



Technical Service Information

RE0F09A

PRELIMINARY INFORMATION

The RE0F09A is Nissan's Continuous Variable Transaxle also known as the X-Tronic or the CVT3 transmission. This is a new-generation steel-belt CVT for use with engines up to the 3.5 liter class which has been fitted for use in their Murano crossover SUV vehicle starting back in November of 2002.

Viewing the unit in Figure 1, the following can be seen:

1. It utilizes a typical torque converter to input power from the engine into the transmission. This torque converter also contains a clutch for increased fuel economy.
2. There are several pressure taps available for diagnosing; a line pressure tap, a forward clutch tap, and taps for both the primary and secondary pulleys.
3. For cooling the transmission fluid, an external cooler independent from the radiator is used.
4. A 22 pin case connector
5. A vehicle Speed Sensor.

This CVT is controlled by a Transmission Control Module (TCM) which is located to the right side the Engine Control Module (ECM) under the passenger side dash. Sensor and signal inputs to the TCM are:

1. Park Neutral Position Switch
2. Accelerator Pedal Position Signal
3. Closed Throttle Position Signal
4. Engine Speed Signal
5. CVT Fluid Temperature Sensor
6. Vehicle Speed Signal
7. Manual Mode Signal
8. Second Position Signal
9. Stop Lamp Switch Signal
10. Primary Speed Sensor
11. Secondary Speed Sensor
12. Primary Pressure Sensor
13. Secondary Pressure Sensor

From these Inputs, the TCM can control the following transmission operations:

1. Shift Control
2. Line Pressure Control
3. Primary Pressure Control
4. Secondary Pressure Control
5. Lock-up Control

The TCM performs these operations via the devices mounted on the valve body as seen in Figure 2:

1. Lock-Up Select Solenoid (LUSS)
2. Torque Converter Clutch Solenoid (TCCS)
3. Line Pressure Control Solenoid B - (LPCSB)
4. Line Pressure Control Solenoid A - (LPCSA)
5. Stepper Motor - A Ratio Control Motor (RCM)



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Figure 3 shows where the Park/Neutral Position Switch and the Transmission Fluid Temperature Sensor is located. You will also notice a ROM assembly. This must stay with the transmission as it contains information specific to that transmission for it to operate at its optimum. A case passage identification is also provided in Figure 3.

Figures 4 and 5 provide valve body small parts location and identification as well as valve location and identification. NOTE: *The names of the valves have been assigned by ATSG as manufacturer information has not been made available at the time of printing.*

Figure 6 identifies the Primary and Secondary pulleys location, the steel push belt by Van Doorne Transmissie now carried by BOSCH and the Ratio Control Motor follower. The steel belt is 30mm in width with each element being 1.8mm thick. Center distance is 240mm with an input torque rating of 350Nm or 258FtLbs from a 3.5L V6 engine. These belts do NOT stretch. What occurs is wear on the rocking or rolling edge of the element making the elements looser between themselves. Additionally the bands that hold them together may eventually begin to have stress cracks from being in a constant varying wrap angle. Should the belt begin to slip from a loss of holding pressure, the elements will damage the pulley face (sheave) and bits and pieces of the element will transpose themselves to the sheave face.

A Gerotor style pump is used in the RE0F09A as seen in Figure 7. This pump also utilizes a Volume Control Valve. Care must be taken when assembling the pump. It is very easy to place the pump gears in the body incorrectly. The upper left illustration in Figure 7 is correct while the upper right illustrates the incorrect assembly. Be sure that the converter ear pockets of the drive gear is facing you when you place the gears into the body.

Figure 8 provides the proper Reverse and Forward clutch cushion plate assembly. The Forward Clutch has two dished plates with the smaller inner ID facing each other while the Reverse clutch has one dished plate which sits at the bottom like a bowl.

Figure 9 provides a hydraulic schematic.

Figures 10 and 11 explain the operation of the solenoids.

Figure 12 provides information concerning the Ratio Control Motor (RCM) and Transducers.

Figure 13 gives data on the Park/Neutral Position Sensor and Transmission Fluid Temperature Sensor.

An overall wiring schematic and transmission case connector pin identification is provided in Figure 14.

Figures 15, 16 and 17 are a listing of Diagnostic Service Codes related to the TCM.

Fluid Information from Nissan Bulletin NTB02-114 Dated November 14th, 2002.

If the CVT/Xtronic transmission in the Murano (Z50) requires service, a new type of CVT transmission fluid MUST be used. The new fluid is CVT Fluid NS-2 as the internal parts used in this transmission REQUIRES the use of this fluid. Only Nissan CVT Fluid NS-2 is especially formulated to meet the exacting requirements of this new RE0F09A transmission. Use of any other transmission fluid, even Nissan's Matic D or J will cause deterioration in driveability and transmission durability.

Service Information:

CVT Fluid NS-2.....999MP-NS200P

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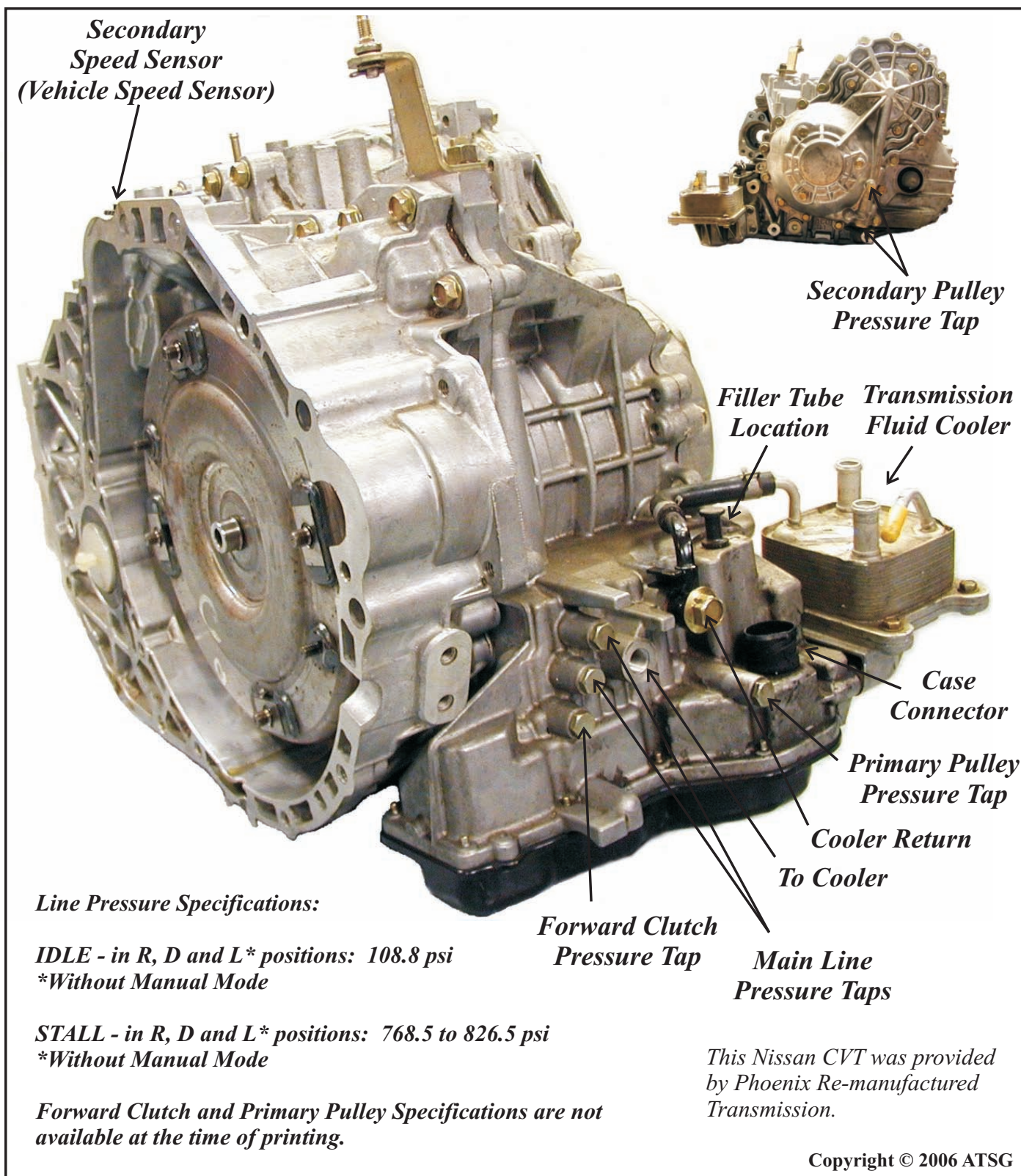


Figure 1

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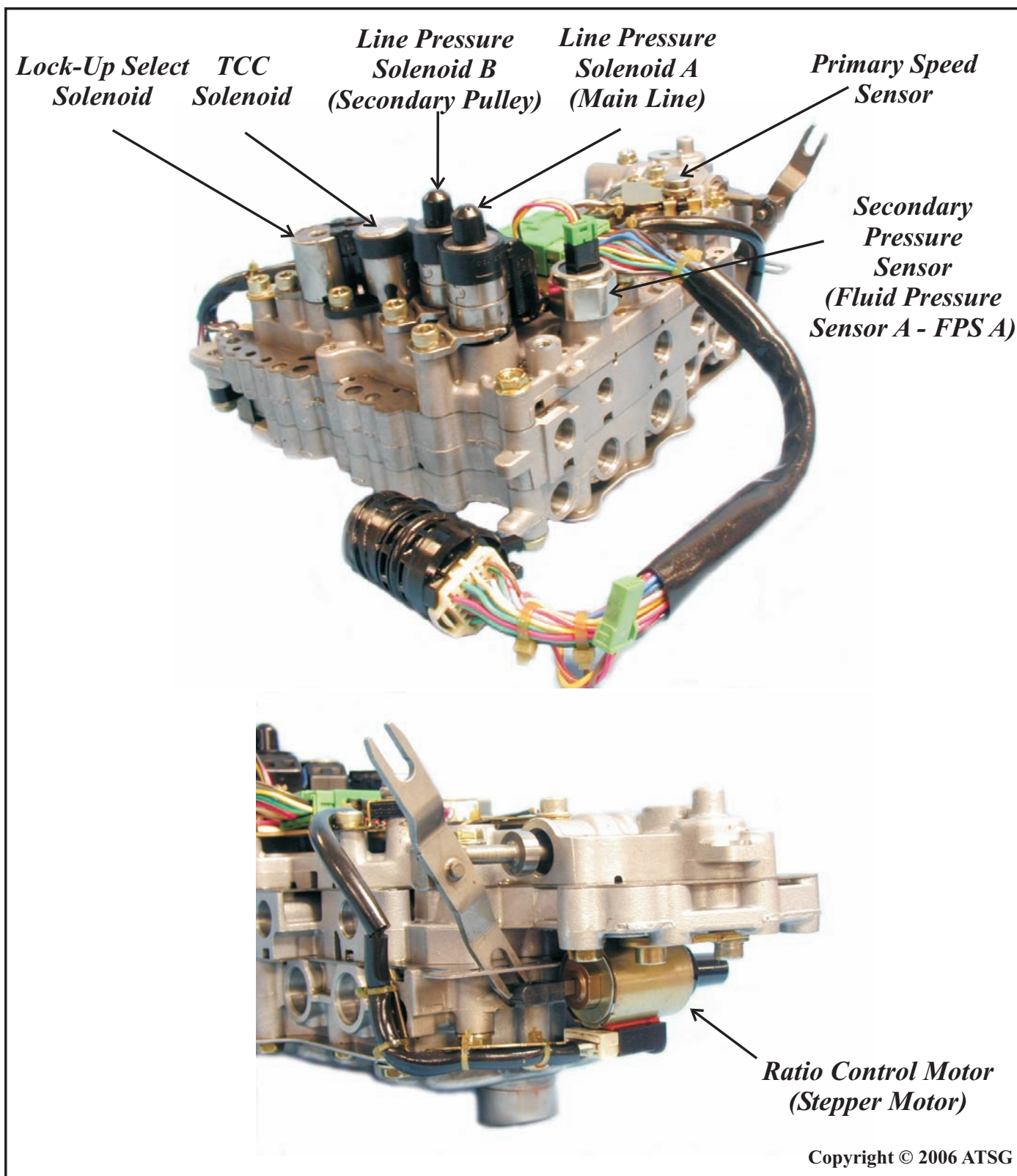
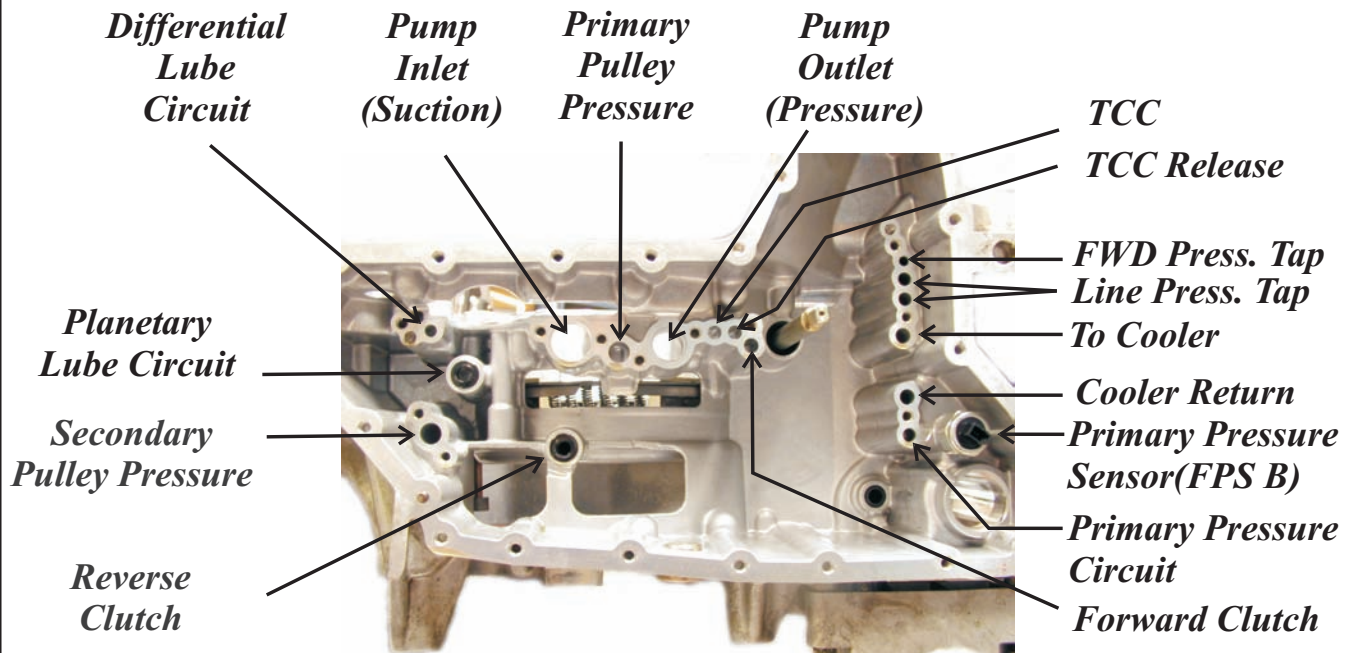
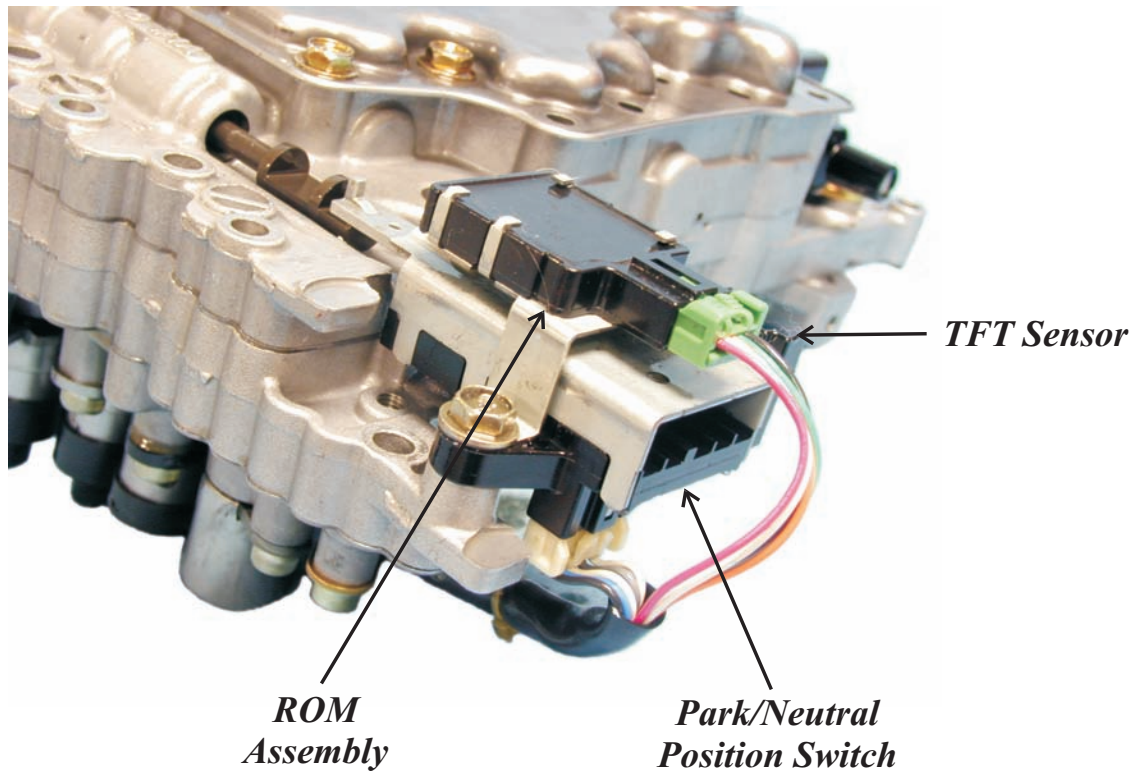


Figure 2



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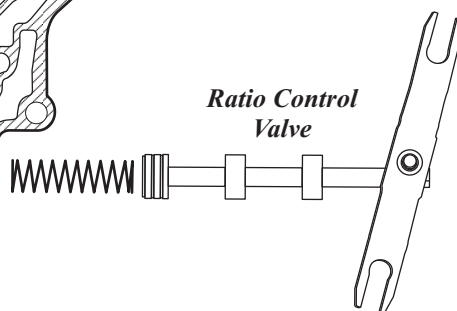
Figure 3

Upper Valve Body

*Differential Lube
Relief Valve*



*Ratio Control
Valve*



Center Valve Body Upper Side

*Solenoid Feed
Filter*



NOTE: *Small parts and valve nomenclature have been assigned by ATSG as information from the manufacturer is not available at the time of printing.*

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Figure 4

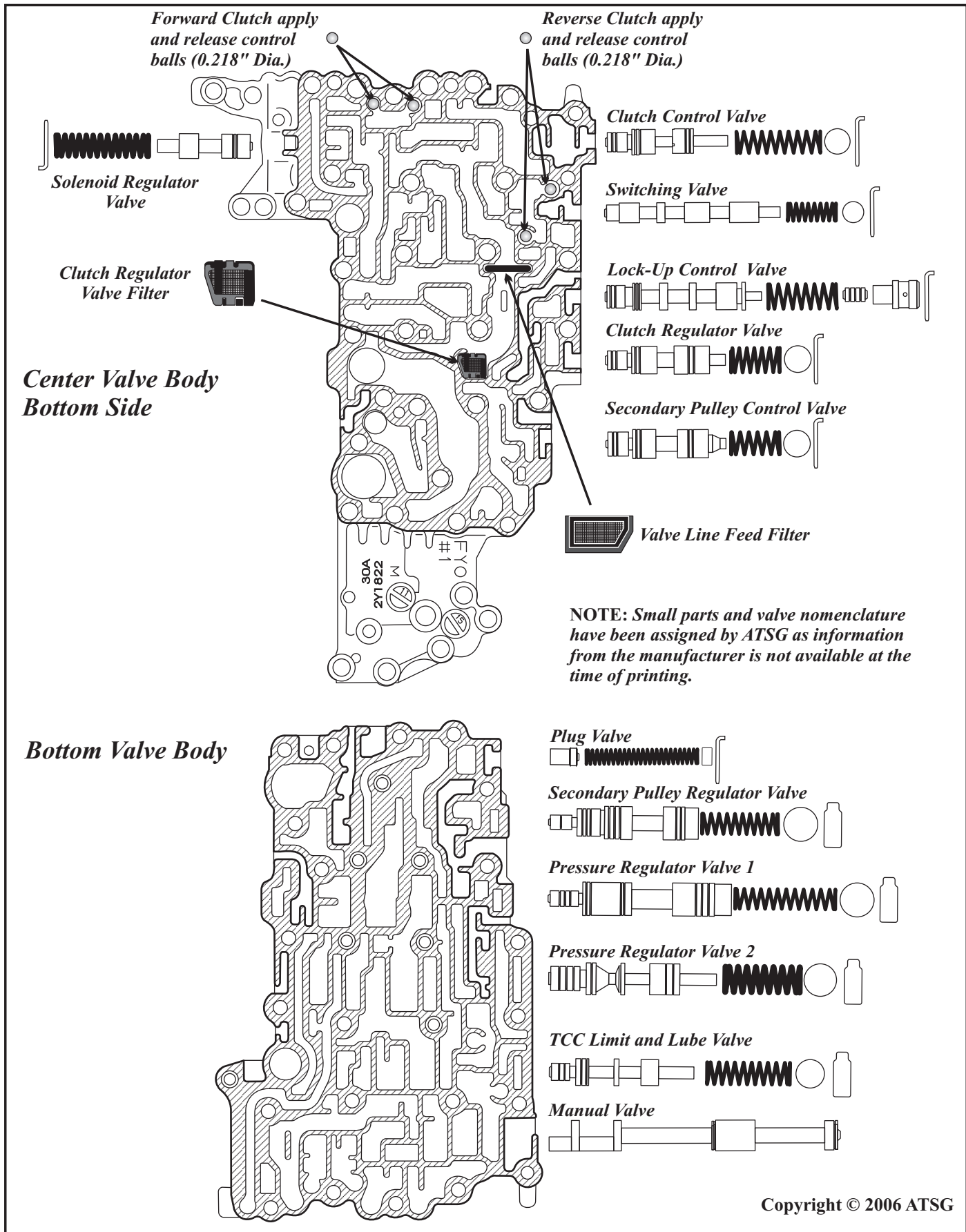
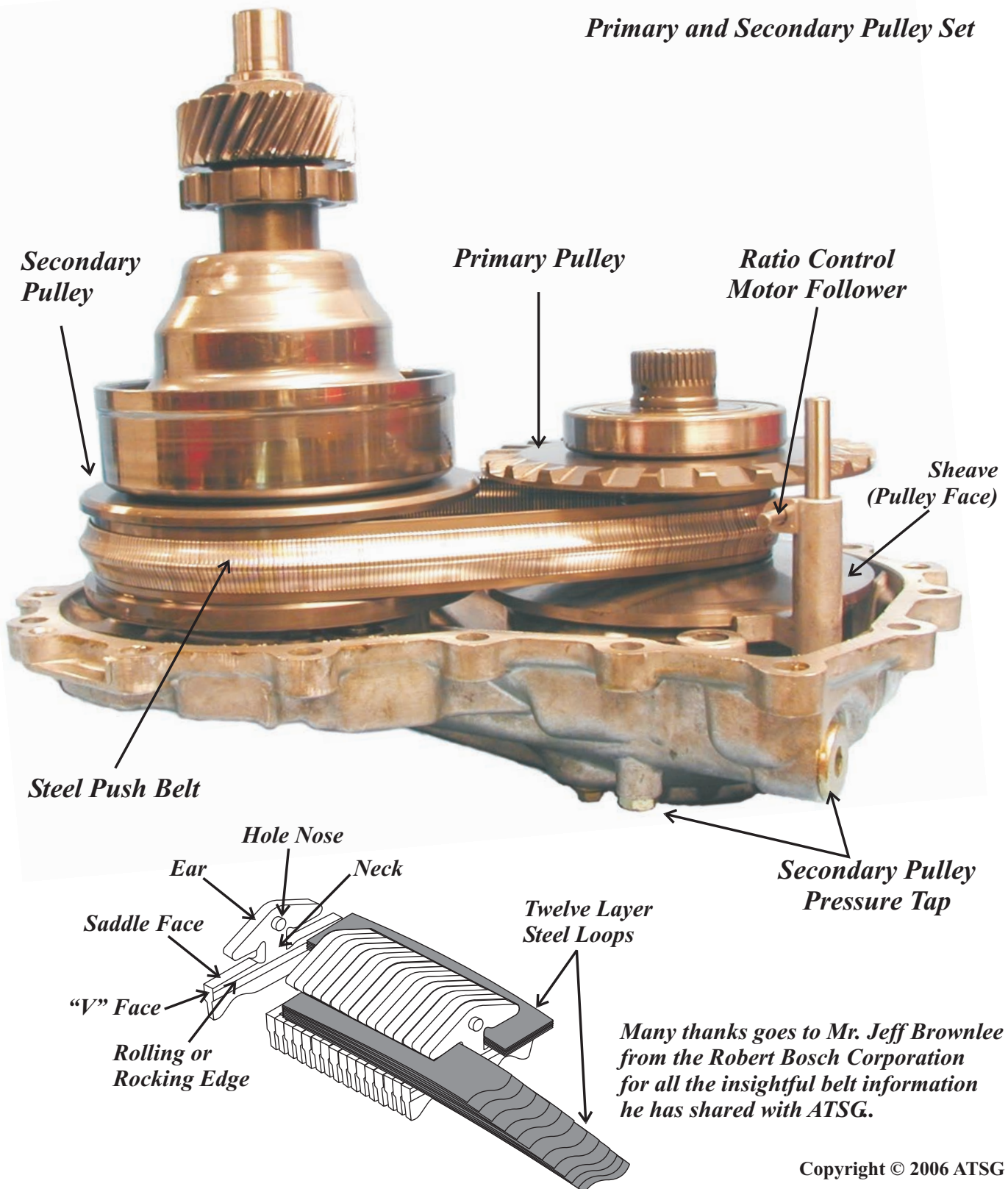


Figure 5



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Primary and Secondary Pulley Set

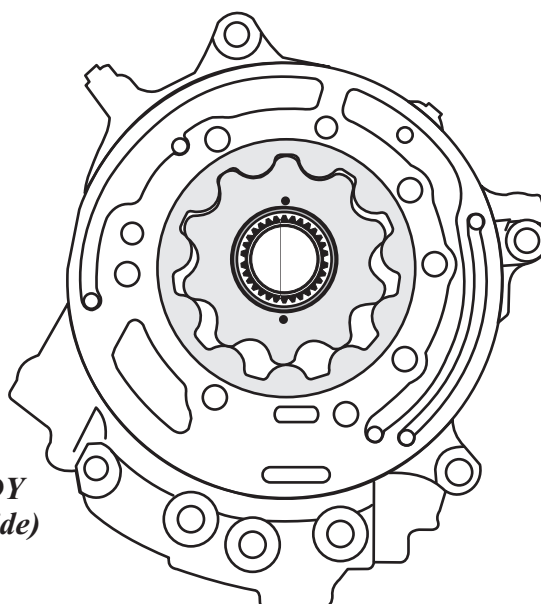
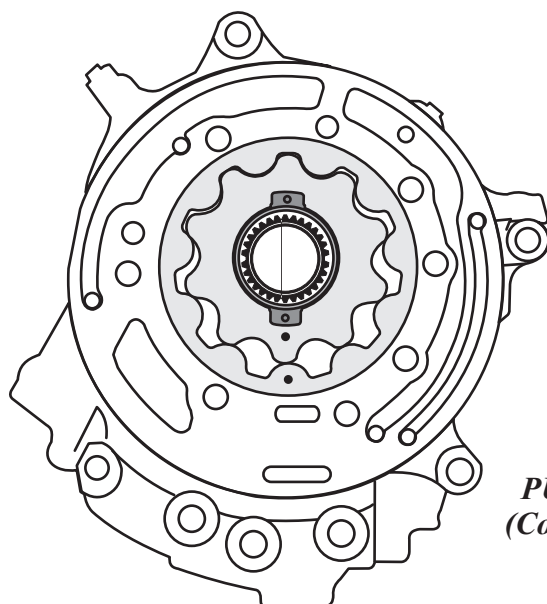


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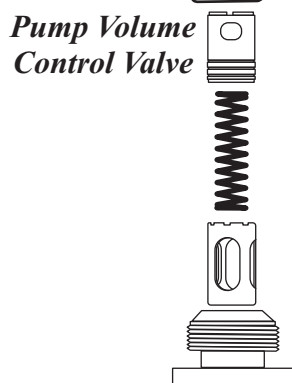
Figure 6

Correct Pump Gear Installation

Incorrect Pump Gear Installation

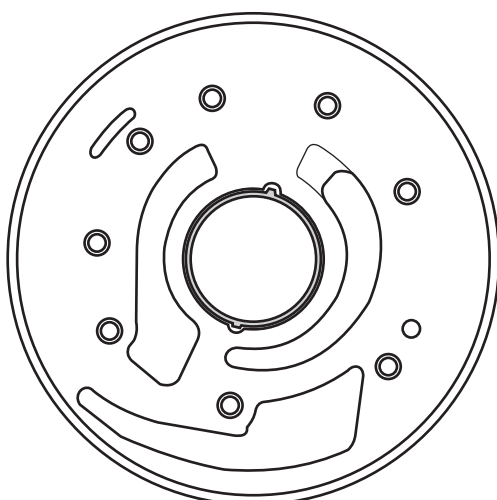
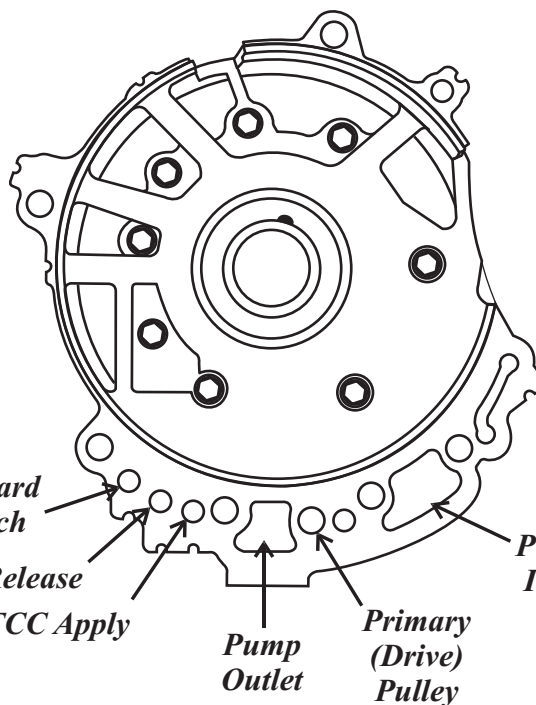


PUMP BODY
(Converter Side)



**Pump Volume
Control Valve**

PUMP BODY
(Transmission Side)

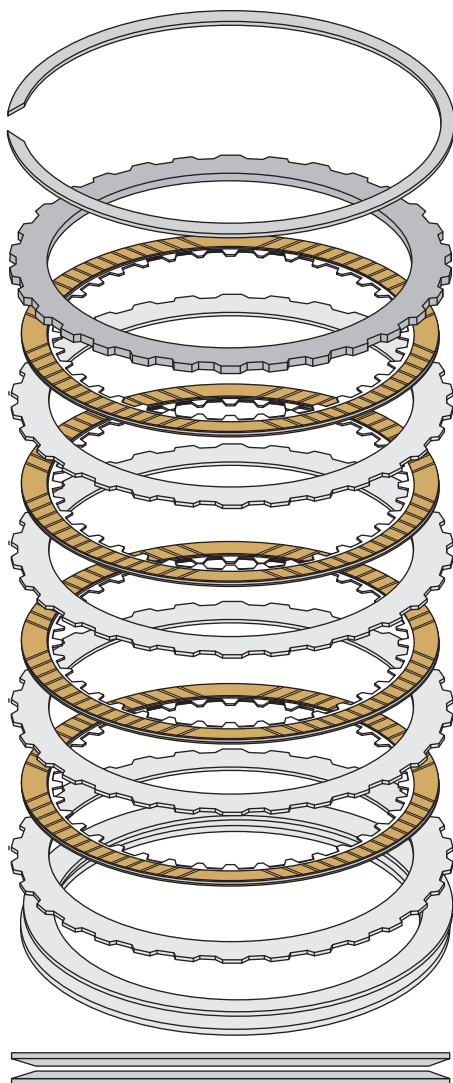


PUMP COVER

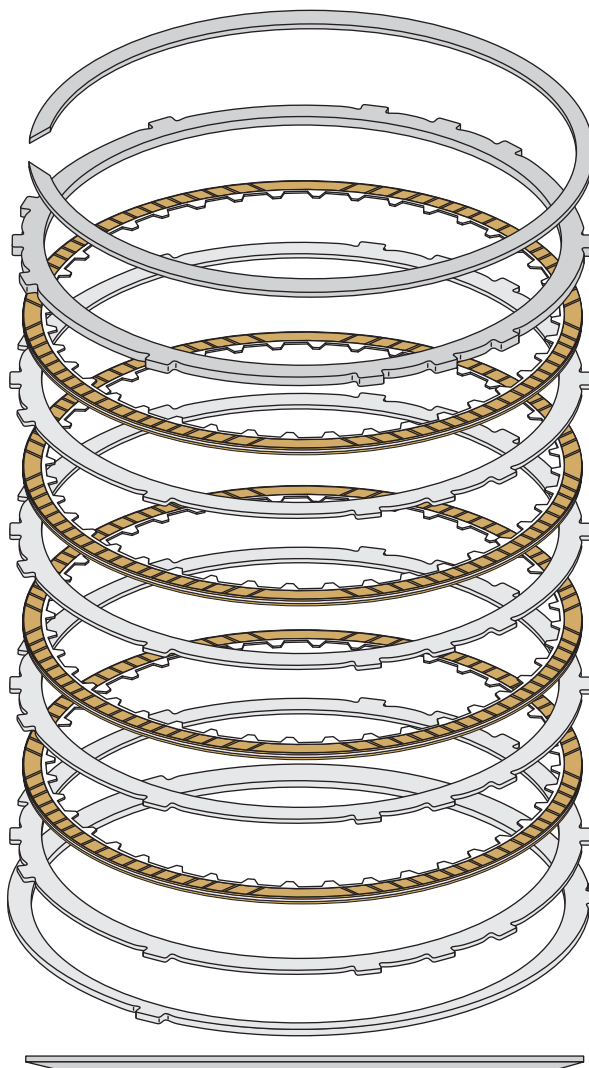
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Figure 7

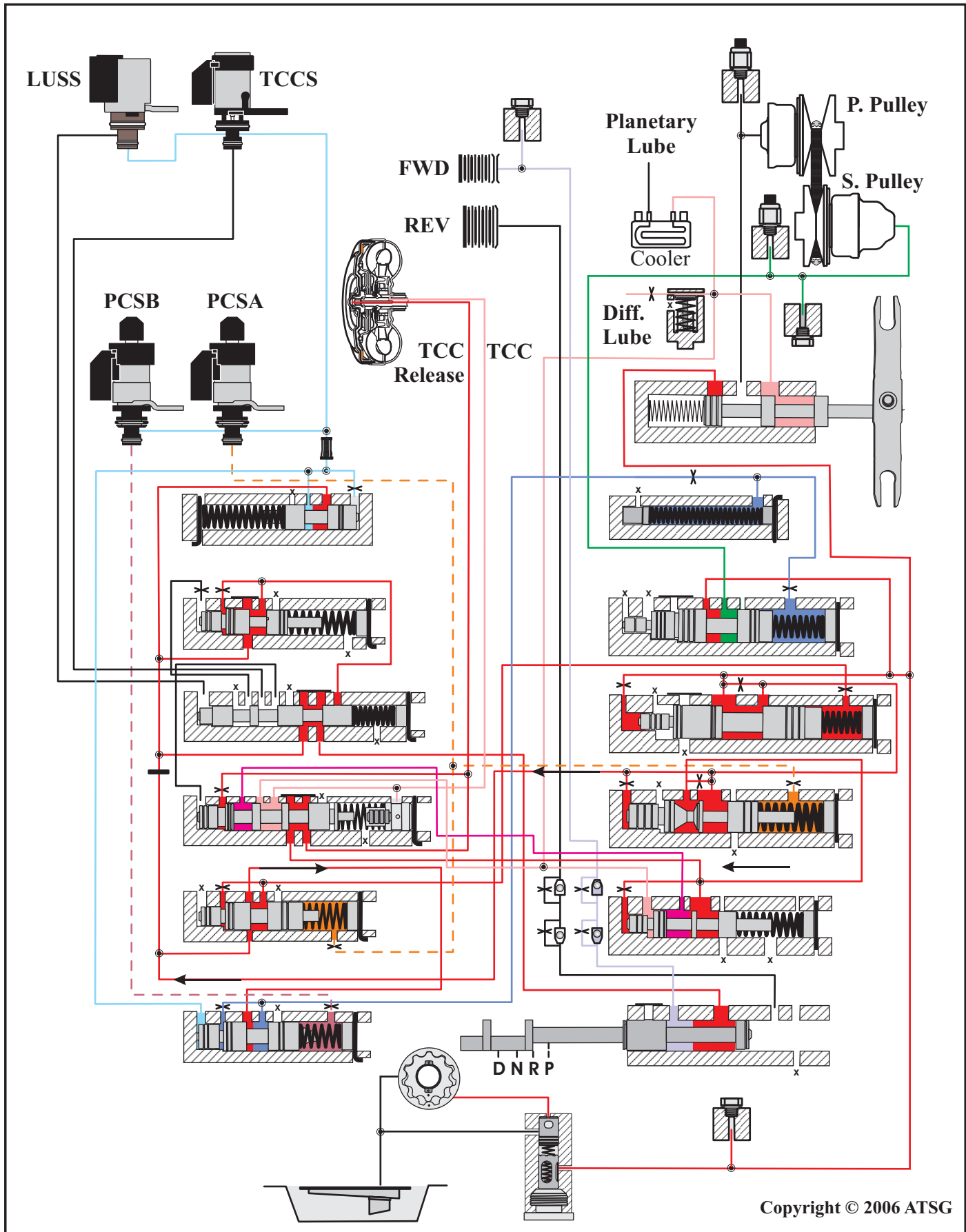
Forward and Reverse Clutch Stack-Up



Forward Clutch with the small diameter of the double cushion plates facing each other.



Reverse Clutch with the small diameter of the single cushion plate facing towards the piston.

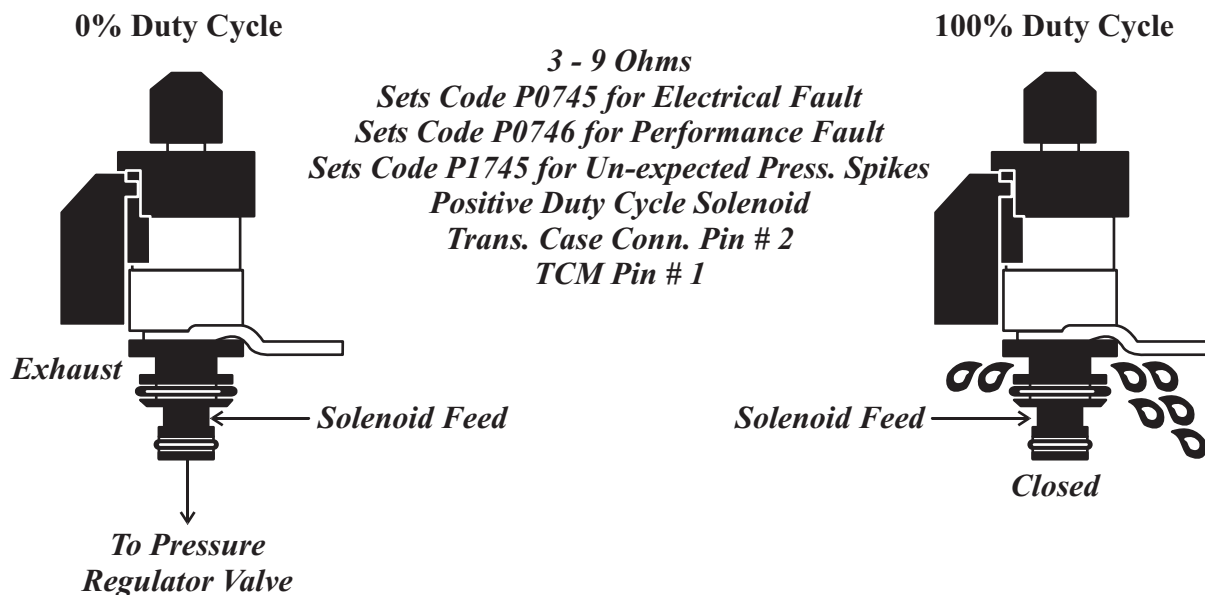


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Figure 9

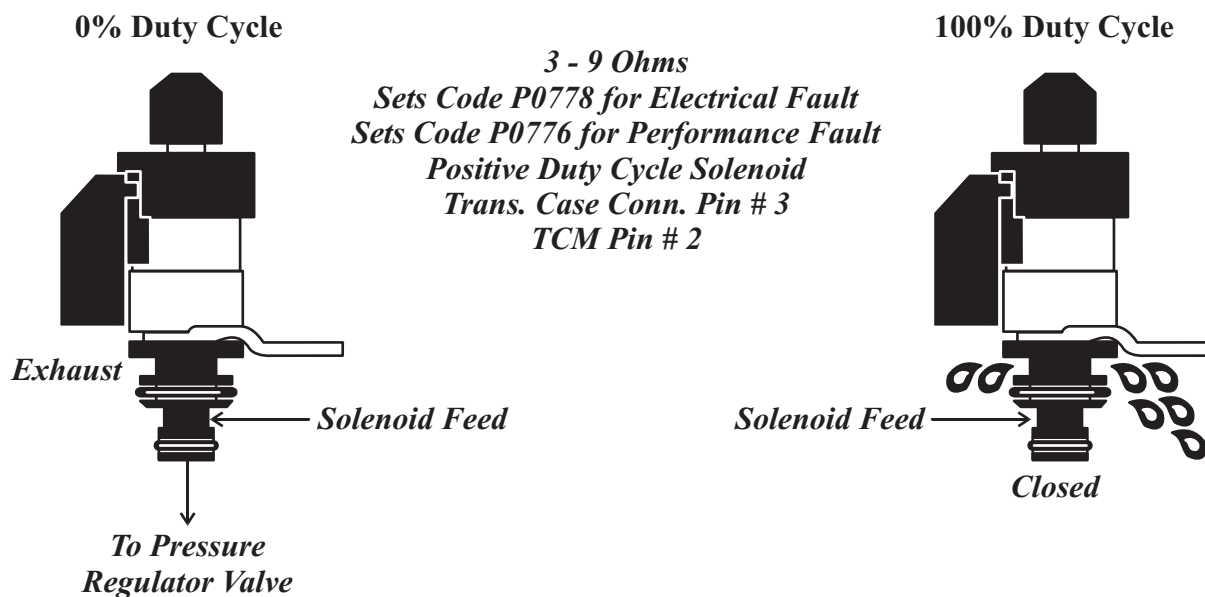
Pressure Control Solenoid A - PCSA (Line Pressure Control Solenoid)

Pressure Control Solenoid A regulates pump discharge pressure in relationship to engine load.



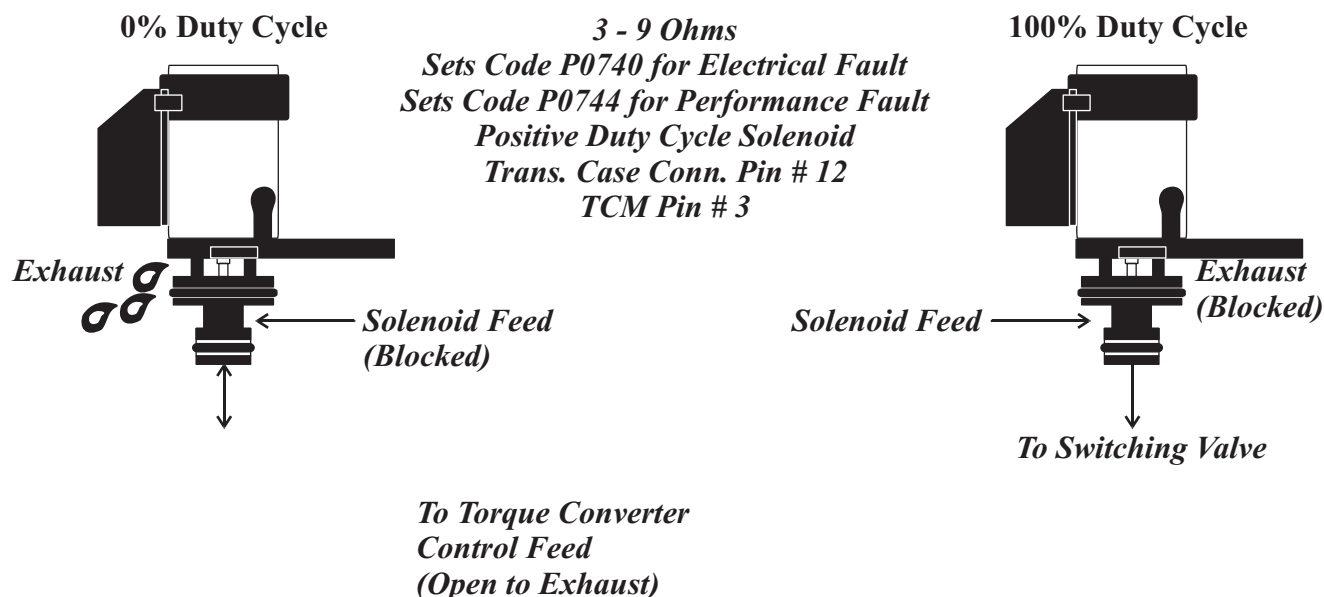
Pressure Control Solenoid B - PCSB (Secondary Pulley Pressure Control Solenoid)

Pressure Control Solenoid B regulates secondary (Driven) pulley pressure in relationship to engine load.



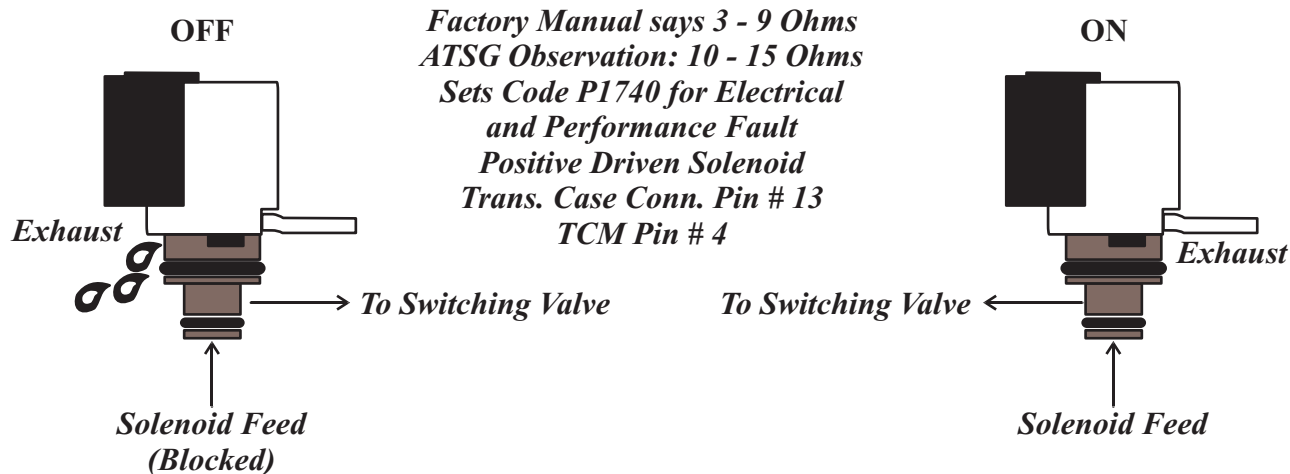
Torque Converter Clutch Solenoid - TCCS

The TCM commands the TCC Solenoid to apply the converter clutch when all requirements from the VSS, TPS and TFT are met.



Lock-Up Select Solenoid - LUSS

The Lock-Up Select Solenoid controls Forward, Reverse and Torque Converter Clutch engagement by directing the position of a Switching Valve in the valve body.



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Figure 11

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Stepper Motor - SM (Ratio Control Motor)

The Stepper Motor changes the step with turning 4 coils ON/OFF to control the flow of line pressure to the primary pulley controlling pulley ratio.

10-20 Ohms (Per Coil)

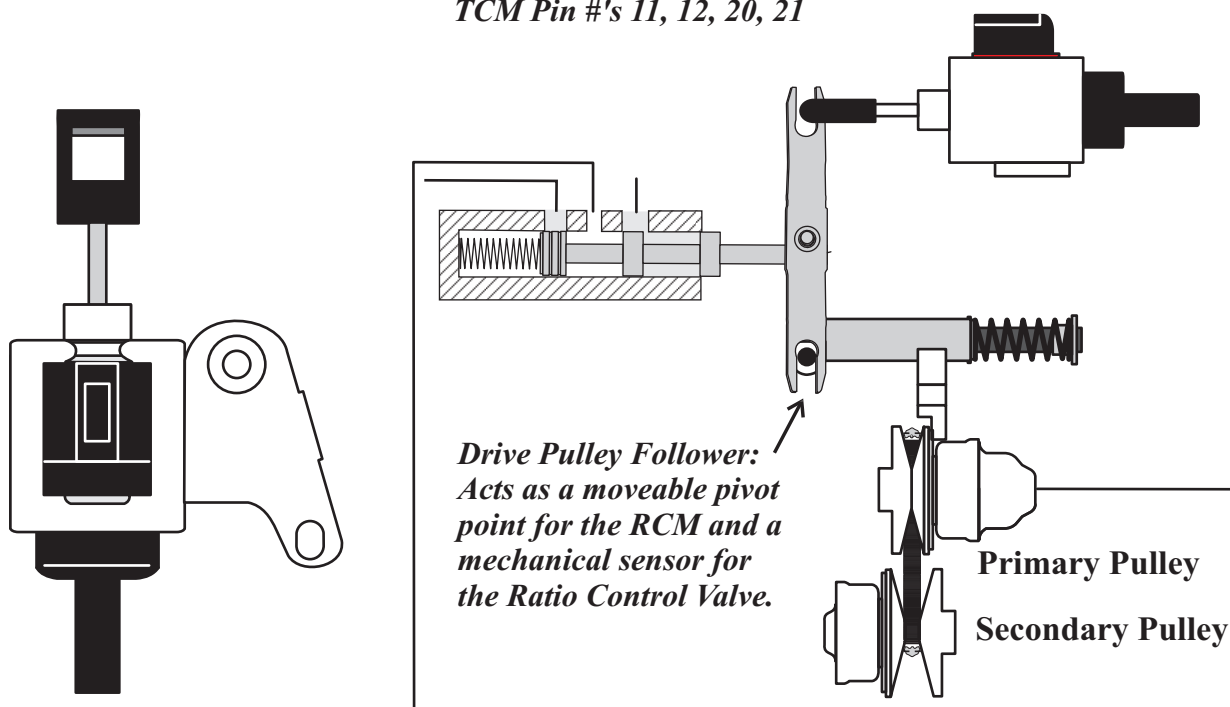
Sets Code P1777 for Electrical Fault

Sets Code P1778 for Performance Fault

Positive Driven Motor

Trans. Case Conn. Pin #'s 6, 7, 8, 9

TCM Pin #'s 11, 12, 20, 21



Transmission Fluid Pressure Sensor A & B - TFPSA & B (Transducers)

These pressure sensors are typical transducers monitoring pressure. They are supplied with 5 volts and a ground from the TCM. The pressure sensor then provides a linear voltage signal to the TCM proportional to the pressure it senses. Pressure sensor A monitors the secondary (driven) pulley pressure while Pressure sensor B monitors main line pressure.



TFPSA Sets Code P0840 for Electrical Fault

P0841 sets when both sensors are out of sync

TFPSB Sets Code P0845 for Electrical Fault

TFPSA Sets Code P0868 when pressure is down

Trans. Case Conn. Pin #'s 19, 20, 22, 23, 25

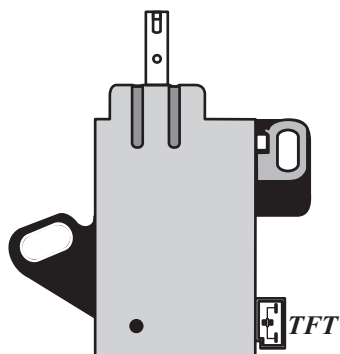
TCM Pin #'s 37, 38, 41, 42, 46

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Figure 12

Park/Neutral Position Sensor - PNP & Transmission Fluid Sensor - TFT

The Park/Neutral Sensor includes 4 position switches which the TCM judges the selector lever position by the combination of OFF/ON states of each switch. The TFT is a variable resistor which signals to the TCM approximate fluid temperature (68 F 1.8 - 2.0 Volts and at 176 F 0.6 - 1.0Volts).



*PNP Sets Code P0705 for
Implausible Combinations and for Electrical Fault
TFT Sets Code P0710 for
signal voltage excessively high or low*

*PNP
Trans. Case Conn. Pin #'s 4, 5, 14, 14, 18
TCM Pin #'s 27, 32, 34, 35, 36
TFT
Trans. Case Conn. Pin #'s 17, 19
TCM Pin #'s 42, 47
5K Ohms @ 75 F*

| Shift Position | PNP Switch 1 | PNP Switch 2 | PNP Switch 3 | PNP Switch 4 |
|----------------|--------------|--------------|--------------|--------------|
| P | OFF | OFF | OFF | OFF |
| R | ON | OFF | OFF | ON |
| N | ON | ON | OFF | OFF |
| D-S* | ON | ON | ON | ON |
| L* | OFF | ON | ON | OFF |

**:Without Manual Mode*

Note: Scanner may display the state of the PNP Switch # 3 only.

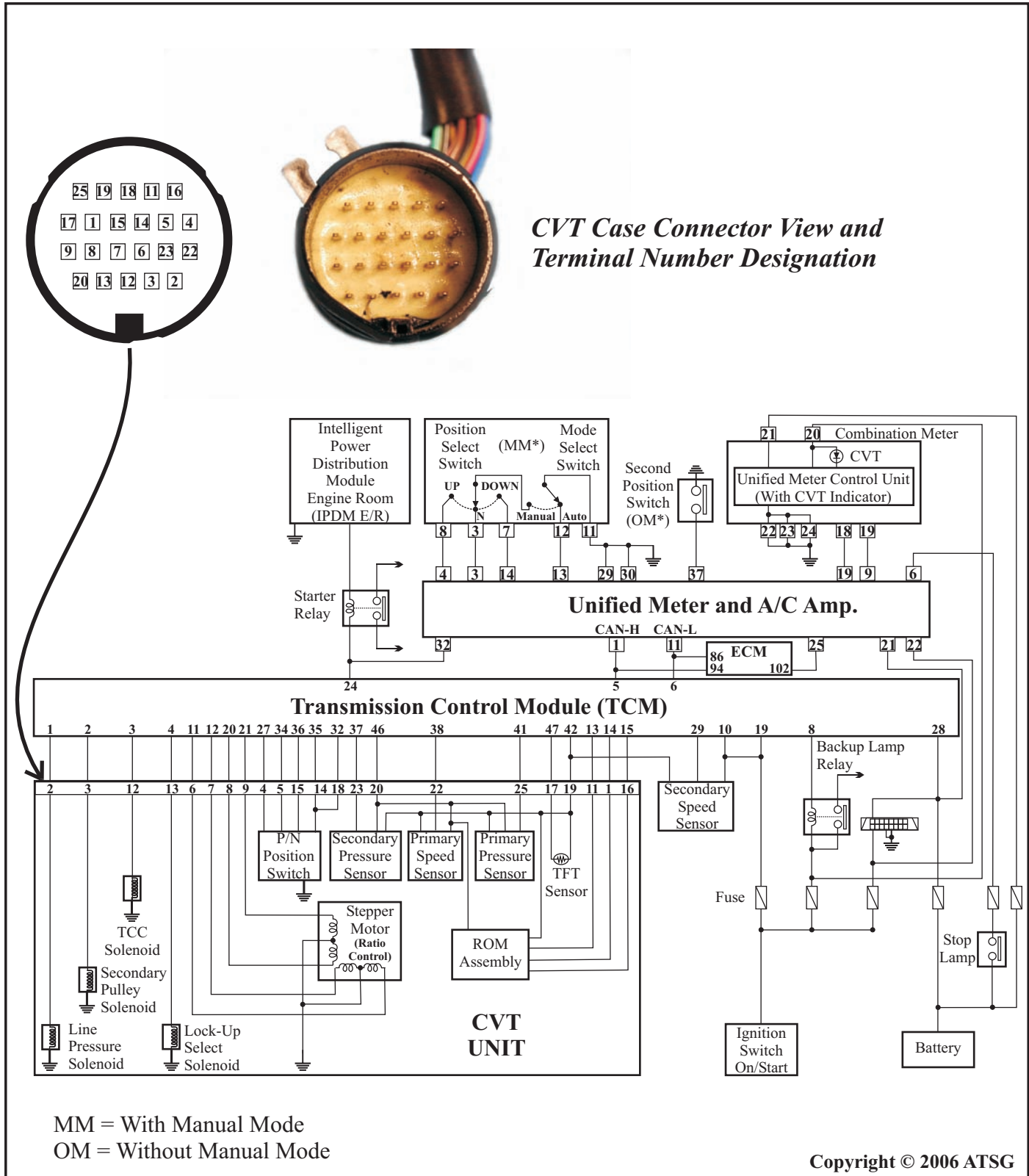


Figure 14



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| DTC | Scanner Display | Description |
|-------|---|--|
| U100 | CAN Communication Circuit | This code is produced when a malfunction is detected in CAN communications. |
| P0615 | Starter Relay Circuit | If this signal is "ON" <u>other than</u> P or N, or if it is "OFF" in P or N, this is judged to be a malfunction. |
| P0703 | Brake Switch Circuit | When the brake switch signal fails to switch between ON and OFF. |
| P0705 | Park Neutral Position (PNP) Switch Circuit | PNP switch 1-4 signals input with impossible pattern or, PNP switch 3 monitor terminal open or short circuit. |
| P0710 | Transmission Fluid Temp. (TFT) Sensor Circuit | During running conditions the TFT Sensor signal voltage is excessively high or low. |
| P0715 | Input Speed Sensor Circuit | No Input Speed Sensor signal due to an open/short circuit, or an unexpected signal is supplied while driving. |
| P0720 | Vehicle Speed Sensor Circuit | No Vehicle Speed Sensor signal due to an open/short circuit or an unexpected signal is supplied while driving. |
| P0725 | Engine Speed Signal | TCM does not receive the CAN communications signal from the ECM. |
| P0730 | Belt Damage | Unexpected gear ratio detected. |
| P0740 | TCC Solenoid Circuit | Excessive or insufficient current draw is detected due to an open or shorted circuit. |
| P0744 | TCC Solenoid Performance Fault | The TCM commands Converter Clutch apply and the engine RPM drop is insufficient. This could also include electrical failure, mechanical failure of the solenoid, related shift valve, the converter clutch and/or related parts. |
| P0745 | Line Pressure Solenoid A Circuit Fault | Excessive or insufficient current draw is detected due to an open or shorted circuit or, the TCM detects as irregular by comparing target value with monitor value. |
| P0746 | Line Pressure Solenoid A Performance Fault | Unexpected gear ratio was detected in the LOW side due to excessively low line pressure. |
| P0776 | Line Pressure Solenoid B Performance Fault | Secondary pressure is too high or too low compared with the command value while driving. |

Figure 15



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| DTC | Scanner Display | Description |
|-------|--|--|
| P0778 | Line Pressure Solenoid B Circuit Fault | Excessive or insufficient current draw is detected due to an open or shorted circuit or, the TCM detects as irregular by comparing target value with monitor value. |
| P0826 | Manual Mode Switch | When an impossible pattern of switch signals is detected, a malfunction is detected. |
| P0840 | Transmission Fluid Pressure Sensor A Circuit | Signal voltage of the transmission fluid pressure sensor A (secondary pressure) is too high or low while driving. |
| P0841 | Transmission Pressure Sensor Function | Correlation between the values of fluid pressure sensor A (secondary pressure) and the transmission fluid pressure sensor B (primary pressure) is out of specification. |
| P0845 | Transmission Fluid Pressure Sensor A Circuit | Signal voltage of the transmission fluid pressure sensor B (primary pressure) is too high or low while driving. |
| P0868 | Secondary Pressure Down | Secondary pressure is too low compared with the command value while driving. |
| P1701 | TCM Power Supply | When the power supply to the TCM is cut "OFF," for example; because the battery was disconnected or removed, and the self-diagnostics memory function stops. This may or may not be interpreted as a malfunction. If the battery was known to be disconnected, this message is not a malfunction. If the battery was NOT disconnected, this message may be interpreted as a malfunction. |
| P1705 | Throttle Position Sensor | TCM does not receive the proper accelerator pedal position signal (input by CAN communication) from ECM. |
| P1722 | Estimated Vehicle Speed Signal | CAN communication with the ABS actuator and the electrical unit (control unit) is malfunctioning or, there is a great difference between the vehicle speed signal from the ABS actuator and the electronic unit (control unit), and the vehicle speed sensor signal. |
| P1723 | CVT Speed Sensor Function | A rotation sensor error is detected because the gear does not change in accordance with the positioning of the stepper motor. Caution: One of the secondary rotation, the primary rotation, or the engine speed is displayed at the same time |

Figure 16

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| DTC | Scanner Display | Description |
|-------|-----------------------------|---|
| P1726 | Electronic Throttle Control | The electrically controlled throttle for the ECM is malfunctioning. |
| P1740 | Lock-Up Solenoid Circuit | Excessive or insufficient current draw is detected due to an open or shorted circuit or, the TCM detects as irregular by comparing target value with monitor value. |
| P1745 | Line Pressure Control | The TCM detects the unexpected line pressure. |
| P1777 | Stepper Motor Circuit | Each coil of the stepper motor is not energized properly due to an open or a short. |
| P1778 | Stepper Motor Function | There is a great difference between the number of steps for the stepping motor and for the actual gear ratio. |

Figure 17