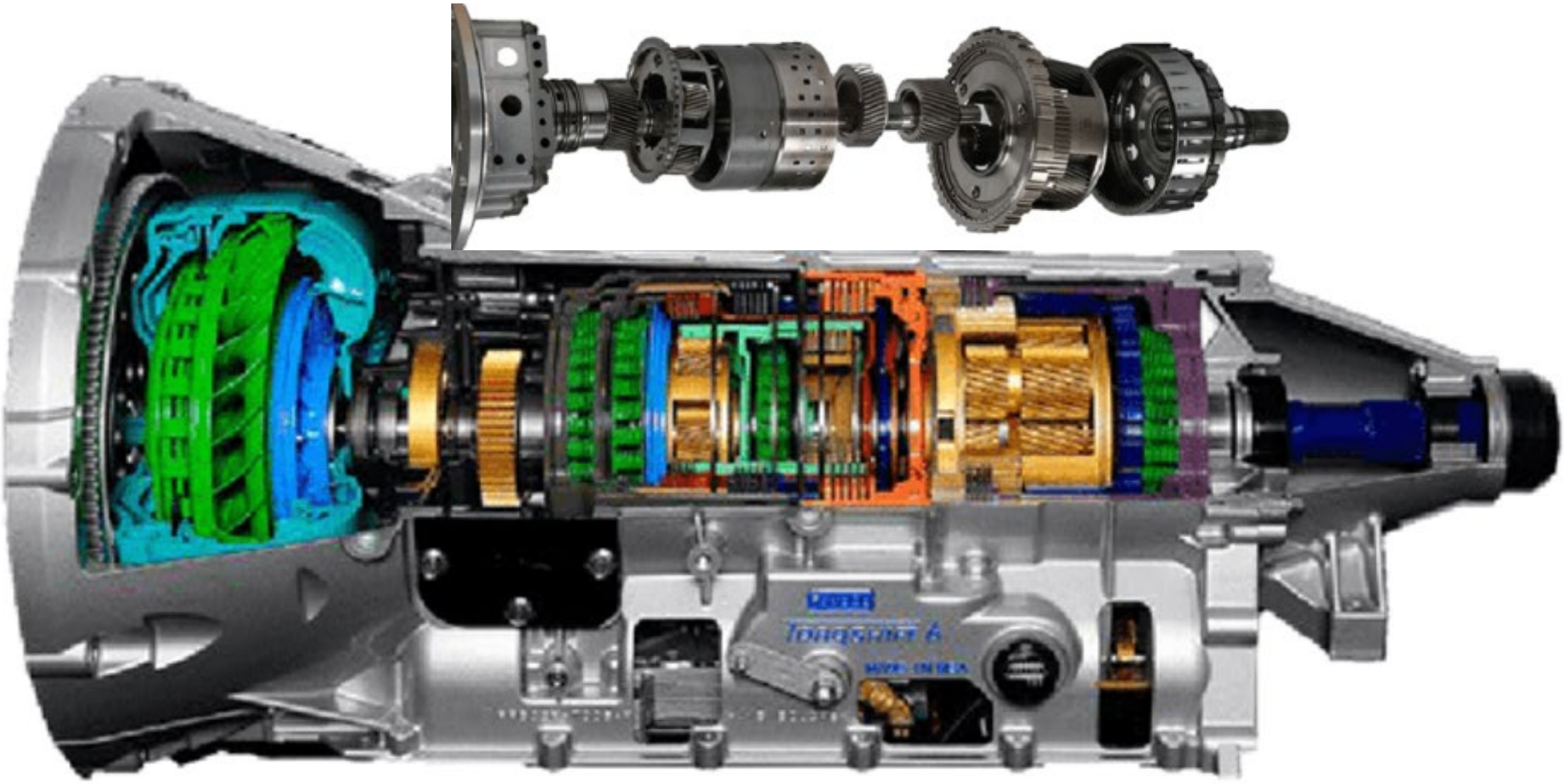
Torqshift 6 STARS Notes



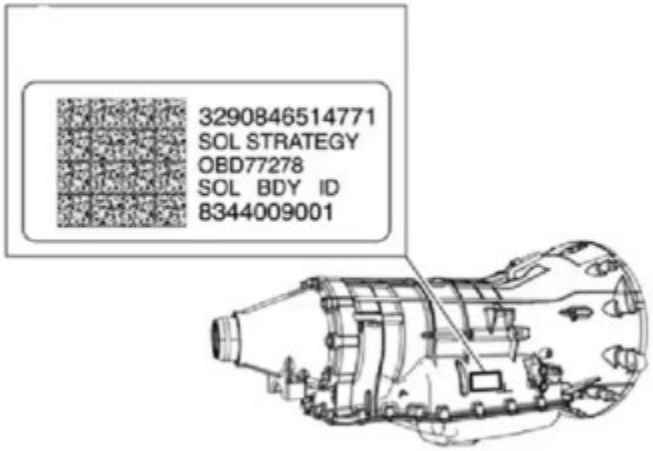
Overview

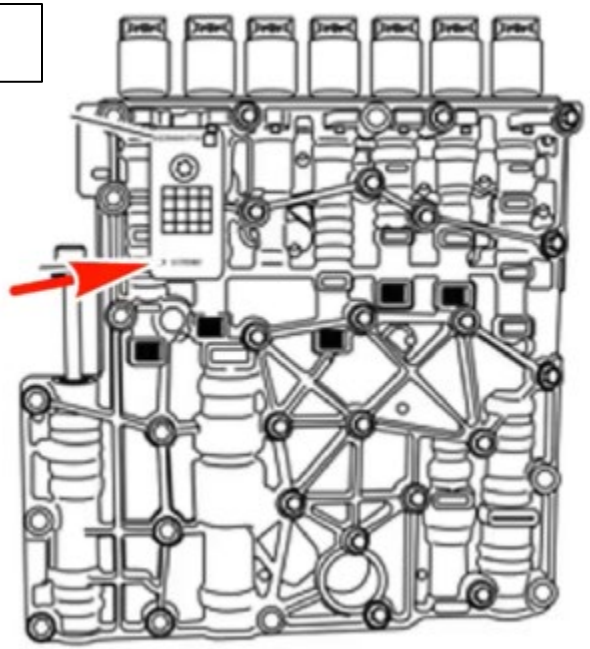
- Mercon LV is recommended transmission fluid
- UPS part # 5308490 (quart)

ID #s

Driver's Side

Passenger's Side





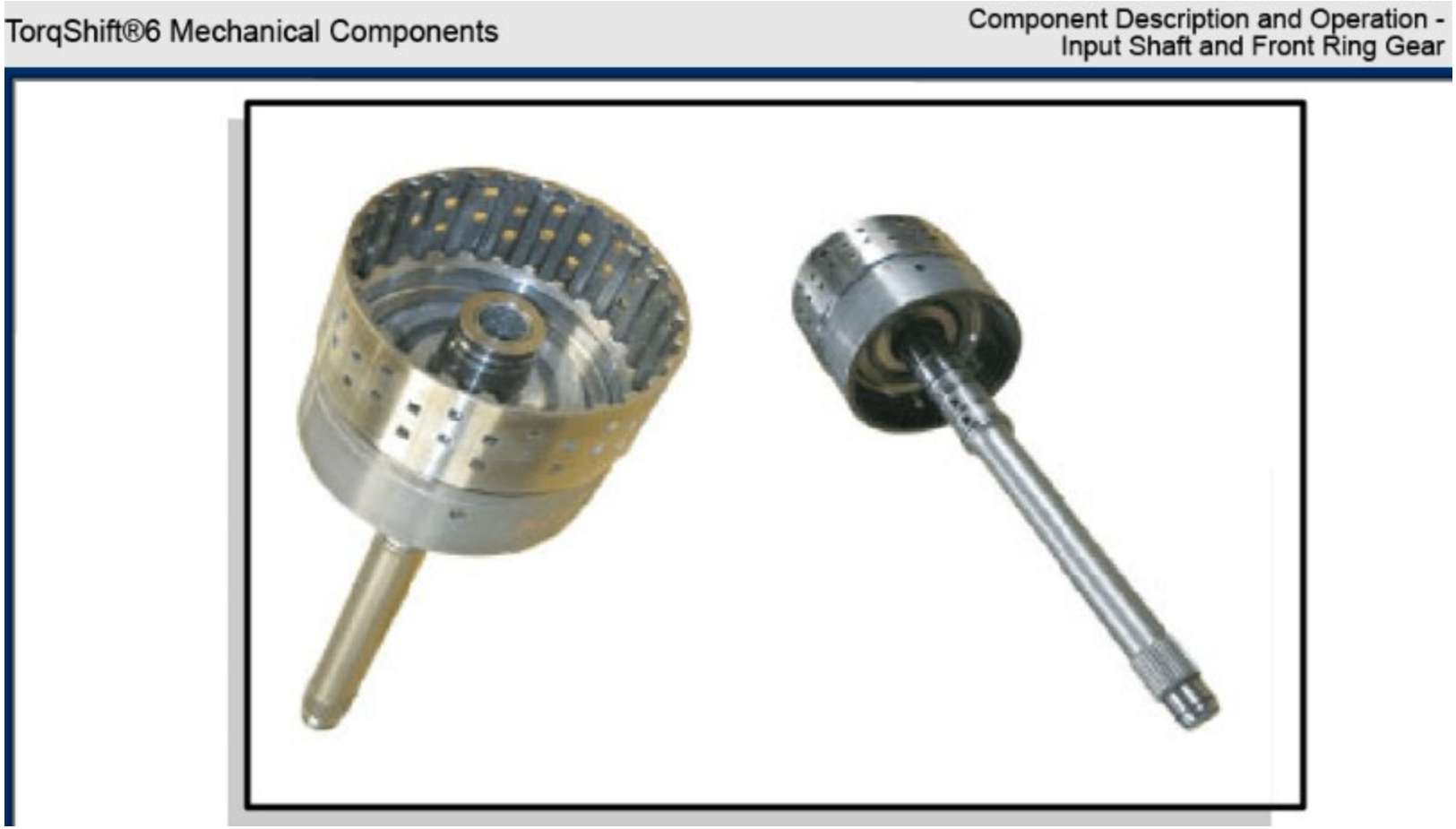
Torqshift 6

TorqShift®6 transmissions have:

- six forward speeds.
- one reverse speed.
- one simple planetary gearset.
- one Ravigenaux planetary gearset.
- one mechanical one-way clutch.
- five friction clutches.
- a upper valve body.
- a lower valve/solenoid body.
- PCM or TCM controlled electronics, depending on engine type.

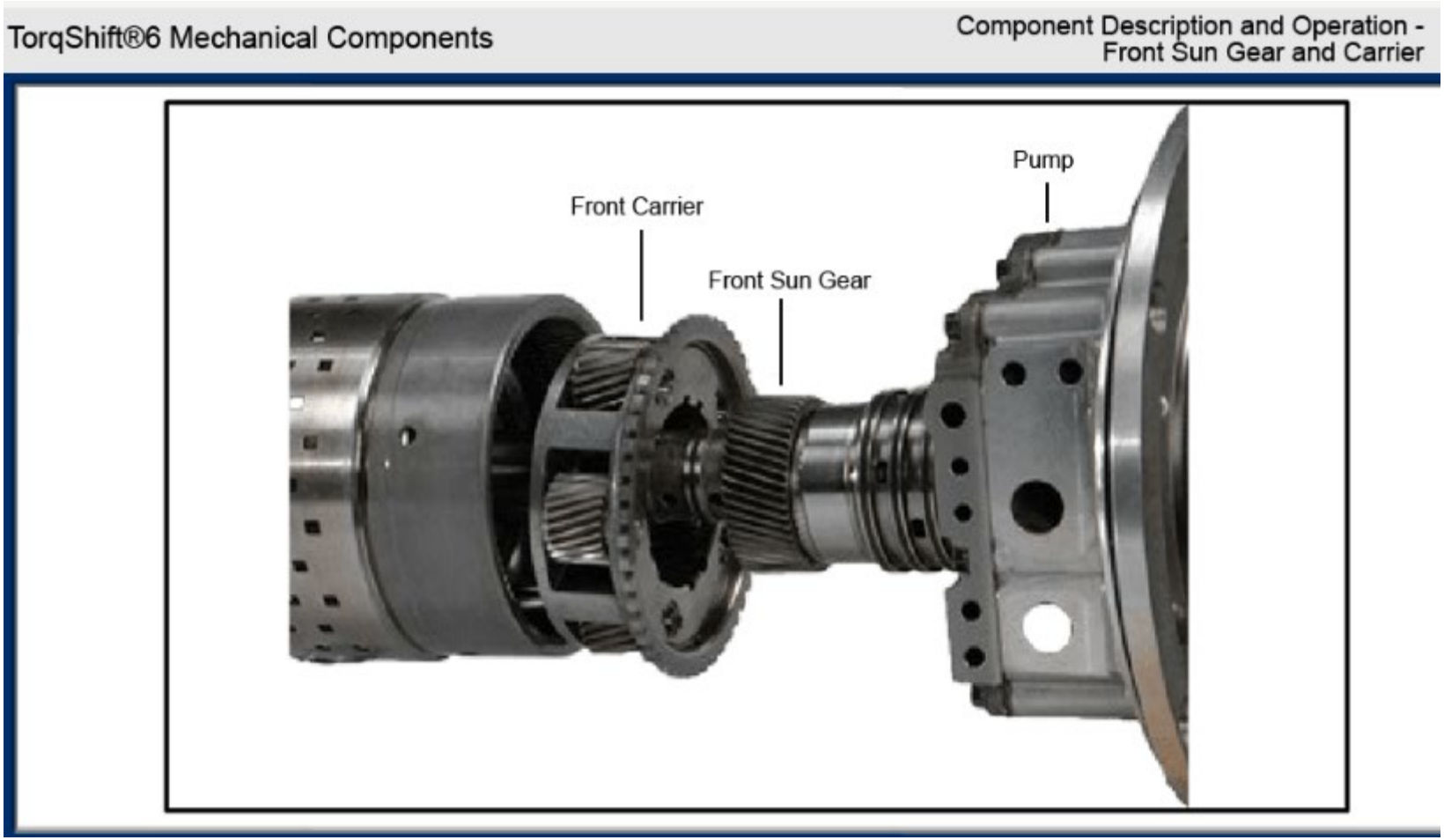
Mechanical Components

Input Shaft and Front Ring Gear



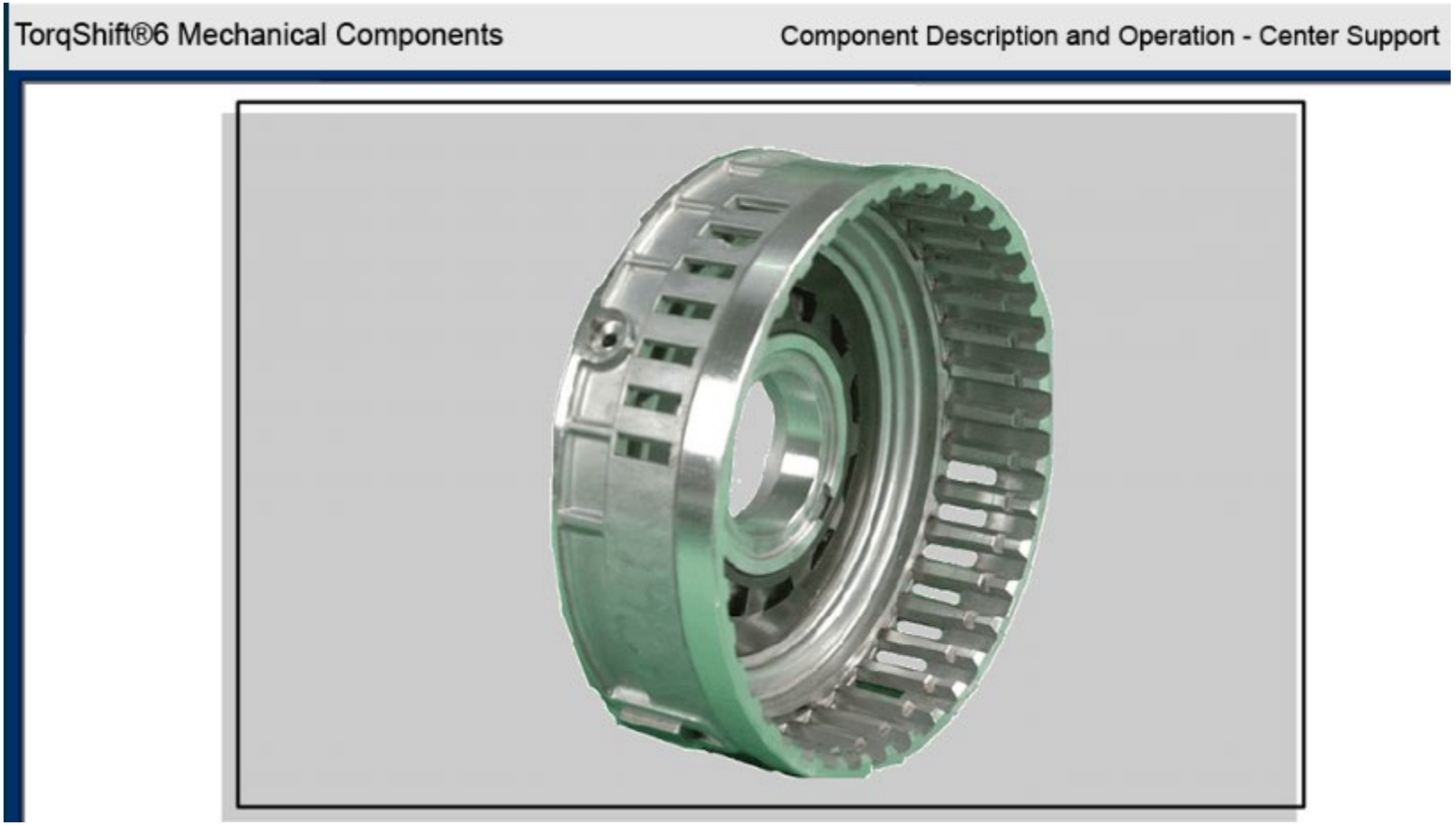
Splined to torque converter turbine, OD clutch cyl and front planetary ring gear. 5 serviceable sealing rings

Front Sun Gear and Carrier



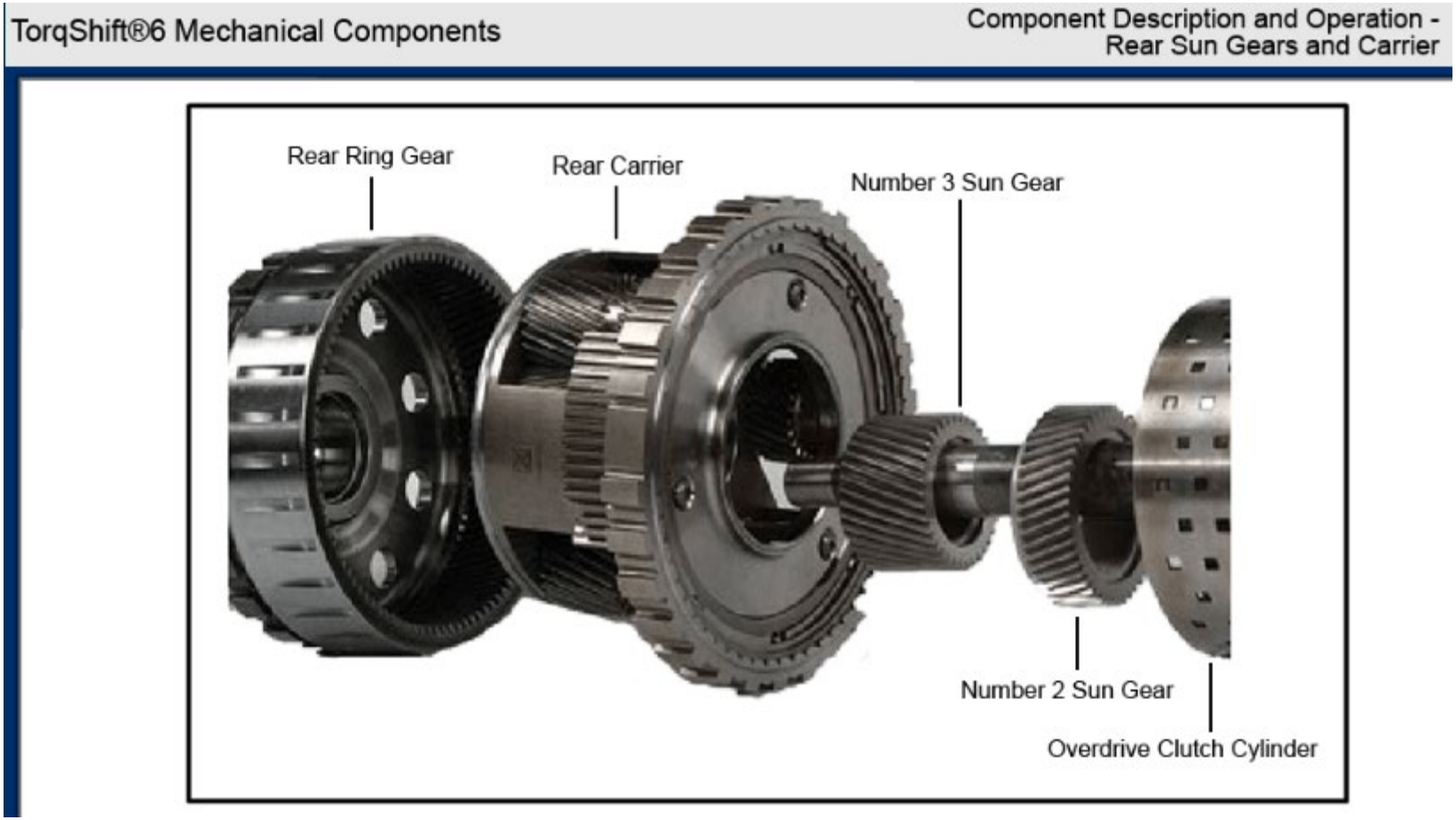
Simple planetary gear set. Input shaft rotates front ring gear which is part of the OD clutch cyl. Front sun gear connected to fluid pump and always held stationary.

Center Support



Supports the internal components and houses intermediate clutch piston and seals

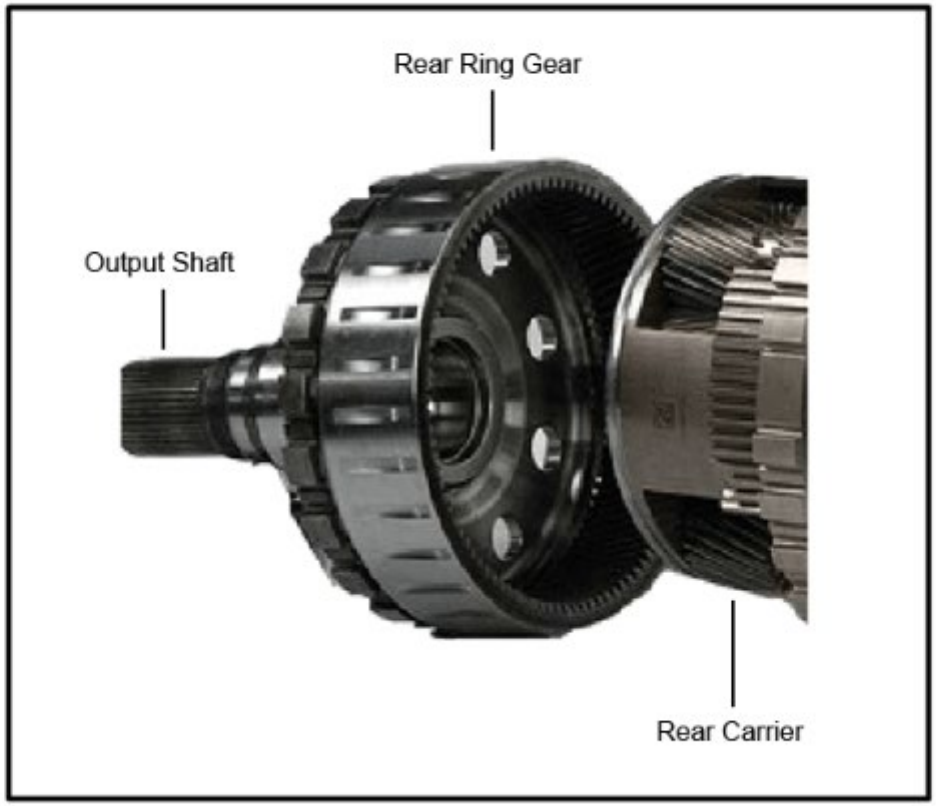
Rear Sun Gears and Carrier



Rear planetary is a Ravigenaux. #2 sun gear splined to direct clutch cyl. # 3 sun gear splined to #3 sun gear hub & shaft assy. Rear planetary ring gear is connected to output shaft

Output Shaft

TorqShift®6 Mechanical Components — Component Description and Operation - Output Shaft



2 output shaft types: 4WD slip yoke, 2WD Fixed yoke

Clutches

TorqShift®6 Mechanical Components — Component Description and Operation

The clutches in the transmission are the:

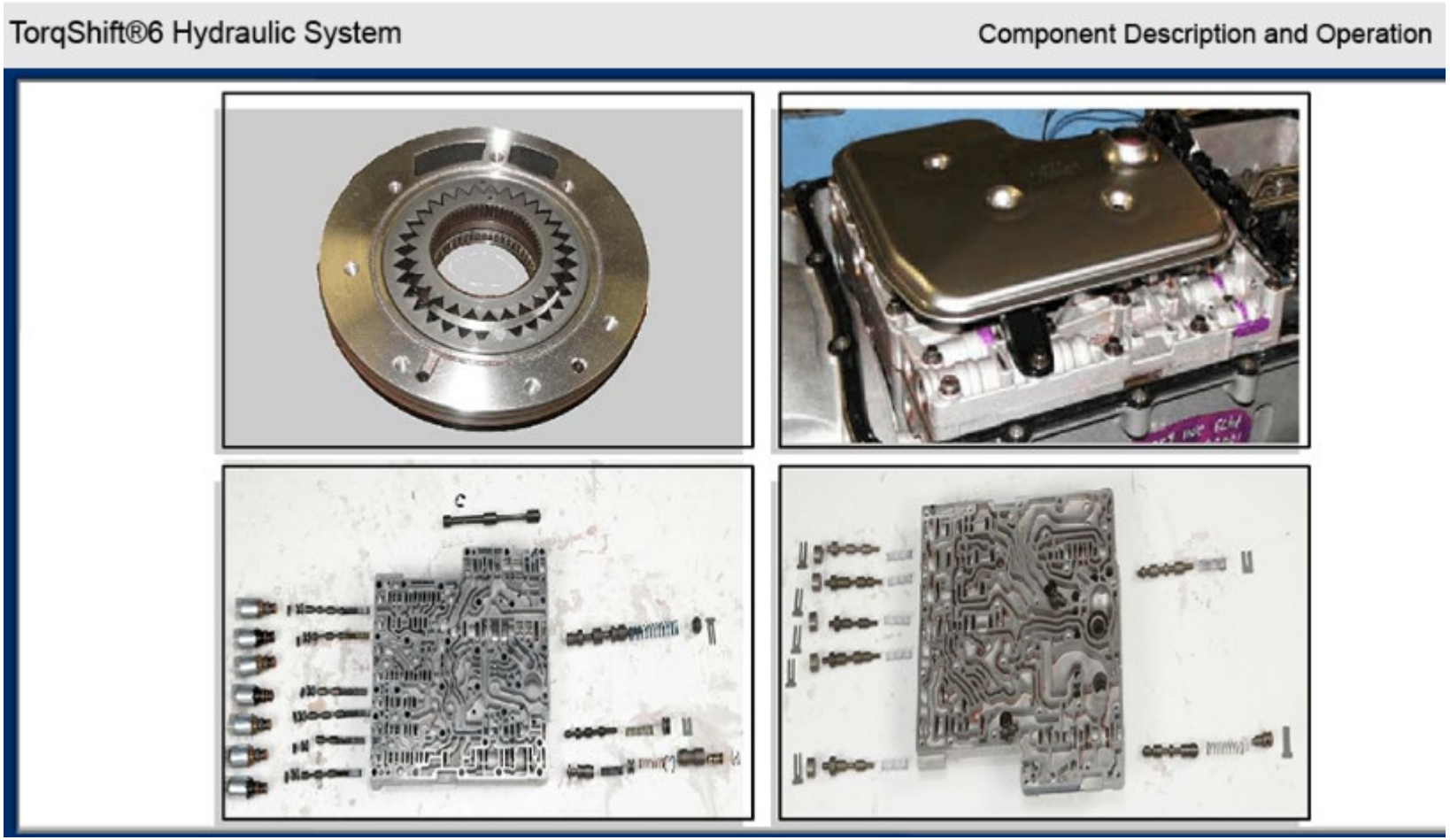
- Forward Clutch (1,2,3,4) — Controlled by shift solenoid A. Connects planetary carrier to rear #3 sun gear
- Overdrive Clutch (4-5-6) — Controlled by shift solenoid E. Connects input shaft to rear planetary carrier
- Direct Clutch (3,5,R) — Controlled by shift solenoid B. Connects front planetary carrier to rear #2 sun gear
- Intermediate Clutch (2,6) — Controlled by shift solenoid C. Holds rear planetary #2 sun gear stationary to transmission case
- Low/Reverse (1,R) Clutch — Controlled by shift solenoid D. Holds rear planetary carrier stationary to transmission case
- Low One-Way Clutch — Brake clutch. Holds rear planetary carrier in 1 direction and allows to freewheel in opposite direction

Click on a part name for more information about that part.

Hydraulic System

Hydraulic System Components

1. Fluid Pump – Mounted in torque converter housing and driven by torque converter hub
2. Fluid Filter
3. Upper Valve Body
4. Lower Valve Solenoid Body

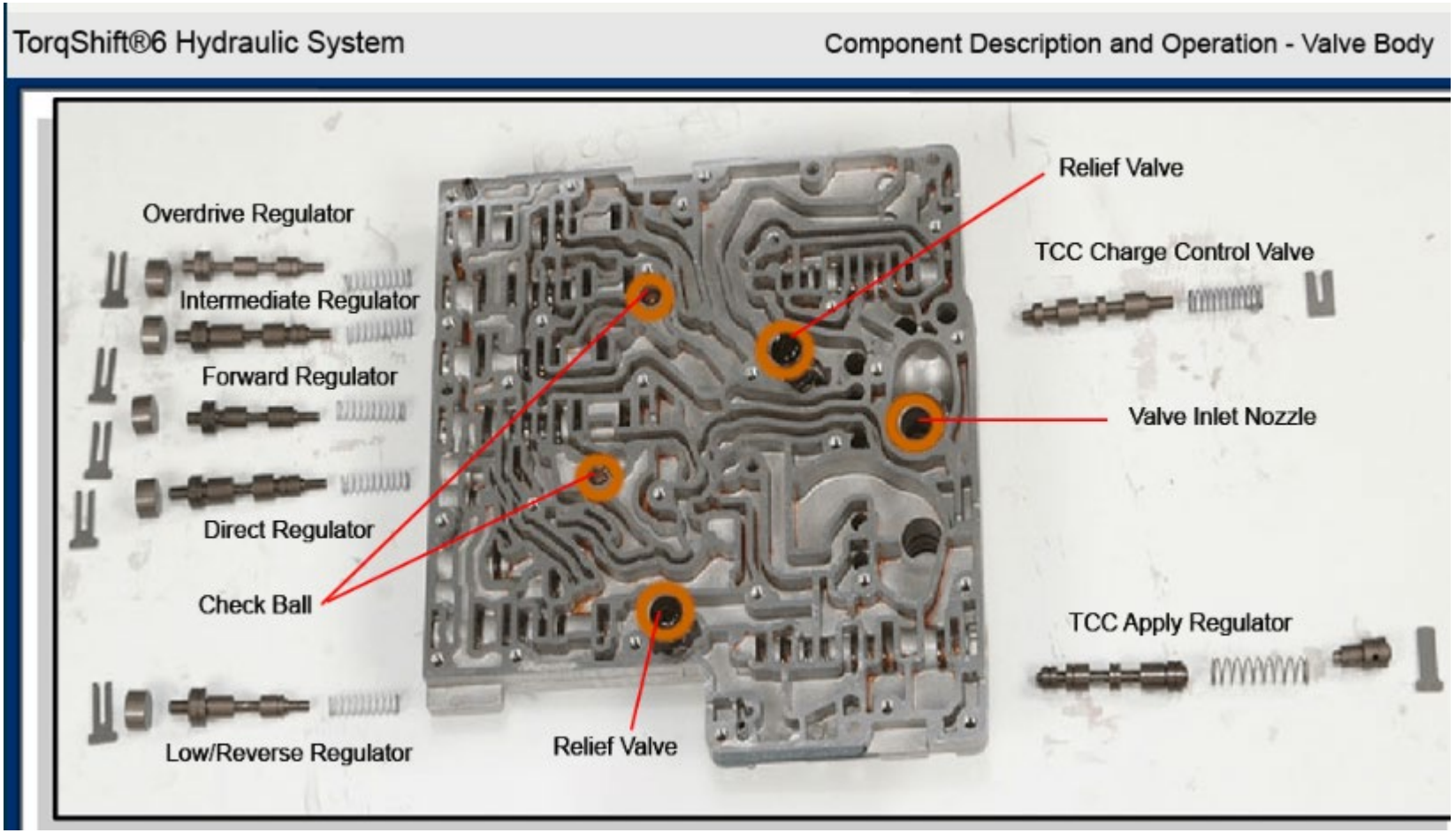


Main Control Assembly

1. Main Control Separator Plate
2. Upper Valve Body
3. Lower Valve Body

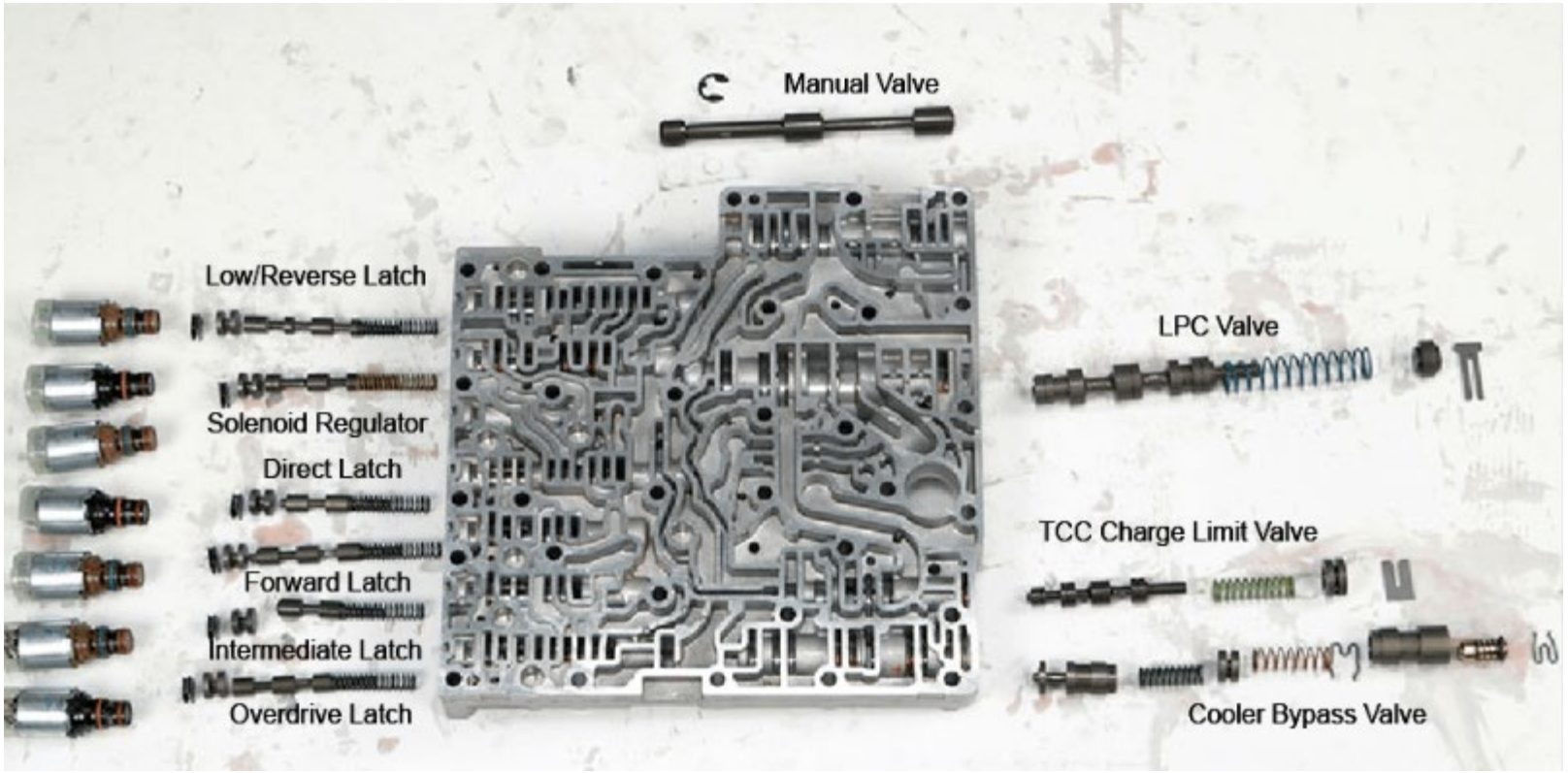
Upper Valve Body

1. Main Control Separator Plate – Routes fluid between the upper and lower valve bodies
2. Upper Valve Body – 7 valves, 2 check balls, valve inlet nozzle, 2 relief valves

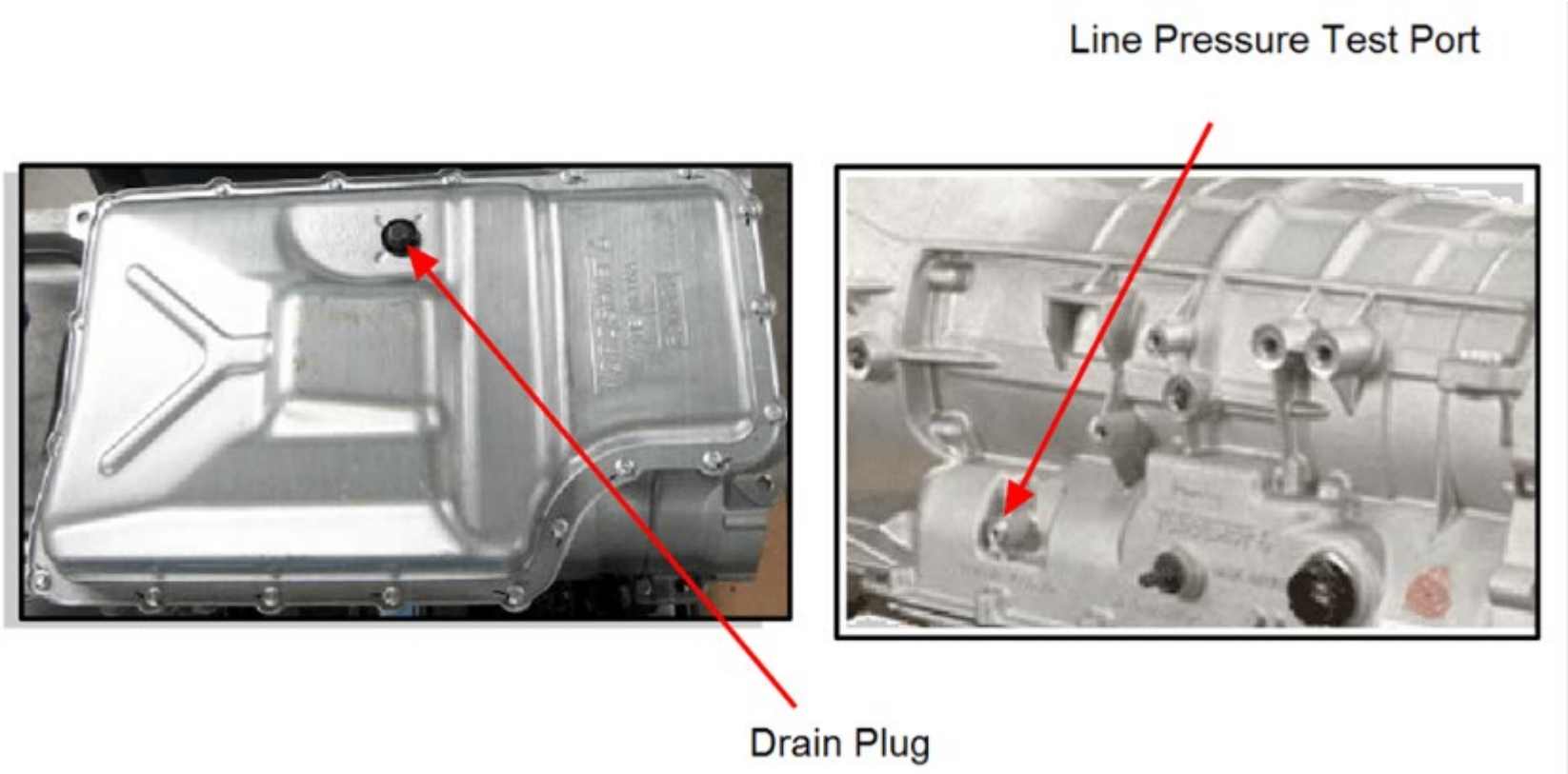


Lower Valve Body

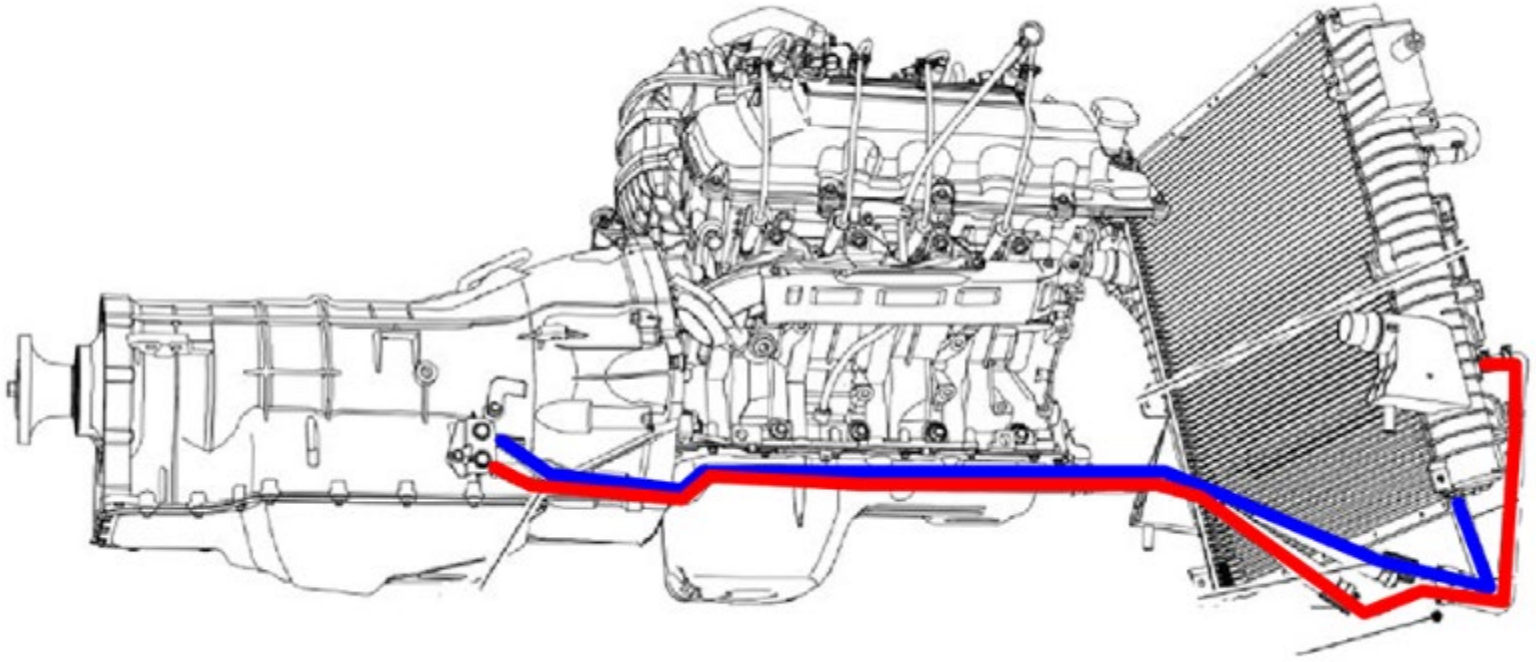
3. Lower Valve Body – Solenoids used by PCM for transmission control and 10 valves



Drain Plug & Line Pressure Test Port



Transmission Cooler

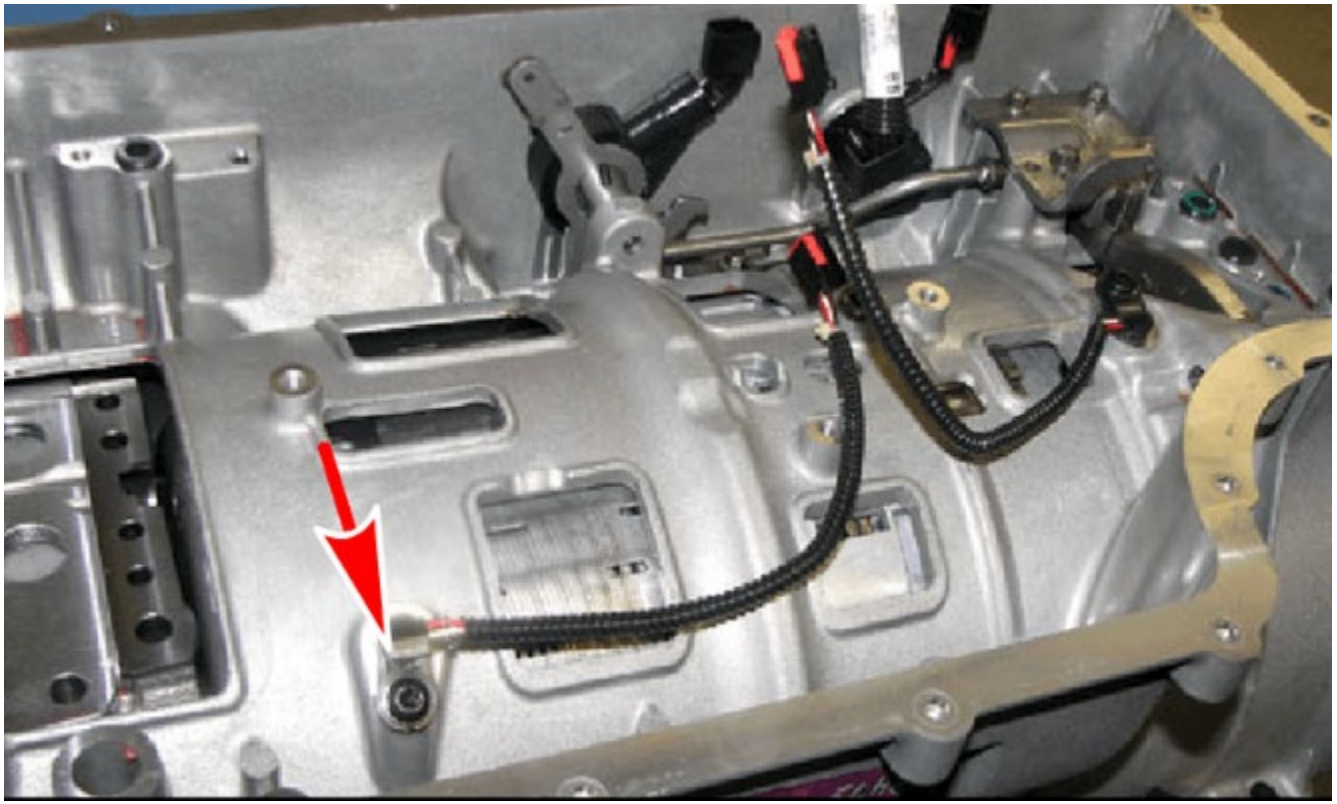


Fluids flows to radiator, then to trans cooler, then back to trans

Electronic Control System

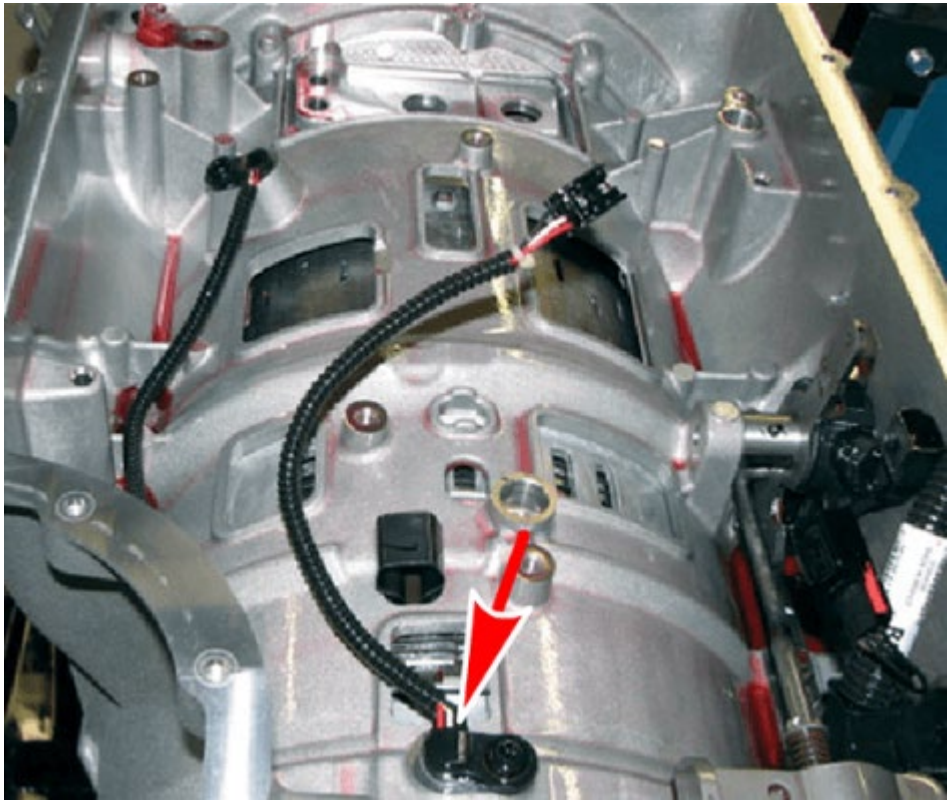
Sensors

1. Transmission Range (TR) – PWM for each position of shift lever (what gear it is in)
2. Turbine Shaft Speed (TSS) – Located beneath the main control assembly for Torque Converter Clutch. Compared to RPM and OSS.



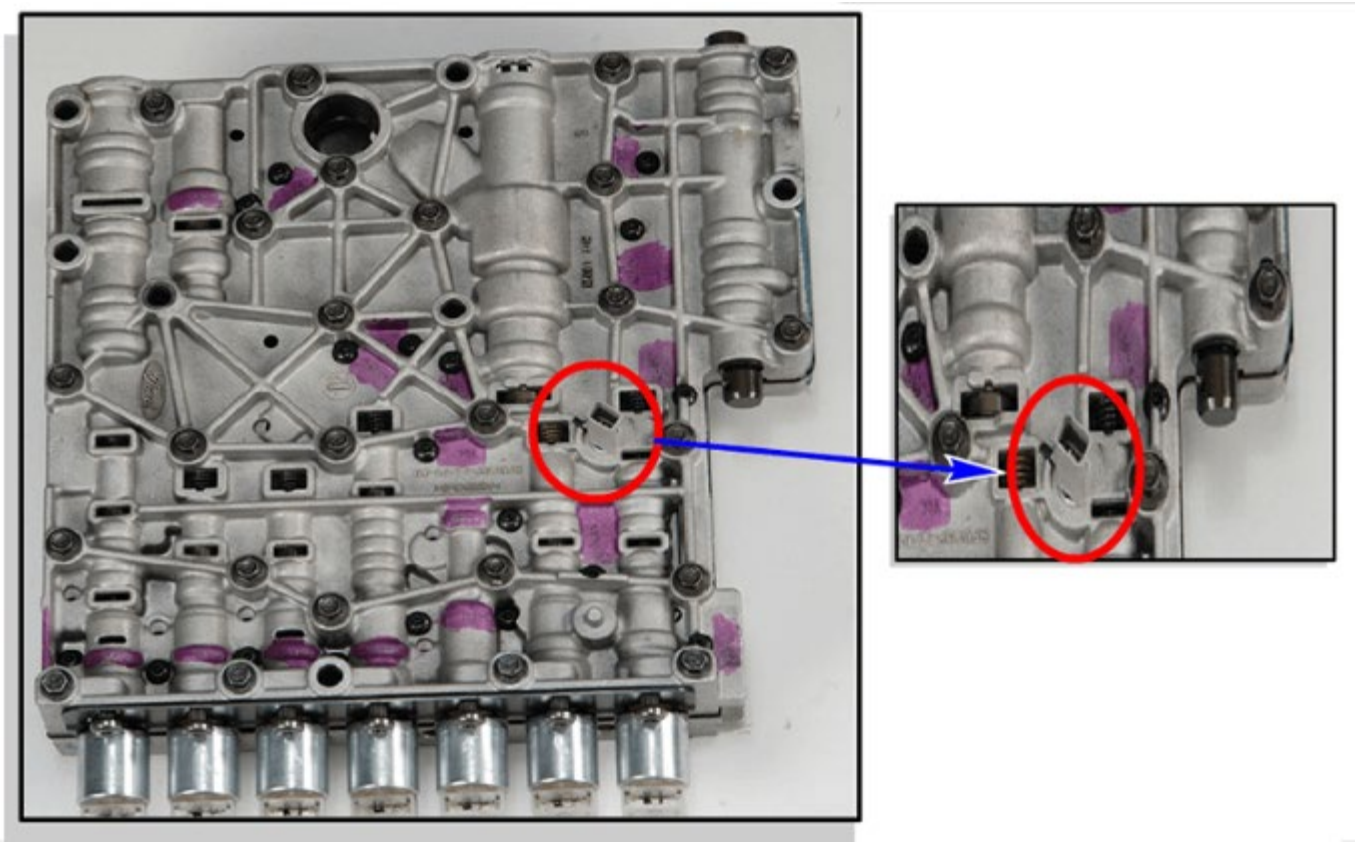
Sensors

3. Output Shaft Speed (OSS) – Under transmission pan. Sends to PCM and TCM for shift scheduling



Sensors

4. Transmission Fluid Temperature(TFT) – Twist locked into lower valve body.



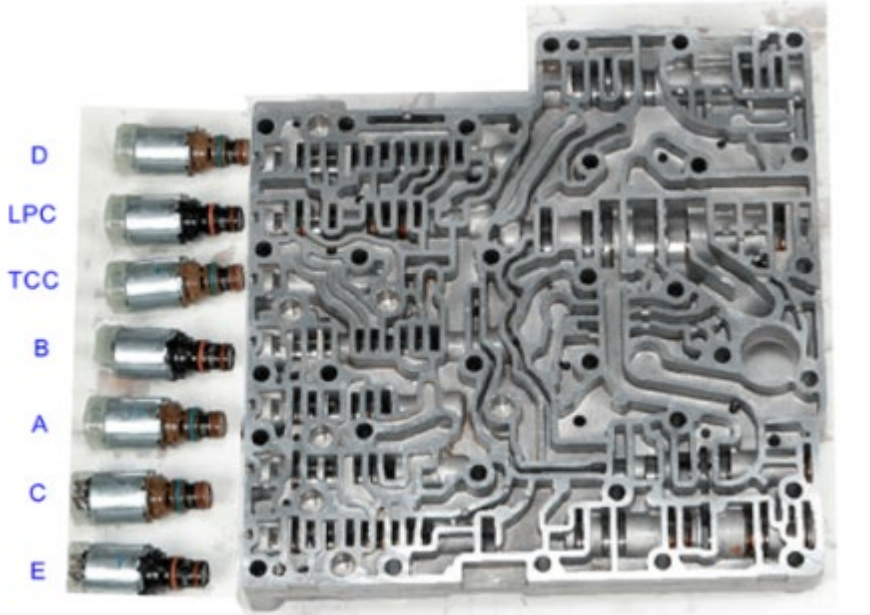
Solenoids in Lower Valve Body

2 types:

1. Normally low (NL) – provide hydraulic pressure proportional to supplied voltage
2. Normally high (NH) – provide full output at low voltage and low pressure at high voltage

The solenoids are calibrated from the factory and are not all the same.

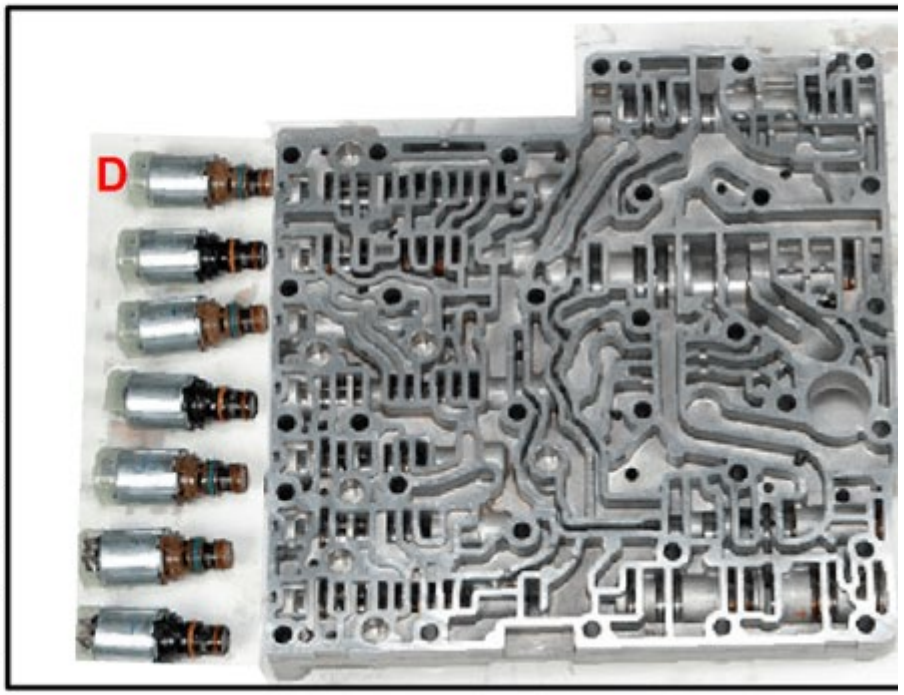
The replacement solenoid band number must match the band number of the solenoid being replaced. **The band number is printed on the side of the solenoid and will be 1, 2, 3 4, or 5**



Shift Solenoid D (SSD)

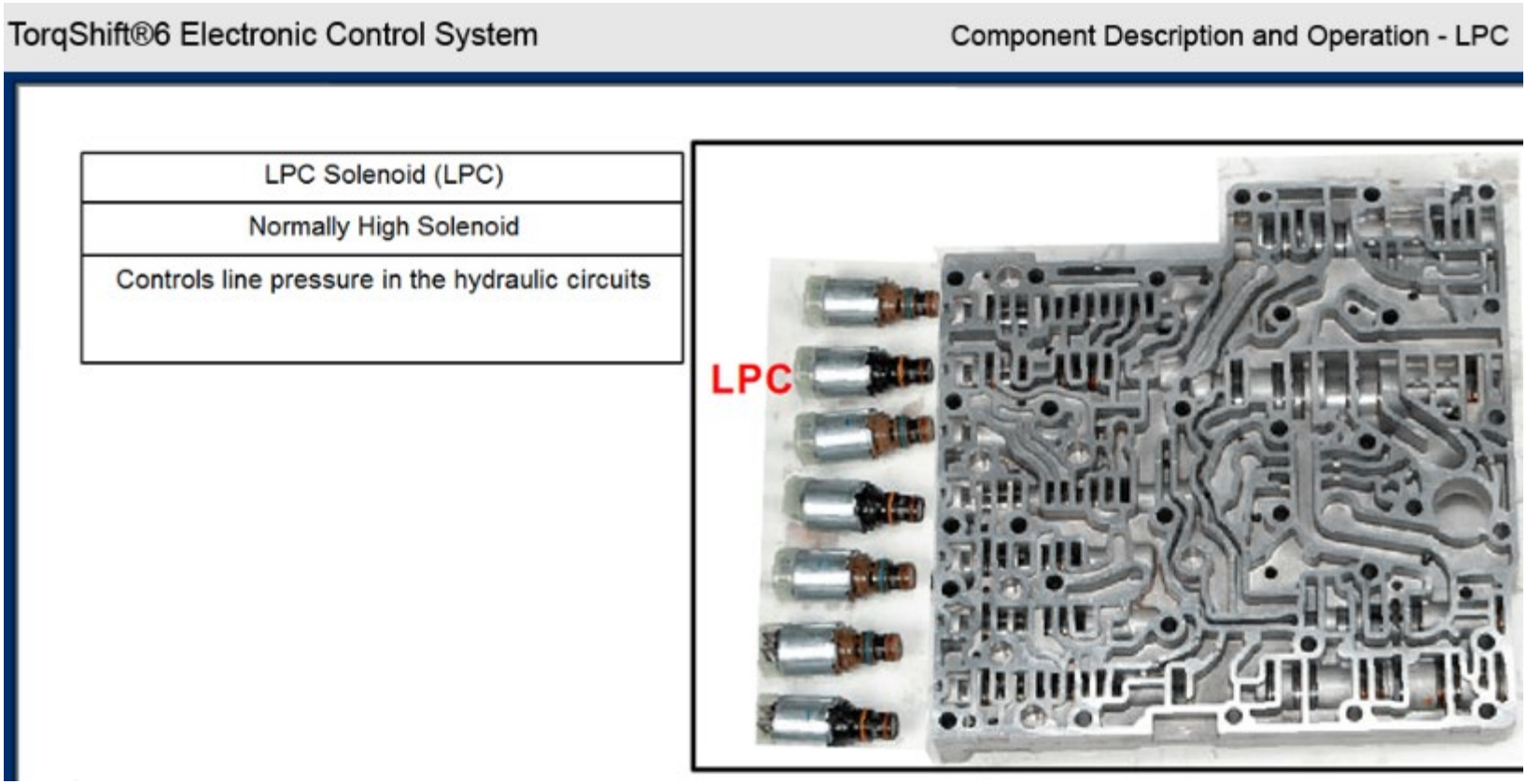
TorqShift®6 Electronic Control System — Component Description and Operation - SSD

Shift Solenoid D (SSD)	
Normally Low Solenoid	
Low/Reverse Clutch	
P/N	On (850 mA)
R	On (850 mA)
1	On (850 mA)
2	Off (50 mA)
3	Off (50 mA)
4	Off (50 mA)
5	Off (50 mA)
6	Off (50 mA)



Line Pressure Control Solenoid D (LPC)

Used in all gears to provide main line pressure

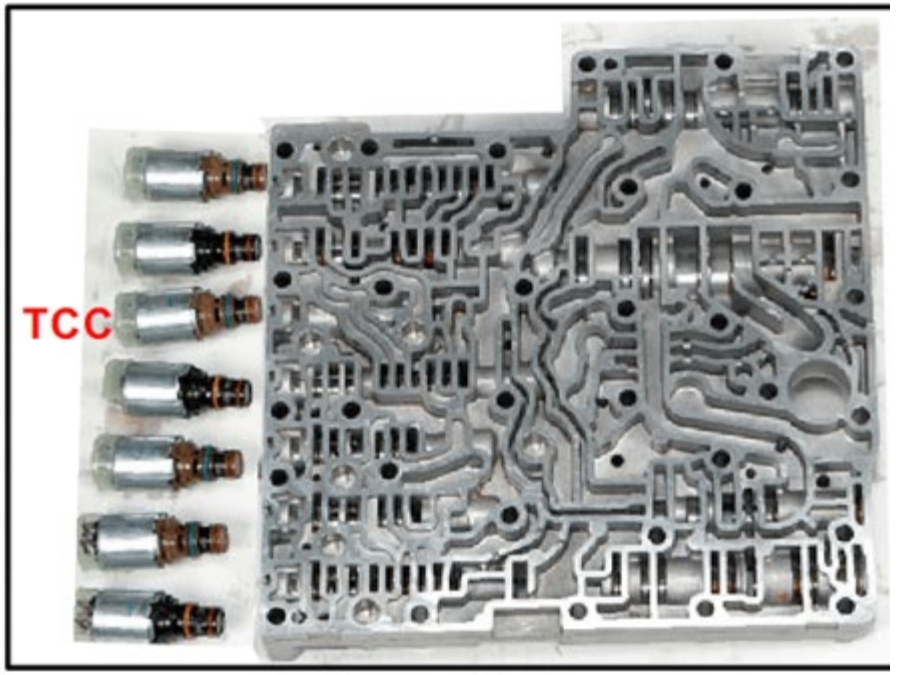


Torque Converter Clutch (TCC)

Used to apply torque converter clutch

TorqShift®6 Electronic Control System — Component Description and Operation - TCC

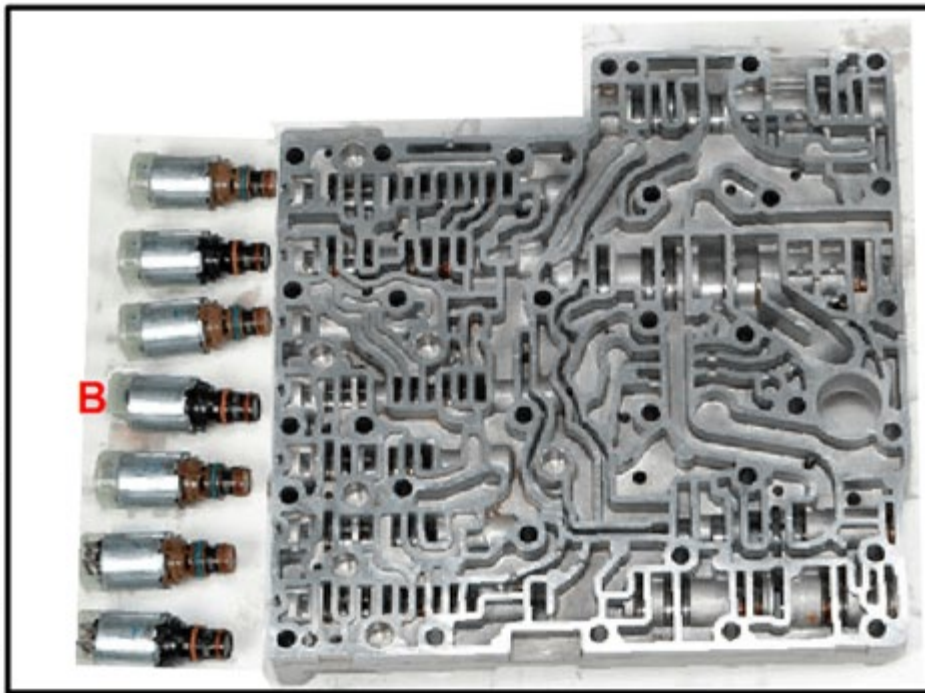
Torque Converter Clutch Solenoid	
Normally Low Solenoid	
Torque Converter Clutch	
P	Off (50 mA)
R	Off (50 mA)
1	Off (50 mA)
2	Off (50 mA)
3	Off (50 mA)
4	On/Off (850/50 mA)
5	On/Off (850/50 mA)
6	On/Off (850/50 mA)



Shift Solenoid B (SSB)

Used to apply direct clutch

Shift Solenoid B (SSB)	
Normally High Solenoid	
Direct Clutch	
P	On (50 mA)
R	Off (850 mA)
1	On (50 mA)
2	On (50 mA)
3	Off (850 mA)
4	On (50 mA)
5	Off (850 mA)
6	On (50 mA)

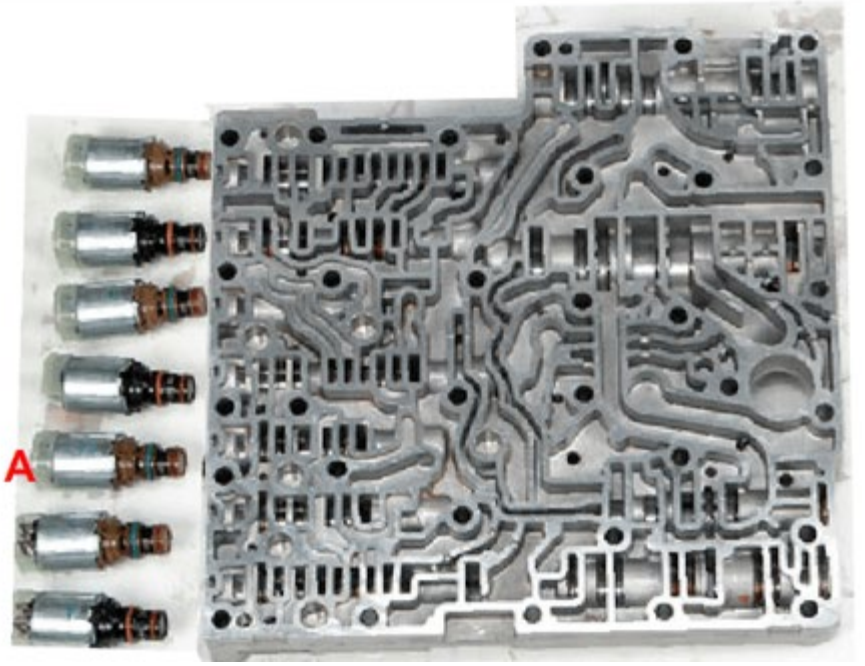


Shift Solenoid A (SSA)

Used to forward clutch

TorqShift®6 Electronic Control System — Component Description and Operation - SSA

Shift Solenoid A (SSA)	
Normally Low Solenoid	
Forward Clutch	
P	Off (50 mA)
R	Off (50 mA)
1	On (850 mA)
2	On (850 mA)
3	On (850 mA)
4	On (850 mA)
5	Off (50 mA)
6	Off (50 mA)

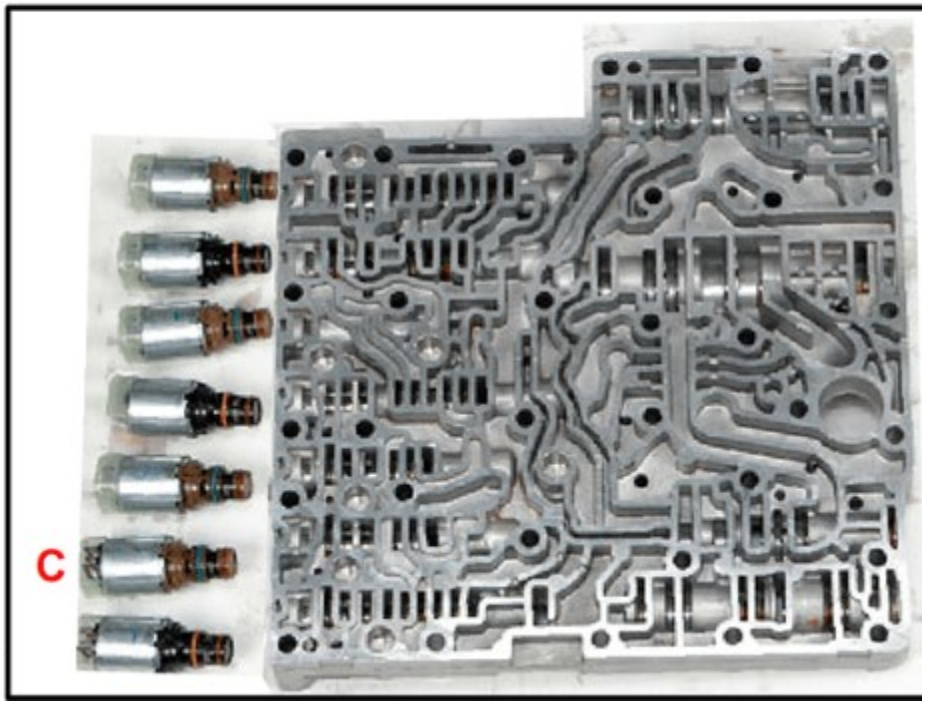


Shift Solenoid C (SSC)

Used to apply intermediate clutch

TorqShift®6 Electronic Control System — Component Description and Operation - SSC

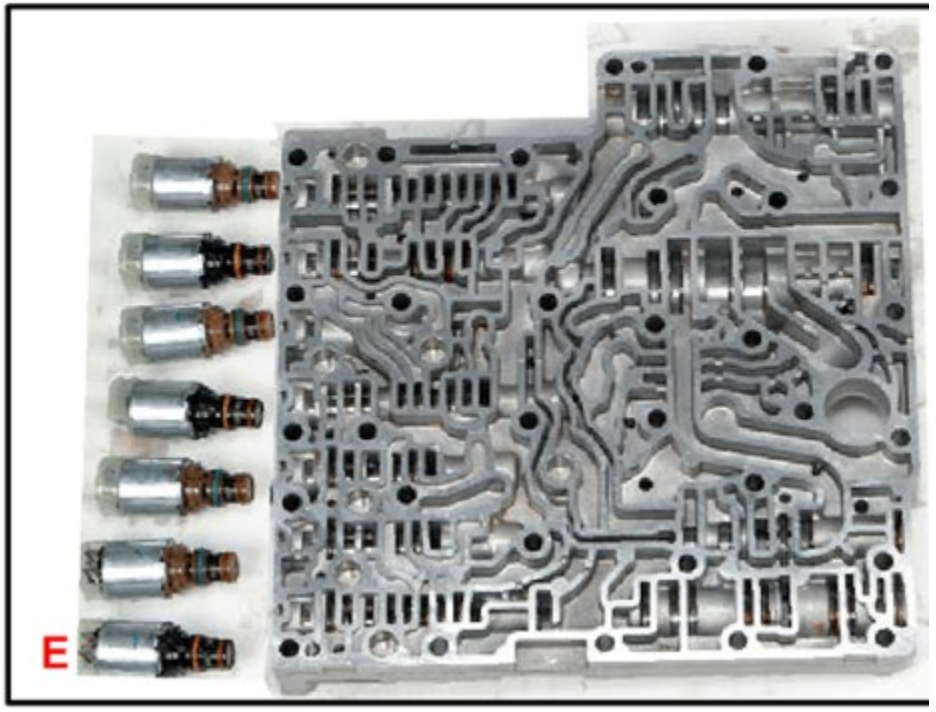
Shift Solenoid C (SSC)	
Normally Low Solenoid	
Intermediate Clutch	
P	Off (50 mA)
R	Off (50 mA)
1	Off (50 mA)
2	On (850 mA)
3	Off (50 mA)
4	Off (50 mA)
5	Off (50 mA)
6	On (850 mA)



Shift Solenoid E (SSE)

Used to apply overdrive clutch

Shift Solenoid E (SSE)	
Normally High Solenoid	
Overdrive Clutch	
P	On
R	On
1	On
2	On
3	On
4	Off
5	Off
6	Off



Transmission Operation

Solenoid Operation Chart

Solenoid Operation Chart

Selector Lever Position	Commanded Gear	Shift Solenoid					TCC NL
		SSA NL (1,2,3,4)	SSB NH (3,5,R)	SSC NL (2,6)	SSD NL (1,R)	SSE NH (4,5,6)	
P	P	OFF	ON	OFF	ON	ON	OFF
R	R	OFF	OFF	OFF	ON	ON	OFF
N	N	OFF	ON	OFF	ON	ON	OFF
D	1	ON	ON	OFF	ON	ON	ON/OFF
	2	ON	ON	ON	OFF	ON	ON/OFF
	3	ON	OFF	OFF	OFF	ON	ON/OFF
	4	ON	ON	OFF	OFF	OFF	ON/OFF
	5	OFF	OFF	OFF	OFF	OFF	ON/OFF
	6	OFF	ON	ON	OFF	OFF	ON/OFF
L	L	ON	ON	OFF	ON	ON	OFF

Clutch Application Chart

Clutch Application Chart

NOTE

Gear	Forward (1,2,3,4)	Direct (3,5,R)	Intermediate (2,6)	Low/Reverse (1,2,3,4)	Overdrive (4,5,6)	Low OWC
Park				H		
Reverse		D		H		
Neutral				H		
D 1st	D			H (Below 4 mph		H
D 2nd	D		H			O/R
D 3rd	D	D				O/R
D 4th	D				D	O/R
D 5th		D			D	O/R
D 6th			H		D	O/R
M 1st	D			H		H
Planetary Components	Front Carrier to No. 3 Sun	Front Carrier to No. 2 Sun	No. 2 Sun	Rear Carrier	Input shaft to Rear Carrier	Rear Carrier

NOTE: Above 4mph the low/rev clucth releases, however the low 1 way clucth continues to hold the rear carrier stationary during acceleration

Transmission Diagnosis

Symptom-> System-> Component-> Cause (SSCC)

SSCC is recommended approach to diagnosis

Checks:

1. Check fluid level and condition
2. Solenoid body and strategy must match what is in IDS
   - IDS->Powertrain->Transmission->Transmission Solenoid Body ID
3. Shift point road test in Workshop Manual
4. Inspect fulid cooler and lines
5. Perform shift linkage check
6. Retrieve DTCs
7. Review parameter identification (PID) data in IDS
8. Line pressure test at idle in Workshop Manual
9. Stall test (5 sec max) checks torque converter 1 way clutch and holding capability of applied clutches. Reference stall speed diagnosis chart in Workshop Manual
10. Inspect main control assembly (use plastic screwdrivers)
11. Inspect transmission body

Transmission Service

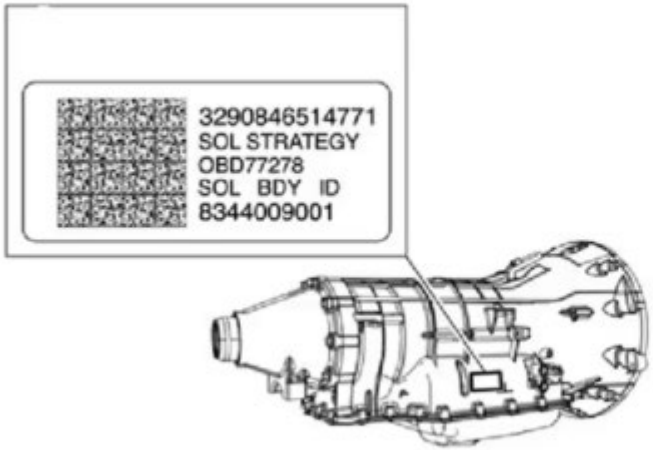
Service Procedures

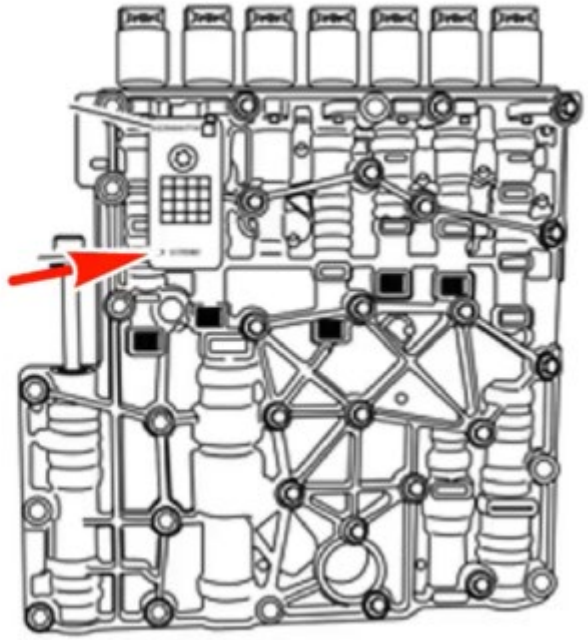
Cooler Flush – Flush the cooler any time the torque converter is replaced, metal is found in the fluid filter, or if the transmission experiences catastrophic failure

Fluid Cooler Flow Test – Reference Workshop Manual

Solenoid Body Strategy Programming –

- Programmable Parameters->Transmission->Enter numbers from tag





Special Tools

TKIT-2009C-F Box 5, 6, 7

307-654

307-667

307-654