1983-93 AUTOMATIC TRANSMISSIONS

Hydra-Matic 700-R4/4L60 Overhaul

APPLICATION

THM 700-R4/4L60 APPLICATIONS

Vehicle Application	Engine
Buick	
Electra	5.0L
LeSabre	5.0L
Roadmaster	5.0L, 5.7L
Cadillac	
Brougham	5.0L, 5.7L
Fleetwood	5.7L
Chevrolet	
Astro	2.5L & 4.3L
Blazer	2.5L, 4.3L, 5.0L, 5.7L & 6.2L
Camaro	2.5L, 2.8L, 3.1L, 5.0L & 5.7L
Caprice	4.3L, 4.4L, 5.0L & 5.7L
Corvette	5.7L
Cutaway Van	5.7L, 6.2L, 7.4L
El Camino	4.3L & 5.0L
Hi-Cube Van	5.7L, 6.2L, 7.4L
Impala	4.3L, 4.4L, 5.0L & 5.7L
Monte Carlo	4.3L & 5.0L
Passenger Van	4.3L, 5.0L, 5.7L, 6.2L, 7.4L
Sport Van	4.3L, 5.0L, 5.7L, 6.2L, 7.4L
Suburban	5.7L, 6.2L, 7.4L
Pickup	2.5L, 4.3L, 5.0L, 5.7L, 6.2L, 6.5L, 7.4L
S10 & S10 Blazer	2.0L, 2.2L, 2.5L, 2.8L & 4.3L
Suburban	5.0L, 5.7L & 6.2L
GMC	
Caballero	4.3L & 5.0L
Cutaway Van	4.3L, 5.7L
Jimmy	5.0L, 5.7L & 6.2L
Magnavan	5.7L, 6.2L, 7.4L
Passenger Van	4.1L, 4.3L, 5.0L, 5.7L & 6.2L
Rally Van	4.3L, 5.0L, 5.7L, 6.2L
Safari	2.5L & 4.3L
School Bus	4.3L, 5.7L

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Sierra	4.3L, 5.7L, 6.2L, 7.4L
Sonoma	2.5L & 4.3L
Pickup	2.5L, 4.1L, 4.3L, 5.7L & 6.2L
S15 Pickup & Jimmy	2.0L, 2.5L, 2.8L & 4.3L
Suburban	5.0L, 5.7L & 6.2L
Vandura	4.1L, 4.3L, 5.0L, 5.7L & 6.2L
Yukon	5.7L
Oldsmobile	
Bravada	4.3L
Custom Cruiser	5.0L, 5.7L
Pontiac	
Bonneville	4.3L & 5.0L
Firebird	2.5L, 2.8L, 3.1L, 5.0L & 5.7L
Grand Prix	4.3L & 5.0L
Parisienne	4.3L, 5.0L & 5.7
Safari	5.0L

IDENTIFICATION

Turbo Hydra-Matic 4L60 (previously 700-R4) transmission can be identified by a letter code contained in identification number. Identification number is stamped on transmission case above oil pan rail on right rear side. See **Fig. 1** . Identification number contains information which must be used when ordering replacement parts.

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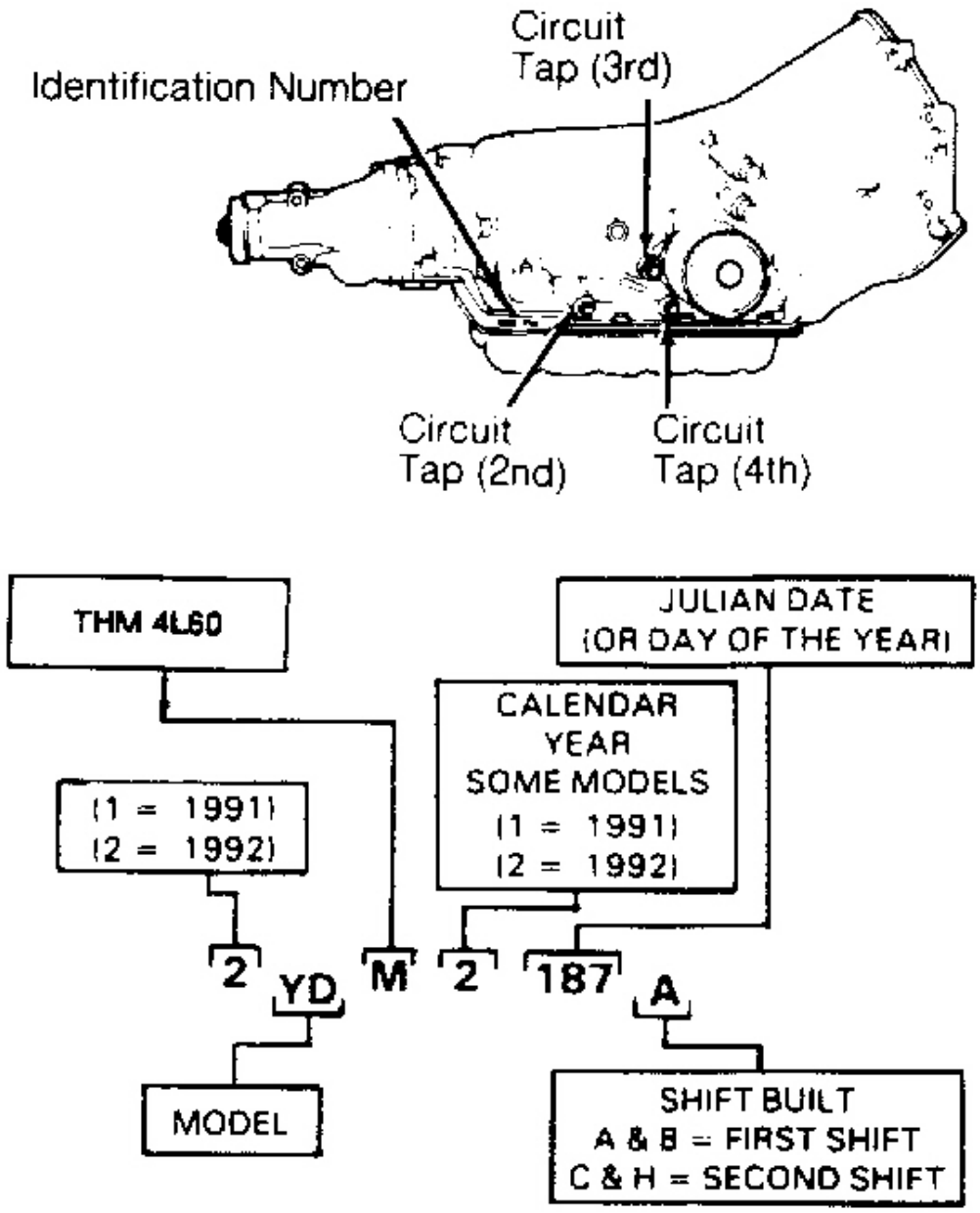


Fig. 1: Identifying Transmission & Locating Circuit Taps
Courtesy of GENERAL MOTORS CORP.

DESCRIPTION

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Turbo Hydra-Matic (THM) 4L60 is a fully automatic trans-mission consisting of a 3-element hydraulic torque converter with a Torque Converter Clutch (TCC). Two planetary gear sets, 5 multiple-disc clutches, one sprag clutch, one roller clutch and a band provide friction elements necessary to produce 4 forward speeds, last of which is Overdrive. See **Fig. 2** .

A hydraulic system, pressurized by a variable capacity vane type pump, provides pressure required to operate friction elements and automatic controls. Transmission contains an auxiliary valve body for smoother Drive and Reverse engagement. Temperature switch may be used to apply TCC to prevent transmission overheating. Temperature switch reduces fluid temperature in Overdrive when TCC is not applied.

Temperature switch mounts on valve body and sits in transmission pan fluid. See **Fig. 37** . At normal operating temperature or less, switch is open. As fluid in pan heats to 270-286°F (134-140°C), switch closes to allow TCC to apply until fluid in pan cools to 250-268°F (121-131°C). Heat is reduced when TCC is applied and torque multiplication function of converter is bypassed.

CAUTION: Ensure transmission contains auxiliary valve body before performing repairs. See Fig. 3 .

NOTE: See AUTO TRANS DIAGNOSIS - GM TORQUE CONVERTER CLUTCH article in AUTOMATIC TRANSMISSIONS for information on converter clutch system used in THM 4L60 transmission.

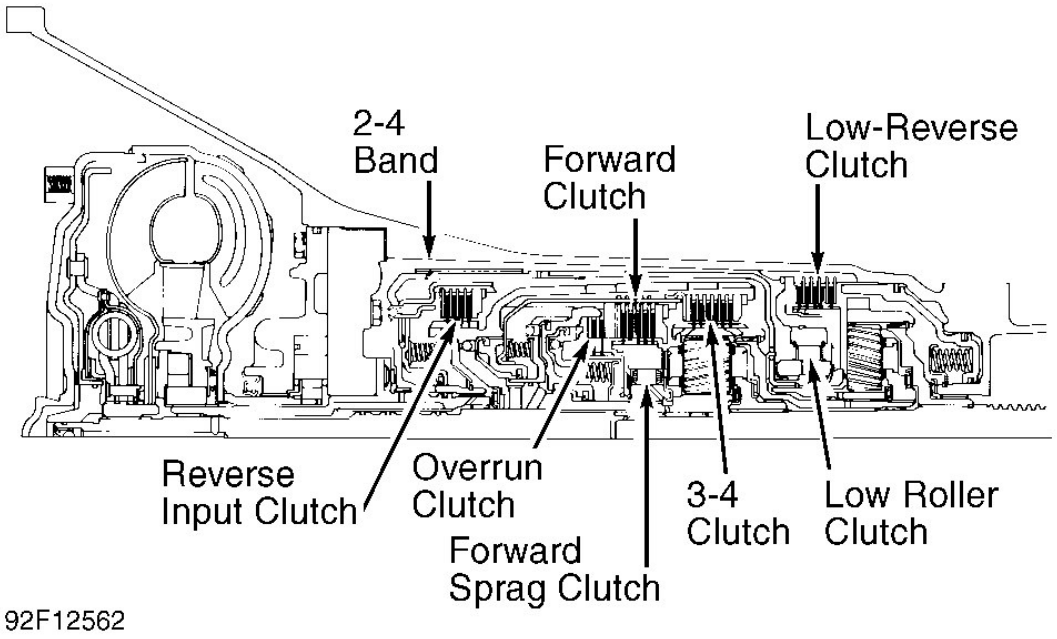


Fig. 2: Cut-Away View of 4L60 Transmission
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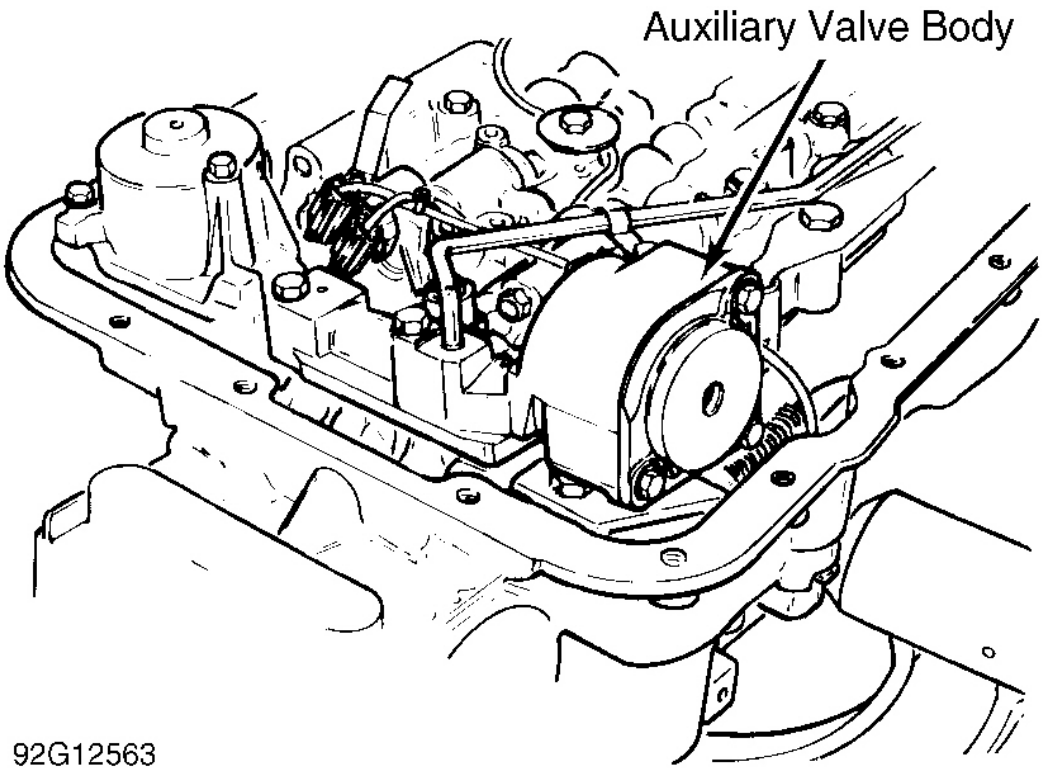


Fig. 3: Locating Auxiliary Valve Body
Courtesy of GENERAL MOTORS CORP.

LUBRICATION & ADJUSTMENTS

See appropriate TRANSMISSION SERVICING - A/T article in the AUTOMATIC TRANSMISSION SERVICING section.

ON-VEHICLE SERVICE

THROTTLE VALVE CABLE

Removal

Remove air cleaner. Disconnect throttle valve cable from throttle linkage. Compress locking tabs. Remove cable from mounting bracket. Raise and support vehicle. Remove cable retaining bolt from transmission. Disconnect cable from transmission. Remove seal.

Installation

To install, reverse removal procedure. Install NEW seal. Once cable is fully installed, pull upper end of cable.

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Slight resistance should be felt due to return spring. Ensure cable fully returns. Adjust cable. See appropriate TRANSMISSION SERVICING - A/T article in the TRANSMISSION SERVICING section.

GOVERNOR ASSEMBLY

Removal

Raise and support vehicle. On some models, exhaust system components may require removal and transmission may require lowering to access governor cover. Remove governor cover and "O" ring. Remove governor assembly.

Inspection

Inspect governor valve and sleeve for binding and scoring. See **Fig. 4** . Ensure weights operate freely. Inspect governor drive gear for damage and loose fit on shaft. Replace governor if necessary.

Installation

To install, reverse removal procedure. Install NEW cover seal or gasket. Apply thin coat of Loctite sealant on cover before installation. Ensure cover is fully seated. Ensure fluid level is correct.

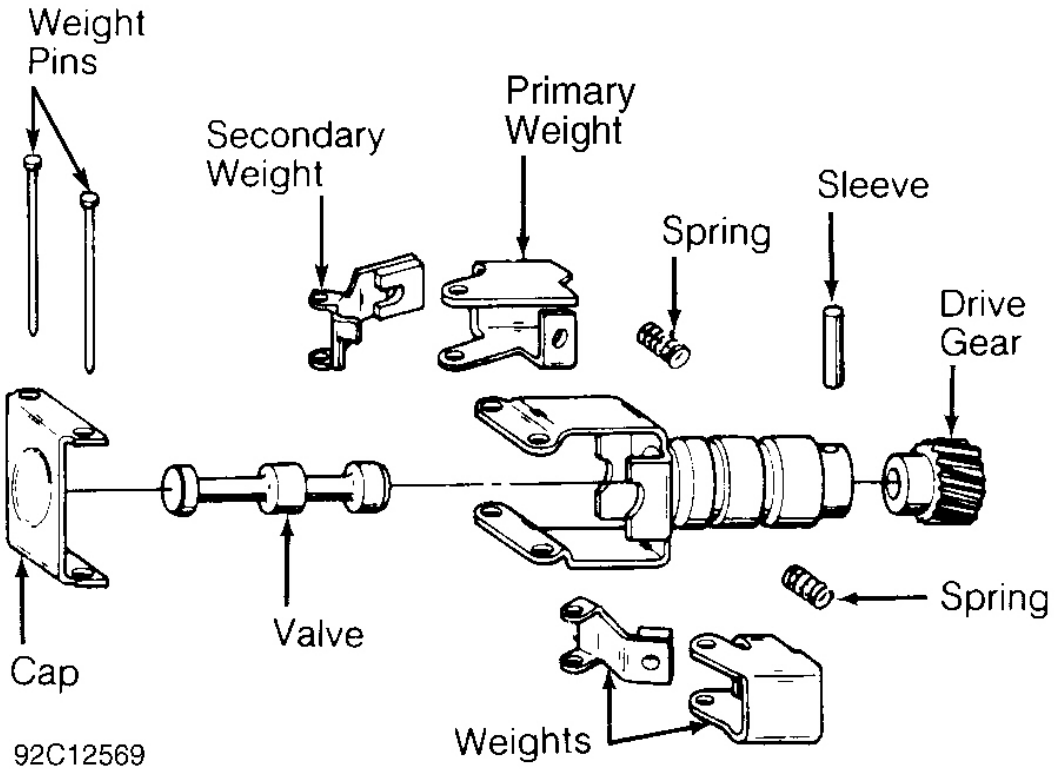


Fig. 4: Exploded View of Governor Assembly

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Courtesy of GENERAL MOTORS CORP.

2-4 SERVO ASSEMBLY

Removal & Installation

1. Raise and support vehicle. On some models, exhaust system, drive shaft and crossmember may require removal and transmission may require lowering to access servo assembly. Install piston compressor (J-29714) on 2 oil pan bolts.
2. Compress servo cover, and remove retaining ring. See **Fig. 31** . Remove servo cover and "O" ring. Remove 2-4 servo assembly. To install, reverse removal procedure. For servo pin length check, see **2-4 SERVO ASSEMBLY** under TRANSMISSION DISASSEMBLY.

REAR OIL SEAL

Removal

Raise and support vehicle. On some models, exhaust system may require removal to access rear oil seal. Remove drive shaft. Pry oil seal from extension housing.

Installation

Coat NEW oil seal O.D. with non-hardening sealer. Using Seal Installer (J-21426), install oil seal into housing. To complete installation, reverse removal procedure. Check fluid level.

AUXILIARY VALVE BODY

Removal

Raise and support vehicle. Remove transmission oil pan. Remove oil filter and "O" ring. Ensure "O" ring is removed from transmission case. Remove clamp and pressure tube. Remove auxiliary valve body retaining bolts. Remove auxiliary valve body and check ball. See **Fig. 5** . Note location of check ball.

Installation

Coat check ball with petroleum jelly before installation. Install check ball in auxiliary valve body. To complete installation, reverse removal procedure. Lubricate "O" ring with petroleum jelly. Install new filter and "O" ring. Tighten bolts to specification. See **TORQUE SPECIFICATIONS** table. Fill transmission with fluid.

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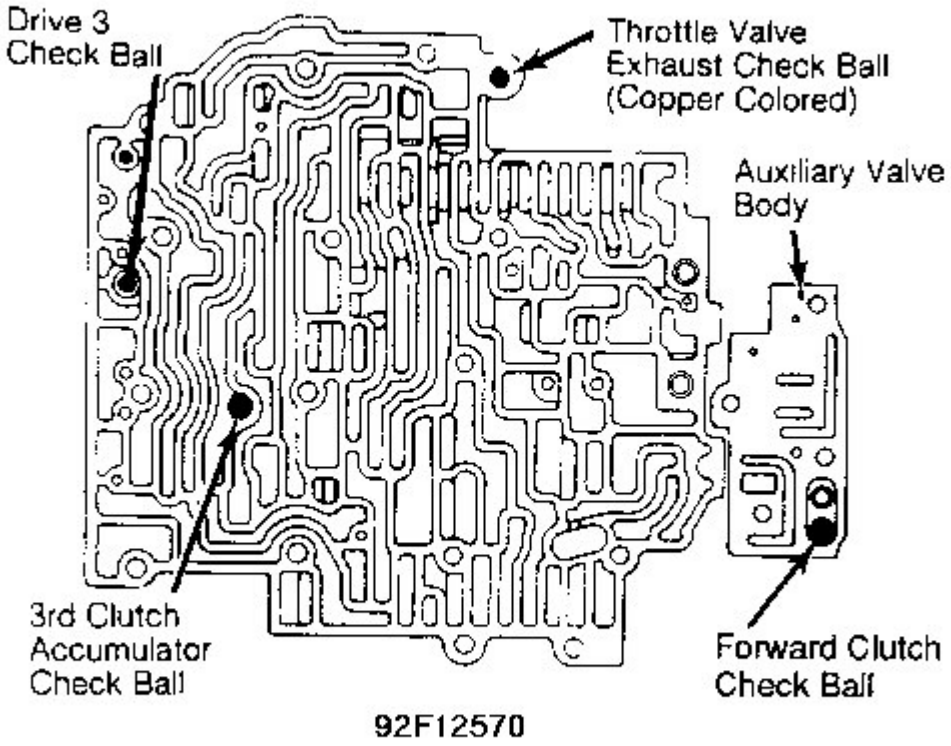


Fig. 5: Locating Valve Body Check Balls
Courtesy of GENERAL MOTORS CORP.

VALVE BODY

CAUTION: Note valve body bolt length and location during removal procedure. Transmission case damage may occur if bolts are incorrectly installed.

Removal

1. Disconnect throttle valve cable from throttle lever. Raise and support vehicle, and remove transmission oil pan. Remove oil filter and "O" ring. Ensure "O" ring is removed from transmission case.
2. Remove electrical connectors from switches (if required), and tag. Remove auxiliary valve tube to access valve body. Remove valve body bolts. Note length and location of bolts for installation.
3. Note direction of manual valve link. Remove manual valve link from manual valve at valve body. See **Fig. 6** . Note direction of throttle valve link. See **Fig. 7** . Remove throttle valve bracket and throttle valve link. Remove valve body. Note location of check balls. **DO NOT** lose balls. See **Fig. 5** .

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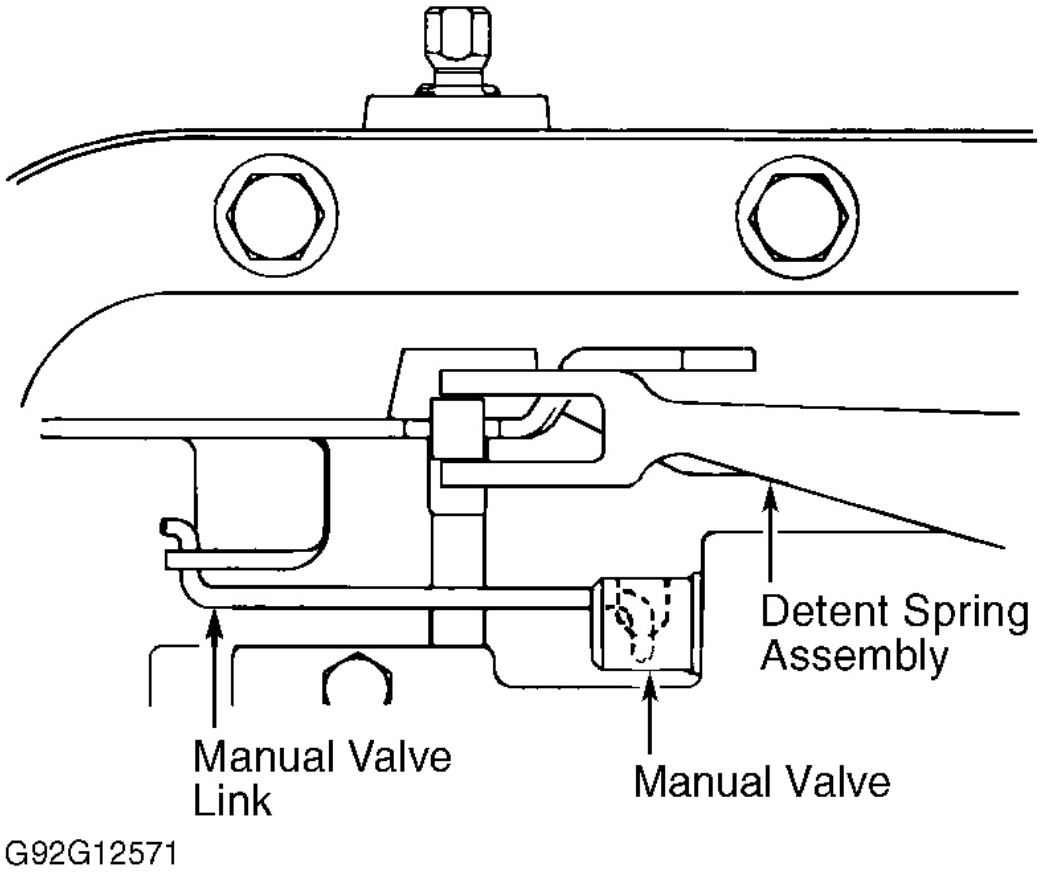


Fig. 6: Installing Manual Valve Link
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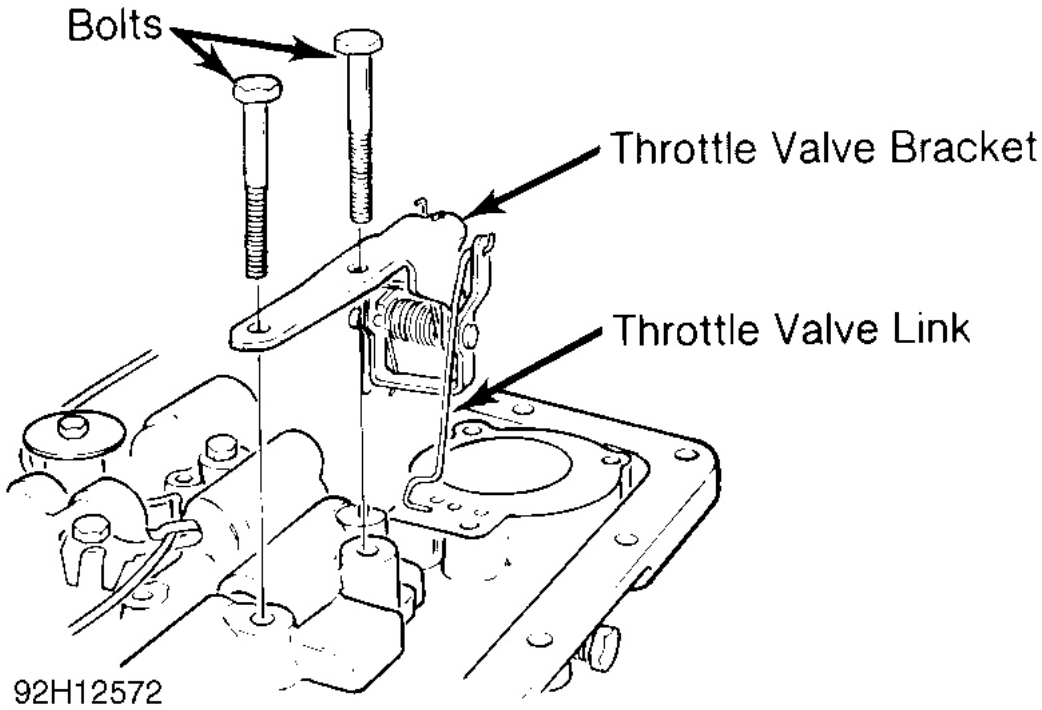


Fig. 7: Installing Throttle Valve Link
Courtesy of GENERAL MOTORS CORP.

Installation

1. Coat check balls with petroleum jelly. Install check balls in proper locations on separator plate. See **Fig. 5** . Install manual valve link. Ensure manual valve link is properly seated in manual valve. See **Fig. 6** . Improper positioning may prevent vehicle operation in "D" range.

   NOTE: Improper positioning of throttle valve link will result in erratic shift points or high main line oil pressure.

2. Install throttle link. Ensure link is properly positioned with lower hook facing outside of transmission case. See **Fig. 7** . Install valve body and retaining bolts. Tighten bolts to specification. To complete installation, reverse removal procedure.
3. Lubricate oil filter "O" ring with ATF before installation. Tighten all bolts to specification. See **TORQUE SPECIFICATIONS** . Fill transmission with fluid.

TROUBLE SHOOTING

NOTE: For additional trouble shooting, see SERVICE BULLETINS . For clutch and band

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application, see CLUTCH & BAND APPLICATION CHART under CLUTCH & BAND APPLICATION.

1ST GEAR ONLY, NO UPSHIFT

Check governor assembly. Governor valve sticking. Driven gear loose or damaged. Drive gear retaining pin missing. Nicks or burrs on output shaft, governor sleeve or case bore. Improper support pin length. Governor weights or springs missing, damaged or binding.

1-2 shift valve sticking in valve body. Spacer plate or gaskets damaged or not positioned properly. Case-to-valve body face damaged or not flat. Governor screen restricted or damaged. 2-4 servo assembly restricted or blocked case passages. Nicks or burrs on servo pin or case pin bore. Missing or damaged piston or pin seals. 4th servo piston installed backward. 2-4 band worn or damaged or band anchor pin not engaged.

SLIPS IN 1ST

Defective forward clutch assembly. Clutch plates worn. Piston porous or damaged. Piston seals missing or damaged. Input housing-to-forward clutch housing "O" ring seal missing or damaged. Damaged housing. Housing retainer and ball assembly damaged or not seating. Input housing and shaft assembly turbine shaft seals missing or damaged. Accumulator valve stuck in valve body.

Valve body face not flat, damaged lands, or interconnected passages. Spacer plate or gaskets incorrect, damaged or not positioned properly. Binding or broken T.V. cable. Defective 1-2 accumulator piston assembly. Porosity in piston or cover and pin assembly. Damaged piston ring grooves. Piston seal missing or damaged. Cover gasket missing or damaged. Broken accumulator spring.

Improper oil pressure. Torque converter stator roller clutch not holding or 4th servo piston in backward. Damage to low roller clutch lugs or inner ramps. Rollers not free moving, inadequate spring tension or damage to inner splines. Oil passage plugged. Forward clutch accumulator piston seal missing or damaged. Piston out of its bore. Porosity in piston or auxiliary valve body. Abuse valve stuck in auxiliary valve body.

HIGH OR LOW 1-2 SHIFT SPEEDS

T.V. cable binding, broken or improperly adjusted. Governor assembly valve sticking. Driven gear loose or damaged. Drive gear retaining pin missing. Nicks or burrs on output shaft, governor sleeve or case bore. Improper support pin length. Governor weights or springs missing, damaged or binding.

Throttle lever and bracket assembly damaged, binding or not installed properly. T.V. link missing, binding or damaged. Valve body face not flat, T.V. exhaust check ball stuck or T.V. plunger sticking. Oil pump assembly or case face not flat.

SLIPPING OR ROUGH 1-2 SHIFT

Throttle lever and bracket assembly damaged, not installed properly or T.V. cable broken or binding. Valve body assembly throttle valve sticking. T.V. bushing turned in bore. Defective valve body assembly. 1-2 shift valve train, line bias valve, accumulator valve or T.V. limit valve stuck. Gaskets or spacer plate incorrect, damaged or not installed properly. Body face not flat.

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Defective 2-4 servo assembly. Apply pin incorrect length. Servo seals or "O" ring seals missing or damaged. Restricted or missing oil passages. Case servo bore damaged. Defective 2nd accumulator. Porosity in 1-2 accumulator housing or piston. Piston seal or groove damaged. Nicks or burrs in 1-2 accumulator housing. Missing or restricted oil passages or 2-4 band worn or not positioned properly. Oil pump assembly or case faces not flat.

SLIPPING, ROUGH OR NO 2-3 SHIFT

Internal converter damage. Governor valve sticking. Drive gear retaining pin missing or loose. Governor weights binding. Governor drive gear damaged. Support pin in case incorrect length. Oil pump stator shaft sleeve scored or not located properly. Valve body 2-3 valve train or accumulator valve stuck. Spacer plate or gaskets incorrect, damaged or not positioned properly. Throttle valve or T.V. limit valve stuck. Input housing assembly forward or 3-4 clutch plates worn. Excessive clutch plate travel.

Forward or 3-4 piston seals damaged. Porosity in 3-4 clutch housing or piston, or 3-4 piston check ball stuck, damaged or not sealing. Restricted apply passages. Forward clutch piston or 3rd accumulator retainer and ball assembly not seating. Sealing balls loose or missing. 2-4 servo assembly or 2nd apply piston seals missing or damaged.

SLIPPING, ROUGH OR NO 3-4 SHIFT

Governor weights binding. Governor valve sticking. Drive gear damaged or retaining pin missing or loose. Support pin in case incorrect length. Oil pump assembly faces not flat or pump cover retainer and ball assembly omitted or damaged. Valve body assembly 2-3 valve train, accumulator valve, throttle valve, T.V. limit valve, 1-2 shift valve or 3-2 control valve stuck. Manual valve link bent or damaged. Spacer plate or gaskets incorrect, damaged or not positioned properly. Defective 2-4 servo assembly.

Incorrect band apply pin. Servo seals missing or damaged. Porosity in pistons, cover or case. Plugged or missing orifice cup plug. Case 3rd accumulator retainer and ball assembly leaking. Porosity in 3-4 accumulator piston or bore. 3-4 accumulator piston seal or seal grooves damaged. Restricted oil passage. Defective input housing assembly. Forward or 3-4 clutch plates worn, or excessive plate travel.

Forward or 3-4 piston seals damaged. Porosity in 3-4 clutch housing or piston. 3-4 piston check ball stuck, damaged or not sealing. Restricted apply passages. Forward clutch piston retainer and ball assembly not seating. 2-4 band worn or not positioned properly. Sealing balls loose or missing.

NO "R" OR SLIPS IN "R"

Defective input housing assembly. 3-4 apply ring stuck in applied position. Forward clutch not releasing. Turbine shaft seals missing or damaged. Manual valve link disconnected. Defective oil pump assembly. Retainer and ball assembly missing or damaged. Stator shaft seal rings or ring grooves damaged. Stator shaft sleeve scored or damaged. Reverse boost valve stuck, damaged or not assembled properly. Cup plug missing.

Restricted oil passage. Faces not flat. Converter clutch apply valve stuck. Defective valve body assembly. 2-3 shift valve stuck. Manual linkage out of adjustment. Spacer plate and gaskets incorrect, damaged or not positioned properly. Defective reverse input clutch assembly. Clutch plate worn. Housing and drum assembly cracked at weld. Clutch plate or return spring assembly retaining ring out of groove. Piston deformed or dished.

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Seals damaged or missing. Retainer and ball assembly not sealing. Restricted apply passage. Defective low-reverse clutch. Clutch plates worn or retaining ring not positioned properly. Porosity in piston. Seals damaged. Return spring assembly retaining ring not positioned properly. Case porosity. Case cover plate not tightened properly or gasket missing or damaged. Auxiliary valve body low overrun valve stuck. Cup plug restricted, missing or damaged.

NO PART THROTTLE OR DELAYED DOWNSHIFTS

T.V. cable loose or not adjusted properly. T. V. bracket assembly bent. Defective 2-4 servo assembly. Servo cover retaining ring missing or not assembled properly. 4th apply piston damaged or not assembled properly. Inner housing damaged or not assembled properly. Governor weights binding or governor valve stuck. Defective valve body assembly. Throttle valve, 3-2 control valve or T.V. modulated downshift valve stuck. T.V. sleeve turned in bore. 4-3 sequence valve body channel blocked. No. 5 check ball missing.

NO OVERRUN BRAKING IN MANUAL 3-2-1

T.V. cable loose or not adjusted properly. Defective valve body assembly. 4-3 sequence valve or throttle valve stuck. No. 3 check ball not positioned properly. Spacer plate and gaskets incorrect, damaged or not positioned properly. Defective input clutch assembly. Turbine shaft oil passages plugged or not drilled. Turbine shaft seal rings damaged. Turbine shaft sealing balls loose or missing. Porosity in forward or overrun clutch piston. Overrun piston seals damaged or cut. Overrun piston check ball not sealing.

DRIVES (CREEPS) IN NEUTRAL

Forward clutch not releasing. Manual valve link disconnected. Converter clutch apply valve stuck in oil pump. Face of transmission case not flat or internal leakage in case.

STARTS IN 2ND IN "D"

Governor support pin too long or missing or governor valve stuck. Forward sprag clutch assembly installed backward.

NO PARK

Parking linkage binding, loose, missing or not positioned properly.

OIL PRESSURE HIGH OR LOW

Perform PRELIMINARY CHECKING PROCEDURE. See **CONTROL PRESSURE TEST** under TESTING. Oil pressure regulator valve stuck or valve spring damaged. Rotor guide omitted or not assembled properly. Rotor cracked or broken. T.V. or reverse boost valve or sleeve stuck, damaged or not assembled properly. Orifice valve in pressure regulator valve plugged. Sticking slide or excessive rotor clearance. Pressure relief ball not seated or damaged. Pump cover or body has porosity. Incorrect pump cover or pump face not flat. Excessive rotor clearance.

Intake pipe restricted by casting flash. Cracks in filter body or intake pipe. "O" ring seal missing, cut or damaged. Incorrect grease used during rebuild procedure. T.V. exhaust ball stuck or damaged. Throttle link, lever and bracket assembly binding, damaged or not assembled properly.

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Manual valve scored or damaged. Spacer plate or gaskets incorrect, damaged or not assembled properly. Face not flat. Throttle valve or T.V. limit valve sticking. Modulated downshift valve, line bias valve or 2-3 shift valve stuck. Check balls omitted or not assembled properly. Case-to-valve body face not flat.

HIGH OR LOW SHIFT POINTS

T.V. cable binding or not adjusted properly. T.V. exhaust ball stuck or damaged. Throttle lever and bracket assembly binding, damaged or not assembled properly. Pressure regulator valve or T.V. boost valve stuck. Pump slide sticking.

Throttle valve or plunger sticking. Modulated T.V. upshift or downshift valves, T.V. limit valve or line bias valve sticking. Spacer plate or gaskets damaged, incorrect or not assembled properly.

Valve body pad porous or damaged. Governor filter restricted or damaged. 2-4 accumulator has porosity. Servo piston seals damaged. Apply pin damaged or has improper length. 2-4 band burned or anchor pin not engaged.

NO CONVERTER CLUTCH APPLY

Transmission not supplied 12 volts. Outside electrical connector damaged. Inside electrical connector wiring harness or solenoid damaged. Solenoid wire pinched. Solenoid not grounded. Pressure switches incorrect or damaged. Temperature switch damaged. Converter internal damage.

Converter clutch valve stuck or assembled backward, or retaining ring not positioned properly. Pump-to-case gasket not positioned properly. Orifice cup plug restricted or damaged. Solenoid "O" ring seal cut or damaged. Pump-to-body cover high or uneven bolt torque.Turbine shaft "O" ring seal cut or damaged. Turbine shaft retainer and ball assembly restricted or damaged. TCC shift valve or apply valve stuck. Solenoid "O" ring leaking. Solenoid screen is blocked.

CONVERTER SHUDDER

Torque converter has internal damage. Converter clutch valve stuck. Restricted oil passages. Crack in filter body. Flash restricting filter neck. "O" ring seal cut or damaged.Turbine shaft "O" ring cut or damaged. Turbine shaft retainer and ball assembly restricted or damaged. Low oil pressure. Engine not tuned properly.

NO CONVERTER CLUTCH RELEASE

Solenoid external ground. Converter internal damage. Converter clutch valve stuck. Converter clutch apply valve stuck in apply position. ECM external ground.

RATCHETING NOISE

Parking pawl return spring weak, damaged or not assembled properly.

OIL LEAKING OUT VENT

Chamfer in pump body rotor pocket too large. T.V. limit valve stuck. Fluid level overfilled. Cross leak out of pump body and cover.

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VIBRATION IN REVERSE & WHINING NOISE IN PARK

Oil pump broken vane rings.

FRONT OIL LEAK

Torque converter welded seam leaking. Damaged torque converter hub. Damaged front seal.

NO REVERSE, SLIPS IN REVERSE, BAD ENGAGEMENT (NO BRAKING OR WEAK BRAKING IN MANUAL LOW)

No. 5 check ball missing. Faulty low-reverse clutch. Reverse boost valve sticking. Reverse boost valve installed backward.

PUMP BUSHING SPINS OUT, "WALKS" INTO SEAL, OR SEIZES TO CONVERTER HUB

Transmission and engine center lines do not match. Excessive crankshaft runout (common on 6.2L). Bent flexplate (drive plate). Excessive converter hub runout. Pump bushing I.D. not centered in pump. Bushing too loose in pump. Not enough hub-to-bushing clearance.

SLIP ON 2-3 SHIFT, FALLING OUT OF 3RD, REPEATED 3-4 CLUTCH OR 2-4 BAND FAILURE

Leaking No. 7 check ball (direct clutch accumulator check valve located in case, visible through servo). Cracked input shaft. Input shaft sealing rings leaking. Leak at base of input shaft where shaft is pressed into drum. Pump cover bore (sealing ring surface) worn. Servo air bleed cup plug loose or blown out of case. Pump-to-case gasket misaligned or ripped. 3-4 air bleed ball in back of input drum leaking. 3-4 clutch piston seals leaking. Servo release side (large) sealing ring leaking in 2nd gear and dragging 3rd clutch. Band apply pin in case worn. Servo seized in case. Damaged pump. Stator sleeve turned in pump and partly blocking feed passage. Throttle valve sticking, causing delayed 3rd clutch circuit pressure rise during 2-3 shift.

DELAYED OR NO FORWARD CLUTCH ENGAGEMENT, SLIPS OR CHATTERS IN 1ST GEAR

Leak at forward clutch accumulator (auxiliary valve body) caused by accumulator pin "walking" out of oval hole in cover.

NO 4TH GEAR, NO 3-4 UPSHIFT (STAYS IN 3RD, 2ND USUALLY OKAY)

Leaking 4th gear piston sealing ring (inside servo cover). Excessive servo clearance allowing 4th piston to "walk" out of cover, leaking 4th apply oil out servo vent hole. Servo vent hole blocked (hole is at pan gasket surface). Leaking 4th signal switch. 3-4 relay valve installed backward. Aluminum disc missing from between 3-4 relay valve and hole pin. Servo feed tunnel cup missing from valve body. 3-4 shift valve stuck. Incorrect spring or spring too stiff at 3-4 shift valve. 3-4 accumulator air bleed cup plug blown out of case. Throttle valve sticks.

FALLS OUT OF 4TH GEAR DURING COASTING

Low line pressure at idle (weak pressure regulator spring).

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BINDS UP ON 3-4 SHIFT (FEELS LIKE BRAKE DRAG)

Forward pressure plate installed incorrectly. Too many plates in overrun clutch. Incorrect top steel plate installed in overrun clutch.

NO FORWARD OR REVERSE GEARS (LINE PRESSURE READING OKAY)

Mismatched converter input shaft or broken turbine hub.

BINDS UP IN REVERSE

Stator sleeve rotated out of position. Stuck 2-3 shift valve. Servo pin jammed in case. Stuck 3-4 relay or 4-3 sequence valve.

NO REVERSE

Reverse input drum cracked at weld or seals damaged.

NO DRIVE IN DRIVE RANGE

Torque converter stator roller clutch not holding.

NO DRIVE IN OVERDRIVE RANGE

Faulty output sprag. Teeth "hammered" out of forward friction plates.

CLUTCH & BAND APPLICATION

CLUTCH & BAND APPLICATION CHART

Selector Lever Position	Elements In Use
"D" (Overdrive)	
First Gear	Forward Clutch, Forward Sprag & Low Roller Clutch
Second Gear	Forward Clutch, Forward Sprag & 2-4 Band
Third Gear	Forward Clutch, Forward Sprag & 3-4 Clutch
Overdrive	Forward Clutch, 2-4 Band & 3-4 Clutch
"D" (Drive)	
First Gear	Forward Clutch, Forward Sprag, Low Roller Clutch & Overrun Clutch
Second Gear	Forward Clutch, Forward Sprag, Overrun Clutch & 2-4 Band

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Third Gear	Forward Clutch, Forward Sprag, Overrun Clutch & 3-4 Clutch
"2" (Intermediate)	
First Gear	Forward Clutch, Forward Sprag, Low Roller Clutch & Overrun Clutch
Second Gear	Forward Clutch, Forward Sprag, Overrun Clutch & 2-4 Band
"1" (Low)	
First Gear	Forward Clutch, Forward Sprag, Low Reverse Clutch, Low Roller Clutch & Overrun Clutch
"R" (Reverse)	Low Reverse Clutch & Reverse Input Clutch
"N" Or "P" (Neutral Or Park)	All Clutches & Bands Released Or Ineffective

TESTING

ROAD TEST

1. Operate vehicle in Overdrive. Accelerate using steady throttle pressure. Note shift points for 2nd, 3rd, Overdrive and TCC application. TCC application should occur in 3rd or Overdrive.
2. Torque converter clutch will not engage until engine coolant has reached a temperature of 130°F (54°C). Compare shift points to shift speed charts. See SHIFT SPEED CHARTS. If TCC application is not obtained, see **AUTO TRANS DIAGNOSIS - GM TORQUE CONVERTER CLUTCH** article in the AUTOMATIC TRANSMISSIONS section.
3. Operate vehicle in Overdrive normally at 40-55 MPH with throttle in half-open position. Ensure TCC releases, and note 3rd gear downshift point. Repeat procedure with wide open throttle. Ensure TCC releases, and note 2nd gear downshift point.
4. Operate vehicle in Overdrive normally at 40-55 MPH. Release accelerator while manually shifting transmission to 3rd gear. Ensure TCC releases and engine braking is felt, and note 3rd gear downshift point.
5. Operate vehicle in Overdrive normally at 40-45 MPH. Release accelerator while manually shifting transmission into 2nd gear. Ensure TCC releases and engine braking is felt, and note 2nd gear downshift point.
6. With transmission in Overdrive, accelerate normally to 25 MPH, allowing vehicle to upshift normally. Release accelerator while manually shifting transmission into 1st gear. Ensure TCC releases and engine braking is felt, and note 1st gear downshift point.
7. With transmission in Overdrive, accelerate to 4th gear with TCC applied. Release accelerator. Lightly apply brakes, and ensure TCC releases and note speed at which downshifts occur. Compare shift points noted to shift speed charts. See **SHIFT SPEED CHARTS** .

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8. Place transmission in 3rd gear with vehicle stopped. Accelerate, and note 1st-2nd and 2nd-3rd shift points. Repeat procedure with transmission in 2nd gear. Note 1st-2nd shift point. Accelerate to 25 MPH. Ensure 2nd-3rd gear upshift does not occur and TCC does not engage.
9. Place transmission in 1st gear with vehicle stopped. Accelerate to 15 MPH. Ensure upshifts do not occur and TCC does not engage. With vehicle stopped, place transmission in Reverse and slowly accelerate to observe reverse gear operation.
10. Compare all shift points to shift speed charts. See **SHIFT SPEED CHARTS** . If shift points are not within approximate speed listed, see **TROUBLE SHOOTING** . Control pressure can also be checked. See **CONTROL PRESSURE TEST** .

SHIFT SPEED CHARTS

NOTE: Shift speed charts are not available for 1983 through 1986 models.

Model	1-2 Min Throt	2-3 Min Throt	3-4 Min Throt	4-3 Part Throt	3-2 Part Throt	4-3 Coast Down	3-2 Coast Down	2-1 Coast Down
FAM	12-15	20-32	33-55 +	55 +	38-55 +	28-54	17-28	11-14
MDM	13-16	22-30	37-55 +	55 +	42-55 +	32-55	19-27	12-14
MHM	9-11	17-24	28-47	55 +	27-45	25-44	14-22	8-10
MPM	11-14	19-26	33-51	55 +	37-55	28-49	16-24	10-13
NTM	13-19	23-38	46-55 +	55 +	44-55 +	38-55 +	19-31	12-17
PAM	9-11	17-24	28-47	55 +	27-45	25-44	14-22	8-10
TAM	9-11	15-22	23-51	55 +	27-51	20-47	11-20	8-10
TSM	8-10	16-22	25-53	55 +	26-55	23-48	13-20	7-9
YMM	9-10	13-19	24-44	55 +	22-52	18-38	10-16	8-9
YTM	12-14	19-25	36-55	55 +	38-55 +	31-53	15-23	11-13
YWM	8-9	12-17	24-44	55 +	23-53	19-39	9-14	7-9
YXM	10-12	16-27	35-52	55 +	36-54	30-49	13-23	9-11
YZM	11-13	13-24	34-46	55 +	10-20	30-44	10-20	13-24
YLM	10-12	16-23	32-37	55 +	31-47	28-45	12-19	16-23
YKM	10-12	19-25	31-48	55 +	31-52	27-45	15-23	19-25
YFM	11-14	18-25	31-54	55 +	28-51	26-51	15-23	10-13
YCM	11-12	15-22	32-55 +	55 +	30-55 +	24-51	12-18	9-11
YAM	9-10	13-18	27-48	55 +	25-55 +	21-43	10-16	8-9
YPM	11-13	19-26	28-43	55 +	35-55	25-41	16-24	10-12

NOTES:
1. ALL SPEEDS INDICATED ARE IN MILES PER HOUR.
2. SHIFT POINTS WILL VARY SLIGHTLY DUE TO ENGINE LOADS AND VEHICLE OPTIONS.
3. SPEEDS LISTED WITH + EXCEED 55 MPH.

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Fig. 8: Shift Speed Chart (1987 Models Except Corvette)
Courtesy of GENERAL MOTORS CORP.

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MODEL	1-2 MIN THROTTLE	2-3 MIN THROTTLE	3-4 MIN THROTTLE	4-3 PART THROTTLE	3-2 PART THROTTLE	4-3 COAST DOWN	3-2 COAST DOWN	2-1 COAST DOWN
FAM, MAM, MFM, MMM, MRM, MXM	12-15	13-24	33-55 +	55 +	38-55 +	28-54	17-28	11-14
MCM, MTM, PRM	9-13	16-27	32-55	55 +	31-48	27-53	14-22	8-12
MDM, MKM, MUM, TJM, TKM	13-16	22-30	37-55 +	55 +	42-55 +	32-55	19-27	12-14
MHM, PAM, PBM, PCM, TNM, TRM	9-11	17-24	28-47	55 +	27-45	25-44	14-22	8-10
MPM, MWM, MZM, TUM, TXM	11-14	19-26	33-51	55 +	37-55	28-49	16-24	10-13
TAM, TBM	9-11	15-22	23-51	52-55 +	27-51	20-47	11-20	8-10
TSM	8-10	16-22	32-47	55 +	26-55	26-43	13-20	7-9
YAM	9-10	13-18	27-48	55 +	25-55 +	21-43	10-16	8-9
YCM, YDM	11-12	15-22	32-55 +	55 +	30-55 +	24-51	12-18	9-11
YFM	11-14	18-25	31-54	55 +	28-51	26-51	15-23	10-13
YKM	10-12	19-25	31-48	55 +	31-52	27-45	15-23	9-11
YLM	10-12	16-23	32-47	55 +	31-47	28-45	12-19	9-11
YMM	9-10	13-19	24-44	55 +	22-52	18-38	10-16	8-9
YPM	11-13	19-26	28-43	55 +	35-55	25-41	16-24	10-12
YSM	10-12	15-22	31-55	55 +	29-55 +	24-50	12-18	9-11
YTM	12-14	19-25	36-55	55 +	38-55 +	31-53	15-23	11-13
YWM	8-9	12-17	24-44	55 +	23-53	19-39	9-14	7-9
YXM	10-12	16-27	35-52	55 +	36-54	30-49	13-23	9-11
YZM	11-13	13-24	34-46	55 +	36-53	30-44	10-20	10-12

NOTES:
1. ALL SPEEDS INDICATED ARE IN MILES PER HOUR.
2. SHIFT POINTS WILL VARY SLIGHTLY DUE TO ENGINE LOADS AND VEHICLE OPTIONS.
3. SPEEDS LISTED WITH + EXCEED 55 MPH.

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Fig. 9: Shift Speed Chart (1987 Corvette)
Courtesy of GENERAL MOTORS CORP.

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MODEL	1-2 MIN THROTTLE	2-3 MIN THROTTLE	3-4 MIN THROTTLE	1-2 W.O.T.	3-2 PART THROTTLE	4-3 COAST DOWN	3-2 COAST DOWN	2-1 COAST DOWN
FAM, FMM, MAM	12-15	19-26	41-51	31-43	37-55+	37-48	15-24	11-14
MFM, MRM, MXM	12-15	20-38	41-51	32-44	38-55+	37-48	17-28	11-14
MCM, MTM, PRM	10-13	14-22	40-49	24-37	26-46	37-47	10-18	9-12
MDM, MKM, MLM, TJM, TKM	13-15	22-30	43-54	33-46	42-55+	39-50	19-27	12-14
MPM, MWM, MZM, TUM, TXM	11-13	19-26	38-47	29-41	37-55	34-45	16-24	10-13
MHM, PAM, PBM, PCM, TNM	9-11	17-24	34-43	25-34	27-45	29-40	14-22	8-10
TAM, TBM	9-11	15-22	35-42	30-44	27-50	30-38	11-20	8-10
THM, TLM	12-14	20-27	48-55+	30-42	38-55+	44-54	17-24	11-13
YNM	10-11	17-23	37-54	28-46	29-55+	30-49	13-21	8-10
YKM	10-12	19-25	35-45	32-46	31-52	30-42	15-23	9-11
YTM	11-13	17-23	41-52	29-43	34-55	36-48	13-20	9-11
YPM	11-13	19-26	36-42	31-44	35-55	32-39	16-24	10-12
YXM	10-12	16-27	40-48	31-42	35-53	36-45	13-23	9-11
YZM	11-13	13-24	39-43	36-46	36-53	35-40	10-20	10-12
YWM	8-9	12-17	32-39	23-41	23-53	23-34	9-14	7-9
YDM	10-12	15-22	41-51	30-53	30-55+	30-44	12-18	9-11
YMM	9-10	13-19	32-39	23-41	23-52	21-33	10-16	7-9

NOTES:
1. ALL SPEEDS INDICATED ARE IN MILES PER HOUR. CONVERSION TO KPH = MPH x 1.609.
2. SHIFT POINTS WILL VARY SLIGHTLY DUE TO ENGINE LOADS AND VEHICLE OPTIONS.
3. SPEEDS LISTED WITH + EXCEED 55 MPH.

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Fig. 10: Shift Speed Chart (1988 Car Models)
Courtesy of GENERAL MOTORS CORP.

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MODEL	1-2 MIN THROTTLE	2-3 MIN THROTTLE	3-4 MIN THROTTLE	1-2 W.O.T.	3-2 PART THROTTLE	4-3 COAST DOWN	3-2 COAST DOWN	2-1 COAST DOWN
FAM, FMM, MAM	12-15	19-26	41-51	31-43	37-55 +	37-48	15-24	11-14
MFM, MRM, MXM	12-15	20-38	41-51	32-44	38-55 +	37-48	17-28	11-14
MCM, MTM, PRM	10-13	14-22	40-49	24-37	26-46	37-47	10-18	9-12
MDM, MKM, MLM, TJM, TKM	13-15	22-30	43-54	33-46	42-55 +	39-50	19-27	12-14
MPM, MWM, MZM, TUM, TXM	11-13	19-26	38-47	29-41	37-55	34-45	16-24	10-13
MHM, PAM, PBM, PCM, TNM	9-11	17-24	34-43	25-34	27-45	29-40	14-22	8-10
TAM, TBM	9-11	15-22	35-42	30-44	27-50	30-38	11-20	8-10
THM, TLM	12-14	20-27	48-55 +	30-42	38-55 +	44-54	17-24	11-13
YNM	10-11	17-23	37-54	28-46	29-55 +	30-49	13-21	8-10
YKM	10-12	19-25	35-45	32-46	31-52	30-42	15-23	9-11
YSM	10-12	15-22	40-50	29-52	29-55 +	29-43	12-18	9-11
YTM	11-13	17-23	41-52	29-43	34-55	36-48	13-20	9-11
YPM	11-13	19-26	36-42	31-44	35-55	32-39	16-24	10-12
YXM	10-12	16-27	40-48	31-42	35-53	36-45	13-23	9-11
YZM	11-13	13-24	39-43	36-46	36-53	35-40	10-20	10-12
YWM	8-9	12-17	32-39	23-41	23-53	23-34	9-14	7-9
YDM	10-12	15-22	41-51	30-53	30-55 +	30-44	12-18	9-11
YAM	9-10	13-18	34-43	25-45	25-55 +	25-37	10-16	8-9
YMM	9-10	13-19	32-39	23-41	23-52	21-33	10-16	7-9

NOTES:
1. ALL SPEEDS INDICATED ARE IN MILES PER HOUR. CONVERSION TO KPH = MPH x 1.609.
2. SHIFT POINTS WILL VARY SLIGHTLY DUE TO ENGINE LOADS AND VEHICLE OPTIONS.
3. SPEEDS LISTED WITH + EXCEED 55 MPH.

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Fig. 11: Shift Speed Chart (1988 Truck Models)
Courtesy of GENERAL MOTORS CORP.

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1989 THM 4L60 SHIFT SPEED CHART

MODEL	1-2 MIN THROTTLE	2-3 MIN THROTTLE	3-4 MIN THROTTLE	1-2 W.O.T.	3-2 PART THROTTLE	4-3 COAST DOWN	3-2 COAST DOWN	2-1 COAST DOWN
FKM, FXM	10-12	17-24	29-38	25-41	27-54	25-31	14-21	9-11
FMM, MAM, MFM, MRM, MXM	12-15	19-26	41-51	31-43	37-56	37-48	15-24	11-14
HBM	11-13	18-26	34-43	27-44	35-63	27-36	15-22	10-12
HDM	11-14	19-27	31-39	29-41	35-56	28-35	16-25	10-12
MCM, PRM	10-13	14-22	40-49	24-37	26-46	37-47	10-18	9-12
MDM, MKM, MLM, TJM, TKM	13-15	19-27	42-51	33-46	37-59	37-47	14-24	12-14
MHM, PAM, PBM, PCM, TNM	9-11	17-24	34-43	25-34	26-44	29-40	14-22	8-10
MPM, MWM, MZM, TUM, TXM	11-13	18-24	38-47	29-41	35-53	34-45	15-21	10-13
THM, TLM	12-14	19-26	41-51	30-42	36-55	37-48	15-24	11-13
YDM	10-12	15-22	41-51	30-53	30-65+	30-44	12-18	9-11
YNM	11-13	20-28	33-40	31-48	33-65	29-33	17-24	10-12
YPM	11-13	17-25	36-42	28-41	33-54	31-39	13-22	10-12
YTM	11-13	17-23	41-52	29-43	36-56	36-48	13-20	9-11
YXM	10-12	16-27	40-48	31-42	36-53	36-45	13-23	9-11
YZM	11-13	13-24	39-43	36-46	36-53	34-39	10-19	10-12

NOTES:
1. ALL SPEEDS INDICATED ARE IN MILES PER HOUR. CONVERSION TO km/h = MPH x 1.609.
2. SHIFT POINTS WILL VARY SLIGHTLY DUE TO ENGINE LOADS AND VEHICLE OPTIONS.
3. SPEEDS LISTED WITH + EXCEED 65 MPH.

For transmission model identification, *see Fig. 1*.

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Fig. 12: Shift Speed Chart (1989 Models)
Courtesy of GENERAL MOTORS CORP.

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1990 HYDRA-MATIC 4L60 SHIFT SPEED CHART

MODEL	1-2 MIN THROTTLE	2-3 MIN THROTTLE	3-4 MIN THROTTLE	1-2 W.O.T.	4-3 COAST DOWN	3-2 COAST DOWN	2-1 COAST DOWN
BAM	13-16	22-27	50+	29-43	36-48	13-20	9-11
BPM	14-18	26-31	40-52	31-48	29-33	17-24	10-12
CAM, CBM, KAM, MJM, MNM, WAM	14-18	24-42	49+	31-43	37-48	15-24	11-14
CCM, CFM, KBM, WBM	16-19	25-31	50+	33-46	37-47	14-24	12-14
CHM, CJM, KCM, RAM, WCM	14-17	22-28	46-53	29-41	34-45	15-21	10-13
DBM	14-18	27-31	38-51	31-43	28-33	16-24	9-12
FBM	14-18	26-33	42-53	37-51	28-35	16-24	10-12
FTM	12-15	22-25	40-49	28-41	31-39	13-22	10-12
FUM	12-15	22-25	39-47	25-41	25-31	14-21	9-11
FZM	12-16	24-31	44-52	36-46	34-39	10-19	10-12
HBM, HHM	12-16	21-25	40-48	27-44	26-35	15-22	9-12
HCM, HDM	15-18	25-28	40-48	31-45	28-34	19-29	12-15
HJM	14-17	27-31	51+	30-44	31-47	16-27	11-13
LAM, LBM, LCM, LDM, LFM	12-14	21-26	45-51	24-33	28-38	14-21	7-9
MBM, SAM	12-14	20-25	47-53	24-37	37-47	10-18	9-12
MSM	10-13	20-23	40-46	22-36	26-37	11-19	7-9
SHM, TLM	13-18	24-31	50+	30-42	37-48	19-26	11-13
YDM	13-16	21-25	39-51	39-53	22-28	13-19	9-11

Notes:
1. All Speeds Indicated Are In Miles Per Hour. Conversion To KPH = MPH x 1.609.
2. Shift Points Will Vary Slightly Due To Engine Loads And Vehicle Options.
3. Speeds Listed With + Exceed 65 MPH.

For transmission model identification, *see Fig. 1*.

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Fig. 13: Shift Speed Chart (1990 Models)
Courtesy of GENERAL MOTORS CORP.

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1991 HYDRA-MATIC 4L60 SHIFT SPEED CHART

MODEL	1-2 MIN THROTTLE	2-3 MIN THROTTLE	3-4 MIN THROTTLE	1-2 W.O.T.	4-3 COAST DOWN	3-2 COAST DOWN	2-1 COAST DOWN
BBM	13-18	26-33	40-52	31-46	25-30	14-25	9-11
CAM, CBM, KAM	14-17	22-29	46-52	31-43	37-48	15-24	11-14
CCM, CFM, KBM, WBM	12-17	21-26	42-48	33-46	37-47	14-24	12-14
CHM, CJM, KCM, RAM, WCM	15-18	23-30	49+	29-41	34-45	15-21	10-13
FBM	15-17	24-30	39-45	37-51	28-35	16-24	10-12
FTM	12-15	21-26	39-48	28-41	31-39	13-22	10-12
FUM	13-15	23-25	38-46	25-41	25-31	14-21	9-11
FZM	13-17	24-32	44-52	36-46	34-39	10-19	10-12
LAM, LBM, LCM, LDM, LFM	10-13	20-24	38-43	25-34	29-40	14-22	8-10
MJM, MNM, WAM	13-17	22-29	46-52	28-39	34-44	14-22	10-12
MSM	11-13	20-23	41-46	22-36	26-37	11-19	7-9
SAM	12-14	18-24	47-53	24-37	37-47	10-18	9-12
SHM, TLM	14-17	24-31	49+	30-42	37-48	19-26	11-13

Notes:
1. All speeds indicated are in miles per hour. Conversion to KM/H = MPH x 1.609.
2. Shift points will vary slightly due to engine loads and vehicle options.
3. Speeds listed with + exceed 65 MPH.
4. Speeds are based on TPS of 10 or 20. Use scan tool to measure correct TPS.

For transmission model identification, see Fig. 1.

Fig. 14: Shift Speed Chart (1991 Models)
Courtesy of GENERAL MOTORS CORP.

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1992 HYDRA-MATIC 4L60 SHIFT SPEED CHART

MODEL	1-2 MIN THROTTLE	2-3 MIN THROTTLE	3-4 MIN THROTTLE	1-2 W.O.T.	4-3 COAST DOWN	3-2 COAST DOWN	2-1 COAST DOWN
AAM	13-17	26-32	37-51	30-41	28-33'	16-24	7-10
ACM	13-17	25-32	41-51	28-40	25-36	17-24	10-12
ADM, AKM	13-17	26-32	37-52	30-41	28-33	16-24	7-10
BBM	14-18	26-33	40-52	31-46	25-30	14-25	9-11
BCM	14-18	25-32	42-53	31-45	27-34	14-24	9-11
BFM	13-16	24-28	38-52	27-42	25-29	14-21	8-10
BWM	13-17	26-31	39-52	31-45	25-30	14-24	9-11
CAM, CBM, KMM	14-17	22-28	46-52	28-39	34-44	14-22	10-12
CCM, CFM, KHM, WBM	13-16	21-26	42-48	27-39	31-39	12-20	10-12
CHM, CJM, KJM, WCM	15-18	23-30	48-56	31-44	36-47	16-23	11-13
DDM	16-19	26-32	35-47	33-55	24-31	15-23	10-13
FBM	14-18	26-34	43-53	37-51	28-35	16-24	10-12
FTM	12-15	21-26	39-50	28-41	31-39	13-22	10-12
FUM	12-15	22-26	38-47	25-41	24-30	14-20	9-11
FZM	13-16	2332	44-52	36-46	35-40	10-19	10-12
LAM, LBM, LCM, LDM, LFM	11-13	21-24	39-45	24-33	28-38	14-21	7-9
LHM	12-14	21-26	48-53	23-33	35-47	13-21	8-10
MJM, MNM, WAM	13-17	22-28	46-52	28-39	34-44	14-22	10-12
MMM	12-15	24-28	39-47	29-48	29-35	15-26	9-11
MSM	12-15	24-28	38-47	22-36	27-36	12-19	7-8
SAM	12-15	18-24	47-53	24-37	37-47	10-18	9-12
SFM	10-12	18-23	43-52	25-37	38-45	13-19	8-10
SHM, TLM	14-17	24-31	49-56	30-42	37-48	15-24	11-13
TAM, TBM	15-18	28-34	48-53	31-52	32-39	17-28	10-12
TWM	12-17	23-27	32-38	25-33	26-30	15-22	9-11
YDM	13-17	22-28	38-51	29-53	21-27	13-19	9-11

Notes:
1. All speeds indicated are in miles per hour. Conversion to KM/H = MPH x 1.609.
2. Shift points will vary slightly due to engine loads and vehicle options.
3. Speeds listed with + exceed 65 MPH.
4. Speeds are based on TPS of 10 or 20. Use scan tool to measure correct TPS.

For transmission model identification, see Fig. 1.

Fig. 15: Shift Speed Chart (1992 Models)
Courtesy of GENERAL MOTORS CORP.

CONTROL PRESSURE TEST

Preliminary Checking Procedure

1. Ensure fluid level is correct and engine is in good operating condition before performing control pressure test. Ensure shift linkage is properly adjusted. See appropriate TRANSMISSION SERVICING - A/T article in the AUTOMATIC TRANSMISSION SERVICING section.
2. Control pressure can be checked to ensure proper throttle valve cable adjustment. If control pressure is not within specification, adjust throttle valve cable before attempting any other corrections. See THROTTLE VALVE CONTROL PRESSURE CHECK.

Throttle Valve Control Pressure Check

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1. Install pressure gauge on transmission line pressure tap. See **Fig. 16** . Install tachometer on engine. Apply parking brake. Ensure engine is at normal operating temperature.
2. Operate engine at 1000 RPM. With gear selector in "P" position, note oil pressure reading. Move gear selector to "D" position, and note oil pressure reading.
3. Oil pressure "D" reading must be equal to "P" reading or must not exceed it by more than 10 psi (.70 kg/cm). Operate engine at 1400 RPM. Oil pressure should increase. Adjust throttle valve cable if pressure does not increase. See appropriate TRANSMISSION SERVICING - A/T article in the AUTOMATIC TRANSMISSION SERVICING section.

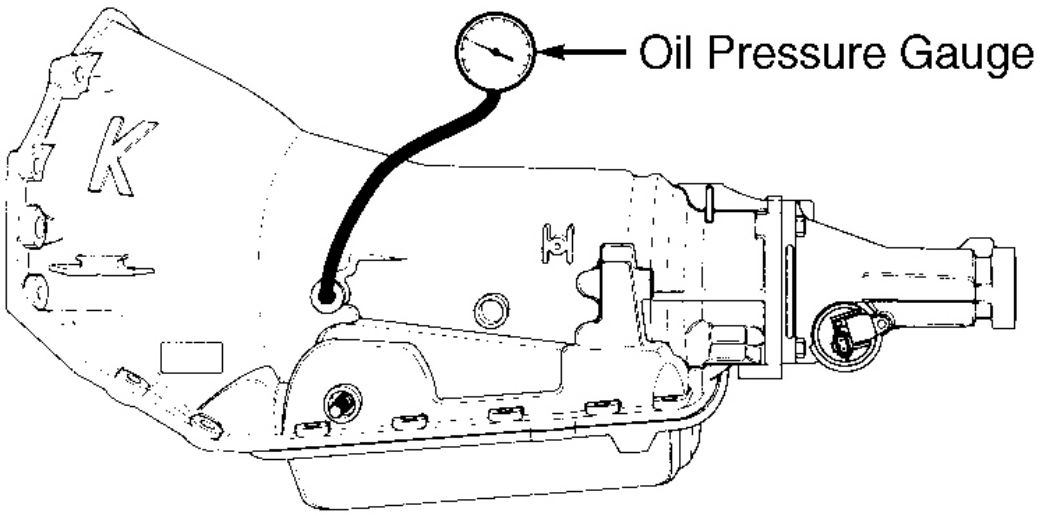


Fig. 16: Locating Line Pressure Tap
Courtesy of GENERAL MOTORS CORP.

CAUTION: DO NOT perform following pressure tests for longer than 2 minutes or transmission damage may occur.

Minimum Throttle Valve Pressure Check

1. Ensure throttle valve cable is properly adjusted. Attach pressure gauge to line pressure tap. See **Fig. 16** . Apply parking brake and service brakes.
2. Check line pressure as specified. See **OIL PRESSURE SPECIFICATION CHARTS** . Pressure readings must be within specification. If pressure reading is not within specification, see **TROUBLE SHOOTING** .

Full Throttle Valve Pressure Check

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1. Attach pressure gauge to line pressure tap. See **Fig. 16** . Apply parking brake and service brakes. Ensure throttle valve cable is secured in fully extended position.
2. Check line pressure as specified. See **OIL PRESSURE SPECIFICATION CHARTS** . Pressure readings must be within specification. If pressure reading is not within specification, see **TROUBLE SHOOTING** .

Pressure Differential Check

1. Possible leakage in clutch circuits may be determined by checking oil pressure differential between line pressure and 2nd, 3rd and 4th clutches. Attach pressure gauges to line pressure tap and appropriate clutch circuit tap on transmission.
2. Circuit tap for 2nd clutch is located on right rear side of transmission, above pan. Circuit tap for 3rd clutch is located next to 2-4 servo, above 4th clutch circuit tap. See **Fig. 1** . Drive vehicle, and note both pressure readings. Pressure differential between line pressure and clutch circuits exceeding 10 psi (0.70 kg/cm^2) indicates possible leakage in clutch circuit.

OIL PRESSURE SPECIFICATION CHARTS

***NOTICE** Total running time for this combination not to exceed 2 minutes.

CAUTION Brakes must be applied at all times.

AUTOMATIC TRANSMISSION OIL PRESSURES

RANGE	MODEL	NORMAL OIL PRESSURE AT MINIMUM T.V.		NORMAL OIL PRESSURE AT FULL T.V.	
		kPa	PSI	kPa	PSI
PARK & NEUTRAL @ 1000 RPM	TC, MB, MC, MJ, VN	385 - 445	55 - 65	880 - 1,190	130 - 170
	TE, TH, TK, MD, ME, MK, MW, VH	385 - 445	55 - 65	880 - 1,190	130 - 170
	VA, ML, T7, MP, MS, PQ, YN, YK, YP, YG, YF, T2	385 - 445	55 - 65	880 - 1,190	130 - 170
	T8, TZ, TP, TS, MH, VJ, TL	450 - 515	65 - 75	880 - 1,190	130 - 170
	YH	450 - 515	65 - 75	965 - 1,240	140 - 180
	Y9	385 - 445	55 - 65	965 - 1,240	140 - 180
REVERSE @ 1000 RPM	TC, MB, MC, MJ, VN	630 - 730	90 - 105	1,445 - 1,955	210 - 285
	TE, TH, TK, MD, ME, MK, MW, VH	630 - 730	90 - 105	1,445 - 1,955	210 - 285
	VA, ML, T7, MP, MS, PQ, YN, YK, YP, YG, YF, T2	630 - 730	90 - 105	1,445 - 1,955	210 - 285
	T8, TZ, TP, TS, MH, VJ, TL	740 - 845	110 - 120	1,445 - 1,955	210 - 285
	YH	740 - 845	110 - 120	1,550 - 2,070	225 - 300
	Y9	630 - 730	90 - 105	1,550 - 2,070	225 - 300
DRIVE & MANUAL THIRD @ 1000 RPM	TC, MB, MC, MJ, VN	385 - 445	55 - 65	880 - 1,190	130 - 170
	TE, TH, TK, MD, ME, MK, MW, VH	385 - 445	55 - 65	880 - 1,190	130 - 170
	VA, ML, T7, MP, MS, PQ, YN, YK, YP, YG, YF, T2	385 - 445	55 - 65	880 - 1,190	130 - 170
	T8, TZ, TP, TS, MH, VJ, TL	450 - 515	65 - 75	880 - 1,190	130 - 170
	YH	450 - 515	65 - 75	965 - 1,240	140 - 180
	Y9	385 - 445	55 - 65	965 - 1,240	140 - 180
MANUAL SECOND & LO @ 1000 RPM	TC, MB, MC, MJ, VN	705 - 815	100 - 120	705 - 815	100 - 120
	TE, TH, TK, MD, ME, MK, MW, VH	705 - 815	100 - 120	705 - 815	100 - 120
	VA, ML, T7, MP, MS, PQ, YN, YK, YP, YG, YF, T2	705 - 815	100 - 120	705 - 815	100 - 120
	T8, TZ, TP, TS, MH, VJ, TL	705 - 815	100 - 120	705 - 815	100 - 120
	YH	705 - 815	100 - 120	705 - 815	100 - 120
	Y9	705 - 815	100 - 120	705 - 815	100 - 120

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Fig. 17: Oil Pressure Specifications (1983 Models)
Courtesy of GENERAL MOTORS CORP.

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***NOTICE** Total running time for this combination not to exceed 2 minutes.

CAUTION Brakes must be applied at all times.

AUTOMATIC TRANSMISSION OIL PRESSURES

RANGE	MODEL	NORMAL OIL PRESSURE AT MINIMUM T.V.		NORMAL OIL PRESSURE AT FULL T.V.	
		kPa	PSI	kPa	PSI
PARK & NEUTRAL @ 1000 RPM	TC, MB, MC, MJ, VN	385 - 445	55 - 65	880 - 1,190	130 - 170
	TE, TH, TK, MD, ME, MK, MW, VH	385 - 445	55 - 65	880 - 1,190	130 - 170
	VA, ML, T7, MP, MS, PQ, YN, YK, YP, YG, YF, Y6	385 - 445	55 - 65	880 - 1,190	130 - 170
	T8, TZ, TM, MG, VE, MH, VJ, TL, TD, MR, TG, Y7, Y8	450 - 515	65 - 75	880 - 1,190	130 - 170
	YH	450 - 515	65 - 75	965 - 1,240	140 - 180
	Y9	385 - 445	55 - 65	965 - 1,240	140 - 180
REVERSE @ 1000 RPM	TC, MB, MC, MJ, VN	630 - 730	90 - 105	1,445 - 1,955	210 - 285
	TE, TH, TK, MD, ME, MK, MW, VH	630 - 730	90 - 105	1,445 - 1,955	210 - 285
	VA, ML, T7, MP, MS, PQ, YN, YK, YP, YG, YF, Y6	630 - 730	90 - 105	1,445 - 1,955	210 - 285
	T8, TZ, TM, MG, VE, MH, VJ, TL, TD, MR, TG, Y7, Y8	740 - 845	110 - 120	1,445 - 1,955	210 - 285
	YH	740 - 845	110 - 120	1,550 - 2,070	225 - 300
	Y9	630 - 730	90 - 105	1,550 - 2,070	225 - 300
OVERDRIVE & MANUAL THIRD @ 1000 RPM	TC, MB, MC, MJ, VN	385 - 445	55 - 65	880 - 1,190	130 - 170
	TE, TH, TK, MD, ME, MK, MW, VH	385 - 445	55 - 65	880 - 1,190	130 - 170
	VA, ML, T7, MP, MS, PQ, YN, YK, YP, YG, YF, Y6	385 - 445	55 - 65	880 - 1,190	130 - 170
	T8, TZ, TM, MG, VE, MH, VJ, TL, TD, MR, TG, Y7, Y8	450 - 515	65 - 75	880 - 1,190	130 - 170
	YH	450 - 515	65 - 75	965 - 1,240	140 - 180
	Y9	385 - 445	55 - 65	965 - 1,240	140 - 180
MANUAL SECOND & LO @ 1000 RPM	TC, MB, MC, MJ, VN	705 - 815	100 - 120	705 - 815	100 - 120
	TE, TH, TK, MD, ME, MK, MW, VH	705 - 815	100 - 120	705 - 815	100 - 120
	VA, ML, T7, MP, MS, PQ, YN, YK, YP, YG, YF, Y6	705 - 815	100 - 120	705 - 815	100 - 120
	T8, TZ, TM, MG, VE, MH, VJ, TL, TD, MR, TG, Y7, Y8	705 - 815	100 - 120	705 - 815	100 - 120
	YH	705 - 815	100 - 120	705 - 815	100 - 120
	Y9	705 - 815	100 - 120	705 - 815	100 - 120

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Fig. 18: Oil Pressure Specifications (1984 Models)
Courtesy of GENERAL MOTORS CORP.

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***NOTICE** Total running time for this combination not to exceed 2 minutes.

CAUTION Brakes must be applied at all times.

AUTOMATIC TRANSMISSION OIL PRESSURES

RANGE	MODEL	NORMAL OIL PRESSURE AT MINIMUM T.V.		NORMAL OIL PRESSURE AT FULL T.V.	
		kPa	PSI	kPa	PSI
PARK, NEUTRAL, OVERDRIVE, & MANUAL 3RD @ 1000 RPM	YC	384 - 443	56 - 64	1019 - 1387	148 - 201
	YX	451 - 514	65 - 75	945 - 1253	137 - 182
	YN, YK, Y6, YP, YZ	384 - 443	56 - 64	878 - 1182	127 - 171
	VE, MG, VJ, MH, T8, TM	451 - 514	65 - 75	885 - 1175	128 - 170
	TH,MK,VH,TK,MD,TE,ME,MW,TZ,TW,VZ, VK,MX,VF,ML,MP,MS,T7,TD,MR,TG,YT, PQ,TL,Y8,TS,VG,VL,MM,VC,MT,PR	451 - 514	65 - 75	885 - 1175	128 - 170
REVERSE @ 1000 RPM *@2000 RPM	YC	631 - 728	92 - 106	*1674 - 2278	243 - 330
	YX	740 - 845	107 - 123	*1552 - 2058	225 - 298
	YN, YK, Y6, YP, YZ	631 - 728	92 - 106	*1443 - 1942	209 - 282
	VE, MG, VJ, MH, T8, TM	740 - 845	107 - 123	*1453 - 1929	211 - 280
	TH,MK,VH,TK,MD,TE,ME,MW,TZ,TW,VZ, VK,MX,VF,ML,MP,MS,T7,TD,MR,TG,YT, PQ,TL,Y8,TS,VG,VL,MM,VC,MT,PR	740 - 845	107 - 123	*1454 - 1930	211 - 280
MANUAL 2ND & MANUAL LO @ 1000 RPM	YC	704 - 813	102 - 118	704 - 813	102 - 118
	YX	709 - 808	103 - 117	709 - 808	103 - 117
	YN, YK, Y6, YP, YZ	704 - 813	102 - 118	704 - 813	102 - 118
	VE, MG, VJ, MH, T8, TM	644 - 734	93 - 106	644 - 734	93 - 106
	TH,MK,VH,TK,MD,TE,ME,MW,TZ,TW,VZ, VK,MX,VF,ML,MP,MS,T7,TD,MR,TG,YT, PQ,TL,Y8,TS,VG,VL,MM,VC,MT,PR	709 - 808	103 - 117	709 - 808	103 - 117

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Fig. 19: Oil Pressure Specifications (1985 Models)
Courtesy of GENERAL MOTORS CORP.

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***NOTICE** Total running time for this combination not to exceed 2 minutes.

CAUTION Brakes must be applied at all times.

AUTOMATIC TRANSMISSION OIL PRESSURES

RANGE	MODEL	NORMAL OIL PRESSURE AT MINIMUM T.V.		NORMAL OIL PRESSURE AT FULL T.V.	
		kPa	PSI	kPa	PSI
PARK, NEUTRAL, OVERDRIVE & MANUAL 3RD @ 1000 RPM	YT	384-444	56-64	818-1040	119-151
	YL	384-444	56-64	838-1085	122-157
	YK,YN,YP	384-444	56-64	898-1164	130-169
	TS	384-444	56-64	962-1237	140-179
	YS	384-444	56-64	1020-1388	148-201
	YA, YC, YD, YW, YZ	384-444	56-64	1039-1369	151-199
	TA, TB	451-515	65-75	792-998	115-145
	FA, MH, TN, TR, TW	451-515	65-75	827-1086	120-158
	YX	451-515	65-75	838-1057	122-153
	TL, YF	451-515	65-75	886-1176	128-171
	MA, MC, MF, MJ, MK, MM, MP, MR, MT, MW, MX, PR, TJ, TK	451-515	65-75	905-1157	131-168
	TC, TD, TF	451-515	65-75	964-1235	140-179
REVERSE @ 1000 RPM *@ 2000 RPM	YT	632-730	92-106	*1345-1710	195-248
	YL	632-730	92-106	*1377-1785	200-259
	YK, YN, YP	632-730	92-106	*1476-1914	214-278
	TS	632-730	92-106	*1581-2034	229-295
	YS	632-730	92-106	*1677-2284	243-331
	YA, YC, YD, YW, YZ	632-730	92-106	*1708-2251	248-326
	TA, TB	742-846	108-123	*1302-1640	189-238
	FA, MH, TN, TR, TW	742-846	108-123	*1358-1786	197-259
	YX	742-846	108-123	*1376-1736	200-252
	TL, YF	742-846	108-123	*1456-1933	211-280
	MA, MC, MF, MJ, MK, MM, MP, MR, MT, MW, MX, PR, TJ, TK	742-846	108-123	*1487-1902	216-276
	TC, TD, TF	742-846	108-123	*1585-2030	230-294
MANUAL 2ND & MANUAL LO @ 1000 RPM	YT	605-698	88-101	605-698	88-101
	MH, TN, TR, TW	644-736	93-107	644-736	93-107
	TS, YA, YC, YD, YK, YL, YN, YP, YS, YW, YZ	705-814	102-118	705-814	102-118
	FA, MA, MC, MF, MJ, MK, MM, MP, MR, MT, MW, PR, TA, TB, TC, TD, TF, TJ, TK, TL, TZ, YF, YX	710-810	103-117	710-810	103-117

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Fig. 20: Oil Pressure Specifications (1986 Car Models)
Courtesy of GENERAL MOTORS CORP.

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***NOTICE** Total running time for this combination not to exceed 2 minutes.

CAUTION Brakes must be applied at all times.

AUTOMATIC TRANSMISSION OIL PRESSURES

RANGE	MODEL	NORMAL OIL PRESSURE AT MINIMUM T.V.		NORMAL OIL PRESSURE AT FULL T.V.	
		kPa	PSI	kPa	PSI
PARK, NEUTRAL, OVERDRIVE & MANUAL 3RD @ 1000 RPM	YC	384-443	56-64	1019-1387	148-201
	YT,YX	451-514	65-75	945-1253	137-182
	YA, YD, YK, YL, YN, YP, YR, YS, YW, YZ	384-443	56-64	878-1182	127-171
	MH, TN, TR	451-514	65-75	885-1175	128-170
	FA, MA, MC, MD, MF, MK, MM, MP, MR, MT, MW, MX, PL, PR, TA, TB, TC, TD, TF, TJ, TK, TS, TW, YF	451-514	65-75	885-1175	128-170
REVERSE @ 1000 RPM *@ 2000 RPM	YC	631-728	92-106	*1674-2278	243-330
	YT, YX	740-845	107-123	*1552-2058	225-298
	YA, YD, YK, YL, YN, YP, YR, YS, YW, YZ	631-728	92-106	*1443-1942	209-282
	MH, TN, TR	740-845	107-123	*1453-1929	211-280
	FA, MA, MC, MD, MF, MK, MM, MP, MR, MT, MW, MX, PL, PR, TA, TB, TC, TD, TF, TJ, TK, TS, TW, YF	740-845	107-123	*1454-1930	211-280
MANUAL 2ND & MANUAL LO @ 1000 RPM	YC	704-813	102-118	704-813	102-118
	YT, YX	709-808	103-117	709-808	103-117
	YA, YD, YK, YL, YN, YP, YR, YS, YW, YZ	704-813	102-118	704-813	102-118
	MH, TN, TR	644-734	93-106	644-734	93-106
	FA, MA, MC, MD, MF, MK, MM, MP, MR, MT, MW, MX, PL, PR, TA, TB, TC, TD, TF, TJ, TK, TS, TW, YF	709-808	103-117	709-808	103-117

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Fig. 21: Oil Pressure Specifications (1986 Truck Models)
Courtesy of GENERAL MOTORS CORP.

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Range	Model	NORMAL OIL PRESSURE AT MINIMUM T.V.		NORMAL OIL PRESSURE AT FULL T.V.	
		kPa	PSI	kPa	PSI
Park, Neutral, Overdrive & Manual 3rd @ 1000 RPM	YSM	384-444	56-64	994-1277	144-185
	YLM, YTM	384-444	56-64	818-1040	119-151
	YMM	451-515	65-75	1115-1430	162-207
	YXM	451-515	65-75	840-1053	122-153
	MCM, MHM, MTM, PAM, PBM, PCM, PRM, TAM, TBM, TNM, TRM, YFM	451-515	65-75	844-1068	122-155
	FAM, MAM, MDM, MFM, MKM, MMM, MPM, MRM, MSM, MUM, MWM, MXM, MZM, TJM, TKM, TUM, TXM	451-515	65-75	851-1063	123-154
	YPM	384-444	56-64	876-1333	127-193
	YKM	384-444	56-64	883-1129	128-164
	TSM	384-444	56-64	962-1237	139-179
	YAM, YCM, YDM, YWM, YZM	384-444	56-64	1049-1359	152-197
	YSM	632-729	92-106	*1634-2100	237-305
Reverse @ 1000 RPM * @ 2000 RPM	YTM	632-729	92-106	*1345-1710	195-248
	YMM	742-846	108-123	*1834-2351	266-341
	YLM	632-729	92-106	*1380-1782	200-258
	YXM	742-847	108-123	*1381-1731	200-251
	MCM, MHM, MTM, PAM, PBM, PCM, PRM, TAM, TBM, TNM, TRM, YFM	742-847	108-123	*1388-1755	201-254
	FAM, MAM, MDM, MFM, MKM, MMM, MPM, MRM, MSM, MUM, MWM, MXM, MZM, TJM, TKM, TUM, TXM	742-847	108-123	*1399-1747	203-253
	YPM	632-730	92-106	*1441-2191	209-318
	YKM	632-730	92-106	*1452-1856	211-269
	TSM	632-730	92-106	*1581-2034	229-295
	YAM, YCM, YDM, YWM, YZM	632-730	92-106	*1724-2234	250-324
Manual 2nd & Manual 1st @ 1000 RPM	TSM, YAM, YCM, YDM, YKM, YLM, YPM, YSM, YTM, YWM, YZM	1120-1293	162-187	1120-1293	162-187
	FAM, MAM, MCM, MDM, MHM, MKM, MMM, MPM, MRM, MSM, MTM, MUM, MWM, MXM, MZM, PAM, PBM, PCM, PRM, TAM, TBM, TJM, TKM, TNM, TRM, TUM, TXM, YFM, YMM, YXM	1127-1286	163-186	1127-1286	163-186

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Fig. 22: Oil Pressure Specifications (1987 Models Except Astro & Safari)
Courtesy of GENERAL MOTORS CORP.

Range	Model	NORMAL OIL PRESSURE AT MINIMUM T.V.		NORMAL OIL PRESSURE AT FULL T.V.	
		kPa	PSI	kPa	PSI
Park, Neutral, Overdrive & Manual 3rd @ 1000 RPM	YC	384-443	56-64	1019-1387	148-201
	YT, YX	451-514	65-75	945-1253	137-182
	YA, YD, YK, YL, YN, YP, YR, YS, YW, YZ	384-443	56-64	878-1182	127-171
	MH, TN, TR	451-514	65-75	885-1175	128-170
	FA, MA, MC, MD, MF, MK, MM, MP, MR, MT, MW, MX, PL, PR, TA, TB, TC, TD, TF, TJ, TK, TS, TW, YF	451-514	65-75	885-1175	128-170
Reverse @ 1000 RPM * @ 2000 RPM	YC	631-728	92-106	*1674-2278	243-330
	YT, YX	740-845	107-123	*1552-2058	225-298
	YA, YD, YK, YL, YN, YP, YR, YS, YW, YZ	631-728	92-106	*1443-1942	209-282
	MH, TN, TR	740-845	107-123	*1453-1929	211-280
	FA, MA, MC, MD, MF, MK, MM, MP, MR, MT, MW, MX, PL, PR, TA, TB, TC, TD, TF, TJ, TK, TS, TW, YF	740-845	107-123	*1454-1930	211-280
Manual 2nd & Manual 1st @ 1000 RPM	YC	704-813	102-118	704-813	102-118
	YT, YX	709-808	103-117	709-808	103-117
	YA, YD, YK, YL, YN, YP, YR, YS, YW, YZ	704-813	102-118	704-813	102-118
	MH, TN, TR	644-734	93-106	644-734	93-106
	FA, MA, MC, MD, MF, MK, MM, MP, MR, MT, MW, MX, PL, PR, TA, TB, TC, TD, TF, TJ, TK, TS, TW, YF	709-808	103-117	709-808	103-117

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Fig. 23: Oil Pressure Specifications (1987 Astro & Safari)
Courtesy of GENERAL MOTORS CORP.

RANGE	MODEL	NORMAL OIL PRESSURE AT MINIMUM T.V.		NORMAL OIL PRESSURE AT FULL T.V.	
		kPa	PSI	kPa	PSI
PARK, NEUTRAL, OVERDRIVE & MANUAL 3RD @ 1000 RPM	YSM	384-444	56-64	994-1277	144-185
	YTM	451-515	65-75	947-1185	137-172
	YMM	451-515	65-75	1073-1354	155-196
	YXM	451-515	65-75	1002-1267	145-184
	MCM, MHM, MTM, PAM, PBM, PCM, PRM, TAM, TBM, TNM,	451-515	65-75	844-1068	122-155
	FAM, FMM, MAM, MDM, MFM, MKM, MLM, MPM, MRM, MWM, MXM, MZM, THM, TJM, TKM, TLM, TUM, TXM	451-515	65-75	851-1063	123-154
	YPM	384-444	56-64	1006-1285	146-186
	YKM	384-444	56-64	883-1129	128-164
	YNM	384-444	56-64	962-1237	139-179
	YAM, YDM, YWM, YZM	384-444	56-64	1049-1359	152-197
REVERSE @ 1000 RPM * @ 2000 RPM	YSM	632-729	92-106	*1634-2100	237-305
	YTM	742-847	108-123	*1557-1948	226-283
	YMM	742-846	108-123	*1763-2225	256-323
	YXM	742-847	108-123	*1647-2082	239-302
	MCM, MHM, MTM, PAM, PBM, PCM, PRM, TAM, TBM, TNM	742-847	108-123	*1388-1755	201-254
	FAM, FMM, MAM, MDM, MFM, MKM, MLM, MPM, MRM, MWM, MXM, MZM, THM, TJM, TKM, TLM, TUM, TXM	742-847	108-123	*1399-1747	203-253
	YPM	632-730	92-106	*1654-2112	240-306
	YKM	632-730	92-106	*1452-1856	211-269
	YNM	632-730	92-106	*1581-2034	229-295
	YAM, YDM, YWM, YZM	632-730	92-106	*1724-2234	250-324
MANUAL 2ND & MANUAL LO @ 1000 RPM	YXM	1316-1501	191-217	1316-1501	191-217
	YAM, YDM, YKM, YLM, YNM, YPM, YSM, YTM, YWM, YZM	1120-1293	162-187	1120-1293	162-187
	FAM, FMM, MAM, MCM, MDM, MHM, MKM, MLM, MPM, MRM, MSM, MTM, MWM, MXM, MZM, PAM, PBM, PCM, PRM, TAM, TBM, THM, TJM, TKM, TLM, TNM, TUM, TXM, YMM, YXM	1127-1286	163-186	1127-1286	163-186

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Fig. 24: Oil Pressure Specifications (1988 Car Models)
Courtesy of GENERAL MOTORS CORP.

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RANGE	MODEL	NORMAL OIL PRESSURE AT MINIMUM T.V.		NORMAL OIL PRESSURE AT FULL T.V.	
		kPa	PSI	kPa	PSI
PARK, NEUTRAL, OVERDRIVE & MANUAL 3RD @ 1000 RPM	YTM	451-515	65-75	947-1185	137-172
	YMM	451-515	65-75	1073-1354	155-196
	YXM	451-515	65-75	1002-1267	145-184
	MCM, MHM, MTM, PAM, PBM, PCM, PRM, TAM, TBM, TNM,	451-515	65-75	844-1068	122-155
	FAM, FMM, MAM, MDM, MFM, MKM, MLM, MPM, MRM, MWM, MXM, MZM, THM, TJM, TKM, TLM, TUM, TXM	451-515	65-75	851-1063	123-154
	YPM	384-444	56-64	1006-1285	146-186
	YKM	384-444	56-64	883-1129	128-164
	YNM	384-444	56-64	962-1237	139-179
	YDM, YWM, YZM	384-444	56-64	1049-1359	152-197
REVERSE @ 1000 RPM *@ 2000 RPM	YTM	742-847	108-123	*1557-1948	226-283
	YMM	742-846	108-123	*1763-2225	256-323
	YXM	742-847	108-123	*1647-2082	239-302
	MCM, MHM, MTM, PAM, PBM, PCM, PRM, TAM, TBM, TNM	742-847	108-123	*1388-1755	201-254
	FAM, FMM, MAM, MDM, MFM, MKM, MLM, MPM, MRM, MWM, MXM, MZM, THM, TJM, TKM, TLM, TUM, TXM	742-847	108-123	*1399-1747	203-253
	YPM	632-730	92-106	*1654-2112	240-306
	YKM	632-730	92-106	*1452-1856	211-269
	YNM	632-730	92-106	*1581-2034	229-295
	YDM, YWM, YZM	632-730	92-106	*1724-2234	250-324
MANUAL 2ND & MANUAL LO @ 1000 RPM	YDM, YKM, YLM, YNM, YPM, YTM, YWM, YZM	1120-1293	162-187	1120-1293	162-187
	FAM,FMM,MAM,MCM,MDM,MHM,MKM,MLM,MPM,MRM,MSM,MTM,MWM,MXM, MZM,PAM,PBM,PCM,PRM,TAM,TBM,THM,TJM,TKM,TLM,TNM,TUM,TXM,YMM,YXM	1127-1286	163-186	1127-1286	163-186

50G16986

Fig. 25: Oil Pressure Specifications (1988 Truck Models)
Courtesy of GENERAL MOTORS CORP.

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1989 THM 4L60 TRANSMISSION PRESSURES

RANGE	MODEL	NORMAL PRESSURE AT MINIMUM T.V.		NORMAL PRESSURE AT FULL T.V.	
		kPa	PSI	kPa	PSI
PARK, NEUTRAL, OVERDRIVE & MANUAL 3RD @ 1000 RPM	FKM, FXM, YPM, YZM	451-515	65-75	1073-1354	155-196
	FMM, HDM, MAM, MFM, MRM, MXM	451-515	65-75	851-1063	123-154
	HBM	451-515	65-75	1029-1308	149-190
	MCM, PRM	451-515	65-75	845-1068	123-155
	MDM, MKM, MLM, TJM, TKM	451-515	65-75	947-1185	137-172
	MHM, PAM, PBM, PCM, TNM	451-515	65-75	899-1134	130-164
	MPM, MWM, MZM, TUM, TXM	451-515	65-75	914-1149	133-167
	THM, TLM	451-515	65-75	969-1231	141-179
	YDM	384-444	56-64	1049-1359	152-197
	YNM	451-515	65-75	1025-1306	149-189
	YTM	451-515	65-75	816-1016	118-147
	YXM	451-515	65-75	865-1080	125-157
REVERSE @ 1000 RPM	FKM, FXM, YPM, YZM	742-847	108-123	1763-2225	256-323
	FMM, HDM, MAM, MFM, MRM, MXM	742-847	108-123	1400-1747	203-253
	HBM	742-847	108-123	1691-2150	245-312
	MCM, PRM	580-662	84-96	1085-1372	157-199
	MDM, MKM, MLM, TJM, TKM	742-847	108-123	1556-1948	226-283
	MHM, PAM, PBM, PCM, TNM	741-845	107-123	1474-1860	214-270
	MPM, MWM, MZM, TUM, TXM	742-847	108-123	1503-1889	218-274
	THM, TLM	742-847	108-123	1593-2023	231-293
	YDM	632-730	92-106	1724-2234	250-324
	YNM	742-847	108-123	1686-2146	245-311
	YTM	742-847	108-123	1342-1670	195-242
	YXM	580-662	84-96	1111-1387	161-201
MANUAL 2ND & MANUAL LO @ 1000 RPM	FKM, FXM, HBM, HDM, MAM, MCM, MDM, MFM, MKM, MLM, MPM, MRM, MWM, MXM, MZM, PRM, THM, TJM, TKM, TLM, TUM, TXM, YMM, YNM, YPM, YTM, YUM, YXM, YZM	1127-1286	163-186	1127-1286	163-186
	MHM, PAM, PBM, PCM, TNM	1191-1359	173-197	1191-1359	173-197
	YDM	1120-1293	162-187	1120-1293	162-187

For transmission model identification, *see Fig. 1.*

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Fig. 26: Oil Pressure Specifications (1989 Models)
Courtesy of GENERAL MOTORS CORP.

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1990 HYDRA-MATIC 4L60 TRANSMISSION PRESSURES					
RANGE	MODEL	NORMAL PRESSURE AT MINIMUM T.V.		NORMAL PRESSURE AT FULL T.V.	
		kPa	PSI	kPa	PSI
PARK, NEUTRAL, OVERDRIVE & MANUAL 3RD @ 1000 RPM	BAM, FTM	451-515	65-75	816-1016	118-147
	BPM	451-515	65-75	1025-1306	149-189
	CAM, CBM, HCM, HDM, KAM, MJM, MNM, WAM	451-515	65-75	851-1063	123-154
	CCM, CFM, TNM, WBM	451-515	65-75	947-1185	137-172
	CHM, CJM, RAM, TMM, WCM	451-515	65-75	914-1149	133-167
	DBM	483-622	70-90	883-1170	128-170
	FBM	451-515	65-75	918-1146	133-166
	FUM, FZM	451-515	65-75	1073-1354	155-196
	HBM, HHM	483-622	70-90	1019-1347	148-195
	HJM, YDM	451-515	65-75	1116-1430	162-207
	LAM, LBM, LCM, LDM, LFM	451-515	65-75	899-1134	130-164
	MBM, SAM	451-515	65-75	845-1068	123-155
	MSM	483-622	70-90	797-1079	116-157
	SHM, TLM	451-515	65-75	969-1231	141-179
REVERSE @ 1000 RPM	BAM, FTM	742-847	108-123	1342-1670	195-242
	BPM	742-847	108-123	1686-2146	245-311
	CAM, CBM, HCM, HDM, KAM, MJM, MNM, WAM	742-847	108-123	1400-1747	203-253
	CCM, CFM, TNM, WBM	742-847	108-123	1556-1948	226-283
	CHM, CJM, RAM, TMM, WCM	742-847	108-123	1503-1889	218-274
	DBM	793-1023	115-148	1451-1924	210-279
	FBM	580-662	84-96	1180-1472	171-214
	FUM, FZM	742-847	108-123	1763-2225	256-323
	HBM, HHM	793-1023	115-148	1676-2214	243-320
	HJM, YDM	742-847	108-123	1834-2351	265-340
	LAM, LBM, LCM, LDM, LFM	741-845	107-123	1474-1860	214-270
	MBM, SAM	580-662	84-96	1085-1372	157-199
	MSM	793-1023	115-148	1311-1773	190-257
	SHM, TLM	742-847	108-123	1593-2023	231-293
MANUAL 2ND & MANUAL LO @ 1000 RPM	BAM, BPM, CAM, CBM, CCM, CFM, CHM, CJM, FBM, FTM, FUM, FZM, HCM, HDM, HJM, KAM, MBM, MJM, MNM, RAM, SAM, SHM, TLM, TMM, TNM, WAM, WBM, WCM, YDM	1127-1286	163-186	1127-1286	163-186
	DBM, HBM, HHM, MSM	1205-1554	175-226	1205-1554	175-226
	LAM, LBM, LCM, LDM, LFM	1191-1359	173-197	1191-1359	173-197

For transmission model identification, *see Fig. 1*.

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Fig. 27: Oil Pressure Specifications (1990 Models)
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1991 HYDRA-MATIC 4L60 TRANSMISSION PRESSURES

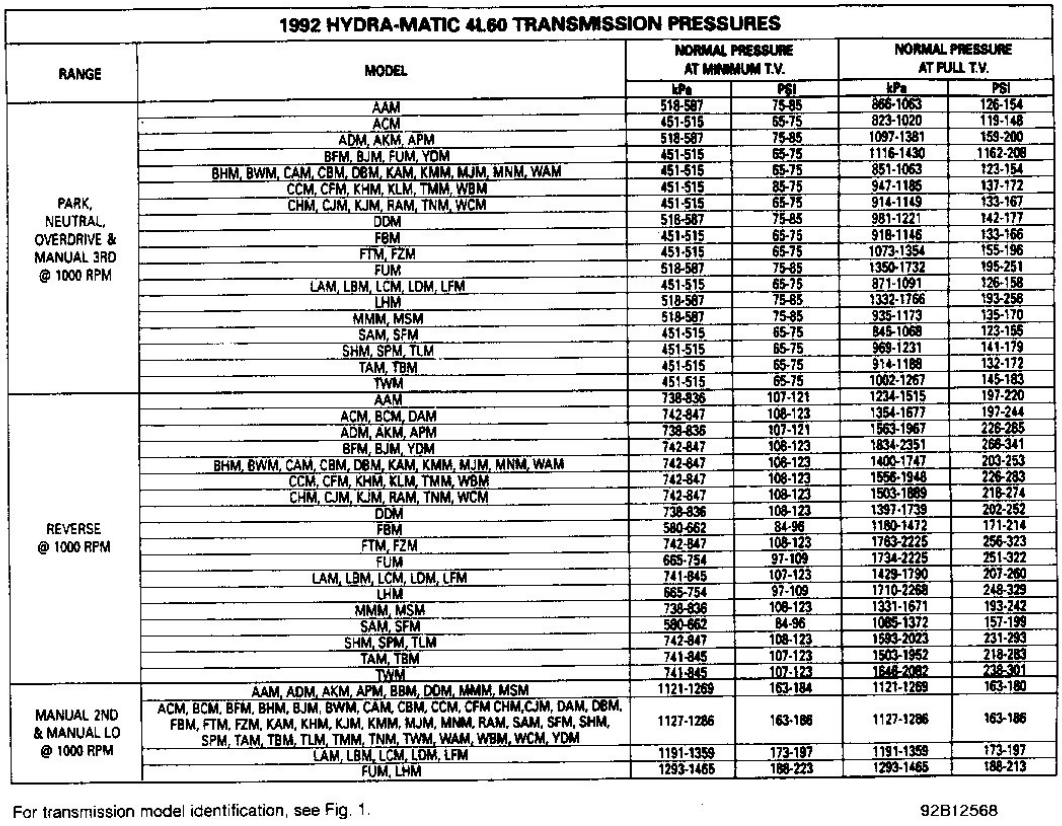
RANGE	MODEL	NORMAL PRESSURE AT MINIMUM T.V.		NORMAL PRESSURE AT FULL T.V.	
		kPa	PSI	kPa	PSI
PARK, NEUTRAL, OVERDRIVE & MANUAL 3RD @ 1000 RPM	BBM	483-622	70-90	866-1146	125-166
	CAM, CBM, KAM, MJM, MNM, WAM	451-515	65-75	851-1063	123-154
	CCM, CFM, KBM, WBM	451-515	65-75	947-1185	137-172
	CHM, CJM, KCM, RAM, WCM	451-515	65-75	914-1149	133-167
	FBM	451-515	65-75	918-1146	133-166
	FTM, FUM, FZM	451-515	65-75	1073-1354	155-196
	LAM, LBM, LCM, LDM, LFM	451-515	65-75	899-1134	130-164
	MSM	483-622	70-90	797-1079	116-157
	SAM	451-515	65-75	845-1068	123-155
	SHM, TLM	451-515	65-75	969-1231	141-179
REVERSE @ 1000 RPM	BBM	793-1023	115-148	1424-1883	206-273
	CAM, CBM, KAM, MJM, MNM, WAM	742-847	108-123	1400-1747	203-253
	CCM, CFM, KBM, WBM	742-847	108-123	1556-1948	226-283
	CHM, CJM, KCM, RAM, WCM	742-847	108-123	1503-1889	218-274
	FBM	580-662	84-96	1180-1472	171-214
	FTM, FUM, FZM	742-847	108-123	1763-2225	256-323
	LAM, LBM, LCM, LDM, LFM	741-845	107-123	1474-1860	214-270
	MSM	793-1023	115-148	1311-1773	190-257
	SAM	580-662	84-96	1085-1372	157-199
	SHM, TLM	742-847	108-123	1583-2023	231-293
MANUAL 2ND & MANUAL LO @ 1000 RPM	CAM, CBM, CCM, CFM, CHM, CJM, FBM, FTM, FUM, FZM, KAM, KBM, KCM, MJM, MNM, RAM, SAM, SHM, TLM, WAM, WBM, WCM	1127-1286	163-186	1127-1286	163-186
	BBM, MSM	1205-1554	175-226	1205-1554	175-226
	LAM, LBM, LCM, LDM, LFM	1191-1359	173-197	1191-1359	173-197

For transmission model identification, see Fig. 1.

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Fig. 28: Oil Pressure Specifications (1991 Models)
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1992 HYDRA-MATIC 4L60 TRANSMISSION PRESSURES

RANGE	MODEL	NORMAL PRESSURE AT MINIMUM T.V.		NORMAL PRESSURE AT FULL T.V.	
		kPa	PSI	kPa	PSI
PARK, NEUTRAL, OVERDRIVE & MANUAL 3RD @ 1000 RPM	AAM	518-587	75-85	866-1063	126-154
	ACM	451-515	65-75	823-1020	119-148
	ADM, AKM, APM	518-587	75-85	1097-1381	159-200
	BFM, BJM, FUM, YDM	451-515	65-75	1116-1430	1162-208
	BHM, BWM, CAM, CBM, DBM, KAM, KMM, MJM, MNM, WAM	451-515	65-75	851-1063	123-154
	CCM, CFM, KHM, KLM, TMM, WBM	451-515	65-75	947-1185	137-172
	CHM, CJM, KJM, RAM, TNM, WCM	451-515	65-75	914-1149	133-167
	DDM	518-587	75-85	981-1221	142-177
	FBM	451-515	65-75	918-1145	133-166
	FTM, FZM	451-515	65-75	1073-1354	155-196
	FUM	518-587	75-85	1350-1732	195-251
	LAM, LBM, LCM, LDM, LFM	451-515	65-75	871-1091	126-158
	LHM	518-587	75-85	1332-1766	193-256
	MMM, MSM	518-587	75-85	935-1173	135-170
	SAM, SFM	451-515	65-75	845-1068	123-155
	SHM, SPM, TLM	451-515	65-75	969-1231	141-179
	TAM, TBM	451-515	65-75	914-1188	132-172
	TWM	451-515	65-75	1002-1267	145-183
REVERSE @ 1000 RPM	AAM	738-836	107-121	1234-1515	197-220
	ACM, BCM, DAM	742-847	108-123	1354-1677	197-244
	ADM, AKM, APM	738-836	107-121	1563-1967	226-285
	BFM, BJM, YDM	742-847	108-123	1834-2351	266-341
	BHM, BWM, CAM, CBM, DBM, KAM, KMM, MJM, MNM, WAM	742-847	108-123	1400-1747	203-253
	CCM, CFM, KHM, KLM, TMM, WBM	742-847	108-123	1556-1948	226-283
	CHM, CJM, KJM, RAM, TNM, WCM	742-847	108-123	1503-1889	218-274
	DDM	738-836	108-123	1397-1739	202-252
	FBM	580-662	84-96	1180-1472	171-214
	FTM, FZM	742-847	108-123	1763-2225	256-323
	FUM	665-754	97-109	1734-2225	251-322
	LAM, LBM, LCM, LDM, LFM	741-845	107-123	1429-1790	207-260
	LHM	665-754	97-109	1710-2268	248-329
	MMM, MSM	738-836	108-123	1331-1671	193-242
	SAM, SFM	580-662	84-96	1085-1372	157-199
	SHM, SPM, TLM	742-847	108-123	1593-2023	231-293
	TAM, TBM	741-845	107-123	1503-1952	218-283
	TWM	741-845	107-123	1646-2082	238-301
MANUAL 2ND & MANUAL LO @ 1000 RPM	AAM, ADM, AKM, APM, BBM, DDM, MMM, MSM	1121-1269	163-184	1121-1269	163-180
	ACM, BCM, BFM, BHM, BJM, BWM, CAM, CBM, CCM, CFM CHM,CJM, DAM, DBM, FBM, FTM, FZM, KAM, KHM, KJM, KMM, MJM, MNM, RAM, SAM, SFM, SHM, SPM, TAM, TBM, TLM, TMM, TNM, TWM, WAM, WBM, WCM, YDM	1127-1286	163-186	1127-1286	163-186
	LAM, LBM, LCM, LDM, LFM	1191-1359	173-197	1191-1359	173-197
	FUM, LHM	1293-1465	188-223	1293-1465	188-213

For transmission model identification, see Fig. 1.

92B12568

Fig. 29: Oil Pressure Specifications (1992 Models)
Courtesy of GENERAL MOTORS CORP.

TORQUE CONVERTER

NOTE: Torque converter is a sealed unit and must be serviced as complete assembly.

STALL TEST

1. Torque converter whine is usually noticed when vehicle is stopped and transmission is in Reverse or Drive. Whine will increase when engine RPM is increased and will stop when vehicle is moving or when torque converter clutch is applied. Stall test is to ensure whine is coming from torque converter.
2. Start engine, and allow it to reach normal operating temperature. Apply parking and service brakes. Put transmission in Drive. Depress accelerator to approximately 1200 RPM for less than 6 seconds. **DO NOT** depress accelerator for more than 6 seconds or transmission damage may occur. Torque converter noise will increase under this load.

NOTE: Torque converter whine should not be confused with pump whine, which is usually noticeable in Park, Neutral and all other gear ranges.

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STATOR CHECK

1. Torque converter stator roller clutch can either remain locked up at all times or freewheel in both directions. If stator is freewheeling at all times, vehicle tends to have poor acceleration from a stop. Vehicle may act normal at speeds above 30-35 MPH.
2. If poor acceleration is noted, ensure exhaust system is not blocked, engine timing is correct and transmission is in 1st gear when starting from a stop. If stator is locked up at all times, performance from a stop appears normal. Engine RPM and acceleration is limited at high speeds. Engine may overheat from this condition.
3. A visual inspection of torque converter may reveal converter is Blue from overheating. If torque converter has been removed from vehicle, stator roller clutch can be checked by inserting a finger into splined inner race of roller clutch and trying to turn race in both directions. Inner race should turn freely clockwise but should not turn or should be difficult to turn counterclockwise.

END PLAY CHECK

1. Inspect torque converter for hub scoring, cracks or weld area cracks before checking end play. Install End Play Checking Tool (J-35138) on torque converter. See **Fig. 30** .
2. Note end play of torque converter. End play must be within specification. See **TORQUE CONVERTER END PLAY SPECIFICATIONS** . Replace torque converter if end play is not within specification or damage to hub area exists.

TORQUE CONVERTER END PLAY SPECIFICATIONS

Converter Diameter: In. (mm)	End Play: In. (mm)
9.65 (245.0)	.000-.020 (.00-.50)
11.73 (298.0)	.000-.024 (.00-.61)

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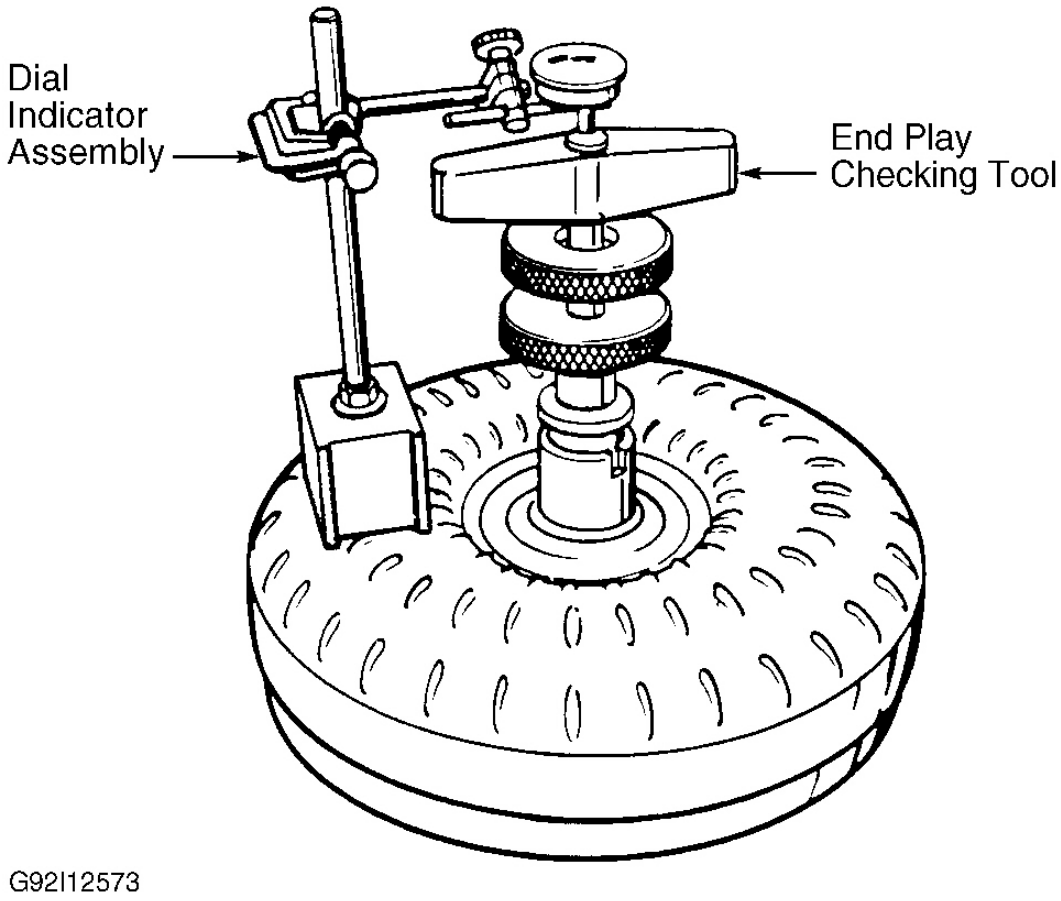


Fig. 30: Checking Torque Converter End Play
Courtesy of GENERAL MOTORS CORP.

CONVERTER FLUSHING

Torque converter flushing is not recommended. Replace torque converter if contamination is found during oil cooler flushing procedure.

NOTE: For additional information on Torque Converter Clutch (TCC), see AUTO TRANS DIAGNOSIS - GM TORQUE CONVERTER CLUTCH article in the AUTOMATIC TRANSMISSIONS section.

REMOVAL & INSTALLATION

See appropriate TRANSMISSION REMOVAL & INSTALLATION - A/T article in the TRANSMISSION SERVICING section.

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TRANSMISSION DISASSEMBLY

2-4 SERVO ASSEMBLY

1. Mount transmission in Holding Fixture (J-8763-02). Remove torque converter. Clean outside of transmission case if necessary. Install Servo Cover Compressor (J-29714) on 2 oil pan bolts. See **Fig. 31** . Compress servo cover. Remove retaining ring. Remove servo cover and "O" ring.
2. Remove 2-4 servo assembly. Servo pin length should be checked before disassembling assembly to determine 2-4 band and reverse input drum wear or damage.

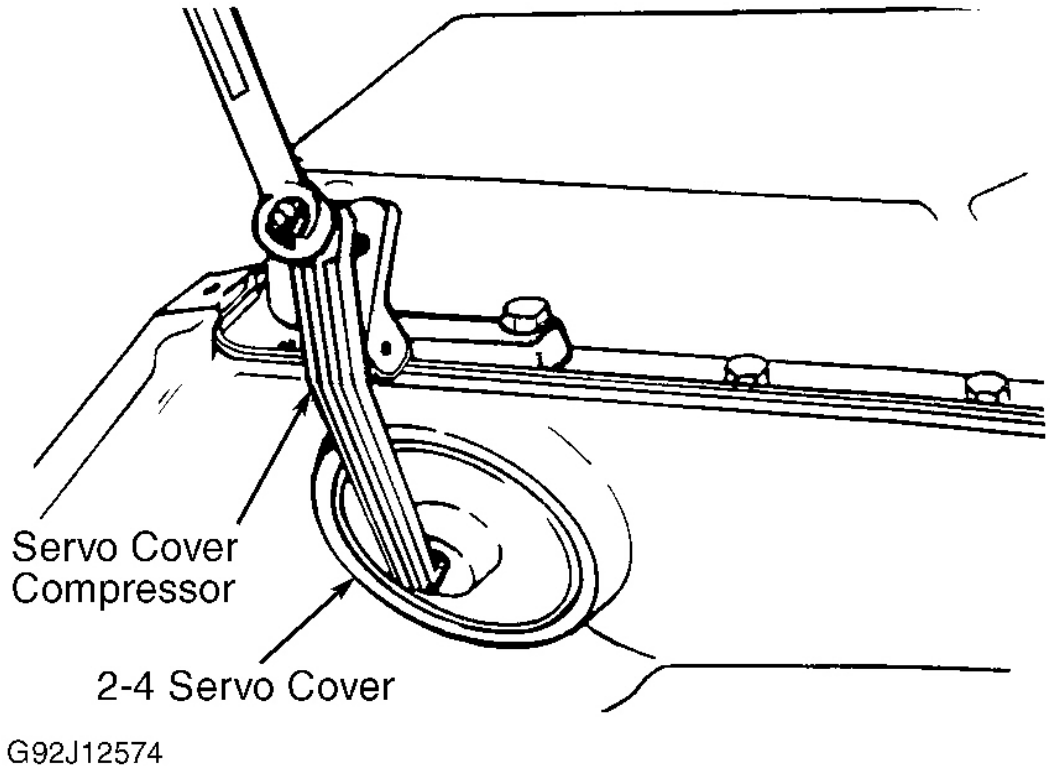


Fig. 31: Compressing Servo Cover
Courtesy of GENERAL MOTORS CORP.

CHECKING SERVO PIN LENGTH

1. Remove 4th apply piston and return spring. See **Fig. 32** . Remove retainer ring, washer, apply pin spring and 2nd apply piston pin. Install Piston Compressor (J-22269-01) on 2nd apply piston. See **Fig. 33** .
2. Remove retainer ring, cushion spring and spring retainer. Install Band Apply Pin Tool (J-33037) and apply pin. See **Fig. 34** . Apply 100 INCH lbs. (11 N.m) torque. Note White line on band apply tool.
3. White line should appear within gauge slot if pin length is correct. If White line does not appear, inspect

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2-4 band and reverse input drum for wear and damage during disassembly.

4. Servo pin length must be checked during reassembly. Servo pin is preset and must not be readjusted. See **SERVO PIN SPECIFICATIONS** under **2-4 BAND & SERVO ASSEMBLY** under TRANSMISSION REASSEMBLY.

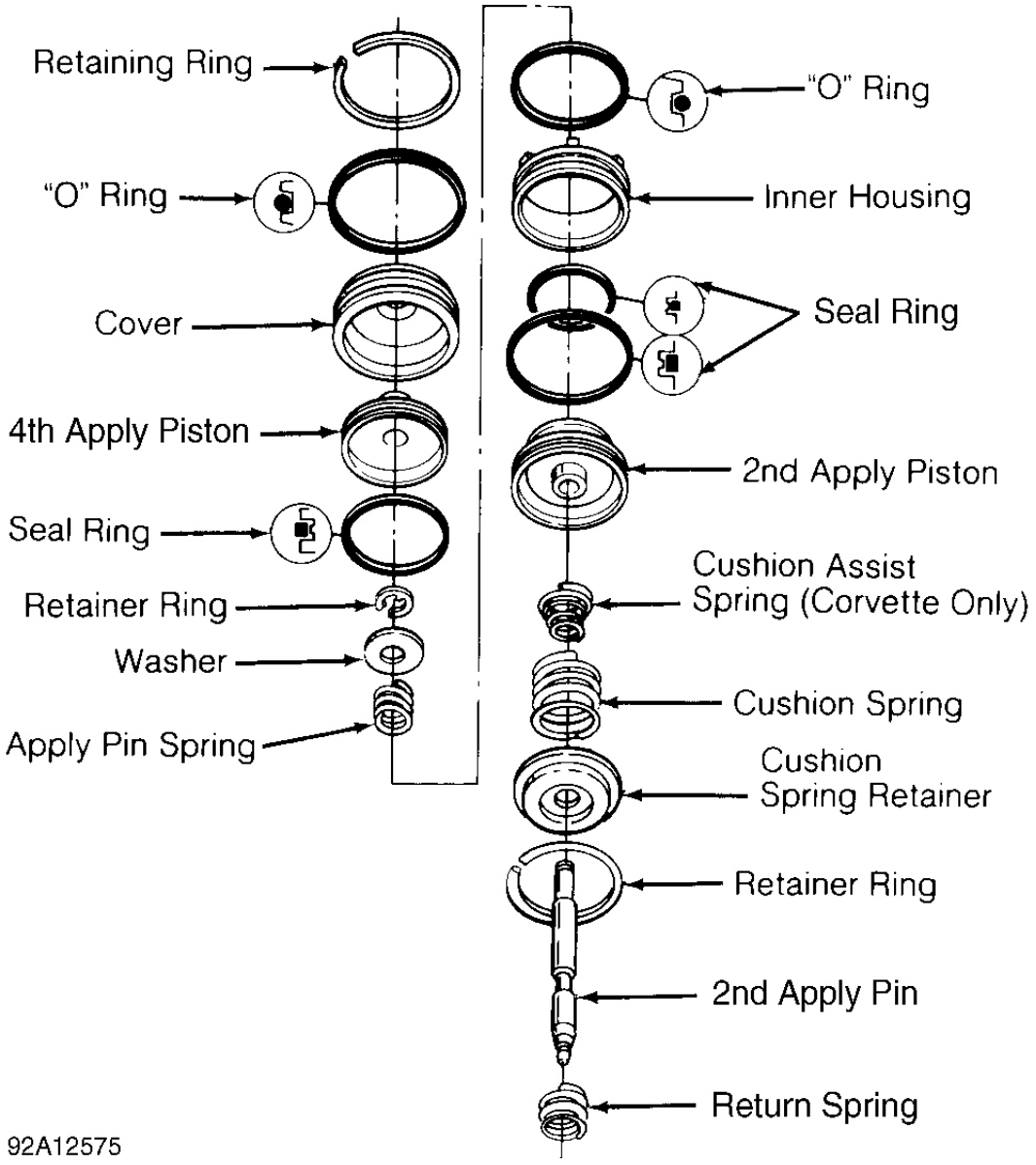


Fig. 32: Exploded View of 2-4 Servo Assembly
Courtesy of GENERAL MOTORS CORP.

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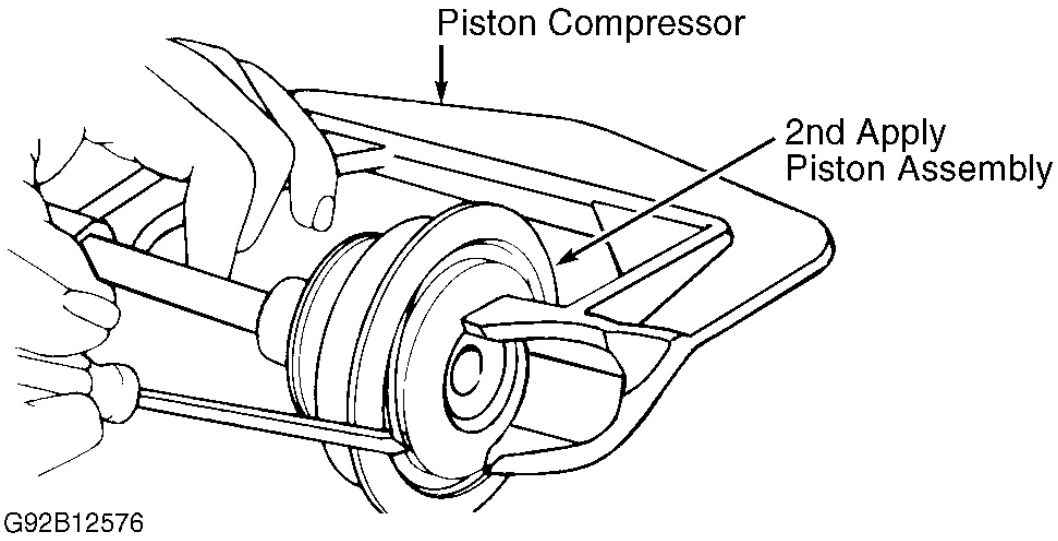


Fig. 33: Compressing 2nd Apply Piston
Courtesy of GENERAL MOTORS CORP.

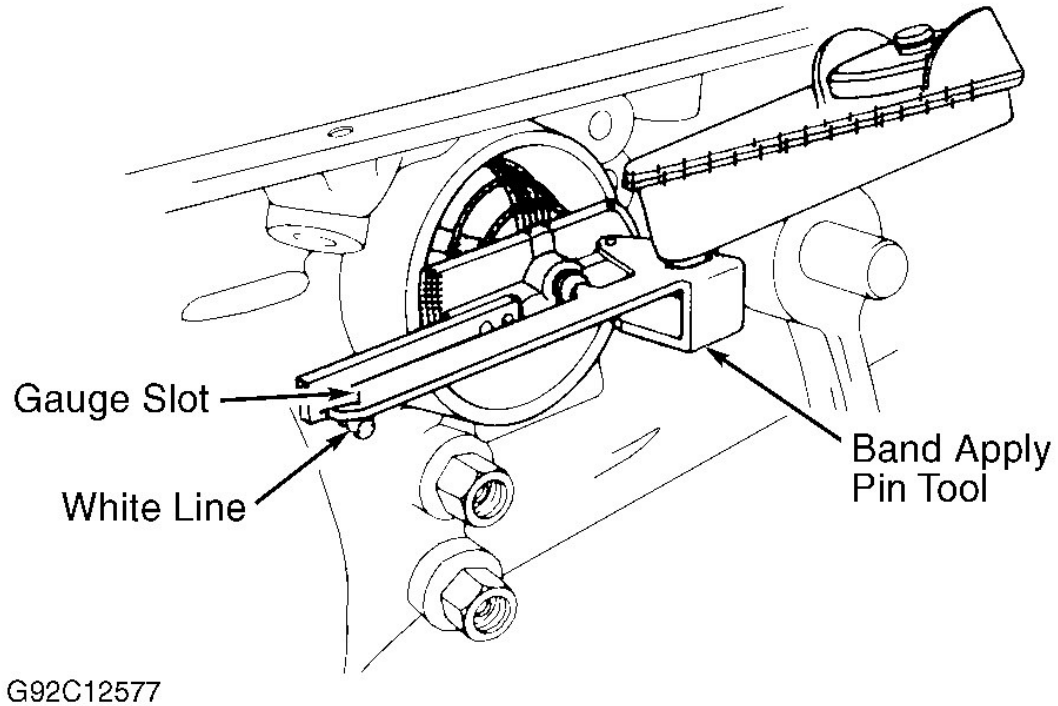


Fig. 34: Measuring Servo Pin Length

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Courtesy of GENERAL MOTORS CORP.

EXTENSION HOUSING

1. Remove governor cover and "O" ring. Remove governor assembly. On models with mechanical speedometers, remove retaining bolt, washer and retainer. Remove speedometer driven gear assembly, driven gear and "O" ring.
2. On models with internal speed sensor, remove retaining bolt and washer. Remove speed sensor assembly and "O" ring. Remove extension housing retaining bolts. Remove extension housing and seal. Remove output shaft sleeve and "O" ring (if equipped). Speed sensor rotor must be removed from output shaft.
3. Install Gear Puller (J-21427-01) and Adapter (J-8433) on rotor. Pull rotor from output shaft. On models with mechanical speedometers, push retaining clip tab. Remove speedometer gear from output shaft.

VALVE BODY & AUXILIARY VALVE BODY

Remove valve body and auxiliary valve body. See **VALVE BODY** and **AUXILIARY VALVE BODY** under ON-VEHICLE SERVICE. Note bolt length and location during removal. Note check ball location for reassembly reference.

1-2 ACCUMULATOR & SPACER PLATES

1. Remove solenoid retaining bolts. Remove solenoid and "O" ring. Remove wiring harness, and note location for reassembly reference. Carefully remove accumulator cover retaining bolts, 1-2 accumulator cover and pin assembly.
2. Remove 1-2 accumulator piston, seal and spring. Remove spacer plate, and note check ball and filter locations. Remove spring, 3-4 accumulator piston and pin. Note spacer plate and gasket locations. See **Fig. 35** for check ball and filter locations.

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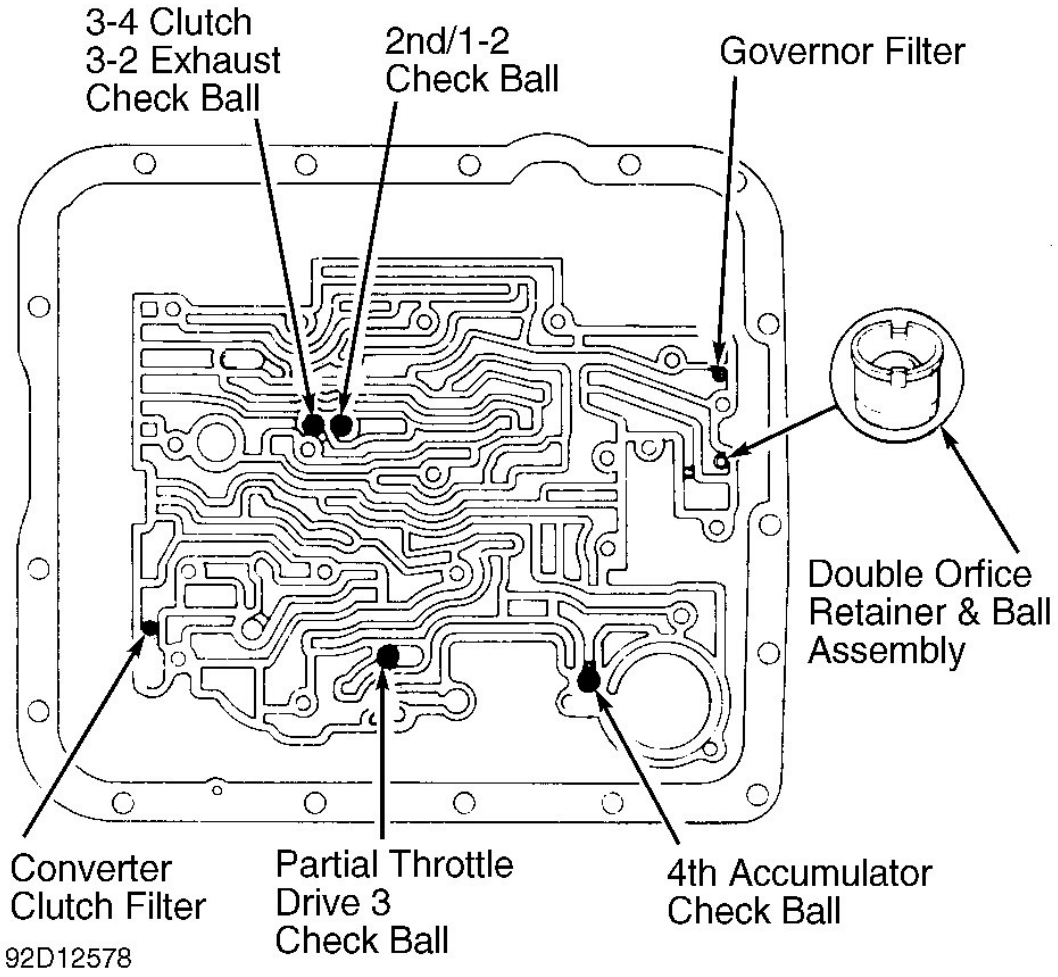


Fig. 35: Locating Check Balls & Filters
Courtesy of GENERAL MOTORS CORP.

TRANSMISSION END PLAY CHECK

NOTE: Check transmission end play before disassembly. If end play is not within specification, check for damaged components.

1. Position transmission with oil pump facing up. Remove one oil pump retaining bolt and washer, and replace it using an 11" bolt and lock nut. Install Pump Remover/End Play Fixture (J-24773-A) and End Play Adapter (J-25022-A) on end of turbine shaft. See **Fig. 36** .
2. Clamp dial indicator on long bolt. Position indicator tip on end play fixture. Zero dial indicator. Pull up on pump remover. Note dial indicator reading. Transmission end play should be .005-.036" (.13-.91 mm). Check for worn components if end play is not within specification.

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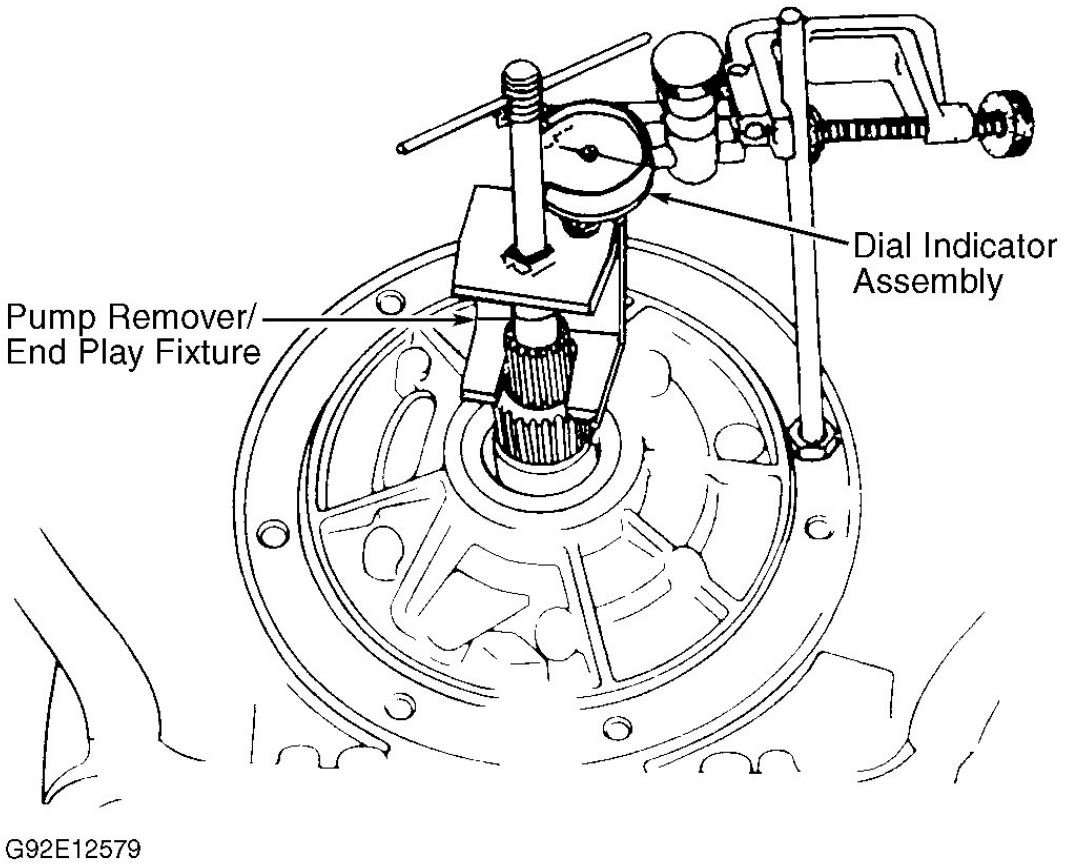


Fig. 36: Checking Transmission End Play
Courtesy of GENERAL MOTORS CORP.

OIL PUMP, INPUT CLUTCH & REVERSE CLUTCH

1. Ensure solenoid assembly and oil filter are removed before oil pump removal. Remove oil pump retaining bolts. Using Oil Pump Remover (J-37789-A) and Adapter (J-39119), pull pump assembly free from case.
2. Remove oil pump seal and gasket. Remove reverse input clutch-to-pump thrust washer from pump. Remove reverse and input clutch assembly by lifting out along with turbine shaft.

2-4 BAND & INPUT GEAR SET

1. Remove band anchor pin from case. See **Fig. 37** . Remove 2-4 band assembly from case. Remove input sun gear. See **Fig. 38** .

CAUTION: Output shaft must be held in place when removing input carrier retaining ring.

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2. Install Output Shaft Support (J-29837) on output shaft. See **Fig. 39** . Remove input carrier to output shaft retaining ring. Remove input carrier. Remove output shaft. Remove input carrier thrust washer from reaction carrier shaft.

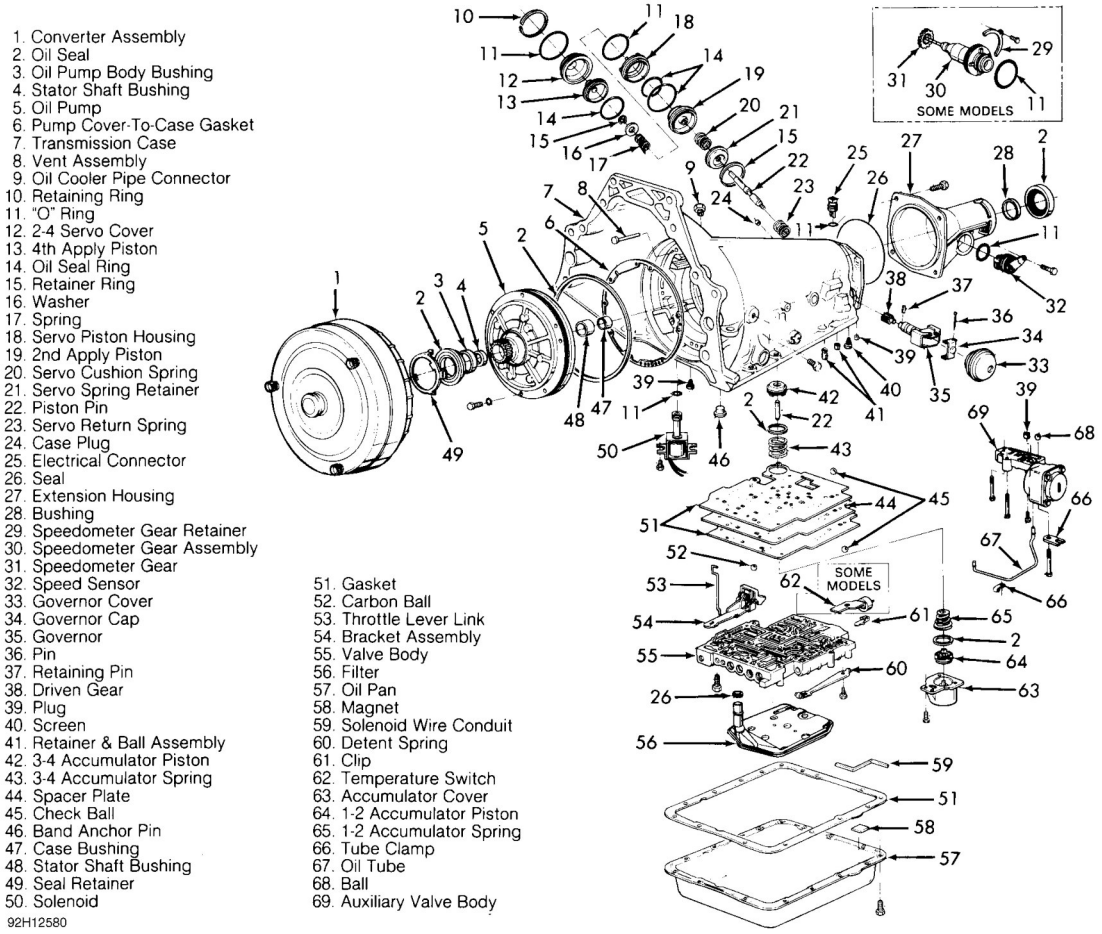


Fig. 37: Exploded View of 4L60 Transmission External Components
Courtesy of GENERAL MOTORS CORP.

LEGEND FOR FIGURE 37

Item No.	Description
1	Converter Assembly
2	Oil Seal
3	Oil Pump Body Bushing
4	Stator Shaft Bushing
5	Oil Pump
6	Pump Cover-To-Case Gasket
7	Transmission Case
8	Vent Assembly
9	Oil Cooler Pipe Connector

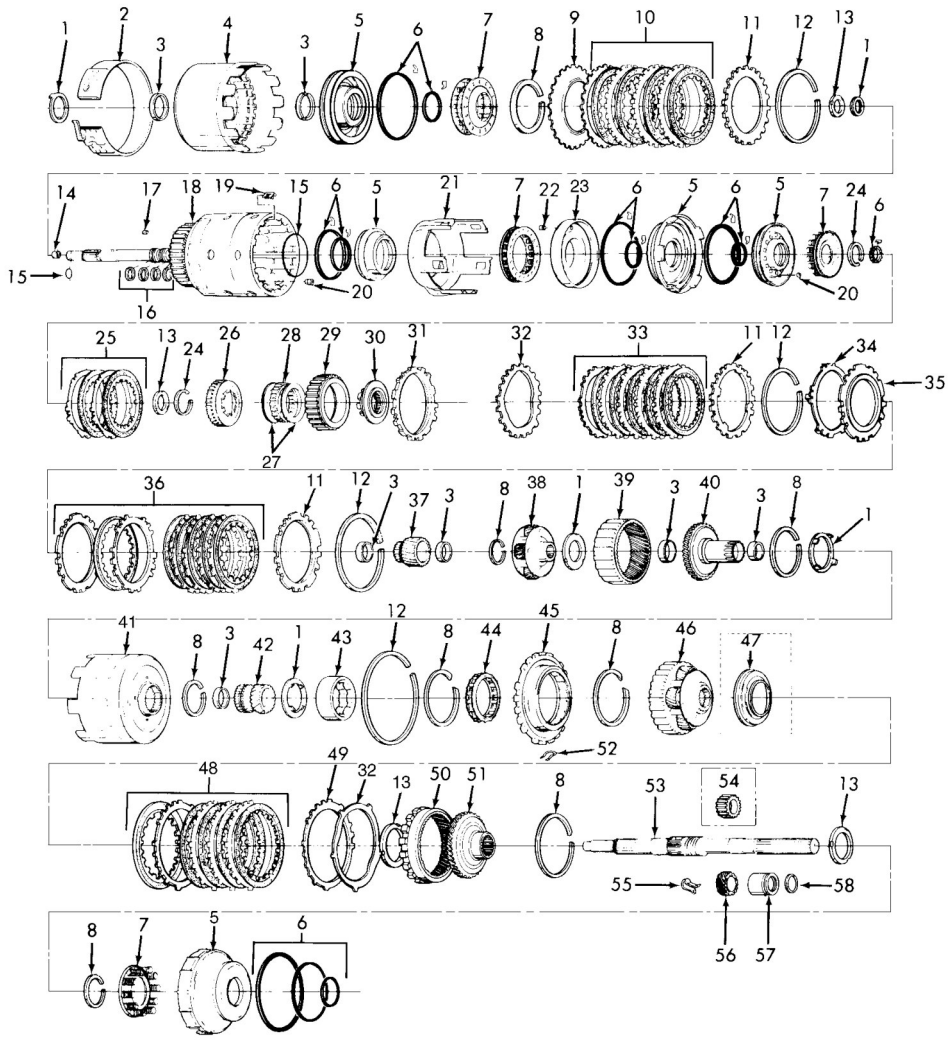
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10	Retaining Ring
11	"O" Ring
12	2-4 Servo Cover
13	4th Apply Piston
14	Oil Seal Ring
15	Retainer Ring
16	Washer
17	Spring
18	Servo Piston Housing
19	2nd Apply Piston
20	Servo Cushion Spring
21	Servo Spring Retainer
22	Piston Pin
23	Servo Return Spring
24	Case Plug
25	Electrical Connector
26	Seal
27	Extension Housing
28	Bushing
29	Speedometer Gear Retainer
30	Speedometer Gear Assembly
31	Speedometer Gear
32	Speed Sensor
33	Governor Cover
34	Governor Cap
35	Governor
36	Pin
37	Retaining Pin
38	Driven Gear
39	Plug
40	Screen
41	Retainer & Ball Assembly
42	3-4 Accumulator Piston
43	3-4 Accumulator Spring
44	Spacer Plate
45	Check Ball
46	Band Anchor Pin
47	Case Bushing
48	Stator Shaft Bushing
49	Seal Retainer
50	Solenoid
51	

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	Gasket
52	Carbon Ball
53	Throttle Lever Link
54	Bracket Assembly
55	Valve Body
56	Filter
57	Oil Pan
58	Magnet
59	Solenoid Wire Conduit
60	Detent Spring
61	Clip
62	Temperature Switch
63	Accumulator Cover
64	1-2 Accumulator Piston
65	1-2 Accumulator Spring
66	Tube Clamp
67	Oil Tube
68	Ball
69	Auxiliary Valve Body

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1. Thrust Washer
2. 2-4 Band
3. Bushing
4. Reverse Input Clutch Housing
5. Piston
6. Seal
7. Spring Assembly
8. Retainer Ring
9. Belleville Plate
10. Clutch Assembly
11. Backing Plate
12. Retaining Ring
13. Bearing Assembly
14. Check Valve
15. "O" Ring
16. Oil Seal
17. Cup Plug
18. Input Shaft Housing Assembly
19. Clutch Boost Spring Assembly
20. Check Ball
21. 3-4 Clutch Apply Ring
22. Retainer & Ball Assembly
23. Forward Clutch Housing
24. Snap Ring
25. Overrun Clutch Assembly
26. Overrun Clutch Hub
27. Sprag Retainer Rings
28. Sprag Assembly
29. Forward Clutch Race
30. Sprag Retainer & Race
31. Forward Clutch Apply Plate
32. Waved Plate
33. Forward Clutch Assembly
34. Clutch Retainer Plate
35. 3-4 Clutch Apply Plate
36. 3-4 Clutch Assembly
37. Input Sun Gear
38. Input Carrier Assembly
39. Input Internal Gear
40. Reaction Carrier Shaft
41. Reaction Sun Gear Shell
42. Reaction Sun Gear
43. Low-Reverse Clutch Race
44. Low-Reverse Roller Clutch
45. Support
46. Reaction Carrier Assembly
47. Oil Deflector
48. Low-Reverse Clutch Assembly
49. Spacer Plate
50. Internal Reaction Gear
51. Internal Reaction Gear Support
52. Retainer Spring
53. Output Shaft
54. Rotor
55. Clip
56. Speedometer Drive Gear
57. Output Shaft Sleeve
58. Output Shaft Seal

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Fig. 38: Exploded View of 4L60 Transmission Internal Components
Courtesy of GENERAL MOTORS CORP.

LEGEND FOR FIGURE 38

Item No.	Description
1	Thrust Washer
2	2-4 Band

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3	Bushing
4	Reverse Input Clutch Housing
5	Piston
6	Seal
7	Spring Assembly
8	Retainer Ring
9	Belleville Plate
10	Clutch Assembly
11	Backing Plate
12	Retaining Ring
13	Bearing Assembly
14	Check Valve
15	"O" Ring
16	Oil Seal
17	Cup Plug
18	Input Shaft Housing Assembly
19	Clutch Boost Spring Assembly
20	Check Ball
21	3-4 Clutch Apply Ring
22	Retainer & Ball Assembly
23	Forward Clutch Housing
24	Snap Ring
25	Overrun Clutch Assembly
26	Overrun Clutch Hub
27	Sprag Retainer Rings
28	Sprag Assembly
29	Forward Clutch Race
30	Sprag Retainer & Race
31	Forward Clutch Apply Plate
32	Waved Plate
33	Forward Clutch Assembly
34	Clutch Retainer Plate
35	3-4 Clutch Apply Plate
36	3-4 Clutch Assembly
37	Input Sun Gear
38	Input Carrier Assembly
39	Input Internal Gear
40	Reaction Carrier Shaft
41	Reaction Sun Gear Shell
42	Reaction Sun Gear
43	Low-Reverse Clutch Race
44	

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	Low-Reverse Roller Clutch
45	Support
46	Reaction Carrier Assembly
47	Oil Deflector
48	Low-Reverse Clutch Assembly
49	Spacer Plate
50	Internal Reaction Gear
51	Internal Reaction Gear Support
52	Retainer Spring
53	Output Shaft
54	Rotor
55	Clip
56	Speedometer Drive Gear
57	Output Shaft Sleeve
58	Output Shaft Seal

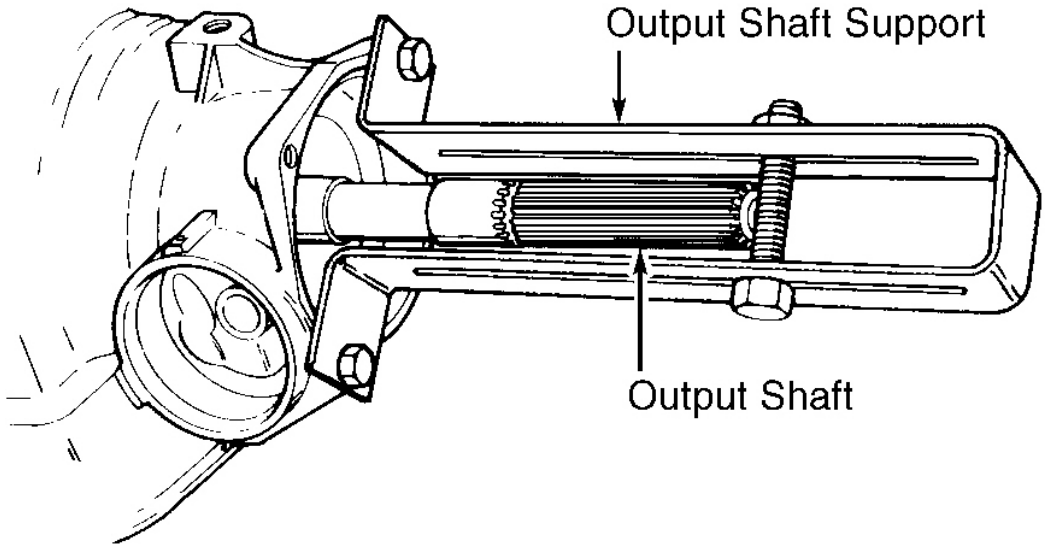


Fig. 39: Installing Output Shaft Support
Courtesy of GENERAL MOTORS CORP.

REACTION GEAR SET

1. Remove input internal gear and reaction carrier shaft. Remove reaction sun shell and thrust washer. Remove sun shell-to-clutch race thrust washer. Remove support-to-case retaining ring.

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2. Remove spring retainer from low-reverse support. Remove reaction sun gear, low-reverse clutch race, clutch roller, support assembly and reaction carrier assembly. See **Fig. 38** .
3. Remove low-reverse clutch assembly. Note locations of components. Remove internal reaction gear and bearing assembly. Remove internal reaction support-to-case bearing assembly.

LOW-REVERSE CLUTCH

NOTE: Parking pawl may require removal to access low-reverse clutch.

1. Remove parking lock bracket retaining bolts. Remove lock bracket. Using screw extractor, remove shaft plug. Remove parking pawl shaft, parking pawl and return spring if necessary.
2. Using Clutch Spring Compressor (J-23327), compress low reverse clutch spring retainer. Remove spring retaining ring and low-reverse spring assembly. Remove low-reverse clutch piston by applying air pressure in case apply passage. See **Fig. 40** .

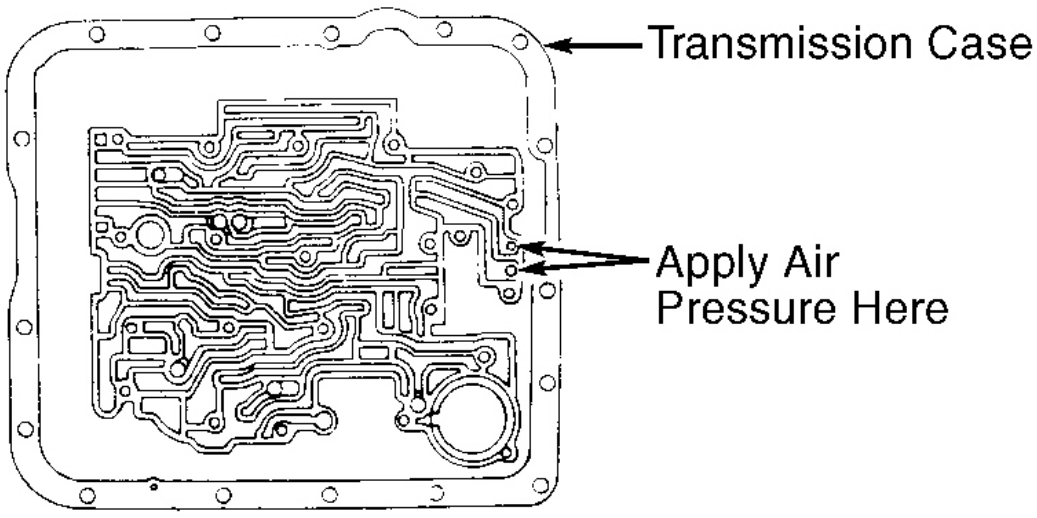


Fig. 40: Removing Low-Reverse Clutch Piston
Courtesy of GENERAL MOTORS CORP.

INNER MANUAL SHAFT LINKAGE

Remove manual shaft nut. Remove manual shaft and retainer. Remove parking lock actuator assembly and inner detent lever. Using a screwdriver, remove manual shaft seal from transmission case.

3RD ACCUMULATOR CHECK VALVE

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1. Check 3rd accumulator check valve before removing it. **DO NOT** remove check valve unless it is leaking. Install servo assembly in bore. Install servo cover and retaining ring. See **Fig. 31** . Pour clean solvent in bore. Inspect for leaks in transmission case. Replace check valve assembly if it leaks. See **Fig. 41** . Remove servo assembly.
2. For check valve removal, install No. 4 screw extractor in check valve assembly. Remove check valve. Ensure bore is free of burrs. Installation tool must be made to ensure proper installation depth is obtained. Using a 3/8" O.D. rod, scribe indicator mark at 1.653" (41.98 mm) from end of rod. Install check valve until scribe mark on rod is flush with case. See **Fig. 41** .

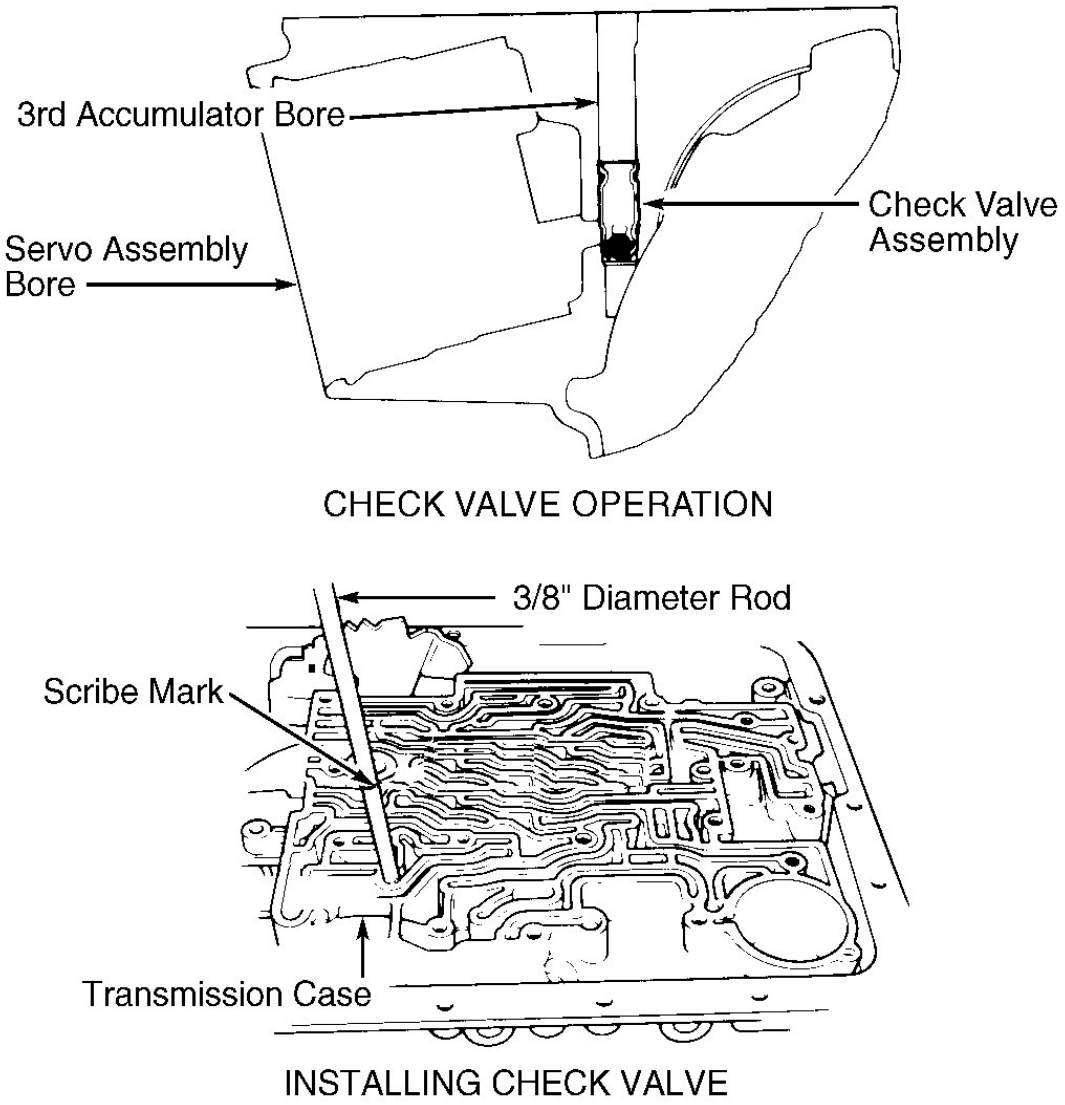


Fig. 41: Installing 3rd Accumulator Check Valve Assembly
Courtesy of GENERAL MOTORS CORP.

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COMPONENT DISASSEMBLY & REASSEMBLY

REVERSE INPUT CLUTCH

Disassembly

1. Remove retaining ring from reverse input clutch housing. Remove backing plate, steel clutch plates, composition plates and Belleville plate. See **Fig. 38** . Note number of clutch plates used. Using Clutch Spring Compressor (J-23327), compress reverse input spring assembly.
2. Remove retaining ring. Remove clutch spring compressor, and remove spring assembly. Remove piston and seals. Thickness of composition plates should be .068-.074" (1.73-1.88 mm). Selective thickness backing plate is also used.

Inspection

1. Inspect backing plate and steel clutch plates for damage, distortion, flatness and burred edges. Inspect composition plates for signs of excessive heat and damage to tang areas.
2. Inspect spring retainer for distortion. Check piston for deformation or damage in seal ring area. Inspect clutch housing bushings for wear. Inspect clutch housing for dishing. Replace worn or damaged components as necessary. If components are replaced, ensure replacement components match those previously used.

NOTE: Soak clutch plates in ATF before installation.

Reassembly

1. Lubricate piston seals with ATF. Install seals on piston with seal lips facing away from hub. Install piston in clutch housing. Use small feeler gauge to position seals. Install spring assembly with large opening toward piston.
2. Using clutch spring compressor, compress spring assembly. Install retaining ring. Remove spring compressor.

CAUTION: Ensure correct retaining ring is used. Ensure reverse input clutch retaining ring is not interchanged with low-reverse retaining ring.

3. Install Belleville plate. Note number of clutch plates to be installed. Install clutch plates. Install backing plate with chamfered side upward. Install retaining ring. Clearance must be checked to determine proper selective backing plate usage. Apply even pressure to backing plate using fingers.
4. **DO NOT** apply excessive pressure or Belleville plate will be distorted, resulting in inaccurate measurement. Using feeler gauge, measure clearance between retaining ring and backing plate. Clearance should be 040-.076" (1.02-1.94 mm). Select backing plate to obtain correct clearance. See **BACKING PLATE SPECIFICATIONS** .

BACKING PLATE SPECIFICATIONS

Identification	Thickness: In. (mm)

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5	.293-.299 (7.44-7.59)
6	.267-.273 (6.78-6.93)
7	.241-.247 (6.12-6.27)
8	.215-.221 (5.46-5.61)

VALVE BODY

NOTE: Valves are held in valve body by pins. Use care when removing pins. Valves may be under spring pressure. Note locations of all components during disassembly for reassembly reference.

Disassembly

1. Remove valve train, and note direction of valve installation. Remove all outside pins by pushing pins through from rough casting side of valve body. See **Fig. 42** .
2. Remove blind pins using modified drill bit. Grind taper on end of a 1/16" drill bit. Drive drill bit into pin. Pull drill bit and pin straight out. Remove pressure switches. Note locations of all components.

Inspection

1. Clean all components with clean solvent, and dry using compressed air. Ensure all components are placed in sequence for correct reassembly.
2. Inspect valves and sleeves for scoring and cracks. Ensure valves move freely in bores. Inspect valve body for cracks and scored bores. Inspect machined surfaces for damage. Inspect springs for damaged coils. Replace damaged components as necessary.

Reassembly

For reassembly, reverse disassembly procedure. Ensure all components are installed in correct location. See **Fig. 42** . Ensure pins are fully installed and do not extend into machined areas. Note position of valve lands and bushing passages.

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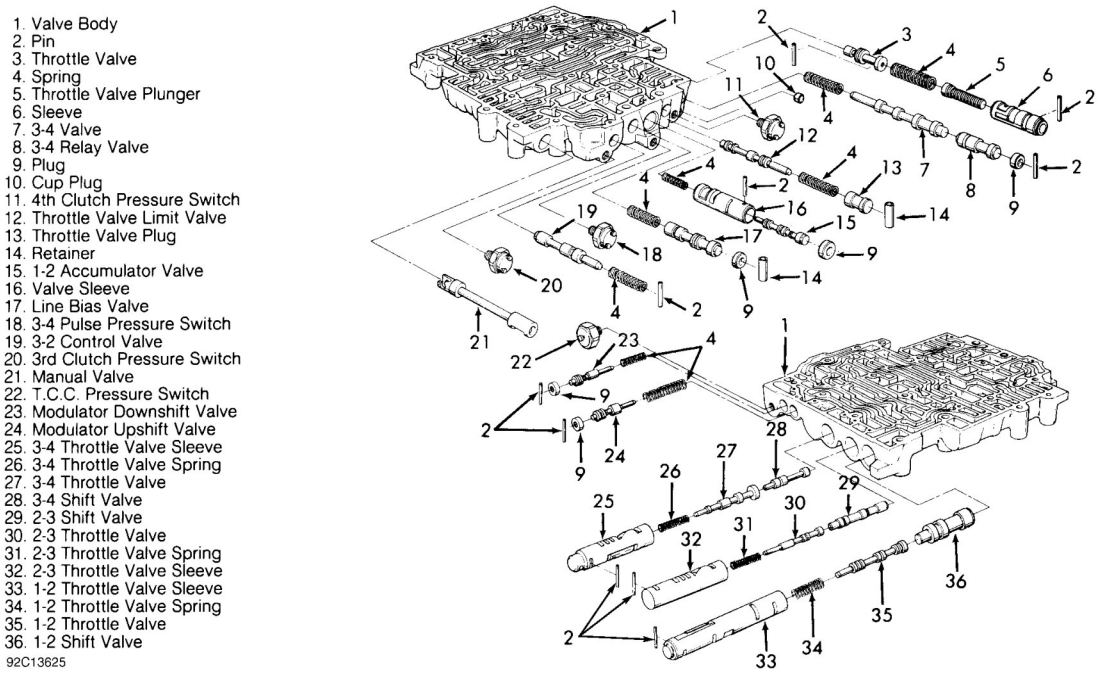


Fig. 42: Exploded View of Valve Body
Courtesy of GENERAL MOTORS CORP.

LEGEND FOR FIGURE 42

Item No.	Description
1	Valve Body
2	Pin
3	Throttle Valve
4	Spring
5	Throttle Valve Plunger
6	Sleeve
7	3-4 Valve
8	3-4 Relay Valve
9	Plug
10	Cup Plug
11	4th Clutch Pressure Switch
12	Throttle Valve Limit Valve
13	Throttle Valve Plug
14	Retainer
15	1-2 Accumulator Valve
16	Valve Sleeve
17	Line Bias Valve
18	3-4 Pulse Pressure Switch
19	3-2 Control Valve

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20	3rd Clutch Pressure Switch
21	Manual Valve
22	T.C.C. Pressure Switch
23	Modulator Downshift Valve
24	Modulator Upshift Valve
25	3-4 Throttle Valve Sleeve
26	3-4 Throttle Valve Spring
27	3-4 Throttle Valve
28	3-4 Shift Valve
29	2-3 Shift Valve
30	2-3 Throttle Valve
31	2-3 Throttle Valve Spring
32	2-3 Throttle Valve Sleeve
33	1-2 Throttle Valve Sleeve
34	1-2 Throttle Valve Spring
35	1-2 Throttle Valve
36	1-2 Shift Valve

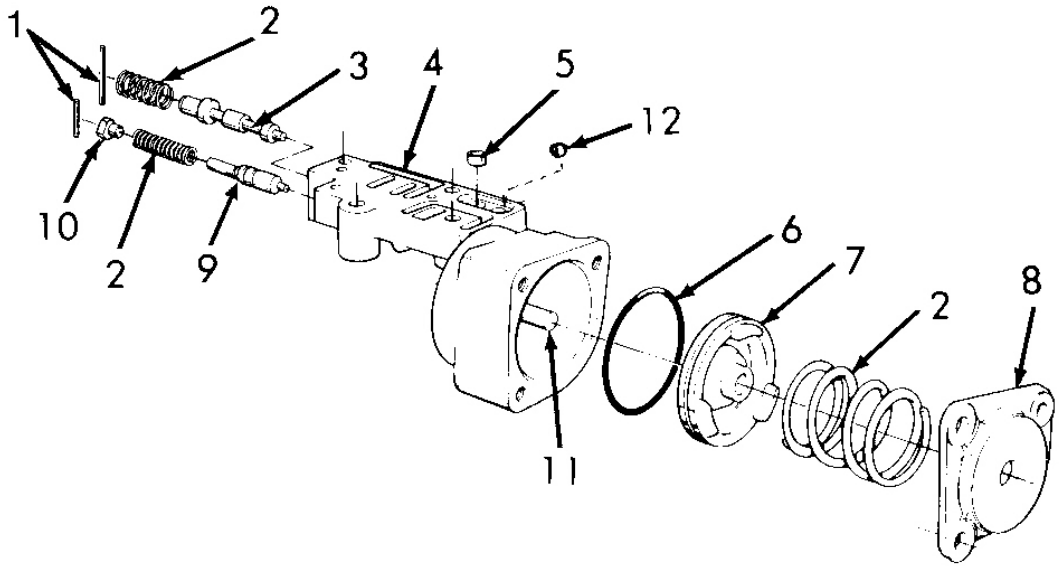
AUXILIARY VALVE BODY

CAUTION: Note location of all components during disassembly for reassembly reference.

Disassembly

1. Auxiliary valve cover is under spring tension. Carefully remove cover retaining bolts. Remove cover and spring. Remove piston and "O" ring. See **Fig. 43** . Press low-overrun clutch valve downward.
2. Remove pin, spring and low-overrun valve. Remove pin, abuse valve stop, spring and abuse valve. **DO NOT** remove orifice plug unless it is damaged.

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1. Pin
2. Spring
3. Low-Overrun Clutch Valve
4. Auxiliary Valve Body
5. Orifice Plug
6. "O" Ring
7. Piston
8. Cover
9. Abuse Valve
10. Abuse Valve Stop
11. Piston Pin
12. Check Ball

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Fig. 43: Exploded View of Auxiliary Valve Body
Courtesy of GENERAL MOTORS CORP.

LEGEND FOR FIGURE 43

Item No.	Description
1	Pin
2	Spring
3	Low-Overrun Clutch Valve
4	Auxiliary Valve Body
5	Orifice Plug
6	"O" Ring
7	Piston
8	Cover
9	Abuse Valve
10	Abuse Valve Stop
11	Piston Pin
12	Check Ball

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Inspection

1. Clean all components with clean solvent, and dry using compressed air. Inspect piston for cracks and roughness. Inspect valves and piston bore for nicks and scoring. Inspect springs for damaged coils.
2. Ensure valves operate freely in bores. Inspect valve body for damaged or rough machined surfaces. Ensure overrun valve pin is tight in valve body. If pin has come out of valve body, loss or slipping in "D" range may occur or forward and overrun clutches may be burnt.

Reassembly

1. Install orifice plug (if removed) using 3/8" diameter rod. Orifice plug must be positioned flush with mounting surface. For reassembly, reverse disassembly procedure.
2. Install NEW "O" ring on piston. Lubricate "O" ring with petroleum jelly. Install piston and spring. Install cover and retaining bolts. Tighten bolts to specification. See **TORQUE SPECIFICATIONS** .

LOW-REVERSE SUPPORT ASSEMBLY

CAUTION: Note direction roller clutch is installed in support. Roller clutch must be installed in proper direction to provide lockup of inner race when rotated.

Disassembly & Inspection

Remove inner race and retainer ring. Remove roller clutch assembly. Check inner race for damage and surface finish. See **Fig. 44** . Inspect roller and springs for damage and distortion. Inspect support for loose cam, cracks and damaged surface finish. Replace damaged components as necessary.

Reassembly

1. Install roller clutch assembly in low-reverse support. See **Fig. 44** . Place support in case with hub facing downward. Install inner race. Rotate inner race while pushing downward. Use care not to damage roller and springs during installation.
2. Ensure inner race is fully seated. Bottom tangs will be flush with carrier hub when fully seated. Inner race should rotate clockwise and lock counterclockwise with clutch hub downward. Insert support retainer spring into case between case lug and open notch in support.

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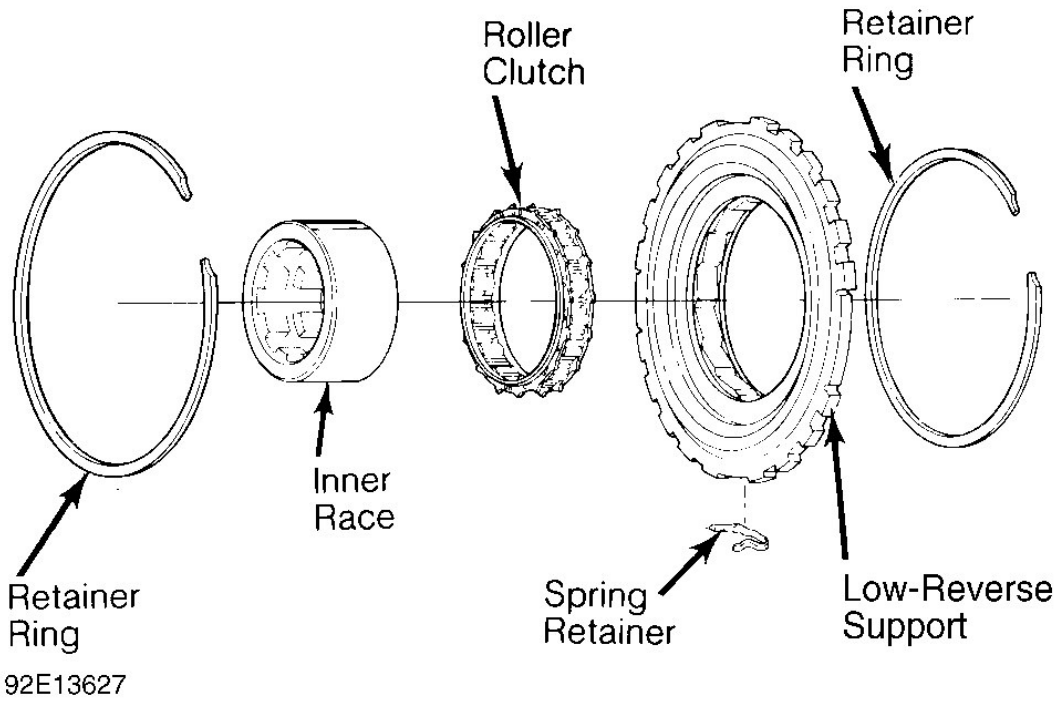


Fig. 44: Exploded View of Low-Reverse Clutch Assembly
Courtesy of GENERAL MOTORS CORP.

INPUT CLUTCH & FORWARD CLUTCH HUB ASSEMBLY

Disassembly

1. Position input clutch assembly on bench. Remove snap ring retaining 3-4 clutch backing plate. Remove backing plate. Remove 3-4 clutch plates. Note number and locations of components. Remove 3-4 apply plate and clutch ring retainer. See **Fig. 38** .
2. Remove forward clutch retainer ring, and remove backing plate. Remove forward clutch sprag assembly and bearing. Remove input housing seal. Remove forward clutch plates. Note number and locations of components.
3. Remove waved and apply plates. Remove overrun clutch plates (2 steel and 2 composition). Using Clutch Spring Compressor (J-23456) and Adapter (J-25018-A), compress overrun clutch spring retainer.
4. Remove retainer ring. Remove compressor, adapter and spring assembly. Remove overrun piston and forward clutch piston. Remove seals from pistons. Note direction of seals. Remove forward clutch housing. Remove 3-4 spring, 3-4 apply ring and piston. Remove "O" ring from input housing. Remove turbine shaft seal rings.
5. Remove forward clutch race. Remove snap ring and overrun clutch hub. Remove sprag retainer and race. Note direction race is installed. Use care not to lose rollers from roller cage.

Inspection

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1. Inspect sprag assembly for weak or damaged springs and retainers and worn rollers. Inspect overrun clutch hub for spline damage, excessive wear and open oil passages. Inspect retainer and race for spline damage, surface wear and damaged ring grooves.
2. Replace sprag assembly if damaged. Inspect forward clutch race for spline damage, excessive wear and open oil passages. Inspect input shaft and housing for spline damage, wear and open feed passages.
3. Inspect 3 sealing balls located in rear of turbine shaft for tightness. Turbine shaft contains one open lubrication hole. Ensure orifice plug is installed.
4. Inspect check valve located in end of turbine shaft for tightness in shaft. Check ball must move freely. Replace check valve if damaged. Inspect turbine shaft seal areas for roughness and burrs.
5. Inspect check ball located in input housing for free operation. Pour solvent in check ball, and check for leakage. Replace check ball if it leaks.
6. Inspect pistons for wear, damage and porosity. Inspect spring assemblies for damage and distortion. Inspect steel clutch plates for damaged tang ends, high or burned spots, excessive wear and distortion caused by heat.
7. Inspect composition clutch plates for damaged tang ends, burning, flaking and excessive wear. Inspect retainer rings for distortion and damage. Check backing plates for flatness and distortion. Inspect clutch apply rings for distortion and damaged tangs.
8. Inspect forward clutch housing check ball for proper operation (if equipped). Inspect housing for cracks and damage in seal areas. Inspect bearings for excessive wear, flatness, damage and flat rollers.

Reassembly

1. If turbine shaft check valve requires replacement, straighten tangs of retainer and remove check ball. Using No. 4 screw extractor, remove check valve. Remove retainer from shaft by turning.
2. Position check valve in turbine shaft. Using a 3/8" diameter rod, drive retainer and check valve assembly into shaft. Check valve must be positioned 1/8" below top surface of turbine shaft. Ensure check ball is loose.
3. For input housing check ball replacement, drive retainer and ball assembly from housing using 1/4" diameter drift. Install NEW check ball assembly using 1/4" drift. Check ball assembly should seat on housing shoulder. Assemble forward clutch sprag assembly.
4. Install sprag assembly in forward clutch race. Notches located in sprag must face upward. See **Fig. 45** . Install retainer ring on sprag retainer and race. Retainer ring flange must face away from retainer and race.

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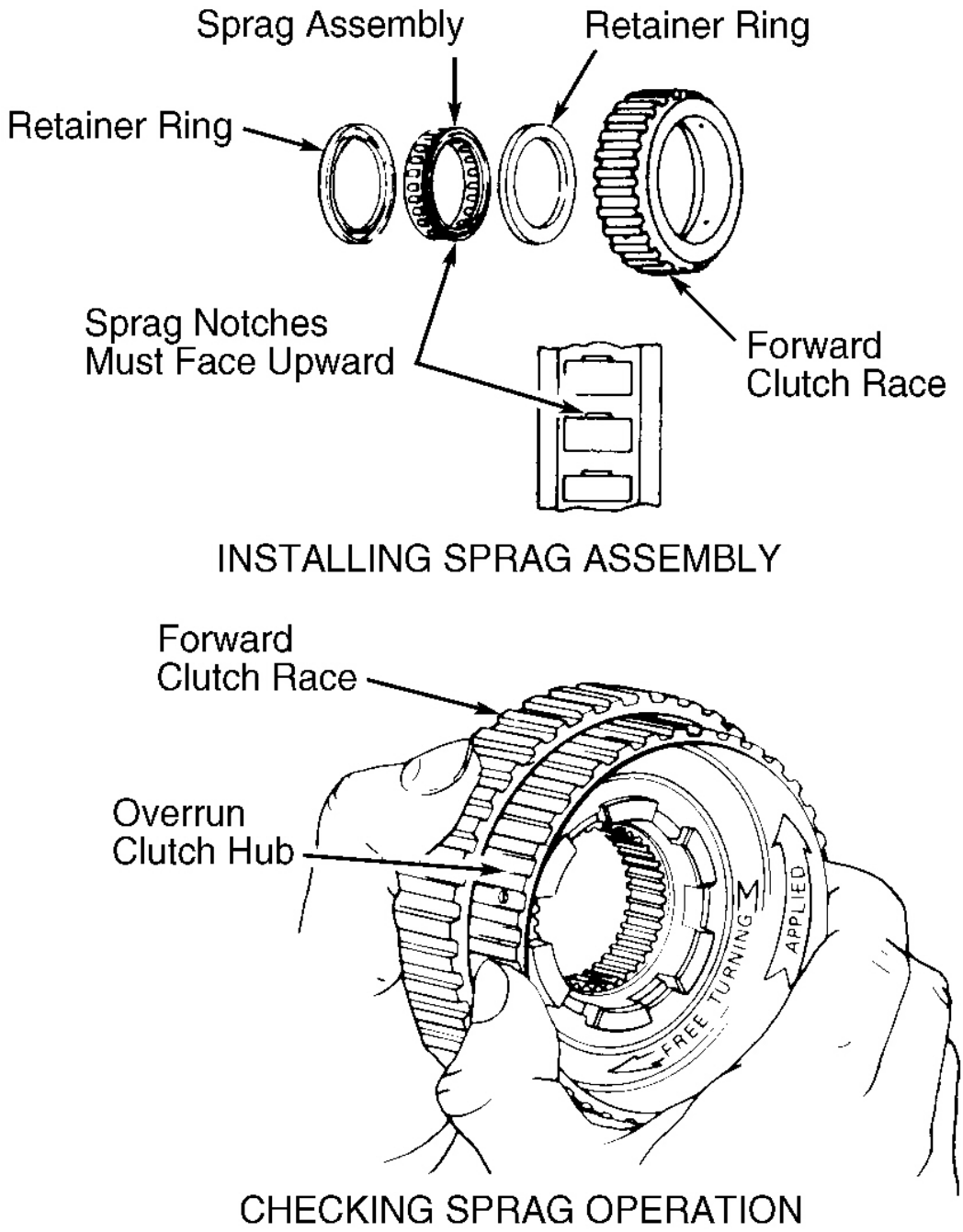


Fig. 45: Installing & Checking Clutch Sprag Assembly
Courtesy of GENERAL MOTORS CORP.

5. Hold outer race in left hand. Support sprag assembly. Install sprag retainer and race in sprag assembly.

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Rotate retainer and race left. Install remaining retainer ring. Install overrun clutch hub. Install snap ring.

6. Check sprag operation. Holding forward clutch race, rotate overrun clutch hub. Overrun clutch hub should turn freely clockwise and lock counterclockwise. See **Fig. 45** . If lock operation is not correct, sprag assembly is installed backward.
7. Place input clutch housing with turbine shaft downward. Install 3-4 piston seals with lips facing away from hub. Install 3-4 piston in input housing. Rotate and gently push downward. Ensure piston is fully seated. Measure 3-4 clutch apply ring from end of arm to base area that sets against 3-4 piston. Different size apply rings are used.
8. Install 3-4 clutch apply ring. Install "O" ring in input clutch housing. Install forward clutch housing. Install seals on forward clutch piston with lips facing away from tangs.
9. Install forward clutch piston in forward clutch housing. Install 3-4 spring on 3-4 clutch apply ring. Install forward clutch assembly on3-4 spring assembly. Align forward clutch piston legs with tangs of 3-4 apply ring. Install Seal Protector (J-29883) on input housing.
10. Install 3-4 apply ring and forward clutch assembly in input clutch housing. Hold apply ring tangs while installing. **DO NOT** allow forward clutch piston to separate from assembly. Ensure assembly is firmly seated.
11. Install Seal Protector (J-29883) on input housing. Install overrun clutch piston with hub facing upward. Remove seal protector. If fully seated, overrun piston should be 3/16" below top of snap ring groove in input housing hub.
12. Install spring assembly on overrun piston. Install Spring Compressor (J-23456) and Adapter (J-25018-A) on spring assembly. Compress springs, and install snap ring. Remove spring compressor. Install input housing seal.

NOTE: Soak clutch plates in ATF before installation. Coat all seals and "O" rings with ATF. Coat thrust washers and bearings with petroleum jelly.

13. Install 4 overrun clutch plates, starting with steel plate. Align wide notches with case lugs. Install remaining clutch plates, alternating steel and composition plates.
14. Install bearing assembly on input clutch hub. Bearing inner race must face input housing hub. Ensure bearing is centered. Align clutch plate tabs. Install forward clutch sprag assembly in input housing. Align overrun clutch hub with clutch plates.
15. Install forward clutch apply plate in input housing. Install waved forward clutch plate. Ensure all plates are aligned with input housing tangs. Starting with steel plate, install clutch plates, alternating steel and composition plates. Install backing plate and retainer ring.
16. Using 2 feeler gauges, measure clearance between backing plate and retainer ring. Clearance should be .030-.063" (.75-1.60 mm). Install correct amount of clutch plates for model application. See **FORWARD CLUTCH PLATE SPECIFICATIONS** . Install backing plate with chamfered side upward. For backing plate thickness, see **FORWARD CLUTCH BACKING PLATE SPECIFICATIONS** . Install retainer ring.

FORWARD CLUTCH PLATE SPECIFICATIONS

Plate Type	Quantity	Thickness In. (mm)
Apply	1	.169 (4.29)
Waved Steel	1	.070 (1.78)

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Flat Steel	5	.090 (2.29)
Composition	5	.070 (1.78)
Backing	1	Selective

FORWARD CLUTCH BACKING PLATE SPECIFICATIONS

Identification	Thickness In. (mm)
A	.274-.278 (6.96-7.06)
B	.251-.255 (6.38-6.48)
C	.228-.232 (5.79-5.89)
D	.205-.208 (5.20-5.28)
E	.180-.185 (4.57-4.70)

17. Install steel plate, composition plate and backing plate in reverse order of disassembly. Install clutch plates and backing plate with chamfered side upward. Install retainer ring.
18. Using feeler gauge, measure clearance between backing plate and first composition plate. Clearance is different depending on transmission model. See **3-4 CLUTCH PLATE SPECIFICATIONS** .
19. Select proper backing plate to obtain correct clearance. See **3-4 BACKING PLATE SPECIFICATIONS** . Air check all clutches by applying air pressure at feed holes in turbine shaft.
20. During overrun clutch test, air pressure will blow past forward clutch piston seals and exit out forward clutch feed hole in turbine shaft. Turbine shaft seals require sizing and should be installed just before oil pump installation.

3-4 CLUTCH PLATE SPECIFICATIONS

Plate Type	Quantity	Thickness In. (mm)
Stepped Apply	1	.183 (4.65)
Flat Steel (1)	1	.070 (1.78)
Flat Steel (2)	5 Or 6	.070 (1.78)
Composition (3)	5 Or 6	.079 (2.01)
Backing	1	Selective

(1) Same spline configuration as apply plate.

(2) 6 plates on FBM, MBM and SAM models.

(3) 5 plates on FBM, MBM and SAM models.

3-4 BACKING PLATE SPECIFICATIONS

Identification	Thickness In. (mm)
FBM & SAM Models	
5	.251-.259 (6.38-6.58)
6	.218-.226 (5.54-5.74)
All Others	
7	.186-.194 (4.72-4.93)

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8	.153-.161 (3.89-4.09)

OIL PUMP ASSEMBLY

Disassembly

1. Remove reverse input clutch drum-to-pump thrust washer, pump-to-case gasket and pump-to-case oil seal ring from pump assembly. Remove pump cover retaining bolts. Separate pump cover from pump body.

CAUTION: Pump slide spring and pressure relief spring rivet are under high pressure. To prevent possible injury, cover springs during removal.

2. Using needle-nose pliers, compress pump slide spring. Remove from pump by pulling straight out. Remove pump vane rings, pump vanes, pump rotor and rotor guide from pump pocket.
3. Remove slide from pump pocket. Remove slide seal and seal support from pump slide. See **Fig. 46** . Remove pivot pin and pivot pin spring. Remove seal ring and "O" ring from pump slide. Remove seal retainer and seal from pump body.
4. Check condition of pump bushing. If bushing is in good condition, **DO NOT** remove it. Push inward on converter clutch valve stop to compress spring. Remove snap ring. Remove valve stop, converter clutch apply valve and springs.
5. Using a small punch, remove pressure relief spring retaining rivet. Remove relief spring and ball. Remove oil screen and "O" ring from pump cover. Using a small screwdriver, compress throttle valve boost valve bushing. Remove snap ring.
6. Remove Throttle Valve (T.V.) boost bushing, throttle valve boost valve and reverse boost valve sleeve. Remove reverse boost valve, pressure regulator valve spring and pressure regulator valve.

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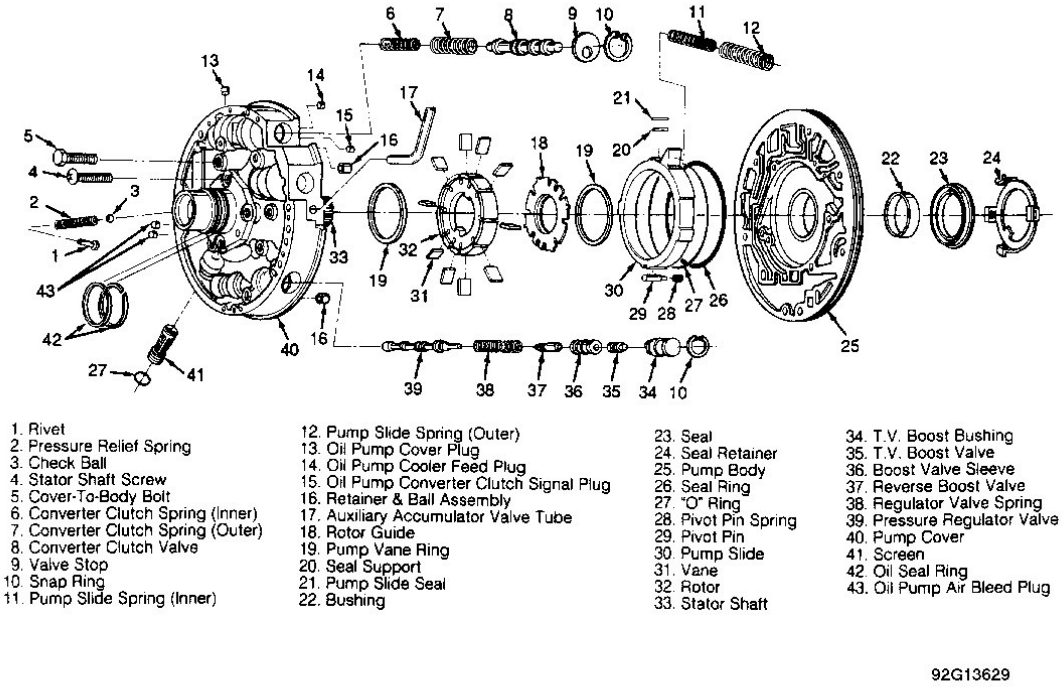


Fig. 46: Exploded View of Oil Pump Assembly
Courtesy of GENERAL MOTORS CORP.

LEGEND FOR FIGURE 46

Item No.	Description
1	Rivet
2	Pressure Relief Spring
3	Check Ball
4	Stator Shaft Screw
5	Cover-To-Body Bolt
6	Converter Clutch Spring (Inner)
7	Converter Clutch Spring (Outer)
8	Converter Clutch Valve
9	Valve Stop
10	Snap Ring
11	Pump Slide Spring (Inner)
12	Pump Slide Spring (Outer)
13	Oil Pump Cover Plug
14	Oil Pump Cooler Feed Plug
15	Oil Pump Converter Clutch Signal Plug
16	Retainer & Ball Assembly
17	Auxiliary Accumulator Valve Tube

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18	Rotor Guide
19	Pump Vane Ring
20	Seal Support
21	Pump Slide Seal
22	Bushing
23	Seal
24	Seal Retainer
25	Pump Body
26	Seal Ring
27	"O" Ring
28	Pivot Pin Spring
29	Pivot Pin
30	Pump Slide
31	Vane
32	Rotor
33	Stator Shaft
34	T.V. Boost Bushing
35	T.V. Boost Valve
36	Boost Valve Sleeve
37	Reverse Boost Valve
38	Regulator Valve Spring
39	Pressure Regulator Valve
40	Pump Cover
41	Screen
42	Oil Seal Ring
43	Oil Pump Air Bleed Plug

Inspection

1. Inspect all valves, springs, sleeves and bushings for chips, burrs, distortion and freeness in bores. Check pressure relief ball and spring for damage and distortion, especially after metal contamination. Low main line pressure will exist if ball and spring are damaged.

NOTE: Use compressed air to blow out all passages, especially converter passage between TCC apply valve and stator support shaft. Metal particles commonly get lodged inside passage.

2. Inspect pump cover screen and "O" ring for wear and damage. Clean pump body and cover. Check all bores for obstructions. Inspect mating sides of cover and body for scoring, flatness and damage between channels. Check channels for dirt and damaged passages. Inspect stator shaft and pump body bushings for damage.
3. Inspect rotor and slide for scoring, cracks and damage. Check rotor guide and pump vane rings for excessive wear and damage. Inspect all seals for damage. Measure pump rotor and slide thickness in

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undamaged area if replacement is required. Replacement components must be same size as those removed to provide proper end clearance.

Reassembly

1. Lay pump body flat on bench, and install rotor into rotor and slide cavity. Lay straight edge over pump body and rotor. Use feeler gauge to check rotor-to-stator (cover) clearance. Specification is .0010-.0015" (.025-.038 mm). If pump cover is replaced, ensure reverse input feed hole in stator hub is same diameter as in hub removed.
2. Install "O" ring and seal ring in groove on back side of pump slide. Retain seal ring using petroleum jelly. Install pivot pin and spring in pump body. Install pump slide. Notch in pump slide must align with pivot pin hole and with flat oil seal ring facing downward in pump pocket. Install slide seal and support.
3. Install pump vane ring into pump pocket. Coat rotor guide with petroleum jelly. Install rotor guide on rotor. Install rotor and guide into pump pocket with guide toward pump pocket. Install vanes in rotor. Install vane guide ring. Compress pump slide spring and install into pump pocket. All components must be even with pump body surface. Install "O" ring on pump screen, and install screen in pump cover with seal end last.
4. Using Seal Installer (J-25016), install seal in pump body. Install seal retainer. Install pressure relief check ball and spring in pump cover. Install retaining rivet. Install converter clutch valve springs and converter clutch valve. Install valve stop and snap ring. Install pressure regulator valve and spring in pump cover. See **Fig. 46** .
5. Coat T.V. boost valve with petroleum jelly. Install T.V. boost valve in throttle valve bushing. Long area on valve must be positioned in large hole of bushing. Coat reverse boost valve with petroleum jelly. Install reverse boost valve in boost valve sleeve with small end first. Install reverse boost valve sleeve in pump cover.
6. Install T.V. boost valve sleeve in pump cover. Install snap ring. Ensure snap ring is fully seated. Install pump cover on pump body. Install retaining bolts finger tight. Align pump body and cover using Alignment Strap (J-21368). Place bolt through pump-to-case bolt hole. Tighten retaining bolts to specification. See **TORQUE SPECIFICATIONS** . Remove alignment strap.
7. Position NEW pump-to-case gasket on pump, and retain it using petroleum jelly. Install oil seal rings on stator hub. Retain oil seal rings using petroleum jelly. Install NEW pump-to-case oil seal on cover. Ensure seal is not twisted. Coat seal with ATF. Install pump-to-drum thrust washer. Ensure tangs on washer engage with holes in hub.

2-4 SERVO ASSEMBLY

Disassembly

1. Remove 4th apply piston and housing from 2nd apply piston assembly. Remove return spring from apply pin. Install Piston Compressor (J-22269-01) on second apply piston. See **Fig. 33** .
2. Compress 2nd servo apply piston assembly. Remove retainer ring. Separate 2nd apply piston, spring and retainer. Remove retainer ring, washer and spring from apply pin, and remove pin. Remove all oil seal rings. See **Fig. 32** .

Inspection

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Inspect all pistons for porosity and damage. Check for ring groove damage and servo bore in case for any wear which may cut servo seals. Check all springs and oil seal rings for distortion and damage.

Reassembly

Different servo piston housings and 2nd apply pistons are used for different applications. If servo piston housing or 2nd apply piston is replaced, inside dimension of components must be checked. Measure inside of piston housing and 2nd apply piston. Dimension must be same as original. To assemble, reverse disassembly procedure. Coat seals with petroleum jelly before assembly.

CLEANING & INSPECTION

TRANSMISSION CASE

Cleaning & Inspection

1. Clean case with solvent, and dry using compressed air. Inspect case assembly for damage, cracks and damaged bolt hole threads. Inspect valve body surface for flatness and land damage. Using compressed air, check case oil passages for restrictions and blockage.
2. Inspect case internal clutch plate lugs for damage and wear. Inspect speedometer, servo and accumulator bores for damage. Inspect all snap ring grooves for damage. Inspect governor support pin for proper length. Measure distance from governor cover surface to end of governor support pin.
3. Governor support pin length should be 3.30" (83.8 mm) measured from governor cover surface to end of support pin. Incorrect pin length may result in damaged governor gear. Replace transmission case if damaged. Ensure replacement case contains a ribbed area in valve body area. Rib area must be present for use with auxiliary valve body.

CASE ATTACHING PARTS

Cleaning & Inspection

1. Clean all components with clean solvent, and dry using compressed air. Inspect 1-2 and 3-4 accumulator components for damage to pistons or housing. Inspect for flatness and condition of accumulator, oil passage plate and gasket.
2. Inspect wiring harness leads and connectors for damage. Inspect coil and all connections for damage. Inspect speedometer gear and clip for tooth damage and distortion.

REACTION & INPUT GEAR SETS, LOW-REVERSE CLUTCH & SUPPORT

Cleaning & Inspection

1. Clean all components with clean solvent, and dry using compressed air. Inspect reaction and input carriers for pinion gear damage, excessive wear and improper staking of pinion pins.
2. Inspect carrier bearings for heat damage, flatness and roller condition by rotating top thrust washer. Check bearing located inside reaction carrier. Place output shaft sleeve inside reaction carrier and input carrier.

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3. Rotate sleeve and note smoothness of bearing operation. Replace carrier assembly if roughness is felt. Check pinion gear end play on reaction and input carriers.
4. Pinion gear end play should be .008-.024" (.20-.61 mm). Replace carrier if pinion gear end play is excessive. Inspect internal reaction gear and support for cracks and damaged splines. Inspect low-reverse clutch plates for wear and signs of excessive heat.
5. Inspect low-reverse clutch piston for roughness or damage in seal ring area. Inspect retainer ring and spring assembly for damage. Inspect sun and internal gears and supports for spline and bushing wear and damage. Replace damaged components as necessary.

TRANSMISSION REASSEMBLY

NOTE: To identify seals, bearings and thrust washers locations, see SEALS, BEARINGS & THRUST WASHERS under TRANSMISSION REASSEMBLY.

LOW-REVERSE CLUTCH

1. Place transmission in a vertical position. Ensure piston is same dimension as that removed if replacement is required. Different thickness pistons are used. Install seals on low-reverse clutch piston. Coat seals with petroleum jelly. Install piston into transmission case.
2. Align piston with notch in bottom of transmission case. Ensure piston is fully seated and parking pawl aligns with opening in piston wall. Install spring assembly with flat side of retainer upward. Using Spring Compressor (J-23327), compress springs past ring groove in case hub. Install retainer ring.
3. Remove spring compressor. Coat bearing assembly with petroleum jelly. Install bearing assembly on case hub with outside bearing race toward case hub. Install internal reaction gear and support. Install bearing assembly onto support with outside bearing race toward support. Install oil deflector (if equipped) and reaction carrier assembly in case. See **Fig. 38** . Ensure clutch plates are proper thickness.
4. Install correct number of clutch plates. See **LOW-REVERSE CLUTCH PLATE USAGE** . Ensure clutch plates align with splines of reaction carrier and case and that steel plates are aligned. Place waved plate on work bench. Install 5 composition plates and 4 steel plates alternately, starting with composition plate.

LOW-REVERSE CLUTCH PLATE USAGE

Type	No. Used	Thickness: In. (mm)
Flat Steel	4	.069 (1.75)
Composition	5	.088 (2.24)

5. Install low-reverse support. Apply light pressure to low-reverse support. **DO NOT** apply excessive pressure or waved plate will start to flatten, resulting in inaccurate measurement. Measure height of clutch pack from work bench to top of low-reverse support. Using height dimension, determine proper selective spacer plate to be used. See **SPACER PLATE SELECTION** .

SPACER PLATE SELECTION

Measured Clutch Pack Height In. (mm) (2)	(1) Plate Thickness In. (mm)

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1.136-1.164 (28.85-29.57)	.066-.073 (1.67-1.85)
1.107-1.136 (28.12-28.85)	.094-.101 (2.39-2.57)
1.079-1.107 (27.41-28.12)	.122-.129 (3.10-3.28)

(1) Spacer plates are available in select sizes. Plate (8680439) has no identifying marks and is .066-.073" (1.67-1.85 mm) thick. All other plates have same GM part number (8680440) but are different thicknesses and have one of following stamped identifying marks: "0", "4" or "8".

(2) Clutch pack height is measured without spacer plate in position.

6. Place spacer plate between waved plate and first composition clutch plate with identification facing upward. Measure overall height of clutch pack. Overall height should be 1.20-1.24" (30.5-31.5 mm). Install clutch pack assembly in transmission case.
7. Install low-reverse support in case with hub downward. Install inner race by pushing downward while rotating until it is fully engaged. Bottom tangs will be flush with hub when fully installed. Install spring retainer in case between case lug and open notch in support. Install low-reverse retainer ring.

REACTION & INPUT GEAR SETS

1. Install snap ring on reaction sun gear (if removed). Install sun gear into reaction carrier. Install thrust washer on low-reverse clutch race. Install reaction sun gear shell on reaction sun gear.
2. Install thrust washer on reaction sun gear shell. Ensure thrust washer tangs engage on gear shell. Install input internal gear and reaction carrier shaft in sun gear shell. Carrier shaft splines must engage with reaction carrier. See **Fig. 38** .
3. Install thrust washer on reaction carrier shaft. Outer race must face toward reaction carrier shaft. Install output shaft in transmission. Ensure output shaft engages with all components.
4. Install Output Shaft Support (J-29837). Adjust support so output shaft is positioned upward as far as possible. Install input carrier assembly with hub end down on output shaft. Install NEW retainer ring on output shaft. Remove output shaft support. Install input sun gear, indexing gear end with input carrier pinions.

REVERSE INPUT ASSEMBLY & INPUT CLUTCH

Install selective thrust washer on input housing. Install bearing assembly on selective thrust washer. Inner race (Black) must go toward oil pump. Position reverse input assembly on input clutch assembly. Reverse input clutch plates must align with input clutch hub. Ensure all clutch plates are fully engaged.

REVERSE & INPUT CLUTCHES

Install reverse and input clutch assemblies in case as an assembly. Align 3-4 clutch plates of input assembly with input internal gear. Assembly is fully seated when reverse housing is just below oil pump face of case.

2-4 BAND & SERVO ASSEMBLY

1. Install 2-4 band in case. Align band anchor pin end with case pin hole. Install band anchor pin in case. Ensure band anchor pin aligns with end of 2-4 band.

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2. Install 2-4 servo assembly into case, and index apply pin on band end. Check for proper engagement of apply pin on band end. Recheck 2-4 servo apply pin selection to ensure correct pin is installed. See **CHECKING SERVO PIN LENGTH** under TRANSMISSION DISASSEMBLY. Different length servo pins are available. See **SERVO PIN SPECIFICATIONS** . Select proper length servo pin.

SERVO PIN SPECIFICATIONS

Pin ID	Pin Length: In. (mm)
2 Rings	2.61-2.62 (66.3-66.5)
3 Rings	2.67-2.68 (67.8-68.1)
Wide Band	2.72-2.73 (69.1-69.3)

3. Install servo cover and "O" ring. Install Servo Cover Compressor (J-29714), and compress cover. Install cover retaining ring, indexing ring ends with slot in case.

SEALS, BEARINGS & THRUST WASHERS

NOTE: To identify seals, bearings and thrust washers locations, see Fig. 47 .

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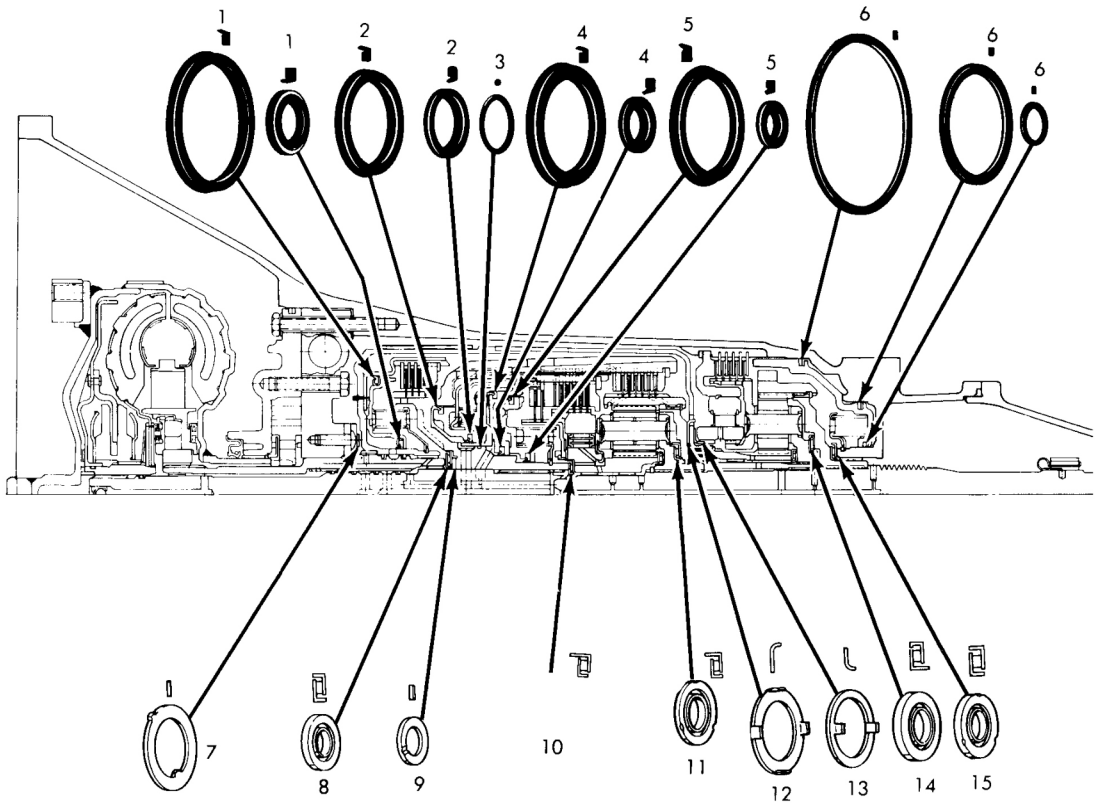


Fig. 47: Exploded View of Seals, Bearings & Thrust Washers
Courtesy of GENERAL MOTORS CORP.

LEGEND FOR FIGURE 47

Item No.	Description
1	Reverse Input Clutch Seals
2	3-4 Clutch Seals
3	Input-To-Forward Housing "O" Ring
4	Forward Clutch Seals
5	Overrun Clutch Seals
6	Low-Reverse Clutch Seals
7	Pump-To-Input Drum Thrust Washer
8	Stator Shaft Bearing
9	Selective Thrust Washer
10	Input Sun Gear Bearing
11	Input Carrier-To-Reaction Shaft Thrust Washer

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12	Reaction Shaft-To-Shell Thrust Washer
13	Reaction Shell-To-Shaft Thrust Washer
14	Reaction Carrier-To-Support Bearing
15	Reaction Gear-To-Case Bearing

OIL PUMP ASSEMBLY

1. Turbine shaft seals should be installed just before oil pump installation. Position Seal Installer (J-36418-1) on input shaft. See **Fig. 48** . Adjustment screw in seal installer must be adjusted to obtain correct height for each seal installation. Install 4 turbine shaft seals.

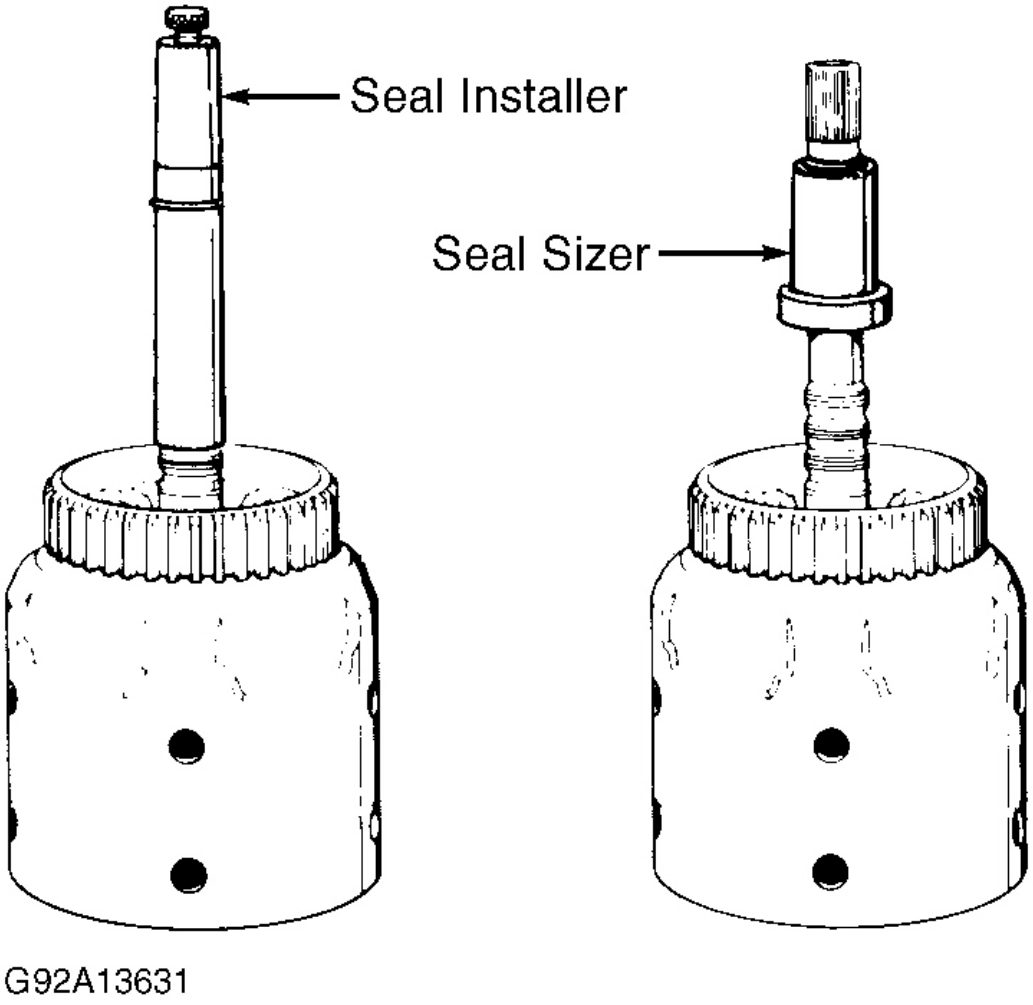


Fig. 48: Installing & Sizing Turbine Shaft Seals
Courtesy of GENERAL MOTORS CORP.

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2. Turbine shaft seals must be sized using Seal Sizer (J-36418-2A) after installation. Install aligning pins in 2 opposing pump bolt holes in case. Ensure thrust washer is installed on rear of oil pump. Thrust washer can be retained using petroleum jelly.
3. Install pump into case, aligning filter and pressure regulator holes with holes in case. Install retaining bolts. Tighten bolts to specification. See **TORQUE SPECIFICATIONS** . Place transmission in a horizontal position.
4. Turbine shaft should rotate by hand. If turbine shaft will not rotate, loosen pump retaining bolts and attempt to rotate shaft again. If shaft now turns, reverse and input assemblies have not been indexed properly or some other assembly problem has occurred, such as thrust washer not positioned properly.
5. Transmission end play should be checked. See **TRANSMISSION END PLAY CHECK** under TRANSMISSION DISASSEMBLY. Transmission end play should be .005-.036" (.13-.91 mm). If transmission end play is not within specification, thrust washer must be changed between oil pump and input housing.
6. Select proper thickness thrust washer. See **OIL PUMP THRUST WASHER SPECIFICATIONS** . Install thrust washer, and recheck end play. Install torque converter. Ensure converter hub is aligned with oil pump. Install torque converter retaining strap to hold converter.

OIL PUMP THRUST WASHER SPECIFICATIONS

Identification	Thickness: In. (mm)
67	.074-.078 (1.88-1.98)
68	.080-.084 (2.03-2.13)
69	.087-.091 (2.21-2.31)
70	.094-.098 (2.39-2.49)
71	.100-.104 (2.54-2.64)
72	.107-.111 (2.72-2.82)
73	.113-.118 (2.87-3.00)
74	.120-.124 (3.05-3.15)

1-2 ACCUMULATOR & SPACER PLATES

CAUTION: If spacer plate and gasket replacement is required, ensure NEW spacer plate and gasket are identical as those removed.

1. Install 3-4 accumulator piston pin in case. Install 3-4 piston seal on piston. Install 3-4 accumulator piston on pin. Legs of piston must face valve body.
2. Install 3-4 accumulator spring. Install check balls and oil screens in proper locations. Install special retainer and ball assembly. See **Fig. 35** and **Fig. 36** for check ball and filter installation locations. Install spacer plate gasket and spacer plate.
3. Install 1-2 accumulator spring, oil seal ring and 1-2 accumulator piston. Install accumulator cover and bolts. Tighten bolts to specification. See **TORQUE SPECIFICATIONS** .

VALVE BODY & AUXILIARY VALVE BODY

Install valve body and auxiliary valve body. See **VALVE BODY** and **AUXILIARY VALVE BODY** under

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ON-VEHICLE SERVICE.

EXTENSION HOUSING

1. Install speedometer gear and retaining clip on output shaft. If output shaft has 2 locating holes, use hole nearest yoke on Corvette only. Install "O" ring in output shaft sleeve.
2. Using Seal Installer (J-25016), install output sleeve on output shaft. **DO NOT** position output sleeve past machined surface of output shaft. Install seal ring on extension housing.
3. Position extension housing on transmission case with speedometer bore on governor side of case. Install retaining bolts. Tighten bolts to specification. Using Seal Installer (J-21426), install oil seal in extension housing.
4. Install speedometer driven gear and fitting assembly. Install retainer and bolt. Tighten bolt to specification. See **TORQUE SPECIFICATIONS** . Install outside electrical connector and manual shift lever.

SERVICE BULLETINS

NO UPSHIFT OR STUCK IN 1ST GEAR

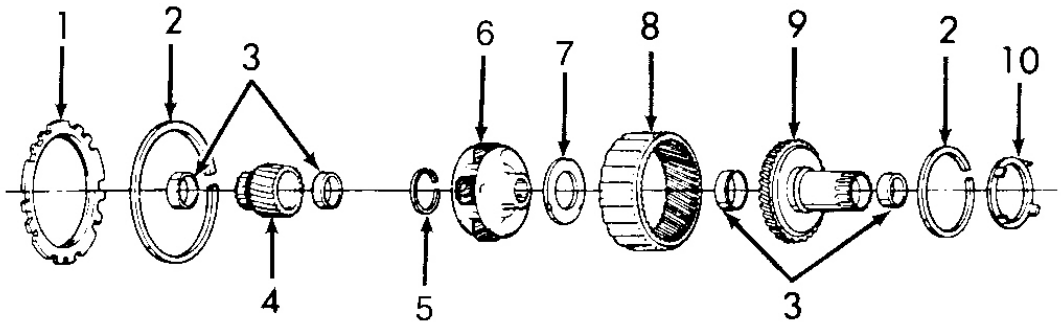
1991 Custom Cruiser, 1991 Bravada & 1991-92 Roadmaster (GM TSB 177113R)

Some Hydra-Matic 4L60 transmissions may experience a no upshift or stuck in 1st gear condition. This condition may be caused by input carrier-to-output shaft retaining ring becoming unseated or retaining ring omitted during assembly.

Output shaft is able to move slightly and will cause wear on governor driven gear. Governor driven gear wear may be described as an "apple coring" condition. If governor driven gear is worn, transmission cannot upshift out of 1st gear.

Remove governor, and inspect governor driven gear. If "apple coring" condition exists, disassemble transmission to determine if retaining ring is unseated, broken or missing. See **Fig. 49** . Install NEW retaining ring as necessary. **DO NOT** over expand new retaining ring during installation.

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1. 3rd-4th Backing Plate
2. Retaining Ring
3. Bushing
4. Input Sun Gear
5. Output Shaft-To-Input Carrier Retainer Ring
6. Input Carrier Assembly
7. Bearing
8. Input Internal Gear
9. Reaction Carrier Shaft
10. Thrust Washer

92B13632

Fig. 49: Exploded View Of Input Carrier-To-Output Shaft Assembly
Courtesy of GENERAL MOTORS CORP.

LEGEND FOR FIGURE 49

Item No.	Description
1	3rd-4th Backing Plate
2	Retaining Ring
3	Bushing
4	Input Sun Gear
5	Output Shaft-To-Input Carrier Retainer Ring
6	Input Carrier Assembly
7	Bearing
8	Input Internal Gear
9	Reaction Carrier Shaft
10	Thrust Washer

NO 3RD OR 4TH GEAR OR SLIPPING IN 3RD OR 4TH GEAR

1991-92 All Models (GM TSB 177119)

Some Hydra-Matic 4L60 transmissions may experience a no 3rd or 4th gear or slipping in 3rd or 4th gear condition. Ensure T.V. cable is adjusted correctly and fluid level is filled to correct level. Check cooler lines to ensure lines are not restricted. Remove transmission pan, and check transmission filter neck seal for proper fit. If seal does not seal properly around filter, air can enter into oil pump and cause low line pressure or aerated fluid. Replace seal if necessary.

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If overhaul is performed, disassemble oil pump and inspect pump body bushing for wear. Replace bushing if necessary. A worn bushing can create a large leak in oil pump and lower line pressure, which can cause oil flow to be cut off. If oil pump bore has excessive wear in one area (out-of-round), replace oil pump body. Inspect 3-4 clutch boost springs for signs of polishing on spring tabs. Polishing is caused by 3-4 clutch friction plates rubbing on boost springs. Replace boost springs as necessary.

Inspect input housing splines on inside of input housing. If splines show drag marks in middle spline, 3-4 clutch steel plates are binding in housing. New plates with smaller outer diameter are available to correct this condition. See **REDESIGNED 3-4 STEEL CLUTCHPLATES** under SERVICE BULLETINS. Check 2-4 band for a lube passage. If lube passage does not exist in 2-4 band, install new design 2-4 band with lube passage.

Inspect 1-2 and 3-4 accumulator piston and bore for scoring caused by metal particles in transmission. Inspect 3rd accumulator exhaust check ball and retainer (located in case servo bore). Check ball may not seat due to metal particles stuck in bore. This will cause 2-4 band to drag or 3-4 clutch to not fully apply on 2-3 upshift.

Ensure 3rd accumulator orifice cup plug (located in case servo bore) is not blocked. If metal particles block orifice, 3rd accumulator will not fill properly due to trapped air in cavity. This can effect 3-4 clutch. Orifice cup plug also lubricates 2-4 band through lube passage.

Check 3-4 clutch exhaust check ball and retainer (located in input housing). Check ball helps exhaust 3-4 clutch. If check ball does not seat, 3-4 clutch cannot fully apply. If check ball is stuck in seated position, 3-4 clutch cannot exhaust fully.

NO 4TH GEAR, LATE OR FALLS OUT OF 4TH GEAR

1991-92 All Models (ATRA TSB 043)

Ensure T.V. cable and manual linkage is adjusted correctly. Check line pressure at 4th gear transmission tap. If pressure does not exist, go to **STEP "A"** . If pressure is low, go to **STEP "B"** . If pressure is normal, go to **STEP "C"** .

STEP "A"

If 4th gear pressure does not exist, check items which could keep transmission from shifting. Check for oversized tires. Oversized tires can reduce governor pressure. Ensure governor is operating correctly. Ensure valve body bolts are tightened to correct specification.

Ensure pressure regulator snap ring is installed in its groove. Air check into exhaust hole at 4-3 sequence valve to check 4th apply servo circuit. Air check into exhaust hole at 3-4 shift valve to check 4th gear switch, 4-3 relay and sequence valve for sticking and binding. Check for missing plug at relay valve.

Air check governor circuit for leaks, and check for sticking 3-4 shift valve. Check for missing cup plug. Remove valve body, and check for stuck valves, relay valve installed backward or plugs missing from upshift and downshift valves. Ensure gaskets are not covering separator plate holes. Check placement of check balls in case and 3-4 spring tension.

STEP "B"

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If 4th gear pressure is low, shift occurred but a leak exists in circuit. Remove transmission pan, and air check into exhaust hole at 4-3 sequence valve to check 4th apply servo circuit. Check for valve body leaks. Remove servo, and check for damaged seals, incorrect clearance and assembly errors. Check piston for cracks and pin bore for wear. Check 3-4 accumulator piston for cracks and damaged seal. Check for missing cup plug.

STEP "C"

If 4th gear pressure is normal, a mechanical problem exists in transmission. Remove transmission pan, and check servo exhaust hole for blockage by pan gasket or sealant. Air check into 4th gear pressure tap. Air should come out 4-3 sequence exhaust hole, showing a clear circuit. Block 4-3 sequence exhaust hole, and air check again. Servo should apply. Remove servo, and check for stuck servo pin in second gear piston. Check for stripped sun gear shell. Stripped sun gear shell will cause loss of 2nd gear and Reverse.

LOSS OF WIDE OPEN THROTTLE 3-4 UPSHIFT WHEN HOT

1991 Caprice 5.7L Police (GM TSB 077155)

Some 1991 Hydra-Matic 4L60 transmissions, models BFM, BPM & YNM with 5.7L engine, may exhibit a loss of wide open throttle 3-4 upshift when hot. When servicing this condition, install new T.V. boost valve and spring into oil pump cover. Install new 3-4 throttle valve, sleeve and spring into valve body. See **Fig. 50** . If service is necessary on BFM model transmission, replacement of T.V. boost valve and sleeve in oil pump cover may not be required.

Beginning September 24,1991 (Julian Date 267), transmission contains updated boost valve and sleeve. Beginning October 19, 1990 (Julian Date 292), BFM model transmission was replaced by BJM model transmission. BJM model transmission contains updated components.

BFM, BPM & YNM MODEL TRANSMISSION SERVICE PARTS

Description	Part Number
Throttle Boost Valve & Bushing, 3-4 Throttle Valve, Bushing & Sleeve Service Package	8673948

NOTE: During high speed pursuit, vehicles should be driven in Overdrive for maximum power train performance. DO NOT install 1991 model transmission in earlier model vehicles. 1991 model transmission is not compatible with earlier model vehicles.

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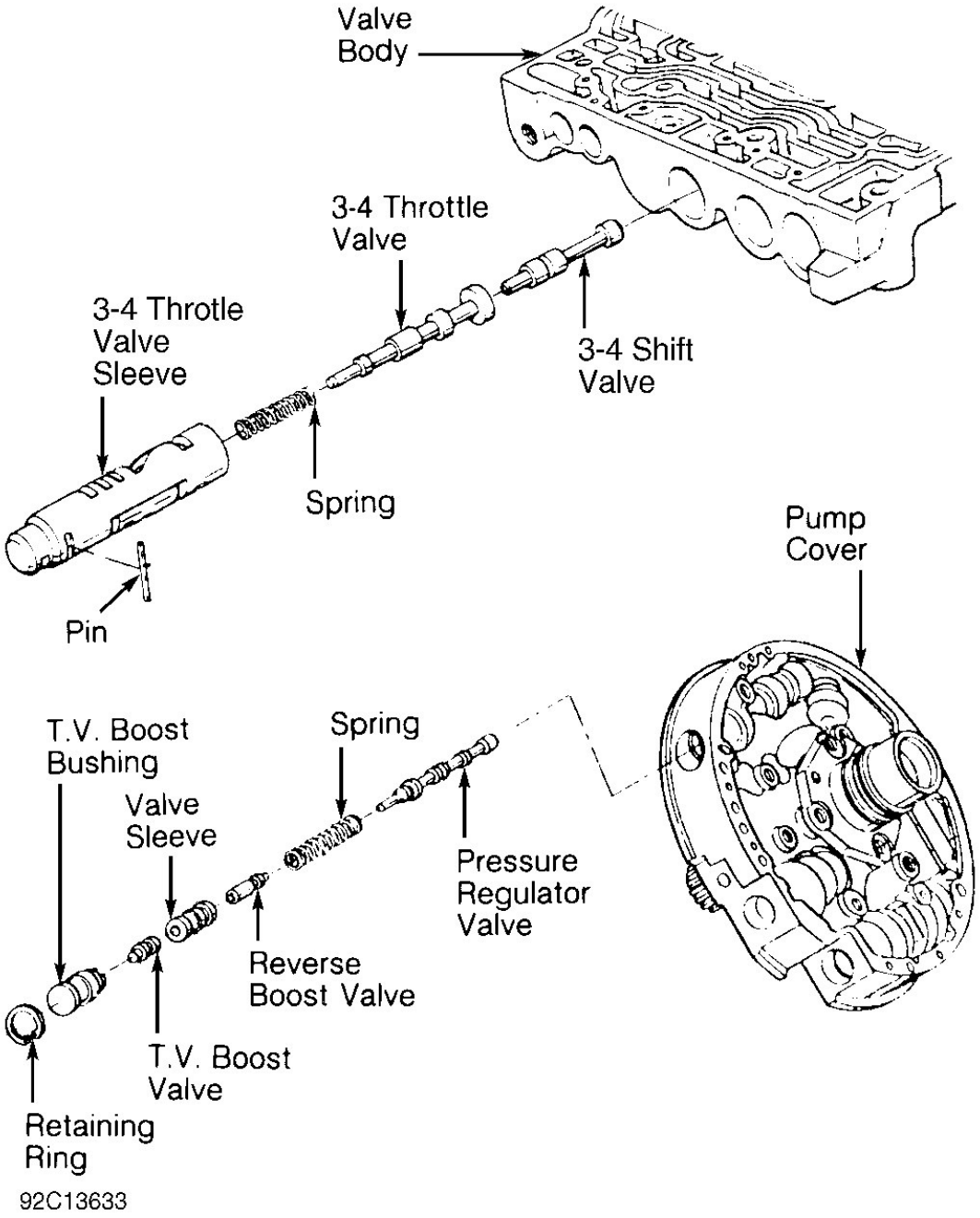


Fig. 50: Installing Throttle Valve & T.V. Boost Valve Assemblies
Courtesy of GENERAL MOTORS CORP.

REDESIGNED OUTPUT SHAFT & INPUT HOUSING-TO-OUTPUT SHAFT SEAL

1991 All Models (GM TSB 177118)

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Due to changes in lube passage locations, Hydra-Matic 4L60 transmission output shafts and input housing-to-output shaft seals have been redesigned to provide increased oil flow. Beginning January 28, 1991 (Julian Date 028), all transmissions were built using new output shaft and seal. New seal can only be used on new output shaft. If new seal is used on previous model output shaft, seal will block one lube passage. Previous seal can be used on both shaft designs.

New output shaft and seal can be used as a set in all 4L60 transmissions manufactured. New output shaft can be identified by lube passage location. New shaft has a lube passage on chamfer at front of output shaft. Lube passage was previously located on shank of output shaft.

REDESIGNED 3-4 STEEL CLUTCH PLATES

1991 All Models (GM TSB 077138)

Redesigned 3-4 steel clutch plates have a slightly smaller outer radius. Design lets plates move freely in clutch housing. Beginning July 27,1990 (Julian Date 208), all Hydra-Matic 4L60 transmissions are equipped with new design plates. New clutch plates may be used on any 1989-91 4L60 transmission.

3-4 STEEL CLUTCH PLATES

Description	Part Number
3rd & 4th Plate (Set Of 5 Plates)	8678053
3rd & 4th Plate (Single Plate)	8678054

NEW 3-4 CLUTCH FRICTION MATERIAL

1991-92 All Models (GM TSB 177119)

New friction material on 3-4 clutch plates has been installed on limited applications of Hydra-Matic 4L60 transmission. New friction material has increased heat capacity but cannot be used interchangeably with previous friction material. New material was put into production during 1991 model year. Model codes changed as transmissions received new 3-4 clutch plates.

New plates cannot be used to service any transmissions except those 1991 models listed. See **1991 TRANSMISSION MODEL LIST** . Transmissions used with 5.7L engine were first to contain new plates, beginning in January 1991.

NOTE: DO NOT use new plates in any transmission which is not listed in 1991 TRANSMISSION MODEL LIST . If new plates are used in incorrect application, shift quality will be poor and transmission damage could occur quickly.

1991 TRANSMISSION MODEL LIST

New (1)	Previous
AMM	AKM
APM	DBM
CNM	CHM
CYM	CJM

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FYM	FUM
KWM	KRM
LHM	None
RCM	RAM
RDM	WCM
YHM	YDM
(1) New models contain new material. Previous models are early 1991 models which do not contain new material.	

PEENED SPACER PLATE

1991 All Models (GM TSB 177120)

Some valve body spacer plate peening is acceptable and preferred to help seat check balls. Excessive peening will cause uneven seating of check ball. Inspect spacer plate for raised material on opposite side of check ball seat. If material on opposite side is raised, peening is too severe and spacer plate must be replaced. See **Fig. 51** .

To verify spacer plate is peening evenly and check ball is sealing correctly, seat check ball on spacer plate. Shine beam of light on opposite side and inspect for light between spacer plate and check ball. Light should not be present. If light is present, check ball is not seated properly and spacer plate must be replaced.

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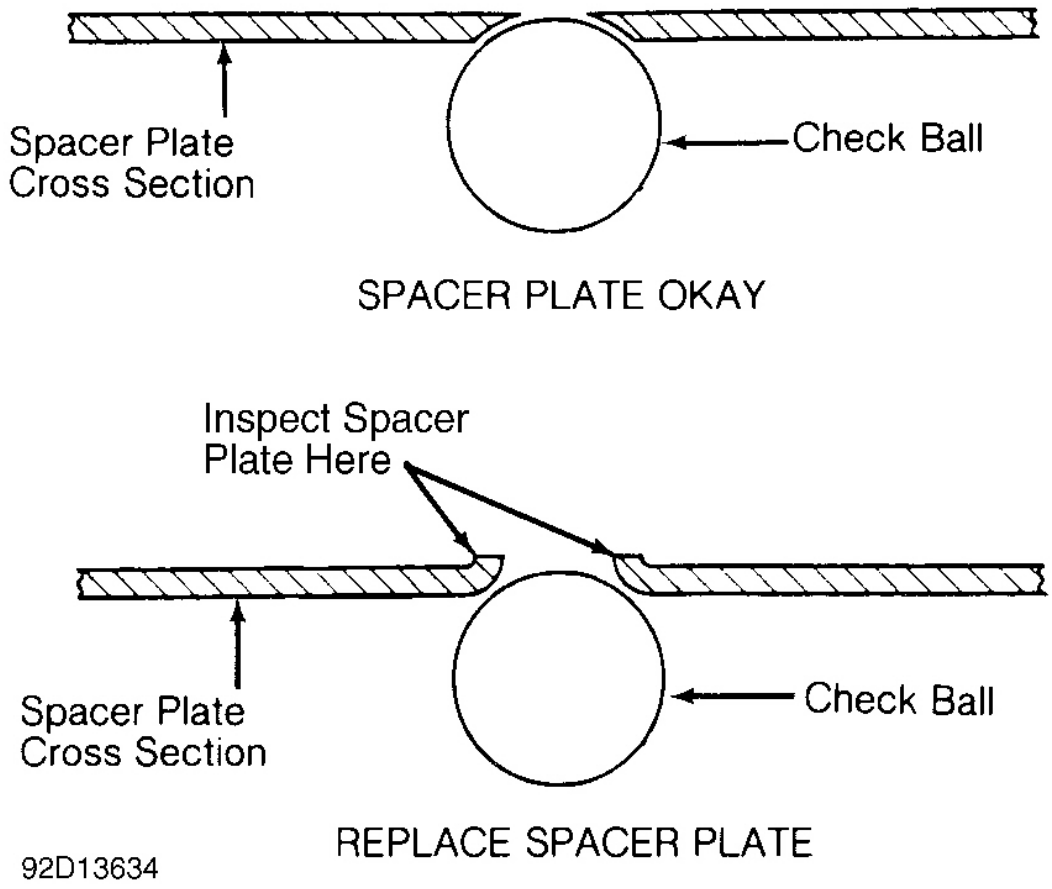


Fig. 51: Checking for Spacer Plate Peening
Courtesy of GENERAL MOTORS CORP.

NOISE IN SHIFT LEVER

1991 Bravada (GM TSB 167103)

When driving vehicle, a squeak or buzz can be heard in shift lever. Possible cause can be found at connection of transmission shift lever and transmission control lever. Check for loose fitting of control lever to shift lever. A loose control lever can generate a vibration induced noise. To correct this condition, a wave washer should be installed on control lever.

A second source of noise is a possible grinding out of shift lever with end of slot in control lever. This condition can be corrected by adding one or 2 flat washers as necessary to end of shift lever that is secured to frame. See **Fig. 52** . Shift lever will center in slot in control lever, preventing grinding out condition. When wave and flat washers have been added to control lever, ensure shift linkage is adjusted correctly. Bravada vehicles built after Vehicle Identification Number (VIN) 1GHDT13Z2M2704746 have had new washers installed.

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SHIFT LEVER SERVICE PARTS

Description	Part Number
Wave Washer	4722812
Flat Washer	14074908

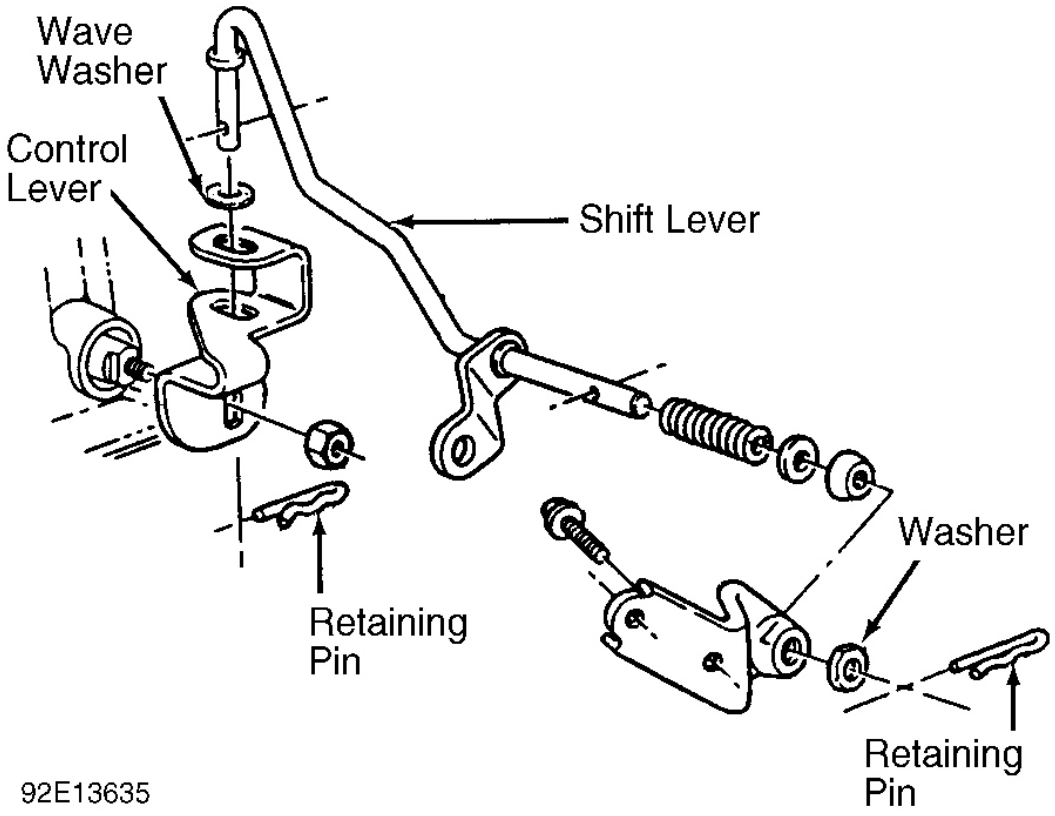


Fig. 52: Exploded View of Shift Lever Assembly
Courtesy of GENERAL MOTORS CORP.

VALVE BODY SLEEVE INSTALLATION

1991-92 All Models (ATRA TSB 058)

Valve body sleeves may be installed incorrectly if casting lines on end of sleeve are not within 10 degrees of vertical. Casting lines are visible without removing valve body. If casting lines are not within 10 degrees of vertical, retaining pin is installed into an oil slot, not into retaining groove. See **Fig. 53** .

NOTE: Sleeves can be installed incorrectly even if casting lines are within vertical position.

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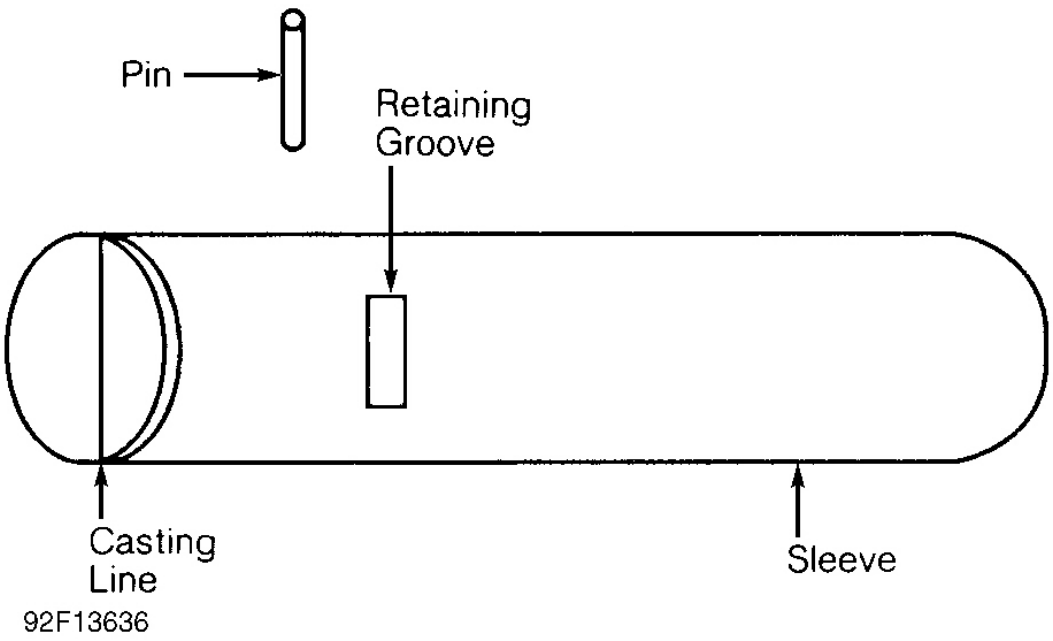


Fig. 53: Locating Valve Sleeve Retaining Groove
Courtesy of ATRA.

OIL PUMP REMOVAL TOOL

1991-92 Bravada, Custom Cruiser & Firebird (GM TSB 277107)

Due to product changes in 4L60 Hydra-Matic transmission stator shaft, a new tool has been developed to remove oil pump assembly. New tool is an adapter for use with current pump puller. Because groove under stator shaft has been removed, previous tool cannot fit onto new shaft.

With transmission removed from vehicle, remove torque converter. Position transmission in an upright position. Remove "O" ring and turbine shaft. Remove oil pump bolts, and install 4L60 adapter by slipping adapter over stator shaft. Install 4L80E pump puller over adapter. Tighten small screw to secure pump puller to adapter. Turn forcing screw to lift oil pump out of case.

POSSIBLE BLOWN FUSES ON CIRCUITS 420, 422 OR 446 DUE TO SHORTED TCC WIRING

1989 B, C, D, F, G, K, M, R, S, T, V, & Y Body Vehicles

A breakdown in Torque Converter Clutch (TCC) wiring insulation may cause a short to ground which may affect vehicle's transmission, electrical system and engine performance. Short circuit may cause blown fuse, loss of A/C, ECM failure or instrument cluster failure.

Die to electrical design differences, each vehicle line may show unique symptoms. A short in TCC wiring will

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usually blow the circuit containing the TCC fuse.

The TCC solenoid wiring harness was modified in production as of May 17, 1989 (Julian Date 137) in all 4L60 transmissions.

NOTE: Check vehicle wiring diagram and eliminate any other cause of blown fuses.

Checking Vehicle For Short To Ground

1. Turn off ignition. Unplug TCC wiring harness at transmission. Replace blow fuse.
2. Start engine. Check if short circuit is still present. If so, TCC wiring is probably not the cause. If short circuit is not present, continue with diagnosis.

Check TCC Wiring Harness For Short To Ground

1. Turn off ignition. Unplug wiring harness from transmission case. Using self-powered test light or high impedance ohmmeter, check for short circuit between transmission case and terminal "A", and between terminal "D".
2. If short exists, replace TCC solenoid wiring harness. DO NOT attempt to repair wiring.

Diagnostic Hints

1. If wire "A" (circuit 420) shorts to ground, check for blown fuse in 12-volt feed circuit. See **TCC BATTERY FEED CIRCUIT** .

NOTE: TCC BATTERY FEED CIRCUIT does not include all possible fuses. Check vehicle wiring diagram.

TCC BATTERY FEED CIRCUIT

Vehicle Type & Body Code	Check For Blown Fuse (Circuit 420)
Passenger Cars	
B	Gauges
D	G.A. Trans
F	Gauges
Y	Gauges
Light Trucks & Vans	
C/K	ECM/Ignition
M	Gauges
R/V	Gauges/Idle
G	Gauges
S/T	Ignition/Gauges

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2. If wire "D" (circuit 422) shorts to ground, 3 different conditions may occur:
    - TCC may engage if transmission is too hot and there is short in White wire between TCC and TCC switch.
    - Engine may idle rough. If transmission has 4th gear switch and there is short between ECM and switch, ECM always receives signal that transmission is in 4th gear. This may affect engine performance if spark timing depends on gear position.
3. If wire "B" (circuit 446) shorts to ground, TCC will engage after a 1-2 shift (all except S and T truck with 2.5L engine).

DIAGNOSIS INFORMATION FOR POSSIBLE INOPERATIVE TORQUE CONVERTER OR RELATED CONDITION

1985-87 F (2.8L), M, S & T Body Vehicles

1. Causes for possible torque converter failure are as follows:
    - Broken damper plate rivet (inside the converter)
    - Broken or loose spring tips
    - Broken or loose converter pump vanes
    - Broken converter turbine hub
    - Damaged seals causing hydraulic leak
    - Delamination of converter clutch apply plate fiber material
2. Symptoms that a vehicle may exhibit upon or during torque converter operation are as follows:
    - Shudder and/or vibration during torque converter clutch apply
    - No upshift due to fiber material sticking valves and/or fiber material and metal particles in filter
    - No Drive and/or Reverse
    - Converter sprag inoperative (no torque multiplication)
    - Noisy converter bearing or excessive end play
    - Pinging noise (constantly)
    - Vibration, out of balance, loose vanes (noisy)
    - Vehicle may exhibit shudder or no TCC apply. Torque converter clutch lining delaminating due to coolant contamination from transmission cooler
    - Torque converter clutch crowd shudder condition: This condition is caused by a leak in the TCC circuit which could cause excessive slippage and wear away the fiber lining on the TCC apply plate. Possible causes for TCC solenoid "O" ring, valve body gaskets. Worn TCC accumulator piston pin or seal.
    - TCC apply shudder caused by converter dampener plate not parallel.
    - A whine noise when shifted into drive that may increase when brake torqued. Torque converter whine is usually noticed when the vehicle is stopped and when the transmission is in Drive or Reverse. The noise will increase when the vehicle is moving and there is no torque multiplication (both halves of the torque converter are turning at the same speed) or when the torque converter clutch is applied.
3. With foot on brake and Gear Selector in Drive, depress accelerator to approximately 1200 RPM for no

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more than 6 seconds (Stall Test). A torque converter noise increases under load.

NOTE: This noise should not be confused with pump whine noise which is usually noticeable in Park, Neutral and all other gear ranges. Pump whine will vary with pressure ranges.

4. The torque converter should be replaced under any of the following conditions:
   - Vehicles have TCC shudder and/or No TCC apply but, only after all Electrical and Hydraulic diagnosis has been made (Converter Clutch material may be glazed)
   - Evidence of damage to the pump assembly or steel particles in converter
   - Steel particles are found after flushing the cooler and cooler lines
   - External leaks in the hub weld area
   - Converter pilot is broken, damaged or poor fit into crankshaft.
   - Converter hub is scored or damaged
   - Internal failure to stator roller clutch
   - Contamination from engine coolant
   - Excess end play found after checking converter for end play
   - Steel particles or clutch lining material found in fluid filter or on magnet when no internal parts in unit are worn or damaged indicating lining material came from converter.
   - Heavy clutch debris due to overheating (Blue Converter)

NEW LOW & REVERSE CLUTCH SUPPORT & SELECTIVE PLATE DIMENSIONS

1990 B, C, D, F, G, K, L, M, R, S, T, V & Y Body Vehicles

1. Dimensional change has been made in low and reverse clutch support and its selective plates. Thickness of low and reverse clutch support has increased while thickness of selective plates has decreased. Three selective plates are available. Productions change was initiated as follows:
   - Low and Reverse Clutch Support November 1, 1989 (Julian Date 305) and Selective Plates February 2, 1990 (Julian Date 033).
2. In most cases, new low and reverse clutch assembly will only require fifth reactions plate instead of selective plate. To identify low and reverse clutch support, measure its thickness with a micrometer.
3. The new low and reverse clutch support and selective plates may be used to service a post model year transmission if:
   - Transmission was built after February 9, 1987 (Julian Date 040)

NOTE: Selective plates are not interchangeable between previous clutch support and new clutch support. If selective plates are installed in the wrong clutch assembly, durability or low and reverse clutch will be reduced.

4. The following is service parts information:

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NEW LOW & REVERSE CLUTCH ASSEMBLY

Part Name	Part No.	Dimension: In. (mm)
Selective Plate	8673548	.0459-.0519 (1.168-1.314)
Selective Plate	8673549	.0865-.0922 (2.198-2.344)
Selective Plate	6261120	N/A
Clutch Support	N/A	.3020-.3090 (7.671-7.849)
Low & Reverse Clutch & Support Assembly	8673544	N/A

PREVIOUS LOW & REVERSE CLUTCH ASSEMBLY

Part Name	Part No.	Dimension: In. (mm)
Selective Plate	8667584	.0939-.1007 (2.386-2.557)
Selective Plate	8667585	.1221-.1288 (3.101-3.272)
Clutch Support	N/A	.2620-.2720 (6.655-6.909)
Low & Reverse Clutch & Support Assembly	8663094	N/A

CLUTCH APPLY PLATES-MATERIAL CHANGED TO POWDERED METAL IN FORWARD & 3-4 CLUTCHES

1990 B, C, D, F, G, K, L, M,, S, T, V, & 7 Body Vehicles

The forward and 3-4 clutch apply plates will now be manufactured from powdered metal instead of steel. Production change was as follows:

Forward - January 25, 1990 (Julian Date 025), 3-4 - January 29, 1990 (Julian Date 029)

The new powdered metal plates are interchangeable with current steel plates. Part Numbers have changed as listed in **3-4 CLUTCH APPLY PLATE** .

3-4 CLUTCH APPLY PLATE

Part Number	Description
8663785	Apply Plate - Forward Clutch (steel)
8667423	Apply Plate - 3-4 Clutch (steel)
8676059	Apply Plate - Forward Clutch (powdered metal)
8676379	Apply Plate - 3-4 Clutch (powdered metal)

NOISE/VIBRATION WITH TORQUE CONVERTER CLUTCH APPLIED (REPLACE TORQUE CONVERTER K7020)

1989-91 S/T Trucks, 1989-90 C, G, L & M Body Vehicles (4.3L LB4 Engines Only)

The transmission may produce a noise or vibration with the torque converter clutch (TCC) applied. This may happen if the damper spring stops in the torque converter damper bottom out against the damper plate. This may occur in Hydra-Matic 4L60 models that are used with 4.3L LB4 engines.

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Date of Production Change

The following dates show which transmissions contain torque converters with damper springs that may bottom out against the spring stops.

TORQUE CONVERTER WITH DAMPER SPRINGS

Model	Date of Production
9FMM, 9MAM, 9MFM, 9MXM, 9TH, 9TLM	Some after December 9, 1988 Julian Date 343)
0CAM, 0CAM, 0WAM	All before February 20, 1990 Julian Date 051)
0SHM	All before February 20, 1990 Julian Date 051)
0TLM	All before February 14, 1990 Julian Date 045)
0MJM, 0MNM	All before February 2, 1990 Julian Date 033)

Diagnosis

The following information will help you determine if vehicle has a vibration condition caused by damper spring stops bottoming out in the torque converter.

- Gear Range: Drive 4 (overdrive) with TCC engaged
- Vehicle Speed: Approximately 40-50 MPH with TCC engaged - then step into the throttle slightly

Conditions:

1. Noise, vibration or rattle
2. Low frequency noise that builds up until the floorboards rattle
3. Low growl or driveline grumble

Road grades or trailer loads may cause conditions to be more prominent or extended.

The condition should disappear when the TCC is disengaged. To eliminate this condition, a Torque Converter Assembly Package (8678979) containing damper springs with a higher spring rate and improved torque capacity has been released for production and service.

ERRATIC OR NO UPSHIFT

1989 B, C, E, F, K, M, R, S, T, V & Y Body Vehicles

A Hydra-Matic 4L60 transmission with an erratic or no upshift condition may be due to "Applecoring" or the governor driven gear. "Applecoring" may be caused by nicks and burrs on the governor drive gear. Beginning July 6, 1987 all transmissions were produced with the new governor driven gear and pin package (8663995).

REDESIGNED CLUTCH PISTON SEAL

1989 B, C, F, G, K, M, R, S, T & Y Body Vehicles

Beginning February 28, 1989, all 1989 Hydra-Matic 4L60 transmissions have been built using the new short lip

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design. Short lip seals are interchangeable with previous seals. All eight seals are available in overhaul kit or in two separate packages. See **NEW PISTON SEAL PACKAGES** .

NEW PISTON SEAL PACKAGES

Part Number	Description
8642919	3-4 Clutch Piston Inner and Outer Seals, Forward Clutch Piston Inner and Outer Seals, Overrun Clutch Piston Inner and Outer Seals
8657922	Reverse Input Clutch Piston Inner and Outer Seals

PROPER SPACER PLATE GASKETS USAGE

1982-89 B, C, F, G, K, M, R, S, T, V & Y Body Vehicles

Two sets of spacer plate gaskets are supplied with each transmission overhaul service kit. One set is for use on model years 1982-86, and the other set for model years 1987-89. The difference between the two sets of gaskets is the addition of holes in 1987 to accommodate an auxiliary valve body.

If the incorrect (1982-86) gasket set is used on a 1987-89 model year transmission, with or without an auxiliary valve body, the third clutch exhaust passage will be blocked. This may cause slipping or flaring during a 3-2 shift, a delayed 3-2 downshift, or a burned 3-4 clutch. See **PROPER SPACER PLATE GASKET SELECTION** .

PROPER SPACER PLATE GASKET SELECTION

Model Year	Part No.: Gasket Set Only	Part No.: Output Kit
1982-86	8642993	8649995
1988-89	8657938	8649995

LOSS OF WIDE OPEN THROTTLE 3-4 UPSHIFT WHEN HOT

1989 B Body (5.7L Police Only)

Some 1989 Hydra-Matic 4L60 YNM Model transmissions, a 5.7L (Police only) may exhibit a loss of wide open throttle 3-4 upshift when hot. Beginning April 24, 1989, all YNM model transmissions were built with a new control valve assembly containing the new 3-4 throttle valve and sleeve. When servicing for a no wide open throttle 3-4 upshift when hot, install the new 3-4 throttle valve and sleeve. The new control valve assembly is also available if it is necessary to replace the control valve assembly complete. See **YNM MODEL SERVICE PARTS** .

YNM MODEL SERVICE PARTS

Part Number	Description
8671953	9YNM - 3-4 Throttle Valve and Sleeve Service Package
8673413	9YNM - Control Valve Assembly Complete

BINDING OR INOPERATIVE IN REVERSE

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1982-89 B, C, F, G, K, M, R, S, T, V & Y Body Vehicles

When servicing a transmission for a binding in reverse condition, remove the control valve assembly and inspect the 4-3 sequence valve and the 2-3 shift valve. Either valve, if stuck in the upshifted position, will result in a binding condition. To correct this condition, the valve body must be completely disassembled and reconditioned.

Inspect the transmission bottom pan for clutch material or burned fluid. Evidence of this will require further transmission diagnosis. Repairs may include complete transmission reconditioning, including disassembly and reconditioning of the transmission pump and possible torque converter replacement.

Complete the cleaning of the hydraulic circuit by changing the transmission fluid and filter and flushing the transmission cooler and cooler pipes.

CAUTION: Overtorquing the bolts during unit reassembly can cause valve to bind. This condition may become more apparent as the unit warms to operating temperature. Correct bolt torque specifications for control valve assembly are 72-120 INCH lbs. (8-14 N.m). Torquing bolts to minimum specification, 72 INCH lbs. (8 N.m) is recommended.

DRIVELINE CLUNK DURING GARAGE SHIFT OR HARD ACCELERATION

1990 C Bodies

Vehicles may exhibit a clunking noise during a garage shift or a driveline clunk during hard acceleration. Vehicles may be affected if they were built within the following VIN numbers ranges:

- Chevrolet: 1GCDC14K2LZ100013 - 1GCDC14Z2LZ101290
- GMC: 1GTDC14Z1LZ500000 - 1GTDC14KXLZ500368

This condition can be repaired by installing a reinforcement plate in the tailshaft crossover support. To install, remove the nut and washer from the underside of the transmission crossmember. Install reinforcement plate (15567681) onto the bolt that passes through crossmember and replace the washer and nut. Torque the nut 40 ft.lbs. (54 N.m).

2-4 BAND CHANGES

1989 B, C, D, F, G, K, L, M, S, T, V & Y Body Vehicles

A new transmission 2-4 band has changes to the apply and anchor brackets, locating tabs, and the addition of a "lube window". The lube window was added to direct lubricating transmission fluid to the bank friction material while the band is not applied. Structural changes to the apply and anchor brackets increase their durability and the locating tabs were added to aid in assembly.

The new band is interchangeable with the previous band and should be used for service whenever possible. As soon as the previous bands are used up, the new bands will become available. See **2-4 BAND ASSEMBLY** .

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2-4 BAND ASSEMBLY

Part Name	Previous Part Number	New Part Number
Band Assembly-2/4	8654144	8673175

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

Application	Ft. Lbs. (N.m)
Cooler Pipe Connector	28 (38)
Detent Spring-To-Valve Body Bolt	18 (24)
Extension Housing Bolt	26 (35)
Manual Shaft-To-Detent Lever Nut	23 (31)
Oil Pump Cover-To-Body Bolt	18 (24)
Oil Pump-To-Case Bolt	18 (24)
Park Bracket-To-Case Bolt	18 (24)
Pressure Plugs 1/4 X 18"	18 (24)
Torque Converter-To-Flexplate Bolt	46 (62)
	INCH Lbs. (N.m)
Accumulator Cover-To-Case Bolt	96 (11.0)
Auxiliary Valve Body Bolt	96 (11.0)
Oil Pan-To-Case Bolt	96 (11.0)
Oil Passage Cover Bolt	96 (11.0)
Pressure Plugs 1/8 X 27"	96 (11.0)
Pressure Switches	96 (11.0)
Solenoid Bolt	96 (11.0)
Speed Sensor Bolt	89 (10.0)
T.V. Cable Bolt	75 (8.5)
Valve Body-To-Case Bolt (1)	96 (11.0)
(1) Tighten valve body bolts in a spiral pattern starting in center of valve body.	

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