

BRAKES

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TEVES MARK IV-G ANTILOCK BRAKE SYSTEM AND ANTILOCK BRAKE SYSTEM WITH			

GENERAL INFORMATION

GENERAL INFORMATION

BASE BRAKE SYSTEM COMPONENTS

The vehicle is available with 3 different types of brake systems. The standard brake system consists of front disc brakes and rear drum brakes and is not available with antilock brakes. The second optional brake system is 4 wheel disc brakes with antilock brakes. The third optional brake system is 4 wheel disc brakes with traction control. The traction control system is dependent on the antilock brake system and is not available without antilock brakes.

Standard brake equipment consists of:

- Double pin floating caliper front disc brakes.
- Rear automatic adjusting drum brakes.
- Proportioning valve on non antilock brakes.
- Master cylinder.
- Vacuum power booster.
- Double pin floating caliper rear disc brakes are

standard on vehicles with antilock brakes.

The antilock braking system, uses the standard power brake system caliper assemblies, braking discs, pedal assembly, brake lines and hoses. The unique parts of the antilock braking system consists of the following components. Unique proportioning valves, wheel speed sensors, tone wheels, electronic control unit, hydraulic control unit, master cylinder and power booster. These components will be described in detail in the antilock brake section in this group of the service manual.

The front disc brake shoes have non-asbestos semi-metallic linings.

The hydraulic brake system (Fig. 1), (Fig. 2) and (Fig. 3) is diagonally split on both the Non-ABS and ABS braking system. With the left front and right rear brakes on one hydraulic system and the right front and left rear on the other.

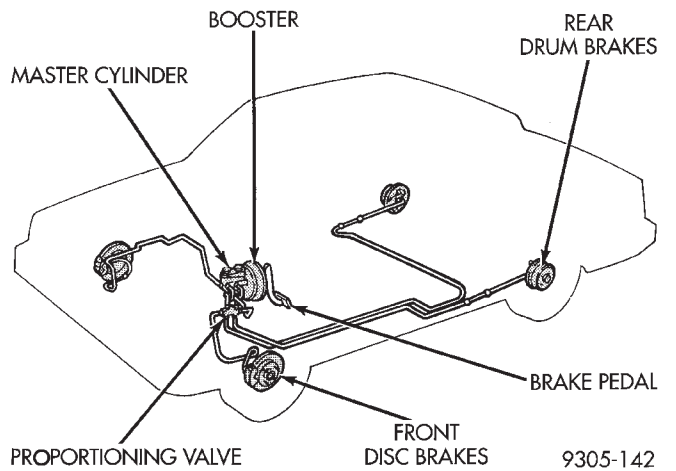


Fig. 1 Diagonally Split Braking System (TypicalNon-ABS System)

All available brake systems on this vehicle (except rear drum brakes) use the same type of brake line fittings and tubing flares. The brake line fittings used are double wall ISO style tubing flares and fittings at all tubing joint locations. See (Fig. 2) and (Fig. 3) for specific joint locations and tube fitting size.

Vehicles that are equipped with rear drum brakes, use conventional double wall inverted style flares at the brake flex hose to wheel cylinder connections

GENERAL INFORMATION (Continued)

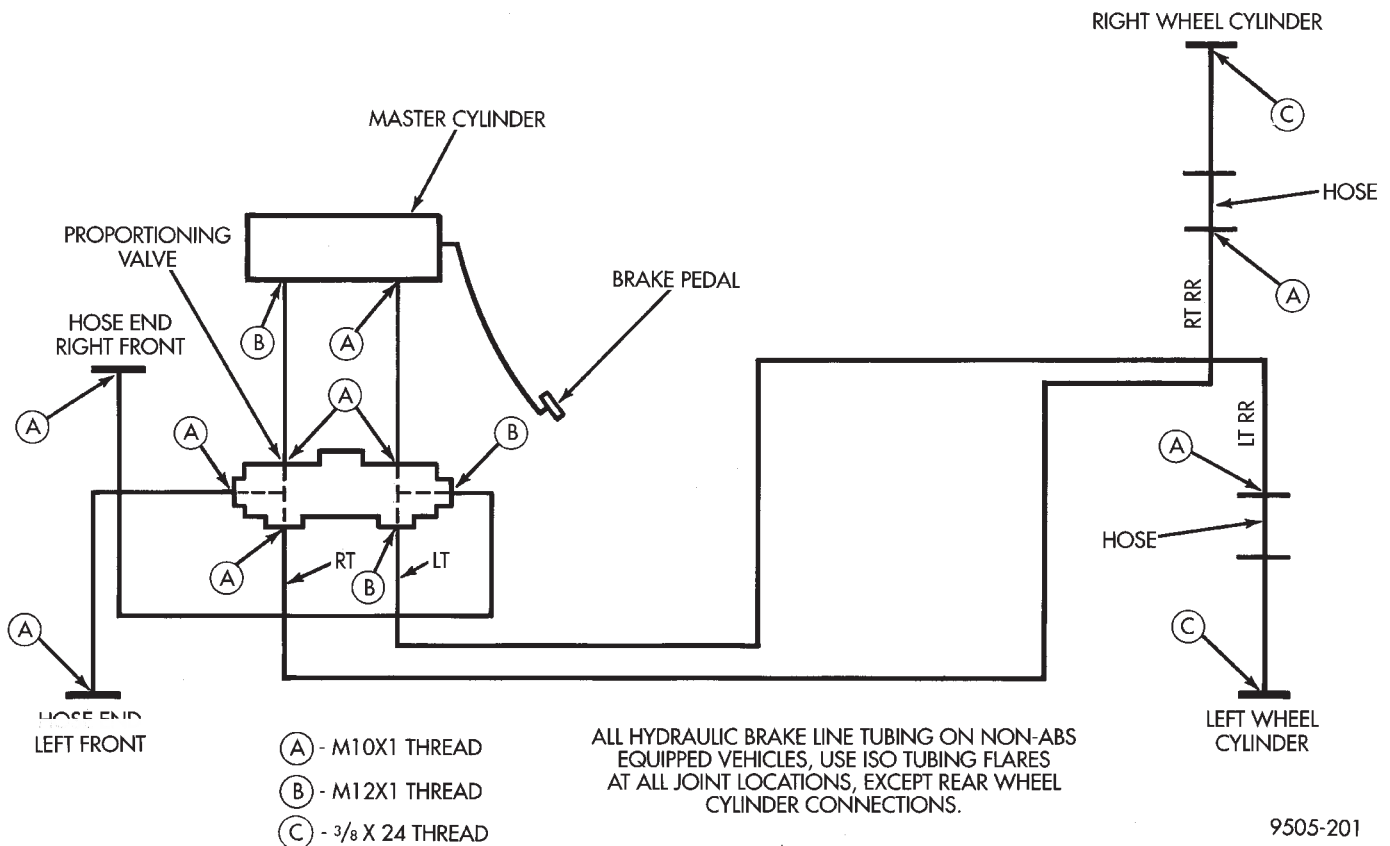


Fig. 2 Proper Tube Nut Thread Size And Tube Routing (Non-ABS Equipped)

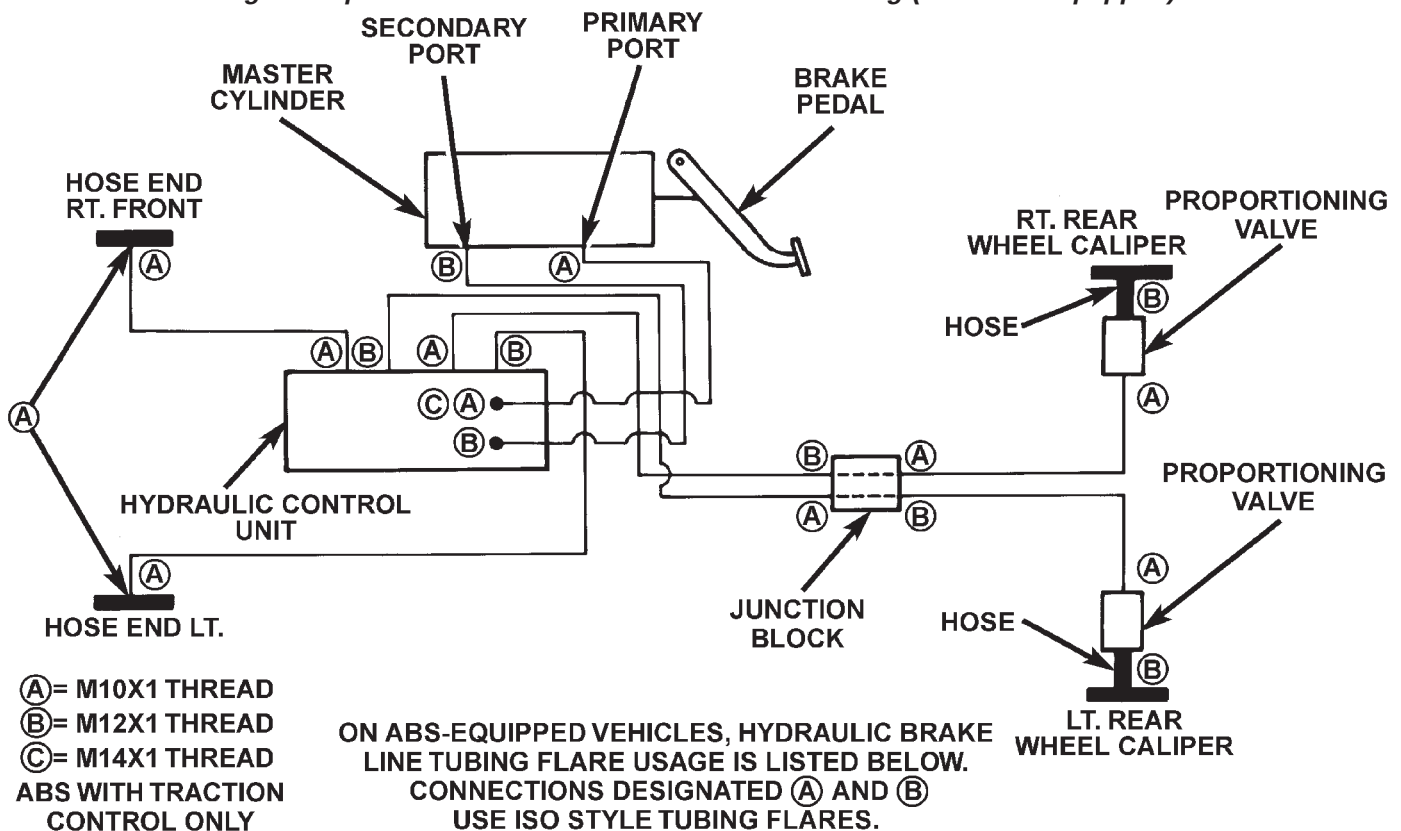
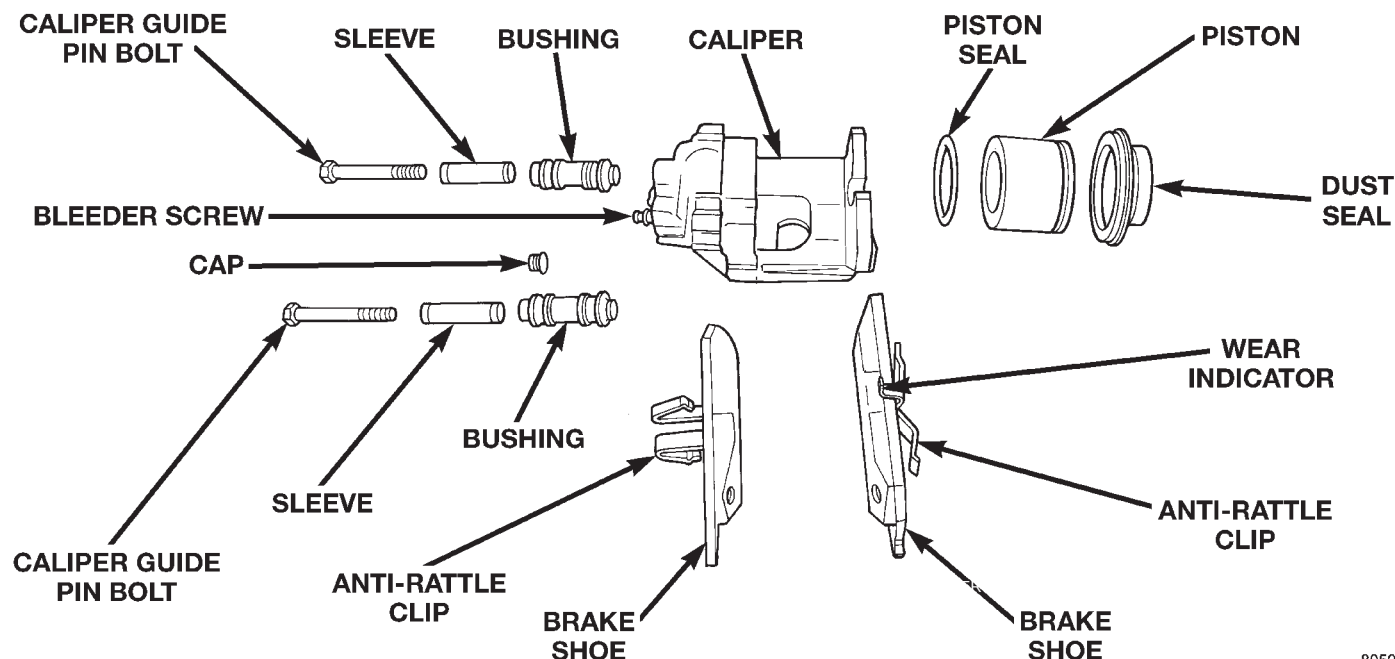


Fig. 3 Proper Nut Thread Size And Tube Routing (Teves Mark IV-G ABS)

BASE BRAKE SYSTEM

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Fig. 1 Front Disc Brake Caliper Assembly

DESCRIPTION AND OPERATION

FRONT DISC BRAKES

The front disc brake assembly used on this vehicle consists of the following components.

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

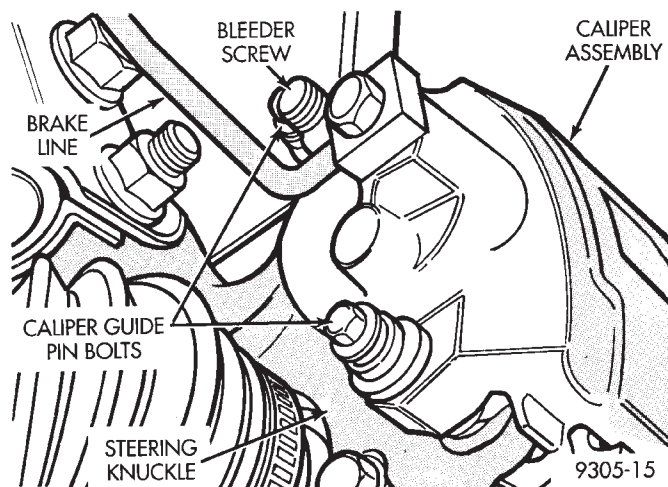
The floating double pin single piston Kelsey-Hayes Family Calipers, (Fig. 1) used on this vehicle are mounted directly to the steering knuckles and use no adapter. The caliper is mounted to the steering knuckle using bushings, sleeves and 2 through bolts which thread directly into the steering knuckle (Fig. 2).

Two machined abutments on the steering knuckle, (Fig. 2) 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 pull the piston back into the bore of the caliper when the brake pedal is released. This maintains the proper brake shoe to rotor clearance.

Vehicles equipped with the Kelsey-Hayes double pin family caliper, have anti-rattle clips attached to the inner and outer brake shoe and lining assemblies (Fig. 1).

All of the braking force is taken up directly by the steering knuckle of the vehicle.

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



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Fig. 2 Disc Brake Caliper Mounting

WARNING: THE PISTONS THAT ARE USED IN THE FRONT AND REAR DISC BRAKE CALIPER ASSEMBLIES ARE UNIQUE TO THE CALIPER THEY ARE USED IN. THE DIMENSIONS OF THESE PISTONS ARE DIFFERENT, DO NOT INTERCHANGE THE CALIPER PISTONS. IMPROPER USE COULD CAUSE A COMPLETE FAILURE OF THE BRAKE SYSTEM.

The front disc brake caliper 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. This provides a hydraulic seal between the piston and the cylinder wall (Fig. 3).

DESCRIPTION AND OPERATION (Continued)

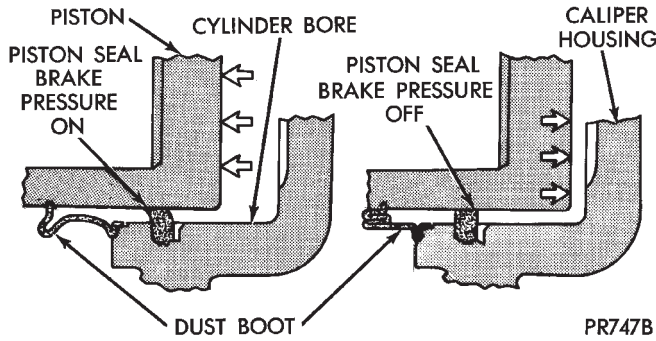


Fig. 3 Piston Seal Function for Automatic Adjustment Of Front Brakes

A molded rubber dust boot is installed in a groove in the cylinder bore and the piston, keeping contamination from the cylinder wall and the piston (Fig. 3).

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

All these vehicles, are equipped with an audible wear indicator (Fig. 1) on the outboard pad of the front disc brake assemblies. This indicator when emitting a sound signals that brake lining may need inspection and/or replacement.

REAR DISC BRAKES

The rear disc brakes are similar to front disc brakes, however, there are several distinctive features that require different service procedures. This

single piston, floating caliper rear disc brake assembly includes a hub and bearing assembly, adapter, braking disc (rotor), caliper, shoes and linings. The parking brake system on all 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 assembly that has a 34 mm (1.34 in.) piston and uses a 14 inch solid non-vented rotor.

The caliper assembly on all applications float on rubber bushings using internal metal sleeves which are attached to the adapter using threaded guide pin bolts.

The adapter and disc shield are mounted to the rear suspension knuckles of vehicle. The adapter is used to mount the brake shoes and actuating cables for the parking brake system. The adapter also mounts the rear caliper assembly to the vehicle. The adapter has two machined abutments which are used to position and align the caliper and brake shoes for movement inboard and outboard (Fig. 4).

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.

PARKING BRAKE

The parking brake mechanism on vehicles equipped with rear disc brakes, consists of a small duo-servo

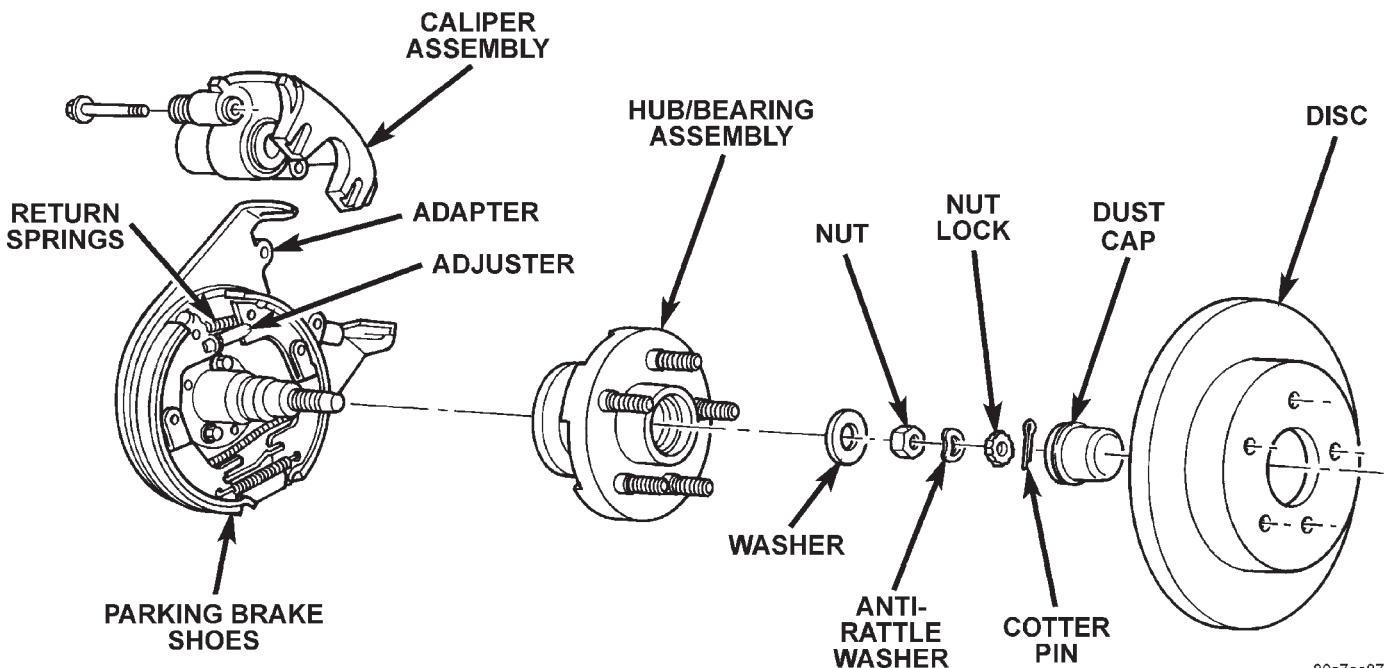


Fig. 4 Rear Disc Brake Assembly

DESCRIPTION AND OPERATION (Continued)

brake which is mounted to the disc brake caliper adapter. The hat (center) section (Fig. 5) of the rear rotor serves as the braking surface (drum) for the parking brakes.

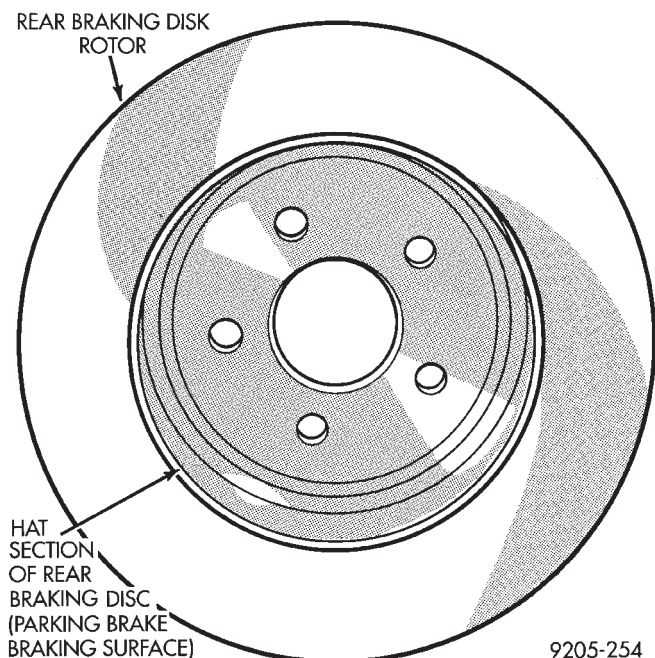


Fig. 5 Drum In Hat Braking Disc

On rear drum brake applications, the rear wheel service brakes also act as parking brakes. The rear drum brake shoes are mechanically operated by an internal lever and strut connected to a flexible steel cable. The wheel brake cables are joined at an equalizer which is attached to the front cable leading to the foot lever.

PROPORTIONING VALVES

NON-ANTILOCK BRAKES (EXCLUDING NON-ABS TLEV)

NOTE: A Vehicle that is not equipped with antilock brakes, but is equipped as a Transitional Low Emission Vehicle (TLEV) having two front catalytic converters, does not use the non antilock brake proportioning/combination valve (Fig. 6) and (Fig. 7). The proportioning valves on a TLEV are in-line with the rear brake chassis tubes (Fig. 8).

Vehicles not equipped with antilock brakes, (except TLEV) have a hydraulic system proportioning/combination valve in the brake hydraulic system. The valve is attached to the frame rail below the master cylinder (Fig. 6).

The proportioning valve (Fig. 7) balances the front to rear braking by controlling at a given ratio, the increase in rear system hydraulic pressure above a preset level. Under light pedal application, the valve allows full hydraulic pressure to the rear brakes.

There is only one valve assembly in each vehicle which is not equipped with antilock brakes. During

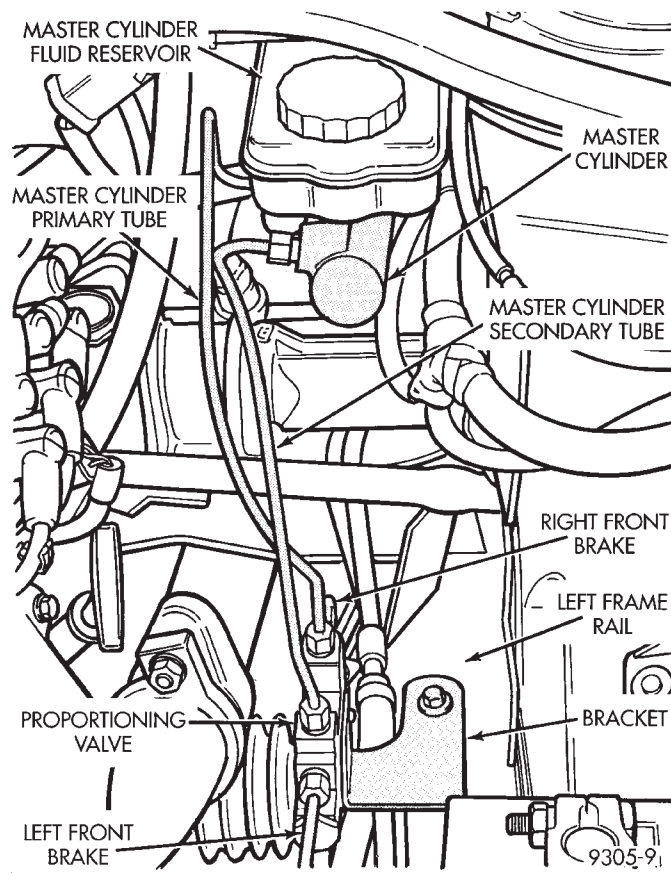


Fig. 6 Proportioning Valve Location (Non-ABS Without TLEV)

any service procedures identify valve assemblies by part number as well as split point (PSI) and slope.

The hydraulic brake system, on non-ABS vehicles, is split diagonally. The left front and right rear brakes are part of one system. The right front and left rear are part of another. Both systems are routed through, but hydraulically separated by the proportioning valve.

However, since the brake systems are split diagonally the vehicle will retain 50% of its stopping capability in the event of a failure in either half.

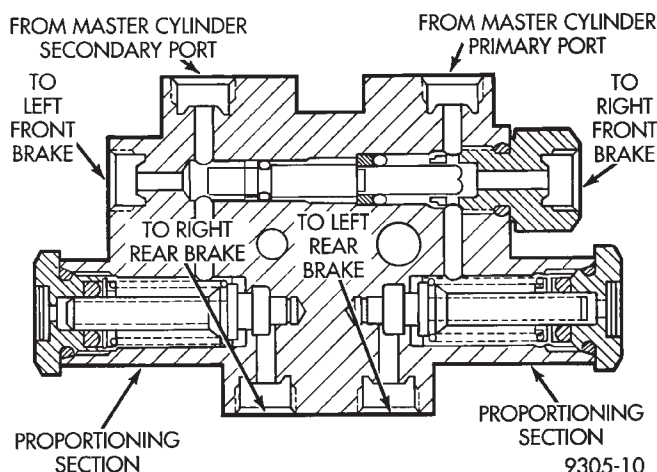


Fig. 7 Non-ABS Proportioning Valve Assembly

DESCRIPTION AND OPERATION (Continued)

The proportioning valve section operates by transmitting full input pressure to the rear brakes up to a certain point. This is called the split point. Beyond this point it reduces the amount of pressure increase to the rear brakes according to a certain ratio.

On light pedal applications equal brake pressure will be transmitted to the front and rear brakes. On heavier pedal applications the pressure transmitted to the rear will be lower than the front brakes. This will prevent premature rear wheel lock-up and skid. If hydraulic pressure is lost in one half of the diagonally split system, the operation of the proportioning valve in the remaining half is not effected.

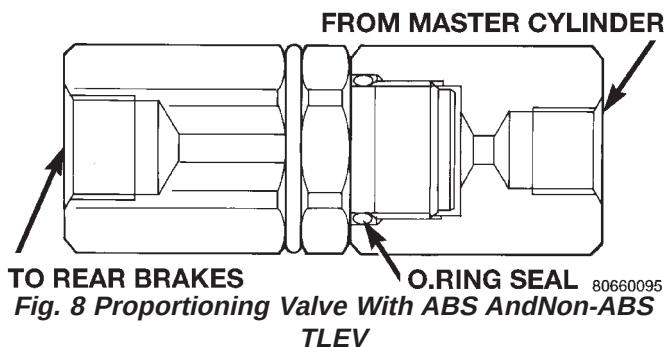
ANTILOCK BRAKES (INCLUDING NON-ABS TLEV)

NOTE: A Vehicle not equipped with antilock brakes, but equipped as a Transitional Low Emission Vehicle (TLEV), having two front catalytic converters, uses the same type proportioning valve (Fig. 8) and proportioning valve location as an antilock equipped vehicle.

Two in line proportioning valves (Fig. 8) are used on the Teves Mark IV-G ABS brake system, one for each rear brake hydraulic circuit.

On light pedal applications equal brake pressure will be transmitted to the front and rear brakes. On heavier pedal applications the pressure transmitted to the rear will be lower than the front brakes. This will prevent premature rear wheel skid. If hydraulic pressure is lost in one half of the diagonally split system, the operation of the proportioning valve in the remaining half is not effected.

The in line proportioning valves are located in the rear of the vehicle-at the rear brake flex hose. The proportioning valves are not serviceable but are a replaceable component of the rear brake tube.



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 vehicle suspension.

MASTER CYLINDER

This vehicle has 2 functionally different master cylinders depending on the type of brake system the vehicle is equipped with. For standard brake and ABS brake applications, a Bendix compensating port master cylinder is used. For traction control/ABS applications, a Teves center valve master cylinder is used.

The only serviceable components on both master cylinder assemblies (Fig. 9) are the reservoir and sealing grommets. Neither of the master cylinder assemblies can be serviced, and must be replaced as assemblies if found to be defective.

The reservoir is indexed to prevent installation in the wrong direction. The cap diaphragm is slit to allow atmospheric pressure to equalize on both sides of the diaphragm.

The primary and secondary outlet tubes of the master cylinder are connected to the proportioning valve on non-ABS equipped vehicles. The front port of the junction block connects to the secondary outlet tube and supplies the right rear and left front brakes. The rear port of the junction block connects to the primary outlet tube and supplies the right front and left rear brakes.

On vehicles equipped with ABS or ABS with Traction Control, the master cylinder primary outlet port connects to the inboard inlet port of the HCU and the secondary outlet port to the outboard inlet port of the HCU.

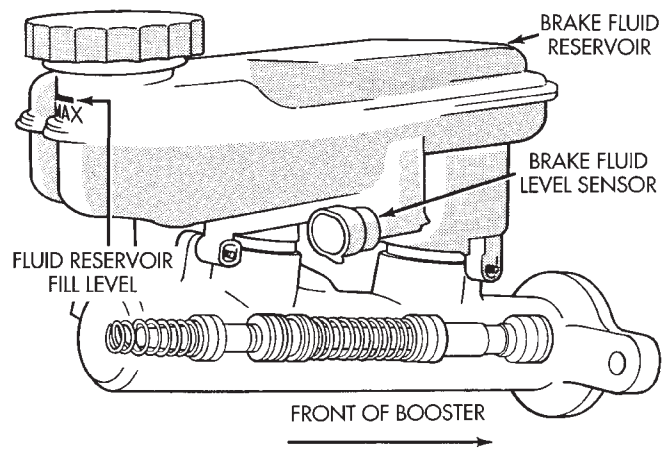


Fig. 9 Master Cylinder (Cutaway View)

POWER BRAKE VACUUM BOOSTER

The purpose of the vacuum operated power brake booster is to reduce the amount of force applied to the brake pedal by the driver's foot. To obtain the required hydraulic pressure in the brake system to stop the vehicle.

DESCRIPTION AND OPERATION (Continued)

For the 1996 M.Y., this vehicle has two functionally different power brake vacuum boosters. For standard brake applications and ABS applications a Bendix vacuum booster is used. For traction control/ABS applications, a Teves booster is used.

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 manufactured it.

NOTE: The power brake booster assembly is not a repairable part and must be replaced as a complete unit if it is found to be faulty in any way. The power booster vacuum check valve is not repairable but can be replaced as an assembly.

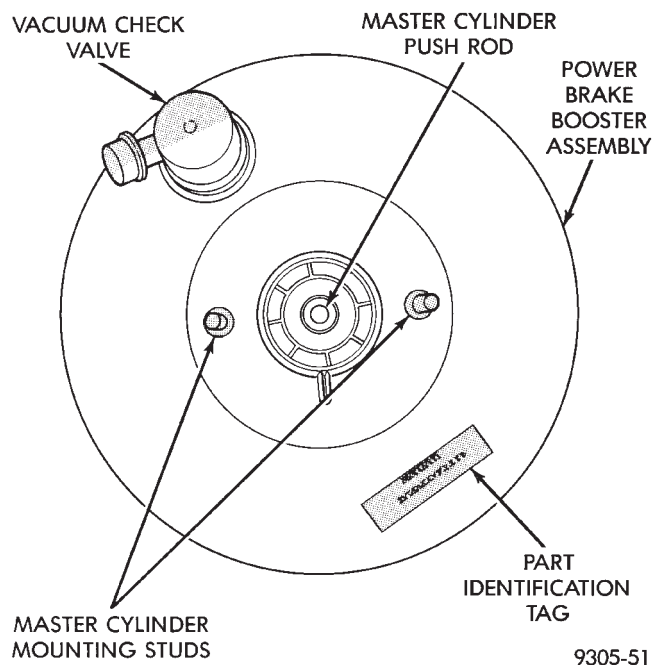


Fig. 10 Power Brake Booster Identification

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. 11).

As the brake pedal is depressed, the power booster's input rod moves forward. This opens and closes valves in the power booster, creating a vacuum on one side of a diaphragm and allowing atmospheric pressure to enter on the other. This difference in pressure forces the output rod of the power booster 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.

Different systems and engine combinations require different vacuum hose routings.

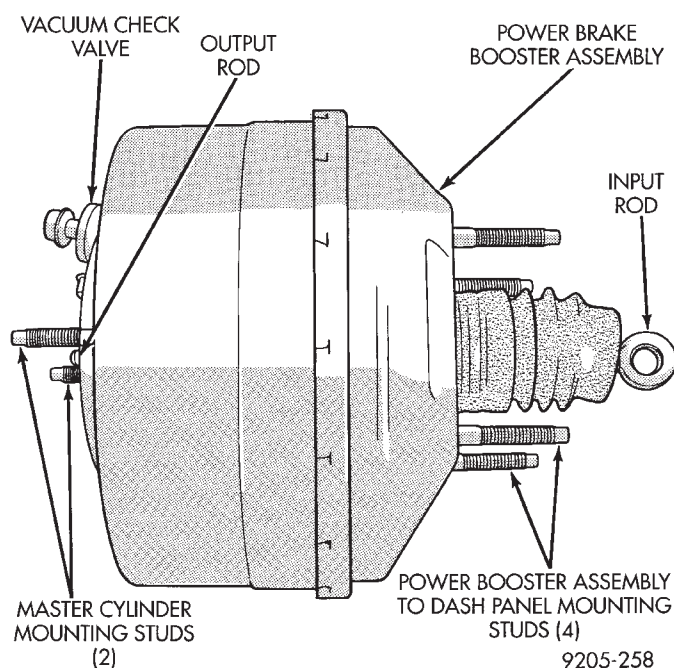


Fig. 11 Power Brake Booster Assembly

The power brake booster assembly mounts on the engine side of the dash panel. It is externally connected to the brake system by an input push rod to the brake pedal. A vacuum line connects the power booster to the intake manifold. The master cylinder is bolted to the front of the power brake booster assembly.

RED BRAKE WARNING LAMP

The red Brake warning lamp is located in the instrument 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 when the ignition switch is placed in the crank position. Problems with this system will generally be of the type where the warning lamp fails to turn on when it should, or remains on when it should not.

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 in the crank position.

As the fluid drops below the minimum level, the fluid level sensor closes the brake warning light circuit.

MASTER CYLINDER RESERVOIR FLUID LEVEL SENSOR

The purpose of the brake fluid level sensor is to provide the driver with early warning that brake fluid in the master cylinder is below a normal level.

DESCRIPTION AND OPERATION (Continued)

The brake fluid level sensor used on this vehicle's master cylinder is internal to the master cylinder fluid reservoir (Fig. 12). The vehicle wiring harness has a connector which plugs directly into the brake fluid reservoir.

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

The brake fluid level sensor in the master cylinder brake fluid reservoir is not a repairable item. If the level sensor is found to be defective the brake fluid reservoir must be replaced.

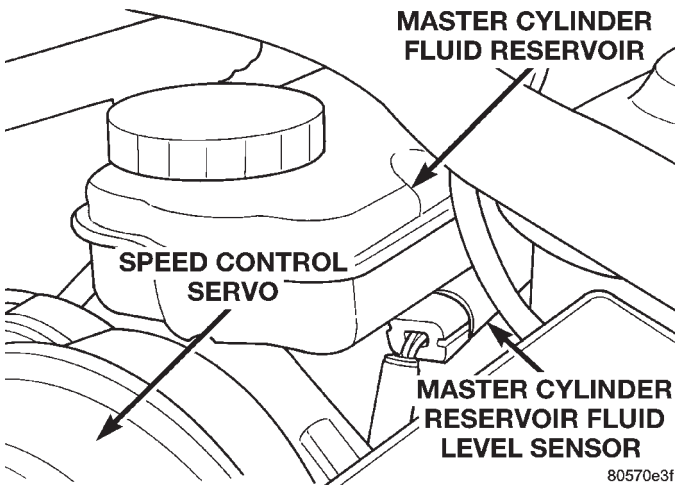


Fig. 12 Master Cylinder Reservoir Level Sensor

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.

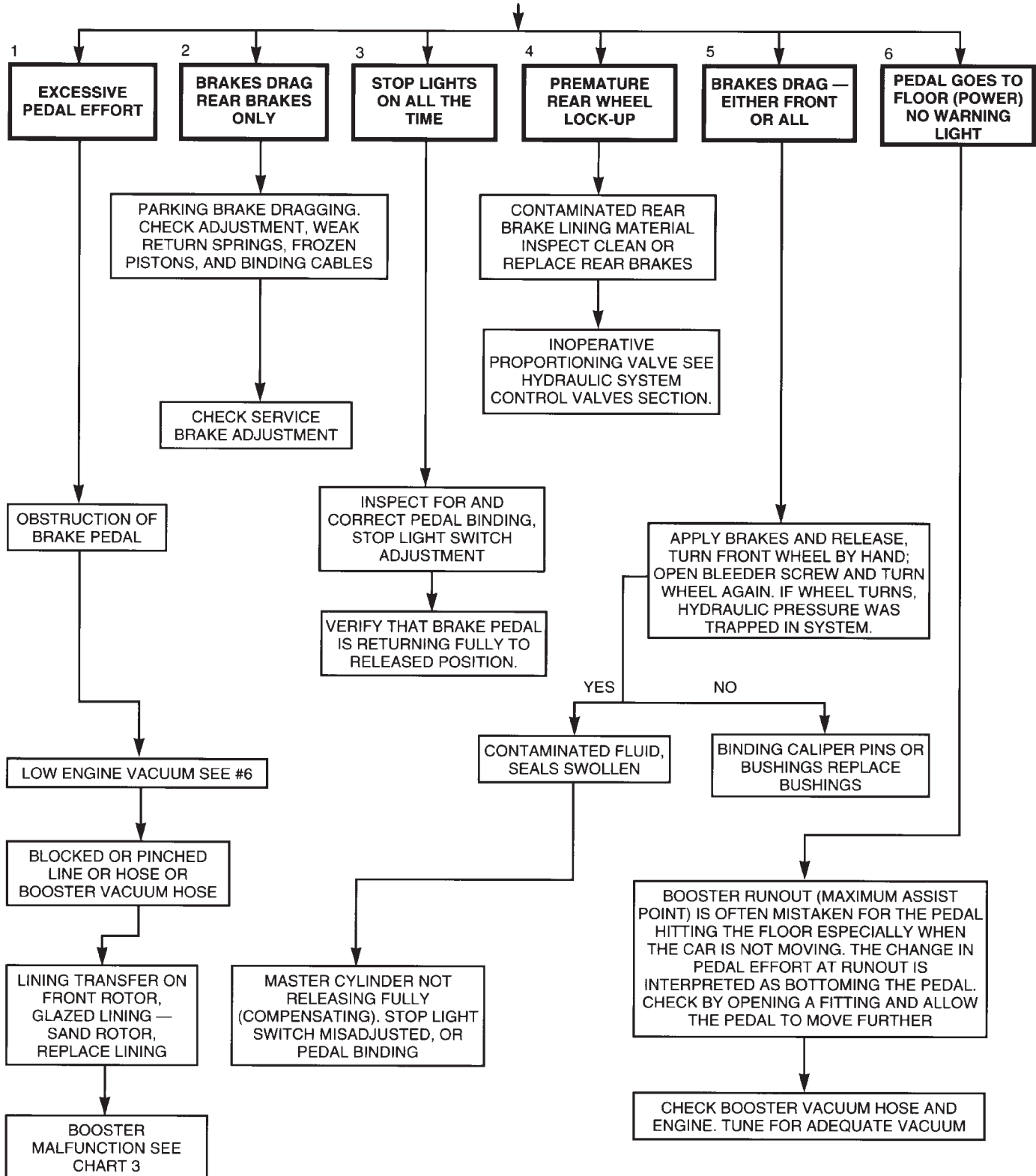
REAR WHEEL HUB AND BEARING ASSEMBLY

All vehicles are equipped with permanently lubricated and sealed for life rear wheel bearings. There is no periodic lubrication or maintenance recommended for these units. However, if servicing of a rear wheel bearing is required, refer to procedures in the diagnosis and testing section and the removal and installation section in this group of the service manual for the inspection and replacement of the rear wheel bearing.

DIAGNOSIS AND TESTING

BRAKE SYSTEM BASIC DIAGNOSIS GUIDE

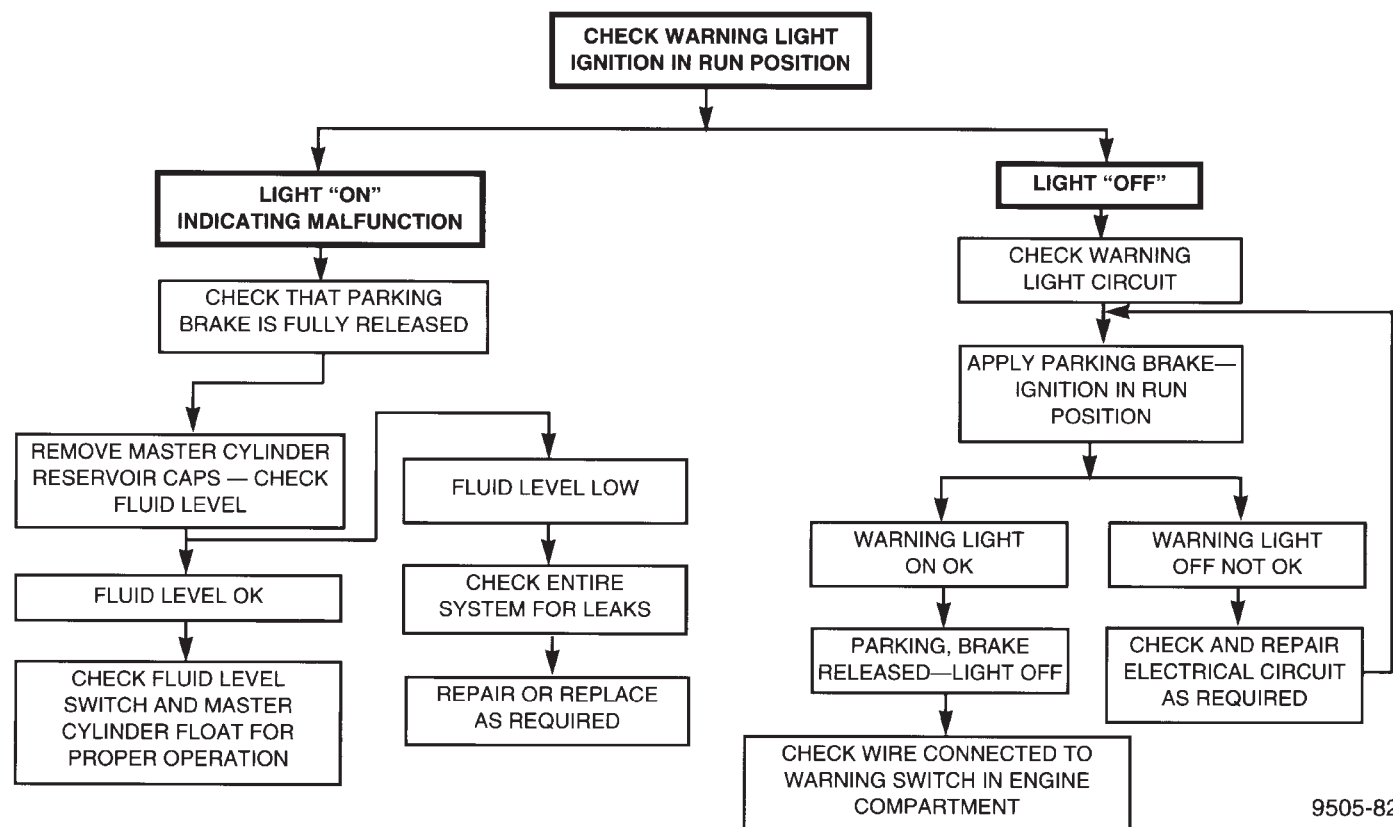
SYMPTOM	CHART 1 MISC. COND.	CHART 2 WARNING LIGHT	CHART 3 POWER BRAKES	CHART 4 BRAKE NOISE	CHART 5 WHEEL BRAKES
Brake Warning Light On		X	NO	NO	
Excessive Pedal Travel	6	X	NO		O
Pedal Goes To The Floor	6	X			
Stop Light On Without Brakes	3				
All Brakes Drag	5				
Rear Brakes Drag	2	NO	NO		
Grabby Brakes			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
CHART 1 MISCELLANEOUS CONDITIONS


DIAGNOSIS AND TESTING (Continued)

RED BRAKE WARNING LAMP

CHART 2 WARNING LAMP FUNCTION

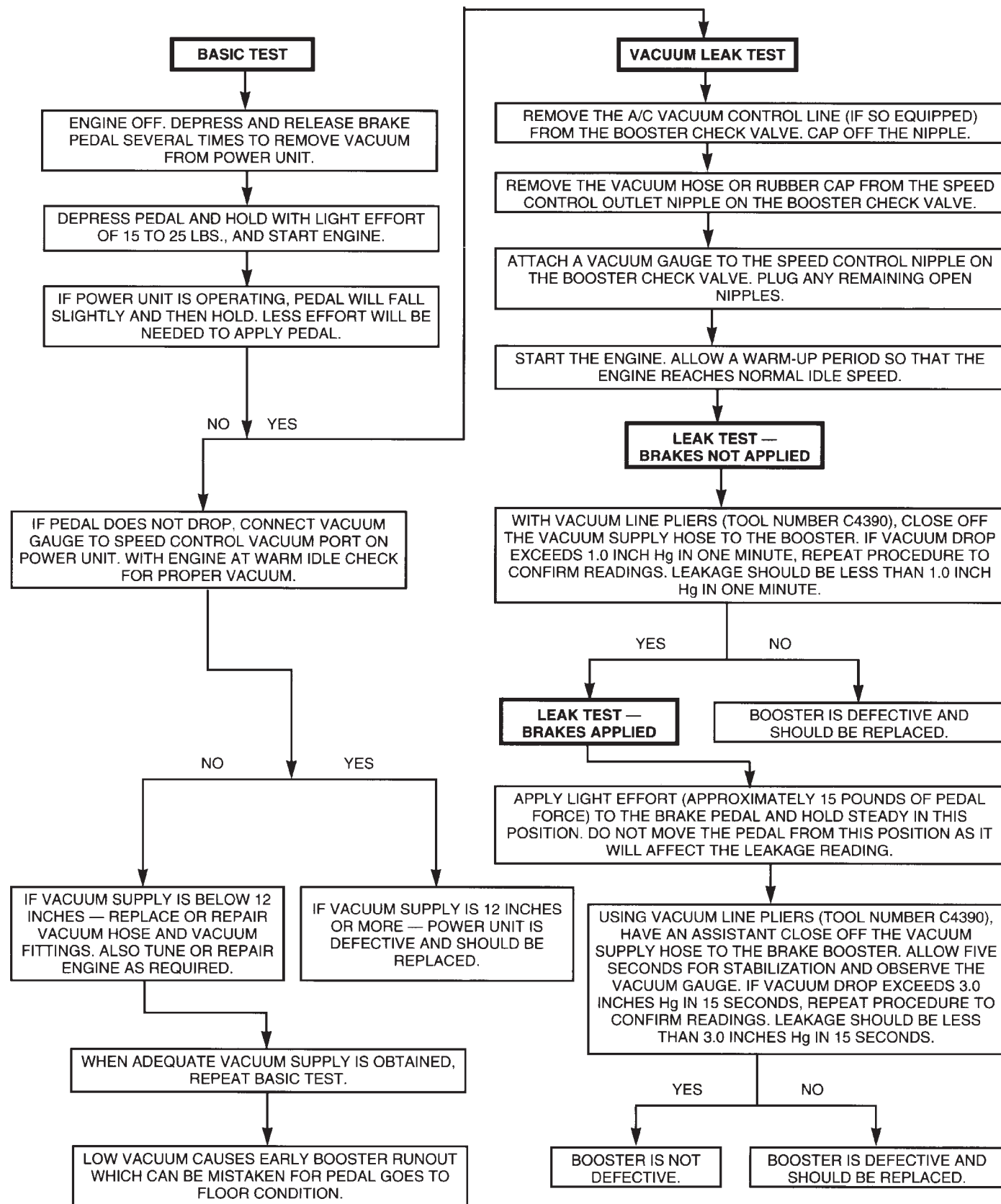


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DIAGNOSIS AND TESTING (Continued)

POWER BRAKE SYSTEM DIAGNOSIS

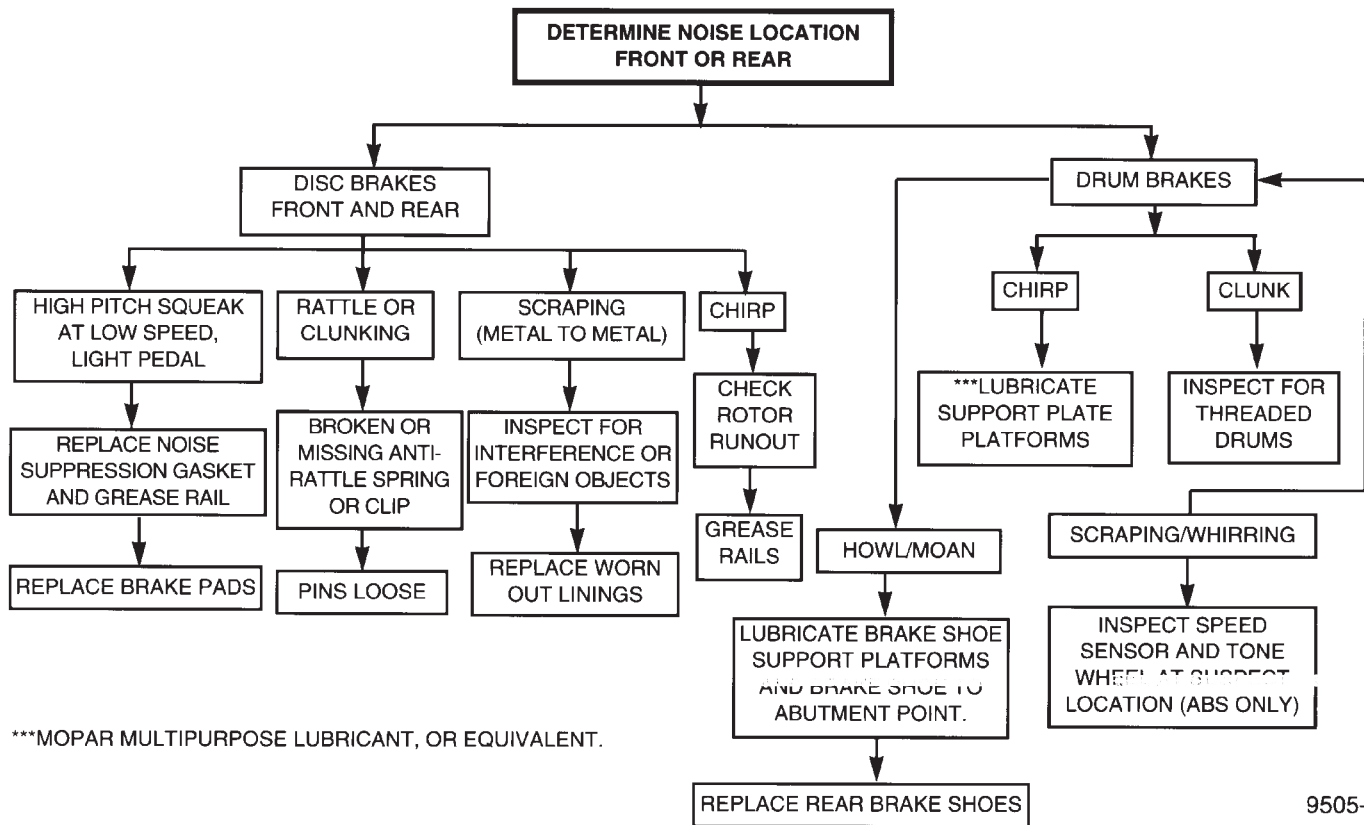
CHART 3 POWER BRAKES



DIAGNOSIS AND TESTING (Continued)

BRAKE NOISE

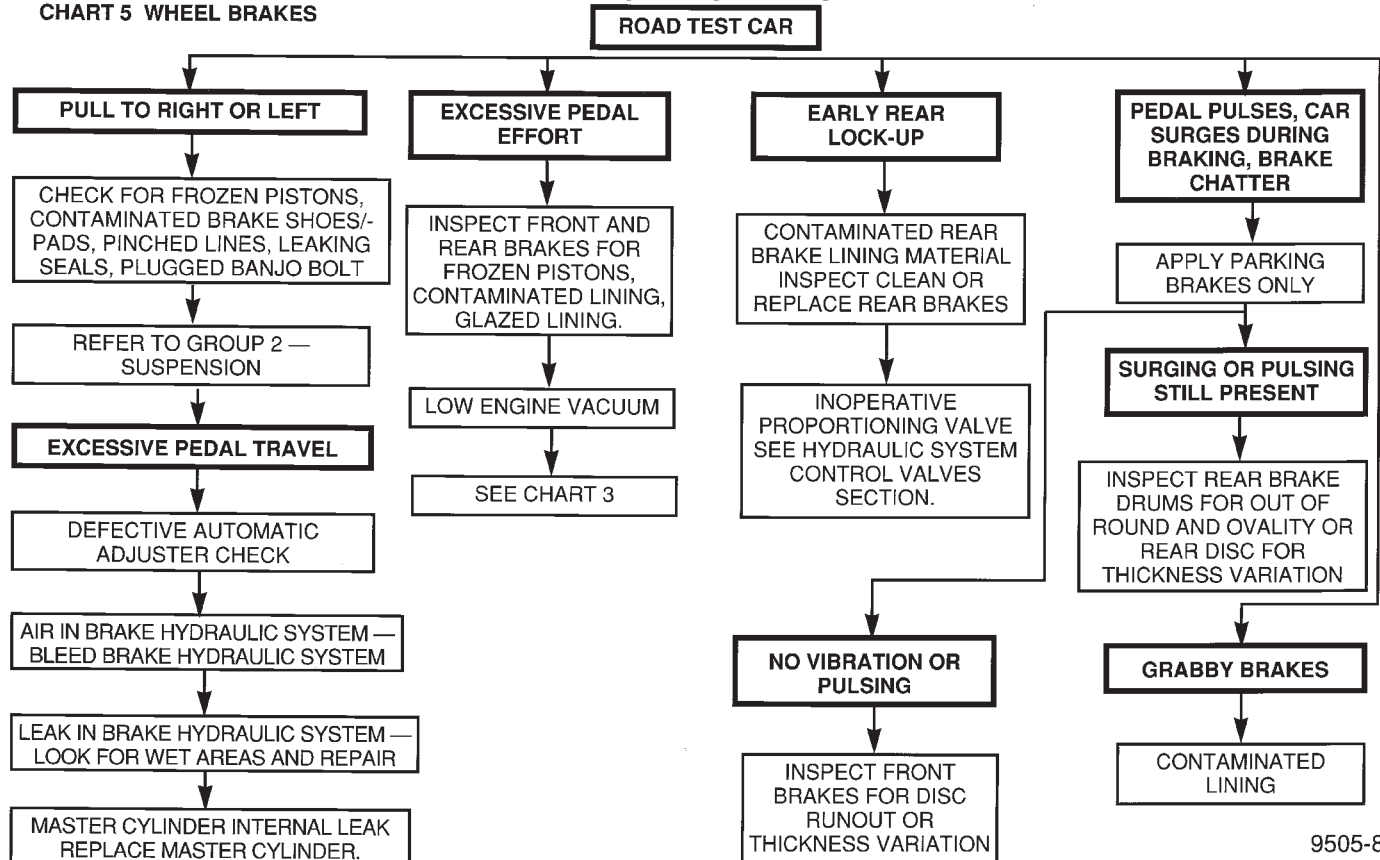
CHART 4 BRAKE NOISE



9505-84

CHART 5 WHEEL BRAKES

VEHICLE ROAD TEST



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DIAGNOSIS AND TESTING (Continued)

DRUM BRAKE AUTOMATIC ADJUSTER OPERATION

Place the vehicle on a hoist with a helper in the driver's seat to apply the brakes. Remove the access plug from the rear adjustment slot in each brake support plate (Fig. 13) to provide visual access to brake adjuster star wheel. Then, to eliminate the possibility of maximum adjustment, where the adjuster does not operate because the closest possible adjustment has been reached. 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.

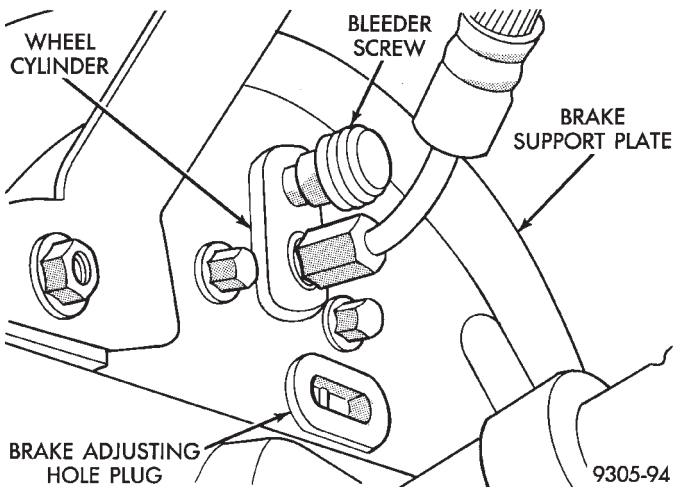


Fig. 13 Brake Adjuster Access Hole Plug

Spin the wheel and brake drum in the forward direction, and with a greater than normal force apply the brakes suddenly. This sudden application of force will cause the leading brake shoe to leave the anchor. The wrap up effect will move the leading shoe, and the spring will pull the adjuster lever down. Upon application of the brake pedal, the lever should move down, turning the 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 THICKNESS AND RUNOUT

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

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

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

Excessive lateral runout or wobble.

Thickness variation (Parallelism).

Dishing or distortion (Flatness).

If a vehicle has not been driven for a period of time, the rotor surface 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 before installation of new brake pad assemblies.

Some discoloration 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 increase guide pin bushing wear due to tendency of 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 rotor or hub.

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

ROTOR RUNOUT AND THICKNESS VARIATION

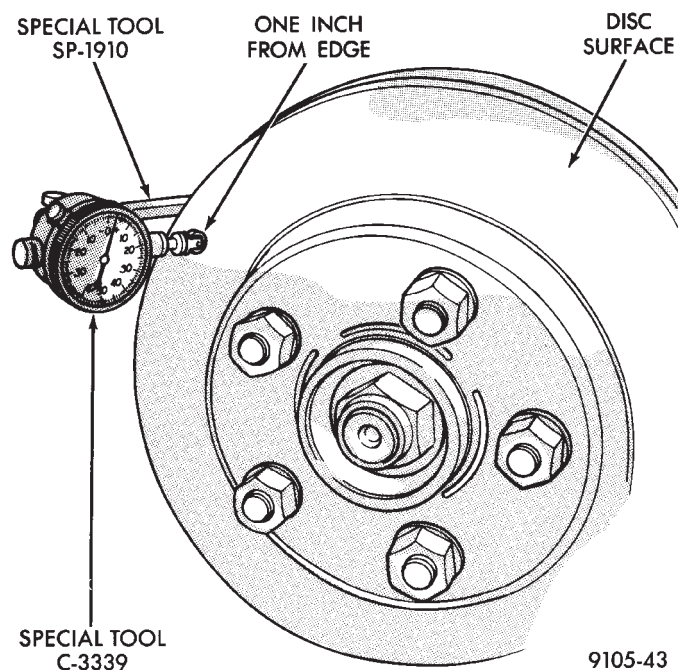
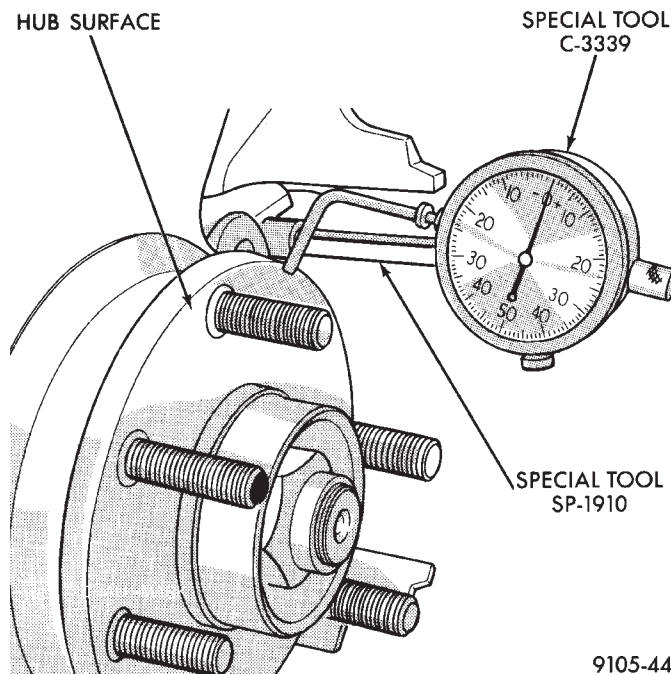
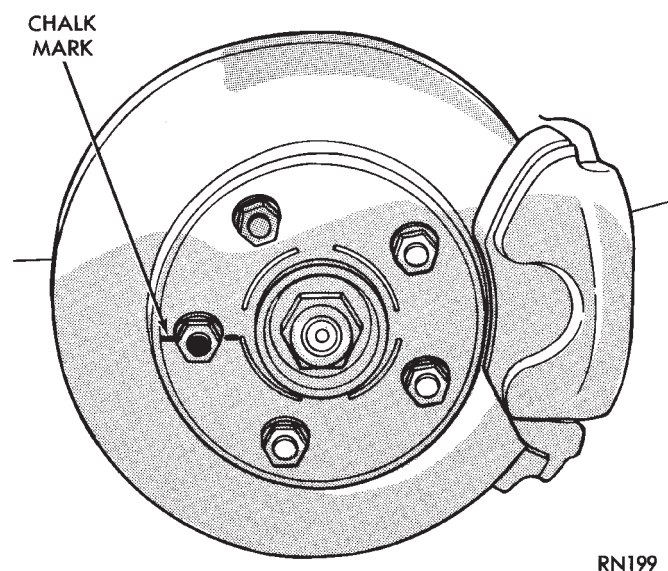
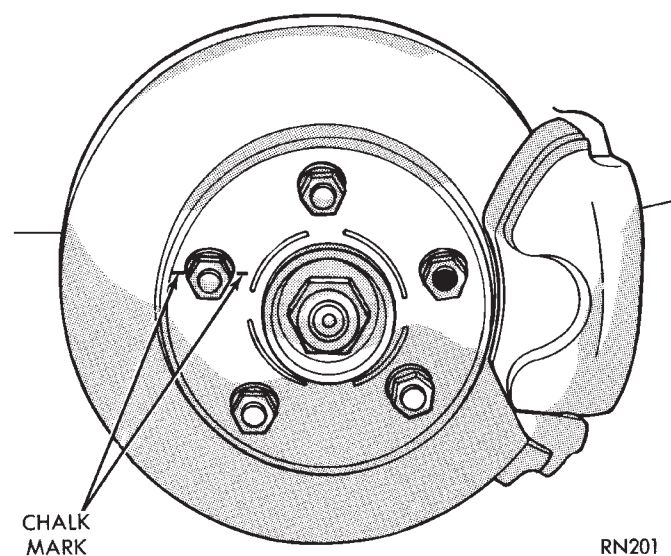
On vehicle rotor runout is the combination of the individual runout of the hub face and the runout of the rotor. (The hub and rotor runouts are separable). To measure runout on the vehicle, remove the wheel and reinstall the lug nuts tightening the rotor to the hub. Mount Dial Indicator, Special Tool C-3339 with Mounting Adaptor, Special Tool SP-1910 on steering arm. Dial indicator plunger should contact braking surface of rotor approximately one inch from edge of rotor (Fig. 14). Check lateral runout (both sides of rotor) runout should not exceed 0.13 mm (0.005 inch).

If 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 both the rotor and one wheel stud on the high side of runout so you'll know exactly how the rotor and hub was originally mounted (Fig. 15). Remove rotor from hub.

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 rim (Fig. 16). **Clean hub surface before checking.**

Runout should not exceed 0.08 mm (0.003 inch). If runout exceeds this specification, hub must be replaced. See Suspension Group 2. If hub runout does not exceed this specification, install rotor on hub with chalk marks two wheel studs apart (Fig. 17). Tighten nuts in the proper sequence and torque to specifications. Finally, check runout of rotor to see if runout is now within specifications.

DIAGNOSIS AND TESTING (Continued)

**Fig. 14 Checking Rotor For Runout****Fig. 16 Checking Hub for Runout****Fig. 15 Marking Rotor and Wheel Stud****Fig. 17 Index Rotor And Wheel Stud**

If runout is not within specifications. Install a new rotor or reface rotor, being careful to remove as little as possible from each side of rotor. Remove equal amounts from each side of rotor. Do not reduce thickness below minimum thickness cast into the un-machined surface of the rotor.

Thickness variation measurements of rotor should be made in conjunction with runout. Measure thickness of rotor at 12 equal points with a micrometer at a radius approximately 25.4 mm (1 inch) from 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.

Light scoring and/or wear is acceptable. If heavy scoring or warping is evident, the rotor must be machined or replaced. See Brake Rotor Machining in the Service Procedures Section in this group of the service manual. Refer to front or rear brake rotor in the Removal And Installation section in this group of the service manual for the required brake rotor replacement procedure.

DIAGNOSIS AND TESTING (Continued)

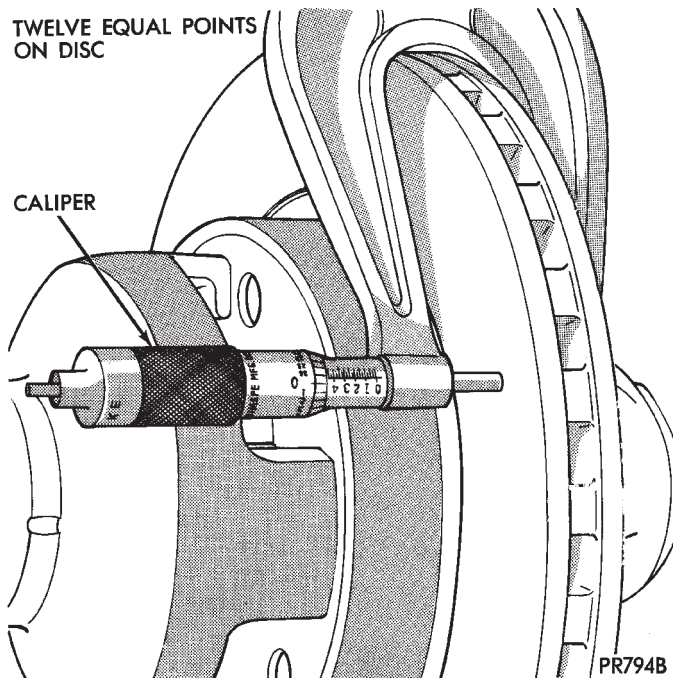


Fig. 18 Checking Rotor For Thickness

PROPORTIONING VALVE

NOTE: A vehicle that is equipped as a Transitional Low Emission Vehicle, (TLEV) having two front catalytic converters, uses unique proportioning valve applications. Refer to the test procedures below to determine which should be used if testing a proportioning valve on a TLEV equipped vehicle.

PROPORTIONING VALVE TEST—NON-ABS BRAKES W/O TLEV

If premature rear wheel skid occurs on hard brake application, it could be an indication that a malfunction has occurred with the proportioning valve unit.

The proportioning valve is designed with two **separate** systems. One half controls the right rear brake, and the other half controls the left rear brake. Therefore, a road test to determine which rear brake slides first is essential.

CAUTION: All brake line fittings used on this vehicle use ISO style tubing flares. Ensure that when fabricating adapter tubes required to test proportioning valve operation. That only ISO style tubing flares are used at proportioning valve connections. Failure to use ISO style tubing flares at the proportioning valve connections, will destroy the tubing seats in the proportioning valve.

RIGHT REAR WHEEL SLIDES FIRST

To test the proportioning valve when the right rear wheel slides first, leave the front brakes connected to the valve, and proceed as follows:

(1) Install one gauge and (TEE) of set C-4007-A between the brake line from the master cylinder secondary port and the brake valve assembly (Fig. 19).

(2) Install the second gauge of set C-4007-A to the right rear brake outlet port (Fig. 19). Gauge to be attached using an adapter tube, made from a short piece of brake tube and (1) 3/8 x 24 tube nut, and (1) M10x1 tube nut. Connect the hose to the valve. Bleed the hose and gauge.

(3) Have a helper exert pressure on the brake pedal (holding pressure) to get a reading on the valve inlet gauge and check the reading on the outlet gauge. If the inlet and outlet pressures do not agree with the values on the following chart, replace the valve.

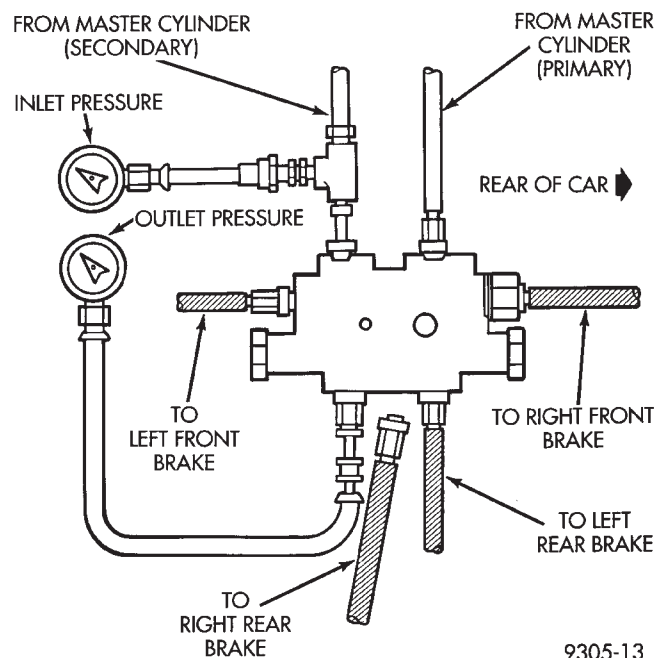


Fig. 19 Tube Connection For Right Rear Skidding

LEFT REAR WHEEL SLIDES FIRST

To test the proportioning valve when the left rear wheel slides first, leave the front brakes connected to the valve, and proceed as follows:

(1) Install one gauge and (TEE) of set C-4007-A between brake line from master cylinder primary port and brake valve assembly (Fig. 20).

(2) Install the second gauge of set C-4007-A to the left rear brake outlet port (Fig. 20). An adapter tube, made up from a M12x1 tube nut, a short piece of brake tube and 3/8 x 24 tube nut, will be required to connect hose to valve. Bleed the gauge and hose.

DIAGNOSIS AND TESTING (Continued)

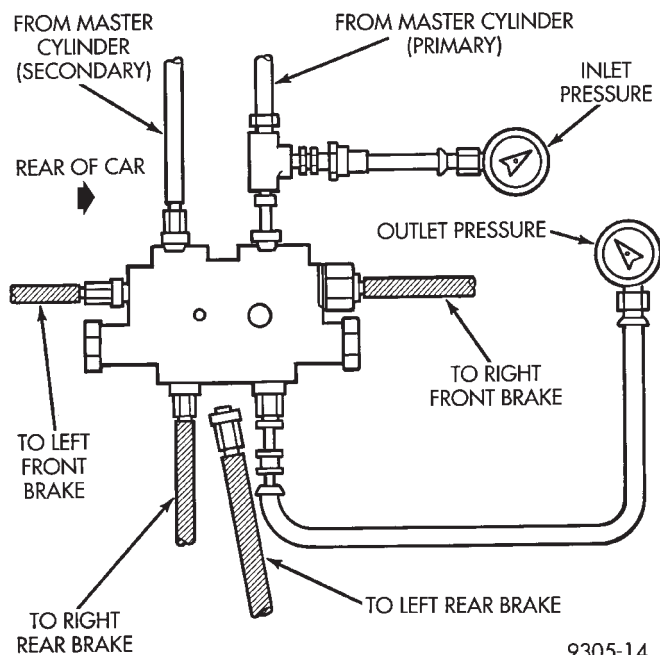


Fig. 20 Tube Connection For Left Rear Skidding

(3) Have a helper exert pressure on the brake pedal. Hold pressure steady to get a reading on the valve inlet gauge and check the reading on the outlet gauge. If the inlet and outlet pressures do not agree with the values on the following chart, replace the valve.

PROPORTIONING VALVE TEST-ABS BRAKES AND NON-ABS BRAKES WITH TLEV

CAUTION: All ABS components use an ISO type tubing flare. Use the correct adapters with ISO type tubing flares when installing gauges to test ABS proportioning valves.

If premature rear wheel ABS cycling occurs on a hard brake application, it could be an indication that a malfunction has occurred with one of the proportioning valves.

One proportioning valve controls the right rear brake, and the other proportioning valve controls the left rear brake. Since ABS cycles both rear brakes together, both valves must be tested to isolate the suspect proportioning valve. The test procedure is the same for both rear wheel proportioning valves.

(1) Road test vehicle to determine which rear wheel exhibits premature rear wheel skid.

(2) Remove the proportioning valve (Fig. 21) from the chassis brake tube.

NOTE: Step 3 should be done to allow the proportioning valve pressure test fittings to be installed without bending the chassis brake tubes.

(3) Remove the bracket (Fig. 21) attaching the brake flex hose to the side of the frame rail. Also, remove routing bracket attaching brake tube to bottom of frame rail.

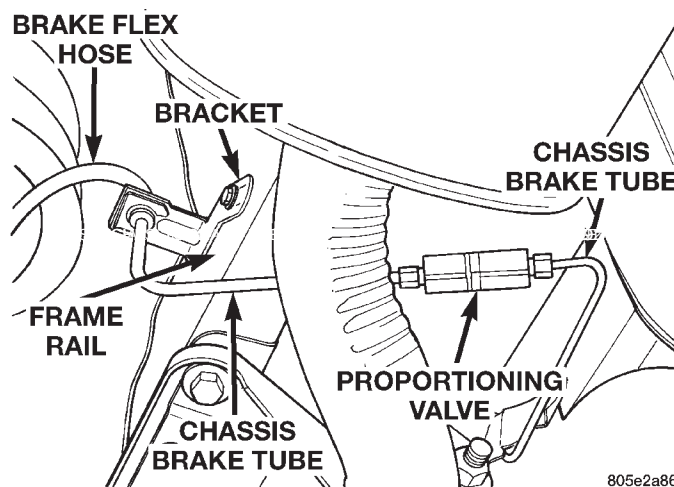


Fig. 21 Brake Flex Hose Bracket

CAUTION: Be sure the pressure test fittings being installed into the proportioning valve, have the correct thread sizes for installation into the proportioning valve and installation of the chassis brake tubes.

(4) Correctly install Pressure Test Fittings, Special Tool 6892 into the inlet and outlet ports of the proportioning valve.

(5) Install the proportioning valve and the Pressure Test Fittings, Special Tool 6892 as an assembly (Fig. 22) back into the chassis brake tube.

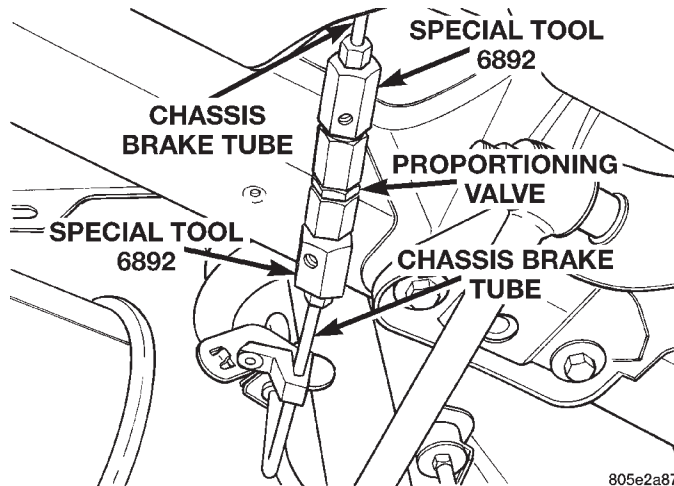


Fig. 22 Pressure Test Fittings And Proportioning Valve Installed

(6) Install a Pressure Gauge, Special Tool C-4007-A into each pressure test fitting (Fig. 23). Bleed air out of hose from pressure test fitting to

DIAGNOSIS AND TESTING (Continued)

pressure gauge, at pressure gauge to remove all trapped air.

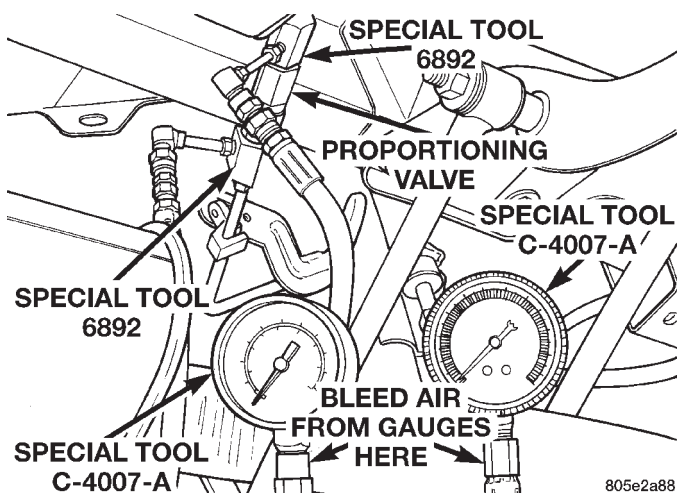


Fig. 23 Pressure Gauges Installed

(7) With the aid of a helper, apply pressure to the brake pedal until reading on proportioning valve inlet gauge, is at the pressure shown on the following chart. Then check the pressure reading on the proportioning valve outlet gauge. If proportioning valve outlet pressure does not agree with value shown on the following chart, when inlet pressure shown on chart is obtained, replace the proportioning valve. If proportioning valve is within pressure specifications do not replace proportioning valve.

(8) Remove the pressure gauges from the pressure test fittings.

(9) Remove the proportioning valve and the Pressure Test Fittings, Special Tool 6892 from the chassis brake tube.

(10) Install the bracket (Fig. 21) attaching the brake flex hose to the side of the frame rail. Also, install routing bracket attaching brake tube to bottom of frame rail.

(11) Install the proportioning valve in the chassis brake tube and hand tighten tube nuts until fully seated into proportioning valve. Tighten the tube nuts to a torque of 17 N·m (145 in-lbs.).

(12) Bleed the affected brake line. See Bleeding Brake System in the Service Adjustments section of the manual for proper bleeding procedure.

(13) Repeat steps 2 thru 14 for the other proportioning valve.

(14) Check rear wheel brake shoe linings for contamination or for replacement brake shoes not meeting OEM brake lining material specifications. These conditions can also be a possible cause for a premature rear wheel skid.

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.

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.

PROPORTIONING VALVE APPLICATIONS AND PRESSURE SPECIFICATIONS

Sales Code	Brake System Type	Split Point	Slope	Identification	Inlet Pressure	Outlet Pressure
BRB	15" Disc/Drum	500 psi	0.43	White Tag Or Bar Code Label	1000 psi	725-850 psi
BRT	15" Disc/Disc W/ABS	435 psi	0.43	Bar Code Label	1000 psi	525-600 psi
BNM	15" Disc/Disc W/ABS And Traction Control	435 psi	0.43	Bar Code Label	1000 psi	525-600 psi

SERVICE PROCEDURES

MASTER CYLINDER FLUID LEVEL

Check master cylinder reservoir brake fluid level a minimum of twice a year.

The master cylinder brake fluid reservoir used on this vehicle includes a brake fluid level sensor. The brake fluid level sensor location is in the body of the brake fluid reservoir (Fig. 24). In the event of low brake fluid level in the brake fluid reservoir, the RED brake warning light in the instrument panel will turn on.

Master cylinder fluid reservoirs on both standard and antilock brake systems, are marked with a MAX fill line indicating the fluid reservoirs proper fluid level (Fig. 24).

NOTE: When filling brake fluid reservoir, use only Mopar® brake fluid or an equivalent stored in a tightly sealed container. Brake fluid must conform to DOT 3, specifications. Do not use brake fluid with a lower boiling point than DOT 3, as brake failure could result during prolonged hard braking. Do not use petroleum-based fluid because seal damage in the brake system will result.

If necessary, add brake fluid to reservoir, bringing brake fluid level to the MAX fill line shown on fluid reservoir (Fig. 24).

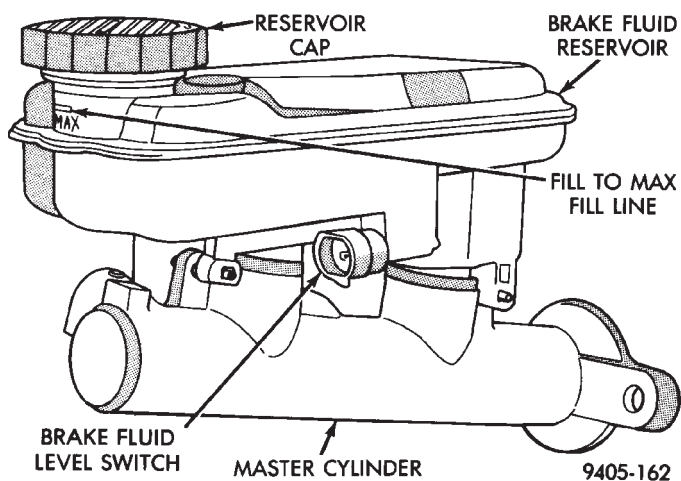


Fig. 24 Master Cylinder Fluid Level

BRAKE BLEEDING

CAUTION: For bleeding this vehicles antilock brakes hydraulic system, see the antilock brake system service procedures in this group of the service manual. It describes in detail the required procedure which needs to be followed when bleeding the antilock brake system.

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

PRESSURE BLEEDING

CAUTION: Use bleeder tank Special Tool C-3496-B or equivalent, with Snap-On adapter BB400-9A or equivalent (Fig. 25) and (Fig. 26), to pressurize the brake hydraulic system for bleeding.

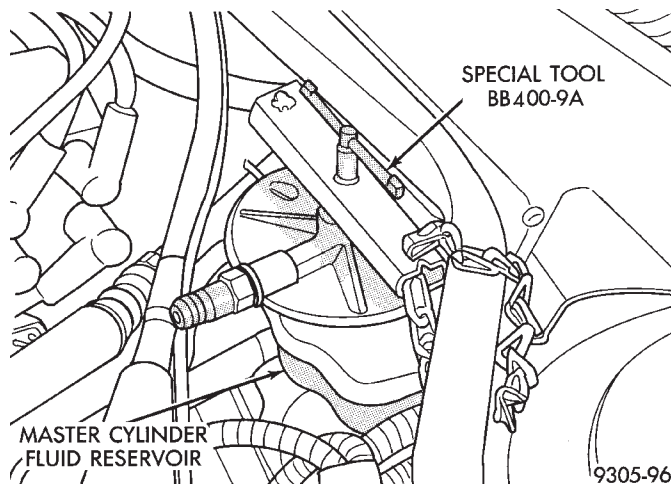


Fig. 25 Pressure Bleeding Adapter Mounted On Fluid Reservoir

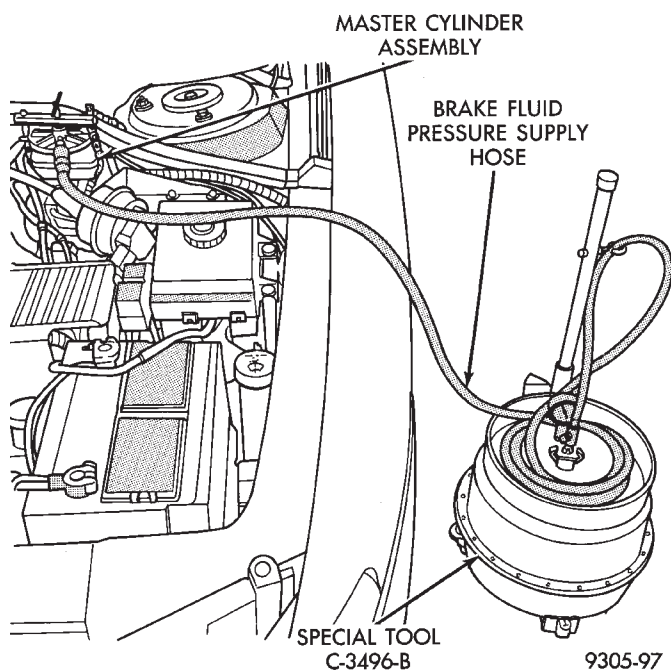


Fig. 26 Pressure Bleeding Vehicle Brake System

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

SERVICE PROCEDURES (Continued)

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. This will ensure all the air is bled from the brakes hydraulic system.

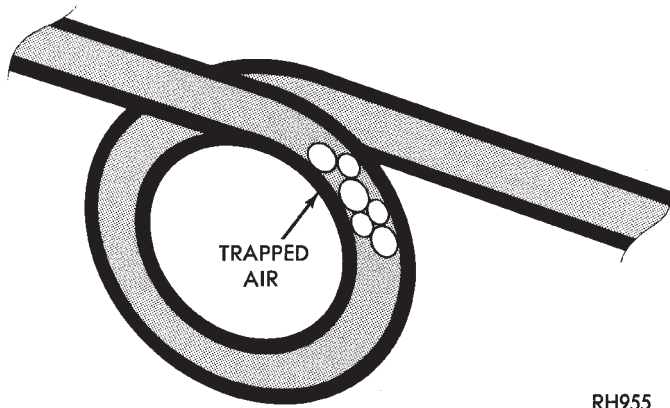


Fig. 27 Trapped Air in Brake Line

(1) Remove rubber dust caps from all 4 bleeder screws.

(2) Attach a clear hose to the bleeder screw at one wheel and feed the hose into a clear jar containing fresh brake fluid (Fig. 28).

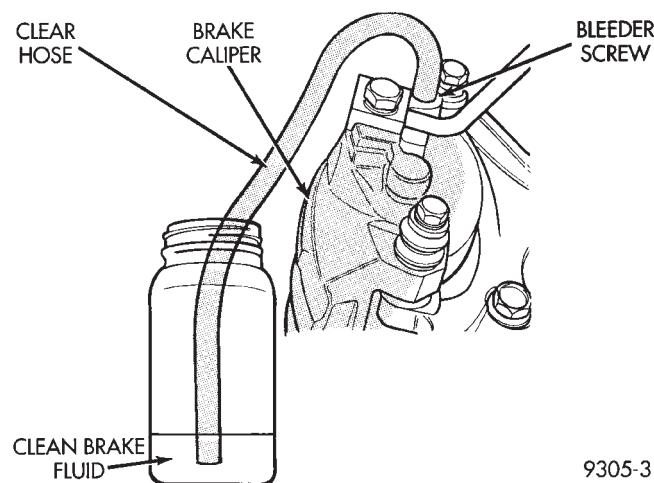


Fig. 28 Proper Method for Purging Air From Brake System

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

(3) Open bleeder screw (Fig. 28) on caliper assembly or wheel cylinder, at least **one full turn** or more to obtain an adequate flow of brake fluid.

(4) After 4 to 8 ounces of brake fluid has been bled through an individual wheel's brake hydraulic system. And an air-free flow (no bubbles) is maintained in the clear plastic hose and jar, this will indicate a good bleed of this individual hydraulic circuit.

(5) 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. It must stay at the proper level so air will not be allowed to re-enter the brake system through the master cylinder.

(6) Replace all 4 bleeder screw rubber dust caps.

BLEEDING WITHOUT A PRESSURE BLEEDER

If a pressure bleeder is not available. A good brake fluid flow can be obtained by manual bleeding of the brake hydraulic system, following these steps.

(1) Remove rubber duct caps from all 4 bleeder screws.

(2) Attach a clear hose to the bleeder screw at one wheel and feed the hose into a clear jar containing fresh brake fluid (Fig. 28).

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

(4) Then open the bleeder screw at least 1 full turn. When the bleeder screw opens the brake pedal will drop all the way to the floor.

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

(6) Repeat steps 1 through 3, four or five times at each bleeder screw. This should pass a sufficient amount of fluid to expel all the trapped air from the brakes hydraulic system. Be sure to monitor brake fluid level in master cylinder fluid reservoir, to ensure it stays at a proper level. This will ensure air does not re-enter brake hydraulic system through master cylinder.

(7) Only after a short stroke and solid brake pedal feel is obtained, test drive vehicle to ensure brakes are operating correctly.

(8) Replace all 4 bleeder screw dust caps.

MASTER CYLINDER BLEEDING

CAUTION: When clamping the master cylinder in a vise for bleeding, carefully tighten the vise just enough to hold the master cylinder from moving. Excessive pressure can damage the master cylinder.

(1) Clamp the master cylinder in a vise (Fig. 29).

(2) Attach Bleeding Tubes, Special Tool 8129 to master cylinder (Fig. 29). Position the bleed tubes in the fluid reservoir of the master cylinder so the outlets are below the surface of the brake fluid when the reservoir is filled to the proper level.

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

(4) Using a wooden dowel per (Fig. 29). Depress master cylinder pistons slowly, and then allow pis-

SERVICE PROCEDURES (Continued)

tons to return to released position. Repeat several times until all air bubbles are expelled.

(5) Remove bleeding tubes from cylinder, plug outlets and install caps.

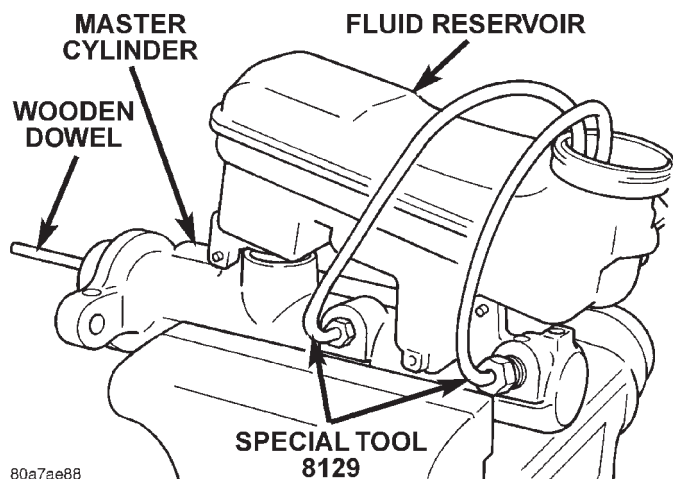


Fig. 29 Bleeding Master Cylinder

(6) Remove master cylinder from vise and install on power brake vacuum booster.

NOTE: It is not necessary to bleed the entire hydraulic system after replacing the master cylinder, providing that the master cylinder has been bled and filled upon installation.

BRAKE ROTOR MACHINING

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. 30) or (Fig. 31) or replaced.

NOTE: All rotors have markings for minimum allowable thickness cast on an un-machined surface of the rotor (Fig. 32) or (Fig. 33).

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.

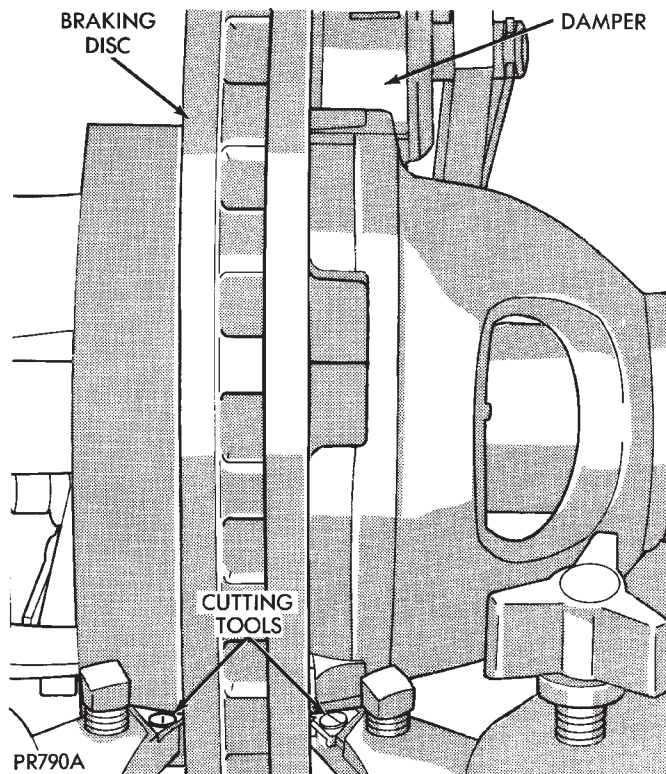


Fig. 30 Refacing Brake Rotor

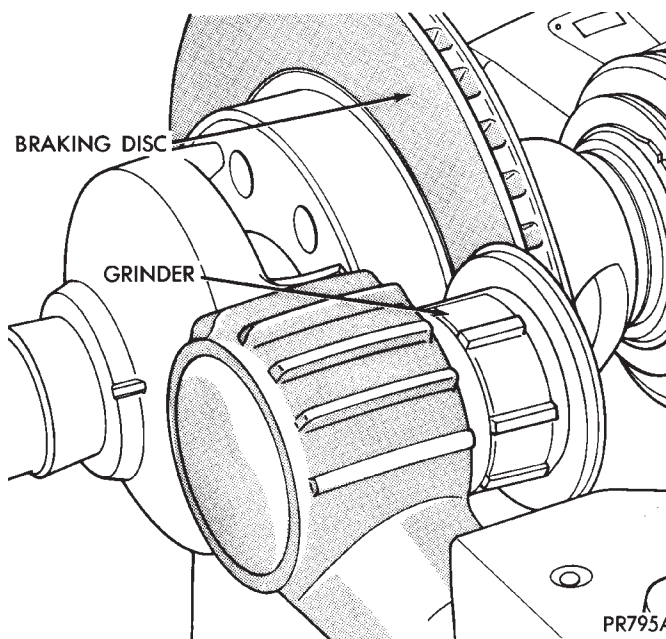


Fig. 31 Resurfacing Brake Rotor (Final Finish)

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)

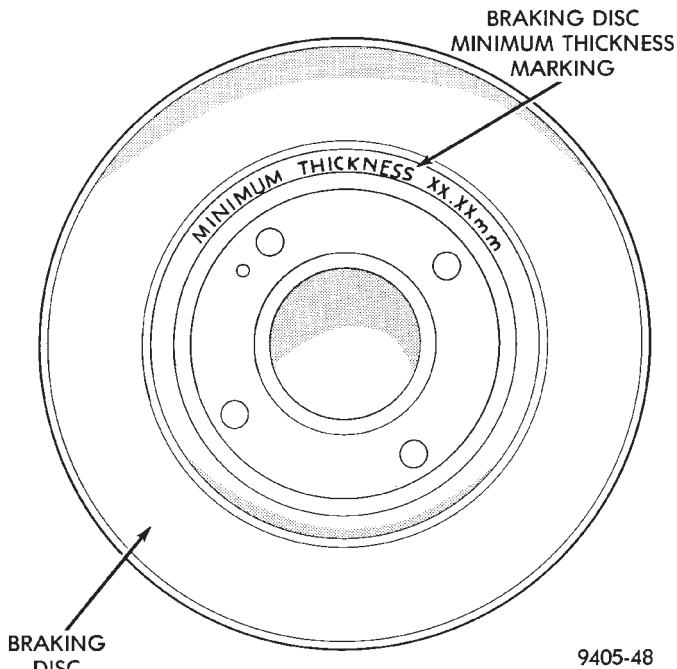


Fig. 32 Front Rotor Thickness Markings

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. 30) that machines both sides of the rotor at the same time is highly recommended.

RESURFACING 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 will remove surface contamination without removing much rotor material.

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

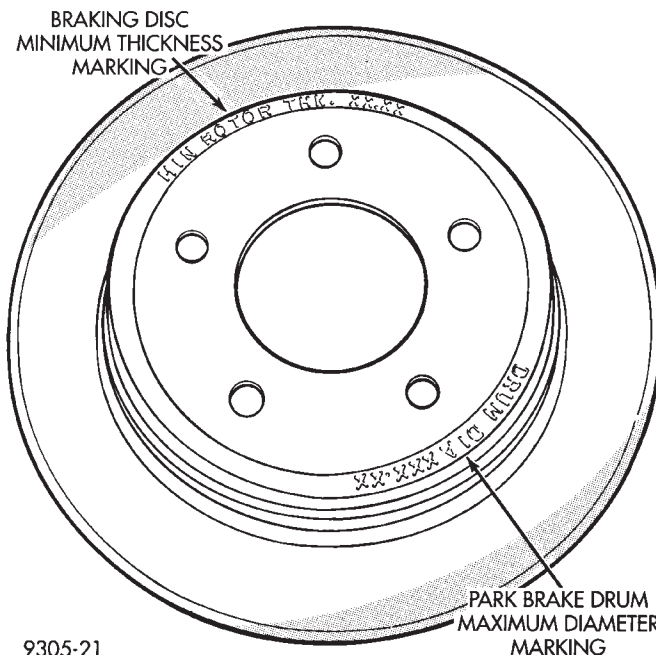


Fig. 33 Front Rotor Thickness Markings

BRAKE DRUM MACHINING

Measure drum runout and diameter. If not to specification, reface drum. (Runout should not exceed 0.1524 mm or 0.006 inch). The diameter variation (oval shape) of the drum braking surface must not exceed either 0.0635 mm (0.0025 inch) in 30° or 0.0889 mm (0.0035 inch) in 360°.

All drums will show markings of maximum allowable diameter (Fig. 34).

CHASSIS BRAKE TUBE REPAIR

All available brake systems on this vehicle use **ISO STYLE TUBING FLARES** (Fig. 35) at all chassis brake tube to component locations, **except the rear flex hose to wheel cylinder connection on drum brakes**.

Only double wall 4.75mm (3/16 in.) steel tubing should be used for replacement of the chassis brake tubes. **The chassis brake tubes used on this vehicle are coated with a zinc alloy and aluminum rich coating referred to as Prokote 2000. If**

BRAKE ROTOR REFINISHING LIMITS

Braking Rotor	Rotor Thickness	Minimum Rotor Thickness	Rotor Thickness Variation	Rotor Run Out*	Rotor Micro Finish
Front Rotor	24.13-23.87 mm .950 -.940 in.	22.4 mm .882 in.	.013 mm .0005 in.	.08 mm .003 in.	15-80 RMS
Rear Rotor	12.13-11.63 mm .478 -.458 in.	10.4 mm .409 in.	.013 mm .0005 in.	.08 mm .003 in.	15-80 RMS
* TIR Total Indicator Reading (Measured On Vehicle)					

SERVICE PROCEDURES (Continued)

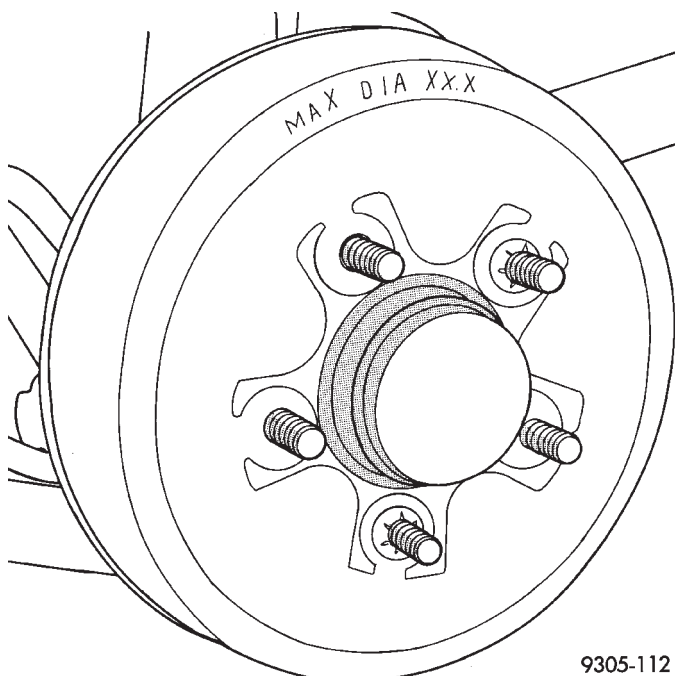


Fig. 34 Maximum Drum Diameter Identification

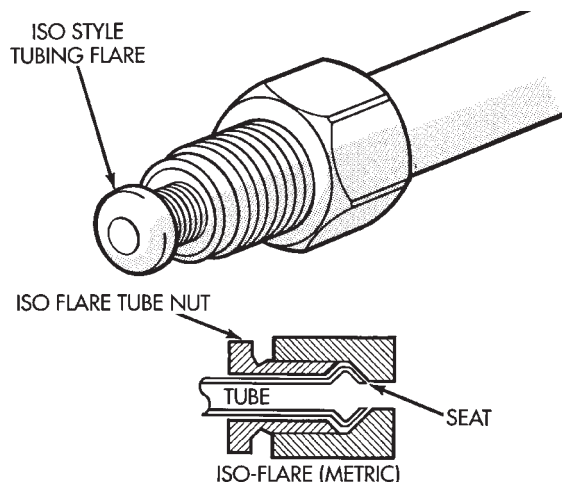


Fig. 35 I.S.O. Style Tubing Flare And Fitting Connection

a chassis brake tube requires replacement, only brake tubing with the same coating should be used as a service replacement. 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 and fasteners.

Care must be taken when servicing components on a vehicle equipped with antilock brakes. To avoid damage to the flexible stainless steel hoses between the master cylinder and antilock hydraulic control unit.

ISO STYLE TUBE FLARING PROCEDURE

CAUTION: ALWAYS USE THE PROPER TYPE OF ISO FLARING TOOL AND REQUIRED PROCEDURE, WHEN TUBE FLARING IS REQUIRED WHEN SERVICING THE VEHICLES HYDRAULIC BRAKE SYSTEM. THIS IS REQUIRED TO ENSURE THE INTEGRITY OF THE VEHICLE'S HYDRAULIC BRAKING SYSTEM.

Using Tubing Cutter, Special Tool C-3478-A or equivalent, cut off damaged seat on tubing (Fig. 36). Ream out any burrs or rough edges showing on inside of tubing. This will make the ends of tubing square (Fig. 37) and ensure better seating of flared end tubing. **Be sure to put the tube nut on tubing before the tubing is flared.**

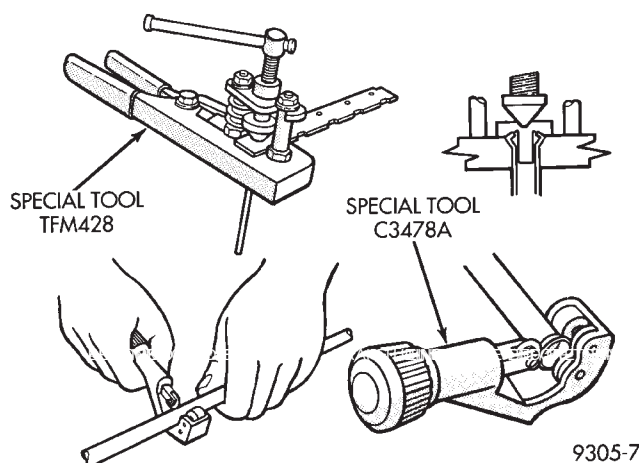


Fig. 36 Cutting and Flaring of Brake Line Tubing

BE SURE ALL BURRS ARE REMOVED FROM INSIDE OF TUBING

BE SURE END OF TUBING IS SQUARE BEFORE FLARING TUBE

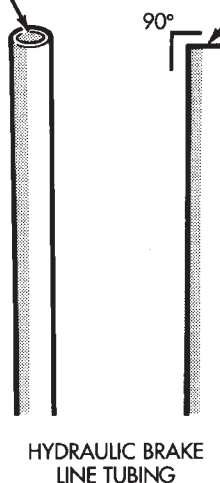


Fig. 37 Tube End Properly Prepared For Flaring

SERVICE PROCEDURES (Continued)

CAUTION: All ISO style tubing flares are of metric dimensions. When performing any service procedures on a vehicle 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, (Fig. 36) or equivalent. See (Fig. 38) and proceed with the steps listed below. **Be sure to place the tubing nut on tube before proceeding to flare the tubing.**

(1) Carefully prepare the end of the tubing to be flared. Be sure the end of the tubing is square and all burrs on the inside of the tubing are removed (Fig. 37). **This preparation is essential to obtain the correct form of a (metric) ISO tubing flare.**

(2) Open the jaws of the Flaring Tool. Align the jaws of the flaring tool around the tubing. Close the jaws of the Flaring Tool around the tubing, but do not lock the tubing in place.

(3) Position tubing in jaws of the Flaring Tool so that it is flush with top surface of flaring tool bar assembly (Fig. 38).

(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 the brake tubing. Make sure the adapter pilot is fully inserted in the end of the brake tubing. Tighten screw on yoke assembly until the adaptor has seated squarely on the surface of the bar assembly (Fig. 38). This process will properly create a metric ISO tubing flare.

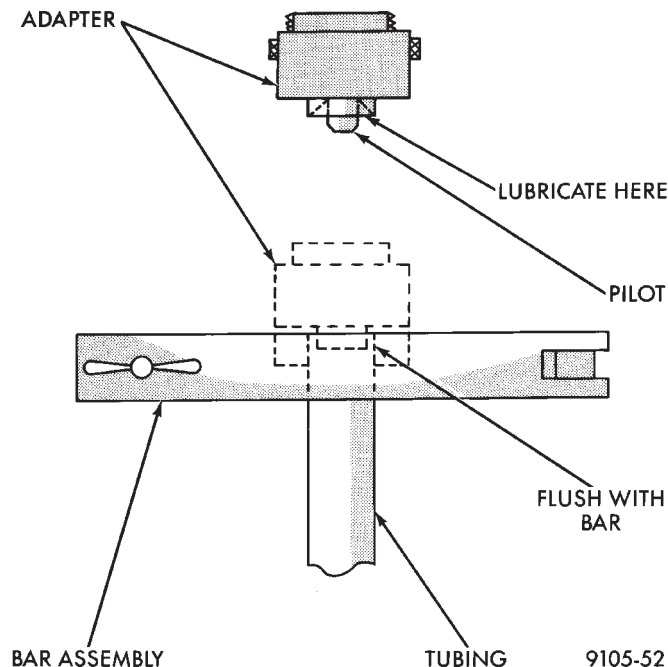


Fig. 38 ISO Tubing Flare Tool

PARK BRAKE AUTOMATIC ADJUSTER RELOADING

(1) Insert a 1/4 in. drive ratchet and extension into the 1/4 in. square hole located in the sector of park brake pedal mechanism (Fig. 39).

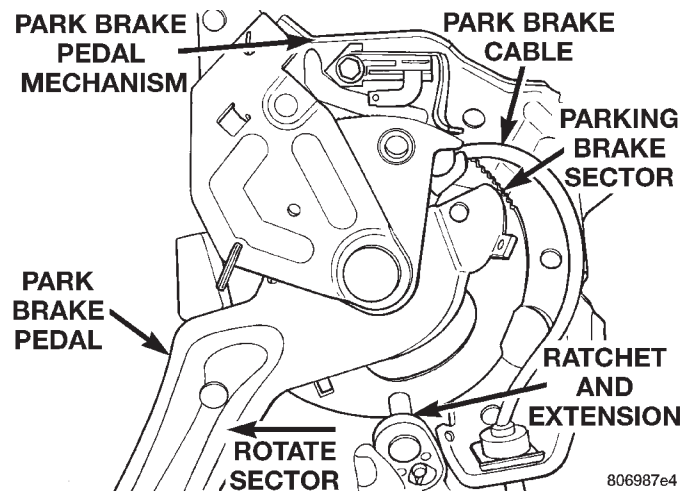


Fig. 39 Winding Park Brake Sector Spring

(2) Pull on ratchet and extension, rotating sector toward rear of vehicle until the hole in the sector is aligned with the two holes in the bracket of the park brake pedal assembly (Fig. 39).

(3) Insert a 1/8 inch allen wrench through the two holes in the park brake pedal bracket and the sector locking the sector in place (Fig. 40).

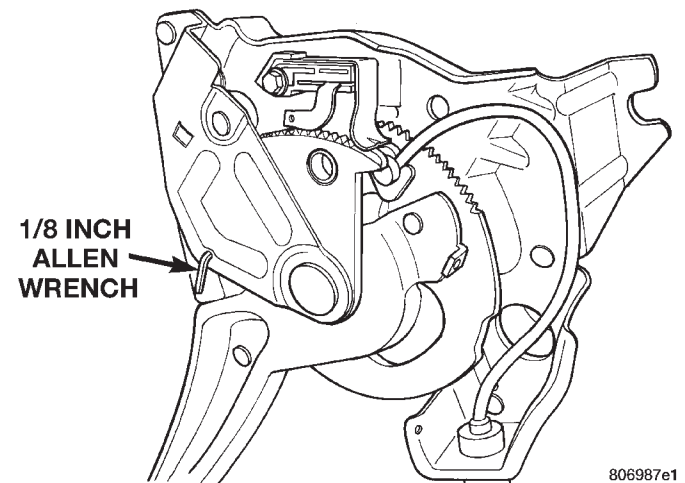


Fig. 40 Locking Pin Installed In Park Brake Mechanism

REMOVAL AND INSTALLATION

WHEEL AND TIRE ASSEMBLY

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 5 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.) (Fig. 41). Never use oil or grease on studs or lug nuts.

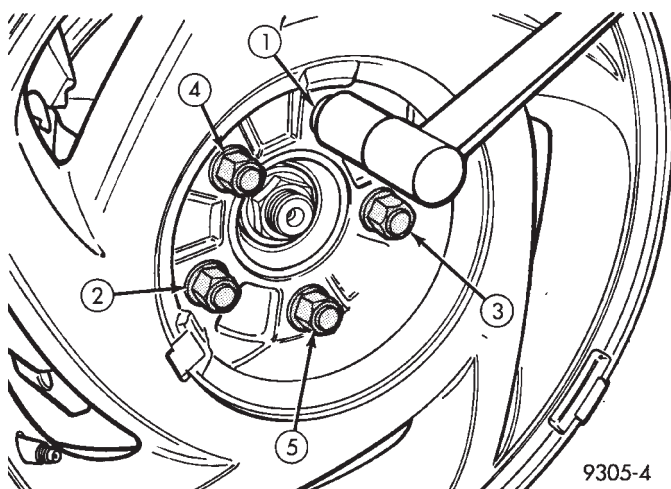


Fig. 41 Five Stud Wheel Lug Nut Tightening Sequence

FRONT DISC BRAKE CALIPER

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

Handle the rotor and caliper carefully, to avoid damaging the rotor and/or scratching or nicking of brake shoe lining.

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.

REMOVE

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

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

(3) Remove the 2 caliper assembly to steering knuckle guide pin bolts (Fig. 42).

(4) Remove caliper assembly from steering knuckle. Proceed by first rotating top of caliper away from steering knuckle and then lifting caliper off bottom machined abutment on steering knuckle (Fig. 43).

(5) Support caliper firmly to prevent weight of caliper from damaging the flexible brake hose (Fig. 44).

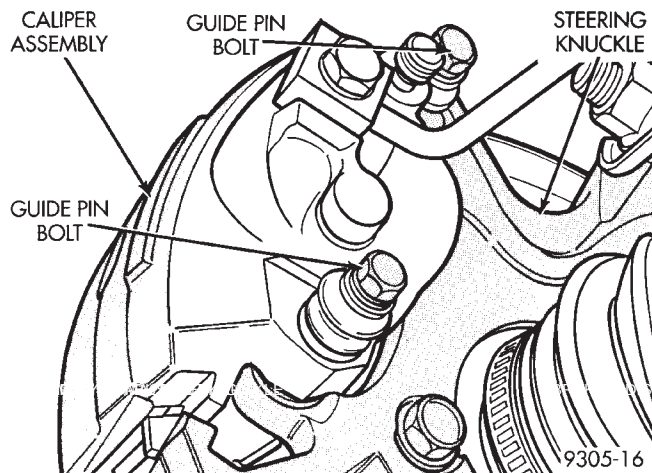


Fig. 42 Removing Caliper Assembly Guide Pin Bolts

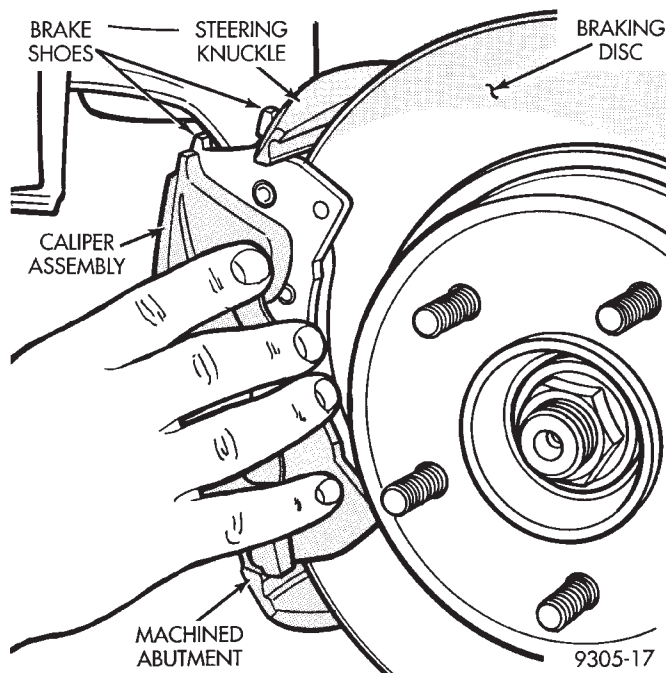


Fig. 43 Removing Caliper Assembly

(6) If required, remove rotor from hub by pulling it straight off wheel mounting studs (Fig. 45).

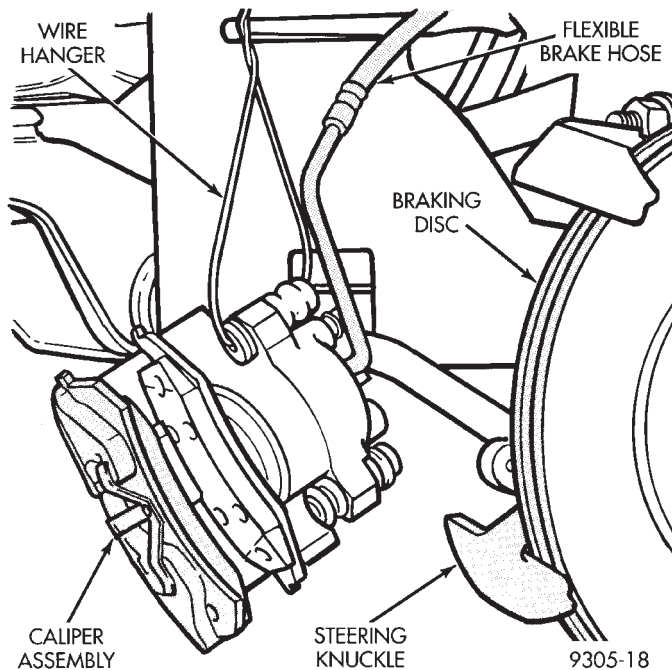
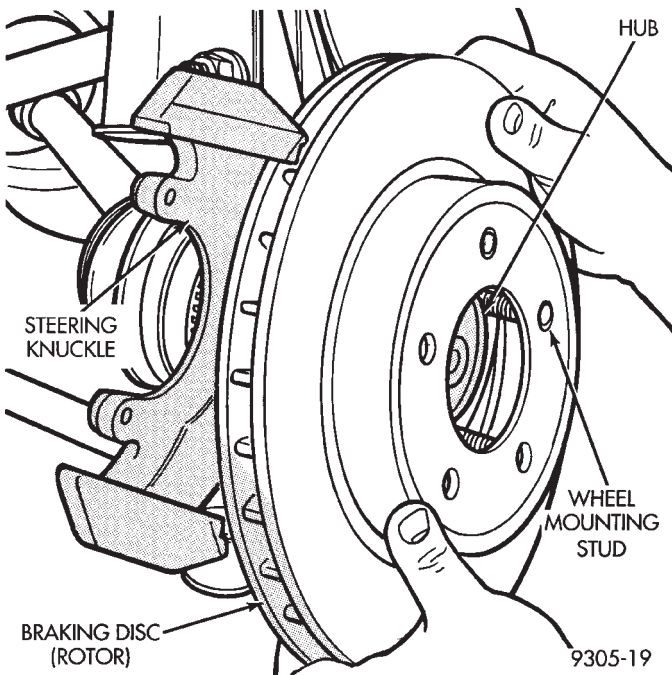
INSTALL

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

(1) Completely retract the caliper piston back into the piston bore of the caliper, if new brake shoes have been installed.

(2) If removed, install rotor on hub (Fig. 45).

REMOVAL AND INSTALLATION (Continued)

**Fig. 44 Storing Caliper****Fig. 45 Removing Or Installing Braking Disc**

(3) Carefully position caliper and brake shoe assemblies over rotor using the reversed required removal procedure (Fig. 43).

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

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

(5) Install the wheel and tire assembly.

(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 129 N·m (95 ft. lbs.).

(7) Remove jackstands or lower hoist. **Before moving vehicle, pump the brake pedal several times to insure the vehicle has a firm brake pedal to adequately stop vehicle.**

WARNING: Before moving vehicle after performing any service to the vehicle brake system, be sure to obtain a firm brake pedal.

(8) 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 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.

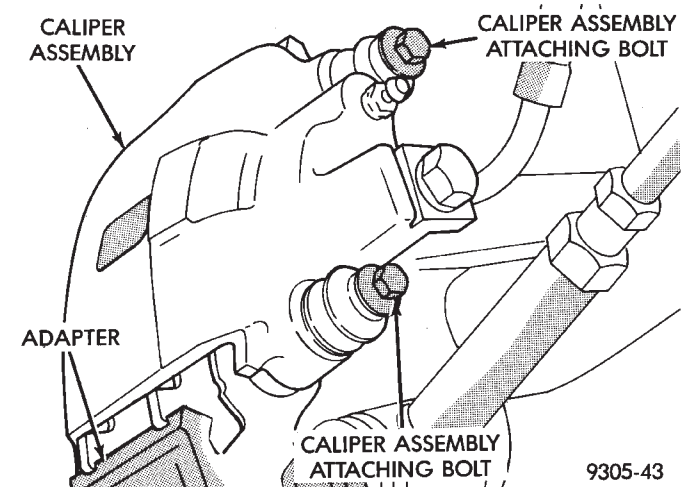
During removal and installation of a wheel and tire assembly, use care not to strike the caliper.

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 2 caliper assembly to adapter guide pin bolts (Fig. 46).

**Fig. 46 Removing Caliper Guide Pin Bolts**

REMOVAL AND INSTALLATION (Continued)

(4) Remove caliper from adapter using following procedure. First rotate top of caliper away from adapter. Then lift the caliper off the bottom abutment on the adapter (Fig. 47).

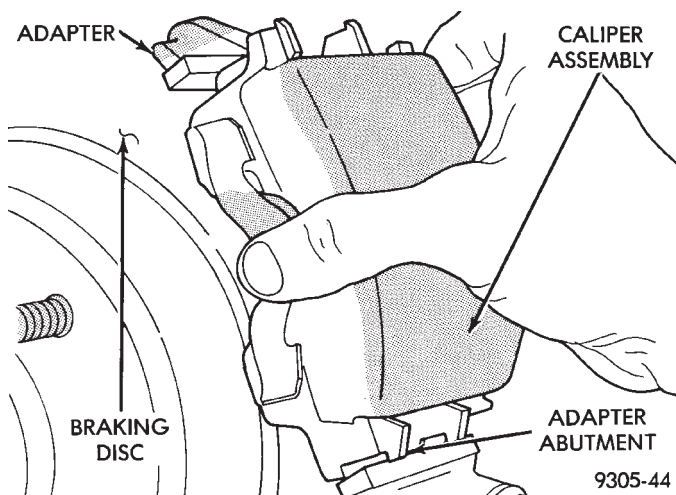


Fig. 47 Removing / Installing Caliper Assembly

(5) Support caliper assembly firmly from rear strut to prevent weight of caliper from damaging the flexible brake hose (Fig. 48).

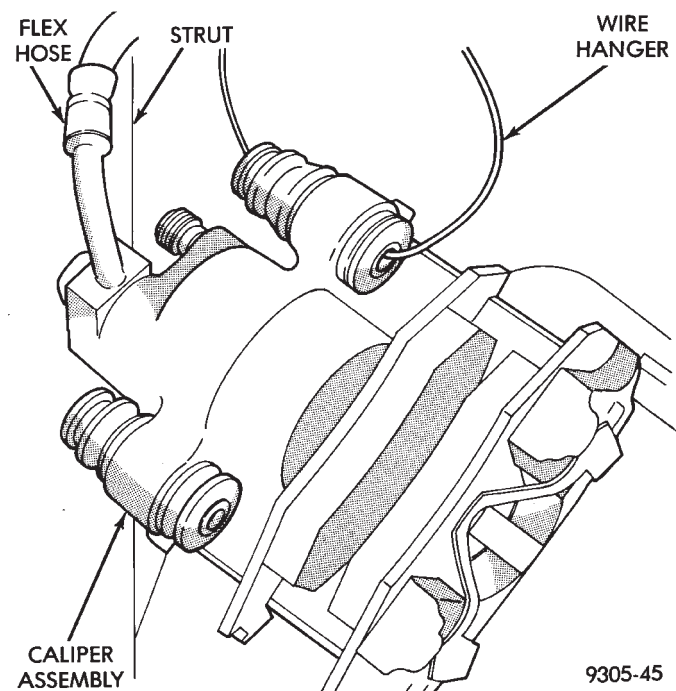


Fig. 48 Storing Caliper

(6) Remove the rear rotor from hub by pulling it straight off the wheel mounting studs (Fig. 49).

INSTALL

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

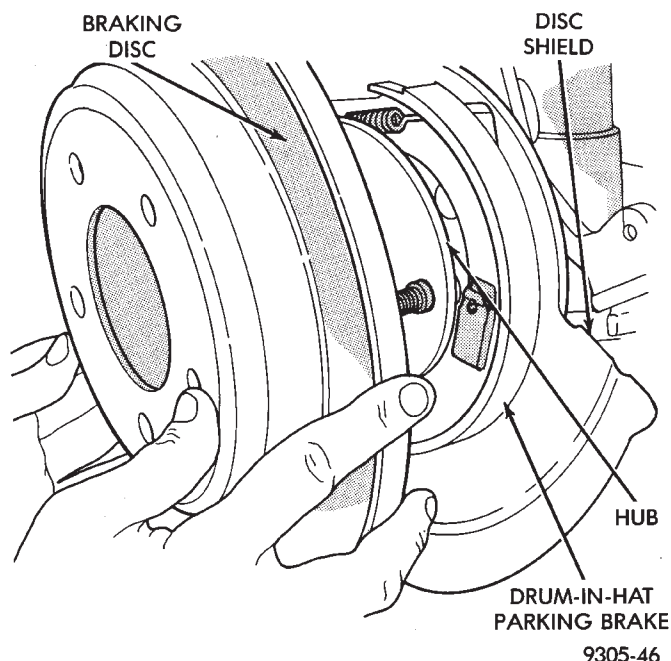


Fig. 49 Removing / Installing Rear Rotor

(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) Install the rear rotor on the hub, making sure it is squarely seated on the face of the hub (Fig. 49).

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. 47).

CAUTION: When installing guide pin bolts extreme caution should be taken not to crosstread 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 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 AIR-TIGHT 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.

REMOVE

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

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

(3) Remove the 2 caliper assembly to steering knuckle guide pin bolts (Fig. 50).

(4) Remove caliper assembly from steering knuckle. Proceed by first rotating top of caliper away from steering knuckle and then lifting caliper off bottom machined abutment on steering knuckle (Fig. 51).

(5) Support caliper firmly to prevent weight of caliper from damaging the flexible brake hose (Fig. 52).

(6) Remove front rotor from hub by pulling it straight off wheel mounting studs (Fig. 53).

(7) Remove outboard brake shoe, by prying the shoe retaining clip over raised area on caliper. Then slide the brake shoe off the caliper (Fig. 54).

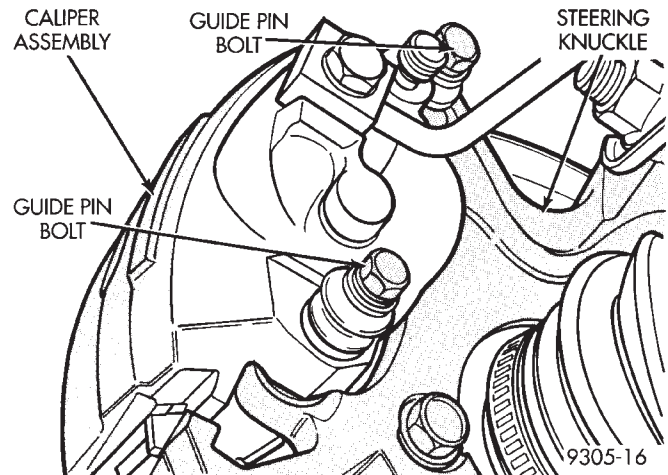


Fig. 50 Removing Caliper Assembly Guide Pin Bolts

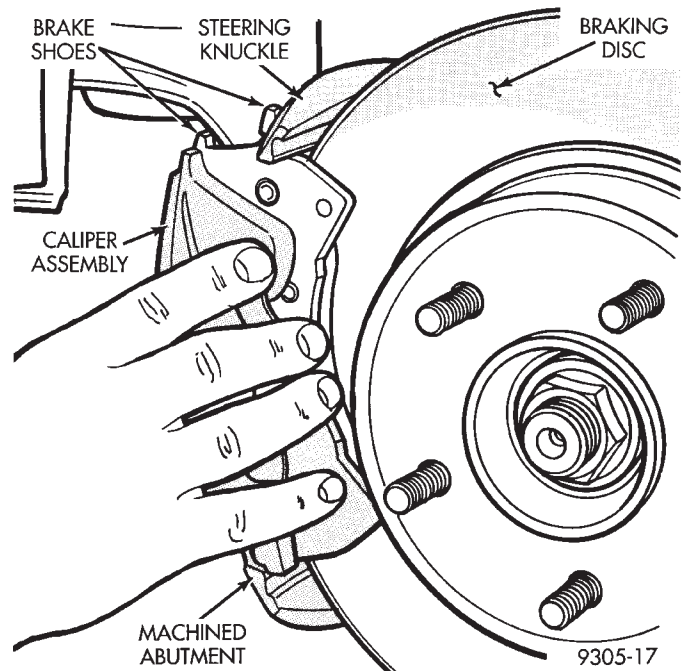


Fig. 51 Removing Caliper Assembly

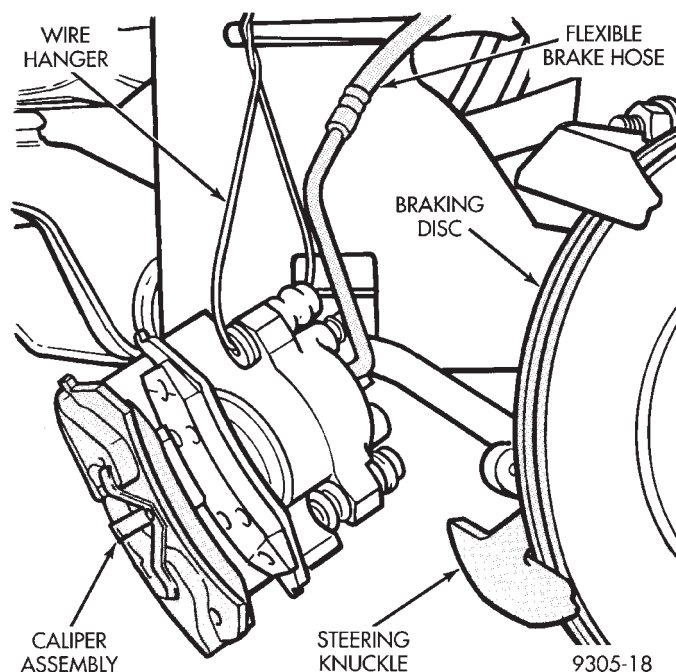
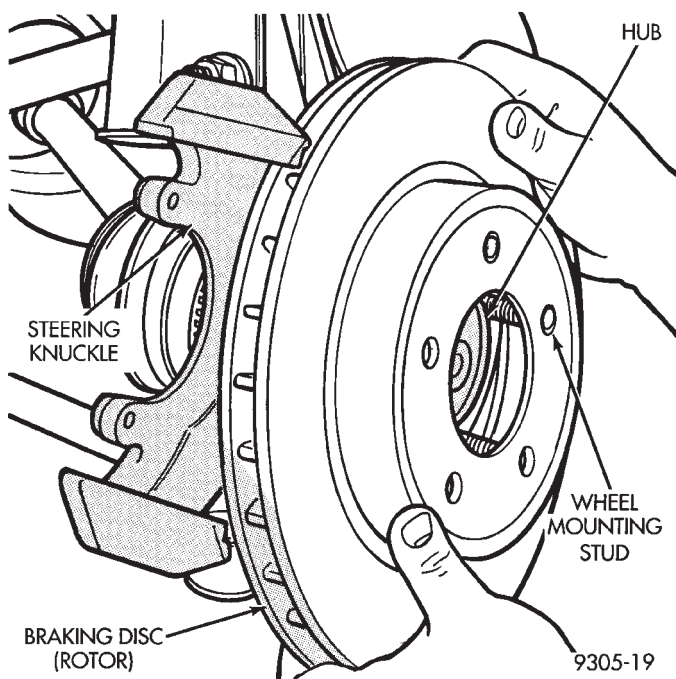
(8) Pull inboard brake shoe away from piston, until retaining clip is free from cavity in piston (Fig. 55).

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.

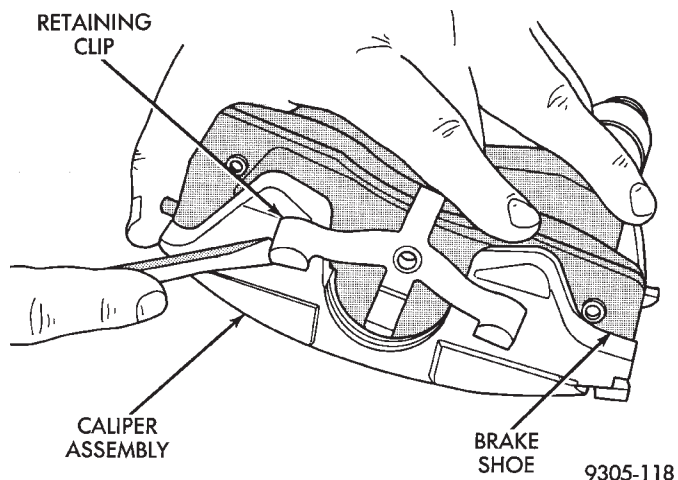
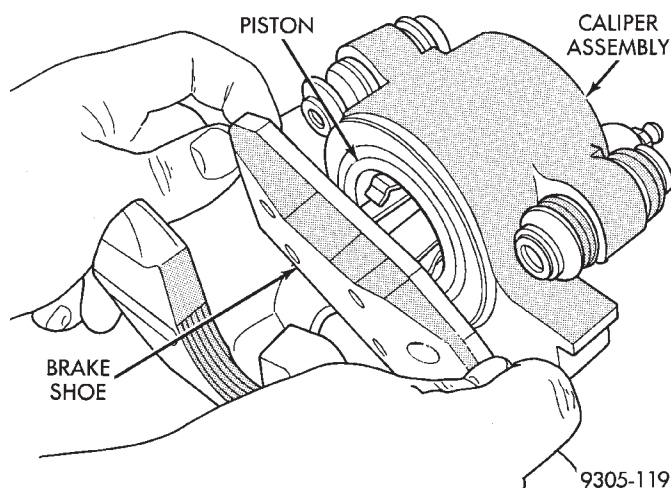
REMOVAL AND INSTALLATION (Continued)

**Fig. 52 Storing Caliper****Fig. 53 Removing or Installing Braking Disc**

tle. 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.

**Fig. 54 Removing Outboard Brake Shoe****Fig. 55 Inboard Brake Shoe**

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

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

(3) Install the brake rotor on the hub, (Fig. 53) making sure it is squarely seated on face of hub.

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

NOTE: The inboard and outboard brake shoes are not common, refer to (Fig. 56) for inboard and outboard brake shoe assembly identification.

NOTE: When installing inboard brake shoe into caliper piston, be sure brake shoe is positioned squarely against the face of the caliper piston.

REMOVAL AND INSTALLATION (Continued)

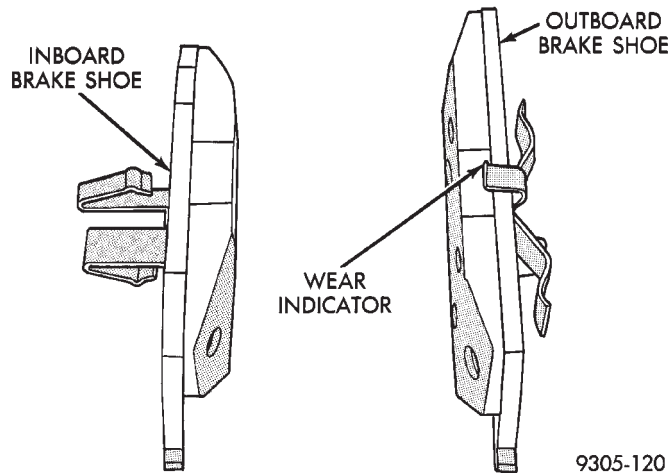


Fig. 56 Front Brake Shoe Assembly Identification

(5) Install the new inboard brake shoe assembly into the caliper piston by firmly pressing it into bore of caliper piston with thumbs (Fig. 55).

(6) Slide the new outboard brake shoe assembly onto the caliper assembly (Fig. 57).

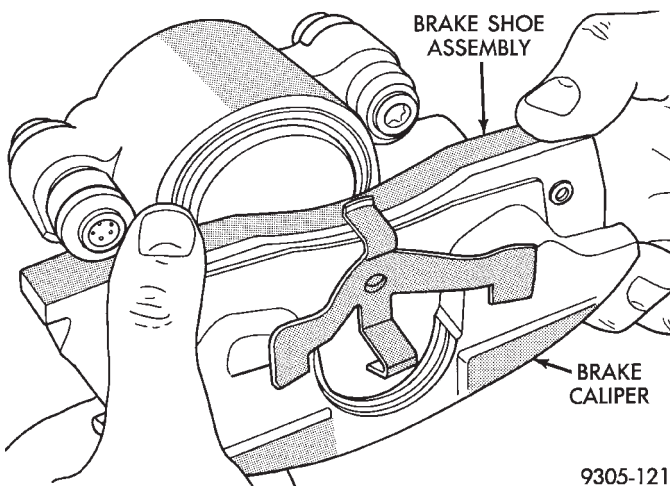


Fig. 57 Installing Outboard Brake Shoe Assembly

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

(7) Carefully position caliper and brake shoes on steering knuckle, using the reversed removal procedure (Fig. 53).

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

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

(9) Install the wheel and tire assembly.

(10) Tighten the wheel mounting stud lug 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.).

(11) Remove jackstands or lower hoist..

CAUTION: Before vehicle is moved after performing a service procedure on the vehicle brake system, pump the brake pedal several times to insure the vehicle has a firm brake pedal that is adequate to stop the vehicle.

(12) 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 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 AIR-TIGHT 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. Should be done in such a way as to avoid deformation of the disc and scratching or nicking of brake linings.

REMOVAL AND INSTALLATION (Continued)

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 2 caliper assembly to adapter guide pin bolts (Fig. 58).

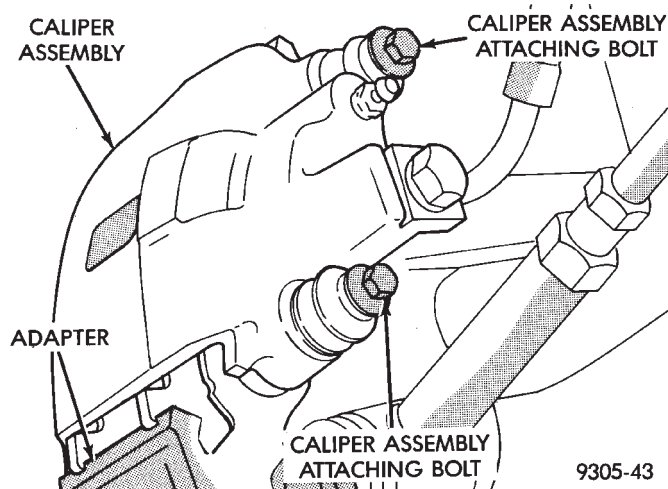


Fig. 58 Caliper Guide Pin Bolts

(4) Remove caliper from adapter using the following procedure. First rotate top of caliper away from adapter. Then lift caliper assembly off bottom abutment of adapter to remove it from the vehicle (Fig. 59).

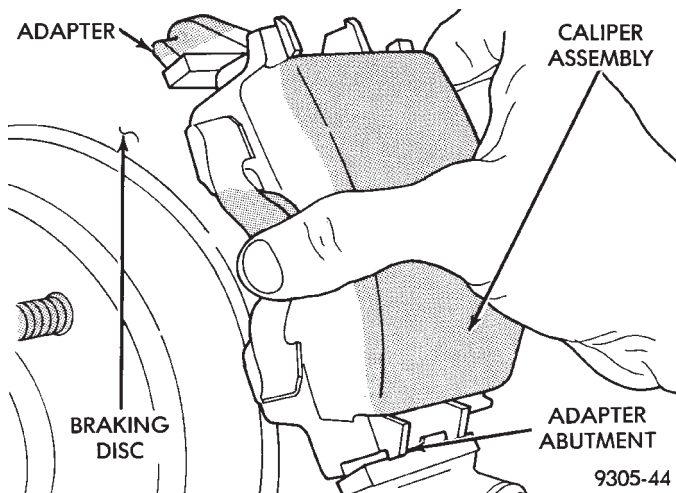


Fig. 59 Removing / Installing Caliper

(5) Support caliper assembly firmly from rear strut to prevent weight of caliper from damaging the flexible brake hose (Fig. 60).

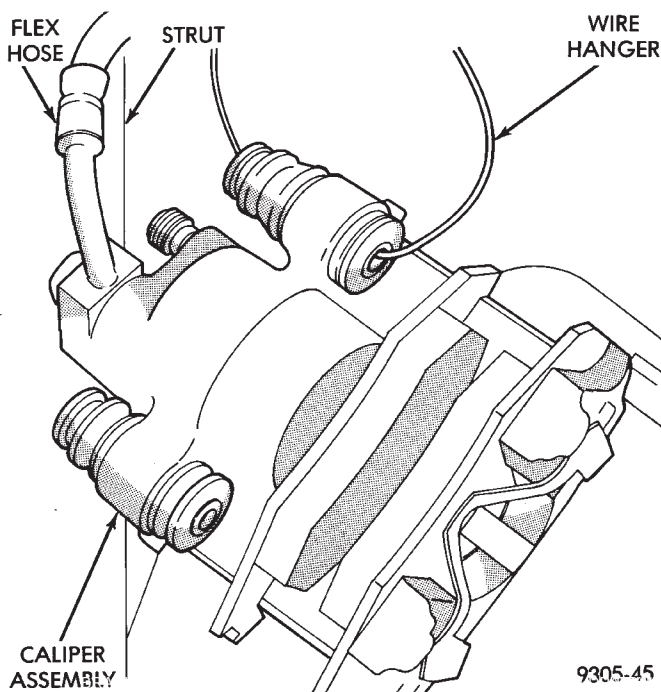


Fig. 60 Storing Caliper

(6) Remove the rear rotor from the hub by pulling it straight off the wheel mounting studs (Fig. 61).

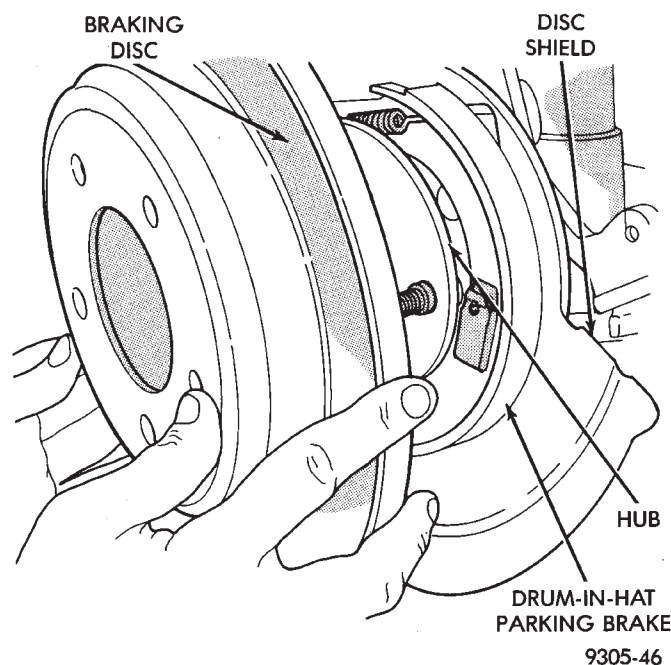
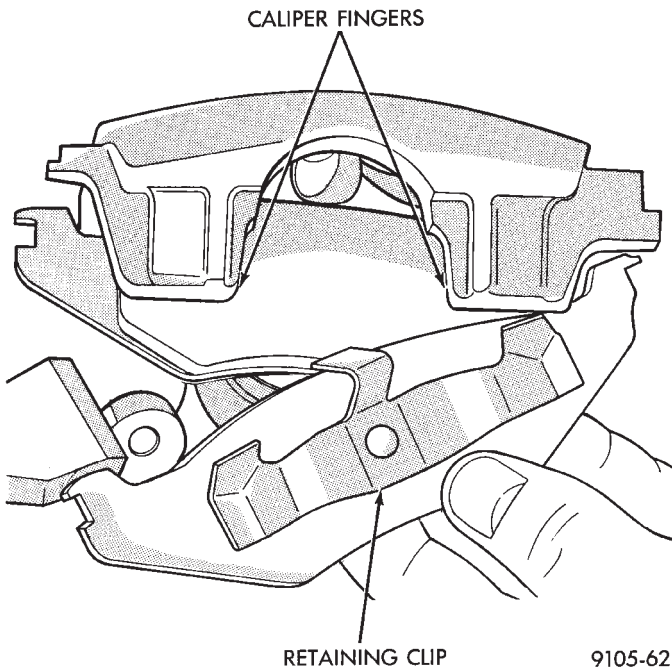


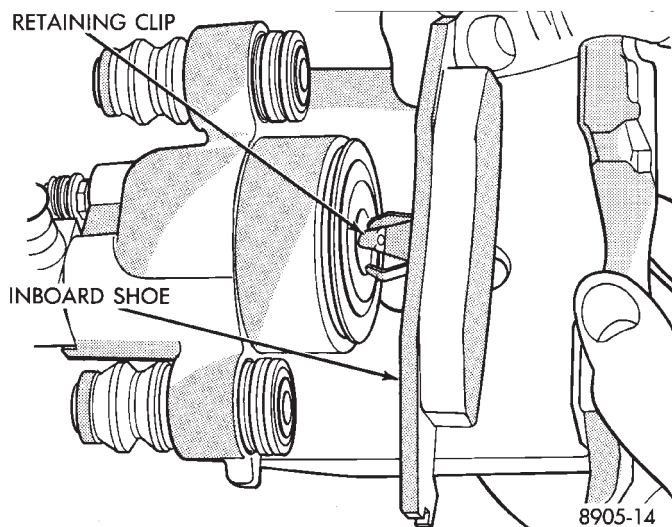
Fig. 61 Removing / Installing Rear Rotor

(7) Remove outboard brake shoe, by prying brake shoe retaining clip over raised area on caliper and sliding the shoe off the caliper (Fig. 62).

REMOVAL AND INSTALLATION (Continued)

**Fig. 62 Removing / Installing Outboard Brake Shoe**

(8) Pull inboard brake shoe away from piston, until the retaining clip is free from the cavity in the piston (Fig. 63).

**Fig. 63 Removing / Installing 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) Install the rear rotor on the hub, making sure it is squarely seated on the face of the hub (Fig. 61).
- (4) Remove the protective paper from the noise suppression gasket on both the inner and outer brake shoe assemblies (if equipped).
- (5) Install the new inboard brake shoe assembly into the caliper piston by firmly pressing into piston bore with thumbs. Be sure inboard brake shoe assembly is positioned squarely against the face of the caliper piston (Fig. 63).
- (6) Slide the new outboard brake shoe assembly onto the caliper assembly (Fig. 62).

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.

- (7) Carefully lower caliper and brake shoes over rotor and onto adapter, reversing the removal procedure (Fig. 59).

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

- (8) Install the caliper guide pin bolts. Tighten the guide pin bolts to a torque of 22 N·m (192 in. lbs.).
- (9) Install the wheel and tire assembly.
- (10) 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.).
- (11) 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.

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

REMOVAL AND INSTALLATION (Continued)

REAR BRAKE DRUM

REMOVE

- (1) Raise vehicle on jackstands or centered on a frame contact hoist. See Hoisting in the Lubrication And Maintenance group of this service manual.
- (2) Remove the wheel and tire from the vehicle.

NOTE: Further clearance to allow easier removal of the brake drum can be obtained by backing off the brake automatic adjuster screw.

- (3) Remove rubber plug from top of brake support plate.

- (4) Rotate automatic adjuster screw assembly with an upward motion, using a medium size screwdriver.

See adjusting rear service brakes in the Service Adjustments section in this group of the service manual for the specific adjustment procedure.

- (5) Remove rear brake drum from rear hub and bearing (Fig. 64).

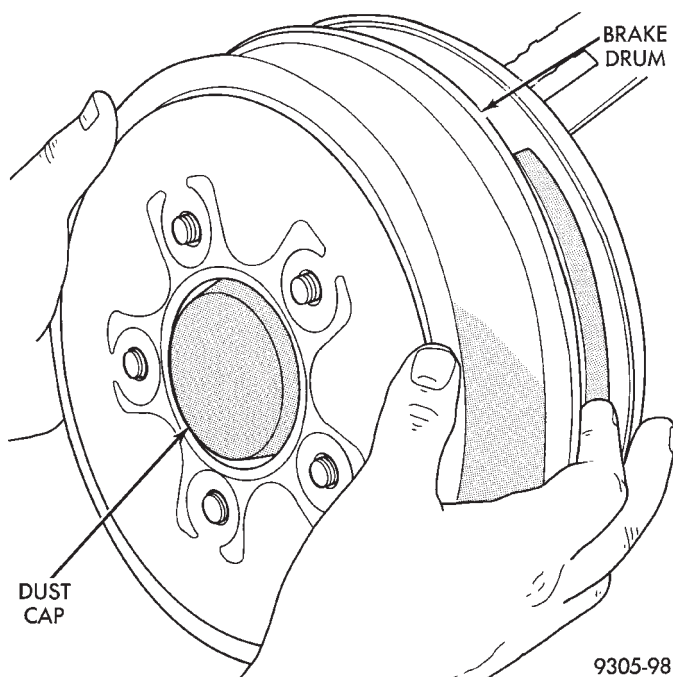


Fig. 64 Rear Brake Drum

- (6) Inspect brake linings for wear, shoe alignment and contamination.

INSTALL

- (1) Install rear brake drum assembly on rear hub and bearing assembly.
- (2) Install the wheel and tire assembly.
- (3) 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.).

- (4) Adjust rear brake shoes. See Rear Brake Shoe Adjustment in the Adjustments Section in this group of the service manual.

- (5) Lower vehicle.

REAR BRAKE SHOES

REMOVE

- (1) Remove rear hub and bearing assembly dust cap (Fig. 65).

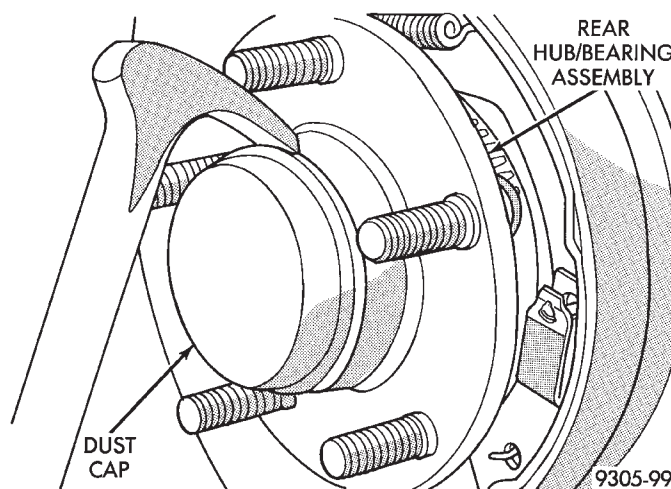


Fig. 65 Dust Cap Removal

- (2) Remove the rear hub and bearing assembly cotter pin, nut retainer, wave washer, hub and bearing retaining nut and the washer (Fig. 66) from rear spindle. Then remove rear hub and bearing assembly from spindle.

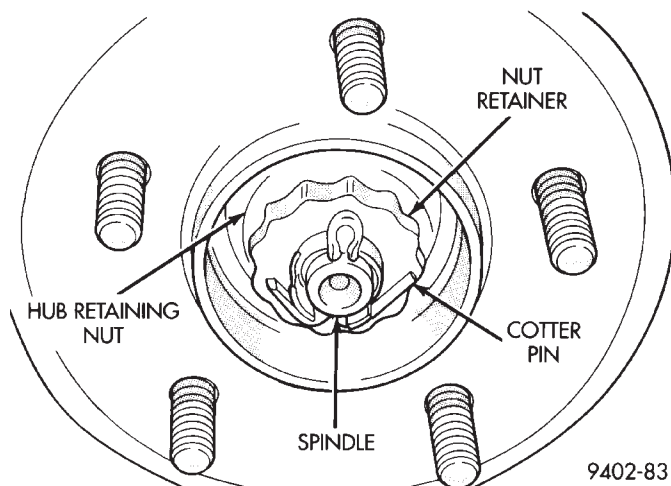


Fig. 66 Rear Hub And Bearing Retaining Nut Removal

- (3) Remove automatic adjuster spring from automatic adjuster lever (Fig. 67).
- (4) Rotate the automatic adjuster screw assembly so that each shoe assembly moves out far enough to be free from the wheel cylinder boots (Fig. 68).

REMOVAL AND INSTALLATION (Continued)

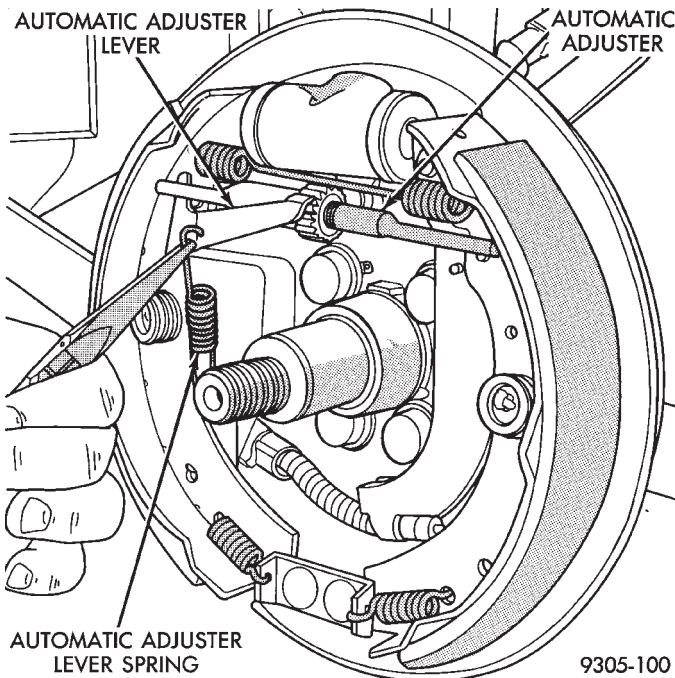


Fig. 67 Remove or Install Automatic Adjuster Lever Spring

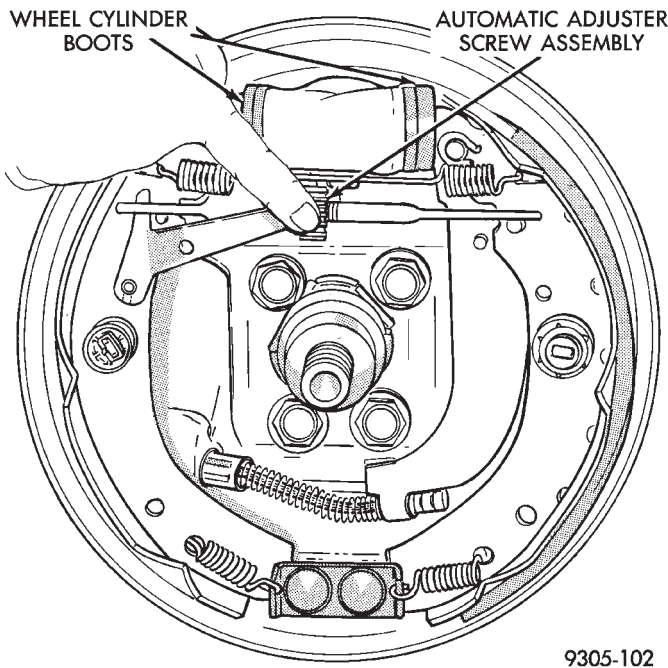


Fig. 68 Expand or Retract Adjuster Screw

NOTE: Only disconnect the park brake cable on one side of the vehicle at a time. Failure to do so will result in high efforts required to connect park brake cables to equalizer or park brake lever.

(5) Disconnect parking brake cable from parking brake lever (Fig. 69).

(6) Remove both lower brake shoe assembly to anchor plate springs (Fig. 70).

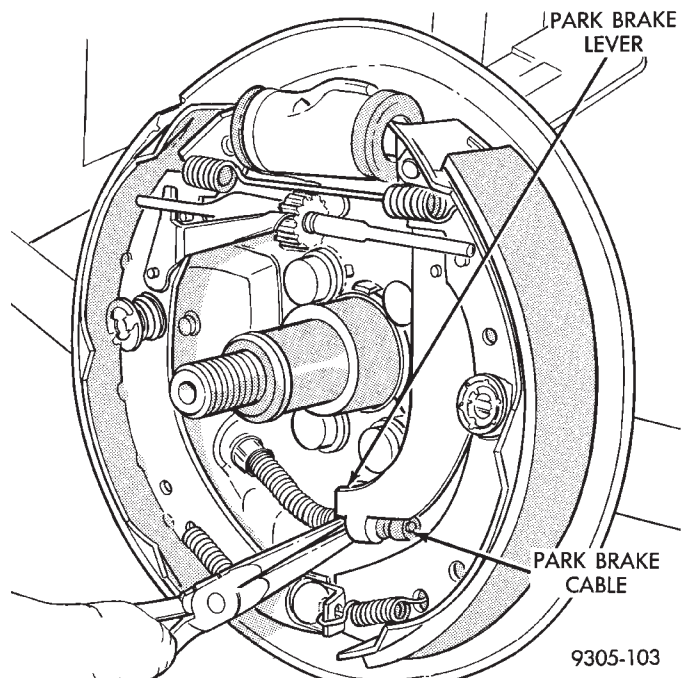


Fig. 69 Remove / Install Parking Brake Cable

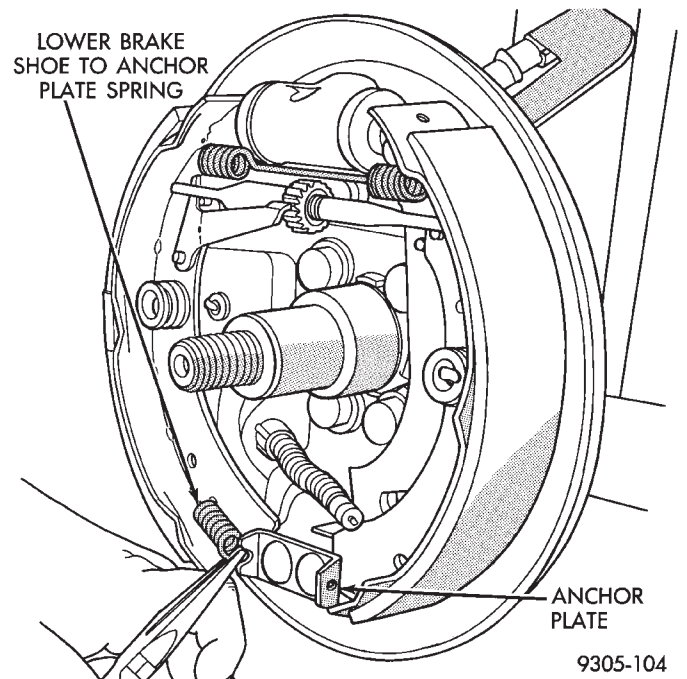


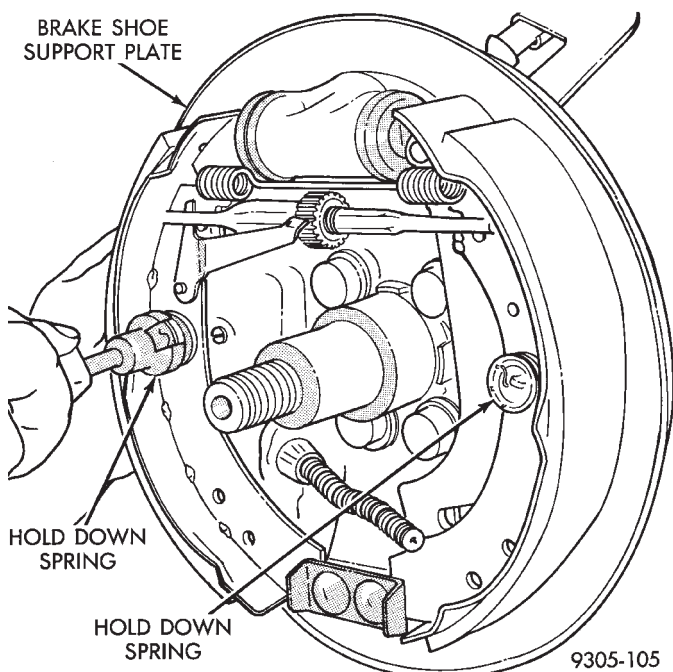
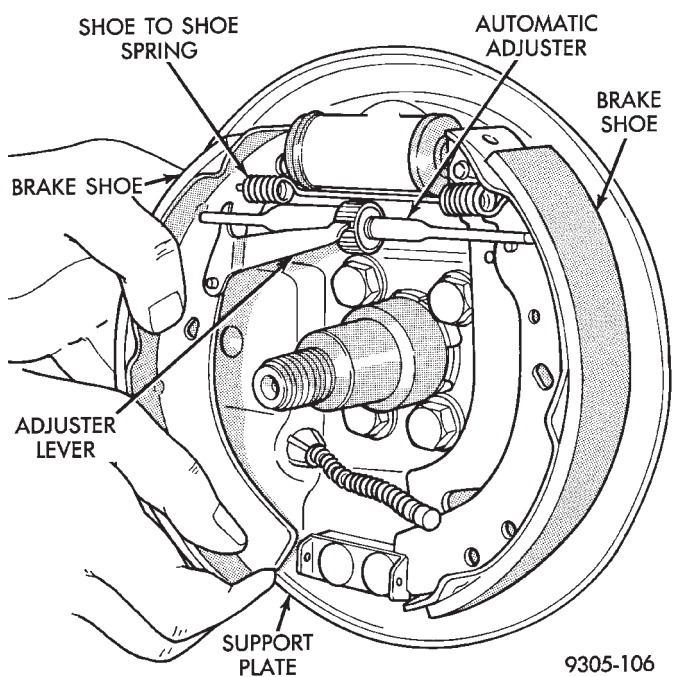
Fig. 70 Brake Shoe To Anchor Plate Spring

(7) Remove the 2 brake shoe assembly to support plate hold down springs from brake shoe assemblies (Fig. 71).

(8) Remove brake shoe upper shoe to shoe return spring, automatic adjuster and adjuster lever from brake shoe support plate as an assembly (Fig. 72).

(9) After brake shoe assemblies are removed from brake support plate. Separate brake shoe assemblies from automatic adjuster mechanism (Fig. 73).

REMOVAL AND INSTALLATION (Continued)

**Fig. 71 Remove or Install Holddown Springs****Fig. 72 Remove or Install Brake Shoe Assemblies**

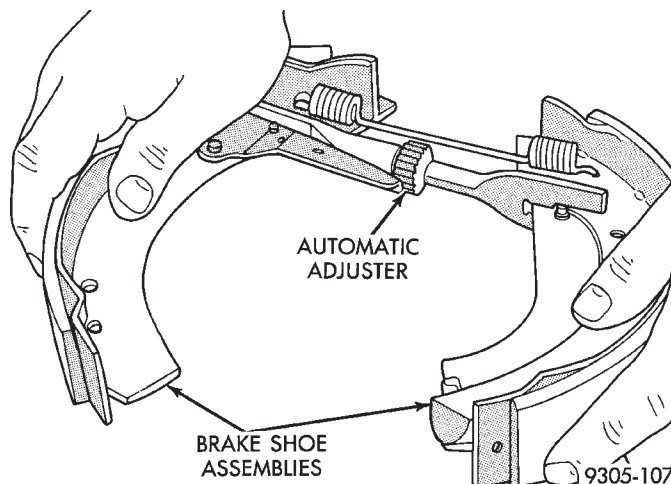
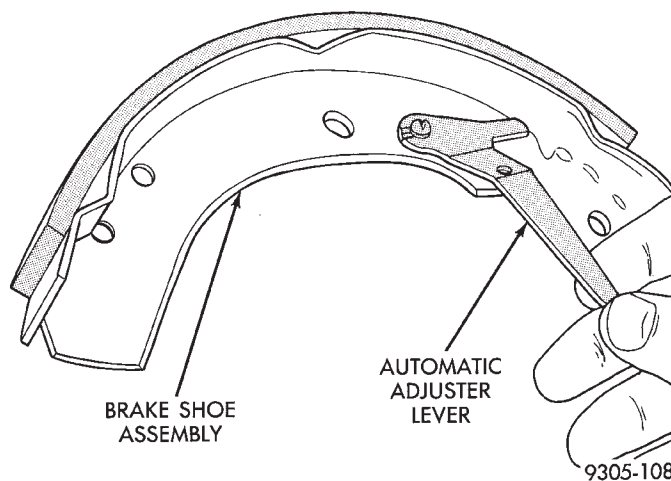
(10) Remove automatic adjuster lever from leading brake shoe (Fig. 74).

CLEANING AND INSPECTION

Clean metal portion of brake shoes. Check to see if shoes are bent.

Lining should show contact across entire width and from heel to toe, otherwise replace.

Shoes with lack of contact at toe or heel may be improperly ground.

**Fig. 73 Remove Brake Shoe Assemblies From Adjuster****Fig. 74 Automatic Adjuster Lever**

Clean and inspect support and adjusting screws. Apply a thin coat of Mopar Multi-Purpose Lubricant or equivalent to the threads of the self adjuster. Replace adjusting screw if corroded.

If old springs have overheated or are damaged, replace them. Overheating indication is distorted end coils.

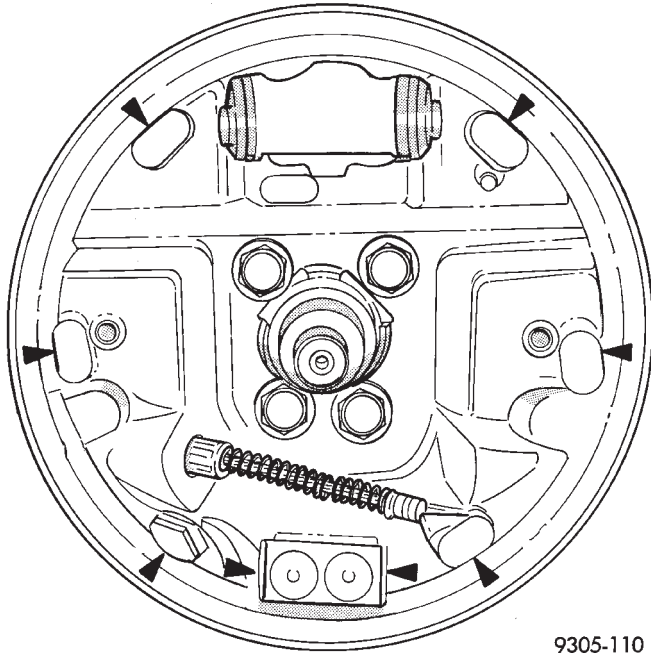
INSTALL

(1) Lubricate the eight shoe contact areas on the support plate and anchor using Mopar Multi-Purpose Lubricant or equivalent (Fig. 75).

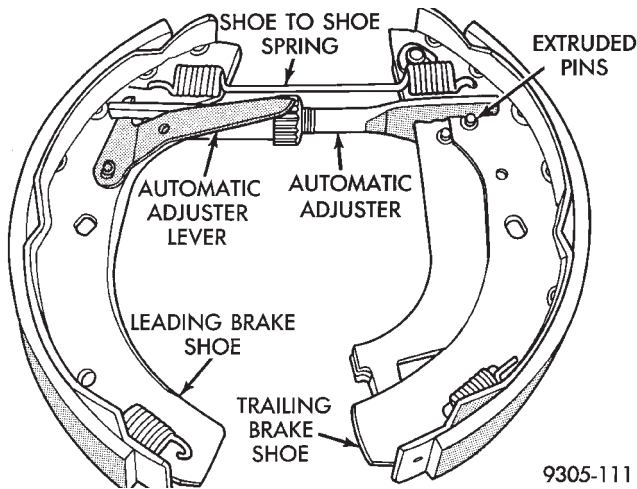
(2) Assemble leading and trailing brake shoe assemblies, top shoe to shoe spring, automatic adjuster lever and automatic adjuster (Fig. 76), before mounting on vehicle. Be sure automatic adjuster ends are above extruded pins in web of brake shoes as shown in (Fig. 76).

(3) Install the pre-assembled brake shoe assembly on the brake support plate (Fig. 72).

REMOVAL AND INSTALLATION (Continued)



9305-110

Fig. 75 Brake Shoe Contact Areas on Support Plate

9305-111

Fig. 76 Rear Brake Shoes Assembled (Left Rear Shown)

- (4) Install the brake shoe assembly to brake support plate hold down springs (Fig. 71).
- (5) Install both lower brake shoe assembly to anchor plate return springs (Fig. 70).
- (6) Install park brake cable on park brake lever of trailing brake shoe (Fig. 69).
- (7) Rotate serrated adjuster nut to remove free play from the adjuster assembly (Fig. 68).
- (8) Install automatic adjuster lever spring, on leading brake shoe assembly and automatic adjuster lever (Fig. 67).
- (9) Install rear hub and bearing assembly on rear spindle. Install hub and bearing assembly washer and retaining nut. Tighten the hub and bearing assembly retaining nut to a torque of 168 N·m (124

ft. lbs.). Install wave washer, nut lock and cotter pin on spindle, and then the dust cap on the hub.

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

(11) Install the rear brake drums on the hubs. **After brake drums are installed pump brake pedal several times to partially adjust the brake shoe assemblies. When park brake pedal is released assure that both rear brakes are not dragging. This will verify proper operation of the self-adjust parking brake.**

(12) Install the wheel and tire assemblies.

(13) 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.).

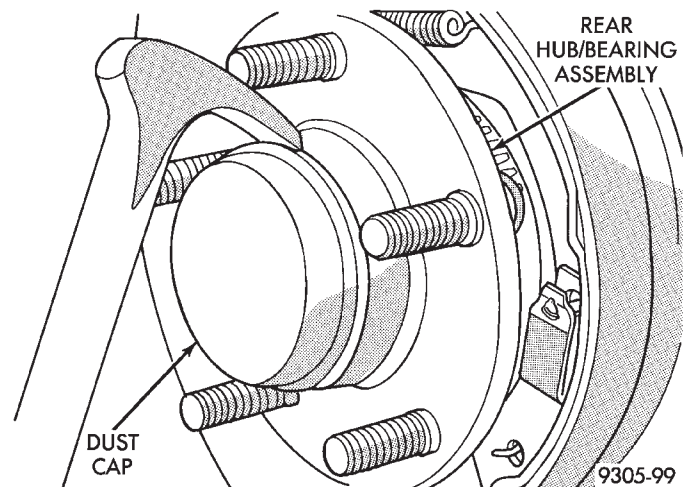
(14) Road test vehicle. The automatic adjuster will continue the brake adjustment during the road test of the vehicle.

REAR BRAKE SUPPORT PLATE**REMOVE**

(1) Raise vehicle on jackstands or a frame contact type hoist. See Hoisting in the Lubrication And Maintenance group of this service manual.

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

(3) Remove rear hub and bearing assembly dust cap (Fig. 77).



9305-99

Fig. 77 Dust Cap Removal

(4) Remove the rear hub and bearing assembly cotter pin, nut retainer, wave washer, hub and bearing retaining nut and washer (Fig. 78) from the rear spindle. Then remove rear hub and bearing assembly from spindle.

(5) Remove the rear brake shoes from the brake support plate. Refer to Rear Brake Shoes in the Removal And Installation Section in this group of the

REMOVAL AND INSTALLATION (Continued)

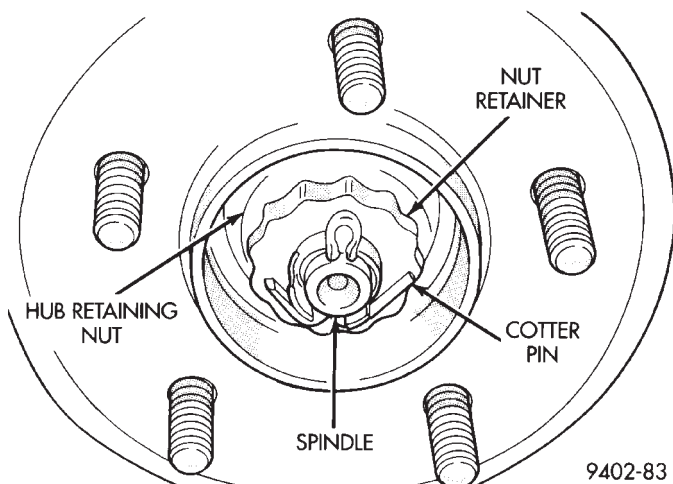


Fig. 78 Rear Hub And Bearing Retaining Nut

service manual for the proper brake shoe removal procedure.

(6) Position a 1/2 box wrench over the retainer fingers on the end of the parking brake cable (Fig. 79). Compress cable housing retaining fingers and start housing out of support plate (Fig. 79). Remove wrench when retainer is free from the park brake cable mounting hole in the rear brake support plate. Alternate method is to use a aircraft type hose clamp over cable housing end fitting compressing the three fingers.

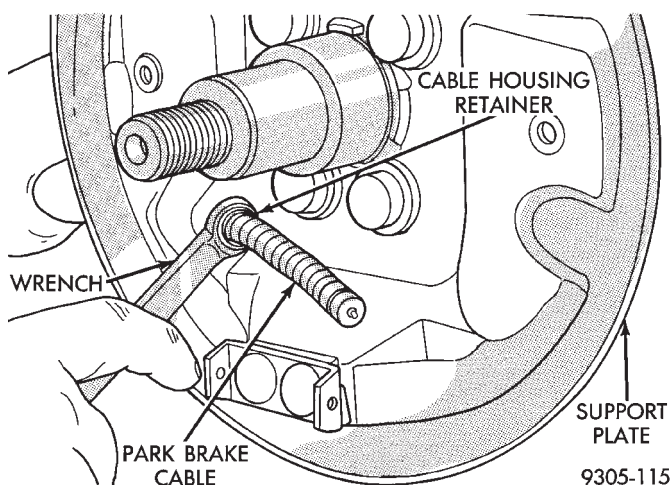


Fig. 79 Removing Park Brake Cable From Support Plate

(7) Remove the brake flex hose from the wheel cylinder, and if equipped the flex hose bracket from the brake support plate.

(8) Remove brake support plate attaching bolts and washers. Separate the brake support plate from rear suspension knuckle casting.

INSTALL

(1) Install support plate and gasket on rear suspension knuckle. Tighten the support plate attaching bolts to a torque of 115 N·m (85 ft. lbs.).

(2) Insert parking brake cable end fitting into the brake support plate.

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

(4) Attach parking brake cable to parking brake lever on trailing brake shoe.

(5) Connect brake hose tube to wheel cylinder and attach bracket to support plate. Tighten brake tube to wheel cylinder fitting to 17 N·m (145 in. lbs.).

(6) Install rear hub and bearing assembly on rear spindle. Install hub and bearing assembly washer and retaining nut. Tighten the hub and bearing assembly retaining nut to a torque of 168 N·m (124 ft. lbs.). Install the wave washer, nut lock, and a new cotter pin on the rear spindle. Install the dust cap on the rear hub.

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

(8) Install rear brake drum on the hub.

(9) Adjust and bleed service brakes. Adjust parking brake.

(10) Install the wheel and tire assembly. 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.).

(11) Pump the brake pedal several times to achieve the final adjustment of the brake shoes.

(12) Road test vehicle to ensure proper function of the vehicle's brake system.

REAR BRAKE WHEEL CYLINDER

REMOVE

(1) Raise vehicle on jackstands or a frame contact type hoist. See Hoisting in the Lubrication And Maintenance group of this service manual.

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

(3) Remove rear hub and bearing assembly dust cap (Fig. 80).

(4) Remove rear hub and bearing assembly cotter pin, nut retainer, wave washer, hub/bearing retaining nut and the washer (Fig. 81) from rear spindle. Then remove rear hub and bearing assembly from spindle.

(5) Remove the rear brake shoes from the brake support plate. Refer to Rear Brake Shoes in the Removal And Installation Section in this group of the service manual for the proper brake shoe removal procedure.

REMOVAL AND INSTALLATION (Continued)

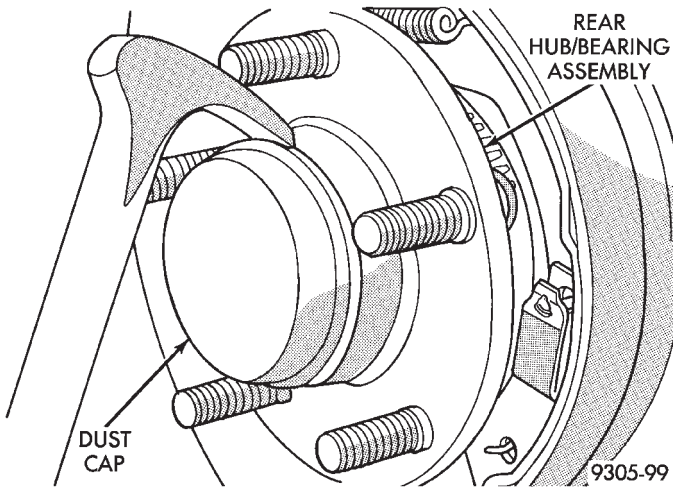


Fig. 80 Dust Cap Removal

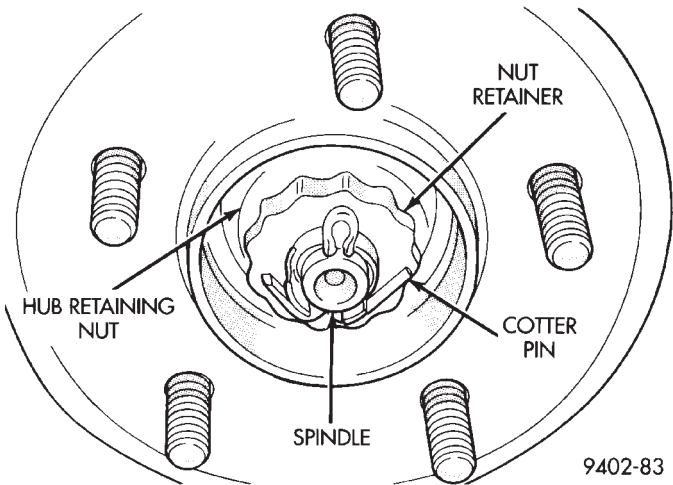


Fig. 81 Rear Hub And Bearing Retaining Nut

(6) Remove brake hose bracket from rear brake support plate (Fig. 82).

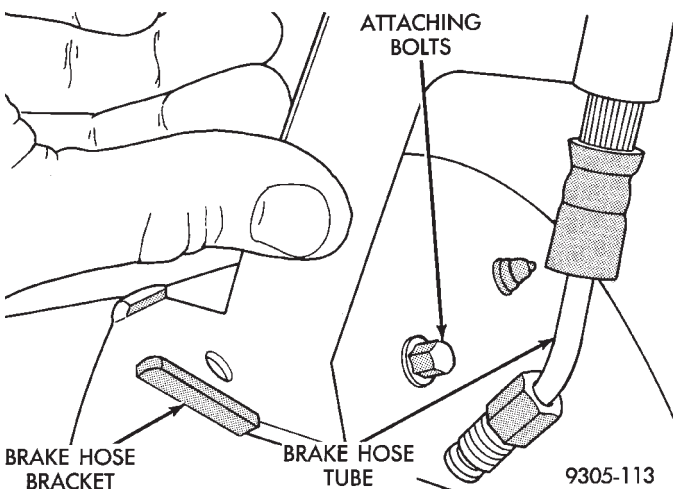


Fig. 82 Brake Hose Bracket And Tube

(7) Disconnect brake hose tube from wheel cylinder (Fig. 82).

(8) Remove rear wheel cylinder attaching bolts (Fig. 82).

(9) Pull wheel cylinder assembly off brake support plate (Fig. 83).

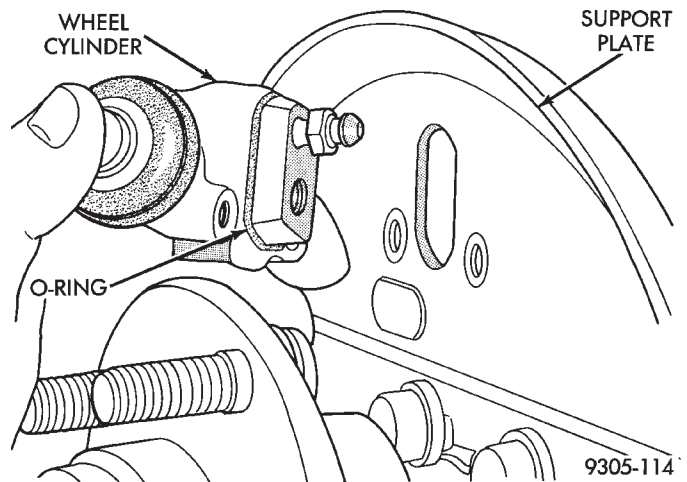


Fig. 83 Remove or Install Wheel Cylinder

INSTALL

(1) Install O-Ring on wheel cylinder as shown in (Fig. 83).

(2) Install wheel cylinder onto brake support plate. Tighten the wheel cylinder to brake support plate attaching bolts to 8 N·m (75 in. lbs.).

(3) Hand start hydraulic brake hose tube fitting to wheel cylinder. Attach brake hose bracket to support plate (Fig. 82). Tighten tube to wheel cylinder fitting to a torque of 17 N·m (145 in. lbs.).

(4) Install the rear brake shoes on the brake support plate. Refer to Rear Brake Shoes in the Removal And Installation Section in this group of the service manual for the proper brake shoe installation procedure.

(5) Install rear hub and bearing assembly on rear spindle. Install hub and bearing assembly washer and retaining nut. Tighten the hub and bearing assembly retaining nut to a torque of 168 N·m (124 ft. lbs.). Install the wave washer, nut retainer and a new cotter pin on rear spindle. Install the dust cap on the hub/bearing.

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

(7) Install the rear brake drum on the hub.

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

(9) Install the wheel and tire assembly. 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.).

REMOVAL AND INSTALLATION (Continued)

(10) Pump the brake pedal several times to achieve the final adjustment of the brake shoes.

(11) Road test vehicle to ensure proper function of the vehicle's brake system.

REAR HUB AND BEARING ASSEMBLY

REMOVE

(1) Raise vehicle on jackstands or 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 rear wheel and tire assembly.

(3) If vehicle is equipped with rear disc brakes, remove disc brake caliper from the adapter.

(4) Remove the brake drum or the rotor from the hub/bearing.

(5) Remove rear hub and bearing assembly dust cap (Fig. 84).

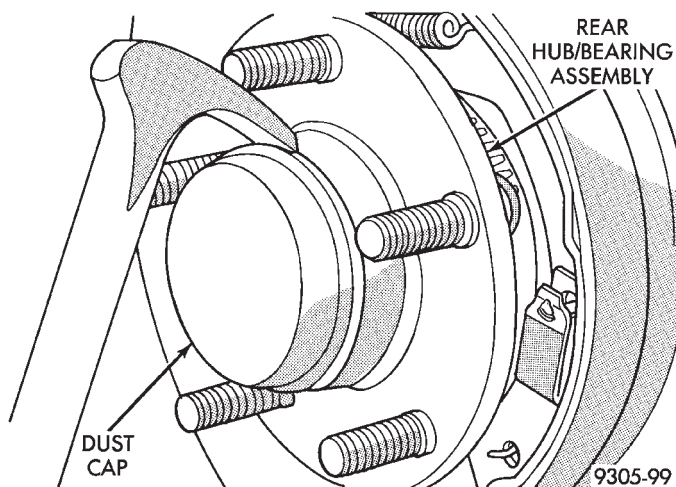


Fig. 84 Rear Hub And Bearing Dust Cap

(6) Remove rear hub and bearing assembly cotter pin, nut retainer and hub/bearing retaining nut and washer (Fig. 85). Then remove rear hub and bearing assembly from spindle.

INSTALL

(1) Install rear hub and bearing assembly on rear spindle. Install hub and bearing assembly washer and retaining nut (Fig. 85). Tighten the hub and bearing retaining nut to a torque of 168 N·m (124 ft. lbs.).

(2) Install wave washer, nut retainer and cotter pin on spindle.

(3) Install rear hub and bearing dust cap (Fig. 84).

(4) Install rear brake drum or rotor on hub.

(5) If vehicle is equipped with rear disc brakes, install rear disc brake caliper onto the adapter. Install the caliper assembly to adapter guide pin bolts and torque to 22 N·m (17 ft. lbs.).

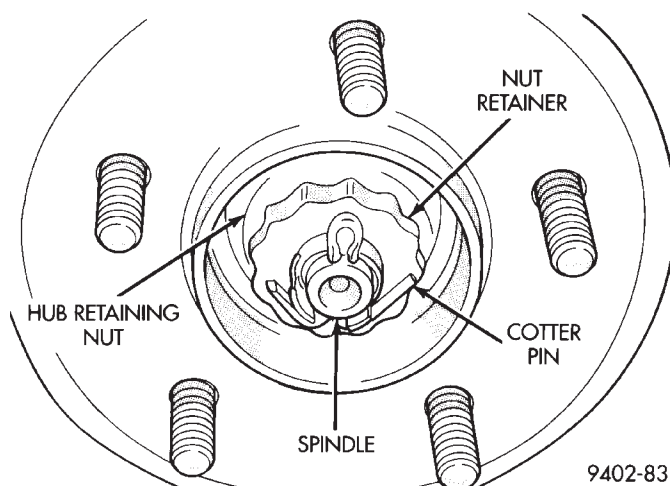


Fig. 85 Hub And Bearing Retaining Nut

(6) Install the wheel and tire assembly. 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.).

MASTER CYLINDER

REMOVE

(1) Disconnect primary and secondary brake tubes from master cylinder housing. Install plugs at brake tube outlets.

(2) Remove the 2 nuts (Fig. 86) attaching the master cylinder to the vacuum booster.

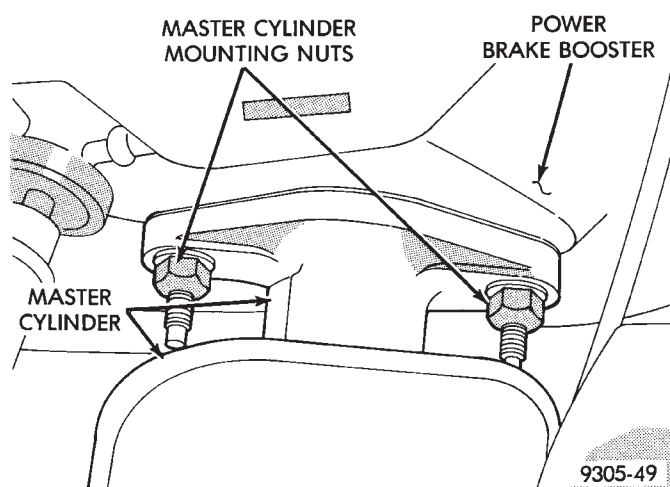


Fig. 86 Master Cylinder Mounting

(3) Slide master cylinder straight out from the vacuum booster.

REMOVAL AND INSTALLATION (Continued)

BLEEDING MASTER CYLINDER

NOTE: The master cylinder used on this vehicle, has ISO style flares and metric threads on the master cylinder outlet ports. When bleeding master cylinder, it will be necessary to fabricate bleeding tubes with the correct style flares and metric tube nuts.

- (1) Clamp the master cylinder in a vise (Fig. 87).
- (2) Attach Bleeding Tubes, Special Tool 8129 to master cylinder (Fig. 87). Position the bleed tubes in the fluid reservoir of the master cylinder so the outlets are below the surface of the brake fluid when the reservoir is filled to the proper level.
- (3) Fill reservoir with brake fluid conforming to DOT 3 specifications such as Mopar or an equivalent.
- (4) Using a wooden dowel per (Fig. 87), fully depress master cylinder pistons slowly then release allowing pistons to return to the released position. Repeat several times until all air bubbles are expelled.

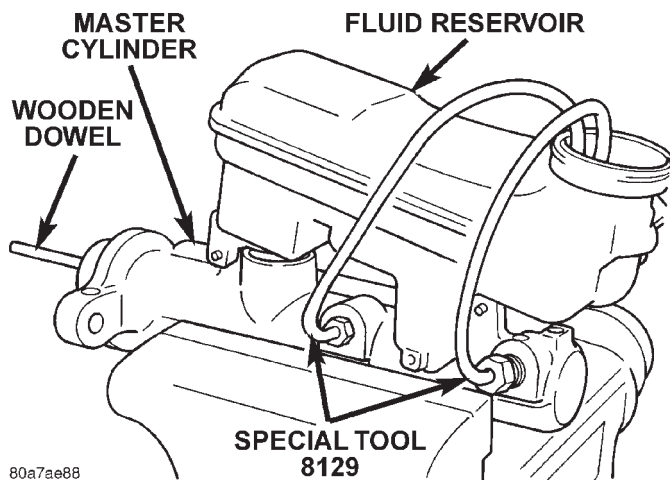


Fig. 87 Bleeding Master Cylinder

- (5) Remove bleeding tubes from master cylinder. Plug outlet ports of master cylinder and install cap on reservoir.
- (6) Remove master cylinder from vise and install on power brake vacuum booster.

NOTE: It is not necessary to bleed the entire hydraulic system after replacing the master cylinder, providing that the master cylinder has been adequately bled and filled upon installation.

INSTALL

- (1) Install master cylinder on studs of vacuum booster, aligning the vacuum booster push rod with master cylinder piston.

- (2) Install the master cylinder mounting nuts (Fig. 86). Tighten the nuts to a torque of 28 N·m (250 in. lbs.).

- (3) Connect brake tubes to master cylinder primary and secondary ports. Tighten fittings to 17 N·m (145 in. lbs.) torque.

VACUUM BOOSTER

REMOVE

- (1) Remove both wiper arm assemblies.
- (2) Remove cowl panel cover to expose windshield wiper module.
- (3) Remove the 5 screws attaching the windshield wiper module to the dash panel. Remove the windshield wiper module from the vehicle.
- (4) Remove the 2 nuts (Fig. 88) attaching the master cylinder to the vacuum booster.

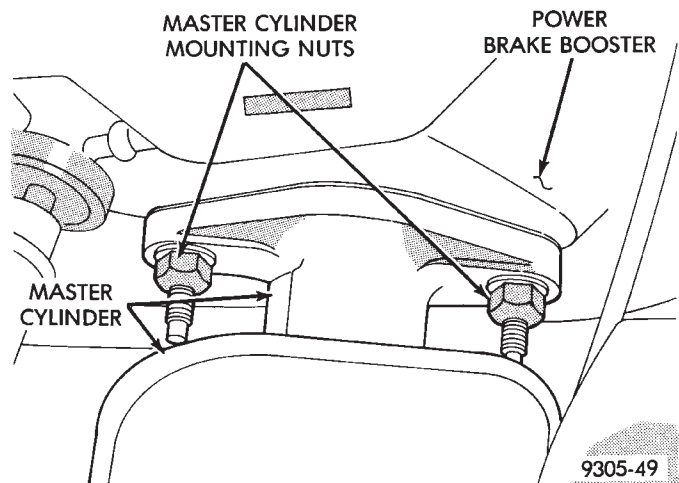


Fig. 88 Master Cylinder Mounting

- (5) Carefully slide master cylinder off vacuum booster with brake lines attached, and place it against left shock tower.

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

- (7) From under instrument panel, position a small screwdriver between the center tang on the power brake booster input rod to brake pedal pin retaining clip.

- (8) Rotate screwdriver enough to allow retainer clip center tang to pass over end of brake pedal pin and pull retainer clip off pin. **Discard retainer clip it is not to be reused, replace only with a new retainer clip.**

- (9) Remove the four nuts that attach the vacuum booster to the vehicle dash panel. Nuts are accessible from under the dash panel in the area of the steering column and pedal bracket (Fig. 89).

REMOVAL AND INSTALLATION (Continued)

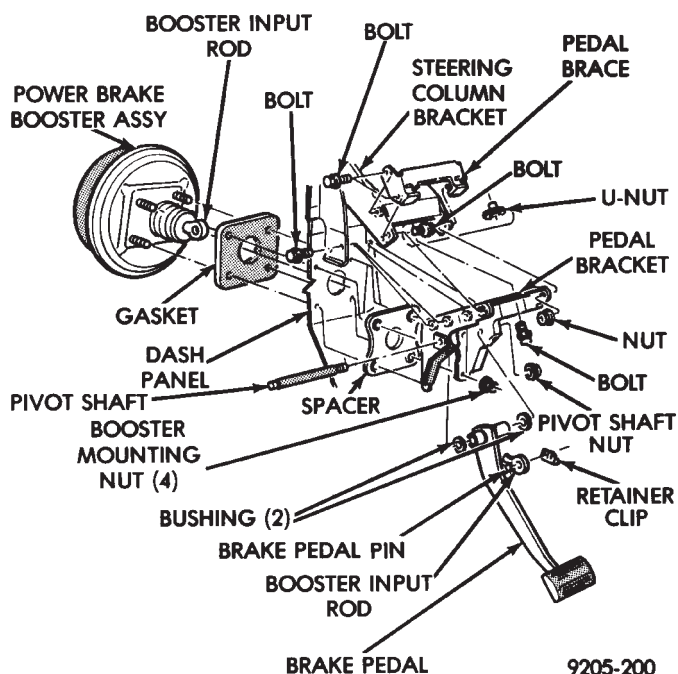


Fig. 89 Power Brake Booster Mounting

(10) Slide the vacuum booster up and to the right (mounting holes are slotted) on the dash panel, then tilt outboard and up to remove from vehicle (Fig. 90).

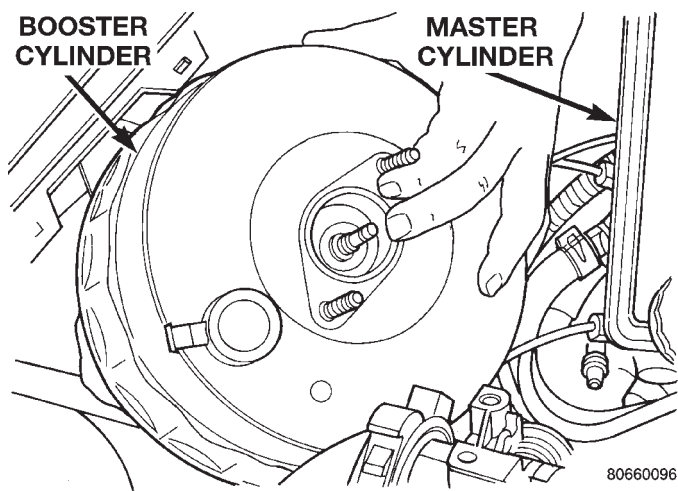


Fig. 90 Removing Vacuum Booster

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

INSTALL

- (1) Position vacuum booster on dash panel.
- (2) Install and tighten the 4 power brake booster to dash panel mounting nuts (Fig. 89) to 29 N·m (250 in. lbs.) torque.
- (3) Carefully position master cylinder on vacuum booster.

(4) Install and tighten the 2 master cylinder to vacuum booster mounting nuts (Fig. 88) to 29 N·m (250 in. lbs.) torque.

(5) Connect all vacuum hoses onto the vacuum booster check valve.

(6) Using lubriplate, or equivalent, coat the bearing surface of pedal pin (Fig. 89).

(7) Connect vacuum booster input rod to brake pedal pin and install a **NEW** retainer clip. **Use only a new retainer clip DO NOT USE the old clip.**

(8) Check stop light operation.

(9) Install the windshield wiper module back into the dash panel opening. Install the 5 windshield wiper module attaching bolts and securely tighten.

(10) Install cowl panel cover.

(11) Install the windshield wiper arm assemblies back on pivots. Connect windshield washer hoses.

CHASSIS BRAKE TUBES AND HOSES

Always use factory recommended brake hose to ensure quality, correct length and superior fatigue life. Care should be taken to make sure that the tube and hose mating surfaces are clean and free from nicks and burrs. **Front and rear right and left side hoses, are not interchangeable.**

Connections should be correct and properly made. Use new copper seal washers on all connections using Banjo Bolts and tighten all fittings to their specified torques.

The flexible front hydraulic brake hose should always be installed on the vehicle by first attaching the Banjo connector to the caliper assembly. Then attach the remaining hose end bracket to the vehicle frame to minimize hose twisting. Then hand start the steel brake tube fitting into the hose end fitting. Tighten all attachment screws and tube fittings to specified torque. The frame bracket is keyed so that it will only fit one way.

On vehicles equipped with rear drum brakes, first install rear brake flex hose into wheel cylinder then attach bracket to brake support plate. Then attach brake hose end bracket to vehicle frame to minimize hose twisting. Then hand start the steel brake tube fitting into the hose end fitting. Tighten all attachment screws and tube fittings to their specified torque (See Specifications Section) at the end of this group for the required fitting torques.

Vehicles equipped with rear disc brakes have brake flex hoses attached to the brake caliper on each side of vehicle. The brake flex hose should be first attached to the Banjo bolt at the caliper and then secured the flex hose/bracket at the vehicle frame. Then attach the steel brake tubing to the hose fitting. Tighten all attachment screws and brake line tube fittings to their specified torque (See Specifications Section).

REMOVAL AND INSTALLATION (Continued)

tions Section) at the end of this group for the required fitting torques.

PROPORTIONING VALVE

REMOVE

(1) Raise vehicle using a frame contact type host or correctly supported on jackstands. See Hoisting in the Lubrication and Maintenance group of this service manual for the required lifting procedure to be used for this vehicle.

(2) Remove the proportioning valve (Fig. 91) from the chassis brake tubes.

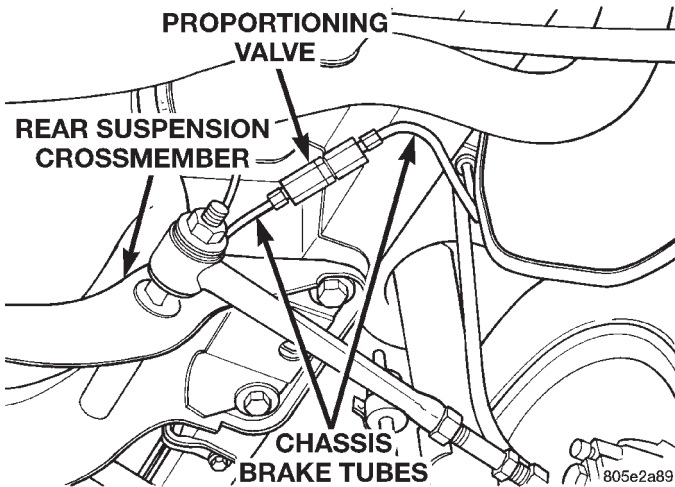


Fig. 91 Proportioning Valve

INSTALL

(1) Install the proportioning valve in the chassis brake tube and hand tighten tube nuts until fully seated into proportioning valve. Tighten the tube nuts to a torque of 17 N·m (145 in. lbs.).

(2) Bleed the affected brake line. See Bleeding Brake System in the Service Adjustments section of the manual for proper bleeding procedure.

(3) Lower vehicle.

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

PARK BRAKE PEDAL

REMOVE

(1) Reload the self adjuster mechanism of the park brake pedal. Use the procedure as described in Reloading Self Adjuster in Service Procedures Section in this group of the service manual.

(2) Remove the brake warning light ground wire from the switch on the park brake mechanism (Fig. 92).

(3) Using a screw driver, pry the park brake cable retaining clip (Fig. 92) from the park brake cable.

(4) Remove the 1 bolt holding park brake pedal assembly to door frame (Fig. 92). Loosen but do not

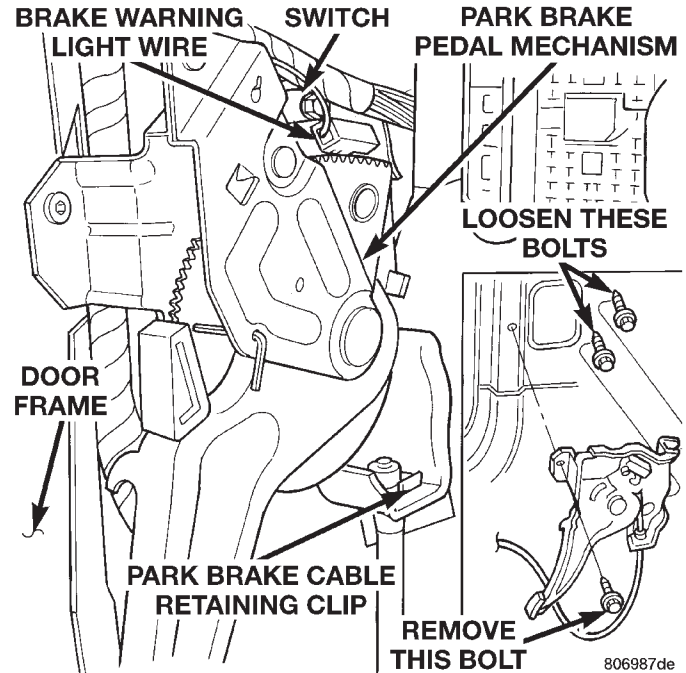


Fig. 92 Park Brake Pedal Mechanism

remove the 2 bolts attaching park brake pedal mechanism to inner body panel (Fig. 92).

(5) Remove park brake pedal mechanism and cable as an assembly from body of vehicle.

(6) After park brake pedal assembly is removed from vehicle body. Rotate park brake cable to align cable with notch in cable attaching hole on park brake pedal mechanism (Fig. 93). Lift lead slug of park brake cable, out of retaining hole in park brake mechanism, then remove park brake cable from park brake mechanism.

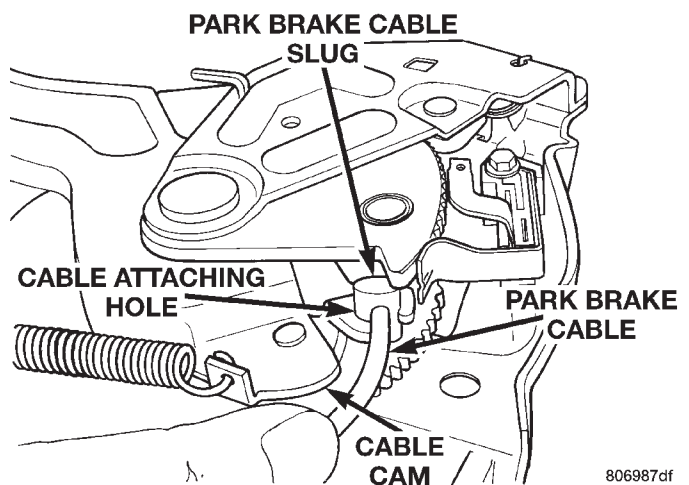


Fig. 93 Park Brake Cable Removal From Park Brake Mechanism

INSTALL

(1) Install park brake cable assembly, through cable mounting in park brake pedal mechanism.

REMOVAL AND INSTALLATION (Continued)

(2) Align park brake cable slug with attaching hole on park brake assembly (Fig. 93). Install park brake cable into cable attaching hole in park brake assembly, and rotate cable into place. Be sure cable is properly seated in the cam surface track in the foot lever assembly (Fig. 93).

(3) Install park brake cable to park brake pedal mechanism retaining clip (Fig. 94). Be sure retaining clip is fully installed on park brake cable. Install park brake pedal return spring (Fig. 94) before installing park brake pedal assembly back in vehicle.

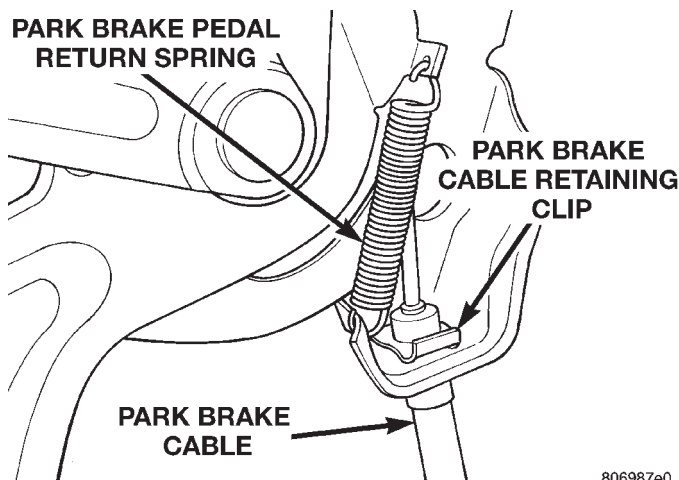


Fig. 94 Park Brake Cable Installed In Mechanism

(4) Install park brake pedal mechanism onto the 2 loosened mounting bolt on inner body panel (Fig. 92). Install the park brake pedal assembly retaining bolt into door frame (Fig. 92). Tighten all 3 park brake assembly mounting bolts to a torque of 27 N·m (19 ft. lbs.).

(5) Connect the brake warning light wire from vehicles wiring harness, onto switch located on park brake pedal mechanism (Fig. 92).

(6) Ensure that the park brake cable is properly routed in the cam surface track of the park brake pedal assembly (Fig. 93). Using a pair of pliers, firmly grasp the 1/8 inch allen wrench installed in the park brake mechanism (Fig. 95). Remove allen wrench from park brake pedal mechanism, using a firm and rapid pull. When allen wrench is removed from park brake pedal mechanism, the park brake mechanism and park brake cables will automatically adjust. **See parking brake adjustment procedure in this section of the service manual for complete parking brake adjustment procedure.**

(7) **When repairs are complete, adjust rear brakes before adjusting parking brake. On drum-in-hat type of rear disc brake adjust shoe diameter to 171.5 mm (6.75 inch).**

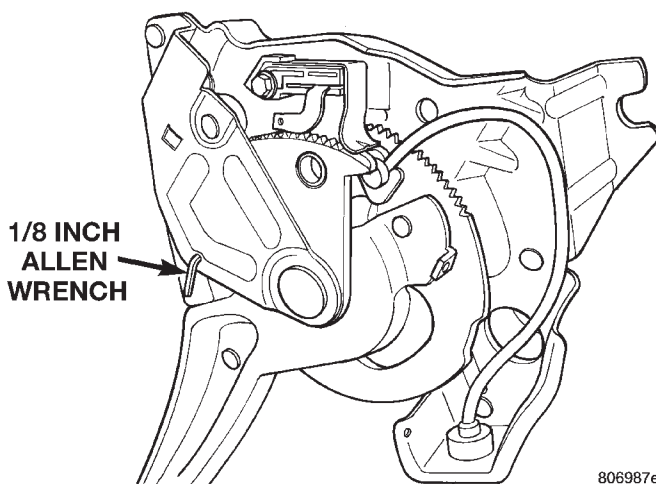


Fig. 95 Adjuster Locking Pin

PARK BRAKE FRONT CABLE (BENCH SEAT)

REMOVE

(1) Remove drivers seat assembly from vehicle. Refer to group 23 Body in this service manual for required seat, removal procedure.

(2) Remove rear seat lower cushion from vehicle. Refer to group 23 Body in this service manual for required lower seat cushion, removal procedure.

(3) Remove drivers side door opening sill molding. Remove drivers side cowl kick molding to expose park brake pedal mechanism (Fig. 96).

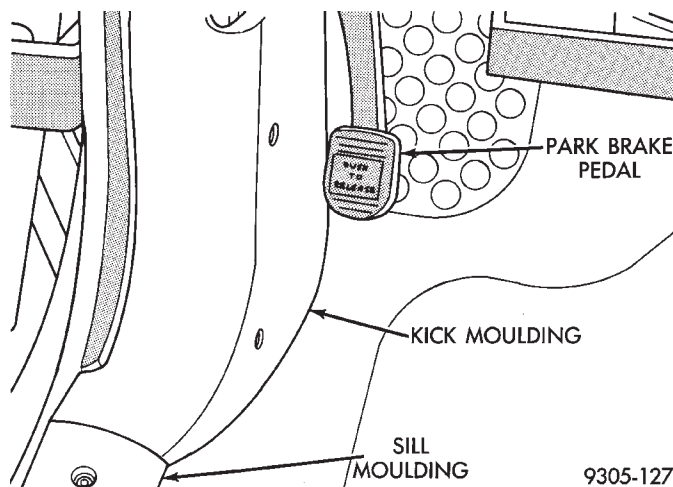


Fig. 96 Sill Molding And Kick Molding

NOTE: The throttle pedal and bracket have to be removed from the dash panel to allow the carpet to be folded back.

(4) Fold back carpeting to expose the front park brake cable, reaction bracket cover and equalizer. Remove equalizer cover from reaction bracket (Fig. 97).

REMOVAL AND INSTALLATION (Continued)

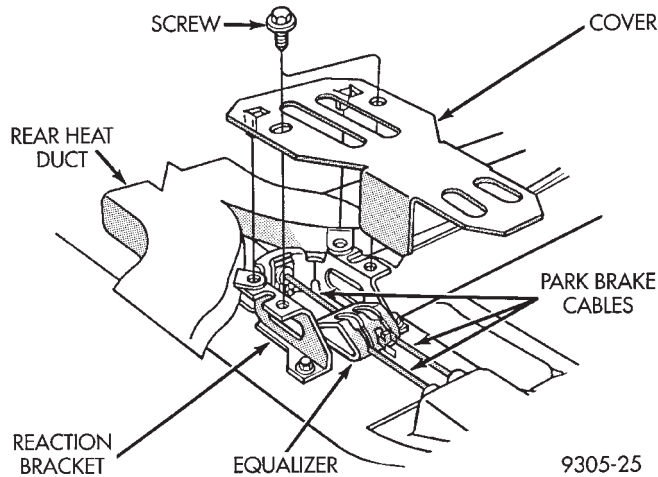


Fig. 97 Park Brake Equalizer And Cover

WARNING: PARK BRAKE PEDAL ASSEMBLY SELF ADJUSTER MECHANISM MUST BE RELOADED AND LOCKED TO REMOVE TENSION FROM PARK BRAKE CABLES. THIS MUST BE DONE BEFORE REMOVE THE FRONT PARK BRAKE CABLE FROM THE PARK BRAKE CABLE EQUALIZER. FAILURE TO DO THIS WILL MAKE ASSEMBLY EXTREMELY DIFFICULT AND COULD LEAD TO SERIOUS INJURY.

(5) Reload the self adjuster mechanism of the park brake pedal. Use the procedure as described in Reloading Self Adjuster in Service Procedures Section in this group of the service manual.

(6) Remove front park brake cable from park brake cable equalizer (Fig. 98).

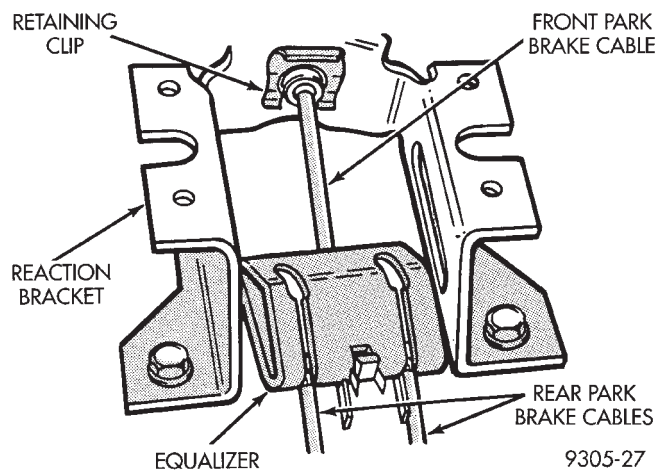


Fig. 98 Front Park Brake Cable Connection At Equalizer

(7) Remove the front park brake cable to reaction bracket retaining clip, by prying it off cable using a screwdriver (Fig. 99).

(8) Remove front park brake cable from reaction bracket (Fig. 100). Remove screw, attaching park brake cable routing clip to left front floor pan (Fig.

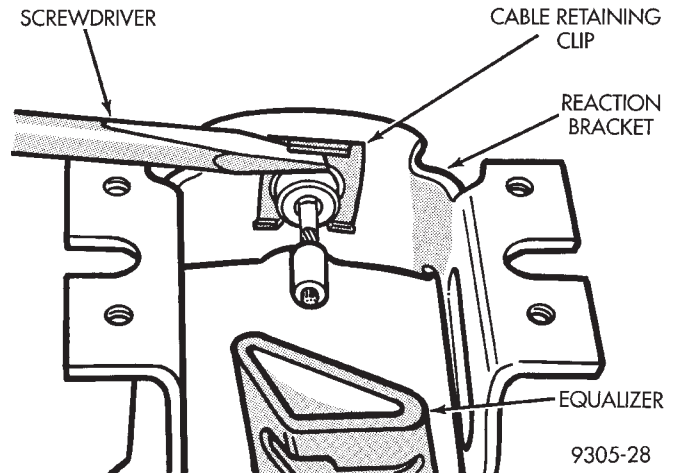


Fig. 99 Front Park Brake Cable Retaining Clip

100). Remove front park brake cable from the 2 routing clips attached to the floor pan crossmember (Fig. 100).

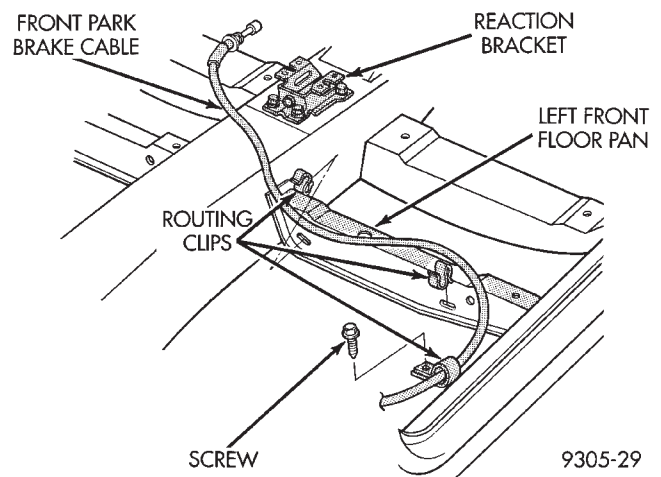


Fig. 100 Front Park Brake Cable Routing And Clipping

(9) Remove the bolt (Fig. 101) attaching park brake pedal assembly to left front door frame. Loosen but do not remove the 2 bolts (Fig. 101) attaching park brake pedal assembly to cowl panel. Unplug the brake warning light connector from switch on park brake pedal assembly. Remove park brake pedal mechanism and front park brake cable as an assembly.

REMOVAL AND INSTALLATION (Continued)

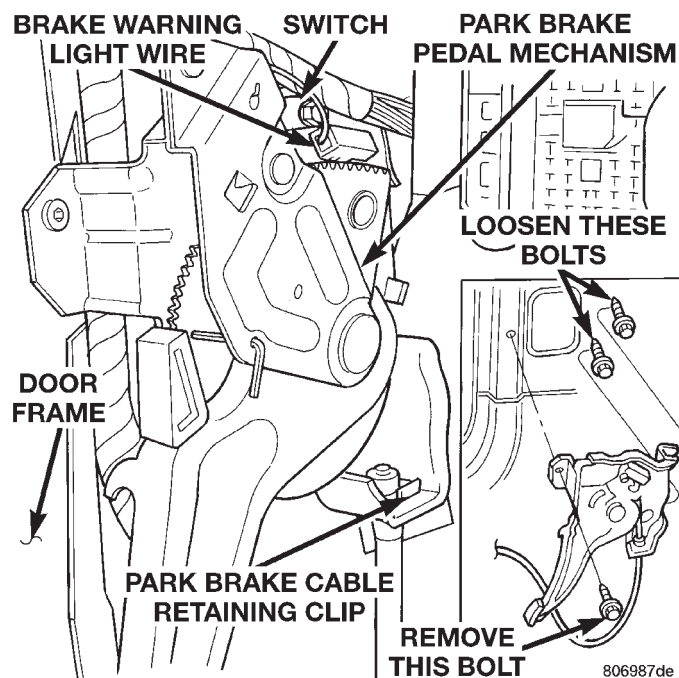


Fig. 101 Park Brake Pedal Assembly Mounting

WARNING: PARK BRAKE PEDAL ASSEMBLY SELF ADJUSTER MECHANISM MUST BE RELOADED AND LOCKED TO REMOVE TENSION FROM PARK BRAKE CABLE. THIS MUST BE DONE BEFORE ATTEMPTING TO REMOVE FRONT PARK BRAKE CABLE FROM PARK BRAKE PEDAL ASSEMBLY. FAILURE TO DO THIS WILL MAKE ASSEMBLY EXTREMELY DIFFICULT AND COULD LEAD TO SERIOUS INJURY.

(10) Remove park brake pedal from vehicle. Mount park brake pedal assembly in a vise. Remove front park brake cable to park brake assembly retaining clip (Fig. 102).

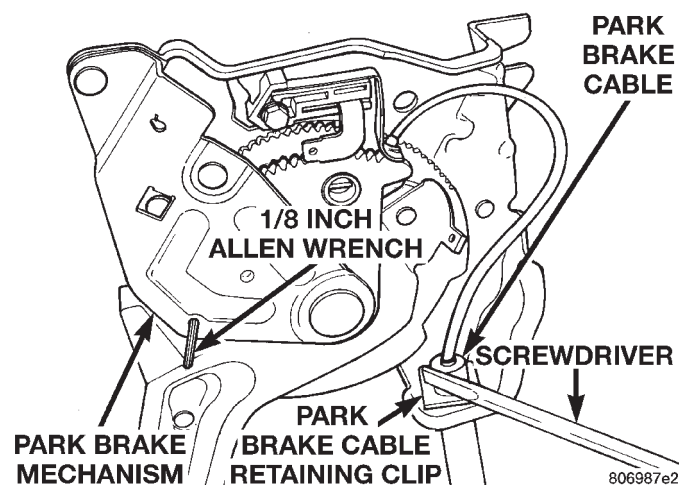


Fig. 102 Park Brake Cable Retaining Clip

(11) Rotate park brake cable aligning cable with notch in cable attaching hole on park brake pedal mechanism (Fig. 103). Lift park brake cable, out of hole in park brake mechanism. Remove park brake cable from park brake mechanism.

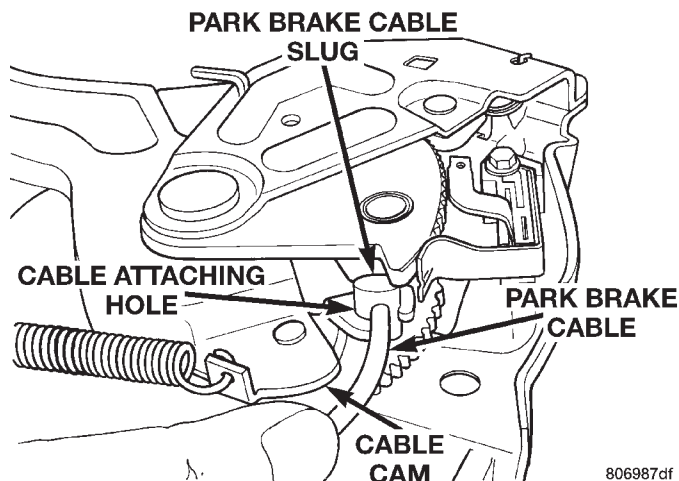


Fig. 103 Cable Removal / Installation

INSTALL

(1) Install park brake cable through hole in park brake pedal mechanism.

(2) Install park brake cable on park brake pedal assembly (Fig. 103). Install park brake cable into cable attaching hole in park brake assembly, and rotate cable into place. Be sure cable is properly seated in the cam surface track of foot lever assembly (Fig. 103).

(3) Install park brake cable to park brake pedal mechanism retaining clip (Fig. 104). Be sure retaining clip is fully installed on park brake cable.

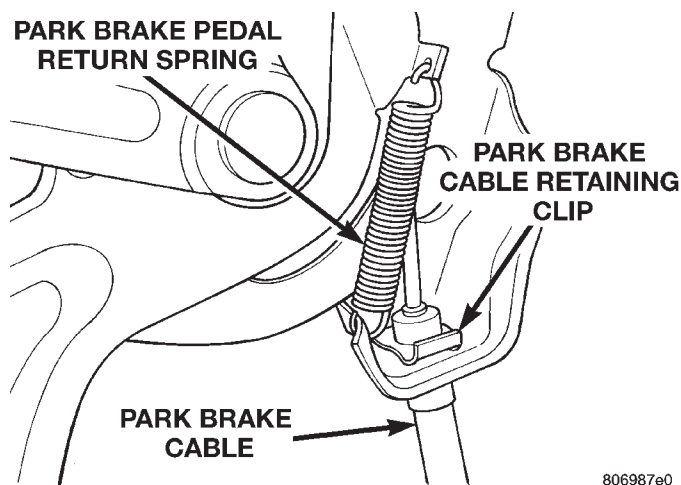


Fig. 104 Park Brake Cable Installed In Mechanism

(4) Install park brake pedal mechanism onto the 2 loosened mounting bolt on cowl panel (Fig. 101). Install the park brake pedal assembly retaining bolt

REMOVAL AND INSTALLATION (Continued)

into door frame (Fig. 101). Torque all 3 park brake assembly mounting bolts to 27 N·m (19 ft. lbs.).

(5) Connect the brake warning light wire from vehicles wiring harness, onto switch located on park brake pedal mechanism (Fig. 101).

(6) Route front park brake cable along floor of vehicle. Install end of front park brake cable into reaction bracket. Install front park brake cable to reaction bracket retaining clip. Tap retaining clip with hammer until fully installed on cable. Install front park brake cable into equalizer (Fig. 98).

(7) Install the park brake cable routing clip to floor pan attaching screw (Fig. 100). Torque the routing clip to floor pan attaching screw to 4 N·m (35 in. lbs.). Install front park brake cable into routing clips on floor pan crossmember (Fig. 100).

(8) Ensure that park brake cable is properly routed in cam surface track of park brake pedal assembly (Fig. 105). Using a pair of pliers, firmly grasp allen wrench previously installed in park brake mechanism (Fig. 106). Remove allen wrench from park brake pedal mechanism, using a firm and rapid pull. When allen wrench is removed from park brake pedal mechanism, the park brake mechanism and park brake cables will automatically adjust. **See parking brake adjustment procedure in this section of the service manual for complete parking brake adjustment procedure.**

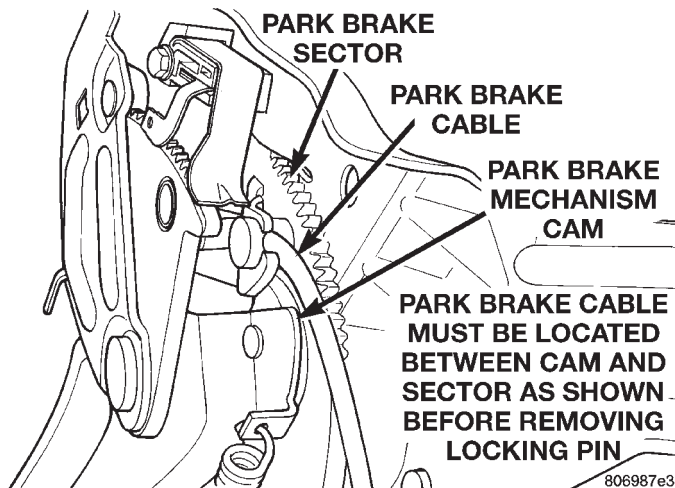


Fig. 105 Correct Park Brake Cable Routing

(9) Install equalizer cover back on reaction bracket (Fig. 97). Torque equalizer cover to reaction bracket mounting bolts to 10 N·m (88 in. lbs.). Fold carpeting back into position on left floor pan of vehicle. Install throttle pedal and bracket back on dash panel studs and install attaching nuts.

(10) Install drivers side cowl area kick molding back in vehicle. Install drivers side door opening sill molding (Fig. 96).

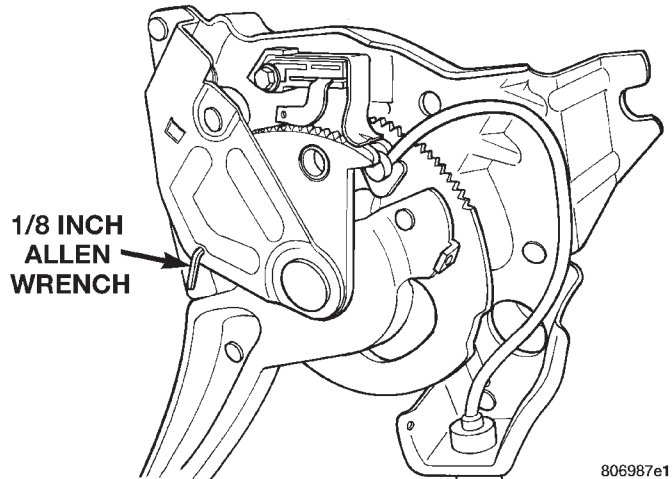


Fig. 106 Park Brake Pedal Lock Pin

(11) Install rear seat lower cushion back in vehicle. Refer to group 23 Body in this service manual for required lower seat cushion, installation procedure.

(12) Install drivers side seat assembly back vehicle. Refer to group 23 Body in this service manual for required seat, installation procedure.

(13) **When repairs are complete, adjust rear brakes before adjusting parking brake. See parking brake adjustment procedure in this section of the service manual for complete parking brake adjustment procedure.** On drum-in-hat type of rear disc brake adjust shoe diameter to 171.5 mm (6.75 inch).

PARK BRAKE FRONT CABLE (W/BUCKET SEATS)

REMOVE

(1) Remove drivers seat assembly from vehicle. Refer to group 23 Body in this service manual for required seat, removal procedure.

(2) Remove shift knob from floor shifter. Shift knob is removed by removing 3/32 in. allen head set screw located on drivers side of shift knob and pulling straight up on shift knob.

(3) Remove center console cover from vehicle. Refer to group 23 Body in this service manual for required procedure to remove center console.

(4) Remove drivers side door opening sill molding. Remove drivers side cowl kick molding to expose park brake pedal mechanism (Fig. 107).

(5) Remove rear console mounting bracket (Fig. 108) from park brake cable reaction bracket. Remove rear passenger compartment heat duct (Fig. 108) from vehicle for access to park brake cables.

NOTE: Note: The throttle pedal and bracket have to be removed from the dash panel to allow carpet to be folded back.

REMOVAL AND INSTALLATION (Continued)

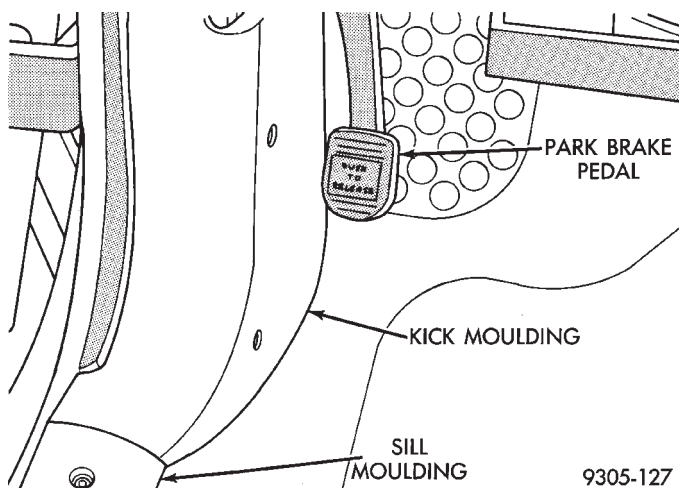


Fig. 107 Sill Molding And Kick Molding

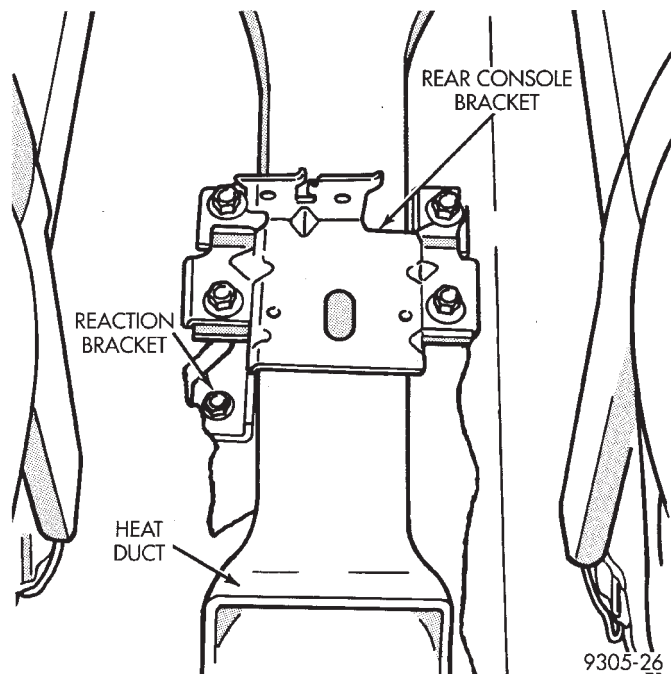


Fig. 108 Console Mounting Bracket And HeatDuct

(6) Fold back carpeting to expose front park brake cable and routing clips..

WARNING: PARK BRAKE PEDAL ASSEMBLY SELF ADJUSTER MECHANISM MUST BE RELOADED AND LOCKED TO REMOVE TENSION FROM PARK BRAKE CABLES. THIS MUST BE DONE BEFORE REMOVE THE FRONT PARK BRAKE CABLE FROM THE PARK BRAKE EQUALIZER. FAILURE TO DO THIS WILL MAKE ASSEMBLY EXTREMELY DIFFICULT AND COULD LEAD TO SERIOUS INJURY.

(7) Reload the self adjuster mechanism of the park brake pedal. Use the procedure as described in Reloading Self Adjuster in Service Procedures Section in this group of the service manual.

(8) Remove front park brake cable from park brake cable equalizer (Fig. 109).

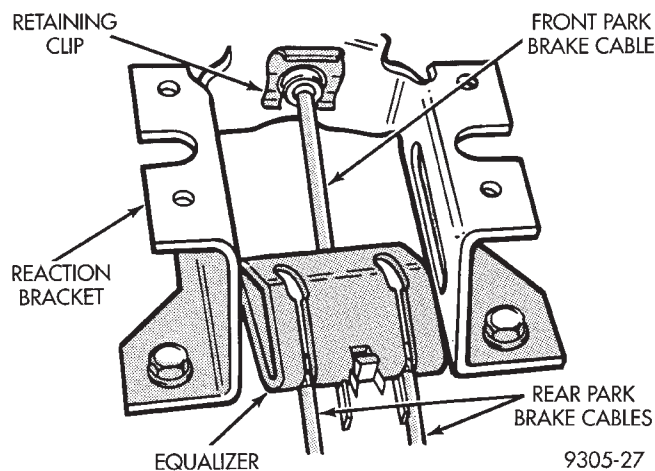


Fig. 109 Front Park Brake Cable Connection At Equalizer

(9) Remove the front park brake cable to reaction bracket retaining clip, by prying it off cable using a screwdriver (Fig. 110).

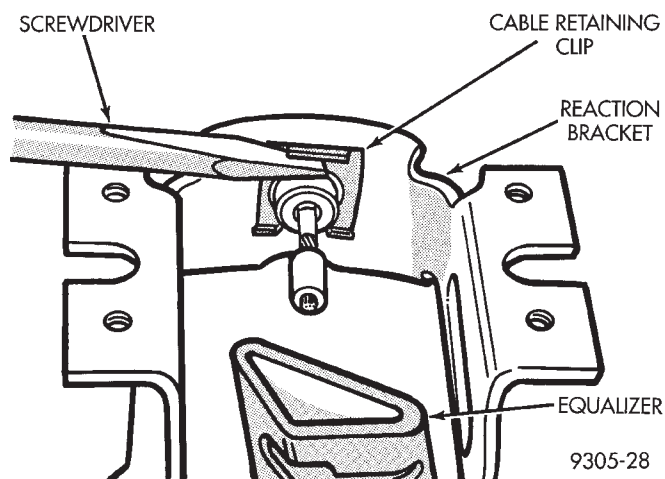


Fig. 110 Park Brake Cable Retaining Clip

(10) Remove front park brake cable from reaction bracket (Fig. 111). Remove screw, attaching park brake cable routing clip to left front floor pan (Fig. 111). Remove front park brake cable from the 2 routing clips attached to the floor pan crossmember (Fig. 111).

(11) Remove the bolt (Fig. 112) attaching park brake pedal assembly to left front door frame. Loosen but do not remove the 2 bolts (Fig. 112) attaching park brake pedal assembly to cowl panel. Unplug the brake warning light connector from switch on park brake pedal assembly. Remove park brake pedal mechanism and front park brake cable as an assembly from the vehicle.

REMOVAL AND INSTALLATION (Continued)

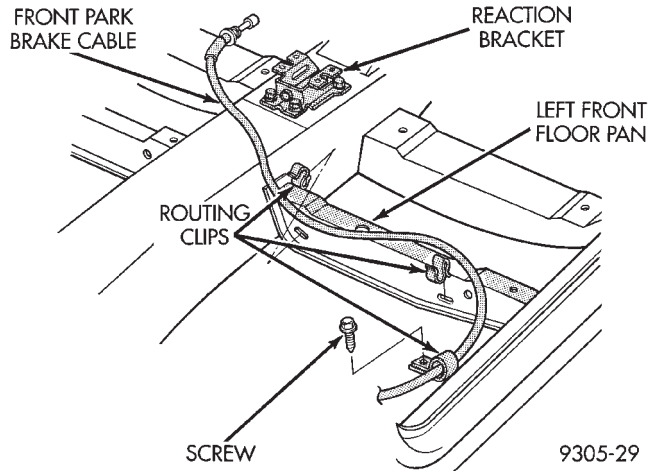


Fig. 111 Park Brake Cable Routing And Clipping

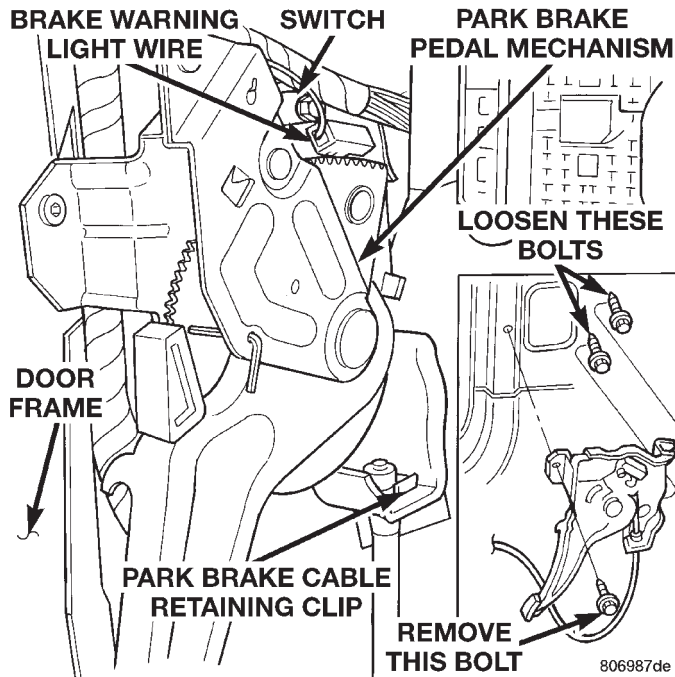


Fig. 112 Park Brake Pedal Assembly Mounting

WARNING: PARK BRAKE PEDAL ASSEMBLY SELF ADJUSTER MECHANISM MUST BE RELOADED AND LOCKED TO REMOVE TENSION FROM PARK BRAKE CABLES. THIS MUST BE DONE BEFORE REMOVING THE FRONT PARK BRAKE CABLE FROM THE PARK BRAKE CABLE PEDAL ASSEMBLY. FAILURE TO DO THIS WILL MAKE ASSEMBLY EXTREMELY DIFFICULT AND COULD LEAD TO SERIOUS INJURY.

(12) Mount park brake pedal assembly in a vise. Remove front park brake cable to park brake assembly retaining clip (Fig. 113).

(13) Rotate park brake cable, aligning cable with notch in cable attaching hole (Fig. 114). Then remove park brake cable from park brake pedal assembly.

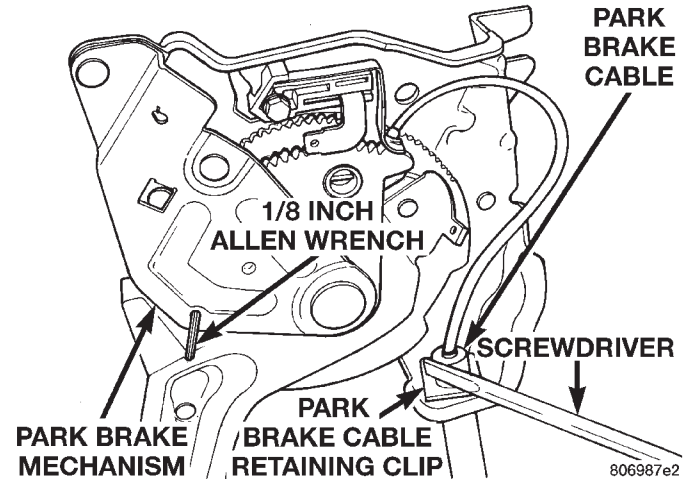


Fig. 113 Park Brake Cable Retaining Clip

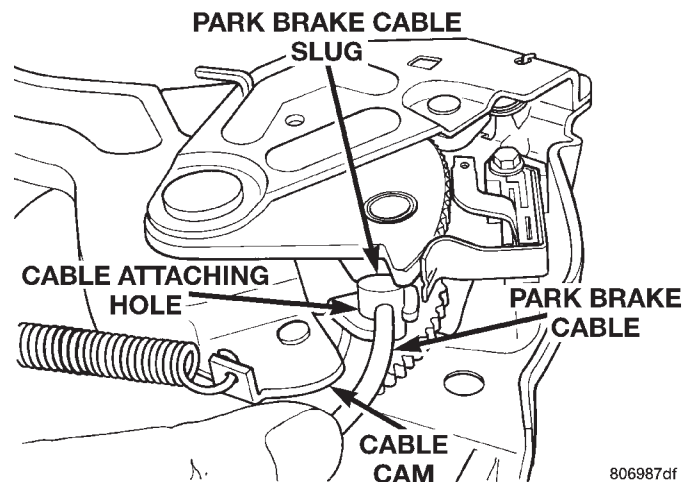


Fig. 114 Park Brake Cable Removal

INSTALL

(1) Install park brake cable assembly, through hole in park brake pedal assembly.

(2) Install park brake cable in attaching hole on park brake assembly (Fig. 114). Install park brake cable into cable attaching hole in park brake assembly, and rotate cable into place. Be sure cable is properly seated in the cam surface track of foot lever assembly (Fig. 114).

(3) Install park brake cable to park brake pedal mechanism retaining clip (Fig. 115). Be sure retaining clip is fully installed on park brake cable.

(4) Install park brake pedal mechanism onto the 2 loosened mounting bolt on cowl panel (Fig. 112). Install the park brake pedal assembly retaining bolt into door frame (Fig. 112). Torque all 3 park brake assembly mounting bolts to 27 N·m (19 ft. lbs.).

(5) Connect the brake warning light wire from vehicles wiring harness, onto switch located on park brake pedal mechanism (Fig. 112).

(6) Route front park brake cable along floor of vehicle. Install end of front park brake cable into

REMOVAL AND INSTALLATION (Continued)

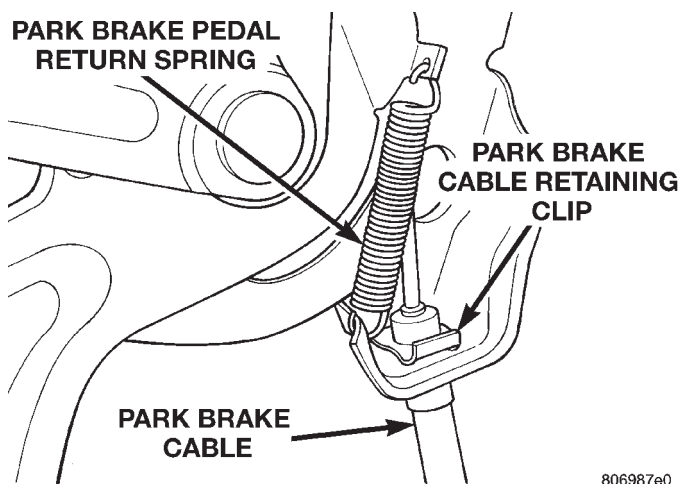


Fig. 115 Park Brake Cable Installed In Mechanism

mounting hole in reaction bracket. Install front park brake cable to reaction bracket retaining clip. Be sure retaining clip is fully installed on cable. Install front park brake cable into equalizer (Fig. 111).

(7) Install the park brake cable routing clip to floor pan attaching screw (Fig. 111). Torque the routing clip to floor pan attaching screw to 4 N·m (35 in. lbs.). Install front park brake cable into routing clips on floor pan crossmember.

(8) Ensure that park brake cable is properly routed in cam surface track of park brake pedal assembly (Fig. 116). Using a pair of pliers, firmly grasp the allen wrench previously installed in park brake mechanism (Fig. 117). Remove the allen wrench from the park brake pedal mechanism, using a firm and rapid pull. When allen wrench is removed from the park brake pedal mechanism, the park brake mechanism and park brake cables will automatically adjust. **See parking brake adjustment procedure in this section of the service manual for complete parking brake adjustment procedure.**

(9) Fold carpeting back into position on left floor pan of vehicle. Install throttle pedal and bracket back on dash panel studs and install attaching nuts.

(10) Install rear passenger compartment heat duct (Fig. 108). Install rear console assembly mounting bracket (Fig. 108) on park brake cable reaction bracket. Torque rear console assembly mounting bracket to reaction bracket mounting bolts to 10 N·m (88 in. lbs.).

(11) Install drivers side cowl kick molding (Fig. 107). Install drivers side door opening sill molding (Fig. 107).

(12) Install upper center console cover assembly back in vehicle. Refer to group 23 Body in this service manual for required procedure to install upper center console.

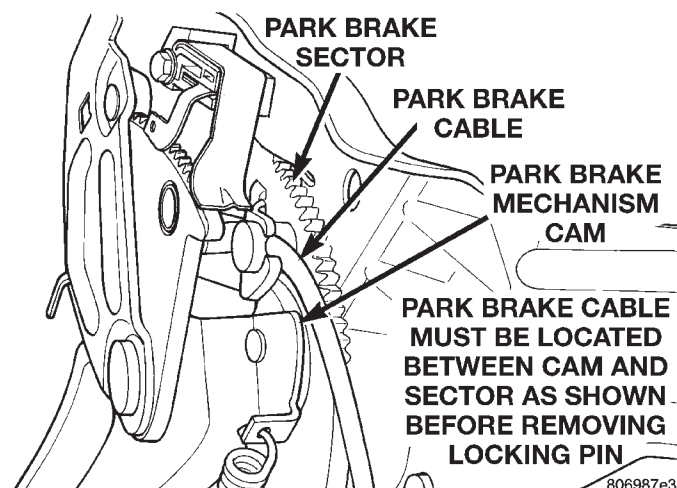


Fig. 116 Park Brake Cable Routing At Pedal Assembly

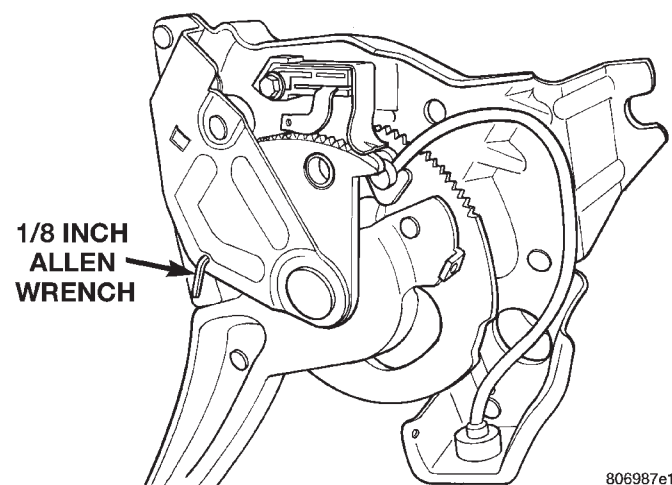


Fig. 117 Park Brake Assembly LockPin

(13) Install shift knob on floor shifter (if equipped). Shift knob is installed by pushing shift knob down shift shaft until fully bottomed. Then install and tighten 3/32 in. allen head set screw located on drivers side of shift knob.

(14) Install drivers side seat assembly back in vehicle. Refer to group 23 Body in this service manual for required seat, installation procedure.

(15) **When repairs are complete, adjust rear brakes before adjusting parking brake. See parking brake adjustment procedure in this section of the service manual for complete parking brake adjustment procedure.** On drum-in-hat type of rear disc brake adjust shoe diameter to 171.5 mm (6.75 inch).

REMOVAL AND INSTALLATION (Continued)

PARK BRAKE REAR CABLES (W/DRUM BRAKES AND BENCH SEAT)**REMOVE**

Raise vehicle using a frame contact type hoist or correctly jack and support the vehicle using jack stands. See Hoisting in the Lubrication And Maintenance Group of this service manual for the required lifting procedures to be used for this vehicle.

(1) Remove the rear wheel and tire assembly from the side of the vehicle requiring service to the park brake cable.

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

(3) Remove dust cap from rear hub/bearing assembly (Fig. 118).

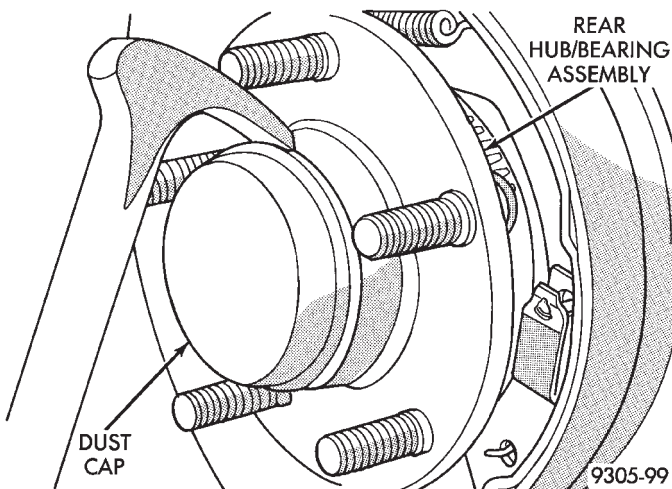


Fig. 118 Hub/Bearing Dust Cap

(4) Remove the cotter pin, wave washer, nut retainer, and the nut and washer attaching the hub/bearing assembly to the spindle (Fig. 119).

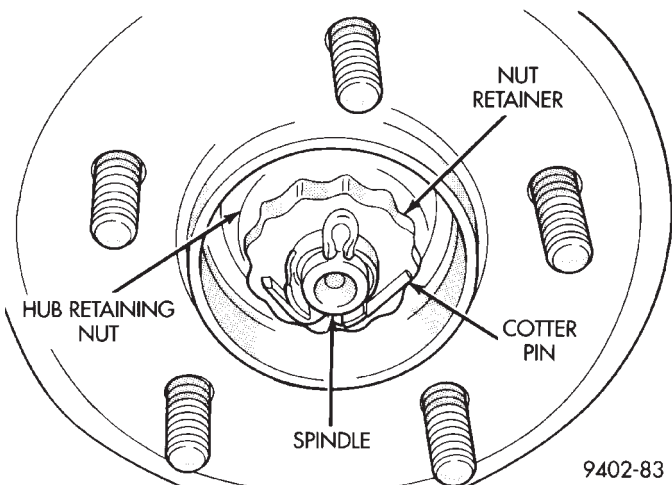


Fig. 119 Hub And Bearing Retaining Nut

NOTE: Remove the rear park brake cable from only one rear park brake lever at a time. Failure to do so will result in high efforts required, to connect the park brake cables to equalizer or the park brake lever.

(5) Disconnect park brake cable from park brake lever on rear brake assembly (Fig. 120).

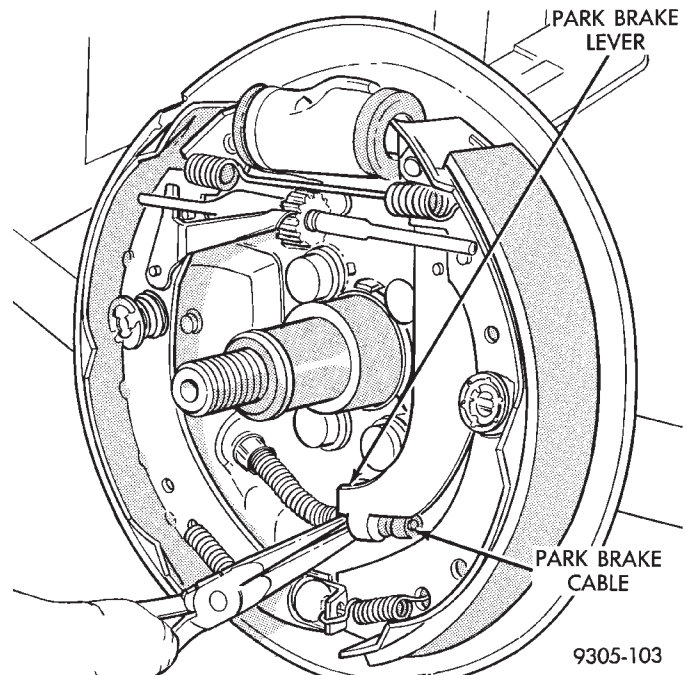


Fig. 120 Park Brake Cable Attachment To Park Brake Lever

(6) Position a 1/2 box wrench over the retainer on the end of the parking brake cable (Fig. 121). Compress cable housing retaining fingers and start housing out of support plate (Fig. 121). Remove wrench when retainer is free from the park brake cable mounting hole in the rear brake support plate. Alternate method is to use a aircraft type hose clamp over housing end fitting compressing the three fingers.

(7) Remove the 4 routing clips attaching rear park brake cable to floor pan and frame of vehicle (Fig. 122).

(8) Move passenger side front seat to its full forward position.

(9) Remove the drivers side front seat assembly from the vehicle. Refer to group 23 Body in this service manual for required procedure for front seat assembly removal.

(10) Remove rear seat lower cushion from vehicle. Refer to group 23 Body in this service manual for required lower seat cushion, removal procedure.

(11) Remove both lower rear door opening sill moldings. This is required to allow rear section of carpeting to be folded forward. This will expose the

REMOVAL AND INSTALLATION (Continued)

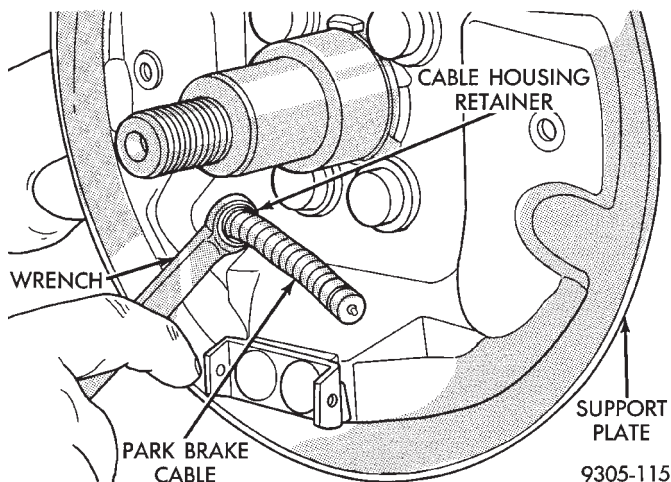


Fig. 121 Removing Park Brake Cable From Support Plate

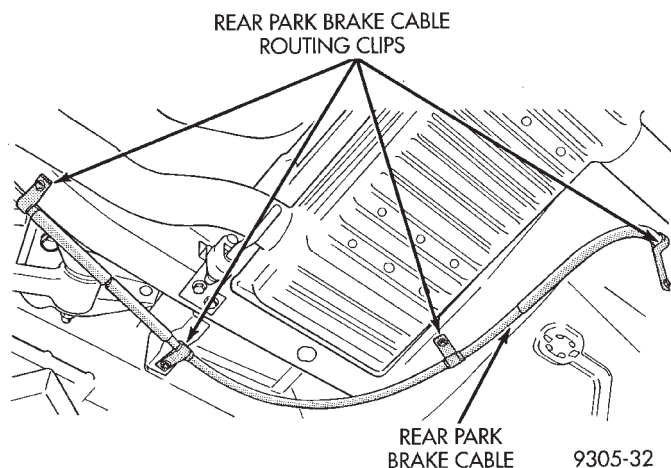


Fig. 122 Park Brake Cable Routing Clips

equalizer cover which is attached to the park brake cable reaction bracket (Fig. 123).

(12) Remove the park brake equalizer cover from the reaction bracket (Fig. 123).

NOTE: Do not remove the second rear park brake cable from the equalizer. If second park brake cable is removed from the equalizer, high effort will be required to connect the park brake cables to the equalizer.

(13) Remove rear park brake cable from vehicle floor pan using the following procedure. Disconnect rear park brake cable requiring replacement from equalizer (Fig. 124). Slip the box end of a 1/2 inch over end of park brake cable (Fig. 124). This will compress retaining tabs on end of park brake cable housing. Using a screw driver, press on end of park brake cable housing to remove cable from floor pan of vehicle.

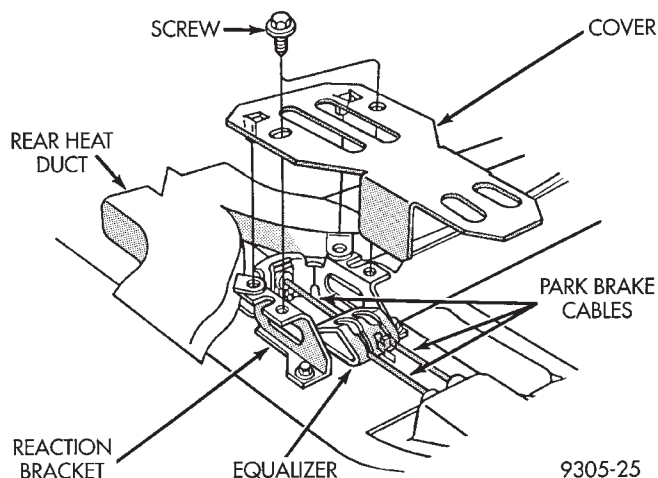


Fig. 123 Park Brake Equalizer Bracket

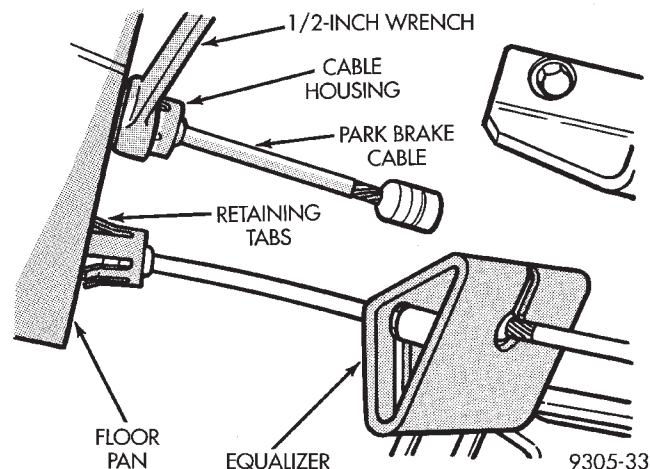


Fig. 124 Park Brake Cable Removal From Floor Pan

INSTALL

(1) Install parking brake cable into rear brake support plate. Be sure the park brake retainers are expanded around mounting hole in brake support plate. Connect parking brake cable to park brake lever on trailing brake shoe (Fig. 120).

(2) Install parking brake cable into cable mounting hole in floor pan of vehicle. Be sure that cable retainers are expanded around mounting hole in floor pan.

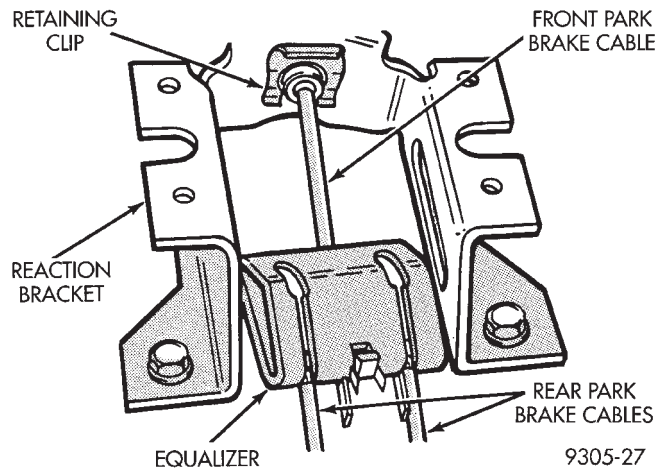
(3) Install the 4 routing clips attaching rear park brake cable to floor pan and frame of vehicle (Fig. 122).

(4) Connect the park brake cable to the park brake cable equalizer (Fig. 125). **Note: The equalizer can be moved rearward to allow connection of the rear cable to the equalizer.**

(5) Install equalizer cover back on reaction bracket (Fig. 123). Torque equalizer cover to reaction bracket mounting bolts to 10 N·m (88 in. lbs.).

(6) Fold rear passenger compartment carpeting back into position.

REMOVAL AND INSTALLATION (Continued)

**Fig. 125 Park Brake Cables Connected To Equalizer**

(7) Install both lower rear door opening sill moldings.

(8) Install the rear seat lower cushion back in vehicle. Refer to group 23 Body in this service manual for required lower seat cushion, installation procedure.

(9) Install drivers side seat assembly back in vehicle. Refer to group 23 Body in this service manual for required lower seat cushion, installation procedure.

(10) Return the driver and passenger side seats back to their original positions.

(11) Install hub/bearing assembly on spindle.

(12) Install the washer and retaining nut for the hub/bearing assembly (Fig. 119). Tighten the retaining nut to a torque of 168 N·m (124 ft. lbs.).

(13) Install the wave washer, nut retainer and cotter pin on rear spindle (Fig. 119).

(14) Install hub/bearing dust cap.

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

(16) When repairs are complete, adjust rear brakes before adjusting parking brake. See parking brake adjustment procedure in this section of the service manual for complete parking brake adjustment procedure.

PARK BRAKE REAR CABLES (W/DRUM BRAKES AND BUCKET SEATS)

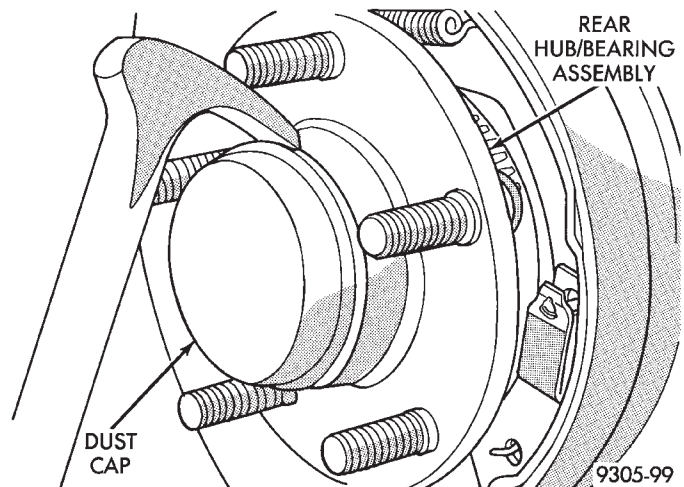
REMOVE

(1) Raise vehicle using a frame contact type hoist or correctly jack and support the vehicle using jack stands. See Hoisting in the Lubrication And Maintenance Group of this service manual for the required lifting procedures to be used for this vehicle.

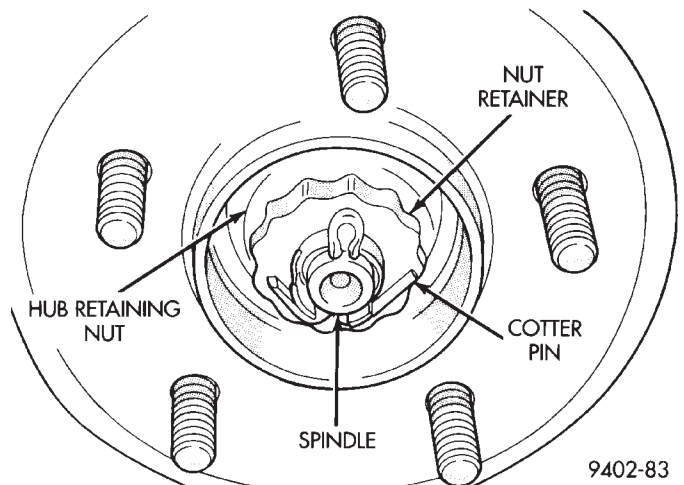
(2) Remove the rear wheel and tire assembly from the side of the vehicle requiring service to the park brake cable.

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

(4) Remove dust cap from rear hub/bearing assembly (Fig. 126).

**Fig. 126 Hub/Bearing Dust Cap**

(5) Remove cotter pin, nut retainer, wave washer, and nut and washer attaching the hub/bearing assembly to the spindle (Fig. 127).

**Fig. 127 Hub And Bearing Retaining Nut**

NOTE: Remove the rear park brake cable from only one rear park brake lever at a time. Failure to do so will result in high efforts required, to connect the park brake cables to equalizer or the park brake lever.

(6) Disconnect park brake cable from park brake lever on rear brake assembly (Fig. 128).

(7) Position a 1/2 box wrench over the retainer on the end of the parking brake cable (Fig. 129). Compress cable housing retaining fingers and start housing out of support plate (Fig. 129). Remove wrench when retainer is free from the park brake cable mounting hole in the rear brake support plate. Alter-

REMOVAL AND INSTALLATION (Continued)

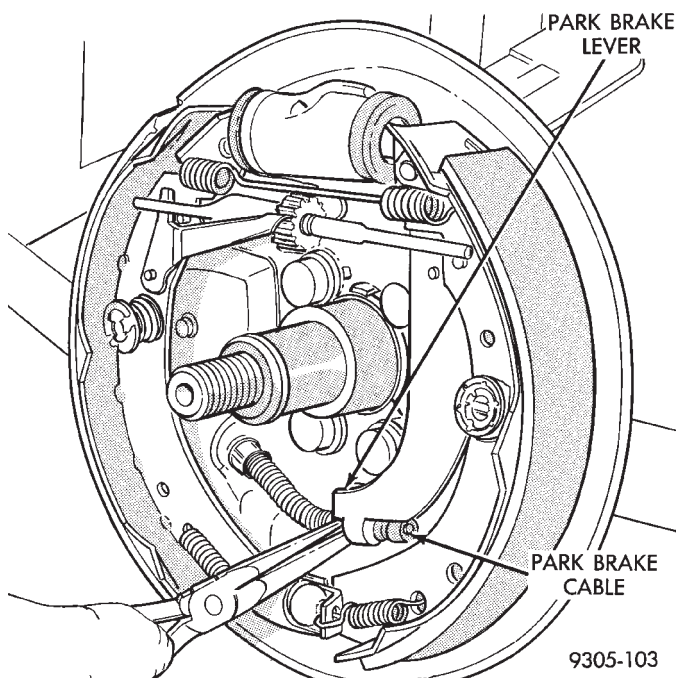


Fig. 128 Park Brake Cable Attachment To Park Brake Lever

nate method is to use a aircraft type hose clamp over housing end fitting compressing the three fingers.

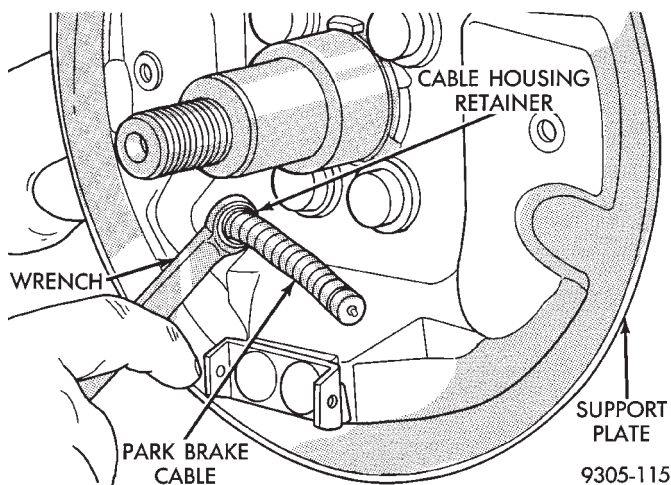


Fig. 129 Removing Park Brake Cable From Support Plate

(8) Remove the 4 routing clips attaching rear park brake cable to floor pan and frame of vehicle (Fig. 130).

(9) Lower vehicle.

(10) Remove shift knob from floor shifter. Shift knob is removed by removing 3/32 in. allen head set screw located on drivers side of shift knob and pulling straight up on shift knob.

(11) Remove upper center console cover from vehicle. Refer to group 23 Body in this service manual for required procedure to remove center console.

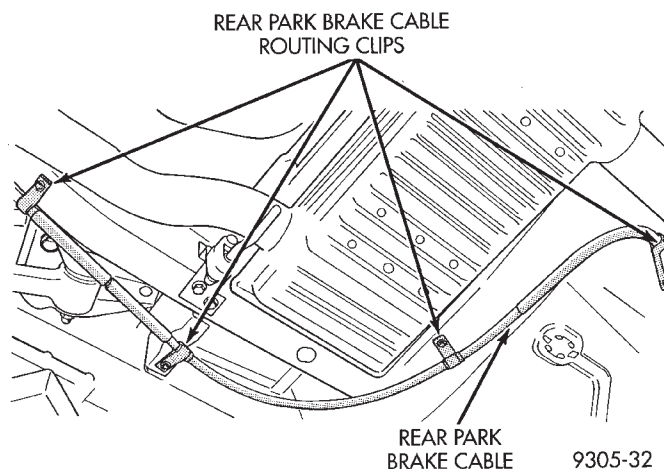


Fig. 130 Park Brake Cable Routing Clips

(12) Remove rear console mounting bracket (Fig. 131) from park brake cable reaction bracket. Remove rear passenger compartment heat duct (Fig. 131) from vehicle, for access to park brake cables.

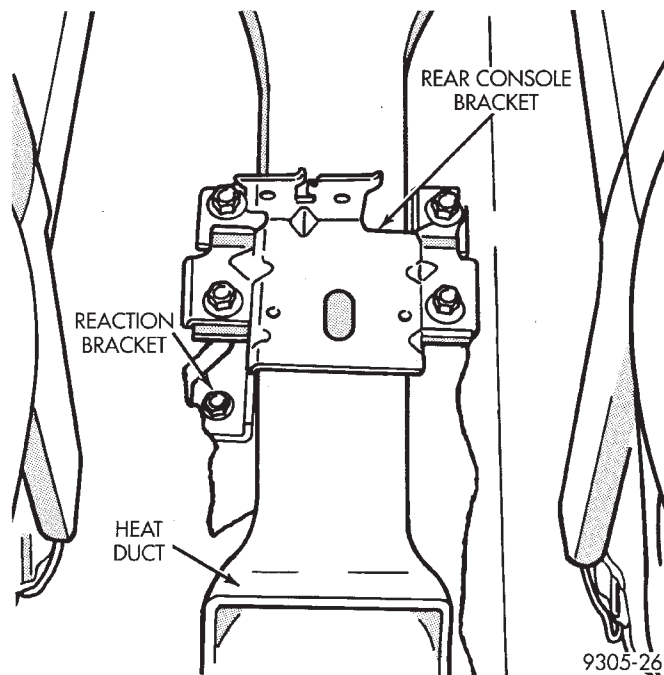


Fig. 131 Console Mounting Bracket And Heat Duct

NOTE: Do not remove the second rear park brake cable from the equalizer. If second park brake cable is removed from the equalizer, high effort will be required to connect the park brake cables to the equalizer.

(13) Remove rear park brake cable from vehicle floor pan using the following procedure. Disconnect rear park brake cable requiring replacement from equalizer (Fig. 132). Slip the box end of a 1/2 inch over end of park brake cable (Fig. 132). This will

REMOVAL AND INSTALLATION (Continued)

compress retaining tabs on end of park brake cable housing. Using a screw driver, press on end of park brake cable housing to remove cable from floor pan of vehicle.

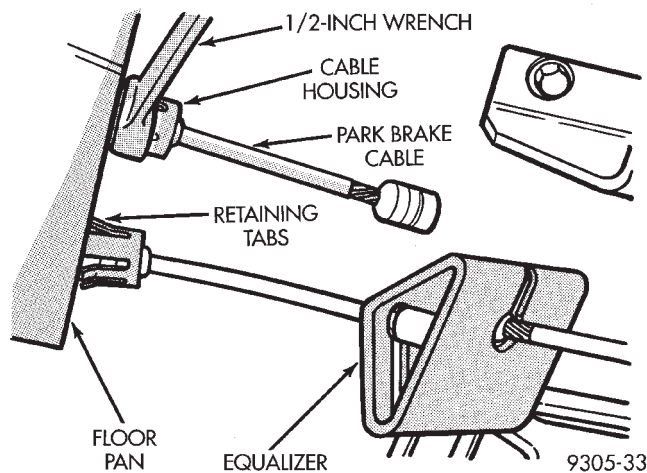


Fig. 132 Park Brake Cable Removal From FloorPan

INSTALL

- (1) Raise vehicle.
- (2) Install parking brake cable into rear brake support plate. Be sure the park brake retainers are expanded around mounting hole in brake support plate. Connect parking brake cable to park brake lever on trailing brake shoe (Fig. 128).
- (3) Install parking brake cable into cable mounting hole in floor pan of vehicle. Be sure that cable retainers are expanded around mounting hole in floor pan.
- (4) Install the 4 routing clips attaching rear park brake cable to floor pan and frame of vehicle (Fig. 130).
- (5) Connect the park brake cable to the park brake cable equalizer (Fig. 133). **Note: The equalizer can be moved rearward to allow connection of the rear cable to the equalizer.**

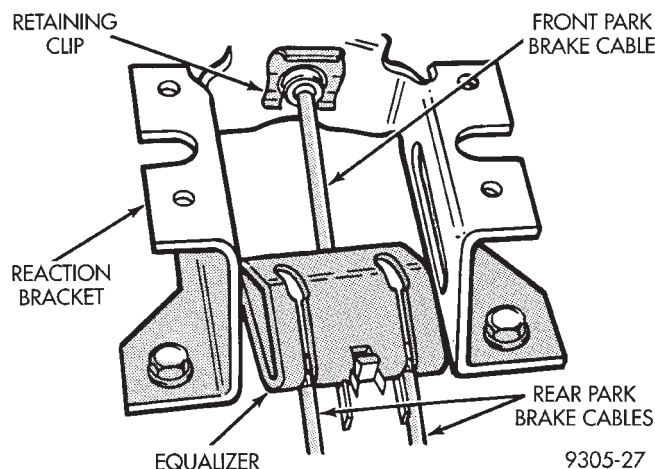


Fig. 133 Park Brake Cables Connected To Equalizer

- (6) Lower vehicle.

(7) Install upper center console cover assembly back in vehicle. Refer to group 23 Body in this service manual for required procedure to install upper center console.

(8) Install shift knob on floor shifter (if equipped). Shift knob is installed by pushing shift knob down shift shaft until fully bottomed. Then install and tighten 3/32 in. allen head set screw located on drivers side of shift knob.

- (9) Install hub/bearing assembly on spindle.

(10) Install the washer and retaining nut for the hub/bearing assembly (Fig. 127). Tighten the retaining nut to a torque of 168 N·m (124 ft. lbs.).

(11) Install wave washer, nut retainer and cotter pin on rear spindle (Fig. 127).

- (12) Install hub/bearing dust cap.

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

(14) When repairs are complete, adjust rear brakes before adjusting parking brake. See parking brake adjustment procedure in this section of the service manual for complete parking brake adjustment procedure.

PARK BRAKE REAR CABLES (W/DISC BRAKES AND BENCH SEAT)

REMOVE

(1) Raise vehicle using a frame contact type hoist or correctly jack up the vehicle and support it using jack stands. See Hoisting in the Lubrication And Maintenance Group of this service manual for the required lifting procedures to be used for this vehicle.

(2) Remove the rear wheel and tire assembly from the side of the vehicle requiring service to the park brake cable.

(3) Remove rear disc brake caliper from adapter and rotor. Then remove the rotor from the hub.

(4) Remove dust cap from rear hub/bearing assembly (Fig. 134).

(5) Remove the cotter pin, nut retainer, wave washer and the nut and washer attaching the hub/bearing assembly to the spindle (Fig. 135).

(6) Remove parking brake shoe assemblies from the rear disc brake adapter. See Park Brake Shoes With Rear Disc Brakes in the Removal And Installation section in this group of the service manual for the removal procedure.

NOTE: Remove the rear park brake cable from only one rear park brake lever at a time. Failure to do so will result in high efforts required, to connect the park brake cables to equalizer or the park brake lever.

REMOVAL AND INSTALLATION (Continued)

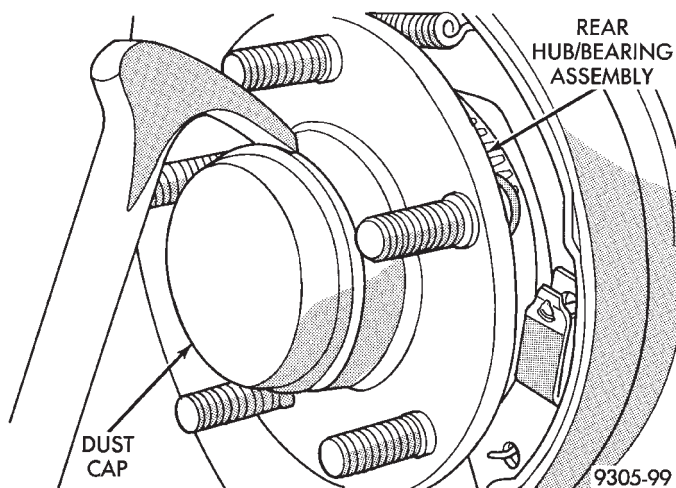


Fig. 134 Hub/Bearing Dust Cap

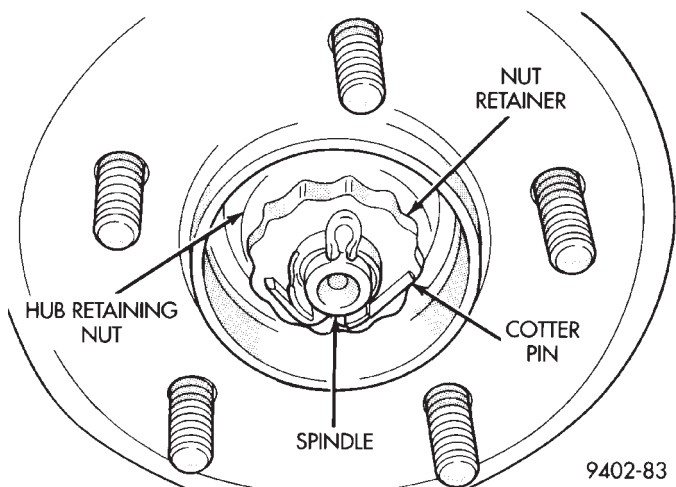


Fig. 135 Hub And Bearing Retaining Nut

(7) Disconnect park brake cable from the park brake actuator lever (Fig. 136).

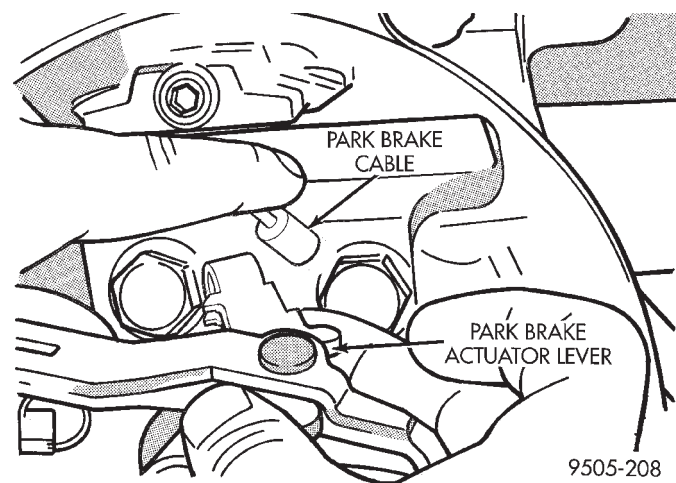


Fig. 136 Park Brake Cable Attachment To Park Brake Lever

(8) Remove park brake cable from adapter using the following procedure. Compress retaining tabs on park brake cable housing using a small screwdriver (Fig. 137) while pulling and rotating park brake cable until cable is removed from adapter.

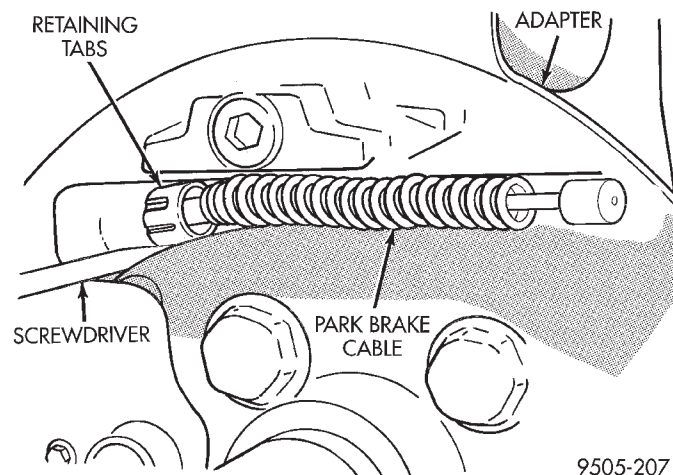


Fig. 137 Removing Park Brake Cable From Adapter

(9) Remove the 4 routing clips attaching rear park brake cable to floor pan and frame of vehicle (Fig. 138).

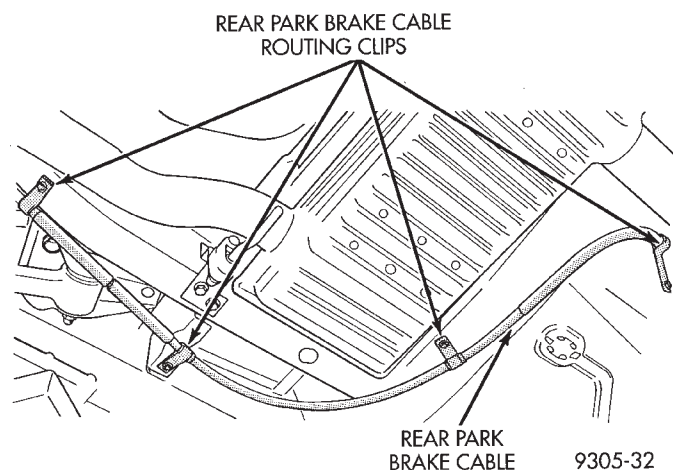


Fig. 138 Park Brake Cable Routing Clips

(10) Lower vehicle.

(11) Move passenger side front seat to its full forward position.

(12) Remove the drivers side front seat assembly from the vehicle. Refer to group 23 Body in this service manual for required procedure for front seat assembly removal.

(13) Remove rear seat lower cushion from vehicle. Refer to group 23 Body in this service manual for required lower seat cushion, removal procedure.

(14) Remove both lower rear door opening sill moldings. This is required to allow rear section of carpeting to be folded forward. This will expose the

REMOVAL AND INSTALLATION (Continued)

equalizer cover which is attached to the park brake cable reaction bracket (Fig. 139).

(15) Remove the park brake equalizer cover from the reaction bracket (Fig. 139).

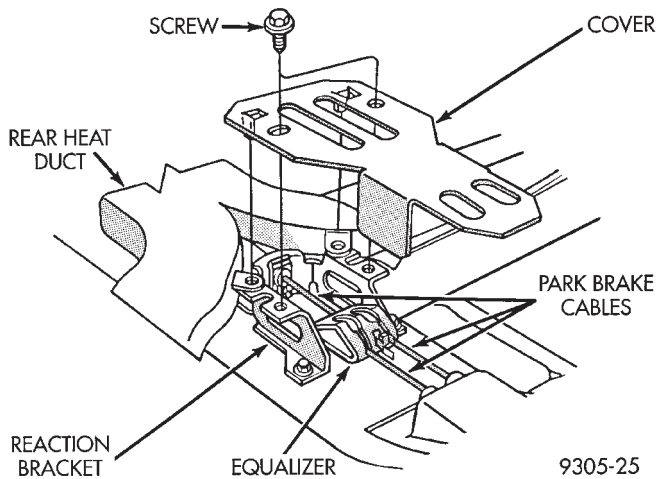


Fig. 139 Park Brake Equalizer Bracket

NOTE: Do not remove the second rear park brake cable from the equalizer. If second park brake cable is removed from the equalizer, high effort will be required to connect the park brake cables to the equalizer.

(16) Remove rear park brake cable from vehicle floor pan using the following procedure. Disconnect rear park brake cable requiring replacement from equalizer (Fig. 140). Slip the box end of a 1/2 inch over end of park brake cable (Fig. 140). This will compress retaining tabs on end of park brake cable housing. Using a screw driver, press on end of park brake cable housing to remove cable from floor pan of vehicle.

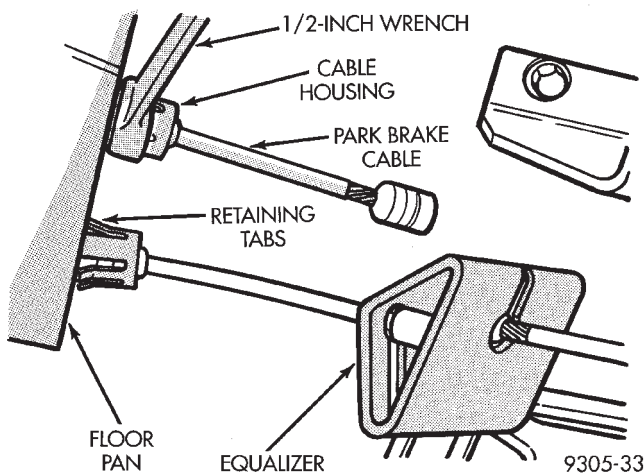


Fig. 140 Park Brake Cable Removal From FloorPan

INSTALL

(1) Install parking brake cable into rear disc brake adapter. Be sure the cable retaining tabs are expanded around mounting hole in brake adapter. Connect parking brake cable end to brake shoe assembly actuator lever (Fig. 136).

(2) Install parking brake cable into cable mounting hole in floor pan of vehicle. Be sure that cable retainers are expanded around mounting hole in floor pan.

(3) Install the 4 routing clips attaching rear park brake cable to floor pan and frame of vehicle (Fig. 138).

(4) Lower vehicle.

(5) Connect the park brake cable to the park brake cable equalizer (Fig. 141). **Note: The equalizer can be moved rearward to allow connection of the rear cable to the equalizer.**

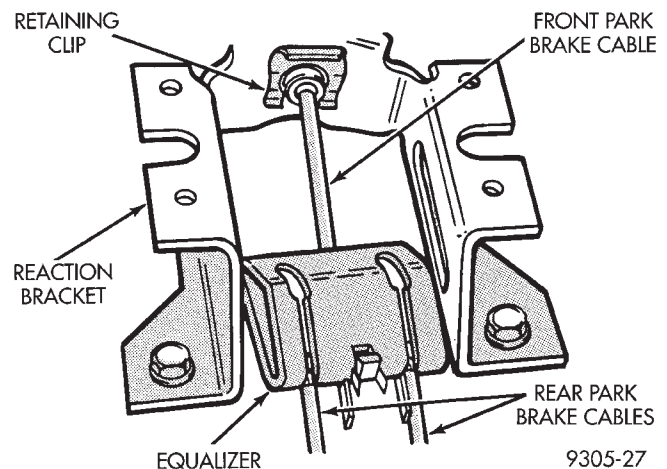


Fig. 141 Park Brake Cables Connected To Equalizer

(6) Install equalizer cover back on reaction bracket (Fig. 139). Torque equalizer cover to reaction bracket mounting bolts to 10 N·m (88 in. lbs.).

(7) Fold rear passenger compartment carpeting back into position.

(8) Install both lower rear door opening sill moldings.

(9) Install the rear seat lower cushion back in vehicle. Refer to group 23 Body in this service manual for required lower seat cushion, installation procedure.

(10) Install drivers side seat assembly back in vehicle. Refer to group 23 Body in this service manual for required lower seat cushion, installation procedure.

(11) Return the driver and passenger side seats back to their original positions.

(12) Raise vehicle.

(13) Install the parking brake shoes on the rear disc brake adapter. See Park Brake Shoes With Rear Disc Brakes in the Removal And Installation section

REMOVAL AND INSTALLATION (Continued)

in this group of the service manual for the installation procedure.

(14) Adjust the park brake shoes to an outside diameter of 171.5 mm (6.75 in.).

(15) Install hub/bearing assembly on spindle.

(16) Install the washer and retaining nut for the hub/bearing assembly (Fig. 135). Tighten the retaining nut to a torque of 168 N·m (124 ft. lbs.).

(17) Install the wave washer, nut retainer and cotter pin on rear spindle (Fig. 135).

(18) Install hub/bearing dust cap.

(19) Install rear rotor on the rear hub assembly. Install rear disc brake caliper assembly on adapter.

(20) Install rear tire and wheel assembly on vehicle.

PARK BRAKE REAR CABLES (W/DISC BRAKES AND BUCKET SEATS)

REMOVE

(1) Raise vehicle using a frame contact type hoist or correctly jack up the vehicle and support it vehicle using jack stands. See Hoisting in the Lubrication And Maintenance Group of this service manual for the required lifting procedures to be used for this vehicle.

(2) Remove the rear wheel and tire assembly from the side of the vehicle requiring service to the park brake cable.

(3) Remove rear disc brake caliper from adapter and rotor. Then remove the rotor from the hub.

(4) Remove dust cap from rear hub/bearing assembly (Fig. 142).

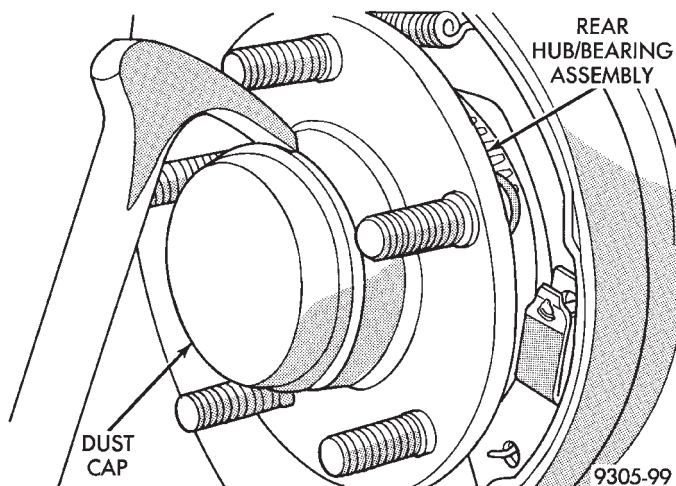


Fig. 142 Hub/Bearing Dust Cap

(5) Remove cotter pin, nut retainer, wave washer and the nut and washer attaching the hub/bearing assembly to the spindle (Fig. 143).

(6) Remove parking brake shoe assemblies from the rear disc brake adapter. See Park Brake Shoes

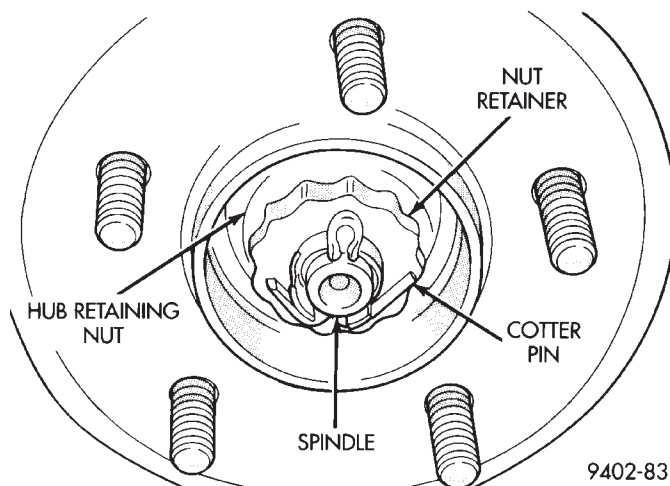


Fig. 143 Hub And Bearing Retaining Nut

With Rear Disc Brakes in the Removal And Installation section in this group of the service manual for the removal procedure.

NOTE: Remove the rear park brake cable from only one rear park brake lever at a time. Failure to do so will result in high efforts required, to connect the park brake cables to equalizer or the park brake lever.

(7) Disconnect park brake cable from the park brake actuator lever (Fig. 144).

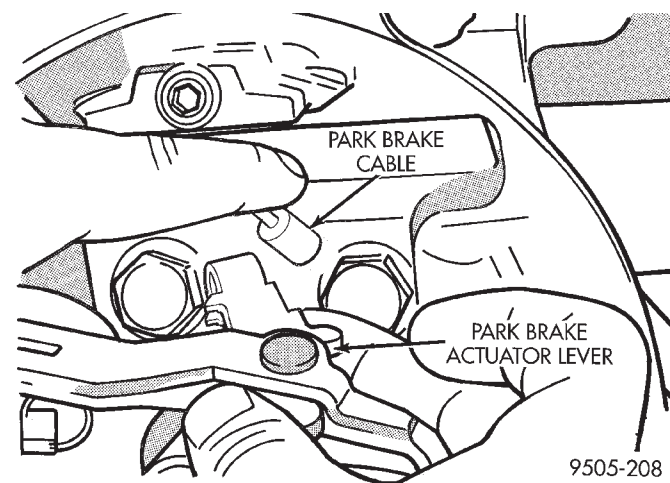


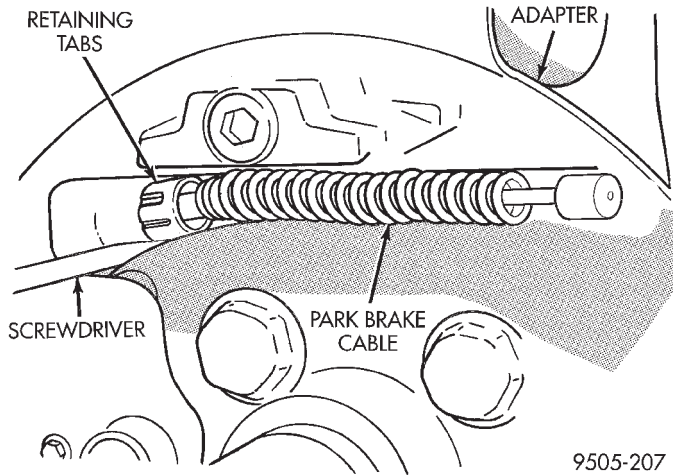
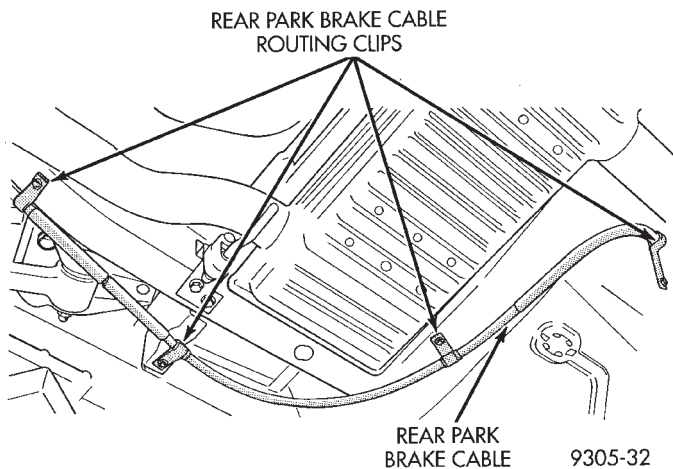
Fig. 144 Park Brake Cable Attachment To Park Brake Lever

(8) Remove park brake cable from adapter using the following procedure. Compress retaining tabs on park brake cable housing using a small screwdriver (Fig. 145) while pulling and rotating park brake cable until cable is removed from adapter.

(9) Remove the 4 routing clips attaching rear park brake cable to floor pan and frame of vehicle (Fig. 146).

(10) Lower vehicle.

REMOVAL AND INSTALLATION (Continued)

**Fig. 145 Removing Park Brake Cable From Adapter****Fig. 146 Park Brake Cable Routing Clips**

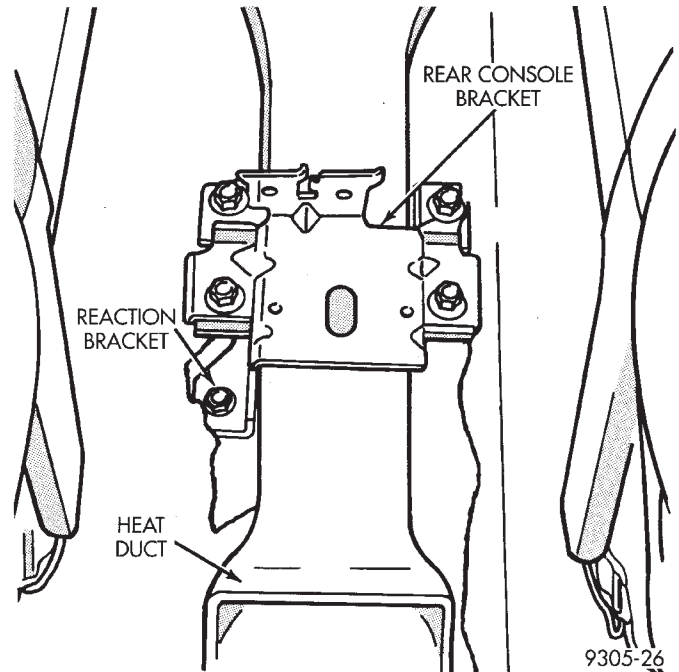
(11) Remove shift knob from floor shifter. Shift knob is removed by removing 3/32 in. allen head set screw located on drivers side of shift knob and pulling straight up on shift knob.

(12) Remove upper center console cover from vehicle. Refer to group 23 Body in this service manual for required procedure to remove center console.

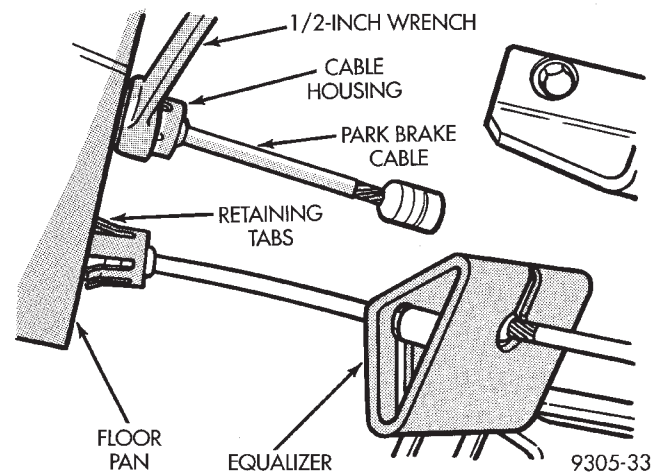
(13) Remove rear console mounting bracket (Fig. 147) from park brake cable reaction bracket. Remove rear passenger compartment heat duct (Fig. 147) from vehicle, for access to park brake cables.

NOTE: Do not remove the second rear park brake cable from the equalizer. If second park brake cable is removed from the equalizer, high effort will be required to connect the park brake cables to the equalizer.

(14) Remove rear park brake cable from vehicle floor pan using the following procedure. Disconnect rear park brake cable requiring replacement from equalizer (Fig. 148). Slip the box end of a 1/2 inch

**Fig. 147 Console Mounting Bracket And HeatDuct**

over end of park brake cable (Fig. 148). This will compress retaining tabs on end of park brake cable housing. Using a screw driver, press on end of park brake cable housing to remove cable from floor pan of vehicle.

**Fig. 148 Park Brake Cable Removal From FloorPan****INSTALL**

(1) Raise vehicle.
 (2) Install parking brake cable into rear disc brake adapter. Be sure the cable retaining tabs are expanded around mounting hole in brake adapter. Connect parking brake cable end to brake shoe assembly actuator lever (Fig. 144).

(3) Install parking brake cable into cable mounting hole in floor pan of vehicle. Be sure that cable retainers are expanded around mounting hole in floor pan.

REMOVAL AND INSTALLATION (Continued)

(4) Install the 4 routing clips attaching rear park brake cable to floor pan and frame of vehicle (Fig. 146).

(5) Lower vehicle.

(6) Connect the park brake cable to the park brake cable equalizer (Fig. 149). **Note: The equalizer can be moved rearward to allow connection of the rear cable to the equalizer.**

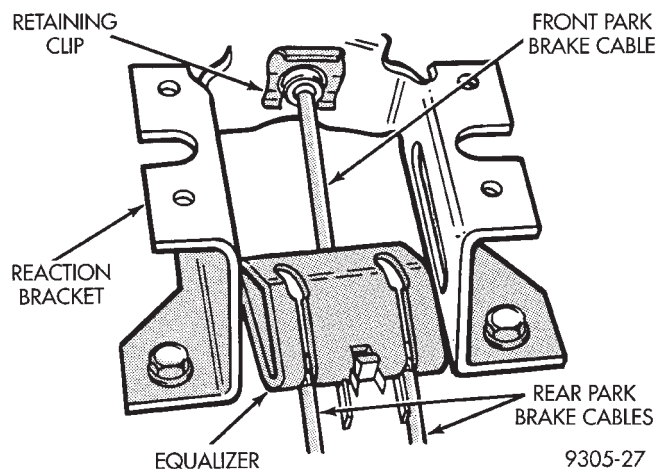


Fig. 149 Park Brake Cables Connected To Equalizer

(7) Install upper center console cover assembly back in vehicle. Refer to group 23 Body in this service manual for required procedure to install upper center console.

(8) Install shift knob on floor shifter (if equipped). Shift knob is installed by pushing shift knob down shift shaft until fully bottomed. Then install and tighten 3/32 in. allen head set screw located on drivers side of shift knob.

(9) Raise vehicle.

(10) Install parking brake shoe assemblies on the rear disc brake adapter. See Park Brake Shoes With Rear Disc Brakes in the Removal And Installation section in this group of the service manual for the installation procedure.

(11) Adjust the park brake shoes to an outside diameter of 171.5 mm (6.75 in.).

(12) Install hub/bearing assembly on spindle.

(13) Install the washer and retaining nut for the hub/bearing assembly (Fig. 143). Tighten the retaining nut to a torque of 168 N·m (124 ft. lbs.).

(14) Install wave washer, nut retainer and cotter pin on rear spindle (Fig. 143).

(15) Install hub/bearing dust cap.

(16) Install rear rotor on the rear hub assembly. Install rear disc brake caliper assembly on adapter.

(17) Install rear tire and wheel assembly on vehicle.

PARK BRAKE SHOES WITH REAR DISC BRAKES

REMOVE

(1) Remove rear disc brake caliper assembly from adapter and rotor (See Disc Brake Shoe Removal).

(2) Remove rear rotor from rear hub.

(3) Remove dust cap from rear hub.

(4) Remove the cotter pin, nut retainer, wave washer and rear hub/bearing assembly retaining nut and washer from the rear spindle.

(5) Remove rear hub and bearing assembly from rear spindle.

(6) Remove rear brake shoe assembly hold down clip (Fig. 150).

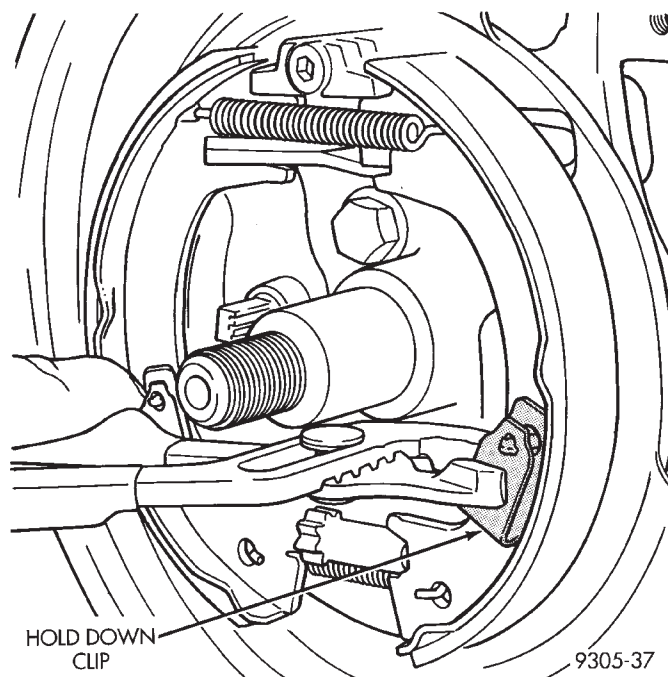


Fig. 150 Rear Brake Shoe Hold-Down Clip

(7) Turn brake shoe adjuster wheel until adjuster is at shortest length.

(8) Remove adjuster assembly from the parking brake shoe assemblies (Fig. 151).

(9) Remove lower shoe to shoe spring (Fig. 152).

(10) Pull rear brake shoe assembly away from anchor. Then remove rear brake shoe and upper spring (Fig. 153).

(11) Remove front brake shoe hold-down clip (Fig. 154). Then remove front brake shoe assembly.

INSTALL

(1) Install front brake shoe and hold down clip (Fig. 154).

(2) Install rear brake shoe and the upper brake shoe to shoe return spring (Fig. 153).

(3) Pull rear brake shoe over anchor block until properly located on adapter.

REMOVAL AND INSTALLATION (Continued)

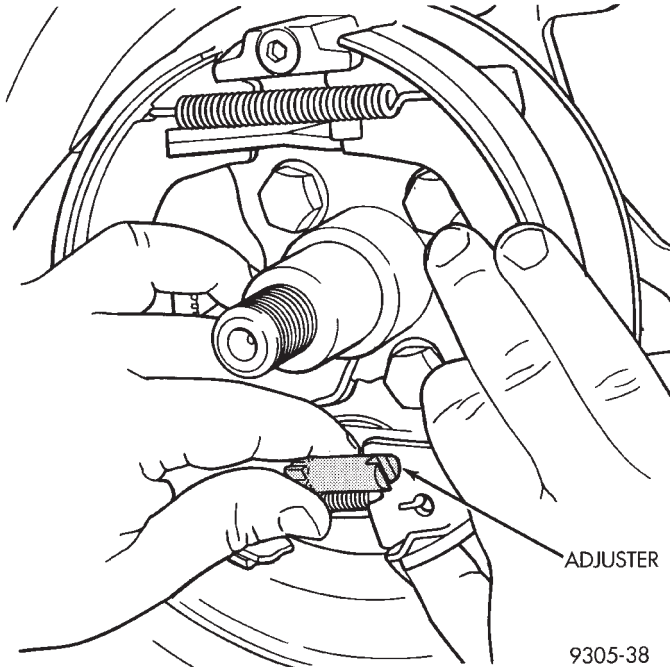


Fig. 151 Park Brake Shoe Adjuster Assembly

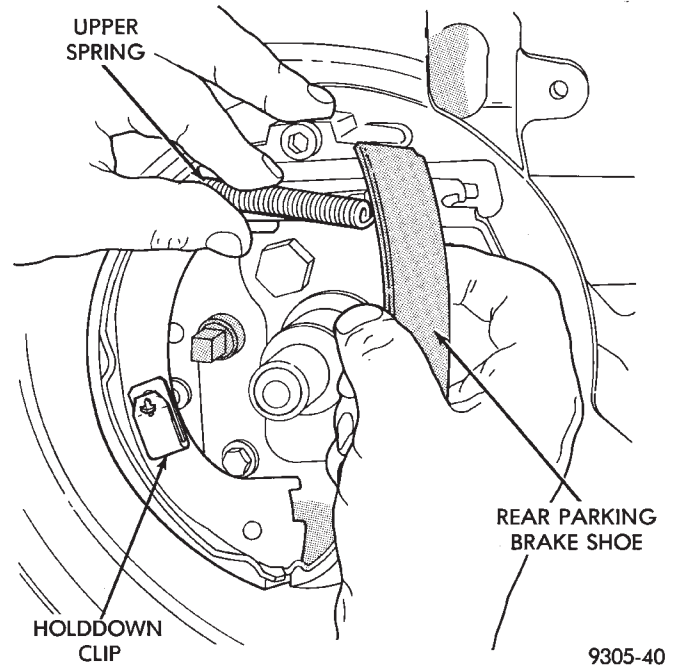


Fig. 153 Brake Shoe and Upper Spring

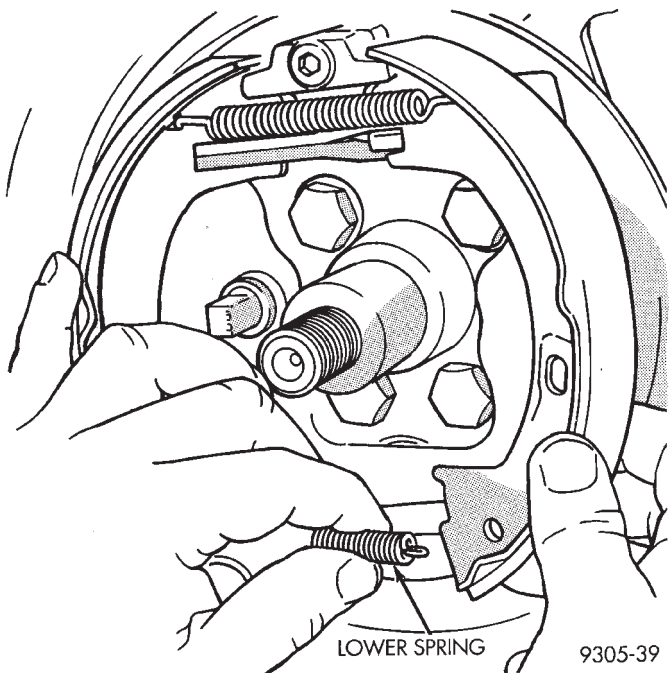


Fig. 152 Brake Shoe Lower Return Spring

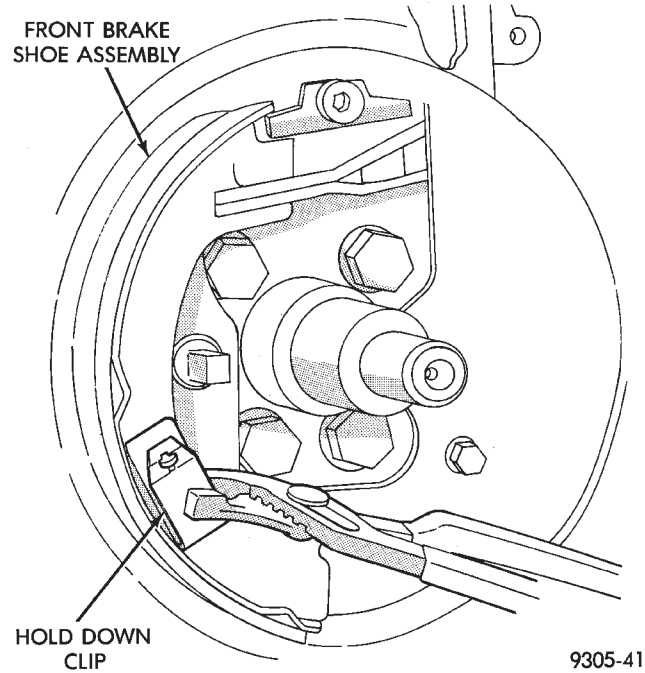


Fig. 154 Front Hold Down Clip And Brake Shoe

- (4) Install the lower shoe to shoe return spring (Fig. 152).
- (5) Install brake shoe adjuster assembly with star wheel rearward (Fig. 151).
- (6) Install rear brake shoe hold down clip (Fig. 150).
- (7) Adjust brake shoes to a diameter to 171 mm (6.75 inch).
- (8) Install rear hub and bearing assembly on spindle.

- (9) Install hub and bearing assembly washer and retaining nut. Torque the hub and bearing assembly retaining nut to 168 N·m (124 ft. lbs.).
- (10) Install the wave washer, retaining nut and cotter pin.
- (11) Install hub and bearing assembly dust cap.
- (12) Install rear rotor.
- (13) Install rear disc brake caliper on the adapter (See Brake Shoe Removal).
- (14) Install wheel and tire assemblies.

REMOVAL AND INSTALLATION (Continued)

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

STOP LAMP SWITCH

REMOVE

(1) Depress and hold the brake pedal while rotating stop lamp switch (Fig. 155) 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.

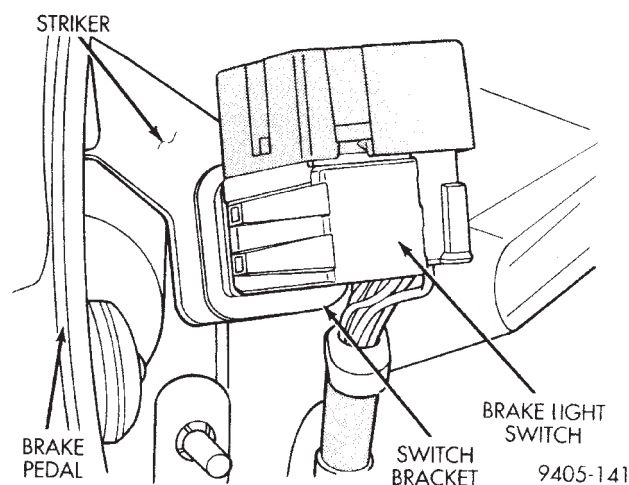


Fig. 155 Stop Lamp Switch

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 too much force is used, damage to the stop lamp switch or striker (Fig. 155) 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

BRAKE FLUID RESERVOIR

DISASSEMBLE

(1) Using an appropriate cleaner such as Mopar, Brake Parts Cleaner, clean the master cylinder housing and brake fluid reservoir.

(2) Remove the brake fluid reservoir caps. Using a syringe or equivalent empty brake fluid from reservoir.

(3) Remove the master cylinder from the vacuum booster.

(4) Clamp the master cylinder in vise.

(5) Remove the 2 fluid reservoir to master cylinder retaining pins (Fig. 156).

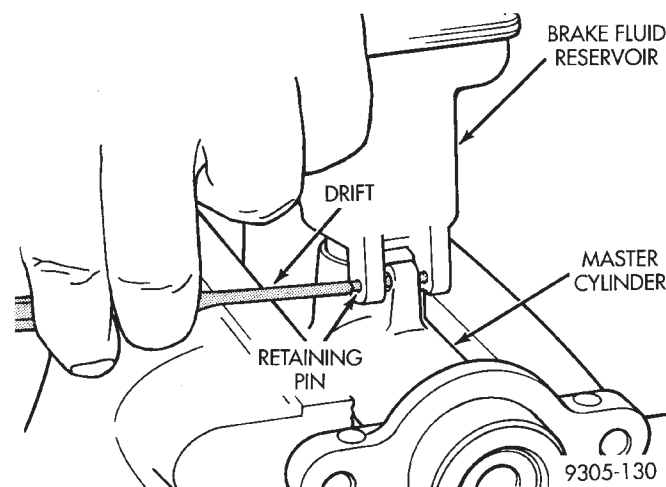


Fig. 156 Reservoir Retaining Pins

NOTE: Do not pry off fluid reservoir using a tool, damage to reservoir may result.

(6) Remove reservoir from master cylinder (Fig. 157) by pulling upward on the reservoir while rock it from side to side.

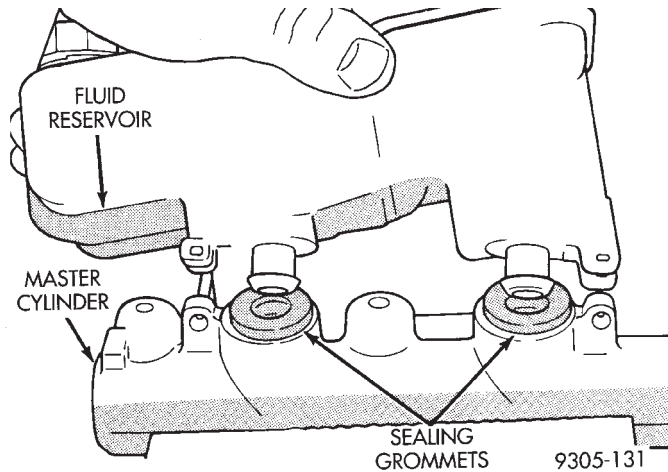
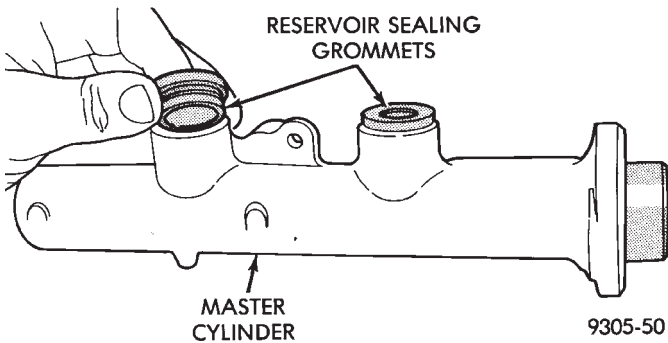
(7) Remove the master cylinder housing-to-reservoir grommets (Fig. 158).

ASSEMBLE

(1) Install new housing-to-reservoir grommets in master cylinder housing (Fig. 158).

(2) Lubricate brake fluid reservoir mounting area with clean brake fluid. Place reservoir in position over grommets. Seat reservoir into sealing grommets using a rocking motion while pushing down on reservoir.

DISASSEMBLY AND ASSEMBLY (Continued)

**Fig. 157 Removing Reservoir****Fig. 158 Reservoir Sealing Grommets**

(3) Make sure bottom of reservoir touches the top of both sealing grommets.

(4) Install the 2 fluid reservoir to master cylinder retaining pins (Fig. 156).

FRONT AND REAR 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.

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.

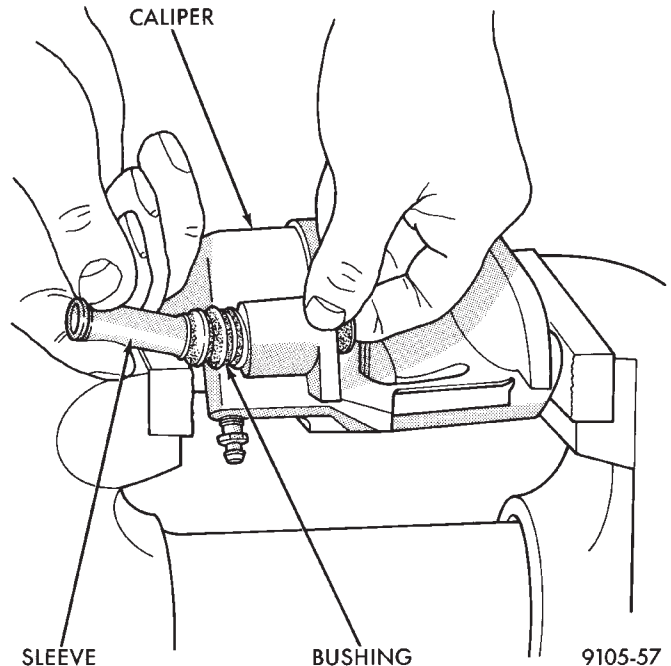
CALIPER GUIDE PIN BUSHING SERVICE

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. 159).

**Fig. 159 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. 160).

INSTALLING CALIPER GUIDE PIN BUSHINGS

(1) Fold the bushing in half lengthwise at the solid middle section of the bushing (Fig. 161).

(2) Insert the folded bushing into the caliper housing (Fig. 162). **Do not use a sharp object to perform this step due to possible damage to the bushing.**

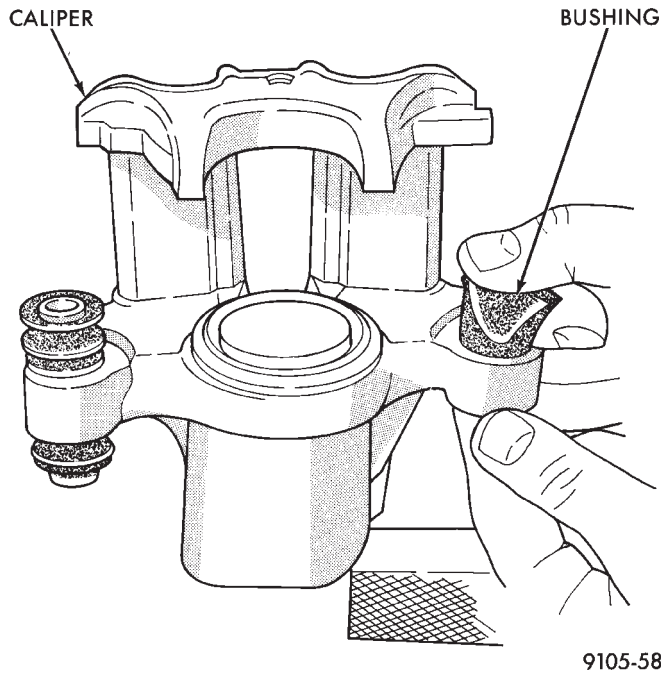
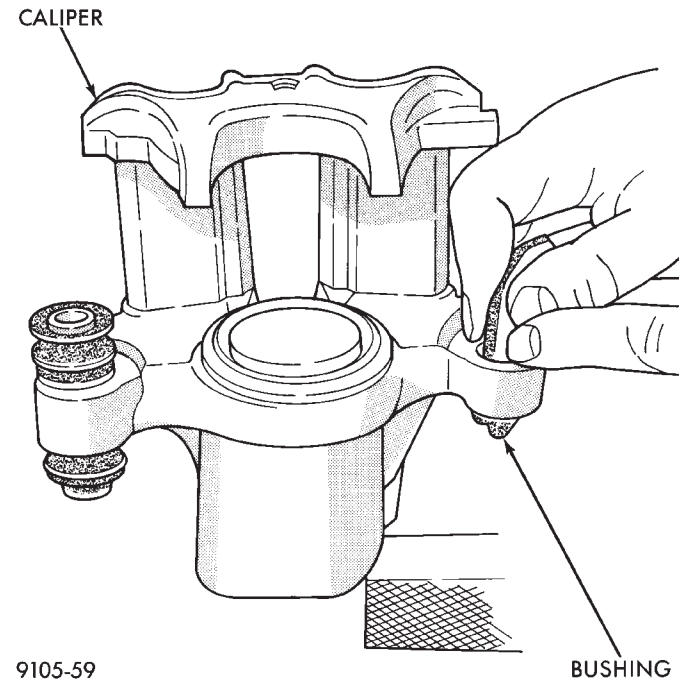
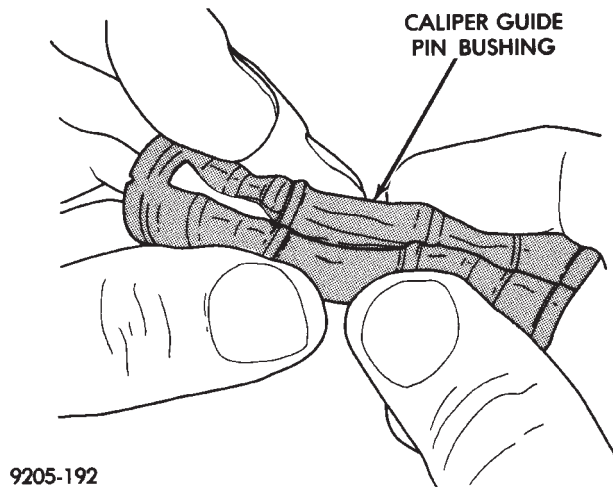
(3) Unfold the bushing using your fingers or a wooden dowel until the bushing is fully seated into the caliper housing. Flanges should be seated evenly on both sides of the bushing hole (Fig. 163).

(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. 164).

(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. 164).

DISASSEMBLY AND ASSEMBLY (Continued)

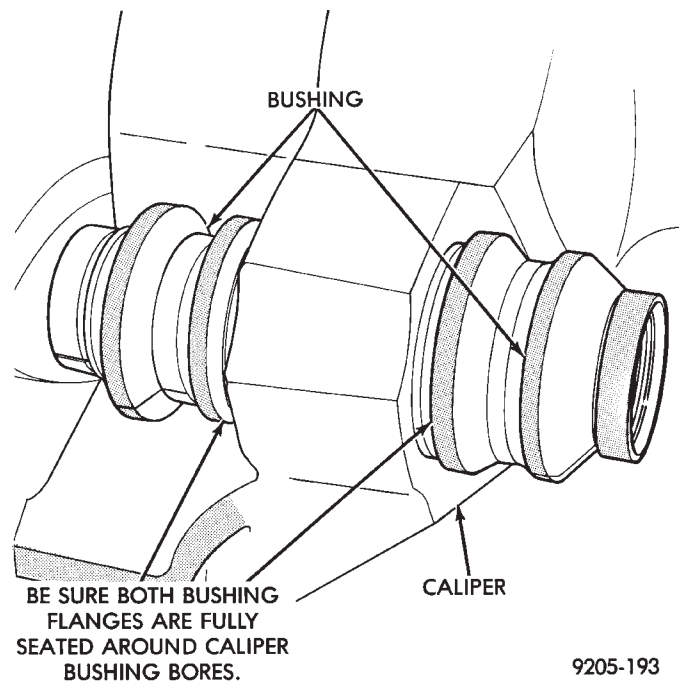
**Fig. 160 Removing Bushing From Caliper****Fig. 162 Installing Caliper Guide Pin Bushing****Fig. 161 Folded Caliper Guide Pin Bushing**

(7) Holding sleeve in place, work other end of bushing over end of sleeve and into the seal groove on sleeve (Fig. 165). Be sure other end of bushing did not come out of seal groove in sleeve.

(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.

CALIPER DISASSEMBLY

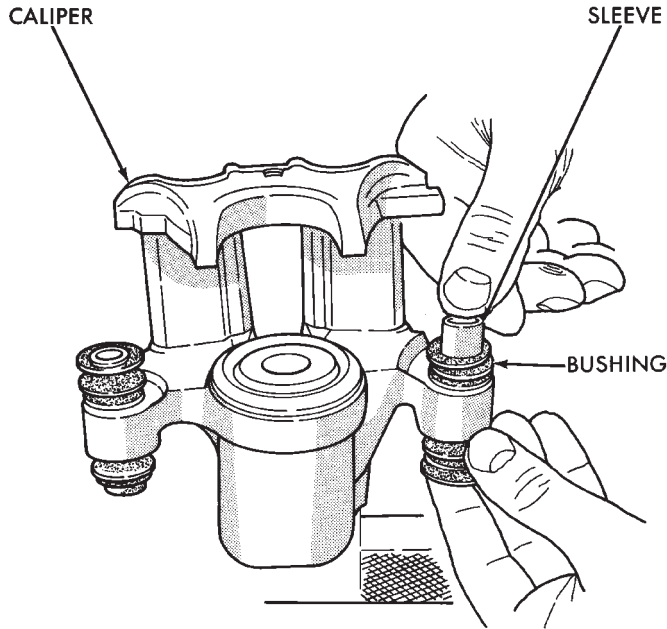
WARNING: UNDER NO CONDITION SHOULD AIR PRESSURE EVER BE USED TO REMOVE A PISTON FROM A CALIPER BORE. PERSONAL INJURY COULD RESULT FROM SUCH A PRACTICE.

**Fig. 163 Bushing Correctly Installed In Caliper**

(1) Remove caliper from brake rotor (See Brake Shoe Removal). Hang assembly on a wire hook away from rotor, so hydraulic fluid cannot get on rotor. Place a small piece of wood between the piston and caliper fingers.

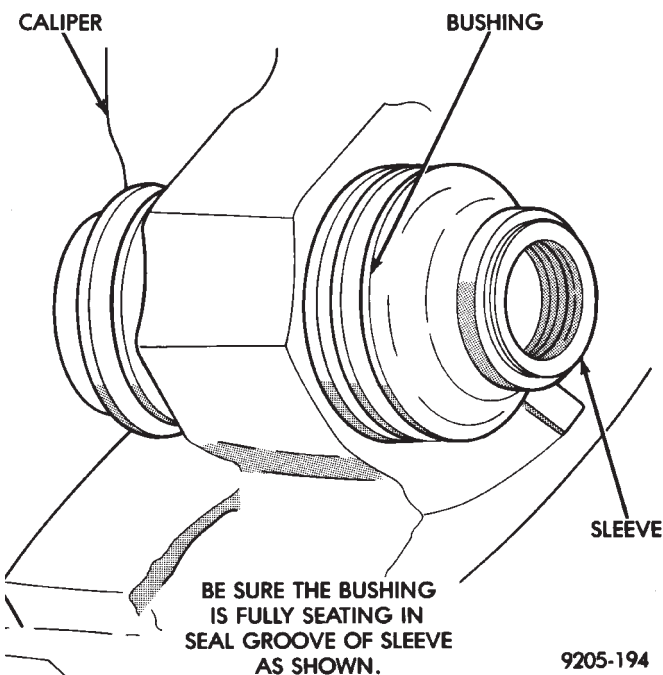
(2) **Carefully** depress brake pedal to hydraulically push piston out of bore. Then apply and hold down the brake pedal to any position beyond the first

DISASSEMBLY AND ASSEMBLY (Continued)



9105-60

Fig. 164 Installing Sleeve In Bushing



9205-194

Fig. 165 Correctly Installed Caliper Sleeve And Bushing

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.

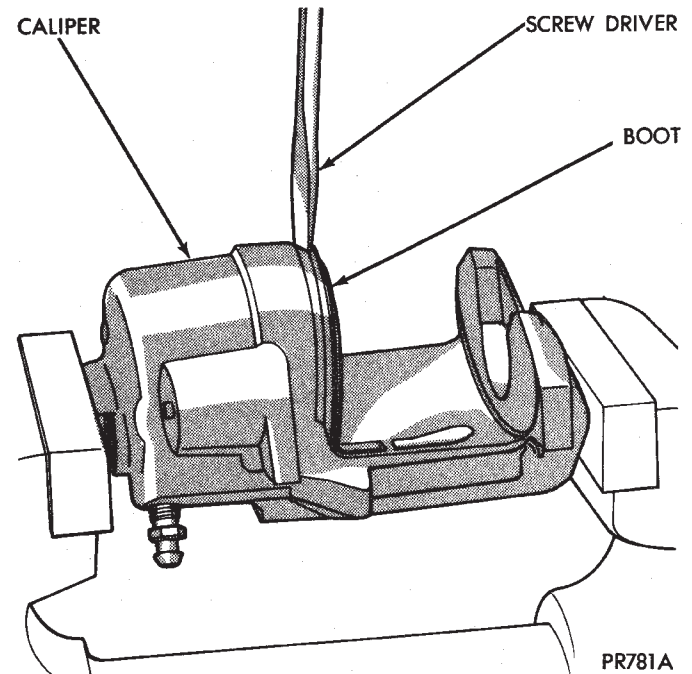
(4) Disconnect the brake fluid flex hose from the caliper assembly.

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. 166).



PR781A

Fig. 166 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. 167). 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.**

(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. 168).

DISASSEMBLY AND ASSEMBLY (Continued)

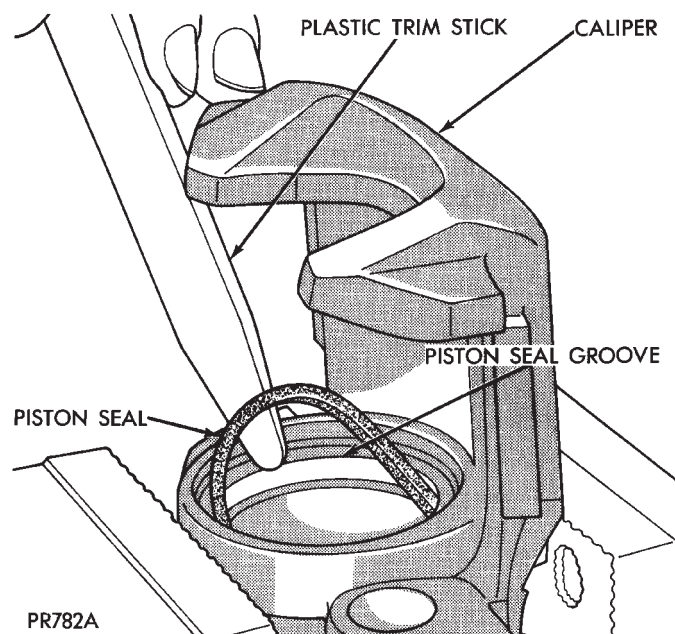


Fig. 167 Removing Piston Seal From Caliper

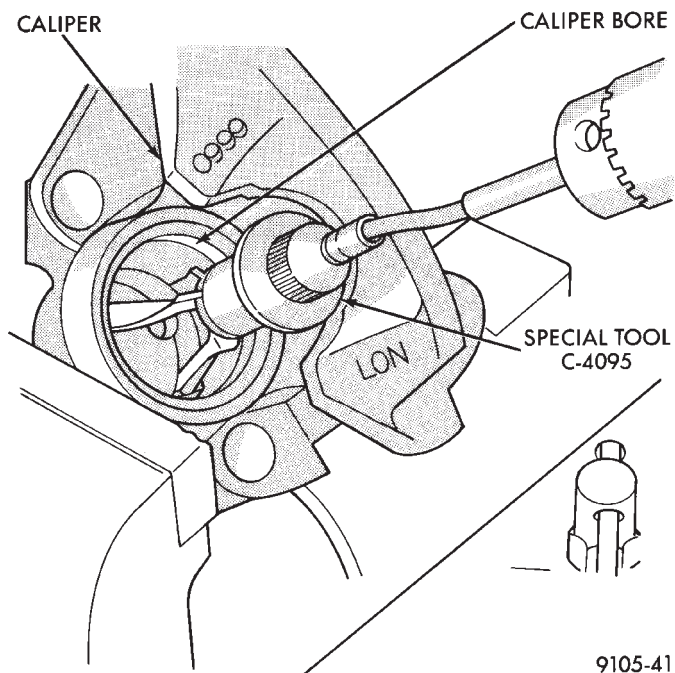


Fig. 168 Honing Brake Caliper Piston Bore

(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.

(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. 169), 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. 169).

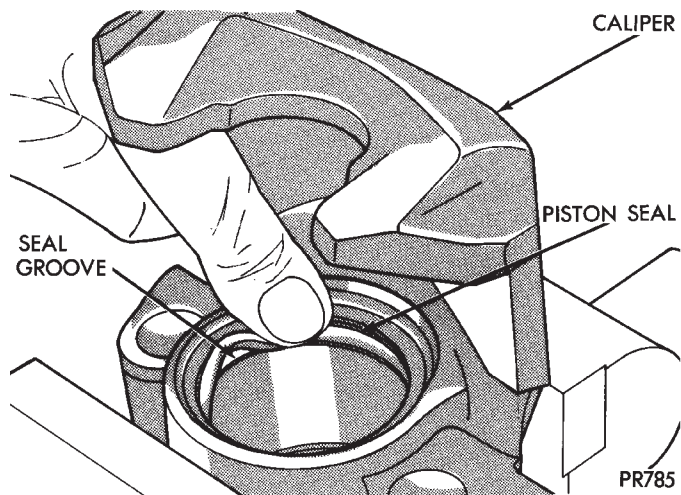


Fig. 169 Installing New Piston Seal In Caliper

(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.

DISASSEMBLY AND ASSEMBLY (Continued)

(5) Install piston into caliper bore pushing it past the piston seal until it bottoms in the caliper bore (Fig. 170).

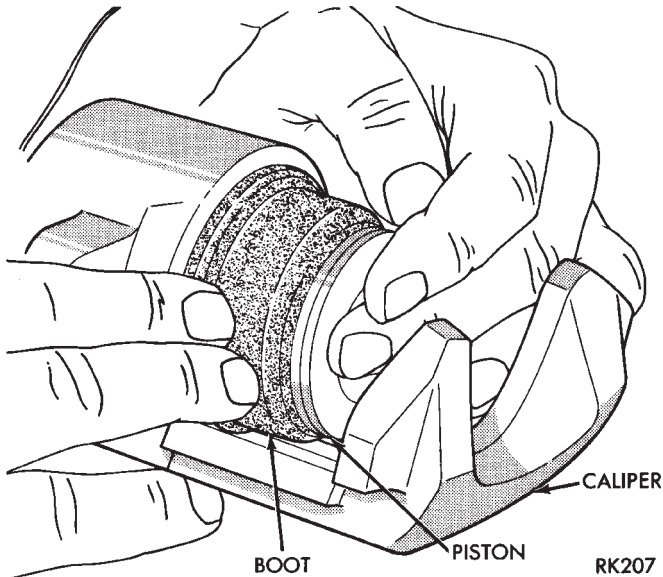


Fig. 170 Installing Piston Into Caliper Bore

(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 C-4171, drive boot into counterbore of the caliper (Fig. 171).

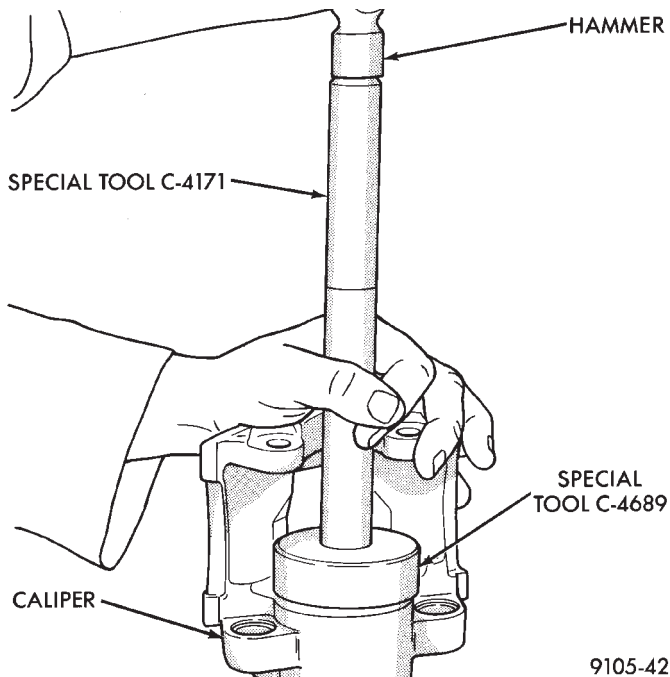


Fig. 171 Installing Dust Boot In Caliper Counterbore

(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 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. 172).

(2) Press **IN** on one piston to force out opposite piston, cup and spring (Fig. 172). 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. 172) 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

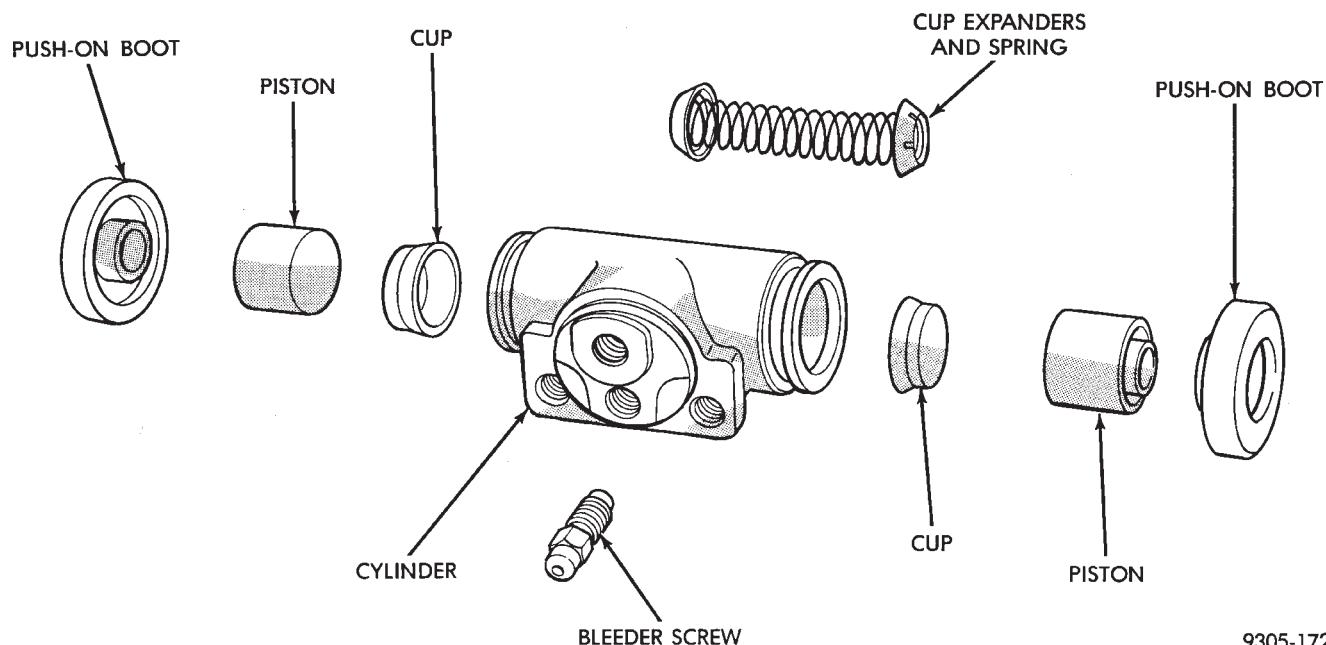
Before assembling the pistons and new cups in the wheel cylinders, dip them in clean brake fluid. If the boots are deteriorated, cracked or do not fit tightly on the pistons or the cylinder casting, install new boots.

(1) Coat cylinder bore with clean brake fluid.

(2) Lightly coat the sealing lip and outer surfaces of the wheel cylinder cups with Mopar Protect-A-Cup Lubricant.

(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. 172).

DISASSEMBLY AND ASSEMBLY (Continued)



9305-172

Fig. 172 Rear Wheel Cylinder (Exploded View)

(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. 172).

(5) Install a boot over each end of cylinder (Fig. 172). **Be careful not to damage boot during installation.**

CLEANING AND INSPECTION**FRONT 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 front disc brake shoes. Refer to Front Disc Brake Shoe Removal in the Removal And Installation 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 7.95 mm (5/16 inch) they should be replaced.

Replace **both** brake shoe assemblies (inboard and outboard). It is necessary that **both** front 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 Front 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 Front 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 Front Disc Brake Caliper in the Disassembly And Assembly Section in this group of the service manual.

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 Installation section in this group of the service manual for the required procedure.

CLEANING AND INSPECTION (Continued)

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.

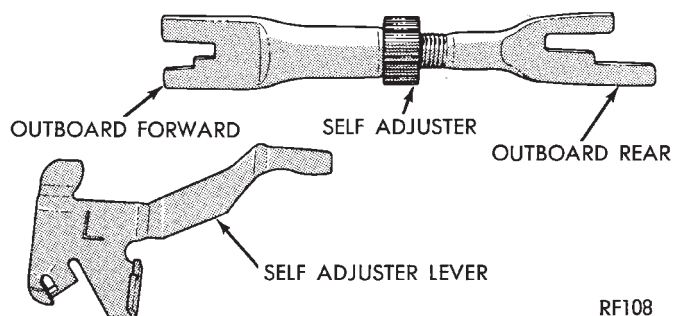
Check the guide pin dust boots to determine if they are in good condition. Replace if they are damaged, dry, or found to be brittle. Refer to Rear Disc Brake Caliper in the Disassembly And Assembly Section in this group of the service manual.

REAR DRUM BRAKES

Rear brake shoe lining should show contact across entire width of the lining and also from the heel to the toe of the lining, otherwise replace.

Brake shoes with lack of contact at the toe or heel of the brake shoe lining may be improperly ground.

Clean and inspect the brake support plate and adjusting screws. Apply a thin coat of Mopar Multi-Purpose Lubricant or equivalent to the threads of the self adjuster (Fig. 173). Replace adjusting screw if corroded.



RF108

Fig. 173 Adjuster Screw And Lever (Typical)

If old brake shoe return or hold down springs have overheated or are damaged, replace. Overheating indications are paint discoloration or distorted end coils.

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.

CHASSIS TUBES AND HOSES

Flexible rubber hose is used at both front and rear brakes. 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 severe surface cracking, scuffing, worn spots or physical damage. 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 corrosion, physical damage or contact with moving or hot components 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. 174) 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. 174) to ratchet backward to the correct position.

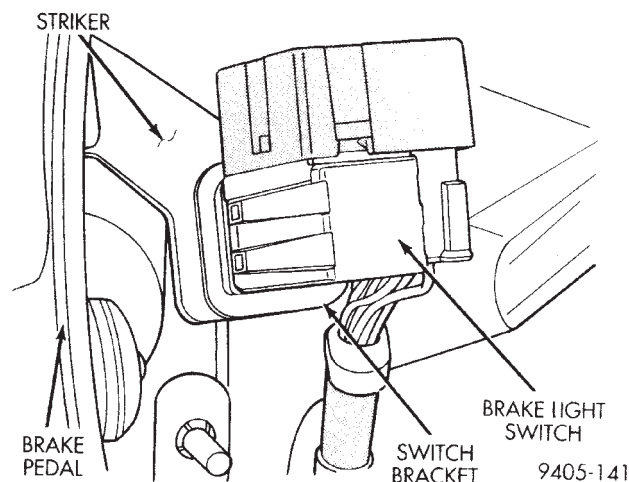


Fig. 174 Stop Light Switch Location In Vehicle

REAR DRUM BRAKE SHOES

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 all wheels are free to turn. See Hoisting in the Lubrication And Maintenance Section, of this service manual for the required lifting procedure.

(2) Remove brake adjusting hole plug (Fig. 175), from the rear brake shoe support plate.

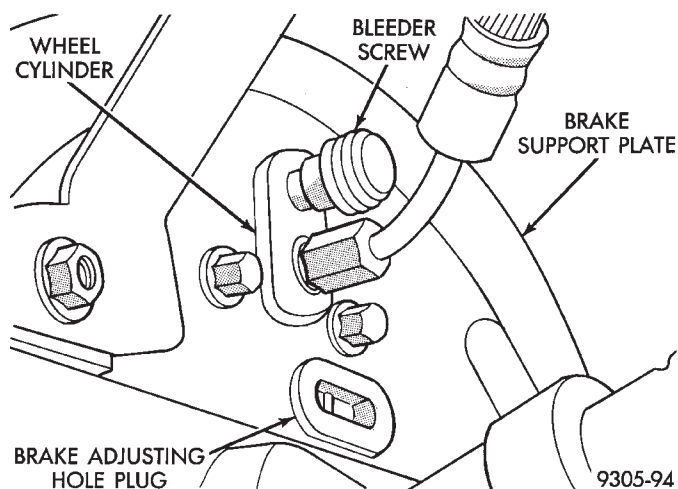


Fig. 175 Brake Adjusting Hole Plug

(3) Be sure parking brake foot pedal is in its fully released position.

(4) Insert a medium blade screwdriver (Fig. 176) or equivalent through the adjusting hole in the support plate and against star wheel of adjusting screw. Move handle of tool downward until a slight drag is felt when the road wheel is rotated.

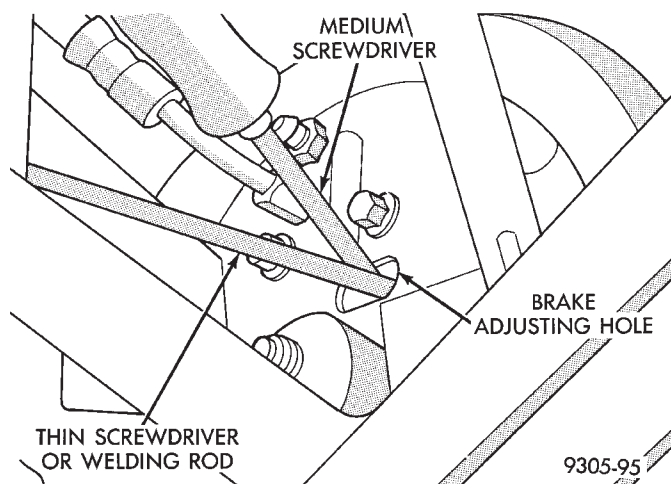


Fig. 176 Rear Brake Shoe Adjustment

ADJUSTMENTS (Continued)

(5) Insert a thin screwdriver or piece of welding rod into brake adjusting hole (Fig. 176). 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 with star wheel, back off star wheel to ensure a free wheel with no brake shoe drag.

(6) Repeat above adjustment at the other rear wheel. Install adjusting hole rubber plugs (Fig. 175) in rear brake supports.

PARKING BRAKES

VEHICLE EQUIPPED WITH REAR DRUM BRAKES

Due to the auto adjust feature of the parking brake lever, adjustment of the parking brake system on vehicles equipped with rear drum brakes relies on proper drum brake shoe adjustment. See Rear Brake Adjustment in the Service Adjustments Section in this group of the service manual.

VEHICLE EQUIPPED WITH REAR DISC BRAKES

Due to the auto adjust feature of the parking brake lever, adjustment of the parking brake system on vehicles equipped with rear disc brakes relies on proper drum-in-hat brake shoe adjustment. See Rear Park Brake Adjustment in the Parking Brakes Section in this group of the service manual.

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.

BRAKE ACTUATION SYSTEM

ACTUATION:

Vacuum Operated Power Brakes Standard Hydraulic System Dual-Diagonally Split

MASTER CYLINDER ASSEMBLY:

Type Dual Tandem
Body Material Anodized Aluminum
Reservoir Material Glass Reinforced Nylon

MASTER CYLINDER BORE / STROKE AND SPLIT:

Non ABS 21 mm x 32.6 mm (.875 in. x 1.28 in.)
ABS 21 mm x 32.7 mm (.874 in. x 1.29 in.)
Displacement Split 50 / 50

MASTER CYLINDER FLUID OUTLET PORTS:

ABS W/O Traction
Control Primary M-10 Secondary M-12
ABS With Traction
Control Primary M-12 Secondary M-12
Non ABS Primary M-10
Non ABS Secondary M-12
Outlet Fitting Type ISO Flare

ABS HYDRAULIC CONTROL UNIT:

Hydraulic Tube Fitting Type ISO Flare

BOOSTER:

Make/Type Bendix, Vacuum Assist
With And With Out ABS
Make/Type Teves Vacuum W/ABS
And Traction Control

Mounting Studs M8 x 1.25
Type 205 mm With And With Out ABS
Type 200 mm With ABS And Traction Control
Boost At 20 inches Of Manifold Vacuum . . . 4690 All

IN-LINE PROPORTIONING VALVE:

Material Aluminum
Function Hydraulic Pressure Proportioning

BRAKE PEDAL

Pedal Ratio 3.28:1

SPECIFICATIONS (Continued)

BRAKE FASTENER TORQUE SPECIFICATIONS

DESCRIPTION	TORQUE
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BRAKE TUBES:

Tube Nuts To Fittings	
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And Components	17 N·m (145 in. lbs.)
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BRAKE HOSE:

To Caliper Banjo Bolt	48 N·m (35 ft. lbs.)
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Intermediate Bracket	12 N·m (105 in. lbs.)
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MASTER CYLINDER:

To Vacuum Booster	
-------------------	--

Mounting Nut	28 N·m (250 in. lbs.)
------------------------	-----------------------

BRAKE BOOSTER:

To Dash Panel	
---------------	--

Mounting Nuts	28 N·m (250 in. lbs.)
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REAR WHEEL CYLINDER:

To Support Plate Mounting Bolts .	8 N·m (75 in. lbs.)
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Bleeder Screw	10 N·m (80 in. lbs.)
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BRAKE SUPPORT PLATE:

To Spindle Mounting Bolts	63 N·m (46 ft. lbs.)
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DISC BRAKE CALIPER:

Guide Pin Bolts	41 N·m (30 ft. lbs.)
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Bleeder Screw	15 N·m (125 in. lbs.)
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ABS HYDRAULIC CONTROL UNIT BRACKET:

To Frame Rail Bolts	19 N·m (14 ft. lbs.)
-------------------------------	----------------------

To Inner Fender Bolts	2 N·m (18 in. lbs.)
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CAB To HCU Screws	12 N·m (106 in. lbs.)
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PARKING BRAKE:

Pedal Assembly	
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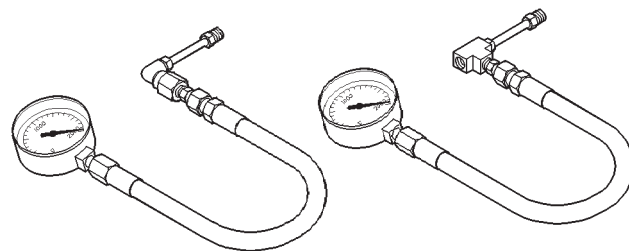
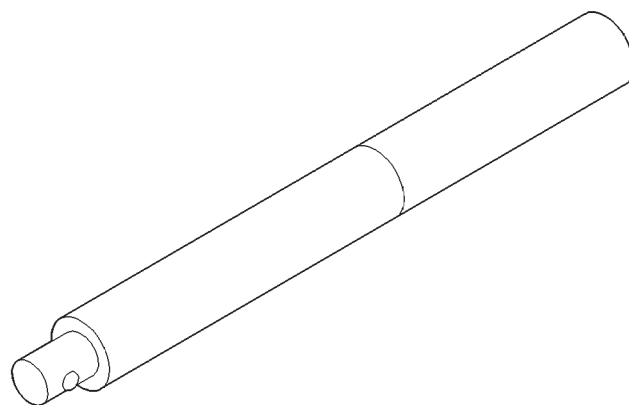
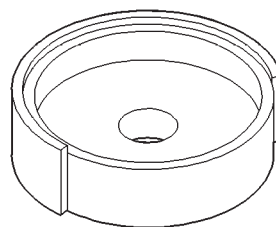
Mounting Bolts	28 N·m (250 in. lbs.)
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REAR HUB AND BEARING:

To Knuckle Retaining Nut . . .	168 N·m (124 ft. lbs.)
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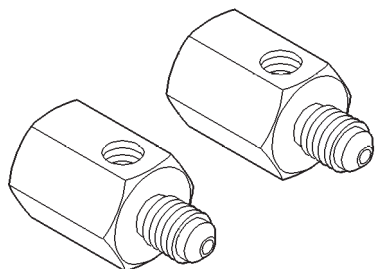
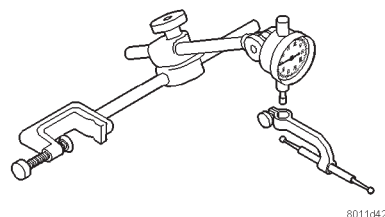
WHEEL:

Stud Lug Nut	110–135 N·m (85–115 ft. lbs.)
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*Gauge Set C-4007-A**Handle, Universal C-4171**Installer, Dust Boot C-4689*

SPECIAL TOOLS

BASE BRAKE SYSTEM

*Adapters, Brake Pressure Test 6892**Dial Indicator C-3339*

TEVES MARK IV-G ANTILOCK BRAKE SYSTEM AND ANTILOCK BRAKE SYSTEM WITH TRACTION CONTROL

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DESCRIPTION AND OPERATION

ANTILOCK BRAKE SYSTEM OPERATION

The purpose of the antilock brake system (ABS) is to prevent wheel lock-up under heavy braking conditions on virtually any type of road surface. An ABS brake system 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 heavy braking.

This section of the service manual covers the description, diagnostics and service of the ABS and traction control systems. For the 1996 M.Y., this vehicle's ABS and ABS with traction control are the Teves Mark IV-G.

The traction control feature is designed to operate at speeds up to approximately 48 KM/H (30 MPH). Traction control can be deactivated via the traction control switch located on the instrument panel.

An electronic control module is used to monitor wheel speeds and to modulate (control) hydraulic pressure in each brake channel. The hydraulic pressure is used to prevent wheel lock up during braking, and to maintain traction at the driven wheels by reducing wheel spin.

The Teves Mark IV-G system uses a diagonal split hydraulic brake system. In the standard brake mode the master cylinder primary circuit supplies pressure to the right front and left rear wheel brakes. The master cylinder secondary circuit supplies pressure to the left front and right rear wheel brakes.

DESCRIPTION AND OPERATION (Continued)

During an ABS stop the Mark IV-G system uses four channel operation. This means that during antilock operation each wheel brake is independently controlled. By using separate hydraulic channels for stopping each wheel. The system is able to retain directional stability and steering control while applying maximum braking. The system provides maximum braking even when road conditions vary.

During an ABS stop, "wheel lock-up" does not necessarily mean that the wheel has stopped turning. It only means that the wheel is turning slower than the vehicle speed. This is called "wheel slip" and is indicated in percent. Zero percent slip means that the wheel is rolling free and one hundred percent slip means that the wheel is locked. The ABS system maintains an average of approximately 15 to 20 percent wheel slip.

ABS COMPONENT ABBREVIATION LIST

In this section of the service manual several abbreviations are used for the components that are in the Teves Mark IV-G ABS or Traction Control System. These components are listed below for your reference.

- CAB—Controller Antilock Brake
- HCU—Hydraulic Control Unit
- ABS—Antilock Brake System
- PSI—Pounds per Square Inch (pressure)
- WSS—Wheel Speed Sensor
- FWD—Front Wheel Drive
- DTC—Diagnostic Trouble Code

ABS OPERATION AND VEHICLE PERFORMANCE

This ABS Brake System represents current state-of-the-art in vehicle braking systems. It offers the driver increased safety and vehicle control during hard 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 system will enter 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 electrical valves and hydraulic line to provide modulation, although for vehicle stability, both rear wheel valves receive the same electrical signal. The

system can hold, build and reduce hydraulic pressure at each wheel brake. Depending on signals generated by the wheel speed sensors (WSS) at each wheel and received at the Controller ABS brakes CAB.

During ABS Braking, brake pressures are modulated by cycling electric solenoid valves. The cycling of these valves can be heard as a series of popping or ticking noises. In addition, the cycling may be felt as a pulsation in the brake pedal. 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.

Although ABS operation is available at virtually all vehicle speeds. It will automatically turn off at speeds below 3 to 5 mph. Wheel lockup may be perceived at the very end of an anti lock stop and is considered normal.

ABS COMMON DRIVER PERCEPTIONS

Below are the normal conditions that may be felt and heard by the driver of a vehicle equipped with the Teves Mark IV-G ABS or ABS with traction control. The driver will only be aware of these conditions when the system is activated during a hard braking condition, therefore, perceiving them as an abnormal operating conditions of the brake system or vehicle. Therefore, these conditions can be perceived by the driver as a concern that the ABS is not functioning correctly or that there is some other incorrect condition with the vehicle.

None of these conditions will result in turning on the ABS warning lamp or the setting of an ABS trouble code.

Brake Pedal Feedback During An ABS Stop:

Brake pedal feedback is defined as a clicking and/or vibration of the brake pedal.

This is a normal condition that the driver will feel through the brake pedal when the ABS is operating.

This is caused by brake fluid pressure modulation in the wheel brake circuits resulting in the brake pedal feedback.

Clicking/Buzzing At Approximately 7 mph (10 kph):

This is a normal self test condition that the ABS performs to ensure proper function.

The clicking/buzzing is caused by the "Pump Check" which turns on the pump/motor for a short duration (100 milli seconds) to verify operation

Groaning Sound At Approximately 7 mph (10 kph) While Driving Away From An ABS Stop:

This is a normal condition of the ABS which can occur following an ABS stop.

This condition will result if the CAB has not completed a 500 milli second pump run (during an ABS stop, after the last pressure dump, and before reach-

DESCRIPTION AND OPERATION (Continued)

ing 2.5 mph (4 kph) the remainder of the 500 milliseconds must be completed at the next drive off when the vehicle reaches 7 mph (10 kph).

Groaning During Hard Braking Resulting In ABS Operation:

This condition is the pump/motor/valve noise heard by the driver during an ABS stop.

This is a normal condition that the driver will hear when the ABS is operating.

When Key Is Turned To The On/Run Position, Brake Pedal Drops And A "Pop" Sound Is Heard:

This is a normal operating condition of the ABS.

This noise and brake pedal movement is due to the initialization (valve pulse) occurring in the HCU.

Brake Pedal Ratchets Downward At The End Of An ABS Stop:

This is a condition that is normal for the driver to feel through the brake pedal at the end of an ABS stop.

This occurs because the inlet valves in the HCU are pulsed open to bring the circuit pressures back up to the system pressures, creating the ratcheting pedal effect.

Unwarranted ABS Operation (False Cycling):

This condition is caused by the CAB interpreting marginal signals from the wheel speed sensors.

This condition can be caused by the following: Wheel speed sensor to tone wheel air gap to large, damaged tone wheel, low wheel speed sensor output and sticking disc brake calipers.

Groaning Sound Between 0 – 30 mph (Vehicle Equipped With Traction Control):

This condition is caused by a front wheel(s) slipping on the road surface when accelerating the vehicle.

This is a normal sound the driver will hear when the traction control system on a vehicle is operating.

The green "TRACTION" lamp will be turned on and remain on until the traction control cycle is over.

VEHICLE HANDLING PERFORMANCE DURING ABS BRAKING

It is important to remember that ABS 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

Brake pedal feel during normal braking, if the vehicle is equipped with the Teves Mark IV-G ABS or Traction Control system, is the same as conventional Non ABS equipped cars.

When ABS is activated during hard braking due to a wheel lockup tendency. Brake pedal effort will increase due to the master cylinder pressure being isolated from the brake system. Some brake pedal movement and associated noises may be felt and heard by the driver. This is normal of ABS due to pressurized fluid being transferred to and from the wheel brakes.

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. During brake pressure modulation, as brake pressure is increased, wheel slip is allowed to reach up to 30%. This means that the wheel rolling velocity is 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. A vehicle equipped with ABS though, will not leave dark black tire marks since the wheel never reaches a locked condition. Tire marks may however be noticeable as light patched marks.

ABS AND TRACTION CONTROL COMPONENTS

The following is a detailed description of the Mark IV-G ABS and Traction Control components. For information on servicing the base brake system components, see the Base Brake section of this Group in the service manual.

ABS MASTER CYLINDER AND VACUUM BOOSTER

The master cylinder used with the traction control / ABS is a Teves, standard tandem design except that central valves are used in conjunction with the traditional compensation ports. The center valve is a spring loaded ball and seat design which is unseated by a stop in the master cylinder when the brakes are released. The ABS uses a traditional compensating port Allied Signal master cylinder.

DESCRIPTION AND OPERATION (Continued)

A fluid level switch is located in the master cylinder fluid reservoir (Fig. 1). The switch closes when a low fluid level is detected. The FLS-1 turns on the Brake Warning Lamp by grounding the lamp circuit. This switch does not disable the ABS system.

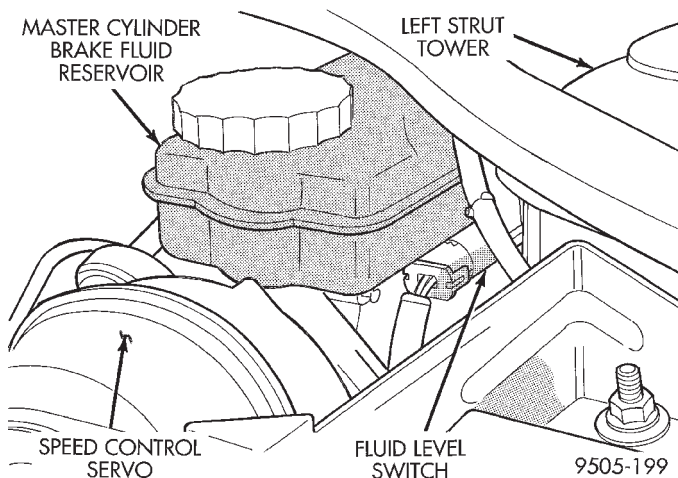


Fig. 1 Fluid Level Switch Location In FluidReservoir

The vacuum booster used with the Teves Mark IV-G ABS is the Allied Signal, zero lost travel type booster. The Teves Mark IV-G Traction Control with ABS, uses a Teves vacuum booster.

HYDRAULIC CONTROL UNIT

CAUTION: THE ONLY PART OF THE HYDRAULIC CONTROL UNIT HCU THAT IS REPLACEABLE IS THE MOUNTING BRACKET. THE REMAINING COMPONENTS OF THE HCU ARE NOT SERVICEABLE OR REPLACEABLE ITEMS. NO ATTEMPT SHOULD EVER BE MADE TO REMOVE OR SERVICE ANY OTHER PARTS OF THE HCU.

The HCU (Fig. 2) is located in the engine compartment on the left frame rail forward of the master cylinder and is covered by a heat shield. The Hydraulic Control Unit HCU contains the valve block assembly, the pump/motor assembly, and fluid accumulators.

HCU VALVE BLOCK

The valve block assembly (Fig. 2) on a vehicle which is equipped only with ABS contains eight valve/solenoids: four inlet valves and four outlet valves. The valve block assembly on a vehicle which is equipped with ABS and traction control contains ten valve/solenoids: four inlet valves four outlet valves and 2 additional valves for the traction control function. The inlet valves are spring loaded in the open position and the outlet valves are spring loaded in the closed position. During an antilock stop these valves are cycled to maintain the proper slip ratio for each channel. If a wheel locks, the inlet valve is

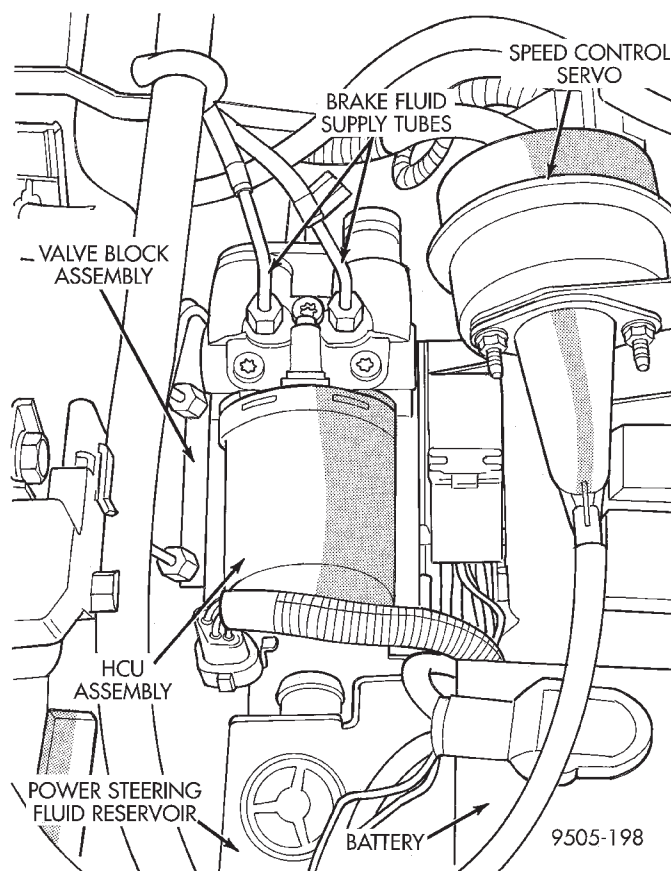


Fig. 2 Teves Mark IV-G ABS HCU MountingLocation

closed to prevent any further pressure increase. Then the outlet valve is opened to release the pressure back to the accumulators until the wheel is no longer slipping. Once the wheel is no longer slipping the outlet valve is closed and the inlet valve is opened to reapply pressure. If the wheel is decelerating within its predetermined limits (proper slip ratio), both valves will close to hold the pressure constant. During the stop, the build pressure is initially supplied by the master cylinder. During decay, the fluid is dumped to the fluid accumulators by the pump and restored to high pressure for the next build cycle.

HCU FLUID ACCUMULATORS

There are two fluid accumulators (Fig. 3) in the hydraulic control unit, one each for the primary and secondary hydraulic circuits. The fluid accumulators temporarily store brake fluid that is decayed from the wheel brakes during an ABS cycle. This fluid is then delivered by the pump to provide build pressure.

HYDRAULIC CONTROL UNIT PUMP MOTOR ASSEMBLY

The pump/motor assembly (Fig. 4) consists of an electric motor and a dual piston pump. The motor

DESCRIPTION AND OPERATION (Continued)

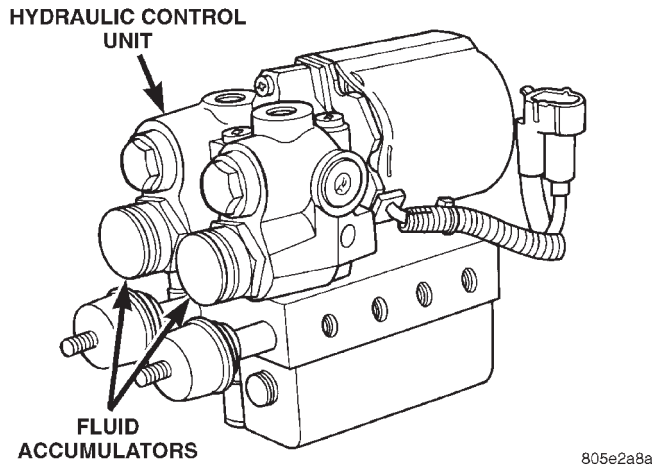


Fig. 3 HCU FLUID ACCUMULATORS

shaft inside the pump is designed as a cam in order to drive both pistons.

The pump picks up fluid from the accumulators to supply build pressure to the brakes during an ABS stop. The pump motor only runs during an ABS stop and is controlled by the CAB from the pump/motor relay. The pump/motor assembly is not a serviceable item. If the pump/motor requires replacement the complete HCU assembly must be replaced.

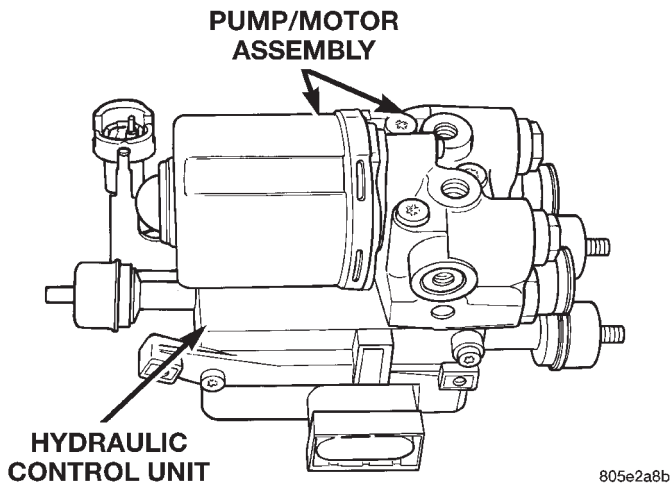


Fig. 4 HCU Pump/Motor

ABS RELAYS

MAIN RELAY

The Main Relay (Fig. 5) is attached to the outside of the Power Distribution Center. The Main Relay has two functions. First, when the relay is energized, it supplies power to the solenoid valves in the Valve Block Assembly and the pump/motor relay coil. Second, when the relay is de-energized, it supplies a ground to turn on the ABS warning light. The Main Relay is controlled by the CAB. The CAB energizes

the Main Relay when it receives an ignition input signal and verifies that no locked faults exist.

PUMP/MOTOR RELAY

The Pump/Motor Relay (Fig. 5) supplies power to the pump/motor. It is attached to the outside of the Power Distribution Center (PDC). The relay coil is powered by the Main Relay and the coil ground is controlled by the CAB.

The Pump/Motor Relay is a special four terminal relay and should not be replaced with a standard relay. If either relay is defective both relays must be replaced. They are serviced as an assembly.

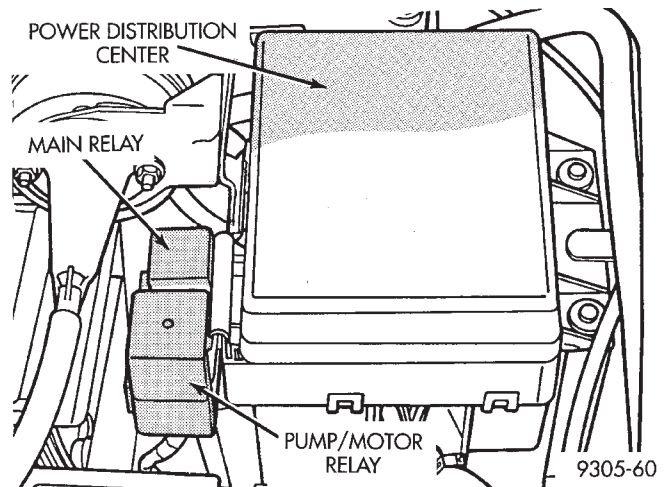


Fig. 5 Main Relay And Pump/Motor Relay

PROPORTIONING VALVES

Two in line proportioning valves (Fig. 6) are used in the Teves Mark IV-G ABS and Teves Mark IV-G ABS with Traction Control. One proportioning valve is used in each rear brake hydraulic circuit. The in line proportioning valves are located in the rear chassis brake tubes of the vehicle (Fig. 7). The proportioning valves are not serviceable but are a replaceable component of the rear brake tube.

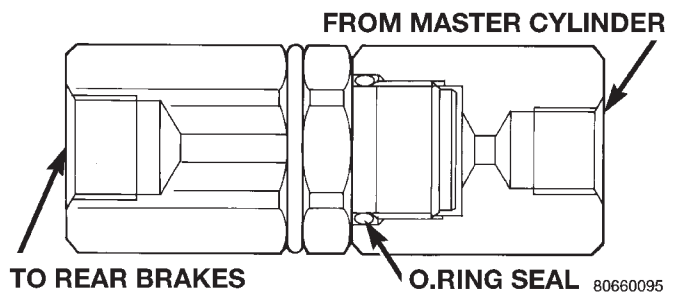
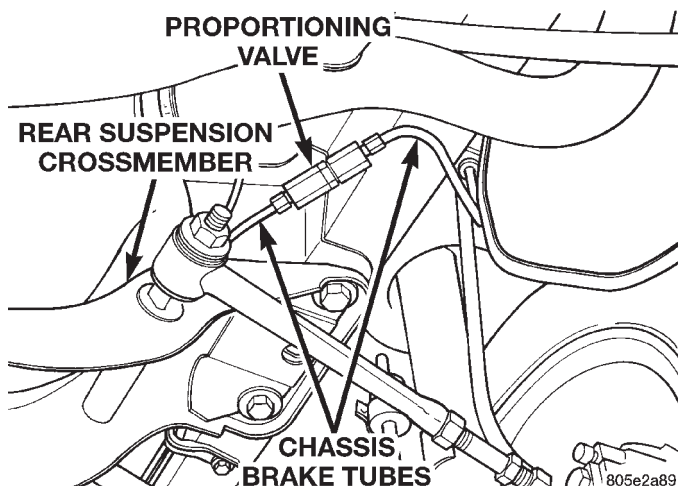


Fig. 6 Proportioning Valve

WHEEL SPEED SENSORS

One wheel speed sensor WSS is located at each wheel and sends a small AC signal to the control module CAB. This voltage is generated by magnetic induction when a toothed sensor ring (tonewheel)

DESCRIPTION AND OPERATION (Continued)

**Fig. 7 Proportioning Valve Location On Vehicle**

passes by a stationary magnetic sensor WSS. The CAB converts the AC signals into digital signals for each wheel.

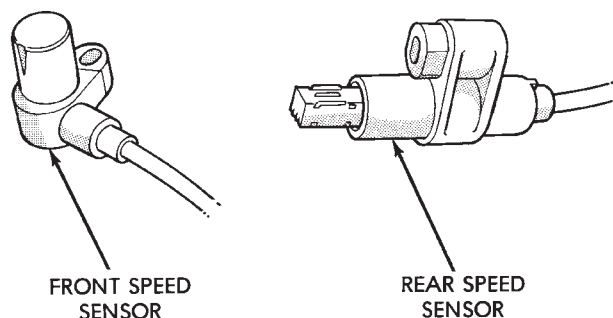
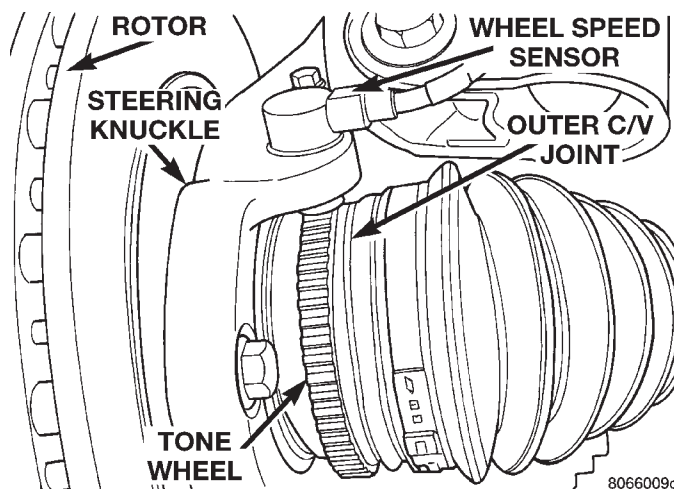
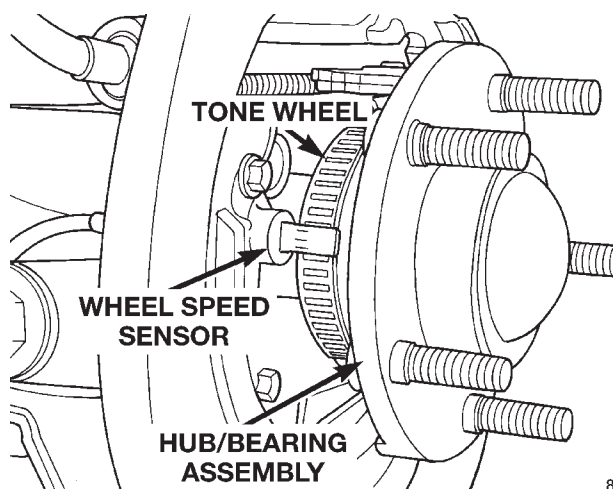
The front wheel speed sensor (Fig. 8) is attached to a boss in the steering knuckle (Fig. 9). The tonewheel is an integral part of the front axle shaft outer C/V joint (Fig. 9). The rear speed sensor (Fig. 8) is mounted in the caliper adapter plate and the rear tonewheel is an integral part of the rear rotor hub (Fig. 10). The wheel speed sensor air gap is NOT adjustable. The correct wheel speed sensor air gap is from 0.52 to 1.64mm for the front sensors, and from 0.45 to 1.21mm for the rear sensors. All wheel speed sensors have a resistance between 950 and 1250 ohms.

The four wheel speed sensors are serviced individually. The front tonewheels are serviced as an assembly with the outer C.V. Joint Housing. The rear tonewheels are serviced as an assembly with the rotor hub (Fig. 9).

Correct ABS system operation is dependent on the wheel speed signals from the wheel speed sensors. The wheels and tires should all be the same size and type to generate accurate signals. In addition, the tires should be inflated to the recommended pressures for optimum system operation. Variations in wheel and tire size or significant variations in inflation pressure can produce inaccurate wheel speed signals. However, the system will continue to function correctly when using the mini-spare.

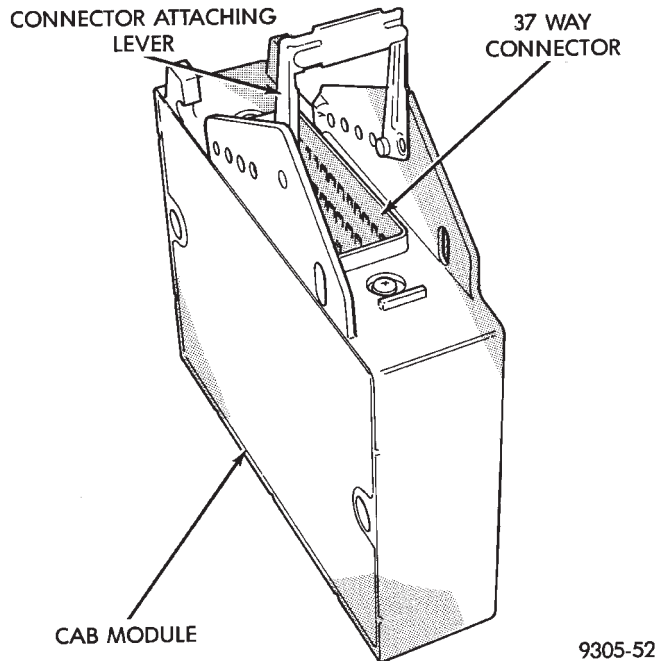
CONTROLLER ANTILOCK BRAKES AND ANTILOCK BRAKES WITH TRACTION CONTROL

The Controller ABS Brakes CAB (Fig. 11) is a microprocessor based device which monitors wheel speeds and controls the ABS functions. The CAB contains two microprocessors which receive identical sensor signals and then independently process the information. The results are then compared to make

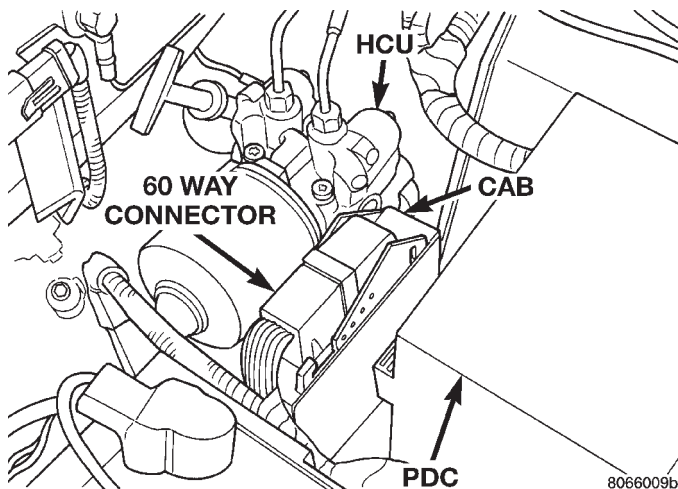
**Fig. 8 Wheel Speed Sensors****Fig. 9 Front Wheel Speed Sensor And ToneWheel****Fig. 10 Rear Wheel Speed Sensor And Tone Wheel**

sure that they agree otherwise the CAB will turn off the ABS function and turn on the warning lights.

DESCRIPTION AND OPERATION (Continued)

**Fig. 11 Controller Antilock Brakes**

The CAB on this vehicle is located in the engine compartment, on the left front inner frame rail (Fig. 12). The CAB is connected directly to the HCU by a 14 way electrical connector. To remove the CAB from the HCU it is necessary to remove the HCU from the vehicle. The CAB diagnostic connector is located under the dash, to the right of the steering column. This is the C2D diagnostics connector.

**Fig. 12 Controller Location In Vehicle**

The primary function of the CAB is to:

- Detect wheel spin tendencies
- Detect wheel locking tendencies.
- Control fluid pressure modulation to the brakes during ABS operation.
- Monitor the system for proper operation.
- Provide communication to the DRB scan tool while in diagnostic mode.
- Store diagnostic information in non-volatile memory.

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 HCU to modulate brake fluid pressure in some or all of the hydraulic circuits. The CAB continues to control pressure to individual wheels, until the locking tendency is no longer present.

The ABS and the ABS with traction control is constantly monitored by the CAB for proper operation. If the CAB detects a fault, it can disable the ABS function and turn on the ABS warning lamp. If the ABS function is disabled, the system will revert to standard base brake system operation.

The CAB Inputs include the following:

- Four Wheel Speed Sensors
- Stop Lamp Switch
- Ignition Switch
- Main Relay Voltage
- Pump/Motor Voltage Sense
- ABS Warning Lamp Voltage

The CAB Outputs include the following:

- Eight Valve/Solenoid Drivers
- Main Relay Actuation
- Pump/Motor Relay Actuation
- Antilock Warning Light Actuation
- Brake Warning Light Actuation
- Diagnostic Communication (C2D)
- Traction Control Lamp Actuation

ABS AND TRACTION CONTROL WARNING LAMPS**NORMAL WARNING LAMP OPERATION**

With the ignition in the Crank position, the Red Brake Warning Lamp will turn on as a bulb check. The Amber ABS Warning Lamp and the Traction Control Lamps will stay on for 1-2 seconds then turn off, once verification of the self diagnosis is completed.

TRACTION CONTROL FUNCTION LAMP

The Green Traction Control Function Lamp is located in the message center. It is used to inform the driver that the system has entered the traction control mode. The lamp is controlled by the CAB. The CAB turns on the lamp by directly grounding the circuit.

ABS WARNING LAMP

The amber ABS Warning Lamp is located in the message center. It is used to inform the driver that the ABS function has been turned off. The warning lamp is controlled by the CAB and/or the Main Relay through an in harness diode. The CAB controls the lamp by directly grounding the circuit. The Main Relay passively grounds the ABS Warning Lamp circuit when it is de-energized.

DESCRIPTION AND OPERATION (Continued)

TRACTION CONTROL WARNING LAMP

The Amber Traction Control Warning Lamp is also located in the message center. It is used to inform the driver that the Traction Control function has been turned off by the CAB. This lamp will also come on if the traction control switch is in the off position and the ignition is on.

BRAKE WARNING LAMP

The red BRAKE Warning Lamp is located in the Instrument Panel. It can be activated in several ways. Application of the parking brake or a low fluid signal from the fluid level switch located in the master cylinder reservoir will cause the lamp to come on. The CAB will also activate the brake warning lamp if there is a fault in the ABS system, and the amber ABS lamp fails to operate. Both the red and the amber lamps will flash when the system is placed in the diagnostic mode with the DRB scan tool. ABS operation is disabled while in the diagnostics mode.

**ABS AND ABS WITH TRACTION CONTROL
HYDRAULIC CIRCUITS AND VALVE OPERATION**

Through the following operation descriptions and diagrams. The function of the various hydraulic control valves in the ABS system 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 Antilock braking.

The following hydraulic circuit drawings are only a representation of the actual hydraulic circuits. Note that only the valves for the right front wheel brake are shown actuated for the various modes.

BRAKES RELEASED

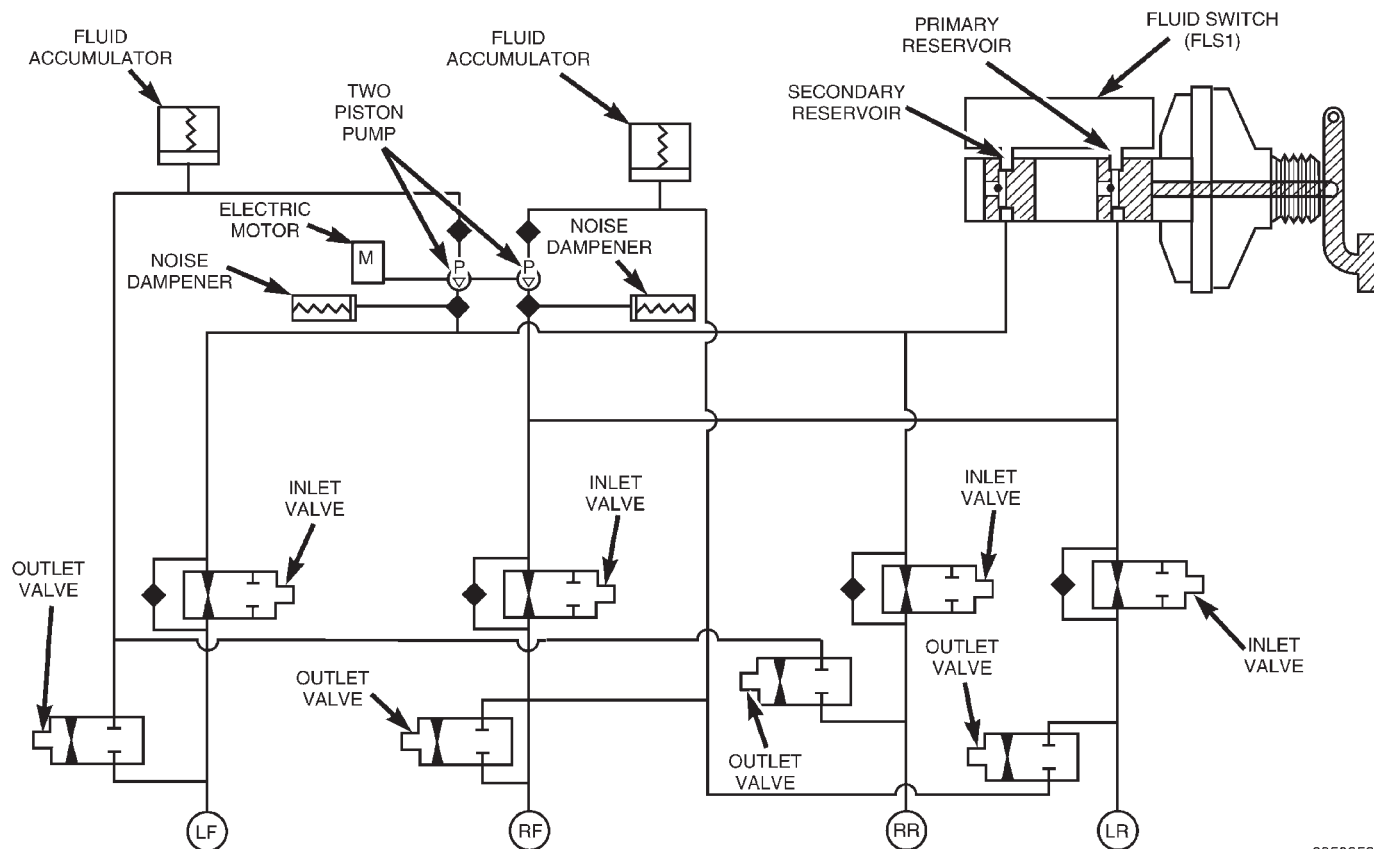
When the brake pedal is in its fully released position, all pressures in the brake hydraulic system are equalized and are at atmospheric pressure (Fig. 13).

BASE BRAKE SYSTEM

The Baseline Brake System is a diagonal split brake system. In a diagonal split brake system the master cylinder primary circuit supplies pressure to the right front and left rear wheel brakes. The master cylinder secondary circuit supplies pressure to the left front and right rear wheel brakes (Fig. 14).

ABS BRAKING-PRESSURE HOLD

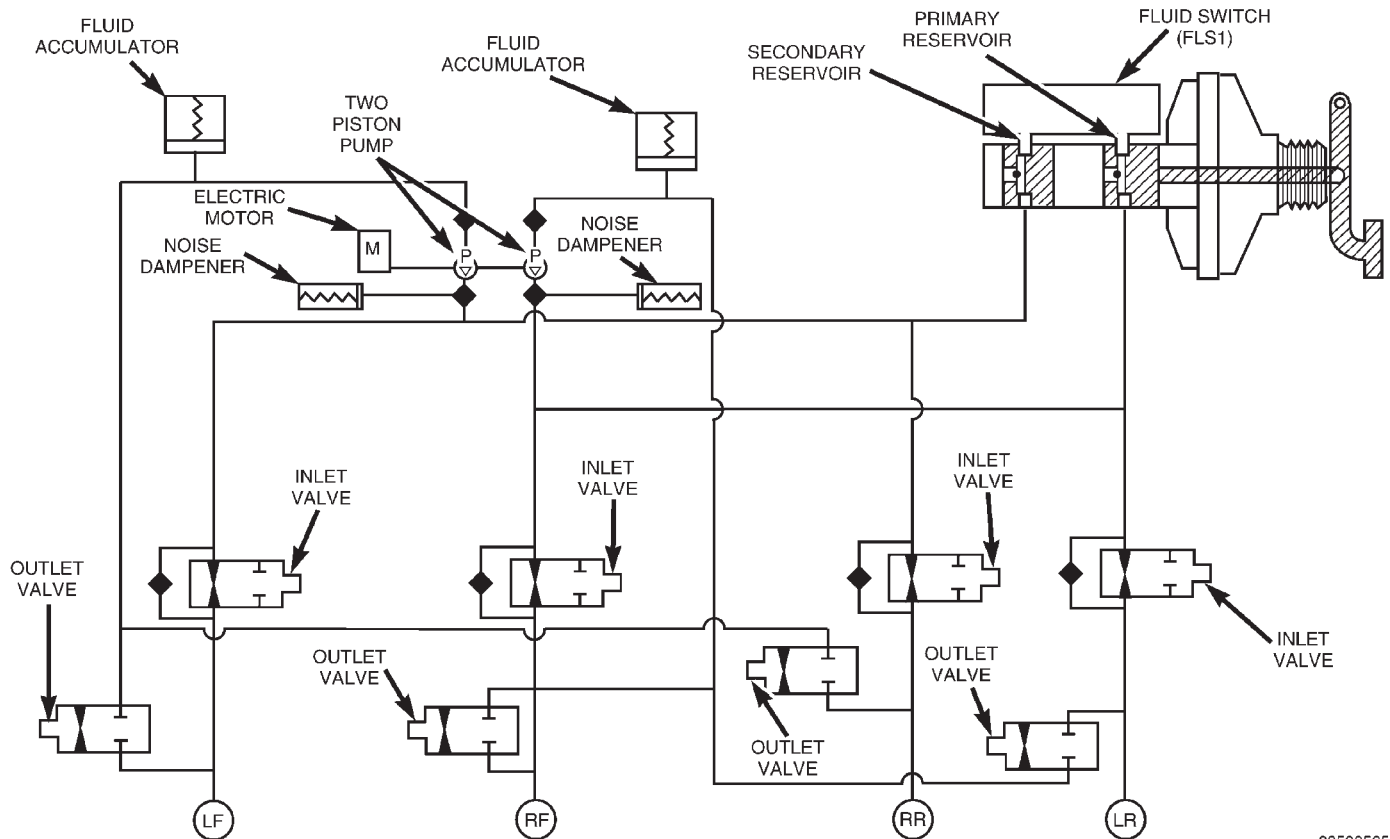
During an ABS stop, if a wheel speed sensor indicates a wheel locking tendency. The normally open inlet valve (Fig. 15) is cycled closed by the CAB. This will prevent any additional pressure from being applied to the wheel brake.



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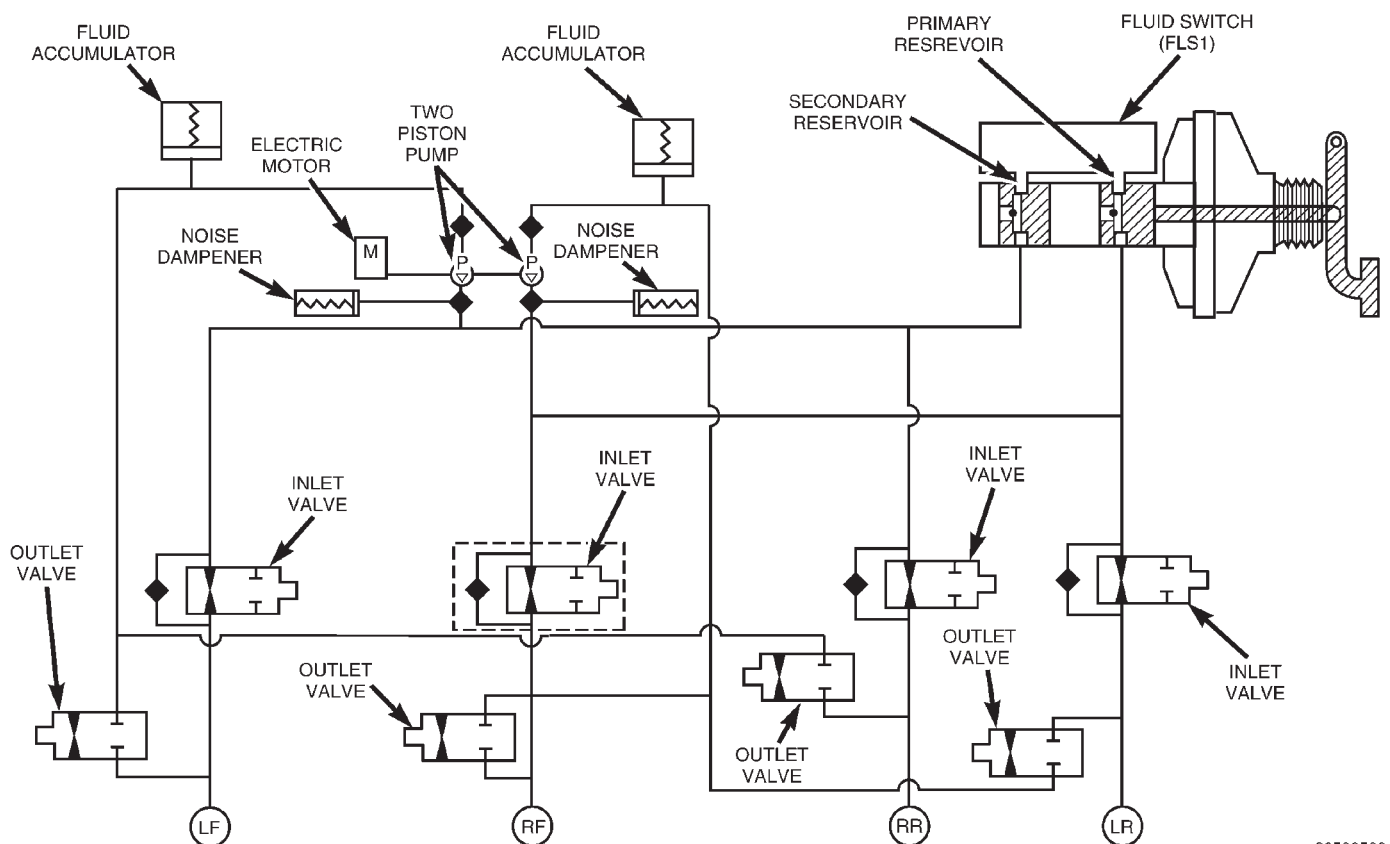
Fig. 13 Brakes Released - Hydraulic ControlTeves Mark IV-G ABS

DESCRIPTION AND OPERATION (Continued)



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Fig. 14 ABS Baseline Brakes - Hydraulic ControlTeves Mark IV-G



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Fig. 15 Pressure Hold - Hydraulic ControlTeves Mark IV-G ABS

DESCRIPTION AND OPERATION (Continued)

ABS BRAKING-PRESSURE DECAY

If the wheel locking tendency continues, the CAB releases the pressure by opening the normally closed outlet valve (Fig. 16). With the outlet valve open, fluid is stored in the accumulators.

ABS BRAKING-PRESSURE BUILD

Once the locking wheel begins to accelerate the CAB closes the outlet valve and opens the inlet valve (Fig. 17) in order to rebuild the wheel brake pressure. The pressure is reapplied from the master cylinder and the accumulators which may cause the brake pedal to drop.

TRACTION CONTROL-PRESSURE BUILD

If a wheel speed sensor indicates a wheel spin (traction loss) tendency and Traction Control function has not been switched off by the driver, the system will begin traction control operation. The normally open Traction Control valves are closed to isolate the drive wheel brake channels from the master cylinder and the rear brake channels. The CAB will also turn on the pump and close the inlet valves to the brake channel it does not need to apply. For example: if a traction loss condition is detected at the right front wheel only, the CAB will close the left front inlet valve to prevent unneeded application of the brake at

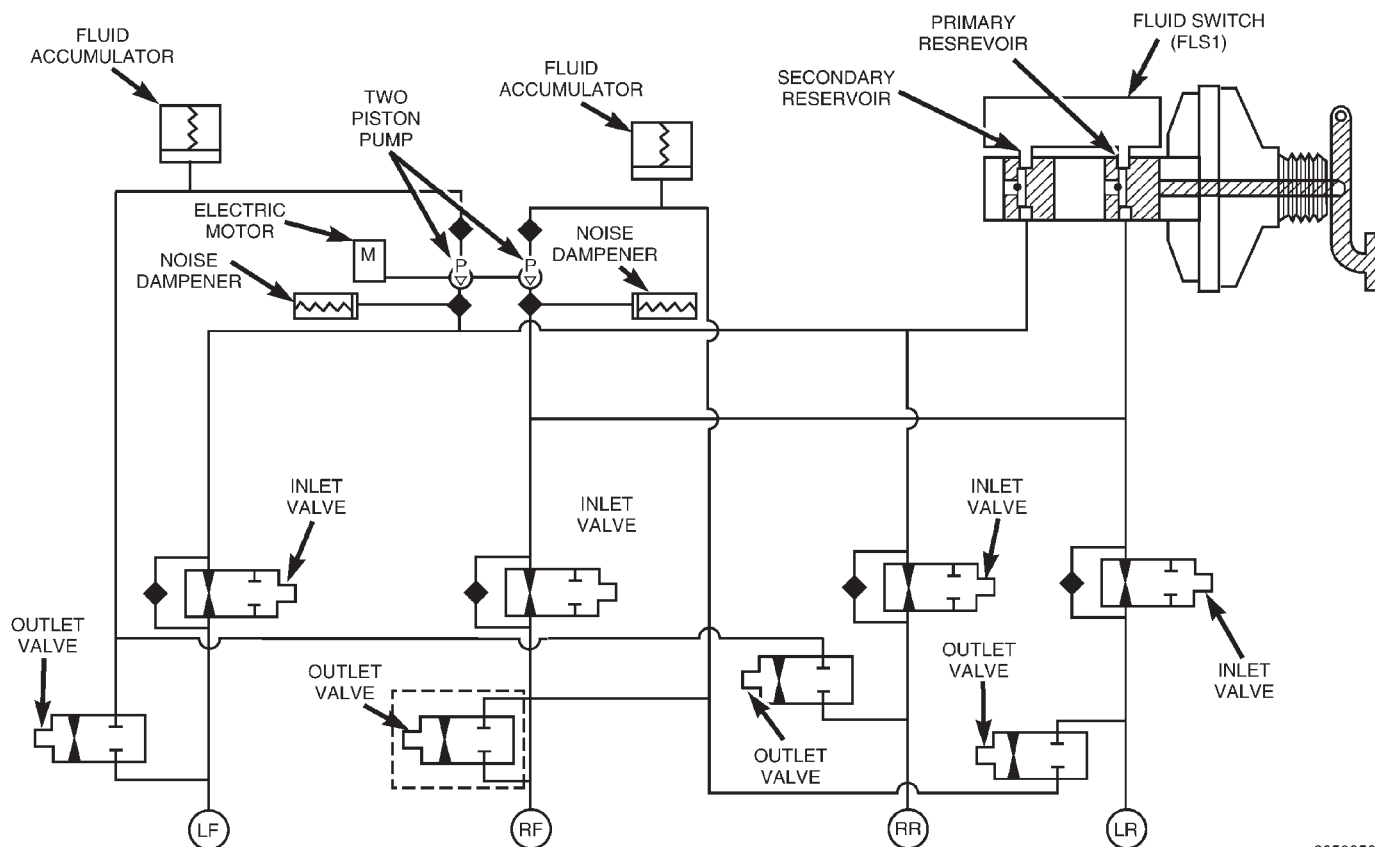
that wheel. Fluid pressure/volume from the pump will be applied to the right front brake caliper via the normally open inlet valve.

TRACTION CONTROL-PRESSURE HOLD

As soon as the traction loss at the spinning wheel has been braked down to acceptable limits. The CAB will close the normally open inlet valve to prevent any additional pressure from being applied at the wheel brake. Since the pump can produce more volume than required for traction control operation. Pressure relief valves in the HCU will direct the excess fluid volume to the master cylinder primary and secondary circuits. This fluid will enter the reservoir through the open center valves in the primary and secondary pistons.

TRACTION CONTROL-PRESSURE DECAY

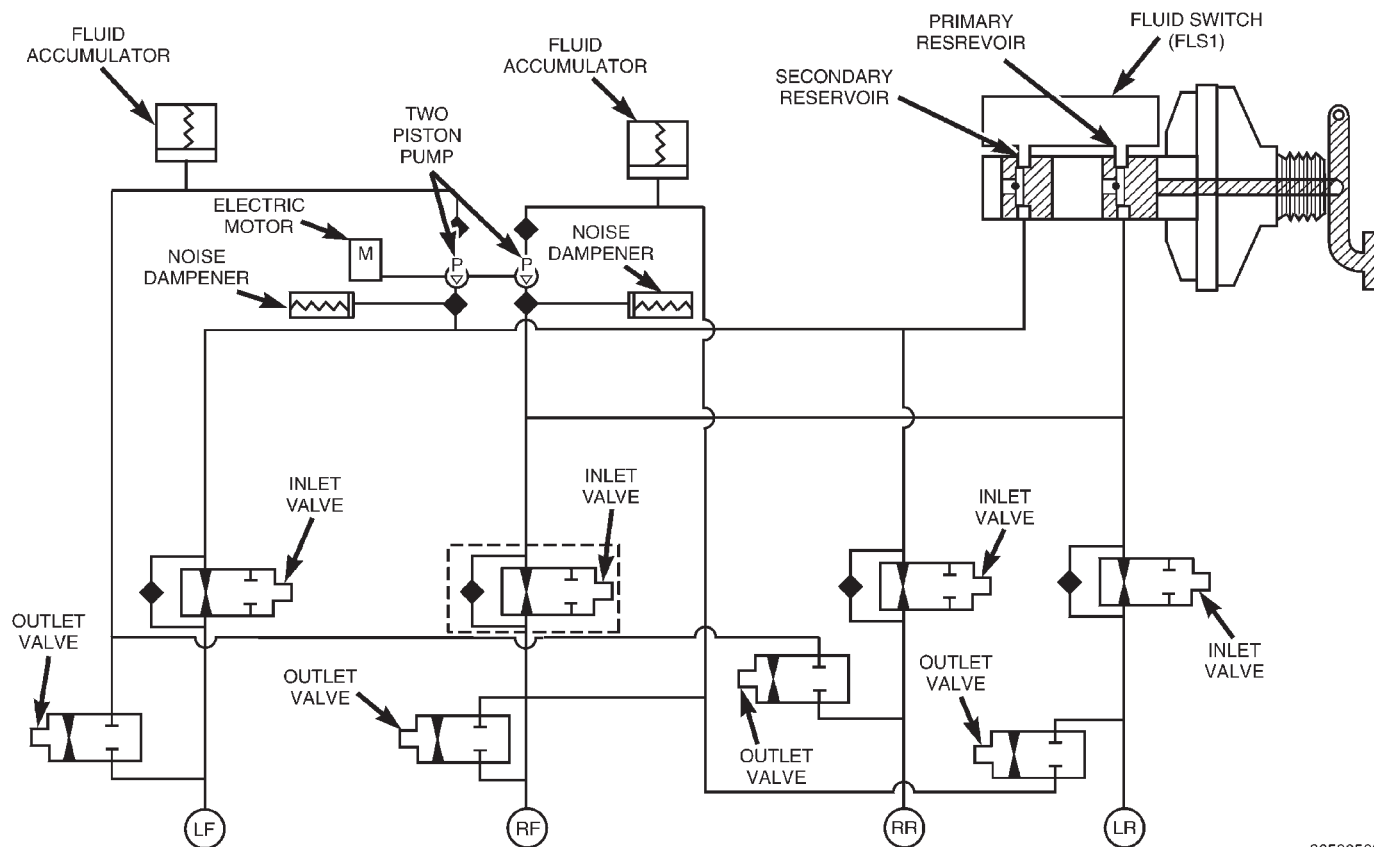
When the wheel spin tendency is no longer detected, the CAB will open the outlet valve to lower the pressure in the brake channel. When the outlet valve is opened, fluid from the brake channel is permitted to flow back to the reservoir at the HCU.



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Fig. 16 Pressure Decay - Hydraulic ControlTeves Mark IV-G ABS

DIAGNOSIS AND TESTING (Continued)



80500568

Fig. 17 Pressure Build - Hydraulic ControlTeves Mark IV-G ABS

DIAGNOSIS AND TESTING

GENERAL DIAGNOSTICS INFORMATION

WARNING: SOME OPERATIONS IN THIS SECTION MAY REQUIRE THAT HYDRAULIC TUBES, HOSES AND FITTINGS BE DISCONNECTED FOR INSPECTION OR TESTING PURPOSES. REVIEW THIS ENTIRE SECTION PRIOR TO PERFORMING ANY DIAGNOSTIC WORK ON A VEHICLE EQUIPPED WITH THE TEVES MARK IV-G ABS OR TEVES MARK IV-G ABS SYSTEM WITH TRACTION CONTROL. THIS SECTION CONTAINS INFORMATION ON PRECAUTIONS PERTAINING TO POTENTIAL COMPONENT DAMAGE, VEHICLE DAMAGE AND PERSONAL INJURY WHICH COULD RESULT WHEN SERVICING AN ABS OR AN ABS WITH TRACTION CONTROL EQUIPPED VEHICLE.

CAUTION: Certain components of the Teves Mark IV-G ABS or the Teves Mark IV-G ABS With Traction Control are not intended to be serviced individually. Attempting to remove or disconnect certain system components, may result in personal injury and/or 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.

The ABS and the ABS with traction control for the 1996 M.Y. is the Teves Mark IV-G system. The components of each system are functionally different and each must be serviced separately.

This section contains information on diagnosing conditions which can affect operation of the Teves Mark IV-G ABS and the Teves Mark IV-G ABS With Traction Control. Specifically, this section should be used to help diagnose mechanical conditions which result in any of the following.

- (1) Anti-Lock Warning Lamp turned on.
- (2) Brakes Lock on Hard Application
- (3) Diagnosis of conditions such as brake noise, brake pulsation, lack of power assist, turning on of the Red Brake Warning Lamp or vehicle vibration during normal braking, should be directed to Base Brake System Section in this group of the service manual.

(4) In order to effectively diagnose an ABS or ABS with traction control system condition, it is important to read and understand the ABS/ABS with traction control system description in this section of the service manual. Then follow the required diagnostic procedures outlined in this section.

(5) 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 or the ABS with traction control operation. These conditions can be recognized without performing extensive diagnostic work, given adequate understanding of the operating principles and performance characteristics of the ABS or the ABS with traction control system.

The ABS and the ABS with traction control uses an electronic control module referred to in this service manual as the CAB. This module is designed to withstand normal current draws associated with vehicle operation. However 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 by the appropriate diagnostic procedure.** These circuits should only be tested using a high impedance multi-meter, special tools or the DRB scan tool 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.

NOTE: The following are general precautions which should be observed when servicing and diagnosing the Teves Mark IV-G ABS or the Teves Mark IV-G ABS With Traction Control. Failure to observe these precautions may result in ABS system damage.

(6) If welding work is to be performed on a vehicle using an arc welder, the CAB should be disconnected before the welding operation begins.

(7) The CAB connector should never be connected or disconnected with the ignition in the on position.

(8) Some components of the Teves Mark IV-G ABS and the Teves Mark IV-G ABS with traction control are not serviced separately and must be serviced as complete assemblies. Do not disassemble any component which is designated as being non-serviceable.

DIAGNOSIS AND TESTING (Continued)

DIAGNOSTICS MANUAL INFORMATION

Detailed procedures for diagnosing specific Teves Mark IV-G ABS or ABS with traction control conditions, are covered in the ABS Teves Brake System diagnostics manual covering the model year of the being serviced. The following information is presented to give the technician a general background on the diagnostic capabilities of the Teves Mark IV-G ABS or ABS with traction control system. Please refer to the above mentioned manual for any further electronic diagnostics and service procedures that are required on the Teves Mark IV-G ABS or ABS with traction control system.

DIAGNOSTIC TESTER (DRB)

The Teves Mark IV-G ABS and ABS with traction control, system diagnostics are performed using the DRB scan tool. Refer to the proper model year ABS Teves Brake System diagnostics manual for the proper testing procedures and the DRB operators manual for its proper operational information when diagnosing this brake system.

(DRB) DIAGNOSTIC CONNECTOR

On this vehicle, the Teves Mark IV-G ABS or ABS with traction control diagnostic connector is located under the lower instrument panel to the right side of the steering column. The diagnostics connector is a blue 6 way connector see (Fig. 18).

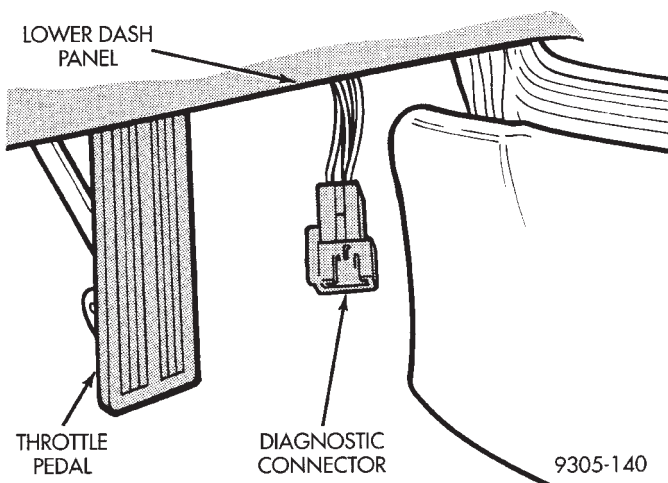


Fig. 18 ABS Diagnostic Connector Location

SELF DIAGNOSTICS INFORMATION

The Teves Mark IV-G ABS and ABS with traction control systems are equipped with a self diagnostic capability which may be used to assist in isolation of trouble codes. The features of the self diagnostics are described below.

SYSTEM INITIALIZATION

System initialization starts when the ignition switch is turned to the run position. At this point the CAB performs a complete self check of all electrical components in the ABS and Traction Control systems. Momentarily the build, decay and isolation valves are cycled. If the driver has their foot on the brake pedal, they may feel the test through brake pedal pulsations. This is a normal condition.

DYNAMIC TEST

Between 5 - 10 mph the pump/motor is momentarily turned on.

If any component exhibits a fault during system initialization or dynamic check, the CAB will illuminate the Antilock warning lamp and if equipped with traction control, the Amber Traction Control Warning Lamp. At this time both systems are disabled.

DIAGNOSTIC MODE

To enter diagnostic mode, vehicle must be below 10 MPH. If vehicle speed is not below 10 MPH a no response message is displayed by the DRB scan tool. The following are characteristics of the diagnostic mode.

The amber Antilock warning lamp and the red brake warning lamp flash on and off. If a hard fault, such as an Inlet or Outlet Valve fault or Main Relay Power Circuit failure fault is present, the warning lamps illuminate without blinking and no diagnostic operations are available until the fault condition is cleared.

ABS and Traction control operation are disabled, during the diagnostic mode

The valves in the valve body cannot be actuated when vehicle speed is above 5 MPH. If valve actuation is attempted above 5 MPH a vehicle in motion message is displayed by the DRB scan tool.

DIAGNOSTIC TROUBLE CODE INFORMATION

Fault codes are kept in a Non-Volatile memory until either erased by the technician using the DRB scan tool or automatically after 50 ignition cycles (key cycles). The only fault that will not be erased after 50 (KEY CYCLES) is the CAB fault. A CAB fault can only be erased by the technician using the DRB scan tool. More than one fault can be stored at a time. The number of key cycles since the most recent fault was stored is also displayed. Most functions of the CAB and ABS or traction control system can be accessed by the technician for testing and diagnostic purposes by using the DRB scan tool.

Faults detected by the CAB fall into one of three categories: Locked, Latching, or Non-Latching.

DIAGNOSIS AND TESTING (Continued)

LOCKED FAULT

If a fault is Locked; the ABS and TRACTION CONTROL warning lights will be illuminated and will remain illuminated until the fault code has been erased from the CAB memory using the DRB scan tool.

LOCKED FAULTS

- Valve Power Feed

LATCHED FAULT

If a fault is latched; the ABS and TRACTION CONTROL warning lights will be illuminated and will remain illuminated until the next ignition reset, even if the fault has disappeared.

LATCHED FAULTS

- Pump Motor Circuit Not Working Properly
- Diagnostic Compare Failure
- Pump Motor Running Without Command
- Valve Fault (8/10)
- Sensor Circuit Failure (4)
- Signal Missing (4)
- Wheel Speed Compare (4)
- Wheel Speed Continuity Above 25 MPH (4)
- System Under Voltage
- System Over Voltage

NON-LATCHING FAULT

If the fault is non-latching; the ABS and TRACTION CONTROL warning lights will only be illuminated as long as the fault condition exists. As soon as the fault condition goes away, the warning lights are turned off, although a fault code will be stored by the CAB.

NON-LATCHING FAULT

- Wheel Speed Continuity Below 25 MPH (4)

THERMAL MODEL (TRACTION CONTROL ONLY)

The friction that occurs when the brakes are applied causes the lining temperature to increase. The CAB has the ability to mathematically calculate lining temperature. If Anti-lock and/or Traction Control operation occurs frequently enough during a given period of time, it could cause the brake pads to become too hot. If the CAB calculations indicate that pad temperatures exceed its preprogrammed limits the CAB will turn off the Traction Control function and illuminate the Traction Control Warning Lamp. When the brakes have had time to cool off, the CAB will turn off the Warning Lamp and restore Traction Control operation. The actuation of this "thermal mathematical model" will not cause a fault code to be stored in the CAB memory or effect ABS operation.

INTERMITTENT DIAGNOSTIC TROUBLE CODES

As with virtually any electronic system, intermittent faults in the ABS system may be difficult to accurately diagnose.

Most intermittent faults are caused by faulty electrical connections or wiring. When an intermittent fault is encountered, check suspect circuits for:

- (1) Poor mating of connector halves or terminals not fully seated in the connector body.
- (2) Improperly formed or damaged terminals. All connector terminals in a suspect circuit should be carefully reformed to increase contact tension.
- (3) Poor terminal to wire connection. This requires removing the terminal from the connector body to inspect.
- (4) Pin presence in the connector assembly
- (5) 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.
- (6) 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 Fault code.
- (7) 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 these inputs to the (CAB) should be investigated if a complaint of intermittent warning system operation is encountered.
- (8) 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.
- (9) 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.

TONEWHEEL INSPECTION

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 Tone-

DIAGNOSIS AND TESTING (Continued)

wheel 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. 19) should never be disassembled.

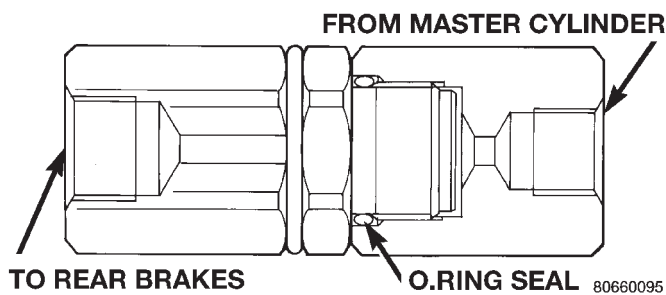


Fig. 19 Proportioning Valve Identification

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.

One proportioning valve controls the right rear brake, and the other proportioning valve controls the left rear brake. Therefore, a road test to determine which rear brake slides first is essential.

If a malfunctioning proportioning valve is suspected on a vehicle equipped with ABS brakes. Refer to Proportioning Valve Test With ABS Brakes in the Proportioning Valves Section in this group of the service manual.

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.

VEHICLE TEST DRIVE INFORMATION AND PROCEDURE

Most customer complaints will require a test drive of the vehicle 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 a complaint vehicle.

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 standard brake, Control Valves Section in the brake group of this manual. If the Amber Antilock Warning light was/is on, read record and erase the fault. While the Amber ABS Warning Lamp is on the ABS system is not functional. When the Amber Antilock Warning Lamp is on only the Antilock function of the brake system is affected. The standard brake system and the ability to stop the car is not affected if only the Amber Antilock Warning Lamp is on.

(1) Turn the key to the off position and then back to the on position. Note whether the Amber ABS Warning Lamp continues to stay on. If it does refer to the appropriate model year, ABS Teves Brake System Diagnostic Manual, for the vehicle being serviced. The diagnostic manual will provide the required test procedures.

(2) If the Amber ABS Warning Lamp goes out, shift into gear and drive the car to a speed of 10 mph to complete the ABS start up cycle. If at this time the Amber ABS Warning Lamp goes on, refer to the ABS Teves Brake System Diagnostic Manual, covering the model year of the vehicle being serviced.

(3) If the Amber ABS Warning Lamp remains OUT, drive the vehicle a short distance. During this test drive be sure that the vehicle achieves at least 25 mph. Brake to at least one complete stop 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 ABS Teves Brake System Diagnostic Manual, covering the model year of the vehicle being serviced, for the required test procedures and proper use of the DRB scan tool.

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 PROCEDURE INFORMATION

The ABS and ABS with traction control must be bled anytime air is permitted to enter the hydraulic system, due to disconnection of brake lines, hoses or components.

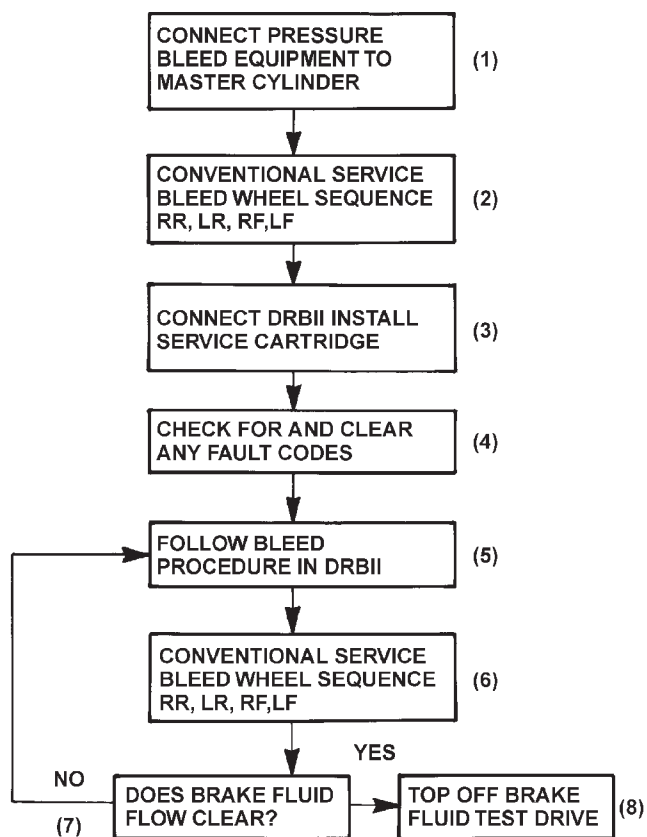
If the HCU for either system, is removed from a vehicle, both the base brake system and the ABS or ABS with traction control system must be bled using the appropriate procedure. It is important to note that excessive air in the brake system will cause a soft or spongy feeling brake pedal.

During bleeding operations, be sure that the brake fluid level in the master cylinder reservoir remains close to the FULL level. Check the fluid level periodically during the bleeding procedure and add DOT 3 brake fluid as required.

The Teves Mark IV-G ABS or ABS with traction control 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 Antilock portion of brake system **MUST** be bled separately. This bleeding procedure requires the use of the DRB scan tool diagnostic tester and the bleeding sequence procedure outlined below.

CAUTION: When bleeding the ABS system, the following bleed sequence **MUST** be followed to ensure complete and adequate bleeding. The brake bleeding procedure is a three step process. The first step is a conventional bleeding procedure using a pressure bleeder or manual procedure. Second step is bleeding HCU assembly using the DRB scan tool. Third step is to repeat the conventional pressure or manual bleeding procedure. Follow the procedure below to ensure adequate bleeding of the entire hydraulic system.



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Brake Bleed Procedure Flow Chart

(1) Connect pressure bleeding equipment to master cylinder. Refer to Bleeding Brake System in the Service Adjustment section of this service manual.

(2) Fully bleed the base brake portion of the brake hydraulic system in the following sequence: right rear wheel, left rear wheel, right front wheel, and left front wheel.

(3) Connect the DRB scan tool to the diagnostic connector under the dash panel to the right of the steering column. Install the required cartridge into the DRB scan tool.

(4) Using the DRB scan tool, check to make sure the CAB does not have any fault codes stored. If it does, remove them using the DRB scan tool.

(5) Using the DRB scan tool, go to the "Bleed ABS" routine and follow procedure as described in the DRB scan tool information and diagnostic manual.

(6) Bleed the base brake system again as in step (2) above.

(7) Repeat steps (5) and (6) above until brake fluid flows clear and is free of any air bubbles. Check brake fluid level in master cylinder reservoir periodically and fill to correct fill level 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

GENERAL SERVICE CAUTIONS

CAUTION: Review this entire section prior to performing any mechanical work on a vehicle equipped with the Teves Mark IV-G ABS or ABS with Traction Control. This section contains information on precautions pertaining to potential component damage, vehicle damage and personal injury which could result when servicing an ABS or ABS with traction control equipped vehicle.

CAUTION: Certain components of the ABS or ABS with traction control 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.

The following are general cautions which should be observed when servicing the ABS or ABS with traction control and/or other vehicle systems. Failure to observe these precautions may result in 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 60 way connector or the HCU connector should never be connected or disconnected with the ignition switch in the ON position.

PUMP/MOTOR

On both the Teves Mark IV-G ABS and ABS with traction control, the Pump/Motor assembly can only be serviced as part of HCU. Never attempt to separate the pump motor from the rest of the HCU.

HYDRAULIC CONTROL UNIT

REMOVE

- (1) Disconnect the negative cable from the battery and isolate it from the post of the battery.
- (2) Remove the heat shield covering the HCU.
- (3) Disconnect the pump motor electrical connector from the HCU (Fig. 20).

CAUTION: Verify that the vehicle ignition is off before removing the 60 way connector from the CAB.

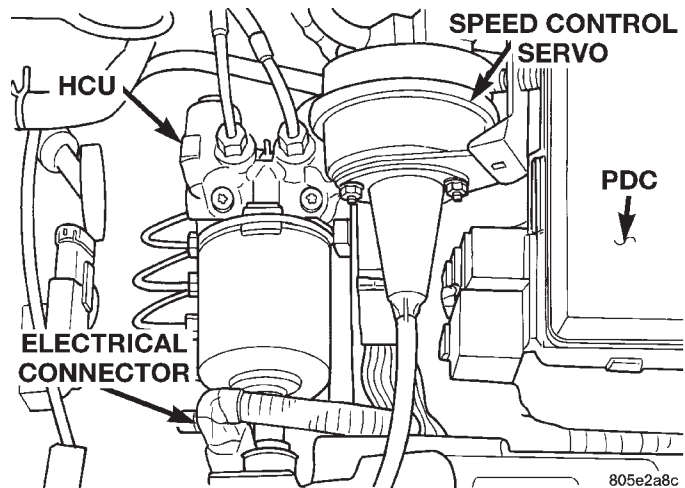


Fig. 20 HCU Electrical Connections

- (4) Disconnect the 60 way connector from the CAB using the following procedure. Lift 60 way connector latch (Fig. 21) away from the 60 way connector, rotating the connector latch all the way back against CAB (Fig. 22). This will lift the CAB connector away from CAB terminals.

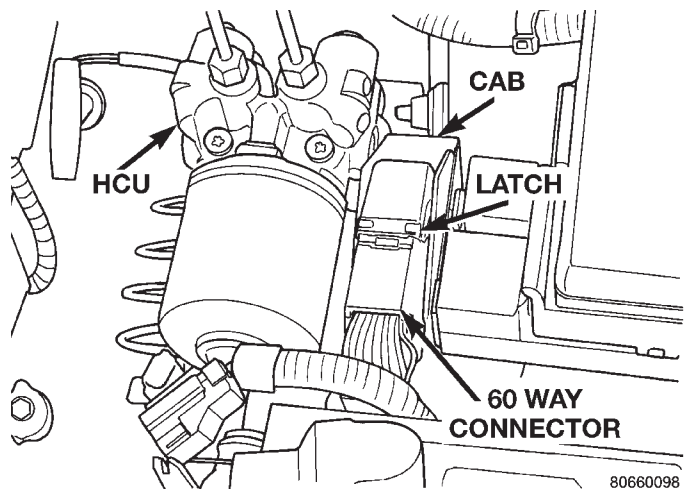


Fig. 21 CAB Connector Locking Latch

- (5) Grasp connector and rotate the rear of the connector up until it clears the connector pins on the CAB (Fig. 23). Then remove the CAB connector pin from the latch on the CAB (Fig. 23).
- (6) Remove the 4 chassis brake tubes (Fig. 24) from the inboard (engine) side of the HCU.
- (7) Remove the 2 brake fluid tubes coming from the master cylinder at the HCU (Fig. 25).
- (8) Remove the 3 nuts attaching the HCU mounting isolators to the HCU mounting bracket. Two nuts are located toward the dash panel and 1 is at the front of mounting bracket just above the power steering fluid reservoir.
- (9) Remove the HCU from its mounting bracket.

REMOVAL AND INSTALLATION (Continued)

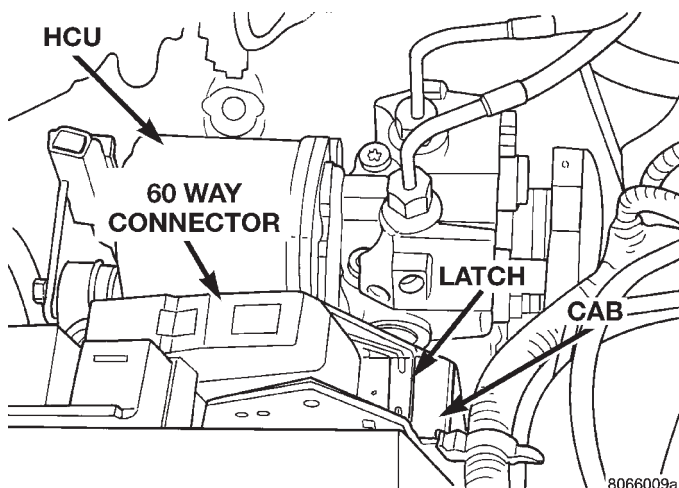


Fig. 22 Unlatched 60 Way Connector

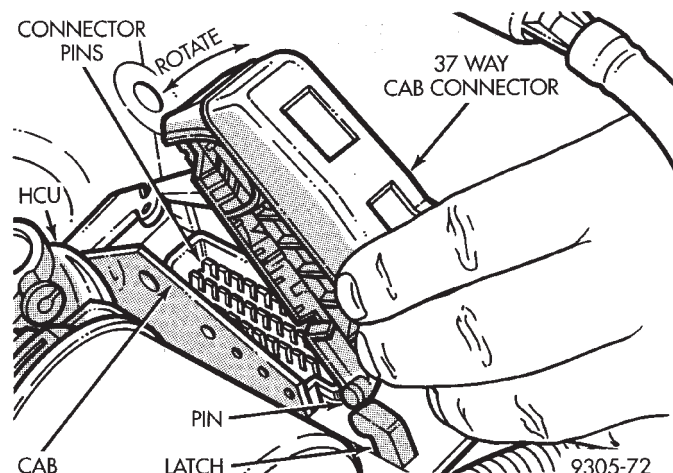


Fig. 23 Connector Removal From CAB

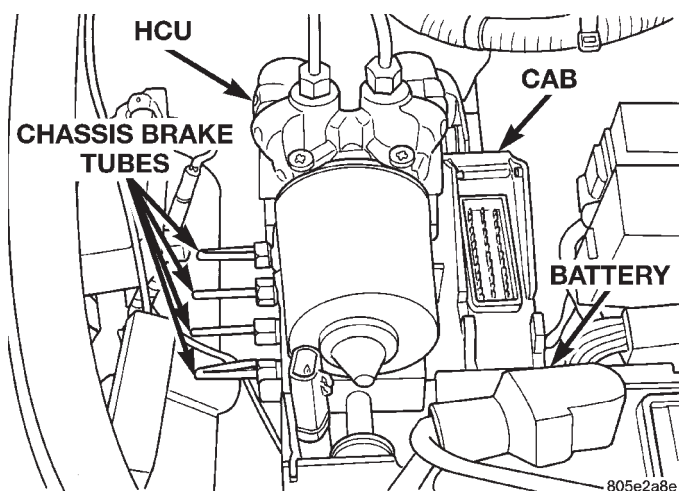


Fig. 24 Brake Tube Connections At HCU

(10) Transfer the CAB from the removed HCU to the replacement HCU. Refer to Controller ABS Brakes CAB removal and installation in this section of the service manual, for the require procedure.

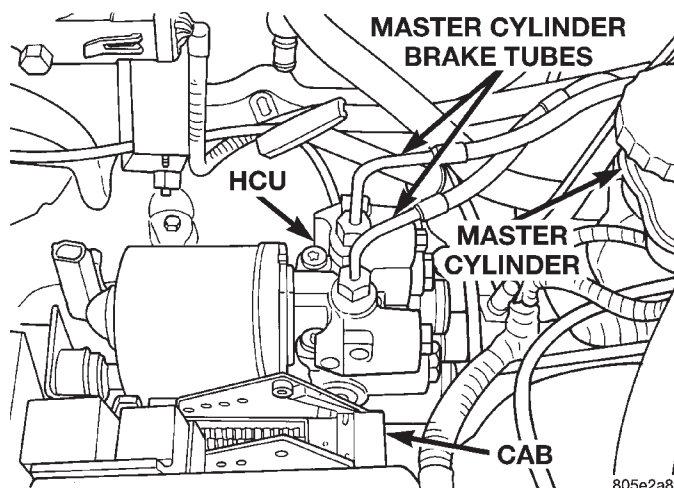


Fig. 25 Master Cylinder Brake Tube Connections At HCU

INSTALL

(1) Install the HCU back in its mounting bracket using the reverse sequence of removing it from bracket. Install and securely tighten the 3 HCU mounting isolator to bracket mounting nuts.

(2) Connect the 2 brake fluid supply tubes from the master cylinder onto the inlet ports of the HCU (Fig. 25). Connect the 4 brake fluid output tubes to the ports on the HCU (Fig. 24). Torque all brake tube fitting nuts to 19 N·m (14 ft. lbs.).

CAUTION: Verify that the vehicle's ignition switch is in the off position before connecting the 60 way connector on the CAB.

(3) Connect the wiring harness 60 way connector to the CAB using the following procedure. Install connector onto CAB with the connector pins located in latch first (Fig. 23). Then rotate rear of connector down onto CAB until fully seated onto connector pins of CAB. Rotate connector latch down until seated on the top of the CAB connector.

(4) Connect the vehicles wiring harness connector on the pump motor connector of the HCU (Fig. 20).

CAUTION: Heat shield must be installed when replacing or servicing HCU. Failure to install heat shield can result in a failure of the CAB due to high temperature.

(5) Install heat shield back on mounting bracket of HCU.

(6) Bleed the air from the brake hydraulic system. Refer to Bleeding Teves Mark IV-G ABS /ABS with traction contro in this section of the manual for the proper bleeding procedure to be used. **When bleeding brake system visually inspect all line fittings previously disconnected for any signs of leakage.**

REMOVAL AND INSTALLATION (Continued)

MASTER CYLINDER AND POWER BRAKE BOOSTER

If the Master Cylinder or the Power Booster need to be serviced or replaced, refer to Master Cylinder or Power Brake Booster in the Removal And Installation Section in the Base Brake Section of this service manual.

MAIN RELAY AND PUMP MOTOR RELAY

The main relay and pump motor relay are both serviced together as an assembly, with the relay mounting bracket. They are mounted to a bracket that is attached to the side of the Power Distribution Center PDC (Fig. 26).

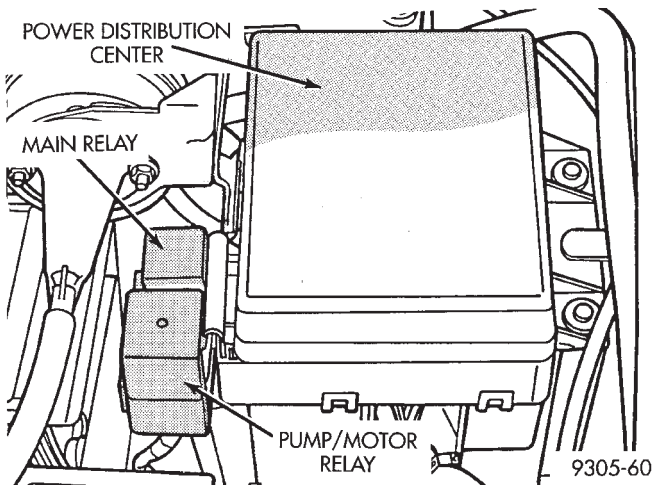


Fig. 26 Main Relay And Pump Motor Relay Location

REMOVE

- (1) Hold the relays with one hand, and pull strait down on wiring harness connectors, until connectors are free from the relays (**do not twist connectors**).
- (2) Remove the relays and bracket as an assembly from the side of the PDC.

INSTALL

- (1) Mount the relays and bracket assembly to the side of the PDC, making sure that the relay bracket is securely latched to the PDC.
- (2) Holding the relays with one hand, push the wiring harness connector strait onto the terminals of the relay. Make sure the connector is fully seated onto the terminals of the relay.

CONTROLLER ANTILOCK BRAKES AND ANTILOCK BRAKES WITH TRACTION CONTROL

CAUTION: The external features of the Teves Mark IV-G ABS CAB and the Mark IV-G ABS With Traction Control CAB are the same. The CABs though are functionally different. If the wrong CAB is installed on the wrong brake system, the system will be disabled and a fault code will be stored.

REMOVE

The CAB used on both the Teves Mark IV-G ABS and ABS with traction control, is mounted and electrically connected directly to the HCU assembly (Fig. 27).

To remove the CAB from the HCU for replacement, it is necessary to remove the entire HCU and CAB from the vehicle as an assembly. There is not enough clearance to remove the CAB connector from the HCU with the assembly in the vehicle.

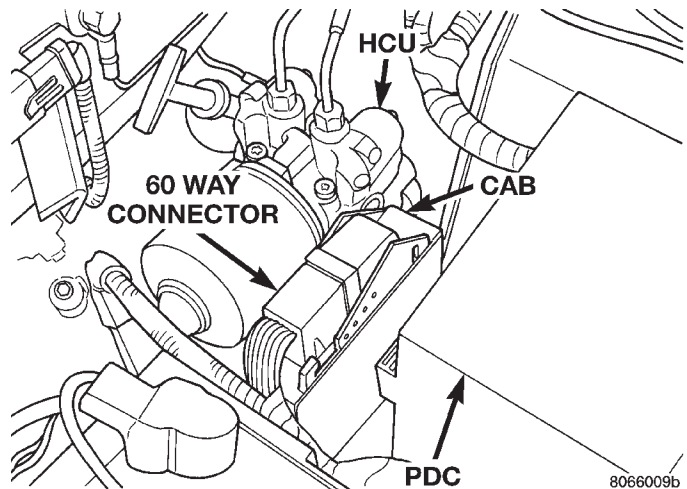


Fig. 27 CAB Location In Vehicle

- (1) Turn vehicle ignition switch to the off position and remove the key.

CAUTION: Verify that the vehicle ignition is off before removing the HCU from the vehicle.

- (2) Remove the HCU assembly from the vehicle. Refer to Hydraulic Control Unit Removal, in this section of the service manual for the required removal procedure.
- (3) Remove the 2 CAB module to HCU assembly mounting bolts (Fig. 28).
- (4) Remove the CAB from the HCU by pulling it straight out of the CAB connector on the HCU **DO NOT TWIST**.

INSTALL

- (1) Install the CAB module by pushing it straight into the connector on the HCU until fully seated.
- (2) Install the 2 CAB module to HCU assembly attaching bolts (Fig. 28). Tighten the 2 bolts mounting the CAB to the HCU to a torque of 12 N·m (106 in. lbs.).
- (3) Install HCU assembly back in the vehicle. Refer to Hydraulic Control Unit Installation, in this section of the service manual for the required installation procedure.
- (4) Bleed the air from brake hydraulic system. Refer to Bleeding the Teves Mark IV-G ABS and ABS

REMOVAL AND INSTALLATION (Continued)

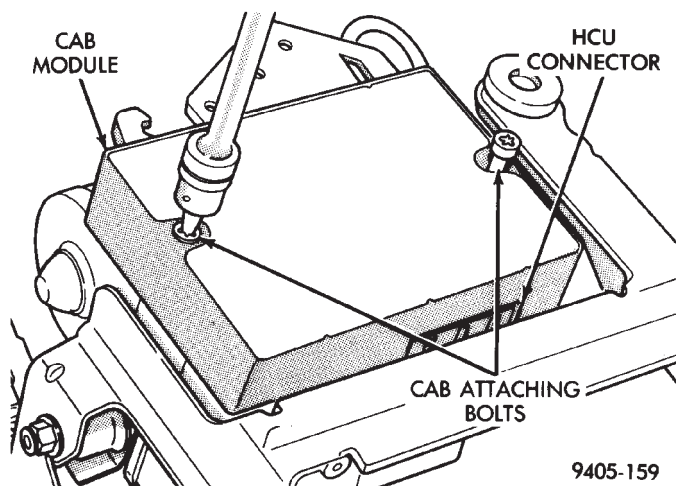


Fig. 28 CAB Removal And Installation From HCU

with traction control in this section of the manual for the proper bleeding procedure. **When bleeding brake system visually inspect all line fittings previously disconnected for any signs of leakage.**

CAUTION: Heat shield **MUST** be installed when servicing of HCU is completed. Failure to install heat shield could result in a failure of the CAB due to high temperature.

(5) Install heat shield back on HCU mounting bracket.

FRONT WHEEL SPEED SENSOR

REMOVE

(1) Raise vehicle using a frame contact type hoist or supported as required using jack stands. See Hoisting in the Lubrication and Maintenance group of this service manual for the required hoisting or jacking procedure to be used for this vehicle.

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

(3) Remove screw attaching the grommet retaining clip to the fender shield (Fig. 29).

(4) Carefully, pull the speed sensor cable grommet from the fender shield.

(5) Unplug speed sensor connector from vehicle wiring harness connector (Fig. 30).

(6) Remove the speed sensor cable routing bracket from the front strut assembly (Fig. 31).

(7) Remove screw attaching speed sensor head to steering knuckle.

(8) Carefully, 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 punch (Fig. 32) to tap edge of sensor ear, rocking sensor side to side until free.

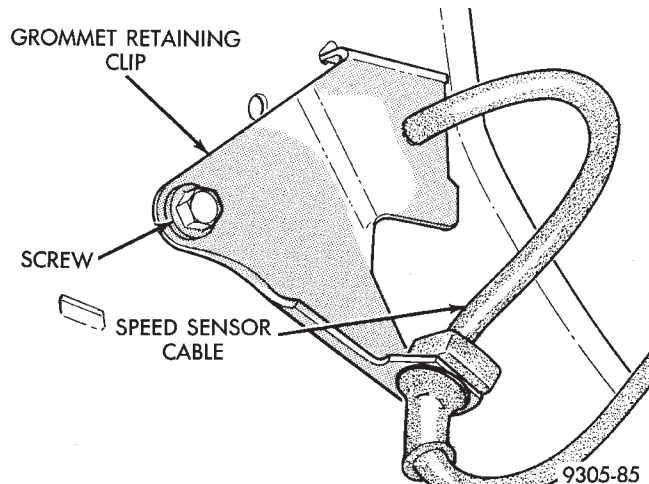


Fig. 29 Front Speed Sensor Cable Retaining Clip

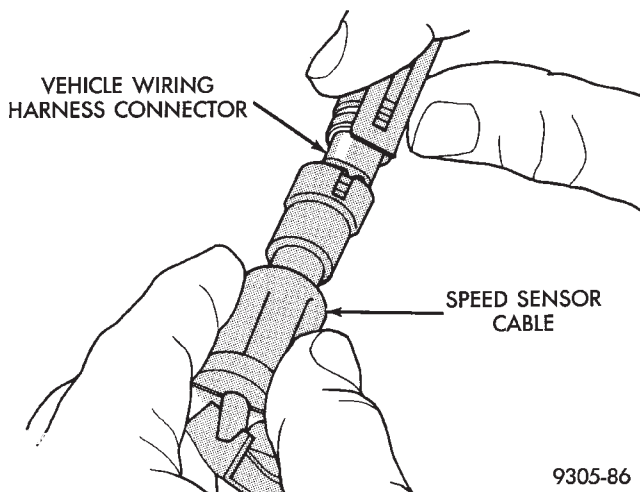


Fig. 30 Speed Sensor Cable To Wiring Harness Connection

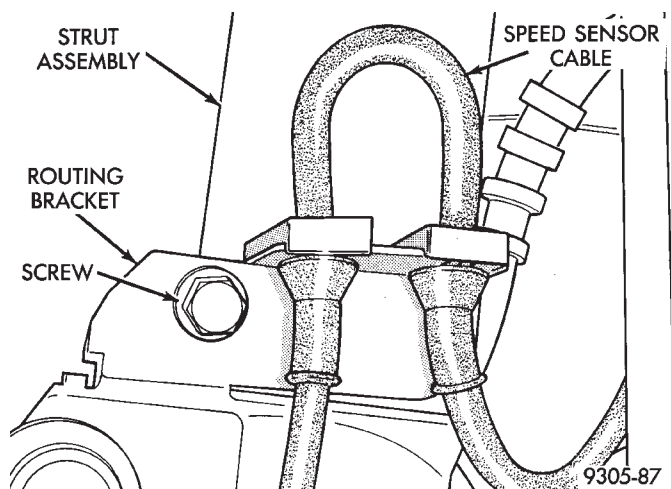
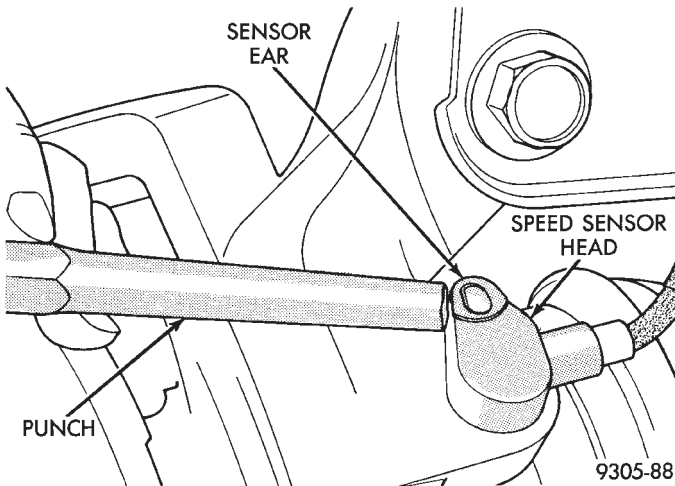


Fig. 31 Speed Sensor Cable To Strut Assembly Routing Clip

REMOVAL AND INSTALLATION (Continued)

**Fig. 32 Speed Sensor Head Removal****INSTALL**

(1) Coat speed sensor head with High Temperature Multi-purpose E.P. Grease before installing into the steering knuckle. Install speed sensor head into steering knuckle. Install screw tighten to 7 N·m (60 in. lbs.)

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.

(2) Correctly route the speed sensor cable up to the strut assembly (Fig. 31). Install speed sensor cable routing bracket on strut assembly. Then install and tighten routing bracket attaching screw (Fig. 31).

(3) Connect speed sensor cable connector, to vehicle wiring harness connector (Fig. 30). Be sure locking tab on connector is securely latched.

(4) Push speed sensor cable grommet into hole in fender shield. Install grommet retaining clip and screw (Fig. 29).

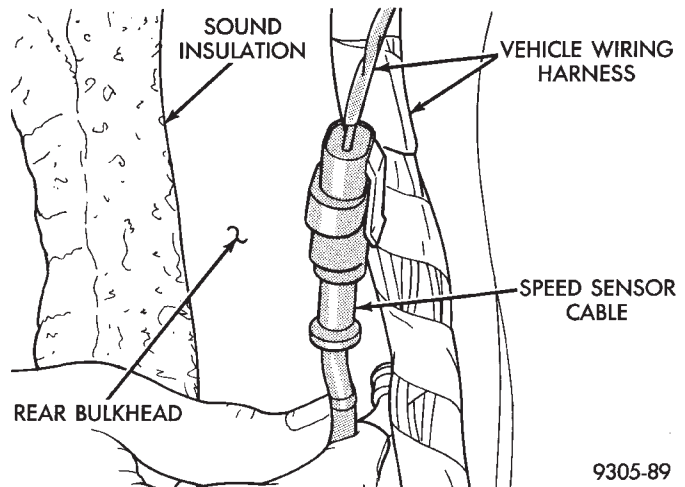
(5) Install wheel and tire assembly on vehicle. Install the wheel and tire assembly. Tighten the wheel mounting stud nuts in proper sequence until all nuts are torqued to half specification. Then repeat the tightening sequence to the full specified torque of 129 N·m (95 ft. lbs.).

(6) Lower vehicle.

REAR WHEEL SPEED SENSOR**REMOVE**

(1) Remove the rear seat lower cushion and seat back cushion from vehicle. Refer to group 23 Body in this service manual for required rear seat cushion removal procedure.

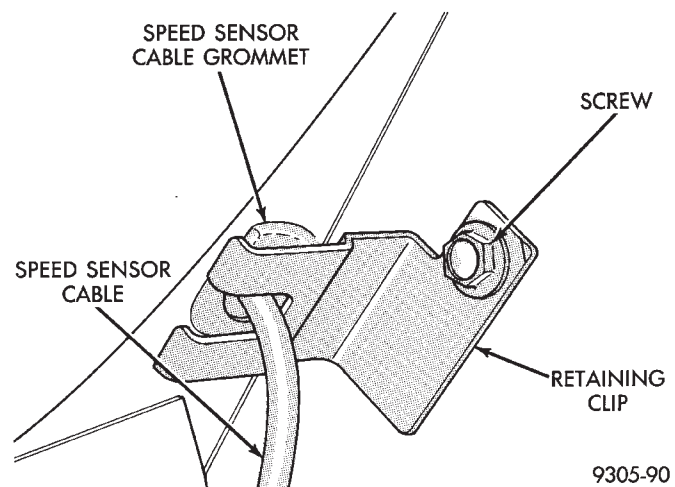
(2) Lift edge of sound insulation on rear bulkhead (Fig. 33). Locate speed sensor cable to vehicle wiring harness connector (Fig. 33). Disconnect speed sensor cable from vehicle wiring harness.

**Fig. 33 Rear Speed Sensor Cable To Vehicle Wiring Harness Connection**

(3) Raise vehicle using a frame contact type hoist or supported as required using jack stands. See Hoisting in the Lubrication and Maintenance group of this service manual for the required hoisting or jacking procedure to be used for this vehicle.

(4) Remove rear wheel and tire from vehicle.

(5) Remove speed sensor cable grommet retaining clip (Fig. 34) from rear inner fender. Carefully pull speed sensor cable and grommet from hole in fender well.

**Fig. 34 Rear Speed Sensor Cable Retaining Clip**

(6) Remove speed sensor head, attaching bolt from rear adapter (Fig. 35). Then remove rear speed sensor head from adapter. If the sensor has seized, due to corrosion, **DO NOT USE PLIERS ON SENSOR HEAD.** Use a hammer and punch (Fig. 36) to tap edge of sensor ear, rocking sensor side to side until free.

REMOVAL AND INSTALLATION (Continued)

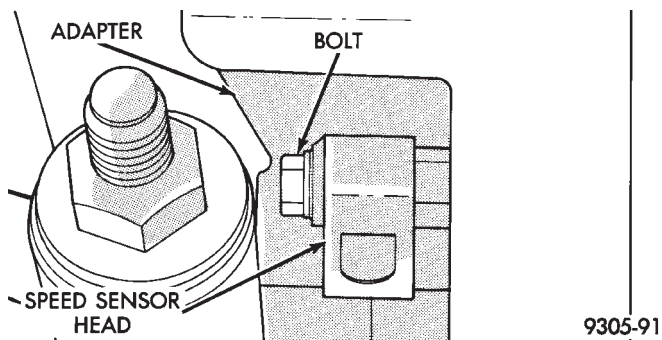


Fig. 35 Speed Sensor Head Attachment To Adapter

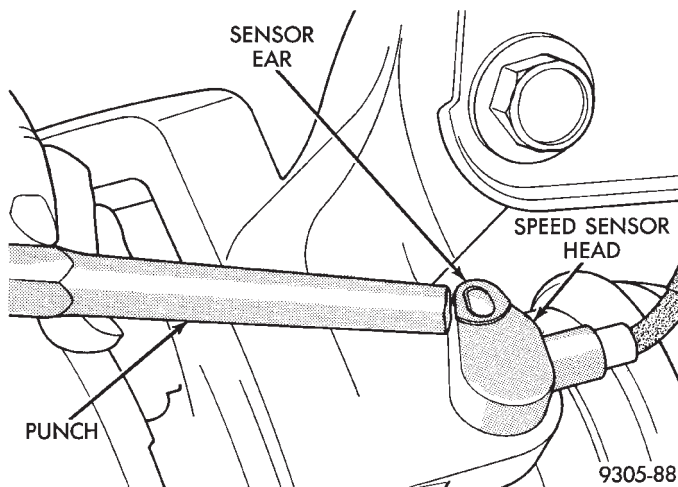


Fig. 36 Speed Sensor Head Removal

(7) Remove screws attaching speed sensor cable mounting bracket to inboard side of trailing arm (Fig. 37). Remove speed sensor cable routing brackets from rear fender well and trailing arm bracket at rear knuckle (Fig. 37).

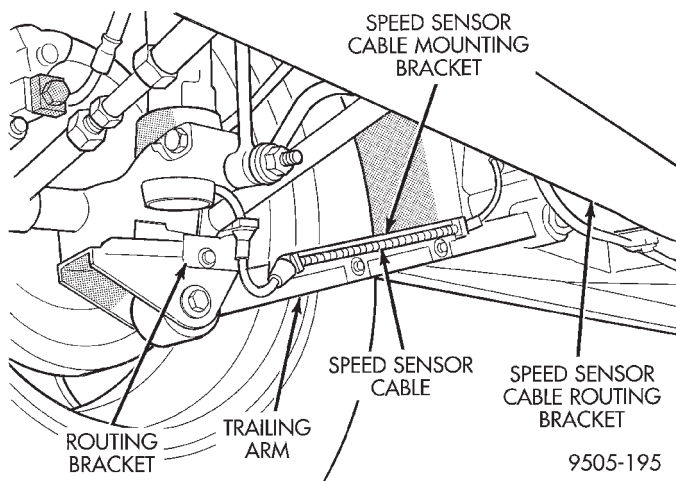


Fig. 37 Speed Sensor Cable Attachment To Trailing Arm

(8) Remove speed sensor cable assembly from vehicle.

INSTALL

(1) Coat speed sensor where it slides into adapter with high temperature multi-purpose E.P. Grease before installing into adapter. Install speed sensor head into adapter. Install speed sensor to adapter attaching screw. Torque the speed sensor attaching screw to 7N·m (60 in. lbs.).

(2) Install speed sensor cable mounting bracket on trailing arm. Install speed cable routing tube to trailing arm attaching screws (Fig. 37). Install speed sensor cable routing brackets at rear fender well and rear knuckle (Fig. 37).

(3) Insert speed sensor cable and grommet back in hole in rear inner fender. Install speed sensor cable grommet retaining bracket and securely tighten attaching screw (Fig. 11).

(4) Install rear wheel and tire assembly back on vehicle. Install the wheel and tire assembly. 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.).

(5) Lower vehicle.

(6) Connect rear speed sensor cable, to vehicles wiring harness (Fig. 33). Be sure locking tab on connector is securely latched.

(7) Install the rear seat back cushion and seat lower cushion back into vehicle. Refer to group 23 Body in this service manual for required rear seat cushion removal procedure.

SPECIFICATIONS**tone WHEEL RUNOUT**

The total indicator runout allowed for both the front and rear tone wheel measured using a dial indicator is 0.25 mm (.009 in.)

WHEEL SPEED SENSOR AIR GAP**FRONT WHEEL**

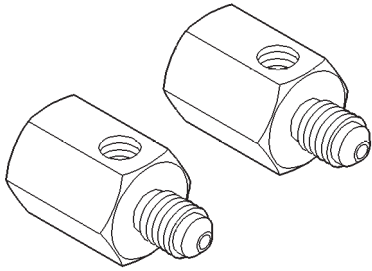
Clearance 0.52 mm to 1.64 mm (.020 in. to .065 in.)

REAR WHEEL

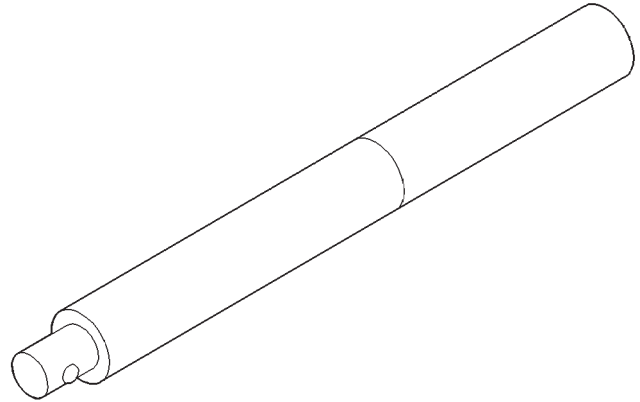
Clearance 0.45 mm to 1.21 mm (.017 in. to .047 in.)

SPECIFICATIONS (Continued)

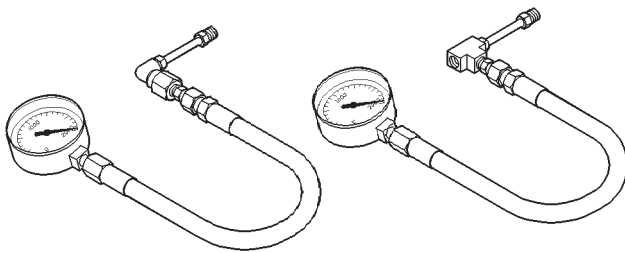
BASE BRAKE SYSTEM



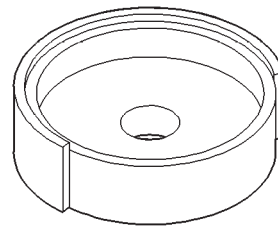
Adapters, Brake Pressure Test 6892



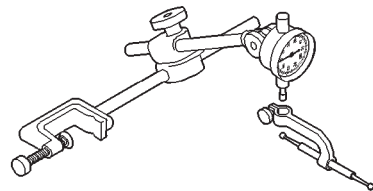
Handle, Universal C-4171



Gauge Set C-4007-A



Installer, Dust Boot C-4689



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Dial Indicator C-3339

