

ATRA WEBINARS

Introduction to the GM 6L80

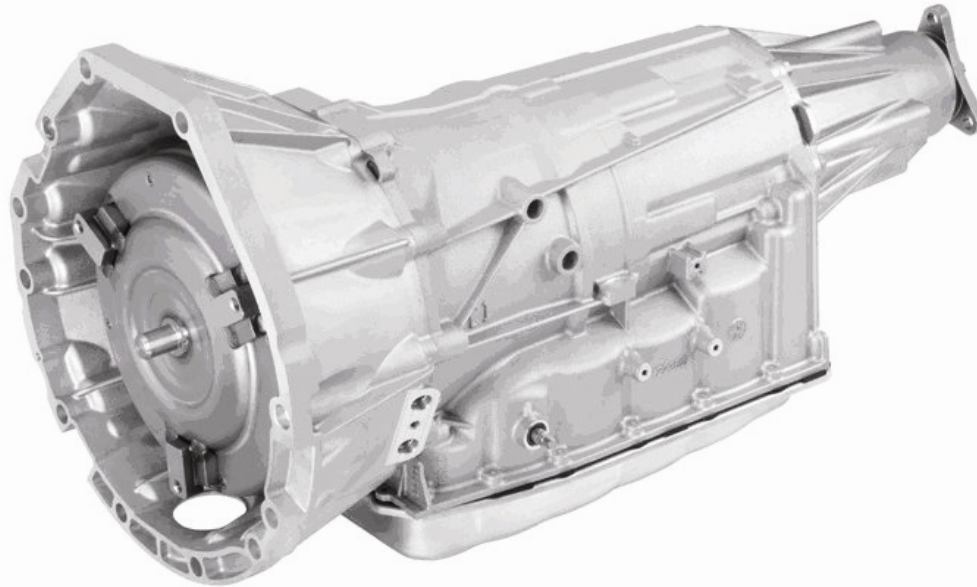


Presented By:
Steve Garrett

6L80 (RPO MYC)

Introduction

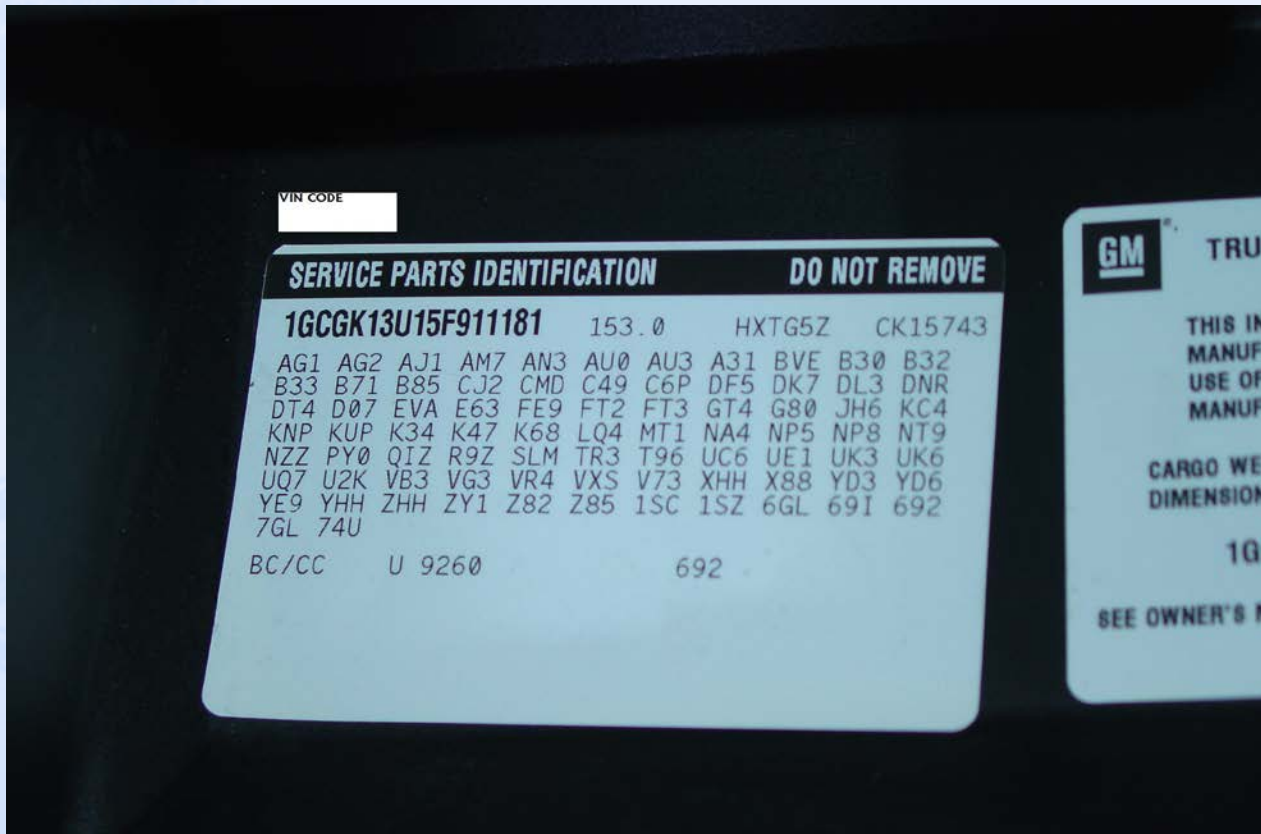
The first of ten 6 speed automatics was introduced in the 2006 model year. The 6L80 (RPO MYC) is currently available in the Chevrolet Corvette, Cadillac XLR-V and the Cadillac STS-V applications. The 6L80 was introduced into several “up level” SUV applications for the 2007 model year. The new plant utilizes several industry first technical innovations and production processes and is unlike any other assembly plant in the world.



Cadillac STS-V

Hydra-Matic
2006 6L80 (MYC)
Six Speed RWD Automatic Transmission

RPO LABELS



6L80

Introduction

- RPO MYC
- Input torque capacity 430 lb ft (583 Nm)
- Output torque capacity 664 lb ft (900 Nm)
- Ratios
 - 1st – 4.02-1
 - 2nd – 2.36-1
 - 3rd – 1.53-1
 - 4th – 1.15-1
 - 5th - .85-1
 - 6th - .67-1
- Maximum shift speed 6500 RPM
- Maximum GVW 8600 lb
- Maximum GCVW 14000 lb
- PRNDL positions P, R, N, D, (S or M)
- 2 shift solenoids used (On/Off Design), SS1,SS2
- 6 PWM controlled pressure control solenoids, PCS, PCS1, PCS2, PCS3, PCS4, PCS5, TCC
- 32 bit TCM (TEHCM) mounted internal to the transmission on the valve body (Referred to as the “control solenoid valve assembly”) TCM (TEHCM) incorporates Solenoids, pressure switches, TFT and it is bolted to the valve body using 6 bolts.

6L80

Introduction

- EC3 Converter 300mm (Corvette) 258mm twin plate (XLR-V and STS-V)
- Fluid required, Dexron VI
- Fluid capacity, 9.5L (10 qts.) model 6CDA, 9.7L (10.2 qts.) model 6CZA, 11.9 L (12.6 qts.) model CYA
- Clutch to clutch shifts, 5 clutches, 1 sprag
- Planetary (Lepelletier) Output (Dual pinion design)
- Vane style oil pump
- Internally mounted TISS and TOSS hall effect type speed sensors
- Internal Mode Switch (IMS) equipped
- Performance Algorithm Shifting (PAS) programming
- Performance Algorithm Lift Foot (PAL) programming
- Sport mode and TAP shift equipped
- Adaptive Strategies with fast learn capabilities
- 75 transmission only DTCs Learn diagnostic process used

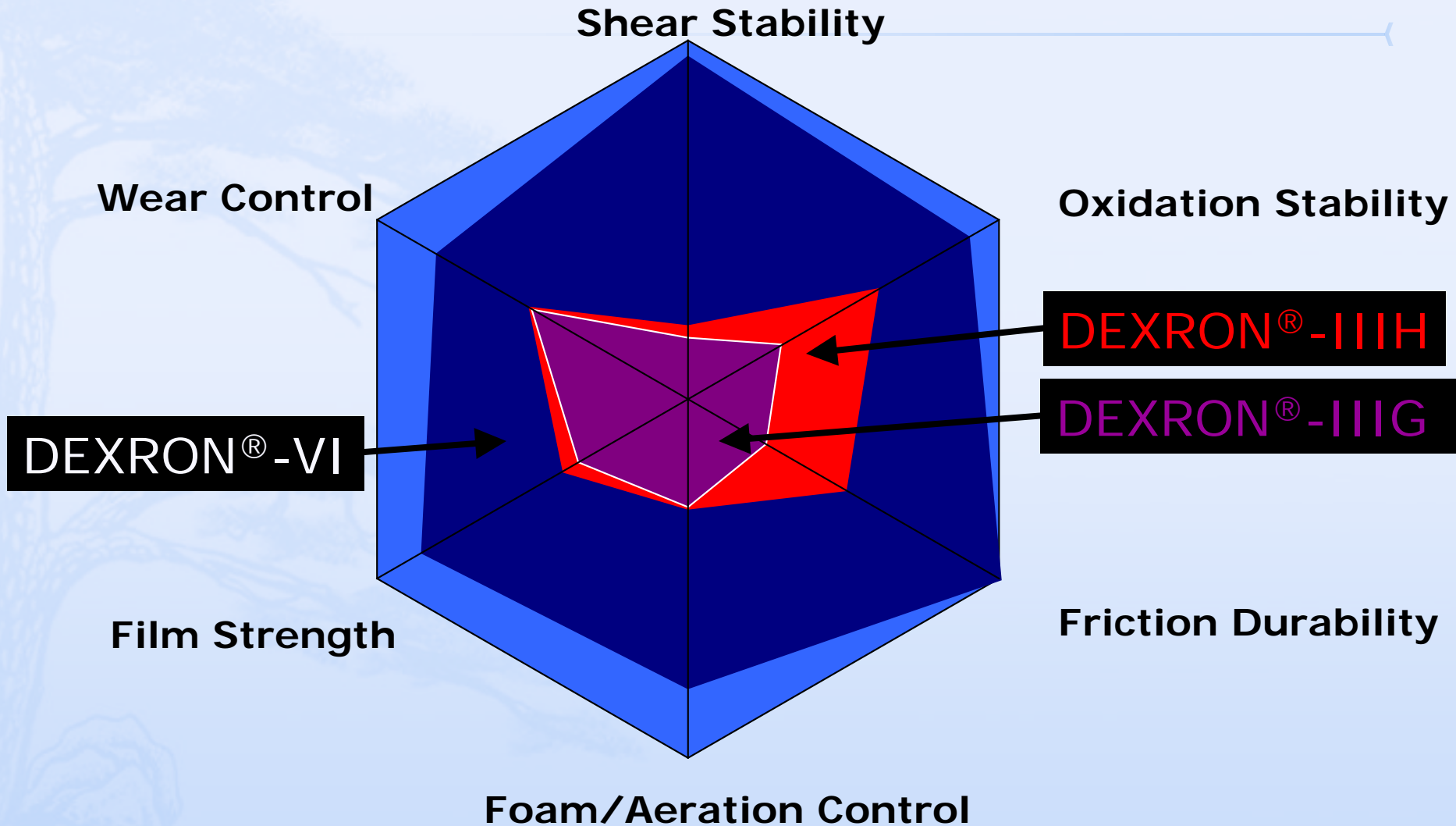
So what is so different?

- ❁ **No Accumulators**
- ❁ **No Shift Valves**
- ❁ **Multifunctional Solenoids**
- ❁ **Backfill Circuits for the Clutches (Exhaust Control)**
- ❁ **Compensator Circuits (Clutch Release control)**
- ❁ **Internal TCM**
- ❁ **Clutch to Clutch Shifts**

Why is Dexron VI Required?

- * **Reduced sump volumes**
- * **Higher fluid turnover rates**
- * **Increased energy densities**
- * **Reduced cooling capacity**
- * **Clutch to Clutch Shifting**
- * **50% improvement in film strength to reduce wear**

Relative performance improvement



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Checking the Fluid Level on Some passenger car applications

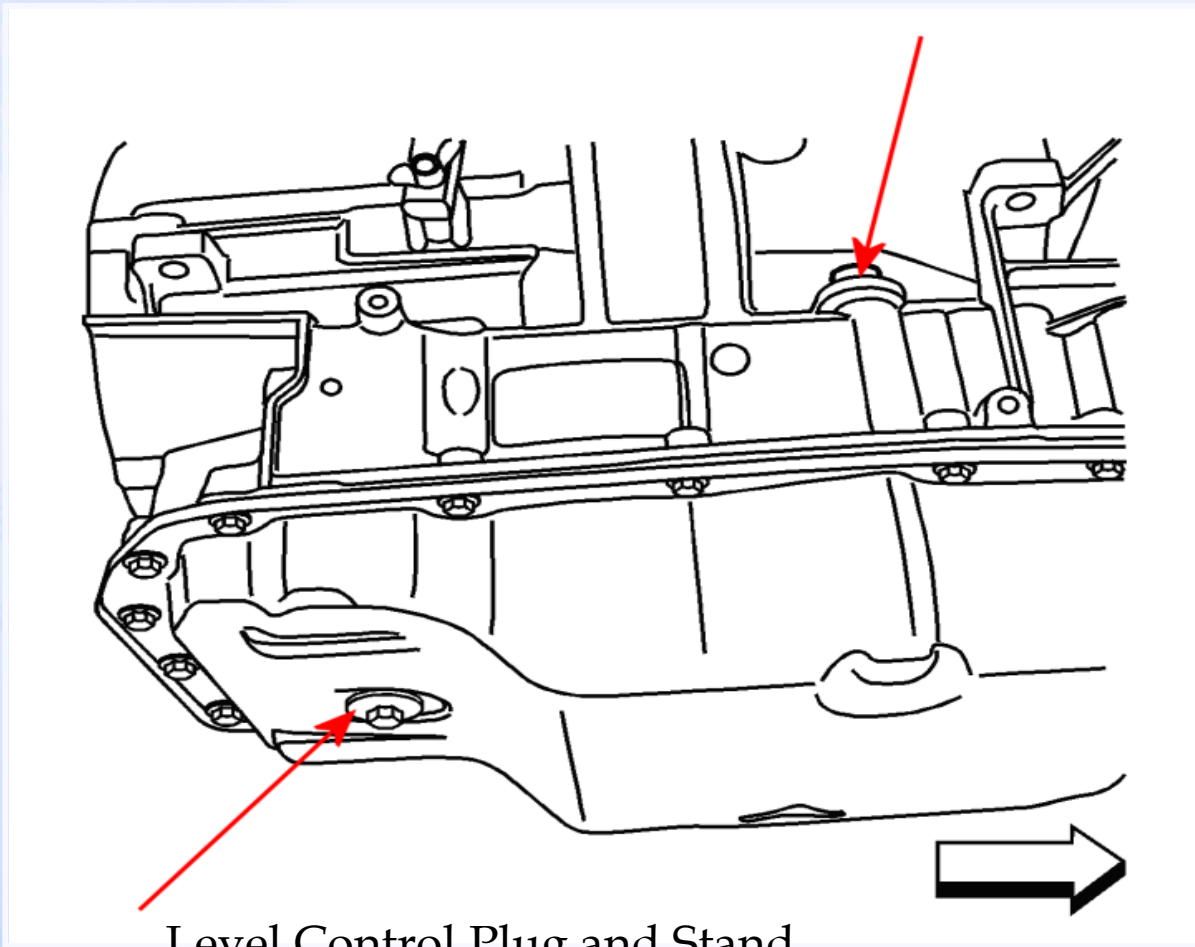
The 6L80 transmission utilizes a very unique process for checking the fluid levels. Some 6L80 applications do not utilize a dipstick. Instead a plug has been placed into the dipstick hole. The plug can be removed and the hole can be used as a fill point for transmission fluid. To check the fluid level the following procedure should be followed:

- The transmission temperature must be between 86-122 °F (30-50°C) a scan tool, the driver information center or the transmission gauge can be used to verify the temperature
- Start the engine and let it idle, Shift the transmission in and out of range pausing in each range for approximately 3 seconds
- Place the transmission in park range
- With the vehicle level, remove the level control plug located in the transmission oil pan
- If fluid does not drip from the level control hole, add Dexron VI fluid until fluid starts to drip from the hole. If fluid runs from the hole wait until the fluid stops running from the hole. The level is correct when fluid drips slightly from the hole. If a steady stream is present or no flow is present the fluid level is incorrect. Install the fill plug and the level control plug.

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Checking the Fluid Level

NOTE: Fluid may be added through the dipstick hole or through the level control hole.



Level Control Plug and Stand
Pipe

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Component Application Chart

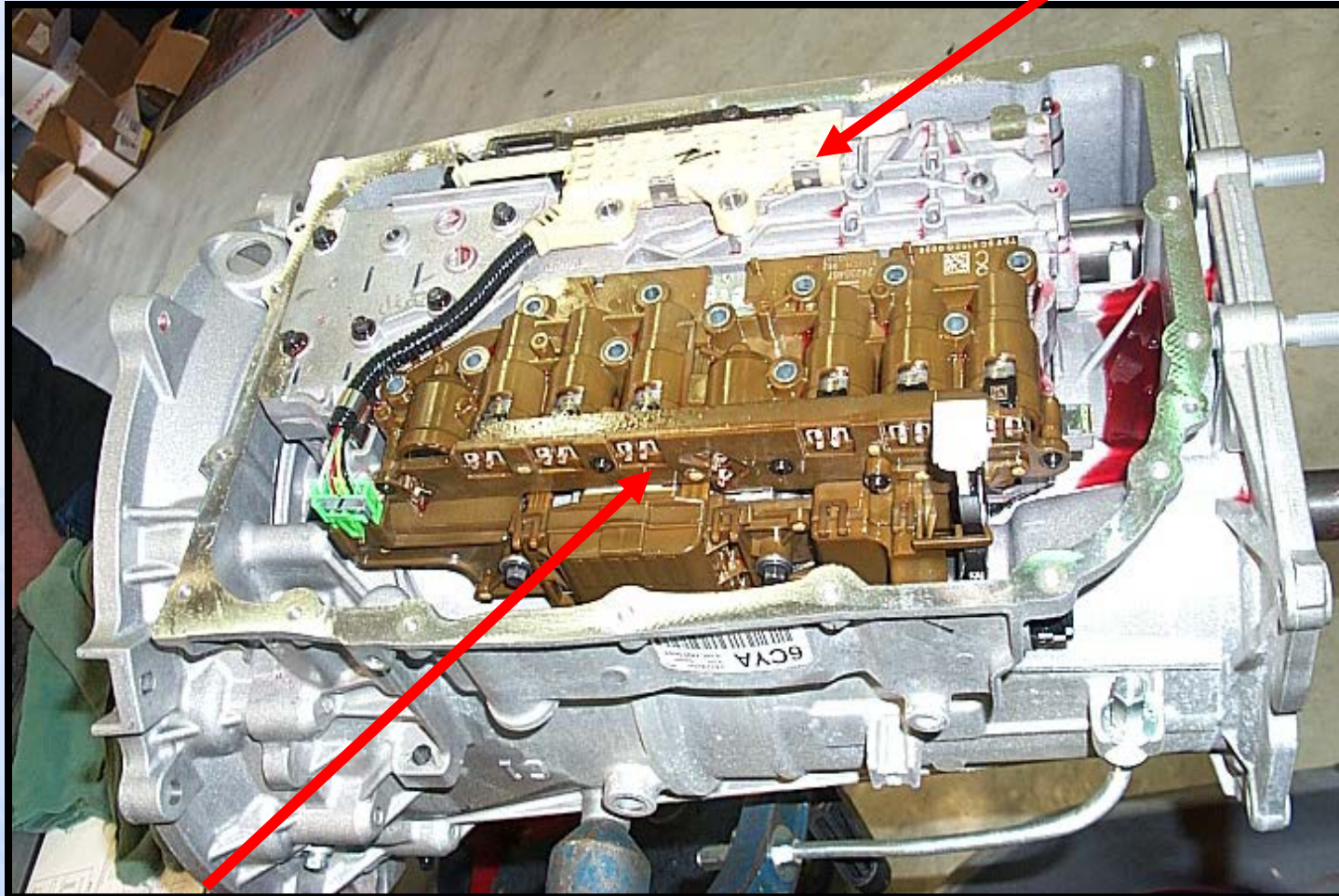
| RANGE | PARK | REV | NEUTRAL | 1ST BRAKING | 1ST | 2ND | 3RD | 4TH | 5TH | 6TH |
|-----------------------|-------------|------------|----------------|--------------------|------------|------------|------------|------------|------------|------------|
| 1-2-3-4 Clutch | | | | ON | ON | ON | ON | ON | | |
| 3-5 Clutch | | ON | | | | | ON | | ON | |
| 4-5-6 Clutch | | | | | | | | ON | ON | ON |
| 2-6 Clutch | | | | | | ON | | | | ON |
| L/R Clutch | ON | ON | ON | ON | | | | | | |
| Low Sprag | | | | ON | ON | | | | | |

TCM over temp protected
(142c) Thermal Shutdown
uses 2 thermal couples on
the board. Default 3rd or
5th

What's Inside

NSBU/PRNDL/
IMS
Switch

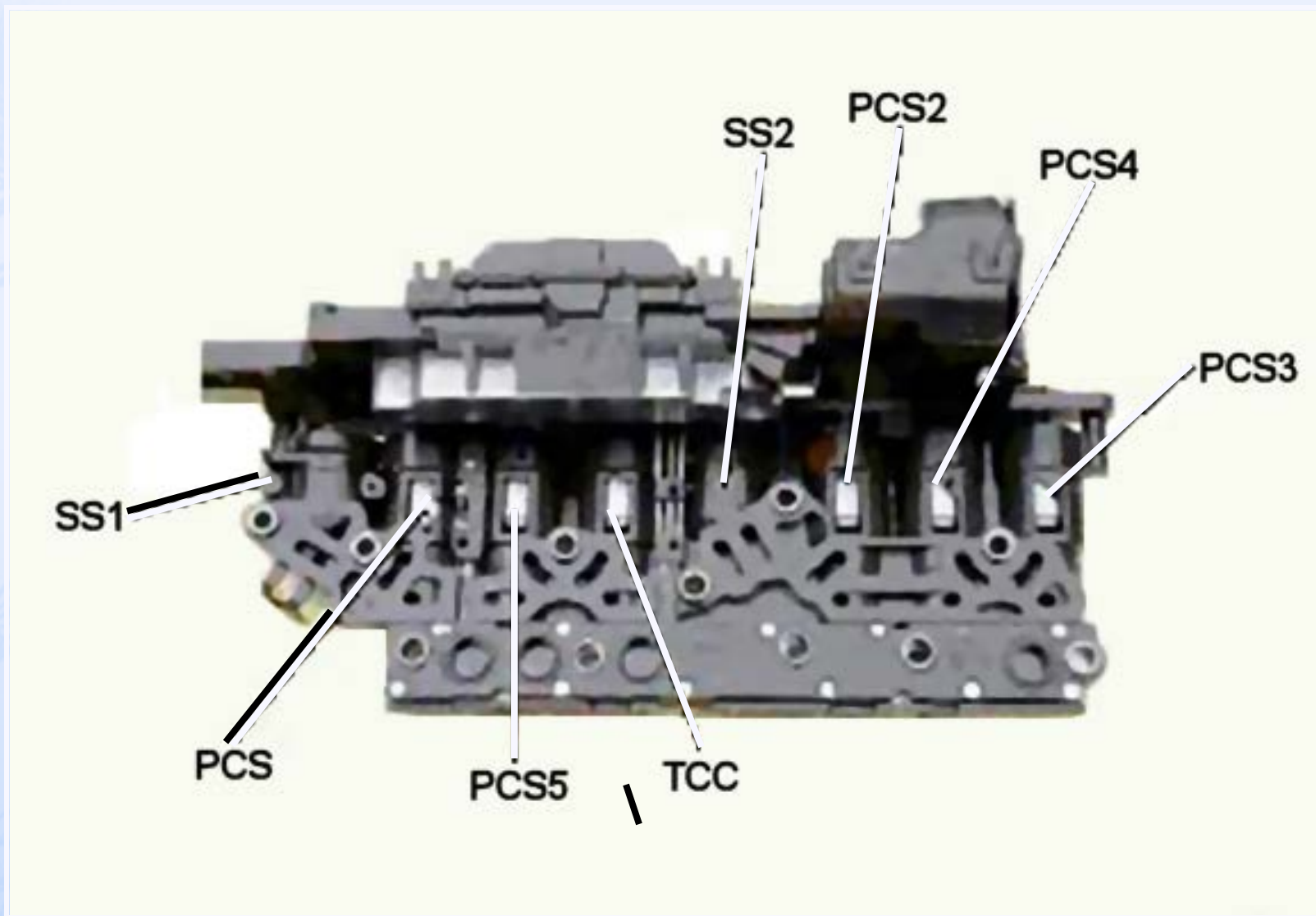
Transmission Internal components



Solenoid Pack/Block
Assembly & TEHCM

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Shift and Control Solenoids



SOLENOIDS

- * 2 ON/OFF SHIFT SOLENOIDS: N/C, GROUND SIDE CONTROLLED
- * 3 VBS NORMALLY "LOW" SOLENOIDS, TCC, #4,#5
- * 3 VBS NORMALLY "HIGH" SOLENOIDS, PCS,#2,#3
- * NORMALLY HIGH= SOLENOID OFF, PRESSURE IS ALLOWED TO TRAVEL TO THE CLUTCH
- * NORMALLY LOW= SOLENOID OFF, NO PRESSURE IS ALLOWED TO TRAVEL TO THE CLUTCH
- * VBS SOLENOIDS ARE "POSITIVE DUTY CYCLE" CONTROLLED, 3000 HZ, 5.5 OHMS AT 70F, CURRENT LIMITED TO .9A, SOLENOID FEED VOLTAGE REGULATED FROM TCM IS 8.3-9.3 VOLTS

Solenoids

- * Solenoid 1 and 2 are ON/OFF solenoids and are used to control whether the transmission is in Reverse or Forward
- * VBS solenoids 2, 3, 4, and 5 control when a shift occurs and how aggressive the shift is. Shift feel is also controlled by the compensator circuit. Solenoid cleaning cycle every 30 seconds while in P/N or when you run the cleaning process with the scan tool

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Control Solenoid Operation

| GEAR | Shift Sol 1 | Shift Sol 2 | 1-2-3-4 Clutch Pres Control Solenoid Solenoid 5 | 2-6 Clutch Pres Control Solenoid Solenoid 4 | 3-5 Clutch Pres Control Solenoid Solenoid 2 | Low/Rev 4-5-Clutch Pres Control Solenoid Solenoid 3 |
|----------------------------|-------------|-------------|---|---|---|---|
| PARK | ON | ON | OFF | OFF | OFF | ON |
| REV | ON | OFF | OFF | OFF | ON | ON |
| NEU | ON | ON | OFF | OFF | OFF | ON |
| 1 st Braking | ON | ON | ON | OFF | OFF | ON |
| 1st | OFF | ON | ON | OFF | OFF | OFF |
| 2nd | OFF | ON | ON | ON | OFF | OFF |
| 3rd | OFF | ON | ON | OFF | ON | OFF |
| 4th | OFF | ON | ON | OFF | OFF | ON |
| 5th | OFF | ON | OFF | OFF | ON | ON |
| 6th | OFF | ON | OFF | ON | OFF | ON |

SHIFT PRESSURE CONTROL SOLENOID ON = PRESSURIZED, OFF = NO PRESSURE

SHIFT SOLENOIDS, ON = PRESSURIZED, OFF = NO PRESSURE

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Introduction

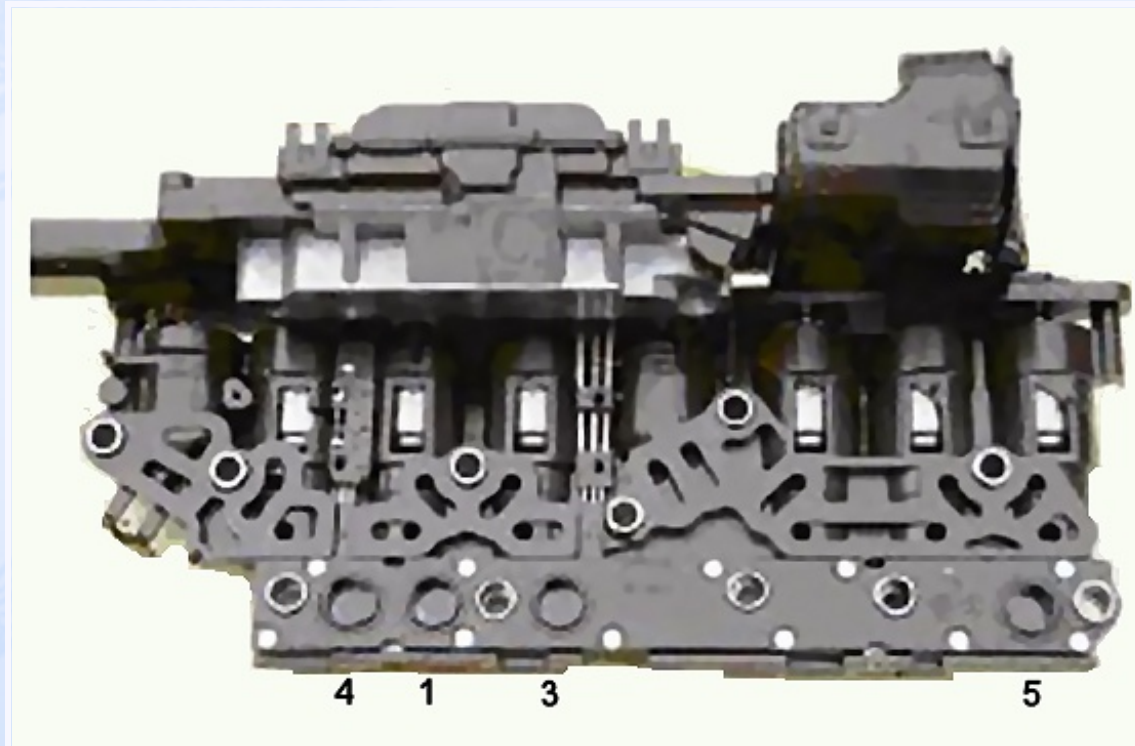
FILTER PLATE



Filter Plate: Must be replaced any time the TEHCM or Valve body has been removed

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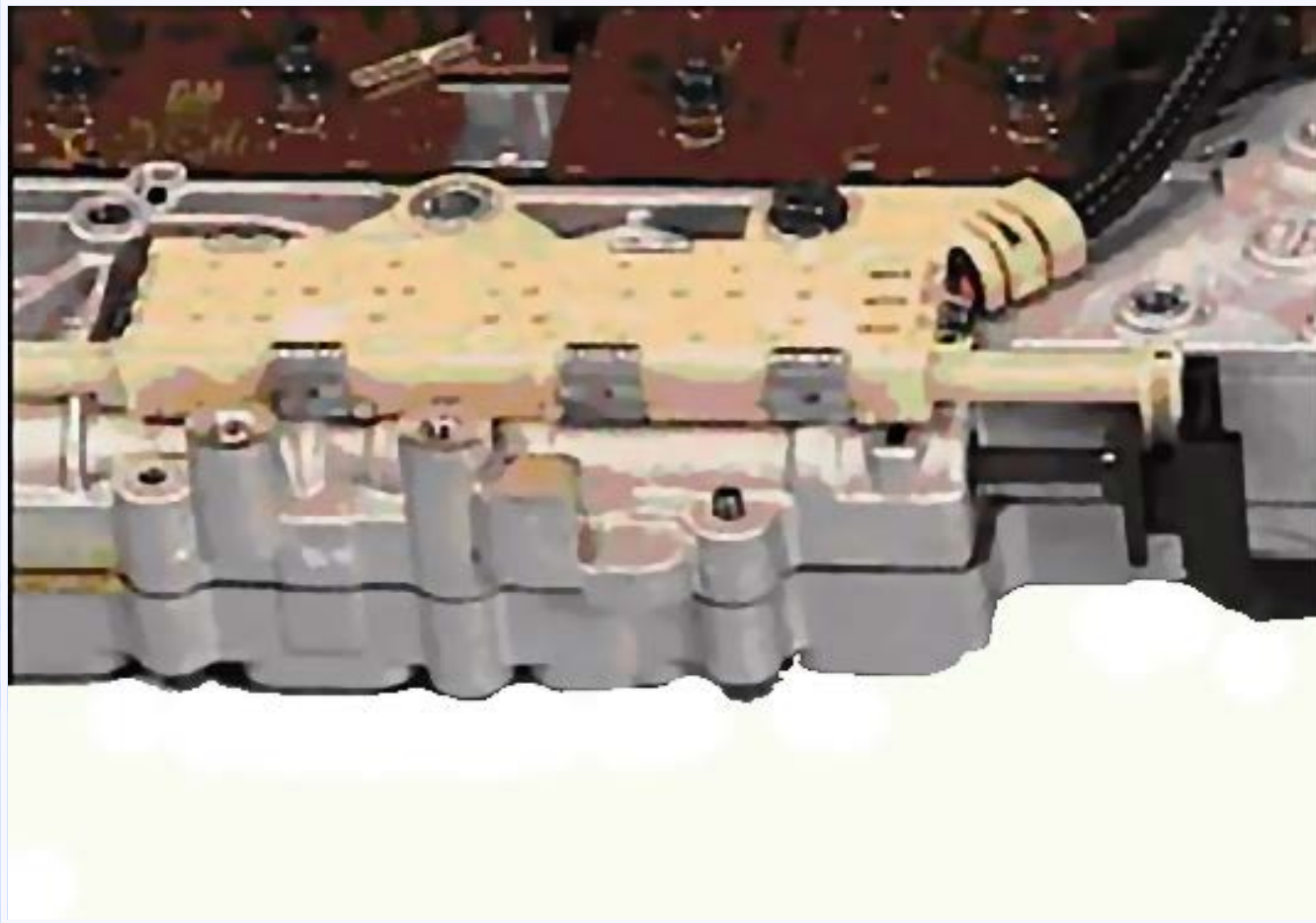
Pressure Switches



| TFP SWITCH | CLUTCH MONITORED |
|------------|--------------------------------|
| 1 | 3-5 clutch |
| 3 | 2-6 clutch |
| 4 | 1-2-3-4 clutch |
| 5 | 4-5-6 clutch Low/Rev Clutch |

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IMS



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IMS Operation

| INTERNAL MODE SWITCH LOGIC | | | | |
|----------------------------|----------|----------|----------|----------|
| GEAR SELECTOR POSITION | SIGNAL A | SIGNAL B | SIGNAL C | SIGNAL P |
| PARK | LOW | HIGH | HIGH | LOW |
| PARK/REV | LOW | LOW | HIGH | LOW |
| REV | LOW | LOW | HIGH | HIGH |
| REV/NEU | HIGH | LOW | HIGH | HIGH |
| NEUTRAL | HIGH | LOW | HIGH | LOW |
| NEU/D6 | HIGH | LOW | LOW | LOW |
| D6 | HIGH | LOW | LOW | HIGH |
| D6/D4 | LOW | LOW | LOW | HIGH |
| D4-(S) | LOW | LOW | LOW | LOW |
| D4/D3 | LOW | HIGH | LOW | LOW |
| D3 | LOW | HIGH | LOW | HIGH |
| D3/D2 | HIGH | HIGH | LOW | HIGH |
| D2 | HIGH | HIGH | LOW | LOW |
| OPEN | HIGH | HIGH | HIGH | HIGH |
| INVALID | HIGH | HIGH | HIGH | LOW |
| INVALID | LOW | HIGH | HIGH | HIGH |

High = 12 volts
Low = 0 volts

Not all applications
utilize all ranges

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Solenoid and Valve Body Diagnosis

Solenoid and valve body diagnosis requires the following tools:

- A quality scan tool capable of communicating and commanding the TCM and it's solenoids.
- Tool number J 47825-1 Solenoid test plate and jumper harness

Remove the Control Solenoid Valve Assembly from the transmission. Install tool J47821-1 onto the Control Solenoid Valve Assembly (5Nm 44 Lb In). Apply regulated shop air (90-100 psi) to the tool. Connect the scan tool to the Control Solenoid Valve Assembly.

- Command the solenoid ON/OFF air pressure should be present on the gauge and then it should exhaust as the solenoid is cycled. If the solenoid or valve are malfunctioning the gauge pressure will not change as you cycle the solenoid. If a malfunction is determined to be present, replace the complete Control Solenoid Valve Assembly.
- If the solenoid checked OK, install the gauge on another solenoid port and command that solenoid ON/OFF with the scan to repeat the process.



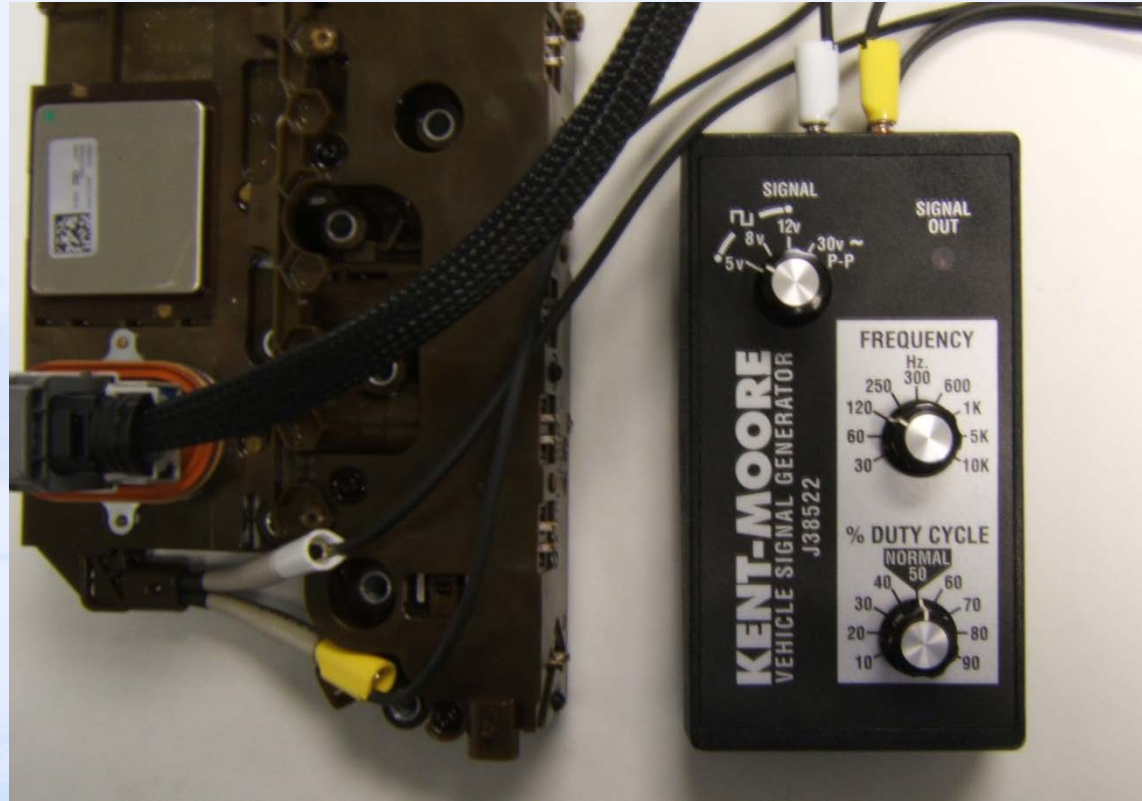
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Solenoid and Valve Body Diagnosis

| Control Solenoid Valve Assembly Test chart | |
|---|---------------------|
| COMPONENT | PORT ON TEST |
| PCS 1 | G |
| PCS 2 | C |
| PCS 3 | A |
| PCS 4 | B |
| PCS 5 | F |
| TCC | E |
| SS 1 | H |
| SS 2 | D |

NOTE: The TEHCM will normally cycle several of the solenoids ON/OFF to help keep the solenoids and the valves free of debris. Therefore this cleaning function (Dither) may cause the gauge to flicker when the TCM is cleaning the solenoid you are testing.

ISS/OSS Input Test



1. Set the J 38522 Signal to 8 volts, the Frequency to 120 and the Percent Duty Cycle to 50.
2. Ignition On, observe either the scan tool parameter ISS Signal or OSS Signal.
3. The signal parameter should display between 100- 400 RPM.

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Adaptive Learning

The 6L80 is fully equipped with several adaptive learning strategies. As with some other GM applications you will need to erase the adaptive values and perform a “Fast Learn” prior to operating the vehicle. Adapts and fast learn procedures should be performed if any of the following occur:

- Internal Transmission repairs have been performed
- The valve body was replaced
- The Control Solenoid valve assembly was replaced
- The TCM was recalibrated
- Internal repairs were performed that could effect shift quality

NOTE: Fast learn is not required if a GM New or Rebuilt 6L80 is used. The transmission is fast learned prior to it being shipped from the plant

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Adaptive Learning (cont)

To perform a fast learn:

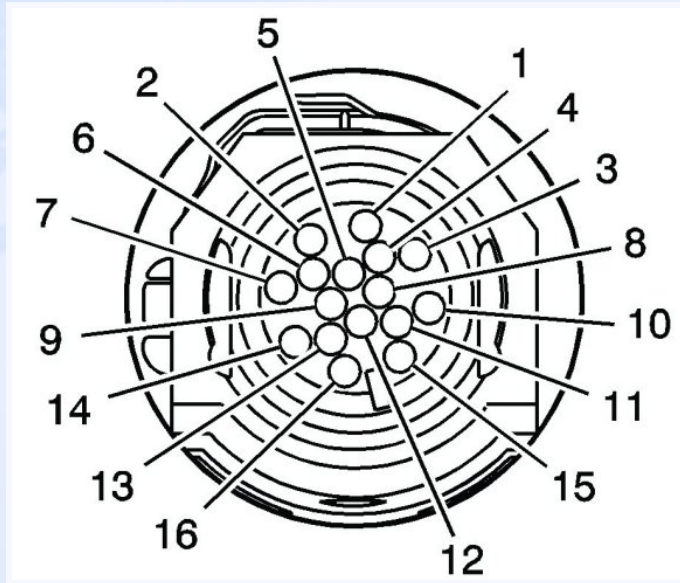
- Use a scan tool capable of performing the fast learn procedure
- TFT 158-230°F (70-110°C)
- Select Fast learn process from the scan tool menu
- Place the transmission in Drive with the vehicle stationary. The TEHCM will individually apply the clutches and calculate the clutch volume
- Place the transmission in Reverse with the vehicle stationary. The TEHCM will individually apply the clutches and calculate the clutch volume
- Shut off the engine, power off the scanner
- The process is now complete

The fast learn procedure will not run if:

- DTCs are set
- TFT is not between 158-230 °F (70-110°C)
- The brake switch is not working
- TP is 0% but engine RPM increases during the test
- P/N switch is improperly adjusted or is not functioning correctly
- Line pressure control system malfunction

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Pass-thru Connector ID



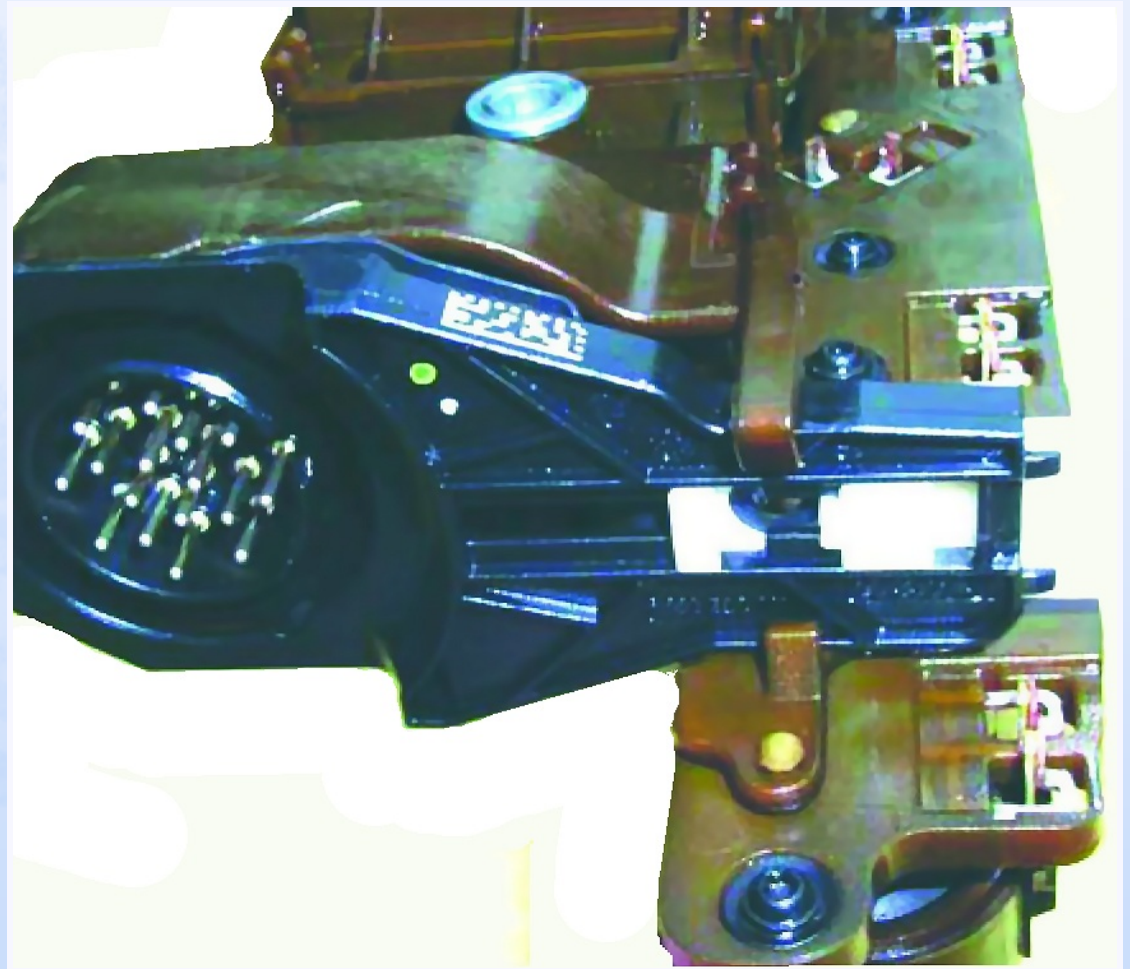
| Pin | Wire Color | Circuit No. | Function |
|-------|------------|-------------|--------------------------|
| 1-2 | -- | -- | Not Used |
| 3 | OG/BK | 1786 | Park/Neutral Signal |
| 4 | RD/WH | 2440 | Battery Positive Voltage |
| 5 | BK/WH | 451 | Ground |
| 6 | WH | 17 | Brake Pedal Apply Signal |
| 7 | PU | 5526 | Tap Up/Tap Down Switch |
| 8 | -- | -- | Not Used |
| 9 | YE | 43 | Accessory Voltage Power |
| 10 | TN/BK | 2500 | CAN Hi |
| 11 | TN | 2501 | CAN Lo |
| 12 | PK | 1339 | Run/Crank Voltage |
| 13 | TN | 2501 | CAN Lo 2 |
| 14 | TN/BK | 2500 | CAN Hi 2 |
| 15-16 | -- | -- | Not Used |

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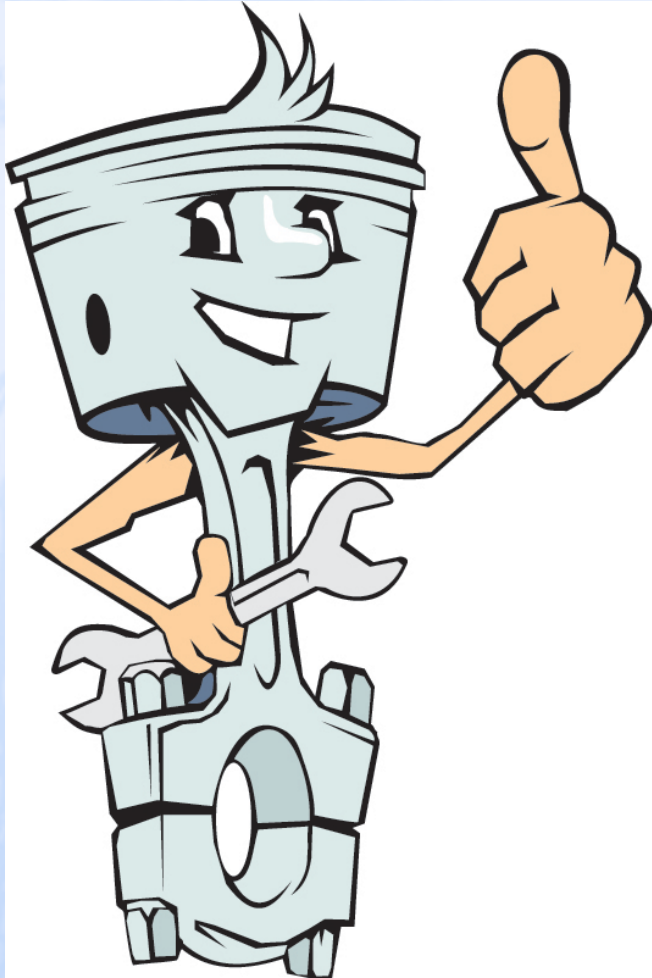
Pass-thru Connector Location

The pass through connector is located on the valve body and is a hard connection to the solenoids. During disassembly of the valve body, use care in the removal of the hard wire harness and connector.

Connector and Pass-thru Sleeve



Thank you for Attending



If you have any questions or comments please raise your hand...

Or email

lwiggins@atra.com

We hope you enjoyed today's presentation!