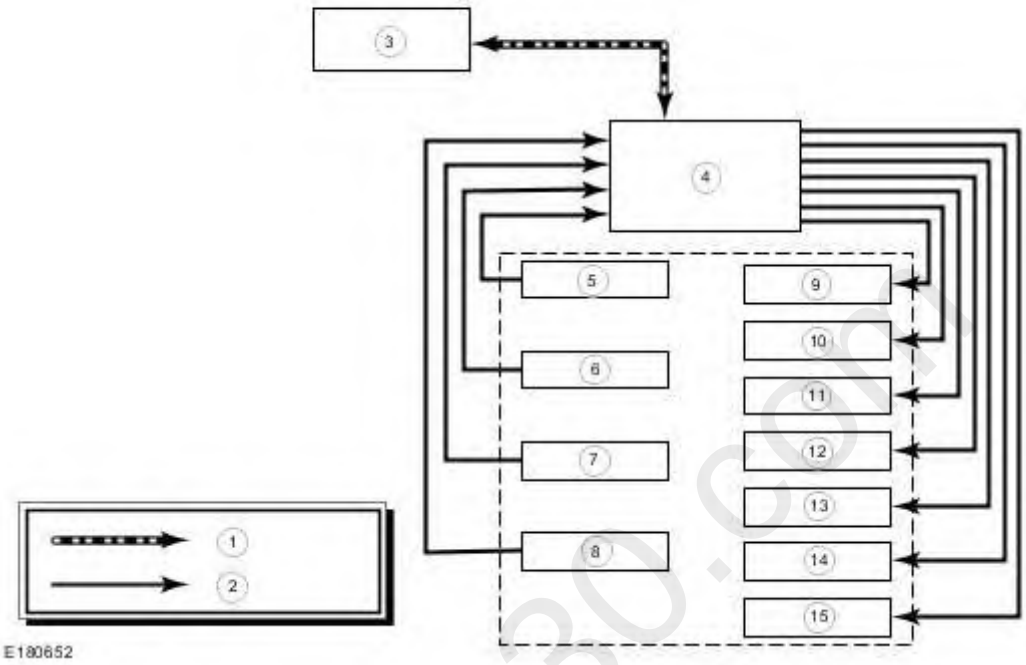
Automatic Transmission - 6-Speed Automatic Transmission - 6F55 - Transmission Description - System Operation and Component Description

Print

Description and Operation

System Diagram



Item	Description
1	HS-CAN (high speed-controller area network)
2	Hardwire Connection
3	PCM (powertrain control module)
4	TCM (transmission control module)
5	TFT (transmission fluid temperature)
6	TR (transmission range)
7	TSS (turbine shaft speed)
8	OSS (output shaft speed)
9	{Acronym.LPC} ({Acronym.LPC})
10	{Acronym.SSA} ({Acronym.SSA})
11	{Acronym.SSB} ({Acronym.SSB})
12	{Acronym.SSC} ({Acronym.SSC})
13	{Acronym.SSD} ({Acronym.SSD})
14	{Acronym.SSE} ({Acronym.SSE})
15	TCC (torque converter clutch)

Network Message Chart

Broadcast Message	Originating Module	Message Purpose
Engine Speed	TCM	

		Directly affects shift scheduling, TCC control, line pressure and transmission diagnostics. Indirectly affects shift pressure control.
Engine torque estimate	TCM	Directly affects shift pressure control, TCC control and transmission diagnostics. Indirectly affects shift scheduling and TCC scheduling.
APP (accelerator pedal position)	TCM	Directly affects shift scheduling, TCC scheduling and transmission diagnostics. Indirectly affects TCC control and shift control.
Commanded engine torque	TCM	Directly affects shift scheduling, TCC scheduling and transmission diagnostics. Indirectly affects shift control.
BPP (brake pedal position)	TCM	Directly affects shift scheduling and TCC scheduling.

System Operation

The TCM and its input/output network controls the following operations:

Shift timing

Line pressure (shift feel)

Transmission operation is controlled by an external TCM located in the LHS front wheel arch.

The transmission control strategy is separate from the engine control strategy by an external TCM, located in the LHS front wheel arch. Although some of the input signals are shared. When determining the best operating strategy for transmission operation, the TCM uses input information from engine and driver related sensors and switches.

In addition, the TCM receives input signals from transmission related sensors and switches. The TCM uses these signals when determining transmission operating strategy.

Using all of these input signals, the TCM can determine when the time and conditions are right for a shift or when to apply or release the TCC. It also determines the best line pressure to optimize shift engagement feel. To accomplish this, the TCM uses output solenoids to control transmission operation.

Component Description

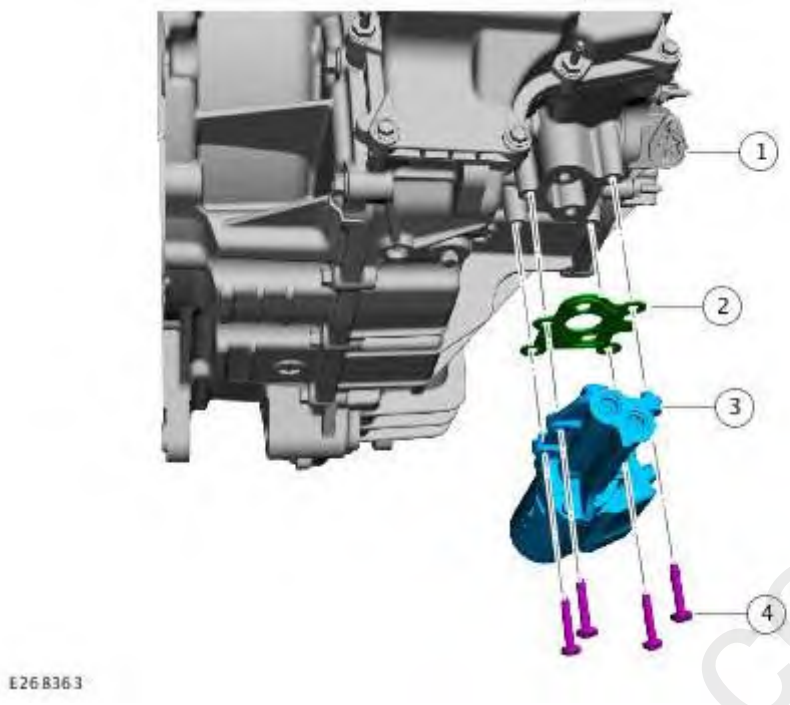
Sensors and Switches

The TCM controls the electronic functions of this transmission. The TCM receives input signals from engine and transmission sensors and uses these inputs to control line pressure, shift time, TCC and shift solenoids.

Item	Description
TFT Sensor	This sensor is located in the transmission solenoid body. It is a temperature-sensitive device called a thermistor. The resistance value of the TFT sensor will vary with temperature change. The TCM monitors the voltage across the TFT sensor to determine the temperature of the transmission fluid. The TCM uses this initial signal to determine whether a cold start shift schedule is necessary. The cold start shift schedule allows delayed shifts when the transmission fluid is cold to help warm the transmission fluid. The TCM also inhibits TCC operation at low transmission fluid temperatures and adjusts line pressure for temperature.
TR Sensor	The TR sensor has a 6-pin electrical connector. The TR sensor is located on the inside of the transmission at the manual control lever. The TR sensor sends a signal to the TCM/PCM to start the vehicle in PARK and NEUTRAL. The TR sensor opens/ closes a set of 4 switches that are monitored by the TCM to determine the position of the manual control lever.
TSS Sensor	This TSS sensor is a Hall-effect pickup that sends a signal to the TCM that indicates transmission turbine shaft input speed. The TSS information is compared to engine rpm to determine TSS performance. TSS is also compared to OSS to determine shift quality and clutch performance.

OSS Sensor	The OSS sensor is a Hall-effect pickup, located on the transfer shaft drive gear, that sends a signal to the TCM to indicate transmission output speed. The OSS is used for shift scheduling. OSS is also compared to TSS to determine shift quality and clutch performance.

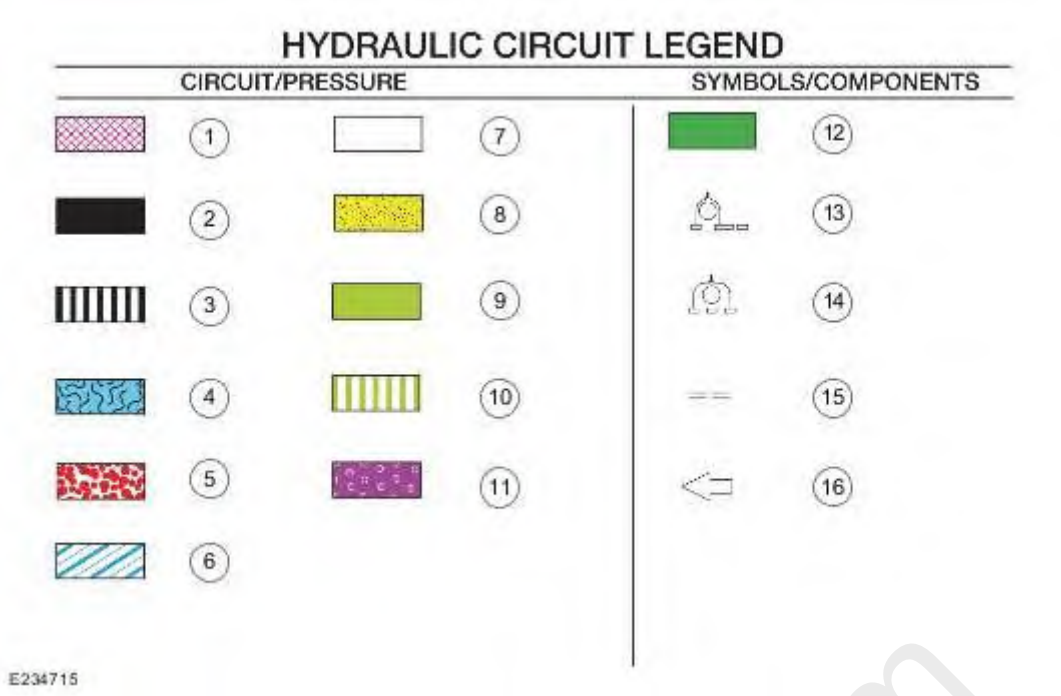
Transmission Fluid Auxiliary Pump Components



Item	Description
1	Transmission assembly
2	Gasket - Transmission fluid auxiliary pump-to-transmission case
3	Transmission fluid auxiliary pump
4	Transmission fluid auxiliary pump-to-transmission case bolts

Mechanical Operation

The transmission fluid auxiliary pump is an electric external pump bolted to the transmission case that draws fluid from the sump area of the transmission. The transmission fluid auxiliary pump maintains line pressure during engine shut down on vehicles equipped with the Auto-Start-Stop System. The transmission auxiliary fluid pump is controlled by the TCM.



Item	Description
1	Decrease Pressure (Line Pressure Control)
2	Line Pressure 353-2.206 kPa (52-320 psi)
3	Regulated Pressure 0-2.206 kPa (0-320 psi)
4	Compensator Pressure 62 kPa (9 psi)
5	Transmission Fluid Cooler Feed/Lubricant 0-758 kPa (0-110 psi)
6	Torque Converter Clutch (TCC) Pressure 0-1.138 kPa (0-165 psi)
7	No Pressure
8	Exhaust Circuit Approximately 21 kPa (3 psi)
9	Solenoid Feed Circuit/Full Solenoid Pressure 896 kPa (130 psi)
10	Variable Solenoid Pressure 0-896 kPa (0-130 psi)
11	Feddback Pressure 0-407 kPa (0-59 psi)
12	Valves/Pucks/Pistons
13	Ball Check
14	Shuttle Ball
15	Orifice
16	Fluid Direction

HYDRAULIC CIRCUIT IDENTIFICATION CHART

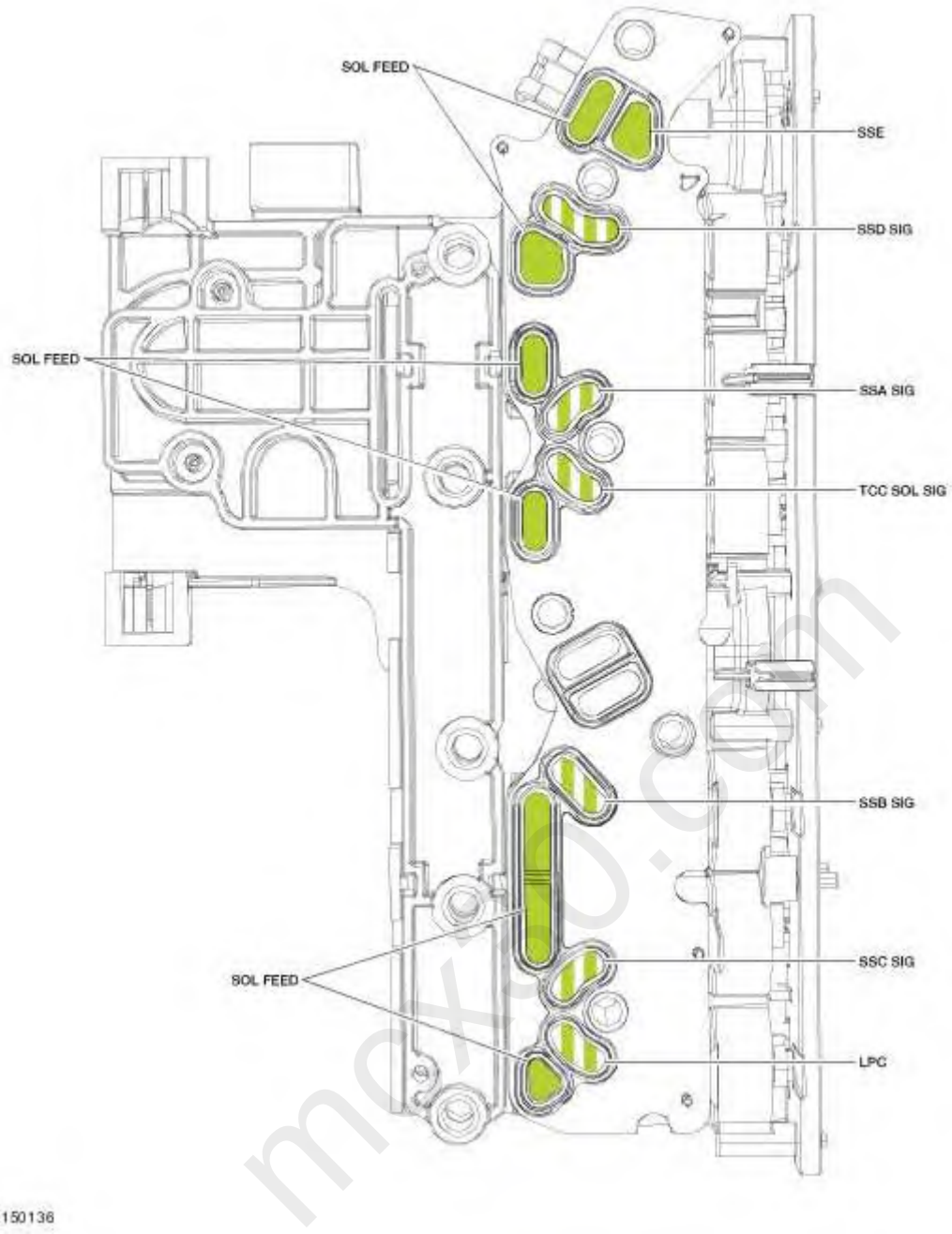
Circuit Name	Description
CB1234	Regulated pressure from the forward (1, 2, 3, 4) clutch regulator valve to the forward clutch.
CB1234 FDBK	CB1234 pressure from the CB1234 boost valve supplied to the CB1234 clutch regulator valve to oppose movement of the valve from {Acronym.SSA} SIG pressure during forward (1, 2, 3, 4) clutch application.
CB1234 SUP	CB26FD/CB1234FD pressure supplied to the CB1234 regulator valve downstream of the CB26FD/CB1234FD check ball.
CB26	Regulated pressure supplied to the intermediate (2, 6) clutch in 2nd and 6th gears.
CB26FD/CB1234FD	DRIVE 2 or DRIVE B pressure directed to the CB26 and CB1234 regulator valves by the DRIVE 2/DRIVE B shuttle ball.
C35R	

	Regulated C35R SUPPLY pressure from the direct (3, 5, R) regulator valve that supplies the direct (3, 5, R) clutch.
C35R FDBK	C35R pressure from the C35R boost valve supplied to the C35R clutch regulator valve to oppose movement of the valve from {Acronym.SSB} SIG pressure during direct (3, 5, R) clutch application.
C35R SUPPLY	DRIVE 2 or REV SUPPLY pressure directed to the 3, 5, R clutch regulator valve by the DRIVE 2/REV SUPPLY shuttle ball.
C456/C456 SUPPLY	Regulated clutch pressure from the low/reverse/overdrive (4, 5, 6) regulator valve directed to the overdrive (4, 5, 6) clutch in 4th, 5th, and 6th gears.
CBLR/C456 FDBK	CBLR/C456 SUPPLY pressure from the CBLR/C456 boost valve supplied to the CBLR/C456 regulator valve to oppose movement of the valve from {Acronym.SSD} SIG pressure during low/reverse and overdrive (4, 5, 6) clutch application.
CBLR/C456 SUPPLY	Regulated pressure from the low/reverse/overdrive (4, 5, 6) regulator valve to the multiplex shift valve assembly. The multiplex shift valve directs it to the overdrive clutch or the low/reverse clutch, depending on what position it is in.
CBLR/CBLR SUPPLY	Regulated pressure from the low/reverse/overdrive (4, 5, 6) regulator valve directed to the low/reverse clutch by the multiplex shift valve in LOW and REVERSE.
COMP FEED	Compensator feed pressure applied to the back side of clutches to keep the clutches from centrifugally applying.
CONV FD	Pressure from the pressure regulator valve to the torque converter clutch control valve, which supplies the valve to apply and release the torque converter clutch.
COOLER FEED	Pressure supplied to the transmission fluid cooler from the torque converter clutch control valve and feeds the LUBE circuit.
DECREASE	Pressure from the pressure regulator valve to the pump that raises and lowers the line pressure.
DRIVE 1	Line pressure directed to the multiplex shift valve by the manual valve in DRIVE and LOW.
DRIVE 2	DRIVE 1 pressure from the multiplex shift valve to the torque converter clutch regulator apply valve, DRIVE 2/DRIVE B shuttle ball, DRIVE 2/REV SUPPLY shuttle ball and CBLR/C456 regulator valve.
DRIVE B	REV DRIVE B pressure directed to the DRIVE 2/ DRIVE B shuttle ball by the multiplex manual valve.
EXH	Fluid exhausted from the valves that drains to the sump area.
EXH BF	Fills the forward (1, 2, 3, 4), intermediate (2, 6) and low/reverse/overdrive (4, 5, 6) regulator valves and the multiplex shift and manual valves with fluid (no pressure).
LINE	Line pressure from the pump to the manual valve, solenoid regulator valve, fluid temperature sensor, low/reverse/overdrive (4, 5, 6) regulator valve, COMP FEED circuit and EXH BF circuit.
LPC	Full or regulated pressure from the {Acronym.LPC} solenoid to the pressure regulator valve.
REG APPLY	Regulated DRIVE 2 pressure from the torque converter clutch regulator apply valve supplied to the torque converter clutch control valve to apply the torque converter clutch.
REV DRIVE B	DRIVE 1 pressure directed to the multiplex manual valve by the multiplex shift valve.
REV/REV SUPPLY	Pressure supplied to the multiplex shift valve assembly and the direct (3, 5, R) clutch regulator valve from the manual valve in REVERSE only.
SOL FEED	Regulated pressure from the solenoid regulator valve that supplies the shift, TCC and {Acronym.LPC} solenoids, multiplex manual valve and the direct (3, 5, R) clutch regulator valve.
SSA SIG	Pressure supplied to the forward (1, 2, 3, 4) clutch regulator and boost valves from {Acronym.SSA} to direct regulated pressure to the forward clutch in 1st, 2nd, 3rd or 4th gears.
SSB SIG	

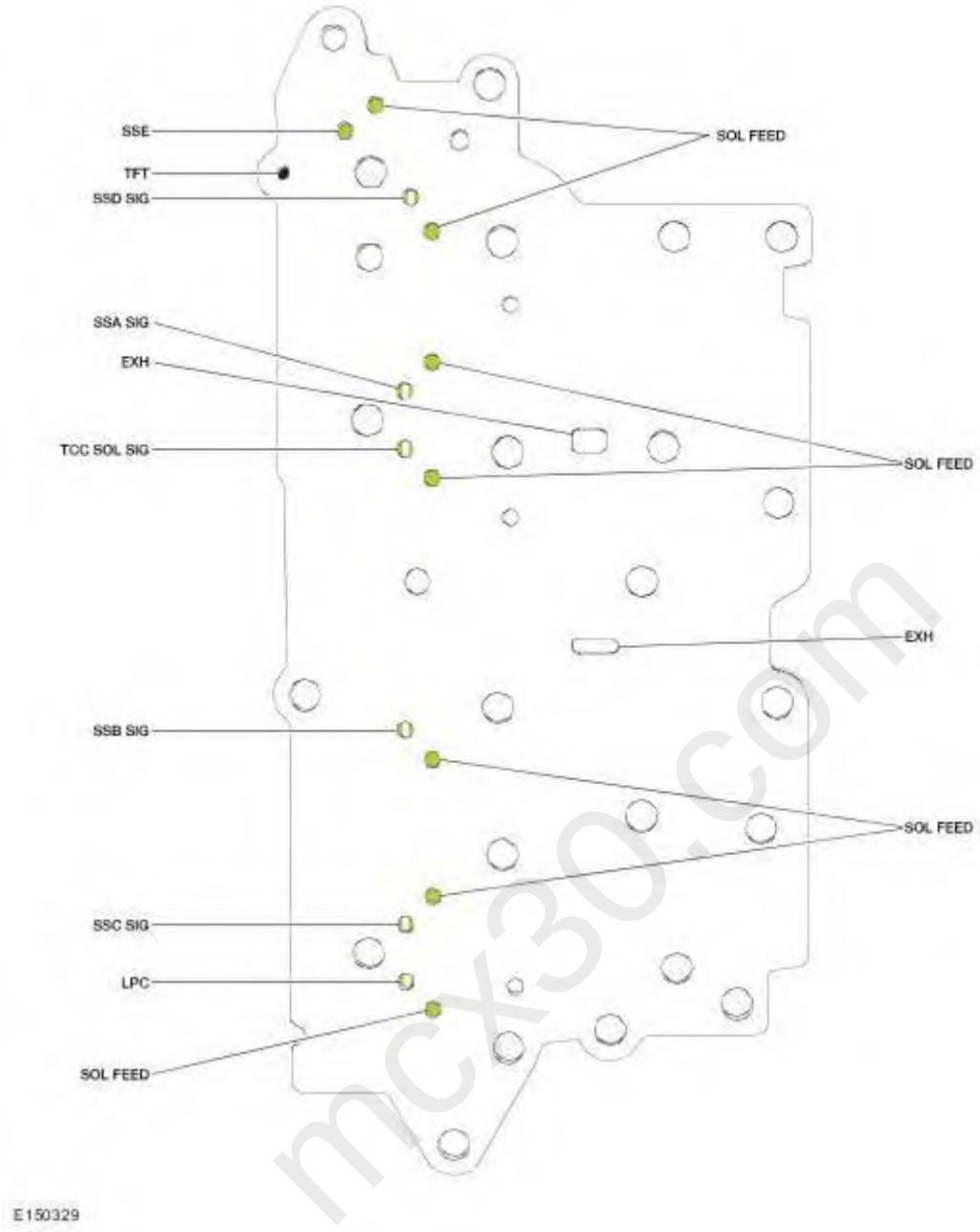
	Pressure supplied to the direct (3, 5, R) clutch regulator and boost valves from {Acronym.SSB} to direct regulated pressure to the direct clutch in 3rd and 5th gears and REVERSE.
SSC SIG	Pressure supplied to the intermediate (2, 6) clutch regulator and boost valves from {Acronym.SSC} to direct regulated pressure to the intermediate clutch in 2nd and 6th gears.
SSD SIG	Pressure supplied to the low/reverse/overdrive regulator and boost valves from {Acronym.SSD} to direct regulated pressure to the multiplex shift valve in LOW or REVERSE position or 4th, 5th and 6th gear.
SSE	Full solenoid pressure from {Acronym.SSE} to the torque converter clutch regulator valve and multiplex shift valve.
TCC APPLY	Pressure supplied to the torque converter from the TCC control valve to apply the torque converter clutch.
TCC RELEASE	Pressure supplied to the torque converter from the TCC control valve to release the torque converter clutch.
TCC SOL SIG	Full or regulated pressure from the TCC solenoid to the torque converter clutch regulator and control valves.
TFT	Line pressure directed to TFT sensor.

Valve Body Maps for Solenoid and Line Pressure

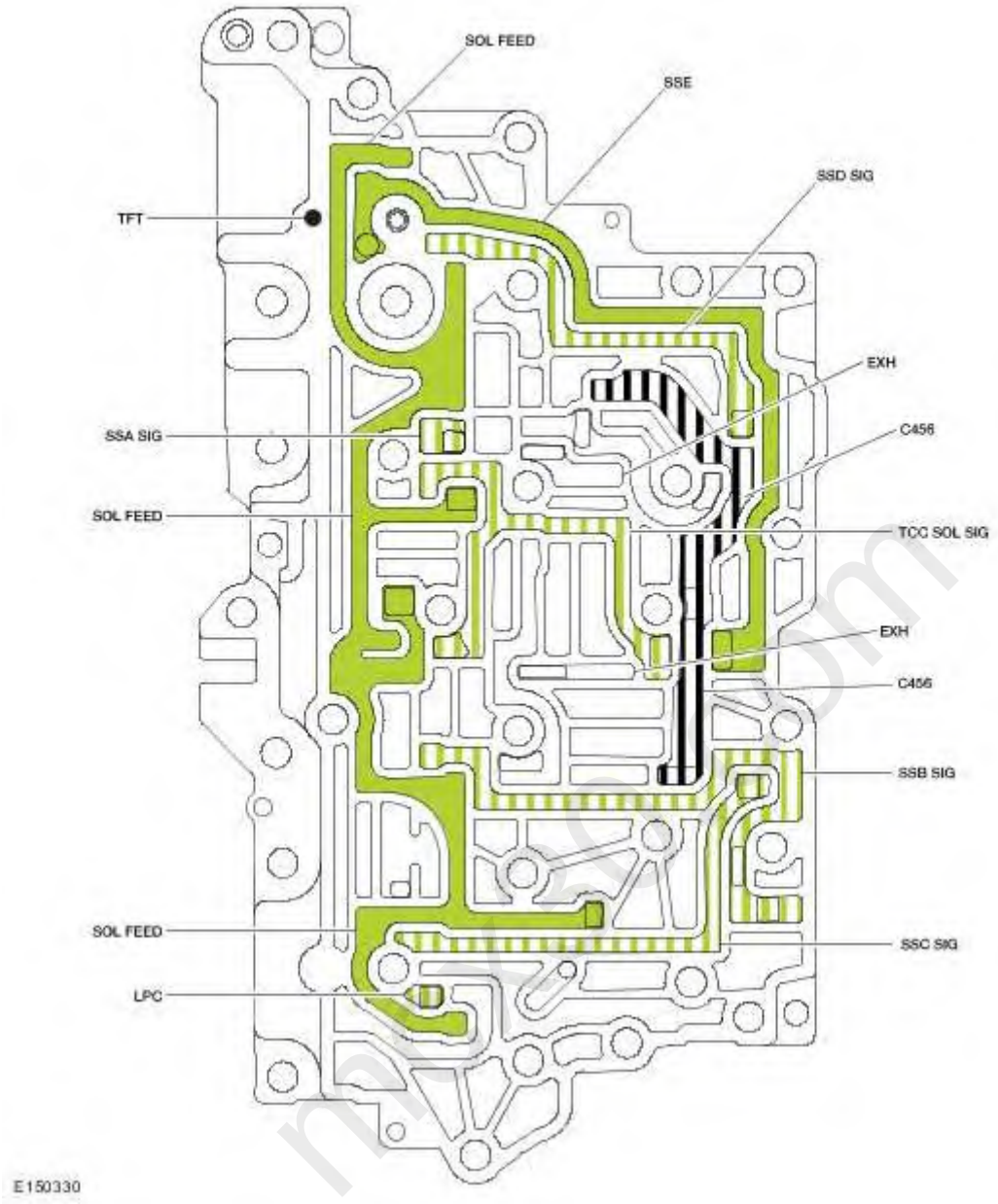
Solenoid Body Hydraulic Passages



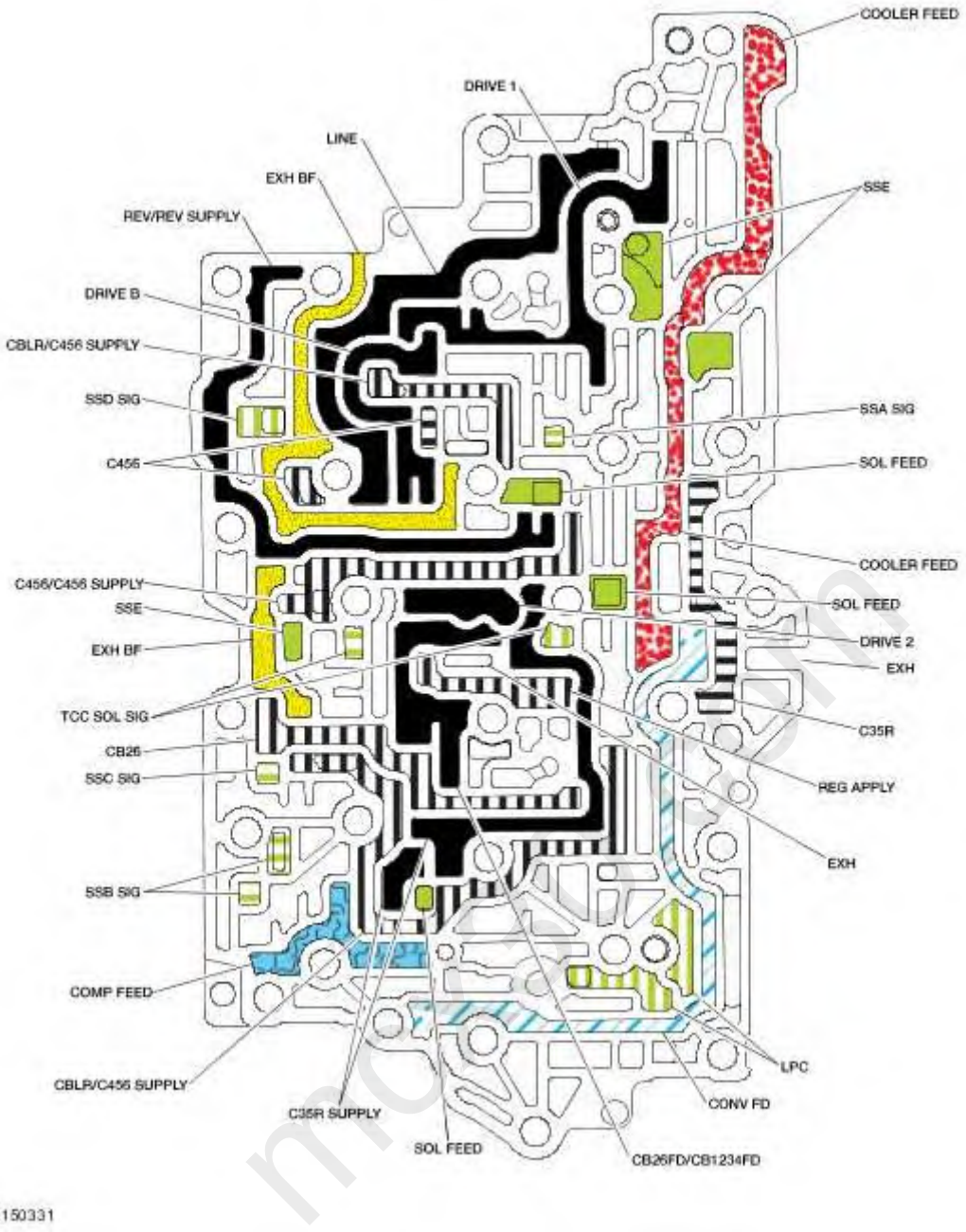
Cover Plate Hydraulic Passages



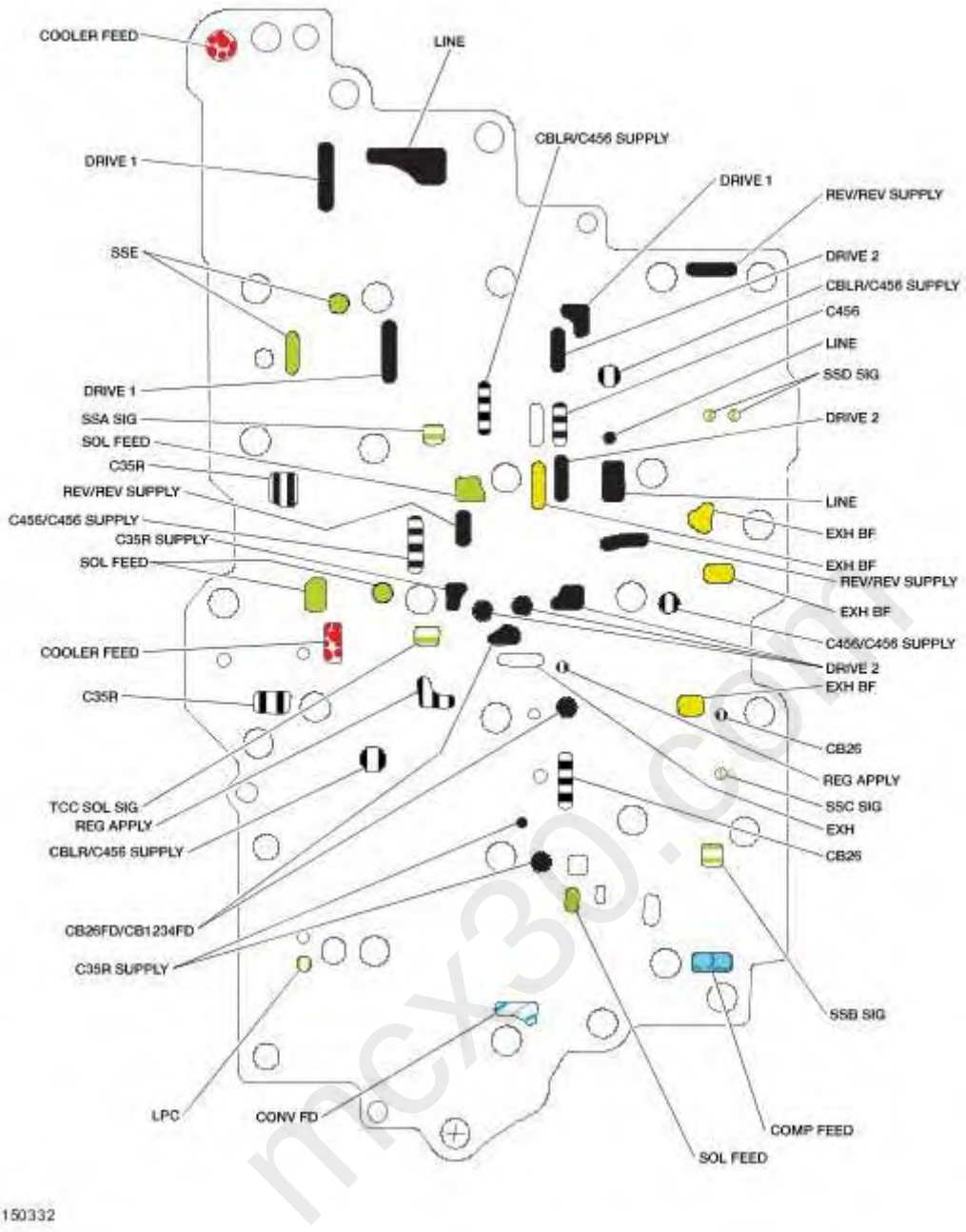
Transfer Plate Hydraulic Passages (Top View)



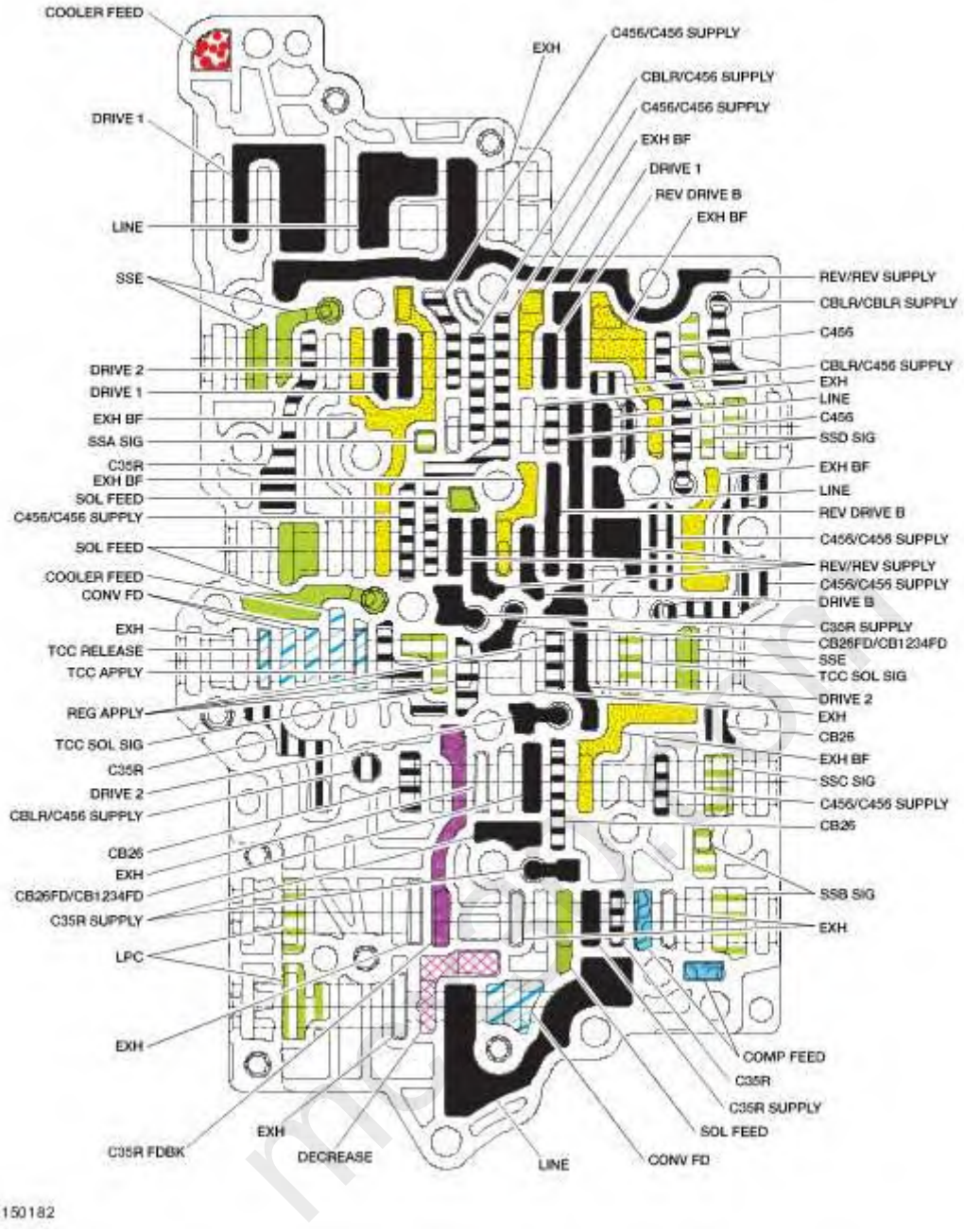
Transfer Plate Hydraulic Passages (Bottom View)



Center Spacer Plate Hydraulic Passages



Valve Body Hydraulic Passages (Top View)



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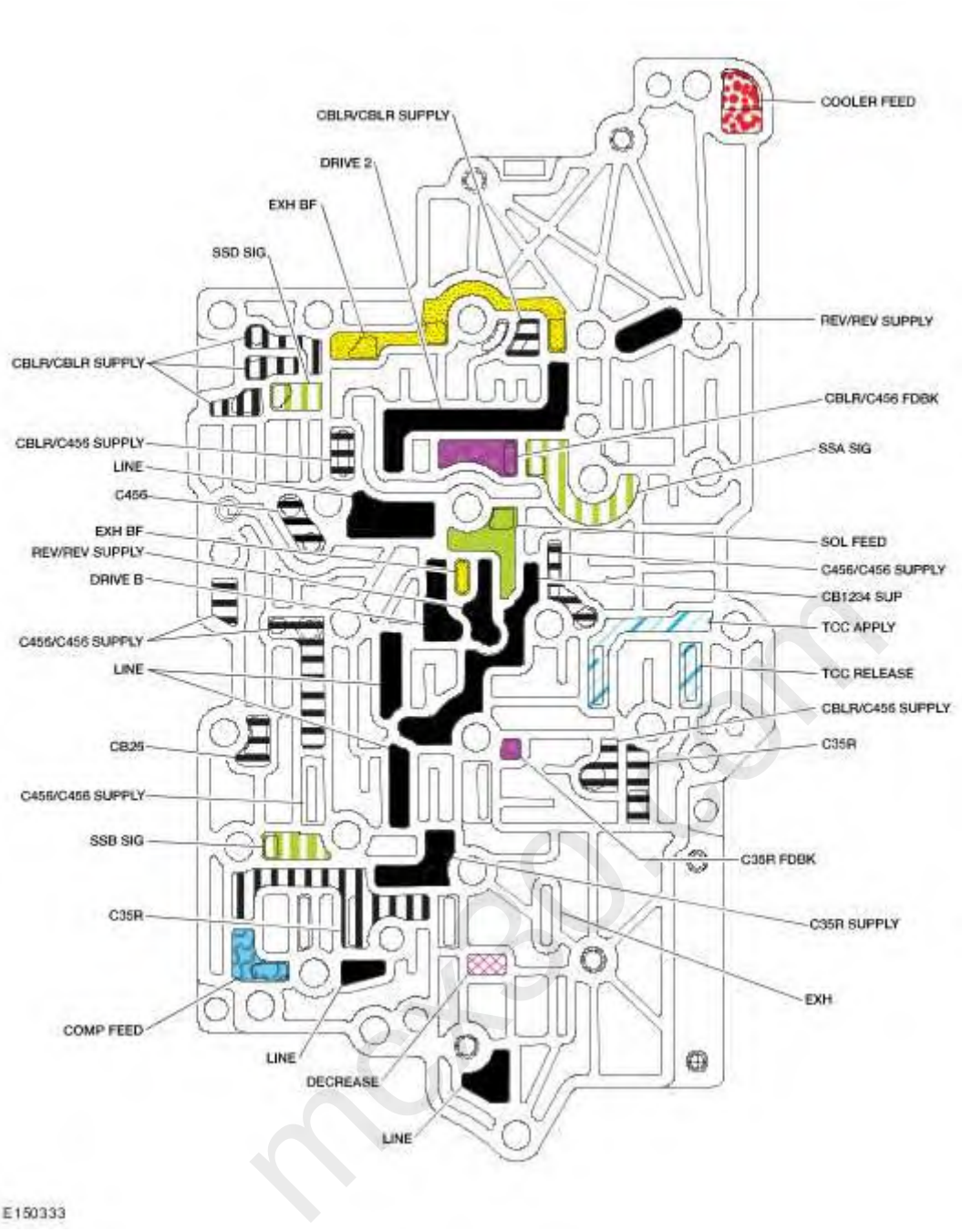
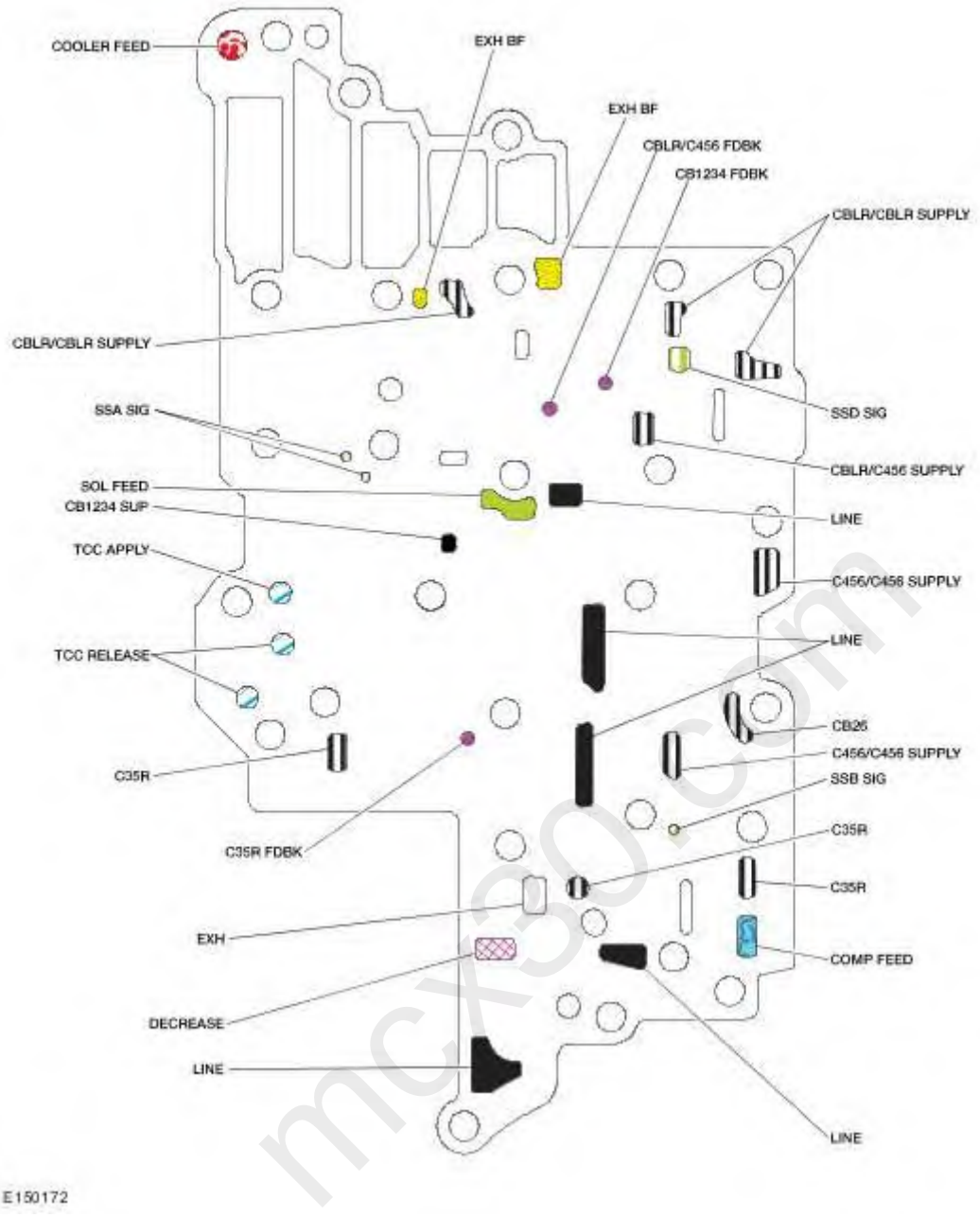
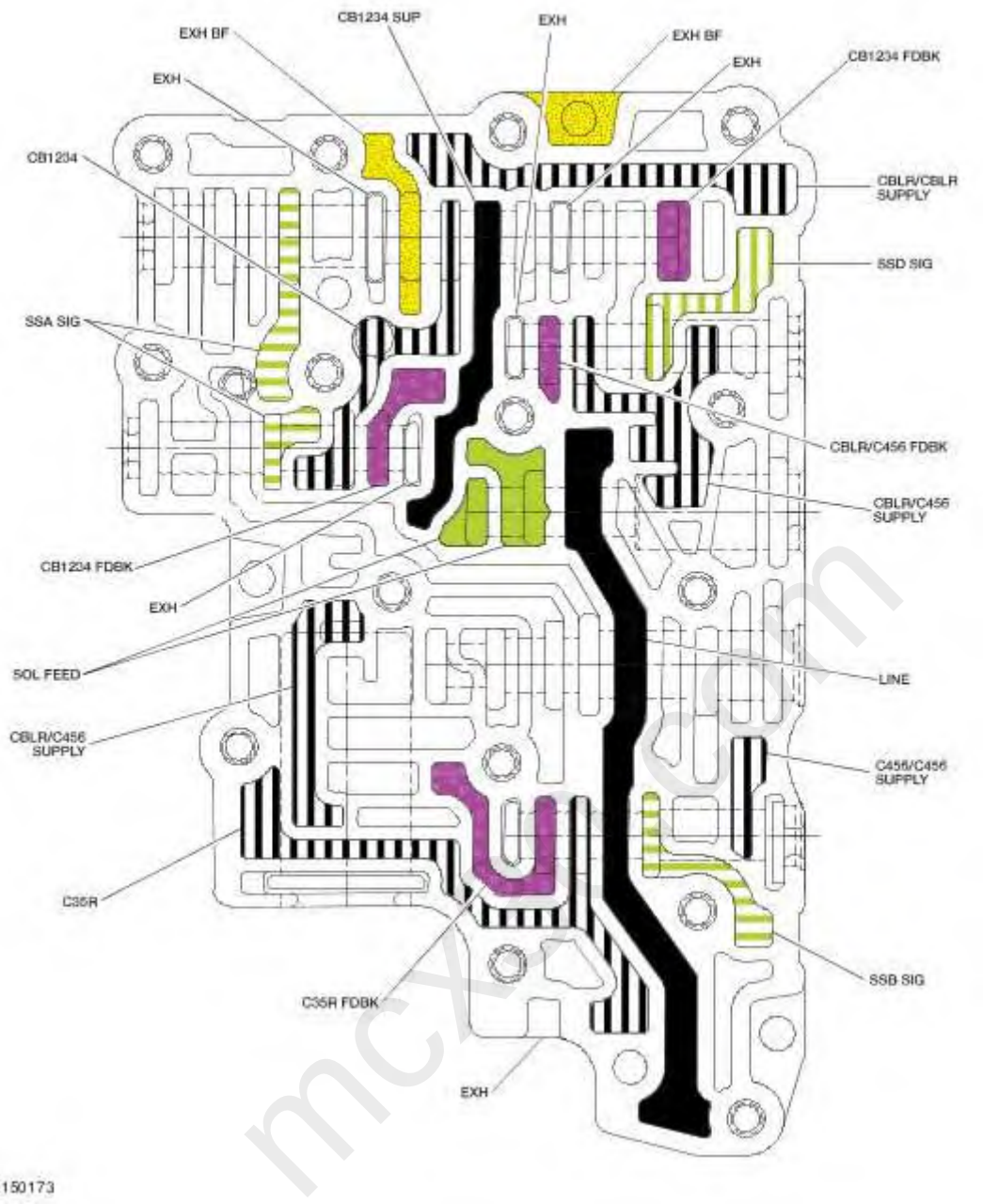
Valve Body Hydraulic Passages (Bottom View)



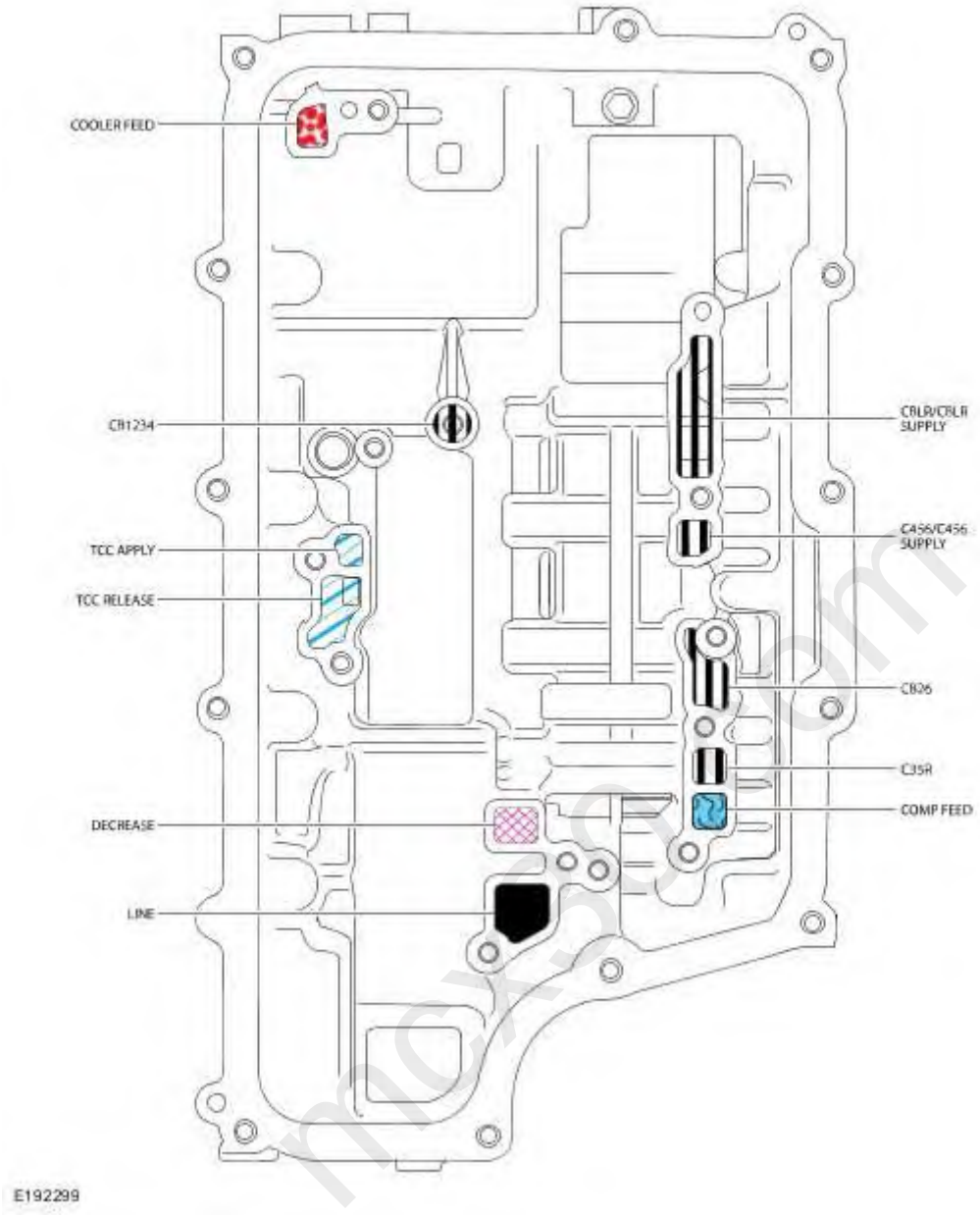
Lower Spacer Plate Hydraulic Passages



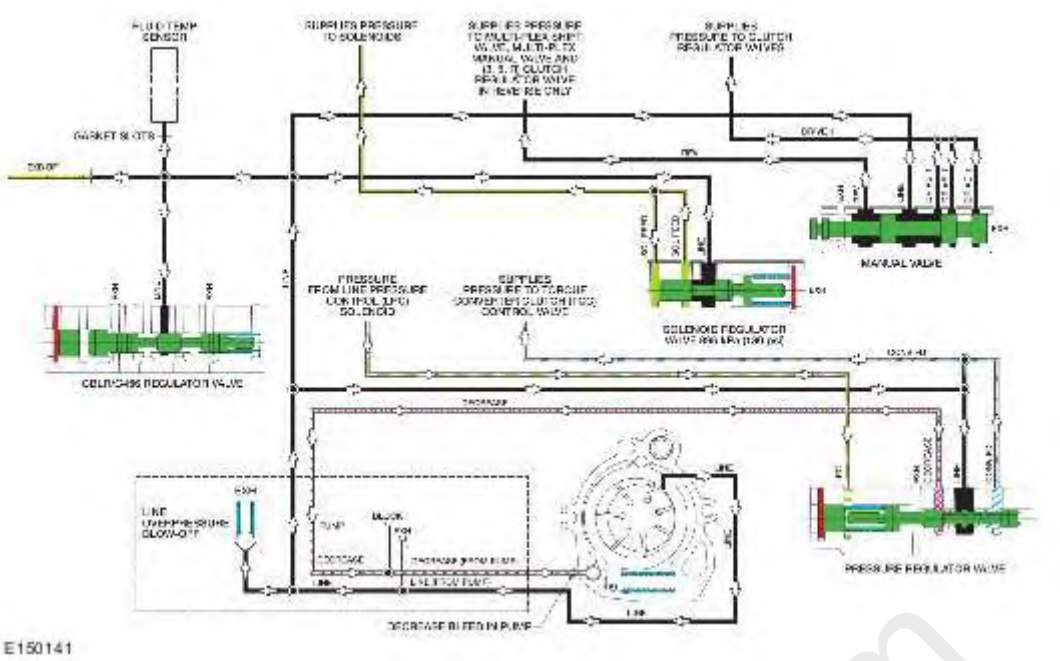
Lower Valve Body Hydraulic Passages



Transmission Case Hydraulic Passages



Line Pressure Hydraulic Circuits (Shown with the Manual Valve in the DRIVE Position)



E150141

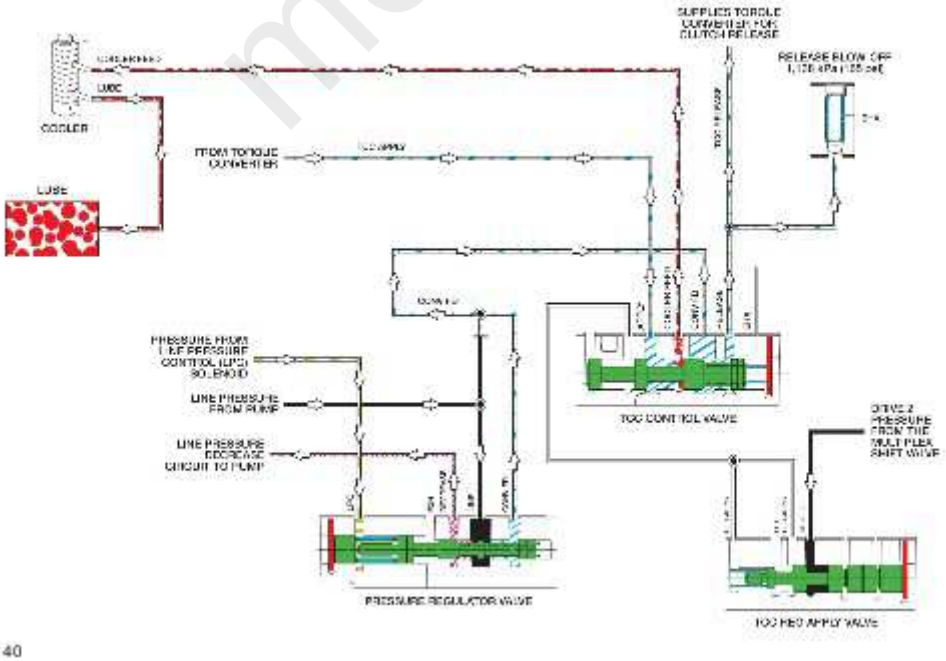
Line Pressure Hydraulic Circuits

The TCM controls line pressure with the {Acronym.LPC} solenoid. This affects shift feel and apply component operation.

When the engine is running, the pump supplies pressure to the pressure regulator valve, which is controlled by the {Acronym.LPC} solenoid. The pressure regulator valve controls the line pressure.

The line pressure circuit supplies the manual valve. The manual valve directs the line pressure to either the REV/REV SUPPLY circuit when the manual control lever is in the REVERSE position or the DRIVE 1 circuit when the manual control lever is in the DRIVE or LOW position.

Lubrication Circuits (Torque Converter Clutch (TCC) Released)



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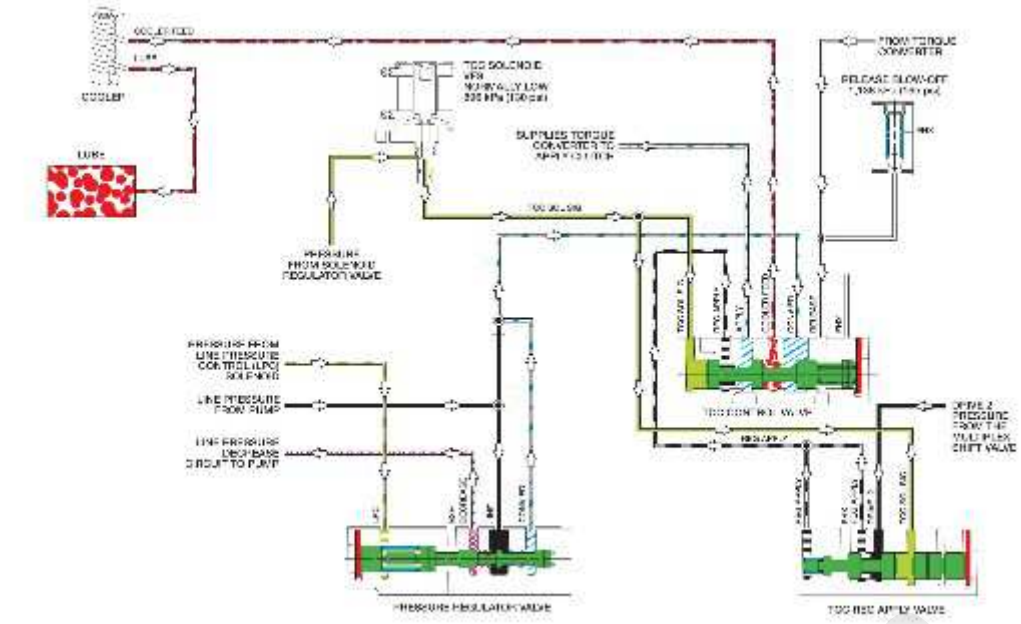
Lubrication Circuits (Torque Converter Clutch [TCC] Applied)



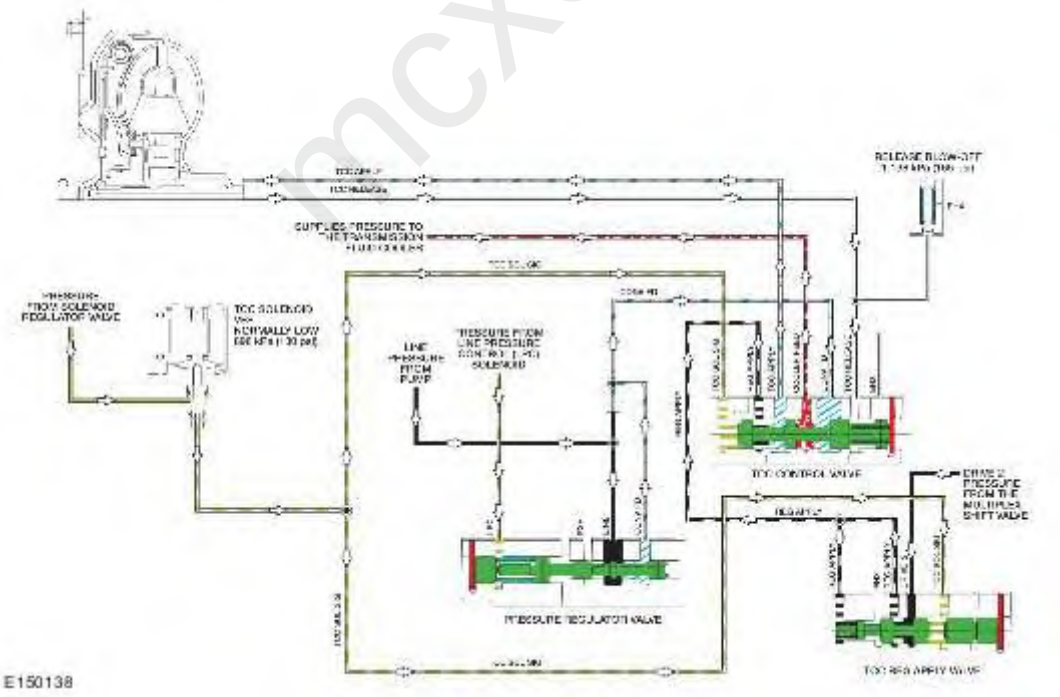
E150139

Lubrication Hydraulic Circuits

Lubrication for the transmission is supplied by the transmission fluid cooler return tube. Transmission fluid is sent to the transmission fluid cooler from the TCC control valve.

LINE pressure supplied to the pressure regulator valve is sent to the TCC control valve as CONV FD pressure. During TCC release, the TCC control valve sends the transmission fluid to the torque converter to release the clutch. The transmission fluid returns to the TCC control valve from the torque converter and is directed to the transmission fluid cooler on the COOLER FEED circuit.

Torque Converter Hydraulic Circuits (Torque Converter Clutch [TCC] Applied)



E150138

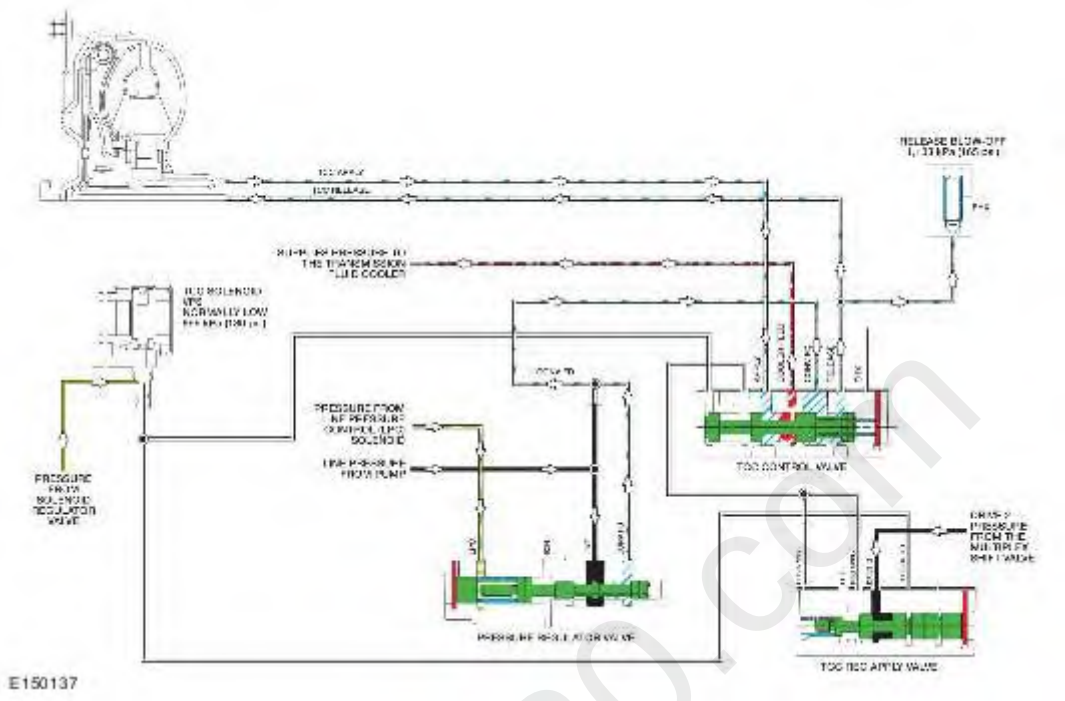
Torque Converter Hydraulic Circuits

The TCM controls the TCC solenoid. The TCC solenoid applies hydraulic pressure to the TCC control and regulator apply valves through the TCC SOL SIG circuit. Regulated DRIVE 2

pressure from the multiplex shift valve is directed to the TCC control valve by the TCC regulator apply valve through the REG APPLY circuit. The TCC control valve directs pressure from the REG APPLY circuit to the TCC APPLY circuit to apply the clutch.

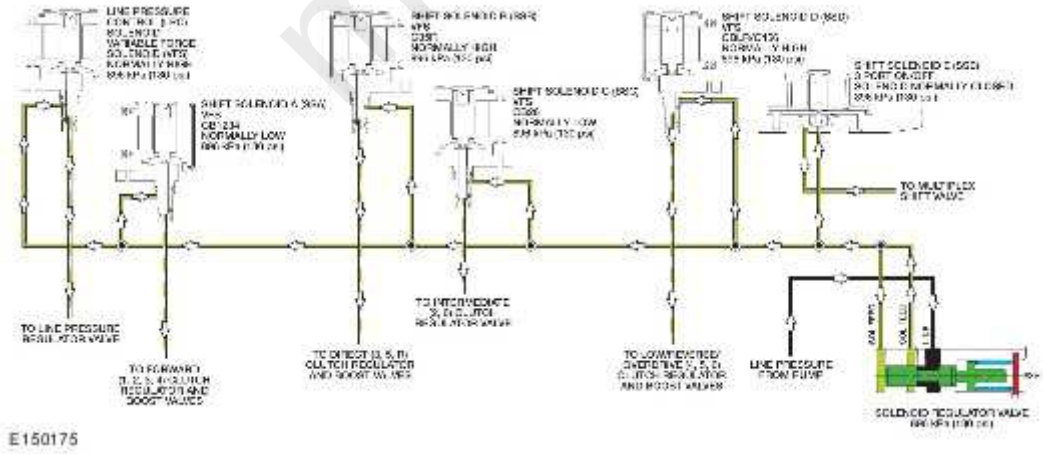
The transmission fluid returns to the TCC control valve through the TCC RELEASE hydraulic circuit. The TCC control valve opens the TCC RELEASE circuit to exhaust, so the TCC RELEASE circuit is not pressurized when the TCC is applied.

Torque Converter Hydraulic Circuits (Torque Converter Clutch [TCC] Released)



When the TCC is released, The TCC solenoid does not apply hydraulic pressure to the TCC control or regulator apply valves. The TCC control valve, in this position, directs hydraulic pressure from the CONV FD circuit to the torque converter through the TCC RELEASE hydraulic circuit and it returns to the TCC control valve through the TCC APPLY circuit.

Solenoid Hydraulic Circuits

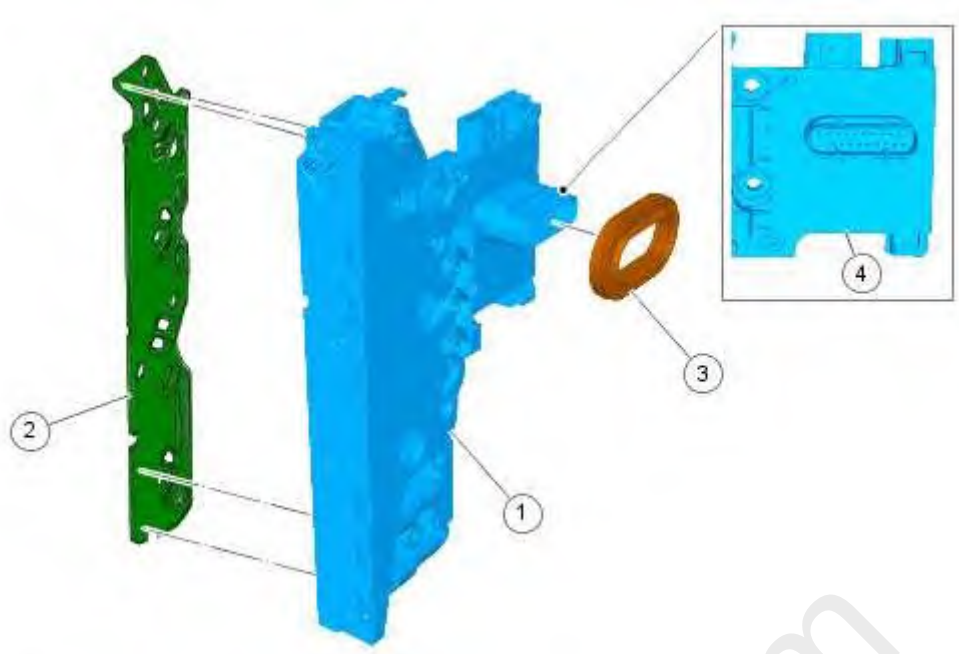


Solenoid Hydraulic Circuits

LINE pressure from the pump is directed to the individual shift, TCC and {Acronym.LPC} solenoids by the solenoid regulator valve on the SOL FEED circuit. The solenoids, controlled by the TCM, direct the fluid to the valves that they control.

The {Acronym.LPC} solenoid sends varying pressure to the line pressure regulator valve to control line pressure.

Solenoid Body



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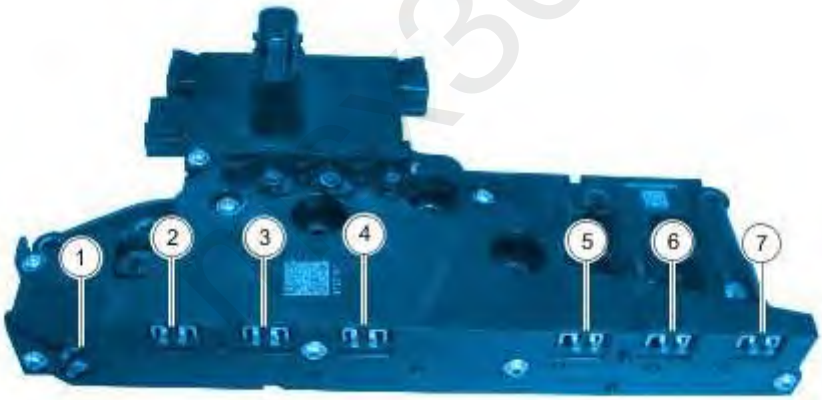
Item	Description
1	Solenoid body
2	Solenoid body filter
3	Seal-solenoid body electrical connector
4	Internal wiring harness frame



E150165

Item	Description
1	{Acronym.SSE}
2	{Acronym.SSD}
3	{Acronym.SSA}
4	TCC solenoid
5	{Acronym.SSB}
6	{Acronym.SSC}
7	{Acronym.LPC} solenoid

Solenoid Body

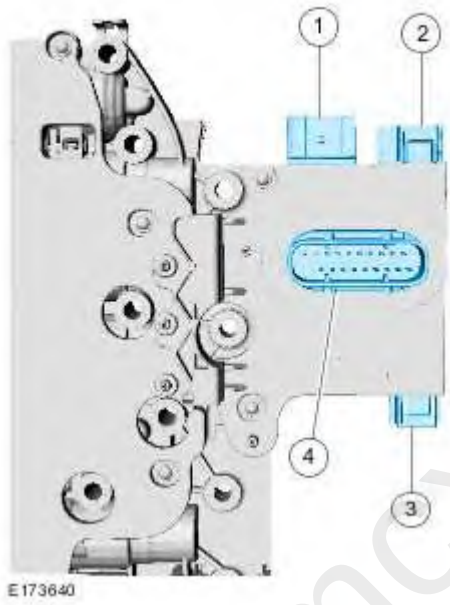
The solenoid body contains 7 solenoids: 5 shift solenoids {Acronym.SSA}, {Acronym.SSB}, {Acronym.SSC}, {Acronym.SSD} and {Acronym.SSE}, 1 TCC solenoid and 1 {Acronym.LPC} solenoid. The TFT sensor is located in the solenoid body. The solenoid body is serviced as an assembly.

The solenoid body has a unique strategy data file that must be downloaded to the TCM. There is a 7- digit solenoid body identification and a 13-digit solenoid body strategy for each solenoid body. When a new solenoid body or transmission is installed, the scan tool must be used to get the solenoid body strategy data file and download it into the TCM.

If the TCM is replaced and the TCM data cannot be inhaled or exhaled, the solenoid body identification and solenoid body strategy must be downloaded into the TCM.

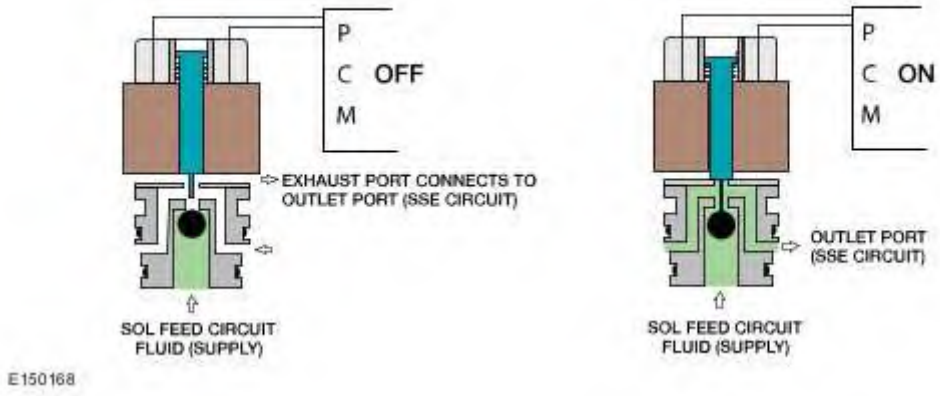
This transmission uses 3 types of solenoids: On/Off, normally low and normally high. On/Off solenoids open or close hydraulic passages based on the voltage signal it receives. Normally low solenoids provide hydraulic pressure proportional to supplied current. A normally low solenoid will not provide pressure without current, while it will supply high pressure with high current. Normally high solenoids provide pressure inversely proportional to supplied current. Normally high solenoids provide full output of pressure with no current and very low pressure with high current.

Solenoid Body Electrical Connector Identification



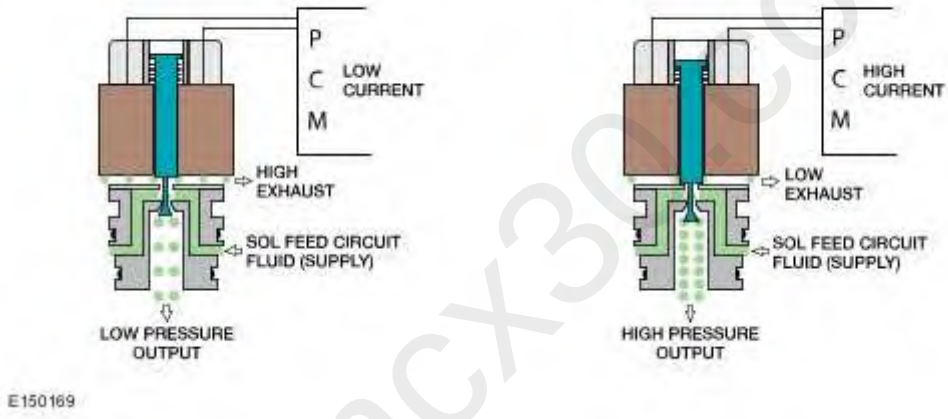
Item	Description
1	TR connector
2	OSS connector
3	Solenoid Body Connector C168
4	TSS connector

ON/OFF Solenoids



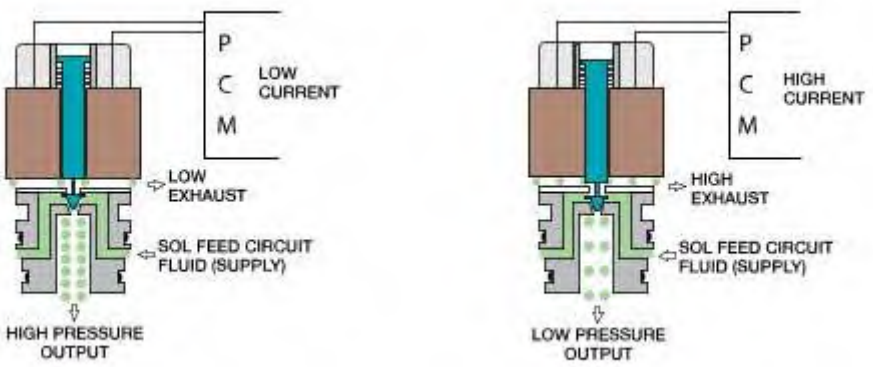
Item	Description
{Acronym.SSE}	Normally closed solenoid that blocks SOL FEED pressure from the {Acronym.SSE} circuit. When energized, pressure from the {Acronym.SSE} circuit positions the multiplex shift valve to direct CBLR/C456 SUPPLY pressure to the low reverse clutch.

Normally Low Solenoids



Item	Description
{Acronym.SSA}	{Acronym.SSA} blocks SOL FEED pressure from the {Acronym.SSA} SIG circuit when low current is supplied. When energized, {Acronym.SSA} SIG pressure positions the CB1234 clutch regulator and boost valves to direct CB1234 SUP pressure to apply the forward clutch.
{Acronym.SSC}	{Acronym.SSC} blocks SOL FEED pressure to the {Acronym.SSC} SIG circuit when low current is supplied. When energized, {Acronym.SSC} SIG pressure positions the CB26 clutch regulator valve to direct CB26FD/CB1234FD pressure to apply the intermediate clutch.
TCC solenoid	The TCC solenoid is used in the transmission control system to control the application, modulation and release of the torque converter clutch. The TCC solenoid blocks SOL FEED pressure to the TCC SOL SIG circuit when low current is supplied. When energized, TCC SOL SIG pressure positions the TCC reg apply and control valves to direct REG APPLY pressure to apply the torque converter.

Normally High Solenoids



Item	Description
{Acronym.SSB}	{Acronym.SSB} feeds SOL FEED pressure to the {Acronym.SSB} SIG circuit to position the direct (3,5,R) clutch regulator and boost valves to apply the direct (3,5,R) clutch. When energized, {Acronym.SSB} blocks {Acronym.SSB} SIG to position the direct clutch (3,5,R) regulator and boost valves to release the direct (3,5,R) clutch.
{Acronym.SSD}	{Acronym.SSD} feeds SOL FEED pressure to the {Acronym.SSD} SIG circuit to position the CBLR/C456 regulator and boost valves to apply either the low/reverse clutch or the overdrive (4,5,6) clutch. When energized, {Acronym.SSD} blocks {Acronym.SSD} SIG to position the CBLR/C456 regulator and boost valves to release either the low/reverse clutch or the overdrive (4,5,6) clutch.
{Acronym.LPC} solenoid	The {Acronym.LPC} solenoid is used to apply resistive force to the main regulator valve to adjust line pressure. Line pressure is inversely proportional to the current supplied to the {Acronym.LPC} solenoid. As current decreases, line pressure increases.

Park

PARK CLUTCH APPLICATION CHART

Gear	Forward (1,2,3,4)	Direct (3,5,R)	Intermediate (2,6)	Low / Reverse (1,R)	Overdrive (4,5,6)	Low-OWC
Park				H		
Planetary Components	Front sun	Rear sun	Rear sun	Rear carrier/ center ring	Rear carrier/ center ring	Rear carrier/ center ring

H = Holding

PARK POSITION SOLENOID OPERATION CHART

Base Selector Lever Position	PCM Commanded Gear	SSA NL (1,2,3,4)	SSB NH (3,5,R)	SSC NL (2,6)	SSD NH (1,R,4,5,6)	SSE (On/ Off) NC	TCC NL
P	P	Off	On	Off	Off	On	Off

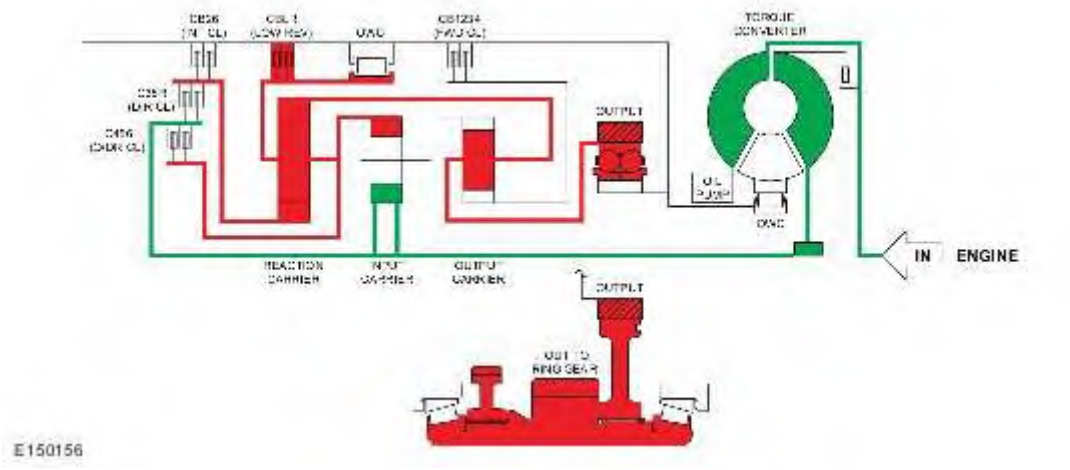
NC = Normally Closed

NH = Normally High

NL = Normally Low

Powerflow

- With the selector lever in PARK, the low/reverse clutch holds the rear planetary carrier/center ring gear stationary.
- The park pawl holds the rear ring/front planetary carrier stationary.
- The turbine shaft drives the center sun gear.



Reverse

REVERSE CLUTCH APPLICATION CHART

Gear	Forward (1,2,3,4)	Direct (3,5,R)	Intermediate (2,6)	Low / Reverse (1,R)	Overdrive (4,5,6)	Low-OWC
Reverse		D		H		
Planetary Components	Front sun	Rear sun	Rear sun	Rear carrier/ center ring	Rear carrier/ center ring	Rear carrier/ center ring

H = Holding

D = Driving

REVERSE POSITION SOLENOID OPERATION CHART

Base Selector Lever Position	PCM Commanded Gear	SSA NL (1,2,3,4)	SSB NH (3,5,R)	SSC NL (2,6)	SSD NH (1,R,4,5,6)	SSE (On/ Off) NC	TCC NL
R	R	Off	Off	Off	Off	On	Off

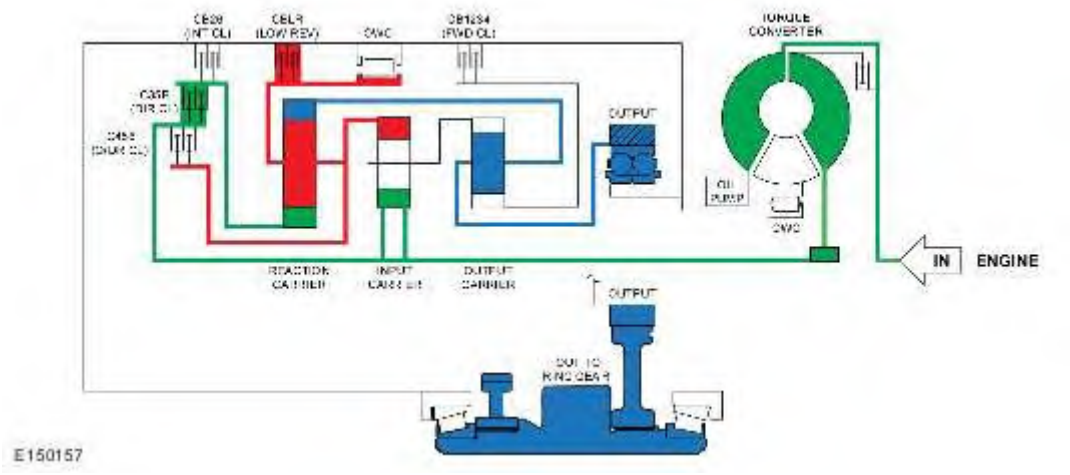
NC = Normally Closed

NH = Normally High

NL = Normally Low

Powerflow

- With the selector lever in REVERSE, the low/reverse clutch holds the rear planetary carrier/center ring gear stationary.
- The direct clutch drives the rear sun gear.
- The rear ring/front planetary carrier transfers torque to the output hub in a reverse direction with a ratio of 2.88.



Neutral

NEUTRAL CLUTCH APPLICATION CHART

Gear	Forward (1,2,3,4)	Direct (3,5,R)	Intermediate (2,6)	Low / Reverse (1,R)	Overdrive (4,5,6)	Low-OWC
Neutral				H		
Planetary Components	Front sun	Rear sun	Rear sun	Rear carrier/ center ring	Rear carrier/ center ring	Rear carrier/ center ring

H = Holding

NEUTRAL POSITION SOLENOID OPERATION CHART

Base Selector Lever Position	PCM Commanded Gear	SSA NL (1,2,3,4)	SSB NH (3,5,R)	SSC NL (2,6)	SSD NH (1,R,4,5,6)	SSE (On/ Off) NC	TCC NL
N	N	Off	On	Off	Off	On	Off

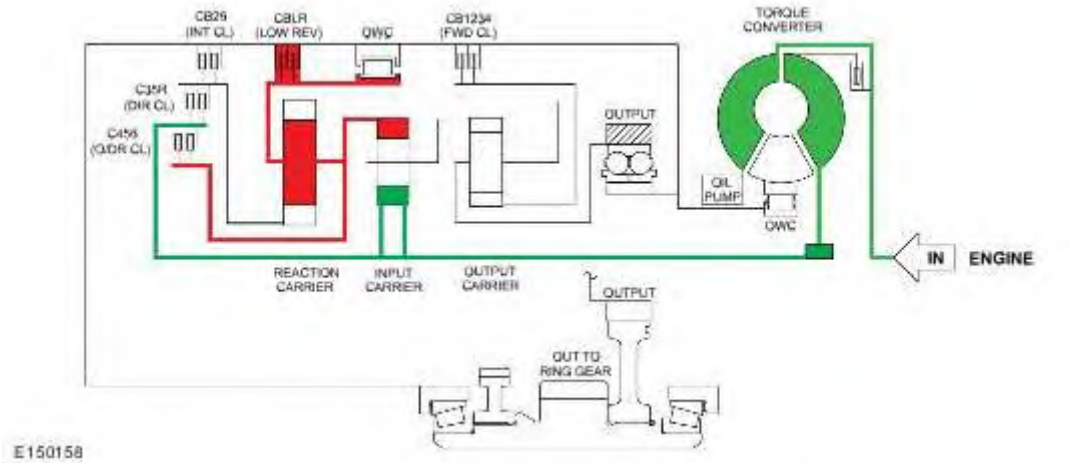
NC = Normally Closed

NH = Normally High

NL = Normally Low

Powerflow

- With the selector lever in NEUTRAL, the low/reverse clutch holds the rear planetary carrier/center ring gear stationary.
- The turbine shaft drives the center sun gear.



1st Gear

NOTE: The transmission operates differently in 1st gear above and below 8 km/h (5 mph). Transmission operation is the same below 8 km/h (5 mph) and in the LOW position.

1ST GEAR ABOVE 8 KM/H (5 MPH) CLUTCH APPLICATION CHART

Gear	Forward (1,2,3,4)	Direct (3,5,R)	Intermediate (2,6)	Low / Reverse (1,R)	Overdrive (4,5,6)	Low-OWC
1st Gear D	H					H
Planetary Components	Front sun	Rear sun	Rear sun	Rear carrier/ center ring	Rear carrier/ center ring	Rear carrier/ center ring

H = Holding

1ST GEAR LOW POSITION AND BELOW 8 KM/H (5 MPH) CLUTCH APPLICATION CHART

Gear	Forward (1,2,3,4)	Direct (3,5,R)	Intermediate (2,6)	Low / Reverse (1,R)	Overdrive (4,5,6)	Low-OWC
1st Gear D	H			H		H
Planetary Components	Front sun	Rear sun	Rear sun	Rear carrier/ center ring	Rear carrier/ center ring	Rear carrier/ center ring

H = Holding

1ST GEAR ABOVE 8 KM/H (5 MPH) SOLENOID OPERATION CHART

Base Selector Lever Position	PCM Commanded Gear	SSA NL (1,2,3,4)	SSB NH (3,5,R)	SSC NL (2,6)	SSD NH (1,R,4,5,6)	SSE (On/ Off) NC	TCC NL
D	1	On	On	Off	On	Off	Off

NC = Normally Closed

NH = Normally High

NL = Normally Low

1ST GEAR LOW POSITION AND BELOW 8 KM/H (5 MPH) SOLENOID OPERATION CHART

Base Selector Lever Position	PCM Commanded Gear	SSA NL (1,2,3,4)	SSB NH (3,5,R)	SSC NL (2,6)	SSD NH (1,R,4,5,6)	SSE (On/ Off) NC	TCC NL
L	1	On	On	Off	Off	On	Off

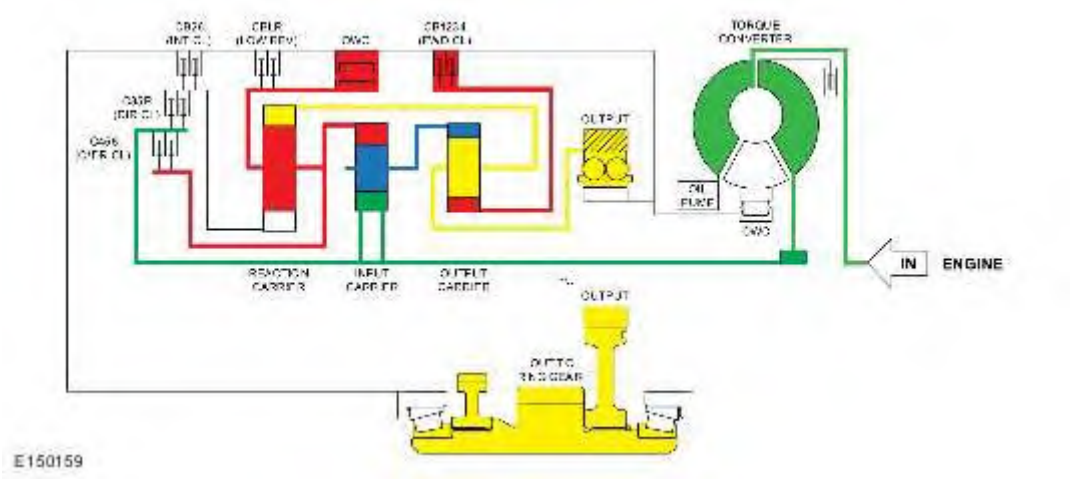
NC = Normally Closed

NH = Normally High

NL = Normally Low

Powerflow

- In first gear, the forward clutch holds the front sun gear stationary.
- The rear planetary carrier/center ring gear is held stationary by the low One-Way Clutch (OWC) and/or the low reverse (1, R) clutch.
- The turbine shaft transfers torque to the center sun gear. The center sun gear transfers the torque to the center planetary carrier/front ring gear. The front ring gear transfers torque to the front planetary carrier/rear ring gear and the output hub to produce a ratio of 4.48.



2nd Gear

2ND GEAR CLUTCH APPLICATION CHART

Gear	Forward (1,2,3,4)	Direct (3,5,R)	Intermediate (2,6)	Low / Reverse (1,R)	Overdrive (4,5,6)	Low-OWC
2nd Gear D	H		H			
Planetary Components	Front sun	Rear sun	Rear sun	Rear carrier/ center ring	Rear carrier/ center ring	Rear carrier/ center ring

H = Holding

2ND GEAR SOLENOID OPERATION CHART

Base Selector Lever Position	PCM Commanded Gear	SSA NL (1,2,3,4)	SSB NH (3,5,R)	SSC NL (2,6)	SSD NH (1,R,4,5,6)	SSE (On/ Off) NC	TCC NL
D	2	On	On	On	On	Off	Off

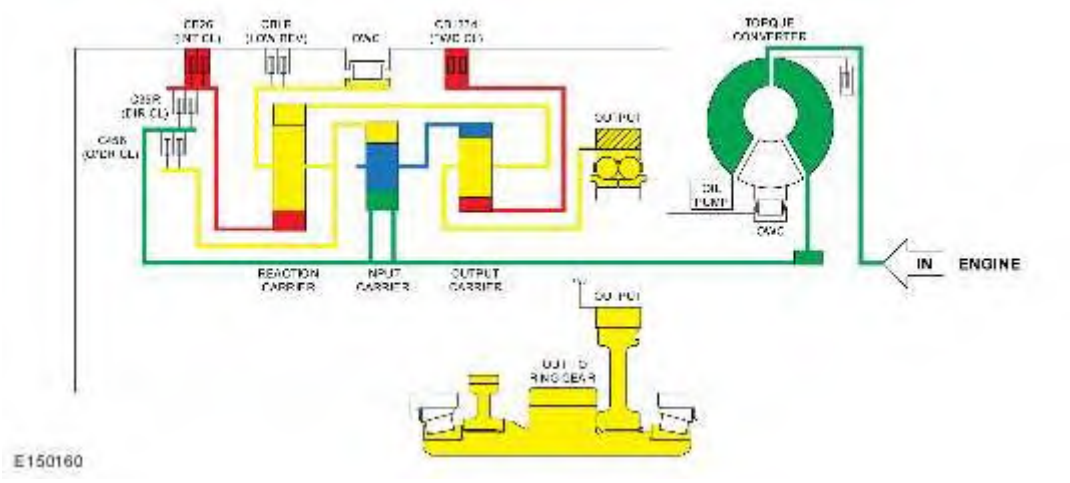
NC = Normally Closed

NH = Normally High

NL = Normally Low

Powerflow

- In second gear the forward clutch holds the front sun gear stationary.
- The intermediate clutch holds the rear sun gear stationary.
- The turbine shaft transfers torque to the center sun gear. The center sun gear transfers torque to the center ring gear/rear planetary carrier.
- The rear planetary carrier transfers the torque to the rear ring gear/front planetary carrier and the output hub to produce a gear ratio of 2.87.



3rd Gear

3RD GEAR CLUTCH APPLICATION CHART

Gear	Forward (1,2,3,4)	Direct (3,5,R)	Intermediate (2,6)	Low / Reverse (1,R)	Overdrive (4,5,6)	Low-OWC
3rd Gear D	H	D				
Planetary Components	Front sun	Rear sun	Rear sun	Rear carrier/ center ring	Rear carrier/ center ring	Rear carrier/ center ring

H = Holding

D = Driving

3RD GEAR SOLENOID OPERATION CHART

Base Selector Lever Position	PCM Commanded Gear	SSA NL (1,2,3,4)	SSB NH (3,5,R)	SSC NL (2,6)	SSD NH (1,R,4,5,6)	SSE (On/ Off) NC	TCC NL
D	3	On	Off	Off	On	Off	Off

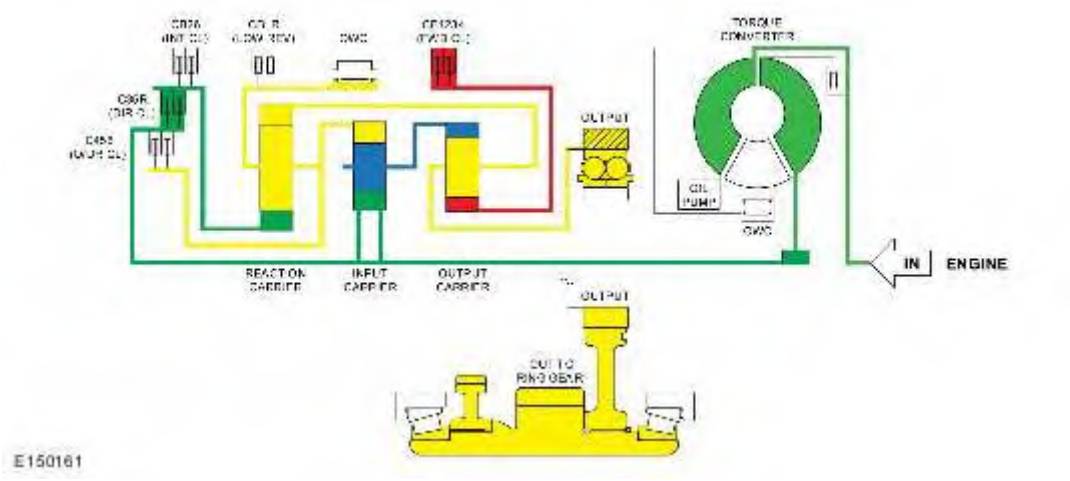
NC = Normally Closed

NH = Normally High

NL = Normally Low

Powerflow

- In third gear the forward clutch holds the front sun gear stationary.
- The direct clutch drives the rear sun gear.
- Power flows from the center sun gear to the center planetary carrier/front ring gear. From there, torque is transferred to the rear ring gear/front planetary carrier.
- Power also flows from the rear sun gear to the rear ring gear/front planetary carrier.
- The two inputs to the front planetary carrier combine and transfer torque to the output hub to produce a gear ratio of 1.84.



4th Gear

4TH GEAR CLUTCH APPLICATION CHART

Gear	Forward (1,2,3,4)	Direct (3,5,R)	Intermediate (2,6)	Low / Reverse (1,R)	Overdrive (4,5,6)	Low-OWC
4th Gear D	H				D	
Planetary Components	Front sun	Rear sun	Rear sun	Rear carrier/ center ring	Rear carrier/ center ring	Rear carrier/ center ring

H = Holding

D = Driving

4TH GEAR SOLENOID OPERATION CHART

Base Selector Lever Position	PCM Commanded Gear	SSA NL (1,2,3,4)	SSB NH (3,5,R)	SSC NL (2,6)	SSD NH (1,R,4,5,6)	SSE (On/ Off) NC	TCC NL
D	4	On	On	Off	Off	Off	On/Off

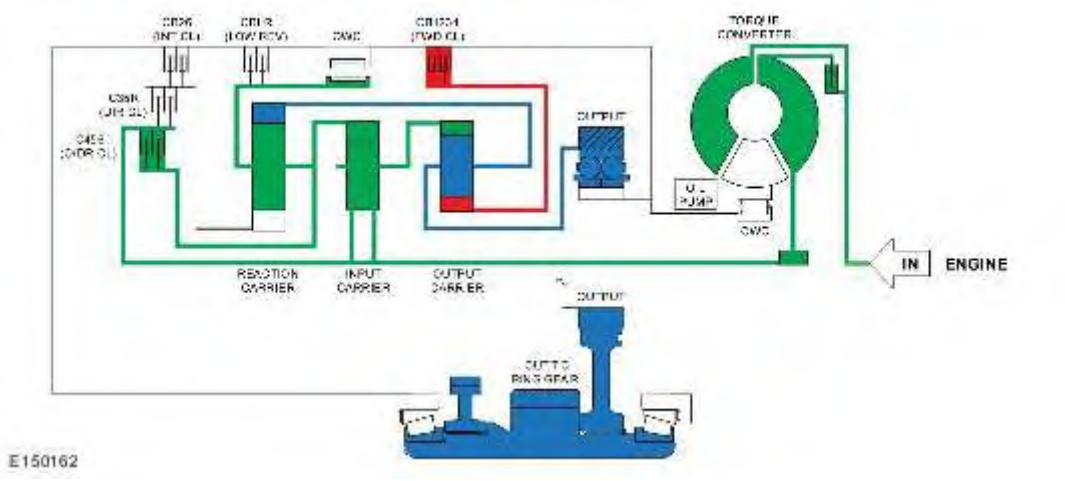
NC = Normally Closed

NH = Normally High

NL = Normally Low

Powerflow

- In fourth gear the forward clutch holds the front sun gear stationary.
- The overdrive clutch drives the rear planetary carrier/center ring gear.
- Power flows from turbine shaft to the center sun gear and center ring gear.
- The two inputs to the center planetary carrier combine and transfer torque to the front ring gear.
- The front ring gear transfers the torque to the front planetary carrier and onto the output hub to produce a gear ratio of 1.41.



5th Gear

5TH GEAR CLUTCH APPLICATION CHART

Gear	Forward (1,2,3,4)	Direct (3,5,R)	Intermediate (2,6)	Low / Reverse (1,R)	Overdrive (4,5,6)	Low-OWC
5th Gear D		D			D	
Planetary Components	Front sun	Rear sun	Rear sun	Rear carrier/ center ring	Rear carrier/ center ring	Rear carrier/ center ring

D = Driving

5TH GEAR SOLENOID OPERATION CHART

Base Selector Lever Position	PCM Commanded Gear	SSA NL (1,2,3,4)	SSB NH (3,5,R)	SSC NL (2,6)	SSD NH (1,R,4,5,6)	SSE (On/ Off) NC	TCC NL
D	5	Off	Off	Off	Off	Off	On/Off

NC = Normally Closed

NH = Normally High

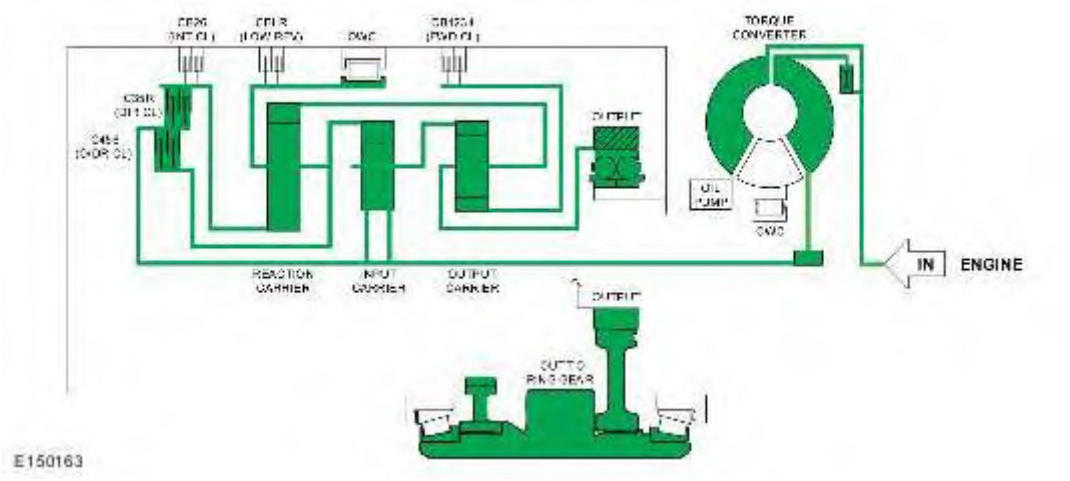
NL = Normally Low

Powerflow

- In fifth gear the overdrive clutch drives the rear planetary carrier/center ring gear.
- The direct clutch drives the rear sun gear.
- The turbine shaft transfers torque to the center sun gear, rear sun gear, and rear planetary carrier/center ring gear.
- The torque from the three inputs locks the three planetary gearsets which produces a gear ratio of 1 to 1

Fail-safe Mode

- Because both {Acronym.SSD} and {Acronym.SSB} apply the clutches they control when they are turned OFF, 5th gear is the fail-safe.



6th Gear

6TH GEAR CLUTCH APPLICATION CHART

Gear	Forward (1,2,3,4)	Direct (3,5,R)	Intermediate (2,6)	Low / Reverse (1,R)	Overdrive (4,5,6)	Low-OWC
6th Gear D			H		D	
Planetary Components	Front sun	Rear sun	Rear sun	Rear carrier/ center ring	Rear carrier/ center ring	Rear carrier/ center ring

H = Holding

D = Driving

6TH GEAR SOLENOID OPERATION CHART

Base Selector Lever Position	PCM Commanded Gear	SSA NL (1,2,3,4)	SSB NH (3,5,R)	SSC NL (2,6)	SSD NH (1,R,4,5,6)	SSE (On/ Off) NC	TCC NL
D	6	Off	On	On	Off	Off	On/Off

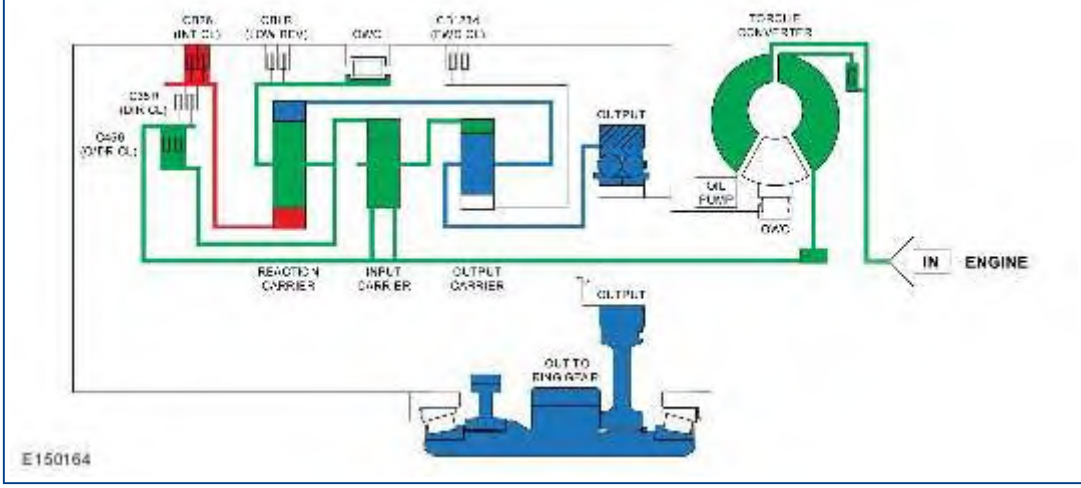
NC = Normally Closed

NH = Normally High

NL = Normally Low

Powerflow

- In sixth gear the overdrive clutch drives the rear planetary carrier/center ring gear.
- The intermediate clutch holds the rear sun gear.
- The torque from the rear planetary carrier is transferred to the rear ring gear/front planetary carrier and the output hub which produces a gear ratio of 0.74.


OUTPUT
OIL PUMP
OWC
IN
ENGINE
REACTION CARRIER
INPUT CARRIER
OUTPUT CARRIER
OUTPUT
OUT TO ENGAGER
E150164