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"What's in Store for 2004" Seminar Information

Introduction

Welcome to ATSG's "What's in Store For 2004" as it is another year of practical information presented to you in the most proficient and professional fashion in the entire industry. We are a proud employee owned company with a staff that works hard to bring to you the latest information and fixes that help you to be your very best. Technology has not slacked in being forth coming and neither has ATSG. It is imperative for a transmission business to belong to a tech service and we are a tech service that helps. We are staying with and looking beyond the cutting edge of our industry's technology and bringing this information and training to you.

As with our previous seminars, most of the information presented throughout the entire day has been placed into three technical manuals. The White, Red and Blue. These are your tools to bring back into your shop which you will use for years to come. So sit back and enjoy a great day of learning in ATSG's "What's in Store for 2004" technical seminar.

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*The information and part numbers contained in this booklet have
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A-Z Tools

WIT



4T65E TRANS-AXLE SHIFT QUALITY/CLUTCH CLEARANCE

COMPLAINT: After overhaul the transmission exhibits long drawn out shifts when performing high load or wide open throttle shift maneuvers.
All solenoids were replaced when the trans was overhauled and the pressure control solenoid was “tweaked” prior to installation.
Data viewed on the scan tool indicates that the 1-2 and/or the 2-3 shift show high shift times exceeding 0.65 seconds. This is also reflected when the 1-2 or 2-3 TAP CELL parameters are viewed. (Trans Adaptive Pressure)
The PCM **may** or **may not** store a fault code P1811 while operating under these conditions.
This occurs more frequently with fleet service vehicles such as police cars.

CAUSE: The cause may be excessive clutch clearance in the 2nd and/or 3rd clutch packs which require a high volume of oil to fill the related cylinder and compress the wave plate before the clutch can be fully applied.
On some units this clearance may be as much as 0.130”(in.) or more and there may be no evidence of deterioration or stress on the individual plates at all. This can also cause the molded piston to cock and bind in the cylinder bore as it strokes to apply the clutch resulting in premature wear of the piston and/or seal.
The factory service manual does not provide a specification for clutch clearances and as a result, aftermarket service publications do not have this information either.

*The reason for this is that the factory does not make selective pieces available for these applications. Their idea is that if you acquire the **correct** overhaul kit for your vehicle then no adjustments are required.*

CORRECTION: As a **general rule**, wet clutches require 0.008”- 0.012”(in.) clearance per friction disc **unless otherwise specified in a factory service manual**. Some clutch packs will have a friction surface on one side of each of the drive and driven plates. *If this is the case then just pick one set or the other, not the total of both combined.* With less than 0.008”(in.) clearance you will risk having the clutch drag when it is not applied or lack adequate lubrication.

2nd Clutch Assembly

The 2nd clutch has 6 driving friction discs and 5 driven steel plates. Referring to the general rule, this means that our preferred 2nd clutch clearance will be 0.048”- 0.072”. The OEM steel plates are 0.068” thick. If the clearance is 0.116” or more then adding an extra steel plate on top of the waved plate may be all that is needed to correct this condition. There are also thicker steel plates now available from ALTO Products (PT # 062733-228) that are 0.088” thick so that you can “fine tune” your 2nd clutch pack clearance. This modification will reduce the volume of oil that is needed to charge the clutch cylinder and cut the fill time as a result. (See Figure 1)

Thickness of the drive and driven plates may vary slightly with temperature.

Do not attempt to eliminate the waved apply plate. If it is broken, warped or has become flat, then replacement will be necessary.



4T65E TRANS-AXLE SHIFT QUALITY/CLUTCH CLEARANCE

CORRECTION: 3rd Clutch Assembly

(cont'd)

The 3rd clutch contains 5 driving plates (externally splined) and 5 driven plates (internally splined). Each of the drive and driven plates have a friction surface on one side only. Referring to the general rule, this means that our preferred 3rd clutch clearance will be 0.040"- 0.060". The OEM driving plates are 0.076" in total thickness with the steel portion of the plate measuring 0.048". The OEM driven plates are 0.082" total thickness with the steel portion measuring 0.050". If the clutch clearance is 0.088" or more then you could remove the friction material from one extra externally splined driving plate and place it on top of the waved plate first and then add the regular stack of drive and driven plates on top. Another possibility is substituting various model 4T60E or later model 440T4 3rd clutch plates until the desired clearance is obtained. These plates are available with a variety of different thicknesses. This modification will reduce the volume of oil that is needed to charge the clutch cylinder and cut the fill time as a result. (See Figure 2)

Thickness of the drive and driven plates may vary slightly with temperature.

Do not attempt to eliminate the waved apply plate. If it is broken, warped or has become flat, then replacement will be necessary.

Spacer Plate

Further modification to the valve body spacer plate can be made to allow the 2nd and 3rd clutch cylinders to fill more quickly. Opening the 2nd and/or 3rd clutch feed orifices in the spacer plate 0.010"(in.) larger than they are now, will let the oil get to the cylinder faster. The OEM orifice size is originally 0.070". (See Figure 3)

This spacer plate orifice modification is not recommended as a part of an overhaul procedure. This should only be considered as an option when all other possible causes have been eliminated. Do not exceed a maximum of 0.082" total orifice size.

Special thanks to Barrie McLaughlin of McLaughlin's Transmission, Stittsville Ontario, Canada for sharing his insight and experience with us.

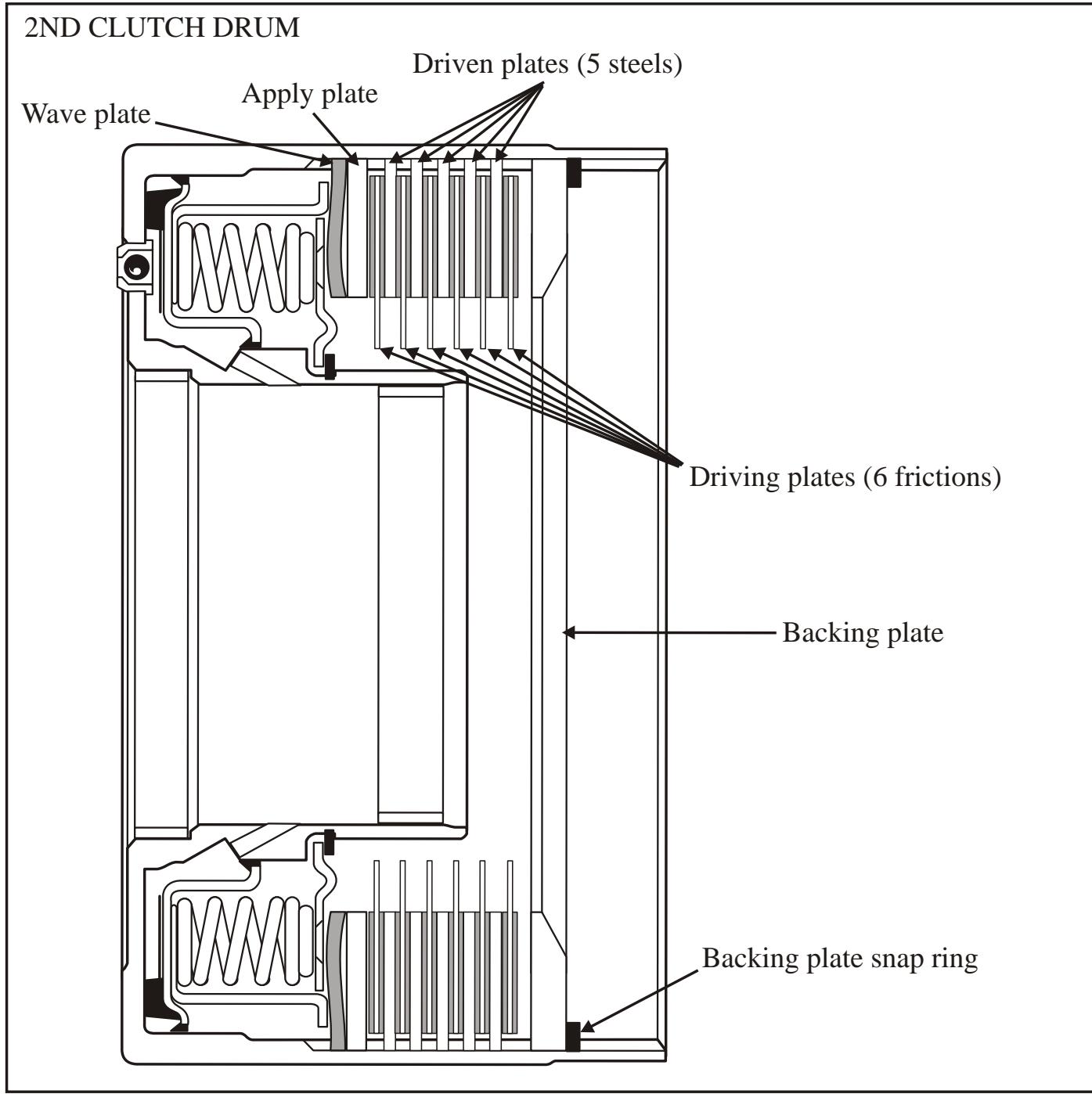
**4T65E TRANS-AXLE
SHIFT QUALITY/CLUTCH CLEARANCE**

Figure 1

4T65E TRANS-AXLE SHIFT QUALITY/CLUTCH CLEARANCE

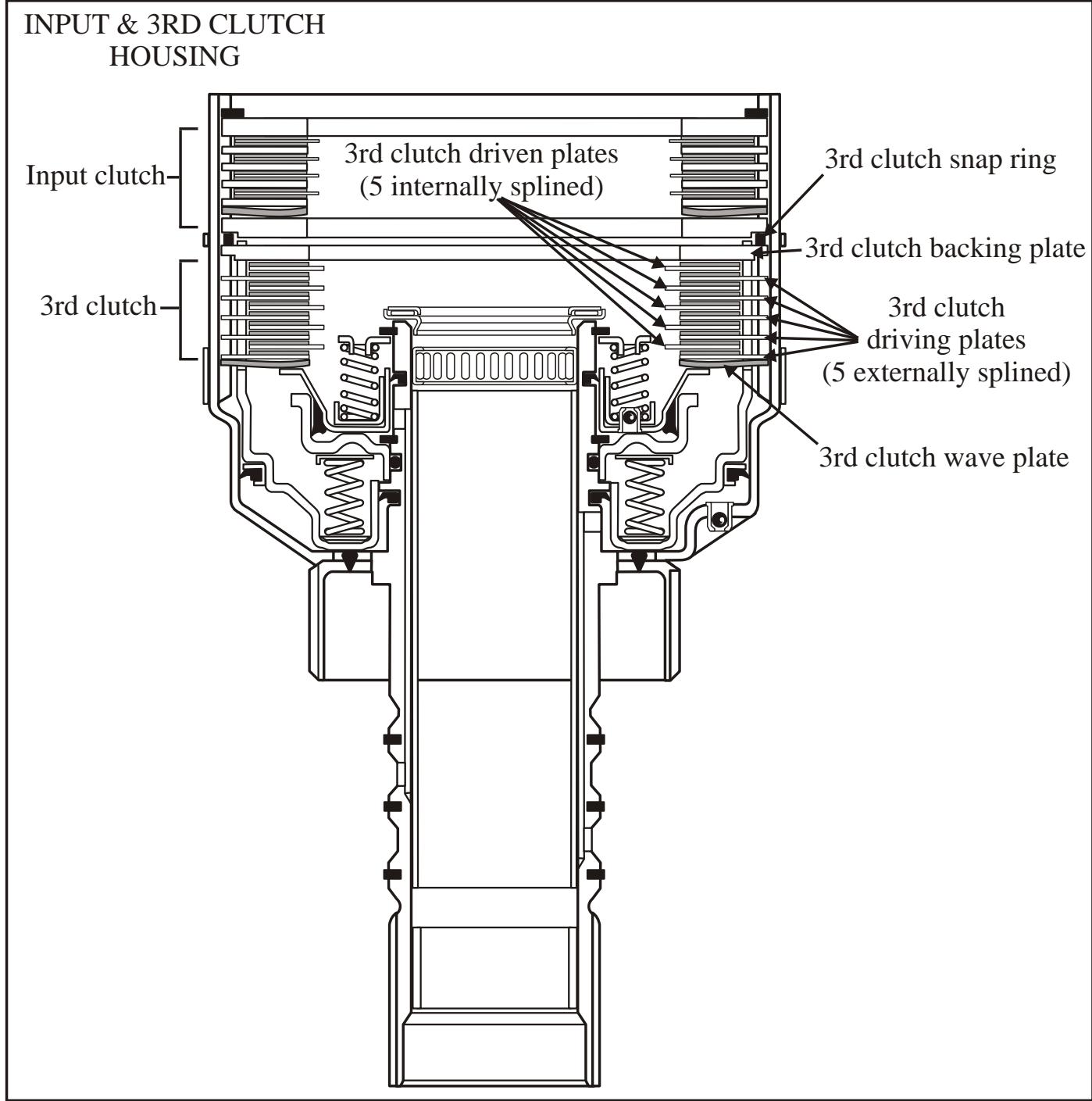


Figure 2

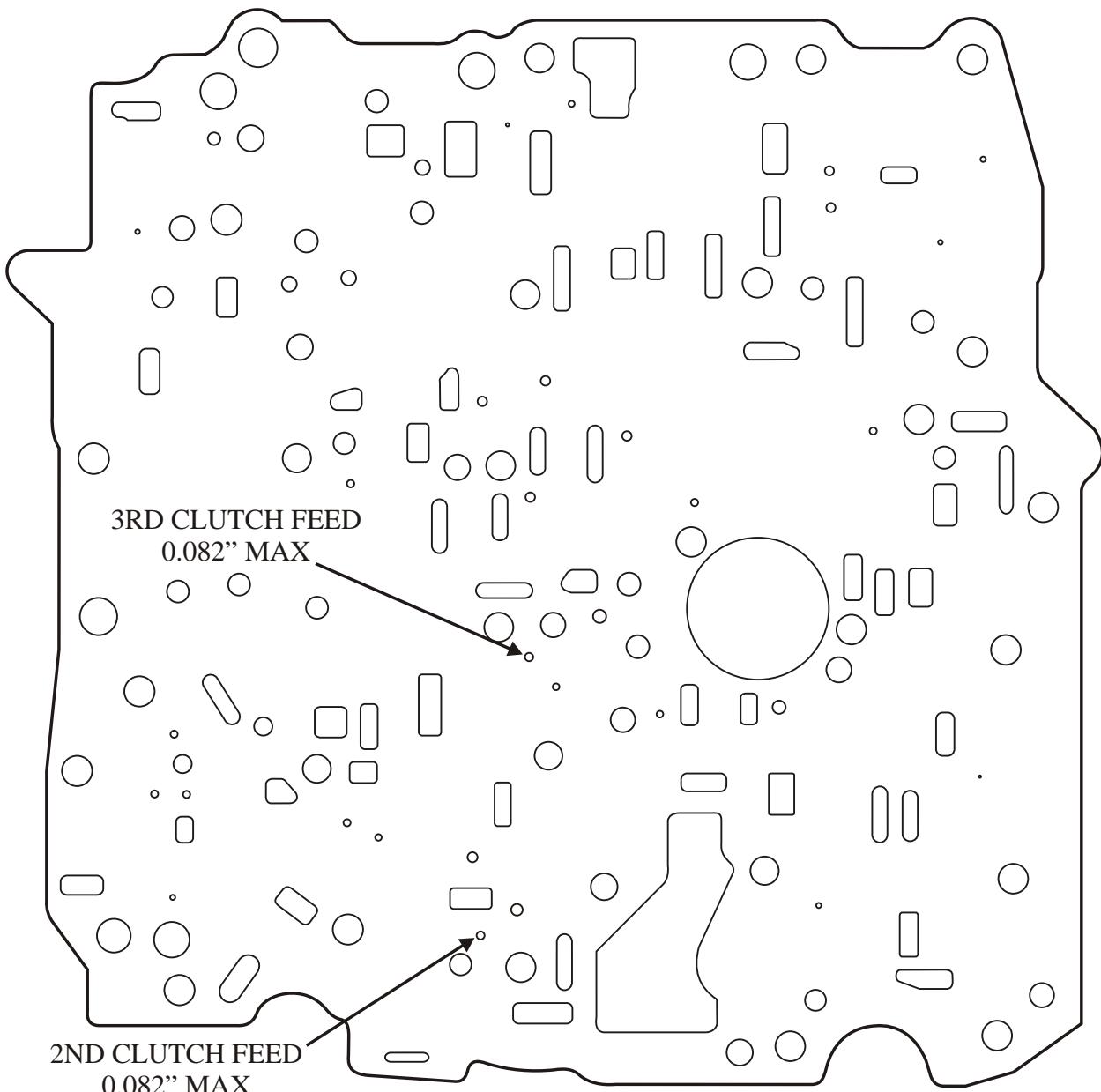
**4T65E TRANS-AXLE
SHIFT QUALITY/CLUTCH CLEARANCE****SPACER PLATE***View from channel plate side*

Figure 3



4T65E TRANS-AXLE SHIFTS OUT OF SEQUENCE / SOLENOID PERFORMANCE CODES

COMPLAINT: Before or after overhaul a GM or import vehicle equipped with a 4T65E trans-axle exhibits a 2nd gear start or is shifting out of sequence even though a scan tool indicates the computer commands are correct and electrical signals at the trans harness connector have been monitored and verified. The PCM (or TCM for some imports) *may* or *may not* store performance codes such as P0751(Sol.A) or P0756(Sol.B). A different complaint with the same root cause may be that the trans has a 1-3 shift or a 2-3 cut-loose shift only when cold but operation improves as the vehicle warms up.

CAUSE: Mechanical problems with shift solenoids, sticking shift valves etc would be the usual and most likely suspects. A lack of Actuator Feed Limit (AFL) oil volume or pressure to the solenoids due to a damaged/ mis positioned upper channel plate gasket, a sticking or worn AFL valve or bore in the channel plate are often commonly over looked causes of these problems.

CORRECTION: Dis-assemble and clean the entire valve body. Be sure that all valves work freely in their bores upon re-assembly. If shift valves or bores are worn to the point that the valves wobble in their bore or show signs of heavy scoring as a result of contamination, then replacement of the control valve assembly will be necessary. ***Do not attempt to sand or Scotch-Brite valves or bores.***

Locate the Actuator Feed Limit valve in the channel plate. (See Figure 1) Remove the retainer, spring and valve. Thoroughly clean the channel plate and valve and inspect the valve and bore for scoring. If either the valve or bore are damaged, then replacement of the channel plate will be required. Be sure the balance orifice cup plug is present and the orifice is not plugged with debris.(Figure 1)

Find orifice #1(Sol. A) and orifice #30(Sol. B) in the valve body spacer plate. (See Figure 2) Open both of these feed holes to 0.035in. to 0.040in. **Maximum**. AFL oil becomes Signal oil at the shift solenoids after passing through these orifices. This will help to overcome slight leakage in the feed oil circuit. Do not exceed the maximum of 0.040in. for the feed holes or you will risk flooding the solenoids when they are open to exhaust.

Clean or replace the two screens in the spacer plate.

Replace both shift solenoids with new ones.

SERVICE INFORMATION:

At the time of this printing the latest updated OEM part number for both the 1-2 Shift Solenoid(A) and the 2-3 Shift Solenoid (B) is **24219819**

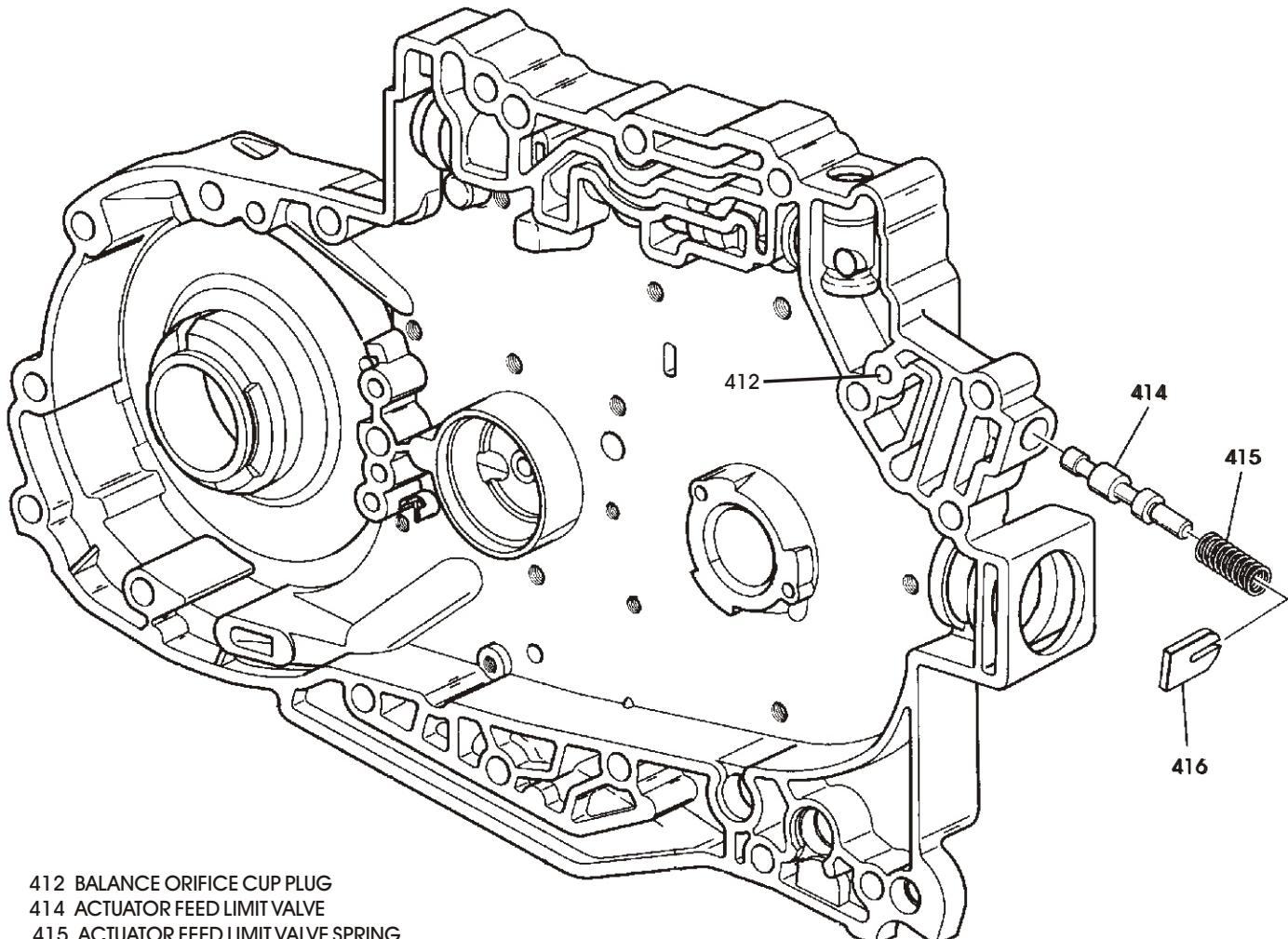
4T65E TRANS-AXLE**SHIFTS OUT OF SEQUENCE / SOLENOID PERFORMANCE CODES****CASE COVER/CHANNEL PLATE**

Figure 1

4T65E TRANS-AXLE

SHIFTS OUT OF SEQUENCE / SOLENOID PERFORMANCE CODES

SPACER PLATE

View from channel plate side

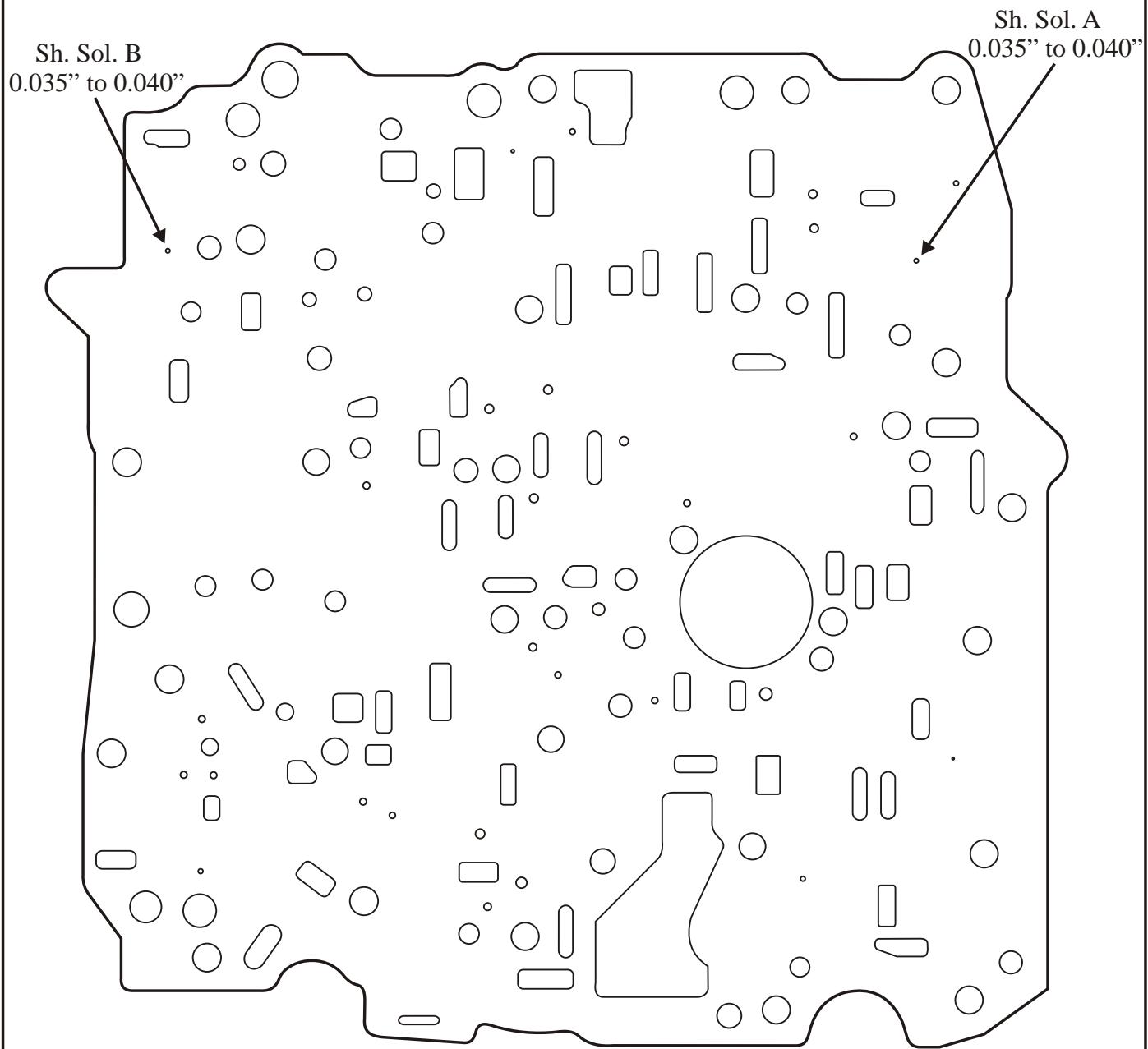


Figure 2

4T65E TRANS-AXLE NO 3-4 SHIFT

COMPLAINT: A GM or import vehicle equipped with the 4T65E trans-axle comes to the shop with a complaint of no 3-4 shift at any time.

Live data viewed on a scan tool indicates that the computer is commanding a 3-4 shift. Shift solenoid A is being switched on after 3rd gear and the electrical signals at the trans harness connector have been monitored and verified.

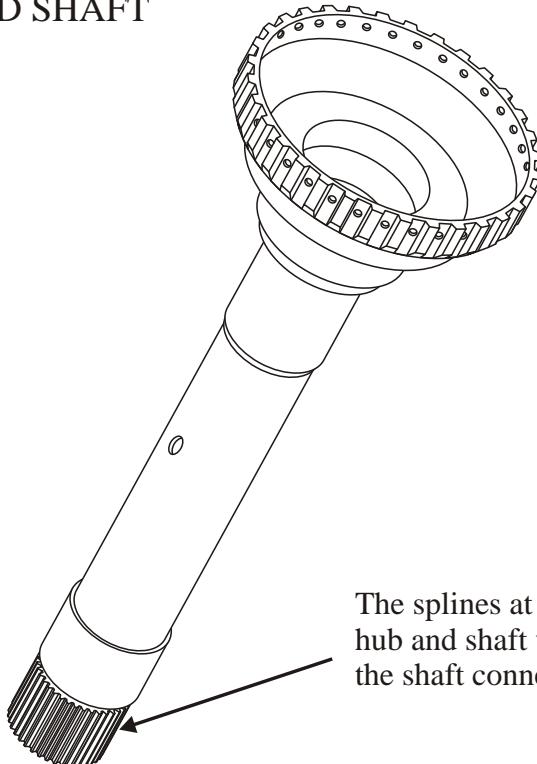
The PCM (or TCM for some imports) **may** or **may not** store a shift solenoid A performance code such as P0751.

CAUSE: The cause may be a stripped spline at the base of the 4th clutch hub and shaft where it connects to the input sun gear. (See Figure 1)

CORRECTION: Replace the 4th clutch hub and shaft assembly.

Special Note: *As a result of feedback received from many of our "Help Line" subscribers, it has been reported that in most cases this problem will occur without any fault codes, such as P0751 (Shift Sol. A Performance) or a P0730 (Undefined/Incorrect Gear Ratio), being stored at all.*

4TH CLUTCH HUB AND SHAFT



The splines at the base of the 4th clutch hub and shaft will be stripped here where the shaft connects to the input sun gear

Figure 1



THM 4T65-E

NEW DESIGN "PAWL" CLUTCH TYPE FREEWHEEL FOR INPUT AND THIRD

CHANGE: Some 2003 model THM 4T65-E transaxles will come equipped with a newly designed Input and Third "Pawl" Clutch Assembly instead of the previous design Input and Third Sprag Clutch, as shown in Figures 1 and 2. This was implemented at start of production for the 2003 model year.

REASON: Ease of assembly and cost savings.

PARTS AFFECTED:

- (1) INPUT "PAWL" CLUTCH - The new design outer race has 30 splines instead of the previous 32 on the Input Sprag and cannot be disassembled like the previous design Sprag Clutch, which obviously makes the assembly process easier. Refer to Figures 1 and 2 for illustrations of both designs.
- (2) INPUT CLUTCH FIBER PLATE - The new design fiber plate has 30 teeth instead of the previous design 32 teeth, to accommodate the new design "Pawl" Clutch Assembly. Refer to Figure 3 for illustrations of both designs.
- (3) THIRD "PAWL" CLUTCH - The new design cannot be disassembled, like the previous design Sprag Clutch, which obviously makes the assembly process easier. Refer to Figures 1 and 2 for illustrations of both designs. The third clutch fiber plates remain the same as previous models.

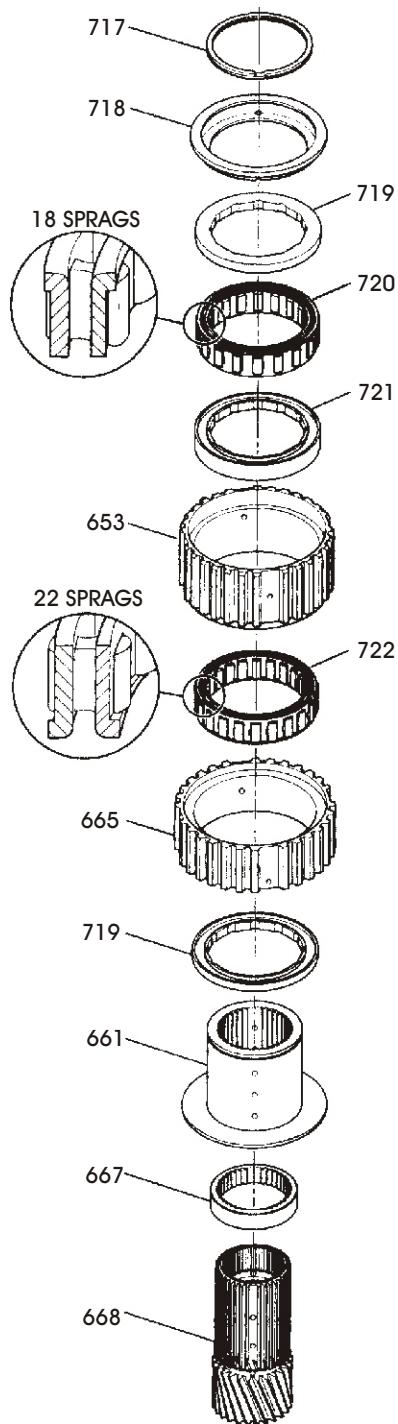
INTERCHANGEABILITY:

The above listed parts will back service any model 4T65-E transaxle equipped with the previous "Dual Sprag" design, *when all parts are used as a service package*.

Note: To maintain proper operating clearances within the transaxle, these parts must be used as a set. Do not mix these parts with any previous design assemblies.

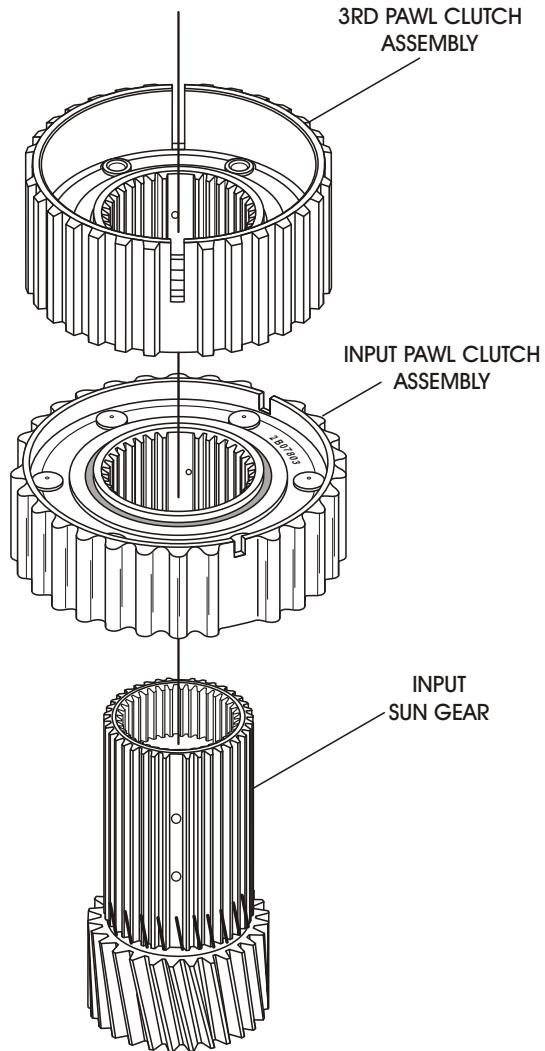
SERVICE INFORMATION:

	<i>Borg Warner</i>	<i>OEM</i>
Input Pawl Clutch Assembly	13013BW	24216816
Input Clutch Friction (Mates with Pawl Clutch)	29194AM	24216502
Third Pawl Clutch Assembly	13000BW	24216817



653 3RD CLUTCH SPRAG OUTER RACE
 661 INPUT/3RD CLUTCH SPRAG INNER RACE
 665 INPUT CLUTCH SPRAG OUTER RACE
 667 INPUT SUN GEAR SPACER
 668 INPUT SUN GEAR
 717 SPIRAL LOCKING RING
 718 3RD CLUTCH SPRAG RETAINER
 719 SPRAG END BEARINGS (2)
 720 3RD SPRAG ASSEMBLY
 721 SPRAG CENTER BEARING
 722 INPUT SPRAG ASSEMBLY

Figure 1

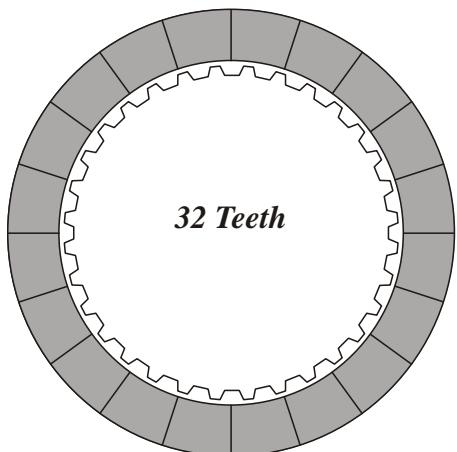


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Figure 2

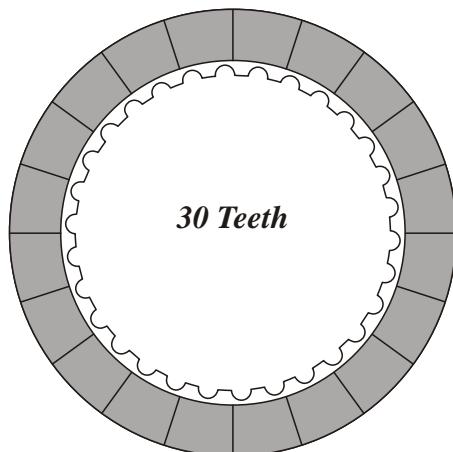


**"1ST DESIGN" 4T65-E
INPUT CLUTCH FIBER PLATE**



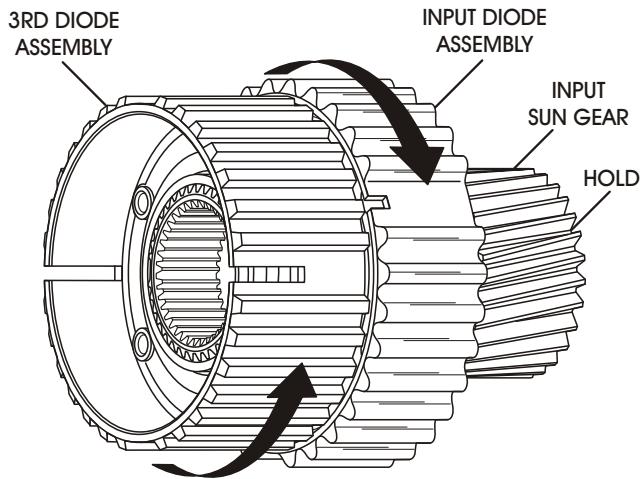
SPRAG TYPE FIBER PLATE

**"2ND DESIGN" 4T65-E
INPUT CLUTCH FIBER PLATE**

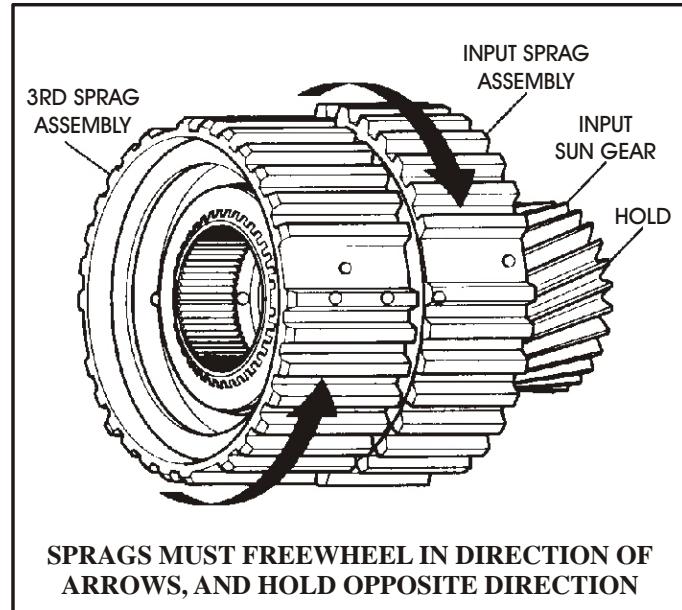


PAWL TYPE FIBER PLATE

Figure 3



PAWLS MUST FREEWHEEL IN DIRECTION OF ARROWS, AND HOLD OPPOSITE DIRECTION



SPRAGS MUST FREEWHEEL IN DIRECTION OF ARROWS, AND HOLD OPPOSITE DIRECTION

Figure 4

Alto

S P X



THM 4T65-E 2002-2003 OIL PUMP CHANGES

CHANGE: Beginning in June of 2002 Hydra-matic changed the design of the Oil Pump Assembly on 2002 and 2003 models of the 4T65-E transaxles. The "2 Piece" design level pump has been changed to a "3 Piece" design and has affected many of the related parts. The "2 Piece" design level pump is illustrated in Figure 2 and the "3 Piece" design level is illustrated in Figure 3.

A physical inspection of the I.D. Tag will be **mandatory**, to obtain the update level, before ordering components for these transaxles. Refer to Figure 1 for the location of the update level on the I.D. Tag and a usage chart for design level of pump assembly.

REASON: Ease of assembly and cost savings.

PARTS AFFECTED:

- (1) OIL PUMP ASSEMBLY - Changed to a "3 Piece" design, as shown in Figure 3. The "3 Piece" design now incorporates the rotor support sleeve in the pump instead of the valve body. The previous design "2 Piece" design level pump is illustrated in Figure 2.
- (2) OIL PUMP ASSEMBLY RETAINING BOLTS - Are a different length than the previous design level oil pump bolts.
- (3) VALVE BODY ASSEMBLY - The pump rotor support sleeve has been removed from the valve body to accommodate the "3 Piece" design level pump assembly, as shown in Figure 1.
- (4) PRESSURE SWITCH ASSEMBLY - Changed to a much smaller Pressure Switch Assembly with the elimination of all switches except the TCC switch, as shown in Figure 4.
- (5) INTERNAL WIRE HARNESS ASSEMBLY - Changed to accommodate the 2nd design (Smaller) Pressure Switch Assembly
- (6) PRESSURE CONTROL SOLENOID - Solenoid that is much smaller than the previous design, as shown in Figure 4, for improved line pressure control.

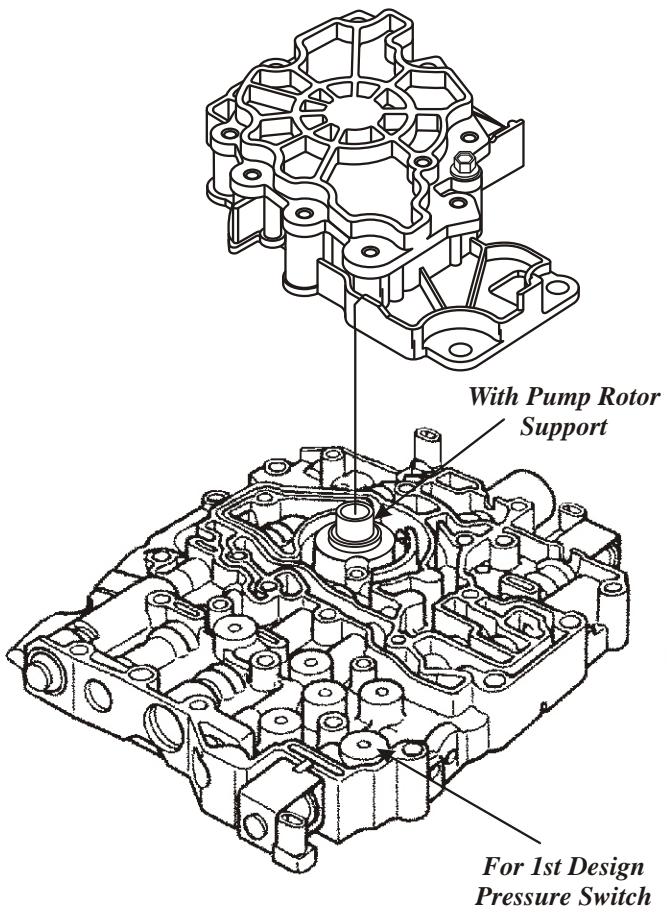
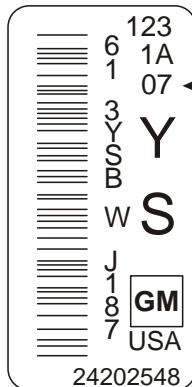
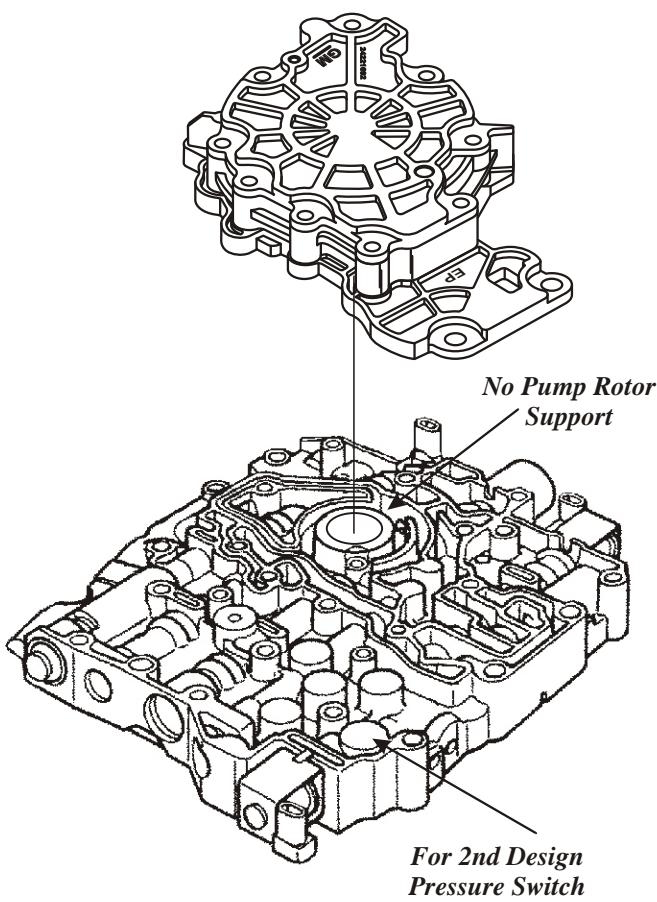
SPECIAL INFORMATION: *Following are the possible combinations that you may encounter.*

1. "2 Piece" Oil Pump and Valve Body Assembly with large 1st design Pressure Switch.
2. "3 Piece" Oil Pump and Valve Body Assembly with large 1st design Pressure Switch.
3. "2 Piece" Oil Pump and Valve Body Assembly with small 2nd design Pressure Switch.
4. "3 Piece" Oil Pump and Valve Body Assembly with small 2nd design Pressure Switch.

INTERCHANGEABILITY:

None of the parts listed above will interchange with one another. 1st design parts "**must**" be used together and 2nd design level parts "**must**" be used together.

Special Note: The physical dimensions will allow the new Pressure Control Solenoid to be installed in past models, or the previous Pressure Control Solenoid to be installed in 2003 models. *Interchanging the Pressure Control Solenoids will result in customer dissatisfaction and additional repairs.*

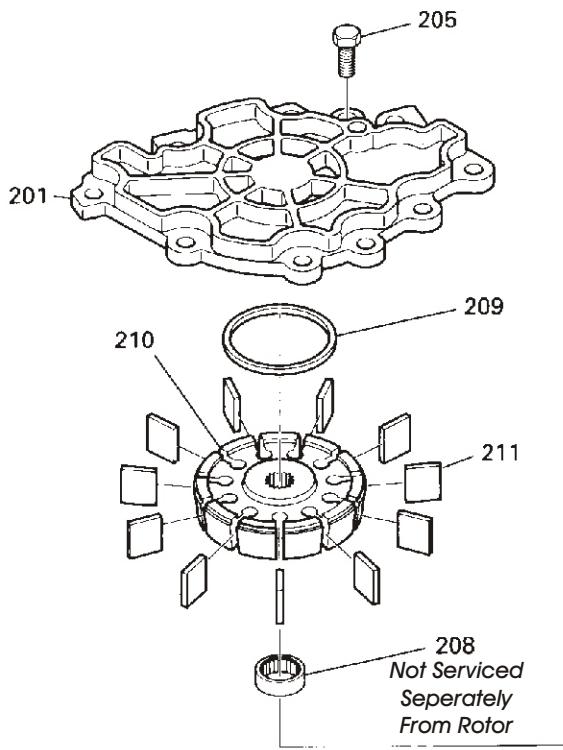
**1ST DESIGN "2 PIECE"
PUMP AND VALVE BODY****2ND DESIGN "3 PIECE"
PUMP AND VALVE BODY**

PUMP AND VALVE BODY USAGE CHART		
Broadcast Code	Update Level	Pump Style
All 2002 Models except 2BCB, 2RNB	Less Than 7	"2 Piece"
2002 Model, 2BCB	Less Than 4	"2 Piece"
2002 Model, 2RNB	Less Than 4	"2 Piece"
All 2002 Models except 2BCB, 2RNB	7	"3 Piece"
2002 Model, 2BCB	4	"3 Piece"
2002 Model, 2RNB	4	"3 Piece"
All 2003 Models except 3BCB,	Less Than 3	"2 Piece"
2003 Model, 3BCB	4	"2 Piece"
All 2003 Models except 3BCB,	3 And Greater	"3 Piece"
2003 Model, 3BCB	Greater Than 4	"3 Piece"

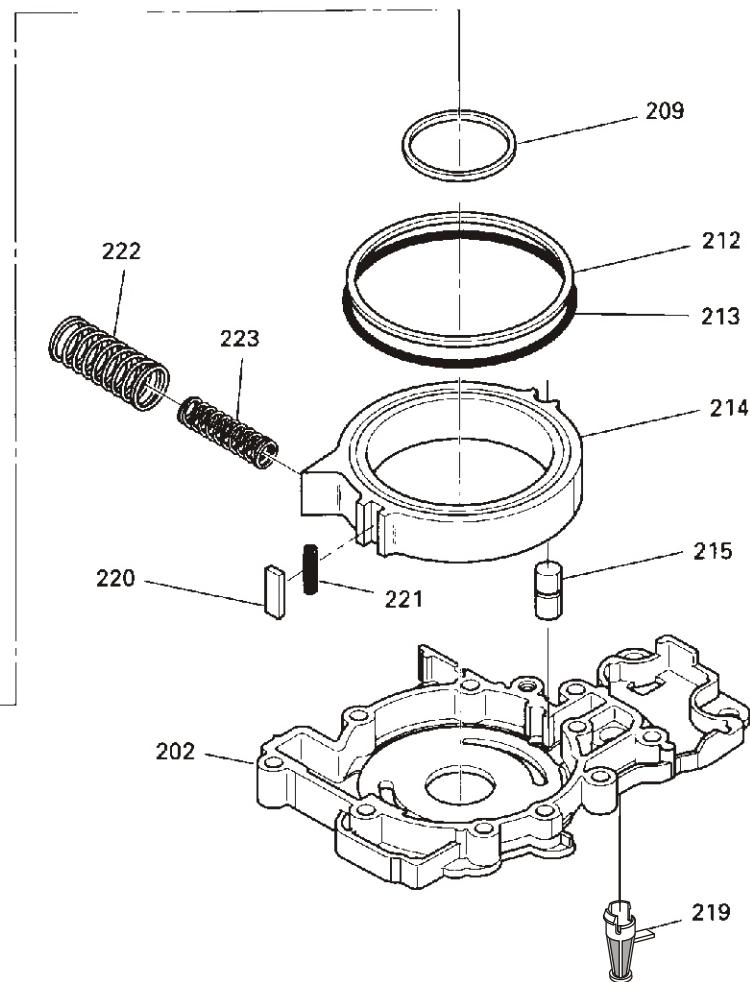
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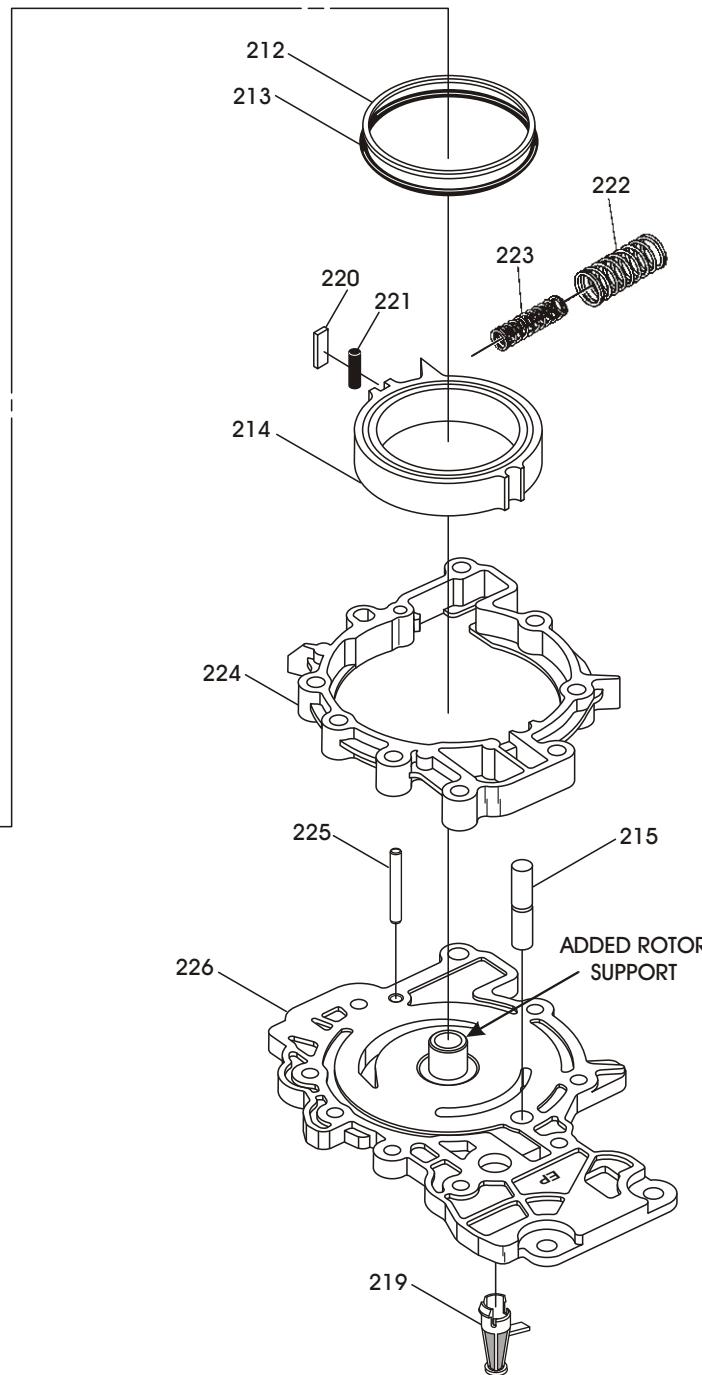
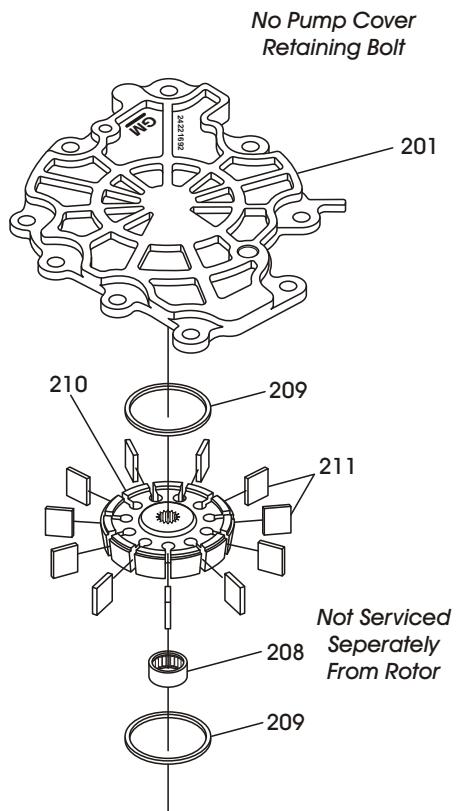
Figure 1

**1ST DESIGN "2 PIECE"
PUMP AND VALVE BODY**



- 201 OIL PUMP COVER
- 202 OIL PUMP BODY
- 205 OIL PUMP COVER BOLT
- 208 OIL PUMP DRIVE SHAFT BEARING ASSEMBLY
- 209 OIL PUMP VANE RINGS (2)
- 210 OIL PUMP SELECTIVE ROTOR
- 211 OIL PUMP SELECTIVE VANE (11)
- 212 OIL PUMP SLIDE SEAL RING
- 213 OIL PUMP SLIDE "O" RING SEAL
- 214 OIL PUMP SELECTIVE SLIDE
- 215 OIL PUMP SLIDE PIVOT PIN
- 219 OIL PUMP OUTLET SCREEN ASSEMBLY
- 220 OIL PUMP SLIDE SEAL
- 221 OIL PUMP SLIDE SEAL SUPPORT
- 222 OIL PUMP PRIME OUTER SPRING
- 223 OIL PUMP PRIME INNER SPRING



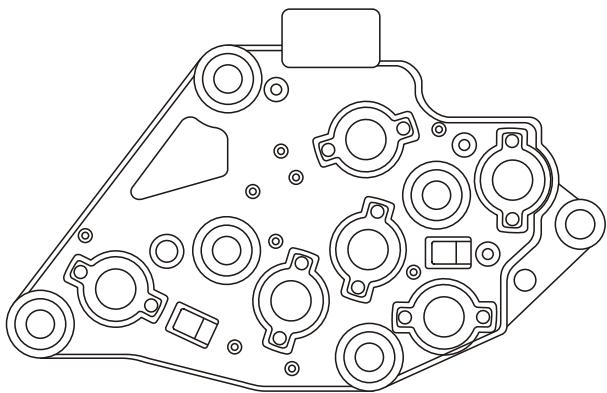
**2ND DESIGN "3 PIECE"
PUMP AND VALVE BODY**

- 201 OIL PUMP COVER
- 208 OIL PUMP DRIVE SHAFT BEARING ASSEMBLY
- 209 OIL PUMP VANE RINGS (2)
- 210 OIL PUMP SELECTIVE ROTOR
- 211 OIL PUMP SELECTIVE VANE (11)
- 212 OIL PUMP SLIDE SEAL RING
- 213 OIL PUMP SLIDE "O" RING SEAL
- 214 OIL PUMP SELECTIVE SLIDE
- 215 OIL PUMP SLIDE PIVOT PIN
- 219 OIL PUMP OUTLET SCREEN ASSEMBLY
- 220 OIL PUMP SLIDE SEAL
- 221 OIL PUMP SLIDE SEAL SUPPORT
- 222 OIL PUMP PRIME OUTER SPRING
- 223 OIL PUMP PRIME INNER SPRING
- 224 OIL PUMP SPACER/BODY
- 225 OIL PUMP DOWEL PIN
- 226 OIL PUMP PLATE/ROTOR SUPPORT ASSEMBLY

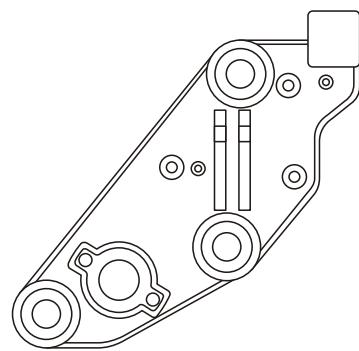
Note: The Oil Pump Retaining Bolts For This Pump Are Different Length Than For The "2 Piece" Pump.



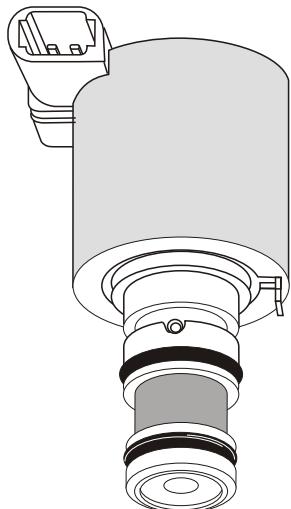
"1ST DESIGN"
PRESSURE SWITCH ASSEMBLY



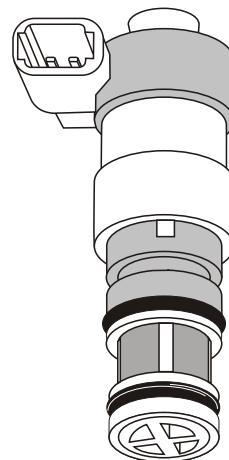
"2ND DESIGN"
PRESSURE SWITCH ASSEMBLY



"1ST DESIGN"
PRESSURE CONTROL SOLENOID



"2ND DESIGN"
PRESSURE CONTROL SOLENOID





4T40E/4T45E HARSH ENGAGEMENTS AND UPSHIFTS

COMPLAINT: Some 1997-2002 vehicles equipped with the 4T40E or 4T45E transaxle may exhibit harsh engagements and /or harsh upshifts, and may have trouble codes PO112,PO113,P1111 or P1112.

CAUSE: One cause may be, a broken ground wire at the Intake Air Temperature Sensor (IAT) connector. The reason for the hard shifts is that Computer strategy monitors the Intake Air Temperature Sensor for Pressure control. When the ground wire, to the IAT, is open, the Powertrain Control Module receives information from the IAT that the temperature is below -40°, which causes the PCM to command Maximum Line Pressure.

CORRECTION: The (IAT) sensor is located in the air duct between the Mass Air Flow Sensor and the Air cleaner as shown in Figure 1. The (IAT) sensor can be checked using the chart as shown in Figure 2. Factory Technical Service Bulletin #02-06-03-005

SERVICE INFORMATION:

INTAKE AIR TEMPERATURE SENSOR CONNECTOR REPAIR END.....	12162199
INTAKE AIR TEMPERATURE SENSOR.....	12160244

4T40E/4T45E HARSH ENGAGEMENTS AND UPSHIFTS

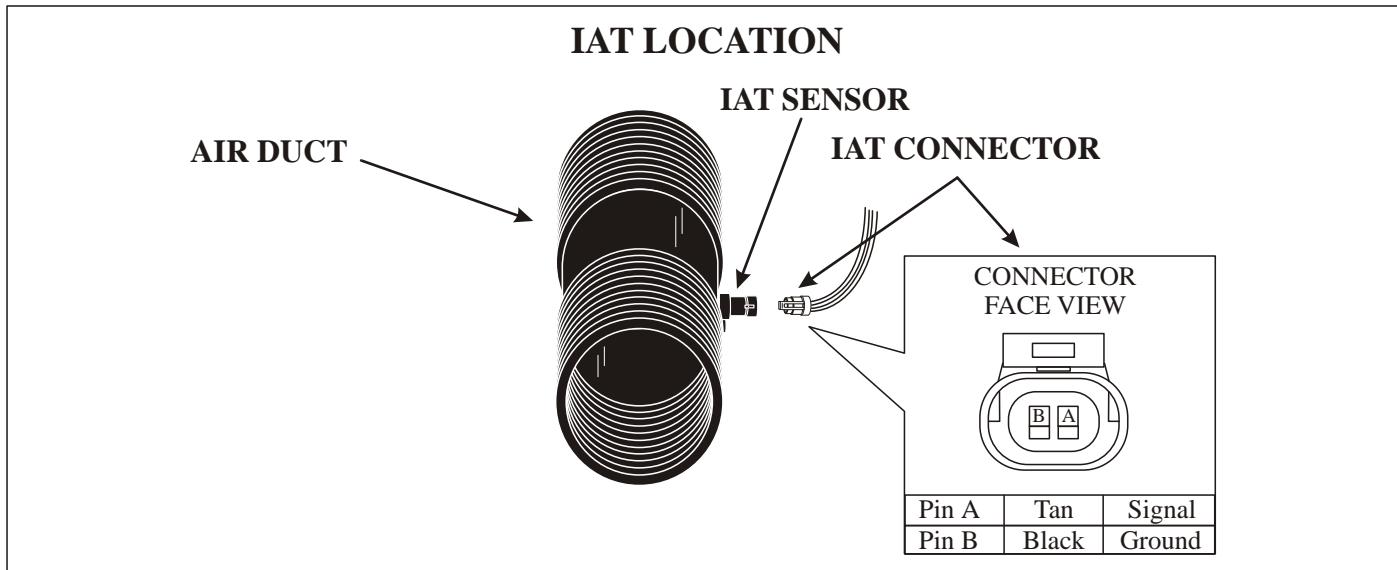
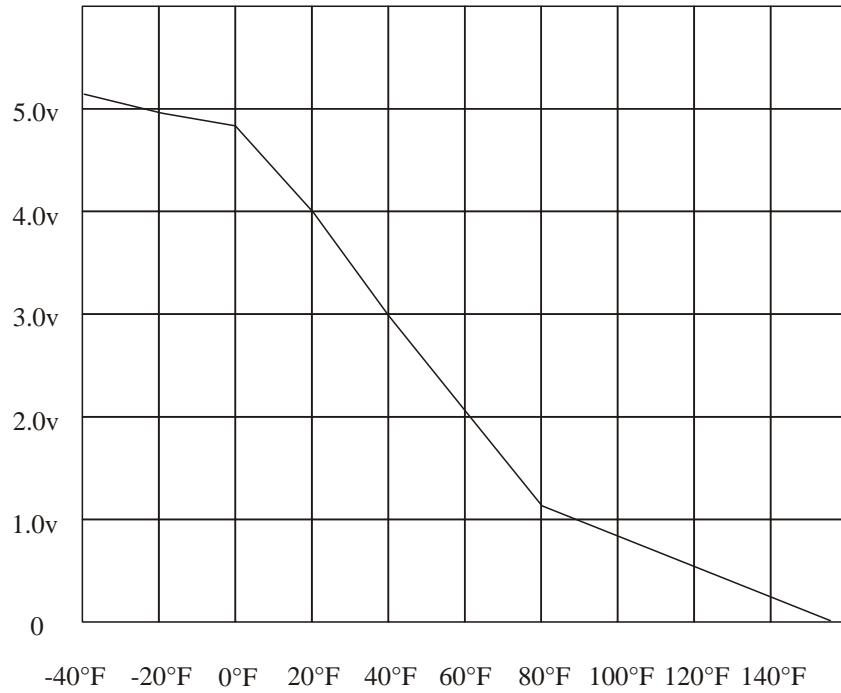


Figure 1

TEMPERATURE DEGREES IN FAHRENHEIT TO VOLTAGE CONVERSION CHART



Connect Voltmeter across terminals A and B to measure voltage at the IAT

Figure 2
Automatic Transmission Service Group



THM 4T40-E 1-2 ,2-3, AND 3-4 ACCUMULATOR SPRING DIMENSIONS AND PROPER ASSEMBLY PROCEDURE

Since the introduction of the THM 4T40-E transaxle in 1995, there have been three different design levels of the accumulator springs and their locations.

Refer to Figure 1 for 1995 models.

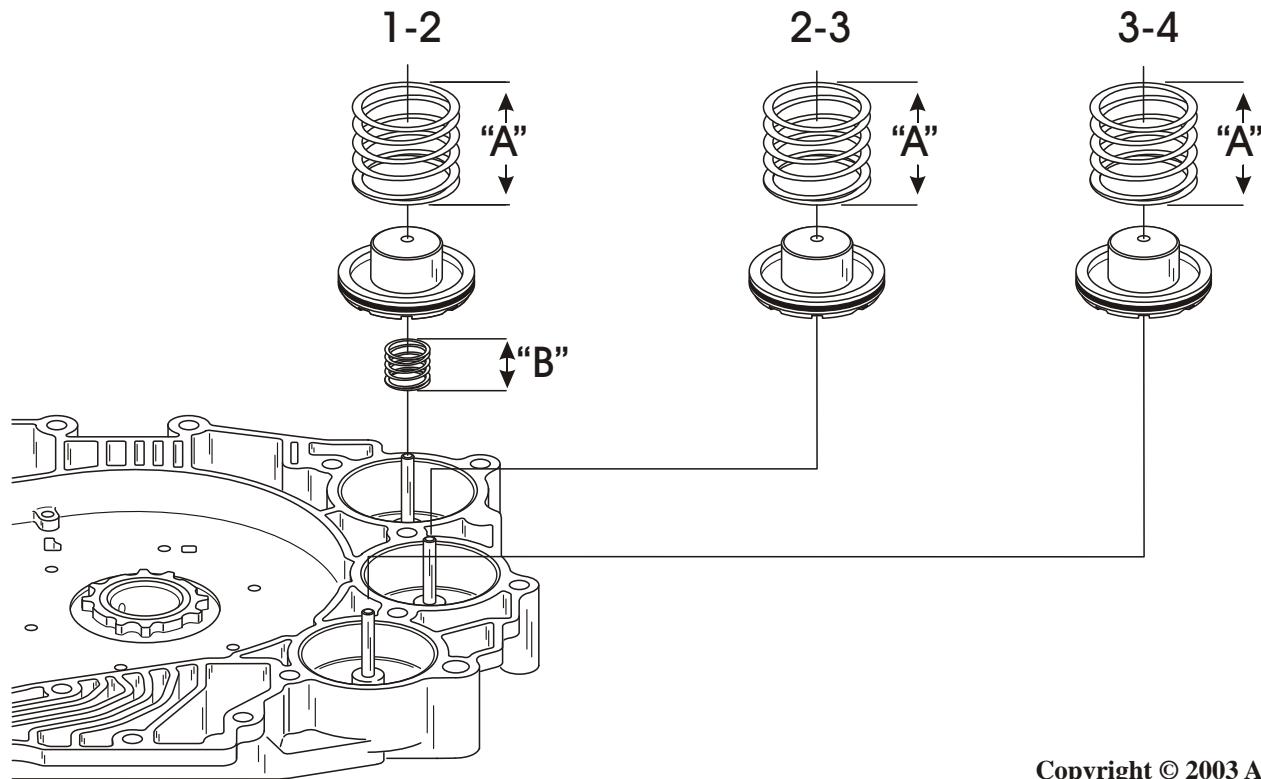
Refer to Figure 2 for 1996 models.

Refer to Figure 3 for 1997-2004 models.

1995 MODELS "ONLY"

<i>"1st Design" Accumulator Spring Dimensions</i>			
	1-2	2-3	3-4
<i>Dimension "A"</i>	1.815"	1.655"	1.655"
<i>OEM Part Number</i>	8685241	8685240	8685240

<i>"1st Design" Accumulator Assist Spring Dimensions</i>			
	1-2	2-3	3-4
<i>Dimension "B"</i>	.950"	NA	NA
<i>OEM Part Number</i>	24203557	NA	NA



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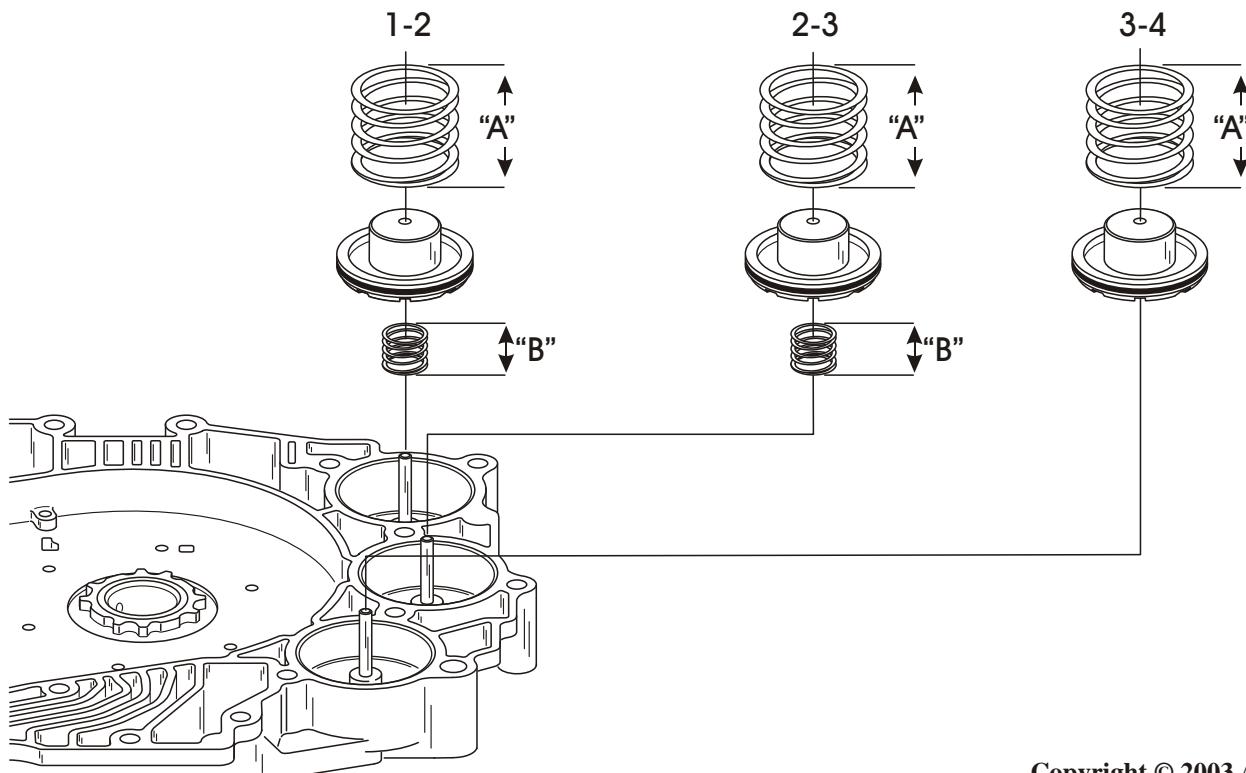
Figure 1

THM 4T40-E 1-2 ,2-3, AND 3-4 ACCUMULATOR SPRING DIMENSIONS AND PROPER ASSEMBLY PROCEDURE

1996 MODELS "ONLY"

<i>"2nd Design" Accumulator Spring Dimensions</i>			
	1-2	2-3	3-4
<i>Dimension "A"</i>	1.815"	1.655"	1.655"
<i>OEM Part Number</i>	8685241	8685240	8685240

<i>"2nd Design" Accumulator Assist Spring Dimensions</i>			
	1-2	2-3	3-4
<i>Dimension "B"</i>	.950"	.950"	NA
<i>OEM Part Number</i>	24203557	24203557	NA



Copyright © 2003 ATSG

Figure 2

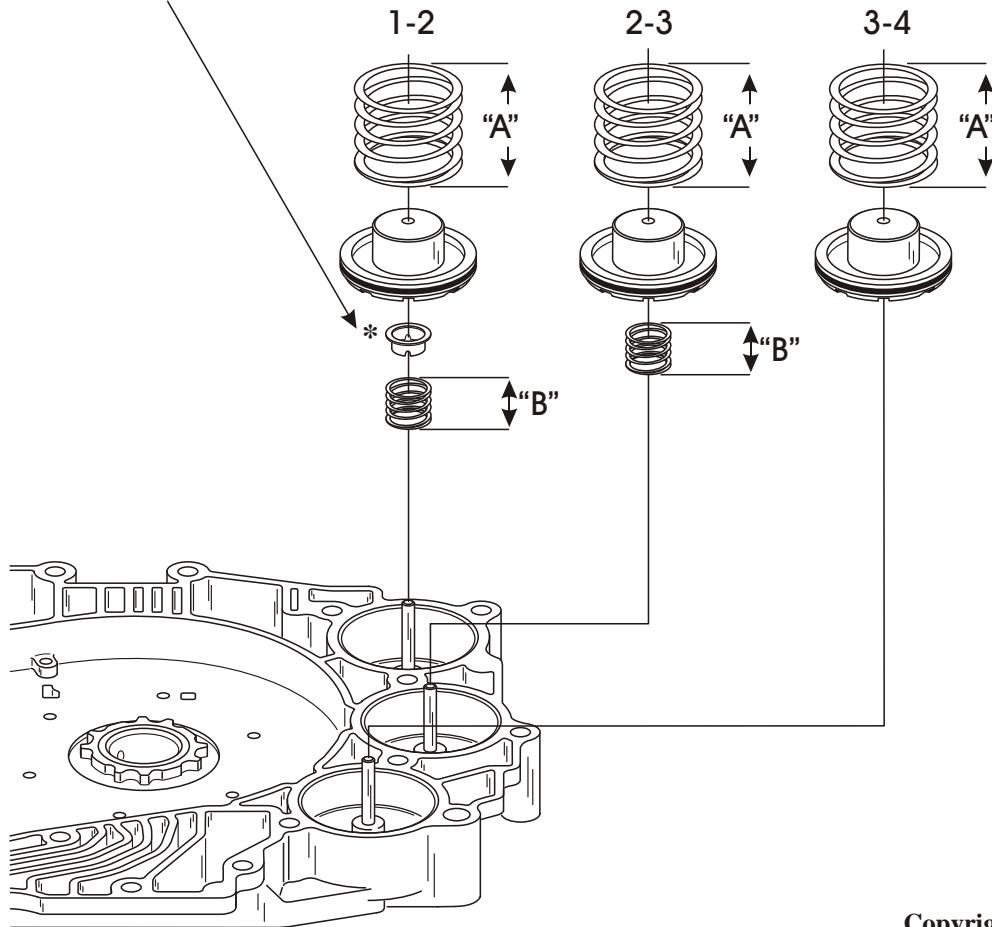
THM 4T40-E 1-2 ,2-3, AND 3-4 ACCUMULATOR SPRING DIMENSIONS AND PROPER ASSEMBLY PROCEDURE

1997-2004 MODELS "ONLY"

<i>"3rd Design" Accumulator Spring Dimensions</i>			
	1-2	2-3	3-4
<i>Dimension "A"</i>	1.815"	1.655"	1.655"
<i>OEM Part Number</i>	8685241	8685240	8685240

<i>"3rd Design" Accumulator Assist Spring Dimensions</i>			
	1-2	2-3	3-4
<i>Dimension "B"</i>	* .830"	.950"	NA
<i>OEM Part Number</i>	24207237	24203557	NA

* = Must have retainer.



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Figure 3

Superior

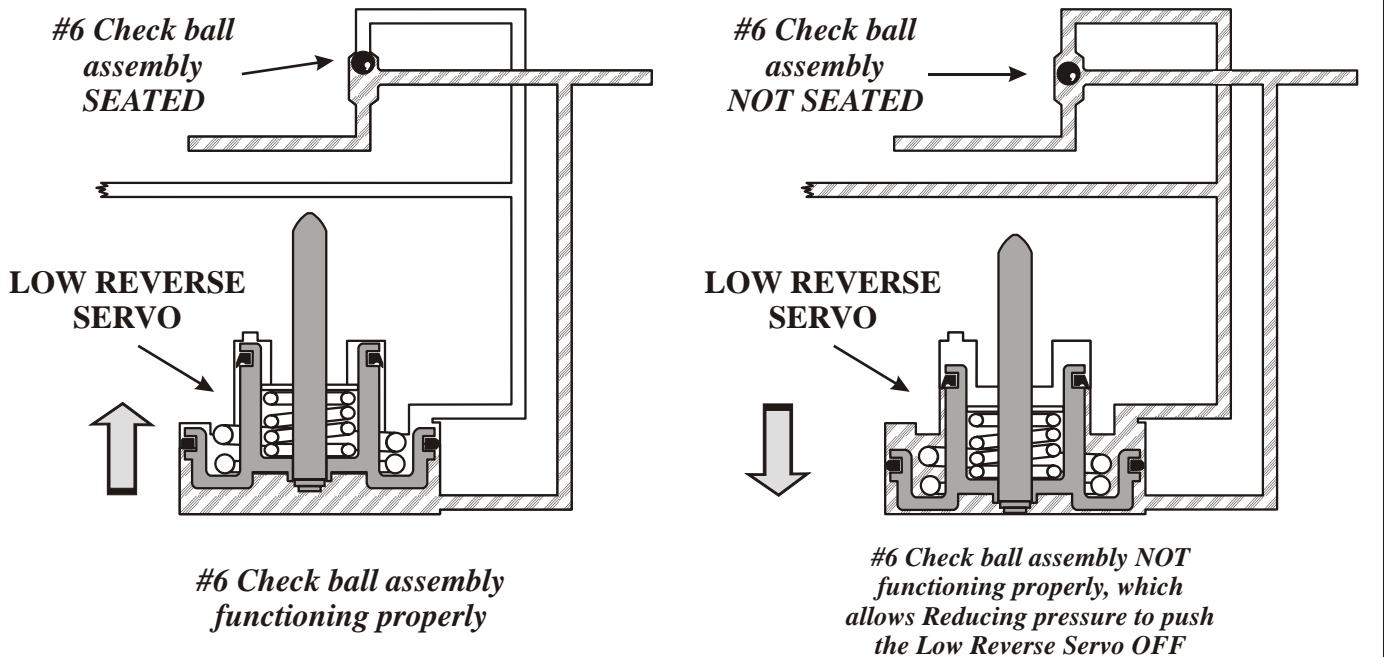
HELC

**4T80-E
SLIPPING OR NO REVERSE**

COMPLAINT: Before or after overhaul a vehicle equipped with the 4T80E automatic transaxle exhibits a complaint of Slipping or No reverse.

CAUSE: One cause may be the number six check ball in the lower valve body not seating in the valve body. There have been occasions where material would get in between the checkball and the valve body casting, keeping the ball from seating. If the number six check ball does not seal, oil pressure passes by the ball into the low/reverse band reducing chamber, this oil pressure will assist spring tension to keep the low/reverse servo from fully applying. See Figure 1 below for a brief circuit description.

CORRECTION: Remove the lower valve body and inspect the capsule for material, then repair or replace as necessary. Refer to Figure 2 for location of number six check ball capsule in the lower valve body.

PARTIAL SCHEMATIC OF THE #6 CHECKBALL FUNCTION IN REVERSE


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Figure 1

Automatic Transmission Service Group

SEATAC

4T80-E
SLIPPING OR NO REVERSE

#6 CHECKBALL LOCATION

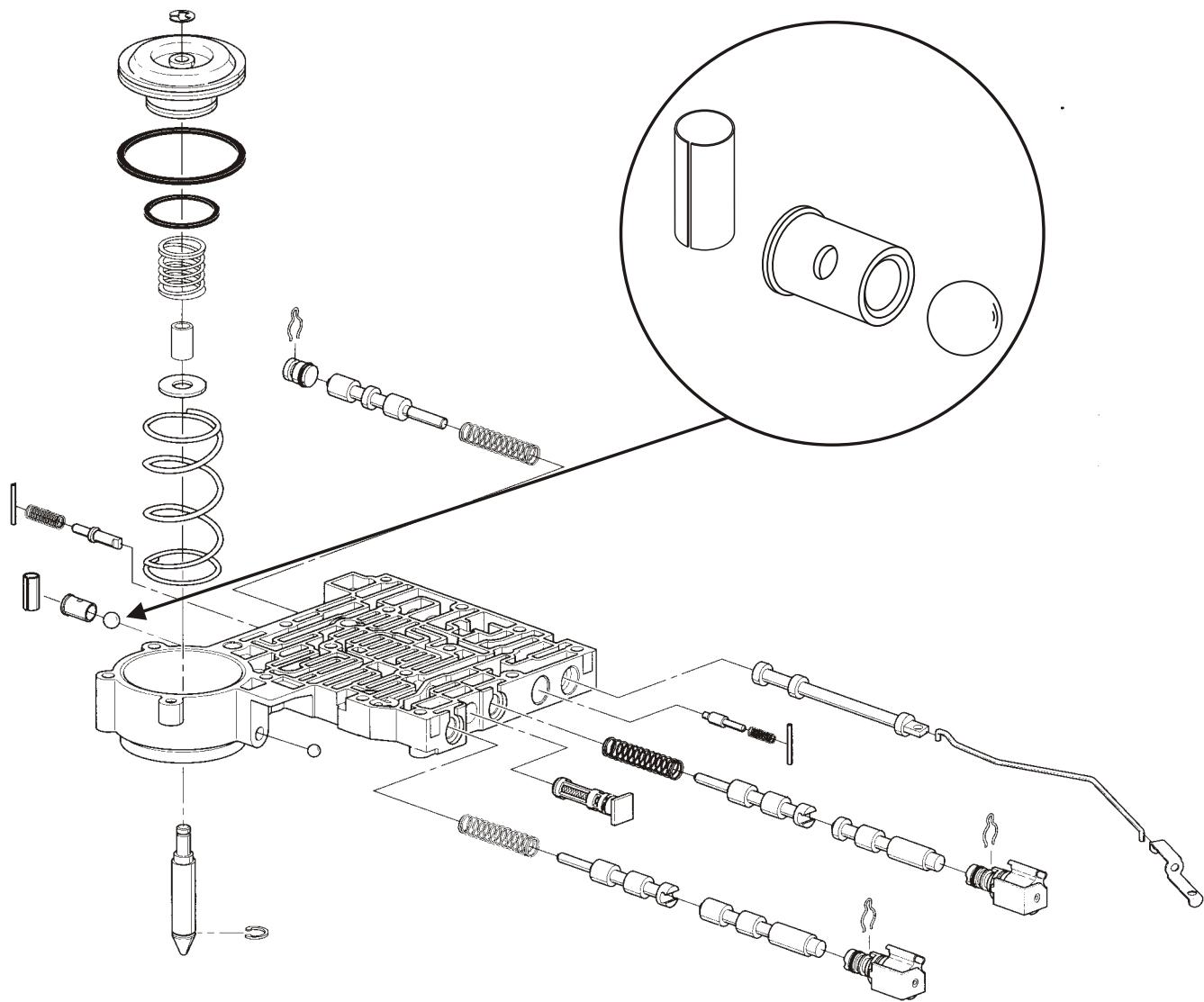


Figure 2



4T80E

SLIPS IN FOURTH OR NO FOURTH

COMPLAINT: The transmission may slip in fourth gear or have no fourth gear. The "Service Engine Soon" lamp may illuminate with DTC P0734, gear ratio error in fourth, stored. The affected vehicles are the 2000 Cadillac DeVille, Eldorado and Seville as well as the 2001 Oldsmobile Aurora.

CAUSE: This complaint may be caused by a warped lower control valve body channel plate, shown in Figure 1. The warped channel plate causes a loss of fourth band apply pressure resulting in damage to the fourth band and the reverse clutch housing.

CORRECTION: Inspect the fourth band and the reverse clutch housing and replace them if necessary. Replace the lower control valve body channel plate, spacer plate and gasket.

SERVICE INFORMATION:

<i>Lower Control Valve Body Channel Plate</i>	24200434
<i>Spacer Plate And Gasket</i>	24213957
<i>Fourth Band</i>	8684246
<i>Reverse Clutch Housing</i>	24212654
<i>Factory TSB</i>	01-07-30-005A

Special thank you to Stuart Nethery at Richmond Hill Transmission in Richmond Hill, Ga. for sharing his experiences with us.

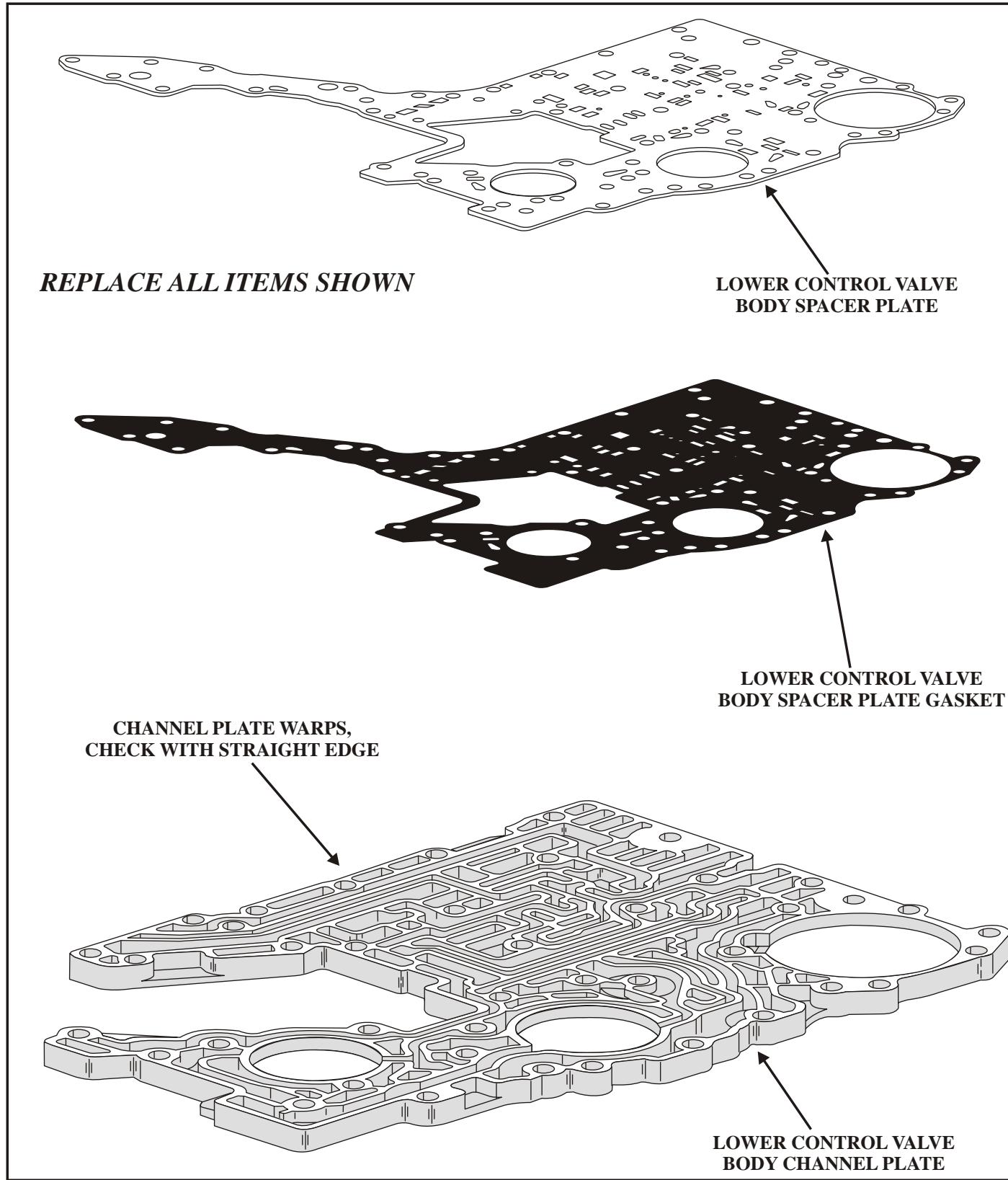
4T80E**SLIPS IN FOURTH OR NO FOURTH**

Figure 1

CADILLAC & AURORA 4T80-E 2ND GEAR STARTS

COMPLAINT: We have had accounts of 1995 Cadillac DeVilles and 1996 Olds Auroras with traction control having second gear starts. The scanner indicates that first gear is being commanded yet a signal monitor confirms that a second gear command is being made.

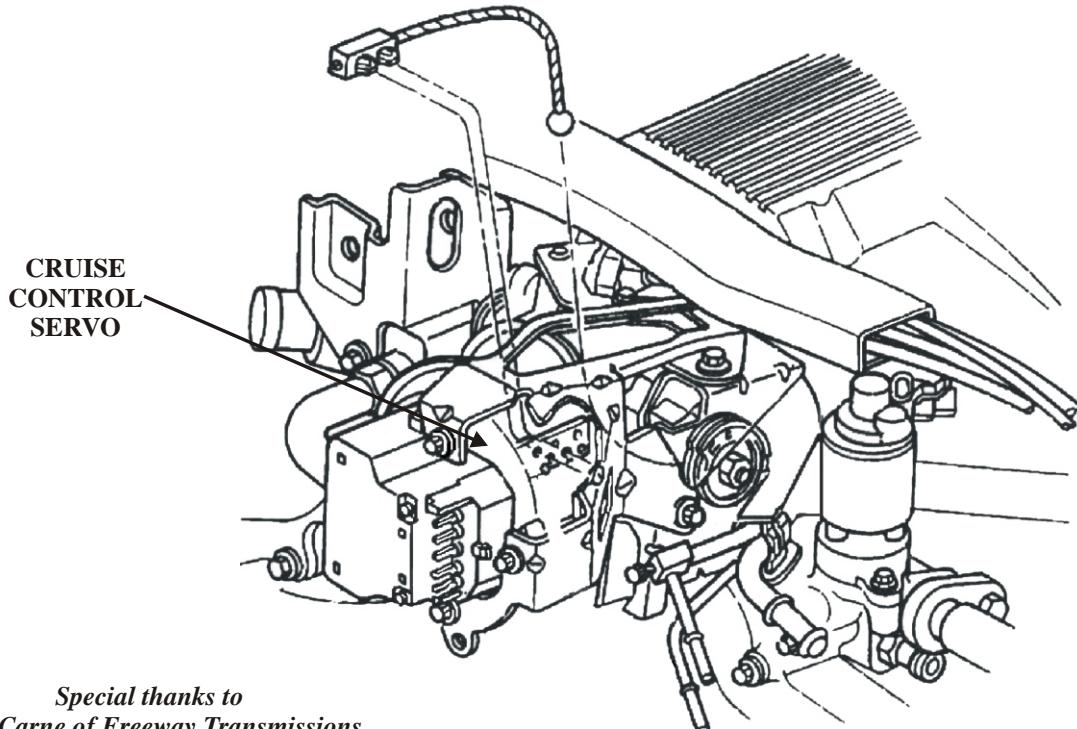
- CAUSE:**
1. A malfunctioning Cruise Control Servo which influences the PCM to command the second gear start condition. In all cases experienced to date, it has been observed that "Cruise Control Request" was denied (See Figure 1).
 2. Second Gear Start complaints have also been known to occur as the result of circuit malfunctions in the traction control system. 1991 to 1995 Cadillacs have the Traction Control Button located in the center console. When cup holders from the center arm rest are used, occasionally sodas or sweetened coffee spills onto the switch and in time erodes the electrical integrity of the switch. 1996 this switch was moved into the glove box. There have been reports where this box becomes overstuffed tearing the cardboard compromising the switches electrical integrity and producing the similar second gear start complaint. Circuit 1571 shown in the wiring diagram shown in Figure 2 is the signal from the TCS Disable switch. Codes are found in Engine and Transmission Data prior to 1997. 1997 and later codes are stored in the ABS module not in the Engine or Transmission data.

Special Note: We have also encountered engine power loss and shift business when one or more wheel speed sensor readings are not correct. The "Electronic Brake And Traction Control Module" (EBTCM) interprets an off reading sensor signal as a slip or wheel break-a-way. Factory repair manuals explain that when "Traction Control" is initiated, a torque reduction of the engine takes place. With Auroras, adjustment of the spark firing and engine fueling occurs while Cadillacs selectively cut fuel up to as many as 5 cylinders depending on the level of torque management required. These **generally described strategies** are what occurs when the system is operating correctly. However, as stated earlier, when a wheel sensor reading becomes unusual, power loss and shift business have been known to occur. The Traction light will remain illuminated.

Causes of bad speed sensor signals to watch for:

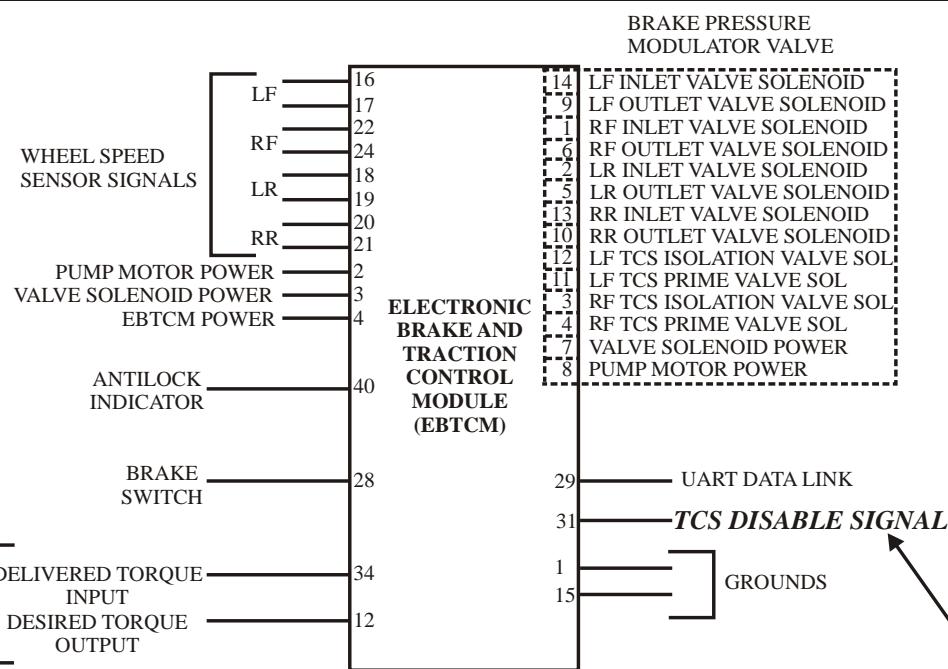
1. Malfunctioning speed sensors
2. Eroded wheel sensor exciter ring windows
3. Axle replacement causing damage to the exciter ring windows, bent axles, etc..
4. Road debris slung into and trapped in the exciter ring windows.

- CORRECTION:**
1. Replace the Cruise Control Servo.
 2. Repair or replace the TCS Request Button
 3. Replace the malfunctioning wheel sensor.
 4. Inspect, repair or replace the damaged, eroded or dirty wheel sensor exciter ring.
 5. Clear all codes. On later models (1997 and newer) check the Body Control Module for duplicate codes to be erased after repairs. Otherwise erratic malfunctions will continue to occur.

**CADILLAC & AURORA 4T80-E
2ND GEAR STARTS**


*Special thanks to
Gary Carne of Freeway Transmissions*

Figure 1



1991 TO 1995 THE DISABLE BUTTON
IS IN THE CENTER CONSOLE.
1996 AND LATER IT IS IN THE GLOVE BOX

*Special thanks to John Parmenter,
a technical consultant for Precision International*

Figure 2

SATURN**INCORRECT ECT/IAT CODE ASSIGNMENT**

COMPLAINT: When attempting to diagnose a TCC application problem on a 1998 Saturn, and a temperature related problem is suspected to be the reason for no TCC apply, a code P0112 or P0113 for the Intake Air Temperature (IAT) Sensor may be stored.

CAUSE: An error was committed for the Engine Coolant Temperature (ECT) Sensor and the Intake Air Temperature (IAT) Sensor, (shown in figure 1), diagnostic trouble code logic (sensor high, sensor low), for the 1998 model year.

THEY WERE REVERSED!

CORRECTION: When diagnosing a 1998 Saturn for codes P0112, P0113, P0117 or P0118, refer to the chart in figure 2 for the correct code assignment for these sensors for the 1998 model year. The chart also cross references the **CORRECT** 1998 code assignments with the 1996-97 code assignments for these two sensors.

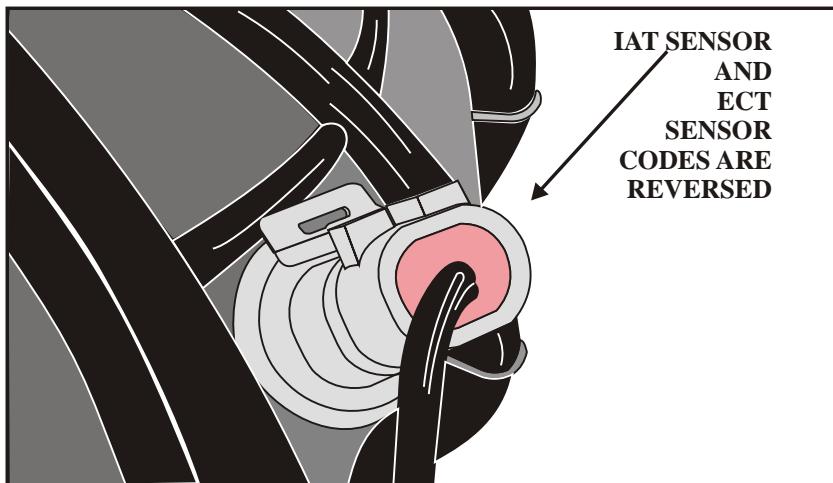


Figure 1

SATURN ECT & IAT DIAGNOSTIC TROUBLE CODE CHART		
DTC DESCRIPTION	1996-97	1998
IAT - TEMPERATURE OUT OF RANGE - HIGH	P0112	P0113
IAT - TEMPERATURE OUT OF RANGE - LOW	P0113	P0112
ECT - TEMPERATURE OUT OF RANGE - HIGH	P0117	P0118
ECT - TEMPERATURE OUT OF RANGE - LOW	P0118	P0117

Figure 2

GM CARS WITH 4L60E FAIL-SAFE WITH DTC 84

COMPLAINT: 1994-1995 General Motors B,D,F and Y body cars come to the shop with the transmission stuck in a limp or fail-safe mode and a hard fault code 84 (3-2 control solenoid) is stored that can not be cleared. Only 3rd gear is available with the shifter in the OD or D positions and 2nd gear in the 2 or 1 positions. No automatic up or down shifting will occur.

CAUSE: The 3-2 control solenoid circuit has been traced and checked O.K. in it's entirety from the transmission to the PCM and the correct 3-2 solenoid is installed in the transmission. The Powertrain Control Module (PCM) may have an internally shorted circuit driver.

CORRECTION: Verify the 10th VIN digit is either an R or S regardless of body type. This is the model year code. Verify the 8th VIN digit is either a P or W for B body cars. The 8th VIN digit must only be a P for D,F and Y body vehicles. This is the engine code. Locate the PCM (See figures 1,2&3)and find the black connector B. All 4 PCM connectors have 32 terminal locations but only one connector is black. (Figure 4) Identify terminal 13 in the black connector. There will be a brown wire at this location in B and D body cars or a white wire for F and Y bodies. This is the 3-2 solenoid ground wire between the trans and the computer. Make sure that all circuits are complete. Nothing may be unplugged or disconnected. Set your multi-meter to Volts D/C and place the negative meter lead to a known good ground and leave it there. Back probe the wire at the B13 location with the positive meter lead. Turn the key on engine OFF. Battery voltage should be seen.

(Scenario 1)

If battery voltage is **NOT** present.

Turn the key off. Unplug the black connector from the PCM, then turn the key on engine OFF and recheck the wire while unplugged. If battery voltage is present now then the computer is the problem.

If there is still no battery voltage on the wire then the circuit is open or shorted to ground somewhere between the transmission and computer.

(Scenario 2)

If battery voltage **IS** present.

Have an assistant start the engine and while the brakes are applied place the shifter into the OD position. If battery voltage disappears when the engine is started or the shifter is placed into a drive position with 0 vehicle speed then the computer is the problem.

This solenoid does not get switched until an automatic up shift to 2nd gear has occurred.

Body designations:

*B = Caprice, Roadmaster. D=Fleetwood.
F = Camaro, Firebird. Y = Corvette.*

Special Note:

New replacement PCM's must be flashed according to the VIN or the engine will not run. Also, if a used PCM from a 1995 vehicle is installed into a 1994 vehicle then a code 83 will be set because earlier vehicles do not have the TCC/PWM solenoid.

GM CARS WITH 4L60E FAIL-SAFE WITH DTC 84

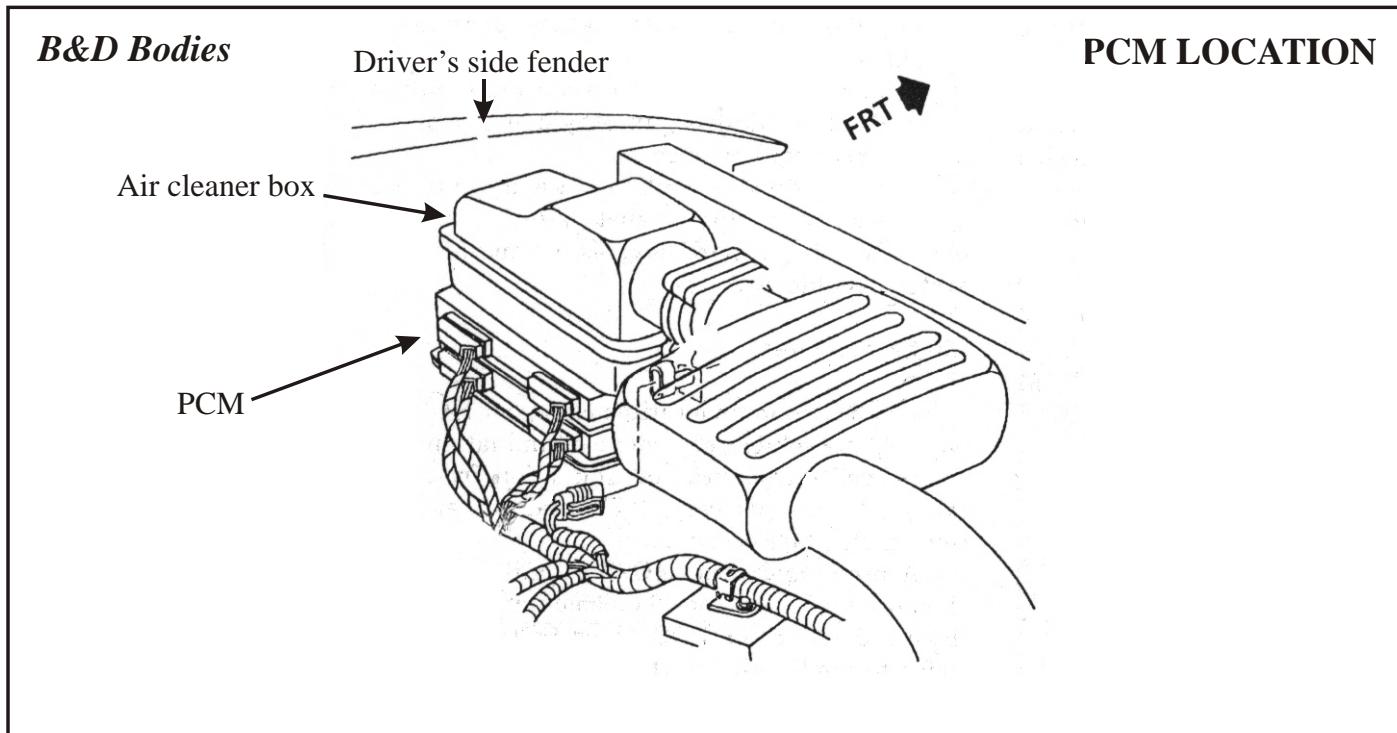


Figure 1

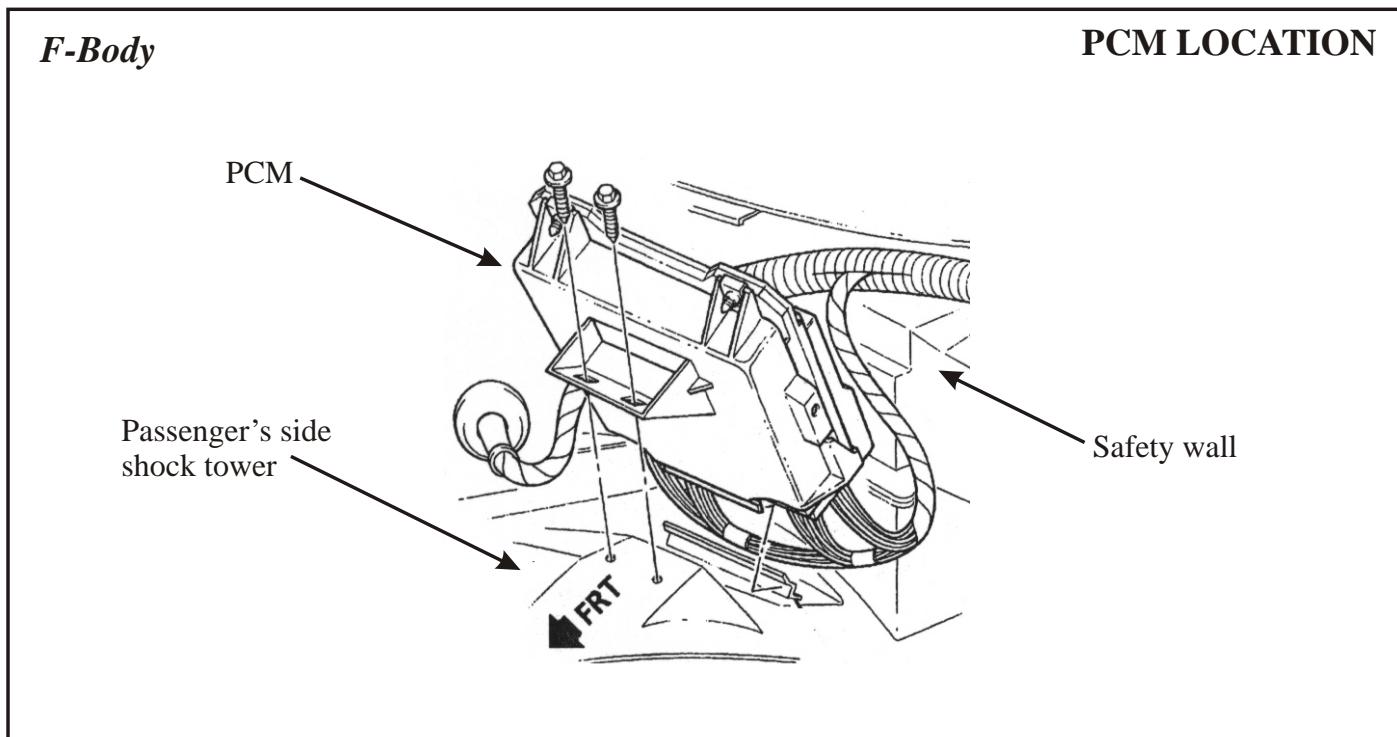


Figure 2

GM CARS WITH 4L60E FAIL-SAFE WITH DTC 84

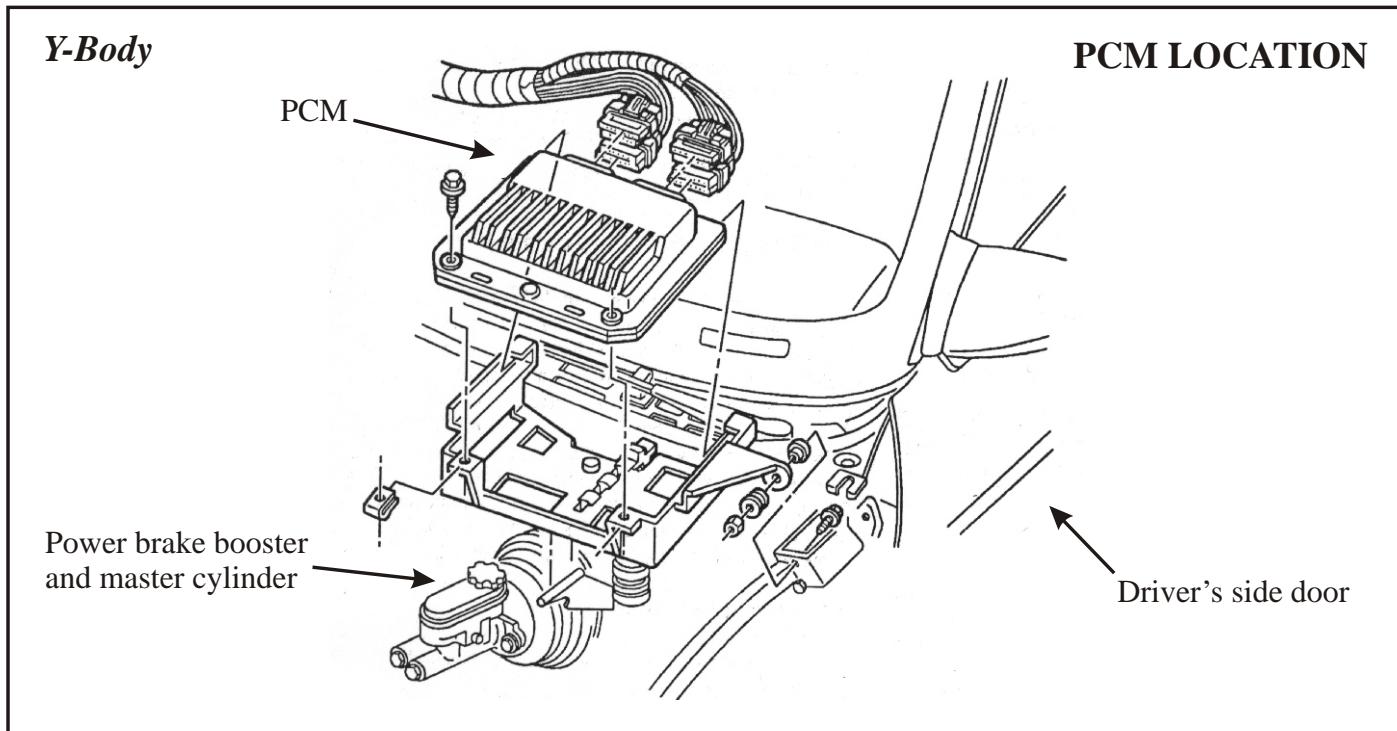


Figure 3

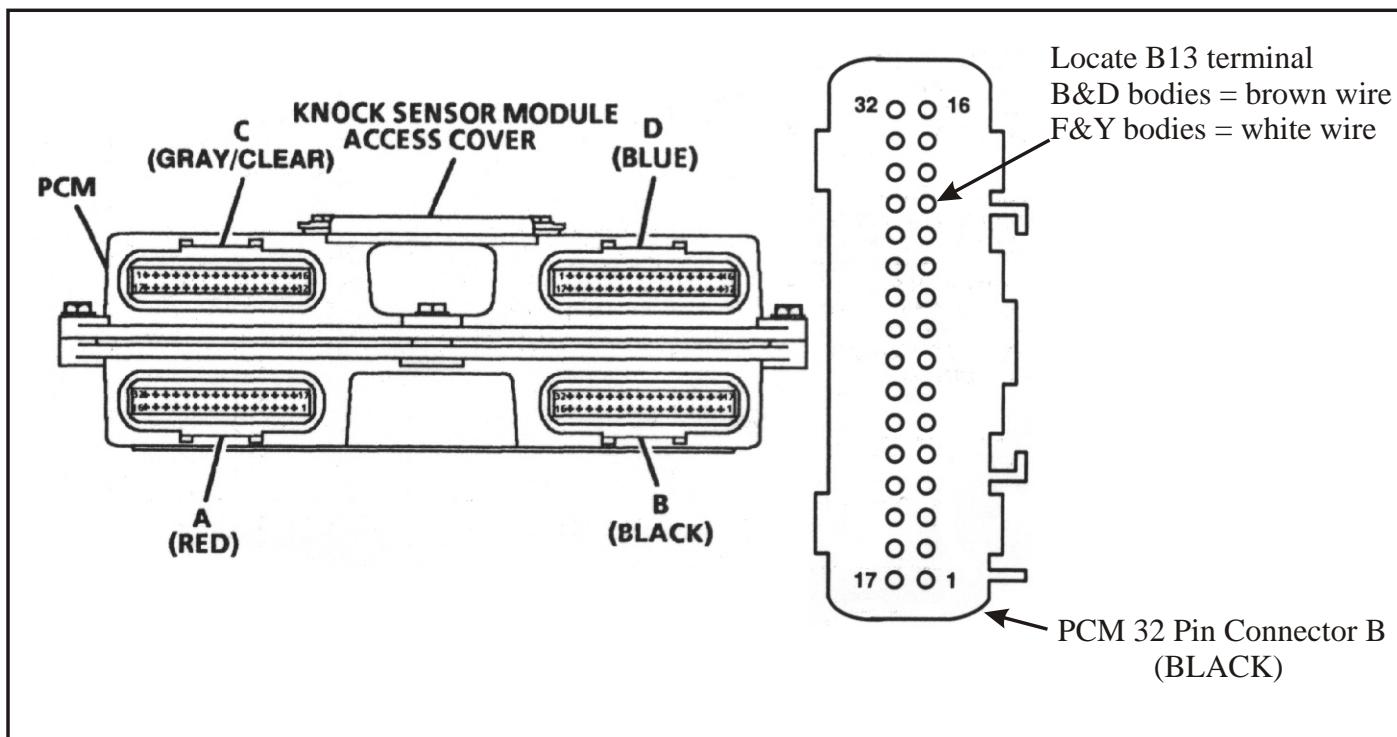


Figure 4

**4L60-E****ERRATIC SHIFTING AND NEUTRALIZING**

COMPLAINT: A 1998 Chevy Pickup with a 4L60-E came into the shop with complaints of, the vehicle during initial take off drove sluggishly and made a shift becoming a little stronger on the pull. Made another shift and began pull back and then went to neutral. When a scanner was attached, it could be observed that the solenoid command indicated that the computer was commanding the vehicle to start in 4th, go to 3rd, then to 2nd and then to 1st. Of course it would neutralize by the time first gear was commanded and failsafed to 3rd.

CAUSE: The tip was a code P0717 was stored in the computer which is "No Turbine Shaft Speed Sensor reading." A 4L60-E does not have a Turbine Shaft Speed Sensor. A 4L80-E does. The shift pattern for a 4L80-E and the 4L60-E are exactly opposite as Figure 1 illustrates. Either the computer was flashed incorrectly or it was exchanged with one that was originally in a vehicle with a 4L80-E.

CORRECTION: Have the VCM re-flashed according to the VIN or replace it with the correct transmission application.

NOTE: This occurs most frequently on vehicles that were acquired from auction.

Also, a vehicle with a 4L80-E could accidentally receive a re-flash or a computer exchange that would give it a 4L60-E shift pattern.

4L60E SHIFT SOLENOID SEQUENCE			4L80E SHIFT SOLENOID SEQUENCE		
GEAR	SSA	SSB	GEAR	SSA	SSB
1ST	ON	ON	1ST	ON	OFF
2ND	OFF	ON	2ND	OFF	OFF
3RD	OFF	OFF	3RD	OFF	ON
4TH	ON	OFF	4TH	ON	ON

Figure 1

*Thanks to Bob Lathrope of
Cottman Transmissions in
Jacksonville, Florida*



THM 4L60-E NEW PARK/NEUTRAL SWITCH STRATEGY FOR SOME 2000 MODELS

CHANGE: Beginning at the start of production for 2000 model S/T Trucks, M Vans and C/K Trucks, equipped with the **4.3L engine "Only"**, the Vehicle Control Module (VCM) strategy was modified for the PNBU Switch, which changes the vehicle harness, wire colors and all testing procedures for the PNBU Switch.

REASON: Increased reliability, as the PNBU Switch signals are now sent direct to the VCM, and the VCM responds with the appropriate action.

PARTS AFFECTED:

- (1) VEHICLE CONTROL MODULE - Strategy changes to enhance the overall system.
- (2) VEHICLE WIRING HARNESS - Wires are going to different components than the previous models and the wire colors have changed.

Refer to Figure 2 for 1996-1999 models only.

Refer to Figure 4 for 2000 model S/T Trucks, M Vans, C/K Trucks equipped with the 4.3L.

- (3) PARK/NEUTRAL BACK-UP SWITCH - There is now available from OEM parts sources, a revised PNBU switch that has improved sealing capabilities to help prevent water intrusion, and is available under OEM part number 29540479 (See Figure 3). High ambient heat may have caused the sealing compound in the switch to melt and flow into the connectors, sealing the connectors to the switch.

There is now available from OEM sources, service repair connectors for both the 7-way and the 4-way connectors under part numbers 15305887 and 15305925 (See Figure 3).

Note: The service connector pigtailed use wires that are all the same color. Use the old connector as a pattern to ensure that the new wires are connected to the vehicle harness correctly. This switch is in a wet area, and it is **imperative** that the wires be soldered and heat-shrink tubing be used to insure water-tight connections. Refer to Figure 2 for a full wiring schematic of the 1996-1999 Park/Neutral Position Switch circuit for diagnostic purposes. Refer to Figure 4 for a full wiring schematic of the 2000 Park/Neutral Position Switch on models equipped with the 4.3L engine.

- (4) TESTING PROCEDURES - Testing procedures have also changed.

When testing the 1996-1999 models, the ohmmeter should indicate continuity between the connected dots when checking the specified range, as shown in Figure 1.

The 2000 and later models can be tested using the appropriate scanner. The VCM compares the actual voltage combination of the switch signals to a switch combination chart stored in memory. Refer to the chart found in Figure 4, for proper switch combinations in each range. Refer to Figure 5 for VCM location, Figure 6 for PNBU connector identification, Figures 7 and 8 for VCM connector identification and Figures 9 and 10 for underhood fuse block location and fuse block detail.

SERVICE INFORMATION:

Park/Neutral Position Switch (All Models, Tan in Color)	29540479
7-Way Repair Connector Assembly (Includes Heat-Shrink Connectors)	15305887
4-Way Repair Connector Assembly (Includes Heat-Shrink Connectors)	15305925

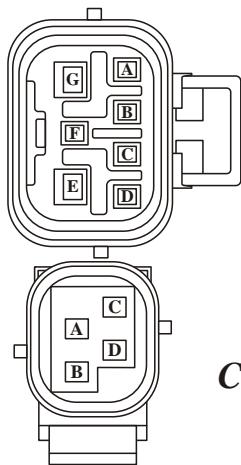
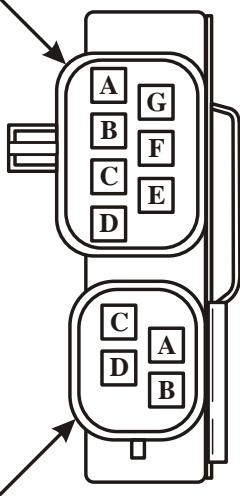


PARK/NEUTRAL SWITCH CONTINUITY CHART

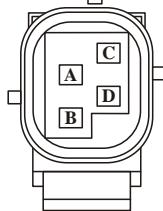
		RANGE SELECTED						
		P	R	N	O/D	D	2	1
C1 CONNECTOR	A	●		●				
	B		●					
	C		●	●				
	D	●	●	●	●	●	●	●
	E		●		●			
	F			●				
	G		●		●			
C2 CONNECTOR	A	●	●			●	●	●
	B				●	●	●	●
	C		●		●	●		●
	D			●	●	●		

7-Way PNBU
Switch Receptacle
(Face View)

PARK/NEUTRAL SWITCH TERMINALS



C1 CONNECTOR



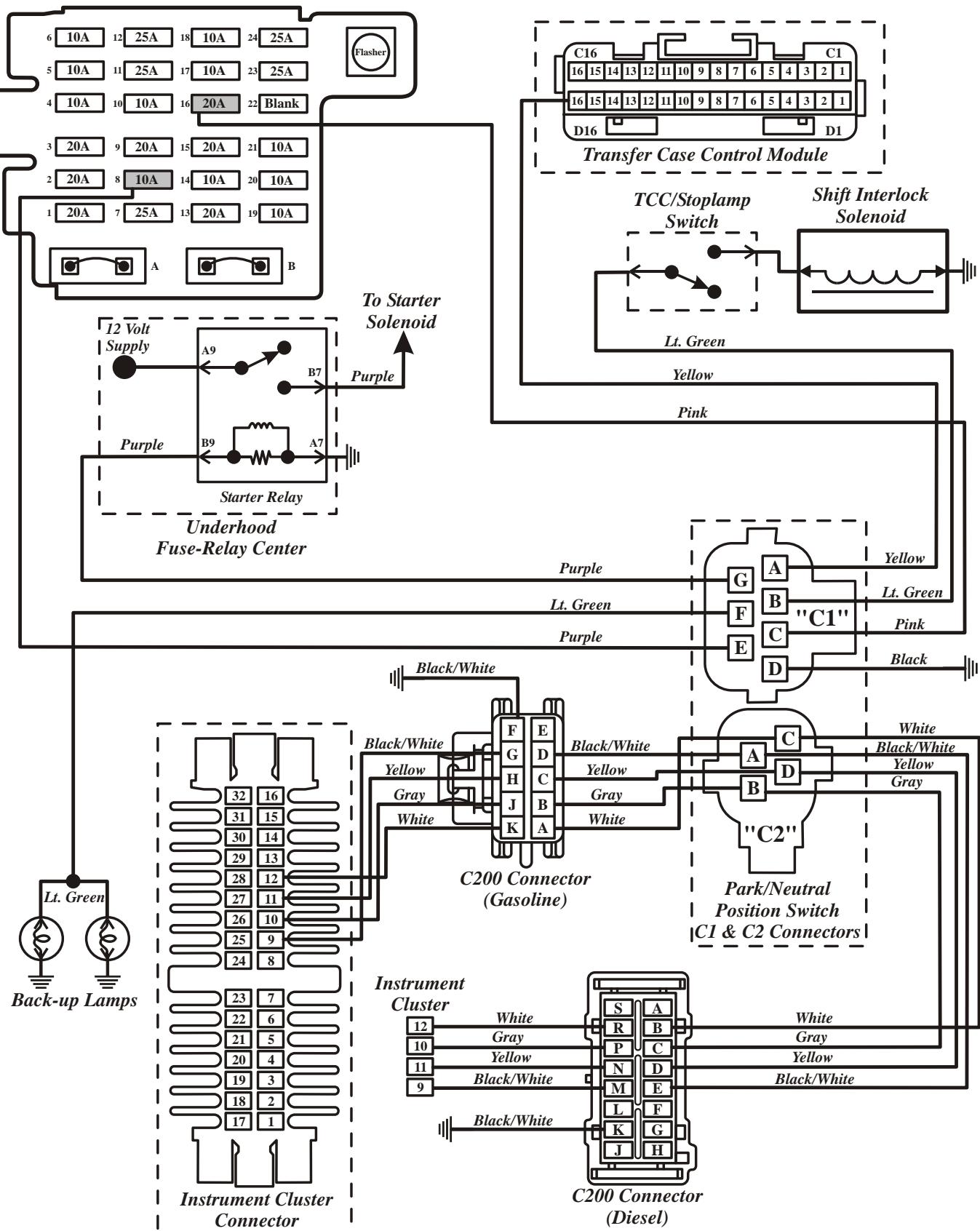
C2 CONNECTOR

4-Way PNBU
Switch Receptacle
(Face View)

OHM METER SHOULD INDICATE CONTINUITY BETWEEN THE CONNECTED
DOTS LISTED ABOVE WHEN CHECKING THE SPECIFIED RANGE

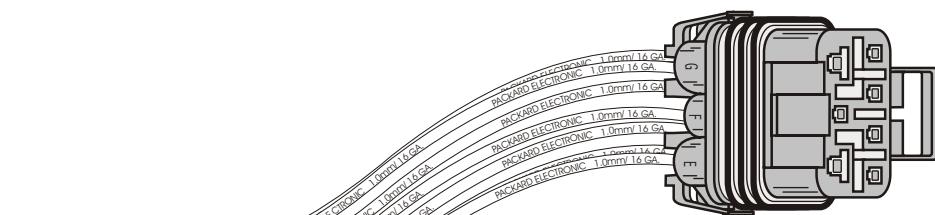
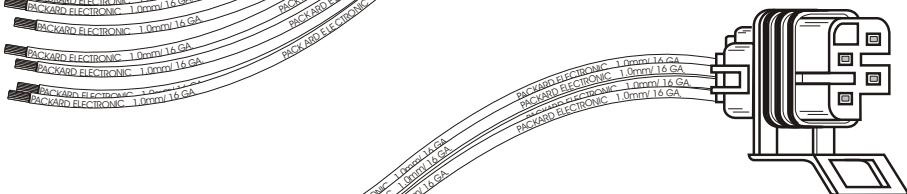


PNBU SWITCH WIRE SCHEMATIC (1996-1999 MODELS ONLY)



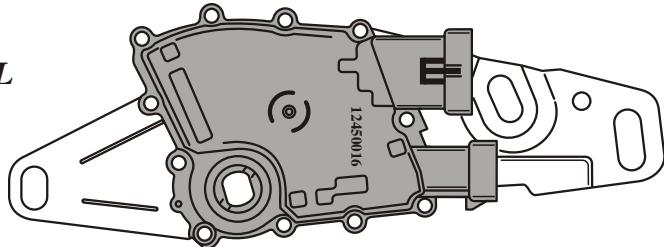
Copyright © 1998 ATSG

Figure 2

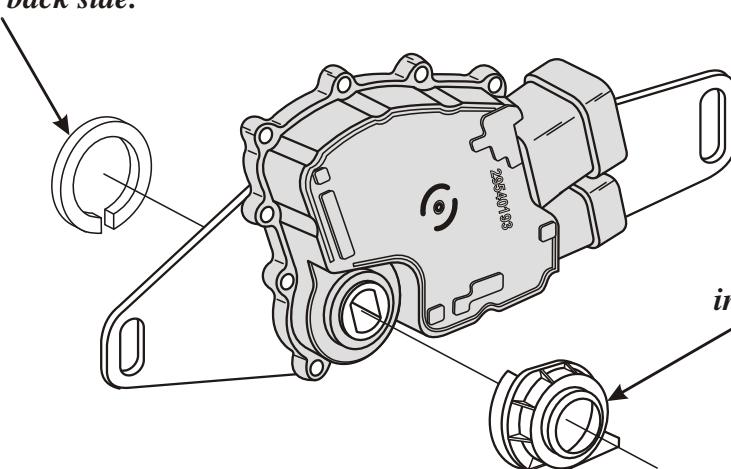
**PNBU SWITCH CONNECTOR REPAIR PACKAGES
FOR ALL MODELS****PART NUMBER
15305887****PART NUMBER
15305925**

*Previous design level PNBU
Switch is "Black" in color.*

**"PREVIOUS"
DESIGN LEVEL**



*New PNBU Switch has
seal glued to back side.*



**"NEW"
DESIGN LEVEL**

*New service package
includes cover for front
side of new switch.*

*New design level PNBU Switch is "Tan" in color,
and is available under OEM part number 29540479.*

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Figure 3

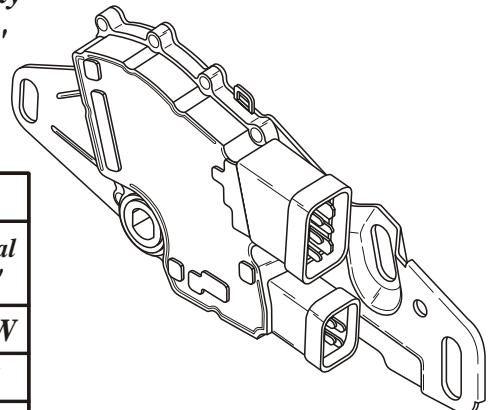


PNBU SWITCH WIRE SCHEMATIC

2000 "S/T" TRUCK, 4.3L "Only"

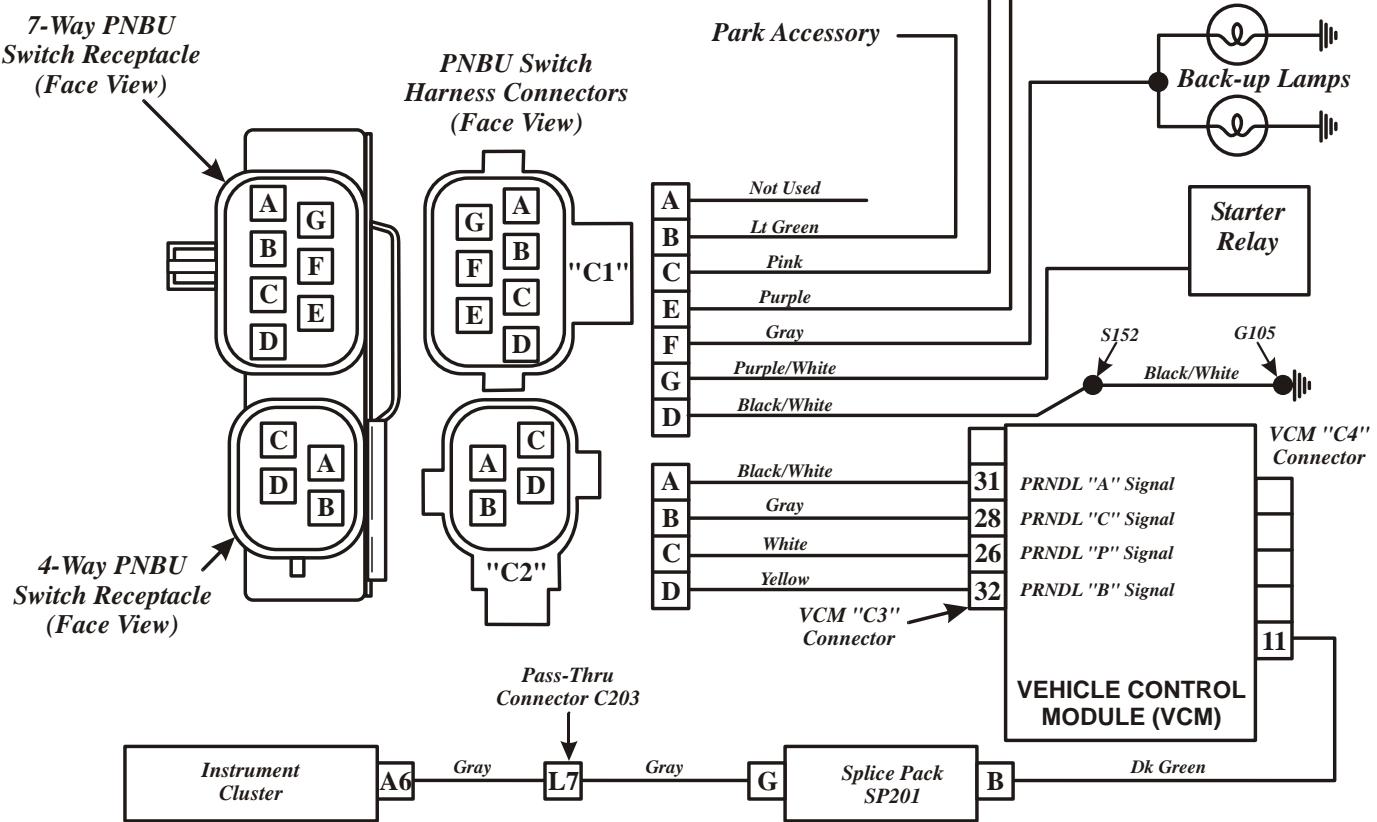
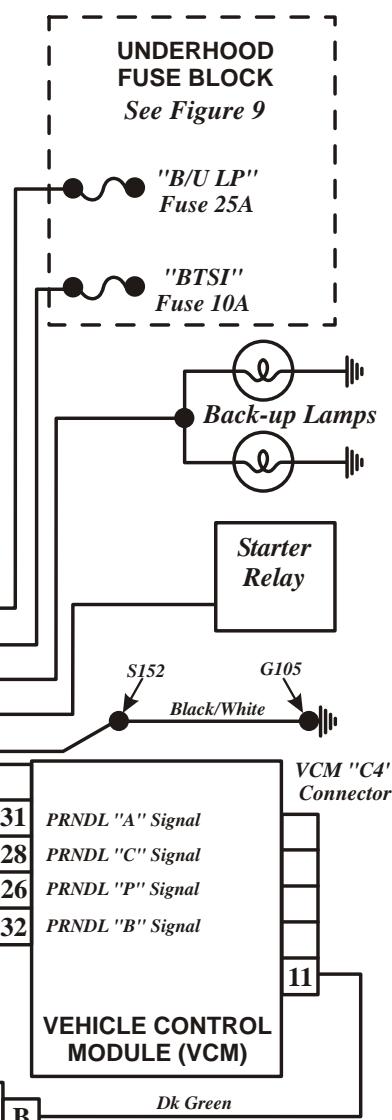
2000 "C/K" TRUCK, 4.3L "Only"

2000 "M" VAN, 4.3L "Only"



TRANSMISSION RANGE SWITCH LOGIC				
Gear Selector Position	Signal "A"	Signal "B"	Signal "C"	Signal "P"
Park (P)	LOW	HI	HI	LOW
Reverse (R)	LOW	LOW	HI	HI
Neutral (N)	HI	LOW	HI	LOW
Drive 4 (OD)	HI	LOW	LOW	HI
Drive 3 (3)	LOW	LOW	LOW	LOW
Drive 2 (2)	LOW	HI	LOW	HI
Drive 1 (1)	HI	HI	LOW	LOW

HI = 12 Volts
LOW = 0 Volts



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Figure 4

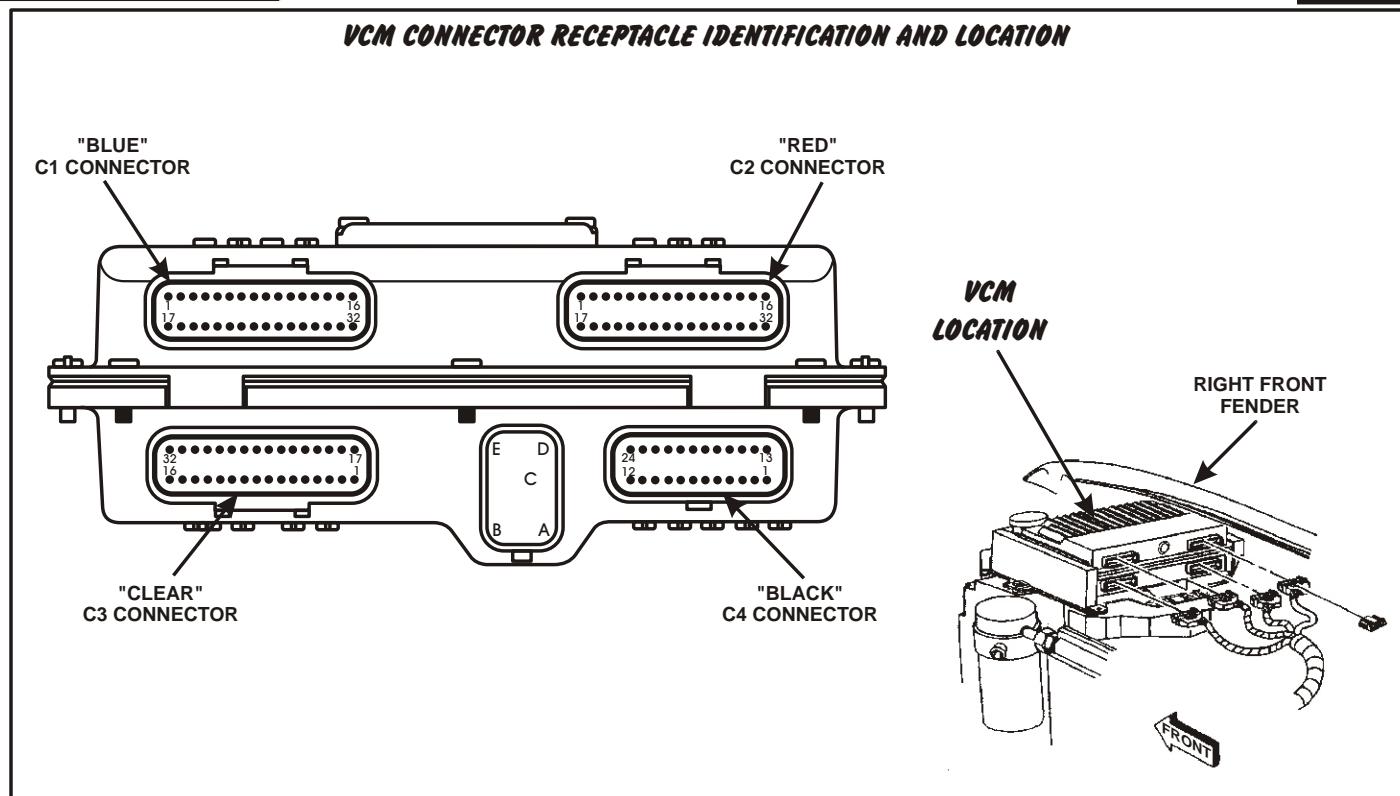


Figure 5

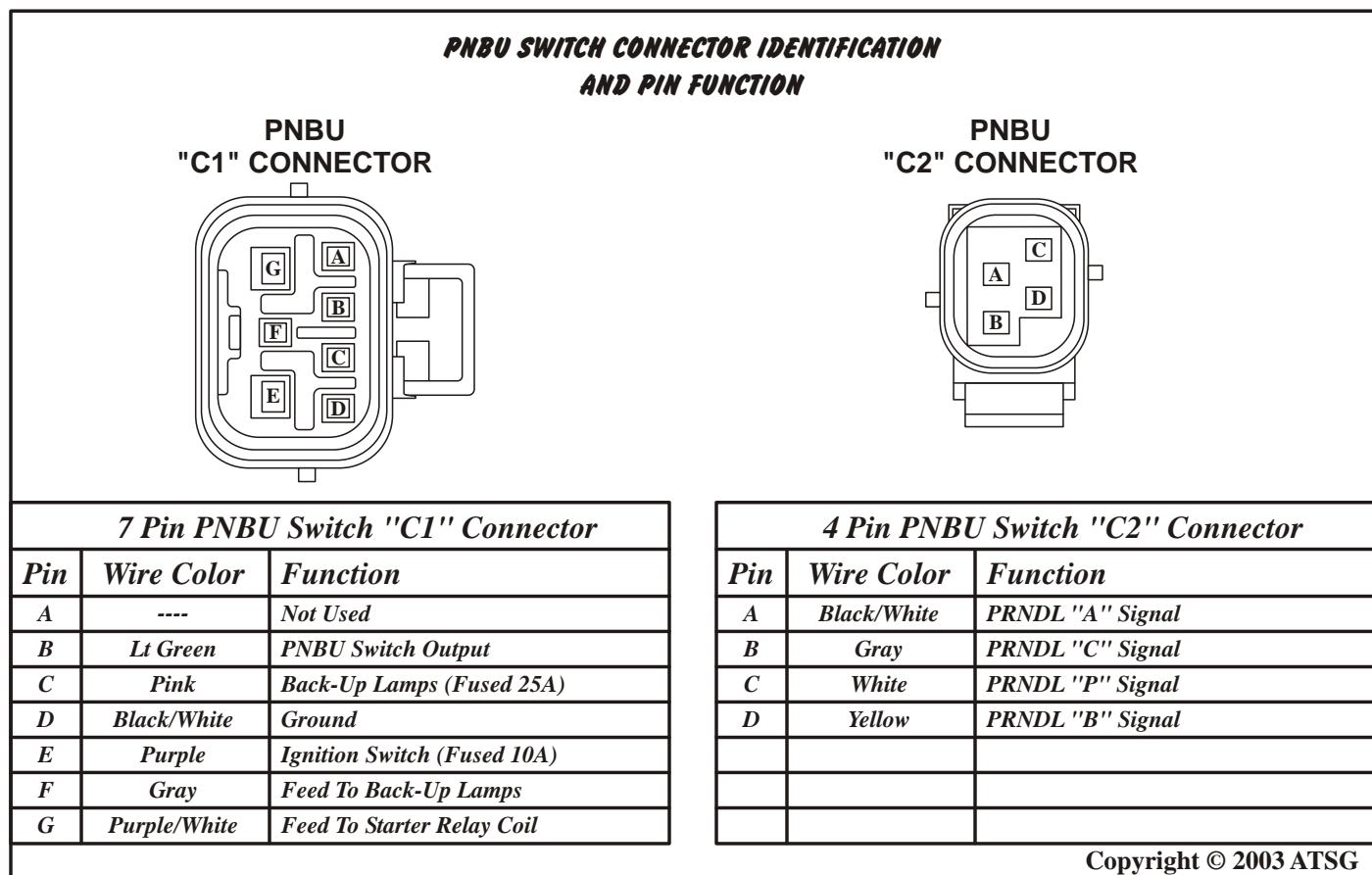
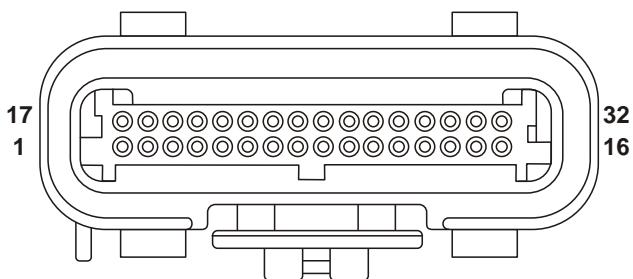


Figure 6

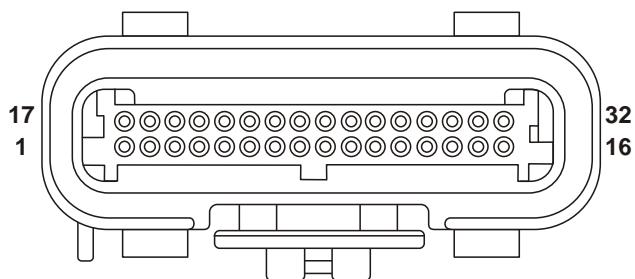


VCM CONNECTORS "C1" AND "C2" PIN IDENTIFICATION AND FUNCTION

32 Pin VCM "C1" Connector (Blue)



32 Pin VCM "C2" Connector (Red)



32 Pin VCM "C1" Connector (Blue)

32 Pin VCM "C2" Connector (Red)

Pin	Wire Color	Function
1	----	<i>Not Used</i>
2	White	EVAP Canister Vent Valve Control
3	----	<i>Not Used</i>
4	Yellow/Black	2-3 Shift Solenoid Ground Control
5	----	<i>Not Used</i>
6	Lt Green	1-2 Shift Solenoid Ground Control
7	Brown	TCC PWM Solenoid Ground Control
8	Black	Fuel Injector No. 1 Driver
9	Yellow/Black	Fuel Injector No. 6 Driver
10	Brown	EGR Pintle Position Signal
11-12	----	<i>Not Used</i>
13	Lt Green/White	IAC Coil B High
14	Lt Blue/White	IAC Coil A High
15	Lt Green/Black	Fuel Injector No. 2 Driver
16	Pink/Black	Fuel Injector No. 3 Driver
17-18	----	<i>Not Used</i>
19	Dk Blue	Knock Sensor Signal
20	White	Tachometer Output
21	Lt Green	MAP Sensor Signal
22	Tan	IAT Sensor Signal
23	Yellow	ECT Sensor Signal
24	Dk Blue	Throttle Position Sensor Signal
25	Dk Green	Fuel Tank Pressure Sensor Signal
26	----	<i>Not Used</i>
27	Yellow/Black	TFT Sensor Signal
28	Yellow	MAF Sensor Signal
29	Lt Green/Black	IAC Coil B Low
30	Lt Blue/Black	IAC Coil A Low
31	Black/White	Fuel Injector No. 5 Driver
32	Lt Blue/Black	Fuel Injector No. 4 Driver

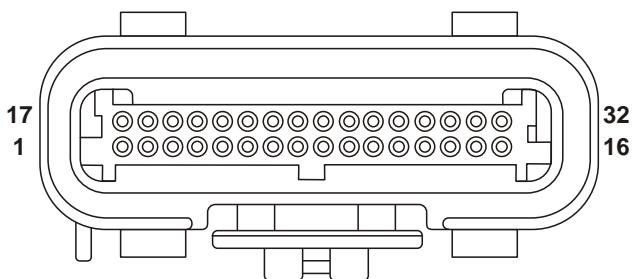
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Figure 7



VCM CONNECTORS "C3" AND "C4" PIN IDENTIFICATION AND FUNCTION

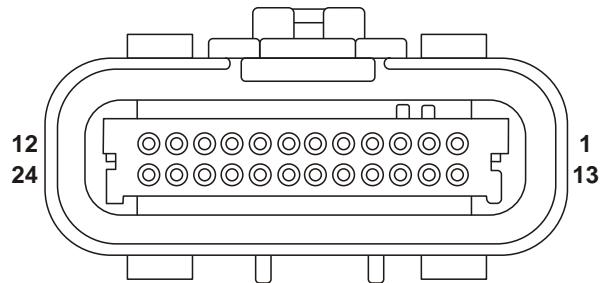
32 Pin VCM "C3" Connector (Clear)



32 Pin VCM "C3" Connector (Clear)

Pin	Wire Color	Function
1	Dk Green/White	A/C Compressor Clutch Relay Control
2	Dk Green/White	EVAP Canister Purge Valve Control
3	----	Not Used
4	Black	Sensor Ground
5	Red	L Terminal Generator Control
6	Red/Black	Pressure Control Solenoid (High)
7-8	----	Not Used
9	White	IC Control
10	----	Not Used
11	Red	Trans Pressure Switch Range C Input
12	Gray	5 Volt Reference
13	White	Fuel Level Sensor Signal
14-15	----	Not Used
16	Lt Blue/White	Pressure Control Solenoid (Low)
17	Black/White	VCM Ground
18	Black/White	VCM Ground
19	Black	Sensor Ground
20	----	Not Used
21	White	PRNDL "P" Signal
22	Dk Blue	Trans Pressure Switch Range B Input
23	Pink	Trans Pressure Switch Range A Input
24	----	Not Used
25	Dk Green/White	A/C Request Signal
26	White	PRNDL "D" Signal
27	Gray	5 Volt Reference
28	Gray	PRNDL "C" Signal
29	----	Not Used
30	Dk Green/White	A/C Cycling Switch Signal
31	Black/White	PRNDL "A" Signal
32	Yellow	PRNDL "B" Signal

24 Pin VCM "C4" Connector (Black)



24 Pin VCM "C4" Connector (Black)

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Figure 8

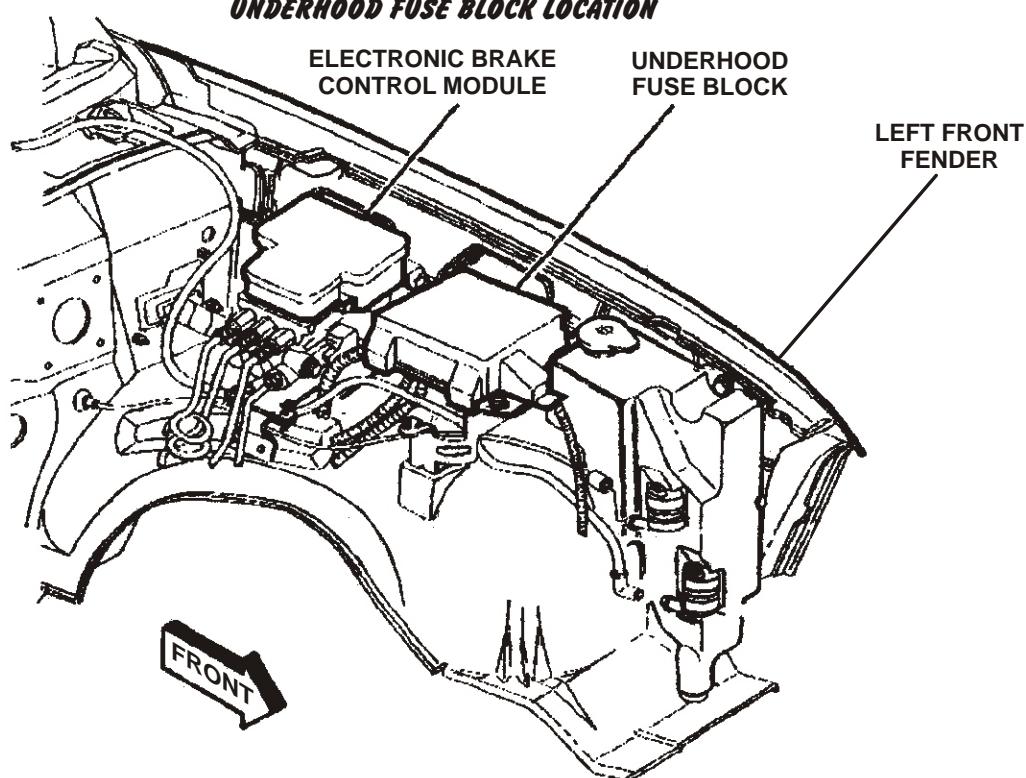
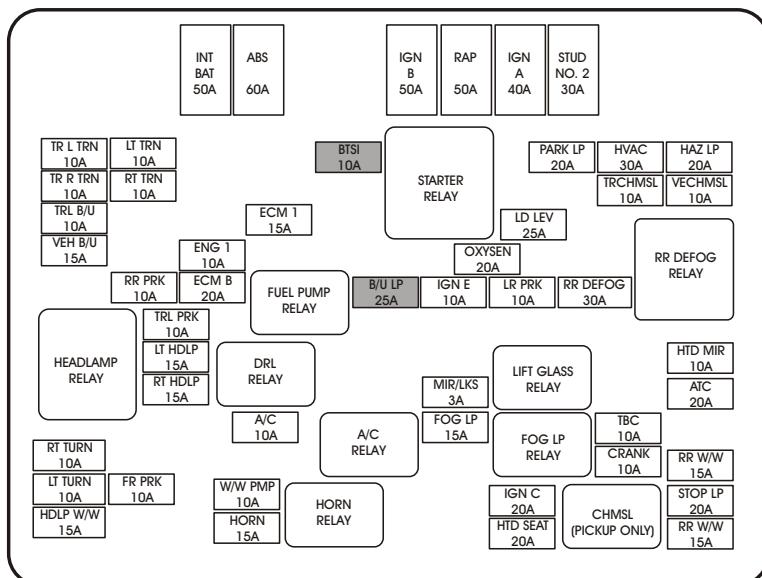


Figure 9

UNDERHOOD FUSE BLOCK FUSE AND RELAY LOCATIONS**UNDERHOOD FUSE BLOCK**

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Figure 10

GENERIC OBD-II TCC CODES

IS IT ELECTRICALLY OR MECHANICALLY GENERATED?

COMPLAINT: When Generic codes for "TCC Stuck On or Off" or a TCC Solenoid circuit fault are stored, it becomes confusing for the technician to determine if the code is *Electrically* or *Mechanically* generated. In many cases the diagnosis goes in the wrong direction.

When the code is electrically generated, there is a problem with the TCC solenoid circuit. When the code is mechanically generated, it means the signal is given or canceled normally, but the incorrect RPM range is seen by the computer.

CAUSE: This is due to the O.E. automobile manufacturers, using the codes differently between one make and another. The same code number could mean the opposite even within the same manufacturer. For example, a P0740 for a 1995 GM car with a 4T60E transmission will be *mechanically* generated while the same code for 1997 GM truck with a 4L60E transmission will be *electrically* generated.

The Asian auto makers use a different group of codes in the P0700 category, for example, Toyota uses code P0770 with a code definition of "Lock-Up Solenoid" with no other explanation. This actually is a solenoid performance code which means it is *mechanically* generated.

As far as the European manufacturers, they may have these codes available in a given model year and gone the next.

OBD-II rules were intended to make the same code mean the same thing for all manufacturers selling vehicles in the USA, **BUT**, it doesn't mean it has to be the exact same code number, just that it has to indicate the same type of symptom or failure.

CORRECTION: Refer to the charts in figures 1 through 5 to determine if the code stored is mechanically or electrically generated.

NOTE: Always check the "**GENERIC**" section of your scan tool, and always check the "Pending Code" and the "Freeze Frame" categories for codes as well as the Codes and Data section.

There may be NO codes stored in the Codes and Data section, but there could be codes in the "Pending Codes" category if it is not a hard code yet or if it is an Intermittent code.

There may be a code in the "Freeze Frame" section as well as one movie frame of data that was recorded when the code was stored.

**IS IT ELECTRICALLY OR MECHANICALLY GENERATED?**

GENERAL MOTORS TCC P0700 CODES			
MODEL YEAR	TRANSMISSION TYPE	FAULT CODE	TYPE OF FAULT
1994	4T60E	P0740	MECHANICAL
1995	4T40E	P0741	MECHANICAL
1995	4T40E	P0742	MECHANICAL
1995	4L60E	P0742	MECHANICAL
1995	4T60E	P0740	MECHANICAL
1996	4T40E	P0741	MECHANICAL
1996	4T40E	P0742	MECHANICAL
1996	4L60E	P0742	MECHANICAL
1996	4T60E	P0742	MECHANICAL
1996	4L80E	P0741	MECHANICAL
1996	4L80E	P0742	MECHANICAL
1996	4T80E	P0741	MECHANICAL
1996	4T80E	P0742	MECHANICAL
1996	4L30E	P0742	MECHANICAL
1996	3T40	P0742	MECHANICAL
1996	SATURN	P0740	ELECTRICAL
1996	SATURN	P0741	MECHANICAL
1996	SATURN	P0742	MECHANICAL
1997-02	4T40/45E	P0741	MECHANICAL
1997-02	4T40/45E	P0742	MECHANICAL
1997-02	4L60E	P0740	ELECTRICAL
1997-02	4L60E	P0742	MECHANICAL
1997-99	4T60E	P0740	ELECTRICAL
1997-99	4T60E	P0742	MECHANICAL
1997-02	4T65E	P0741	MECHANICAL
1997-02	4T65E	P0742	MECHANICAL
1997-02	4L80E	P0741	MECHANICAL
1997-02	4L80E	P0742	MECHANICAL
1997-02	4T80E	P0741	MECHANICAL
1997-02	4T80E	P0742	MECHANICAL
1997-98	4L30E	P0743	ELECTRICAL
1997-02	3T40	P0742	MECHANICAL
1997-02	SATURN	P0740	ELECTRICAL
1997-02	SATURN	P0741	MECHANICAL
1997-02	SATURN	P0742	MECHANICAL
1997-02	SATURN	P0743	ELECTRICAL
1997-99	SATURN	P0744	ELECTRICAL
1999-02	4L30E	P0742	MECHANICAL
1999-02	4L30E	P0743	ELECTRICAL

Figure 1



IS IT ELECTRICALLY OR MECHANICALLY GENERATED?

FORD TCC P0700 CODES			
MODEL YEAR	TRANSMISSION TYPE	FAULT CODE	TYPE OF FAULT
1994	AODE	P0743	ELECTRICAL
1995-02	AX4S	P0741	MECHANICAL
1995-02	AX4S	P0743	ELECTRICAL
1995-02	AX4N/4F50N	P0741	MECHANICAL
1995-02	AX4N/4F50N	P0743	ELECTRICAL
1995-02	CD4E	P0741	MECHANICAL
1995-02	CD4E	P0743	ELECTRICAL
1995-96	E4OD	P0743	ELECTRICAL
1995-96	4R44/55E	P0741	MECHANICAL
1995-96	4R44/55E	P0743	ELECTRICAL
1995-02	AODE/4R70W	P0741	MECHANICAL
1995-02	AODE/4R70W	P0743	ELECTRICAL
1996	F4EAT	P0740	ELECTRICAL
1996	GF4EAT	P0741	MECHANICAL
1996	GF4EAT	P0743	ELECTRICAL
1997-98	E4OD/4R100	P0743	ELECTRICAL
1997-02	4R44/55/5R55E	P0741	MECHANICAL
1997-02	4R44/55/5R55E	P0743	ELECTRICAL
1997-02	F4E-III	P0741	MECHANICAL
1997-02	F4E-III	P0743	ELECTRICAL
1997-98	GF4EAT	P0740	EITHER
1999-02	4R100	P0741	MECHANICAL
1999-02	4R100	P0743	ELECTRICAL
2000-03	5R55N	P0741	MECHANICAL
2000-03	5R55N	P0743	ELECTRICAL
2002	5R55W/S	P0740	ELECTRICAL
2002	5R55W/S	P0741	MECHANICAL
2002	5R55W/S	P0743	ELECTRICAL

Figure 2

CHRYSLER TCC P0700 CODES			
MODEL YEAR	TRANSMISSION TYPE	FAULT CODE	TYPE OF FAULT
1996-02	41TE/42LE	P0740	MECHANICAL
1996-02	41TE/42LE	P0743	ELECTRICAL
1996-02	42/44/46/47RE	P0740	MECHANICAL
1996-02	42/44/46/47RE	P0743	ELECTRICAL
2000-02	45RFE	P0740	MECHANICAL
2000-02	45RFE	P0743	ELECTRICAL

Figure 3



IS IT ELECTRICALLY OR MECHANICALLY GENERATED?

IMPORT TCC P0700 CODES			
MODEL YEAR	TRANSMISSION TYPE	FAULT CODE	TYPE OF FAULT
1996-02	ACURA	P0740	MECHANICAL
1996-98	AUDI	P0773	ELECTRICAL
2000-01	DAEWOO	P0741	MECHANICAL
2000-01	DAEWOO	P0742	MECHANICAL
2000-01	DAEWOO	P0743	ELECTRICAL
1996	GEO TRACKER	P0741	MECHANICAL
1999	GEO TRACKER	P0741	MECHANICAL
1996-98	GEO TRACKER	P0743	ELECTRICAL
1996	GEO TRACKER	P0771	MECHANICAL
1996	GEO TRACKER	P0773	ELECTRICAL
2000-01	CHEVY TRACKER	P0741	MECHANICAL
1996-02	HONDA	P0740	MECHANICAL
1996-02	HYUNDAI	P0740	MECHANICAL
1996-99	HYUNDAI	P0742	ELECTRICAL
1996-02	HYUNDAI	P0743	ELECTRICAL
1999	HYUNDAI	P0744	MECHANICAL
1999-02	INFINITI	P0740	ELECTRICAL
1999-02	INFINITI	P0744	MECHANICAL
1996-02	ISUZU	P0742	MECHANICAL
2000	JAGUAR	P0741	MECHANICAL
2000	JAGUAR	P0743	ELECTRICAL
1996-02	KIA SPORTAGE	P0743	ELECTRICAL
1997-02	KIA SPORTAGE	P0740	MECHANICAL
1996-02	KIA SEPHIA/SPECTRA	P0740	MECHANICAL
1997-02	KIA SEPHIA/SPECTRA	P0743	ELECTRICAL
1996-02	LEXUS	P0770	MECHANICAL
1996-02	LEXUS	P0773	ELECTRICAL
1996-02	MAZDA	P0740	MECHANICAL
1999-02	MAZDA	P0741	MECHANICAL
1999-02	MAZDA	P0742	MECHANICAL
1999	MAZDA	P0743	ELECTRICAL
1999-02	MAZDA	P0771	MECHANICAL
1999-02	MAZDA	P0772	MECHANICAL
1999-02	MAZDA	P0773	ELECTRICAL
1997-02	MERCEDES BENZ	P0740	MECHANICAL
1997-02	MERCEDES BENZ	P0743	ELECTRICAL
1999-02	MITSUBISHI	P0740	MECHANICAL
1999-02	MITSUBISHI	*P0743	ELECTRICAL
1996-02	NISSAN	P0740	ELECTRICAL
1997-02	NISSAN	P0744	MECHANICAL
1999-02	PORSCHE	P0740	MECHANICAL
1999-02	PORSCHE	P0743	ELECTRICAL

** Denotes this code is assigned to vehicles equipped with a 40 or 50 series unit only.*

IS IT ELECTRICALLY OR MECHANICALLY GENERATED?

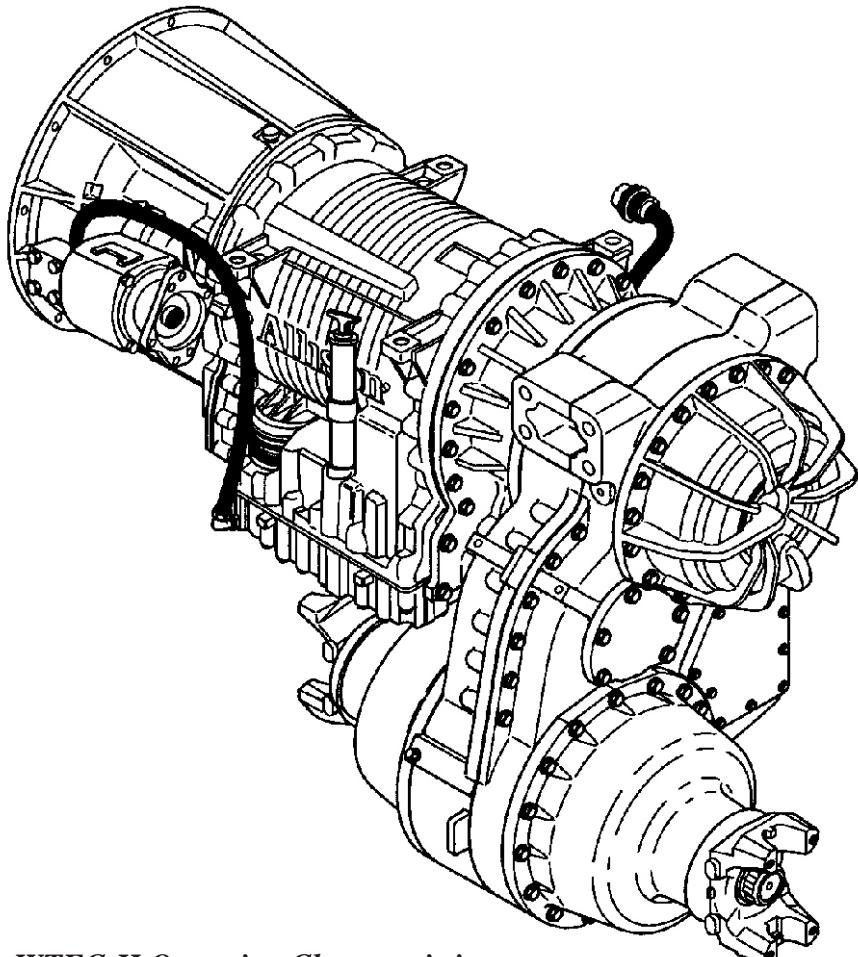
IMPORT TCC P0700 CODES			
MODEL YEAR	TRANSMISSION TYPE	FAULT CODE	TYPE OF FAULT
1996-02	SUBARU	P0740	MECHANICAL
2001	SUBARU	P0741	MECHANICAL
1996-02	SUBARU	P0743	ELECTRICAL
1996-02	SUZUKI ESTEEM	P0741	MECHANICAL
1996-02	SUZUKI ESTEEM	P0743	ELECTRICAL
1996	SUZUKI ESTEEM	P0771	MECHANICAL
1996	SUZUKI ESTEEM	P0773	ELECTRICAL
1996-98	SUZUKI SIDEKICK	P0741	MECHANICAL
1996	SUZUKI SIDEKICK	P0743	ELECTRICAL
1996	SUZUKI SIDEKICK	P0771	MECHANICAL
1996	SUZUKI SIDEKICK	P0773	ELECTRICAL
2000-02	SUZUKI VITARA	P0743	ELECTRICAL
1999-02	TOYOTA (GEO) PRIZM	P0771	MECHANICAL
1996-02	TOYOTA	P0770	MECHANICAL
1996-02	TOYOTA	P0773	ELECTRICAL
1997-98	VOLVO	P0740	ELECTRICAL
1996-98	VOLKSWAGEN	P0773	ELECTRICAL

Figure 5

TECHTALK
1/2 Page

Phoenix

Transgo

ALLISON ELECTRONIC WORLD TRANSMISSIONS

Refer to Figure 1 for WTEC-II Operating Characteristics.

Refer to Figure 2 for WTEC-III Operating Characteristics.

Refer to Figure 3 for Clutch Identification.

Refer to Figure 4 for the Clutch Application Chart and Transmission Default Operation.

Refer to Figure 5 for MD Series Transmission Pressure Port Locations.

Refer to Figure 6 for MD3070PT Transfer Case Pressure Port Locations.

Refer to Figure 7 for the MD Series Oil Pressure Chart.

Refer to Figure 8 for the MD3070PT Oil Pressure Chart.

Refer to Figure 9 for the Fluid Capacity Chart.

Schaffer

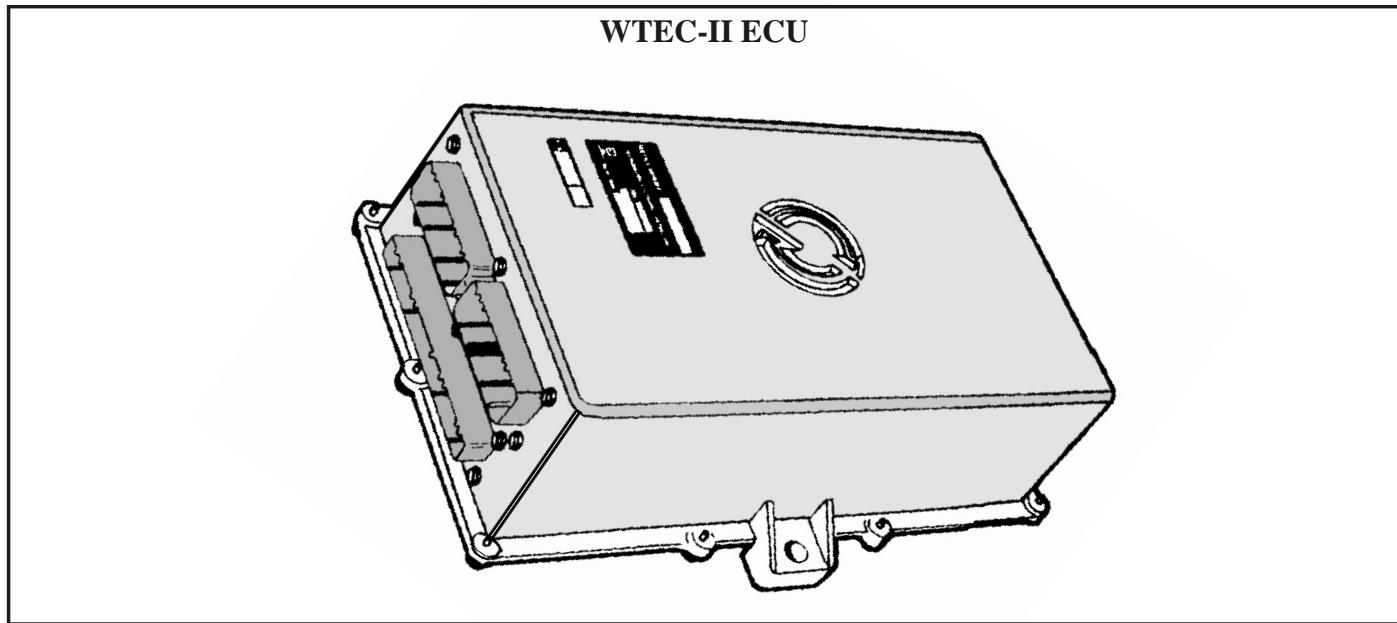
ALLISON ELECTRONIC WORLD TRANSMISSIONS**WTEC-II ECU OPERATING CHARACTERISTICS**

Figure 1

1. The **WTEC-II** ECU was used from 1992 to 1997 which contains an EEPROM in order to change shift calibrations. It also contains an EPROM chip which contains program information and would require replacement in order to change program information.
2. Early model **WTEC-II** ECU's were capable of accepting 12 volt systems only.
3. Late model **WTEC-II** were capable of accepting 12 or 24 volt systems.
4. There are four **WTEC-II** ECU configurations capable of up to nine input and five output functions.
5. Some **WTEC-II** ECU's were an integral part of the keypad or lever type shift selectors.
6. On earlier models, when the **WTEC-II** system is in default, the "**SELECT**" display goes blank and the "**ATTAINED**" display indicates which default gear to which the transmission has defaulted. This display module may also have a "**Check Transmission**" Lamp as well. When a "soft" code is detected by the ECU, this lamp will illuminate, but transmission operation will not be inhibited. When a "hard" code is detected, the "**Check Transmission**" and "**Do Not Shift**" Lamps will illuminate and transmission operation will be inhibited.
7. On later models the **WTEC-II** system uses a "**Do Not Shift**" Lamp for transmission fault warning system.
8. **WTEC-II** shift selectors produce a series of short "beeps" when the system is in default.
9. Moving the **WTEC-II** shift lever selector will result in a continuous tone being sounded until the selector is moved back to the position it was in previously.
10. When a **WTEC-II** system failure prevents the ECU from seeing the shift selector signal, it will display (**).
11. Beginning in September of 1996, a feature called "**TransID**" was introduced for **WTEC-II** systems that are version 6E or higher. This feature is designed to make the use of a common transmission with any compatible ECU. The **WTEC-II** system uses **TransID Level 1**. It is how the transmission internal wire harness is arranged that allows a "**TransID**" compatible ECU to incorporate changes and improvements without having to change or recalibrate the ECU.

ALLISON ELECTRONIC WORLD TRANSMISSIONS

WTEC-III ECU OPERATING CHARACTERISTICS

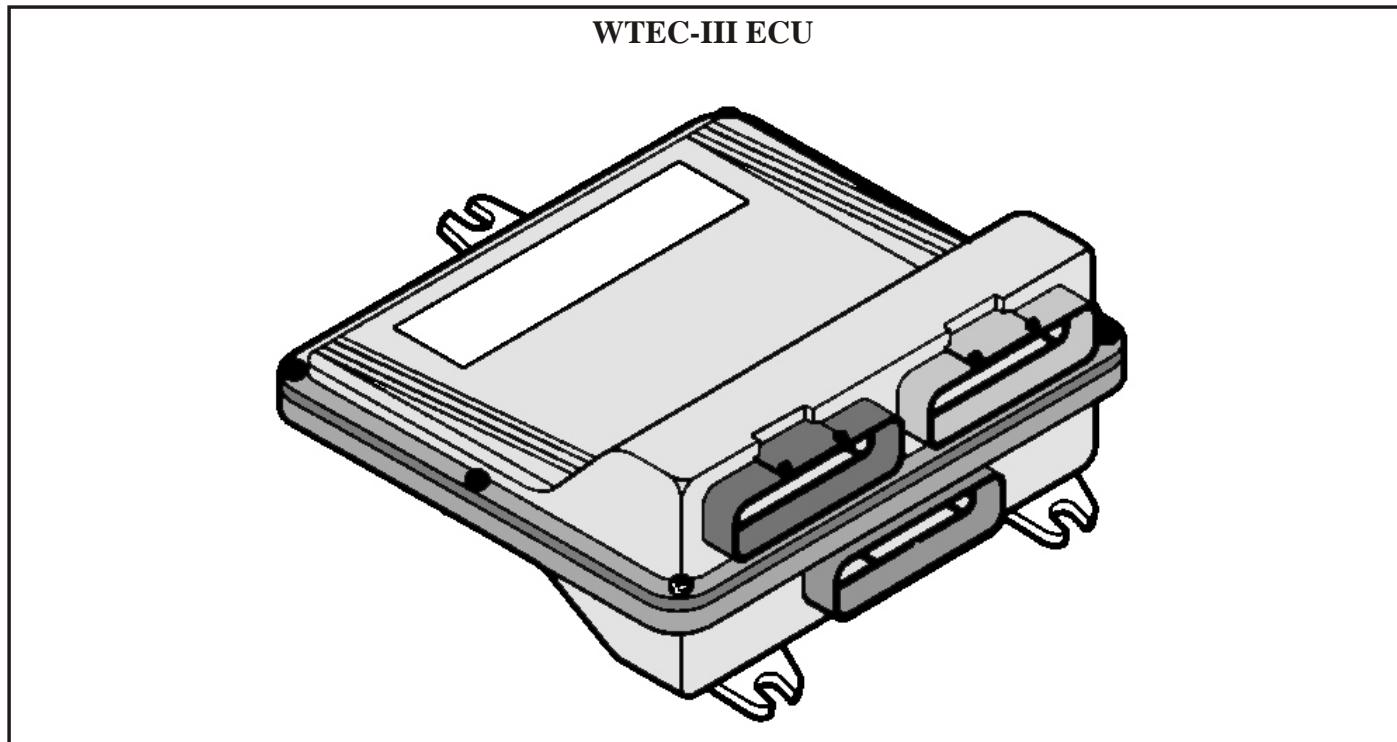


Figure 2

1. The **WTEC-III** ECU is used from 1997 to present which contains an EEPROM in order to change all available shift and program calibrations.
2. The **WTEC-III** ECU is not available as an integral part of any shift selector models.
3. The **WTEC-III** ECU can accept 12 or 24 volt systems.
4. The **WTEC-III** ECU is capable of up to 13 input and 9 output functions.
5. The **WTEC-III** system uses a “**Check Trans**” Lamp for the transmission warning system.
6. When the **WTEC-III** system is in default, the gear indicator displays the default gear the transmission is locked in.
7. **WTEC-III** system shift selectors do not “beep” when the system is in default.
8. When a **WTEC-III** system failure prevents the ECU from seeing the shift selector signal, it will display (-/-).
9. **AUTODETECT** is a sensing feature of the **WTEC-III** system that allows the ECU to automatically accommodate a variety of transmission and interface configurations, and then searches for them. Once these configurations are recognized, strategies are initiated to operate these items, such as, retarders, oil level sensors, TPS, ECT sensors, etc.
10. Beginning in September of 1997, a feature called “**TransID**” was introduced for **WTEC-III** systems that are version 8A or higher. This feature is designed to make the use of a common transmission with any compatible ECU. The **WTEC-III** system uses **TransID Level 2 and 3**. It is how the transmission internal wire harness is arranged that allows a “**TransID**” compatible ECU to incorporate changes and improvements without having to change or recalibrate the ECU. **TransID Level 3** was introduced in April of 2000.

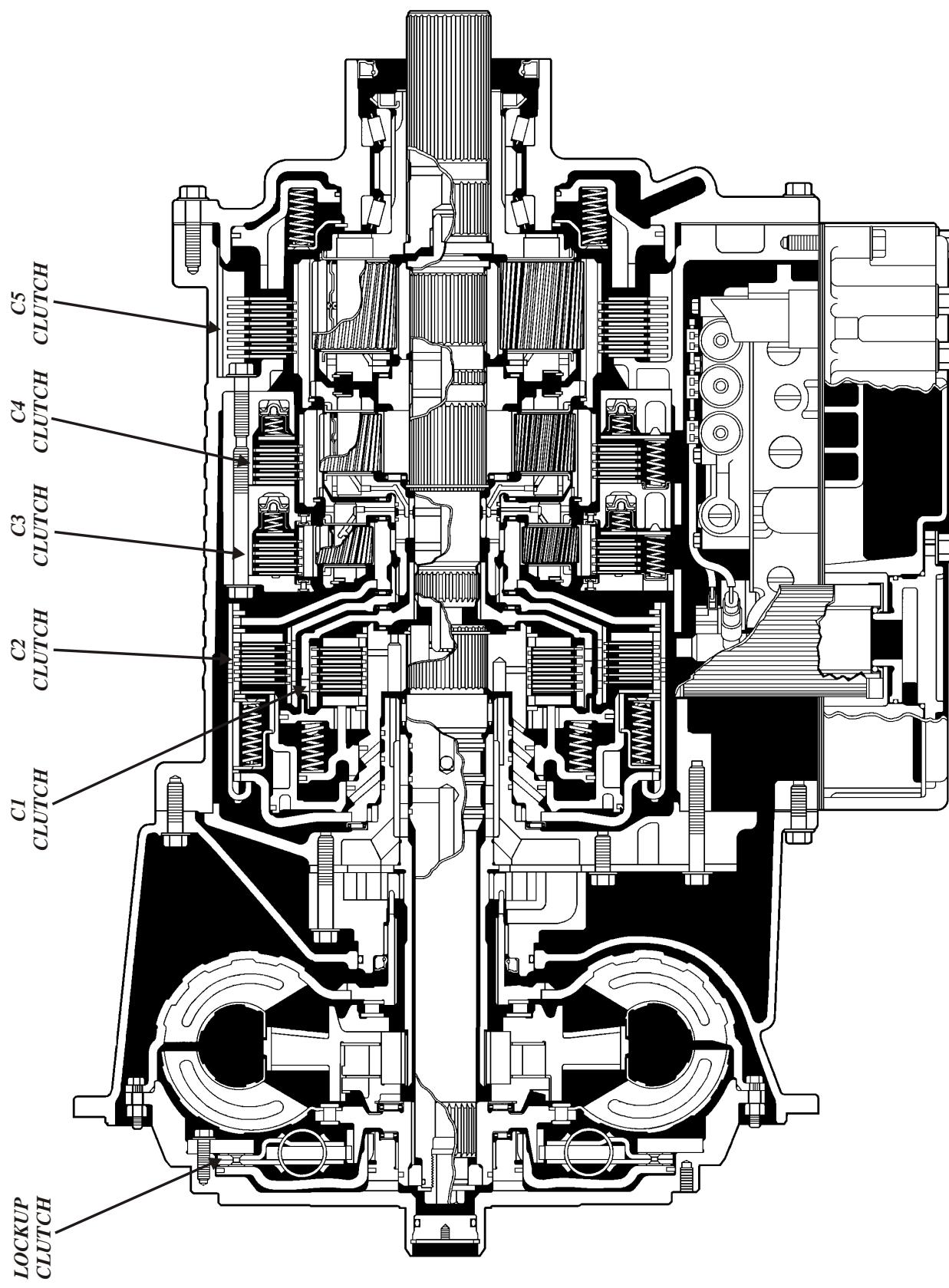
ALLISON MD SERIES SIX SPEED

Figure 3

Automatic Transmission Service Group

ALLISON MD, HD CLUTCH, SOLENOID & DEFAULT OPERATION

ALLISON MD3000 & B4/500 SERIES CLUTCH APPLICATION CHART		
RANGE	CLUTCHES APPLIED	SOLENOIDS ENERGIZED
NEUTRAL	C5	A, B, E
REVERSE	C3, C5	A, B, C, E
FIRST	C1, C5	B, E, G
FIRST (HD4070 Only)	C1, C6	B, G, J, N
FIRST (MD3070 Only)	C3, C6	A, G, J, N
SECOND	C1, C4, Lockup	B, D, F, G
SECOND (HD4070 Only)	C1, C5	B, E
THIRD	C1, C3, Lockup	B, C, F, G
THIRD (HD4070 Only)	C1, C4, Lockup	B, D, G
FOURTH	C1, C2, Lockup	F, G
FOURTH (HD4070 Only)	C1, C3, Lockup	B, C, G
FIFTH	C2, C3, Lockup	A, C, G, F
FIFTH (HD4070 Only)	C1, C2, Lockup	G
SIXTH	C2, C4, Lockup	A, D, F
SIXTH (HD4070 Only)	C2, C3, Lockup	A, C, G
SEVENTH (HD4070 Only)	C2, C4, Lockup	A, D

NOTE: Solenoids "A" and "B" are normally open when not energized.

Solenoids "C, D, E, F and G" are normally closed when not energized.

DEFAULT HYDRAULIC OPERATION	
OPERATING RANGE	HYDRAULIC DEFAULT RANGE (ALL SOLENOIDS OFF)
REVERSE	NEUTRAL
NEUTRAL	NEUTRAL
1	3
1 (MD3070)	NEUTRAL
1 (HD4070)	1
2	3 or 4
2 (HD4070)	4
3	3 or 4
3 (HD4070)	5
4	4
4 (HD4070)	5
5	4 or 5
5 (HD4070)	5
6	5
6 (HD4070)	5
7 (HD4070)	6

Figure 4

Automatic Transmission Service Group

ALLISON MD SERIES PRESSURE PORT LOCATIONS

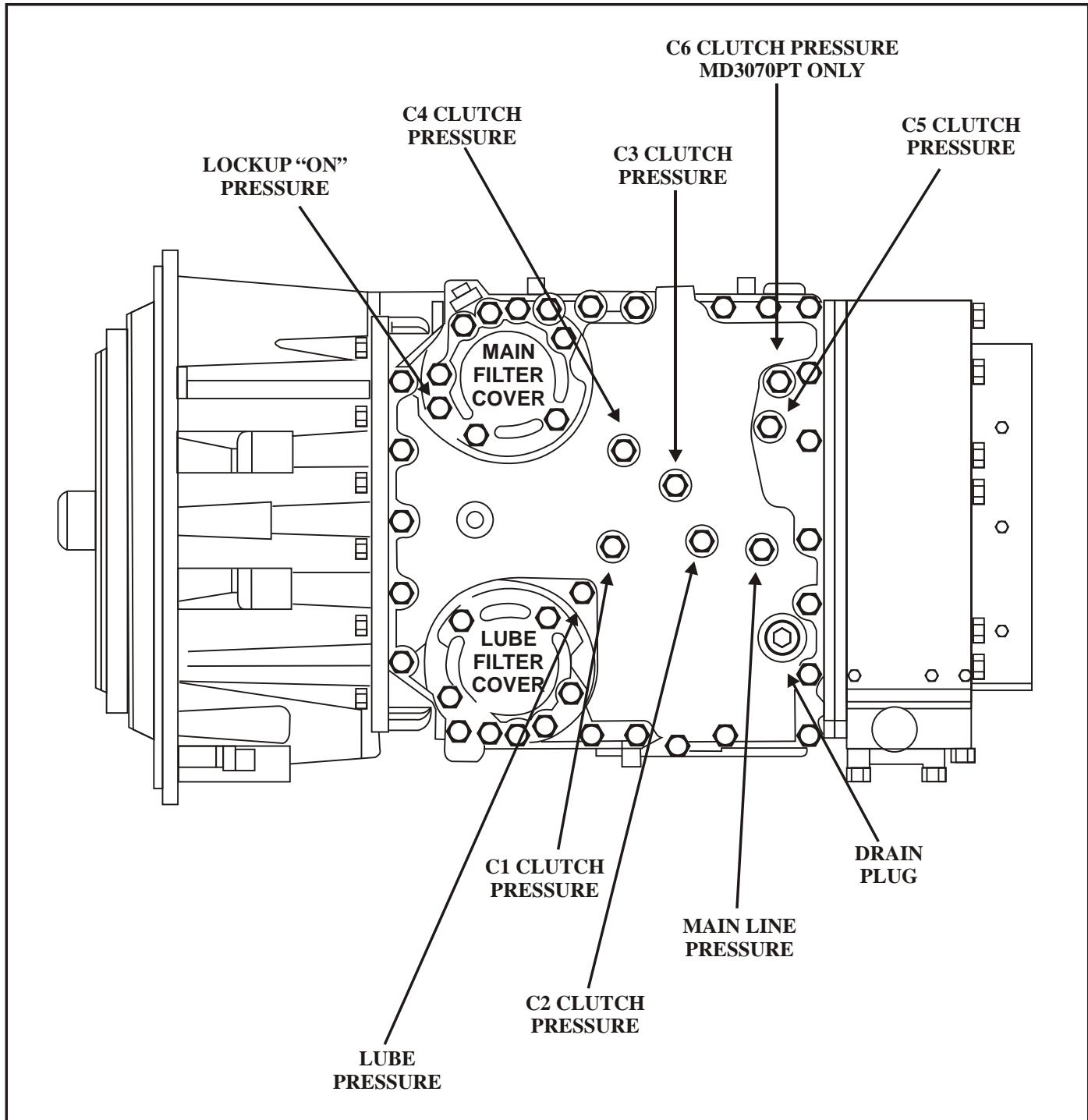


Figure 5

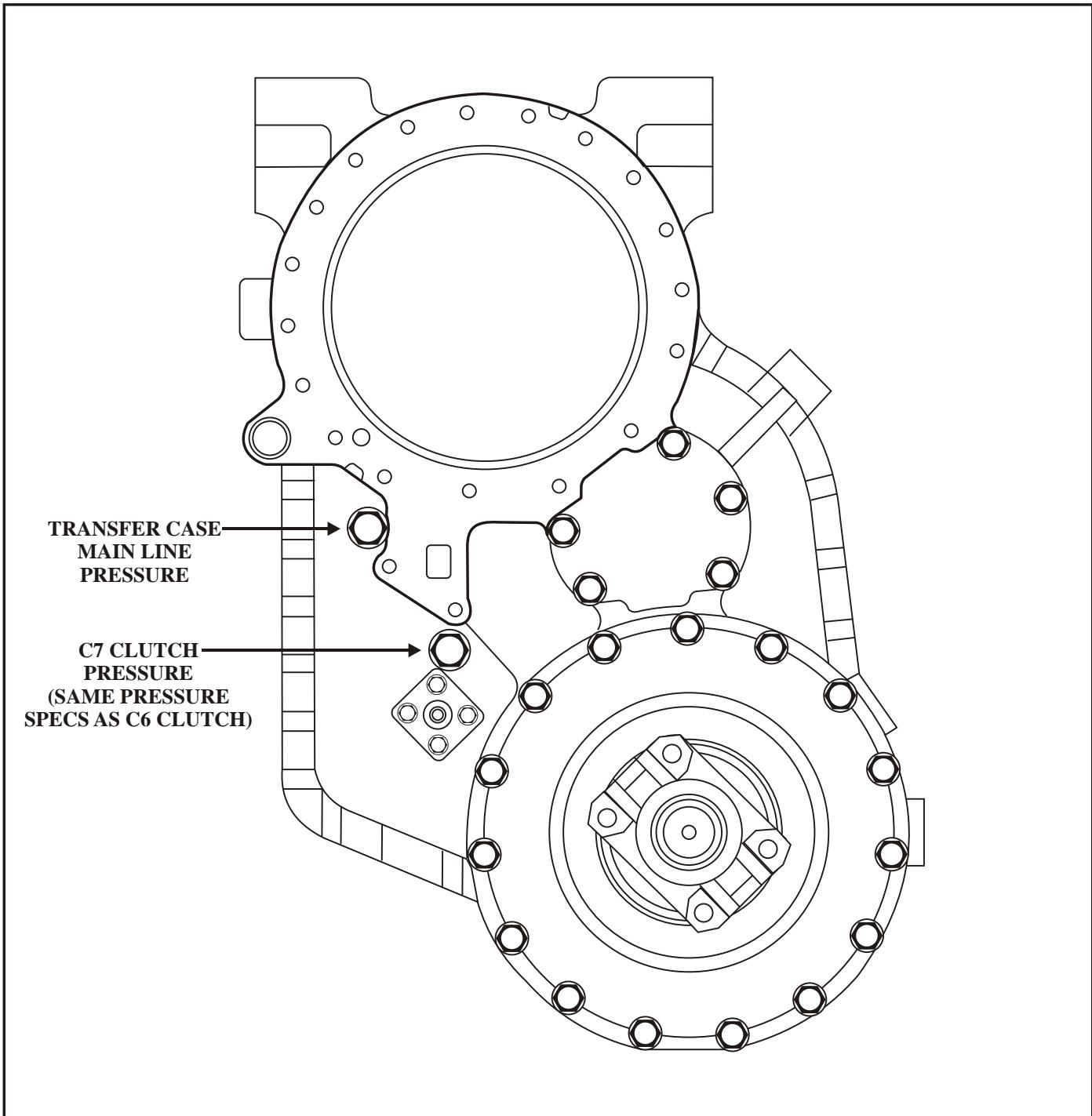
ALLISON MD3070PT TRANSFER CASE PRESSURE PORT LOCATIONS

Figure 6

ALLISON MD SERIES PRESSURE CHARTS

ALLISON MD SERIES CLUTCH PRESSURE (PSI) CHART (ALL EXCEPT 3070PT)						
ENGINE RPM	SELECTOR RANGE	CLUTCHES APPLIED	MAIN LINE PRESSURE	CLUTCH PRESSURE	CONVERTER "OUT" PRESSURE	LUBE PRESSURE
580 - 620	NEUTRAL	C5	203-290	0-6		
	REVERSE	C3, C5	203-290	0-6		0.5 MIN.
	FIRST	C1, C5	189-286	0-10 (C1) 0-6 (C5)		0.5 MIN.
	SECOND	C1, C4	189-286	0-10 (C1) 0-6 (C4)		0.5 MIN.
	NEUTRAL	C5	265-285	0-6	45 - 60	22 - 28
	REVERSE	C3, C5	265-285	0-6	45 - 60	22 - 28
	FIRST	C1, C5	225-245	0-10 (C1) 0-6 (C5)	45 - 60	22 - 28
	SECOND	C1, C4	225-245	0-10 (C1) 0-6 (C4)	45 - 60	22 - 28
	SECOND-LU	C1, C4, LU	160 - 180	0-10 (C1) 0-6 (C4)	45 - 60	22 - 28
	THIRD-LU	C1, C3, LU	160 - 180	0-10 (C1) 0-6 (C3)	45 - 60	22 - 28
2080 - 2120	FOURTH-LU	C1, C2, LU	160 - 180	0-10 (C1) 0-10 (C2)	45 - 60	22 - 28
	FIFTH-LU	C2, C3, LU	160 - 180	0-10 (C2) 0-6 (C3)	45 - 60	22 - 28
	SIXTH-LU	C2, C4, LU	160 - 180	0-10 (C2) 0-6 (C4)	45 - 60	22 - 28
						0 - 9

NOTE: Pressures were taken with the Transmission fluid temperature between 160-200°F

Figure 7

ALLISON MD SERIES PRESSURE CHARTS
ALLISON MD SERIES CLUTCH PRESSURE (PSI) CHART (3070PT)

ENGINE RPM	SELECTOR RANGE	CLUTCHES APPLIED	MAIN LINE PRESSURE	CLUTCH PRESSURE	CONVERTER "OUT" PRESSURE	LUBE PRESSURE	LOCKUP "ON" PRESSURE	TRANSFER CASE PRESSURE
580 - 620	NEUTRAL	C5	203-290	0 - 6				203-290
	REVERSE	C3, C5	203-290	0 - 6			0.5 MIN.	203-290
	LOW	C3, C6	203-290	0 - 6(C3) 0 - 6(C6)			0.5 MIN.	203-290
	FIRST	C1, C5	189-286	0 - 10(C1) 0 - 6(C5)			0.5 MIN.	203-290
	NEUTRAL	C5	265-285	0 - 6	45 - 60	22 - 28		209-247
	REVERSE	C3, C5	265-285	0 - 6	45 - 60	22 - 28		209-247
2080 - 2120	LOW	C3, C6	225-245	0 - 6(C3) 0 - 6(C6)	45 - 60	22 - 28		209-247
	FIRST	C1, C5	225-245	0 - 10(C1) 0 - 6(C5)	45 - 60	22 - 28		209-247
	SECOND	C1, C4	225-245	0 - 10(C1) 0 - 6(C4)	45 - 60	22 - 28		209-247
	SECOND-LU	C1, C4, LU	160 - 180	0 - 10(C1) 0 - 6(C4)	45 - 60	22 - 28		209-247
	THIRD-LU	C1, C3, LU	160 - 180	0 - 10(C1)	45 - 60	22 - 28	0 - 9	209-247
	FOURTH-LU	C1, C2, LU	160 - 180	0 - 10(C1) 0 - 10(C2)	45 - 60	22 - 28	0 - 9	209-247
FIFTH-LU	C2, C3, LU	160 - 180	0 - 10(C2)	45 - 60	22 - 28	0 - 9		209-247
	SIXTH-LU	C2, C4, LU	160 - 180	0 - 10(C2) 0 - 6(C4)	45 - 60	22 - 28	0 - 9	209-247

NOTE: Pressures were taken with the Transmission fluid temperature between 160-200°F



"2004" SEMINAR INFORMATION

SLIDE

69

ALLISON FLUID CAPACITIES

FLUID FILL CHART		
ITEM	EQUIPT WITH	DRY FILL*
MD SERIES & B300/400	4.00 INCH SUMP	29.0 QUARTS 27.0 LITERS
MD SERIES & B300/400	2.00 INCH SUMP	26.0 QUARTS 25.0 LITERS
MD 3070PT	7.00 INCH SUMP	39.0 QUARTS 37.0 LITERS
REMOTE COOLER	NO RETARDER	2.1 QUARTS 2.31 LITERS
REMOTE COOLER	RETARDER	3.6 QUARTS 2.41 LITERS
DIRECT MOUNT	NO RETARDER	1.1 QUARTS 1.01 LITERS
DIRECT MOUNT	RETARDER	2.1 QUARTS 2.01 LITERS
REMOTE	RETARDER ACCUMULATOR	1.3 QUARTS 1.21 LITERS

**Capacities do not include cooling lines*

NOTE: Recommended fluid is DEXRON®-III for light duty service, C-4 equivalent for heavy duty service or TranSynd™ synthetic fluid.

Figure 9

ALLISON® 1000 SERIES TRANSMISSIONS

5TH GEAR HUNTING UNDER LOAD

COMPLAINT: A Chevrolet or GMC truck equipped with an 8100 gas engine or the 6.6L Duramax® diesel engine and an Allison® 1000 series transmission may have a complaint of 4-5 shift hunting when pulling a load and 4th gear cannot be manually selected.

CAUSE: The computer strategy for these vehicles along with the inability to manually select 4th gear creates the above complaint.

CORRECTION: A 5th Gear Inhibit Switch, (Refer to Figure 1), has been made available through the GM Service Parts Organization (GMSPO). With the installation of this switch the above complaints can be eliminated. After switch installation, the TCM will require a relearn procedure.

IMPORTANT NOTE:

When an owner of a **diesel** equipped vehicle authorizes the installation of the 5th gear inhibit switch, he must be informed that a possibly objectionable noise may be present due to the nature of the diesel fueling system.

Diesel engine fuel injection systems that use a common rail system, as the Duramax® does, could experience a main fuel injection combustion noise that may be heard above engine rpm of 2600.

This fuel knock may be heard when the transmission is in 4th gear and pulling a load up hill between 2600-2700 rpm.

This is not harmful in any way and is considered normal, however, it may become a customer complaint if the customer is not pre-warned.

SERVICE INFORMATION:

<i>5th Gear Inhibit Switch Kit.....</i>	<i>15174508</i>
<i>Wire Conduit (5Ft.).....</i>	<i>12051375</i>
<i>Wire Terminal Package (10).....</i>	<i>12084912</i>
<i>Wire Terminal Package (10).....</i>	<i>12110844</i>
<i>Retainers (10).....</i>	<i>22573692</i>
<i>Connector.....</i>	<i>15306105</i>
<i>Housing.....</i>	<i>15040483</i>

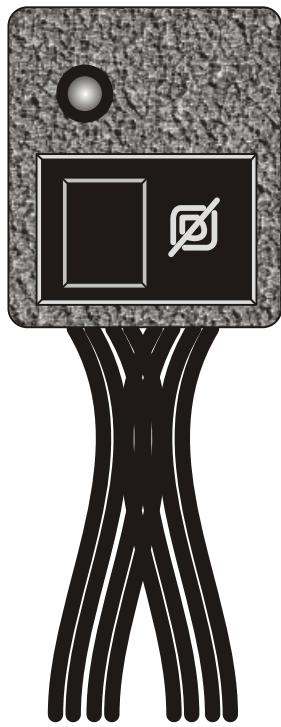
5TH GEAR HUNTING UNDER LOAD**5TH GEAR INHIBIT SWITCH**

Figure 1

ALLISON 1000/2000 SERIES

3RD OR 5TH GEAR STARTS DTC P0705, P0706, P0708

COMPLAINT: Some vehicles equipped with the Allison 1000/2000 series transmission may exhibit a 3rd gear or 5th gear start. In rare cases the vehicle may not take drive but will still have reverse. The customer may report NSBU switch related electrical problems, such as improper or no shift indication on the dash indicator, or no back-up light operation. Diagnostic Trouble Codes (DTC) P0705, P0706 and P0708 may be stored in memory.

CAUSE: The cause may be, a defective Neutral Start Back-Up (NSBU) switch, created by weather intrusion. The NSBU switch is mounted on the exterior of the transmission and rotated by the manual shaft, as shown in Figure 1.

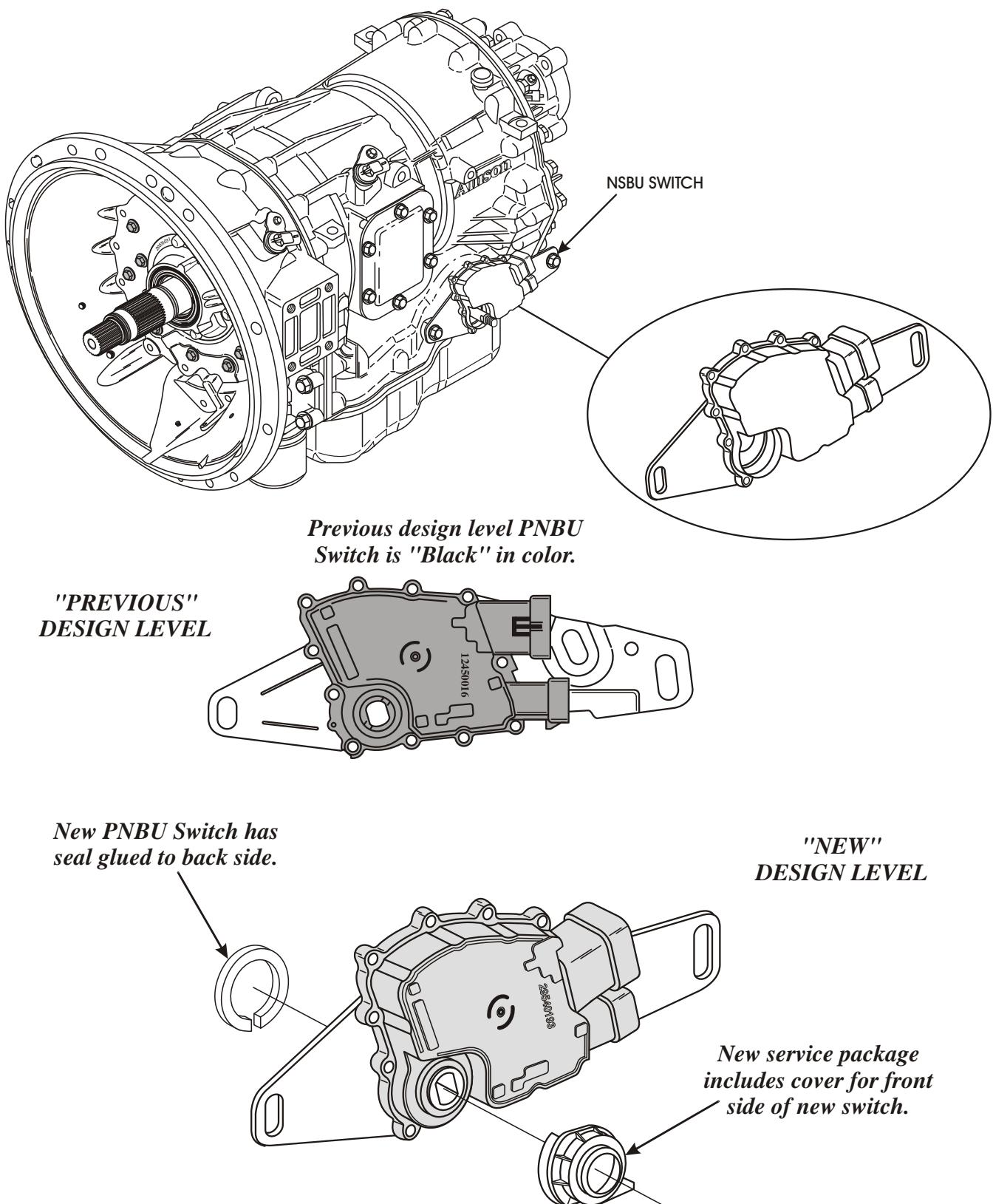
CORRECTION: There is now available from OEM parts sources, a revised NSBU switch that has improved sealing capabilities to help prevent water intrusion, and is available under OEM part number 29540479. (See Figure 1) Since the original switch is the same part number as the 4L60-E switch, high ambient heat may have caused the sealing compound in the switch to melt and flow into the connectors, sealing the connectors to the switch.

There is now available from OEM sources, service repair connectors for both the 7-way and the 4-way connectors under part numbers 15305887 and 15305925 (See Figure 3).

Note: The service connector pigtails use wires that are all the same color. Use the old connector as a pattern to ensure that the new wires are connected to the vehicle harness correctly. This switch is in a wet area, and it is **imperative** that the wires be soldered and heat-shrink tubing be used to insure water-tight connections. Refer to Figure 1 for the location of the Park/Neutral Position Switch. Refer to Figure 2 for a full wiring schematic of the Park/Neutral Position Switch circuit for diagnostic purposes.

SERVICE INFORMATION:

Park/Neutral Position Switch (All Models, Tan in Color)	29540479
7-Way Repair Connector Assembly (Includes Heat-Shrink Connectors)	15305887
4-Way Repair Connector Assembly (Includes Heat-Shrink Connectors)	15305925



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Figure 1

NEUTRAL START BACK-UP SWITCH

The installation of a transmission mounted Neutral Start/ Reverse Signal switch is required. This switch commonly referred to as an "NSBU Switch", mounts directly onto the transmission case from the outside and detects the angular position of the manual shift selector shaft. This position is relayed to the TCM so that certain vehicle control functions can be coordinated with the position of the shift controls. The NSBU Switch has redundant circuitry to alert the TCM in the event of a single wire or switch failure. The switch is interfaced to the starter circuit, and the reverse signal provision may be used to activate vehicle back-up lights and/or reverse warning devices.

Refer to Figure 2

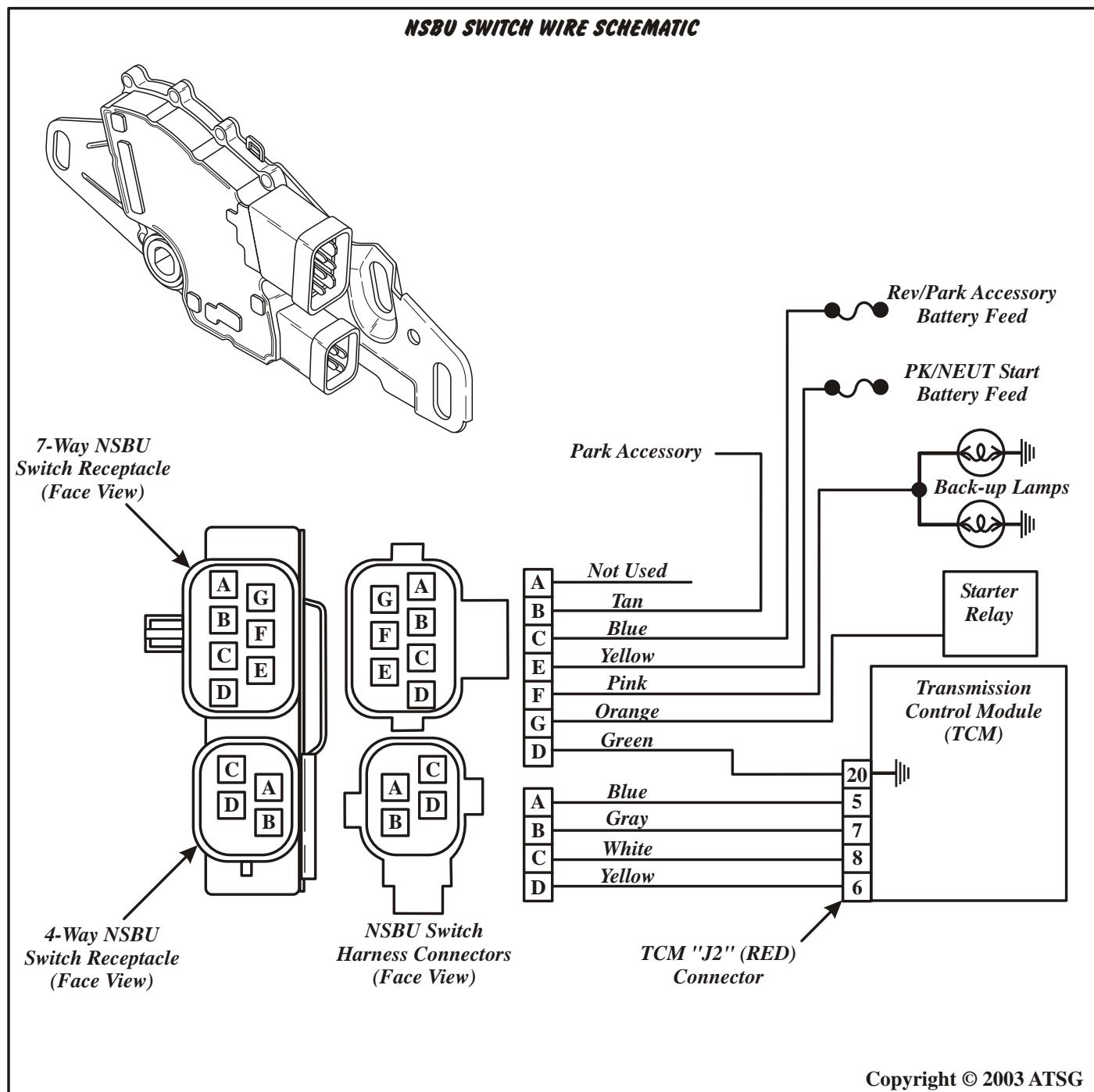
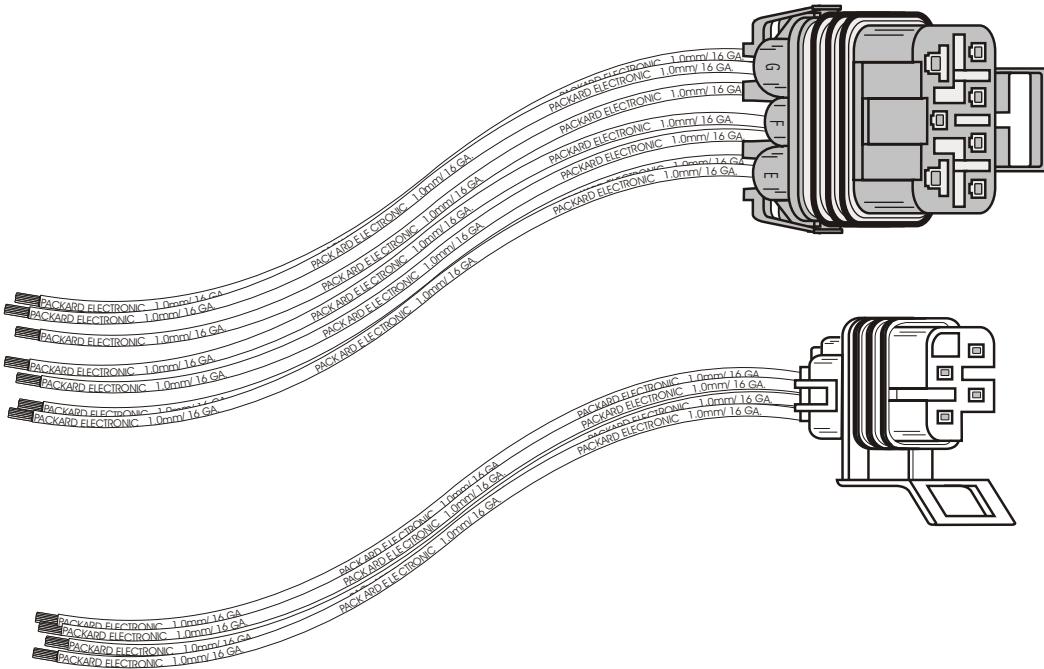


Figure 2

NSBU SWITCH REPAIR CONNECTORS

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Figure 3

ISUZU NPR, GMC TILTMMASTER, CHEVY FORWARD

2000 & LATER CODE RETRIEVAL PROCEDURE

COMPLAINT: The three wire diagnostic jump connector located at the driver side kick panel area has been eliminated.

CAUSE: These vehicles have become OBD-II compliant.

CORRECTION: Locate the OBD-II diagnostic connector as shown in figure 1. **Jump terminals 4 and 11** also seen in figure 1 and read the code pattern using the “**Check Trans**” lamp on the instrument cluster. A code chart is provided in figure 2.

To **Clear** codes, do the following:

1. Turn ignition “**ON**”, but do not start engine.
2. **Jump terminals 4 and 11** in the diagnostic connector.
3. Shift the transmission to “**Neutral**”.
4. Depress the brake pedal and release it.
5. Depress the accelerator pedal fully and release it.

When codes are cleared, the “**Check Trans**” lamp will flash rapidly for 10 seconds.

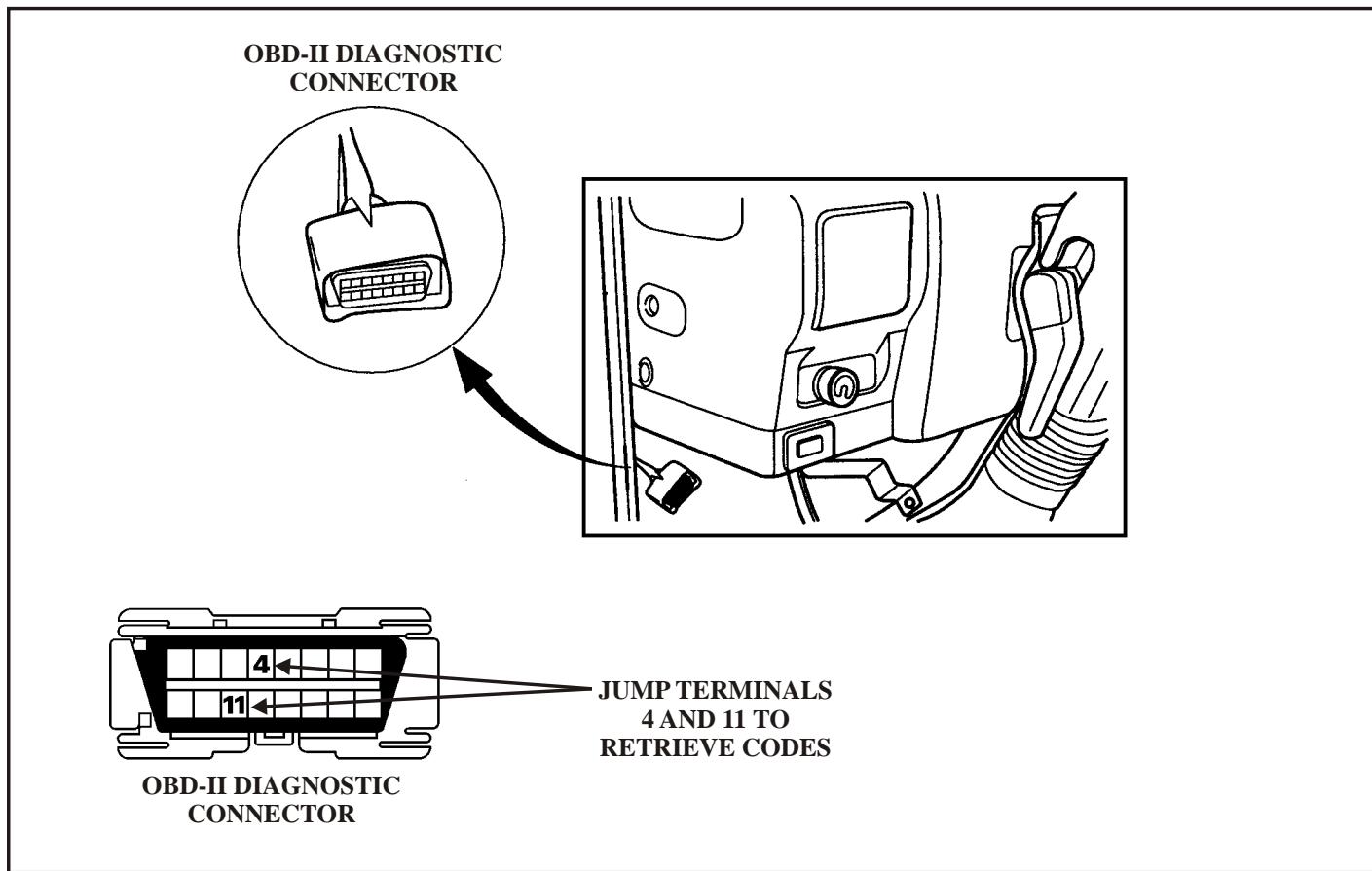


Figure 1

**2000 & LATER CODE RETRIEVAL PROCEDURE**

DTC	CODE PATTERN	CODE DESCRIPTION
11	ON OFF 	Vehicle Speed Sensor #1 circuit open or shorted (On the extension housing, Pulse Generator)
13		Engine Speed Sensor circuit open or shorted
15		Automatic Transmission Fluid Thermosensor circuit open
17		Inhibitor Switch circuit open or shorted
21		Throttle Position Sensor circuit open or shorted
24		Vehicle Speed Sensor #2 circuit open or shorted (On Extension Housing, Gear Driven)
31		Shift Solenoid #1 (S1) circuit open or shorted
32		Shift Solenoid #2 (S2) circuit open or shorted
33		Timing Solenoid (ST) circuit open or shorted
34		Lock-Up Solenoid circuit open or shorted
35		Line Pressure Solenoid circuit open or shorted
37		Exhaust brake system circuit open or shorted
38		Engine warm-Up cut system circuit open or shorted

Figure 2

1999-2003 NISSAN UD MANUAL CODE RETRIEVAL

COMPLAINT: The truck comes in with the “ATM” Lamp flashing in the instrument cluster, (Refer to Figures 1 and 2). A group of 10 diagnostic connectors is found in the driver’s kick panel area.

Which of these is to be jumped?

CAUSE: Little or no information is provided by the manufacturer.

CORRECTION: *Use the following procedure to retrieve codes:*

1. Using a suitable jumper wire, jump diagnostic connectors **1-14** which is a **BLUE/YELLOW** wire and **1-15** which is **BLACK**. This pair of diagnostic connectors has an “A” on the connector identification tag as shown in figure 3.
2. Turn the ignition “on”, do not start the engine.
3. Watch the “ATM” Lamp for the flash codes.

If no codes are present, the “ATM” Lamp will flash code 1 continuously.

Use the following procedure to clear codes:

1. Turn the ignition “on”, do not start the engine.
2. Connect diagnostic terminals 1-14 and 1-15 as described above.
3. Insure that the shift lever is in park
4. Depress brake pedal
5. Depress accelerator pedal fully.

When the memory is cleared, the “ATM” Lamp will flash on and off at 0.2 second intervals for 10 seconds.

Use the code chart in figure 4 for code identification.

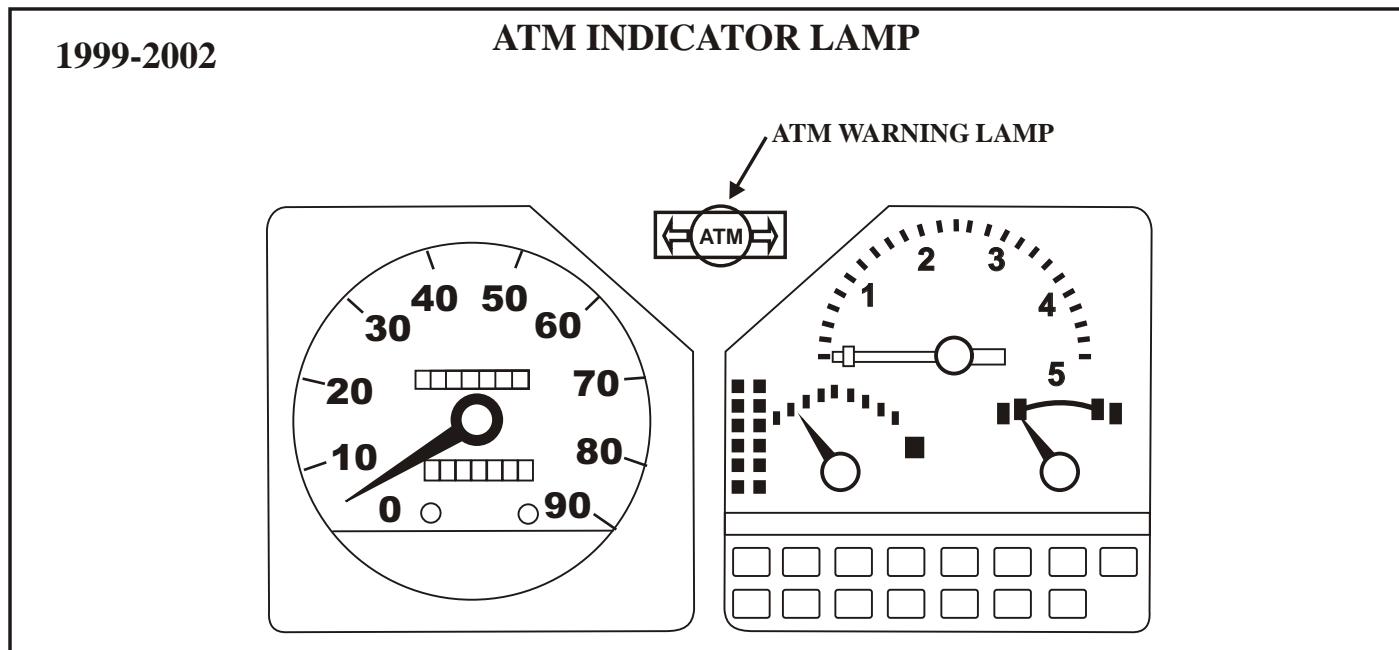


Figure 1

Automatic Transmission Service Group

1999-2003 NISSAN UD

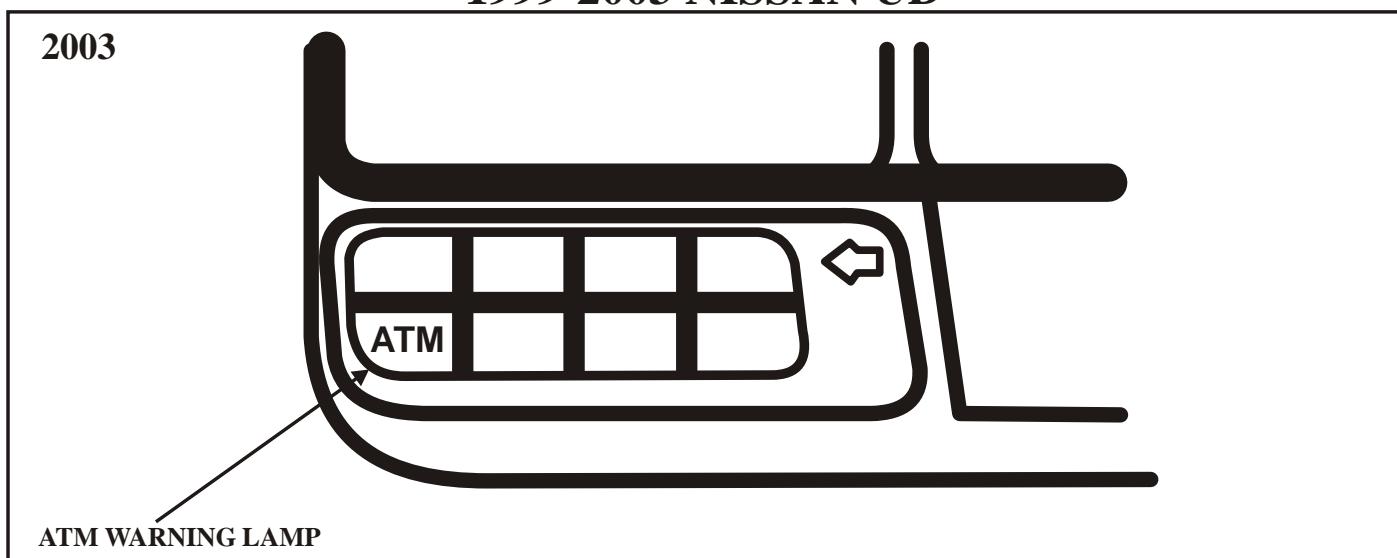


Figure 2

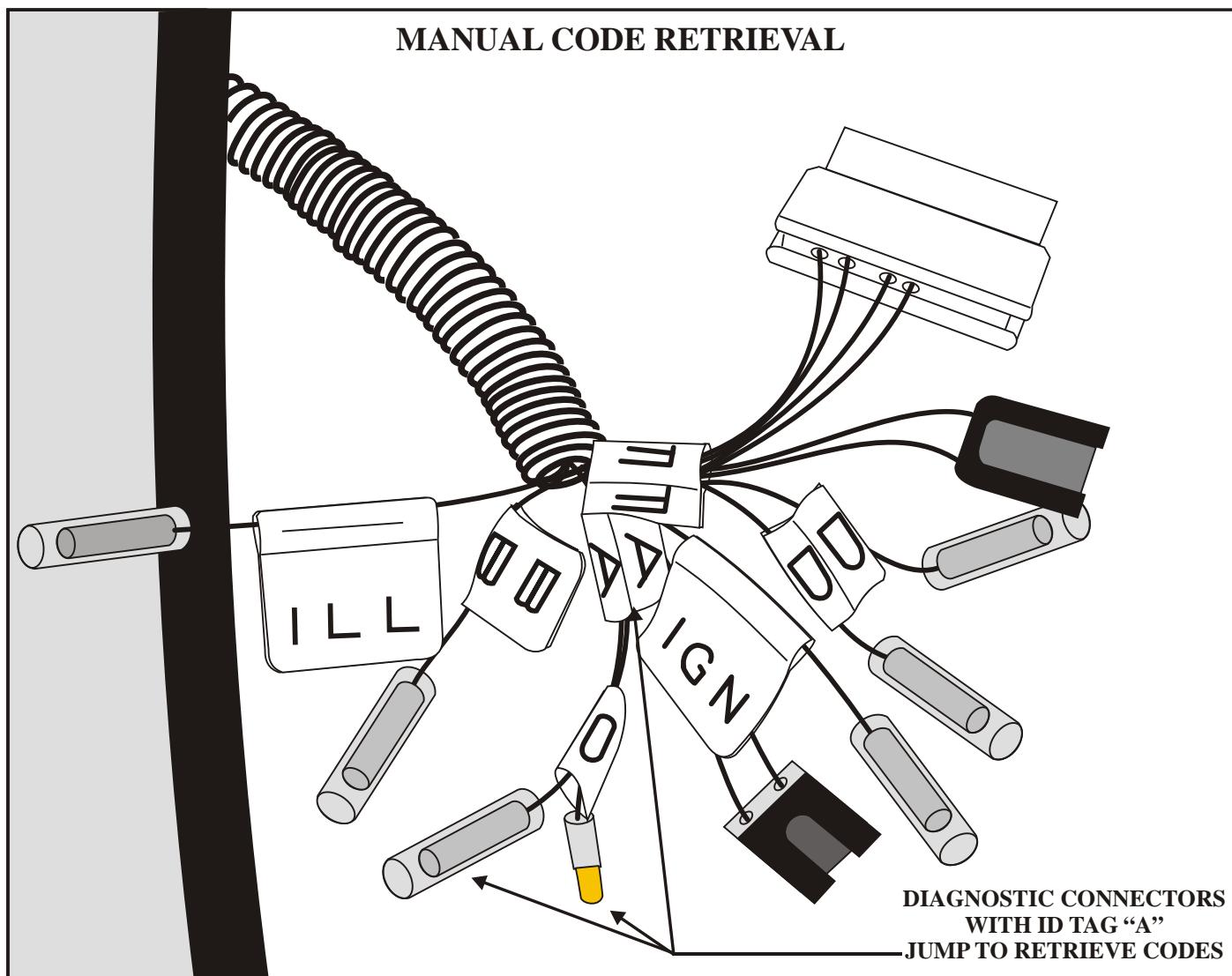


Figure 3

1999-2003 NISSAN UD
MANUAL CODE RETRIEVAL

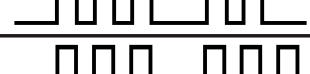
DTC	CODE PATTERN	CODE DESCRIPTION
11		Vehicle Speed Sensor #1 circuit open or shorted (Located on the extension housing)
13		Engine Speed Sensor circuit open or shorted
15		Automatic Transmission Fluid Thermosensor circuit open
17		Inhibitor Switch circuit open or shorted
21		Throttle Position Sensor circuit open or shorted
24		Vehicle Speed Sensor #2 circuit open or shorted (Built into speedometer)
31		Shift Solenoid #1 (S1) circuit open or shorted
32		Shift Solenoid #2 (S2) circuit open or shorted
33		Timing Solenoid (ST) circuit open or shorted
34		Lock-Up Solenoid circuit open or shorted
35		Line Pressure Solenoid circuit open or shorted
37		Exhaust brake system circuit open or shorted

Figure 4

1999-2004 MITSUBISHI FUSO**MANUAL CODE RETRIEVAL**

COMPLAINT: Retrieving codes on 1999-2004 Mitsubishi Fuso tilt cab medium duty trucks equipped with the Aisin Seiki, 450-43LE transmission.

CAUSE: The TCM does not communicate with aftermarket scan tools, data is not available and code retrieval must be done via the flash code method.

CORRECTION: The illustration in figure 1 shows the location of the "**Diagnosis Switch**" and the "**Memory Clear Switch**", *both of which are single pin connectors*.

To retrieve **current** codes do the following:

- 1 - Turn the ignition "ON".
- 2 - Disconnect the "**Diagnosis Switch**". The "**Diagnosis Switch**" connector will have a **Green/Blue** wire on one side of the connector and a **Black** wire on the other side.
- 3 - Watch the transmission warning lamp located below the instrument cluster shown in figure 2 for the flash code pattern and refer to the code charts in figures 4 and 5.

To retrieve **Current and Historical** codes do the following:

- 1 - Turn the ignition "ON".
- 2 - Disconnect the "**Diagnosis Switch**" and the "**Memory Clear Switch**" connector. The "**Memory Clear Switch**" will have a **Black/White** wire on one side of the connector and a **Black** wire on the other side.
- 3 - Watch the transmission warning lamp located below the instrument cluster shown in figure 2 for the flash code patterns and refer to the code charts in figures 4 and 5.

Reading **Diagnostic** codes:

- 1 - The warning lamp will come "ON" when the ignition is turned on for 2.4 seconds, and will then turn "OFF".
- 2 - The "tens" digit is a 1.2 second long flash, and the "ones" digit flash is 0.4 seconds long. The "tens" and "ones" digit are separated by 0.6 seconds.
- 3 - There is a 2.4 second lamp "OFF" time period between codes. Code timing is illustrated in figure 3.

If there is more than one code stored, they will be displayed in numerical order starting with the lowest.

IMPORTANT NOTE: *Each code is repeated three times before going on to the next code.*

After all codes have been displayed, the process will repeat itself.

To **Clear** codes do the following:

- 1 - Keep the "**Diagnosis Switch**" connector connected.
- 2 - Turn the ignition "ON".
- 3 - Disconnect the "**Memory Clear Switch**" connector. After more than one second, reconnect the "**Memory Clear Switch**". After three seconds, all codes will be cleared.

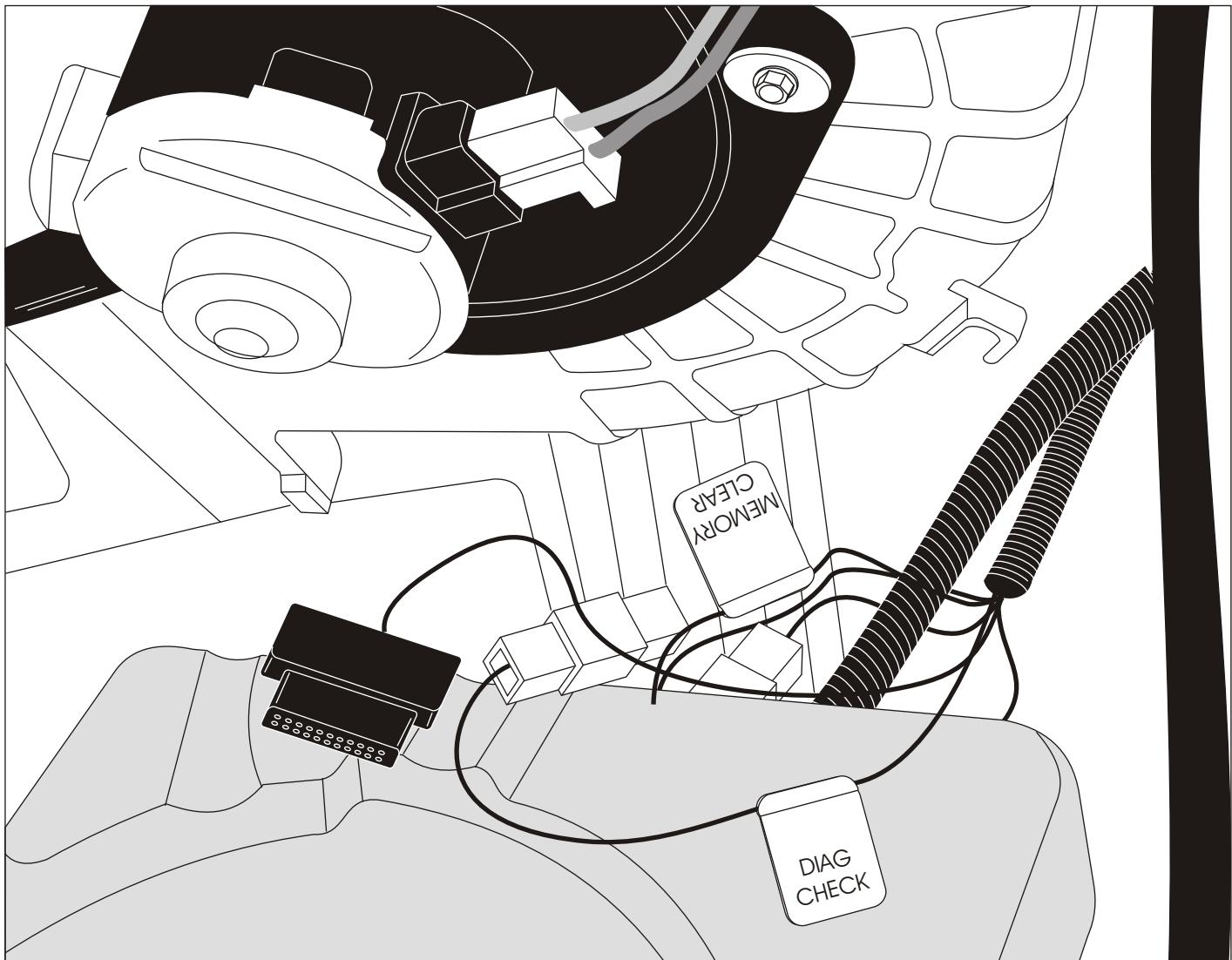
**1999-2004 MITSUBISHI FUSO
MANUAL CODE RETRIEVAL**

Figure 1

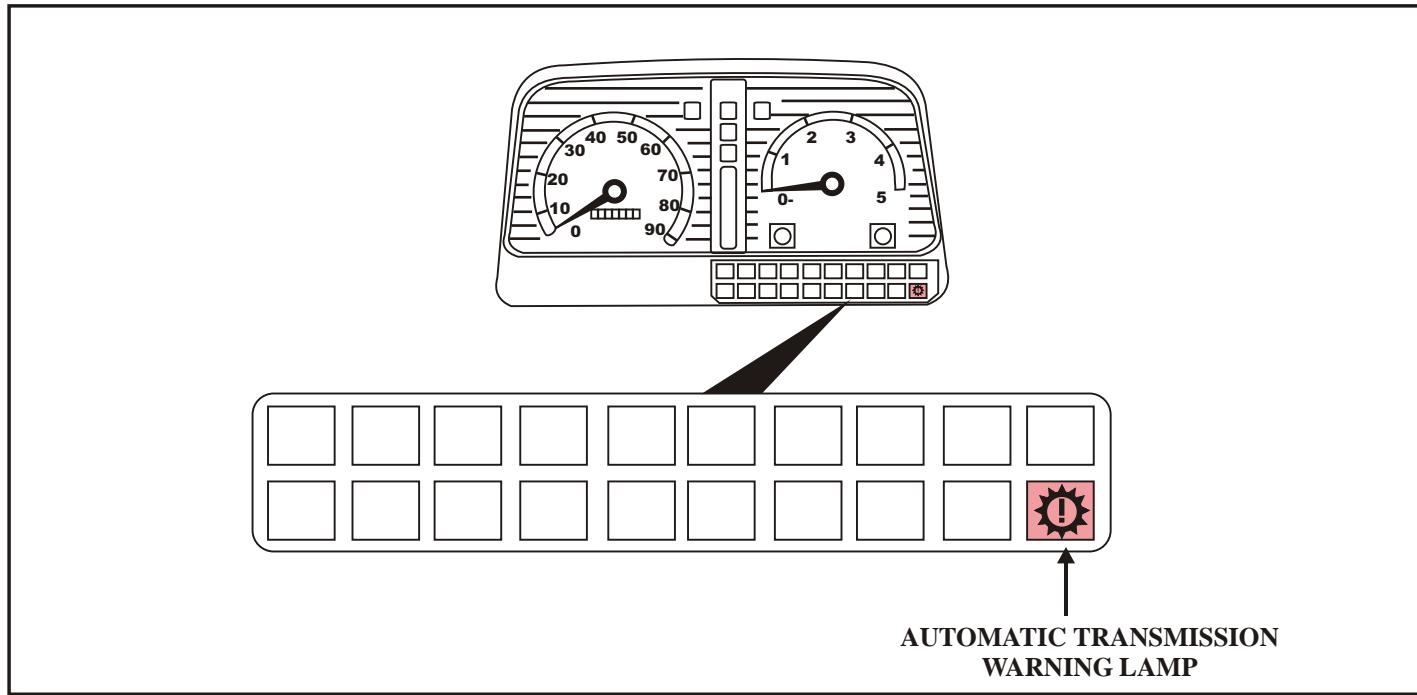
1999-2004 MITSUBISHI FUSO
MANUAL CODE RETRIEVAL


Figure 2

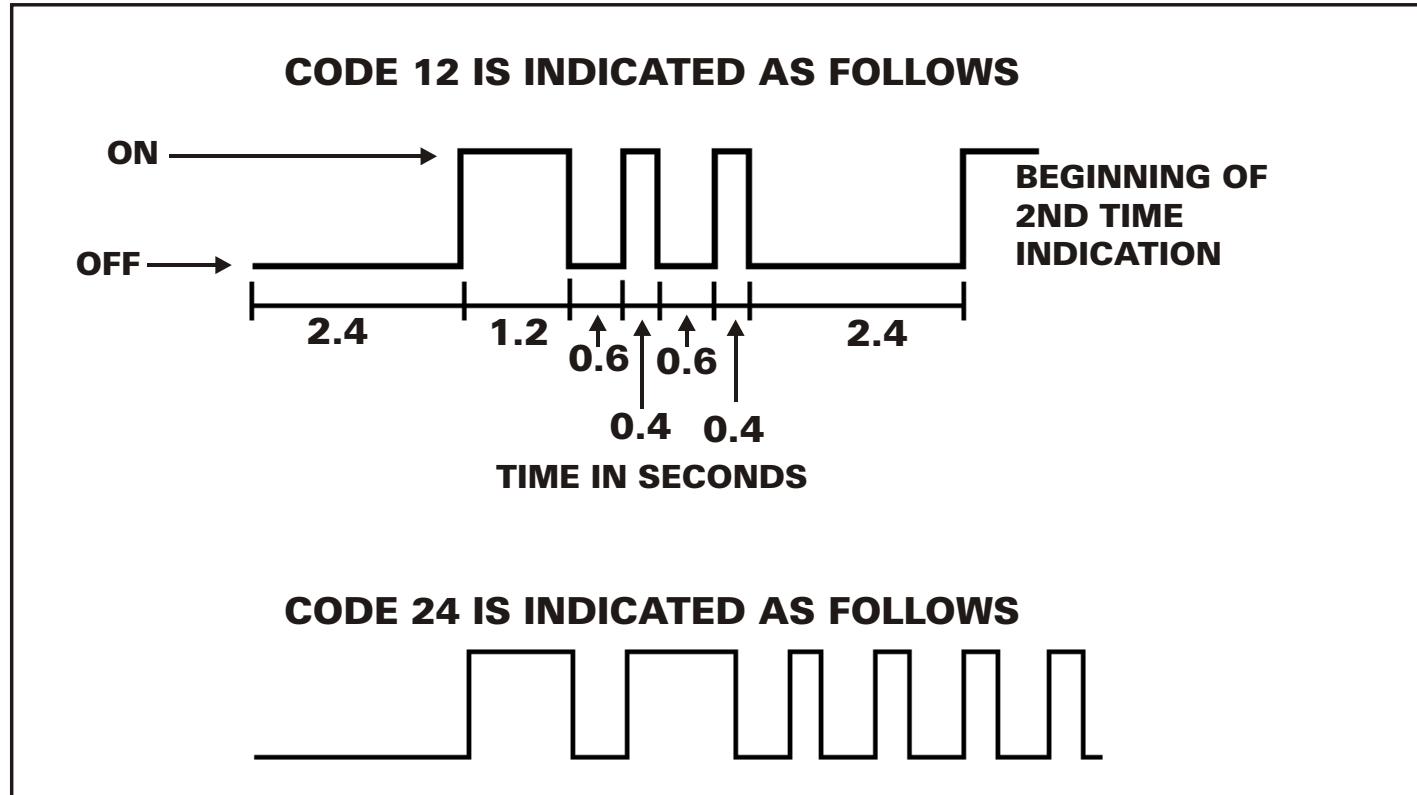


Figure 3

DIAGNOSIS CODE CHART			
DIAGNOSIS CODE	PROBLEM LOCATION	JUDGEMENT CRITERION	FAIL-SAFE MEASURE
01	Normal		
11	Power supply voltage	Power supply voltage remains below 7.5 V for 1 second or longer with range selector in a position other than P or N range.	
12	Vehicle speed sensor 1	Vehicle speed sensor 1 indicates sudden speed decrease.	<ul style="list-style-type: none"> · Maintains the gear selected immediately before malfunction. · Turns off shift solenoids 1 and 2 when engine speed sensor detects a signal or less than 1000 rpm.
13	Oil temperature sensor	When oil temperature of more than 135°C (275°F) or lower than -50°C (-58°F) is detected.	Maximum oil temperature
15	Engine speed sensor	Engine speed sensor detects a value of less than 300 rpm when range selector is in a position other than P or N range and when output shaft rotating speed is 1000 rpm or higher.	Prohibits 2-3 shift timing control.
24	Except FE640	Accelerator sensor	<ul style="list-style-type: none"> · Shift point is set at 0% throttle opening. · Prohibits throttle learning function. · Prohibits 2-3 shift timing control. · Line pressure at maximum. · Lock-up control change.
	FE640		<ul style="list-style-type: none"> · Shift point is set at 0% throttle opening. · Prohibits 2-3 shift timing control. · Executes controls assuming that throttle pressure is at maximum. · Prohibits lock-up control (lock-up solenoid OFF) except during driving at high speeds.
25	Vehicle speed sensor 2	Vehicle speed sensor 2 indicates sudden speed decrease.	<ul style="list-style-type: none"> · Maintains the gear selected immediately before malfunction detection. · Turns off shift solenoids 1 and 2 when engine speed sensor detects a value of less than 1000 rpm.
31	Shift solenoid 1	<ul style="list-style-type: none"> · When solenoid output short circuit occurs while solenoid is receiving current. · When solenoid output disconnection occurs while solenoid is not receiving current. 	<ul style="list-style-type: none"> · Turns off malfunctioning shift solenoid. · Turns off lock-up solenoid and timing solenoid.
32	Shift solenoid 2	<ul style="list-style-type: none"> · When solenoid output short circuit occurs while solenoid is receiving current. · When solenoid output disconnection occurs while solenoid is not receiving current. 	<ul style="list-style-type: none"> · Turns off malfunctioning shift solenoid. · Turns off lock-up solenoid and timing solenoid.
34	Line pressure solenoid	When wire breakage or short circuit occurs.	Turns off line pressure solenoid.
35	Lock-up solenoid	<ul style="list-style-type: none"> · When solenoid output short circuit occurs while solenoid is receiving current. · When solenoid output disconnection occurs while solenoid is not receiving current. 	Turns off lock-up solenoid.
43	Inhibitor switch	No signal	Operates as D range and prohibits shifting to 4th gear.
		Two or more signals	Control function activates based on priority order of L>R>2>D>N(P).

Figure 4
Automatic Transmission Service Group

1999-2004 MITSUBISHI FUSO
MANUAL CODE RETRIEVAL

DIAGNOSIS CODE CHART			
DIAGNOSIS CODE	PROBLEM LOCATION	JUDGEMENT CRITERION	FAIL-SAFE MEASURE
50	PTO solenoid	<ul style="list-style-type: none"> ·When solenoid output short circuit occurs while solenoid is receiving current. ·When solenoid output is cut off while solenoid is not receiving current. 	Turns off PTO solenoid.
51	Timing solenoid	<ul style="list-style-type: none"> ·When solenoid output short circuit occurs while solenoid is receiving current. ·When solenoid output disconnection occurs while solenoid is not receiving current. 	Turns off timing solenoid.
54	Exhaust brake cut-off signal	Exhaust brake activates when exhaust brake cut-off signal is generated.	<ul style="list-style-type: none"> ·Prohibits exhaust brake cut-off control. ·Allows lock-up only at high cruising speed.
58	TPS PWM signal	Malfunction of engine electronic control unit (PWM signal fixed at 1 V or lower).	<ul style="list-style-type: none"> ·Shift point is set at 0% throttle opening. ·Prohibits 2-3 shift timing control. ·Line pressure at maximum. ·Prohibits throttle position learning function.
		Wire breakage or short circuit.	Prohibits throttle position learning function.

Figure 5

AISIN SEIKI 450-43LE**NO THIRD OR REVERSE**

COMPLAINT: After overhaul the transmission has no reverse movement and no third gear.

CAUSE: Located in the upper valve body is the C2 (Direct) Clutch check valve assembly (Refer to Figure 1). This check valve contains a checkball, which, if left out, will cause the above complaint.

This check valve assembly switches C2 clutch application oil to the direct clutch between the "D", third gear circuit and C2 clutch application circuit in the reverse range.

CORRECTION: Refer to the illustration in Figure 1 for the correct C2 clutch check valve. The checkball in the C2 clutch check valve assembly is 6.35mm (.250"), should you need one.

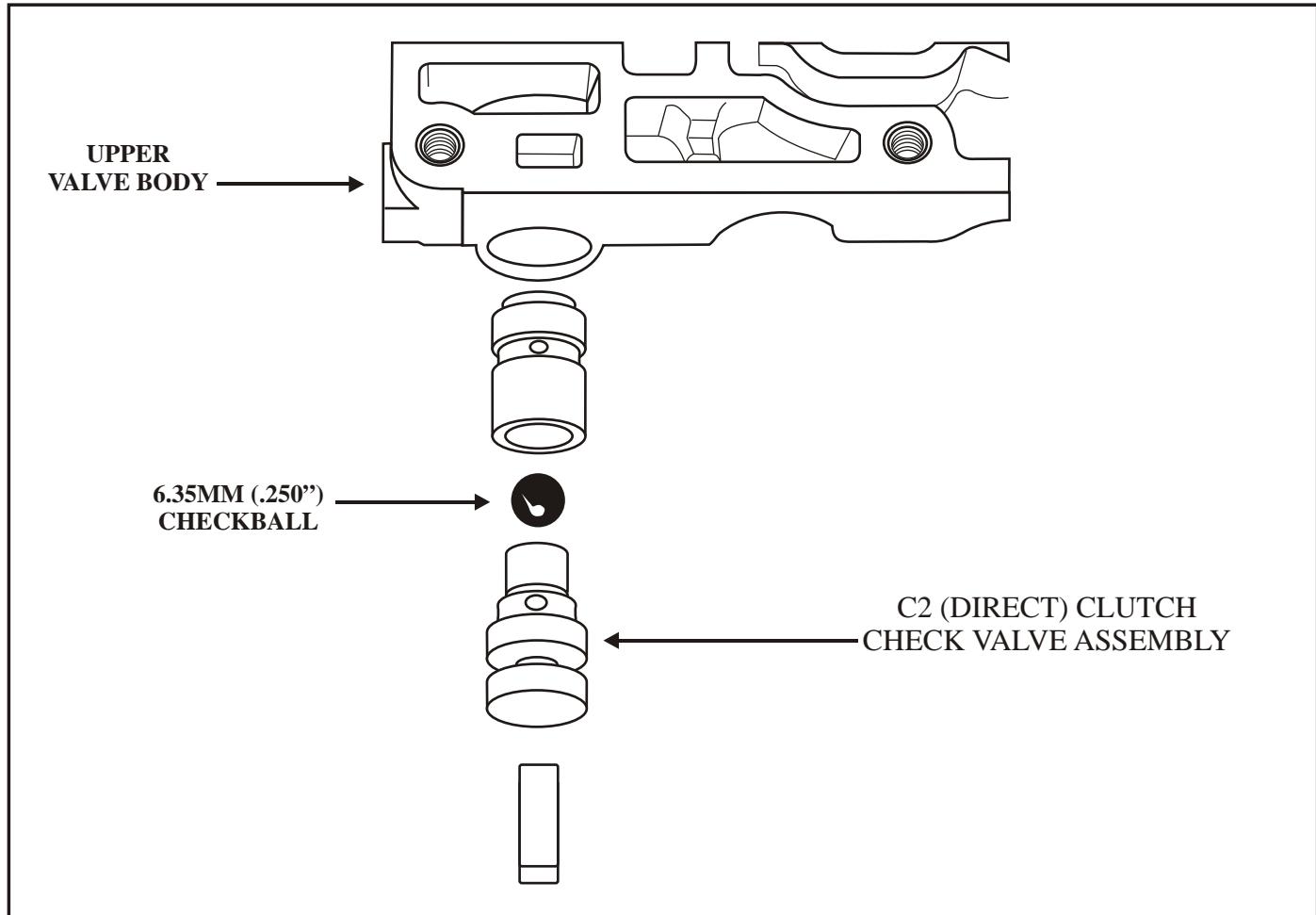
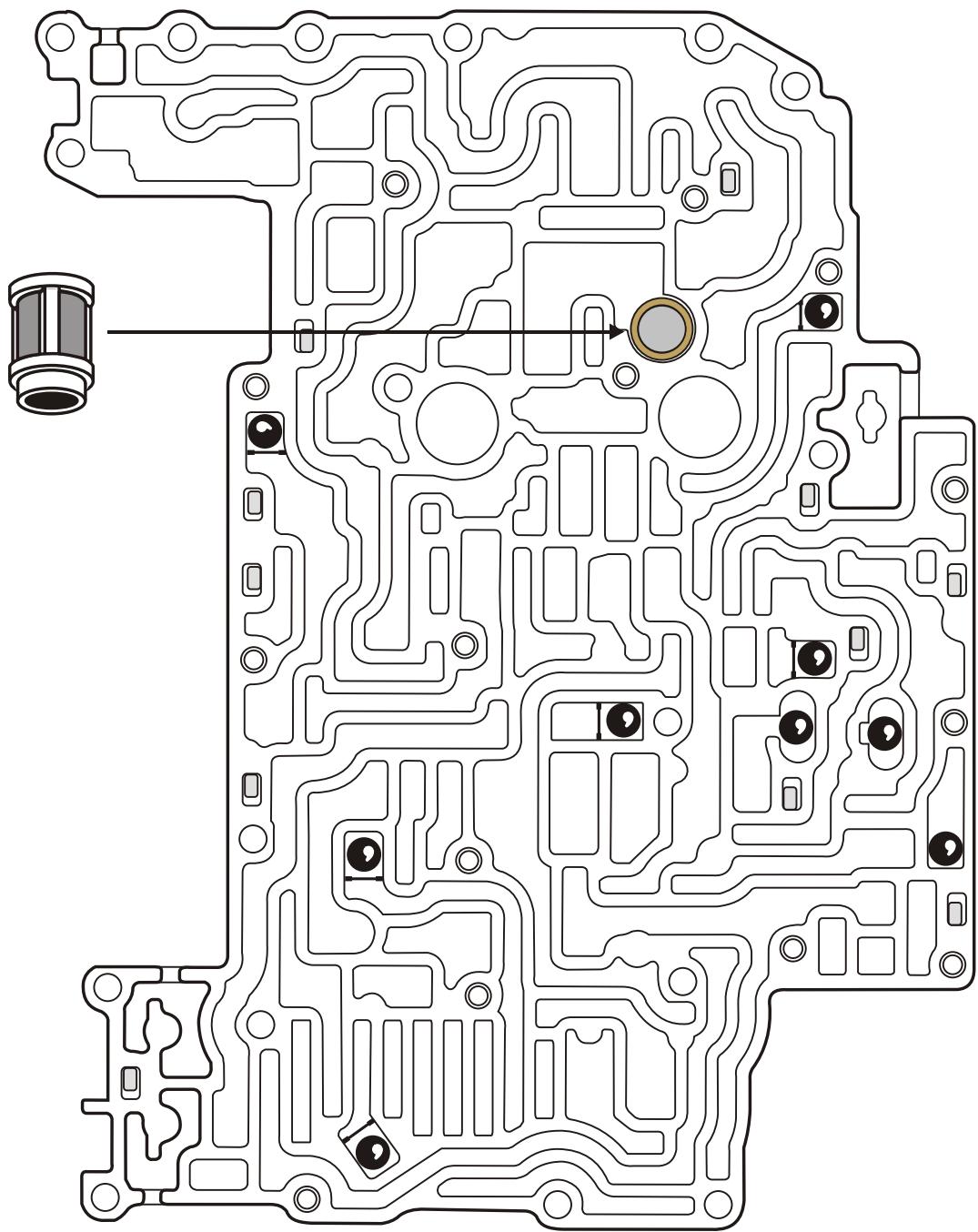


Figure 1

AISIN SEIKI 450-43LE**CHECKBALL LOCATIONS**

THE UPPER VALVE BODY HAS NINE 6.35MM (.250") STEEL CHECKBALLS

Figure 1

AISIN SEIKI 450-43LE

CHECKBALL LOCATIONS

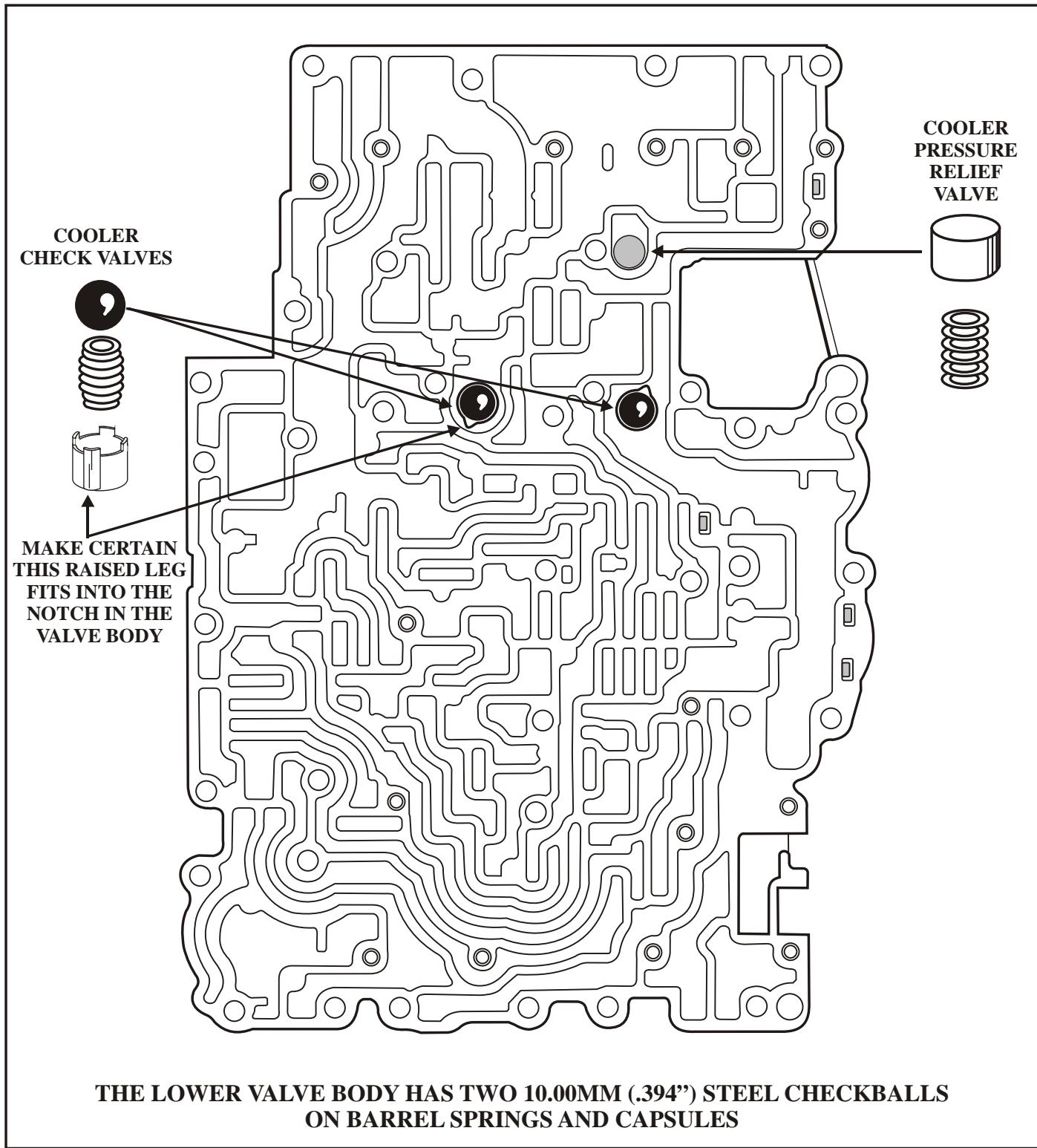


Figure 2

FORD 5R55N NO 4TH OR 5TH GEAR/DELAYED REVERSE ENGAGEMENT

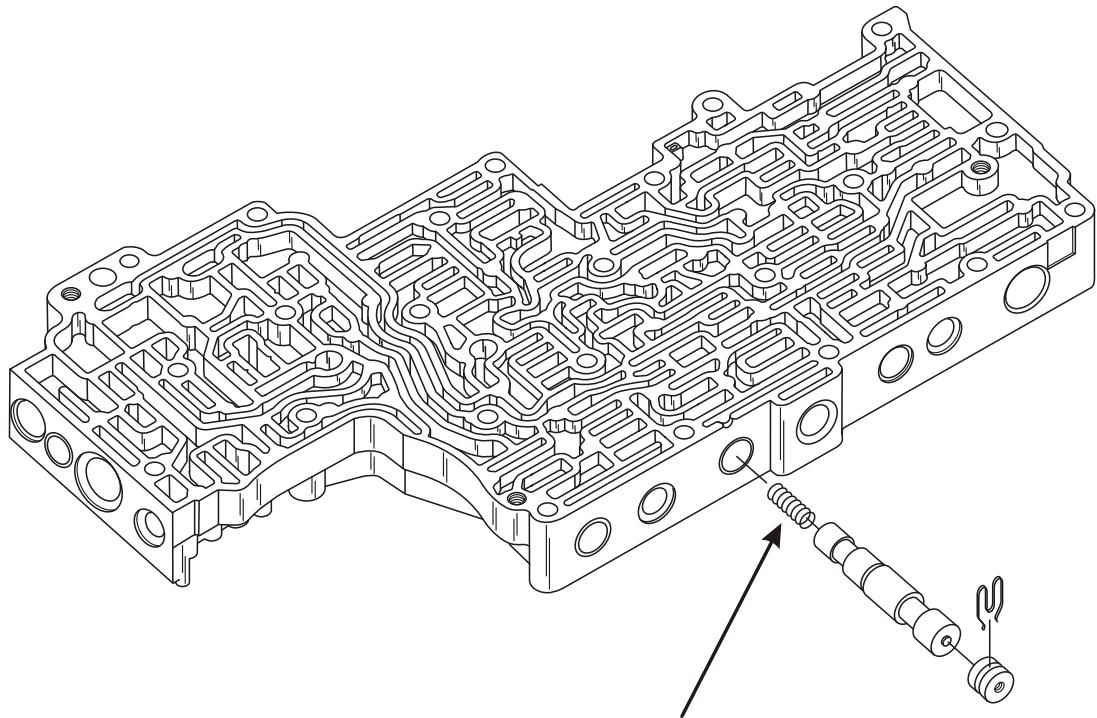
COMPLAINT: No 4th or 5th gear before and/or after overhaul, possible delayed reverse engagement as well. A code P0795 "Pressure Control C Solenoid Circuit" or P0797 "Intermittent Gear Ratio in 4th & 5th" may also be present.

CAUSE: One possible cause is a broken 4-3 Pre-stroke Intermediate Band Control Spring, as shown in Figure 1.

REASON: When the 4-3 Pre-stroke Intermediate Band control spring breaks, the passage to the Direct Clutch is blocked by the valve as shown in partial schematic in Figure 3. See Figure 2 for a partial schematic showing the function of the 4-3 Pre-stroke Intermediate Band Control Valve.

CORRECTION: Replace spring from another 5R55N valve body or find a spring that is as close to the original spring, dimension listed below. Sonnax® will have one available soon under part number 56947J-S1

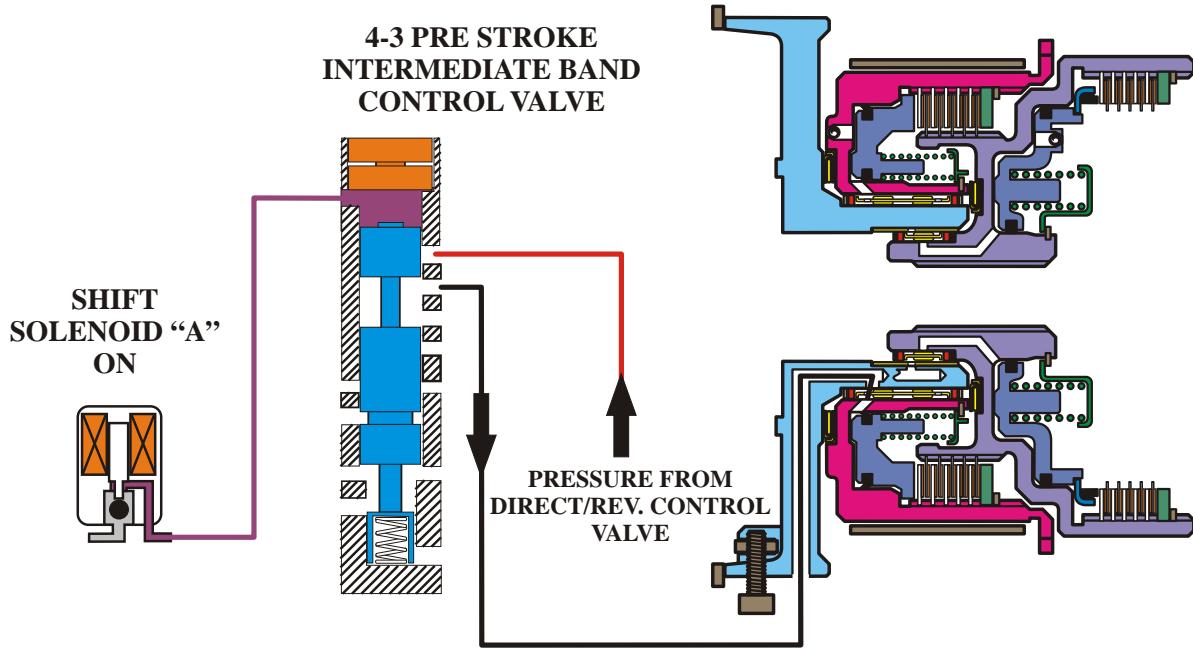
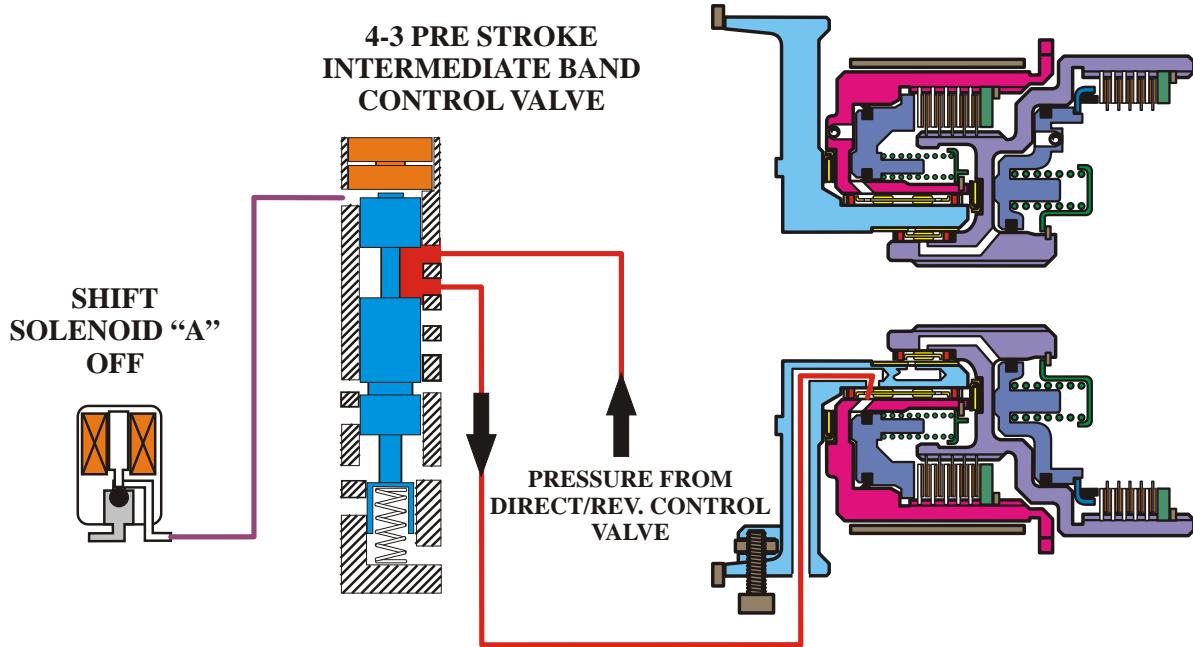
FREE LENGTH	.880"
DIAMETER	.294"
WIRE DIAMETER	.033"



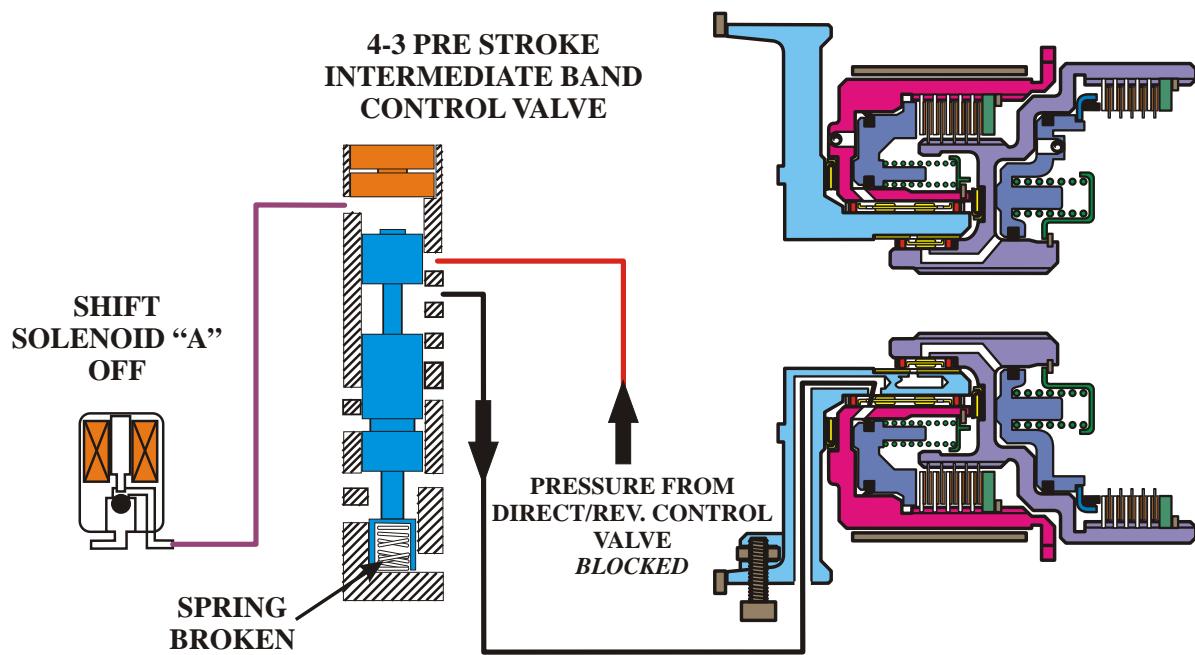
4-3 Pre-stroke Intermediate
Band Control Spring

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Figure 1

**4-3 PRE STROKE INTERMEDIATE BAND CONTROL
VALVE POSITION IN 3rd GEAR**

**4-3 PRE STROKE INTERMEDIATE BAND CONTROL
VALVE POSITION IN 4th AND 5th GEAR**


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**4-3 PRE STROKE INTERMEDIATE BAND CONTROL
VALVE POSITION IN 4th AND 5th GEAR SPRING BROKEN**

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Figure 3

ATEC

FORD 5R55W

EXPLODED VALVE BODY VIEW

Exploded view of the valve body is illustrated in Figure 1 and the legend is found in Figure 1 Legend. The valve retainer locations are illustrated in Figure 2, as some of them are located inboard from the valve body edge.

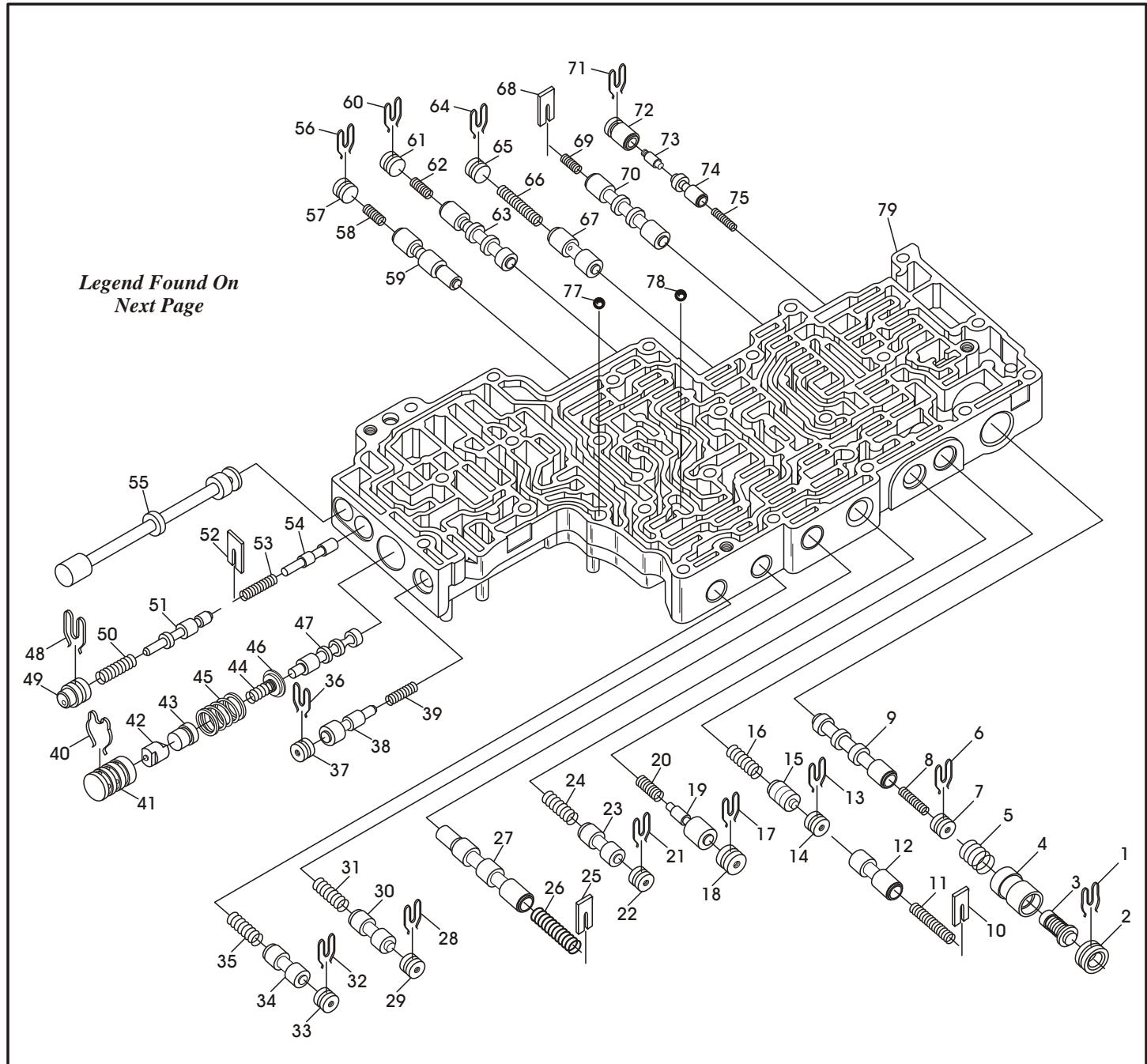


Figure 1

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"2004" SEMINAR INFORMATION VIDEO

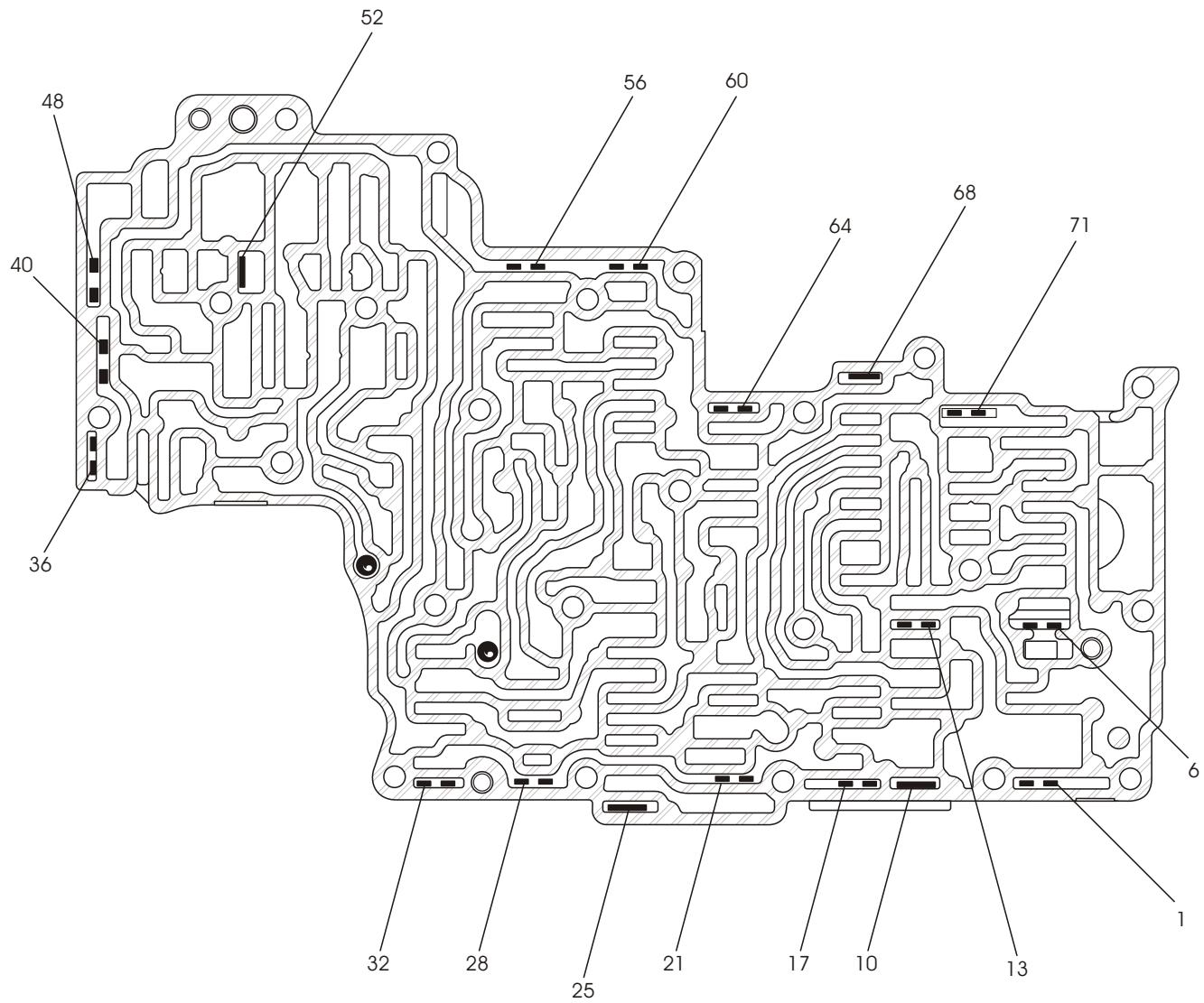
94

FORD 5R55W EXPLODED VALVE BODY VIEW

LEGEND FOR FORD 5R55W VALVE BODY

- | | |
|--|---|
| 1 COOLER BYPASS VALVE RETAINER CLIP | 40 MAIN REGULATOR BOOST VALVE SLEEVE RETAINER CLIP |
| 2 COOLER BYPASS VALVE BORE PLUG | 41 MAIN REGULATOR BOOST VALVE SLEEVE |
| 3 THERMO VALVE ASSEMBLY | 42 MAIN REGULATOR BOOST VALVE |
| 4 COOLER BYPASS VALVE | 43 MAIN REGULATOR BOOST VALVE |
| 5 COOLER BYPASS VALVE SPRING | 44 MAIN REGULATOR BOOST VALVE INNER SPRING |
| 6 CONVERTER CLUTCH CONTROL VALVE RETAINER | 45 MAIN REGULATOR BOOST VALVE OUTER SPRING |
| 7 CONVERTER CLUTCH CONTROL VALVE BORE PLUG | 46 MAIN REGULATOR BOOST VALVE SPRING RETAINER |
| 8 CONVERTER CLUTCH CONTROL VALVE SPRING | 47 MAIN REGULATOR VALVE |
| 9 CONVERTER CLUTCH CONTROL VALVE | 48 CONVERTER LIMIT VALVE RETAINER CLIP |
| 10 COAST CLUTCH CONTROL VALVE RETAINER PLATE | 49 CONVERTER LIMIT VALVE BORE PLUG |
| 11 COAST CLUTCH CONTROL VALVE SPRING | 50 CONVERTER LIMIT VALVE SPRING |
| 12 COAST CLUTCH CONTROL VALVE | 51 CONVERTER LIMIT VALVE |
| 13 CONVERTER CLUTCH BACK PRESSURE VALVE RETAINER CLIP | 52 SOLENOID REGULATOR VALVE RETAINER PLATE |
| 14 CONVERTER CLUTCH BACK PRESSURE VALVE BORE PLUG | 53 SOLENOID REGULATOR VALVE SPRING |
| 15 CONVERTER CLUTCH BACK PRESSURE VALVE | 54 SOLENOID REGULATOR VALVE |
| 16 CONVERTER CLUTCH BACK PRESSURE VALVE SPRING | 55 MANUAL SHIFT CONTROL VALVE |
| 17 VARIABLE FORCE SOLENOID 2 MODULATOR VALVE RETAINER CLIP | 56 REAR SERVO CONTROL VALVE RETAINER CLIP |
| 18 VARIABLE FORCE SOLENOID 2 MODULATOR VALVE BORE PLUG | 57 REAR SERVO CONTROL VALVE BORE PLUG |
| 19 VARIABLE FORCE SOLENOID 2 MODULATOR VALVE | 58 REAR SERVO CONTROL VALVE SPRING |
| 20 VARIABLE FORCE SOLENOID 2 MODULATOR VALVE SPRING | 59 REAR SERVO CONTROL VALVE |
| 21 INTERMEDIATE SERVO RELEASE VALVE RETAINER CLIP | 60 REAR SERVO/INT. SERVO APPLY SELECT VALVE RETAINER CLIP |
| 22 INTERMEDIATE SERVO RELEASE VALVE BORE PLUG | 61 REAR SERVO/INT. SERVO APPLY SELECT VALVE BORE PLUG |
| 23 INTERMEDIATE SERVO RELEASE VALVE | 62 REAR SERVO/INT. SERVO APPLY SELECT VALVE SPRING |
| 24 INTERMEDIATE SERVO RELEASE VALVE SPRING | 63 REAR SERVO/INT. SERVO APPLY SELECT VALVE |
| 25 HIGH CLUTCH CONTROL VALVE RETAINER PLATE | 64 FORWARD ENGAGEMENT CONTROL VALVE RETAINER CLIP |
| 26 HIGH CLUTCH CONTROL VALVE SPRING | 65 FORWARD ENGAGEMENT CONTROL VALVE BORE PLUG |
| 27 HIGH CLUTCH CONTROL VALVE | 66 FORWARD ENGAGEMENT CONTROL VALVE SPRING |
| 28 REVERSE MODULATOR VALVE RETAINER CLIP | 67 FORWARD ENGAGEMENT CONTROL VALVE |
| 29 REVERSE MODULATOR VALVE BORE PLUG | 68 OVERDRIVE SERVO CONTROL VALVE RETAINER PLATE |
| 30 REVERSE MODULATOR VALVE | 69 OVERDRIVE SERVO CONTROL VALVE SPRING |
| 31 REVERSE MODULATOR VALVE SPRING | 70 OVERDRIVE SERVO CONTROL VALVE |
| 32 REVERSE ENGAGEMENT VALVE RETAINER CLIP | 71 TCC MODULATOR CONTROL VALVE RETAINER CLIP |
| 33 REVERSE ENGAGEMENT VALVE BORE PLUG | 72 TCC MODULATOR CONTROL VALVE SLEEVE |
| 34 REVERSE ENGAGEMENT VALVE | 73 TCC MODULATOR CONTROL VALVE |
| 35 REVERSE ENGAGEMENT VALVE SPRING | 74 TCC MODULATOR CONTROL VALVE |
| 36 VARIABLE FORCE SOLENOID 1 MODULATOR VALVE RETAINER CLIP | 75 TCC MODULATOR CONTROL VALVE SPRING |
| 37 VARIABLE FORCE SOLENOID 1 MODULATOR VALVE BORE PLUG | 77 .250" DIAMETER CHECKBALL |
| 38 VARIABLE FORCE SOLENOID 1 MODULATOR VALVE | 78 .250" DIAMETER CHECKBALL |
| 39 VARIABLE FORCE SOLENOID 1 MODULATOR VALVE SPRING | 79 VALVE BODY CASTING |

Figure 1 Legend

FORD 5R55W**EXPLODED VALVE BODY VIEW****FORD 5R55W VALVE BODY RETAINER LOCATIONS**

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Figure 2

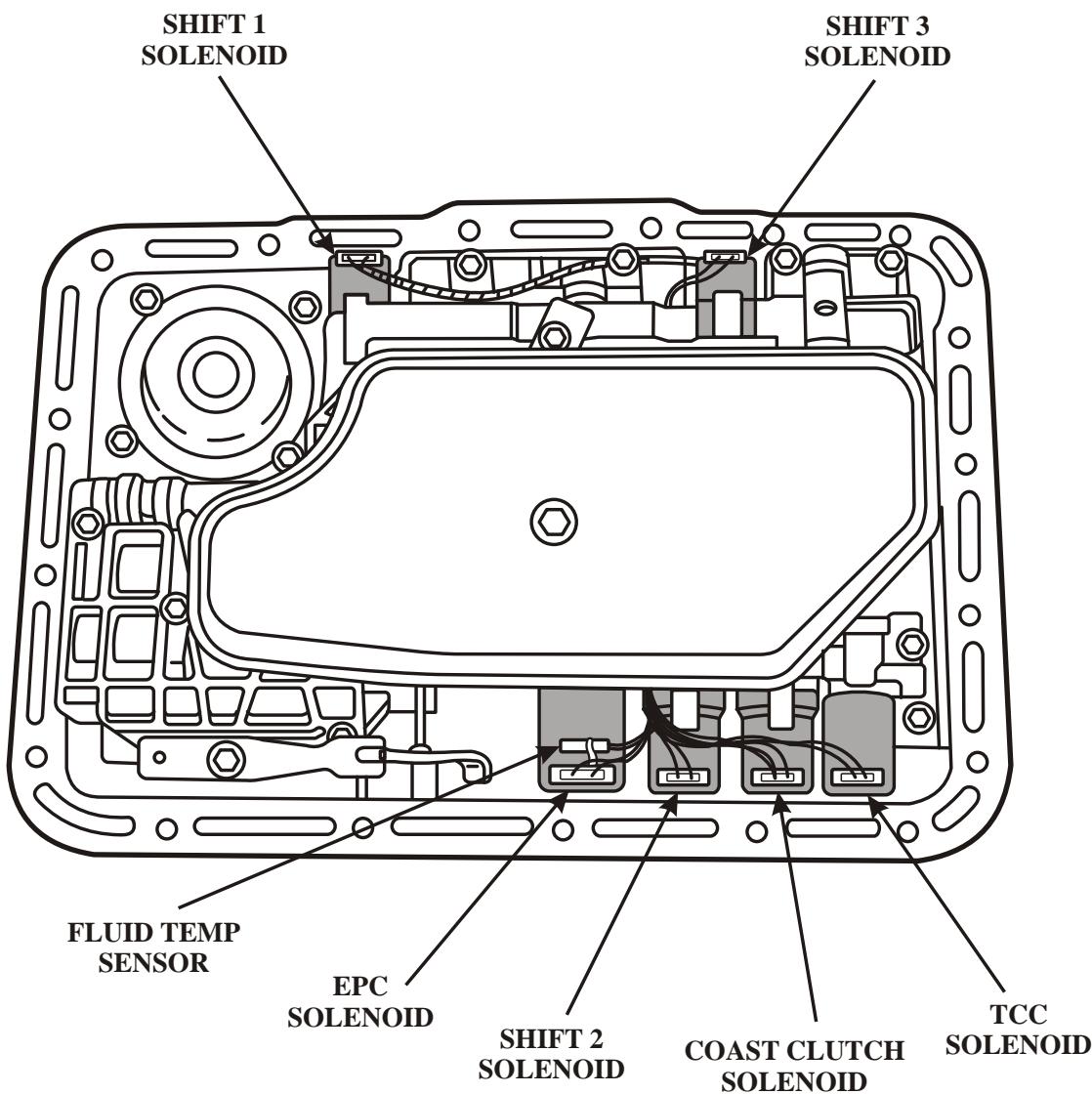
**FORD 5R55E
2-3 FLARE**

COMPLAINT: Some vehicles equipped with the 5R55E transmissions may exhibit a flare on the 2-3 upshift.

CAUSE: One cause may be, a mechanically sticking No. 2 shift solenoid.

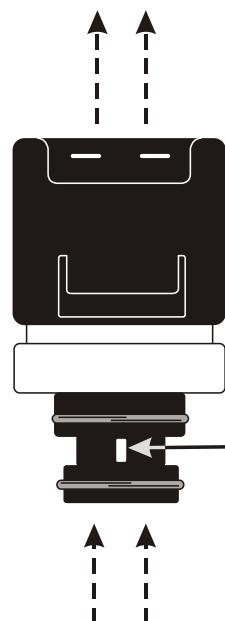
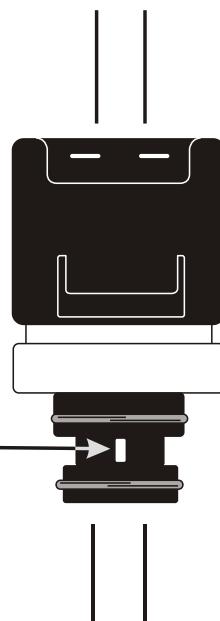
REASON: On a 2-3 up shift the overdrive band has to release and the intermediate band has to apply at the same time. If the No. 2 shift solenoid is stuck open the transmission will fall back to 1st then up shift into 3rd creating the flare shift feeling. Proper operation of shift solenoid is shown in Figure 2

CORRECTION: Replace shift solenoid No. 2 as shown in Figure 1



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Figure 1
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**FORD 5R55E
2-3 FLARE****SHIFT SOLENOID NO. 2 OPERATION****SOLENOID OFF****EXHAUSTED****FROM 2-3
SHIFT VALVE****SOLENOID ON****BLOCKED****TO 2-3
SHIFT VALVE**

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Shift solenoid no. 2 is a normally open solenoid, when it is off oil from the 2-3 shift valve exhausts out the back. When the solenoid is on the exhaust closes and the 2-3 shift valve is stroked.

Figure 2



FORD 4R44E/55E AND 5R44E/55E FLARED SHIFTS AND/OR GEAR RATIO ERROR CODES

COMPLAINT: Before and/or after overhaul, 1995-2002 vehicles equipped with the 4R44E/55E or 5R44E/55E transmissions, may exhibit soft or flared shifts as well as multiple gear ratio error codes or solenoid performance codes.

CAUSE: The cause may be, insufficient pressure rise.

CORRECTION: To correct this condition, install the "Throttle Kit" as shown below and in Figure 1. This new service kit **requires** the use of a "*new*" spacer plate with the EPC blow-off hole eliminated, as per Ford Motor Company bulletin number 02-13-8, and shown in Figure 1.

- (1) Remove and discard the bore plug and retaining clip from the Forward Modulating Valve bore, as shown in Figure 1.
- (2) Install the new design bore plug and retaining clip in the Forward Modulating Valve bore, as shown in Figure 1. The new design bore plug now incorporates the EPC blow-off ball and spring, as shown in Figure 1.
- (3) Remove and discard the previous design EPC ball and spring from its location in the valve body, as shown in Figure 1.
- (4) Remove and discard the EPC limit screen from its location in the valve body, as shown in Figure 1.
- (5) Install a *new* spacer plate, available from Ford Motor Company, that has hole number 50 eliminated, as shown in Figure 1. Refer to Figure 2 to choose the proper spacer plate to ensure the correct calibration for the vehicle that you are working on.

Special Note: Inspect the new spacer plate to ensure that the hole has been eliminated, before you install it on valve body.

SERVICE INFORMATION:

Throttle Kit	1L5Z-7M203-JB
Spacer Plate	Refer To Figure 2

SPECIAL THANKS
TO: JOHN PARMENTER

FORD 4R44E/55E AND 5R44E/55E FLARED SHIFTS AND/OR GEAR RATIO ERROR CODES

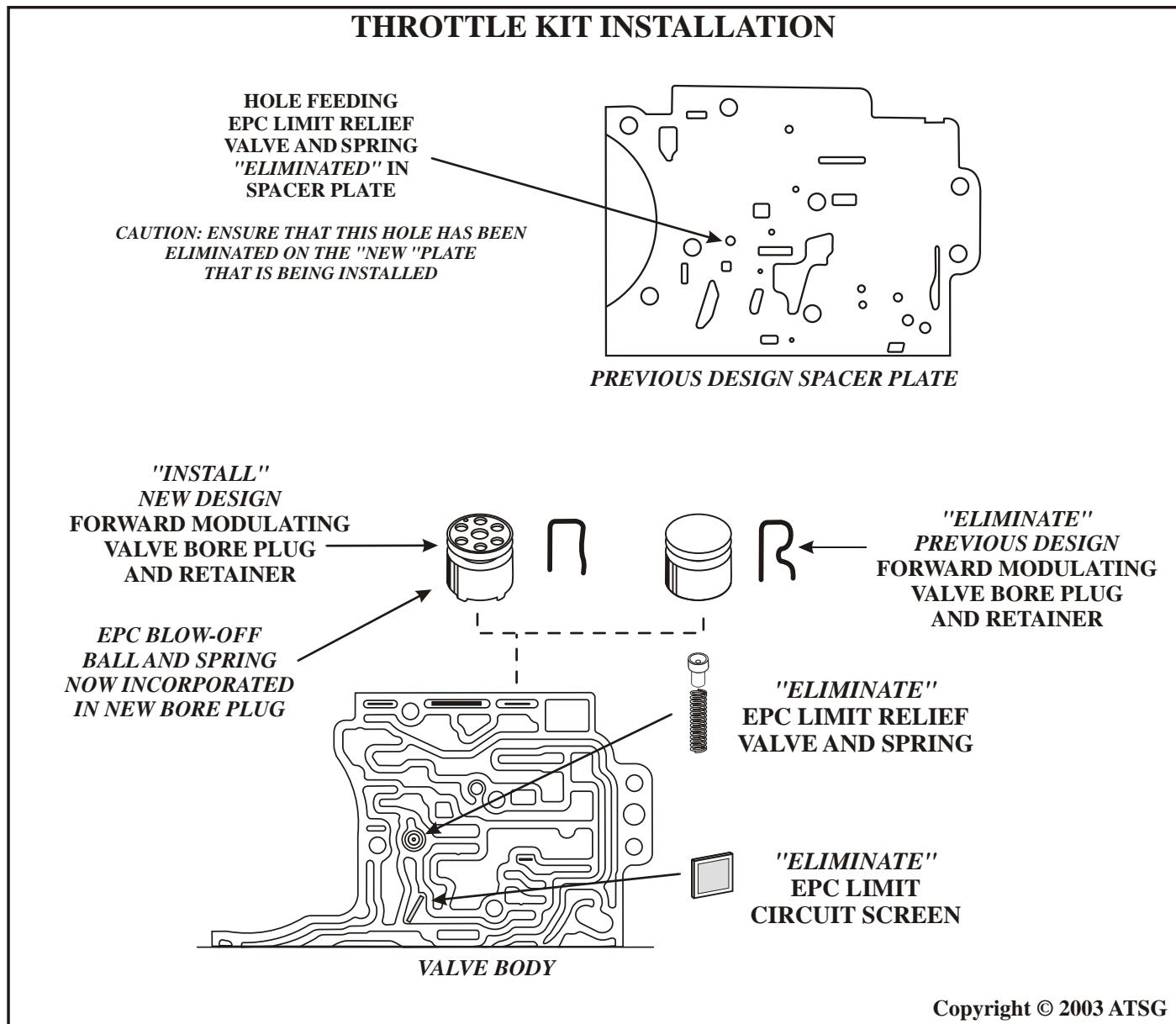


Figure 1



"2004" SEMINAR INFORMATION VIDEO

100

FORD 4R44E/55E AND 5R44E/55E FLARED SHIFTS AND/OR GEAR RATIO ERROR CODES

VEHICLE APPLICATION	SPACER PLATE NO.
95-96 ALL MODELS	F5TZ-7A008-CA
97 2.3L & 3.0L (OHV) RANGER/AEROSTAR	F77Z-7A008-AB
97 4.0L RANGER/AEROSTAR (OHV)	F77Z-7A008-CB
97 4.0L EXPLORER/MOUNTAINEER (OHV)	F77Z-7A008-DB
97 4.0L EXPLORER/MOUNTAINEER (SOHC)	F77Z-7A008-EB
NOTE: ALL OF THE SPACER PLATES LISTED ABOVE REQUIRE FORD PART NO. 2L5Z-7C155-AA AND 2L5Z-7D100-BA SPACER PLATE GASKETS	

VEHICLE APPLICATION	SPACER PLATE NO.
98-01 2.5 RANGER	1L5Z-7Z490-DA
98-00 3.0L RANGER	1L5Z-7Z490-EA
98-00 4.0L EI RANGER	1L5Z-7Z490-FA
98-00 4.0L EI EXPLORER	1L5Z-7Z490-GA
98-00 4.0L SOHC	1L5Z-7Z490-HA
NOTE: ALL OF THE SPACER PLATES LISTED ABOVE HAVE THE GASKETS BONDED TO THE SPACER PLATE	

VEHICLE APPLICATION	SPACER PLATE NO.
01-02 2.3L RANGER	1L5Z-7Z490-AA
01-02 3.0L RANGER	1L5Z-7Z490-BA
01-02 4.0L SOHC	1L5Z-7Z490-CA
NOTE: ALL OF THE SPACER PLATES LISTED ABOVE HAVE THE GASKETS BONDED TO THE SPACER PLATE	

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Figure 2

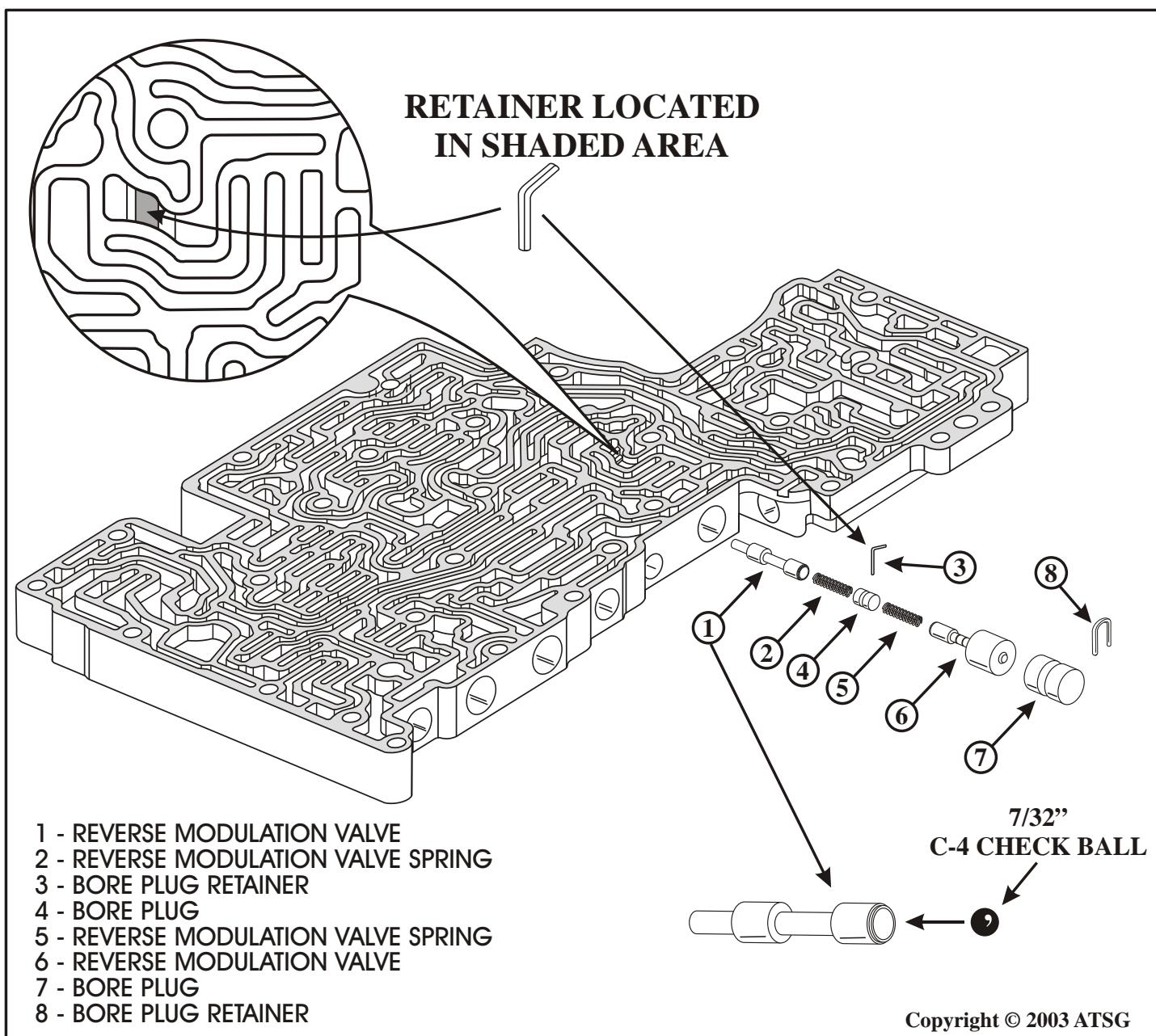
**FORD 4R44E/4R55E/5R55E
DELAYED REVERSE ENGAGEMENT**

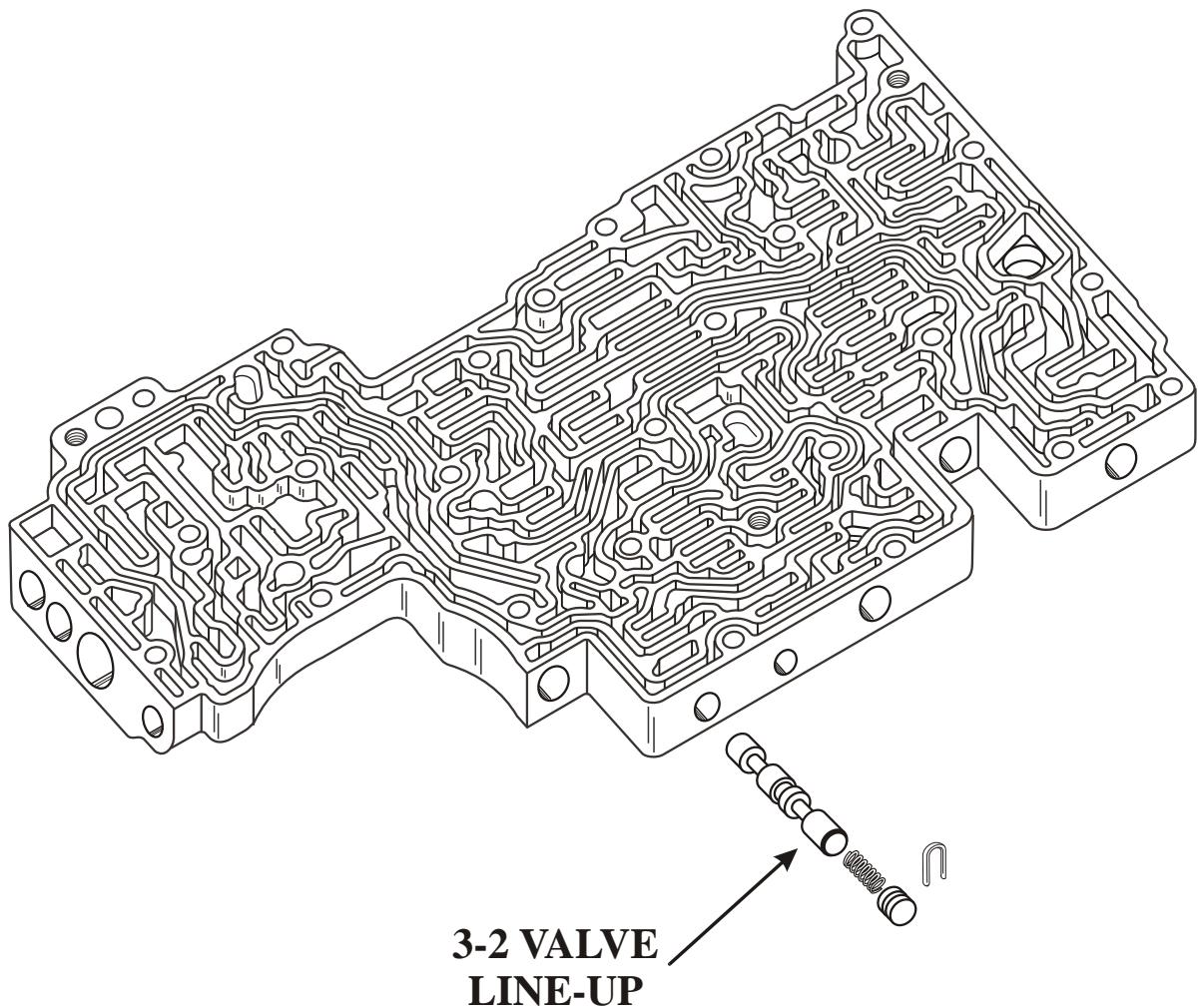
COMPLAINT: Some vehicles equipped with the 4R44E/4R55E/5R55E transmissions may exhibit a delayed engagement in reverse and no engine braking in manual low.

CAUSE: One cause may be, a weak reverse modulation valve spring.

CORRECTION: Install a 7/32" (C-4) check ball in the end of the reverse modulation valve as shown in Figure 1, to use as a shim to increase spring tension.

SERVICE TIP: If bore plug No. 4 is difficult to remove, remove the 3-2 valve line-up on the opposite side of the valve body (Figure 2) and gently tap out the reverse modulation valve with a long 5/32 pin punch until the bore plug pops out.



**FORD 4R44E/4R55E/5R55E
DELAYED REVERSE ENGAGEMENT**

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Figure 2



FORD / MAZDA 4F27E / FN4A-EL DTC P0741, TCC STUCK "OFF"

COMPLAINT: Ford or Mazda vehicles equipped with the 4F27E or FN4A-EL transaxles, may exhibit a trouble code P0741 Torque Converter Clutch Stuck "OFF" trouble code, before or after overhaul.

CAUSE: The cause may be, the bushings in the rear of the Pump Stator are worn causing a loss of Converter apply oil, as shown in the cut-away in Figure 1 , when the TCC is applied.

NOTE: *When the stator bushings wear, Torque Converter Clutch Apply pressure will be exhausted thru the already exhausting Torque Converter Release pressure.*

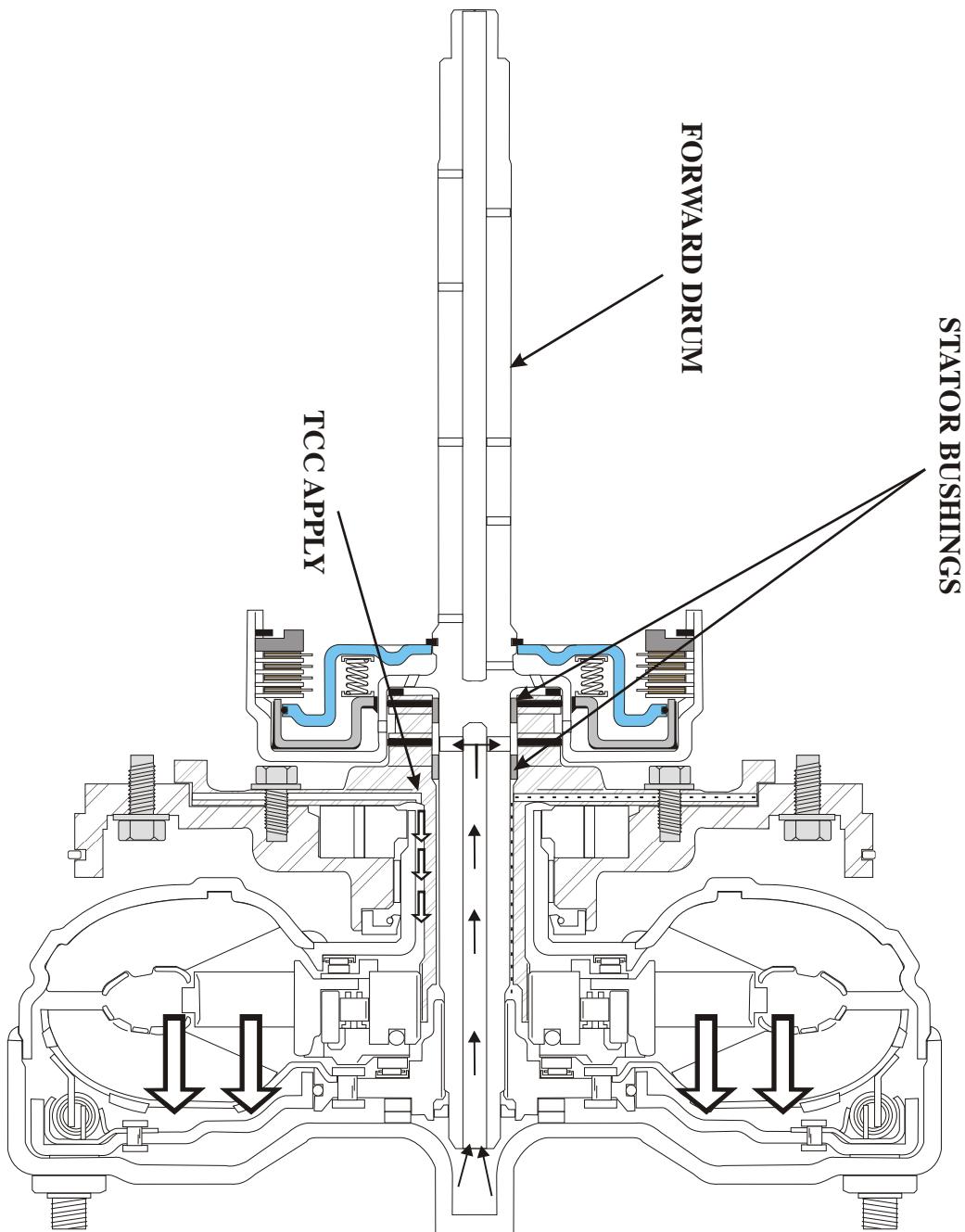
CORRECTION: Refer to Figure 2 for the identification of the Turbine shaft and Stator passages. Refer to Figure 3 to air check the Turbine Shaft to ensure that the bushings are worn. Refer to Figure 4 for the location of the Stator bushings. If stator does not pass the air check as shown in Figure 3, the stator bushings must be replaced.

NOTE: *At the time of this printing the only bushings available are in the stator of a complete pump assembly, available thru Ford Motor Company.*

SERVICE INFORMATION:

PUMP ASSEMBLY (Ford Part number).....3S4Z-7A103-AA

*Special thanks to
Newark, Deleware Deltrans*

TORQUE CONVERTER APPLIED


NOTE: Wear in the Stator bushings may cause a loss of TCC Apply Pressure to the already exhausting TCC Release Pressure, creating TCC slip.

LEGEND	
↑	TCC APPLY PRESSURE
↓	TCC RELEASE PRESSURE
-----	TO COOLER

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Figure 1
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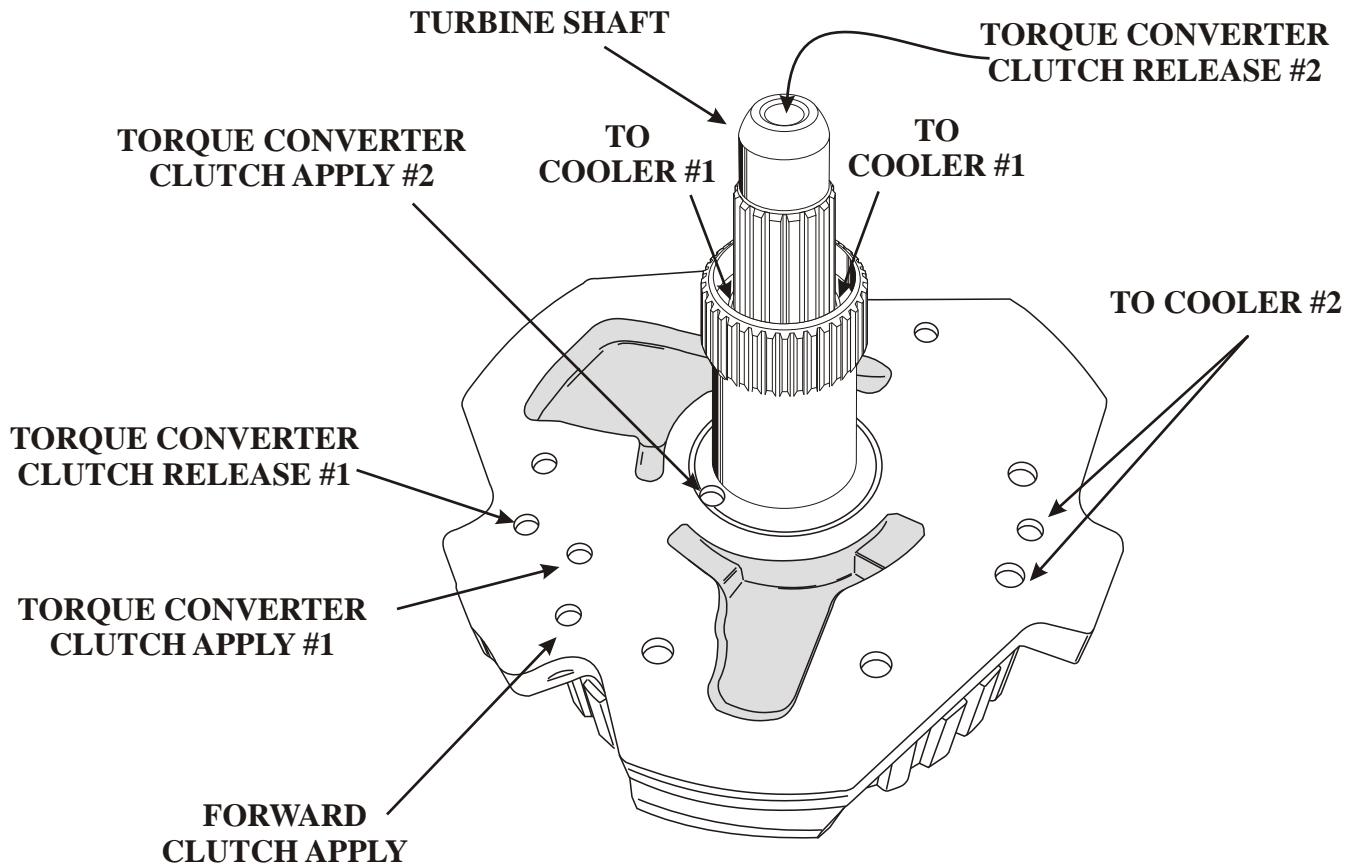
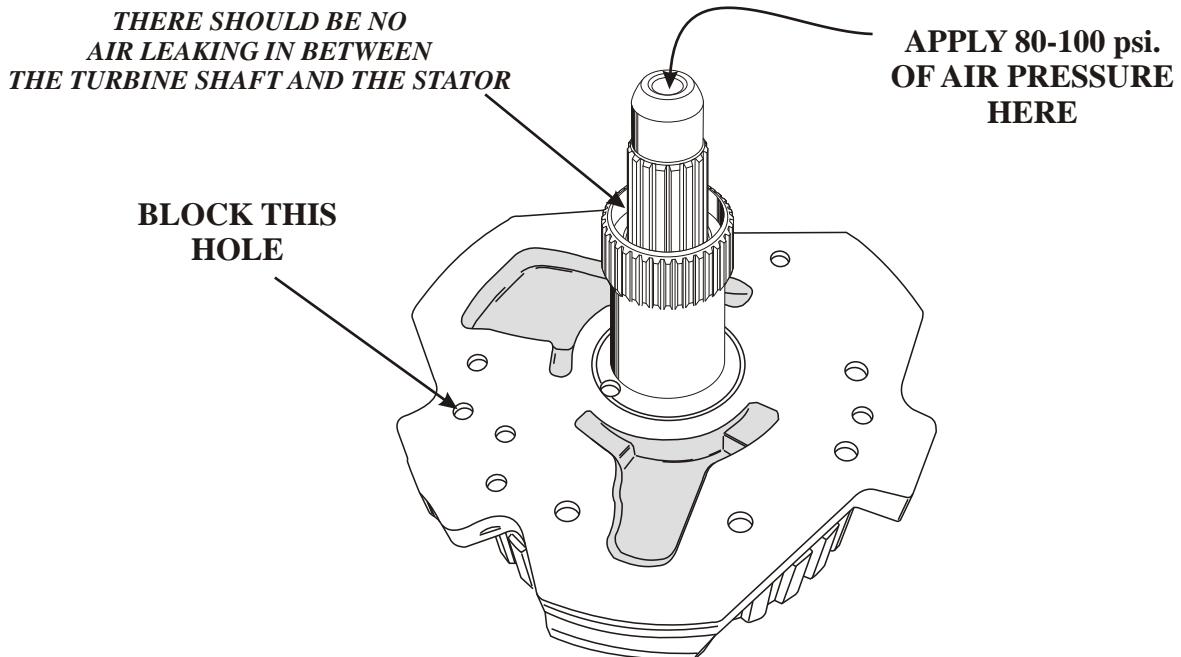
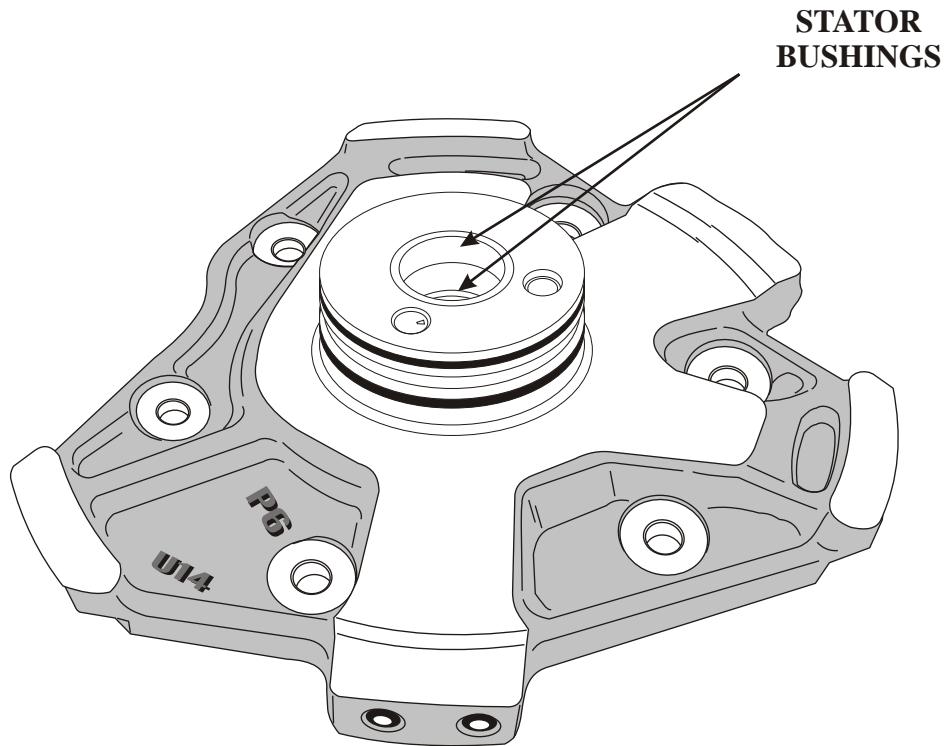
STATOR PASSAGE IDENTIFICATION


Figure 2

AIR CHECKING THE STATOR BUSHINGS


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Figure 3
Automatic Transmission Service Group

STATOR BUSHING LOCATIONS

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Figure 4

**FORD / MAZDA
4F27E / FN4A-EL****DELAY IN "D" OR PREMATURE FORWARD CLUTCH FAILURE**

COMPLAINT: Ford or Mazda vehicles equipped with the 4F27E or FN4A-EL transaxles, may exhibit a Delayed Forward engagement or Premature Forward Clutch failure.

CAUSE: The cause may be, a rough finish inside of the Forward Clutch Drum surface, as shown in Figure 2, wearing the bonded piston seals down, creating a leak in the Forward Clutch circuit.

CORRECTION: To correct this condition, polish the inside of the Forward Clutch drum with Scotchbrite® or fine Emery paper to smooth out the bonded piston seal contact surfaces, and replace the Forward Piston, as shown in Figure 1.

SERVICE INFORMATION:

FORWARD CLUTCH BONDED PISTON (Ford Part number).....XS4P-7A262-CC

FORWARD CLUTCH BONDED PISTON

**BONDED PISTON SEALS
WEAR OFF HERE**

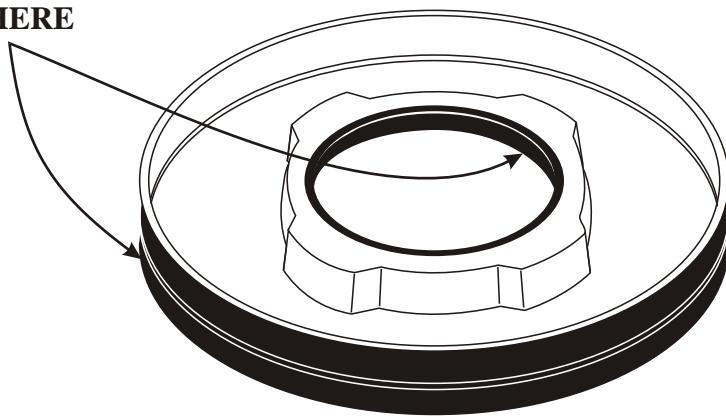


Figure 1

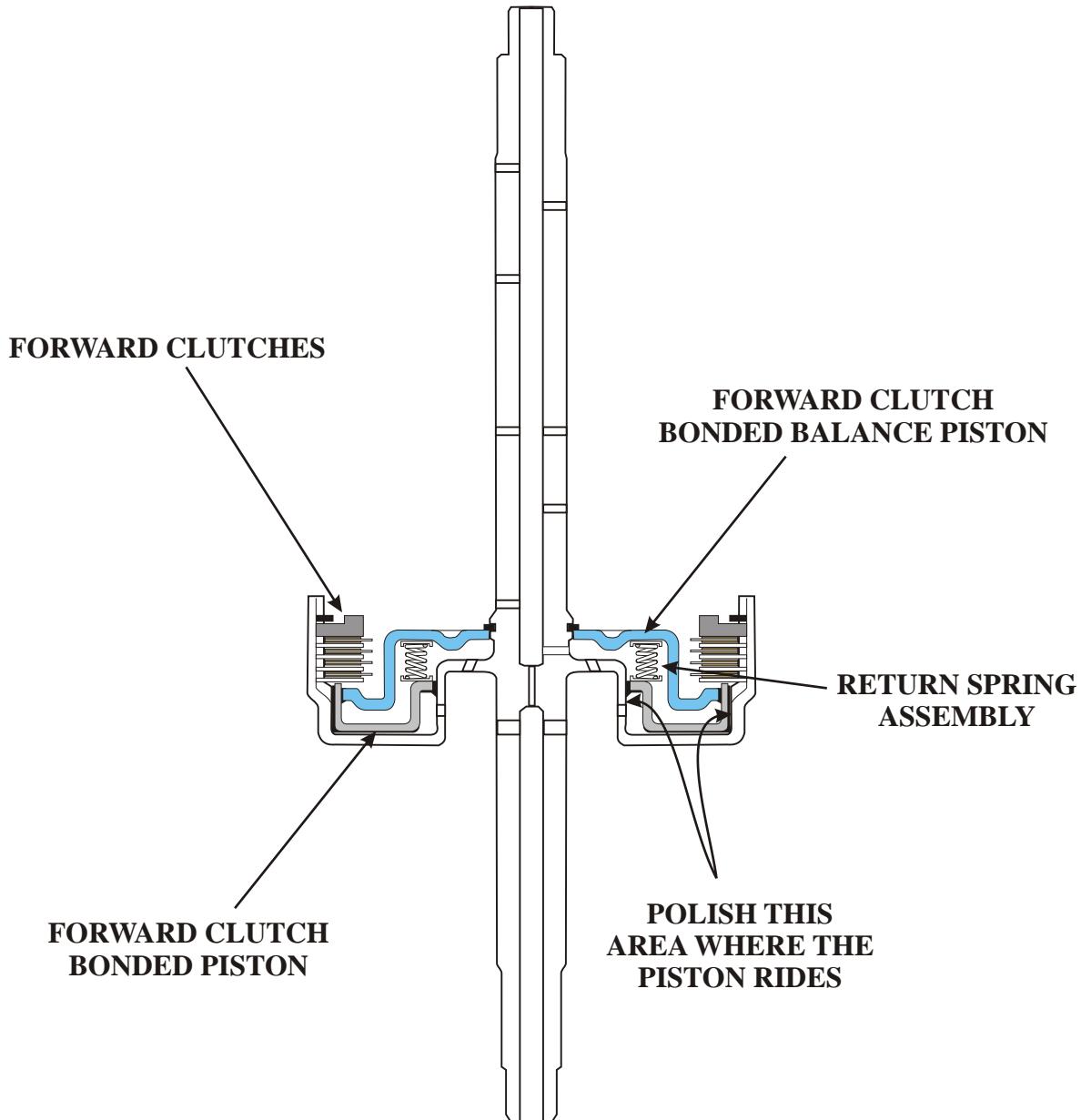
FORWARD DRUM ASSEMBLY

Figure 2

Automatic Transmission Service Group

FORD 4F27E

FAILURE DUE TO LACK OF LUBE

COMPLAINT: Before or after overhaul, Ford vehicles equipped with the 4F27E transaxle may exhibit Failure due to Lack of Lubrication.

CAUSE: The cause may be, a restricted Transmission Oil Cooler limiting the amount of lubrication oil, which is fed to the rear case fitting as shown in Figure 2. The Direct/Reverse Drum bushing and the Sealing Ring Journal on the Rear Cover are the most common failures with lack of Lubrication. See Figure 3 for a Cross-Sectional view of the Lube Circuit.

CORRECTION: Replace the External Transmission Oil Cooler as shown in Figure 1. NOTE: This cooler is extremely hard to flush and should be replaced according to Ford Motor Company.

SERVICE INFORMATION:

TRANSMISSION OIL COOLER.....XS4Z-7A095-BA

TRANSMISSION OIL COOLER

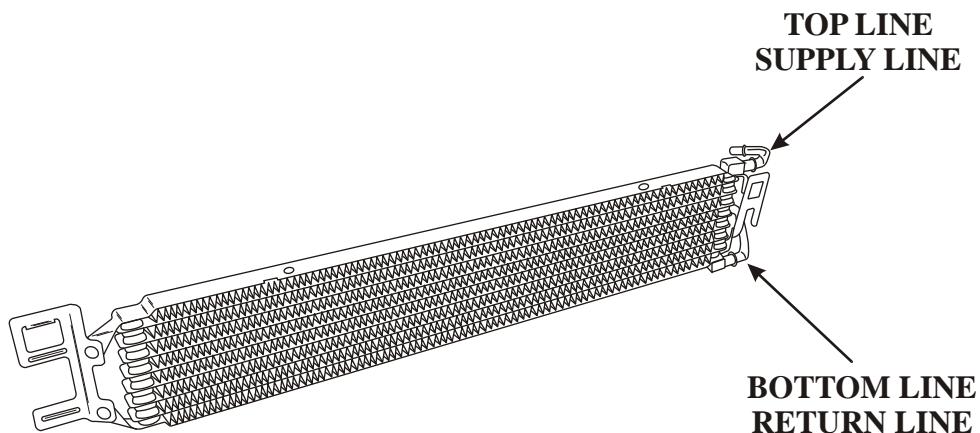


Figure 1
Automatic Transmission Service Group

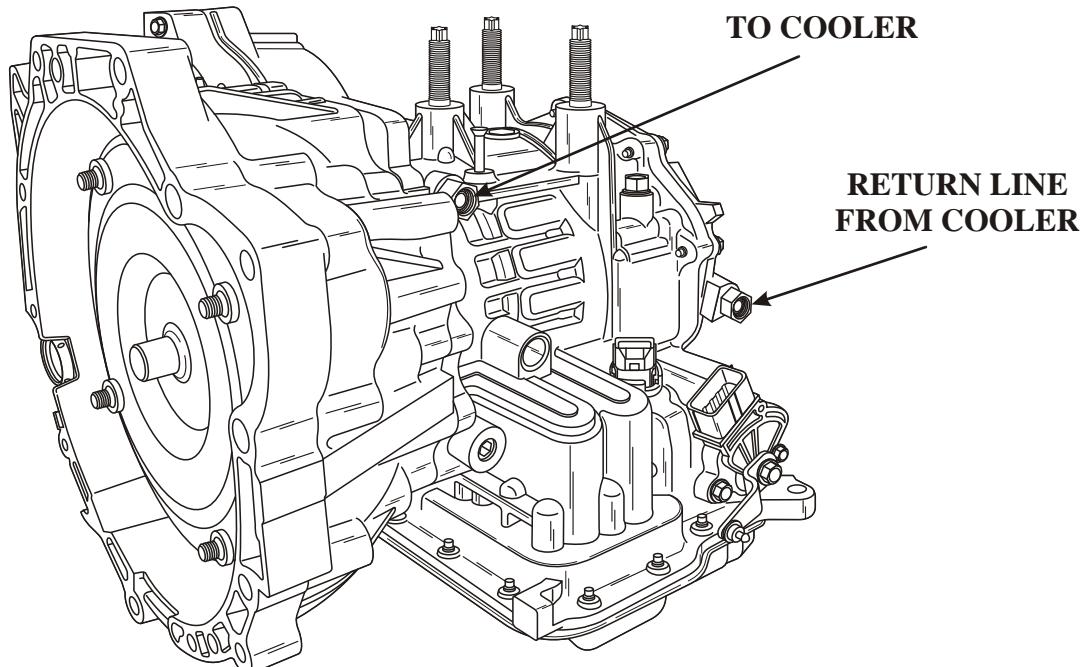
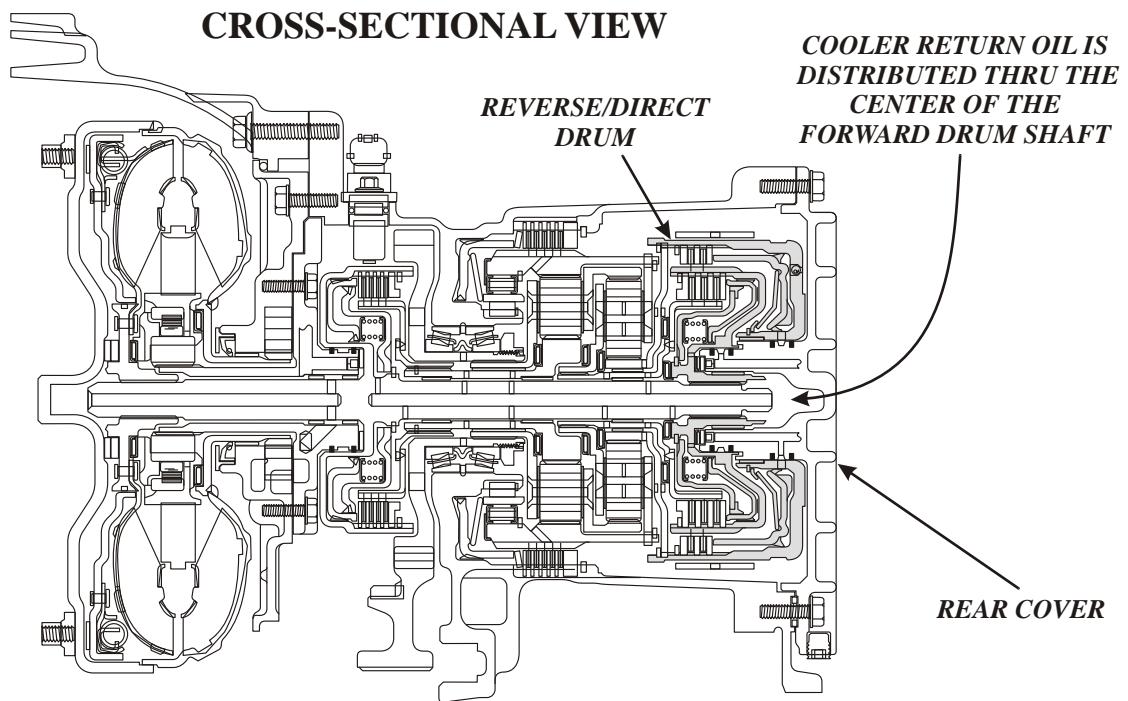
COOLER FITTING IDENTIFICATION

Figure 2

CROSS-SECTIONAL VIEW

**BUSHING FAILURE IN THE REVERSE/DIRECT DRUM ALONG WITH
FAILURE OF THE SEALING RING JOURNAL ON THE BACK COVER ARE NORMALLY
CAUSED FROM A RESTRICTED COOLER**

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Figure 3
Automatic Transmission Service Group

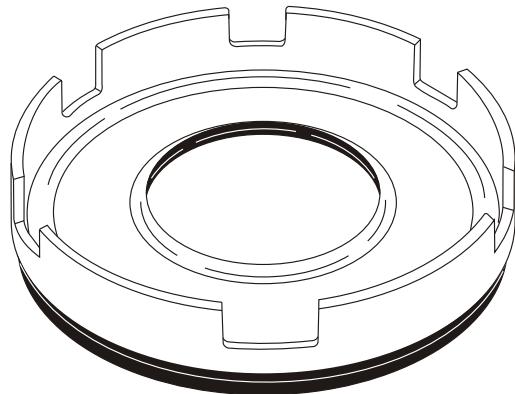
**FORD / MAZDA
4F27E / FN4A-EL
REVERSE CLUTCH PISTON USAGE**

Currently there are two different Reverse bonded pistons available.

Figure 1 shows the "Ford" type piston which measures approximately 1.475" tall.

Figure 2 shows the Mazda type piston which measures approximately 1.375" tall.

**FORD PISTON
XS4Z-7D402-AB**



DIMENSION "A" = 1.475"

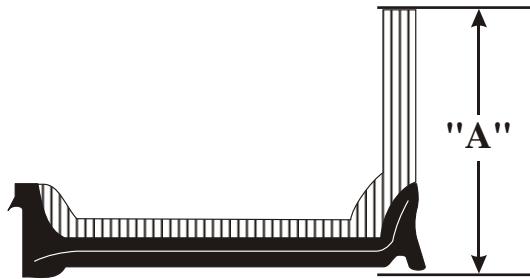
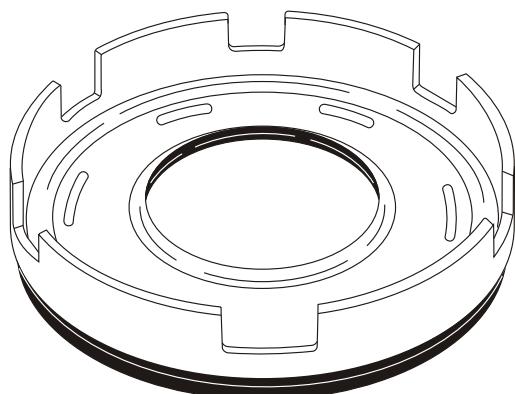


Figure 1

**MAZDA PISTON
FN01-19-SHOA**



DIMENSION "A" = 1.375"

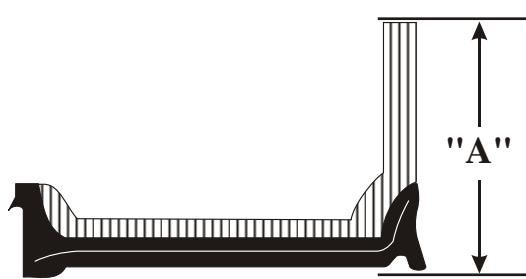


Figure 2

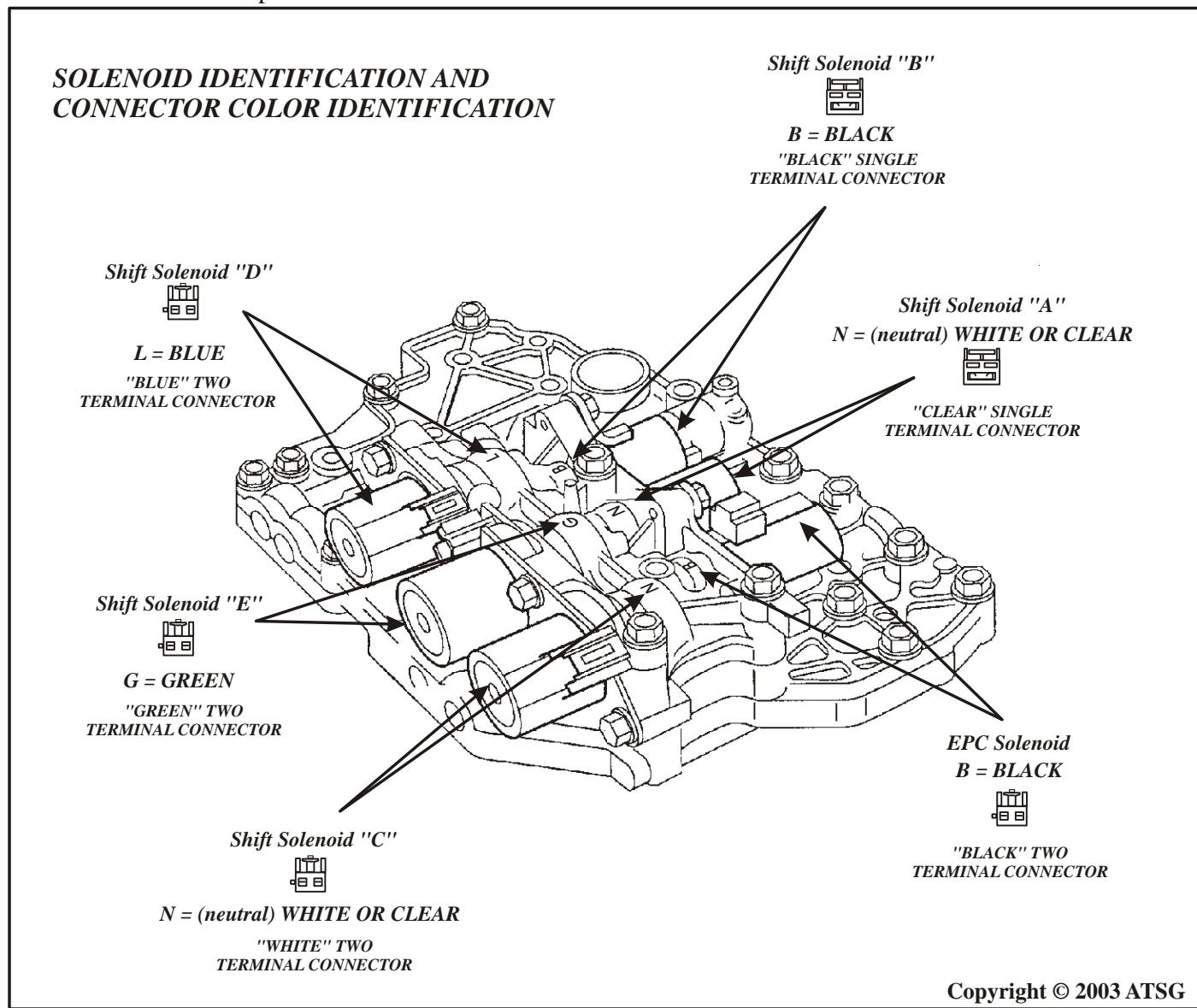
FORD / MAZDA
4F27E / FN4A-EL

ERRATIC OR NEUTRALIZING UPSHIFTS OR WRONG GEAR STARTS

COMPLAINT: After overhaul, Ford or Mazda vehicles equipped with the 4F27E or FN4A-EL transaxles, may exhibit Erratic or Neutralizing upshifts or wrong gear starts.

CAUSE: The cause may be, one or more of the solenoid wire harness connectors were plugged into the wrong solenoid.

CORRECTION: To correct this condition, Refer to Figure 1 to identify Solenoid positions and the correct harness connector color which is identified by a letter stamping on the valve body. Refer to Figure 2 for an internal wire schematic showing the connector colors as well as internal wire colors. Refer to Figure 3 for the ohm values of the solenoids and the Transmission Oil Temperature sensor.



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Figure 1



TRANSAXLE COMPONENT WIRE SCHEMATIC

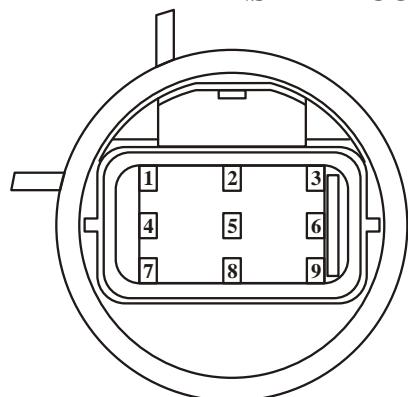
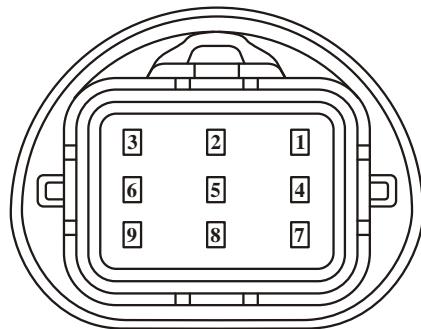
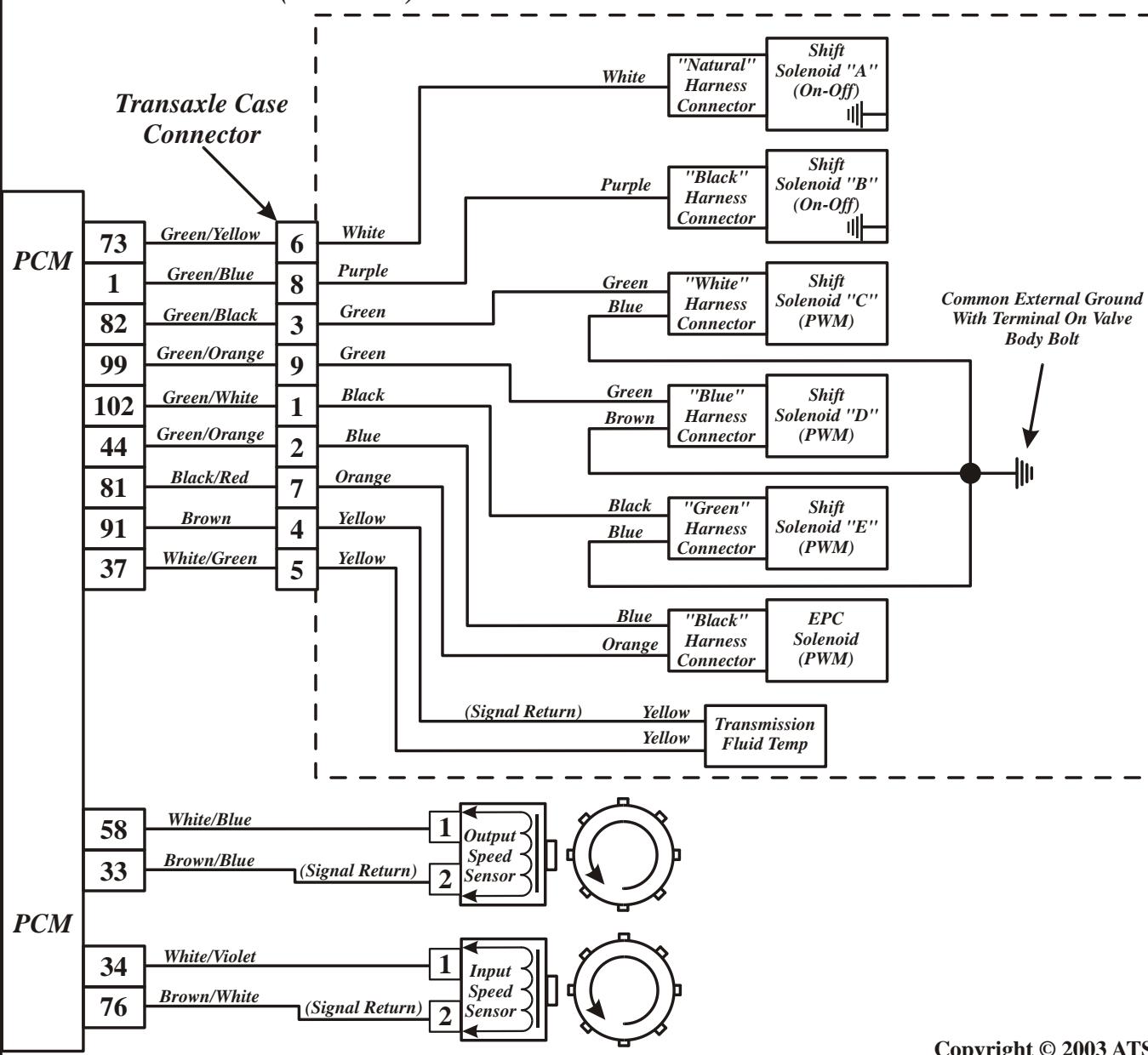
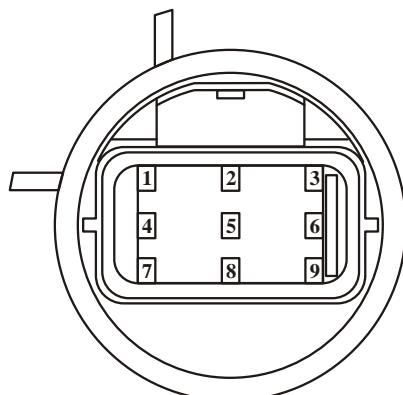
Transaxle Case Connector
(Face View)Vehicle Harness Connector
(Face View)

Figure 2



**Transaxle Case Connector
(Face View)**

INTERNAL TRANSAKLE COMPONENTS RESISTANCE CHART

<i>Transaxle Component</i>	<i>Ohms Resistance At 20°C (70°F)</i>
<i>Shift Solenoid "A" (On-Off)</i>	<i>10.9 - 26.2</i>
<i>Shift Solenoid "B" (On-Off)</i>	<i>10.9 - 26.2</i>
<i>Shift Solenoid "C" (PWM)</i>	<i>1.0 - 4.2</i>
<i>Shift Solenoid "D" (PWM)</i>	<i>1.0 - 4.2</i>
<i>Shift Solenoid "E" (PWM)</i>	<i>1.0 - 4.2</i>
<i>EPC Solenoid (PWM)</i>	<i>2.4 - 7.3</i>

Transaxle Temperature Sensor Resistance Chart

<i>0°C (32°F) = 83.2k - 107k Ohms</i>
<i>20°C (70°F) = 33.5k - 41.2k Ohms</i>
<i>40°C (104°F) = 14.6k - 17.6k Ohms</i>
<i>60°C (140°F) = 7.08k - 8.01k Ohms</i>
<i>80°C (176°F) = 3.61k - 4.06k Ohms</i>
<i>100°C (212°F) = 1.96k - 2.20k Ohms</i>
<i>120°C (248°F) = 1.13k - 1.25k Ohms</i>
<i>130°C (266°F) = 0.87k - 0.96k Ohms</i>

FORD / MAZDA
4F27E / FN4A-EL
P0750, P0751 OR NEUTRALIZING IN 4TH

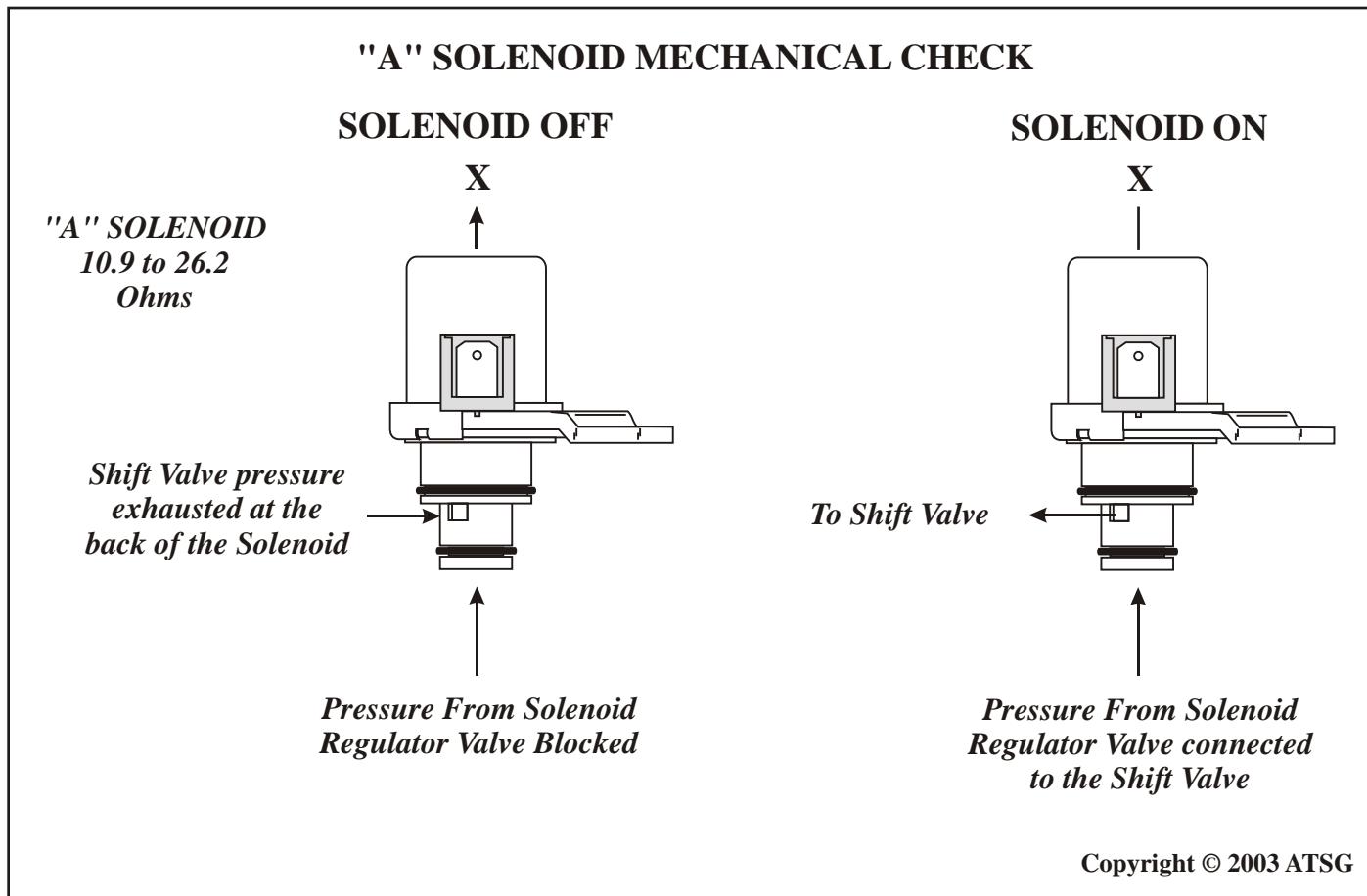
COMPLAINT: Before or after overhaul, Ford or Mazda vehicles equipped with the 4F27E or FN4A-EL transaxle may exhibit a Diagnostic Trouble Code P0750 Shift Solenoid "A" Circuit fault or P0751 Shift Solenoid "A" performance code along with a Neutralizing 3-4 upshift.

CAUSE: The cause may be, an electronically or mechanically faulty "A" Shift Solenoid. Due to a poor ground strap connection internally of the solenoid casing, the "A" Shift solenoid will not be able to stroke the 3-4 shift valve fully creating a Neutralizing 3-4 upshift and the Diagnostic Trouble codes.

CORRECTION: To correct this condition, refer to Figure 2 to locate the placement of the "A" Shift Solenoid. Refer to Figure 1 to mechanically air check the "A" Shift Solenoid. Refer to Figure 3 to verify the correct ohm value of the "A" Shift Solenoid. Replace the solenoid as necessary.

SERVICE INFORMATION:

"A" SHIFT SOLENOID (Ford Part Number).....XS4Z-7G383-AA



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Figure 1
Automatic Transmission Service Group

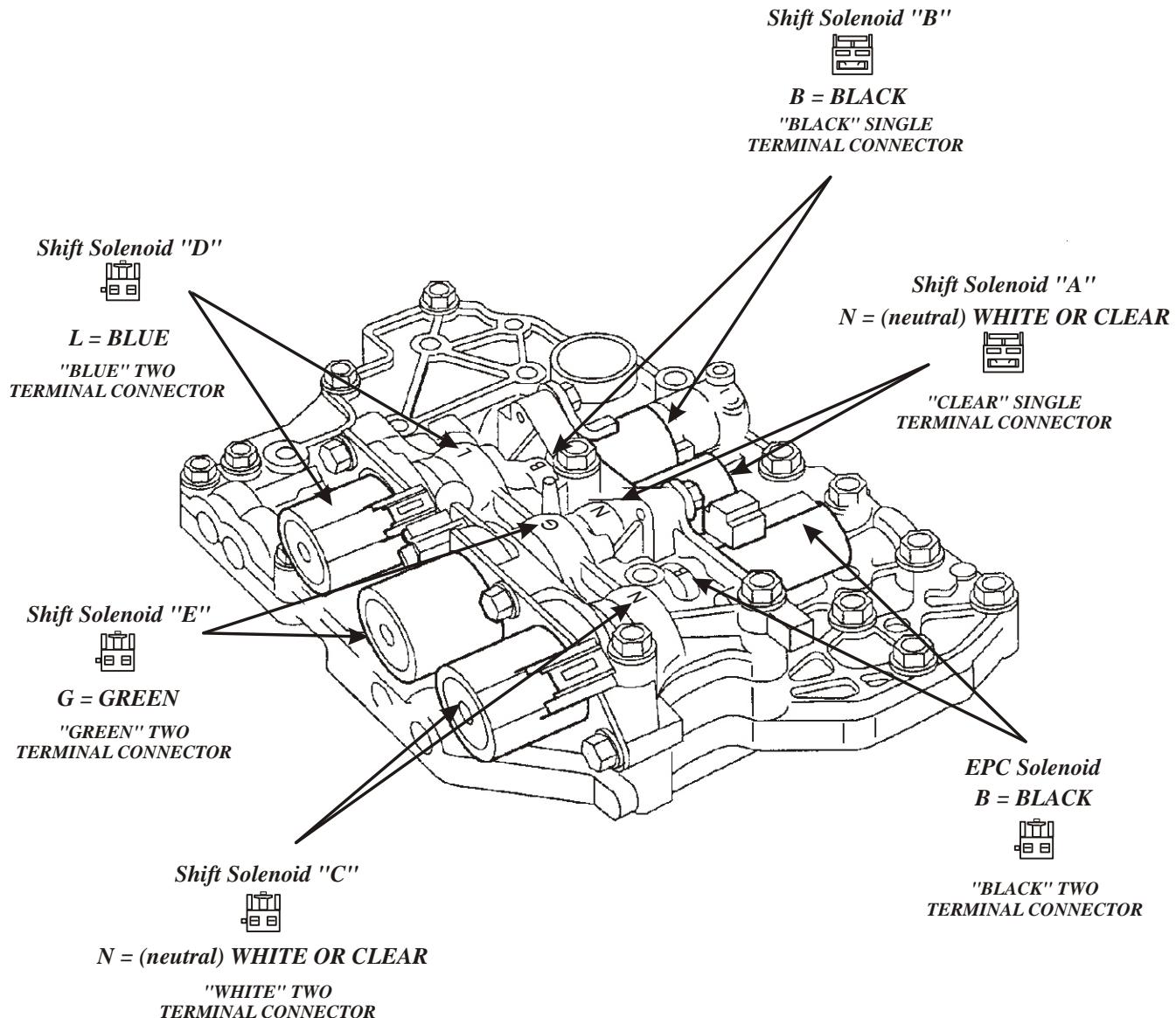
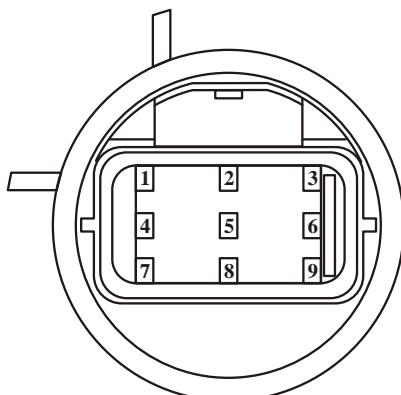
SOLENOID IDENTIFICATION
AND CONNECTOR COLOR IDENTIFICATION

Figure 2

Rostra



**Transaxle Case Connector
(Face View)**

INTERNAL TRANSAKLE COMPONENTS RESISTANCE CHART		
<i>Terminals</i>	<i>Transaxle Component</i>	<i>Ohms Resistance At 20°C (70°F)</i>
6 and Gnd.	Shift Solenoid "A" (On-Off)	10.9 - 26.2
8 and Gnd.	Shift Solenoid "B" (On-Off)	10.9 - 26.2
3 and Gnd.	Shift Solenoid "C" (PWM)	1.0 - 4.2
9 and Gnd.	Shift Solenoid "D" (PWM)	1.0 - 4.2
1 and Gnd.	Shift Solenoid "E" (PWM)	1.0 - 4.2
2 and 7	EPC Solenoid (PWM)	2.4 - 7.3

NOTE: Gnd. = Ground Ohm Meter to the Case

<i>Transaxle Temperature Sensor Resistance Chart Terminals 4 and 5</i>
<i>0°C (32°F) = 83.2k - 107k Ohms</i>
<i>20°C (70°F) = 33.5k - 41.2k Ohms</i>
<i>40°C (104°F) = 14.6k - 17.6k Ohms</i>
<i>60°C (140°F) = 7.08k - 8.01k Ohms</i>
<i>80°C (176°F) = 3.61k - 4.06k Ohms</i>
<i>100°C (212°F) = 1.96k - 2.20k Ohms</i>
<i>120°C (248°F) = 1.13k - 1.25k Ohms</i>
<i>130°C (266°F) = 0.87k - 0.96k Ohms</i>