INDEX

GENERAL DESCRIPTION

Jatco's JF011E CVT transmission utilizes a three-element, one-stage, two-phase type torque converter with a built-in torque converter clutch. The transmission's gear train consists of one forward (multi-disc) clutch drum assembly, one reverse (multi-disc) brake stack-up, a planetary gear set composed of a sun gear, a carrier and an annulus gear (internal ring gear), along with a variator assembly (primary pulley, secondary pulley and a steel push belt). The Input shaft drives the primary pulley through the planetary gear set for forward and reverse direction. The pulleys provide a continuously variable ratio between 2.5 to 0.4 moving forward and a 1.75 reverse ratio. Attached to the secondary pulley is an output gear which drives an Idler/Reduction gear assembly which drives the differential ring gear for a final reduction gear ratio dependent on vehicle platform and engine size such as 5.407, 6.120, 6.466 for example (Final reduction gear ratio in this case can be defined as the number of revolutions of the output gear required for one complete revolution of the front axle).

The transmission is operated by an external TCM which selects the optimal pulley ratio and determines the shift strategy by detecting the vehicle's driving conditions such as the vehicle speed and throttle position (accelerator angle). It then outputs a command to a stepper motor inside the transmission which controls the in and out flow of line pressure to and from the primary pulley. The change in pressure forces the pulley to open and close its moveable half to continuously provide the appropriate ratio. This allows ratio patterns to alter continuously based on the driving method of the driver. Pulley ratio can also be controlled to obtain engine brake suitable for the driving habits of the operator, particularly on downward slopes. Learning compensation is made to meet the driving habits of the operator by judging the amount of the engine braking required from the application of the accelerator or the brake. During uphill climbs, shift ratio change is held to a minimum whenever the accelerator pedal be released.

With this transmission being used in Dodge, Jeep, Mitsubishi and Nissan vehicles, a variety of different shift strategies can be made available. For example; a P-R-N-D + 6-speed sport mode (with paddle shift) can be fitted with the vehicle. When the sport mode is switched ON with the selector lever or paddle shift, a fixed shifting strategy is initiated. The upshift - downshift operation enables the driver to shift in steps according to a predetermined shift strategy providing a manual transmission type shifting with 6-speeds suitable for sporty driving.

Another unique aspect to the operation of this CVT is the converter clutch apply strategy. Nissan refers to Torque Converter Clutch Control as "Direct Clutch Control". Depending on engine size, the converter clutch can begin to partially apply as early as 11 mph just slightly above 1,000 engine rpm's to a full apply shortly thereafter. The TCM controls this operation through two solenoids and two valves in the valve body; the Lock-up Control Solenoid (LCS), the Lock-up Select Switch Solenoid (LSS), the Select Switching Valve and the Select Control Valve. This grouping of solenoids and valves also control the garage shift into both Reverse and Forward gears. Both solenoids are Normally Low. The LCS is pulse width modulated and the LSS is On/Off. Both solenoids are energized in Park/Neutral lowering line pressure to the manual valve. Approximately five seconds after Reverse or Drive is selected routing low pressure to the clutch for a smooth engagement, these two solenoids turn off providing full line pressure to act on the clutch. A malfunction with these solenoids and valves can affect both garage shifts and converter clutch application.

NORTH AMERICA VEHICLE APPLICATION CHART

VEHICLE	YEAR	ENGINE	COUNTRY	TRANS-AXLE
DODGE, CALIBER	*2007-12*	*1.8L, 2.0L, 2.4L (L4)*	*USA*	*CVT 2*
JEEP, COMPASS	*2007-16*	*2.0L, 2.4L (L4)*	*USA*	*CVT 2*
JEEP, PATRIOT	*2007-16*	*2.0L, 2.4L (L4)*	*USA*	*CVT 2*
MITSUBISHI, LANCER	*2009-16*	*2.0L, 2.4L (L4)*	*USA*	*F/WICJA*
MITSUBISHI, OUTLANDER	*2009-16*	*2.4L (L4)*	*USA*	*F/WICJA*
NISSAN, ALTIMA	*2007-12*	*2.5L (L4)*	*USA*	*RE0F10A*
NISSAN, ROQUE	*2007-15*	*2.5L (L4)*	*USA*	*RE0F10A*
NISSAN, SENTRA	*2007-12*	*2.0L, 2.5L (L4)*	*USA*	*RE0F10A*

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Figure 1

GENERAL DESCRIPTION

Pressing the manual shift mode button (figure 2) will return the transmission to the normal driving mode.

Manual Shift Mode Overrides:

While in the manual shift mode, there may be a request from the driver to make a shift which will be denied. The purpose of the override is to maintain optimal driving performance and reduces the chance of damaging the transmission, vehicle damage, or loss of control.

There may also be situations where, while in the manual shift mode, the transmission will make un unrequested up-shift to the next highest range. This typically occurs when the transmission is left in a lower range for too long increasing engine RPM's to an unsafe level.

Another shift override occurs when vehicle speed decreases while manually holding too high a gear. A shift to a lower gear will occur automatically for both optimum driving performance and to prevent transmission damage. Similarly, when a stop is being made while holding a higher gear, it will automatically shift to the M1 position shortly before the full stop is made. This is to ensure that it takes off in the lower ranger for optimal performance and transmission safety.

CVT Fluid Temperature Affects Manual Shifts:

When the CVT fluid temperature is extremely low, the manual shift mode may be prohibited and will automatically shift as a drive mode. This is not a malfunction. Press the manual shift button to off and drive for awhile in the normal drive range giving time for the CVT fluid to warm up and then reactivate the manual shift mode.

When the CVT fluid temperature is high, the shift range may up-shift in lower rpm than usual. This is not a malfunction (See Fail-safe for high temp protection mode).

Shift Lock Release:

If the battery becomes discharged, the shift interlock solenoid will not function preventing the shift selector to be moved out of Park, even with the brake depressed.

To move the shift selector, use a suitable tool (flat bladed screwdriver) to release the shift lock (figure 2). The shift selector can be moved to Neutral. However, the steering wheel will be locked unless the ignition switch is turned to the ON position. This allows the vehicle to be moved should the battery become discharged.

Shift Lock Release Procedure:

1. Turn the ignition to the LOCK position and remove the key.
2. Apply the parking brake.
3. Remove the shift lock release cover.
4. Insert a small screwdriver in the shift lock release slot and push down.
5. Move the shift selector to the Neutral position while holding down the shift lock release.
6. Turn the ignition to the ON position to unlock the steering wheel. The vehicle can now be moved to the desired location.

Overdrive (O/D) Off Switch:

When the O/D Off switch (figure 2) is pushed with the selector in the Drive position, the O/D OFF light in the instrument panel illuminates. This option is used whenever improved engine breaking is desired. Pushing the button again will turn off the Overdrive off mode and the indicator light will turn off.

Each time the engine is started, or when the selector lever is shifted to any position other than Drive, the Overdrive off mode will automatically be turned off.

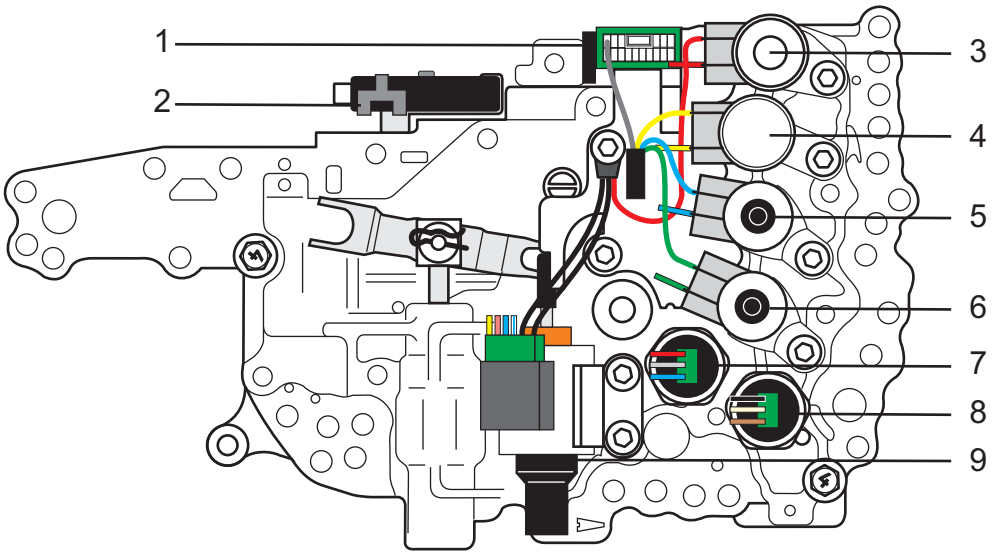
Fail-safe:

When the fail-safe operation occurs, the CVT will not be shifted into the selected driving position.

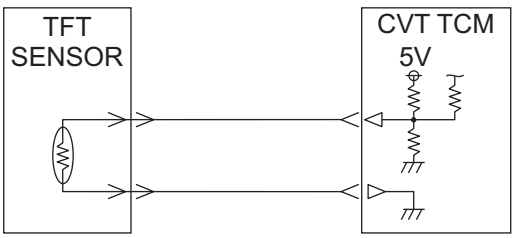
If the vehicle is driven under extreme conditions, such as excessive wheel spinning and subsequent hard braking, the fail-safe system may be activated. The MIL may come on to indicate the fail-safe mode is activated. This will even occur even if the electrical circuits are functioning properly. In this case, turn the ignition to the OFF position and wait for 10 seconds. The vehicle should return to its normal operating condition.

When the high fluid temperature protection mode or fail-safe operation occurs, vehicle speed may be gradually reduced. The reduced speed may be lower than other traffic, which could increase the chance of collision. If driving the vehicle under these conditions, it is best to find a safe place on the side of the road and allow the transmission to return to normal operation or be towed back to the shop for diagnostics and repairs.

ELECTRICAL DESCRIPTION

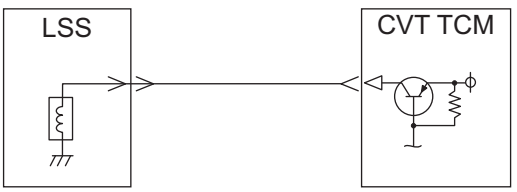


1. Transmission Fluid Temperature Sensor (TFT)
   The TFT sensor is used in the calculations to determine lock-up torque converter operation and variable pulley ratio. The TFT sensor is a negative temperature coefficient sensor which means as temperature rises the resistance decreases.



Temperature	Approx. Resistance Value
0°C (32°F)	15.5K
20°C (68°F)	6.5K (2VDC)
40°C (104°F)	3.1K
60°C (140°F)	1.6K
80°C (176°F)	0.9K (2VDC)
100°C (212°F)	0.5K

2. ROM
   Contains data specific for the vehicle - this must stay with the vehicle when swapping valve bodies or transmissions.
3. Lock-Up Select Solenoid (LSS)
   The Lock-Up Select Solenoid controls the positioning of the Select Switching Valve. It directs pilot pressure from the Lock-up Solenoid to the Select Control Valve for a soft engagement from P/N. It then directs pilot pressure to the Torque Converter Lock-up Control Valve for converter clutch apply control. This is a Normally Closed On/Off solenoid. When in P/N the TCM sends 12 volts to the solenoid. Once the desired gear is selected (D or R), within approximately 5 seconds power is cut to the solenoid by the TCM.



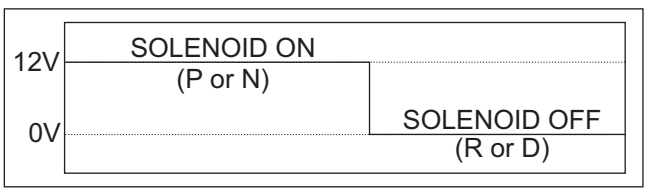


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Figure 5

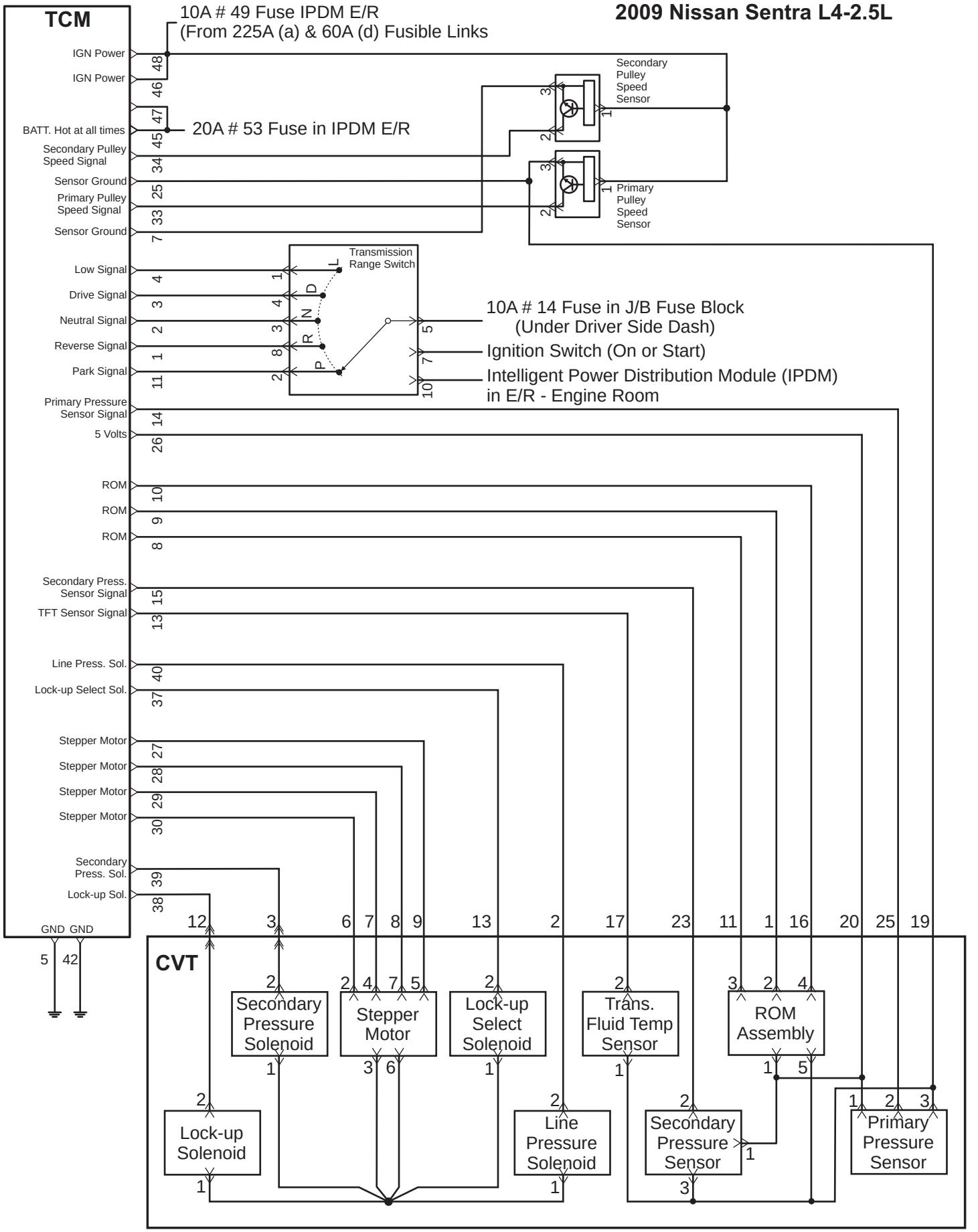
TCM
2009 Nissan Sentra L4-2.5L
10A # 49 Fuse IPDM E/R
(From 225A (a) & 60A (d) Fusible Links
IGN Power
IGN Power
BATT. Hot at all times
20A # 53 Fuse in IPDM E/R
Secondary Pulley Speed Signal
Sensor Ground
Primary Pulley Speed Signal
Sensor Ground
Secondary Pulley Speed Sensor
Primary Pulley Speed Sensor
Transmission Range Switch
Low Signal
Drive Signal
Neutral Signal
Reverse Signal
Park Signal
10A # 14 Fuse in J/B Fuse Block
(Under Driver Side Dash)
Ignition Switch (On or Start)
Intelligent Power Distribution Module (IPDM)
in E/R - Engine Room
Primary Pressure Sensor Signal
5 Volts
ROM
ROM
ROM
Secondary Press. Sensor Signal
TFT Sensor Signal
Line Press. Sol.
Lock-up Select Sol.
Stepper Motor
Stepper Motor
Stepper Motor
Stepper Motor
Secondary Press. Sol.
Lock-up Sol.
GND GND
CVT
Secondary Pressure Solenoid
Stepper Motor
Lock-up Select Solenoid
Trans. Fluid Temp Sensor
ROM Assembly
Lock-up Solenoid
Line Pressure Solenoid
Secondary Pressure Sensor
Primary Pressure Sensor

Figure 15

DIAGNOSTIC TROUBLE CODES	
DTC	**DESCRIPTION**
P0826	*Manual Mode Switch System Failure*
P0840	*Secondary Pressure Sensor Malfunction (Nissan & Mitsubishi)*
P0841	*Line Pressure Sensor Function Abnormality (Nissan & Mitsubishi)*
P0842	*Primary Pressure Sensor Circuit Low*
P0843	*Primary Pressure Sensor Circuit High*
P0845	*Primary Pressure Sensor Malfunction (Mitsubishi)*
P0847	*Secondary Pressure Sensor Circuit Low*
P0848	*Secondary Pressure Sensor Circuit High*
P0868	*Secondary Pressure Drop*
P0882	*Power Supply System Low Malfunction (Mitsubishi)*
P0883	*Power Supply System High Malfunction (Mitsubishi)*
P0846	*2/4 Clutch Pressure Switch Rationality*
P0962	*Line Pressure Solenoid Circuit Low*
P0963	*Line Pressure Solenoid Circuit High*
P0966	*Secondary Pressure Solenoid Circuit Low*
P0967	*Secondary Pressure Solenoid Circuit High*
P161B	*Battery Disconnected/TCM Internal*
P1637	*Memory Back-up Malfunction (Mitsubishi)*
P1661	*Sensor Ground Open*
P1679	*Failure of Initializing Calibration*
P167A	*Calibration Mismatch*
P1701	*TCM Power Supply (Nissan)*
P1702	*Primary/Secondary Pressure Sensor Performance*
P1705	*Throttle Position Sensor (Nissan)*
P1710	*Vehicle Speed Signal Malfunction (Mitsubishi)*
P1722	*No VSS from ABS over CAN*
P1723	*Speed Sensor Signal Abnormality (Nissan & Mitsubishi)*
P1723	*Lock-up/Selection Switching Solenoid Circuit Open/Short (Dodge & Jeep)*
P1726	*Electric Throttle Control System (Nissan)*
P1729	*Stepping Motor Circuit Open/Short*
P1740	*Lockup/Select Switching Solenoid Malfunction (Mitsubishi)*
P1745	*Monitoring of Percentage Change in Pulley Ratio (Mitsubishi)*
P1770	*Stepping Motor Circuit Open/Short*
P1773	*Malfunction of ABS (Mitsubishi)*
P1777	*Stepper Motor Malfunction (Nissan & Mitsubishi)*

Figure 24

JF011-E CVT Unit Disassembly Procedures

Figure 45

43. Using a magnet, remove the manual control shaft sleeve from the valve body (figure 45).

44. Insert a 3mm diameter wire 126mm in length (5.0”) or equivalent into the retaining pin hole in the valve body next to the harness hold down bracket. This will retain the spring loaded ratio control valve in position when removing the valve body (figure 46).

45. Using a 10mm socket, remove 11 valve body attaching bolts (figure 47).

46. Carefully push the harness connector into the case (figure 48).

47. Remove the valve body assembly (figure 49).

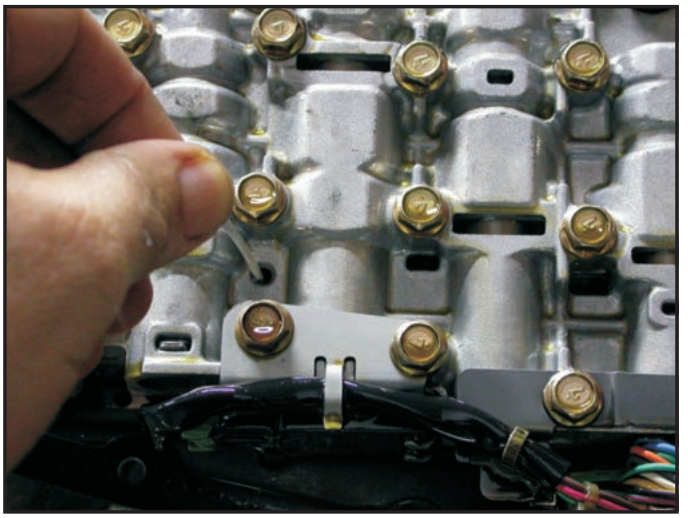

Figure 46

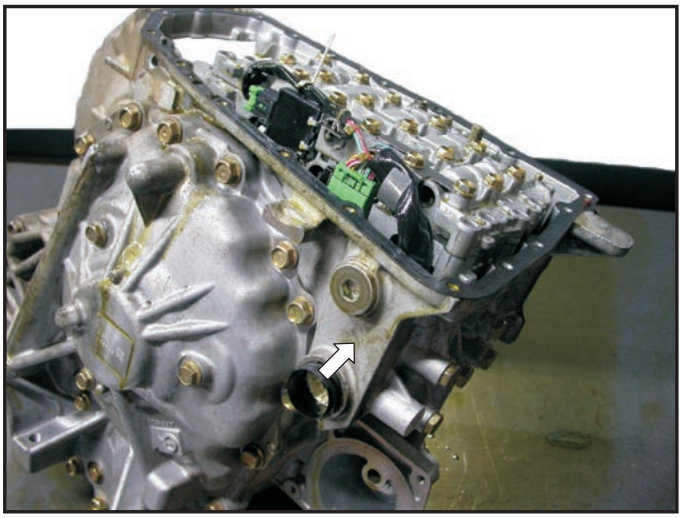

Figure 48

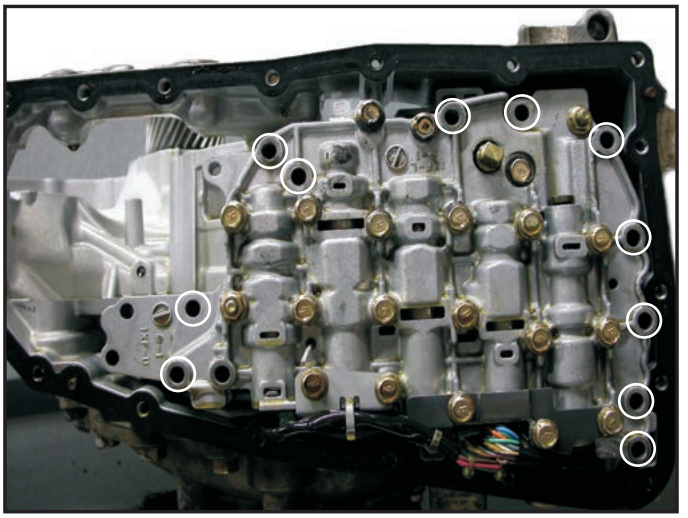

Figure 47

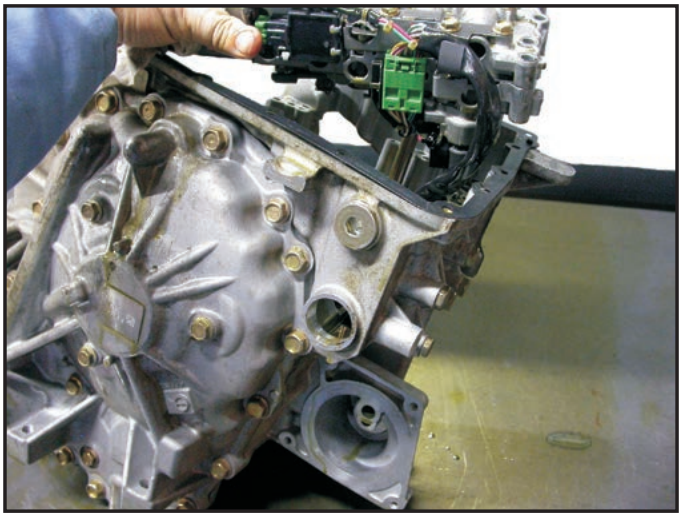

Figure 49

VALVE FUNCTION

Manual Valve:
Depending on shift lever position, directs pressure from the Select Control Valve to the Forward or Reverse Clutch.

Torque Converter Regulator Valve:
Regulates the supply pressure to the transaxle cooling and lubrication circuits during torque converter lock-up operation.

Clutch Regulator Valve:
Regulates torque converter operating pressure.

Pressure Regulator Valve:
Regulates the discharge pressure from the oil pump to optimal pulley clamping pressure for all driving conditions.

Secondary Pressure Regulator Valve:
Controls clamping pressure to the Secondary Pulley.

Secondary Control Valve:
Supplies control pressure to the Secondary Pressure Regulator Valve

Line Pressure Control Valve:
Regulates normal (non-pulley clamping) line pressure.

Lock-Up Control Valve:
Directs line pressure to the apply or release side of the lock-up torque converter.

Select Switch Valve:
Depending on its position, directs Lock-up Solenoid Valve pressure to the Select Control Valve or the Lock-up Control Valve. When Lock-up Solenoid Valve pressure is applied to the Select Control Valve, line pressure to the Forward Clutch or Reverse Clutch is reduced to provide smooth gear engagement from Park or Neutral. When Lock-up Solenoid Valve pressure is being directed to the Lock-up Control Valve, the Select Switch Valve provides normal line pressure to the Forward or Reverse Clutch.

Select Control Valve:
Reduces line pressure to the Forward or Reverse Clutch during gear selection to ensure smooth engagements.

Pilot Valve:
Controls feed pressure to all the solenoids.

Ratio Control Valve:
Controls in/out flow of line pressure to/from the Primary Pulley based on the stroke difference between the stepper motor and primary pulley position.

Figure 24

Pump Servicing

Figure 6

6. Remove both the inner and outer pump housing to base plate rubber o-rings (figure 6).

7. Using a 10mm hex head socket, carefully remove the flow control valve and spring retaining plug. Once off, remove the spring and valve from the pump housing (figure 7).

8. Perform a visual and physical inspection of the flow control valve bore (figure 8) and valve (figure 9) for wear. Repair or replace as necessary.

9. Clean and inspect all other pump parts for wear or grooving and replace as necessary (figure 10).

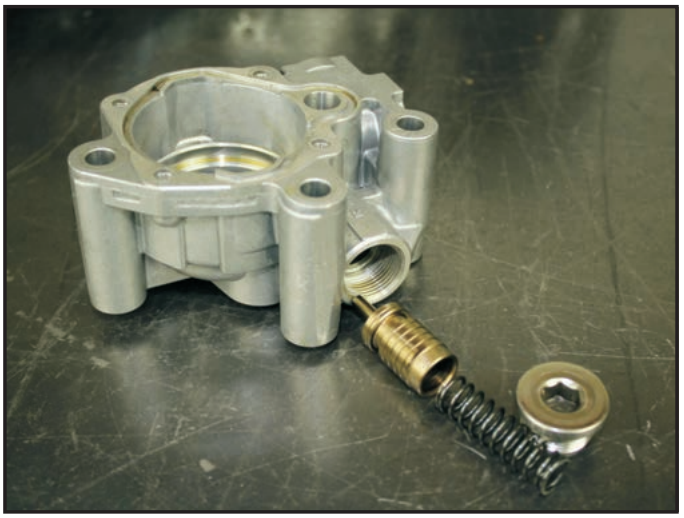

Figure 7

Figure 9

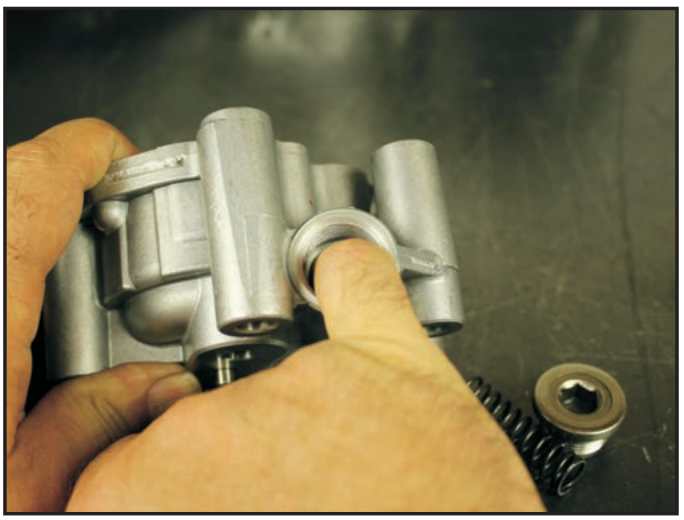

Figure 8

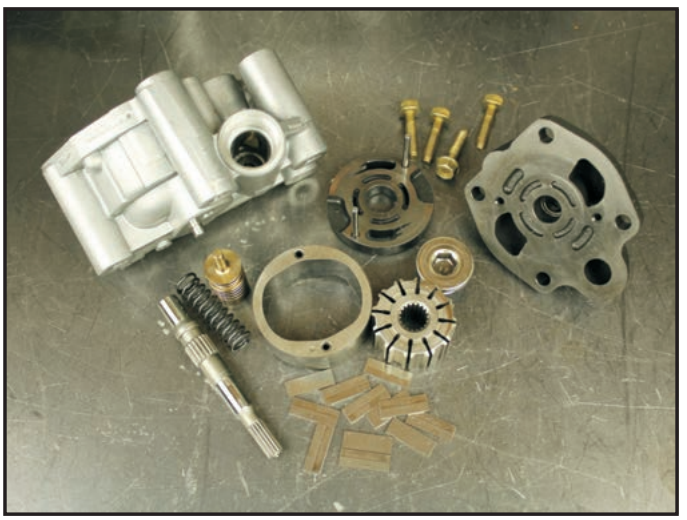

Figure 10

Differential and Reduction Gear Servicing

1. If the differential needs servicing, use a 17mm socket and remove eight ring gear attaching bolts (figures 1 and 2).

2. Measure the backlash between each side gear. (figure 3). Standard value: 0.025-0.150mm (0.001-0.006”). If the backlash deviates from the standard value, replace each side gear spacer with one of an appropriate thickness and measure the backlash again for confirmation.

3. Should removal be necessary, mark each of the gears so they can be installed in the same location. This is a noise preventive safety measure (figure 4).

4. Using a punch, drive out the roll pin (figure 5).

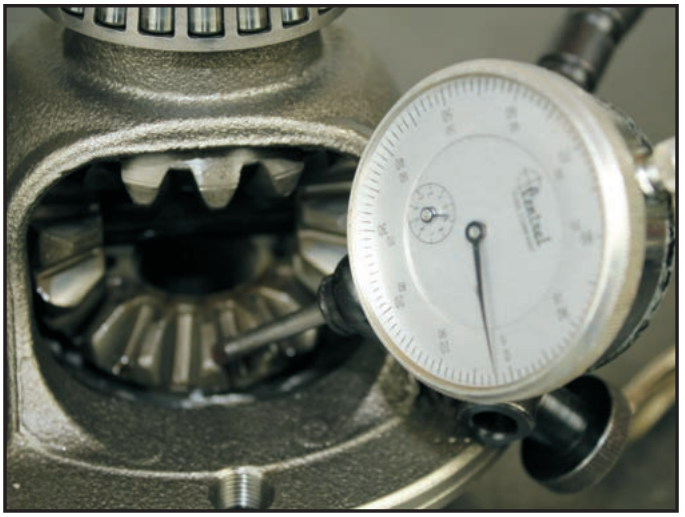

Figure 3

Figure 1

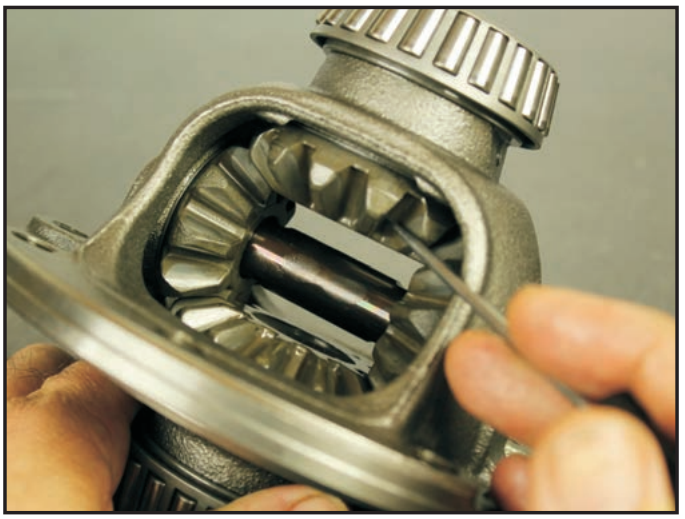

Figure 4

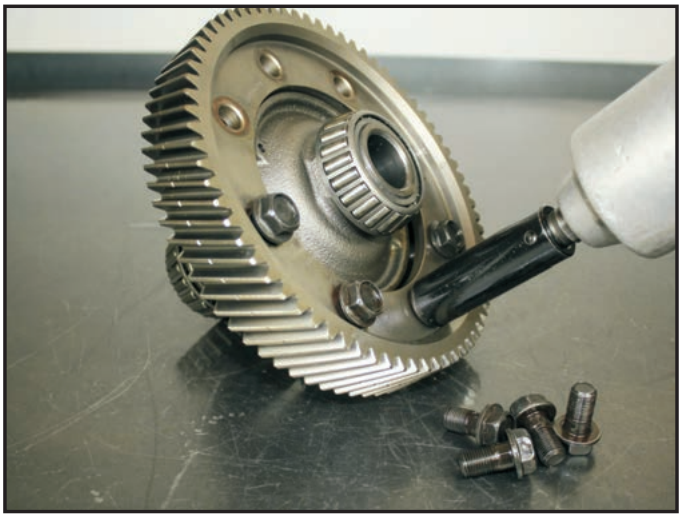

Figure 2

Figure 5

Variator Servicing

17. Place the Secondary Pulley into a press being careful to not score the pulley sheave face. Place a catch basin/bucket below the pulley assembly (figure 21).

18. The shaft will begin to push through the piston once it bottoms out in the sheave drum compressing the high tension spring (figure 22). ***Use caution:*** The moment the shaft has pushed through the pressed fit on the piston, it will pop violently but the nut will hold the parts in place (figure 23).

19. Support the shaft from underneath while disassembling the pulley beginning with the removal of the piston seal (figure 24) followed by the nut (figure 25).

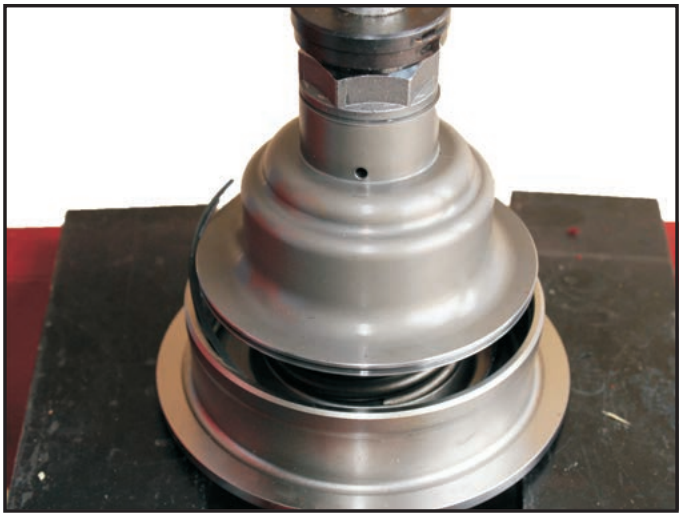

Figure 23

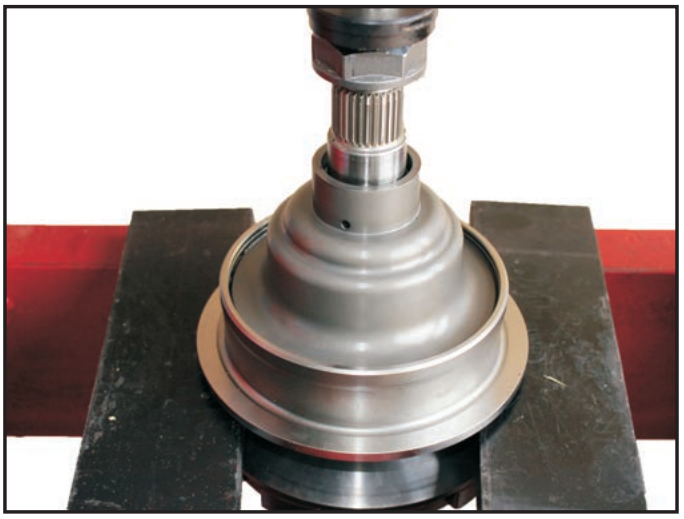

Figure 21

Figure 24

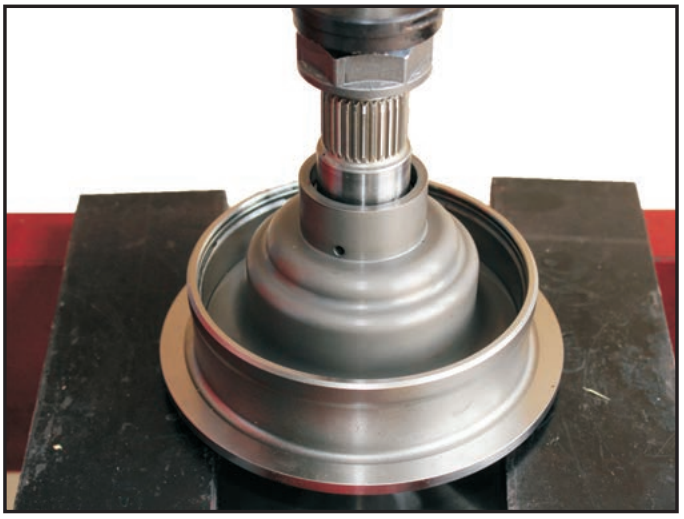

Figure 22

Figure 25

Variator Servicing

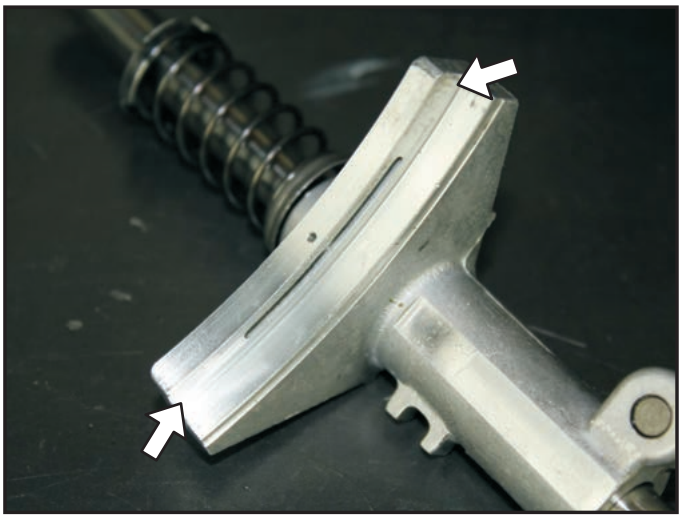

Figure 66

53. Inspect the ledge of the pulley follower where it rides against the pulley for excessive wear and replace if necessary (figure 66).

54. Install the pulley follower spring cup up first (figure 67). Then sit the pulley follower into the spring cup. Carefully push the follower down placing the edge under the pulley sheave (figure 68). Secure the spring and follower into place with the pin guide (figure 69).

55. Install a new main case to side cover secondary pulley o-ring into its pocket and secure with jell (figure 70).

Figure 67

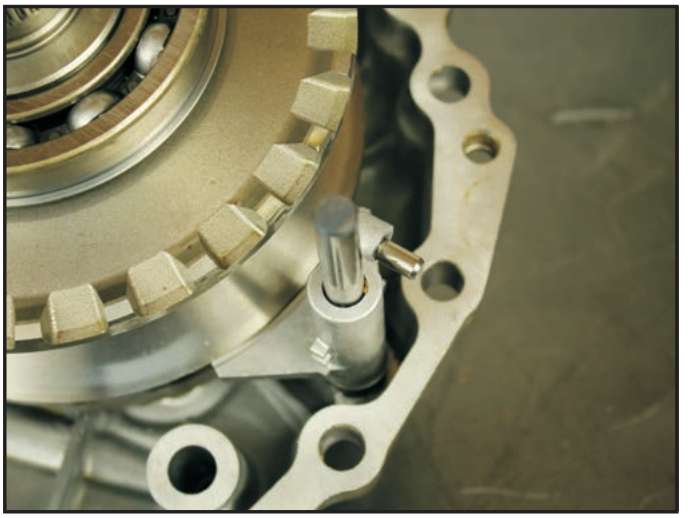

Figure 69

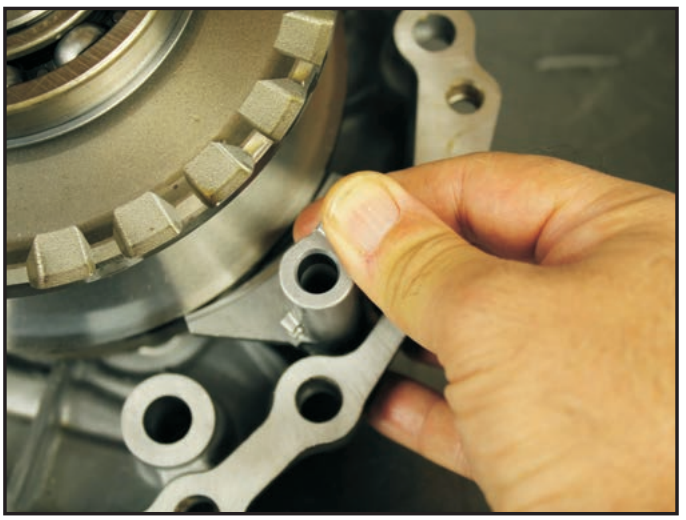

Figure 68

Figure 70

Transmission Reassembly

27. Measure the thickness of the bearing and compare it to the calculation made and verify if the bearing can be re-used or if needs to be replaced (figure 27). See service information on page 110 figure 6 for selective bearing thicknesses.

28. Install the correct selective needle bearing # 1 down into the forward clutch drum with the inner race down. Make sure the bearing is fully seated and not sitting on top of any of the locating tabs on the forward drum (figure 28).

29. Install the stator support with a couple of attaching bolts without any forward clutch sealing rings. Verify end-play to be between 0.25-0.55mm (0.010-0.020 in). If needed, adjust using the correct selective needle bearing assembly (figure 29).

30. Remove the stator support cover and install a high pressure metal clad lip seal into the case. Secure it with trans jell or equivalent (figure 30).

31. Install the oil pump down into the case, then install three 6mm allen head oil pump mounting bolts (70mm [2.75 in.]) finger tight only at this time (figure 31).

32. Depending on the style bolt, install a new o-ring or sealing compound onto the rear of pump mounting bolt. Install the bolt into the pump through the case finger tight (figure 32).

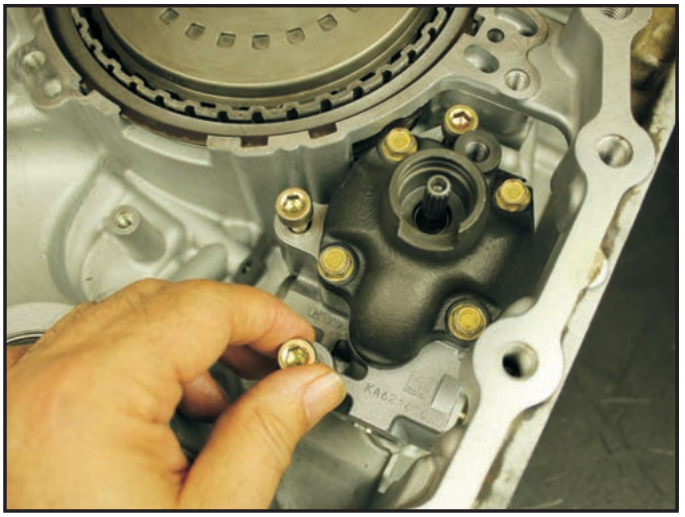

Figure 31

Figure 32

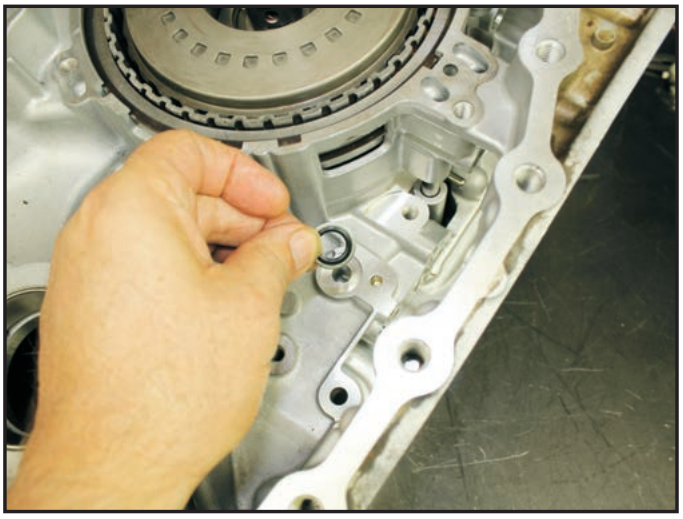

Figure 30

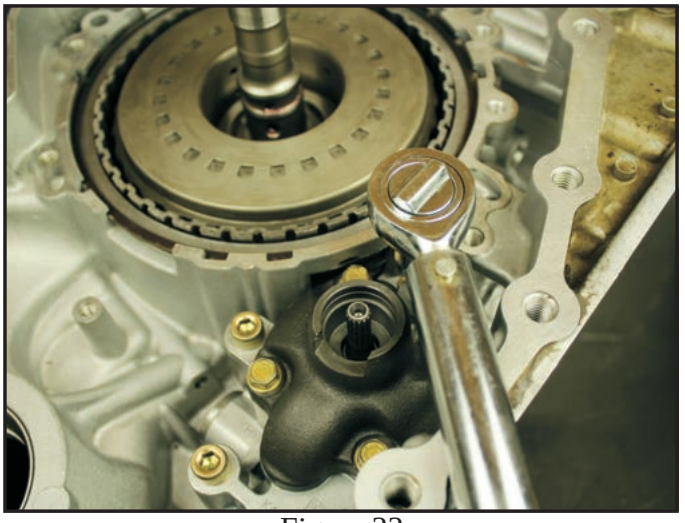

Figure 33

Transmission Reassembly

64. Insert the main harness connector into the case with the stopper tab towards the pan rail (figure 69).

65. Insert the retaining clip into the groove on the harness connector (figure 70).

66. Position the harness so that it is clear for the valve body assembly to be installed (figure 71).

67. Install the valve body into the main case and hold it in place (figure 72). Install the one valve body attaching bolt finger tight followed by the remaining attaching bolts. There are a total of ten 54 mm (2.13 in.) length bolts and one 44 mm (1.73 in.) length attaching bolts to be installed.

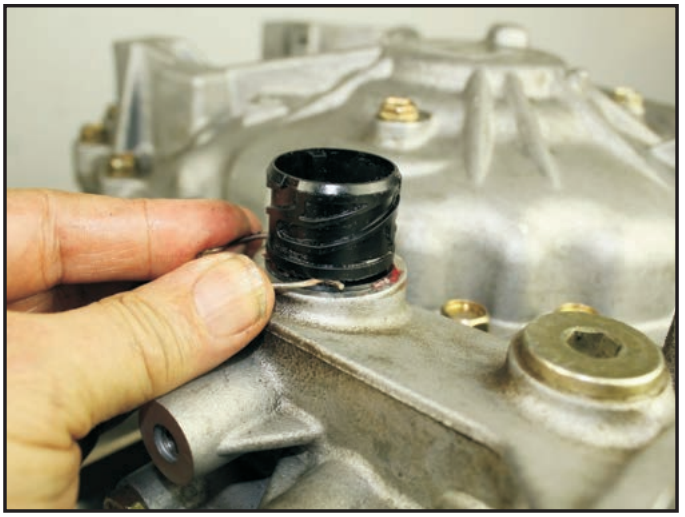

Figure 70

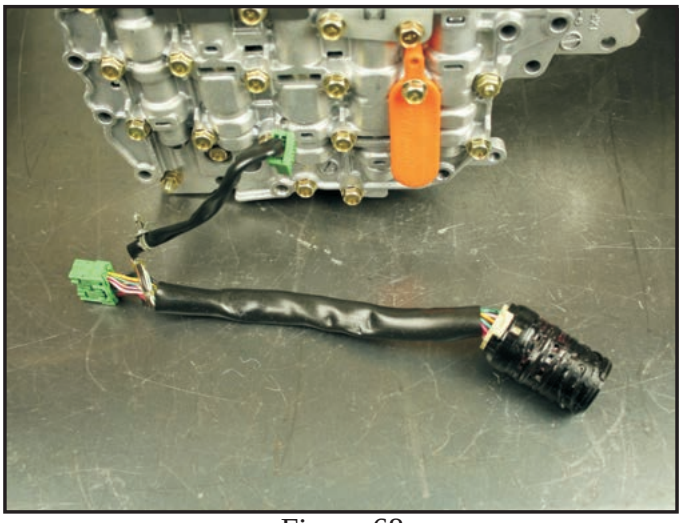

Figure 68

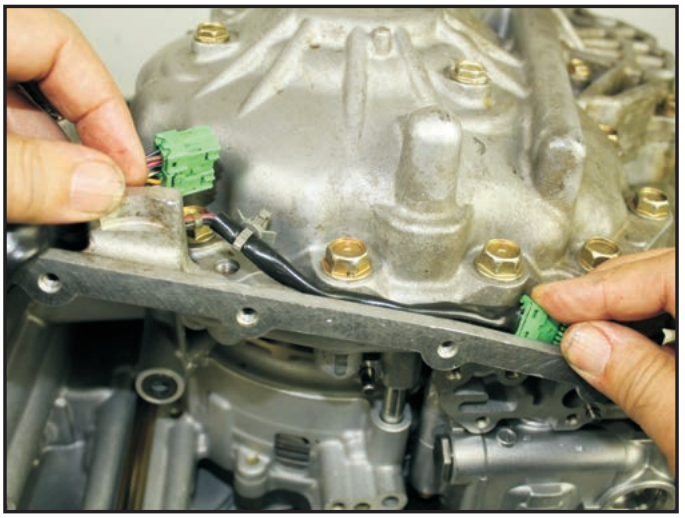

Figure 71

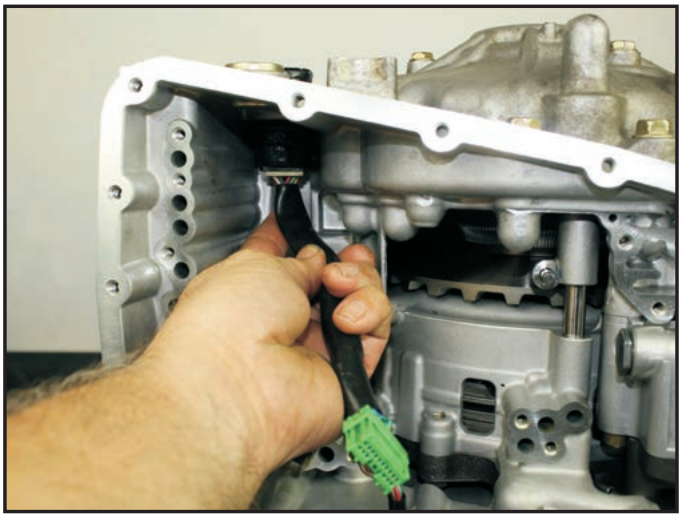

Figure 69

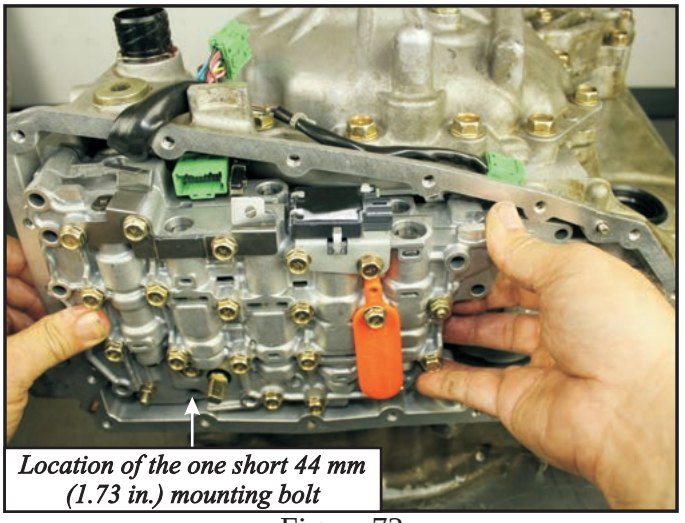

Figure 72

Case Passage Identification

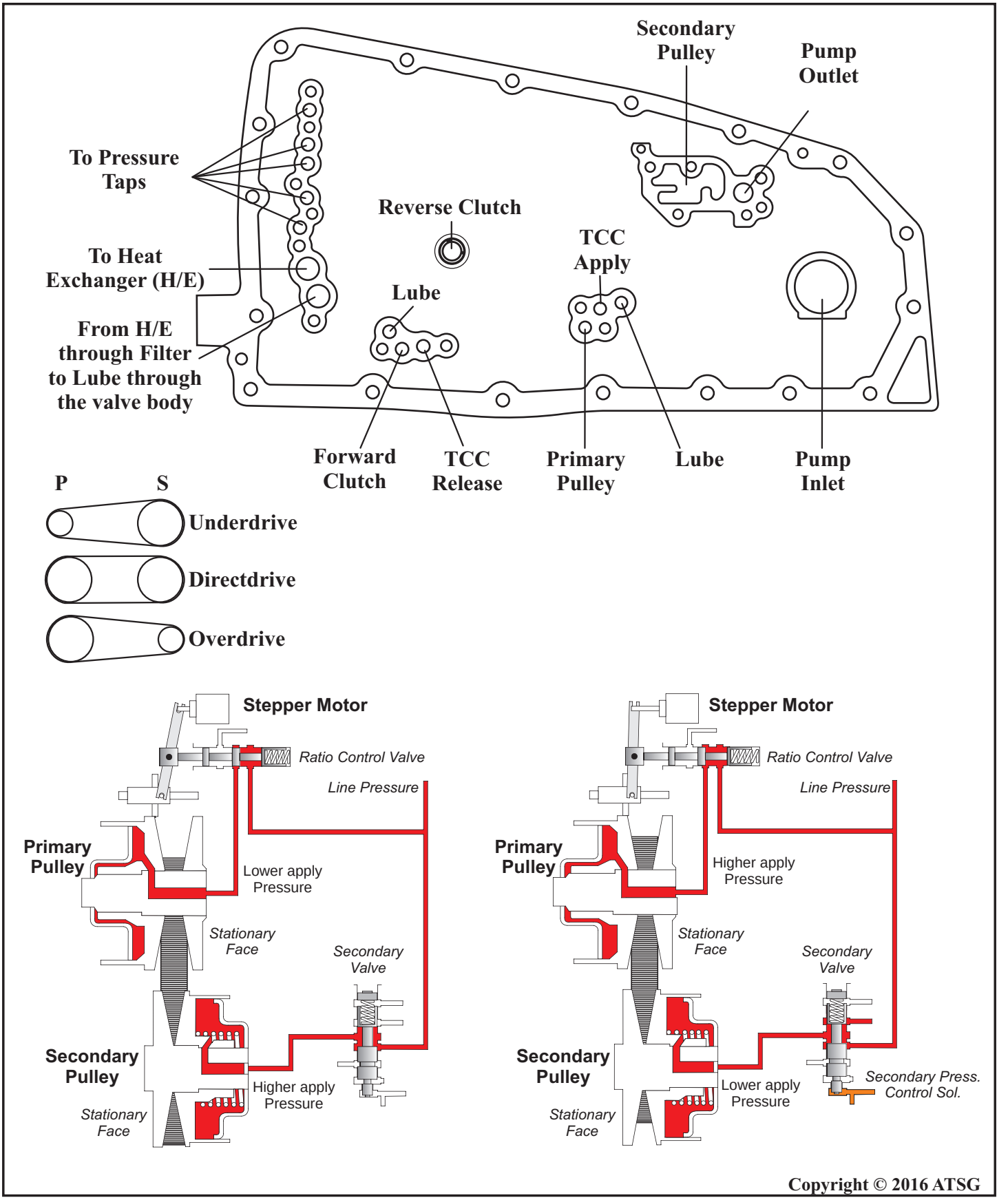

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Figure 104