SECTION 200-4R

MD9

AUTOMATIC TRANSMISSION HYDRAULIC DIAGNOSIS

CONTENTS

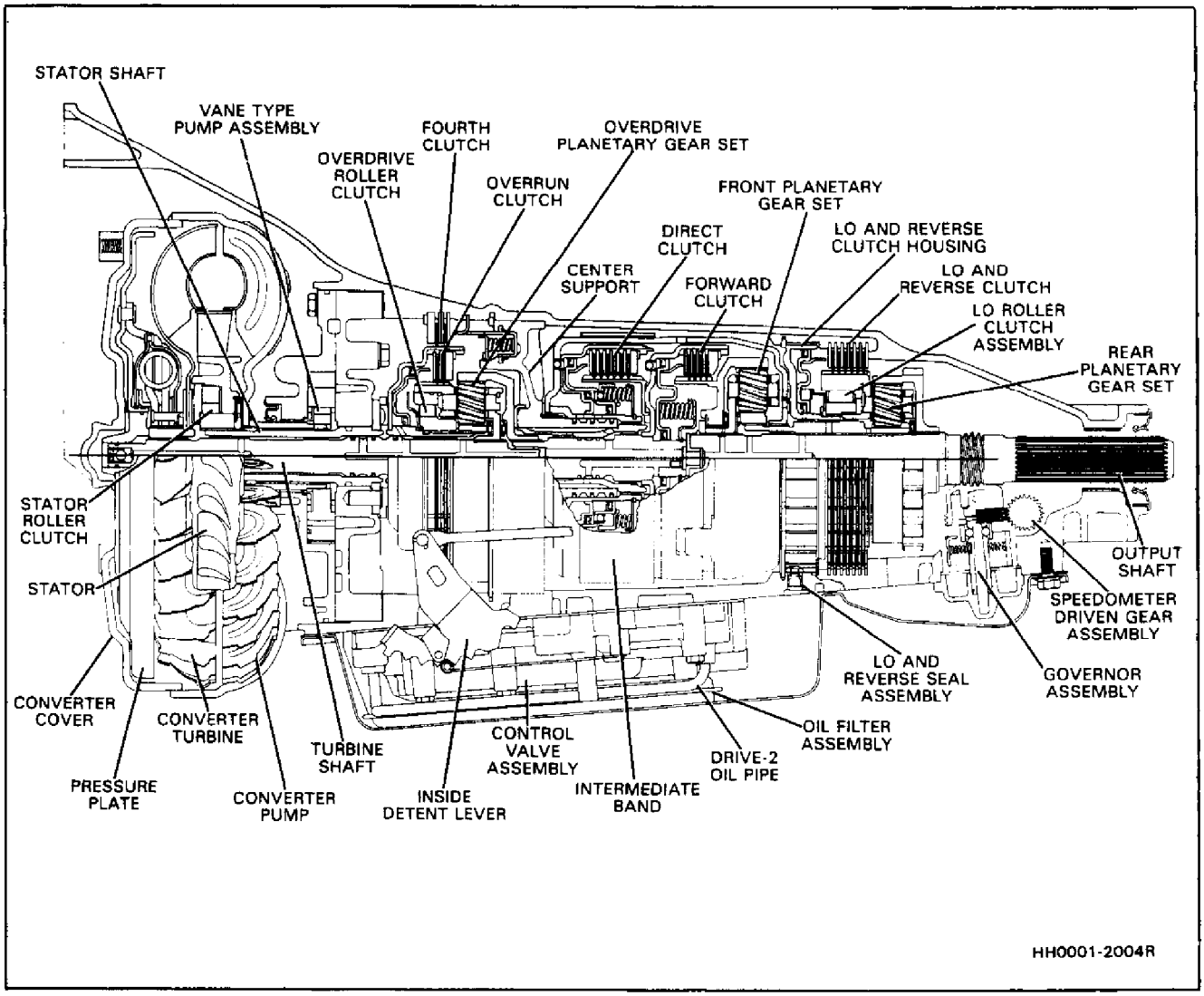

Figure 1 THM 200-4R Transmission

GENERAL DESCRIPTION

The THM 200-4R is a fully automatic transmission for rear wheel drive vehicles which provides four forward gear ranges and a reverse.

The major components of this transmission are:

- Torque Converter Clutch Asm.
- Vane Type Oil Pump
- Intermediate Band Asm.
- Five Multiple Disc Clutches
- Two Planetary Gear Sets
- Two Roller Clutches
- Valve Body Asm.

The oil pressure and shift points are controlled by throttle opening via a throttle valve cable. (See Section 7A for T.V. cable information).

P - Park position prevents the vehicle from rolling either forward or backward. (For safety reasons the parking brake should be used in addition to the park position).

R - Reverse allows the vehicle to be operated in a rearward direction.

N - Neutral allows the engine to be started and operated without driving the vehicle. If necessary this position may be selected if the engine must be restarted with the vehicle moving.

D - Overdrive is used for all normal driving conditions. It provides four gear ratios plus converter clutch operation. Downshifts are available for safe passing by depressing the accelerator.

3 - Drive position is used for city traffic, hilly terrain, and trailer towing. It provides three gear ranges. Again, downshifts are available by depressing the accelerator.

2 - Manual second is used to provide acceleration and engine braking. This range may be selected at any vehicle speed.

1 - Manual Lo is used to provide maximum engine braking. This range may also be selected at any vehicle speed.

DIAGNOSIS INFORMATION

ROAD TEST PROCEDURE

- Perform the road test following the sequence given
- MPH (KPH) shift points will vary with actual throttle position and driver habits
- Compare the results of the test with speed shift chart information. Use these results with the diagnosis information in the specific Automatic Transmission Unit Repair Section the evaluate the transmission.
- This test should only be performed when traffic and road conditions permit
- Observe all traffic safety regulations

Garage Shift Check

1. Start engine
2. Depress brake pedal
3. Move gear selector:
   - "Park" (P) to "Reverse" (R)
   - "Reverse" (R) to "Neutral" (N) to "Drive" (D)

   Gear selections should be immediate and not harsh.

Upshifts and Torque Converter Clutch (TCC) Apply (Figure 2)

With gear selector in "Overdrive" (D)

1. Accelerate using a steady increasing throttle pressure
2. Note the shift speed point gear engagements for:
   - 2nd gear
   - 3rd gear
   - Overdrive
3. Note the speed shift point for TCC apply. This should occur while in Third Gear or Overdrive. If the apply is not noticed, refer to the Preliminary Torque Converter Clutch Diagnosis information contained in this section of the Service Manual.

Important

The torque converter clutch will not engage if engine coolant has not reached a minimum operating temperature of approximately 54°C (130°F).

Part Throttle Detent Downshift

At vehicle speeds of 40-55 MPH (64-88 KPH) quickly depressed the accelerator to a half open position and observe:

- TCC releases
- Transmission downshift to 3rd gear immediately

Full Throttle Detent Downshift

At vehicle speeds of 40-55 MPH (64-88 KPH) quickly depress the accelerator to a wide open position and observe:

- TCC releases
- Transmission downshifts to 3rd gear immediately

Manual Downshift

1. At vehicle speeds of 40-55 MPH (64 to 88 KPH) release the accelerator pedal while moving the gear selector to "Third" gear (D) and observe:
   - TCC release
   - Transmission downshift to 3rd gear should be immediate
   - Engine should slow vehicle down
2. Move gear selector to "Overdrive" and accelerate to 40-45 MPH (64-72 KPH). Release the accelerator pedal while moving the gear selector to "Second" gear (2) and observe:
   - TCC Release
   - Downshift to second gear should be immediate
   - Engine should slow vehicle down

3. Move gear selector to "Overdrive" (D) and accelerate to 25 MPH (40 KPH). Release the accelerator pedal while moving the gear selector to "First" gear (1) and observe:
   - TCC release
   - Transmission downshift to 1st gear should be immediate
   - Engine should slow vehicle down

Coastdown Downshift

1. With the gear selector in "Overdrive" (D) accelerate to 4th gear with TCC applied.
2. Release the accelerator pedal and lightly apply the brakes to observe:
   - TCC release
   - Shift points for downshifts.

Manual Gear Range Selection

MANUAL THIRD (D)

1. With vehicle stopped, place gear selector in "Third" (D) and accelerate to observe:
   - The first to second gear shift point
   - The second to third gear shift point

MANUAL SECOND (2)

2. With vehicle stopped, place gear selector in "Second" (2) and accelerate to observe:
   - The first to second gear shift point
3. Accelerate to 25 MPH (40 KPH) and observe:
   - That a second to third gear shift does not occur
   - That TCC does not engage

MANUAL FIRST (1)

1. With vehicle stopped, place gear selector in "First" (1) and accelerate to 15 MPH (24 KPH) and observe:
   - That no upshift occurs
   - That TCC does not engage

REVERSE

1. With vehicle stopped, place gear selector in "Reverse" (R) and slowly accelerate to observe reverse gear operation.

All possible throttle positions and corresponding MPH shift point information has not been provided.

TRANSMISSION PRESSURE CHECK PROCEDURE

Inspect

- Fluid level
- TV cable adjustment
- Manual linkage
- Engine mechanical, emissions, electrical and fuel delivery systems

Install or Connect (Figure 3)

- Oil pressure gage
- Tachometer

1987 "THM 200-4R" SPEED SHIFT CHART

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
BR	14	22	43	53	46	37	21	11
CC	11	22	33	37	46	31	20	8
CH	11	22	26	31	49	24	20	7
CR	12	24	29	32	49	28	22	9
CY	11	23	29	33	41	28	21	8
CZ	9	20	30	35	44	23	19	6
HD	12	20	43	55+	39	42	18	9
HF	12	22	43	55+	39	42	18	9
HT	13	22	45	55+	41	43	20	9
KC	12	20	28	46	32	26	19	9
KJ	10	20	26	42	29	25	19	7
KT	12	21	29	48	33	28	19	9
KZ	12	18	24	52	45	20	17	10

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

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Figure 2 Speed Shift Chart

PRELIMINARY CHECK PROCEDURE

CHECK TRANSMISSION OIL LEVEL
CHECK AND ADJUST T.V. CABLE
CHECK OUTSIDE MANUAL LINKAGE AND CORRECT
CHECK ENGINE TUNE
INSTALL OIL PRESSURE GAGE
(SEE FIGURES 24 AND 74 FOR OIL PRESSURE TAP LOCATION)
CONNECT TACHOMETER TO ENGINE
CHECK OIL PRESSURES IN THE FOLLOWING MANNER:

Minimum T.V. Line Pressure Check
Set the T.V. cable to specification; and with the brakes applied, take the line pressure readings in the ranges and at the engine r.p.m.'s indicated in the chart below.

Full T.V. Line Pressure Check
Full T.V. line pressure readings are obtained by tying or holding the T.V. cable to the full extent of its travel; and with the brakes applied, take the line pressure readings in the ranges and at the engines r.p.m.'s indicated in the chart below.

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

CAUTION Brakes must be applied at all times.

1987 200-4R AUTOMATIC TRANSMISSION OIL PRESSURE

MODEL	RANGE	NORMAL OIL PRESSURE AT MINIMUM T.V.		NORMAL OIL PRESSURE AT FULL T.V.	
		kPa	P.S.I.	kPa	P.S.I.
CRF	PARK & NEUTRAL @ 1000 RPM	389 - 439	56 - 64	772 - 869	112 - 126
CHF, CYF		389 - 439	56 - 64	788 - 888	114 - 129
KCF, KJF, KTF		389 - 439	56 - 64	797 - 896	116 - 130
CCF, HFF, HTF, HDF		389 - 439	56 - 64	823 - 927	119 - 134
CZF		389 - 439	56 - 64	991 - 1117	144 - 162
KZF		389 - 439	56 - 64	1104 - 1259	160 - 183
BRF		389 - 439	56 - 64	1194 - 1368	173 - 198
KZF	*REVERSE @ 1000 RPM	549 - 619	80 - 90	1557 - 1774	226 - 257
CRF		725 - 817	105 - 118	1437 - 1617	208 - 235
CHF, CYF		725 - 817	105 - 118	1467 - 1653	213 - 240
KCF, KJF, KTF		725 - 817	105 - 118	1485 - 1667	215 - 242
CCF, HHF, HTF, HDF		725 - 817	105 - 118	1533 - 1725	222 - 250
CZF		725 - 817	105 - 118	1845 - 2078	268 - 301
BRF		725 - 817	105 - 118	2223 - 2547	322 - 369
CRF	*DRIVE (D4) & MANUAL THIRD (D3) @ 1000 RPM	389 - 439	56 - 64	772 - 869	112 - 126
CHF, CYF		389 - 439	56 - 64	778 - 888	113 - 129
KCF, KJF, KTF		389 - 439	56 - 64	797 - 896	116 - 130
CCF, HFF, HTF, HDF		389 - 439	56 - 64	823 - 927	119 - 134
CZF		389 - 439	56 - 64	991 - 1117	144 - 162
KZF		389 - 439	56 - 64	1104 - 1259	160 - 183
BRF		389 - 439	56 - 64	1194 - 1368	173 - 198
KZF	*MANUAL SECOND (D2) & LO (D1) @ 1000 RPM	789 - 889	114 - 129	789 - 889	114 - 129
BRF, CCF, CHF, CRF		846 - 953	123 - 138	846 - 953	123 - 138
CYF, CZF, HHF, HTF		846 - 953	123 - 138	846 - 953	123 - 138
KCF, KJF, KTF, HDF		846 - 953	123 - 138	846 - 953	123 - 138

Line pressure is basically controlled by pump output and the pressure regulator valve. In addition, line pressure is boosted in Reverse, Second and Lo by the reverse boost valve.

Also, in the Neutral, Drive, Intermediate and Reverse positions of the selector lever, the line pressure should increase with throttle opening because of the T.V. system. The T.V. system is controlled by the T.V. cable, the throttle lever and bracket assembly and the T.V. link, as well as the control valve assembly.

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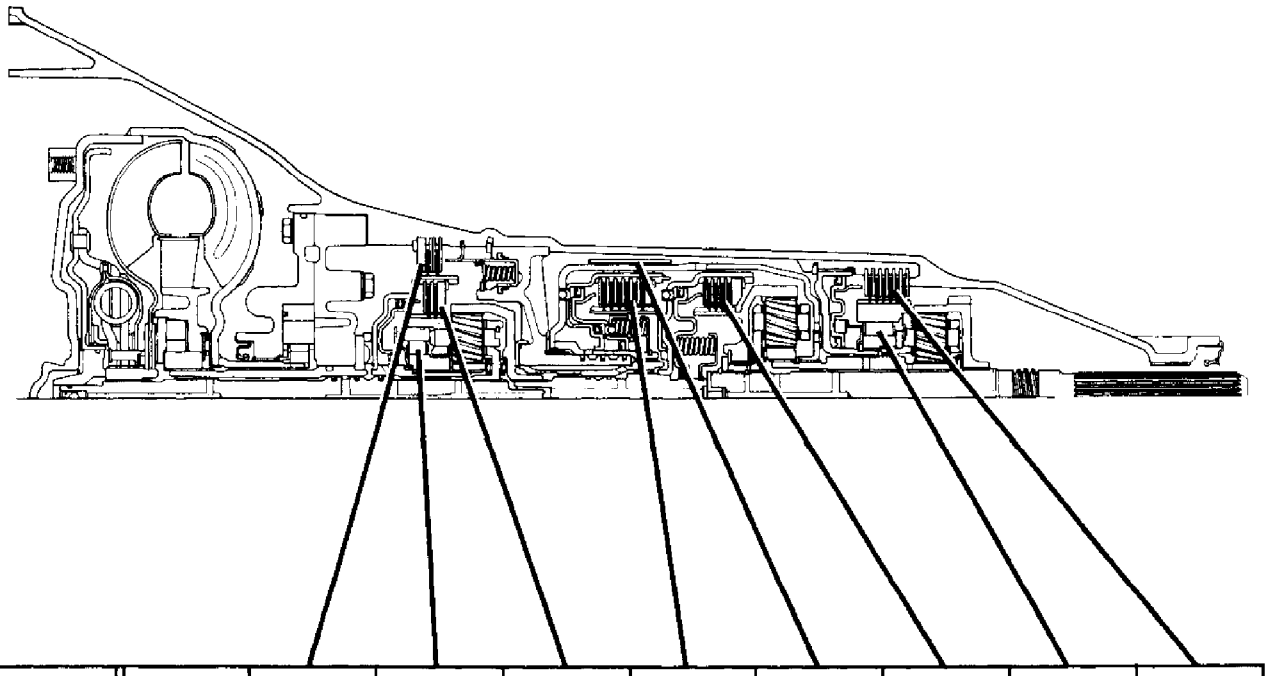
Figure 3 Preliminary Check Procedure



RANGE	GEAR	FOURTH CLUTCH	OVERDRIVE ROLLER CLUTCH	OVERRUN CLUTCH	DIRECT CLUTCH	INTERMEDIATE BAND	FORWARD CLUTCH	LO-ROLLER CLUTCH	LO-REVERSE CLUTCH
P-N			HOLDING						
D	FIRST		HOLDING				APPLIED	HOLDING	
	SECOND		HOLDING			APPLIED	APPLIED		
	THIRD		HOLDING		APPLIED		APPLIED		
	FOURTH	APPLIED			APPLIED		APPLIED		
D	FIRST			APPLIED			APPLIED	HOLDING	
	SECOND			APPLIED		APPLIED	APPLIED		
	THIRD			APPLIED	APPLIED		APPLIED		
2	FIRST			APPLIED			APPLIED	HOLDING	
	SECOND			APPLIED		APPLIED	APPLIED		
1	FIRST			APPLIED			APPLIED		APPLIED
R	REVERSE		HOLDING		APPLIED				APPLIED

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Figure 4 Clutch Application Chart

CONDITION	INSPECT COMPONENT	FOR CAUSE
OIL LEAK	• Oil Pan	— Bolts not correctly torqued. — Improperly installed or damaged pan gasket. — Oil pan gasket mounting face not flat.
	• Filler Pipe	— Multi lip seal damaged or missing.
	• Filler Pipe Bracket	— Mispositioned.
	• Throttle Valve Cable	— Multi lip seal missing, damaged or improperly installed.
	• Rear Seal Assembly	— Damaged or improperly installed.
	• Speedometer Driven Gear	— "O" ring damaged.
	• Manual Shaft	— Lip seal damaged or improperly installed.
	• Case	— Line pressure tap plug. — Fourth clutch pressure tap plug. — Porous.
	• Intermediate Servo	— "O" rings damaged.
	• Oil Pump Assembly	— Front pump seal leaks: Seal lip cut — check converter hub for nicks, etc.; bushing moved forward and damaged; garter spring missing from seal. — Front pump attaching bolts loose or bolt seal damaged or missing. — Front pump housing "O" ring damaged or cut. — Porous casting. — Inspect converter weld area.
	• Vent Pipe	— Transmission over filled. — Water in oil. — Foreign matter between pump and case or between pump cover and body. — Case porous; front pump cover mounting face shy of stock near breather. — Pump to case gasket mispositioned. — Incorrect dipstick. — Pump shy of stock on mounting faces, porous casting, breather hole plugged in pump cover.
NO DRIVE IN DRIVE RANGE (Install Pressure Gage)	• Oil Level	— Incorrect level. — External leaks.
	• Manual Linkage	— Misadjusted.

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Figure 5 Diagnosis Chart

CONDITION	INSPECT COMPONENT	FOR CAUSE
NO DRIVE IN DRIVE RANGE (Install Pressure Gage) (Continued)	• Oil Pressure	— Plugged or restricted oil filter. — Cut or missing oil filter "O" ring seals. — Pump assembly - pressure regulator stuck. — Pump rotor - tangs damaged by converter. — Porosity in oil filter to pump intake bore.
	• Overdrive Unit	— Springs missing in the roller clutch. — Rollers galled or missing.
	• Forward Clutch	— Piston cracked, seals missing, damaged; clutch plates burned; snap ring out of groove. — Oil seal rings missing or damaged on turbine shaft; leak in feed circuits; pump to case gasket mispositioned or damaged. — Clutch housing ball check stuck or missing. — Cup plug leaking or missing in the rear of the forward clutch shaft in the clutch apply passage.
	• Lo & Reverse Roller Clutch	— Springs missing. — Rollers galled or missing.
HIGH OR LOW OIL PRESSURE (Refer To Oil Pressure Checks)	• Throttle Valve Cable	— Misadjusted, binding, unhooked, broken or wrong link.
	• Throttle Valve Assembly	— Damaged or leaking. — Throttle lever and bracket assembly binding, unhooked or mispositioned. — Throttle valve or plunger valve binding.
	• Pressure Regulator Valve	— Binding.
	• T.V. Boost Valve	— Binding. — Wrong valve - causing low oil pressure only.
	• Reverse Boost Valve	— Binding.
	• Manual Valve	— Unhooked. — Mispositioned.
	• Pressure Relief Valve	— Ball missing. — Spring damaged.
	• Pump	— Slide stuck. — Slide seal damaged or missing. — Decrease air bleed orifice missing or damaged - causing high oil pressure. — Decrease air bleed orifice plugged - causing low oil pressure.
	• T.V. Limit Valve	— Binding.

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Figure 6 Diagnosis Chart

CONDITION	INSPECT COMPONENT	FOR CAUSE
HIGH OR LOW OIL PRESSURE (Refer To Oil Pressure Checks) (Continued)	• Line Bias Valve	— Binding in open position - causing high oil pressure. — Binding in closed position - causing low oil pressure.
	• Control Valve Assembly Spacer Plate & Case	— Correct orifices and passages.
1-2 SHIFT - FULL THROTTLE ONLY	• Throttle Valve Cable	— Binding, unhooked or broken. — Misadjusted.
	• Throttle Lever & Bracket Assembly	— Binding or unhooked.
	• T.V. Exhaust Ball Lifter Or No. 5 Ball	— Binding, mispositioned or unhooked. (Allowing No. 5 ball to seal causes full T.V. pressure regardless of throttle valve position.
	• Throttle Valve & Plunger	— Binding.
	• Control Valve Assembly	— Valve body gaskets leaking, damaged, incorrectly installed.
	• Case Assembly	— Porosity.
NO 1-2 SHIFT	• Governor & Governor Feed Passages	— Plugged governor oil feed orifice in spacer plate. — Ball or balls missing in governor assembly. — Inner governor cover rubber "O" ring seal missing or leaking. — Governor shaft seal missing or damaged. — Driven gear stripped. — Weights binding on pin. — Driven gear not engaged with governor shaft.
	• Control Valve Assembly	— 1-2 shift, Lo 1st/Detent, or 1-2 throttle valve stuck in downshift position. — Spacer plate gaskets in wrong position.
	• Case	— Porosity in case channels or undrilled 2nd oil feed hole. — Excessive leakage between case bore and intermediate band apply rings. — Intermediate band anchor pin missing or unhooked from band. — Broken or missing band.

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Figure 7 Diagnosis Chart

CONDITION	INSPECT COMPONENT	FOR CAUSE
NO 1-2 SHIFT (Continued)	• Intermediate Servo Assy.	— Servo cover oil seal ring missing. — Porosity in servo; cover, inner piston or outer piston. — Wrong intermediate band apply pin. — Incorrect usage of cover and piston.
	• 1-2 Accumulator	— Housing bolts loose. — Housing face damaged. — Missing or damaged accumulator plate.
NO 2-3 SHIFT	• Control Valve Assembly & Spacer Plate	— 2-3 shift valve or 2-3 throttle valve stuck in the downshift position. — Valve body gaskets leaking, damaged or incorrectly installed. — Reverse/3rd check ball not seating, damaged or missing.
	• Case	— Porosity in case channels.
	• Center Support	— Direct clutch feed passage in the center support plugged or not drilled through. — Steel oil seal rings on center support damaged.
	• Direct Clutch	— Inner oil seal ring missing or damaged on piston. — Center oil seal ring missing or damaged on direct clutch hub. — Check ball and/or retainer damaged or missing from direct clutch piston. — Direct clutch piston or housing damaged or missing. — Direct clutch plates damaged or missing. — Direct clutch backing plate snap ring out of groove. — Release spring guide mislocated, preventing piston check ball from seating in retainer.
	• Intermediate Servo Assy. (Third Clutch Accumulator Oil Passages)	— Servo to case oil seal ring broken or missing on intermediate servo piston. — Intermediate servo and/or capsule missing or damaged. — Exhaust hole in case between servo piston seal rings plugged or undrilled. — Bleed orifice cup plug missing from intermediate servo pocket in case.
NO REVERSE OR SLIPS IN REVERSE (Install Pressure Gage)	• Throttle Valve Cable	— Binding or misadjusted.
	• Manual Linkage	— Misadjusted.
	• Throttle Valve	— Binding.

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Figure 8 Diagnosis Chart

CONDITION	INSPECT COMPONENT	FOR CAUSE
NO REVERSE OR SLIPS IN REVERSE (Install Pressure Gage) (Continued)	• T.V. Limit Valve	— Binding.
	• Line Bias Valve	— Binding.
	• Reverse Boost Valve	— Binding in pressure regulator bore.
	• Reverse/3rd Or Lo/Reverse Check Ball	— Missing or seat in spacer plate damaged.
	• Reverse Clutch	— Piston cracked, or missing inner or outer seals. Clutch plates burned. — Reverse oil seal in case missing or damaged. — Missing clutch plate or wave plate.
	• Center Support	— Attaching bolts loose or missing. — Passages blocked or not drilled. — Porosity.
	• Direct Clutch Housing	— Piston or housing cracked. — Inner or outer piston seal missing or damaged. — Check ball in either the direct clutch housing or the piston missing or damaged. — Plates burned.
	• Spacer Plate	— Lo/Reverse overrun clutch orifice plugged.
DRIVE IN NEUTRAL	• Manual Linkage	— Misadjusted or disconnected.
	• Forward Clutch	— Clutch does not release. — Exhaust check ball sticking. — Plates burned together.
	• Case	— Cross leakage to forward clutch passage (D4).
SLIP IN 1-2 SHIFT	• Oil Level	— Low oil level.
	• Spacer Plate & Gaskets	— Gaskets damaged or incorrectly installed.
	• Accumulator Valve	— Valve sticking in valve body causing low 1-2 accumulator pressure. — Weak or missing spring.
	• 1-2 Accumulator Piston	— Seal leaking, spring broken or missing. — Leak between piston and pin. — Piston binding. — Piston bore damaged.
	• Intermediate Band Apply Pin	— Wrong selection of apply pin. — Excessive leakage between apply pin and case. — Apply pin feed hole not completely drilled.

HH0006-2004R

Figure 9 Diagnosis Chart

CONDITION	INSPECT COMPONENT	FOR CAUSE
SLIP IN 1-2 SHIFT (Continued)	• Intermediate Servo Assy.	— Porosity in piston. — Cover to servo oil seal ring damaged or missing. — Leak between servo apply pin and case.
	• Throttle Valve Cable	— Not properly adjusted.
	• Throttle Valve	— Binding, causing low T.V. pressure.
	• T.V. Limit Valve	— Binding.
	• Line Bias Valve	— Sticking, causing low line pressure.
	• Intermediate Band	— Worn or burned.
	• Case	— Porosity in 2nd clutch passage.
ROUGH 1-2 SHIFT	• Throttle Valve Cable	— Not adjusted properly. — Binding.
	• Throttle Valve Or T.V. Plunger	— Binding.
	• T.V. Limit Valve	— Binding.
	• Accumulator Valve	— Binding.
	• Line Bias Valve	— Binding.
	• Intermediate Servo Assy.	— Wrong selection apply pin. — Servo piston to case oil seal ring damaged or missing. — Bleed cup plug missing in case.
	• 1-2 Accumulator	— Oil ring damaged. — Piston stuck. — Broken or missing spring. — Bore damaged.
	• 1-2 Shift Check Ball No. 8	— Missing or sticking.
SLIP IN 2-3 SHIFT	• Oil Level	— Low oil level.
	• Throttle Valve Cable	— Not adjusted properly.
	• Throttle Valve	— Binding.
	• Spacer Plate & Gaskets	— Direct Clutch orifice partially blocked in spacer plate. — Gaskets mispositioned or damaged.

HH0007-2004R

Figure 10 Diagnosis Chart

CONDITION	INSPECT COMPONENT	FOR CAUSE
SLIP IN 2-3 SHIFT (Continued)	• Intermediate Servo Assy.	— Servo to case oil seal ring damaged or missing. — Piston or servo bore damaged. — Intermediate servo orifice bleed cup plug in case missing. — Porosity in the case in the servo bore area.
	• Direct Clutch Feed	— Porosity in direct clutch feed channels in case. — Case to support bolts not tight causing leakage. — Direct clutch piston or housing cracked. — Piston seals cut or missing. — Direct clutch plates burned. — Check ball in piston and/or housing missing, damaged or leaking. — Check ball capsule damaged. — Release spring guide mislocated preventing check ball from seating in piston.
	• Center Support	— Channels cross feeding, leaking or restricted. — Oil seal rings damaged or missing.
ROUGH 2-3 SHIFT	• Throttle Valve Cable	— Mispositioned or missing.
	• Throttle Valve & Plunger	— T.V. plunger binding. — Throttle valve binding.
	• T.V. Limit Valve	— Binding.
	• Intermediate Servo Assy.	— Exhaust hole undrilled or plugged between intermediate servo piston seals, not allowing intermediate servo piston to complete its stroke.
	• 3-2 Exhaust Check Ball No. 4	— Missing or mispositioned.
	• 3rd Accumulator Check Ball No. 2	— Missing or mispositioned.
SLIP IN 3-4 SHIFT	• Oil Level	— Low oil level.
	• Control Valve Assembly & Spacer Plate	— Gaskets or spacer plate damaged or incorrectly installed. — Accumulator valve sticking causing low 3-4 accumulator pressure. — Weak or missing accumulator valve spring.
	• 3-4 Accumulator	— Piston stuck. — Bore damaged. — Oil ring damaged.

HH0008-2004R

Figure 11 Diagnosis Chart

CONDITION	INSPECT COMPONENT	FOR CAUSE
SLIP IN 3-4 SHIFT (Continued)	• Center Support	— Porosity. — Center support attaching bolts loose. — Fourth clutch piston surface damaged. — Fourth clutch piston seals damaged. — Proper plate usage (see Clutch Plate Usage Chart). — Fourth clutch plates burned.
	• Case	— Porosity. — 1-2 accumulator housing bolts loose. — 3-4 accumulator piston seal damaged. — 3-4 accumulator leaking between the piston and pin. — 3-4 accumulator bore damaged.
ROUGH 3-4 SHIFT	• Throttle Valve Cable	— Mispositioned or missing.
	• Throttle Valve & Plunger	— Binding.
	• T.V. Limit Valve	— Binding.
	• 3-4 Accumulator	— Piston stuck. — Bore damaged.
	• Fourth Clutch	— Piston binding.
NO CONVERTER CLUTCH APPLY	• Electrical System (12 volts must be supplied to the solenoid for it to engage)	— Defective solenoid. — Damaged electrical connector. — Defective pressure switch. — Wire grounded.
	• Control Valve Assembly & Spacer Plate	— Converter clutch shift valve or throttle valve stuck.
	• Pump Assembly	— Orifice plugged for converter signal oil in pump. — "O" ring damaged or missing on solenoid. — Orificed cup plug missing in oil cooler passage in pump. — Pump to case gasket damaged or mispositioned. — Converter clutch apply valve stuck. — Cup plug missing from apply passage.
ROUGH CONVERTER CLUTCH APPLY	• Converter Clutch Pressure Plate	— Damaged.
	• Check Ball In End Of Turbine Shaft	— Damaged or missing.

HH0009-2004R

Figure 12 Diagnosis Chart

CONDITION	INSPECT COMPONENT	FOR CAUSE
NO CONVERTER CLUTCH RELEASE	• Converter Clutch Apply Valve	— Stuck.
	• Converter	— Damaged.
	• Pump	— Cup plug in release passage missing.
	• Turbine Shaft	— Seal missing or damaged. — Hole not drilled through.
NO 3-4 SHIFT (Install Pressure Gage To Fourth Clutch Pressure Tap)	• Control Valve Assembly & Spacer Plate	— 3-4 shift valve or 3-4 throttle valve stuck. — Orifice in spacer plate plugged.
	• Center Support	— Oil passages plugged or not drilled. — Center support attaching bolts loose or missing. — Fourth clutch piston cracked or damaged. — Fourth clutch piston seals damaged, missing or improperly assembled. — Improper plate usage (see Clutch Plate Usage Chart). — Fourth clutch plates burned. — Overrun clutch plates binding.
	• Case	— Porosity. — Orificed cup plug missing in 3-4 accumulator passage in case. — Leakage between accumulator piston and pin. — 3-4 accumulator bore damaged.
NO MANUAL 3RD OR 2ND	• Turbine Shaft & Overrun Clutch	— D-3 oil passage not drilled or plugged in turbine shaft. — D-3 oil passage not drilled through in overrun clutch hub. — Oil seals missing or damaged in the overrun clutch piston. — Overrun clutches burned. — Overrun clutch backing plate snap ring out of groove.

HH0010-2004R

Figure 13 Diagnosis Chart

CONDITION	INSPECT COMPONENT	FOR CAUSE
NO ENGINE BRAKING IN MANUAL LO-1ST GEAR	• Control Valve Assembly & Spacer Plate	— Manual linkage misadjusted. — D-3 orifice in spacer plate plugged. — Valve body gaskets leaking, damaged or incorrectly installed. — D-2 oil pipe leaking or out of position. — Lo overrun clutch valve binding in valve body. — Lo/Reverse check ball (#10) mispositioned or missing. — Lo/Detent check ball (#9) mispositioned or missing. — Lo/Reverse overrun clutch orifice in spacer plate plugged. — PT/D-3 check ball (#3) mispositioned or missing.
	• Turbine Shaft & Overrun Clutch	— D-3 oil passage not drilled or plugged in turbine shaft. — D-3 oil passage not drilled through in overrun clutch hub. — Oil seals missing or damaged in the overrun clutch piston. — Overrun clutches burned. — Overrun clutch backing plate snap ring out of groove.
	• Case	— Porosity.
	• Lo/Reverse Clutch Assy.	— Piston seals broken or missing. — Clutch housing snap ring out of case. — Piston or housing cracked or porous. — Cup plug or rubber seal missing or damaged between case and lo/reverse clutch housing.
NO ENGINE BRAKING IN MANUAL 2ND-2ND GEAR	• Control Valve Assembly & Spacer Plate	— Manual linkage misadjusted. — Valve body gaskets leaking, damaged, or incorrectly installed. — D-2 oil pipe leaking or out of position. — D-3 orifice in spacer plate plugged. — PT/D-3 check ball (#3) mispositioned or missing.
	• Case	— Porosity.
	• Intermediate Servo Assy.	— Servo cover to case oil seal ring missing or damaged.
	• Intermediate Band	— Off anchor pin. — Broken or burned.

HH0011-2004R

Figure 14 Diagnosis Chart

CONDITION	INSPECT COMPONENT	FOR CAUSE
NO ENGINE BRAKING IN MANUAL 2ND-2ND GEAR (Continued)	• Turbine Shaft & Overrun Clutch	– D-3 oil passage not drilled through in overrun clutch hub. – Oil seals missing or damaged in the overrun clutch piston. – D-3 oil hole not drilled or plugged in turbine shaft. – Overrun clutches burned. – Overrun clutch backing plate snap ring out of groove.
NO ENGINE BRAKING IN MANUAL 3RD-3RD GEAR	• Control Valve Assembly & Spacer Plate	– Manual linkage misadjusted. – D-3 orifice in spacer plate plugged. – Valve body gaskets leaking, damaged, or incorrectly installed. – PT/D-3 check ball (#3) mispositioned or missing.
	• Turbine Shaft & Overrun Clutch	– D-3 oil passage not drilled or plugged in turbine shaft. – D-3 oil hole not drilled through in overrun clutch hub. – Oil seals missing or damaged in the overrun clutch piston. – Overrun clutches burned. – Overrun clutch backing plate snap ring out of groove.
WILL NOT HOLD IN PARK	• Manual Linkage	– Misadjusted.
	• Internal Linkage	– Parking pawl binding in case. – Actuator rod, spring or plunger damaged. – Parking pawl broken. – Parking bracket loose or damaged. – Manual shaft to case pin missing or mispositioned.
	• Inside Detent Lever & Pin Assembly	– Nut loose. – Hole in lever worn or damaged.
	• Manual Detent Roller & Spring Assembly	– Bolt loose that holds roller assembly to valve body. – Pin or roller damaged, mispositioned or missing.
NO PART THROTTLE DOWNSHIFTS (Install Pressure Gage)	• Throttle Valve	– Binding.
	• T.V. Limit Valve	– Binding.
	• Spacer Plate	– Hole plugged or undrilled.

HH0012-2004R

Figure 15 Diagnosis Chart

CONDITION	INSPECT COMPONENT	FOR CAUSE
NO PART THROTTLE DOWNSHIFTS (Install Pressure Gage) (Continued)	• Valve Body Gaskets	— Mispositioned or damaged.
	• T.V. Modulator Downshift Valve	— Stuck.
	• Throttle Valve Cable	— Improperly set.
NO PART THROTTLE 4-3 DOWNSHIFT (On Selected Models With A P.T. Passage In The Throttle Plunger Bushing)	• Throttle Plunger Bushing	— Passages not open.
	• 3-4 Throttle Valve Bushing	— Passages not open.
	• PT/D-3 Check Ball (#3)	— Mispositioned or missing.
	• Valve Body Gaskets	— Mispositioned or damaged.
	• Throttle Valve Cable	— Improperly set.
	• T.V. Limit Valve	— Binding.
LOW OR HIGH SHIFT POINTS (Install Pressure Gage To Line Pressure Tap)	• Throttle Valve Cable	— Binding or misadjusted.
	• T.V. Limit Valve	— Binding.
	• Throttle Valve	— Binding.
	• T.V. Modulator Upshift Valve	— Binding.
	• T.V. Modulator Downshift Valve	— Binding.
	• Valve Body Gaskets	— Mispositioned, leaking or damaged.
	• Throttle Valve Plunger	— Binding.
	• 1-2, 2-3 or 3-4 Throttle Valves	— Binding in bushings.
	• Pressure Regulator Valve	— Binding.
	• T.V. Exhaust Ball (#5) & Lifter	— Mispositioned, unhooked or missing.
	• Throttle Lever & Bracket Assembly	— Binding, unhooked or loose at mounting valve body bolt. — Not positioned at the throttle valve plunger bushing pin locator.
	• Governor Shaft To Cover Seal Ring	— Broken or missing.
	• Governor Cover Gasket	— Broken or missing.
	• Case	— Porosity.

HH0013-2004R

Figure 16 Diagnosis Chart

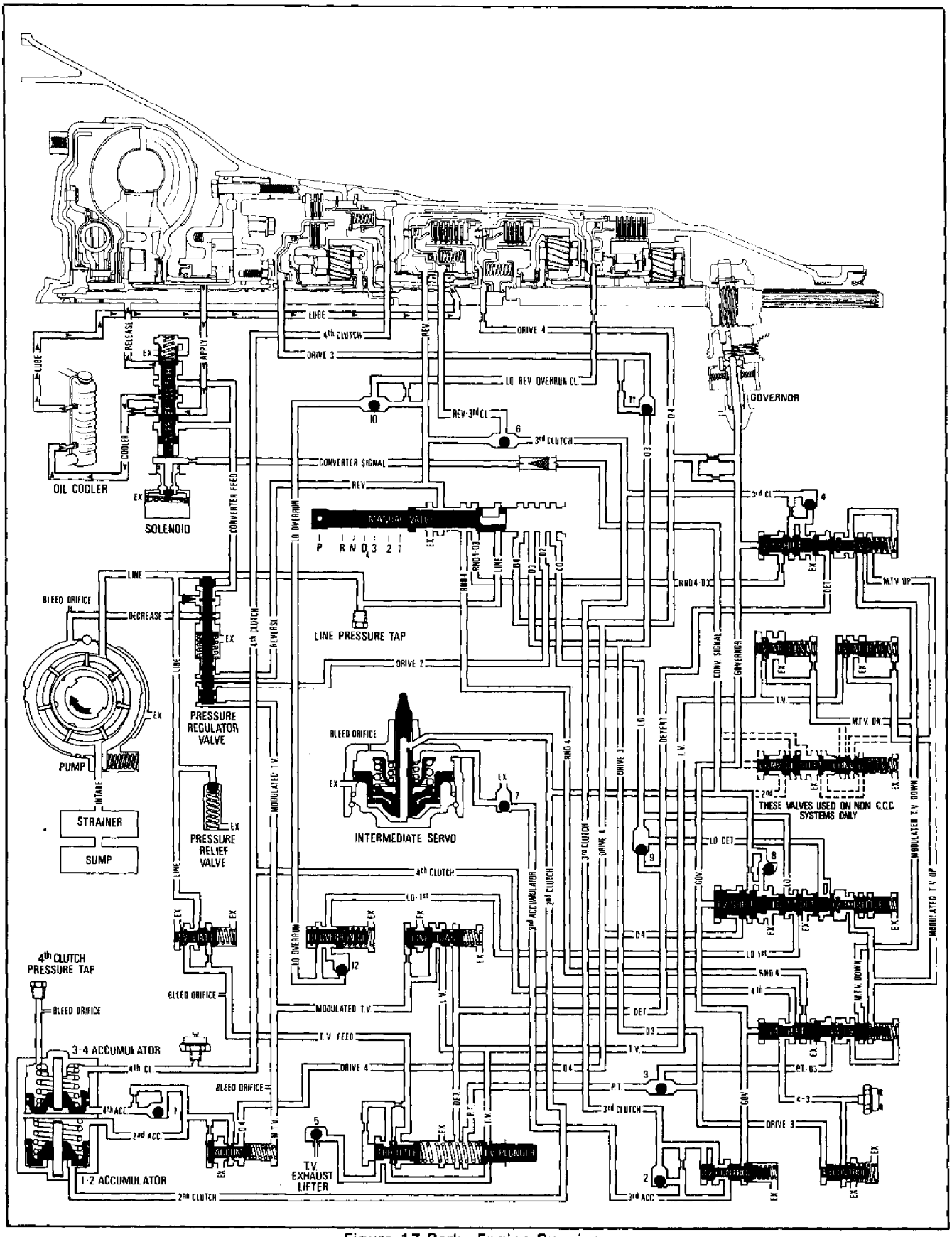


Figure 17 Park - Engine Running

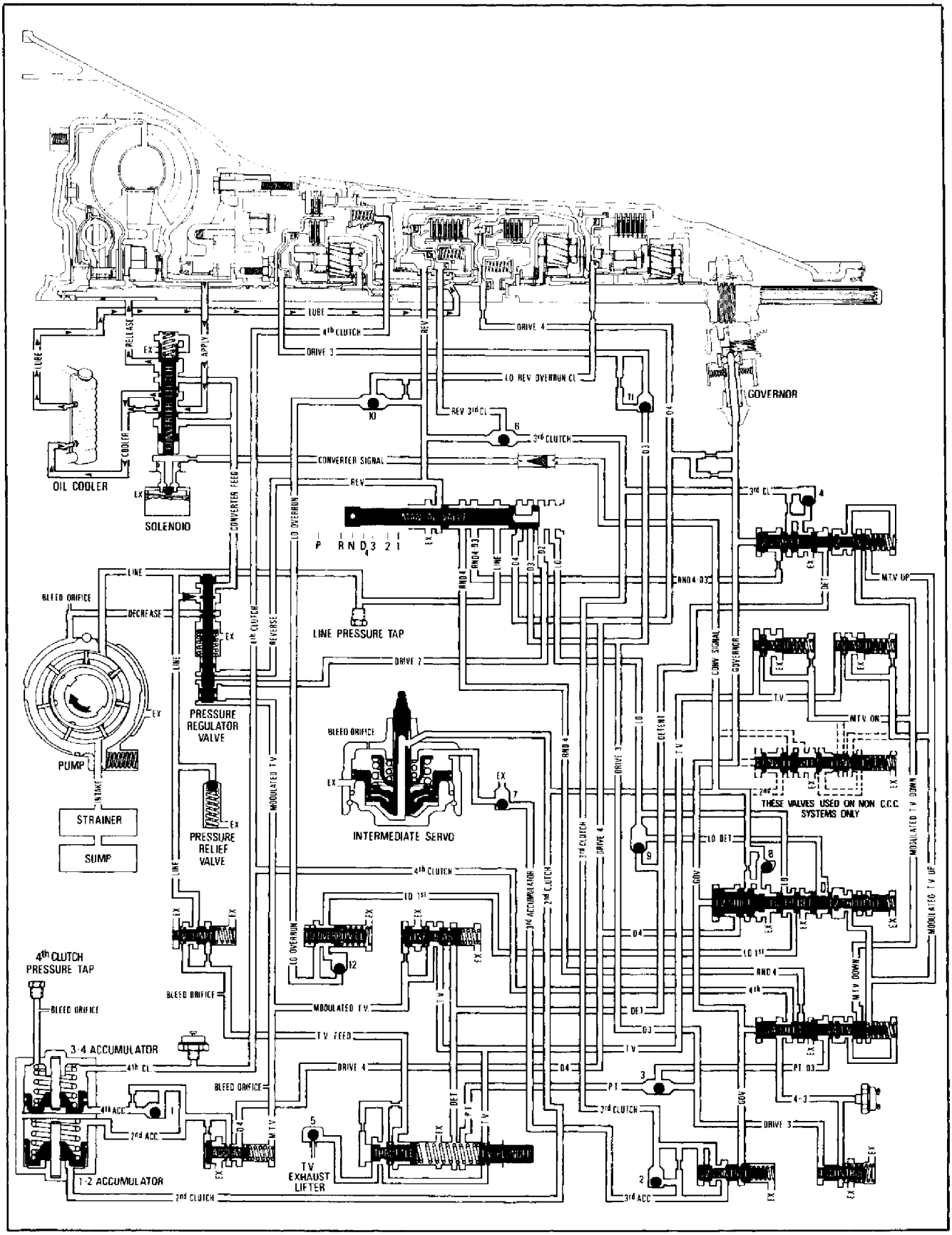


Figure 18 Neutral - Engine Running

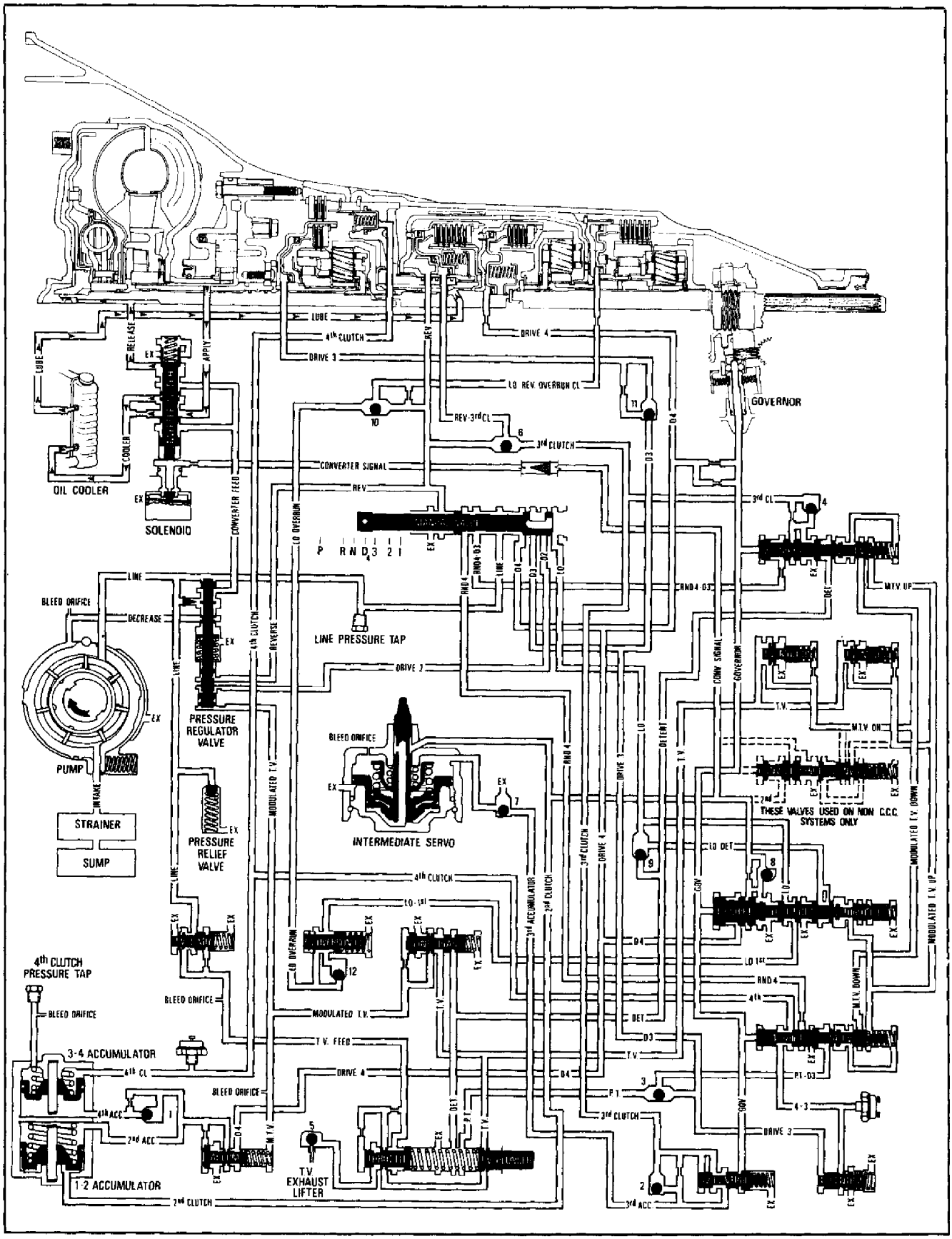


Figure 19 Drive Range - First Gear

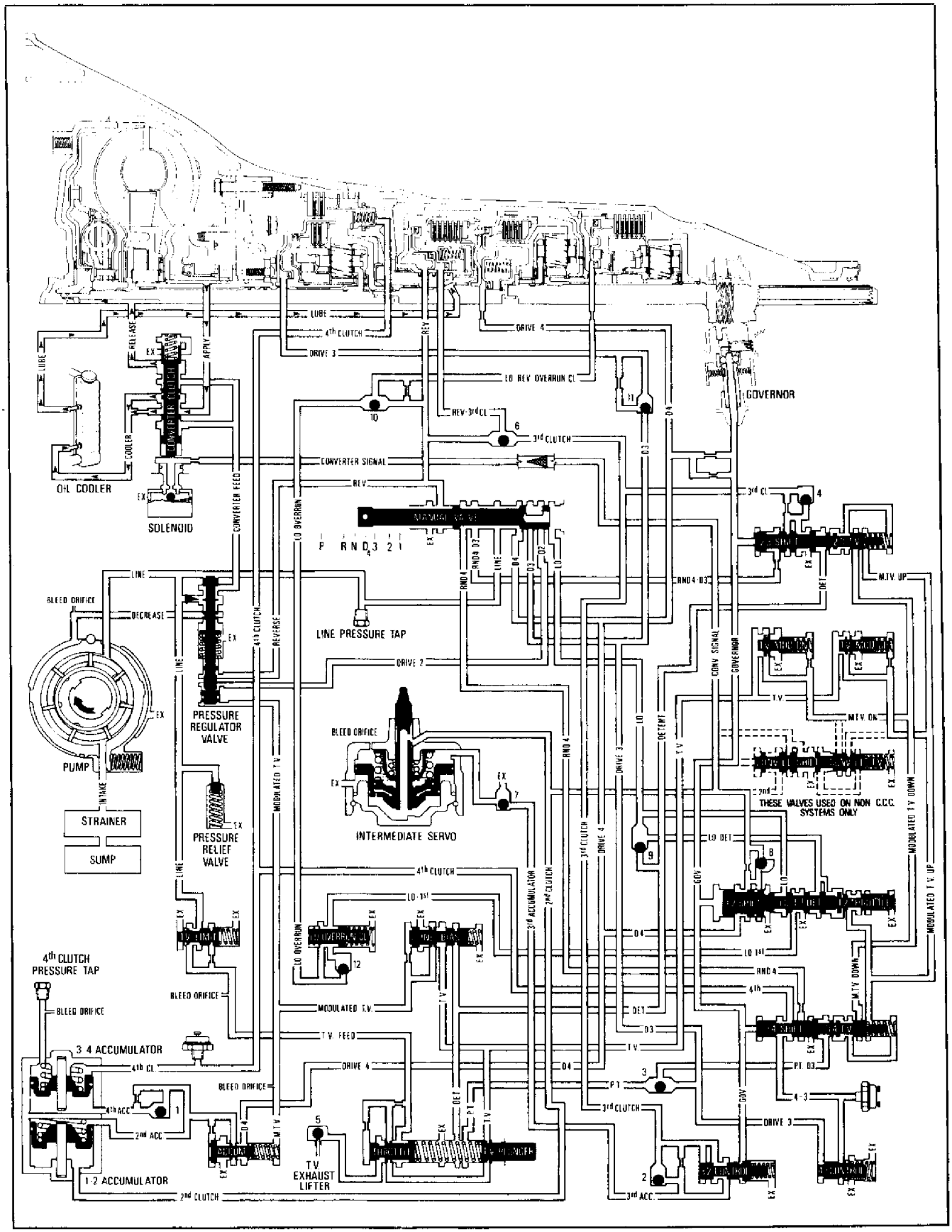


Figure 20 Drive Range - Second Gear

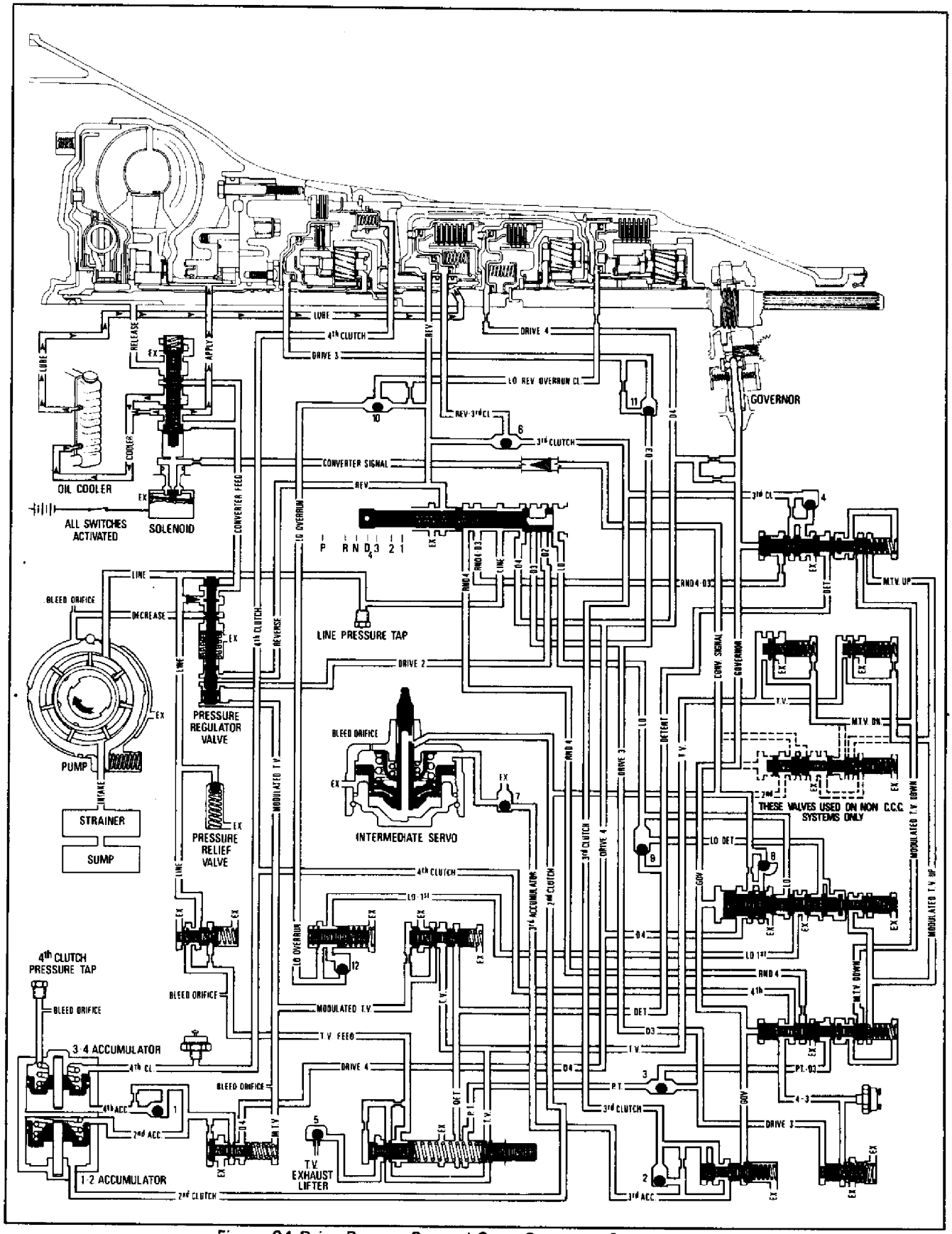


Figure 21 Drive Range - Second Gear, Converter Clutch Applied

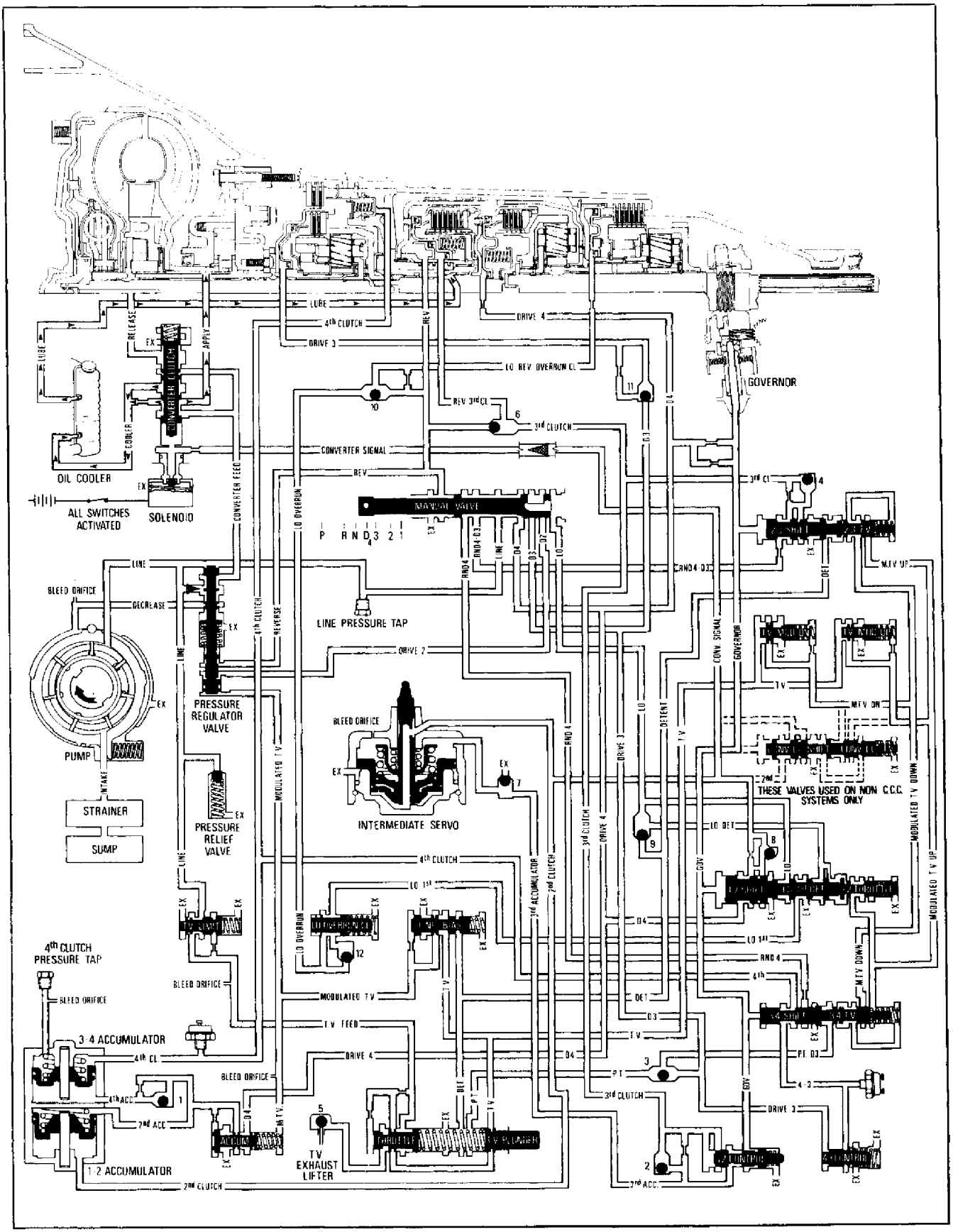


Figure 22 Drive Range - Third Gear

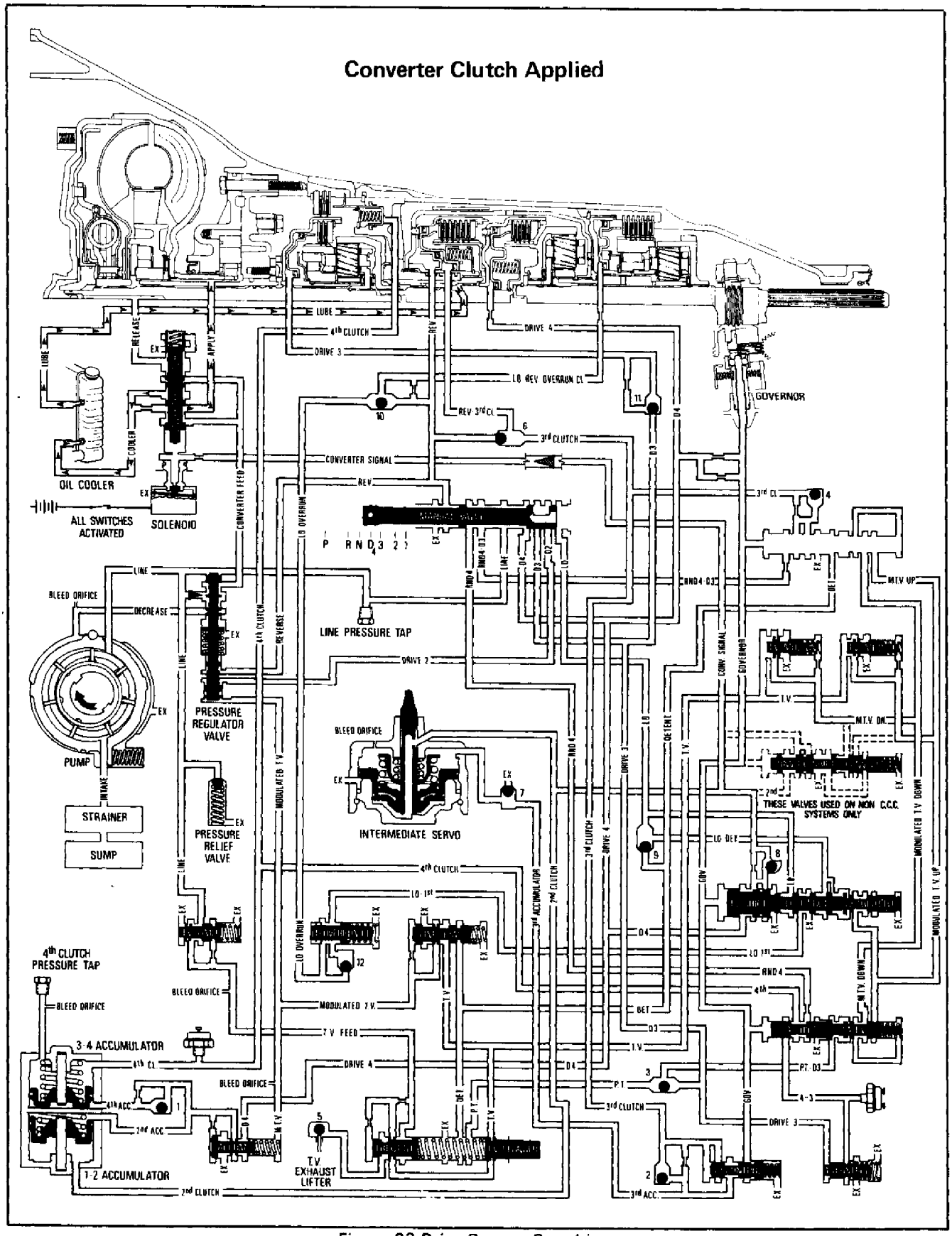


Figure 23 Drive Range - Overdrive

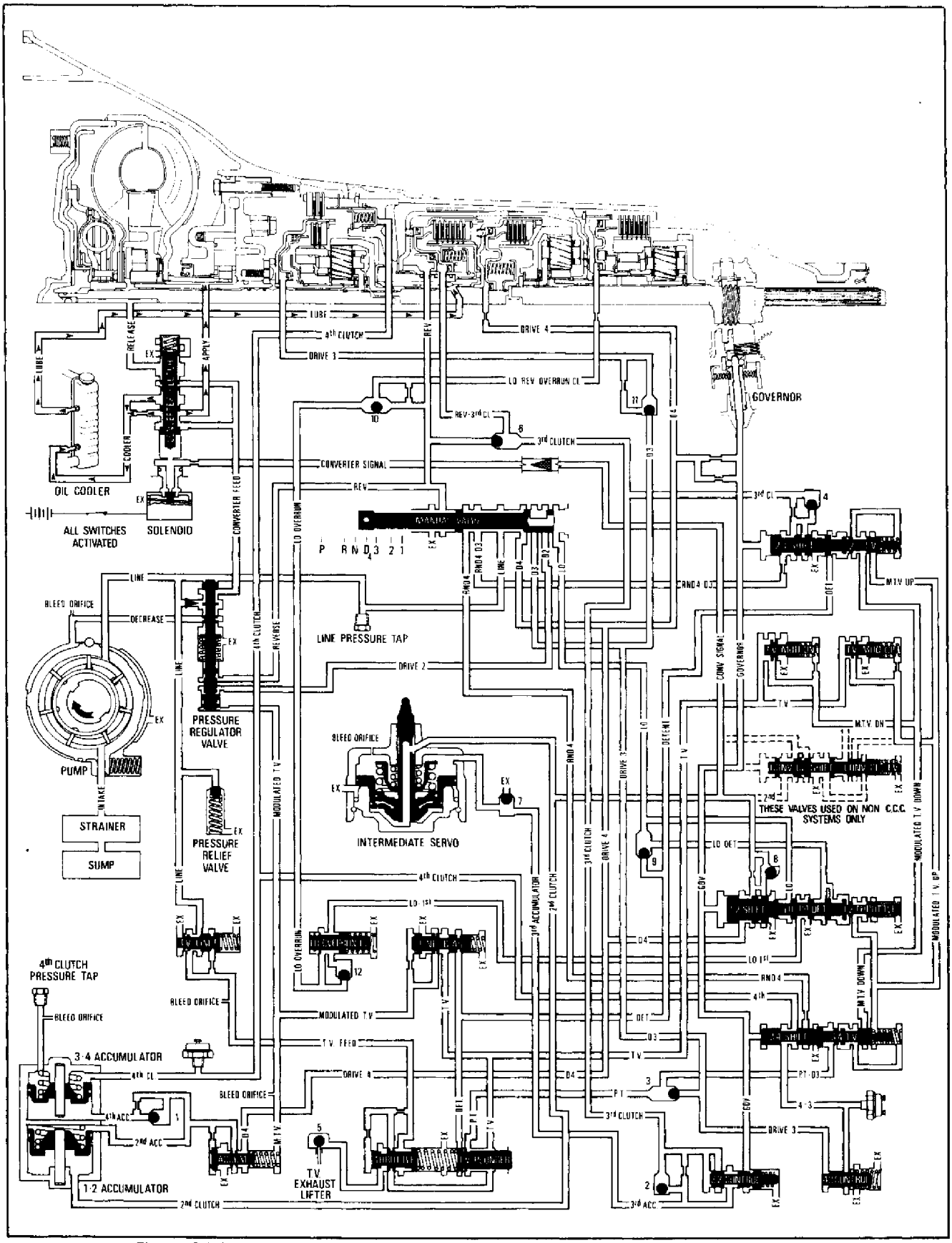


Figure 24 Part Throttle 4-3 and Modulated Downshifts - Valves in Third Gear Position

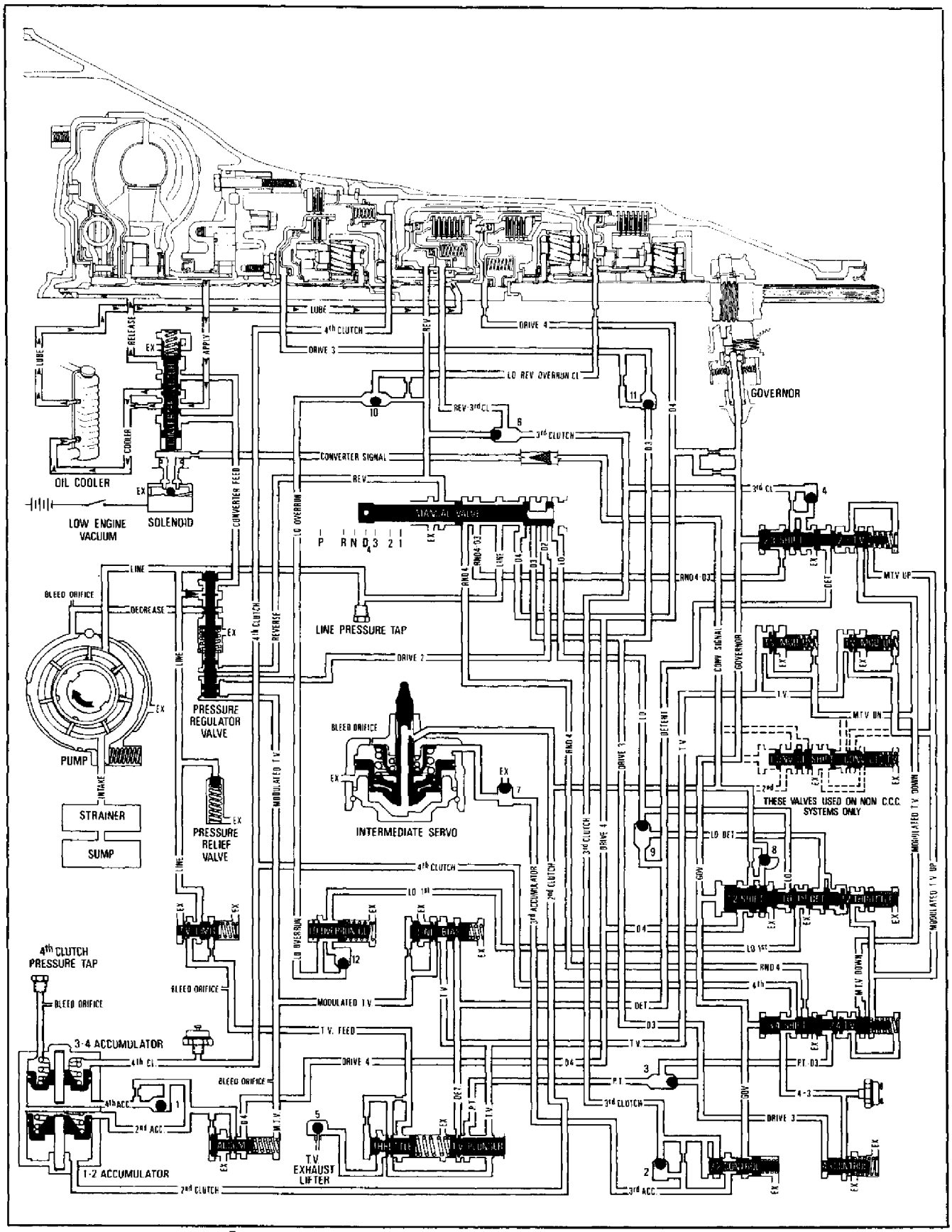


Figure 25 Detent Downshifts - Valves in Second Gear Position

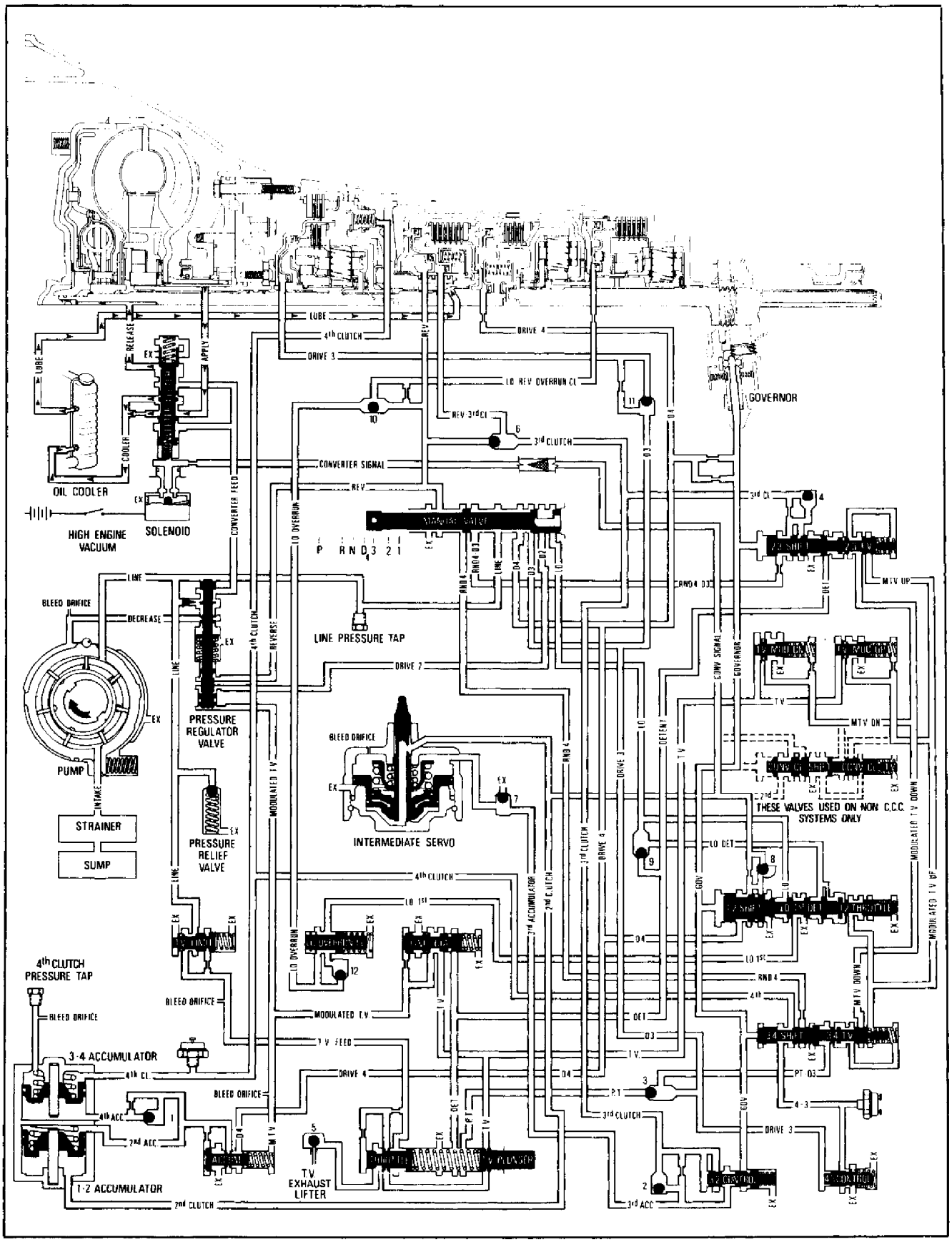


Figure 26 Manual Third

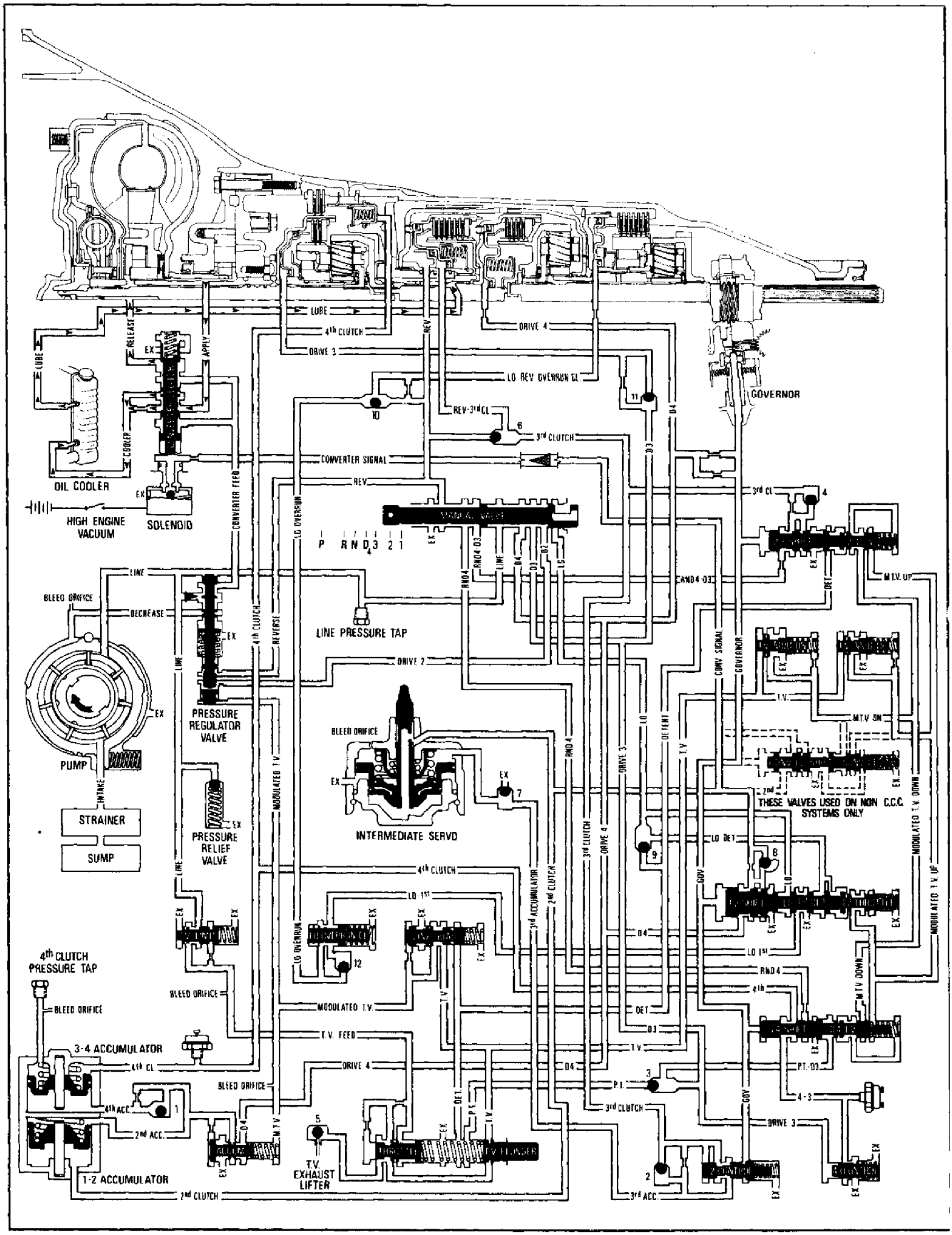


Figure 27 Manual Second

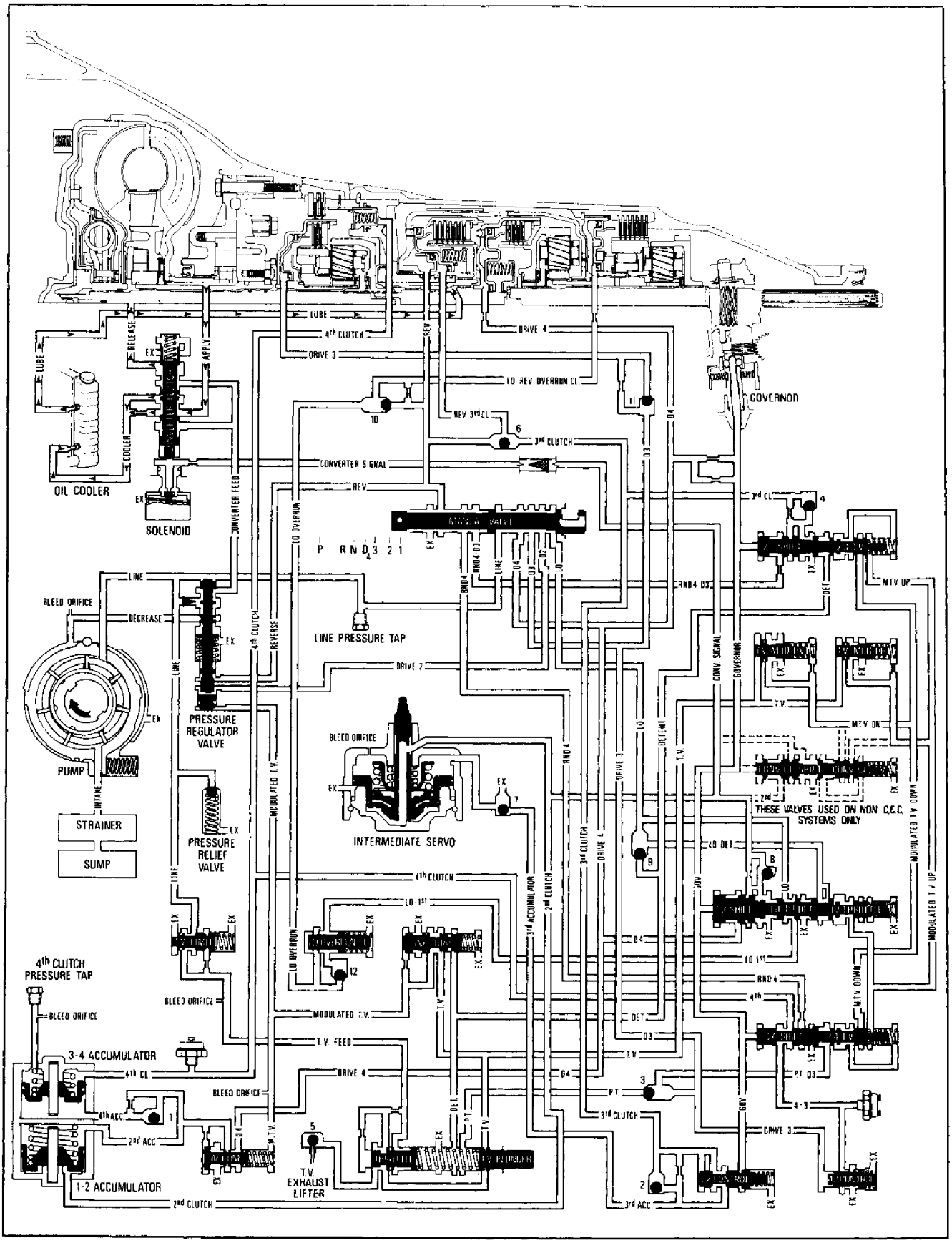


Figure 28 Manual Lo

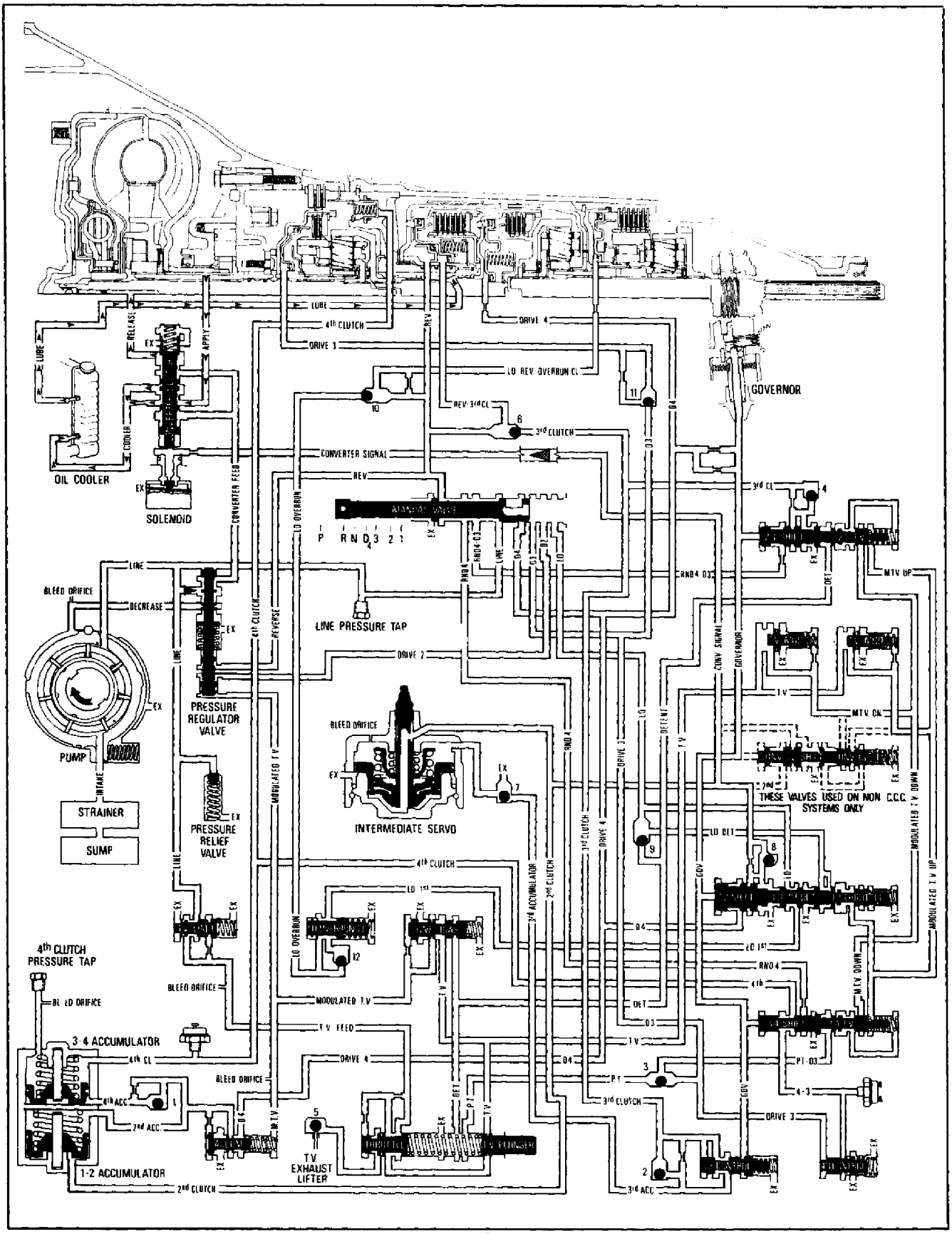
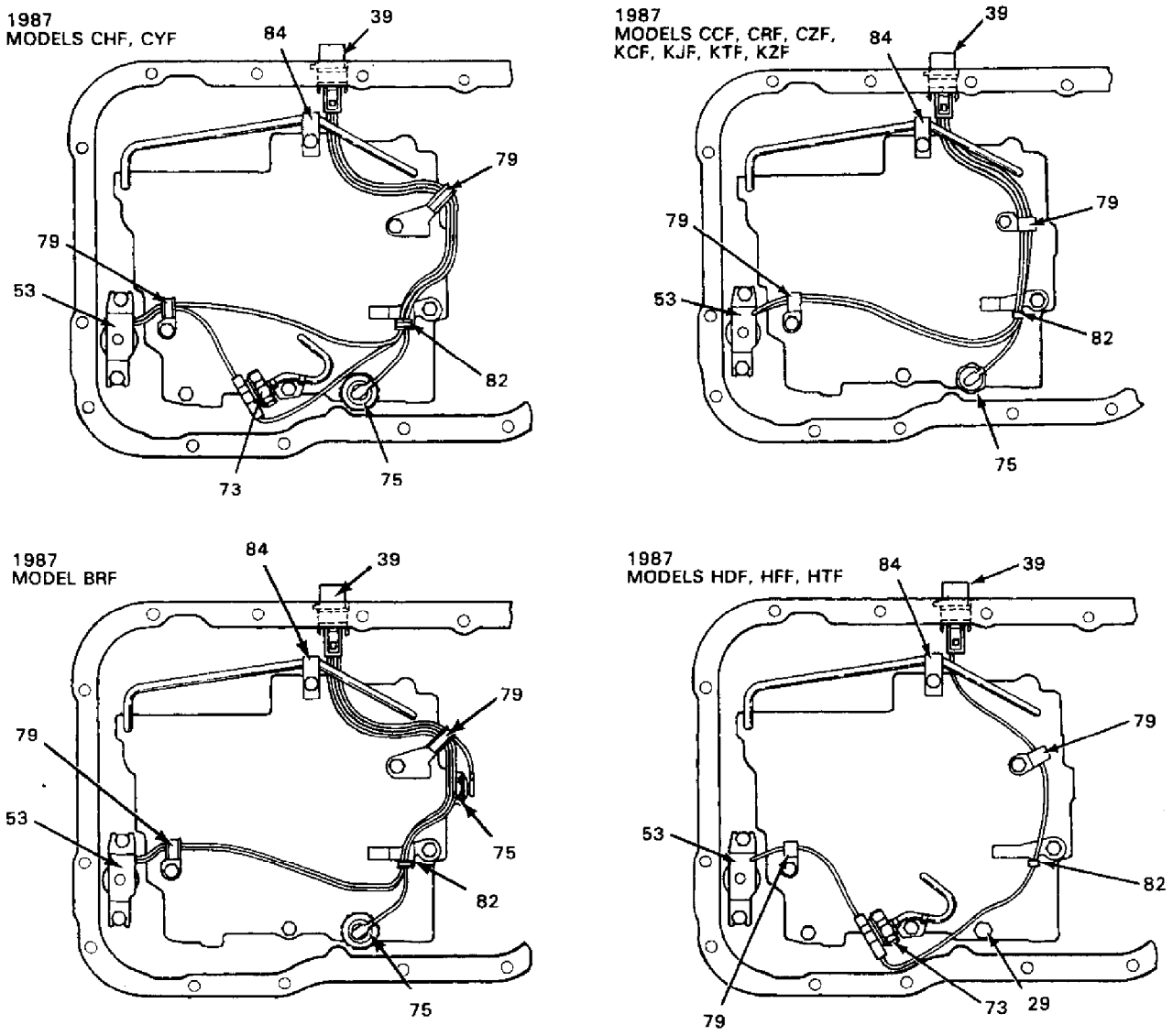


Figure 29 Reverse

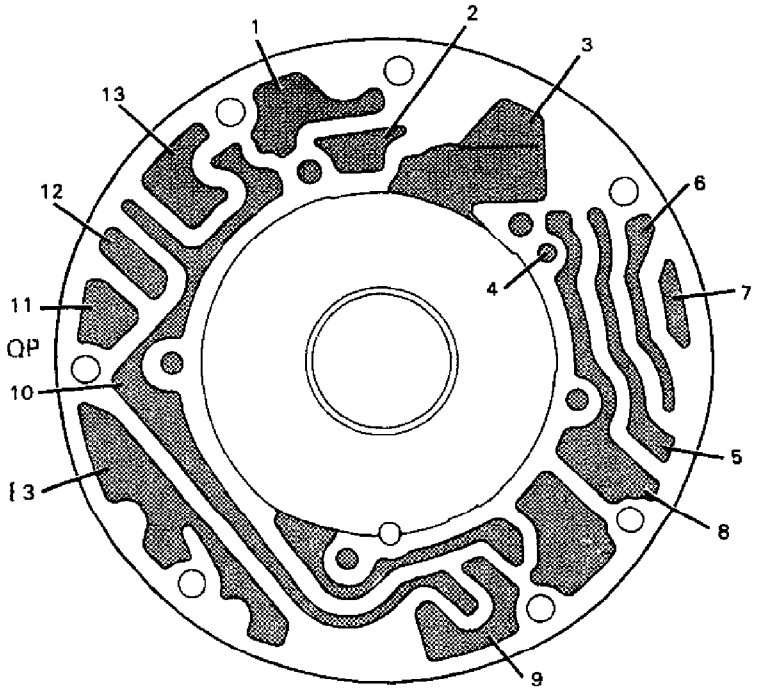


ILL. NO.	DESCRIPTION
29	PLUG, HEX HEAD 1/8" PIPE (2)
39	CONNECTOR, ELECTRICAL
53	SOLENOID ASSEMBLY
73	SWITCH, PRESSURE 4-3
75	SWITCH ASSEMBLY, PRESSURE (3RD OR 4TH)
79	CLIP, SOLENOID WIRE (2)
82	CLIP, FILTER RETAINER
84	RETAINER, SIGNAL OIL PIPE

HH0017-2004R

Figure 30 Wiring Diagrams

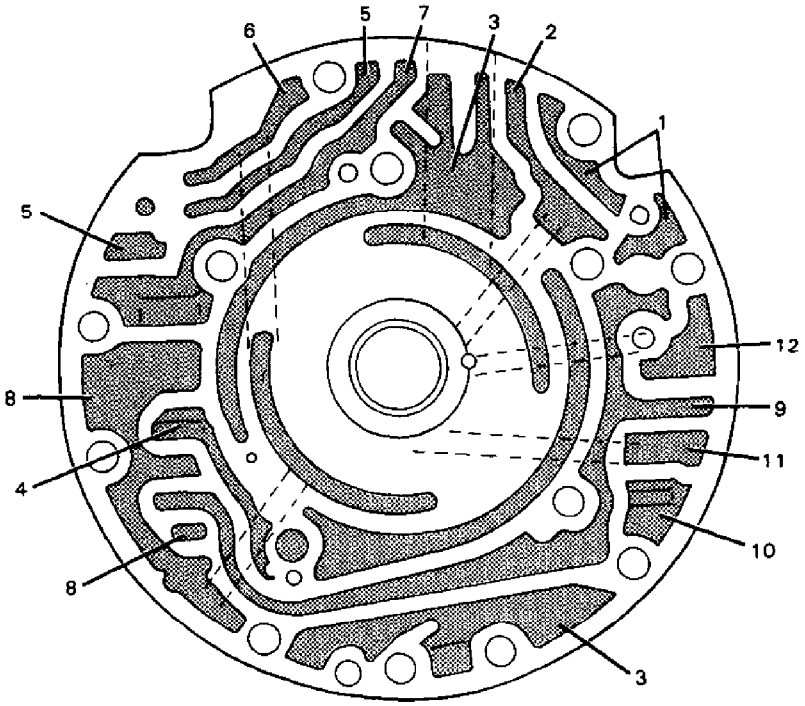
ILL. NO.	DESCRIPTION
1	CONVERTER CL. SIGNAL
2	OVERRUN CLUTCH
3	VENT
4	DRAIN
5	LO
6	MTV
7	VOID
8	REVERSE
9	LINE
10	CONVERTER FEED
11	EXHAUST
12	RELEASE
13	TO COOLER



HH0018-2004R

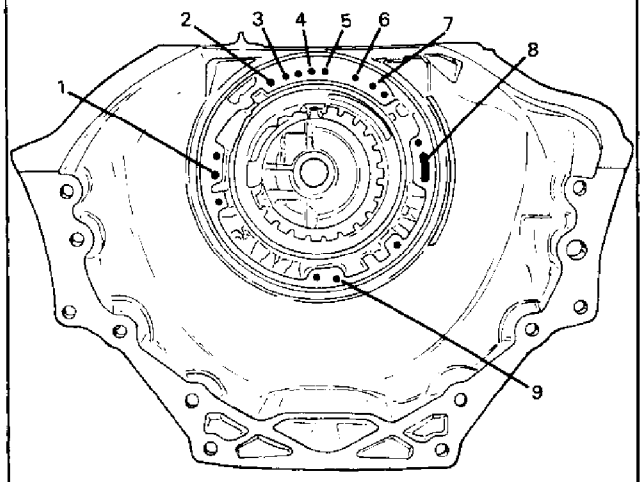
Figure 31 Pump Body

ILL. NO.	DESCRIPTION
1	CONVERTER CL. SIGNAL
2	OVERRUN CLUTCH
3	VENT
4	DECREASE
5	LO
6	MTV
7	REVERSE
8	LINE
9	CONVERTER FEED
10	EXHAUST
11	RELEASE
12	TO COOLER



HH0019-2004R

Figure 32 Pump Cover



ILL. NO.	DESCRIPTION
1	LINE PRESSURE TAP
2	LINE
3	MODULATOR THROTTLE VALVE
4	DRIVE 2
5	REVERSE
6	DRIVE 3
7	CONVERTER CL. SIGNAL
8	TO COOLER
9	CASE VENT

Figure 33 Pump Assembly to Case Passages

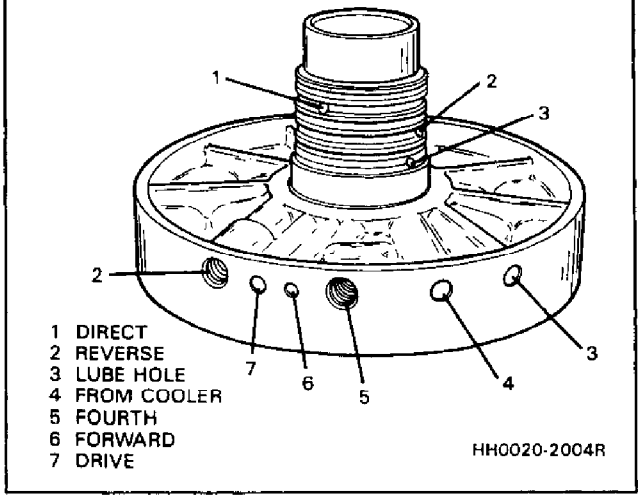


Figure 34 Center Support Passages

1 EXHAUST
2 LINE
3 REVERSE
4 RND4D3
5 3RD CLUTCH
6 REVERSE/3RD
7 3RD ACCUMULATOR
8 DRIVE 2
9 GOVERNOR
10 RND4
11 LO/DETENT
12 DRIVE 4
13 DRIVE 3
14 REVERSE OR LO OVERRUN
15 VOID
16 4TH CLUTCH
17 4TH ACCUMULATOR
18 LO OVERRUN
19 2ND CLUTCH
20 LO-1ST
21 LO
22 SERVO EXHAUST
23 THROTTLE VALVE
24 PART THROTTLE/D3
25 TV FEED
26 TV EXHAUST
27 MTV DOWN
28 MOD. THROTTLE VALVE
29 CONVERTER CL. SIGNAL
30 MTV UP
31 CUP PLUG

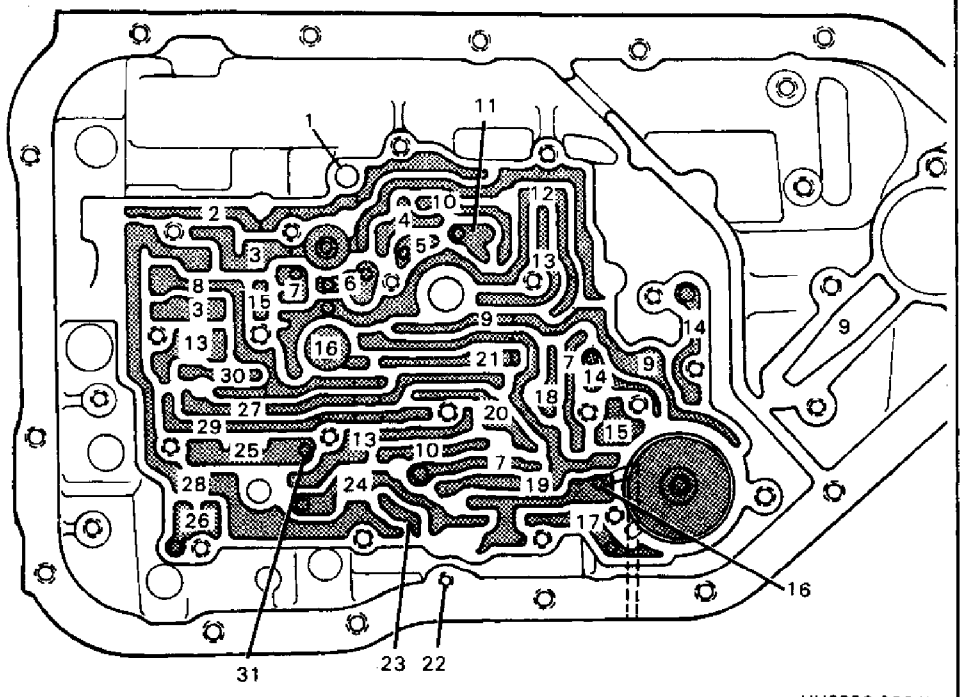
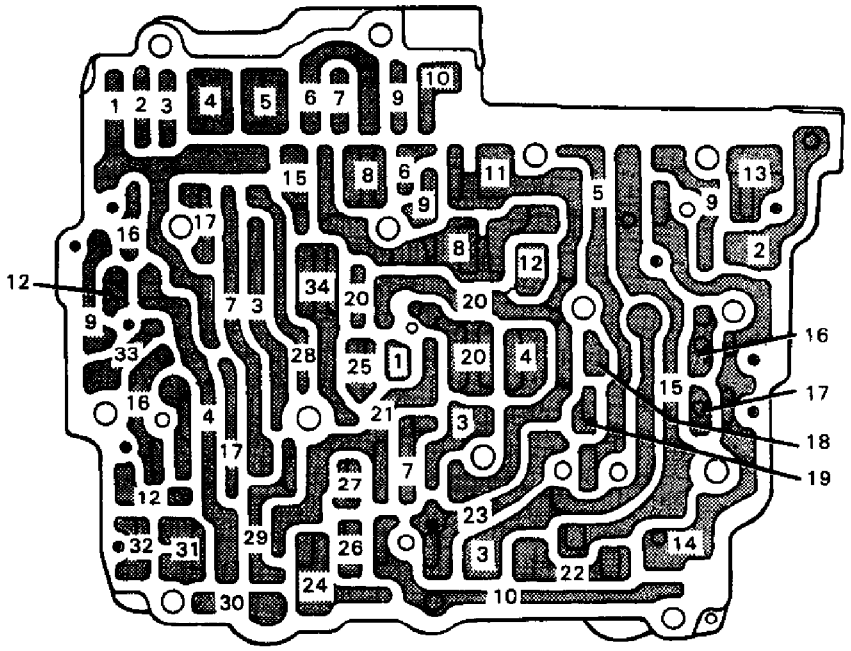


Figure 35 Case Passages - Valve Body Side

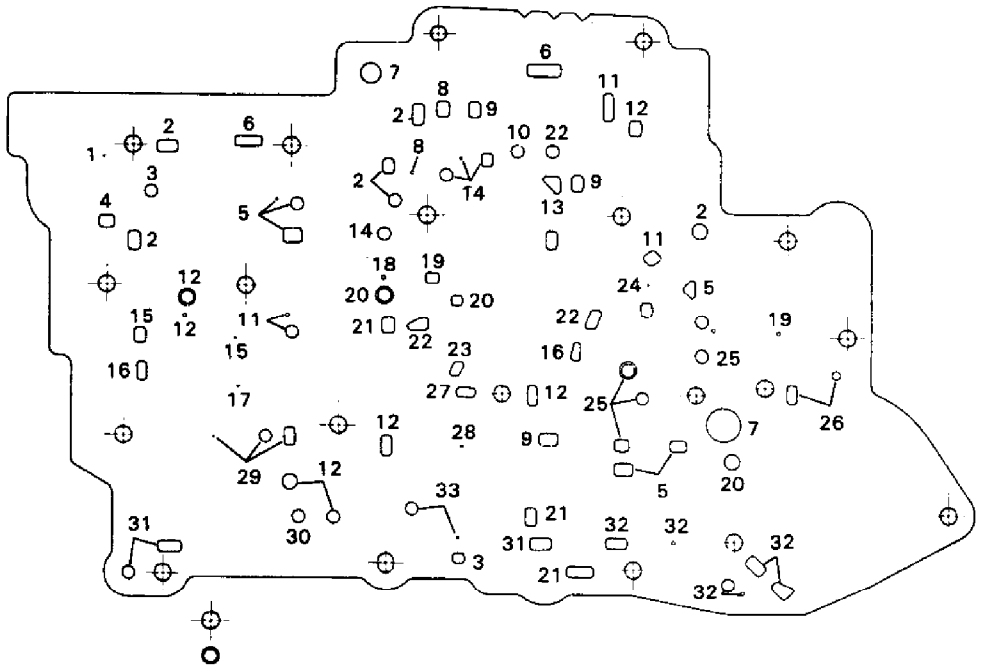
1 LO
2 DRIVE 2
3 DRIVE 3
4 DRIVE 4
5 LINE
6 RND4D3
7 RND4
8 3RD CLUTCH
9 REVERSE
10 EXHAUST
11 GOVERNOR
12 3RD ACCUMULATOR
13 ORIFICED MODULATED TV
14 THROTTLE VALVE
15 DETENT
16 MTV UP
17 MTV DOWN
18 ORIFICED MTV UP
19 ORIFICED MTV DOWN
20 2ND CLUTCH
21 4-3
22 PART THROTTLE
23 TV FEED
24 MODULATED TV
25 LO-1ST
26 ORIFICED TV
27 4TH CLUTCH
28 LO OR DETENT
29 PART THROTTLE/D3
30 VOID
31 ACCUMULATOR
32 4TH ACCUMULATOR
33 LO OVERRUN
34 CONVERTER CL. SIGNAL



HH0023-2004R

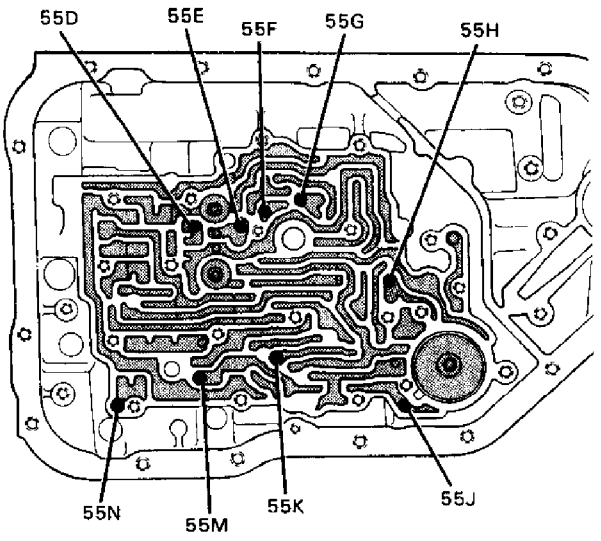
Figure 36 Valve Body Passages - Case Side

ILL. NO.	DESCRIPTION
1	ORI MTV
2	REVERSE
3	MTV
4	DRIVE 2
5	3RD ACC.
6	LINE
7	EXHAUST
8	RND4D3
9	RND4
10	DETENT
11	DRIVE 4
12	DRIVE 3
13	LO/DETENT
14	3RD CLUTCH
15	MTV UP
16	MTV DOWN
17	ORI MTV DOWN
18	ORIFICE
19	GOVERNOR
20	2ND CLUTCH
21	4TH CLUTCH
22	LO
23	LO-1ST
24	GOV. ORIFICE
25	LO OV
26	REV/LO OV
27	CONV. CL. SIGNAL
28	RND4 ORI
29	TV FEED
30	PART THROTTLE
31	PT/D3
32	ACCUMULATOR
33	TV



HH0016-2004R

Figure 37 Typical Spacer Plate



ILL. NO.	DESCRIPTION
55D	CHECK BALL #2 3RD ACCUMULATOR
55E	CHECK BALL #6 REVERSE/3RD
55F	CHECK BALL #4 3RD CLUTCH
55G	CHECK BALL #9 LO/DETENT
55H	CHECK BALL #10 LO/REVERSE
55J	CHECK BALL #1 4TH ACCUMULATOR
55K	CHECK BALL #7 INTERMEDIATE SERVO CHECK BALL IS LOCATED IN CAPSULE
55M	CHECK BALL #3 PT/D3
55N	CHECK BALL #5 T.V. EXHAUST

HH0015-2004R

Figure 38 Check Ball Location - Case

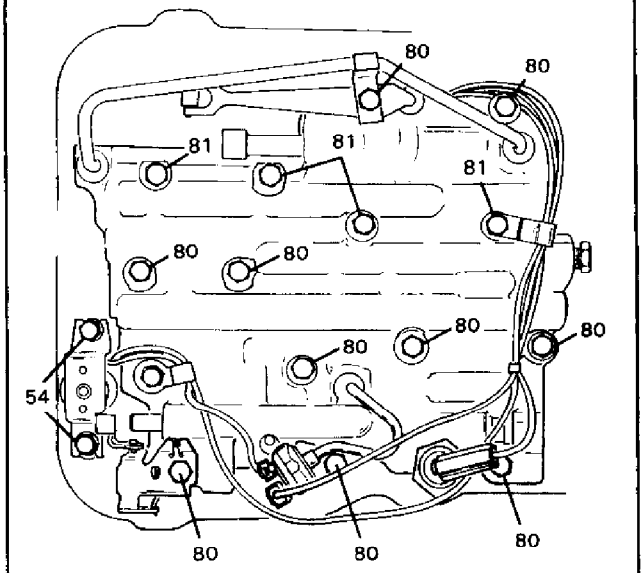
TORQUE CONVERTER CLUTCH (TCC) DIAGNOSIS

To properly diagnose the Torque Converter Clutch (TCC) system, perform all electrical testing first and then the hydraulic testing. Refer to Torque Converter Section 6E2-C8 for additional information.

The TCC is applied by fluid pressure which is controlled by a solenoid located inside the Automatic Transmission assembly. The solenoid is energized or released by making or breaking an electrical circuit through a combination of switches and sensors.

TCC Electrical Diagnosis

- For electrical diagnosis of TCC, refer to the specific carline section in Section 8A, Electrical Diagnosis.
- For diagnosis of emission control related components of TCC, Refer to the specific section of 6E, Driveability and Emissions.
- For the diagnosis of TCC Hydraulic Controls, refer to the specific procedure and wiring diagrams provided in this section.



ILL. NO.	DESCRIPTION
54	BOLTS, HEX WASHER HEAD M6 X 1 X 12.0
80	BOLT, M6 X 1 X 45
81	BOLT, M6 X 1 X 60

HH0021-2004R

Figure 39 Valve Body Bolt Location

Functional Check Procedure

Inspect

1. Install a tachometer
2. Operate the vehicle until proper operating temperature is reached
3. Drive vehicle at 50-55 mph (80-88 Km/h) with light throttle (road load)
4. Maintaining throttle lightly touch the brake pedal and check for a slight bump when the TCC releases and a slight increase in engine RPM.
5. Release the brake, slowly accelerate and check for a re-apply of the converter clutch and a slight decrease in engine RPM.

Preliminary Checking Procedure

The purpose of the preliminary checking procedure is to isolate external (electrical) problems from internal (electrical or mechanical) ones.

Important

- Use only a scale type ohmmeter. High impedance type ohmmeters and those with a digital readout will not work.
- An ALCL scanner may be used to verify the electrical circuit. Remember, a completed ground does not indicate that the solenoid will apply.
- Do not bench test using an automotive type battery. Accidentally crossed wires will damage the internal diodes of the TCC solenoid.

External Controls

Inspect

- Connect voltmeter between transmission connector and ground.
- Turn key "ON"
- If 0 or low voltage is found, refer to Sections 6E and 8A for electrical diagnosis.
- If 12 volts are present at the connector, refer to the TCC hydraulic diagnosis.

TORQUE CONVERTER STATOR

The Torque Converter Stator roller clutch can have one of two different type malfunctions:

A. Stator Assembly freewheels in both directions.

B. Stator Assembly remains locked up at all times.

Condition A-Poor Acceleration Low Speed

The car tends to have poor acceleration from a standstill. At speeds above 30-35 mph (50-55 km/h), the car may act normal. If poor acceleration is noted, it should first be determined that the exhaust system is not blocked, the engine timing is correct and the transmission is in first (1st) gear when starting out.

If the engine freely accelerates to high r.p.m. in "NEUTRAL" (N), it can be assumed that the engine and exhaust system are normal. Checking for poor performance in "Drive" and Reverse will help determine if the stator is freewheeling at all times.

Condition B-Poor Acceleration High Speed

Engine r.p.m. and car speed limited or restricted at high speeds. Performance when accelerating from a standstill is normal. Engine may over-heat. Visual examination of the converter may reveal a blue color from over-heating.

If the converter has been removed, the stator roller clutch can be checked by inserting a finger into the splined inner race of the roller clutch and trying to turn the race in both directions. The inner race should turn freely clockwise, but not turn or be very difficult to turn counterclockwise.

TORQUE CONVERTER EVALUATION

The converter should be replaced if:

- Converter has an imbalance which cannot be corrected. (Refer to Converter Vibration Test Procedure)
- Converter is contaminated with engine coolant containing antifreeze.

The Converter Should Not be Replaced If:

- The oil has an odor, is discolored, and there is no evidence of metal or clutch facing particles.
- The threads in one or more of the three converter bolt holes are damaged.
  - Correct with thread insert. (Refer to Section 6A)