## BENDIX HYDRO-BOOST

**Granada & Monarch**
**Lincoln Continental**
**Continental Mk IV**
**Mercury**
**Thunderbird**

### DESCRIPTION

System utilizes power steering pump fluid pressure to operate booster. Assembly contains an open center spool valve which controls pump pressure magnitude during braking, a lever mechanism to control position of the valve, and a boost piston to provide force necessary to operate master cylinder. Unit also has a reserve system which stores sufficient fluid under pressure to provide at least two braking applications in case fluid flow from power steering pump is not available. Brakes can also be applied manually if reserve system is depleted.

### OPERATION

#### RELEASED POSITION (NO BRAKING)

In this position, spool valve return spring holds spool valve open. In open position, spool valve provides unrestricted fluid flow between power steering pump and power steering gear. Fluid pressure is blocked from entering boost pressure chamber by lands on spool valve. As fluid pressure increases with steering demand, it has no effect on boost pressure chamber. Boost pressure chamber is vented through spool valve, to pump return port, and back to power steering pump.

#### BRAKING POSITION

As brake pedal is depressed, it moves pedal rod and initiates movement of spool valve. This closes fluid return port to pump from boost chamber, and admits fluid into boost chamber from pressure port. Additional valve movement restricts flow between pump and steering gear, causing pump to increase fluid pressure to maintain flow rate to steering gear. As fluid pressure increases in boost chamber, it forces piston forward actuating master cylinder piston, resulting in brake application. If fluid pressure is required for steering while braking, pump pressure will rise and spool valve will shift in an open direction allowing more fluid to flow to steering gear.

#### RESERVE SYSTEM

1) System consists of a charging valve, accumulator valve, and a spring loaded accumulator. System is open to pressure port of booster unit. Charging valve has an orifice and ball check. Fluid from pump passes through orifice in valve, and if pressure exceeds pressure in accumulator, it unseats ball check valve and enters accumulator. Ball check valve prevents reverse flow when accumulator pressure is greater than pump pressure.

2) Accumulator valve is a poppet type valve held closed by pressure stored in accumulator. An actuator on spool valve sleeve opens accumulator valve when a stop with no pump pressure is made that requires use of reserve pressure. Fluid pressure can also enter accumulator from boost chamber through accumulator valve, when boost chamber pressure exceeds accumulator pressure. A pressure relief valve vents accumulator to pump return port when pressure in accumulator exceeds approximately 1600 psi.

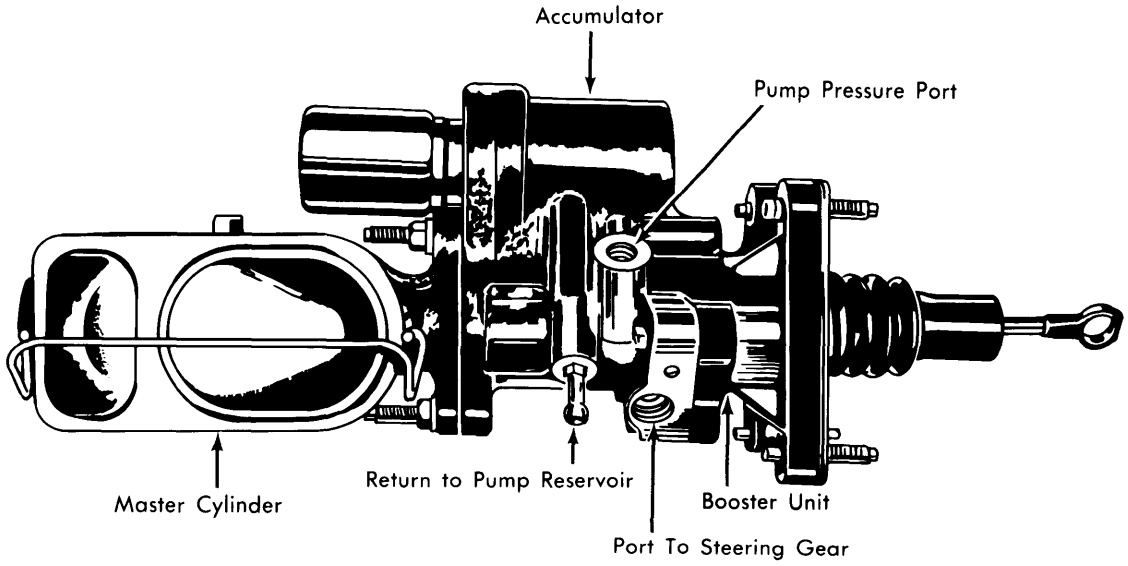
### TESTING

*NOTE – Hydro-Boost cannot cause noisy brakes, fading brake pedal, or pulling brakes. If one of these conditions exists, other components of brake system may be the cause.*

#### PRELIMINARY CHECKS

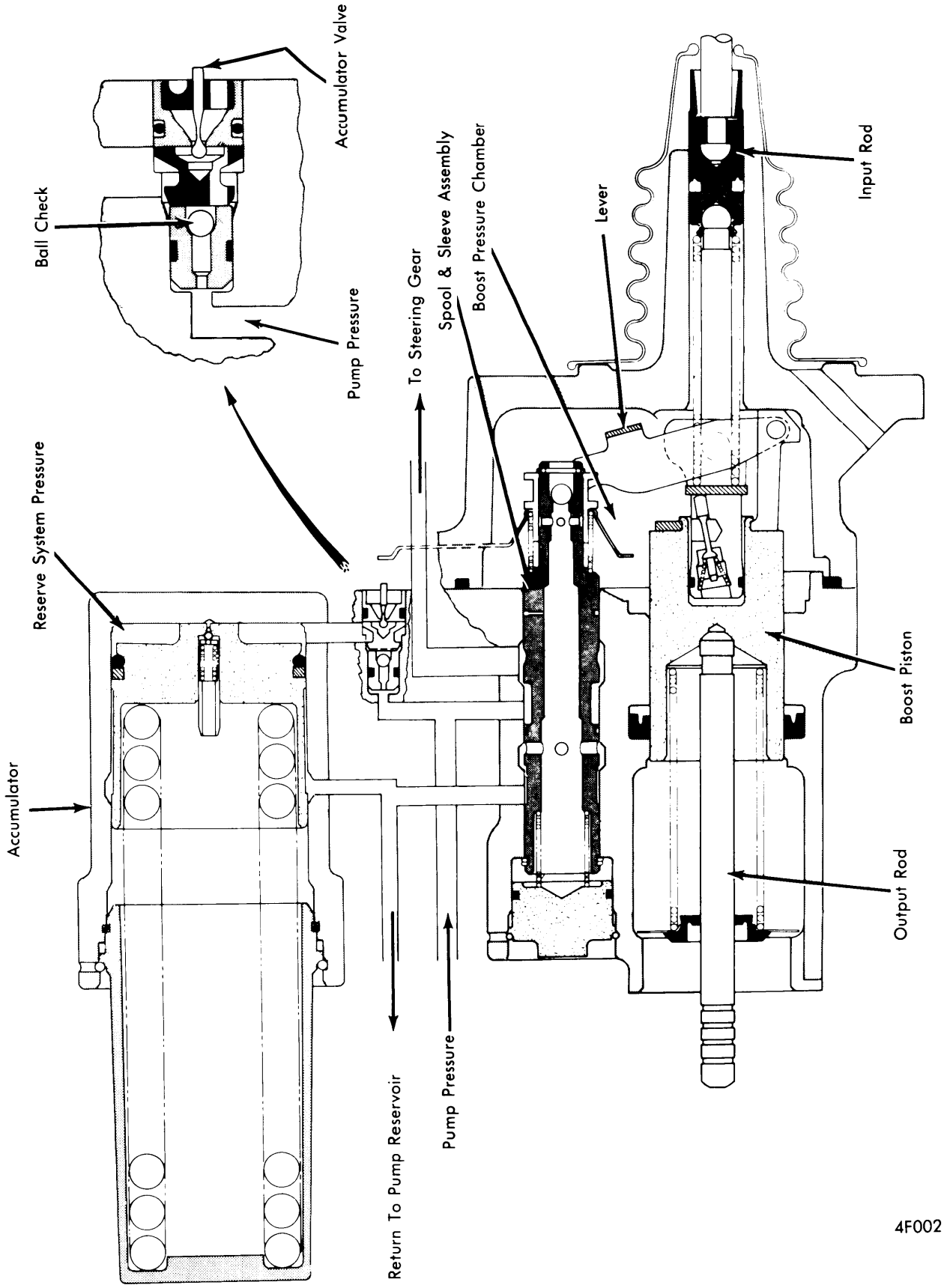
Check fluid levels in master cylinder and power steering pump. Check power steering pump belt tension, and adjust if necessary. Inspect all power steering hoses for leaks or kinks. If fluid smells burned, check hoses or cooler for restrictions. Check and adjust engine idle speed. Check power steering hydraulic fluid for aeration (shown by bubbles in fluid), bleed system if necessary.

*NOTE – If problem cannot be found in preliminary steps, make following tests. If unit is found to be operating properly, check areas of brake system that might cause condition. See Hydraulic Brake Trouble Shooting in this section.*




**HYDRO-BOOST POWER BRAKE UNIT**

## BENDIX HYDRO-BOOST (Cont.)




HYDRO-BOOST HYDRAULIC CIRCUITS

## BENDIX HYDRO-BOOST (Cont.)

### HYDRO-BOOST FUNCTIONAL TEST

Check hydraulic brake system for leaks or insufficient fluid in master cylinder reservoir. With transmission in Neutral, stop engine and apply brake pedal several times to deplete all accumulator reserve. Hold brake pedal depressed with medium pressure (approximately 25-35 lbs.) and start engine. If unit is operating correctly, brake pedal will fall slightly and then push back against foot. If no action is felt, hydraulic booster system is not operating.

### ACCUMULATOR LEAKDOWN TEST

1) Start engine and operate at idle speed. Turn steering wheel to either stop and hold in this position for a maximum of five seconds. Return steering wheel to center position and turn off engine. Depress and release brake pedal. Repeat procedure until a hard pedal is obtained. There should be at least two power assisted brake applications with 20-25 lbs. applied to brake pedal.

2) Restart engine and let it idle. Turn steering wheel to either stop. There should be a light hissing sound as accumulator is charged. Hold steering wheel lightly against stop for a maximum of five seconds. Return steering wheel to center position and turn off engine. Wait one hour and apply brake pedal (DO NOT re-start engine). There should still be at least two power assisted brake applications at 20-25 lbs. pedal load before a hard pedal is encountered.

*NOTE — If Hydro-Boost is not functioning, insure power steering system is operating normally before replacing Hydro-Boost unit.*

## REMOVAL & INSTALLATION

### REMOVAL

*NOTE — Before removing unit, discharge accumulator by making several brake applications until a hard pedal is obtained.*

1) Working from inside vehicle below instrument panel, disconnect Hydro-Boost push rod from brake pedal assembly as follows: Disconnect stop light switch wires at connector, then remove hairpin retainer. Slide stop light switch off brake pedal pin just far enough for switch outer hole to clear pin, then remove switch from pin. Slide push rod and nylon bushing and washers off brake pedal pin.

2) Working under hood, remove two nuts which attach master cylinder to booster unit, then move master cylinder to one side of power unit without damaging brake lines. Disconnect pressure, steering gear and return lines from booster unit, then plug all lines and ports to prevent entry of dirt. Remove booster unit to dash panel attaching nuts, then remove assembly, sliding push rod link out from engine side of dash panel.

### INSTALLATION

1) Mount booster unit to dash panel by inserting push rod and boot through hole in dash panel, then install and tighten attaching nuts. Install master cylinder on booster unit, then install and tighten attaching nuts. Remove plugs and connect fluid pressure, steering gear and return line fittings to booster unit.

2) Install inner nylon washer, booster unit push rod, and bushing on brake pedal pin. Position switch so that it stradles push rod with switch slot on pedal pin and switch outer hole just clearing pin. Slide switch completely onto pin and install nylon washer and hairpin retainer. Connect stop light switch wires to connector, then install wires in retaining clip.

3) Remove coil wire so that engine will not start. Fill power steering pump reservoir and, while engaging starter, apply brake pedal with a pumping action. Do not cycle steering wheel until all residual air has been purged from booster unit. Check fluid level, adjust as necessary. Install coil wire, start engine, cycle steering wheel and apply brake pedal with a pumping action. Check for fluid leaks.

*NOTE — If a whine type noise develops following installation of power unit, fluid aeration may be suspected. Air must be removed from system using a suitable power steering pump air evacuator assembly.*

## OVERHAUL

*NOTE — Ford Motor Co. does not recommend overhaul of this unit. If a problem is determined to be in booster unit, complete assembly must be replaced. Do not disassemble booster unit.*