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 Detent 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.

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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

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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.

Transmission Abbreviations

A/C

Air Conditioning

AC

Alternating Current

AT

Automatic Transmission

CCDIC

Climate Control Driver Information Center

DC

Direct Current

DIC

Driver Information Center

DLC

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Data 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

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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

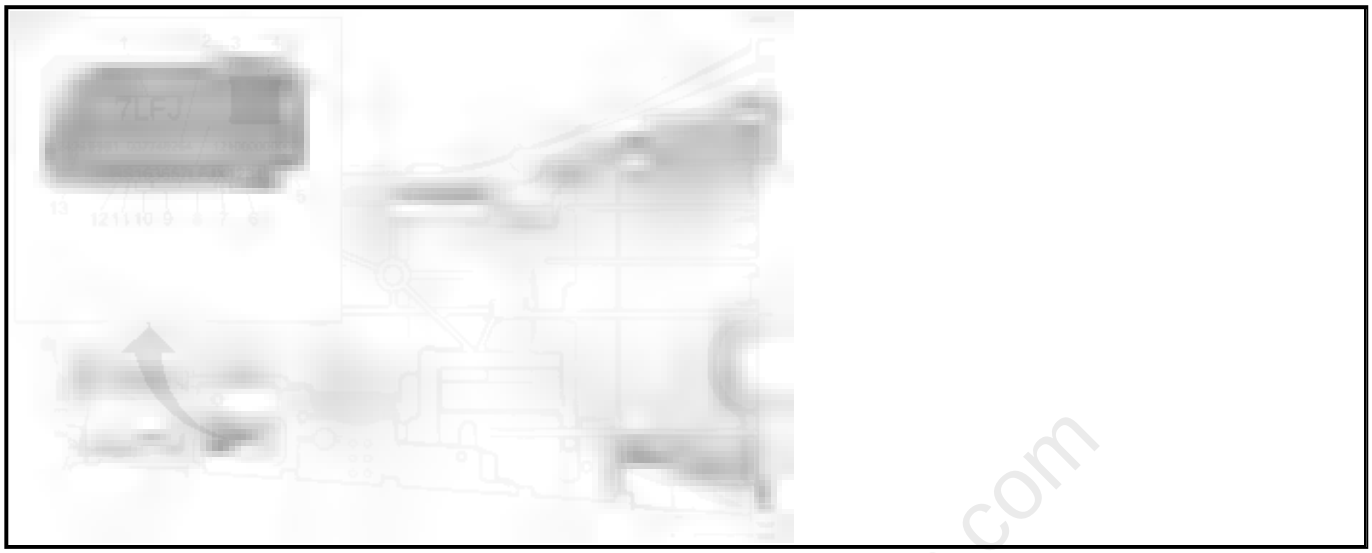
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Vehicle Speed Sensor

WOT

Wide Open Throttle

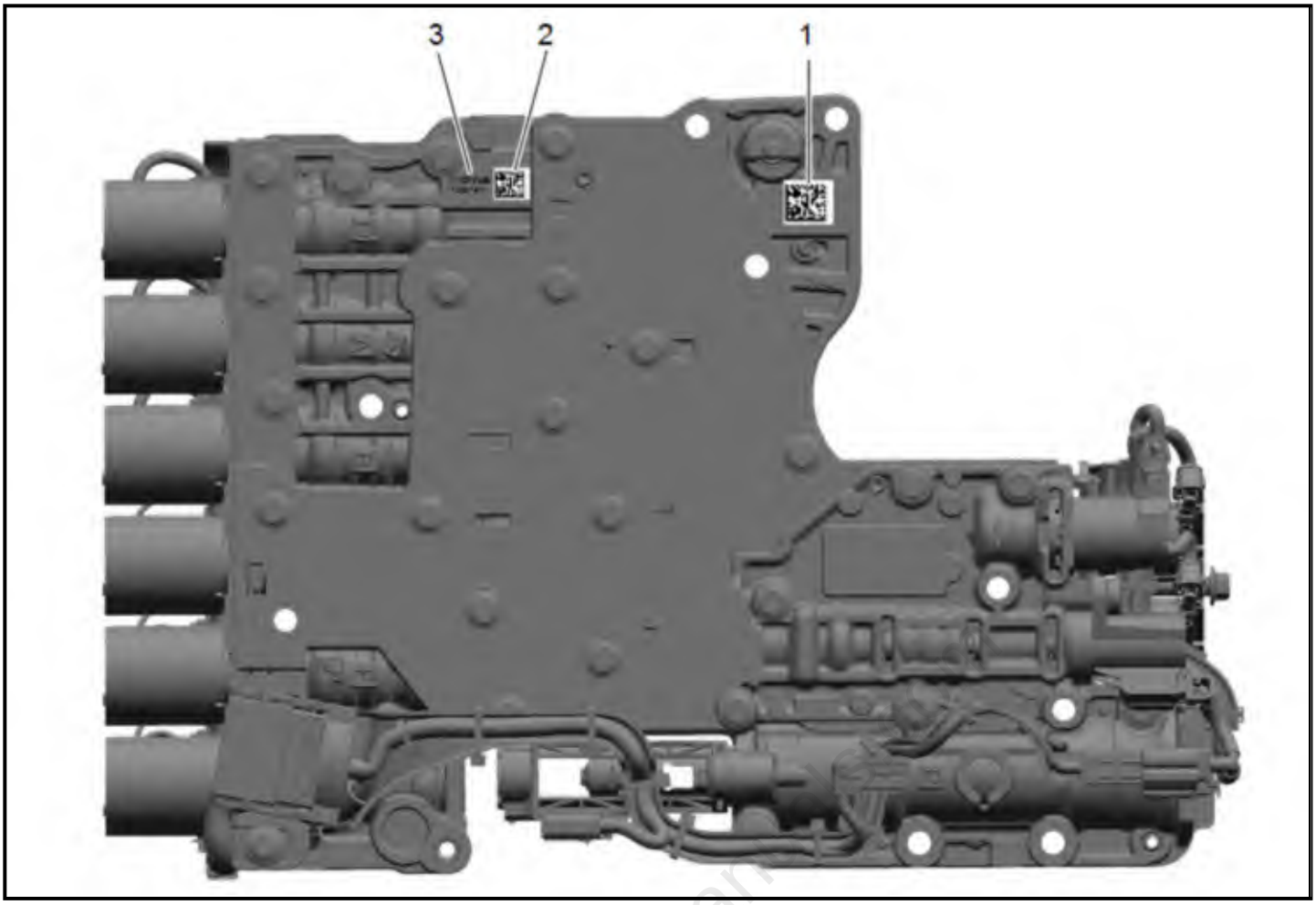
TRANSMISSION IDENTIFICATION INFORMATION



1. Broadcast Code
2. Source DUNS Number
3. Transmission Unique Number (TUN)
4. 2D Machine Readable Matrix
5. VPPS Code
6. Part Sequence Number
7. Site ID
8. Broadcast Code
9. Julian Date
10. Year of Build
11. Shift ID
12. Line Plant ID
13. GM Part Number

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CONTROL VALVE SOLENOID BODY IDENTIFICATION INFORMATION



1. QR Code/Data Matrix
2. QR Code/Data Matrix - DO NOT USE
3. Human Readable (PUN) - DO NOT USE

TRANSMISSION GENERAL DESCRIPTION

The Hydra-matic 10-Speed RWD is a fully automatic, 10-speed, rear-wheel drive, electronic-controlled transmission. The ten speed ratios are generated using four simple planetary gearsets, two brake clutches, and four rotating clutches. The resultant on-axis transmission architecture utilizes a squashed torque converter, an off-axis pump and four close coupled gearsets. The four rotating clutches have been located forward of the gearsets to minimize the length of oil feeds which provides for enhanced shift response. There are different variants of the transmission, all based on torque capacity. Architecture is common between the variants, and component differences are primarily related to size.

The transmission architecture features a case with integral bell housing for enhanced powertrain stiffness. A unique pump drive design allows for off-axis packaging very low in the transmission. The pump is a variable vane type which effectively allows for two pumps in the packaging size of one. This design and packaging strategy not only enables low parasitic losses and optimum priming capability but also provides for ideal oil routing to the controls system, with the pump located in the valve body itself. The transmission control module (TCM) is externally mounted, enabling packaging and powertrain integration flexibility. The controller makes use of three speed sensors which provide for enhanced shift response and accuracy.

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

The hydraulic system primarily consists of an off-axis gear-driven variable vane-type pump next to the valve body, and 2 control valve body assemblies. 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 6 multiple disc clutches. The multiple disc clutches deliver 11 different gear ratios, 10 forward and one reverse, through the gear sets. The gear sets then transfer torque through the output shaft.

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

PARK (P)

This position locks the rear 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 10 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.

MANUAL (M) SPORT MODE (S)

This position allows the driver to utilize the Driver Shift Control (DSC) system, or manual mode. When the shift selector lever is moved to the M/S position, the driver may select upshifts or downshifts by using the paddle switches located on the steering wheel. An upshift is requested by pushing either + button forward. A downshift is requested by pulling either + button rearward toward the driver.
To protect the engine or transmission from damage, the TCM will only allow you to shift into a gear appropriate for engine speed and vehicle speed.

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TRANSMISSION COMPONENT AND SYSTEM DESCRIPTION

The mechanical components of the 10-Speed RWD are as follows:

- A torque converter with an electronically controlled capacity clutch (ECCC). ECCC was developed to reduce the possibility of noise, vibration, or chuggle caused by TCC apply. In a torque converter with ECCC, the pressure plate does not always fully lock to the torque converter cover. Instead, the pressure plate maintains a small amount of slippage. In RWD 10-Speed transmissions, this slippage can range from 0 - 50 RPM. Full lockup (0 RPM slip) is still available on some applications. TCC may apply in 1st trough 10th gear. The specific TCC apply points and the amount of clutch slippage are determined by a number of operating conditions, including throttle position, vehicle speed, gear, as well as specific vehicle application. Transmission fluid temperature will also affect TCC apply points.
- Vairable Vane-Type Fluid Pump Assembly
- 1-2-3-4-5-6-Reverse Clutch
- 1-2-8-9-10-Reverse Clutch

- 2-3-4-5-7-9-10 Clutch
- 1-2-3-4-6-7-8-10-Reverse Clutch
- 1-3-5-6-7-8-9 Clutch
- 4-5-6-7-8-9-10-Reverse Clutch
- Low Clutch Roller
- Reaction Internal Gear
- Reaction Carrier
- Reaction Sun Gear Assembly
- Automatic Transmission Input Shaft Speed Sensor Reluctor Wheel
- Input Sun Gear
- Input Carrier Assembly
- Direct Overdrive Sun Gear Shaft
- Direct Overdrive Carrier
- Direct Overdrive Sun Gear
- Output Carrier Internal Gear
- Output Carrier Assembly
- Output Shaft
- Control Valve Body Assembly

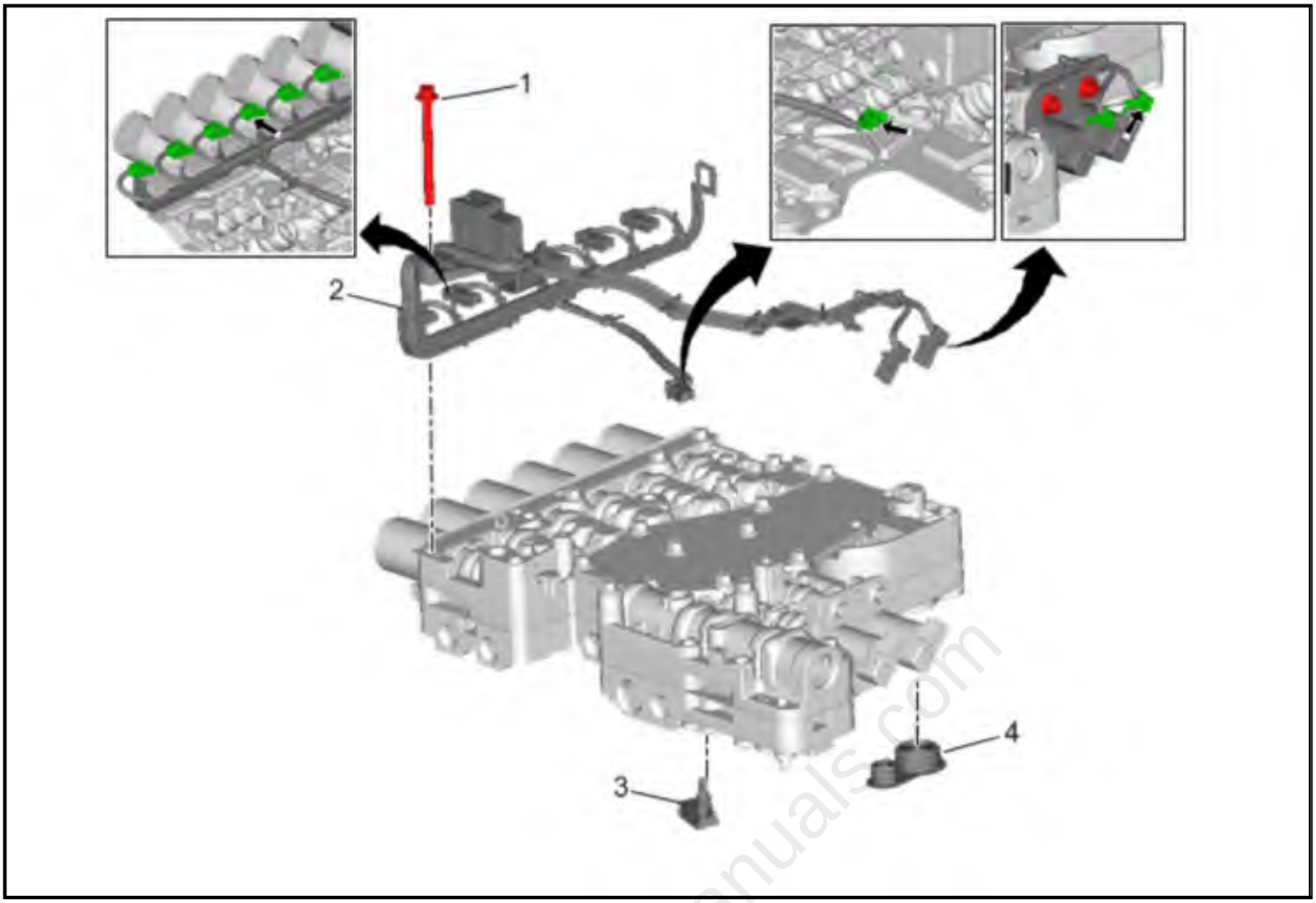
The electrical components of the 10-Speed RWD are as follows:

- Automatic Transmission Turbine Speed Sensor
- Automatic Transmission Intermediate Speed Sensor [2x]
- Automatic Transmission Output Speed Sensor
- Manual Shift Shaft Position Switch
- Control Solenoid Valve Body, which contains the following components:
    - 6 Transmission Control Solenoids
    - Torque Converter Clutch Solenoid Valve
    - Line Pressure Control Solenoid Valve

ELECTRONIC COMPONENT DESCRIPTION

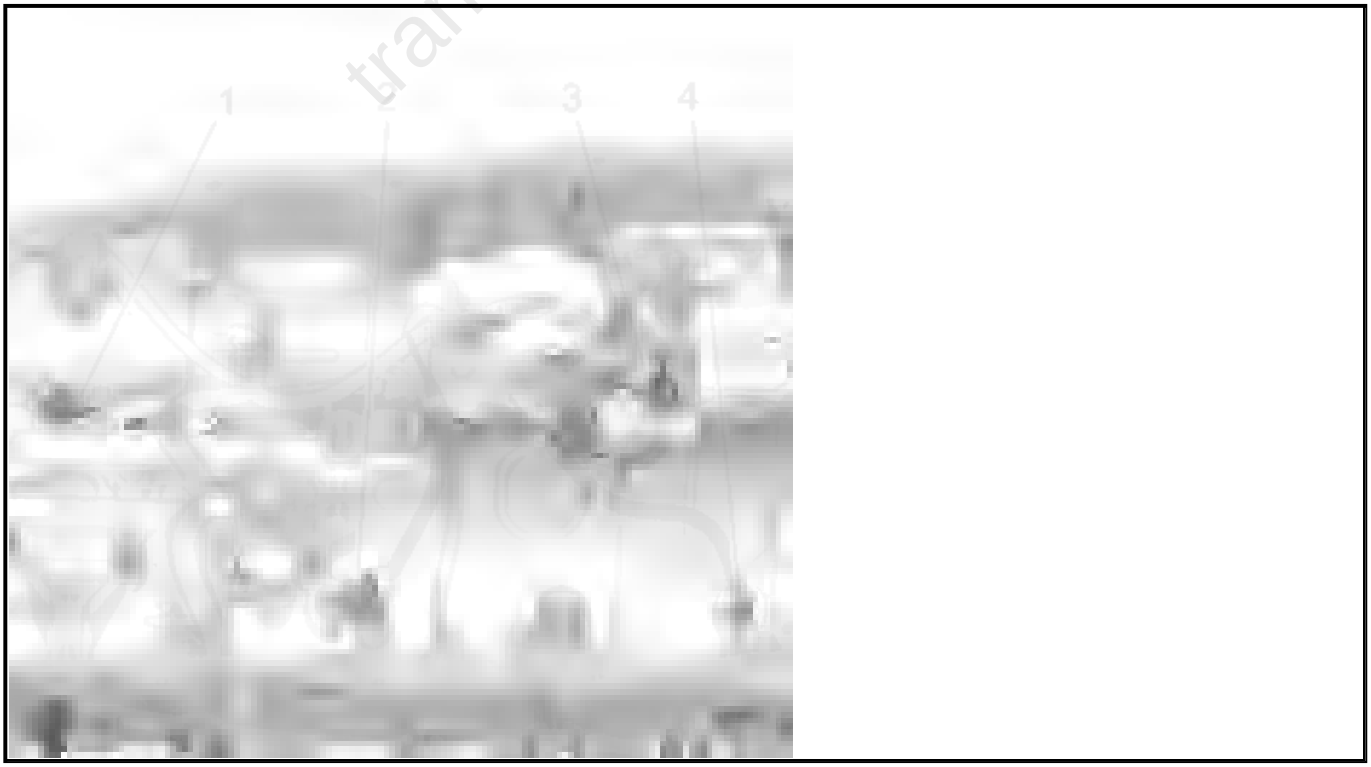
B13 Automatic Transmission Fluid Temperature Sensor

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The transmission fluid temperature sensor (3) is a 2 wire negative temperature coefficient thermistor. The TCM supplies a 5 V signal circuit and a low reference circuit to the transmission fluid temperature sensor. The transmission fluid temperature sensor measures the temperature of the fluid in the transmission fluid pan. As the temperature of the fluid increases, the resistance of the sensor decreases, varying the voltage on the signal circuit. The transmission fluid temperature sensor is mounted to the top of the control valve assembly (between the case and the control valve assembly).

Automatic Transmission Speed Sensors



The 10 speed transmission has four speed sensors mounted internally to the transmission case above the valve body:

- B14C Automatic Transmission Input Speed Sensor (4)
- B14DA Automatic Transmission Intermediate Speed Sensor 1 (3)
- B14DB Automatic Transmission Intermediate Speed Sensor 2 (2)
- B14A Automatic Transmission Output Speed Sensor (1)

Sensor Type = Two Wire Hall Effect.

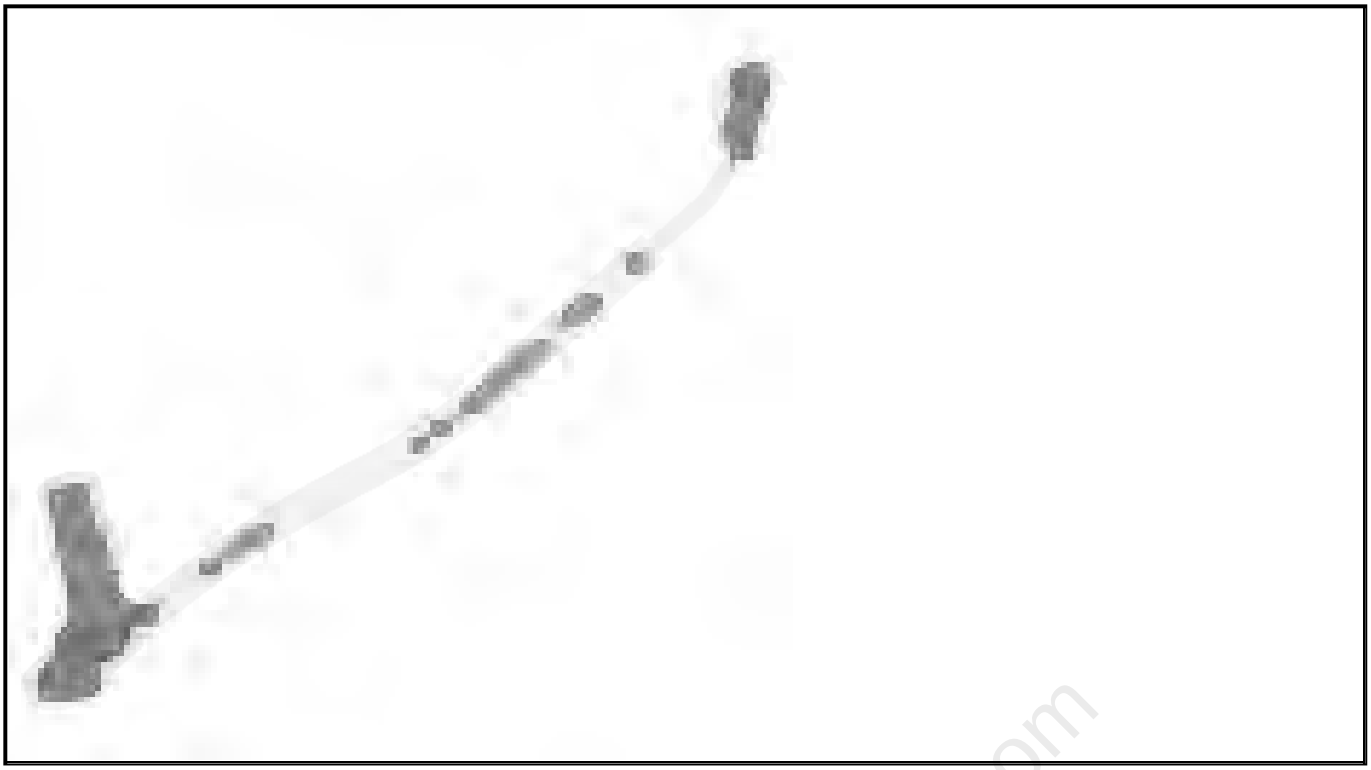
The TCM has two 9V Reference outputs; 9V1 and 9V2. 9V1 is used for B14C Automatic Transmission Input Speed Sensor, B14DB Automatic Transmission Intermediate Speed Sensor 2 and B315A Transmission Range Control Valve 1 Position Switch. 9V2 is used for B14DA Automatic Transmission Intermediate Speed Sensor 1, B14A Automatic Transmission Output Speed Sensorand B316 Transmission Park Valve Position Switch. The scan tool displays the input signal as a RPM value. The TCM uses these speed sensor inputs to determine transmission line pressure, shift patterns, correct gear ratio and the torque converter clutch slip speed.

B14C Automatic Transmission Input Speed Sensor


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The input speed sensor is also known as the automatic transmission turbine speed sensor. A 40 tooth reluctor ring is splined to the transmission input shaft.

B14DA Automatic Transmission Intermediate Speed Sensor 1



The intermediate speed sensor 1 is also known as the automatic transmission intermediate speed sensor A. A 50 tooth reluctor ring is part of the transmission reaction carrier assembly.

B14DB Automatic Transmission Intermediate Speed Sensor 2



The intermediate speed sensor 2 is also known as the automatic transmission intermediate speed sensor B. A 50 tooth reluctor ring is part of the transmission output carrier shell.

B14A Automatic Transmission Output Speed Sensor



{10L60} A 46 tooth reluctor ring is part of the transmission output carrier assembly, splined to the output shaft.

{10L80/90} A 68 tooth reluctor ring is part of the transmission output carrier assembly, splined to the output shaft.

{If equipped} G5 Automatic Transmission Auxiliary Fluid Pump/Automatic Transmission Auxiliary Fluid Pump



The G5 Transmission Fluid Pump - Electric/Auxiliary is an electric pump used to maintain transmission fluid pressure for autostart/autostop functions. The pump uses 12V DC power and a chassis ground. The pump is commanded on by the TCM when required

K71 Transmission Control Module

The Transmission Control Module (TCM) for this transmission is a remotely mounted, stand-alone controller. The TCM has one 66 way connector to interface with the vehicle electrical system, transmission assembly and

other vehicle control modules. The TCM sends and receives various input and output signals from a number of switches and sensors within the transmission and throughout the vehicle. In addition, the TCM is part of a network of other control modules on the vehicle. This network of control modules will share information with each other over a common serial data communications line. Based upon the TCM software/calibrations and input information the TCM receives, it will always have final authority of when to allow an upshift or downshift whether in manual mode operation or in drive position for automatic shifting.

Control Solenoid Valve Body

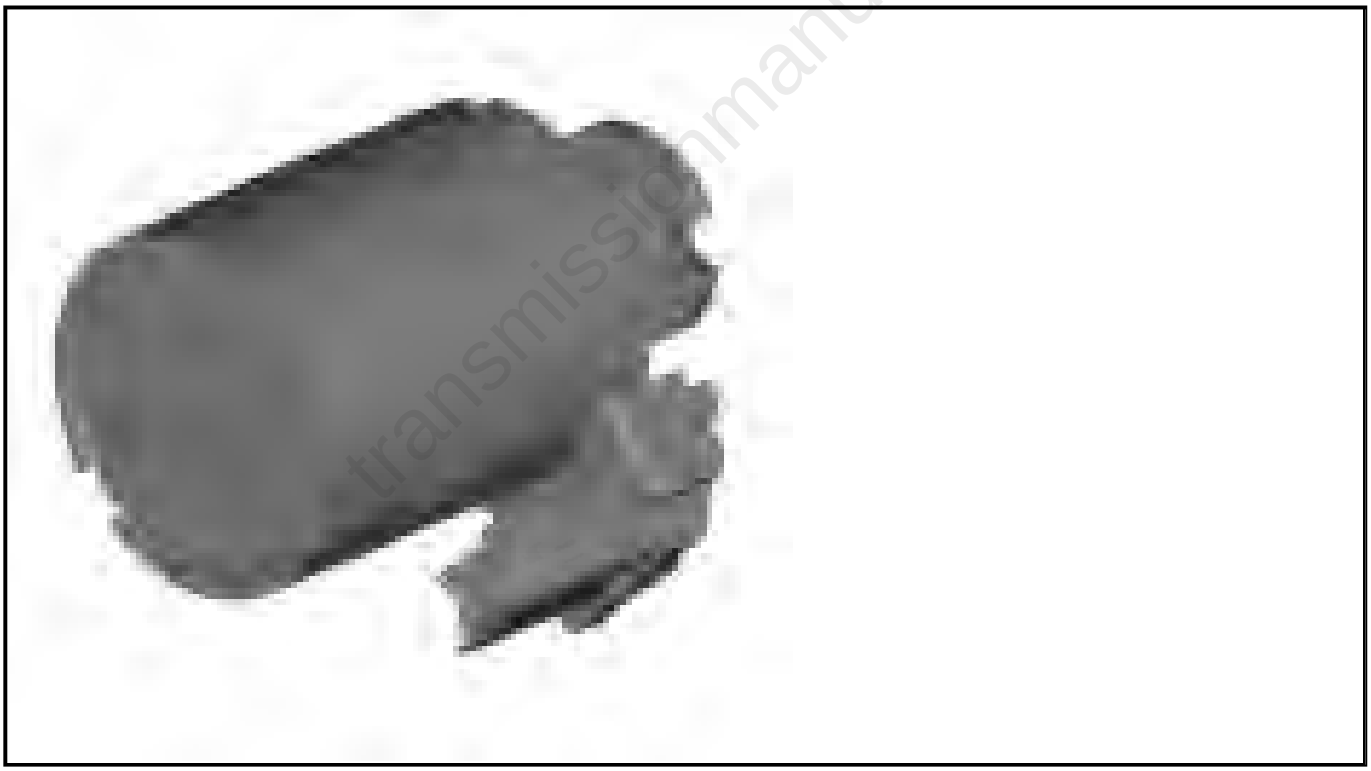
Transmission Control Solenoid Valves

The 10 speed transmission could contain a maximum of nine individual solenoids - RPO dependent - installed in various bore locations on the lower control valve body assembly. Eight of the nine solenoid valves are used to control pressure regulation and direction of transmission fluid. The one ON/OFF solenoid valve is only used to direct transmission fluid.

The normal operating current range for these solenoid valves is between 0 - 1.2 amps. If the TCM detects an electrical circuit malfunction or excessive current flow, the TCM will turn OFF the high side driver to that solenoid and set a DTC. The high side driver will reset when the circuit fault is corrected and the ignition switch is cycled.

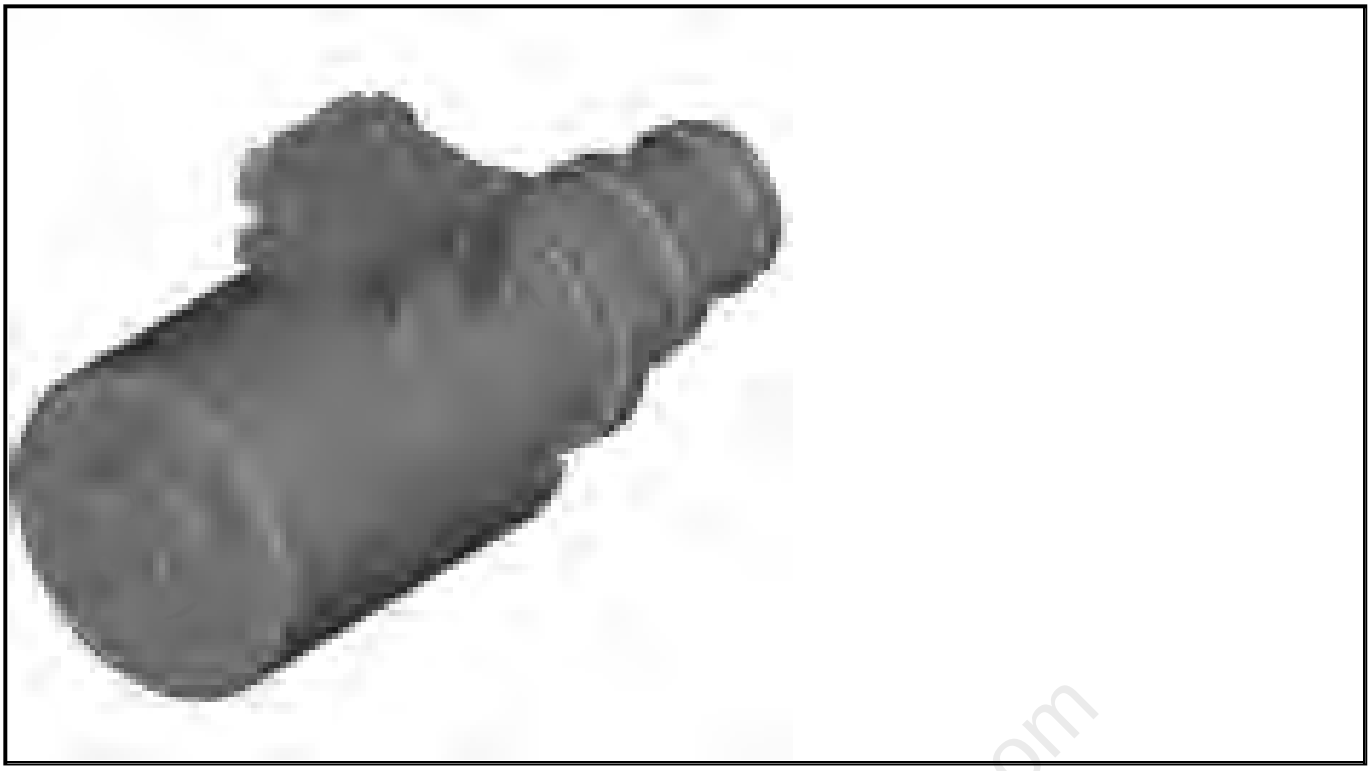
There are three slightly different designed variations of the pressure regulating solenoid valves used on this transmission. They are; linear variable force solenoid, normally low variable force solenoid and normally high variable force solenoid.

Normally Low - Linear Solenoids



- A normally low linear solenoid actuator is an electro-mechanical device that converts electrical power into a mechanical pushing or pulling force or motion.
- When energized, the solenoid armature applies force to the face of a pressure regulating spool valve.
- The solenoid actuator applies minimum force with minimum current applied to the solenoid coil.
- The solenoid actuator applies maximum force with maximum current applied to the solenoid coil.
- Transmission control solenoid valves 1, 2, 3, 4, 5 & 6 are of the linear design.

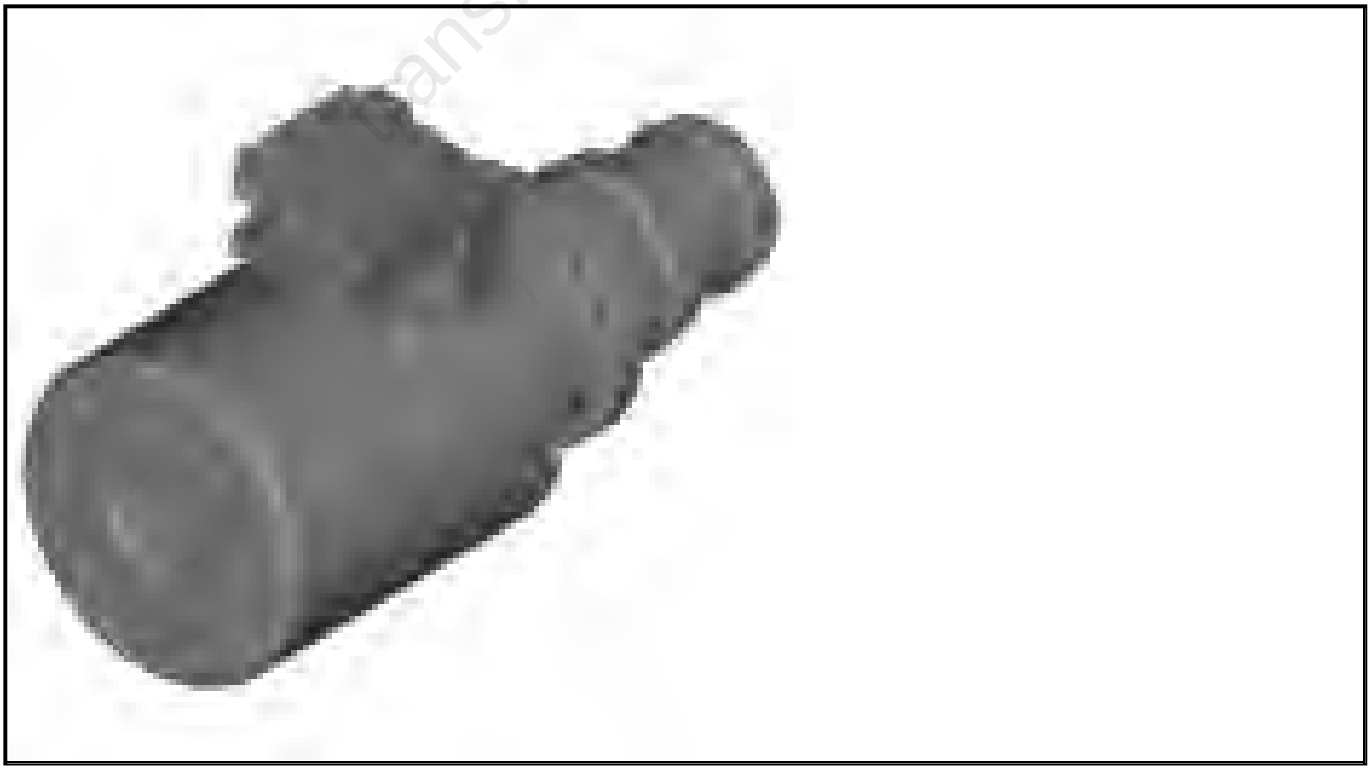
Normally Low - Variable Force Solenoid



A normally low variable force solenoid is an electro-mechanically operated valve. The valve is controlled by an electric current through the solenoid coil.

- The solenoid valve varies the control pressure depending on the current applied to the solenoid coil.
- The solenoid valve control pressure is low with no or minimum current applied to the solenoid coil.
- The solenoid valve control pressure increases with increasing current applied to the solenoid coil.
- Nominal resistance of a variable force solenoid is 5.1 Ohms +/- 0.3 Ohms @ 20C (68F). As the temperature of the solenoid windings increase, the resistance will also increase. When the solenoid temperature is at 100C (212F), the resistance value will be approximately 6.7 Ohms +/- 0.4 Ohms.
- Transmission control solenoid valve 8 is a normally low solenoid.

Normally High - Variable Force Solenoid



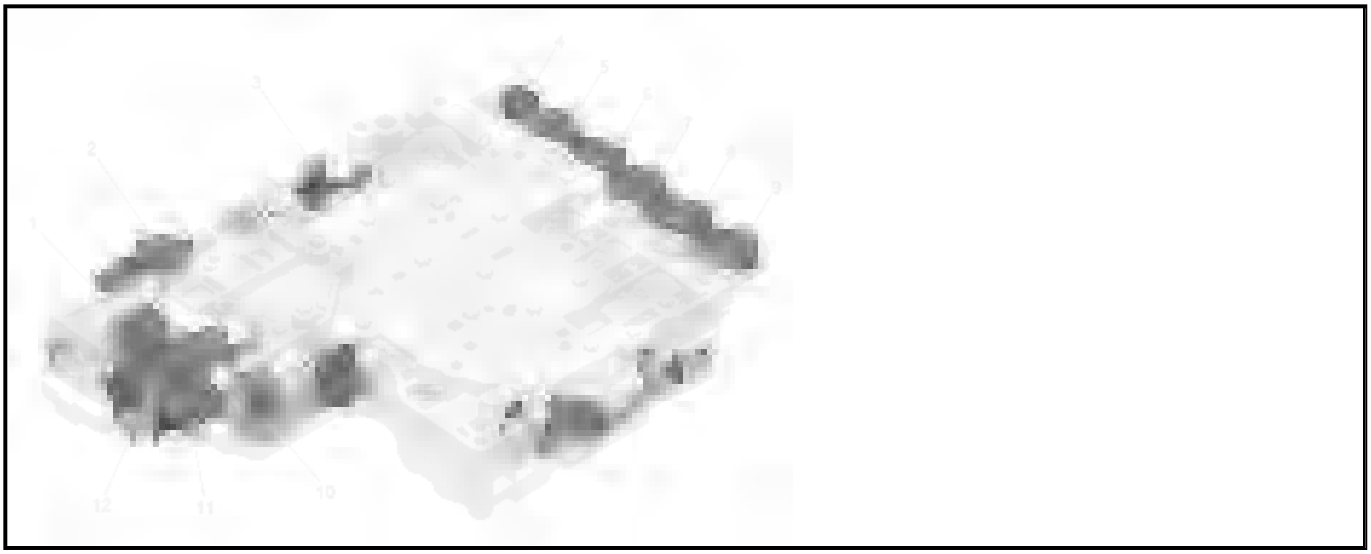
- A normally high variable force solenoid is an electro-mechanically operated valve. The valve is controlled by an electric current through the solenoid coil.
- The solenoid valve varies the control pressure depending on the current applied to the solenoid coil.
- The solenoid valve control pressure is high with no or minimum current applied to the solenoid coil.
- The solenoid valve control pressure decreases with increasing current applied to solenoid coil.
- Nominal resistance of a variable force solenoid is 5.1 Ohms +/- 0.3 Ohms @ 20C (68F). As the temperature of the solenoid windings increase, the resistance will also increase. When the solenoid temperature is at 100C (212F), the resistance value will be approximately 6.7 Ohms +/- 0.4 Ohms.
- Transmission control solenoid valve 7 is a normally high solenoid.

ON/OFF Solenoid



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- The ON/OFF solenoid valve is an electro-mechanically operated valve. The valve is controlled by an electric current through the solenoid coil.
- This solenoid is normally closed solenoid that is controlled ON (fully open) or OFF (fully closed).
- Nominal resistance of an On/Off solenoid is 12.0 Ohms +/- 0.3 Ohms @ 20C (68F). As the temperature of the solenoid windings increase, the resistance will also increase. When the solenoid temperature is at 100C (212F), the resistance value will be approximately 15.8 Ohms +/- 0.4 Ohms.
- Transmission control solenoid valve 9 is an ON/OFF solenoid.



Solenoid Characterization

Transmission control solenoid valves 1 - 8 are pressure regulating valves. Each solenoid valve is tested after assembly to determine the output fluid pressure at certain electrical values, applied to the coil winding. This information is referred to as solenoid current/pressure data points. The solenoid valves are tested two ways, with an increasing and then a decreasing electrical current applied to the coil winding. The resultant current versus pressure data points are saved and assigned a file number. This file number is marked on the solenoid valve housing end or on the valve body itself. The solenoid performance data file is stored on the TIS web site. This data file is programmed and stored in the vehicle's TCM. Replacing any of the following components will require the TCM to be programmed with either the new or existing solenoid valve performance data, depending on what component is replaced.

- Transmission assembly - program the TCM with the new data file stored on the TIS web site for all pressure regulating solenoid valves.
- Lower control valve body assembly with solenoid valves - program the TCM with the new data file stored on the TIS web site for all pressure regulating solenoid valves.
- Transmission Control Module - program the TCM with the existing data file stored on the TIS web site for all pressure regulating solenoid valves.
- One or more solenoids - program the TCM with the new data file stored on the TIS web site for all pressure regulating solenoid valves that were replaced.

Electronic Transmission Range Select (ETRS) Components

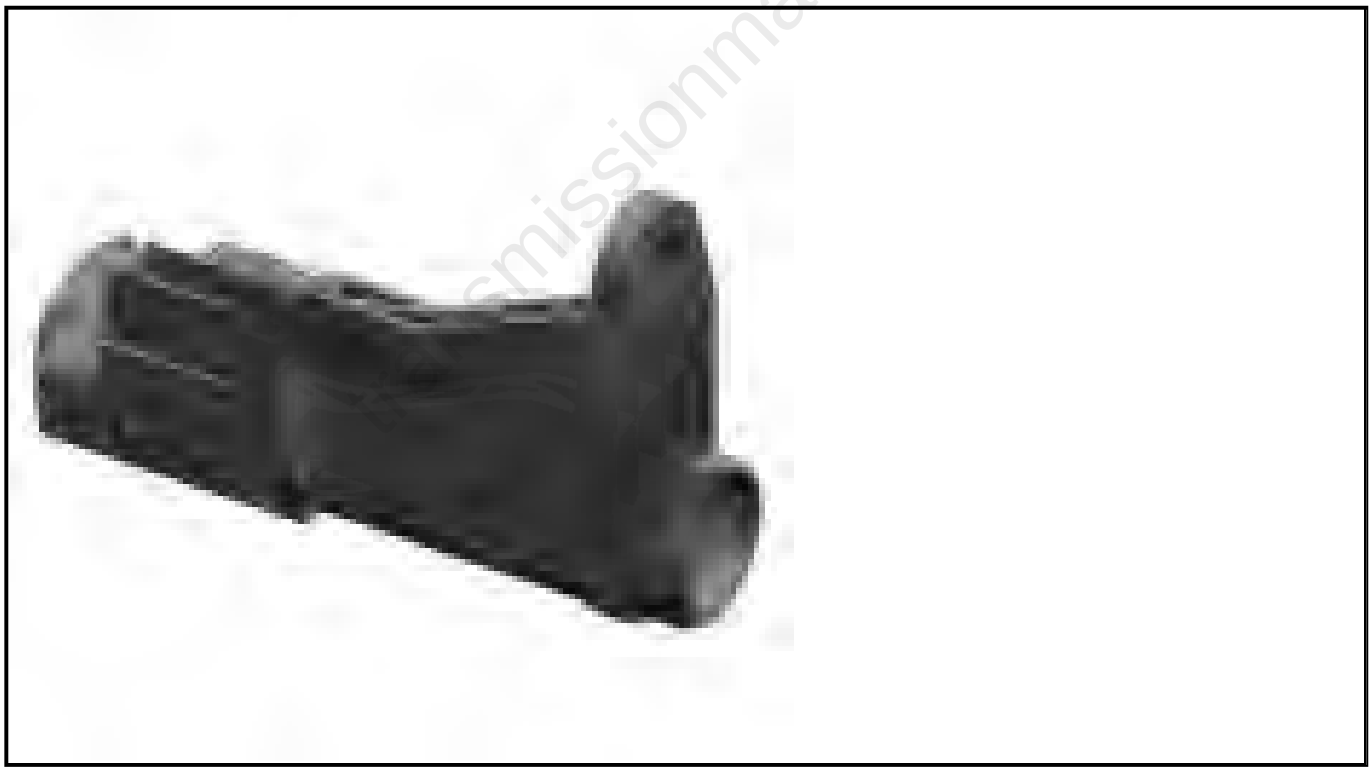
B315A Transmission Range Control Valve 1 Position Switch



This position switch uses the 9V1 reference voltage from the TCM to power the component.

This component detects the position of the component: ETRS Valve

B316 Transmission Park Valve Position Switch



This position switch uses the 9V2 reference voltage from the TCM to power the component.

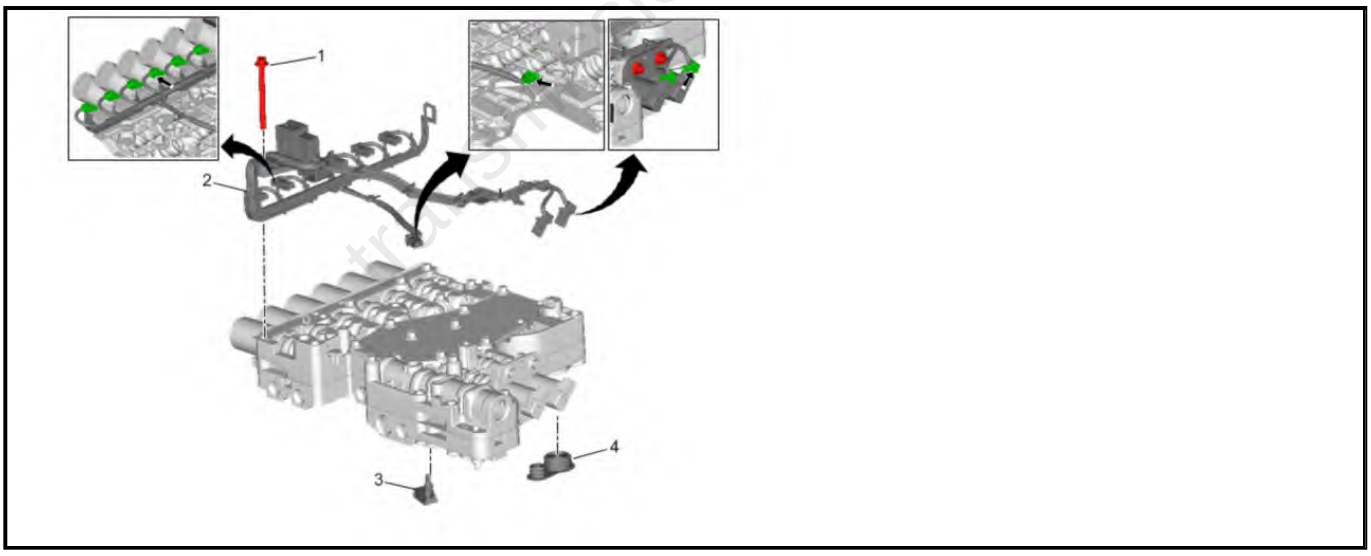
This component detects the position of the component: Park Servo Valve

M123 Transmission Park Valve Lock Solenoid Actuator

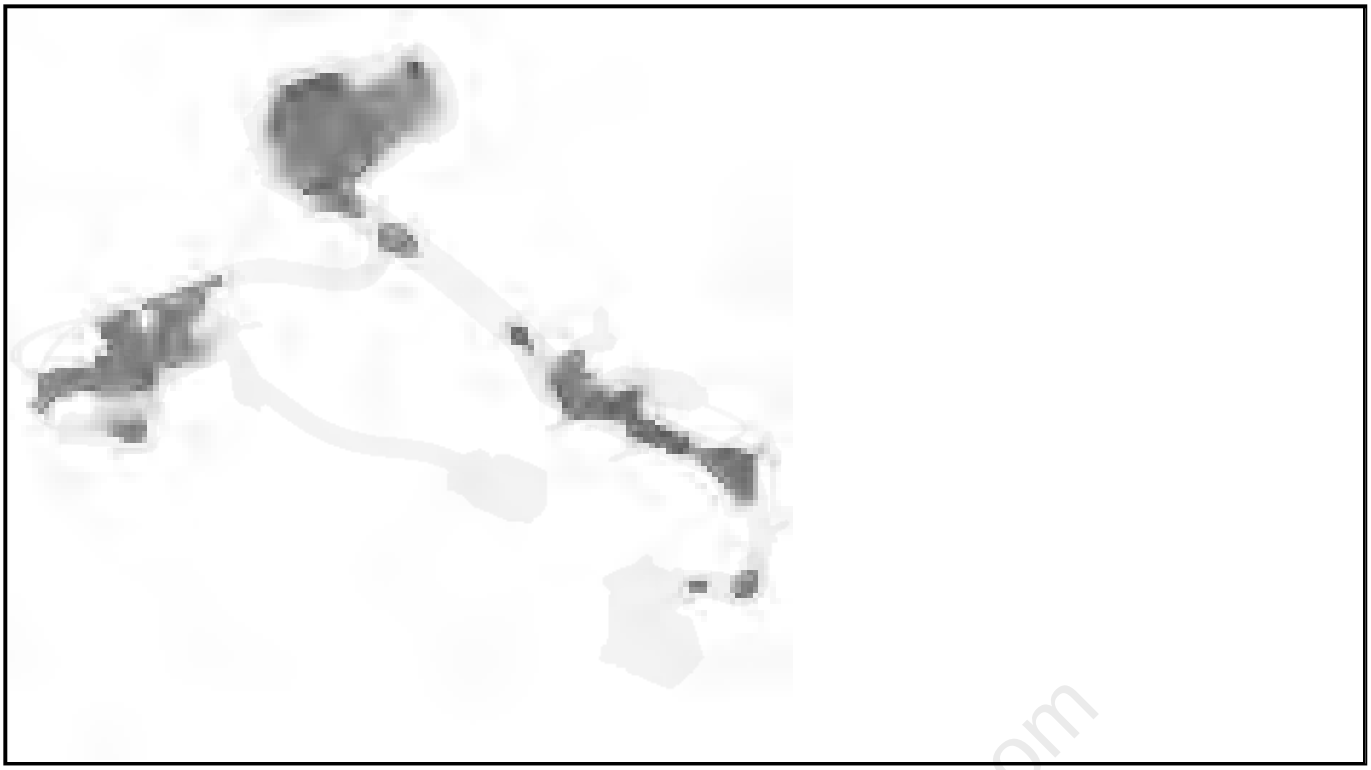


- When energized the actuator will extend a pin, locking the park servo in the applied position which holds the parking pawl in the out of park position.
- The M123 Transmission Park Valve Lock Solenoid Actuators also known as the:
  - Park Inhibit Solenoid
  - Park Inhibitor Solenoid
  - Park Inhibit Solenoid Actuator (PISA)

Automatic Transmission Wiring Harness



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There are three separate internal wire harness assemblies.

- (PASS-THRU) or (5)
- (MAIN/SOLENOID) or (305)
- (JUMPER) or (371)

The transmission internal wire harness is serviced by replacement only. No repairs to the internal wire harness should be attempted.

PARK - ENGINE RUNNING (MECHANICAL POWERFLOW)

Note: The component callouts in the text refer to the component callout numbers in disassembled views. **Disassembled Views (2WD)** , or **Disassembled Views (AWD)**

The transmission is in the park position. The park pawl actuator assembly (602) engages the park pawl (614) with the lugs on the output carrier assembly (73). The output carrier assembly (38) is held stationary, preventing the vehicle from moving.

1. Power from Torque Converter

The power flows through the turbine shaft (568) into the output sun gear (70). Powerflow continues through the input carrier (62) which drives the direct overdrive sun gear shaft (65) and direct overdrive sun gear (68). The direct overdrive sun gear drives the direct overdrive carrier (67) pinion gears.

2. 1-2-3-4-6-7-8-10 Reverse Clutch Assembly

The 1-2-3-4-6-7-8-10 reverse clutch is applied and is driven by the direct overdrive carrier (67) pinion gears.

3. Powerflow Terminated

The turbine shaft (568), output sun gear (70), input carrier (62), direct overdrive sun gear shaft (65), direct overdrive sun gear (68), direct overdrive carrier (67) and triple clutch housing (66) rotate freely, powerflow is terminated.

4. Vehicle Held Stationary

With the park pawl (614) engaged, the vehicle cannot move forward or backward.

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5. 1-2-8-9-10 Reverse Clutch

The 1-2-8-9-10 reverse clutch is applied in park in preparation for a shift into either 1st or reverse. This aids shift timing as only one clutch will need to be applied to achieve either range. The 10 Speed RWD is designed to have four components applied for each gear range, Also in each forward range, the design includes that only one component will need to be applied as another component releases.

6. 1-2-3-4-5-6 Reverse Clutch

The 1-2-3-4-5-6 reverse clutch is applied in park in preparation for a shift into either 1st or reverse. This aids shift timing as only one clutch will need to be applied to achieve either range. The 10 Speed RWD is designed to have four components applied for each gear range, Also in each forward range, the design includes that only one component will need to be applied as another component releases.

Park - Engine Running

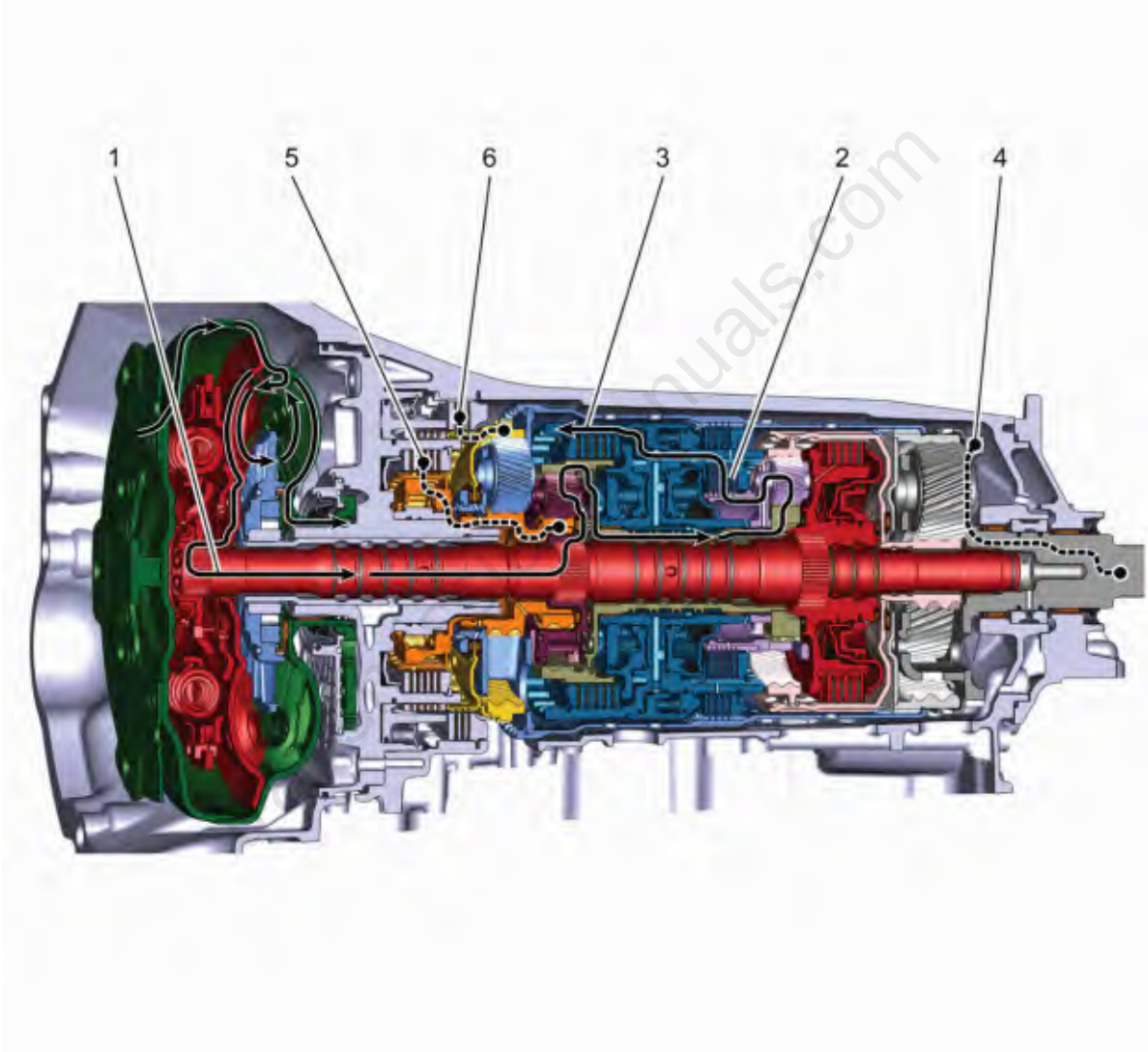


Fig. 1: Identifying Mechanical Powerflow Diagram - Park - Engine Running
Courtesy of GENERAL MOTORS COMPANY

PARK - ENGINE RUNNING (HYDRAULIC CIRCUITS)

When the gear selector is in the Park (P) position, the shift solenoids A, B and are commanded ON and the following changes occur in the transmission's hydraulic and electrical systems:

Fluid Pressure Directed in Preparation for a Shift

Secondary Line Fluid Circuit

PUMP OUT (3) fluid from the automatic transmission fluid pump supplies constant fluid pressure to various components such as the main regulator valve, anti-backflow valve, priority valve, TCC control solenoid valve and the TCC regulator control valve.

Line Fluid Circuit

PUMP OUT (3) fluid is directed through the anti-backflow valve into the LINE (2) fluid circuit. LINE (2) fluid supplies constant fluid pressure to various components such as the start/stop check e-pump, etrs valve, 1-2-3-4-5-6 clutch regulator valve, 1-2-8-9-10-R clutch regulator valve, 2-3-4-5-7-9-10 clutch regulator valve, 4-5-6-7-8-9-10-R clutch regulator valve, 1-3-5-6-7-8-9 clutch regulator valve and the 1-2-3-4-6-7-8-10-R clutch regulator valve. The anti-backflow valve requires a minimum Line VFS pressure of 107 kPa. This pressure nominally corresponds to a minimum line pressure required of 269 kPa.

1-2-3-4-5-6 Reverse Clutch Regulator Valve

Shift solenoid valve A is energized and applying pressure against the 1-2-3-4-5-6 reverse clutch regulator valve allowing LINE (2) fluid to enter the 123456R CLUTCH (21) fluid circuit. 123456R CLUTCH (21) fluid is directed to the 1-2-3-4-5-6 reverse clutch assembly. 123456R CLUTCH (21) fluid is also directed through orifice #6 into the 123456R CLUTCH FEEDBACK (22) fluid passage to the #1 ball check valve which seats against the FEED LIMIT - LOW (15) fluid passage.

1-2-3-4-5-6 Reverse Clutch Assembly

123456R CLUTCH (21) fluid is directed through orifice #9 into the 1-2-3-4-5-6 reverse clutch assembly. 123456R CLUTCH (21) fluid moves the piston against spring force to apply holding of the 1-2-3-4-5-6 reverse clutch plates.

1-2-8-9-10 Reverse Clutch Regulator Valve

Shift solenoid valve B is energized and applying pressure against the 1-2-8-9-10 reverse clutch regulator valve allowing LINE (2) fluid to enter the 1289-10R CLUTCH (24) fluid circuit. 1289-10R CLUTCH (24) fluid is directed to the 1-2-8-9-10 reverse clutch assembly. 1289-10R CLUTCH (24) fluid is also directed through orifice #11 into the 1289-10R CLUTCH FEEDBACK (25) fluid passage to the #2 ball check valve which seats against the FEED LIMIT - LOW (15) fluid passage. Fluid is also directed through orifice #69 to the #7 ball check valve.

1-2-8-9-10 Reverse Clutch Assembly

1289-10R CLUTCH (24) fluid is directed through orifice #14 into the 1-2-8-9-10 reverse clutch assembly. 1289-10R CLUTCH (24) fluid moves the piston against spring force to apply holding of the 1-2-8-9-10 reverse clutch plates.

Park - Engine Running

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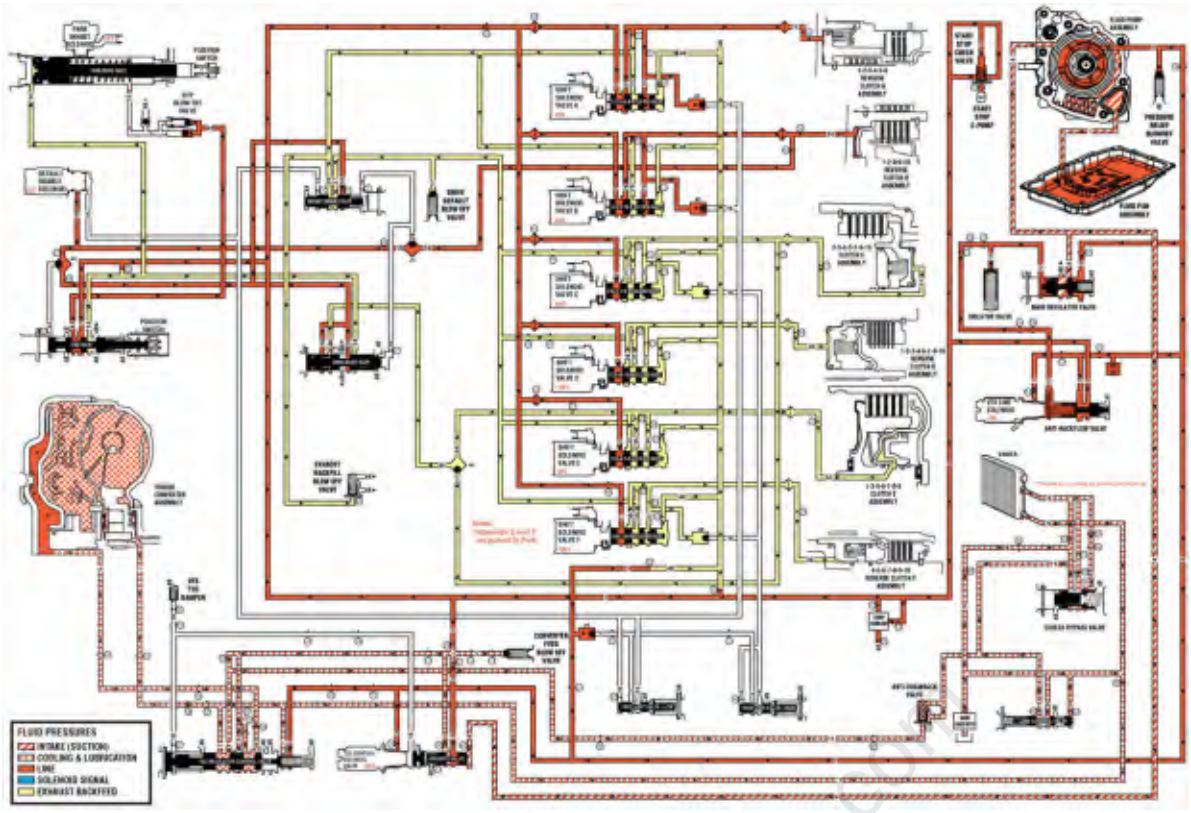


Fig. 2: Identifying Park - Engine Running - Hydraulic Flow Diagram
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Suction
2	Line
3	Pump Out
4	Decrease
5	Converter Feed
6	TCC Release
7	TCC Apply
8	Cooler Feed
9	Lube
10	VFS-TCC
11	Converter Return
12	VFS Line
13	Park On
14	Park Off
15	Feed Limit - Low
16	Feed Limit - High
17	Drive Default
18	Drive Latch
19	ON/OFF Signal
20	On/Off 1289-10 Reverse Clutch
21	123456 Reverse Clutch
22	123456 Reverse Clutch Feedback
23	123456 Reverse Clutch Exhaust
24	1289-10 Reverse Clutch
25	1289-10 Reverse Clutch Feedback
26	1289-10 Reverse Clutch Exhaust

Callout	Component Name
27	234579-10 Clutch
28	234579-10 Clutch Feedback
29	234579-10 Clutch Exhaust
30	1234678-10 Reverse Clutch
31	1234678-10 Reverse Clutch Feedback
32	1234678-10 Reverse Clutch Exhaust
33	1356789 Clutch
34	1356789 Clutch Feedback
35	1356789 Clutch Exhaust
36	456789-10 Reverse Clutch
37	456789-10 Reverse Clutch Feedback
38	456789-10 Reverse Clutch Exhaust
39	Exhaust Backfill
40	Exhaust
41	Return to Park
42	On/Off Drive Latch
44	234579-10/1356789 CLUTCH

REVERSE (MECHANICAL POWERFLOW)

Note: The component callouts in the text refer to the component callout numbers in disassembled views. **Disassembled Views (2WD)** , or **Disassembled Views (AWD)**

In Reverse (R), torque from the engine is multiplied through the torque converter and transmission gearsets to the vehicle's drive shaft and rear axle. The planetary gearset operates in reduction and also reverses the direction of input torque for a reverse gear ratio of approximately 4.866:1.

1. Power from Torque Converter

The turbine shaft with the 1-3-5-6-7-8-9 clutch assembly (554-565) is driven by the converter turbine.

2. Input Carrier Assembly Driving

The power flows through the turbine shaft to the input carrier (62) through the input carrier pinion gears which are driving the direct overdrive sun gear shaft (65).

3. Direct Overdrive Sun Gear Shaft Driven

The direct overdrive sun gear shaft (65) is driven by the input carrier (62) pinion gears.

4. 4-5-6-7-8-9-10 Reverse Clutch Assembly Applied

The 4-5-6-7-8-9-10 reverse clutch assembly is applied and holds the Output Carrier Internal Gear (74).

5. 1-2-3-4-6-7-8-10 Reverse Clutch Assembly Applied

The 1-2-3-4-6-7-8-10 reverse clutch is applied and holds the Direct Overdrive Carrier (67).

6. Direct Overdrive Sun Gear Driving

The direct overdrive sun gear which is splined to the direct overdrive sun gear shaft (65) is driving the direct overdrive carrier pinion gears.

7. Direct Overdrive Carrier Held

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The direct overdrive carrier (67) is held by the 1-2-3-4-6-7-8-10 reverse clutch while the direct overdrive carrier pinion gears drive the Direct Overdrive Internal Gear (551).

8. Direct Overdrive Internal Gear Driven

The direct overdrive internal gear (551) which is splined to the output sun gear (572) is driven by the direct overdrive carrier pinion gears.

9. Output Sun Gear Driving

The output sun gear (572) is driving the output carrier (38) pinion gears.

10. Output Carrier Internal Gear Held

The output carrier internal gear (74) is splined to the output carrier internal gear transfer shell (71) which is held by the 4-5-6-7-8-9-10 reverse clutch assembly (521-535).

11. 1-2-8-9-10 Reverse Clutch Assembly Applied

The 1-2-8-9-10 reverse clutch assembly (414-420) is applied and holding the low clutch roller (421) which is splined to the reaction sun gear (572) and held stationary.

12. 1-2-3-4-5-6 Reverse Clutch Assembly Applied

The 1-2-3-4-5-6 reverse clutch assembly (30-35) is applied and holding the reaction internal gear (52) which is held stationary.

13. Output Carrier Driven

The output carrier (38) is driven by the output sun gear (572). Power is transferred to the differential assembly.

Reverse

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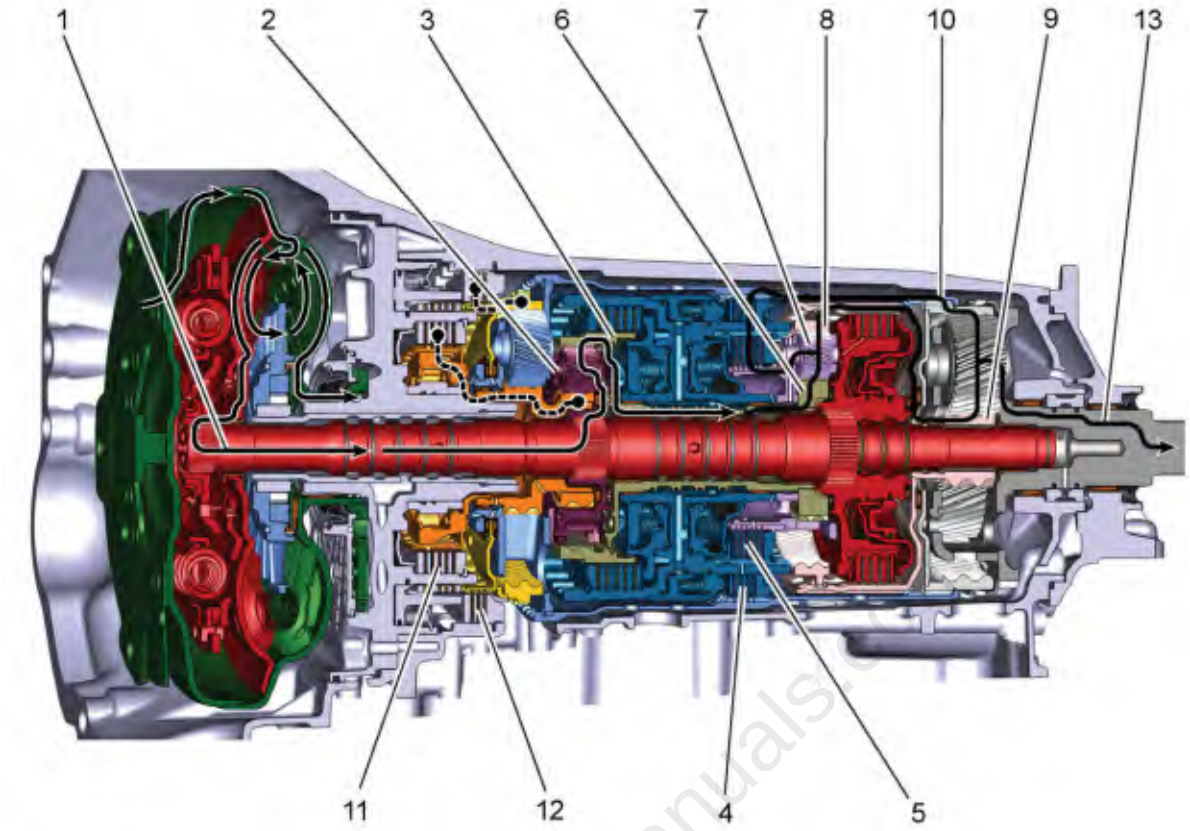


Fig. 3: Identifying Mechanical Powerflow Diagram - Reverse
Courtesy of GENERAL MOTORS COMPANY

REVERSE (HYDRAULIC CIRCUITS)

When the gear selector is moved to the Reverse (R) position (from the Park position) the shift solenoid D and F are commanded ON, and the following changes occur in the transmission's hydraulic and electrical systems:

Fluid Pressure Directed in Preparation for a Power Loss Situation

Default Disable Solenoid

The default disable solenoid is energized on allowing ON/OFF SIGNAL (19) fluid to enter the FEED LIMIT - LOW (15) fluid circuit. FEED LIMIT - LOW (15) fluid is directed to the default disable valve, feed limit valve - low, ball check valve # 1 and ball check valve # 2. The default solenoid controls the default disable valve, which controls the system to pressurize clutches through their exhaust ports to hold either gear in a power loss situation. Default disable solenoid has to be on to keep out of default. Default in Reverse gives Reverse, while default in Drive gives 7th gear initially. The vehicle will restart in 2nd gear after a key cycle or a Drive-Reverse-Drive state change, as determined by the Drive Select valve's latch state. Drive and reverse oils are controlled by a manual shaft. There needs to be a minimum of 450 kpa line pressure to result in a gear under default. This is due to the spring pressure of the default disable valve.

Feed Limit Valves

The boost ball system uses two additional pressure circuits called FEED LIMIT - LOW (15) and FEED LIMIT - HIGH (16). These circuits control the pressure at which the circuit boosts to line pressure. The FEED LIMIT - LOW (15) circuit controls the boost balls for clutches 1-2-3-4-5-6 R and 1-2-8-9-10 R, while the FEED LIMIT - HIGH (16) circuit is used for clutches 2-3-4-5-7-9-10 and 1-2-3-4-6-7-8-10 R. The following is the range on feed

limit pressures at which boost can happen. FEED LIMIT - LOW (15) boost range is a minimum of 660 to a maximum of 825 kpa. FEED LIMIT - HIGH (16) boost range is a minimum of 1000 to a maximum of 1252 kpa.

ETRS Valve

The default disable solenoid is pressurized and moves the ETRS Mode Valve, whose position is read by a switch. This allows line pressure to feed Out of Park oil which shifts over the Park Servo valve, and its position is recorded with two position switches.

Park Servo Valve

The Park Servo valve is held in the out of park position by the Park Inhibit Solenoid. The park inhibit solenoid is only designed to hold the trans out of park against the park servo spring, so any pressure at the return to park end of the servo can cause the park inhibit solenoid to be overcome.

1-2-3-4-6-7-8-10 Reverse Clutch Applies

1-2-3-4-6-7-8-10 Reverse Clutch Regulator Valve

Shift solenoid valve D is energized and applying pressure against the 1-2-3-4-6-7-8-10 reverse clutch regulator valve allowing LINE (2) fluid to enter the 1234678-10R CLUTCH (30) fluid circuit. 1234678-10R CLUTCH (30) fluid is also directed through orifice #21 into the 1234678-10R CLUTCH FEEDBACK (31) fluid passage to the 1-2-3-4-6-7-8-10 reverse clutch regulator valve.

1-2-3-4-6-7-8-10 Reverse Clutch Assembly

1234678-10R CLUTCH (30) fluid is directed through orifice # 24 into the 1-2-3-4-6-7-8-10 reverse clutch assembly. 1234678-10R CLUTCH (30) fluid moves the piston against spring force to apply holding of the 1-2-3-4-6-7-8-10 reverse clutch plates.

4-5-6-7-8-9-10 Reverse Clutch Applies

4-5-6-7-8-9-10 Reverse Clutch Regulator Valve

Shift solenoid valve F is energized and applying pressure against the 4-5-6-7-8-9-10 reverse clutch regulator valve allowing 456789-10R (20) fluid to enter the 456789-10R CLUTCH (36) fluid circuit. 456789-10R CLUTCH (36) fluid is directed to the 4-5-6-7-8-9-10 reverse clutch assembly. 456789-10R CLUTCH (36) fluid is also directed through orifice #31 into the 456789-10R CLUTCH FEEDBACK (37) fluid passage to the #4 ball check valve which seats against the FEED LIMIT - HIGH (16) fluid passage.

4-5-6-7-8-9-10 Reverse Clutch Assembly

456789-10R CLUTCH (36) fluid is directed through orifice # 34 into the 4-5-6-7-8-9-10 reverse clutch assembly. 456789-10R CLUTCH (36) fluid moves the piston against spring force to apply holding of the 4-5-6-7-8-9-10 reverse clutch plates.

Reverse

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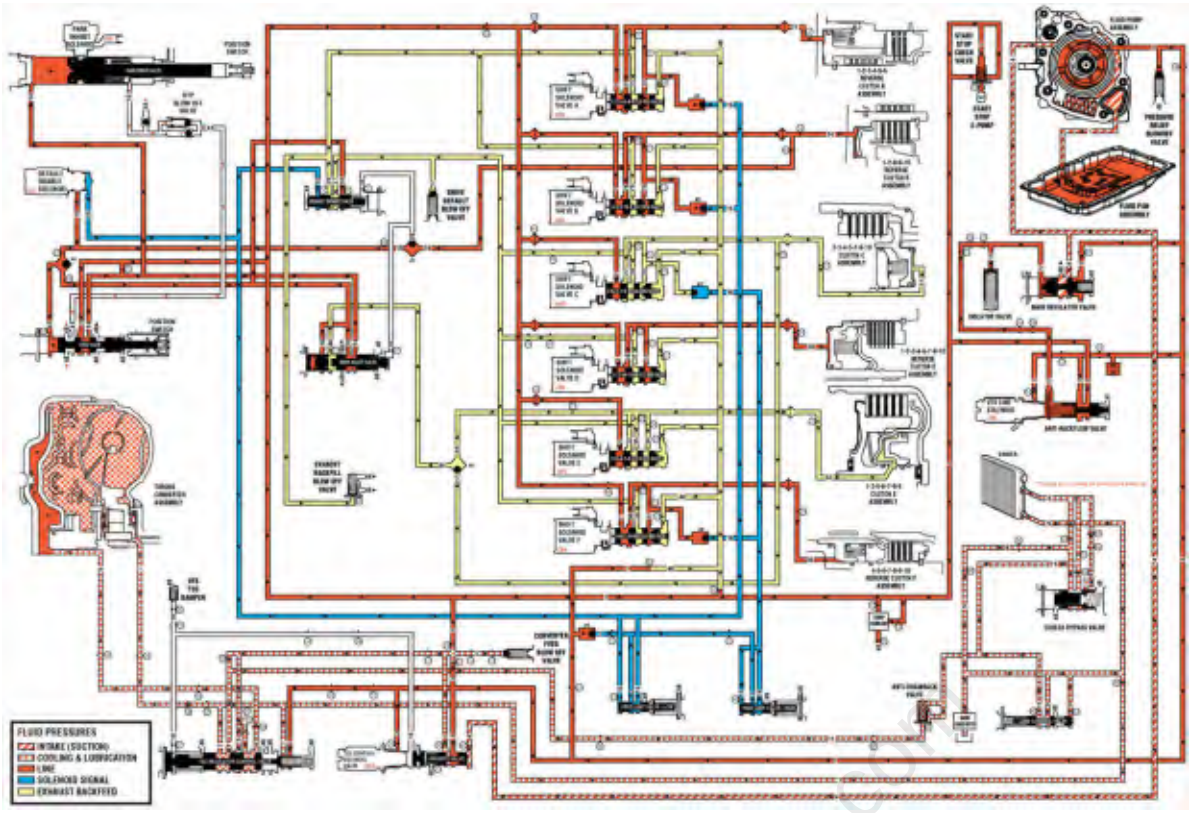


Fig. 4: Identifying Reverse - Hydraulic Flow Diagram
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Suction
2	Line
3	Pump Out
4	Decrease
5	Converter Feed
6	TCC Release
7	TCC Apply
8	Cooler Feed
9	Lube
10	VFS-TCC
11	Converter Return
12	VFS Line
13	Park On
14	Park Off
15	Feed Limit - Low
16	Feed Limit - High
17	Drive Default
18	Drive Latch
19	ON/OFF Signal
20	On/Off 1289-10 Reverse Clutch
21	123456 Reverse Clutch
22	123456 Reverse Clutch Feedback
23	123456 Reverse Clutch Exhaust
24	1289-10 Reverse Clutch
25	1289-10 Reverse Clutch Feedback
26	1289-10 Reverse Clutch Exhaust

Callout	Component Name
27	234579-10 Clutch
28	234579-10 Clutch Feedback
29	234579-10 Clutch Exhaust
30	1234678-10 Reverse Clutch
31	1234678-10 Reverse Clutch Feedback
32	1234678-10 Reverse Clutch Exhaust
33	1356789 Clutch
34	1356789 Clutch Feedback
35	1356789 Clutch Exhaust
36	456789-10 Reverse Clutch
37	456789-10 Reverse Clutch Feedback
38	456789-10 Reverse Clutch Exhaust
39	Exhaust Backfill
40	Exhaust
41	Return to Park
42	On/Off Drive Latch
44	234579-10/1356789 CLUTCH

NEUTRAL - ENGINE RUNNING (MECHANICAL POWERFLOW)

Note: The component callouts in the text refer to the component callout numbers in disassembled views. Disassembled Views (2WD) , or Disassembled Views (AWD)

When the gear selector lever is placed in the Neutral (N) position, mechanical power flow is identical to Park (P) range, except that the park pawl actuator (602) is disengaged. The park pawl spring (613) releases the park pawl (614) from the lugs on the output carrier (38). With the park pawl disengaged, the output carrier is free to rotate allowing the vehicle to roll.

1. Power from Torque Converter

The power flows through the turbine shaft (568) into the output sun gear (70). Powerflow continues through the input carrier (62) which drives the direct overdrive sun gear shaft (65) and direct overdrive sun gear (68). The direct overdrive sun gear drives the direct overdrive carrier (67) pinion gears.

2. 1-2-3-4-6-7-8-10 Reverse Clutch Assembly

The 1-2-3-4-6-7-8-10 reverse clutch is applied and is driven by the direct overdrive carrier (67) pinion gears.

3. Powerflow Terminated

The turbine shaft (568), output sun gear (70), input carrier (62), direct overdrive sun gear shaft (65), direct overdrive sun gear (68), direct overdrive carrier (67) and triple clutch housing (66) rotate freely, powerflow is terminated.

4. 1-2-8-9-10 Reverse Clutch Assembly Applied

The 1-2-8-9-10 reverse clutch is applied in Park in preparation for a shift into either 1st or Reverse. This aids shift timing as only one clutch will need to be applied to achieve either range. The 10 Speed RWD is designed to have four components applied for each gear range, Also in each forward range, the design includes that only one component will need to be applied as another component releases.

5. 1-2-3-4-5-6 Reverse Clutch Assembly Applied

The 1-2-3-4-5-6 reverse clutch is applied in Park in preparation for a shift into either 1st or Reverse. This aids shift timing as only one clutch will need to be applied to achieve either range. The 10 Speed RWD is designed to

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have four components applied for each gear range, Also in each forward range, the design includes that only one component will need to be applied as another component releases.

6. Output Carrier Held

The output carrier (38) is held by torque transmitted from the wheels.

7. Direct Overdrive Internal Gear Held

The direct overdrive internal gear (551) which is splined to the output sun gear (572) is held by the direct overdrive carrier pinion gears.

Neutral - Engine Running

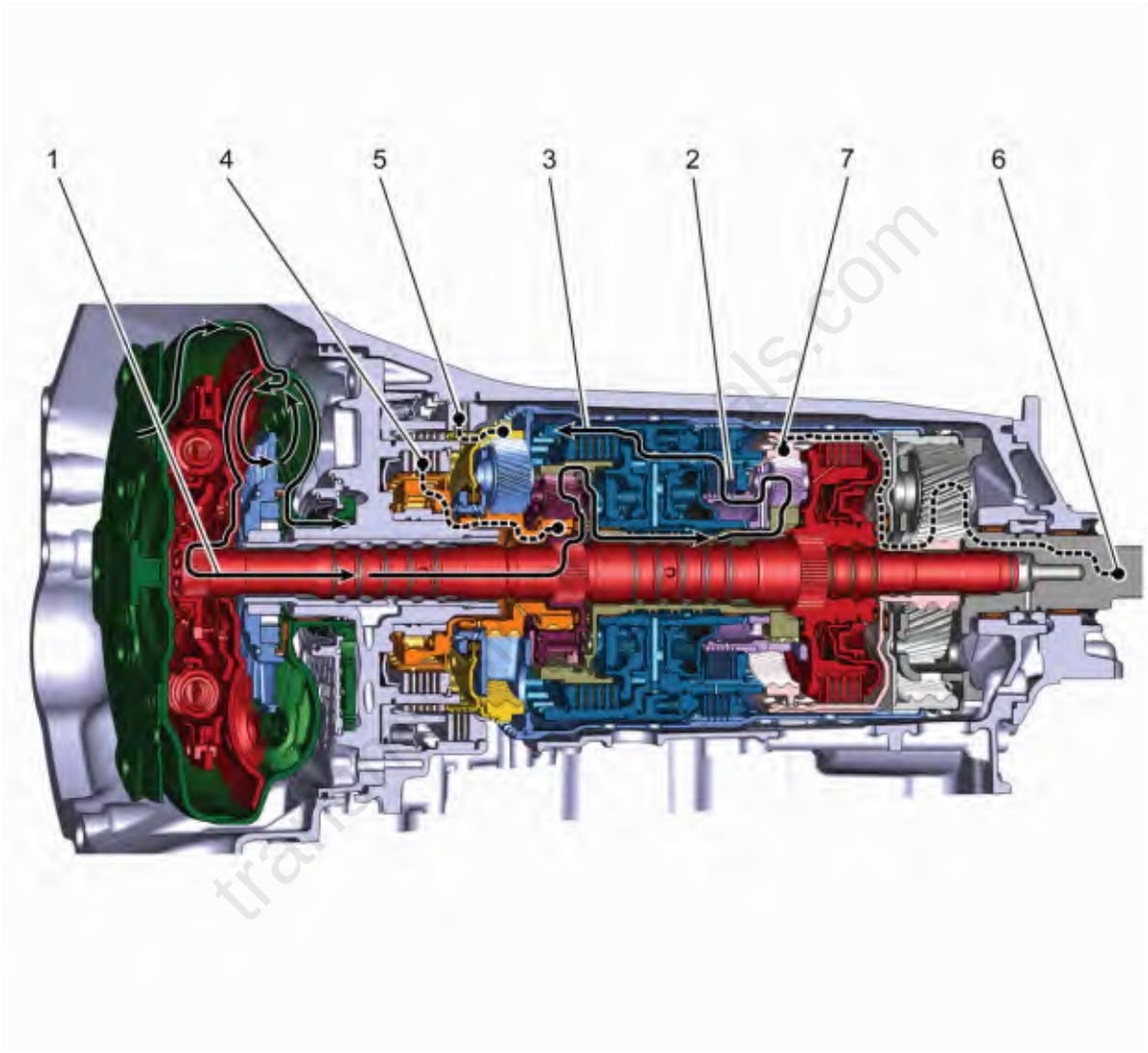


Fig. 5: Neutral - Engine Running Mechanical Powerflow Diagram
Courtesy of GENERAL MOTORS COMPANY

NEUTRAL - ENGINE RUNNING (HYDRAULIC CIRCUITS)

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), Shift solenoid valve F is commanded OFF and thus the following changes would occur in the hydraulic system:

4-5-6-7-8-9-10 Reverse Clutch Releases

4-5-6-7-8-9-10 Reverse Clutch Regulator Valve

Shift solenoid valve F is signaled off allowing 456789-10R CLUTCH (36) fluid to exhaust through orifice # 30 and into the 456789-10R CLUTCH EXHAUST (38) fluid circuit. 456789-10R CLUTCH EXHAUST (38) fluid is directed to the exhaust backfill blow off valve through the EXHAUST BACKFILL (39) fluid circuit.

Neutral

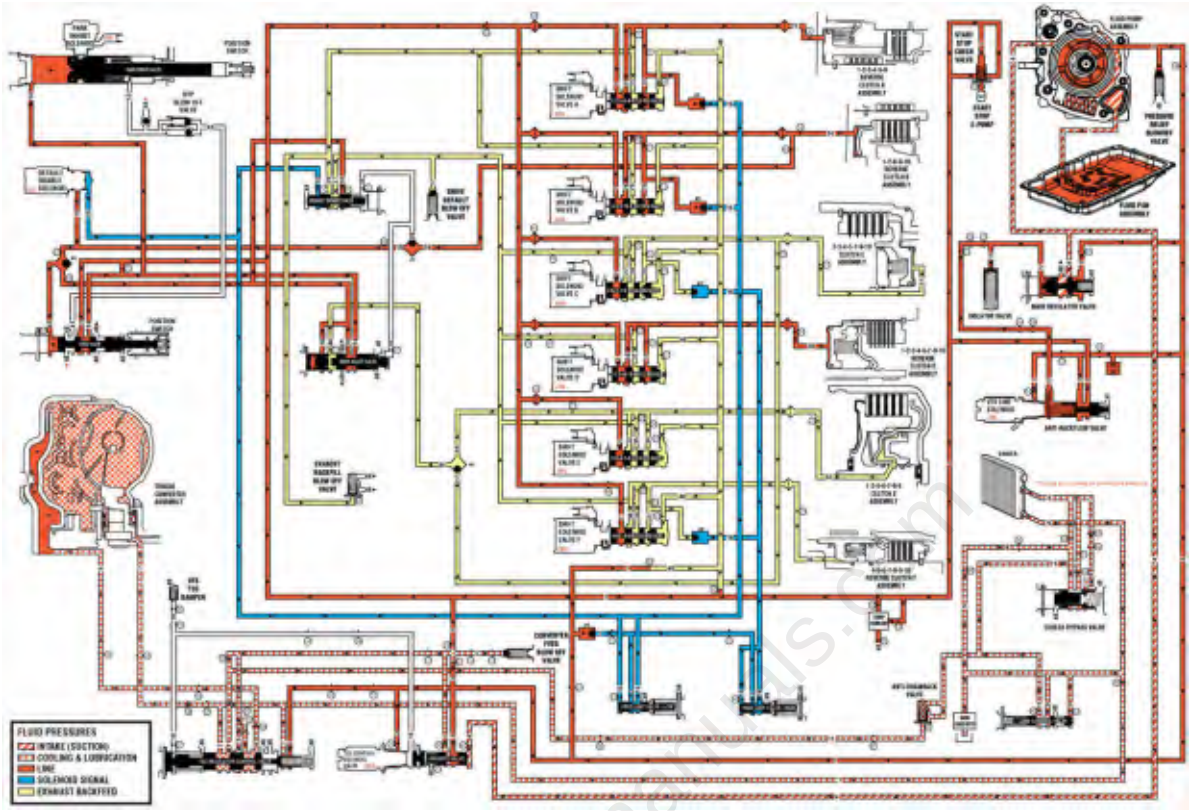


Fig. 6: Identifying Neutral - Hydraulic Flow Diagram
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Suction
2	Line
3	Pump Out
4	Decrease
5	Converter Feed
6	TCC Release
7	TCC Apply
8	Cooler Feed
9	Lube
10	VFS-TCC
11	Converter Return
12	VFS Line
13	Park On
14	Park Off
15	Feed Limit - Low
16	Feed Limit - High
17	Drive Default
18	Drive Latch
19	ON/OFF Signal
20	On/Off 1289-10 Reverse Clutch
21	123456 Reverse Clutch

Callout	Component Name
22	123456 Reverse Clutch Feedback
23	123456 Reverse Clutch Exhaust
24	1289-10 Reverse Clutch
25	1289-10 Reverse Clutch Feedback
26	1289-10 Reverse Clutch Exhaust
27	234579-10 Clutch
28	234579-10 Clutch Feedback
29	234579-10 Clutch Exhaust
30	1234678-10 Reverse Clutch
31	1234678-10 Reverse Clutch Feedback
32	1234678-10 Reverse Clutch Exhaust
33	1356789 Clutch
34	1356789 Clutch Feedback
35	1356789 Clutch Exhaust
36	456789-10 Reverse Clutch
37	456789-10 Reverse Clutch Feedback
38	456789-10 Reverse Clutch Exhaust
39	Exhaust Backfill
40	Exhaust
41	Return to Park
42	On/Off Drive Latch
44	234579-10/1356789 CLUTCH

DRIVE RANGE, FIRST GEAR (MECHANICAL POWERFLOW)

Note: The component callouts in the text refer to the component callout numbers in disassembled views. **Disassembled Views (2WD)** , or **Disassembled Views (AWD)**

In Drive Range (D) 1st gear, torque from the engine is multiplied through the torque converter and transmission gearsets to the vehicle's drive shaft. The planetary gears operate in reduction to achieve a 1st gear starting ratio of approximately 4.696:1. The manual shift shaft (611) and the automatic transmission manual shift shaft position switch (606) are in the Drive position. As vehicle speed increases, less torque multiplication is needed for maximum efficiency. Therefore, it is desirable to shift the transmission to a lower gear ratio, or 2nd gear.

1. Power from Torque Converter

The power flows through the turbine shaft to the 1-3-5-6-7-8-9 clutch assembly (554-565).

2. 1-3-5-6-7-8-9 Clutch Assembly Applied

The 1-3-5-6-7-8-9 clutch assembly (554-565) is applied and holds the output sun gear (572).

3. Output Sun Gear Driving

The output sun gear (572) is driving the output carrier (38) pinion gears.

4. Input Carrier Driving

The power flows to the input carrier (62) which is splined to the turbine shaft (568) and rotates at the same speed and direction. Power flow continues through the input carrier pinion gears which are driving the direct overdrive sun gear shaft (65).

5. Direct Overdrive Sun Gear Shaft Driven

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The input internal gear (500) which is splined to the direct overdrive sun gear shaft (65) and rotates at the same speed and direction is driven by the input carrier (62) pinion gears.

6. Direct Overdrive Sun Gear Driving

The direct overdrive sun gear (68) which is splined to the direct overdrive sun gear shaft (65) is driving the direct overdrive carrier (67) pinion gears.

7. Direct Overdrive Carrier Driven

The direct overdrive carrier (67) is driven by the direct overdrive sun gear (68).

8. 1-2-3-4-6-7-8-10 Reverse Clutch Assembly Applied

The 1-2-3-4-6-7-8-10 reverse clutch is applied, but not with line pressure. It only has enough pressure to prevent the 1-2-3-4-6-7-8-10 Reverse Clutch from slip. The 1-2-3-4-6-7-8-10 reverse clutch which is part of the triple clutch housing (66) is applied and holding the direct overdrive carrier (67) which is driven by the direct overdrive sun gear (68).

9. Direct Overdrive Internal Gear Driven

The direct overdrive internal gear (551) which is splined to the output sun gear (572) is driven by the direct overdrive carrier (67) pinion gears.

10. Output Carrier Driven

Powerflow continues through the output sun gear (572). Which drives the output carrier (38) pinions to achieve the 1st gear starting ratio of approximately 4.696:1.

11. Low Clutch Roller Holding

The power transferred to the input carrier (62) by the output carrier pinion gears attempts to rotate the carrier, but the carrier is held stationary by the low clutch roller (421) during engine braking.

12. 1-2-8-9-10 Reverse Clutch Assembly Applied

The 1-2-8-9-10 reverse clutch assembly (414-420) is applied and holding the low clutch roller (421) which is splined to the reaction sun gear (572) and held stationary.

13. 1-2-3-4-5-6 Reverse Clutch Assembly Applied

The 1-2-3-4-5-6 reverse clutch assembly (30-35) is applied and holding the reaction internal gear (52) which is held stationary.

Drive Range First Gear

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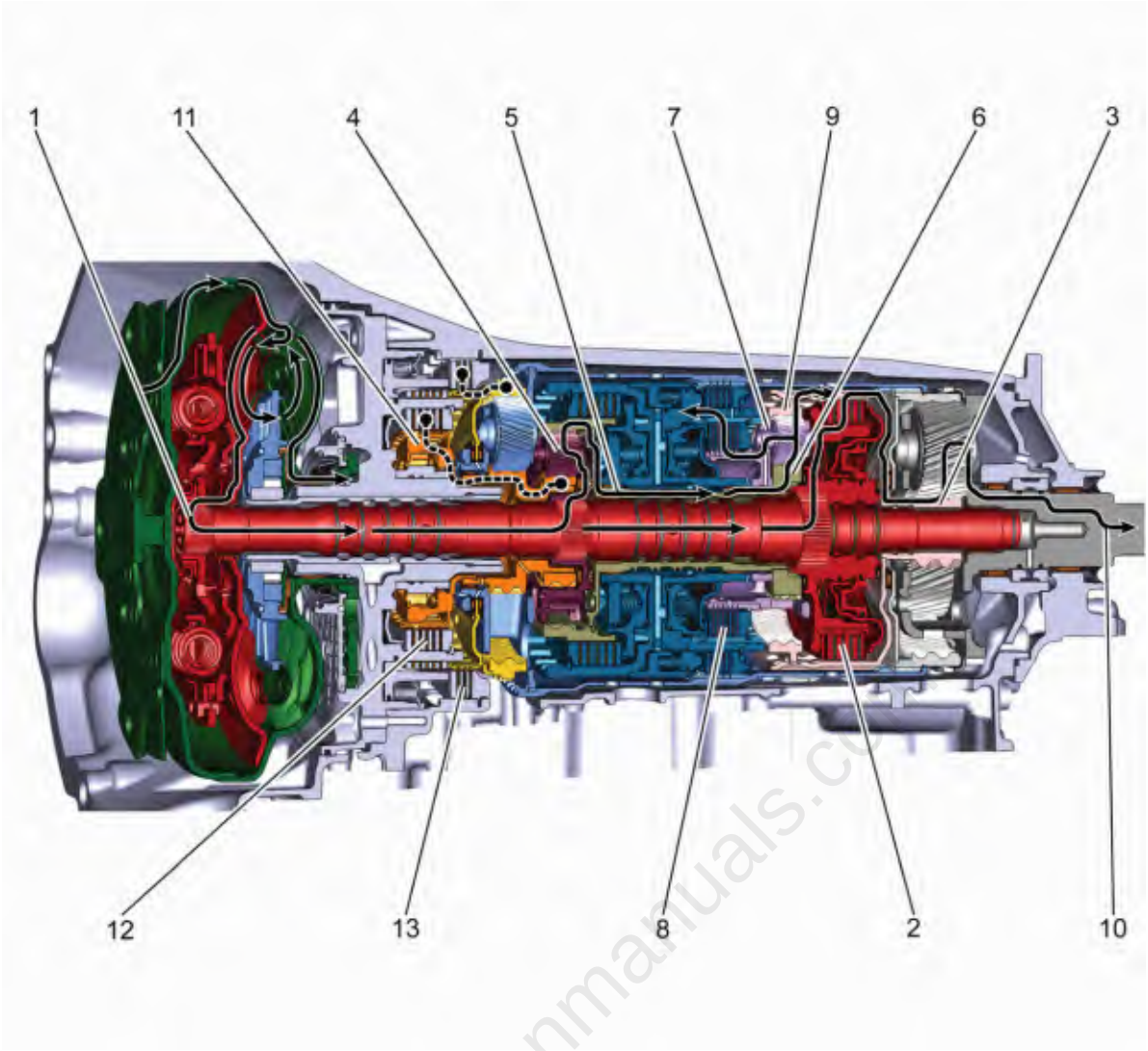


Fig. 7: Drive Range, First Gear Mechanical Powerflow Diagram
Courtesy of GENERAL MOTORS COMPANY

DRIVE RANGE, FIRST GEAR (HYDRAULIC CIRCUITS)

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 energize or turn on. Shift solenoid valve E is commanded ON. Shift solenoid valve D is already on and commanded for low pressure.

1-3-5-6-7-8-9 Clutch Applies

1-3-5-6-7-8-9 Clutch Regulator Valve

Shift solenoid valve E is energized and applying pressure against the 1-3-5-6-7-8-9 clutch regulator valve allowing LINE (2) fluid to enter the 1356789 CLUTCH (33) fluid circuit. 1356789 CLUTCH (33) fluid is directed to the 1-3-5-6-7-8-9 clutch assembly.

1-3-5-6-7-8-9 Clutch Assembly

1356789 CLUTCH (33) fluid is directed through orifice # 29 into the 1-3-5-6-7-8-9 clutch assembly. 1356789 CLUTCH (33) fluid moves the piston against spring force to apply holding of the 1-3-5-6-7-8-9 clutch plates.

1-2-3-4-6-7-8-10 Reverse Clutch Applied

1-2-3-4-6-7-8-10 Reverse Clutch Regulator Valve

Shift solenoid valve D is energized and applying low pressure against the 1-2-3-4-6-7-8-10 reverse clutch regulator valve allowing LINE (2) fluid to enter the 1234678-10R CLUTCH (30) fluid circuit. 1234678-10R CLUTCH (30) fluid is also directed through orifice #21 into the 1234678-10R CLUTCH FEEDBACK (31) fluid passage to the 1-2-3-4-6-7-8-10 reverse clutch regulator valve.

1-2-3-4-6-7-8-10 Reverse Clutch Assembly

1234678-10R CLUTCH (3o) fluid is directed through orifice # 24 into the 1-2-3-4-6-7-8-10 reverse clutch assembly but not with line pressure. It only has enough pressure to prevent the 1-2-3-4-6-7-8-10 Reverse Clutch from slip.

Drive Range, First Gear

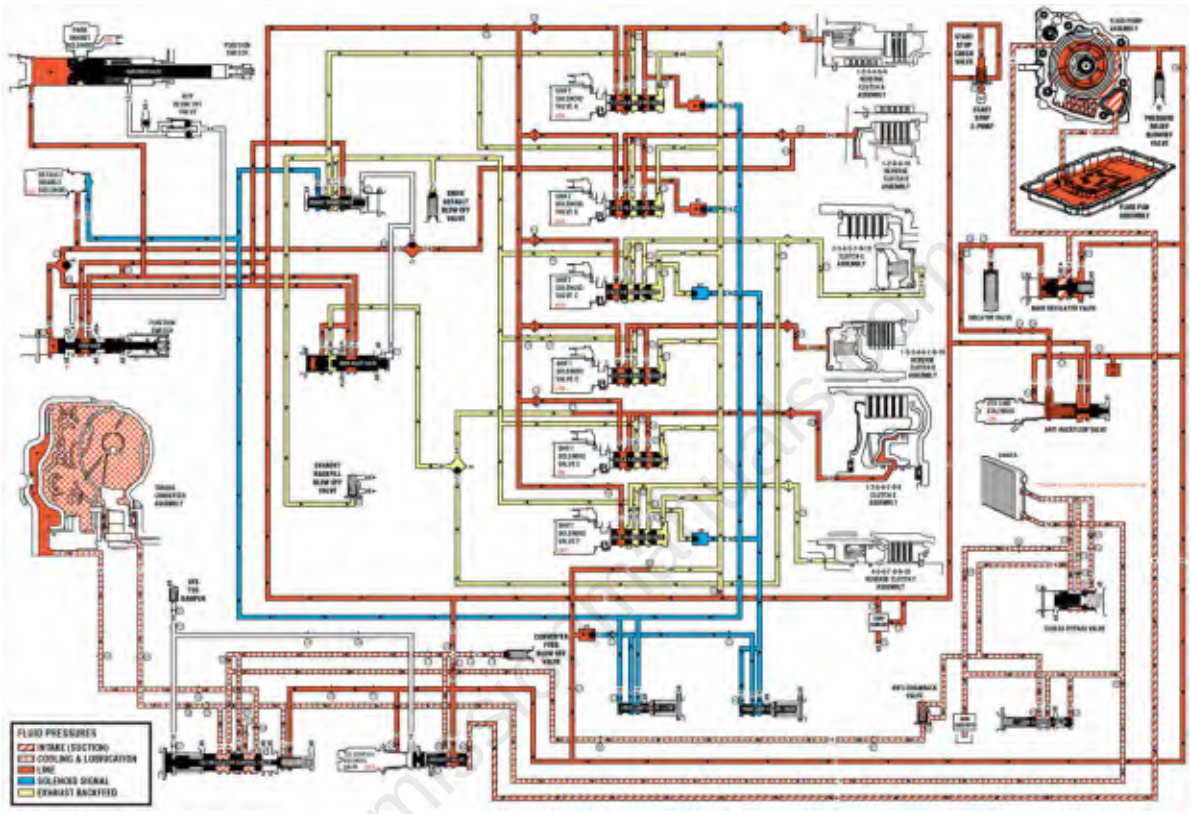


Fig. 8: Identifying Drive Range, First Gear - Hydraulic Flow Diagram
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Suction
2	Line
3	Pump Out
4	Decrease
5	Converter Feed
6	TCC Release
7	TCC Apply
8	Cooler Feed
9	Lube
10	VFS-TCC
11	Converter Return
12	VFS Line
13	Park On
14	Park Off
15	Feed Limit - Low
16	Feed Limit - High

Callout	Component Name
17	Drive Default
18	Drive Latch
19	ON/OFF Signal
20	On/Off 1289-10 Reverse Clutch
21	123456 Reverse Clutch
22	123456 Reverse Clutch Feedback
23	123456 Reverse Clutch Exhaust
24	1289-10 Reverse Clutch
25	1289-10 Reverse Clutch Feedback
26	1289-10 Reverse Clutch Exhaust
27	234579-10 Clutch
28	234579-10 Clutch Feedback
29	234579-10 Clutch Exhaust
30	1234678-10 Reverse Clutch
31	1234678-10 Reverse Clutch Feedback
32	1234678-10 Reverse Clutch Exhaust
33	1356789 Clutch
34	1356789 Clutch Feedback
35	1356789 Clutch Exhaust
36	456789-10 Reverse Clutch
37	456789-10 Reverse Clutch Feedback
38	456789-10 Reverse Clutch Exhaust
39	Exhaust Backfill
40	Exhaust
41	Return to Park
42	On/Off Drive Latch
44	234579-10/1356789 Clutch

DRIVE RANGE, SECOND GEAR (MECHANICAL POWERFLOW)

Note: The component callouts in the text refer to the component callout numbers in disassembled views. **Disassembled Views (2WD)** , or **Disassembled Views (AWD)**

As vehicle speed increases, input signals from the transmission speed sensors (input and output), throttle position (TP) sensor, and other vehicle sensors are sent to the transmission control module (TCM). The TCM processes this information to determine the precise moment to shift the transmission. In 2nd gear, the planetary gearset continues to operate in reduction at a gear ratio of approximately 2.985:1. As vehicle speed increases, less torque multiplication is needed to move the vehicle efficiently. Therefore, it is desirable to shift the transmission to a lower gear ratio, or 3rd gear.

1. Power from Torque Converter

The power flows through the turbine shaft to the input carrier (62) which is splined to the turbine shaft (568) and rotates at the same speed and direction.

2. Input Carrier Driving

The power flows to the input carrier (62) which is splined to the turbine shaft (568) and rotates at the same speed and direction. Power flow continues through the input carrier pinion gears which are driving the direct overdrive sun gear shaft (65).

3. Direct Overdrive Sun Gear Shaft Driven

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The input internal gear (500) which is splined to the direct overdrive sun gear shaft (65) and rotates at the same speed and direction is driven by the input carrier (62) pinion gears.

4. 2-3-4-5-7-9-10 Clutch Assembly Applied

The 2-3-4-5-7-9-10 clutch which is part of the triple clutch housing (66) is applied and holding the input internal gear (500) which is splined to the direct overdrive sun gear shaft (65) and rotates at the same speed and direction.

5. 1-2-3-4-6-7-8-10 Reverse Clutch Assembly Applied

The 1-2-3-4-6-7-8-10 reverse clutch which is part of the triple clutch housing (66) is applied and holding the direct overdrive carrier (67) and rotates at the same speed and direction.

6. Direct Overdrive Carrier

The direct overdrive carrier (67) is held by the 1-2-3-4-6-7-8-10 reverse clutch which is part of the triple clutch housing (66). The direct overdrive carrier rotates at the same speed and direction as the triple clutch housing (66) and the direct overdrive sun gear (68).

7. Direct Overdrive Sun Gear Driving

The direct overdrive sun gear (68) which is splined to the direct overdrive sun gear shaft (65) rotates at the same speed and direction as the triple clutch housing (66) and the direct overdrive carrier (67).

8. Direct Overdrive Internal Gear Driven

The direct overdrive internal gear (551) which is splined to the output sun gear (572) is driven by the direct overdrive carrier (67) at the same speed and direction.

9. Output Sun Gear Driving

The output sun gear (572) is driving the output carrier (38) pinion gears.

10. Output Carrier Driven

Powerflow continues through the output sun gear (572). Which drives the output carrier (38) pinions to achieve the 2nd gear starting ratio of approximately 2.985:1.

11. Low Clutch Roller Holding

The power transferred to the input carrier (62) by the output carrier pinion gears attempts to rotate the carrier, but the carrier is held stationary by the low clutch roller (421) during engine braking.

12. 1-2-8-9-10 Reverse Clutch Assembly Applied

The 1-2-8-9-10 reverse clutch assembly (414-420) is applied and holding the low clutch roller (421) which is splined to the reaction sun gear (572) and held stationary.

13. 1-2-3-4-5-6 Reverse Clutch Assembly Applied

The 1-2-3-4-5-6 reverse clutch assembly (30-35) is applied and holding the reaction internal gear (52) which is held stationary.

Drive Range Second Gear

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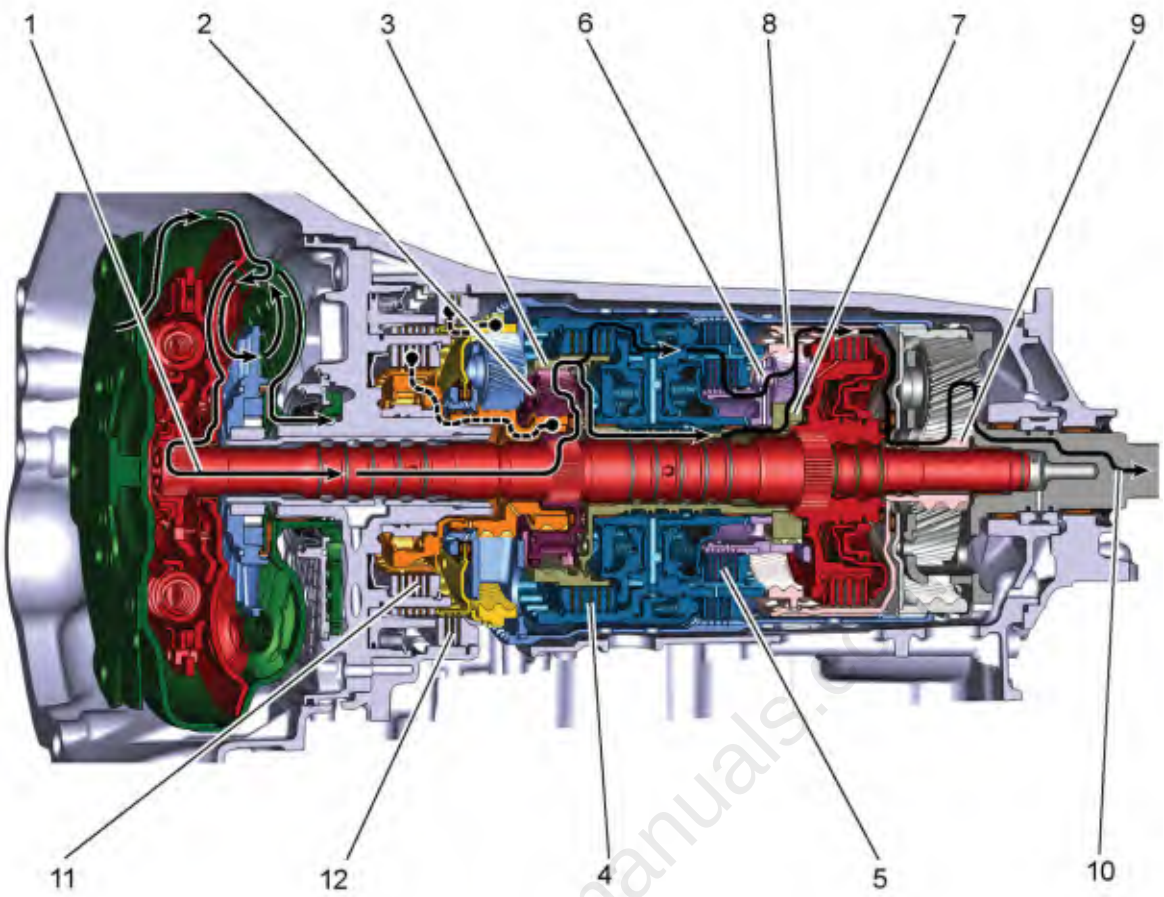


Fig. 9: Drive Range Mechanical Powerflow Diagram - Second Gear
Courtesy of GENERAL MOTORS COMPANY

DRIVE RANGE, SECOND GEAR (HYDRAULIC CIRCUITS)

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 energize or turn on. Shift solenoid valve C is commanded ON and Shift solenoid valve E is commanded OFF.

2-3-4-5-7-9-10 Clutch Applies

2-3-4-5-7-9-10 Clutch Regulator Valve

Shift solenoid valve C is energized and applying pressure against the 2-3-4-5-7-9-10 clutch regulator valve allowing LINE (2) fluid to enter the 234579-10 CLUTCH (27) fluid circuit. 234579-10 CLUTCH (27) fluid is directed to the 2-3-4-5-7-9-10 clutch assembly. Fluid is also directed through orifice #70 to the #6 check ball valve.

2-3-4-5-7-9-10 Clutch Assembly

234579-10 CLUTCH (27) fluid is directed through orifice # 19 into the 2-3-4-5-7-9-10 clutch assembly. 234579-10 CLUTCH (27) fluid moves the piston against spring force to apply holding of the 2-3-4-5-7-9-10 clutch plates.

1-3-5-6-7-8-9 Clutch Releases

1-3-5-6-7-8-9 Clutch Regulator Valve

Shift solenoid valve E is signaled off allowing 1356789 CLUTCH (33) fluid to exhaust through orifice # 29 and # 25 to the 1356789 CLUTCH EXHAUST (35) fluid circuit. 1356789 CLUTCH EXHAUST (35) fluid is directed to the DRIVE DEFAULT (17) fluid circuit to the exhaust backfill blow off valve through the EXHAUST BACKFILL (39) fluid circuit.

Drive Range, Second Gear

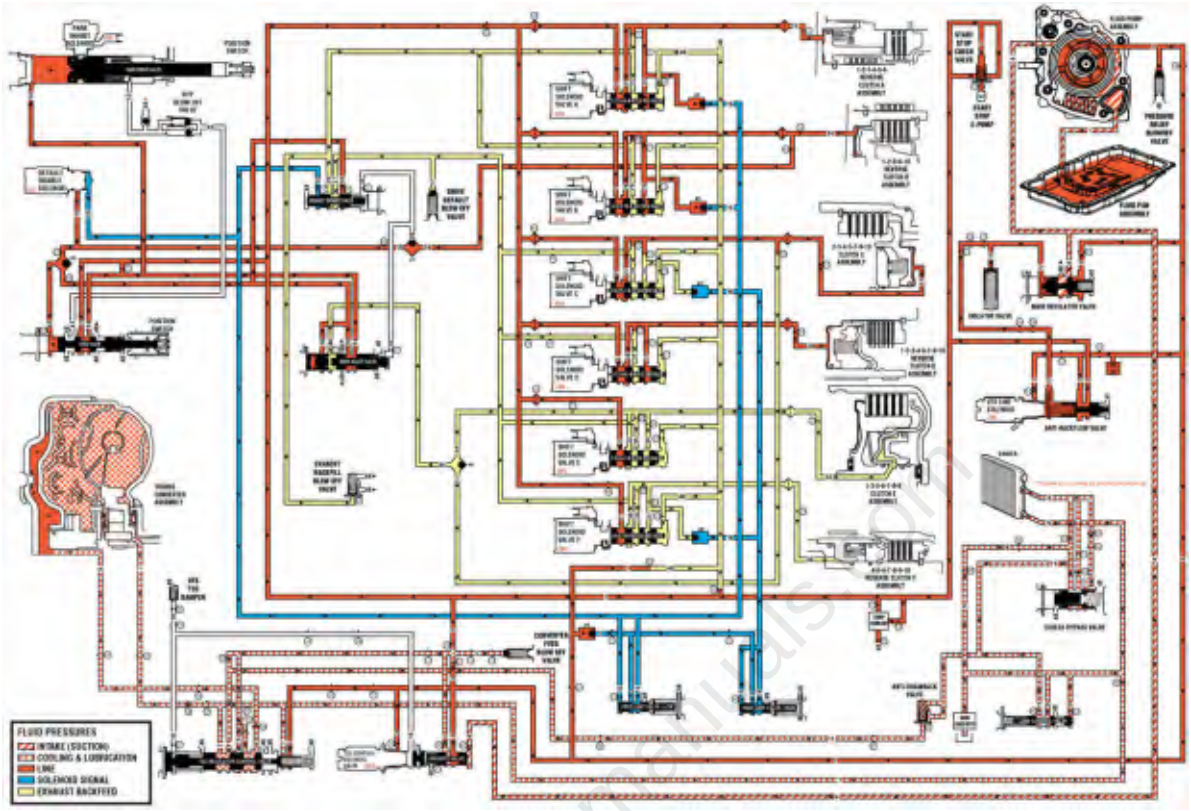


Fig. 10: Identifying Drive Range, Second Gear - Hydraulic Flow Diagram
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Suction
2	Line
3	Pump Out
4	Decrease
5	Converter Feed
6	TCC Release
7	TCC Apply
8	Cooler Feed
9	Lube
10	VFS-TCC
11	Converter Return
12	VFS Line
13	Park On
14	Park Off
15	Feed Limit - Low
16	Feed Limit - High
17	Drive Default
18	Drive Latch
19	ON/OFF Signal
20	On/Off 1289-10 Reverse Clutch

Callout	Component Name
21	123456 Reverse Clutch
22	123456 Reverse Clutch Feedback
23	123456 Reverse Clutch Exhaust
24	1289-10 Reverse Clutch
25	1289-10 Reverse Clutch Feedback
26	1289-10 Reverse Clutch Exhaust
27	234579-10 Clutch
28	234579-10 Clutch Feedback
29	234579-10 Clutch Exhaust
30	1234678-10 Reverse Clutch
31	1234678-10 Reverse Clutch Feedback
32	1234678-10 Reverse Clutch Exhaust
33	1356789 Clutch
34	1356789 Clutch Feedback
35	1356789 Clutch Exhaust
36	456789-10 Reverse Clutch
37	456789-10 Reverse Clutch Feedback
38	456789-10 Reverse Clutch Exhaust
39	Exhaust Backfill
40	Exhaust
41	Return to Park
42	On/Off Drive Latch
44	234579-10/1356789 Clutch

DRIVE RANGE, THIRD GEAR (MECHANICAL POWERFLOW)

Note: The component callouts in the text refer to the component callout numbers in disassembled views. **Disassembled Views (2WD)** , or **Disassembled Views (AWD)**

As vehicle speed increases, input signals from the transmission speed sensors (input and output), throttle position (TP) sensor, and other vehicle sensors are sent to the transmission control module (TCM). The TCM processes this information to determine the precise moment to shift the transmission. In 3rd gear, the planetary gearset continues to operate in reduction at a gear ratio of approximately 2.156:1. As vehicle speed increases, less torque multiplication is needed to move the vehicle efficiently. Therefore, it is desirable to shift the transmission to a lower gear ratio, or 4th gear.

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1. Power from Torque Converter

The power flows through the turbine shaft to the input carrier (62) and 1-3-5-6-7-8-9 clutch assembly (554-565) which are both splined to the turbine shaft (568) and rotate at the same speed and direction.

2. 1-3-5-6-7-8-9 Clutch Assembly Applied

The 1-3-5-6-7-8-9 clutch assembly (554-565) is applied and holds the output sun gear (572).

3. Input Carrier Driving

The power flows to the input carrier (62) which is splined to the turbine shaft (568) and rotates at the same speed and direction. Power flow continues through the input carrier pinion gears which are driving the direct overdrive sun gear shaft (65).

4. Direct Overdrive Sun Gear Shaft Driven

The input internal gear (500) which is splined to the direct overdrive sun gear shaft (65) and rotates at the same speed and direction is driven by the input carrier (62) pinion gears.

5. 2-3-4-5-7-9-10 Clutch Assembly Applied

The 2-3-4-5-7-9-10 clutch which is part of the triple clutch housing (66) is applied and holding the input internal gear (500) which is splined to the direct overdrive sun gear shaft (65) and rotates at the same speed and direction.

6. 1-2-3-4-6-7-8-10 Reverse Clutch Assembly Applied

The 1-2-3-4-6-7-8-10 reverse clutch which is part of the triple clutch housing (66) is applied and holding the direct overdrive carrier (67) and rotates at the same speed and direction.

7. Direct Overdrive Carrier

The direct overdrive carrier (67) is held by the 1-2-3-4-6-7-8-10 reverse clutch which is part of the triple clutch housing (66). The direct overdrive carrier rotates at the same speed and direction as the triple clutch housing (66) and the direct overdrive sun gear (68).

8. Direct Overdrive Sun Gear Driving

The direct overdrive sun gear (68) which is splined to the direct overdrive sun gear shaft (65) rotates at the same speed and direction as the triple clutch housing (66) and the direct overdrive carrier (67).

9. Direct Overdrive Internal Gear Driven

The direct overdrive internal gear (551) which is splined to the output sun gear (572) is driven by the direct overdrive carrier (67) at the same speed and direction.

10. Output Sun Gear Driving

The output sun gear (572) is driving the output carrier (38) pinion gears.

11. Output Carrier Driven

Powerflow continues through the output sun gear (572). Which drives the output carrier (38) pinions to achieve the 3rd gear starting ratio of approximately 2.156:1.

12. Low Clutch Roller Overrunning

When the throttle is released the low clutch roller (OWC) (421) will overrun, allowing the vehicle to coast, at least briefly, until the TCM determines that engine braking is required.

13. 1-2-3-4-5-6 Reverse Clutch Assembly Applied

The 1-2-3-4-5-6 reverse clutch assembly (30-35) is applied and holding the reaction internal gear (52).

Drive Range Third Gear

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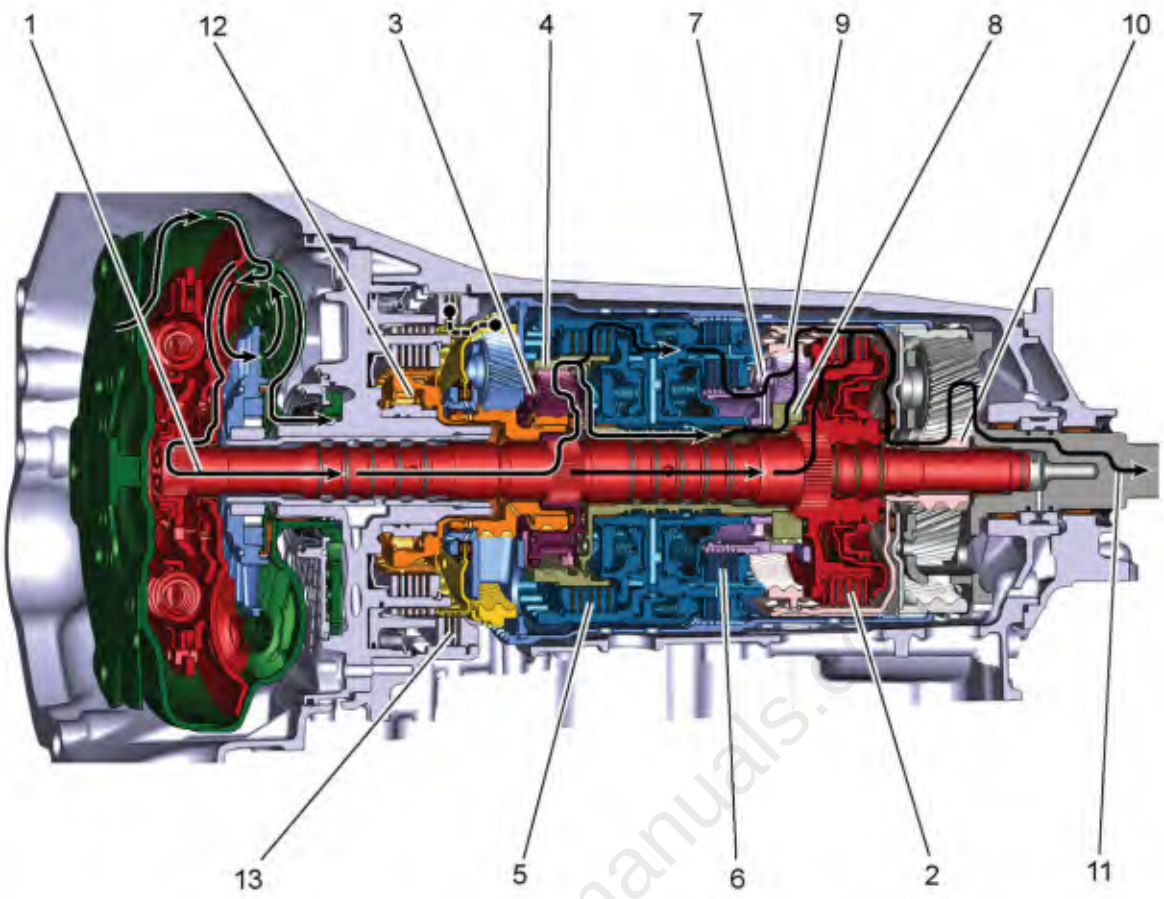


Fig. 11: Drive Range Mechanical Powerflow Diagram - Third Gear
Courtesy of GENERAL MOTORS COMPANY

DRIVE RANGE, THIRD GEAR (HYDRAULIC CIRCUITS)

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 energize or turn on. Shift solenoid valve E is commanded ON and Shift solenoid valve B is commanded OFF.

1-3-5-6-7-8-9 Clutch Applies

1-3-5-6-7-8-9 Clutch Regulator Valve

Shift solenoid valve E is energized and applying pressure against the 1-3-5-6-7-8-9 clutch regulator valve allowing LINE (2) fluid to enter the 1356789 CLUTCH (33) fluid circuit. 1356789 CLUTCH (33) fluid is directed to the 1-3-5-6-7-8-9 clutch assembly.

1-3-5-6-7-8-9 Clutch Assembly

1356789 CLUTCH (33) fluid is directed through orifice # 29 into the 1-3-5-6-7-8-9 clutch assembly. 1356789 CLUTCH (33) fluid moves the piston against spring force to apply holding of the 1-3-5-6-7-8-9 clutch plates.

1-2-8-9-10-R Clutch Releases

1-2-8-9-10-R Clutch Regulator Valve

Shift solenoid valve B is signaled Off allowing 1289-10R CLUTCH (24) fluid to exhaust through orifice # 10 and into the 1289-10R CLUTCH EXHAUST (26) fluid circuit. 1289-10R CLUTCH EXHAUST (26) fluid is directed to the exhaust backfill blow off valve through the EXHAUST BACKFILL (39) fluid circuit.

Drive Range, Third Gear

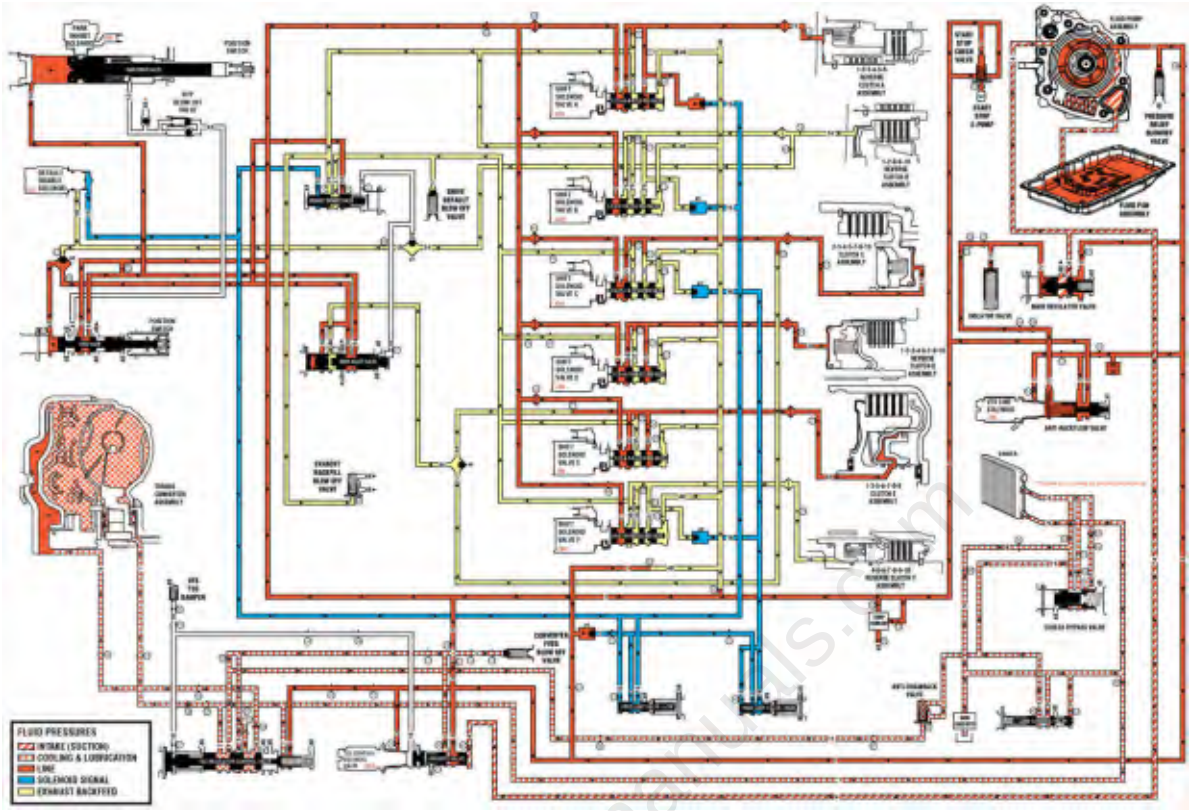


Fig. 12: Identifying Drive Range, Third Gear - Hydraulic Flow Diagram
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Suction
2	Line
3	Pump Out
4	Decrease
5	Converter Feed
6	TCC Release
7	TCC Apply
8	Cooler Feed
9	Lube
10	VFS-TCC
11	Converter Return
12	VFS Line
13	Park On
14	Park Off
15	Feed Limit - Low
16	Feed Limit - High
17	Drive Default
18	Drive Latch
19	ON/OFF Signal
20	On/Off 1289-10 Reverse Clutch
21	123456 Reverse Clutch

Callout	Component Name
22	123456 Reverse Clutch Feedback
23	123456 Reverse Clutch Exhaust
24	1289-10 Reverse Clutch
25	1289-10 Reverse Clutch Feedback
26	1289-10 Reverse Clutch Exhaust
27	234579-10 Clutch
28	234579-10 Clutch Feedback
29	234579-10 Clutch Exhaust
30	1234678-10 Reverse Clutch
31	1234678-10 Reverse Clutch Feedback
32	1234678-10 Reverse Clutch Exhaust
33	1356789 Clutch
34	1356789 Clutch Feedback
35	1356789 Clutch Exhaust
36	456789-10 Reverse Clutch
37	456789-10 Reverse Clutch Feedback
38	456789-10 Reverse Clutch Exhaust
39	Exhaust Backfill
40	Exhaust
41	Return to Park
42	On/Off Drive Latch
44	234579-10/1356789 Clutch

DRIVE RANGE, FOURTH GEAR (MECHANICAL POWERFLOW)

Note: The component callouts in the text refer to the component callout numbers in disassembled views. **Disassembled Views (2WD)** , or **Disassembled Views (AWD)**

As vehicle speed increases, input signals from the transmission speed sensors (input and output), throttle position (TP) sensor, and other vehicle sensors are sent to the transmission control module (TCM). The TCM processes this information to determine the precise moment to shift the transmission. In 4th gear, the planetary gearset continues to operate in reduction at a gear ratio of approximately 1.779:1. As vehicle speed increases, less torque multiplication is needed to move the vehicle efficiently. Therefore, it is desirable to shift the transmission to a lower gear ratio, or 5th gear.

1. Power from Torque Converter

The power flows through the turbine shaft to the input carrier (62) which is splined to the turbine shaft (568) and rotate at the same speed and direction.

2. Input Carrier Driving

The power flows to the input carrier (62) which is splined to the turbine shaft (568) and rotates at the same speed and direction. Power flow continues through the input carrier pinion gears which are driving the direct overdrive sun gear shaft (65).

3. Direct Overdrive Sun Gear Shaft Driven

The input internal gear (500) which is splined to the direct overdrive sun gear shaft (65) and rotates at the same speed and direction is driven by the input carrier (62) pinion gears.

4. 2-3-4-5-7-9-10 Clutch Assembly Applied

The 2-3-4-5-7-9-10 clutch which is part of the triple clutch housing (66) is applied and holding the input internal gear (500) which is splined to the direct overdrive sun gear shaft (65) and rotates at the same speed and direction.

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5. 4-5-6-7-8-9-10 Reverse Clutch Assembly Applied

The 4-5-6-7-8-9-10 reverse clutch which is part of the triple clutch housing (66) is applied and holding the output carrier internal gear transfer shell (71) which is splined to the reaction carrier (55) and the output carrier internal gear (74), both rotate at the same speed and direction.

6. Output Carrier Internal Gear Transfer Shell

The output carrier internal gear transfer shell is held by the 4-5-6-7-8-9-10 reverse clutch which is part of the triple clutch housing (66). The output carrier internal gear transfer shell rotates at the same speed and direction as the triple clutch housing (66) and the direct overdrive sun gear (68).

7. Output Carrier Internal Gear Driving

The output carrier internal gear (74) which is splined to the output carrier internal gear transfer shell (71) is driving the output carrier (38) and rotates at the same speed and direction.

8. 1-2-3-4-6-7-8-10 Reverse Clutch Assembly Applied

The 1-2-3-4-6-7-8-10 reverse clutch which is part of the triple clutch housing (66) is applied and holding the direct overdrive carrier (67) and rotates at the same speed and direction.

9. Direct Overdrive Carrier Held

The direct overdrive carrier (67) is held by the 1-2-3-4-6-7-8-10 reverse clutch which is part of the triple clutch housing (66). The direct overdrive carrier rotates at the same speed and direction as the triple clutch housing (66) and the direct overdrive sun gear (68).

10. Direct Overdrive Sun Gear Driving

The direct overdrive sun gear (68) which is splined to the direct overdrive sun gear shaft (65) rotates at the same speed and direction as the triple clutch housing (66) and the direct overdrive carrier (67).

11. Direct Overdrive Internal Gear Driven

The direct overdrive internal gear (551) which is splined to the output sun gear (572) is driven by the direct overdrive carrier (67) at the same speed and direction.

12. Output Sun Gear Driving

The output sun gear (572) is driving the output carrier (38) pinion gears.

13. Output Carrier Driven

Powerflow continues through the output sun gear (572). Which drives the output carrier (38) pinions to achieve the 4th gear starting ratio of approximately 1.779:1.

14. Reaction Carrier Driven

The reaction carrier (55), which is splined to the output carrier internal gear transfer shell (71), rotates at the same speed and direction.

15. Low Clutch Roller Overrunning

When the throttle is released the low clutch roller (OWC) (421) will overrun, allowing the vehicle to coast, at least briefly, until the TCM determines that engine braking is required.

16. 1-2-3-4-5-6 Reverse Clutch Assembly Applied

The 1-2-3-4-5-6 reverse clutch assembly (30-35) is applied and holding the reaction internal gear (52).

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Drive Range Fourth Gear

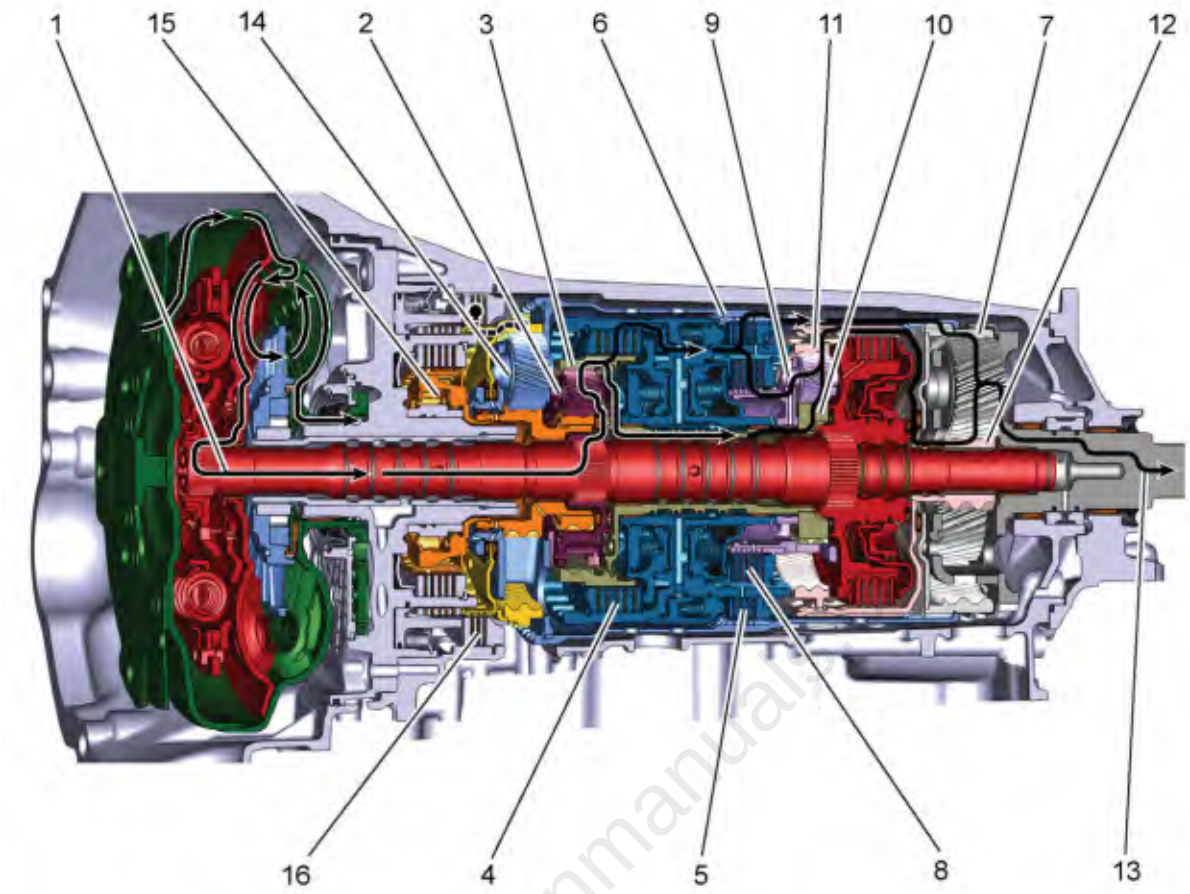


Fig. 13: Drive Range Mechanical Powerflow Diagram - Fourth Gear
Courtesy of GENERAL MOTORS COMPANY

DRIVE RANGE, FOURTH GEAR (HYDRAULIC CIRCUITS)

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 energize or turn on. Shift solenoid valve F is commanded ON and Shift solenoid valve E is commanded OFF.

4-5-6-7-8-9-10 Reverse Clutch Applies

4-5-6-7-8-9-10 Reverse Clutch Regulator Valve

Shift solenoid valve F is energized and applying pressure against the 4-5-6-7-8-9-10 reverse clutch regulator valve allowing 456789-10R (20) fluid to enter the 456789-10R CLUTCH (36) fluid circuit. 456789-10R CLUTCH (36) fluid is directed to the 4-5-6-7-8-9-10 reverse clutch assembly. 456789-10R CLUTCH (36) fluid is also directed through orifice #31 into the 456789-10R CLUTCH FEEDBACK (37) fluid passage to the #4 ball check valve which seats against the FEED LIMIT - HIGH (16) fluid passage.

4-5-6-7-8-9-10 Reverse Clutch Assembly

456789-10R CLUTCH (36) fluid is directed through orifice # 34 into the 4-5-6-7-8-9-10 reverse clutch assembly. 456789-10R CLUTCH (36) fluid moves the piston against spring force to apply holding of the 4-5-6-7-8-9-10 reverse clutch plates.

1-3-5-6-7-8-9 Clutch Releases

1-3-5-6-7-8-9 Clutch Regulator Valve

Shift solenoid valve E is signaled off allowing 1356789 CLUTCH (33) fluid to exhaust through orifice # 29 and # 25 to the 1356789 CLUTCH EXHAUST (35) fluid circuit. 1356789 CLUTCH EXHAUST (35) fluid is directed to the DRIVE DEFAULT (17) fluid circuit to the exhaust backfill blow off valve through the EXHAUST BACKFILL (39) fluid circuit.

Drive Range, Fourth Gear

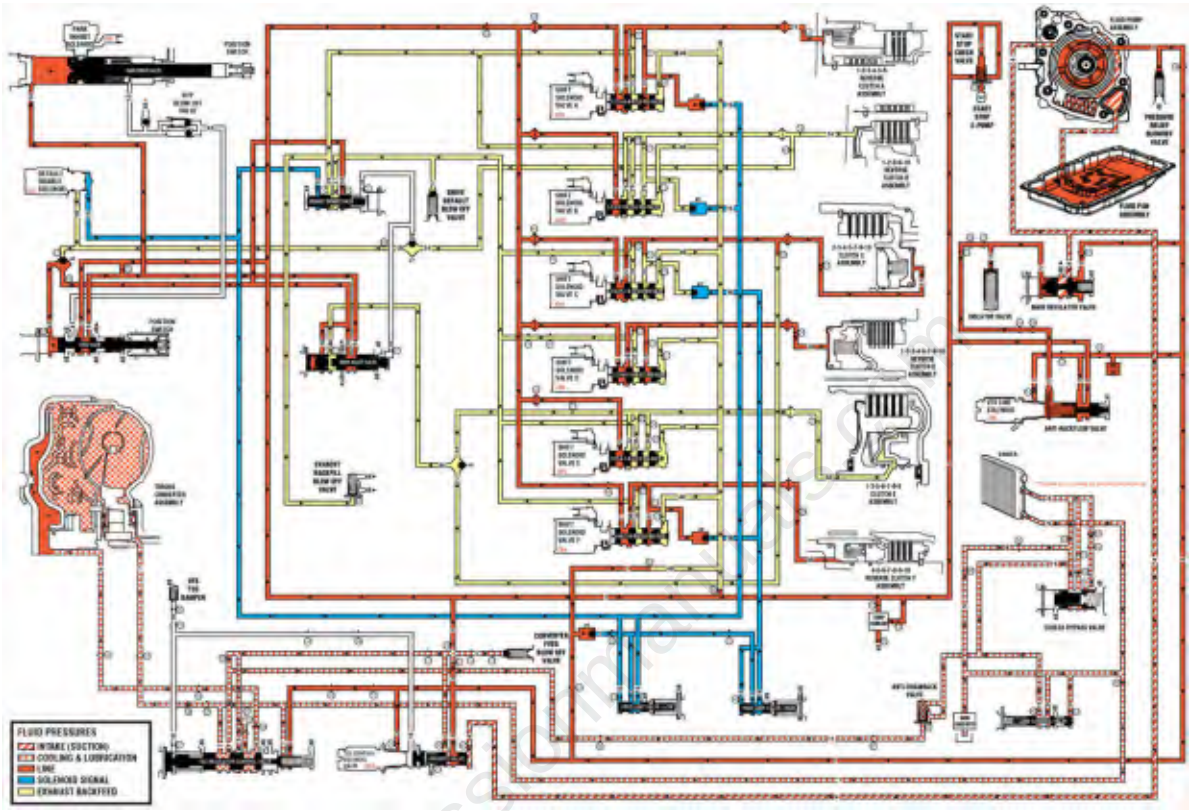


Fig. 14: Identifying Drive Range, Fourth Gear - Hydraulic Flow Diagram
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Suction
2	Line
3	Pump Out
4	Decrease
5	Converter Feed
6	TCC Release
7	TCC Apply
8	Cooler Feed
9	Lube
10	VFS-TCC
11	Converter Return
12	VFS Line
13	Park On
14	Park Off
15	Feed Limit - Low
16	Feed Limit - High
17	Drive Default

Callout	Component Name
18	Drive Latch
19	ON/OFF Signal
20	On/Off 1289-10 Reverse Clutch
21	123456 Reverse Clutch
22	123456 Reverse Clutch Feedback
23	123456 Reverse Clutch Exhaust
24	1289-10 Reverse Clutch
25	1289-10 Reverse Clutch Feedback
26	1289-10 Reverse Clutch Exhaust
27	234579-10 Clutch
28	234579-10 Clutch Feedback
29	234579-10 Clutch Exhaust
30	1234678-10 Reverse Clutch
31	1234678-10 Reverse Clutch Feedback
32	1234678-10 Reverse Clutch Exhaust
33	1356789 Clutch
34	1356789 Clutch Feedback
35	1356789 Clutch Exhaust
36	456789-10 Reverse Clutch
37	456789-10 Reverse Clutch Feedback
38	456789-10 Reverse Clutch Exhaust
39	Exhaust Backfill
40	Exhaust
41	Return to Park
42	On/Off Drive Latch
44	234579-10/1356789 Clutch

DRIVE RANGE, FIFTH GEAR (MECHANICAL POWERFLOW)

Note: The component callouts in the text refer to the component callout numbers in disassembled views. **Disassembled Views (2WD)** , or **Disassembled Views (AWD)**

As vehicle speed increases, input signals from the transmission speed sensors (input and output), throttle position (TP) sensor, and other vehicle sensors are sent to the transmission control module (TCM). The TCM processes this information to determine the precise moment to shift the transmission. In 5th gear, the planetary gearset continues to operate in reduction at a gear ratio of approximately 1.526:1. As vehicle speed increases, less torque multiplication is needed to move the vehicle efficiently. Therefore, it is desirable to shift the transmission to a lower gear ratio, or 6th gear.

1. Power from Torque Converter

The power flows through the turbine shaft to the input carrier (62) and 1-3-5-6-7-8-9 clutch assembly (554-565) which are both splined to the turbine shaft (568) and rotate at the same speed and direction.

2. 1-3-5-6-7-8-9 Clutch Assembly Applied

The 1-3-5-6-7-8-9 clutch assembly (554-565) is applied and holds the output sun gear (572).

3. Output Sun Gear Driving

The output sun gear (572) is driving the output carrier (38) pinion gears.

4. Output Carrier Driven

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Powerflow continues through the output sun gear (572). Which drives the output carrier pinions to achieve the 5th gear starting ratio of approximately 1.526:1.

5. Input Carrier Driving

The power flows to the input carrier (62) which is splined to the turbine shaft (568) and rotates at the same speed and direction. Power flow continues through the input carrier pinion gears which are driving the direct overdrive sun gear shaft (65).

6. Direct Overdrive Sun Gear Shaft Driven

The input internal gear (500) which is splined to the direct overdrive sun gear shaft (65) and rotates at the same speed and direction is driven by the input carrier (62) pinion gears.

7. 2-3-4-5-7-9-10 Clutch Assembly Applied

The 2-3-4-5-7-9-10 clutch which is part of the triple clutch housing (66) is applied and holding the input internal gear (500) which is splined to the direct overdrive sun gear shaft (65) and rotates at the same speed and direction.

8. 4-5-6-7-8-9-10 Reverse Clutch Assembly Applied

The 4-5-6-7-8-9-10 reverse clutch which is part of the triple clutch housing (66) is applied and holding the output carrier internal gear transfer shell (71) which is splined to the reaction carrier (55) and the output carrier internal gear (74), both rotate at the same speed and direction.

9. Output Carrier Internal Gear Transfer Shell

The output carrier internal gear transfer shell is held by the 4-5-6-7-8-9-10 reverse clutch which is part of the triple clutch housing (66). The output carrier internal gear transfer shell rotates at the same speed and direction as the triple clutch housing (66).

10. Output Carrier Internal Gear Driving

The output carrier internal gear (74) which is splined to the output carrier internal gear transfer shell (71) is driving the output carrier (38) and rotates at the same speed and direction.

11. Direct Overdrive Sun Gear Driving

The direct overdrive sun gear (68) which is splined to the direct overdrive sun gear shaft (65) rotates at the same speed and direction as the triple clutch housing (66) and the direct overdrive carrier (67).

12. Direct Overdrive Carrier Driven

The direct overdrive carrier (67) is driven by the direct overdrive sun gear (68).

13. Direct Overdrive Internal Gear Driven

The direct overdrive internal gear (551) which is splined to the output sun gear (572) is driven by the direct overdrive carrier (67).

14. Low Clutch Roller Overrunning

When the throttle is released the low clutch roller (OWC) (421) will overrun, allowing the vehicle to coast, at least briefly, until the TCM determines that engine braking is required.

15. 1-2-3-4-5-6 Reverse Clutch Assembly Applied

The 1-2-3-4-5-6 reverse clutch assembly (30-35) is applied and holding the reaction internal gear (52).

16. Reaction Carrier Driven

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The reaction carrier (55) Which is splined to the output carrier internal gear transfer shell (71) rotates at the same speed and direction.

Drive Range Fifth Gear

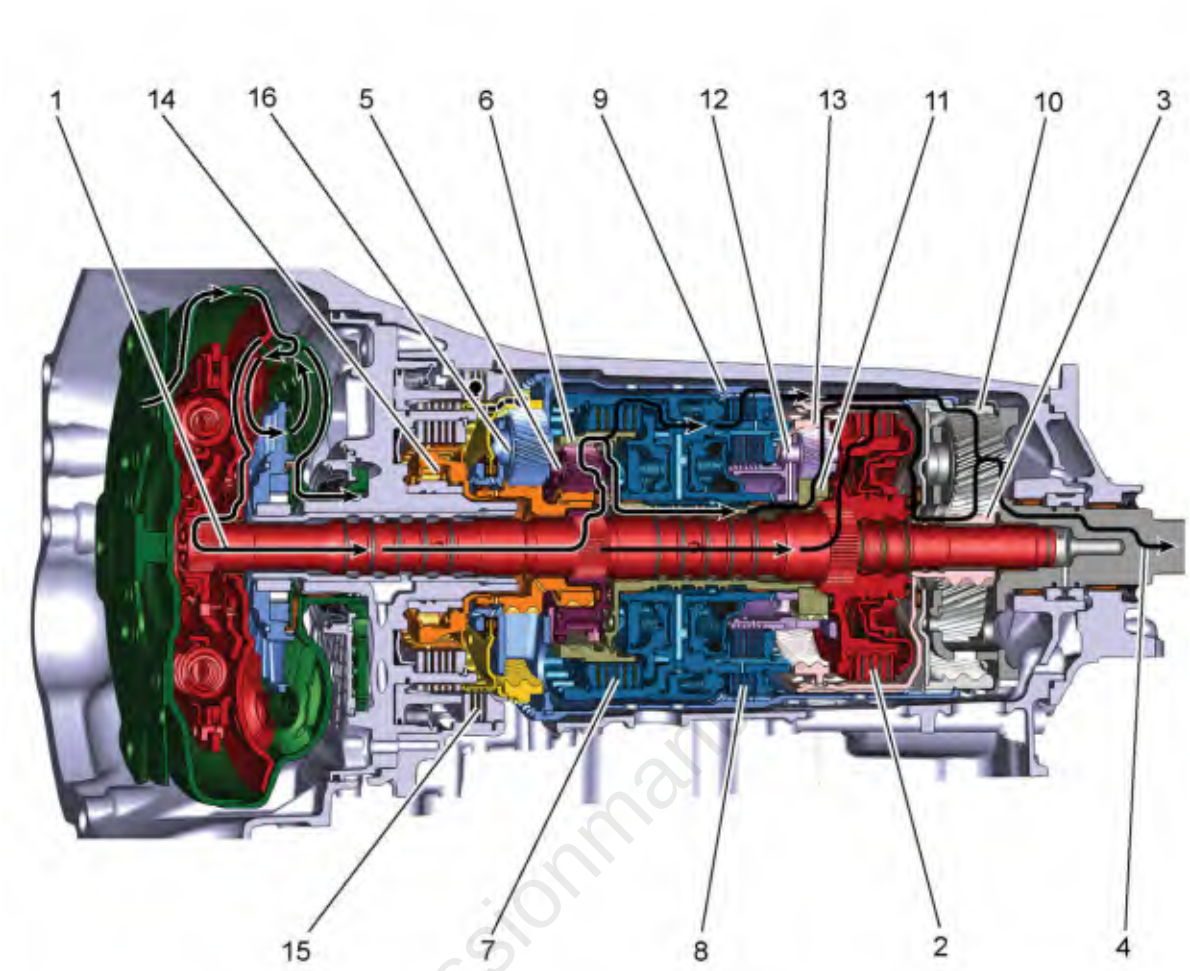


Fig. 15: Drive Range Mechanical Powerflow Diagram - Fifth Gear
Courtesy of GENERAL MOTORS COMPANY

DRIVE RANGE, FIFTH GEAR (HYDRAULIC CIRCUITS)

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 energize or turn on. Shift solenoid valve E is commanded ON and Shift solenoid valve D is commanded OFF.

1-3-5-6-7-8-9 Clutch Applies

1-3-5-6-7-8-9 Clutch Regulator Valve

Shift solenoid valve E is energized and applying pressure against the 1-3-5-6-7-8-9 clutch regulator valve allowing LINE (2) fluid to enter the 1356789 CLUTCH (33) fluid circuit. 1356789 CLUTCH (33) fluid is directed to the 1-3-5-6-7-8-9 clutch assembly.

1-3-5-6-7-8-9 Clutch Assembly

1356789 CLUTCH (33) fluid is directed through orifice # 29 into the 1-3-5-6-7-8-9 clutch assembly. 1356789 CLUTCH (33) fluid moves the piston against spring force to apply holding of the 1-3-5-6-7-8-9 clutch plates.

1-2-3-4-6-7-8-10-R Clutch Regulator Valve

Shift solenoid valve D is signaled off allowing 1234678-10 REVERSE CLUTCH (30) fluid to exhaust through orifice #20 and into the 1234678-10 REVERSE CLUTCH EXHAUST (32) fluid circuit. 1234678-10 REVERSE CLUTCH EXHAUST (32) fluid is directed to the exhaust backfill blow off valve through the EXHAUST BACKFILL (39) fluid circuit.

Drive Range, Fifth Gear

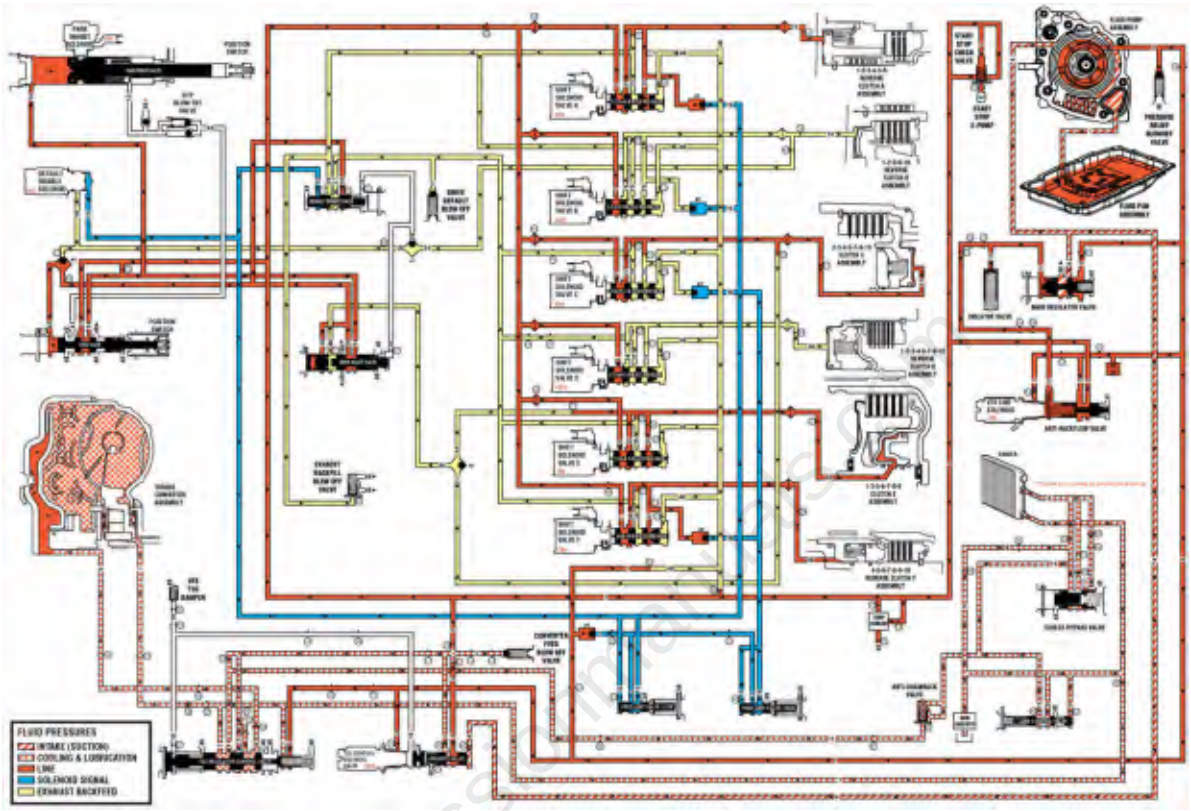


Fig. 16: Identifying Drive Range, Fifth Gear - Hydraulic Flow Diagram
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Suction
2	Line
3	Pump Out
4	Decrease
5	Converter Feed
6	TCC Release
7	TCC Apply
8	Cooler Feed
9	Lube
10	VFS-TCC
11	Converter Return
12	VFS Line
13	Park On
14	Park Off
15	Feed Limit - Low
16	Feed Limit - High
17	Drive Default

Callout	Component Name
18	Drive Latch
19	ON/OFF Signal
20	On/Off 1289-10 Reverse Clutch
21	123456 Reverse Clutch
22	123456 Reverse Clutch Feedback
23	123456 Reverse Clutch Exhaust
24	1289-10 Reverse Clutch
25	1289-10 Reverse Clutch Feedback
26	1289-10 Reverse Clutch Exhaust
27	234579-10 Clutch
28	234579-10 Clutch Feedback
29	234579-10 Clutch Exhaust
30	1234678-10 Reverse Clutch
31	1234678-10 Reverse Clutch Feedback
32	1234678-10 Reverse Clutch Exhaust
33	1356789 Clutch
34	1356789 Clutch Feedback
35	1356789 Clutch Exhaust
36	456789-10 Reverse Clutch
37	456789-10 Reverse Clutch Feedback
38	456789-10 Reverse Clutch Exhaust
39	Exhaust Backfill
40	Exhaust
41	Return to Park
42	On/Off Drive Latch
44	234579-10/1356789 Clutch

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DRIVE RANGE, SIXTH GEAR (MECHANICAL POWERFLOW)

Note: The component callouts in the text refer to the component callout numbers in disassembled views. Disassembled Views (2WD) , or Disassembled Views (AWD)

As vehicle speed increases, input signals from the transmission speed sensors (input and output), throttle position (TP) sensor, and other vehicle sensors are sent to the transmission control module (TCM). The TCM processes this information to determine the precise moment to shift the transmission. In 6th gear, the planetary gearset continues to operate in reduction at a gear ratio of approximately 1.278:1. As vehicle speed increases, less torque multiplication is needed to move the vehicle efficiently. Therefore, it is desirable to shift the transmission to a lower gear ratio, or 7th gear.

1. Power from Torque Converter

The power flows through the turbine shaft to the input carrier (62) and 1-3-5-6-7-8-9 clutch assembly (554-565) which are both splined to the turbine shaft (568) and rotate at the same speed and direction.

2. Input Carrier Driving

The power flows to the input carrier (62) which is splined to the turbine shaft (568) and rotates at the same speed and direction. Power flow continues through the input carrier pinion gears which are driving the direct overdrive sun gear shaft (65).

3. Direct Overdrive Sun Gear Shaft Driven

The input internal gear (500) which is splined to the direct overdrive sun gear shaft (65) and rotates at the same speed and direction is driven by the input carrier (62) pinion gears.

4. Direct Overdrive Sun Gear

The direct overdrive sun gear (68) which is splined to the direct overdrive sun gear shaft (65) rotates at the same speed and direction.

5. Direct Overdrive Carrier Driven

The direct overdrive carrier (67) is driven by the direct overdrive sun gear (68).

6. 1-2-3-4-6-7-8-10 Reverse Clutch Assembly Applied

The 1-2-3-4-6-7-8-10 reverse clutch which is part of the triple clutch housing (66) is applied and holding the direct overdrive carrier (67) and rotates at the same speed and direction.

7. 4-5-6-7-8-9-10 Reverse Clutch Assembly Applied

The 4-5-6-7-8-9-10 reverse clutch which is part of the triple clutch housing (66) is applied and holding the output carrier internal gear transfer shell (71) which is splined to the reaction carrier (55) and the output carrier internal gear (74), both rotate at the same speed and direction.

8. Output Carrier Internal Gear Transfer Shell

The output carrier internal gear transfer shell (71) is held by the 4-5-6-7-8-9-10 reverse clutch which is part of the triple clutch housing (66). The output carrier internal gear transfer shell (71) rotates at the same speed and direction as the triple clutch housing (66).

9. Output Carrier Internal Gear Driving

The output carrier internal gear (74) which is splined to the output carrier internal gear transfer shell (71) is driving the output carrier (38).

10. Output Carrier Driven

Powerflow continues through the output sun gear (572). Which drives the output carrier (38) pinions to achieve the 6^{th} gear starting ratio of approximately 1.278:1.

11. Output Sun Gear Driving

The output sun gear (572) is driving the output carrier (38) pinion gears.

12. 1-3-5-6-7-8-9 Clutch Assembly Applied

The 1-3-5-6-7-8-9 clutch assembly (554-565) is applied and holds the output sun gear (572).

13. Low Clutch Roller Overrunning

When the throttle is released the low clutch roller (OWC) (421) will overrun, allowing the vehicle to coast, at least briefly, until the TCM determines that engine braking is required.

14. 1-2-3-4-5-6 Reverse Clutch Assembly Applied

The 1-2-3-4-5-6 reverse clutch assembly (30-35) is applied and holding the reaction internal gear (52).

Drive Range Sixth Gear

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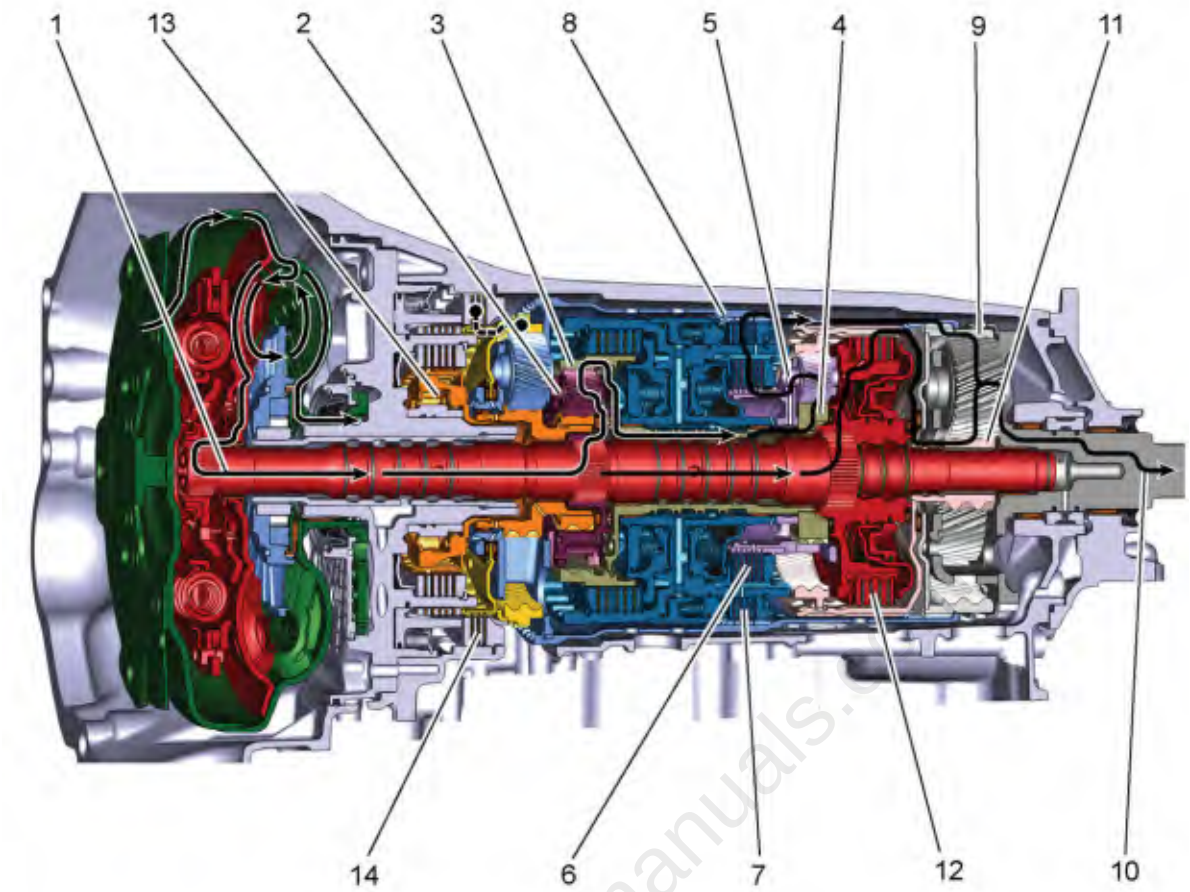


Fig. 17: Drive Range Mechanical Powerflow Diagram - Sixth Gear
Courtesy of GENERAL MOTORS COMPANY

DRIVE RANGE, SIXTH GEAR (HYDRAULIC CIRCUITS)

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 energize or turn on. Shift solenoid valve D is commanded ON and Shift solenoid valve C is commanded OFF.

1-2-3-4-6-7-8-10 Reverse Clutch Applies

1-2-3-4-6-7-8-10 Reverse Clutch Regulator Valve

Shift solenoid valve D is energized and applying pressure against the 1-2-3-4-6-7-8-10 reverse clutch regulator valve allowing LINE (2) fluid to enter the 1234678-10R CLUTCH (30) fluid circuit. 1234678-10R CLUTCH (30) fluid is also directed through orifice #21 into the 1234678-10R CLUTCH FEEDBACK (31) fluid passage to the 1-2-3-4-6-7-8-10 reverse clutch regulator valve.

1-2-3-4-6-7-8-10 Reverse Clutch Assembly

1234678-10R CLUTCH (30) fluid is directed through orifice # 24 into the 1-2-3-4-6-7-8-10 reverse clutch assembly. 1234678-10R CLUTCH (30) fluid moves the piston against spring force to apply holding of the 1-2-3-4-6-7-8-10 reverse clutch plates.

2-3-4-5-7-9-10 Clutch Releases

2-3-4-5-7-9-10 Clutch Regulator Valve

Shift solenoid valve C is signaled off allowing 234579-10 CLUTCH (27) fluid to exhaust through orifice #15 and into the 234579-10 CLUTCH EXHAUST (29) fluid circuit. 234579-10 CLUTCH EXHAUST (29) fluid is directed through the DRIVE DEFAULT (17) fluid circuit to the exhaust backfill blow off valve through the EXHAUST BACKFILL (39) fluid circuit.

Torque Converter Clutch (TCC) Applies

Torque Converter Clutch (TCC) Control Solenoid Valve

The TCC control solenoid valve is commanded ON, allowing SECONDARY LINE (3) fluid to enter the VFS-TCC (10) fluid circuit. VFS-TCC (10) fluid is directed thru orifice #36 to the VFS TCC damper and thru orifice #37 to the TCC regulator control valve.

TCC Regulator Control Valve

VFS-TCC (10) fluid moves the TCC regulator control valve against TCC regulator control valve spring force, allowing PUMP OUT (3) fluid to pass through the valve into the TCC APPLY (7) fluid circuit and apply the torque converter clutch. TCC release (6) fluid passes through the TCC regulator control valve and is exhausted.

Drive Range, Sixth Gear

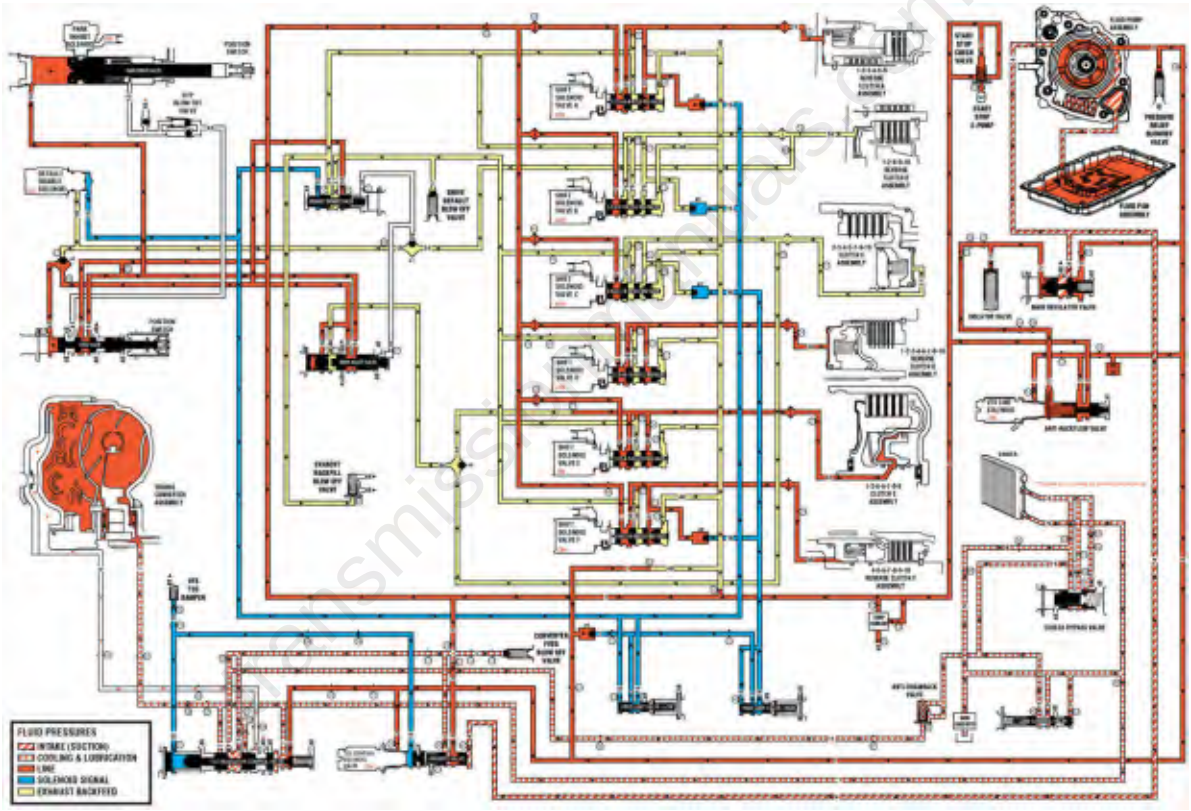


Fig. 18: Identifying Drive Range, Sixth Gear - Hydraulic Flow Diagram
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Suction
2	Line
3	Pump Out
4	Decrease
5	Converter Feed
6	TCC Release
7	TCC Apply
8	Cooler Feed
9	Lube

Callout	Component Name
10	VFS-TCC
11	Converter Return
12	VFS Line
13	Park On
14	Park Off
15	Feed Limit - Low
16	Feed Limit - High
17	Drive Default
18	Drive Latch
19	ON/OFF Signal
20	On/Off 1289-10 Reverse Clutch
21	123456 Reverse Clutch
22	123456 Reverse Clutch Feedback
23	123456 Reverse Clutch Exhaust
24	1289-10 Reverse Clutch
25	1289-10 Reverse Clutch Feedback
26	1289-10 Reverse Clutch Exhaust
27	234579-10 Clutch
28	234579-10 Clutch Feedback
29	234579-10 Clutch Exhaust
30	1234678-10 Reverse Clutch
31	1234678-10 Reverse Clutch Feedback
32	1234678-10 Reverse Clutch Exhaust
33	1356789 Clutch
34	1356789 Clutch Feedback
35	1356789 Clutch Exhaust
36	456789-10 Reverse Clutch
37	456789-10 Reverse Clutch Feedback
38	456789-10 Reverse Clutch Exhaust
39	Exhaust Backfill
40	Exhaust
41	Return to Park
42	On/Off Drive Latch
44	234579-10/1356789 Clutch

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DRIVE RANGE, SEVENTH GEAR (MECHANICAL POWERFLOW)

Note: The component callouts in the text refer to the component callout numbers in disassembled views. Disassembled Views (2WD) , or Disassembled Views (AWD)

As vehicle speed increases, input signals from the transmission speed sensors (input and output), throttle position (TP) sensor, and other vehicle sensors are sent to the transmission control module (TCM). The TCM processes this information to determine the precise moment to shift the transmission. In 7th gear, the planetary gearset continues to operate in reduction at a gear ratio of approximately 1.000:1. As vehicle speed increases, less torque multiplication is needed to move the vehicle efficiently. Therefore, it is desirable to shift the transmission to a lower gear ratio, or 8th gear.

1. Power from Torque Converter

The power flows through the turbine shaft to the input carrier (62) and 1-3-5-6-7-8-9 clutch assembly (554-565) which are both splined to the turbine shaft (568) and rotate at the same speed and direction.

2. Input Carrier Driving

The power flows to the input carrier (62) which is splined to the turbine shaft (568) and rotates at the same speed and direction. Power flow continues through the input carrier pinion gears which are driving the direct overdrive sun gear shaft (65).

3. Direct Overdrive Sun Gear Shaft Driven

The input internal gear (500) which is splined to the direct overdrive sun gear shaft (65) and rotates at the same speed and direction is driven by the input carrier (62) pinion gears.

4. 2-3-4-5-7-9-10 Clutch Assembly Applied

The 2-3-4-5-7-9-10 clutch which is part of the triple clutch housing (66) is applied and holding the input internal gear (500) which is splined to the direct overdrive sun gear shaft (65) and rotates at the same speed and direction.

5. 4-5-6-7-8-9-10 Reverse Clutch Assembly Applied

The 4-5-6-7-8-9-10 reverse clutch which is part of the triple clutch housing (66) is applied and holding the output carrier internal gear transfer shell (71) which is splined to the reaction carrier (55) and the output carrier internal gear (74), both rotate at the same speed and direction.

6. Output Carrier Internal Gear Transfer Shell

The output carrier internal gear transfer shell (71) is held by the 4-5-6-7-8-9-10 reverse clutch which is part of the triple clutch housing (66). The output carrier internal gear transfer shell (71) rotates at the same speed and direction as the triple clutch housing (66).

7. Output Carrier Internal Gear Driving

The output carrier internal gear (74) which is splined to the output carrier internal gear transfer shell (71) is driving the output carrier (38).

8. Output Carrier Driven

Powerflow continues through the output sun gear (572). Which drives the output carrier (38) pinions to achieve the 7^{th} gear starting ratio of approximately 1.000:1.

9. 1-3-5-6-7-8-9 Clutch Assembly Applied

The 1-3-5-6-7-8-9 clutch assembly (554-565) is applied and holds the output sun gear (572).

10. Output Sun Gear Driving

The output sun gear (572) is driving the output carrier (38) pinion gears.

11. Direct Overdrive Sun Gear Driving

The direct overdrive sun gear (68) which is splined to the direct overdrive sun gear shaft (65) rotates at the same speed and direction.

12. Direct Overdrive Carrier Driven

The direct overdrive carrier (67) is driven by the direct overdrive sun gear (68).

13. 1-2-3-4-6-7-8-10 Reverse Clutch Assembly Applied

The 1-2-3-4-6-7-8-10 reverse clutch which is part of the triple clutch housing (66) is applied and holding the direct overdrive carrier (67) and rotates at the same speed and direction.

14. Low Clutch Roller Overrunning

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When the throttle is released the low clutch roller (OWC) (421) will overrun, allowing the vehicle to coast, at least briefly, until the TCM determines that engine braking is required.

Drive Range Seventh Gear

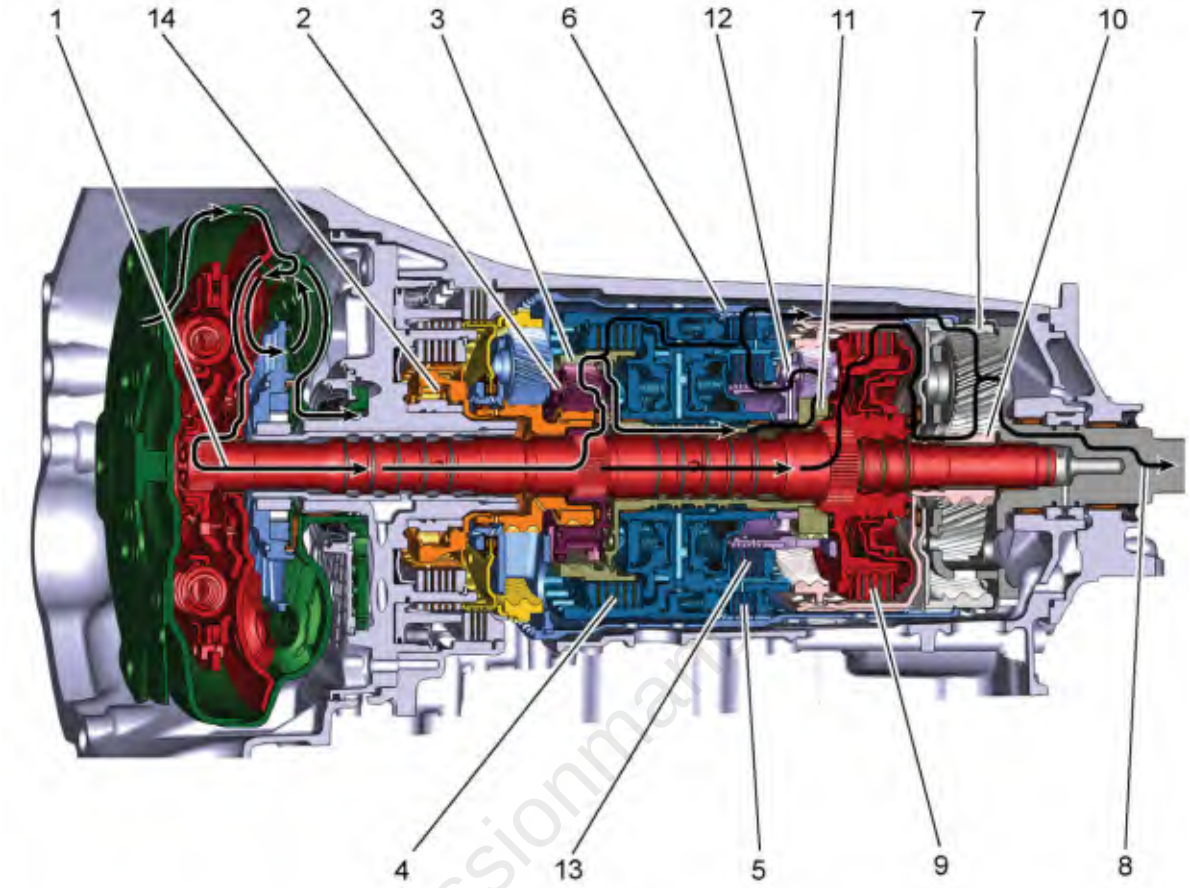


Fig. 19: Drive Range Mechanical Powerflow Diagram - Seventh Gear
Courtesy of GENERAL MOTORS COMPANY

DRIVE RANGE, SEVENTH GEAR (HYDRAULIC CIRCUITS)

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 energize or turn on. Shift solenoid valve C is commanded ON and Shift solenoid valve A is commanded OFF.

2-3-4-5-7-9-10 Clutch Applies

2-3-4-5-7-9-10 Clutch Regulator Valve

Shift solenoid valve C is energized and applying pressure against the 2-3-4-5-7-9-10 clutch regulator valve allowing LINE (2) fluid to enter the 234579-10 CLUTCH (27) fluid circuit. 234579-10 CLUTCH (27) fluid is directed to the 2-3-4-5-7-9-10 clutch assembly. Fluid is also directed through orifice #70 to the #6 check ball valve.

2-3-4-5-7-9-10 Clutch Assembly

234579-10 CLUTCH (27) fluid is directed through orifice # 19 into the 2-3-4-5-7-9-10 clutch assembly. 234579-10 CLUTCH (27) fluid moves the piston against spring force to apply holding of the 2-3-4-5-7-9-10 clutch

plates.

1-2-3-4-5-6 Reverse Clutch Releases

1-2-3-4-5-6 Reverse Clutch Regulator Valve

Shift solenoid valve A is signaled off allowing 123456 CLUTCH (21) fluid to exhaust through orifice #5 and into the 123456 CLUTCH EXHAUST (23) fluid circuit. 123456 CLUTCH EXHAUST (23) fluid is directed to the exhaust backfill blow off valve through the EXHAUST BACKFILL (39) fluid circuit.

Drive Range, Seventh Gear

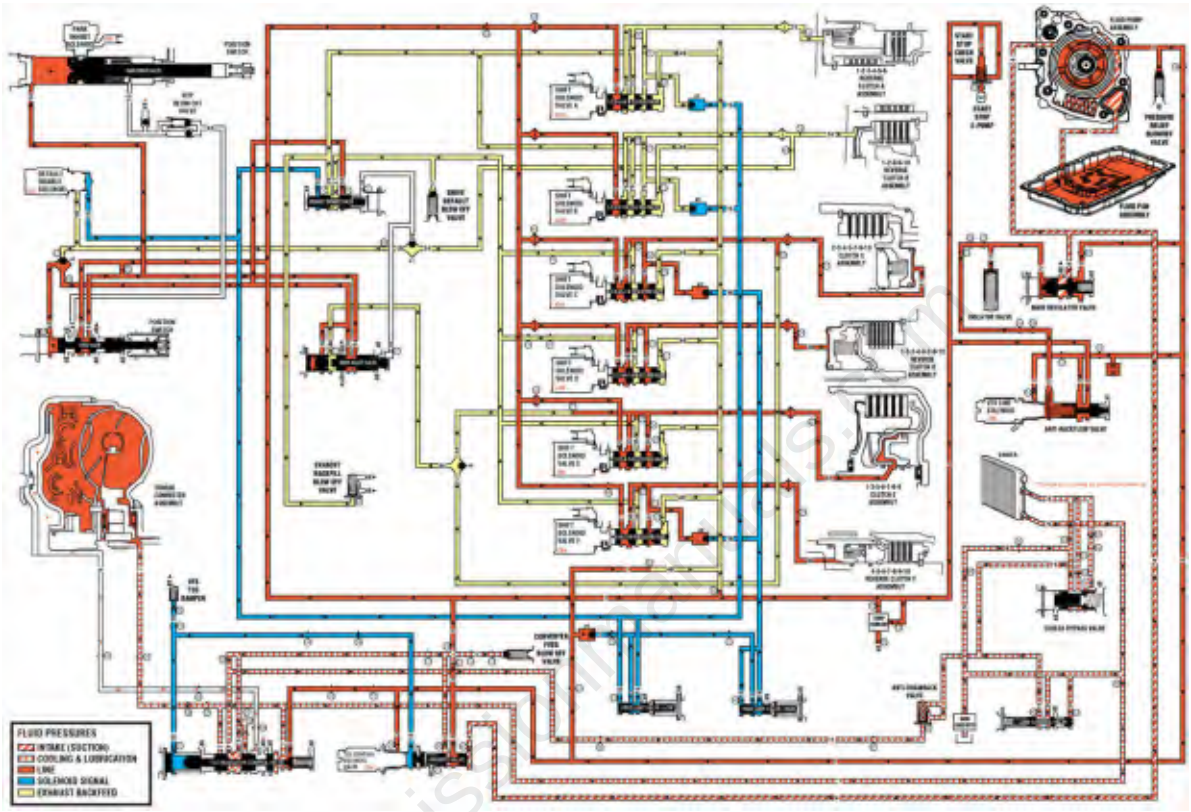


Fig. 20: Identifying Drive Range, Seventh Gear - Hydraulic Flow Diagram
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Suction
2	Line
3	Pump Out
4	Decrease
5	Converter Feed
6	TCC Release
7	TCC Apply
8	Cooler Feed
9	Lube
10	VFS-TCC
11	Converter Return
12	VFS Line
13	Park On
14	Park Off
15	Feed Limit - Low
16	Feed Limit - High
17	Drive Default

Callout	Component Name
18	Drive Latch
19	ON/OFF Signal
20	On/Off 1289-10 Reverse Clutch
21	123456 Reverse Clutch
22	123456 Reverse Clutch Feedback
23	123456 Reverse Clutch Exhaust
24	1289-10 Reverse Clutch
25	1289-10 Reverse Clutch Feedback
26	1289-10 Reverse Clutch Exhaust
27	234579-10 Clutch
28	234579-10 Clutch Feedback
29	234579-10 Clutch Exhaust
30	1234678-10 Reverse Clutch
31	1234678-10 Reverse Clutch Feedback
32	1234678-10 Reverse Clutch Exhaust
33	1356789 Clutch
34	1356789 Clutch Feedback
35	1356789 Clutch Exhaust
36	456789-10 Reverse Clutch
37	456789-10 Reverse Clutch Feedback
38	456789-10 Reverse Clutch Exhaust
39	Exhaust Backfill
40	Exhaust
41	Return to Park
42	On/Off Drive Latch
44	234579-10/1356789 Clutch

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DRIVE RANGE, EIGHTH GEAR (MECHANICAL POWERFLOW)

Note: The component callouts in the text refer to the component callout numbers in disassembled views. Disassembled Views (2WD) , or Disassembled Views (AWD)

To maximize engine performance and fuel economy, a 8th gear is used to achieve an approximate ratio of 0.854:1 through the transmission gearset to the vehicle drive shaft. This allows the vehicle to maintain a given road speed with less engine output speed. When the throttle is released in 8th Gear, the vehicle is allowed to coast brake. Because the low clutch roller assembly is not used in driving the vehicle during acceleration, there are no elements to overrun to allow the vehicle to coast freely. Therefore, engine compression slows the vehicle when the throttle is released until the transmission downshifts into 7th gear.

1. Power from Torque Converter

The power flows through the turbine shaft to the input carrier (62) and 1-3-5-6-7-8-9 clutch assembly (554-565) which are both splined to the turbine shaft (568) and rotate at the same speed and direction.

2. Input Carrier Driving

The power flows to the input carrier (62) which is splined to the turbine shaft (568) and rotates at the same speed and direction. Power flow continues through the input carrier pinion gears which are driving the direct overdrive sun gear shaft (65).

3. Direct Overdrive Sun Gear Shaft Driven

The input internal gear (500) which is splined to the direct overdrive sun gear shaft (65) and rotates at the same speed and direction is driven by the input carrier (62) pinion gears.

4. Direct Overdrive Sun Gear Driving

The direct overdrive sun gear (68) which is splined to the direct overdrive sun gear shaft (65) rotates at the same speed and direction.

5. Direct Overdrive Carrier Driven

The direct overdrive carrier (67) is driven by the direct overdrive sun gear (68).

6. 1-2-3-4-6-7-8-10 Reverse Clutch Assembly Applied

The 1-2-3-4-6-7-8-10 reverse clutch which is part of the triple clutch housing (66) is applied and holding the direct overdrive carrier (67) and rotates at the same speed and direction.

7. 4-5-6-7-8-9-10 Reverse Clutch Assembly Applied

The 4-5-6-7-8-9-10 reverse clutch which is part of the triple clutch housing (66) is applied and holding the output carrier internal gear transfer shell (71) which is splined to the reaction carrier (55) and the output carrier internal gear (74), both rotate at the same speed and direction.

8. Output Carrier Internal Gear Transfer Shell

The output carrier internal gear transfer shell (71) is held by the 4-5-6-7-8-9-10 reverse clutch which is part of the triple clutch housing (66). The output carrier internal gear transfer shell (71) rotates at the same speed and direction as the triple clutch housing (66).

9. Output Carrier Internal Gear Driving

The output carrier internal gear (74) which is splined to the output carrier internal gear transfer shell (71) is driving the output carrier (38).

10. Output Carrier Driven

Powerflow continues through the output sun gear (572). Which drives the output carrier (38) pinions to achieve the 8^{th} gear starting ratio of approximately 0.854:1.

11. Output Sun Gear Driving

The output sun gear (572) is driving the output carrier (38) pinion gears.

12. 1-3-5-6-7-8-9 Clutch Assembly Applied

The 1-3-5-6-7-8-9 clutch assembly (554-565) is applied and holds the output sun gear (572).

13. 1-2-8-9-10 Reverse Clutch Assembly Applied

The 1-2-8-9-10 reverse clutch assembly (414-420) is applied and holding the low clutch roller (421) which is splined to the reaction sun gear (572) and held stationary.

Drive Range Eighth Gear

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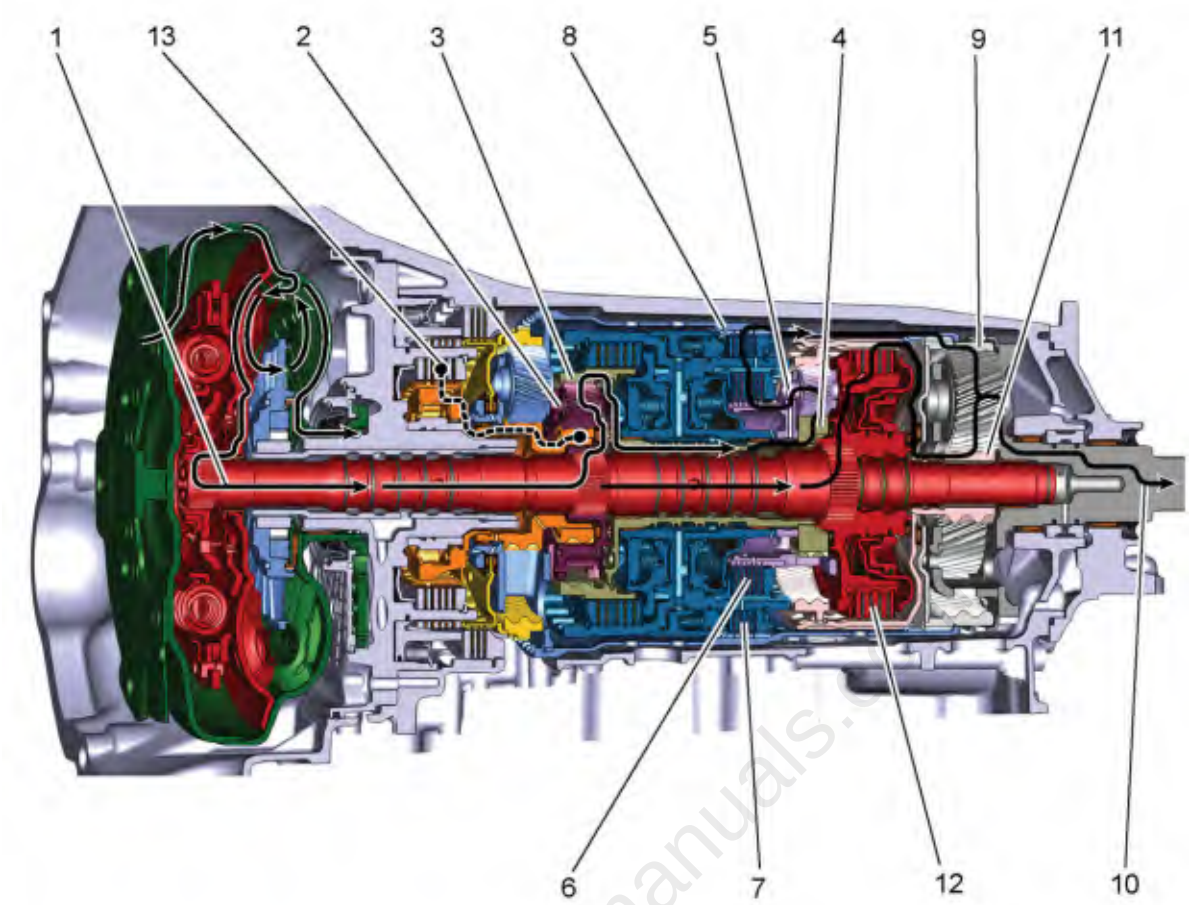


Fig. 21: Drive Range Mechanical Powerflow Diagram - Eighth Gear
Courtesy of GENERAL MOTORS COMPANY

DRIVE RANGE, EIGHTH GEAR (HYDRAULIC CIRCUITS)

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 energize or turn on. Shift solenoid valve B is commanded ON and Shift solenoid valve C is commanded OFF.

1-2-8-9-10 Reverse Clutch Applies

1-2-8-9-10 Reverse Clutch Regulator Valve

Shift solenoid valve B is energized and applying pressure against the 1-2-8-9-10 reverse clutch regulator valve allowing LINE (2) fluid to enter the 1289-10R CLUTCH (24) fluid circuit. 1289-10R CLUTCH (24) fluid is directed to the 1-2-8-9-10 reverse clutch assembly. 1289-10R CLUTCH (24) fluid is also directed through orifice #11 into the 1289-10R CLUTCH FEEDBACK (25) fluid passage to the #2 ball check valve which seats against the FEED LIMIT - LOW (15) fluid passage. Fluid is also directed through orifice #69 to the # 7 ball check valve.

1-2-8-9-10 Reverse Clutch Assembly

1289-10R CLUTCH (24) fluid is directed through orifice # 14 into the 1-2-8-9-10 reverse clutch assembly. 1289-10R CLUTCH (24) fluid moves the piston against spring force to apply holding of the 1-2-8-9-10 reverse clutch plates.

2-3-4-5-7-9-10 Clutch Releases

2-3-4-5-7-9-10 Clutch Regulator Valve

Shift solenoid valve C is signaled off allowing 234579-10 CLUTCH (27) fluid to exhaust through orifice #15 and into the 234579-10 CLUTCH EXHAUST (29) fluid circuit. 234579-10 CLUTCH EXHAUST (29) fluid is directed through the DRIVE DEFAULT (17) to the exhaust backfill blow off valve through the EXHAUST BACKFILL (39) fluid circuit.

Drive Range, Eighth Gear

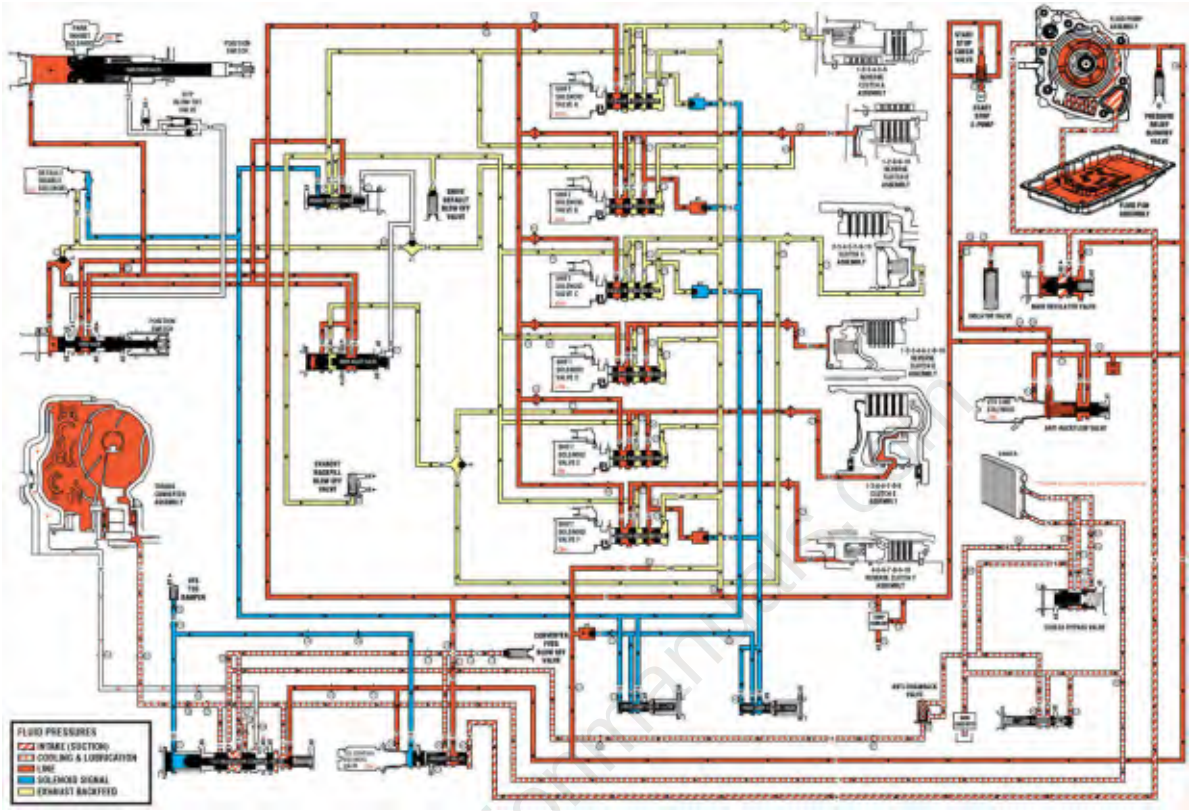


Fig. 22: Identifying Drive Range, Eighth Gear - Hydraulic Flow Diagram
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Suction
2	Line
3	Pump Out
4	Decrease
5	Converter Feed
6	TCC Release
7	TCC Apply
8	Cooler Feed
9	Lube
10	VFS-TCC
11	Converter Return
12	VFS Line
13	Park On
14	Park Off
15	Feed Limit - Low
16	Feed Limit - High
17	Drive Default
18	Drive Latch
19	ON/OFF Signal

Callout	Component Name
20	On/Off 1289-10 Reverse Clutch
21	123456 Reverse Clutch
22	123456 Reverse Clutch Feedback
23	123456 Reverse Clutch Exhaust
24	1289-10 Reverse Clutch
25	1289-10 Reverse Clutch Feedback
26	1289-10 Reverse Clutch Exhaust
27	234579-10 Clutch
28	234579-10 Clutch Feedback
29	234579-10 Clutch Exhaust
30	1234678-10 Reverse Clutch
31	1234678-10 Reverse Clutch Feedback
32	1234678-10 Reverse Clutch Exhaust
33	1356789 Clutch
34	1356789 Clutch Feedback
35	1356789 Clutch Exhaust
36	456789-10 Reverse Clutch
37	456789-10 Reverse Clutch Feedback
38	456789-10 Reverse Clutch Exhaust
39	Exhaust Backfill
40	Exhaust
41	Return to Park
42	On/Off Drive Latch
44	234579-10/1356789 Clutch

DRIVE RANGE, NINTH GEAR (MECHANICAL POWERFLOW)

Note: The component callouts in the text refer to the component callout numbers in disassembled views. **Disassembled Views (2WD)** , or **Disassembled Views (AWD)**

To maximize engine performance and fuel economy, a 9th gear is used to achieve an approximate ratio of 0.689:1 through the transmission gearset to the vehicle drive shaft. This allows the vehicle to maintain a given road speed with less engine output speed. When the throttle is released in 9th Gear, the vehicle is allowed to coast brake. Because the low clutch roller assembly is not used in driving the vehicle during acceleration, there are no elements to overrun to allow the vehicle to coast freely. Therefore, engine compression slows the vehicle when the throttle is released until the transmission downshifts into 8th gear.

1. Power from Torque Converter

The power flows through the turbine shaft to the input carrier (62) and 1-3-5-6-7-8-9 clutch assembly (554-565) which are both splined to the turbine shaft (568) and rotate at the same speed and direction.

2. 1-3-5-6-7-8-9 Clutch Assembly Applied

The 1-3-5-6-7-8-9 clutch assembly (554-565) is applied and holds the output sun gear (572).

3. Output Sun Gear Driving

The output sun gear (572) is driving the output carrier (38) pinion gears.

4. Output Carrier Driven

Powerflow continues through the output sun gear (572). Which drives the output carrier pinions to achieve the 9^{th} gear starting ratio of approximately 0.689:1.

5. Input Carrier Driving

The power flows to the input carrier (62) which is splined to the turbine shaft (568) and rotates at the same speed and direction. Power flow continues through the input carrier pinion gears which are driving the direct overdrive sun gear shaft (65).

6. Direct Overdrive Sun Gear Shaft Driven

The input internal gear (500) which is splined to the direct overdrive sun gear shaft (65) and rotates at the same speed and direction is driven by the input carrier (62) pinion gears.

7. 2-3-4-5-7-9-10 Clutch Assembly Applied

The 2-3-4-5-7-9-10 clutch which is part of the triple clutch housing (66) is applied and holding the input internal gear (500) which is splined to the direct overdrive sun gear shaft (65) and rotates at the same speed and direction.

8. 4-5-6-7-8-9-10 Reverse Clutch Assembly Applied

The 4-5-6-7-8-9-10 reverse clutch which is part of the triple clutch housing (66) is applied and holding the output carrier internal gear transfer shell (71) which is splined to the reaction carrier (55) and the output carrier internal gear (74), both rotate at the same speed and direction.

9. Output Carrier Internal Gear Transfer Shell

The output carrier internal gear transfer shell is held by the 4-5-6-7-8-9-10 reverse clutch which is part of the triple clutch housing (66). The output carrier internal gear transfer shell rotates at the same speed and direction as the triple clutch housing (66).

10. Output Carrier Internal Gear Driving

The output carrier internal gear (74) which is splined to the output carrier internal gear transfer shell (71) is driving the output carrier (38) and rotates at the same speed and direction.

11. Direct Overdrive Sun Gear Driving

The direct overdrive sun gear (68) which is splined to the direct overdrive sun gear shaft (65) rotates at the same speed and direction as the triple clutch housing (66) and the direct overdrive carrier (67).

12. Direct Overdrive Carrier Driven

The direct overdrive carrier (67) is driven by the direct overdrive sun gear (68).

13. Direct Overdrive Internal Gear Driven

The direct overdrive internal gear (551) which is splined to the output sun gear (572) is driven by the direct overdrive carrier (67).

14. 1-2-8-9-10 Reverse Clutch Assembly Applied

The 1-2-8-9-10 reverse clutch assembly (414-420) is applied and holding the low clutch roller (421) which is splined to the reaction sun gear (572) and held stationary.

15. Reaction Carrier Driven

The reaction carrier (55) Which is splined to the output carrier internal gear transfer shell (71) rotates at the same speed and direction.

Drive Range Ninth Gear

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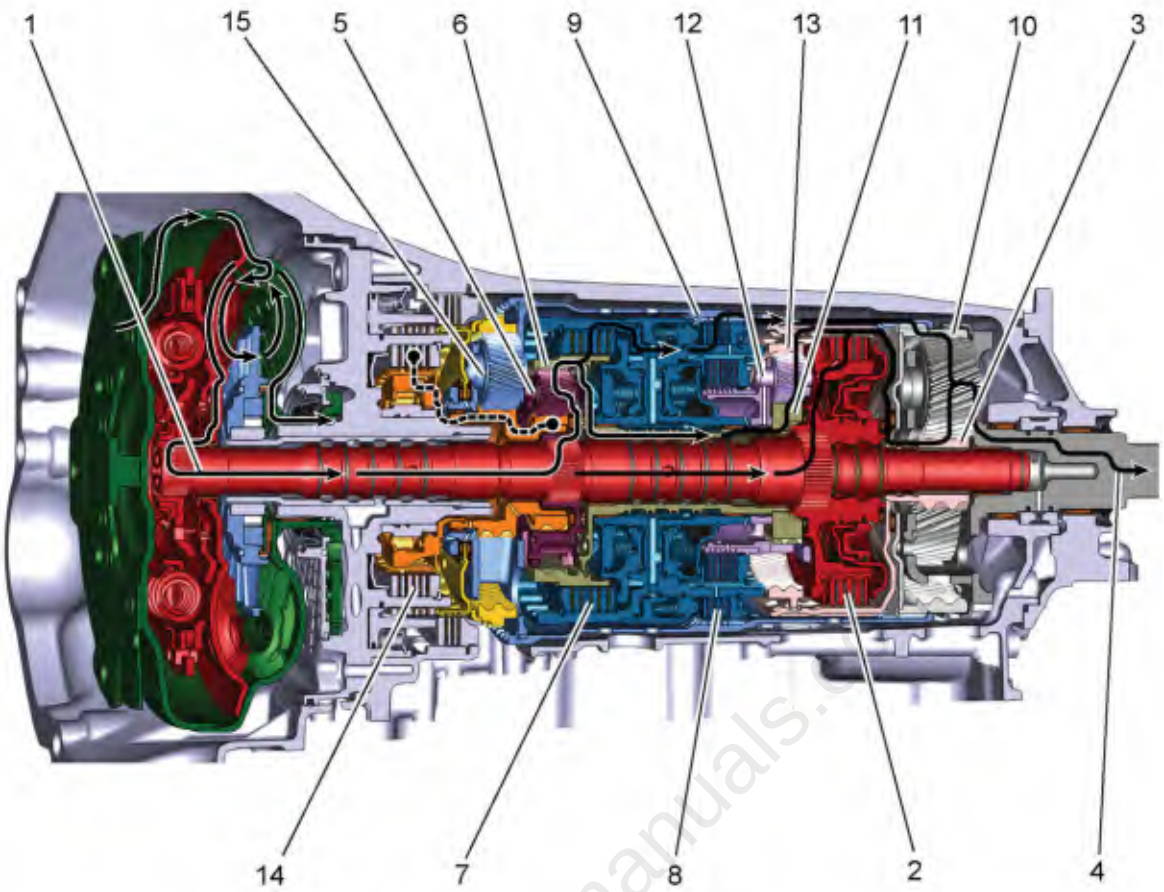


Fig. 23: Drive Range Mechanical Powerflow Diagram - Ninth Gear
Courtesy of GENERAL MOTORS COMPANY

DRIVE RANGE, NINTH GEAR (HYDRAULIC CIRCUITS)

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 energize or turn on. Shift solenoid valve C is commanded ON and Shift solenoid valve D is commanded OFF.

2-3-4-5-7-9-10 Clutch Applies

2-3-4-5-7-9-10 Clutch Regulator Valve

Shift solenoid valve C is energized and applying pressure against the 2-3-4-5-7-9-10 clutch regulator valve allowing LINE (2) fluid to enter the 234579-10 CLUTCH (27) fluid circuit. 234579-10 CLUTCH (27) fluid is directed to the 2-3-4-5-7-9-10 clutch assembly. Fluid is also directed through orifice # 70 to the # 7 ball check valve.

2-3-4-5-7-9-10 Clutch Assembly

234579-10 CLUTCH (27) fluid is directed through orifice # 19 into the 2-3-4-5-7-9-10 clutch assembly. 234579-10 CLUTCH (27) fluid moves the piston against spring force to apply holding of the 2-3-4-5-7-9-10 clutch plates.

1-2-3-4-6-7-8-10-R Clutch Releases

1-2-3-4-6-7-8-10-R Clutch Regulator Valve

Shift solenoid valve D is signaled off allowing 1234678-10 REVERSE CLUTCH (30) fluid to exhaust through orifice #20 and into the 1234678-10 REVERSE CLUTCH EXHAUST (32) fluid circuit. 1234678-10 REVERSE CLUTCH EXHAUST (32) fluid is directed to the exhaust backfill blow off valve through the EXHAUST BACKFILL (39) fluid circuit.

Drive Range, Ninth Gear

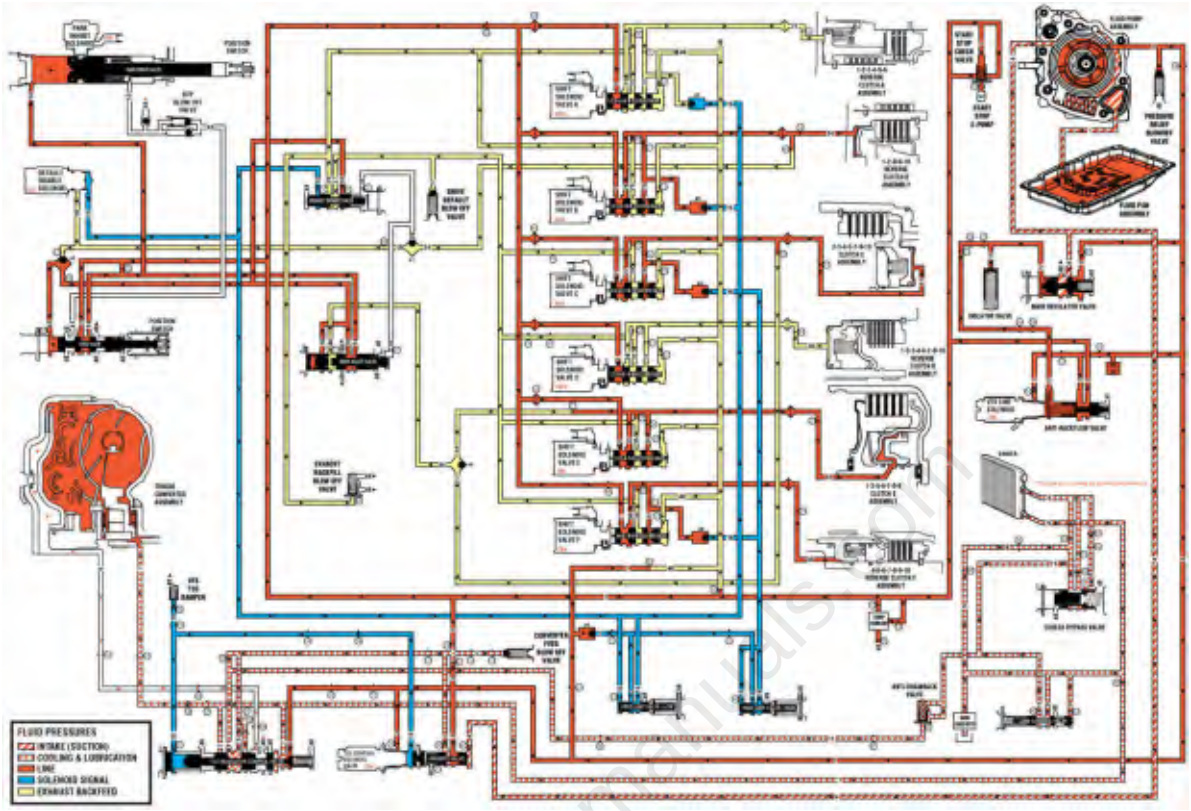


Fig. 24: Identifying Drive Range, Ninth Gear - Hydraulic Flow Diagram
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Suction
2	Line
3	Pump Out
4	Decrease
5	Converter Feed
6	TCC Release
7	TCC Apply
8	Cooler Feed
9	Lube
10	VFS-TCC
11	Converter Return
12	VFS Line
13	Park On
14	Park Off
15	Feed Limit - Low
16	Feed Limit - High
17	Drive Default
18	Drive Latch
19	ON/OFF Signal
20	On/Off 1289-10 Reverse Clutch

Callout	Component Name
21	123456 Reverse Clutch
22	123456 Reverse Clutch Feedback
23	123456 Reverse Clutch Exhaust
24	1289-10 Reverse Clutch
25	1289-10 Reverse Clutch Feedback
26	1289-10 Reverse Clutch Exhaust
27	234579-10 Clutch
28	234579-10 Clutch Feedback
29	234579-10 Clutch Exhaust
30	1234678-10 Reverse Clutch
31	1234678-10 Reverse Clutch Feedback
32	1234678-10 Reverse Clutch Exhaust
33	1356789 Clutch
34	1356789 Clutch Feedback
35	1356789 Clutch Exhaust
36	456789-10 Reverse Clutch
37	456789-10 Reverse Clutch Feedback
38	456789-10 Reverse Clutch Exhaust
39	Exhaust Backfill
40	Exhaust
41	Return to Park
42	On/Off Drive Latch
44	234579-10/1356789 Clutch

DRIVE RANGE, TENTH GEAR (MECHANICAL POWERFLOW)

Note: The component callouts in the text refer to the component callout numbers in disassembled views. **Disassembled Views (2WD)** , or **Disassembled Views (AWD)**

To maximize engine performance and fuel economy, a 10th gear is used to achieve an approximate ratio of 0.636:1 through the transmission gearset to the vehicle drive shaft. This allows the vehicle to maintain a given road speed with less engine output speed. When the throttle is released in 10th Gear, the vehicle is allowed to coast brake. Because the low clutch roller assembly is not used in driving the vehicle during acceleration, there are no elements to overrun to allow the vehicle to coast freely. Therefore, engine compression slows the vehicle when the throttle is released until the transmission downshifts into 9th gear.

1. Power from Torque Converter

The power flows through the turbine shaft to the input carrier (62) which is splined to the turbine shaft (568) and rotate at the same speed and direction.

2. Input Carrier Driving

The power flows to the input carrier (62) which is splined to the turbine shaft (568) and rotates at the same speed and direction. Power flow continues through the input carrier pinion gears which are driving the direct overdrive sun gear shaft (65).

3. Direct Overdrive Sun Gear Shaft Driven

The input internal gear (500) which is splined to the direct overdrive sun gear shaft (65) and rotates at the same speed and direction is driven by the input carrier (62) pinion gears.

4. 2-3-4-5-7-9-10 Clutch Assembly Applied

The 2-3-4-5-7-9-10 clutch which is part of the triple clutch housing (66) is applied and holding the input internal gear (500) which is splined to the direct overdrive sun gear shaft (65) and rotates at the same speed and direction.

5. 4-5-6-7-8-9-10 Reverse Clutch Assembly Applied

The 4-5-6-7-8-9-10 reverse clutch which is part of the triple clutch housing (66) is applied and holding the output carrier internal gear transfer shell (71) which is splined to the reaction carrier (55) and the output carrier internal gear (74), both rotate at the same speed and direction.

6. Output Carrier Internal Gear Transfer Shell

The output carrier internal gear transfer shell is held by the 4-5-6-7-8-9-10 reverse clutch which is part of the triple clutch housing (66). The output carrier internal gear transfer shell rotates at the same speed and direction as the triple clutch housing (66) and the direct overdrive sun gear (68).

7. Output Carrier Internal Gear Driving

The output carrier internal gear (74) which is splined to the output carrier internal gear transfer shell (71) is driving the output carrier (38).

8. 1-2-3-4-6-7-8-10 Reverse Clutch Assembly Applied

The 1-2-3-4-6-7-8-10 reverse clutch which is part of the triple clutch housing (66) is applied and holding the direct overdrive carrier (67) and rotates at the same speed and direction.

9. Direct Overdrive Carrier

The direct overdrive carrier (67) is held by the 1-2-3-4-6-7-8-10 reverse clutch which is part of the triple clutch housing (66). The direct overdrive carrier rotates at the same speed and direction as the triple clutch housing (66) and the direct overdrive sun gear (68).

10. Direct Overdrive Sun Gear Driving

The direct overdrive sun gear (68) which is splined to the direct overdrive sun gear shaft (65) rotates at the same speed and direction as the triple clutch housing (66) and the direct overdrive carrier (67).

11. Direct Overdrive Internal Gear Driven

The direct overdrive internal gear (551) which is splined to the output sun gear (572) is driven by the direct overdrive carrier (67) at the same speed and direction.

12. Output Sun Gear Driving

The output sun gear (572) is driving the output carrier (38) pinion gears.

13. Output Carrier Driven

Powerflow continues through the output sun gear (572). Which drives the output carrier (38) pinions to achieve the 10^{th} gear starting ratio of approximately 0.636:1.

14. Reaction Carrier Driven

The reaction carrier (55) Which is splined to the output carrier internal gear transfer shell (71) rotates at the same speed and direction.

15. 1-2-3-4-5-6 Reverse Clutch Assembly Applied

The 1-2-3-4-5-6 reverse clutch assembly (30-35) is applied and holding the reaction internal gear (52).

Drive Range Tenth Gear

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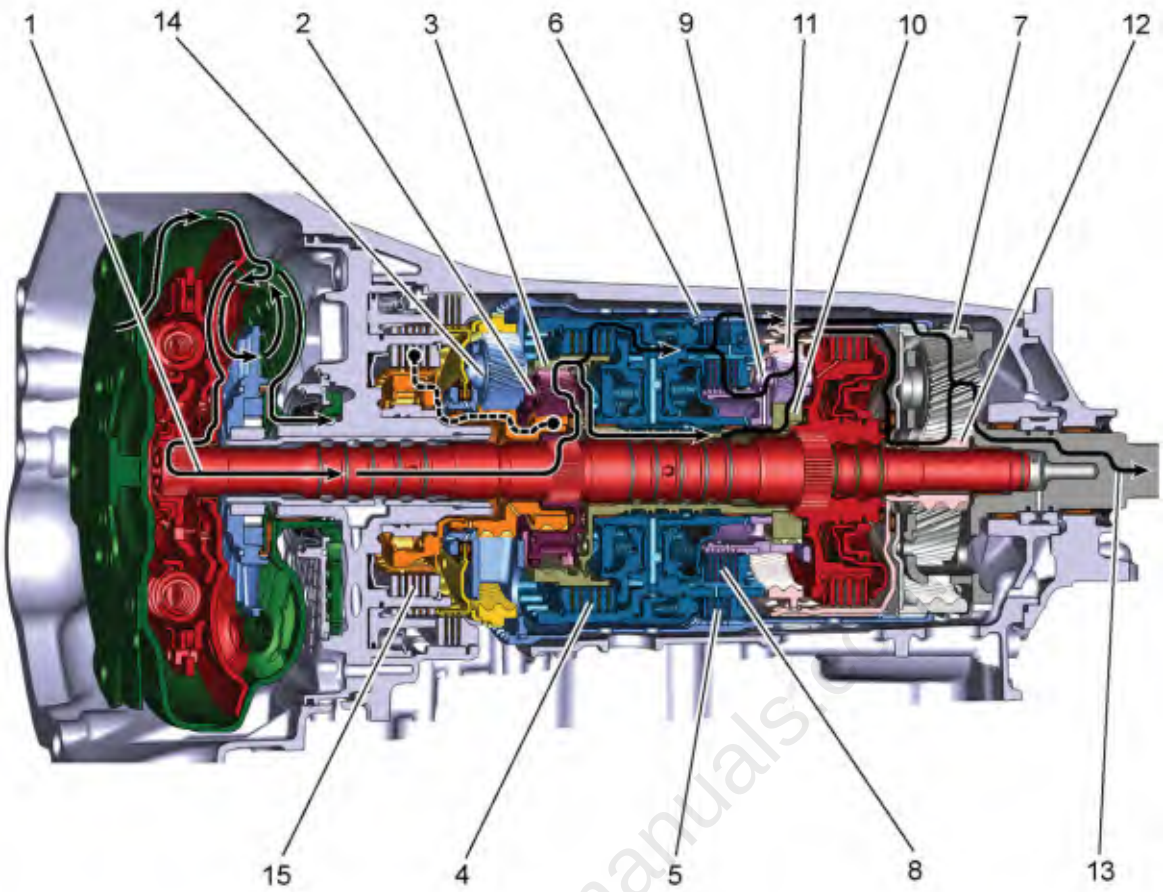


Fig. 25: Drive Range Mechanical Powerflow Diagram - Tenth Gear
Courtesy of GENERAL MOTORS COMPANY

DRIVE RANGE, TENTH GEAR (HYDRAULIC CIRCUITS)

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 energize or turn on. Shift solenoid valve D is commanded ON and Shift solenoid valve E is commanded OFF.

1-2-3-4-6-7-8-10 Reverse Clutch Applies

1-2-3-4-6-7-8-10 Reverse Clutch Regulator Valve

Shift solenoid valve D is energized and applying pressure against the 1-2-3-4-6-7-8-10 reverse clutch regulator valve allowing LINE (2) fluid to enter the 1234678-10R CLUTCH (30) fluid circuit. 1234678-10R CLUTCH (30) fluid is also directed through orifice #21 into the 1234678-10R CLUTCH FEEDBACK (31) fluid passage to the 1-2-3-4-6-7-8-10 reverse clutch regulator valve.

1-2-3-4-6-7-8-10 Reverse Clutch Assembly

1234678-10R CLUTCH (30) fluid is directed through orifice # 24 into the 1-2-3-4-6-7-8-10 reverse clutch assembly. 1234678-10R CLUTCH (30) fluid moves the piston against spring force to apply holding of the 1-2-3-4-6-7-8-10 reverse clutch plates.

1-3-5-6-7-8-9 Clutch Releases

1-3-5-6-7-8-9 Clutch Regulator Valve

Shift solenoid valve E is signaled off allowing 1356789 CLUTCH (33) fluid to exhaust through orifice #25 and into the 1356789 CLUTCH EXHAUST (35) fluid circuit. 1356789 CLUTCH EXHAUST (35) fluid is directed through the DRIVE DEFAULT (17) fluid circuit to the exhaust backfill blow off valve through the EXHAUST BACKFILL (39) fluid circuit.

Drive Range, Tenth Gear

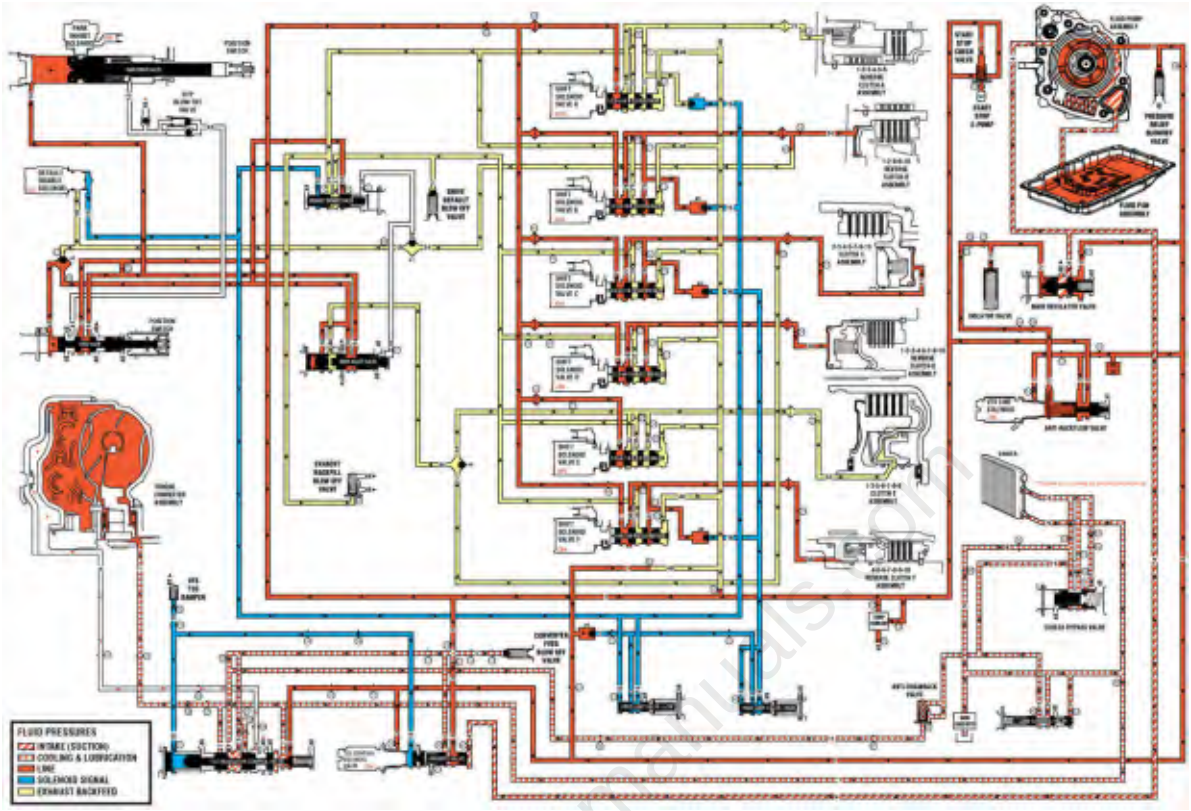


Fig. 26: Identifying Drive Range, Tenth Gear - Hydraulic Flow Diagram
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Suction
2	Line
3	Pump Out
4	Decrease
5	Converter Feed
6	TCC Release
7	TCC Apply
8	Cooler Feed
9	Lube
10	VFS-TCC
11	Converter Return
12	VFS Line
13	Park On
14	Park Off
15	Feed Limit - Low
16	Feed Limit - High
17	Drive Default
18	Drive Latch
19	ON/OFF Signal
20	On/Off 1289-10 Reverse Clutch

Callout	Component Name
21	123456 Reverse Clutch
22	123456 Reverse Clutch Feedback
23	123456 Reverse Clutch Exhaust
24	1289-10 Reverse Clutch
25	1289-10 Reverse Clutch Feedback
26	1289-10 Reverse Clutch Exhaust
27	234579-10 Clutch
28	234579-10 Clutch Feedback
29	234579-10 Clutch Exhaust
30	1234678-10 Reverse Clutch
31	1234678-10 Reverse Clutch Feedback
32	1234678-10 Reverse Clutch Exhaust
33	1356789 Clutch
34	1356789 Clutch Feedback
35	1356789 Clutch Exhaust
36	456789-10 Reverse Clutch
37	456789-10 Reverse Clutch Feedback
38	456789-10 Reverse Clutch Exhaust
39	Exhaust Backfill
40	Exhaust
41	Return to Park
42	On/Off Drive Latch
44	234579-10/1356789 Clutch

FLUID PASSAGES

Auxiliary Control Valve Body - Auxiliary Control Valve Body Spacer Plate Side

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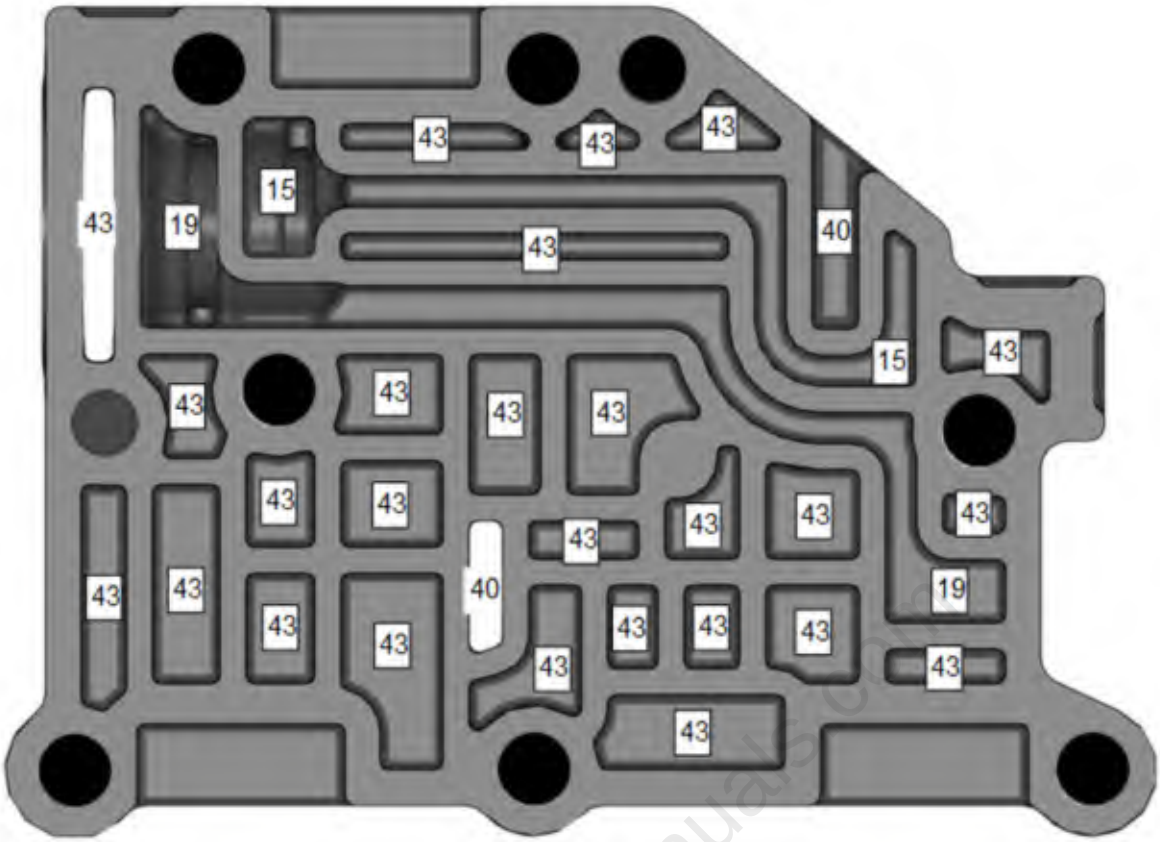


Fig. 27: Identifying Auxiliary Control Valve Body Fluid Passage Components - Auxiliary Control Valve Body Spacer Plate Side
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
15	Feed Limit Low
19	ON/OFF Signal
40	Exhaust
43	Void

Auxiliary Control Valve Body Spacer Plate - Auxiliary Control Valve Body Side

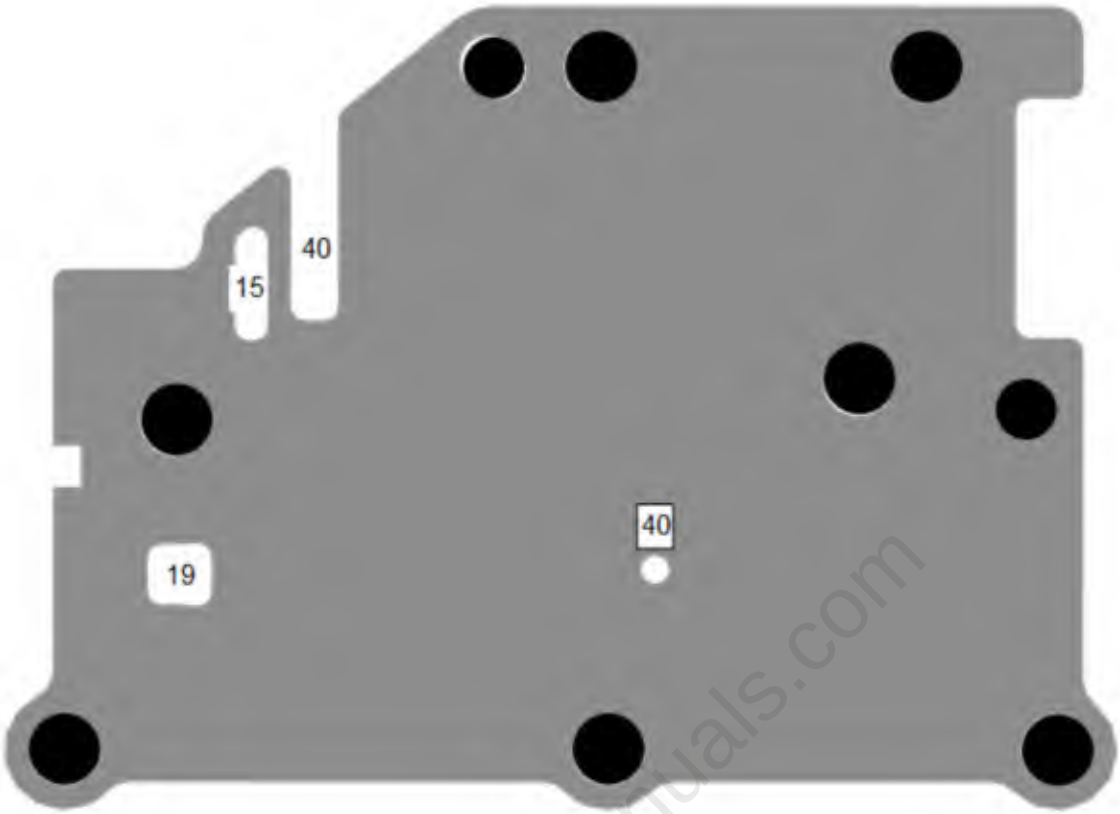


Fig. 28: Identifying Auxiliary Control Valve Body Spacer Plate Fluid Passage Components - Auxiliary Control Valve Body Side
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
15	Feed Limit Low
19	ON/OFF Signal
40	Exhaust

Control Valve Channel Plate - Fluid Pan Side

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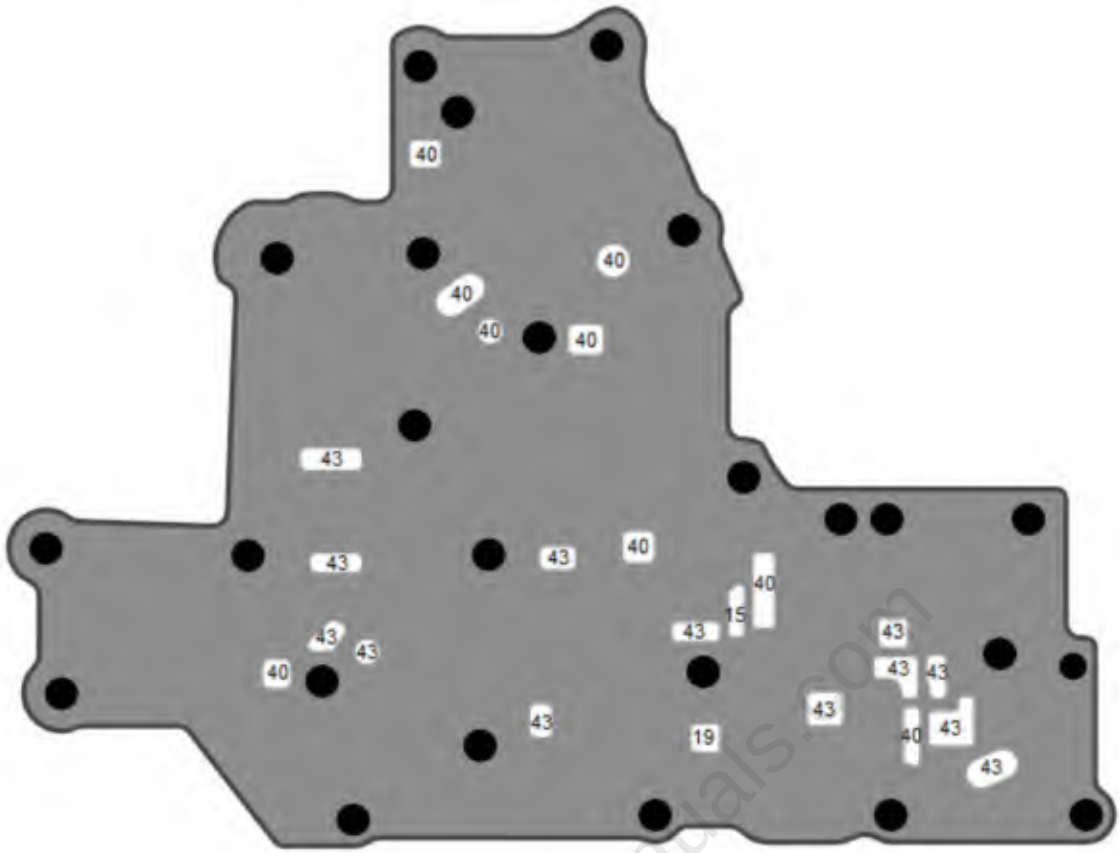


Fig. 29: Identifying Control Valve Channel Plate Fluid Passage Components - Fluid Pan Side
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
15	Feed Limit Low
19	ON/OFF Signal
40	Exhaust
43	Void

Control Valve Spacer Plate - Control Valve Channel Plate Side

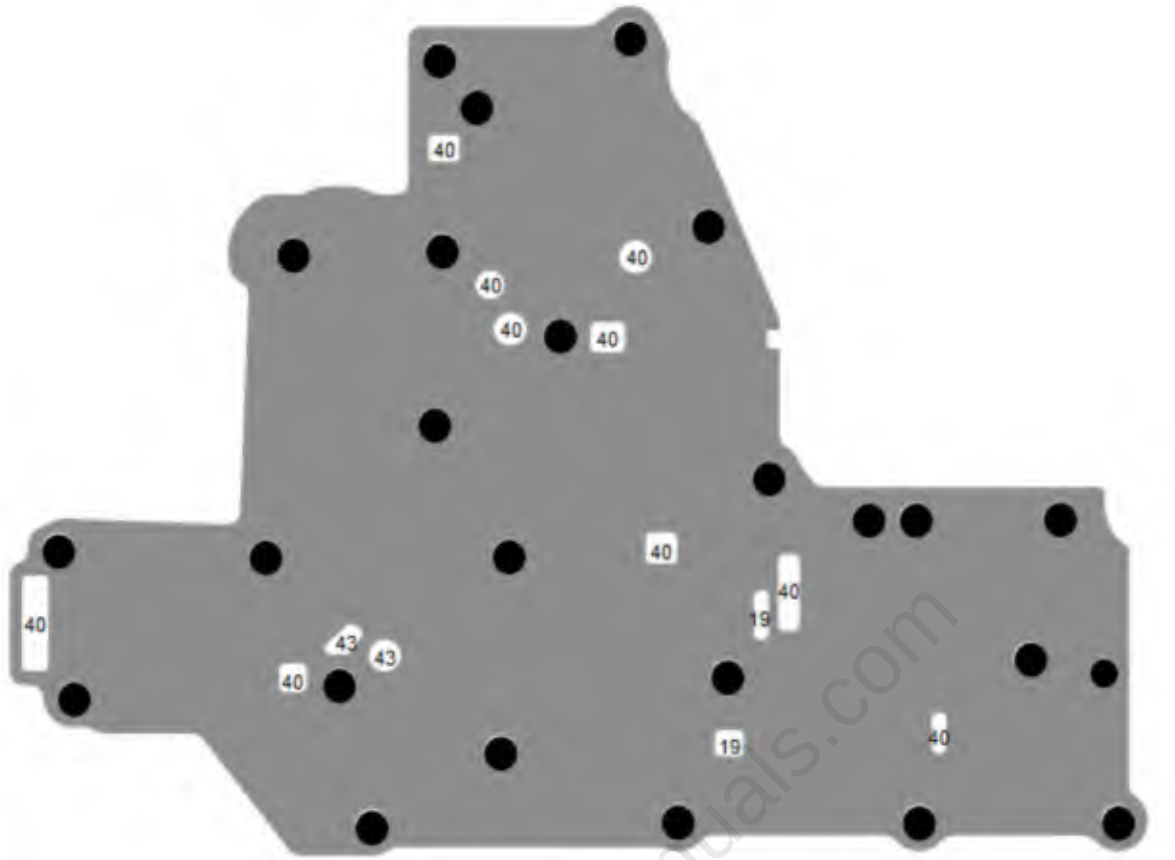


Fig. 30: Identifying Control Valve Spacer Plate Fluid Passage Components - Control Valve Channel Plate Side

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
15	Feed Limit Low
19	ON/OFF Signal
40	Exhaust
43	Void

Control Valve Solenoid Body Assembly - Fluid Pan Side

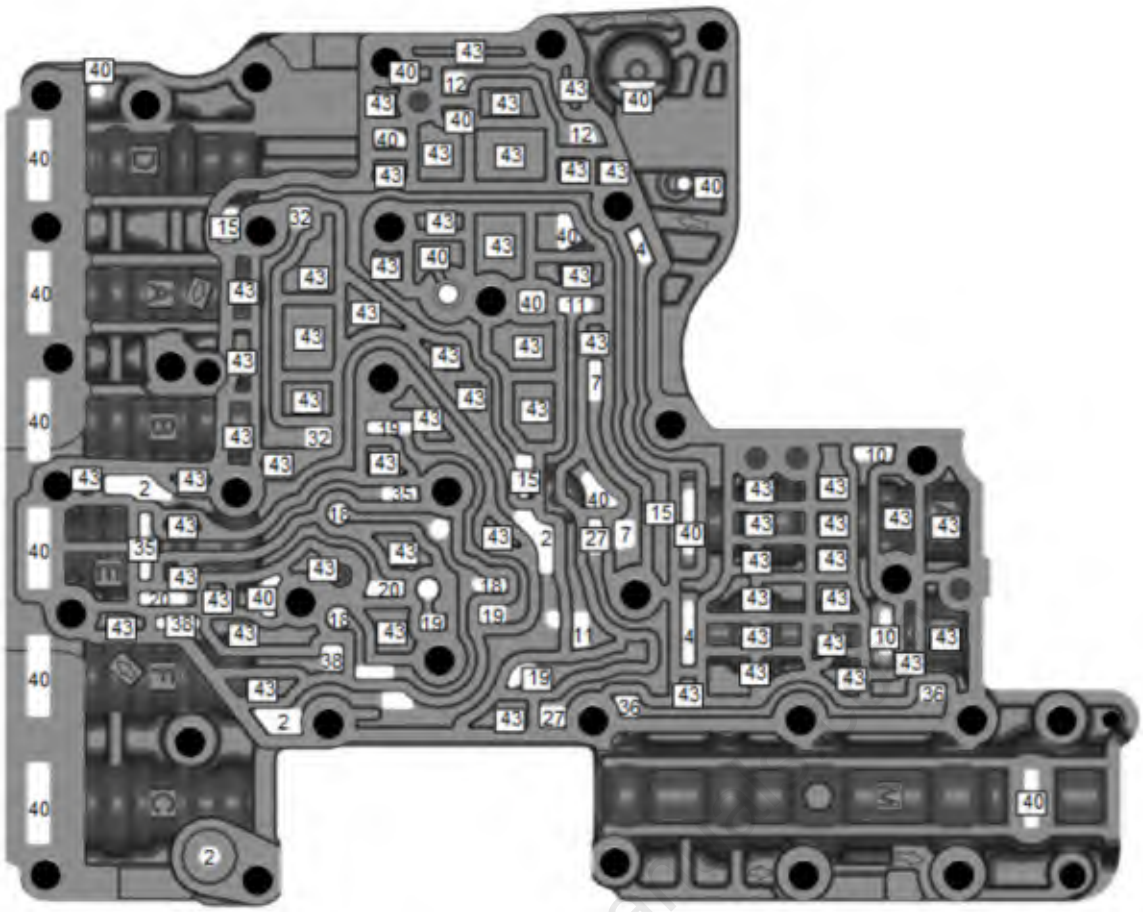


Fig. 31: Identifying Control Valve Solenoid Body Assembly Fluid Passage Components - Fluid Pan Side
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
2	Line
4	Decrease
7	TCC Apply
10	VFS-TCC
11	Converter Return
12	VFS Line
14	Reverse
15	Feed Limit Low
18	Reverse Default
19	ON/OFF Signal
27	2-3-4-5-7-9-10 Clutch
32	4-5-6-7-8-9-10-Reverse Clutch Exhaust
35	1-3-5-6-7-8-9 Clutch Exhaust
36	1-2-3-4-6-7-8-10-Reverse Clutch
43	Void

Control Valve Solenoid Body Assembly - Control Valve Upper Body Assembly Side

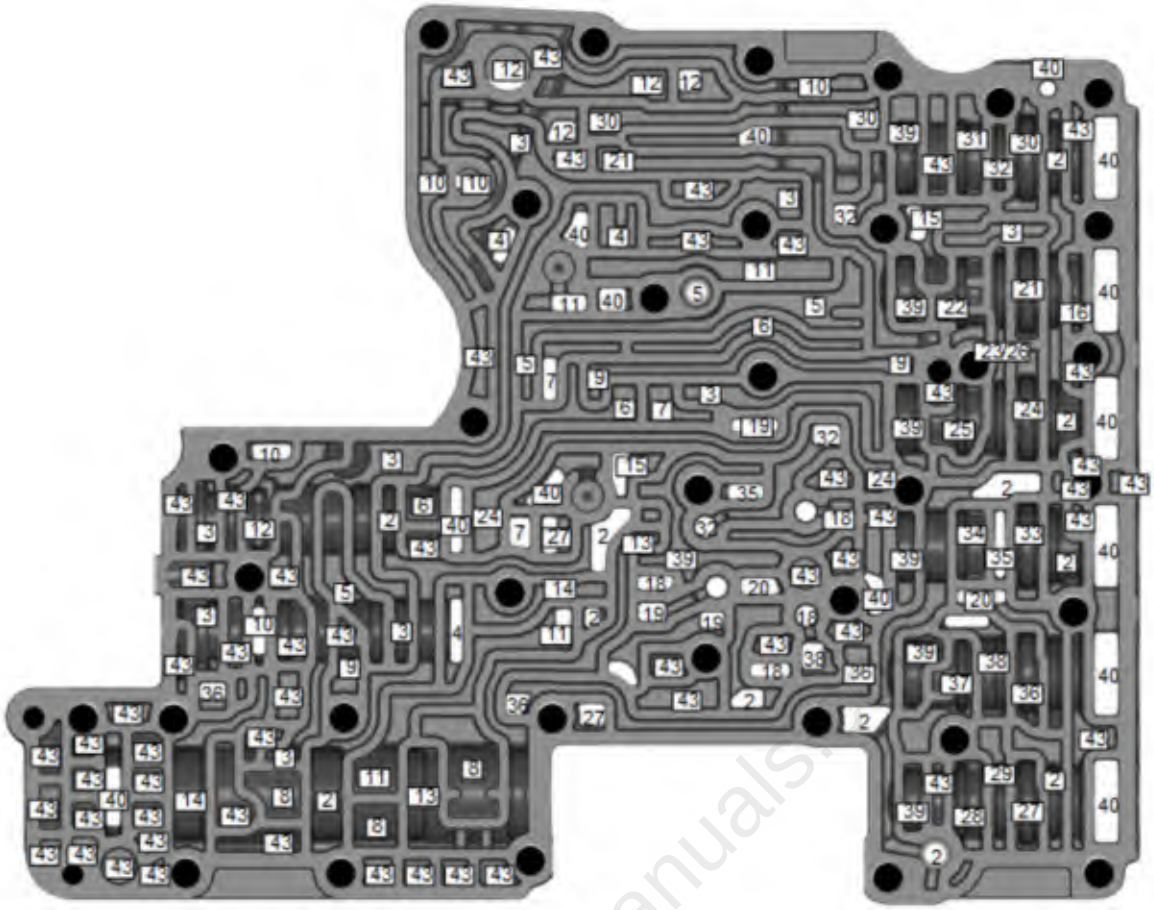


Fig. 32: Identifying Control Valve Solenoid Body Assembly Fluid Passage Components - Control Valve Upper Body Assembly Side
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
2	Line
3	Secondary Line
4	Decrease
5	Converter Feed
6	TCC Release
7	TCC Apply
8	Cooler Feed
10	VFS-TCC
11	Converter Return
12	VFS Line
13	Drive
14	Reverse
16	Feed Limit High
18	Reverse Default
19	ON/OFF Signal
21	1-2-3-4-5-6-Reverse Clutch
22	1-2-3-4-5-6-Reverse Clutch Feedback
23	1-2-3-4-5-6-Reverse Clutch Exhaust
24	1-2-8-9-10-Reverse Clutch

Callout	Component Name
25	1-2-8-9-10-Reverse Clutch Feedback
27	2-3-4-5-7-9-10 Clutch
28	2-3-4-5-7-9-10 Clutch Feedback
30	4-5-6-7-8-9-10-Reverse Clutch
31	4-5-6-7-8-9-10-Reverse Clutch Feedback
32	4-5-6-7-8-9-10-Reverse Clutch Exhaust
33	1-3-5-6-7-8-9 Clutch
35	1-3-5-6-7-8-9 Clutch Exhaust
36	1-2-3-4-6-7-8-10-Reverse Clutch
37	1-2-3-4-6-7-8-10-Reverse Clutch Feedback
39	Exhaust Backfill
40	Exhaust
43	Void

Control Valve Body Spacer Plate - Control Valve Solenoid Body Assembly Side

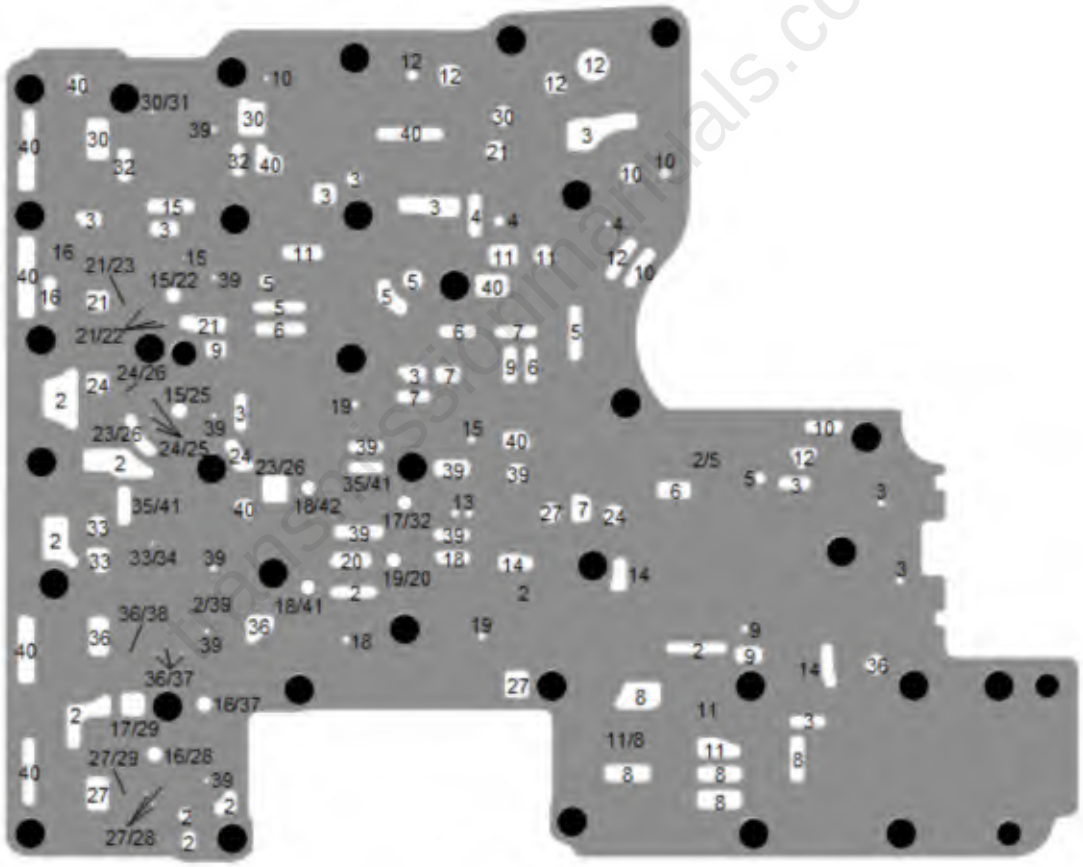


Fig. 33: Identifying Control Valve Body Spacer Plate Fluid Passage Components - Control Valve Solenoid Body Assembly Side
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
2	Line
3	Secondary Line

Callout	Component Name
4	Decrease
5	Converter Feed
6	TCC Release
7	TCC Apply
8	Cooler Feed
9	Lube
10	VFS-TCC
11	Converter Return
12	VFS Line
13	Drive
14	Reverse
15	Feed Limit Low
16	Feed Limit High
17	Drive Default
18	Reverse Default
19	ON/OFF Signal
20	1-2-3-4-6-7-8-10-Reverse Clutch Feedback
21	1-2-3-4-5-6-Reverse Clutch
22	1-2-3-4-5-6-Reverse Clutch Feedback
23	1-2-3-4-5-6-Reverse Clutch Exhaust
24	1-2-8-9-10-Reverse Clutch
25	1-2-8-9-10-Reverse Clutch Feedback
26	1-2-8-9-10-Reverse Clutch Exhaust
27	2-3-4-5-7-9-10 Clutch
28	2-3-4-5-7-9-10 Clutch Feedback
29	2-4-5-7-9-10 Clutch Exhaust
30	4-5-6-7-8-9-10-Reverse Clutch
31	4-5-6-7-8-9-10-Reverse Clutch Feedback
32	4-5-6-7-8-9-10-Reverse Clutch Exhaust
33	1-3-5-6-7-8-9 Clutch
34	1-3-5-6-7-8-9 Clutch Feedback
35	1-3-5-6-7-8-9 Clutch Exhaust
36	1-2-3-4-6-7-8-10-Reverse Clutch
37	1-2-3-4-6-7-8-10-Reverse Clutch Feedback
38	1-2-3-4-6-7-8-10-Reverse Clutch Exhaust
39	Exhaust Backfill
40	Exhaust
41	1-3-5-6-7-8-9/1-2-3-4-6-7-8-10-Reverse Clutch Exhaust
42	1-2-3-4-5-6-Reverse/1-2-8-9-10 Clutch Exhaust

Control Valve Upper Body Assembly - Control Valve Solenoid Body Assembly Side

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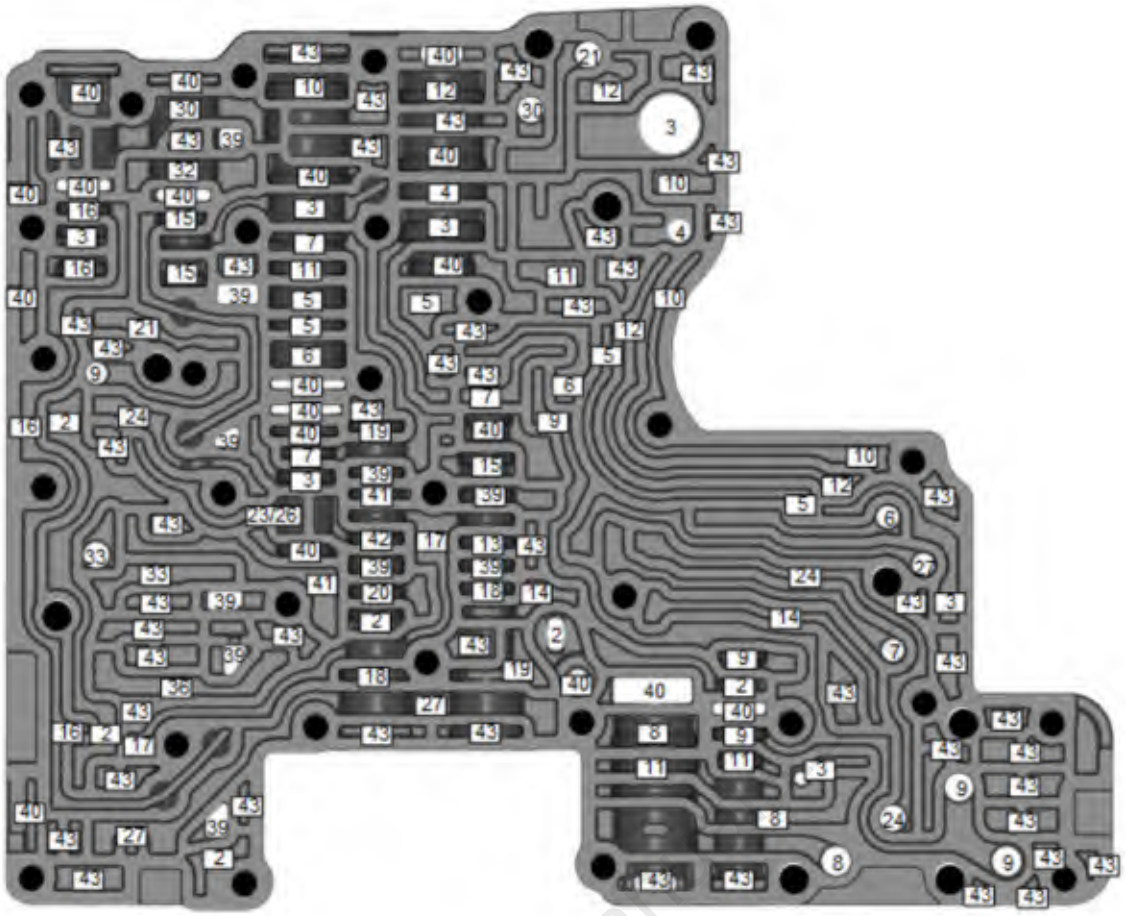


Fig. 34: Identifying Control Valve Upper Body Assembly Fluid Passage Components - Control Valve Solenoid Body Assembly Side
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Suction
2	Line
3	Secondary Line
4	Decrease
5	Converter Feed
6	TCC Release
7	TCC Apply
8	Cooler Feed
9	Lube
10	VFS-TCC
11	Converter Return
12	VFS Line
13	Drive
14	Reverse
15	Feed Limit Low
16	Feed Limit High
17	Drive Default
18	Reverse Default
19	ON/OFF Signal

Callout	Component Name
20	1-2-3-4-6-7-8-10-Reverse Clutch Feed
21	1-2-3-4-5-6-Reverse Clutch
23	1-2-3-4-5-6-Reverse Clutch Exhaust
24	1-2-8-9-10-Reverse Clutch
26	1-2-8-9-10-Reverse Clutch Exhaust
27	2-3-4-5-7-9-10 Clutch
30	4-5-6-7-8-9-10-Reverse Clutch
32	4-5-6-7-8-9-10-Reverse Clutch Exhaust
33	1-3-5-6-7-8-9 Clutch
36	1-2-3-4-6-7-8-10-Reverse Clutch
39	Exhaust Backfill
40	Exhaust
41	1-3-5-6-7-8-9/1-2-3-4-6-7-8-10-Reverse Clutch Exhaust
42	1-2-3-4-5-6-Reverse/1-2-8-9-10 Clutch Exhaust
43	Void

Control Valve Upper Body Assembly - Case Side

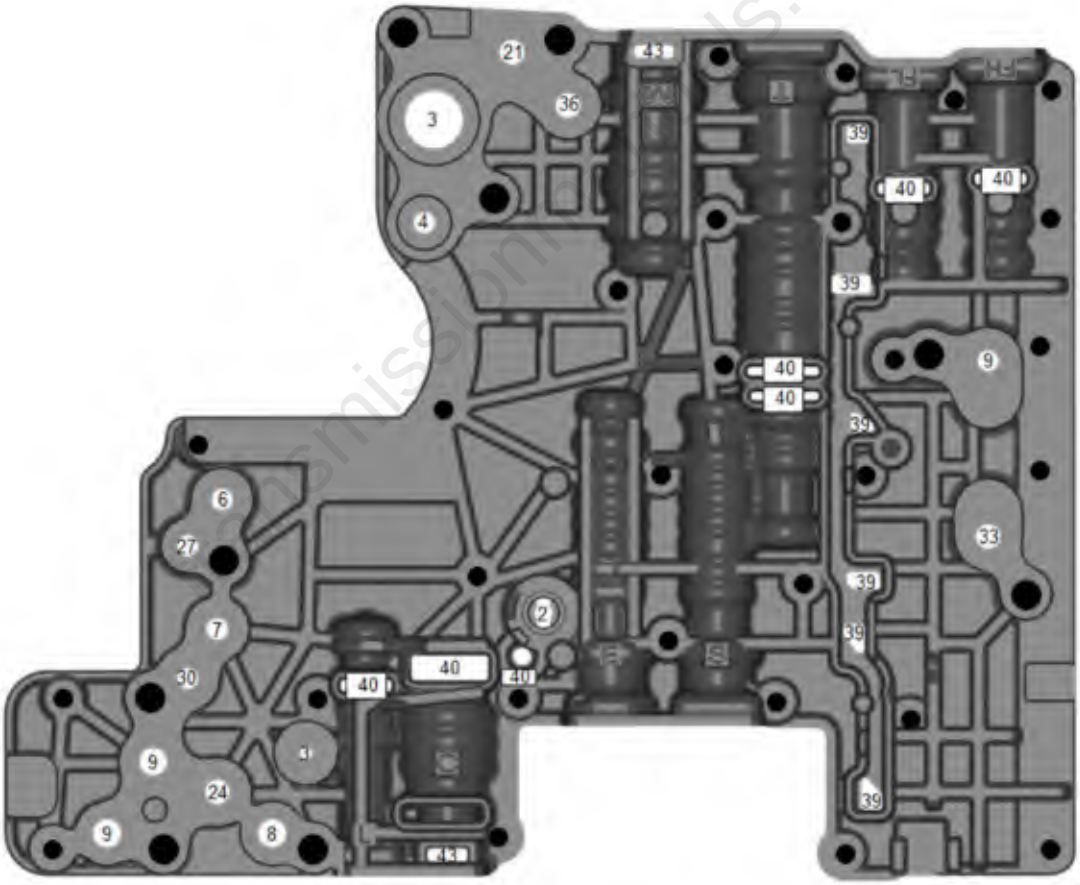


Fig. 35: Identifying Control Valve Upper Body Assembly Fluid Passage Components - Case Side
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
2	Line
3	Secondary Line

Callout	Component Name
4	Decrease
6	TCC Release
7	TCC Apply
8	Cooler Feed
9	Lube
21	1-2-3-4-5-6-Reverse Clutch
24	1-2-8-9-10-Reverse Clutch
27	2-3-4-5-7-9-10 Clutch
30	4-5-6-7-8-9-10-Reverse Clutch
33	1-3-5-6-7-8-9 Clutch
36	1-2-3-4-6-7-8-10-Reverse Clutch
39	Exhaust Backfill
40	Exhaust
43	Void

Case Assembly - Control Valve Upper Body Assembly Side

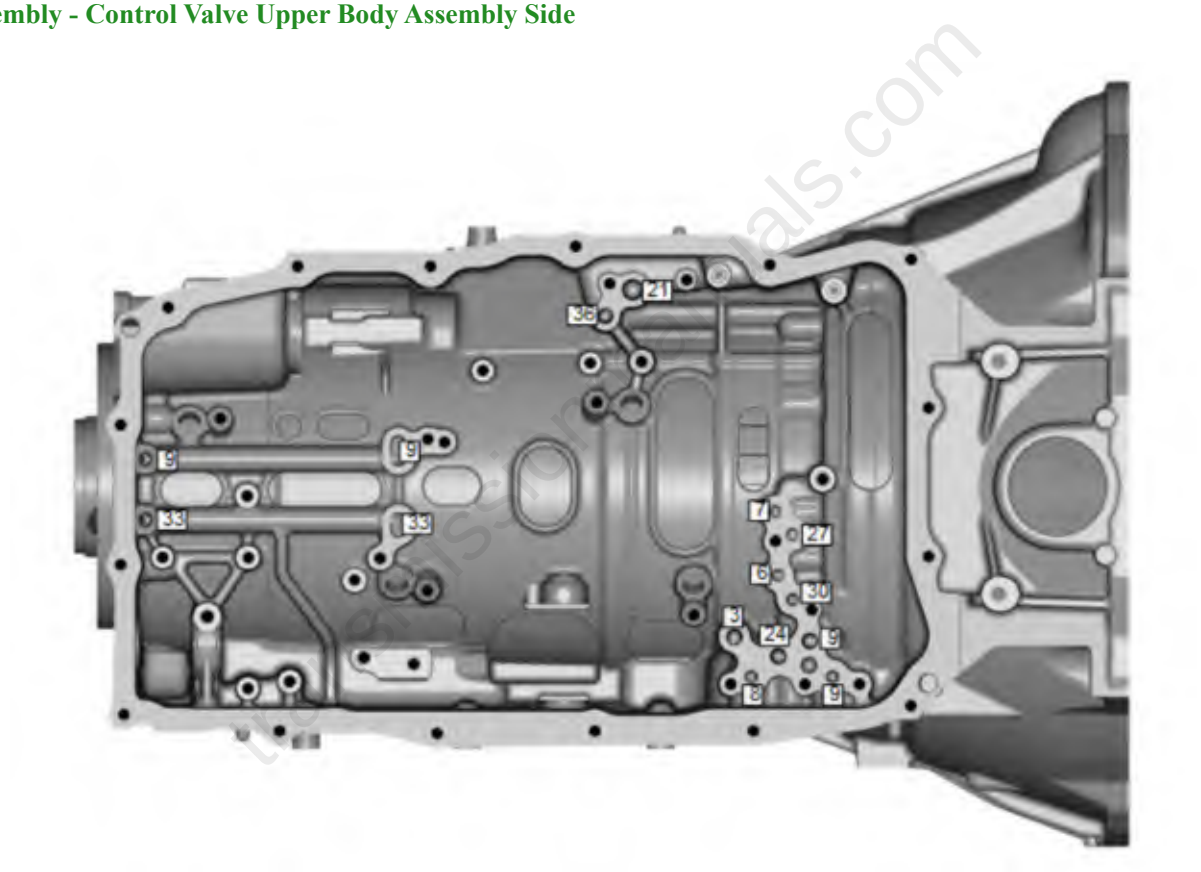


Fig. 36: Identifying Case Assembly Fluid Passage Components - Control Valve Upper Body Assembly Side
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
3	Secondary Line
6	TCC Release
7	TCC Apply
8	Cooler Feed
9	Lube
21	1-2-3-4-5-6-Reverse Clutch
24	1-2-8-9-10-Reverse Clutch
27	2-3-4-5-7-9-10 Clutch
30	4-5-6-7-8-9-10-Reverse Clutch

Callout	Component Name
33	1-3-5-6-7-8-9 Clutch
36	1-2-3-4-6-7-8-10-Reverse Clutch

Case Assembly - Stator Shaft Support Side



Fig. 37: Identifying Case Assembly Fluid Passage Components - Stator Shaft Support Side
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
6	TCC Release
7	TCC Apply
9	Lube
21	1-2-3-4-5-6-Reverse Clutch
24	1-2-8-9-10-Reverse Clutch
27	2-3-4-5-7-9-10 Clutch
30	4-5-6-7-8-9-10-Reverse Clutch
36	1-2-3-4-6-7-8-10-Reverse Clutch

Case Assembly - Case Extension Side

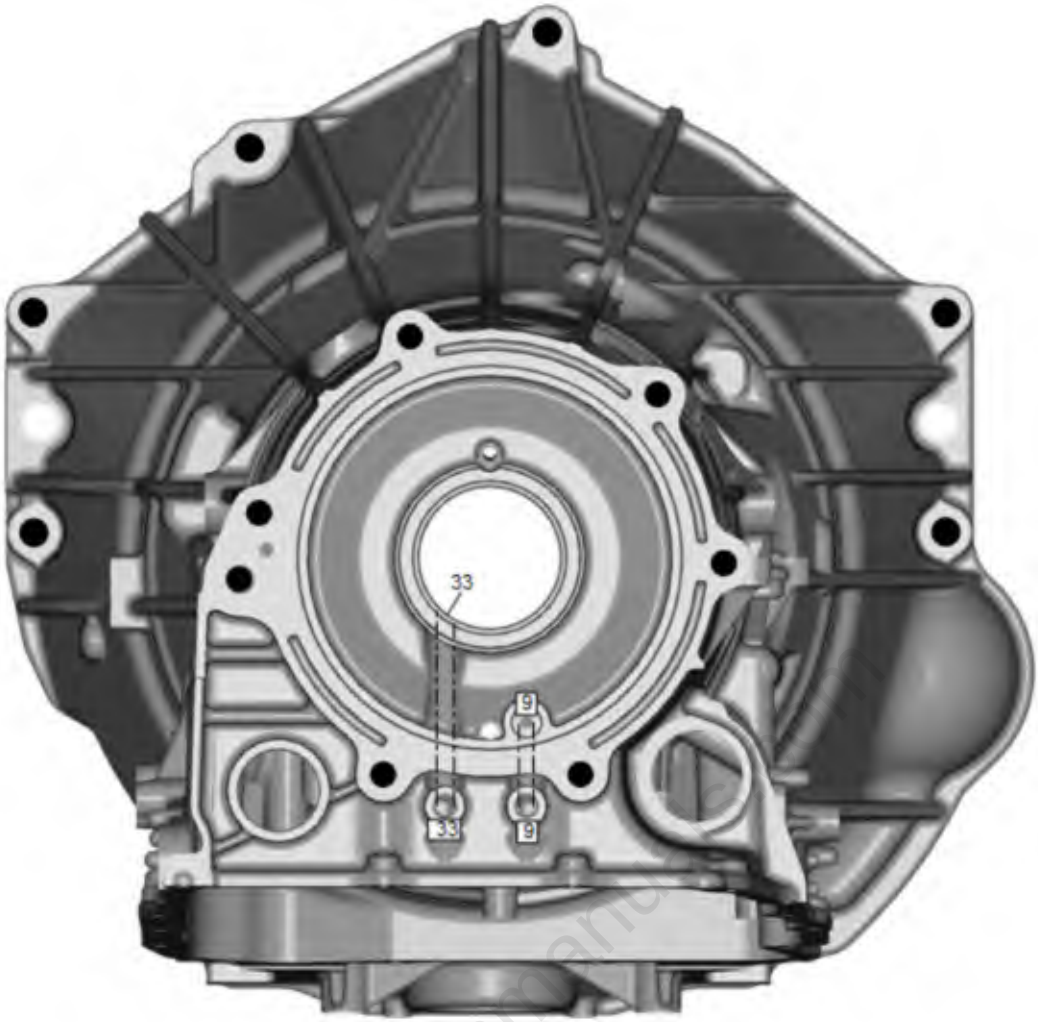


Fig. 38: Identifying Case Assembly Fluid Passage Components - Case Extension Side
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
9	Lube
33	1-3-5-6-7-8-9 Clutch

Stator Shaft Support Assembly - Case Assembly Side



Fig. 39: Identifying Stator Shaft Support Assembly Fluid Passage Components - Case Assembly Side
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
6	TCC Release
7	TCC Apply
8	Cooler Feed
9	Lube
21	1-2-3-4-5-6-Reverse Clutch
24	1-2-8-9-10-Reverse Clutch
27	2-3-4-5-7-9-10 Clutch
30	4-5-6-7-8-9-10-Reverse Clutch
36	1-2-3-4-6-7-8-10-Reverse Clutch

Fluid Pump Assembly - Control Valve Upper Body Assembly Side



Fig. 40: Identifying Fluid Pump Assembly Fluid Passage Components - Control Valve Upper Body Assembly Side
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Suction
2	Line
4	Decrease

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