BENDIX POWER BRAKE

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GENERAL DESCRIPTION

The Bendix power brake unit can be identified by its all-black color and external piston stop screw.

The power brake unit is a combined vacuum and hydraulic unit for power braking and replaces the conventional master brake cylinder. This brake assembly has an over-all ratio of 2.3 to 1 (2.3 in. of pedal travel moves the power piston 1 in.). The wheel brakes are the same, manual or power.

Pedal travel compared to the conventional braking system is greatly reduced. The brake pedal height is approximately 1 in. above the accelerator pedal, permitting the driver to shift his toe from the one pedal to the other without lifting his heel from the floor. Lighter pedal pressures are also required for normal stops.

The power brake unit utilizes engine intake manifold vacuum, and atmospheric pressure for its operation. These units are self-contained, requiring no additional rods or levers. The external vacuum line connection to this unit is to the carburetor.

A vacuum check valve is connected in the vacuum line at the front housing to prevent loss of vacuum when manifold vacuum falls below that in the power brake system.

In case of engine failure and consequent loss of engine vacuum, several applications of the brakes are possible by using vacuum retained in the power unit. In case of complete vacuum loss, brakes can be applied in the conventional manner, although more effort is required due to loss of power assist.

DESIGN

The Bendix power unit is composed of two main sections, a vacuum power cylinder and a dual-system hydraulic master cylinder. (A cross-sectional view of the Bendix power brake is shown in Fig. 5B-1)

The vacuum power cylinder contains a power diaphragm assembly which houses the control valve and reaction mechanism, the power diaphragm return spring and a rod which contacts the rear piston in the hydraulic master cylinder. The control valve is made up of a single poppet with an atmospheric port and a vacuum port. A power diaphragm and return spring give quick response, lighter pedal effort and improved control.

The reaction mechanism consists of a hard rubber disc which distributes pressure between the diaphragm plate and the valve plunger in proportion to their contact areas to provide brake feel. A valve operating rod, which operates the control valve, projects out the end of the power cylinder housing through a boot and attaches to the brake pedal. A vacuum seal between the cylinder housing and the control valve hub seals the rear power cylinder chamber against atmospheric pressure leaks. The dual system (tandem piston) master cylinder attaches to the vacuum power cylinder front housing. A vacuum seal between these two units seals the front power cylinder chamber against atmospheric pressure leaks. A secondary seal around the rear master cylinder piston prevents hydraulic fluid in the master cylinder from leaking into the cavity of the power cylinder housing between the hub of the master cylinder and the front vacuum seal.
Free breathing for this cavity, during braking, is provided by the two intersecting air passages in the mounting flange of the master cylinder.

Two hydraulic fluid reservoirs are cast integrally with the master cylinder. A rubber diaphragm covers both reservoirs to seal the brake system from contamination and prevent corrosion and subsequent leakage. Inside the master cylinder, there are parts for the two separate hydraulic systems: a rear piston assembly, which includes a secondary seal, primary cup and spring, screw and spacer; a front piston assembly, which includes two back-to-back secondary seals, a primary cup and a spring and spring retainer; a piston stop screw and seal; and two separate check valves, springs and tube seal retainers mounted in the two side outlet ports. (See Fig. 5B-7, master cylinder exploded view.)

**PRINCIPLES OF OPERATION**

**RELEASED POSITION (Fig. 5B-2)**

With the engine running and the brake pedal released, vacuum created by the engine removes the air from the power brake chamber via a hose connection from the vacuum check valve mounted in the front housing to a hose nipple in the base of the carburetor. In the released position, the valve operating rod and valve plunger are held to the right (as illustrated) by the valve return spring thereby closing the atmospheric port and opening the vacuum port. With the vacuum port open, the chamber to the rear (right) of the diaphragm is open to vacuum and the diaphragm is balanced or suspended by vacuum on both sides. With the power piston assembly in the released position, the hydraulic push rod and master cylinder pistons are also released and fluid in the two master cylinder sections is free to return from the brake systems to the fluid reservoirs or to enter either brake system from its reservoir in order to compensate for the expansion or loss of fluid in either system.

**APPLYING POSITION (Fig. 5B-3)**

As the brakes are applied by the driver, the valve operating rod and plunger assembly moves forward (toward the left in Fig. 5B-3), in the power piston assembly to compress the valve return spring and bring the poppet valve into contact with the vacuum...
port seat in the valve housing to CLOSE the vacuum port. Any additional movement of the valve operating rod in the applied direction moves the valve plunger away from the poppet valve to OPEN the atmospheric port and admit atmospheric pressure through the air filter and passages to the control vacuum chamber to the right of the power piston and diaphragm assembly. With constant vacuum to the left of the piston and diaphragm, the atmospheric pressure on the right side exerts force to move the power piston and diaphragm and hydraulic push rod and pistons to the left to close the compensating ports in both systems and force hydraulic fluid under pressure through the residual check valves and brake tubes into the brake wheel cylinders. As hydraulic pressure is developed in the master cylinder, a counter-force (to the right), acting through the hydraulic push rod and rubber reaction disc, sets up a reaction force against the vacuum power piston and valve plunger. The rubber disc distributes the pressure between the vacuum power piston and the valve plunger in proportion to their respective contact areas.

The pressure acting against the valve plunger and valve operating rod tend to move the valve plunger slightly to the right in relation to the valve housing of the power piston to close off the atmospheric port. Since part of the counter-force (to the right) reacts through the valve plunger and valve operating rod against the driver's foot, a feel of the braking effort is provided. This reaction force is in direct proportion to the hydraulic pressure developed within the brake system. As shown in Fig. 5B-3, full power application has been attained with full atmospheric pressure admitted to the control vacuum chamber (to the right) and with constant vacuum to the left of the power piston and diaphragm assembly. Any increase in hydraulic pressure to the wheel brakes beyond this point must be supplied by physical effort of the driver.

**HOLDING POSITION (Fig. 5B-4)**

During application of the brakes, the reaction against the valve plunger is working against the driver to close the atmospheric port. With both the atmospheric and vacuum ports closed, the power brake is in the holding position. When both ports are closed, any degree of braking application attained will be held until either the atmospheric port is re-opened by an increase in pedal pressure to further
increase the brake application or by a decrease in pedal pressure to re-open the vacuum port to decrease the brake application. Whenever the pressure applied to the brake pedal is held constant for a moment, the valve plunger and poppet return to their holding position. However, upon reaching the fully applied position (as shown in Fig. 5B-3, Full Applied Position), the valve plunger is held away from the valve poppet atmospheric valve seat to admit maximum atmospheric pressure to the control vacuum chamber (to the right) of the power piston and diaphragm. As the power piston and hydraulic master cylinder pistons move back, the fluid from the wheel cylinders flows back into the two master cylinder sections (by unseating the two residual pressure check valves) and into the reservoirs.

The fluid reservoirs, cast integrally with the master cylinder, supply fluid to the space around each piston between the primary and secondary seals through a by-pass hole in the casting. When the brake pedal is released quickly, fluid pressure and the two return springs force the master cylinder pistons to return immediately (to the released position). If hydraulic fluid from the lines cannot return as quickly as the master cylinder pistons, compensation is provided by a flow of fluid from the space between the primary cup and secondary seal through the holes in the piston and around the edge of the primary cup. The excess fluid then in the system flows back to the reservoir through the compensating port. The secondary seal on the front piston that faces toward the rear system prevents any flow of fluid from the rear system to the front system and the other secondary seal facing forward on the front piston prevents any fluid flow from the front to the rear system. The front or floating piston supplies the correct fluid displacement for the front wheel brake requirements. The rear (or primary) piston supplies the correct fluid displacement for the rear wheel brake requirements. The hydraulic pressure developed in both systems is equal at all times since the front or floating piston is balanced between the two hydraulic pressures. If the front system fails, the front piston and spring bottom and then the rear piston develops hydraulic pressure to the rear wheels. If the rear system fails, the rear piston and spring bottom against the front piston and then mechanically force the front piston forward to develop hydraulic pressure to the front wheels.
Failure in either system has no effect on the other system but is immediately evident to the driver because of the additional pedal travel required to actuate the remaining half of the dual brake system.

CHECKS AND ADJUSTMENTS ON CAR

1. Check for free operation of brake pedal. If binding exists, check all pivot points for binding and lubricate as required.

2. Check stop light switch for proper setting and operation.

3. Check fluid level in hydraulic cylinder reservoirs. Fluid level should be as shown in Fig. 5A-19.

4. Check vacuum line and connections at carburetor and vacuum check valve for possible vacuum leaks.

5. Check engine for good stall-free idle, and correct as required.

MINOR REPAIRS

BLEEDING BRAKES

Brakes should be bled in the same manner as standard brakes, but, if bleeding manually, do not run engine.

STOP LAMP SWITCH

See Section 5 for service.

OVERHAUL BENDIX POWER BRAKE

MASTER CYLINDER ONLY—REMOVE

Certain repair operations, such as replacement of master cylinder internal parts, permit the master cylinder to be removed by itself, leaving the power cylinder on the car.

1. Disconnect hydraulic lines at master cylinder. Cover openings in master cylinder and end of both pipes to prevent entry of dust, dirt, etc.
2. Remove two nuts and lock washers from vacuum cylinder studs extending through master cylinder assembly.

3. Remove master cylinder from power unit.

**POWER BRAKE AND MASTER CYLINDER ASSEMBLY—REMOVE**

1. Disconnect vacuum hose from vacuum cylinder assembly. Cover openings to prevent entry of dust, dirt, etc.

2. Disconnect pipe from master cylinder hydraulic ports and cover openings in master cylinder and end of both pipes to prevent entry of dust, dirt, etc.

3. Remove cotter key and clevis pin from brake pedal inside the car.

4. Disconnect stop light switch wires.

5. Remove nuts and lock washers from vacuum cylinder studs under dash and remove power brake assembly.

6. Clean exterior of power brake assembly and drain reservoirs of hydraulic fluid.

**OVER-ALL BRAKE UNIT—DISASSEMBLE**

1. Mount power brake assembly in vise, clamping on sides of master cylinder reservoir with valve operating rod up.

2. Scribe a line across the front and rear housings and the master cylinder to facilitate reassembly.
3. Remove clevis from valve operating rod.

4. Using tool J 9504, press down firmly and rotate tool and housing clockwise so that cut-outs in rear housing line up with indentation of front housing.

   NOTE: Remove rear housing carefully as it is spring-loaded and will tend to fly away from the front housing.

5. Remove tool, housing, remove hydraulic push rod from diaphragm plate (power piston) and remove return spring from front housing.

6. If check valve needs replacing, push it and the grommet out of the front of the housing.

7. Remove assembly from vise and remove master cylinder assembly from front housing.

   8. Remove front vacuum seal with a blunt tool.

**POWER PISTON ASSEMBLY—DISASSEMBLE**

   CAUTION: Exercise extreme care in handling power piston, rubber surfaces and metal parts in this assembly. They should be guarded against grease, oil and foreign matter and must be protected from nicks or cuts that might be caused by rough surfaces or damaged tools.

1. Remove boot and felt filter from power unit.

2. Remove the two felt air silencers and the one foam type filter. Be careful not to chip plastic housing.

3. Remove diaphragm plate (power piston) from rear housing.

4. Carefully remove rubber diaphragm from diaphragm plate.

5. Tilt diaphragm plate and depress valve operating rod slightly to remove valve assembly retainer (valve plunger stop key). See Fig. 5B-6.

6. Pull control valve assembly straight out from diaphragm plate and with a blunt tool, push reaction disc out front of plate. Do not disassemble control valve assembly.

7. Inspect rear vacuum seal, remove only if necessary to replace by driving out with a screwdriver or punch.

**MASTER CYLINDER—DISASSEMBLE (Fig. 5B-7)**

1. Pry splash seal and retainer out of shallow cavity around master cylinder hub.

2. Press in against rear piston with round-end rod to relieve spring load on piston stop screw under master cylinder bore. Use 3/8 in. wrench to remove stop screw and O-ring seal. Maintain pressure on rear piston and use Tru-Arc pliers to remove snap ring from groove in master cylinder bore.

3. Remove rear piston and spring assembly and discard. Do not attempt to disassemble it since complete new assembly is provided in repair kit.

4. Remove front piston assembly, front return spring and retainer, slide primary cup and protector off rear of front piston. Use dull scriber to lift both secondary seals from the grooves at rear end of front piston. Discard all old rubber parts.

5. Install spare tube nut in outlet ports. Place thin washer on self-tapping screw and install screw in tube seat with washer bottomed against tube nut. (Fig. 5B-7) Hold screw with screwdriver and use wrench to remove tube nut, screw, washer and tube.
seat. Remove rubber check valve and spring from both output ports and discard.

**INSPECTION—CLEANING**

Thoroughly wash all parts in alcohol and air dry. Blow dust and cleaning fluid out of all internal passages. If inside of front housing is slightly scored or scratched, clean with crocus cloth or fine emery cloth. If scratches cannot be removed, replace housing.

All rubber parts should be replaced, regardless of condition, and those parts which come in contact with brake fluid should be rewashed in clean alcohol before reassembly.

**CAUTION:** it is important that all parts be placed on a clean paper or cloth after being cleaned to prevent the possibility of dirt being assembled into unit or grease contacting any rubber parts.

**INSPECT POWER BRAKE ASSEMBLY**

Inspect all parts for scoring, pitting, dents or nicks. Small imperfections can be smoothed out with fine emery cloth or parts replaced if badly nicked, scored, or otherwise damaged.

**Fig. 5B-8 Power Brake Assembly - Exploded View**

**Fig. 5B-9 Installing Rear Vacuum Seal**
INSPECT HYDRAULIC MASTER CYLINDER ASSEMBLY

Inspect bore from the open end. The bore should be free of scoring, rust, pitting or etching. If any of these are apparent, master cylinder must be replaced. If it appears that contaminants have damaged the bore, replace damaged parts and flush out entire brake system including wheel cylinders.

The sealing surfaces should be clean and smooth. Check for cracks and damaged threads. Be sure that the by-pass and compensating ports to the master cylinder reservoirs are not restricted.

Check for distortion of all springs and deterioration of all rubber parts. Any evidence of soft or swollen rubber parts indicates contaminated brake fluid requiring flushing of the entire brake system and replacement of wheel cylinder cups as well as all rubber parts in master cylinder.

INSPECT AIR FILTERS

Replace felt air filters if dirty. Do not clean.

BRAKE ASSEMBLY—ASSEMBLE

MASTER CYLINDER—ASSEMBLE (Fig. 5B-7)

1. Clamp master cylinder in vise with front end slightly below horizontal.

2. Install new secondary seals, back to back, in grooves on rear end of front piston. Dip seals in brake fluid and lift them carefully into grooves with dull scribe. Slide protector and primary cup onto nose of front piston.

3. Stack front piston return spring and retainer on nose of front piston and dip assembly in brake fluid. Slide assembly to bottom of master cylinder bore. Press and twist piston to ease cups past snap ring groove into bore.

4. Dip new rear piston and spring assembly into bore. Press and twist piston to ease cups past snap ring groove into bore.

5. Press in against rear piston with round-end rod to compress return springs. Do NOT use screwdriver or other sharp-edged tool since this will damage the push rod seat inside the piston. Maintain pressure on piston and use Tru-Arc pliers to install snap ring in groove inside bore. Make certain that snap ring is securely seated in groove.

6. Install piston stop screw and new O-ring seal in port underneath bore. Torque screw with 3/8 in. wrench to 40 in. lbs.

7. Install new spring and check valve in both output ports. Press new tube seat into port using spare tube nut. Torque tube nut to 40 in. lbs. to be sure tube seats are bottomed in port.

8. Remove master cylinder assembly from vise.

POWER PISTON—ASSEMBLE

1. If rear vacuum seal was removed, place rear housing on bench with studs down and press new seal carefully into cavity in housing, plastic side first, using tool J 22577. (Fig. 5B-9) Use hands to press seal about 7/16 in. below inner housing surface or until metal shoulder bottoms. DO NOT CRACK PLASTIC.

2. Lubricate outside diameter of diaphragm plate hub, bearing surfaces of the valve plunger, and outer edge of valve poppet with power brake lubricant.

3. Insert control valve assembly into diaphragm plate hub. Push on valve enough to insert the valve plunger stop key. (Fig. 5B-6)

4. Assemble diaphragm on diaphragm plate, making sure the inner bead of the diaphragm is seated in the groove in plate.

5. Install silencers over valve operating rod, foam type filter first, then small felt silencer. Be careful not to chip the plastic. (Fig. 5B-10).

6. Apply power brake lubricant to seal in rear housing and around hub of diaphragm plate. Install rear housing over hub of diaphragm plate.

7. Install large felt air silencer and boot. Press boot onto housing until it bottoms.

8. Install clevis on the valve operating rod.
9. Coat all surfaces of reaction disc with power brake lubricant and install disc, button side first, in hub cavity of diaphragm plate.

10. Apply power brake lubricant to piston end and shaft of hydraulic push rod and install firmly against reaction disc in diaphragm plate. DO NOT LUBRICATE ADJUSTING NUT END OF PUSH ROD.

OVER-ALL BRAKE UNIT—ASSEMBLE

1. Coat front vacuum seal with power brake lubricant and install in cavity of front housing, rubber side toward master cylinder. Make certain rubber portion does not separate from metal plate.

2. Install master cylinder on front housing, aligning scribe marks. Torque bolts to 10 lb. ft.

3. Install check valve and grommet in front housing if they were removed. Lubricate with alcohol for easier assembly.

4. Place master cylinder in vise with front housing up.

5. Place diaphragm return spring in front housing, small end toward master cylinder.

6. Apply silicone grease or talcum powder to all surfaces of outer bead of diaphragm that bear against front and rear housings.

7. Place rear housing assembly over diaphragm return spring and, using tool, J 9504 press down firmly on rear housing, guiding push rod into front housing seal making certain scribe marks will align when housings are locked together. Rotate tool counter-clockwise to lock the two housings. Vacuum may be applied to the check valve to help draw the housings together.

CAUTION: Do not release pressure on rear housing until the housings are fully locked.

NOTE: Be sure diaphragm is not pinched during assembly.

ASSEMBLE MASTER CYLINDER TO POWER BRAKE ASSEMBLY

Remove master cylinder and power brake assembly from vise and remove master cylinder assembly.

NOTE: Before reassembling master cylinder to power section, the distance from the outer end of the push rod to the master cylinder must be measured as explained under PUSH ROD ADJUSTMENT below.

PUSH ROD ADJUSTMENT

The push rod is designed with a self-locking adjustment screw to provide the correct relationship between the vacuum power piston and master cylinder piston. The adjustment screw is set to the correct height at the time of original assembly of the power unit. Under normal service conditions the adjustment screw does not require any further attention providing the push rod assembly remains in the original unit.

Whether a new push rod is used or the push rod assembly is transferred to a unit other than the original one, the distance from the end of the adjustment screw to the mounting face of the power cylinder should be rechecked either with a micrometer depth gauge to a dimension of 1.225 to 1.210 in. or with height gauge J 22644. Place gauge over the push rod on the front housing. Cutout portion of the gauge should never be lower than the adjustment screw end of the push rod and the gap between the cutout and edge of the push rod end should never exceed .010 in. (Fig. 5B-11)

To adjust push rod, grip splined area of push rod with pliers, being careful not to scratch machined shaft. (DO NOT REMOVE PUSH ROD FROM POWER CYLINDER SINCE REACTION DISC MIGHT BE PULLED OUT OF DIAPHRAGM PLATE AND FALL INTO FRONT VACUUM CHAMBER.) Use a 5/16 in. wrench to turn adjusting nut in to shorten or out to lengthen push rod.

When push rod adjustment is correct, assemble master cylinder assembly to the vacuum cylinder at two studs. Secure with two nuts and lock washers tightening to 10 lb. ft. torque.

After assembly of the master cylinder to the power unit, the primary cups of the master cylinder must clear the compensating hole when the unit is in the released position. This can be checked by partially filling the reservoir, and then stroking the power unit. If air bubbles appear or fluid spurts, the compensating ports are clear. If the primary cups overlap the compensating ports, there will be no flow of

Fig. 5B-11 Gauging Push Rod Length
air or fluid through the compensating port when stroked. If this condition exists, the adjusting screw should be turned into the push rod a slight amount, or until the compensating port is open. Failure to clear the compensating port in the released position traps fluid in the hydraulic lines and wheel cylinders and causes brake drag when the fluid warms up.

If compensating port is blocked, fluid from pressure bleeder will flow thru bypass main metering port behind primary cup and then thru holes in piston, around lip of primary cup to wheel cylinders.

POWER BRAKE ASSEMBLY—INSTALL

1. Place power brake into position and install four rear housing to dash attaching lock washers and nuts from inside of car. Tighten nuts to 20 lb. ft. torque.

2. Attach clevis to brake pedal assembly and install pin and cotter key.

NOTE: Pedal height is not adjustable.

3. Adjust stop light switch if necessary to provide 3/16 in. plunger extension from body. Attach wire.

4. Attach vacuum hose to vacuum check valve.

5. Attach hydraulic lines.

6. Bleed brakes as necessary and fill fluid reservoir. Fluid level should be as shown in Fig. 5A-19.

SYSTEM TESTS

1. VACUUM LEAK IN RELEASED POSITION

With transmission in Neutral or Park, and brake released, stop engine and wait one minute. Apply brake several times. Each application should provide less and less pedal travel following normal depletion of reserve vacuum. Number of applications on reserve vacuum will depend on how hard pedal is pressed and how far pedal moves. If vacuum assist is not present, an air leak is indicated.

2. UNIT OPERATION

After depleting reserve vacuum put light pressure on pedal and start engine. If power system is functioning properly pedal will fall away slightly.

3. VACUUM LEAK IN HOLDING POSITION

With transmission in Neutral or Park, stop engine while holding a moderately heavy load steadily on pedal. After one minute release and apply pedal several times. If there is no vacuum assist during this test but system was normal during test No. 1 above, there is an air leak within the unit.

NOTE: Some units on this test will leak air internally if pedal load is light. This is a normal condition.

4. HYDRAULIC LEAK

a. Depress brake pedal while engine is running, maintaining constant pressure. If pedal falls noticeably in one minute, the hydraulic system is leaking.

b. If pedal has a spongy feel when applying the brakes, air may be present in the hydraulic system.

Road test brakes by making a brake application at about 40 MPH to determine if vehicle stops evenly and quickly.

If system checks are satisfactory and the brake pedal travels to within 1 in. of the floor-board, brake shoes require adjustment or replacement.

TROUBLE DIAGNOSIS

The same types of brake trouble may be encountered with power brakes as with standard brakes. Before checking power brake system for source of trouble, refer to trouble diagnosis of standard brakes. After these possible causes have been eliminated, check for cause as outlined below:

HARD PEDAL

a. Vacuum failure due to:
   1. Faulty vacuum check valve.
   2. Vacuum hose or pipe collapsed, plugged, kinked or disconnected.
   3. Internal leaks in power brake unit.

b. Tight brake pedal clevis pin.

c. Power brake unit trouble.

1. Vacuum
   (a) Vacuum leaks in unit caused by improper assembly, missing parts, damaged parts and foreign material.

2. Hydraulic
   (a) Cups swollen by improper fluid,
   (b) Compensating port not cleared by primary cup,
   (c) Solid hub seals should never be installed between the master cylinder and front housing.

3. Mechanical
   (a) Badly dented vacuum cylinder.
   (b) Bound up pedal linkage.
   (c) Improperly adjusted stop light switch.
(d) Galled valve plunger.
(e) Broken or missing springs.

d. Air inlet failure due to:
   1. Excessively dirty air filters.
   2. Manual type dust guard (boot) (without air
      inlet holes) installed around operating rod.

GRABBY BRAKES (APPARENT
OFF-AND-ON CONDITION)

   a. Faulty pedal linkage.
   b. Dented vacuum cylinder.
   c. Sticking valve plunger.
   d. Defective vacuum check valve.
   e. Loose vacuum connections.

PEDAL GOES TO THE FLOOR OR
ALMOST TO THE FLOOR

   a. Brake adjustment.

   b. Air in hydraulic system.
      1. Fluid reservoir empty.
      2. Faulty master cylinder check valve.

   c. Hydraulic fluid leakage.
      1. External:
         (a) Defective reservoir cover or diaphragm
             missing.
         (b) Cracked master cylinder casting.
         (c) Leaks at wheel cylinder, in pipe, hose
             or at connections (brake fluid in cavity
             around front vacuum seal)
      2. Internal:
         (a) Defective secondary seal on master
             cylinder piston.
         (b) Faulty primary cup which causes pedal
to sink to the floor under constant load
but does not empty reservoir.

TORQUE SPECIFICATIONS

<table>
<thead>
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<th>Component</th>
<th>Torque Specification</th>
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<tr>
<td>Piston Stop Screw</td>
<td>40 lb. in.</td>
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<td>Power cylinder housing to</td>
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<tr>
<td>master cylinder nuts</td>
<td>10 lb. ft.</td>
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<tr>
<td>Rear housing to dash nuts</td>
<td>25 lb. ft.</td>
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SPECIAL TOOLS

- J 2254 Height Gauge
- J 22677 Seal Installer
- J 9304 Spanner Wrench

Fig. 5B-12 Special Tools