discoloration and/or wear of the rotor surface is normal and does not require resurfacing when linings are replaced.

Excessive runout or wobble in a rotor can increase pedal travel due to piston knock-back. This will also increase guide pin bushing wear due to the tendency of the caliper to follow rotor wobble.

Thickness variation in a rotor can also result in pedal pulsation, chatter and surge due to variation in brake output. This can also be caused by excessive runout in the rotor and/or the hub.

Dishing or distortion can be caused by extreme heat and abuse of the brakes.

CHECKING ROTOR FOR RUNOUT AND THICKNESS

NOTE: The procedure for checking rotor runout and thickness is the same for the front and rear rotor. If there is a specification difference between the front and rear rotor it will be designated as such in the specifications of the following procedure.

On-vehicle rotor runout is the combination of the individual runout of the hub face and the runout of the rotor. (The hub and rotor runouts are separable). To measure runout on the vehicle, remove the wheel and reinstall the lug nuts tightening the rotor to the hub. Mount Dial Indicator, Special Tool C-3339 with Mounting Adaptor, Special Tool SP- 1910 on steering arm. Dial indicator plunger should contact braking surface of rotor approximately 10 mm (0.393 in.) from outer edge of rotor (Fig. 13). Check lateral runout on both sides of rotor. Lateral runout of the rotor should not exceed 0.13 mm (0.005 inch).

If lateral runout is in excess of the specification, check the lateral runout of the hub face. Before removing rotor from hub, make a chalk mark across

DIAGNOSIS AND TESTING (Continued)

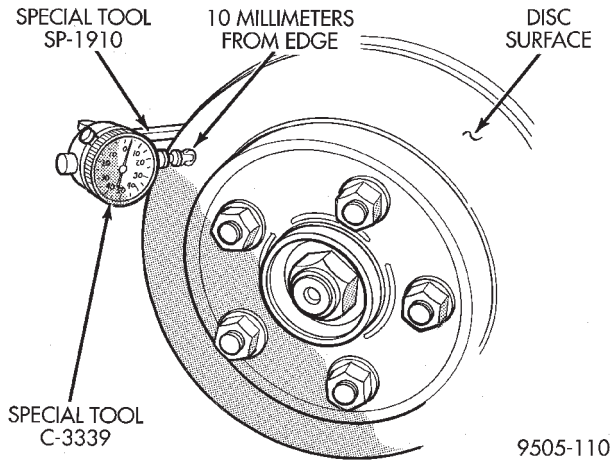


Fig. 13 Checking Brake Rotor For Runout

both the rotor and one wheel stud on the high side of the runout. This will ensure that the original location of the rotor in relation to the hub can be retained (Fig. 14). Remove rotor from hub.

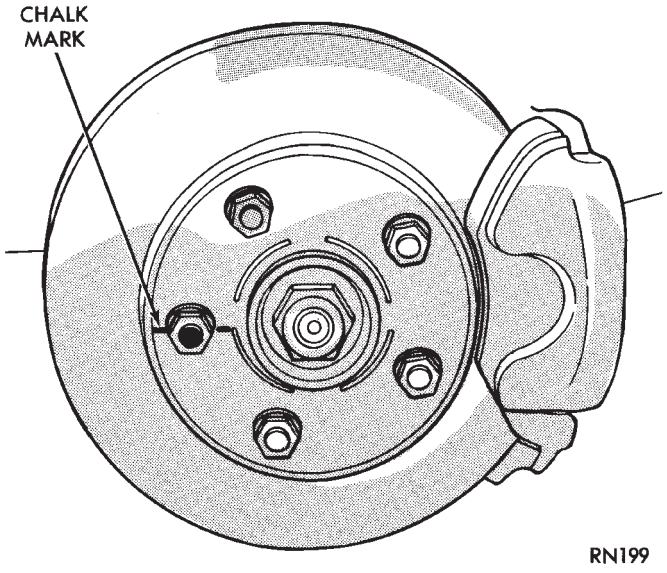


Fig. 14 Marking Rotor And Wheel Stud

Thoroughly clean the front surface of the front hub. Then install Dial Indicator, Special Tool C-3339 and Mounting Adaptor, Special Tool SP-1910 on steering knuckle. Position stem so it contacts hub face near outer diameter. Care must be taken to position stem outside the stud circle but inside the chamfer on the hub face (Fig. 15). **Clean hub surface before checking.**

Lateral runout should not exceed 0.08 mm (0.003 inch). If runout exceeds this specification, the hub must be replaced. See Suspension Group 2. If lateral runout of the hub does not exceed this specification, install rotor on hub with chalk marks two wheel studs apart (Fig. 16). Tighten nuts in the propersequence and torque to specification. Finally, check lateral runout of rotor to see if lateral runout is now within specification.

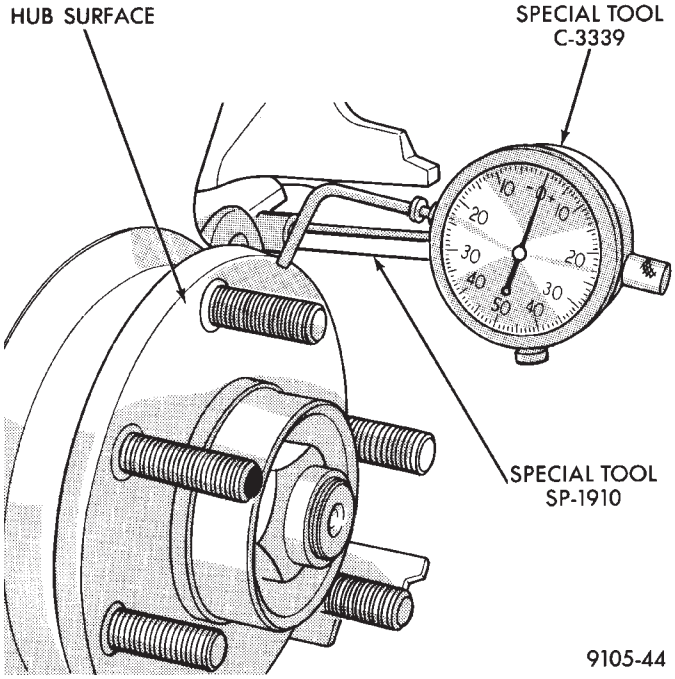


Fig. 15 Checking Disc Brake Rotor For Runout

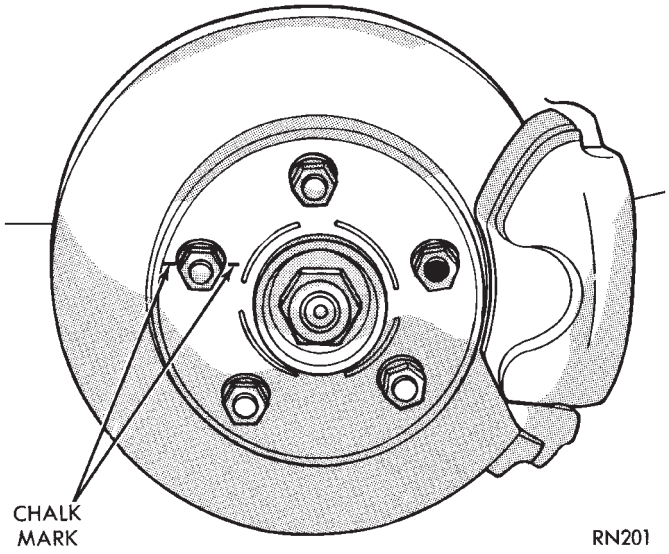


Fig. 16 Indexing Rotor And Wheel Stud

If lateral runout is not within specification, install a new rotor or reface rotor, being careful to remove as little rotor material as possible from each side of rotor. Remove equal amounts from each side of rotor. Do not reduce thickness below minimum thickness marking cast into the un-machined surface (Fig. 17) of the rotor .

Thickness variation measurements of the rotor should be made in conjunction with the lateral runout measurements. Measure the thickness of the rotor at 12 circumferentially equal points with a

DIAGNOSIS AND TESTING (Continued)

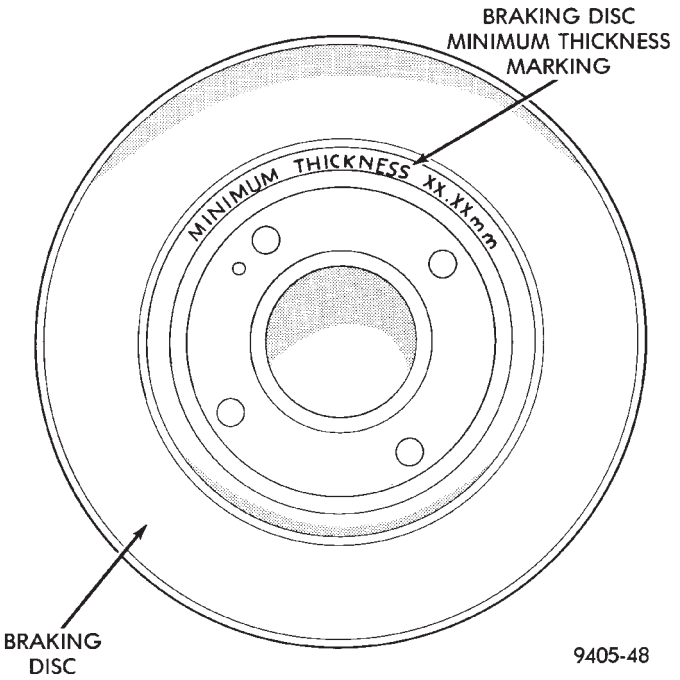


Fig. 17 Minimum Rotor Thickness Markings

micrometer at a radius approximately 25.4 mm (1 inch) from outer edge of rotor (Fig. 18). If thickness measurements vary by more than 0.013 mm (0.0005 inch), rotor should be removed and resurfaced, or a new rotor installed. If cracks or burned spots are evident, rotor must be replaced.

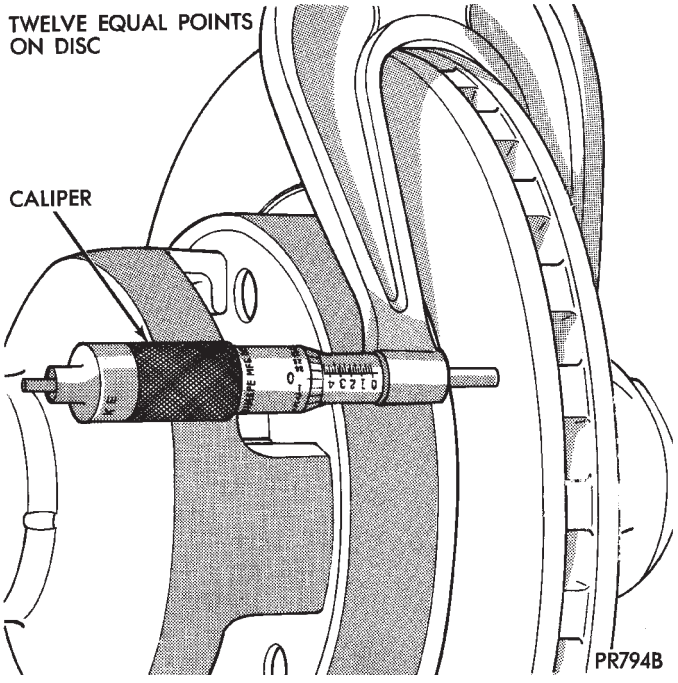


Fig. 18 Checking Rotor For Thickness Variation

Light scoring and/or wear is acceptable. If heavy scoring or warping is evident, the rotor must be refinished or replaced (See Refinishing/Refacing Rotor). If cracks are evident in the rotor, replace the rotor.

PROPORTIONING VALVES

FIXED PROPORTIONING VALVE TEST PROCEDURE

On a vehicle equipped with ABS, premature or excessive rear wheel ABS cycling may be an indication that the brake fluid pressure to the rear brakes is above the desired output.

Prior to testing a proportioning valve for function, check that all tire pressures are correct. Also, ensure the front and rear brake linings are in satisfactory condition. **It is also necessary to verify that the brakes shoe assemblies on a vehicle being tested, are either original equipment manufacturers (OEM), or original replacement brake shoe assemblies meeting the OEM lining material specification. The vehicles brake system is not balanced for after market brake shoe assembly lining material.**

If brake shoe assembly lining material is of satisfactory condition, and of the correct material specification, check for proper proportioning valve function using the following procedure.

(1) Road test vehicle to be sure the vehicle is truly exhibiting a condition of excessive rear wheel ABS cycling. Since ABS cycles both rear brakes together **both proportioning valves of the assembly** (Fig. 19) must be tested. Use the following procedure to test the proportioning valve.

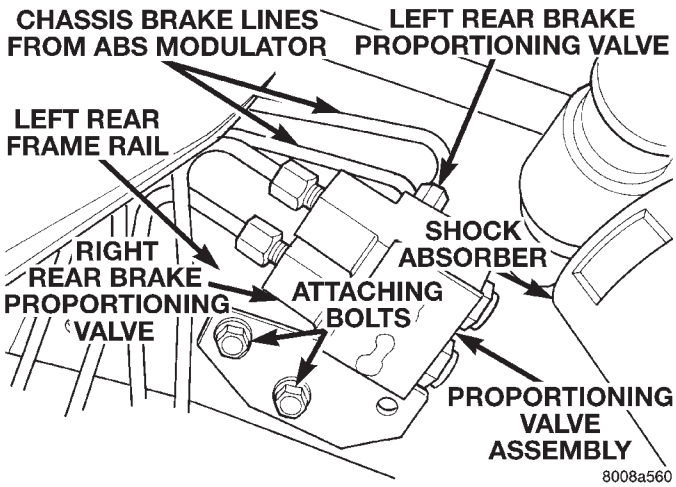


Fig. 19 Rear Brake Proportioning Valve And Brake Tube Locations

(2) Remove one of the chassis brake lines (Fig. 19) coming from the ABS modulator, at

(3) the proportioning valve assembly. Remove the hydraulic brake line going to one of the rear wheels of the vehicle from the proportioning valve (Fig. 19)

DIAGNOSIS AND TESTING (Continued)

(4) Remove the 2 bolts (Fig. 19) attaching the proportioning valve to the frame rail.

CAUTION: When lowering the proportioning valve, care must be taken not to kink any of the chassis brake lines.

(5) Carefully lower the proportioning valve for clearance to install the proportioning valve test fittings.

(6) Install the required fitting from Pressure Test Fittings, Special Tool 6833 (Fig. 20) into the inlet port of the proportioning valve assembly, from which the chassis brake line was removed. Install the removed chassis brake line into the Pressure Test Fitting (Fig. 20). Install the required fitting from Pressure Test Fittings, Special Tool 6833 into the required outlet port of the proportioning valve. Install the required fitting from Pressure Test Fittings, Special Tool 6833 into the required outlet port of the proportioning valve (Fig. 20). Then install the removed chassis brake line into the Pressure Test Fitting (Fig. 20).

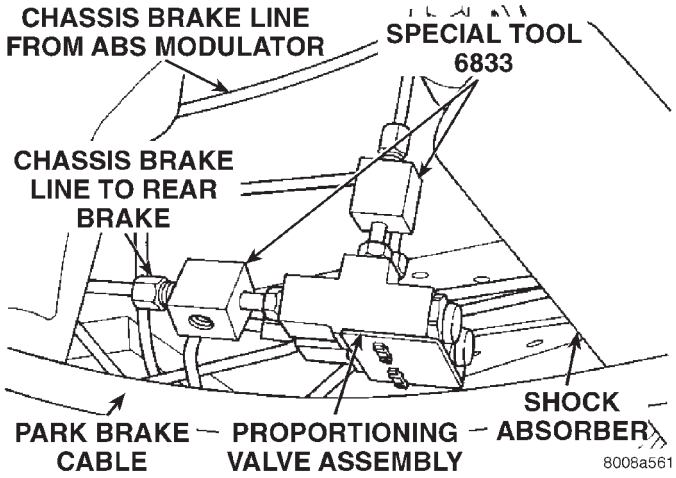


Fig. 20 Proportioning Valve Test Fitting Installation

(7) Install a pressure gauge from Gauge Set, Special Tool C-4007-A into each pressure test fitting (Fig. 21). Bleed air out of hose from pressure test fittings to pressure gauges, at the pressure gauges (Fig. 21). Then bleed air out of the brake line being tested, at that rear wheel cylinder.

(8) With the aid of a helper, apply pressure to the brake pedal until a pressure of 6895 kPa (1000 psi) is obtained on the proportioning valve inlet gauge. Then based on the type of brake system the vehicle is equipped with and the pressure specification shown on the following table, compare the pressure reading on the outlet gauge to the specification. If outlet pressure at the proportioning valve is not within specification when required inlet pressure is obtained, replace the proportioning valve.

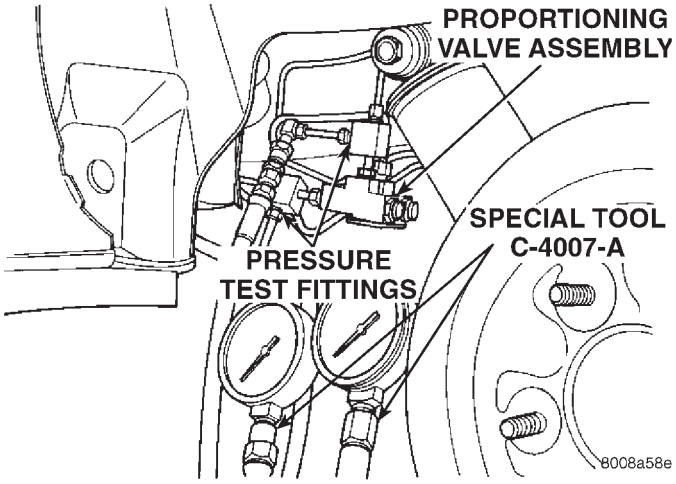


Fig. 21 Pressure Gauges Installed On Pressure Test Fittings

(9) Repeat steps 2 through 7 for the other proportioning valve of the assembly.

CAUTION: When mounting the original or a replacement proportion valve on the frame rail of the vehicle install the mounting bolts in only the two forward holes of the mounting bracket (Fig. 19).

HEIGHT SENSING PROPORTIONING VALVE

CAUTION: The use of after-market load leveling or load capacity increasing devices on this vehicle are prohibited. Using air shock absorbers or helper springs on this vehicle will cause the height sensing proportioning valve to inappropriately reduce the hydraulic pressure to the rear brakes. This inappropriate reduction in hydraulic pressure potentially could result in increased stopping distance of the vehicle.

When a premature rear wheel skid is obtained on a brake application, it may be an indication that the hydraulic pressure to the rear brakes is above the specified output from the proportioning valve. This condition indicates a possible malfunction of the height sensing proportioning valve, which will require testing to verify that it is properly controlling the hydraulic pressure allowed to the rear brakes. Premature rear wheel skid may also be caused by an incorrectly adjusted proportioning valve actuator assembly, or contaminated front or rear brake linings.

Prior to testing a proportioning valve for function, check that all tire pressures are correct. Also, ensure the front and rear brake linings are in satisfactory condition. **It is also necessary to verify that the brakes shoe assemblies on a vehicle being tested, are either original equipment manufacturers (OEM), or original replacement brake**

DIAGNOSIS AND TESTING (Continued)

shoe assemblies meeting the OEM lining material specification. The vehicles brake system is not balanced for after market brake shoe assembly lining material.

If both front and rear brakes check OK, proceed to verify that the actuator assembly for the height sensing proportioning valve is adjusted correctly. See Height Sensing Proportioning Valve in the Adjustment Section in this group of the service manual for the adjustment procedure. If the proportioning valve is adjusted correctly, proceed with the test procedure for the height sensing proportioning valve as follows:

(1) Remove the actuator assembly adjustment nut (Fig. 22). Remove the actuator assembly from the lever on the height sensing proportioning valve.

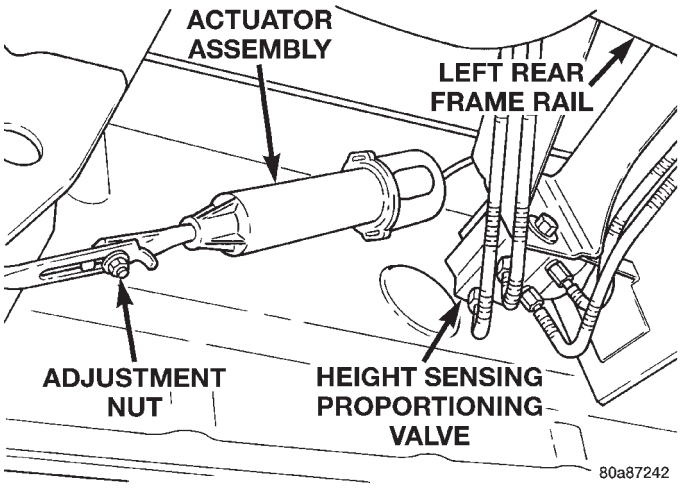


Fig. 22 Actuator Assembly Adjustment Nut

(2) Remove the chassis brake tube coming from the junction block from the front of the height sensing proportioning valve (Fig. 23). Remove the chassis brake tube going to the rear brakes from the back of the height sensing proportioning valve (Fig. 23).

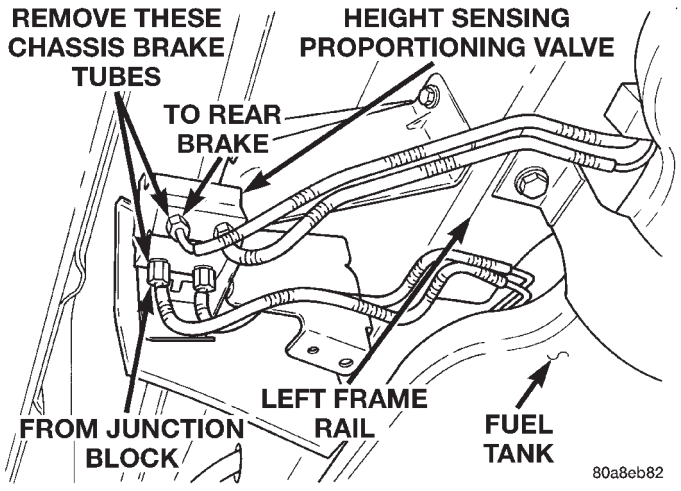


Fig. 23 Brake Tube Connections To Proportioning Valve

(3) Install the required fittings from Pressure Test Fittings, Special Tool 6833 (Fig. 24) into the inlet port of the proportioning valve assembly, from which the chassis brake line was removed. Install the removed chassis brake line into the Pressure Test Fitting (Fig. 24). Install the required fitting from Pressure Test Fittings, Special Tool 6833 into the required outlet port of the proportioning valve. Install the required fitting from Pressure Test Fittings, Special Tool 6833 into the required outlet port of the proportioning valve (Fig. 24). Then install the removed chassis brake line into the Pressure Test Fitting (Fig. 20).

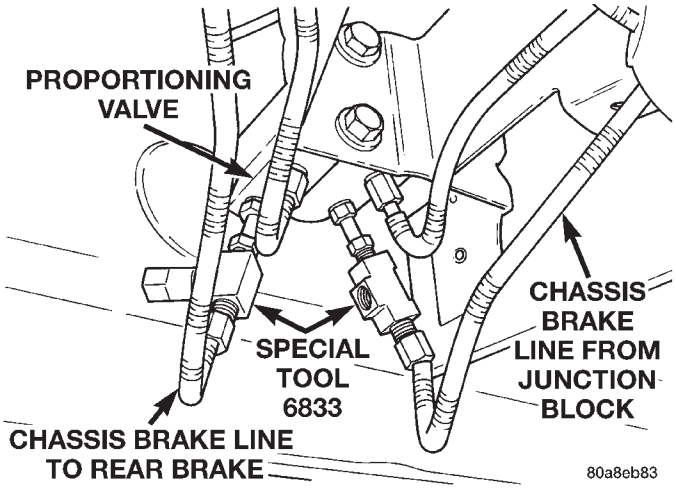


Fig. 24 Proportioning Valve Test Fitting Installation

(4) Install a pressure gauge from Gauge Set, Special Tool C-4007-A into each pressure test fitting (Fig. 25). Bleed air out of hose from pressure test fittings to pressure gauges, at the pressure gauges (Fig. 25). Then bleed air out of the brake line being tested, at that rear wheel cylinder.

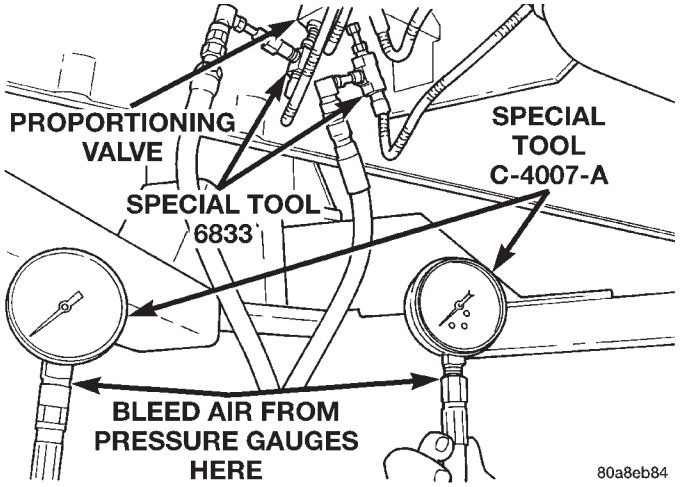


Fig. 25 Pressure Gauges Installed On Pressure Test Fittings

DIAGNOSIS AND TESTING (Continued)

(5) With the aid of a helper, apply pressure to the brake pedal until a pressure of 6895 kPa (1000 psi) is obtained on the proportioning valve inlet gauge. Then based on the type of brake system the vehicle is equipped with and the pressure specification shown on the following table, compare the pressure reading on the outlet gauge to the specification. If outlet pressure at the proportioning valve is not within specification when required inlet pressure is obtained, replace the proportioning valve.

(6) Remove the pressure test fittings and pressure gauges from the proportioning valve.

(7) Install the chassis brake lines in the correct ports of the proportioning valve.

(8) Install the pressure test fittings and pressure gauges in the opposite inlet and outlet port of the height sensing proportioning valve. Repeat steps 4 and 5 for the other proportioning valve.

(9) Remove the pressure test fittings and pressure gauges from the proportioning valve.

(10) Install the chassis brake lines in the correct ports of the proportioning valve.

(11) Install the actuator (Fig. 22) on the height sensing proportioning valve. Adjust the proportioning valve actuator. See Height Sensing Proportioning Valve in the Adjustment Section in this group of the service manual for the adjustment procedure.

(12) Bleed both rear hydraulic circuits at the rear brakes.

(13) Road test vehicle.

BRAKE FLUID CONTAMINATION

Indications of fluid contamination are swollen or deteriorated rubber parts.

Swollen rubber parts indicate the presence of petroleum in the brake fluid.

To test for contamination, put a small amount of drained brake fluid in clear glass jar. If fluid separates into layers, there is mineral oil or other fluid contamination of the brake fluid.

If brake fluid is contaminated, drain and thoroughly flush system. Replace master cylinder, proportioning valve, caliper seals, wheel cylinder seals, Antilock Brakes hydraulic unit and all hydraulic fluid hoses.

RED BRAKE WARNING LAMP TEST

For diagnosis of specific problems with the red brake warning lamp system, refer to Brake System Diagnostics Chart 2, located in the Diagnosis And Testing section in this group of the service manual.

TRACTION CONTROL LAMP TEST

The traction control light is tested by cycling the traction control switch on and off. The traction control switch used on this vehicle is a momentary contact type switch. The test procedure for the traction control light is performed as follows: Press the traction control switch once and the “Trac Off” lamp will illuminate. With the “Trac Off” lamp illuminated, press the traction control switch again and the “Trac Off” lamp will turn off.

If the traction control lamp does not function as described in the test above, diagnosis of the traction control switch, lamp, wiring and other related components of the traction control system is required.

STOP LAMP SWITCH TEST PROCEDURE

The required procedure for testing the stop lamp switch is covered in Group 8H, Vehicle Speed Control System in this service manual. The electrical circuit tests for stop lamps is covered in Group 8W Rear-Lighting in this service manual.

WHEEL BASE	DRIVE TRAIN	SALES CODE	BRAKE SYSTEM	SPLIT POINT	SLOPE	INLET PRESSURE PSI	OUTLET PRESSURE PSI
SWB	FWD	BRA+BGF	14″ DISC/DRUM W/O ANTILOCK	VAR.	.30	1000 PSI	250-350 PSI
SWB	FWD	BRA+BGF BRB+BGF BRV+BGF	14″,15″,15″HD DISC/DRUM WITH ANTILOCK	25 BAR	.59	1000 PSI	660-780 PSI
LWB	FWD	BRA+BGF	14″ DISC/DRUM W/O ANTILOCK	VAR.	.30	1000 PSI	250-350 PSI
LWB	FWD	BRA+BGF BRB+BGF BRV+BGF	14″,15″,15″HD DISC/DRUM WITH ANTILOCK	25 BAR	.59	1000 PSI	660-780 PSI
SWB	AWD	BRE+BGF	15″ DISC/DISC WITH ANTILOCK	25 BAR	.36	1000 PSI	525-640 PSI
LWB	AWD	BRE+BGF	15″ DISC/DISC WITH ANTILOCK	41 BAR	.36	1000 PSI	690-800 PSI

SERVICE PROCEDURES

MASTER CYLINDER FLUID LEVEL CHECK

Check master cylinder reservoir fluid level a minimum of twice annually.

Master cylinder reservoirs are marked with the words FULL and ADD to indicate proper brake fluid fill level of the master cylinder (Fig. 26).

If necessary, add brake fluid to bring the level to the bottom of the FULL mark on the side of the master cylinder fluid reservoir. **When filling master cylinder fluid reservoir do not fill the filler neck of the fluid reservoir (Fig. 26) with brake fluid.**

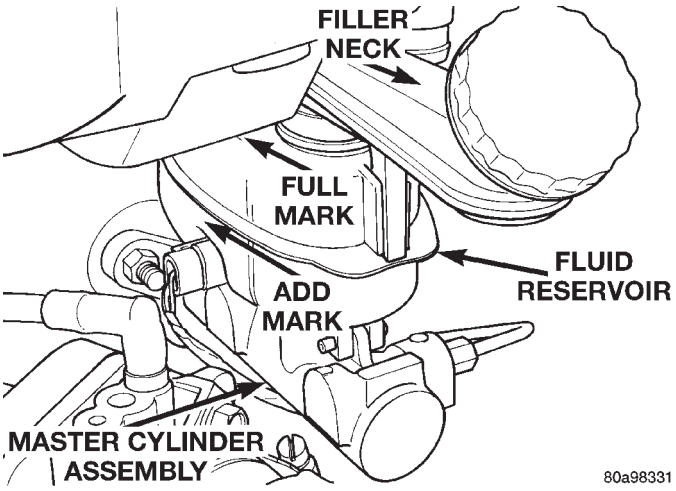


Fig. 26 Master Cylinder Fluid Level Marks

Use only Mopar® brake fluid or an equivalent from a sealed container. Brake fluid must conform to DOT 3, specifications.

DO NOT use brake fluid with a lower boiling point, as brake failure could result during prolonged hard braking.

Use only brake fluid that was stored in a tightly-sealed container.

DO NOT use petroleum-based fluid because seal damage will result. Petroleum based fluids would be items such as engine oil, transmission fluid, power steering fluid ect.

BLEEDING BASE BRAKE HYDRAULIC SYSTEM

NOTE: This bleeding procedure is only for the vehicle's base brakes hydraulic system. For bleeding the antilock brakes hydraulic system, refer to the ITT Teves Mark 20 Antilock Brake System bleeding procedure in the antilock brakes section of this service manual.

PRESSURE BLEEDING PROCEDURE

CAUTION: Before removing the master cylinder cover, throughly clean the cover and master cylinder fluid reservoir to prevent dirt and other foreign matter from dropping into the master cylinder fluid reservoir.

CAUTION: Use bleeder tank Special Tool C-3496-B with adapter Special Tool 6921 to pressurize the hydraulic system for bleeding.

CAUTION: When pressure bleeding the brakes hydraulic system the fluid reservoir filler neck must be removed from the master cylinder fluid reservoir. Failure to remove the filler neck from the fluid reservoir, may result in the filler neck separating from the fluid reservoir when the hydraulic system is pressurized.

Follow pressure bleeder manufacturer's instructions, for use of pressure bleeding equipment.

When bleeding the brake system, some air may be trapped in the brake lines or valves far upstream, as much as ten feet from the bleeder screw (Fig. 27). Therefore, it is essential to have a fast flow of a large volume of brake fluid when bleeding the brakes to ensure all the air gets out.

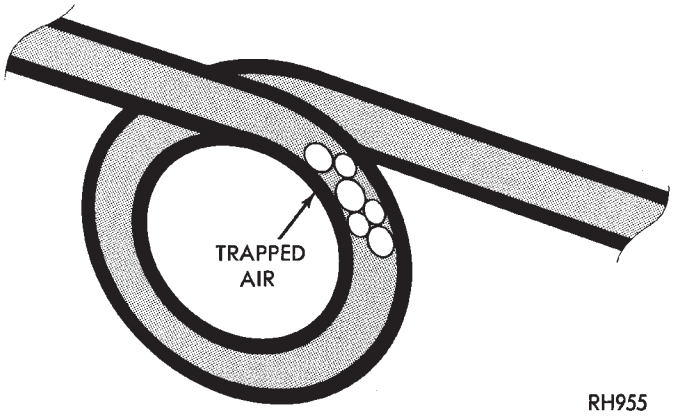


Fig. 27 Trapped Air In Brake Fluid Line

(1) Remove the filler neck from the master cylinder fluid reservoir.

(2) Install the Adapter Master Cylinder Pressure Bleed Cap, Special Tool 6921 on the fluid reservoir of the master cylinder (Fig. 28). Attach the fluid hose from the pressure bleeder to the fitting on Special Tool 6921.

(3) Attach a clear plastic hose to the bleeder screw at one wheel and feed the hose into a clear jar containing fresh brake fluid.

SERVICE PROCEDURES (Continued)

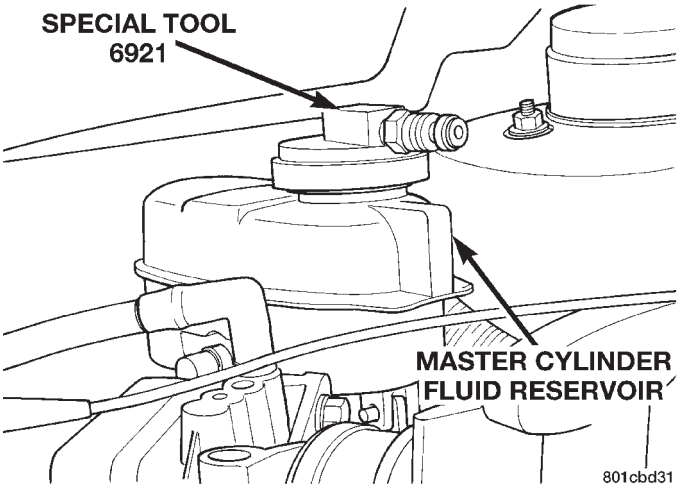


Fig. 28 Pressure Bleeding Cap Installed On Master Cylinder

NOTE: The following wheel sequence should be used when bleeding the brake hydraulic system. The use of this wheel sequence will ensure adequate removal of all trapped air from the brake hydraulic system.

- Left Rear Wheel
- Right Front Wheel
- Right Rear Wheel
- Left Front Wheel

(4) Open the left rear wheel bleeder screw at least **one full turn** or more to obtain an adequate flow of brake fluid (Fig. 29).

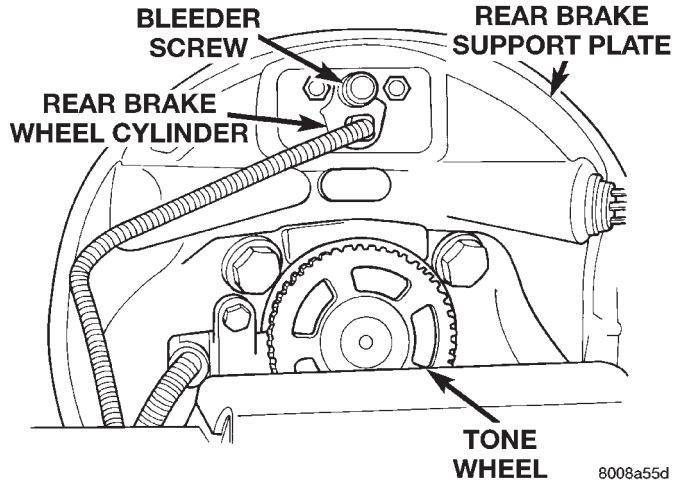


Fig. 29 Rear Wheel Cylinder Bleeder Screw

CAUTION: Just cracking the bleeder screw often restricts fluid flow, and a slow, weak fluid discharge will NOT get all the air out.

(5) After 4 to 8 ounces of brake fluid has been bled through the hydraulic system, and an air-free flow is maintained in the hose and jar, this will indicate a good bleed of the hydraulic system has been obtained.

(6) Repeat the procedure at all the other remaining bleeder screws. Then check the pedal for travel. If pedal travel is excessive or has not been improved, enough fluid has not passed through the system to expel all the trapped air. Be sure to monitor the fluid level in the pressure bleeder, so it stays at a proper level so air will not enter the brake system through the master cylinder.

(7) Perform a final adjustment of the rear brake shoes and then test drive vehicle to be sure brakes are operating correctly and that pedal is solid.

BLEEDING WITHOUT A PRESSURE BLEEDER

NOTE: Correct manual bleeding of the brakes hydraulic system will require the aid of a helper.

NOTE: To adequately bleed the brakes using the manual bleeding procedure the rear brakes must be correctly adjusted. Prior to the manual bleeding of the brake hydraulic system, correctly adjust the rear brakes.

NOTE: The following wheel sequence should be used when bleeding the brake hydraulic system. The use of this wheel sequence will ensure adequate removal of all trapped air from the brake hydraulic system.

- Left Rear Wheel
- Right Front Wheel
- Right Rear Wheel
- Left Front Wheel

(1) Pump the brake pedal three or four times and hold it down before the bleeder screw is opened.

(2) Push the brake pedal toward the floor and hold it down. Then open the left rear bleeder screw at least 1 full turn. When the bleeder screw opens the brake pedal will drop all the way to the floor.

(3) Release the brake pedal only **after** the bleeder screw is closed.

(4) Repeat steps 1 through 3, four or five times, at each bleeder screw in the required sequence. This should pass a sufficient amount of fluid to expel all the trapped air from the brake system. Be sure to monitor the fluid level in the master cylinder, so it stays at a proper level so air will not enter the brake system through the master cylinder.

(5) Perform a final adjustment of the rear brake shoes and then test drive vehicle to be sure brakes are operating correctly and that pedal is solid.

SERVICE PROCEDURES (Continued)

MASTER CYLINDER BLEEDING PROCEDURE

CAUTION: When clamping master cylinder in vise, only clamp master cylinder by its mounting flange, do not clamp on primary piston, seal\boot or body of master cylinder.

(1) Clamp the master cylinder in a vise using only the mounting flange (Fig. 30).

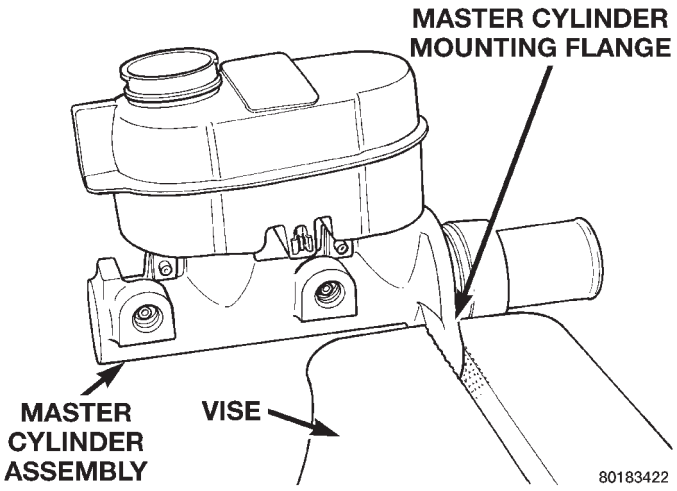


Fig. 30 Master Cylinder Mounted In Vise

NOTE: Two different size bleeding tubes are used depending on which type of master cylinder the vehicle is equipped with. Vehicles equipped with traction control use a center port master cylinder with a larger diameter brake tube. Vehicles not equipped with traction control use a compensating port master cylinder using a standard 3/16 inch diameter brake tube. Be sure the correct size bleeding tubes are used when bleeding the master cylinder.

(2) Install the Bleeding Tubes, Special Tool 6920 for a non traction control master cylinder or Special Tool 8129 for a traction control master cylinder on the master cylinder (Fig. 102). Position bleeding tubes so the outlets of bleeding tubes will be below surface of brake fluid when reservoir is filled to its proper level.

(3) Fill brake fluid reservoir with brake fluid conforming to DOT 3 specifications such as Mopar or an Equivalent.

(4) Using a wooden dowel, depress push rod slowly, and then allow pistons to return to released position. Repeat several times until all air bubbles are expelled from master cylinder.

(5) Remove bleeding tubes from master cylinder outlet ports, and then plug outlet ports and install fill cap on reservoir.

(6) Remove master cylinder from vise.

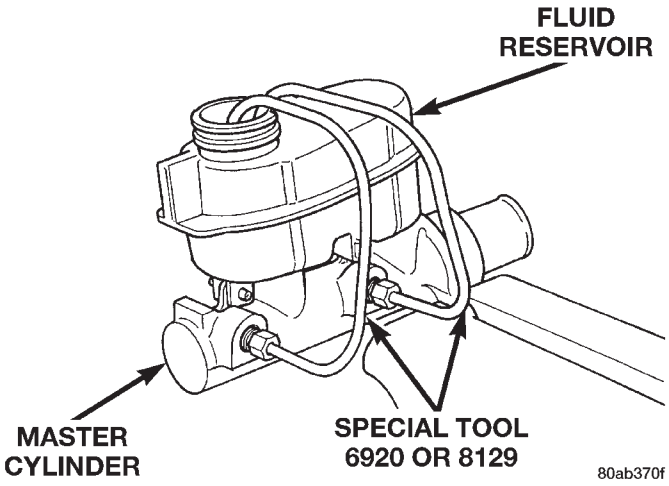


Fig. 31 Bleed Tubes Installed On Master Cylinder

(7) Install the filler cap from the master cylinder filler neck, on the master cylinder fluid reservoir.

(8) Install the master cylinder assembly on the power brake vacuum booster.

NOTE: Note: It is not necessary to bleed the ABS hydraulic control unit (HCU) after replacing the master cylinder. But, the base brake hydraulic system must be bled to ensure no air is entered the hydraulic system when the master cylinder was removed.

ROTOR MACHINING (FRONT/REAR)

BRAKE ROTOR MACHINING PROCEDURES

Any servicing of the rotor requires extreme care to maintain the rotor to within service tolerances to ensure proper brake action.

If the rotor surface is deeply scored or warped, or there is a complaint of brake roughness or brake pedal pulsation, the rotor should be resurfaced, refaced (Fig. 32) or (Fig. 33) or replaced.

NOTE: All rotors have markings for minimum allowable thickness cast on an un-machined surface of the rotor (Fig. 34) or (Fig. 35).

This marking includes 0.76 mm (0.030 inch) allowable rotor wear beyond the recommended 0.76 mm (0.030 inch) of rotor refacing.

The collets, shafts and adapters used on the brake lathe and the bearing cups in the rotor MUST be clean and free from any chips or contamination.

When mounting the rotor on the brake lathe, strict attention to the brake lathe manufacturer's operating instructions is required.

If the rotor is not mounted properly, the lateral runout will be worse after refacing or resurfacing than before.

SERVICE PROCEDURES (Continued)

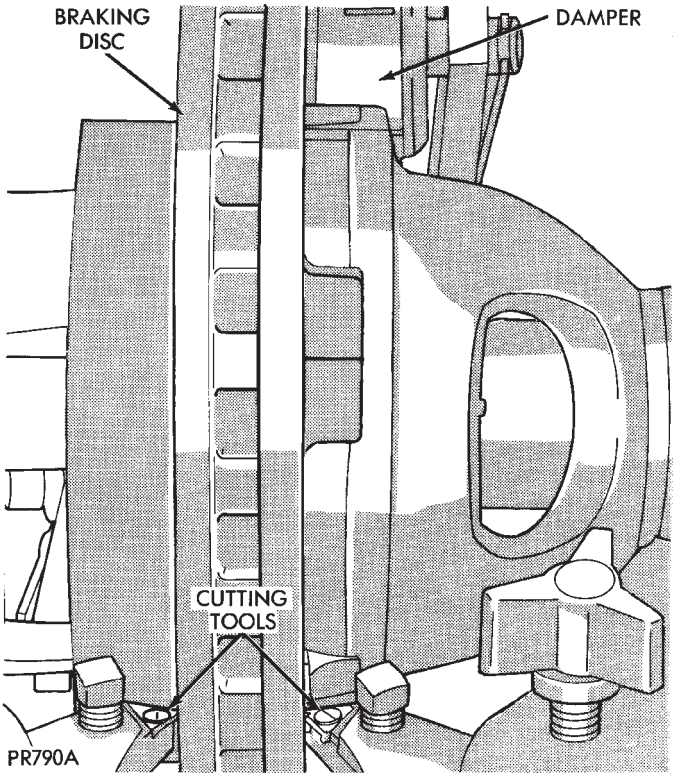


Fig. 32 Refacing Brake Rotor

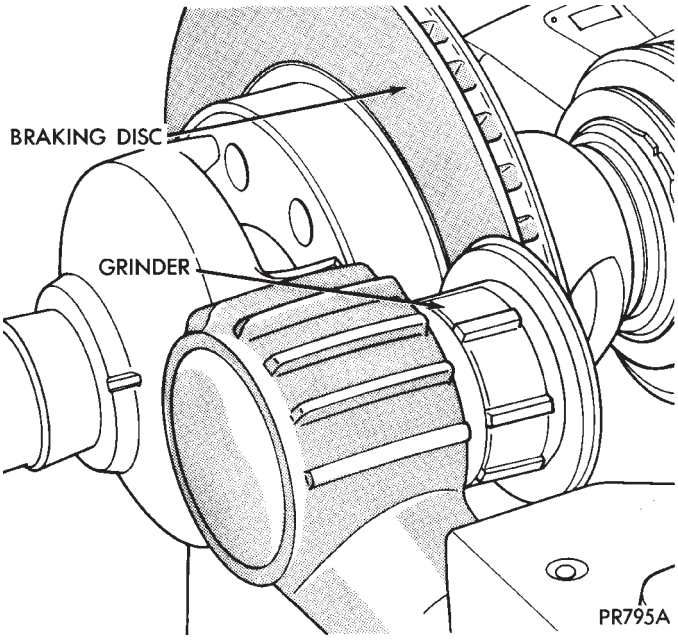


Fig. 33 Resurfacing Brake Rotor (Final Finish)

REFACING BRAKE ROTOR

Refacing of the rotor is not required each time the brake pads are replaced.

When refacing a rotor the required 0.08 mm (0.003 inch) TIR (Total Indicator Reading) and 0.013 mm (0.0005 inch) thickness variation limits MUST BE MAINTAINED. **Extreme care** in the operation of rotor turning equipment is required.

The use of a double straddle cutter (Fig. 32) that machines both sides of the rotor at the same time is highly recommended.

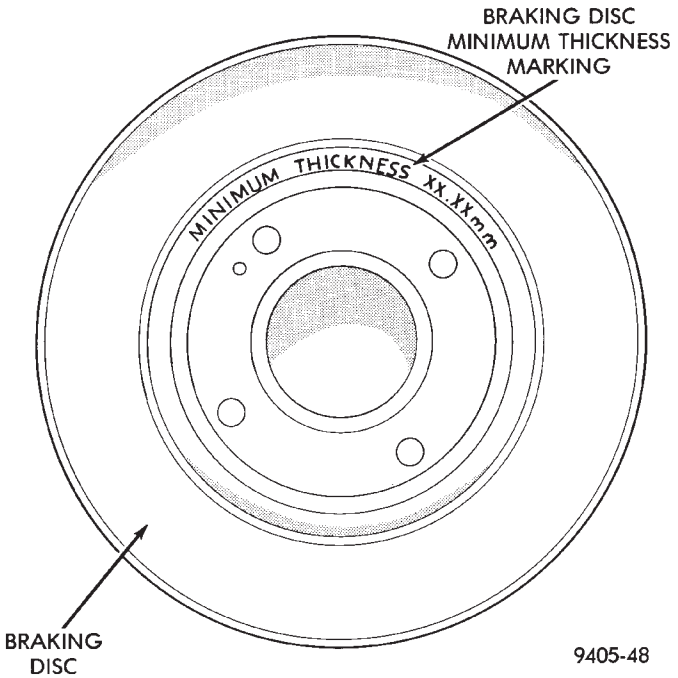


Fig. 34 Front Rotor Thickness Markings

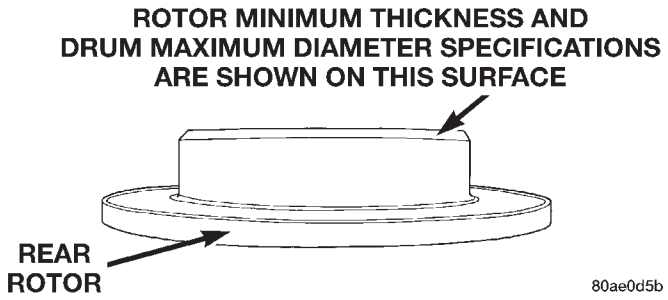


Fig. 35 Rear Rotor Thickness Markings

RESURFACNG BRAKE ROTOR

This operation can be used when rotor surface is rusty, has lining deposits or excessive lateral runout or thickness variation is evident.

A sanding rotor attachment (Fig. 33) will remove surface contamination without removing much rotor material.

It will generally follow variations in thickness that are in the rotor.

SERVICE PROCEDURES (Continued)

ROTOR REFINISHING LIMITS

Braking Rotor	Rotor Thickness	Minimum Rotor Thickness	Rotor Thickness Variation	Rotor Run Out*	Rotor Micro Finish
Front Rotor	23.87-24.13 mm .939 -.949 in.	22.4 mm .881 in.	.013 mm .0005 in.	.08 mm .003 in.	15-80 RMS
Rear Rotor	12.75-12.25 mm .502 -.482 in.	11.25 mm .443 in.	.013 mm .0005 in.	.08 mm .003 in.	15-80 RMS
* TIR Total Indicator Reading (Measured On Vehicle)					

BRAKE DRUM MACHINING

Measure the runout and diameter of the rear brake using only accurate measuring equipment. There should be no variation in the drum diameter greater than 0.090 mm (0.004 inch). Drum runout should not exceed 0.15 mm (0.006 inch) out of round. If the drum runout or diameter variation exceed these values the drum should be refaced. For best results in eliminating the irregularities that cause brake roughness and surge, the amount of material removed during a single cut should be limited to 0.13 mm (0.005 inch). When the entire braking surface has been cleaned. A final cut of 0.0254 mm (0.001 inch) will assure a good drum surface providing the equipment used is capable of the precision required for resurfacing brake drums. Deeper cuts are permissible for the sole purpose of removing deep score marks. **Do not reface more than 1.52 mm (0.060 inch) over the standard drum diameter.**

All drums will show markings of maximum allowable diameter (Fig. 36). For example, a drum will have a marking of MAX. DIA. 251.55 mm (9.90 inch). This marking includes 0.76 mm (0.030 inch) for allowable drum wear beyond the recommended 1.52 mm (0.060 inch) of drum refacing

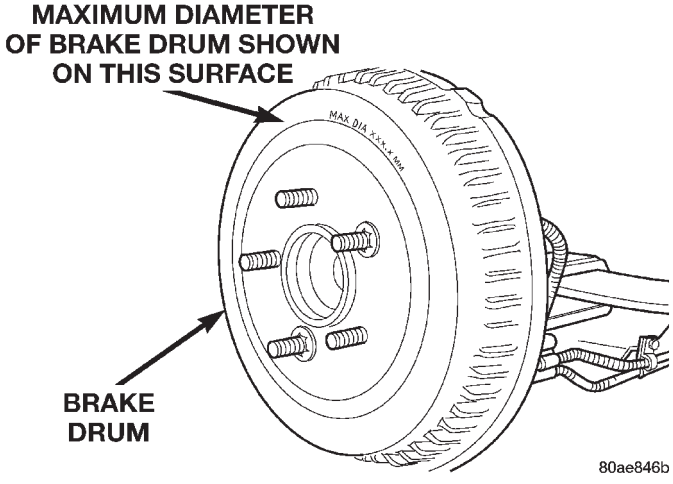


Fig. 36 Rear Brake Drum Maximum Diameter Identification

BRAKE TUBE REPAIR PROCEDURE

CAUTION: When repairing brake chassis lines or flex hoses, the correct fasteners must be used to attach the routing clips or hoses to the front suspension cradle. The fasteners used to attach components to the front suspension cradle have an anti-corrosion coating due to the suspension cradle being made of aluminum. Only Mopar replacement fasteners with the required anti-corrosion coating are to be used if a replacement fastener is required when installing a brake chassis line or flex hose.

Only double wall 4.75mm (3/16 in.) steel tubing with Al-rich/ZW-AC alloy coating and the correct tube nuts are to be used for replacement of a hydraulic brake tube.

NOTE: On vehicles equipped with traction control, the primary and secondary hydraulic tubes between the master cylinder and the hydraulic control unit are 6 mm (15/64 in.). These tubes are also coated with the Al-rich/ZW-AC alloy and must be replaced with tubes having the same anti-corrosion coating. Be sure the correct tube nuts are used for the replacement of these hydraulic brake tubes.

Care should be taken when repairing brake tubing, to be sure the proper bending and flaring tools and procedures are used, to avoid kinking. Do not route the tubes against sharp edges, moving components or into hot areas. All tubes should be properly attached with recommended retaining clips.

If the primary or secondary brake line from the master cylinder to the ABS Hydraulic Control Unit, or the flexible brake lines between the hydraulic control unit and the proportioning valve require replacement **only** the original factory brake lines containing a flexible section can be used. This is required due to the movement of the front suspension cradle while the vehicle is in motion.

Using Tubing Cutter, Special Tool C-3478-A or equivalent, cut off damaged seat or tubing (Fig. 37). Ream out any burrs or rough edges showing on inside of tubing (Fig. 38). This will make the ends of tubing square (Fig. 38) and ensure better seating of

SERVICE PROCEDURES (Continued)

flared end tubing. **PLACE TUBE NUT ON TUBING BEFORE FLARING THE TUBING.**

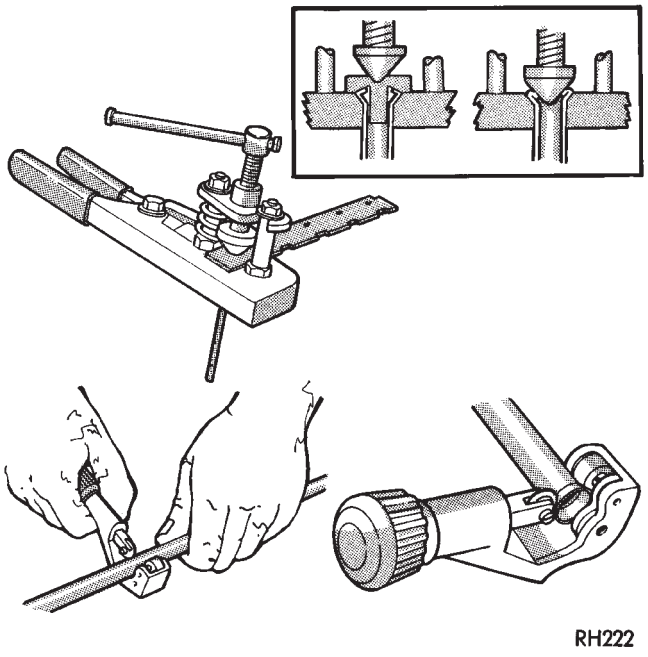


Fig. 37 Cutting And Flaring Of Brake Fluid Tubing

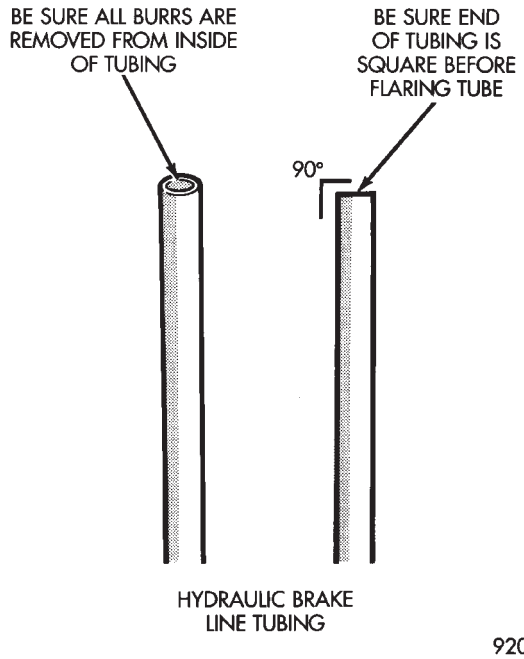


Fig. 38 Brake Fluid Tube Preparation For Flaring

DOUBLE INVERTED TUBING FLARES

To make a double inverted tubing flare (Fig. 39) and (Fig. 40). Open handles of Flaring Tool, Special Tool C-4047 or equivalent. Then rotate jaws of tool until the mating jaws of tubing size are centered between vertical posts on tool. Slowly close handles with tubing inserted in jaws but do not apply heavy pressure to handle as this will lock tubing in place.

Place gauge (Form A) on edge over end of brake tubing. Push tubing through jaws until end of tubing contacts the recessed notch in gauge matching the tubing size. Squeeze handles of flaring tool and lock tubing in place. Place 3/16 inch plug of gauge (A) down in end of tubing. Swing compression disc over gauge and center tapered flaring screw in recess of disc. Screw in until plug gauge has seated on jaws of flaring tool. This action has started to invert the extended end of the tubing. Remove gauge and continue to screw down until tool is firmly seated in tubing. Remove tubing from flaring tool and inspect seat. Refer to tube routing diagrams for proper brake tube routing and clip locations. Replace any damaged tube routing clips.

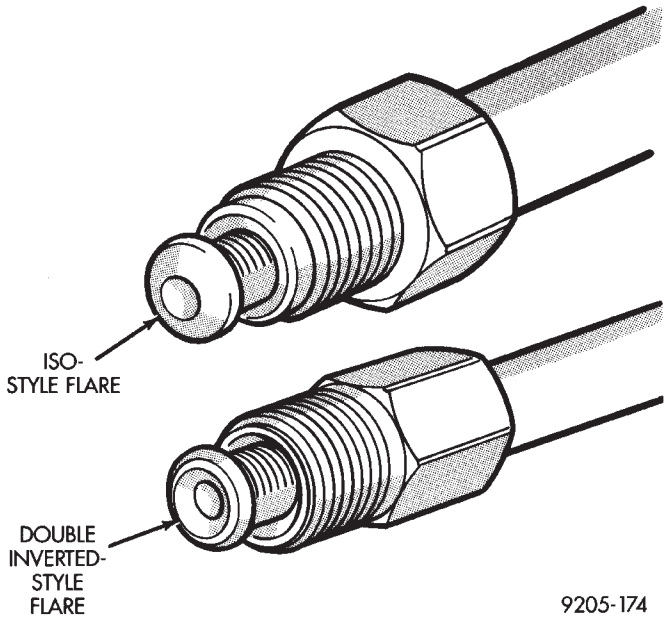


Fig. 39 Hydraulic Brake Tubing Flare Styles

ISO TUBING FLARES

CAUTION: All ISO style tubing flares (Fig. 39) and (Fig. 40) are of metric dimensions. When performing any service procedures on vehicles using ISO style tubing flares, metric size tubing of 4.75 mm MUST be used with metric ISO tube flaring equipment.

To create a (metric) ISO style tubing flare, Use Snap-On Flaring Tool TFM-428, or equivalent. See (Fig. 41) and proceed with the steps listed below. **Be sure to place the tubing nut on the tube before flaring the tubing.**

(1) Carefully prepare the end of the tubing to be flared. Be sure the end of the tubing to be flared is square and all burrs on the inside of the tubing are removed (Fig. 38). **This preparation is essential to**

SERVICE PROCEDURES (Continued)

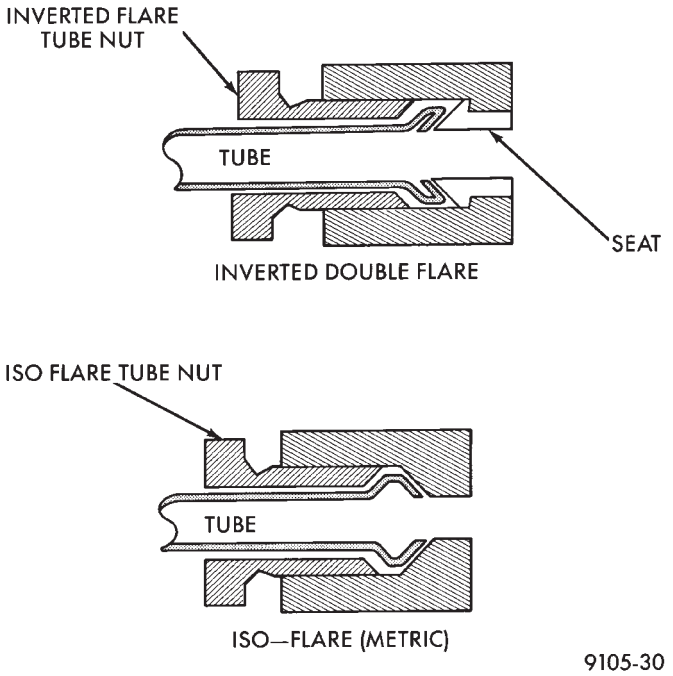


Fig. 40 Inverted Double Wall Flare And ISO Flare Tubing Connections

obtain the correct form of a (metric) ISO tubing flare.

(2) Open jaws of the Flaring Tool. Align the mating size jaws of the flaring tool around the size of the tubing to be flared. Close the jaws of the Flaring Tool around the tubing to keep it from sliding out of the flaring tool, but do not lock the tubing in place. See (Fig. 41)

(3) Position the tubing in the jaws of the Flaring Tool so that it is flush with the top surface of the flaring tool bar assembly. (Fig. 41))

(4) Install the correct size adaptor for the brake tubing being flared, on the feed screw of the yoke assembly. Center the yoke and adapter over the end of the tubing. Apply lubricant to the adapter area that contacts brake tubing. Making sure the adapter pilot is fully inserted in the end of the brake tubing. Screw in the feed screw of the yoke assembly until the adaptor has seated squarely on the surface of the bar assembly (Fig. 41). This process has created the (metric) ISO tubing flare.

PARK BRAKE AUTO ADJUSTER MECHANISM RELEASE

The park brake pedal mechanism used in this vehicle is designed so that the auto adjuster is not required to be locked out when servicing the park brake pedal and or the park brake cables.

This park brake pedal mechanism is designed so that the adjuster mechanism will rotate only half a turn when the tension is released from the park brake cable. This eliminates the requirement to lock

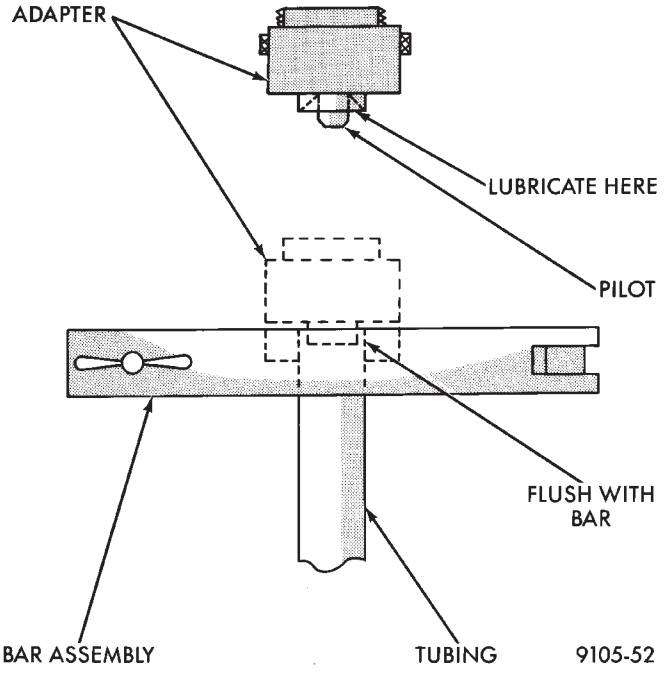


Fig. 41 Brake Tubing ISO Flaring Process

out the automatic adjuster when servicing the park brake pedal mechanism and cables.

Use the following procedure to release the tension from the park brake cables and the auto adjuster in the park brake pedal mechanism.

(1) Grasp the exposed section of the front park brake cable and pull rearward on it. While holding the park brake in this position, install a pair of locking pliers on the front park brake cable just rearward of the second body outrigger bracket (Fig. 42).

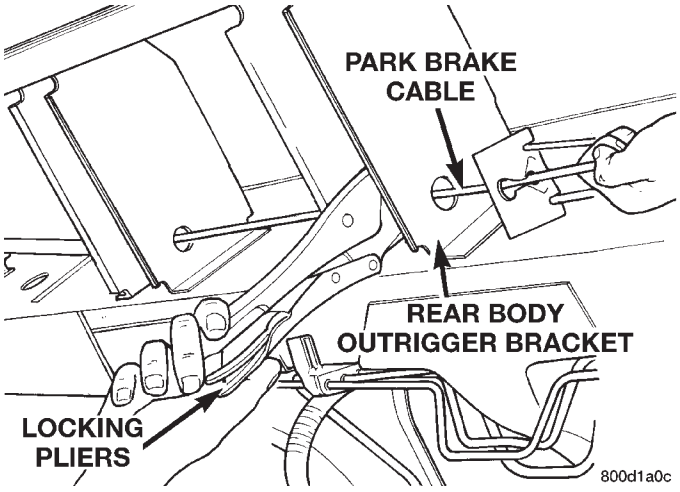


Fig. 42 Locking Out Automatic Adjuster

(2) Remove the left rear and intermediate park brake cable from the park brake cable equalizer (Fig. 43).

(3) Remove the equalizer from the front park brake cable.

SERVICE PROCEDURES (Continued)

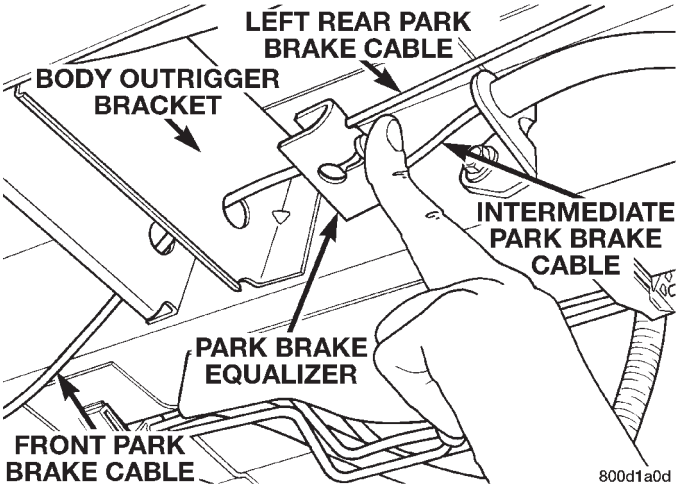


Fig. 43 Park Brake Cable Attachment To Equalizer

(4) Remove the locking pliers from the front park brake cable. This will allow the adjuster in the park brake pedal mechanism to rotate around to its stop. This will remove the tension from the adjuster and front park brake cable.

Use the following procedure to reset the auto adjuster in the park brake pedal mechanism.

(5) Grasp the exposed section of the front park brake cable and pull rearward on it. While holding the park brake in this position, install a pair of locking pliers on the front park brake cable just rearward of the second body outrigger bracket (Fig. 42).

(6) Install the equalizer on the front park brake cable.

(7) Install the left rear and intermediate park brake cable in the correct location on the park brake cable equalizer (Fig. 43).

(8) Remove the locking pliers from the front park brake cable. This will allow the adjuster in the park brake pedal mechanism to tension the park brake cables.

(9) Apply and release the park brake pedal one time. This will seat the park brake cables and allow the auto adjuster in the park brake pedal mechanism to correctly tension the park brake cables.

REMOVAL AND INSTALLATION

WHEEL AND TIRE INSTALLATION

To install the wheel and tire assembly, first position it properly on the mounting surface using the hub pilot as a guide. Then progressively tighten the lug nuts in the proper sequence to half of the required torque. Finally tighten the lug nuts in the proper sequence to 129 N·m (95 ft. lbs.). Never use oil or grease on studs or nuts.

FRONT DISC BRAKE CALIPER

SERVICE PRECAUTIONS

WARNING: ALTHOUGH FACTORY INSTALLED BRAKE LININGS ARE MADE FROM ASBESTOS FREE MATERIALS, SOME AFTER MARKET BRAKE LINING MAY CONTAIN ASBESTOS. THIS SHOULD BE TAKEN INTO ACCOUNT WHEN SERVICING A VEHICLE'S BRAKE SYSTEM, WHEN AFTERMARKET BRAKE LININGS MAY HAVE BEEN INSTALLED ON THE VEHICLE. ALWAYS WEAR A RESPIRATOR WHEN CLEANING BRAKE COMPONENTS AS ASBESTOS CAN CAUSE SERIOUS BODILY HARM SUCH AS ASBESTOSIS AND OR CANCER. NEVER CLEAN BRAKE COMPONENTS BY USING COMPRESSED AIR, USE ONLY A VACUUM CLEANER SPECIFICALLY DESIGNED FOR THE REMOVAL OF BRAKE DUST. IF A VACUUM CLEANER IS NOT AVAILABLE, CLEAN BRAKE PARTS USING ONLY WATER–DAMPENED SHOP TOWELS. DO NOT CREATE BRAKELINING DUST BY SANDING BRAKE LININGS WHEN SERVICING A VEHICLE. DISPOSE OF ALL DUST AND DIRT SUSPECTED OF CONTAINING ASBESTOS FIBERS USING ONLY SEALED AIRTIGHT BAGS OR CONTAINERS. FOLLOW ALL RECOMMENDED SAFETY PRACTICES PRESCRIBED BY THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) AND THE ENVIRONMENTAL PROTECTION AGENCY (EPA), FOR HANDLING AND DISPOSAL OF PRODUCTS CONTAINING ASBESTOS.

CAUTION: During service procedures, grease or any other foreign material must be kept off brake shoe assemblies, and braking surfaces of brake drum and external surfaces of hub/bearing assembly.

REMOVE

(1) Raise vehicle on jackstands or centered on a hoist. See Hoisting in the Lubrication and Maintenance group of this service manual.

(2) Remove front wheel and tire assemblies.

REMOVAL AND INSTALLATION (Continued)

(3) Remove the 2 caliper to steering knuckle guide pin bolts (Fig. 44).

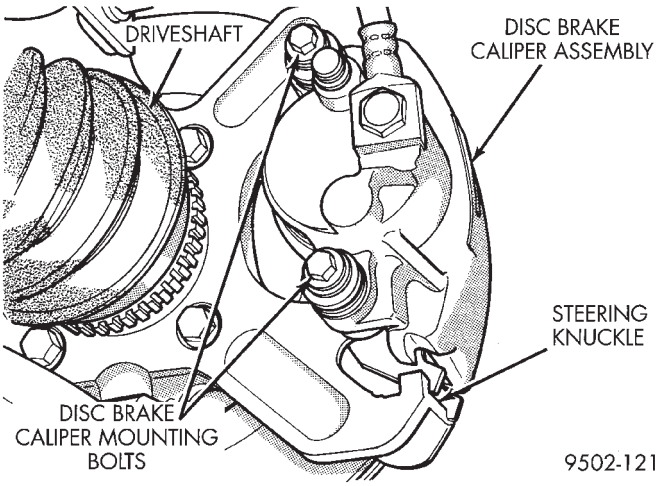


Fig. 44 Removing Caliper Guide Pin Bolts

(4) Remove caliper from steering knuckle, by first rotating free end of caliper away from steering knuckle. Then slide opposite end of caliper out from under machined abutment on steering knuckle (Fig. 45).

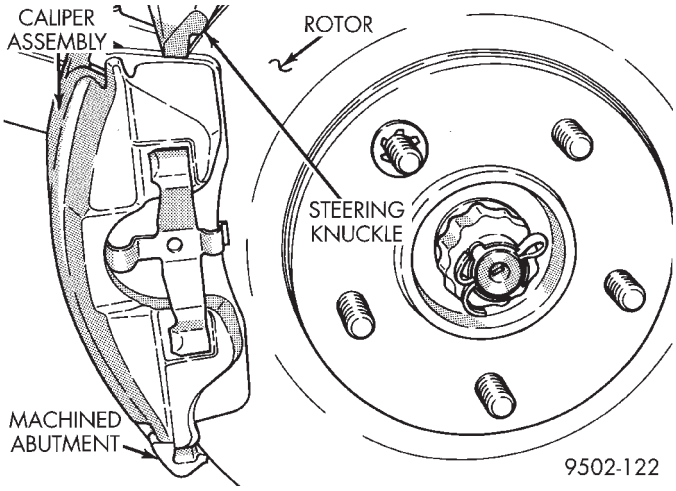


Fig. 45 Caliper Assembly Mounting On Steering Knuckle (Typical)

(5) Support caliper firmly to prevent weight of caliper from being supported by the brake fluid flex hose. Supporting weight of caliper by the brake fluid flex hose, can damage the flexible brake hose (Fig. 46).

INSTALL

(1) Lubricate both steering knuckle abutments with a liberal amount of Mopar® Multipurpose Lubricant, or equivalent.

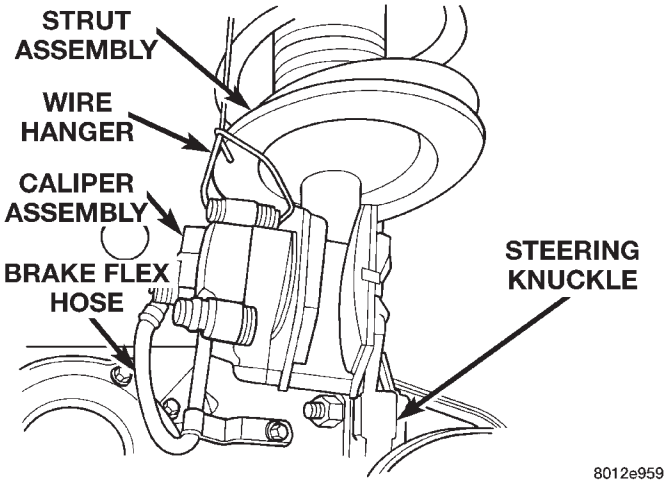


Fig. 46 Storing Front Disc Brake Caliper

CAUTION: Use care when installing the caliper assembly onto the steering knuckle, so the seals on the caliper guide pin bushings do not get damaged by the steering knuckle bosses.

(2) Carefully position caliper and brake pad assemblies over brake rotor by hooking lower or upper end of caliper over the machined abutment on steering knuckle (Fig. 45). Then rotate caliper into position at the top of the steering knuckle (Fig. 45). Make sure that caliper guide pin bolts, bushings and sleeves are clear of the steering knuckle bosses.

(3) Install the caliper guide pin bolts (Fig. 44) and tighten to a torque of 41 N·m (40 ft. lbs.). **Extreme caution should be taken not to cross thread the caliper guide pin bolts.**

(4) Install the wheel and tire assembly.

(5) Using a torque wrench, tighten the wheel mounting stud nuts in proper sequence until all nuts are torqued to half specification. Then repeat the tightening sequence to the full specified torque of 135 N·m (100 ft. lbs.).

(6) Remove jackstands or lower hoist.

(7) **Before moving vehicle, pump the brake pedal several times to insure the vehicle has a firm brake pedal.**

REAR DISC BRAKE CALIPER

During service procedures, grease or any other foreign material must be kept off brake shoe assemblies, and braking surfaces of rotor.

Handling of the rotor and caliper, must be done in such a way as to avoid damage to the rotor and scratching or nicking of lining on the brake shoes.

If inspection reveals that the caliper piston seal is leaking, it **MUST** be replaced immediately.

During removal and installation of a wheel and tire assembly, use care not to strike the caliper.

REMOVAL AND INSTALLATION (Continued)

REMOVE

(1) Raise vehicle on jackstands or centered on a hoist. See Hoisting in the Lubrication and Maintenance section of this manual.

(2) Remove rear wheel and tire assemblies from vehicle.

(3) Remove the disc brake caliper to adapter guide pin bolts (Fig. 47).

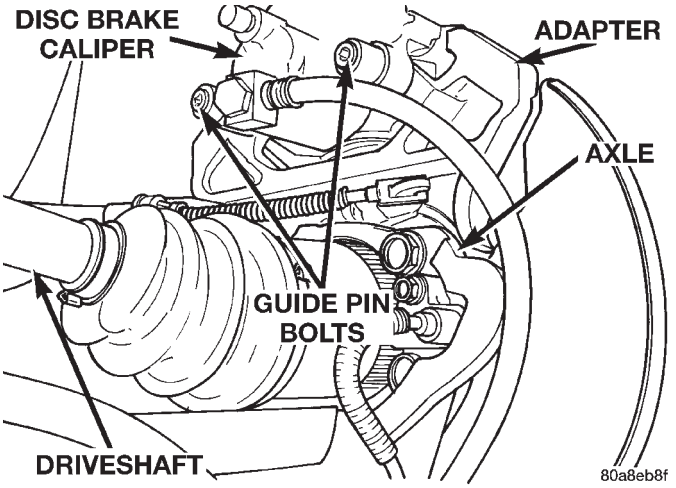


Fig. 47 Removing Caliper Guide Pin Bolts

(4) Remove rear caliper from adapter using the following procedure. First rotate rear of caliper up from the adapter. Then pull the front of the caliper and the outboard brake shoe anti-rattle clip out from under the front abutment on the adapter (Fig. 48).

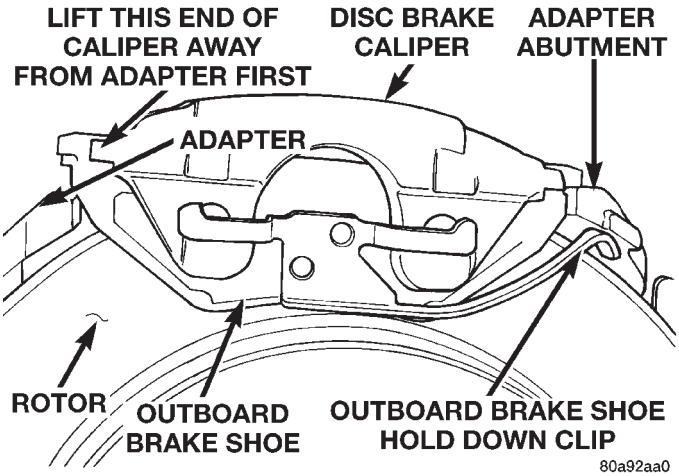


Fig. 48 Removing / Installing Caliper

(5) Support caliper to prevent the weight of the caliper from damaging the flexible brake hose (Fig. 49).

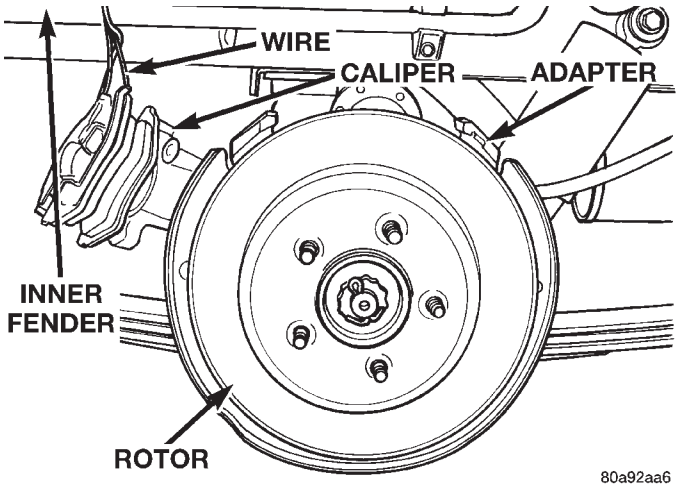


Fig. 49 Correctly Supported Caliper

INSTALL

NOTE: Step 1 below is only required when installing the disc brake caliper after new brake shoes have been installed.

(1) Completely retract caliper piston back into piston bore of caliper assembly.

(2) Lubricate both adapter abutments with a liberal amount of Mopar® Multipurpose Lubricant, or equivalent.

(3) If removed, install the rear rotor on the hub, making sure it is squarely seated on the face of the hub.

CAUTION: Use care when installing the caliper assembly onto the adapter, so the caliper guide pin bushings do not get damaged by the mounting bosses.

(4) Carefully lower caliper and brake shoes over rotor and onto the adapter using the reverse procedure for removal (Fig. 48).

CAUTION: When installing guide pin bolts extreme caution should be taken not to crossthread the caliper guide pin bolts.

(5) Install the caliper guide pin bolts. Tighten the guide pin bolts to a torque of 22 N·m (192 in. lbs.).

(6) Install the wheel and tire assembly.

(7) Tighten the wheel mounting stud nuts in proper sequence until all nuts are torqued to half specification. Then repeat the tightening sequence to the full specified torque of 129 N·m (95 ft. lbs.).

(8) Remove jackstands or lower hoist.

CAUTION: Before moving vehicle, pump the brake pedal several times to insure the vehicle has a firm brake pedal to adequately stop vehicle.

REMOVAL AND INSTALLATION (Continued)

(9) Road test the vehicle and make several stops to wear off any foreign material on the brakes and to seat the brake shoe linings.

FRONT DISC BRAKE PADS

REMOVE

WARNING: ALTHOUGH FACTORY INSTALLED BRAKE LININGS ARE MADE FROM ASBESTOS FREE MATERIALS, SOME AFTERMARKET BRAKE LININGS MAY CONTAIN ASBESTOS. THIS SHOULD BE TAKEN INTO ACCOUNT WHEN SERVICING A VEHICLE'S BRAKE SYSTEM, WHEN AFTERMARKET BRAKE LININGS MAY HAVE BEEN INSTALLED ON THE VEHICLE. ALWAYS WEAR A RESPIRATOR WHEN CLEANING BRAKE COMPONENTS AS ASBESTOS CAN CAUSE SERIOUS BODILY HARM SUCH AS ASBESTOSIS AND OR CANCER. NEVER CLEAN BRAKE COMPONENTS BY USING COMPRESSED AIR, USE ONLY A VACUUM CLEANER SPECIFICALLY DESIGNED FOR THE REMOVAL OF BRAKE DUST. IF A VACUUM CLEANER IS NOT AVAILABLE, CLEAN BRAKE PARTS USING ONLY WATER–DAMPENED SHOP TOWELS. DO NOT CREATE BRAKELINING DUST BY SANDING BRAKE LININGS WHEN SERVICING A VEHICLE. DISPOSE OF ALL DUST AND DIRT SUSPECTED OF CONTAINING ASBESTOS FIBERS USING ONLY SEALED AIRTIGHT BAGS OR CONTAINERS. FOLLOW ALL RECOMMENDED SAFETY PRACTICES PRESCRIBED BY THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) AND THE ENVIRONMENTAL PROTECTION AGENCY (EPA), FOR HANDLING AND DISPOSAL OF PRODUCTS CONTAINING ASBESTOS.

CAUTION: During service procedures, grease or any other foreign material must be kept off brake shoe assemblies, and braking surfaces of brake drum and external surfaces of hub/bearing assembly.

(1) Remove outboard brake pad, by prying the pad retaining clip over raised area on caliper (Fig. 50). Then slide the pad down and off the caliper.

(2) Pull inboard brake pad away from piston, until retaining clip on brake pad is free from cavity in caliper piston (Fig. 51).

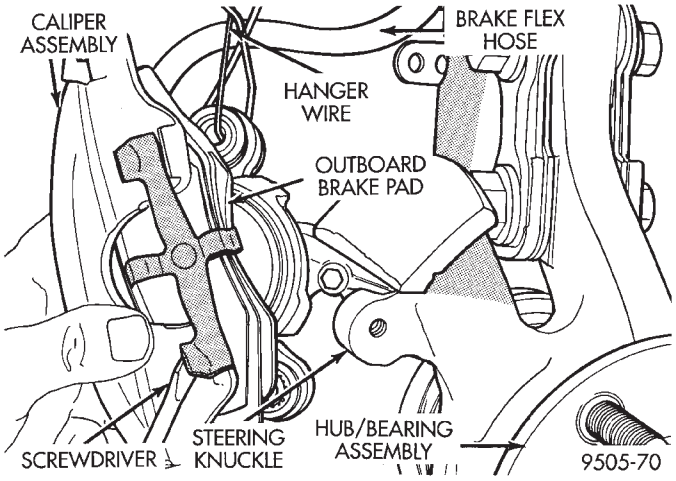


Fig. 50 Removing Outboard Brake Pad From Caliper

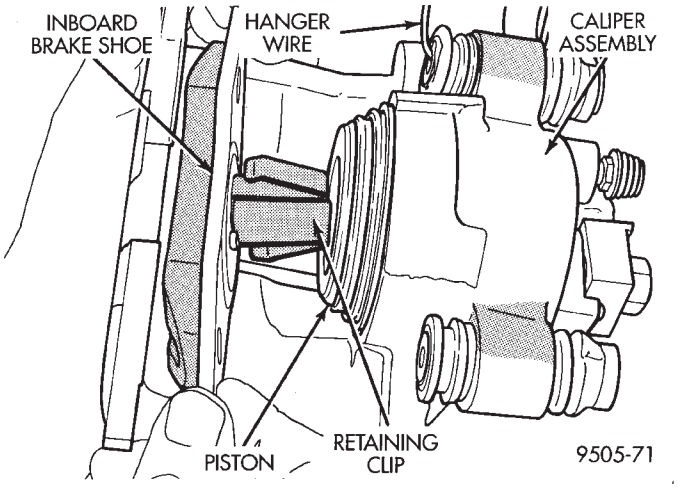


Fig. 51 Removing Inboard Brake Pad From Piston

INSTALL

(1) Completely retract caliper piston back into piston bore of caliper assembly. This is required for caliper installation with new brake pad assemblies.

(2) Remove the protective paper from the noise suppression gasket on both the inner and outer brake pad assemblies (if equipped).

NOTE: The inboard and outboard brake pads are not common, refer to (Fig. 52) for inboard and outboard brake pad assembly identification.

(3) Install the new inboard brake pad assembly into the caliper piston by firmly pressing into piston bore (Fig. 53). Be sure inboard brake pad assembly is positioned squarely against face of caliper piston.

(4) Slide the new outboard brake pad assembly onto the caliper assembly (Fig. 54).

REMOVAL AND INSTALLATION (Continued)

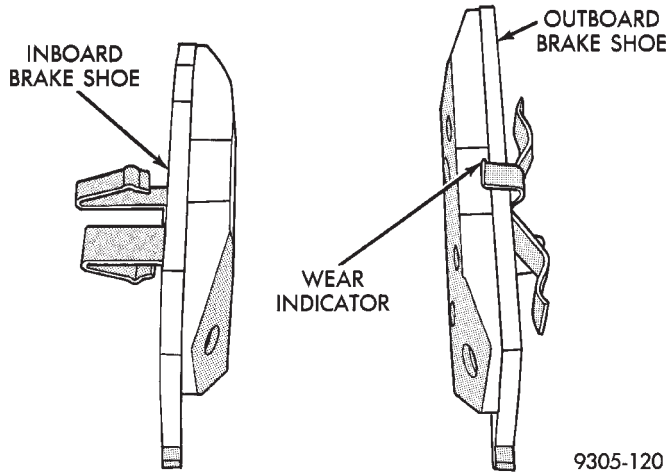


Fig. 52 Front Brake Pad Assembly Identification

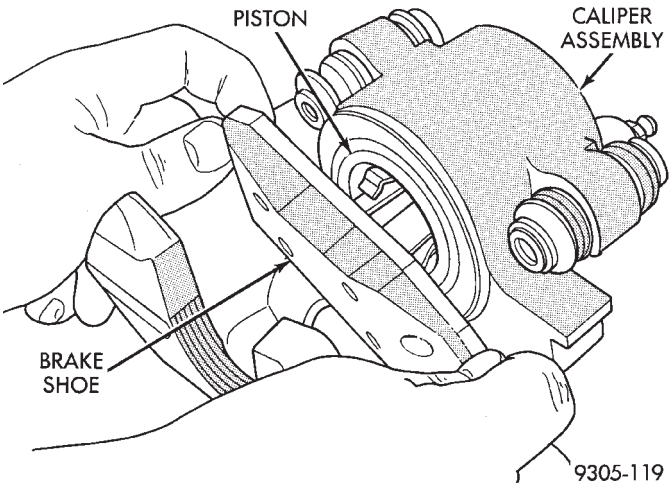


Fig. 53 Installing Inboard Brake Pad Assembly

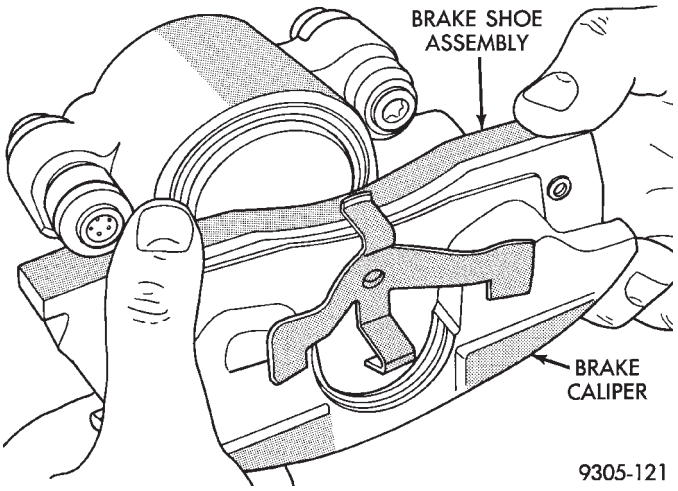


Fig. 54 Installing Outboard Brake Shoe Assembly

REAR DISC BRAKE SHOES

WARNING: ALTHOUGH FACTORY INSTALLED BRAKELININGS ARE MADE FROM ASBESTOS FREE MATERIALS, SOME AFTER MARKET BRAKELINING MAY CONTAIN ASBESTOS. THIS SHOULD BE TAKEN INTO ACCOUNT WHEN SERVICING A VEHICLE'S BRAKE SYSTEM, WHEN AFTERMARKET BRAKELININGS MAY HAVE BEEN INSTALLED ON THE VEHICLE. ALWAYS WEAR A RESPIRATOR WHEN CLEANING BRAKE COMPONENTS AS ASBESTOS CAN CAUSE SERIOUS BODILY HARM SUCH AS ASBESTOSIS AND OR CANCER. NEVER CLEAN BRAKE COMPONENTS BY USING COMPRESSED AIR, USE ONLY A VACUUM CLEANER SPECIFICALLY DESIGNED FOR THE REMOVAL OF BRAKE DUST. IF A VACUUM CLEANER IS NOT AVAILABLE, CLEAN BRAKE PARTS USING ONLY WATER DAMPENED SHOP TOWELS. DO NOT CREATE BRAKELINING DUST BY SANDING BRAKE LININGS WHEN SERVICING A VEHICLE. DISPOSE OF ALL DUST AND DIRT SUSPECTED OF CONTAINING ASBESTOS FIBERS USING ONLY SEALED AIRTIGHT BAGS OR CONTAINERS. FOLLOW ALL RECOMMENDED SAFETY PRACTICES PRESCRIBED BY THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) AND THE ENVIRONMENTAL PROTECTION AGENCY (EPA), FOR HANDLING AND DISPOSAL OF PRODUCTS CONTAINING ASBESTOS.

During service procedures, grease or any other foreign material must be kept off brake shoe assemblies, and braking surfaces of brake drum and external surfaces of hub/bearing assembly.

Handling of the braking disc and caliper is to be done in such a way as to avoid deformation of the disc and scratching or nicking of brake linings.

If inspection reveals that the square sectioned caliper piston seal is worn or damaged, it **MUST** be replaced immediately.

During removal and installation of a wheel and tire assembly, use care not to strike the caliper.

REMOVE

(1) Raise vehicle on jackstands or centered on a hoist. See Hoisting in the Lubrication and Maintenance section of this manual.

(2) Remove rear wheel and tire assemblies from vehicle.

(3) Remove the caliper to adapter guide pin bolts (Fig. 55).

(4) Remove rear caliper from adapter using the following procedure. First rotate rear of caliper up from the adapter. Then pull the front of the caliper and the outboard brake shoe anti-rattle clip out from under the front abutment on the adapter (Fig. 56).

(5) Support caliper to prevent the weight of the caliper from damaging the flexible brake hose (Fig. 57).

REMOVAL AND INSTALLATION (Continued)

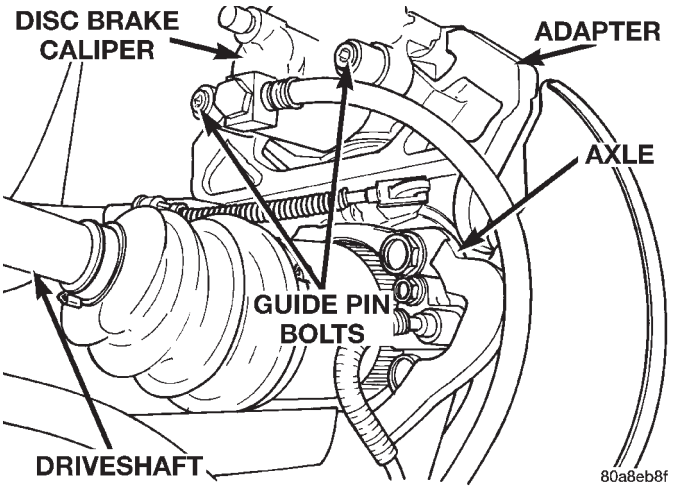


Fig. 55 Caliper Guide Pin Bolts

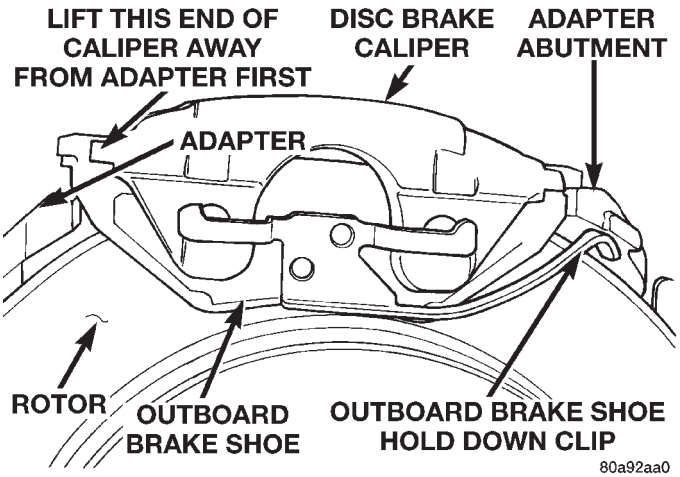


Fig. 56 Removing / Installing Caliper

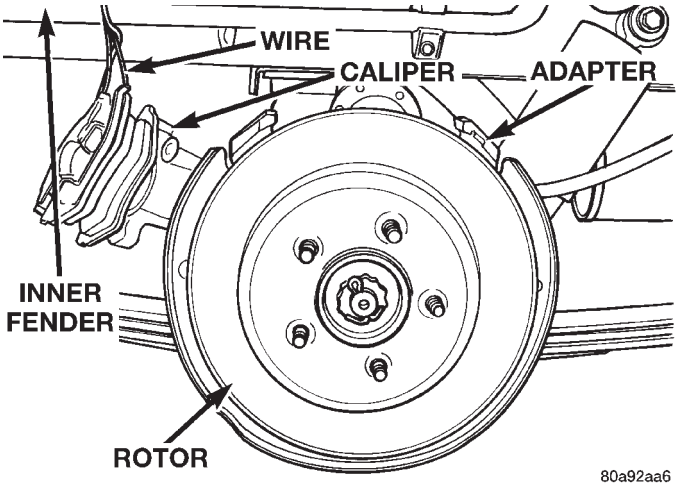


Fig. 57 Correctly Supported Caliper

(6) Remove the rear rotor from the hub by pulling it straight off the wheel mounting studs.

(7) Remove the outboard brake shoe from the caliper. Brake shoe is removed by prying brake shoe retaining clip over raised area on caliper and sliding the brake shoe off the caliper.

(8) Remove inboard brake shoe from caliper. Inboard brake shoe is removed by pulling it out of the caliper piston, until the retaining clip is free of the piston (Fig. 58).

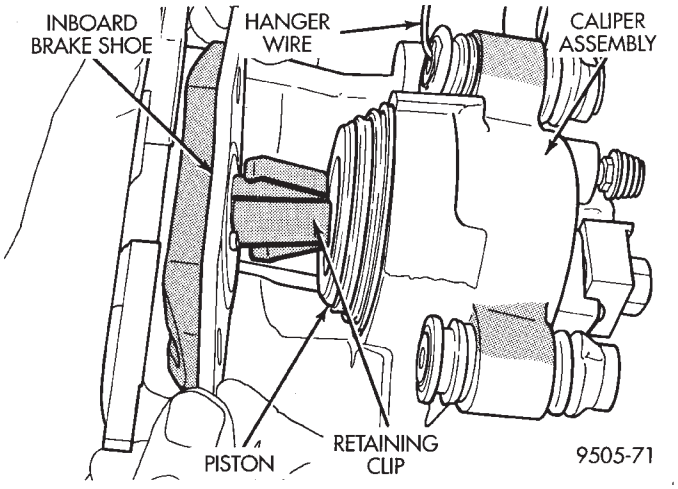


Fig. 58 Removing Inboard Brake Shoe

CALIPER INSPECTION

Check for piston seal leaks (brake fluid in and around boot area and inboard lining) and for any ruptures of the piston dust boot. If boot is damaged, or fluid leak is visible, disassemble caliper assembly and install a new seal and boot, (and piston if scored). Refer to procedures titled Disc Brake Caliper Disassembly.

Check the caliper dust boot and caliper pin bushings to determine if they are in good condition. Replace if they are damaged, dry, or found to be brittle. Refer to Cleaning And Inspection Of Brake Caliper.

INSTALL

NOTE: Step 1 below is only required when installing a caliper after new brake shoes have been installed.

(1) Completely retract caliper piston back into piston bore of caliper assembly.

(2) Lubricate both adapter abutments with a liberal amount of Mopar® Multipurpose Lubricant, or equivalent.

(3) If removed, install the rear rotor on the hub, making sure it is squarely seated on the face of the hub.

(4) Install the inboard brake shoe into the caliper piston by firmly pressing it into the piston bore using your thumbs. Be sure inboard brake shoe is positioned squarely against the face of the caliper piston (Fig. 59).

REMOVAL AND INSTALLATION (Continued)

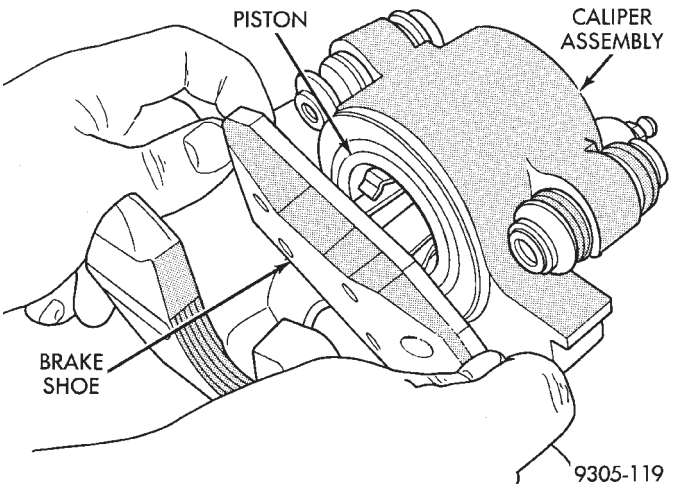


Fig. 59 Installing Inboard Brake Shoe

(5) Install the outboard brake shoe on the disc brake caliper

CAUTION: Use care when installing the caliper assembly onto the adapter, so the caliper guide pin bushings do not get damaged by the mounting bosses.

(6) Carefully lower caliper and brake shoes over rotor and onto adapter, reversing the removal procedure (Fig. 56)

CAUTION: When installing the caliper guide pin bolts extreme caution should be taken not to crossthread the guide pin bolts.

(7) Install the caliper guide pin bolts. Tighten the guide pin bolts to a torque of 22 N·m (192 in. lbs.).

(8) Install the wheel and tire assembly.

(9) Tighten the wheel mounting stud nuts in proper sequence until all nuts are torqued to half specification. Then repeat the tightening sequence to the full specified torque of 129 N·m (95 ft. lbs.).

(10) Remove jackstands or lower hoist.

CAUTION: Before moving vehicle, pump the brake pedal several times to insure the vehicle has a firm brake pedal to adequately stop the vehicle.

(11) Road test the vehicle and make several stops to wear off any foreign material on the brakes and to seat the brake shoe linings.

REAR BRAKE DRUM

REMOVE

(1) Remove the tire and wheel assembly from the vehicle

Remove the park brake cable, for the wheel of the vehicle that is being worked on, from the park brake cable equalizer (Fig. 60). This is required to gain access to the star wheel. If the cable is not removed from the equalizer, the cable and spring inside of the brake drum is in the way of the star wheel.

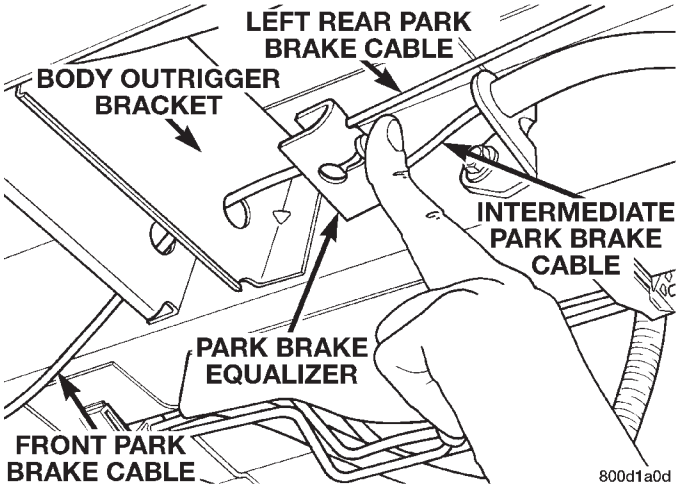


Fig. 60 Park Brake Cable Equlizer

(2) Remove the rear brake shoe adjusting hole cover plug.

(3) Insert a thin screwdriver into brake adjusting hole and hold adjusting lever away from notches of adjusting screw star wheel.

(4) Insert Tool C-3784 into brake adjusting hole and engage notches of brake adjusting screw star wheel. Release brake adjustment by prying down with adjusting tool.

(5) Remove rear brake drum from rear hub/bearing assembly.

INSTALL

(1) Adjust brake shoes assemblies so as not to interfere with brake drum installation.

(2) Install the rear brake drums on the hubs.

(3) Adjust rear brake shoes per Adjusting Rear Brakes procedure in the service adjustments section of the service manual.

(4) Install the removed park brake cable back on the park brake cable equalizer (Fig. 60)

(5) Install wheel and tire.

(6) Tighten the wheel mounting stud nuts in proper sequence until all nuts are torqued to half specification. Then repeat the tightening sequence to the full specified torque of 130 N·m (95 ft. lbs.).

REMOVAL AND INSTALLATION (Continued)

REAR DRUM BRAKE SHOES

REMOVE

WARNING: ALTHOUGH FACTORY INSTALLED BRAKE LININGS ARE MADE FROM ASBESTOS FREE MATERIALS, SOME AFTERMARKET BRAKLINING MAY CONTAIN ASBESTOS. THIS SHOULD BE TAKEN INTO ACCOUNT WHEN SERVICING A VEHICLE'S BRAKE SYSTEM, WHEN AFTERMARKET BRAKE LININGS MAY HAVE BEEN INSTALLED ON THE VEHICLE. ALWAYS WEAR A RESPIRATOR WHEN CLEANING BRAKE COMPONENTS AS ASBESTOS CAN CAUSE SERIOUS BODILY HARM SUCH AS ASBESTOSIS AND OR CANCER. NEVER CLEAN BRAKE COMPONENTS BY USING COMPRESSED AIR, USE ONLY A VACUUM CLEANER SPECIFICALLY DESIGNED FOR THE REMOVAL OF BRAKE DUST. IF A VACUUM CLEANER IS NOT AVAILABLE, CLEAN BRAKE PARTS USING ONLY WATER–DAMPENED SHOP TOWELS. DO NOT CREATE BRAKE LINING DUST BY SANDING BRAKE LININGS WHEN SERVICING A VEHICLE. DISPOSE OF ALL DUST AND DIRT SUSPECTED OF CONTAINING ASBESTOS FIBERS USING ONLY SEALED AIRTIGHT BAGS OR CONTAINERS. FOLLOW ALL RECOMMENDED SAFETY PRACTICES PRESCRIBED BY THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) AND THE ENVIRONMENTAL PROTECTION AGENCY (EPA), FOR HANDLING AND DISPOSAL OF PRODUCTS CONTAINING ASBESTOS.

(1) Raise vehicle on jackstands or centered on a hoist. See Hoisting in the Lubrication and Maintenance section of this manual.

(2) Remove the rear wheel and tire assemblies from the vehicle.

(3) Remove rear brake drum to hub retaining nuts (if equipped). Then remove rear brake drums from hub and bearing assemblies.

NOTE: When creating slack in the park brake cables by locking out the automatic adjuster, (Fig. 61) be sure that the park brake pedal is in the released (most upward) position.

(4) Create slack in the rear park brake cables. Slack is created by grabbing exposed section of front park brake cable and pulling it down and rearward. Slack is maintained in the park brake cable by installing a pair of locking pliers on the park brake cable just rearward of **only the rear** body outrigger bracket. (Fig. 61)

(5) Remove adjustment lever spring (Fig. 62) from adjustment lever and front brake shoe.

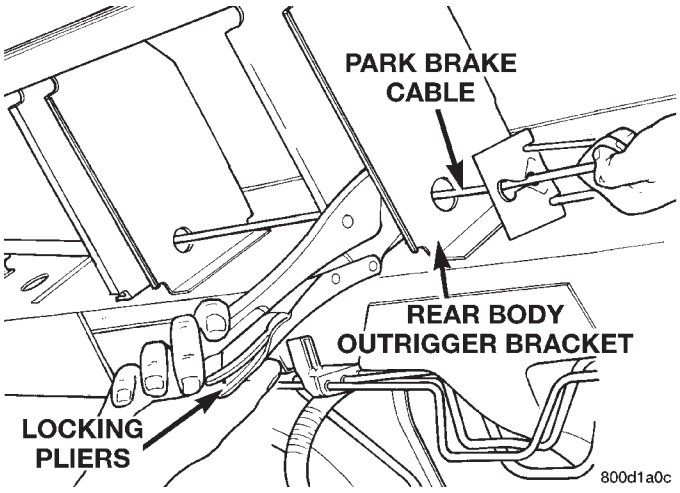


Fig. 61 Locked Out Park Brake Automatic Adjuster

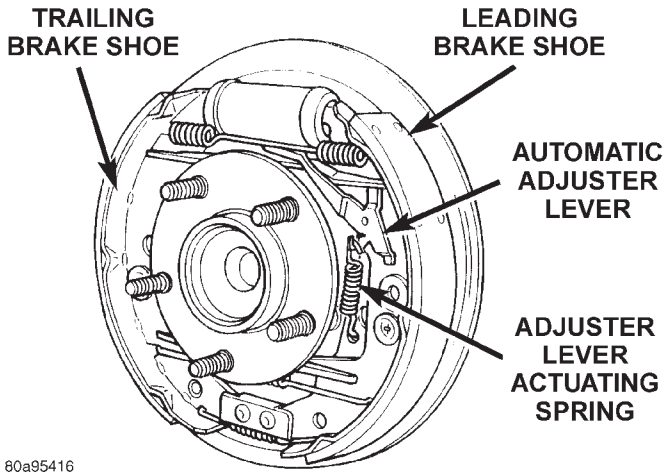


Fig. 62 Adjustment Lever Actuating Spring

(6) Remove adjustment lever (Fig. 63) from leading brake shoe.

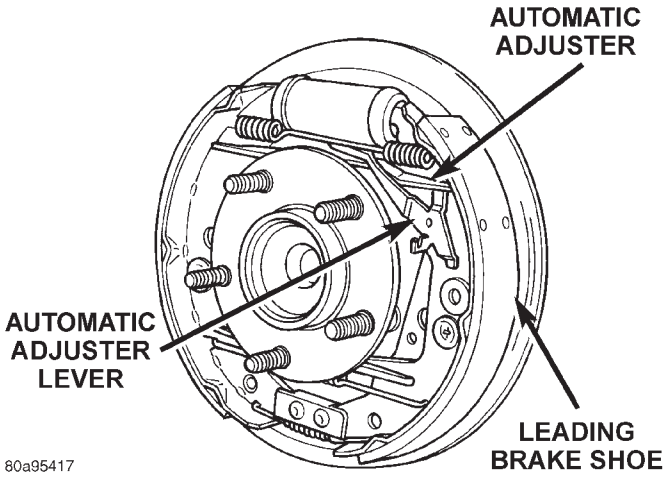


Fig. 63 Adjustment Lever

REMOVAL AND INSTALLATION (Continued)

(7) Remove the brake shoe to brake shoe lower return springs (Fig. 64) and (Fig. 65).

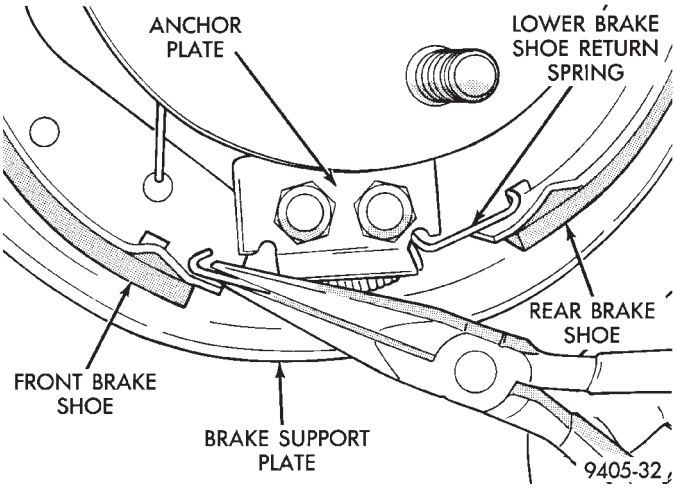


Fig. 64 Remove/Install Brake Shoe Lower Return Spring

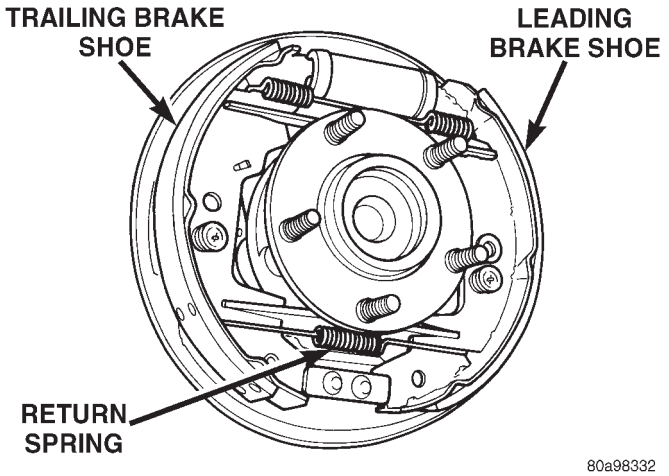


Fig. 65 Brake Shoe Lower Return Spring

(8) Remove the tension clip (Fig. 66) attaching the upper return spring to the automatic adjuster assembly.

(9) Remove the brake shoe to brake shoe upper return spring (Fig. 67).

(10) Remove the trailing brake shoe assembly to brake support plate hold down spring and pin (Fig. 68) from the brake shoe assembly.

(11) Remove the trailing brake shoe assembly from the brake support plate, park brake actuating lever and park brake actuating strut (Fig. 69). Remove the automatic adjuster assembly from the leading brake shoe.

(12) Remove the leading brake shoe assembly to brake support plate hold down spring and pin (Fig. 70) from the brake shoe. Remove the leading brake shoe from the brake support plate.

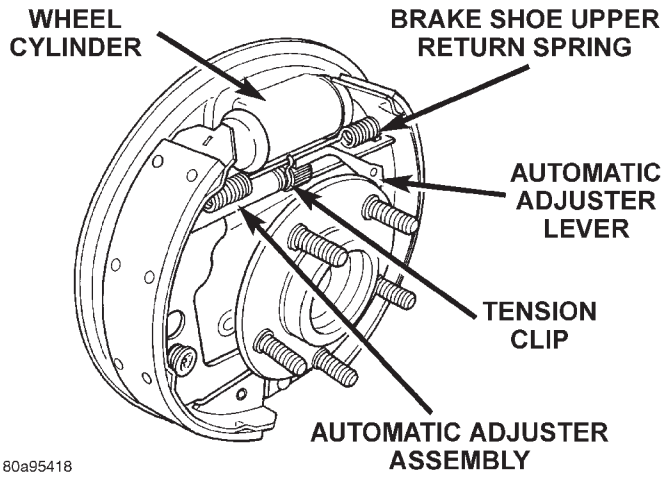


Fig. 66 Tension Clip Attachment To Adjuster

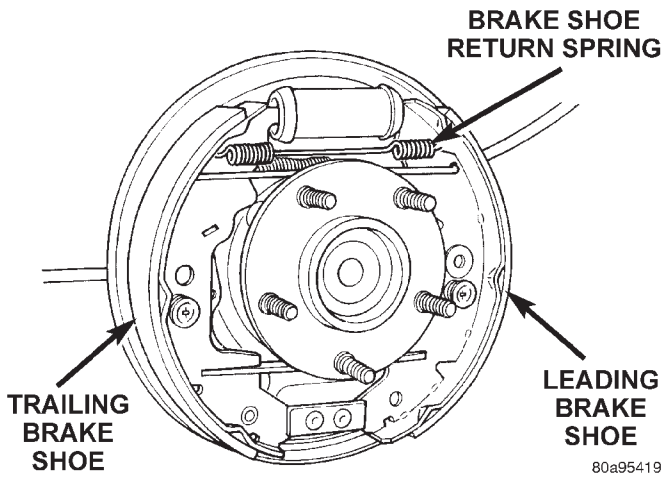


Fig. 67 Brake Shoe Upper Return Spring

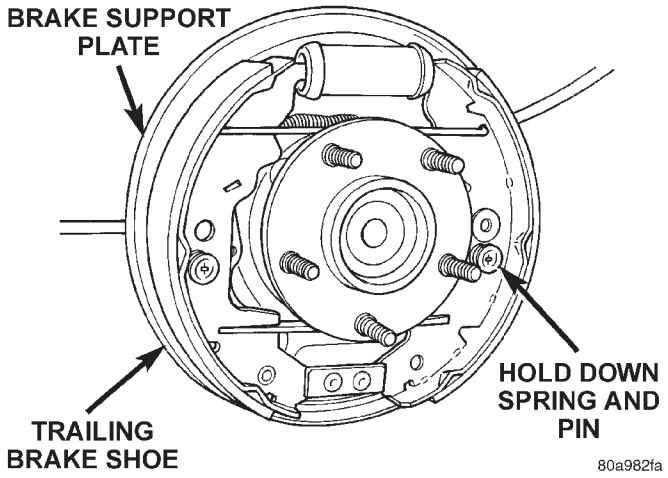


Fig. 68 Trailing Brake Shoe Hold Down Spring And Pin

(13) Remove the park brake actuator (Fig. 71) from the leading brake shoe and transfer to the replacement brake shoe.

REMOVAL AND INSTALLATION (Continued)

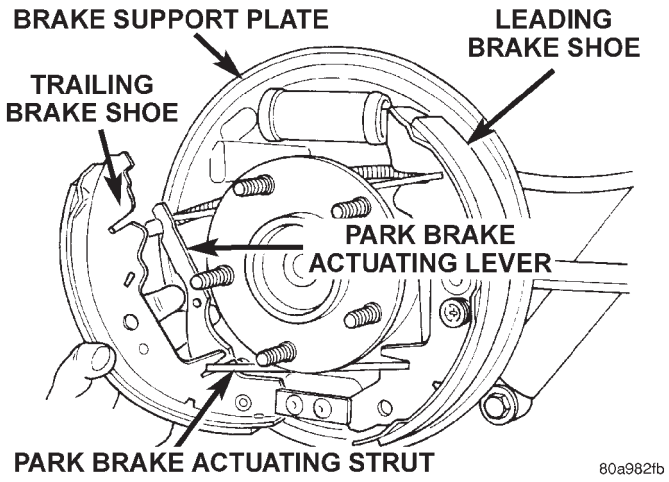


Fig. 69 Trailing Brake Shoe Removal/Installation

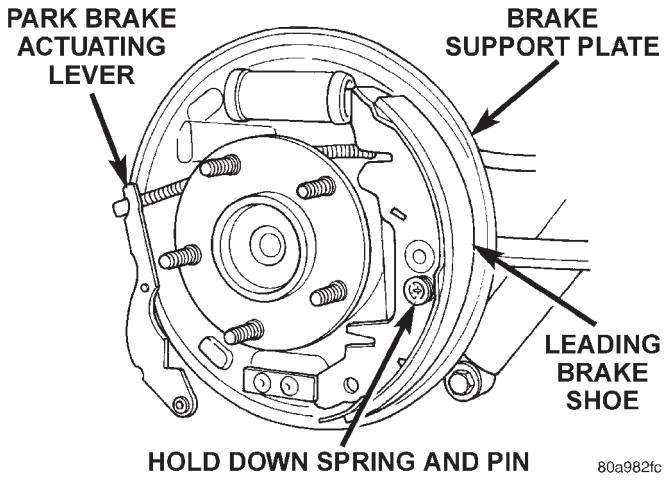


Fig. 70 Leading Brake Shoe Hold Down Spring And Pin

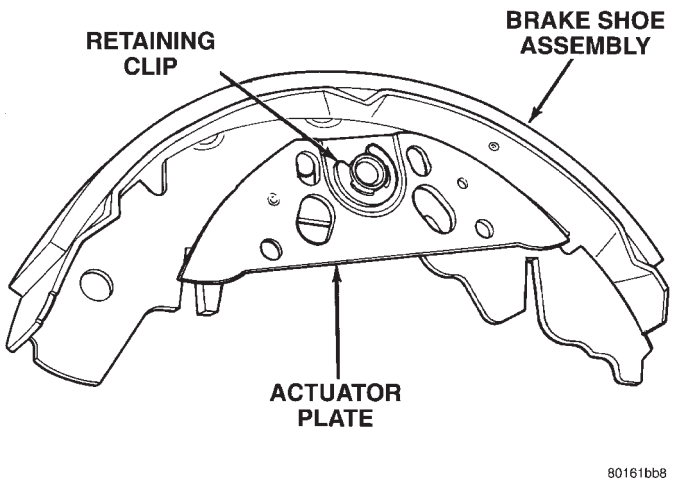


Fig. 71 Park Brake Actuator Plate

INSTALL

(1) Lubricate the eight shoe contact areas on the support plate and anchor, (Fig. 72) using the required special Mopar Brake Lubricant, P/N 4796269.

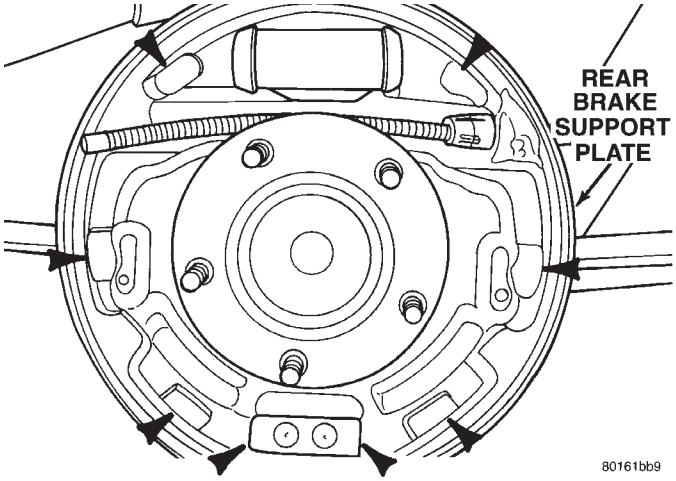


Fig. 72 Brake Support Plate Contact Areas

(2) Install leading brake shoe on brake support plate. Install the leading brake shoe hold down spring and pin (Fig. 70) on the brake shoe.

(3) Install the park brake actuator strut (Fig. 73) on the leading brake shoe. Then install the park brake actuator lever on the strut (Fig. 73).

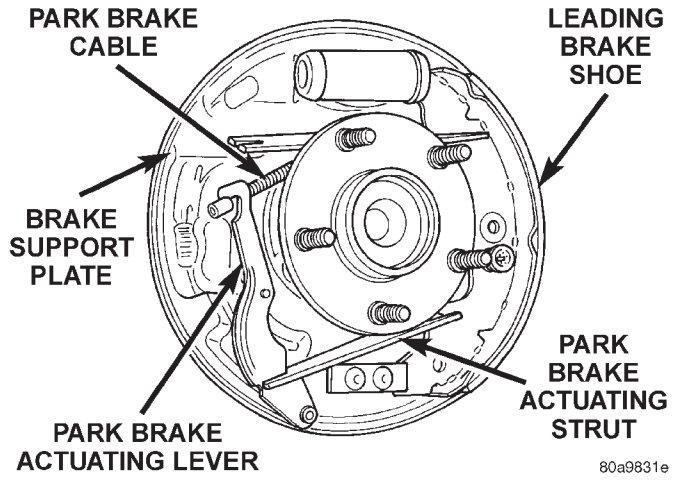


Fig. 73 Park Brake Components Assembled On Leading Brake Shoe

(4) Install the automatic adjuster screw on the leading brake shoe. Then install the trailing brake shoe on the park brake actuating lever and park brake actuating strut (Fig. 69). Position trailing brake shoe on brake support plate.

(5) Install the brake shoe hold down pin and spring on the trailing brake shoe (Fig. 68).

(6) Install the brake shoe to brake shoe upper return spring (Fig. 67).

REMOVAL AND INSTALLATION (Continued)

CAUTION: When installing the tension clip on the automatic adjuster, it must be located on only the threaded area of the adjuster assembly (Fig. 66). If it is located on a non-threaded area of the adjuster, the function of the automatic adjuster will be affected.

(7) Install the tension clip (Fig. 66) attaching the upper return spring to the automatic adjuster assembly.

(8) Install the brake shoe to brake shoe lower return springs on the brake shoes (Fig. 64) and (Fig. 65).

(9) Install automatic adjustment lever on the leading brake shoe of the rear brake assembly (Fig. 63).

(10) Install the actuating spring on the automatic adjustment lever and leading brake shoe assembly (Fig. 62).

(11) Verify that the automatic adjuster lever has positive contact with the star wheel on the automatic adjuster assembly.

(12) When all components of both rear brake assemblies are correctly and fully installed, remove the locking pliers from the front park brake cable.

(13) Adjust brake shoes assemblies so as not to interfere with brake drum installation.

(14) Install the rear brake drums on the hubs.

(15) Adjust rear brake shoes per Adjusting Rear Brakes procedure in the service adjustments section of the service manual.

(16) Install the wheel and tire assembly.

(17) Push the park brake pedal to the floor once and release pedal. This will automatically remove the slack from and correctly adjust the park brake cables.

(18) Tighten the wheel mounting stud nuts in proper sequence until all nuts are torqued to half specification. Then repeat the tightening sequence to the full specified torque of 130 N·m (95 ft. lbs.).

(19) Road test vehicle. The automatic adjuster will continue the brake adjustment during the road test of the vehicle.

BRAKE SUPPORT PLATE (REAR DRUM BRAKES)

REMOVE

(1) Raise vehicle on jackstands or centered on a frame contact type hoist. See Hoisting in the Lubrication and Maintenance section of this service manual for required lifting procedure.

(2) Remove wheel and tire.

(3) Remove brake drum from hub/bearing.

(4) Remove brake shoes from brake support plate. Refer to Rear Brake Shoe Removal in the removal and installation section in this group of the service manual for the required procedure.

(5) Disconnect the park brake cable from the park brake actuation lever.

(6) Remove the rear wheel speed sensor from the rear hub/bearing flange (Fig. 74). This will prevent damage to the speed sensor during removal and installation of the hub/bearing. **The rear wheel speed sensor bolts to the hub/bearing. It can not be removed unless the speed sensor is removed first.**

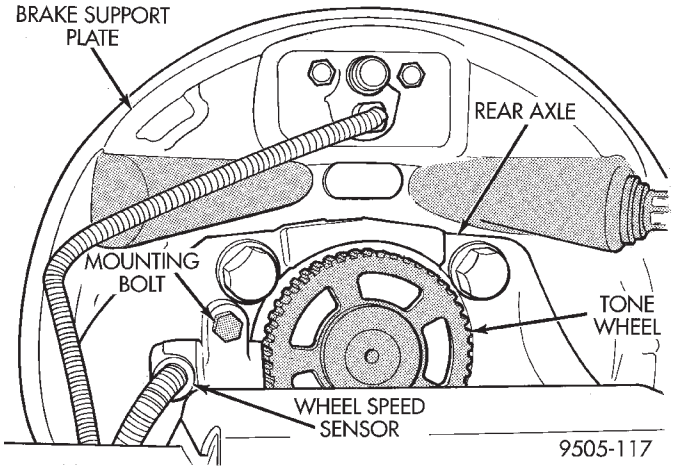


Fig. 74 Rear Wheel Speed Sensor

CAUTION: When working in the area of the rear hub/bearing and when removing it from the rear axle, care must be used so the teeth on the tone wheel are not damaged. Damage to the teeth on the tone wheel will result in false ABS cycling and corrosion of the tone wheel.

(7) Remove the 4 bolts (Fig. 75) attaching the hub/bearing to the flange of the rear axle .

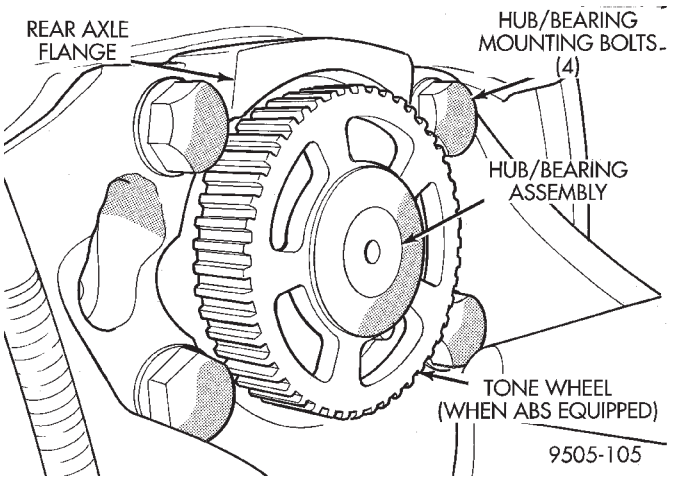


Fig. 75 Rear Hub/Bearing Mounting Bolts

REMOVAL AND INSTALLATION (Continued)

CAUTION: Corrosion may occur between the hub/bearing and the axle. If this occurs the hub/bearing will be difficult to remove from the axle. If the hub/bearing will not come out of the axle by pulling on it by hand, do not pound on the hub/bearing to remove it from the axle. Pounding on the hub/bearing to remove it from the axle will damage the hub/bearing. This damage will result in noise or failure of the bearing.

(8) If hub/bearing cannot be removed from the axle by hand, use Remover Special Tool 8214 (Fig. 76) and following procedure to press the hub/bearing out of the axle.

(a) Place Special Tool 8214-1 over tone wheel and against cast flange of hub/bearing (Fig. 76)

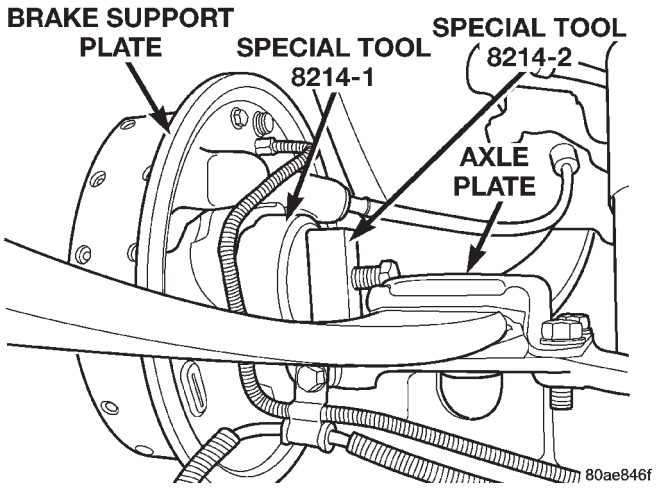


Fig. 76 Special Tool 8214 Installed

(b) Put a dab of grease in the bolt pilot hole on the back of Special Tool 8214-1.

(c) Insert Special Tool 8214-2 into the hole in the bottom of the end casting on the axle (Fig. 76). Special Tool 8214-2 should be against and supported by the axle plate (Fig. 76) when pressing the wheel bearing out of the axle.**If Special Tool 8214-2 will not fit into the hole in the end casting, file or grind the flashing from the hole until tool fits properly.**

(d) Align bolt in Special Tool 8214-2 with pilot hole in Special Tool 8214-1. Tighten bolt against Special Tool 8214-1.

(e) Press hub/bearing out of axle by continuing to tighten bolt in Special Tool 8214-2 against Special Tool 8214-1.

(9) Remove the hub/bearing from the rear axle and brake support plate (Fig. 77).

(10) Using a suitable tool such as a 14 mm box wrench (Fig. 78) or an aircraft type hose clamp, compress the flared legs on park brake cable retainer. Then pull the park brake cable out of brake support plate.

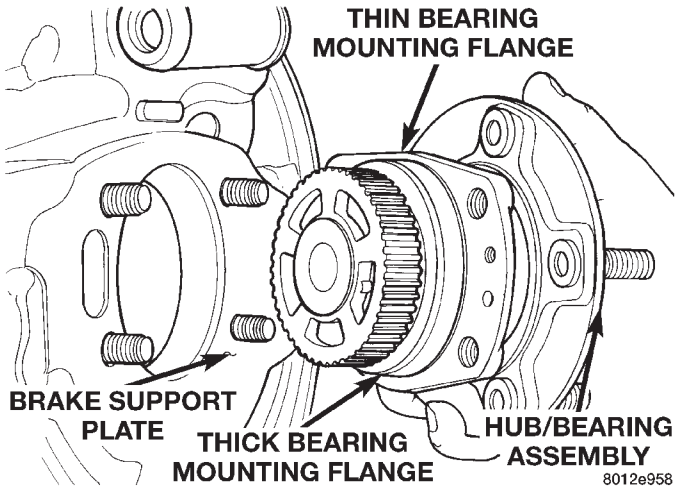


Fig. 77 Hub/Bearing Removal And Installation On Axle

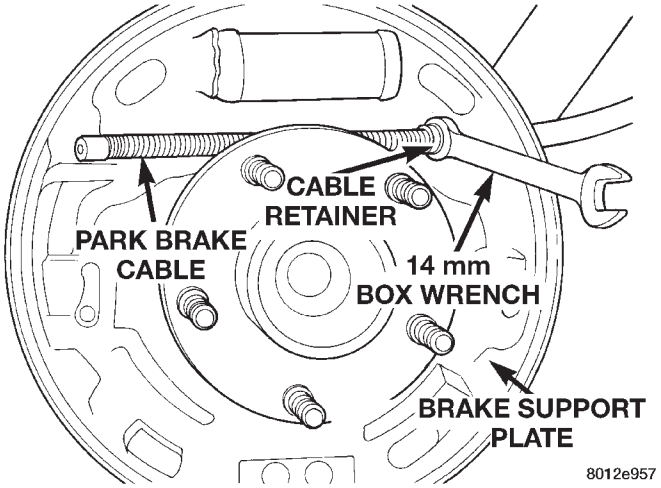


Fig. 78 Removing Park Brake Cable From Brake Support Plate

(11) Lower vehicle enough to access the brake pedal.

(12) Using a brake pedal depressor, move brake pedal to a position past its first 1 inch of travel. This will prevent brake fluid from draining out of master cylinder when brake tube is remove from wheel cylinder.

(13) Raise vehicle.

(14) Disconnect brake tube from wheel cylinder (Fig. 79).

(15) Remove the 2 bolts attaching the wheel cylinder to the brake support plate (Fig. 79).

(16) Remove the wheel cylinder from the brake support plate.

(17) Remove the rear brake support plate from the rear axle.

REMOVAL AND INSTALLATION (Continued)

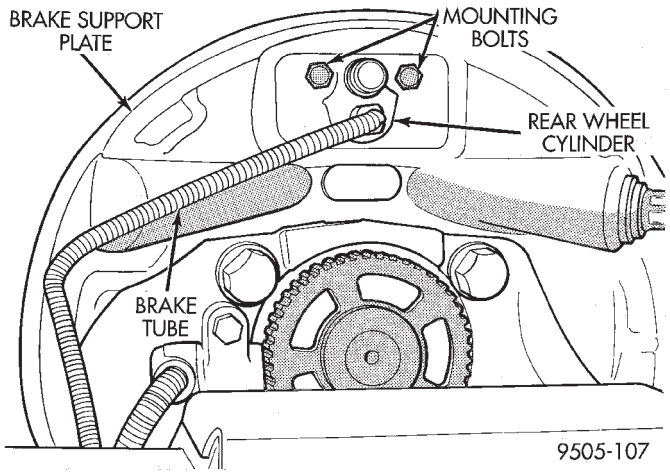


Fig. 79 Rear Wheel Cylinder Mounting Bolts And Brake Tube

INSTALL

(1) Install the 4 hub/bearing to axle mounting bolts into the mounting holes in the flange of the rear axle.

(2) Install the rear brake support plate on the 4 mounting bolts installed in the flange of the rear axle (Fig. 80).

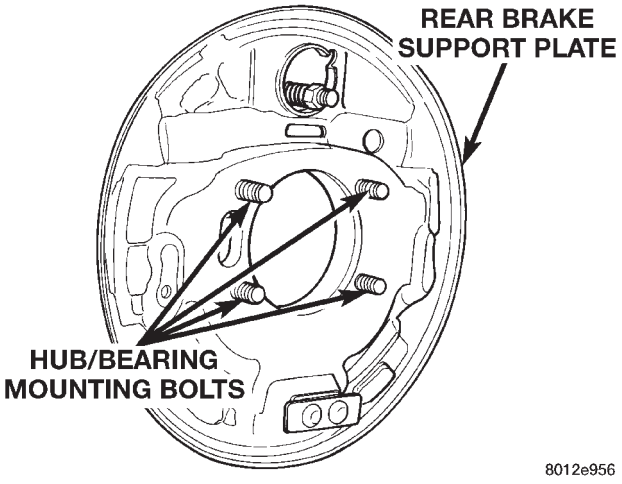


Fig. 80 Brake Support Plate Mounted On Bearing Attaching Bolts

NOTE: When installing the hub/bearing on the rear axle, the bearing is to be installed with the thick bearing mounting flange (Fig. 77) pointing down.

(3) Align the rear hub/bearing with the 4 mounting bolts and start mounting bolts into hub/bearing. Tighten the 4 bolts in a criss-cross pattern until the hub/bearing and brake support plate is fully and squarely seated onto flange of rear axle.

(4) Tighten the 4 hub/bearing mounting bolts (Fig. 75) to a torque of 129 N·m (95 ft. lbs.)

(5) Apply sealant such as Mopar Gasket-In-A-Tube or an equivalent around the wheel cylinder opening in the brake support plate.

(6) Install wheel cylinder onto brake support and tighten the wheel cylinder to brake support plate attaching bolts (Fig. 79) to 8 N·m (75 in. lbs.).

(7) Install brake tube (Fig. 79) on rear wheel cylinder. Tighten tube nut to a torque of 16 N·m (142 in. lbs.).

(8) Install the rear wheel speed sensor on the rear hub/bearing flange (Fig. 74). Install the speed sensor attaching bolt and tighten to a torque of 12 N·m (105 in. lbs.).

(9) Install the rear park brake cable into its mounting hole in the rear brake support plate.

(10) Install the park brake cable on the park brake actuation lever.

(11) Install the rear brake shoes on the brake support plate. Refer to Brake Shoe Service in this section of the service manual for the proper brake shoe installation procedure.

(12) Install brake drum onto hub/bearing.

(13) Install wheel and tire.

(14) Tighten wheel stud nuts to 129 N·m (95 ft. lbs.).

(15) Adjust the rear brakes, (See Adjusting Service Brakes) in Service Adjustments section in this group of the service manual.

(16) Bleed the entire brake system. See Bleeding Brake System in the Service Procedures section in this group of the service manual.

REAR BRAKE WHEEL CYLINDER

REMOVE

(1) In case of a leak, remove brake shoes, (replace if soaked with grease or brake fluid.)

(2) Disconnect the rear brake hydraulic tube from the wheel cylinder (Fig. 81).

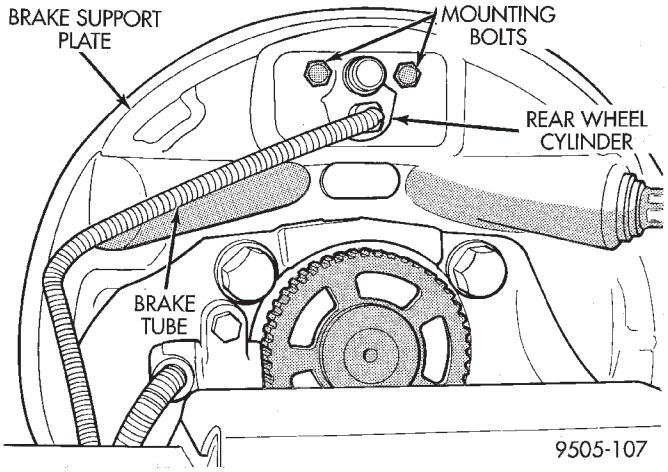


Fig. 81 Brake Hydraulic Tube At Wheel Cylinder

REMOVAL AND INSTALLATION (Continued)

(3) Remove the rear wheel cylinder attaching bolts (Fig. 81). Then pull wheel cylinder assembly off the brake support plate.

INSTALL

(1) Apply Mopar® Gasket In-A-Tube or equivalent sealant around wheel cylinder mounting surface in brake support plate.

(2) Install wheel cylinder onto brake support, and tighten the wheel cylinder to brake support plate attaching bolts (Fig. 81) to 8 N·m (75 in. lbs.).

(3) Attach hydraulic brake tube to wheel cylinder, (Fig. 81) and tighten tube to wheel cylinder fitting to 16 N·m (142 in. lbs.).

(4) Install brake shoes on support plate.

(5) Install rear brake drum onto rear hub. Install rear wheel and tire assembly, tighten wheel stud nuts to 129 N·m (95 ft. lbs.).

(6) Adjust the rear brakes, (See Adjusting Service Brakes) in Service Adjustments section in this group of the service manual.

(7) Bleed the entire brake system. See (Bleeding Brake System) in Service Adjustments section in this group of the service manual.

HUB/BEARING

FRONT WHEEL DRIVE

REMOVE

(1) Raise vehicle on jackstands or centered on a frame contact type hoist. See Hoisting in the Lubrication and Maintenance section of this service manual for required lifting procedure.

(2) Remove wheel and tire.

(3) Remove brake drum from hub/bearing.

(4) Remove rear wheel speed sensor from rear hub/bearing (Fig. 82). This will prevent damage to the speed sensor during removal and installation of the hub/bearing. **The rear wheel speed sensor bolts to the hub/bearing. It can not be removed unless the speed sensor is removed first.**

CAUTION: When working in the area of the rear hub/bearing and when removing it from the rear axle, care must be used so the teeth on the tone wheel are not damaged. Damage to the teeth on the tone wheel will result in false ABS cycling and corrosion of the tone wheel.

(5) Remove the 4 bolts (Fig. 83) attaching the hub/bearing to the rear axle.

CAUTION: Corrosion may occur between the hub/bearing and the axle. If this occurs the hub/bearing will be difficult to remove from the axle. If the hub/bearing will not come out of the axle by pulling on it by hand, do not pound on the hub/bearing to remove it from the axle. Pounding on the hub/bearing to remove it from the axle will damage the hub/bearing. This damage will result in noise or failure of the bearing.

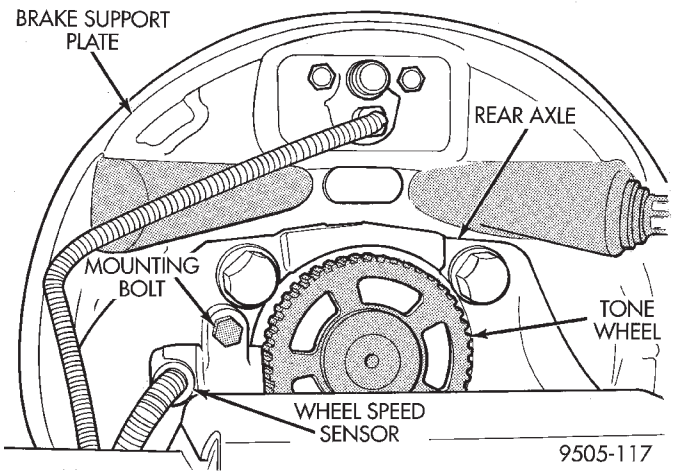


Fig. 82 Rear Wheel Speed Sensor

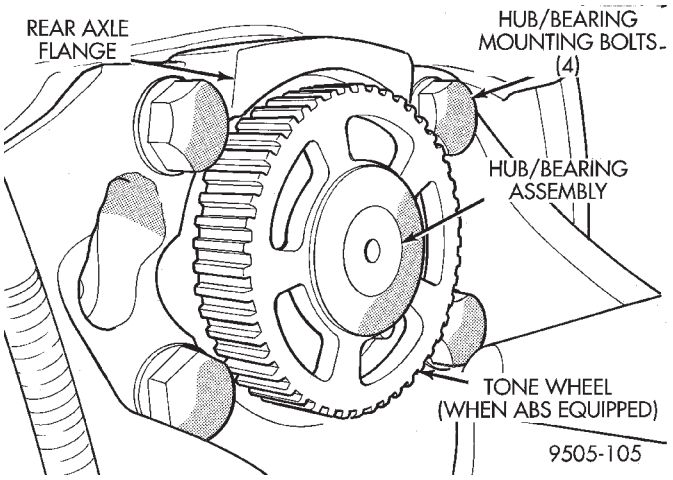


Fig. 83 Rear Hub/Bearing Mounting Bolts

(6) If hub/bearing cannot be removed from the axle by hand, use Remover Special Tool 8214 (Fig. 84) and following procedure to press the hub/bearing out of the axle.

(a) Place Special Tool 8214-1 over tone wheel and against cast flange of hub/bearing (Fig. 84)

(b) Put a dab of grease in the bolt pilot hole on the back of Special Tool 8214-1.

(c) Insert Special Tool 8214-2 into the hole in the bottom of the end casting on the axle (Fig. 84). Special Tool 8214-2 should be against and supported by the axle plate (Fig. 84) when pressing the wheel bearing out of the axle. **If Special Tool 8214-2 will not fit into the hole in the end casting, file or grind the flashing from the hole until tool fits properly.**

REMOVAL AND INSTALLATION (Continued)

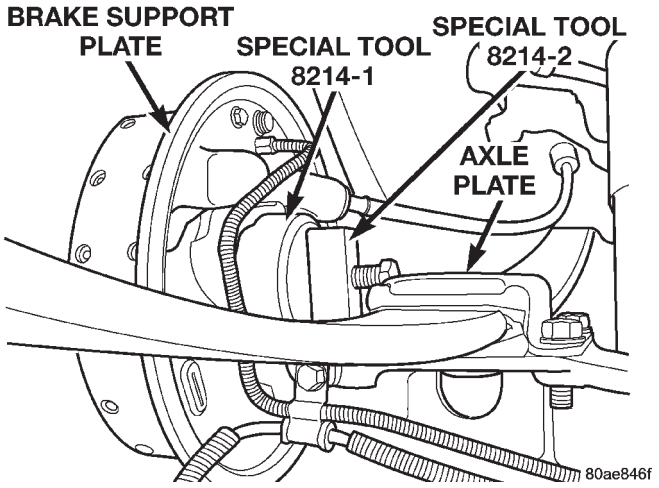


Fig. 84 Special Tool 8214 Installed

(d) Align bolt in Special Tool 8214-2 with pilot hole in Special Tool 8214-1. Tighten bolt against Special Tool 8214-1.

(e) Press hub/bearing out of axle by continuing to tighten bolt in Special Tool 8214-2 against Special Tool 8214-1.

(7) Remove the hub/bearing from the rear axle and brake support plate (Fig. 85).

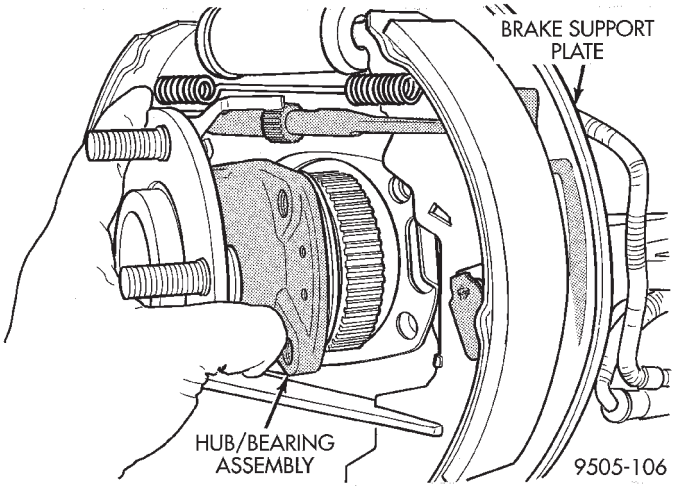


Fig. 85 Removing Rear Hub/Bearing From Axle

INSTALL

(1) Install the 4 hub/bearing to axle mounting bolts into the holes in the flange of the rear axle.

(2) Install the rear brake support plate on the 4 mounting bolts installed in the flange of the rear axle.

(3) Align the rear hub/bearing with the 4 mounting bolts and start mounting bolts into hub/bearing. Tighten the 4 bolts in a criss-cross pattern until the hub/bearing and brake support plate is fully and squarely seated onto flange of rear axle.

(4) Tighten the 4 hub/bearing mounting bolts (Fig. 83) to a torque of 129 N·m (95 ft. lbs.)

(5) Install the rear wheel speed sensor on the rear hub/bearing flange (Fig. 82). Install the speed sensor attaching bolt and tighten to a torque of 12 N·m (105 in. lbs.).

(6) Install brake drum on hub/bearing.

(7) Install wheel and tire.

(8) Tighten the wheel stud nuts in the proper sequence to a torque of 129 N·m (95 ft. lbs.).

(9) Adjust the rear brakes, (See Adjusting Service Brakes) in Service Adjustments section in this group of the service manual.

ALL WHEEL DRIVE

REMOVE

(1) Set the parking brake. **The parking brake is set to keep the hub/bearing and axle shaft from rotating when loosening the hub nut.**

(2) Raise vehicle. Vehicle is to be raised and supported on jackstands or on a frame contact type hoist. See Hoisting in the Lubrication And Maintenance section of this service manual.

(3) Remove the wheel/tire.

(4) Remove the cotter pin and nut retainer (Fig. 86) from the stub shaft of the outer C/V joint.

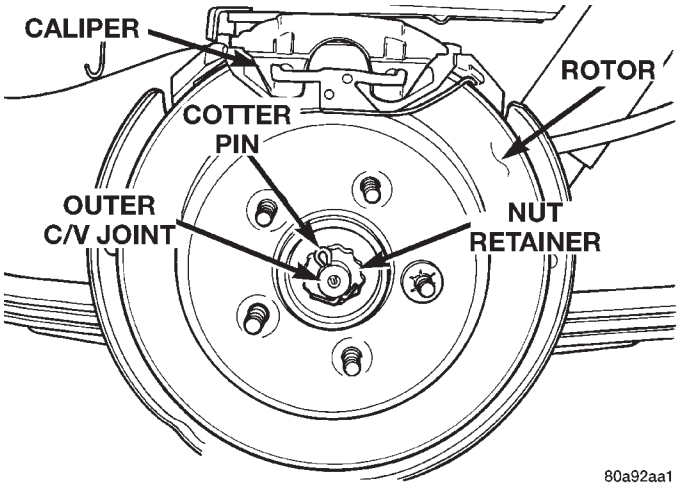


Fig. 86 Cotter Pin And Nut Retainer

(5) Remove the spring washer (Fig. 87) from the stub shaft of the outer C/V joint.

(6) Remove the hub nut and washer (Fig. 88) from the stub shaft of the outer C/V joint.

(7) Remove the 6 bolts (Fig. 89) mounting the driveshaft inner joint to the output shaft of the rear drive line module.

(8) Remove the rear wheel speed sensor (Fig. 90) from the rear hub/bearing.

(9) Release the parking brake.

(10) Remove the disc brake caliper to adapter guide pin bolts (Fig. 91).

(11) Remove rear caliper from adapter using the following procedure. First rotate rear of caliper up

REMOVAL AND INSTALLATION (Continued)

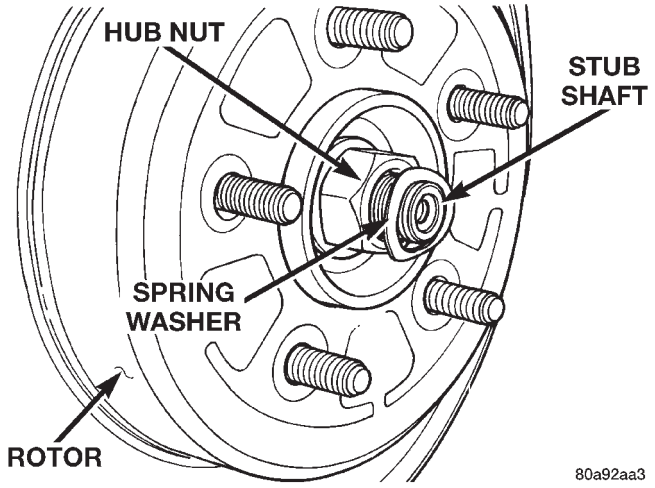


Fig. 87 Spring Washer

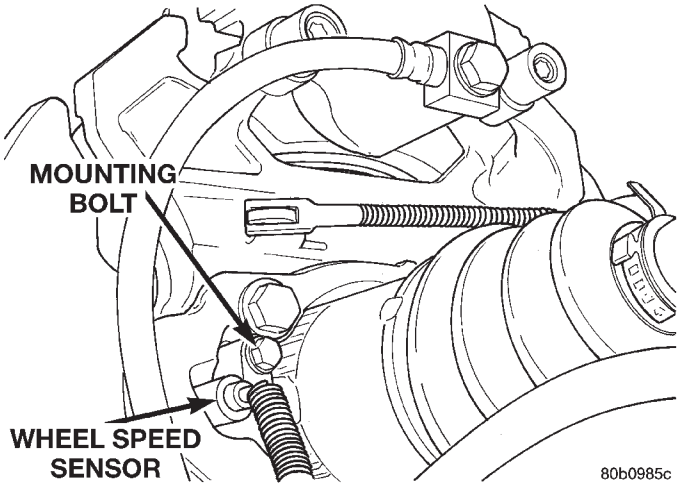


Fig. 90 Wheel Speed Sensor

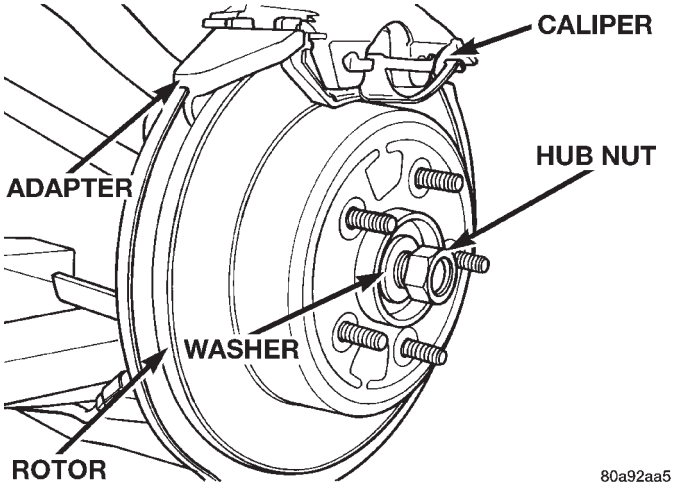


Fig. 88 Hub Nut And Washer

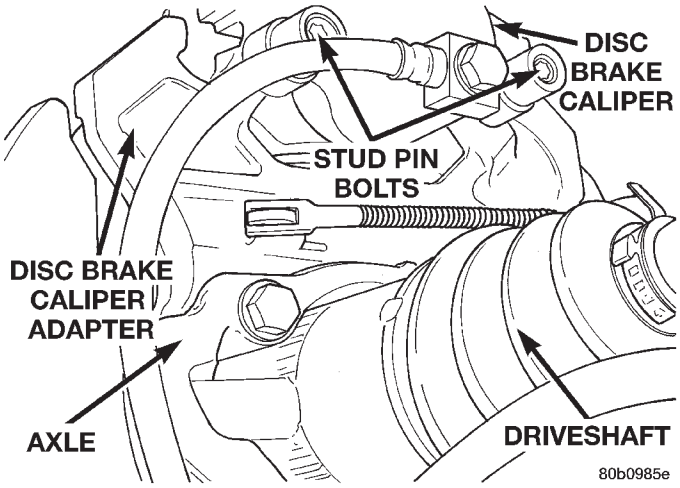


Fig. 91 Caliper Guide Pin Bolts

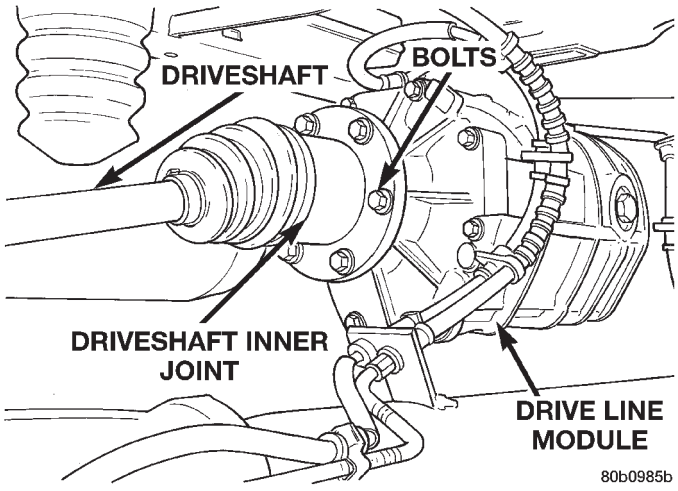


Fig. 89 Driveshaft Attachment To Driveline Module

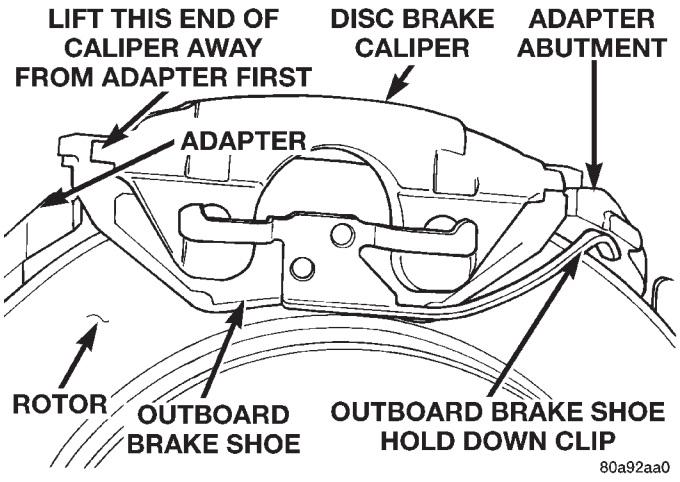


Fig. 92 Removing / Installing Caliper

from the adapter. Then pull the front of the caliper and the outboard brake shoe anti-rattle clip out from under the front abutment on the adapter (Fig. 92).

(12) Support caliper to prevent the weight of the caliper from damaging the flexible brake hose (Fig. 93).

(13) Remove the rotor from the hub/bearing.

REMOVAL AND INSTALLATION (Continued)

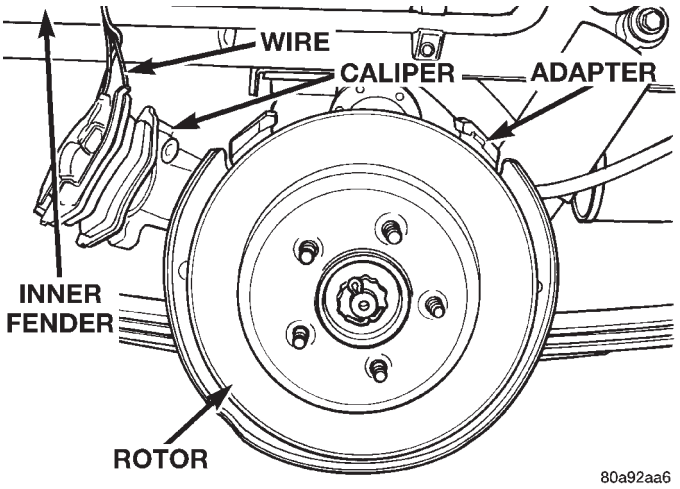


Fig. 93 Correctly Supported Caliper

(14) Remove driveshaft from rear drive line module and hub/bearing. Driveshaft is removed by first compressing the inner joint on the driveshaft and removing it from the drive line module. Then, slide the outer joint of the driveshaft out of the hub/bearing.

(15) Remove the hub/bearing to axle mounting bolts (Fig. 94).

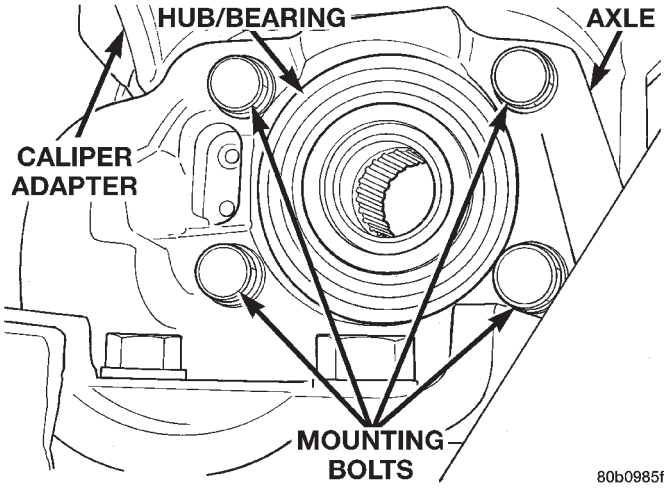


Fig. 94 Hub/Bearing Mounting Bolts

CAUTION: Corrosion may occur between the hub/bearing and the axle. If this occurs the hub/bearing will be difficult to remove from the axle. If the hub/bearing will not come out of the axle by pulling on it by hand, do not pound on the hub/bearing to remove it from the axle. Pounding on the hub/bearing to remove it from the axle will damage the hub/bearing. This damage will result in noise or failure of the hub/bearing. To remove a hub/bearing which is corroded to the axle, lightly tap the disc brake caliper adapter using a soft faced hammer. This will remove both the disc brake caliper adapter and hub/bearing from the axle. The hub/bearing will then need to be removed from the caliper adapter.

(16) Remove the hub/bearing from the axle. (Fig. 95).

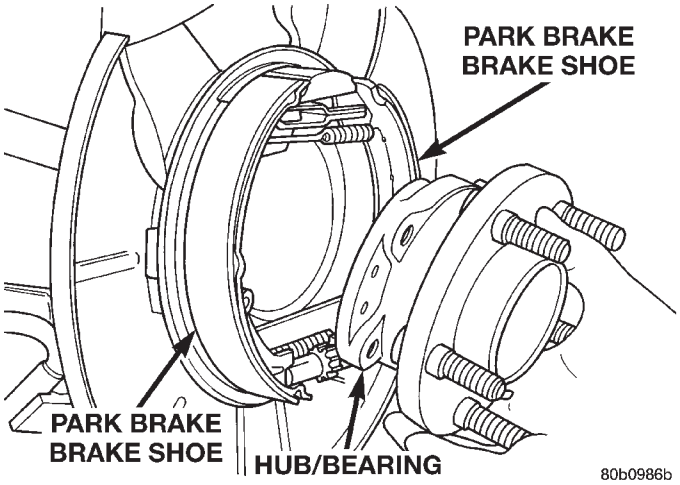


Fig. 95 Hub/Bearing Removal And Installation

(17) If the disc brake caliper adapter and hub/bearing were removed as an assembly from the axle and the hub/bearing cannot be removed from the adapter by hand, use the following procedure to remove it from the adapter. With a helper supporting the caliper adapter in his hands, position Remover, Special Tool 8214-1 on the cast housing of hub/bearing (Fig. 96). **Do not position special tool on inner race of hub/bearing.** Lightly strike Remover, Special Tool 8214-1 with a hammer to remove the bearing.

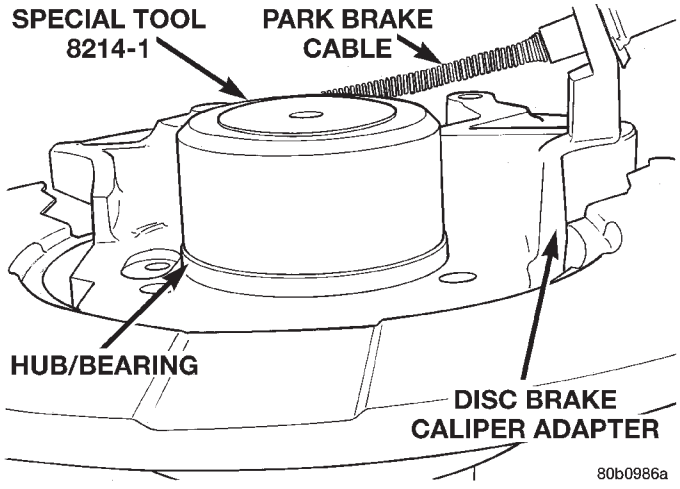


Fig. 96 Hub/Bearing Removal From Caliper Adapter

INSTALL

(1) Install hub/bearing on end of axle. (Fig. 95).

(2) Install the hub/bearing mounting bolts. In a progressive criss-cross pattern, tighten the 4 hub/bearing mounting bolts (Fig. 94) until the disc brake

REMOVAL AND INSTALLATION (Continued)

caliper adapter and hub/bearing are squarely seated against the axle. Then tighten the hub/bearing mounting bolts to a torque of 129 N·m (95 ft. lbs.).

(3) Install driveshaft in hub/bearing and on output shaft of rear drive line module. Driveshaft is installed by first sliding the outer joint of the driveshaft into the hub/bearing and then compressing the inner joint on the driveshaft and installing it on the output shaft the drive line module.

(4) Install rotor on hub/bearing.

(5) Carefully lower disc brake caliper and brake shoes over rotor and onto caliper adapter by reversing the removal procedure (Fig. 92).

CAUTION: When installing guide pin bolts extreme caution should be taken not to crossthread the caliper guide pin bolts.

(6) Install the disc brake caliper guide pin bolts (Fig. 91). Tighten the guide pin bolts to a torque of 22 N·m (192 in. lbs.).

(7) Clean all foreign material off the threads of the outer C/V joint stub shaft. Install the washer and hub nut (Fig. 88) on the stub shaft of the outer C/V joint.

(8) Lower vehicle.

(9) Set the park brake. **This is required to keep the driveshaft from rotating when tightening and torquing the hub nut and driveshaft inner joint to driveline module mounting nuts.**

(10) Raise vehicle.

(11) Tighten the driveshaft inner joint to drive line module output shaft mounting bolts (Fig. 89) to a torque of 61 N·m (45 ft. lbs.).

(12) Tighten the outer C/V joint hub nut (Fig. 88) to a torque of 244 N·m (180 ft. lbs.).

(13) Install the spring washer (Fig. 87) on the stub shaft of the outer C/V joint.

(14) Install the nut retainer and cotter pin (Fig. 86) on the stub shaft of the outer C/V joint.

(15) Install the wheel speed sensor on the hub/bearing and adapter. Install the wheel speed sensor attaching bolt (Fig. 90). Tighten the wheel speed sensor attaching bolt to a torque of 12 N·m (105 in. lbs).

(16) Install wheel and tire.

(17) Tighten the wheel mounting stud nuts in proper sequence until all nuts are torqued to half specification. Then repeat the tightening sequence to the full specified torque of 129 N·m (95 ft. lbs.).

(18) Remove jackstands or lower hoist.

CAUTION: Before moving vehicle, pump the brake pedal several times to insure the vehicle has a firm brake pedal to adequately stop vehicle.

(19) Road test vehicle to ensure proper operation of the brake system.

MASTER CYLINDER

CAUTION: Different types of master cylinders are used on this vehicle. Vehicles equipped with traction control use a center port master cylinder. Vehicles not equipped with traction control use a compensating port master cylinder. Be sure to verify if the vehicle is equipped with traction control and that the correct replacement master cylinder is used. Also, vehicles that are equipped with four wheel disc brakes have a master with a different size piston bore than the other master cylinders. If a new master cylinder is being installed, be sure the correct master cylinder is used for the type of brake system the vehicle is equipped with.

REMOVE

CAUTION: Vacuum in the power brake booster must be pumped down (removed) before removing master cylinder from power brake booster. This is necessary to prevent the power brake booster from sucking in any contamination as the master cylinder is removed. This can be done simply by pumping the brake pedal, with the vehicle's engine not running, until a firm feeling brake pedal is achieved.

(1) With engine not running, pump the brake pedal until a firm pedal is achieved (4-5 strokes).

CAUTION: Before removing the master cylinder filler tube from the brake fluid reservoir, the filler tube, brake fluid reservoir and master cylinder must be thoroughly cleaned. This must be done to prevent dirt particles from falling into the brake fluid reservoir and entering the brakes hydraulic system.

(2) Thoroughly clean all surfaces of the filler neck, brake fluid reservoir, and master cylinder. Use only a solvent such as Mopar Brake Parts Cleaner or an equivalent.

(3) Remove master cylinder filler tube from brake fluid reservoir by pushing down and rotating (Fig. 97). Then remove the cap from the removed filler tube and install it on the master cylinder reservoir.

(4) Remove vehicle wiring harness connector, from the brake fluid level sensor, in master cylinder brake fluid reservoir (Fig. 98).

(5) Disconnect the primary and secondary brake tubes from the master cylinder housing (Fig. 99). Install sealing plugs in the open brake tube outlets on master cylinder assembly.

REMOVAL AND INSTALLATION (Continued)

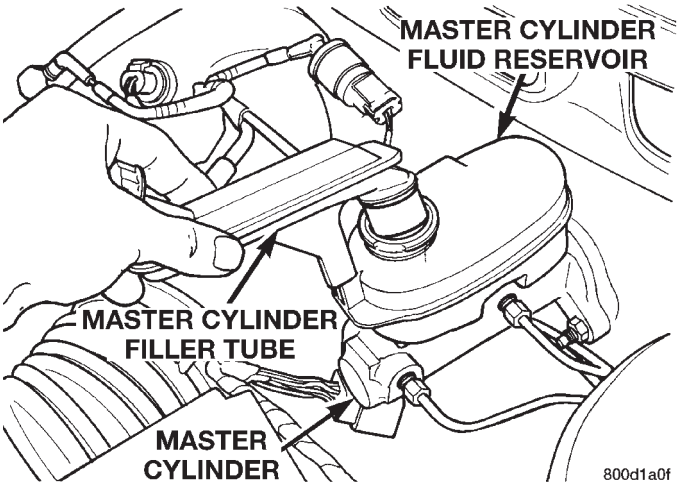


Fig. 97 Master Cylinder Filler Tube Removal

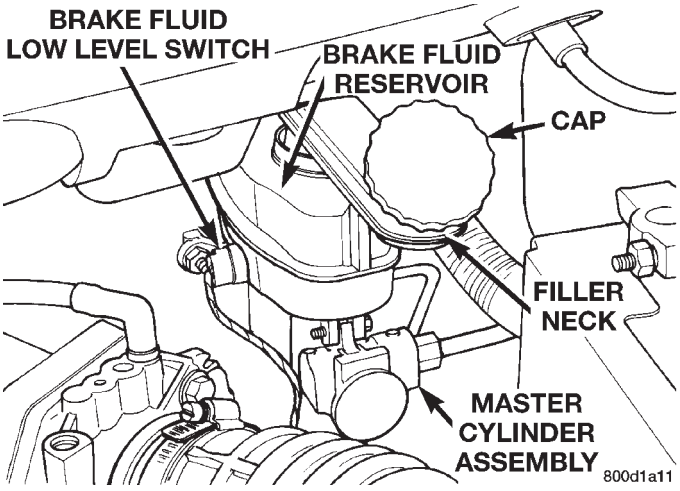


Fig. 98 Electrical Connector At Fluid Level Sensor

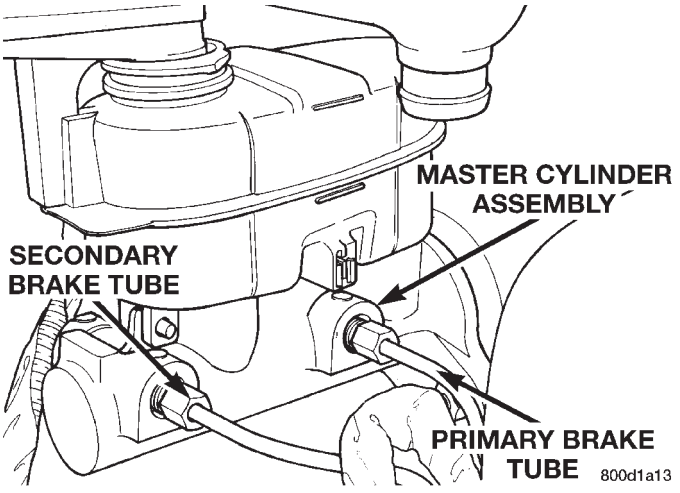


Fig. 99 Primary/Secondary Brake Tubes At Master Cylinder

CAUTION: Before removing the master cylinder from the power brake vacuum booster, the master cylinder and vacuum booster must be thoroughly cleaned. This must be done to prevent dirt particles from falling into the power brake vacuum booster.

(6) Clean the area where the master cylinder assembly attaches to the power brake booster. Use only a solvent such as Mopar Brake Parts Cleaner or an equivalent.

(7) Remove the 2 nuts attaching the master cylinder assembly to the brake vacuum booster (Fig. 100).

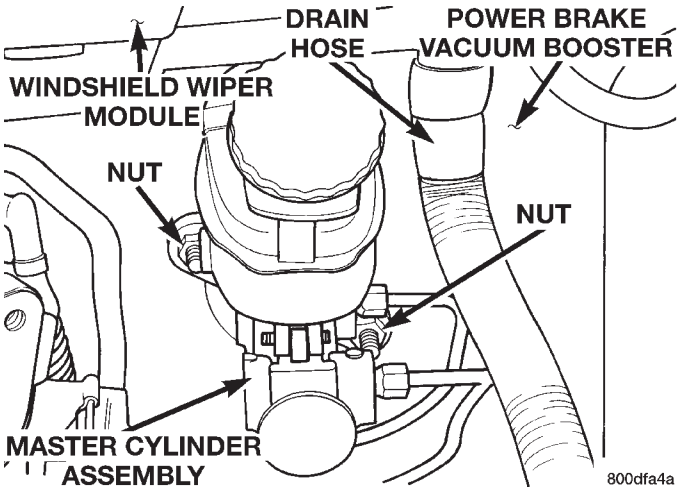


Fig. 100 Master Cylinder Mounting To Vacuum Booster

(8) Slide master cylinder assembly straight out of the power brake vacuum booster.

CAUTION: The master cylinder is used to create the seal for holding vacuum in the power brake vacuum booster. The vacuum seal/boot on the master cylinder MUST be replaced whenever the master cylinder is removed from the power brake vacuum booster.

(9) Remove the vacuum seal located on the mounting flange of the master cylinder. The vacuum seal is removed from the master cylinder by **carefully** pulling it away from the master cylinder. **Do not attempt to pry the seal off the master cylinder by inserting a sharp tool between seal and master cylinder casting.**

BLEEDING MASTER CYLINDER

CAUTION: When clamping master cylinder in vise, only clamp master cylinder by its mounting flange, do not clamp on primary piston, seal or body of master cylinder.

(1) Clamp the master cylinder in a vise using only the mounting flange (Fig. 101).

REMOVAL AND INSTALLATION (Continued)

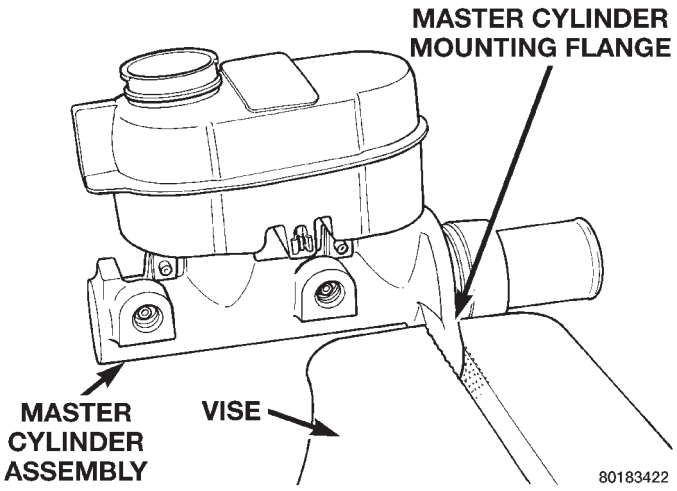


Fig. 101 Master Cylinder Correctly Mounted In Vise

NOTE: Two different size bleeding tubes are used depending on which type of master cylinder the vehicle is equipped with. Vehicles equipped with traction control use a center port master cylinder with a larger diameter brake tube. Vehicles not equipped with traction control use a compensating port master cylinder using a standard 3/16 inch diameter brake tube. Be sure the correct size bleeding tubes are used when bleeding the master cylinder.

(2) Install the Bleeding Tubes, Special Tool 6920 for a non traction control master cylinder or Special Tool 8129 for a traction control master cylinder on the master cylinder (Fig. 102). Position bleeding tubes so the outlets of bleeding tubes will be below surface of brake fluid when reservoir is filled to its proper level.

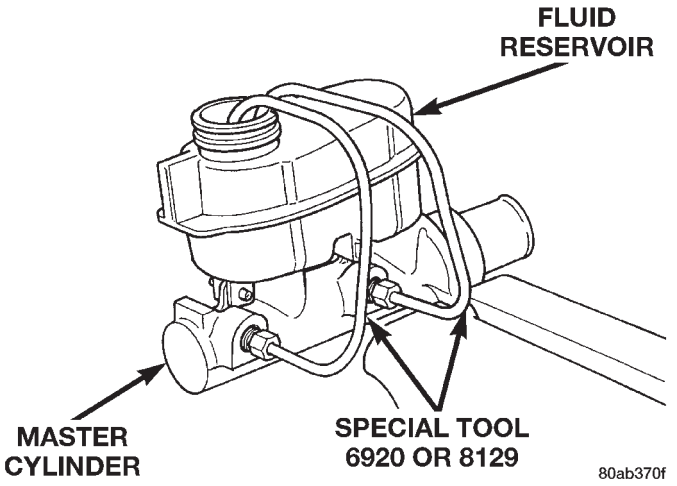


Fig. 102 Bleeding Tubes Installed On Master Cylinder

(3) Fill brake fluid reservoir with brake fluid conforming to DOT 3 specifications such as Mopar or an Equivalent.

(4) Using a wooden dowel, (Fig. 102) depress push rod slowly, and then allow pistons to return to released position. Repeat several times until all air bubbles are expelled from master cylinder.

(5) Remove bleeding tubes from master cylinder outlet ports, and then plug outlet ports and install fill cap on reservoir.

(6) Remove master cylinder from vise.

NOTE: Note: It is not necessary to bleed the ABS hydraulic control unit (HCU) after replacing the master cylinder. But, the base brake hydraulic system must be bled to ensure no air is entered the hydraulic system when the master cylinder was removed.

INSTALL

CAUTION: When replacing the master cylinder on a vehicle, a NEW vacuum seal MUST be installed on the master cylinder. Use only procedure detailed below for installing the vacuum seal onto the master cylinder.

(1) Install a **NEW** vacuum seal on master cylinder making sure seal sits squarely in groove of master cylinder casting (Fig. 103).

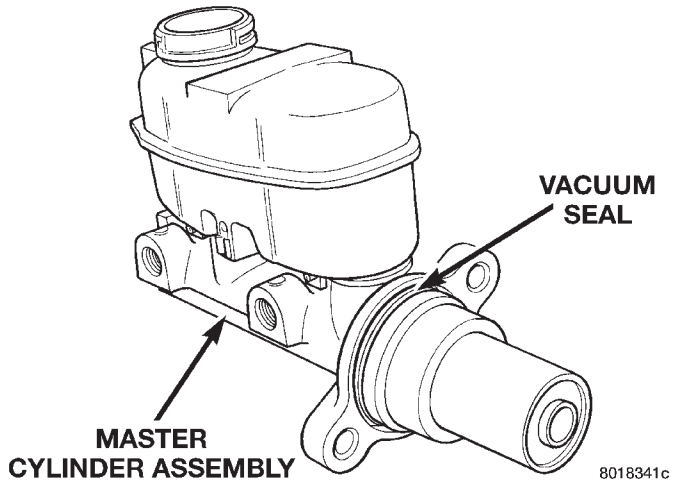


Fig. 103 Vacuum Seal Installed On Master Cylinder

(2) Position master cylinder on studs of power brake unit, aligning push rod on power brake vacuum booster with master cylinder push rod.

(3) Install the 2 master cylinder to power brake unit mounting nuts. Then tighten both mounting nuts to a torque of 25 N·m (225 in. lbs.).

REMOVAL AND INSTALLATION (Continued)

CAUTION: When installing the primary and secondary brake tubes on master cylinder, be sure brake tubes do not contact any other components within the vehicle and that there is slack in the flexible sections of the tubes. This is required due to the movement between the ABS hydraulic control module (HCU) and the master cylinder, when the vehicle is in motion.

(4) Connect the primary and secondary brake tubes to master cylinder primary and secondary ports (Fig. 99). Brake tubes must be held securely when tightened to control orientation of flex section. Then fully tighten the tube nuts to a torque of 17 N·m (145 in. lbs.).

(5) Install the vehicle wiring harness connector, on the brake fluid level sensor in the master cylinder brake fluid reservoir (Fig. 98).

(6) Install filler tube into the master cylinder fluid reservoir (Fig. 97).

VACUUM BOOSTER 2.4 LITER ENGINE

REMOVE

CAUTION: Reserve vacuum in the vacuum booster must be pumped down (removed) before removing master cylinder from vacuum booster. This is necessary to prevent the vacuum booster from sucking in any contamination as the master cylinder is removed. This can be done simply by pumping the brake pedal, with the vehicle's engine not running, until a firm feeling brake pedal is achieved.

(1) With engine not running, pump brake pedal until a firm pedal is achieved (4-5 strokes).

(2) Remove both battery cables from battery.

(3) Remove the battery thermal guard and the battery from the battery tray.

(4) Remove the air inlet resonator and hoses as an assembly from the throttle body and air cleaner housing (Fig. 104)

(5) If vehicle is equipped with speed control, unplug wiring harness connector from the speed control servo. Then disconnect vacuum lines from the speed control servo and vacuum reservoir on battery tray.

(6) Remove bolt attaching the speed control servo bracket to the battery tray. Slide the bracket forward to unhook it from the battery tray and remove.

(7) Remove the 2 bolts and the nut (Fig. 105) attaching the battery tray to the body.

(8) Remove wiring harness connector from brake fluid level sensor in master cylinder fluid reservoir (Fig. 106).

(9) Clean the area where the master cylinder assembly attaches to the power brake booster. Use only a solvent such as Mopar Brake Parts Cleaner or an equivalent.

(10) Remove clip attaching drain hose for wiper module to brake tube at master cylinder. Remove

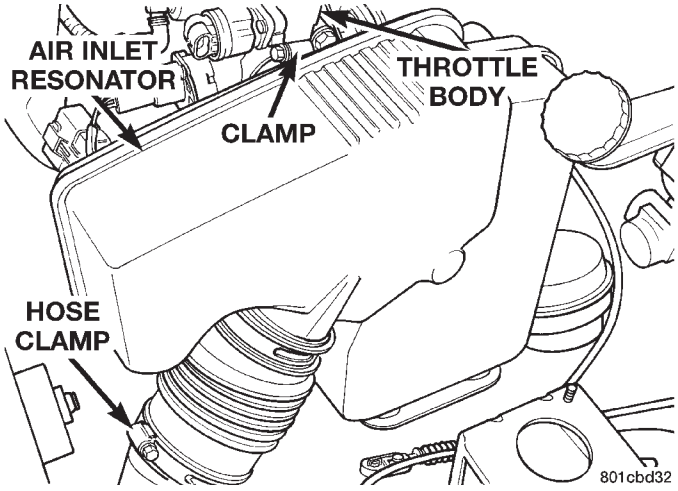


Fig. 104 Air Inlet Resonator

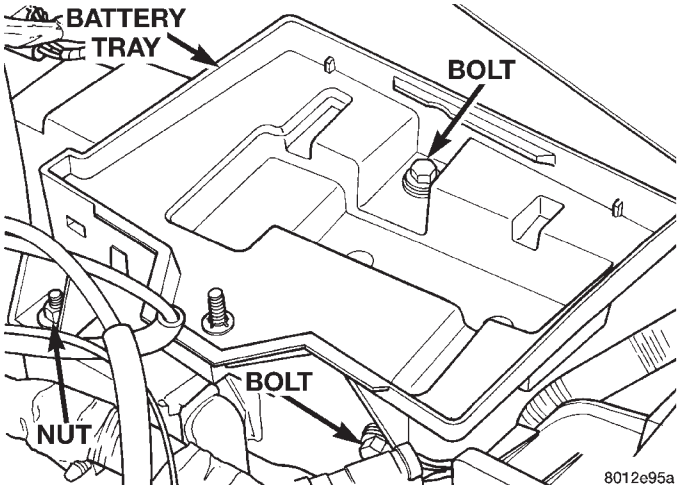


Fig. 105 Battery Tray Mounting Locations

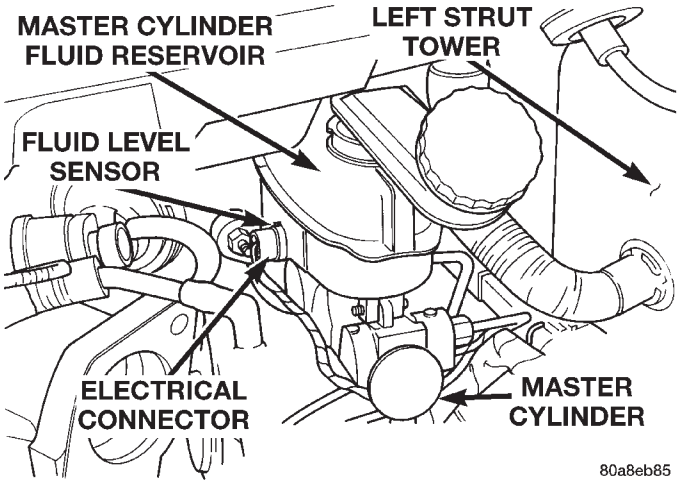


Fig. 106 Fluid Level Sensor Electrical Connection

REMOVAL AND INSTALLATION (Continued)

drain hose (Fig. 107) from wiper module. Remove the 2 nuts attaching the master cylinder to the vacuum booster (Fig. 107).

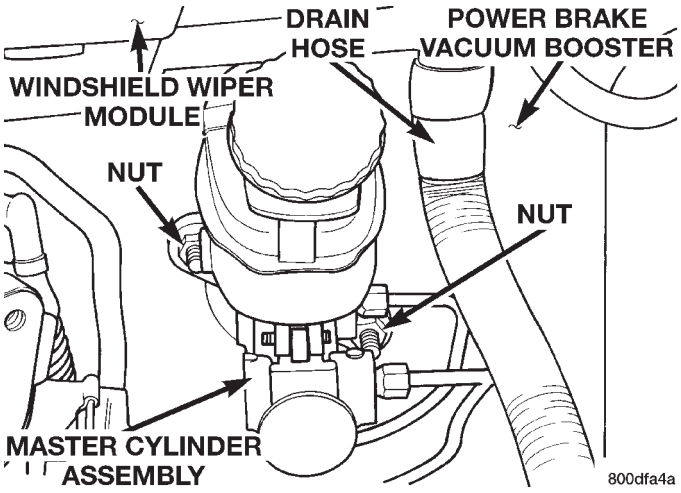


Fig. 107 Master Cylinder Attachment To Vacuum Booster

NOTE: It is not necessary to remove the brake tubes from the master cylinder when removing the master cylinder from the vacuum booster.

(11) Remove the master cylinder and brake tubes as an assembly from the vacuum booster. When master cylinder is removed, lay it out of the way on top of the left motor mount

(12) Disconnect vacuum hose from check valve located on vacuum booster. **DO NOT REMOVE CHECK VALVE FROM POWER BRAKE BOOSTER.**

(13) Locate the vacuum booster input rod to brake pedal attachment under instrument panel. Position a small screwdriver between the center tang on the vacuum booster input rod to brake pedal pin retaining clip (Fig. 108).

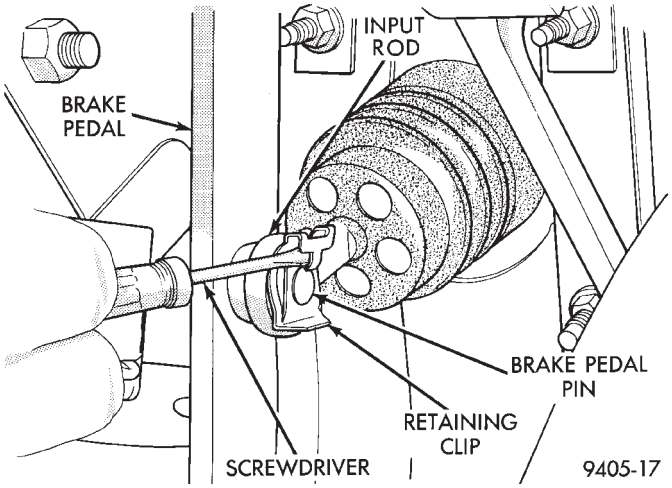


Fig. 108 Input Rod Retaining Pin

(14) Rotate screwdriver enough to allow retaining clip center tang to pass over end of brake pedal pin. Then pull retaining clip off brake pedal pin. **Discard retaining clip. It is not to be reused. Replace only with a new retaining clip when assembled.**

(15) Remove the 4 nuts attaching the vacuum booster to the dash panel. Nuts are accessible from under dash panel in area of the steering column and pedal bracket assembly.

(16) From outside the vehicle, slide vacuum booster forward until its mounting studs clear dash panel. Then tilt the booster up and toward the center of vehicle to remove.

CAUTION: Do not attempt to disassemble the vacuum booster it is to be serviced ONLY as a complete assembly.

INSTALL

CAUTION: When installing the vacuum booster in the vehicle be sure the heater hoses do not become trapped between the booster and the dash panel of the vehicle.

(1) Position vacuum booster onto dash panel using the reverse procedure for its removal.

(2) Install the 4 mounting nuts for the vacuum booster. Tighten the 4 mounting nuts to a torque of 29 N·m (250 in. lbs.).

(3) Using lubriplate, or an equivalent, coat the surface of the brake pedal pin where it contacts the vacuum booster input rod.

CAUTION: When installing the brake pedal pin on the vacuum booster input rod, do not re-use the old retaining clip.

(4) Connect the vacuum booster input rod on the brake pedal pin and install a **NEW** retaining clip (Fig. 109).

(5) Connect the vacuum hose on the check valve in the vacuum booster.

CAUTION: The master cylinder is used to create the seal for holding vacuum in the vacuum booster. The vacuum seal on the master cylinder MUST be replaced with a NEW seal whenever the master cylinder is removed from the vacuum booster.

CAUTION: When removing the vacuum seal from the master cylinder do not use a sharp tool.

(6) Using a soft tool such as a trim stick, remove the vacuum seal from the master cylinder mounting flange.

REMOVAL AND INSTALLATION (Continued)

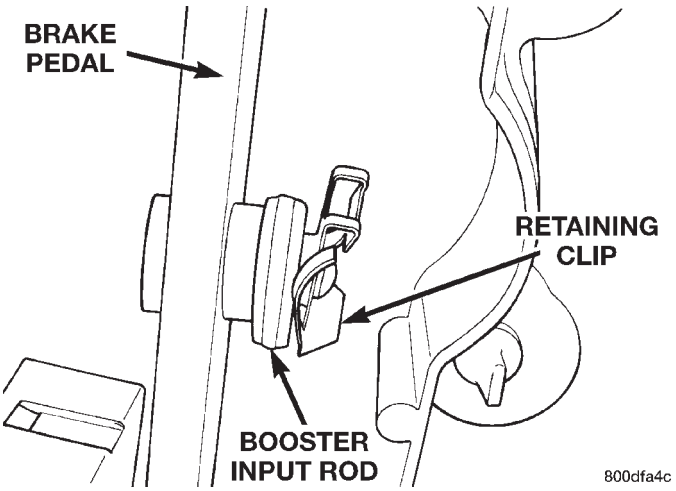


Fig. 109 Retaining Clip Installed On Brake Pedal Pin

(7) Install a **NEW**vacuum seal on mounting flange of master cylinder (Fig. 110).

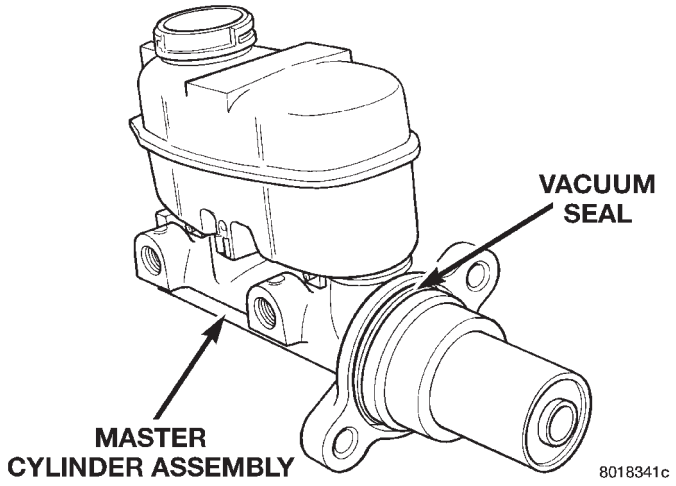


Fig. 110 Vacuum Seal Installed On Master Cylinder

(8) Position master cylinder on studs of vacuum booster aligning push rod on vacuum booster with master cylinder piston.

(9) Install the 2 nuts (Fig. 107) mounting the master cylinder to the vacuum booster. Tighten the mounting nuts to a torque of 25 N·m (225 in. lbs.).

(10) Install the wiper module drain hose (Fig. 107) on the wiper module. Install the tie strap attaching the wiper module drain hose to the brake tube at the master cylinder. **Tie strap should be loosely tightened so as not to collapse the wiper module drain hose.**

(11) Install the wiring harness connector on the brake fluid level sensor in the master cylinder fluid reservoir (Fig. 106).

(12) Install the battery tray in the vehicle. Install the 2 bolts and the nut (Fig. 105) attaching the battery tray. Tighten the 2 bolts and the nut to a torque of 14 N·m (125 in lbs.).

(13) If vehicle is equipped with speed control, install the speed control servo and bracket on the battery tray. Install and securely tighten bolt attaching bracket to battery tray.

(14) If vehicle is equipped with speed control, install the wiring harness connector on the speed control servo. Then connect the vacuum lines onto the speed control servo and vacuum reservoir on battery tray.

(15) Install the air inlet resonator and hoses as an assembly on the throttle body and air cleaner housing (Fig. 104). Securely tighten the hose clamp at the air cleaner housing and throttle body.

(16) Install the battery and the battery thermal guard.

(17) Install the battery cables on the battery.

(18) Check the operation of the stop lamp switch and adjust if necessary.

VACUUM BOOSTER 3.0 LITER ENGINE

REMOVE

CAUTION: Stored vacuum in the vacuum booster must be pumped down (removed) before removing master cylinder from power brake booster. This is necessary to prevent the power brake booster from sucking in any contamination as the master cylinder is removed. This can be done simply by pumping the brake pedal, with the vehicle's engine not running, until a firm feeling brake pedal is achieved.

(1) With engine not running, pump the brake pedal until a firm pedal is achieved (4-5 strokes).

(2) Remove both battery cables from battery.

(3) Remove the battery thermal guard and the battery from the battery tray.

(4) Remove the air inlet resonator and hoses as an assembly from the throttle body and air cleaner housing (Fig. 111)

(5) If vehicle is equipped with speed control, unplug wiring harness connector from the speed control servo. Then disconnect vacuum lines from the speed control servo and vacuum reservoir on battery tray.

(6) Remove bolt attaching the speed control servo bracket to the battery tray. Slide the bracket forward to unhook it from the battery tray and remove.

(7) Remove the 2 bolts and the nut (Fig. 112) attaching the battery tray to the body of the vehicle.

(8) Remove wiring harness connector from brake fluid level sensor in master cylinder fluid reservoir (Fig. 113).

(9) Clean the area where the master cylinder assembly attaches to the power brake booster. Use only a solvent such as Mopar Brake Parts Cleaner or an equivalent.

REMOVAL AND INSTALLATION (Continued)

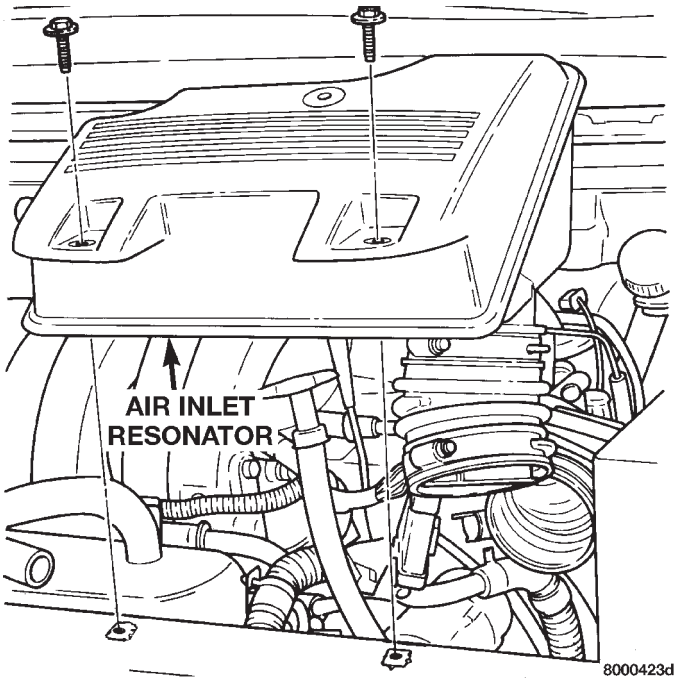


Fig. 111 Air Inlet Resonator

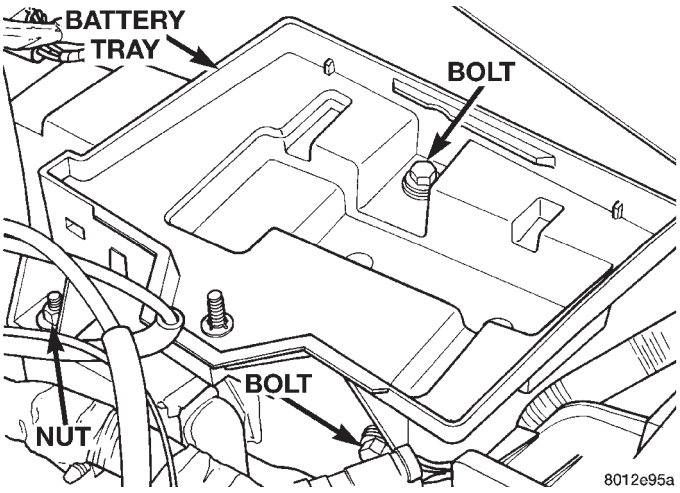


Fig. 112 Battery Tray Mounting Locations

(10) Remove clip attaching drain hose to brake tube at master cylinder. Remove drain hose (Fig. 114) from wiper module. Remove the 2 nuts attaching the master cylinder assembly to the power brake vacuum booster (Fig. 114).

NOTE: It is not necessary to remove the brake tubes from the master cylinder when removing the master cylinder from the power brake vacuum booster.

(11) Remove the master cylinder and the brake tubes as an assembly from power brake vacuum booster. When master cylinder is removed, lay it out of the way on top of the left motor mount

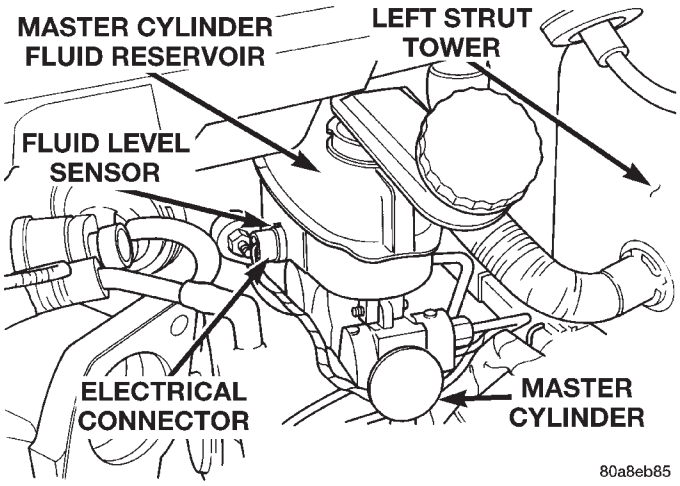


Fig. 113 Electrical Connection To Fluid Level Sensor

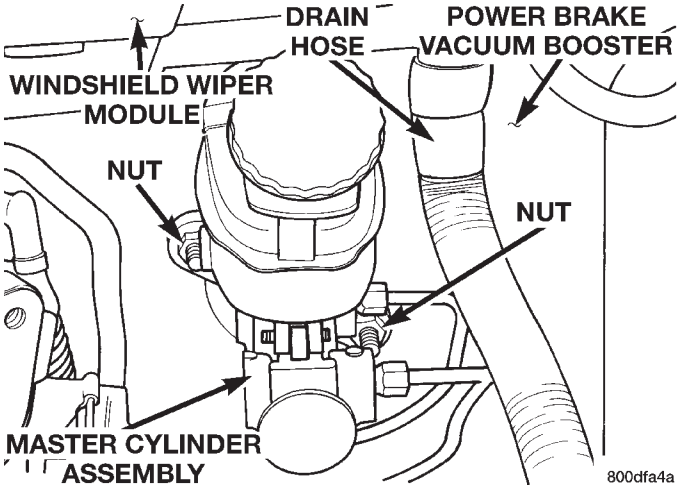


Fig. 114 Master Cylinder Attachment To Power Brake Vacuum Booster

(12) Disconnect vacuum hose from check valve located on power brake vacuum booster. **DO NOT REMOVE CHECK VALVE FROM POWER BRAKE BOOSTER.**

(13) Locate the power brake vacuum booster input rod to brake pedal attachment under instrument panel. Position a small screwdriver between the center tang on the power brake booster input rod to brake pedal pin retaining clip (Fig. 115).

(14) Rotate screwdriver enough to allow retaining clip center tang to pass over end of brake pedal pin. Then pull retaining clip off brake pedal pin. **Discard retaining clip. It is not to be reused. Replace only with a new retaining clip when assembled.**

(15) Remove the 4 nuts attaching the vacuum booster to the dash panel. Nuts are accessible from under dash panel in area of the steering column and pedal bracket assembly.

(16) From outside the vehicle, slide power brake vacuum booster forward until its mounting studs

REMOVAL AND INSTALLATION (Continued)

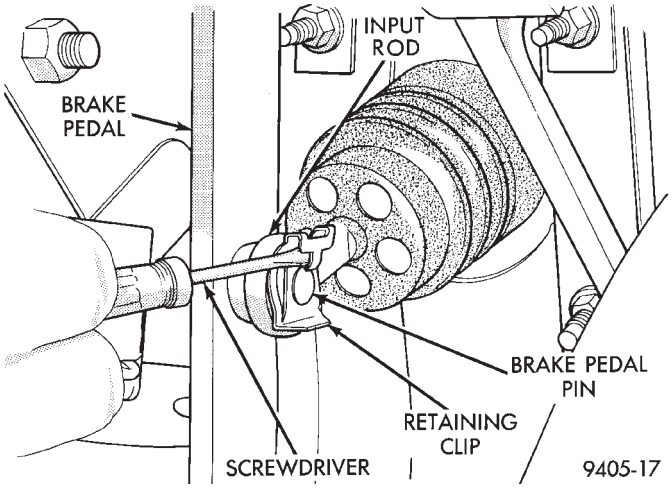


Fig. 115 Booster Input Rod Retaining Pin

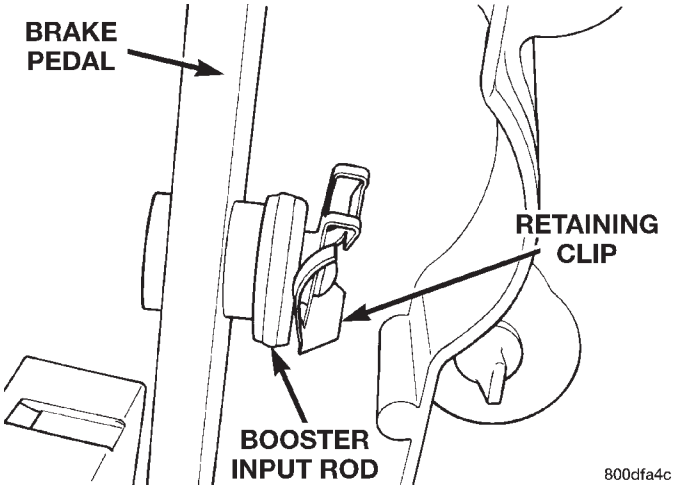


Fig. 116 Retaining Pin Installed On Brake Pedal Pin

clear dash panel. Then tilt the booster up and toward the center of vehicle to remove.

CAUTION: Do not attempt to disassemble the power brake vacuum booster it is to be serviced ONLY as a complete assembly.

INSTALL

CAUTION: When installing the power brake vacuum booster in the vehicle be sure the heater hoses do not become trapped between the booster and the dash panel of the vehicle.

(1) Position power brake booster onto dash panel using the reverse procedure for its removal.

(2) Install the 4 power brake vacuum booster mounting nuts. Tighten the 4 mounting nuts to a torque of 29 N·m (250 in. lbs.).

(3) Using lubriplate, or an equivalent, coat the surface of the brake pedal pin where it contacts the brake vacuum booster input rod.

CAUTION: When installing the brake pedal pin on the power brake vacuum booster input rod, do not re-use the old retaining clip.

(4) Connect power brake vacuum booster input rod on the brake pedal pin and install a **NEW** retaining clip (Fig. 116).

(5) Connect the vacuum hose on the check valve in the power brake vacuum booster.

CAUTION: The master cylinder is used to create the seal for holding vacuum in the power brake vacuum booster. The vacuum seal on the master cylinder MUST be replaced with a NEW seal whenever the master cylinder is removed from the power brake vacuum booster.

CAUTION: When removing the vacuum seal from the master cylinder do not use a sharp tool.

(6) Using a soft tool such as a trim stick, remove the vacuum seal from the master cylinder mounting flange.

(7) Install a **NEW** vacuum seal on mounting flange of master cylinder assembly (Fig. 117).

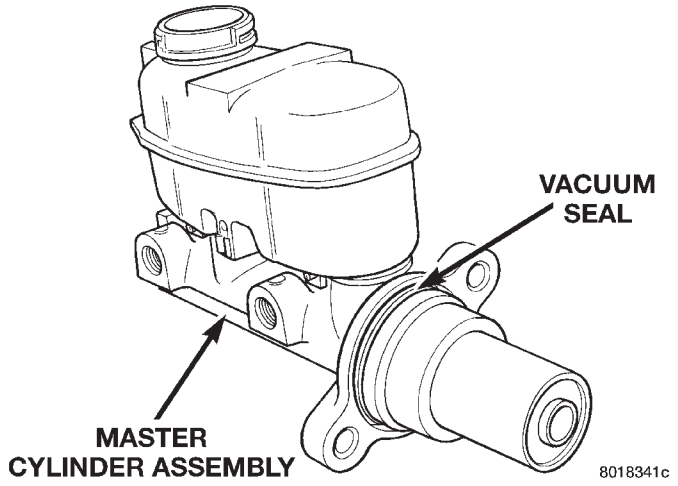


Fig. 117 Vacuum Seal Installed On Master Cylinder

(8) Position master cylinder on studs of power brake booster, aligning push rod on power brake vacuum booster with master cylinder push rod.

(9) Install the 2 master cylinder to power brake unit mounting nuts (Fig. 114). Tighten both mounting nuts to a torque of 25 N·m (225 in. lbs.).

(10) Install the wiper module drain hose (Fig. 114) on the wiper module. Install the tie strap attaching the wiper module drain hose to brake tube at the master cylinder. **Tie strap should be loosely tightened so as not to collapse the wiper module drain hose.**

REMOVAL AND INSTALLATION (Continued)

(11) Install the wiring harness connector on the brake fluid level sensor in the master cylinder fluid reservoir (Fig. 113).

(12) Install the battery tray in the vehicle. Install the 2 bolts and the nut (Fig. 112) attaching the battery tray to the vehicle. Tighten the 2 bolts and the nut to a torque of 14 N·m (125 in lbs.).

(13) If vehicle is equipped with speed control, install the speed control servo and bracket on the battery tray. Install and securely tighten bolt attaching bracket to battery tray.

(14) If vehicle is equipped with speed control, install the wiring harness connector on the speed control servo. Then connect the vacuum lines onto the speed control servo and vacuum reservoir on battery tray.

(15) Install the air inlet resonator and hoses as an assembly on the throttle body and air cleaner housing (Fig. 111). Securely tighten the hose clamp at the air cleaner housing and throttle body.

(16) Install the battery and the battery thermal guard.

(17) Install the battery cables on the battery.

(18) Check the operation of the stop lamp switch and adjust if necessary.

VACUUM BOOSTER 3.3/3.8 LITER ENGINE

REMOVE

CAUTION: Reserve vacuum in the vacuum booster must be pumped down (removed) before removing master cylinder from vacuum booster. This is necessary to prevent the vacuum booster from sucking in any contamination as the master cylinder is removed. This can be done simply by pumping the brake pedal, with the vehicle's engine not running, until a firm feeling brake pedal is achieved.

(1) With engine not running, pump the brake pedal until a firm pedal is achieved (4-5 strokes).

(2) Remove both battery cables from battery.

(3) Remove the battery thermal guard and the battery from the battery tray.

(4) Remove the air inlet resonator and hoses as an assembly from the throttle body and air cleaner housing (Fig. 118)

(5) If vehicle is equipped with speed control, unplug wiring harness connector from the speed control servo. Then disconnect vacuum lines from the speed control servo and vacuum reservoir on battery tray.

(6) Remove bolt attaching the speed control servo bracket to the battery tray. Slide the bracket forward to unhook it from the battery tray and remove.

(7) Remove the 2 bolts and the nut (Fig. 119) attaching the battery tray to the body of the vehicle.

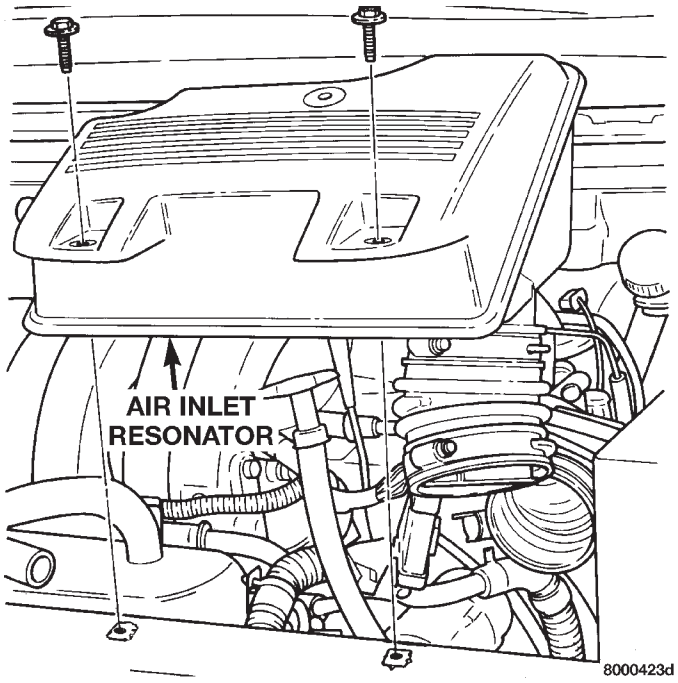


Fig. 118 Air Inlet Resonator

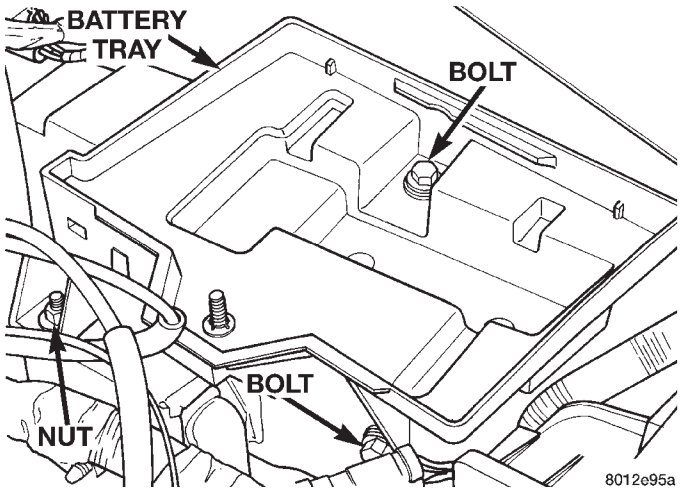


Fig. 119 Battery Tray Mounting Locations

(8) Remove the wiring harness connector (Fig. 120) from the EGR valve transducer.

(9) Remove wiring harness connectors from throttle position sensor and AIS motor on throttle body (Fig. 121).

(10) Remove the 2 bolts (Fig. 122) attaching the throttle body to the intake manifold and the clip (Fig. 122) attaching the wiring harness to the throttle cable bracket. Then remove the throttle body and throttle cable bracket as an assembly from the intake manifold.

(11) Remove wiring harness connector from brake fluid level sensor in master cylinder fluid reservoir (Fig. 123).

(12) Clean the area where the master cylinder assembly attaches to the power brake booster. Use

REMOVAL AND INSTALLATION (Continued)

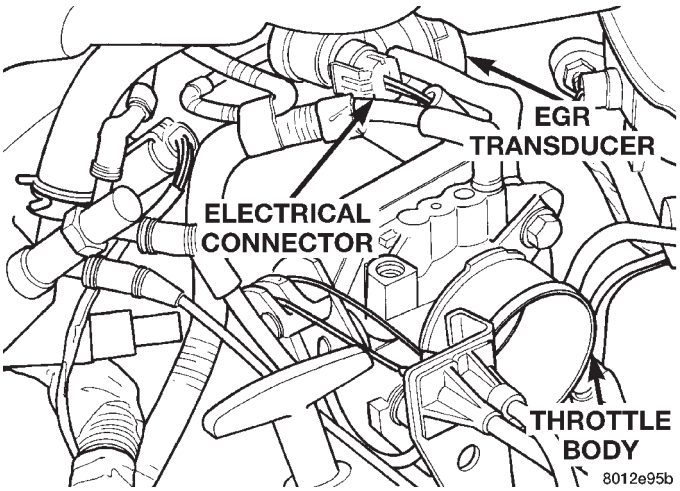


Fig. 120 Electrical Connector At EGR Transducer

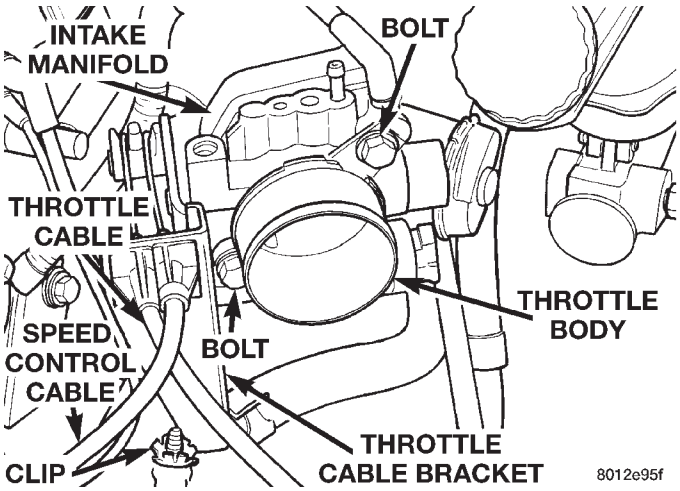


Fig. 122 Throttle Body Attachment To Intake Manifold

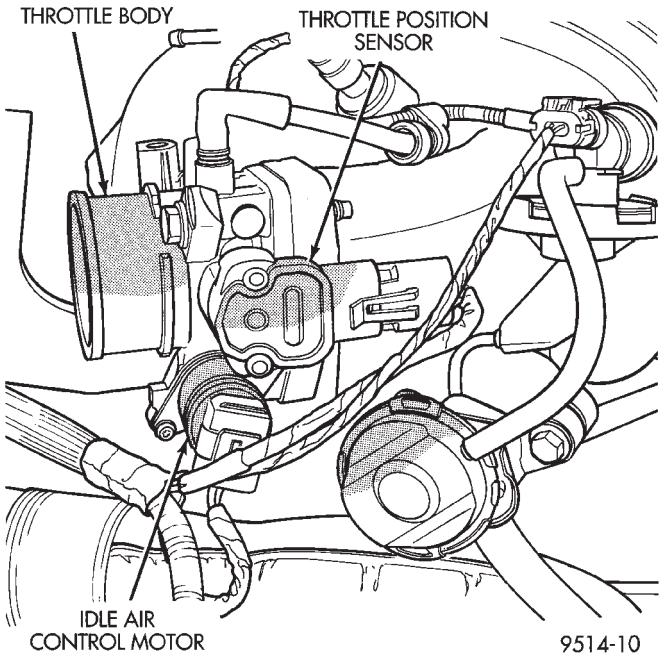


Fig. 121 Electrical And Vacuum Connections To Throttle Body

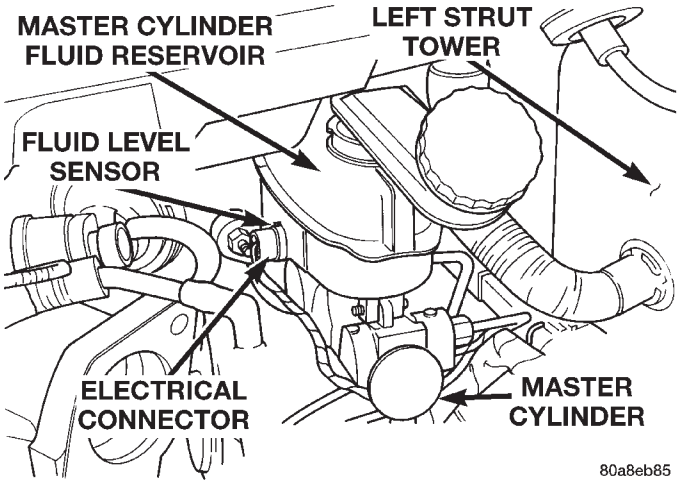


Fig. 123 Fluid Level Sensor Electrical Connection

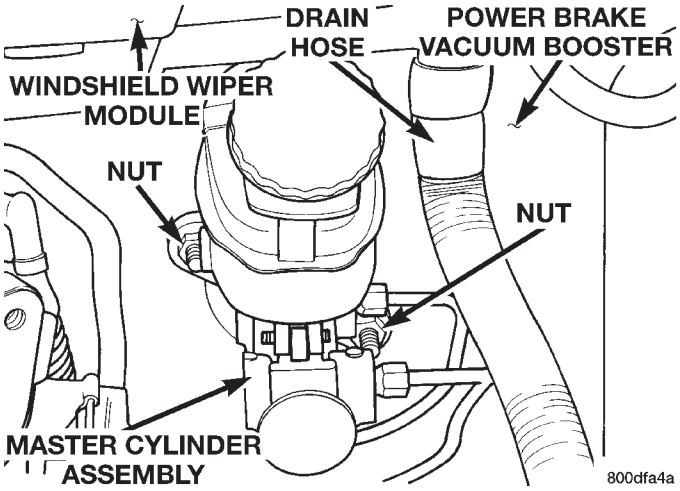


Fig. 124 Master Cylinder Attachment To Vacuum Booster

only a solvent such as Mopar Brake Parts Cleaner or an equivalent.

(13) Remove clip, attaching drain hose for wiper module to brake tube at master cylinder. Remove drain hose (Fig. 124) from wiper module. Remove the 2 nuts, attaching the master cylinder to the vacuum booster (Fig. 124).

NOTE: It is not necessary to remove the brake tubes from the master cylinder when removing the master cylinder from the vacuum booster.

(14) Remove master cylinder and brake tubes as an assembly from the vacuum booster. When master cylinder is removed, lay it out of the way on top of the left motor mount

REMOVAL AND INSTALLATION (Continued)

(15) Remove the EGR Valve and the vacuum transducer (Fig. 125) as an assembly from the intake manifold.

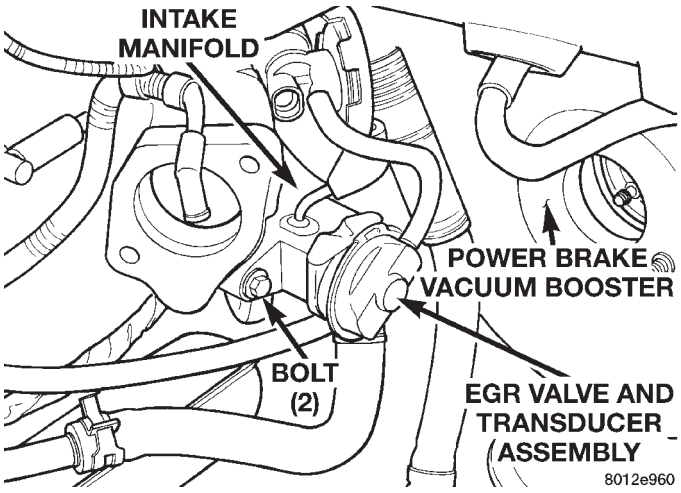


Fig. 125 EGR Valve Attachment To Intake Manifold

(16) Disconnect vacuum hose from check valve located on vacuum booster. **DO NOT REMOVE CHECK VALVE FROM POWER BRAKE BOOSTER.**

(17) Locate the vacuum booster input rod to brake pedal connection under the instrument panel. Position a small screwdriver between the center tang on the power brake booster input rod to brake pedal pin retaining clip (Fig. 126).

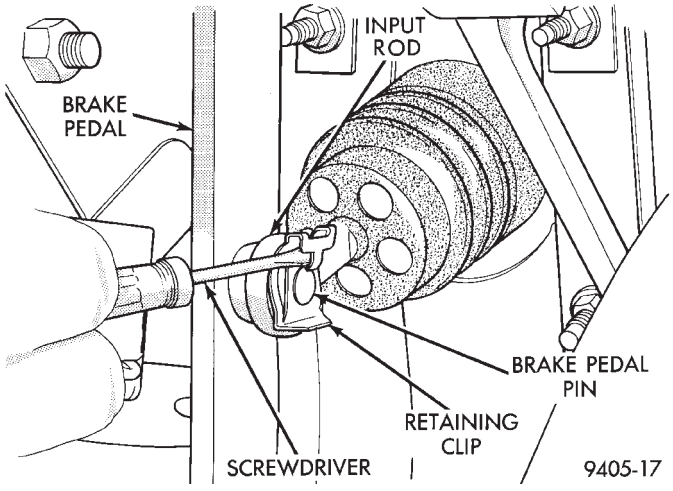


Fig. 126 Vacuum Booster Input Rod Retaining Pin

(18) Rotate screwdriver enough to allow retaining clip center tang to pass over end of brake pedal pin. Then pull retaining clip off brake pedal pin. **Discard retaining clip. It is not to be reused. Replace only with a new retaining clip when assembling.**

(19) Remove the 4 nuts attaching the power brake vacuum booster to the dash panel. Nuts are accessible from under dash panel in area of the steering column and pedal bracket assembly.

(20) From outside the vehicle, slide power brake vacuum booster forward until its mounting studs clear dash panel. Then tilt the booster up and toward the center of vehicle to remove.

CAUTION: Do not attempt to disassemble the power brake vacuum booster it is to be serviced ONLY as a complete assembly.

INSTALL

CAUTION: When installing the power brake vacuum booster in the vehicle be sure the heater hoses do not become trapped between the booster and the dash panel of the vehicle.

(1) Position vacuum booster on dash panel using the reverse procedure of its removal.

(2) Install the 4 nuts mounting the vacuum booster to the dash panel. Tighten the 4 mounting nuts to a torque of 29 N·m (250 in. lbs.).

(3) Using lubriplate, or an equivalent, coat the surface of the brake pedal pin where it contacts the vacuum booster input rod.

CAUTION: When installing the brake pedal pin on the power brake vacuum booster input rod, do not re-use the old retaining clip.

(4) Install vacuum booster input rod on brake pedal pin and install a **NEW** retaining clip (Fig. 127).

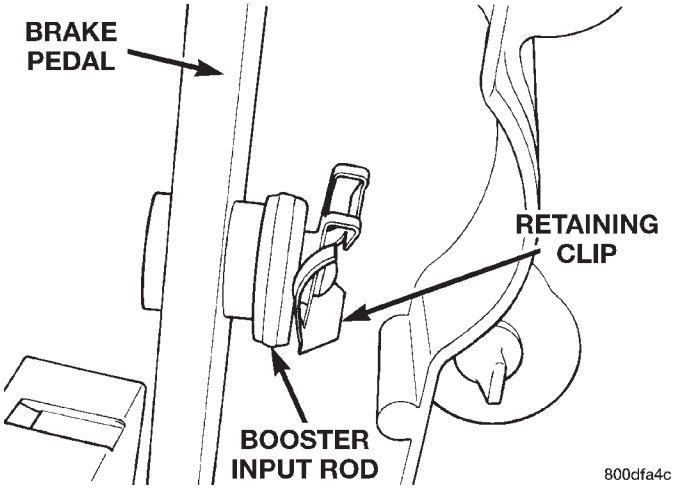


Fig. 127 Retaining Pin Installed On Brake Pedal Pin

(5) Connect the vacuum hose on the check valve in the power brake vacuum booster.

(6) Install EGR Valve and vacuum transducer (Fig. 125) on the intake manifold. Install and tighten the 2 EGR valve mounting bolts to a torque of 22 N·m (200 in. lbs.).

REMOVAL AND INSTALLATION (Continued)

CAUTION: The master cylinder is used to create the seal for holding vacuum in the vacuum booster. The vacuum seal on the master cylinder MUST be replaced with a NEW seal whenever the master cylinder is removed from the vacuum booster.

CAUTION: When removing the vacuum seal from the master cylinder do not use a sharp tool.

(7) Using a soft tool such as a trim stick, remove the vacuum seal from the master cylinder mounting flange.

(8) Install a **NEW** vacuum seal on mounting flange of the master cylinder (Fig. 128).

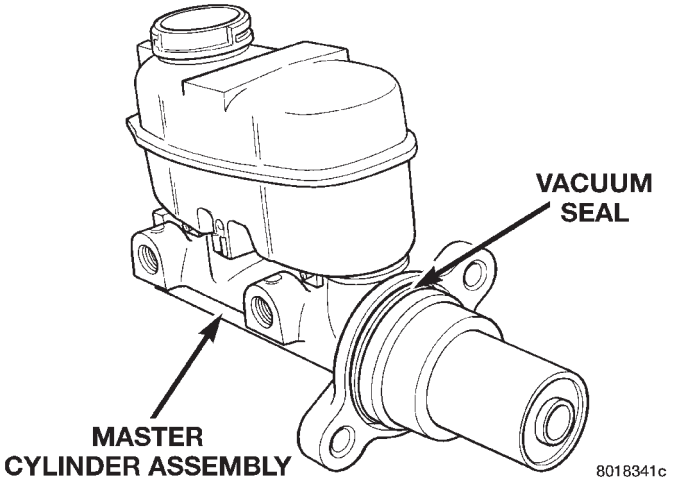


Fig. 128 Vacuum Seal Installed On Master Cylinder

(9) Position master cylinder on studs of vacuum booster, aligning push rod on vacuum booster with master cylinder piston.

(10) Install the 2 nuts mounting the master cylinder to the vacuum booster (Fig. 124). Tighten both mounting nuts to a torque of 25 N·m (225 in. lbs.).

(11) Install the wiper module drain hose (Fig. 124) on the wiper module. Install the tie strap attaching the wiper module drain hose to brake tube at the master cylinder. **Tie strap should be loosely tightened so as not to collapse the wiper module drain hose.**

(12) Install the wiring harness connector on the brake fluid level sensor in the master cylinder fluid reservoir (Fig. 123).

(13) Install the throttle body and throttle cable bracket on the intake manifold. Install the 2 bolts (Fig. 122) attaching the throttle body to the intake manifold and tighten to a torque of 25 N·m (225 in. lbs.) Install clip (Fig. 122) attaching the wiring harness to the throttle cable bracket.

(14) Install the wiring harness connectors on the throttle position sensor and the AIS motor on throttle body (Fig. 121).

(15) Install the wiring harness connector (Fig. 120) on the EGR valve transducer.

(16) Install the battery tray. Install the 2 bolts and the nut (Fig. 119) attaching the battery tray to the vehicle. Tighten the 2 bolts and the nut to a torque of 14 N·m (125 in lbs.).

(17) If vehicle is equipped with speed control, install the speed control servo and bracket on the battery tray. Install and securely tighten bolt attaching bracket to battery tray.

(18) If vehicle is equipped with speed control, install the wiring harness connector on the speed control servo. Then connect the vacuum lines onto the speed control servo and vacuum reservoir on battery tray.

(19) Install the air inlet resonator and hoses as an assembly on the throttle body and air cleaner housing (Fig. 118). Securely tighten hose clamp at air cleaner housing and throttle body.

(20) Install the battery and the battery thermal guard.

(21) Install the battery cables on the battery.

(22) Check the operation of the stop lamp switch and adjust if necessary.

JUNCTION BLOCK

REMOVE

(1) Using a brake pedal depressor, move and lock the brake pedal to a position past its first 1 inch of travel. This will prevent brake fluid from draining out of the master cylinder when the brake tubes are removed from the junction block.

(2) Raise vehicle on jackstands or centered on a hoist. See Hoisting in the Lubrication And Maintenance Group of this service manual.

CAUTION: Before removing the brake tubes from the junction block, the junction block and the brake tubes must be thoroughly cleaned. This is required to prevent contamination from entering the brake hudraulic system.

(3) Remove the 6 chassis brake tubes (Fig. 129) from the junction block.

(4) Remove the bolt (Fig. 130) attaching the junction block mounting braket to the front suspension cradle.

INSTALL

(1) Install the junction block and mounting bracket (Fig. 130) on the front suspension cradle. Install the attaching bolt and tighten to a torque of 28 N·m (250 in. lbs.).

(2) Install the 6 chassis brake tubes (Fig. 131) into the inlet and outlet ports of the junction block.

REMOVAL AND INSTALLATION (Continued)

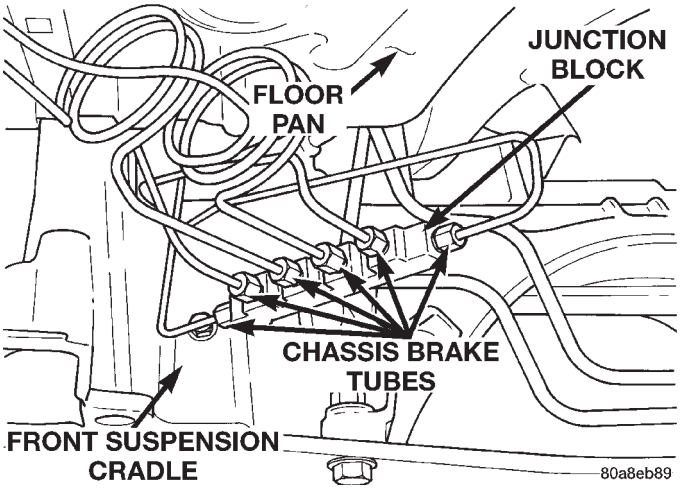


Fig. 129 Junction Block Brake Tubes

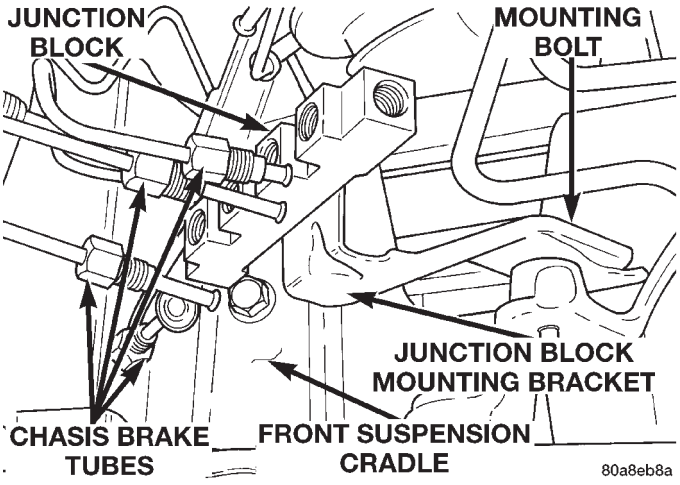


Fig. 130 Junction Block Mounting

Tighten all 6 tube nuts to a torque of 16 N·m (145 in. lbs.).

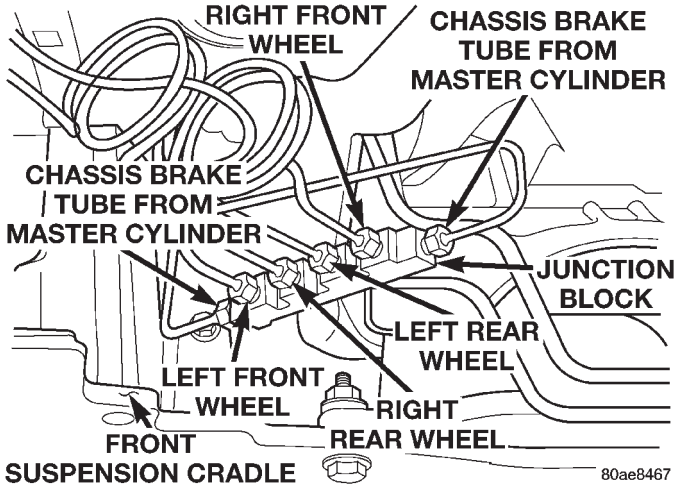


Fig. 131 Brake Tube Connections To Junction Block

(3) Bleed the brake system thoroughly to ensure that all air has been expelled from the hydraulic system. See Bleeding Brake System in the Service Adjustments section in this group of the service manual for the proper bleeding procedure.

(4) Lower the vehicle.

(5) Road test the vehicle to verify proper operation of the vehicles brake system.

PROPORTIONING VALVE (W/ABS BRAKES)

The actual proportioning valves of the proportioning valve assembly are not serviceable or replaceable. If a proportioning valve of the proportioning valve assembly is not functioning properly, the fixed proportioning valve must be replaced as an assembly.

REMOVE

(1) Using a brake pedal depressor, move and lock the brake pedal to a position past its first 1 inch of travel. This will prevent brake fluid from draining out of the master cylinder when the brake tubes are removed from the proportioning valve.

(2) Raise vehicle on jackstands or centered on a hoist. See Hoisting in the Lubrication And Maintenance Group of this service manual.

CAUTION: Before removing the brake tubes from the proportioning valve, the proportioning valve and the brake tubes must be thoroughly cleaned. This is required to prevent contamination from entering the proportioning valve or the brake tubes.

(3) Remove the 4 chassis brake lines from the inlet and outlet ports of the proportioning valve (Fig. 132).

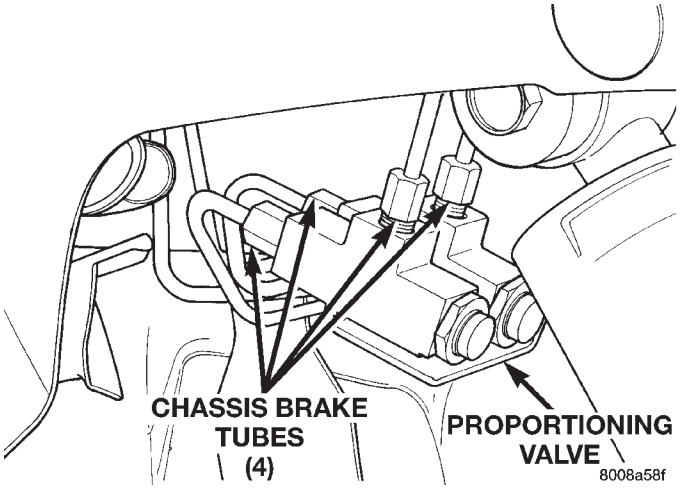


Fig. 132 Chassis Brake Tubes At Proportioning Valve

(4) Remove the bolts (Fig. 133) attaching the proportioning valve bracket to the frame rail of the vehicle. Remove the fixed proportioning valve assembly from the vehicle.

REMOVAL AND INSTALLATION (Continued)

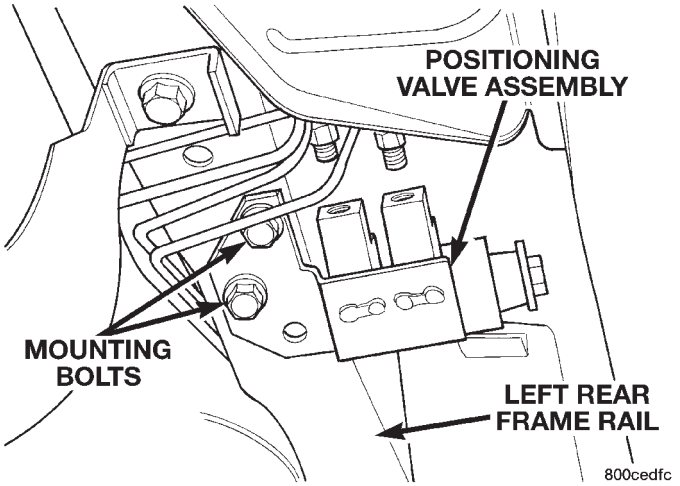


Fig. 133 Proportioning Valve Attachment To Vehicle

INSTALL

CAUTION: When mounting the original or a replacement proportioning valve on the frame rail of the vehicle install the mounting bolts in only the two forward holes of the mounting bracket (Fig. 133).

(1) Install proportioning valve assembly on the frame rail of the vehicle. Install the proportioning valve assembly attaching bolts (Fig. 133). Tighten the attaching bolts to a torque of 14 N·m (125 in. lbs.).

(2) Install the 4 chassis brake lines (Fig. 132) into the inlet and outlet ports of the proportioning valve assembly. Tighten all 4 line nuts to a torque of 16 N·m (142 in. lbs.).

(3) Bleed the brake system thoroughly enough to ensure that all air has been expelled from the hydraulic system. See Bleeding Brake System in the Service Adjustments section in this group of the service manual for the proper bleeding procedure.

(4) Lower the vehicle to the ground.

(5) Road test the vehicle to verify proper operation of the vehicles brake system.

PROPORTIONING VALVE (W/O ABS BRAKES)

The components of the proportioning valve assembly are not serviceable or replaceable. If a component of the proportioning valve assembly is not functioning properly, the proportioning valve must be replaced as an assembly.

REMOVE

(1) Using a brake pedal depressor, move and lock the brake pedal to a position past its first 1 inch of travel. This will prevent brake fluid from draining out of the master cylinder when the brake tubes are removed from the proportioning valve.

(2) Raise vehicle on jackstands or centered on a hoist. See Hoisting in the Lubrication And Maintenance Group of this service manual.

CAUTION: Before removing the brake tubes from the proportioning valve, the proportioning valve and the brake tubes must be thoroughly cleaned. This is required to prevent contamination from entering the proportioning valve or the brake tubes.

(3) Remove the 4 chassis brake tubes from the inlet and outlet ports of the proportioning valve (Fig. 134).

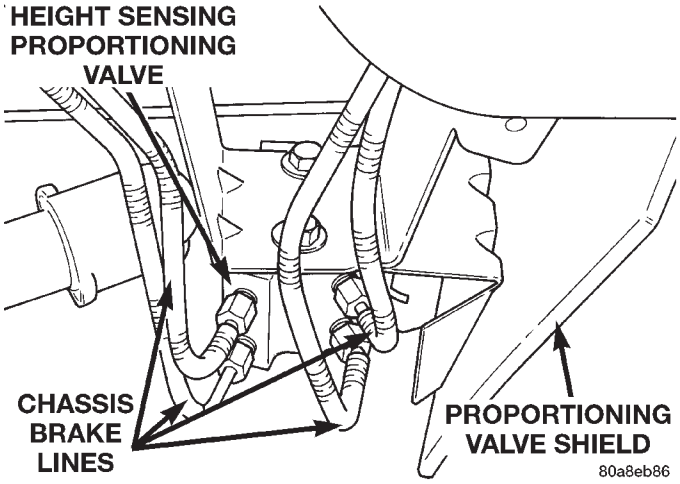


Fig. 134 Chassis Brake Tubes At Proportioning Valve

(4) Remove the 2 bolts (Fig. 135) attaching the proportioning valve to the proportioning valve mounting bracket. Remove the proportioning valve from the mounting bracket.

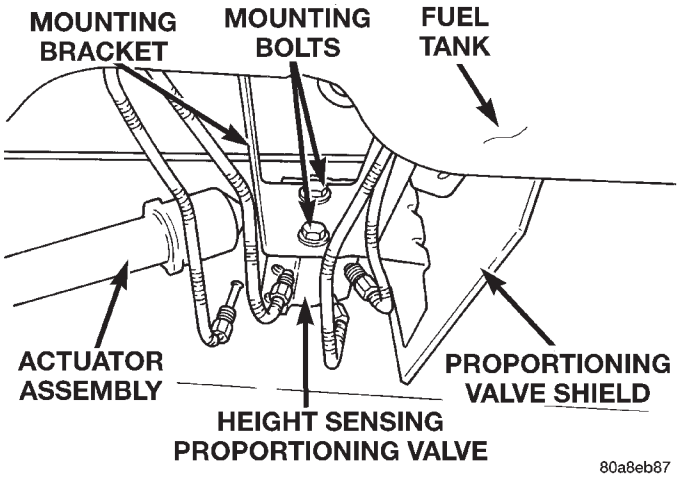


Fig. 135 Proportioning Valve Mounting

(5) Remove the hooked end of the proportioning valve actuator (Fig. 136) from the isolator bushing on the lever of the height proportioning valve (Fig. 136).

REMOVAL AND INSTALLATION (Continued)

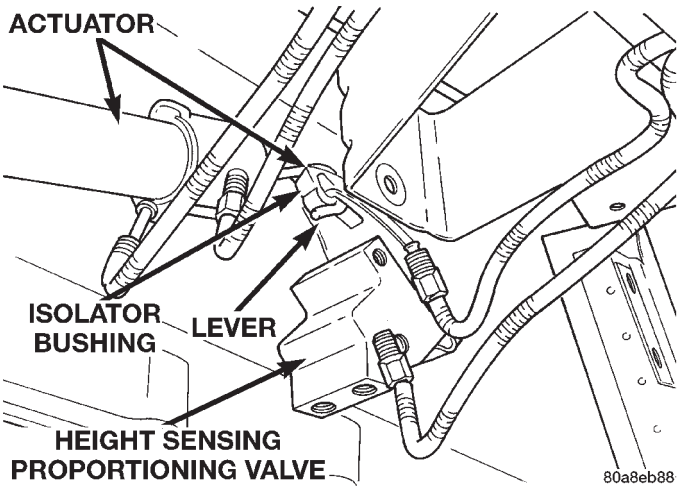


Fig. 136 Actuator Attachment To Proportioning Valve

INSTALL

(1) Install the hooked end of the actuator on the proportioning valve lever (Fig. 136). **Be sure isolator bushing on lever of proportioning valve (Fig. 136) is fully seated in hook of actuator.**

NOTE: When installing height sensing proportioning valve on mounting bracket be sure proportioning valve shield (Fig. 135) is installed between the proportioning valve and the mounting bracket.

(2) Install height sensing proportioning valve on mounting bracket. Install the proportioning valve attaching bolts (Fig. 135). Tighten the attaching bolts to a torque of 23 N·m (200 in. lbs.).

(3) Install the 4 chassis brake lines (Fig. 134) into the inlet and outlet ports of the proportioning valve. Tighten all 4 line nuts to a torque of 16 N·m (142 in. lbs.).

(4) Adjust the proportioning valve actuator. See Height Sensing Proportioning Valve in the Adjustment Section in this group of the service manual for the adjustment procedure.

(5) Bleed the brake system thoroughly to ensure that all air has been expelled from the hydraulic system. See Bleeding Brake System in the Service Adjustments section in this group of the service manual for the proper bleeding procedure.

(6) Lower the vehicle to the ground.

(7) Road test the vehicle to verify proper operation of the vehicles brake system.

HYDRAULIC BRAKE TUBES AND HOSES

CAUTION: When installing brake chassis lines or flex hoses on the vehicle, the correct fasteners must be used to attach the routing clips or hoses to the front suspension cradle. The fasteners used to attach components to the front suspension cradle have an anti—corrosion coating due to the suspension cradle being made of aluminum. Only Mopar replacement fasteners with the required anti-corrosion coating are to be used if a replacement fastener is required when installing a brake chassis line or flex hose.

Only double wall 4.75mm (3/16 in.) steel tubing with Al-rich/ZW-AC alloy coating and the correct tube nuts are to be used for replacement of a hydraulic brake tube.

NOTE: On vehicles equipped with traction control, the primary and secondary hydraulic tubes between the master cylinder and the hydraulic control unit are 6 mm (15/64 in.). These tubes are also coated with the Al-rich/ZW-AC alloy and must be replaced with tubes having the same anti-corrosion coating. Be sure that the correct tube nuts are used for the replacement of these hydraulic brake tubes.

Care should be taken when replacing brake tubing, to be sure the proper bending and flaring tools and procedures are used, to avoid kinking. Do not route the tubes against sharp edges, moving components or into hot areas. All tubes should be properly attached with recommended retaining clips.

If the primary or secondary brake tube from the master cylinder to the ABS Hydraulic Control Unit (HCU) or the brake tubes from the HCU to the proportioing valve require replacement, **only** the original factory brake line containing the flexible section can be used as the replacement part. This is required due to cradle movement while the vehicle is in motion.

PARK BRAKE PEDAL MECHANISM

REMOVE

(1) Disconnect negative (ground) cable from the battery and isolate cable from battery terminal.

(2) Remove sill scuff plate from left door sill.

(3) Remove the left side kick panel.

(4) Remove the steering column cover from the lower instrument panel.

(5) Remove the reinforcement from the lower instrument panel.

(6) Lock out front park brake cable using the following procedure. Grasp the exposed section of the front park brake cable and pull rearward on it. While holding the park brake in this position, install a pair of locking pliers on the front park brake cable just rearward of the second body outrigger bracket (Fig. 137).

(7) Remove the front park brake cable from the park brake cable equalizer.

REMOVAL AND INSTALLATION (Continued)

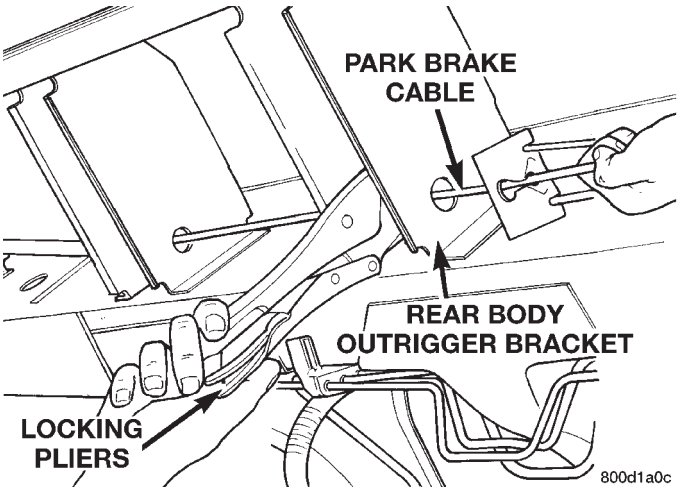


Fig. 137 Locking Out Automatic Adjuster

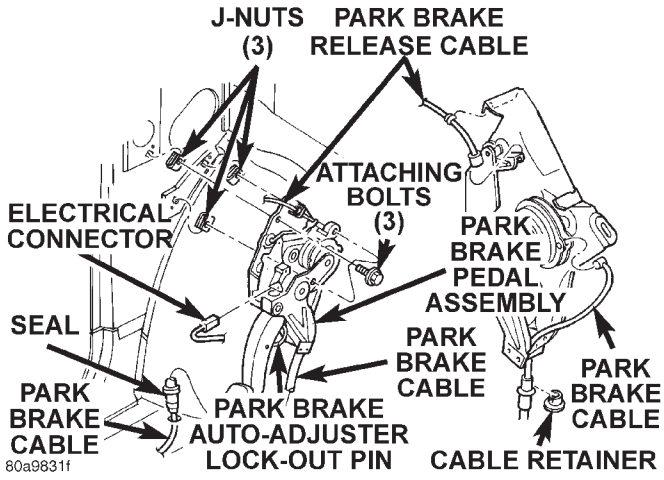


Fig. 138 Park Brake Pedal Mounting

(8) Remove tension from front park brake cable. Tension is removed by releasing the locking pliers from the front park brake cable.

(9) Remove the 3 bolts mounting the wiring junction block to the instrument panel.

NOTE: When removing the lower mounting bolt, push the park brake pedal down 5 clicks to access the lower mounting bolt.

(10) Remove the lower bolt mounting the park brake pedal to the body.

(11) Remove the forward bolt mounting the park brake pedal to the body.

(12) Remove the upper bolt mounting the park brake pedal to the body.

(13) Disconnect the electrical connector for the brake light switch (Fig. 138).

(14) Pull downward on front park brake cable while rotating park brake pedal mechanism out from behind junction block.

(15) Remove park brake pedal release cable (Fig. 138) from park brake mechanism.

(16) Remove the ground switch for the red brake warning lamp from the park brake pedal mechanism.

(17) Remove front park brake cable button from park brake pedal mechanism. Tap end housing of front park brake cable out of park brake pedal mechanism (Fig. 138).

INSTALL

(1) Install the ground switch for the red brake warning lamp on the park brake pedal mechanism

(2) Install park brake cable end housing (Fig. 138) into park brake pedal mechanism.

(3) Install cable retainer (Fig. 138) onto the park brake cable strand and then install retainer into pedal bracket.

(4) Install cable strand button into the clevis on the park brake pedal mechanism.

(5) Install wiring harness connector on red brake warning lamp ground switch.

(6) Install the park brake release cable on the release mechanism of the park brake pedal.

(7) Position the park brake pedal mechanism into its installed position on the body of the vehicle.

(8) Remove the lock-out pin from the park brake pedal release mechanism.

(9) Loosely install the top bolt (Fig. 138) mounting the park brake pedal mechanism to the body.

(10) Loosely install the forward bolt (Fig. 138) mounting the park brake pedal mechanism to the body.

(11) Loosely install the lower bolt (Fig. 138) mounting the park brake pedal mechanism to the body.

(12) Tighten pedal mechanism attaching bolts to 28 N·m (250 in. lbs.).

(13) Verify that the park brake pedal is in the fully released (full up) position.

(14) Raise vehicle.

(15) Install the front park brake cable on the park brake cable equalizer.

(16) Lower vehicle.

(17) Remove the lock-out pin (Fig. 138) from the automatic cable adjuster on the park brake pedal mechanism.

(18) Install the electrical junction block on the instrument panel.

(19) Install the reinforcement on the lower instrument panel.

(20) Install the steering column cover on the lower instrument panel.

(21) Install the left side kick panel.

(22) Install the sill scuff plate on the lower sill of the left door.

REMOVAL AND INSTALLATION (Continued)

(23) Install the negative (ground) cable on the battery.

(24) Cycle the park brake pedal one time. This will seat the park brake cables and will allow the automatic self adjuster to properly tension the park brake cables.

PARK BRAKE SHOES (WITH REAR DISC BRAKES)

On this vehicle, the park brake shoes are removed from the disc brake adapter with the disc brake adapter removed from the vehicle.

REMOVE

(1) Set the parking brake. **The parking brake is set to keep the hub/bearing and axle shaft from rotating when loosening the hub nut.**

(2) Raise vehicle. Vehicle is to be raised and supported on jackstands or on a frame contact type hoist. See Hoisting in the Lubrication And Maintenance section of this service manual.

(3) Remove the wheel/tire.

(4) Remove the cotter pin and nut retainer (Fig. 139) from the stub shaft of the outer C/V joint.

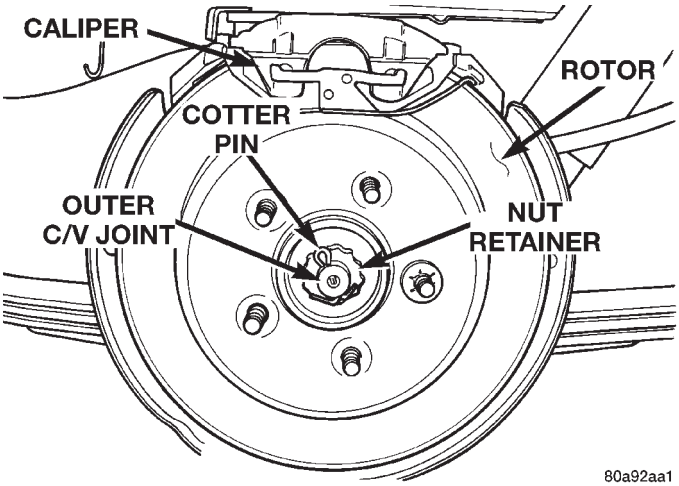


Fig. 139 Cotter Pin And Nut Retainer

(5) Remove the spring washer (Fig. 140) from the stub shaft of the outer C/V joint.

(6) Remove the hub nut and washer (Fig. 141) from the stub shaft of the outer C/V joint.

(7) Release the parking brake.

(8) Create slack in the rear park brake cables by locking the out the automatic adjuster as described. Grasp the exposed section of front park brake cable and pull downward on it. Then install a pair of locking pliers on the front park brake cable just rearward of the second body outrigger bracket (Fig. 142).

(9) Remove the disc brake caliper to adapter guide pin bolts (Fig. 143).

(10) Remove rear caliper from adapter using the following procedure. First rotate rear of caliper up from the adapter. Then pull the front of the caliper

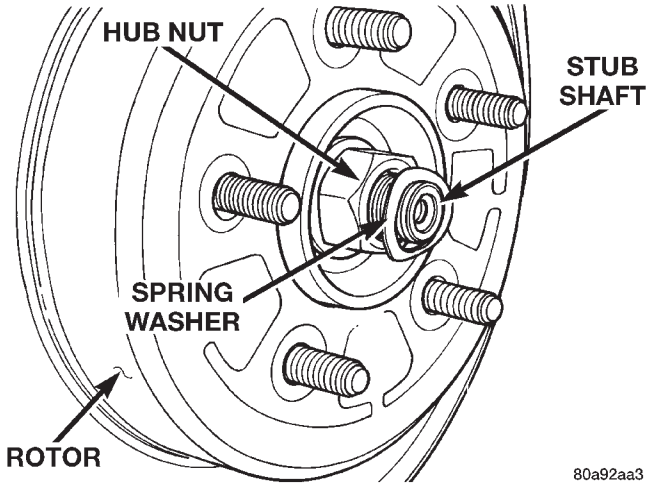


Fig. 140 Spring Washer

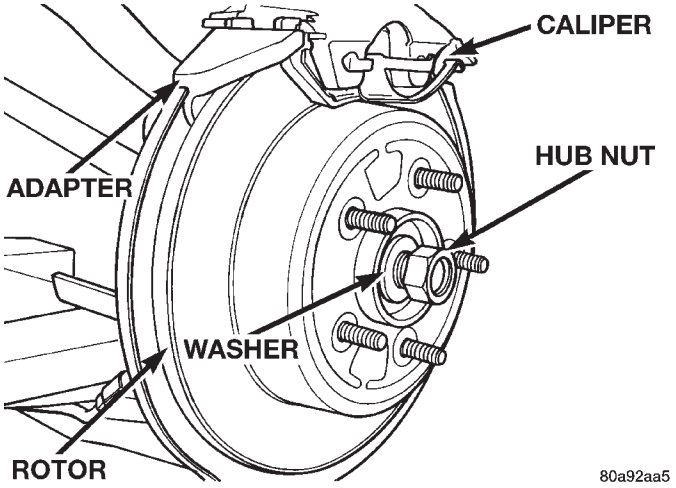


Fig. 141 Hub Nut And Washer

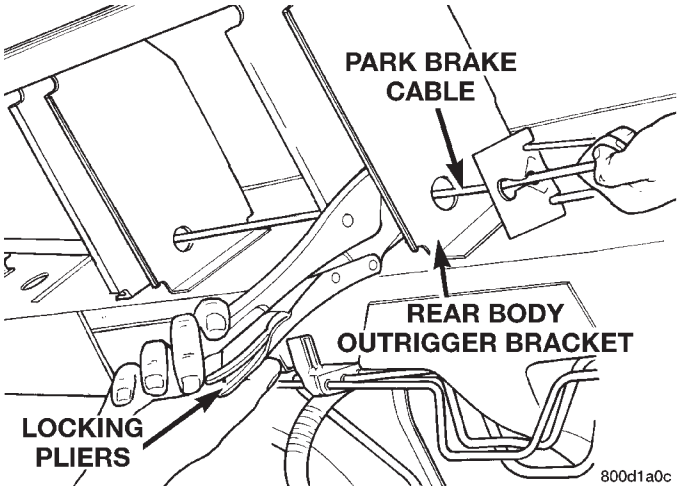


Fig. 142 Locking Out Automatic Adjuster

and the outboard brake shoe anti-rattle clip out from under the front abutment on the adapter (Fig. 144).

(11) Support caliper to prevent the weight of the caliper from damaging the flexible brake hose (Fig.

REMOVAL AND INSTALLATION (Continued)

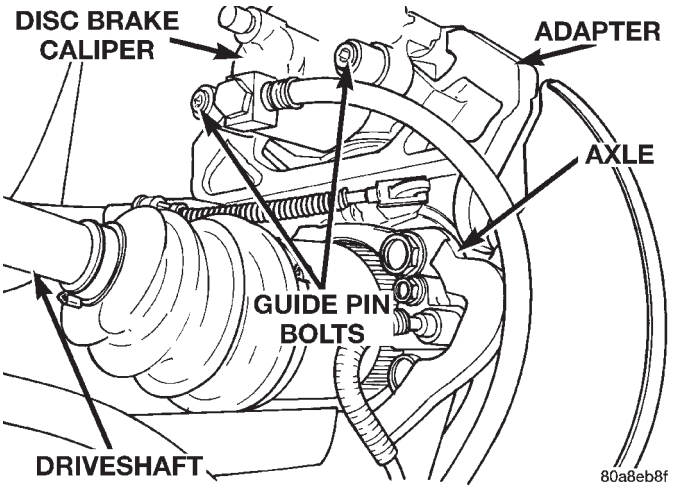


Fig. 143 Removing Caliper Guide Pin Bolts

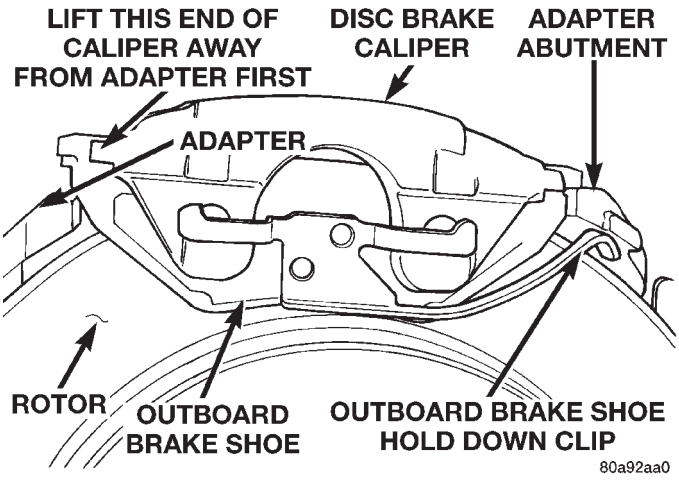


Fig. 144 Removing / Installing Caliper

145).

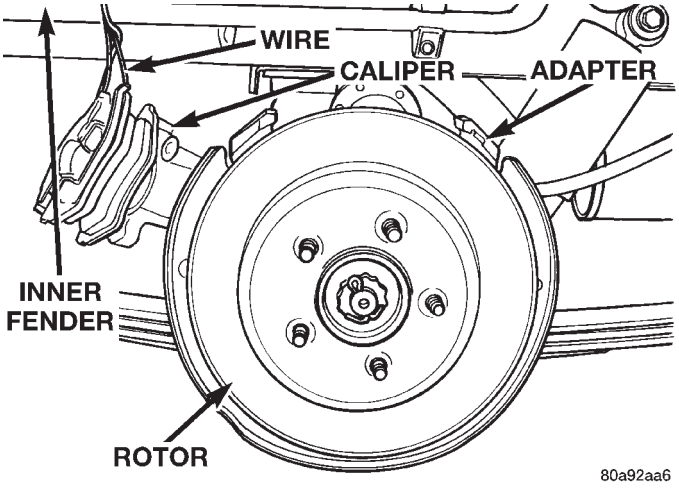


Fig. 145 Correctly Supported Caliper

(12) Remove the rotor from the hub/bearing.

(13) Remove the horseshoe clip (Fig. 146) from the retainer on the end of the park brake cable.

(14) Remove the end of the park brake cable from the actuator lever on the adapter (Fig. 146).

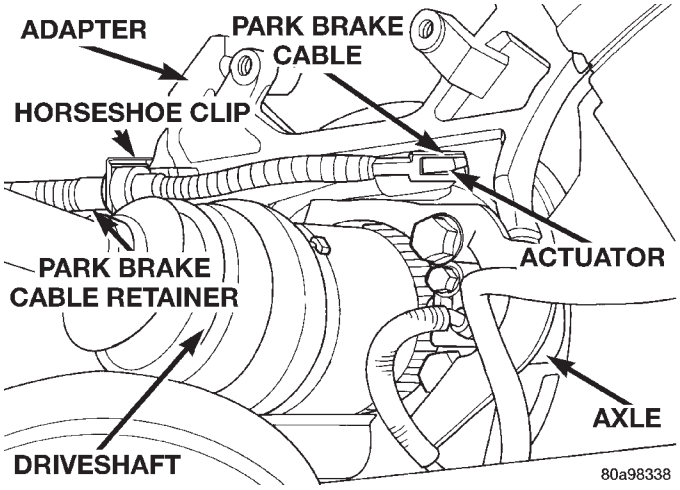


Fig. 146 Park Brake Cable Attachment To Actuator

(15) Remove the end of the park brake cable from the adapter. Park brake cable is removed from adapter using a 1/2 wrench slipped over the park brake cable retainer as show in (Fig. 147) to compress the locking tabs on the park brake cable retainer.

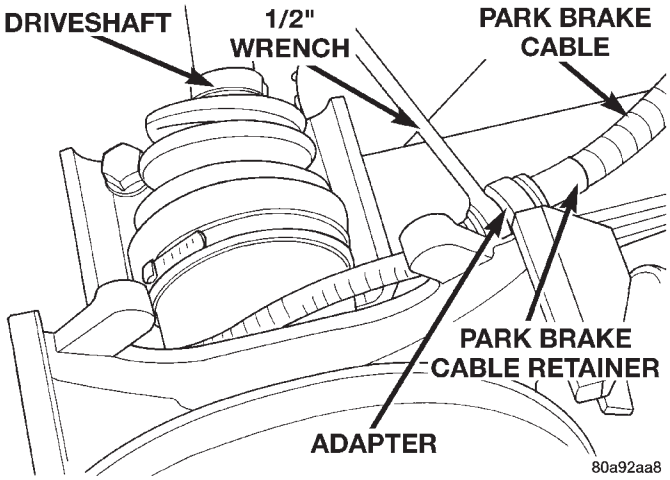


Fig. 147 Park Brake Cable Removal From Adapter

(16) Remove the attaching bolt from the wheel speed sensor (Fig. 148). Then remove wheel speed sensor from hub/bearing and adapter.

(17) Remove the hub/bearing to axle mounting bolts (Fig. 149).

(18) Remove the hub/bearing from the axle and the stub shaft of the outer C/V joint (Fig. 150).

(19) Remove the adapter from the rear axle.

(20) Mount the adapter in a vise using the anchor boss for the park brake cable (Fig. 151).

REMOVAL AND INSTALLATION (Continued)

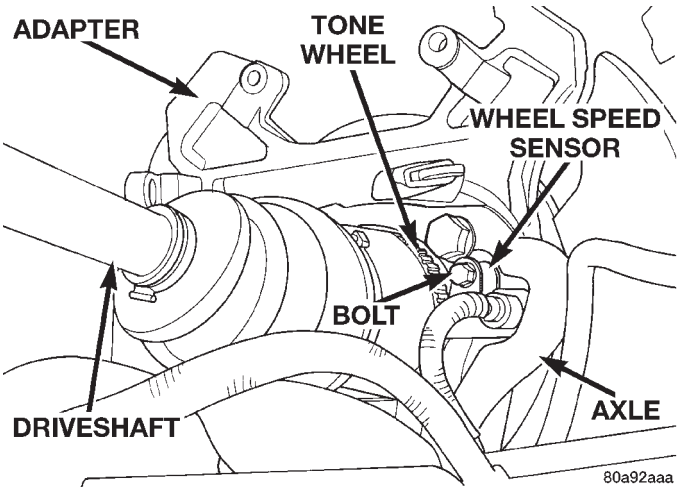


Fig. 148 Speed Sensor Attaching Bolt

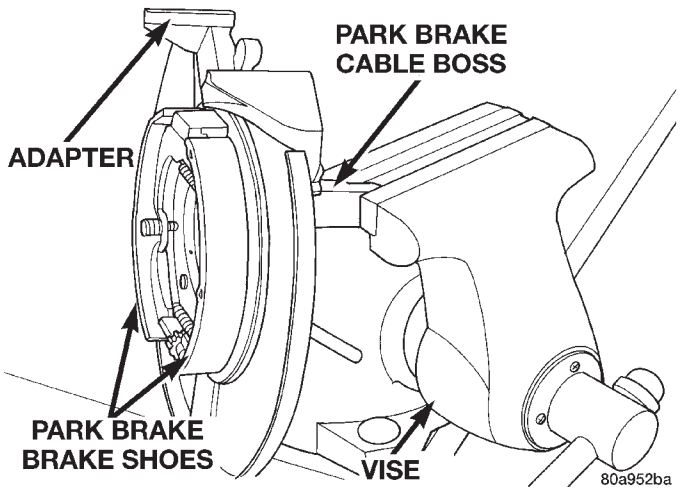


Fig. 151 Adapter Mounted In Vise

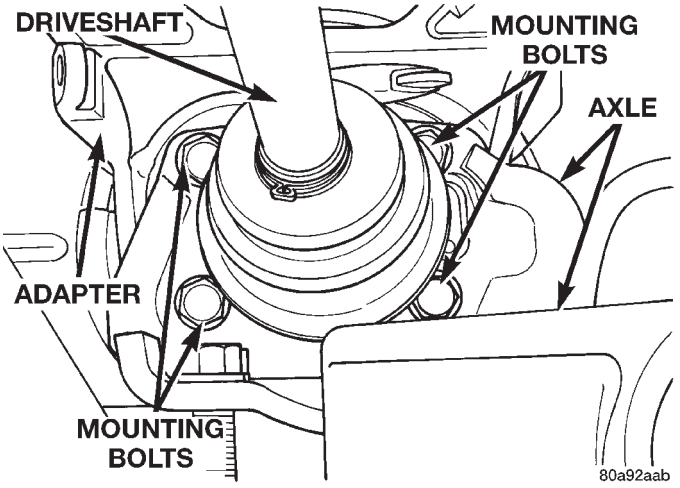


Fig. 149 Hub/Bearing Mounting Bolts

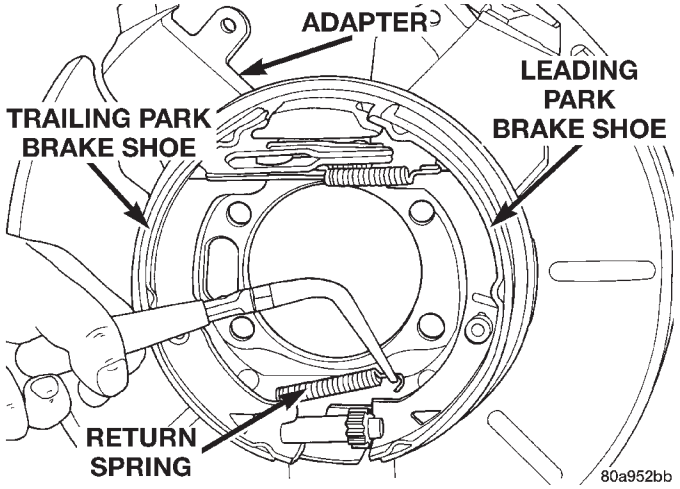


Fig. 152 Lower Return Spring

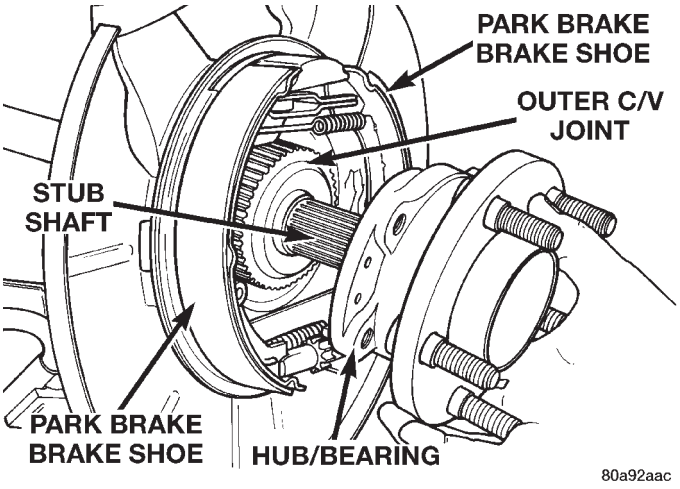


Fig. 150 Hub/Bearing Removal And Installation

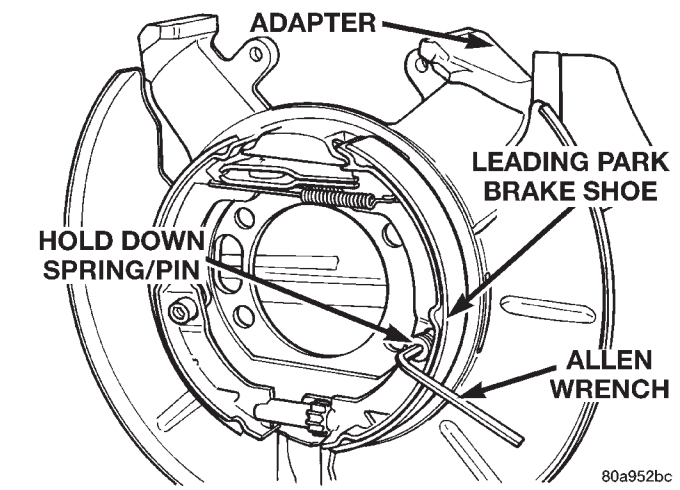


Fig. 153 Leading Brake Shoe Hold Down Pin And Spring

(21) Remove the lower return spring (Fig. 152) from the leading and trailing park brake shoes.

(22) Remove the hold down spring and pin (Fig. 153) from the leading park brake shoe.

REMOVAL AND INSTALLATION (Continued)

(23) Remove the adjuster (Fig. 154) from the leading and trailing park brake shoe.

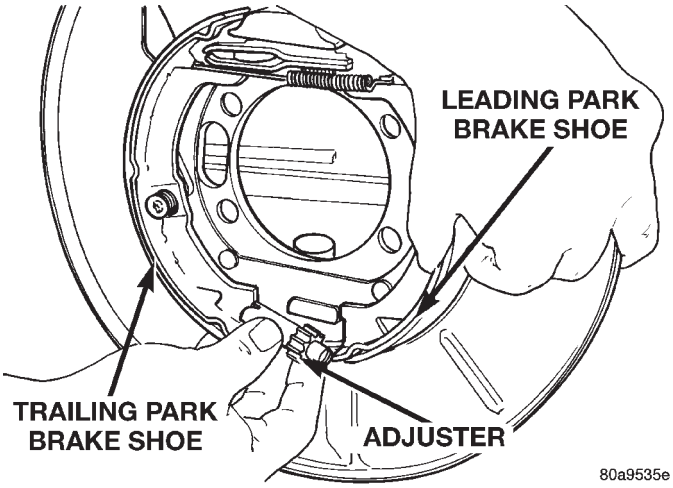


Fig. 154 Brake Shoe Adjuster

(24) Remove the leading park brake shoe (Fig. 155) from the adapter. Leading brake shoe is removed by rotating the bottom of the brake shoe inward (Fig. 155) until the top of the brake shoe can be removed from the brake shoe anchor. Then remove the upper return springs (Fig. 155) from the leading brake shoe.

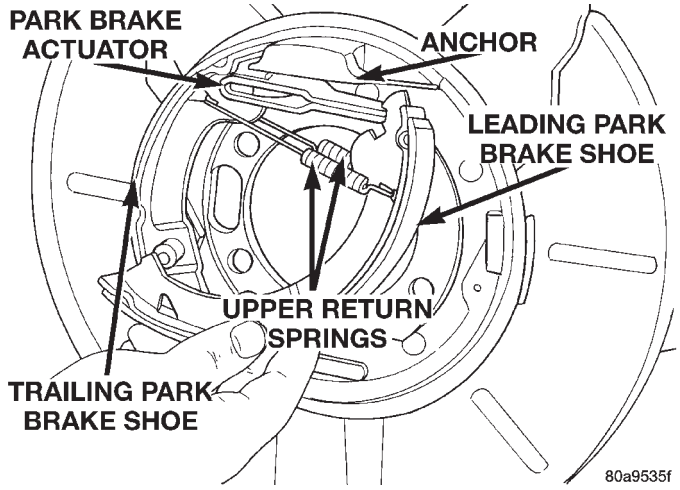


Fig. 155 Primary Brake Shoe Remove/Install

(25) Remove the upper return springs (Fig. 156) from the trailing park brake shoe.

(26) Remove the hold down spring and pin (Fig. 157) from the trailing park brake shoe.

(27) Remove the trailing park brake shoe from the adapter.

(28) Remove the park brake shoe actuator from the adapter and inspect for signs of abnormal wear and binding at the pivot point.

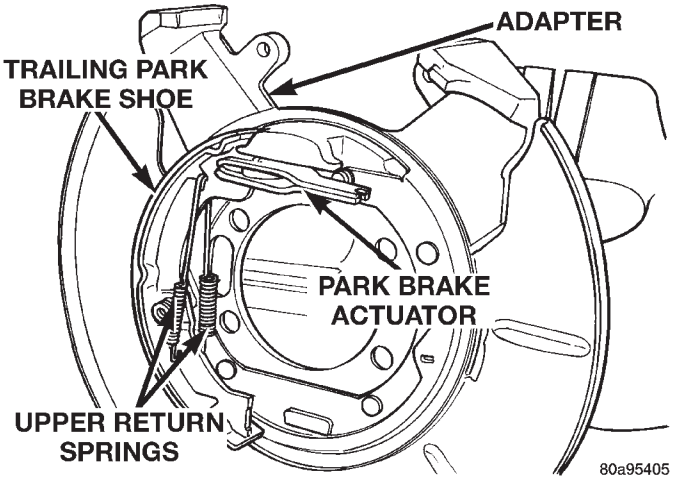


Fig. 156 Upper Return Springs

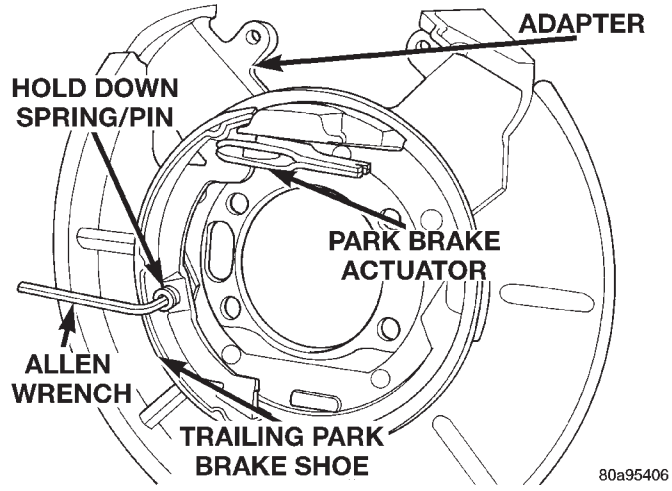


Fig. 157 Trailing Brake Shoe Hold Down Pin And Spring

INSTALL

(1) Install the trailing brake shoe on the adapter.

NOTE: When the hold down pin is installed, the long part of the hold down pin is to be positioned strait up and down. This will ensure that the hold down pin is correctly engaged with the adapter.

(2) Install the hold down spring and pin (Fig. 157) on the trailing park brake shoe.

(3) Install the upper return springs (Fig. 156) on the trailing park brake shoe.

(4) Install the upper return springs on the leading park brake shoe (Fig. 155). Then position the top of the leading park brake shoe at the upper anchor and rotate the bottom of the shoe outward until correctly installed on the adapter.

(5) Install the adjuster (Fig. 154) between the leading and trailing park brake shoe.

REMOVAL AND INSTALLATION (Continued)

NOTE: When the hold down pin is installed, the long part of the hold down pin is to be positioned strait up and down. This will ensure that the hold down pin is correctly engaged with the adapter.

(6) Install the hold down spring and pin (Fig. 153) on the leading park brake shoe.

(7) Install the lower return spring (Fig. 152) on the leading and trailing park brake shoes. **When installing the hold down spring it is to be installed behind the park brake shoes (Fig. 152).**

(8) Install the 4 mounting bolts for the adapter and hub/bearing into the bolt holes in the axle.

(9) Position the adapter on the 4 mounting bolts installed in the rear axle (Fig. 158).

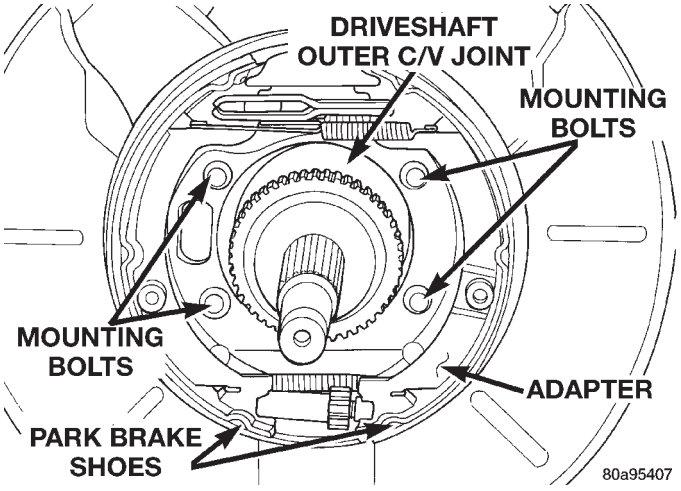


Fig. 158 Adapter Installed On Mounting Bolts

(10) Install the hub/bearing on the stub shaft of outer C/V joint and into the end of the axle. (Fig. 150).

(11) In a progressive criss-cross pattern, tighten the 4 hub/bearing mounting bolts until the hub/bearing is squarely seated against the axle. Then tighten the hub/bearing mounting bolts to a torque of 129 N·m (95 ft. lbs.).

(12) Install the wheel speed sensor on the hub/bearing and adapter. Install the wheel speed sensor attaching bolt (Fig. 148). Tighten the wheel speed sensor attaching bolt to a torque of 12 N·m (105 in. lbs).

(13) Install the park brake cable into its mounting hole in the adapter. **Be sure all the locking tabs on the park brake cable retainer are expanded out to ensure the cable will not pull out of the adapter.**

(14) Install the end of the park brake cable on the park brake actuator lever (Fig. 146).

NOTE: The horseshoe clip must be installed and installed properly when the park brake cable is installed in the adapter. The purpose of the horseshoe clip is to prevent park brake cable retainer from moving in the adapter. If horseshoe clip is not installed the park brake cable retainer will rattle in the adapter.

(15) Install a **NEW** horseshoe clip on the park brake cable retainer (Fig. 146). The horseshoe clip is installed between the retainer for the park brake cable and the adapter. Horseshoe clip must be installed with the curved end of the clip pointing straight up and the edge of the curved end facing toward the rear of the vehicle (Fig. 146).

(16) Remove the locking pliers (Fig. 142) from the front park brake cable.

(17) Adjust the park brake drum-in-hat brake shoes. See Park Brake Shoe Adjustment in the adjustment section in this group of the service manual for the proper park brake shoe adjustment procedure.

(18) Install the rotor on the hub/bearing.

(19) Carefully lower caliper and brake shoes over rotor and onto the adapter using the reverse procedure for removal (Fig. 144).

CAUTION: When installing guide pin bolts extreme caution should be taken not to crossthread the caliper guide pin bolts.

(20) Install the caliper guide pin bolts (Fig. 143). Tighten the guide pin bolts to a torque of 22 N·m (192 in. lbs.).

(21) Clean all foreign material off the threads of the outer C/V joint stub shaft. Install the washer and hub nut (Fig. 141) on the stub shaft of the outer C/V joint.

(22) Set the parking brake.

(23) Tighten the hub nut to a torque of 244 N·m (180 ft. lbs.).

(24) Install the spring washer (Fig. 140) on the stub shaft of the outer C/V joint.

(25) Install the nut retainer and cotter pin (Fig. 139) on the stub shaft of the outer C/V joint.

(26) Install the wheel and tire assembly.

(27) Tighten the wheel mounting stud nuts in proper sequence until all nuts are torqued to half specification. Then repeat the tightening sequence to the full specified torque of 129 N·m (95 ft. lbs.).

(28) Remove jackstands or lower hoist.

(29) **Fully apply and release the park brake pedal one time. This will seat and correctly adjust the park brake cables.**

CAUTION: Before moving vehicle, pump the brake pedal several times to insure the vehicle has a firm brake pedal to adequately stop vehicle.

REMOVAL AND INSTALLATION (Continued)

(30) Road test the vehicle and make several stops to wear off any foreign material on the brakes and to seat the brake shoe linings.

FRONT PARK BRAKE CABLE

REMOVE

(1) Raise vehicle on jackstands or centered on a hoist. See Hoisting in the Lubrication and Maintenance group of this service manual.

(2) Manually lockout the automatic self adjusting mechanism of the park brake pedal assembly. Refer to Manual Lockout Of Auto Adjuster Mechanism in this section of the service manual for the required procedure.

(3) Remove the intermediate and left rear park brake cable from the park brake cable equalizer (Fig. 159).

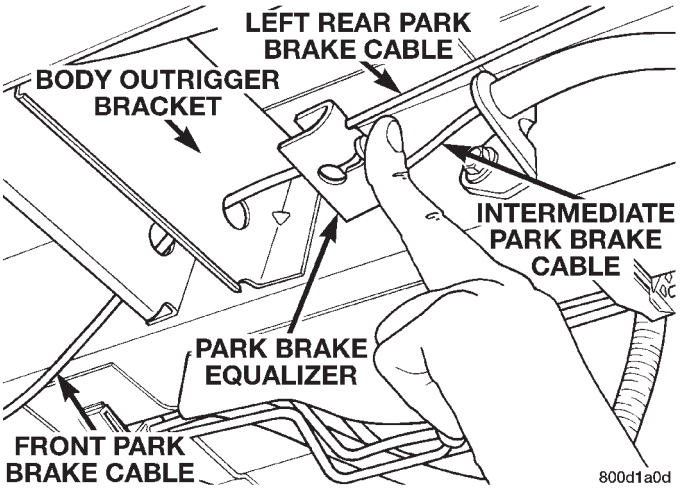


Fig. 159 Park Brake Cable Attachment To Equalizer

(4) Remove the front park cable housing retainer from body outrigger bracket (Fig. 160). Cable is removable by sliding a 14 mm box wrench over cable retainer and compressing the three retaining fingers. Alternate method is to use an aircraft type hose clamp and screwdriver.

(5) Lower vehicle.

(6) Remove the left front door sill molding.

(7) Remove the left front kick panel for access to the park brake cable and park brake pedal assembly.

(8) Lift floor mat for access to park brake cable and floor pan. Pull the seal and the park brake cable (Fig. 161) out of the floor pan of vehicle.

(9) Pull park brake cable strand end forward and disconnect button from clevis. Tap cable housing end fitting out of pedal assembly bracket.

(10) Remove cable retainer from the park brake pedal assembly bracket.

(11) Pull park brake cable assembly out of vehicle through hole in floor pan.

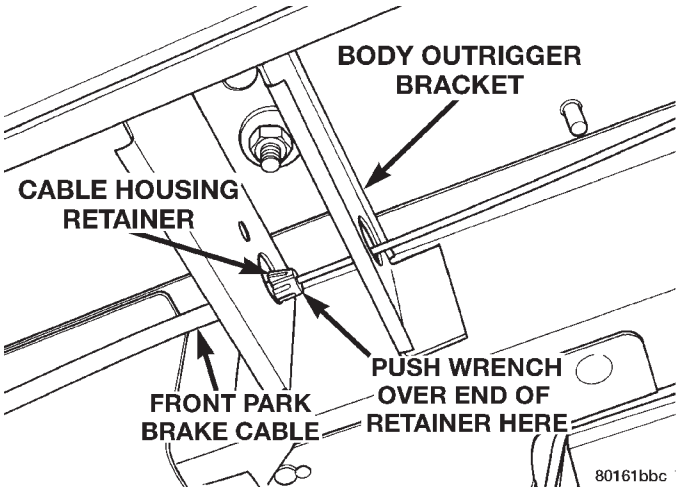


Fig. 160 Front Park Brake Cable Attachment To Body

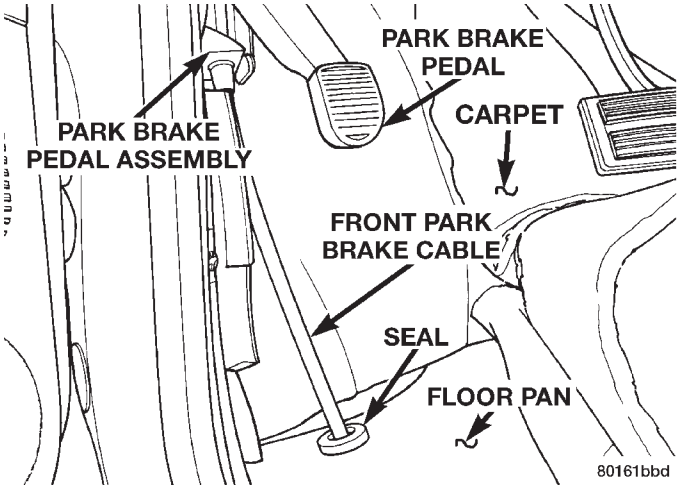


Fig. 161 Front Park Brake Cable At Floor Pan

INSTALL

(1) Pass park brake cable assembly through hole in floor pan from the inside of the vehicle.

(2) Pass cable strand button through the hole in the pedal assembly bracket.

(3) Install cable retainer onto the park brake cable and then install cable retainer into pedal assembly bracket.

(4) Install the end of the park brake cable into the retainer previously installed into the park brake pedal bracket.

(5) Install cable strand button into the clevis on the park brake pedal mechanism.

(6) Install the front park brake cable floor pan seal into hole in floor pan. Seal is to be installed so the flange on the seal is flush with the floor pan (Fig. 161). Fold carpeting back down on floor.

(7) Raise vehicle.

(8) Insert brake cable and housing into body outrigger bracket making certain that housing retainer fingers lock the housing firmly into place (Fig. 160).

REMOVAL AND INSTALLATION (Continued)

(9) Assemble the park brake cables onto the park brake cable equalizer (Fig. 159).

(10) Release the automatic adjuster mechanism on the park brake pedal assembly. Refer to Parking Brake Automatic Adjuster in the Service Procedures Section in this group of the service manual for the required procedure.

(11) Lower vehicle and apply the park brake pedal 1 time, this will seat the park brake cables.

INTERMEDIATE PARK BRAKE CABLE

REMOVE

(1) Raise vehicle on jackstands or centered on a hoist. See Hoisting in the Lubrication and Maintenance group of this service manual.

(2) Manually lockout the automatic self adjusting mechanism of the park brake pedal assembly. Refer to Manual Lockout Of Auto Adjuster Mechanism in this section of the service manual for the required procedure.

(3) Remove the intermediate park brake cable from the park brake cable equalizer (Fig. 162).

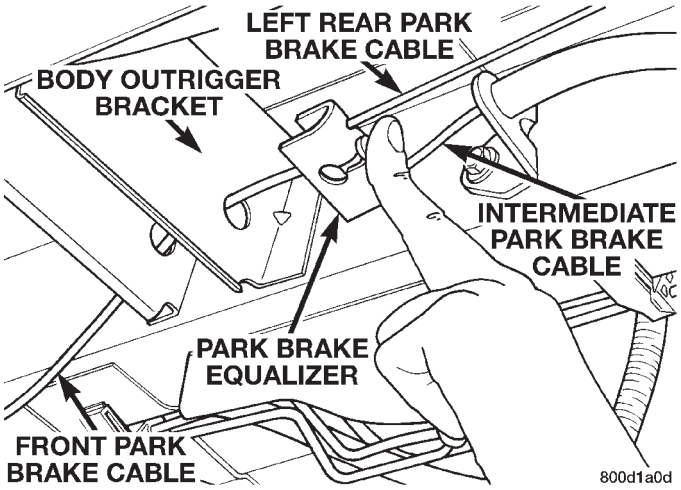


Fig. 162 Park Brake Cable Attachment To Equalizer

(4) Remove the intermediate park brake cable from the cable connector attaching it to the right rear park brake cable (Fig. 163)

(5) Remove the intermediate park brake cable from the cable guides on the frame rails (Fig. 163).

INSTALL

(1) Install the ends of the park brake cables through the cable guides.

(2) Install the intermediate park brake cable on the cable connector at the right rear park brake cable (Fig. 163).

(3) Install the intermediate park brake cable on the cable equalizer (Fig. 162).

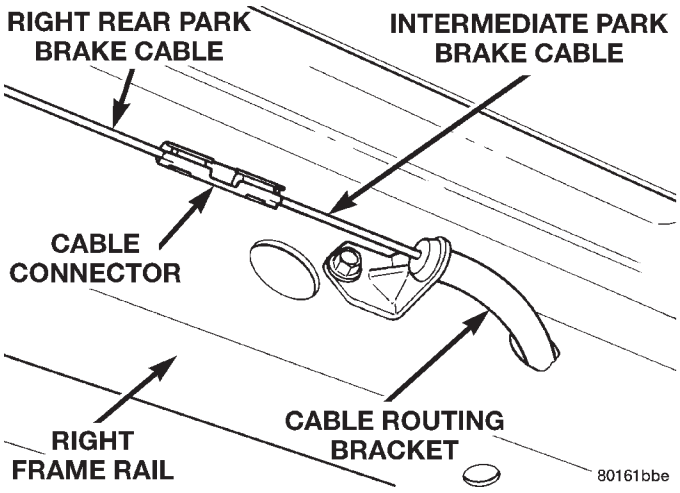


Fig. 163 Intermediate Cable Attachment To Right Rear Cable

(4) Remove the locking pliers from the front park brake cable. This will activate the automatic adjuster and correctly adjust the park brake cables.

(5) Install and position the foam collar on the park brake cable to prevent it from rattling against floor.

(6) Lower vehicle and apply the park brake pedal 1 time, this will seat the park brake cables.

RIGHT REAR PARK BRAKE CABLE

REMOVE

(1) Raise vehicle on jackstands or centered on a hoist. See Hoisting in the Lubrication and Maintenance group of this service manual.

(2) Remove rear tire and wheel assembly.

(3) Remove rear brake drum from the rear wheel of the vehicle requiring service to the rear park brake cable.

(4) Create slack in the rear park brake cables by locking out the automatic adjuster as described. Grasp exposed section of front park brake cable and pull down on it. Then install a pair of locking pliers on the cable just rearward of the second body outrigger bracket (Fig. 164).

(5) Disconnect the right rear park brake cable from the connector on the intermediate cable (Fig. 165).

(6) To remove the right park brake cable housing from the body bracket, slide a 14 mm box end wrench over the end of cable retainer to compress the retaining fingers (Fig. 166). The alternate method using an aircraft type hose clamp will not work on the right side of the vehicle.

(7) Remove the brake shoes from the brake support plate. Refer to Rear Brake Shoes in the Removal And Installation Section of this service manual for the required procedure.

REMOVAL AND INSTALLATION (Continued)

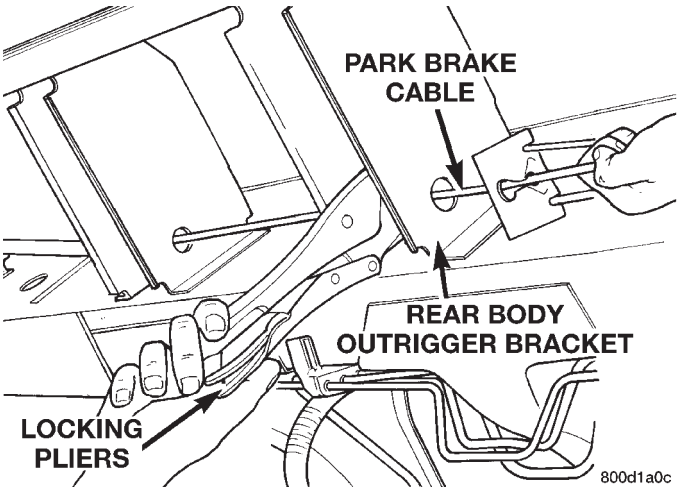


Fig. 164 Locking Out Automatic Adjuster

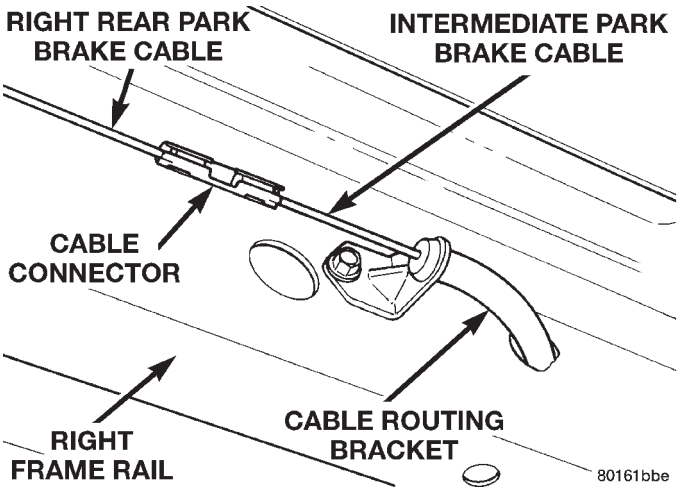


Fig. 165 Right Rear Cable Connection To Intermediate Cable

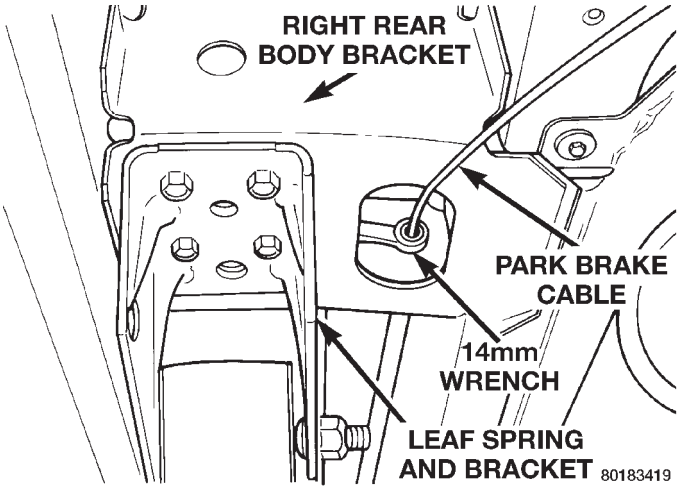


Fig. 166 Right Park Brake Cable Removal From Body Bracket

(8) Disconnect park brake cable from park brake actuator lever.

(9) Remove the park brake cable housing retainer from the brake support plate using a 14mm wrench to compress the retaining fingers (Fig. 167).

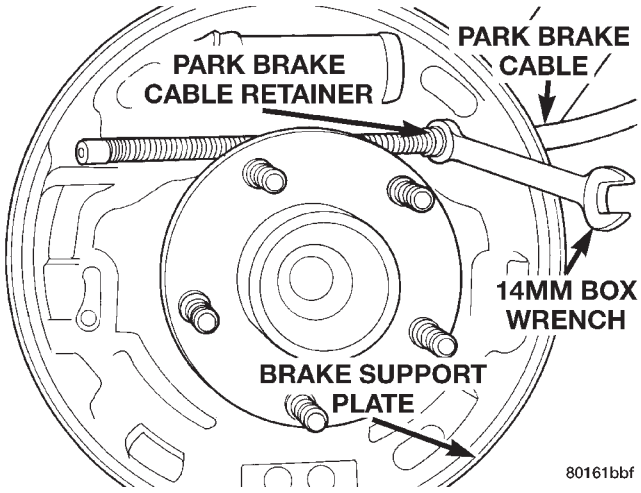


Fig. 167 Removing Park Brake Cable From Brake Support Plate

INSTALL

(1) Install the park brake cable in the brake support plate. Insert cable housing retainer into brake support plate making certain that cable housing retainer fingers lock the housing and retainer firmly into place.

(2) Attach the park brake cable onto the park brake actuator lever.

(3) Install the brake shoes on the rear brake support plate. Refer to Rear Brake Shoes in the Removal And Installation Section of this service manual for the required procedure.

(4) Insert cable housing retainer into body bracket making certain that cable housing retainer fingers lock the housing firmly into place.

(5) Connect the right rear park brake cable to the connector on the intermediate park brake cable (Fig. 165).

(6) Install the brake drum, and the wheel and tire assembly.

(7) Remove the locking pliers from the front park brake cable. This will automatically adjust the park brake cables.

(8) Apply and release park brake pedal 1 time, this will seat the park brake cables.

LEFT REAR PARK BRAKE CABLE

REMOVE

(1) Raise vehicle on jackstands or centered on a hoist. See Hoisting in the Lubrication and Maintenance group of this service manual.

(2) Remove rear tire and wheel assembly.

REMOVAL AND INSTALLATION (Continued)

(3) Remove rear brake drum from the rear wheel of the vehicle requiring service to the rear park brake cable.

(4) Create slack in rear park brake cables by locking out the automatic adjuster as described. Grasp exposed section of front park brake cable and pull down on it. Then install a pair of locking pliers on the cable just rearward of the second body outrigger bracket (Fig. 168).

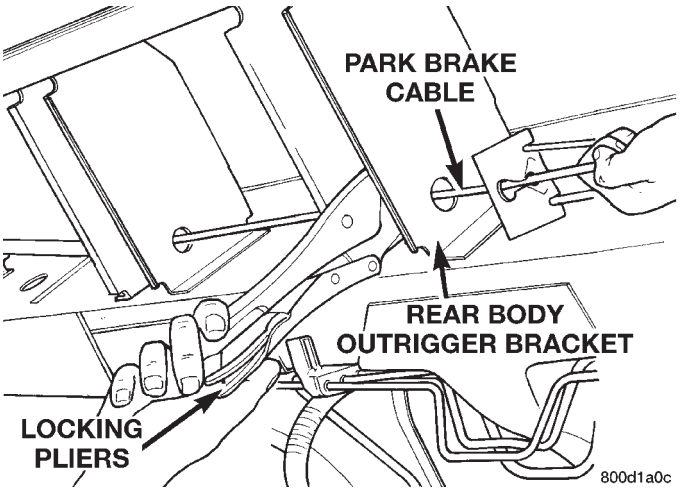


Fig. 168 Locked Out Park Brake Automatic Adjuster

(5) Disconnect the left rear park brake cable from the park brake cable equalizer (Fig. 169).

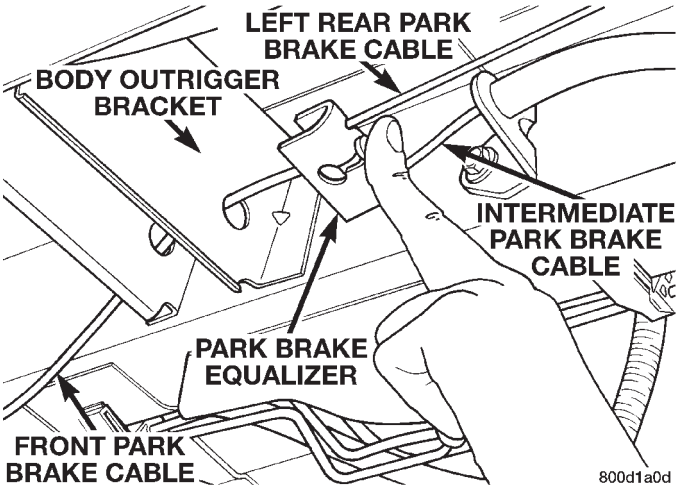


Fig. 169 Rear Park Brake Cables At Equalizer

(6) To remove park brake cable housing from the body bracket, slide a 14 mm box end wrench over retainer end compressing the three fingers (Fig. 170). Alternate method is to use an aircraft type hose clamp.

(7) Remove the brake shoes from the brake support plate. Refer to Rear Brake Shoes in the Removal And Installation Section of this service manual for the required procedure.

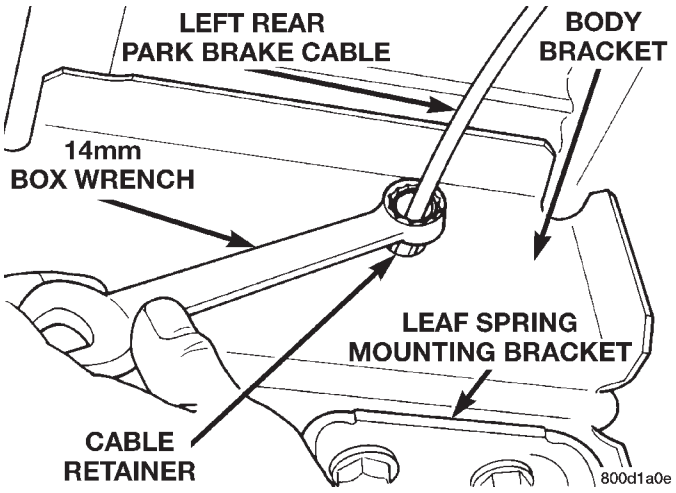


Fig. 170 Park Brake Cable Removal From Body Bracket

(8) Disconnect park brake cable from park brake actuator lever.

(9) Remove the park brake cable housing retainer from the brake support plate using a 14mm wrench to compress the retaining fingers (Fig. 171).

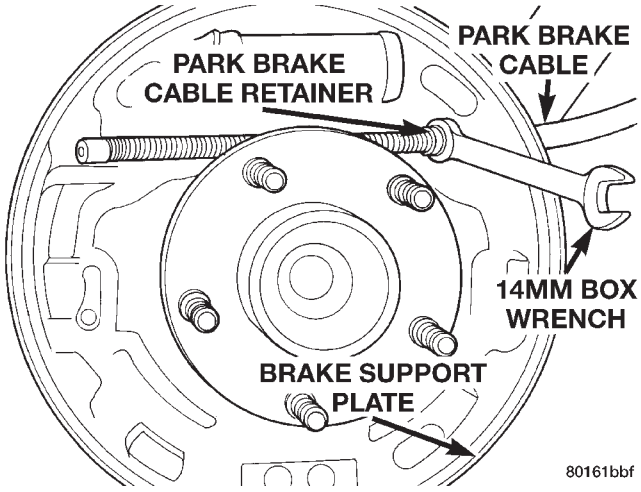


Fig. 171 Removing Park Brake Cable From Brake Support Plate

INSTALL

(1) Install the park brake cable in the brake support plate. Insert cable housing retainer into brake support plate making certain that cable housing retainer fingers lock the housing and retainer firmly into place.

(2) Attach the park brake cable onto the park brake actuator lever.

(3) Install the brake shoes on the rear brake support plate. Refer to Rear Brake Shoes in the Removal And Installation Section of this service manual for the required procedure.

REMOVAL AND INSTALLATION (Continued)

(4) Insert cable housing retainer into body outrigger bracket making certain that cable housing retainer fingers lock the housing firmly into place.

(5) Connect rear park brake cable to the equalizer bracket (Fig. 169).

(6) Install brake drum, and wheel and tire assembly.

(7) Remove the locking pliers from the front park brake cable. This will automatically adjust the park brake cables.

(8) Apply and release park brake pedal 1 time, this will seat the park brake cables.

STOP LAMP SWITCH

REMOVE

(1) Depress and hold the brake pedal while rotating stop lamp switch (Fig. 172) in a counter-clockwise direction approximately 30 degrees.

(2) Pull the switch rearward and remove from its mounting bracket.

(3) Disconnect wiring harness connector from stop lamp switch.

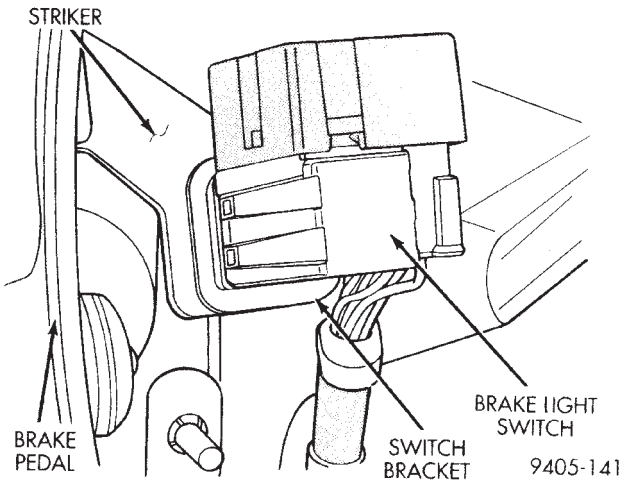


Fig. 172 Stop Lamp Switch

INSTALL

NOTE: Prior to installing stop lamp switch into bracket, the plunger must be moved to its fully extended position using procedure in Step 1.

(1) Hold stop lamp switch firmly in one hand. Then using other hand, pull outward on the plunger of the stop lamp switch until it has ratcheted out to its fully extended position.

(2) Connect the wiring harness connector to the stop lamp switch.

(3) Mount the stop lamp switch into the bracket using the following procedure. Depress the brake pedal as far down as possible. Then install switch in bracket by aligning index key on switch with slot at top of square hole in mounting bracket. When switch is fully installed in bracket, rotate switch clockwise approximately 30° to lock switch into bracket.

CAUTION: Do not use excessive force when pulling back on brake pedal to adjust the stop lamp switch. If to much force is used, damage to the stop lamp switch or striker (Fig. 172) can result.

(4) Gently pull back on brake pedal until the pedal stops moving. This will cause the switch plunger to ratchet backward to the correct position.

DISASSEMBLY AND ASSEMBLY

MASTER CYLINDER TO POWER BRAKE BOOSTER VACUUM SEAL

(1) Remove the master cylinder from the power brake vacuum booster. Refer to Master Cylinder removal, for the required procedure to remove master cylinder from power brake vacuum booster.

(2) Using a soft tool such as a trim stick, remove the vacuum seal from the master cylinder mounting flange.

(3) Using Mopar Brake Parts Cleaner or an equivalent, thoroughly clean end of master cylinder housing and master cylinder push rod.

(4) Install new master cylinder to power brake booster vacuum seal on master cylinder. **When installing new vacuum seal, be sure it is squarely seated against master cylinder mounting flange and in groove of push rod (Fig. 173).**

(5) Bleed the master cylinder assembly prior to

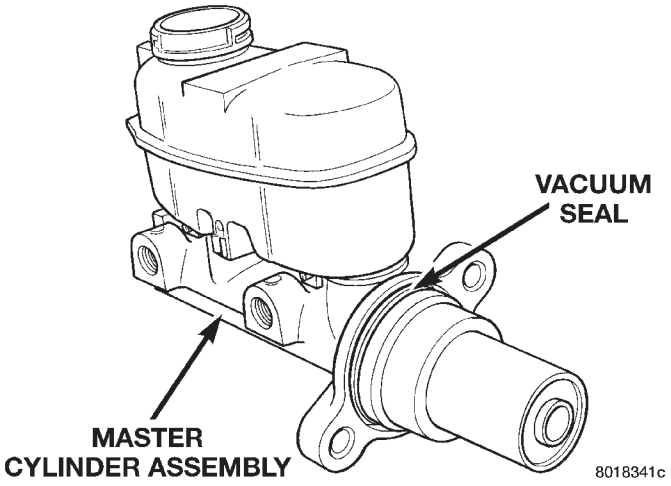


Fig. 173 Vacuum Seal Installed On Master Cylinder

installing it on the power brake vacuum booster.

(6) Install master cylinder assembly on the power brake vacuum booster. Refer to Master Cylinder Installation for the required procedure to install the master cylinder on the power brake vacuum booster.

DISASSEMBLY AND ASSEMBLY (Continued)

(7) Road test vehicle to ensure proper operation of the vehicle's power brake system.

MASTER CYLINDER FLUID RESERVOIR

(1) Clean master cylinder housing and brake fluid reservoir. Use only a solvent such as Mopar Brake Parts Cleaner or an equivalent.

(2) Remove the filler tube and brake fluid reservoir cap. Using a syringe or equivalent type tool empty as much brake fluid as possible from the reservoir.

CAUTION: When removing fluid reservoir from the master cylinder, do not pry off using any type of tool. This can damage the fluid reservoir or master cylinder housing.

(3) Remove the master cylinder assembly from the power brake vacuum booster. Refer to master cylinder, in the removal and installation section in this group of the service manual for the required procedure

(4) Mount the master cylinder in a vise using the master cylinder mounting flange (Fig. 174).

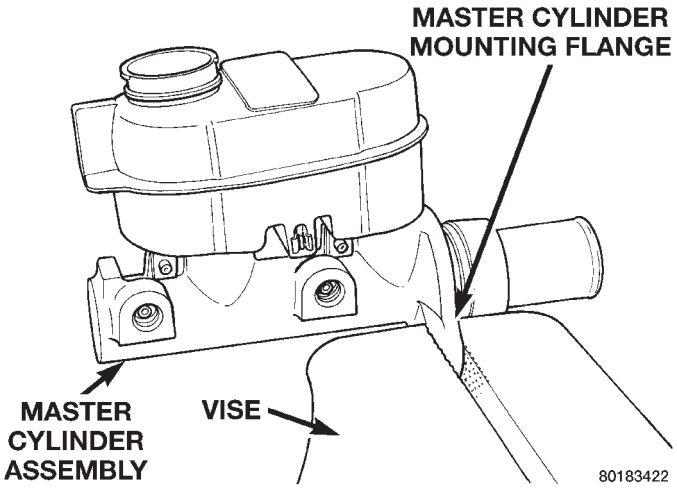


Fig. 174 Master Cylinder Correctly Mounted In Vise

(5) Using correct size pin punch, remove the 2 retaining pins between the fluid reservoir and master cylinder housing (Fig. 175). Rock the brake fluid reservoir from side to side while pulling up to remove it from the seal grommets in master cylinder housing.

(6) Remove the 2 master cylinder housing to brake fluid reservoir seal grommets (Fig. 176).

(7) Install new master cylinder housing to brake fluid reservoir sealing grommets (Fig. 176) in master cylinder housing.

(8) Lubricate reservoir mounting area with fresh clean brake fluid. Place reservoir in position over sealing grommets. Seat reservoir into sealing grommets using a rocking motion while firmly pressing down on fluid reservoir.

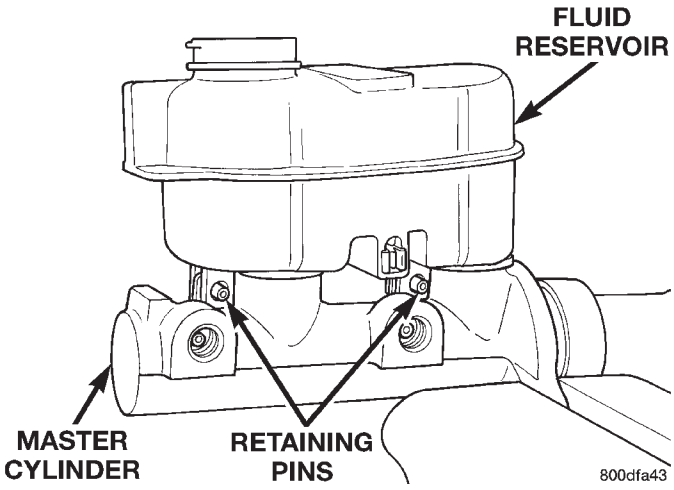


Fig. 175 Fluid Reservoir Retaining Pins

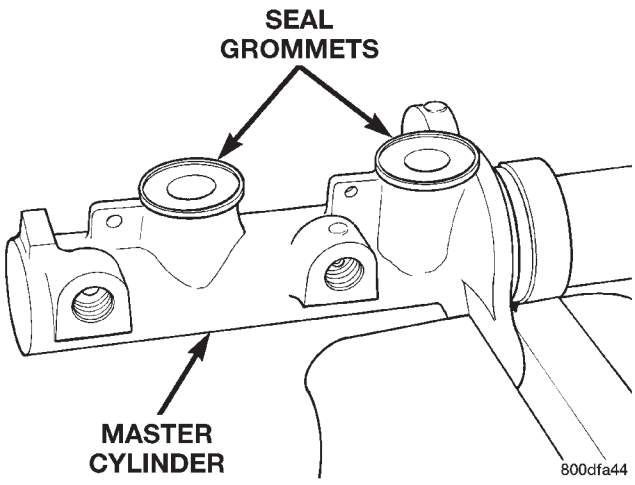


Fig. 176 Master Cylinder To Fluid Reservoir Seal Grommets

(9) Be sure fluid reservoir is positioned properly on master cylinder. **Bottom of fluid reservoir is to be touching the top of both sealing grommets when properly installed on master cylinder housing.**

(10) Install the 2 fluid reservoir to master cylinder retaining pins (Fig. 175).

(11) Install the master cylinder assembly on the power brake vacuum booster. Refer to master cylinder, in the removal and installation section in this group of the service manual for the required procedure

(12) Install filler tube on the fluid reservoir. Fill fluid reservoir to its proper level as indicated on the outboard side of the fluid reservoir. **Be careful not to over fill the fluid reservoir, fluid is not intended to be stored in the filler tube. Install cap on fluid reservoir filler tube.**

DISASSEMBLY AND ASSEMBLY (Continued)

MASTER CYLINDER FLUID RESERVOIR FILL TUBE

The master cylinder fluid reservoir filler neck is removable from the master cylinder fluid reservoir. The filler neck if required, can be replaced as a separate component of the fluid reservoir.

The filler neck is removed and installed using the following procedure.

REMOVE

(1) Check brake fluid level in master cylinder fluid reservoir to be sure brake fluid is not in the filler neck. If brake fluid is in filler neck, lower fluid level before removing filler neck from fluid reservoir

(2) Grasp filler neck at cap end (Fig. 177) and push straight down. This will cause the filler neck to pop out of the fluid reservoir.

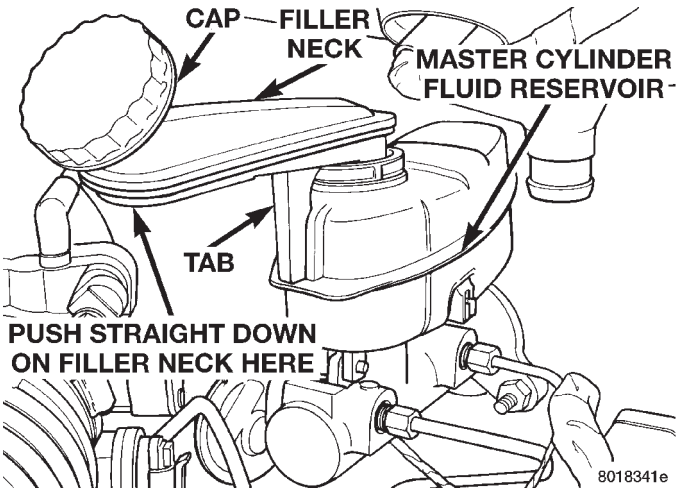


Fig. 177 Master Cylinder Fluid Reservoir Filler Neck

INSTALL

(1) Wet the O-ring on the reservoir end of the filler neck with fresh clean brake fluid.

(2) Position the filler neck in the opening on the fluid reservoir. Ensure tab on filler neck (Fig. 177) is in the groove on the front of the fluid reservoir.

(3) Push down while slightly rocking filler neck until filler neck snaps into the fluid reservoir opening.

(4) Install cap on filler neck.

(5) Check and/or add brake fluid in reservoir to ensure it is at the correct level.

MASTER CYLINDER BRAKE FLUID LEVEL SWITCH

The master cylinder or brake fluid reservoir does not have to be removed from the vehicle for replacement of the brake fluid level sensor.

(1) Remove wiring harness connector from brake fluid reservoir level sensor (Fig. 178).

(2) Using fingers, compress the retaining tabs on the end of brake fluid level switch (Fig. 179).

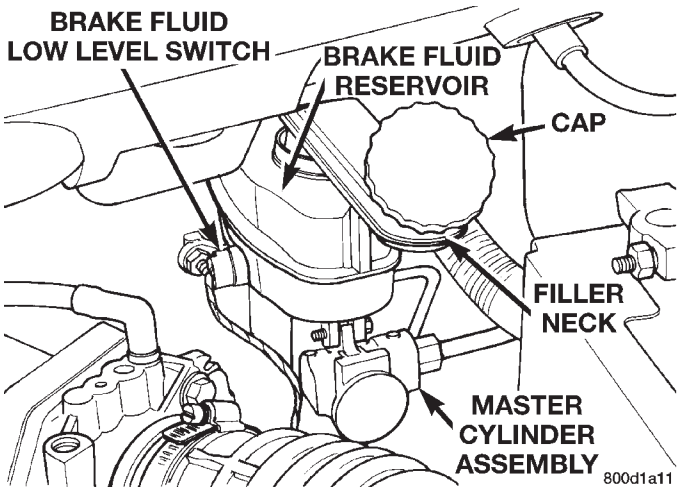


Fig. 178 Fluid Level Sensor Electrical Connection

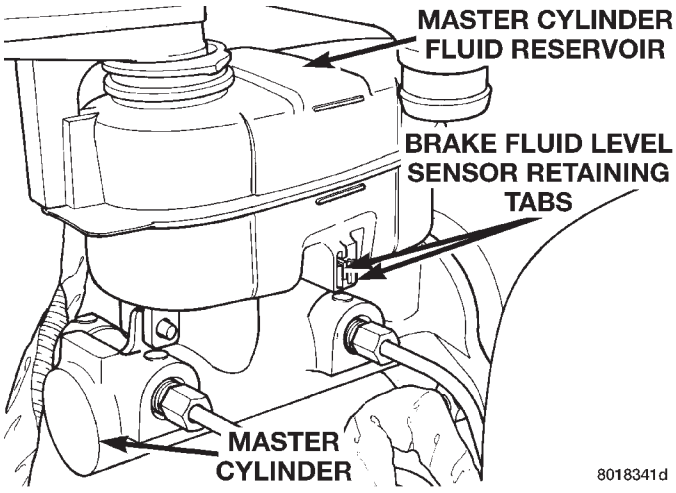


Fig. 179 Master Cylinder Brake Fluid Level Sensor

(3) With retaining tabs compressed, (Fig. 179) grasp opposite end of brake fluid level switch and pull it out of master cylinder brake fluid reservoir.

(4) Insert the replacement brake fluid level sensor into brake fluid reservoir. Be sure sensor is pushed in until retaining tabs (Fig. 179) lock it to the brake fluid reservoir.

(5) Connect the vehicle wiring harness connector to the brake fluid level sensor (Fig. 178).

FRONT DISC BRAKE CALIPER

CLEANING AND INSPECTION

Check for brake fluid leaks in and around dust boot area and inboard brake pad, and for any ruptures, brittleness or damage to the piston dust boot. If the dust boot is damaged, or a fluid leak is visible, disassemble caliper assembly and install a new piston seal and dust boot, and piston if scored. Refer to Caliper Disassembly And Re-Assembly Procedures in Disc Brake Caliper Service in this section of the service manual.

DISASSEMBLY AND ASSEMBLY (Continued)

Check the guide pin dust boots to determine if they are in good condition. Replace if they are damaged, dry, or found to be brittle. Refer to Guide Pin Bushing Service in Disc Brake Caliper Service in this section of the service manual.

CALIPER GUIDE PIN BUSHING SERVICE

The double pin caliper uses a sealed for life bushing and sleeve assembly. If required this assembly can be serviced using the following procedure.

REMOVING CALIPER GUIDE PIN BUSHINGS

(1) Remove caliper from brake rotor (See Brake Shoe Removal). Hang caliper assembly on a wire hook away from the brake rotor.

(2) Push out and then pull the steel sleeve from the inside of the bushing using your fingers as shown in (Fig. 180).

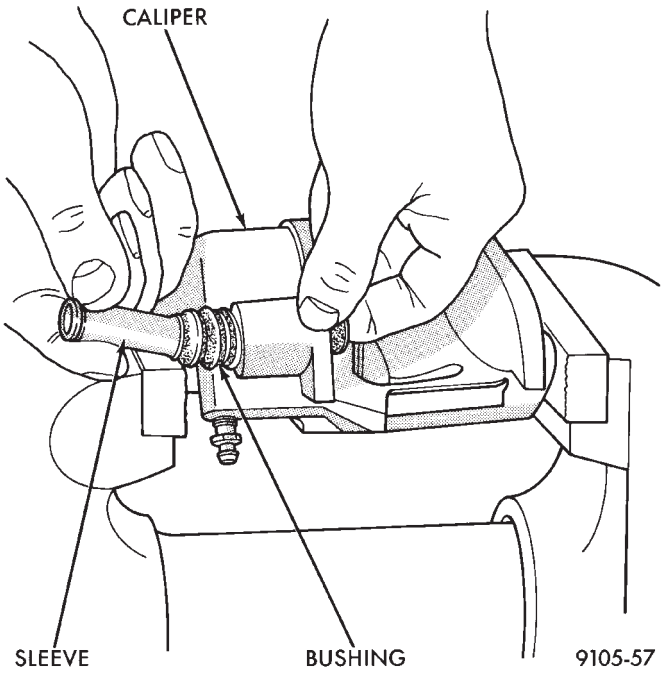


Fig. 180 Removing Inner Sleeve From Bushing

(3) Using your fingers, collapse one side of the bushing. Then pull on the opposite side to remove the bushing from the brake caliper housing (Fig. 181).

INSTALLING CALIPER GUIDE PIN BUSHINGS

(1) Fold the bushing in half lengthwise at the solid middle section of the bushing (Fig. 182).

(2) Insert the folded bushing into the caliper housing (Fig. 183). **Do not use a sharp object to perform this step due to possible damage to the bushing.**

(3) Unfold the bushing using your fingers or a wooden dowel until the bushing is fully seated into the caliper housing. Flanges should be seated evenly on both sides of the bushing hole (Fig. 184).

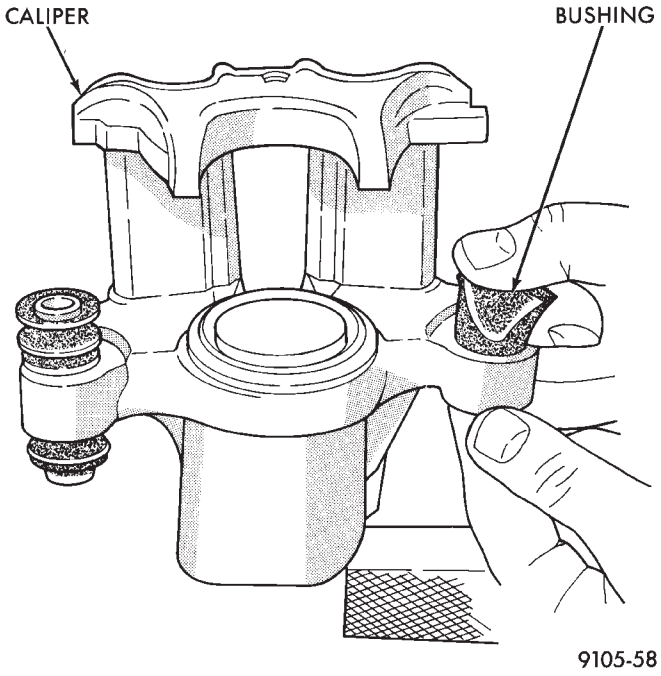


Fig. 181 Removing Bushing From Caliper

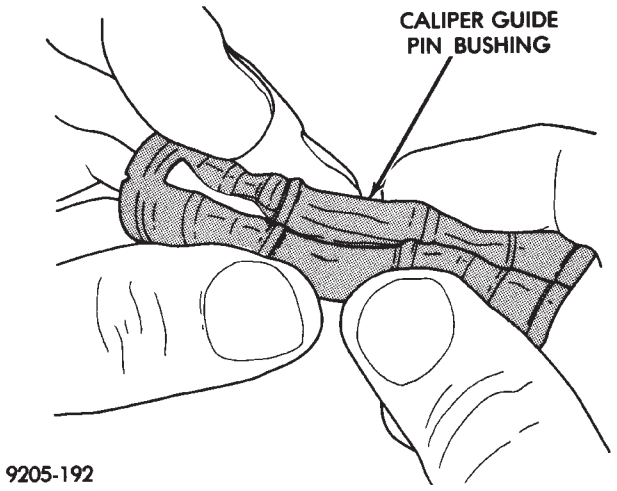


Fig. 182 Folded Caliper Guide Pin Bushing

(4) Lubricate the inside surfaces of the bushing using Mopar, Silicone Dielectric Compound or an equivalent.

(5) Install guide pin sleeve into one end of bushing until seal area of bushing is past seal groove in sleeve (Fig. 185).

(6) Holding convoluted boot end of bushing with one hand, push steel sleeve bushing through boot until one end of bushing is fully seated into seal groove on one end of sleeve (Fig. 185).

(7) Holding sleeve in place, work other end of bushing over end of sleeve and into the seal grove on sleeve (Fig. 186). Be sure other end of bushing did not come out of seal grove in sleeve.

DISASSEMBLY AND ASSEMBLY (Continued)

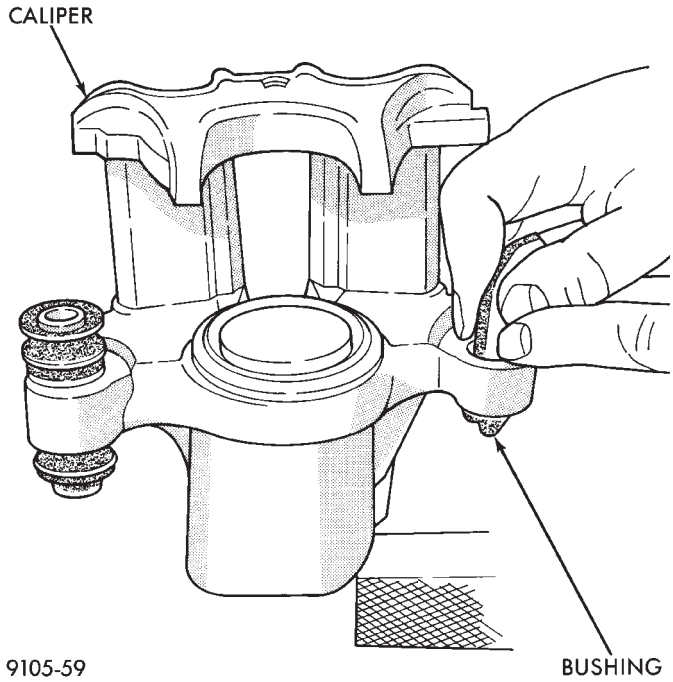


Fig. 183 Installing Caliper Guide Pin Bushing

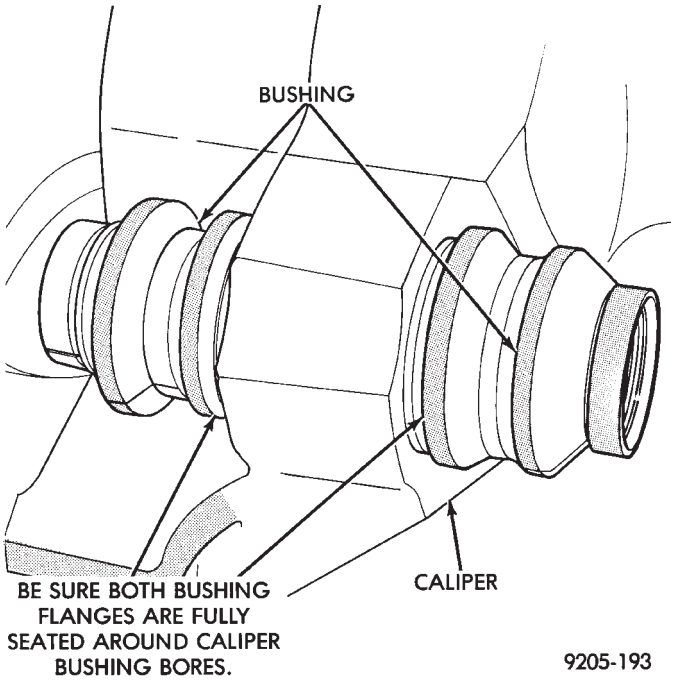


Fig. 184 Bushing Correctly Installed In Caliper

(8) When the sleeve is seated properly into the bushing, the sealed for life sleeve/bushing can be held between your fingers and easily slid back and forth without the bushing unseating from the sleeve groove.

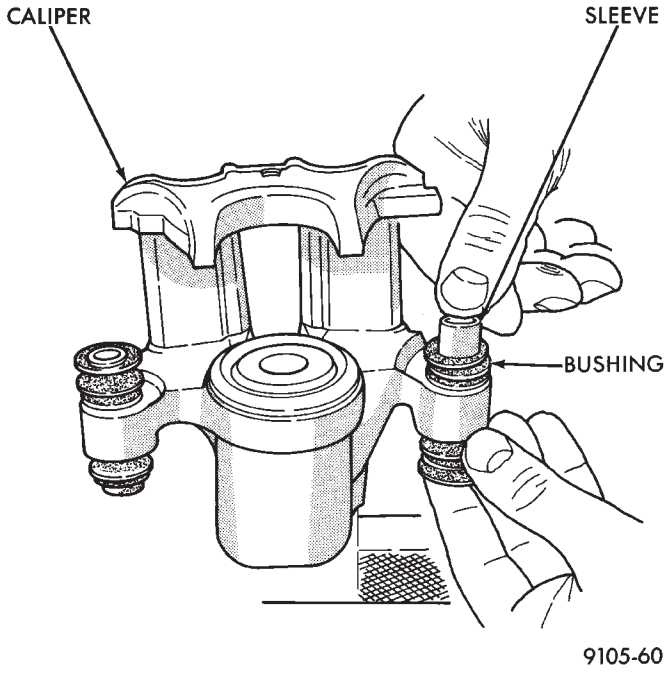


Fig. 185 Installing Sleeve In Bushing

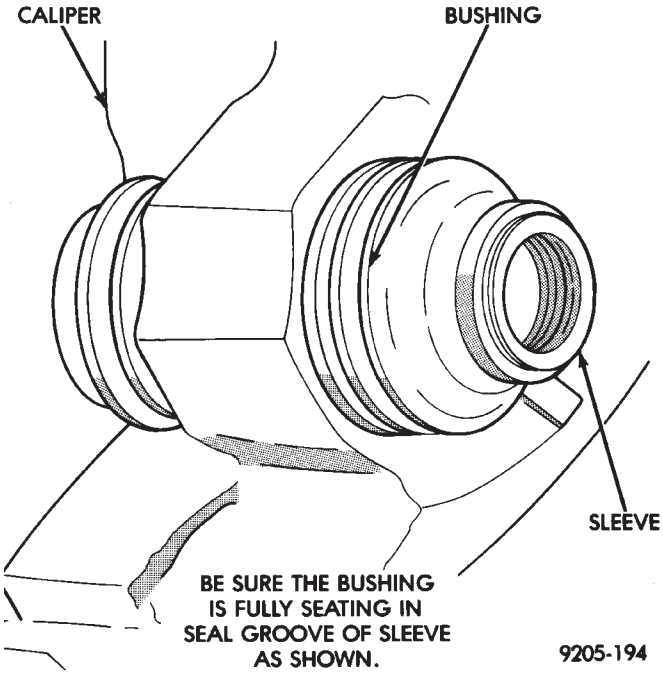


Fig. 186 Correctly Installed Caliper Sleeve And Bushing

CALIPER DISASSEMBLY

WARNING: UNDER NO CONDITION SHOULD AIR PRESSURE EVER BE USED TO REMOVE A PISTON FROM A CALIPER BORE. PERSONAL INJURY COULD RESULT FROM SUCH A PRACTICE.

(1) Remove caliper from brake rotor (See Brake Shoe Removal). Hang assembly on a wire hook away

DISASSEMBLY AND ASSEMBLY (Continued)

from rotor, so hydraulic fluid cannot get on rotor. Place a small piece of wood between the piston and caliper fingers.

(2) **Carefully** depress brake pedal to hydraulically push piston out of bore. Then apply and hold down the brake pedal to any position beyond the first inch of pedal travel. This will prevent loss of brake fluid from the master cylinder.

(3) If both front caliper pistons are to be removed, disconnect brake tube at flexible brake hose at frame rail. Plug brake tube and remove piston from opposite caliper using the same process as above for the first piston removal.

(4) Disconnect the brake fluid flex hose from the caliper assembly.

CAUTION: Do not use excessive force when clamping caliper in vise. Excessive vise pressure will cause bore distortion and binding of piston.

(5) To disassemble caliper, mount in a vise equipped with protective jaws.

(6) Remove guide pin sleeves and guide pin bushings. See Removing Guide Pin Bushings in the caliper disassembly section of this manual.

(7) Remove the piston dust boot from the caliper and discard (Fig. 187).

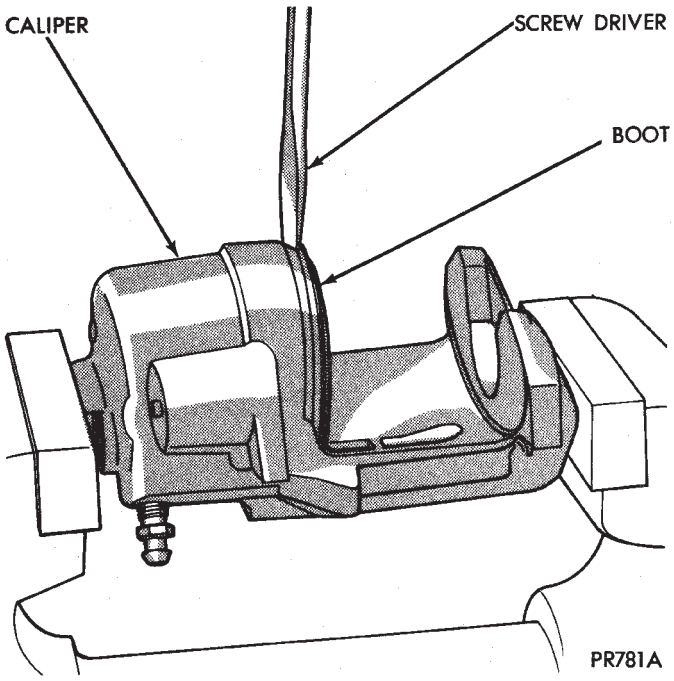


Fig. 187 Removing Caliper/Piston Dust Boot

(8) Using a soft tool, such as a plastic trim stick, work piston seal out of its groove in caliper piston bore (Fig. 188). Discard old seal. **Do not use a screw driver or other metal tool for this operation, because of the possibility of scratching piston bore or burring edges of seal groove.**

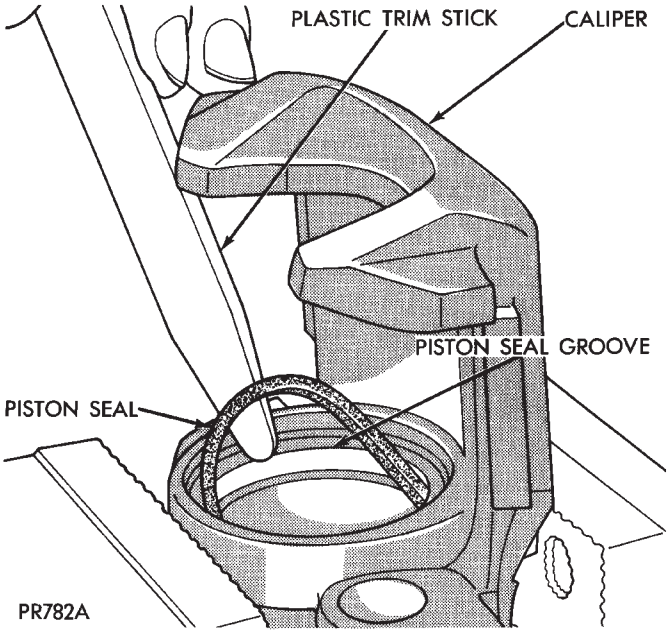


Fig. 188 Removing Piston Seal From Caliper

(9) Clean all parts using alcohol or a suitable solvent and wipe dry **using only a lint free cloth.** No lint residue can remain in caliper bore. Clean out all drilled passages and bores. **Whenever a caliper has been disassembled, a new boot and seal must be installed at assembly.**

(10) Inspect the piston bore for scoring or pitting. Bores that show light scratches or corrosion can usually be cleared of the light scratches or corrosion using crocus cloth. Bores that have deep scratches or scoring should be honed. Use Caliper Hone, Special Tool C-4095, or equivalent providing the diameter of the bore is not increased more than 0.0254 mm (0.001 inch) (Fig. 189).

(11) If the bore does not clean up within this specification, a new caliper housing should be installed. Install a new piston if the old one is pitted or scored.

NOTE: When using Caliper Honing Tool, Special Tool C-4095, coat the stones and bore with brake fluid. After honing the bore, carefully clean the seal and boot grooves with a stiff non-metallic rotary brush.

NOTE: Use extreme care in cleaning the caliper after honing. Remove all dirt and grit by flushing the caliper with brake fluid; wipe dry with a clean, lint free cloth and then clean a second time.

CAUTION: When inspecting caliper piston, do not use anything but solvents to clean piston surface. If surface of piston cannot be cleaned using only solvents, piston must be replaced.

DISASSEMBLY AND ASSEMBLY (Continued)

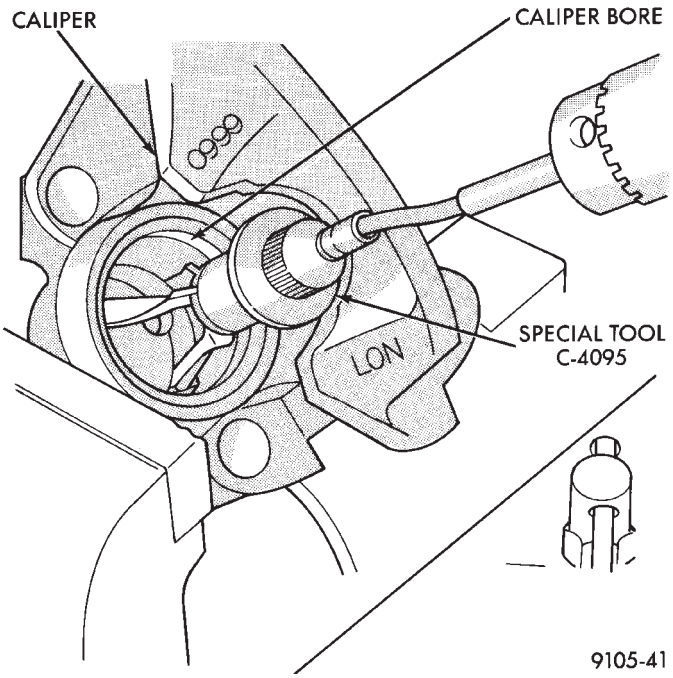


Fig. 189 Honing Brake Caliper Piston Bore

(12) Inspect caliper piston for pitting, scratches, or any physical damage. Replace piston if there is evidence of scratches, pitting or physical damage.

CALIPER ASSEMBLY

CAUTION: Excessive vise pressure will cause bore distortion and binding of piston.

(1) Clamp caliper in a vise (with protective caps installed on jaws of vise).

(2) Dip new piston seal in clean brake fluid and install in the groove of the caliper bore. Seal should be positioned at one area in groove and gently worked around the groove (Fig. 190), using only your fingers until properly seated. **NEVER USE AN OLD PISTON SEAL.** Be sure that fingers are clean and seal is not twisted or rolled (Fig. 190).

(3) Coat new piston boot with clean brake fluid leaving a generous amount inside boot.

(4) Position dust boot over piston after coating with brake fluid.

CAUTION: Force must be applied to the piston uniformly to avoid cocking and binding of the piston in the bore of the caliper.

(5) Install piston into caliper bore pushing it past the piston seal until it bottoms in the caliper bore (Fig. 191).

(6) Position dust boot into the counterbore of the caliper assembly piston bore.

(7) Using a hammer and Installer Piston Caliper Boot, Special Tool C-4689 and Handle, Special Tool

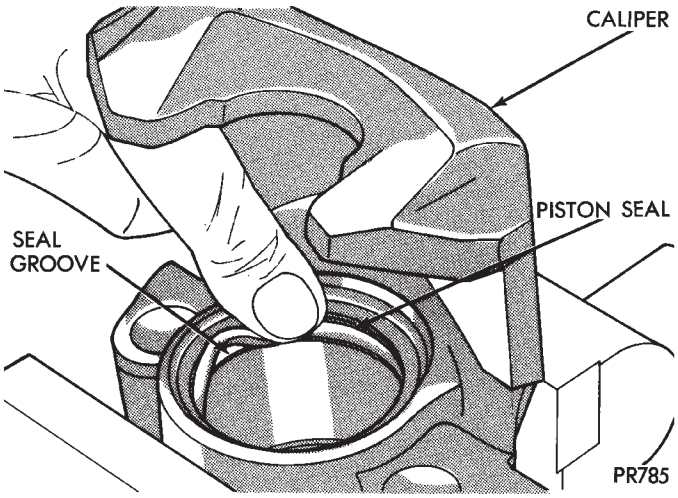


Fig. 190 Installing New Piston Seal In Caliper

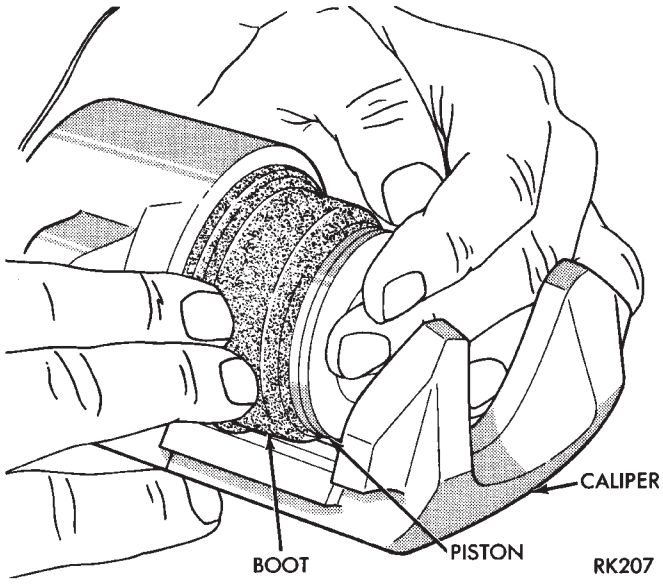


Fig. 191 Installing Piston Into Caliper Bore

C-4171, drive boot into counterbore of the caliper (Fig. 192).

(8) Install guide pin sleeves and bushings. See Install Guide Pin Bushings section in the caliper disassembly section of this manual.

(9) Install brake pads. See Installing Brake Pads in the Brake Pad Service Procedures section of this manual.

(10) Before installing caliper assembly on vehicle, inspect brake rotor. If any conditions as described in Checking Brake Rotor for Runout and Thickness are present the rotor, must be replaced or refaced. If the rotor does not require any servicing, install caliper assembly.

(11) Install brake hose onto caliper using banjo bolt. Torque the brake hose to caliper assembly banjo bolt to 33 N·m (24 ft. lbs.). **New seal washers**

DISASSEMBLY AND ASSEMBLY (Continued)

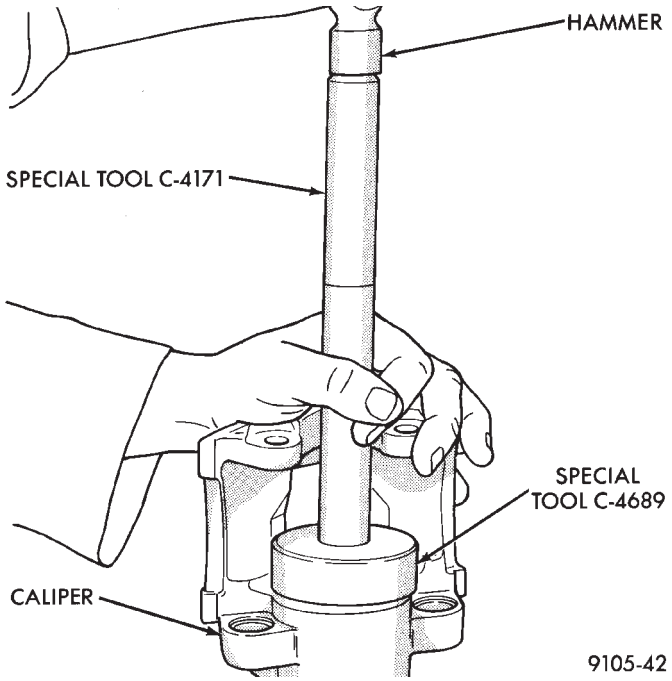


Fig. 192 Installing Dust Boot In Caliper Counterbore

MUST always be used when installing brake hose to caliper.

(12) Bleed the brake system (see Bleeding Brake System).

WHEEL CYLINDER REAR DRUM BRAKE

DISASSEMBLE

To disassemble the wheel cylinders, proceed as follows:

(1) Pry boots away from cylinders and remove (Fig. 193).

(2) Press **IN** on one piston to force out opposite piston, cup and spring (Fig. 193). Then using a soft tool such as a dowel rod, press out the cup and piston that remain in the wheel cylinder.

(3) Wash wheel cylinder, pistons, and spring (Fig. 193) in clean brake fluid or alcohol; **(DO NOT USE ANY PETROLEUM BASE SOLVENTS)** clean thoroughly and blow dry with compressed air. Inspect cylinder bore and piston for scoring and pitting. (Do not use a rag as lint from the rag will stick to bore surfaces.)

(4) Wheel cylinder bores and pistons that are badly scored or pitted should be replaced. Cylinder walls that have light scratches, or show signs of corrosion, can usually be cleaned with crocus cloth, using a circular motion. Black stains on the cylinder walls are caused by piston cups and will not impair operation of cylinder.

ASSEMBLE

Before assembling the pistons and new cups in the wheel cylinders, dip them in clean brake fluid. If the boots are deteriorated, cracked or do not fit tightly on the pistons or the cylinder casting, install new boots.

(1) Coat cylinder bore with clean brake fluid.

(2) Lightly coat the sealing lip and outer surfaces of the wheel cylinder cups with **only Mopar Protect-A-Cup Lubricant p/n 04883068 and no substitute.**

(3) Install expansion spring with cup expanders in cylinder. Install cups in each end of cylinder with open end of cups facing each other (Fig. 193).

(4) Install piston in each end of cylinder having the flat face of each piston contacting the flat face of each cup, already installed (Fig. 193).

(5) Install a boot over each end of cylinder (Fig. 193). **Be careful not to damage boot during installation.**

CLEANING AND INSPECTION

FRONT DISC BRAKE PAD LINING INSPECTION

If a visual inspection does not adequately determine the condition of the lining, a physical check will be necessary. To check the amount of lining wear, remove the wheel and tire assemblies, and the calipers.

Remove the shoe and lining assemblies. (See Brake Shoe Removal).

Combined shoe and lining thickness should be measured at the thinnest part of the brake shoe assembly.

When a shoe and lining assembly is worn to a thickness of approximately 7.95 mm (0.313 inch) it should be replaced.

Replace **both** shoe assemblies (inboard and outboard) on the front wheels. It is also necessary that **both** front wheel brake shoe assembly sets be replaced, whenever shoe assemblies on either side of the vehicle require replacement.

If a shoe assembly does not require replacement, reinstall it, making sure each shoe assembly is returned to its original position. (See Brake Shoe Installation).

REAR DISC BRAKES

BRAKE PAD LINING WEAR

If a visual inspection does not adequately determine the condition of the lining, a physical check will be necessary. To check the amount of lining wear, remove the wheel and tire assemblies, and the calipers.

Remove the rear disc brake shoes. Refer to Rear Disc Brake Shoe Removal in the Removal And Instal-

CLEANING AND INSPECTION (Continued)

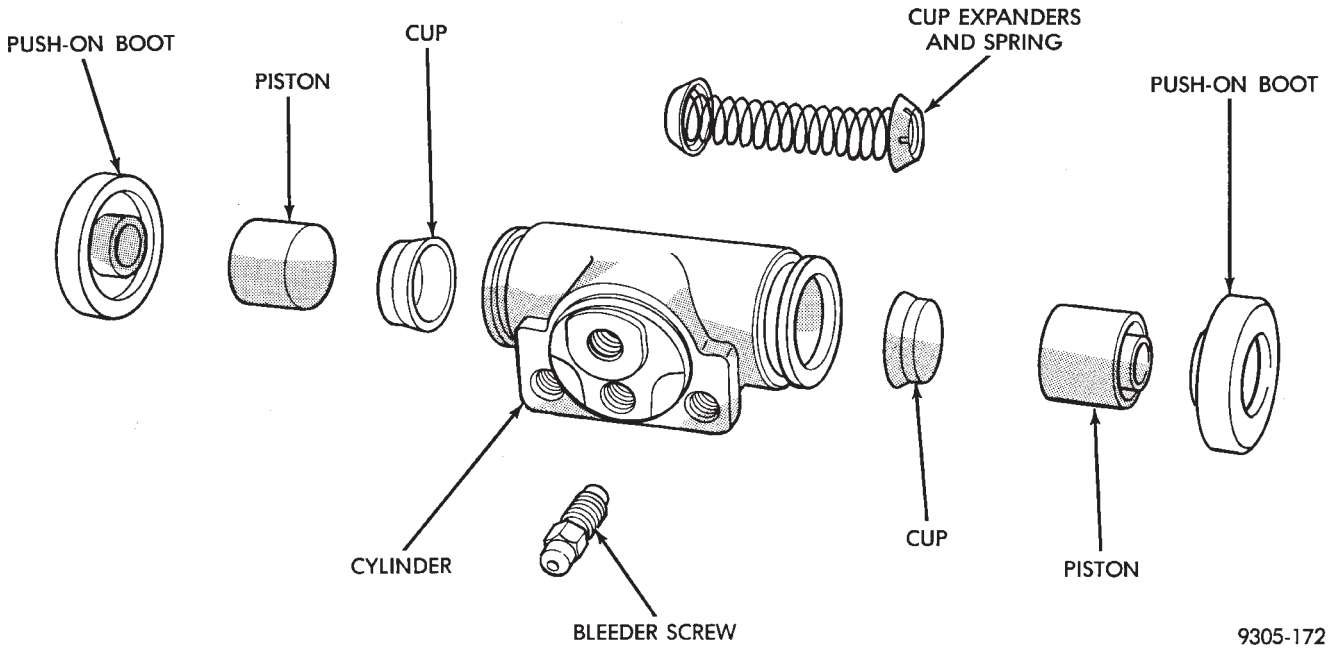


Fig. 193 Rear Wheel Cylinder (Exploded View)

lation section in this group of the service manual for the required procedure.

The combined brake shoe and lining material thickness should be measured at the thinnest part of the assembly.

When a set of brake shoes are worn to a total thickness of approximately 7.0 mm (9/32 inch) they should be replaced.

Replace **both** brake shoe assemblies (inboard and outboard). It is necessary that **both** rear wheel sets be replaced whenever brake shoe assemblies on either side are replaced.

If the brake shoe assemblies do not require replacement, reinstall, the assemblies making sure each brake shoe is returned to the original position. Refer to Rear Disc Brake Shoe Installation in the Removal And Installation section in this group of the service manual for the required procedure.

CALIPER INSPECTION

Check for brake fluid leaks in and around boot area and inboard lining, and for any ruptures, brittleness or damage to the piston dust boot. If the boot is damaged, or a fluid leak is visible, disassemble caliper assembly and install a new seal and boot, and piston if scored. Refer to Rear Disc Brake Caliper in the Disassembly And Assembly Section in this group of the service manual.

Check the guide pin dust boots to determine if they are in good condition. Replace if they are damaged, dry, or found to be brittle. Refer to Rear Disc Brake Caliper in the Disassembly And Assembly Section in this group of the service manual.

REAR DRUM BRAKE SHOE LINING INSPECTION

(1) Remove the tire and wheel assembly from the vehicle

(2) Remove the rear brake adjusting hole cover plug (Fig. 194).

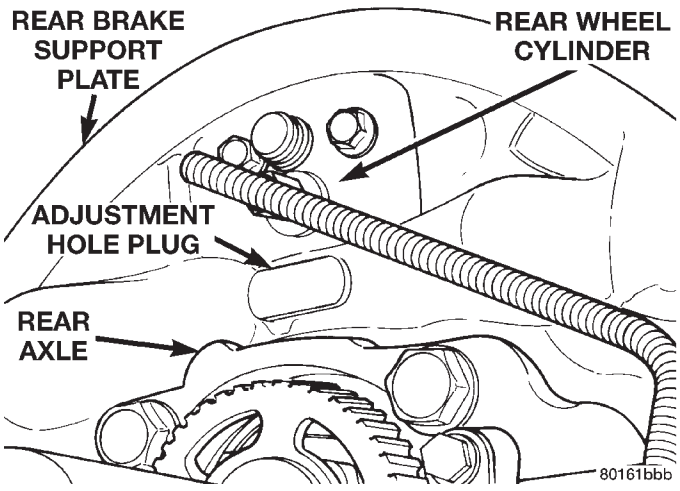


Fig. 194 Brake Adjustment Hole Rubber Plug

(3) Insert a thin screwdriver into brake adjusting hole to hold the adjusting lever away from the notches on the adjusting screw star wheel.

(4) Insert Tool C-3784 into brake adjusting hole and engage notches of brake adjusting screw star wheel. Release brake by prying down with adjusting tool.

(5) Remove the rear brake drum from the rear hub/bearing assembly.

(6) Inspect brake lining for wear, shoe alignment, and or contamination from grease or brake fluid.

CLEANING AND INSPECTION (Continued)

REAR DRUM BRAKE WHEEL CYLINDER

With brake drums removed, inspect the wheel cylinder boots for evidence of a brake fluid leak. Visually check the boots for cuts, tears, or heat cracks. If any of these conditions exist, the wheel cylinders should be completely cleaned, inspected and new parts installed.

If a wheel cylinder is leaking and the brake lining material is saturated with brake fluid, the brake shoes must be replaced.

BRAKE HOSE AND BRAKE LINES INSPECTION

Flexible rubber hose is used at both front brakes and at the rear axle. Inspection of brake hoses should be performed whenever the brake system is serviced and every 7,500 miles or 12 months, whichever comes first (every engine oil change). Inspect hydraulic brake hoses for surface cracking, scuffing, or worn spots. If the fabric casing of the rubber hose becomes exposed due to cracks or abrasions in the rubber hose cover, the hose should be replaced immediately. Eventual deterioration of the hose can take place with possible burst failure. Faulty installation can cause twisting, resulting in wheel, tire, or chassis interference.

The steel brake tubing should be inspected periodically for evidence of physical damage or contact with moving or hot components.

The flexible brake tube sections used on this vehicle in the primary and secondary tubes from the master cylinder to the ABS hydraulic control unit connections and the chassis brake tubes between the hydraulic control unit and the proportioning valve must also be inspected. This flexible tubing must be inspected for kinks, fraying and its contact with other components of the vehicle or contact with the body of the vehicle.

REAR WHEEL HUB AND BEARING ASSEMBLY

The rear hub and bearing assembly is designed for the life of the vehicle and should require no maintenance. The following procedure may be used for evaluation of bearing condition.

With wheel and brake drum removed, rotate flanged outer ring of hub. Excessive roughness, lateral play or resistance to rotation may indicate dirt intrusion or bearing failure. If the rear wheel bearings exhibit these conditions during inspection, the hub and bearing assembly should be replaced.

Damaged bearing seals and resulting excessive grease loss may also require bearing replacement. Moderate grease loss from bearing is considered normal and should not require replacement of the hub and bearing assembly.

ADJUSTMENTS

STOP LAMP SWITCH

(1) Remove stop lamp switch from its bracket by rotating it approximately 30° in a counter-clockwise direction.

(2) Disconnect wiring harness connector from stop lamp switch.

(3) Hold stop lamp switch firmly in one hand. Then using other hand, pull outward on the plunger of the stop lamp switch until it has ratcheted out to its fully extended position.

(4) Install the stop lamp switch into the bracket using the following procedure. Depress the brake pedal as far down as possible. Then while keeping the brake pedal depressed, install the stop lamp switch into the bracket by aligning index key on switch with slot at top of square hole in mounting bracket. When switch is fully installed in the square hole of the bracket, rotate switch clockwise approximately 30° to lock the switch into the bracket.

CAUTION: Do not use excessive force when pulling back on brake pedal to adjust the stop lamp switch. If too much force is used, damage to the vacuum booster, stop lamp switch or striker (Fig. 195) can result.

(5) Connect the wiring harness connector to the stop lamp switch.

(6) Gently pull back on brake pedal until the pedal stops moving. This will cause the switch plunger (Fig. 195) to ratchet backward to the correct position.

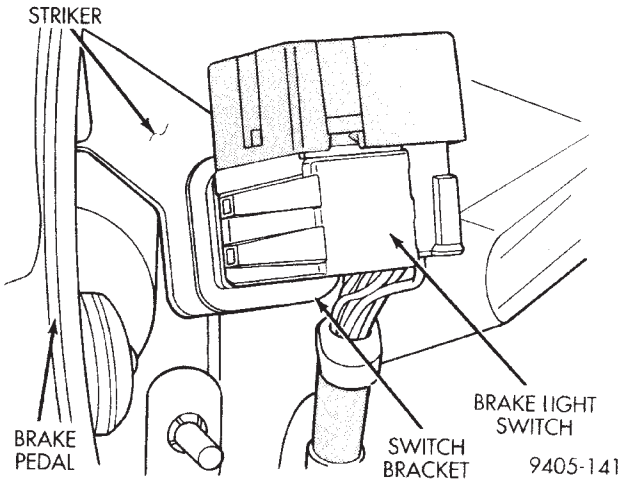


Fig. 195 Stop Light Switch Location In Vehicle

ADJUSTMENTS (Continued)

REAR DRUM BRAKE SHOE ADJUSTMENT

NOTE: Normally, self adjusting drum brakes will not require manual brake shoe adjustment. Although in the event of a brake reline it is advisable to make the initial adjustment manually to speed up the adjusting time.

(1) Raise the vehicle so that the rear wheels are free to turn. See Hoisting Recommendations in the Lubrication And Maintenance Section, at the front of this service manual.

Remove the park brake cable, for the wheel of the vehicle that is being worked on, from the park brake cable equalizer (Fig. 196). This is required to gain access to the star wheel. If the cable is not removed from the equalizer, the cable and spring inside of the brake drum is in the way of the star wheel.

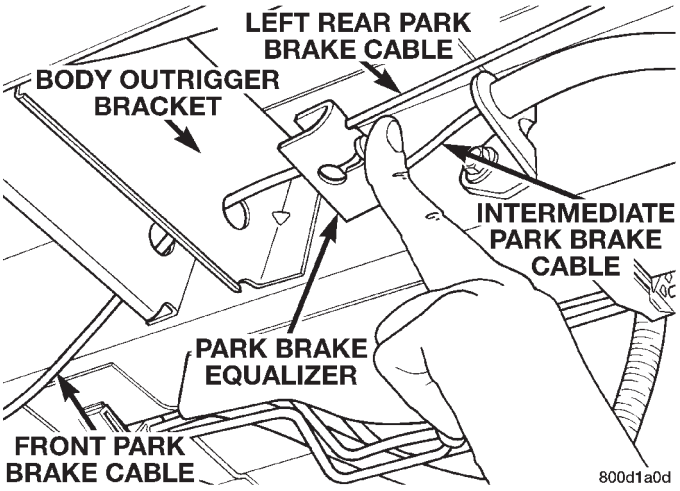


Fig. 196 Park Brake Cable Equlizer

(2) Remove rubber plug, from rear brake adjusting hole, in the rear brake support plate (Fig. 197).

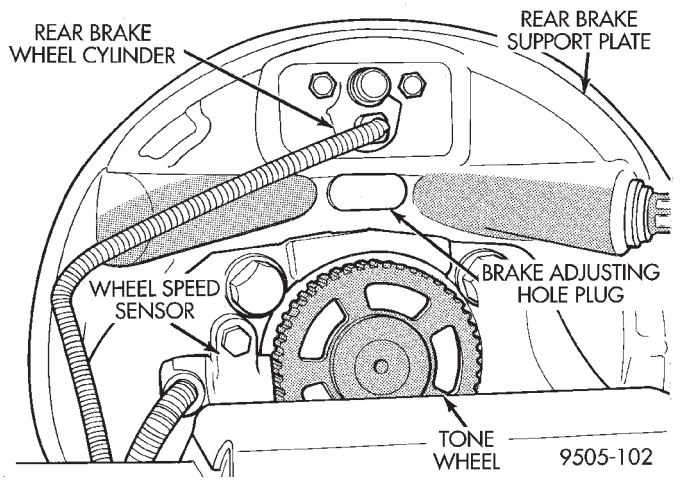


Fig. 197 Brake Adjusting Hole Plug

(3) **Be sure parking brake lever is fully released.**

(4) Insert Brake Adjusting, Special Tool C-3784 or equivalent through the adjusting hole in support plate and against star wheel of adjusting screw. Move handle of tool upward until a slight drag is felt when road wheel is rotated.

(5) Insert a thin screwdriver or piece of welding rod into brake adjusting hole. Push adjusting lever out of engagement with star wheel. **Care should be taken so as not to bend adjusting lever or distort lever spring.** While holding adjusting lever out of engagement, back off star wheel to ensure a free wheel with no brake shoe drag.

(6) Repeat above adjustment at the other rear wheel.

(7) Install adjusting hole rubber plug (Fig. 197) in rear brake support plates.

(8) Install park brake cables on park brake cable equalizer (Fig. 196).

PARK BRAKE SHOES (WITH REAR DISC BRAKES)

CAUTION: Before adjusting the park brake shoes be sure that the park brake pedal is in the fully released position. If park brake pedal is not in the fully released position, the park brake shoes can not be accurately adjusted.

(1) Raise vehicle.

(2) Remove tire and wheel.

(3) Remove disc brake caliper from caliper adapter (Fig. 198). If required, refer to Rear Disc Brake Caliper in the Removal And Installation Section in this group of the service manual for the removal procedure.

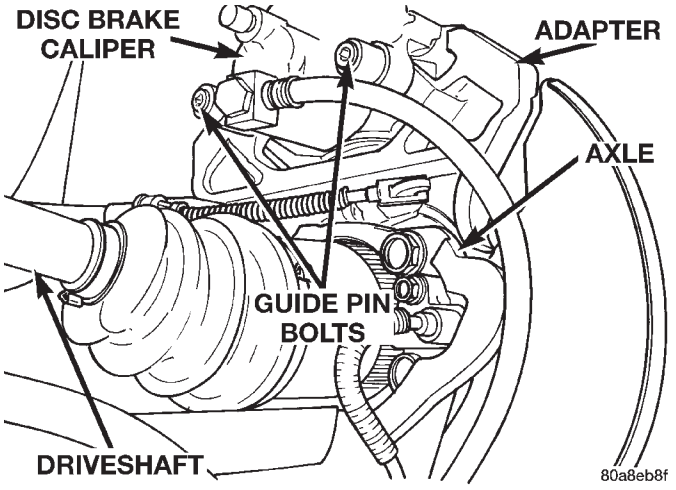


Fig. 198 Disc Brake Caliper

ADJUSTMENTS (Continued)

(4) Remove rotor from hub/bearing.

NOTE: When measuring the brake drum diameter, the diameter should be measured in the center of the area in which the park brake shoes contact the surface of the brake drum.

(5) Using Gauge, Brake Shoe, Special Tool C-3919 or an equivalent, **accurately** measure the inside diameter of the park brake drum portion of the rotor (Fig. 199).

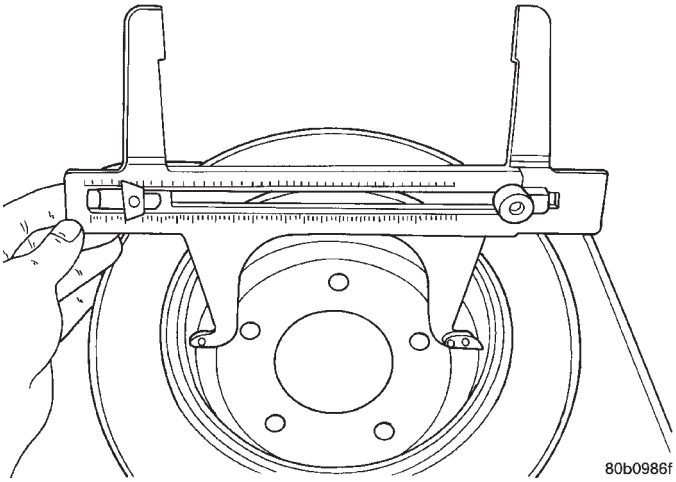


Fig. 199 Measuring Park Brake Drum Diameter

(6) Using a ruler that reads in 64th of an inch, accurately read the measurement of the inside diameter of the park brake drum from the special tool (Fig. 200).

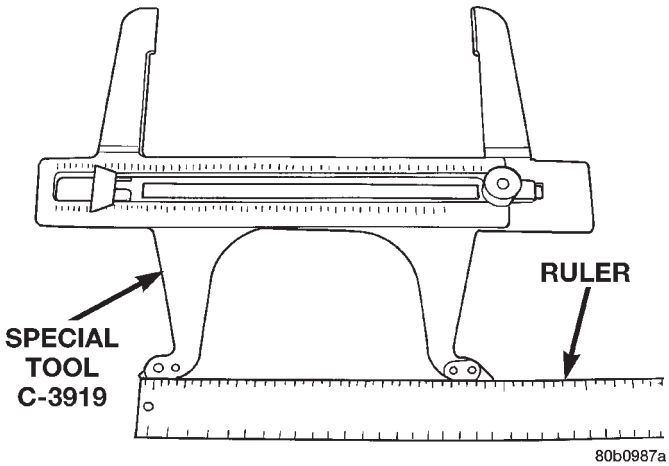


Fig. 200 Reading Park Brake Drum Diameter

(7) Reduce the inside diameter measurement of the brake drum that was taken using Special Tool C-3919 by 1/64 of an inch. Reset Gauge, Brake Shoe, Special Tool C-3919 or the equivalent used, so that the outside measurement jaws are set to the reduced measurement (Fig. 201).

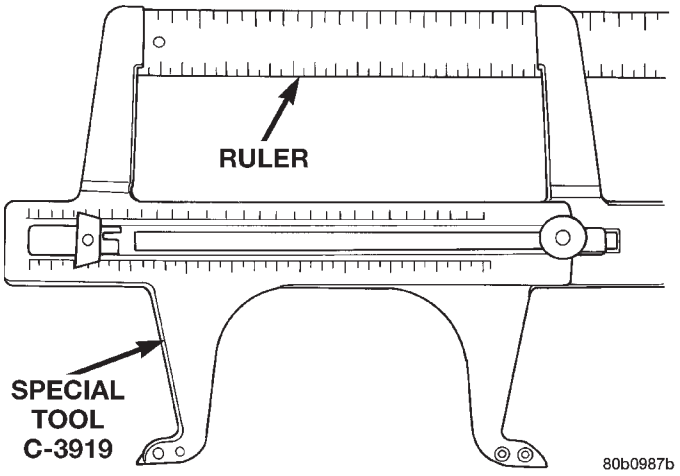


Fig. 201 Setting Gauge To Park Brake Shoe Measurement

(8) Place Gauge, Brake Shoe, Special Tool C-3919 or equivalent over the park brake shoes (Fig. 202). The special tool must be located straight across at the center (widest point) of the park brake shoes (Fig. 202).

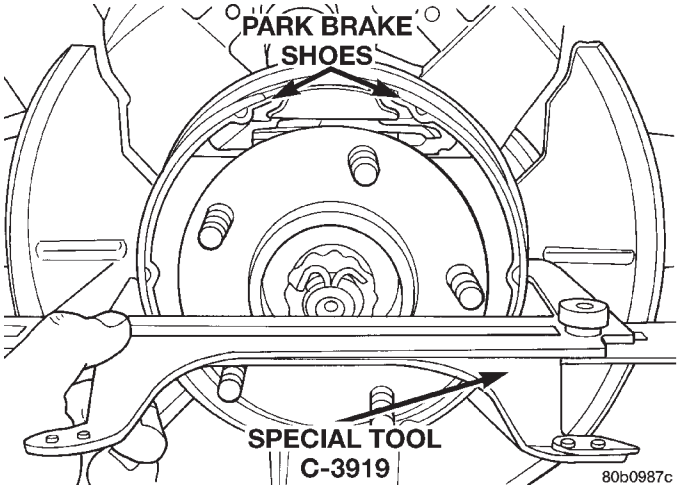


Fig. 202 Adjusting Park Brake Shoes

(9) Using the star wheel adjuster, adjust the park brake shoes until the lining on the park brake shoes just touches the jaws on the special tool.

(10) Install rotor on hub/bearing.

(11) Rotate rotor to verify that the park brake shoes are not dragging on the brake drum. If park brake shoes are dragging, remove rotor and back off star wheel adjuster one notch and recheck for brake shoe drag against drum. Continue with the previous step until brake shoes are not dragging on brake drum.

(12) Install disc brake caliper on caliper adapter (Fig. 198). If required, refer to Rear Disc Brake Caliper in the Removal And Installation Section in this

ADJUSTMENTS (Continued)

group of the service manual for the installation procedure.

(13) Install wheel and tire.

(14) Tighten the wheel mounting nuts in the proper sequence until all nuts are torqued to half the specified torque. Then repeat the tightening sequence to the full specified torque of 129 N·m (95 ft. lbs.).

(15) Lower vehicle.

(16) Apply and release the park brake pedal one time. This will seat and correctly adjust the park brake cables.

CAUTION: Before moving vehicle, pump brake pedal several times to ensure the vehicle has a firm enough pedal to stop the vehicle.

(17) Road test the vehicle to ensure proper function of the vehicle's brake system.

PARK BRAKE CABLE ADJUSTMENT

The park brake cables on this vehicle have an automatic self adjuster built into the park brake pedal mechanism. When the foot operated park brake pedal is in its released (upward most) position, a clock spring automatically adjusts the park brake cables. The park brake cables are adjusted (tensioned) just enough to remove all the slack from the cables. The automatic adjuster system will not over adjust the cables causing rear brake drag.

Due to the automatic adjust feature of the park brake pedal, adjustment of the parking brake cables on these vehicles relies on proper drum brake and park brake shoe adjustment. See Rear Brake Adjustment and Park Brake Shoe Adjustment in the Service Adjustments Section in this group of the service manual.

When the park brake pedal is applied the self adjuster is by-passed and the pedal operates normally to engage the park brakes.

When a service procedure needs to be performed on the park brake pedal or the park brake cables, the automatic self adjuster can be manually locked out by the service technician.

PROPORTIONING VALVE (HEIGHT SENSING)

Proportioning valve actuator adjustment will be required if there is a complaint of premature rear wheel lockup and the front and rear brake shoe linings checked OK during inspection, the height sensing proportioning valve required replacement, or there is a complaint of excessive pedal effort and the vacuum booster and brake pedal checked OK. Make sure the proportioning valve and the mounting bracket are firmly attached to the vehicle. Then, proceed with the following procedure to perform the adjustment of the actuator.

(1) Raise vehicle. Vehicle is to be raised and supported on jackstands or with a frame contact type hoist so the rear suspension of the vehicle is hanging free. See hoisting in the Lubrication And Maintenance section of this service manual.

(2) Remove rear wheels/tires.

(3) Using an appropriate jack, support the rear axle prior to the removal of the track bar and shock absorber bolts from the rear axle.

(4) Unbolt the track bar from the rear axle.

(5) Unbolt both shock absorbers from the rear axle.

(6) Loosen (do not remove) both of the leaf spring to front spring hanger pivot bolts.

NOTE: When lowering the rear axle be sure that the leaf springs do not come in contact with the hoist limiting the downward movement of the axle. If this occurs an improper adjustment of the actuator may result.

(7) Lower the rear axle so it is at its farthest point of downward movement.

(8) Loosen the adjustment nut (Fig. 203) on the actuator.

(9) Be sure the hooked end of the actuator is correctly (fully) seated in the clip on the proportioning valve lever and that the clip is correctly positioned on the lever of the proportioning valve.

(10) Pull the housing of the proportioning valve actuator toward the spring hanger (Fig. 203) until the lever on the proportioning valve bottoms on the body of the proportioning valve. **Hold the proportioning valve actuator in this position while tightening the adjustment nut (Fig. 203) to a torque of 5 N·m (45 in. lbs.). Proportioning valve adjustment is now complete.**

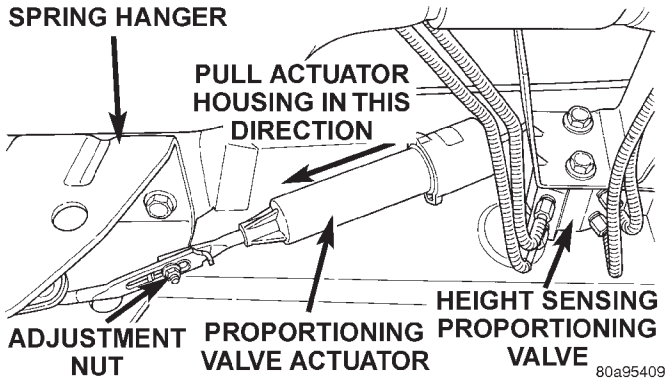


Fig. 203 Proportioning Valve Actuator Adjustment

(11) Install shock absorbers and track bar on rear axle. **Do not tighten the mounting bolts for any of the loosened suspension components at this time.**

(12) Install the wheel/tires.

ADJUSTMENTS (Continued)

(13) Lower the vehicle to the ground. **Be sure that the suspension is supporting the full weight of the vehicle.**

(14) Tighten the spring to front hanger pivot bolts to a torque of 156 N·m (115 ft. lbs.).

(15) Tighten the shock absorber mounting bolts to a torque of 101 N·m (75 ft. lbs.).

(16) Tighten the track bar mounting bolt to a torque of 95 N·m (70 ft. lbs.).

(17) Road test vehicle to ensure that the premature rear wheel lockup condition has been corrected.

SPECIFICATIONS

BRAKE FLUID

The brake fluid used in this vehicle must conform to DOT 3 specifications and SAE J1703 standards. No other type of brake fluid is recommended or approved for usage in the vehicle brake system. Use only Mopar brake fluid or an equivalent from a tightly sealed container.

CAUTION: Never use reclaimed brake fluid or fluid from an container which has been left open. An open container will absorb moisture from the air and contaminate the fluid.

CAUTION: Never use any type of a petroleum-based fluid in the brake hydraulic system. Use of such type fluids will result in seal damage of the vehicle brake hydraulic system causing a failure of the vehicle brake system. Petroleum based fluids would be items such as engine oil, transmission fluid, power steering fluid ect.

VEHICLE BRAKE SYSTEM COMPONENT SPECIFICATIONS

BRAKE SYSTEM COMPONENTS

FRONT BRAKES—DISC	
Type	Single Piston-Pin Slider-Disc
Caliper Bore Diameter	60mm
Adjustment	Automatic
Piston Material	Glass Filled Phenolic
Piston Boot Type	Press In EPDM Rubber
Disc Type All Bodies	Vented
Disc Diameter-Outside	260 mm or 283 mm
Runout - Maximum Allowable T.I.R.*	.13 mm (.005 in.)
Parallelism-Total Variation in Thickness in 360° of Rotation	.013 mm (.0005 in.)
Brake Shoes And Linings	Riveted

REAR BRAKES—DRUM	
Type	Leading-Trailing
Adjustment	Automatic
Drum Diameter	250 mm (9.84 in.)
Wheel Cylinder Diameter	19.0 mm (3/4 in.)
Brake Shoes And Linings	Riveted

*Measured On The Vehicle

8018347c

Brake System Component Specifications

SPECIFICATIONS (Continued)

BRAKE ACTUATION SYSTEM

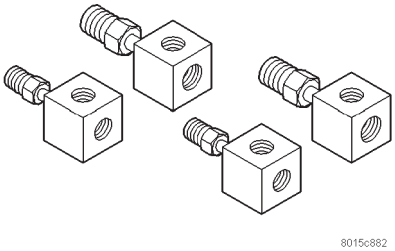
ACTUATION:
Vacuum Operated Power Brakes . . . . . .Standard
Hydraulic System. . . . . .Dual-Diagonally Split
Antilock Brake Sytem (Teves Mark-20) . . . . . .
MASTER CYLINDER ASSEMBLY:
Supplier . . . . . .Bosch
Type For Non-ABSAnd
ABS Brakes . . . .Conventional Compensating Port
Type For ABS Brakes
With Traction Control . . .Dual Center Port Design
Body Material. . . . . .Anodized Aluminum
Reservoir Material . . . . . .Polypropelene
MASTER CYLINDER BORE / STROKE AND SPLIT:
ABS W/Disc/Drum Brakes . . . . . 23.8 mm x 36 mm (.937 in. x 1.47 in.)
AWD W/Disc/Disc Brakes. . . . . .25.4 mm x 39 mm (1.00 in. x 1.50 in.)
Displacement Split . . . . . .50 / 50
MASTER CYLINDER FLUID OUTLET PORTS:
Non-ABS And ABS . . .Primary 7/16–24 Secondary 7/16–24
ABS With Traction Control . . . . . .Primary M12 x 1 Secondary M12 x 1
Outlet Fitting Type Non-ABS
And ABS . . . . . .Double Wall Inverted Flare
Outlet Fitting Type ABS With
Traction Control . . . . . .ISO Flare
ABS HYDRAULIC CONTROL UNIT:
Hydraulic Tube Fitting Type. . . . . .ISO Flare
BOOSTER:
Make/Type. . . . . .Bosch Vacuum Assist
Mounting Studs . . . . . .M8 x 1.25
Type . . . . . .270 ZLT RSMV
Boost At 20 inches Of
Manifold Vacuum. . . . . .3800 N·m (850 lbs.)
PROPORTIONING VALVE:
Material. . . . . .Aluminum
Function. . . . . .Hydraulic Pressure Proportioning To Rear Brakes
BRAKE PEDAL
Pedal Ratio 3.36

BRAKE FASTENER TORQUE SPECIFICATIONS

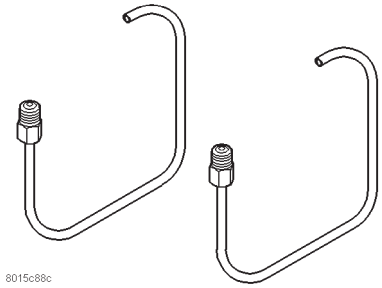
DESCRIPTION	TORQUE
BRAKE TUBES:	
Tube Nuts To Fittings And Components	17 N·m (145 in. lbs.)
BRAKE HOSE:	
To Caliper Banjo Bolt	48 N·m (35 ft. lbs.)
Intermediate Bracket	12 N·m (105 in. lbs.)
MASTER CYLINDER:	
To Vacuum Booster Mounting Nut	25 N·m (225 in. lbs.)
FIXED PROPORTIONING VALVE:	
To Frame Rail Attaching Bolts	14 N·m (125 in. lbs.)
HEIGHT SENSING PROPORTIONING VALVE:	
To Mounting Bracket Attaching Bolts	23 N·m (200 in. lbs.)
Actuator Assembly Adjustment Nut	5 N·m (45 in. lbs.)
Mounting Bracket To Frame Rail Bolts	17 N·m (150 in. lbs.)
JUNCTION BLOCK (NON-ABS BRAKES)	
To Suspension Cradle Mounting Bolt	28 N·m (250 in. lbs.)
VACUUM BOOSTER:	
To Dash Panel Mounting Nuts	28 N·m (250 in. lbs.)
REAR WHEEL CYLINDER:	
To Support Plate Mounting Bolts	8 N·m (75 in. lbs.)
Bleeder Screw	10 N·m (80 in. lbs.)
BRAKE SUPPORT PLATE:	
To Rear Axle Mounting Bolts	130 N·m (95 ft. lbs.)
DISC BRAKE CALIPER:	
Guide Pin Bolts	41 N·m (30 ft. lbs.)
Bleeder Screw	15 N·m (125 in. lbs.)
ABS HYDRAULIC CONTROL UNIT:	
Mounting Bracket To Suspension Cradle Bolts.	28 N·m (250 in. lbs.)
To Mounting Bracket Isolator Attaching Bolts	11 N·m (97 in. lbs.)
CAB To HCU Mounting Screws	2 N·m (17 in. lbs.)
WHEEL SPEED SENSOR:	
To Axle Or Steering Knuckle Mounting Bolt	12 N·m (105 in. lbs.)
PARKING BRAKE:	
Pedal Assembly Mounting Bolts	28 N·m (250 in. lbs.)
REAR HUB AND BEARING:	
To Axle Mounting Bolts	129 N·m (95 ft. lbs.)
WHEEL:	
Stud Lug Nut	115–156 N·m (84-115 ft. lbs.)

SPECIAL TOOLS

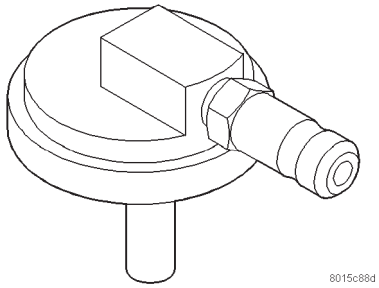
SPECIAL TOOLS—BASE BRAKES



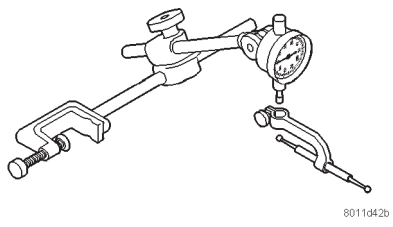
Fittings, Brake Proportioning Valve Testing 6833



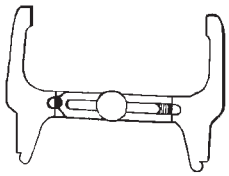
Tubes, Master Cylinder Bleeding 6920



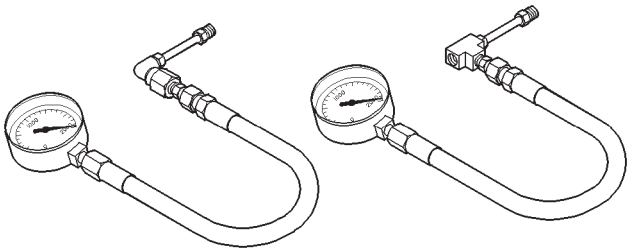
Adapter, Master Cylinder Pressure Bleed Cap 6921



Dial Indicator, C-3339



Gauge, Brake Safe-Set



Gauge Set, C-4007–A

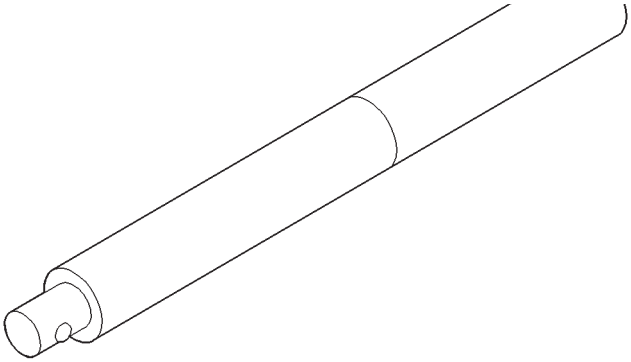


Fig. 204 Handle, Universal C–4171

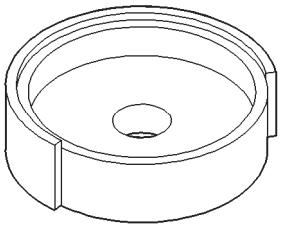


Fig. 205 Installer, Dust Boot C-4689

ANTILOCK BRAKE SYSTEM – TEVES MARK-20

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DESCRIPTION AND OPERATION

ANTILOCK BRAKES OPERATION DESCRIPTION

The purpose of an Antilock Brake System (ABS) is to prevent wheel lock-up under braking conditions on virtually any type of road surface. Antilock Braking is desirable because a vehicle which is stopped without locking the wheels will retain directional stability and some steering capability. This allows the driver to retain greater control of the vehicle during braking.

This section of the service manual covers the description and on car service for the ITT Teves Mark 20 ABS Brake System and the ITT Teves Mark 20 ABS Brake System with Traction Control. If other service is required on the non ABS related components of the brake system, refer to the appropriate section in this group of the service manual for the specific service procedure required.

ABS BRAKES COMPONENT ABBREVIATION LIST

In this section of the service manual, several abbreviations are used for the components of the Teves Mark 20 ABS Brake System and the Teves Mark 20 ABS Brake System with Traction Control. They are listed below for your reference.

- CAB–Controller Antilock Brake
- ICU–Integrated Control Unit
- HCU–Hydraulic Control Unit
- TCS–Traction Control
- ABS–Antilock Brake System
- PSI–Pounds Per Square Inch (pressure)
- WSS–Wheel Speed Sensor
- FWD–Front Wheel Drive
- AWD–All Wheel Drive
- DTC–Diagnostic Trouble Code

DESCRIPTION AND OPERATION (Continued)

ABS BRAKES OPERATION AND VEHICLE PERFORMANCE

This ABS System represents the current state-of-the-art in vehicle braking systems and offers the driver increased safety and control during braking. This is accomplished by a sophisticated system of electrical and hydraulic components. As a result, there are a few performance characteristics that may at first seem different but should be considered normal. These characteristics are discussed below.

NORMAL BRAKING SYSTEM FUNCTION

Under normal braking conditions, the ABS System functions the same as a standard brake system with a diagonally split master cylinder and conventional vacuum assist.

ABS SYSTEM OPERATION

If a wheel locking tendency is detected during a brake application, the brake system will enter the ABS mode. During ABS braking, hydraulic pressure in the four wheel circuits is modulated to prevent any wheel from locking. Each wheel circuit is designed with a set of electric solenoids to allow modulation, although for vehicle stability, both rear wheel solenoids receive the same electrical signal.

During an ABS stop, the brakes hydraulic system is still diagonally split. However, the brake system pressure is further split into four control channels. During antilock operation of the vehicle's brake system the front wheels are controlled independently and are on two separate control channels and the rear wheels of the vehicle are controlled together.

The system can build and release pressure at each wheel, depending on signals generated by the wheel speed sensors (WSS) at each wheel and received at the Controller Antilock Brake (CAB).

ABS operation is available at all vehicle speeds above 3 to 5 mph. Wheel lockup may be perceived at the very end of an ABS stop and is considered normal.

VEHICLE HANDLING PERFORMANCE DURING ABS BRAKING

It is important to remember that an antilock brake system does not shorten a vehicle's stopping distance under all driving conditions, but does provide improved control of the vehicle while stopping. Vehicle stopping distance is still dependent on vehicle speed, weight, tires, road surfaces and other factors.

Though ABS provides the driver with some steering control during hard braking, there are conditions however, where the system does not provide any benefit. In particular, hydroplaning is still possible when the tires ride on a film of water. This results in the vehicles tires leaving the road surface rendering the vehicle virtually uncontrollable. In addition, extreme steering maneuvers at high speed or high speed cornering beyond the limits of tire adhesion to the road surface may cause vehicle skidding, independent of vehicle braking. For this reason, the ABS system is termed Antilock instead of Anti-Skid.

NOISE AND BRAKE PEDAL FEEL

During ABS braking, some brake pedal movement may be felt. In addition, ABS braking will create ticking, popping and/or groaning noises heard by the driver. This is normal due to pressurized fluid being transferred between the master cylinder and the brakes. If ABS operation occurs during hard braking, some pulsation may be felt in the vehicle body due to fore and aft movement of the suspension as brake pressures are modulated.

At the end of an ABS stop, ABS will be turned off when the vehicle is slowed to a speed of 3–4 mph. There may be a slight brake pedal drop anytime that the ABS is deactivated, such as at the end of the stop when the vehicle speed is less then 3 mph or during an ABS stop where ABS is no longer required. These conditions will exist when a vehicle is being stopped on a road surface with patches of ice, loose gravel or sand on it. Also stopping a vehicle on a bumpy road surface will activate ABS because of the wheel hop caused by the bumps.

TIRE NOISE AND MARKS

Although the ABS system prevents complete wheel lock-up, some wheel slip is desired in order to achieve optimum braking performance. Wheel slip is defined as follows, 0 percent slip means the wheel is rolling freely and 100 percent slip means the wheel is fully locked. During brake pressure modulation, wheel slip is allowed to reach up to 25 to30%. This means that the wheel rolling velocity is 25 to 30% less than that of a free rolling wheel at a given vehicle speed. This slip may result in some tire chirping, depending on the road surface. This sound should not be interpreted as total wheel lock-up.

Complete wheel lock up normally leaves black tire marks on dry pavement. The ABS System will not leave dark black tire marks since the wheel never reaches a fully locked condition. Tire marks may however be noticeable as light patched marks.

START UP CYCLE

When the ignition is turned on, a popping sound and a slight brake pedal movement may be noticed. Additionally, when the vehicle is first driven off a humming may be heard and/or felt by the driver at approximately 20 to 40 kph (12 to 25 mph). The ABS warning lamp will also be on for up to 5 seconds after the ignition is turned on. All of these conditions are a normal function of ABS as the system is performing a diagnosis check.

DESCRIPTION AND OPERATION (Continued)

PREMATURE ABS CYCLING

NOTE: When working on a vehicle which has a complaint of premature ABS cycling it may be necessary to use a DRB Scan Tool to detect and verify the condition.

There is one complaint called Premature ABS Cycling in which neither the Red Brake Warning Lamp nor the Amber Antilock Lamp were illuminated and no fault codes were stored in the CAB. Symptoms of Premature ABS Cycling, include clicking sounds from the solenoids valves, pump motor running and pulsations in the brake pedal. This condition can occur at any braking rate of the vehicle and on any type of road surface. This creates an additional condition which needs to be correctly assessed when diagnosing problems with the antilock brake system.

The following conditions are common causes that need to be checked when diagnosing a condition of Premature ABS Cycling. Damaged tone wheels, incorrect tone wheels, damage to a wheel speed sensor mounting boss on a steering knuckle, a loose wheel speed sensor mounting bolt, and excessive tone wheel runout. Also, an excessively large tone wheel to wheel speed sensor air gap can lead to the condition of Premature ABS Cycling. Special attention is to be given to these components when diagnosing a vehicle exhibiting the condition of Premature ABS Cycling. After diagnosing the defective component, repair or replace as required.

When the component repair or replacement is completed, test drive the vehicle to verify the condition of Premature ABS Cycling has been corrected.

ABS BRAKE SYSTEM COMPONENTS

The following is a detailed description of the Teves Mark 20 ABS brake system components. For information on servicing the base brake system components, see the base Brake System section of this Service Manual.

ABS MASTER CYLINDER AND POWER BRAKE BOOSTER

A vehicle equipped with Teves Mark 20 ABS without optional traction control uses the same type of a master cylinder and power brake booster (Fig. 1) as a vehicle not equipped with antilock brakes.

A vehicle equipped with Teves Mark 20 ABS with Traction control uses a unique center port master cylinder. If the master cylinder is replaced on a vehicle equipped with traction control be sure the right type of master cylinder is installed.

A vehicle equipped with four wheel disc brakes (AWD applications) also have a unique master cylinder. The master cylinder used on these vehicles have a piston bore diameter which is larger then the master cylinder used on the other brake applications.

The primary and secondary outlet ports on the master cylinder go directly to the hydraulic control unit HCU.

Reference the appropriate section of this service manual for further information on the individual components.

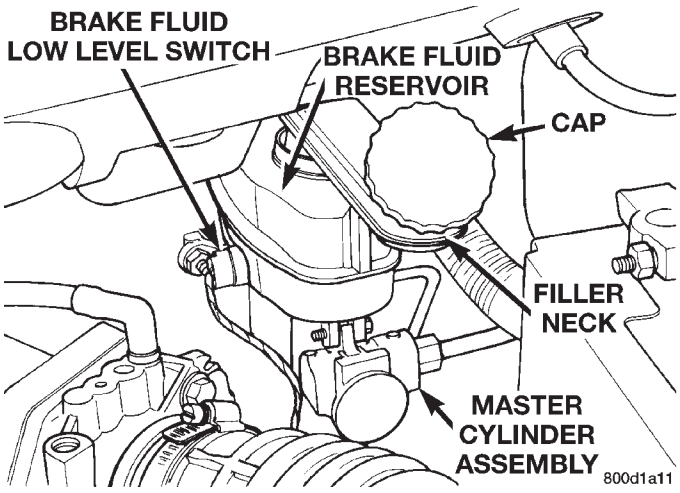

Fig. 1 Master Cylinder And Vacuum Booster

INTEGRATED CONTROL UNIT (ICU)

The hydraulic control unit (HCU) (Fig. 2) used with the Teves Mark 20 ABS is different from the HCU used on previous Chrysler products with ABS. The HCU used on this ABS system is part of the integrated contol unit (ICU). The HCU is part of what is referred to as the ICU because the HCU and the controller antilock brakes (CAB) are combined (integrated) into one unit. This differs from previous Chrysler products with ABS, where the HCU and the CAB were separate components located in different areas of the vehicle.

Teves Mark 20 ABS uses two different HCU's and CAB's depending on the type of ABS system the vehicle is equipped with. There is a unique HCU and CAB for a vehicle equipped with just ABS and a unique HCU and CAB for a vehicle equipped with ABS and traction control.

NOTE: The HCU and CAB used on a vehicle that is equipped with only ABS and on a vehicle that is equipped with ABS and traction control are different. The HCU on a vehicle equipped with ABS and traction control has a valve block housing (Fig. 2) that is approximately 1 inch longer on the low pressure fluid accumulators side than a HCU for a vehicle that is equipped with only ABS.

DESCRIPTION AND OPERATION (Continued)

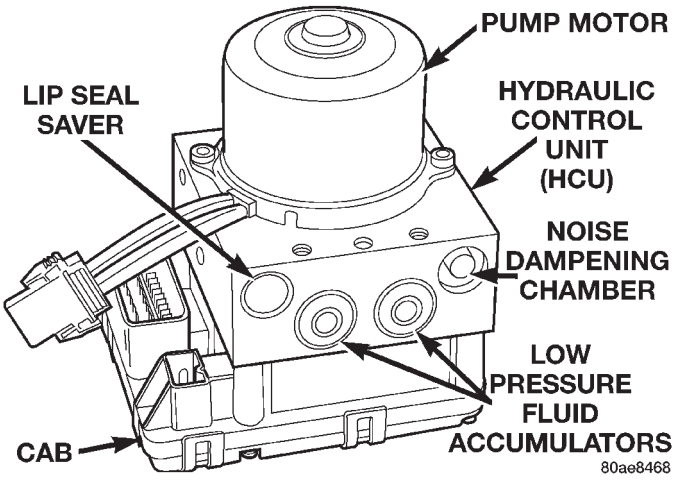

Fig. 2 Teves Mark 20 ICU

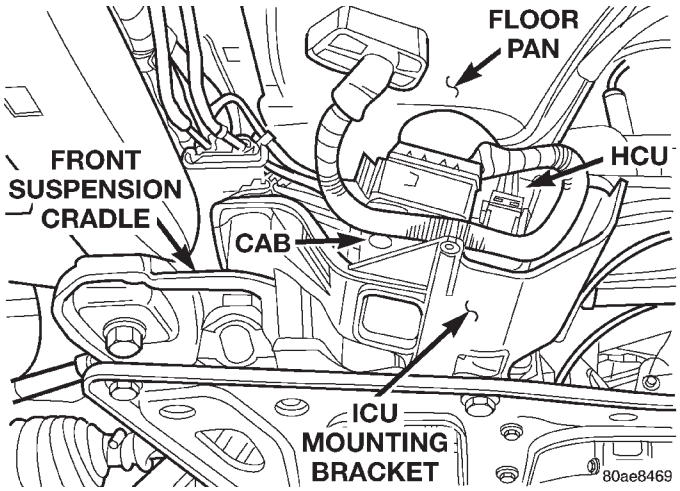

Fig. 3 ICU Mounting Location

The ICU is located on the driver's side of the vehicle, and is mounted to the front suspension cradle (Fig. 3). The **ABS only** ICU contains the following components for controlling the brake system hydraulic pressure during ABS braking: The CAB, eight valve solenoids, (four inlet valves and four outlet valves) fluid accumulators a pump, and an electric motor. The **ABS with traction control** ICU contains the following components for controlling the brake system hydraulic pressure during ABS braking and traction control operation: The CAB, four solenoid controlled inlet valves, four solenoid controlled outlet valves, two hydraulic shuttle valves, two ASR valves, fluid accumulators a pump and an electric motor. Also attached to the hydraulic control unit are the master cylinder primary and secondary brake tubes and the brake tubes going to each wheel of the vehicle. (Fig. 3).

CAUTION: No components of the ICU are serviceable. If any component that makes up the ICU is diagnosed as not functioning properly it MUST be replaced. The replaceable components of the ICU, are the HCU and the CAB (Fig. 2) and (Fig. 3). The mounting bracket is also replaceable as a separate component of the ICU. The remaining components of the ICU are not serviceable items. No attempt should ever be made to remove or service any individual components of the HCU. This is due to the concern of contamination entering the HCU while performing a service procedure. Also no attempt should ever be made to remove or service any individual components of the CAB.

CAUTION: At no time when servicing the ICU should a 12 volt power source be applied to any electrical connector of the HCU or the CAB.

INLET VALVES AND SOLENOIDS

There are four inlet solenoids, one for each wheel. In the released position they provide a fluid path from the master cylinder to the wheel brakes of the vehicle. When the ABS cycle has been completed the inlet solenoids will return to their released (open) position.

OUTLET VALVES AND SOLENOIDS

There are four outlet solenoids, one for each wheel. In the released position they are closed to allow for normal braking. In the actuated (open) position, they provide a fluid path from the wheel brakes of the vehicle to the hydraulic control unit HCU accumulators and pump motor. The outlet solenoids are spring loaded in the released (closed) position during normal braking.

ASR VALVE (ABS WITH TRACTION CONTROL ONLY)

On vehicles equipped with ABS having traction control, there are two special ASR valves located in the HCU portion of the ICU. The ASR valves are a normally open type valve and are solenoid actuated.

The special ASR valves are used to isolate the rear (non-driven) wheels of the vehicle from the hydraulic pressure that the HCU pump motor is sending to the front (driven) wheels, when the traction control system is in operation. The rear brakes need to be isolated from the master cylinder when traction control is in operation so that the HCU can build the required hydraulic pressure to the front brakes.

HCU BRAKE FLUID ACCUMULATORS AND NOISE DAMPING CHAMBER

There are two brake fluid accumulators in the HCU. There is one brake fluid accumlator for the primary and secondary hydraulic circuits. The brake

DESCRIPTION AND OPERATION (Continued)

fluid accumulators temporarily store brake fluid that is decayed from the wheel brakes during an ABS cycle. This stored brake fluid is then used by the pump in the HCU to provide build pressure for the brake hydraulic system.

Additionally on vehicles that are equipped with only ABS (non-traction control vehicles) there is a mini brake fluid accumulator on the secondary hydraulic circuit which protects the master cylinder's seals during an ABS stop. There is also a noise damping chamber on the primary hydraulic circuit.

On ABS equipped vehicles with traction control, in addition to the brake fluid accumulators there are also two noise damping chambers in the HCU.

HCU PUMP/MOTOR

The HCU (Fig. 4) contains 2 pump assemblies, one for the primary and one for the secondary hydraulic circuit of the brake system. Both pumps are driven by a common electric motor (Fig. 4) which is part of the HCU. The pumps draw brake fluid from the fluid accumulators to supply build pressure to the brakes during an ABS stop. The pump motor runs during the drive-off cycle as a check and during an ABS stop and is controlled by the CAB. The Pump/Motor Assembly is not a serviceable item. If the pump/motor requires replacement the complete HCU (Fig. 4) (minus the CAB) must be replaced.

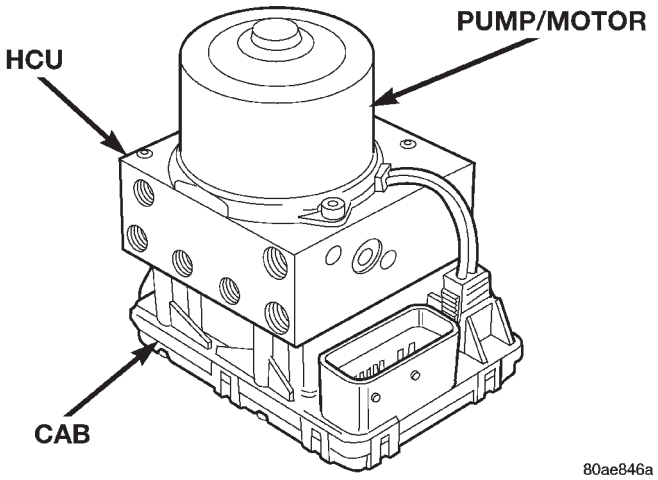

Fig. 4 Teves Mark 20 HCU Pump/Motor

ABS FUSES

The fuse for the ABS pump motor and the ABS system are located in the power distribution center (PDC) (Fig. 5). The PDC is located on the drivers side of the engine compartment forward of the strut tower. The fuse for the ABS warning lamp in the instrument panel message center is located in the junction block.

On vehicles equipped with traction control, the fuse for the traction control switch is also located in the junction block.

The junction block is located on the left hand front cowl panel on the vehicle.

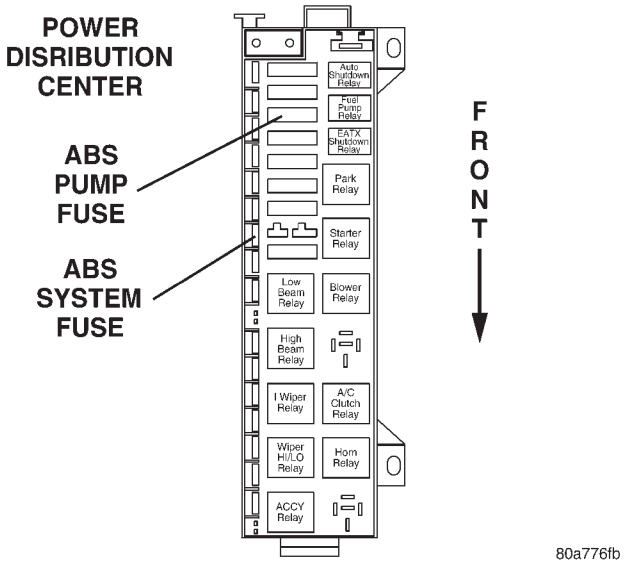

Fig. 5 Fuse Locations In Power Distribution Center

ABS RELAYS

On the Teves Mark 20 Antilock Brake System both the pump motor relay and the system relay are located in the CAB. If either of the relays is diagnosed as not functioning properly the CAB will need to be replaced. Refer to Controller Antilock Brakes in the Removal And Installation Section in this group of the service manual for the procedure.

PROPORTIONING VALVES

One assembly containing two proportioning valves are used in the system, one for each rear brake hydraulic circuit. The proportioning valve is located on the frame rail next to the fuel tank, forward of the right rear shock absorber (Fig. 6). Be sure replacement proportioning valve assemblies have the same split point and slope as the proportioning valve being replaced.

WHEEL SPEED SENSORS

One Wheel Speed Sensor WSS is located at each front and rear wheel of the vehicle (Fig. 7), (Fig. 8) and (Fig. 9). The wheel speed sensor sends a small AC signal to the CAB. This signal is generated by magnetic induction created when a toothed sensor ring (tone wheel) (Fig. 7), (Fig. 8) and (Fig. 9) passes the stationary magnetic wheel speed sensor. The CAB converts the AC signal generated at each wheel into a digital signal. If a wheel locking tendency is detected by the CAB, it will then modulate hydraulic pressure via the HCU to prevent the wheel(s) from locking.

DESCRIPTION AND OPERATION (Continued)

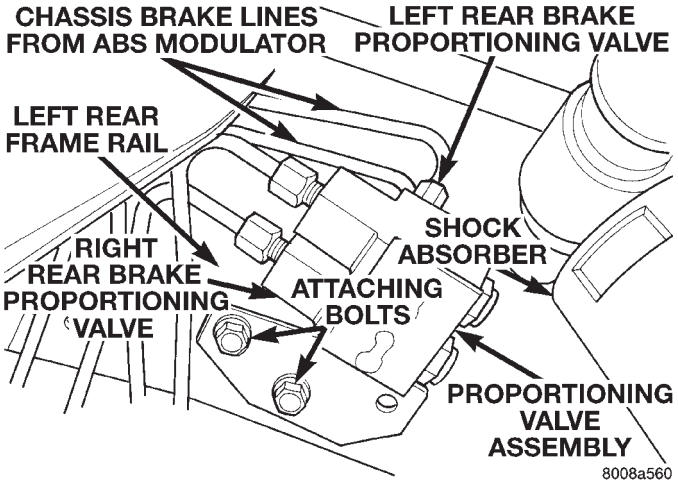

Fig. 6 Proportioning Valve Mounting Location

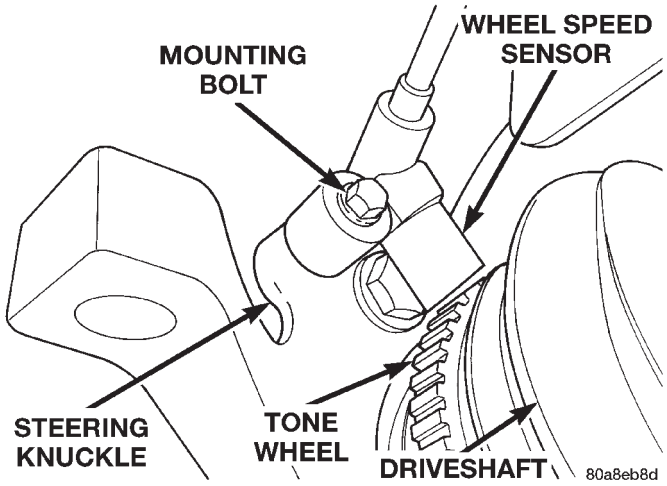

Fig. 7 Front Wheel Speed Sensor

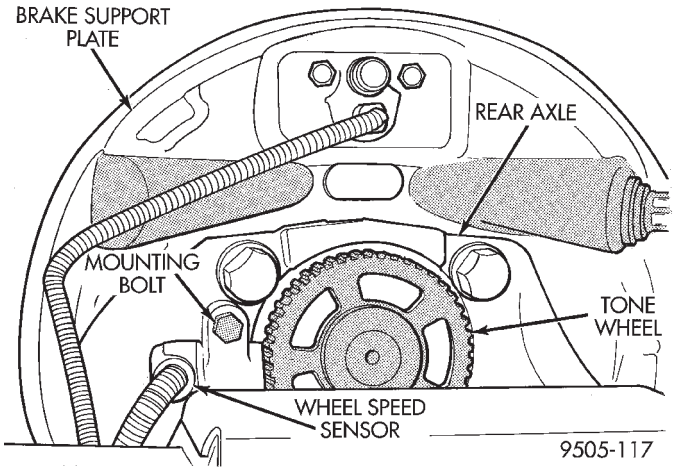

Fig. 8 Rear Wheel Speed Sensor (FWD)

The front wheel speed sensor is attached to a boss in the steering knuckle (Fig. 7). The front tone wheel (Fig. 7) is part of the driveshafts outboard constant velocity joint. The rear wheel speed sensor is

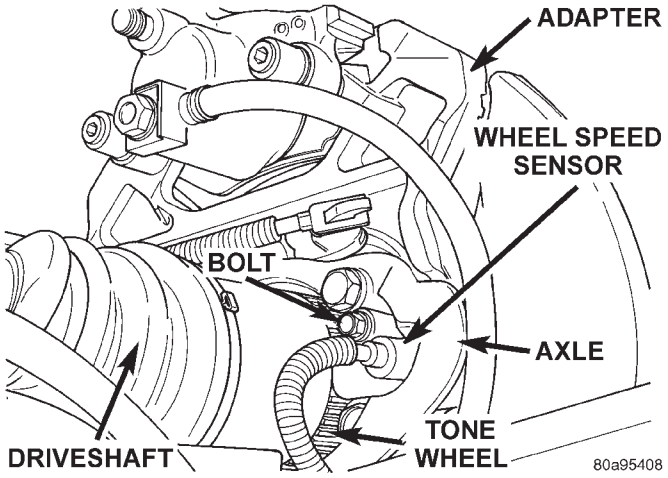

Fig. 9 Rear Wheel Speed Sensor (AWD)

mounted through the rear axle, rear brake support plate and directly to the rear bearing (Fig. 8) (Fig. 9). The rear tone wheel on a front wheel drive vehicle is an integral part of the rear wheel hub/bearing assembly. If damaged though, the rear tone wheel on a front wheel drive vehicle can be replaced as a individual component of the rear hub/bearing assembly. Refer to Rear Tone Wheel in the Remove And Install Section in this group of the service manual for the required procedure. The wheel speed sensor air gap is NOT adjustable.

The rear tone wheel on a all wheel drive vehicle, is part of the outboard constant velocity joint on the rear driveshaft (Fig. 9).

The four wheel speed sensors are all serviced individually, but the front tone wheel on all vehicles and the rear tone wheel on all wheel drive vehicles are serviced as part of the front or rear driveshaft outboard constant velocity joint (Fig. 7) and (Fig. 9).

Correct ABS system operation is dependent on accurate wheel speed signals. The vehicle's wheels and tires must all be the same size and type to generate accurate signals. Variations in wheel and tire size can produce inaccurate wheel speed signals, which can cause false ABS cycles to occur.

CONTROLLER ANTILOCK BRAKES (CAB)

The Controller Antilock Brakes (CAB) is a microprocessor based device which monitors the ABS system during normal braking and controls it when the vehicle is in an ABS stop. The CAB is mounted to the bottom of the HCU (Fig. 10). The CAB uses a 25 way electrical connector on the vehicle wiring harness. The power source for the CAB is through the ignition switch in the Run or On position. **THE (CAB) IS ON THE CCD BUS**

DESCRIPTION AND OPERATION (Continued)

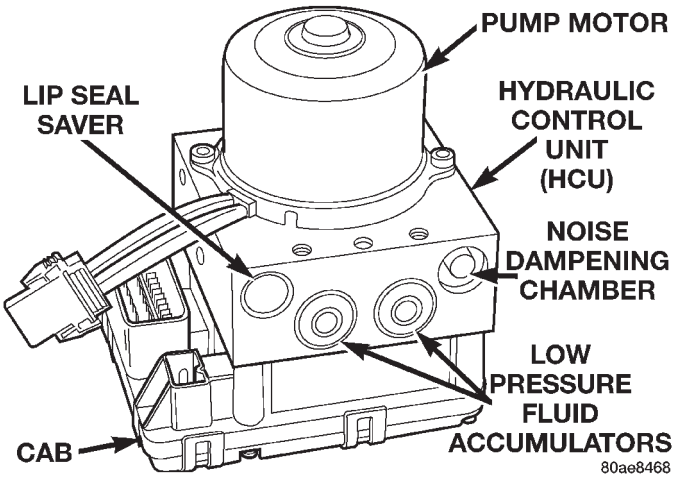

Fig. 10 Controller Antilock Brake (CAB)

The primary functions of the (CAB) are:

(1) Detect wheel locking or wheel slipping tendencies by monitoring the speed of all four wheels of the vehicle.

(2) Illuminate the TRAC lamp in the message center on the instrument panel when a traction control event is occurring.

(3) Control fluid modulation to the wheel brakes while the system is in an ABS mode or the traction control system is activated.

(4) Monitor the system for proper operation.

(5) Provide communication to the DRB Scan Tool while in diagnostic mode.

(6) Store diagnostic information.

(7) **The CAB continuously communicates with the body controller by sending out a message to the body controller on the CCD Bus. This message is used for illumination of the yellow antilock warning lamp. This is used if the ABS controller communication is lost in the hard wire between the body controller and the yellow antilock warning lamp. If the body controller does not receive this message from the CAB, the body controller will illuminate the antilock yellow warning lamp.**

The CAB continuously monitors the speed of each wheel through the signals generated by the wheel speed sensors to determine if any wheel is beginning to lock. When a wheel locking tendency is detected, the CAB commands the CAB command coils to actuate. The CAB command coils then open and close the valves in the HCU which modulate brake fluid pressure in some or all of the hydraulic circuits. The CAB continues to control pressure in individual hydraulic circuits until a locking tendency is no longer present.

The ABS system is constantly monitored by the CAB for proper operation. If the CAB detects a fault, it will turn on the Amber ABS Warning Lamp and disable the ABS braking system. The normal base braking system will remain operational.

The CAB contains a self-diagnostic program which will turn on the Amber ABS Warning Lamp when a ABS system fault is detected. Faults are then stored in a diagnostic program memory. There are multiple fault messages which may be stored in the CAB and displayed through the DRB Scan Tool. These fault messages will remain in the CAB memory even after the ignition has been turned off. The fault messages can be read and or cleared from the CAB memory by a technician using the DRB Scan Tool. The fault occurrence and the fault code will also be automatically cleared from the CAB memory after the identical fault has not been seen during the next 3500 miles of vehicle operation. Mileage though of the last fault occurrence will not be automatically cleared.

CONTROLLER ANTILOCK BRAKE INPUTS

- Four wheel speed sensors.
- Stop lamp switch.
- Ignition switch.
- System relay voltage.
- Ground.
- Traction Control Switch (If Equipped).
- Diagnostics Communications (CCD)

CONTROLLER ANTILOCK BRAKE OUTPUTS

- C2D Communication To Body Controller And Instrument Cluster
- ABS warning lamp actuation.
- Traction Control Light (If Equipped).
- Diagnostic communication. (CCD)

ABS WARNING LAMP (YELLOW)

The ABS system uses a yellow colored ABS Warning Lamp. The ABS warning lamp is located on the right side of the message center located at the top of the instrument panel. The purpose of the warning lamp is discussed in detail below.

The ABS warning lamp will turn on when the CAB detects a condition which results in a shutdown of ABS function or when the body controller does not receive C2D messages from the CAB. When the ignition key is turned to the on position, the ABS Warning Lamp is on until the CAB completes its self tests and turns the lamp off (approximately 4 seconds after the ignition switch is turned on). Under most conditions, when the ABS warning lamp is on, only the ABS function of the brake system is affected. The standard brake system and the ability to stop the car will not be affected when only the ABS warning lamp is on.

The ABS warning lamp is controlled by the CAB and the body controller through a diode located in the wiring harness junction block. The junction block is located under the instrument panel to the left of

DESCRIPTION AND OPERATION (Continued)

the steering column. The CAB and the body controller, controls the yellow ABS warning lamp by directly grounding the circuit.

HYDRAULIC CIRCUITS AND VALVE OPERATION

Through the following operation descriptions the function of the various hydraulic control valves in the ABS will be described. The fluid control valves mentioned below, control the flow of pressurized brake fluid to the wheel brakes during the different modes of ABS braking.

For explanation purposes, all wheel speed sensors except the right front are sending the same wheel speed information. The following diagrams show only the right front wheel in a antilock braking condition.

NORMAL BRAKING HYDRAULIC CIRCUIT AND SOLENOID VALVE FUNCTION

This condition is the normal operation of the vehicles base brake hydraulic system. The hydraulic system circuit diagram (Fig. 11) shows a situation where no wheel spin or slip is occurring relative to the speed of the vehicle. The driver is applying the brake pedal to build pressure in the brake hydraulic system to apply the brakes and stop the vehicle.

TEVES MARK 20 ABS CIRCUIT AND SOLENOID VALVE FUNCTION

This hydraulic circuit diagram (Fig. 12) shows the vehicle in the ABS braking mode. This hydraulic circuit (Fig. 12) shows a situation where one wheel is slipping because the driver is attempting to stop the vehicle at a faster rate than the surface the vehicle's tires are on will allow. The normally open and normally closed valves modulate the brake hydraulic pressure as required. The pump/motor is switched on so that the brake fluid from the low pressure accumulators is returned to the master cylinder circuits. The brake fluid will then be routed to either the master cylinder or the wheel brake depending on the position of the normally open valve.

TEVES MARK 20 SECONDARY ABS CIRCUIT AND SOLENOID VALVE FUNCTION

This hydraulic circuit diagram (Fig. 13) shows the vehicle in the ABS braking mode. This hydraulic circuit (Fig. 13) shows a situation where one wheel is slipping because the driver is attempting to stop the vehicle at a faster rate than the surface the vehicle's tires are on will allow. The normally open and normally closed valves modulate the brake hydraulic pressure as required. The pump/motor is switched on so that the brake fluid from the low pressure accu-

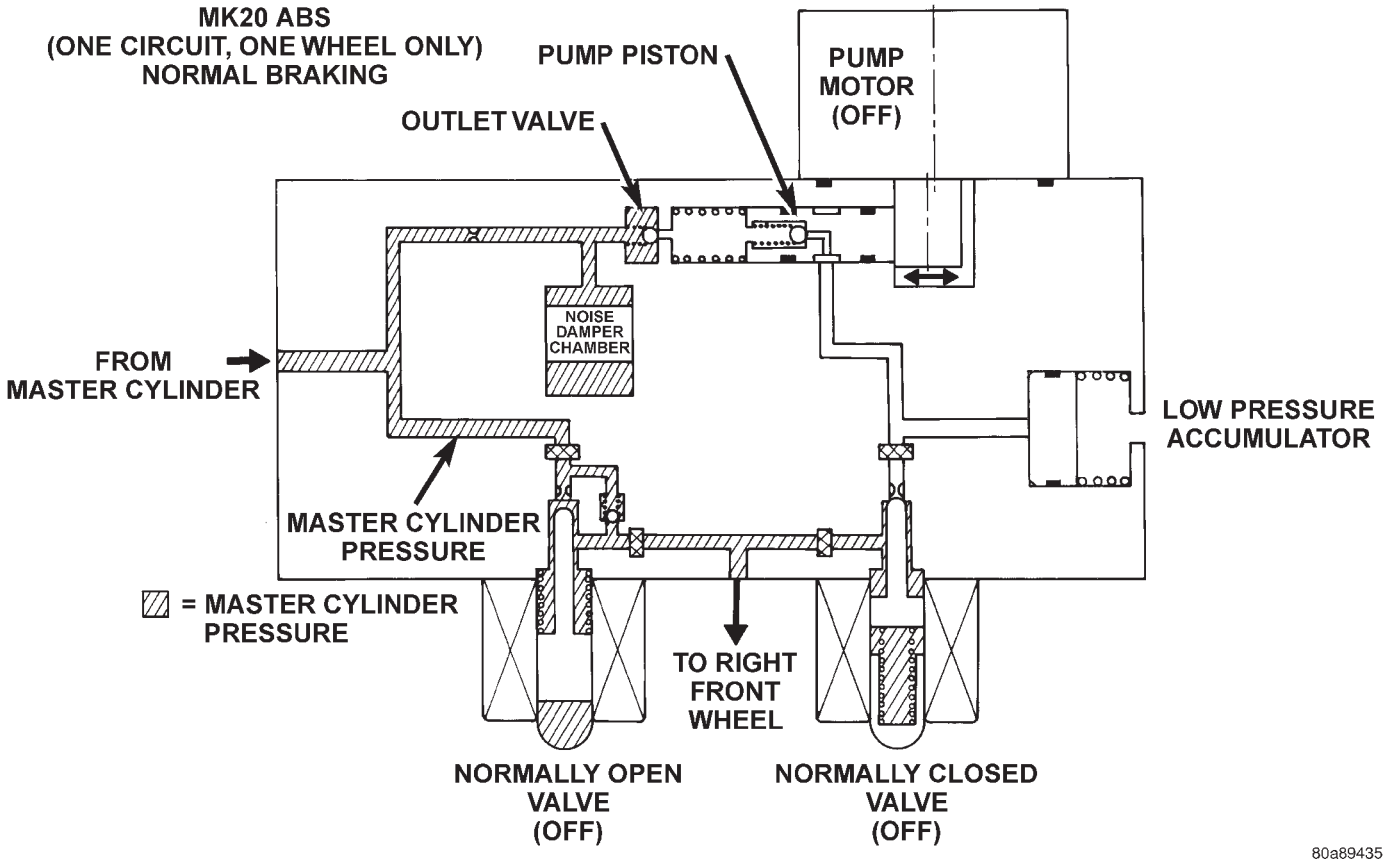

Fig. 11 Normal Braking Hydraulic Circuit

DESCRIPTION AND OPERATION (Continued)

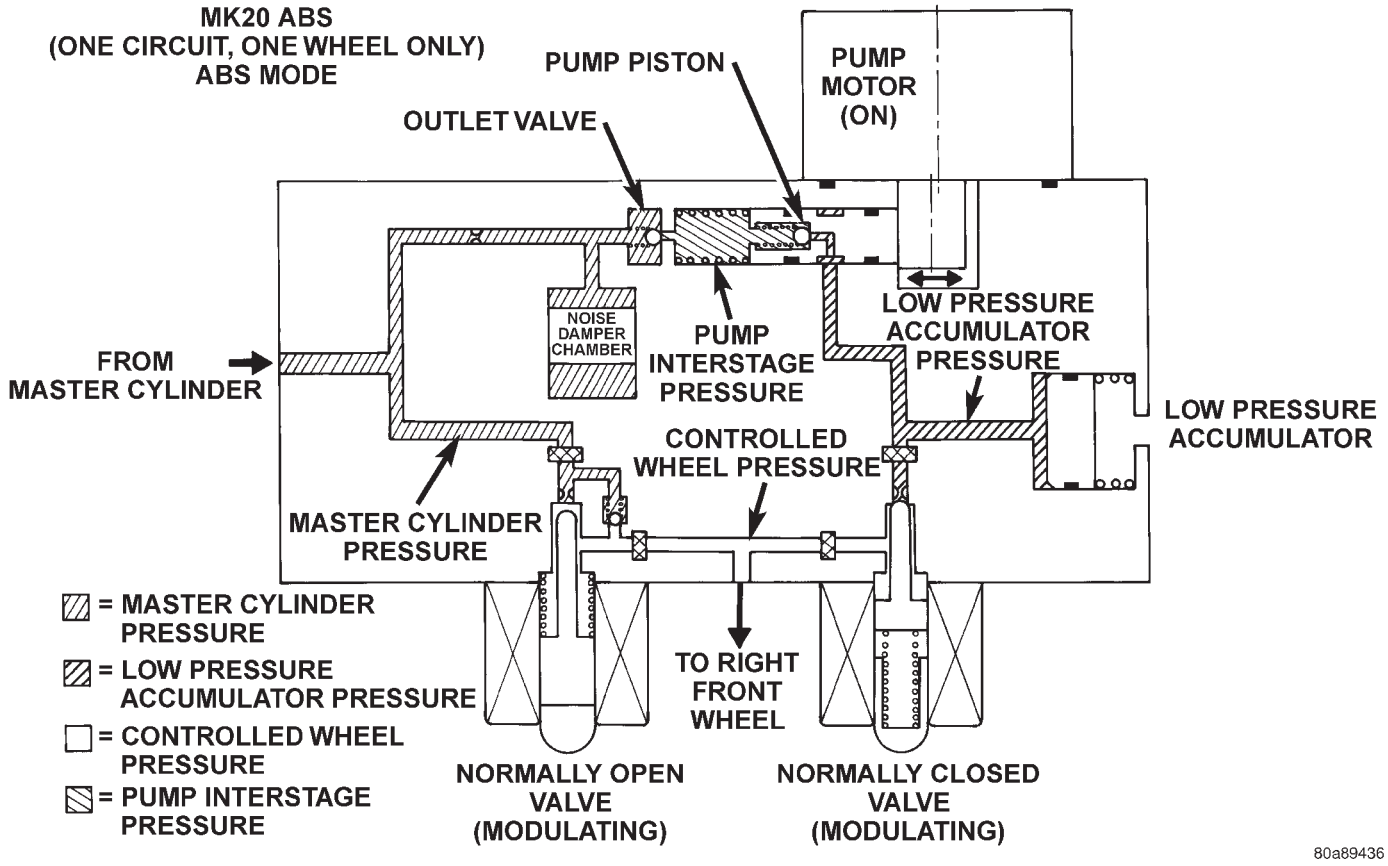

Fig. 12 ABS Mode Hydraulic Circuit

mulators is returned to the master cylinder circuits. The brake fluid will then be routed to either the master cylinder or the wheel brake depending on the position of the normally open valve. A volume of 1.2 cc's of brake fluid is taken in by the lip seal saver (Fig. 13) to protect the lip seals on the piston of the master cylinder.

TEVES MARK 20 ABS WITH TRACTION CONTROL NORMAL BRAKING HYDRAULIC CIRCUIT – SOLENOID AND SHUTTLE VALVE FUNCTION

This condition is the normal operation of the vehicles base brake hydraulic system when the vehicle is equipped with ABS and traction control. The hydraulic system circuit diagram (Fig. 14) shows a situation where no wheel spin or slip is occurring relative to the speed of the vehicle. The driver is applying the brake pedal to build pressure in the brake hydraulic system to apply the brakes and stop the vehicle. The hydraulic shuttle valve (Fig. 14) closes with every brake pedal application so pressure is not created at the inlet to the pump.

TEVES MARK 20 ABS WITH TRACTION CONTROL ABS BRAKING HYDRAULIC CIRCUIT – SOLENOID AND SHUTTLE VALVE FUNCTION

This hydraulic circuit diagram (Fig. 15) shows a vehicle equipped with ABS and traction control in the ABS braking mode. This hydraulic circuit (Fig. 15) shows a situation where one wheel is slipping because the driver is attempting to stop the vehicle at a faster rate than the surface the vehicle's tires are on will allow. The hydraulic shuttle valve (Fig. 15) closes upon brake application so that the pump can not suck brake fluid from the master cylinder. The normally open and normally closed valves modulate the brake hydraulic pressure as required. The pump/motor is switched on so that the brake fluid from the low pressure accumulators is returned to the master cylinder circuits. The brake fluid will then be routed to either the master cylinder or the wheel brake depending on the position of the normally open valve.

DESCRIPTION AND OPERATION (Continued)

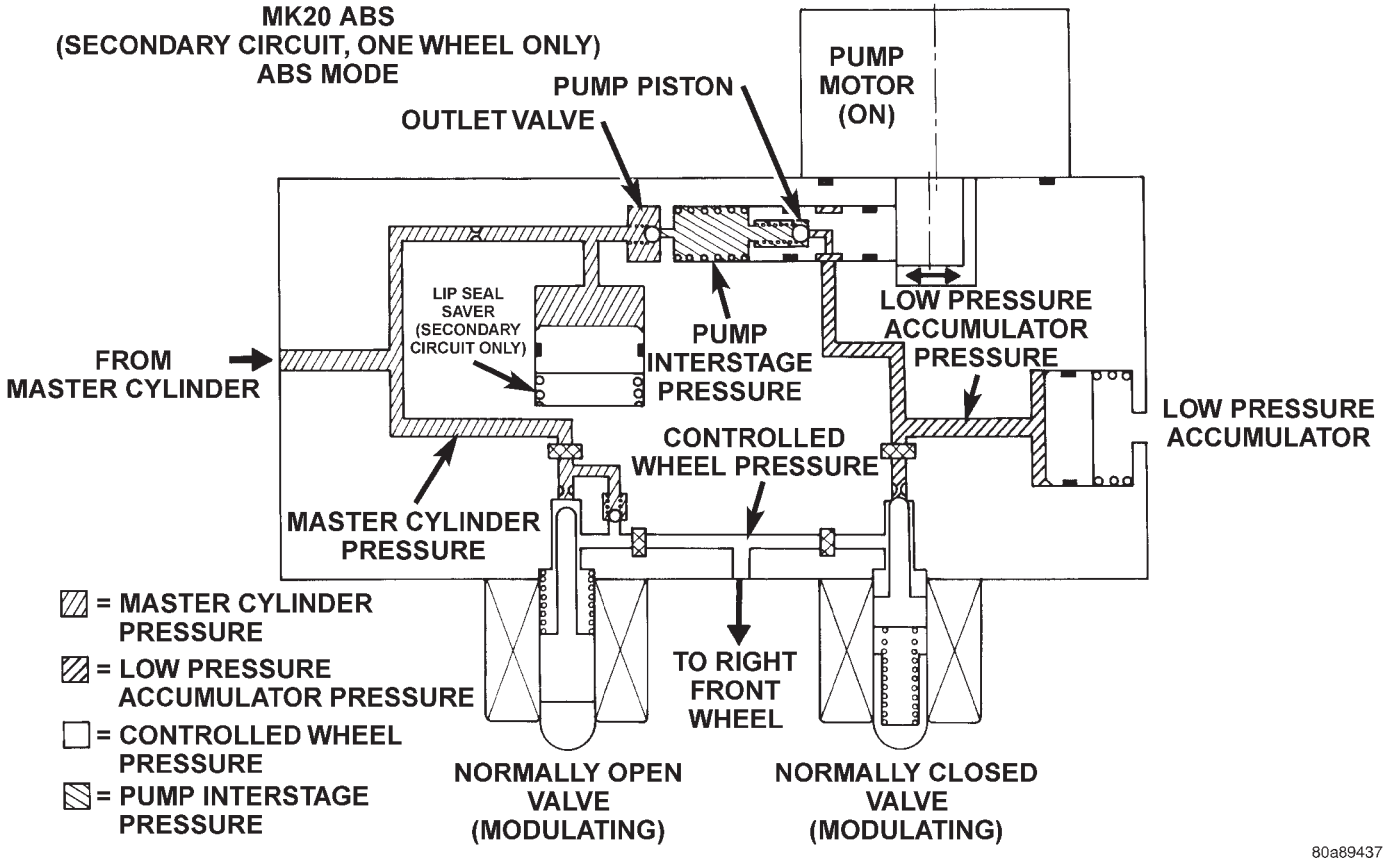

Fig. 13 ABS Mode Secondary Hydraulic Circuit

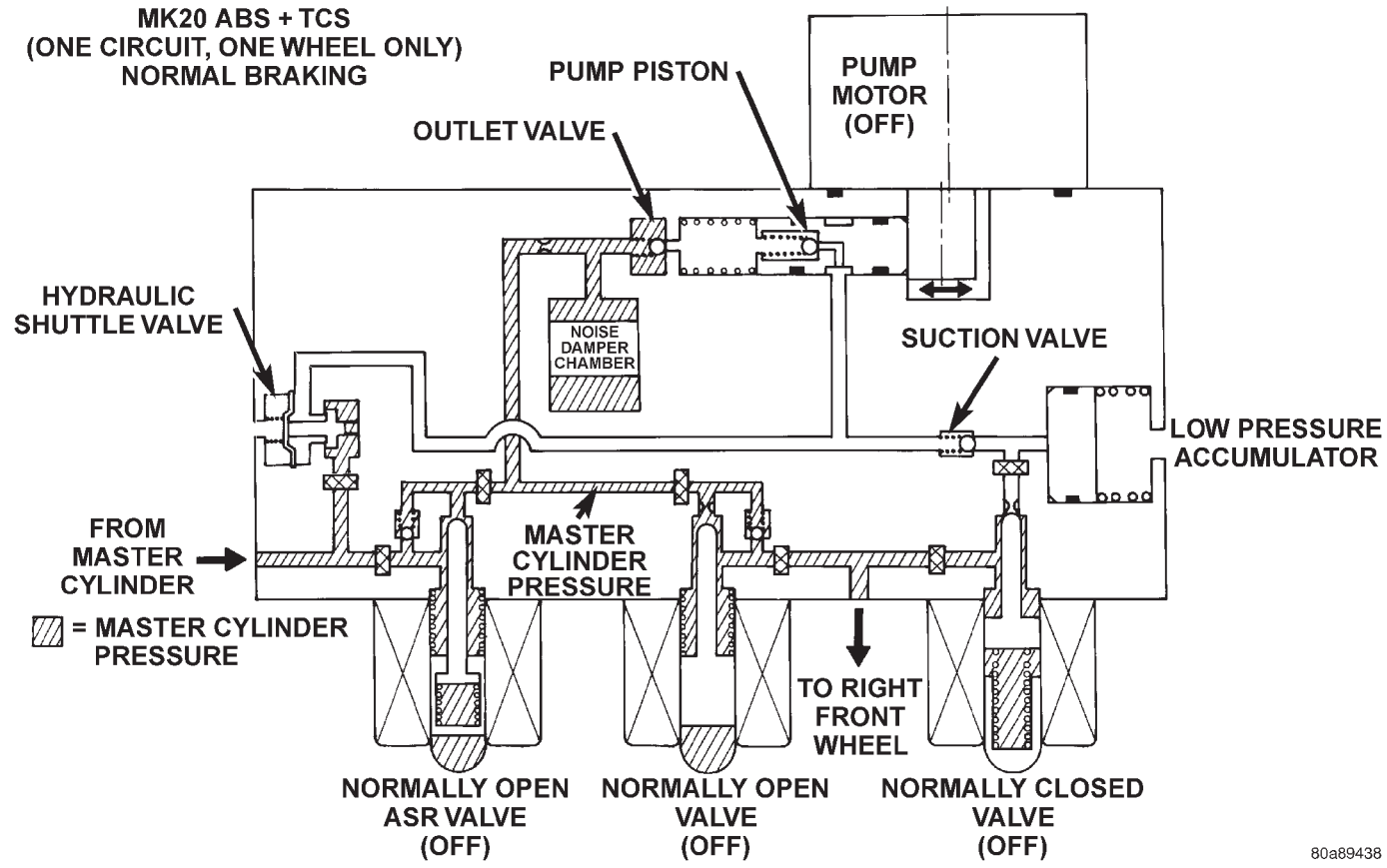

Fig. 14 ABS With Traction Control Normal Braking Hydraulic Circuit

DESCRIPTION AND OPERATION (Continued)

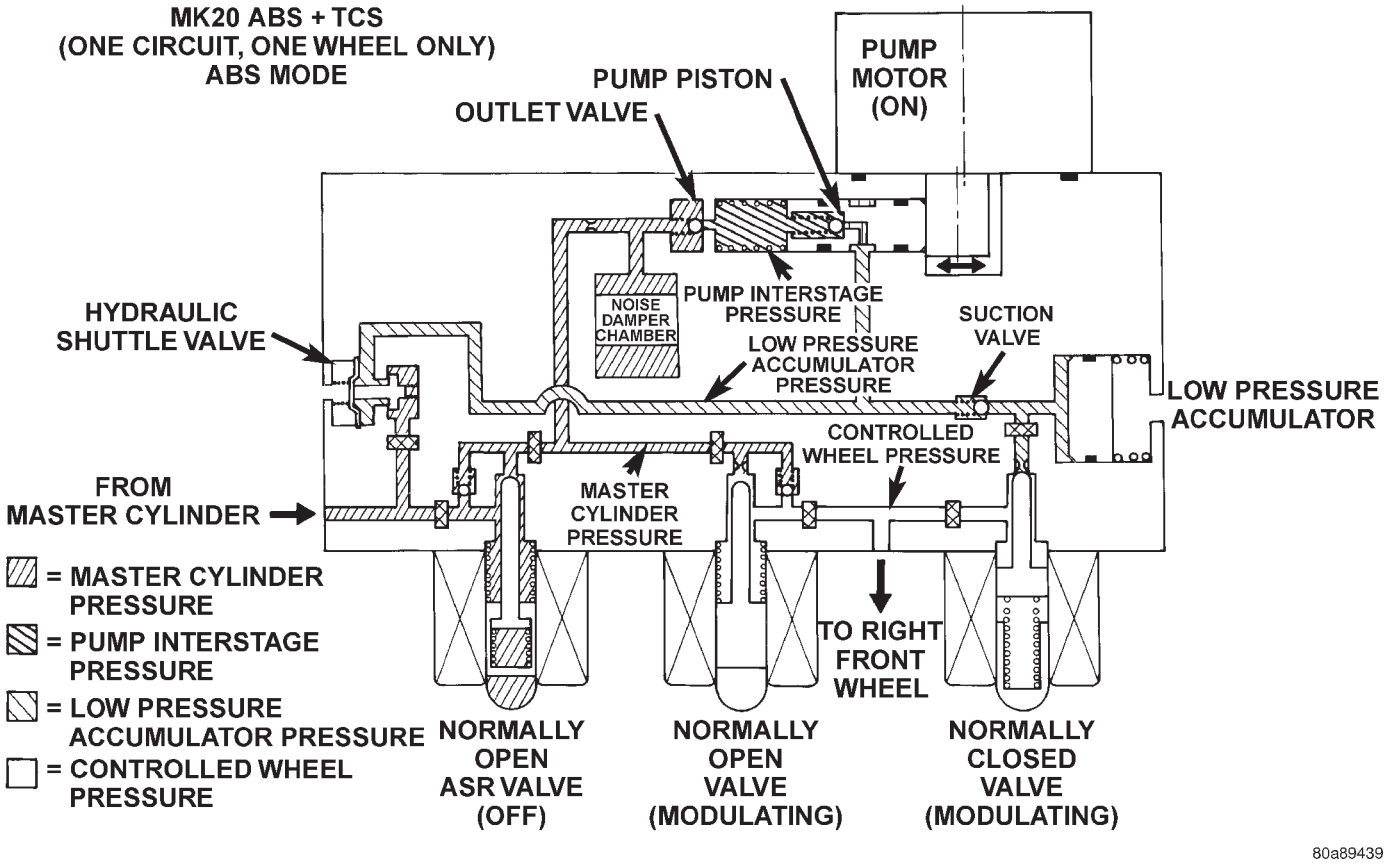

Fig. 15 ABS With Traction Control ABS Braking Hydraulic Circuit

TEVES MARK 20 ABS WITH TRACTION CONTROL– TRACTION CONTROL HYDRAULIC CIRCUIT – SOLENOID AND SHUTTLE VALVE FUNCTION

This hydraulic circuit diagram (Fig. 16) shows a vehicle equipped with ABS and traction control in the traction control mode. The hydraulic circuit (Fig. 16) shows a situation where a driven wheel is spinning and brake pressure is required to reduce its speed. The normally open ASR valve (Fig. 16) is energized to isolate the brake fluid being pumped from the master cylinder and to isolate the driven wheel. Also, the normally open ASR valve bypasses the pump output back to the master cylinder at a fixed pressure setting. The normally open and normally closed valves (Fig. 16) modulate the brake pressure as required to the spinning wheel.

DIAGNOSIS AND TESTING

ABS GENERAL DIAGNOSTICS INFORMATION

This section contains the information necessary to diagnose the ITT Teves Mark 20 ABS Brake System. Specifically, this section should be used to help diagnose conditions which result in any of the following:

(1) ABS Warning Lamp turned on.

(2) Brakes Lock-up on hard application

Diagnosis of base brake conditions which are obviously mechanical in nature should be directed to Group 5 Brakes in this service manual. This includes brake noise, brake pulsation, lack of power assist, parking brake, Red BRAKE Warning Lamp lighting, or vehicle vibration during normal braking.

Many conditions that generate customer complaints may be normal operating conditions, but are judged to be a problem due to not being familiar with the ABS system. These conditions can be recognized without performing extensive diagnostic work, given adequate understanding of the operating principles and performance characteristics of the ABS. See the ABS System Operation Section in this group of the service manual to familiarize yourself with the operating principles of the ABS system.

ABS WIRING DIAGRAM INFORMATION

During the diagnosis of the antilock brake system it may become necessary to reference the wiring diagrams covering the antilock brake system and its components. For wiring diagrams refer to Antilock Brakes in Group 8W of this service manual. This group will provide you with the wiring diagrams and the circuit description and operation information covering the antilock brake system.

DIAGNOSIS AND TESTING (Continued)

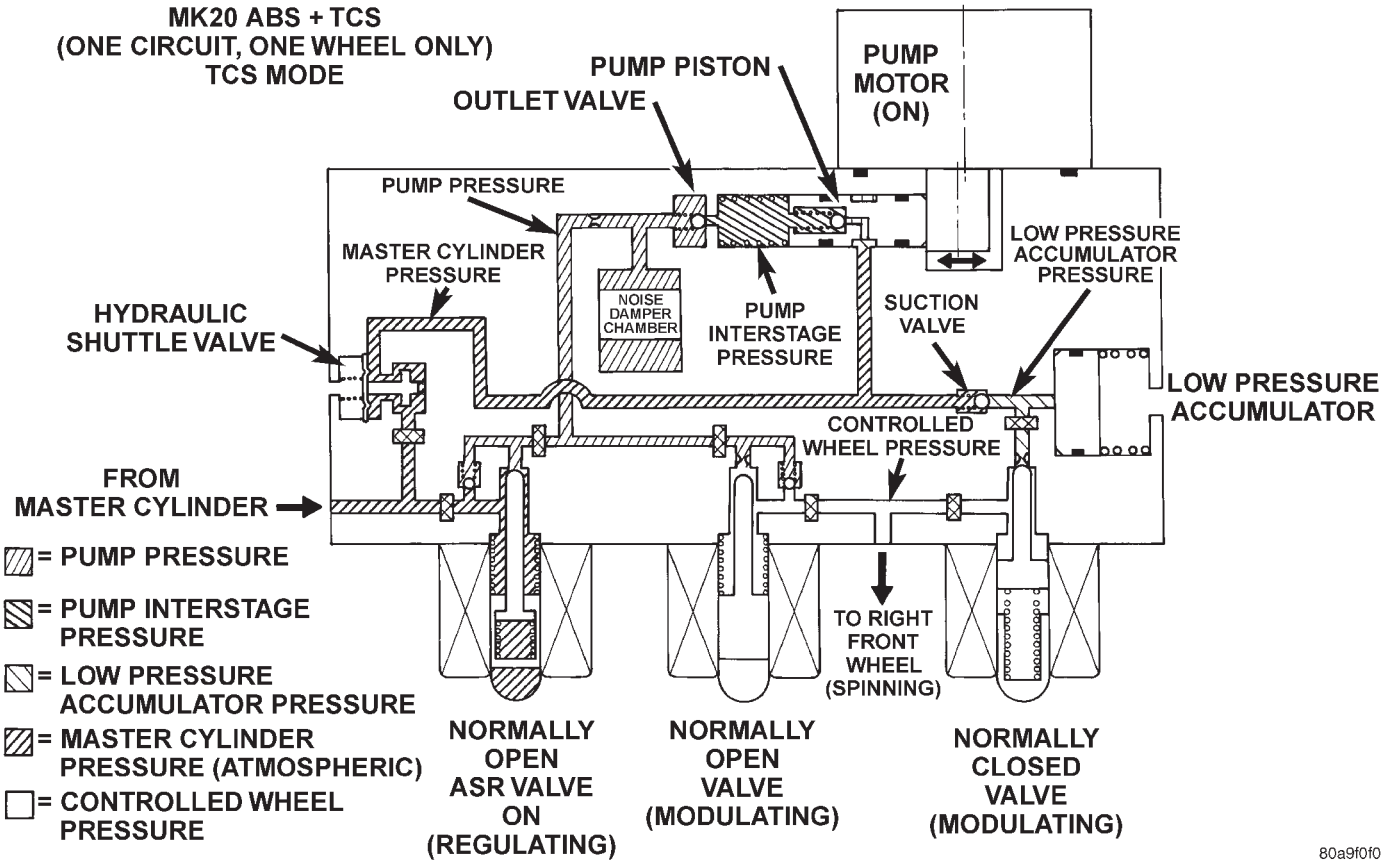

Fig. 16 Traction Control Hydraulic Circuit

ABS DIAGNOSTICS MANUAL

Detailed procedures for diagnosing specific ABS conditions are covered in the diagnostics manual covering the ITT Teves Mark 20 ABS system. The following information is presented to give the technician a general background on the diagnostic capabilities of the ITT Teves Mark 20 ABS system. Please refer to the above mentioned manual for any further electronic diagnostics and service procedures that are required.

DRB DIAGNOSTIC SCAN TOOL USAGE

The diagnostics of the ITT Teves Mark 20 ABS system is performed using the DRB scan tool. Refer to the diagnostics manual covering the ITT Teves Mark 20 ABS system for the required diagnostics and testing procedures and the DRB operators manual for its proper operational information.

ABS BRAKE DIAGNOSTIC TOOL CONNECTOR

On this vehicle, the diagnostic connector used for the diagnosis of the ITT Teves Mark 20 ABS system is located under the lower steering column cover, to the left side of the steering column, just below the hood release lever (Fig. 17). The ITT Teves Mark 20 ABS system uses the ISO 9141-K connector which is shared by other vehicle diagnostic systems such as the powertrain control module and air bag electronic control module.

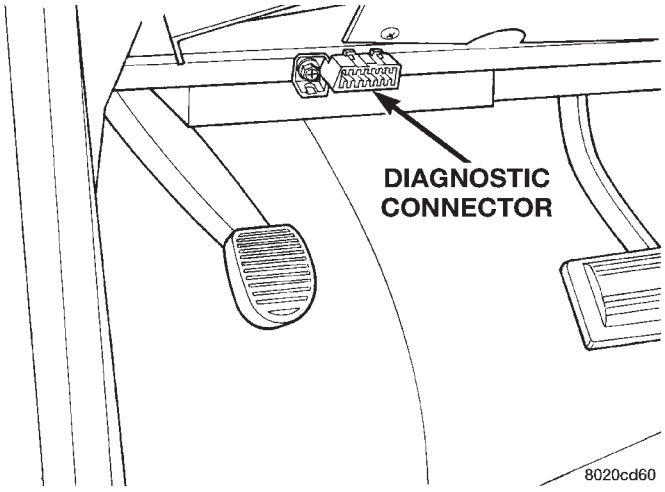

Fig. 17 Diagnostic Scan Tool Data Link Connector

ABS SYSTEM SELF DIAGNOSTICS

The ITT Teves Mark 20 ABS system is equipped with a self diagnostic capability which may be used to assist in the isolation of ABS faults. The features of the self diagnostics system are described below.

DIAGNOSIS AND TESTING (Continued)

START-UP CYCLE

The self diagnostic ABS start up cycle begins when the ignition switch is turned to the on position. Electrical checks are completed on ABS components, such as the Controller, solenoid continuity, and the system relay operation. During this check the Amber ABS Warning Light is turned on for approximately 4 seconds and the brake pedal may emit a popping sound and move slightly when the solenoid valves are checked.

DRIVE-OFF CYCLE

Further Functional testing is accomplished once the vehicle is set in motion and reaches a speed of about 20 kph (12 mph.). This cycle is performed only once after each ignition on/off cycle.

- The pump/motor is activated briefly to verify function. When the pump/motor is activated a whirling or buzzing sound may be heard by the driver, which is normal when the pump/motor is running.
- The wheel speed sensor output is verified to be within the correct operating range.

ONGOING TESTS

Other tests are performed on a continuous basis. These include checks for solenoid continuity, wheel speed sensor continuity and wheel speed sensor output.

ABS DIAGNOSTIC TROUBLE CODES

Diagnostic trouble codes (DTC) are kept in the controller's memory until either erased by the technician using the DRB or erased automatically after 3500 miles. DTC's are retained by the controller even if the ignition is turned off or the battery is disconnected. More than one DTC can be stored at a time. The mileage of the most recent occurrence, number of occurrences and the DTC that was stored is also displayed. Most functions of the CAB and the ABS system can be accessed by the technician for testing and diagnostic purposes by using the DRB.

LATCHING VERSUS NON-LATCHING DIAGNOSTIC TROUBLE CODES

Some DTC's detected by the CAB are latching; the DTC is latched and ABS braking is disabled until the ignition switch is reset. Thus ABS braking is non operational even if the original DTC has disappeared. Other DTC's are non-latching; any warning lights that are turned on, are only turned on as long as the DTC condition exists. As soon as the condition goes away, the ABS Warning Light is turned off, although a DTC will be set in most cases.

INTERMITTENT DIAGNOSTIC TROUBLE CODES

As with virtually any electronic system, intermittent electrical problems in the ABS system may be difficult to accurately diagnose.

Most intermittent electrical problems are caused by faulty electrical connections or wiring. When an intermittent fault is encountered, check suspect circuits for:

A visual inspection for loose, disconnected, or misrouted wires should be done before attempting to diagnose or service the ITT Teves Mark 20 antilock brake system. A visual inspection will eliminate unnecessary testing and diagnostics time. A thorough visual inspection will include the following components and areas of the vehicle.

(1) Inspect fuses in the power distribution center (PDC) and the wiring junction block. Verify that all fuses are fully inserted into the PDC and wring junction block. A label on the underside of the PDC cover identifies the locations of the ABS fuses in the PDC.

(2) Inspect the 25-way electrical connector at the CAB for damage, spread or backed-out wiring terminals. Verify that the 25-way connector is fully inserted in the socket on the CAB. Be sure that wires are not stretched tight or pulled out of the connector.

(3) Verify that all the wheel speed sensor connections are secure.

(4) Poor mating of connector halves or terminals not fully seated in the connector body.

(5) Improperly formed or damaged terminals. All connector terminals in a suspect circuit should be carefully reformed to increase contact tension.

(6) Poor terminal to wire connection. This requires removing the terminal from the connector body to inspect.

(7) Pin presence in the connector assembly

(8) Proper ground connections. Check all ground connections for signs of corrosion, tight fasteners, or other potential defects. Refer to wiring diagram manual for ground locations.

(9) Problems with main power sources of the vehicle. Inspect battery, generator, ignition circuits and other related relays and fuses.

(10) If a visual check does not find the cause of the problem, operate the car in an attempt to duplicate the condition and record the trouble code.

(11) Most failures of the ABS system will disable ABS function for the entire ignition cycle even if the fault clears before key-off. There are some failure conditions, however, which will allow ABS operation to resume during the ignition cycle in which a failure occurred if the failure conditions are no longer present. The following conditions may result in intermittent illumination of the ABS Warning Lamp. All other failures will cause the lamp to remain on until the ignition switch is turned off. Circuits involving

DIAGNOSIS AND TESTING (Continued)

these inputs to the CAB should be investigated if a complaint of intermittent warning system operation is encountered.

(12) Low system voltage. If Low System Voltage is detected by the CAB, the CAB will turn on the ABS Warning Lamp until normal system voltage is achieved. Once normal voltage is seen at the CAB, normal operation resumes.

(13) High system voltage. If high system voltage is detected by the CAB, the CAB will turn on the Amber ABS Warning Lamp until normal system voltage is achieved. Once normal voltage is again detected by the CAB, normal ABS operation will be resumed at the next key on cycle.

(14) Additionally, any condition which results in interruption of electrical current to the CAB or modulator assembly may cause the ABS Warning Lamp to turn on intermittently.

(15) The body controller can turn on the (yellow) ABS warning lamp if CCD communication between the body controller and the CAB is interupted.

TONEWHEEL INSPECTION

CAUTION: The tone wheels used on this vehicle equipped with the Teves Mark 20 Antilock Brake System are different then those used on past models of this vehicle equipped with antilock brakes. Reduced braking performance will result if this part is used on earlier model vehicles and an accident could result. Do not use on pre-1998 model year vehicles.

Carefully inspect tonewheel at the suspected faulty wheel speed sensor for missing, chipped or broken teeth, this can cause erratic speed sensor signals.

Tonewheels should show no evidence of contact with the wheel speed sensors. If contact was made, determine cause and correct before replacing the wheel speed sensor.

Excessive runout of the tonewheel can cause erratic wheel speed sensor signals. Refer to Tonewheel Runout in the Specification Section in this section of the service manual for the tonewheel runout specification. Replace drive shaft assembly or rear hub/bearing assembly if tonewheel runout exceeds the specification.

Inspect tonewheels for looseness on their mounting surfaces. Tonewheels are pressed onto their mounting surfaces and should not rotate independently from the mounting surface.

Check the wheel speed sensor head alignment to the tone wheel. Also check the gap between the speed sensor head and the tone wheel to ensure it is at specification. Refer to Wheel Speed Sensor Clearance in the Specification Section in this section of the service manual.

PROPORTIONING VALVE

CAUTION: Proportioning valves (Fig. 18) should never be disassembled.

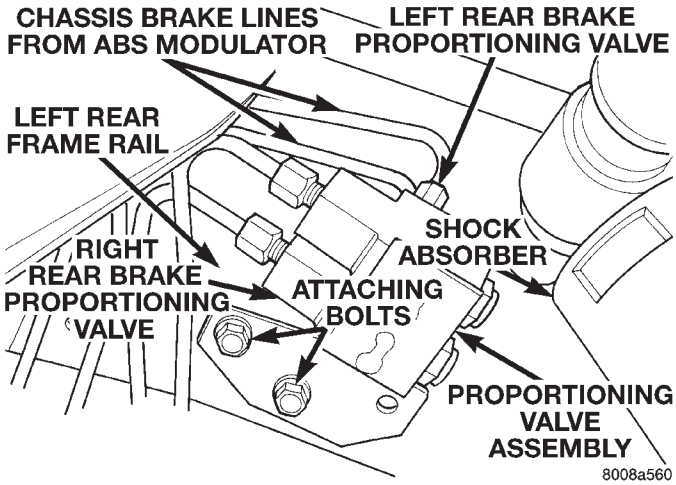

Fig. 18 Brake Proportioning Valve Identification

If premature rear wheel skid occurs on hard brake application, it could be an indication that a malfunction has occurred with one of the proportioning valves.

If a malfunctioning proportioning valve is suspected on a vehicle, refer to Proportioning Valve Test in the Proportioning Valves Section in this group of the service manual for the required test procedure.

BRAKE FLUID CONTAMINATION

Indications of fluid contamination are swollen or deteriorated rubber parts.

Swollen rubber parts indicate the presence of petroleum in the brake fluid.

To test for contamination, put a small amount of drained brake fluid in clear glass jar. If fluid separates into layers, there is mineral oil or other fluid contamination of the brake fluid.

If brake fluid is contaminated, drain and thoroughly flush system. Replace master cylinder, proportioning valve, caliper seals, wheel cylinder seals, Antilock Brakes hydraulic unit and all hydraulic fluid hoses.

TEST DRIVING ABS COMPLAINT VEHICLE

Most ABS complaints will require a test drive as a part of the diagnostic procedure. The purpose of the test drive is to duplicate the condition.

NOTE: Remember conditions that result in the turning on of the Red BRAKE Warning Lamp may indicate reduced braking ability. The following procedure should be used to test drive an ABS complaint vehicle.

DIAGNOSIS AND TESTING (Continued)

Before test driving a brake complaint vehicle, note whether the Red or Amber Brake Warning Lamp is turned on. If it is the Red Brake Warning Lamp, refer to the hydraulic system section in the brake group of this manual. If the ABS Warning lamp was/is on, test drive the vehicle as described below, to verify the complaint. While the ABS Warning Lamp is on, the ABS is not functional. The standard brake system and the ability to stop the car may not be affected if only the ABS Warning Lamp is on.

Discuss with the owner of the vehicle or note any other electrical problems or conditions that may be occurring on the vehicle. They may have an effect on the antilock brake system's function.

(1) Turn the key to the off position and then back to the on position. Note whether the ABS Warning Lamp continues to stay on. If it does, refer to the diagnostic manual covering the ITT Teves Mark 20 ABS system for the required test procedures.

(2) If the ABS Warning Lamp goes out, shift into gear and drive the car to a speed of 20 kph (12 mph) to complete the ABS start up cycle. If at this time the ABS Warning Lamp goes on refer to the ITT Teves Mark 20 Diagnostic Manual.

(3) If the ABS Warning Lamp remains OUT, drive the vehicle a short distance. During this test drive be sure that the vehicle achieves at least 40 mph. Brake to at least one complete stop in an ABS cycle, and again accelerate to 25 mph.

(4) If a functional problem with the ABS system is determined while test driving a vehicle, refer to the diagnostic manual covering the ITT Teves Mark 20 ABS system for the required test procedures and proper use of the DRB diagnostic scan tool.

ABS SERVICE PRECAUTIONS

The ABS uses an electronic control module, the CAB. This module is designed to withstand normal current draws associated with vehicle operation. Care must be taken to avoid overloading the CAB circuits. **In testing for open or short circuits, do not ground or apply voltage to any of the circuits unless instructed to do so for a diagnostic procedure.** These circuits should only be tested using a high impedance multi-meter or the DRB tester as described in this section. Power should never be removed or applied to any control module with the ignition in the ON position. Before removing or connecting battery cables, fuses, or connectors, always turn the ignition to the OFF position.

CAUTION: Use only factory wiring harnesses. Do not cut or splice wiring to the brake circuits. The addition of after-market electrical equipment (car phone, radar detector, citizen band radio, trailer lighting, trailer brakes, ect.) on a vehicle equipped with antilock brakes may affect the function of the antilock brake system.

SERVICE PROCEDURES

BRAKE FLUID LEVEL INSPECTION

CAUTION: Use only Mopar brake fluid or an equivalent from a tightly sealed container. Brake fluid must conform to DOT 3 specifications. Do not use petroleum-based fluid because seal damage in the brake system will result.

For the specific procedure covering the inspection of the brake fluid level and adding brake fluid to the reservoir, refer to the Service Adjustments Section in this group of the service manual.

BLEEDING TEVES MARK 20 HYDRAULIC SYSTEM

The base brake system must be bled anytime air is permitted to enter the hydraulic system, due to disconnection of brake lines, hoses or components. The ABS system, particularly the HCU, should only be bled when the HCU is replaced or removed from the vehicle, or if there is reason to believe the HCU has ingested air. Under most circumstances that would require brake bleeding, only the base brake system needs to be bled.

It is important to note that excessive air in the brake system will cause a soft or spongy feeling brake pedal.

During bleeding operations, be sure that the brake fluid level remains close to the FULL level in the reservoir. Check the fluid level periodically during the bleeding procedure and add DOT 3 brake fluid as required.

The Teves Mark 20 ABS hydraulic system and the base brake hydraulic system must be bled as two independent braking systems. The non ABS portion of the brake system is to be bled the same as any non ABS system. Refer to the Service Adjustments section in this manual for the proper bleeding procedure to be used. This brake system can be either pressure bled or manually bled.

The ABS portion of the brake system MUST be bled separately. This bleeding procedure requires the use of the DRB Diagnostic Tester and the bleeding sequence procedure outlined below.

ABS BLEEDING PROCEDURE

When bleeding the ABS system, the following bleeding sequence **MUST** be followed to insure complete and adequate bleeding. The ABS system can be bled using a manual bleeding procedure or standard pressure bleeding equipment.

SERVICE PROCEDURES (Continued)

If the brake system is to be bled using pressurized bleeding equipment, refer to Bleeding Brake System in the Service Adjustments section at the beginning of this group for proper equipment usage and procedures.

(1) Assemble and install all brake system components on the vehicle making sure all hydraulic fluid lines are installed and properly torqued.

(2) Connect the DRB Diagnostics Tester to the diagnostics connector. The Teves Mark 20 ABS diagnostic connector is located under the instrument panel to the left of the steering column cover.

(3) Using the DRB, check to make sure the CAB does not have any fault codes stored. If it does, remove them using the DRB.

WARNING: WHEN BLEEDING THE BRAKE SYSTEM WEAR SAFETY GLASSES. A CLEAR BLEED TUBE MUST BE ATTACHED TO THE BLEEDER SCREWS AND SUBMERGED IN A CLEAR CONTAINER FILLED PART WAY WITH CLEAN BRAKE FLUID. DIRECT THE FLOW OF BRAKE FLUID AWAY FROM THE PAINTED SURFACES OF THE VEHICLE. BRAKE FLUID AT HIGH PRESSURE MAY COME OUT OF THE BLEEDER SCREWS WHEN OPENED.

(4) Bleed the base brake system using the standard pressure or manual bleeding procedure as outlined in the Service Adjustments section of this service manual.

(5) Using the DRB, go to the ″Bleed ABS″ routine. Apply the brake pedal firmly and initiate the ″Bleed ABS″ cycle one time. Release the brake pedal.

(6) Bleed the base brake system again, as in step Step 4 above.

(7) Repeat steps Step 5 and Step 6 above until brake fluid flows clear and is free of any air bubbles. Check brake fluid level in reservoir periodically to prevent reservoir from running low on brake fluid.

(8) Test drive the vehicle to be sure brakes are operating correctly and that brake pedal is solid.

REMOVAL AND INSTALLATION

ABS GENERAL SERVICE PRECAUTIONS

CAUTION: Review this entire section prior to performing any mechanical work on a vehicle equipped with the ITT Tevis Mark 20 ABS brake system. This section contains information on precautions pertaining to potential component damage, vehicle damage and personal injury which could result when servicing an ABS equipped vehicle.

CAUTION: Only the recommended jacking or hoisting positions for this vehicle are to be used whenever it is necessary to lift a vehicle. Failure to raise a vehicle from the recommended locations could result in lifting a vehicle by the hydraulic control unit mounting bracket. Lifting a vehicle by the hydraulic control unit mounting bracket will result in damage to the mounting bracket and the hydraulic control unit.

CAUTION: Certain components of the ABS System are not intended to be serviced individually. Attempting to remove or disconnect certain system components may result in improper system operation. Only those components with approved removal and installation procedures in this manual should be serviced.

CAUTION: Brake fluid will damage painted surfaces. If brake fluid is spilled on any painted surfaces, wash off with water immediately.

CAUTION: When performing any service procedure on a vehicle equipped with ABS do not apply a 12 volt power source to the ground circuit of the pump motor in the CAB. Doing this will damage the pump motor and will require replacement of the HCU.

The following are general cautions which should be observed when servicing the ABS system and/or other vehicle systems. Failure to observe these precautions may result in ABS System component damage.

If welding work is to be performed on the vehicle, using an electric arc welder, the CAB connector should be disconnected during the welding operation.

The CAB 25 way connector connector should never be connected or disconnected with the ignition switch in the ON position.

Many components of the ABS System are not serviceable and must be replaced as an assembly. Do not disassemble any component which is not designed to be serviced.

HYDRAULIC CONTROL UNIT

REMOVE

(1) Disconnect the negative (ground) cable from the battery and isolate cable.

(2) Using a brake pedal depressor, move and lock the brake pedal to a position past the first inch of pedal travel. **This will prevent brake fluid from draining out of the master cylinder when the brake tubes are removed from the HCU.**

(3) Raise vehicle. Vehicle is to be raised and supported on jackstands or on a frame contact type

REMOVAL AND INSTALLATION (Continued)

hoist. See Hoisting in the Lubrication And Maintenance section of this service manual.

(4) Remove the routing clip attaching the HCU wiring harness to the HCU mounting bracket (Fig. 19).

CAUTION: Do not apply a 12 volt power source to any terminals of the 25 way HCU connector when disconnected.

(5) Remove the 25 way connector (Fig. 19) from the CAB. The 25 way connector is removed from the CAB using the following procedure. Grasp the lock on the 25 way connector (Fig. 19) and pull it as far out as possible (Fig. 20). This will raise and unlock the 25 way connector from the socket on the CAB.

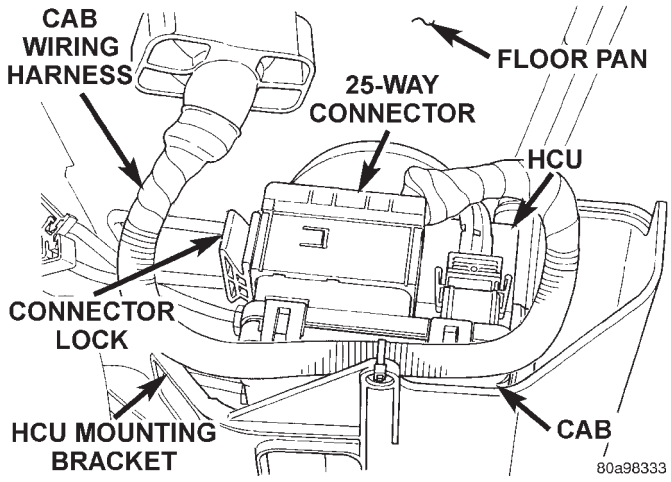

Fig. 19 CAB 25 Way Connector

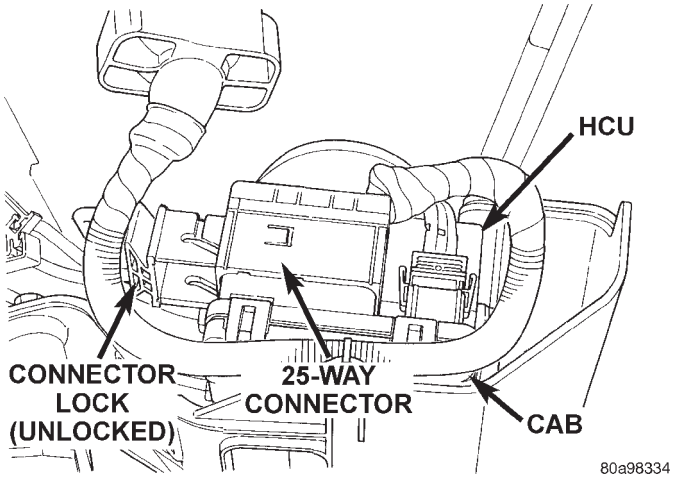

Fig. 20 Unlocked 25 Way CAB Connector

CAUTION: Before removing the brake tubes from the HCU, the HCU must be thoroughly cleaned. This must be done to prevent dirt particles from falling into the ports of HCU or entering the brake tubes.

(6) Thoroughly clean all surfaces of the HCU, and all brake tube nuts located on the HCU. Use only a solvent such as Mopar Brake Parts Cleaner or an equivalent to clean the HCU.

(7) Remove the brake tubes (6) from the inlet and outlet ports on the HCU. (Fig. 21).

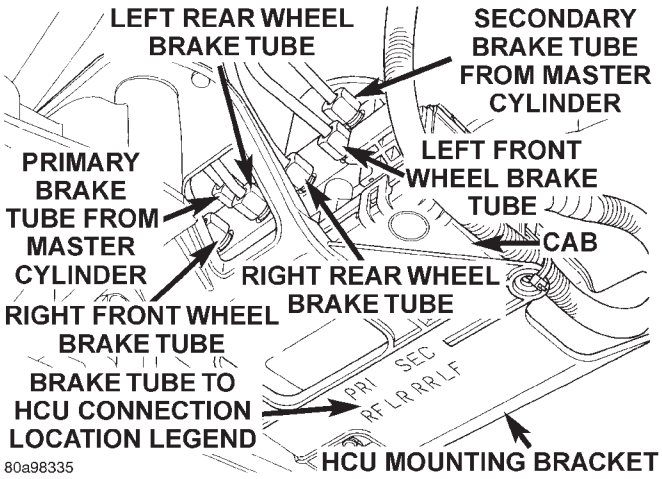

Fig. 21 Brake Tube Connections To HCU

(8) Remove the 3 bolts (Fig. 22) attaching the HCU mounting bracket to the front suspension crossmember.

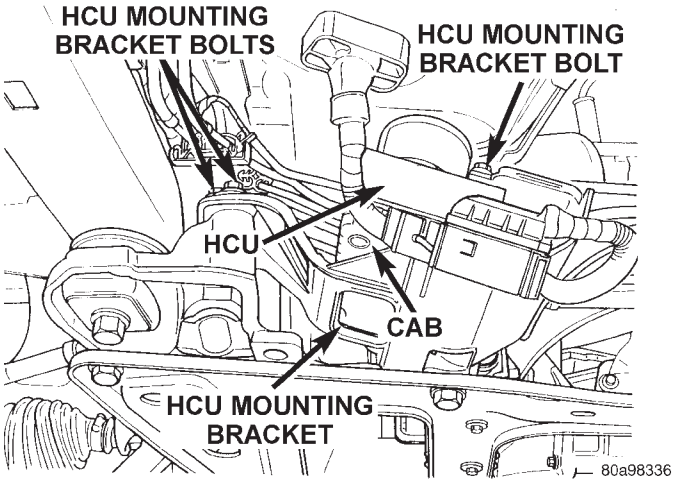

Fig. 22 HCU To Suspension Cradle Mounting Bolts

(9) Remove HCU and the mounting bracket as a unit from the vehicle.

(10) Remove the 3 bolts (Fig. 23) mounting the HCU to the mounting bracket. Separate the HCU from the mounting bracket.

(11) Remove the CAB (Fig. 19) from the bottom of the HCU for installation on the replacement HCU. Refer to Controller Antilock Brakes (CAB) in the Removal And Installation Section in this group of the service manual for the required procedure.

REMOVAL AND INSTALLATION (Continued)

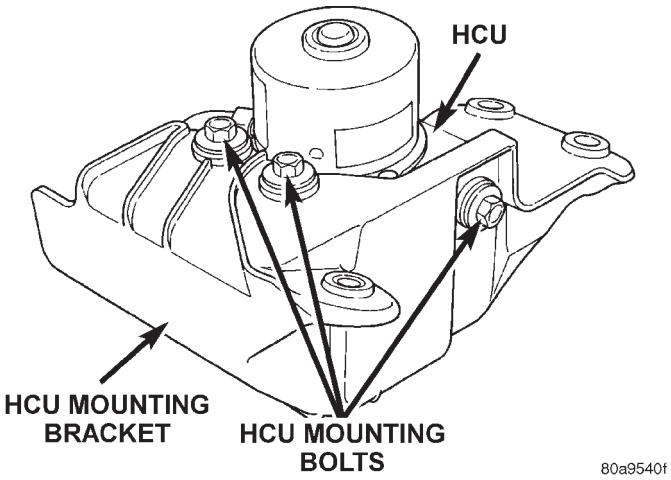

Fig. 23 HCU Mounting Bolts

INSTALL

(1) Install the CAB (Fig. 19) on the bottom of the HCU. Refer to Controller Antilock Brakes (CAB) in the Removal And Installation Section in this group of the service manual for the required procedure.

(2) Install the HCU on the mounting bracket (Fig. 23). Install the 3 bolts (Fig. 23) attaching the HCU to the mounting bracket. Tighten the 3 mounting bolts to a torque of 11 N·m (97 in. lbs.).

CAUTION: The HCU mounting bracket to front suspension cradle mounting bolts have a unique corrosion protection coating and a special aluminum washer. For this reason, only the original, or original equipment Mopar replacement bolts can be used to mount the HCU bracket to the front suspension crossmember.

(3) Install the HCU and its mounting bracket as an assembly on the front suspension crossmember. Install the 3 bolts attaching the HCU bracket to the crossmember (Fig. 22). Tighten the 3 mounting bolts to a torque of 28 N·m (250 in. lbs.).

CAUTION: Because of the flexible section in the primary and secondary brake tubes, and the brake tubes between the HCU and the proportioning valve, the brake tubes must be held in proper orientation when tightened and torqued. These tubes must not contact each other or other vehicle components when installed. Also, after the brake tubes are installed on the HCU, ensure all spacer clips are reinstalled on the brake tubes.

CAUTION: When installing the chassis brake tubes on the HCU valve block, they must be located correctly in the valve block to ensure proper ABS operation. Refer to (Fig. 21) for the correct chassis brake tube locations.

NOTE: The chassis brake tube attachment locations to the HCU, are marked on the bottom of the HCU mounting bracket.

(4) Install the 6 chassis brake tubes into their correct port locations on the HCU valve block as shown in (Fig. 21). Tighten the tube nuts to a torque of 17 N·m (145 in. lbs.).

NOTE: Before installing the 25 way connector in the CAB be sure the seal is properly installed in the connector.

(5) Install the 25 way connector (Fig. 19) on the CAB using the following procedure. Position the 25 way connector in the socket of the CAB and carefully push it down as far as possible. When connector is fully seated by hand into the CAB socket, push in the connector lock (Fig. 20). This will pull the connector into the socket of the CAB and lock it in the installed position.

NOTE: The CAB wiring harness must be clipped to the HCU mounting bracket. This will ensure the wiring harness is properly routed and does not contact the brake tubes or the body of the vehicle.

(6) Clip the cab wiring harness (Fig. 19) to the HCU mounting bracket.

(7) Install the routing clips (Fig. 24) on the brake tubes.

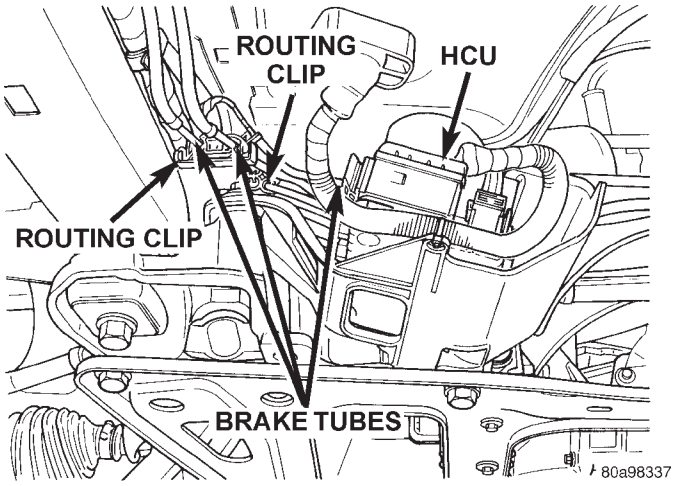

Fig. 24 Brake Tube Routing Clips

(8) Lower vehicle.

(9) Connect negative cable back on negative post of the battery.

(10) Bleed the base brakes and the ABS brakes hydraulic system. Refer to the Bleeding ABS System in this section of the manual for the proper bleeding procedure.

(11) Road test vehicle to ensure proper operation of the base and ABS systems.

REMOVAL AND INSTALLATION (Continued)

CONTROLLER ANTILOCK BRAKES (CAB)

REMOVE

(1) Disconnect the negative (ground) cable from the battery and isolate cable.

(2) Using a brake pedal depressor, move and lock the brake pedal to a position past the first inch of pedal travel. **This will prevent brake fluid from draining out of the master cylinder when the brake tubes are removed from the HCU.**

(3) Raise vehicle. Vehicle is to be raised and supported on jackstands or on a frame contact type hoist. See Hoisting in the Lubrication And Maintenance section of this service manual.

CAUTION: Do not apply a 12 volt power source to any terminals of the 25 way HCU connector when disconnected.

(4) Remove the 25 way connector (Fig. 25) from the CAB located on the bottom of the HCU. The 25 way connector is removed from the CAB using the following procedure. Grasp the lock on the 25 way connector (Fig. 25) and pull it as far out as possible (Fig. 26). This will unlock and raise the 25 way connector from the socket on the CAB.

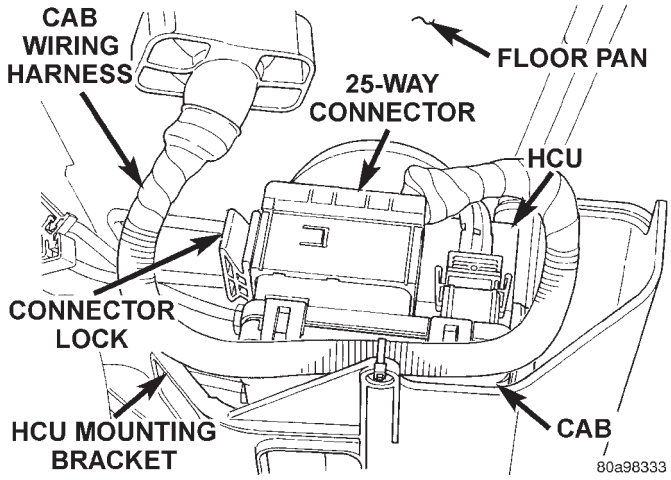

Fig. 25 CAB 25 Way Connector

CAUTION: Before removing the brake tubes from the HCU, the HCU must be thoroughly cleaned. This must be done to prevent dirt particles from falling into the ports of HCU or entering the brake tubes.

(5) Thoroughly clean all surfaces of the HCU, and all brake tube nuts located on the HCU. Use only a solvent such as Mopar Brake Parts Cleaner or an equivalent to clean the HCU.

(6) Remove the brake tubes (6) from the inlet and outlet ports on the HCU. (Fig. 27).

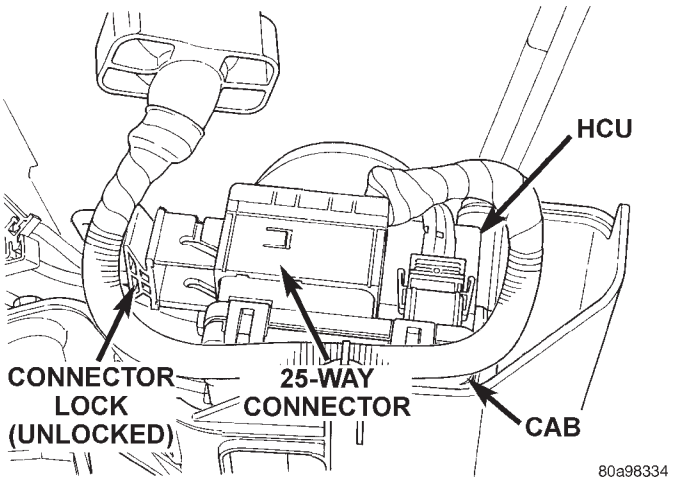

Fig. 26 Unlocking CAB 25 Way Connector

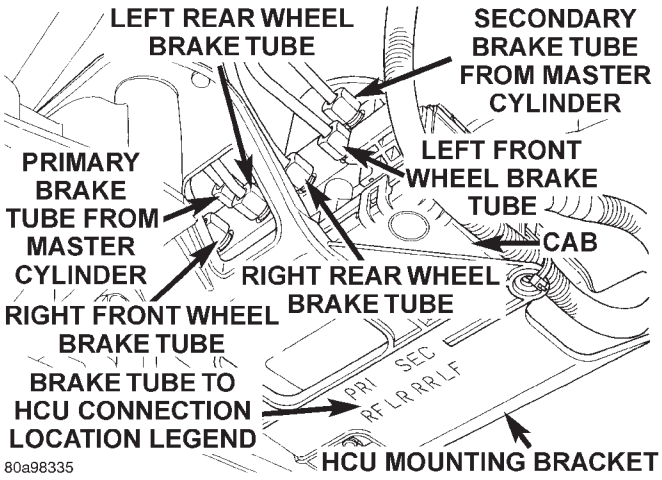

Fig. 27 Brake Tube Connections To HCU

(7) Remove the 3 bolts (Fig. 28) attaching the HCU mounting bracket to the front suspension crossmember.

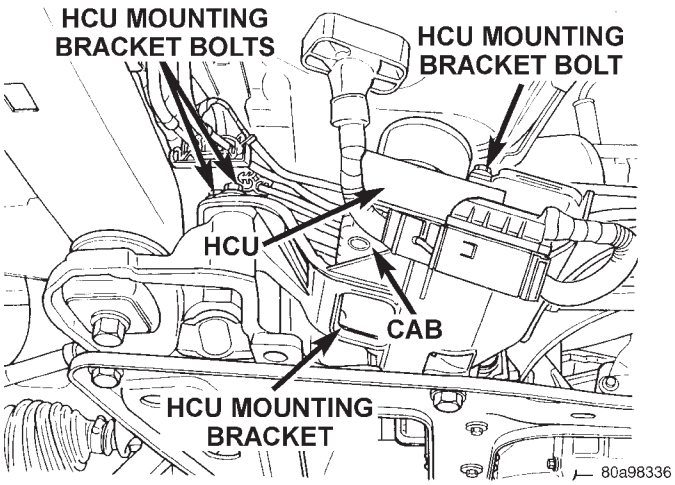

Fig. 28 HCU To Suspension Cradle Mounting Bolts

REMOVAL AND INSTALLATION (Continued)

(8) Remove HCU and the mounting bracket as a unit from the vehicle.

(9) Remove the 3 bolts (Fig. 29) mounting the HCU to the mounting bracket. Separate the HCU from the mounting bracket.

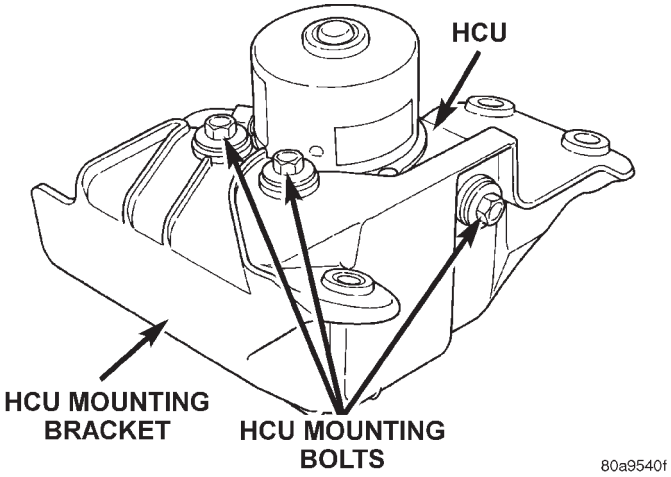

Fig. 29 HCU Mounting Bolts

(10) Unplug the pump motor wiring harness (Fig. 30) from the CAB.

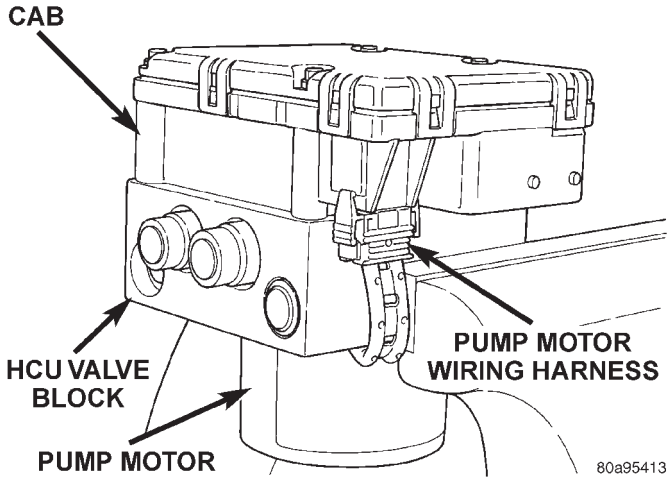

Fig. 30 Pump Motor To CAB Wiring Harness

(11) Remove the 4 bolts (Fig. 31) attaching the CAB to the valve block of the HCU.

(12) Remove the CAB from the valve block of the HCU (Fig. 32).

INSTALL

(1) Install the CAB (Fig. 32) on the valve block of the HCU.

(2) Install the 4 bolts mounting the CAB (Fig. 31) to the valve block of the HCU. Tighten the CAB mounting bolts to a torque of 2 N·m (17 in. lbs.).

(3) Plug the pump/motor wiring harness into the CAB (Fig. 30).

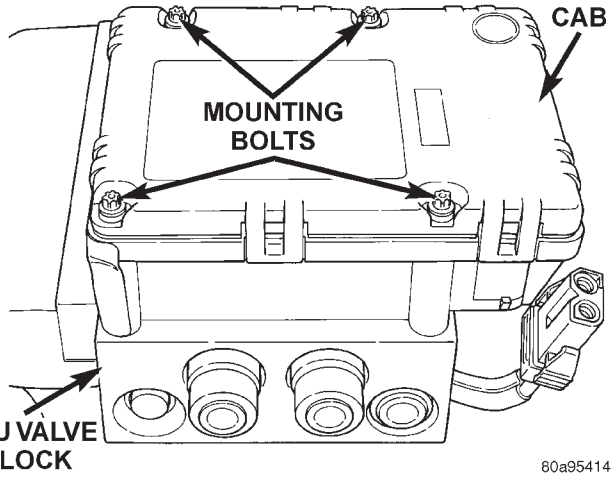

Fig. 31 CAB Attaching Bolts

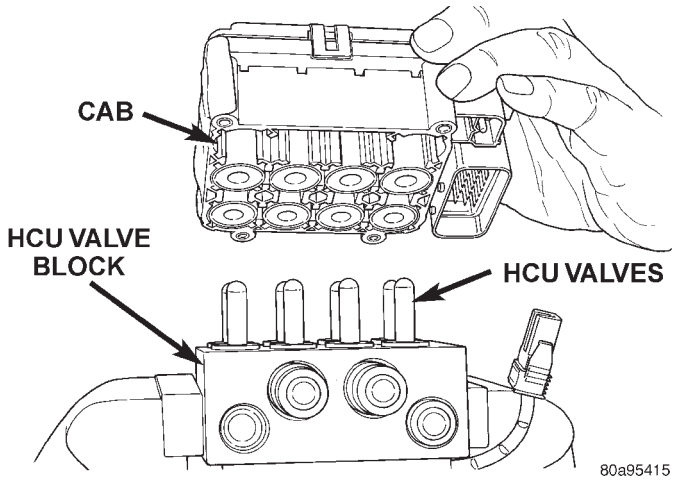

Fig. 32 Remove/Install CAB

(4) Install the HCU on the mounting bracket (Fig. 29). Install the 3 bolts (Fig. 29) attaching the HCU to the mounting bracket. Tighten the 3 mounting bolts to a torque of 11 N·m (97 in. lbs.).

CAUTION: The HCU mounting bracket to front suspension cradle mounting bolts have a unique corrosion protection coating and a special aluminum washer. For this reason, only the original, or original equipment Mopar replacement bolts can be used to mount the HCU bracket to the front suspension crossmember.

(5) Install the HCU and its mounting bracket as an assembly on the front suspension crossmember. Install the 3 bolts attaching the HCU bracket to the crossmember (Fig. 28). Tighten the 3 mounting bolts to a torque of 28 N·m (250 in. lbs.).

REMOVAL AND INSTALLATION (Continued)

CAUTION: Because of the flexible section in the primary and secondary brake tubes, and the brake tubes between the HCU and the proportioning valve, the brake tubes must be held in proper orientation when tightened and torqued. These tubes must not contact each other or other vehicle components when installed.

CAUTION: When installing the chassis brake tubes on the HCU valve block, they must be located correctly in the valve block to ensure proper ABS operation. Refer to (Fig. 27) for the correct chassis brake tube locations.

NOTE: The chassis brake tube attachment locations to the HCU, are marked on the bottom of the HCU mounting bracket.

(6) Install the 6 chassis brake tubes into their correct port locations on the HCU valve block as shown in (Fig. 27). Tighten the tube nuts to a torque of 17 N·m (145 in. lbs.).

NOTE: Before installing the 25 way connector in the CAB be sure the seal is properly installed in the connector.

(7) Install the 25 way connector on the CAB using the following procedure. Position the 25 way connector in the socket of the CAB and carefully push it down as far as possible. When connector is fully seated by hand into the CAB socket, push in the connector lock (Fig. 26). This will pull the connector into the socket of the CAB and lock it in the installed position.

(8) Install the routing clips (Fig. 33) on the brake tubes.

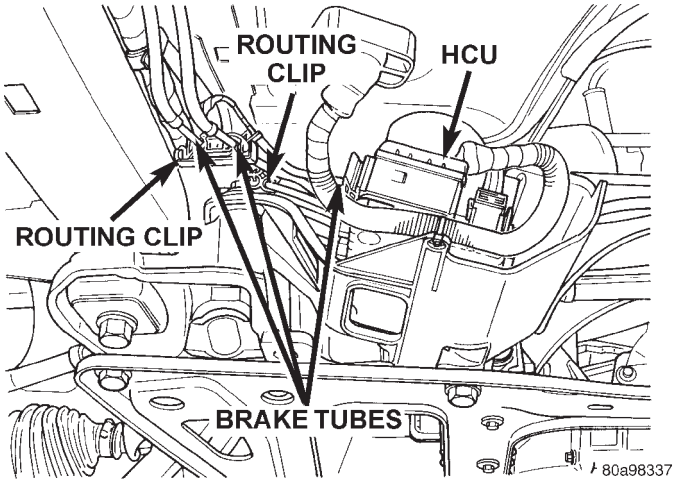

Fig. 33 Brake Tube Routing Clips

(9) Lower vehicle.

(10) Connect negative cable back on negative post of the battery.

(11) Bleed the base brakes and the ABS brakes hydraulic system. Refer to the Bleeding ABS System in this section of the manual for the proper bleeding procedure.

(12) Road test vehicle to ensure proper operation of the base and ABS brake systems.

WHEEL SPEED SENSOR (FRONT)

REMOVE

(1) Raise vehicle on jack stands or centered on a frame contact type hoist. See Hoisting in the Lubrication and Maintenance section of this service manual, for the required lifting procedure to be used for this vehicle.

(2) Remove the tire and wheel assembly from the vehicle.

(3) Remove the 2 screws (Fig. 34) attaching front channel bracket and grommet retainer to the outer frame rail.

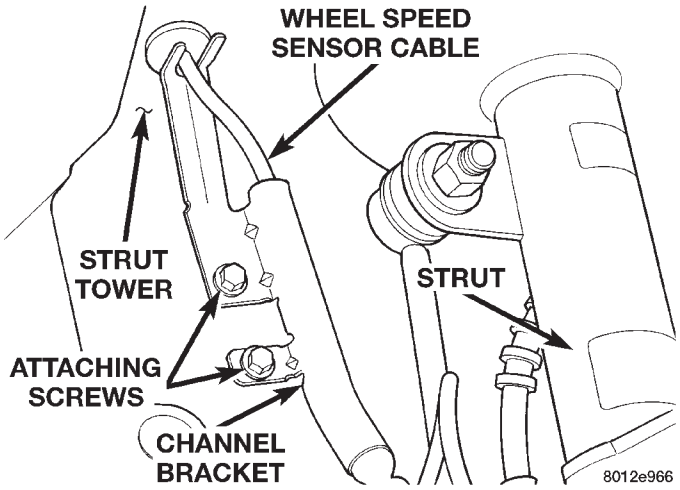

Fig. 34 Front Speed Sensor Cable Channel Bracket

CAUTION: When disconnecting the wheel speed sensor from vehicle wiring harness, be careful not to damage pins on connector

(4) Pull speed sensor cable grommet and connector through the hole in the strut tower (Fig. 35). Disconnect speed sensor cable from vehicle wiring harness (Fig. 35).

(5) Remove the wheel speed sensor head to steering knuckle attaching bolt (Fig. 36).

(6) Remove sensor head from steering knuckle. If the sensor has seized, due to corrosion, **DO NOT USE PLIERS ON SENSOR HEAD.** Use a hammer and a punch and tap edge of sensor ear, rocking the sensor side to side until free.

REMOVAL AND INSTALLATION (Continued)

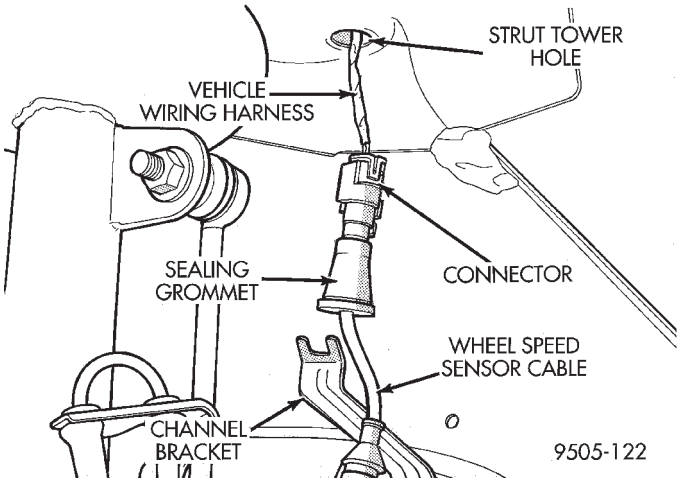

Fig. 35 Speed Sensor Cable To Vehicle Wiring Harness

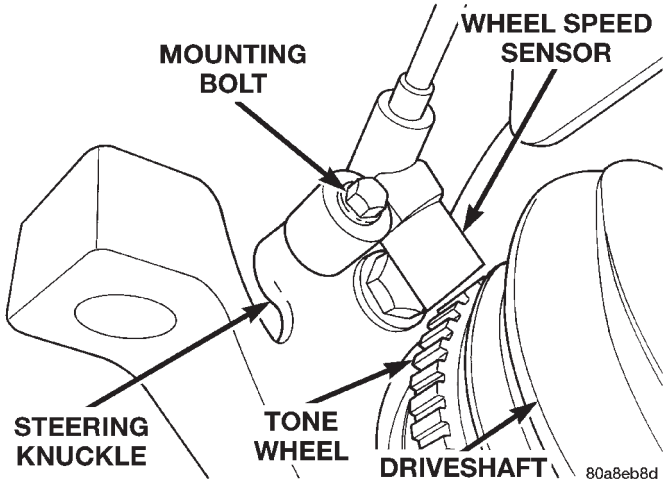

Fig. 36 Front Wheel Speed Sensor Attaching Bolt

(7) Remove the wheel speed sensor cable grommets from the retaining bracket (Fig. 37).

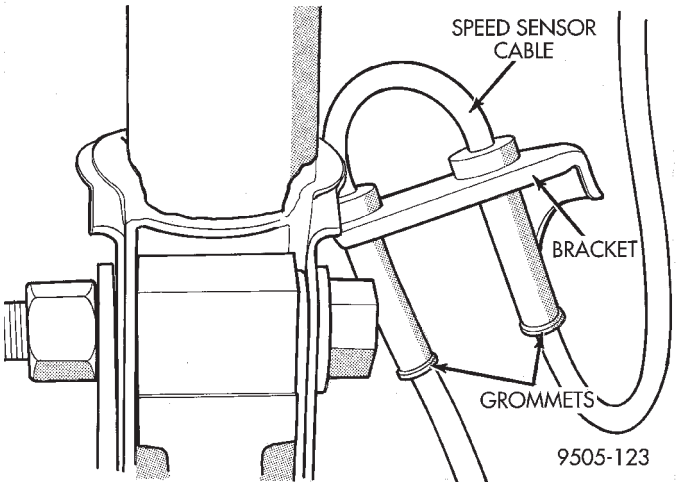

Fig. 37 Front Wheel Speed Sensor Cable Routing

(8) Remove front wheel speed sensor assembly from the vehicle.

INSTALL

CAUTION: Proper installation of wheel speed sensor cables is critical to continued system operation. Be sure that cables are installed in retainers. Failure to install cables in retainers as shown in this section may result in contact with moving parts and/or over extension of cables, resulting in an open circuit.

(1) Connect the front wheel speed sensor cable to the vehicle wiring harness connector (Fig. 35). Be sure speed sensor cable connector is fully seated and locked into vehicle wiring harness connector, then insert cable and grommet into hole in strut tower (Fig. 35).

CAUTION: When installing channel bracket, do not pinch the speed sensor cable under the channel bracket.

(2) Install the channel bracket and grommet retainer on the frame rail (Fig. 34).

(3) Install the 2 bolts (Fig. 34) attaching the channel bracket to frame. Tighten the 2 attaching bolts to a torque of 11 N·m (95 in. lbs.).

(4) Insert speed sensor cable grommets into intermediate bracket on strut (Fig. 37). Route cable from strut to steering knuckle on the rearward side of the stabilizer bar link.

(5) Install the wheel speed sensor to steering knuckle attaching bolt (Fig. 36). Tighten the speed sensor attaching bolt to a torque of 12 N·m (105 in. lbs.)

(6) Check the air gap between the face of the wheel speed sensor and the top surface of the tone-wheel. Air gap must be less then the maximum allowable tolerance of 1.2 mm (.047 in.).

(7) Install the wheel and tire assembly on vehicle.

(8) Road test vehicle to ensure proper operation of the base and ABS brake systems.

WHEEL SPEED SENSOR (REAR FWD)

REMOVE

(1) Raise vehicle on jack stands or centered on a frame contact type hoist. See Hoisting in the Lubrication and Maintenance section of this manual, for the required lifting procedure to be used for this vehicle.

(2) Remove the tire and wheel assembly from the vehicle.

REMOVAL AND INSTALLATION (Continued)

CAUTION: When unplugging speed sensor cable from vehicle wiring harness be careful not to damage pins on the electrical connectors. Also inspect connectors for any signs of previous damage.

(3) Remove grommet from floor pan of vehicle and unplug speed sensor cable connector from vehicle wiring harness (Fig. 38).

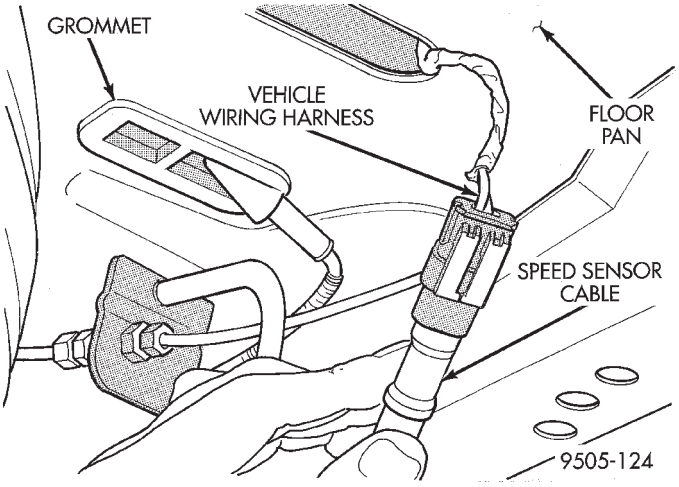

Fig. 38 Rear Speed Sensor Cable Connection To Vehicle Wiring Harness

CAUTION: When removing rear wheel speed sensor cable from routing clips on rear brake flex hose, be sure not to damage the routing clips. Routing clips are molded onto the hose and will require replacement of the brake flex hose if damaged during removal of the speed sensor cable.

(4) Carefully remove the speed sensor cable from the rear brake flex hose routing clips (Fig. 39).

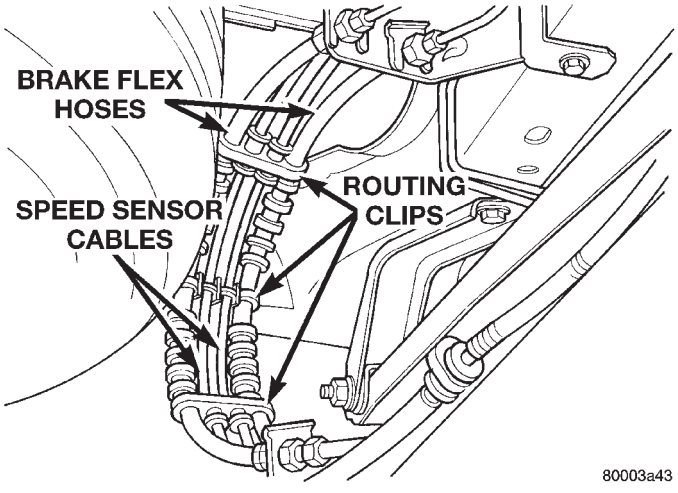

Fig. 39 Speed Sensor Cable Attachment To Brake Flex Hose

(5) If removing the right rear speed sensor cable, remove the speed sensor cable grommet from the axle flange, the brake tube clip and the routing clip from the track bar bracket on the axle (Fig. 40).

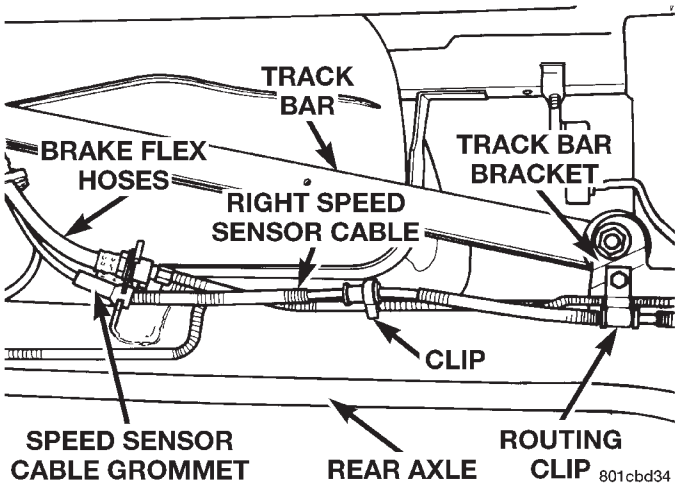

Fig. 40 Right Rear Speed Sensor Cable Routing

(6) Remove the 2 rear wheel speed sensor cable/brake tube routing clips (Fig. 41). Then un-clip the speed sensor cable from the routing clips on rear brake tube (Fig. 41).

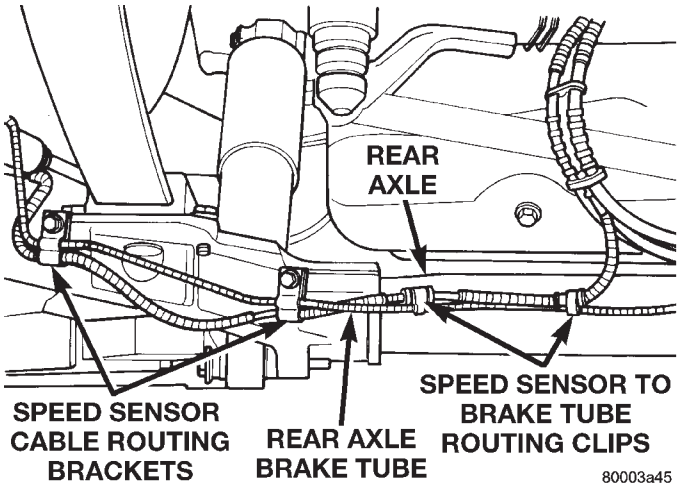

Fig. 41 Rear Speed Sensor Routing Brackets And Clips

CAUTION: If the speed sensor has seized, due to corrosion, do not use pliers on speed sensor head in a attempt to remove it. Use a hammer and a punch and tap edge of sensor, rocking the sensor from side to side until free.

(7) Remove the wheel speed sensor head to rear bearing attaching bolt (Fig. 42). If sensor head does not come loose, do not use pliers. Tap with screw driver and hammer.

(8) Remove the wheel speed sensor head from the rear bearing assembly.

(9) Remove speed sensor assembly from vehicle.

REMOVAL AND INSTALLATION (Continued)

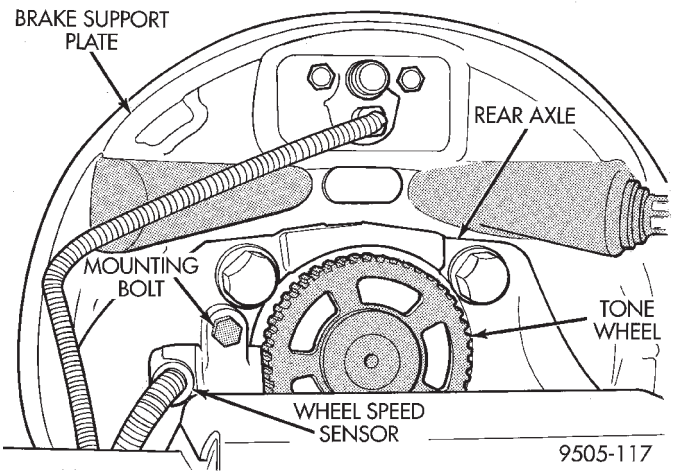

Fig. 42 Rear Wheel Speed Sensor Attaching Bolt

INSTALL

CAUTION: Proper installation of wheel speed sensor cables is critical to continued system operation. Be sure that cables are installed in retainers. Failure to install cables in retainers as shown in this section may result in contact with moving parts and/or over extension of cables, resulting in an open circuit.

(1) Install wheel speed sensor head. Note, the plastic anti rotation pin must be fully seated prior to installing the attaching bolt.

CAUTION: Prior to installing the speed sensor head attaching bolt, the plastic anti-rotation pin must be fully seated into the bearing flange.

(2) Install the wheel speed sensor head to bearing flange attaching bolt (Fig. 42). Tighten the attaching bolt to a torque 12 N·m (105 in. lbs.)

(3) Check the air gap between the face of the wheel speed sensor and the top surface of the tone-wheel. Air gap must be less then the maximum allowable tolerance of 1.2 mm (.047 in.).

(4) Install the 2 routing brackets attaching the speed sensor cable and brake tube to the rear axle (Fig. 41). **The rear wheel speed sensor cable should be routed under the rear brake tube (Fig. 41).**

CAUTION: When installing rear wheel speed sensor cable in the routing clips on rear brake flex hose, be sure not to damage the routing clips. Routing clips are molded onto the hose and will require replacement of the brake flex hose if damaged during installation of the wheel speed sensor cable.

(5) Install speed sensor cable into routing clips on rear brake flex hose (Fig. 41).

(6) If installing a right rear speed sensor cable, install the speed sensor cable grommet on the axle brake flex hose bracket (Fig. 40).

CAUTION: The wheel speed sensor cable connectors for the left and right rear wheel speed sensors are keyed differently. Therefore, when connecting a wheel speed sensor cable to the vehicle wiring harness, do not force the connectors together. If the connectors are forced together, damage to the connectors will occur.

(7) Plug speed sensor cable connector into vehicle wiring harness (Fig. 38). **Be sure speed sensor cable connector is fully seated and locked into vehicle wiring harness connector.**

(8) Install the speed sensor cable grommet into the body, being sure the grommet is fully seated into the body hole.

(9) Install the tire and wheel assembly on vehicle.

(10) Road test vehicle to ensure proper operation of the base and ABS braking systems.

WHEEL SPEED SENSOR (REAR AWD)

REMOVE

(1) Raise vehicle on jack stands or centered on a frame contact type hoist. See Hoisting in the Lubrication and Maintenance section of this manual, for the required lifting procedure to be used for this vehicle.

(2) Remove the tire and wheel assembly from the vehicle.

CAUTION: When unplugging speed sensor cable from vehicle wiring harness be careful not to damage pins on the electrical connectors. Also inspect connectors for any signs of previous damage.

(3) Remove grommet from floor pan of vehicle and unplug speed sensor cable connector from vehicle wiring harness (Fig. 43).

CAUTION: When removing rear wheel speed sensor cable from routing clips on rear brake flex hose, be sure not to damage the routing clips. Routing clips are molded onto the hose and will require replacement of the brake flex hose if damaged during removal of the speed sensor cable.

REMOVAL AND INSTALLATION (Continued)

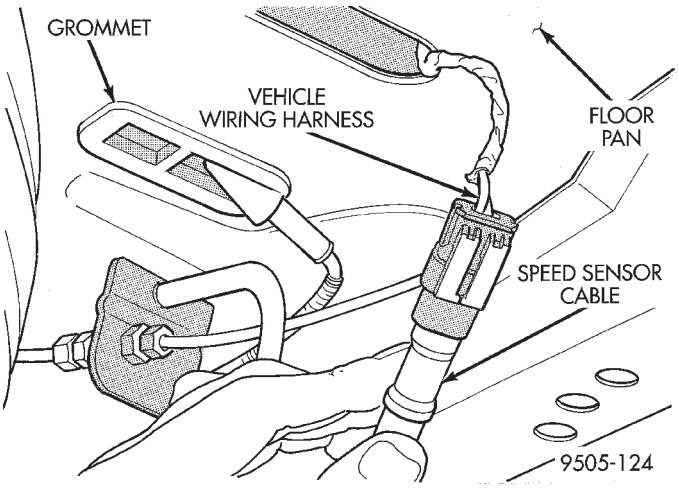

Fig. 43 Speed Sensor Cable Connection To Vehicle Wiring Harness

(4) Carefully remove the speed sensor cable from the rear brake flex hose routing clips (Fig. 44).

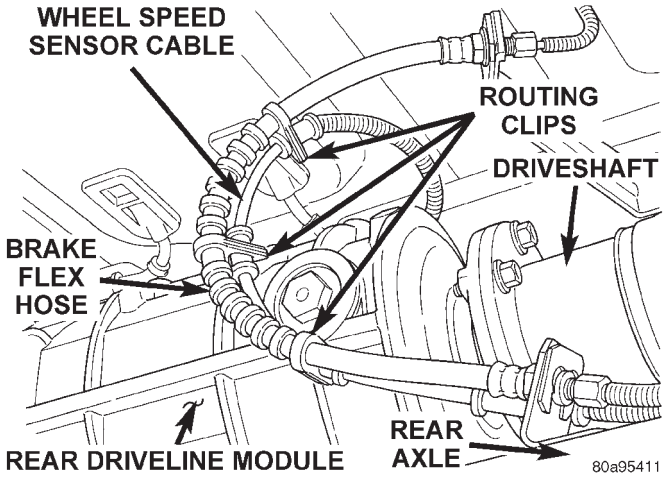

Fig. 44 Speed Sensor Cable Attachment To Brake Flex Hose

(5) Remove the rear wheel speed sensor cable/ brake tube routing clips (Fig. 45). Then un-clip the speed sensor cable from the routing clips on rear brake tube (Fig. 45).

CAUTION: If the speed sensor has seized, due to corrosion, do not use pliers on speed sensor head in a attempt to remove it. Use a hammer and a punch and tap edge of sensor, rocking the sensor from side to side until free.

(6) Remove the wheel speed sensor attaching bolt (Fig. 46). If sensor head does not come loose, do not use pliers on the sensor head to loosen. Tap sensor head from side to side to loosen.

(7) Remove the wheel speed sensor from the rear bearing assembly.

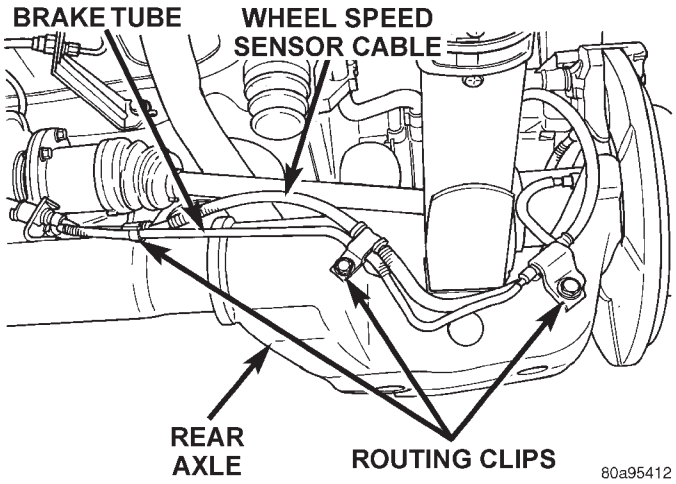

Fig. 45 Rear Speed Sensor Routing Brackets And Clips

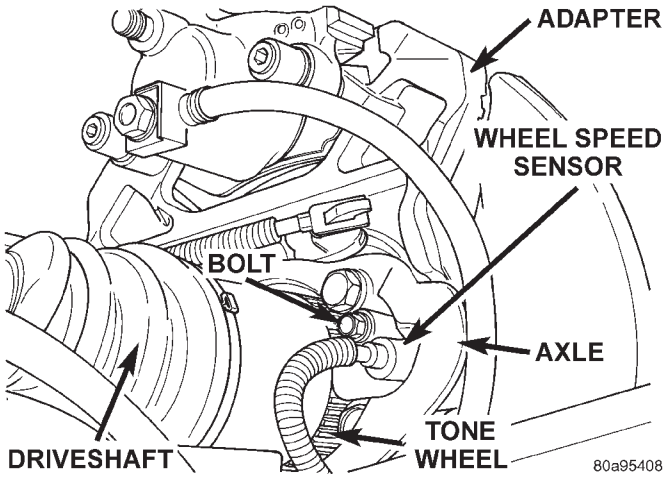

Fig. 46 Speed Sensor Attaching Bolt

(8) Remove the speed sensor assembly from the vehicle.

INSTALL

CAUTION: Proper installation of wheel speed sensor cables is critical to continued system operation. Be sure that cables are installed in retainers. Failure to install cables in retainers as shown in this section may result in contact with moving parts and/or over extension of cables, resulting in an open circuit.

(1) Install wheel speed sensor head. Note, the plastic anti rotation pin must be fully seated prior to installing the attaching bolt.

CAUTION: Prior to installing the speed sensor head attaching bolt, the plastic anti-rotation pin must be fully seated into the bearing flange.

REMOVAL AND INSTALLATION (Continued)

(2) Install the wheel speed sensor head attaching bolt (Fig. 46). Tighten the attaching bolt to a torque 12 N·m (105 in. lbs.)

(3) Check the air gap between the face of the wheel speed sensor and the top surface of the tone-wheel. Air gap must be less then the maximum allowable tolerance of 1.2 mm (.047 in.).

(4) Install the routing brackets attaching the speed sensor cable and brake tube to the rear axle (Fig. 45). **The rear wheel speed sensor cable should be routed under the rear brake tube (Fig. 45).**

CAUTION: When installing rear wheel speed sensor cable in the routing clips on rear brake flex hose, be sure not to damage the routing clips. Routing clips are molded onto the hose and will require replacement of the brake flex hose if damaged during installation of the wheel speed sensor cable.

(5) Install speed sensor cable into routing clips on rear brake flex hose (Fig. 44).

CAUTION: The wheel speed sensor cable connectors for the left and right rear wheel speed sensors are keyed differently. Therefore, when connecting a wheel speed sensor cable to the vehicle wiring harness, do not force the connectors together. If the connectors are forced together, damage to the connectors will occur.

(6) Plug speed sensor cable connector into vehicle wiring harness (Fig. 43). **Be sure speed sensor cable connector is fully seated and locked into vehicle wiring harness connector.**

(7) Install the speed sensor cable grommet into the body, being sure the grommet is fully seated into the body hole.

(8) Install the tire and wheel assembly on vehicle.

(9) Road test vehicle to ensure proper operation of the base and ABS braking systems.

TONE WHEEL (REAR FWD)

REMOVE

(1) Raise vehicle on jackstands or centered on a frame contact type hoist. See Hoisting in the Lubrication and Maintenance section of this service manual for required lifting procedure.

(2) Remove the wheel and tire assembly.

(3) Remove rear brake drum from the hub/bearing assembly.

(4) Remove the rear wheel speed sensor from the rear hub/bearing flange (Fig. 47). This will prevent damage to the speed sensor during removal and installation of the hub/bearing assembly.

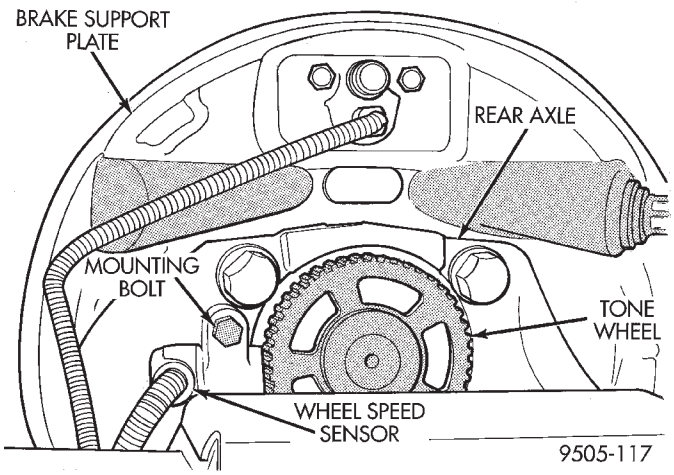

Fig. 47 Rear Wheel Speed Sensor

(5) Remove the 4 bolts (Fig. 48) attaching the hub/bearing assembly to the flange of the rear axle.

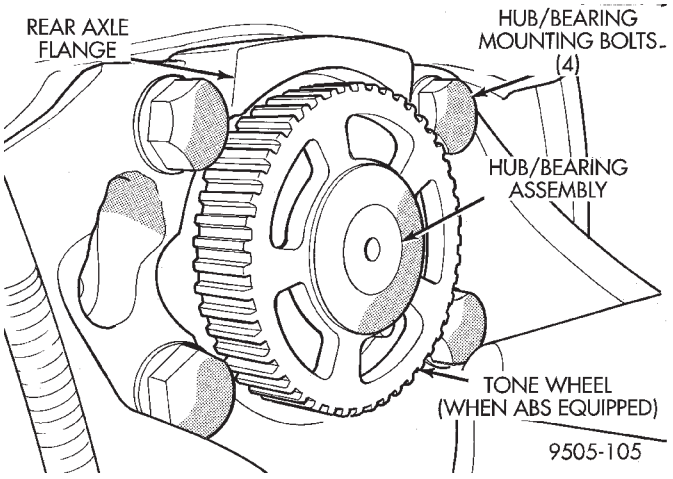

Fig. 48 Rear Hub/Bearing Mounting Bolts

(6) Remove the hub/bearing assembly from the rear axle and brake support plate (Fig. 49).

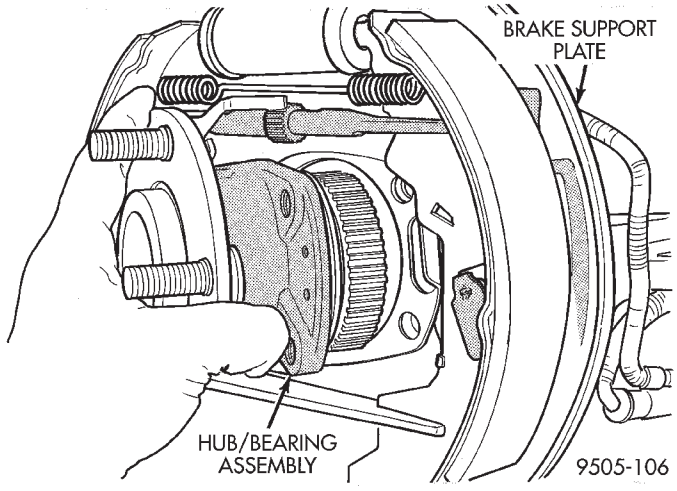

Fig. 49 Removing Rear Hub/Bearing From Axle

REMOVAL AND INSTALLATION (Continued)

(7) Install wheel lug nuts on 3 of the wheel mounting studs to protect the stud threads from damage by the vise jaws. Mount the hub/bearing assembly in a vise (Fig. 50). Using Puller, Special Tool C-4693 installed as shown in (Fig. 50) remove the tone wheel from the hub/bearing assembly.

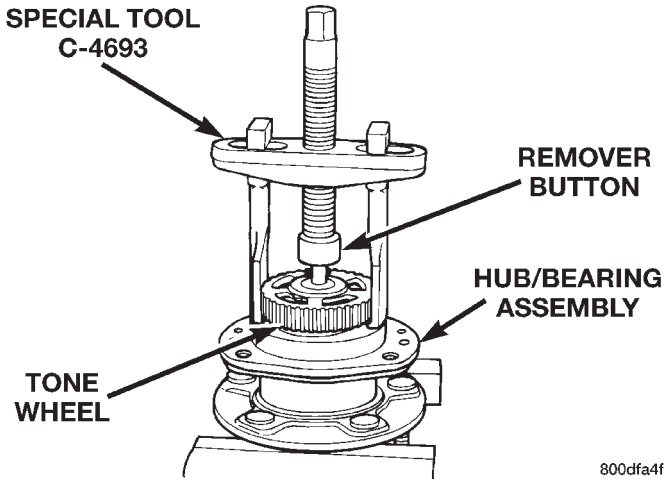

Fig. 50 Tone Wheel Removal From Hub/Bearing Assembly

INSTALL

(1) Place hub/bearing assembly in an arbor press supported by Receiver, Special Tool, 6062A–3 (Fig. 51). Position Driver, Special Tool 6908–1 with undercut side facing up (Fig. 51) on top of the tone wheel.

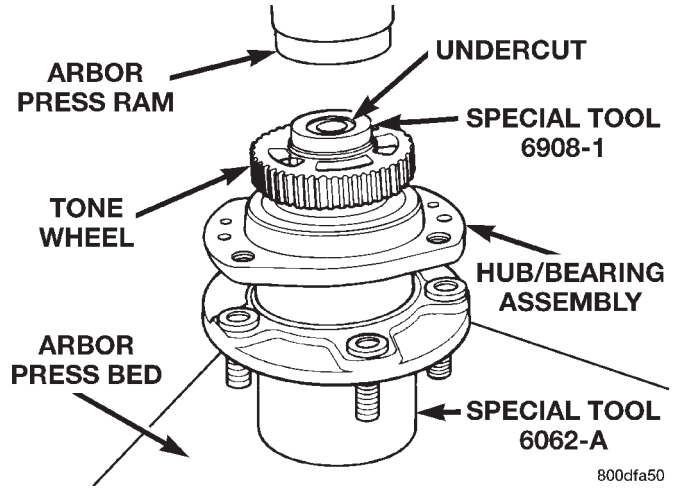

Fig. 51 Installing Tone Wheel On Hub/Bearing Assembly

(2) Press the tone wheel onto the hub/bearing assembly until it is flush with the end of hub shaft (Fig. 52).

(3) Install the 4 hub/bearing to axle flange mounting bolts into the 4 mounting holes in the flange of the rear axle.

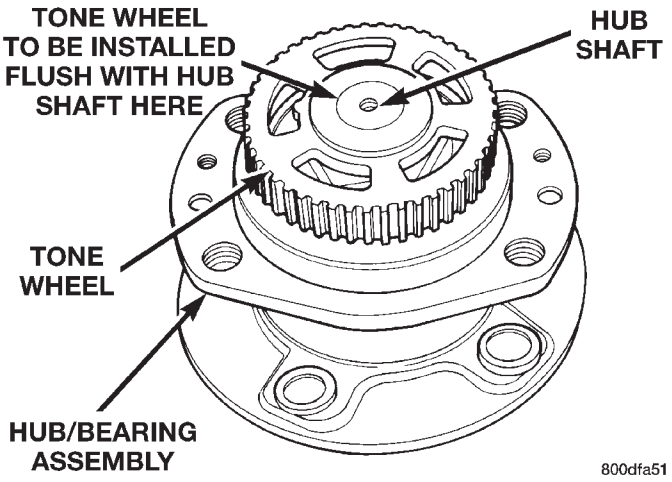

Fig. 52 Correctly Installed Tone Wheel

(4) Install the rear brake support plate on the 4 mounting bolts installed in the flange of the rear axle.

(5) Align the rear hub/bearing assembly with the 4 mounting bolts and start mounting bolts into hub/bearing assembly. Tighten the 4 bolts in a criss-cross pattern until the hub/bearing and brake support plate is fully and squarely seated onto flange of rear axle.

(6) Tighten the 4 hub/bearing mounting bolts (Fig. 48) to a torque of 129 N·m (95 ft. lbs.)

(7) Install the rear wheel speed sensor on the rear hub/bearing flange (Fig. 47). Install the speed sensor attaching bolt and tighten to a torque of 12 N·m (105 in. lbs.).

(8) Check the air gap between the face of the wheel speed sensor and the top surface of the tonewheel. Air gap must be less then the maximum allowable tolerance of 1.2 mm (.047 in.).

(9) Install the brake drum onto the rear hub/bearing assembly.

(10) Install rear wheel and tire assembly, tighten wheel stud nuts to 129 N·m (95 ft. lbs.).

(11) Adjust the rear brakes, (See Adjusting Service Brakes) in Service Adjustments section in this group of the service manual.

TONE WHEEL (REAR AWD)

The rear tone wheel on all wheel drive applications is an integral part of each rear axle outer C/V joint. If the rear tone wheel on an all wheel drive vehicle requires replacement it can not be replace as a separate component of the rear axle. Tone wheel replacement will require the replacement of the rear axle. Refer to Differential And Driveline in this service manual for the rear axle replacement procedure.

SPECIFICATIONS

SPEED SENSOR TONE WHEEL RUNOUT

The total indicator runout allowed for both the front and rear tone wheel measured using a dial indicator is 0.15 mm (.006 in.).

WHEEL SPEED SENSOR TO TONE WHEEL CLEARANCE

FRONT WHEEL

Minimum Clearance .35mm (.014 in.)
Maxamum Clearance 1.2 mm (.047 in.)

REAR WHEEL

Minimum Clearance .40mm (.016 in.)
Maxamum Clearance 1.2 mm (.047 in.)

BRAKE FASTENER TORQUE SPECIFICATIONS

DESCRIPTION	TORQUE
BRAKE TUBES:	
Tube Nuts To Fittings And Components	17 N·m (145 in. lbs.)
BRAKE HOSE:	
To Caliper Banjo Bolt	48 N·m (35 ft. lbs.)
Intermediate Bracket	12 N·m (105 in. lbs.)
MASTER CYLINDER:	
To Vacuum Booster Mounting Nut	25 N·m (225 in. lbs.)
FIXED PROPORTIONING VALVE:	
To Frame Rail Attaching Bolts	14 N·m (125 in. lbs.)
HEIGHT SENSING PROPORTIONING VALVE:	
To Mounting Bracket Attaching Bolts	23 N·m (200 in. lbs.)
Actuator Assembly Adjustment Nut	5 N·m (45 in. lbs.)
Mounting Bracket To Frame Rail Bolts	17 N·m (150 in. lbs.)
JUNCTION BLOCK (NON-ABS BRAKES)	
To Suspension Cradle Mounting Bolt	28 N·m (250 in. lbs.)
VACUUM BOOSTER:	
To Dash Panel Mounting Nuts	28 N·m (250 in. lbs.)
REAR WHEEL CYLINDER:	
To Support Plate Mounting Bolts	8 N·m (75 in. lbs.)
Bleeder Screw	10 N·m (80 in. lbs.)
BRAKE SUPPORT PLATE:	
To Rear Axle Mounting Bolts	130 N·m (95 ft. lbs.)
DISC BRAKE CALIPER:	
Guide Pin Bolts	41 N·m (30 ft. lbs.)
Bleeder Screw	15 N·m (125 in. lbs.)
ABS HYDRAULIC CONTROL UNIT:	
Mounting Bracket To Suspension Cradle Bolts	28 N·m (250 in. lbs.)
To Mounting Bracket Isolator Attaching Bolts	11 N·m (97 in. lbs.)
CAB To HCU Mounting Screws	2 N·m (17 in. lbs.)
WHEEL SPEED SENSOR:	
To Axle Or Steering Knuckle Mounting Bolt	12 N·m (105 in. lbs.)
PARKING BRAKE:	
Pedal Assembly Mounting Bolts	28 N·m (250 in. lbs.)
REAR HUB AND BEARING:	
To Axle Mounting Bolts	129 N·m (95 ft. lbs.)
WHEEL:	
Stud Lug Nut	115–156 N·m (84-115 ft. lbs.)