

2010 Transmission

Automatic Transmission - 6T30/6T40/6T45 - Equinox & Terrain

DESCRIPTION AND OPERATION

DEFINITIONS AND ABBREVIATIONS

Throttle Positions

Engine Braking

A condition where the engine is used to slow the vehicle by manually downshifting during a zero throttle coastdown.

Full Throttle Downshift

A quick apply of the accelerator pedal to its full travel, forcing a downshift.

Heavy Throttle

Approximately 3/4 of accelerator pedal travel, 75 percent throttle position.

Light Throttle

Approximately 1/4 of accelerator pedal travel, 25 percent throttle position.

Medium Throttle

Approximately 1/2 of accelerator pedal travel, 50 percent throttle position.

Minimum Throttle

The least amount of throttle opening required for an upshift.

Wide Open Throttle (WOT)

Full travel of the accelerator pedal, 100 percent throttle position.

Zero Throttle Coastdown

A full release of the accelerator pedal while the vehicle is in motion and in drive range.

Shift Condition Definitions

Bump

A sudden and forceful apply of a clutch or a band.

Chuggle

A bucking or jerking. This condition may be most noticeable when the converter clutch is engaged. It is similar to the feel of towing a trailer.

Delayed

A condition where a shift is expected but does not occur for a period of time. This could be described as a clutch or band engagement that does not occur as quickly as expected during a part throttle or wide open throttle apply of the accelerator, or during manual downshifting to a lower range. This term is also defined as LATE or EXTENDED.

Double Bump - Double Feel

Two sudden and forceful applies of a clutch or a band.

Early

A condition where the shift occurs before the car has reached proper speed. This condition tends to labor the engine after the upshift.

End Bump

A firmer feel at the end of a shift than at the start of the shift. This is also defined as END FEEL or SLIP BUMP.

Firm

A noticeably quick apply of a clutch or band that is considered normal with a medium to heavy throttle. This apply should not be confused with HARSH or ROUGH.

Flare

A quick increase in engine RPM along with a momentary loss of torque. This most generally occurs during a shift. This condition is also defined as SLIPPING.

Harsh - Rough

A more noticeable apply of a clutch or band than FIRM. This condition is considered undesirable at any throttle position.

Hunting

A repeating quick series of upshifts and downshifts that causes a noticeable change in engine RPM, such as a 4-3-4 shift pattern. This condition is also defined as BUSYNESS.

Initial Feel

A distinctly firmer feel at the start of a shift than at the finish of the shift.

Late

A shift that occurs when the engine RPM is higher than normal for a given amount of throttle.

Shudder

A repeating jerking condition similar to CHUGGLE but more severe and rapid. This condition may be most noticeable during certain ranges of vehicle speed.

Slipping

A noticeable increase in engine RPM without a vehicle speed increase. A slip usually occurs during or after initial clutch or band apply.

Soft

A slow, almost unnoticeable clutch or band apply with very little shift feel.

Surge

A repeating engine related condition of acceleration and deceleration that is less intense than CHUGGLE.

Tie-Up

A condition where two opposing clutch and/or bands are attempting to apply at the same time causing the engine to labor with a noticeable loss of engine RPM.

Noise Conditions

Drive Link Noise

A whine or growl that increases or fades with vehicle speed, and is most noticeable under a light throttle acceleration. It may also be noticeable in PARK or NEUTRAL operating ranges with the vehicle stationary.

Final Drive Noise

A hum related to vehicle speed which is most noticeable under a light throttle acceleration.

Planetary Gear Noise

A whine related to vehicle speed, which is most noticeable in FIRST gear, SECOND gear, FOURTH gear or REVERSE. The condition may become less noticeable, or go away, after an upshift.

Pump Noise

A high pitched whine that increases in intensity with engine RPM. This condition may also be noticeable in all operating ranges with the vehicle stationary or moving.

Torque Converter Noise

A whine usually noticed when a vehicle is stopped, and the transmission is in DRIVE or REVERSE. The noise will increase with engine RPM.

Driver Shift Control

Driver shift control (DSC) allows the driver to change gears similar to a manual transmission. Refer to the vehicle owner's manual for specific DSC operating instructions.

Transmission Abbreviations

A/C

Air Conditioning

AC

Alternating Current

AT

Automatic Transmission

CC

Climate Control

DC

Direct Current

DIC

Driver Information Center

DLC

Diagnostic Link Connector

DMM

Digital Multimeter

DSC

Driver Shift Control

DTC

Diagnostic Trouble Code

EBTCM

Electronic Brake/Traction Control Module

ECCC

Electronically-Controlled Capacity Clutch

ECT

Engine Coolant Temperature

EMI

Electromagnetic Interference

IAT

Intake Air Temperature

IGN

Ignition

IMS

Internal Mode Switch

ISS

Input Speed Sensor

MAP

Manifold Absolute Pressure

MIL

Malfunction Indicator Lamp

NC

Normally Closed

NO

Normally Open

OBD

On Board Diagnostic

OSS

Output Speed Sensor

PC

Pressure Control

PCM

Powertrain Control Module

PCS

Pressure Control Solenoid

PS

Pressure Switch

PWM

Pulse Width Modulation

RPM

Revolutions Per Minute

SS

Shift Solenoid

STL

Service Transmission Lamp

TAP

Transmission Adaptive Pressure

TCC

Torque Converter Clutch

TFP

Transmission Fluid Pressure

TFT

Transmission Fluid Temperature

TP

Throttle Position

VSS

Vehicle Speed Sensor

WOT

Wide Open Throttle

TRANSMISSION IDENTIFICATION INFORMATION

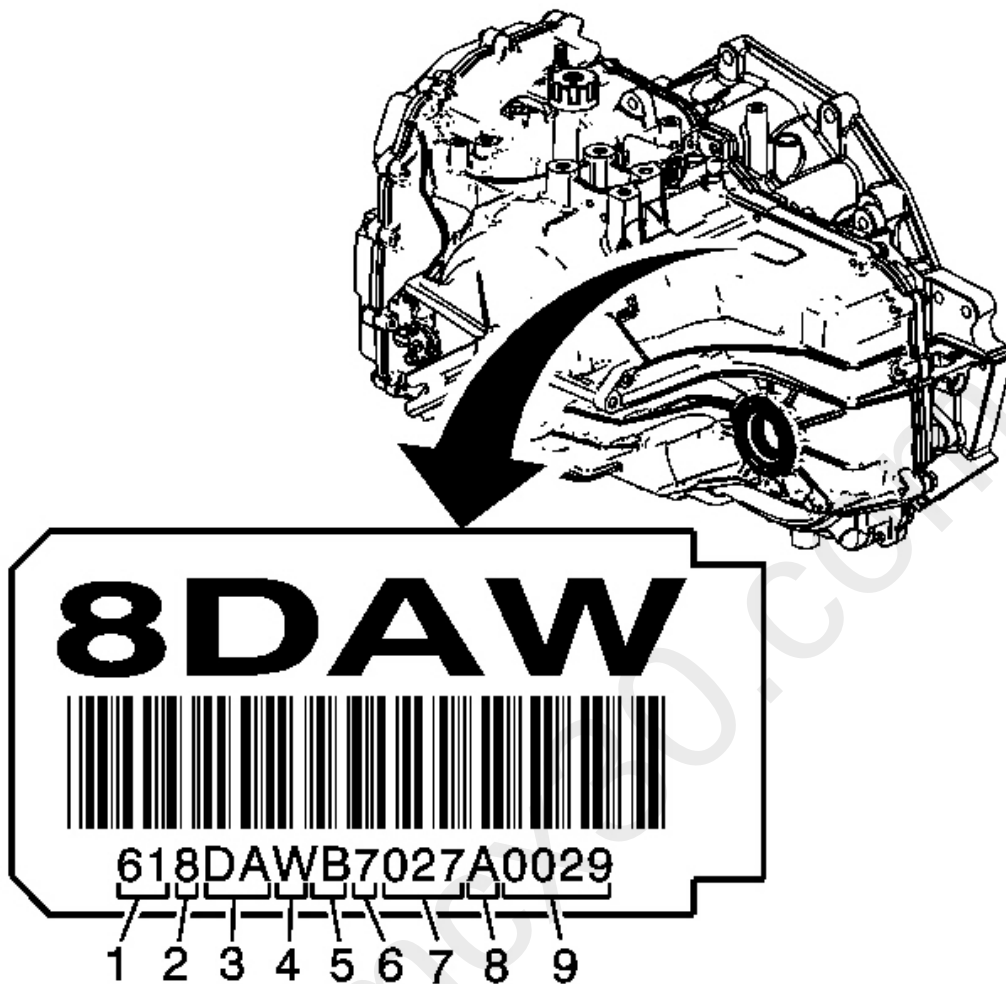


Fig. 1: Identifying Transmission Identification Information Plate
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
1	Code for Automatic Transmission
2	Model Year
3	Model for Transmission
4	Transmission Family
5	Source Code for Plant
6	Calender Year
7	Julian Date
8	Shift/Line (A/B)

Source Code for Plant

- 4 - Ramos Arizpe, Mexico
- H - Ypsilanti, Michigan
- J - Windsor, Ontario
- S - Strasbourg, France
- W - Warren, Michigan
- Y - Toledo, Ohio
- R - Boryeong, Korea
- M - Yan Tai, Shan Dong, China
- P - San Luis Potosi, Mexico

TRANSMISSION GENERAL DESCRIPTION

The Hydra-matic 6T40/45 is a fully automatic, 6-speed, front-wheel drive, electronic-controlled transmission. It consists primarily of a 4-element torque converter, a compound planetary gear set, friction and mechanical clutch assemblies, and a hydraulic pressurization and control system. There are 2 variants of the transmission, based on torque capacity. Architecture is common between the variants, and component differences are primarily related to size.

The 4-element torque converter contains a pump, a turbine, a pressure plate splined to the turbine, and a stator assembly. The torque converter acts as a fluid coupling to smoothly transmit power from the engine to the transmission. It also hydraulically provides additional torque multiplication when required. The pressure plate, when applied, provides a mechanical direct drive coupling of the engine to the transmission.

The planetary gear sets provide the 6 forward gear ratios and reverse. Changing gear ratios is fully automatic and is accomplished through the use of a transmission control module (TCM) located inside the transmission. The TCM receives and monitors various electronic sensor inputs and uses this information to shift the transmission at the optimum time.

The TCM commands shift solenoids and variable bleed pressure control solenoids to control shift timing and feel. The TCM also controls the apply and release of the torque converter clutch which allows the engine to deliver the maximum fuel efficiency without sacrificing vehicle performance. All the solenoids, including the TCM, are packaged into a self-contained control solenoid valve assembly.

The hydraulic system primarily consists of a gear-type pump, a control valve body assembly and case. The pump maintains the working pressures needed to stroke the clutch pistons that apply or release the friction components. These friction components, when applied or released, support the automatic shifting qualities of the transmission.

The friction components used in this transmission consist of 5 multiple disc clutches. The multiple disc clutches combine with one way clutch to deliver 7 different gear ratios, 6 forward and one reverse, through the gear sets. The gear sets then transfer torque through the transfer drive gear, transfer driven gear and differential assembly.

The transmission may be operated in any of the following gear ranges:

PARK (P)

This position locks the front wheels and prevents the vehicle from rolling either forward or backward. PARK is the best position to use when starting the vehicle. Because the transmission utilizes a shift lock control system, it is necessary to fully depress the brake pedal before shifting out of PARK. For safety reasons, use the parking brake in addition to the PARK position.

REVERSE (R)

This position allows the vehicle to be operated in a rearward direction.

NEUTRAL (N)

This position allows the engine to be started and operated while driving the vehicle. If necessary, you may select this position in order to restart the engine with the vehicle moving. This position should also be used when towing the vehicle.

DRIVE (D)

Drive range should be used for all normal driving conditions for maximum efficiency and fuel economy. Drive range allows the transmission to operate in each of the 6 forward gear ratios. Downshifts to a lower gear, or higher gear ratio, are available for safe passing by depressing the accelerator or by manually selecting a lower gear in the manual mode range.

Driver Shift Control (DSC) or Electronic Range Selection (ERS)

This position (M-Manual / L-Low) allows the driver to utilize the DSC/ERS system. When the shift selector lever is moved to this position, the driver may select upshifts or downshifts by using the paddle switches located on the steering wheel/shifter. An upshift is requested by pushing either + button. Refer to the vehicle owner's manual for more specific DSC/ERS information.

TRANSMISSION COMPONENT AND SYSTEM DESCRIPTION

The mechanical components of the 6T40/45 are as follows:

- A torque converter with an electronically controlled capacity clutch (ECCC)
- Gear-type fluid pump assembly
- 1-2-3-4 and low and reverse clutch housing assembly
- 4-5-6 and 3-5 reverse clutch housing assembly
- 2-6 clutch assembly
- Low and reverse clutch (one way clutch) assembly
- Control valve body assembly
- Drive sprocket, driven sprocket and link assembly

- Front differential carrier assembly
- Input Carrier Assembly
- Reaction Carrier Assembly
- Output Carrier Assembly

The electrical components of the 6T40/45 are as follows:

- Output speed sensor assembly
- Input speed sensor assembly
- Manual shift shaft with internal mode switch
- Control solenoid valve assembly, which contains the following components:
 - Transmission control module (TCM)
 - 5 variable bleed line pressure control (PC) solenoids
 - Transmission fluid pressure (TFP) switch assembly
 - Torque converter clutch (TCC) pressure control solenoid
 - shift solenoid
 - Transmission fluid temperature sensor

For more information, refer to **Electronic Component Description**.

TRANSMISSION ADAPTIVE FUNCTIONS

The 6T40/45 transmission utilizes a line pressure control system during upshifts to compensate for the normal wear of transmission components. As the apply components within the transmission wear or change over time, shift time (the time required to apply a clutch) increase or decreases. In order to compensate for these changes, the transmission control module (TCM) adjusts the pressure commands to the various PC solenoids, to maintain the originally calibrated shift timing. The automatic adjusting process is referred to as "adaptive learning" and it is used to ensure consistent shift feel plus increase transmission durability. The TCM monitors the A/T input speed sensor (ISS) and the A/T output speed sensor (OSS) during commanded shifts to determine if a shift is occurring too fast (harsh) or too slow (soft) and adjusts the corresponding pressure control (PC) solenoid signal to maintain the set shift feel.

The purpose of the adapt function is to automatically compensate the shift quality for the various vehicle shift control systems. The adapt function is a continuous process that will help to maintain optimal shift quality throughout the life of the vehicle.

TRANSMISSION INDICATORS AND MESSAGES

The following transmission-related indicators and messages may be displayed on the Instrument Panel Cluster (IPC). For a complete listing and description of all vehicle indicators and messages, refer to **Indicator/Warning Message Description and Operation**.

"TRANSMISSION HOT IDLE ENGINE"

This message is displayed when the TCM detects a transmission fluid temperature (TFT) equal to or greater than 130°C (266°F) for 5 seconds.

"SERVICE TRANSMISSION"

This message displays when there is a problem with the transmission.

ELECTRONIC COMPONENT DESCRIPTION

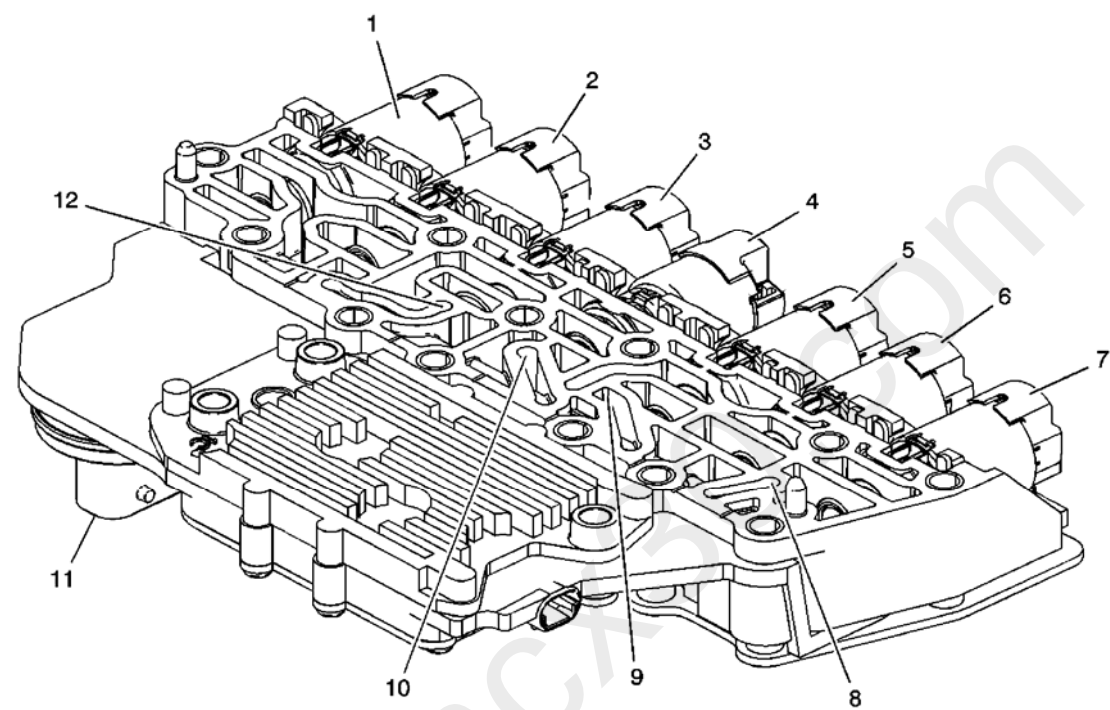


Fig. 2: View Of Control Solenoid (W/Body & TCM) Valve Assembly
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
1	Pressure Control Solenoid 3 (R1/456)
2	Pressure Control Solenoid 2 (35R)
3	Torque Converter Clutch (TCC) Pressure Control Solenoid
4	Shift Solenoid 1 (On/Off)
5	Pressure Control Solenoid 5 (1234)
6	Pressure Control Solenoid 4 (26)
7	Line Pressure Control Solenoid
8	Transmission Fluid Pressure (TFP) Switch 3 (26)
9	Transmission Fluid Pressure (TFP) Switch 2 (35R)
10	Transmission Fluid Pressure (TFP) Switch 1 (1234)
11	Pass Through Connector

The control solenoid (w/body and TCM) valve assembly contains the following components:

- Transmission control module (TCM)
- Clutch pressure control solenoids (Clutch PC Sol)
- Shift solenoids (SS)
- Line pressure control solenoid (Line PC Sol)
- Torque converter clutch pressure control solenoid (TCC PC Sol)
- Transmission fluid temperature sensor (TFT Sensor)
- TCM temperature sensor
- Power-up temperature sensor
- Transmission fluid pressure switches (TFP Sw)

These components are not serviced separately. The control solenoid (w/body and TCM) valve assembly utilizes a lead-frame system to connect these components electrically to the TCM. No wires are used for these components. The control solenoid (w/body and TCM) valve assembly bolts directly to the lower and upper valve body assemblies inside the transmission. The control solenoid (w/body and TCM) valve assembly connects to the engine harness 14-way connector.

Manual Shift Detent Lever with Shaft Position Switch Assembly

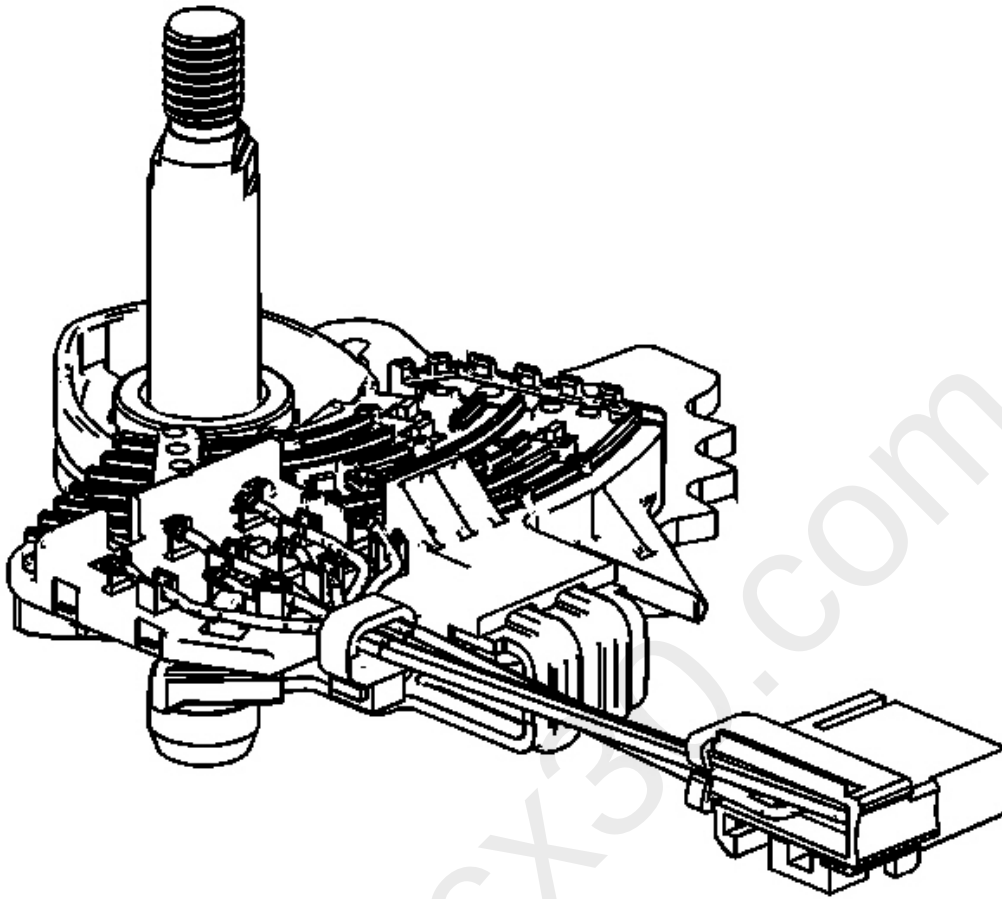


Fig. 3: View Of Manual Shift Detent Lever W/ Shaft Position Switch Assembly
Courtesy of GENERAL MOTORS CORP.

The transmission shaft position switch assembly is a sliding contact switch attached to the manual shaft detent lever assembly inside the transmission case. The five inputs to the TCM from the transmission manual shift shaft switch assembly indicate the transmission gear selector lever position. This information is used for engine controls as well as determining the transmission shift patterns. The state of each input is available for display on the scan tool. The five input parameters represented are Signal A, Signal B, Signal C, Signal P (Parity) and Signal N (P/N Start).

Input Speed Sensor (ISS)

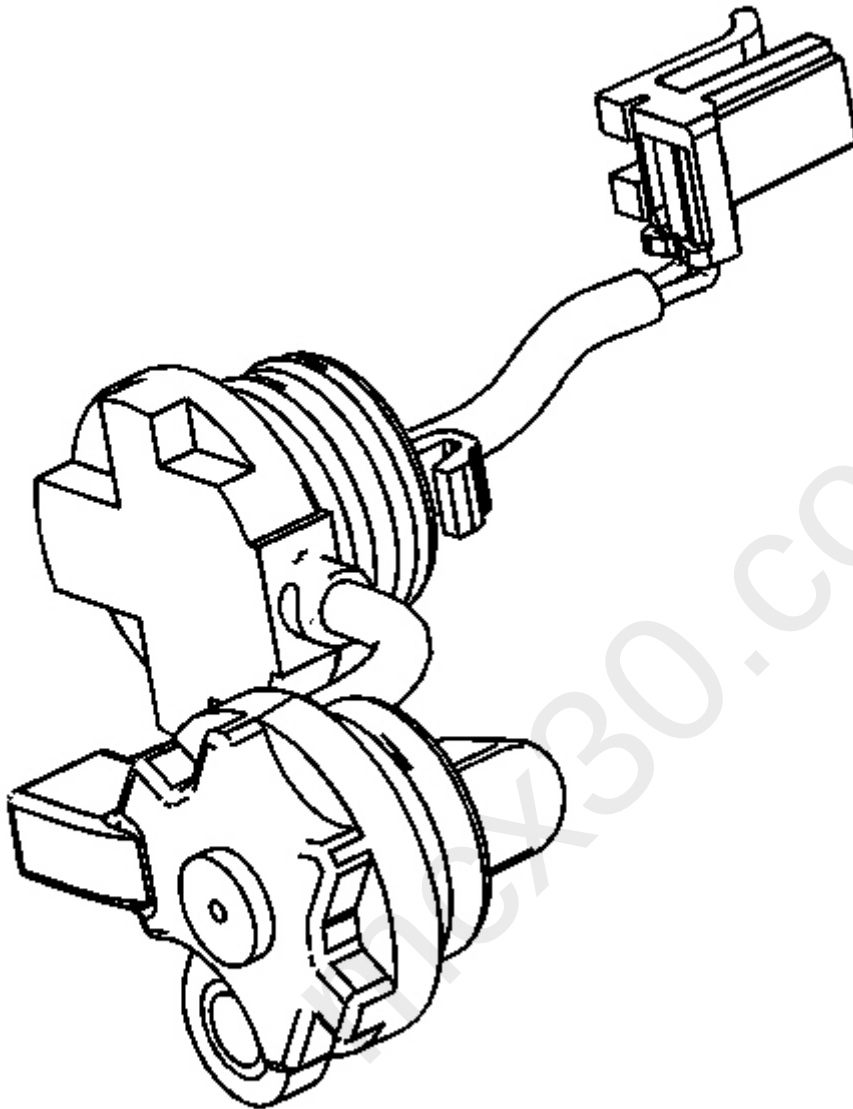


Fig. 4: View Of Input Speed Sensor (ISS)
Courtesy of GENERAL MOTORS CORP.

The input speed sensor (ISS) is a hall-effect type sensor. The ISS mounts to the transmission case assembly and connects to the control solenoid (w/body and TCM) valve assembly through a wire harness and connector. The sensor faces the 3-5-R clutch piston housing machined teeth surface. The sensor receives 8.3-9.3 volts on the ISS/OSS Supply Voltage circuit from the TCM. As the 3-5-R/4-5-6 clutch piston housing rotates, the sensor produces a signal frequency based on the machined surface of the 3-5-R/4-5-6 clutch piston housing. This

signal is transmitted through the ISS signal circuit to the control solenoid (w/body and TCM) valve assembly. The TCM uses the ISS signal to determine line pressure, transmission shift patterns, torque converter clutch (TCC) slip speed and gear ratio.

Output Speed Sensor (OSS)

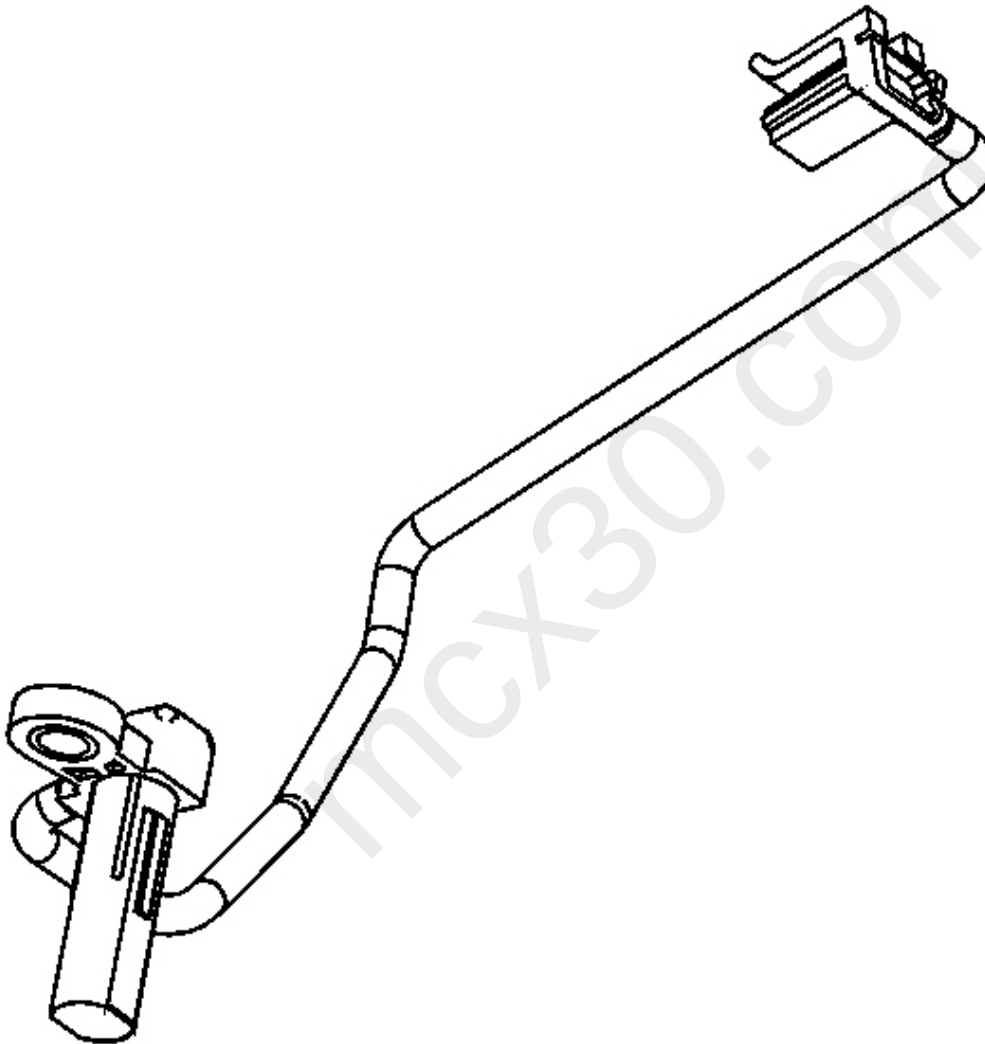


Fig. 5: View Of Output Speed Sensor (OSS)
Courtesy of GENERAL MOTORS CORP.

The output speed sensor (OSS) is a hall-effect type sensor. The OSS mounts to the transmission case below the control valve body assembly and connects to the control solenoid (w/body and TCM) valve assembly through a

wire harness and connector. The sensor faces the Park gear machined teeth surface. The sensor receives 8.3-9.3 volts on the ISS/OSS supply voltage circuit from the TCM. As the front differential transfer drive gear assembly rotates, the sensor produces a signal frequency based on the machined surface of the Park gear. This signal is transmitted through the OSS signal circuit to the TCM. The TCM uses the OSS signal to determine line pressure, transmission shift patterns, torque converter clutch (TCC) slip speed and gear ratio.

PARK - ENGINE RUNNING

When the gear selector lever is in the Park (P) position, fluid is drawn into the pump through the transmission fluid filter assembly. Line pressure is then directed to the following valves:

Fluid Pressure Directed in Preparation for a Shift

Manual Valve

Mechanically controlled by the gear selector lever, the manual valve is in the Park (P) position and prevents line pressure from the pressure regulator valve from entering the reverse and drive fluid circuits.

Actuator Feed Limit Valve

Line pressure is regulated through the valve into the actuator feed limit circuit. Actuator feed limit fluid passes through orifice #10 to a differential area to move the valve against actuator feed limit valve spring pressure. Actuator feed limit fluid is routed to the pressure control solenoids, the shift solenoid, and to the #5 and #6 ball check valves.

Compensator Feed Regulator Valve

Line pressure is regulated through the valve into the compensator feed fluid circuit. Compensator feed fluid pressure is routed through orifice #30 to the 3-5-reverse clutch regulator valve, and also fills the 3-5-reverse clutch and 4-5-6 clutch piston dam areas.

3-5-Reverse Clutch Regulator Valve

35 reverse clutch feed/compensator feed fluid is routed through the valve into the 35 reverse clutch fluid circuit. 35 reverse clutch fluid passes through orifice #6 to assist spring pressure in keeping the valve open. 35 reverse clutch fluid is routed to the 3-5-reverse clutch, and through orifice #33 to the #6 ball check valve.

3-5-Reverse Clutch Assembly

35 reverse clutch fluid fills the 3-5-reverse clutch piston apply cavity in preparation for a shift to Reverse range. However, in Park range, 35 reverse clutch pressure is limited to compensator feed pressure of 9 PSI and is not strong enough to apply the clutch.

TCC Regulated Apply Valve

Shift solenoid fluid is routed to the TCC regulated apply valve and moves the valve against TCC regulated apply valve spring force.

Low and Reverse Clutch Applies

R1/456 Pressure Control (PC) Solenoid 3

The R1/456 PC solenoid is energized (ON) allowing actuator feed limit fluid to enter the PCS R1/456 clutch fluid circuit. PCS R1/456 clutch fluid is then routed through orifice #11 to the R1/4-5-6 clutch regulator valve.

R1/4-5-6 Clutch Regulator Valve

PCS R1/456 clutch fluid at the R1/4-5-6 clutch regulator valve, opposes R1/4-5-6 clutch regulator spring force and R1/456 clutch feed fluid pressure to regulate line pressure into the R1/456 clutch feed circuit. R1/456 clutch feed fluid is routed to the clutch select valve and through orifice #34 to the #5 ball check valve.

Shift Solenoid

The shift solenoid is energized (ON) allowing actuator feed limit fluid to enter the shift solenoid circuit. Shift solenoid fluid is routed to the clutch select valve through orifice #13, and to the TCC regulated apply valve through orifice #14.

Clutch Select Valve

Shift solenoid fluid is routed to the clutch select valve and moves the valve against clutch select valve spring force. This allows R1/456 clutch feed fluid to pass through the valve and enter the R1 circuit. R1 fluid is then routed through orifice #38 to the low and reverse clutch assembly in preparation for a shift into low or reverse gear.

Low and Reverse Clutch

R1/456 fluid enters the transmission case assembly and moves the low and reverse clutch piston against spring force to apply the low and reverse clutch plates. In Park range, the low and reverse has no effect. However, when Reverse or a forward range is selected, only one apply device has to be energized, which helps create a smooth starting motion.

#5 Ball Check Valve

R1/456 clutch feed fluid unseats the #5 ball check valve, allowing excess pressure to pass into the actuator feed limit circuit. This helps to control clutch apply fluid pressure and clutch apply feel.

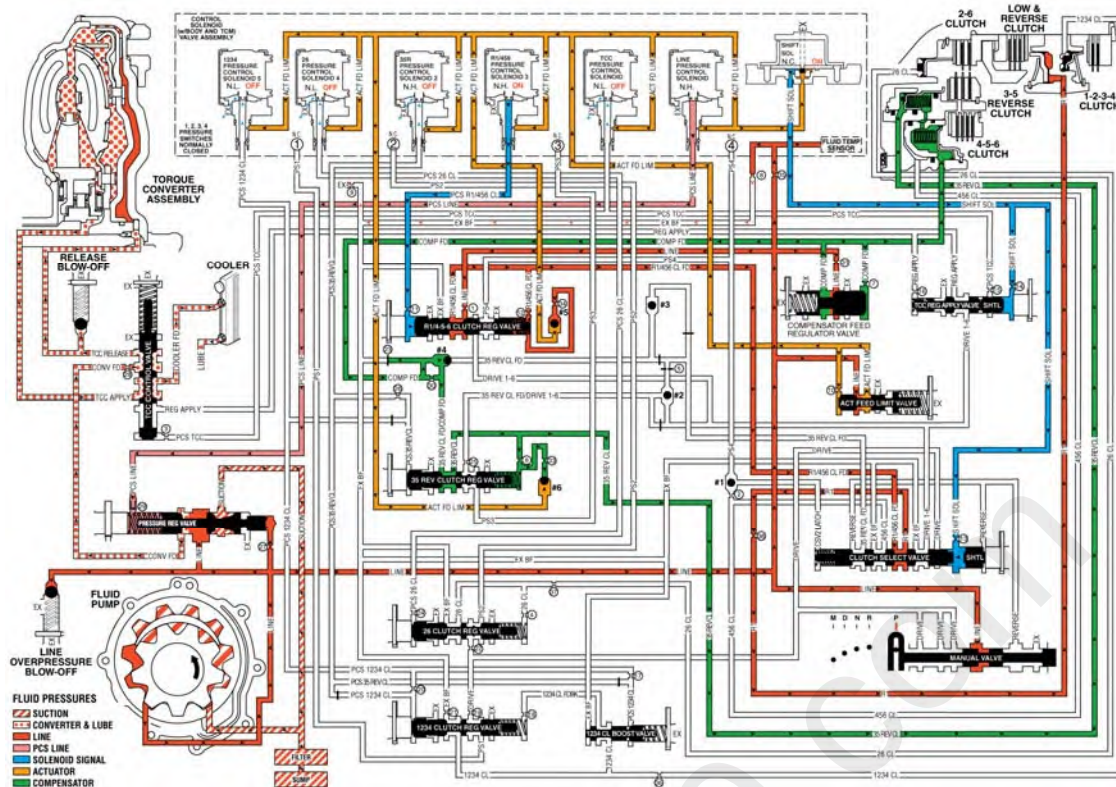


Fig. 6: Park - Engine Running Fluid Flow Diagram
 Courtesy of GENERAL MOTORS CORP.

REVERSE

When the gear selector lever is moved to the Reverse (R) position (from the Park position) the normally-high 35R pressure control solenoid 2 is commanded ON and the following changes occur in the transmission's hydraulic and electrical systems:

3-5-Reverse Clutch Applies

Manual Valve

With the manual valve in the reverse position, line pressure is directed into the reverse fluid circuit and routed to the clutch select valve.

Clutch Select Valve

Reverse fluid is routed to a differential area of the default override shuttle valve and assists shift solenoid fluid, present at the valve from Park position, in holding the clutch select valve against clutch select valve spring force. Reverse fluid passes through the clutch select valve into the 35 reverse clutch feed circuit and is routed to the #2 ball check valve. R1/456 clutch feed fluid, present at the valve from Park position, continues to pass through the valve into the R1 circuit in order to keep the low and reverse clutch applied.

#2 Ball Check Valve

3-5 reverse fluid passes through orifice #5, seats the #2 ball check valve against the drive 1-6 fluid passage, and enters the 35 reverse/drive 1-6 circuit. 35 reverse/drive 1-6 fluid is routed through orifice #25 to the 3-5-reverse clutch regulator valve.

35R Pressure Control (PC) Solenoid 2

The 35R PC solenoid 2 is energized (ON), allowing actuator feed limit fluid to enter the PCS 35 reverse clutch circuit. PCS 35 reverse clutch fluid is then routed through orifice #26 to the 3-5-reverse clutch regulator valve.

3-5-Reverse Clutch Regulator Valve

PCS 35 reverse clutch fluid, at the 3-5-reverse clutch regulator valve, opposes 3-5-reverse clutch regulator valve spring force and orificed 35 reverse clutch feedback fluid pressure to regulate 35 reverse clutch feed/drive 1-6 pressure into the 35 reverse clutch circuit. 35 reverse clutch fluid is then routed to the 3-5-reverse clutch, and through orifice #33 to the #6 ball check valve.

3-5-Reverse Clutch

35 reverse clutch fluid enters the 3-5-reverse and 4-5-6 clutch housing assembly to move the 3-5 reverse clutch piston against spring force and compensator feed fluid pressure to apply the 3-5-reverse clutch plates.

#6 Ball Check Valve

35 reverse clutch feed fluid unseats the #6 ball check valve, allowing excess pressure to pass into the actuator feed limit circuit. This helps to control clutch apply fluid pressure and clutch apply feel.

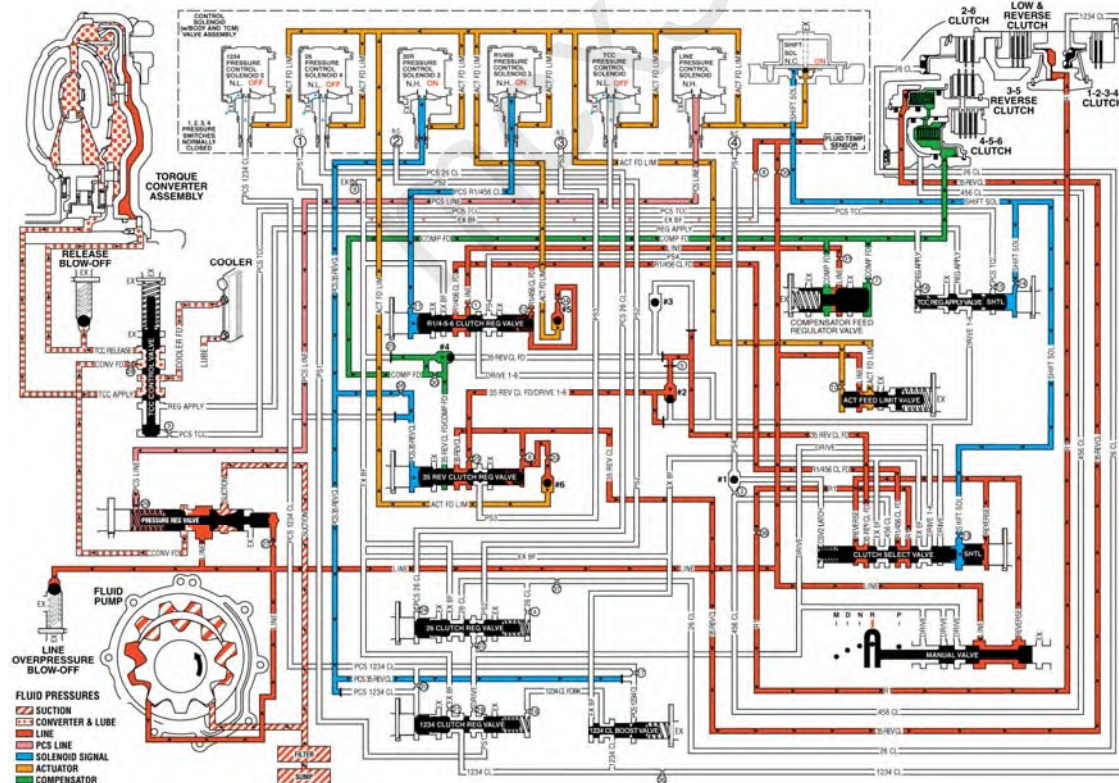


Fig. 7: Reverse Fluid Flow Diagram
Courtesy of GENERAL MOTORS CORP.

NEUTRAL - ENGINE RUNNING

When the gear selector is moved to the Neutral (N) position, the hydraulic and electrical system operation is identical to Park (P) range. However, if Neutral is selected after the vehicle was operating in Reverse (R), the normally-high 35R pressure control solenoid 2 is commanded OFF and the following changes would occur in the hydraulic system.

3-5 Reverse Clutch Releases

Manual Valve

The manual valve is moved to the Neutral position and blocks line pressure from entering the reverse fluid circuit. Reverse fluid, from the 3-5-reverse clutch regulator valve and the clutch select valve, is opened to an exhaust passage at the manual valve.

35R Pressure Control Solenoid 2

The 35R PC solenoid 2 is commanded OFF allowing PCS 35 reverse clutch fluid from the 3-5-reverse clutch regulator valve to exhaust.

3-5-Reverse Clutch Regulator Valve

PCS 35 reverse clutch fluid exhausts, allowing 3-5-reverse clutch regulator valve spring force to move the 3-5-reverse clutch regulator valve to the released position. This allows 35 reverse clutch fluid pressure to exhaust into the compensator feed circuit in order to assist the 3-5-reverse clutch piston spring to quickly release the 3-5-reverse clutch.

3-5-Reverse Clutch

3-5-reverse clutch spring force, assisted by compensator feed pressure, moves the 3-5-reverse clutch piston to release the 3-5-reverse clutch plates and force 35 reverse clutch fluid to exhaust from the 3-5-reverse and 4-5-6 clutch housing assembly. The exhausting 35 reverse clutch fluid pressure is routed to the 3-5-reverse clutch regulator valve where it enters the 35 reverse clutch feed/compensator feed circuit.

Clutch Select Valve

When reverse fluid exhausts from the default override shuttle valve, shift solenoid fluid continues to hold the clutch select valve against clutch select valve spring force allowing 35 reverse clutch feed fluid to exhaust into the reverse circuit.

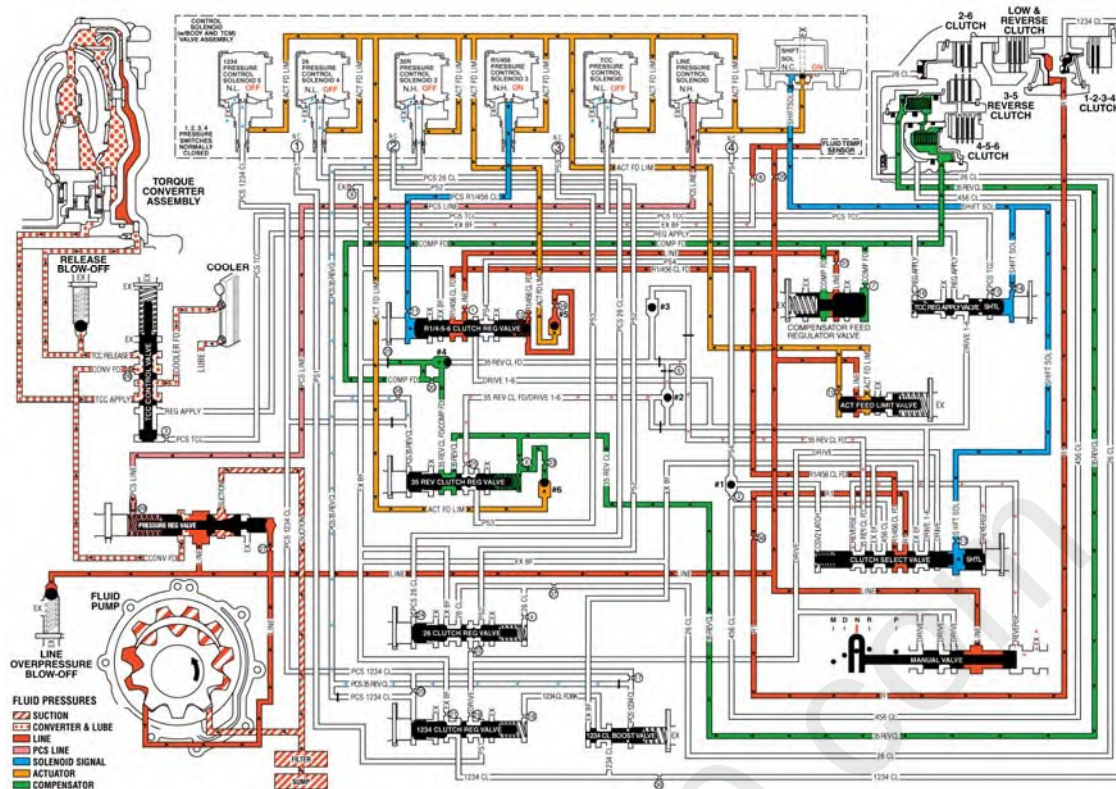


Fig. 8: Neutral - Engine Running Fluid Flow Diagram
Courtesy of GENERAL MOTORS CORP.

DRIVE RANGE, FIRST GEAR ENGINE BRAKING

When the gear selector lever is moved to the Drive (D) range from the Neutral (N) position, the transmission will provide engine braking. In this operating range, the normally-low 1234 pressure control solenoid 5 is commanded ON and, in the engine braking mode, the following changes occur within the hydraulic circuits.

1-2-3-4 Clutch Applies

Manual Valve

The manual valve is moved to the Drive (D) position and allows line fluid pressure to enter the drive fluid circuit. Drive fluid is then routed to the clutch select valve, the 1-2- 3-4 clutch regulator valve through orifice #19 and to the 2-6 clutch regulator valve through orifice #22.

1234 Pressure Control (PC) Solenoid 5

The 1234 PC solenoid 5 is commanded ON allowing actuator feed limit to enter the PCS 1234 clutch fluid circuit. PCS 1234 clutch fluid is then routed through orifice #20 to the 1-2-3-4 clutch regulator valve, and through orifice #17 to the 1-2-3-4 clutch boost valve.

1-2-3-4 Clutch Regulator Valve

PCS 1234 clutch fluid, at the 1-2-3-4 clutch regulator valve, opposes 1-2-3-4 clutch regulator valve spring force

and 1234 clutch feedback fluid pressure to regulate drive fluid pressure into the 1234 clutch fluid circuit. The 1234 clutch fluid is then routed to the 1234 clutch boost valve and through orifice #36 to the 1-2-3-4 clutch.

1-2-3-4 Clutch Boost Valve

PCS 1234 clutch fluid pressure acts on a differential area, moving the 1234 clutch boost valve against 1234 clutch boost valve spring force, to regulate 1234 clutch fluid into the 1234 clutch feedback circuit. As PCS 1234 clutch fluid pressure is increased to a given value, the 1234 clutch boost valve opens the 1234 clutch feedback circuit to exhaust. This results in the 1234 clutch regulator valve moving to the full feed position, sending full 1234 clutch feed pressure (full line pressure) to the 1-2-3-4 clutch.

1-2-3-4 Clutch

The 1234 clutch fluid enters the transmission case assembly and moves the 1234 clutch piston against spring force to apply the 1-2-3-4 clutch plates.

2-6 Clutch Regulator Valve

Drive fluid passes through the 2-6 clutch regulator valve into the PS2 circuit.

#2 Pressure Switch

PS2 fluid is routed to the normally-closed #2 pressure switch and opens the switch.

Low and Reverse Clutch Remains Applied to Provide Engine Braking

Clutch Select Valve

Shift solenoid fluid, present at the valve from Park position, continues to hold the clutch select valve against clutch select valve spring force. R1/456 clutch feed fluid, also present at the valve from Park position, continues to pass into the R1 circuit to feed the low and reverse clutch. Drive fluid is present at the valve in preparation for a change of gears.

Low and Reverse Clutch

The low and reverse clutch remains applied until just before the 1-2 shift in order to provide engine braking.

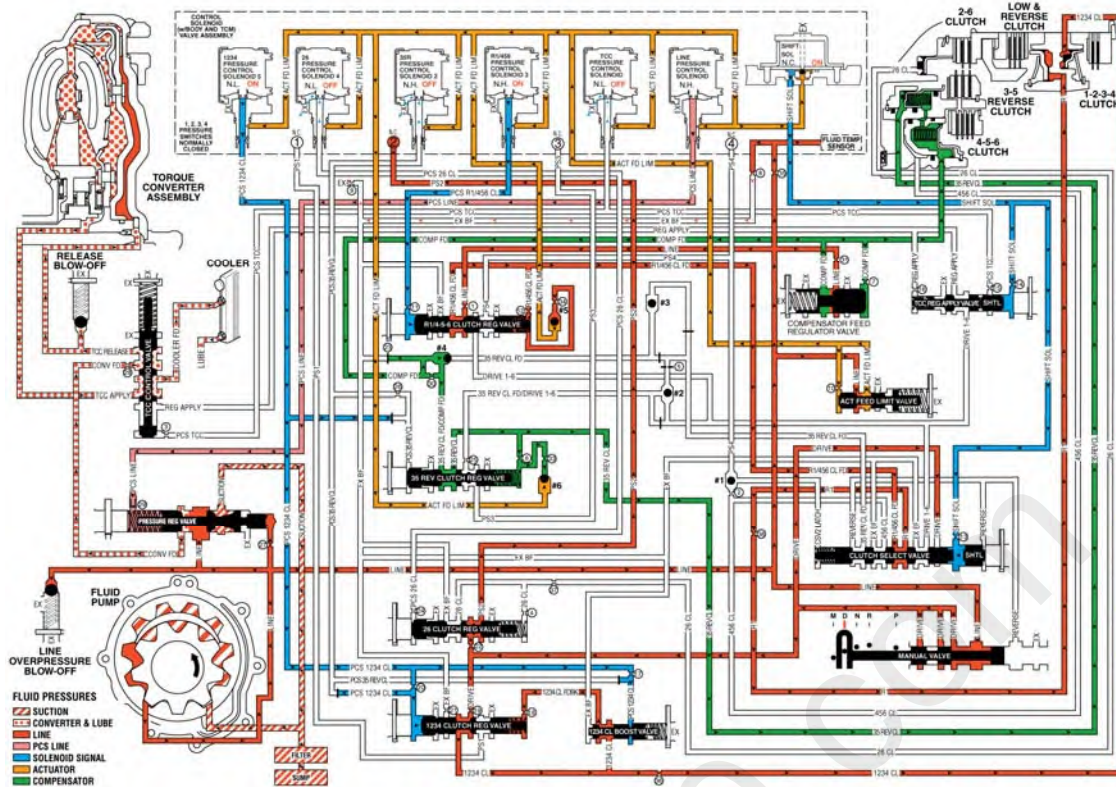


Fig. 9: Drive Range, First Gear Engine Braking Fluid Flow Diagram
Courtesy of GENERAL MOTORS CORP.

DRIVE RANGE, FIRST GEAR

As the vehicle speed increases, the transmission control module (TCM) receives input signals from the automatic transmission input and output speed sensors, throttle position sensor and other vehicle sensors to determine the precise moment to deenergize or "turn OFF" the shift solenoid, and to command OFF the normally-high R1/456 pressure control solenoid 3.

Low & Reverse Clutch Releases

Shift Solenoid

The shift solenoid is "commanded OFF" allowing shift solenoid fluid pressure to exhaust from the clutch select valve and the TCC regulator apply valve.

Clutch Select Valve

Shift solenoid fluid is exhausted from the clutch select valve and clutch select valve spring force moves the valve to the released position. This allows R1 fluid pressure to pass through the valve into the exhaust backfill circuit where it exhausts. Drive fluid from the manual valve passes through the clutch select valve and enters the drive 1-6 fluid circuit. Drive 1-6 fluid is routed to the R1/456 clutch regulator valve, the 35 reverse clutch regulator valve, and the TCC regulator valve.

Low and Reverse Clutch

Low and reverse clutch spring force moves the low and reverse clutch piston to release the low and reverse clutch plates and force R1 fluid to exhaust from the case assembly. The exhausting R1 fluid is routed to the clutch select valve where it enters the exhaust backfill circuit.

Fluid Pressure Directed in Preparation for a Shift

R1/456 Pressure Control (PC) Solenoid 3

The R1/456 PC solenoid 3 is commanded OFF allowing PCS R1/456 clutch fluid to exhaust from the R1/456 clutch regulator valve.

R1/456 Clutch Regulator Valve

R1/456 clutch regulator valve spring force moves the valve to the released position, allowing R1/456 clutch feed fluid to enter the exhaust backfill circuit, and drive 1-6 fluid to enter the PS4 fluid circuit. PS4 fluid is then routed to the normally-closed #4 pressure switch and opens the switch. PS4 fluid is also routed to the #1 ball check valve and flows into the CSV2 latch fluid circuit.

#1 Ball Check Valve

PS4 fluid pressure seats the #1 ball check valve against the 456 clutch fluid circuit. PS4 fluid is then directed into the CSV2 latch circuit and routed to the clutch select valve. CSV2 latch fluid combines with clutch select valve spring force and holds the valve in this position during all six forward gear ranges.

#2 Ball Check Valve

Drive 1-6 fluid pressure seats the #2 ball check valve against the 35 reverse clutch feed fluid passage, and is directed into the 35 reverse clutch feed/drive 1-6 circuit. 35 reverse clutch feed/drive 1-6 fluid is routed through orifice #25 to the 35 Reverse clutch regulator valve.

3-5-Reverse Clutch Regulator Valve

35 reverse clutch feed/drive 1-6 fluid passes through the 3- 5-reverse clutch regulator valve into the PS3 fluid circuit. PS3 fluid is then routed to the normally-closed #3 pressure switch and opens the switch.

Fluid Pressure Directed in Preparation for Torque Converter Clutch (TCC) Apply

TCC Regulator Apply Valve

Drive 1-6 fluid is routed to the TCC regulator apply valve in preparation for TCC apply.

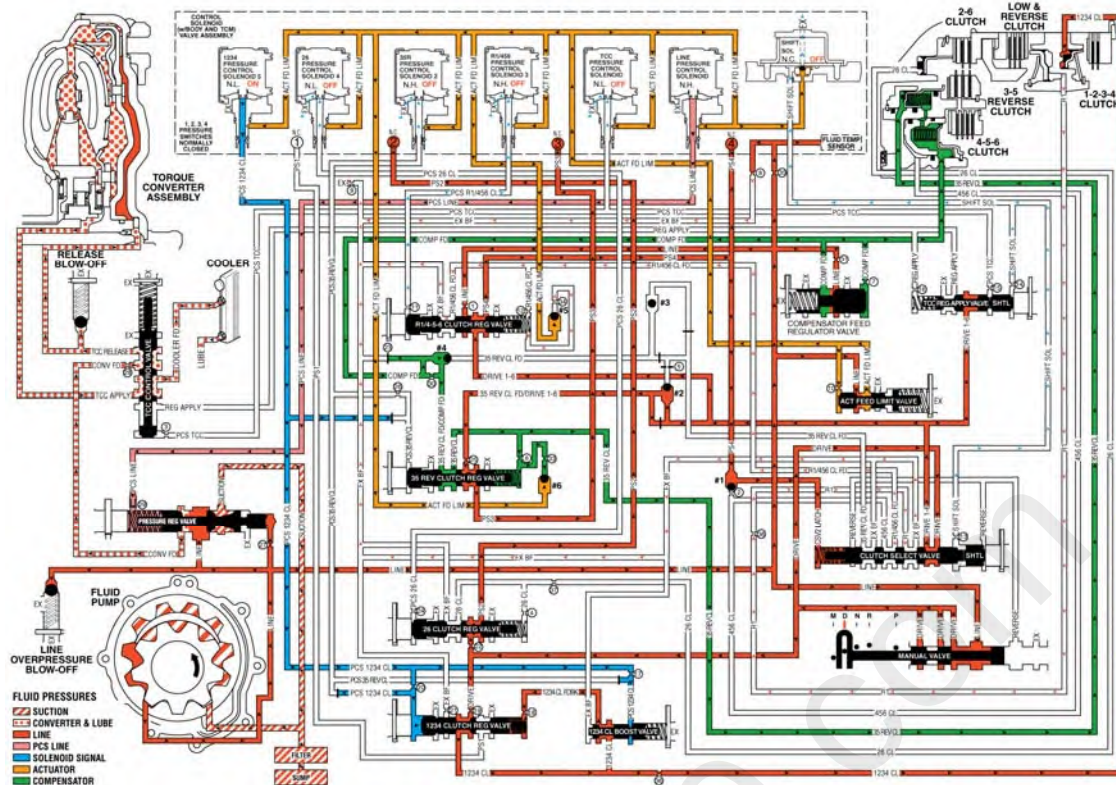


Fig. 10: Drive Range, First Gear Fluid Flow Diagram
 Courtesy of GENERAL MOTORS CORP.

DRIVE RANGE, SECOND GEAR

As vehicle speed increases and operating conditions become appropriate, the transmission control module (TCM) processes input signals from the automatic transmission input and output speed sensors, the throttle position sensor and other vehicle sensors to determine the precise moment to command ON the normally-low 2-6 pressure control solenoid 4 and shift the transmission into Second gear. The manual valve remains in the Drive (D) position and line pressure continues to feed the drive fluid circuit.

2-6 Clutch Applies

26 Pressure Control (PC) Solenoid 4

The 26 PC solenoid 4 is commanded ON, allowing actuator feed limit fluid to enter the PCS 26 clutch fluid circuit. PCS 26 clutch fluid is then routed through orifice #24 to the 2-6 clutch regulator valve.

2-6 Clutch Regulator Valve

PCS 26 clutch fluid, at the 2-6 clutch regulator valve, opposes 2-6 clutch regulator valve spring force and orificed 26 clutch fluid pressure to regulate drive fluid pressure into the 26 clutch circuit. 26 clutch fluid is then routed through orifice #37 to the 2-6 clutch assembly in the transmission case, and through orifice #4 to the spring end of the 2-6 clutch regulator valve. With the 2-6 clutch regulator valve in this position, PS2 fluid is allowed to exhaust and the normally-closed PS2 switch closes.

2-6 Clutch

The 26 clutch fluid from the 2-6 clutch regulator valve is routed through the transmission case to the 2-6 clutch piston assembly. The 26 clutch fluid pressure moves the piston against 2-6 clutch spring force to apply the 2-6 clutch plates.

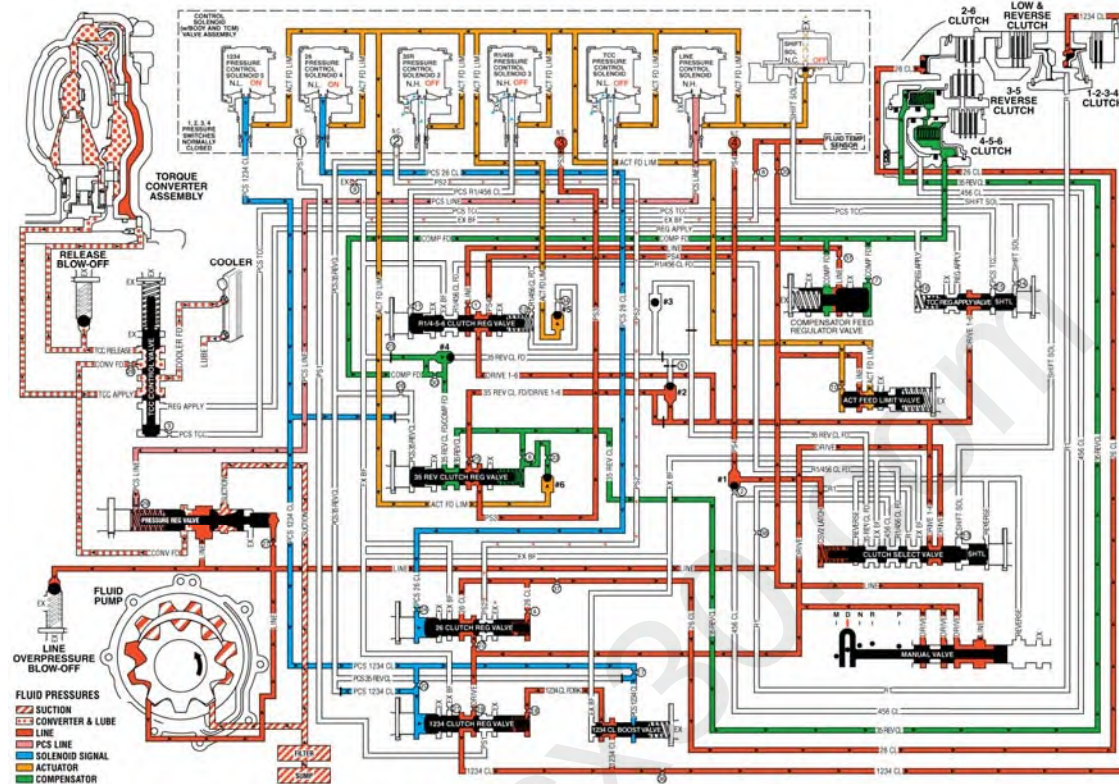


Fig. 11: Drive Range, Second Gear Fluid Flow Diagram
Courtesy of GENERAL MOTORS CORP.

DRIVE RANGE, THIRD GEAR

As vehicle speed increases and operating conditions become appropriate, the transmission control module (TCM) processes input signals from the automatic transmission input and output speed sensors, the throttle position sensor and other vehicle sensors to determine the precise moment to command OFF the normally-low 26 pressure control solenoid 4. At the same time the 35R pressure control solenoid 2 is also commanded ON to regulate 3-5 clutch apply, and the transmission shifts into Third gear. The manual valve remains in the Drive (D) position and line pressure continues to feed the drive fluid circuit.

3-5-Reverse Clutch Applies

35R Pressure Control (PC) Solenoid 2

The 35R PC solenoid 2 is commanded ON, allowing actuator feed limit fluid to enter the PCS 35 reverse clutch fluid circuit. PCS 35 reverse clutch fluid is routed through orifice #26 to the 3-5-reverse clutch regulator valve.

3-5-Reverse Clutch Regulator Valve

PCS 35 reverse clutch fluid, at the 3-5-reverse clutch regulator valve, opposes 3-5-reverse clutch regulator valve spring force and 35 reverse clutch feedback fluid pressure to regulate 35 reverse clutch feed/drive 1-6 pressure into the 35 reverse clutch circuit. The 35 reverse clutch fluid is then routed to the 3-5-reverse clutch assembly, through orifice #6 to the spring end of the 3-5-reverse clutch regulator valve and through orifice #33 to the #6 ball check valve. When the 3-5-reverse clutch regulator valve is in this position, PS3 fluid exhausts through the valve allowing the normally-closed #3 pressure switch to close.

3-5-Reverse Clutch

35 reverse clutch fluid enters the 3-5-reverse and 4-5-6 clutch housing assembly to move the 3-5 reverse clutch piston against spring force and compensator feed fluid pressure to apply the 3-5-reverse clutch plates.

#6 Ball Check Valve

#6 Ball Check Valve 35 reverse clutch feed fluid unseats the #6 ball check valve, allowing excess pressure to pass into the actuator feed limit circuit. This helps to control clutch apply fluid pressure and clutch apply feel.

2-6 Clutch Releases

26 Pressure Control (PC) Solenoid 4

The 26 PC solenoid 4 is commanded OFF, allowing PCS 26 clutch fluid to exhaust from the 2-6 clutch regulator valve.

2-6 Clutch Regulator Valve

2-6 clutch regulator valve spring force moves the valve to the released position, allowing 26 clutch fluid from the 2-6 clutch to pass through the valve and enter the exhaust backfill fluid circuit. With the 2-6 clutch regulator valve in this position, drive fluid passes through the valve into the PS2 circuit. PS2 fluid is routed to the normally-closed #2 pressure switch and opens the switch.

2-6 Clutch

2-6 clutch spring force moves the 2-6 clutch piston to release the 2-6 clutch plates and force 26 clutch fluid to exhaust from the transmission case assembly. The exhausting 26 clutch fluid pressure is routed to the 2-6 clutch regulator valve where it enters the exhaust backfill fluid circuit.

Clutch Select Valve

R1/456 clutch feed fluid passes through the clutch select valve and enters the 456 clutch circuit. 456 clutch fluid is routed to the 4-5-6 clutch assembly, and through orifice #2 to the #1 ball check valve.

#1 Ball Check Valve

Orificed 456 clutch fluid pressure seats the #1 ball check valve against the exhausting PS4 fluid passage. 456 clutch fluid is then directed into the CSV2 latch circuit to replace the exhausting PS4 pressure and is routed to the clutch select valve. CSV2 latch fluid combines with clutch select valve spring force and holds the valve in this position during all six forward gear ranges.

4-5-6 Clutch

456 clutch fluid enters the 3-5-reverse and 4-5-6 clutch housing assembly, and moves the 4-5-6 clutch piston against spring force and compensator feed pressure to apply the 4- 5-6 clutch plates.

#5 Ball Check Valve

R1/456 clutch feed fluid unseats the #5 ball check valve, allowing excess pressure to pass into the actuator feed limit circuit. This helps to control clutch apply fluid pressure and clutch apply feel.

3-5-Reverse Clutch Releases

35R Pressure Control (PC) Solenoid 2

The 35R PC solenoid 2 is commanded OFF allowing PCS 35 reverse clutch fluid from the 3-5-reverse clutch regulator valve to exhaust.

3-5-Reverse Clutch Regulator Valve

PCS 35 reverse clutch fluid exhausts, allowing 3-5-reverse clutch regulator valve spring force to move the 3-5-reverse clutch regulator valve to the released position. This allows 35 reverse clutch fluid pressure to exhaust into the compensator feed circuit in order to assist the 3-5-reverse clutch piston spring to quickly release the 3-5-reverse clutch. With the 3-5-reverse clutch regulator valve in this position, orificed (#25) 35 reverse clutch feed/drive 1-6 fluid passes through the valve into the PS3 circuit. PS3 fluid is routed to the normally-closed #3 pressure switch and opens the switch.

3-5-Reverse Clutch

3-5-reverse clutch spring force, assisted by compensator feed pressure, moves the 3-5-reverse clutch piston to release the 3-5-reverse clutch plates and force 35 reverse clutch fluid to exhaust from the 3-5-reverse and 4-5-6 clutch housing assembly. The exhausting 35 reverse clutch fluid pressure is routed to the 3-5-reverse clutch regulator valve where it enters the 35 reverse clutch feed/compensator feed circuit.

Torque Converter Clutch (TCC) Applies

Torque Converter Clutch (TCC) Pressure Control (PC) Solenoid

The TCC PC solenoid is commanded ON, allowing actuator feed limit fluid to enter the PCS TCC fluid circuit. PCS TCC fluid is routed through orifice #15 to the TCC regulator apply valve and through orifice #3 to the TCC control valve.

TCC Regulator Apply Valve

PCS TCC fluid, at the TCC regulator apply valve, opposes TCC regulator apply valve spring force and orificed regulated apply fluid pressure to regulate drive 1-6 fluid into the regulated apply circuit. Regulated apply fluid is routed to the TCC control valve and through orifice #16 to the spring end of the TCC regulator apply valve.

TCC Control Valve

PCS TCC fluid moves the TCC control valve against TCC control valve spring force, allowing regulated apply fluid to pass through the valve into the TCC apply fluid circuit and apply the torque converter clutch. Converter feed fluid passes through orifice #28 to the TCC control valve, replacing TCC apply fluid, to supply the cooler feed circuit. TCC release fluid passes through the TCC control valve and is exhausted.

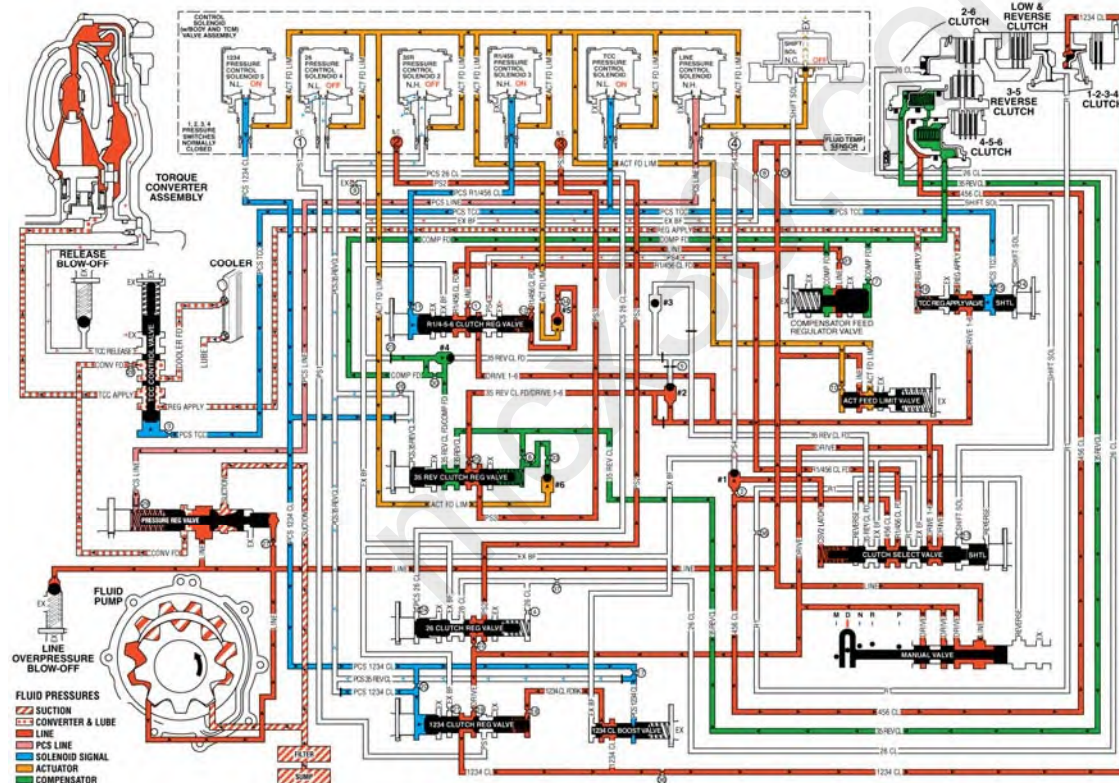


Fig. 13: Drive Range, Fourth Gear Fluid Flow Diagram
Courtesy of GENERAL MOTORS CORP.

DRIVE RANGE, FIFTH GEAR

As vehicle speed increases, the transmission control module (TCM) processes input signals from the automatic transmission input and output speed sensors, the throttle position sensor and other vehicle sensors to determine the precise moment to command ON the normally-high 35R pressure control solenoid 2. At the same time, the normally-low 1234 pressure control solenoid 5 is commanded OFF and the transmission shifts into Fifth gear.

3-5-Reverse Clutch Applies

35R Pressure Control (PC) Solenoid 2

The 35R PC solenoid 2 is commanded ON, allowing actuator feed limit fluid to enter the PCS 35 reverse clutch fluid circuit. PCS 35 reverse clutch fluid is routed through orifice #26 to the 3-5-reverse clutch regulator valve.

3-5-Reverse Clutch Regulator Valve

PCS 35 reverse clutch fluid, at the 3-5-reverse clutch regulator valve, opposes 3-5-reverse clutch regulator valve spring force and 35 reverse clutch feedback fluid pressure to regulate 35 reverse clutch feed/drive 1-6 pressure into the 35 reverse clutch circuit. The 35 reverse clutch fluid is then routed to the 3-5-reverse clutch assembly, through orifice #6 to the spring end of the 3-5-reverse clutch regulator valve and through orifice #33 to the #6 ball check valve. When the 3-5-reverse clutch regulator valve is in this position, PS3 fluid exhausts through the valve allowing the normally-closed #3 pressure switch to close.

3-5-Reverse Clutch

35 reverse clutch fluid enters the 3-5-reverse and 4-5-6 clutch housing assembly to move the 3-5 reverse clutch piston against spring force and compensator feed fluid pressure to apply the 3-5-reverse clutch plates.

#6 Ball Check Valve

35 reverse clutch feed fluid unseats the #6 ball check valve, allowing excess pressure to pass into the actuator feed limit circuit. This helps to control clutch apply fluid pressure and clutch apply feel.

1-2-3-4 Clutch Releases

1234 Pressure Control (PC) Solenoid 5

The 1234 PC solenoid 5 is commanded OFF, allowing PCS 1234 clutch fluid to exhaust from the 1-2-3-4 clutch regulator valve and the 1-2-3-4 clutch boost valve.

1-2-3-4 Clutch Regulator Valve

1-2-3-4 clutch regulator valve spring force moves the valve to the released position, allowing 1234 clutch fluid pressure from the 1-2-3-4 clutch to pass through the valve and enter the exhaust backfill circuit. The exhausting 1234 clutch fluid pressure is routed through orifice #21 in order to help control the release of the 1-2-3-4 clutch. With the 1-2-3-4 clutch regulator valve in this position, drive fluid passes through the valve into the PS1 circuit. PS1 fluid is routed to the #1 pressure switch and opens the normally-closed switch.

1-2-3-4 Clutch Boost Valve

1-2-3-4 clutch boost valve spring force moves the 1-2-3-4 clutch boost valve to the released position, allowing 1234 clutch feedback fluid pressure to exhaust from the 1-2-3-4 clutch regulator valve into the 1234 clutch circuit.

1-2-3-4 Clutch

1-2-3-4 clutch spring force moves the 1-2-3-4 clutch piston to release the 1-2-3-4 clutch plates and force 1234 clutch fluid to exhaust from the transmission case assembly. The exhausting 1234 clutch fluid is routed to the 1-2-3-4 clutch regulator valve where it enters the exhaust backfill circuit.

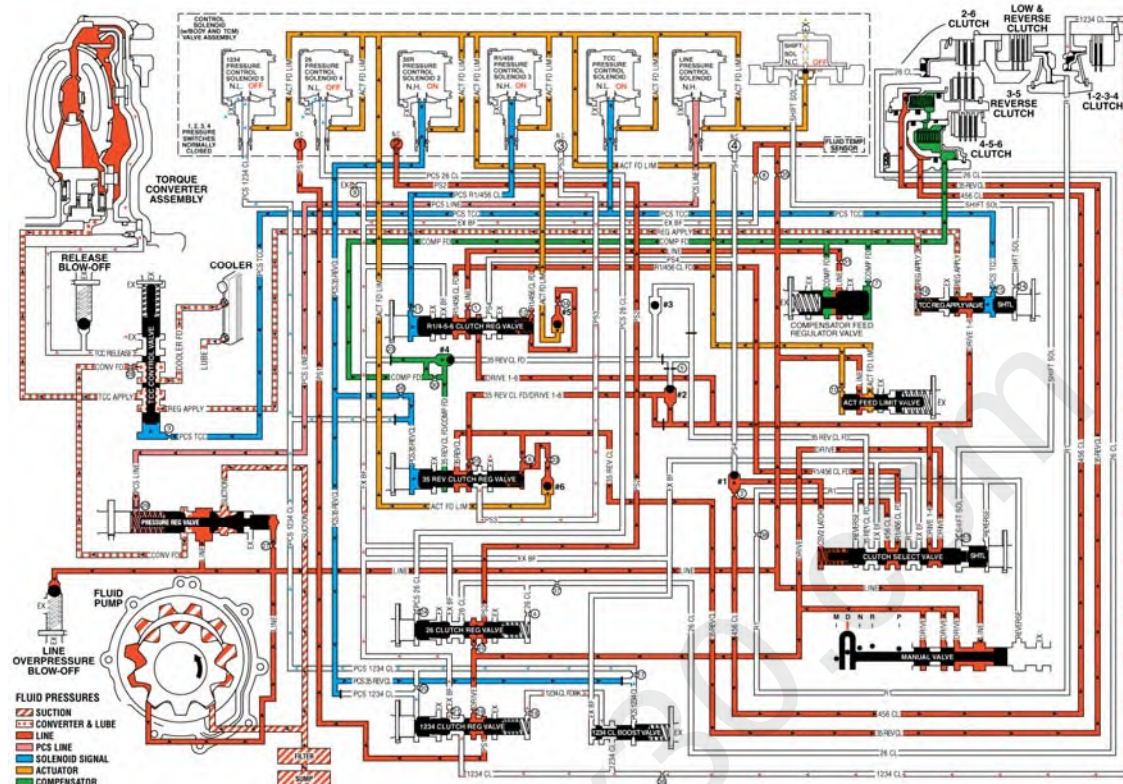


Fig. 14: Drive Range, Fifth Gear Fluid Flow Diagram
Courtesy of GENERAL MOTORS CORP.

DRIVE RANGE, FIFTH GEAR DEFAULT

If the transmission encounters an electrical component malfunction, the transmission will default to Fifth gear. All solenoids will default to their normal state. If the torque converter clutch is applied, it will release. The transmission will remain in Drive Range - Fifth Gear Default until the condition is corrected. Reverse (R) range can also still be selected. This default action enables the vehicle to be safely driven to a service center.

3-5 Reverse Clutch Applies or Remains Applied

35R Pressure Control (PC) Solenoid 2

The 35R PC solenoid 2 defaults to its normally-high state (ON), allowing actuator feed limit fluid to enter the PCS 35 reverse clutch fluid circuit. PCS 35 reverse clutch fluid is routed through orifice #26 to the 3-5-reverse clutch regulator valve. If the transmission is operating in First, Second, Fourth or Sixth gear when an electrical malfunction occurs, the 3-5-reverse clutch will apply. If the transmission is operating in Third or Fifth gear when the electrical malfunction occurs, the 3-5-reverse clutch remains applied.

3-5-Reverse Clutch Regulator Valve

PCS 35 reverse clutch fluid, at the 3-5-reverse clutch regulator valve, opposes 3-5-reverse clutch regulator valve spring force and 35 reverse clutch feedback fluid pressure to regulate 35 reverse clutch feed/drive 1-6 pressure into the 35 reverse clutch circuit. The 35 reverse clutch fluid is then routed to the 3-5-reverse clutch assembly, through orifice #6 to the spring end of the 3-5-reverse clutch regulator valve and through orifice #33 to the #6 ball check valve. When the 3-5-reverse clutch regulator valve is in this position, PS3 fluid exhausts through the valve allowing the normally-closed #3 pressure switch to close.

3-5-Reverse Clutch

35 reverse clutch fluid enters the 3-5-reverse and 4-5-6 clutch housing assembly to move the 3-5 reverse clutch piston against spring force and compensator feed fluid pressure to apply the 3-5-reverse clutch plates.

#6 Ball Check Valve

35 reverse clutch feed fluid unseats the #6 ball check valve, allowing excess pressure to pass into the actuator feed limit circuit. This helps to control clutch apply fluid pressure and clutch apply feel.

4-5-6 Clutch Applies or Remains Applied

R1/456 Pressure Control (PC) Solenoid 3

The R1/456 PC solenoid 3 defaults to its normally-high state (ON), allowing actuator feed limit fluid to enter the PCS R1/456 clutch fluid circuit. PCS R1/456 clutch fluid is routed through orifice #11 to the R1/456 clutch regulator valve. If the transmission is operating in First, Second or Third gear when an electrical malfunction occurs, the 4-5-6 clutch will apply. If the transmission is operating in Fourth, Fifth or Sixth gear when the electrical malfunction occurs, the 4-5-6 clutch remains applied.

R1/4-5-6 Clutch Regulator Valve

PCS R1/456 clutch fluid, at the R1/4-5-6 clutch regulator valve, opposes R1/4-5-6 clutch regulator valve spring force and orificed R1/456 clutch feed fluid pressure to regulate line pressure into the R1/456 clutch feed circuit. R1/456 clutch feed fluid is then routed to the clutch select valve, through orifice #12 to the spring end of the R1/4-5-6 clutch regulator valve, and through orifice #34 to ball check valve #5. When the R1/4-5-6 clutch regulator valve is in this position, PS4 fluid exhausts through the valve allowing the normally-closed #4 pressure switch to close.

Clutch Select Valve

R1/456 clutch feed fluid passes through the clutch select valve and enters the 456 clutch circuit. 456 clutch fluid is routed to the 4-5-6 clutch assembly, and through orifice #2 to the #1 ball check valve.

#1 Ball Check Valve

Orificed 456 clutch fluid pressure seats the #1 ball check valve against the exhausting PS4 fluid passage. 456 clutch fluid is then directed into the CSV2 latch circuit to replace the exhausting PS4 pressure and is routed to the clutch select valve. CSV2 latch fluid combines with clutch select valve spring force and holds the valve in this position during all six forward gear ranges.

4-5-6 Clutch

456 clutch fluid enters the 3-5-reverse and 4-5-6 clutch housing assembly, and moves the 4-5-6 clutch piston against spring force and compensator feed pressure to apply the 4-5-6 clutch plates.

#5 Ball Check Valve

R1/456 clutch feed fluid unseats the #5 ball check valve, allowing excess pressure to pass into the actuator feed limit circuit. This helps to control clutch apply fluid pressure and clutch apply feel.

1-2-3-4 Clutch Releases

1234 Pressure Control (PC) Solenoid 5

If the transmission is in First, Second, Third or Fourth gear when an electrical condition commands a protection mode, the 1234 PC solenoid 5 defaults to its normally-low state (OFF), allowing PCS 1234 clutch fluid pressure to exhaust and the 1-2-3-4 clutch to release.

2-6 Clutch Releases

26 Pressure Control (PC) Solenoid 4

If the transmission is in Second or Sixth gear when an electrical condition commands a protection mode, the 26 PC solenoid 4 defaults to its normally-low state (OFF), allowing PCS 26 clutch fluid pressure to exhaust and the 2-6 clutch to release.

Torque Converter Clutch (TCC) Releases

Torque Converter Clutch (TCC) Pressure Control (PC) Solenoid

If the TCC is applied when an electrical condition commands a protection mode, the TCC PC solenoid defaults to its normally-low state (OFF), allowing PCS TCC fluid to exhaust and the TCC to release.

Drive Range - Fourth Gear Default (Some Models)

The transmission default gear may be Fourth, rather than Fifth gear, depending on engine size and effective final drive ratio. If the transmission encounters an electrical component malfunction, the transmission will default to Fourth gear. All solenoids will default to their normal state. If the torque converter clutch is applied, it will release. The transmission will remain in Drive Range - Fourth Gear Default until the condition has been corrected. Reverse (R) range can also still be selected. This default action enables the vehicle to be safely driven to a service center.

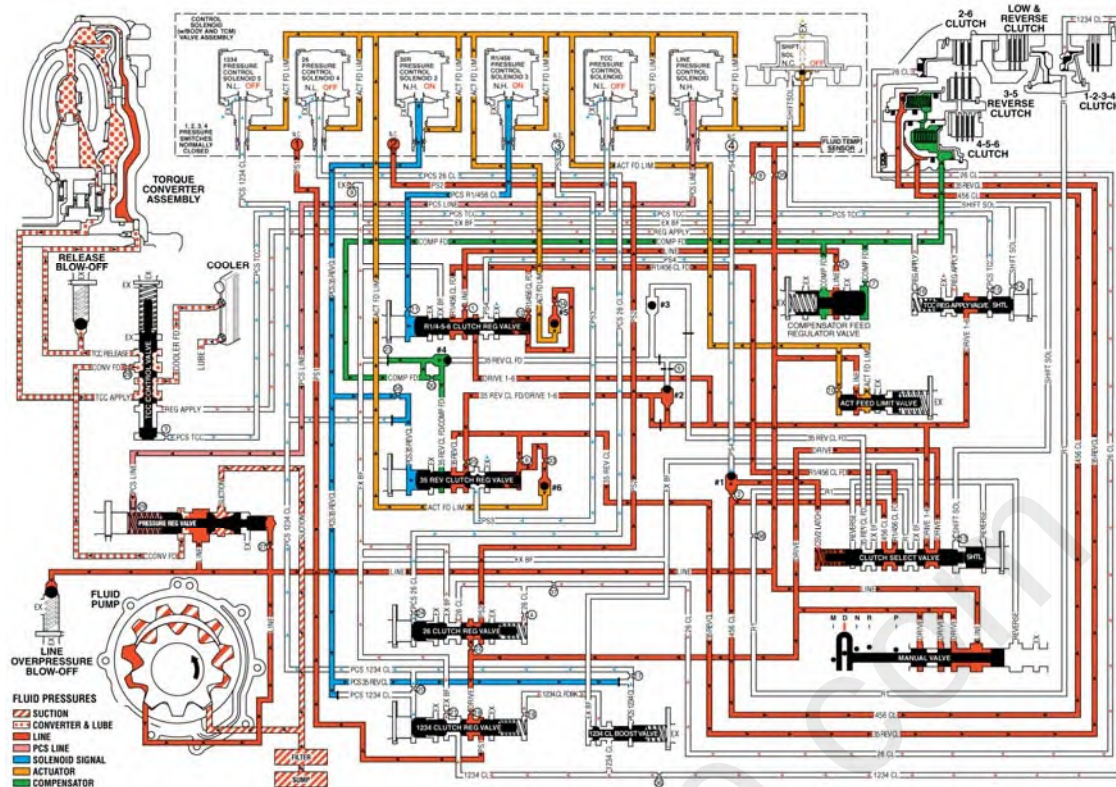


Fig. 15: Drive Range, Fifth Gear Default Fluid Flow Diagram
Courtesy of GENERAL MOTORS CORP.

DRIVE RANGE, SIXTH GEAR

As vehicle speed increases, the transmission control module (TCM) processes input signals from the automatic transmission input and output speed sensors, the throttle position sensor and other vehicle sensors to determine the precise moment to command ON the normally-low 26 pressure control solenoid 4. At the same time, the normally-high 35R pressure control solenoid 2 is commanded OFF and the transmission shifts into Sixth gear.

2-6 Clutch Applies

26 Pressure Control (PC) Solenoid 4

The 26 PC solenoid 4 is commanded ON, allowing actuator feed limit fluid to enter the PCS 26 clutch fluid circuit. PCS 26 clutch fluid is then routed through orifice #24 to the 2-6 clutch regulator valve.

2-6 Clutch Regulator Valve

PCS 26 clutch fluid, at the 2-6 clutch regulator valve, opposes 2-6 clutch regulator valve spring force and orificed 26 clutch fluid pressure to regulate drive fluid pressure into the 26 clutch circuit. 26 clutch fluid is then routed through orifice #37 to the 2-6 clutch assembly in the transmission case, and through orifice #4 to the spring end of the 2-6 clutch regulator valve. With the 2-6 clutch regulator valve in this position, PS2 fluid is allowed to exhaust and the normally-closed PS2 switch closes.

2-6 Clutch

The 26 clutch fluid from the 2-6 clutch regulator valve is routed through the transmission case to the 2-6 clutch piston assembly. The 26 clutch fluid pressure moves the piston against 2-6 clutch spring force to apply the 2-6 clutch plates.

3-5 Reverse Clutch Releases

35R Pressure Control (PC) Solenoid 2

The 35R PC solenoid 2 is commanded OFF allowing PCS 35 reverse clutch fluid from the 3-5-reverse clutch regulator valve to exhaust.

3-5-Reverse Clutch Regulator Valve

PCS 35 reverse clutch fluid exhausts, allowing 3-5-reverse clutch regulator valve spring force to move the 3-5-reverse clutch regulator valve to the released position. This allows 35 reverse clutch fluid pressure to exhaust into the compensator feed circuit in order to assist the 3-5-reverse clutch piston spring to quickly release the 3-5-reverse clutch. With the 3-5-reverse clutch regulator valve in this position, orificed (#25) 35 reverse clutch feed/drive 1-6 fluid passes through the valve into the PS3 circuit. PS3 fluid is routed to the normally-closed #3 pressure switch and opens the switch.

3-5-Reverse Clutch

3-5-reverse clutch spring force, assisted by compensator feed pressure, moves the 3-5-reverse clutch piston to release the 3-5-reverse clutch plates and force 35 reverse clutch fluid to exhaust from the 3-5-reverse and 4-5-6 clutch housing assembly. The exhausting 35 reverse clutch fluid pressure is routed to the 3-5-reverse clutch regulator valve where it enters the 35 reverse clutch feed/compensator feed circuit.

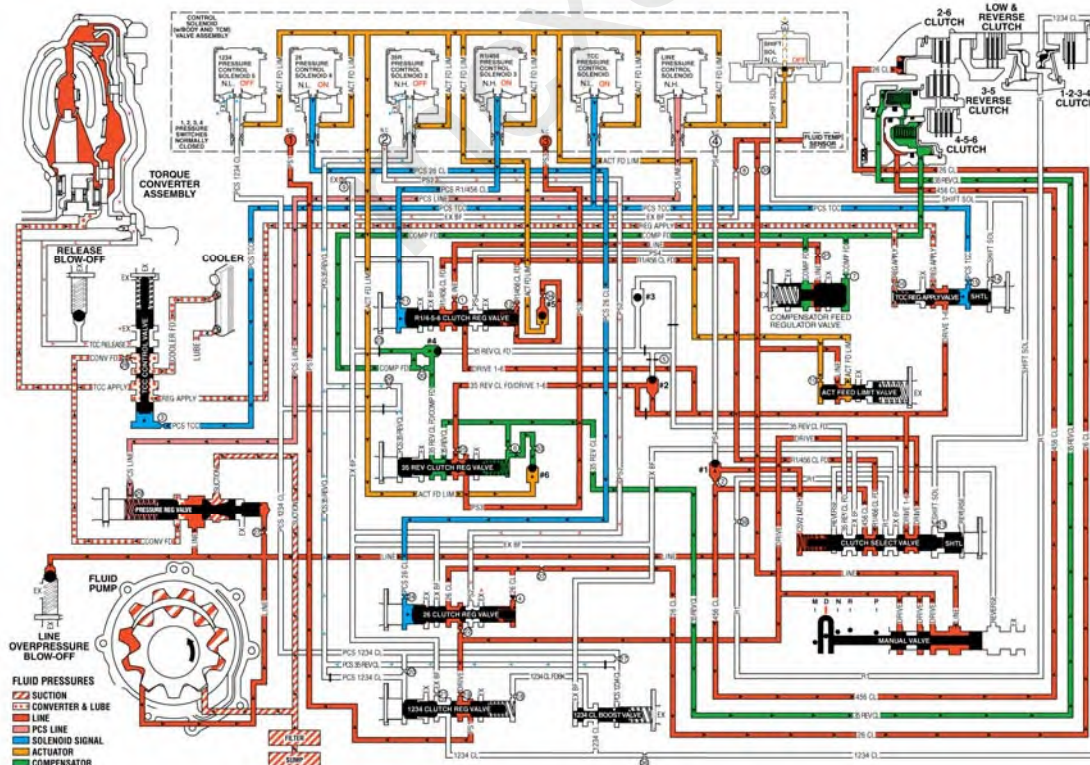


Fig. 16: Drive Range, Sixth Gear Fluid Flow Diagram
Courtesy of GENERAL MOTORS CORP.

FLUID PASSAGES

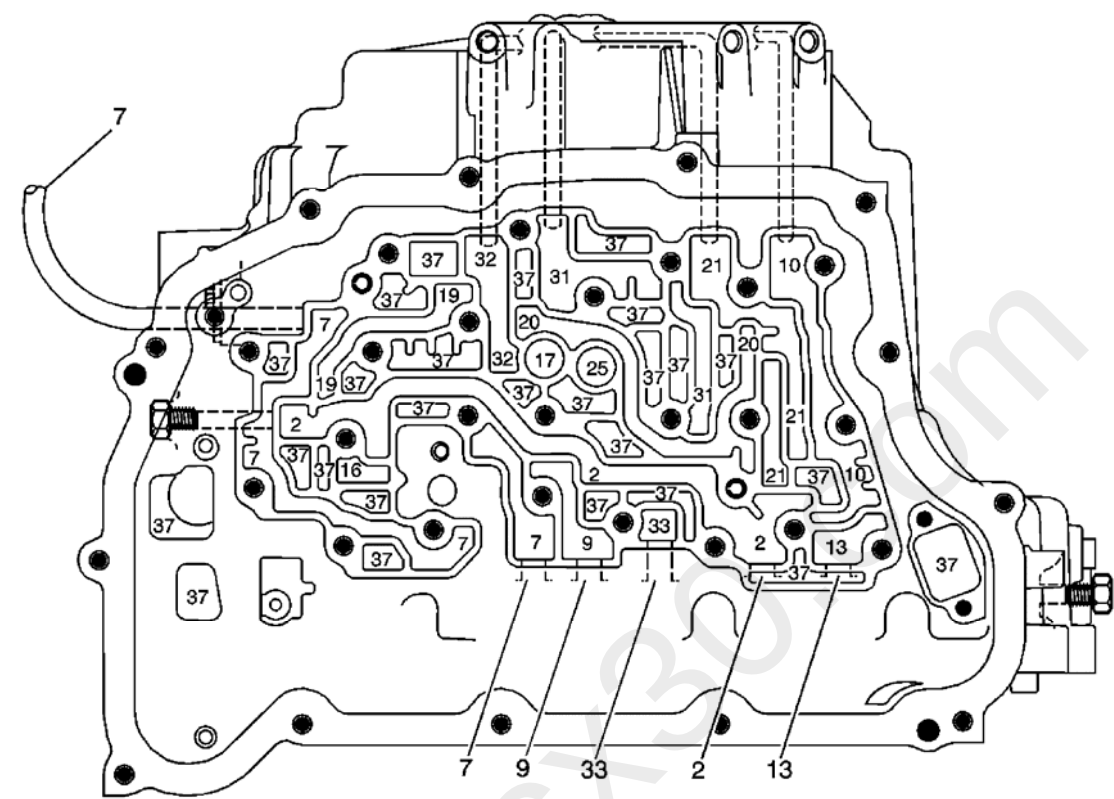


Fig. 17: Case - Control Valve Body Side (Left)
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
2	Line
7	Cooler Feed
9	Regulated Apply
10	Compensator Feed
13	PCS Line
16	R1/456 Clutch Feed
17	R1
19	Reverse
20	35 Reverse Clutch Feed
21	35 Reverse Clutch
25	1234 Clutch
31	26 Clutch

32	456 Clutch
33	PCS TCC
37	Void

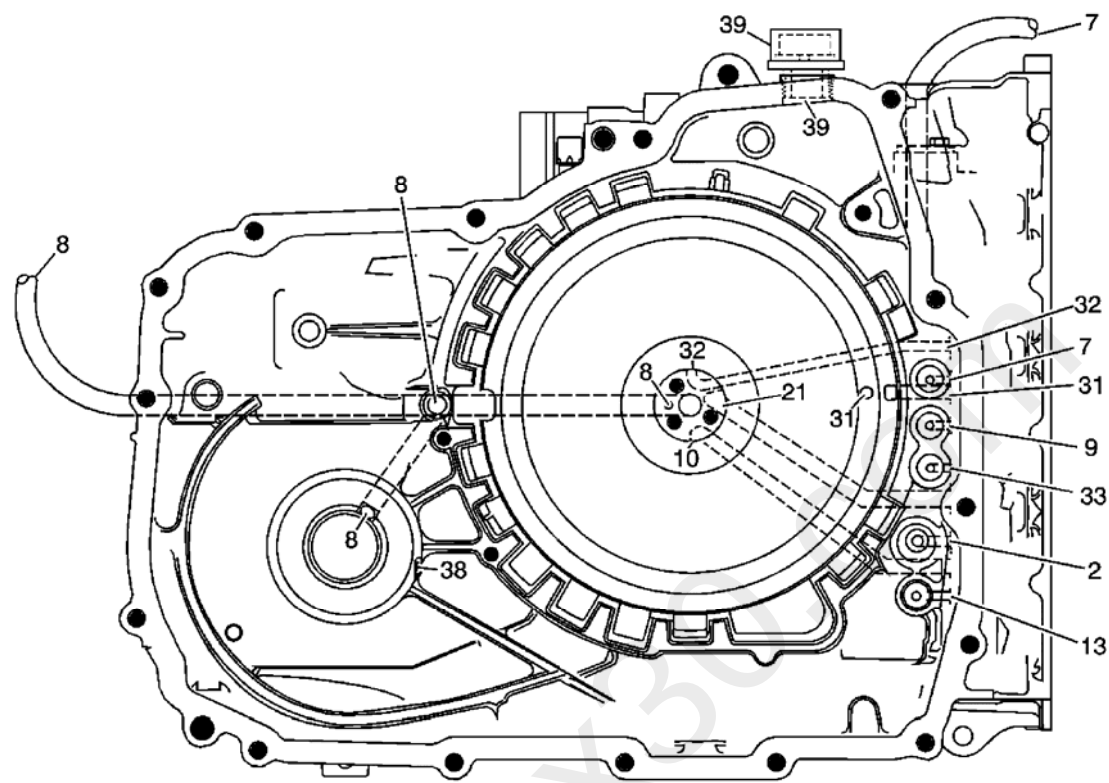


Fig. 18: Case - Pump Side (Back)
 Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
2	Line
7	Cooler Feed
8	Lube
9	Regulated Apply
10	Compensator Feed
13	PCS Line
21	35 Reverse Clutch
31	26 Clutch
32	456 Clutch
33	PCS TCC
38	Seal Drainback
39	Vent

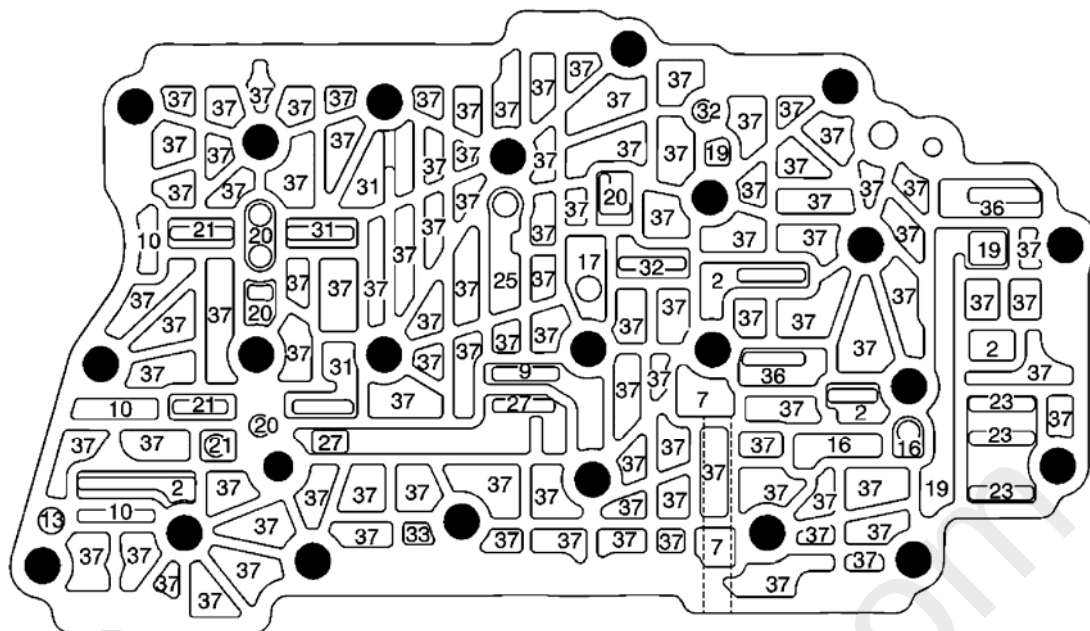


Fig. 19: Control Valve Body - Case Side (Left)
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
2	Line
7	Cooler Feed
9	Regulated Apply
10	Compensator Feed
13	PCS Line
16	R1/456 Clutch Feed
17	R1
19	Reverse
20	35 Reverse Clutch Feed
21	35 Reverse Clutch
23	Drive
25	1234 Clutch
27	Drive 1-6
31	26 Clutch
32	456 Clutch
33	PCS TCC
36	Exhaust
37	Void

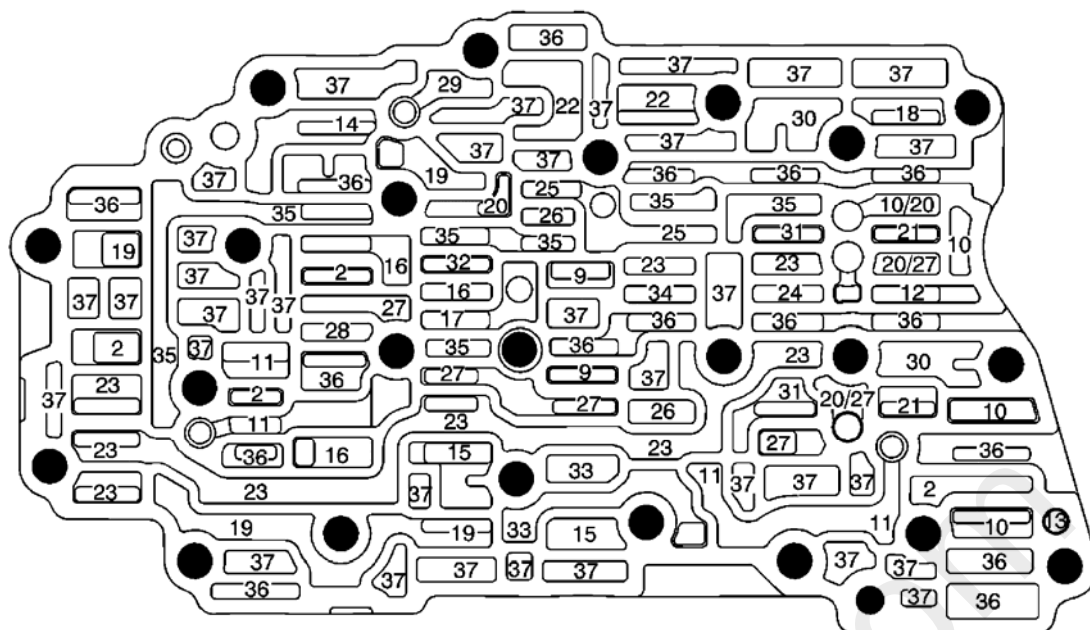


Fig. 20: Control Valve Body - Channel Plate Side (Right - No Valves)
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
2	Line
9	Regulated Apply
10	Compensator Feed
11	Actuator Feed Limit
12	PS3
13	PCS Line
14	PCS R1/456 Clutch
15	Shift Solenoid
16	R1/456 Clutch Feed
17	R1
18	PCS 35 Reverse Clutch
19	Reverse
20	35 Reverse Clutch Feed
21	35 Reverse Clutch
22	PCS 1234 Clutch
23	Drive
24	PS2
25	1234 Clutch
26	1234 Clutch Feedback
27	Drive 1-6

28	PS4
29	CSV2 Latch
30	PCS 26 Clutch
31	26 Clutch
32	456 Clutch
33	PCS TCC
34	PS1
35	Exhaust Backfill
36	Exhaust
37	Void

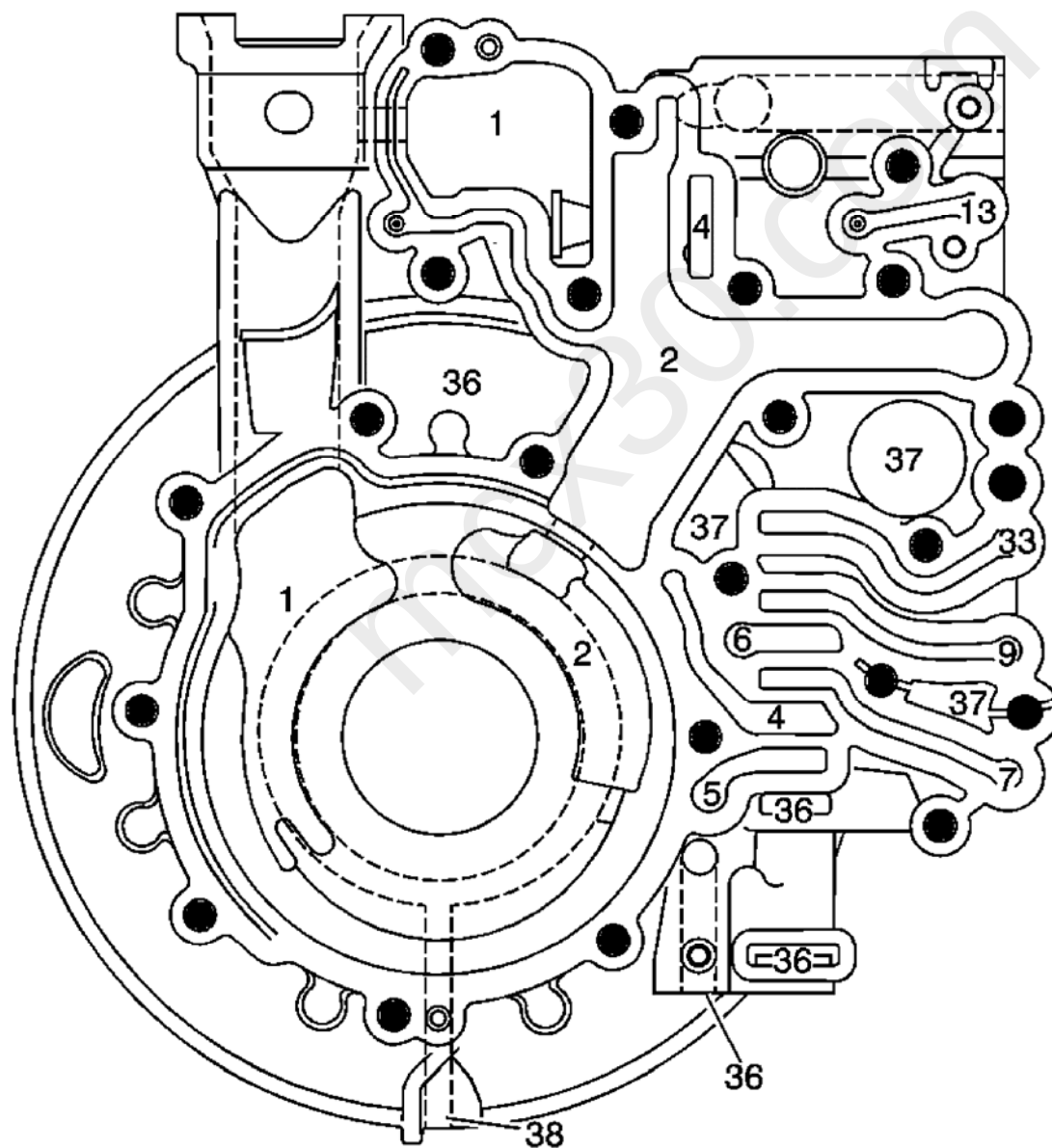


Fig. 21: Pump Body - Pump Cover Side (Front)
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
1	Suction
2	Line
4	Converter Feed
5	TCC Released
6	TCC Apply
7	Cooler Feed
9	Regulated Apply
13	PCS Line
33	PCS TCC
36	Exhaust
37	Void
38	Seal Drainback

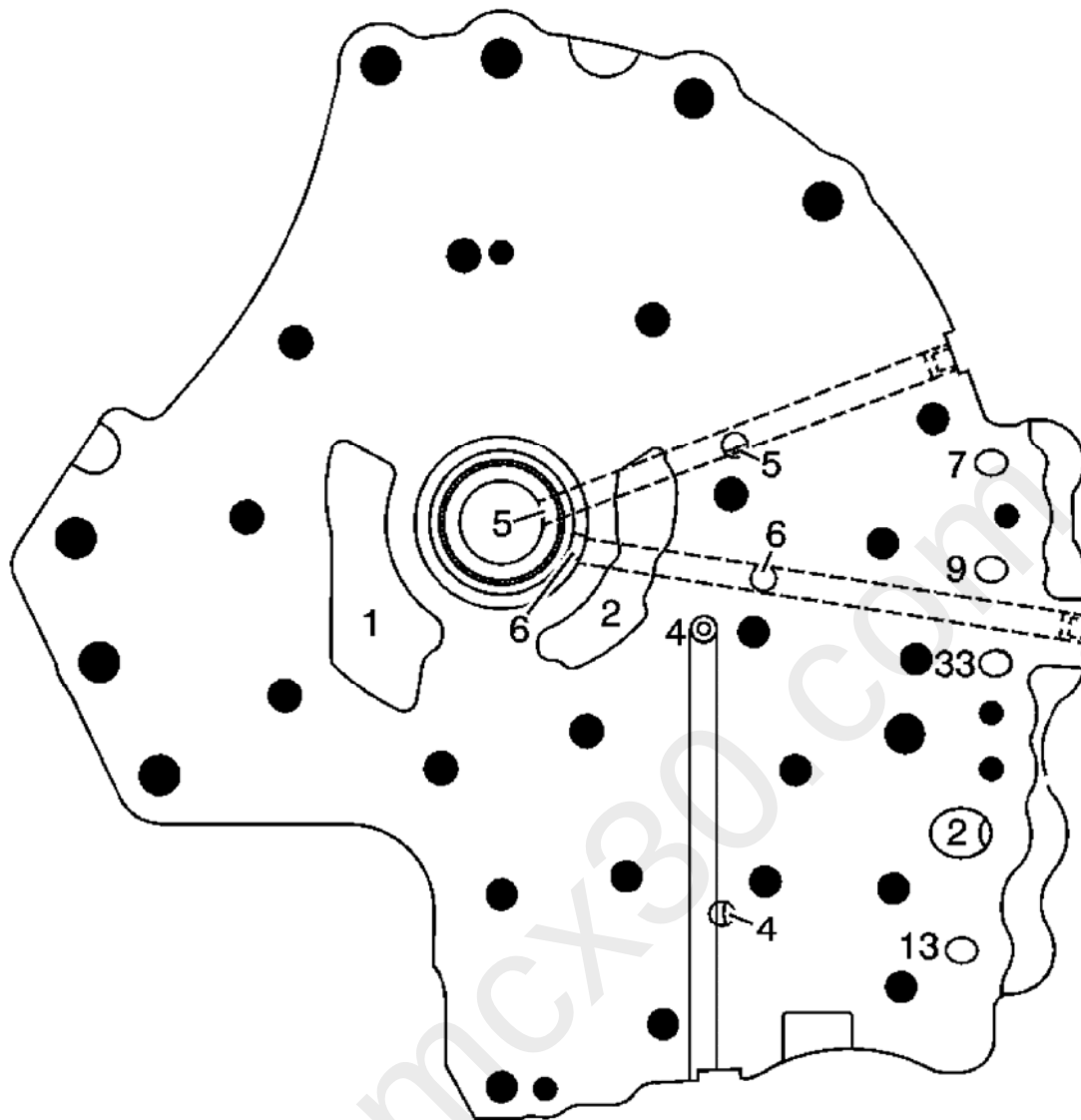


Fig. 22: Pump Cover - Pump Body Side (Back)
 Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
1	Suction
2	Line
4	Converter Feed
5	TCC Released
6	TCC Apply
7	Cooler Feed
9	Regulated Apply
13	PCS Line

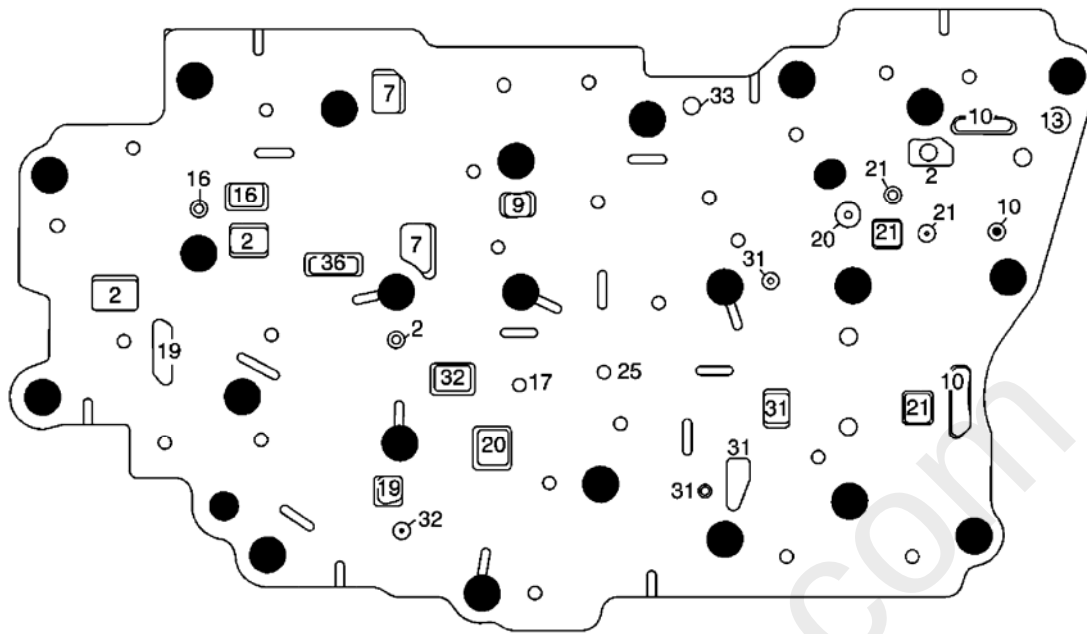


Fig. 23: Spacer Plate (12) - Case Side (Left)
 Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
2	Line
7	Cooler Feed
9	Regulated Apply
10	Compensator Feed
13	PCS Line
16	R1/456 Clutch Feed
17	R1
19	Reverse
20	35 Reverse Clutch Feed
21	35 Reverse Clutch
25	1234 Clutch
31	26 Clutch
32	456 Clutch
33	PCS TCC
36	Exhaust

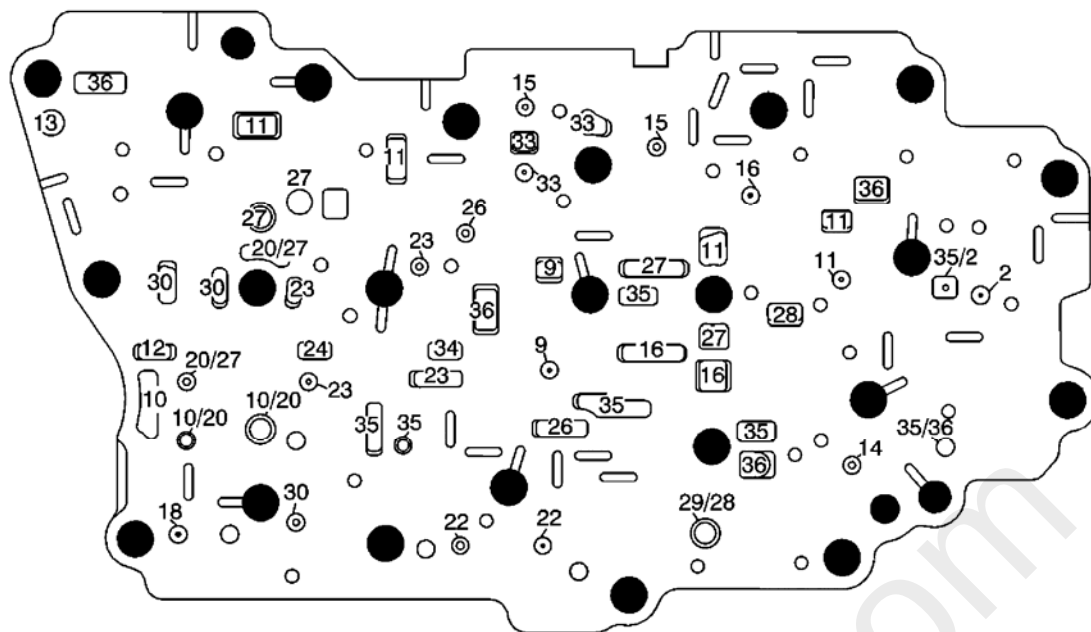


Fig. 24: Spacer Plate (402) - Channel Plate Side (Right)
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
2	Line
9	Regulated Apply
10	Compensator Feed
11	Actuator Feed Limit
12	PS3
13	PCS Line
14	PCS R1/456 Clutch
15	Shift Solenoid
16	R1/456 Clutch Feed
18	PCS 35 Reverse Clutch
20	35 Reverse Clutch Feed
22	PCS 1234 Clutch
23	Drive
24	PS2
26	1234 Clutch Feedback
27	Drive 1-6
28	PS4
29	CSV2 Latch
30	PCS 26 Clutch
33	PCS TCC

34	PS1
35	Exhaust Backfill
36	Exhaust

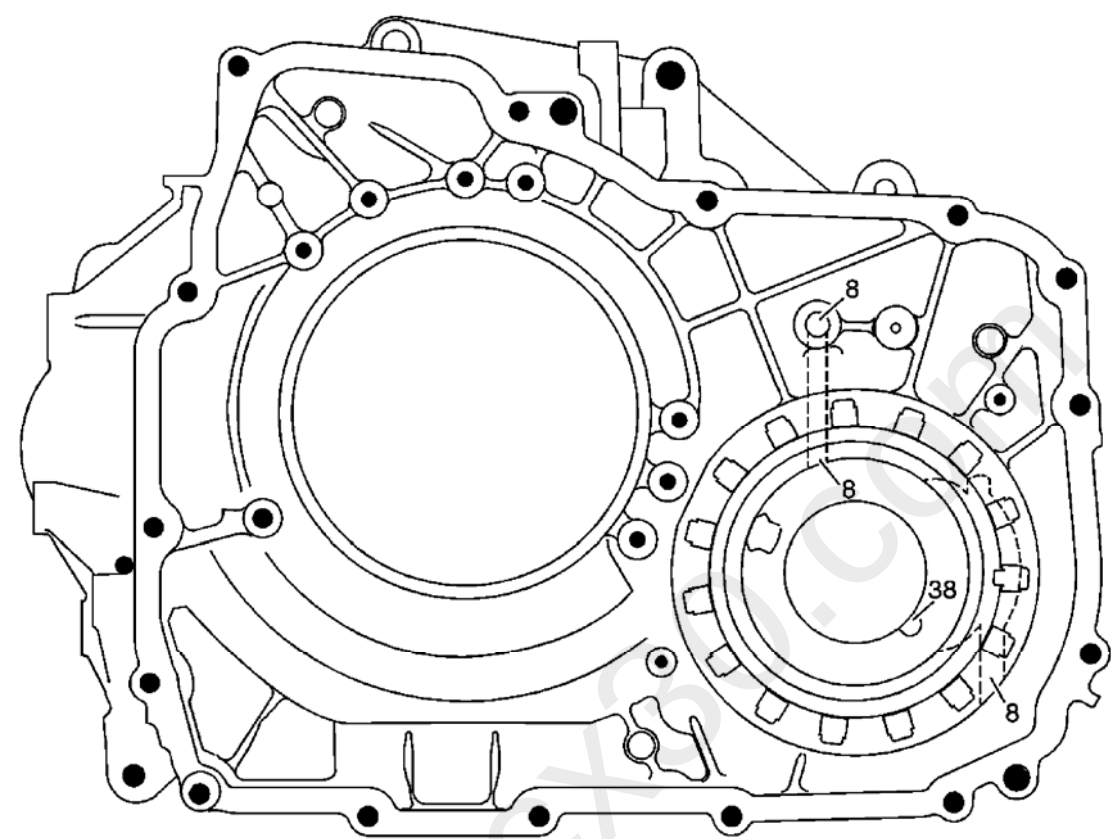


Fig. 25: Torque Converter Clutch Housing - Pump Side (Front)
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
8	Lube
38	Seal Drainback

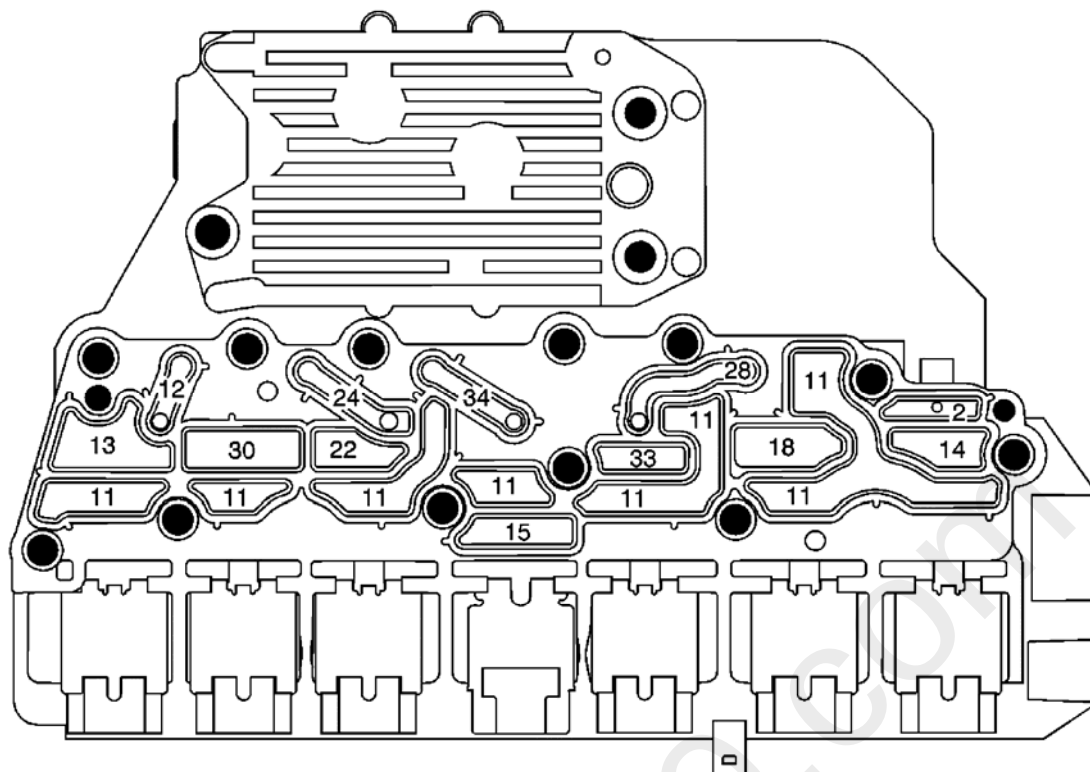


Fig. 26: Control Solenoid Valve Assembly with Filter Plate - Channel Plate Side (Front)
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
2	Line
11	Actuator Feed Limit
12	PS3
13	PCS Line
14	PCS R1/456 Clutch
15	Shift Solenoid
18	PCS 35 Reverse Clutch
22	PCS 1234 Clutch
24	PS2
28	PS4
30	PCS 26 Clutch
33	PCS TCC
34	PS1

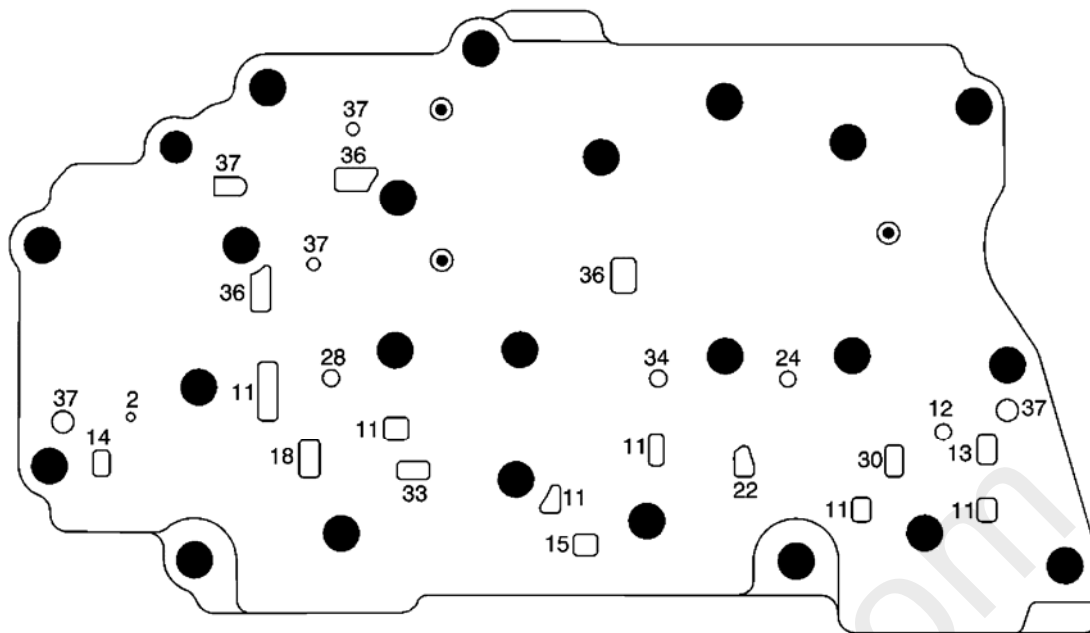


Fig. 27: Channel Plate - Control Solenoid Valve Assembly Side (Right)
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
2	Line
11	Actuator Feed Limit
12	PS3
13	PCS Line
14	PCS R1/456 Clutch
15	Shift Solenoid
18	PCS 35 Reverse Clutch
22	PCS 1234 Clutch
24	PS2
28	PS4
30	PCS 26 Clutch
33	PCS TCC
34	PS1
36	Exhaust
37	Void

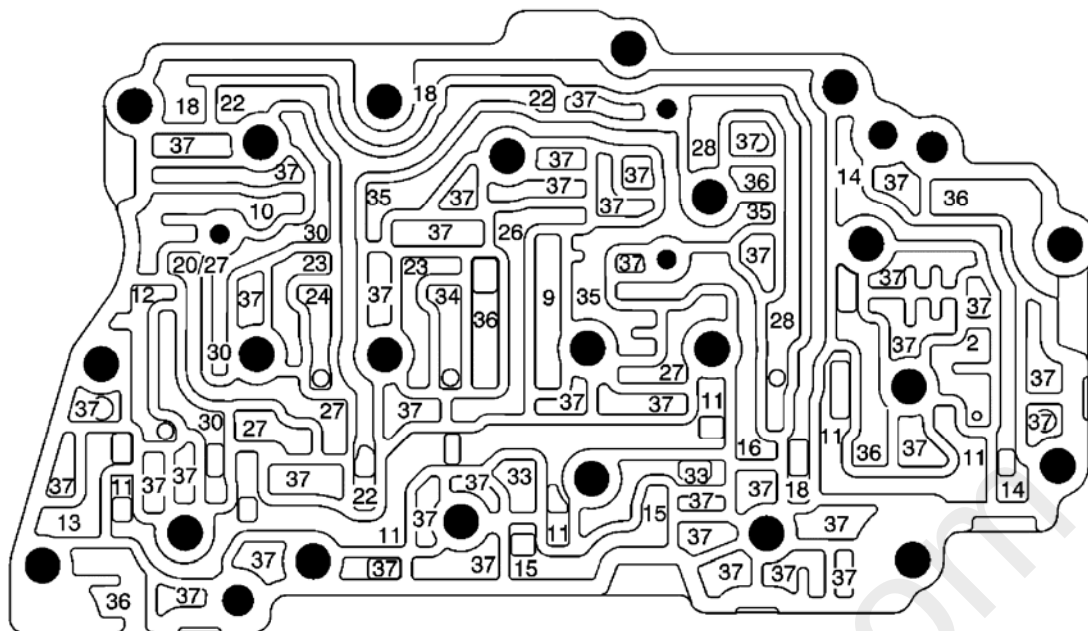


Fig. 28: Channel Plate - Control Valve Body Side (Left)
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
2	Line
9	Regulated Apply
10	Compensator Feed
11	Actuator Feed Limit
12	PS3
13	PCS Line
14	PCS R1/456 Clutch
15	Solenoid
16	R1/456 Clutch Feed
18	PCS 35 Reverse Clutch
20	35 Reverse Clutch Feed
22	PCS 1234 Clutch
23	Drive
24	PS2
26	1234 Clutch Feedback
27	Drive 1-6
28	PS4
30	PCS 26 Clutch
33	PCS TCC
34	PS1

35	Exhaust Backfill
36	Exhaust
37	Void

mcx30.com