

1990 Chevrolet Cab & Chassis C2500

1989-90 AUTOMATIC TRANSMISSIONS Hydra-Matic 3L80 & 3L80HD Overhaul

1989-90 AUTOMATIC TRANSMISSIONS

Hydra-Matic 3L80 & 3L80HD Overhaul

APPLICATION

TRANSMISSION APPLICATION

Application	Transmission Model (RPO)
Chevrolet	
Cab & Chassis "C", "K" "R" & "V" Series (5.7L, 6.2L & 7.4L)	3L80/3L80HD (M40)
Chevy Van "G" Series (4.3L, 5.0L, 5.7L, 6.2L & 7.4)	3L80/3L80HD (M40)
Cutaway "G" Series (5.7L, 6.2L & 7.4L)	3L80/3L80HD (M40)
Cutaway "P" Series (3.9L, 4.8L, 5.7L, 6.2L & 7.4L)	3L80/3L80HD (M40)
Forward Control "P" Series (3.9L, 4.8L, 5.7L, 6.2L & 7.4L)	3L80/3L80HD (M40)
Hi-Cube "P" Series (5.7L, 6.2L & 7.4L)	3L80/3L80HD (M40)
Pickup "C", "K", "R" & "V" Series (4.3L, 5.0L, 5.7L, 6.2L & 7.4)	3L80/3L80HD (M40)
RV Cutaway "G" Series (5.7L, 6.2L & 7.4L)	3L80/3L80HD (M40)
Sportvan "G" Series (5.7L, 6.2L & 7.4L)	3L80/3L80HD (M40)
Step Van "P" Series (3.9L, 4.8L, 5.7L, 6.2L & 7.4L)	3L80/3L80HD (M40)
Suburban "R" & "V" Series (5.7L, 6.2L & 7.4L)	3L80/3L80HD (M40)
GMC	
Cab & Chassis "C", "K" "R" & "V" Series (5.7L, 6.2L & 7.4L)	3L80/3L80HD (M40)
Forward Control "P" Series (3.9L, 4.8L, 5.7L, 6.2L & 7.4L)	3L80/3L80HD (M40)
Magnavan "G" Series (5.7L, 6.2L & 7.4L)	3L80/3L80HD (M40)
Pickup "C", "K", "R" & "V" Series (4.3L, 5.0L, 5.7L, 6.2L & 7.4)	3L80/3L80HD (M40)
Rally Camper Special "G" Series (5.7L, 6.2L & 7.4)	3L80/3L80HD (M40)
Rally "G" Series (5.7L, 6.2L & 7.4)	3L80/3L80HD (M40)
Suburban "R" & "V" Series (5.7L, 6.2L & 7.4L)	3L80/3L80HD (M40)
Value Van "P" Series (3.9L, 4.3L, 4.8L, 5.7L, 6.2L & 7.4L)	3L80/3L80HD (M40)
Vandura "G" Series (4.3L, 5.0L, 5.7L, 6.2L & 7.4L)	3L80/3L80HD (M40)
Vandura "P" Series (4.8L, 5.7L, 6.2L & 7.4L)	3L80/3L80HD (M40)
Vandura Special "G" Series (5.7L, 6.2L & 7.4L)	3L80/3L80HD (M40)

IDENTIFICATION

Transmission serial number is located on identification plate attached to right side of transmission case. See **Fig. 1**. Number consist of model year, 2-letter model code, and production serial number.

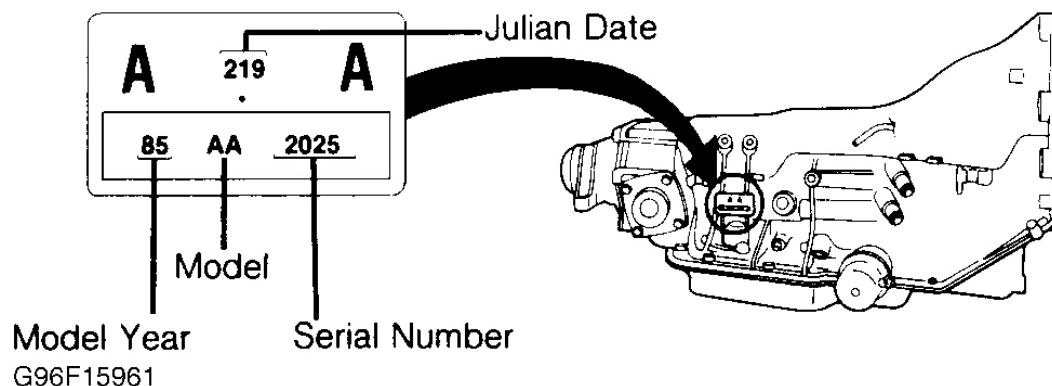


Fig. 1: Identifying 3L80/3L80HD Transmission
Courtesy of GENERAL MOTORS CORP.

DESCRIPTION

Transmission consists of a 3-element torque converter and compound planetary gear set. Three multiple disc clutches, 2 roller clutches, and 2 bands provide friction elements necessary to control functions of planetary gear set.

LUBRICATION

NOTE: See appropriate **SERVICING - A/T** article.

ON-VEHICLE REPAIRS

The following components can be removed with transmission in vehicle.

- Governor Cover And Seals
- Governor Assembly
- Governor Pipes
- Intermediate Servo Piston Assembly
- Rear Servo Assembly
- Front Servo Assembly
- Oil Pan And Oil Screen (Intake Pipe) Assembly
- Valve Body Assembly
- Check Balls, Valve Body Spacer Plates And Gaskets
- Pressure Regulator Parts
- Manual Detent Roller And Spring Assembly

- Parking Pawl Actuator Rod
- Parking Pawl Bracket And Parking Pawl
- Manual Shaft And Seal
- Manual Valve And Valve Link
- Extension Housing And Gasket
- Rear Seal
- 1-2 Accumulator Assembly
- Vacuum Modulator
- Oil Filter Pipe And "O" Ring
- Speedometer Driven Gear Assembly
- Cooler Fittings
- Downshift Solenoid
- Electrical Connectors
- Governor Feed Screen
- Pump Pressure Screen
- Modulator Valve

TROUBLE SHOOTING

NOTE: **Begin every diagnosis of automatic transmission problems with a fluid and linkage check. Following conditions can be caused by one or more of the following factors: incorrect fluid level, contaminated fluid, improperly adjusted linkage, or damaged or worn linkage.**

FLUID LEAK

Check oil pan and gasket, transmission case, case extension, case gasket and seal, oil pump assembly, cover-to-case gasket, oil pump ring seal and front oil seal assembly. Check torque converter, vacuum modulator and "O" ring seal, cooler fittings and pressure tap, governor cover and gasket, electrical connector and "O" ring seal, manual shaft seal, vent pipe, filler pipe and seal, and speedometer adapter and seal.

LOW LINE PRESSURE

Check vacuum modulator for damage or stuck valve; filter assembly, intake pipe and "O" ring seal for damage, blocking, or cracks or being missing. Oil pump for damage, stuck boost valve or pressure regulator, broken or weak pressure regulator spring, excessive gear clearance, and pump-to-case gasket mispositioned. Transmission case, damaged intake bore or valve body area, or intermediate clutch cup plug damaged or missing. Inspect clutches, oil pump, center support, rear servo and front accumulator for internal leaks.

HIGH LINE PRESSURE

Check vacuum modulator for: damaged seams, case bore, and modulator bellows or diaphragm; stuck modulator, low vacuum. Detent solenoid stuck open, switch actuated or shorted, blocking in spacer plate, or

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loose mount bolts. Oil pump assembly regulators stuck, spring pressure, improper assembly, damaged bore plug or boost valve bushing. Control valve assembly detent valve bore plug damaged, detent regulator pin short or valves stuck, or spacer plate-to-case gasket incorrect.

NO DRIVE REVERSE

Check oil pressure. Damaged, stripped or broken torque converter stator roller clutch, turbine hub splines or pump vanes. Oil pump assembly and cover-to-case gasket for damaged gears, restricted intake passage, porosity or casting damage, gasket mispositioned, or feed passage blocked or restricted. Filter assembly blocked or restricted. "O" ring seal missing or damaged. Intake pipe cracked, damaged or plugged.

NO DRIVE IN ANY FORWARD RANGE

Oil pump assembly blocked, restricted or has porosity. Forward clutch feed oil seal rings damaged or missing. Clutch housing has porosity or damage. Check ball in clutch housing missing or damaged. Piston seals damaged or missing. Piston damaged or cracked.

NO DRIVE IN DRIVE OR INTERMEDIATE RANGE

Low clutch roller assembly damaged, missing pieces or installed backward.

NO DRIVE IN DRIVE

Forward clutch feed orifice in clutch housing or pump restricted. Piston seals damaged. Oil pump seal rings damaged or worn.

NO REVERSE

Direct clutch assembly has exhaust check ball in housing or piston missing, piston outer seal damaged or rolled, or damage or porosity in outer area of piston or housing. Reverse oil passages blocked, restricted or have porosity in oil pump assembly, transmission case, control valve assembly, spacer plate, center support or rear servo assembly. Gaskets leaking. Oil seal rings, damaged or missing or grooves damaged. Piston oil seal ring missing or damaged. Rear servo band apply pin damaged or improper length selections. Porosity in case bore. Rear servo cover or gasket leaking. Rear servo band apply pin not engaged in band lug. Rear band damaged or burned.

1ST ONLY (NO 1-2 UPSHIFT)

High oil pressure. Governor weights binding or stuck, valve stuck in bore, driven gear damage, binding in case bore, oil pipes damaged or improperly sealed, or feed screen blocked. Control valve porosity or 1-2 valve binding. Spacer plate and gaskets damaged or leaking. Governor feed passages restricted or leaking. Intermediate clutch piston or sealing surface or center support damaged. Piston seal roller cut or damaged. Intermediate clutch roller or sprag damaged, not holding or installed backward.

1ST & 2ND ONLY (NO 2-3 UPSHIFT)

High oil pressure. Governor weights binding or stuck, valve stuck in bore, driven gear damage, binding in case bore. Feed pipes damaged or leaking. Control valve porosity or 2-3 valves stuck. Spacer plate and/or gaskets

damaged or leaking. Feed passages restricted or leaking. Direct clutch housing has porosity, missing check ball, damaged or cracked piston, or damaged or rolled piston seals. Center support-to-case bolt loose or porosity in casting. Seal rings damaged or missing. Seal ring grooves damaged or mismachined. Damaged front accumulator piston or seal ring groove. Damaged or missing oil seal ring. Sealing surface in control valve damaged.

EARLY, SOFT OR SLIPPING SHIFTS

Low oil pressure. High governor pressure due to weights binding or stuck valve. Center support constant bleed orifice cup plug missing. Clutches missing exhaust check balls, oil seals damaged or rolled in piston or housing, or casting has porosity. Control valve casting porosity, mounting bolt torque low, or shift valve binding. Front accumulator piston oil seal ring or spring damaged. Transmission case casting porosity or restricted oil passages. Stuck servo pistons, damaged springs, leaking gaskets or seals in front and rear servo assemblies.

HARSH OR ROUGH UPSHIFTS AT MINIMUM THROTTLE

High oil pressure when shift occurs. Front accumulator piston binding, stuck or spring broken. Binding or stuck 1-2 accumulator valve. Rear accumulator piston binding or stuck. Rear accumulator assembly damaged or improper, or feed passage restricted.

NO UPSHIFTS, DELAYED OR FULL THROTTLE UPSHIFTS ONLY

High oil pressure. Detent solenoid switch stuck in ON position or shorted. Line-to-detent orifice blocked. 1-2 or 2-3 shift valves stuck upshifted. Governor feed screen clogged, pipes restricted or misassembled. Governor assembly valve binding or stuck, or weights binding. Governor oil passages restricted or have porosity. Case passages damaged or leaking.

NO DETENT DOWNSHIFT

NOTE: **On models with throttle body injection, detent is controlled by engine ECM. On models with diesel engine, detent switch is controlled by a vacuum regulator valve.**

Place vehicle on lift. Turn ignition on (engine off). Unplug electrical plug from transmission. Connect test light to Detent terminal of disconnected wiring harness. Fully depress accelerator.

Light On

Detent solenoid inoperative, poor connections, shorted wire, open wire, valve stuck, or orifice plugged. Detent valve train stuck or binding in valve body.

Light Off

Detent solenoid switch improperly adjusted. Faulty switch, connections, fuse, or shorted wire.

NO PART THROTTLE DOWNSHIFTS

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Vacuum modulator valve binding or stuck. Improper engine vacuum. Defective modulator. 2-3 valve binding, 3-2 valve binding or stuck, or 3-2 modulator valve binding or stuck.

NO ENGINE BRAKING IN "L1"

Low-Reverse check ball mispositioned or missing, or case damaged at Low-Reverse check ball areas. Rear servo oil seal ring, bore or piston damaged. Rear servo band apply pin too short or improperly assembled. Rear band broken, burnt, not engaged on anchor pins and/or servo pin.

NO ENGINE BRAKING IN "L2"

Front servo and accumulator oil rings and/or bores leaking, or front servo piston cocked or stuck. Front band broken, burnt, not engaged on anchor pin and/or servo pin.

PERFORMANCE TESTS

ROAD TEST

1. Connect tachometer to engine. Place selector lever to Drive range and accelerate vehicle from standstill at minimum throttle opening.
2. 1-2 and 2-3 upshifts should occur as vehicle reaches correct speed. As vehicle speed decreases, 3-2 and 2-1 downshifts and engine braking effect should be noticed. See **SHIFT SPEED SPECIFICATIONS** table.
3. Stop vehicle and place selector lever in "2" (Intermediate) range. Accelerate from standstill. Upshift 1-2 should occur at all throttle openings (shift point will vary with throttle opening). 2-3 upshift should occur. Stop vehicle and place selector lever in "1" (Low) range. Accelerate from standstill. No upshift should occur.
4. With selector lever in Drive and vehicle speed at 35 MPH, move selector lever to "2" (Intermediate) range. Transmission should downshift to 2nd gear. Increase in engine RPM and engine braking effect should be noticed.
5. With selector lever in "2" (Intermediate) range and vehicle speed at 25-35 MPH (not over 40 MPH), move selector lever to "1" (Low) range. Throttle **MUST BE** in closed position. Transmission should downshift to 1st gear. Increase in engine RPM and engine braking effect should be noticed. Stop vehicle and place selector lever in Reverse. Check for reverse operation.

SHIFT SPEED SPECIFICATIONS

Application	Speed (MPH)
Upshift (Minimum)	
1-2	15
2-3	30
Detent Downshift (Minimum)	
3-2	68-73
2-1	28-32
Upshift (Maximum)	
1-2	44-48

HYDRAULIC PRESSURE TESTS

CAUTION: For hydraulic pressure tests, total running time in Drive and Reverse ranges with brake applied **MUST NOT** exceed 2 minutes, or damage to transmission may result.

1. Install 0-300 psi (0-21 kg/cm²) Pressure Gauge (J-5907) at pressure take-off point at left side of transmission to rear manual lever. See **Fig. 2**. Place gauge where it can be seen from driver's seat. Connect tachometer to engine.
2. Hydraulic pressures must be checked with transmission fluid at correct level and operating temperature. Check pressures with vehicle stationary and with brakes applied. See **HYDRAULIC PRESSURE SPECIFICATIONS** table.
3. On vehicles equipped with Exhaust Gas Recirculation (EGR), throttle is open enough in Drive range at 1000 RPM to cause EGR valve to open. This allows exhaust gas to enter intake manifold and lower manifold vacuum. Transmission line pressure rises with lower intake manifold vacuum. Line pressure may go above upper limit.
4. If high line pressures are obtained, disconnect and plug vacuum line at EGR valve. Recheck line pressure. If high pressures are still found, check engine vacuum. If low intake vacuum is found, use hand operated vacuum pump and apply 20 in. Hg vacuum to modulator.
5. Recheck pressures according to table. If line pressures are normal with external vacuum applied, check engine vacuum and vacuum systems for leaks. If high line pressures are found, see **HYDRAULIC PRESSURE TEST RESULTS** for possible causes.
6. When stationary testing is complete, drive vehicle at 30 MPH and allow throttle to close completely. Read pressure on gauge. This test may also be conducted on hoist. Run engine at 3000 RPM with driving wheels off ground, selector in Drive, and brakes released. Close throttle and read pressure between 2000 and 1200 RPM. Pressure should read 55-70 psi (3.8-4.9 kg/cm²).

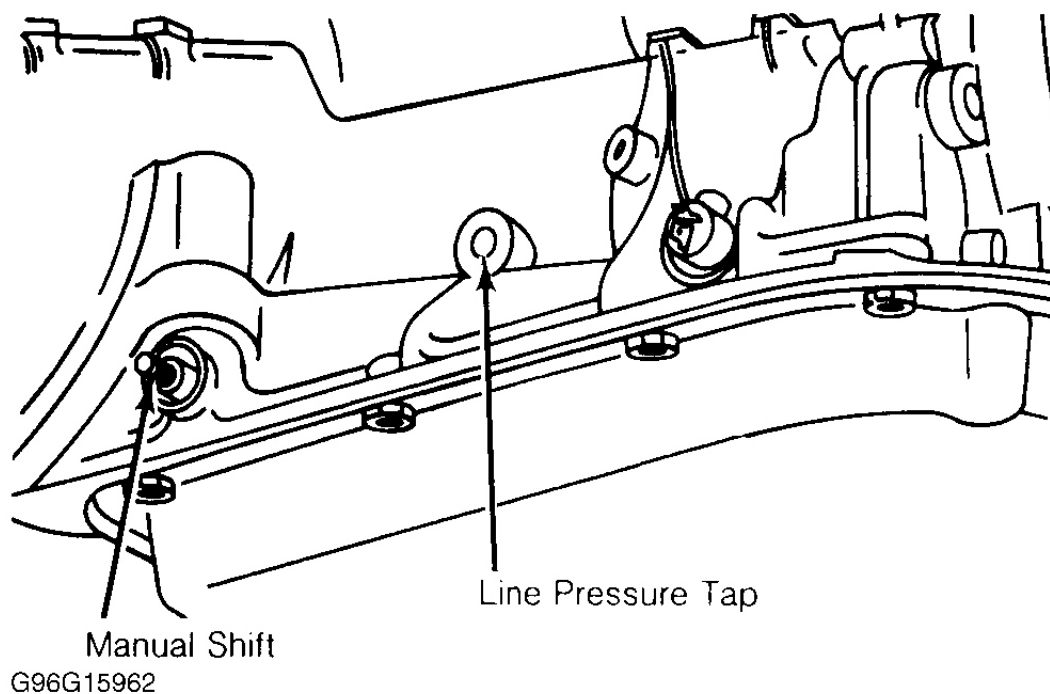


Fig. 2: Pressure Take-Off Point
 Courtesy of GENERAL MOTORS CORP.

HYDRAULIC PRESSURE SPECIFICATIONS

Range @ RPM	psi (kg/cm ²)
Neutral ⁽¹⁾ @ 1000	55-70 (4-5)
Drive @ Idle	60-85 (4.2-6)
Drive ⁽¹⁾ @ 1000	60-90 (4.2-6.3)
Low Or "2" ⁽¹⁾ @ 1000	135-160 (9.5-11.2)
Reverse ⁽¹⁾ @ 1000	95-150 (6.7-10.5)
Drive ⁽¹⁾ ⁽²⁾ @ 1000	90-110 (6.3-7.7)
(1) Brakes applied.	
(2) Downshift switch activated.	

HYDRAULIC PRESSURE TEST RESULTS

Line Pressure Too Low

1. Transmission fluid level low, faulty vacuum modulator assembly. Filter blocked or restricted, "O" ring on filter intake pipe omitted or damaged, intake pipe split or leaking, or incorrect filter.

2. Pump assembly damaged, worn, or mismatched parts. Pump gear clearance damaged or worn. Pressure regulator spring too weak or not enough spacers in pressure regulator.
3. Internal leak in direct clutch circuit (pressure normal in Neutral, Low, Intermediate and Drive, but low in Reverse). Internal leak in forward clutch circuit (pressure normal in Neutral and Reverse, low in Drive).
4. Case assembly porous in intake bore area. Missing plug or leak at intermediate clutch plug. Low-Reverse check ball installed wrong or missing (causing loss of Reverse and no engine braking in Low).

Line Pressure Too High

1. Vacuum system leak or improper engine vacuum. Water in vacuum modulator. Modulator valve not operating properly or defective. Defective EGR valve.
2. Detent switch actuated, shorted or detent solenoid stuck open. Detent feed orifice in spacer plate blocked or detent solenoid loose. Detent valve bore plug damaged. Detent regulator valve pin too short.
3. Pump pressure regulator and/or boost valve stuck. Incorrect pump pressure regulator spring. Pressure boost valve installed backward. Too many pressure regulator valve spacers. Pump casting defective. Aluminum bore plug has hole or not working. Pressure boost bushing broken or not working.
4. Control valve assembly-to-spacer gasket out of proportion or control valve assembly gaskets switched.

GOVERNOR CHECK

1. Raise vehicle on hoist (rear wheels off ground). Disconnect and plug vacuum line to modulator. Connect pressure gauge to transmission and tachometer to engine.
2. Start engine, keep foot off brake pedal, move selector lever to Drive range, and check line pressure at 1000 RPM. Slowly increase engine speed to 3000 RPM and determine if line pressure drop of 10 psi (.7 kg/cm²) or more occurs.
3. If no pressure drop occurs, inspect governor for stuck valve or weight, or restricted orifice in valve. Ensure governor valve entry and exhaust has .020" (.51 mm) minimum opening.
4. Check governor feed system. Check control valve assembly or case screen. Check governor pipe for restriction and proper fit in case holes. Control valve assembly should be disassembled, cleaned, and inspected if pressure drop of 10 psi (.7 kg/cm²) or more occurs (with transmission malfunction).

VACUUM MODULATOR CHECK**Vacuum Diaphragm Leak Check**

Insert pipe cleaner into vacuum connector pipe as far as possible and check for transmission fluid. If fluid is found, replace modulator. Gasoline or water vapor may settle in vacuum side of modulator. If this is found without presence of fluid, modulator should not be changed. If vehicle is to be exposed to temperatures 10°F (-12°C) or below, modulator MUST be replaced.

Atmospheric Leak Check

CAUTION: Air pressure over 6 psi (.4 kg/cm₂) may damage modulator.

Apply soap bubble solution to vacuum connector pipe seam (crimped upper-to-lower housing seam). Use a hose and blow air pressure into vacuum pipe and check for leaks. If leaks are present, replace modulator.

Bellows Comparison Check

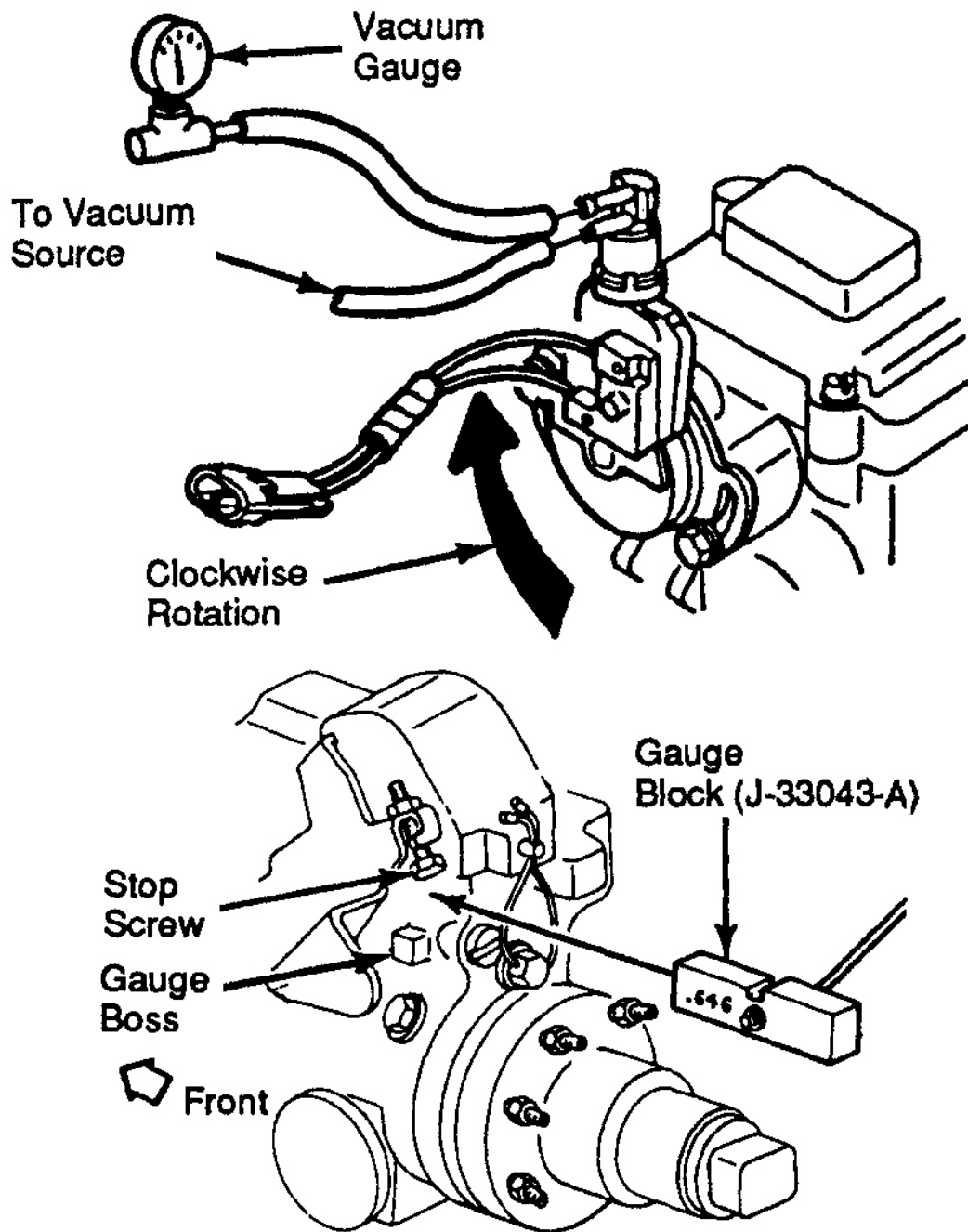
1. Using Comparison Group (J-24466), compare load of vacuum modulator with known good modulator of same type. Part number is stamped on modulator dome. Install good modulator on either end of gauge.
2. Install modulator in question on opposite end of gauge. Holding modulators in horizontal position, bring them slowly together under pressure. If modulator in question is bad, gauge line will remain Blue. If modulator in question is good, gauge line will be White.

Sleeve Alignment Check

Roll main body of modulator on flat surface and observe sleeve for concentricity to can. If sleeve is concentric and plunger is free, modulator is okay.

VACUUM REGULATOR VALVE (DIESEL MODELS ONLY)

1. Attach vacuum regulator valve to fuel injection pump. Valve body **MUST BE** securely attached but free to rotate on pump. Attach vacuum source or 20 in. Hg to bottom vacuum nipple. Attach vacuum gauge to upper nipple. See [Fig. 3](#).
2. Insert vacuum regulator Gauge Block (J-33043-A) between gauge boss on injection pump and wide open stop screw on throttle lever. Rotate throttle shaft and hold lever against gauge bar. Slowly rotate vacuum regulator valve body clockwise.
3. Setting will only be valid if performed with clockwise rotation. When vacuum gauge reads 10.9-12.1 in. Hg, tighten valve body mounting screws. Check setting by releasing throttle lever to idle stop position.
4. Rotate throttle shaft back until lever rests against gauge bar. Check vacuum gauge reading and ensure reading is 10.9-12.1 in. Hg. If not to specification, reset valve and check setting again.



- A. Front
- B. Wide Open Stop Screw
- C. Gage Boss

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Fig. 3: Adjusting Vacuum Regulator Valve
Courtesy of GENERAL MOTORS CORP.

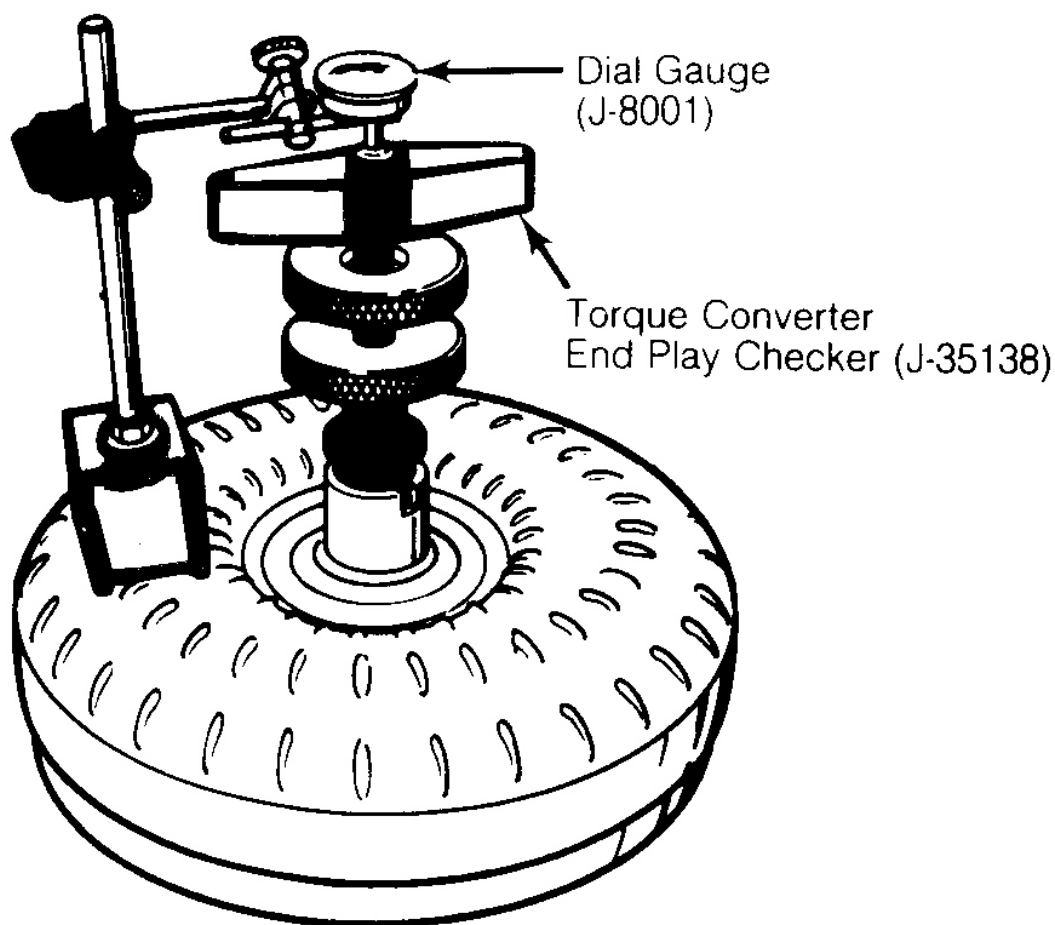
REMOVAL & INSTALLATION

NOTE: See appropriate REMOVAL & INSTALLATION - A/T article.

TORQUE CONVERTER

END PLAY CHECK

Install Torque Converter End Play Checker (J-35138). See **Fig. 4**. Converter end clearance should be less than .024" (.61 mm). If clearance is greater than specification, replace torque converter assembly.



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Fig. 4: Checking Torque Converter End Play

Courtesy of GENERAL MOTORS CORP.

TRANSMISSION DISASSEMBLY

VACUUM MODULATOR & VALVE

Disconnect vacuum hose from modulator stem. Remove vacuum modulator attaching screw and retainer. Remove modulator and "O" ring seal from case. Discard "O" ring. Using magnet, remove modulator valve from case bore.

GOVERNOR

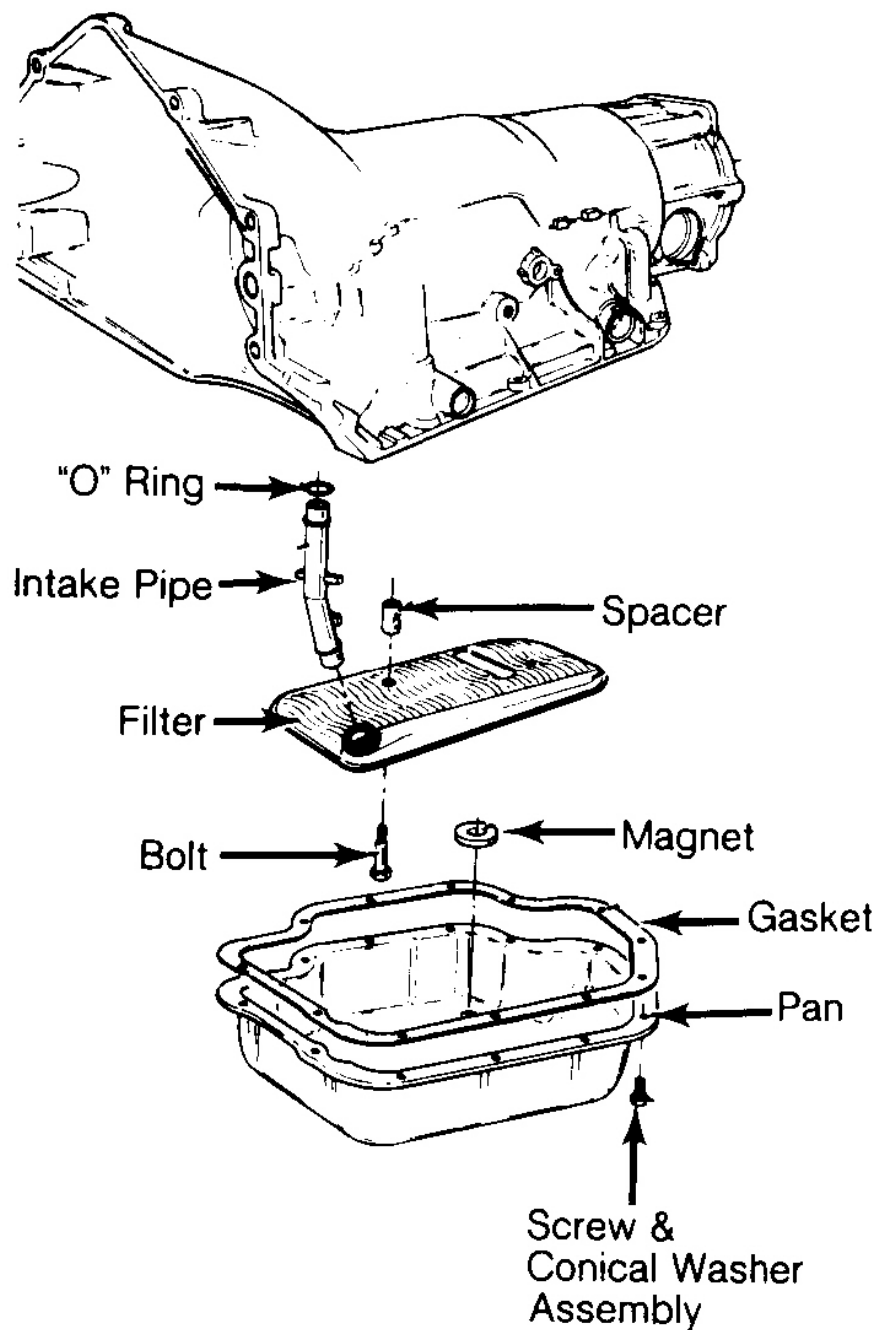
Remove attaching screws, cover, and governor assembly. On internal speed sensor equipped transmissions, remove retaining bolt, speed sensor and "O" ring, being careful not to distort cover. Remove governor assembly by pulling straight out of case.

SPEEDOMETER DRIVEN GEAR

Disconnect speedometer cable. Remove attaching screw and retainer. Remove speedometer driven gear assembly and "O" ring from case.

INTAKE PIPE, FILTER & PAN

Remove pan attaching bolts and pan. Remove filter retaining bolt. Withdraw intake pipe and filter assembly. Discard filter and "O" ring seal from intake pipe. See **Fig. 5**.



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Fig. 5: Intake Pipe & Filter Assembly
 Courtesy of GENERAL MOTORS CORP.

CONTROL VALVE ASSEMBLY

Remove control valve attaching bolts, manual detent spring and roller. Note size and location of each bolt for reassembly reference. Remove governor oil pipes from case and rotate away from holes. Remove governor oil screen from inboard hole. Remove control valve assembly.

DETENT SOLENOID

CAUTION: If transmission is installed in vehicle, be careful when detent solenoid is removed to prevent spacer plate, gasket, and check balls from dropping out. Keep control valve spacer plate level when removing so check balls do not fall.

Remove wire connecting solenoid to exterior electrical connector. Remove solenoid attaching screws and solenoid. Use care to not press against solenoid cover. Remove control valve to spacer plate gasket, spacer plate and spacer plate-to-case gasket. Using magnet, remove 6 check balls.

FRONT & REAR SERVO ASSEMBLY

Remove servo piston assembly, retainer and spring. Remove bolts, cover, gasket, rear servo piston and seal. Perform band apply pin selection check at this time to determine correct pin for use at reassembly. This is equivalent to band adjustment.

Band Apply Pin Selection Check

1. Position Band Apply Pin Selector Gauge (J-21370-6) on transmission case over rear servo bore. See **Fig. 6**. Hex nut on side of gauge faces toward parking brake linkage. Install end of Gauge Pin (J-21370-5) with smaller diameter in servo pin bore.
2. Secure gauge with 2 attaching screws. Tighten screws to 18 ft. lbs. (24 N.m). Ensure stepped gauge pin is free to move in both tool and servo pin bore. Stepped side of pin must face front of transmission case.
3. Apply 25 ft. lbs. (34 N.m) of force to hex nut on side of gauge. This will cause lever on top of gauge to depress stepped gauge pin into servo pin bore, simulating actual operating conditions. Note relation of steps on gauge pin and machined surface on top of gauge.
 - If gauge pin is even with top of gauge surface or above upper step of pin, use long pin.
 - If gauge pin is between upper and lower steps, use medium pin.
 - If gauge surface is even with or below step on gauge pin, use short pin.
4. If new band apply pin is required, make note of apply pin size for reassembly reference. Remove selection gauge from transmission case.

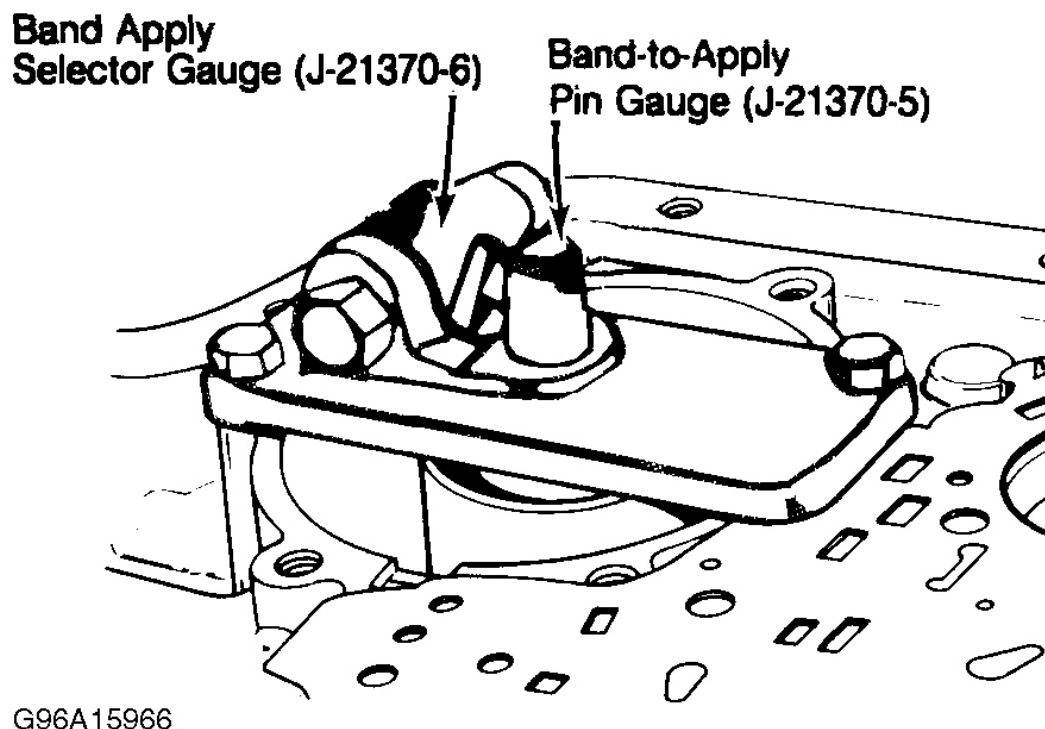


Fig. 6: Servo Pin Gauge Installation
 Courtesy of GENERAL MOTORS CORP.

FRONT UNIT END PLAY CHECK

1. With transmission removed, remove one oil pump attaching bolt and washer at 10 o'clock position. Install Slide Hammer Bolt (J-6125) into bolt hole. Mount Dial Indicator (J-8001) on bolt.
2. Press turbine shaft to rear and output shaft forward to eliminate slack. Set indicator tip to register with end of turbine shaft. Zero dial indicator. Pull out on turbine shaft and note measurement. End play should be .003-.024" (.08-.61 mm).
3. If end play is not within specification, select correct thrust washer for use at reassembly. Thrust washer controlling end play is located between pump cover and forward clutch housing. See **FRONT UNIT THRUST WASHERS** table.

FRONT UNIT THRUST WASHERS

Washer Thickness	I.D. Number	⁽¹⁾ Color Code
.060-.064"	0	Yellow
.071-.075"	1	Blue
.082-.086"	2	Red
.093-.097"	3	Brown
.104-.108"	4	Green

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.115-.119"	5	Black
.126-.130"	6	Purple
(1) Oil soaked washers may discolor. Measure washers for actual thickness.		

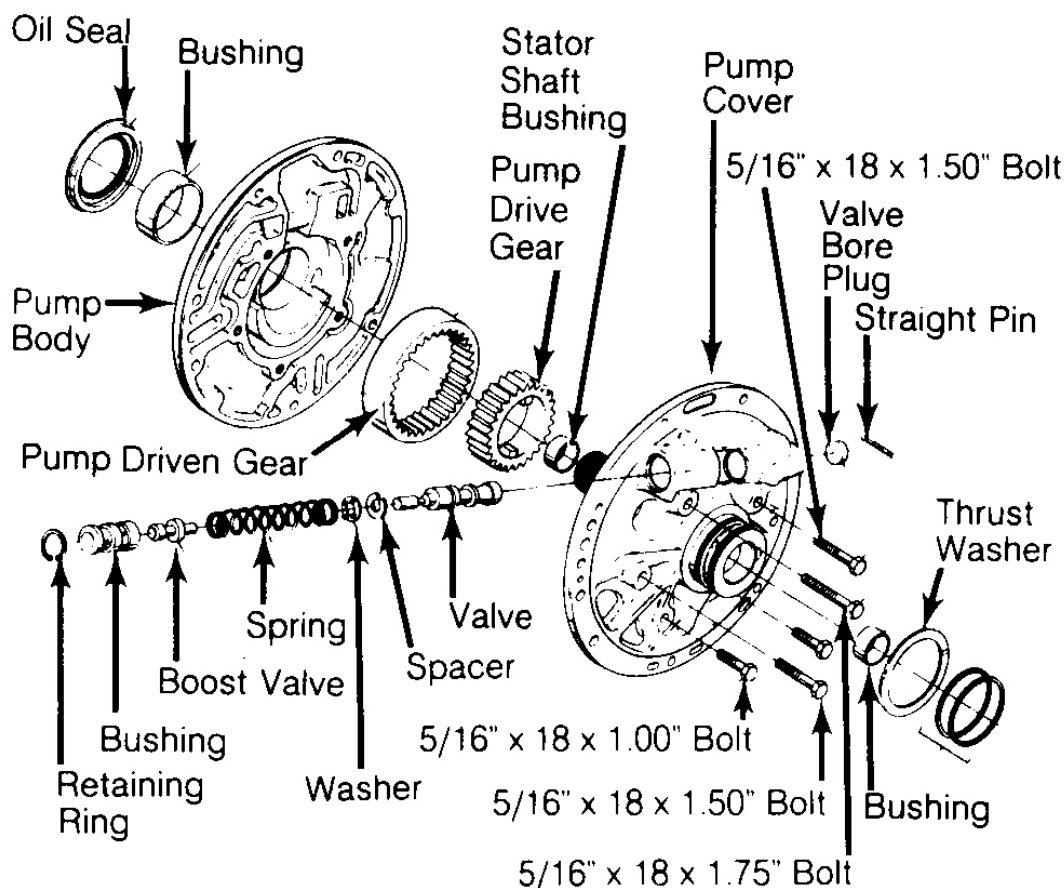
REAR OIL SEAL & EXTENSION HOUSING

If replacement is necessary, pry rear oil seal from extension housing. Remove attaching bolts and remove extension housing and gasket from transmission.

OIL PUMP

NOTE: Check front unit end play before proceeding with transmission disassembly.
Record end play for reassembly procedure.

If front seal requires replacement, pry seal out before removing pump assembly. Remove pump attaching bolts and install Oil Pump Remover (J-24773-1). Remove oil pump assembly, pump seal and gasket. See **Fig. 7**.



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Fig. 7: Exploded View Of Oil Pump

Courtesy of GENERAL MOTORS CORP.

DETENT LEVER, MANUAL LEVER, SHAFT & PARKING LINKAGE

NOTE: Skip step 2) for 9HJA transmission models.

1. Remove manual linkage. Loosen lock nut holding inside detent lever to manual shaft. Remove manual shaft-to-case pin. Remove lock nut and inside detent lever from manual shaft. Remove manual shaft. See [Fig. 8](#).
2. Remove parking actuator rod and detent lever. Remove attaching bolts and parking lock bracket. Remove parking pawl return spring. Remove parking pawl shaft spring retainer. Remove parking pawl shaft cup plug. Pry outward to remove plug. Remove parking pawl shaft and parking pawl.

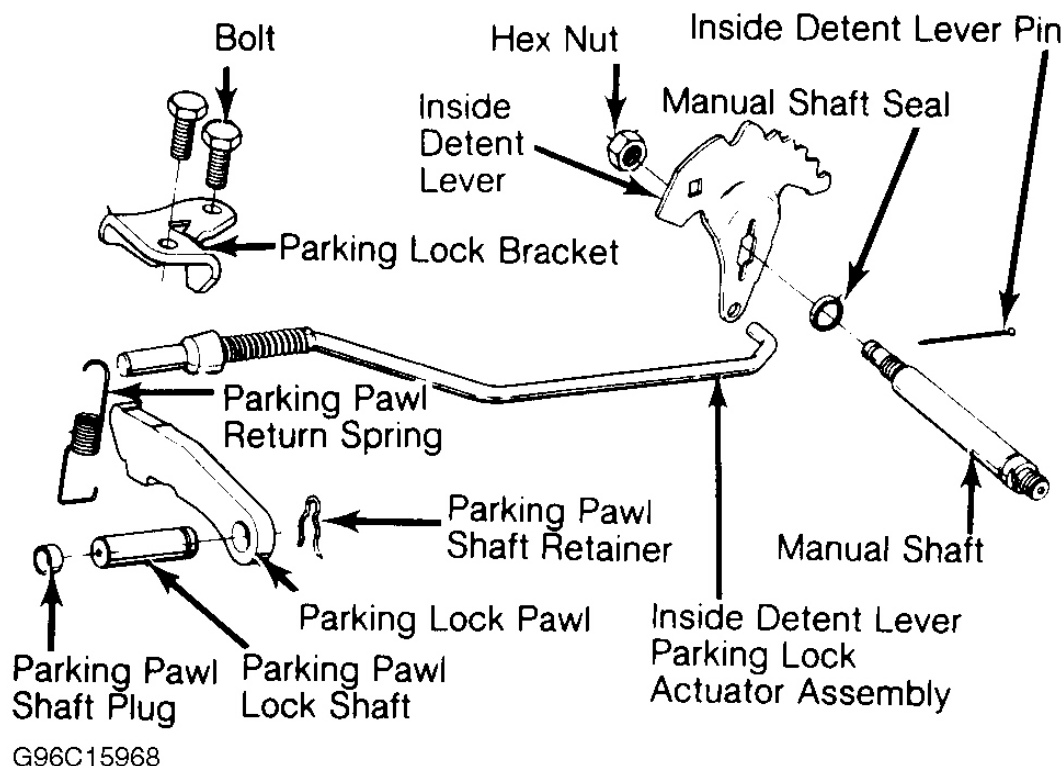


Fig. 8: Exploded View Of Manual Linkage
Courtesy of GENERAL MOTORS CORP.

TURBINE FORWARD, INTERMEDIATE & DIRECT CLUTCH ASSEMBLIES, SUN GEAR SHAFT & FRONT BAND

Remove forward clutch and turbine shaft assembly from case. Remove forward clutch hub-to-direct clutch housing thrust washer. Remove direct clutch and intermediate roller assembly. Remove sun gear shaft. Remove front band assembly.

REAR UNIT END PLAY CHECK

1. Transmission must be out of vehicle and extension housing must be removed. Install Speedometer Puller Bolt (J-21797) in an extension housing bolt hole. Install dial indicator.
2. Zero dial indicator, move output shaft in and out, and note end play. See **Fig. 9**. End play should be .007-.019" (.18-.48 mm). If not within specification, change thrust washer.
3. Thrust washer controlling rear unit end play has 3 tabs. It is located between output shaft thrust washer and rear face of transmission case. Notches and/or numerals on tabs of washer identify thickness. See **REAR UNIT THRUST WASHERS** table.

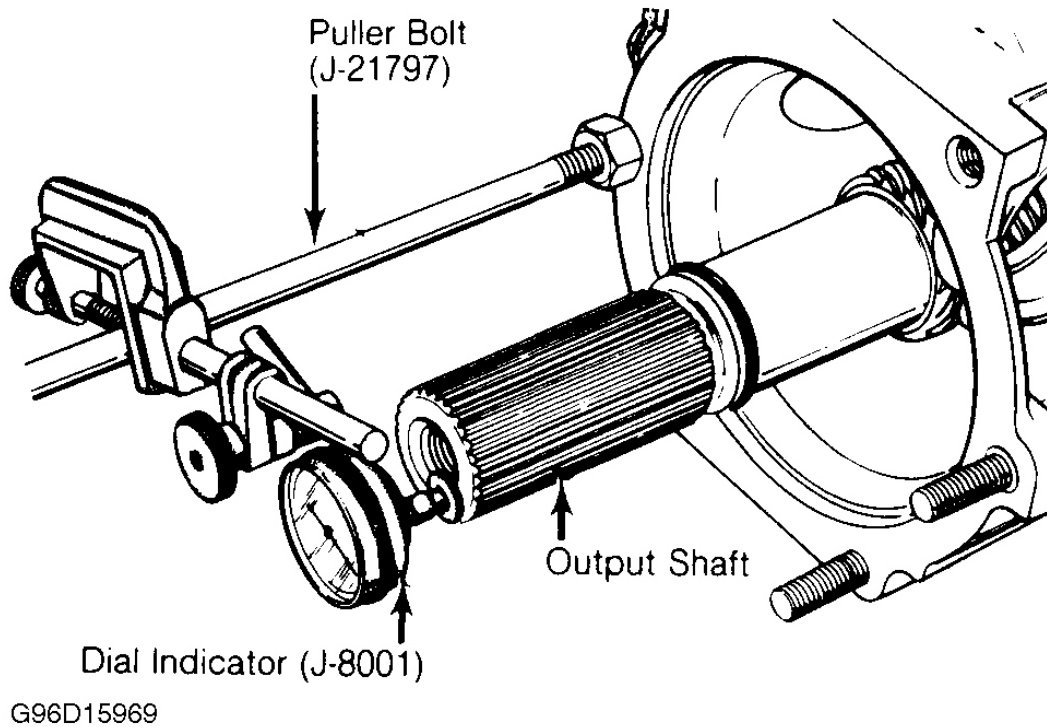


Fig. 9: Measuring Rear Unit End Play
Courtesy of GENERAL MOTORS CORP.

REAR UNIT THRUST WASHERS

Washer Thickness	I.D. Notches	I.D. Numeral
.074-.078"	None	1
.082-.086"	Side 1 Tab	2
.090-.094"	Side 2 Tabs	3
.098-.102"	End 1 Tab	4
.106-.110"	End 2 Tabs	5
.114-.118"	End 3 Tabs	6

CENTER SUPPORT, REAR BAND & GEAR UNIT ASSEMBLIES

1. Remove center support bolt from valve body using a 3/8" 12-point thin wall deep socket. See **Fig. 10**. Remove intermediate clutch backing plate-to-case snap ring. Withdraw backing plate and 6 clutch plates (3 composition and 3 steel).
2. Remove center support-to-case snap ring. Install Remover (J-21795) on end of mainshaft so tangs engage groove in shaft. Tighten screw on tool to secure tool on shaft. This will prevent roller clutch movement during gear unit removal.

NOTE: Install piece of pipe over output shaft for use as handle and to prevent spline damage to case bushing when removing gear unit, center support and reaction carrier.

3. Loosen transmission holding fixture pivot pin slightly so gear unit assembly will not bind during removal from case. With transmission case in horizontal position, shift complete assembly forward and remove from case.
4. Remove output shaft-to-case thrust washer from shaft or case. Place gear unit assembly in Holding Fixture (J-6116-01) using Adapter (J-21364) with mainshaft pointing up. Remove rear unit selective washer from transmission case. Remove center support-to-case spacer.
5. Rotate rear band lugs away from pins and pull band assembly from case. Lifting straight up, remove center support assembly from reaction carrier. Remove center support-to-reaction carrier thrust washer.
6. Washer may be stuck to back of center support. Remove reaction carrier and roller clutch assembly from output carrier. Remove roller clutch assembly from reaction carrier.

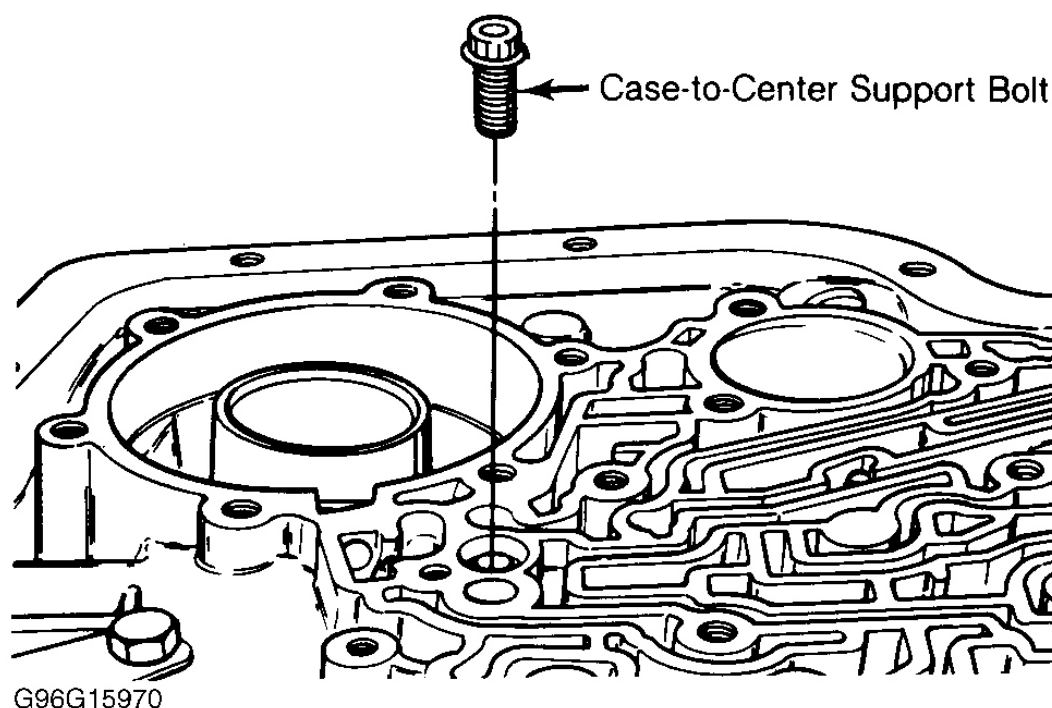


Fig. 10: Removing Center Support Bolt
Courtesy of GENERAL MOTORS CORP.

DISASSEMBLY & REASSEMBLY

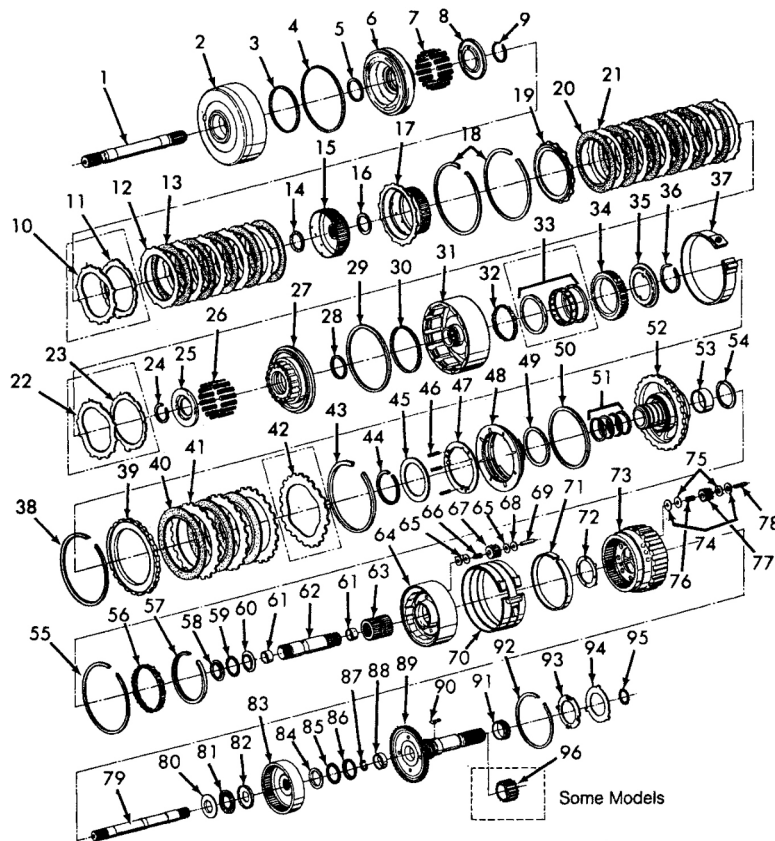
NOTE: When reassembling transmission, lubricate all bushings, seals, thrust bearings, and mating surfaces with transmission fluid. Use petroleum jelly to lubricate

and retain thrust washers. Use compressed, air to dry parts. Never use rags to dry parts.

NOTE: For transmission component locations, see Fig. 11 and Fig. 12

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- | | | |
|---------------------------------|---|---|
| 1. Turbine Shaft | 33. Sprag Assembly | 65. Pinion Thrust Washer |
| 2. Forward Clutch Housing | 34. Intermediate Clutch Race | 66. Needle Roller Bearing |
| 3. Forward Clutch Center Seal | 35. Intermediate Clutch Retainer | 67. Pinion Gear |
| 4. Forward Clutch Outer Seal | 36. Snap Ring | 68. Pinion Thrust Washer |
| 5. Forward Clutch Inner Seal | 37. Front Band Assembly | 69. Pinion Pin |
| 6. Forward Clutch Piston | 38. Snap Ring | 70. Rear Band |
| 7. Piston Release Spring | 39. Backing Plate | 71. Front Internal Gear Ring |
| 8. Release Spring Retainer | 40. Plate | 72. Front Internal Washer |
| 9. Snap Ring | 41. Flat Plate | 73. Output Carrier Assembly |
| 10. Waved Clutch Plate | 42. Waved Plate | 74. Pinion Thrust Washer (Bronze) |
| 11. Dished Forward Clutch Plate | 43. Snap Ring | 75. Pinion Thrust Washer (Steel) |
| 12. Flat Clutch Plate | 44. Snap Ring | 76. Needle Roller Bearing |
| 13. Clutch Plate Assembly | 45. Intermediate Clutch Spring Retainer | 77. Pinion Gear |
| 14. Thrust Washer | 46. Release Spring | 78. Pinion Pin |
| 15. Forward Clutch Hub | 47. Intermediate Clutch Guide | 79. Mainshaft |
| 16. Thrust Washer | 48. Piston | 80. Thrust Bearing-to-Sun Gear Race |
| 17. Direct Clutch Driving Hub | 49. Inner Seal | 81. Needle Thrust Bearing |
| 18. Snap Ring | 50. Outer Seal | 82. Thrust Bearing Race |
| 19. Direct Clutch Backing Plate | 51. Pump Cover Oil Ring | 83. Rear Internal Gear |
| 20. Composition Plate | 52. Center Support | 84. Thrust Bearing Race |
| 21. Steel Plate | 53. Bushing | 85. Needle Thrust Bearing |
| 22. Waved Clutch Plate | 54. Thrust Washer | 86. Thrust Bearing-to-Output Shaft Race |
| 23. Dished Direct Clutch Plate | 55. Snap Ring | 87. Snap Ring |
| 24. Snap Ring | 56. Low Clutch Roller Assembly | 88. Output Shaft Bushing |
| 25. Release Spring Retainer | 57. Reaction Drum Spacer Ring | 89. Output Shaft |
| 26. Piston Release Spring | 58. Thrust Bearing-to-Center Support Race | 90. Drive Gear Clip |
| 27. Forward Clutch Piston | 59. Needle Thrust Bearing | 91. Speedometer Drive Gear |
| 28. Clutch Inner Seal | 60. Thrust Bearing-to-Center Support Race | 92. Snap Ring |
| 29. Clutch Outer Seal | 61. Stator Shaft Bushing | 93. Thrust Washer |
| 30. Clutch Center Seal | 62. Sun Gear Shaft | 94. Thrust Washer |
| 31. Direct Clutch Housing | 63. Sun Gear | 95. "O" Ring |
| 32. Roller Assembly | 64. Reaction Carrier Assembly | 96. Speed Sensor Rotor |

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Fig. 11: Exploded View Of Internal Parts (THM 3L80)
Courtesy of GENERAL MOTORS CORP.

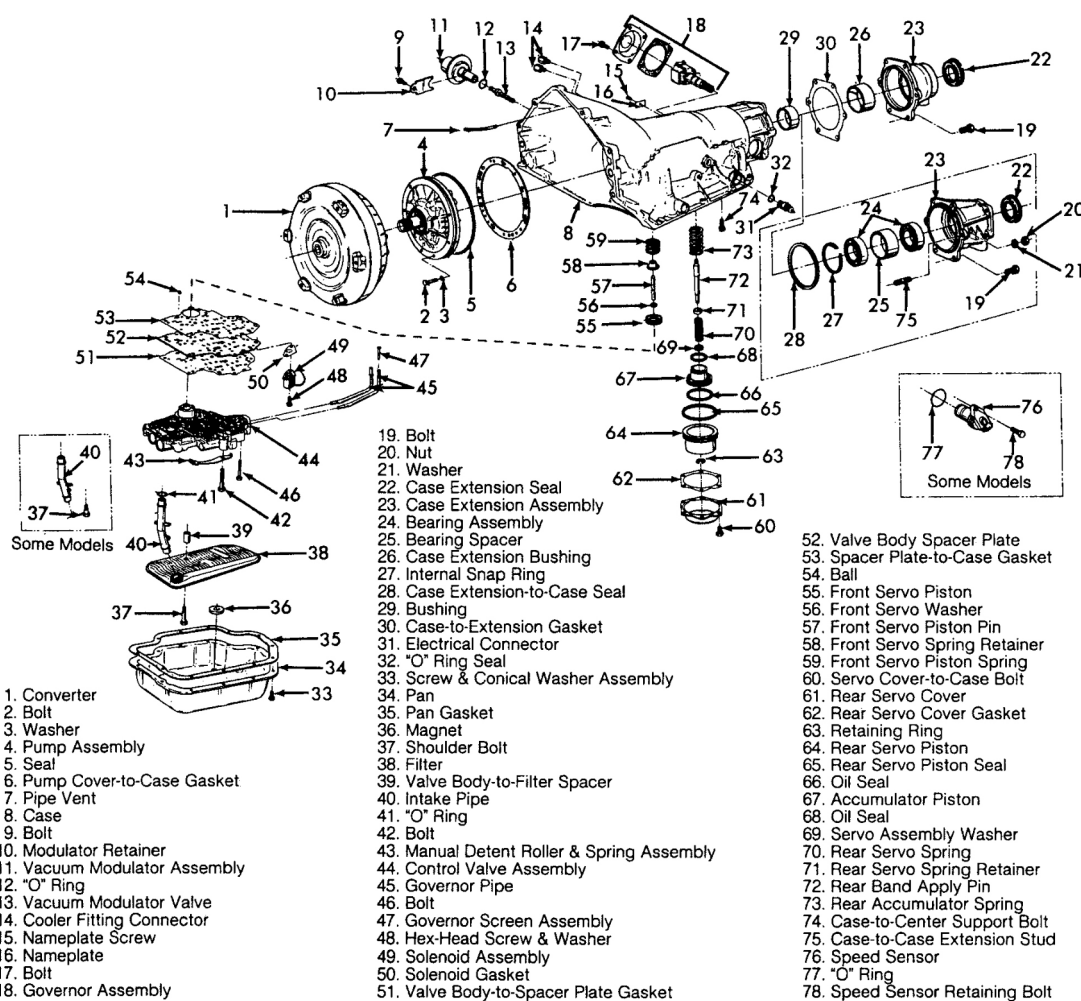


Fig. 12: Exploded View Of Case & External Parts (THM 3L80)
Courtesy of GENERAL MOTORS CORP.

GOVERNOR

Disassembly

1. Governor, except driven gear, is serviced as a complete assembly. Driven gear may be serviced separately and requires disassembly of governor for gear replacement.
2. Governor weights are interchangeable from side to side. Cut off one end of each governor weight pin and remove pins, governor thrust cap, governor weights and springs. Remove governor valve from governor sleeve. See **Fig. 13**.

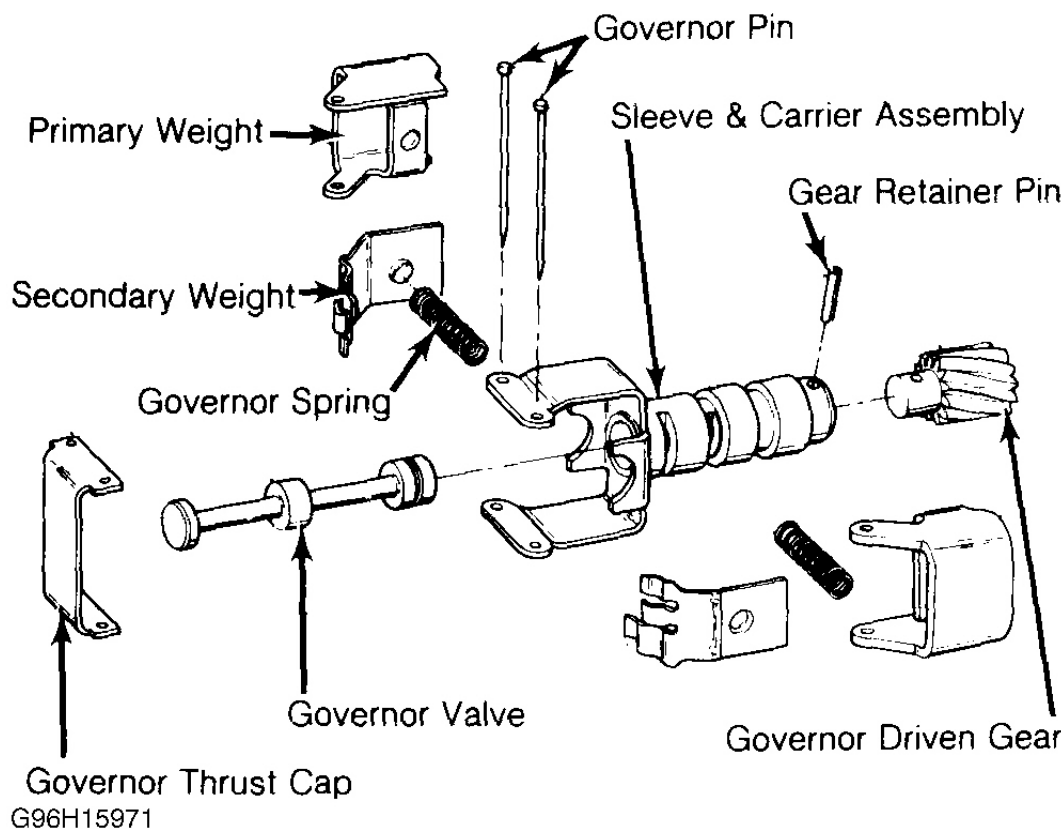


Fig. 13: Exploded View Of Governor Assembly
Courtesy of GENERAL MOTORS CORP.

Inspection

1. Wash all parts in solvent and air dry. Blow out all passages. Inspect sleeve for wear or damage. Check for free operation in case bore. Check driven gear for looseness on sleeve.
2. Ensure valve opening at entry and exhaust is .020" (.51 mm) minimum. Valve opening measurements are made with driven gear up and thrust cap down. Entry measurement is made with weights extended while exhaust is measured with weights inward.

Driven Gear Replacement

1. Drive out gear retaining split pin. Support assembly on 3/16" plates installed in exhaust slots of sleeve. Using a press, press gear out of sleeve with long punch. Clean governor sleeve of chips.
2. To install new gear, press gear into sleeve until nearly seated. Remove any chips that may have been shaved off gear. Press gear in until bottomed on shoulder.
3. New pin hole must be drilled through sleeve and gear. Support governor in press. Locate hole position 90 degrees from existing hole. Center punch and drill new hole through sleeve and gear with 1/8" drill bit. Install new pin.

Reassembly

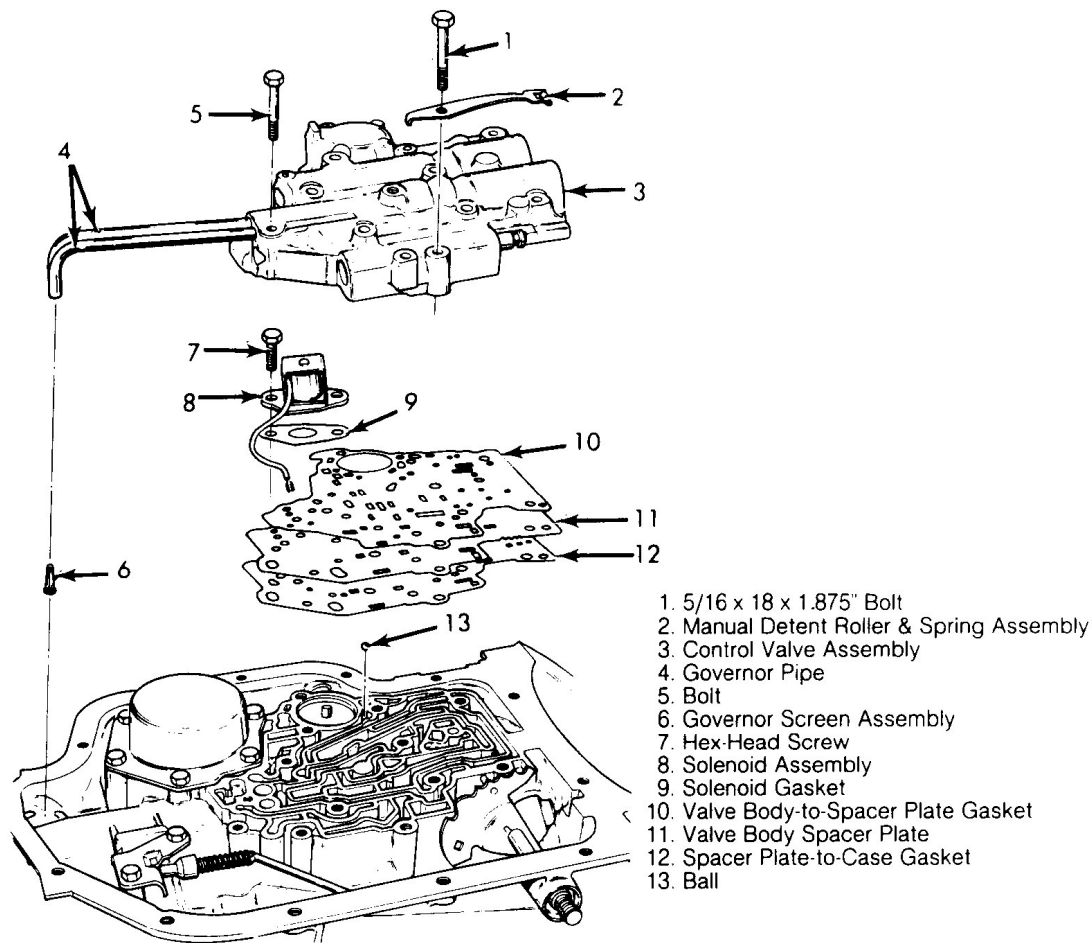
Install valve in bore of sleeve, then install weights, springs, and thrust cap on sleeve. Align pin holes in thrust cap, weight assemblies, and sleeve. Install new pins. Crimp both ends of pin to prevent them from falling out. Check weight assemblies for free operation in sleeve. Ensure valve is free in sleeve.

CONTROL VALVE ASSEMBLY

NOTE: **As each valve is removed, place parts in order for reassembly reference. Valves and springs are not interchangeable. All components must be laid out on a clean surface in exact sequence as they were removed.**

Disassembly

1. Position control valve assembly with gasket surface up and accumulator pocket at bottom. Remove manual valve from upper bore. Install Compressor (J-21885) on accumulator piston. Compress piston and remove "E" retaining ring. Remove front servo piston and spring. See **Fig. 15**.
2. Remove retaining pins (except grooved pin- in lower left bore) from bores with pin punch. Drive pins from outer side of valve body. When removing pins, hold hand over bore end in case spring forces components out of bore. See **Fig. 14** and **Fig. 15** . Remove grooved pin from lower left bore with long nose pliers. Remove valve trains beginning with upper left corner.



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Fig. 14: Control Valve Assembly Removal
 Courtesy of GENERAL MOTORS CORP.

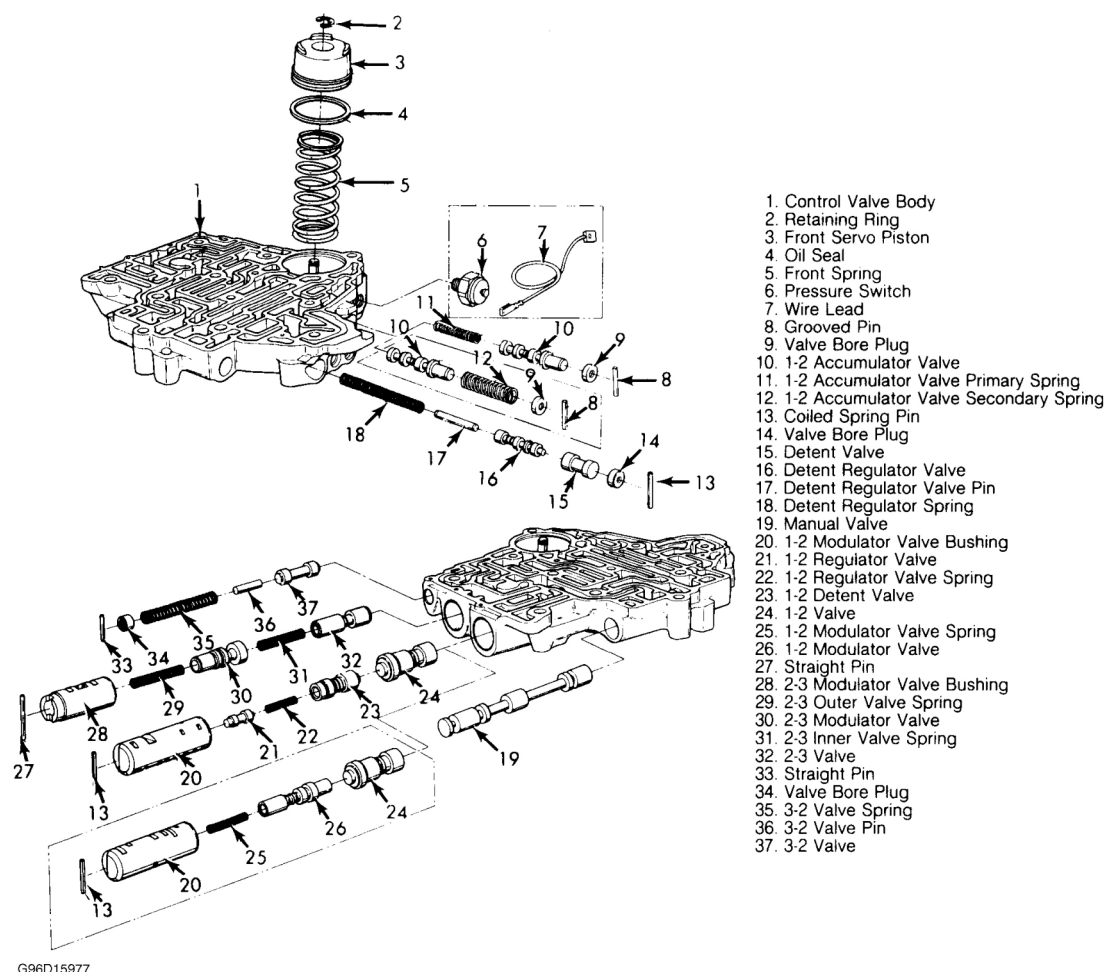


Fig. 15: Exploded View Of Control Valve Assembly
Courtesy of GENERAL MOTORS CORP.

Inspection

NOTE: DO NOT remove Teflon oil seal from front accumulator piston unless seal ring needs replacing. Service oil seal ring is cast iron.

Clean and inspect all parts. If burrs are present on valves, remove with a fine stone. Use care not to round off shoulders of valves. Ensure valves slide freely by their own weight.

Reassembly

Install front accumulator spring and piston into valve body. Compress piston and spring and install retaining "E" clip. To install remaining components, reverse disassembly procedure.

REAR SERVO

Disassembly

Remove rear accumulator piston from rear servo piston. Remove rear servo piston-to-band apply pin "E" clip. Remove seal and rear servo piston from pin. Remove washer, spring and spring retainer. See **Fig. 12**.

Inspection

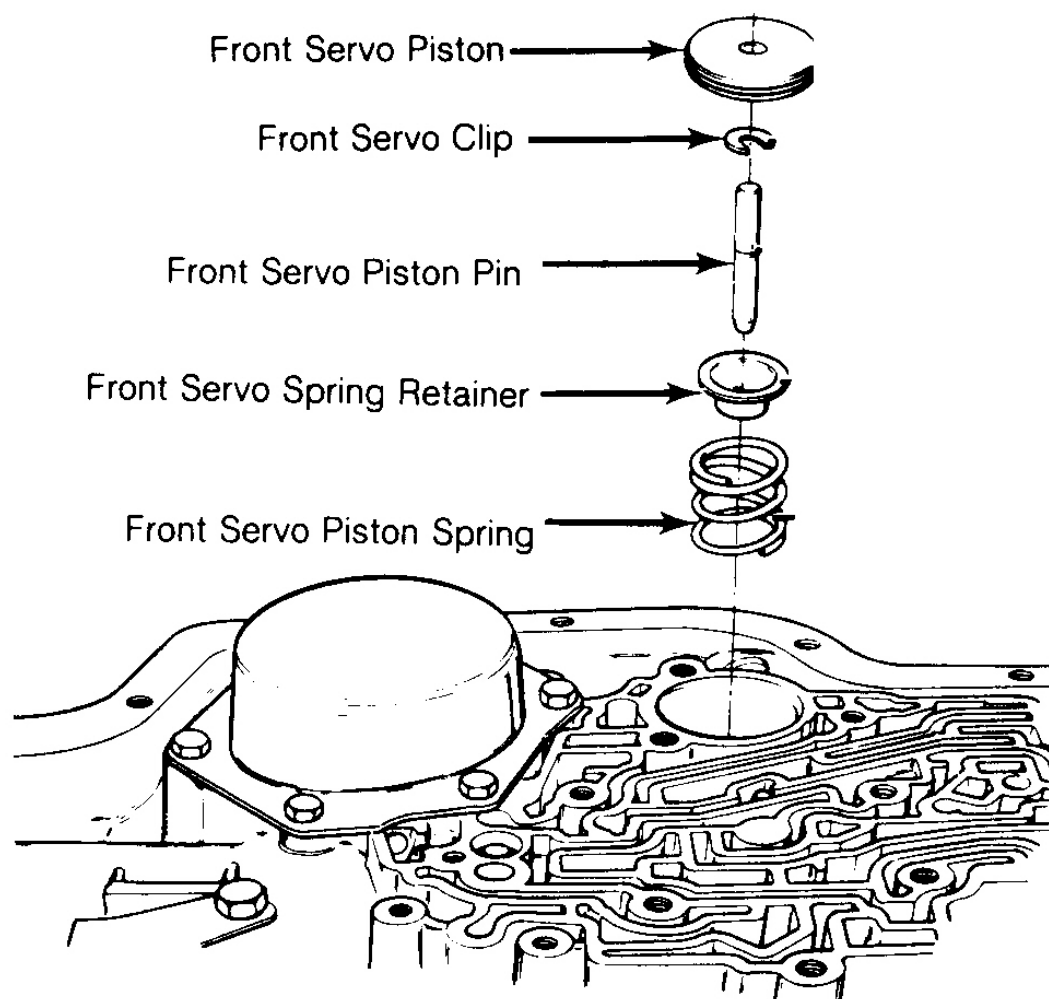
Check oil seal rings. Inspect fit of band apply pin in servo piston. Inspect band apply pin for scores or cracks. Ensure band apply pin is proper size as selected during disassembly. See **FRONT & REAR SERVO ASSEMBLY** under TRANSMISSION DISASSEMBLY.

Reassembly

To reassemble rear servo components, reverse disassembly procedure.

FRONT SERVO**Inspection**

Inspect servo pin, piston and oil seal ring for wear or damage. Check fit of servo pin in piston and in case bore. See **Fig. 16**.



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Fig. 16: Exploded View Of Front Servo Assembly

Courtesy of GENERAL MOTORS CORP.

OIL PUMP**Disassembly****CAUTION: Pressure regulator spring is very tightly compressed.**

1. Compress regulator boost valve bushing against pressure regulator spring. Carefully remove snap ring. See **Fig. 7**.
2. Remove regulator boost valve bushing, valve and pressure regulator spring. Remove regulator valve, spring retainer, and spacer(s) (if present). Remove 5 pump cover attaching bolts noting different lengths

and positions. Separate cover from body. Mark drive and driven gears for reassembly reference and remove from pump body. See **Fig. 7**.

3. Reassembly of pump gears in same position will ensure quietest operation. Remove retaining pin and bore plug from end of regulator bore. Remove 2 oil seal rings from cover. Remove pump-to-forward clutch housing thrust washer.

Inspection

Inspect all parts for wear or damage. Check pump body face-to-gear face clearance with feeler gauge and straight edge. Clearance should be .0008-.0035" (.020-.089 mm). Ensure 1/8" breather hole in pump cover is open.

Bushing Replacement

1. To replace oil pump body bushing, drive bushing from body with Remover/Installer (J-8092 and J-21465-17). Clean pump bushing bore. Drive bushing squarely into bore until flush or 010" (.25 mm) below gear pocket face.
2. To replace stator shaft rear bushing, mount pump cover in vise with stator shaft held in brass jaws. Assemble Bushing Remover (J-21465-15) to slide hammer and Adapter (J-2619 and J-2619-4) and remove bushing.
3. Clean shavings from stator bore. Place pump cover in vise with stator shaft resting on block of wood. Place new bushing on shoulder of Installer (J-21465-2). Bushing should be driven to depth of 19/32".
4. To replace stator shaft front bushing, mount pump cover in vise with stator shaft held in brass jaws. Attach Bushing Removal (J-21465-15) to slide hammer and Adapter (J-2619 and J-2619-4) and remove bushing.
5. Clean shavings from stator shaft. Assemble installer with Drive Handle (J-21465-3 and J-8092). Support hub of pump cover on soft material to protect ring lands and install bushing.

Reassembly

1. When installing front unit thrust washer, ensure it is proper thickness as determined at disassembly. See **FRONT UNIT END PLAY CHECK** under TRANSMISSION DISASSEMBLY. To reassemble remaining components, reverse disassembly procedure. Leave pump cover bolts one turn loose.
2. Install Alignment Band (J-21368) to align cover and body. Tighten attaching bolts and remove alignment band. Install new square-cut "O" ring on pump. Install new pump oil seal on front of pump using Oil Seal Installer (J-21359).

FORWARD CLUTCH

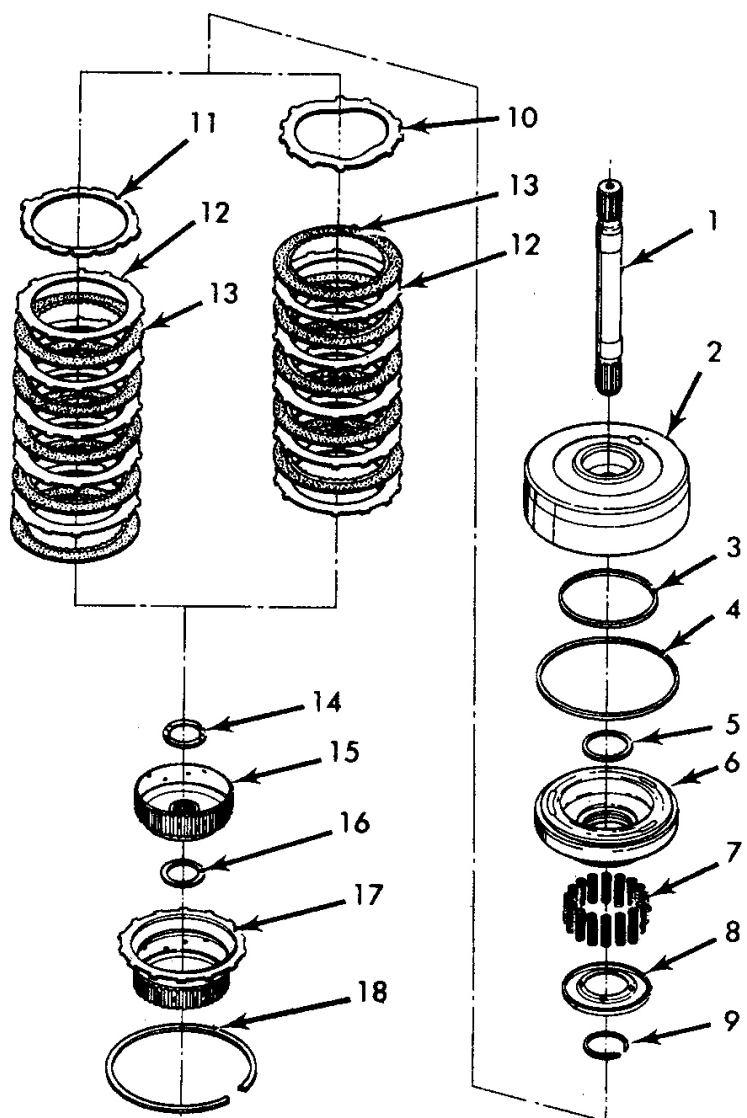
Disassembly

1. Place forward clutch assembly in Adapter and Holding Fixture (J-21364 and J-6116-01) with turbine shaft pointing down. Remove forward clutch housing-to-direct clutch hub snap ring and withdraw hub. Remove forward clutch hub and one thrust washer from each side of hub. See **Fig. 17**.

NOTE: Keep forward clutch release springs separate from direct clutch release

springs.

2. Remove composition and steel clutch plates. Place forward clutch assembly in press with turbine shaft pointing down. Using Clutch Spring Compressor and Adapter (J-4670-01 and J-2.1664), compress spring retainer and remove snap ring. Remove tools. Lift out spring retainer and 16 clutch release springs. See **Fig. 18**.
3. Remove forward clutch piston from housing. Remove inner and outer seals. Remove center piston seal from clutch housing. If turbine shaft or housing is damaged, place housing in press with shaft facing down. Using 3" driver, press turbine shaft out of forward clutch housing.



- | | |
|-------------------------------|---------------------------------|
| 1. Turbine Shaft | 10. Clutch Waved Plate |
| 2. Forward Clutch Housing | 11. Forward Clutch Dished Plate |
| 3. Forward Clutch Center Seal | 12. Flat Steel Plate |
| 4. Piston Outer Seal | 13. Composite Plate |
| 5. Piston Inner Seal | 14. Thrust Washer |
| 6. Forward Clutch Piston | 15. Forward Clutch Hub |
| 7. Piston Release Spring | 16. Thrust Washer |
| 8. Release Spring Retainer | 17. Direct Clutch Driving Hub |
| 9. Snap Ring | 18. Snap Ring |

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Fig. 17: Exploded View Of Forward Clutch Assembly
 Courtesy of GENERAL MOTORS CORP.

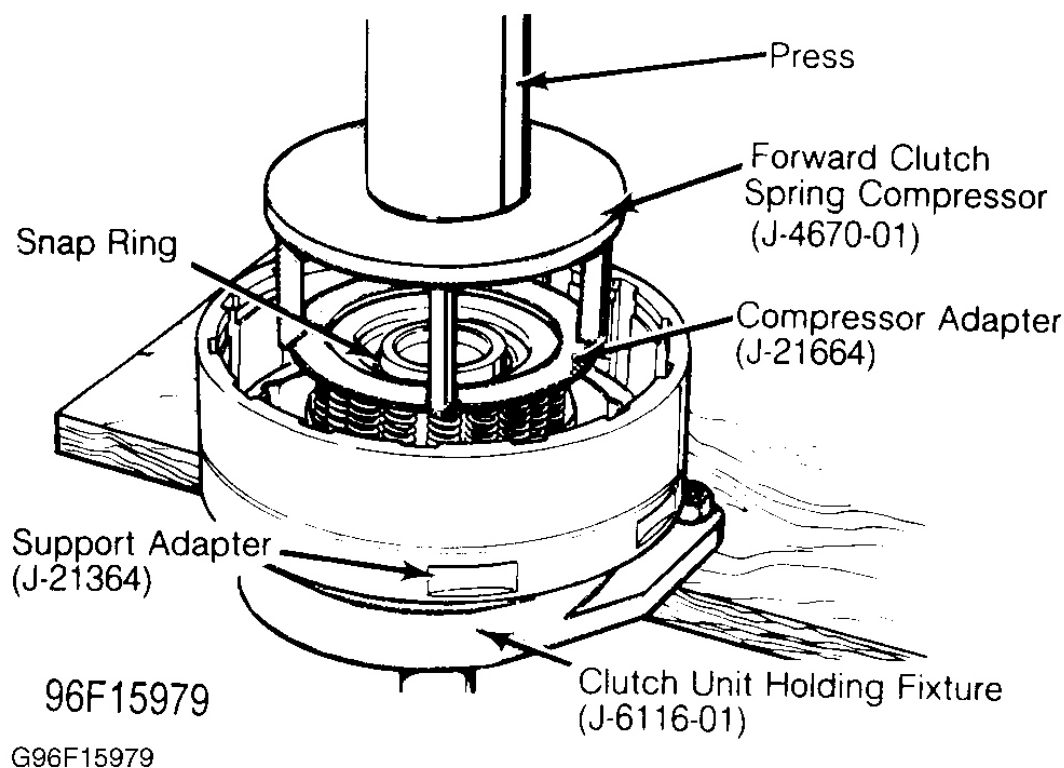


Fig. 18: Removing & Installing Forward Clutch Piston Release Springs
Courtesy of GENERAL MOTORS CORP.

Inspection

Inspect all components for wear or excessive damage. Ensure lubrication passages in housing, hub, and turbine shaft are clear. Check piston for cracks. Check turbine shaft and clutch housing for wear, scoring, or other damage. Ensure check ball in housing moves freely.

Reassembly

NOTE: Start shaft into housing, then back off press so shaft can straighten itself. Repeat until shaft is going in straight.

1. If turbine shaft was removed, place forward clutch housing in press with flat side up. Align shorter splined end of turbine shaft with splines in forward clutch housing. Carefully press shaft into housing until shaft bottoms out.
2. Invert forward clutch housing on press with turbine shaft pointing down. Oil and install inner and outer seals on clutch piston with seal lips facing away from spring pockets. Oil and install center seal in clutch housing with seal lips facing upward.
3. Place Inner Seal Protector (J-21362) over clutch hub. Place clutch piston into Installer (J-21409). Install

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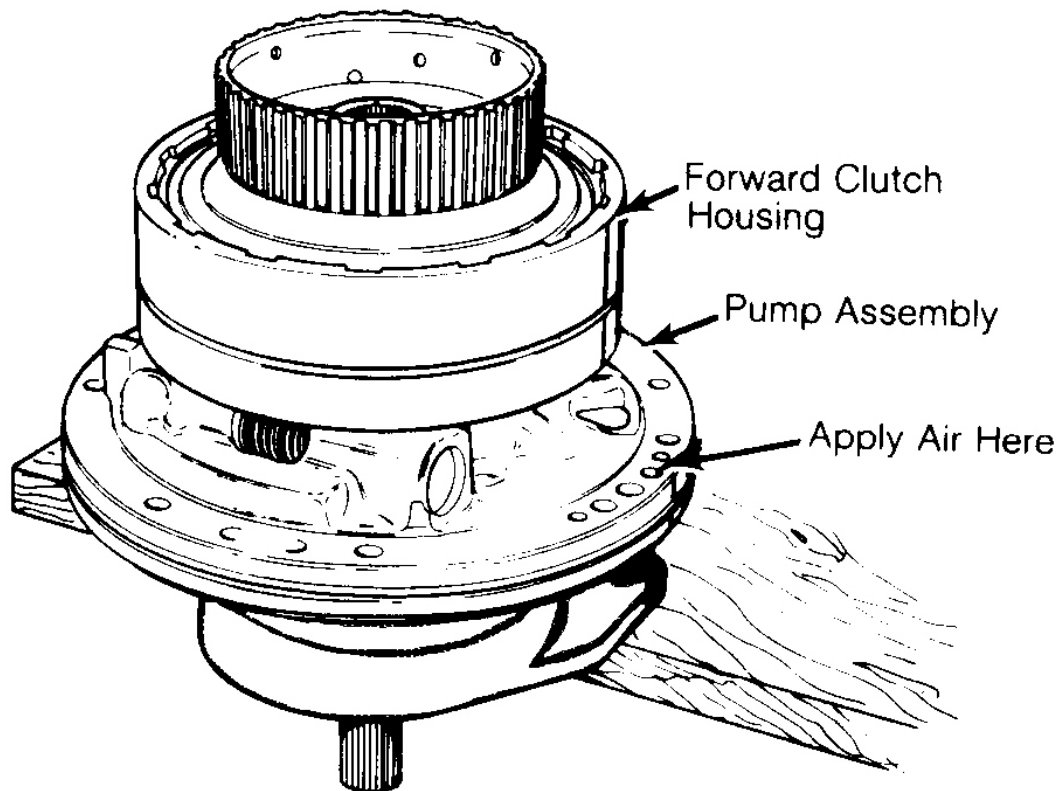
assembly into housing rotating piston clockwise slightly until seated. Install 16 clutch release springs into piston pockets. See **Fig. 18**.

4. Place spring retainer over springs and compress springs with Compressor and Adapter (J-4670-01 and J-21664). See **Fig. 18**. Use care to avoid catching retainer in snap ring groove. Install snap ring. Remove body and ensure all release springs are straight.
5. Install forward clutch hub thrust washers. Ensure bronze washer is installed on side of hub facing forward clutch housing. Place forward clutch hub in clutch housing.
6. Lubricate clutch plates with transmission fluid. Install clutch plates, starting with waved steel plate, then alternating composition and flat steel plates until all clutch plates are installed. See **Fig. 19**.
7. Install direct clutch hub and retaining snap ring. Place forward clutch housing on oil pump delivery sleeve. Check operation of forward clutch by applying air through forward clutch passage. See **Fig. 20**.

MODELS	THICKNESS	NO. OF FLAT STEEL PLATES		NO. OF WAVED STEEL PLATES	NO. OF DISHED PLATES	NO. OF COMPOSITION PLATES
		2.32 MM (.0915")	1.97 MM (.0775")	1.54 MM (.0605")	1.37 MM (.054")	2.03 MM (.080")
EVA, HRA, MAA, RVA,		5				5
FAA, FQA, FRA, FVA, FXA, LLA, LXA, TAA, TBA, TCA, TDA, TFA, TKA, TLA, TMA, TNA			4	1		5
ALL OTHER MODELS		5			1	5

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Fig. 19: Forward Clutch Plate Usage Chart
Courtesy of GENERAL MOTORS CORP.



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Fig. 20: Checking Forward Clutch Operation
Courtesy of GENERAL MOTORS CORP.

DIRECT CLUTCH & INTERMEDIATE ROLLER ASSEMBLY

Disassembly

1. Remove roller retainer snap ring and clutch retainer. Remove roller outer race and roller assembly. Turn unit over and remove direct clutch backing plate-to-clutch housing snap ring. Remove direct clutch backing plate and clutch pack.

NOTE: Keep direct clutch release springs separate from forward clutch release springs.

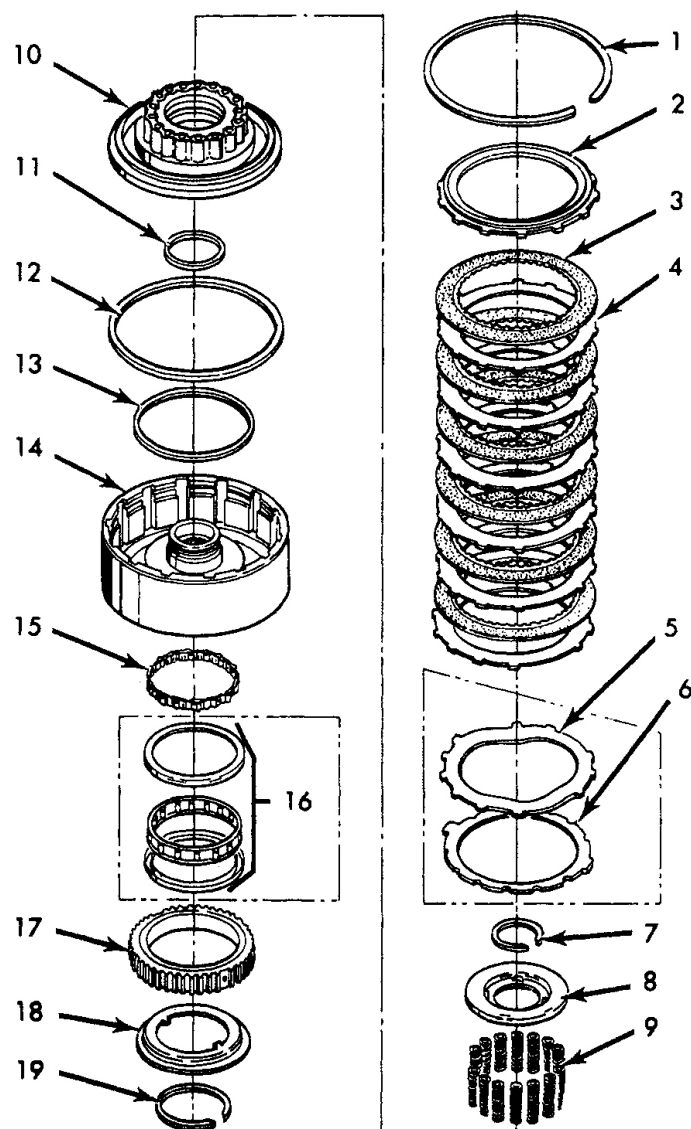
2. Compress spring retainer and remove snap ring. Use either Clutch Spring Compressor (J-4670), Rear Clutch Spring Compressor (J-6129), or press and Adapter (J-21664) to compress spring retainer. Remove retainer and 14 clutch release springs.
3. Remove direct clutch piston from clutch housing. Remove inner and outer seals from piston. Remove center piston seal from direct clutch housing.

Inspection

Check all parts for excessive wear or damage. Ensure oil passages are open. Ensure free operation of check ball in clutch housing. Check release springs for collapsed coils and distortion. See **Fig. 21**

Reassembly

1. Install piston with inner and outer seals. Install waved clutch plate or dished, clutch plate into direct clutch housing. Install clutch plates. Alternate steel and composition plates. See **Fig. 22**. Install direct clutch backing plate and snap ring.
2. Install roller assembly or sprag assembly. Install intermediate clutch race with clockwise motion. When installed properly, it should not rotate counterclockwise. Install intermediate clutch retainer and snap ring.
3. Check operation of clutch with air. See **Fig. 23**. Apply air through left oil feed hole. Air applied through right oil feed hole (reverse passage) should escape through left oil feed hole.



- | | |
|--------------------------------|---------------------------|
| 1. Snap Ring | 11. Inner Seal |
| 2. Direct Clutch Backing Plate | 12. Outer Seal |
| 3. Clutch Plate Assembly | 13. Center Seal |
| 4. Composition Plate | 14. Direct Clutch Housing |
| 5. Steel Waved Plate | 15. Intermediate Clutch |
| 6. Direct Clutch Dished Plate | Roller Assembly |
| 7. Snap Ring | 16. Sprag Assembly |
| 8. Release Spring Retainer | 17. Race |
| 9. Piston Release Spring | 18. Retainer |
| 10. Forward Clutch Piston | 19. Snap Ring |

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Fig. 21: Direct Clutch & Intermediate Roller Clutch Assembly
 Courtesy of GENERAL MOTORS CORP.

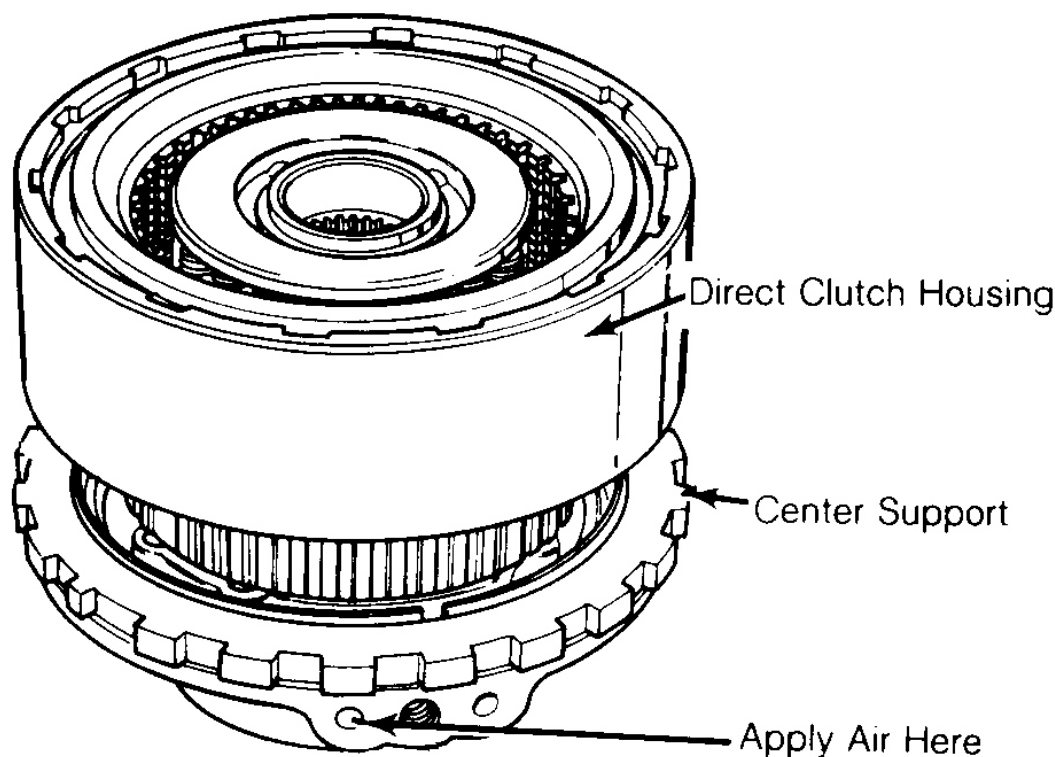
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MODELS	THICKNESS	NO. OF FLAT STEEL PLATES		NO. OF WAVED STEEL PLATES	NO. OF DISHED PLATES	NO. OF COMPOSITION PLATES
		2.32 MM (.0915")	1.97 MM (.0775")	1.54 MM (.0605")	1.37 MM (.054")	2.03 MM (.080")
FAA, FRA, FXA, FVA, LXA, TAA, TBA, TCA, TDA, TFA, TKA, TLA, TMA, TNA		5				5
EVA, FBA, FKA, FSA, HRA, MAA, RVA		6				6
FQA, LLA, RKA, RMA		4		1		5
RDA, RLA		5		1		6
ALL OTHER		2	3		1	5

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Fig. 22: Direct Clutch Plate Application Chart
Courtesy of GENERAL MOTORS CORP.



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Fig. 23: Checking Direct Clutch Assembly Operation
Courtesy of GENERAL MOTORS CORP.

CENTER SUPPORT & INTERMEDIATE CLUTCH

Disassembly

Remove 4 center support oil seal rings. Compress spring retainer and remove snap ring. Remove spring retainer

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and 3 clutch release springs. Remove intermediate clutch spring guide and clutch piston from center support. Remove inner and outer piston seals.

Bushing Replacement

CAUTION: DO NOT remove 3 screws holding roller clutch inner race to center support.

Use Driver (J-21465-6) to remove bushing. To install new bushing, align slot in bushing with drilled hole in oil delivery sleeve closest to piston. Drive bushing into bore no more than .010" (.25 mm) below top of delivery sleeve.

Inspection

Check all parts for excessive wear or damage. Ensure all passages, lubrication grooves and holes are clear of obstructions. Ensure constant bleed orifice is open .020" (.51 mm).

Reassembly

1. Install waved plate (if used). Install steel plates and composition plates alternately. See **Fig. 24**. Install intermediate clutch backing plate and snap ring. Lubricate and install inner and outer seals on piston with seal lips facing away from spring pockets. Place Seal Protector (J-21363) over center support hub. Install intermediate clutch piston. Ensure piston fully seats in center support.
2. Install plastic spring guide and evenly space 3 release springs in holes of spring guide. Place spring retainer over springs. Compress springs and install snap ring in groove. Install 4 oil seal rings on center support. To check clutch piston, apply air to center oil feed hole.

MODELS	THICKNESS	NO. OF FLAT STEEL PLATES	NO. OF WAVED STEEL PLATES	NO. OF COMPOSITION PLATES
		2.51 MM (.099")	1.74 MM (.0685")	
EVA, FBA, FGA, FKA, FSA, HRA, MAA, RVA, ZDA, ZVA		3		3
ALL OTHERS		2	1	3

*See Fig. 1 for Model I.D.

G00169801

Fig. 24: Intermediate Clutch Plate Usage Chart
Courtesy of GENERAL MOTORS CORP.

GEAR UNIT

Disassembly

1. Remove thrust bearing, races and reaction carrier. Remove sun gear, thrust washer and front internal gear

ring. Remove snap ring, output shaft and "O" ring. See **Fig. 11**.

2. Remove thrust bearing and races from rear internal gear. Remove rear internal gear and mainshaft. Remove snap ring from mainshaft. Remove races and bearings.

Inspection

1. Check all components for excessive wear or damage. Ensure lubrication holes are open. Check teeth and bearing surfaces. Inspect splines and gears.
2. Pinion end play range is .009-.024" (.23-.61 mm). Check roller clutch assembly for damage to rollers, springs, or clutch cage. Inspect sun gear and sun gear shaft for damage or wear to splines, teeth, and bushings.

Speedometer Driver Gear/Speed Sensor Rotor Replacement

Use Puller and Gear Remover (J-8433 and J-21427-01) to remove speedometer drive gear or rotor. To install rotor, use Rotor Installer (J-36352-3) or Rotor Installer Mechanical Press (J-36352-5). To install speedometer drive gear and clip, use Speedometer Gear Installer (J-5590).

Output Shaft Bushing Replacement

To remove, use Bushing Remover (J-21465-16). To install bushing, use Driver (J-21465-1). Bushing must be installed so oil hole in flange is aligned with oil hole in hub. Notch in bushing must face outward.

Sun Gear Shaft Bushing Replacement

To remove, use Bushing Remover (J-21465-15). To install, use Driver (J-21465-5) and drive into place until tool bottoms.

Pinion Gear Replacement

1. Support carrier assembly on front face. To avoid damage to carrier when removing pin, use a 1/2" drill bit and remove stake marks from end of pin. DO NOT remove any material from carrier as it will weaken and possibly crack.
2. Using a tapered punch, remove pinion pins from carrier. Remove pinion gears, thrust washers and roller needle bearings. Check pinion pocket thrust faces for burrs.
3. Install 18 needle bearings into each pinion. Use pinion pin as guide and petroleum jelly to hold bearings in place. Place a bronze and steel washer on each side of pinion so steel washer is against pinion.
4. Place pinion gear assembly in carrier. Install pilot shaft through rear face of assembly to hold parts in place. Drive in new pinion pin from front while rotating pinion gear.

NOTE: Both ends of pinion pin must lie below face of carrier or interference may occur.

5. Ensure headed end is flush or below face of carrier. Use punch held in bench vise for an anvil. Place carrier over punch and stake pinion pin in 3 places with blunt radius chisel.

Reassembly (Complete Gear Assembly)

1. Install thrust bearing-to-sun gear race, thrust bearing, and thrust bearing-to-rear internal gear race on grooved end of mainshaft. Install mainshaft into rear internal gear. Install thrust bearing-to-sun gear race, bearing, and thrust bearing-to-output shaft on mainshaft.
2. Install snap ring on mainshaft. Install mainshaft assembly to output shaft. Install snap ring and "O" ring seal. Install gear ring over output carrier. Install thrust washer into output carrier. Ensure tabs are in pockets. Lubricate pinion gears with transmission fluid and install reaction carrier into output carrier.
3. Install sun gear, chamfered inside diameter first, into reaction carrier assembly. Install sun gear shaft with long splined end first. Install thrust bearing-to-center support race on sun gear shaft. Ensure flange is up against sun gear. Install needle thrust bearing. Install thrust bearing-to-center support races.

NOTE: **With reaction carrier held stationary, center support should rotate counterclockwise only.**

4. Install thrust washer in recess of center support. Install reaction drum spacer and roller clutch assembly into reaction carrier. Install center support-to-reaction carrier thrust washer into recess in center support. Install center support into roller clutch in reaction carrier.
5. Install Holding Tool (J-21795-02) so tangs engage groove in mainshaft. Tighten set screw to prevent movement of roller clutch during installation of gear unit assembly. Remove gear unit from holding tool. Place unit on side and install output shaft-to-case metal thrust washer (bent tabs in pockets).

TRANSMISSION CASE

Inspection

Check for cracks, porosity, or interconnected passages. Check bores for scratches or scoring. Check band anchor pins for retention. Inspect intermediate clutch driven plate lugs and snap ring grooves for damage. Ensure parking pawl shaft cup plug is staked and sealed.

Bushing Replacement

1. Position converter end of transmission case down and use Bushing Driver (J-21465-8) and soft-faced hammer to drive bushing out of case. Invert case to install new bushing. Use Drive Handle and Adapters (J-8092, J-21465-13, J-21465-8, and J-21465-9) to install new bushing.
2. Lubrication passage of bushing should face Adapter Ring (J-21465-9). Drive bushing into bore until adapter ring bottoms. Bushing should be .040-.055" (1.02-1.39 mm) above selective thrust washer surface. Stake bushing in place with Staker (J-21465-10). Staking marks must be in bushing groove.

EXTENSION HOUSING

Bushing Replacement

Use Drive Handle and Adapter (J-8092 and J-21465-17) to install new bushing. Bushing should be 0-.010" (0-.25 mm) below oil seal counterbore surface. Stake bushing in place using Staker (J-21465-10). Stake marks must be in lube grooves.

TRANSMISSION REASSEMBLY

PARKING PAWL

Install parking pawl with tooth toward center of transmission. Install parking pawl shaft and shaft retainer clip. Install new shaft cup plug using 3/8" diameter rod. Drive plug into case until shaft bottoms on case rib. Install parking pawl return spring with square end hooked on pawl. Install parking pawl bracket guides over parking pawl.

REAR BAND & GEAR UNIT

1. Install rear band assembly so 2 lugs index with 2 anchor pins. Ensure band is seated on lugs. Install previously selected rear unit end play washer into slots provided inside rear of case. See **REAR UNIT END PLAY CHECK** under TRANSMISSION DISASSEMBLY. Place transmission case in horizontal position in holding tool.
2. Install complete gear unit assembly into case by lining up slots. Carefully guide assembly into case. Make sure center support bolt hole is aligned with hole in case.
3. Position transmission vertically with front end of case up. Install center support-to-case snap ring with beveled side up and flat side against center support. Locate gap adjacent to front band anchor pin. Expand snap ring until center support is against shoulder of case.
4. Install case-to-center support bolt. Carefully pry with punch to align bolt hole. Use care not to burr case valve body mounting surface.
5. Lubricate intermediate clutch plates with transmission fluid. Start with waved steel plate. Alternate composition and flat steel plates until all clutch plates are installed. Install intermediate clutch backing plate and snap ring.

FRONT BAND & CLUTCH ASSEMBLIES

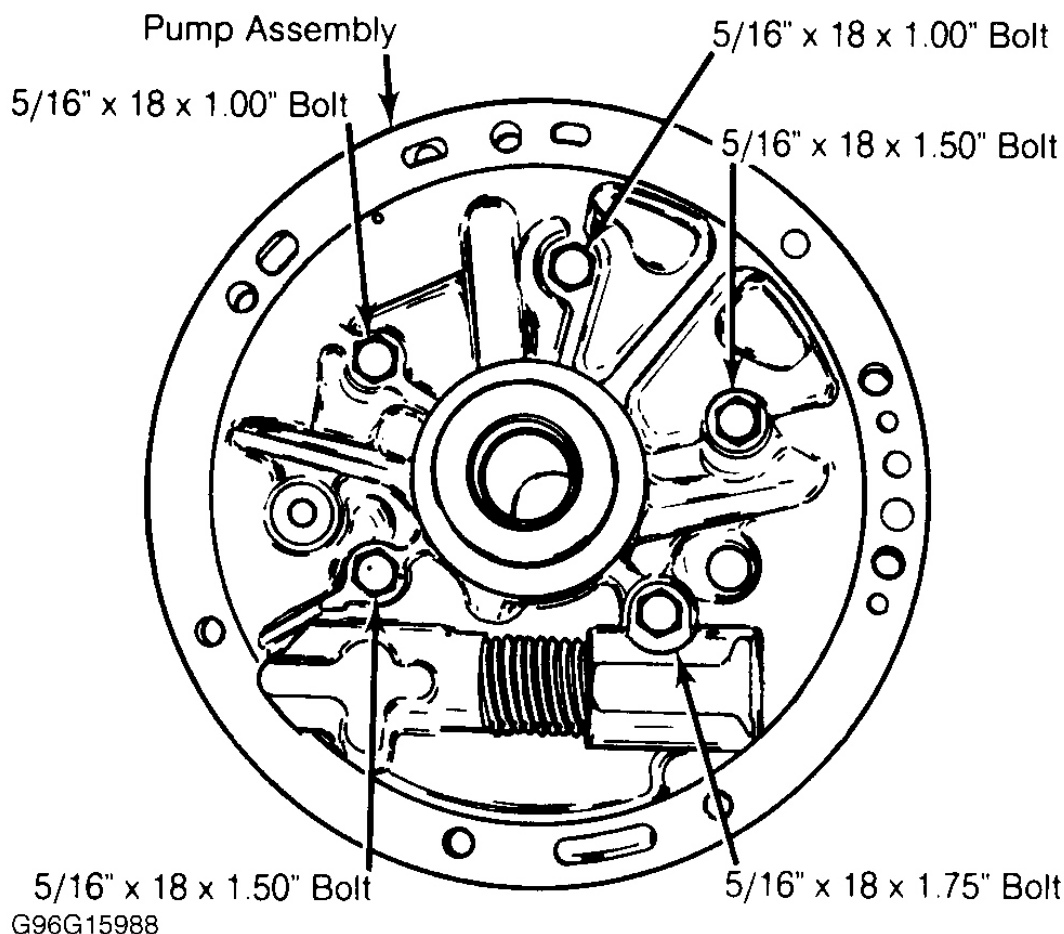
Install direct clutch assembly onto intermediate clutch. Install front band. Install forward clutch on oil pump assembly. Check piston and clutch operation by applying air to forward clutch passage in pump. Install forward clutch with turbine shaft into transmission.

OIL PUMP

1. Install gasket on transmission case. Install forward clutch and oil pump assembly in transmission case. Install oil pump-to-case bolts except bolt in 10 o'clock position to check end play. See **Fig. 25**. Tighten bolts to 15-20 ft. lbs. (20-27 N.m).

CAUTION: If turbine shaft cannot be rotated as pump is being pulled into place, forward or direct clutch housings have been installed improperly and are not indexing with all clutch plates. This **MUST** be corrected before pulling pump fully into place.

2. Recheck front unit end play. See **FRONT UNIT END PLAY CHECK** under TRANSMISSION DISASSEMBLY. Install remaining pump attaching bolt with washer. Install front oil seal.

**Fig. 25: Pump Cover Attaching Bolts**

Courtesy of GENERAL MOTORS CORP.

PARKING LINKAGE, DETENT LEVER & MANUAL SHAFT

NOTE: If work is being performed with transmission installed, it may be necessary to bend manual shaft retaining pin. Straighten pin after installation.

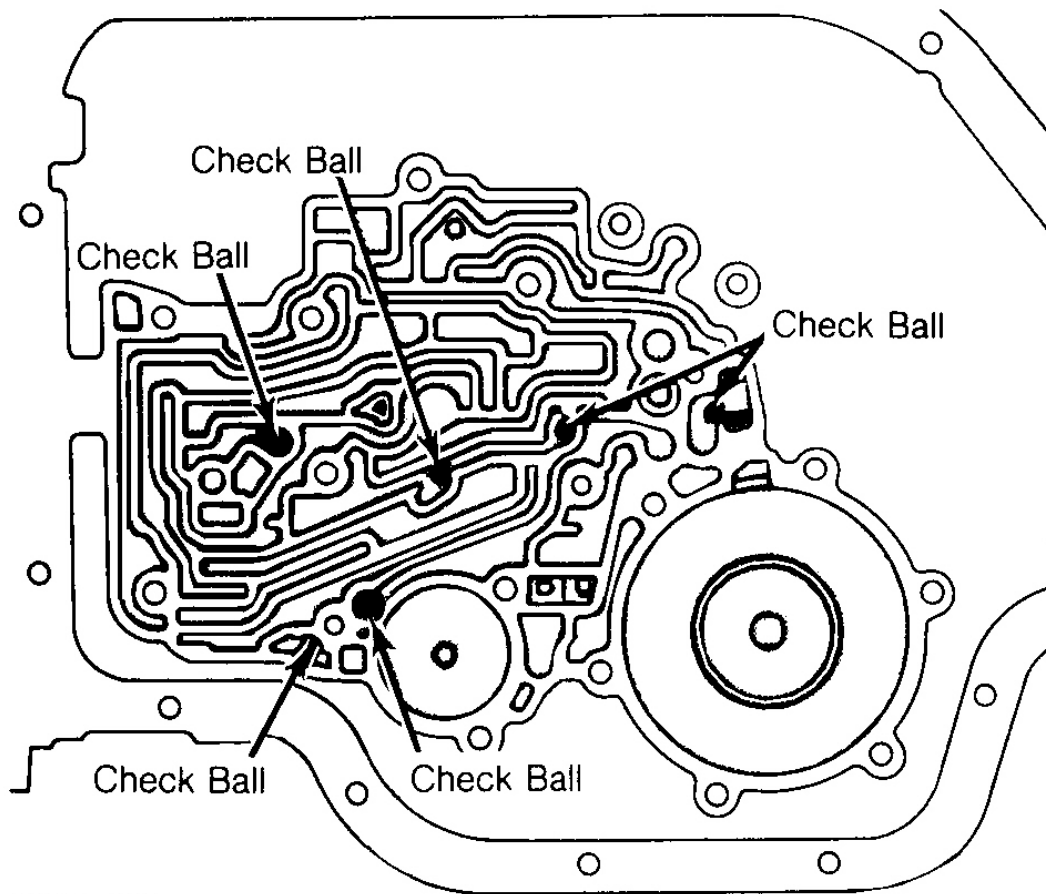
Install new shaft seal. Install actuator rod into manual detent lever from side opposite pin. Install actuator rod plunger under parking bracket and over parking pawl. Install manual shaft through case and detent lever. Install lock nut on manual shaft and tighten. Install retaining pin, indexing with groove in manual shaft.

EXTENSION HOUSING

Install extension housing with new gasket. Check "O" ring on output shaft. Install housing on transmission case and tighten bolts. Install rear oil seal.

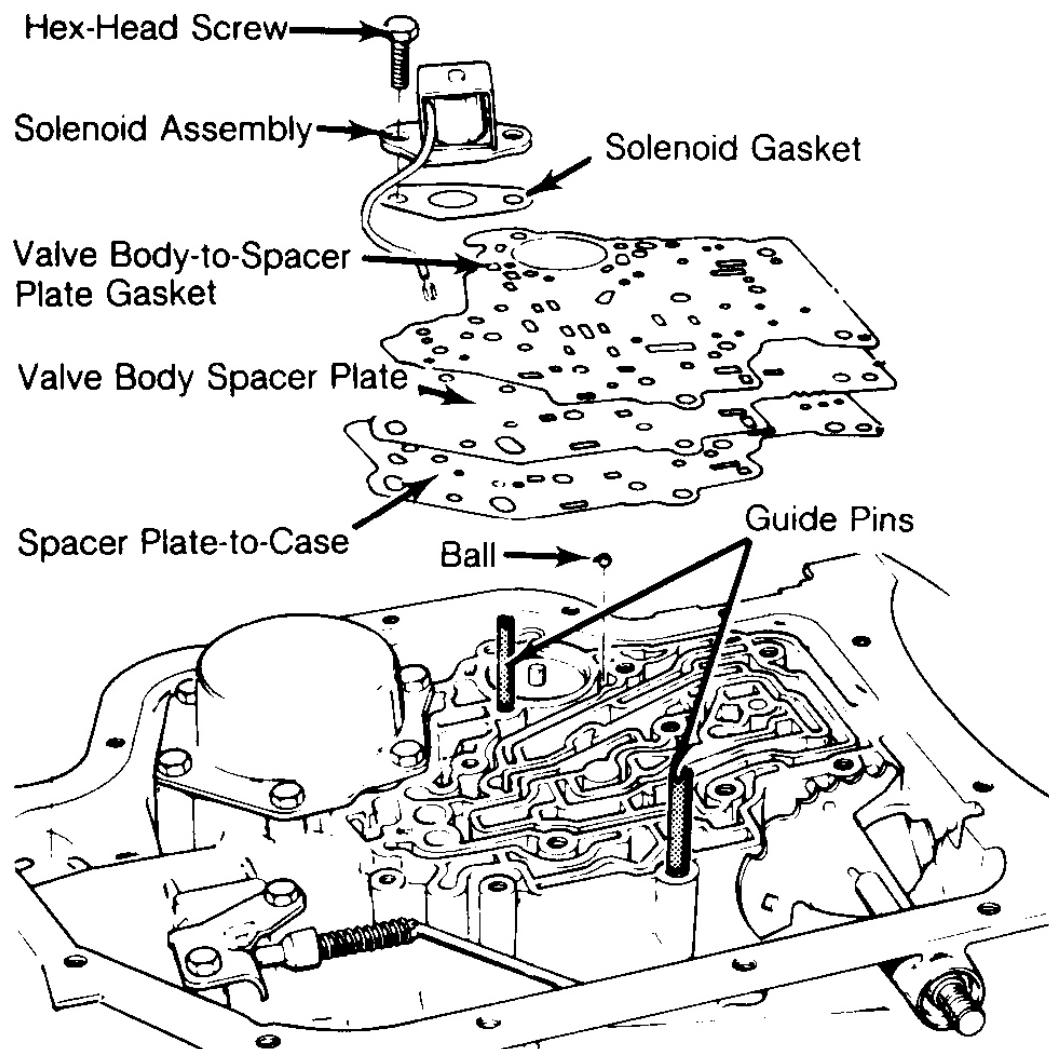
CONTROL VALVE SPACER, DETENT SOLENOID & FRONT SERVO

1. Install guide pins into control valve assembly attaching bolt holes. Install 7 check balls into ball seat pockets in case. If transmission is in vehicle, install check balls in pockets of spacer plate. See **Fig. 26**.
2. Install control valve spacer plate-to-case gasket. Install control valve spacer plate. Install detent solenoid gasket and detent solenoid assembly. See **Fig. 27**. Connect solenoid lead. DO NOT tighten bolts at this time. Install front servo spring and spring retainer in case.



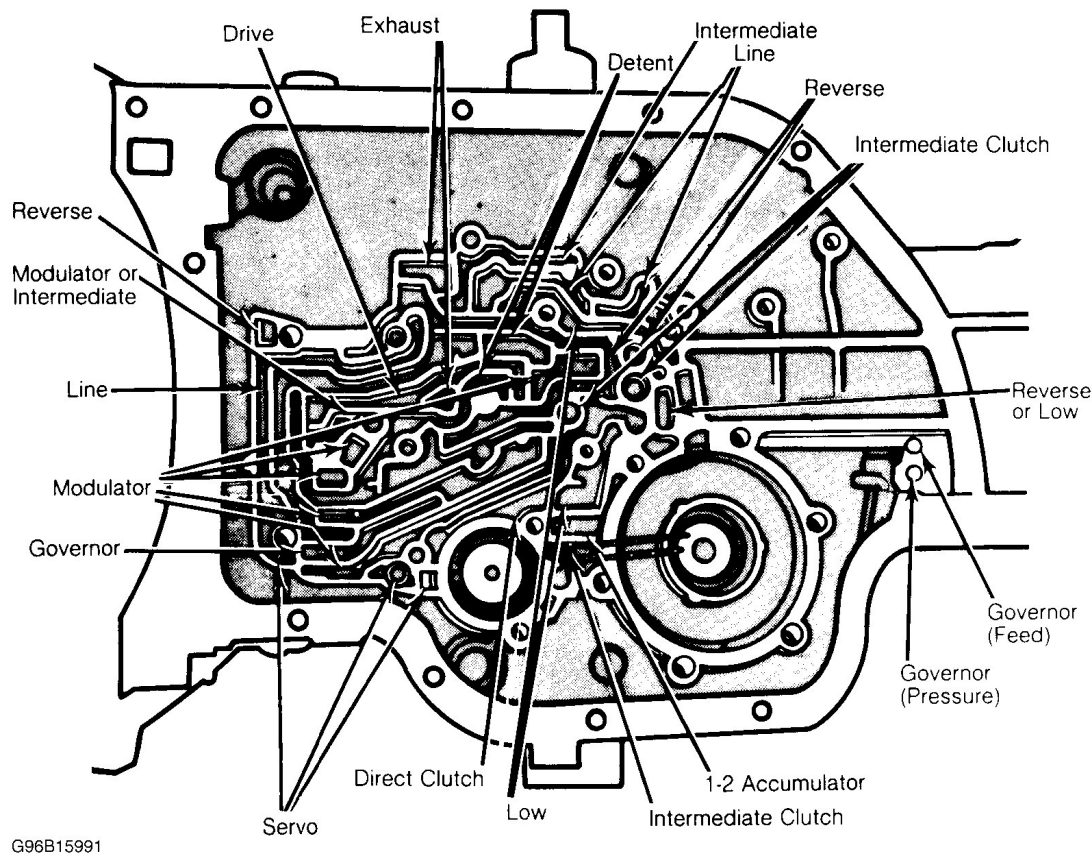
G96H15989

Fig. 26: Identifying Check Ball Location
Courtesy of GENERAL MOTORS CORP.



G96A15990

Fig. 27: Exploded View Of Solenoid & Spacer Plate Assembly
 Courtesy of GENERAL MOTORS CORP.



G96B15991

Fig. 28: Identifying Valve Body Oil Passages
 Courtesy of GENERAL MOTORS CORP.

REAR SERVO

1. Before installing servo, check band apply pin. See **FRONT & REAR SERVO ASSEMBLY** under TRANSMISSION DISASSEMBLY. Ensure rear band apply lug is aligned with servo pin bore in transmission case.
2. Lubricate servo bores with transmission fluid. Install rear accumulator spring in servo inner bore. Install rear servo assembly. Ensure it seats properly in bore. With servo depressed, install gasket and cover. Tighten attaching bolts.

CONTROL VALVE ASSEMBLY

1. Install control valve-to-spacer gasket. Install interchangeable governor pipes on control valve assembly. Install governor screen assembly with pointed end up. Install governor oil pipes and control valve assembly. See [Fig. 27](#).
2. Use care when aligning governor feed pipe over screen. Ensure gasket and spacer plate are not moved out of position and manual valve is indexed properly with pin on detent lever. Ensure governor pipes are seated in case holes.

1990 Chevrolet Cab & Chassis C2500

1989-90 AUTOMATIC TRANSMISSIONS Hydra-Matic 3L80 & 3L80HD Overhaul

- Using 2 guide pins, install control valve assembly and governor pipes on transmission. Be careful when aligning governor feed pipe over screen. Ensure gasket and spacer plate are not moved out of position and manual valve is indexed properly with pin on detent lever. Ensure governor pipes are properly seated in case holes.
- Start control valve-to-case bolts. Remove guide pins. Install detent roller and spring assembly. Install and tighten remaining attaching bolts. Tighten solenoid attaching screws.

GOVERNOR

Install governor assembly into case. Install cover with new gasket and tighten attaching bolts.

SPEEDOMETER DRIVEN GEAR

NOTE: Speedometer driven gears come in 3 different tooth sizes. Driven gear and matching sleeve must correspond to axle ratio. Never turn sleeve in transmission case as gear damage will result. Shaft center line is eccentric to outside diameter of sleeve.

Install driven gear into sleeve. Install driven gear assembly into case. Install retainer with tangs in sleeve positioning bosses. Install and tighten attaching bolt.

INTAKE PIPE, FILTER & OIL PAN

Install new intake pipe "O" ring seal. Install pipe into new filter assembly. Place filter and intake pipe in case bores. Install filter retaining bolt and tighten. Install oil pan with new gasket. Install and tighten attaching screws.

VACUUM MODULATOR & VALVE

Install modulator valve into case with stem end out. Install new "O" ring seal on vacuum modulator. Install modulator into case with vacuum hose pipe facing front and angled 5 degrees toward top of case. Install modulator retainer with curved side of tangs inboard. Tighten attaching bolt.

CONVERTER ASSEMBLY

Install converter onto turbine shaft. Make sure converter hub drive slots are fully engaged with pump drive gear tangs.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

Application	Ft. Lbs. (N.m)
Case-To-Center Support Bolt	20-25 (27-34)
Case-To-Engine Bolt	30-35 (41-47)
Engine Rear Mount-To-Transmission	30-35 (41-47)

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1989-90 AUTOMATIC TRANSMISSIONS Hydra-Matic 3L80 & 3L80HD Overhaul

Engine Rear Support Bracket-To-Frame Nut	30-35 (41-47)
Extension Housing-To-Case Bolt	20-25 (27-34)
Flywheel-To-Converter Bolt	30-35 (41-47)
Governor Cover-To-Case	15-20 (20-27)
Manual Shaft-To-Detent Lever Nut	15-20 (20-27)
Manual Yoke-To-Manual Shaft Nut	13-18 (18-24)
Oil Cooler Pipe-To-Case	26-30 (35-41)
Oil Cooler Pipe-To-Radiator	26-30 (35-41)
Parking Pawl Bracket-To-Case Bolt	15-20 (20-27)
Pump Assembly-To-Case Bolt	15-20 (20-27)
Pump Body-To-Cover Bolt	15-20 (20-27)
Rear Servo Cover-To-Case Bolt	15-20 (20-27)
Vacuum Modulator Retainer-To-Case Bolt	15-20 (20-27)
INCH Lbs. (N.m)	
Control Valve Assembly-To-Case Bolt	72-120 (8-14)
Filter-To-Valve Body Bolt	72-120 (8-14)
Flywheel Housing Cover-To-Transmission Bolt	48-72 (5-8)
Line Pressure Plug	60-120 (7-14)
Oil Pan-To-Case Bolt	72-120 (8-14)
Solenoid-To-Case Bolt	48-120 (5-14)
Speedometer Driven Gear Retainer-To-Case Bolt	48-72 (5-8)
Switch Assembly	24-42 (3-5)