"2006" SEMINAR INFORMATION

INDEX

Ford & Chrysler

ADVERTISERS

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"Top Tech Tricks for 2006" Seminar Information

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Superior

FORD 4R70E/4R75E
DTC P0715/P0717 OR ERRATIC SHIFTS

COMPLAINT: 2004 and up Ford vehicles, equipped with the 4R70E/4R75E transmissions may exhibit erratic shifts or a Diagnostic Trouble Code P0715 or P0717, insufficient input from the Turbine Shaft Speed Sensor or intermittent TSS signal, after overhaul.

CAUSE: The cause may be, that the Forward Clutch Drum, as shown in Figure 2, or Sun gear Shell, as shown in Figure 3, were replaced with the previous design parts causing the Turbine Speed Sensor to return a false reading to the Powertrain Control Module. In the start of production for 2004 the Sun gear shell was made of a non-ferrous material to allow the new Turbine Shaft Speed Sensor to read the Forward Clutch Drum, calculating Turbine shaft speed for the PCM. At the same time the Forward Clutch Drum received a new stamping process, to provide 34 projections for the sensor to read from. See Figure 1 for a cross-sectional view.

CORRECTION: Install the correct Forward Clutch Drum or Sun gear shell into the transmission and or replace the Turbine Shaft Speed Sensor as shown in Figure 4.

SERVICE INFORMATION:

FORWARD CLUTCH DRUM.....3L3Z-7F207-AA
SUN GEAR SHELL.....5L3Z-7A019-AB
TURBINE SHAFT SPEED SENSOR..... 3L3Z-7M101-AA

TRANSMISSION CASE CROSS-SECTION

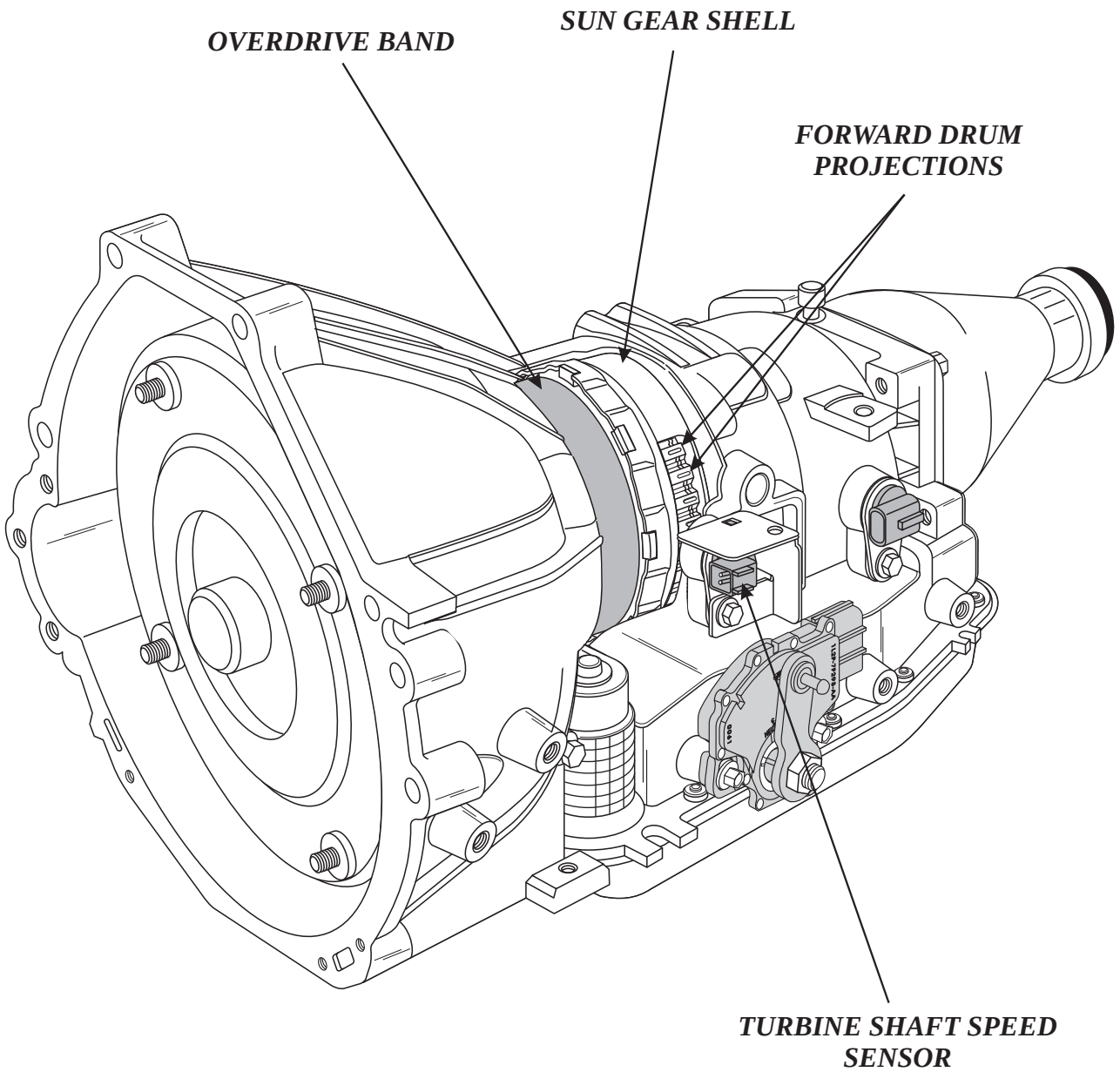
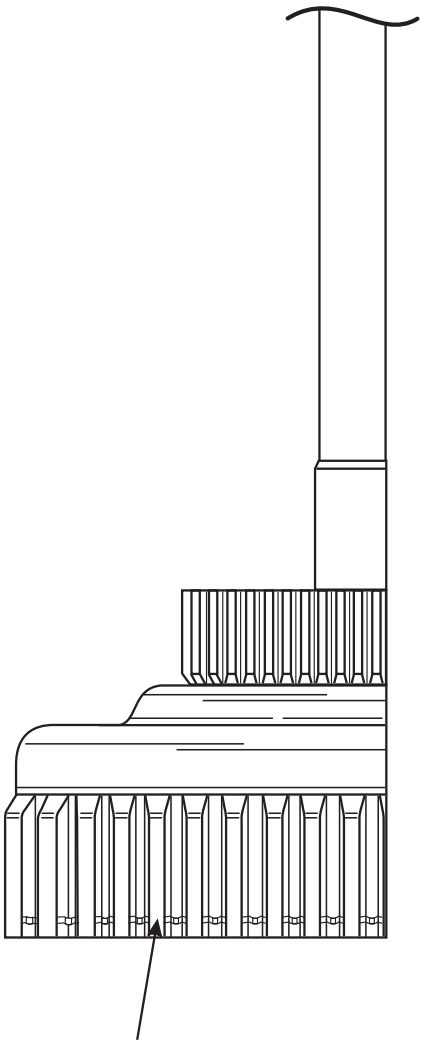


Figure 1

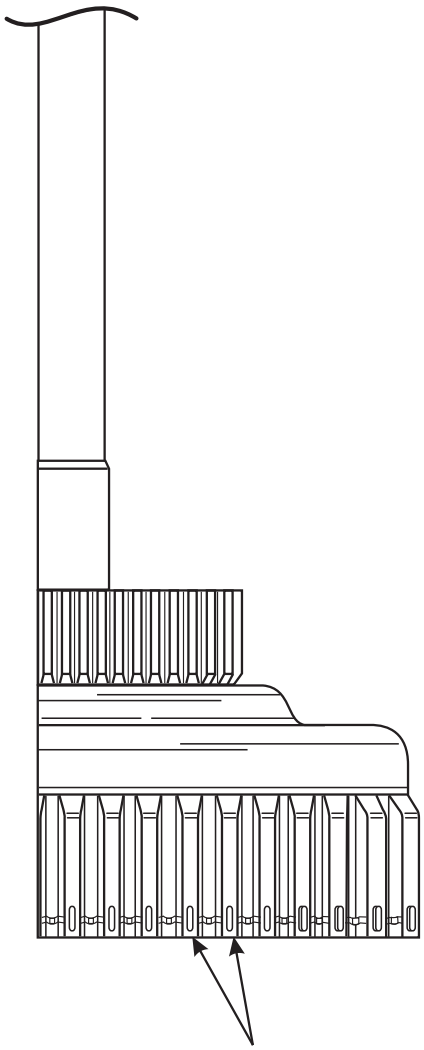
FORWARD CLUTCH DRUM

PREVIOUS DESIGN



NO PROJECTIONS

NEW DESIGN

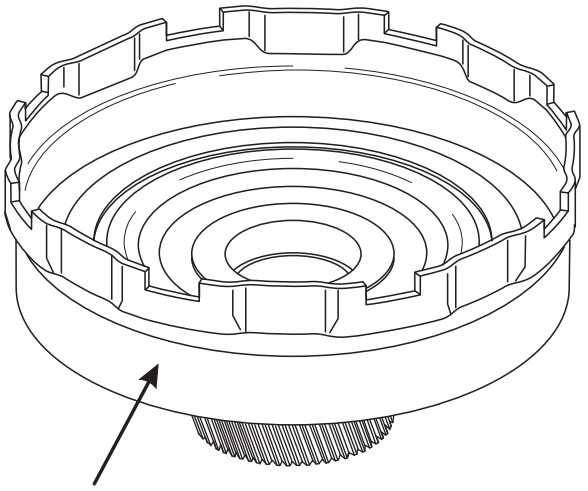


34 STAMPED PROJECTIONS ON THE OUTSIDE OF THE DRUM THAT THE ADDED TURBINE SENSOR READS FROM

Figure 2

SUN GEAR SHELL

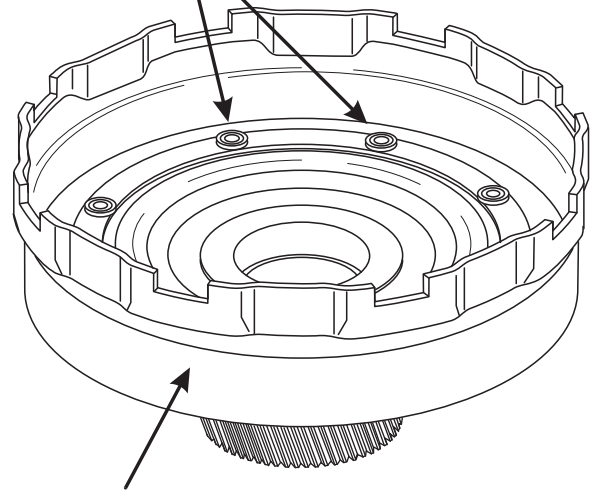
PREVIOUS DESIGN



FERROUS METAL

NEW DESIGN
4L3Z-7A019-BA

New Sun Shell Is Now Riveted To The Sun Gear And Hub

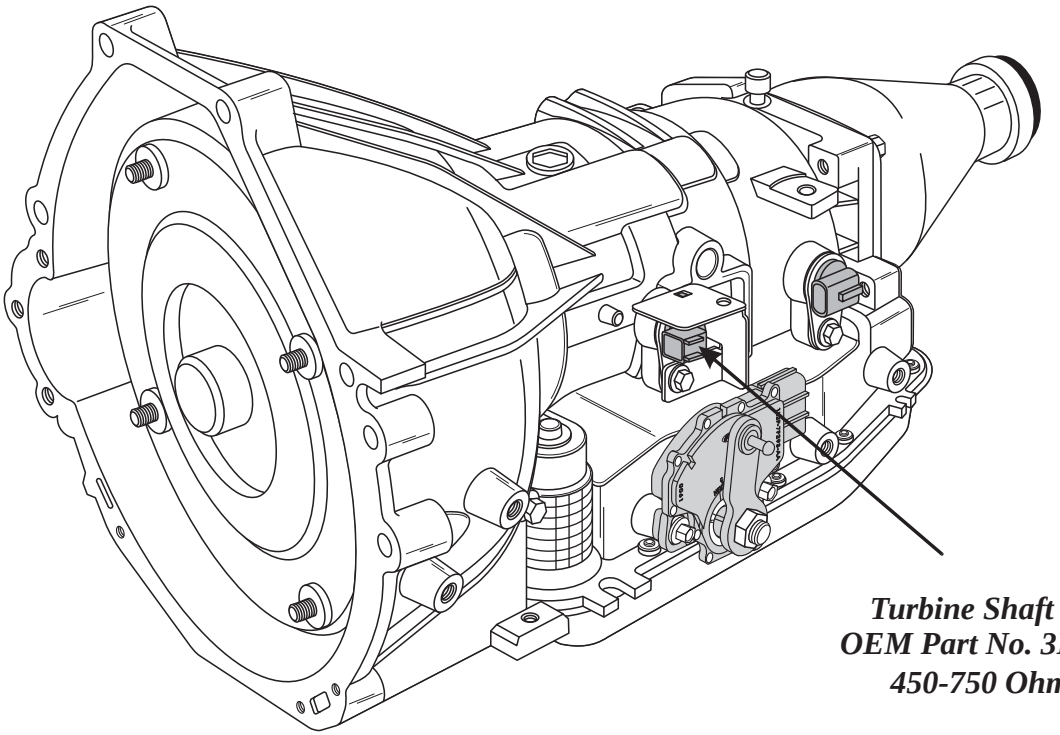


NON-FERROUS METAL

NOTE: The New Sun Shell is made from a non-magnetic material so the Turbine sensor can read the Forward drum. 2005 models use the same type of Sun Shell and there are no rivets for identification. Ford Part number 5L3Z-7A019-AB

Figure 3

TURBINE SHAFT SPEED SENSOR



Turbine Shaft Speed Sensor
OEM Part No. 3L3Z-7M101-AA
450-750 Ohms Resistance

Figure 4

A to Z Tools
B&W

2001 & UP FORD 4R70W FAMILY
VALVE BODY CHANGE

CHANGE: Beginning at the start of production in 2001, Ford Motor Company redesigned the Valve Body for the 4R70W. ***NOTE:*** This change also carries over to the 4R70E and 4R75E models.

REASON: For improved durability.

PARTS AFFECTED:

(1) VALVE BODY CASTING (*Lower side*) - The Lower side of the valve body had casting changes to connect the 2-3 Backout Valve to the Shift Solenoid 2 hydraulic circuit, as shown in Figure 2. Figure 1 shows the previous design casting and identifies the EPC circuit that was connected to the 2-3 Backout Valve on the earlier models.

(2) SPACER PLATE GASKETS - The 2001 and up design upper and lower spacer plate gaskets had numerous hole configuration changes to accommodate the hydraulic changes with the valve body. The most obvious change is the plate that was eliminated over the Direct Clutch Accumulator, as shown in Figure 3.

(3) SPACER PLATE - The 2001 and up design spacer plate had hole changes to connect the added Overdrive Servo Regulator Valve Boost Valve and Sleeve to the EPC solenoid circuit, and to accommodate the changes in the 3-4 Capacity Modulator Valve. Figure 5 shows that a change also was made to the cover plate connecting the Forward Clutch Circuit to the 3-4 Capacity Modulator Valve. The bolt holes were removed from the Spacer plate along with the plate over the Direct Clutch Accumulator. Refer to Figure 4 for a view of the previous design Spacer Plate.

(4) DIRECT CLUTCH ACCUMULATOR RETAINER - The retainer for the accumulator had a dimensional change to accommodate the elimination of the plate over the the Direct Clutch Accumulator. See Figure 6.

(5) MAIN VALVE BODY - The main valve body had casting changes to accommodate the removal of the Orifice Control Valve and the 2-3 Capacity Modulator Valve as shown in Figures 7, 8 and 9.

(6) CASE - The Overdrive Servo Bleed orifice, as shown in Figure 10, was eliminated to accommodate the hydraulic circuit changes in the Overdrive Servo Regulator Valve. See Figure 11 for a partial hydraulic circuit diagram identifying the 2001 and up hydraulic circuit.

SERVICE INFORMATION:

SPACER PLATE GASKET TO CASE.....1L3Z-7C155-AA
SPACER PLATE GASKET TO VALVE BODY.....1W7Z-7D100-AB

Special thanks to Robert at Tri-County Trans

PREVIOUS DESIGN VALVE BODY LOWER SIDE

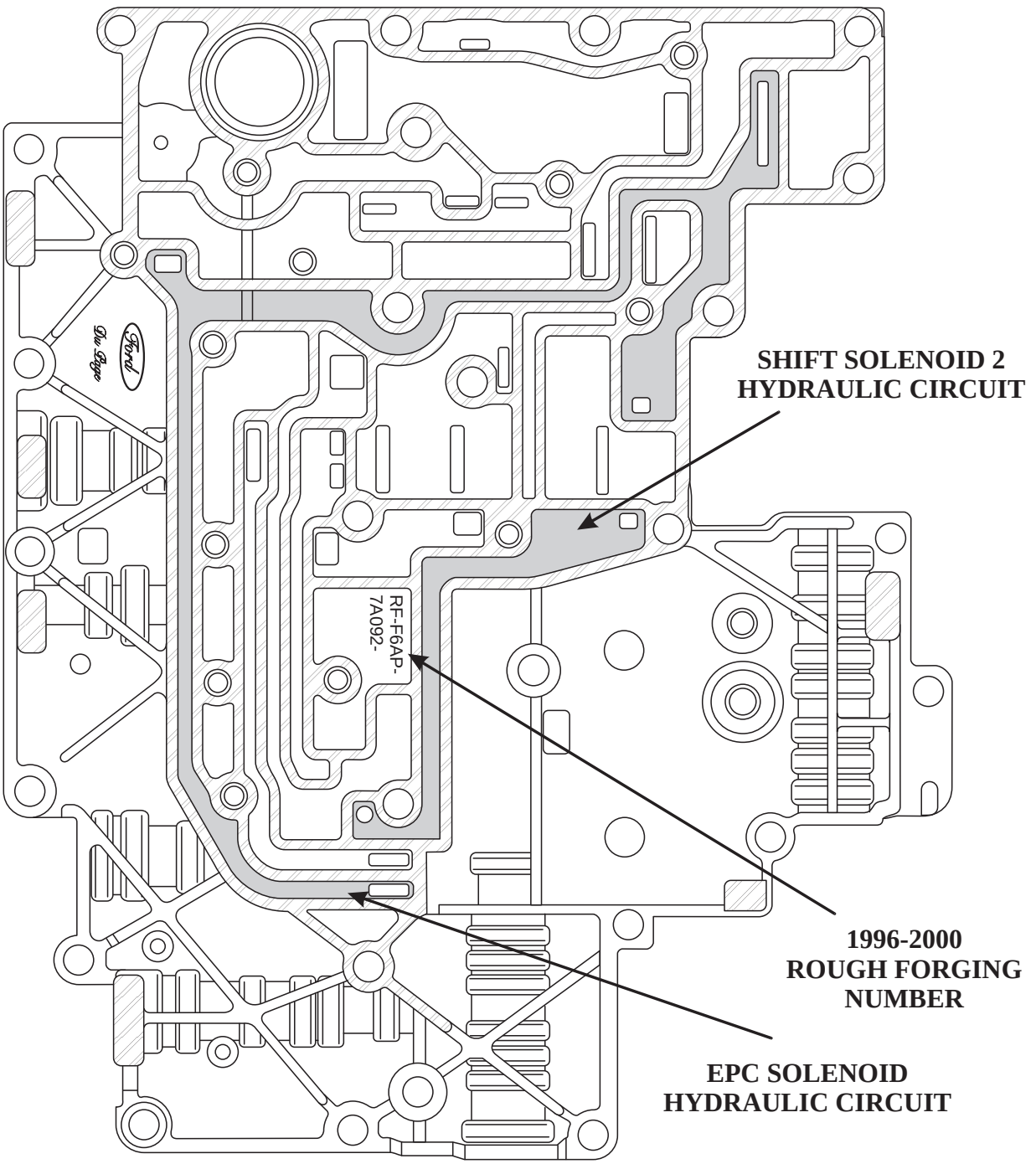


Figure 1

2001 & UP DESIGN VALVE BODY LOWER SIDE

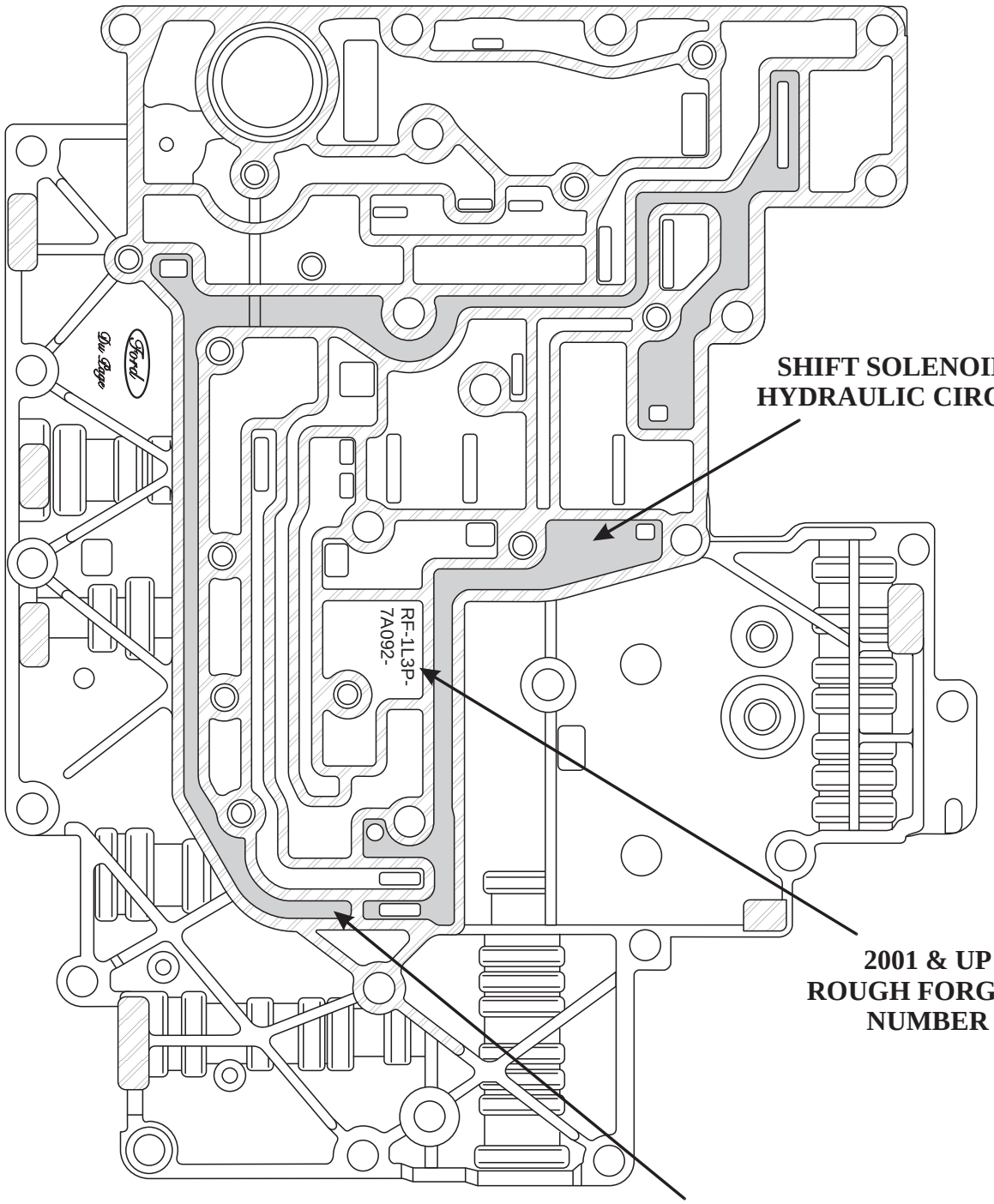
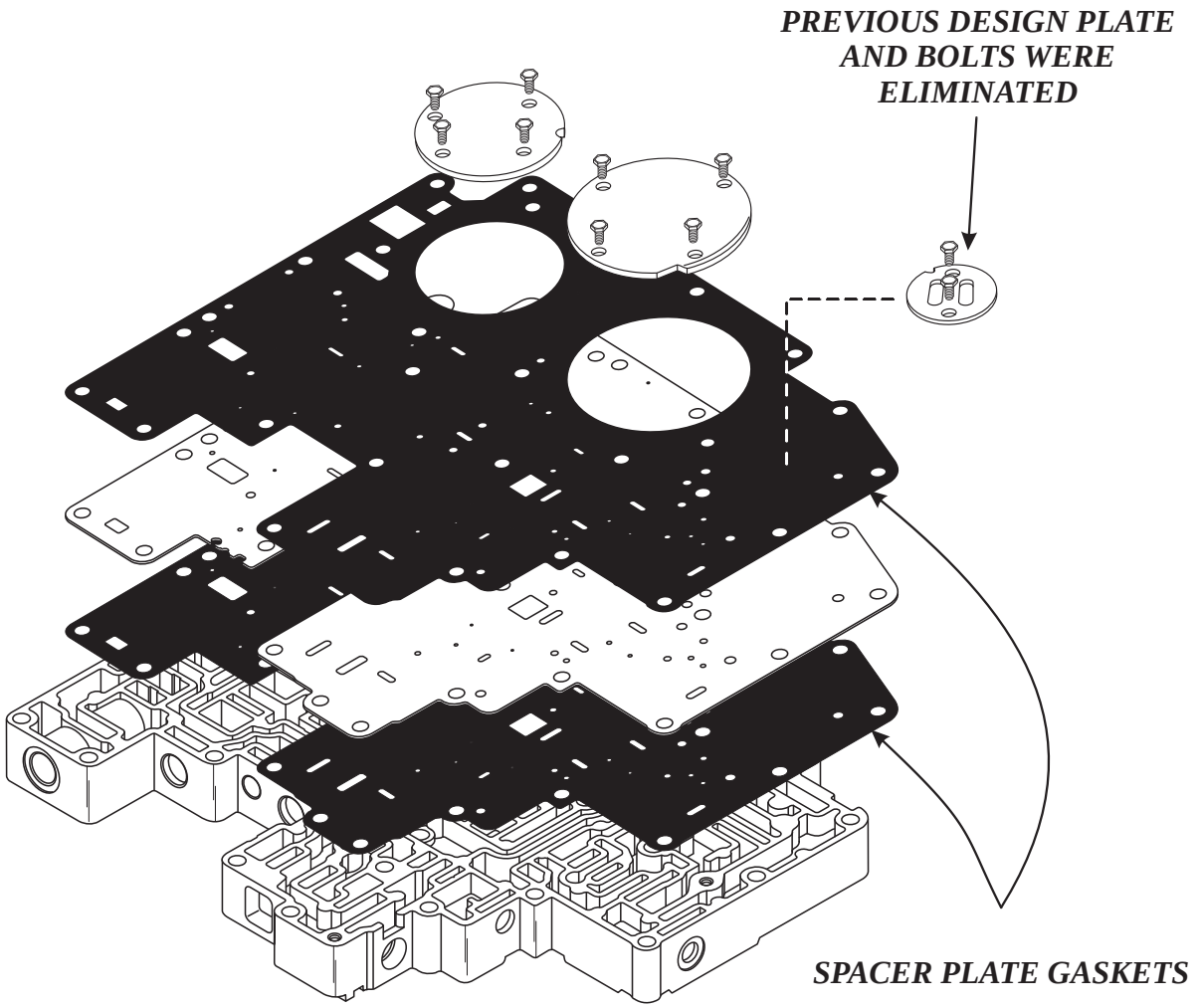


Figure 2

2001 MODEL 4R70W VALVE BODY



SPACER PLATE GASKET TO CASE (FORD NUMBER) 1L3Z-7C155-AA
SPACER PLATE GASKET TO VALVE BODY (FORD NUMBER) 1W7Z-7D100-AB

Figure 3

PREVIOUS DESIGN SPACER PLATE

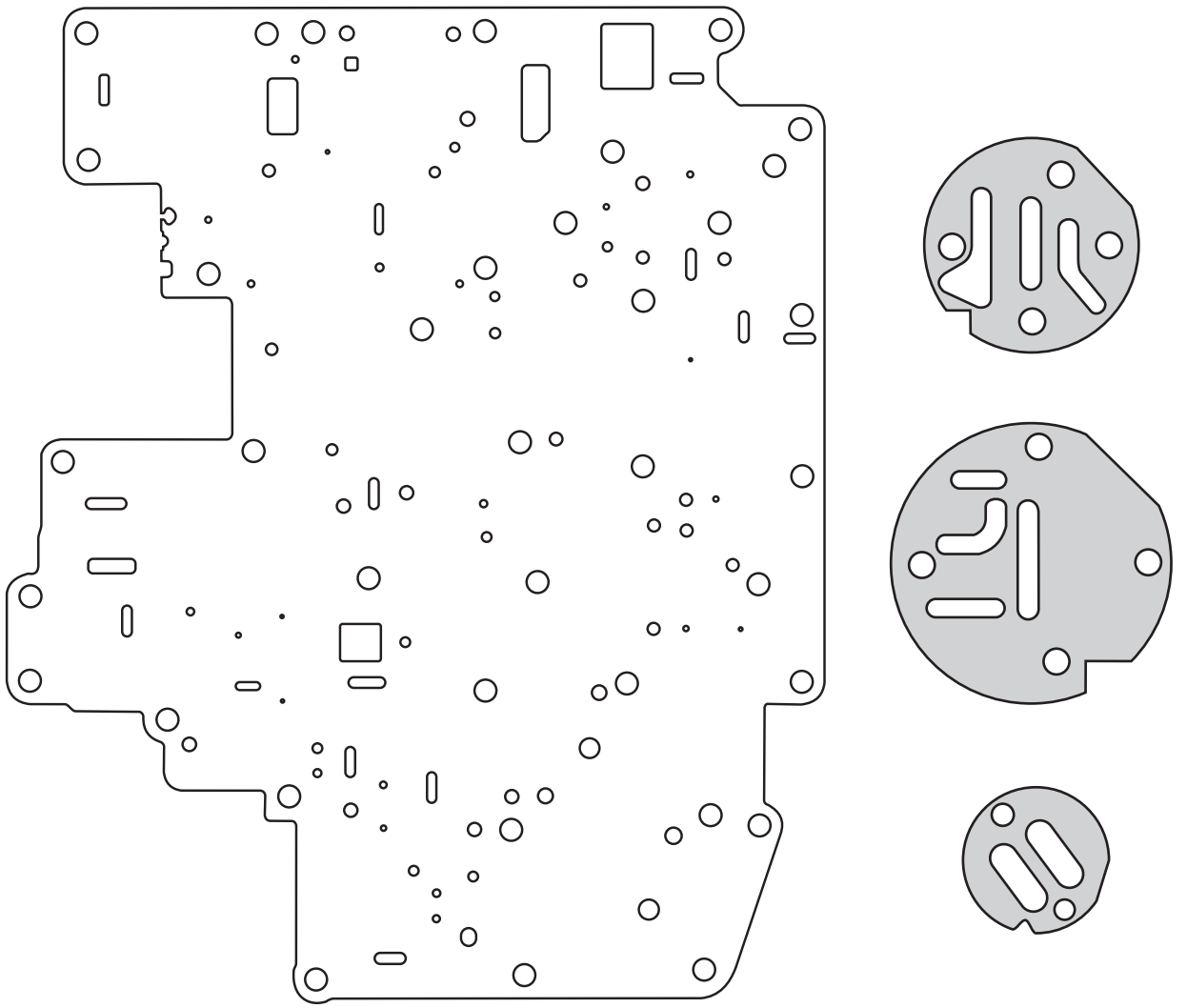
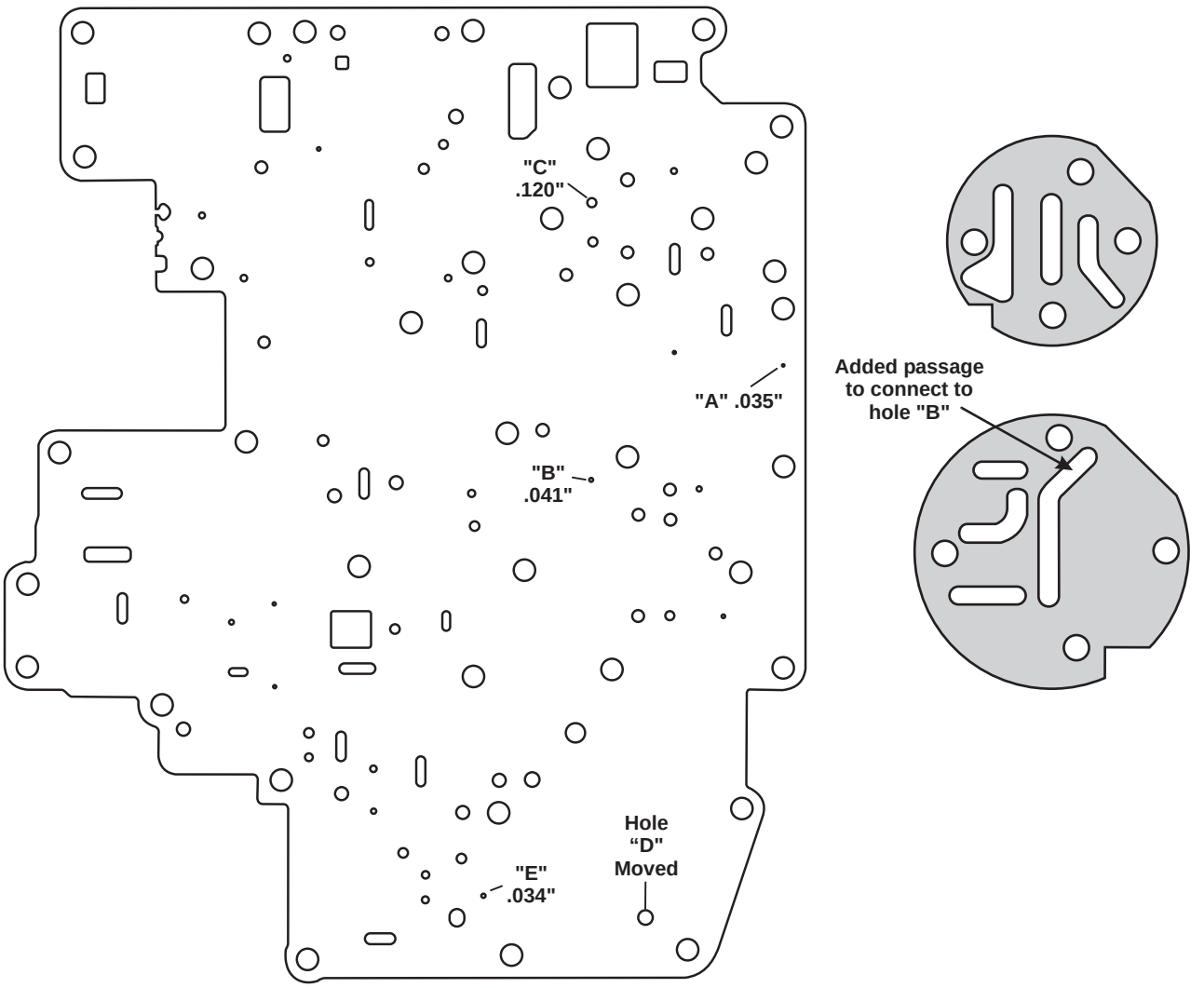


Figure 4

2001 & UP SPACER PLATE



"A" = Added hole to connect the EPC circuit to the added Overdrive Servo Regulator Valve Boost Valve and Sleeve

"B" = Added hole to connect the Forward Clutch to the 3-4 Capacity Modulator Valve

"C" = Tcc Signal Pressure from TCC PWM solenoid. Hole was enlarged to .120"

"D" = Hole moved to connect the Direct Clutch to the Direct Clutch Accumulator

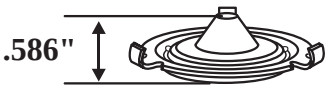
"E" = Orifice added to Direct Clutch Accumulator (Forward Clutch side)

Figure 5

DIRECT CLUTCH ACCUMULATOR RETAINER

PREVIOUS DESIGN SPRING RETAINER

2001 & UP DESIGN SPRING RETAINER



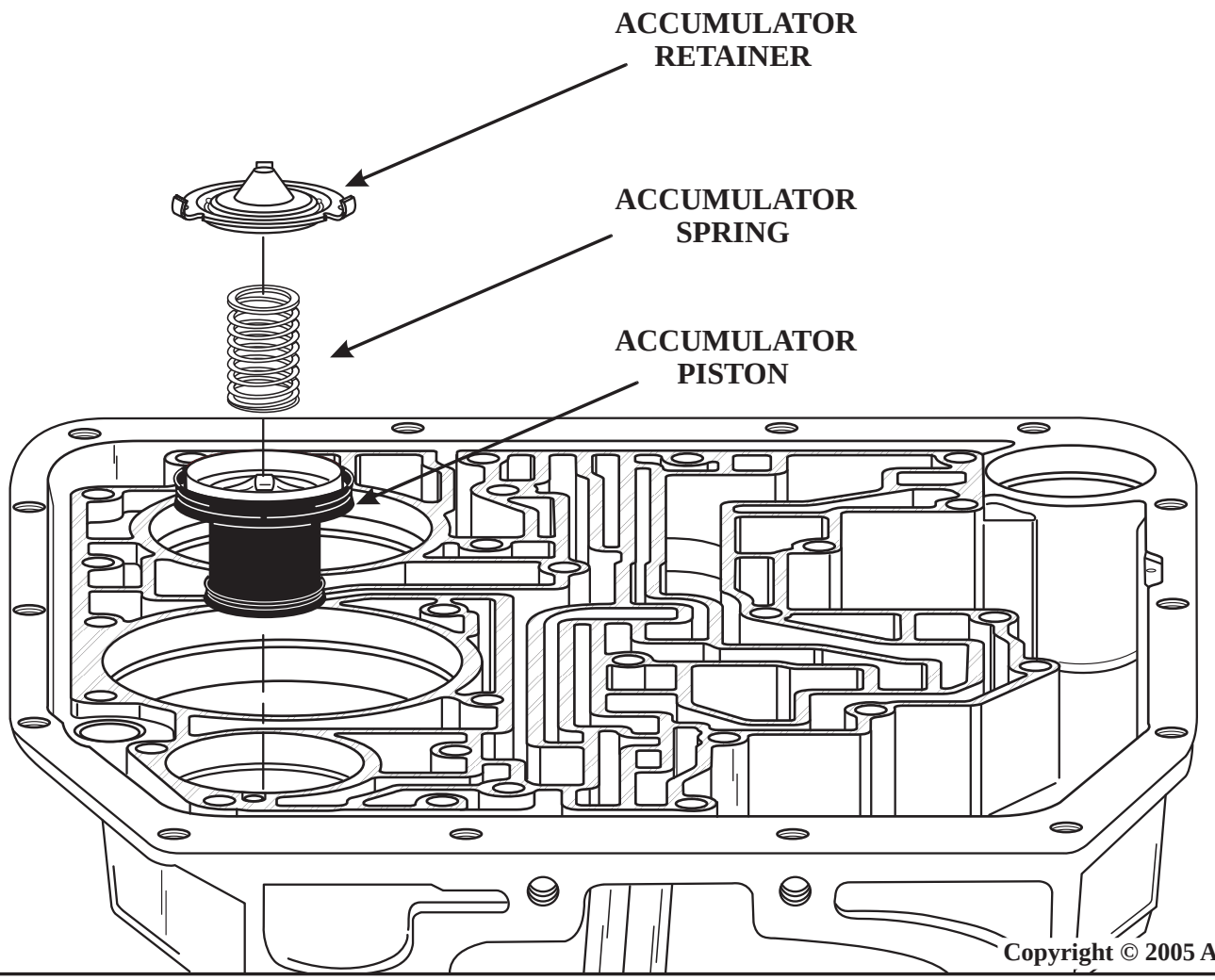


Figure 6

Transtec

FORD 4R70W
2001-UP MAIN VALVE BODY EXPLODED VIEW

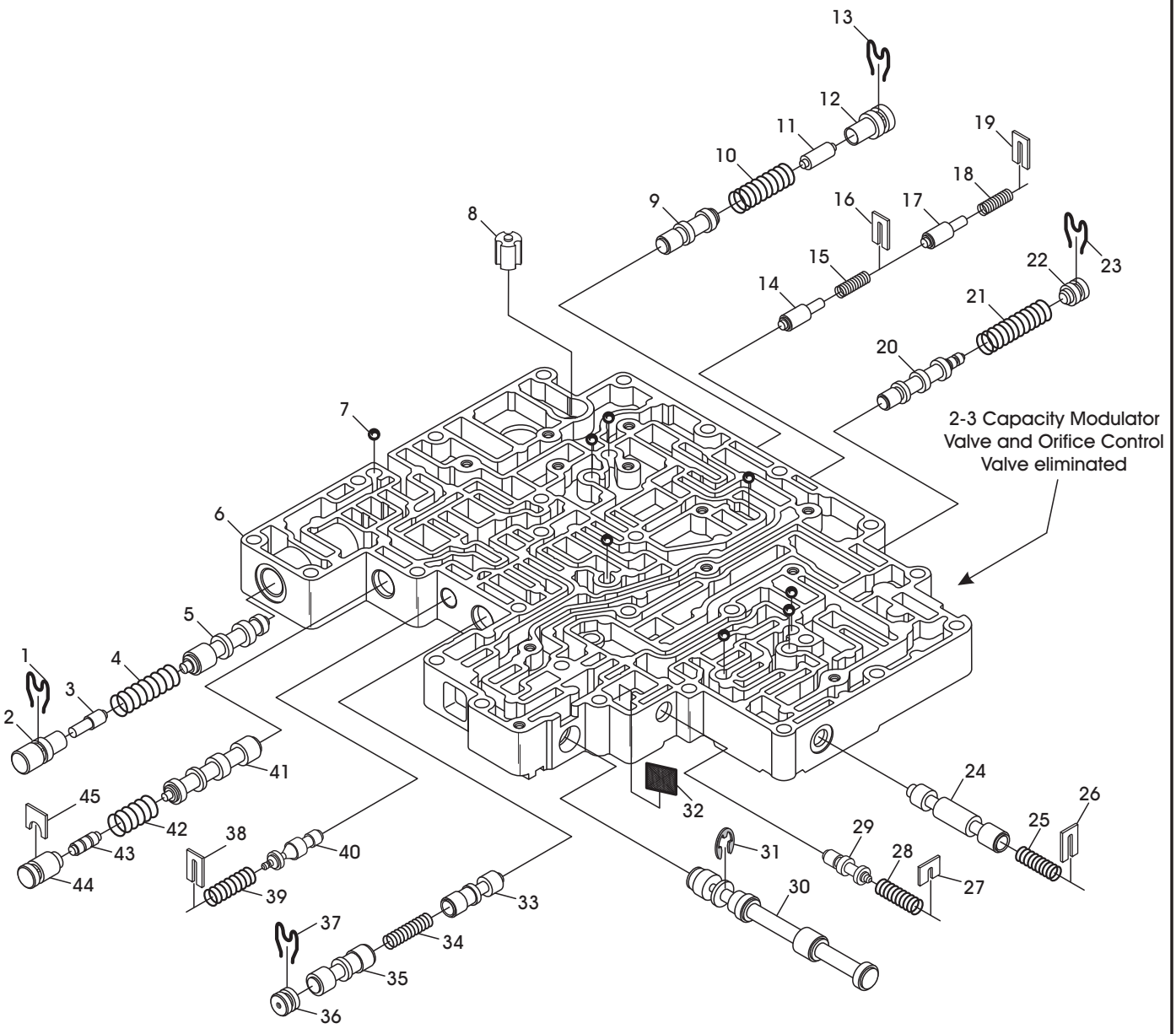


Figure 7

Dacco

FORD 4R70W

MAIN VALVE BODY LEGEND

1 MAIN PRESSURE REGULATOR BOOST VALVE SLEEVE RETAINER.
2. MAIN PRESSURE REGULATOR BOOST VALVE SLEEVE.
3 MAIN PRESSURE REGULATOR BOOST VALVE.
4 MAIN PRESSURE REGULATOR VALVE SPRING.
5 MAIN PRESSURE REGULATOR VALVE.
6 MAIN VALVE BODY CASTING.
7 CHECK BALL, 1/4" DIAMETER (8 REQUIRED).
8 CONVERTER DRAIN BACK VALVE.
9 O.D. SERVO PRESSURE REGULATOR VALVE.
10 O.D. SERVO PRESSURE REGULATOR VALVE SPRING.
11 O.D. SERVO PRESSURE REGULATOR BOOST VALVE.
12 O.D. SERVO PRESSURE REGULATOR BOOST VALVE SLEEVE.
13 BOOST VALVE SLEEVE RETAINER.
14 3-4 CAPACITY MODULATOR VALVE.
15 3-4 CAPACITY MODULATOR VALVE SPRING.
16 3-4 CAPACITY MODULATOR VALVE SPRING RETAINER.
17 LOW SERVO CAPACITY MODULATOR VALVE.
18 LOW SERVO CAPACITY MODULATOR VALVE SPRING.
19 LOW SERVO CAPACITY MODULATOR VALVE SPRING RETAINER.
20 3-4 SHIFT VALVE.
21 3-4 SHIFT VALVE SPRING.
22 3-4 SHIFT VALVE SPRING BORE PLUG.
23 3-4 SHIFT VALVE BORE PLUG RETAINER.
24 2-3 BACKOUT VALVE.
25 2-3 BACKOUT VALVE SPRING.
26 2-3 BACKOUT VALVE SPRING RETAINER.
27 SOLENOID PRESSURE REGULATOR VALVE SPRING RETAINER.
28 SOLENOID PRESSURE REGULATOR VALVE SPRING.
29 SOLENOID PRESSURE REGULATOR VALVE.
30 MANUAL CONTROL VALVE.
31 MANUAL CONTROL VALVE "E" CLIP.
32 EPC SOLENOID SCREEN.
33 1-2 SHIFT VALVE.
34 2-3 SHIFT VALVE SPRING.
35 2-3 SHIFT VALVE.
36 2-3 SHIFT VLAVE BORE PLUG.
37 2-3 SHIFT VALVE BORE PLUG RETAINER.
38 CONVERTER PRESSURE REGULATOR VALVE SPRING RETAINER.
39 CONVERTER PRESSURE REGULATOR VALVE SPRING.
40 CONVERTER PRESSURE REGULATOR VALVE.
41 BYPASS CLUTCH CONTROL VALVE.
42 BYPASS CLUTCH CONTROL VALVE SPRING.
43 BYPASS CLUTCH CONTROL BOOST VALVE.
44 BYPASS CLUTCH CONTROL BOOST VALVE SLEEVE.
45 BYPASS CLUTCH CONTROL VALVE SLEEVE RETAINER.

Figure 8

2001 & UP FORD 4R70W
VALVE BODY CHECKBALL AND RETAINER LOCATIONS

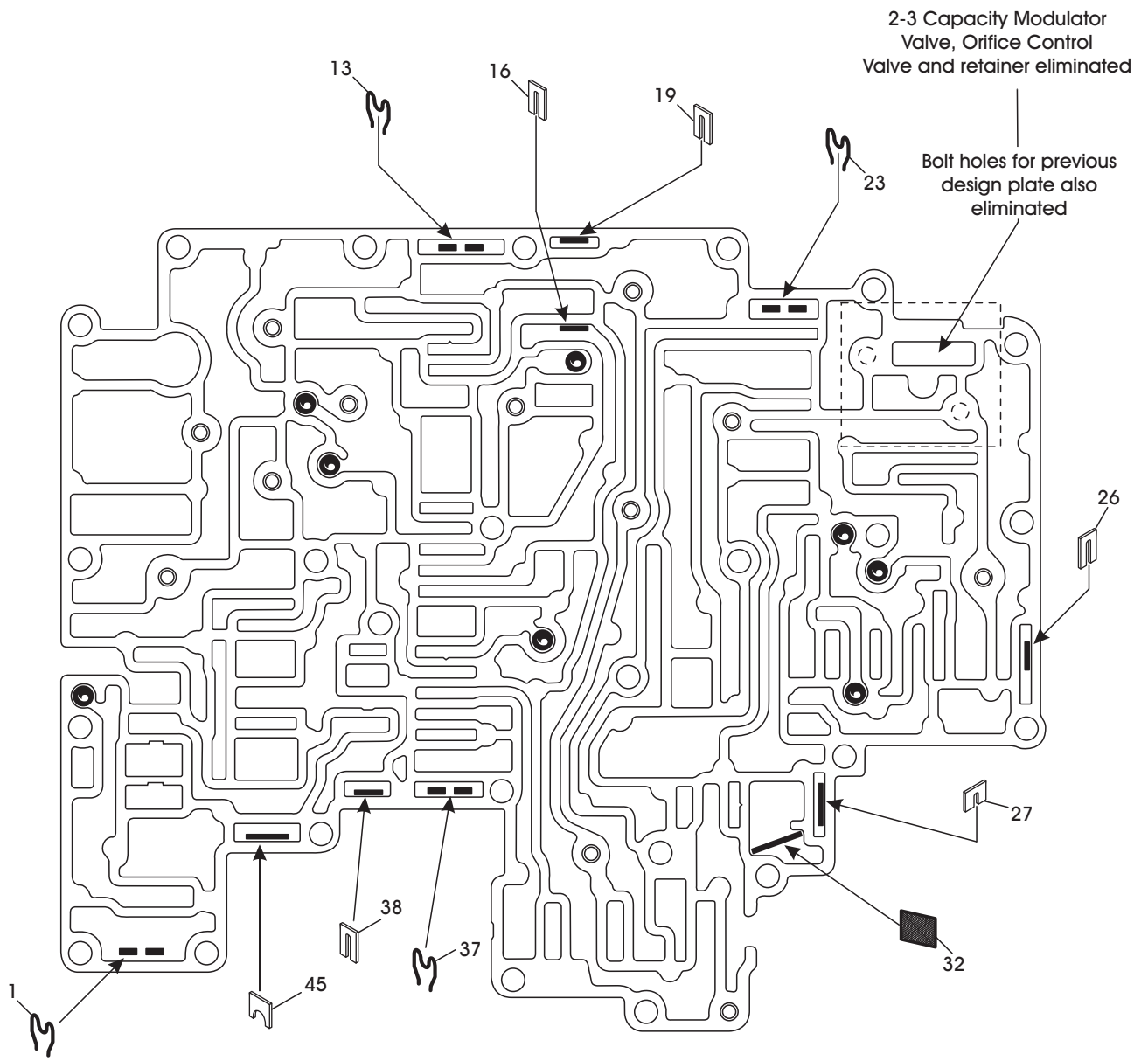
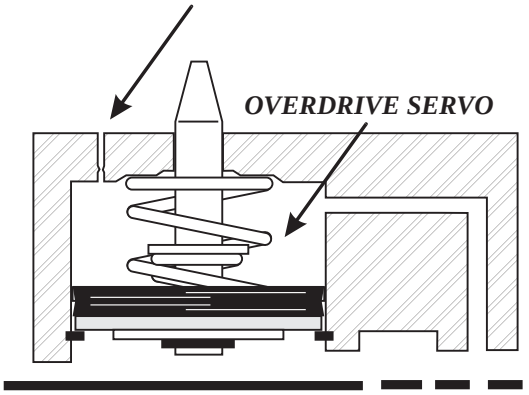


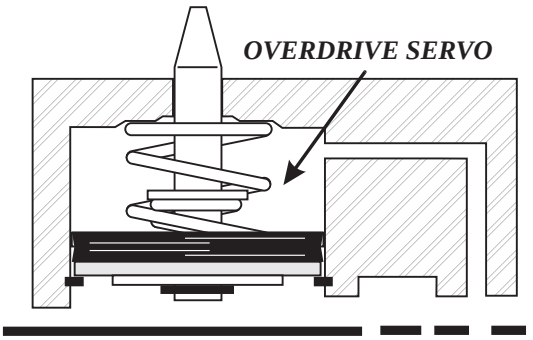
Figure 9

CASE CHANGES

PREVIOUS DESIGN
CASE WITH .020" BLEED ORIFICE



2001 & UP DESIGN
CASE WITHOUT BLEED ORIFICE



OVERDRIVE SERVO
BORE

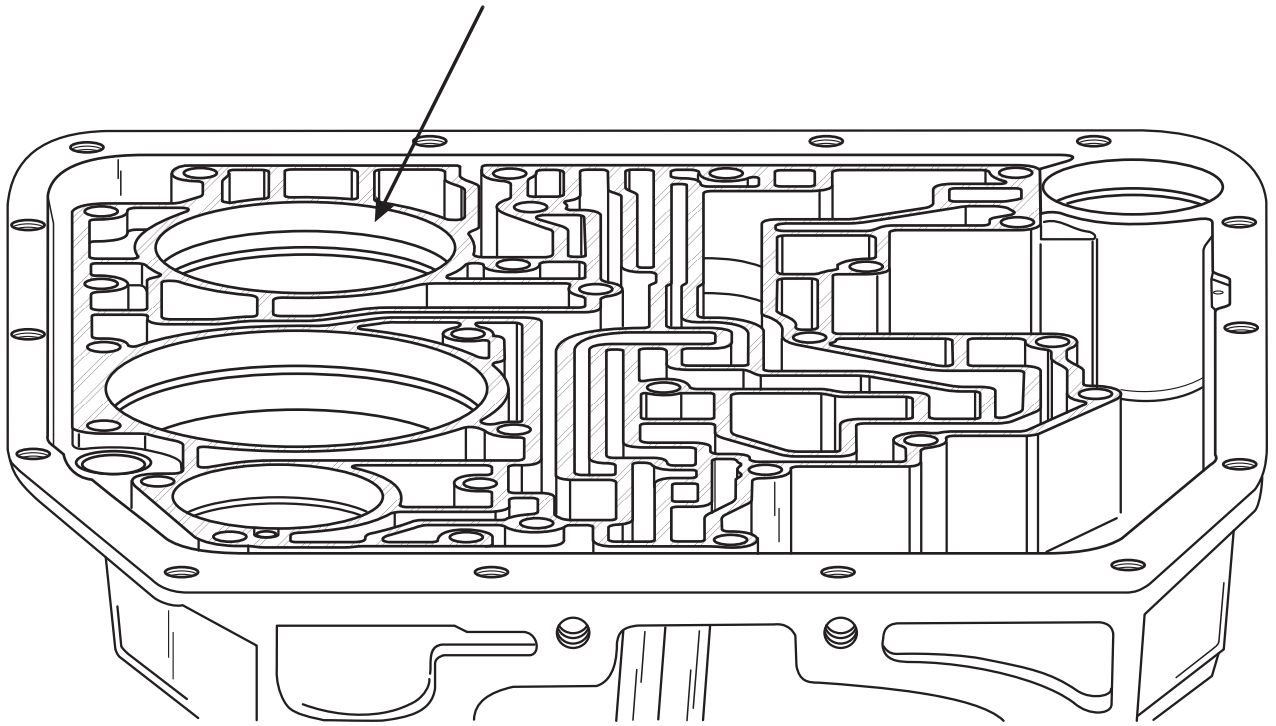


Figure 10

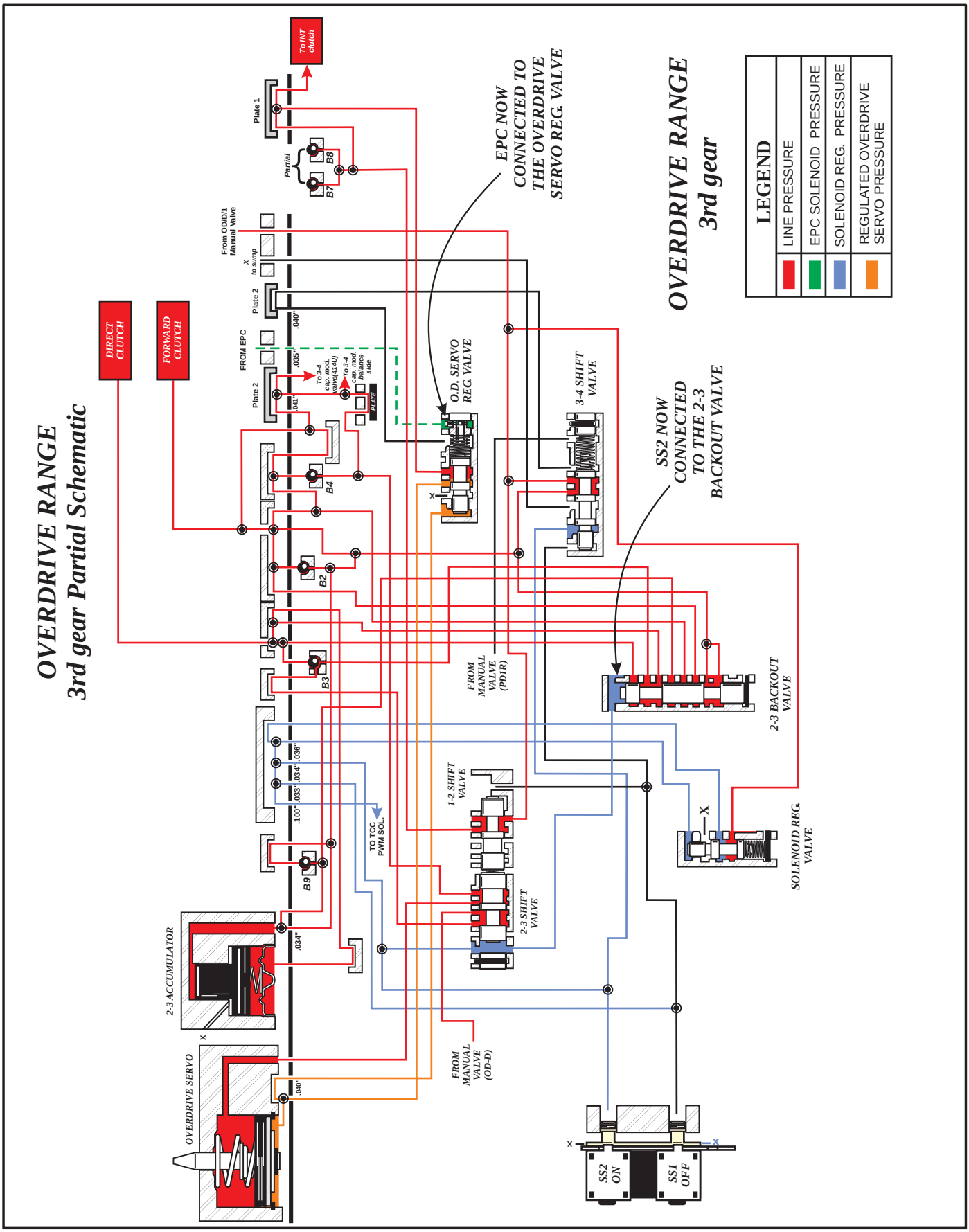

OVERDRIVE RANGE
3rd gear Partial Schematic
OVERDRIVE RANGE
3rd gear
LEGEND
LINE PRESSURE
EPC SOLENOID PRESSURE
SOLENOID REG. PRESSURE
REGULATED OVERDRIVE SERVO PRESSURE
EPC NOW CONNECTED TO THE OVERDRIVE SERVO REG. VALVE
SS2 NOW CONNECTED TO THE 2-3 BACKOUT VALVE
To INT clutch
DIRECT CLUTCH
FORWARD CLUTCH
Plate 1
Partial
B8
B7
From OD/D1 Manual Valve
X to sump
Plate 2
FROM EPC
.040"
.035"
.041"
To 3-4 cap. mod. valve(43,4U)
To 3-4 cap. mod. balance side
PLATE
B4
B2
B3
B9
.100"
.033"
.034"
.036"
O.D. SERVO REG VALVE
3-4 SHIFT VALVE
FROM MANUAL VALVE (PD1R)
2-3 BACKOUT VALVE
1-2 SHIFT VALVE
2-3 SHIFT VALVE
TO TCC PWM SOL.
SOLENOID REG. VALVE
2-3 ACCUMULATOR
OVERDRIVE SERVO
FROM MANUAL VALVE (OD-D)
SS2 ON
SS1 OFF

Figure 11

FORD 4R70W, 4R70E AND 4R75E

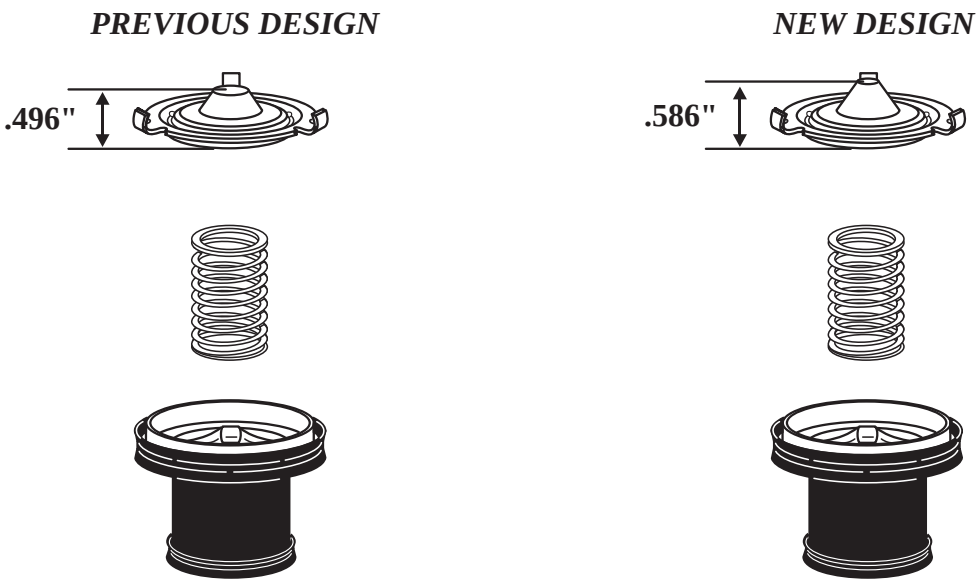
2-3 NEUTRAL

COMPLAINT: 2001 and up Ford vehicles equipped with the 4R70W, 4R70-E or 4R75E, may exhibit a 2-3 neutral up shift after overhaul.

CAUSE: The cause may be that a previous design 2-3 accumulator retainer was used, or the retainer was assembled upside down, when installing it into the case. ***NOTE:*** 2001 and up Valve Body assemblies, as shown in Figure 2, do not use the small plate that is over the 2-3 accumulator retainer. This made necessary a taller 2-3 accumulator retainer as shown in Figure 1. When the wrong 2-3 accumulator retainer is used or if the retainer is upside down, the 2-3 accumulator piston may pop out of its bore dumping Direct Clutch pressure to an exhaust. See Figure 3 for a cutaway of the correct and incorrect assembly.

CORRECTION: Refer to Figure 4 for the location and installation of the 2-3 accumulator retainer, piston and spring.

2-3 ACCUMULATOR AND RETAINER



New Design retainer is taller because of the elimination of the the plate over the 2-3 accumulator line-up

Figure 1

2001 MODEL 4R70W VALVE BODY

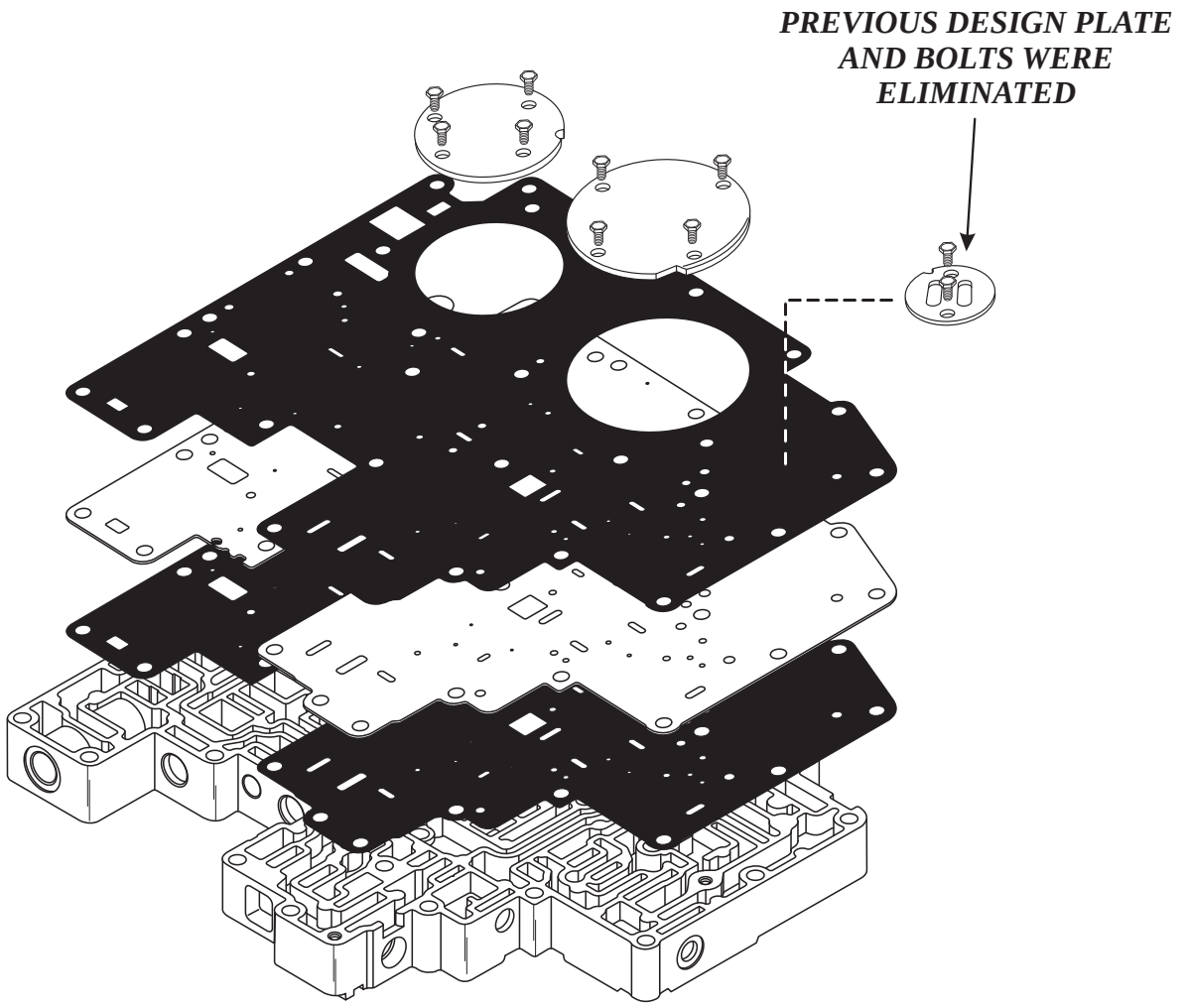


Figure 2

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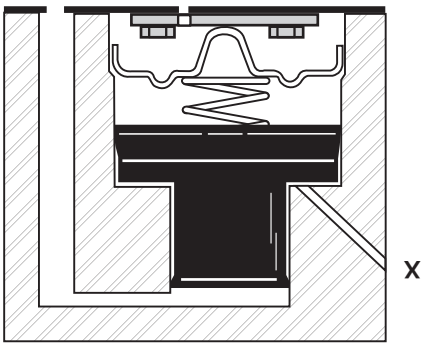
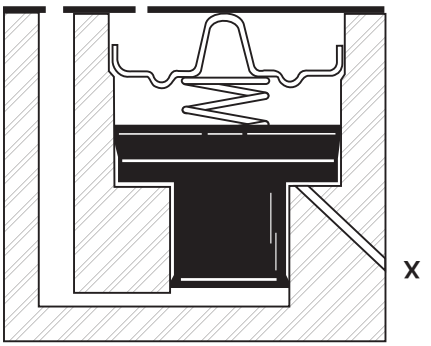
2-3 ACCUMULATOR AND RETAINER CUTAWAY

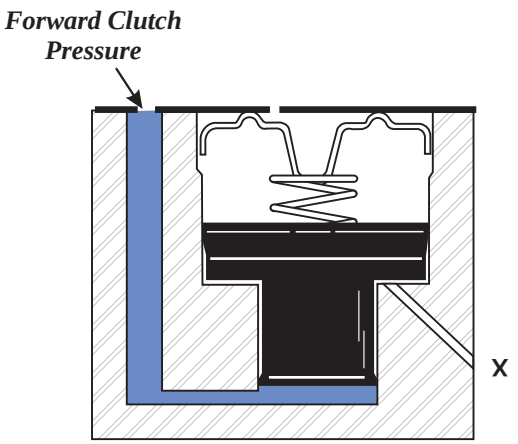
EARLY CORRECT ASSEMBLY



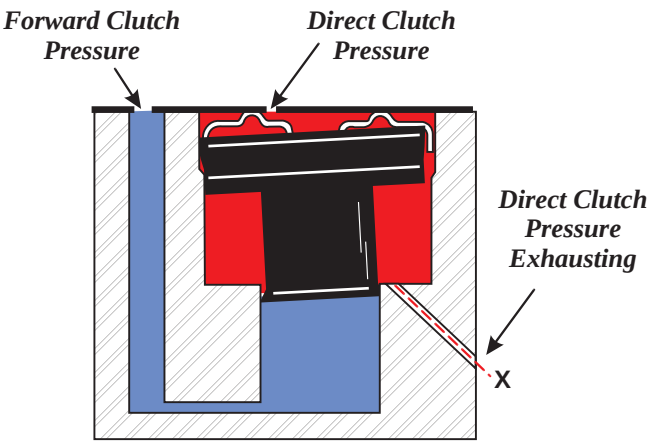
LATE CORRECT ASSEMBLY



INCORRECT ASSEMBLY BEFORE



INCORRECT ASSEMBLY AFTER



Note: When the 2-3 Accumulator piston retainer is installed up-side down the Accumulator may come out of it's bore and connect the Direct Clutch to an exhaust

Figure 3

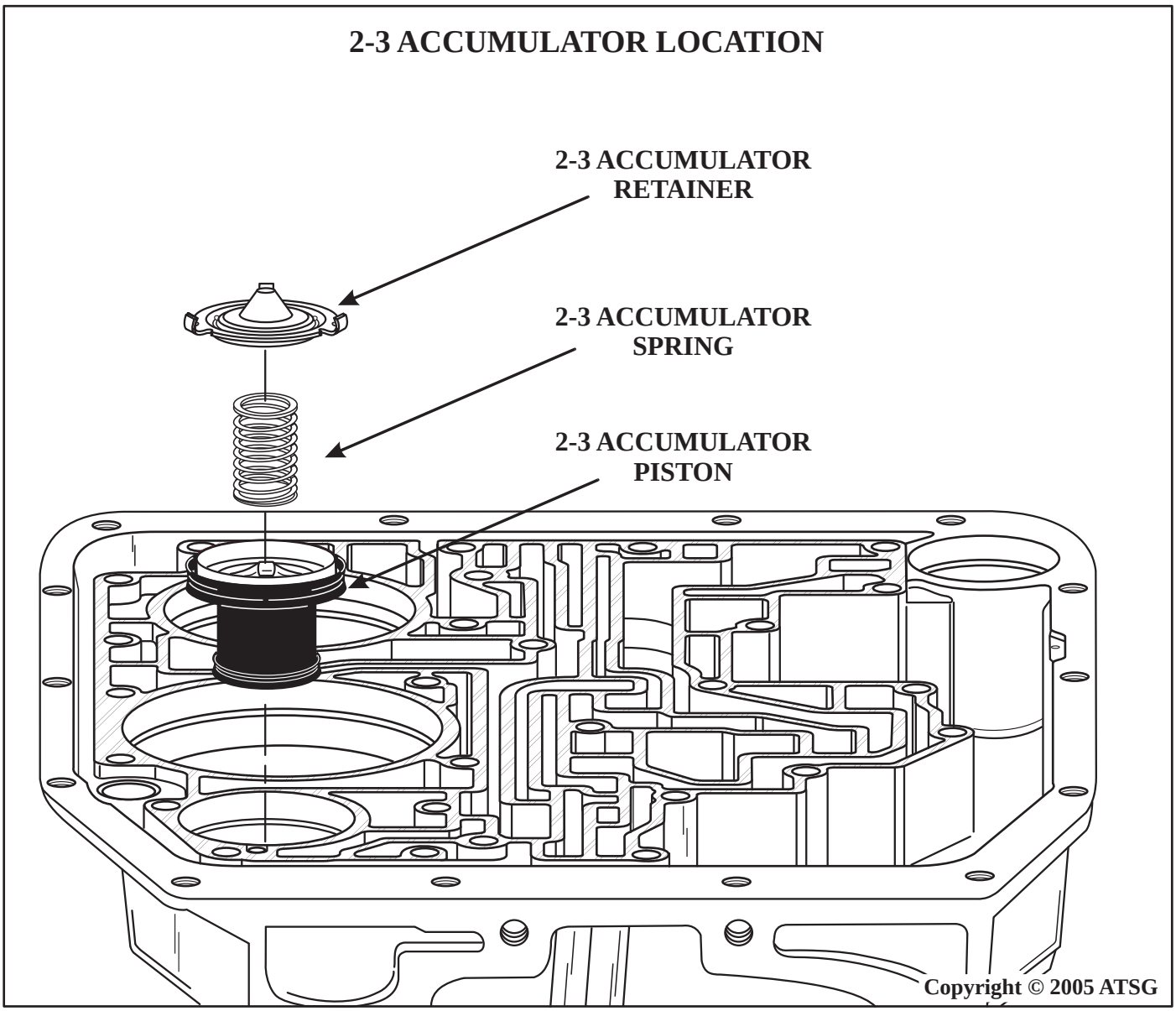


Figure 4

SLIDE

FORD MOTOR COMPANY

VEHICLES EQUIPPED WITH THE 4R70W TRANSMISSION NEUTRALS IN FIRST GEAR FROM A STOP 1996 AND UP IN "D" RANGE ONLY

COMPLAINT: Some Ford Motor Company 1996 and later vehicles equipped with the 4R70W Transmission may exhibit a neutral condition from a stop when the Shift Selector is in the "D" range. There may also be a Diagnostic Trouble Code P0755 stored. (Shift Solenoid 2 Electrical Circuit Fault).

CAUSE:

(1) One cause for this condition may be that the PPL/ORG or VIO/ORG wire, which is model dependant that controls Shift Solenoid 2 may have rubbed on the rear of the engine, causing the circuit to become grounded. When this occurs with the transmission in first gear, Shift Solenoid 2 closes and fluid pressure acts to stroke the 3-4 Shift Valve to the right, causing the Forward Clutch oil to exhaust through the 3-4 Shift Valve, creating the neutral condition. (See Figure 1). Diagnostic Trouble Code P0755 may also be set.

(2) Another cause for this condition may be that the Solenoid Regulator Valve has become stuck down in the bottom of the Valve Body bore causing the pressure in the Solenoid Regulator Circuit to become higher than the Shift Solenoid 2 can exhaust, allowing the Shift Solenoid 2 pressure to build up and strokes the 3-4 Shift Valve to the right exhausting the Forward Clutch, creating the neutral condition. (See Figure 2) No Diagnostic Trouble Codes will be set. See Figures 3 and 4 for valve identification.

(3) Cause 3 is almost identical to Cause 2 with the exception being that Shift Solenoid is sticking closed or has debris built up at the Solenoid exhaust hole, which will allow Shift Solenoid 2 pressure to build up and strokes the 3-4 Shift Valve to move to the right exhausting the Forward Clutch, once again creating the neutral condition. (See Figure 2). No Diagnostic Trouble Codes will be set.

NOTE: When following proper diagnostic procedure for this problem, attach a pressure gauge to the Forward Clutch Pressure Port which is located on the right hand side of the transmission.(See Figure 5) Normally when the Forward Clutch is applied the pressure will be equal to the Main Line pressure. (See Figure 6) When the above causes take place, the pressure seen at the Forward Clutch will suddenly drop to Zero, and this is when the neutral condition will be felt.

CORRECTION:

(1) Repair or replace the damaged Shift Solenoid 2 wire. Refer to Figures 7 and 8 to locate the proper year and model vehicle that you are working on. Wire Diagrams have been provided in Figures 9, 10, 11 and 12.

(2) Locate the Solenoid Regulator Valve in the Valve Body. See Figures 3 and 4 To repair a sticking Solenoid Regulator Valve, it may become necessary to replace the valve assembly. There are replacement Solenoid Regulator Valve Kits available in the Aftermarket.

(3) Replace the Shift Solenoid 1 and 2 assembly.

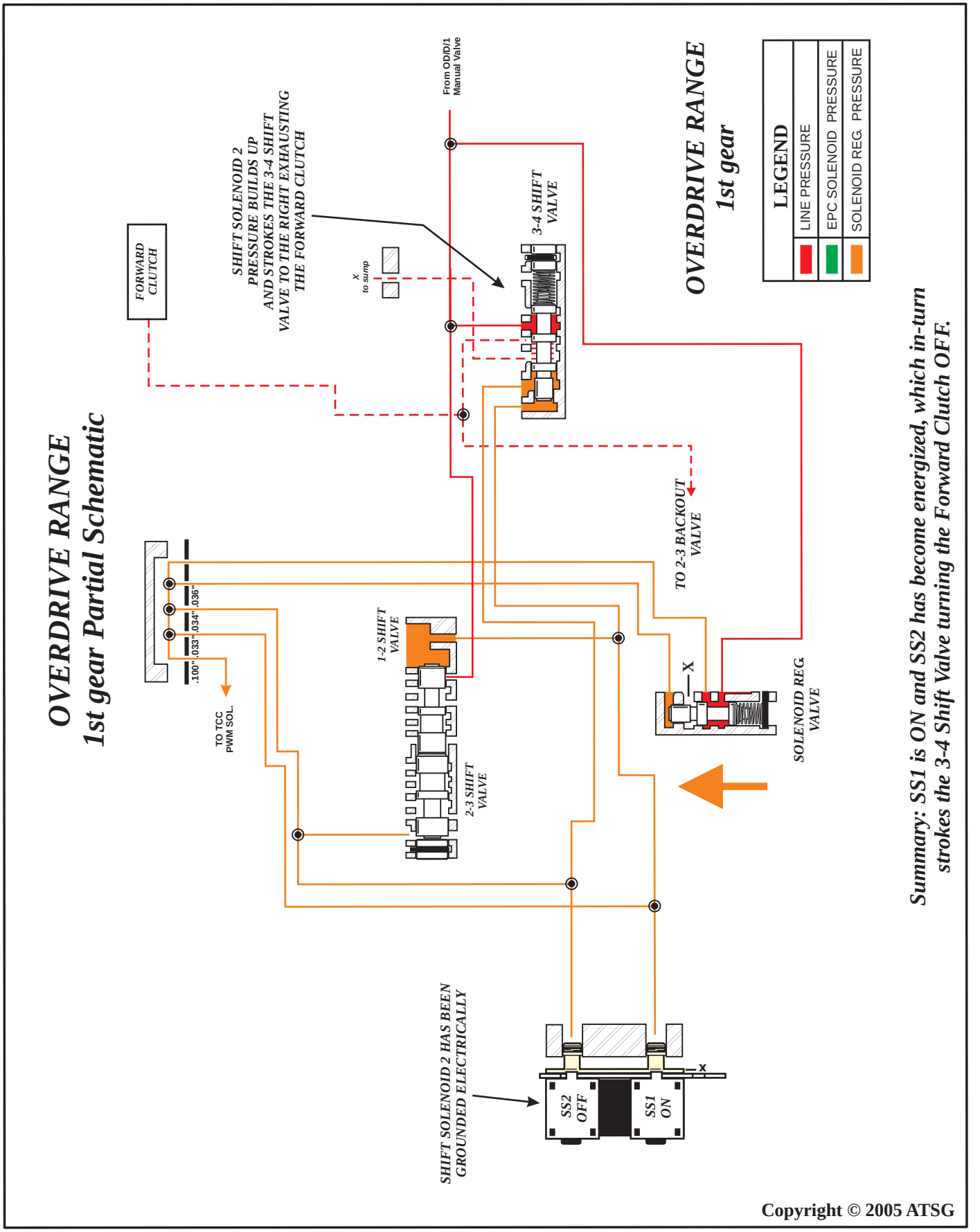

OVERDRIVE RANGE
1st gear Partial Schematic
OVERDRIVE RANGE
1st gear
LEGEND
LINE PRESSURE
EPC SOLENOID PRESSURE
SOLENOID REG. PRESSURE
From OD/D1 Manual Valve
FORWARD CLUTCH
SHIFT SOLENOID 2 PRESSURE BUILDS UP AND STROKES THE 3-4 SHIFT VALVE TO THE RIGHT EXHAUSTING THE FORWARD CLUTCH
X to sump
3-4 SHIFT VALVE
TO 2-3 BACKOUT VALVE
.100" .033" .034" .036"
TO TCC PWM SOL.
1-2 SHIFT VALVE
2-3 SHIFT VALVE
SOLENOID REG VALVE
SHIFT SOLENOID 2 HAS BEEN GROUNDED ELECTRICALLY
SS2 OFF
SS1 ON
Summary: SS1 is ON and SS2 has become energized, which in-turn strokes the 3-4 Shift Valve turning the Forward Clutch OFF.
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Figure 1

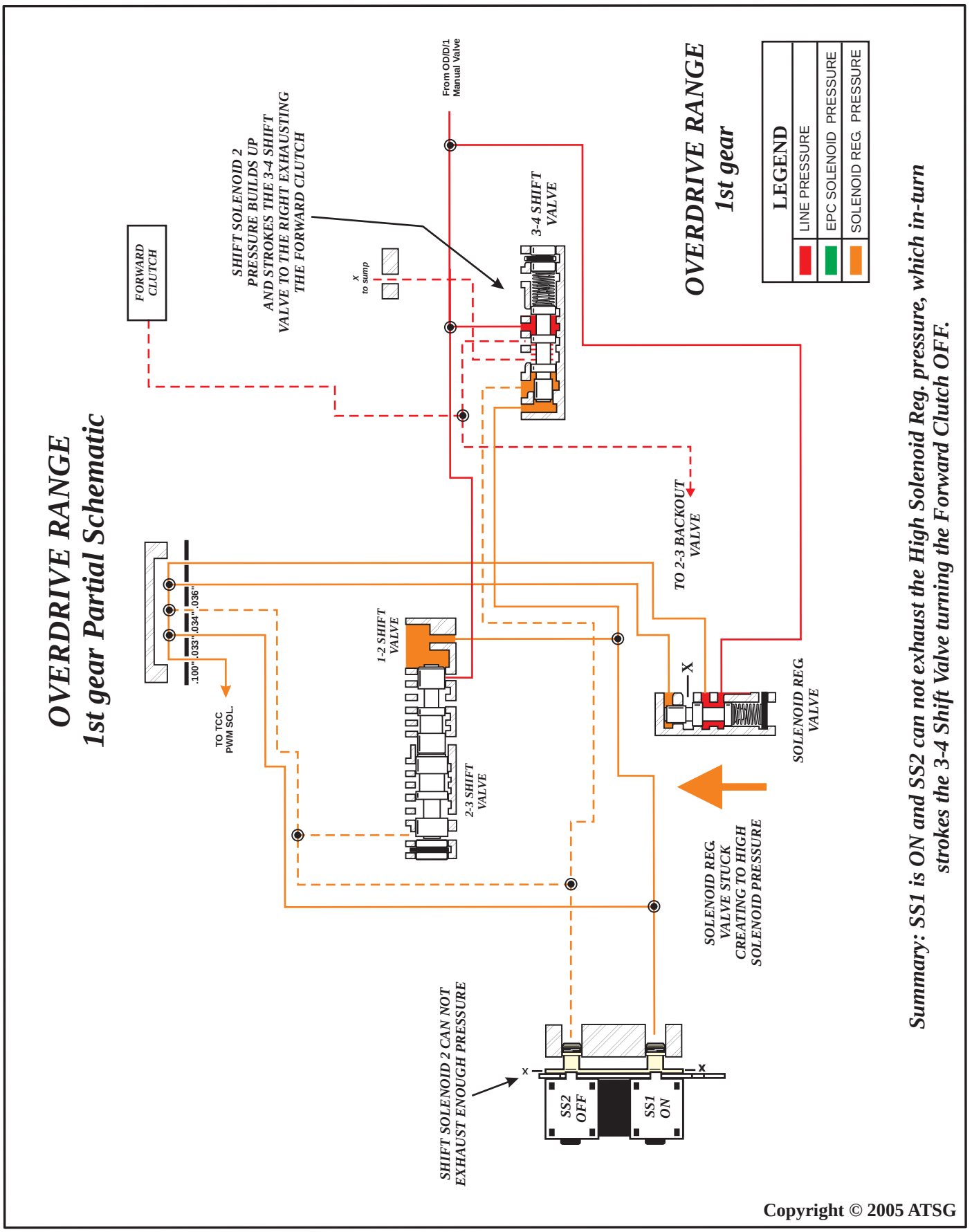
OVERDRIVE RANGE
1st gear Partial Schematic
OVERDRIVE RANGE
1st gear
LEGEND
LINE PRESSURE
EPC SOLENOID PRESSURE
SOLENOID REG. PRESSURE
From OD/D1 Manual Valve
FORWARD CLUTCH
SHIFT SOLENOID 2 PRESSURE BUILDS UP AND STROKES THE 3-4 SHIFT VALVE TO THE RIGHT EXHAUSTING THE FORWARD CLUTCH
x to sump
3-4 SHIFT VALVE
TO 2-3 BACKOUT VALVE
.100" .033" .034" .036"
TO TCC PWM SOL.
1-2 SHIFT VALVE
2-3 SHIFT VALVE
SOLENOID REG VALVE
SOLENOID REG VALVE STUCK CREATING TO HIGH SOLENOID PRESSURE
SHIFT SOLENOID 2 CAN NOT EXHAUST ENOUGH PRESSURE
SS2 OFF
SS1 ON
Summary: SS1 is ON and SS2 can not exhaust the High Solenoid Reg. pressure, which in-turn strokes the 3-4 Shift Valve turning the Forward Clutch OFF.
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Figure 2

FORD 4R70W
2001-UP MAIN VALVE BODY EXPLODED VIEW

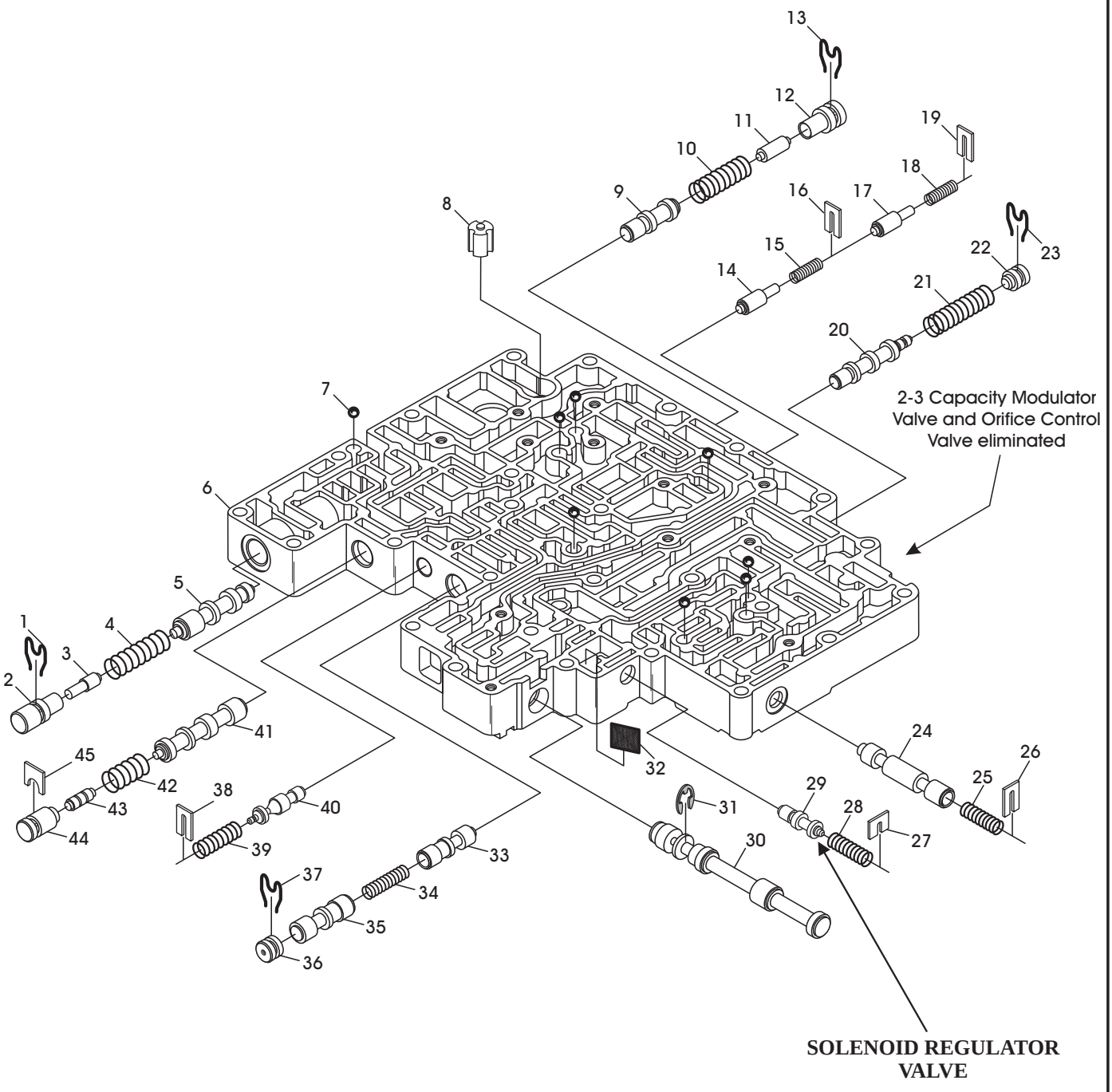


Figure 3

FORD 4R70W

MAIN VALVE BODY LEGEND

1 MAIN PRESSURE REGULATOR BOOST VALVE SLEEVE RETAINER.
2. MAIN PRESSURE REGULATOR BOOST VALVE SLEEVE.
3 MAIN PRESSURE REGULATOR BOOST VALVE.
4 MAIN PRESSURE REGULATOR VALVE SPRING.
5 MAIN PRESSURE REGULATOR VALVE.
6 MAIN VALVE BODY CASTING.
7 CHECK BALL, 1/4" DIAMETER (8 REQUIRED).
8 CONVERTER DRAIN BACK VALVE.
9 O.D. SERVO PRESSURE REGULATOR VALVE.
10 O.D. SERVO PRESSURE REGULATOR VALVE SPRING.
11 O.D. SERVO PRESSURE REGULATOR BOOST VALVE.
12 O.D. SERVO PRESSURE REGULATOR BOOST VALVE SLEEVE.
13 BOOST VALVE SLEEVE RETAINER.
14 3-4 CAPACITY MODULATOR VALVE.
15 3-4 CAPACITY MODULATOR VALVE SPRING.
16 3-4 CAPACITY MODULATOR VALVE SPRING RETAINER.
17 LOW SERVO CAPACITY MODULATOR VALVE.
18 LOW SERVO CAPACITY MODULATOR VALVE SPRING.
19 LOW SERVO CAPACITY MODULATOR VALVE SPRING RETAINER.
20 3-4 SHIFT VALVE.
21 3-4 SHIFT VALVE SPRING.
22 3-4 SHIFT VALVE SPRING BORE PLUG.
23 3-4 SHIFT VALVE BORE PLUG RETAINER.
24 2-3 BACKOUT VALVE.
25 2-3 BACKOUT VALVE SPRING.
26 2-3 BACKOUT VALVE SPRING RETAINER.
27 SOLENOID PRESSURE REGULATOR VALVE SPRING RETAINER.
28 SOLENOID PRESSURE REGULATOR VALVE SPRING.
29 SOLENOID PRESSURE REGULATOR VALVE.
30 MANUAL CONTROL VALVE.
31 MANUAL CONTROL VALVE "E" CLIP.
32 EPC SOLENOID SCREEN.
33 1-2 SHIFT VALVE.
34 2-3 SHIFT VALVE SPRING.
35 2-3 SHIFT VALVE.
36 2-3 SHIFT VLAVE BORE PLUG.
37 2-3 SHIFT VALVE BORE PLUG RETAINER.
38 CONVERTER PRESSURE REGULATOR VALVE SPRING RETAINER.
39 CONVERTER PRESSURE REGULATOR VALVE SPRING.
40 CONVERTER PRESSURE REGULATOR VALVE.
41 BYPASS CLUTCH CONTROL VALVE.
42 BYPASS CLUTCH CONTROL VALVE SPRING.
43 BYPASS CLUTCH CONTROL BOOST VALVE.
44 BYPASS CLUTCH CONTROL BOOST VALVE SLEEVE.
45 BYPASS CLUTCH CONTROL VALVE SLEEVE RETAINER.

Figure 4

4R70W PRESSURE TAP LOCATIONS

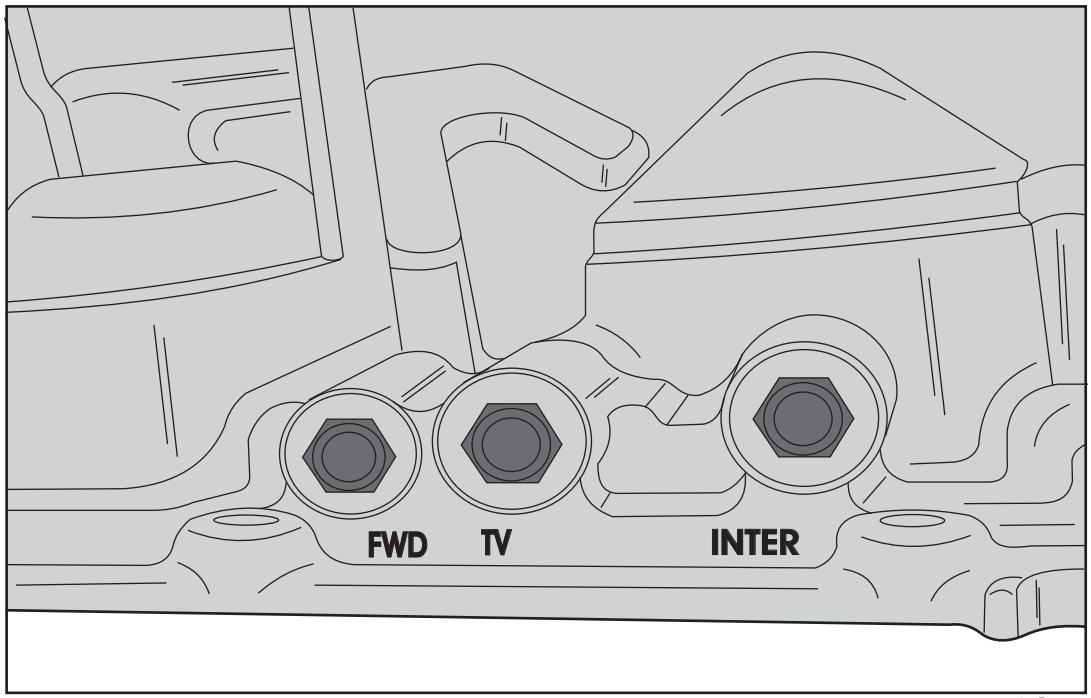
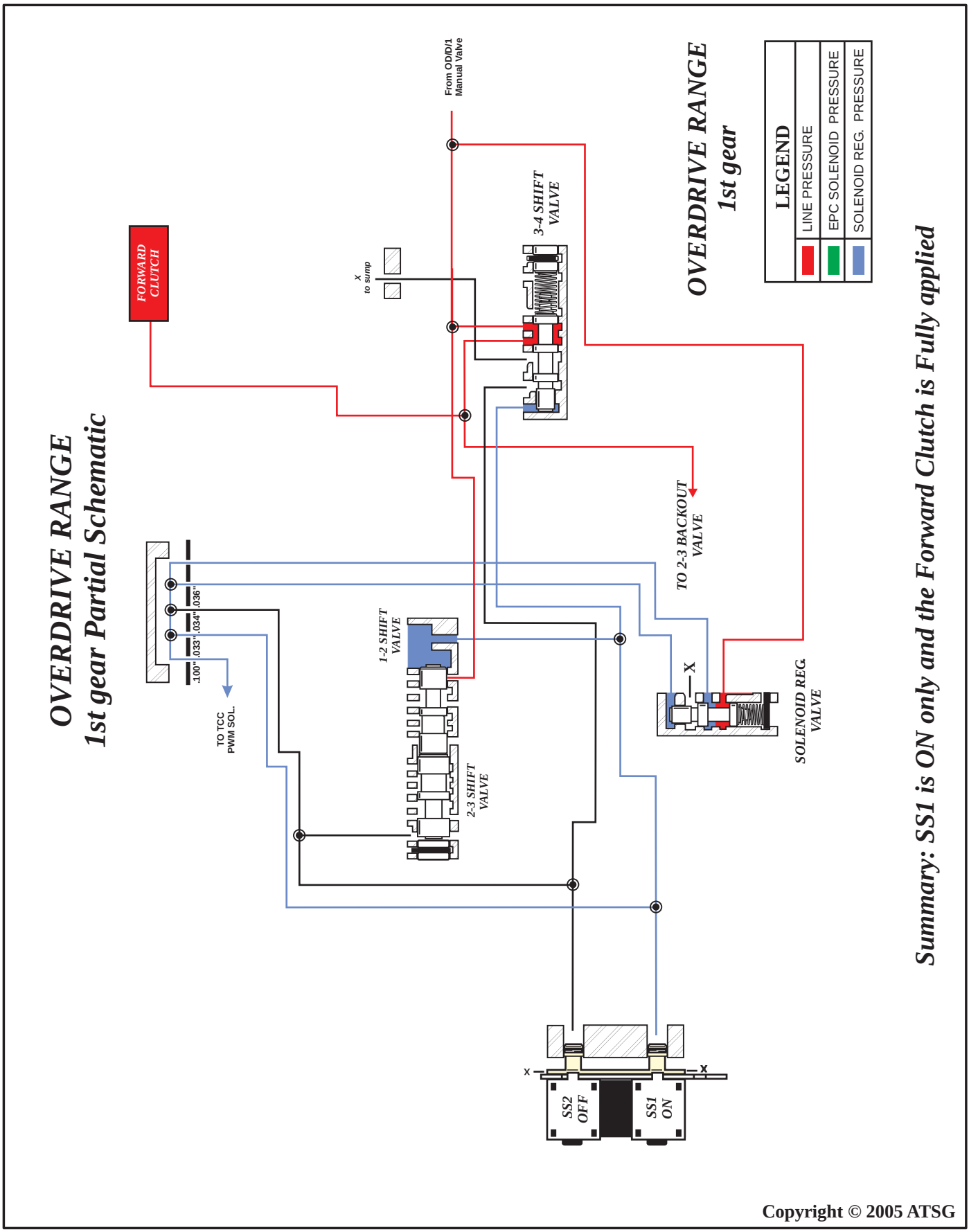


Figure 5


OVERDRIVE RANGE
1st gear Partial Schematic
OVERDRIVE RANGE
1st gear
LEGEND
LINE PRESSURE
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SOLENOID REG. PRESSURE
FORWARD CLUTCH
From OD/D/1 Manual Valve
3-4 SHIFT VALVE
x to sump
TO 2-3 BACKOUT VALVE
1-2 SHIFT VALVE
2-3 SHIFT VALVE
SOLENOID REG VALVE
TO TCC PWM SOL.
.100"
.033"
.034"
.036"
SS2 OFF
SS1 ON
Summary: SS1 is ON only and the Forward Clutch is Fully applied
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Figure 6

SHIFT SOLENOID 2 WIRE DIAGRAM
TABLE OF CONTENTS

Figure 7

SHIFT SOLENOID 2 WIRE DIAGRAM
TABLE OF CONTENTS

Figure 8

SHIFT SOLENOID 2 ELECTRICAL DIAGRAMS

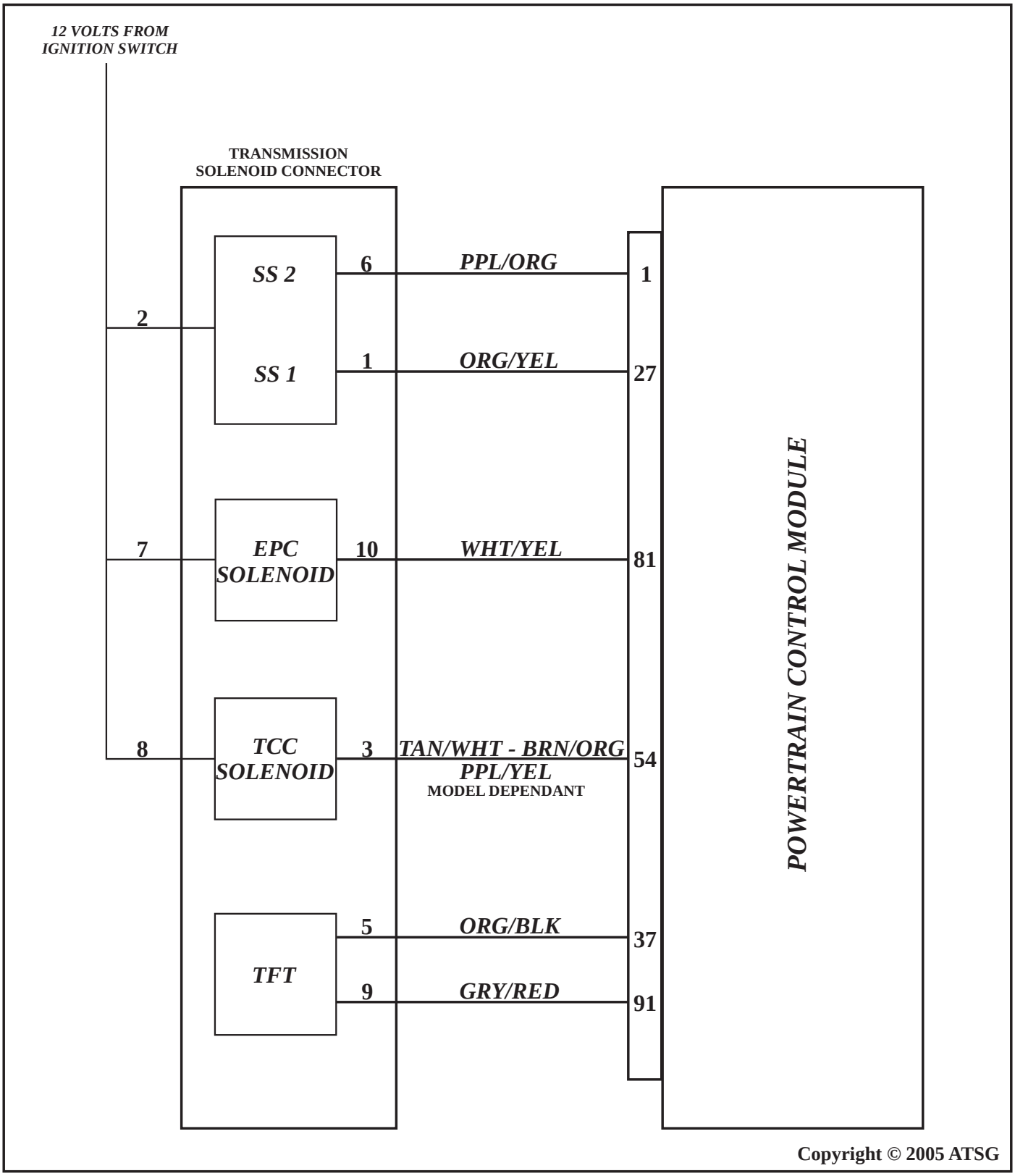


Figure 9

SHIFT SOLENOID 2 ELECTRICAL DIAGRAMS

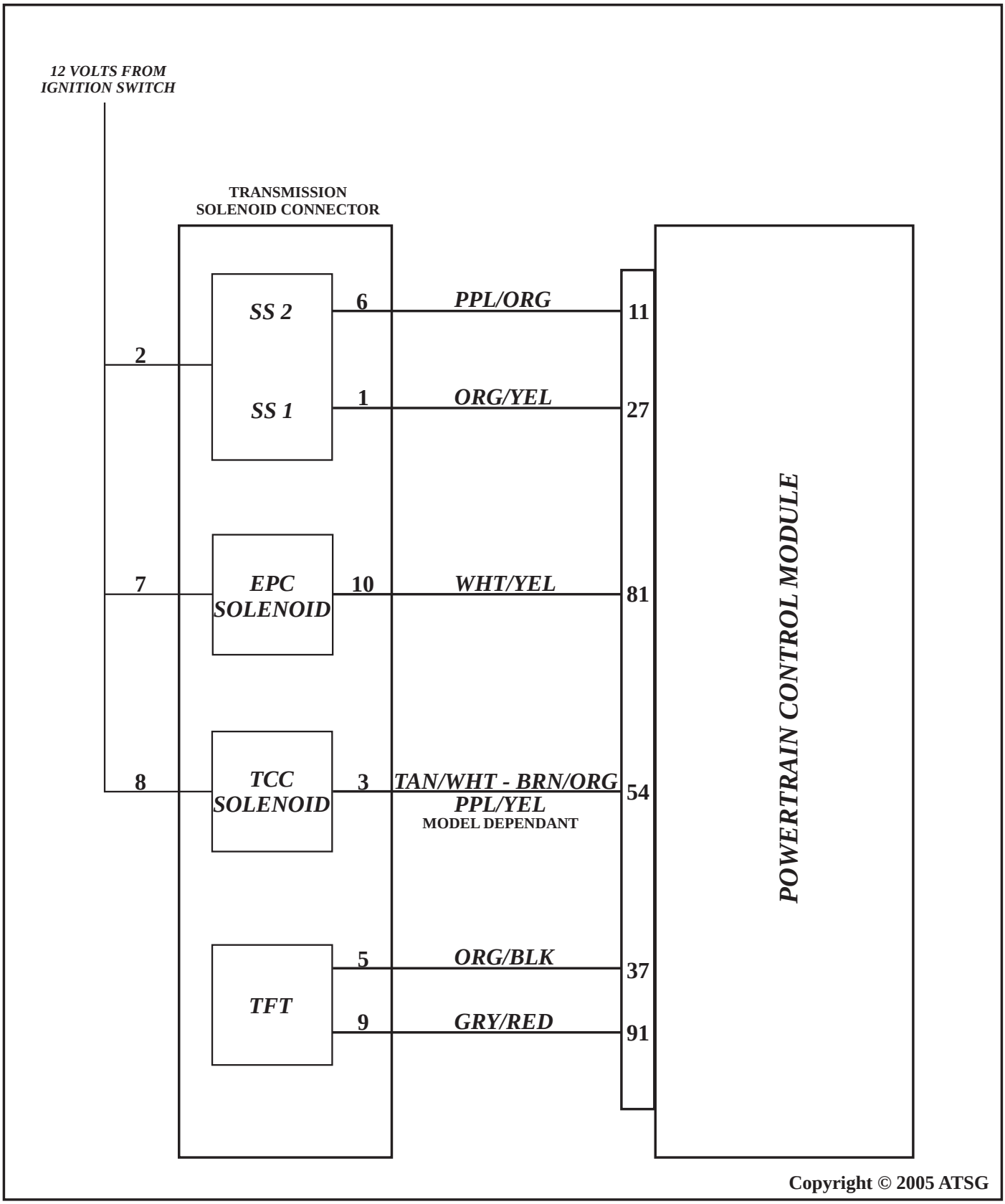


Figure 10

SHIFT SOLENOID 2 ELECTRICAL DIAGRAMS

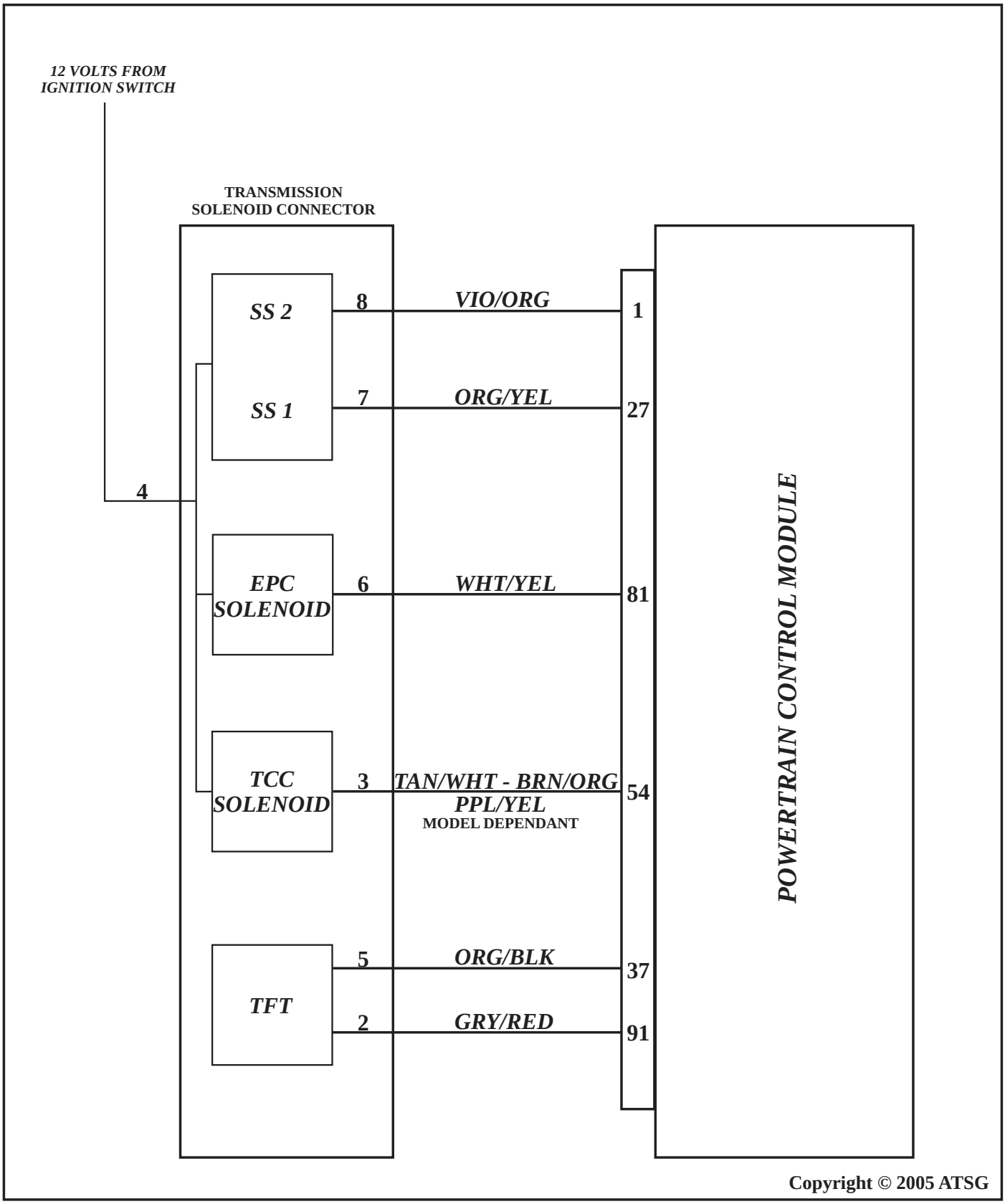


Figure 11

SHIFT SOLENOID 2 ELECTRICAL DIAGRAMS

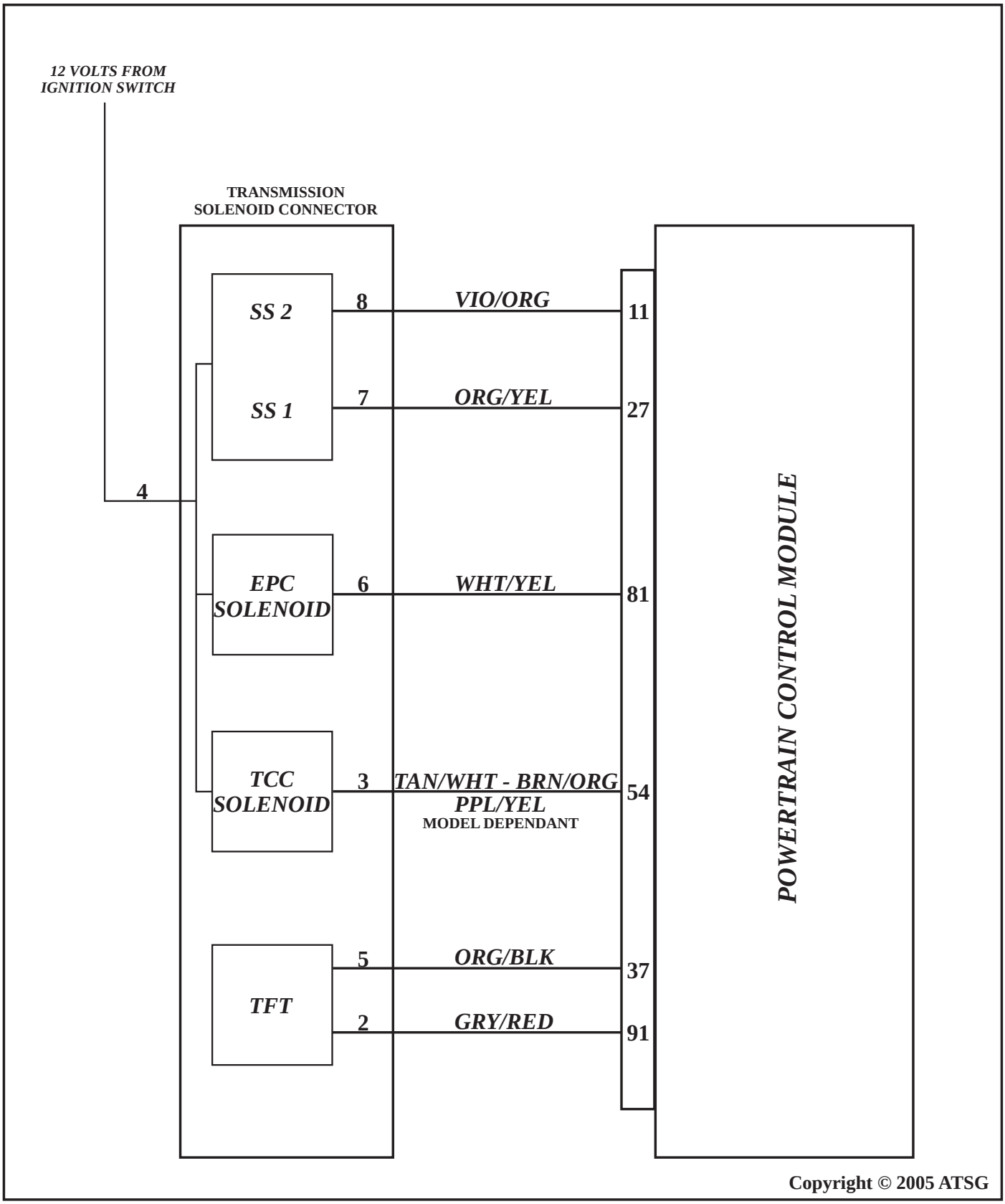


Figure 12

FORD 5R110W *Torqshift*

FORWARD CLUTCH CHANGES FOR 2005

CHANGE: Beginning at the start of production for 2005 models, Ford Motor Company increased the diameter and height of the forward planetary carrier, which affected many of the related internal parts. These changes were for the 6.0L Diesel equipped vehicles.

REASON: Greatly improved durability.

PARTS AFFECTED:

(1) FORWARD PLANETARY CARRIER - Increased diameter, of approximately 1/4", to the planetary carrier, as shown in Figure 1. Notice also that the pinion pin diameter has increased and the pinion gears are taller than previous models, as shown in Figure 1.

(2) FORWARD PLANETARY CARRIER LUBE DAM - Also increased in diameter to accommodate the new design carrier, as shown in Figure 1. Notice also that the new lube dam has only four retaining tabs instead of six.

(3) NUMBER 11 THRUST BEARING - The diameter decreased to accommodate the new design planetary carrier, as shown in Figure 1.

(4) FORWARD PLANETARY RING GEAR - Increased diameter, approximately 1/4" to the ring gear, as shown in Figure 1, to accommodate the new design planetary carrier. The tooth count on the ring gear for the forward clutch frictions also changed.

(5) NUMBER 10 THRUST WASHER - Increased in diameter and the tab configuration changed, as shown in Figure 1.

(6) FORWARD CLUTCH STEEL PLATES - The inside diameter and the pilot diameter increased to accommodate the increased diameter of the planetary carrier, as shown in Figure 2. The outside tooth count did not change.

(7) FORWARD CLUTCH FRICTION PLATES - The inside and outside diameters increased to accommodate the new design planetary carrier, and as a result the tooth count also changed, as shown in Figure 3.

(8) FORWARD CLUTCH BACKING PLATE - The inside diameter and pilot diameter increased to accommodate the increased diameter of the planetary carrier, as shown in Figure 4. The outside tooth configuration did not change.

(9) FORWARD CLUTCH HOUSING - The only thing that changed on the forward clutch housing was the diameter of the lube holes in the hub for the direct clutch plates, as shown in Figure 5.

(10) SUN GEAR AND SHELL ASSEMBLY - The diameter and tooth count of the sun gear for the forward planetary side has increased, as shown in Figure 6. Also from the back side, the retaining snap ring is no longer visible on the 2005 design, as shown in Figure 6.

INTERCHANGEABILITY:

None of the parts listed above will interchange with any of the previous design parts, but when all parts are used as s service package, will retro-fit back on all previous models.

Special Considerations:

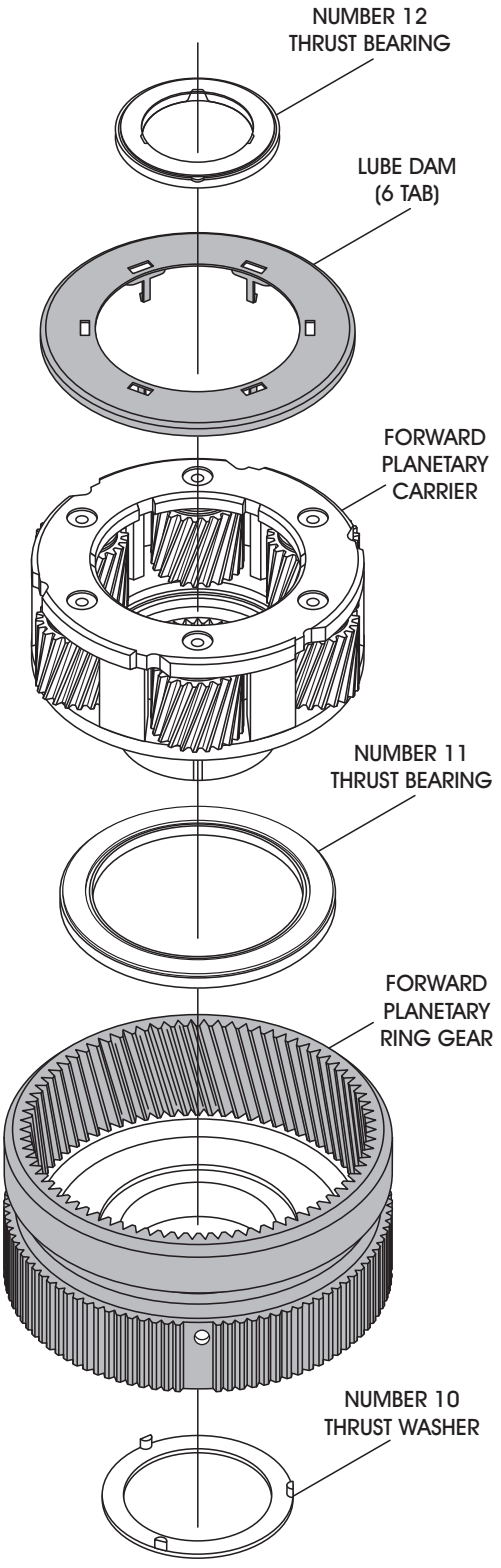
These changes will now allow you to assemble 2003/2004 models with 2005 model forward friction plates. If you do, ***No Forward*** will be the result.

SERVICE INFORMATION:

Forward Clutch Service Package KT5C3Z-7A398-SA
(Includes all parts listed above, plus 2005 Design rear planetary)

FORWARD PLANETARY CARRIER DIFFERENCES

2003/2004 Models



2005/UP Models

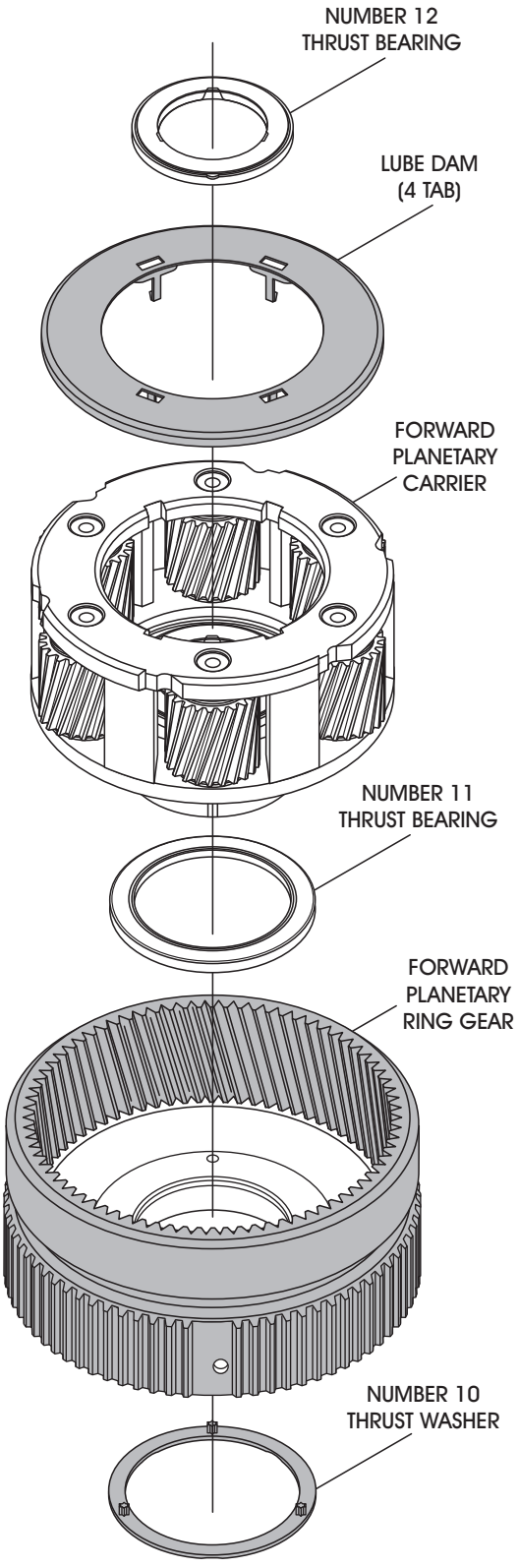


Figure 1

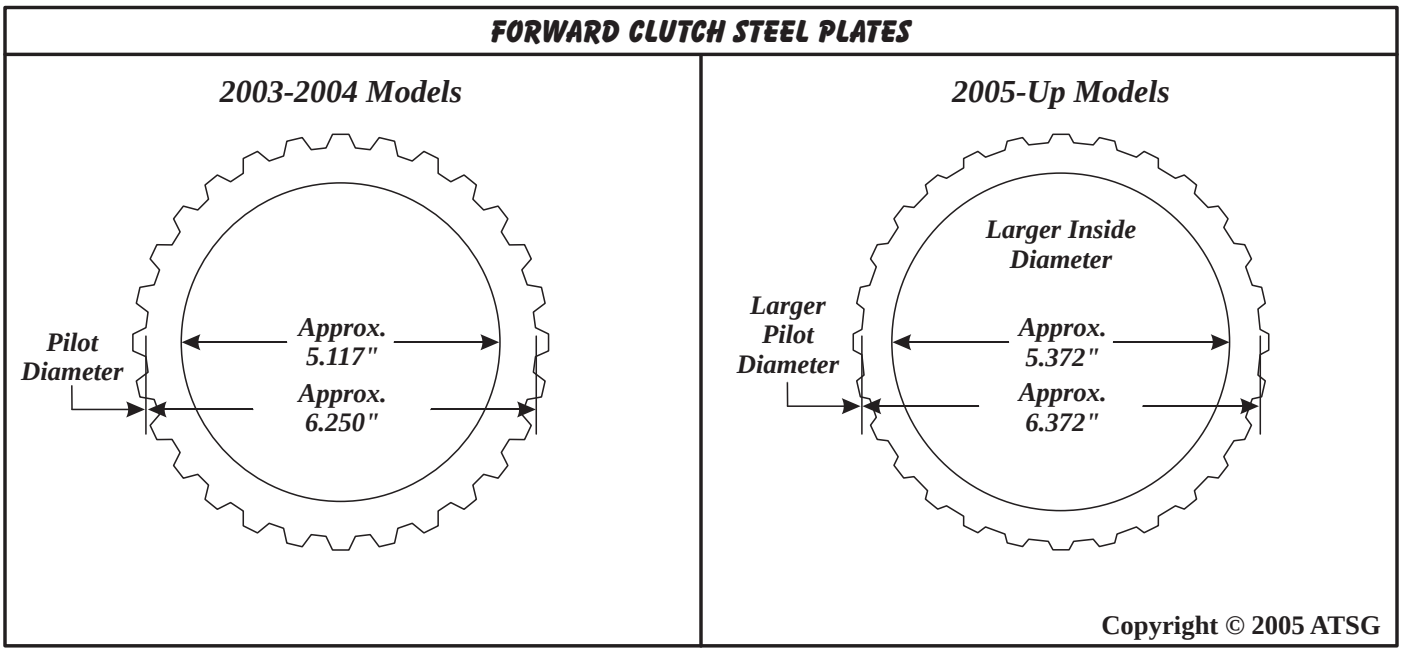


Figure 2

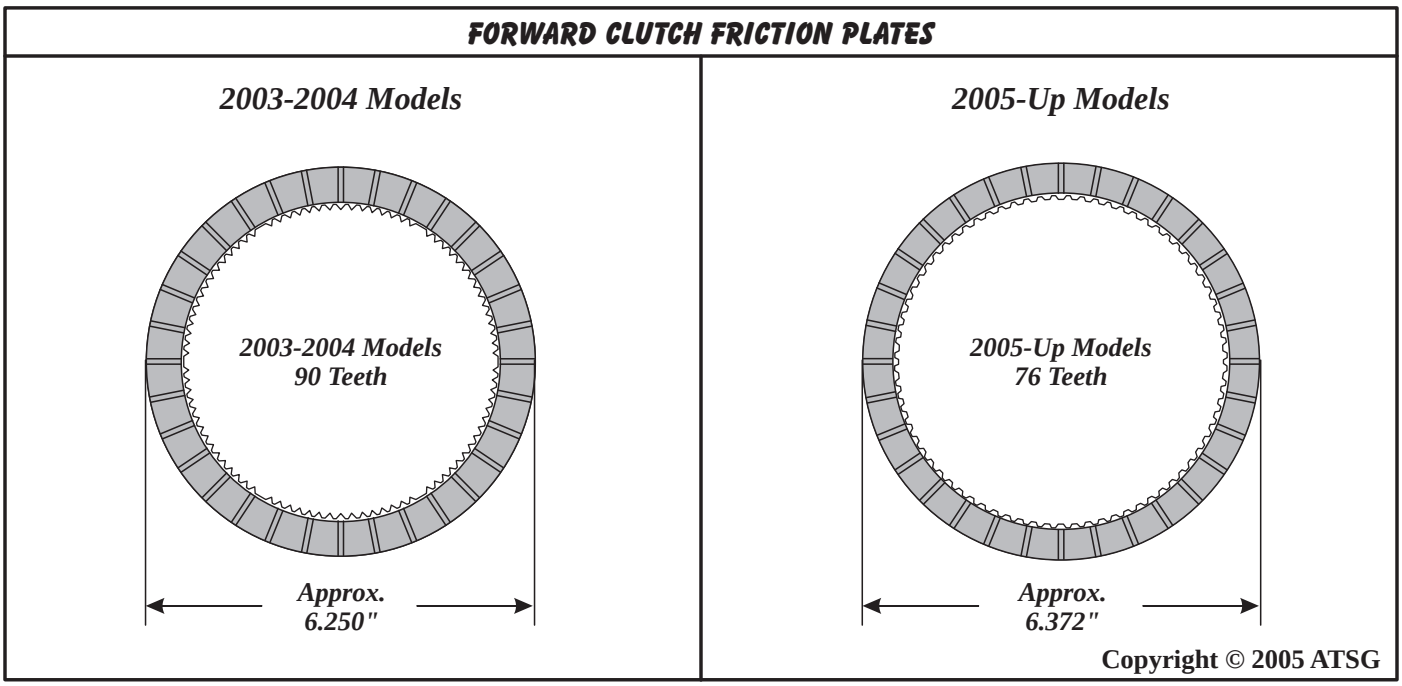


Figure 3

FORWARD CLUTCH BACKING PLATE

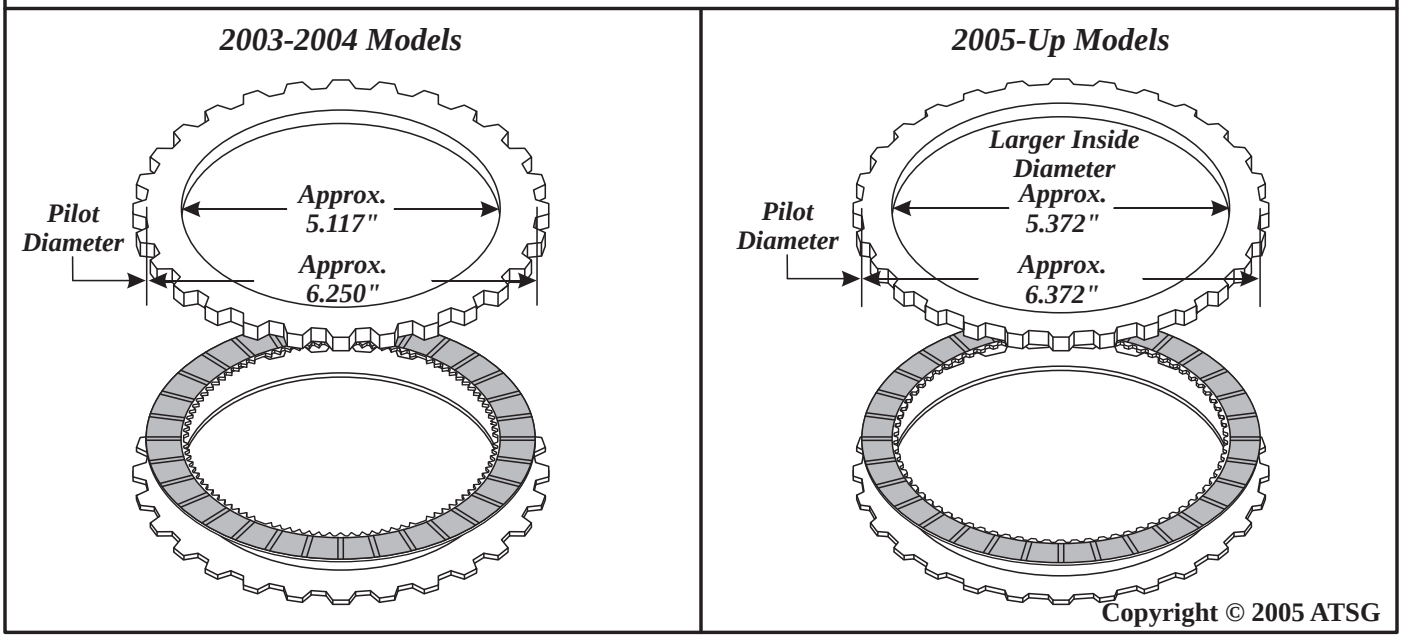


Figure 4

FORWARD CLUTCH HOUSING

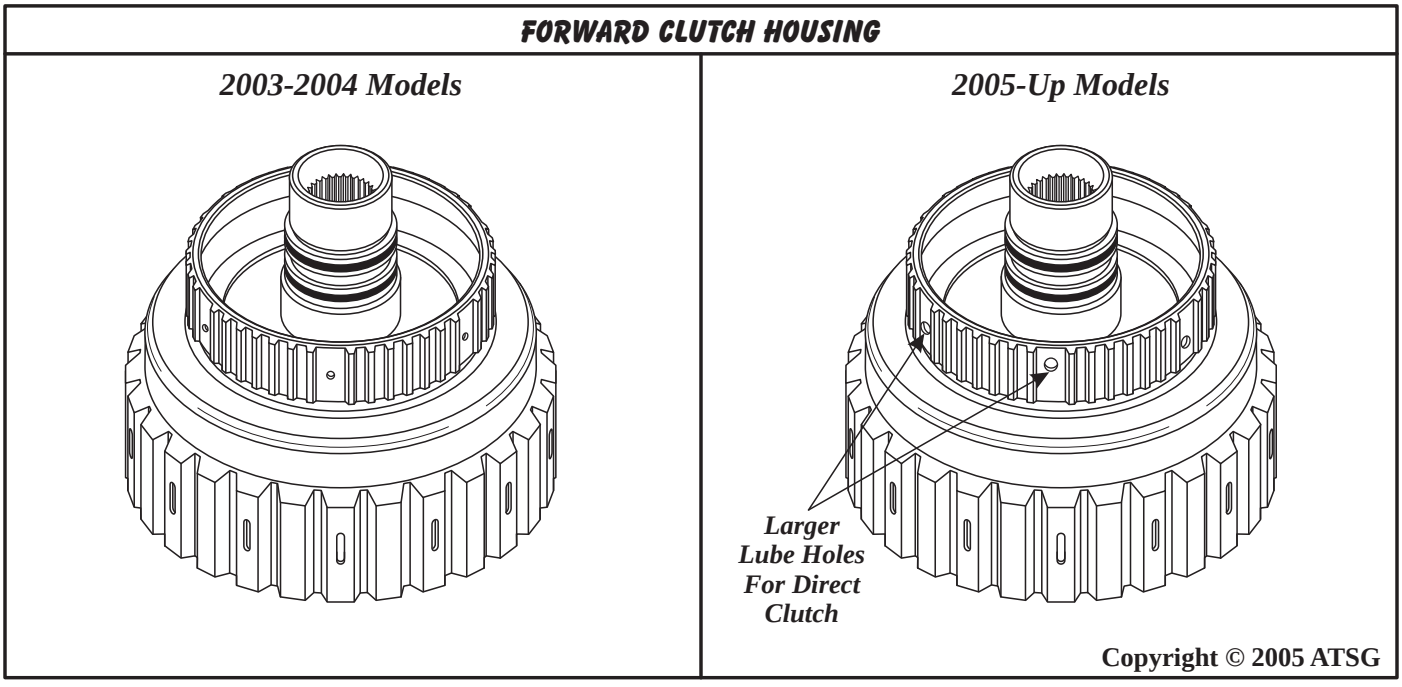
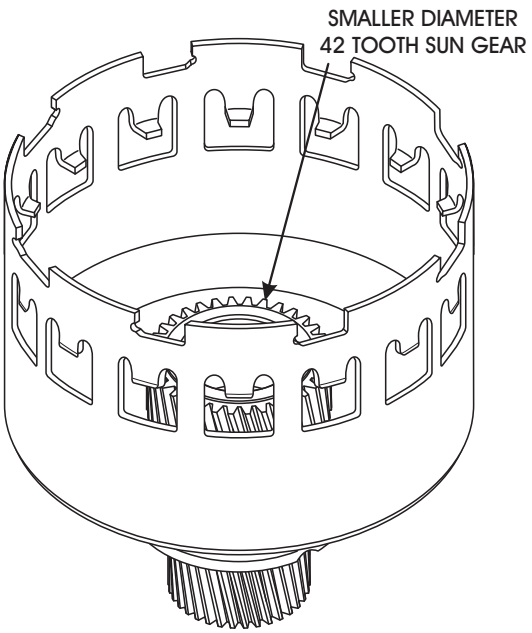
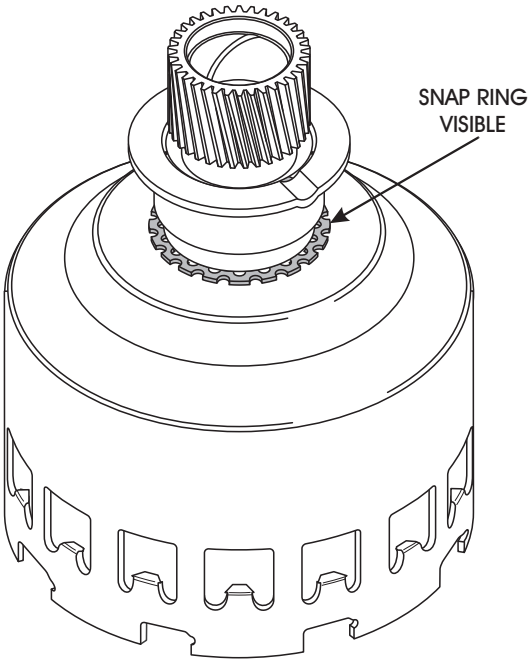


Figure 5

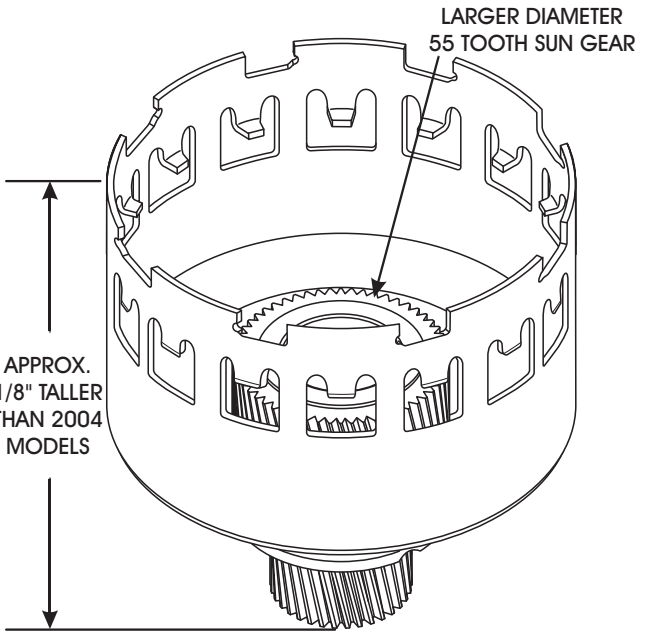
SUN SHELL DIFFERENCES

2003/2004 Models





2005/UP Models



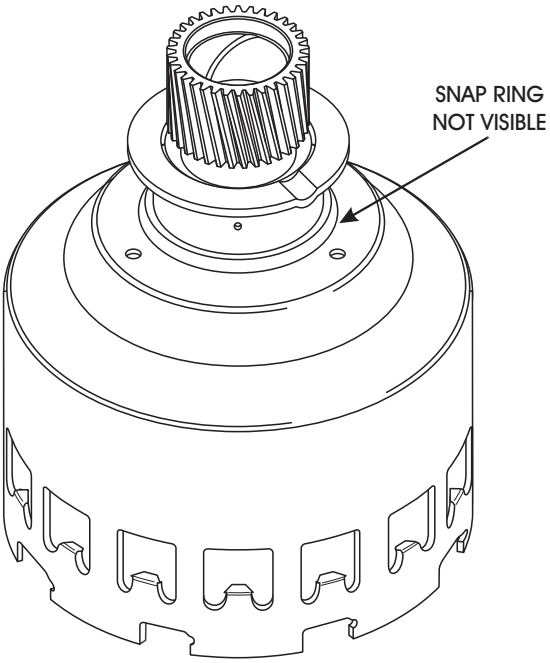


Figure 6

FORD 5R110W *"TorqShift"*
FORWARD CLUTCH FEED BOLT CHANGE FOR 2005

CHANGE: Beginning at the start of production for 2005 models, Ford Motor Company changed the Forward Clutch Feed Bolt.

REASON: To eliminate the need for the previous design Forward Clutch Orifice, as shown in Figure 1.

PARTS AFFECTED:

FORWARD CLUTCH FEED BOLT - The new design bolt now has an orificed cup plug installed into the center of it as shown in Figure 2. NOTE: The orifice in the new feed bolt is now .010" smaller in diameter, and it now requires a 50 torx bit for installation. See the illustration in Figure 3 for it's location in the case.

SERVICE INFORMATION:

FORWARD CLUTCH FEED BOLT.....5C3Z-7N134-AA

PREVIOUS DESIGN

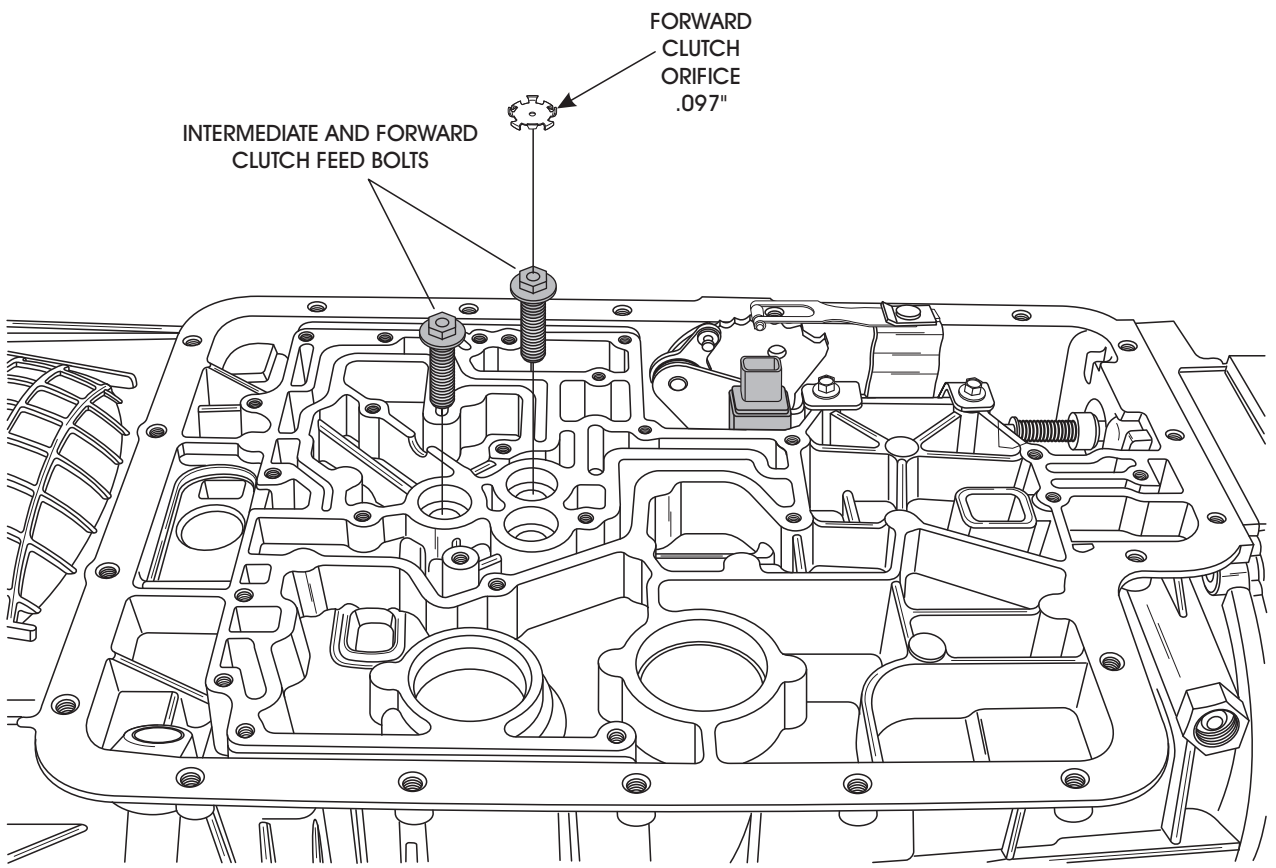
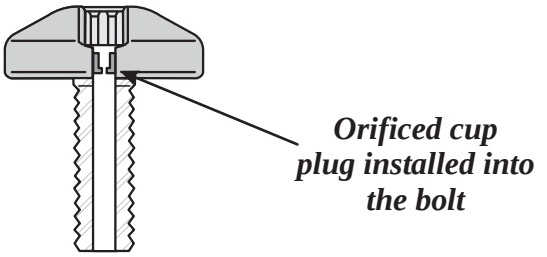


Figure 1

NEW DESIGN FEED BOLT CROSS-SECTION



5C3Z-7N134-AA

Figure 2

NEW DESIGN

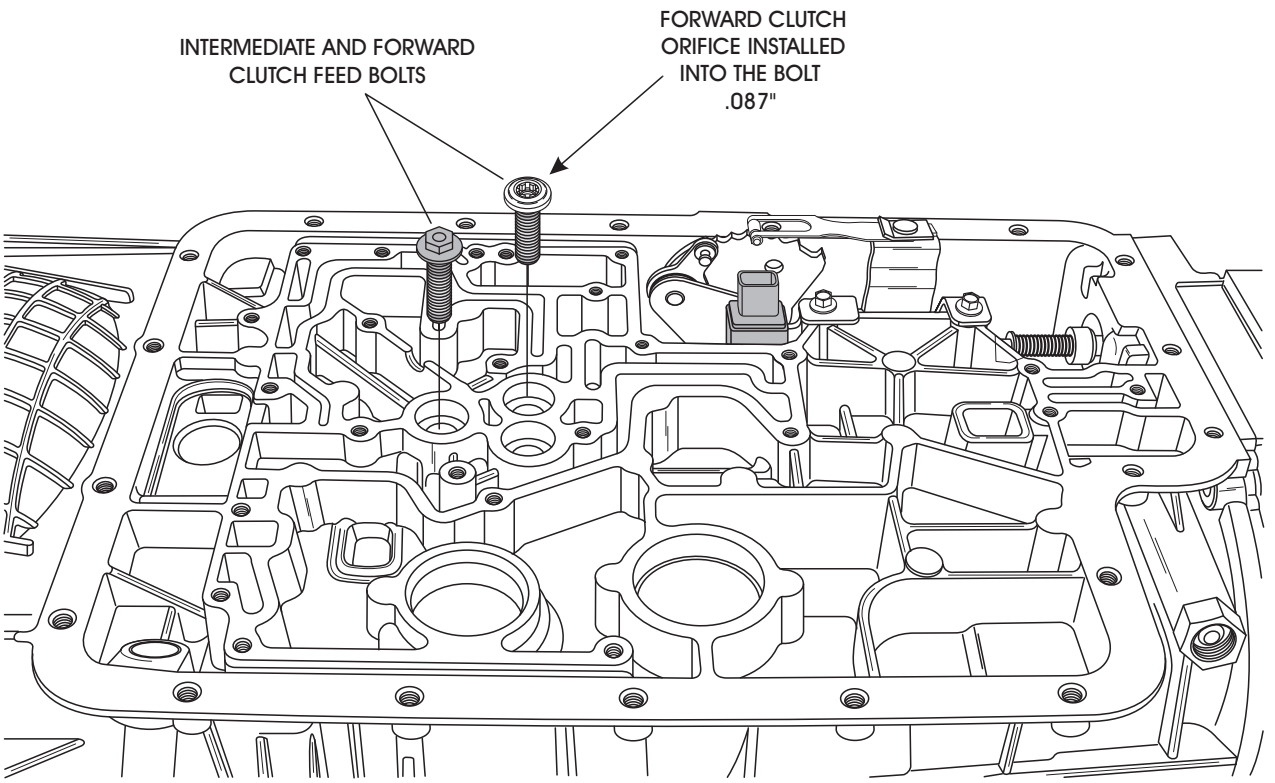


Figure 3

FORD 4R44E/4R55E/5R44E/5R55E

EPC SOLENOID INDUCTIVE SIGNATURE

COMPLAINT: The vehicle PCM is storing codes P1746, P1747, or P1760 for an EPC solenoid electrical fault. When the solenoid circuits are checked they appear to be in proper condition. PCM replacement does not cure the complaint.

CAUSE: **(1)** An EPC solenoid WITHOUT Inductive Signature was installed instead of one with inductive signature.

(2) The vehicle system voltage is low.

CORRECTION:

(1) At the start of production for the 1997 model year Ford vehicles with the 4/5R44/55 series of transmissions were built with a PCM that would recognize a specifically timed signal from the EPC solenoid, this signal is known as "Inductive Signature".
The time that it takes current to flow through the solenoid coil and there is enough magnetic energy to make the armature begin to move, the magnetic field is momentarily disrupted, this causes a slight backward movement of current through the coil.
This creates a slight dip in the electrical pattern of the solenoid which is referred to as an "Inductive Spike".
The PCM is looking for this "Inductive Spike" to occur within a specific time frame from the time the solenoid was turned on by the PCM. ***This is how the PCM makes certain the solenoid is properly working as seen in Figure 1.***
Therefore, in order for this spike to occur at the same time, every time, the solenoid must be manufactured under tight specifications. This is the reason why a solenoid without inductive signature (Refer to Figure 2), should not be used in a vehicle that requires an inductive signature.
The PCM will not see an inductive signature occur when it is looking for it and could therefore store a FALSE EPC solenoid circuit code.

(2) If system voltage is low, the EPC solenoid will not have enough current to move the armature quicky enough, therefore the PCM will not see the inductive signature occur at the correct time and once again a false EPC solenoid electrical fault code may be stored. It is necessary to verify the condition of the vehicle battery, battery cables, alternator output and power and grounds at the PCM. These items must be in proper working order.

NOTE: These transmissions also are equipped with TCC solenoids that use an inductive signature, also since the 1997 model year.

SERVICE INFORMATION:

EPC Solenoid Without Inductive Signature (1995-96).....F5TZ-7H144-A
EPC Solenoid With Inductive Signature (1997 & Later).....XL2Z-7G383-AA
TCC Solenoid Without Inductive Signature (1995-96).....F5TZ-7F037-AA
TCC Solenoid With Inductive Signature (1997 & Later).....XL2Z-7G136-AA

EPC SOLENOID WITH INDUCTIVE SIGNATURE

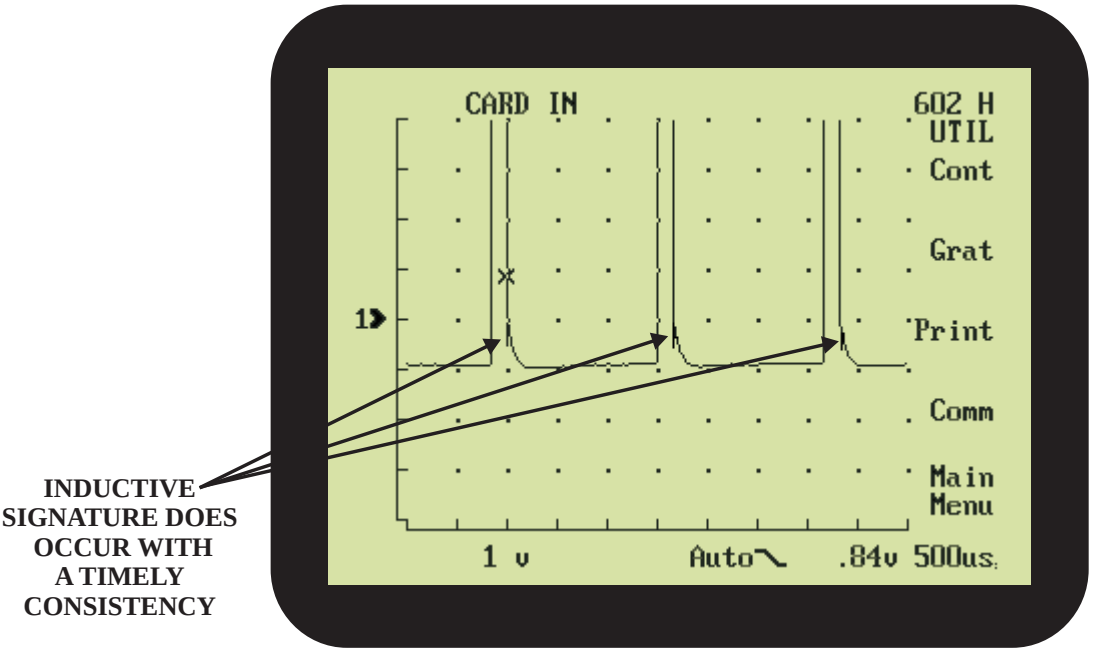


Figure 1

EPC SOLENOID WITHOUT INDUCTIVE SIGNATURE

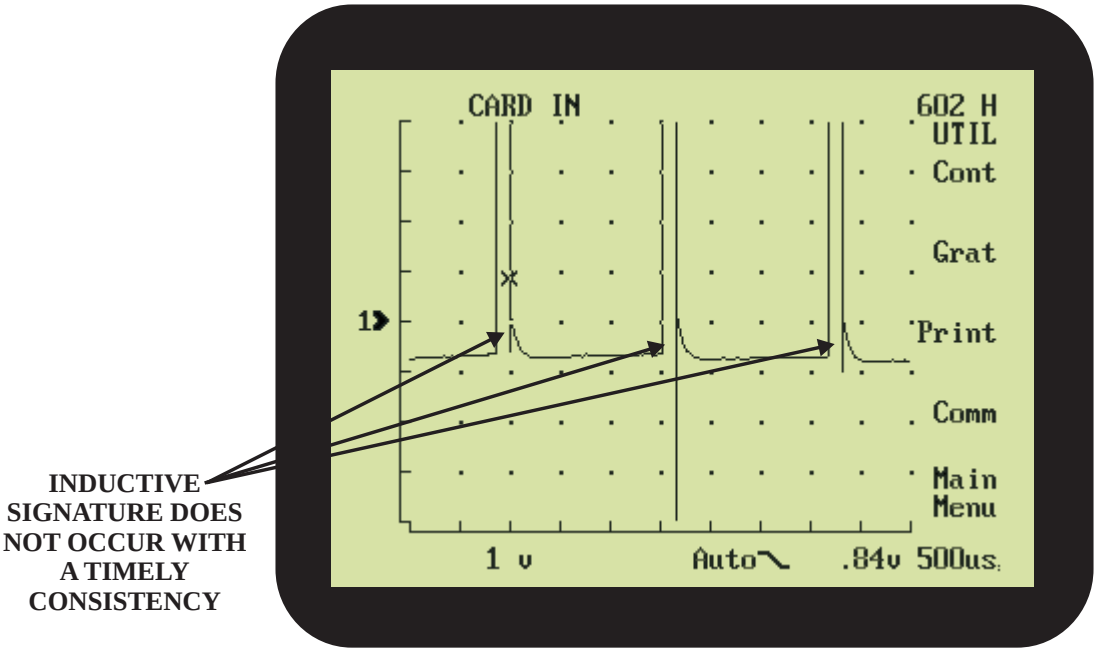


Figure 2

FORD 5R55N
SLIPS ON 2-3 UPSHIFT

COMPLAINT: After overhaul, vehicles equipped with the 5R55N may exhibit a soft or flared upshift into 3rd gear.

CAUSE: The cause may be the Intermediate Clutch Seal, as shown in Figure 1, was not installed deep enough into the case. When this happens Intermediate Clutch pressure is lost between the case and the Intermediate piston housing.

NOTE: This is not commonly looked at because of the clutch and band application on the 5R55N. See Figure 2. Notice the Intermediate Clutch is on in 3rd gear in the Drive position. The term Intermediate, in the past, has normally meant 2nd gear. This is why the Intermediate Clutch is commonly overlooked as a problem with 3rd gear.

CORRECTION: Using a suitable punch, push the Intermediate Clutch Seal against the Intermediate Clutch Piston Housing, as shown in Figure 3. Place the retaining spring on top of the seal, as shown in Figure 4, and re-assemble the valve body onto the case.

INTERMEDIATE CLUTCH SEAL

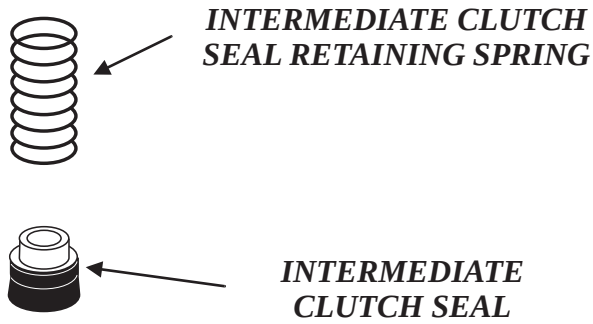


Figure 1

FORD 5R55N COMPONENT APPLICATION CHART

RANGE	FWD CLUT	INT [1] CLUT	DIR CLUT	COAST CLUT	O/D BAND	INT [2] BAND	L/R BAND	O/D SPRAG	INT [3] SPRAG	LOW SPRAG	RATIO
Park											
Reverse			ON	ON			ON	HOLD			3.07
Neutral											
"D5"-1st Gear	ON							HOLD		HOLD	3.25
"D5"-2nd Gear	ON				ON					HOLD	2.44
"D5"-3rd Gear	ON	ON						HOLD	HOLD		1.55
"D5"-4th Gear	ON	ON	ON					HOLD			1.00
"D5"-5th Gear	ON	ON	ON		ON						0.75
"D4"-1st Gear	ON			ON				HOLD		HOLD	3.25
"D4"-2nd Gear	ON				ON					HOLD	2.44
"D4"-3rd Gear	ON	ON		ON				HOLD	HOLD		1.55
"D4"-4th Gear	ON	ON	ON	ON				HOLD			1.00
"3"-1st Gear	ON			ON				HOLD		HOLD	3.25
"3"-2nd Gear	ON				ON					HOLD	2.44
"3"-3rd Gear	ON	ON		ON		ON		HOLD	HOLD		1.55
"2"-2nd Hold *	ON				ON		ON			HOLD	2.44
"1"-1st Hold	ON			ON			ON	HOLD		HOLD	3.25

* Manual "2" is 2nd starts and hold.
** Manual "1" provides 1st gear operation only.

1 - Ford named the new clutch Intermediate Clutch, actually active in 3rd gear.
2 - Intermediate Band is now ON only in Manual 3rd gear.
3 - Ford named the new sprag Intermediate Sprag, actually active in 3rd gear.

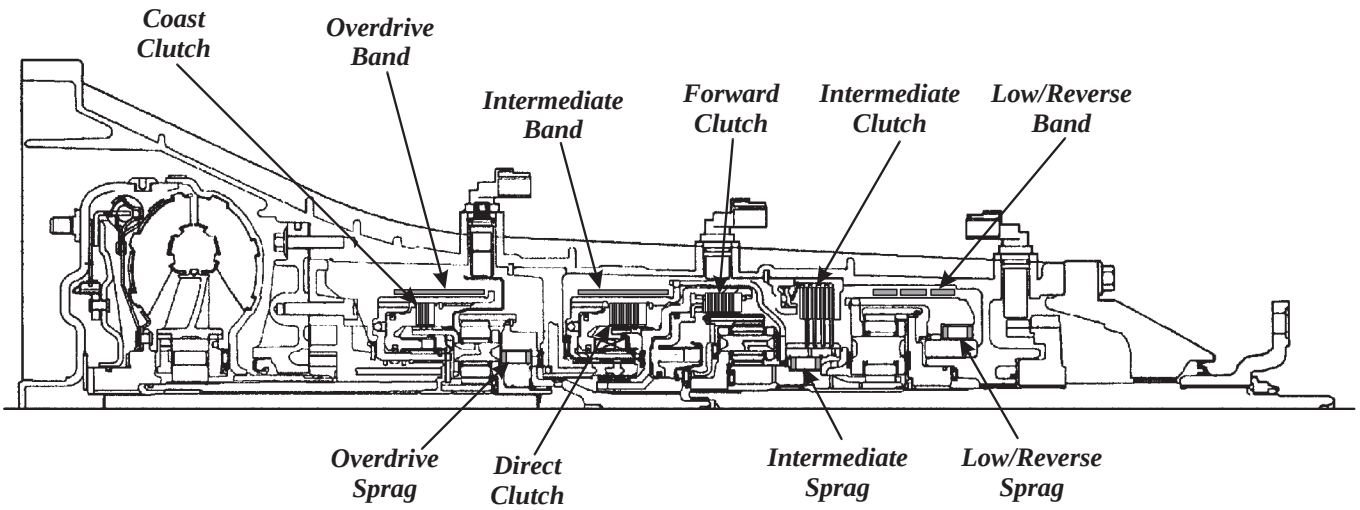


Figure 2

INTERMEDIATE CLUTCH SEAL INSTALLATION

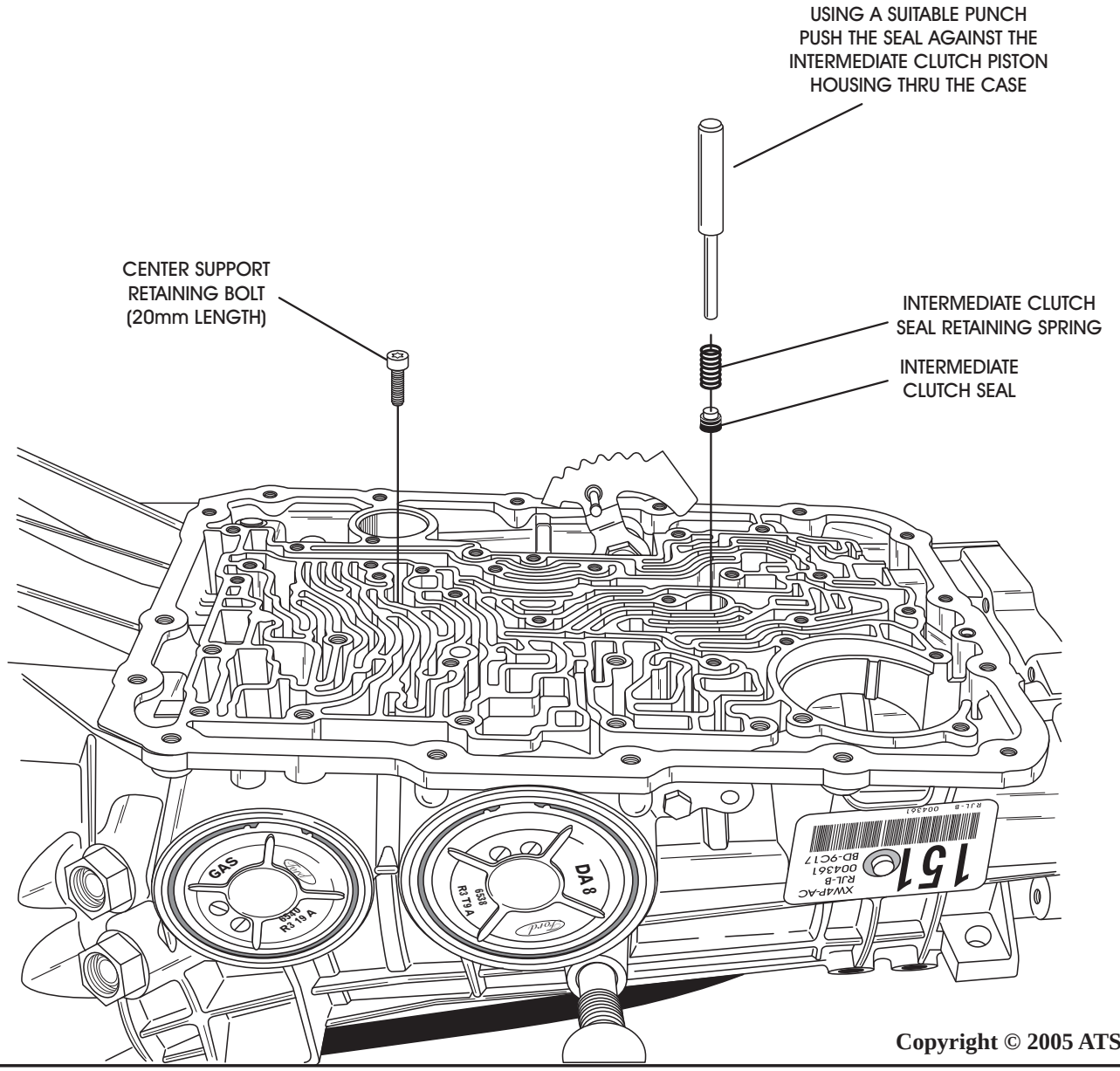


Figure 3

VALVE BODY RE-ASSEMBLY

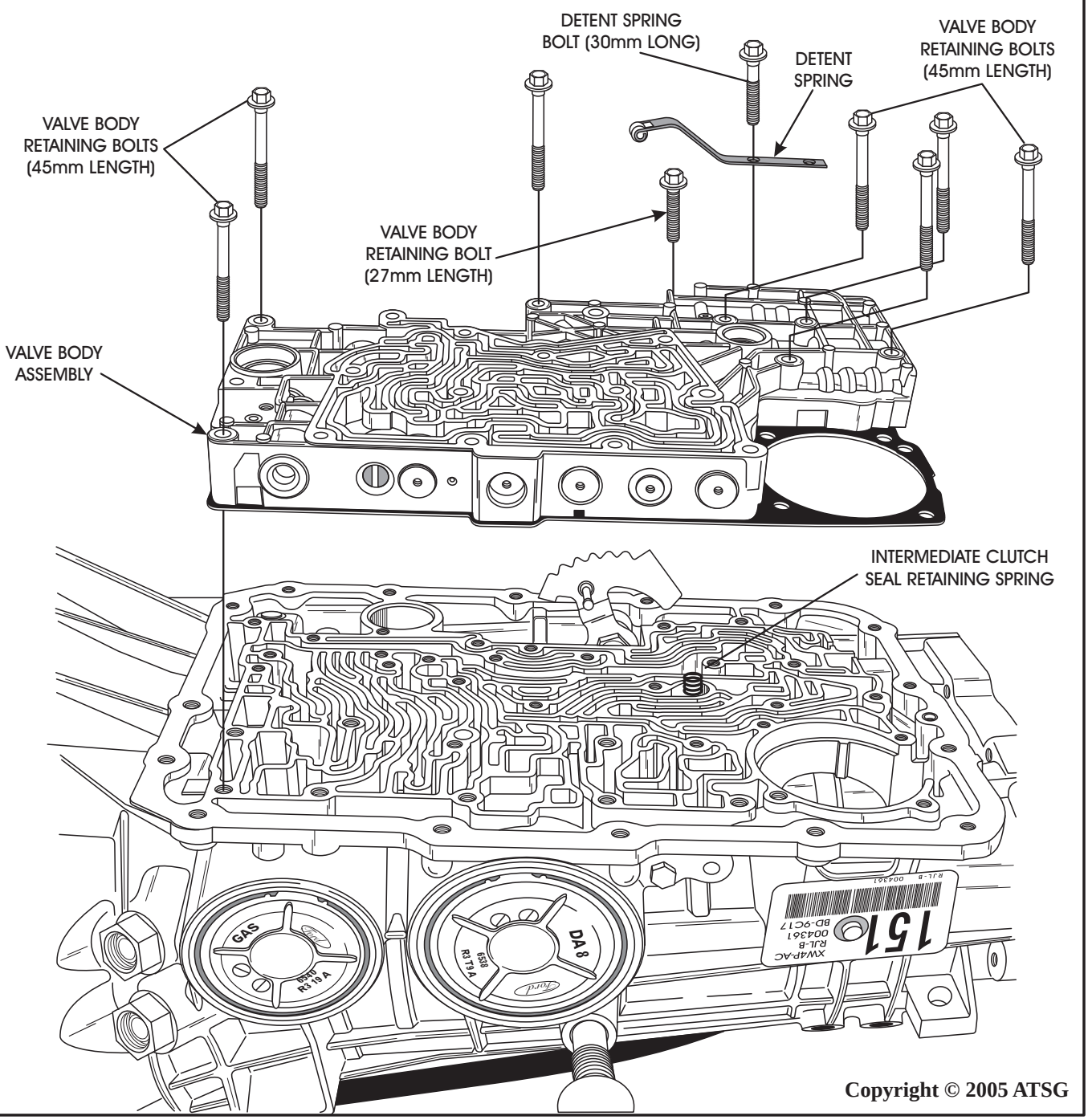


Figure 4

FORD/LINCOLN/JAGUAR 5R55N/W/S

PRESSURE CONTROL SOLENOID *PERFORMANCE* CODES

COMPLAINT: A Ford vehicle with the 5R55W/S/N transmission comes in with the "MIL" Lamp illuminated. When the PCM is scanned for codes, gear ratio error codes are stored as well as codes for, ***what appears to be***, pressure control solenoid ***electrical circuit*** faults.
In many shops, when a vehicle comes in with the possibility of electrically generated codes, the shop attempts to diagnose the electrical codes before the transmission is removed for other repairs. In most instances, the solenoid fault code cannot be solved, even after solenoid replacement, wire inspection and PCM replacement.
In some cases the transmission is removed from the vehicle for repair of the gear ratio error complaint even though the pressure control solenoid code problem has not been resolved.
When the transmission is installed back into the vehicle, the gear ratio error codes are gone, and mysteriously, so are the pressure control solenoid codes.

CAUSE: Code definitions for code P0775 in some service manuals and scan tools define this code as being electrically generated. In some manuals it defines this code as both electrical and mechanically generated. This includes codes P0745 and P0975. This causes the technician to address these codes in the wrong direction. These are solenoid performance codes as a rule.
Pressure control solenoids A, B and C are responsible for maintaining proper clutch pressure in their related gears.
For example, if a gear ratio error in second or fifth gear is stored, a code will be stored for Pressure Control Solenoid "B" because it supplies clutch pressure in 2nd and 5th gear (Refer to Figure 1). This is why you will most likely also have gear ratio error codes P0732 and P0735 stored.

CORRECTION: In most cases, when servo pin bore wear is present, you will have gear ratio codes stored in addition to the pressure control solenoid performance codes that relate to the gears that the worn servo pin bore controls. Figures 2 through 8 contain all transmission related codes for these vehicles.
Gear ratio codes are common on these transmissions due to servo pin bore wear at relatively low mileage. Servo repair kits for these transmissions as well as others are available.

SERVICE INFORMATION:
Servo repair kits are available from Northland Transmission Service at servobore.com or 715-458-2617.

PRESSURE CONTROL SOLENOID IN USE	GEARS EFFECTED	GEAR RATIO ERROR CODE	PRESSURE CONTROL SOLENOID PERFORMANCECODE
PC "A"	3RD	P0733	P0745
PC "B"	2ND, 5TH	P0732, P0735	P0775
PC "C"	4TH, 5TH	P0734, P0735	P0975 *(P0795/797/798)*

Figure 1

DTC	TRANSMISSION APPLICATION	COMPONENT	DESCRIPTION/SYMPTOMS
P0102 P0103 P1100 P1101	5R55N 5R55W 5R55S	MASS AIRFLOW SENSOR	MAF Signal Out of Range: MAF related transmission concerns such as high/low line pressure, incorrect shift schedule or incorrect TCC apply.
P0113	5R55N 5R55W 5R55S	INTAKE AIR TEMP SENSOR	IAT Sensor Circuit Signal High: High/low line pressure.
P0114	5R55N 5R55W 5R55S	INTAKE AIR TEMP SENSOR	IAT Sensor Circuit Out of Range.
P0116	5R55N 5R55W 5R55S	ENGINE COOLANT TEMP SENSOR	ECT Sensor Out of Range.
P0117	5R55N 5R55W 5R55S	ENGINE COOLANT TEMP SENSOR	ECT Sensor Signal Low.
P0118	5R55N 5R55W 5R55S	ENGINE COOLANT TEMP SENSOR	ECT Sensor Signal High.
P0121 P1120 P1124	5R55N 5R55W 5R55S	THROTTLE POSITION SENSOR	TPS Signal Out of Range: Harsh engagements, firm shifts, abnormal shift scheduling, no TCC apply or TCC cycling.
P0122	5R55N 5R55W 5R55S	THROTTLE POSITION SENSOR	TPS Signal Low: Harsh engagements, firm shifts, abnormal shift scheduling, no TCC apply or TCC cycling.
P0123	5R55N 5R55W 5R55S	THROTTLE POSITION SENSOR	TPS Signal High: Harsh engagements, firm shifts, abnormal shift scheduling, no TCC apply or TCC cycling.
P1121	5R55N 5R55W 5R55S	THROTTLE POSITION SENSOR	TPS Signal Inconsistent With MAF: Harsh engagements, firm shifts, abnormal shift scheduling, no TCC apply or TCC cycling.
P1125	5R55N 5R55W 5R55S	THROTTLE POSITION SENSOR	TPS Signal Intermittent: Harsh engagements, firm shifts, abnormal shift scheduling, no TCC apply or TCC cycling.
P0705	5R55N 5R55W 5R55S	DIGITAL RANGE SENSOR	Digital Range Sensor Circuit Failure: Harsh engagement, incorrect commanded gear. Defaults to “D” or “D5” indicator or an invalid position.
P0708	5R55N 5R55W 5R55S	DIGITAL RANGE SENSOR	Digital Range Sensor Circuit Failure: Harsh engagement, incorrect commanded gear. Defaults to “D” or “D5” indicator for all gear shift positions.
P0711	5R55W 5R55S	TRANSMISSION FLUID TEMP SENSOR	TFT Sensor Signal Out of Range: A substitute value will be displayed.

Figure 2

DTC	TRANSMISSION APPLICATION	COMPONENT	DESCRIPTION/SYMPTOMS
P0712	5R55N 5R55W 5R55S	TRANSMISSION FLUID TEMP SENSOR	TFT Signal Low: Firm shifts, high temperature indicated.
P0713	5R55N 5R55W 5R55S	TRANSMISSION FLUID TEMP SENSOR	TFT Sensor Open Circuit: Firm shifts, Temperature displayed at -40º F.
P0715	5R55N 5R55W 5R55S	TURBINE SPEED SENSOR	Loss Of Signal From TSS: Harsh engagement, harsh shifts or harsh TCC engagement.
P0717	5R55N 5R55W 5R55S	TURBINE SPEED SENSOR	TSS Signal Intermittent: Harsh engagement, harsh shifts or harsh TCC engagement.
P0718	5R55N 5R55W 5R55S	TURBINE SPEED SENSOR	TSS Signal Erratic: Harsh engagement, harsh shifts or harsh TCC engagement.
P0720	5R55N 5R55W 5R55S	OUTPUT SHAFT SPEED SENSOR	Loss Of Signal From OSS: Harsh shifts, abnormal shift schedule.
P0721	5R55N 5R55W 5R55S	OUTPUT SHAFT SPEED SENSOR	OSS Signal Erratic: Harsh engagement, harsh shifts.
P0722	5R55N 5R55W 5R55S	OUTPUT SHAFT SPEED SENSOR	OSS Signal Intermittent: Harsh engagement, harsh shifts.
P0731	5R55N 5R55W 5R55S	FIRST GEAR COMPONENT	1st Gear Ratio Error: Wrong gear start, Mechanical shift solenoid fault, stuck valve or internal component failure.
P0732	5R55N 5R55W 5R55S	SECOND GEAR COMPONENT	2nd Gear Ratio Error: Incorrect gear selection, mechanical shift solenoid fault, stuck valve or internal component failure.
P0733	5R55N 5R55W 5R55S	THIRD GEAR COMPONENT	3rd Gear Ratio Error: Incorrect gear selection, mechanical shift solenoid fault, stuck valve or internal component failure.
P0734	5R55N 5R55W 5R55S	FOURTH GEAR COMPONENT	4th Gear Ratio Error: Incorrect gear selection, mechanical shift solenoid fault, stuck valve or internal component failure.
P0735	5R55N 5R55W 5R55S	FIFTH GEAR COMPONENT	5th Gear Ratio Error: Incorrect gear selection, mechanical shift solenoid fault, stuck valve or internal component failure.
P0740	5R55W 5R55S	TCC SOLENOID CIRCUIT FAULT	TCC Solenoid Open Or Shorted: Harsh shifts, harsh engagements, engine rpm higher than normal. TCC Solenoid Shorted To Ground: Engine stalls when transmission is pulled into drive at an idle.

Figure 3

DTC	TRANSMISSION APPLICATION	COMPONENT	DESCRIPTION/SYMPTOMS
P0741	5R55W	TCC SYSTEM COMPONENT	TCC Stuck Off: When TCC is commanded "ON", there is insufficient engine rpm drop due to a mechanical failure of the TCC system.
P0741	5R55N	TCC SYSTEM COMPONENT	TCC Slippage Detected: TCC disabled.
P0743	5R55W 5R55S 5R55N	TCC SOLENOID CIRCUIT	TCC Solenoid Electrical Circuit Failure: Harsh shifts and engagements, engine rpm higher than normal, Engine stall in "D" at an idle, TCC never engages.
P0745	5R55N 5R55W 5R55S	PRESSURE CONTROL SOLENOID "A"	PC "A" Solenoid Functional Fault, Low Pressure: Slipping transmission, may be accompanied by gear ratio error codes. The PCM will check voltage across the solenoid. If the target voltage is not met, an electrical circuit code will also be stored.
P0748	5R55S	PRESSURE CONTROL SOLENOID "A"	PC "A" Solenoid Electrical Fault, Low Pressure: Slipping transmission, may be accompanied by gear ratio error codes. The PCM will check voltage across the solenoid.
P0750	5R55N 5R55W 5R55S	SHIFT SOLENOID "A"	Shift Solenoid "A" Electrical Circuit Failure: W/S=No 1st gear, no 4th gear. N= No 1st gear, no 4th or 5th gear. Gear ratio error codes may be stored.
P0753	5R55N 5R55W 5R55S	SHIFT SOLENOID "A"	Shift Solenoid "A" Electrical Circuit Failure: W/S=No 1st gear, no 4th gear. N= No 1st gear, no 4th or 5th gear. Gear ratio error codes may be stored.
P0755	5R55N 5R55W 5R55S	SHIFT SOLENOID "B"	Shift Solenoid "B" Electrical Circuit Failure: W/S=No 3rd gear, no 1st gear. N= No 1st gear, no 4th or 5th gear. Gear ratio error codes may be stored.
P0758	5R55N 5R55W 5R55S	SHIFT SOLENOID "B"	Shift Solenoid "B" Electrical Circuit Failure: W/S=No 3rd gear, no 1st gear. N= No 1st gear, no 4th or 5th gear. Gear ratio error codes may be stored.
P0760	5R55N 5R55W 5R55S	SHIFT SOLENOID "C"	Shift Solenoid "C" Electrical Circuit Failure: No 2nd, no 5th, and no 1st gear. Gear ratio error codes may be stored.
P0763	5R55N 5R55W 5R55S	SHIFT SOLENOID "C"	Shift Solenoid "C" Electrical Circuit Failure: No 2nd, no 5th, and no 1st gear. Gear ratio error codes may be stored.
P0765	5R55N 5R55W 5R55S	SHIFT SOLENOID "D"	Shift Solenoid "D" Electrical Circuit Failure: No engine braking.
P0768	5R55N 5R55W 5R55S	SHIFT SOLENOID "D"	Shift Solenoid "D" Electrical Circuit Failure: No engine braking.
P0775	5R55N 5R55W 5R55S	PRESSURE CONTROL SOLENOID "B"	PC "B" Solenoid Functional Fault, Low Pressure: Slipping transmission, may be accompanied by gear ratio error codes. The PCM will check voltage across the solenoid. If the target voltage is not met, an electrical circuit code will also be stored.

Figure 4

ALTO

DTC	TRANSMISSION APPLICATION	COMPONENT	DESCRIPTION/SYMPTOMS
P0778	5R55S	PRESSURE CONTROL SOLENOID "B"	Intermittent Short To Ground: Voltage through the solenoid is checked. The TCIL will flash.
P0779	5R55W 5R55S	PRESSURE CONTROL SOLENOID "B"	Intermittent Short To Ground Or Power: Voltage through the solenoid is checked. The TCIL will flash. No 2nd and 5th gear. Harsh engagements and shifts.
P0779	5R55N	PRESSURE CONTROL SOLENOID "B"	Intermittent Short To Ground: Voltage through the solenoid is checked. No 2nd and 5th gear.
P0791	5R55N 5R55W 5R55S	INTERMEDIATE SPEED SENSOR	Loss Of Signal From ISS: Harsh Shifts.
P0794	5R55N 5R55W 5R55S	INTERMEDIATE SPEED SENSOR	Intermittent Loss of ISS Signal:Harsh shifts.
P0795 P0797	5R55N 5R55W	PRESSURE CONTROL SOLENOID "C"	PC Solenoid "C" Functional Fault: No 4th or 5th gear, or incorrect shift pattern indicating a mechanical or hydraulic transmission fault. Voltage will be checked through the solenoid.
P0796	5R55N 5R55W	PRESSURE CONTROL SOLENOID "C"	PC Solenoid "C" Electrical Circuit Open: Maximum PC "C" pressure, harsh engagements and shifts.
P0798	5R55S	PRESSURE CONTROL SOLENOID "C"	PC "C" Solenoid Functional Failure: Low pressure. Voltage through the solenoid will be checked, if an error is detected, an electrical fault code will be stored.
P0799	5R55N 5R55W 5R55S	PRESSURE CONTROL SOLENOID "C"	PC "C" Solenoid Intermittent Short To Ground: No 4th or 5th gears, or harsh shifts and engagements.
P0814	5R55N	J GATE	J-Gate Circuit Input Signal Failed: No illumination or incorrect illumination of the J-GATE position.
P0815	5R55N 5R55S (CAR)	SELECT SHIFT TRANSMISSION +/- SWITCHES	SST +/- Circuit Input Signal Failed: May not be able to shift in Manual Mode.
P0840	5R55N	REVERSE PRESSURE SWITCH	RP Circuit Input Signal Failed: No engine braking in manual 3rd and 4th gear.
P0960	5R55S	PRESSURE CONTROL SOLENOID "A"	PC "A" Solenoid Electrical Circuit Open: Maximum PC "A" pressure, harsh shifts and engagements.
P0962	5R55S	PRESSURE CONTROL SOLENOID "A"	PC "A" Solenoid Circuit Short To Ground: No 3rd gear.

Figure 5

DTC	TRANSMISSION APPLICATION	COMPONENT	DESCRIPTION/SYMPTOMS
P0963	5R55S	PRESSURE CONTROL SOLENOID "A"	PC "A" Solenoid or Electrical Circuit Open: Maximum PC "A" pressure, harsh shifts and engagements.
P0964	5R55S	PRESSURE CONTROL SOLENOID "B"	PC "B" Solenoid or Electrical Circuit Open: Maximum PC "B" pressure, harsh shifts and engagements.
P0966	5R55S	PRESSURE CONTROL SOLENOID "B"	PC "B" Solenoid Short To Ground: Voltage through the solenoid is checked. No 2nd and 5th gear.
P0967	5R55S	PRESSURE CONTROL SOLENOID "B"	PC "B" Solenoid Short To Power: Maximum PC "B" pressure, Harsh shifts and engagement.
P0968	5R55S	PRESSURE CONTROL SOLENOID "C"	PC "C" Solenoid Or Electrical Circuit Open: Maximum PC "C" pressure, Harsh shifts and engagements.
P0970	5R55S	PRESSURE CONTROL SOLENOID "C"	PC "C" Solenoid Or Electrical Circuit Shorted To Ground: No 4th or 5th gears.
P0971	5R55S	PRESSURE CONTROL SOLENOID "C"	PC Solenoid "C" Electrical Circuit Shorted To Power: Maximum PC "C" pressure, harsh engagements and shifts.
P0975	5R55S	PRESSURE CONTROL SOLENOID "C"	PC "C" Solenoid Functional Failure: Low pressure. Voltage through the solenoid will be checked, if an error is detected, an electrical fault code will be stored.
P1112	5R55N 5R55W 5R55S	INTAKE AIR TEMPERATURE SENSOR	IAT Sensor Circuit Voltage LOW: High/Low line pressure resulting in unacceptable shifts.
P1124	5R55N 5R55W 5R55S	THROTTLE POSITION SENSOR	TPS Out Of Range: TPS signal voltage was high or low.
P1460	5R55N 5R55W 5R55S	AIR CONDITIONING SWITCH	A/C Pressure Cycling Switch Error: A/C or defrost was "ON" during Self-Test, rerun with A/C "OFF". Failed "ON": Line pressure slightly low with A/C "OFF".
P1572	5R55N 5R55W 5R55S	BRAKE PEDAL POSITION SWITCH	BPP Switch Circuit Fault: Failed "ON"=TCC will not engage at less than 1/3 throttle. Failed "OFF"=TCC will not disengage when the brake is applied.
P1636	5R55N 5R55W 5R55S	SSx	SSx ISIG Communication Error: The PCM has detected an error with the ISIG chip. May illuminate the "MIL" Lamp.
P1700	5R55N 5R55W 5R55S	INTERNAL TRANSMISSION SOLENOID	Internal Transmission Component Failure: Engine speed limited to 4000 rpm. No 1st, 3rd or 4th gear in automatic mode. FMEM is activated. May also store codes P0745, P0750, P0755, P1714, P1715, P1747 or P1760.

Figure 6

Sonnax

DTC	TRANSMISSION APPLICATION	COMPONENT	DESCRIPTION/SYMPTOMS
P1702	5R55N 5R55W 5R55S	DIGITAL RANGE SENSOR	Digital Range Sensor Signal Intermittent: Codes P0705 and P0708 are also stored.
P1703	5R55N 5R55W 5R55S	BRAKE PEDAL POSITION SWITCH	BPP Switch Circuit Failed "ON": TCC will not engage at less than 1/3 throttle. Failed OFF: TCC will not disengage when the brake is applied.
P1704	5R55N 5R55W 5R55S	DIGITAL RANGE SENSOR	Digital Range Sensor Not In Park: Commanded line pressure error, shift linkage problem or DTR Sensor problem.
P1705	5R55N 5R55W 5R55S	DIGITAL RANGE SENSOR	DTR Sensor Not In Park During Self-Test: DTC is set.
P1711	5R55N 5R55W 5R55S	TRANSMISSION FLUID TEMP SENSOR	TFT Out Of Range: Transmission not at proper operating temperature during diagnostic tests.
P1713	5R55N	TRANSMISSION FLUID TEMP SENSOR	TFT Temperature Stuck In LOW Range: Increased line pressure, Incorrect TCC apply times, Harsh shifts and engagements.
P1714	5R55N 5R55W 5R55S	SHIFT SOLENOID "A"	Shift Solenoid "A" Inoperative: Mechanical failure and no gear ratio error codes. No 1st gear or no 4th or 5th gears.
P1715	5R55N 5R55W 5R55S	SHIFT SOLENOID "B"	Shift Solenoid "B" Inoperative: Mechanical failure and no gear ratio error codes. No 1st or 3rd gears.
P1716	5R55N 5R55W 5R55S	SHIFT SOLENOID "C"	Shift Solenoid "C" Inoperative: Mechanical failure and no gear ratio error codes. No 1st, 2nd or 5th gears. Incorrect gear selection.
P1717	5R55N 5R55W 5R55S	SHIFT SOLENOID "D"	Shift Solenoid "D" Inoperative: Mechanical failure and no gear ratio error codes. No engine braking. Incorrect gear selection.
P1718	5R55N	TRANSMISSION FLUID TEMP SENSOR	TFT Temperature Stuck In HIGH Range: Increased line pressure, Incorrect TCC apply times, Harsh shifts and engagements.
P1740	5R55N 5R55W 5R55S	TCC SYSTEM	TCC Inoperative: Mechanical failure of the TCC system. Engine rpm higher than expected or stalls when coming to a stop.
P1744	5R55W 5R55S	TCC SYSTEM	TCC Performance Fault: TCC slipping when commanded "ON", indicating a mechanical or hydraulic failure of the TCC system.
P1746	5R55N 5R55W	PRESSURE CONTROL SOLENOID "A"	PC "A" Solenoid Circuit Open: Maximum PC "A" pressure, harsh shifts and engagements.

Figure 7

DTC	TRANSMISSION APPLICATION	COMPONENT	DESCRIPTION/SYMPTOMS
P1747	5R55N 5R55W 5R55S	PRESSURE CONTROL SOLENOID "A"	PC "A" Solenoid Electrical Circuit Fault: No 3rd gear, may turn "ON" or flash the "MIL" Lamp.
P1760	5R55N 5R55W 5R55S	PRESSURE CONTROL SOLENOID "A"	PC "A" Solenoid Intermittent Short To Ground: No 3rd gear, harsh shifts and engagements when shorted to power.
P1780	5R55N 5R55W 5R55S	TRANSMISSION CONTROL SWITCH	TCS input incorrect per selected position: W/S=TCS voltage incorrect, no overdrive cancel when TCS is pressed. N= No overdrive cancel when the shifter is moved.
P1783	5R55N 5R55W 5R55S	TRANSMISSION FLUID TEMP SENSOR	Transmission Overtemp Condition Indicated: Transmission temperature exceeded 270º F, Increased line pressure.
P1788	5R55N 5R55W	PRESSURE CONTROL SOLENOID "B"	PC "B" Solenoid Circuit Open: Maximum PC "B" pressure, Harsh shifts and engagements.
P1789	5R55W	PRESSURE CONTROL SOLENOID "B"	PC "B" Solenoid Circuit Shorted To Ground: No 2nd or 5th gears.

Figure 8

FORD, LINCOLN, MERCURY

SHIFT SOLENOID FAILURE CHARTS

COMPLAINT: When a shift solenoid fails to operate it will affect one or more gears depending on how many shift solenoids are used. It is common knowledge that transmissions that use two shift solenoids will lose two gears when one solenoid fails. But which gears will the transmission lose? That depends on which solenoid has failed and whether the solenoid has failed open or closed. Then there are transmissions that use more than two shift solenoids, which makes it more difficult to determine if a failed shift solenoid is causing the transmission shift problems.
Codes for mechanical shift solenoid failure along with gear ratio error codes may be stored, but in most cases the technician already knows the transmission is not shifting properly.

CAUSE: A lack of comprehensive shift solenoid failure charts easily accessible to the technician.

CORRECTION: The charts listed under Service Information, will indicate which gears are affected by a mechanical solenoid failure as well as engine braking availability.

SERVICE INFORMATION:

Figure 1 - Normal shift solenoid operation for AXODE/AX4S.
Figure 2 & 3 - Shift solenoid failure charts for AXODE/AX4S.
Figure 4 - Normal shift solenoid operation for AX4N/4F50N.
Figure 5 - Shift solenoid failure charts for AX4N/4F50N.
Figure 6 - Normal shift solenoid operation for CD4E.
Figure 7 - Shift solenoid failure chart for CD4E.
Figure 8 - Normal shift solenoid operation for 4R44/55E.
Figure 9 & 10 - Shift solenoid failure chart for 4R44/55E.
Figure 11 - Normal shift solenoid operation for 5R55E.
Figure 12 - Shift solenoid failure chart for 5R55E.
Figure 13 - Normal shift & pressure control solenoid operation for 5R55N/W/S.
Figure 14, 15 & 16 - Shift & pressure control solenoid failure chart for 5R55N.
Figure 17 & 18 - Shift & pressure control solenoid failure chart for 5R55W/S.
Figure 19 - Normal shift solenoid operation for AODE/4R70W.
Figure 20 - Shift solenoid failure chart for AODE/4R70W.
Figure 21 - Normal shift solenoid operation for E4OD/4R100.
Figure 22 - Shift solenoid failure chart for E4OD/4R100.

AXODE/AX4S SOLENOID APPLICATION CHART					
GEAR SELECTOR POSITION	**PCM COMMANDED GEAR**	**ENGINE BRAKING**	**SHIFT SOLENOID 1**	**SHIFT SOLENOID 2**	**SHIFT SOLENOID 3**
P/R/N	P/R/N	NO	OFF[1]	ON[1]	OFF
Ⓓ	1	NO	OFF	ON	OFF
Ⓓ	2	YES	ON	ON	OFF
Ⓓ	3	NO	OFF	OFF	ON
Ⓓ	4	YES	ON	OFF	ON
D or 3[2]	1	NO	OFF	ON	OFF
D or 3[2]	2	YES	ON	ON	OFF
D or 3[2]	3	YES	OFF	OFF	OFF
2[3]	2	YES	ON	ON	OFF
1	1	YES	OFF	ON	OFF

[1]Not contributing to powerflow.

[2]Some vehicles are equipped with an overdrive cancel switch, while others must be pulled out of overdrive by moving the shift lever.

[3]Vehicles with a Transmission Control Switch (TCS) will have a Manual 2 position. Vehicles without a Transmission Control Switch will have a Manual 3 position.

Figure 1

AXODE/AX4S SOLENOID FAILURE CHARTS

SS1 ALWAYS OFF	Gearshift Lever Position			
	Ⓓ	D or 3	2	1
PCM GEAR COMMANDED	**ACTUAL GEAR OBTAINED**			
1	1	1	1	1
2	1	1	1	
3	3	3		
4	3			

SS1 ALWAYS ON	Gearshift Lever Position			
	Ⓓ	D or 3	2	1
PCM GEAR COMMANDED	**ACTUAL GEAR OBTAINED**			
1	2	2	2	2
2	2	2	2	
3	4	2		
4	4			

SS2 ALWAYS OFF	Gearshift Lever Position			
	Ⓓ	D or 3	2	1
PCM GEAR COMMANDED	**ACTUAL GEAR OBTAINED**			
1	3	3	3	2
2	2	2	2	
3	3	3		
4	4			

SS2 ALWAYS ON	Gearshift Lever Position			
	Ⓓ	D or 3	2	1
PCM GEAR COMMANDED	**ACTUAL GEAR OBTAINED**			
1	1	1	1	1
2	2	2	2	
3	1	1		
4	2			

Figure 2

AXODE/AX4S SOLENOID FAILURE CHARTS...*continued*

SS3 ALWAYS OFF	Gearshift Lever Position			
	Ⓓ	D or 3	2	1
PCM GEAR COMMANDED	ACTUAL GEAR OBTAINED			
1	1	1	1	1
2	2	2	2	
3	3	3		
4	2			

SS3 ALWAYS ON	Gearshift Lever Position			
	Ⓓ	D or 3	2	1
PCM GEAR COMMANDED	ACTUAL GEAR OBTAINED			
1	1	1	1	1
2	2	2	2	
3	3	3		
4	4			

Figure 3

AX4N/4F50N SOLENOID APPLICATION CHART

GEAR SELECTOR POSITION	PCM COMMANDED GEAR	ENGINE BRAKING	SHIFT SOLENOID 1	SHIFT SOLENOID 2	SHIFT SOLENOID 3
P/N	P/N	NO	OFF[1]	ON[1]	OFF[4]
R	R	YES	OFF	OFF	OFF
Ⓓ	1	NO	OFF	ON	OFF
Ⓓ	2	NO	OFF	OFF	OFF
Ⓓ	3	NO	ON	OFF	ON
Ⓓ	4	YES	ON	ON	ON
D or 3[2]	1	NO	OFF	ON	OFF
D or 3[2]	2	NO	OFF	OFF	OFF
D or 3[2]	3	YES	ON	OFF	OFF
2[3]	2	YES	OFF	OFF	OFF
1	1	YES	OFF	ON	OFF

[1]Not contributing to powerflow.

[2]Some vehicles are equipped with an overdrive cancel switch, while others must be pulled out of overdrive by moving the shift lever.

[3]Vehicles with a Transmission Control Switch (TCS) will have a Manual 2 position. Vehicles without a Transmission Control Switch will have a Manual 3 position.

[4]Shift Solenoid 3 will be turned "ON" when transmission fluid temperature is below 100º F when the vehicle is equipped with a Transmission Control Switch (TCS) to prevent a cold creep condition.

[4]Shift Solenoid 3 will be turned "ON" when transmission fluid temperature is below 50º F when the vehicle is NOT equipped with a Transmission Control Switch (TCS) to prevent a cold creep condition.

Figure 4

AX4N/4F50N SOLENOID FAILURE CHARTS

SS1 ALWAYS OFF	Gearshift Lever Position			
	Ⓓ	D or 3	2	1
PCM GEAR COMMANDED	**ACTUAL GEAR OBTAINED**			
1	1	1	2	1
2	2	2	2	
3	2	2		
4	1			

SS1 ALWAYS ON	Gearshift Lever Position			
	Ⓓ	D or 3	2	1
PCM GEAR COMMANDED	**ACTUAL GEAR OBTAINED**			
1	3	3	3	3
2	3	3	3	
3	3	3		
4	4			

SS2 ALWAYS OFF	Gearshift Lever Position			
	Ⓓ	D or 3	2	1
PCM GEAR COMMANDED	**ACTUAL GEAR OBTAINED**			
1	2	2	2	2
2	2	2	2	
3	3	3		
4	3			

SS2 ALWAYS ON	Gearshift Lever Position			
	Ⓓ	D or 3	2	1
PCM GEAR COMMANDED	**ACTUAL GEAR OBTAINED**			
1	1	1	1	1
2	1	1	1	
3	4	3		
4	4			

SS3 ALWAYS OFF	Gearshift Lever Position			
	Ⓓ	D or 3	2	1
PCM GEAR COMMANDED	**ACTUAL GEAR OBTAINED**			
1	1	1	1	1
2	2	2	2	
3	3	3		
4	3			

SS3 ALWAYS ON	Gearshift Lever Position			
	Ⓓ	D or 3	2	1
PCM GEAR COMMANDED	**ACTUAL GEAR OBTAINED**			
1	1	1	1	1
2	2	2	2	
3	3	3		
4	4			

Figure 5

CD4E SOLENOID APPLICATION CHART				
GEAR SELECTOR POSITION	**PCM COMMANDED GEAR**	**ENGINE BRAKING**	**SHIFT SOLENOID 1**	**SHIFT SOLENOID 2**
P/N	P/N	NO	OFF	ON
R	R	YES	OFF	OFF
OD	1	NO	ON	ON
OD	2	NO	OFF	ON
OD	3	NO	OFF	OFF
OD	4	YES	ON	OFF
D[1]	1	NO	ON	ON
D[1]	2	YES	OFF	ON
D[1]	3	YES	OFF	OFF
2	2	YES	OFF	ON
1	1	YES	ON	OFF*

[1]**Overdrive Canceled.**

* Up to 1996. 1997 and later this solenoid is "ON"

Figure 6

CD4E SOLENOID FAILURE CHARTS

SS1 ALWAYS OFF	Gearshift Lever Position			
	OD	**D**	**2**	**1**
PCM GEAR COMMANDED	**ACTUAL GEAR OBTAINED**			
1	2	2		2
2	2	2	2	
3	3	3		
4	3			

SS1 ALWAYS ON	Gearshift Lever Position			
	OD	**D**	**2**	**1**
PCM GEAR COMMANDED	**ACTUAL GEAR OBTAINED**			
1	1	1		1
2	1	1	1	
3	4	4		
4	4			

SS2 ALWAYS OFF	Gearshift Lever Position			
	OD	**D**	**2**	**1**
PCM GEAR COMMANDED	**ACTUAL GEAR OBTAINED**			
1	4	4		1
2	3	3	3	
3	3	3		
4	4			

SS2 ALWAYS ON	Gearshift Lever Position			
	OD	**D**	**2**	**1**
PCM GEAR COMMANDED	**ACTUAL GEAR OBTAINED**			
1	1	1		4
2	2	2	2	
3	2	2		
4	1			

Figure 7

4R44E/4R55E SOLENOID APPLICATION CHART					
GEAR SELECTOR POSITION	**PCM COMMANDED GEAR**	**ENGINE BRAKING**	**SHIFT SOLENOID 1**	**SHIFT SOLENOID 2**	**SHIFT SOLENOID 3**
P/R/N	P/R/N	NO	ON	OFF	OFF
OD	1	NO	ON	OFF	OFF
OD	2	NO	ON	ON	OFF
OD	3	NO	OFF	OFF	OFF
OD	4	NO	OFF	OFF	ON
OD OFF[1]	1	YES	ON	OFF	OFF
OD OFF[1]	2	YES	ON	ON	OFF
OD OFF[1]	3	YES	OFF	OFF	OFF
2	2	YES	ON	ON	OFF
1	1	YES	ON	OFF	OFF

[1]Transmission Control Switch "ON", overdrive canceled.

Figure 8

4R44E/4R55E SOLENOID FAILURE CHARTS

SS1 ALWAYS OFF	Gearshift Lever Position			
	OD	**OD OFF**	**2**	**1**
PCM GEAR COMMANDED	**ACTUAL GEAR OBTAINED**			
1	3	3		2
2	2	2	2	
3	3	3		
4	4			

SS1 ALWAYS ON	Gearshift Lever Position			
	D	**OD OFF**	**2**	**1**
PCM GEAR COMMANDED	**ACTUAL GEAR OBTAINED**			
1	1	1		1
2	2	2	2	
3	1	1		
4	1.86[1]			

SS2 ALWAYS OFF	Gearshift Lever Position			
	OD	**OD OFF**	**2**	**1**
PCM GEAR COMMANDED	**ACTUAL GEAR OBTAINED**			
1	1	1		1
2	1	1	2	
3	3	3		
4	4			

SS2 ALWAYS ON	Gearshift Lever Position			
	D	**OD OFF**	**2**	**1**
PCM GEAR COMMANDED	**ACTUAL GEAR OBTAINED**			
1	2	2		2
2	2	2	2	
3	2	2		
4	2			

[1]When Shift Solenoid 1 fails "ON", a gear ratio between 1st and 2nd gear (1.86) will be created

Figure 9

4R44E/4R55E SOLENOID FAILURE CHARTS...*continued*

SS3 ALWAYS OFF	Gearshift Lever Position			
	OD	OD OFF	2	1
PCM GEAR COMMANDED	ACTUAL GEAR OBTAINED			
1	1	1		1
2	2	2	2	
3	3	3		
4	3			

SS3 ALWAYS ON	Gearshift Lever Position			
	D	OD OFF	2	1
PCM GEAR COMMANDED	ACTUAL GEAR OBTAINED			
1	1.86[1]	1.86[1]		1.86[1]
2	1.11[2]	1.11[2]	1.11[2]	
3	4	4		
4	4			

[1]When Shift Solenoid 1 fails "ON", a gear ratio between 1st and 2nd gear (1.86) will be created

[2]When Shift Solenoid 3 fails "ON", a gear ratio between 2nd and 3rd gear (1.11) will be created

Figure 10

5R55E SOLENOID APPLICATION CHART

GEAR SELECTOR POSITION	PCM COMMANDED GEAR	ENGINE BRAKING	SHIFT SOLENOID 1	SHIFT SOLENOID 2	SHIFT SOLENOID 3
P/R/N	P/R/N	NO	ON	OFF	OFF
OD	1	NO	ON	OFF	OFF
OD	2	NO	ON	OFF	ON
OD	3	NO	ON	ON	OFF
OD	4	NO	OFF	OFF	OFF
OD	5	NO	OFF	OFF	ON
OD OFF[1]	1	NO	ON	OFF	OFF
OD OFF[1]	2	NO	ON	OFF	ON
OD OFF[1]	3	YES	ON	ON	OFF
OD OFF[1]	4	YES	OFF	OFF	OFF
2	2	YES	ON	ON	OFF
1	1	YES	ON	OFF	OFF

[1]Transmission Control Switch "ON", overdrive canceled.

Figure 11

5R55E SOLENOID FAILURE CHARTS

SS1 ALWAYS OFF	Gearshift Lever Position			
	OD	OD OFF	2	1
PCM GEAR COMMANDED	ACTUAL GEAR OBTAINED			
1	4	4	3	3
2	5	5		
3	3	3		
4	4	4		
5	5			

[1]

SS1 ALWAYS ON	Gearshift Lever Position			
	D	OD OFF	2	1
PCM GEAR COMMANDED	ACTUAL GEAR OBTAINED			
1	1	1	3	1
2	2	2	1.11[1]	
3	3	3		
4	1	1		
5	2			

[1]When Shift Solenoid 3 fails "ON", a gear ratio between 3rd and 4th gear (1.11) will be created

SS2 ALWAYS OFF	Gearshift Lever Position			
	OD	OD OFF	2	1
PCM GEAR COMMANDED	ACTUAL GEAR OBTAINED			
1	1	1	3	1
2	2	2	1.11[1]	
3	2	2		
4	4	4		
5	5			

[1]When Shift Solenoid 3 fails "ON", a gear ratio between 3rd and 4th gear (1.11) will be created

SS2 ALWAYS ON	Gearshift Lever Position			
	D	OD OFF	2	1
PCM GEAR COMMANDED	ACTUAL GEAR OBTAINED			
1	3	3	3	3
2	1.11[1]	1.11[1]	1.11[1]	
3	3	3		
4	3	3		
5	1.11[1]			

[1]When Shift Solenoid 3 fails "ON", a gear ratio between 3rd and 4th gear (1.11) will be created

SS3 ALWAYS OFF	Gearshift Lever Position			
	OD	OD OFF	2	1
PCM GEAR COMMANDED	ACTUAL GEAR OBTAINED			
1	1	1	3	1
2	1	1	3	
3	3	3		
4	4	4		
5	4			

SS3 ALWAYS ON	Gearshift Lever Position			
	D	OD OFF	2	1
PCM GEAR COMMANDED	ACTUAL GEAR OBTAINED			
1	2	2	3	1
2	2	2	1.11[1]	
3	1.11[1]	1.11[1]		
4	5	5		
5	5			

[1]When Shift Solenoid 3 fails "ON", a gear ratio between 3rd and 4th gear (1.11) will be created

Figure 12

5R55N/W/S SOLENOID APPLICATION CHART								
GEAR SHIFTER POSITION	**PCM GEAR COMMAND**	**SHIFT SOL 1**	**SHIFT SOL 2**	**SHIFT SOL 3**	**SHIFT SOL 4**	**PRESSURE CONTROL SOLENOID A**	**PRESSURE CONTROL SOLENOID B**	**PRESSURE CONTROL SOLENOID C**
P/N	P/N	ON	OFF	OFF	ON	L*	L/H#	L*
R	R	ON	OFF	OFF	ON	L*	H^	H^
D5	1	ON	OFF	OFF	ON	L/H#	L*	L*
D5	2	ON	OFF	ON	ON	L*	L/H#	L*
D5	3	ON	ON	OFF	ON	L/H#	L*	L*
D5	4	OFF	OFF	OFF	ON	L/H#	L*	H^
D5	5	OFF	OFF	ON	ON	L/H#	L/H#	H^
D5 +/-	1	ON	OFF	OFF	ON	H^	H^	L*
D5 +/-	2	ON	OFF	ON	ON	H^	H^	L*
D5 +/-	3	ON	ON	OFF	ON	H^	H^	L*
D5 +/-	4	OFF	OFF	OFF	ON	H^	H^	H^
D5 +/-	5	OFF	OFF	ON	ON	H^	H^	H^
D4	1	ON	OFF	OFF	ON	L/H#	L*	L*
D4	2	ON	OFF	ON	ON	L*	L/H#	L*
D4	3	ON	ON	OFF	ON	L/H#	L*	L*
D4	4	OFF	OFF	OFF	OFF	L/H#	L/H#	H^
3	3	ON	ON	OFF	OFF	L/H#	L/H#	L*
2	2	ON	OFF	ON	OFF	L/H#	L/H#	L*
1	1	ON	OFF	OFF	OFF	L/H#	L/H#	L*

***Low Line Pressure**
^ High Line Pressure
 # Variable Line Pressure, PCM Controlled

Figure 13

5R55N SOLENOID FAILURE CHARTS

SS1 ALWAYS OFF	**Gearshift Lever Position**	
	D5	**D4**
PCM GEAR COMMANDED	**ACTUAL GEAR OBTAINED**	
1	3	3
2	2	2
3	3	3
4	4	M-4
5	5	

SS1 ALWAYS ON	**Gearshift Lever Position**	
	D5	**D4**
PCM GEAR COMMANDED	**ACTUAL GEAR OBTAINED**	
1	1	1
2	2	2
3	3	3
4	1	M-1
5	2	

Figure 14

5R55N SOLENOID FAILURE CHARTS...*continued*

SS2 ALWAYS OFF	Gearshift Lever Position	
	D5	D4
PCM GEAR COMMANDED	ACTUAL GEAR OBTAINED	
1	1	1
2	2	2
3	1	1
4	4	M-4
5	5	

SS2 ALWAYS ON	Gearshift Lever Position	
	D5	D4
PCM GEAR COMMANDED	ACTUAL GEAR OBTAINED	
1	3	3
2	2	2
3	3	3
4	4	M-4
5	5	

SS3 ALWAYS OFF	Gearshift Lever Position	
	D5	D4
PCM GEAR COMMANDED	ACTUAL GEAR OBTAINED	
1	1	1
2	1	1
3	1	3
4	4	M-4
5	4	

SS3 ALWAYS ON	Gearshift Lever Position	
	D5	D4
PCM GEAR COMMANDED	ACTUAL GEAR OBTAINED	
1	1 or 2	1 or 2
2	2	2
3	3 or 1.6:1*	3 or1.6:1*
4	4 or 5	4 or 5
5	5	

***When Shift Solenoid 3 fails "ON", a gear ratio between 2nd & 3rd gears will be obtained.**

SS4 ALWAYS OFF	Gearshift Lever Position	
	D5	D4
PCM GEAR COMMANDED	ACTUAL GEAR OBTAINED	
1	1 or M-1	1 or M-1
2	M-2	M-2
3	3 or M-3	M-3
4	4 or M-4	M-4
5	5	

SS4 ALWAYS ON	Gearshift Lever Position	
	D5	D4
PCM GEAR COMMANDED	ACTUAL GEAR OBTAINED	
1	1	1
2	2	2
3	3	3
4	4	4
5	5	

REVERSE ALWAYS OFF	Gearshift Lever Position
	R
SOLENOID FAULT	ACTUAL GEAR OBTAINED
SS1 Stuck OFF	REVERSE
SS2 Stuck OFF	REVERSE
SS3 Stuck OFF	REVERSE
SS4 Stuck OFF	REVERSE

REVERSE ALWAYS ON	Gearshift Lever Position
	R
SOLENOID FAULT	ACTUAL GEAR OBTAINED
SS1 Stuck ON	REVERSE
SS2 Stuck ON	NEUTRAL
SS3 Stuck ON	REVERSE
SS4 Stuck ON	REVERSE

Figure 15

5R55N SOLENOID FAILURE CHARTS...*continued*

PRESSURE SOLENOID "A" ALWAYS LOW	Gearshift Lever Position	
	D5	D4
PCM GEAR COMMANDED	ACTUAL GEAR OBTAINED	
1	1/Slips	1
2	2	2
3	1/Slips	1
4	4/Slips	M-4
5	5	

PRESSURE SOLENOID "A" ALWAYS HIGH	Gearshift Lever Position	
	D5	D4
PCM GEAR COMMANDED	ACTUAL GEAR OBTAINED	
1	1	1
2	2	2
3	3	3
4	4	M-4
5	5	

PRESSURE SOLENOID "B" ALWAYS LOW	Gearshift Lever Position	
	D5	D4
PCM GEAR COMMANDED	ACTUAL GEAR OBTAINED	
1	1	1
2	1	1
3	3	3
4	4	4
5	4	

PRESSURE SOLENOID "B" ALWAYS HIGH	Gearshift Lever Position	
	D5	D4
PCM GEAR COMMANDED	ACTUAL GEAR OBTAINED	
1	1	1
2	2	2
3	3	3
4	4	M-4
5	5	

PRESSURE SOLENOID "C" ALWAYS LOW	Gearshift Lever Position	
	D5	D4
PCM GEAR COMMANDED	ACTUAL GEAR OBTAINED	
1	1	1
2	2	2
3	3	3
4	3	3
5	1.16:1*	

PRESSURE SOLENOID "C" ALWAYS HIGH	Gearshift Lever Position	
	D5	D4
PCM GEAR COMMANDED	ACTUAL GEAR OBTAINED	
1	1	1
2	2	2
3	3	3
4	4	M-4
5	5	

***When Pressure Control Solenoid "C" fails "LOW", a gear ratio between 3rd & 4th gears will be obtained.**

Figure 16

5R55W/S SOLENOID FAILURE CHARTS

SS1 ALWAYS OFF	Gearshift Lever Position	
	D5	D4
PCM GEAR COMMANDED	ACTUAL GEAR OBTAINED	
1	1	1
2	2	M-2
3	3	M-3
4	4	M-4
5	5	

SS1 ALWAYS ON	Gearshift Lever Position	
	D5	D4
PCM GEAR COMMANDED	ACTUAL GEAR OBTAINED	
1	1	M-1
2	2	M-2
3	3	M-3
4	1	M-1
5	2	

SS2 ALWAYS OFF	Gearshift Lever Position	
	D5	D4
PCM GEAR COMMANDED	ACTUAL GEAR OBTAINED	
1	1	M-1
2	2	M-2
3	1	M-1
4	4	M-4
5	5	

SS2 ALWAYS ON	Gearshift Lever Position	
	D5	D4
PCM GEAR COMMANDED	ACTUAL GEAR OBTAINED	
1	3	M-3
2	2	1.1:1*
3	3	M-3
4	4	M-4
5	5	

SS3 ALWAYS OFF	Gearshift Lever Position	
	D5	D4
PCM GEAR COMMANDED	ACTUAL GEAR OBTAINED	
1	1	M-1
2	1	M-1
3	3	M-3
4	4	M-4
5	5	

SS3 ALWAYS ON	Gearshift Lever Position	
	D5	D4
PCM GEAR COMMANDED	ACTUAL GEAR OBTAINED	
1	2	M-2
2	2	M-3
3	3	1.1:1*
4	4 or 5	5
5	5	

SS4 ALWAYS OFF	Gearshift Lever Position	
	D5	D4
PCM GEAR COMMANDED	ACTUAL GEAR OBTAINED	
1	1 or M-1	M-1
2	M-2	M-2
3	3 or M-3	M-3
4	4 or M-4	M-4
5	5	

SS4 ALWAYS ON	Gearshift Lever Position	
	D5	D4
PCM GEAR COMMANDED	ACTUAL GEAR OBTAINED	
1	1	1
2	2	2
3	3	3
4	4	4
5	5	

Figure 17

5R55W/S SOLENOID FAILURE CHARTS...*continued*

REVERSE ALWAYS OFF	Gearshift Lever Position
	R
SOLENOID FAULT	**ACTUAL GEAR OBTAINED**
SS1 Stuck OFF	NEUTRAL
SS2 Stuck OFF	REVERSE
SS3 Stuck OFF	REVERSE
SS4 Stuck OFF	REVERSE

REVERSE ALWAYS ON	Gearshift Lever Position
	R
SOLENOID FAULT	**ACTUAL GEAR OBTAINED**
SS1 Stuck ON	REVERSE
SS2 Stuck ON	NEUTRAL
SS3 Stuck ON	REVERSE
SS4 Stuck ON	REVERSE

PRESSURE SOLENOID "A" ALWAYS LOW	Gearshift Lever Position	
	D5	D4
PCM GEAR COMMANDED	**ACTUAL GEAR OBTAINED**	
1	1/Slips	1
2	2	2
3	1/Slips	1
4	4	M-4
5	5	

PRESSURE SOLENOID "A" ALWAYS HIGH	Gearshift Lever Position	
	D5	D4
PCM GEAR COMMANDED	**ACTUAL GEAR OBTAINED**	
1	1	M-1
2	2	M-2
3	3	M-3
4	4	M-4
5	5	

PRESSURE SOLENOID "B" ALWAYS LOW	Gearshift Lever Position	
	D5	D4
PCM GEAR COMMANDED	**ACTUAL GEAR OBTAINED**	
1	1	1
2	1	1
3	3	3
4	4	4
5	4	

PRESSURE SOLENOID "B" ALWAYS HIGH	Gearshift Lever Position	
	D5	D4
PCM GEAR COMMANDED	**ACTUAL GEAR OBTAINED**	
1	1	M-1
2	2	M-2
3	3	M-3
4	4	M-4
5	5	

PRESSURE SOLENOID "C" ALWAYS LOW	Gearshift Lever Position	
	D5	D4
PCM GEAR COMMANDED	**ACTUAL GEAR OBTAINED**	
1	1	M-1
2	2	M-2
3	3	M-3
4	1	1
5	2	

PRESSURE SOLENOID "C" ALWAYS HIGH	Gearshift Lever Position	
	D5	D4
PCM GEAR COMMANDED	**ACTUAL GEAR OBTAINED**	
1	1	M-1
2	2	M-2
3	3	M-3
4	4	M-4
5	5	

Figure 18

AODE/4R70W SOLENOID APPLICATION CHART				
GEAR SELECTOR POSITION	**PCM COMMANDED GEAR**	**ENGINE BRAKING**	**SHIFT SOLENOID 1**	**SHIFT SOLENOID 2**
P/N	1	NO	ON	OFF
R	1	YES	ON	OFF
Ⓓ or D	1	NO	ON	OFF
Ⓓ or D	2	NO	OFF	OFF
Ⓓ or D	3	YES	OFF	ON
Ⓓ or D	4	YES	ON	ON
D*	1	NO	ON	OFF
D*	2	NO	OFF	OFF
D*	3	YES	OFF	ON
2	2	YES	OFF	OFF
1	1	YES	ON	OFF

***Overdrive Canceled.**

Figure 19

AODE/4R70W SOLENOID FAILURE CHARTS

SS1 ALWAYS OFF	Gearshift Lever Position			
	Ⓓ or D	**D***	**2**	**1**
PCM GEAR COMMANDED	**ACTUAL GEAR OBTAINED**			
1	2	2		2
2	2	2	2	
3	3	3		
4	3			

SS1 ALWAYS ON	Gearshift Lever Position			
	Ⓓ or D	**D***	**2**	**1**
PCM GEAR COMMANDED	**ACTUAL GEAR OBTAINED**			
1	1	1		1
2	1	1	1	
3	4	3		
4	4			

***Overdrive Canceled.**

SS2 ALWAYS OFF	Gearshift Lever Position			
	Ⓓ or D	**D***	**2**	**1**
PCM GEAR COMMANDED	**ACTUAL GEAR OBTAINED**			
1	1	1		1
2	2	2	2	
3	2	2		
4	1			

SS2 ALWAYS ON	Gearshift Lever Position			
	Ⓓ or D	**D***	**2**	**1**
PCM GEAR COMMANDED	**ACTUAL GEAR OBTAINED**			
1	4	3		1
2	3	3	2	
3	3	3		
4	4			

Figure 20

E4OD/4R100 SOLENOID APPLICATION CHART				
GEAR SELECTOR POSITION	**PCM COMMANDED GEAR**	**ENGINE BRAKING**	**SHIFT SOLENOID 1**	**SHIFT SOLENOID 2**
P/N	1	NO	ON	OFF
R	1	NO	ON	OFF
Ⓓ or D	1	NO	ON	OFF
Ⓓ or D	2	NO	ON	ON
Ⓓ or D	3	NO	OFF	ON
Ⓓ or D	4	YES	OFF	OFF
D*	1	NO	ON	OFF
D*	2	NO	ON	ON
D*	3	YES	OFF	ON
2	2	YES	ON	ON
1	1	YES	ON	OFF

***Overdrive Canceled.**

NOTE: 4R100 transmissions that are PTO equipped, will have engine braking in the Ⓓ position in 1st, 2nd and 3rd gears with 4th gear disabled.

Figure 21

E4OD/4R100 SOLENOID FAILURE CHARTS

SS1 ALWAYS OFF	Gearshift Lever Position			
	Ⓓ or D	D*	2	1
PCM GEAR COMMANDED	**ACTUAL GEAR OBTAINED**			
1	4	4		2 or 1
2	3	3	2	
3	3	3		
4	4			

SS1 ALWAYS ON	Gearshift Lever Position			
	Ⓓ or D	D*	2	1
PCM GEAR COMMANDED	**ACTUAL GEAR OBTAINED**			
1	1	1		1
2	2	2	2	
3	2	2		
4	1			

SS2 ALWAYS OFF	Gearshift Lever Position			
	Ⓓ or D	D*	2	1
PCM GEAR COMMANDED	**ACTUAL GEAR OBTAINED**			
1	1	1		1
2	1	1	2	
3	4	4		
4	4			

SS2 ALWAYS ON	Gearshift Lever Position			
	Ⓓ or D	D*	2	1
PCM GEAR COMMANDED	**ACTUAL GEAR OBTAINED**			
1	2	2		1 or 2
2	2	2	2	
3	3	3		
4	3			

***Overdrive Canceled.**

Figure 22

FORD AX4S
NEW INTERNAL COOLER BYPASS CIRCUIT

CHANGE: Beginning at the start of production for 1999 models, Ford Motor Company introduced a new Internal Cooler Bypass Hydraulic Circuit into the Valve body assembly.

REASON: For better durability in the event of a plugged cooler.

PARTS AFFECTED:

(1) MAIN SPACER PLATE AND GASKETS - The Main Spacer Plate and gaskets changed to accommodate the new hole configurations to connect to the Internal Cooler Bypass Circuit. See Figure 1 for a comparison of previous design to new design.

(2) MAIN VALVE BODY - The Main Valve body had casting changes and redesigned relief valves and springs to accommodate the Cooler Bypass Circuit. See Figures 2 and 3 for the previous and new design valve body castings. ***Note: notice that the spring for Relief Valve #1 is "weaker" than the spring for Relief Valve #2.***

(3) CHANNEL PLATE - The Channel Plate also had worm track changes to accommodate the valve body and spacer plate changes. The new design Channel Plate can be identified with the Rough Forging number of "YF2P," as shown in Figure 4.

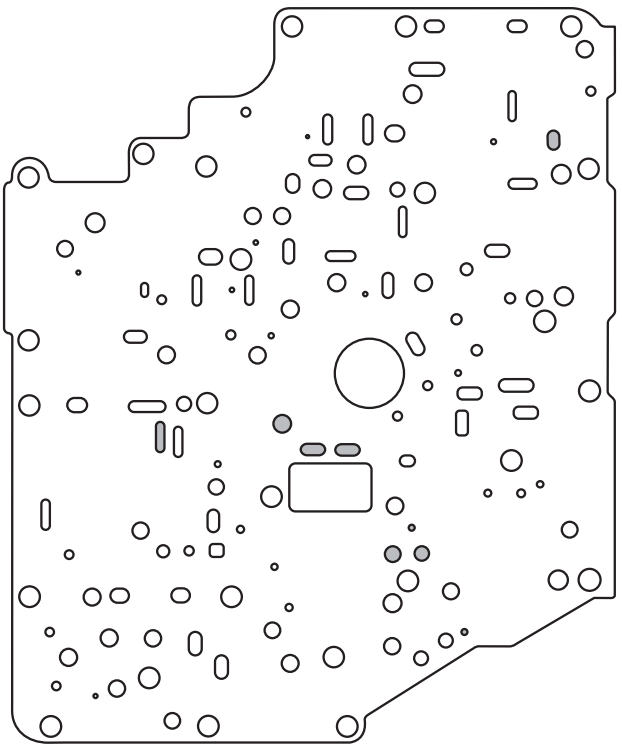
HOW DOES IT WORK?

See Figure 5 for a Partial Hydraulic Circuit Diagram showing normal cooler flow with the New Cooler Bypass Circuit.
See Figure 6 for a Partial Hydraulic Circuit Diagram showing the New Internal Cooler Bypass Circuit in use.

INTERCHANGEABILITY:

None of the new design parts will interchange with the previous design parts.

PREVIOUS SPACER PLATE IDENTIFICATION



NEW DESIGN SPACER PLATE IDENTIFICATION

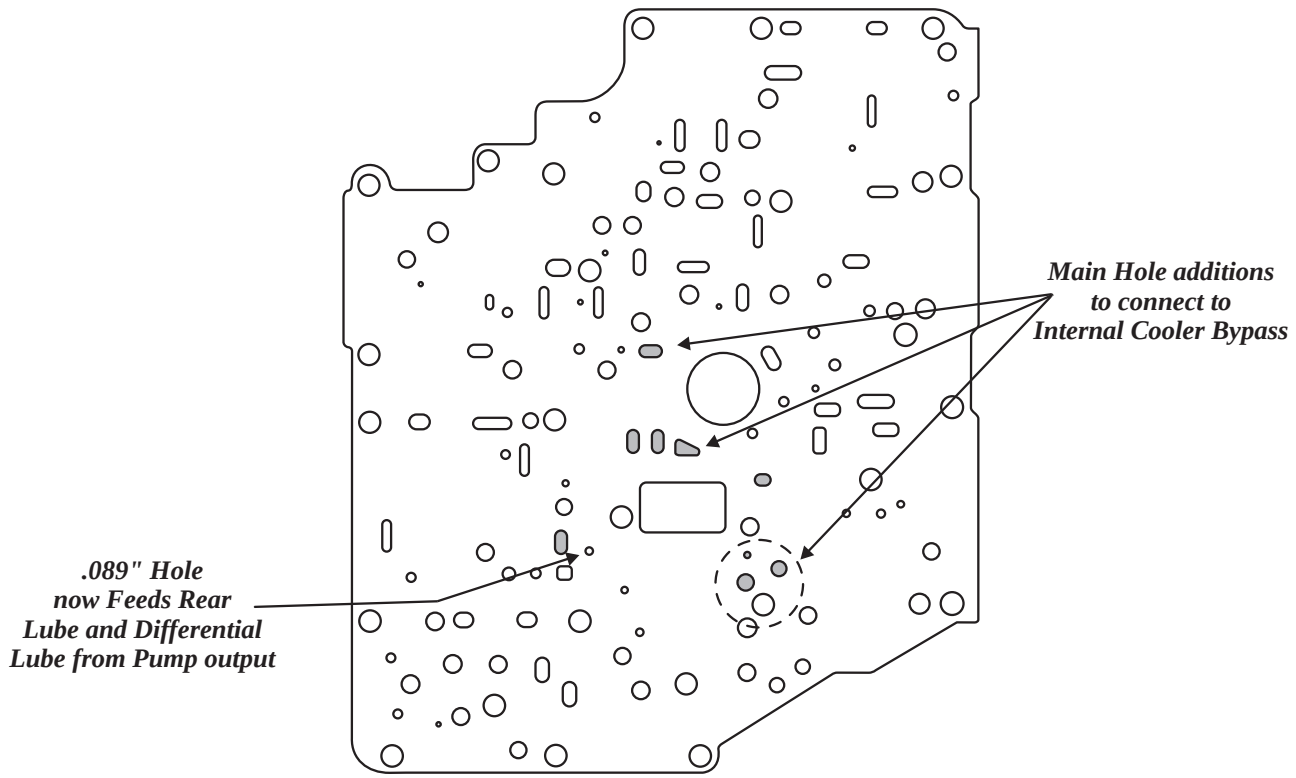


Figure 1

AXODE (AX4S) 1993-1998
CHECKBALL AND RELIEF VALVE LOCATIONS

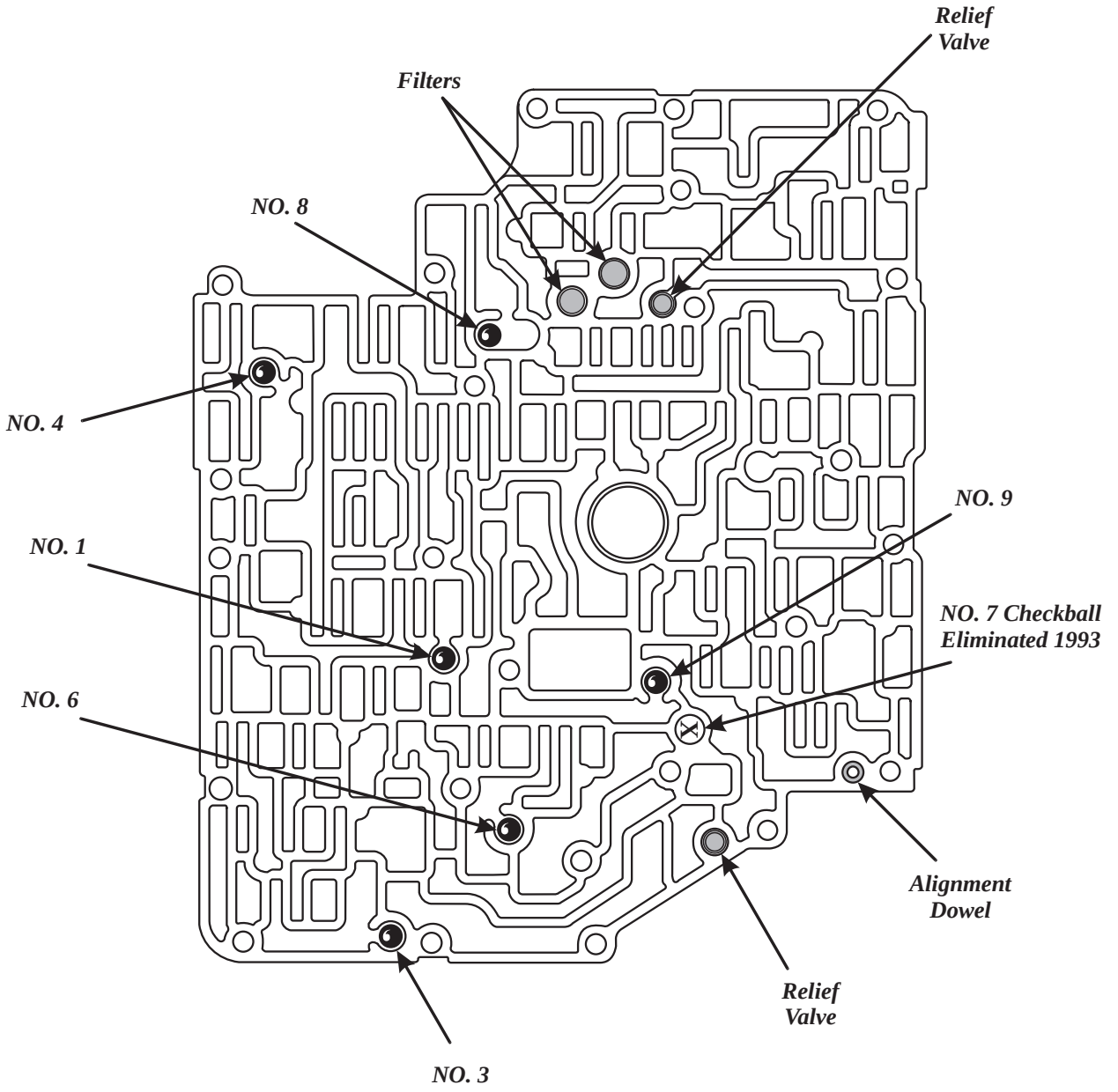
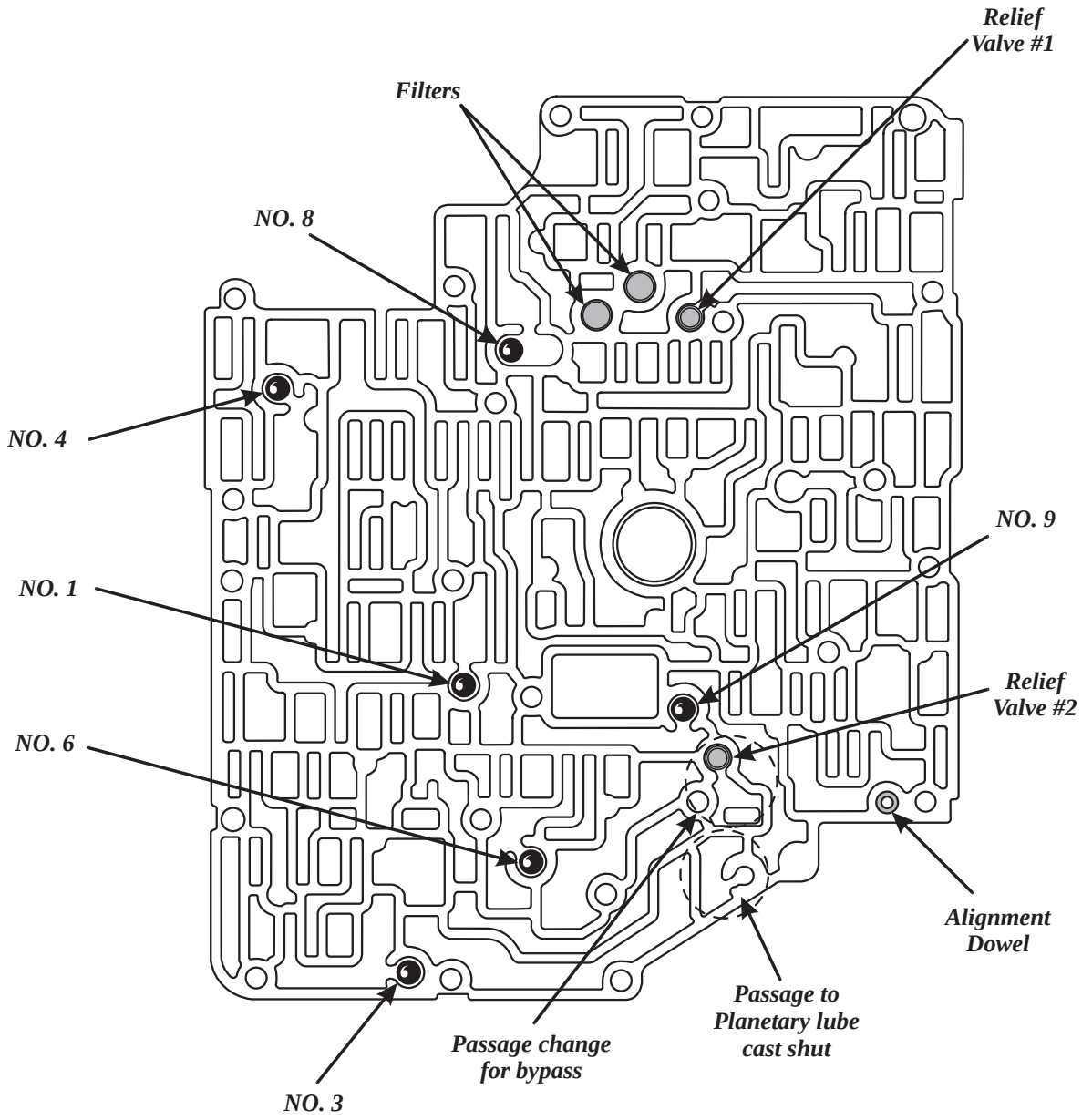


Figure 2

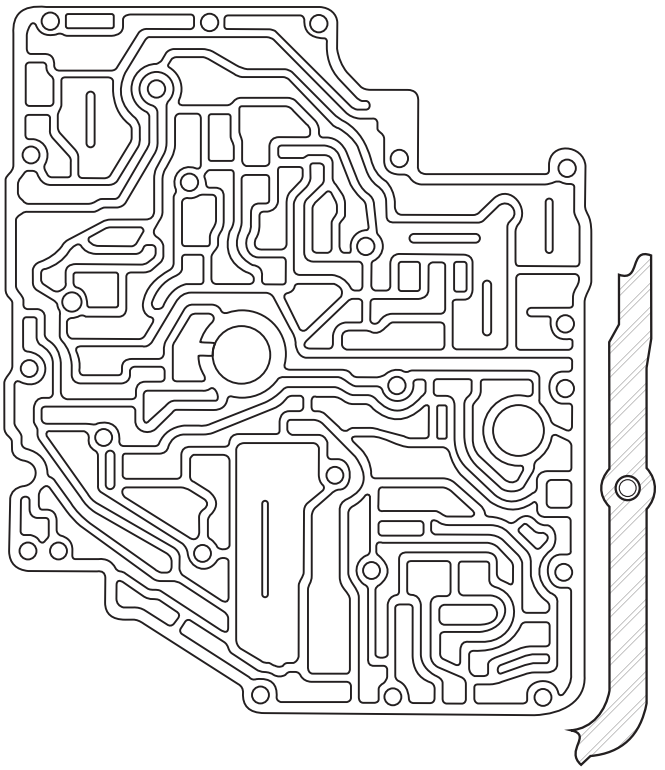
AX4S 1999 & UP
CHECKBALL AND RELIEF VALVE LOCATIONS



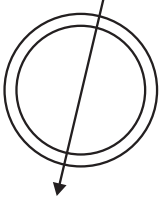
Relief Valve #1 spring dimensions - Overall Length .530"- Wire Diameter.018"
Relief Valve #2 spring dimensions - Overall Length .580"- Wire Diameter.030"

Figure 3

PREVIOUS DESIGN CHANNEL PLATE PASSAGES

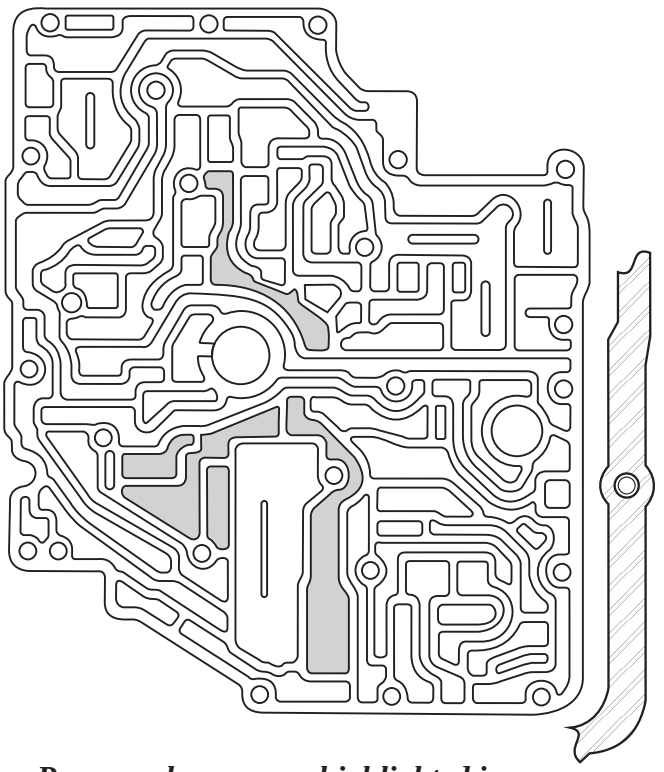


Channel plate I.D. (F6DP)

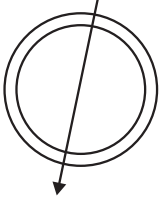


RF-F6DP-7G234AA

NEW DESIGN CHANNEL PLATE PASSAGES



Channel plate I.D. (YF2P)



RF-YF2P-7G234AA

Passage changes are highlighted in grey

Figure 4

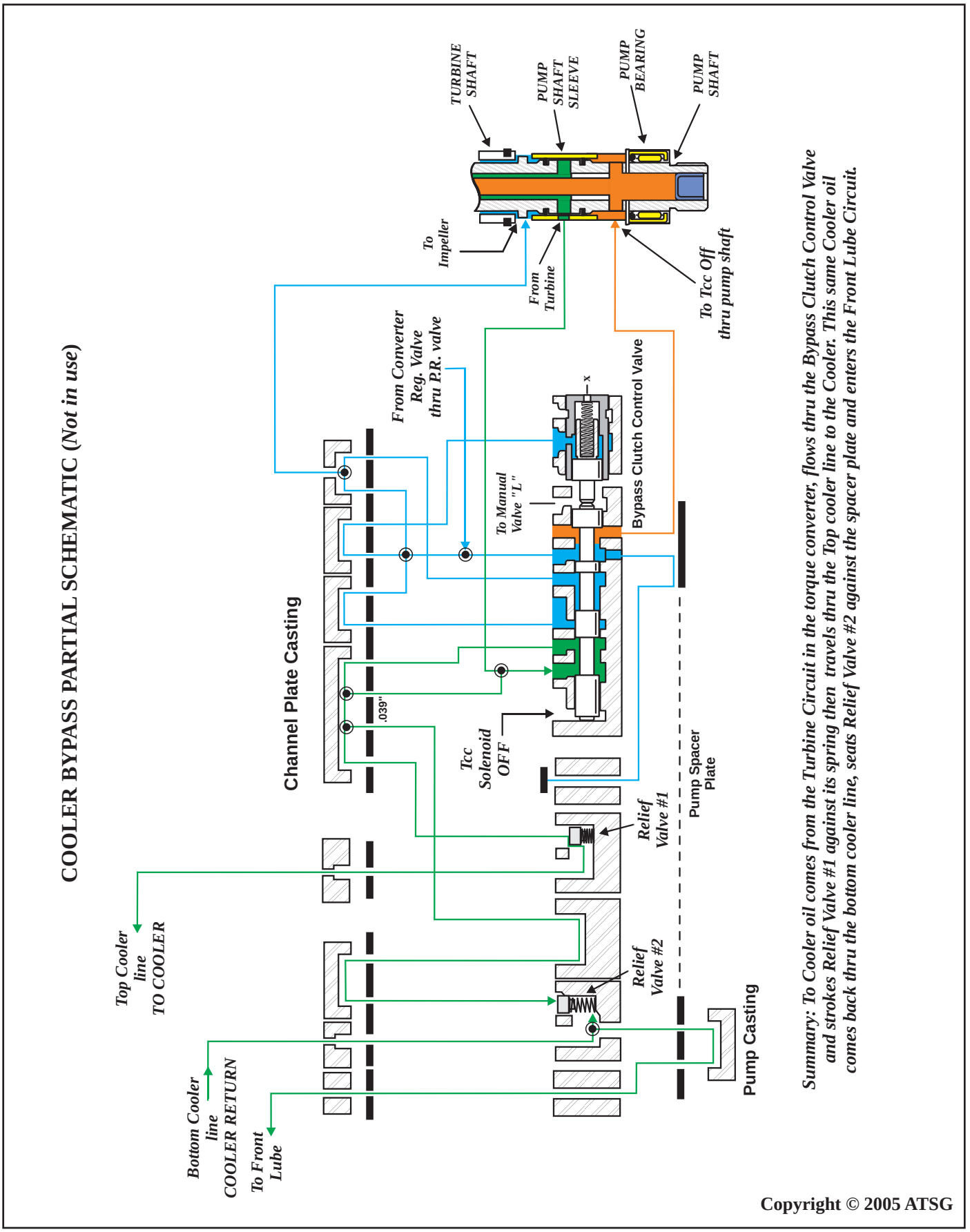

COOLER BYPASS PARTIAL SCHEMATIC (Not in use)
TURBINE SHAFT
PUMP SHAFT SLEEVE
PUMP BEARING
PUMP SHAFT
To Impeller
From Turbine
To Tcc Off thru pump shaft
From Converter Reg. Valve thru P.R. valve
To Manual Valve "L"
Bypass Clutch Control Valve
Channel Plate Casting
.039"
Tcc Solenoid OFF
Pump Spacer Plate
Relief Valve #1
Relief Valve #2
Pump Casting
Top Cooler line TO COOLER
Bottom Cooler line COOLER RETURN
To Front Lube
Summary: To Cooler oil comes from the Turbine Circuit in the torque converter, flows thru the Bypass Clutch Control Valve and strokes Relief Valve #1 against its spring then travels thru the Top cooler line to the Cooler. This same Cooler oil comes back thru the bottom cooler line, seats Relief Valve #2 against the spacer plate and enters the Front Lube Circuit.
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Figure 5

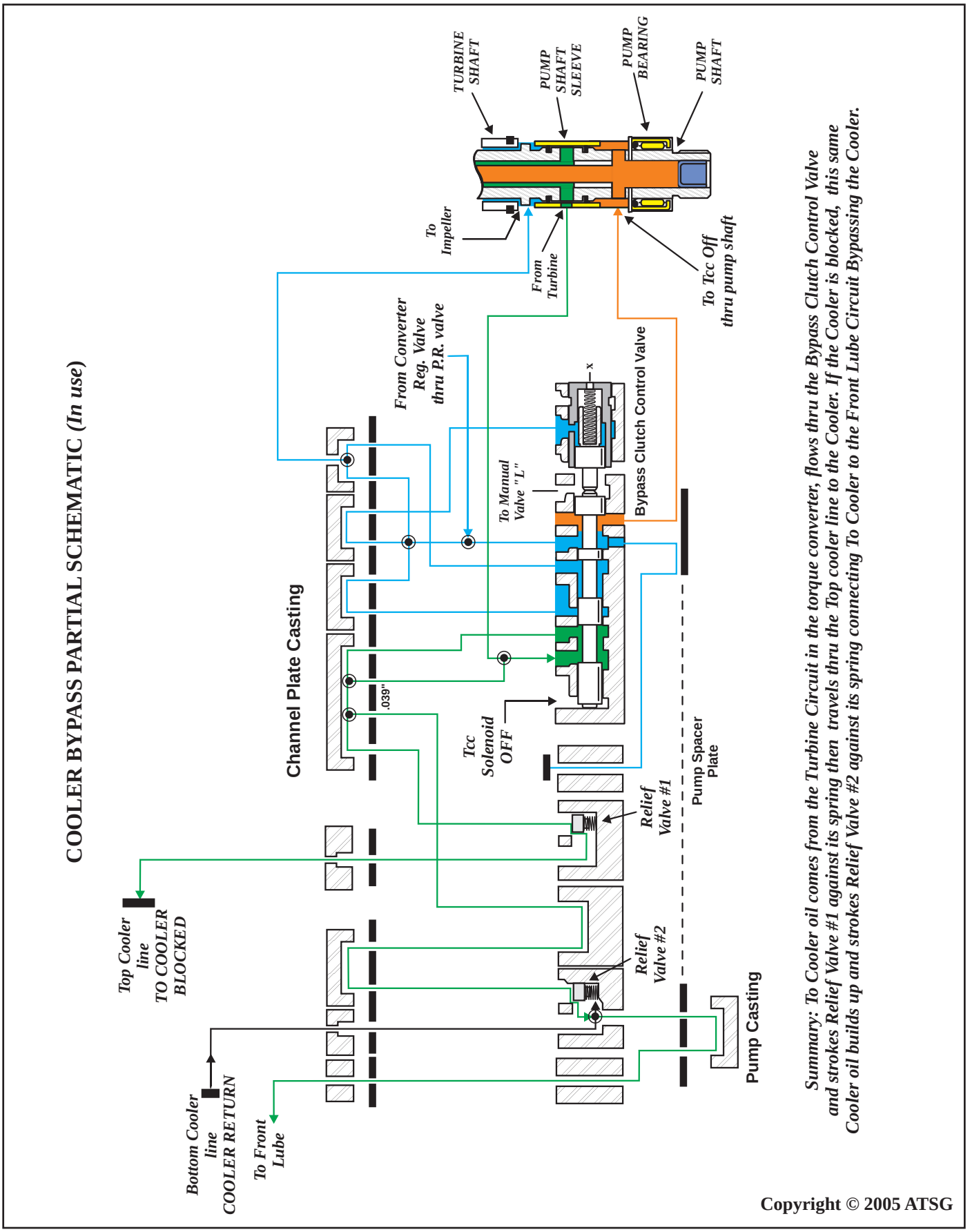
COOLER BYPASS PARTIAL SCHEMATIC (In use)
TURBINE SHAFT
PUMP SHAFT SLEEVE
PUMP BEARING
PUMP SHAFT
To Impeller
From Turbine
To Tcc Off thru pump shaft
From Converter Reg. Valve thru P.R. valve
To Manual Valve "L"
Bypass Clutch Control Valve
x
Channel Plate Casting
.039"
Tcc Solenoid OFF
Pump Spacer Plate
Relief Valve #1
Relief Valve #2
Pump Casting
Top Cooler line TO COOLER BLOCKED
Bottom Cooler line COOLER RETURN
To Front Lube
Summary: To Cooler oil comes from the Turbine Circuit in the torque converter, flows thru the Bypass Clutch Control Valve and strokes Relief Valve #1 against its spring then travels thru the Top cooler line to the Cooler. If the Cooler is blocked, this same Cooler oil builds up and strokes Relief Valve #2 against its spring connecting To Cooler to the Front Lube Circuit Bypassing the Cooler.
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Figure 6

Chrysler PCI (Programmable Controller Interface) Module to Module Bus Communication

Legal:
The law requires that every new car and light duty truck sold in the United States be equipped with and support OBD II (On-Board Diagnostics, phase 2). As a result, the vehicle's computer or computers must support any one of three designated protocols:

J1850 Variable Pulse Width (VPW)
This has been adopted by GM and is known as Class 2. This has been adopted by Chrysler and is known as J1850. This is a 10.4 kbps single wire communication system.

J1850 Pulse Width Modulation (PWM)
This has been adopted by Ford and is known as the Standard Corporate Protocol (SCP) and can be seen in Mazda vehicles as well. This is a 41.6 kbps two wire balanced signal communication system.

ISO 9141 and ISO 9141-2 (also known as ISO 9141 CARB)
Seen in some Chrysler and Mazda products, but seems to be more common in Europe. This is a 10.4 kbps single wire communication system.

Chrysler History:
SCI - Serial Communication Interface was Chrysler's OBD I 62.5kbps communication system from 1983 to 1995 (Jeeps 1991-1995). Still in use with 1996 and later vehicles, it is a dedicated high-speed link. It allows scan tool to PCM and TCM communication. Most scan tools communicate with the PCM using this protocol and the TCM through CCD or PCI.

CCD - Chrysler Collision Detection, a module to module 2 wire 7812.5 bps bus communication system introduced in 1989 with a phase out period from 1998 to 2003 (See Figure 1).

PCI - Programmable Controller Interface, a module to module 1 wire 10.4kbps bus communication system introduced in 1998 on LH vehicles *including the scan tool* (See Figure 1). This meets OBD II J1850 requirements.

PCI Communication

This bus system has the capability of supporting up to as high as 32 different modules. When monitoring voltage on the PCI bus wire, it is normally held low and can be driven as high as 7.5 to 8 volts. In other words, when there is no communication, the system is at rest and will show almost 0 volts. This near 0 voltage reading is not an indication that the wire is being grounded because each module on the system is capable of providing its own pull-up voltage for transmitting data. This means that each module is capable of reading and transmitting bus messages (See Figure 2). SAE International published J1850 VPW DC Parameters where it is learned that the Output Low Voltage range on the PCI bus wire is 0 to 1.5 volts and the range for the Output High Voltage is 6.25 to 8 volts. Minimum network resistance can be as low as 315 ohms and as high as 1,575 ohms depending on the amount of modules on the network.

And when it comes to the modules on the network, there are no "slaves or masters" in this communication system as each module connected to the system can independently transmit and receive data. In some applications the Body Control Module (BCM) is a central connection point for the PCI bus and would be better understood as a "hub." This does not make the module a master or a slave in the system, it simply serves as a "hub" in which all PCI bus wires pass thru it (See Figure 3). In other applications the central connection point for the PCI bus is a splice known as a Diagnostic Junction Port (See Figures 4-7).

Each module that is on the network applies a load to the PCI transceiver circuitry and since the PCI network can support up to 32 modules (Figure 3), termination resistors and capacitors are connected in parallel to the transceiver circuit within each module to minimize circuit loading (Figure 2). What is very helpful is that Chrysler has made available the approximate resistance value of the terminating resistor in each module that could be found on the PCI network system (See Figure 8). This information along with the understanding of how each of the module's terminating resistor is grounded in the module and that the modules are connected in parallel to each other, allows for an attainable diagnostic approach should the network develop communication errors such as a P1695 No CCD/J185O Message from the Body Control Module or P1698 No BUS Message from the Transmission Control Module.

A point to consider when diagnosing PCI Faults is the Required Fault Tolerant Modes (8.9.1) where the network must meet the requirements as defined per the following failure modes:

1. Node (Module) Power Loss - All nodes (modules) must continue to meet the network leakage current requirement during a loss of power (or low voltage) condition.
2. Bus Short to Ground - Network data communications may be interrupted but there shall be no damage to any node (module) when the bus is shorted to ground.
3. Bus Short to Battery - Network data communications may be interrupted but there shall be no damage to any node (module) when the bus is shorted to battery power.
4. Loss of Node (Module) Connection to Ground - When a node (module) loses its ground connection, the remaining nodes (modules) shall remain capable of communication

The first diagnostic step is to identify the modules that are on the network of the vehicle being serviced. This can be done with the use of a scanner or a good wiring diagram like the one provided. See Figure 9. This schematic indicates that up to 14 modules can be found on the PCI network plus the Data Link Connector for the scanner.

Using the schematic in figure 9, notice how terminal 2 in the data link connector is wired into the BCM at terminal 14 in the C1 connector. If we check this circuit for resistance, according to SAE, the minimum amount of ohms we can expect to see is 315 ohms and the maximum would be 1,575 ohms depending on the number of modules on the circuit (See Figure 10).

Suppose there is a vehicle that needed to be tested which has 13 modules on the PCI circuit. You determine that there are 2 modules that contain a 3,300 ohm terminating resistor and 11 that contain a 10,800 ohm resistor (See Figure 11). There is a mathematical equation for equivalent resistance in a parallel circuit and it looks like this:

$$\frac{1}{\frac{1}{R1}+\frac{1}{R2}+\frac{1}{R3}+\frac{1}{R4}}$$

Now if you applied this formula to the (2) 3.3k and (11) 10.8k modules it would look like this:

$$\frac{1}{\frac{1}{3300}+\frac{1}{3300}+\frac{1}{10800}+\frac{1}{10800}+\frac{1}{10800}+\frac{1}{10800}+\frac{1}{10800}} +$$

$$\frac{1}{\frac{1}{10800}+\frac{1}{10800}+\frac{1}{10800}+\frac{1}{10800}+\frac{1}{10800}+\frac{1}{10800}} = 625 \text{ ohms}$$

To simplify this equation you could set the equation up as follows:

$$\frac{1}{\frac{2}{3300}+\frac{11}{10800}} = \frac{1}{\frac{1}{1650}+\frac{1}{982}} = \frac{1}{0.0006+0.001} = \frac{1}{0.0016} = 625 \text{ ohms}$$

So we have math and theory and now comes reality, putting the meter on terminal 2 of the Data Link Connector as seen in figure 10 where 625 ohms should be observed if all the terminating resistors in each module are good and every module is grounded. This is a quick way to check the integrity of the circuit verifying that all modules can be seen on the PCI bus system.

A short to ground or power takes the entire PCI bus down. A typical technique is to disconnect modules one at a time until the short disappears. With PCI, disconnecting modules doesn't necessarily have to be the first step. In some cases it is very easy to gain access to the BCM as is with a 2001 LH vehicle where the module is located under the driver side dash (See Figure 12). Four of the connectors are very easily accessed while a 5th connector is a bit more difficult as it is located between the Junction Block and the backside of the BCM (See Figure 13).

Figure 13 identifies each connector that plugs into the BCM as well as which connector contains PCI circuits that run through the BCM's BUS bar. An example of making a continuity check across the BUS bar inside the BCM is also shown in figure 13 as well as making individual PCI circuit checks with these connectors unplugged from the BCM. A bad BCM bus bar can be quickly and easily diagnosed with a DVOM as well as any shorts to ground or power on individual PCI circuits. This is a much faster diagnostic step when compared to the typical technique of disconnecting modules one at a time until the short disappears.

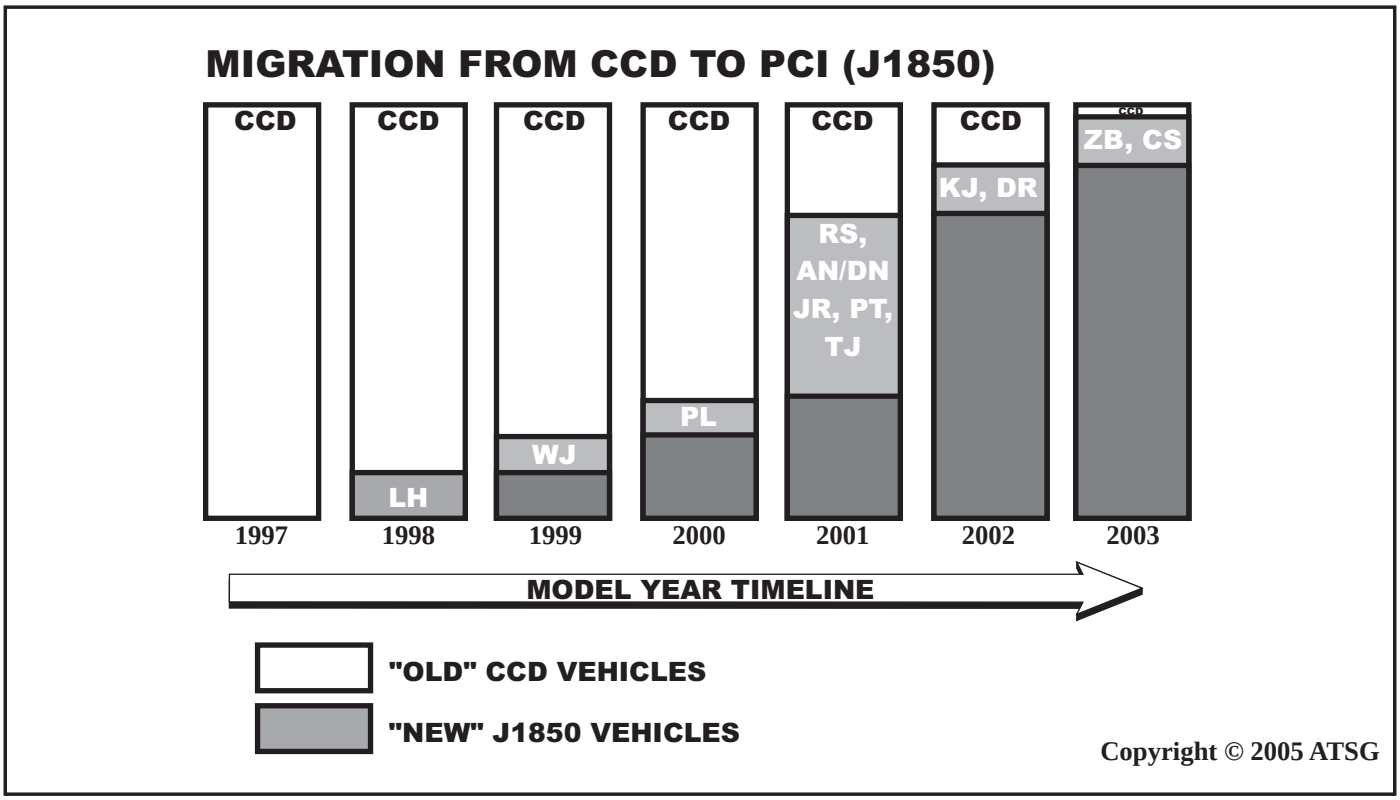
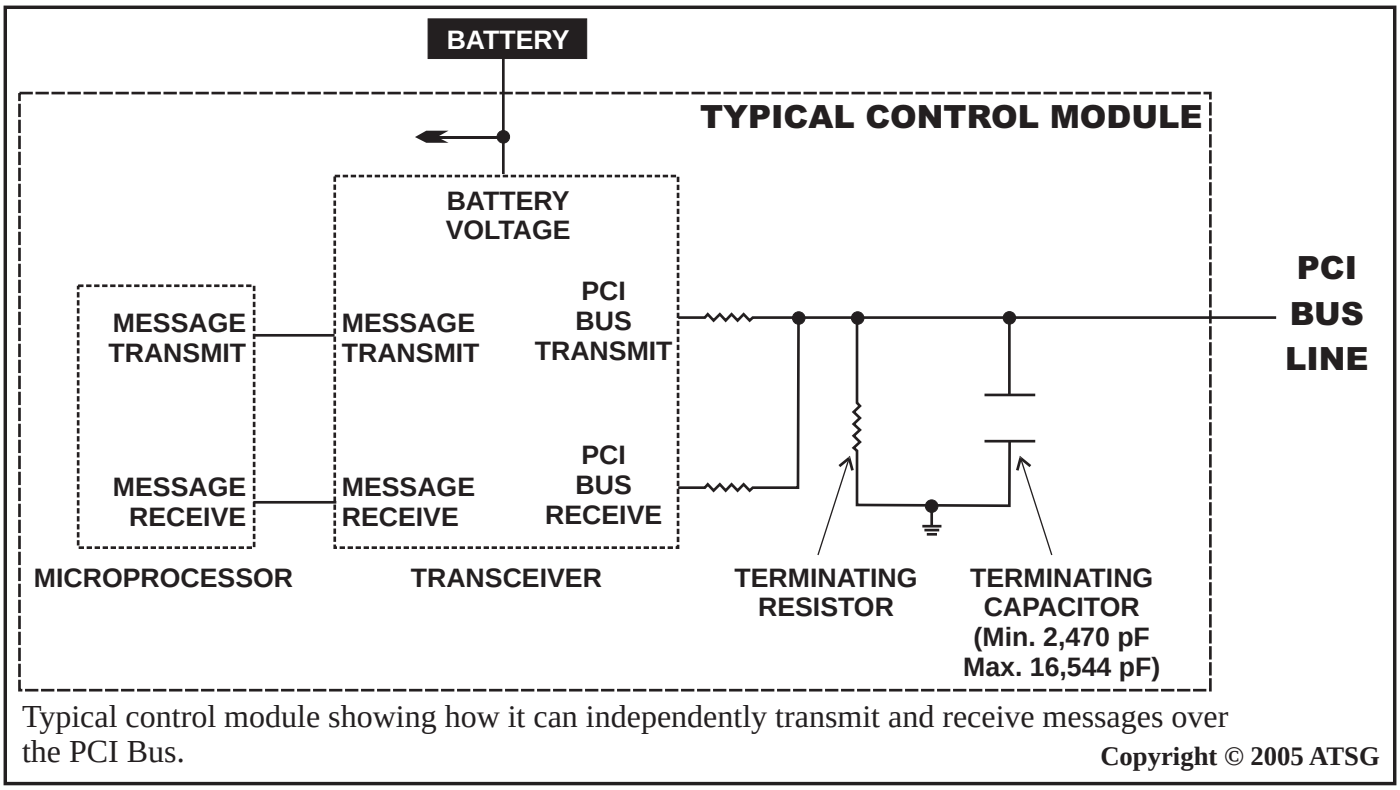


Figure 1



Typical control module showing how it can independently transmit and receive messages over the PCI Bus.

Figure 2

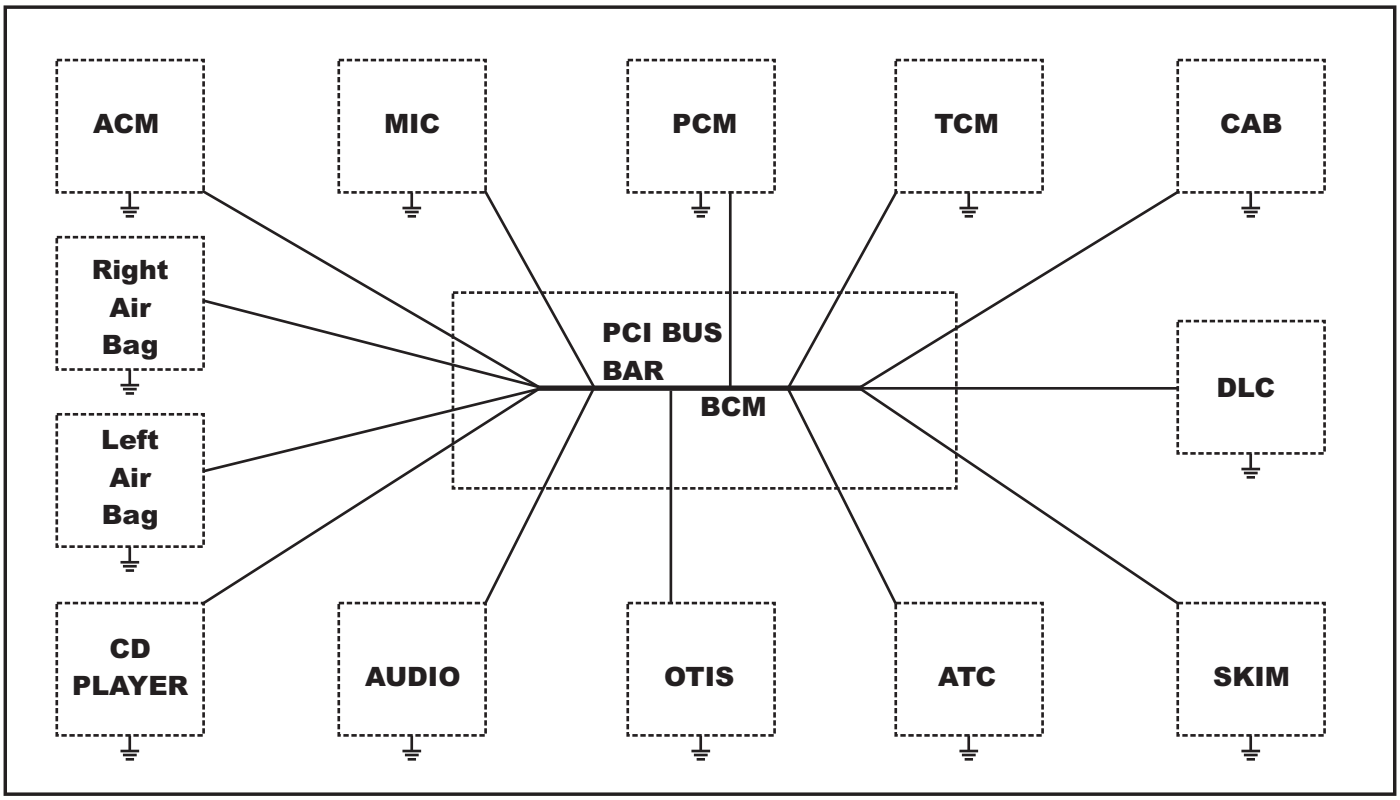


Figure 3

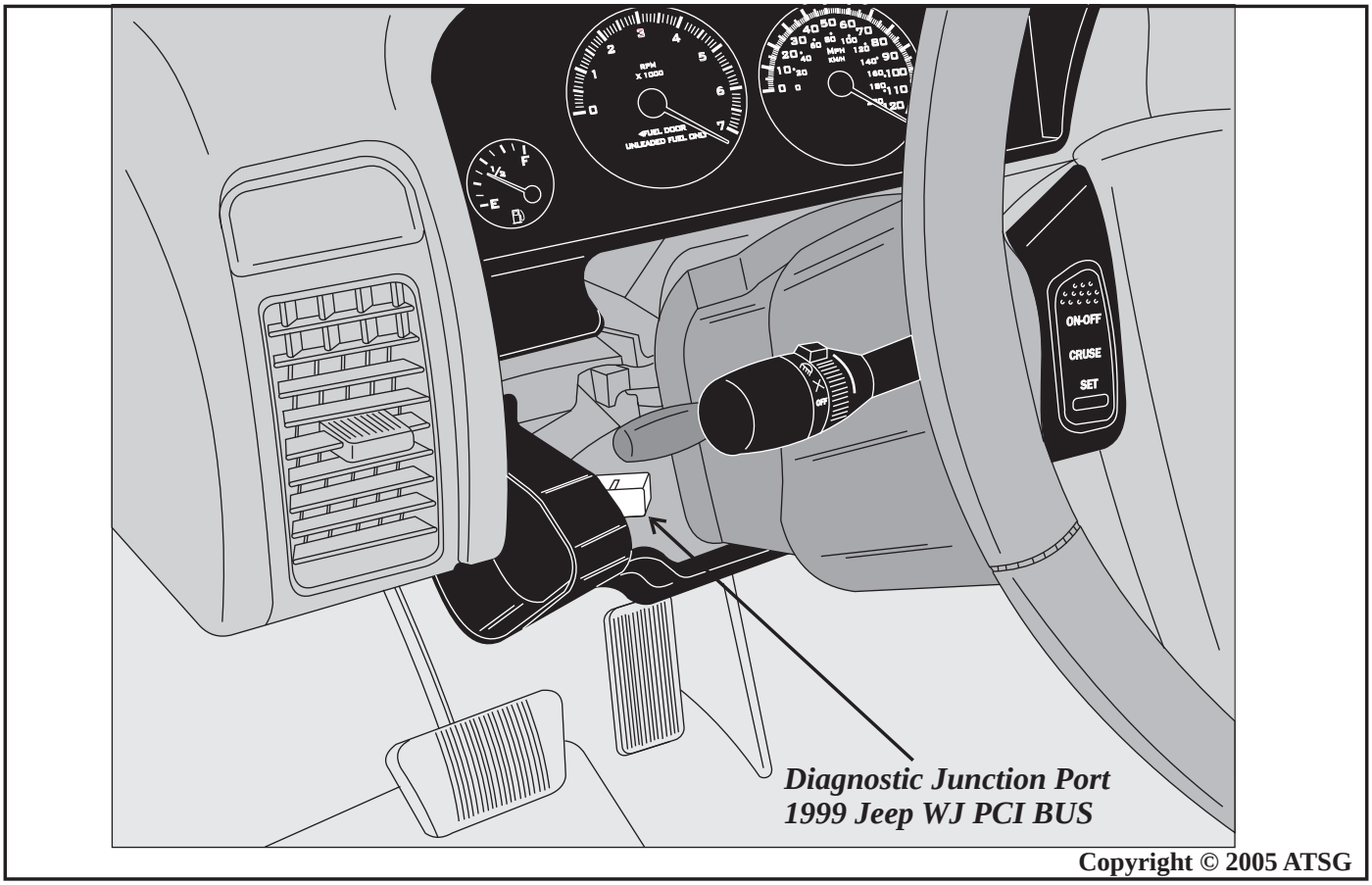


Figure 4

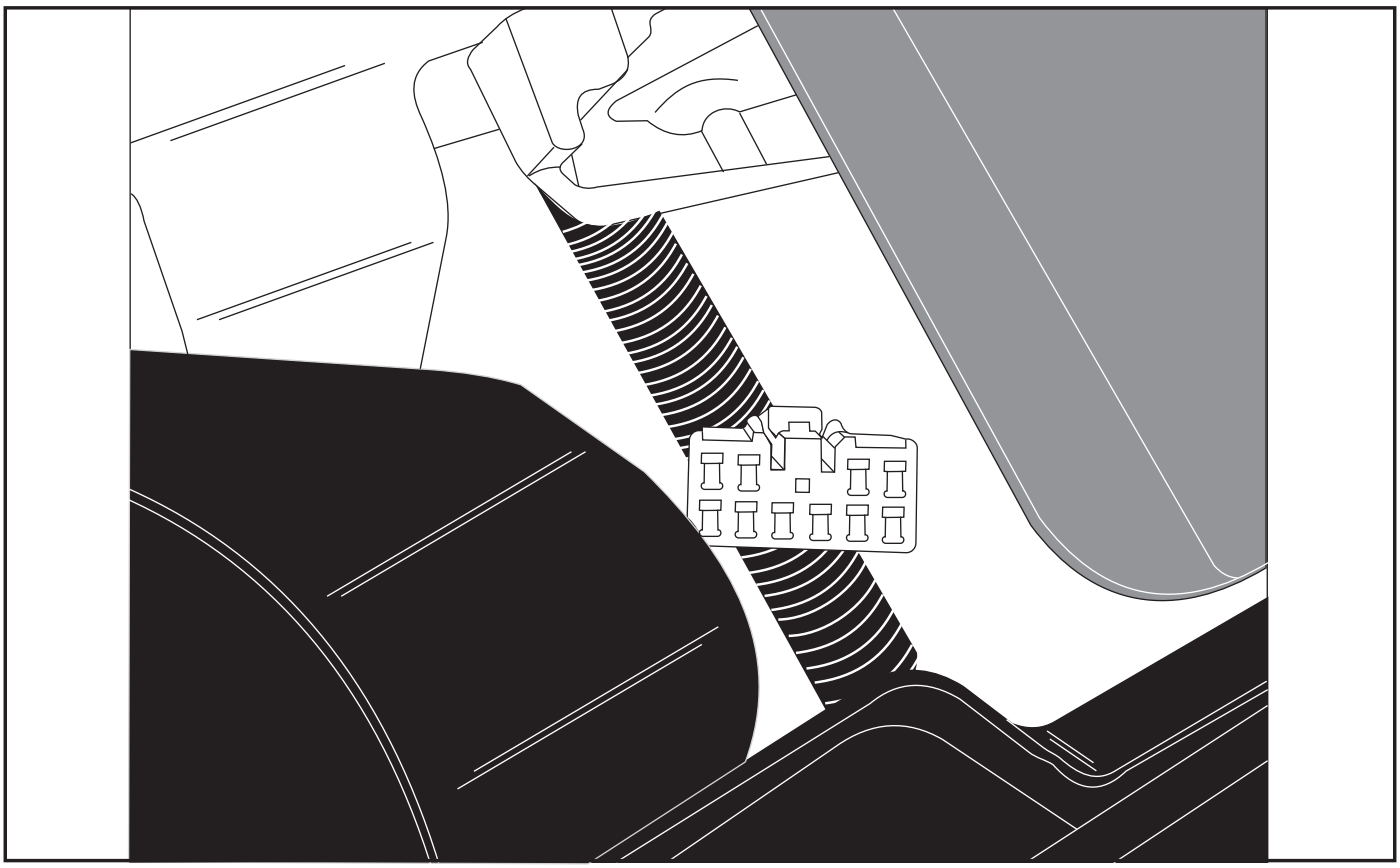


Figure 5

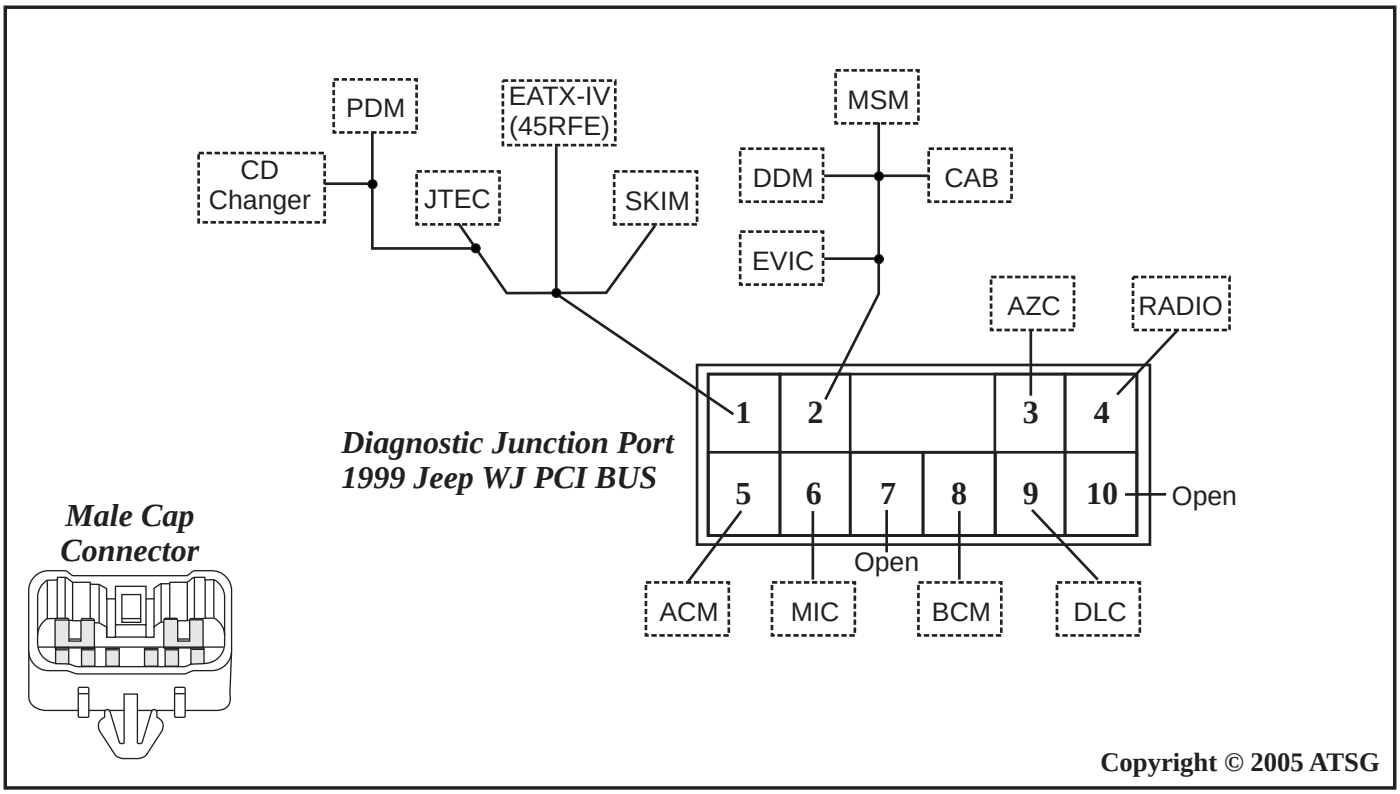


Figure 6

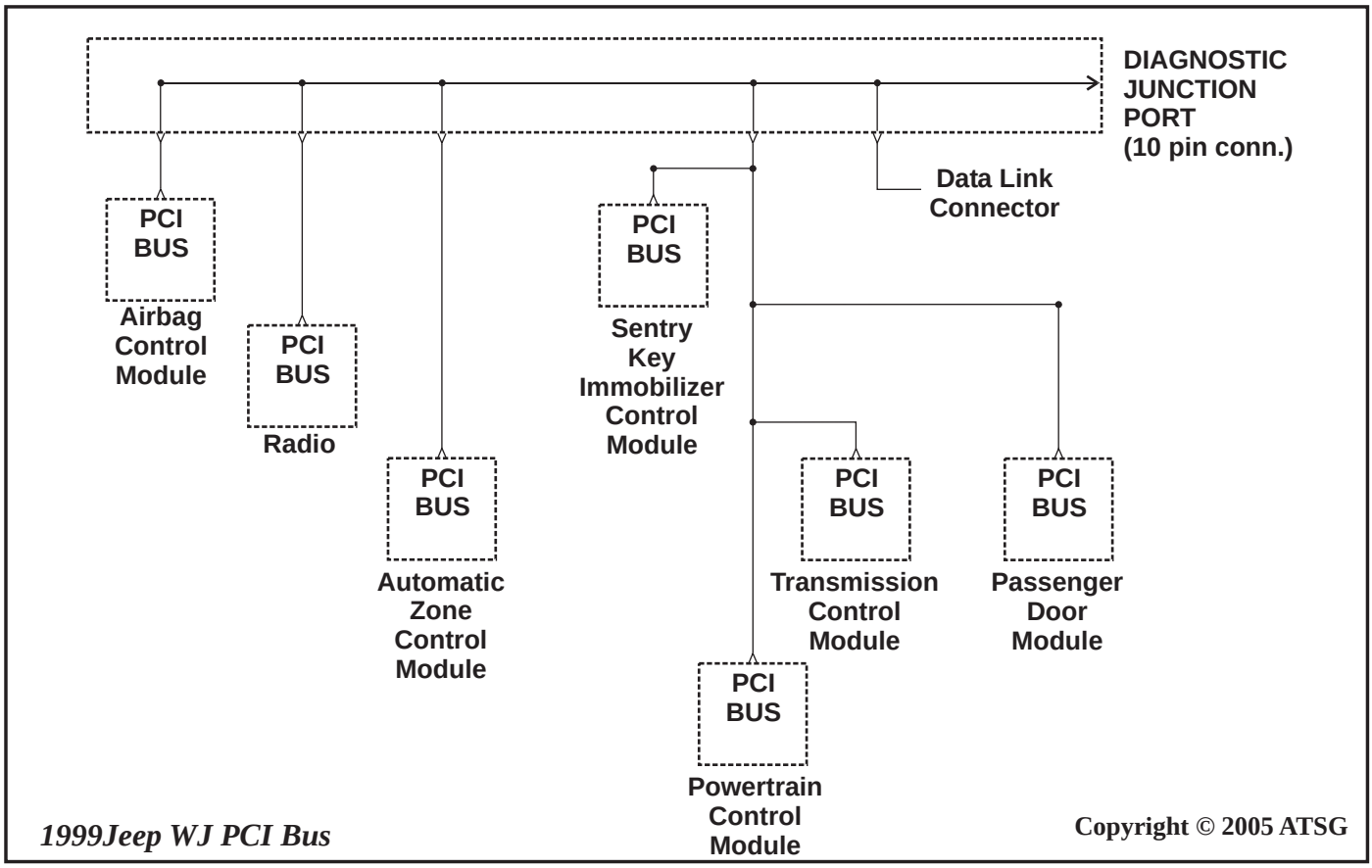

DIAGNOSTIC JUNCTION PORT (10 pin conn.)
Data Link Connector
PCI BUS
Airbag Control Module
PCI BUS
Radio
PCI BUS
Automatic Zone Control Module
PCI BUS
Sentry Key Immobilizer Control Module
PCI BUS
Transmission Control Module
PCI BUS
Passenger Door Module
PCI BUS
Powertrain Control Module
1999Jeep WJ PCI Bus
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Figure 7

Module	Approximate Termination Resistance (ohms)	Module	Approximate Termination Resistance (ohms)
Powertrain Control Module (All except 98 LH)	3,300	Body Control Module (All except 2002 WJ)	10,800
Powertrain Control Module (98 LH)	1,100	Body Control Module (2002 WJ)	8,000
Sentry Key Immobilizer Module	10,800	Data Link Connector	Open (11,400 with DRB III Connected)
Transmission Control Module	10,800	Passenger Door Module (99-01)	10,800
Controller Antilock Brake	10,800	Passenger Door Module (2002)	8,200
Radio (Premium)	10,800	Driver Door Module (99-01)	10,800
Compass Mini Trip Computer	10,800	Driver Door Module (2002)	8,200
Left-side Impact Airbag Control Module	10,800	Memory Head Set Module	10,800
Right-side Impact Airbag Control Module	10,800	Electronic Vehicle Information Center (CMTC, Traveler)	10,800
CD Changer	10,800	Automatic Zone Control (HVAC/ATC Control Heads)	10,800
Occupant Restraint Controller	10,800	Transfer Case Control Module	10,800
Mechanical Instrument Cluster (All except 98 LH & WJ)	3,300	Front Control Module	10,800
Mechanical Instrument Cluster (98 LH)	10,800	Rain Sensor	10,800
Mechanical Instrument Cluster (99-01 WJ)	2,400	Adjustable Pedal Module	10,800
Mechanical Instrument Cluster (02 WJ)	1,200	Intrusion Sensor (BUX)	10,800

Figure 8

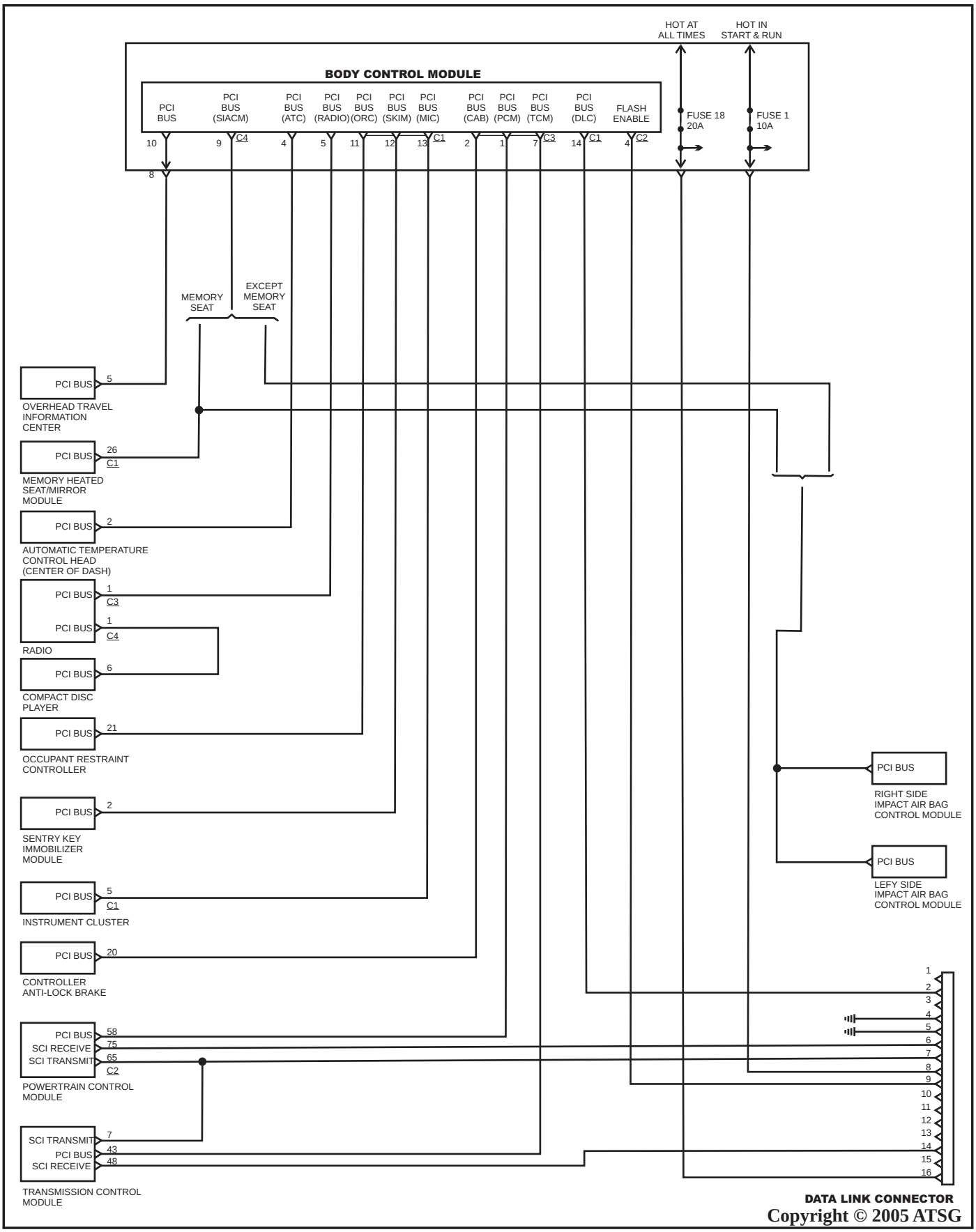
HOT AT ALL TIMES
HOT IN START & RUN
BODY CONTROL MODULE
PCI BUS
PCI BUS (SIACM)
PCI BUS (ATC)
PCI BUS (RADIO)
PCI BUS (ORC)
PCI BUS (SKIM)
PCI BUS (MIC)
PCI BUS (CAB)
PCI BUS (PCM)
PCI BUS (TCM)
PCI BUS (DLC)
FLASH ENABLE
FUSE 18 20A
FUSE 1 10A
MEMORY SEAT
EXCEPT MEMORY SEAT
OVERHEAD TRAVEL INFORMATION CENTER
MEMORY HEATED SEAT/MIRROR MODULE
AUTOMATIC TEMPERATURE CONTROL HEAD (CENTER OF DASH)
RADIO
COMPACT DISC PLAYER
OCCUPANT RESTRAINT CONTROLLER
SENTRY KEY IMMOBILIZER MODULE
INSTRUMENT CLUSTER
CONTROLLER ANTI-LOCK BRAKE
POWERTRAIN CONTROL MODULE
TRANSMISSION CONTROL MODULE
RIGHT SIDE IMPACT AIR BAG CONTROL MODULE
LEFY SIDE IMPACT AIR BAG CONTROL MODULE
DATA LINK CONNECTOR
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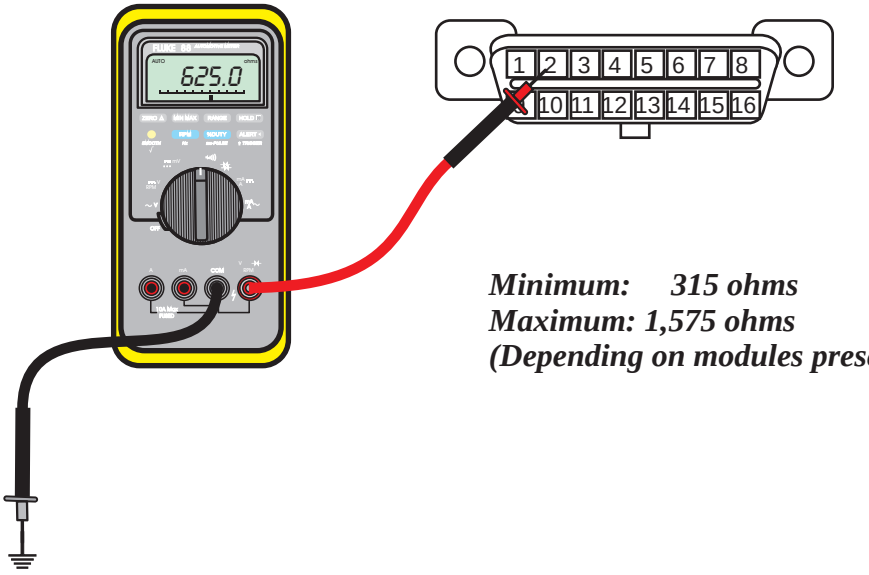
Figure 9

Checking the resistance on the PCI BUS



Minimum: 315 ohms
Maximum: 1,575 ohms
(Depending on modules present)

Figure 10

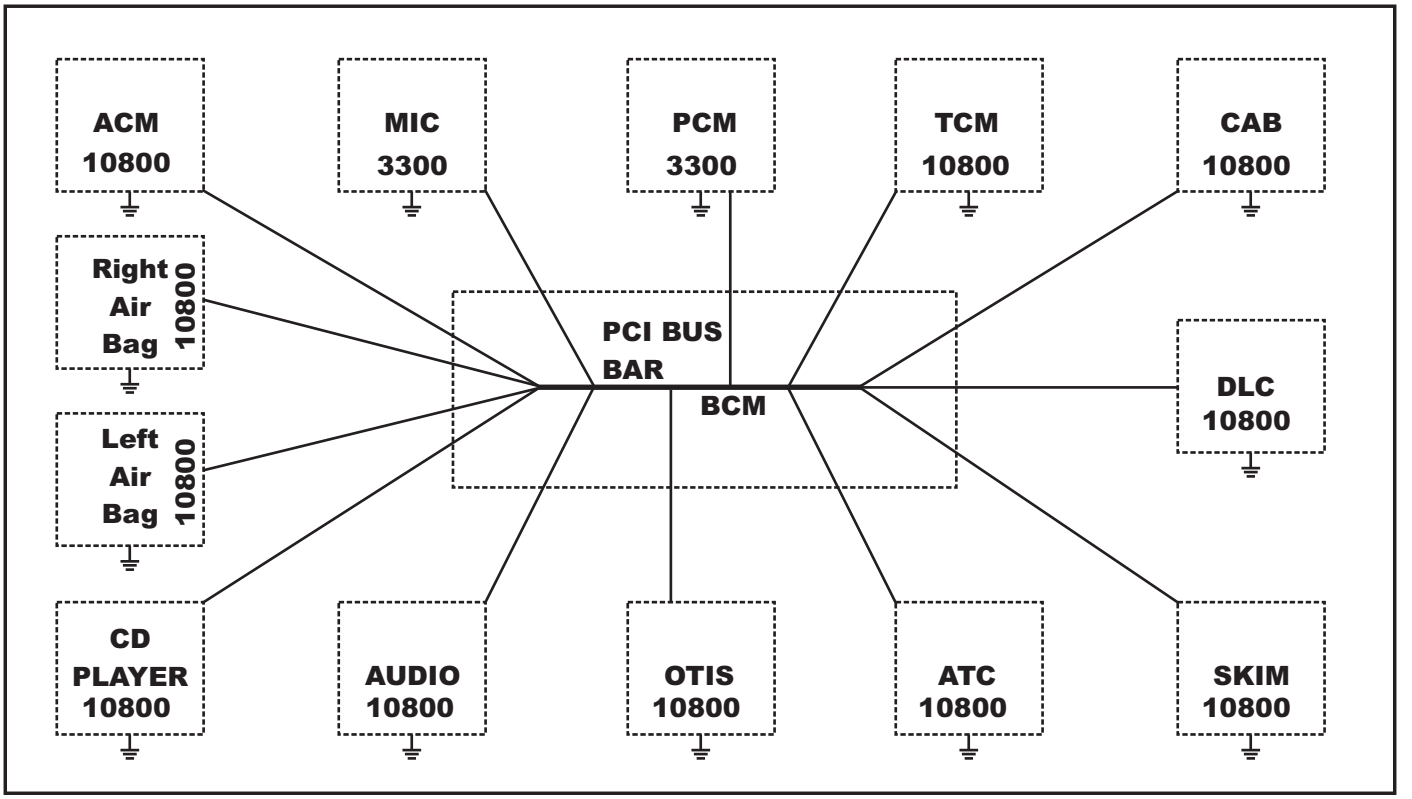


Figure 11

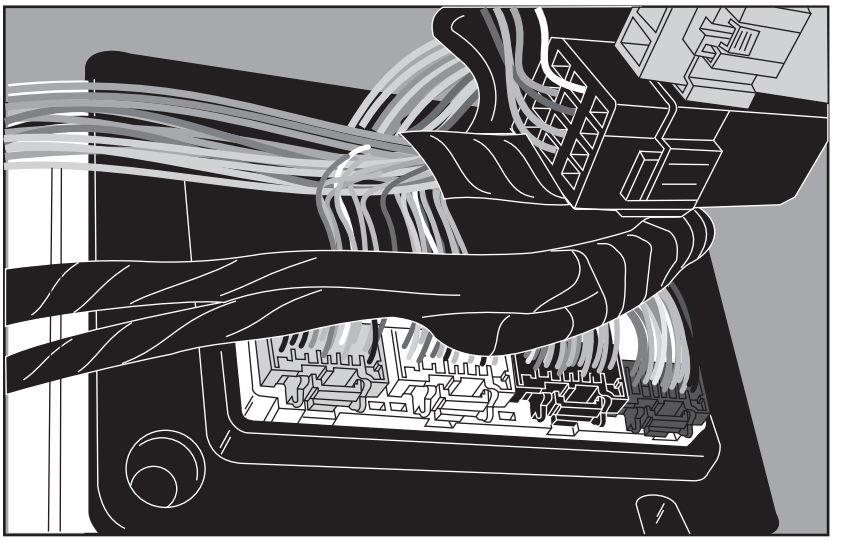
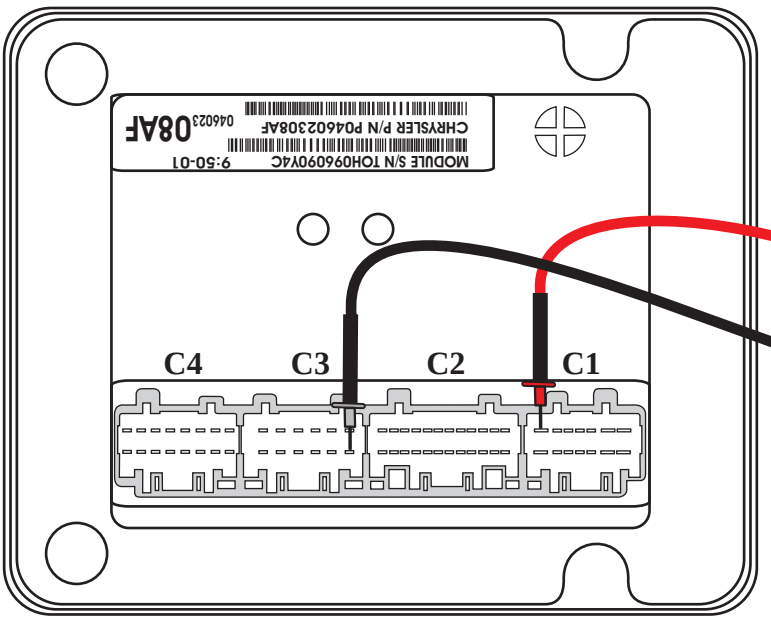
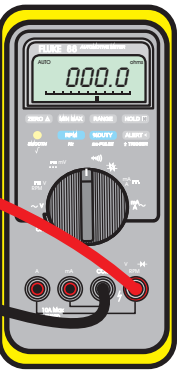


Figure 12

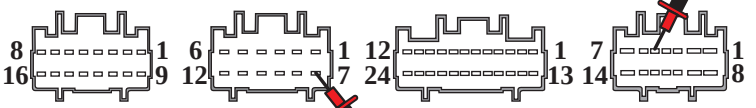




Checking for continuity across the BUS bar in the BCM hub between C3 terminal 1 (PCI PCM) and C1 terminal 14 (PCI DLC).

Junction Block 20-Way Internal Connector is located on the backside of the BCM

10 PCI BUS (OTIS)



C4 (Blue) **C3 (White)** **C2 (Black)** **C1 (Grey)**

1 PCI BUS (PCM)
2 PCI BUS (CAB)
7 PCI BUS (TCM)

4 PCI BUS (ATC)
5 PCI BUS (Radio)
7 PCI BUS (ORC)
12 PCI BUS (SKIM)
13 PCI BUS (MIC)
14 PCI BUS (DLC)

An example of a short to ground on the PCI Radio circuit. With the ignition off, this circuit should have measured 10,800 ohms.

Examples of PCI Circuit checks at the BCM using a 2001 LH vehicle

An example of a short to Power on the PCI TCM circuit. With the ignition on, this circuit should have measured 0 to 8 volts DC.

Figure 13

2004 NEON

PCI BUS QUICK TEST

COMPLAINT: One or more modules not communicating on the PCI Bus or the entire Bus is down.

CAUSE: For individual modules not communicating on the PCI Bus system, suspect that module is either not being powered up, or there is an open PCI bus wire to that module or the module is defective. If the entire system is down, the Bus wire is either shorted to power or ground.

CORRECTION: A quick test that can be performed is to add up all the modules on the Bus and check the resistance of all the modules terminating resistors at the DLC. With this particular vehicle, there are a total of 8 modules on the Bus system (See Figure 14). 2 of the modules have 3,300 ohms while the other 6 have 10,800 ohms. There is a mathematical equation for ***equivalent*** resistance in a parallel circuit where the equivalent resistance is added up and divided into 1 as provided in figure 15. Since we have two 3300 ohm modules and 6 10800 ohm modules, we do not have equivalent numbers to add up to be divided into 1. To acquire that number we would take the two modules that measure 3300 ohms each and the six modules that measure 10800 ohms each and turn them into fractions: 2/3300 + 6/10800. Before they can be added together these fractions need to be simplified: 1/1650 + 1/1800. Now divide the denominator into the numerator and this is what you get: 0.0006 + 0.00056 = 0.00116. It is this number that can be divided into 1 which equals a total of 862 ohms. This is the total resistance of all the modules in the Neon's PCI Bus circuit and should be seen at the DLC terminal 2 (See Figure 16).

If this resistance check shows near 0 ohms the system may be shorted to ground.
If the resistance reads higher, one or more of the modules have lost its ground.
If the resistance checks good, switch your meter to DC volts and turn the ignition on and recheck terminal 2 in the DLC. A minimum of 0 to 1.5 volts to a maximum of 6.25 to 8 volts should be observed. Anything substantially above 8 volts the circuit is shorted to power.

If there is a code specifying the module that is failing, check that module's power source and ground path as well as the terminating resistor at the module itself. Many times, just unplugging and cleaning the connector resolves the problem.

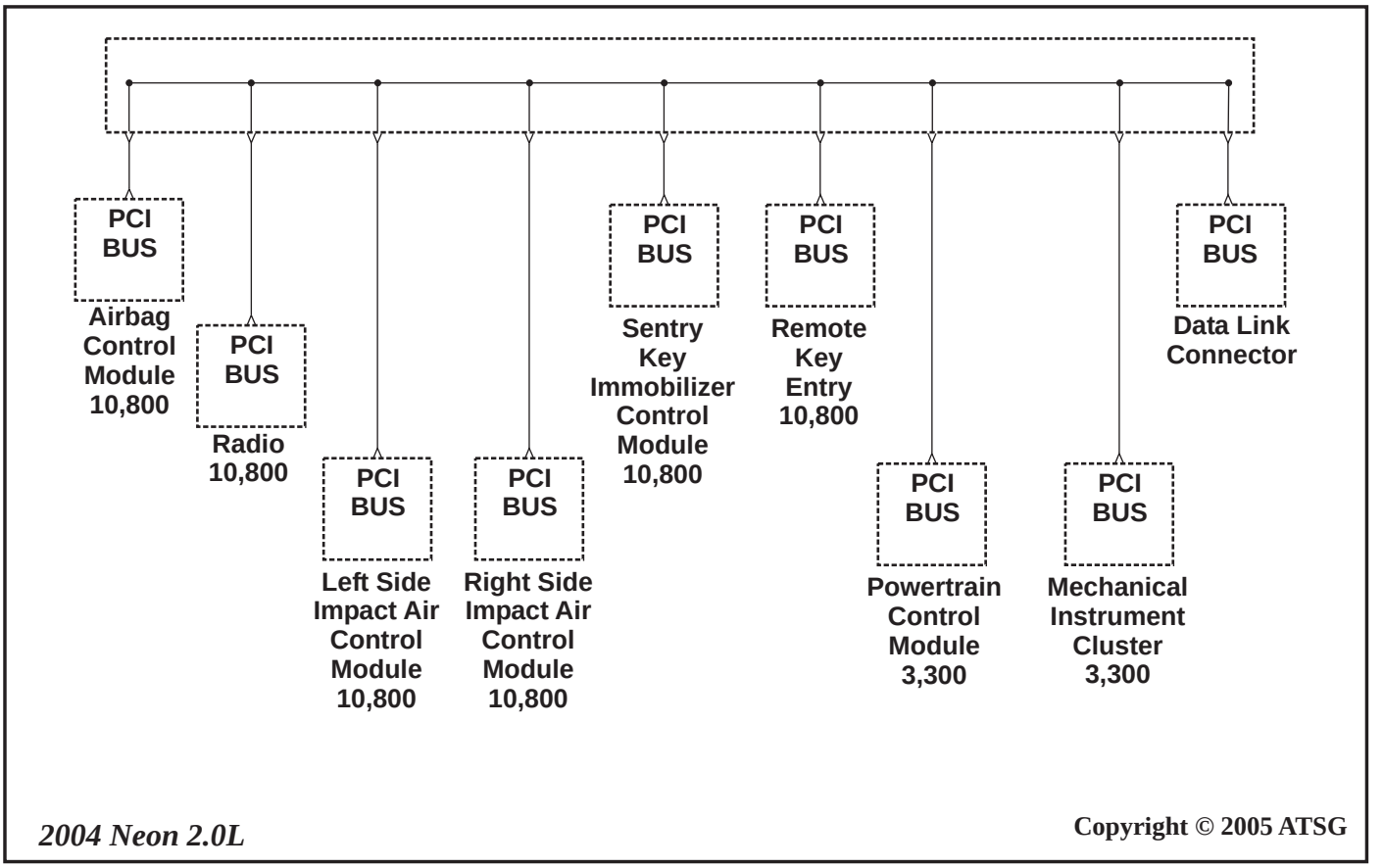


Figure 14

$$\frac{1}{\frac{1}{3300}+\frac{1}{3300}+\frac{1}{10800}+\frac{1}{10800}+\frac{1}{10800}+\frac{1}{10800}+\frac{1}{10800}+\frac{1}{10800}} = 862 \text{ ohms}$$

To simplify this equation you could set the equation up as follows:

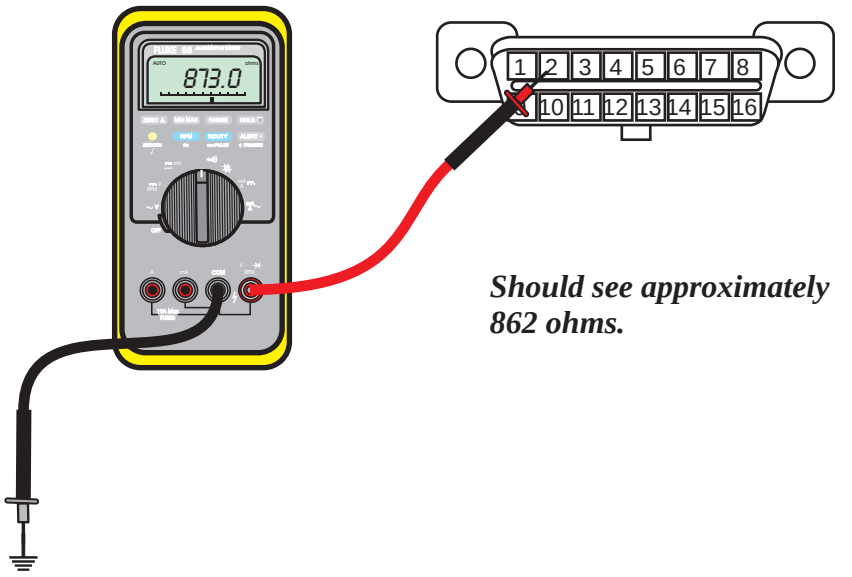
$$\frac{1}{\frac{2}{3300}+\frac{6}{10800}} = \frac{1}{\frac{1}{1650}+\frac{1}{1800}} = \frac{1}{0.0006+0.00056} = \frac{1}{0.00116} = 862 \text{ ohms}$$

Figure 15

AXIOM

A & REDS

Checking the resistance on the PCI BUS



Should see approximately 862 ohms.

2004 Neon 2.0L

Figure 16

ATEC

1998 DODGE INTREPID 3.2L VIN J

DTC'S P1695 AND P1698

COMPLAINT: A 1998 Dodge Intrepid with a 3.2L engine and 42LE transmission comes into the shop with codes P1695 and P1698 stored in the computer. Code 1695 is defined as No CCD/J185O Message from the Body Control Module and P1698 means No BUS Message from the Transmission Control Module (See Figure 1).

It may also be noted that the engine starts and runs well and the transmission shifts properly yet in the Mechanical Instrument Cluster [MIC] (Figure 2), the Tachometer does not work, the speedometer does not work and the coolant temperature gauge does not work, the MIL is illuminated, while the fuel gauge is working as well as the PRNDL display other then when a Bus error message may appear.

CAUSE: The Powertrain Control Module is no longer broadcasting this information to the Mechanical Instrument Cluster.

A partial flow chart provided in figure 3 and wiring diagram in figure 4 reveals the type of information that is being broadcasted and received among the modules. It can be seen that the PCM broadcasts the RPM, VSS and ECT information and the MIC receives it. It is also noticed that the BCM broadcasts the Fuel Level information and the TCM broadcasts the PRNDL information, both of which are also received by the MIC. Since the RPM, VSS and ECT gauges are inoperable while the Fuel Level and PRNDL display are, it is sensible to conclude that the PCM is the module having problems communicating with the MIC.

Checking the Circuit
There are a total of 5 modules being used in this 1998 Dodge Intrepid (See Figure 5). The: 1. PCM 2. MIC 3. ACM (Airbag) 4. TCM 5. BCM

By adding and dividing the resistance of each module on the circuit as seen in figure 5, a quick check of the entire PCI circuit can be performed at terminal 2 in the Data Link Connector (See Figure 6). If the entire circuit measures correctly, it can be determined that the system is neither shorted or open and that the PCM itself is defective.

CORRECTION: If the entire PCI BUS measures correctly, replace the PCM.

Code Information

P1695

Code definition/description: No CCD/PCI BUS Message from Body Control Module.

When Monitored: With the ignition key on, engine running, auto trans must be in drive, and battery voltage greater than 10 volts.

Set Condition: No CCD messages from the BCM for 20 seconds.

Theory of Operation: The Chrysler Programmable Communication Interface multiplex system (PCI Bus) consists of a single wire. The Body Control Module (BCM) acts as a hub for all modules and connects the Data Link Connector (DLC). Each Module on the PCI Bus uses a local ground as a Bus reference. Continuous information is broadcast across the PCI Bus in order for Modules to share sensor information from a common sensor.

Possible Causes:
a) Open Bus wire between PCM and BCM
b) PCM Bus circuit internally open
c) BCM Bus circuit internally open
d) Bus shorted to ground
e) Bus shorted to power

P1698

Code definition/description: No CCD/PCI BUS Message from Transmission Control Module.

When Monitored: Equipped with auto trans, the ignition key on, engine running, auto trans must be in drive, and battery voltage greater than 10 volts.

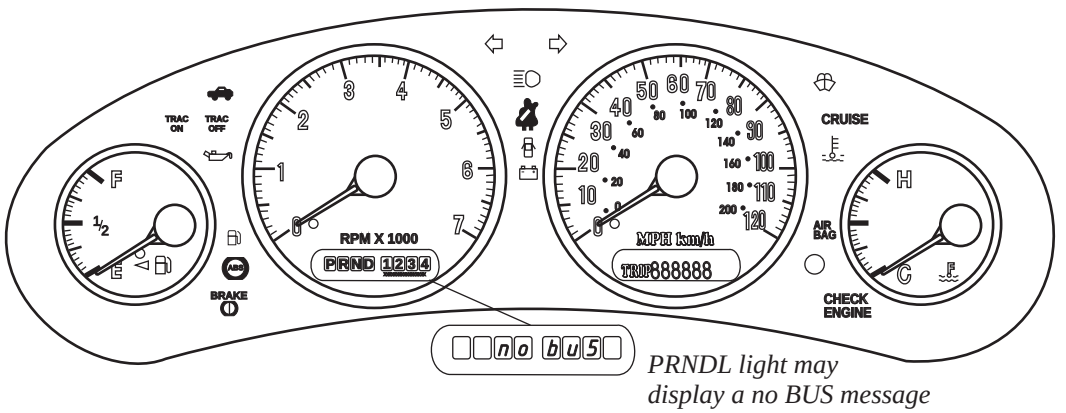
Set Condition: No CCD messages from the TCM for 10 seconds, two trips required.

Theory of Operation: Same as P1695 listed above.

Possible Causes:
a) Open Bus wire between PCM and BCM
b) Open Bus wire between PCM and TCM
c) BCM Bus circuit internally open
d) PCM Bus circuit internally open
e) TCM Bus circuit internally open
f) Bus circuit shorted to ground
g) Bus circuit shorted to power

Figure 1

Mechanical Instrument Cluster



1998 Dodge Intrepid 3.2L - 42LE transmission

Figure 2

1998 Dodge Intrepid 3.2L - 42LE transmission
Partial Module Communication Flow Chart

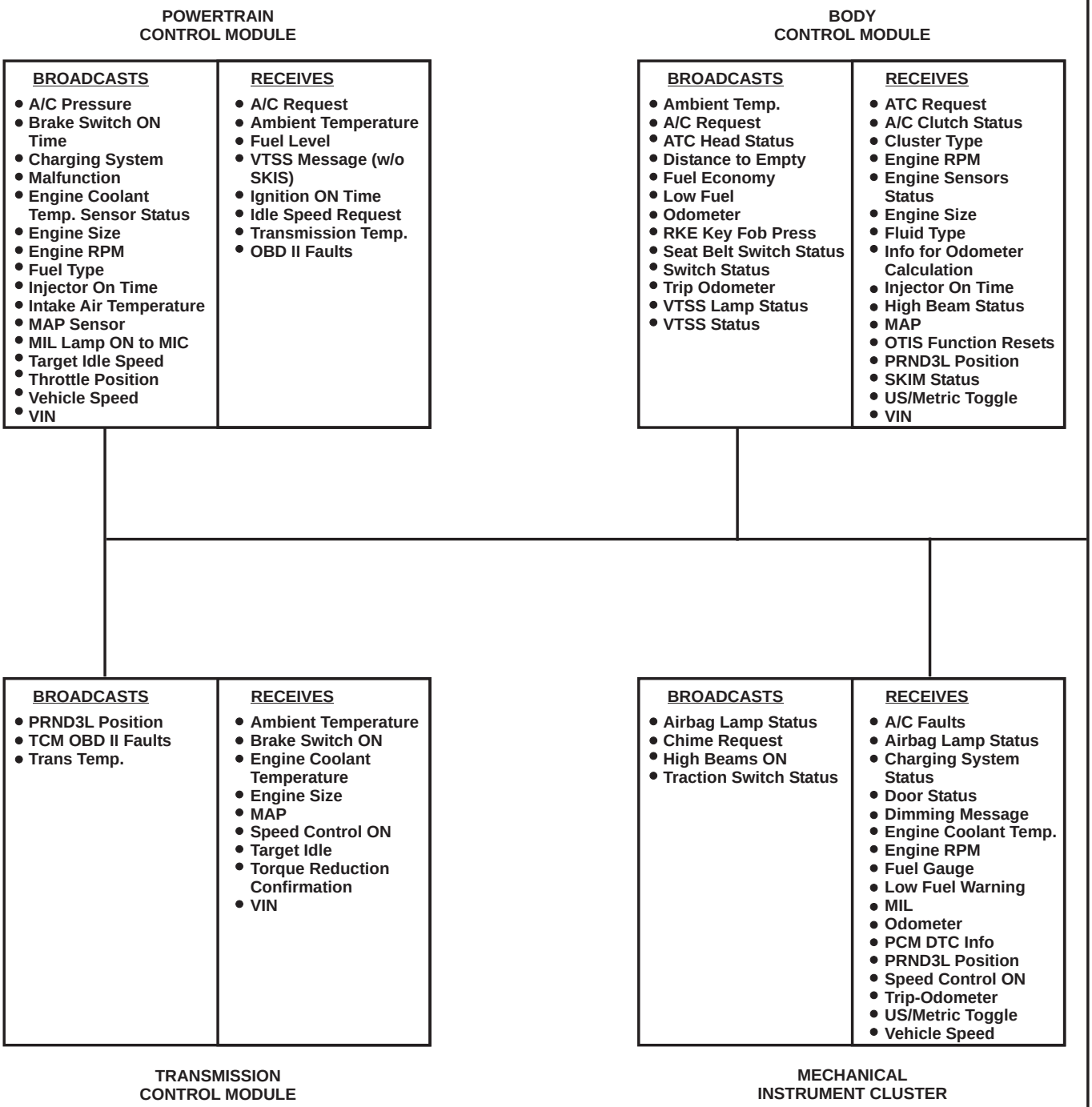
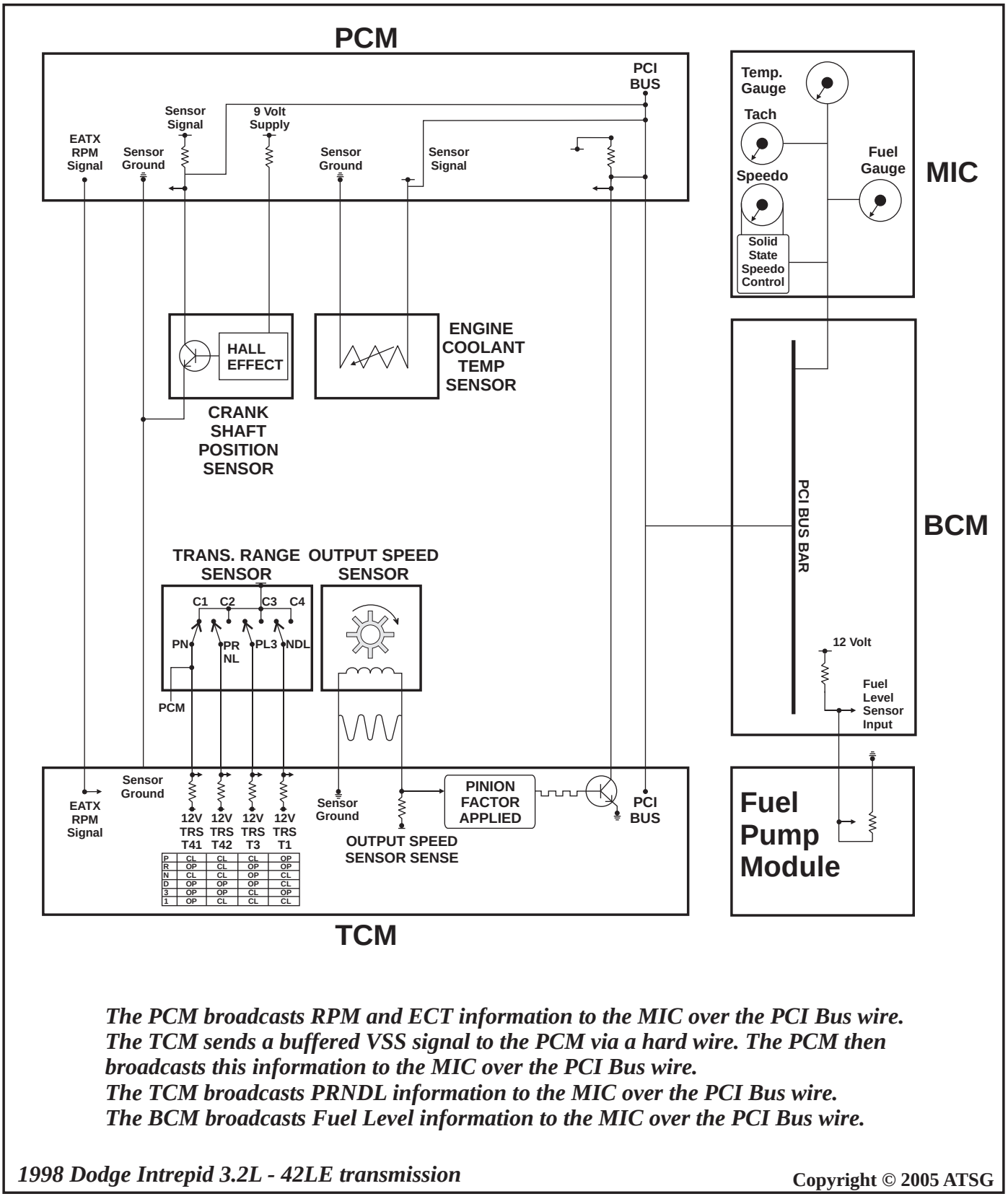


Figure 3



P	CL	CL	CL	OP
R	OP	CL	OP	OP
N	CL	CL	OP	CL
D	OP	OP	OP	CL
3	OP	OP	CL	OP
1	OP	CL	CL	CL

The PCM broadcasts RPM and ECT information to the MIC over the PCI Bus wire. The TCM sends a buffered VSS signal to the PCM via a hard wire. The PCM then broadcasts this information to the MIC over the PCI Bus wire.
The TCM broadcasts PRNDL information to the MIC over the PCI Bus wire.
The BCM broadcasts Fuel Level information to the MIC over the PCI Bus wire.

1998 Dodge Intrepid 3.2L - 42LE transmission

Figure 4

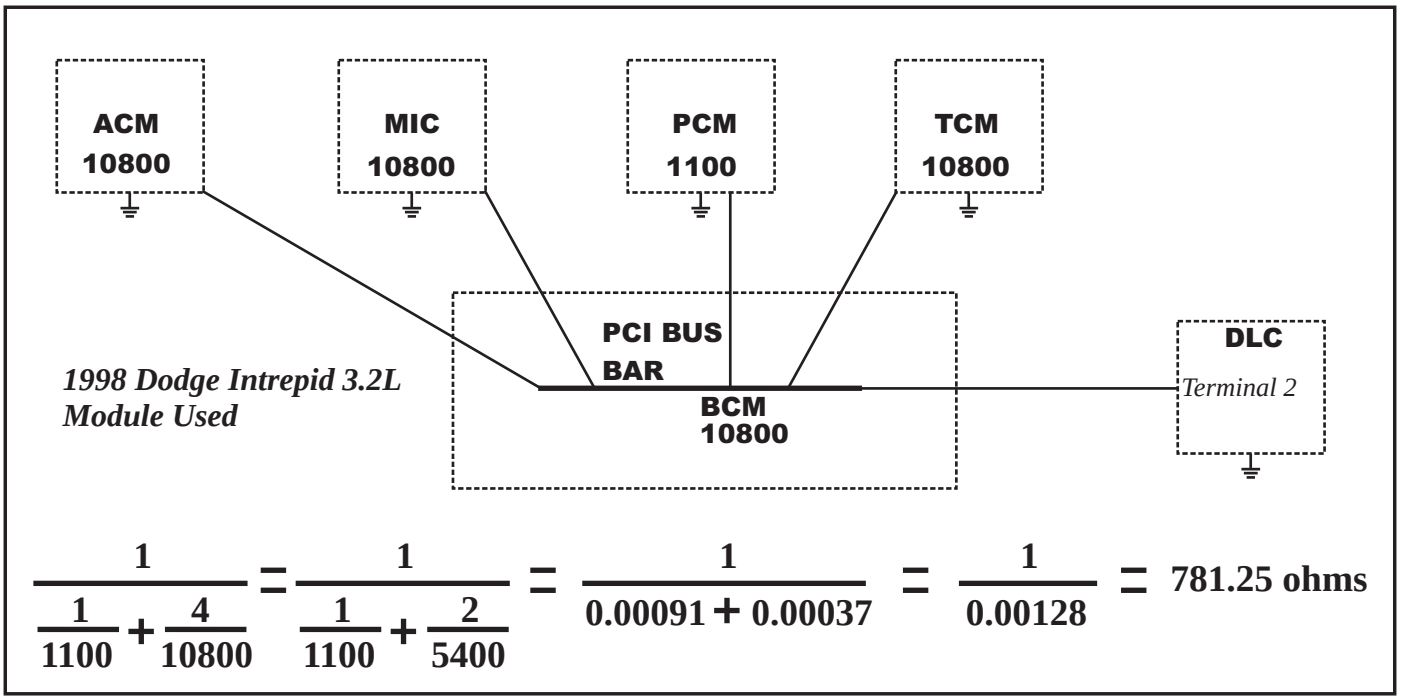


Figure 5

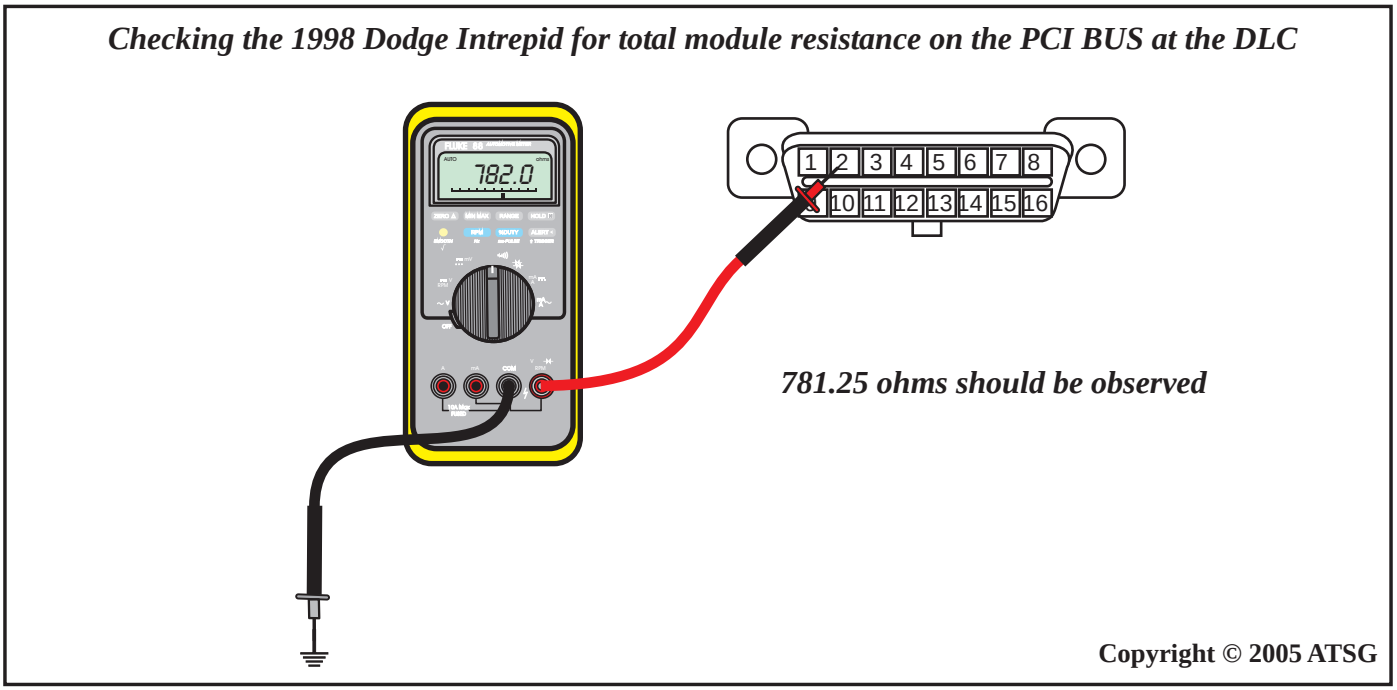


Figure 6

CHRYSLER 42 LE

LOW/REVERSE CASE PLUG BLOWOUT

COMPLAINT: The vehicle may be towed into the shop with a complaint of a significant transmission fluid leak. An inspection reveals a sizable leak coming from the top rear of the transmission when the transmission is in drive or reverse.

CAUSE: The press in plug that is located at the end of the factory drilled low/reverse clutch passage has blown out, (Refer to Figures 1 and 2).

CORRECTION: With a 1/4" Pipe thread blind hole tap, cut threads into the existing hole that the press in plug occupied (Refer to Figures 3 and 4). Next, obtain a 1/4" pipe plug from the local hardware store and apply some thread lock compound on the plug threads and install it into the newly threaded hole (Refer to Figure 5).

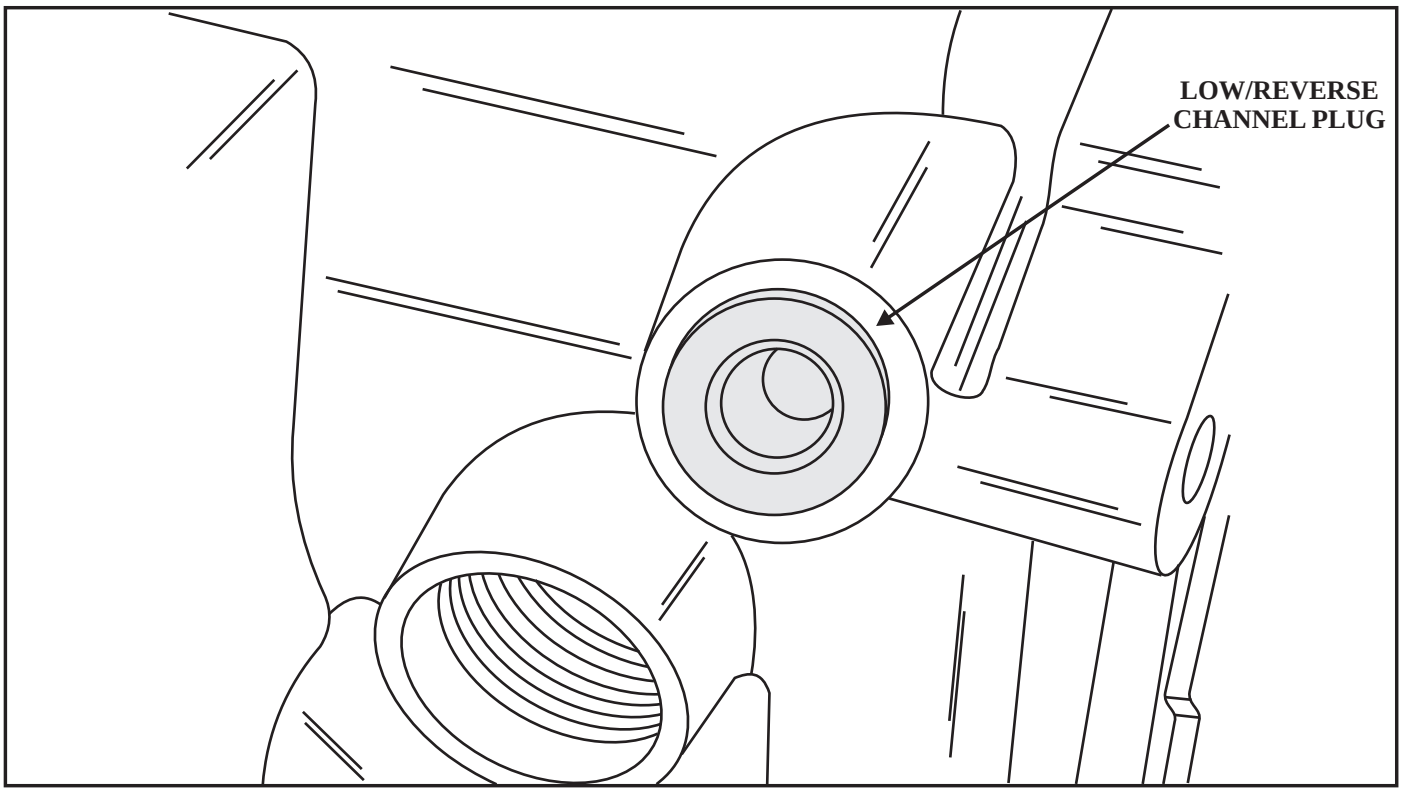


Figure 1

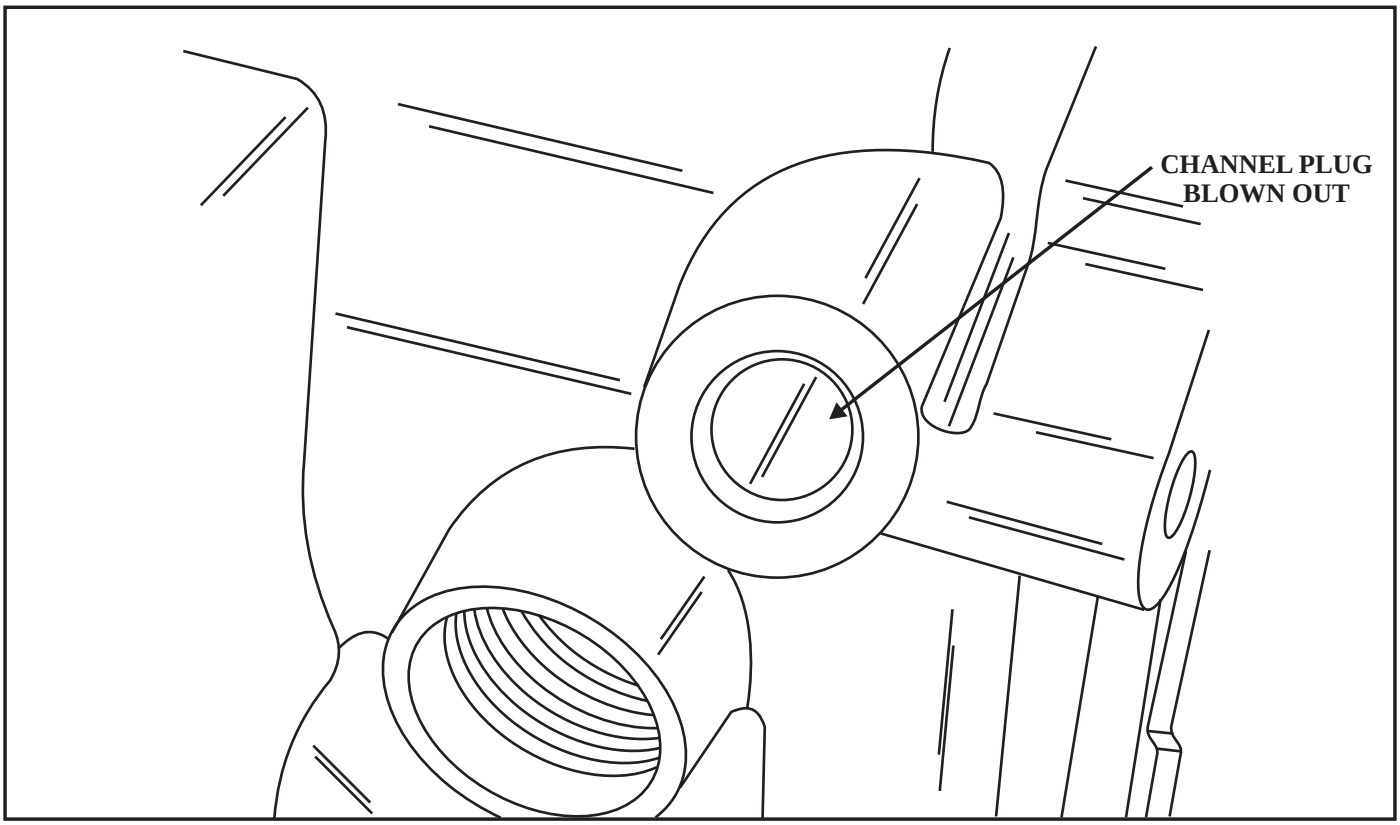


Figure 2

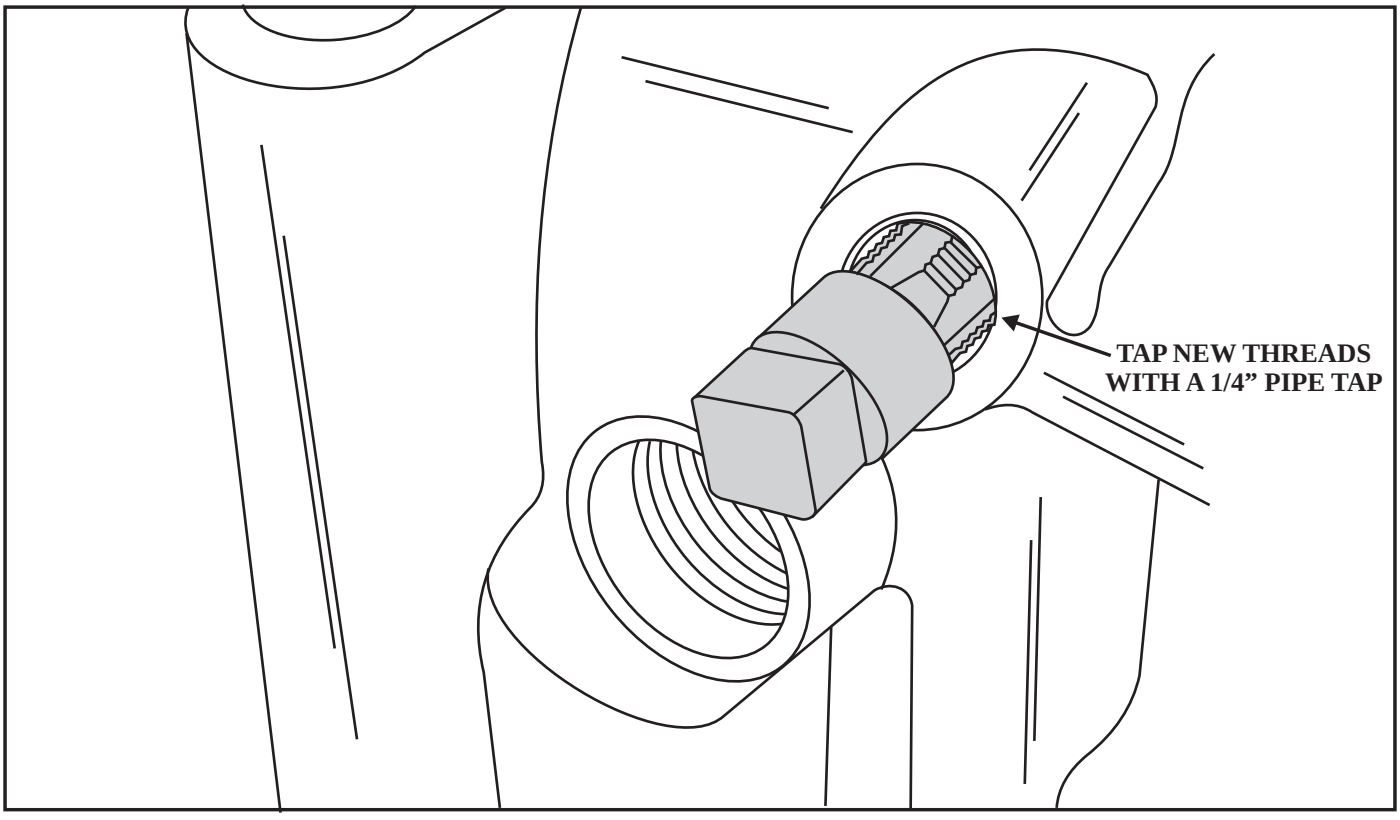


Figure 3

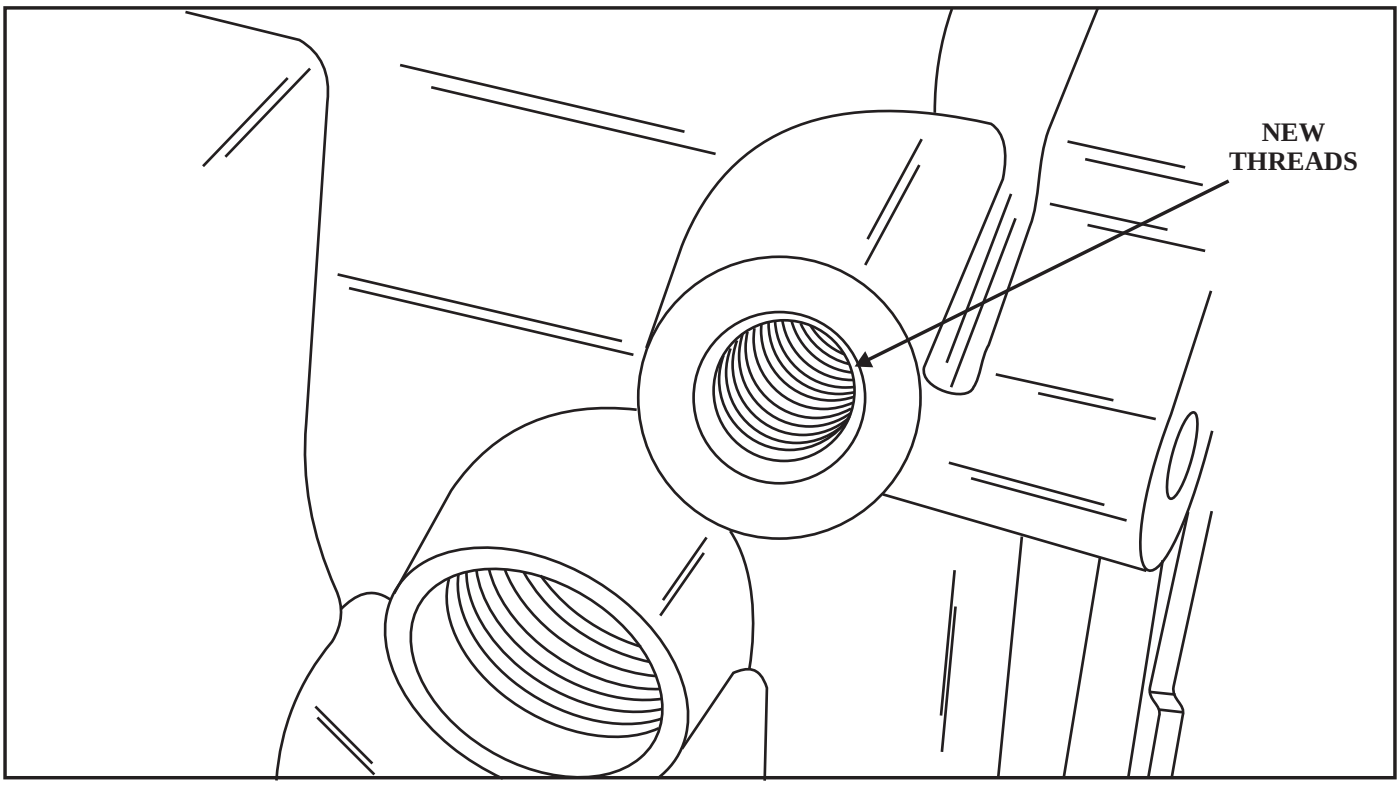


Figure 4

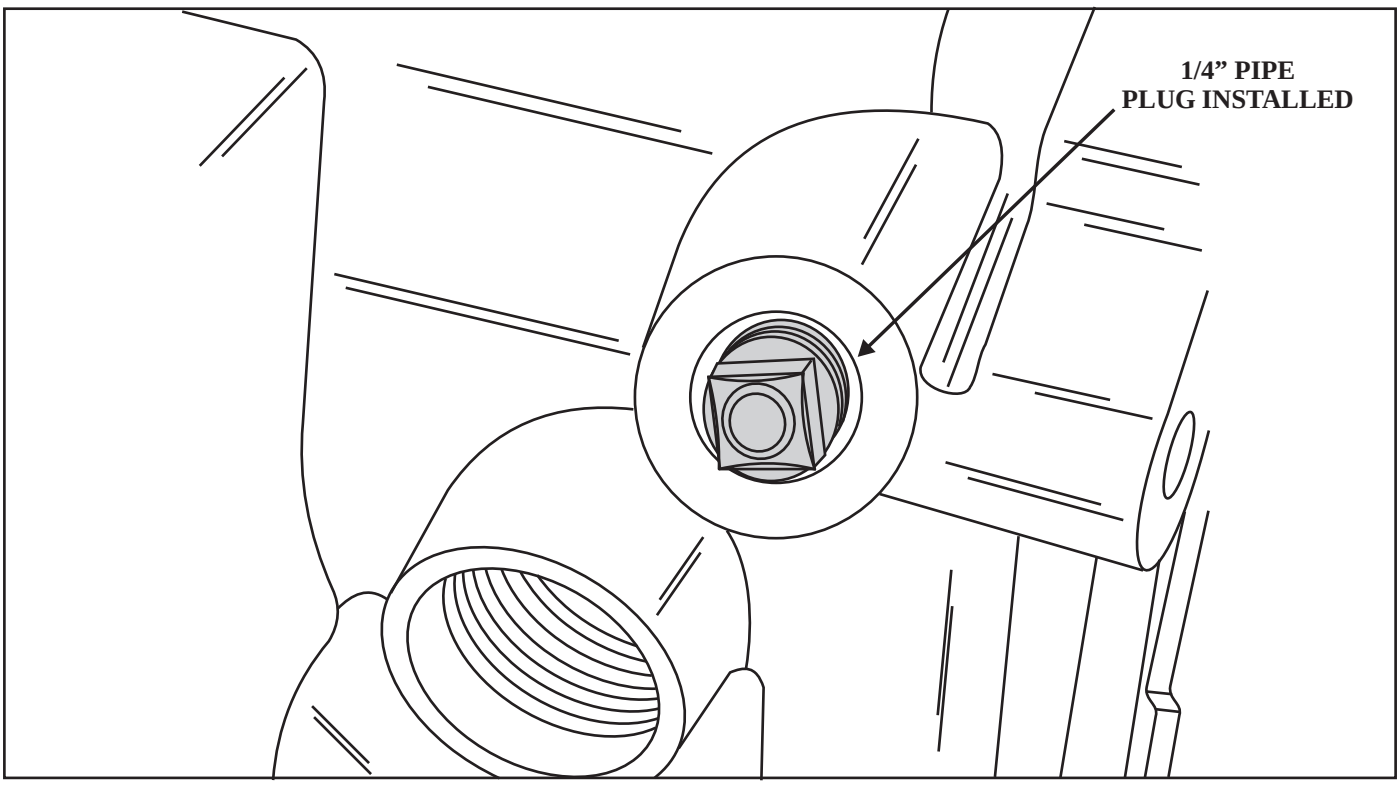


Figure 5

CHRYSLER 45RFE
SLIPS ON TAKE-OFF OR NO MOVE

COMPLAINT: Vehicles equipped with the 45RFE, may exhibit a slip on take-off or a no move condition, after overhaul or fluid change.

CAUSE: The cause may be, an aftermarket Primary Oil Filter was installed into the transmission and the neck of the filter is too narrow allowing the filter to fall out of the pump, causing fluid aeration and/or no pump suction, as shown in the cross-section located in Figure 3.

CORRECTION: Locate the Primary Oil Filter as shown in Figure 1. Remove it from the pump and verify the dimensions of the filter are the same as shown in Figure 2. Replace as necessary.

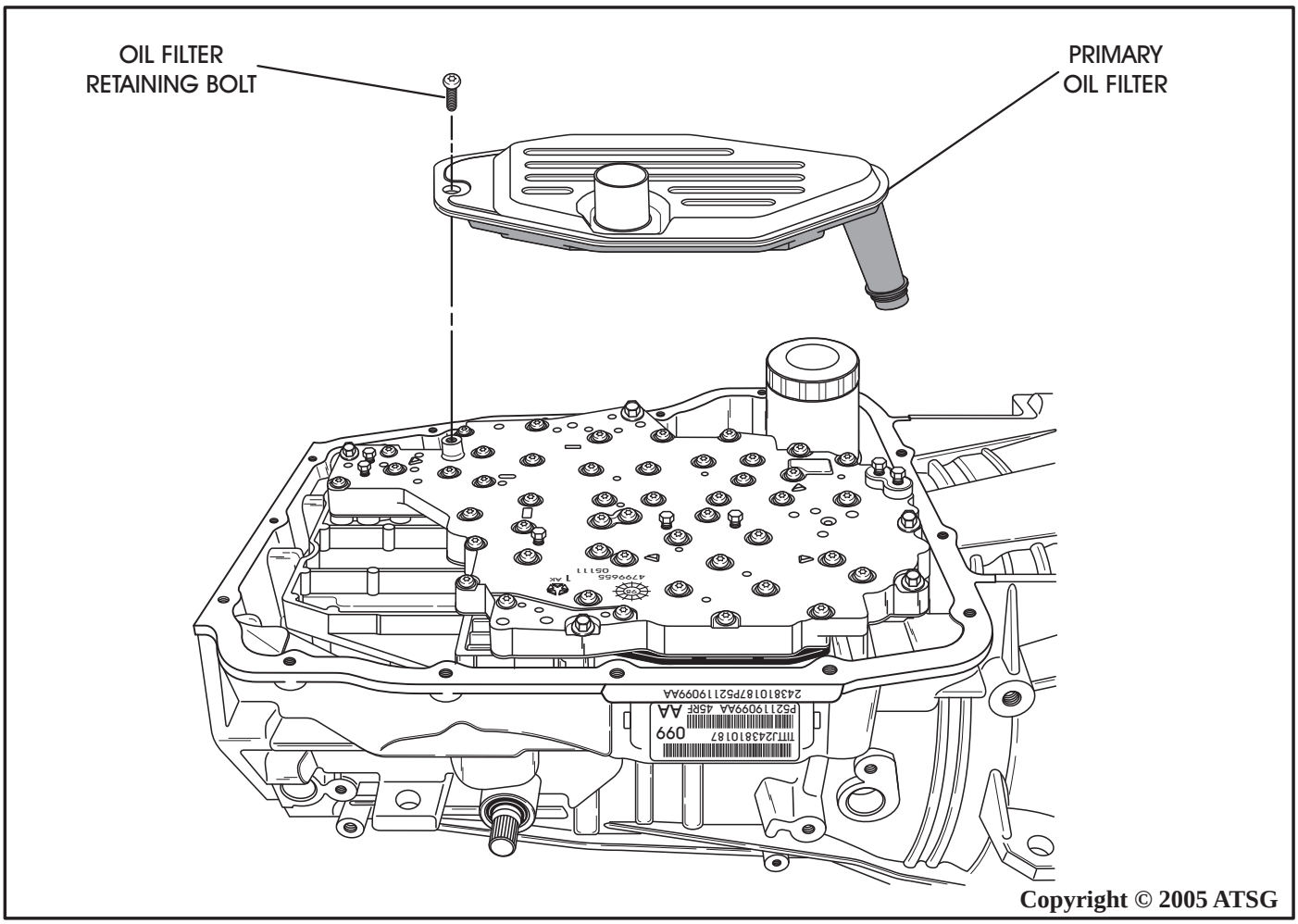
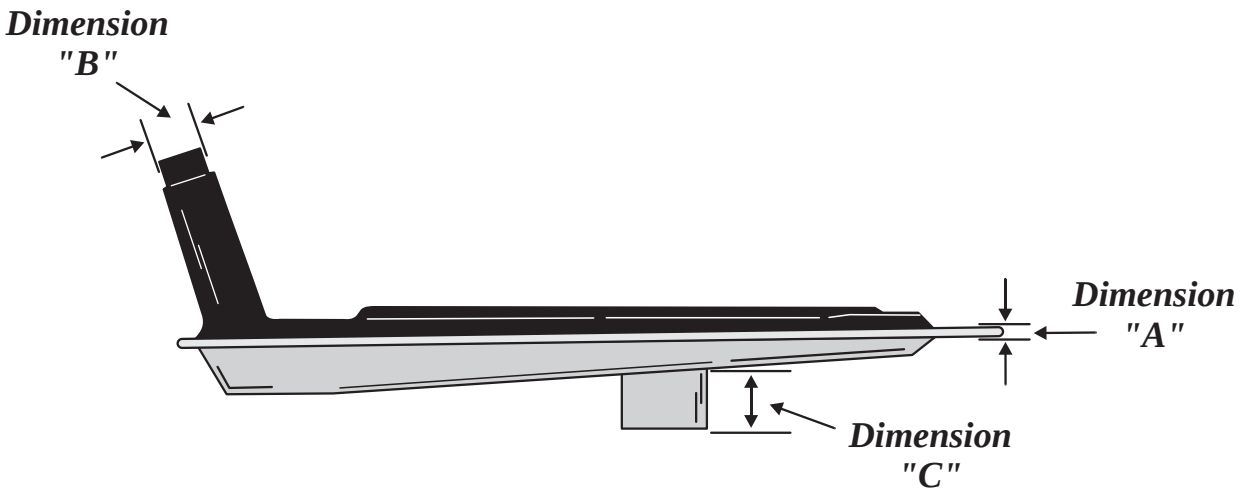


Figure 1

O.E. FILTER DIMENSIONS
(*Filtran*)



Dimension "A" = .180" This is the thickness of the tab that the retaining bolt clamps to the valve body.

Dimension "B" = .746" This is the diameter of the neck of the filter that fits into the seal in the pump.

Dimension "C" = 1.250" This is the depth of the pickup in the pan.
NOTE: The dimension shown above is for a 4 wheel drive application

NOTE: These dimensions are smaller on some aftermarket filters allowing the filter to fall out of the pump or cause pump cavitation and low pressure.

Figure 2

CROSS-SECTION

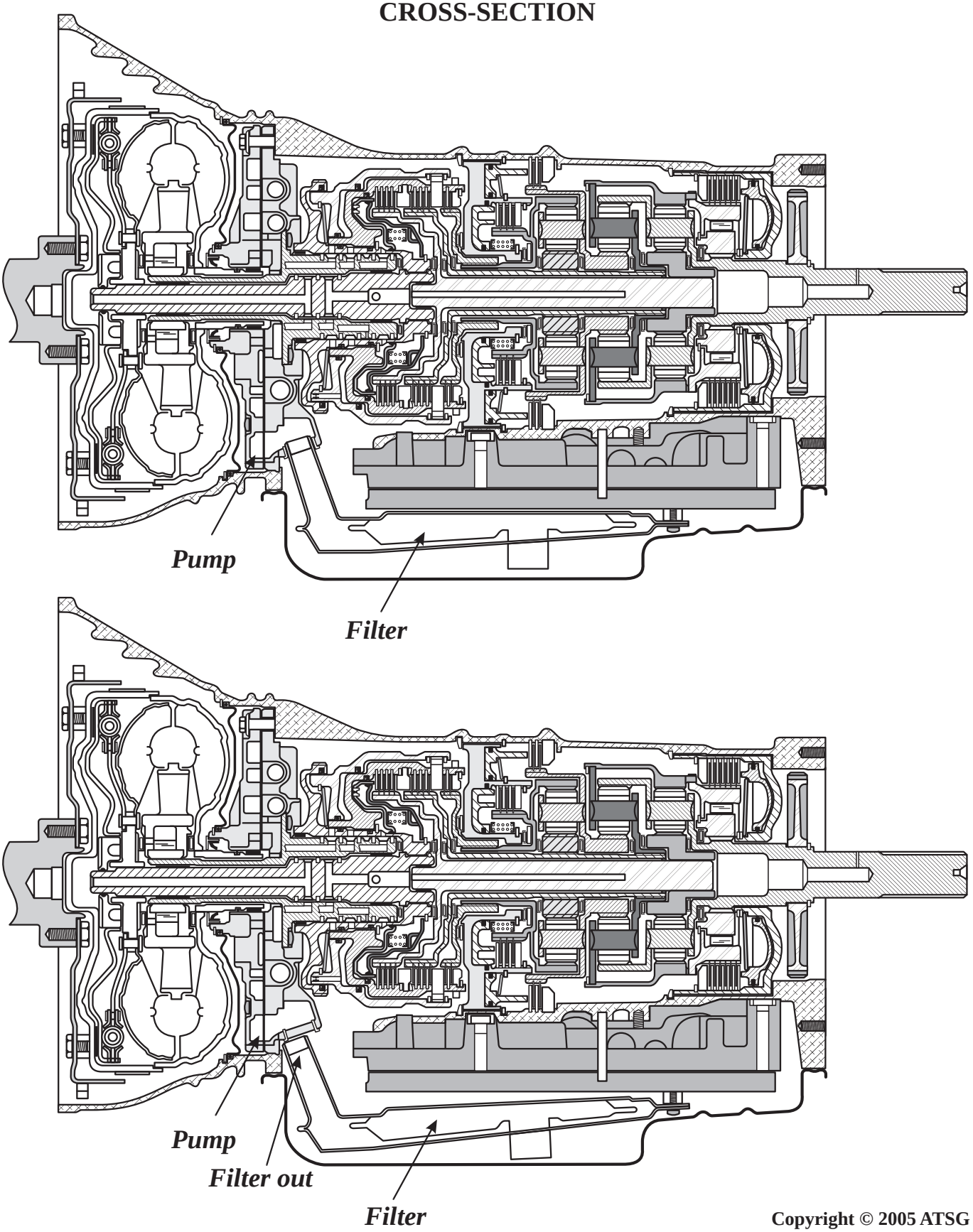


Figure 3

ATSG

DODGE/JEEP TRUCKS WITH 45RFE/545RFE TRANSMISSIONS

HARSH SHIFTS

COMPLAINT: 2000-2001 Dodge Dakota, Durango and 1999-2001 Jeep Grand Cherokee equipped with the 45RFE or 545RFE transmission and the 4.7L engine may exhibit a complaint of a harsh 2-3 upshift accompanied by a clunk or shudder when accelerating, or a harsh 4-5 upshift or a harsh 5-4 downshift, (2001 Jeep only).

CAUSE: The TCM or PCM requires a "Shift Quality Enhancement" software update.

CORRECTION: When all diagnostic procedures have been completed to address these complaints and the complaint is still present, the TCM or PCM will require reprogramming to cure the complaint.
This will require a scan tool (DRB III) that is capable of interfacing with the Mopar Diagnostic System 2 (MDS2) in order to download the necessary revisions.
When the reprogramming is complete, an Authorized Software Update Label (Refer to Figure 1), must be placed near the emissions label.

The reprogramming process may cause diagnostic trouble codes to be stored in one or more modules. Be sure to complete the repair by clearing all DTCs.

SERVICE INFORMATION:

1999-2001 Jeep Grand Cherokee TCM Software Revision....PN05019701AC.....Ver. 9.3
2000 Dodge Dakota & Durango TCM Software Revision.....PN05018454AB.....Ver. 9.1
2001 Dodge Dakota & Durango TCM Software Revision....PN56028285.....Ver. 8.4
1999 Jeep Grand Cherokee PCM Software Revision.....Calibration #99Cal20
2000 Jeep Grand Cherokee PCM Software Revision.....Calibration #00Cal17

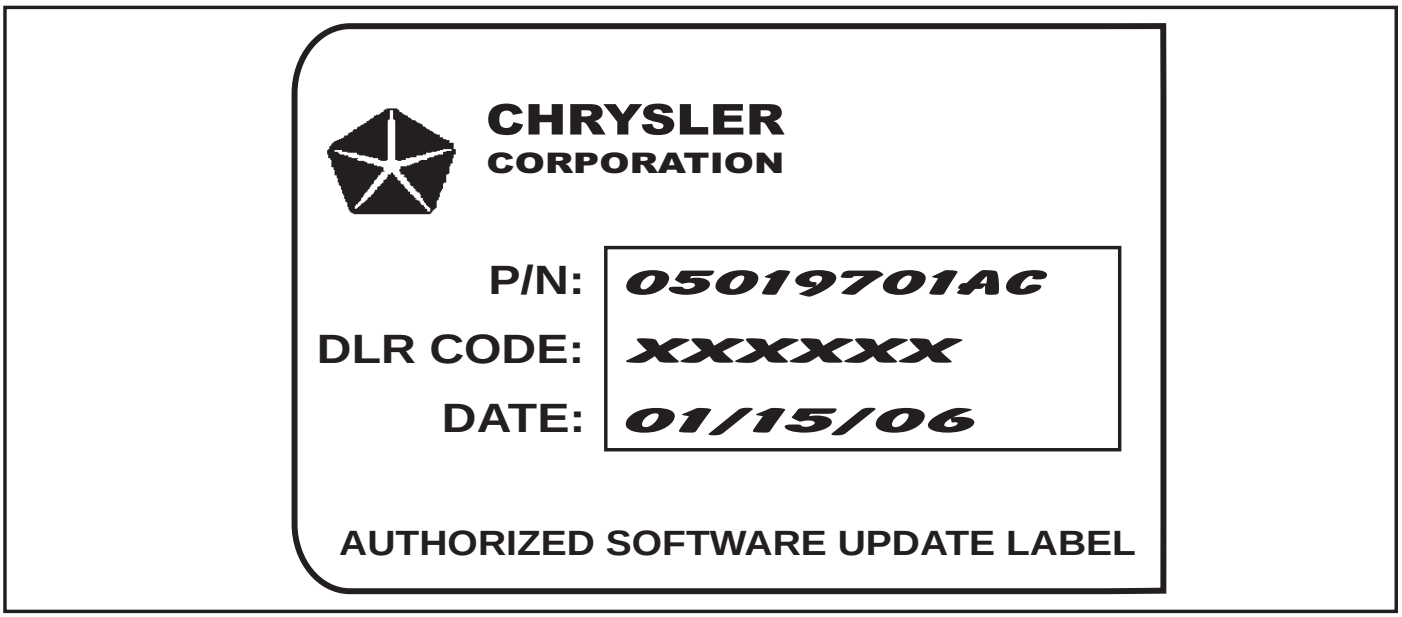


Figure 1

AVI

Raybestos

Precision Intl.

BC

Lubegard