UPDATE HANDBOOK
AODE, 4R70W, 4R70E, 4R75E

INDEX

AUTOMATIC TRANSMISSION SERVICE GROUP
18639 S.W. 107 AVENUE
MIAMI, FLORIDA 33157
(305) 670-4161

INTRODUCTION
AODE, 4R70W, 4R75E

Printed
October, 2006

Since the introduction of the AOD-E transmission in model year 1992, there have been many major engineering design changes to improve durability and reliability. These changes have affected nearly every part used in the AOD-E, including two name changes, 4R70W and 4R75E. This "Update Handbook" will explain each change, the parts affected by the change, and any parts interchangeability concerns created by the change.

We wish to thank Ford Motor Company
for the information and illustrations
that have made this booklet possible.

The information and part numbers contained in this booklet have been carefully compiled from industry sources known for their reliability, but ATSG does not guarantee its accuracy.

WAYNE COLONNA
PRESIDENT

DALE ENGLAND
FIELD SERVICE CONSULTANT

PETER LUBAN
TECHNICAL CONSULTANT

JON GLATSTEIN
TECHNICAL CONSULTANT

JERRY GOTT
TECHNICAL CONSULTANT

GERALD CAMPBELL
TECHNICAL CONSULTANT

JIM DIAL
TECHNICAL CONSULTANT

ED KRUSE
TECHNICAL CONSULTANT

GREGORY LIPNICK
TECHNICAL CONSULTANT

DAVID CHALKER
TECHNICAL CONSULTANT

ROLAND ALVAREZ
TECHNICAL CONSULTANT

MIKE SOUZA
TECHNICAL CONSULTANT

AUTOMATIC TRANSMISSION SERVICE GROUP
18639 S.W. 107 AVENUE
MIAMI, FLORIDA 33157
(305) 670-4161

GENERAL DESCRIPTION

The AODE transmission is a four speed, rear wheel drive, automatic overdrive, which is totally electronic controlled and was first introduced in model year 1992. This unit also has the standard four-element lock-up torque converter. It contains the standard three elements (impeller, turbine and stator) for transmitting and multiplication of engine torque, plus a torque converter clutch for increased fuel economy in 3rd and 4th gears.

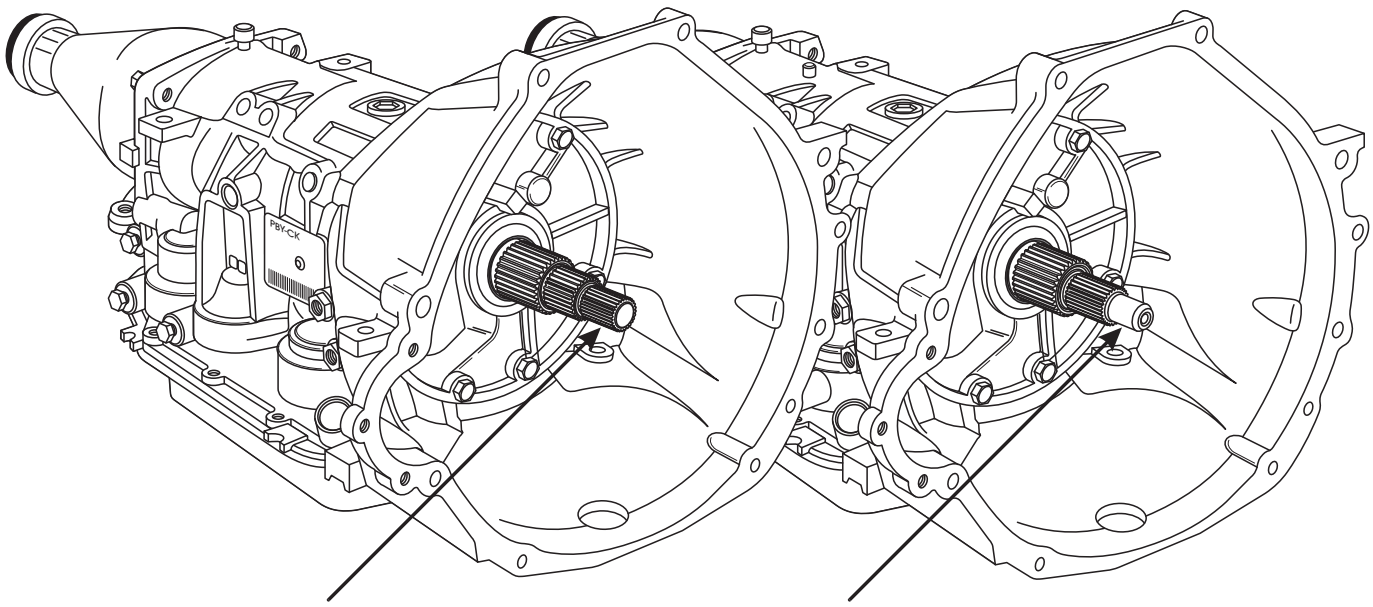
In its general appearance, the AODE transmission very closely resembles the hydraulically controlled AOD unit. However, the AODE is equipped with two splined shafts at the front of the unit, where the AOD is equipped with three, as shown in Figure 1. This would be a quick way to identify these units.

ELECTRONIC COMPONENTS

Shift timing, shift feel (line pressure) and converter clutch control in the AODE transmission are all controlled electronically by the EEC-IV processor and its input/output network. Transmission control is seperate from the engine control strategy in the EEC-IV processor, although some of the input signals are shared.

Some input signals come from engine related sensors such as, the mass air-flow (MAF) sensor, engine coolant temp (ECT) sensor that gives the processor information about engine load and climate the engine is operating under. Some other inputs are based on operator inputs, such as accelerator pedal position which is relayed to the processor by the throttle position sensor (TPS). The manual lever position sensor (MLPS) tells the processor which position has been selected by the operator with the manual shift lever. Still other inputs are relayed from the transmission, such as the output speed sensor (OSS) and the transmission oil temperature (TOT) sensor.

Using all of these input signals the processor can determine when the proper time and conditions are right for a shift or TCC application. The processor can also determine line pressure needed to optimize shift feel. To accomplish these functions, the processor controls 4 electronic solenoids, two ON/OFF solenoids for shifting, one PWM solenoid for TCC control, and one electronic pressure control (EPC) solenoid for line pressure control.



The AOD transmission has three splined shafts with 1 removeable.

The AODE transmission has two splined shafts with 0 removeable.

Figure 1

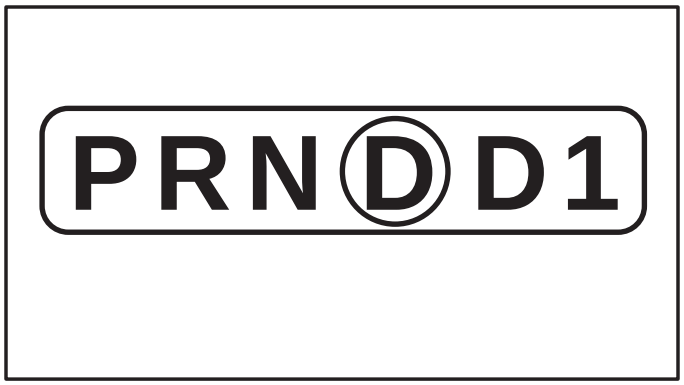


Figure 2

SELECTOR POSITIONS

The AODE transmission has six manual shift selector positions, as shown in Figure 2.

P - Park position enables the engine to be started while preventing the vehicle from moving. For safety reasons, the vehicles parking brake should always be used in addition to the "Park" position. Park position should not be selected until the vehicle has come to a complete stop.

R - Reverse position enables the vehicle to be operated in a rearward direction.

N - Neutral position enables the engine to start and operate without driving the vehicle. If necessary, this position should be selected to restart the engine while the vehicle is moving.

D - Overdrive is the normal selector position for most forward driving conditions. This position provides all automatic upshifts and downshifts, application and release of the converter clutch and maximum fuel economy during normal operation.

D - Drive position provides all automatic shifts, except into fourth gear (Overdrive). Application of the converter clutch may also occur in this range, depending on operating conditions. This position can be selected when overdrive is not desired, such as driving in hilly or mountainous terrain or towing a trailer.

L - Manual Low position will allow first gear operation only (no upshifts). If selected at normal road speeds, transmission will downshift to 2nd, then down shift to 1st when vehicle speed falls below approximately 28 mph.

PLANETARY GEARS AND RATIOS

Power is transmitted from the torque converter to the "Ravigneaux" planetary gearset through the turbine shaft and stub shaft. The geartrain contains a compound planetary set connected by dual pinion gears, as shown in Figure 3. By holding or driving certain members of the gearset, four forward ratios and one reverse ratio are obtained and transmitted to the output shaft. These ratios are as follows:

1st Gear - 2.40 - 1
2nd Gear - 1.47 - 1
3rd Gear - 1.00 - 1
4th Gear - 0.67 - 1
Rev Gear - 2.00 - 1

Members of the gearset are held or driven by a series of bands and/or clutches. The AODE uses two bands, two one-way clutches and four sets of friction clutch packs to achieve the different gear ratios listed above.

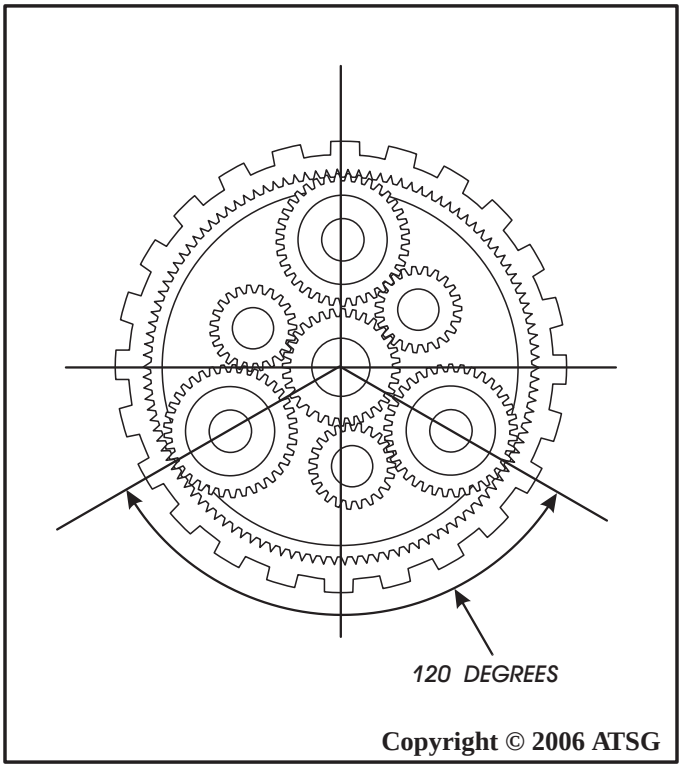


Figure 3

INTERNAL COMPONENT APPLICATION CHART											
	Fwd Clutch	*Interm Clutch*	*Direct Clutch*	*O/D Band*	*Interm Roller*	*Low/Rev Band*	*Low Roller*	*Reverse Clutch*	*SS-1*	*SS-2*	*Ratio*
Park									*ON*	*OFF*	
Reverse						*ON*		*ON*	*ON*	*OFF*	*2.00*
Neutral									*ON*	*OFF*	
Ⓓ - 1st	*ON*						*Hold*		*ON*	*OFF*	*2.40*
Ⓓ - 2nd	*ON*	*ON*			*Hold*				*OFF*	*OFF*	*1.47*
Ⓓ - 3rd	*ON*	*ON*	*ON*						*OFF*	*ON*	*1.00*
Ⓓ - 4th		*ON*	*ON*	*ON*					*ON*	*ON*	*0.67*
Man 1st	*ON*					*ON*	*Hold*		*ON*	*OFF*	*2.40*
D - Range = Same components as overdrive range except no 4th gear.											

Figure 4

COMPOUND PLANETARY GEARSET

The planetary gearset in the AODE transmission is a Ravigneaux type set consisting of forward and reverse sun gears, a pinion carrier, long and short pinions and an internal ring gear. Members are held and/or driven to produce the four forward gear ratios plus one reverse ratio.

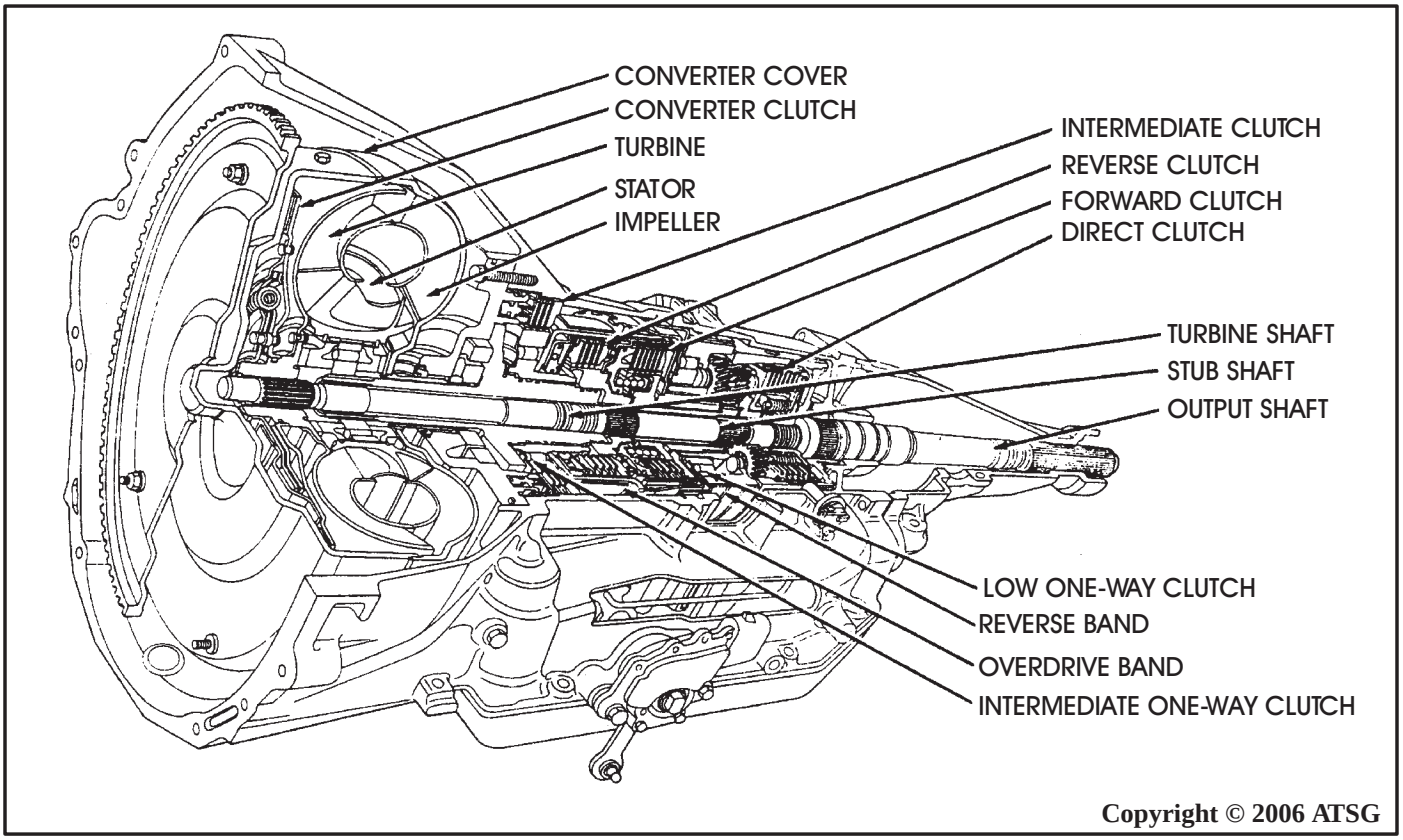


Figure 5

LINE PRESSURE CHART						
Gear	*EPC (TV)*	*Line*	*Forward Clutch*	*Intermediate Clutch*	*Direct Clutch*	
Park/Neut	*0 - 9 psi*	*50 - 75 psi*	*0 - 5 psi*	*0 - 5 psi*	*0 - 5 psi*	
Reverse	*0 - 9 psi*	*80 - 120 psi*	*0 - 5 psi*	*0 - 5 psi*	*0 - 5 psi*	
O/D - 1st	*0 - 9 psi*	*50 - 75 psi*	*50 - 75 psi*	*0 - 5 psi*	*0 - 5 psi*	
O/D - 2nd	*0 - 9 psi*	*50 - 75 psi*	*50 - 75 psi*	*50 - 75 psi*	*0 - 5 psi*	
O/D - 3rd	*0 - 9 psi*	*50 - 75 psi*	*50 - 75 psi*	*50 - 75 psi*	*50 - 75 psi*	
O/D - 4th	*0 - 9 psi*	*50 - 75 psi*	*0 - 5 psi*	*50 - 75 psi*	*50 - 75 psi*	
Man - 2nd	*0 - 9 psi*	*50 - 75 psi*	*50 - 75 psi*	*50 - 75 psi*	*0 - 5 psi*	
Man - 1st	*0 - 9 psi*	*50 - 75 psi*	*50 - 75 psi*	*0 - 5 psi*	*0 - 5 psi*	

As throttle is increased, pressures should increase.

Figure 6

PRESSURE TAP LOCATION AND IDENTIFICATION

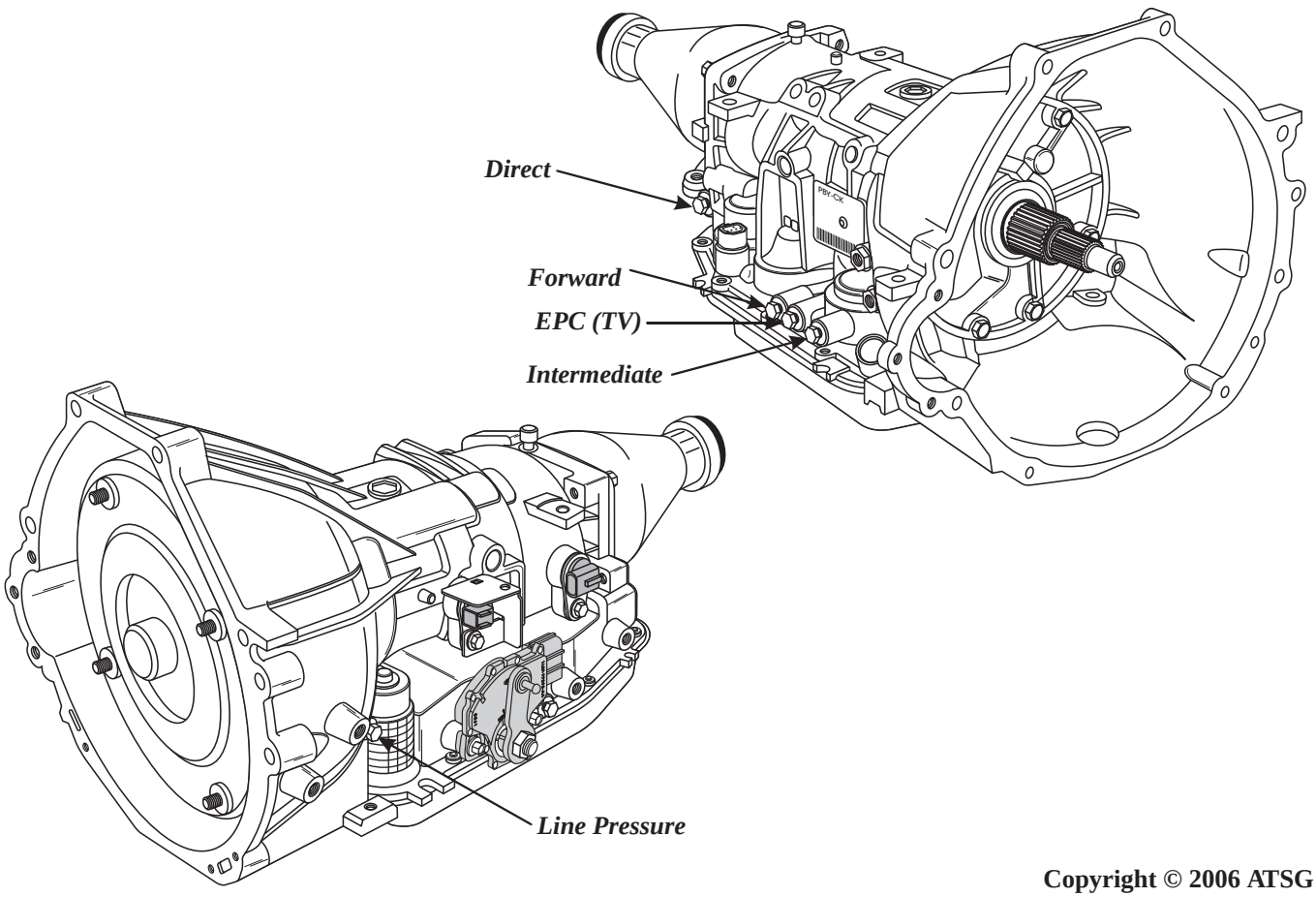


Figure 7

FORD AODE
NO UPSHIFT

COMPLAINT: Since the hydraulically controlled AOD transmission and the electronically controlled AODE transmission planetary gears were the same ratios, the first thing to happen was interchange of parts which is okay to do, ***except*** for the internal ring gear. The internal ring gear for the AODE transmission ***must*** have the holes in the ring gear, to trigger the output shaft speed sensor, as shown in Figure 8.

CAUSE: The cause may be, AOD internal ring gear that has no holes to trigger the output speed sensor has been installed by mistake.

CORRECTION: Install the AODE internal ring gear with the holes to trigger the output speed sensor, as shown in Figure 8.

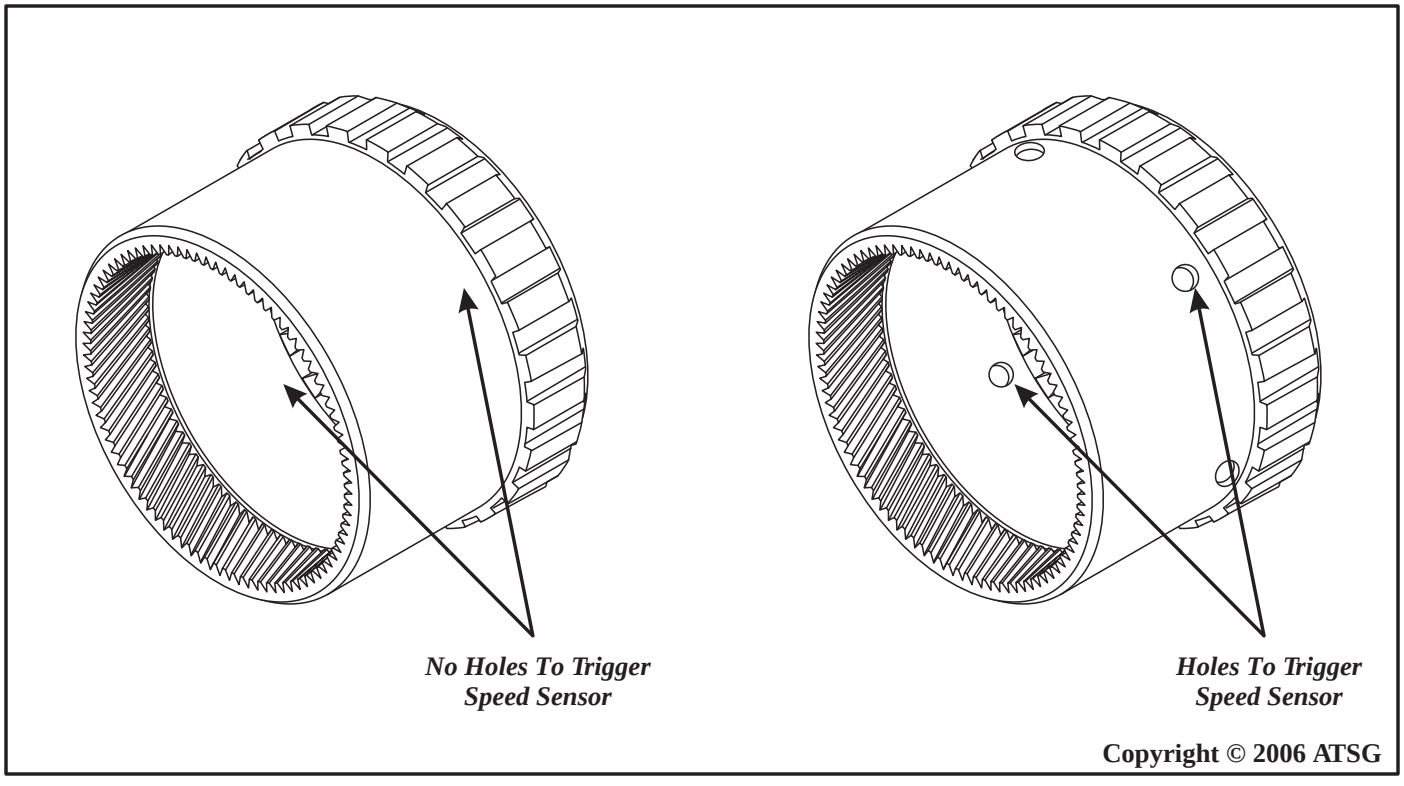


Figure 8

FORD AODE/4R70W

4R70W INTRODUCED WITH GEAR RATIO CHANGES

CHANGE: The Ford AOD-E which was introduced in 1992, and the Ford 4R70W which was introduced in 1993, look identical from the external appearances of the transmission, but have different gear ratios as shown in the chart below. This means that the gear train components have different tooth counts and look very similar when compared, but ***will not interchange.*** Use this information to identify the gear train components to ensure proper build content.

AOD-E	4R70W
1ST - 2.40	1 ST = 2.84
2ND - 1.47	2ND = 1.55
3DR - 1.00	3RD = 1.00
4TH - 0.67	4TH = 0.70
REV - 2.00	REV = 2.32

REASON: Closer ratios for improved fuel economy and performance.

PARTS AFFECTED:

(1) OUTPUT SHAFT RING GEAR SUPPORT - There is a different profile on the supports and each support requires a different style rear case bearing, as shown in Figure 9.
The AOD-E transmission requires a two piece open (needles exposed) rear case bearing that is approximately .113" thick (See Figure 9).
The 4R70W transmission requires a three piece closed (needles not exposed) rear case bearing that is approximately .144" thick (See Figure 9).

(2) OUTPUT SHAFT RING GEAR - The AOD-E has 72 teeth on the Output Shaft Ring Gear, and the direct drum ***will not*** pass through the front side of the ring gear, as shown in Figure 10.
The 4R70W has 88 teeth on the Output Shaft Ring Gear, and the direct drum ***will*** pass through the front side of the ring gear, as shown in Figure 10.

(3) PLANETARY CARRIER ASSEMBLY - The AOD-E has 18 teeth on both the long, and the short pinions, and the thrust plate retaining pins are ***flush*** with the retaining plate, as shown in Figure 11.
The 4R70W has 25 teeth on the long pinions, 24 teeth on the short pinions, and the thrust plate retaining pins are ***recessed***, as shown in Figure 11.

(4) REVERSE SUN GEAR AND SHELL - The AOD-E has 36 teeth on the Reverse Sun Gear Shell and the outside diameter of the gear is approximately 2.600", as shown in Figure 12.
The 4R70W has 38 teeth on the Reverse Sun Gear Shell and the outside diameter of the gear is approximately 2.438", as shown in Figure 12.

(5) FORWARD SUN GEAR - The AOD-E has 30 teeth on the sun gear and the outside diameter of the gear is approximately 2.225", as shown in Figure 13.
The 4R70W has 31 teeth on the sun gear and the outside diameter of the gear is approximately 2.062", as shown in Figure 13.

Continued on next Page

PARTS AFFECTED (Cont'd)

(6) EXTENSION HOUSING - The 4R70W has a "W" cast into the extension housings and the AODE does not, which is one way to identify them externally, in addition the 4R70W transmission has a larger diameter rear seal to accommodate a thicker driveshaft yoke. There are also two different lengths of the 2WD extension housings on the AODE and the 4R70W and a 4WD version on both models.

INTERCHANGEABILITY:

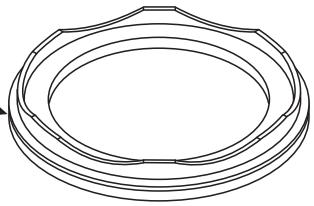
None of the parts listed above will interchange with previous design parts, neither can you interchange the transmissions in the vehicles, as the computers are programed with different gear ratios. Refer to Page 14 to determine which one the vehicle originally came with.

SERVICE INFORMATION:

	AOD-E	4R70W
Output Shaft Hub (Support)	F4AZ-7D164-A	F3LY-7D164-B
Rear Case Bearing (Number 9)	E0AZ-2F242-A	F3LY-7F242-A
Output Shaft Ring Gear	F4AZ-7A153-A	F3LY-7A233-A
Planetary Carrier Assembly	F2AZ-7A398-A	F3LY-7A398-A
Forward Clutch Sun Gear	E0AZ-7A399-A	F3LY-7A399-A
Reverse Sun Gear and Shell Assembly	F4AZ-7A019-A	F4SZ-7A019-A

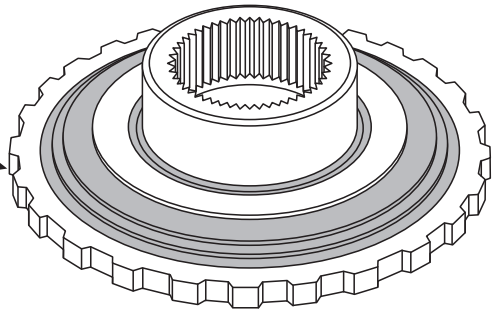
FORD AOD-E
OUTPUT SHAFT RING GEAR SUPPORT AND
REAR CASE BEARING IDENTIFICATION

TWO PIECE "OPEN"
REAR CASE BEARING
.113" THICKNESS
PART NO, EOAZ-7F242-A



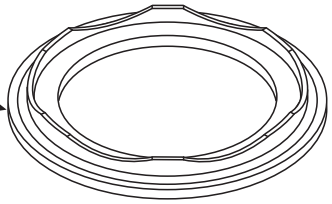
DIFFERENT PROFILE ON SUPPORT
AND WILL NOT INTERCHANGE

RING GEAR SUPPORT
PART NO. F4AZ-7D164-A



FORD 4R70W
OUTPUT SHAFT RING GEAR SUPPORT AND
REAR CASE BEARING IDENTIFICATION

THREE PIECE "CLOSED"
REAR CASE BEARING
.144" THICKNESS
PART NO, F3LY-7F242-A



DIFFERENT PROFILE ON SUPPORT
AND WILL NOT INTERCHANGE

RING GEAR SUPPORT
PART NO. F3LY-7D164-B

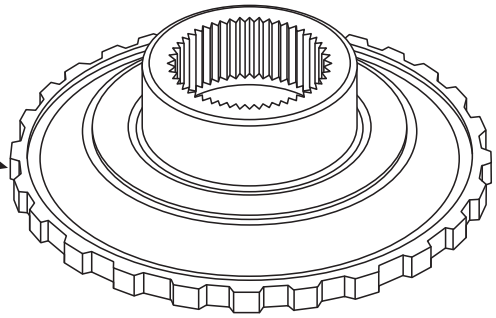
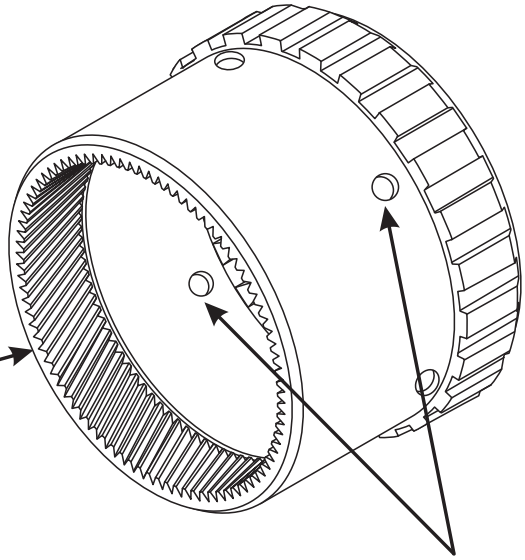


Figure 9

FORD AOD-E
OUTPUT SHAFT RING GEAR
PART NO. F4AZ-7A153-A

72 TEETH, AND THE RING GEAR IS SMALLER IN DIAMETER THAN THE 4R70W RING GEAR

DIRECT CLUTCH HOUSING CANNOT BE REMOVED THROUGH THE FRONT

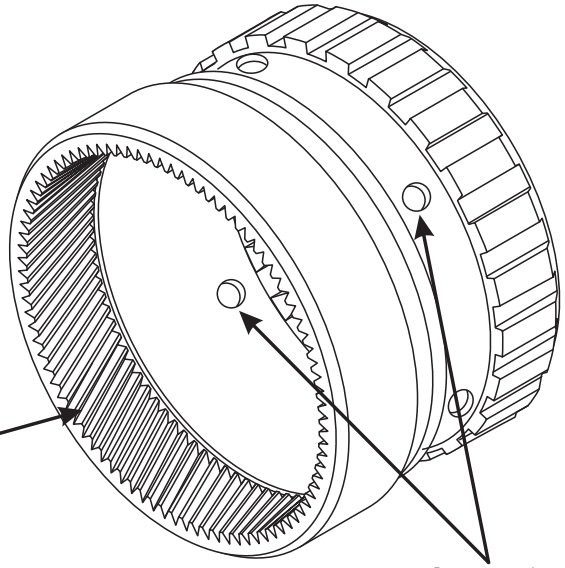


Holes To Trigger Speed Sensor

FORD 4R70W
OUTPUT SHAFT RING GEAR
PART NO. F3LY-7A233-A

88 TEETH, AND THE RING GEAR IS LARGER IN DIAMETER THAN THE AOD-E RING GEAR

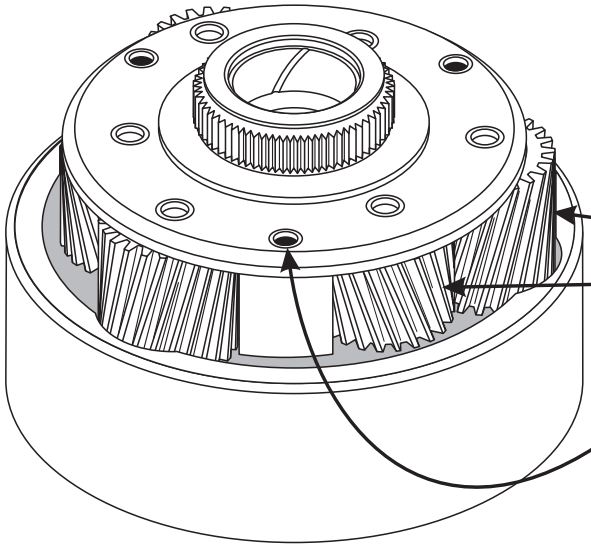
DIRECT CLUTCH HOUSING CAN BE REMOVED THROUGH THE FRONT



Holes To Trigger Speed Sensor

Figure 10

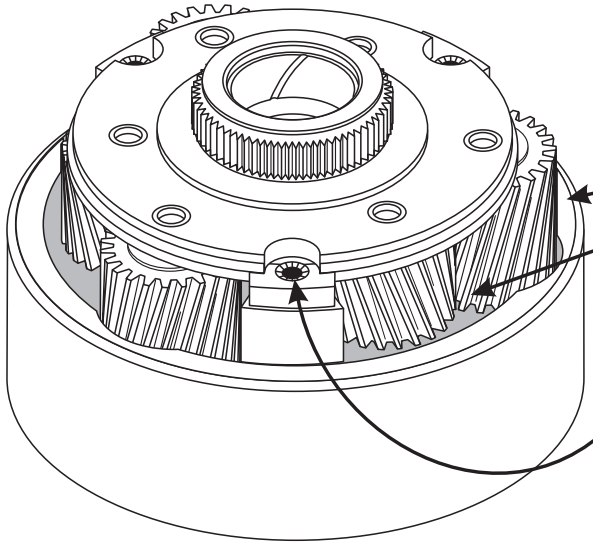
FORD "AODE"
PLANETARY CARRIER ASSEMBLY
PART NO. F2AZ-7A398-A



LONG PINIONS = 18 TEETH
SHORT PINIONS = 18 TEETH

THRUST PLATE RETAINING PINS ARE "FLUSH" WITH PLATE

FORD "4R70W"
PLANETARY CARRIER ASSEMBLY
PART NO. F2LY-7A398-A

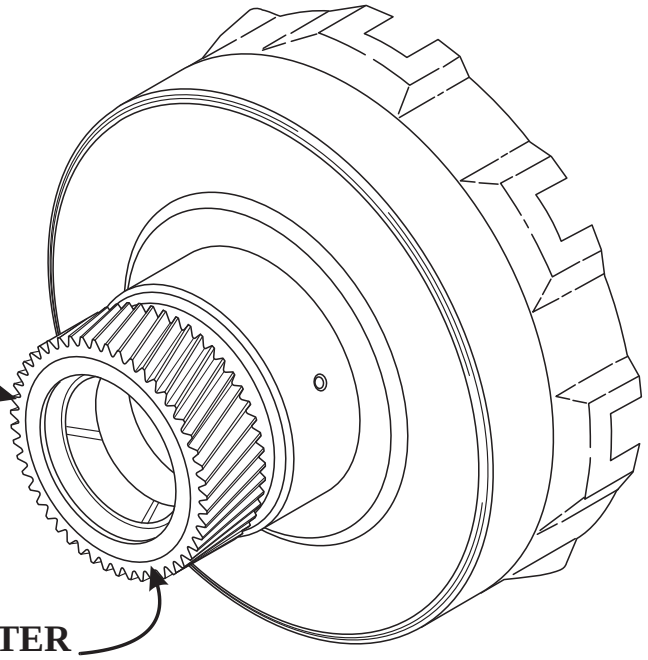


LONG PINIONS = 25 TEETH
SHORT PINIONS = 24 TEETH

THRUST PLATE RETAINING PINS ARE "RECESSED" ON PLATE

Figure 11

REVERSE SUN GEAR AND SUN GEAR SHELL IDENTIFICATION



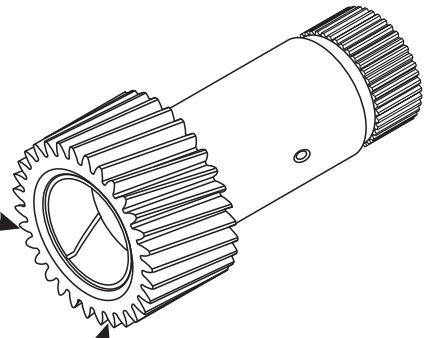
AOD-E = 36 TEETH ON SUN GEAR
4R70W = 38 TEETH ON SUN GEAR

AOD-E = 2.600" OUTSIDE GEAR DIAMETER
4R70W = 2.438" OUTSIDE GEAR DIAMETER

AOD-E = PART NUMBER F4AZ-7A019-A
4R70W = PART NUMBER F4SZ-7A019-A

Figure 12

FORWARD CLUTCH SUN GEAR IDENTIFICATION



AOD-E = 30 TEETH ON SUN GEAR
4R70W = 31 TEETH ON SUN GEAR

AOD-E = 2.225" OUTSIDE GEAR DIAMETER
4R70W = 2.062" OUTSIDE GEAR DIAMETER

AOD-E = PART NUMBER E0AZ-7A399-A
4R70W = PART NUMBER F3LZ-7A399-A

Figure 13

FORD AODE/4R70W

VEHICLE IDENTIFICATION

The "Vehicle Certification Label" (VCL), located on the left door, is where you would go to determine which transmission actually belongs in the vehicle. This would be important if the vehicle was towed in without one even installed, or if someone else was there before you, and you must straighten out some kind of a shift problem. Look for the code letter under the "TR" on the VCL, as shown in Figure 14.

"P" = AODE and "U" = 4R70W.

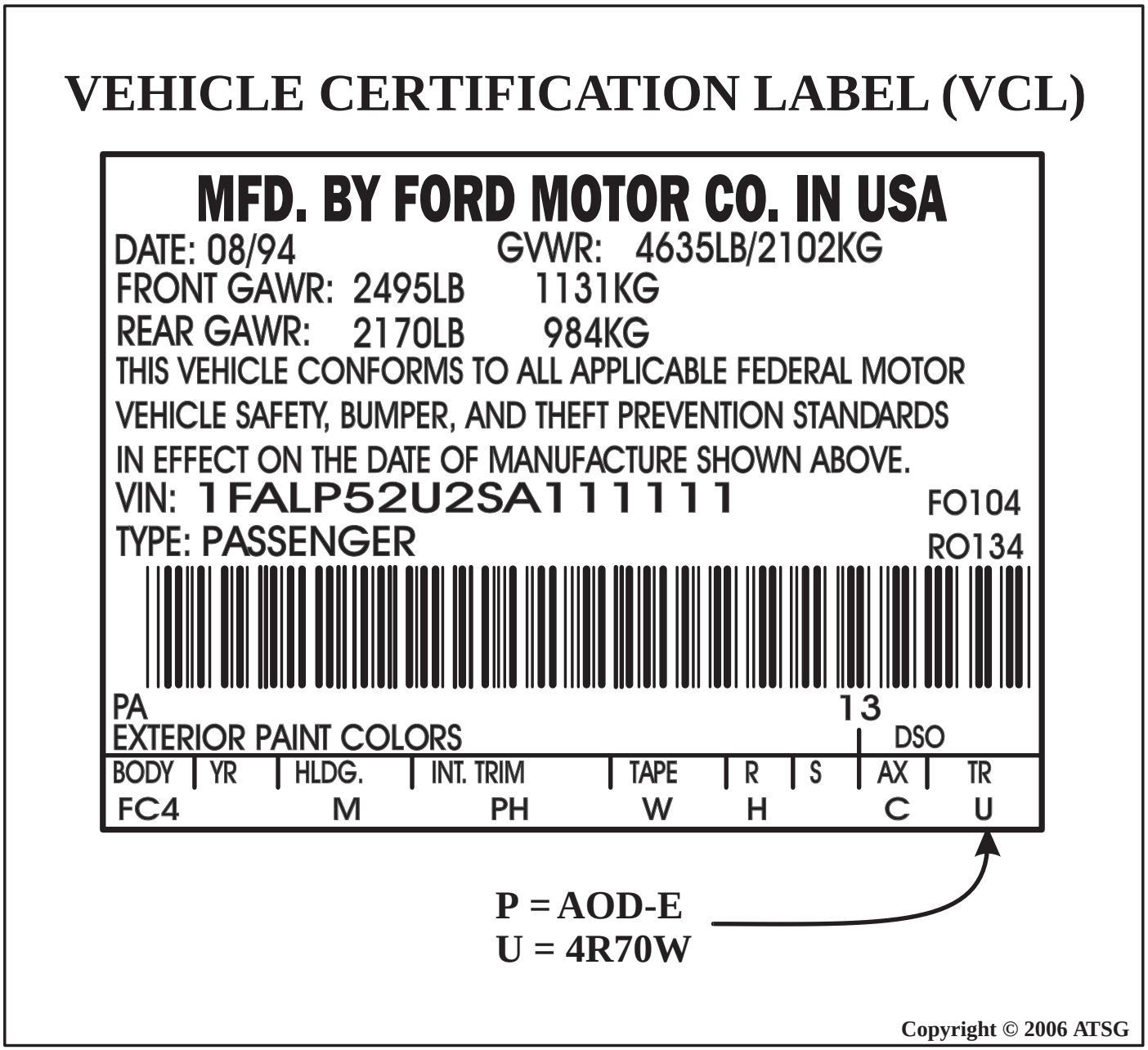


Figure 14

FORD AODE/4R70W
VALVE BODY AND SPACER PLATE IDENTIFICATION

Beginning at the start of production for 1993 model vehicles, that were equipped with the AODE/4R70W transmission, Ford Motor Company added an Overdrive Cancel Switch to cancel 4th gear (Overdrive), when the selector is in the "OD" position. On the previous 1992 models you must move the selector lever into the "D" position to cancel 4th gear operation.
Both the 1992 and 1993 shift selectors have six detent positions, ***but their functions are different,*** as shown in Figure 15. On 1993 models the "2" position replaces the "D" position, and now provides second gear start and hold. This position can be selected when starting on slippery roads for improved traction, or engine braking.
This changed the valve body and spacer plate between 92 and 93 models, ***and they will not interchange.*** If a 1993 valve body and spacer plate are installed onto a 1992 model vehicle, you will have 2nd gear only with the selector lever in the "D" position.
If a 1992 valve body and spacer plate are installed onto a 1993 model vehicle, you will have a 1-2-3 upshift when the selector is in the "2" position, and the overdrive cancel switch will be inefective.

Refer to Figure 16 for 1992 model valve body and spacer plate identification.
Refer to Figure 17 for 1993 model valve body and spacer plate identification.

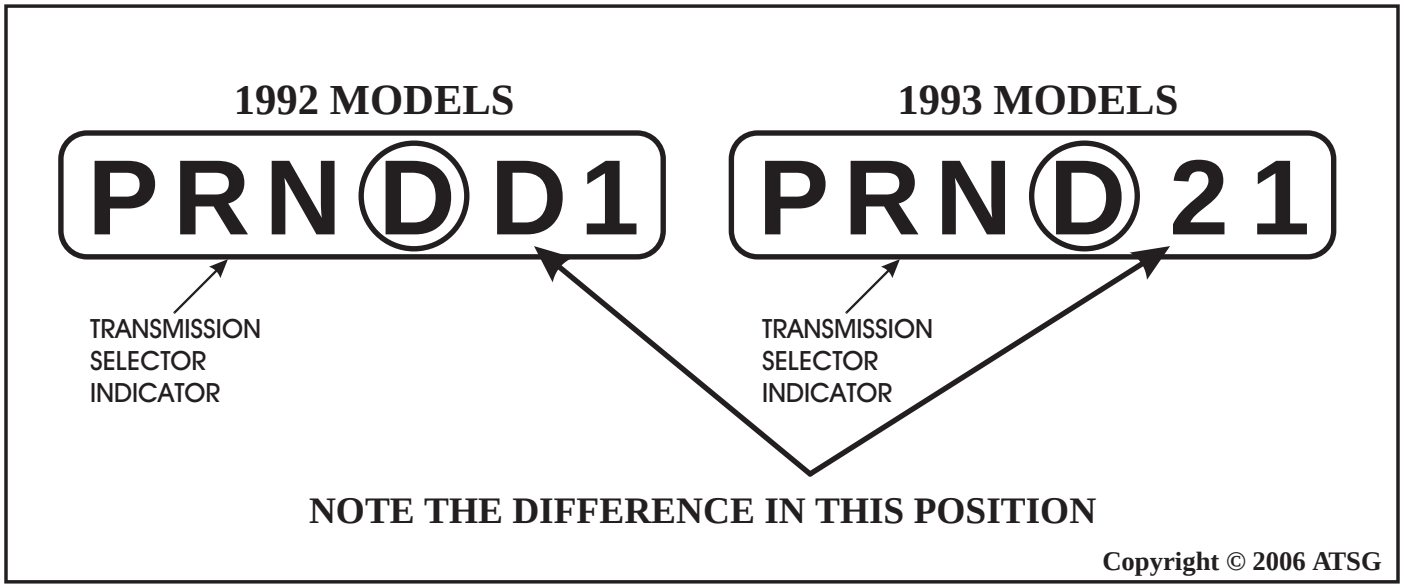


Figure 15

1992 VALVE BODY AND SPACER PLATE

Manual Selector Indicator with OD-D-1, has a 1/8" wide passage in the valve body by the manual valve, and the spacer plate has two (2) additional holes above the manual valve location, as shown below.

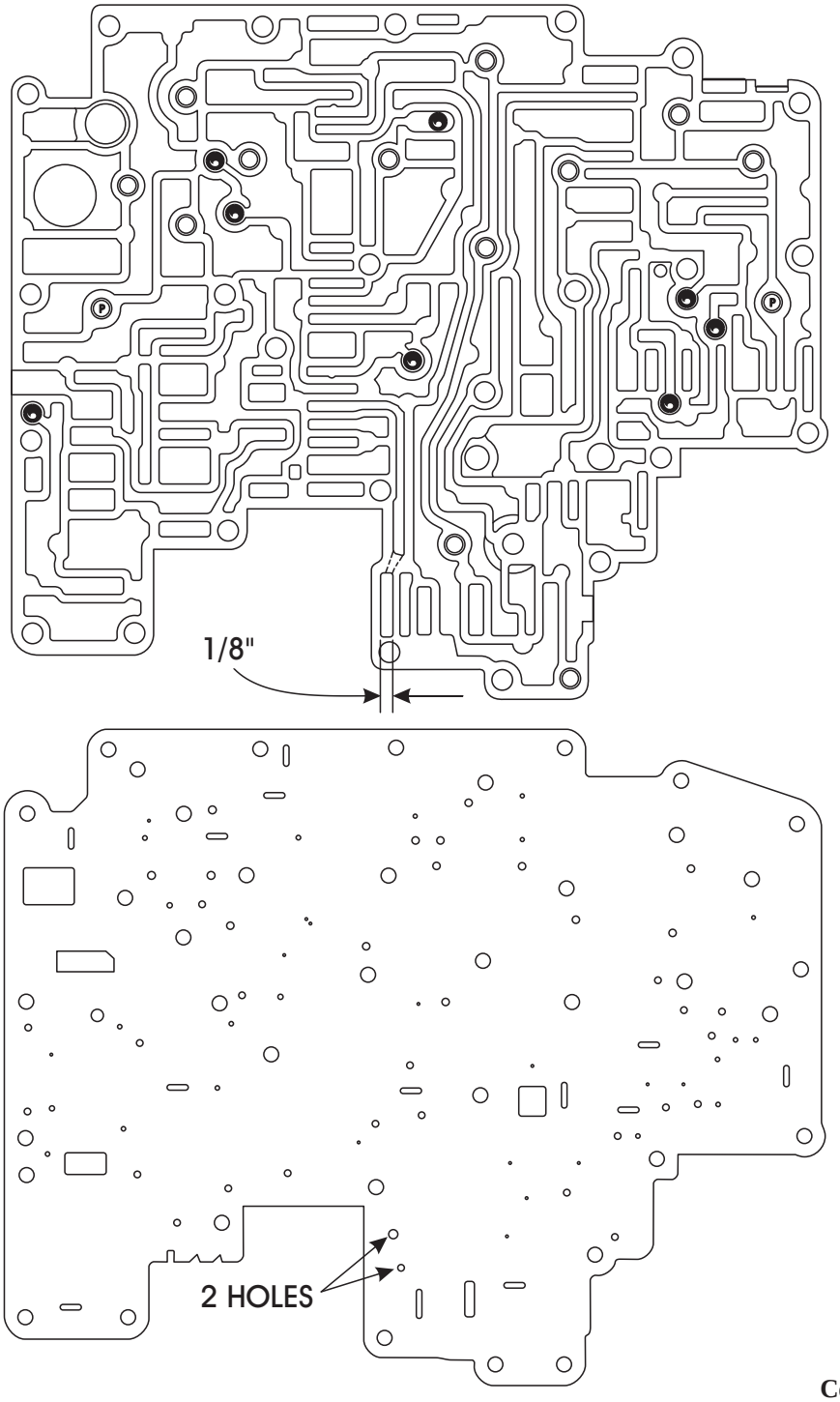


Figure 16

1993 VALVE BODY AND SPACER PLATE

PRND21

Manual Selector Indicator with OD-2-1, and the Overdrive Cancel Switch, has a 3/8" wide passage in the valve body by the manual valve, and the spacer plate DOES NOT have the two holes above the manual valve location.

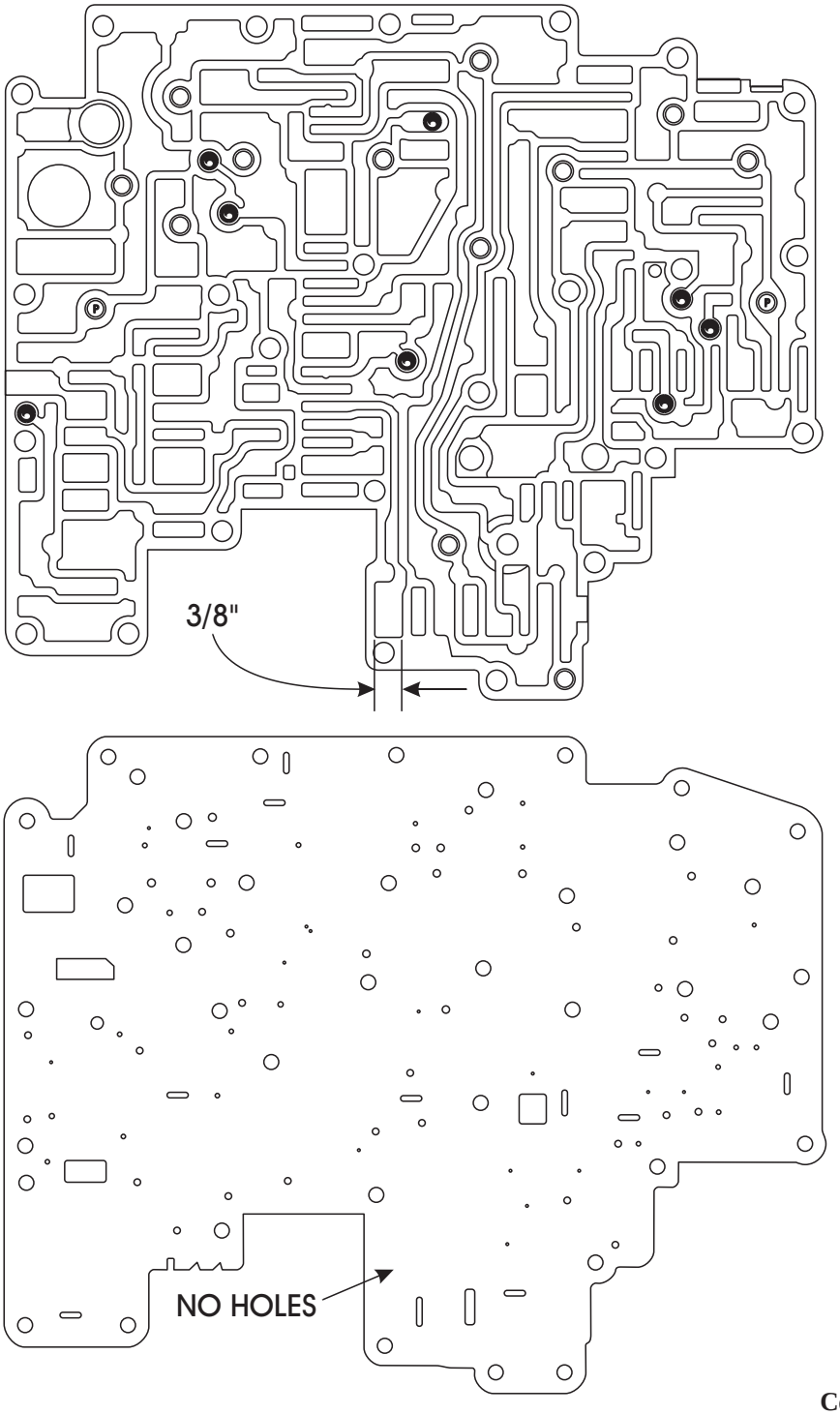


Figure 17

FORD 4R70W

3-NEUTRAL SHIFT AND FORWARD CLUTCHES BURNT

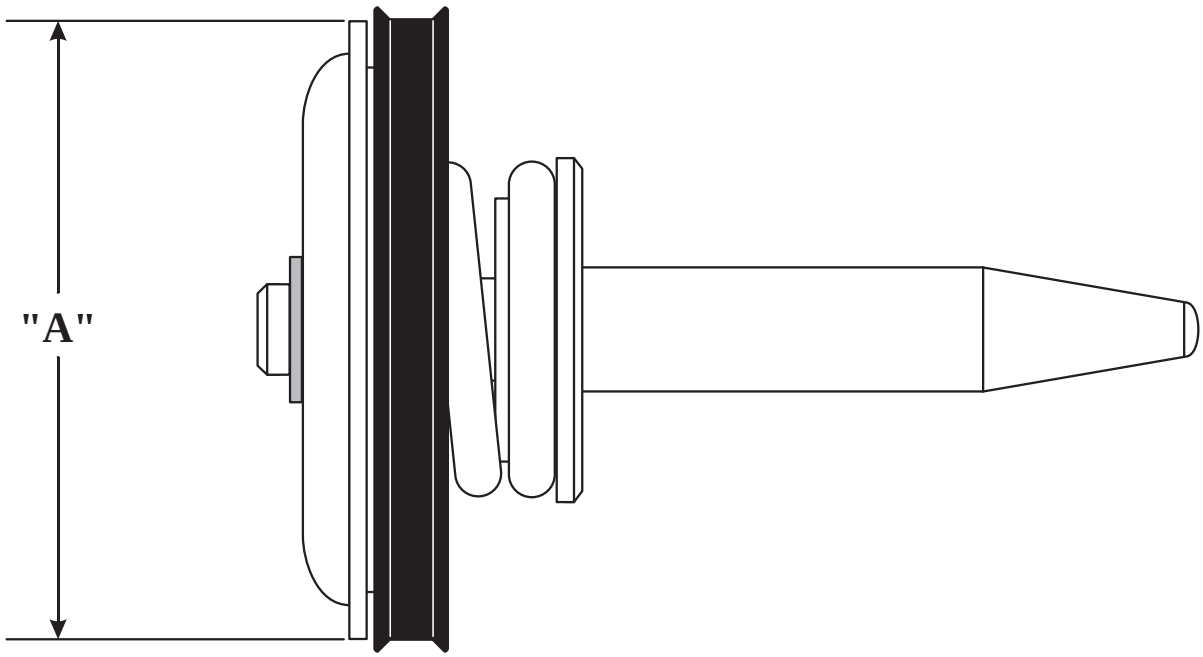
COMPLAINT: After overhaul, the 4R70W transmission displays a 3-neutral upshift and when the unit is disassembled, you find the forward clutches burnt.

CAUSE: The cause may be, a mis-assembled Overdrive Servo Assembly, with the "Rubber Coated Sleeve" omitted. The 4R70W transmission is calabrated with a smaller diameter overdrive servo piston than is the AOD-E transmission. To retain a common case between the two transmissions, an additional "Rubber Coated Sleeve" is required on the 4R70W Overdrive Servo Assembly, as shown in Figure 19.

CORRECTION: Install the "Rubber Coated Sleeve" in the Overdrive Servo Assembly case bore, as shown in Figure 19. If your rubber coated sleeve is missing or lost, you ***must*** purchase the complete Overdrive Servo Assembly, available under part number F3LY-7H188-A. It is not available individually.
Overdrive servo piston dimensions are shown in Figure 18, to identify the two different overdrive servo pistons.

SERVICE INFORMATION:

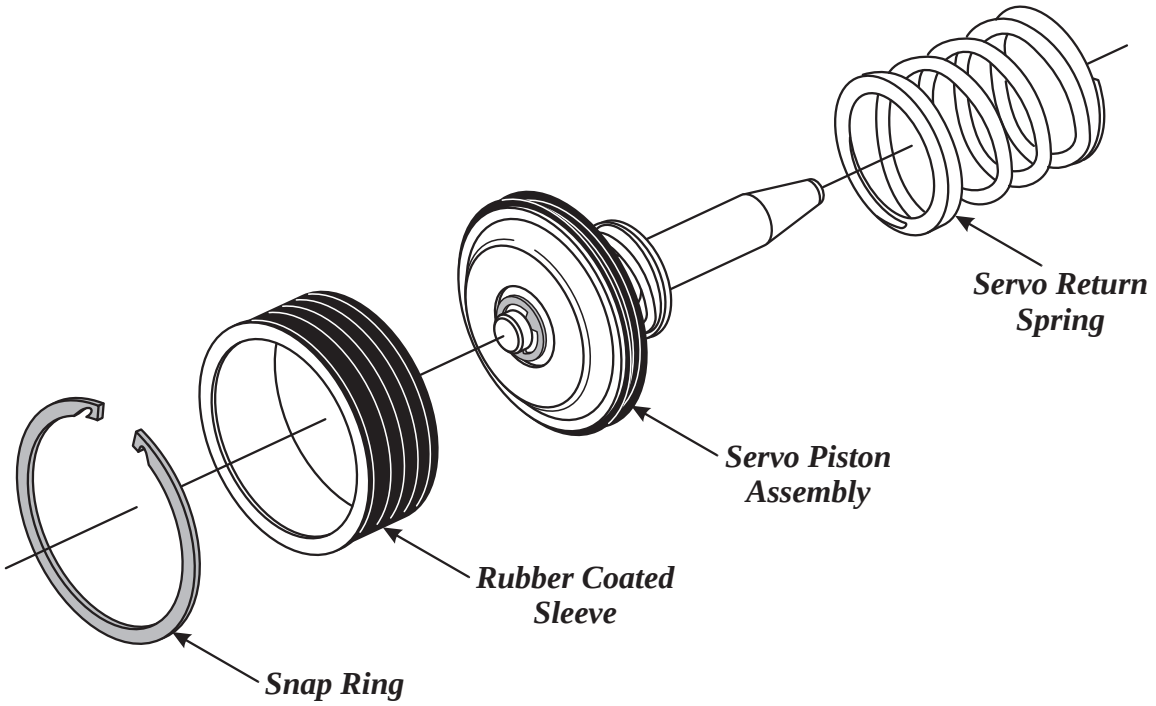
4R70W Overdrive Servo Piston Assembly (Includes Sleeve) F3LY-7H188-A
AOD-E Overdrive Servo Piston Assembly F2VY-7H188-A



4R70W PISTON, DIMENSION "A" = 2.470"
AOD-E PISTON, DIMENSION "A" = 2.680"

Figure 18

"4R70W" OVERDRIVE SERVO



"AOD-E" OVERDRIVE SERVO

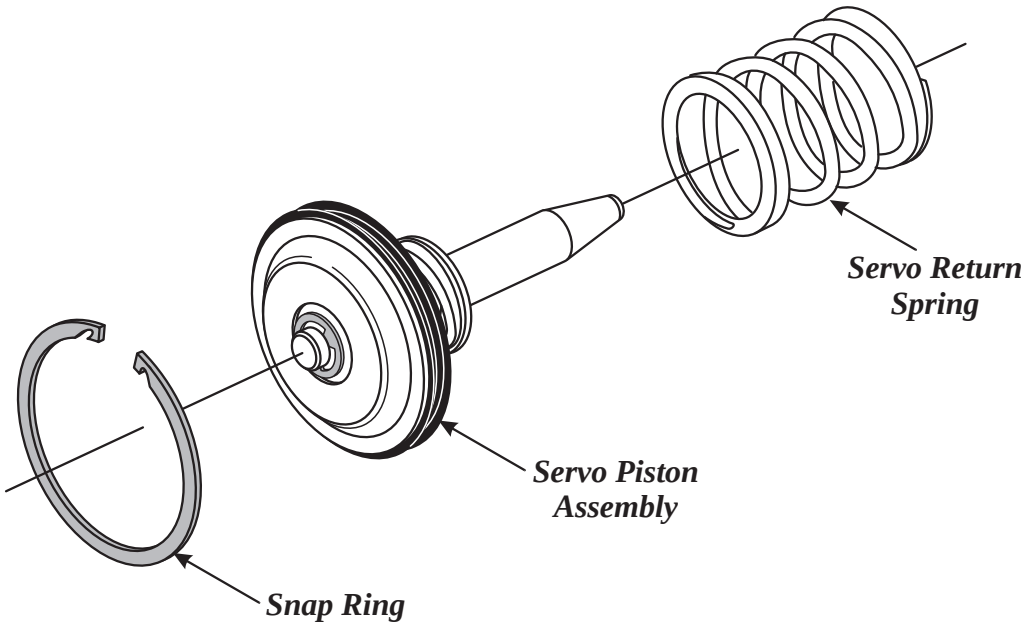


Figure 19

FORD 4R70W

IRREGULAR AND/OR NO CONVERTER CLUTCH APPLY

COMPLAINT: Some 1995 model Crown Victoria, Grand Marquis, and Lincoln Town Cars might illuminate the "Check Engine" light, and may store Diagnostic Trouble Code (DTC) P0743, and there may also be a concern of irregular and/or no torque converter clutch operation.

CAUSE: The cause may be, an incorrect Torque Converter Clutch (TCC) Solenoid, with low resistance (1.0 - 3.0 ohms), mistakenly installed in ***some*** 4R70W transmissions, as shown in Figure 20. The resistance should be 10-16 ohms on ***some*** models.

CORRECTION: ***Step 1:*** Perform the normal on board diagnostics and if DTC P0743 is present, measure the resistance of the TCC solenoid across the transmission case connector pins 3 and 8. Refer to Figure 21 for pin locations in the transmission case connector.

Step 2: If the resistance measures 1.0-3.0 ohms, remove the transmission bottom pan, and record the "Valve Body I.D. Code" from the I.D. tag located on the valve body.

Step 3: ***If*** the valve body I.D. code is G2T, G3T, or G2U, ***and*** resistance on the TCC solenoid measures 1.0-3.0 ohms, ***replace*** the TCC Solenoid with OEM part number F5AZ-7G136-A. The resistance on these models should be 10-16 ohms.

SERVICE INFORMATION:

92-96 Mustang, Thunderbird, Cougar, Mark VIII, E/F Series Trucks,
TCC SOLENOID (All Models) F2VY-7G136-A

92-96 Crown Victoria, Grand Marquis, Lincoln Town Car,
TCC SOLENOID (All ***Except*** V.B. Codes G2T, G3T, G2U) F2VY-7G136-A
TCC SOLENOID (G2T, G3T, G2U V.B. Codes ***Only***) F5AZ-7G136-A

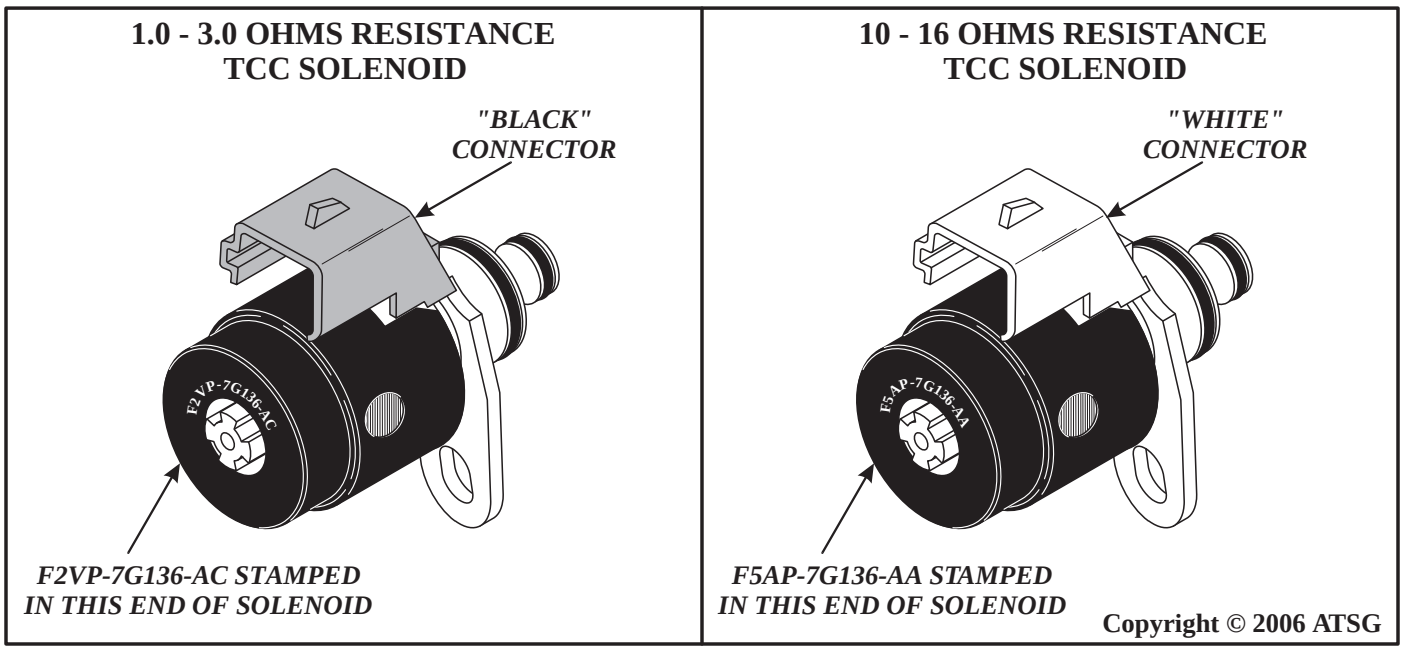
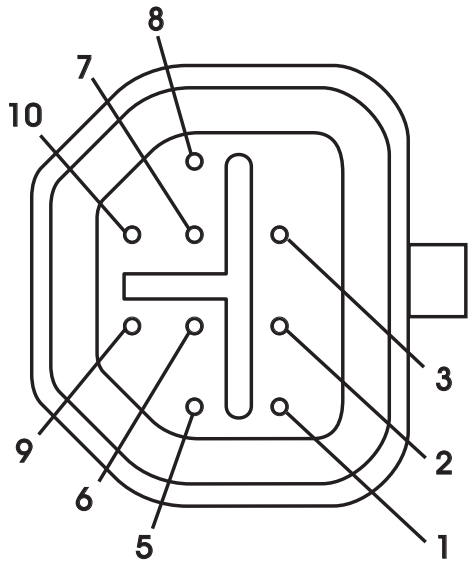
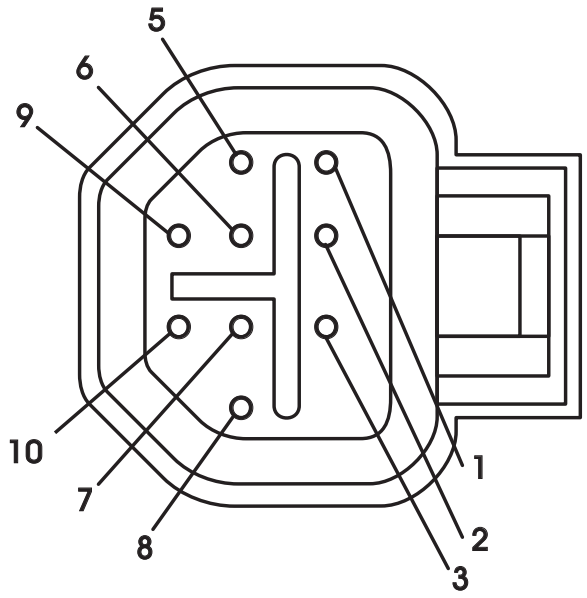


Figure 20

VIEW LOOKING INTO THE TRANSMISSION CASE CONNECTOR



VIEW LOOKING INTO THE VEHICLE HARNESS CONNECTOR



PIN NO.	IDENTIFICATION	INTERNAL COLOR	EXTERNAL COLOR	CIRCUIT NUMBER	PCM PIN NUMBER
1	SS-1 GROUND SIGNAL	WHITE	ORG - YEL	237	51
2	SHIFT SOLENOID POWER 12V	WHT - BLK	RED	361	37 & 57
3	MCC GROUND SIGNAL	GREEN	**	480	53
4	NOT USED				
5	TOT -	WHT - RED	ORG - BLK	923	49
6	SS-2 GROUND SIGNAL	BLACK	PPL - ORG	315	52
7	EPC POWER IN	WHT - BLU	RED	361	37 & 57
8	MCC POWER IN	WHT - GRN	RED	361	37 & 57
9	TOT +	RED	GRY - RED	359	46
10	EPC GROUND SIGNAL	BLUE	WHT - YEL	925	38

** TAN - WHT, BRN - ORG, PPL - YEL, DEPENDING ON YEAR AND MODEL.

SOLENOID	PIN NO.	RESISTANCE
SHIFT SOLENOID - 1	1 & 2	20 - 30 OHMS
SHIFT SOLENOID - 2	6 & 2	20 - 30 OHMS
TORQUE CONVERTER CLUTCH	3 & 8	1.0 - 3.0 OHMS
(SOME 1995 MODELS)	3 & 8	10 - 16 OHMS
ELECTRONIC PRESSURE CONTROL	7 & 10	2.48 - 5.66 OHMS

Figure 21

FORD AOD-E/4R70W

SLIPS OR CHATTERS FORWARD REVERSE IS OK

COMPLAINT: After rebuild, the vehicle displays a slip and/or chatter in forward ranges when you are accelerating from a stop, and reverse is okay. All sealing rings, bushings, seals, and forward clutch drum are known to be good.

CAUSE: The cause may be, a partially clogged Shift Solenoid No. 2, which will stroke the 3-4 shift valve far enough to exhaust ***some*** of the forward clutch oil.

CORRECTION: Install two pressure gages to check line pressure and forward clutch pressure, as shown in Figure 22. With the transmission in Drive, both gages should read the same and should be approximately 55-75 PSI. If the forward clutch gage reads lower than the line pressure gage, ***and all internal parts are known to be good,*** replace the Shift Solenoid Assembly with OEM part number F5AZ-7G484-A (See Figure 23).

SERVICE INFORMATION:

Shift Solenoid Assembly (Latest Design Level) F5AZ-7G484-A

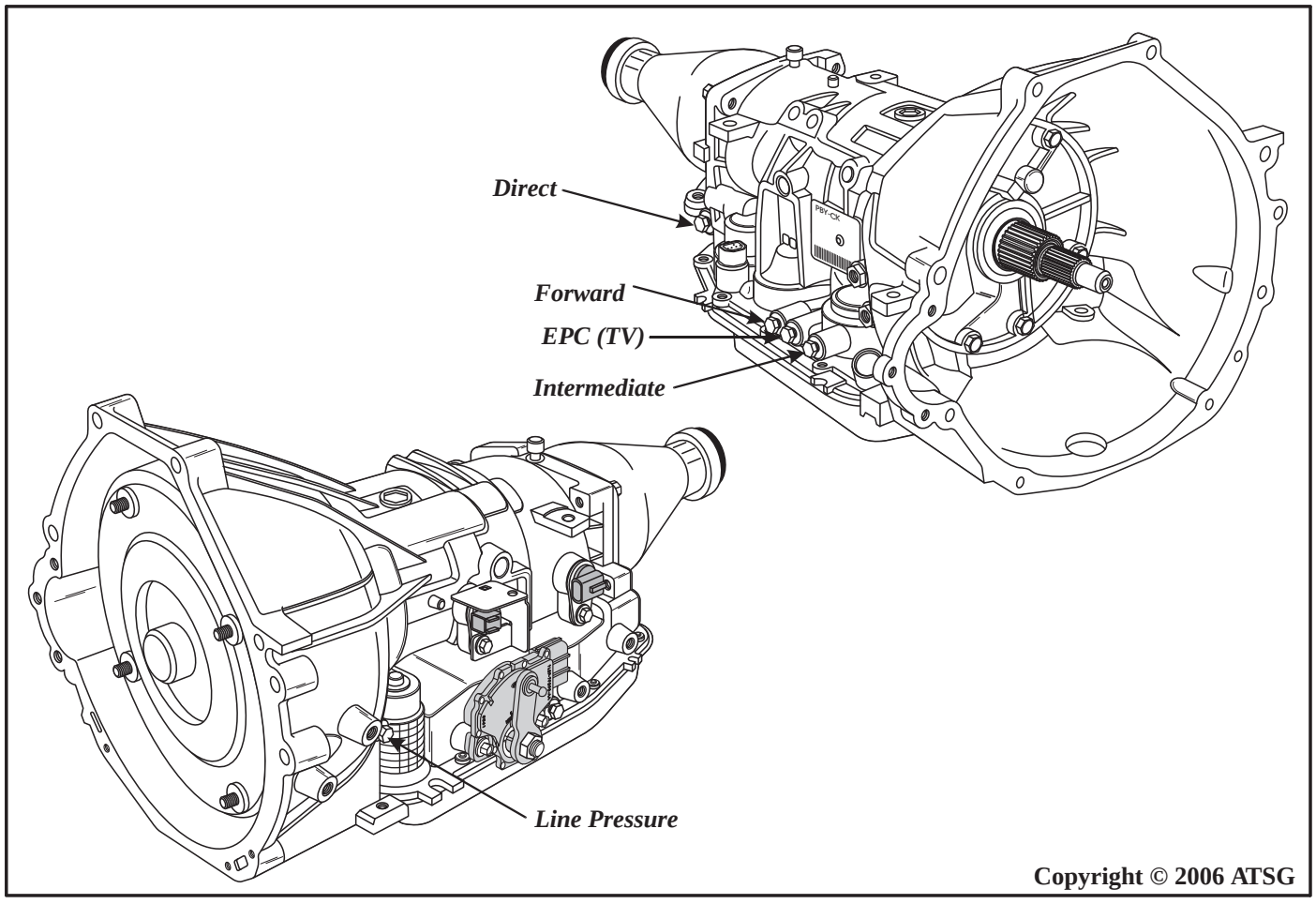
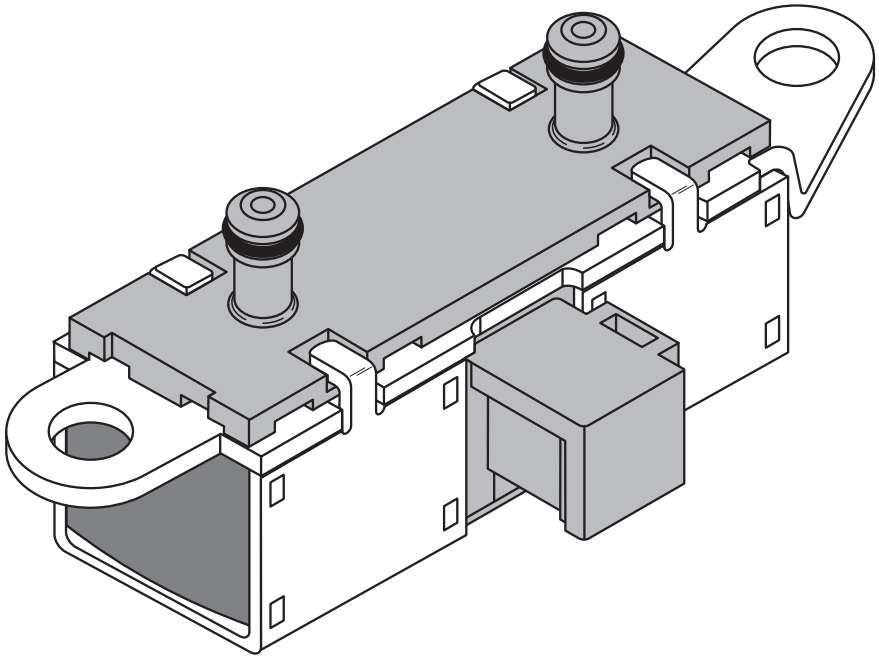


Figure 22



SHIFT SOLENOID ASSEMBLY
PART NUMBER F5AZ-7G484-A

Figure 23

FORD AODE/4R70W
CONVERTER CLUTCH SHUDDER

COMPLAINT: Before and/or after rebuild, the vehicle exhibits a converter clutch shudder condition, even with the proper Mercon® transmission fluid installed.

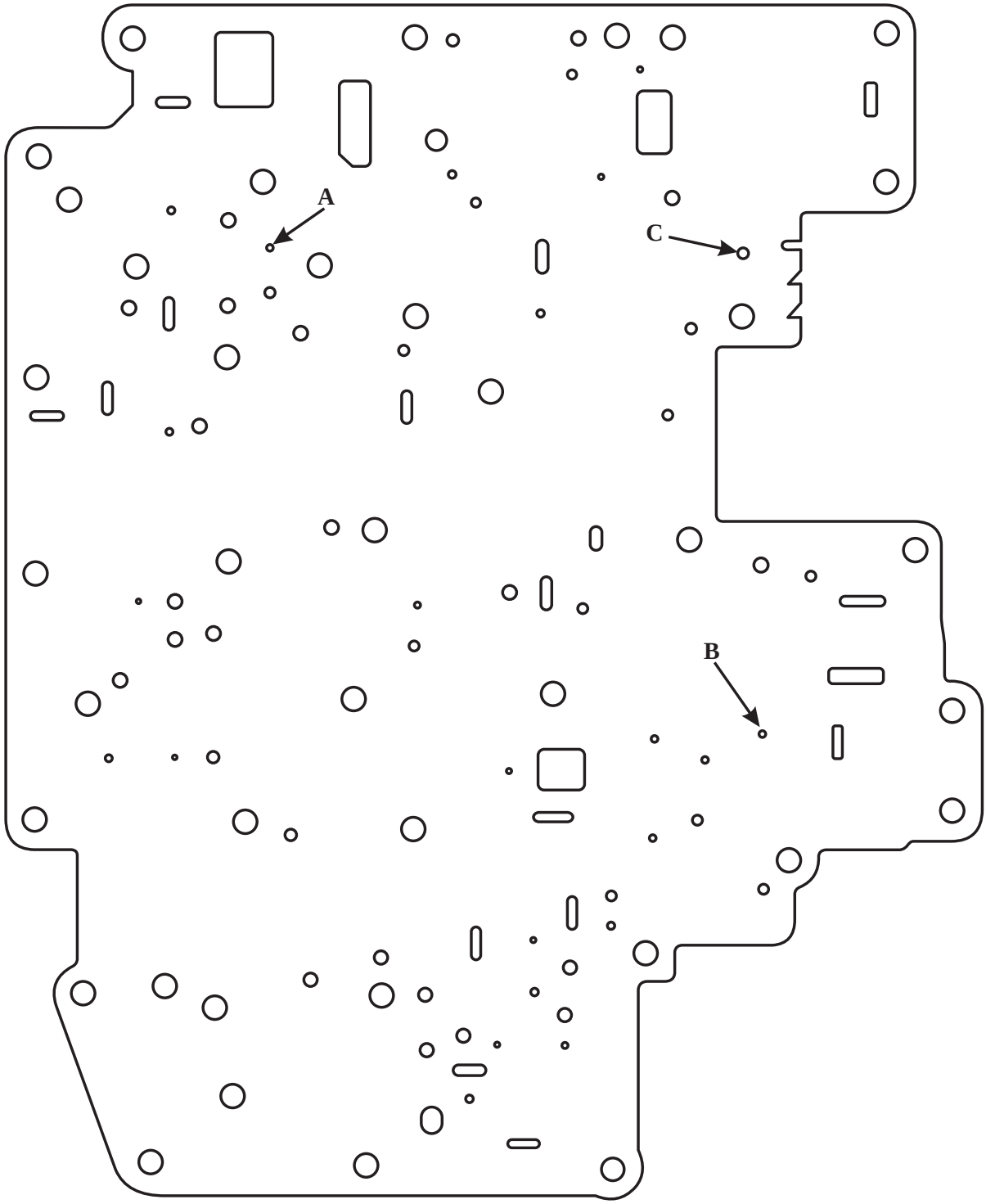
CAUSE: The cause may be, not enough oil to the converter clutch apply circuit.

CORRECTION: Drill the hole marked "A" in Figure 24 out to .062", which increases the volume of oil to the bypass clutch control valve apply circuit.

Drill the hole marked "B" in Figure 24 out to .062", which increases oil volume to the MCC/PWM solenoid. This increases oil to the valve's apply circuit ("A" orifice).

Restrict the hole marked "C" in Figure 24, to approximately .030" using a cotter key, which ensures that apply oil can overcome this balance circuit.

FORD A0DE/4R70W
TCC SHUDDER



1. ***DRILL HOLE MARKED "A" OUT TO .062".***
2. ***DRILL HOLE MARKED "B" OUT TO .062".***
3. ***INSTALL COTTER PIN IN HOLE MARKED "C" TO REDUCE SIZE TO APPROXIMATELY .030".***

Figure 24

FORD AOD-E/4R70W
EPC SOLENOID AND RETAINER CHANGES

CHANGE: The Electronic Pressure Control (EPC) solenoid changed at the start of production for all 1993 models of the AOD-E/4R70W transmissions, and care must be taken to use the proper EPC solenoid retainer (See Figure 26).

REASON: Improved line pressure control.

PARTS AFFECTED:

(1) EPC SOLENOID - The external dimensions on the solenoid changed in the area where the retainer goes over the solenoid to hold it into the case, in addition to internal changes to improve durability. The previous design solenoid is no longer available. Refer to Figure 26, which shows you the current EPC Solenoid F3AZ-7G383-A, which comes with the retainer for 1992-1995 model transmissions.

(2) EPC SOLENOID RETAINER - Changed in 1993 to accommodate the new design solenoid, and must be used with the new design solenoid on 1992 models (See Figure 26).
The EPC Solenoid retainer changed again in 1996, and was made 1/16" ***shorter,*** to accommodate a thinner valve body plate, and must be used on 96 models with the thinner plate (See Figure 26).

INTERCHANGEABILITY:

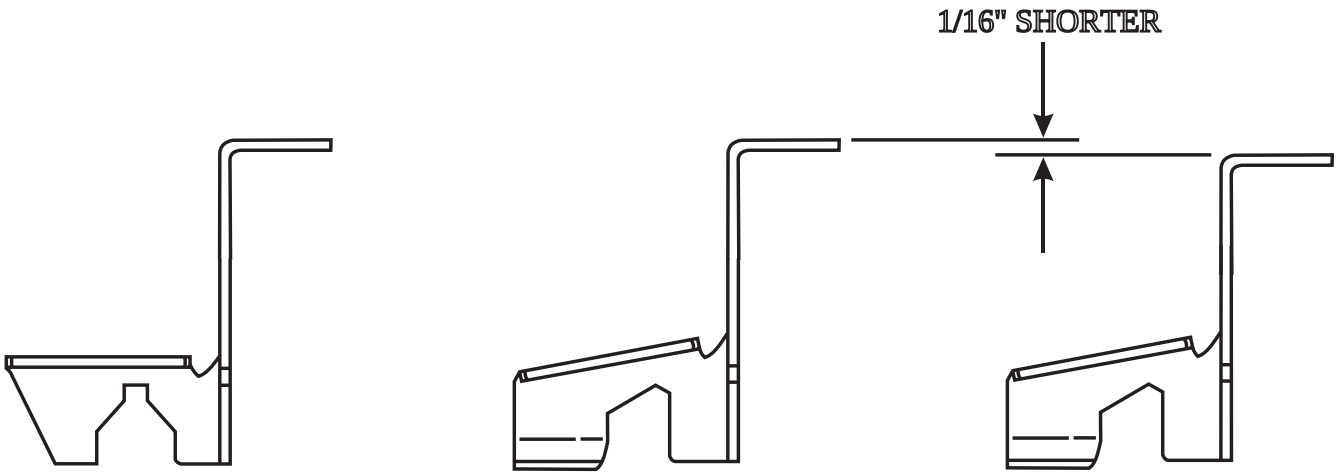
(1) When the EPC Solenoid is replaced, the 2nd design solenoid is the ***only*** one available, and comes with the proper retainer which ***must*** be used on 1992-1995 models (See Figure 26). The new design solenoid will retro-fit to 1992 models.

(2) The only retainer that can be used on 1996 models is the one that is 1/16" shorter to accommodate the thinner valve body plate that was used in 1996 (See Figure 26).

SERVICE INFORMATION:

EPC Solenoid, 2nd Design (Includes F3AZ-7H111-ARetainer)	F3AZ-7G383-A
EPC Solenoid Retainer (1st Design)	F2VY-7H111-A
EPC Solenoid Retainer (2nd Design)	F3AZ-7H111-A
EPC Solenoid Retainer (3rd Design)	F6AZ-7H111-A

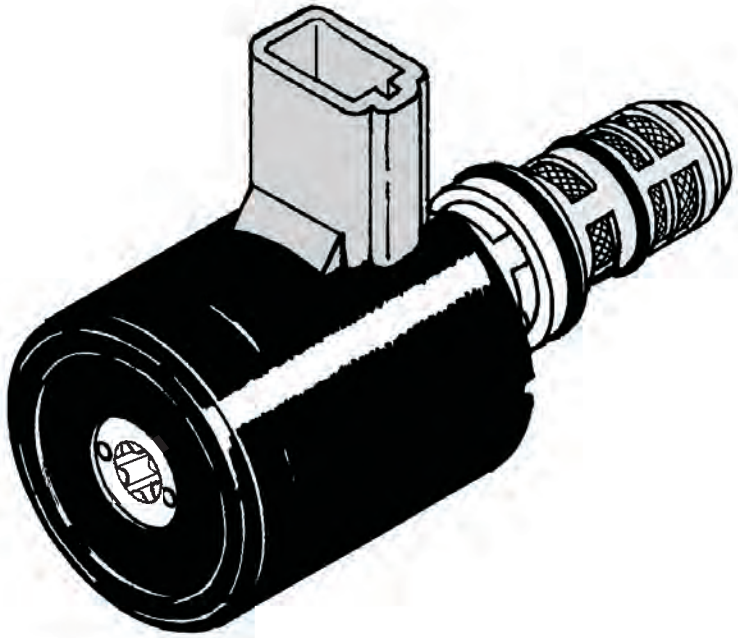
EPC SOLENOID RETAINER DIFFERENCES



1ST DESIGN
92 MODELS
F2VY-7H111-A

2ND DESIGN
93-95 MODELS
F3AZ-7H111-A

3RD DESIGN
96-UP MODELS
F6AZ-7H111-A



EPC SOLENOID
PART NUMBER F3AZ-7G383-A
(INCLUDES F3AZ-7H111-A RETAINER)

Figure 26

FORD AOD-E/4R70W
SLIPPING OR PROLONGED 1-2 UPSHIFT

COMPLAINT: Before and/or after rebuild, the vehicle exhibits a slipping condition on the 1-2 upshift, and sometimes will not be displayed until some miles have been put on the vehicle.

CAUSE: The cause may be, premature 1-2 accumulator seal wear, which also creates the case accumulator bore to become scuffed, which leads to the slipping condition and possible loss of intermediate clutches..

CORRECTION: Replace the cast aluminum 1-2 accumulator piston with a new design one piece stamped steel piston with molded rubber lip seals, and replace the top accumulator spring with the revised parts available from Ford Motor Co. Case replacement should not be necessary with the use of the revised stamped steel accumulator piston. Refer to Figure 27 to remove the piston assembly. Refer to Figure 28 for illustration of both design stack-ups, and to Figure 29 for a chart to install the proper revised springs into the proper model.

SERVICE INFORMATION:

1-2 Accumulator Piston (New Design)	F7AZ-7F251-AA
1-2 Accumulator Spring, Bottom, (Purple)	F3LY-7F284-A
1-2 Accumulaotr Spring, Bottom, (Pink)	F4UZ-7F284-A
1-2 Accumulaotr Spring, Bottom, (Violet)	F7AZ-7F284-BA
1-2 Accumulator Spring, Top, (White)	F7AZ-7F284-AA
1-2 Accumulator Spring, Top, (Dk. Blue)	F7AZ-7F284-CA
1-2 Accumulator Spring, Top, (Lt. Blue)	F75Z-7F284-AA
1-2 Accumulator Spring, Top, (Brown)	F75Z-7F284-BA

Note: ***When referencing spring location, bottom refers to the bottom of the transmission as it sits in the vehicle (pan side).***

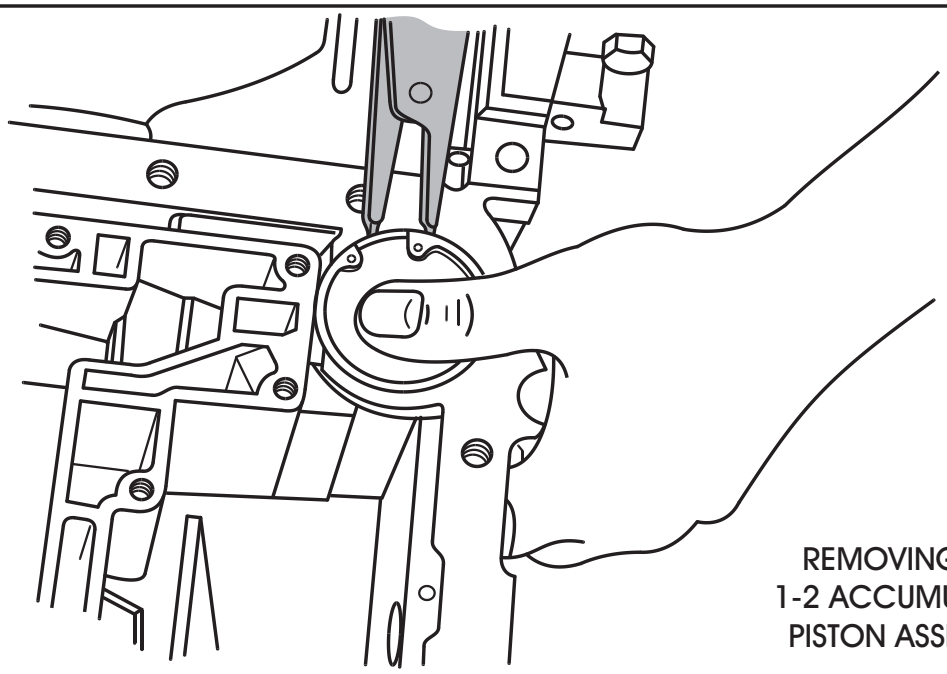
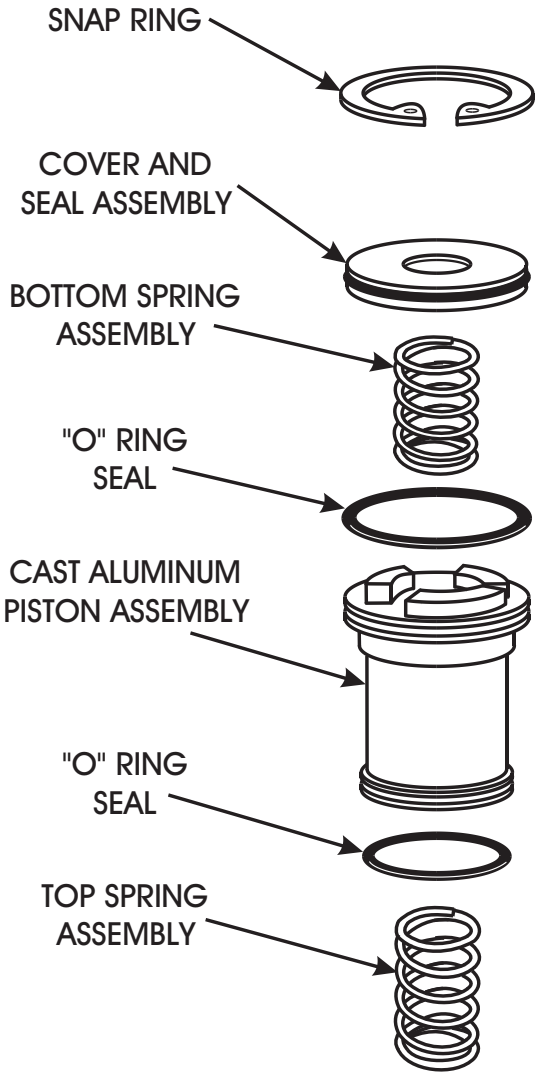
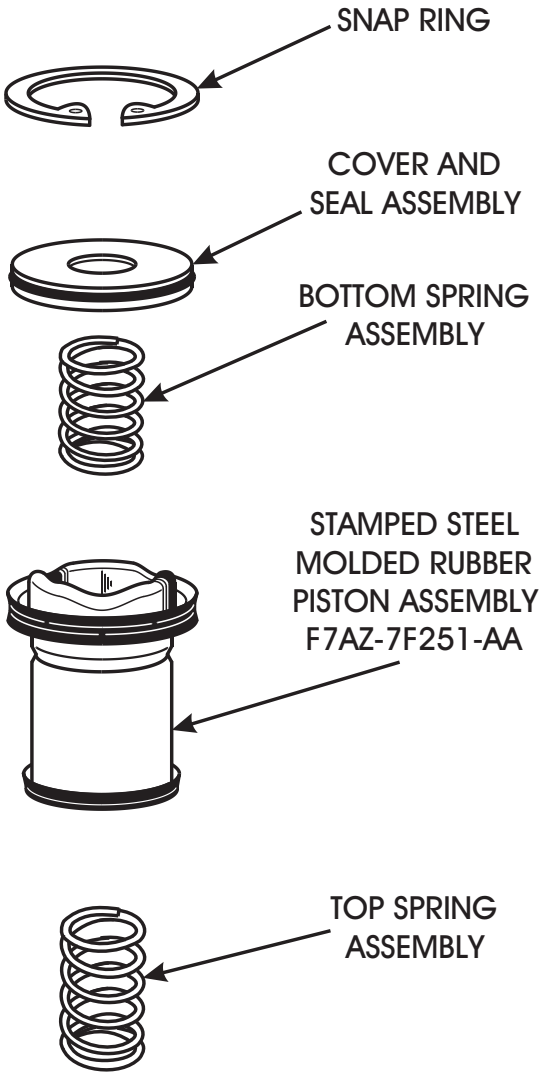


Figure 27

PREVIOUS DESIGN
1-2 ACCUMULATOR
ASSEMBLY



NEW DESIGN
1-2 ACCUMULATOR
ASSEMBLY



Note: When referencing spring location, bottom refers to the bottom of transmission as it sits in the vehicle (pan side).

Figure 28

		1992	1993	1994	1995	1996	1997
Crown Victoria 4.6L Grand Marquis 4.6L	TOP BOTTOM	NONE F7AZ-BA (Violet)	NONE F7AZ-BA (Violet)	F7AZ-CA (Dk. Blue) F7AZ-BA (Violet)	F7AZ-AA (White) F3LY-A (Purple)	F7AZ-AA (White) F3LY-A (Purple)	F7AZ-AA (White) F3LY-A (Purple)
Mark VIII 4.6L 4V	TOP BOTTOM	NA NA	F75Z-AA (Lt. Blue) F3LY-A (Purple)	F75Z-AA (Lt. Blue) F3LY-A (Purple)	F75Z-AA (Lt. Blue) F3LY-A (Purple)	F75Z-AA (Lt. Blue) F3LY-A (Purple)	F75Z-AA (Lt. Blue) F4UZ-A (Pink)
Mustang 3.8L	TOP BOTTOM	NA NA	NA NA	NONE F3LY-A (Purple)	NONE F3LY-A (Purple)	F7AZ-AA (White) F4UZ-A (Pink)	F7AZ-AA (White) F4UZ-A (Pink)
Mustang 4.6L	TOP BOTTOM	NA NA	NA NA	NONE F3LY-A (Purple)	NONE F3LY-A (Purple)	F75Z-AA (Lt. Blue) F3LY-A (Purple)	F75Z-AA (Lt. Blue) F3LY-A (Purple)
Mustang 5.0L	TOP BOTTOM	NA NA	NA NA	NONE F3LY-A (Purple)	NONE F3LY-A (Purple)	NA NA	NA NA
Thunderbird 3.8L & Cougar 3.8L	TOP BOTTOM	NA NA	NA NA	NONE F3LY-A (Purple)	NONE F3LY-A (Purple)	F7AZ-AA (White) F4UZ-A (Pink)	F7AZ-AA (White) F4UZ-A (Pink)
Thunderbird 4.6L & Cougar 4.6L	TOP BOTTOM	NA NA	NA NA	NONE F3LY-A (Purple)	NONE F3LY-A (Purple)	F75Z-AA (Lt. Blue) F3LY-A (Purple)	F75Z-AA (Lt. Blue) F3LY-A (Purple)
Town Car 4.6L	TOP BOTTOM	NONE F7AZ-BA (Violet)	NONE F7AZ-BA (Violet)	F7AZ-CA (Dk. Blue) F7AZ-BA (Violet)	F7AZ-AA (White) F3LY-A (Purple)	F7AZ-AA (White) F3LY-A (Purple)	F7AZ-AA (White) F3LY-A (Purple)
Econoline 4.2L & 4.6L	TOP BOTTOM	NA NA	NA NA	NA NA	NA NA	NA NA	F75Z-BA (Brown) F4UZ-A (Pink)
Econoline 5.0L	TOP BOTTOM	NA NA	NA NA	F7AZ-AA (White) F4UZ-A (Pink)	F7AZ-AA (White) F4UZ-A (Pink)	F7AZ-AA (White) F4UZ-A (Pink)	NA NA
Expedition 4.6L	TOP BOTTOM	NA NA	NA NA	NA NA	NA NA	NA NA	F75Z-AA (Lt. Blue) F4UZ-A (Pink)
Explorer 5.0L & Mountaineer	TOP BOTTOM	NA NA	NA NA	NA NA	NA NA	F7AZ-AA (White) F4UZ-A (Pink)	F7AZ-AA (White) F4UZ-A (Pink)
F-150 4.2L	TOP BOTTOM	NA NA	NA NA	NA NA	NA NA	F7AZ-AA (White) F4UZ-A (Pink)	F7AZ-AA (White) F4UZ-A (Pink)
F-150 4.6L	TOP BOTTOM	NA NA	NA NA	NA NA	NA NA	F75Z-AA (Lt. Blue) F4UZ-A (Pink)	F75Z-AA (Lt. Blue) F4UZ-A (Pink)
F-150 5.0L	TOP BOTTOM	NA NA	NA NA	F7AZ-AA (White) F4UZ-A (Pink)	F7AZ-AA (White) F4UZ-A (Pink)	F7AZ-AA (White) F4UZ-A (Pink)	NA NA
F-250 LD 4.6L	TOP BOTTOM	NA NA	NA NA	NA NA	NA NA	NA NA	F75Z-BA (Brown) F4UZ-A (Pink)

Notes:
1. *The base part number for the springs is -7F284-. For example, the part number for the pink spring is F4UZ-7F284-A.*
2. *When referencing spring location, bottom refers to the bottom of the transmission as ir sits in the vehicle (pan side).*
3. *"NA" means that the AOD-E/4R70W transmission was "Not Available", and not used for that model year.*

Figure 29

FORD A0DE/4R70W
FIRMER 1-2 UPSHIFT

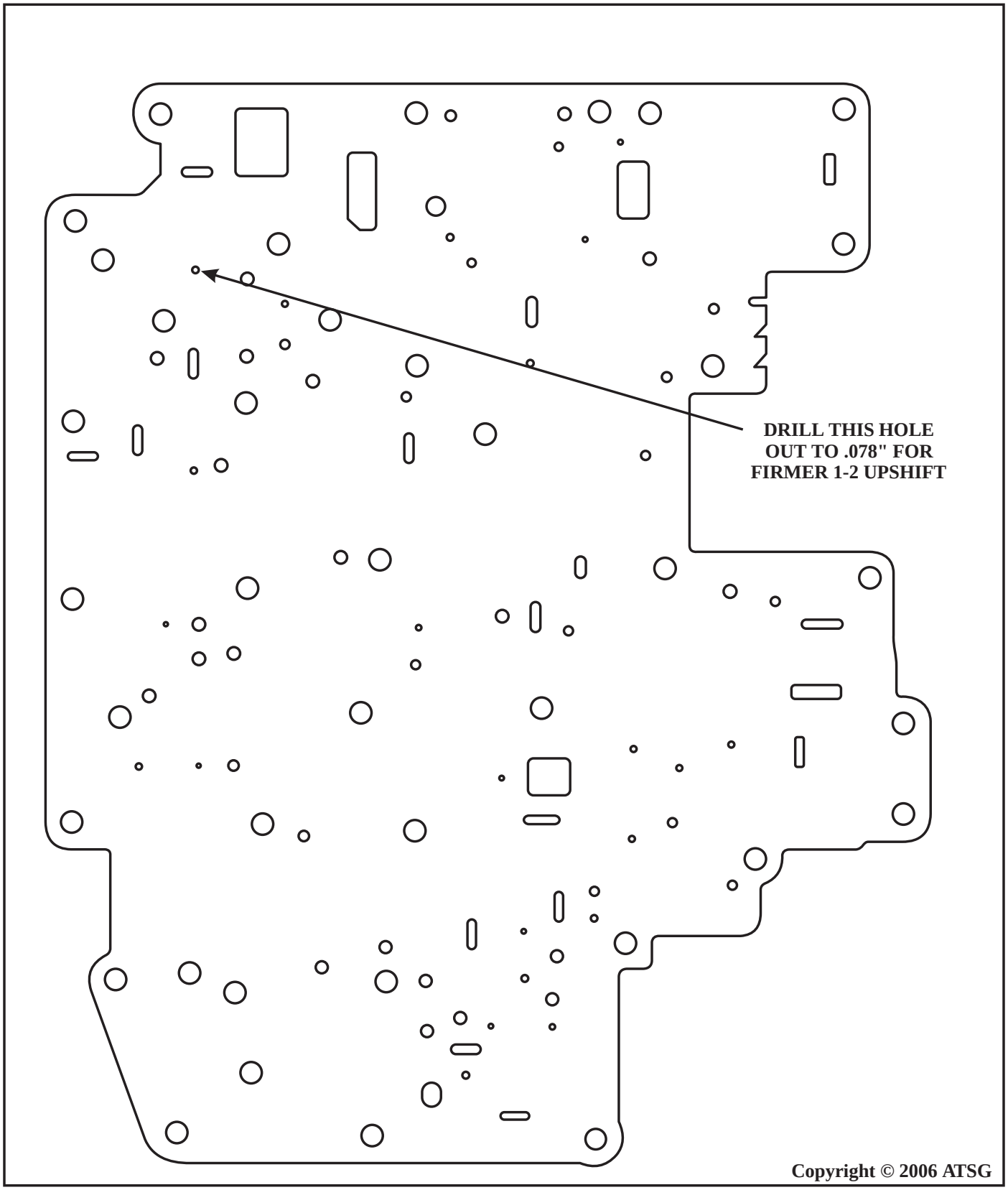


Figure 30

FORD A0DE/4R70W
DELAY TO REVERSE

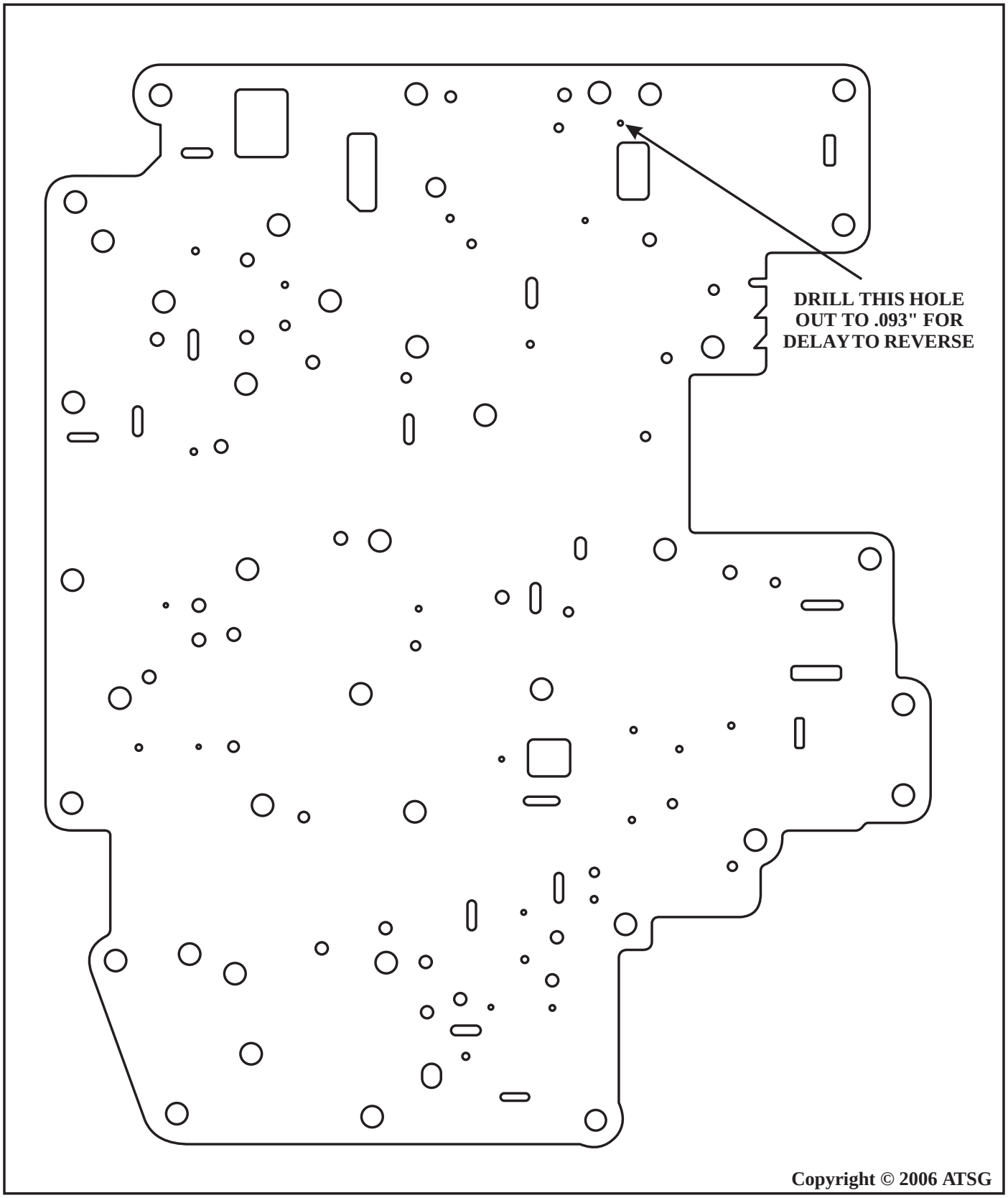


Figure 31

FORD AODE
NEW DESIGN PUMP BODY AND STATOR

CHANGE: Beginning at the start of production for 1995 model vehicles equipped with the AODE/4R70W transmission, a new design oil pump was implemented with re-routed and enlarged pressure cavities (See Figures 32 and 33).

REASON: Greatly improved oil pump efficiency for much improved durability.

PARTS AFFECTED:

(1) OIL PUMP BODY - Has an added pressure passage in pump body, shown in Figure 33, and is easily identified by casting number F5AP-7A105-AA located on the front side of pump body.

(2) OIL PUMP STATOR - Has a much enlarged pressure passage in pump stator as illustrated in Figure 33, and is easily identified by casting number F4AP-7A109 located on back side of the pump stator.

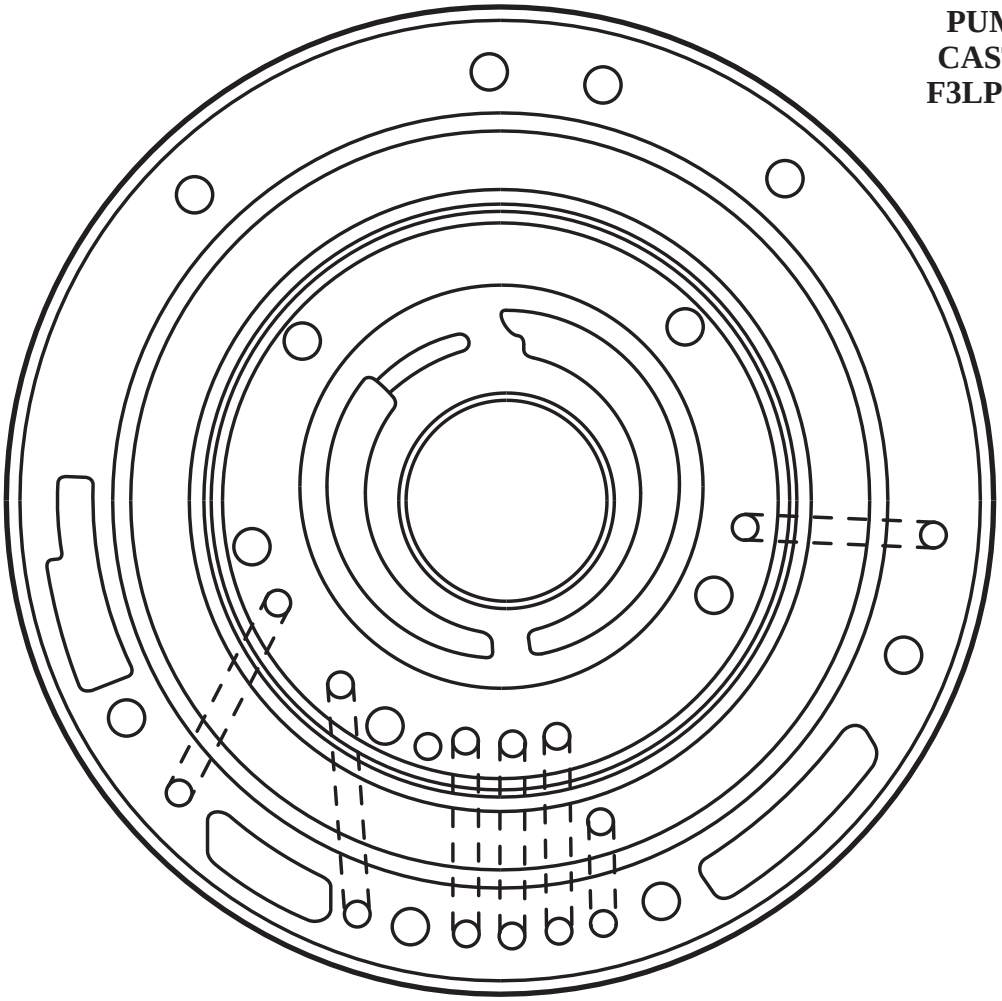
INTERCHANGEABILITY:

None of the parts listed above should be intermixed with one another. With the new design oil pump being so much more efficient than the previous design, it is ***highly*** recommended to use the new design pump assembly on ***all*** models of the AODE/4R70W transmission.

SERVICE INFORMATION:

Oil Pump Assembly (New Design) F4AZ-7A103-A

PUMP BODY
CASTING NO.
F3LP-7A105-AA



PUMP STATOR
CASTING NO.
F2VP-7A109

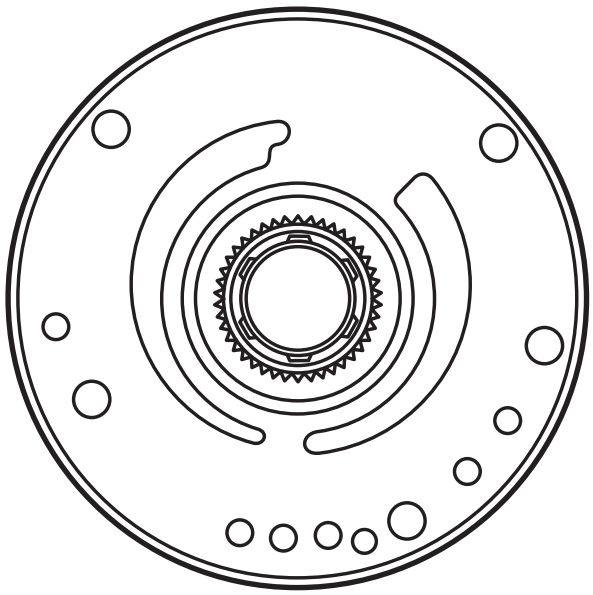
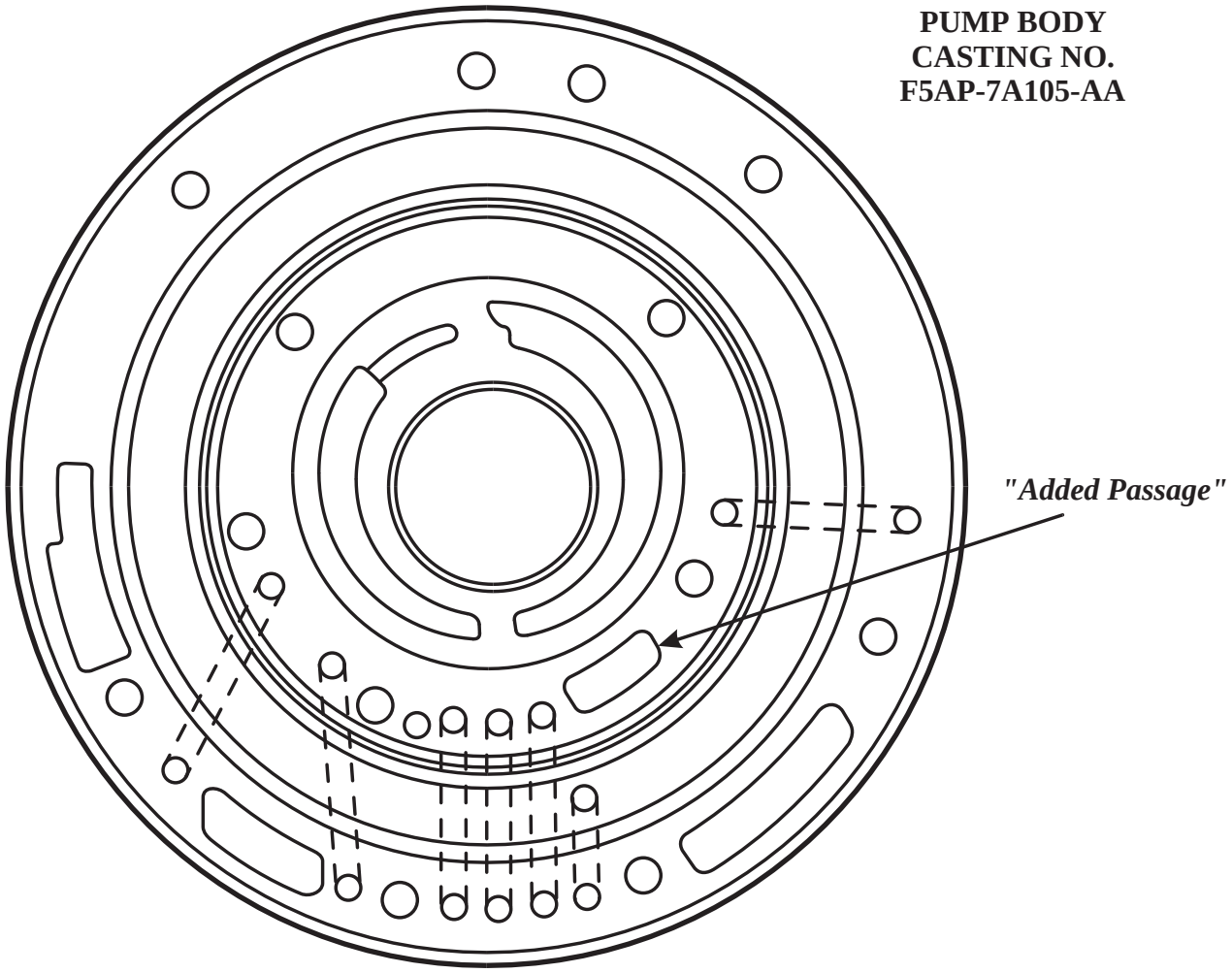


Figure 32



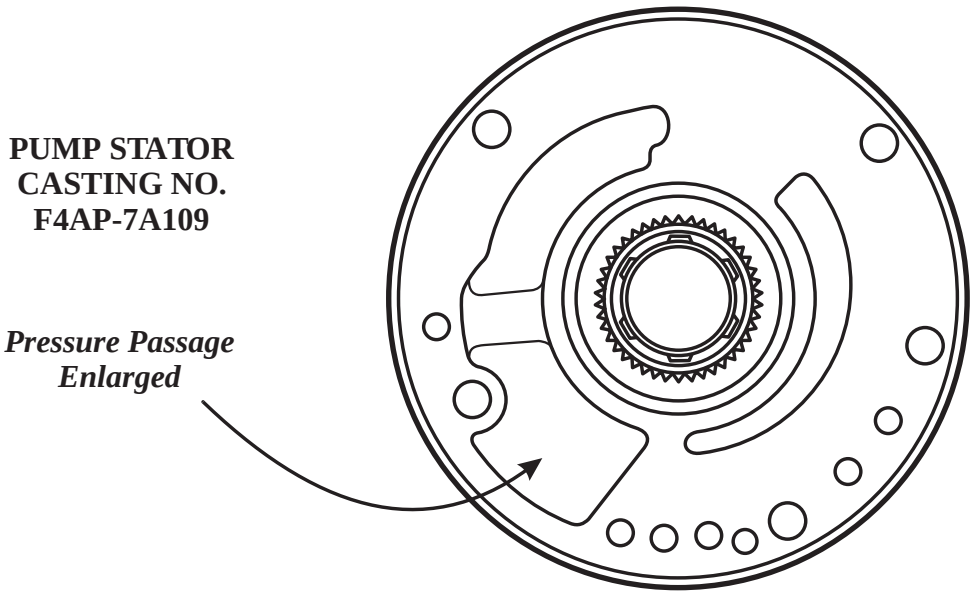


Figure 33

FORD AODE/4R70W

CASE AND VALVE BODY CHANGE FOR 1996-UP MODELS

CHANGE: Beginning in the 1996 model year Ford Motor Company introduced a new transmission case and valve body, which changed the pilot holes in the case used to align the valve body, and changed the checkball locations in the main valve body on AODE/4R70W transmissions.

REASON: Improved 4-3 and 4-2 downshifts, and common case and valve body for service.

PARTS AFFECTED:

(1) VALVE BODY CASTING - The number 1 checkball in the 1992-1995 models was eliminated, the location was moved, and the ball was re-numbered as the number 9 checkball. The worm track configuration also had to change to accommodate the new checkball locations, as shown in Figures 34, 35 and 36, and it received a thinner cover plate.

(2) SPACER PLATE - Hole configuration changes to accommodate the changes in the new checkball locations.

(3) VALVE BODY TO SPACER PLATE GASKET - Hole configuration changes to accommodate the new checkball locations and OEM part numbers are listed below.

(4) SPACER PLATE TO CASE GASKET - Hole configuration changes to accommodate the new checkball locations and OEM part numbers are listed below.

(5) TRANSMISSION CASE - The new transmission case pilot holes, used to align the valve body, have been reduced in diameter to accommodate the smaller pilots used on the new service valve body bolts. OEM part numbers are listed below.

INTERCHANGEABILITY:

None of the parts listed above will interchange with previous design level parts. You can use all of the parts listed above as a package to back service previous models as long as calibration concerns are addressed, and using the proper size valve body pilot bolts and/or case sleeves to ensure proper valve body alignment.

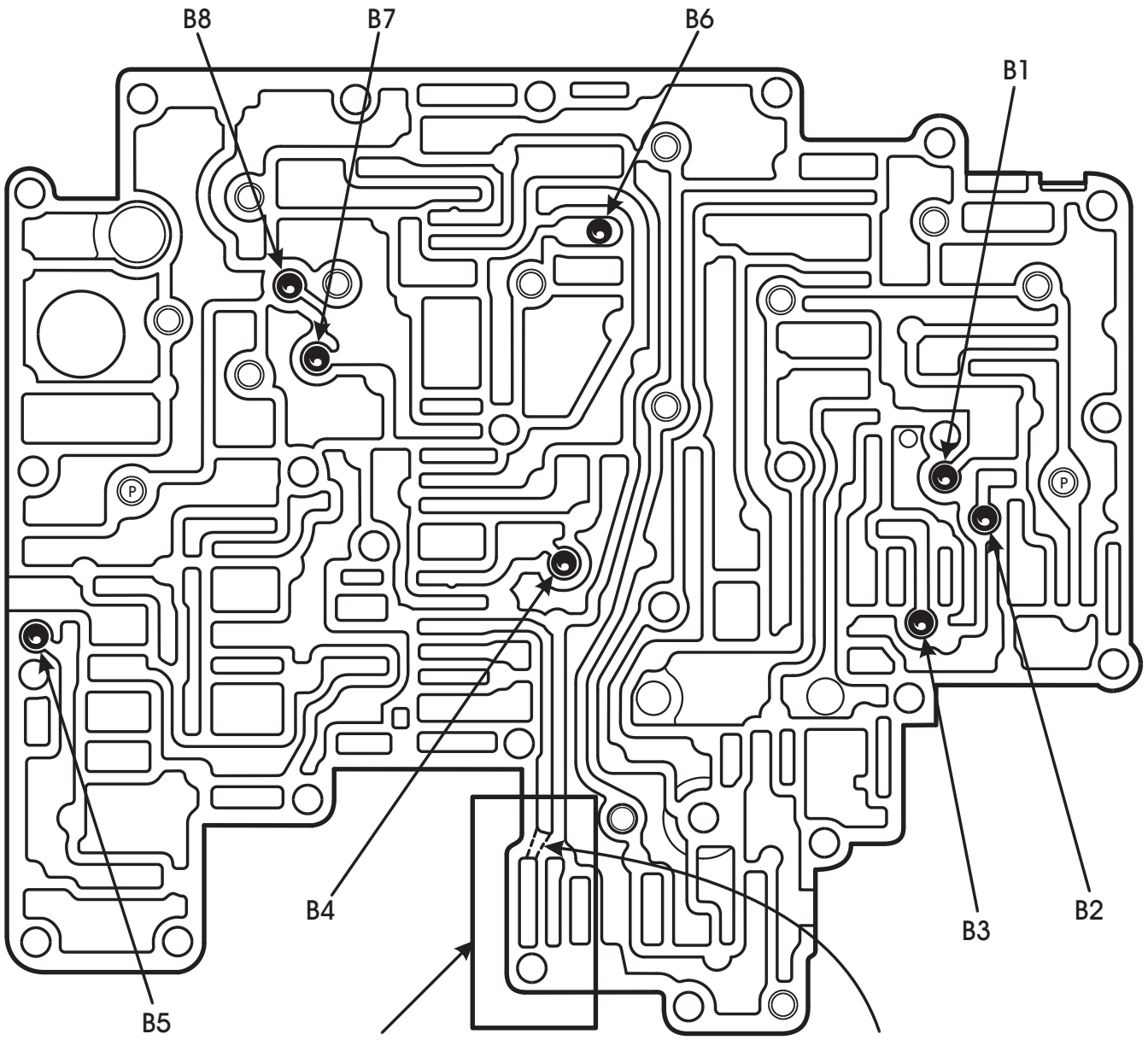
When installing a new service case, and using a 92-95 valve body, the pilot bolts must be replaced with the new bolts with the smaller pilot, part number N808962-S and gasket

When replacing the valve body with a 1996 design level valve body, and reusing the 92-95 case, you must use new sleeves in the case pilot holes, part number F6AZ-7K720-A, to accommodate the new design level valve body with the smaller pilots on the bolts. The new design level EPC Solenoid Retainer, part number F6AZ-7H111-A must also be used because of the thinner cover plate on the 1996 design level valve body.

SERVICE INFORMATION:

Valve Body to Spacer Plate Gasket (92-95 Models)	F2VY-7D100-A
Spacer Plate to Case Gasket (92-95 Models)	F2VY-7C155-A
Valve Body to Spacer Plate Gasket (96-Up Models)	F7AZ-7D100-AA
Spacer Plate to Case Gasket (96-Up Models)	F7AZ-7C155-AA
Valve Body Cover Plate Gasket (92-95 Models)	F2VY-7H173-A
Valve Body Cover Plate Gasket (96-Up Models)	F6AZ-7H173-A
Valve Body Pilot Bolts (Smaller Pilot)	N808962-S
Transmission Case Pilot Sleeves	F6AZ-7K720-A
Transmission Case, 3.8L, 4.2L, 5.0L (New Design)	F6SZ-7005-A
Transmission Case, 4.6L (New Design)	F6AZ-7005-A

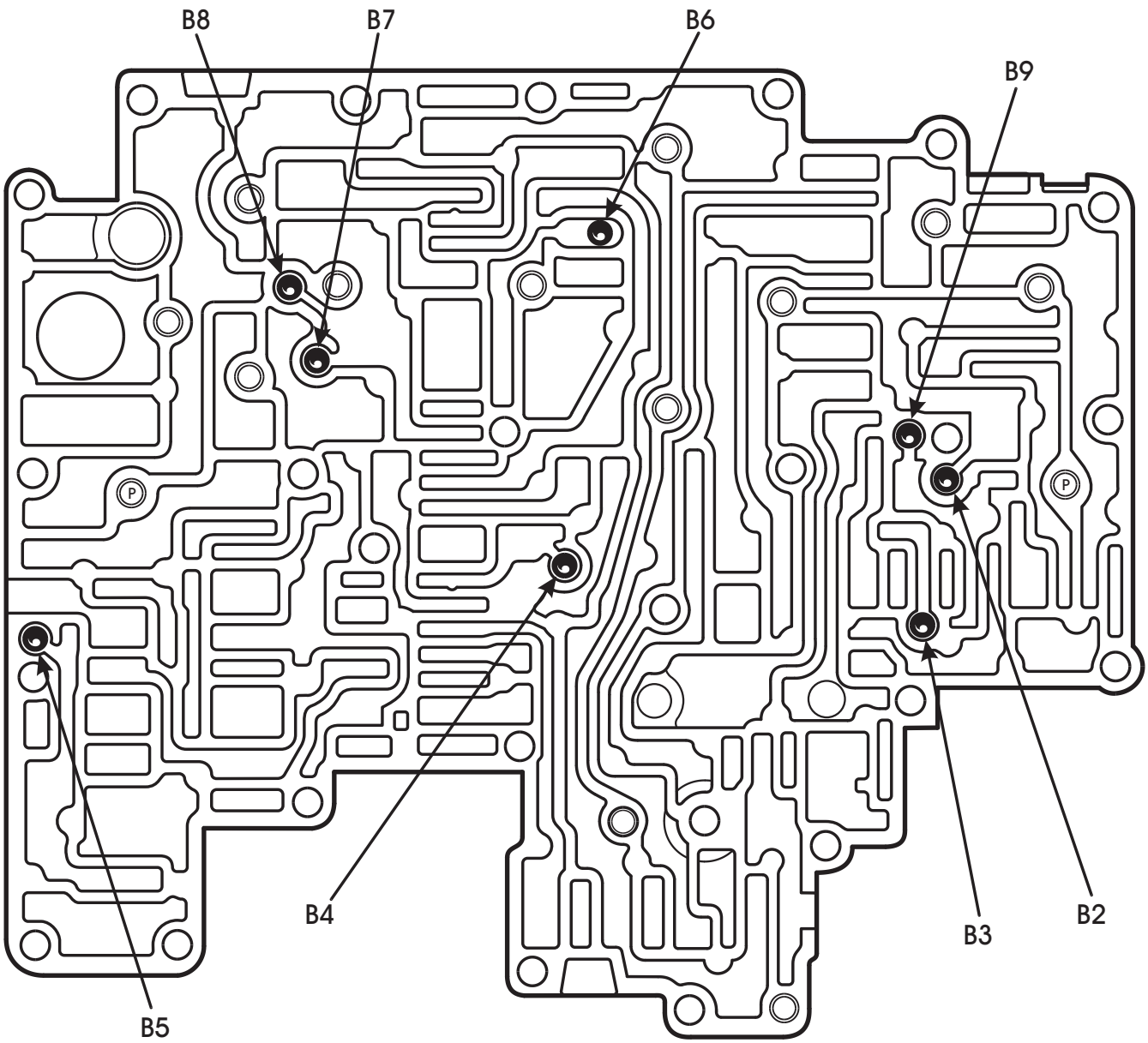
1992-1995 AODE/4R70W CHECKBALL LOCATIONS



B1 - Between the Forward Clutch circuit and the 23BP circuit (92-95 Only).
B2 - In the Forward Clutch circuit near the 3-4 shift valve.
B3 - In the Direct Clutch circuit near the 2-3 backout valve.
B4 - In the Overdrive and Forward Clutch circuits near the 1-2 shift valve.
B5 - In the Reverse circuit near orifice number one.
B6 - Shuttle ball between the Low and Reverse circuits.
B7 - Between the L234 and Torque Converter Clutch circuits.
B8 - Between the L234 and Intermediate Clutch circuits.

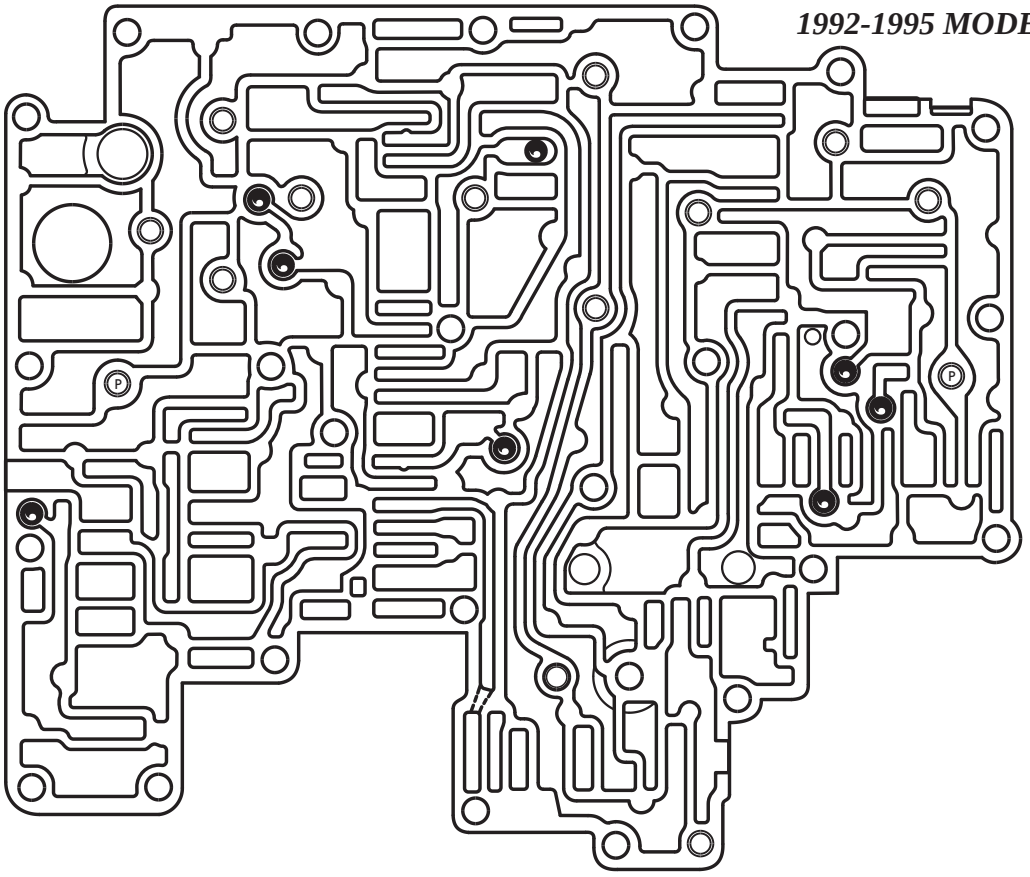
Figure 34

1996-UP AODE/4R70W CHECKBALL LOCATIONS

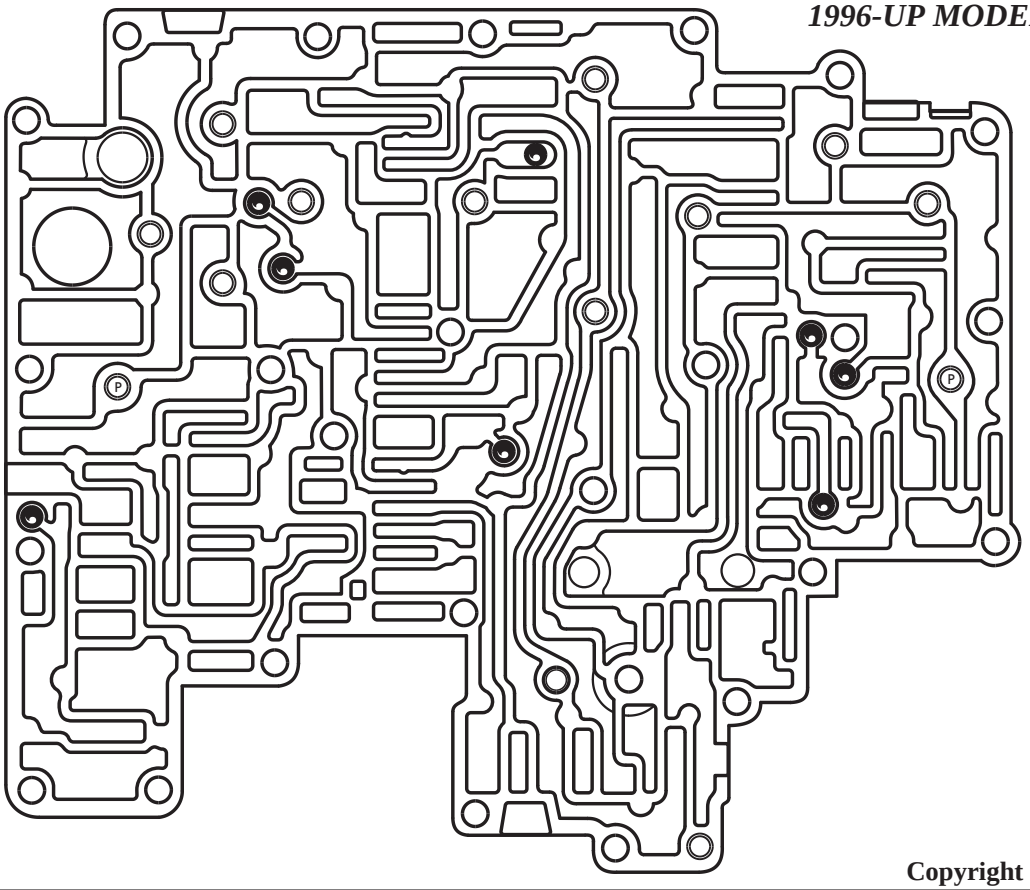


B2 - In the Forward Clutch circuit near the 3-4 shift valve.
B3 - In the Direct Clutch circuit near the 2-3 backout valve.
B4 - In the Overdrive and Forward Clutch circuits near the 1-2 shift valve.
B5 - In the Reverse circuit near orifice number one.
B6 - Shuttle ball between the Low and Reverse circuits.
B7 - Between the L234 and Torque Converter Clutch circuits.
B8 - Between the L234 and Intermediate Clutch circuits.
B9 - Between the FC34 and 23BP circuits (1996-Up Only).

Figure 35



1992-1995 MODELS



1996-UP MODELS

Figure 36

FORD AODE/4R70W

NEW DESIGN FOR ALL MODELS
MECHANICAL DIODE INTERMEDIATE SPRAG

CHANGE: There is now available from Ford Motor Company, a ***Mechanical Diode*** sprag assembly to replace the previous design Intermediate Roller Clutch. It also requires replacing the Reverse Input Housing to accommodate the new design mechanical diode sprag assembly.
This new design can be manufactured in any configuration of outer race, inner race and retainer to hold the parts together, but all will have several spring loaded "Diodes" inside to do the holding and freewheeling. Refer to Figure 37 for a basic cross section of how a mechanical diode sprag assembly works.

REASON: Greatly improved reliability and durability.

PARTS AFFECTED:

(1) MECHANICAL DIODE SPRAG ASSEMBLY - Totally new design to replace the previous design intermediate roller clutch in AODE and 4R70W transmissions (See Figures 37 and 38).

(2) REVERSE INPUT HOUSING - New design reverse input housing with "Splines" in place of the previous inner race, to accommodate the new design mechanical diode sprag assembly. Refer to Figures 37 and 38.

(3) RETAINING RING - No dimensional changes on the snap ring, you still use the original snap ring. When installed, the mechanical diode assembly may move back and forth approximately .010" and this is normal (See Figure 38).

INTERCHANGEABILITY:

The new design Mechanical Diode Sprag Assembly will retro-fit back to all previous models of the AODE/4R70W transmission, but all three pieces listed above must be used as a service package. There will soon be available a Service Package that includes all three pieces so that you do not have to purchase them individually.
The new design Mechanical Diode Sprag Assembly will also retro-fit back to the 1980-1991 AOD units equipped with the cast iron drum, but additional parts are ***required*** to make the 1998 design level parts fit. They are as follows:

(1) The sun shell must be replaced with part number F4AZ-7A019-A.
(2) The 3 reverse input clutch steel plates must be replaced with part number F2TZ-7B442-A.
(3) The pressure plates must be replaced with F2TZ-7B066-A and F2TZ-7B066-B.
(4) If the transmission used a Number 2 thrust washer, it must be replaced with the needle thrust bearing part number E1TZ-7A166-A.

SERVICE INFORMATION:

Mechanical Diode Sprag Assembly	F8AZ-7A089-AA
Reverse Input Housing Assembly (Mech Diode)	F8AZ-7D044-AA
Retaining Ring	391267-S

MECHANICAL DIODE FREEWHEEL PRINCIPLES

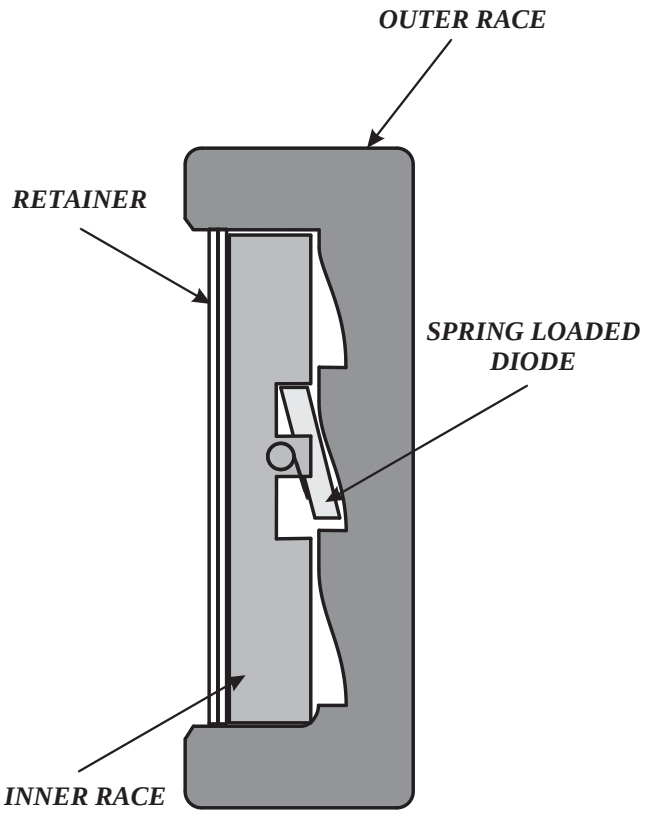


Figure 37

MECHANICAL DIODE INTERMEDIATE FREEWHEEL

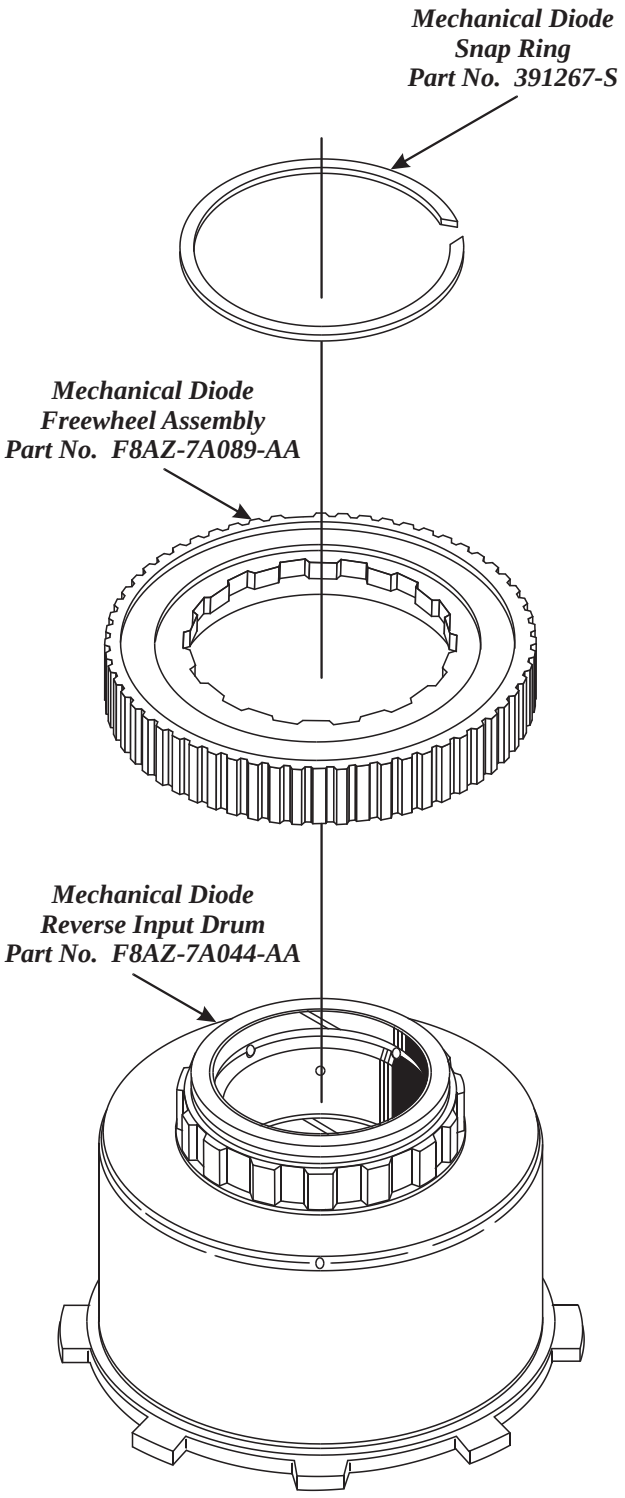


Figure 38

FORD AODE/4R70W

STAMPED STEEL, MOLDED RUBBER 2-3 ACCUMULATOR PISTON

CHANGE: Beginning at the start of production for 1997 models, Ford Motor Company introduced a new design stamped steel, molded rubber 2-3 accumulator piston, for vehicles equipped with the AODE/4R70W transmission (See Figures 39 and 40).

REASON: Increased reliability and durability of the transmission and direct clutches.

PARTS AFFECTED:

(1) Now manufactured of stamped steel with molded rubber seals instead of the previous cast aluminum piston with the individual seals. (See Figure 40).

INTERCHANGEABILITY:

The new design stamped steel, molded rubber 2-3 accumulator piston will retro-fit back to 1981 model hydraulic AOD transmissions, and is recommended.

SERVICE INFORMATION:

2-3 Accumulator Piston (New Design) F7AZ-7H292-AA

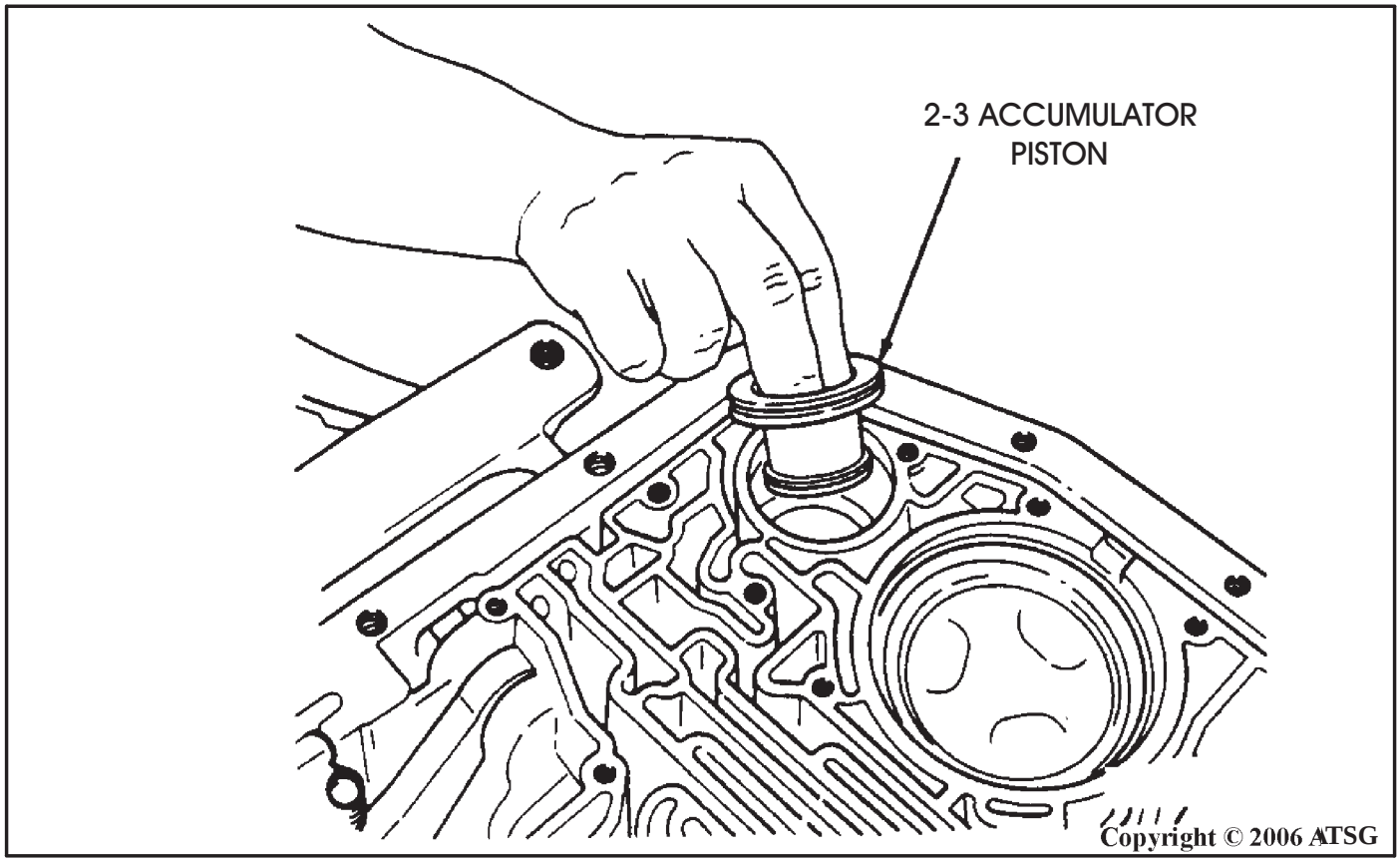


Figure 39

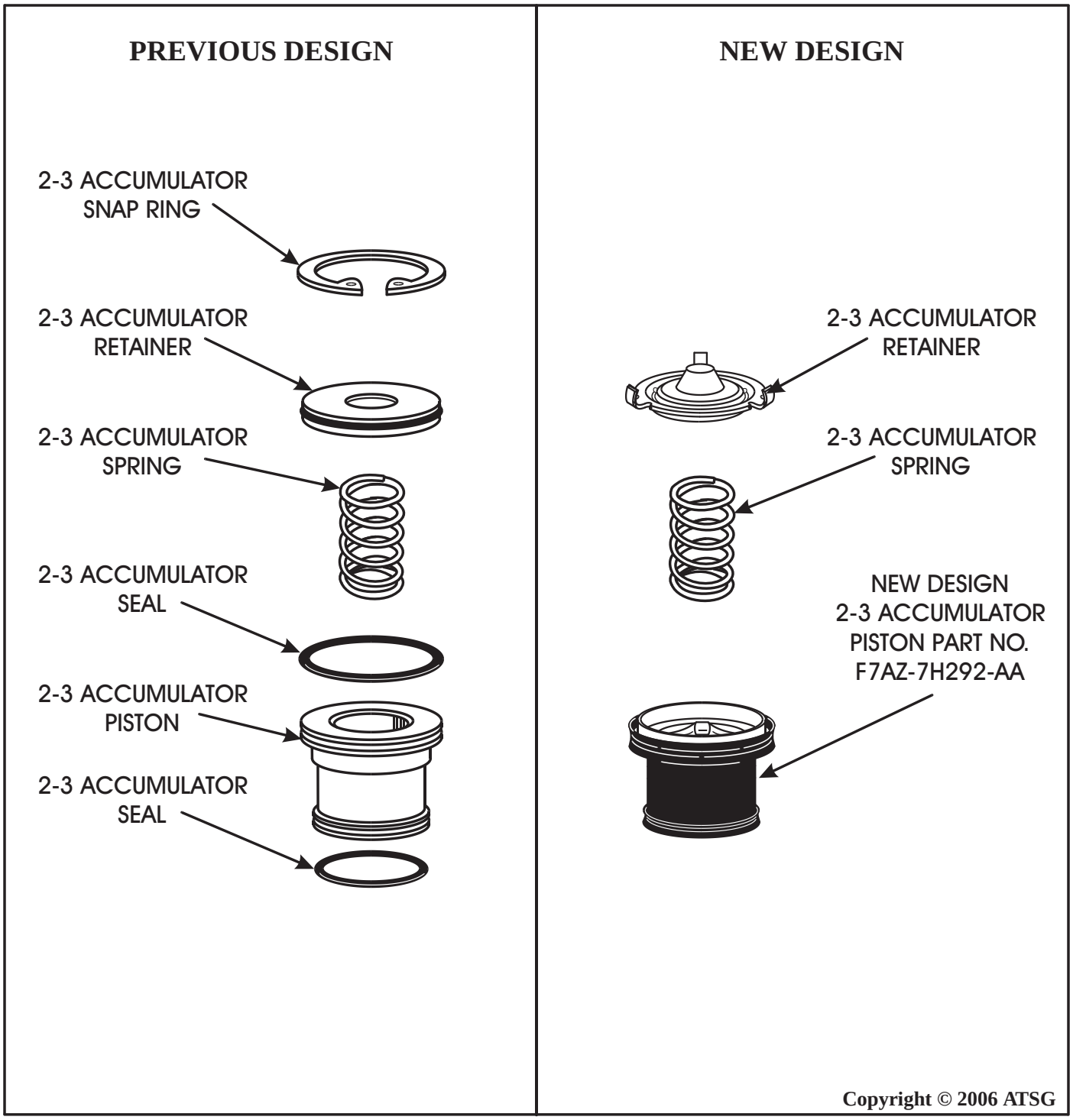

PREVIOUS DESIGN
2-3 ACCUMULATOR SNAP RING
2-3 ACCUMULATOR RETAINER
2-3 ACCUMULATOR SPRING
2-3 ACCUMULATOR SEAL
2-3 ACCUMULATOR PISTON
2-3 ACCUMULATOR SEAL
NEW DESIGN
2-3 ACCUMULATOR RETAINER
2-3 ACCUMULATOR SPRING
NEW DESIGN 2-3 ACCUMULATOR PISTON PART NO. F7AZ-7H292-AA
Copyright © 2006 ATSG

Figure 40

FORD 4R70W
INTERNAL HARNESS AND CASE CONNECTOR CHANGES FOR 1998

CHANGE: Beginning at the start of production for 1998 models, all Ford 4R70W transmissions were built using a molded circuit board to replace the previous internal wire harness assembly, as shown in Figure 41.

REASON: More economical to produce and install and increased durability.

PARTS AFFECTED:

(1) CASE CONNECTOR - Now produced to accommodate the new molded circuit board assembly and case connector pin functions have changed. Refer to Figures 41, 42, and 43.

(2) INTERNAL HARNESS - Changed to a molded circuit board, as shown in Figure 41.

(3) EPC SOLENOID - Connector changes to accommodate the new molded circuit board.

(4) SHIFT SOLENOID ASSEMBLY - Connector changes to accommodate the new circuit board.

(5) TCC SOLENOID ASSEMBLY - Connector changes to accommodate the new circuit board.

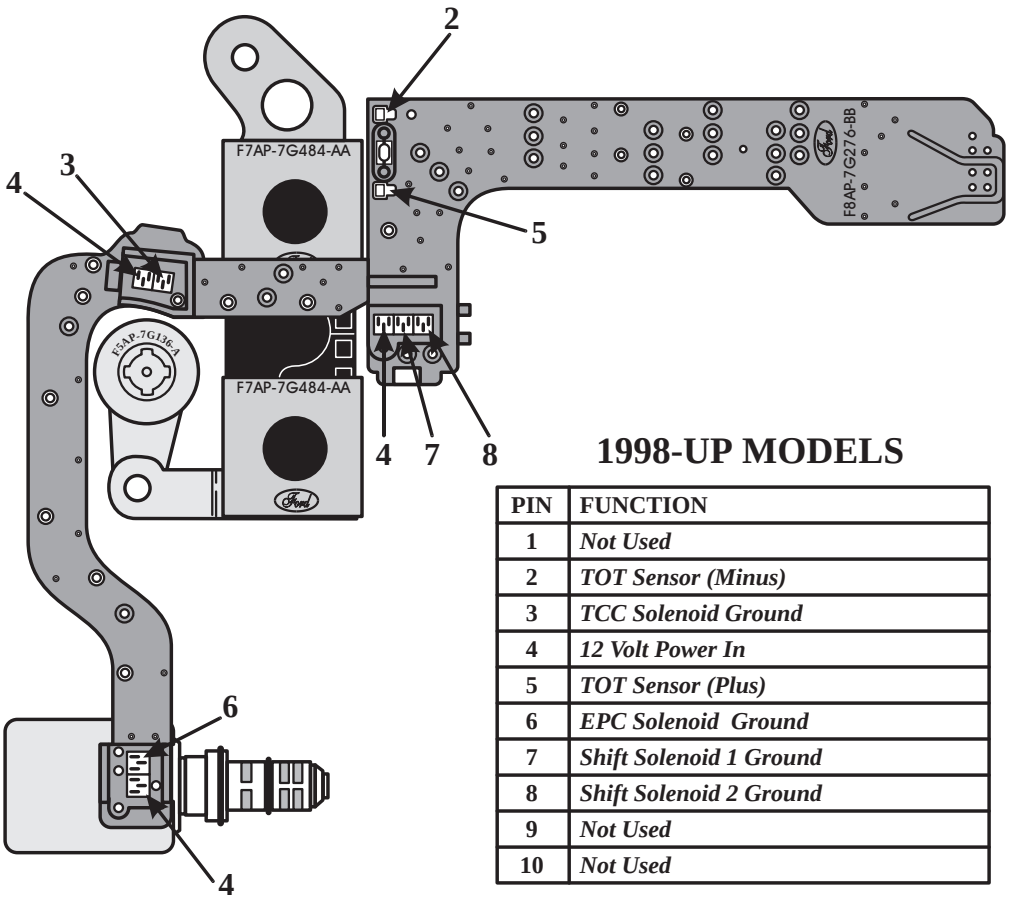
INTERCHANGEABILITY:

(1) 1992-1997 internal harness and solenoid assemblies ***must*** be used on 92-97 models. Refer to "Service Information" below for the current part numbers.

(2) 1998-Up internal harness and solenoid assemblies ***must*** be used on 1998-Up models. Refer to "Service Information" below for the current part numbers.

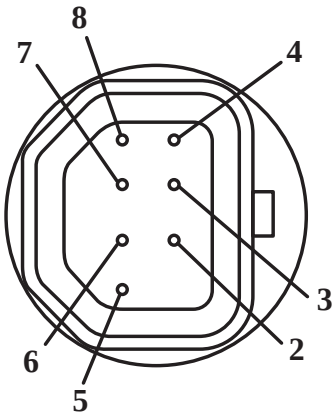
SERVICE INFORMATION:

Internal Wiring Harness and Case Connector Assy, 92-97 Models	F2VY-7G276-A
Case Connector for Molded Internal Wiring, 1998-Up Models	F8AZ-7G276-AA
Molded Internal Wiring Assembly, 1998-Up Models	F8AZ-7G276-BA
Shift Solenoid Assembly, 92-97 Models	F7AZ-7G484-AA
Shift Solenoid Assembly, 1998-Up Models	F8AZ-7G484-AA
EPC Solenoid Assembly, 92-97 Models	F6AZ-7G383-AA
EPC Solenoid Assembly, 1998-Up Models	F8AZ-7G383-AA
TCC Solenoid Assembly, 92-97 Models	F5AZ-7G136-A
TCC Solenoid Assembly, 1998-Up Models	F8AZ-7G136-AA

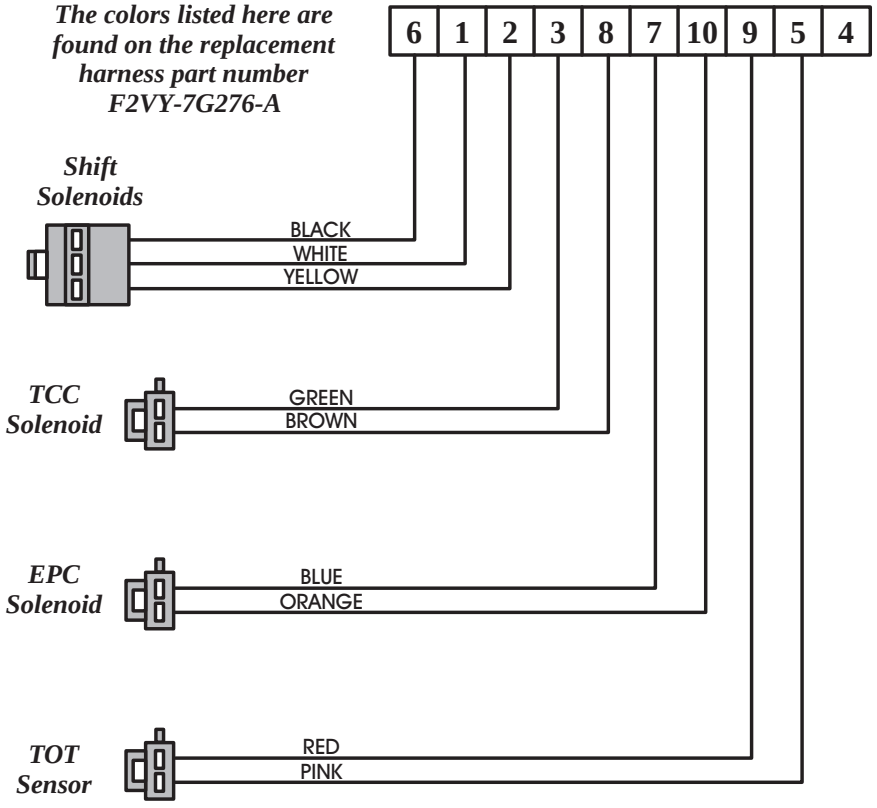


1998-UP MODELS

PIN	FUNCTION
1	*Not Used*
2	*TOT Sensor (Minus)*
3	*TCC Solenoid Ground*
4	*12 Volt Power In*
5	*TOT Sensor (Plus)*
6	*EPC Solenoid Ground*
7	*Shift Solenoid 1 Ground*
8	*Shift Solenoid 2 Ground*
9	*Not Used*
10	*Not Used*



The colors listed here are found on the replacement harness part number F2VY-7G276-A



1992-1997 MODELS

PIN	FUNCTION
1	*Shift Solenoid 1 Ground*
2	*Shift Solenoid 12V Power*
3	*TCC Solenoid Ground*
4	*Not Used*
5	*TOT Sensor*
6	*Shift Solenoid 2 Ground*
7	*EPC Solenoid 12V Power*
8	*TCC Solenoid 12V Power*
9	*TOT Sensor Return*
10	*EPC Solenoid Ground*

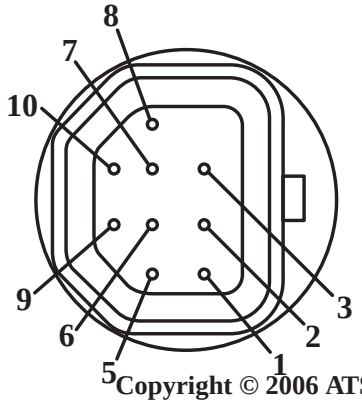
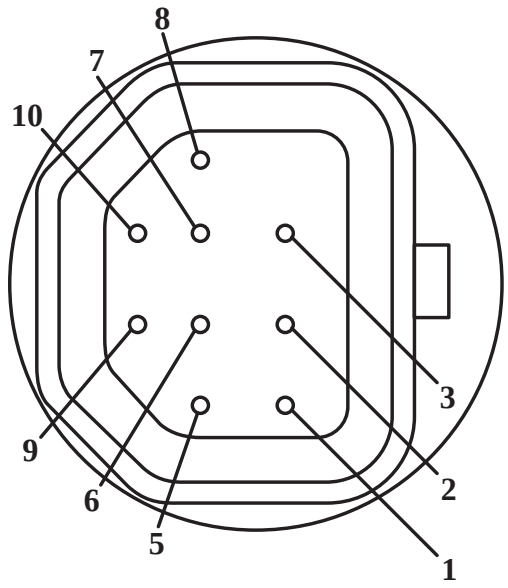
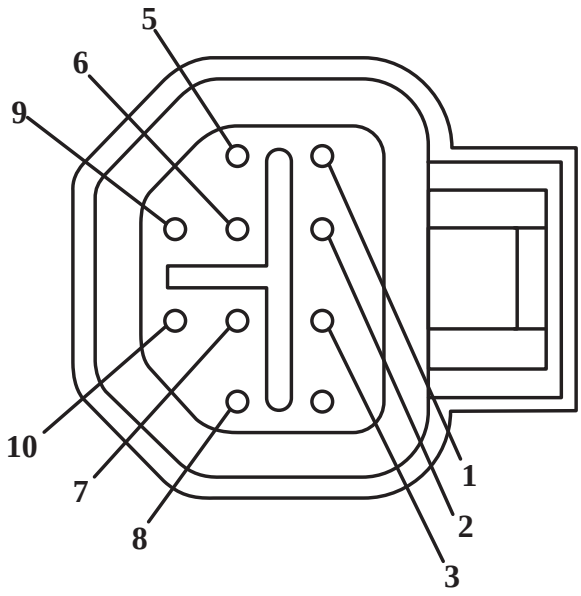


Figure 41

VIEW LOOKING INTO THE 92-97 TRANSMISSION CASE CONNECTOR



VIEW LOOKING INTO THE 92-97 VEHICLE HARNESS CONNECTOR



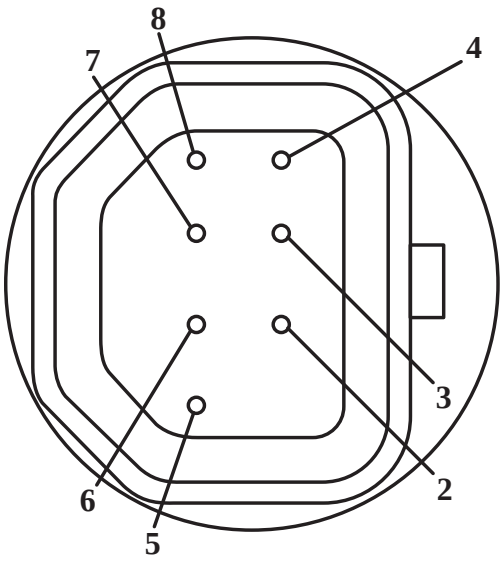
PIN NO.	IDENTIFICATION	INTERNAL COLOR	EXTERNAL COLOR	CIRCUIT NUMBER	EEC IV ECM PIN NUMBER 92-95	EEC V ECM PIN NUMBER 96-97
1	*SS-1 Ground Signal*	*WHITE*	*ORG - YEL*	*237*	*51*	*27*
2	*Shift Solenoid Power 12V*	*WHT - BLK*	*RED*	*361*	*37 & 57*	*71 & 97*
3	*MCC Ground Signal*	*GREEN*	**	*480*	*53*	*54*
4	*NOT USED*					
5	*TOT -*	*WHT - RED*	*GRY - RED*	*923*	*49*	*91*
6	*SS-2 Ground Signal*	*BLACK*	*PPL - ORG*	*315*	*52*	*1*
7	*EPC Power In*	*WHT - BLU*	*RED*	*361*	*37 & 57*	*71 & 97*
8	*MCC Power In*	*WHT - GRN*	*RED*	*361*	*37 & 57*	*71 & 97*
9	*TOT +*	*RED*	*ORG - BLK*	*359*	*46*	*37*
10	*EPC Ground Signal*	*BLUE*	*WHT - YEL*	*925*	*38*	*81*

*** TAN - WHT, BRN - ORG, PPL - YEL, DEPENDING ON YEAR AND MODEL.*

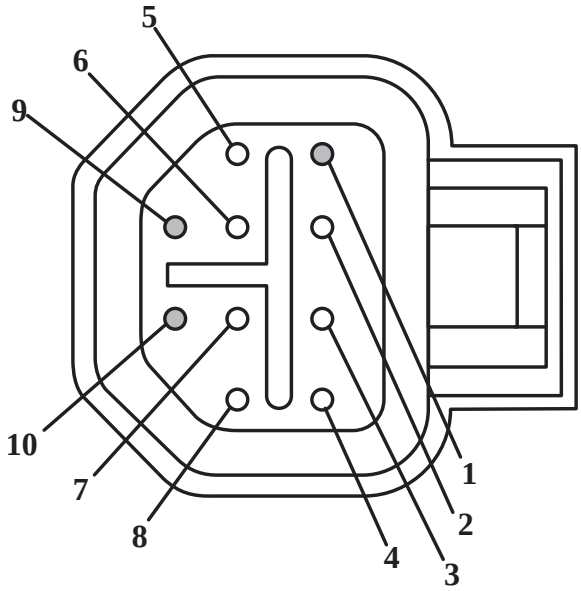
SOLENOID	PIN NO.	RESISTANCE
SHIFT SOLENOID - 1	*1 & 2*	*20 - 30 OHMS*
SHIFT SOLENOID - 2	*6 & 2*	*20 - 30 OHMS*
TORQUE CONVERTER CLUTCH	*3 & 8*	*1.0 - 3.0 OHMS*
(SOME 1995 MODELS)	*3 & 8*	*10 - 16 OHMS*
EPC SOLENOID	*7 & 10*	*2.48 - 5.66 OHMS*

Figure 42

VIEW LOOKING INTO THE 1998-UP TRANSMISSION CASE CONNECTOR



VIEW LOOKING INTO THE 1998-UP VEHICLE HARNESS CONNECTOR



PIN NO.	IDENTIFICATION	INTERNAL COLOR	EXTERNAL COLOR	CIRCUIT NUMBER	EEC-V ECM PIN NUMBER 1998-UP
1	*NOT USED*				
2	*TOT -*	*CIRCUIT BOARD*	*GRY - RED*	*359*	*91*
3	*MCC GROUND SIGNAL*	*CIRCUIT BOARD*	*PPL - YEL*	*126*	*54*
4	*SOLENOID POWER IN 12V*	*CIRCUIT BOARD*	*RED*	*361*	*71 & 97*
5	*TOT +*	*CIRCUIT BOARD*	*ORG - BLK*	*923*	*37*
6	*EPC GROUND SIGNAL*	*CIRCUIT BOARD*	*WHT - YEL*	*925*	*81*
7	*SS-1 GROUND SIGNAL*	*CIRCUIT BOARD*	*ORG/YEL*	*237*	*6*
8	*SS-2 GROUND SIGNAL*	*CIRCUIT BOARD*	*PPL - ORG*	*315*	*11*
9	*NOT USED*				
10	*NOT USED*				

SOLENOID	PIN NO.	RESISTANCE
SHIFT SOLENOID - 1	*4 & 7*	*20 - 30 OHMS*
SHIFT SOLENOID - 2	*4 & 8*	*20 - 30 OHMS*
TORQUE CONVERTER CLUTCH	*4 & 3*	*1.0 - 3.0 OHMS*
(SOME MODELS)	*4 & 3*	*10 - 16 OHMS*
EPC SOLENOID	*4 & 6*	*2.48 - 5.66 OHMS*

Figure 43

FORD AODE/4R70W
CASE INTERCHANGEABILITY

COMPLAINT: The area of concern for this complaint is the manual lever linkage bore area and the mounting of the Manual Lever Position Sensor (MLPS) onto the case, ***and this area of concern applies to both 2 bolt and 3 bolt starter cases.***

After the transmission has been rebuilt, one of the last things to be done is the mounting of the MLPS. At this time the builder, or possibly the R&R technician, realizes the MLPS does not fit properly. The MLPS, as a result of this may not range correctly.

CAUSE: The AODE cases are different in thickness when measuring from the manual lever seal surface to the countersink in the manual lever retaining pin hole See Figure 44 and 45.

PARTS AFFECTED:

(1) TRANSMISSION CASE - The dimension from the manual lever seal surface to the countersink in the manual lever retaining pin hole changed between the Early and Late cases and the identification is as follows:

Early Case - The early case has None or One threaded boss on the lower left side of the case, as shown in Figure 44, and the measurement from the manual lever seal surface to the countersink in the manual lever retaining pin hole is approximately .844", which is also shown in Figure 44.

Late Case - The late case has Two threaded bosses on the lower left side of the case, as shown in Figure 45, and the measurement from the manual lever seal surface to the countersink in the manual lever retaining pin hole is approximately .701", which is also shown in Figure 45.

Note: DO NOT use the rough forging (RF) numbers on the case to identify the early case from the late case, as this is unreliable.

(2) MANUAL SHIFT LEVER - Also is a different dimension to accommodate the change in the transmission case and can be identified as follows:

Early Manual Shift Lever - Measure from the back flange of shift lever to the first edge of the groove for the retaining pin, as shown in Figure 44. Early lever will measure approximately .922".

Late Manual Shift Lever - Measure from the back flange of shift lever to the first edge of the groove for the retaining pin, as shown in Figure 45. The Late lever will measure approximately .753".

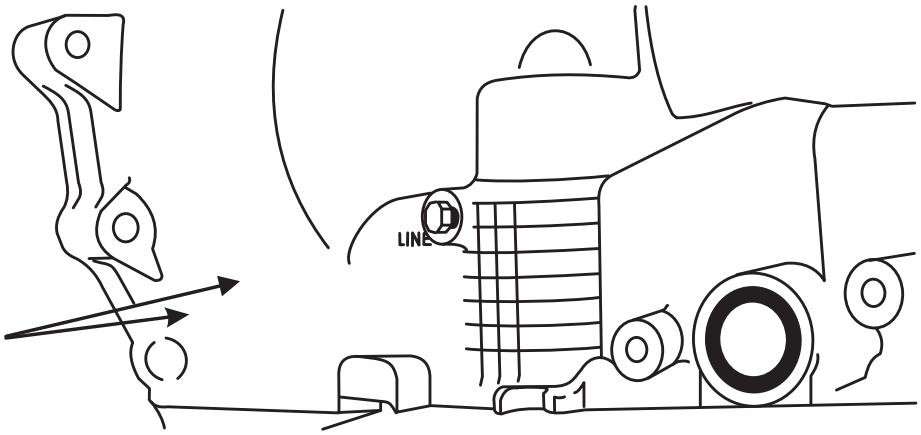
(3) MANUAL LEVER POSITION SENSOR - Has two different heights of torque limiters.

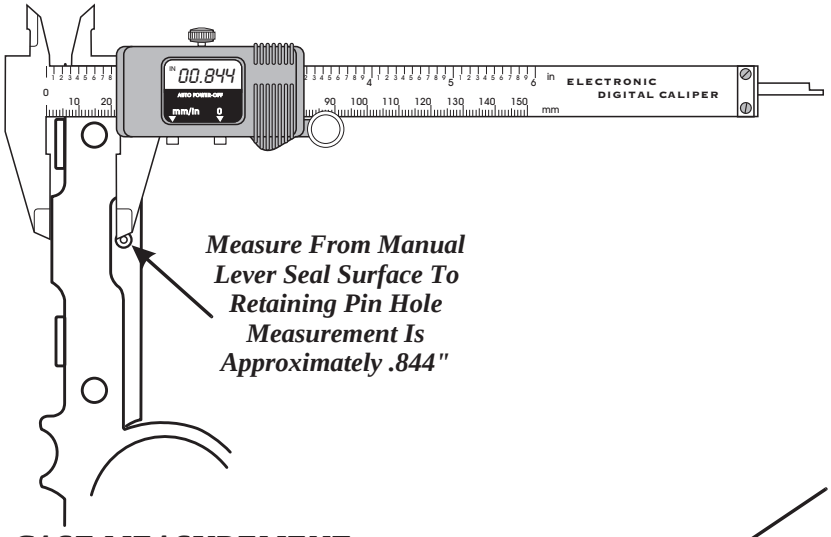
Early MLPS - Has the ***short*** torque limiters, as ahown in Figure 44.

Late MLPS - Has the ***tall*** torque limiters, as shown in Figure 45.

CORRECTION: It is ***mandatory*** that the proper parts be installed into the proper case, ***as the parts listed above are not interchangeable***. Refer to Figure 44 for the early parts and to Figure 45 for the late parts.

EARLY DESIGN

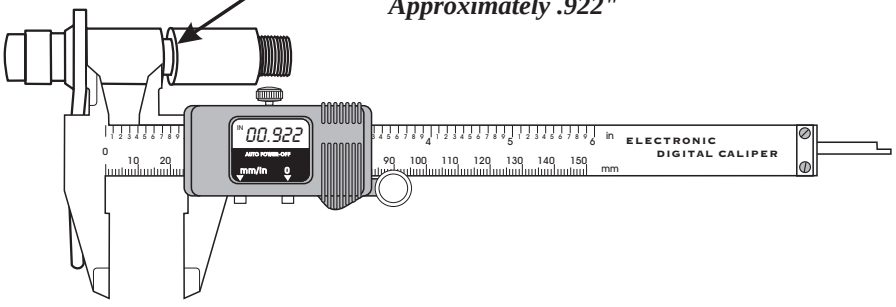




CASE MEASUREMENT

MANUAL LEVER MEASUREMENT

Measure From Manual Lever Surface To Retaining Pin Groove Measurement Is Approximately .922"



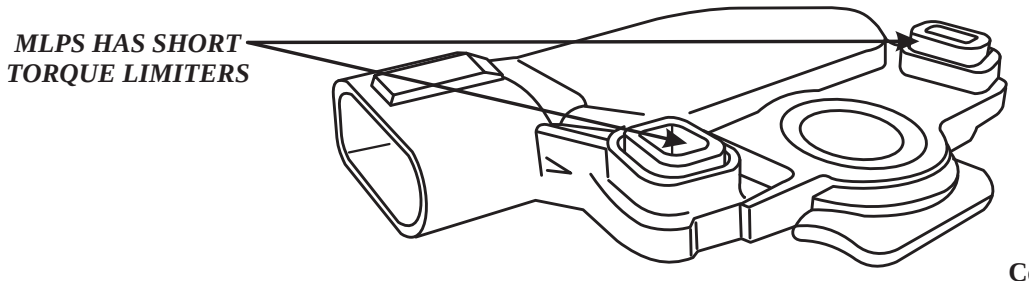
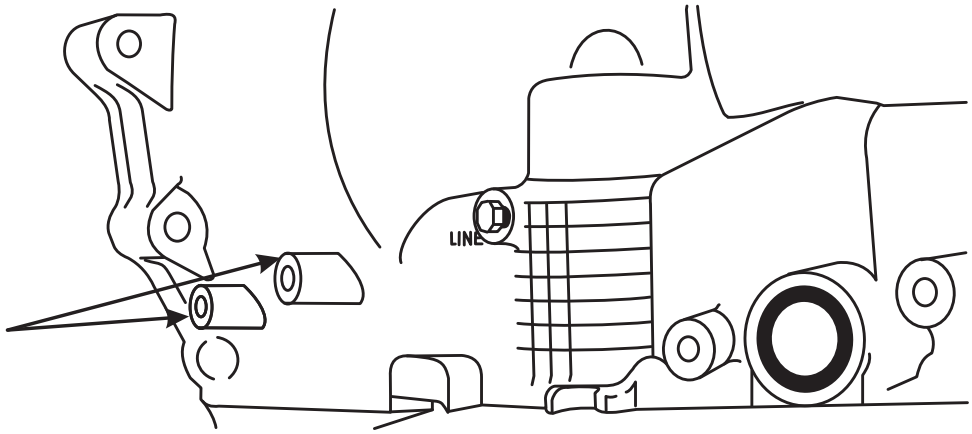
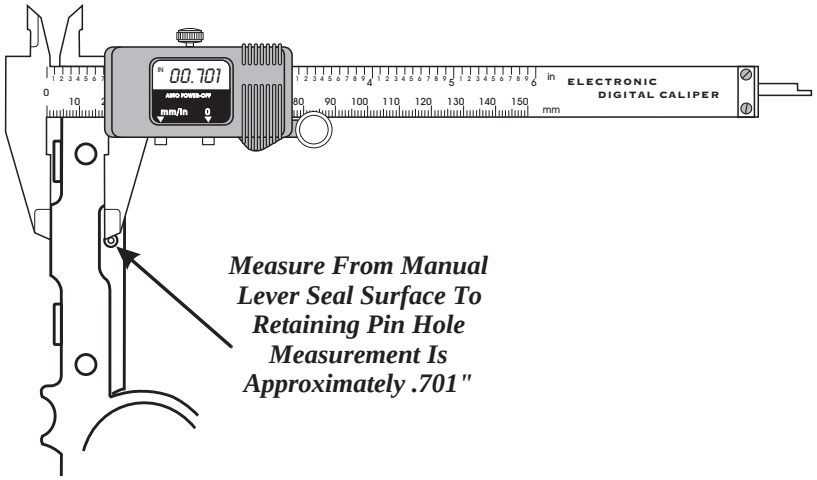


Figure 44

LATE DESIGN



TWO DRILLED AND TAPPED BOSSES IN THIS AREA

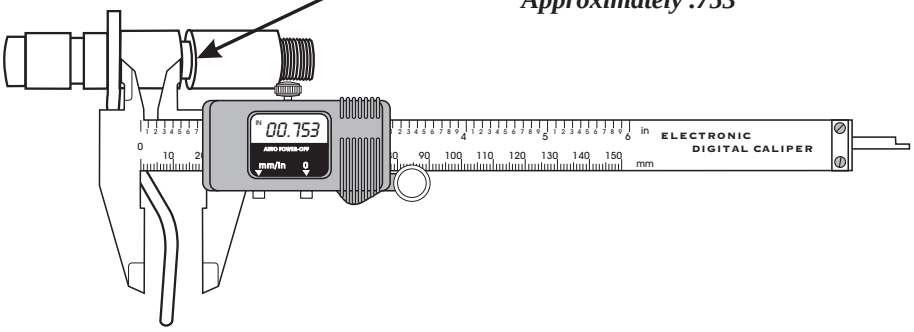


Measure From Manual Lever Seal Surface To Retaining Pin Hole Measurement Is Approximately .701"

CASE MEASUREMENT

MANUAL LEVER MEASUREMENT

Measure From Manual Lever Surface To Retaining Pin Groove Measurement Is Approximately .753"



MLPS HAS TALL TORQUE LIMITERS

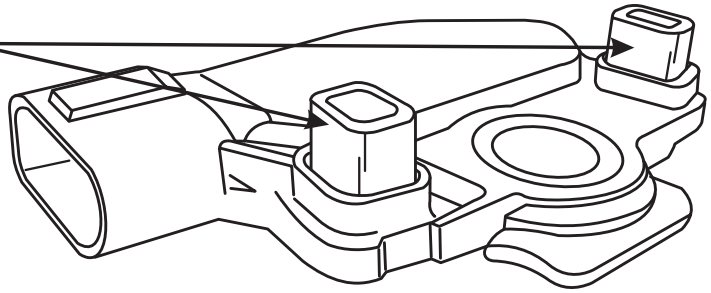


Figure 45

FORD 4R70W

INTERMITTENT TCIL ILLUMINATION DTCS P0741, P0750, P0755 AND P1746 MAY BE STORED IN MEMORY

COMPLAINT: Intermittent Transmission Control Indicator Lamp (TCIL) or Malfunction Indicator Lamp (MIL) illumination may occur on some vehicles equipped with the 4R70W transmission. Diagnostic Trouble Codes (DTCs) P0741, P0750, P0755 and P1746 may be stored in the processors memory.

CAUSE: The cause may be, the solenoid interconnect molded lead frame not being fully seated on the solenoid pack or the bulkhead interconnect clips not being fully seated between the solenoid interconnect molded lead frame and bulkhead interconnect.

CORRECTION: Refer to the following service procedure:

(1) Perform the normal diagnosis routines for the DTCs retrieved from processor memory.

(2) Remove the transmission oil pan per the appropriate model Workshop Manual.

(3) Verify that the solenoid interconnect molded lead frame is fully seated on all the solenoid connectors as shown in Figure 46. If the solenoid interconnect molded lead frame is fully seated, then gently remove the solenoid interconnect molded lead frame, valve body and the bulkhead interconnect.

(4) With the bulkhead interconnect removed, push down on the terminal cover and check to see if any of the terminals are slightly protruding above the plastic cover as shown in Figure 47. Gently pry off the terminal cover using a small screwdriver (See Figure 48). With the terminal cover off, inspect the bulkhead interconnect for spreading terminals as shown in Figure 49.

(5) Replace parts as necessary using the part numbers listed below and reassemble unit.

SERVICE INFORMATION:

Bulkhead Interconnect (Case Connector)	F8AZ-7G276-AA
Solenoid Interconnect (Internal Molded Harness)	F8AZ-7G276-BA

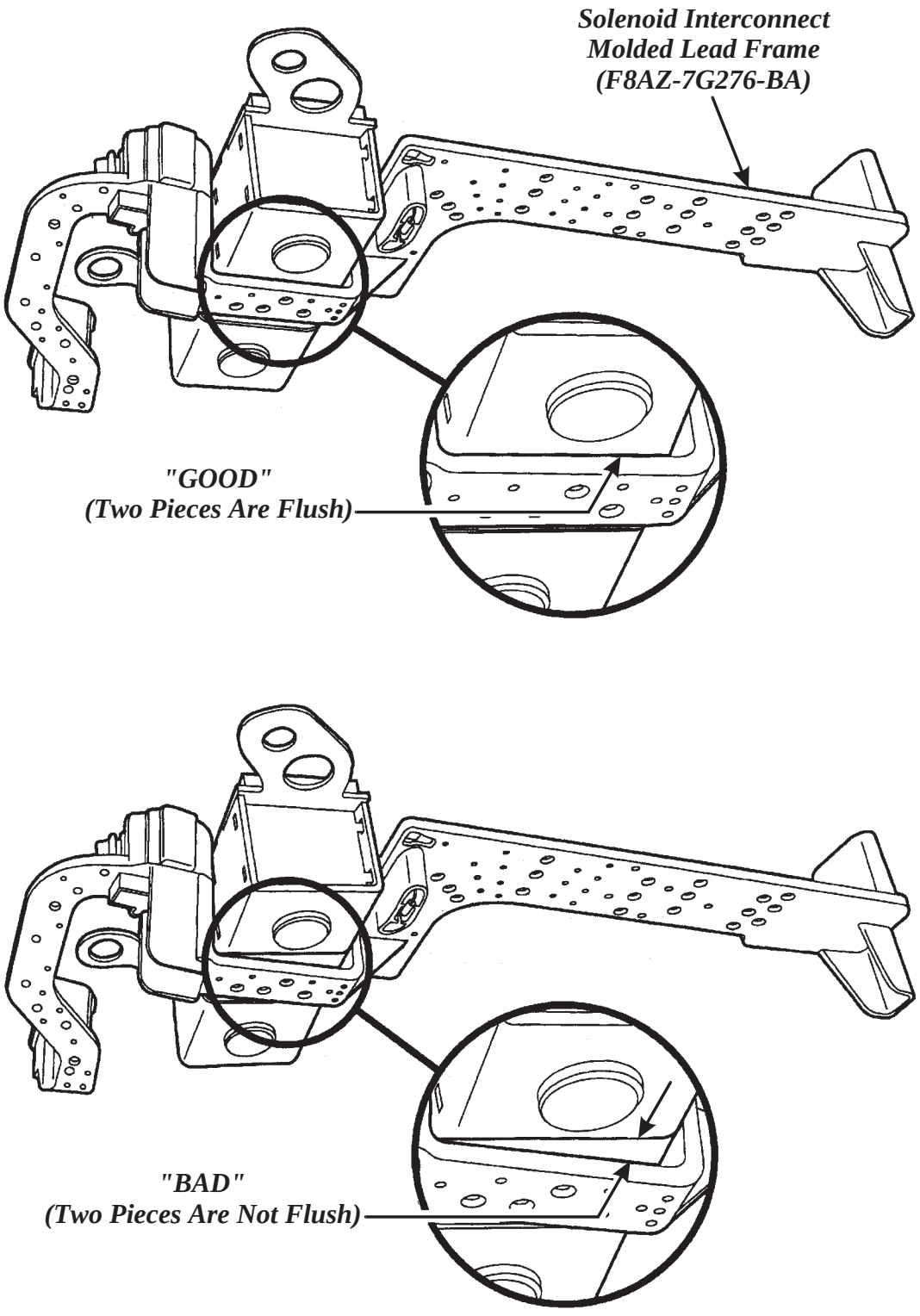


Figure 46

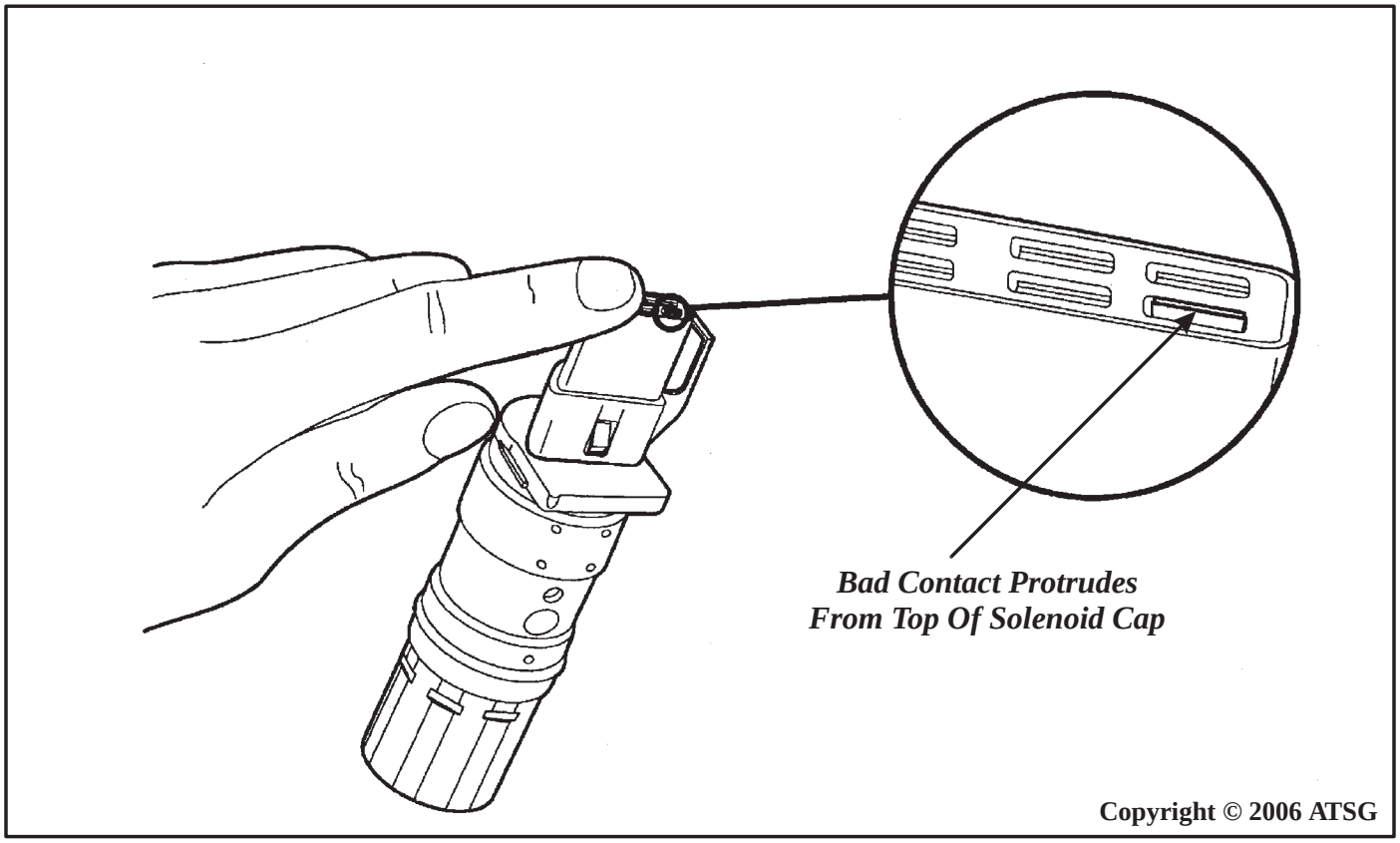


Figure 47

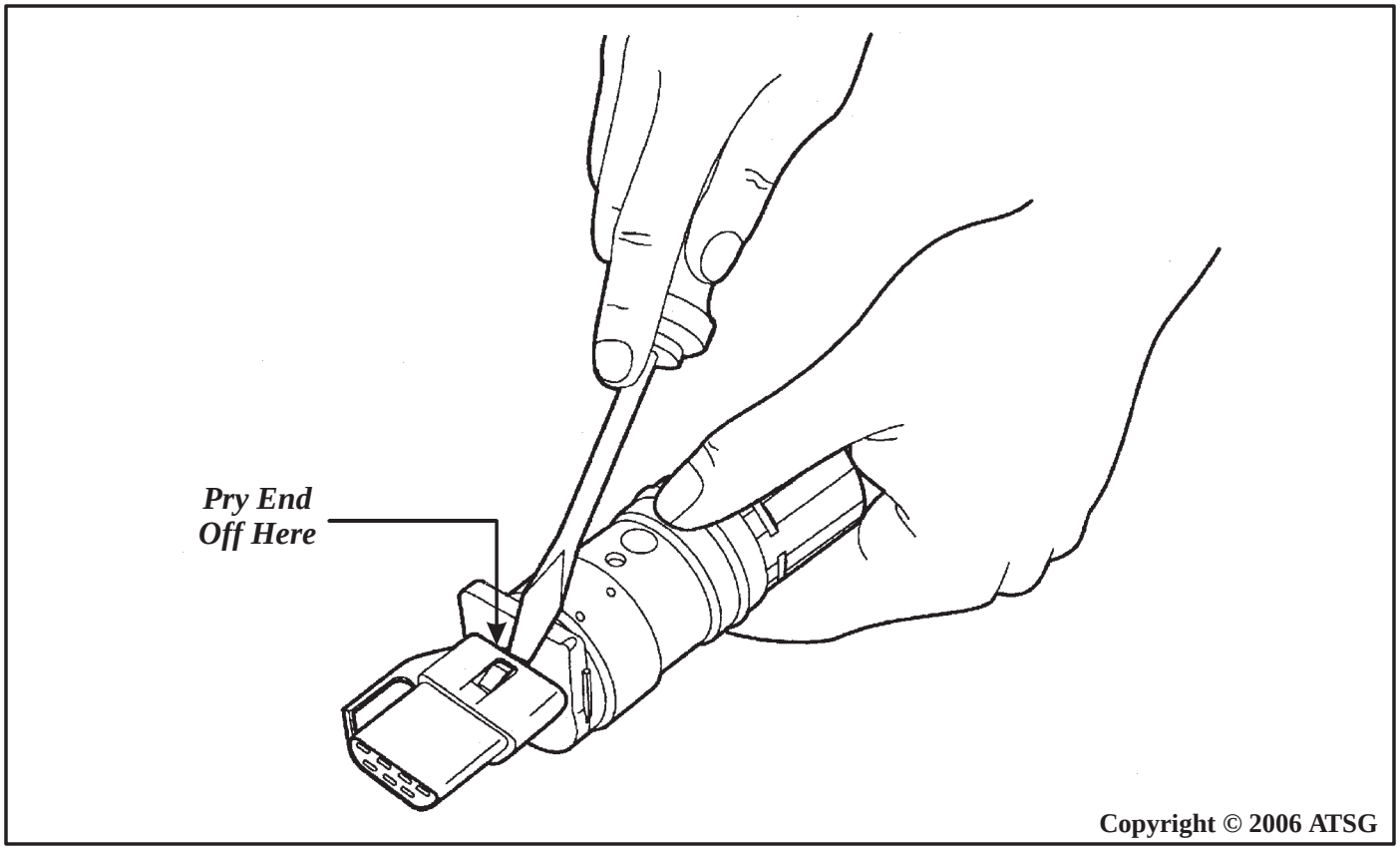


Figure 48

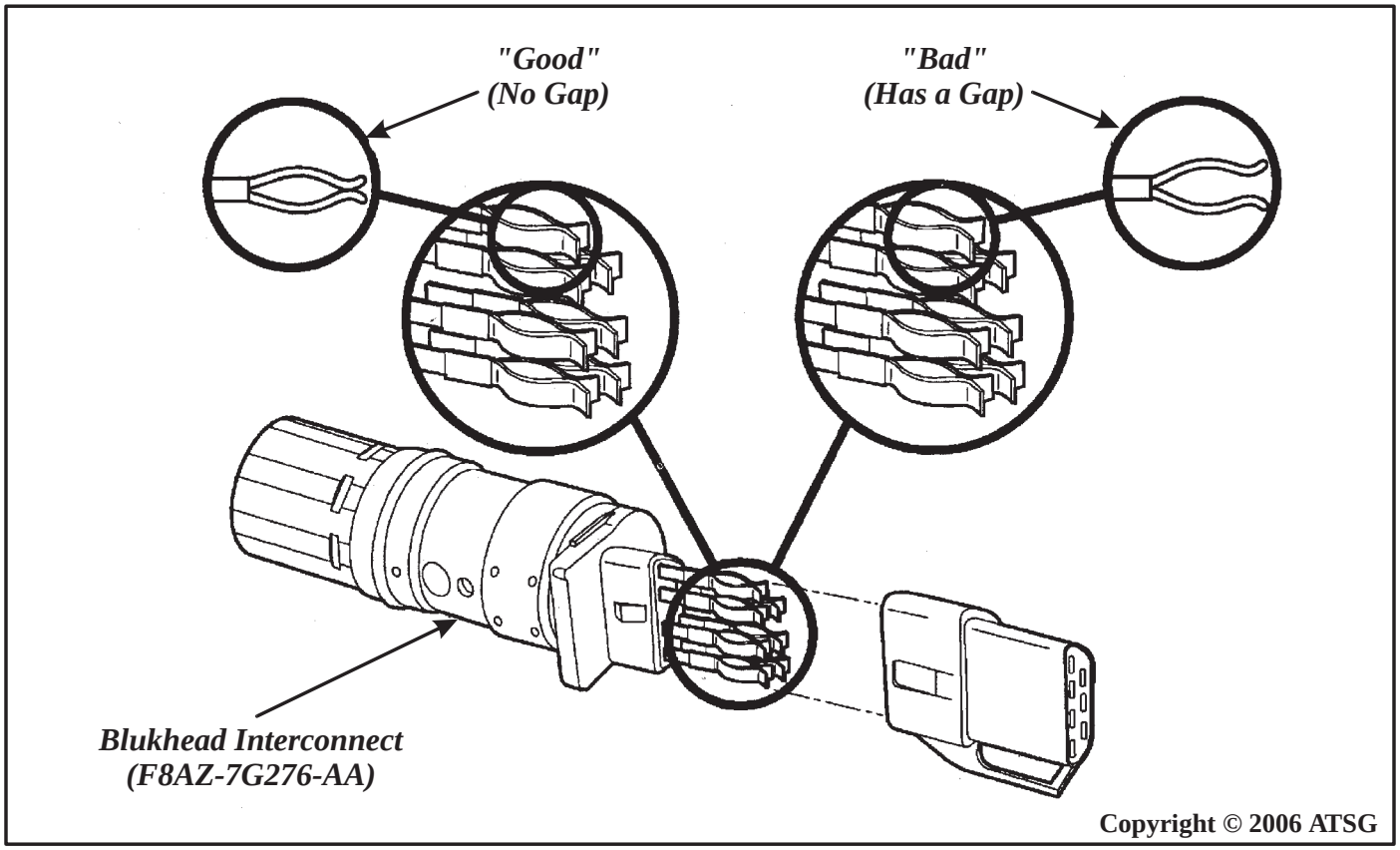


Figure 49

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 pleaseability and 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 51. Figure 50 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 around the plate that was eliminated over the Direct Clutch Accumulator, as shown in Figure 52.

(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 54 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. Figure 53 shows a view of the previous design Spacer Plate.

(4) DIRECT CLUTCH ACCUMULATOR RETAINER - The retainer for the accumulator received a dimensional change to accommodate the elimination of the plate over the the Direct Clutch Accumulator, as shown in Figure 55.

(5) MAIN VALVE BODY - The main valve body received casting changes to accommodate the removal of the Orifice Control Valve and the 2-3 Capacity Modulator Valve, as shown in Figures 56, 57 and 58.

(6) CASE - The Overdrive Servo Bleed orifice, as shown in Figure 59, was eliminated to accommodate the hydraulic circuit changes in the Overdrive Servo Regulator Valve. Refer to Figure 60 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

PREVIOUS DESIGN VALVE BODY LOWER SIDE

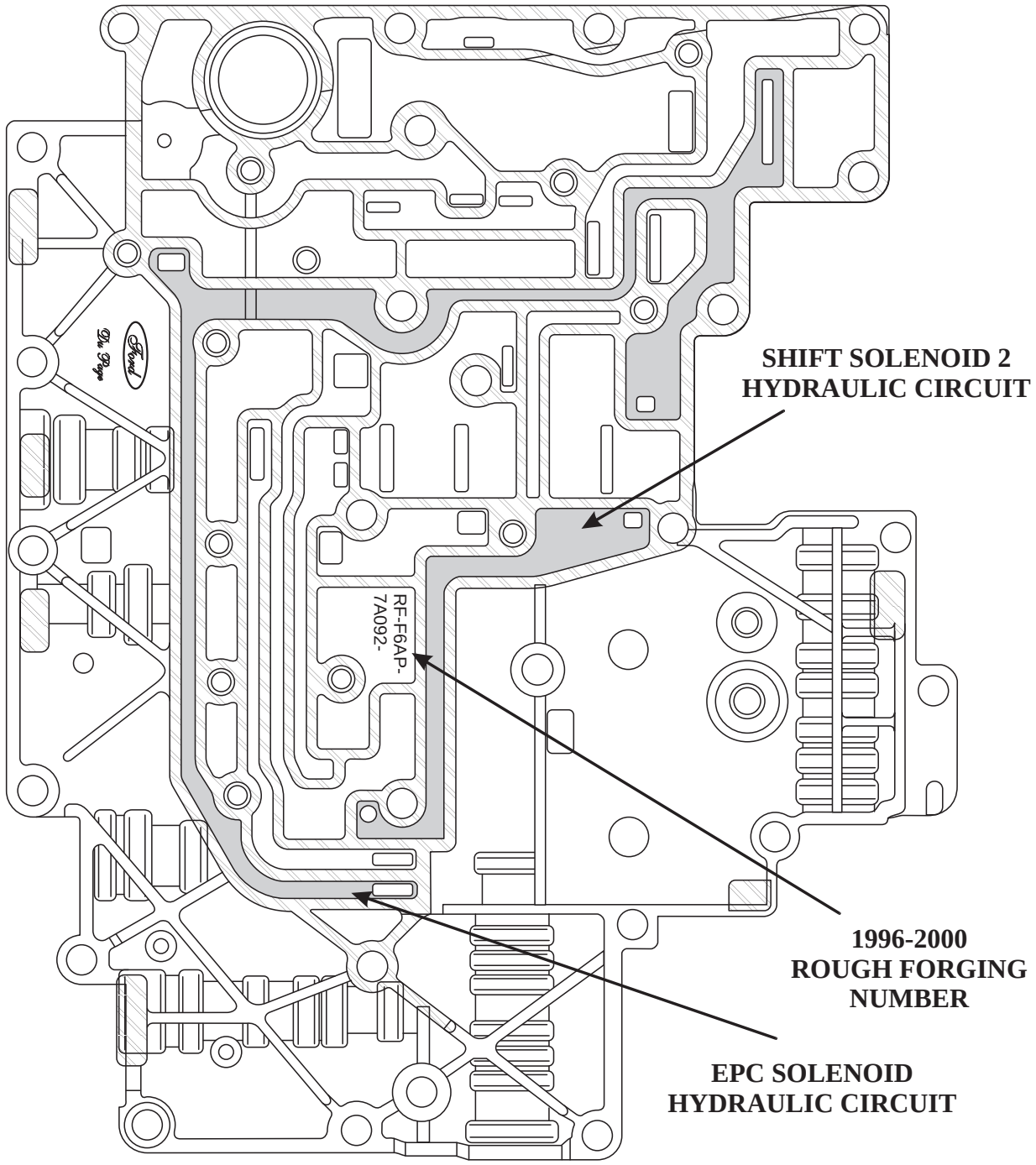


Figure 50

2001 & UP DESIGN VALVE BODY LOWER SIDE

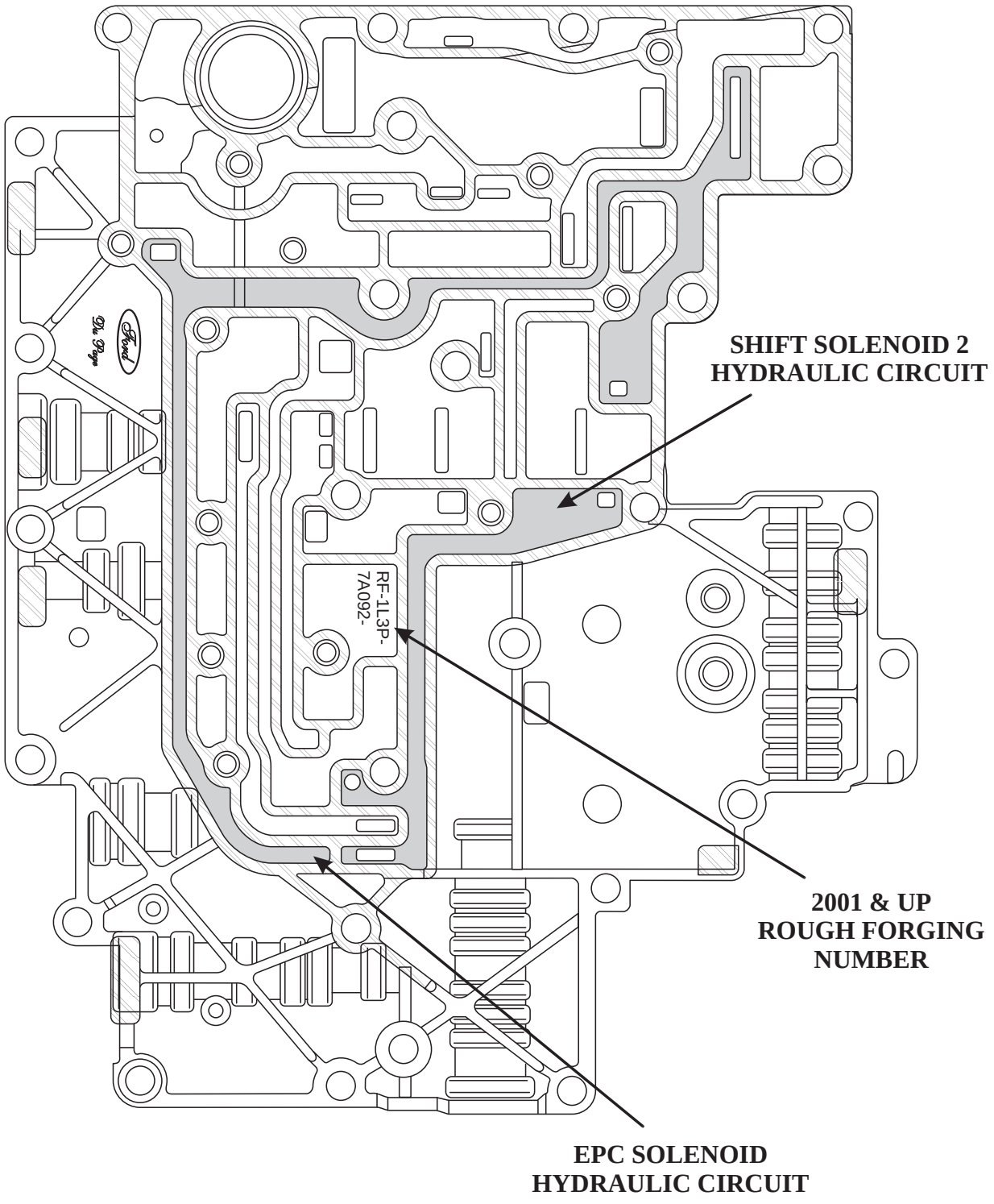
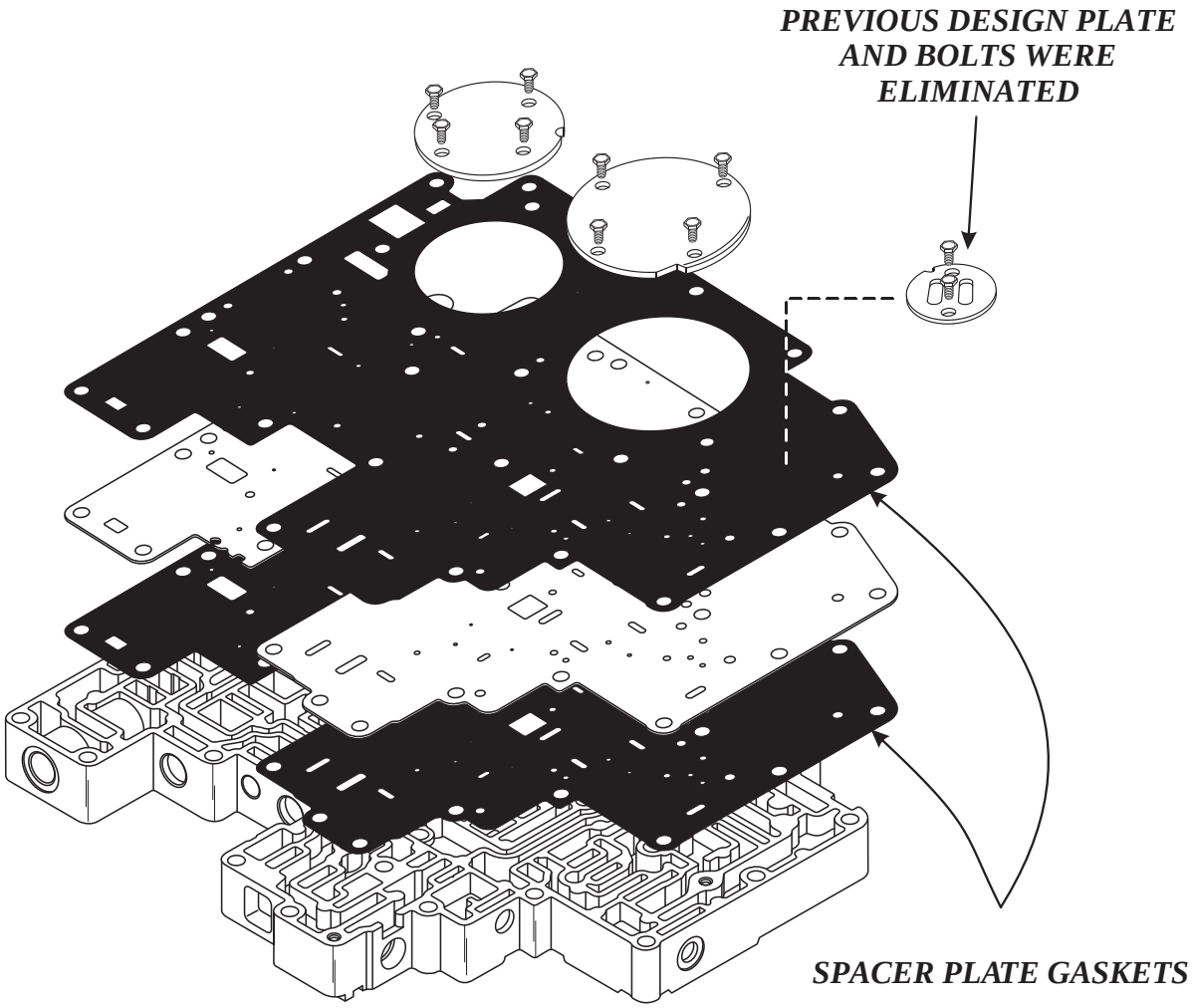


Figure 51

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 52

PREVIOUS DESIGN SPACER PLATE

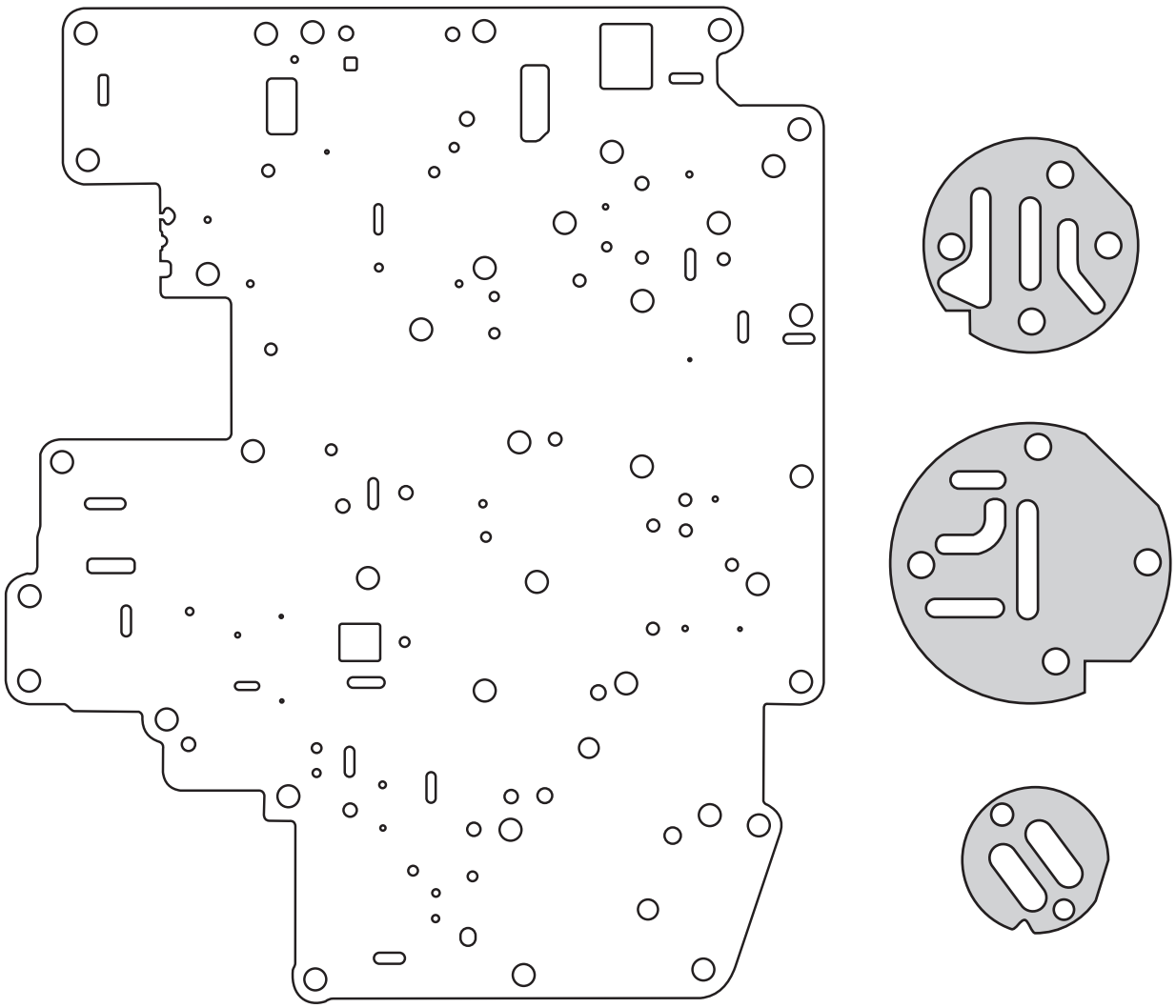
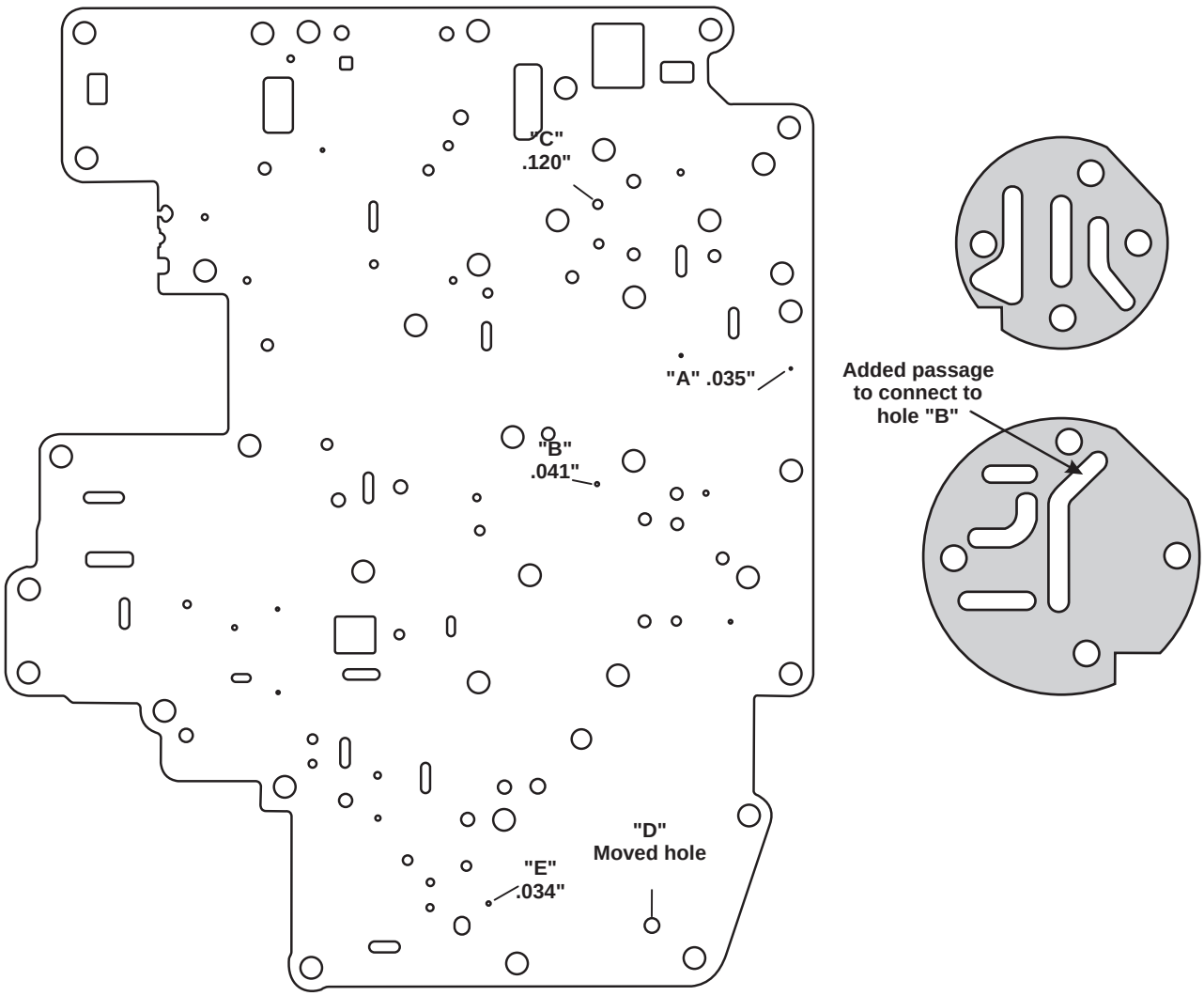


Figure 53

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 54

DIRECT CLUTCH ACCUMULATOR RETAINER

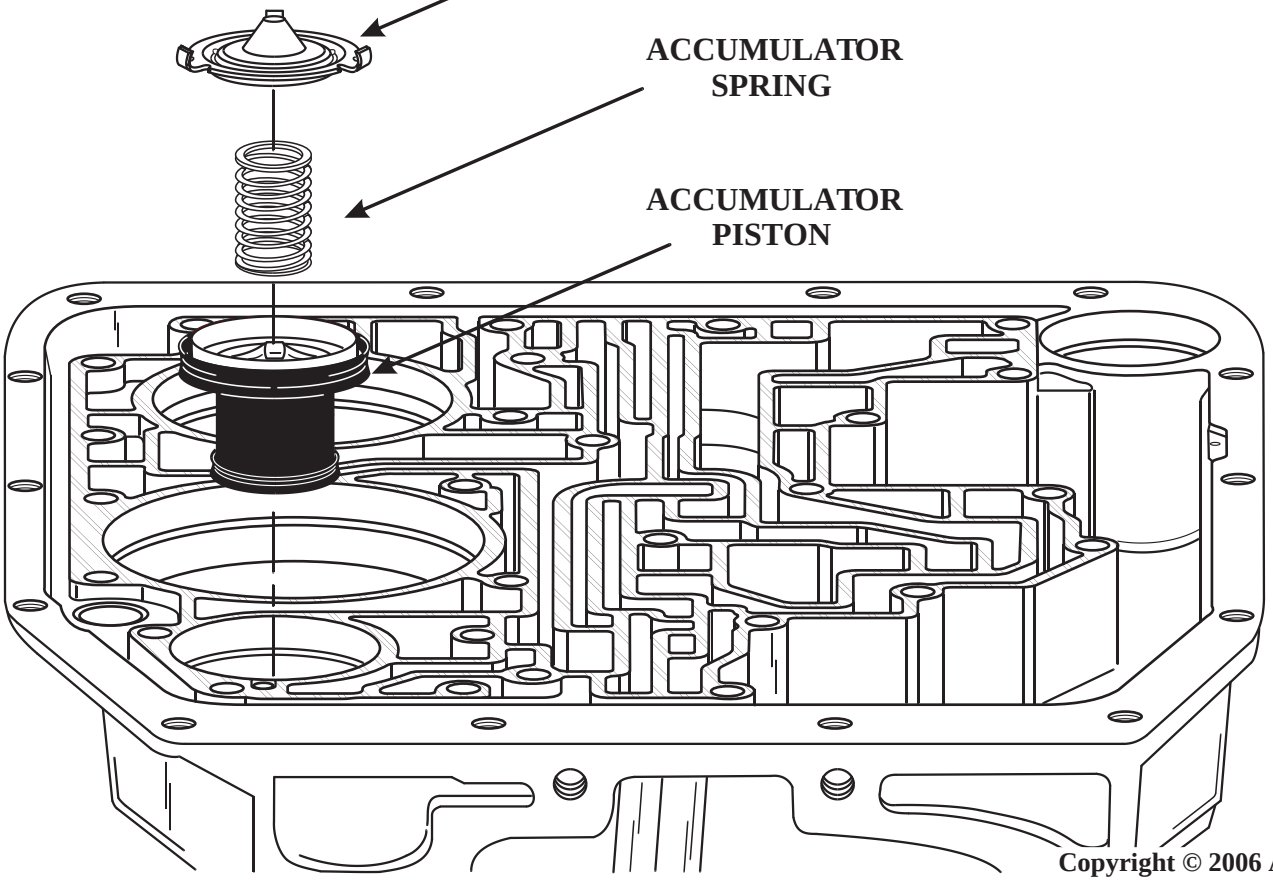


Figure 55

FORD 4R70W
2001-UP MAIN VALVE BODY EXPLODED VIEW

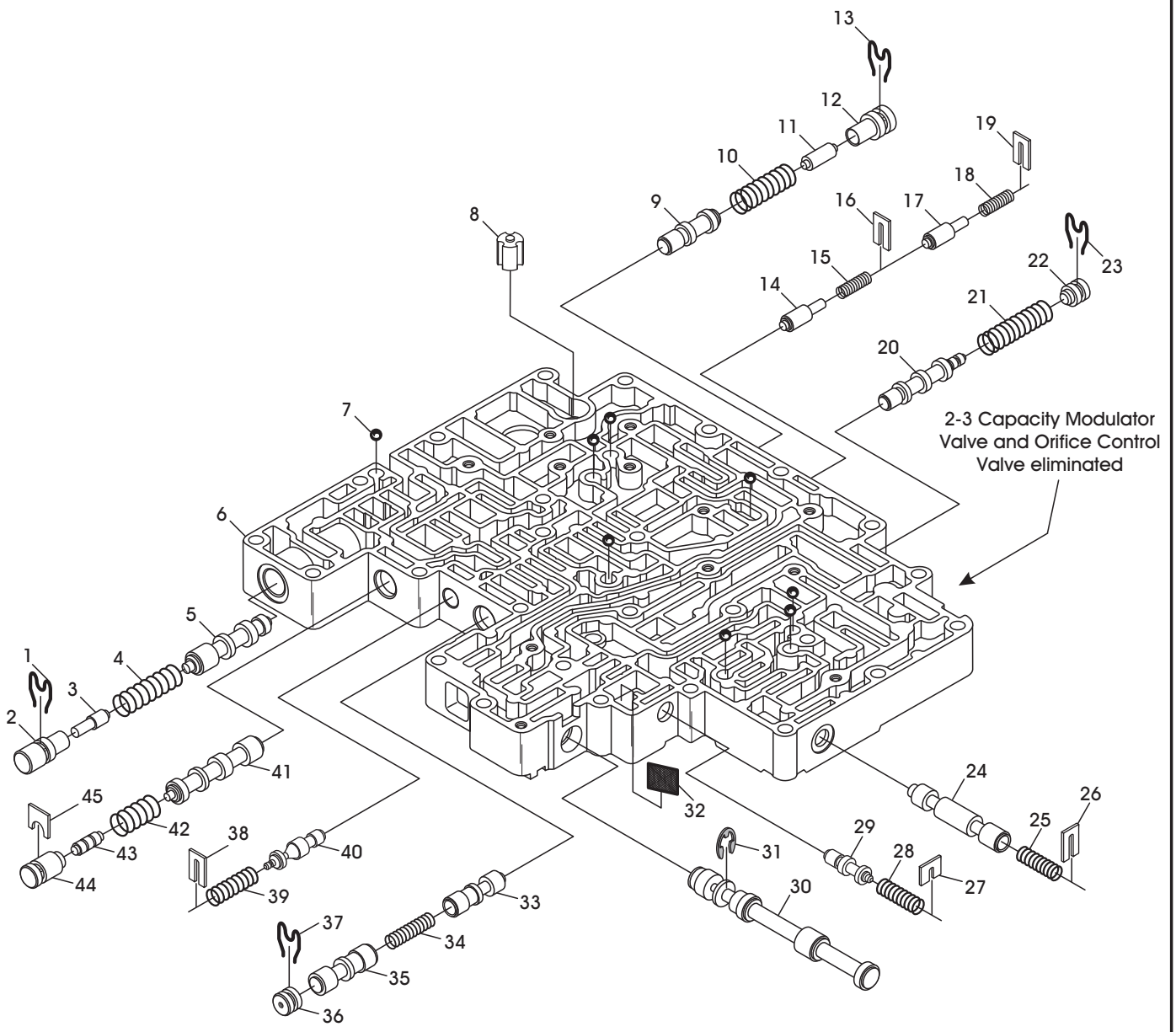


Figure 56

FORD 4R70W

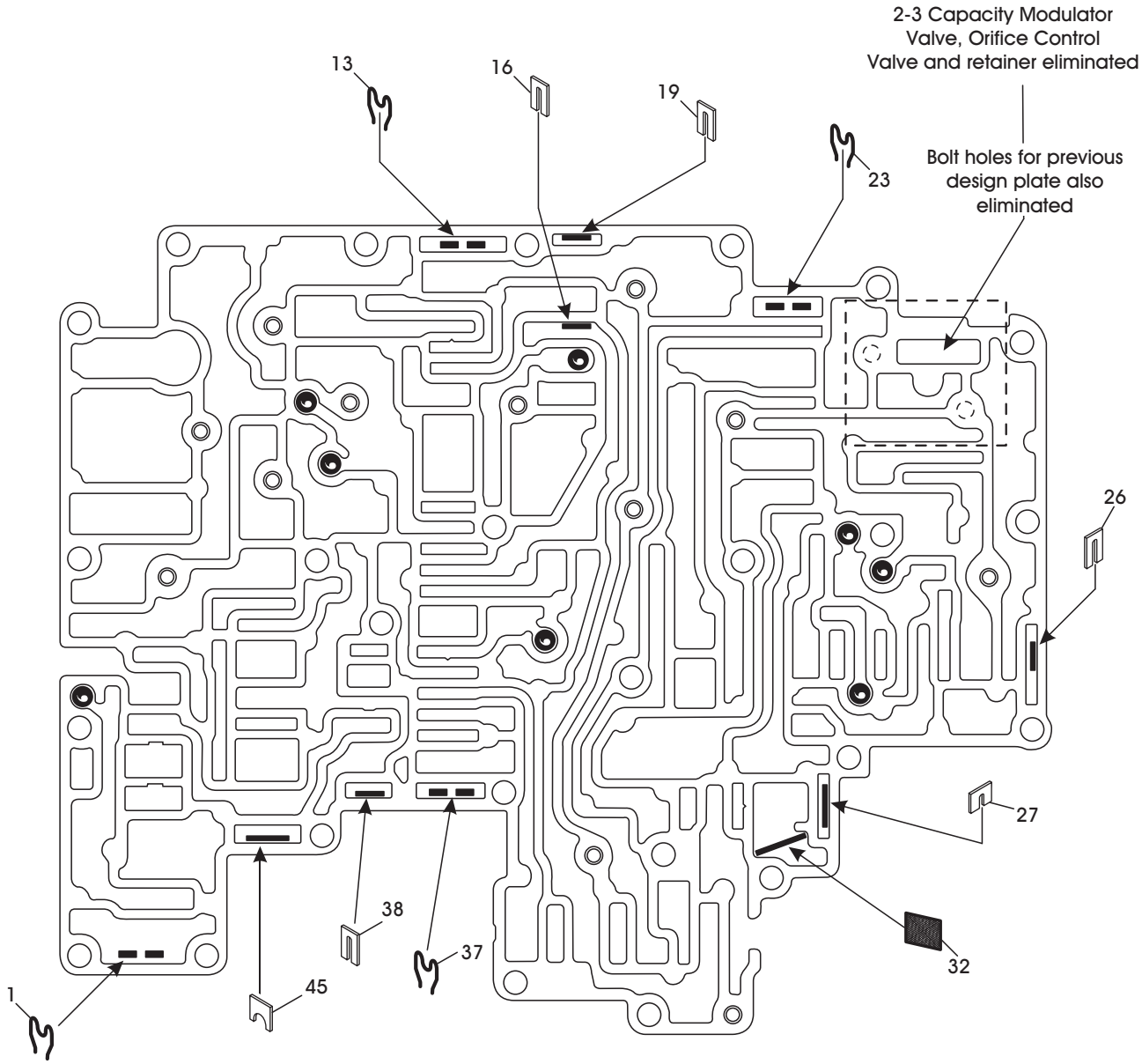
MAIN VALVE BODY LEGEND

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 57

2001 & UP FORD 4R70W

VALVE BODY CHECKBALL AND RETAINER LOCATIONS

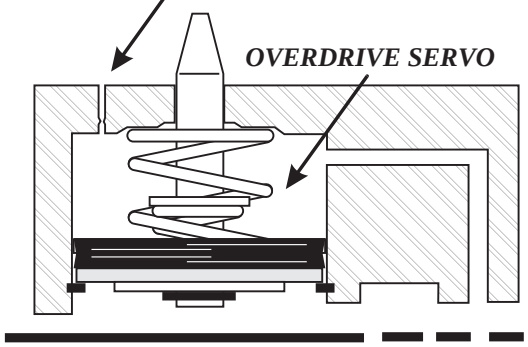


Refer to Valve Body Legend on Page 63

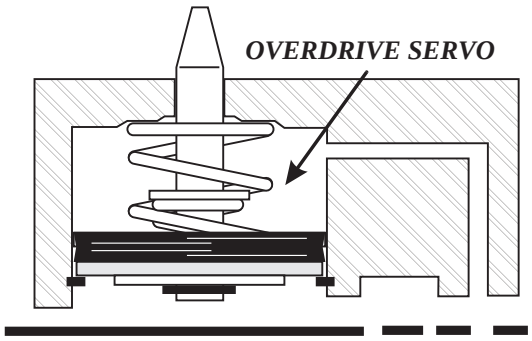
Figure 58

CASE CHANGES

PREVIOUS DESIGN
CASE *"WITH"* .020" BLEED ORIFICE



2001 & UP DESIGN
CASE *"WITHOUT"* BLEED ORIFICE



OVERDRIVE SERVO
BORE

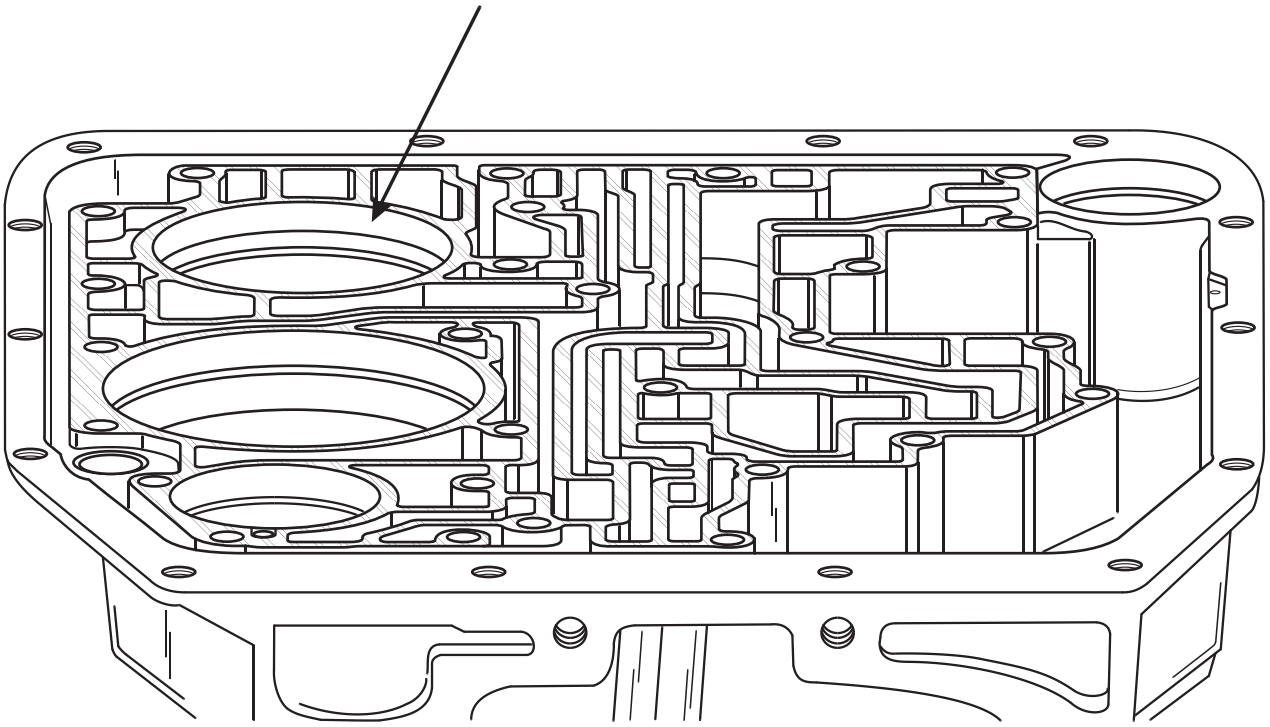


Figure 59

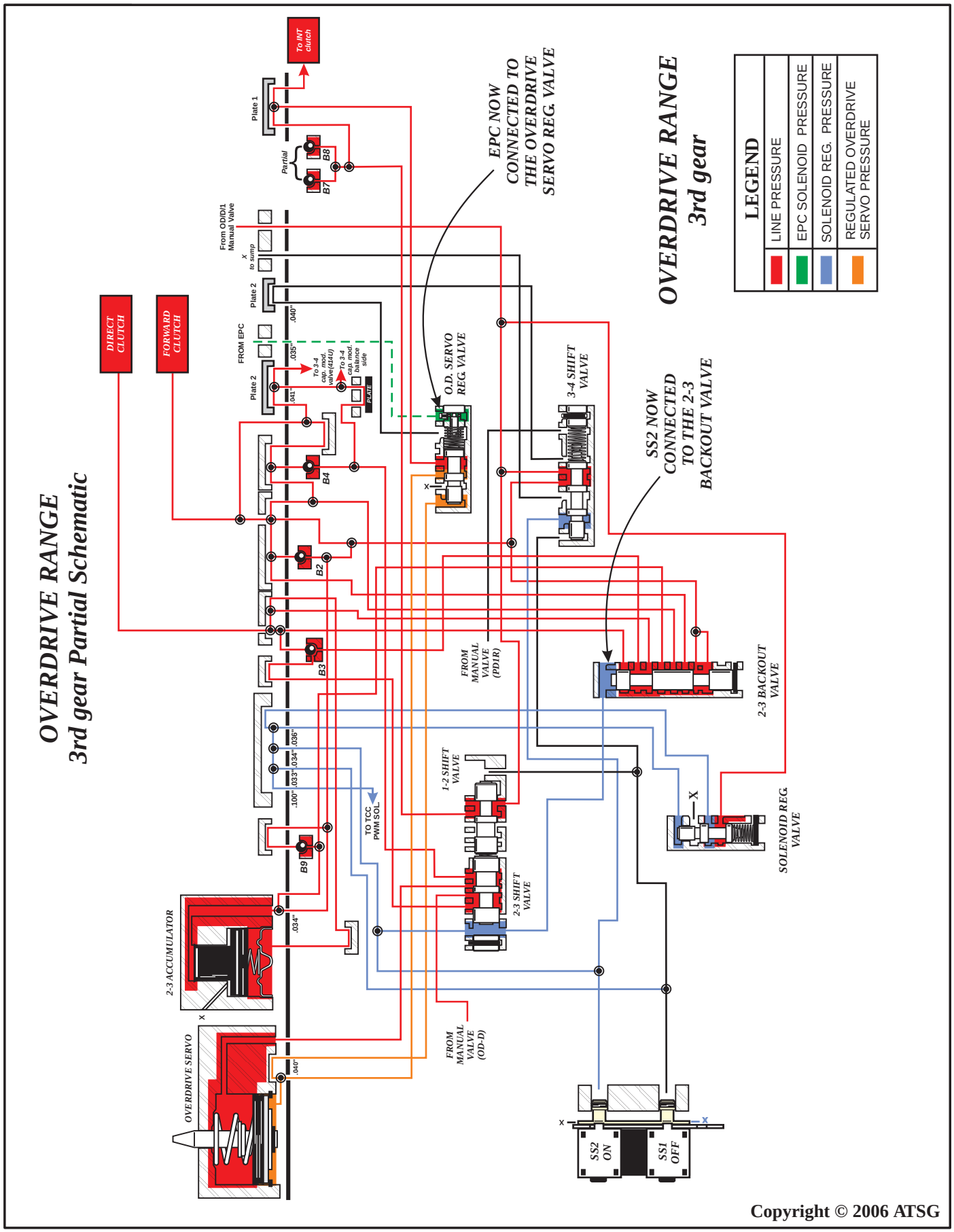
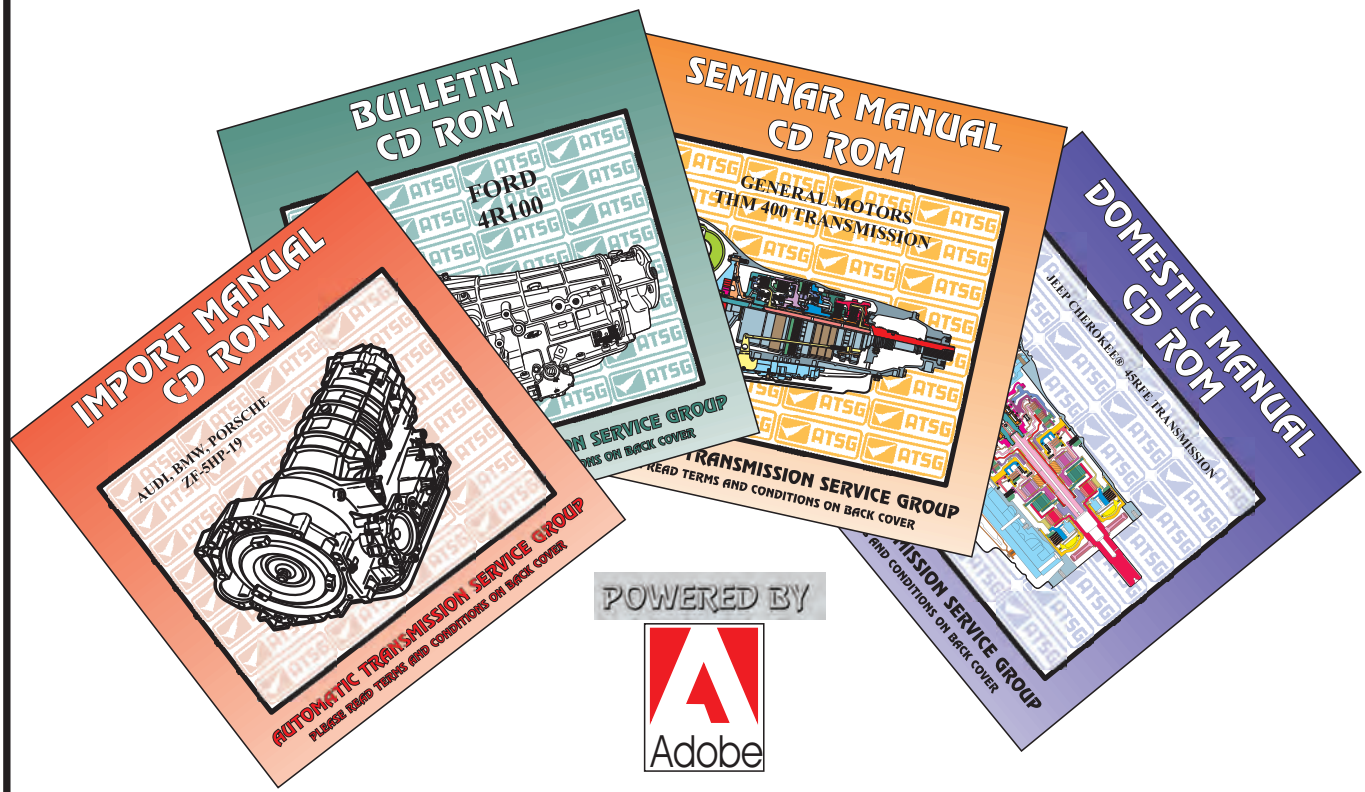


Figure 60

AUTOMATIC TRANSMISSION SERVICE GROUP

THE MOST COMPLETE LINE OF DOMESTIC AND IMPORT MANUALS IS NOW AVAILABLE FOR ALL WINDOWS AND MAC OPERATING SYSTEMS "NEW ADOBE ACROBAT VERSION"



FOR MORE INFORMATION CALL (800) 245-7722 OR VISIT US ON THE WEB WWW.ATSG.BIZ

FORD 4R70E/4R75E
2004 PRODUCTION CHANGES

CHANGE: Beginning at the start of production for 2004, Ford Motor Co. introduced a new rear drive transmission with the designation 4R70E or 4R75E, and based on the 4R70W unit. The 4R75E has a hardened planetary carrier, the 4R70E does not. This transmission now has a redesigned Pump and Stator assembly, Intermediate Clutch assembly, Forward Drum, Sun gear shell, Center Support, Anti-Clunk Clip, an added Turbine Speed Sensor, a new Transmission Case, a shorter Output Speed Sensor, a new planetery carrier and a redesigned Internal Ring Gear.

REASON: Much improved and more accurate gear calculation for improved up-shift and downshift timing in all ranges, and for ease of assembly.

PARTS AFFECTED:

(1) INTERMEDIATE CLUTCH PISTON - The Intermediate Clutch Piston is now a stamped steel, molded rubber piston and is larger in diameter, as shown in Figure 61. The bleed orifice is now a check ball capsule, as shown in Figure 61. The Return Spring Assembly in the previous design level with the aluminum piston has been eliminated.

(2) INTERMEDIATE CLUTCH PISTON RETURN SPRING AND RETAINER- A new design return spring and retainer was added and now installs into the case, as shown in Figure 62, to accommodate the new design level piston. Figure 63 shows cut-away views of both retainers.

(3) OIL PUMP BODY - The Oil Pump body was redesigned to accommodate the new larger piston and the elimination of the Spring retainer. Refer to Figure 64 for the dimensions to identify the new design level oil pump body from the previous design.

(4) OIL PUMP STATOR - The Oil Pump Stator Forward Clutch sealing ring groove depth changed to accommodate a new Plastic Butt Cut Sealing Ring, as shown in Figure 65, for much improved sealing capability.

(5) FORWARD CLUTCH DRUM - The Forward Clutch Drum had a stamping change to provide projections for the added Turbine Shaft Speed Sensor, as shown in Figure 66.

(6) CENTER SUPPORT - The new design Center Support has a notch cut out of it, to accommodate the added Turbine Speed Sensor, as shown in Figure 67. A new design Anti-Clunk Clip was also added for ease of assembly, which was actually changed in the 2002 model year.

(7) SUN SHELL - The Sun shell can be easily identified by the new rivets that retain the shell to the Sun Gear as shown in Figure 68. The new shell is manufactured from a non-ferrous metal which is not magnetic, so the added Turbine Speed Sensor can read the Forward Clutch Drum.
NOTE: 2005 models do not have the rivets for identification and will retrofit to 2004 models.

(8) REAR PLANETARY CARRIER - The pins in the retaining plate have been eliminated. The profile of the retaining plate has changed with different machining and the retaining plate is now TIG welded, as shown in Figure 69. This was changed to make the planetary carrier easier to assemble. There were no ratio changes.

Continued on next Page

PARTS AFFECTED (Cont'd):

(9) REAR INTERNAL RING GEAR - Now manufactured with extended parking lugs on the ring gear to trigger the New, ***Shorter,*** Output Speed Sensor, instead of the previous design holes in the center of the ring gear, as shown in Figure 70.

(10) OUTPUT SHAFT SPEED SENSOR - Stem is now manufactured .100" shorter and reads the extended parking lugs instead of the previous holes in ring gear. (See Figure 71).

(11) TRANSMISSION MAIN CASE - The Transmission Case was changed to accommodate the added Turbine Shaft Speed Sensor, as shown in Figure 71.

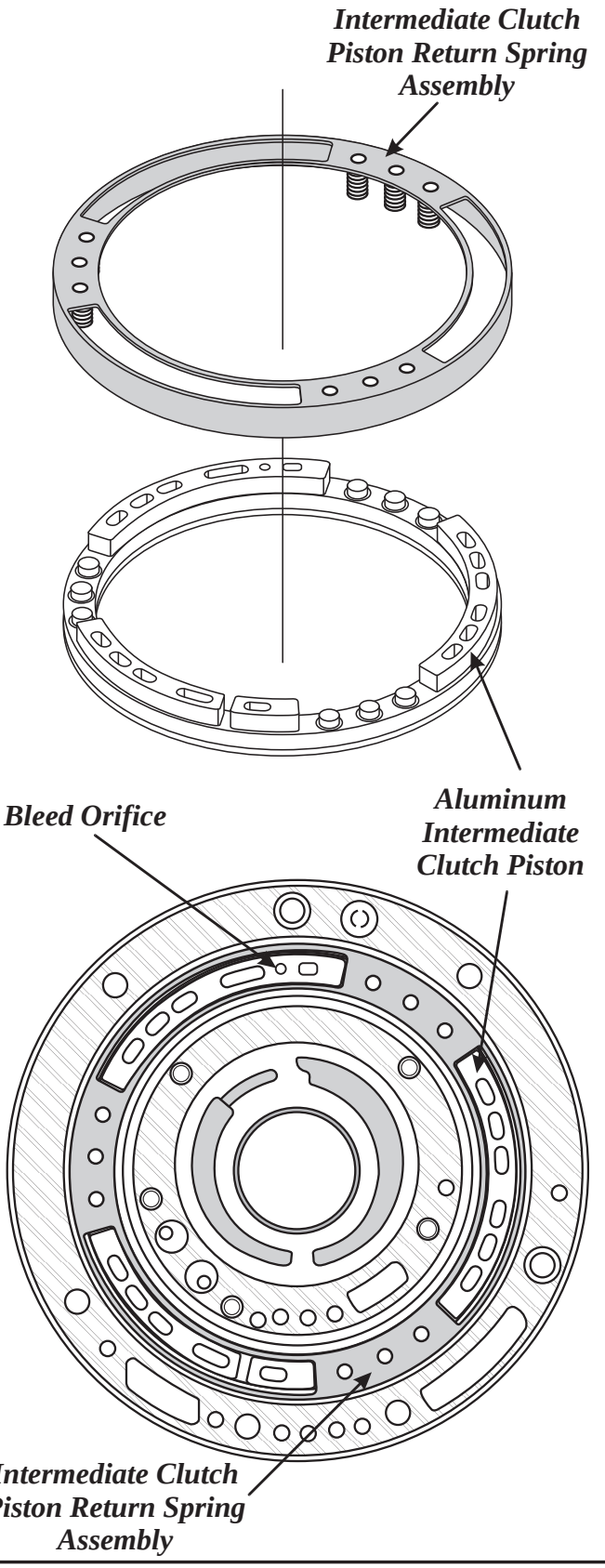
INTERCHANGEABILITY:

None of the parts listed above will interchange with the previous design 4R70W parts.

SERVICE INFORMATION:

INTERMEDIATE CLUTCH BONDED PISTON.....3L3Z-7E005-AA
FORWARD CLUTCH PLASTIC SEALING RINGS (2).....3L3Z-7D019-AA
FORWARD CLUTCH DRUM..... 3L3Z-7F207-AA
SUN GEAR SHELL.....5L3Z-7A019-AB
TURBINE SHAFT SPEED SENSOR.....3L3Z-7M101-AA
OUTPUT SHAFT SPEED SENSOR.....3L3Z-7H103-AA

"PREVIOUS DESIGN" INTERMEDIATE CLUTCH PISTON ASSEMBLY



"NEW" DESIGN INTERMEDIATE CLUTCH PISTON ASSEMBLY

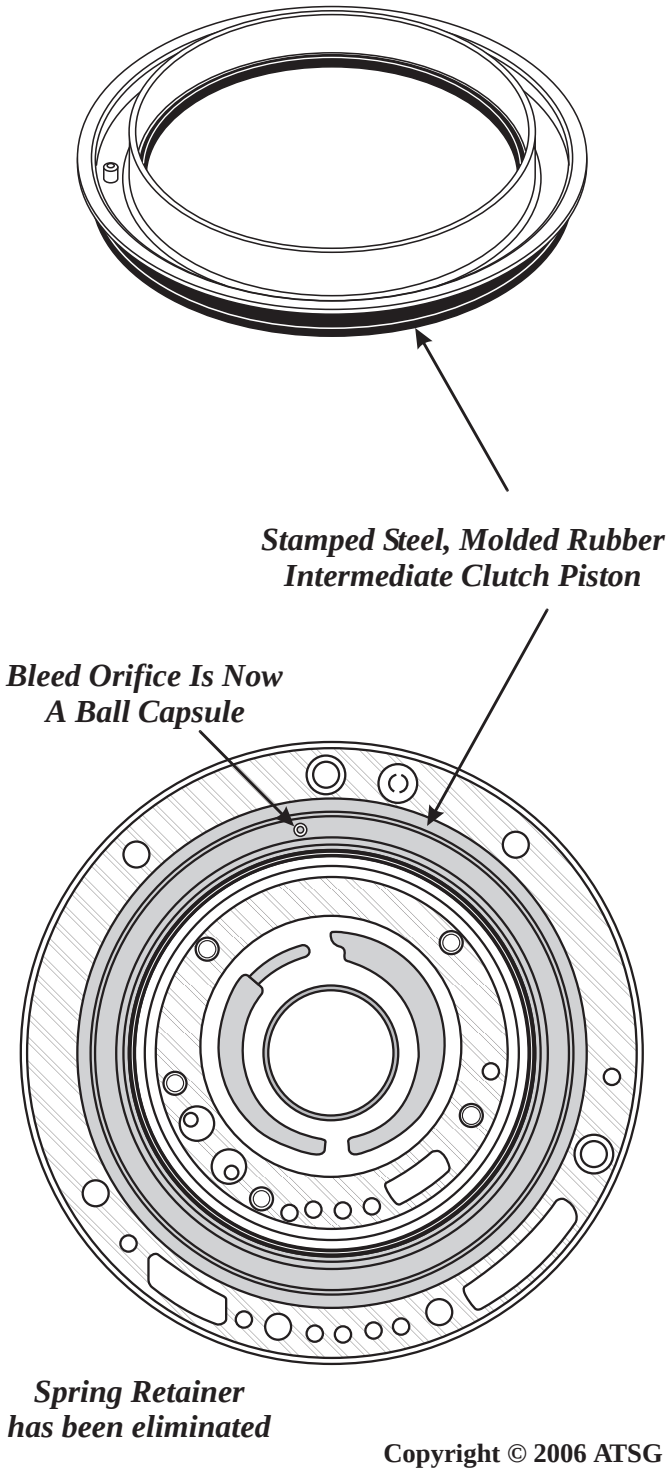


Figure 61

NEW DESIGN LEVEL RETURN SPRING AND INTERMEDIATE CLUTCH ASSEMBLY

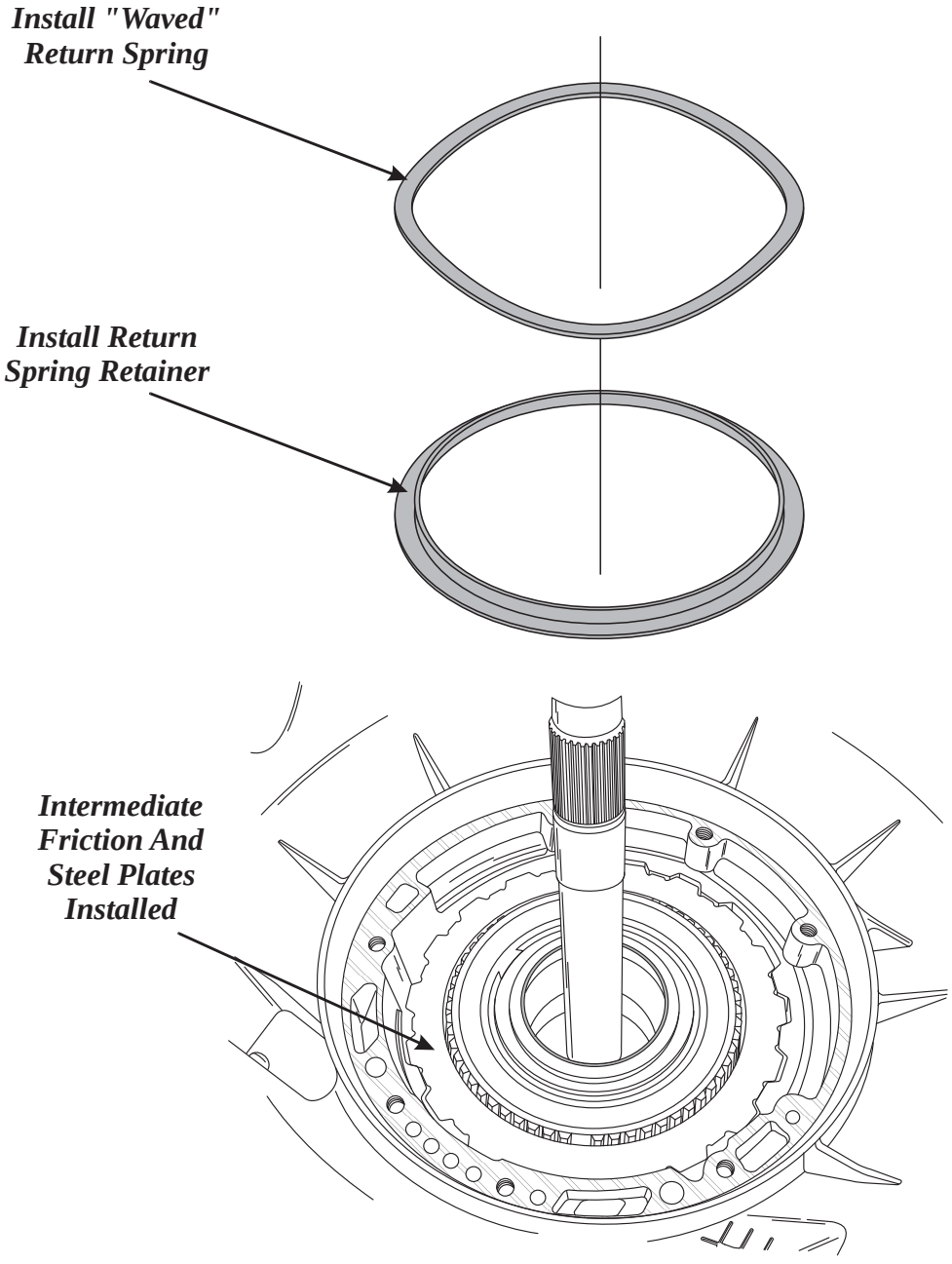
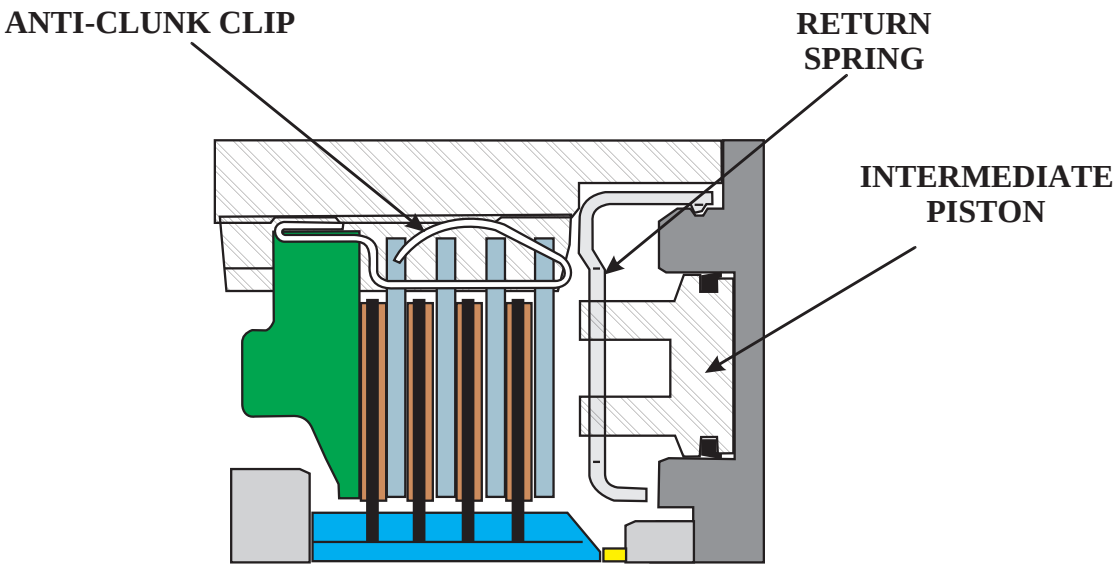


Figure 62

"PREVIOUS DESIGN" PUMP AND INTERMEDIATE CLUTCH PISTON CROSS-SECTION



"NEW DESIGN" PUMP AND INTERMEDIATE CLUTCH PISTON CROSS-SECTION

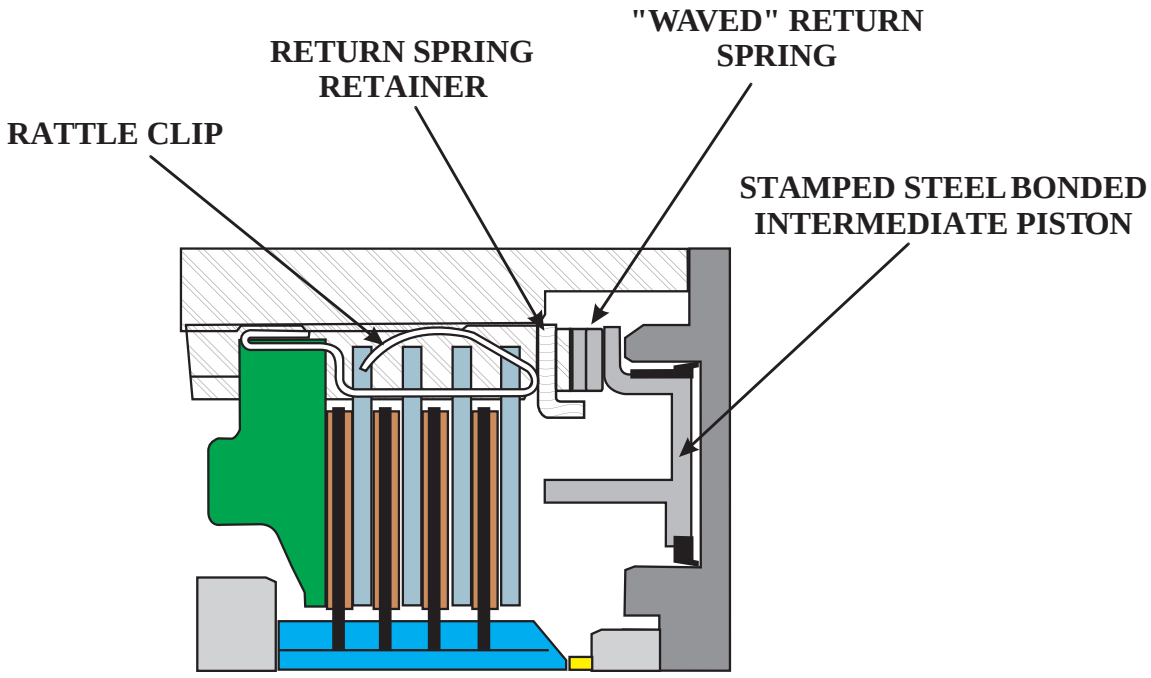
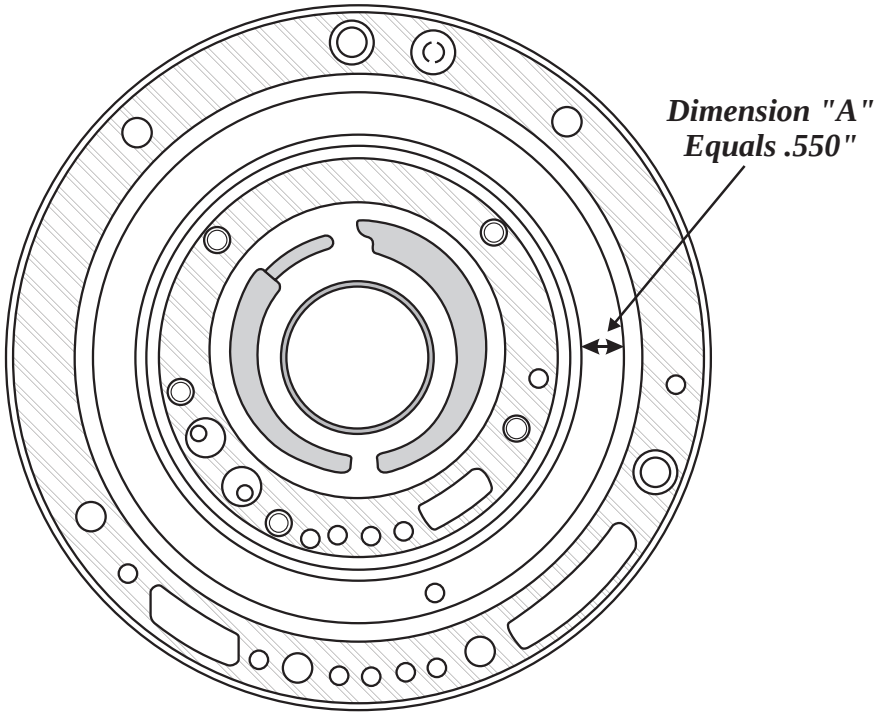


Figure 63

"PREVIOUS DESIGN" PUMP BODY



"NEW DESIGN" PUMP BODY

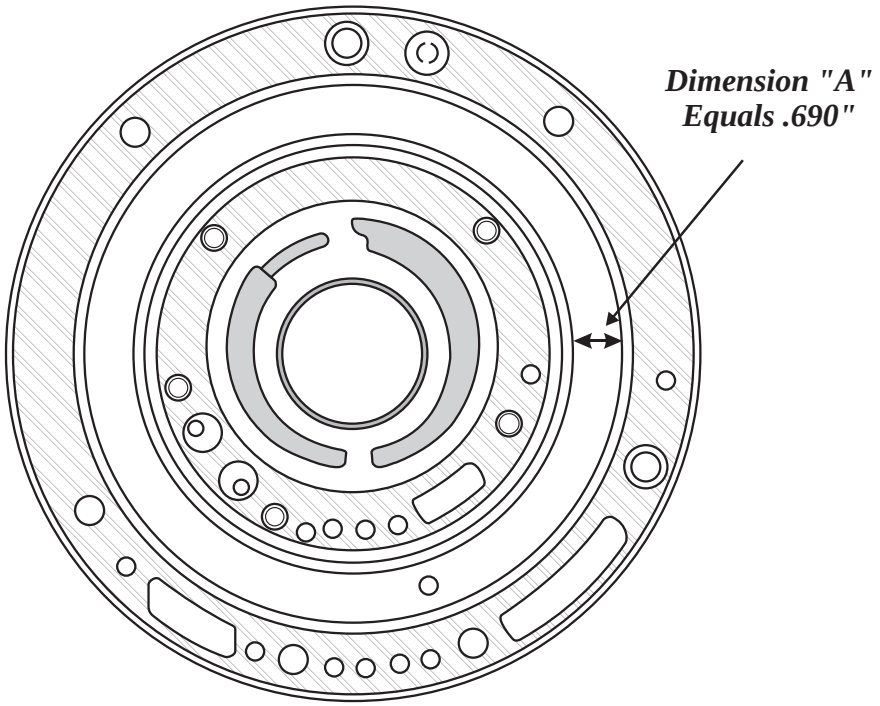
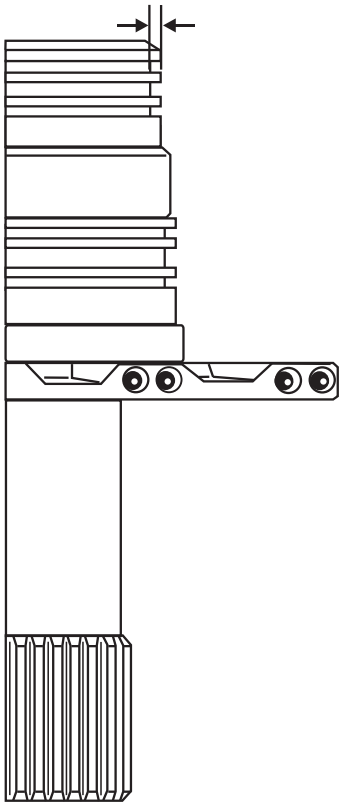


Figure 64

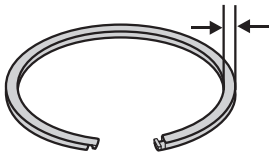
PUMP STATOR

PREVIOUS DESIGN

RING GROOVE DEPTH .100"



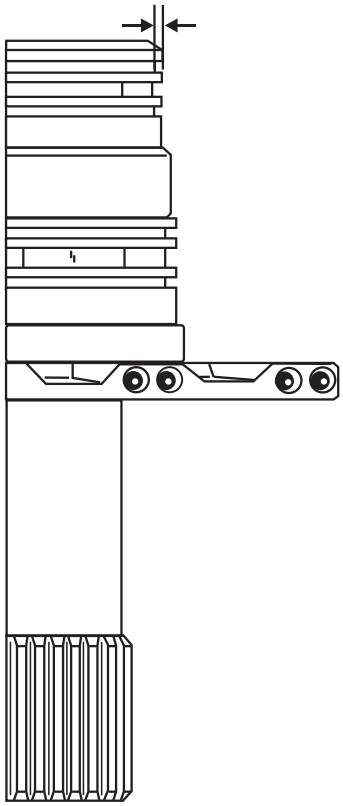
SEALING RING WIDTH .110"



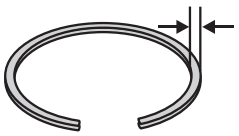
"HOOK JOINT" STEEL SEALING RINGS

NEW DESIGN

RING GROOVE DEPTH .072"



SEALING RING WIDTH .083"

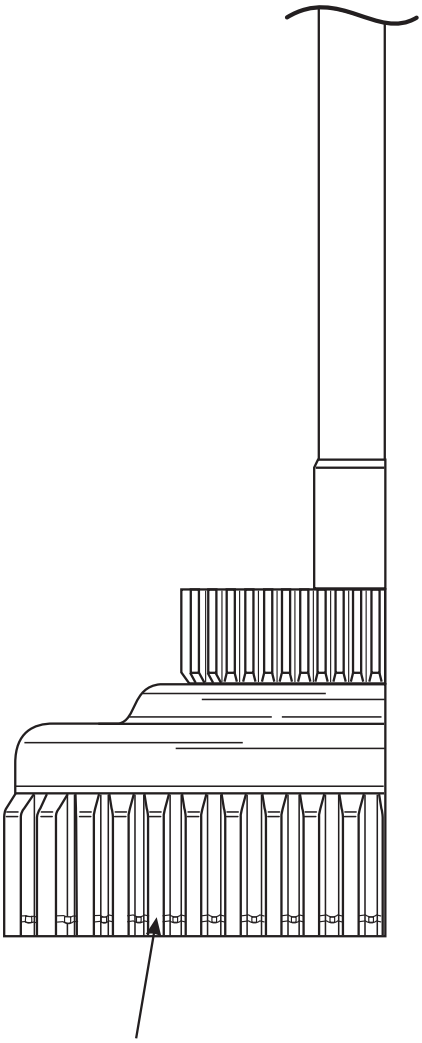


"BUTT CUT" PLASTIC SEALING RINGS

Figure 65

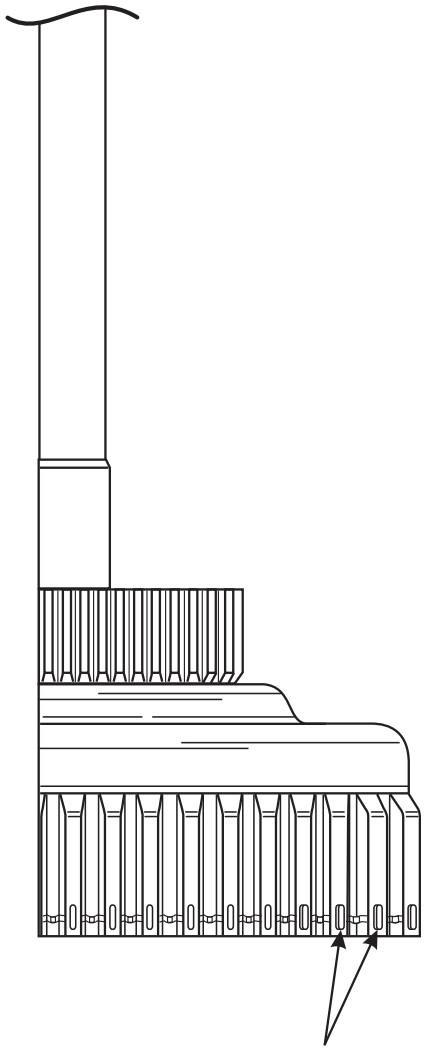
FORWARD CLUTCH DRUM

PREVIOUS DESIGN



NO PROJECTIONS

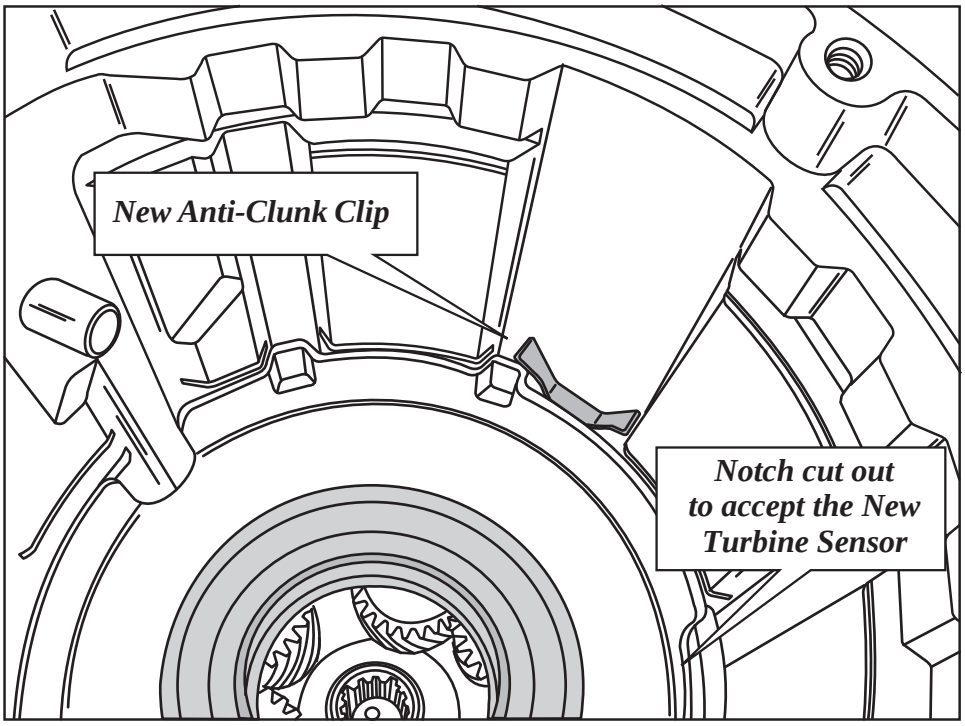
NEW DESIGN



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

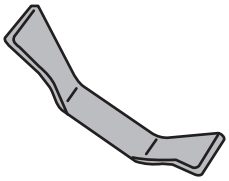
Figure 66

CENTER SUPPORT



PREVIOUS DESIGN
Anti-Clunk Clip

NEW DESIGN
Anti-Clunk Clip

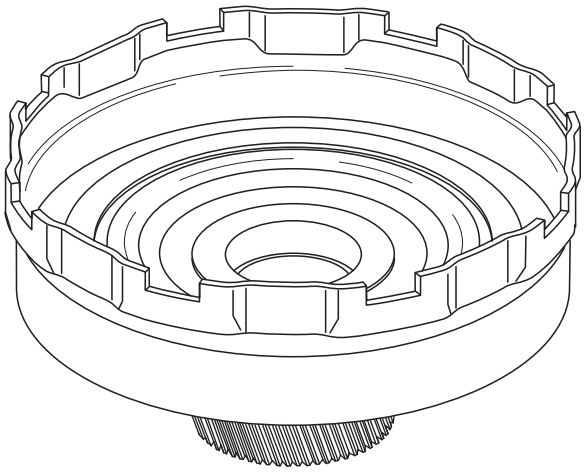


NOTE: The anti-clunk clip was actually changed in the 2002 model year. Ford part number 2L3Z-7F277-AA

Figure 67

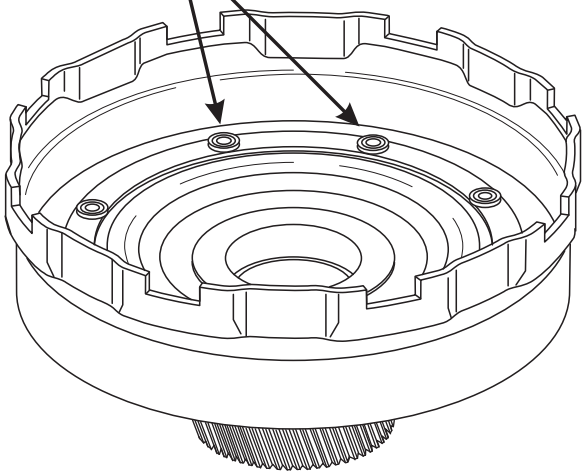
SUN GEAR SHELL

PREVIOUS DESIGN



NEW DESIGN

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



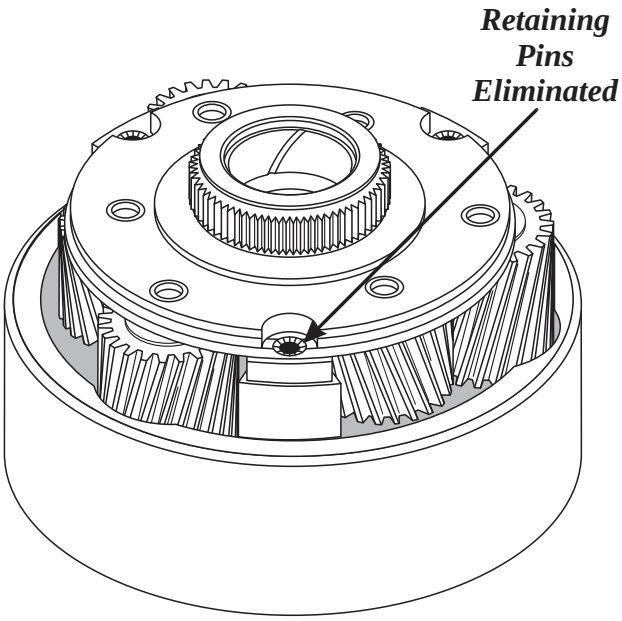
Special Note:

The New Design Sun Shell is manufactured using a non-magnetic material, so the Turbine Sensor can read the stamped projections on the New Design Forward Drum.

Figure 68

PLANETARY CARRIER

PREVIOUS DESIGN



NEW DESIGN

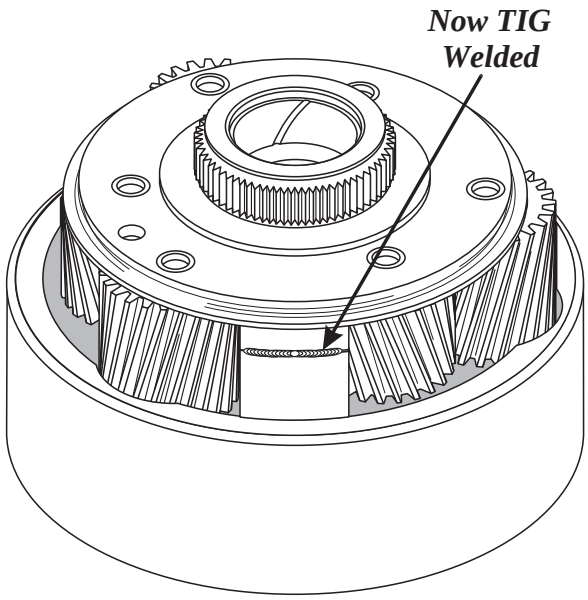


Figure 69

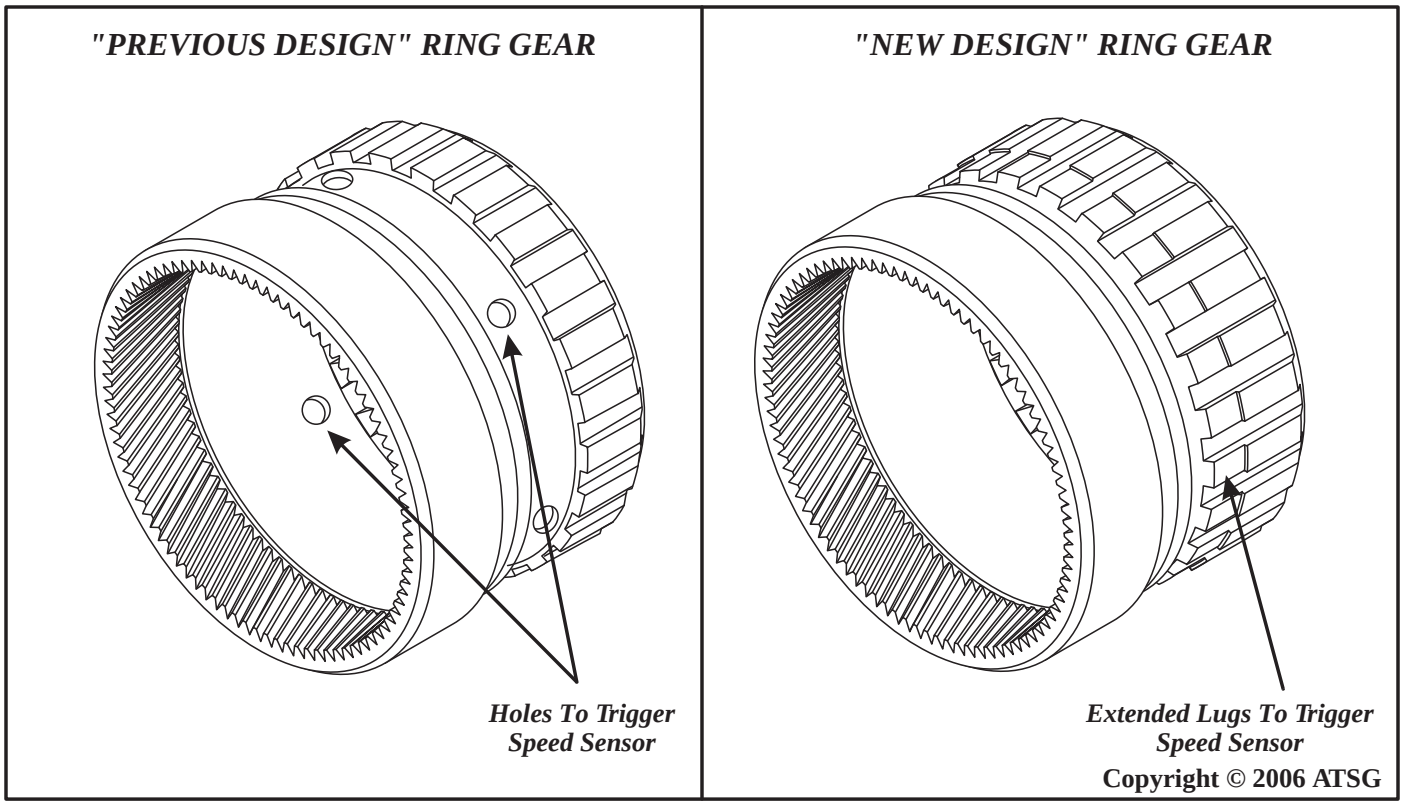


Figure 70

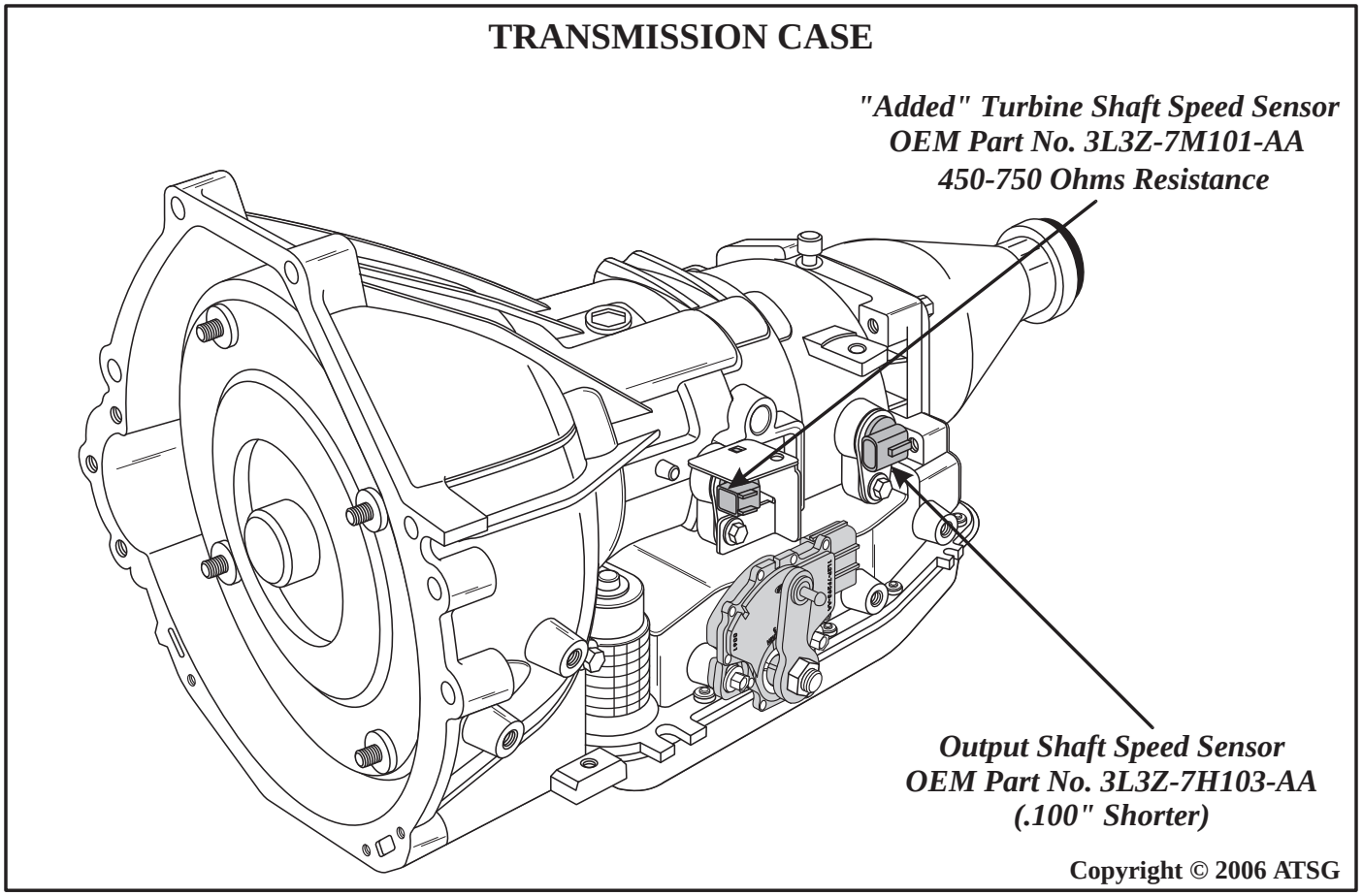


Figure 71

FORD 4R70E/4R75E
NEW TURBINE SHAFT SPEED SENSOR

CHANGE: Beginning at the start of production for 2004, Ford Motor Company introduced a new rear drive transmission with the designation 4R70E or 4R75E, as shown in Figure 72. This unit is another version of the current 4R70W unit. There has been a Turbine Shaft Speed (TSS) sensor added in the center of the case, as shown in Figure 72, and aligned with a new sun gear shell, as shown in Figure 73. Another change is the rear ring gear with extended parking lugs that now trigger the output speed sensor, as shown in Figure 74. These new units are found only in F150 and E150 series vehicles for 2004. The 4.6L engine will be equipped with the 4R70E and the 5.4L engine will be equipped with the 4R75E, difference being, hardened planetary carrier in the 4R75E.

REASON: Improved forced downshifts.

PARTS AFFECTED:

(1) TURBINE SHAFT SPEED SENSOR - Has been added to the center of the case on the left hand side of the transmission, as shown in Figure 72.

(2) TRANSMISSION MAIN CASE - Modified to accommodate the added turbine shaft speed sensor, as shown in Figure 72.

(3) SUN GEAR AND SHELL ASSEMBLY - The new Sun Shell Assembly is easily identified by the new rivets that retain the sun shell to the sun gear, as shown in Figure 73. The new sun shell is manufactured from a different (non-ferrous) material than the previous shell. The new sun shell material is less magnetic than the previous sun shell.

(4) REAR INTERNAL RING GEAR - Now is manufactured with extended parking lugs on the ring gear to trigger the output speed sensor, instead of the previous design with holes in the ring gear, which would also require a strategy change in the PCM. Refer to Figure 74.

(5) OUTPUT SPEED SENSOR - New design has a .100" ***shorter*** stem to accommodate the new design internal ring gear. Part numbers for all models are found in "Service Information".

INTERCHANGEABILITY:

None of the parts listed above will interchange with the previous design 4R70W parts.

SERVICE INFORMATION:

Turbine Shaft Speed Sensor 3L3Z-7M101-AA
Output Speed Sensor, 1994-2000 (Rectangular Connector) F4AZ-7H103-AA
Output Speed Sensor, 2001-2003 (Square Connector) 1L3Z-7H103-AB
Output Speed Sensor, 2004 Models (.100" Shorter) 3L3Z-7H103-AA

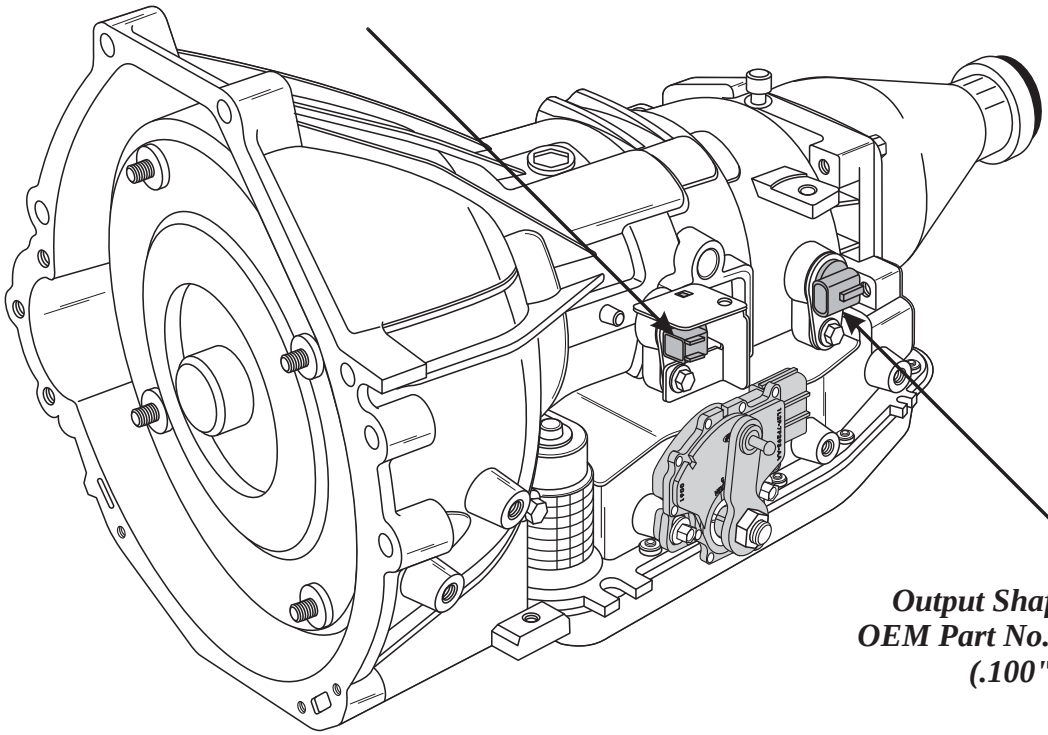
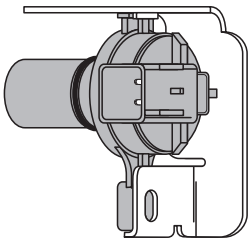


Figure 72

New Turbine Shaft Speed Sensor OEM Part No. 3L3Z-7M101-AA



450-750 Ohms Resistance

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

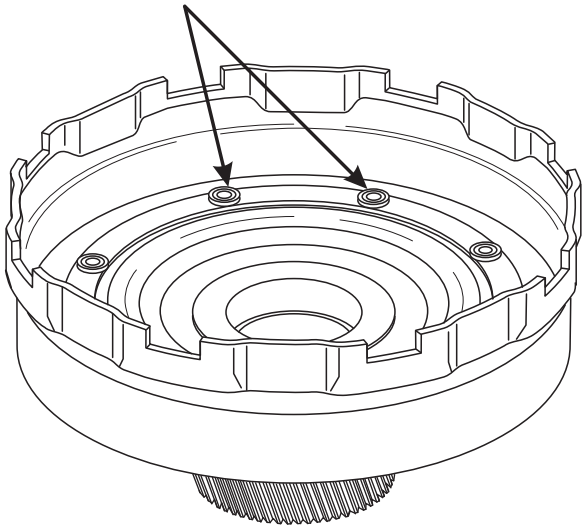


Figure 73

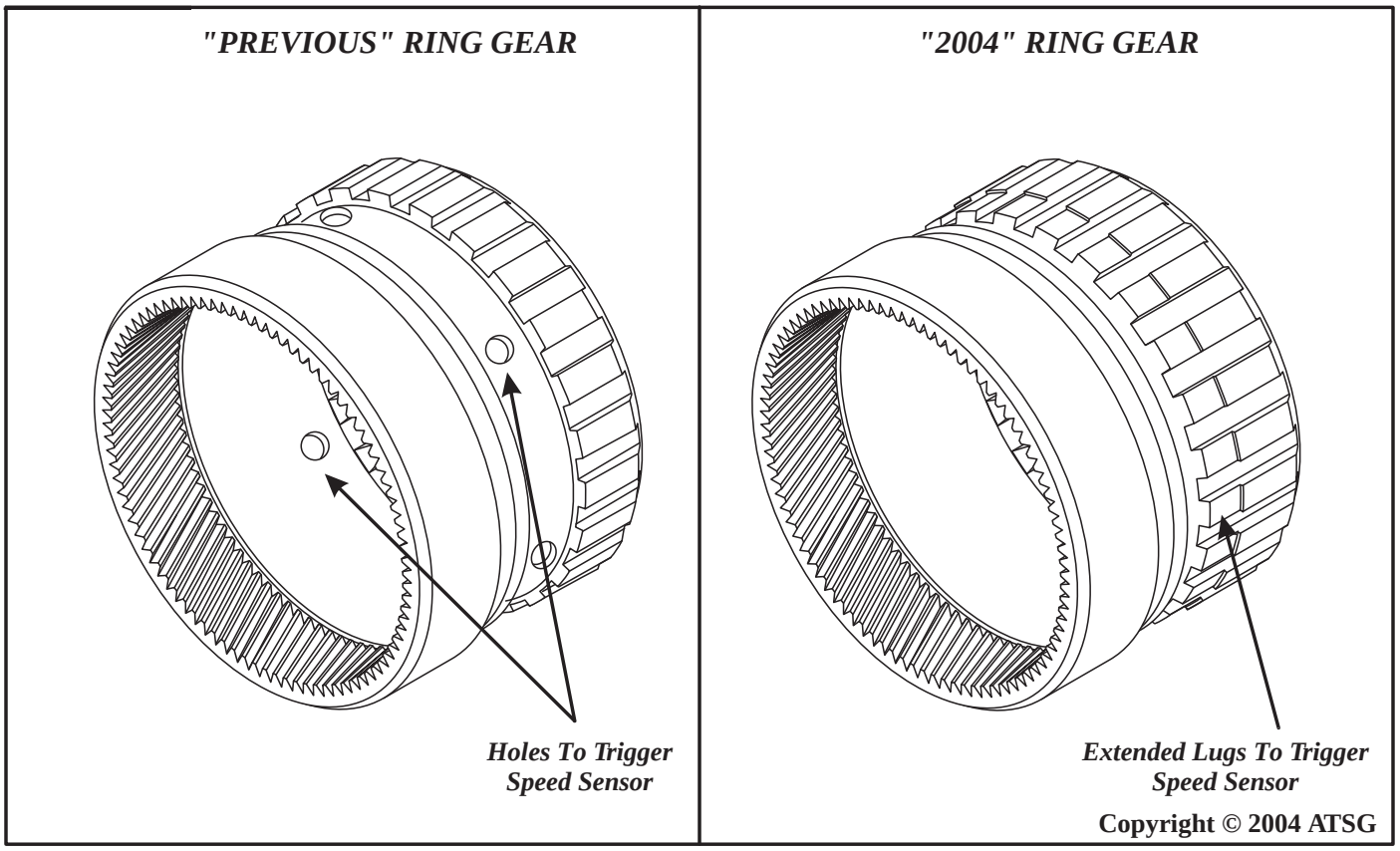


Figure 74

FORD AODE/4R70W/4R75E

LOSS OF EPC PRESSURE

COMPLAINT: The transmission is slipping in all gears as well as during shifts. When line pressure is checked, the gauge indicates little or no line rise. A check of EPC pressure reveals a near zero reading. EPC solenoid amperage is correct and replacement of the EPC solenoid did not cure the complaint.
The long term complaint may be premature failure of the forward clutch, if the loss of pressure was minimal at the time of overhaul. This would result in a small, but steady loss, of EPC pressure, and eventual failure.

CAUSE: EPC pressure is routed to the Pressure Regulator Valve along side of a circuit that Ford identifies as the Boost Circuit. These oil passages can be identified in both the valve body and the case as seen in Figure 75 and 76. This is illustrated by the hydraulic schematic shown in Figure 77. This circuit is routed back to the inlet side of the pump. When the Pressure Regulator Valve or its bore is worn, (See Figure 78), EPC pressure is allowed to be sucked away by pump suction, (See Figure 79 and 80), preventing any line pressure rise from occurring when the throttle is opened.
A quick test can be performed to verify if this condition exists. Remove the pan and filter. Blow compressed air into the TV pressure port in the case. It is normal to see some leakage around the EPC solenoid, but if you see ***any*** oil forced out of the filter neck bore by the air pressure, (Refer to Figure 81), ***PR valve and/or bore wear is the reason.***

CORRECTION: Always check the Pressure Regulator Valve and its bore for wear during the repair process. If it is worn use one of the repair kits that are available from Sonnax® to repair this condition, or, you must replace the valve body.
It is always a good idea to also check the revere boost valve sleeve for wear, as this is also a common wear item.

SERVICE INFORMATION:

Check with your local transmission supplier for the Sonnax® repair kit part numbers, as there are several different numbers, depending on model, make and year.

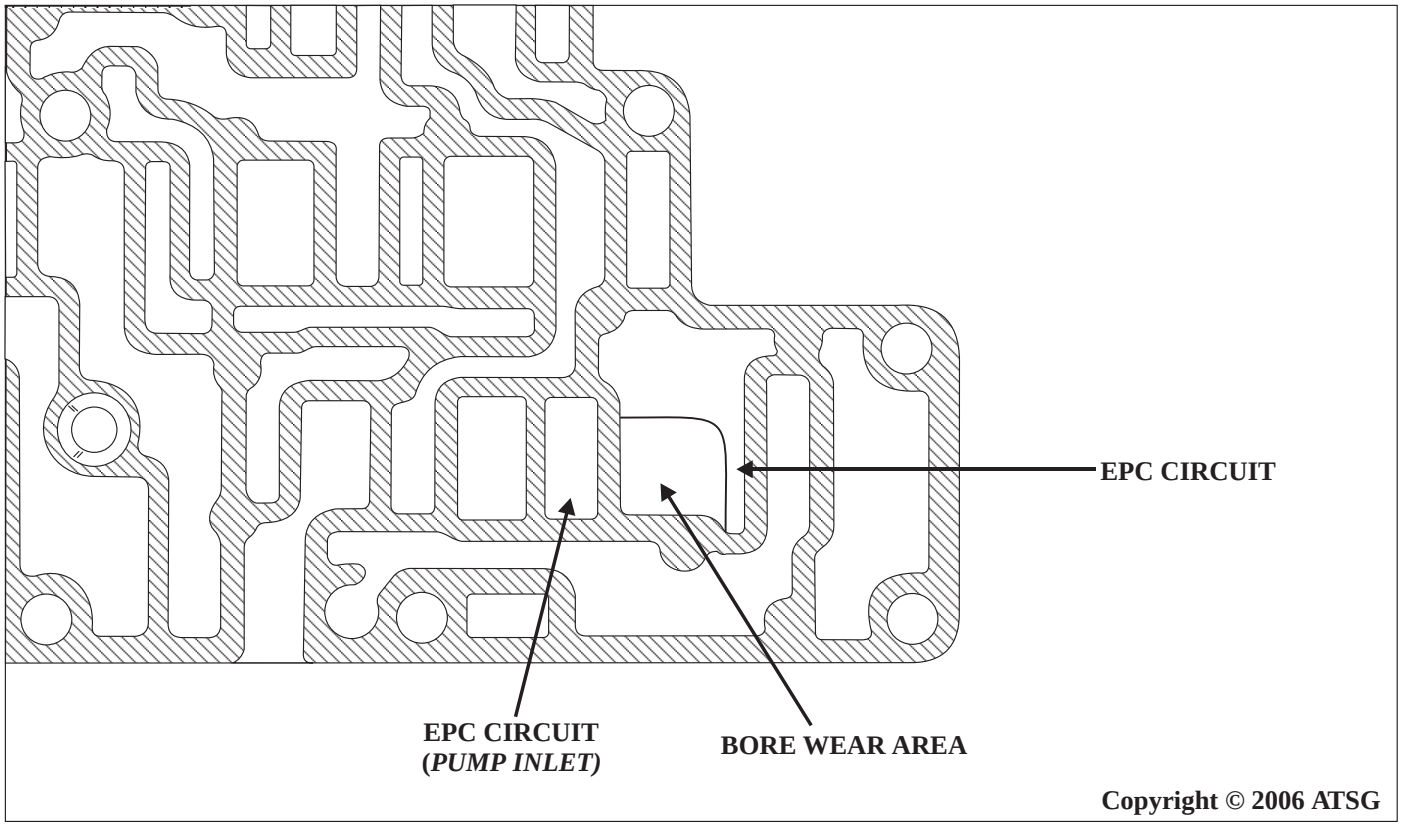


Figure 75

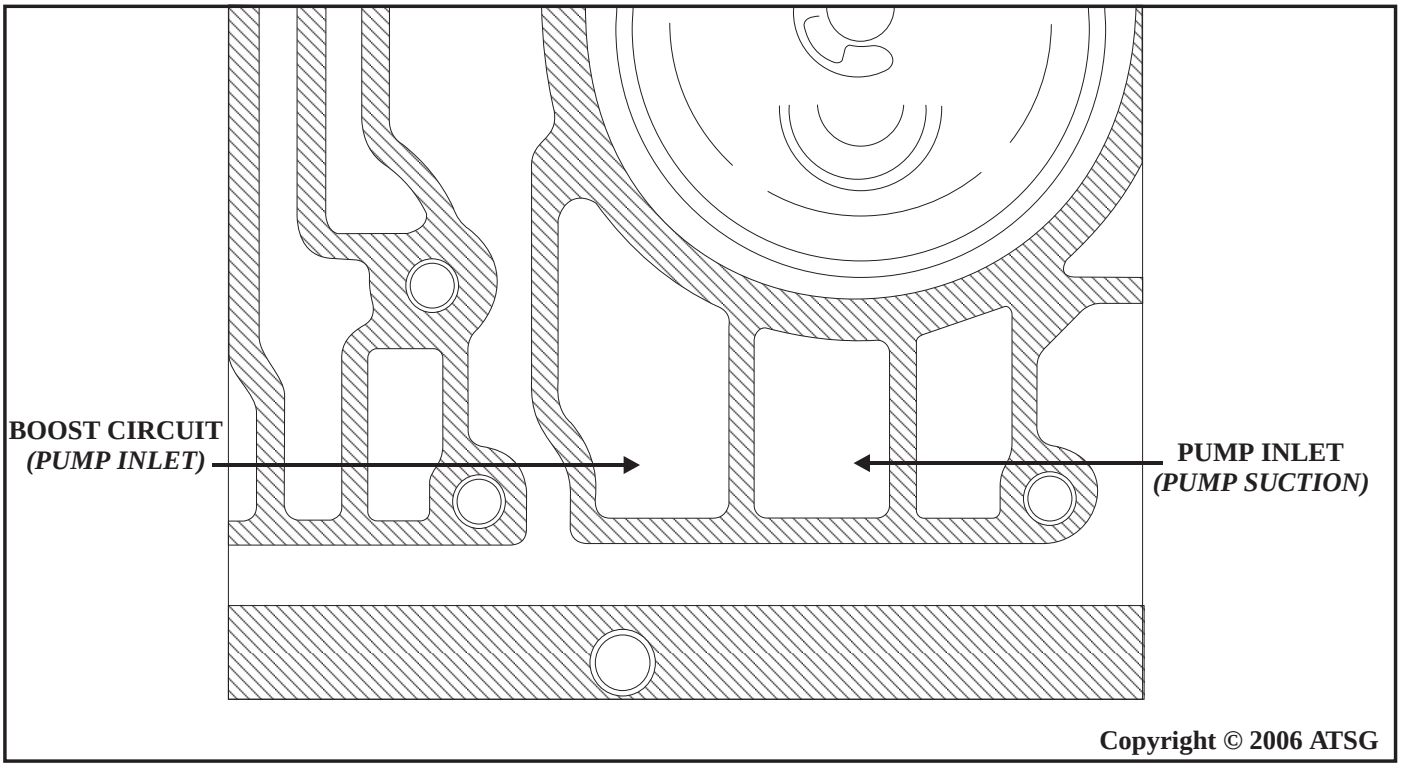


Figure 76

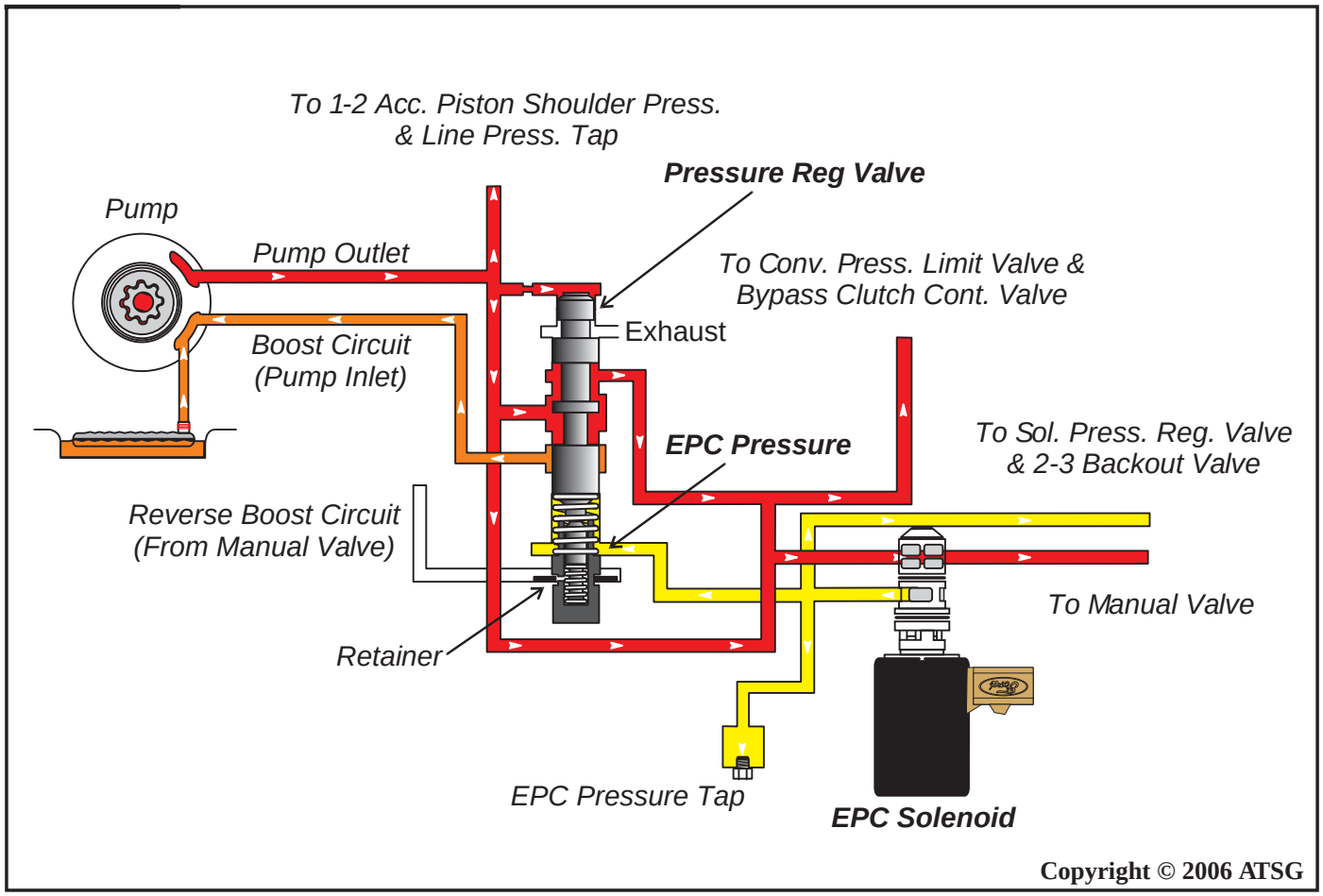

To 1-2 Acc. Piston Shoulder Press.
& Line Press. Tap
Pressure Reg Valve
Pump
Pump Outlet
To Conv. Press. Limit Valve &
Bypass Clutch Cont. Valve
Exhaust
Boost Circuit
(Pump Inlet)
EPC Pressure
To Sol. Press. Reg. Valve
& 2-3 Backout Valve
Reverse Boost Circuit
(From Manual Valve)
To Manual Valve
Retainer
EPC Pressure Tap
EPC Solenoid
Copyright © 2006 ATSG

Figure 77

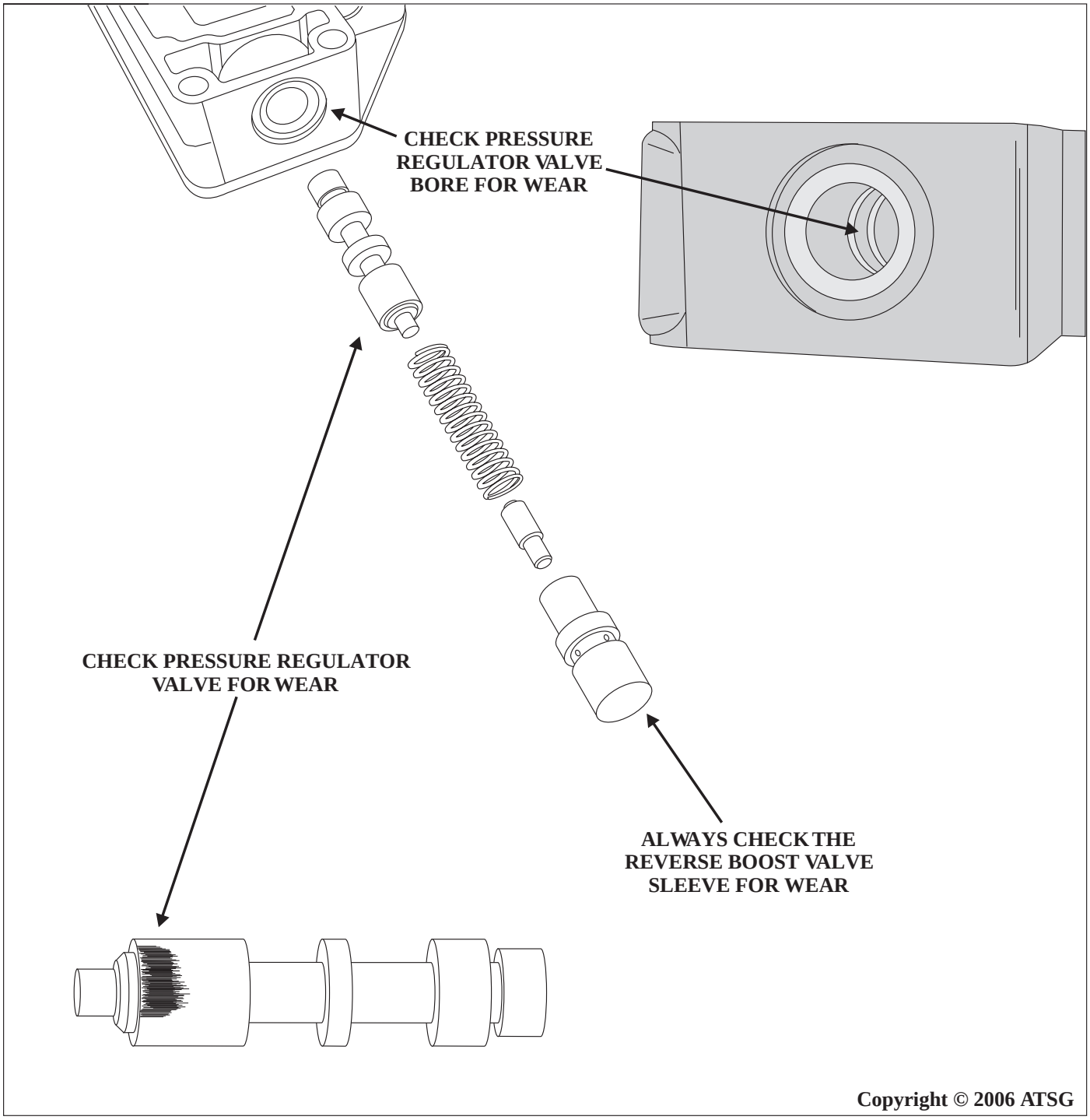

CHECK PRESSURE REGULATOR VALVE BORE FOR WEAR
CHECK PRESSURE REGULATOR VALVE FOR WEAR
ALWAYS CHECK THE REVERSE BOOST VALVE SLEEVE FOR WEAR
Copyright © 2006 ATSG

Figure 78

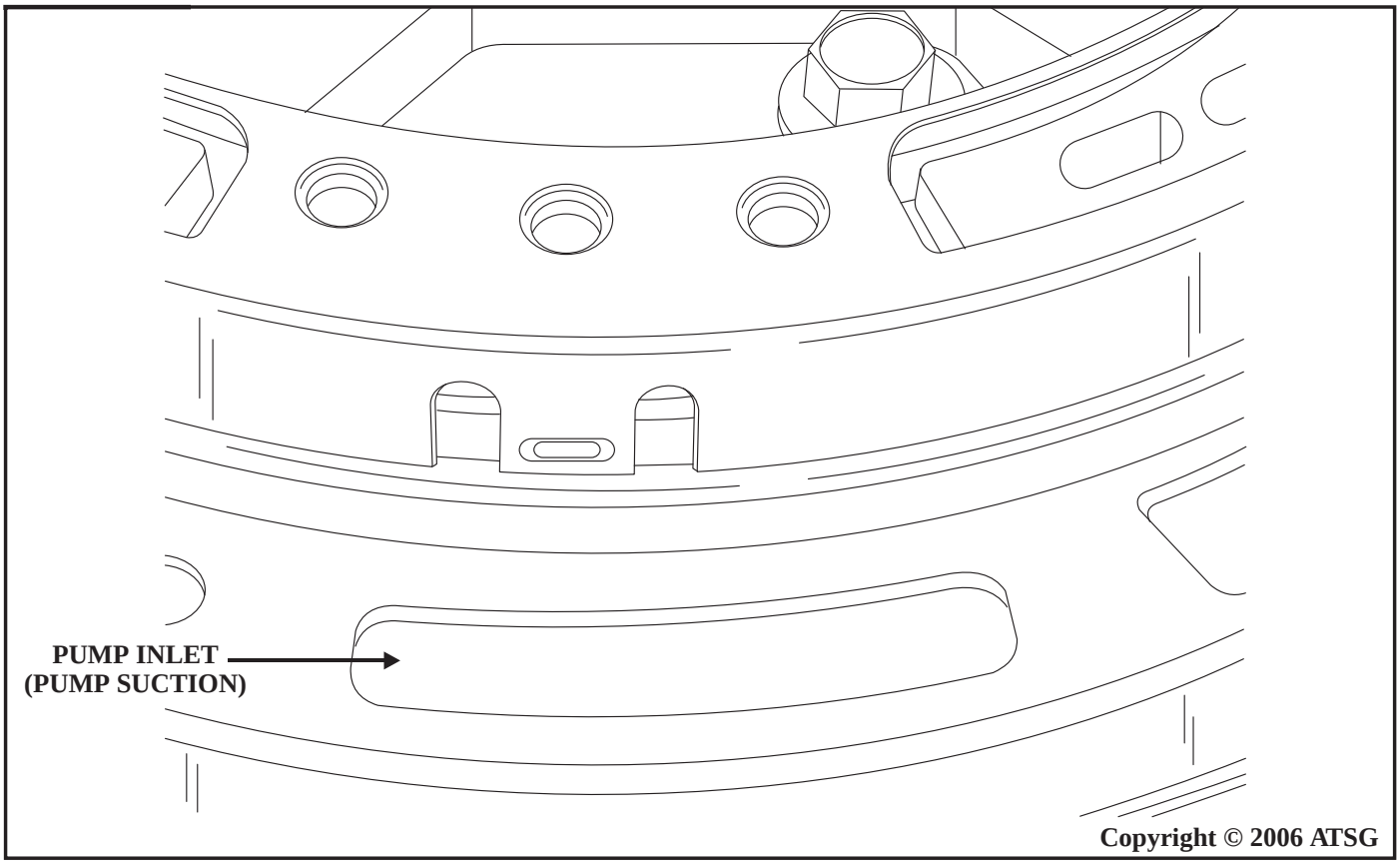


Figure 79

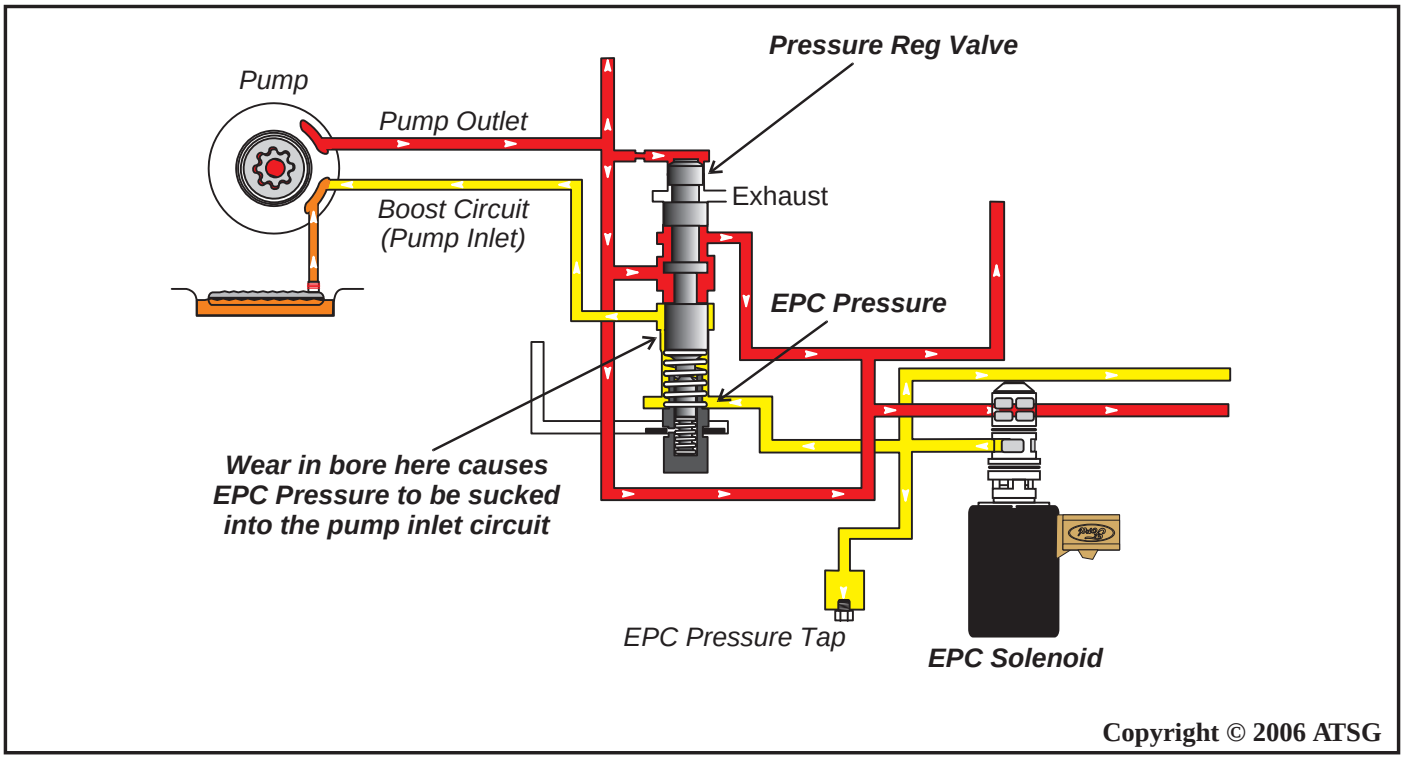


Figure 80

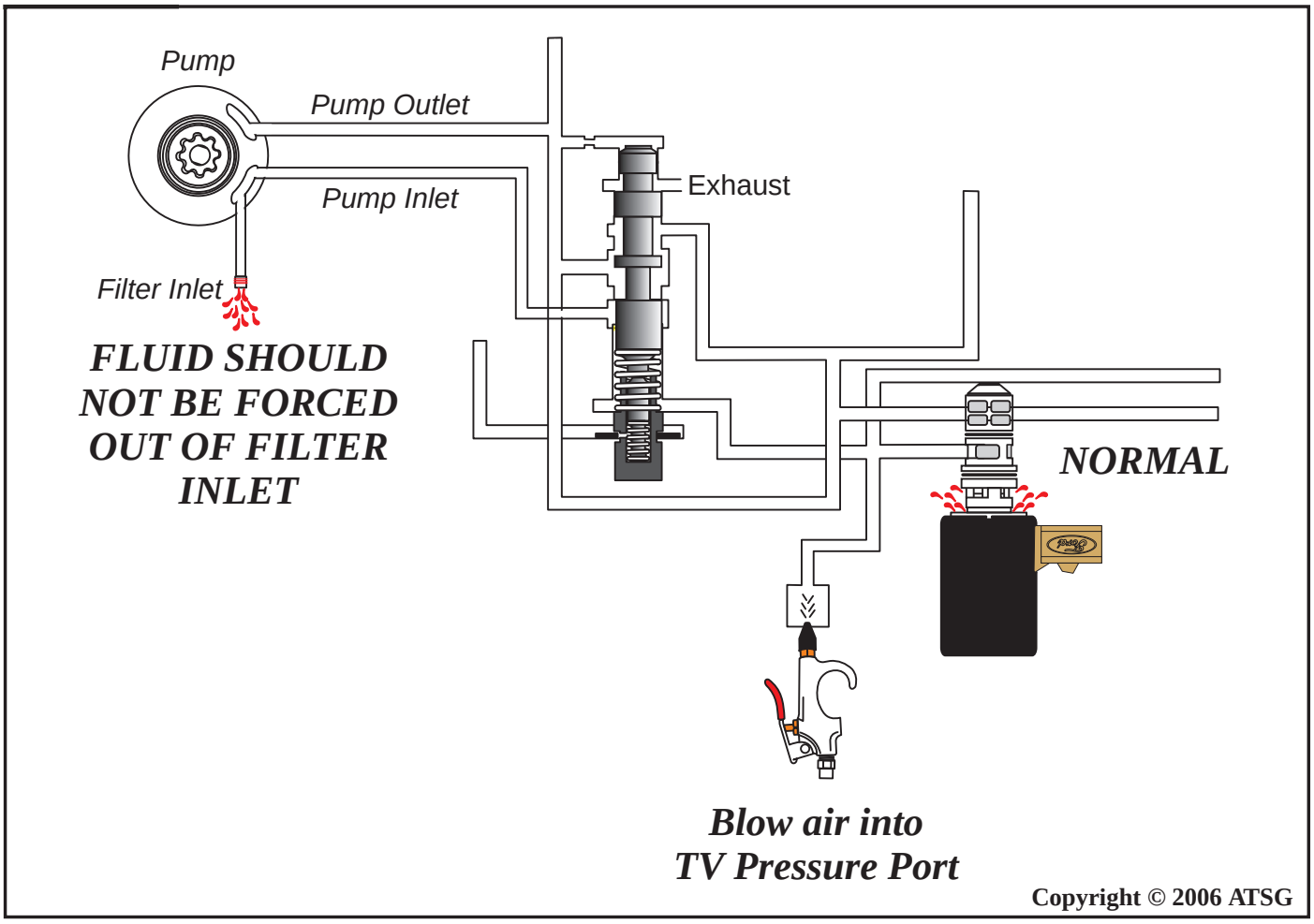

Pump
Pump Outlet
Pump Inlet
Exhaust
Filter Inlet
FLUID SHOULD NOT BE FORCED OUT OF FILTER INLET
NORMAL
Blow air into TV Pressure Port
Copyright © 2006 ATSG

Figure 81

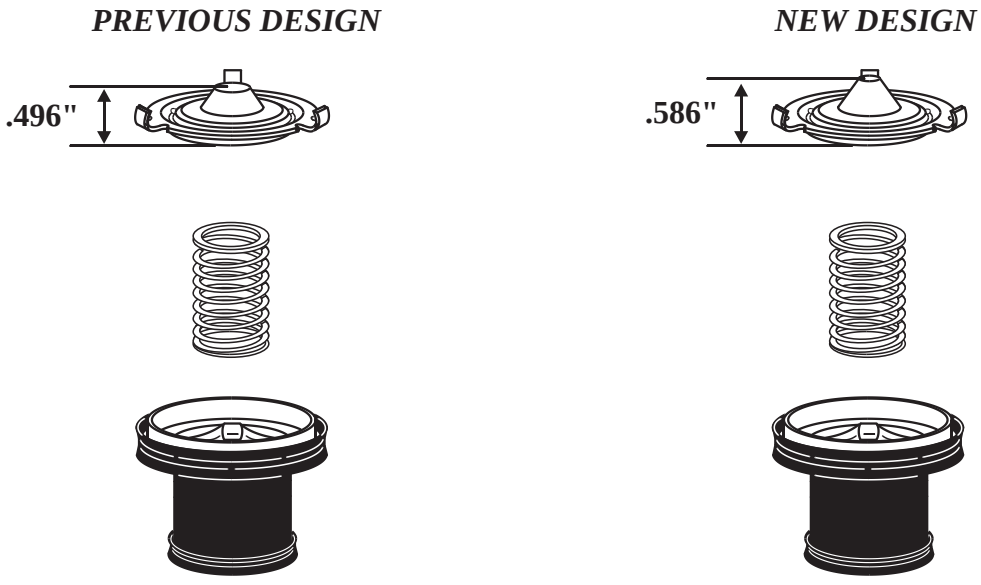
FORD 4R70W, 4R70E AND 4R75E
2-3 NEUTRAL

COMPLAINT: 2001 and later model Ford vehicles equipped with the 4R70W, 4R70-E and 4R75E, may exhibit a 2-3 neutral upshift, 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 83, eliminated the small plate on the spacer plate side over the 2-3 accumulator retainer, which made a taller 2-3 accumulator retainer necessary for 2001 models, shown in Figure 82. When the early 2-3 accumulator retainer (shorter) is used, or if the retainer is installed upside down, the 2-3 accumulator piston may come out of its bore dumping Direct Clutch pressure to an exhaust. Refer to Figure 84 for a cutaway of the correct and incorrect assembly.

CORRECTION: Refer to Figure 85 for the location and proper 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 plate over the 2-3 accumulator line-up

Figure 82

2001 MODEL 4R70W VALVE BODY

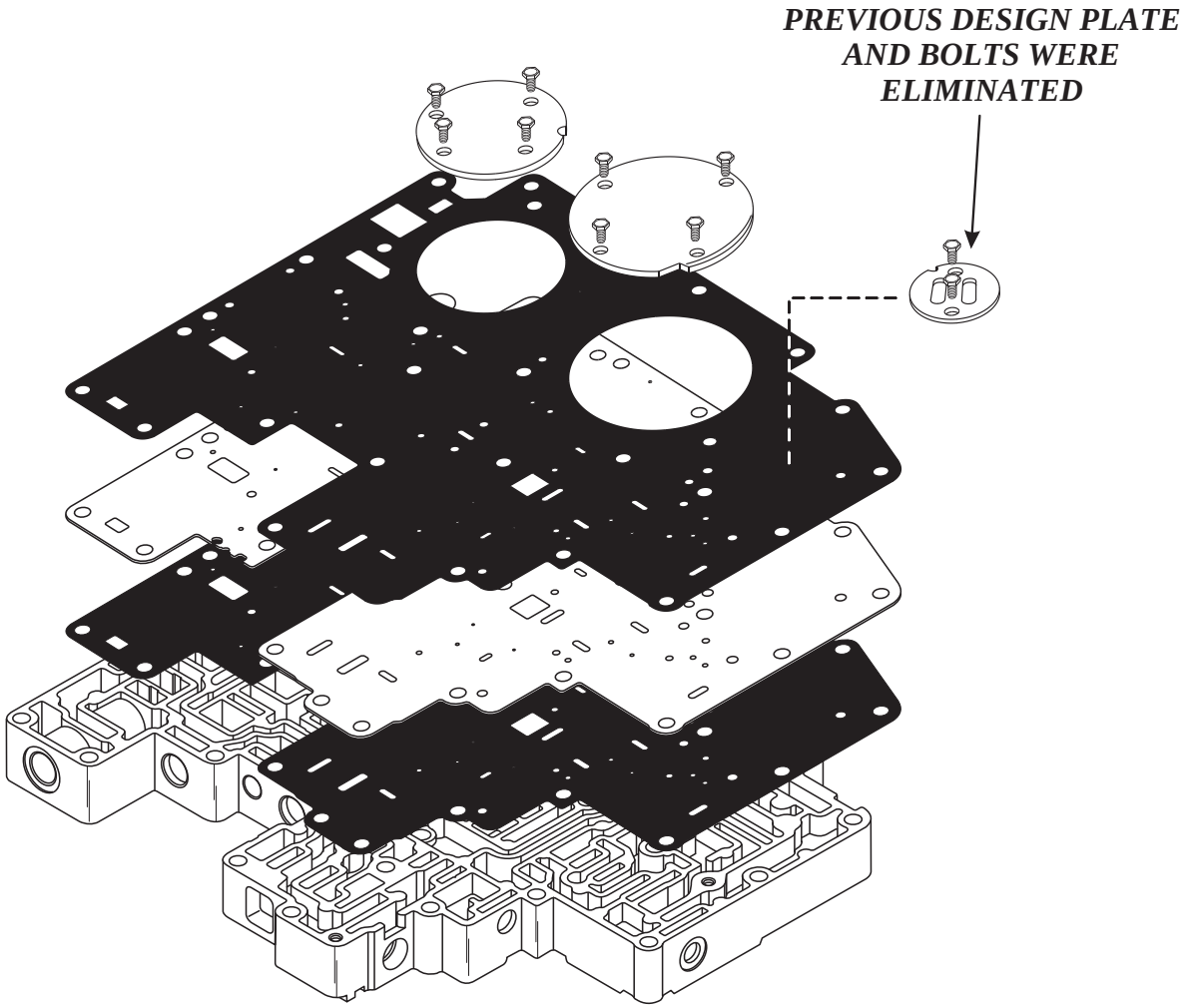
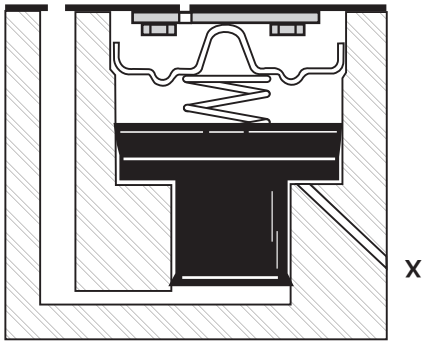


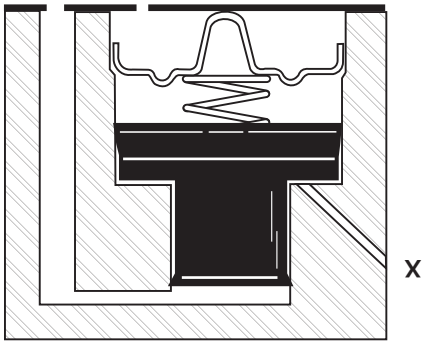
Figure 83

2-3 ACCUMULATOR AND RETAINER CUTAWAY

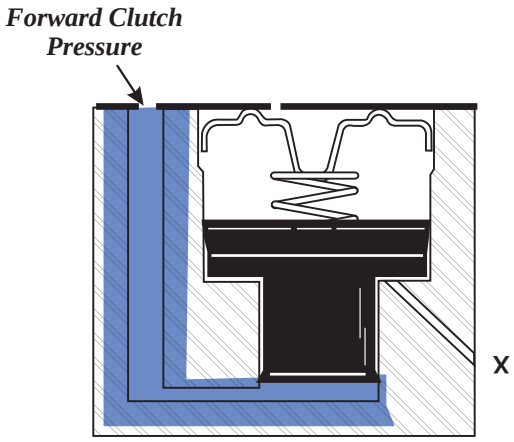
EARLY CORRECT ASSEMBLY



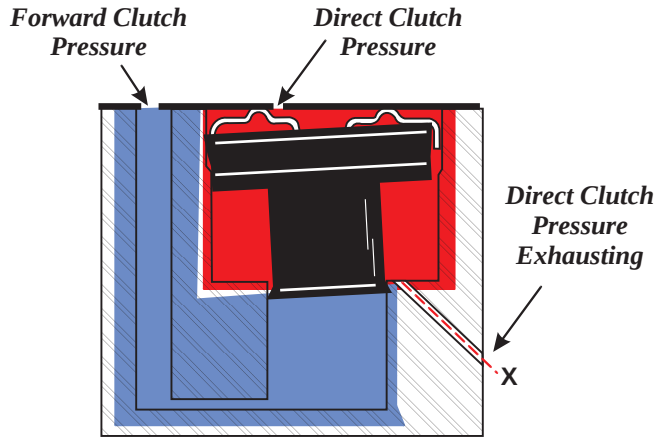
LATE CORRECT ASSEMBLY



INCORRECT ASSEMBLY BEFORE 2-3 SHIFT



INCORRECT ASSEMBLY AFTER 2-3 SHIFT



Note: ***When the 2-3 accumulator piston retainer is installed up-side down, as shown here, the accumulator piston may come out of it's case bore and connect the direct clutch to an exhaust.***

Figure 84

2-3 ACCUMULATOR LOCATION

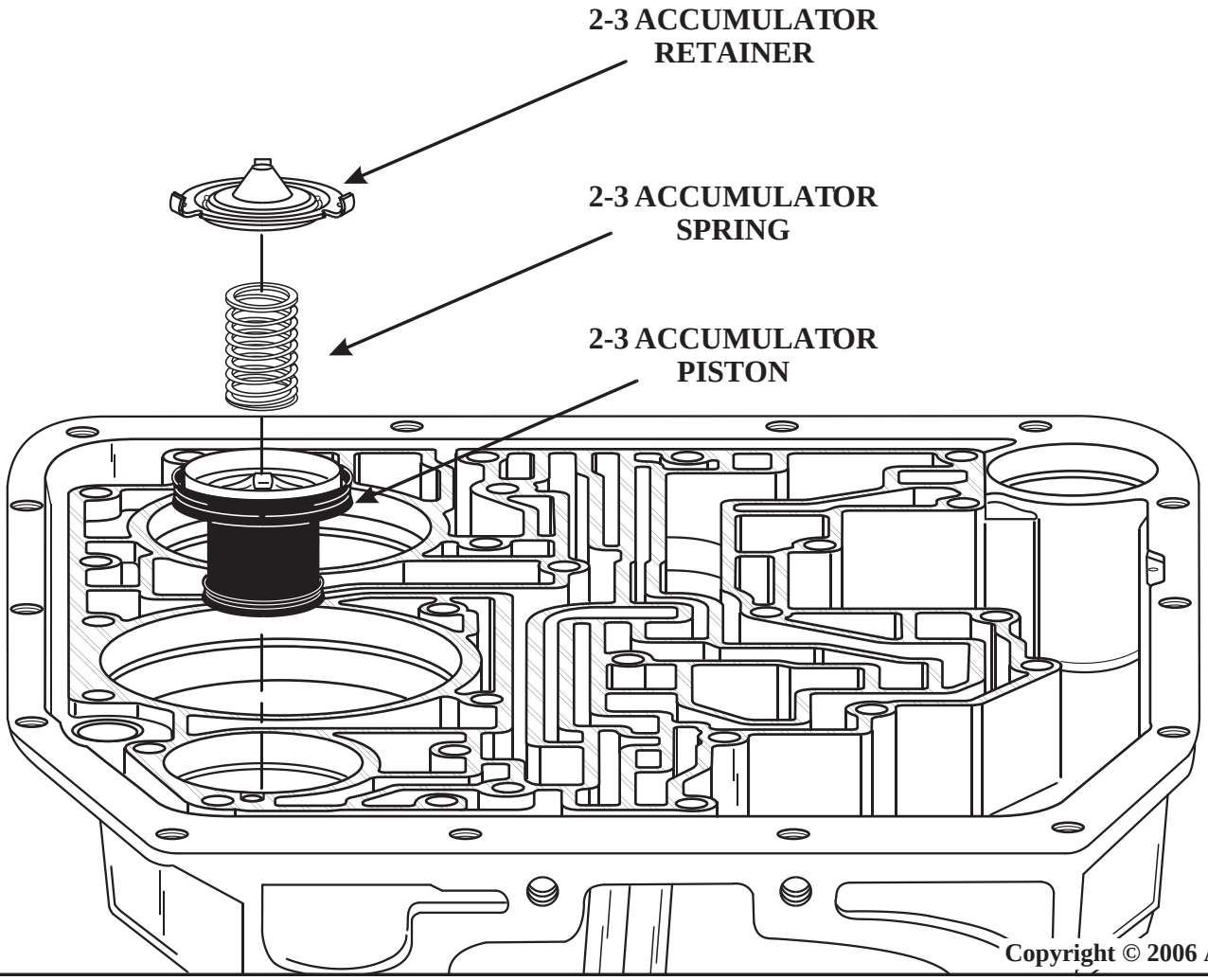


Figure 85

FORD 4R70W
NEUTRALS IN 1ST GEAR FROM A STOP, IN "D" RANGE ONLY (1996 AND LATER)

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, which is "Shift Solenoid 2 Electrical Circuit Fault". There can be three different causes for this concern.

CAUSE NO 1: One cause for this condition may be that the PPL/ORG or VIO/ORG wire, which is model dependant, and 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. Refer to Figure 86 for hydraulic schematic. Diagnostic Trouble Code (DTC) P0755 may also be stored in memory.

CAUSE NO 2: Another cause for this condition may be, 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 what the Shift Solenoid can exhaust. This will allow the Shift Solenoid 2 pressure to build up and stroke the 3-4 Shift Valve to the right exhausting the Forward Clutch oil, creating a neutral condition. Refer to Figure 87 for hydraulic schematic. No Diagnostic Trouble Codes will be stored.
Refer to Figure 88 and 89 for valve identification.

CAUSE NO 3: Cause 3 is almost identical to Cause 2 with the exception being that Shift Solenoid 2 is sticking closed, or has debris built up at the solenoid exhaust hole, which will allow Shift Solenoid 2 pressure to build up which causes the 3-4 Shift Valve to move to the right exhausting the Forward Clutch oil, and once again creating the neutral condition. Refer to Figure 87 for hydraulic schematic. No Diagnostic Trouble Codes will be stored.

CORRECTION: To follow 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, as shown in Figure 90. Normally when the Forward Clutch is applied, the pressure will be equal to the Main Line pressure, as shown in Figure 91. 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.

(1) Repair or replace the damaged Shift Solenoid 2 wire. Refer to Figure 92, for an index to locate the proper year and model vehicle that you are working on, and refer to schematic for that vehicle. Wire schematics have been provided in Figures 93, 94, 95 and 96.

(2) Locate the Solenoid Regulator Valve in the Valve Body, as shown in Figure 88. To repair a sticking Solenoid Regulator Valve, it may become necessary to replace the valve assembly. There are replacement Solenoid Regulator Valve Kits available from aftermarket suppliers.

(3) Replace the complete Shift Solenoid Assembly.

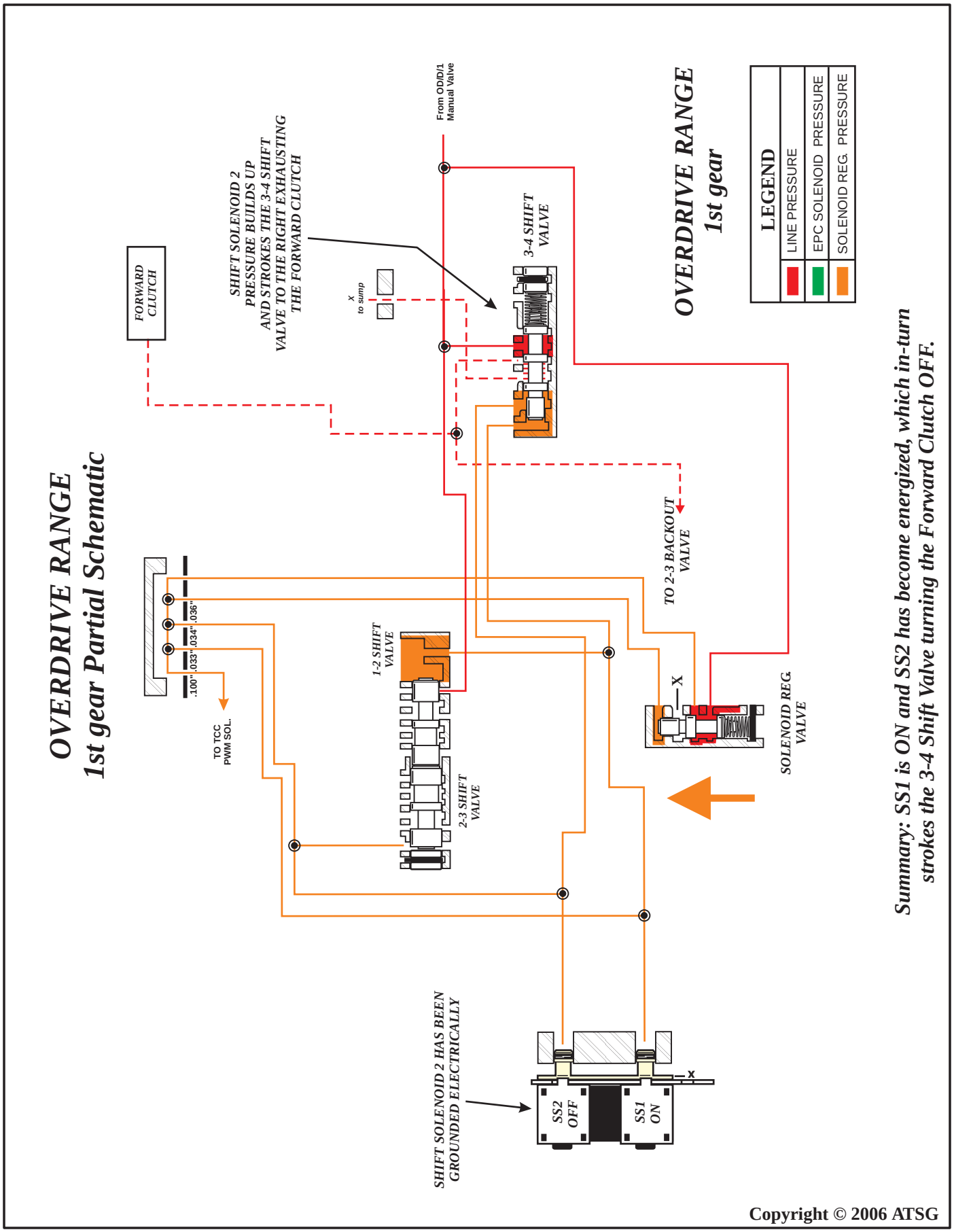

OVERDRIVE RANGE
1st gear Partial Schematic
OVERDRIVE RANGE
1st gear
LEGEND
LINE PRESSURE
EPC SOLENOID PRESSURE
SOLENOID REG. PRESSURE
FORWARD CLUTCH
SHIFT SOLENOID 2 PRESSURE BUILDS UP AND STROKES THE 3-4 SHIFT VALVE TO THE RIGHT EXHAUSTING THE FORWARD CLUTCH
From OD/D1 Manual Valve
X to sump
3-4 SHIFT 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.
Copyright © 2006 ATSG

Figure 86

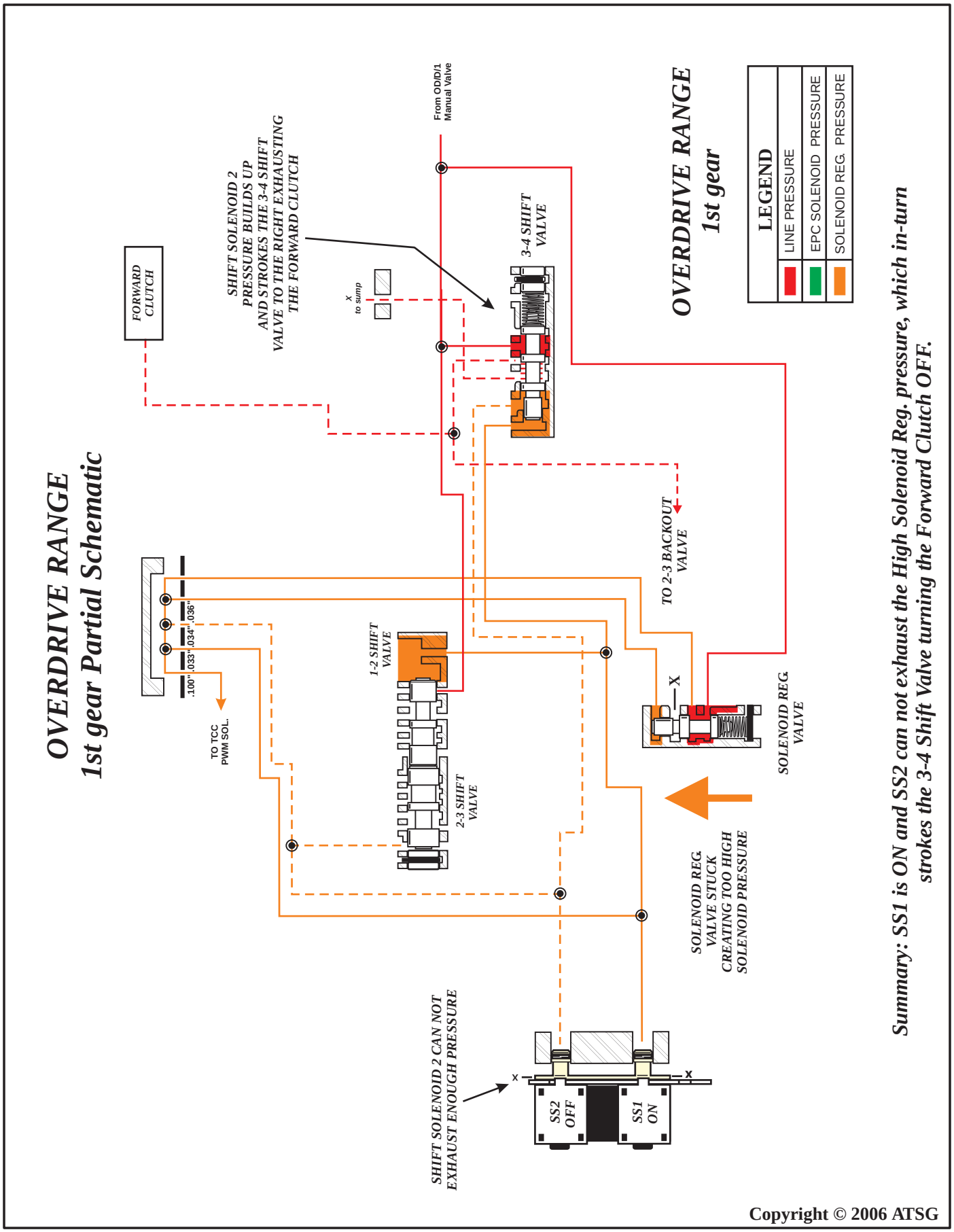

OVERDRIVE RANGE
1st gear Partial Schematic
OVERDRIVE RANGE
1st gear
LEGEND
LINE PRESSURE
EPC SOLENOID PRESSURE
SOLENOID REG. PRESSURE
From ODD/1 Manual Valve
FORWARD CLUTCH
SHIFT SOLENOID 2 PRESSURE BUILDS UP AND STROKES THE 3-4 SHIFT VALVE TO THE RIGHT EXHAUSTING THE FORWARD CLUTCH
X to sump
3-4 SHIFT 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 TOO 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.
Copyright © 2006 ATSG

Figure 87

FORD 4R70W
2001-UP MAIN VALVE BODY EXPLODED VIEW

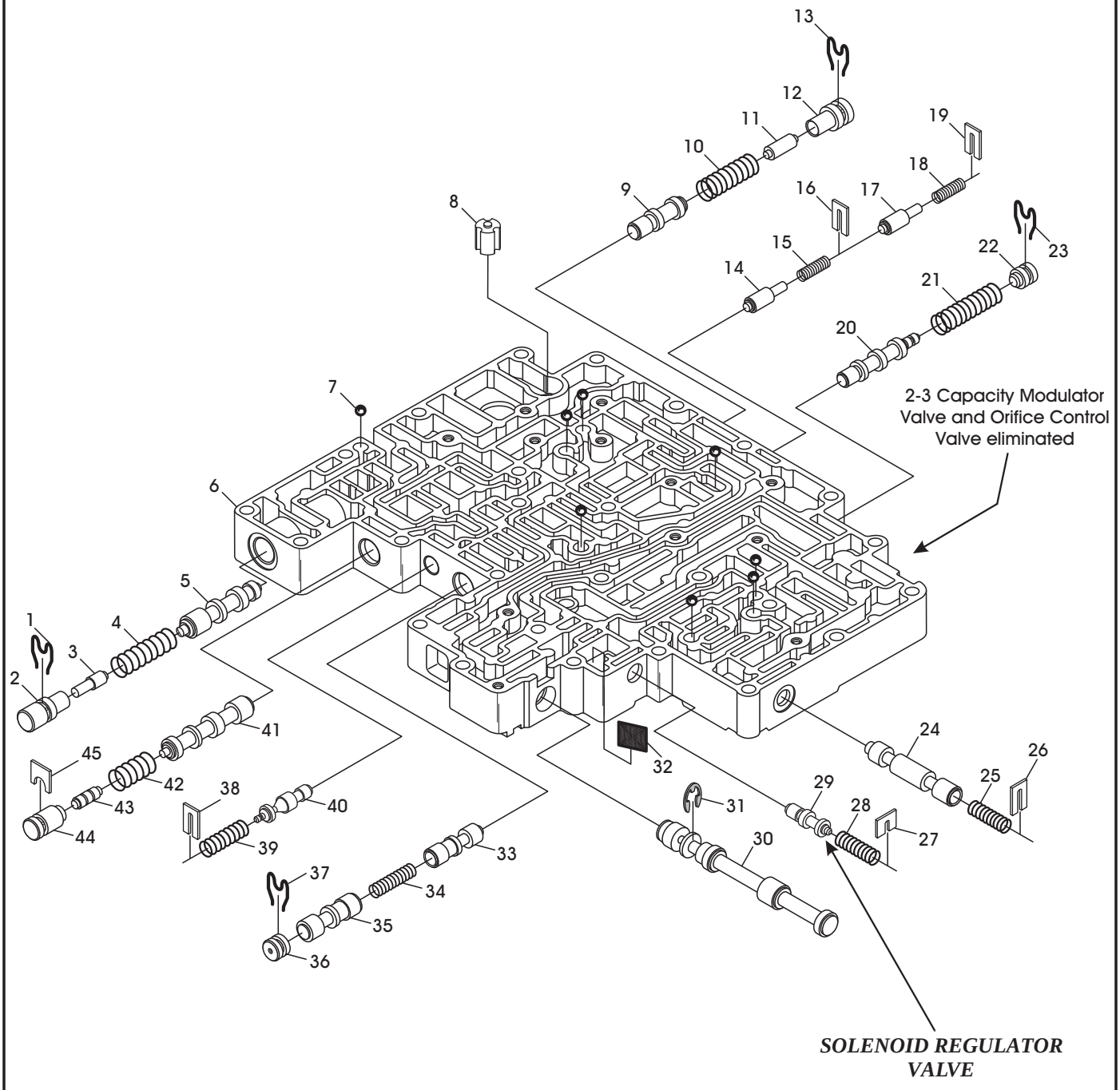


Figure 88

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 89

4R70W PRESSURE TAP LOCATIONS

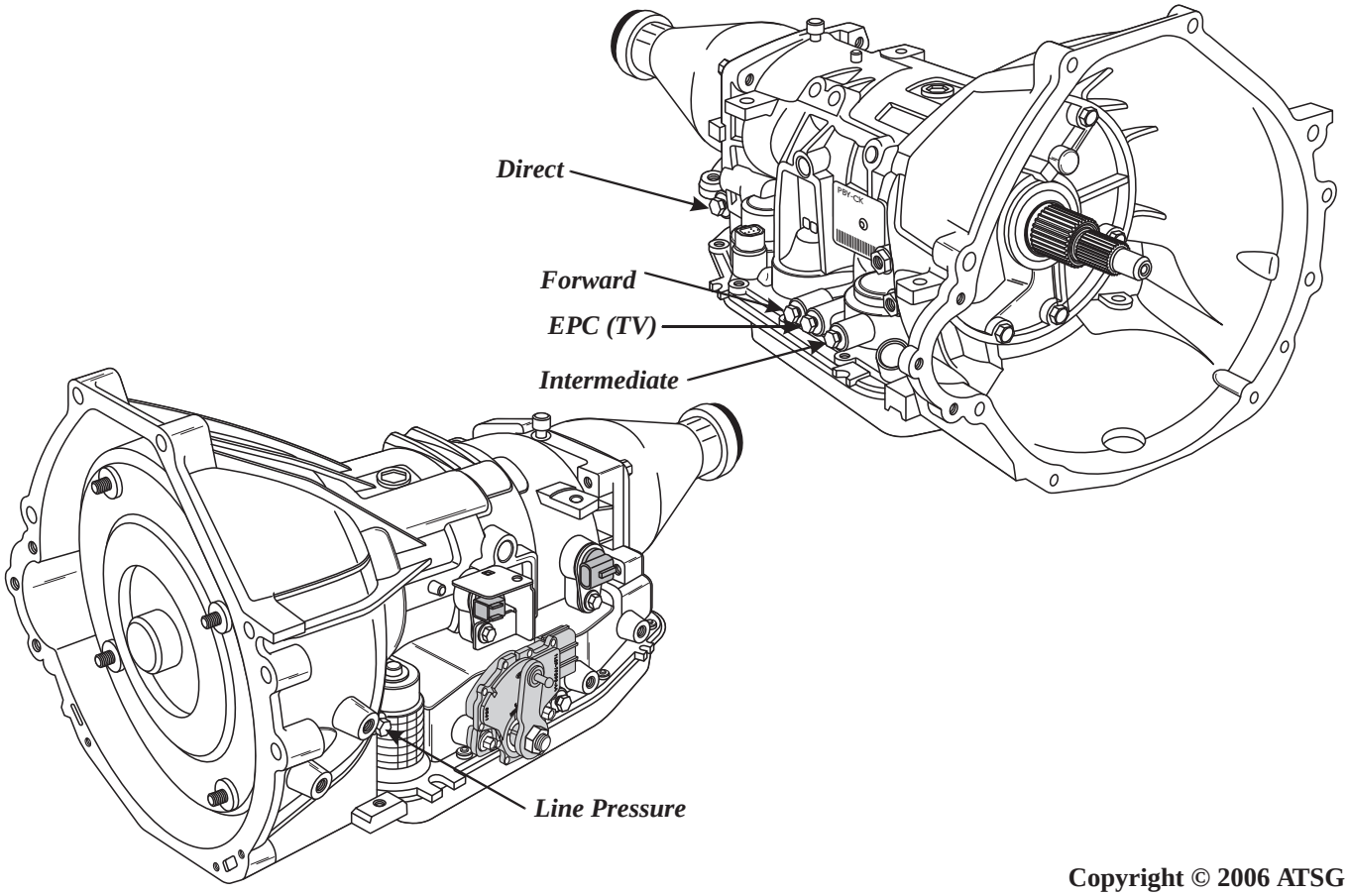


Figure 90

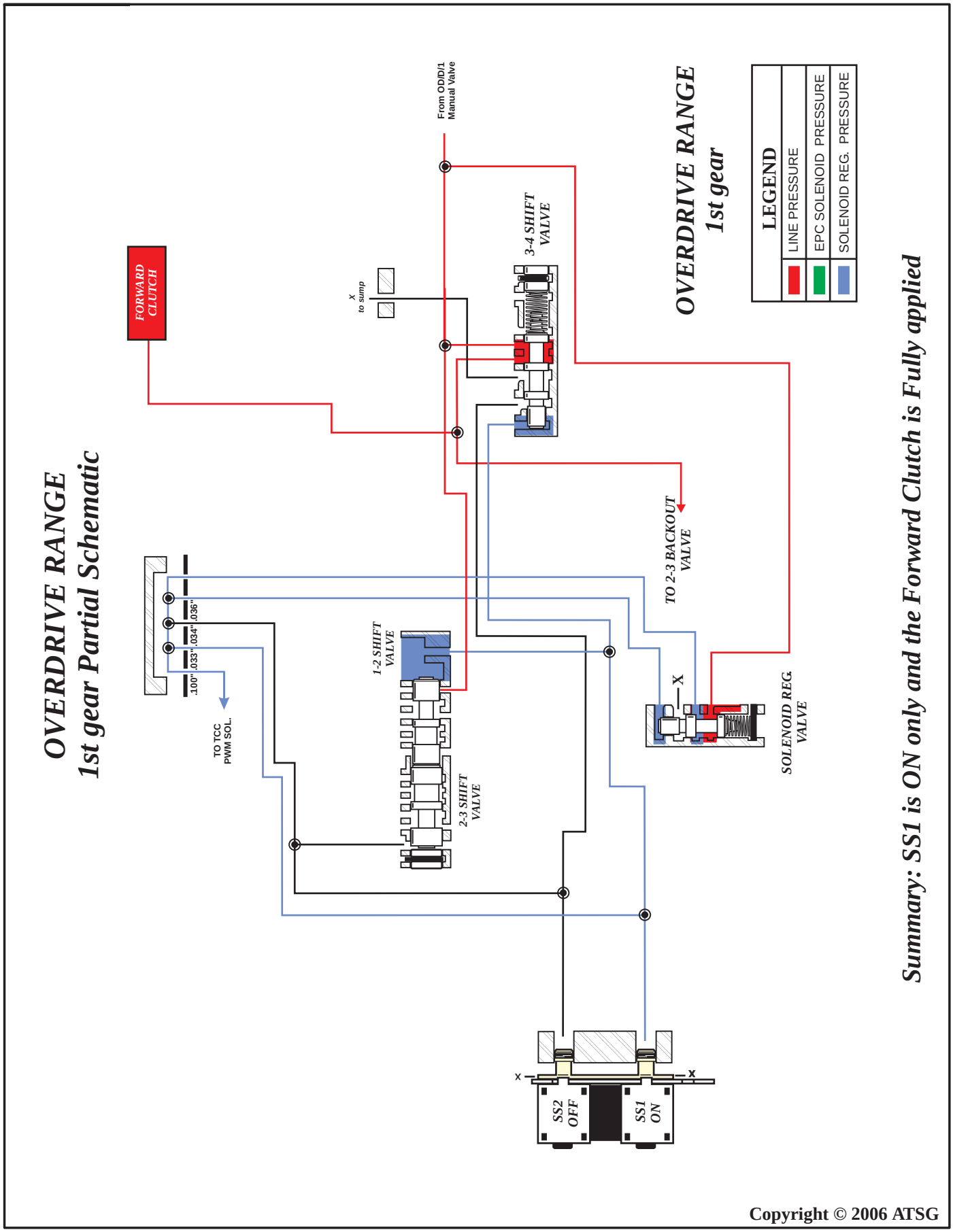

OVERDRIVE RANGE
1st gear Partial Schematic
OVERDRIVE RANGE
1st gear
LEGEND
LINE PRESSURE
EPC SOLENOID PRESSURE
SOLENOID REG. PRESSURE
Summary: SS1 is ON only and the Forward Clutch is Fully applied
FORWARD CLUTCH
From OD/D/1 Manual Valve
X to sump
3-4 SHIFT VALVE
TO 2-3 BACKOUT VALVE
.100" .033" .034" .036"
TO TCC PWM SOL.
1-2 SHIFT VALVE
2-3 SHIFT VALVE
SOLENOID REG VALVE
X
SS2 OFF
SS1 ON
Copyright © 2006 ATSG

Figure 91

"INDEX" FOR WIRE SCHEMATICS

1996 Cougar 3.8L, 4.6L, - See Figure 93
1996 Thunderbird, 3.8L 4.6L, - See Figure 93
1996 Crown Victoria, 4.6L, - See Figure 93
1996 Grand Marquis, 4.6L, - See Figure 93
1996 Lincoln Town Car, 4.6L, - See Figure 93
1996 Lincoln Mark VIII, - See Figure 93
1996 Bronco, 5.0L, - See Figure 93
1996 F Series, 5.0L, - See Figure 93
1996 Mustang, 3.8L, 4.6L, - See Figure 93
1996 E Series, 5.0L, - See Figure 93
1996 Explorer, 5.0L, - See Figure 93

1997 Cougar, 3.8L, 4.6L, - See Figure 93
1997 Thunderbird, 3.8L, 4.6, - See Figure 93
1997 Crown Victoria, 4.6L, - See Figure 93
1997 Grand Marquis, 4.6L, - See Figure 93
1997 Expedition, 4.6L, - See Figure 93
1997 Explorer, 5.0L, - See Figure 93
1997 Mountaineer, 5.0L, - See Figure 93
1997 E Van, 4.2L, 4.6L, - See Figure 93
1997 Lincoln Mark VIII, 4.6L, - See Figure 94
1997 Lincoln Town Car, 4.6L, - See Figure 93
1997 Mustang, 3.8L, 4.6L, - See Figure 93
1997 F Series, 4.2L, 4.6L, - See Figure 93

1998 Crown Victoria, 4.6L, - See Figure 96
1998 Grand Marquis, 4.6L, - See Figure 96
1998 Expedition, 4.6L, - See Figure 95
1998 Explorer, 5.0L, - See Figure 95
1998 Mountaineer, 5.0L, - See Figure 95
1998 E Van, 4.2L, 4.6L, - See Figure 95
1998 Lincoln Mark VIII, 4.6L, - See Figure 96
1998 Lincoln Town Car, 4.6L, - See Figure 96
1998 Mustang, 3.8L, 4.6L, - See Figure 95
1998 F Series, 4.2L, 4.6L, - See Figure 95

1999 Crown Victoria, 4.6L, - See Figure 96
1999 Grand Marquis, 4.6L, - See Figure 96
1999 Expedition, 4.6L, - See Figure 95
1999 Explorer, 5.0L, - See Figure 95
1999 Mountaineer, 5.0L, - See Figure 95
1999 E Van, 4.2L, 4.6L, - See Figure 95
1999 E Van, 5.4L, - See Figure 96
1999 Lincoln Town Car, 4.6L, - See Figure 96
1999 Mustang, 3.8L, - See Figure 95
1999 Mustang, 4.6L, - See Figure 96
1999 F Series, 4.2L, 4.6L, - See Figure 95
1999 F Series, 5.4L, - See Figure 96

2000 Crown Victoria, 4.6L, - See Figure 96
2000 Grand Marquis, 4.6L, - See Figure 96
2000 Expedition, 4.6L, - See Figure 96
2000 Explorer, 5.0L, - See Figure 95
2000 Mountaineer, 5.0L, - See Figure 95
2000 E Van, 4.2L, - See Figure 95
2000 E Van, 4.6L, 5.4L, - See Figure 96
2000 Lincoln Town Car, 4.6L, - See Figure 96
2000 Mustang, 3.8L, - See Figure 95
2000 Mustang, 4.6L, - See Figure 96
2000 F Series, 4.2L, - See Figure 95
2000 F Series, 4.6L, 5.4L, - See Figure 96

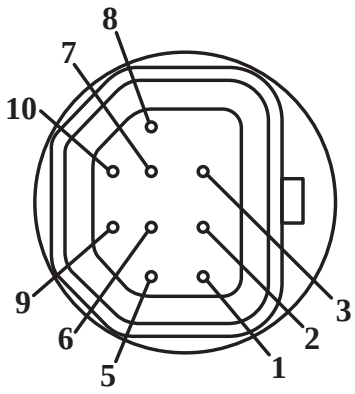
2001 Crown Victoria, 4.6L, - See Figure 96
2001 Grand Marquis, 4.6L, - See Figure 96
2001 Expedition, 4.6L, - See Figure 96
2001 Explorer, 5.0L, - See Figure 95
2001 Mountaineer, 5.0L, - See Figure 95
2001 E Van, 4.2L, 4.6L, 5.4L, - See Figure 95
2001 Lincoln Town Car, 4.6L, - See Figure 96
2001 Mustang, 3.8L, - See Figure 95
2001 Mustang, 4.6L, - See Figure 96
2001 F Series, 4.2L, - See Figure 95
2001 F Series, 4.6L, 5.4L, - See Figure 96

2002 Crown Victoria, 4.6L, - See Figure 96
2002 Grand Marquis, 4.6L, - See Figure 96
2002 Expedition, 4.6L, 5.4L, - See Figure 96
2002 E Van, 4.2L, - See Figure 95
2002 E Van, 4.6L, 5.4L, - See Figure 96
2002 Navigator, 5.4L, - See Figure 96
2002 Lincoln Town Car, 4.6L, - See Figure 96
2002 Mustang, 3.8L, - See Figure 95
2002 Mustang, 4.6L, - See Figure 96
2002 F Series, 4.2L, - See Figure 95
2002 F Series, 4.6L, 5.4L, - See Figure 96

2003 Crown Victoria, 4.6L, - See Figure 96
2003 Grand Marquis, 4.6L, - See Figure 96
2003 Mercury Marauder, 4.6L, - See Figure 96
2003 Expedition, 4.6L, 5.4L, - See Figure 96
2003 E Van, 4.2L, - See Figure 95
2003 E Van, 4.6L, 5.4L, - See Figure 96
2003 Lincoln Town Car, 4.6L, - See Figure 96
2003 Mustang, 3.8L, - See Figure 95
2003 Mustang, 4.6L, - See Figure 96
2003 F Series, 4.2L, - See Figure 95
2003 F Series, 4.6L, 5.4L, - See Figure 96

Figure 92

FORD 4R70W WIRE SCHEMATIC



1992-1997 MODELS

PIN	FUNCTION
1	*Shift Solenoid 1 Ground*
2	*Shift Solenoid 12V Power*
3	*TCC Solenoid Ground*
4	*Not Used*
5	*TOT Sensor*
6	*Shift Solenoid 2 Ground*
7	*EPC Solenoid 12V Power*
8	*TCC Solenoid 12V Power*
9	*TOT Sensor Return*
10	*EPC Solenoid Ground*

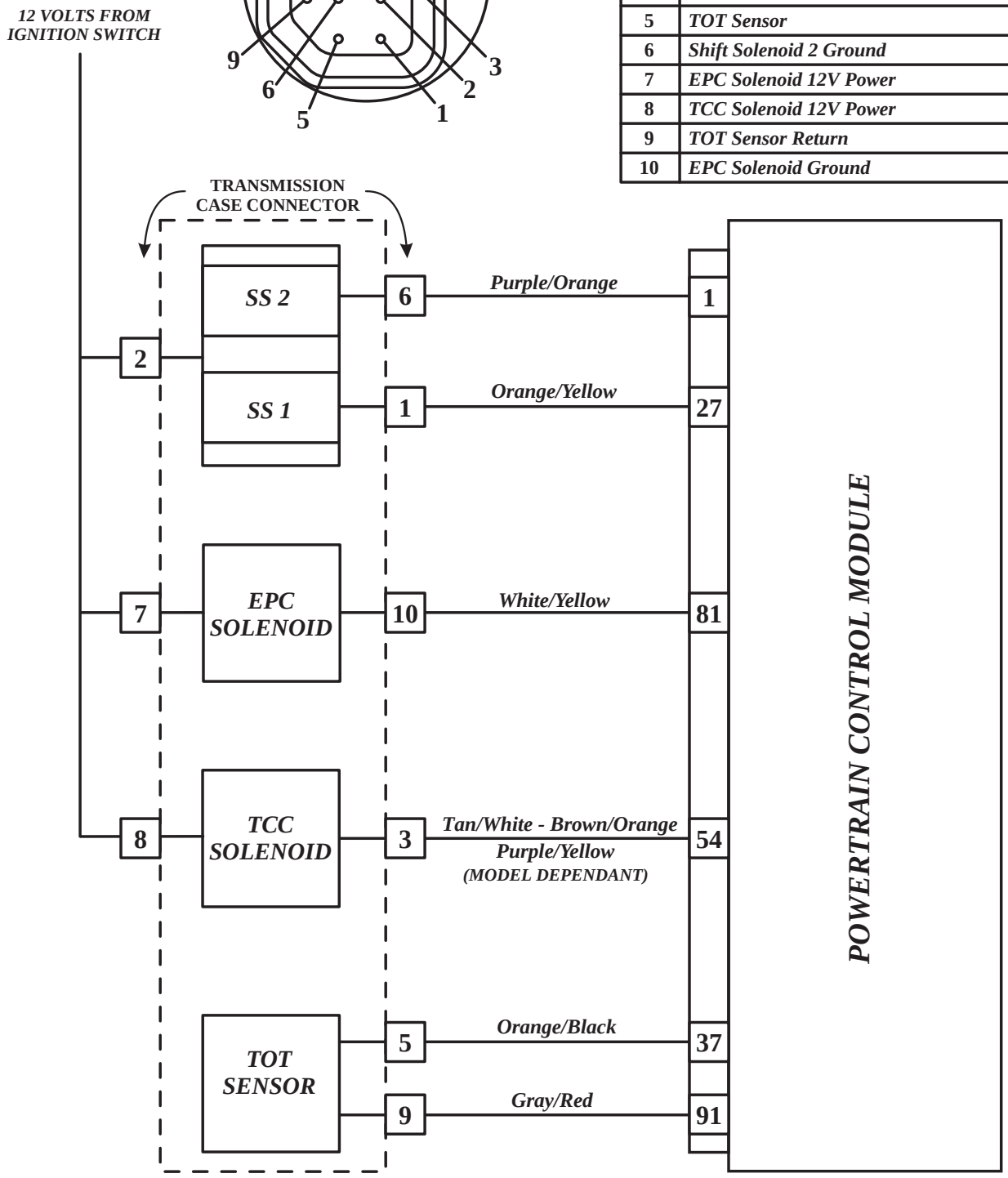
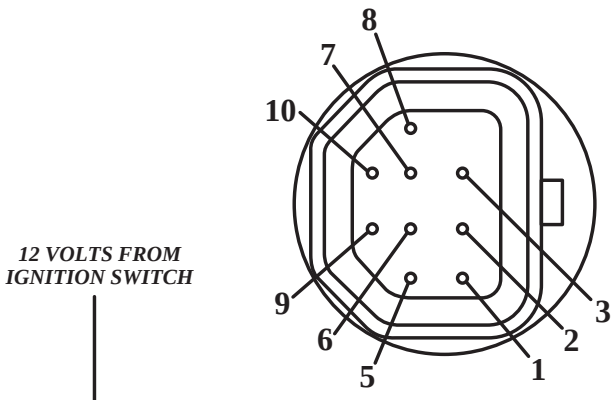


Figure 93

FORD 4R70W WIRE SCHEMATIC



1992-1997 MODELS

PIN	FUNCTION
1	*Shift Solenoid 1 Ground*
2	*Shift Solenoid 12V Power*
3	*TCC Solenoid Ground*
4	*Not Used*
5	*TOT Sensor*
6	*Shift Solenoid 2 Ground*
7	*EPC Solenoid 12V Power*
8	*TCC Solenoid 12V Power*
9	*TOT Sensor Return*
10	*EPC Solenoid Ground*

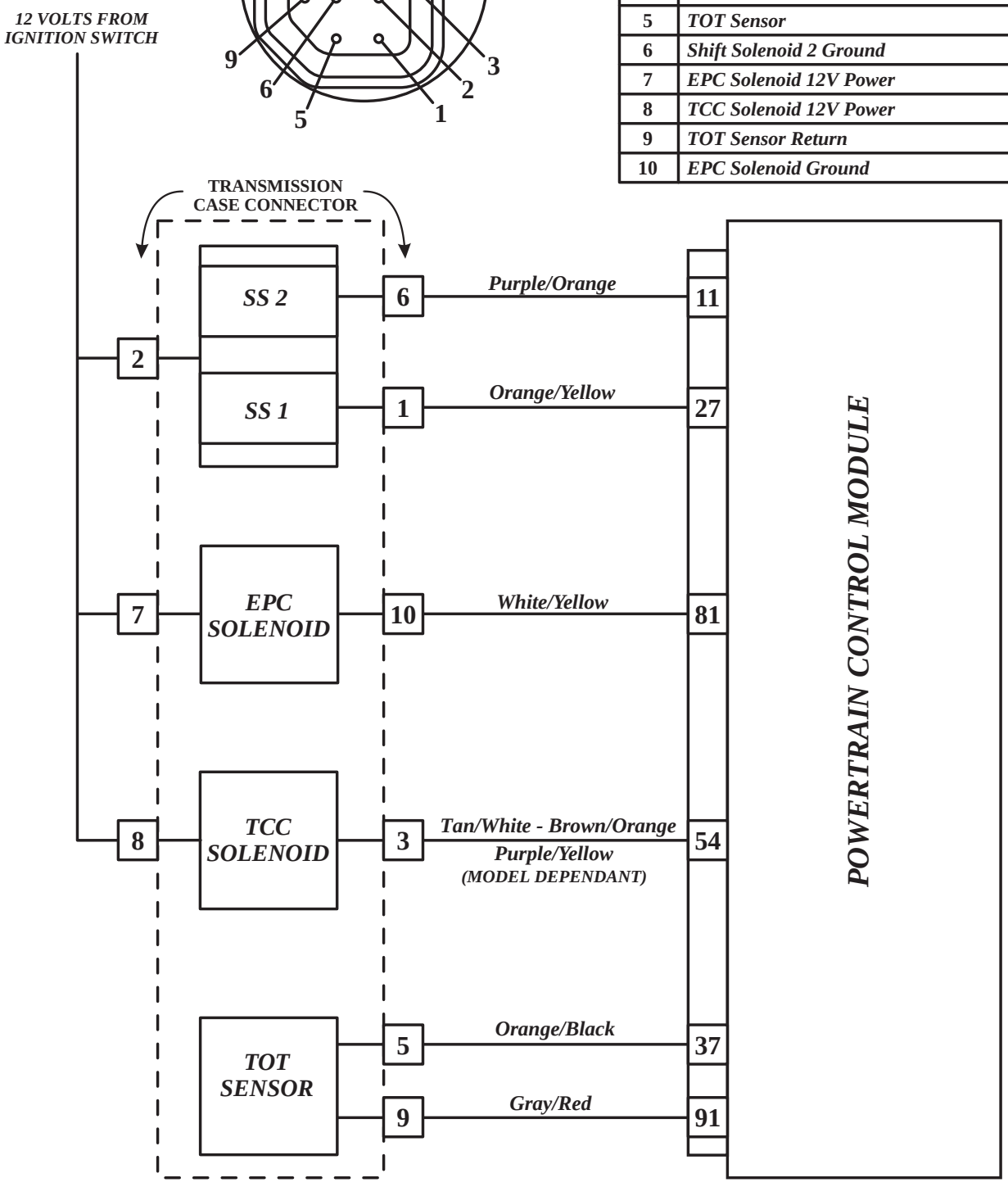
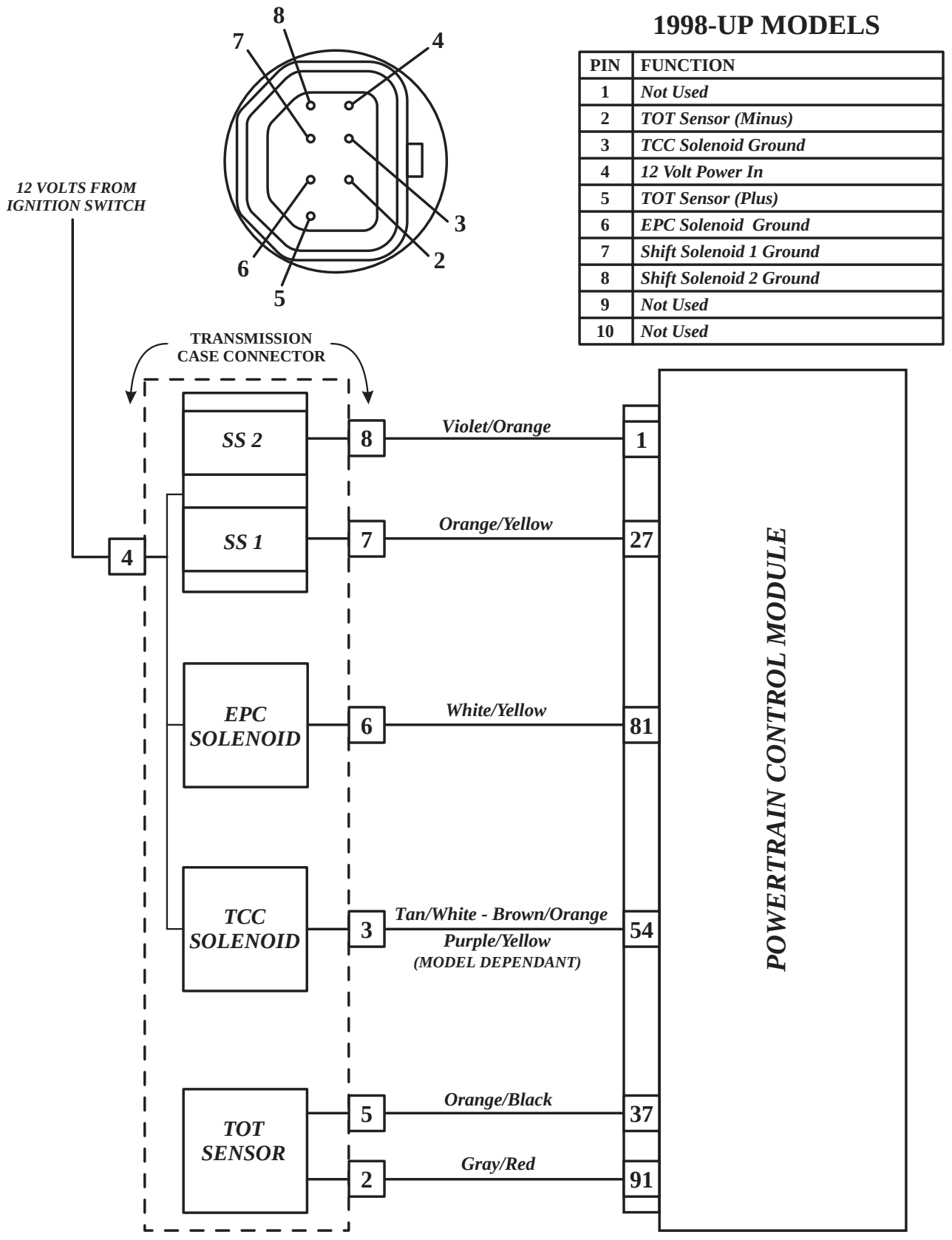


Figure 94

FORD 4R70W WIRE SCHEMATIC

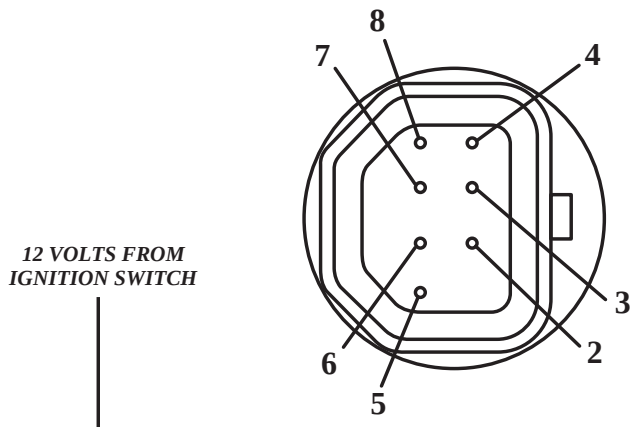


1998-UP MODELS

PIN	FUNCTION
1	*Not Used*
2	*TOT Sensor (Minus)*
3	*TCC Solenoid Ground*
4	*12 Volt Power In*
5	*TOT Sensor (Plus)*
6	*EPC Solenoid Ground*
7	*Shift Solenoid 1 Ground*
8	*Shift Solenoid 2 Ground*
9	*Not Used*
10	*Not Used*

Figure 95

FORD 4R70W WIRE SCHEMATIC



1998-UP MODELS

PIN	FUNCTION
1	*Not Used*
2	*TOT Sensor (Minus)*
3	*TCC Solenoid Ground*
4	*12 Volt Power In*
5	*TOT Sensor (Plus)*
6	*EPC Solenoid Ground*
7	*Shift Solenoid 1 Ground*
8	*Shift Solenoid 2 Ground*
9	*Not Used*
10	*Not Used*

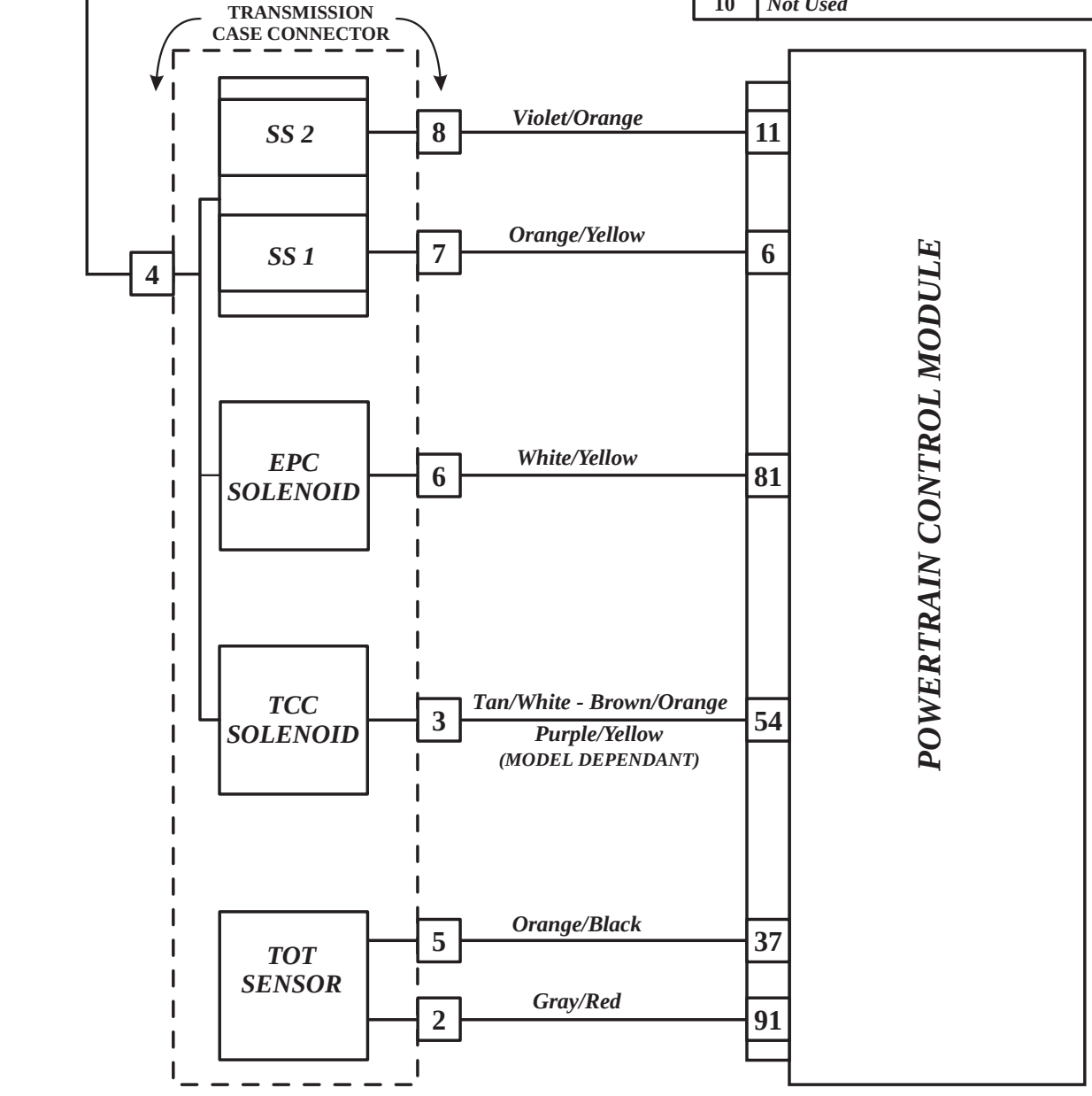


Figure 96

FORD 4R70W
NUMBER 5 THRUST BEARING CHANGE
1994-2003 MODELS ONLY

CHANGE: There is now available, for ***1994-2003 models only***, equipped with the 4R70W transmission, a new service package that contains the forward sun gear, a new design number 5 bearing and new design sun gear shell, as illustrated in Figure 97.

REASON: To eliminate the possibility of mismatching service parts, which would result in gear noise, as well as damage to these and other internal transmission components, due to dimensional differences.

PARTS AFFECTED:

(1) NUMBER 5 THRUST BEARING - The new design number five thrust bearing is now a "two piece open" design (needles exposed) and is .205” (5.24mm) in thickness, as shown in Figure 98. The previous design is a "one piece closed" bearing and is .175” (4.5mm) in thickness, as shown in Figure 98.

(2) REVERSE SUN GEAR AND SHELL ASSEMBLY - The new Sun Gear Shell is shorter, 1.852" (47.04mm) as measured in Figure 98, to accommodate the thicker number 5 thrust bearing. It also has a small groove machined at the base of the bushing journal for identification, as shown in Figure 98. The previous Sun Gear Shell is 1.882" (47.80mm) and does not have an ID groove. Refer to Figure 98.

(3) FORWARD SUN GEAR - Both previous and new Forward Sun Gears are the exact same length, 4.0" (101.6mm). The new design Forward Sun Gear has a groove machined at the base of the splines, and a blue dye stripe for identification purposes, as shown in Figure 98, and appears to have a different hardening process.
Note: Blue dye stripe will wear off during vehicle operation.

INTERCHANGEABILITY:

This new service kit will back service all 4R70W transmissions from ***1994 to 2003 "Only".*** It ***cannot*** be used in 2004 or later models due to the addition of a turbine speed sensor, which created a totally different sun gear shell.

SERVICE INFORMATION:

1994 to 2003 4R70W Trans Service Package..... 4L3Z-7D234-AA

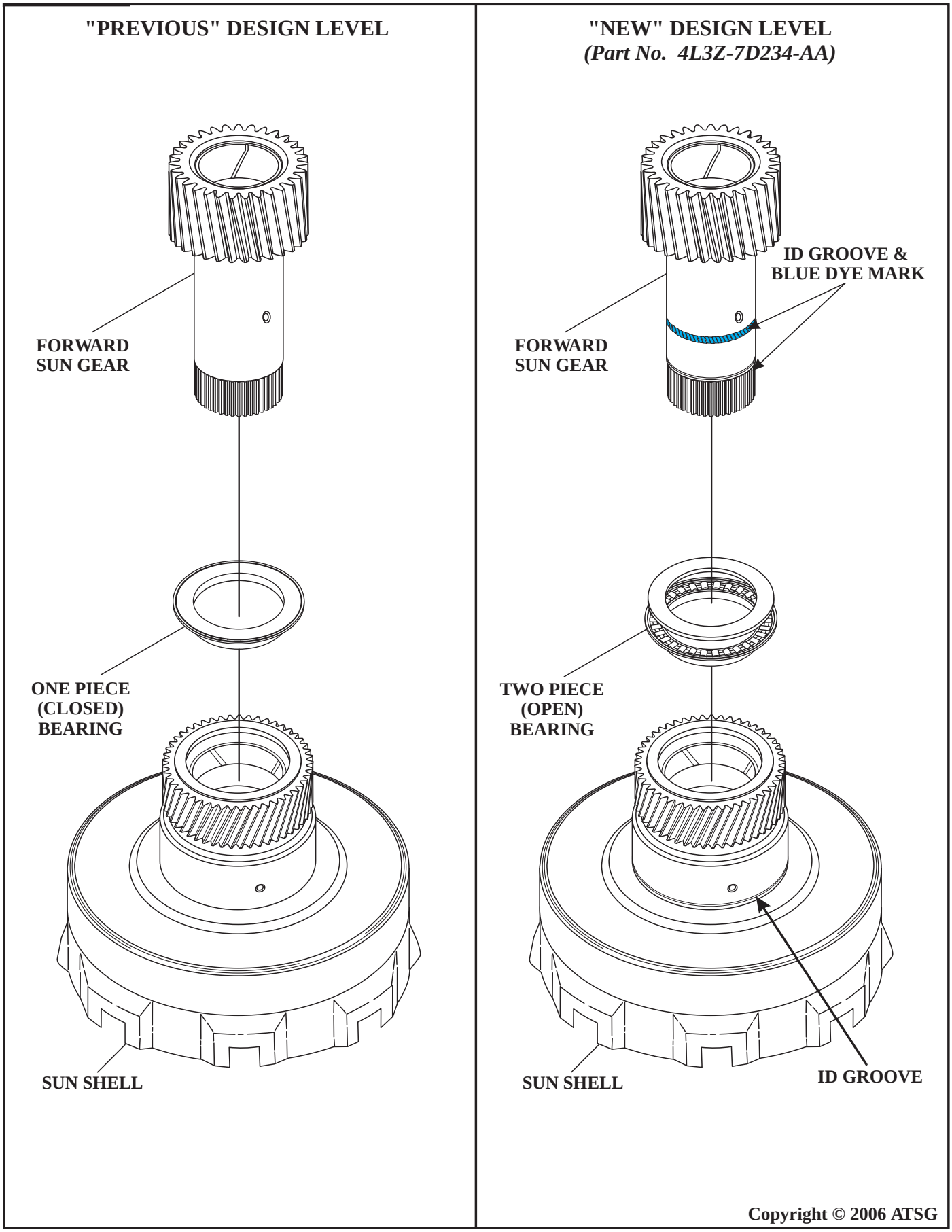

"PREVIOUS" DESIGN LEVEL
"NEW" DESIGN LEVEL
(Part No. 4L3Z-7D234-AA)
FORWARD SUN GEAR
ONE PIECE (CLOSED) BEARING
SUN SHELL
ID GROOVE & BLUE DYE MARK
FORWARD SUN GEAR
TWO PIECE (OPEN) BEARING
SUN SHELL
ID GROOVE
Copyright © 2006 ATSG

Figure 97

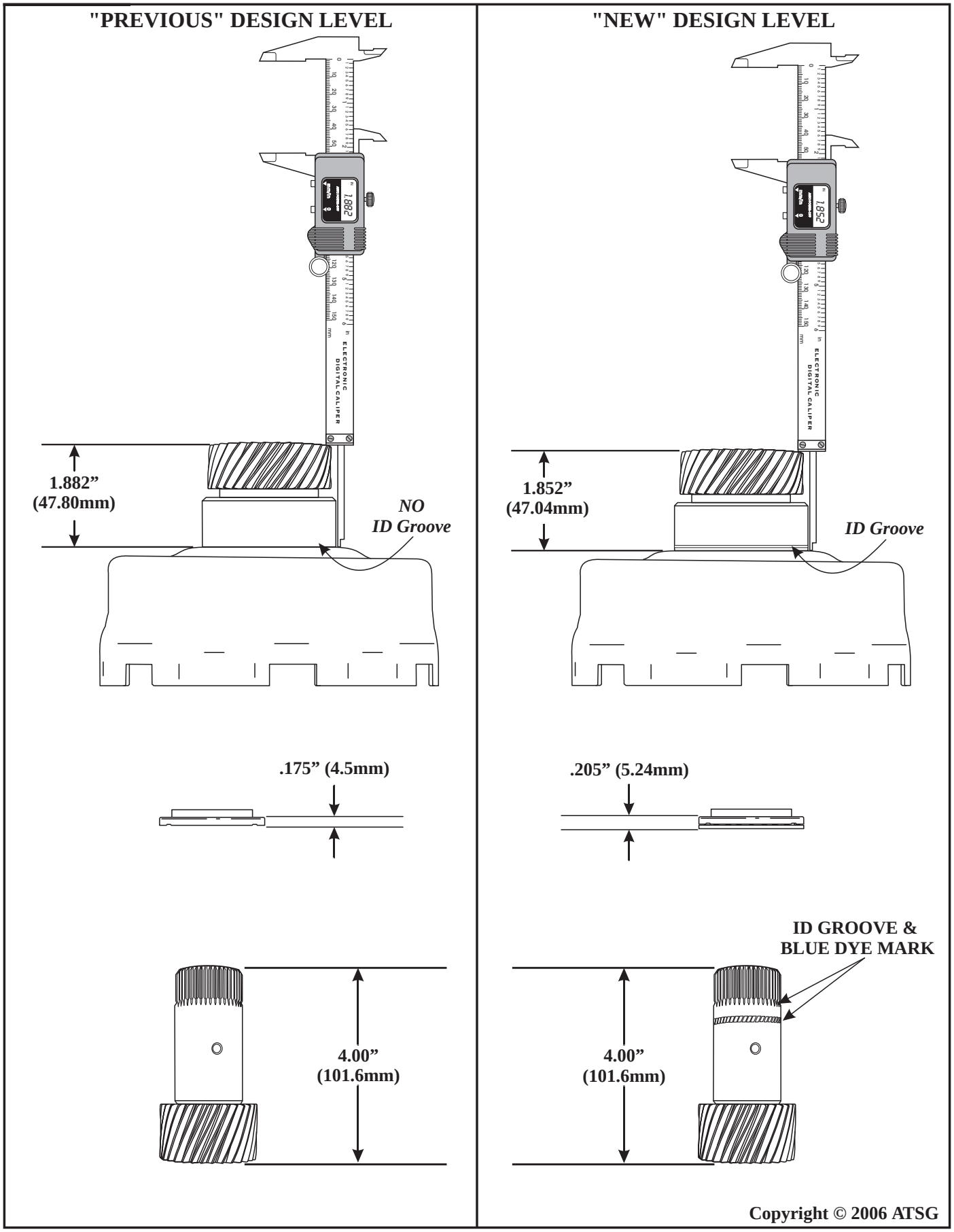

"PREVIOUS" DESIGN LEVEL
"NEW" DESIGN LEVEL
1.882
1852
ELECTRONIC DIGITAL CALIPER
1.882" (47.80mm)
NO ID Groove
1.852" (47.04mm)
ID Groove
.175" (4.5mm)
.205" (5.24mm)
ID GROOVE & BLUE DYE MARK
4.00" (101.6mm)
4.00" (101.6mm)
Copyright © 2006 ATSG

Figure 98

1992 AND LATER FORD TRUCKS WITH LIQUID CRYSTAL DISPLAY (LCD) ODOMETERS

INTERMITTENT OR CONTINUOUS LOSS OF VSS

COMPLAINT:

Vehicles with LCD odometers equipped with either an E4OD, AODE or 4R70W transmission may suddenly go to a neutral condition while driving or, after coming to a stop, the transmission is stuck in first gear. The TCIL (Transmission Control Indicator Lamp) flashes as a result and a scanner reveals that a code 29, 452, PO500 or PO503 has been stored. These symptoms may occur intermittently as well as erratic speedometer operation. The above codes may also be stored in memory from past intermittent failures or glitches.
NOTE: The ABS warning lamp may be illuminated.

CAUSE:

These symptoms may be caused by one or more of the following.

1. A faulty vehicle speed sensor (VSS) known as the Rear Antilock Brake Sensor (RABS) now located in the rear differential (Refer to Figure 99).
2. A loose speed sensor exciter ring on the differential ring gear carrier.(Refer to Figure 100).
3. Excessive use of silicone on the sensor altering the sensor to exciter ring air gap.
4. A deteriorated RAB Sensor connector or wiring.
5. A malfunction of the PSOM (Programable Speedometer/Odometer Module).
6. A loss of power or ground to the PSOM.
7. A faulty PCM/TCM.
8. A faulty Cruise Control Module. Dis-connect cruise control module and perform road test. If problem is eliminated, replace cruise control module.

The PSOM:

The PSOM 's operation directly affects all shift scheduling! 1992 and later Ford trucks with the VSS located in the differential are equipped with an internal microprocessor located within the speedometer cluster that uses a liquid crystal display odometer known as the Programable Speedometer/Odometer Module. The PSOM receives an analog signal from the VSS (RABS) in the form of AC voltage. This frequency (HERTZ) is proportionate to road speed and is converted by the PSOM to an 8000 pulse per mile signal, that can be deciphered by the PCM/TCM and is calibrated for each vehicles tire size and differential gear ratio. The PSOM can be re-calibrated by the technician should tire size and/or differential gear ratio change. An electrical overview of the PSOM system can be seen in Figure 101. Using the following diagnostic procedures, replace or repair the faulty component.

CORRECTION:

STEP 1. The first step would be to question the customer to see if their problems began after tires and/or the differential were changed. The problem may be as simple as over or undersized tires or a changed ratio in the differential. If this has occurred, the situation may need to be evaluated as to whether it would be best to go back to OE or remedy the change by reprogramming the PSOM to accommodate the modified ratio. If this is not the case, road test the vehicle taking note of the speedometer and odometer operation for function and accuracy. If DATA is available from a scanner, compare the speedometer to that of the scanner. If the scanner reads correct but the speedometer is erratic and bouncy, the speedometer head is faulty. If both the DATA and speedometer are bouncy or if DATA is not available for comparison, perform the following checks with the rear wheels off the ground.

Locate the two wire RAB Sensor test connector *(Red with a pink tracer and light green with a black tracer)*. For "F" series trucks it is located in the left rear corner of engine compartment (See Figure 102). For "E" series vans look behind the left side headlamp assembly (See Figure 103).

Continued on next Page

CORRECTION (Cont'd):

STEP 1 (Cont'd). Set your multi-meter to hertz (HZ) and probe the RABS test connector and raise vehicle speed to 30mph (48km/h). The multi-meter should indicate approximately 667 Hertz. If the hertz reading is correct, go to Step 2. If the hertz reading is erratic, unplug the sensor in the differential and repeat the test at the sensor. If the hertz reading continues to be erratic the exciter ring in the differential may be loose or, the speed sensor itself is faulty. If a steady 667 hertz is seen directly from the sensor at 30mph, the sensor's connector or its wiring to the PSOM is faulty and will need to be repaired or replaced.

STEP 2. Using Figure 102 locate the vehicles computer for "F" series trucks which is to the left of the brake booster. Use Figure 103 for "E" series vans where the computer is located to the right of the brake booster. With the multi-meter still set to hertz, back probe the following wires:
(EEC-IV) processors have a 60 pin connector of which back probe wires 3 and 6. Wire 3 is *gray with a black tracer,* and is known as circuit 679. Wire 6 is *pink with an orange tracer,* and is known as circuit 676.
(EEC-V) processors (1994-95 "F" series Turbo Diesels and 1996 and later vehicles) have a 104 pin connector of which back probe wires 33 and 58. Wire 33 is *gray with a black tracer,* and is known as circuit 679. Wire 58 is *pink with an orange tracer,* and is known as circuit 676. Raise vehicle speed to 30mph (48km/h), the meter should indicate approximately 67 Hertz. If the reading is correct, the PCM is faulty. If there is no reading or it is erratic or the reading is incorrect, the problem could be faulty wiring between the PSOM and the PCM. A faulty PSOM and/or the number 8 or 18 fuse has blown. To locate the problem, a step by step pin check of the PSOM circuits must be performed beginning with Step 3.

STEP 3. Remove the instrument cluster from the dash to gain access to the 12 pin PSOM connector as seen at the bottom of Figure 104. Refer to the schematic seen in Figure 104 for the following pin checks at the PSOM connector. **NOTE**: ***If the dash panel has a dual tank fuel switch, it is necessary to remove the switch from the dash and allowing it to remain plugged into the harness. If this switch remains unplugged, the vehicle will not start.***

STEP 4. With the PSOM connector plugged into the cluster, set a multi-meter to DC volts and place the negative lead to a good known ground. With the positive lead, locate and probe a *light green wire with a yellow tracer* (circuit 54) at terminal 1 in the PSOM connector. This is keep alive power at all times and must have full battery voltage there even with the ignition off. If it does, move to Step 5. If it does not, inspect the number 8, (15) amp fuse in the under the dash fuse box for power. The fuse location can be seen in Figure 105. If the fuse is blown, replace it. If it blows again there is a short to ground in the LG/Y wire from the fuse to the PSOM connector and will need to be replaced. If there is power and the fuse is not blown, the LG/Y wire from the fuse to the PSOM connector is open, and will need to be replaced. If the number 8 fuse was not blown, and did not have power either, the 50 amp "S" maxi-fuse in the under hood fuse box should be checked and replaced if necessary (See Figure 106 for location). If the maxi-fuse is not blown, the *black wire with an orange tracer,* between the maxi-fuse and the under the hood fuse box may have been severed or there is an internal problem within the fuse box itself.

STEP 5. Keeping the multi-meter set to DC volts and the negative lead to a good known ground, locate and probe the *white wire with a purple tracer,* (circuit 269) at terminal 3 in the PSOM connector. System voltage must be observed when the ignition is on. If system voltage is there, continue on to Step 6. If it is not, inspect the number 18 (10) amp fuse for power (See Figure 105). If there is power and the fuse is not blown, the W/P wire is open and will need to be replaced. If the number 18 fuse was not blown and did not have power, the ignition switch, or the *grey wire with a yellow tracer* (circuit 687) from the switch to the fuse is faulty and will need to be replaced.

Continued on next Page

CORRECTION (Cont'd):

STEP 6. With the PSOM connector still plugged in, as well as the multi-meter set to DC volts with the negative lead fixed to a good known ground, locate and probe the *pink wire with orange tracer* (circuit 676) at terminal 2. This is the PSOM's ground circuit. With the vehicle running, no more than 0.3 of a volt should be seen during this voltage drop test. It is best to see 0.1 volt or less. If this reading is acceptable move on to Step 7. If this reading is higher than 0.3 volts, this ground wire must be repaired or replaced until 0.1 volt or less is observed.
NOTE: *This wire changes to a black wire with a white tracer (circuit 570) after the factory splice.*

STEP 7. This step verifies the RAB Sensor input to the PSOM. Step 1 verified that the RAB Sensor was working from the sensor to its test connector. This step verifies that the wiring from the test connector to the PSOM is good. To do this, unplug the PSOM connector and set a multi-meter to hertz. With the positive lead, back probe terminal 4 *(red wire with a pink tracer)* or with Bronco's, an *(orange wire with a light blue tracer)* (circuit 523), and the negative lead to terminal 5 *(light green with a black tracer),* or with Bronco's a *(light green wire with a yellow tracer)* circuit 519). There should be approximately 667 HZ @ 30mph (48km/h). If it does, proceed to Step 8. If the hertz reading is unacceptable, an additional check of the circuit can be performed by turning the ignition off and switching the multi-meter setting to the ohms position. This checks the sensor circuit for proper resistance which should be between 900 to 2500 ohms. If erratic, incorrect or no readings are observed (hertz and/or ohms), use the wire diagram in Figure 101 to isolate and check each wire from the PSOM connector to the RABS test connector. Repair or replace one or both wires as necessary.

STEP 8. This step checks the conditioned signal that the PSOM sends to the PCM/TCM. This requires the PSOM connector to be plugged into the instrument cluster. Place the multi-meter to the hertz selection and fix the negative meter lead to a good known ground. Locate and probe with the positive meter lead the *gray wire with a black tracer* (circuit 679, at terminal 7 in the PSOM connector. There should be approximately 67 HZ @ 30mph (48km/h). If this reading is erratic or severely off, either the PSOM is defective and will need to be replaced, or the differential was changed which may be corrected by re-calibrating the PSOM. If this reading is correct and DATA to the scanner reads differently, the PCM/TCM is defective. If DATA is not available but shift scheduling is erratic, chances are the PCM/TCM is defective. If all readings are correct, repeat this test on the road. If readings become altered, it may be possible that a modification in tire size did in fact occur, which may be compensated by re-calibrating the PSOM.
For re-calibrating the PSOM, refer to the following procedures:

RE-CALIBRATING THE PSOM:

The PSOM requires re-calibration when a tire size or differential gear ratio change has occurred, or the speedometer was serviced in some way, and/or when a loss of power to the PSOM for lengthy periods of time has also occurred. Should any one of these occur requiring re-calibration of the PSOM, there are 3 pieces of ***mandatory*** information needed which will be used to acquire a specific number necessary in the re-calibration procedure called "the conversion constant." These 3 pieces of information are as follows:

(A) The differential or (axle) capacity (gear ratio).
(B) The tooth count of the speed sensor's exciter ring on the differential.
(C) The tire size.

Continued on next Page

RE-CALIBRATING THE PSOM (Cont'd):

STEP 1 - AXLE RATIO

To find the axle capacity, there is a sticker on the inside door jam that looks like the sticker shown on the top of Figure 107. Locate at the bottom of the sticker the word "AXLE." Under that word is a number. The example given in Figure 107 is the number 29. Also in Figure 107, there is a cross over chart for Bronco and "F" series trucks, in which 29 equates to a 5300 axle capacity with an axle ratio of 3.55. Use the cross over charts in Figure 108 for all "E" series Vans.

STEP 2 - EXCITER RING TOOTH COUNT

Mounted on the differential ring gear is the speed sensor exciter ring (See Figure 2). There are only two different tooth counts available at the time of this printing; 108 teeth and 120 teeth. The only way to know which one you have is to physically remove the differential cover and count the teeth. For our example, we have a vehicle with 120 teeth.

STEP 3 - TIRE SIZE

Tire size may generally be obtained in one or two places. On the tire itself or from the sticker on the inside door jam as seen in Figure 107. The example in Figure 107 reveals a tire size of : **LT 215/85R-16D.**

STEP 4 - CALCULATING THE CONVERSION CONSTANT

From the above three steps, we have an "F" series truck with an axle capacity of 5300, a speed sensor exciter ring with a tooth count of 120, and a LT 215/85R-16D tire size. Now look at the chart for "F" series pick-ups & Broncos in Figure 109. Find the 5300 axle capacity column where directly below you will find the 120 tooth speed sensor exciter ring listed. Follow the column down until it lines up with the LT-215/85-R16D tire size column to the left. Intersecting these columns you will find in the intersection the conversion constant number of **9.96.** With this number, the re-calibration of the PSOM can begin.

STEP 5 - RE-CALIBRATING THE PSOM

Locate the enable circuit 567 wire connector. This is a *light blue wire with a yellow tracer* coming from the PSOM connector pin 9 to a single connector. It is located under the left side of the dash, below the fuse box, near the bulkhead connector on "E" series vans as seen in Figure 110, and under the center of the dash below the glove box on "F" series trucks (See Figure 111). **NOTE:** ***The letters PSOM should be printed on the enable connector. Once found, use the following procedures to reprogram the PSOM.***

(1) With the ignition in the "OFF" position, ground the enable connector with a jumper wire.

(2) While pushing in on the trip odometer reset button (See Figure 112), turn ignition to the "ON" position. ***Do not start the engine.*** Once in the ON position, release the trip odometer reset button.

(3) At this time the speedometer needle should sweep across the face of the speedometer and back again. This sweep indicates that the PSOM has been put into the enable mode. Looking into the LCD odometer window, you should now see the English/Metric display, the revision level number and the lockout countdown number, which indicates how many times the PSOM can be reprogrammed (See Figure 112). **CAUTION:** ***Each time the PSOM is re-calibrated, the number of times this can be done is reduced by one!*** 1992 vehicles can be re-calibrated 3 times, while 1993 and later vehicles can be re-calibrated 6 times. If the countdown number is zero and the PSOM requires re-calibration, the instrument cluster will require replacement.

(4) Press the odometer reset button once again. Now you will see inside of the odometer window, the ***conversion constant*** number without the decimal point, followed by the abbreviation "CAL". Refer to Figure 113.

(5) Press and release the select button as many times as necessary to change the conversion constant number until the desired number is reached, which for our example is 996. Each time the select button is pressed, the constant will decrease by 1 number. When the desired constant number is reached, press and release the reset button once, to lock in the new conversion constant.

(6) Turn ignition to "OFF", remove jumper wire from PSOM Enable Connector, test drive and verify proper speedometer operation.

Continued on next Page

RE-CALIBRATING THE PSOM: (Cont'd)

STEP 6 - THE "WHAT IF" PROCEDURE

There may be times where one might say, "What if the differential was changed and now we don't know what the axle capacity or ratio is, what do we do now?" ***Or,*** "What if the tires have been changed and the dimensions of the tire do not match up with the vehicles door jam sticker, what do we do now?" These are ***very*** difficult problems with ***very*** involved procedures to remedy them. The easiest remedy is to get the factory specified tires and/or axle ratio required. However, if there are brave technicians who want to go, where few technicians have gone before, here might be some helpful methods.

For the unknown axle capacity, one method that may be employed is to see how many turns of the drive shaft it takes to make the rear tire rotate one complete turn. If it takes slightly more that 4 turns of the drive shaft to make the rear wheel rotate one complete revolution, you would have a 4.1 axle ratio. When comparing the charts in Figure 107 and 108, this ratio applies to many different axle capacities. The breakdown would be like this:

For Bronco and "F" Series Trucks with a 4.1 axle ratio, the rear could have a 3800, a 5300, a 6250, a 7400 or a 8250 axle capacity. "E" Series Vans would have a 6340, a 7800,or an 8000 axle capacity.

Looking now at the axle capacities for both F and E series vehicles found in the Figure 109 charts, only a 3800 axle capacity vehicle would have an exciter ring tooth count of 108. All others would have 120. If the cover on the differential is removed and the exciter ring has 108 teeth, this was an easy find. Now all one would have to do is match the appropriate tire size from the left side column and intersect it with the top 3800/108 column to obtain the conversion constant number. Once the conversion constant number is acquired, the PSOM can now be re-calibrated.

But what if the exciter ring has 120 teeth? Now it becomes necessary to obtain the tire size. Let's say you have an E series van with a LT225/75R16E/A/S...689 tire size. You can find this tire size looking at the bottom chart in Figure 107. There you will notice that all of the 120 teeth exciter ring axle capacities with this tire size has the same 10.34 conversion constant number. You are now ready to re-calibrate the PSOM.

But what if the vehicle tire size is other than OE specified? This situation will require an involved mathematical procedure of which there are four to choose from. Choose which ever one you are most comfortable with.

Formula 1 in Figure 114 uses the entire equation because overall tire height is not known.

Formula 2 in Figure 115 uses the tire inches above and below the rim is known.

Formula 3 in Figure 116 uses overall tire height.

Formula 4 in Figures 117 and 118 are used when tire size or gear ratios are questionable.

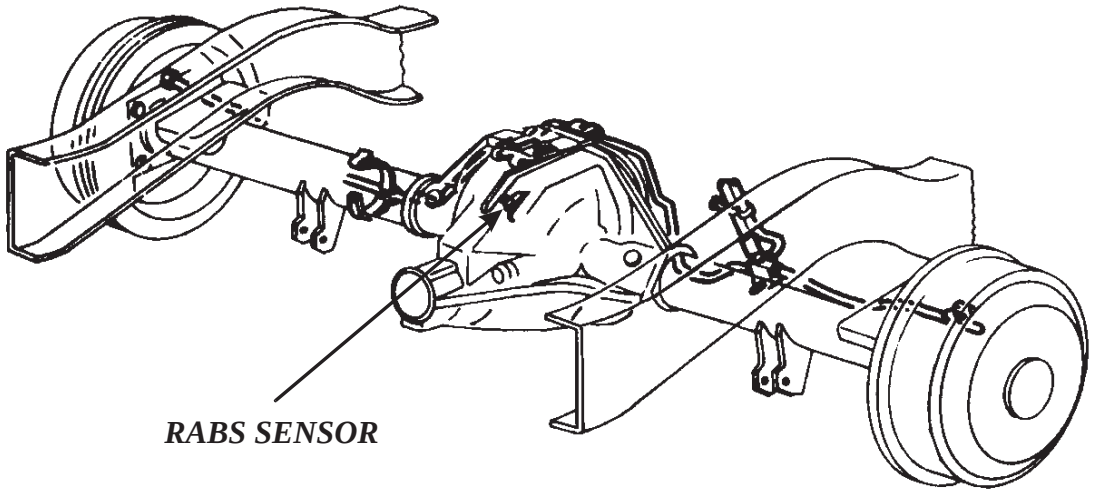


Figure 99

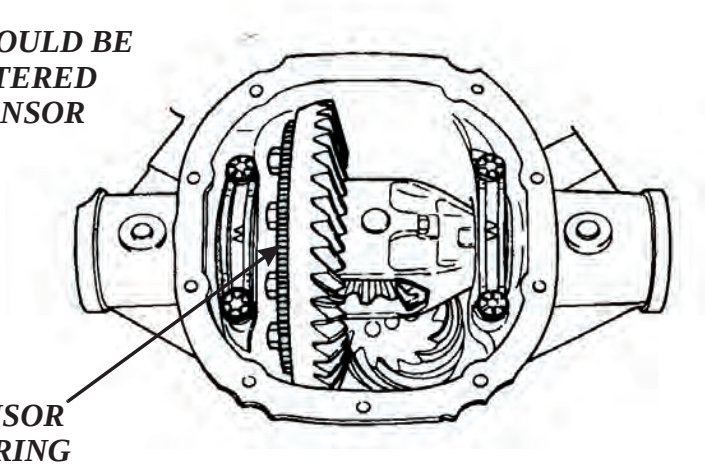


Figure 100

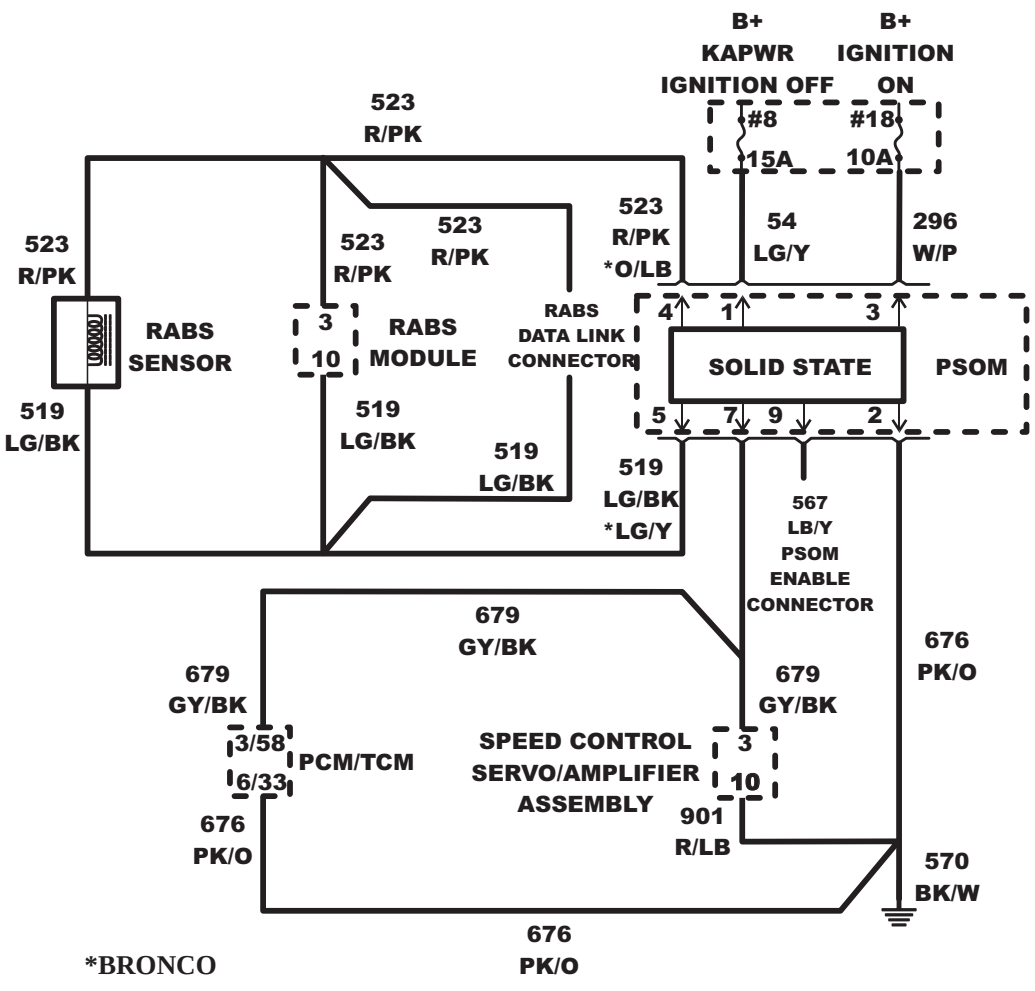


Figure 101

"F" SERIES TRUCKS

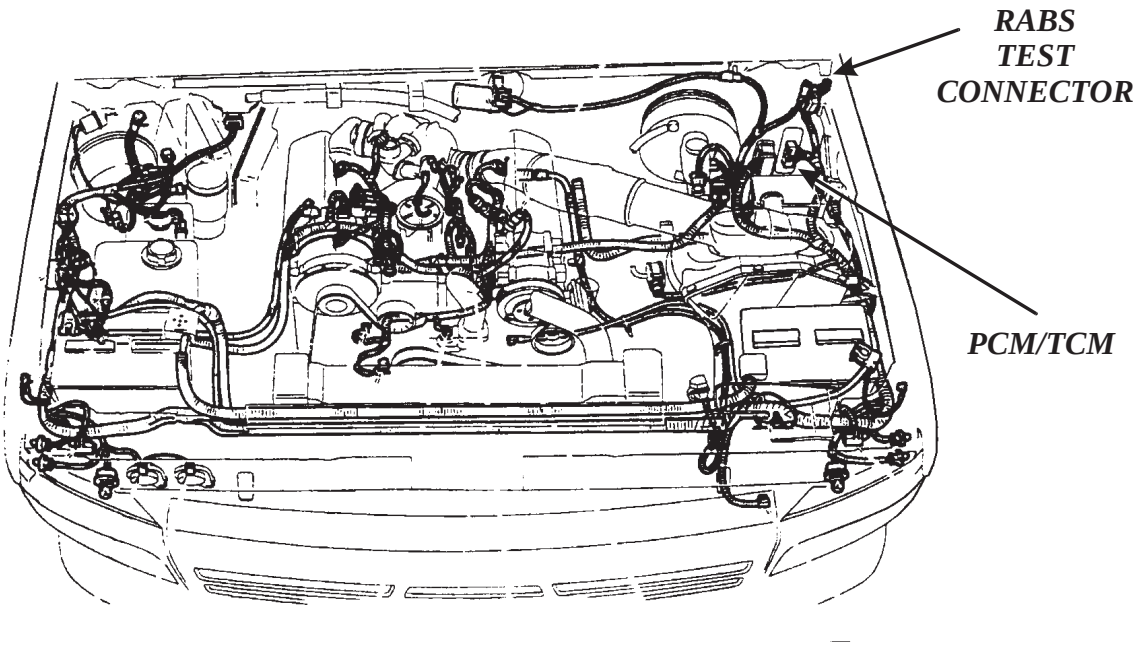


Figure 102

"E" SERIES VANS

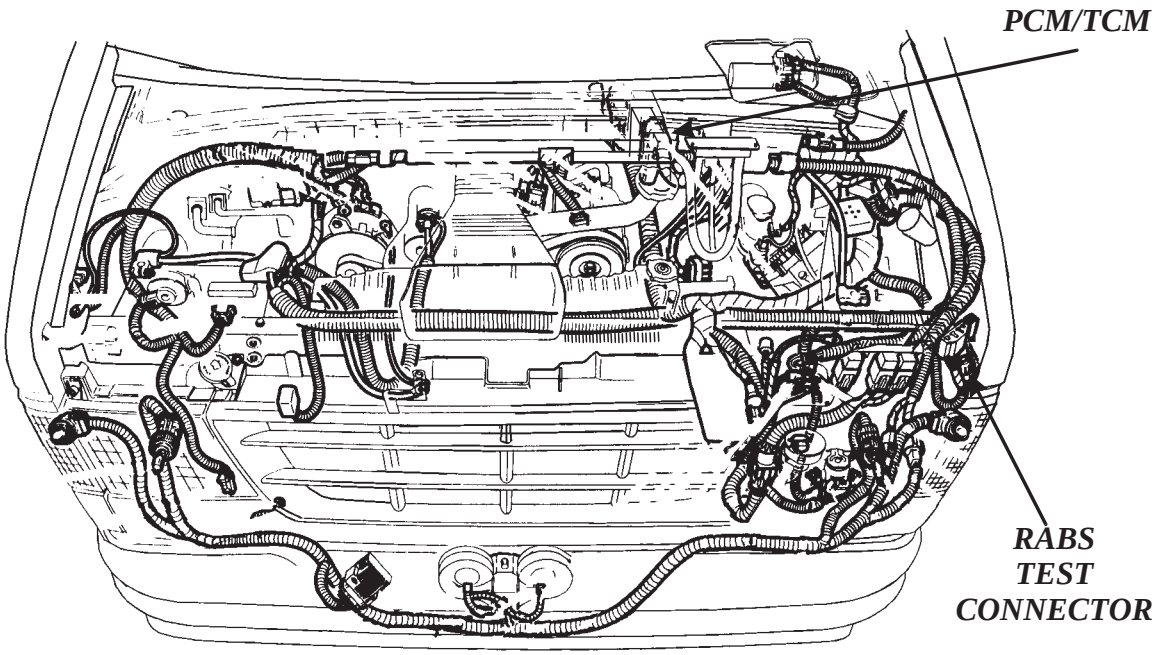
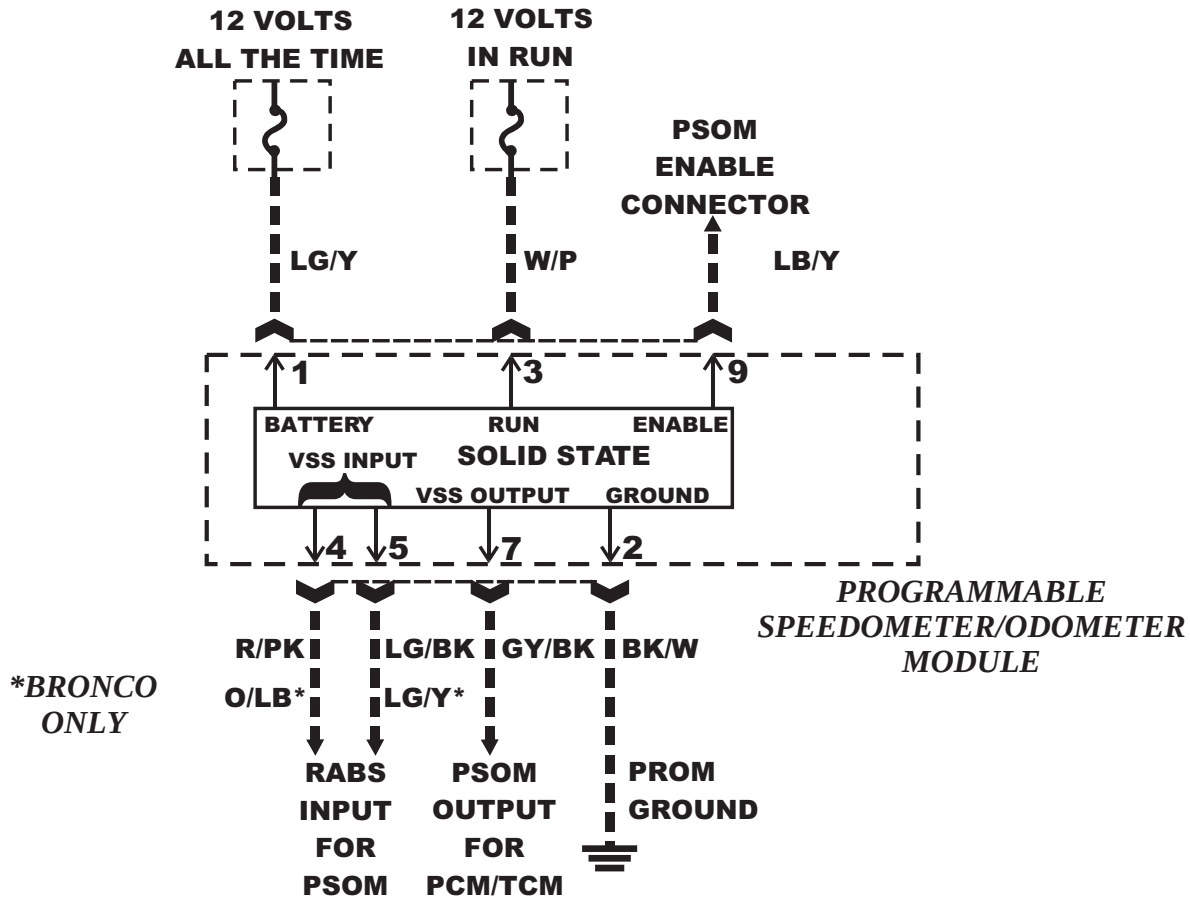
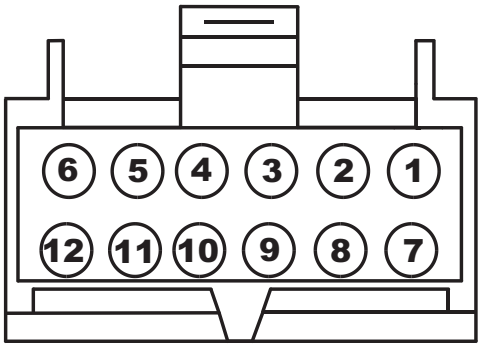


Figure 103

PSOM CONNECTOR PIN IDENTIFICATION





VIEW LOOKING INTO FACE OF CONNECTOR

PIN 1	**12 Volts all the time**
PIN 2	**Ground .1 volt or less**
PIN 3	**12 Volts run only**
PIN 4	**RABS signal input**
PIN 5	**RABS signal return**
PIN 6	**NOT USED**
PIN 7	**Speed output to instrument cluster Cruise Control & PCM/TCM**
PIN 8	**NOT USED**
PIN 9	**PSOM dealer enable**
PIN 10	**NOT USED**
PIN 11	**NOT USED**

Figure 104

UNDER DASH FUSE BOX

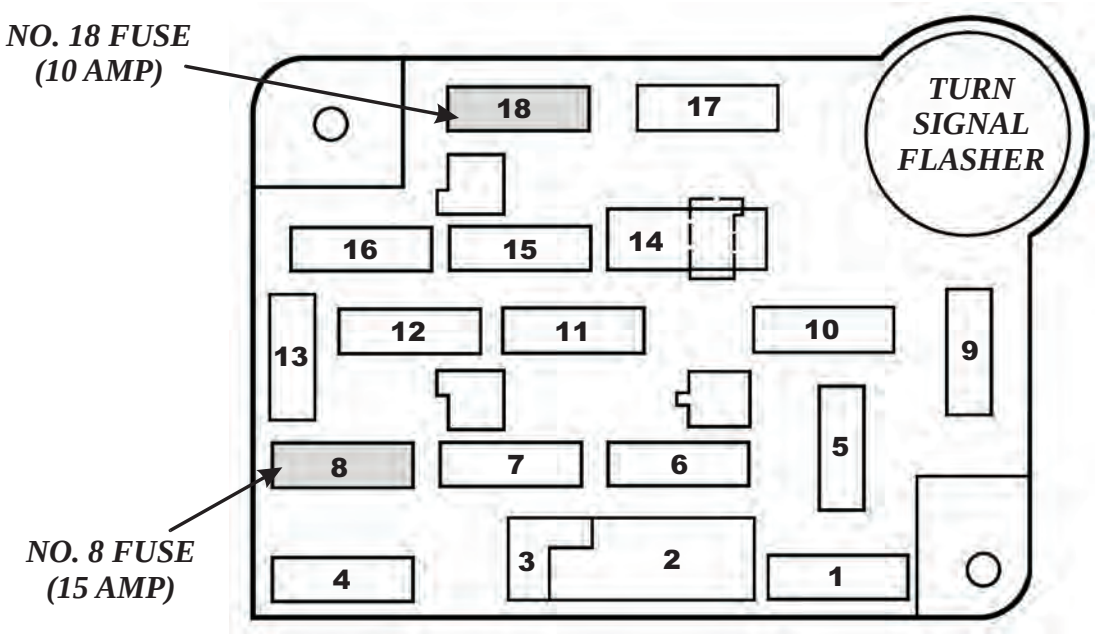


Figure 105

UNDER HOOD FUSE BOX

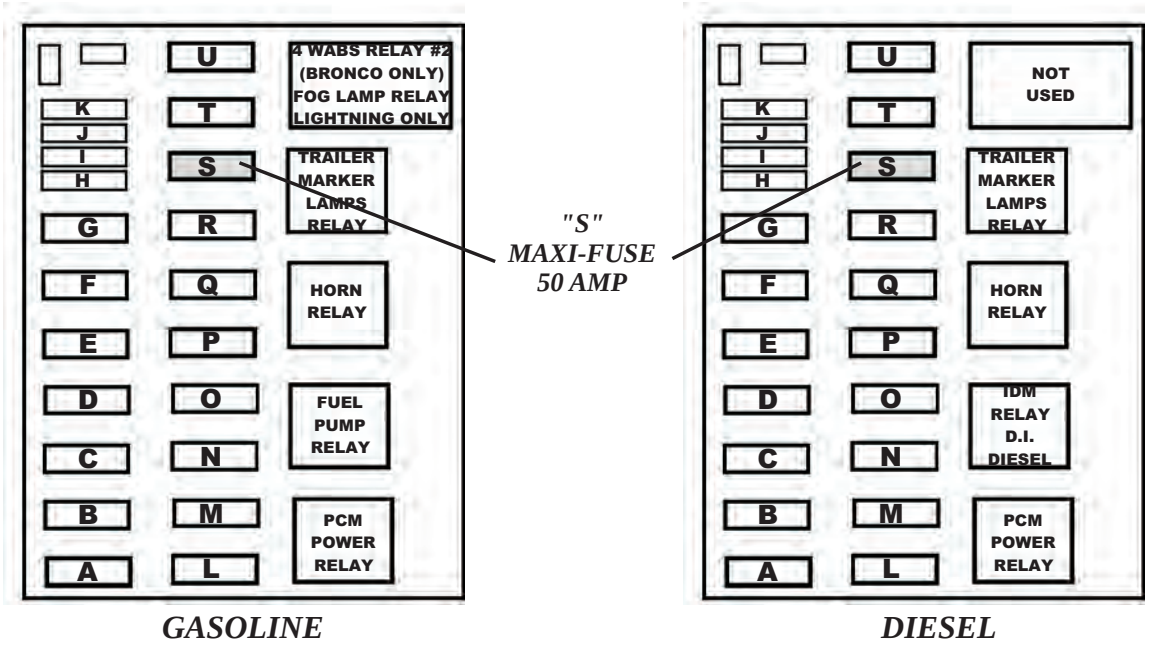
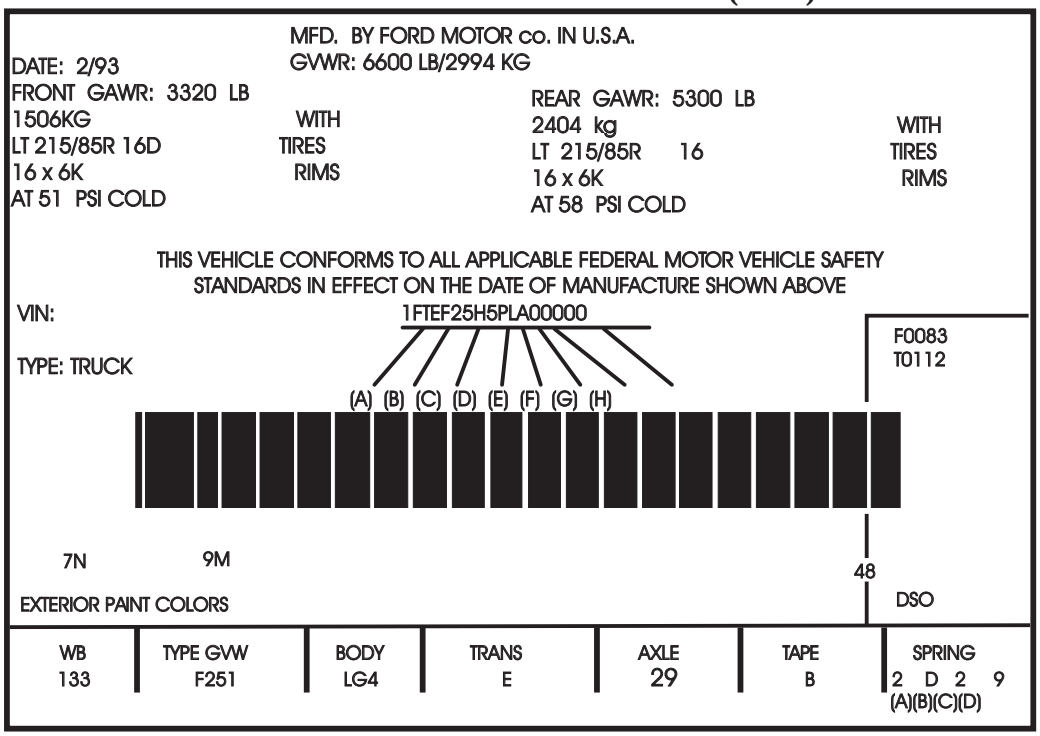


Figure 106

BRONCO & "F" SERIES TRUCKS

VEHICLE CERTIFICATION LABEL (VCL)



REAR AXLE CODES	CAPACITY (LBS)	RATIO
12	3800	2.73
18	3800	3.08
19	3800	3.55
H5	3800	4.10
H8	3800	3.08
H9	3800	3.55
25	3800	4.10
29	5300	3.55
B5	5300	4.10
B9	5300	3.55
35	6250	4.10
39	6250	3.55
C9	6250	3.55
45	7400	4.10
49	7400	3.55
D5	7400	4.10
65	8250	4.10
69	8250	3.55
F5	8250	4.10
72	11,000	4.63
73	11,000	5.13
W5	8250	4.00

FRONT AXLE CODES (NOT APPLICABLE ON E150-250-350)

BRONCO AND F-150-250-350	
CODE	DESCRIPTION
2	FRONT AXLE LIMITED SLIP

Figure 107

"E" SERIES VANS

E150-250-350 REGULAR REAR AXLE

CODE	CAPACITY	RATIO
12	3800	2.73
18	3800	3.08
19	3800	3.55
23	5400	3.54
24	5400	3.73
33	6340	3.54
52	7800	4.10
32	6340	4.10
62	8000	4.10
17	3800	3.31
35	6340	4.09
34	6340	3.73
56	7800	4.10

E150-250-350 LIMITED SLIP REAR AXLE

CODE	CAPACITY	RATIO
H8	3800	3.08
H9	3800	3.08
B4	5400	3.73
C2	6340	4.10
C3	6340	3.54
E2	7800	4.10
F2	8000	4.10
H7	3800	3.31
C5	6340	4.09
C4	6340	3.73
E6	7800	4.10

Figure 108

CONVERSION CONSTANT CHARTS

CONVERSION CONSTANT CHART ("F" SERIES PICKUP & BRONCO)

TIRE SIZE/TYPE AND SAE REVS PER MILE	AXLE CAPACITY	3800	5300	6250	7400	8250	11000
	SPEED SENSOR EXCITER RING TOOTH COUNT	108	120	120	120	120	120
P215/75R15SL/A/S...728		9.83	N/A	N/A	N/A	N/A	N/A
P235/75R15XL/A/S...699		10.48	N/A	N/A	N/A	N/A	N/A
P235/75R15XL/A/T...699		10.48	N/A	N/A	N/A	N/A	N/A
31-10.50R15C/A/T...651		8.79	N/A	N/A	N/A	N/A	N/A
LT215/85R16D/A/T...664		N/A	9.96	N/A	9.96	9.96	N/A
LT215/85R16D/A/S...664		N/A	9.96	N/A	N/A	N/A	N/A
LT235/85R16E/A/T...636		N/A	9.54	9.54	N/A	9.54	9.54
LT235/85R16E/A/S...636		N/A	9.54	9.54	N/A	9.54	9.54
7.50R-16D/HWY...651		N/A	9.76	N/A	N/A	N/A	N/A
7.50R-16D/A/T...651		N/A	9.76	N/A	N/A	N/A	N/A
P265/75R15/A/T...659		8.90	N/A	N/A	N/A	N/A	N/A
P275/60HR17/A/S...673		9.08	N/A	N/A	N/A	N/A	N/A

CONVERSION CONSTANT CHART ("E" SERIES VANS)

TIRE SIZE/TYPE AND SAE REVS PER MILE	AXLE CAPACITY	3800	5400	6340	7800	8000
	SPEED SENSOR EXCITER RING TOOTH COUNT	108	120	120	120	120
P215/75R15SL/A/S...728		9.83	N/A	N/A	N/A	N/A
P225/75R15SL/A/S...713		10.70	N/A	N/A	N/A	N/A
P235/75R15XL/A/T...699		10.48	N/A	N/A	N/A	N/A
LT225/75R16D/A/S...689		N/A	10.34	N/A	10.34	10.34
LT225/75R16E/A/S...689		N/A	10.34	10.34	10.34	1034
LT235/85R16E/A/T...636		N/A	9.54	9.54	N/A	N/A

Figure 109

"E" SERIES VANS

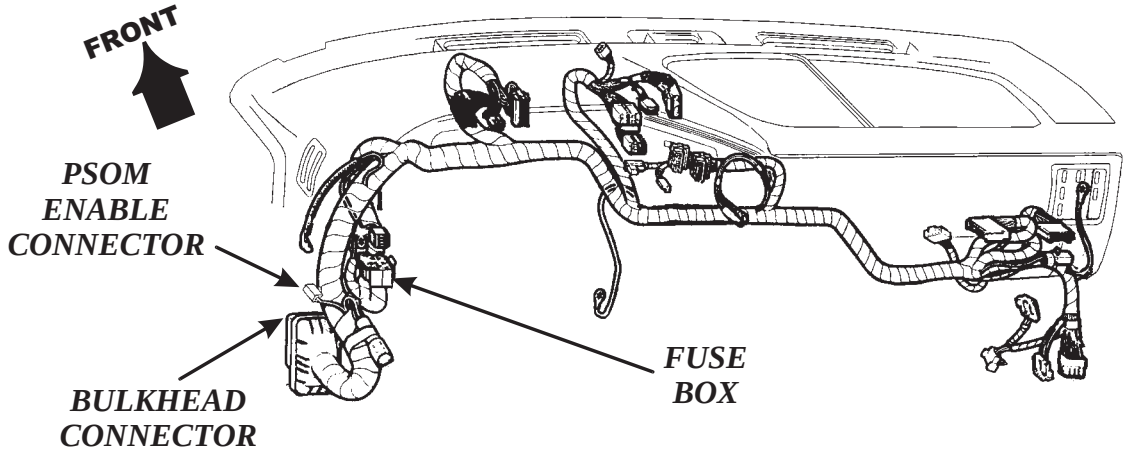


Figure 110

"F" SERIES TRUCKS

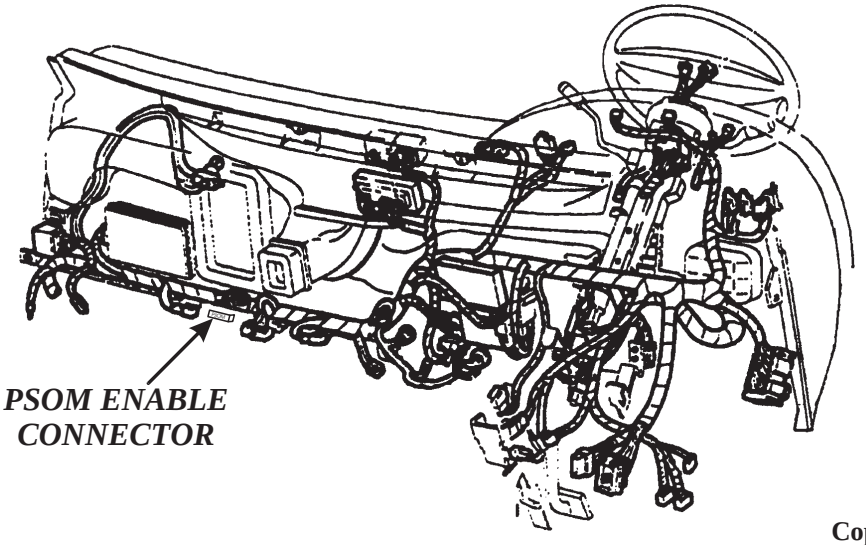


Figure 111

PSOM ODOMETER DISPLAY

REPROGRAM ENABLE MODE

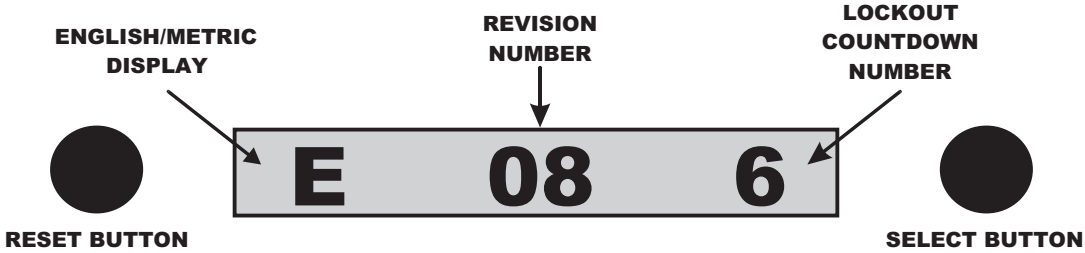


Figure 112

PSOM ODOMETER DISPLAY

CALIBRATION MODE

Figure 113

Formula #1 uses the following equation when overall tire height is not known:

___>____x .3937 =____
___>____x ____ =____ x 2 + _____+____ =_____x 3.14 = 63360 ÷ _____x___ =_____ ÷ 8000 = CC

Here is an example of how this equation works using an LT235/85R-16 tire as an example:

Millimeters / Convert to / Centimeters / Multiplied by / In per Centimeter / equals / Centimeters per Inch
235 > 23.5 x .3937 = 9.25

Millimeters / Convert to / Centimeters / Multiplied by / Centimeters per Inch / equals
85 > .85 x 9.25 =

/ Tire Inches Above & Below the Rim / Multiplied by / Two / equals / _____ / plus / Rim Size / equals
7.86 x 2 = 15.72 + 16 =

/ Overall Tire Height / Multiplied by / Pi / equals / Overall Tire Circumference / Inches per Mile
31.72 x 3.14 = 99.60 63360

Divided by / Overall Tire Circumference / equals / Revolutions per Mile / Multiplied by /
÷ 99.60 = 636.14 x

RABS Sensor Exciter Ring Tooth Count / equals / _____ / Divided by / PSOM Pulses per Mile / equals
120 = 76336.8 ÷ 8000 =

/ **Conversion Constant.**
9.54

Figure 114

Formula #2 uses the following equation when using the tire inches above and below the rim:

____ x 2 = _____+ __ =_____ x 3.14 = _____ 63360 ÷ _____ = _____ x ___ = _____ ÷ 8000 = CC

Here is an example of how this equation works using a 7.50R - 16 tire:

Tire Inches Above and Below the Rim / Multiplied by / Two /equals _____ / plus / Rim Size
7.50 x 2 = 15.00 + 16

/ equals / Overall Tire Height / Multiplied by / Pi / equals / Overall Tire Circumference / Inches per Mile
= 31.00 x 3.14 = 97.34 63360

/ Divided by / Overall Tire Circumference / equals / Revolutions per Mile / Multiplied by
÷ 97.34 = 650.91 x

/ RABS Exciter Ring Tooth Count / equals / _____ / Divided by / PSOM Pulses per Mile / equals
120 = 78109.2 ÷ 8000 =

/ **Conversion Constant**
9.76

Figure 115

Formula #3 uses the following equation when using the overall tire height:

__ x 3.14 = _____ ÷ 63360 = _____ x ___ = _____ ÷ 8000 = CC

A 31-10.50R-15 tire will be used for this example:

Overall Tire Height / Multiplied by / Pi / equals / Overall Tire Circumference / Inches per Mile / Divided
31 x 3.14 = 97.34 63360 ÷

by the Overall Tire Circumference / equals / Revolutions per Mile / Multiplied by
97.34 = 650.91 x

RABS Exciter Ring Tooth Count / equals / _____ / Divided by / PSOM Pulses per Mile / equals
108 = 70298.3 ÷ 8000 =

/ **Conversion Constant**
8.79

Figure 116

Formula #4 uses the following procedure and equation when tire size or gear ratios are questionable:

When gear ratio and/or tire size are questionable, one final method which will determine a conversion constant would be as follows:

1. Mark the tire at the 6 o'clock position and the floor at the same time so as to have both marks lined up with each other.
2. Roll the vehicle so the marked tire has made one complete revolution. At this time, make another mark on the floor so that it lines up with the mark on the tire which should be, once again, at the 6 o'clock position.
3. Now measure the distance between the two marks on the floor (See Figure 20). For this example, the measurement between the two marks was 39¼" which in decimal equals 39.25"

The Formula:

Floor measurement / Multiply by / 2.54 / Equals / Centimeters / Overall Tire Circumference / Divided by
39.25 x 2.54 = 99.69 99.69 ÷
Pi / Equals / Tire Diameter
3.14 = 31.74

The next step is to calculate tire revolutions per mile as follows:

Tire Diameter / Multiplied by / 28 / equals / _____ / 1528 / Minus / _____ / equals / Revolutions per Mile
31.74 x 28 = 888.72 / 1528 - 888.72 = 639.28

With the revolutions per mile, use this following equation to determine the conversion constant:

Revolutions per Mile / Multiplied by / RABS Sensor Exciter Ring Tooth Count / equals / _____
639.28 x 120 = 76713.6

/ Divided by / PSOM Pulses per Mile / equals / **Conversion Constant**
÷ 8000 = **9.59**

Once a numerical conversion constant has been established, the re-calibration process of the PSOM can begin.

Special note: If the arrived numerical conversion constant is not one listed in the PSOM, then the tire size or differential gear ratio far exceeds OE tolerances prohibiting PSOM re-calibration.

Figure 117

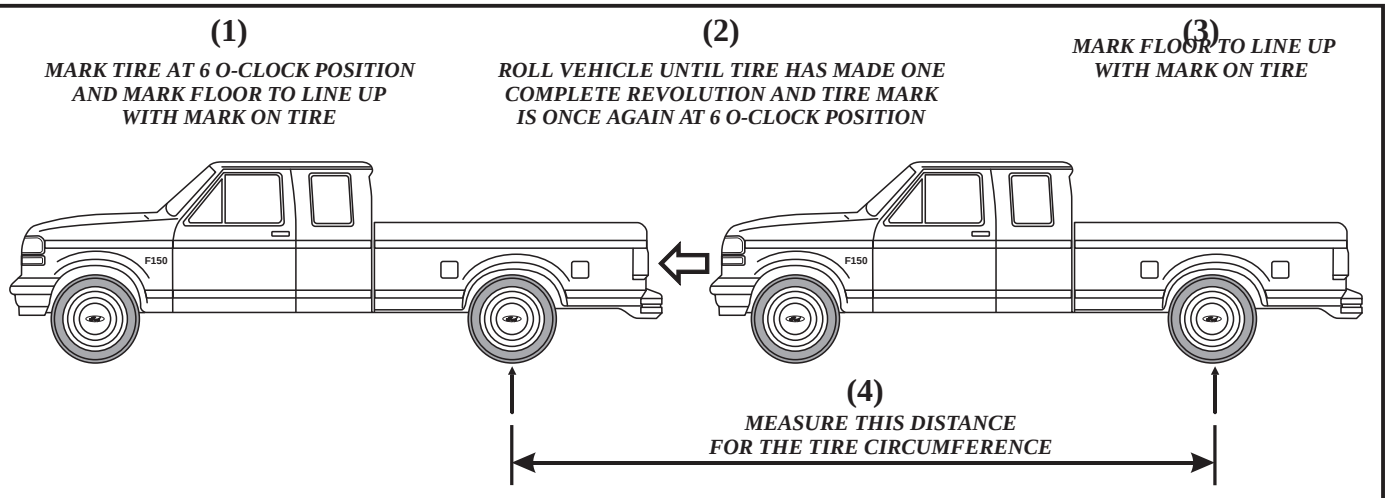


Figure 118

Notes