



1999 SEMINAR INFORMATION
"TECH ON TIME FOR '99"
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1999 SEMINAR INFORMATION

"TECH ON TIME FOR '99"

1

INTRODUCTION

In this third manual on "TECH ON TIME FOR '99" seminar, we begin with FORD'S new 4R100. A look at the E4OD, AX4S/AX4N, AODE/4R70W and the 4R44E transmissions are just a portion of the information provided in this section of the seminar. Updates and part changes, problems and fixes for FORD transmissions fills this manual with valuable information. This manual concludes with information on Chrysler units including a look at the new 45RFE.

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.

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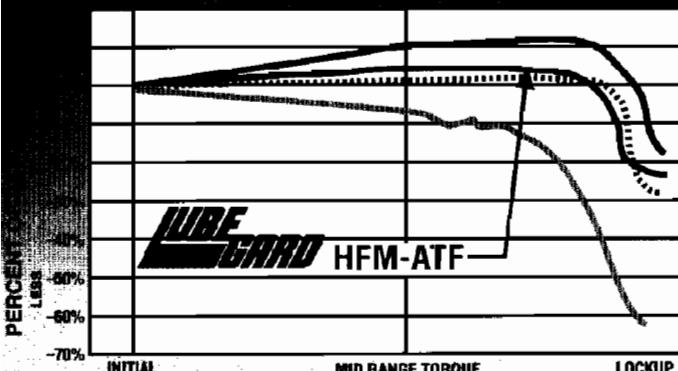
\$ SAVE
\$ \$ \$ \$ \$ \$



LUBE GARD® Highly Friction Modified ATF Supplement will convert your Dexron®/Mercon® into highly friction modified fluids such as..

Honda Genuine ATF
Mopar ATF+3™ (7176)
Toyota Type T & Type TII ATF
Mitsubishi Diamond ATF
Sterling ATF

Other applications requiring a highly friction modified ATF that are called out by some car manufacturer for today's vehicles



The above chart shows:

- DEXRON®/MERCON® ATF has higher friction (less slip) during engagement.
- Adding LUBEGARD® HFM-ATF Supplement to DEXRON®/MERCON® makes the friction during engagement virtually the same as:
- Chrysler Mopar ATF+3™ (7176).
- A competitive HFM-ATF product added to DEXRON®/MERCON® has very low friction, especially at lock-up, implying excessive clutch spin and power loss.

3 It is easy to use. Simply mix the Lubegard® HFM Supplement at 1 oz. per quart of ATF capacity. Do not overfill.



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FORD AODE PRESSURE READINGS USING A GRAPHING MULTI METER **SNAP-ON® PRESSURE TRANSDUCERS**

COMPLAINT: When the technician is confronted with the problem of diagnosing an elusive pressure problem, the amount of speed and accuracy can sometimes make the difference. This is especially true when there is a unexplainable and sudden lose of pressure or a sudden slip or neutral condition due to a oil circuit leak.

CAUSE: There is also the problem of keeping the pressure gauge hose out of harms way, especially if more than one gauge has to be used. Leaks that develop within the multiple fittings needed to get the pressure to the gauge can also be a problem, and in the case of the sudden pressure drop, wouldn't it be nice if the pressure gauge had a MIN/MAX feature.

CORRECTION: Snap-on® Diagnostics has introduced pressure transducers that will screw into a pressure service port with the proper adapter and **ELECTRICALLY** connect to the Snap-on® Vantage® as shown in figure 1.

The actual PSI reading is now displayed on the Vantage® screen and can be viewed as a digital readout and as a graph as seen in figure 2.

The Vantage® MIN/MAX feature can also be used at any time to record the highest and the lowest pressure seen in the event of a pressure spike as seen in figure 3.

Illustrated in figure 4, the operation of the pressure control solenoid is displayed, as a slight snap of the throttle takes place, an instant change in the PSI reading and percentage of duty cycle as the throttle was snapped can be viewed on the same screen.

The transducers are also capable of reading vacuum and as with pressure it can also be viewed as a digital or graphed display or both on the same screen. The display in figure 5 has the Vantage® and transducer connected to a solenoid operated EGR valve. With the Vantage® configured for vacuum testing, the vacuum reading for the EGR valve is displayed in inches of mercury and the voltage operating the EGR valve solenoid can also be seen all on the same screen.

This can be very valuable when trying to diagnose a TCC shudder problem that is EGR valve induced which may be missed on the scan tool.

The pressure transducers are available in 100 psi, 500 psi and 5000 psi limits and additional cables are available so that more than one transducer at a time can be used.

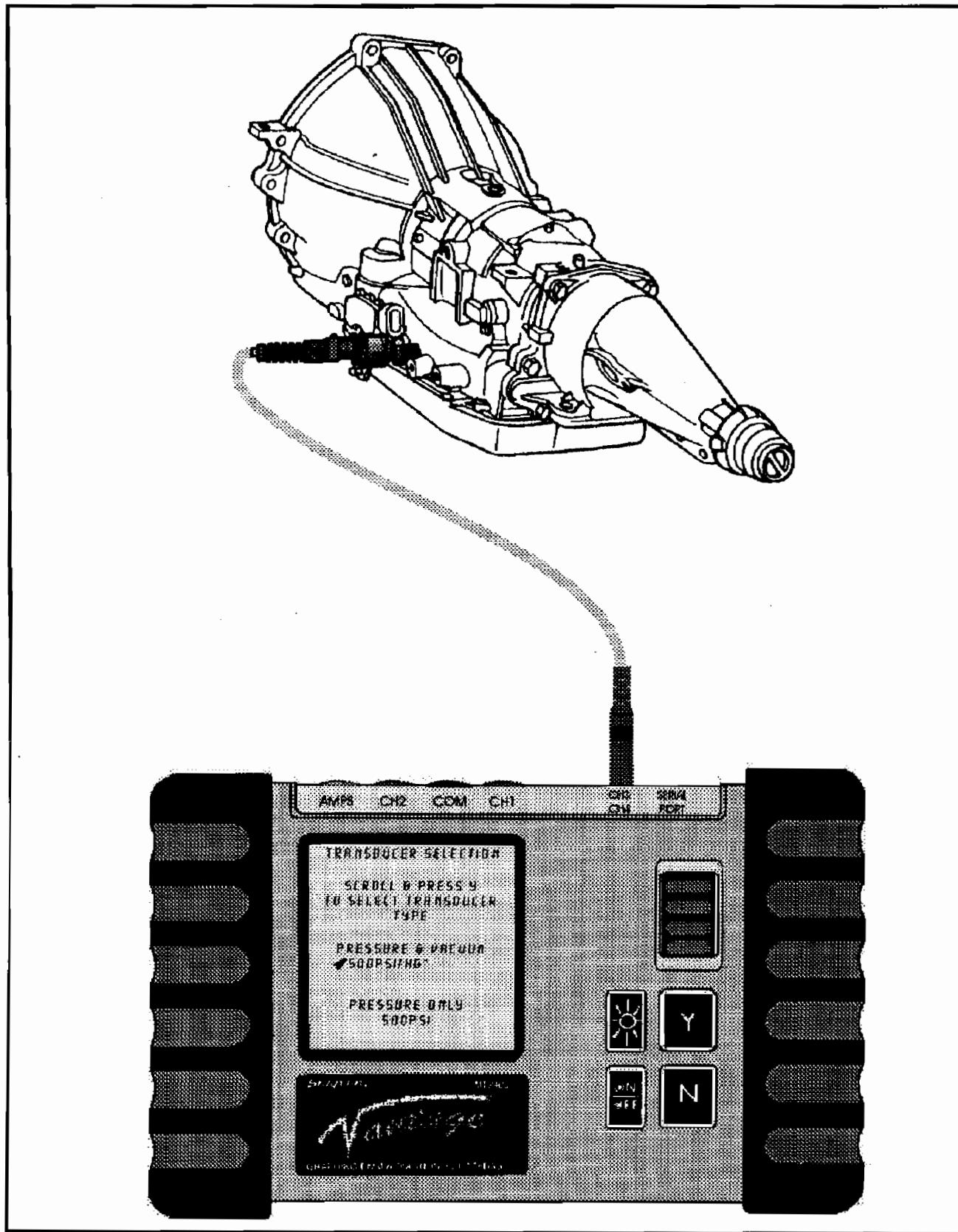
FORD AODE
PRESSURE READINGS USING A GRAPHING MULTI METER

Figure 1

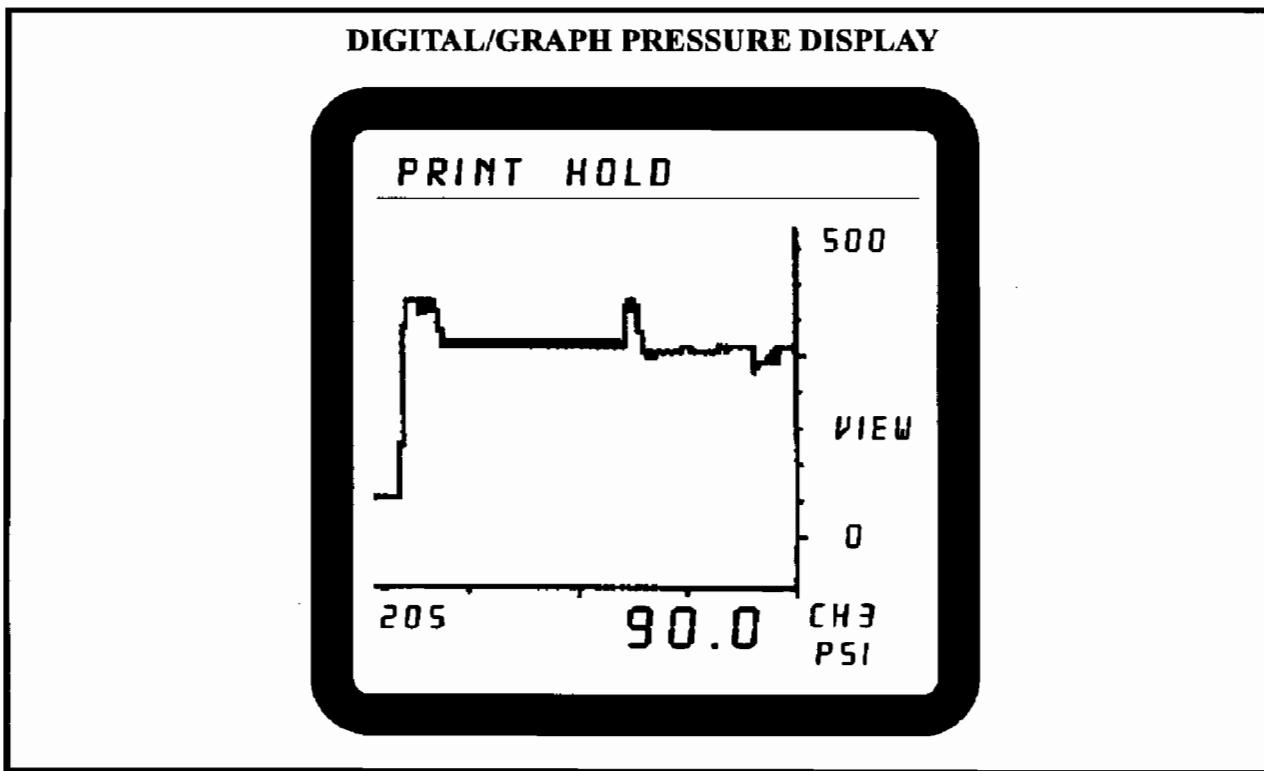
FORD AODE
PRESSURE READINGS USING A GRAPHING MULTI METER

Figure 2

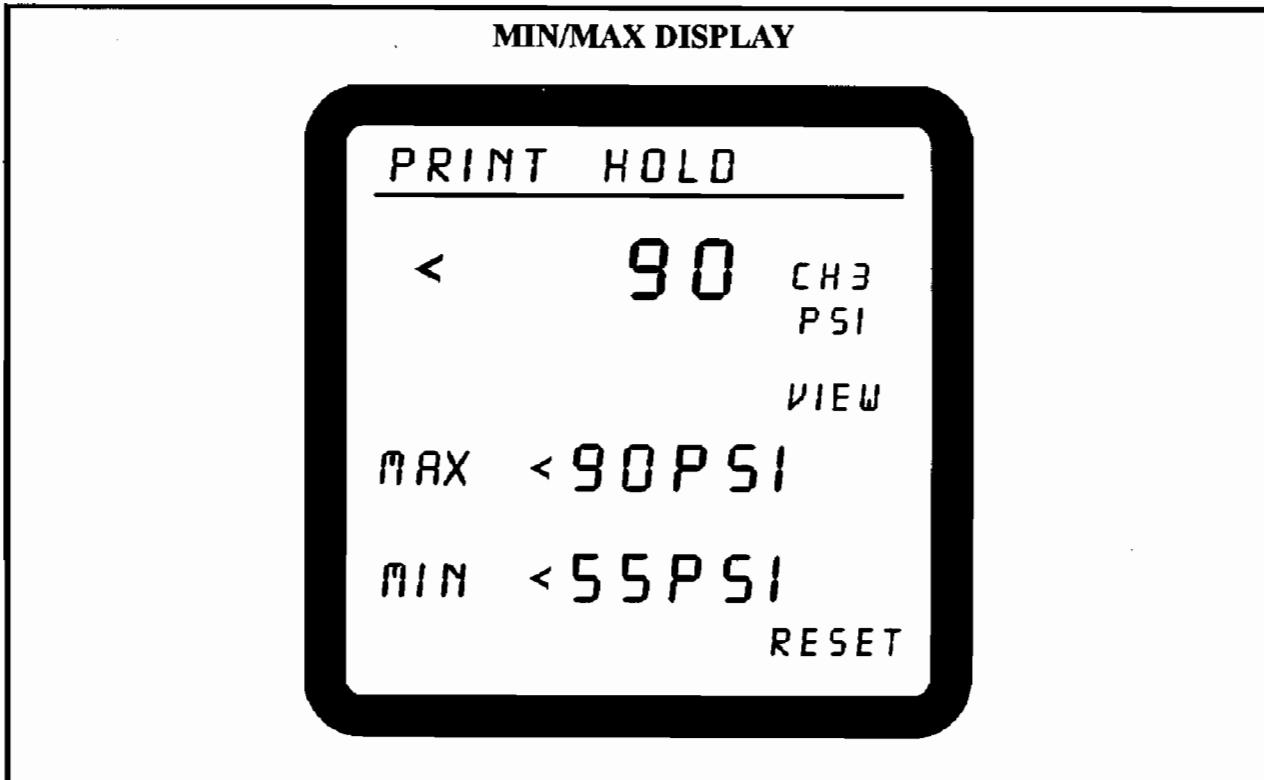


Figure 3

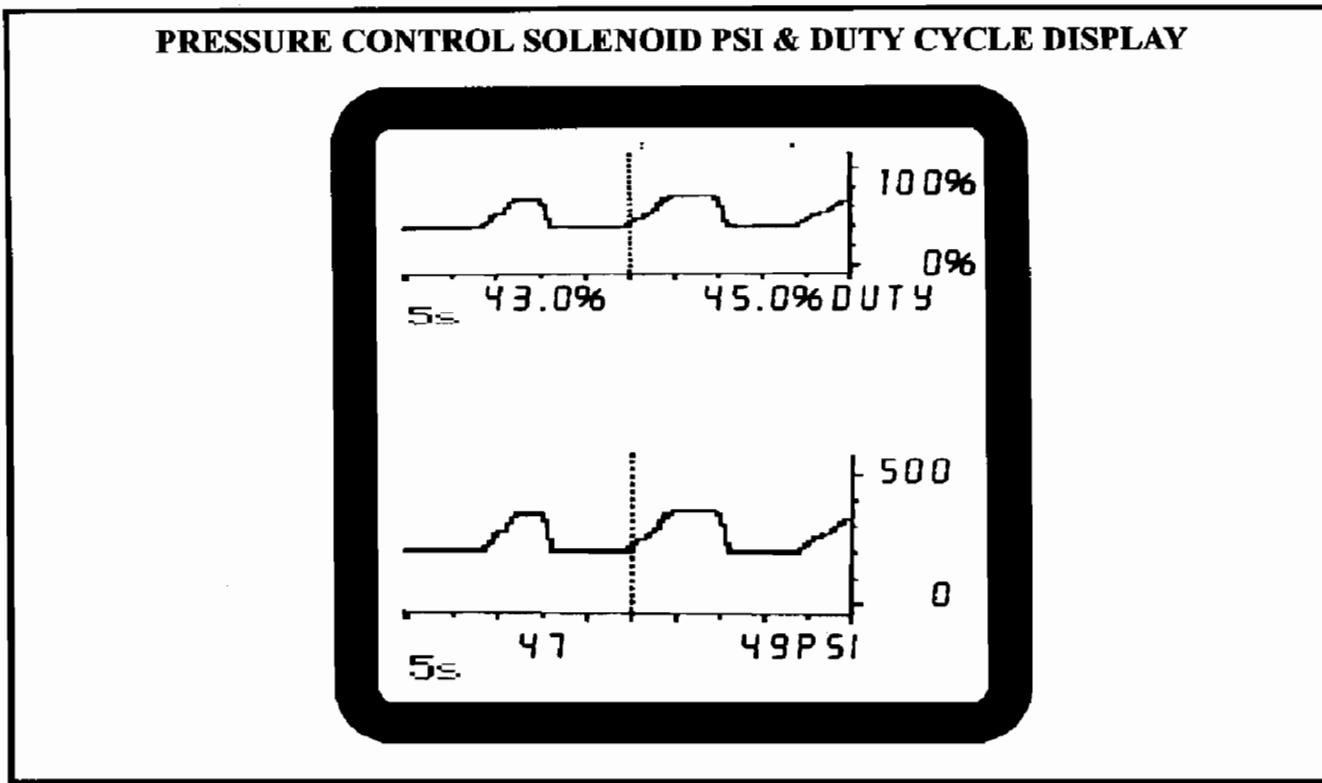
**FORD AODE
PRESSURE READINGS USING A GRAPHING MULTI METER**

Figure 4

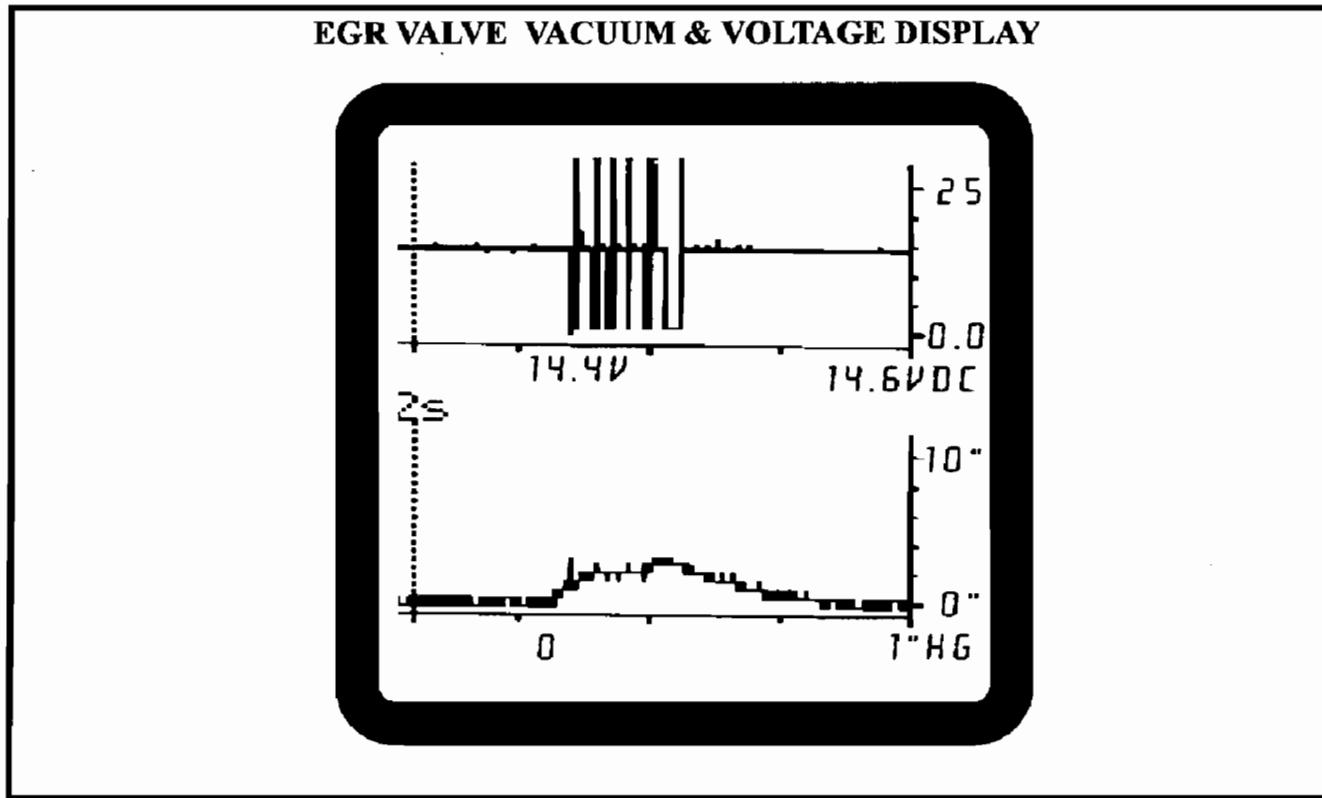


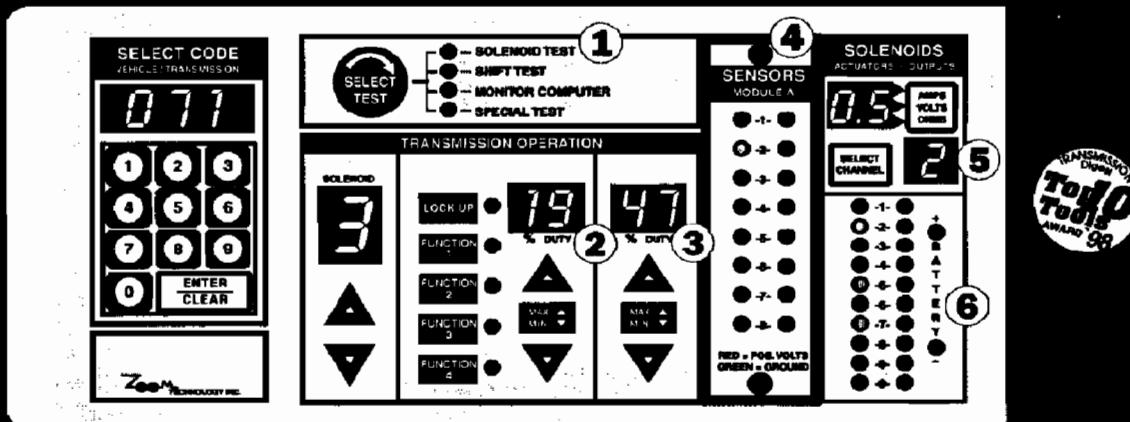
Figure 5

ONE LOOK WILL TELL YOU...

TranX 2000™

SHIFTER MONITOR MULTIMETER BREAKOUT

LEADS THE WAY!



CHECK OUT OUR UNIQUE FEATURES:

1. Solenoid Test - You can test transmission wiring and solenoid draws in less than a minute – on the bench or in the car!

2. Digital Lock-up Control - 1% duty control along with a separate lock-up on off switch provides you with full testing capabilities!

3. Digital Pressure Control - Set pressure control solenoid duties to within 1% - EACH AND EVERY TIME.

4. Sensor Monitoring - Temperature sensors, pressure switches, & speed sensors are all accessible through the TranX sensor monitoring system.

5. Integral 10 Channel Multimeter - Nothing else to hook up – just press the channel selector!

MEASURES: SOLENOID RESISTANCES

SOLENOID CURRENT DRAWS

ECU DRIVER CURRENTS

BATTERY VOLTAGE

6. 10 Solenoid Channels - TranX 2000™ can operate transmissions with up to **10 solenoids**. Each channel has a separate bicolor status LED as well as a 2mm test point (break-out).

The TranX 2000™ safely, accurately and quickly tests:

- SOLENOIDS
- FORCE MOTORS
- TRANSMISSION WIRING
- HARNESS WIRING
- SHIFTING
- ECU OPERATION
- SENSORS

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FORD 4R100 PRELIMINARY INFORMATION

CHANGE: Beginning at the start of production for 1999 models, Ford Motor Company introduced a new transmission in some F250, F350, F450 and F550 Super Duty Trucks, equipped with the 5.4L, 6.8L and 7.3L engines. Basically the new 4R100 is a revised version of the previous E4OD transmission with a Power-Take-Off (PTO) window on the side of the case (See Figure 1). The revisions that have occurred however, have created many major engineering changes that have affected many internal and external parts that will affect service.

REASON: Provided a PTO option for Ford Motor Company.

PARTS AFFECTED:

- (1) TRANSMISSION CASE - Now has a PTO window added to the left side of the case directly behind the front pump area, and a Turbine Speed Sensor has been added at the top of the case and triggered by a revised coast clutch drum (See Figure 2). Another change to the rear of the case is the addition of a Lube Orifice Plug to the Rear of the case, as shown in Figure 4, which also changes the extension housings.
- (2) TURBINE SPEED SENSOR - Added to the top front of the case on some models, as shown in Figure 2. We have also provided you with the resistance readings and OEM part numbers on both Turbine Speed Sensors, as the PTO and Non-PTO models use different sensors. Refer to Figure 2 for turbine speed sensor information.
- (3) OUTPUT SHAFT SENSOR - Output Shaft Speed sensor was added to the top of the extension housing on some models, as shown in Figure 2. OSS is triggered by an added rotor pressed onto the output shaft, which requires a new tool to position the speed rotor properly *if* it is removed during overhaul, as shown in Figure 3. The park gear is also now pressed onto the output shaft, and the number 13 thrust washer has been changed to a thrust bearing as shown in Figure 3. We have provided you with the resistance reading and the OEM part numbers for the output shaft speed sensor. Refer to Figure 2 for output shaft speed sensor information.
- (4) LUBE ORIFICE PLUG - Added to the rear of the case in the lube circuit to provide added lubrication to the extension housing bushing on 2WD models. To retain common cases the 4WD models will also have the lube orifice plug installed, as well as E4OD cases produced after July 24, 1997. Lube Orifice Plug is available under OEM part number F81Z-7E380-AA, and should be replaced on rebuild. Refer to Figure 4.
- (5) EXTENSION HOUSING - Has an added boss or shoulder to retain the lube orifice plug in position in the transmission case, as shown in Figure 5. Notice that the 6.8L and 7.3L, 2 wheel drive extension housing has added a new passage to the extension housing bushing, much like the 4L80-E. All 4R100 and E4OD transmissions equipped with the lube orifice plug **must** use an extension housing with the shoulder or boss. Failure to do so could blow the lube orifice plug out and exhaust all lube oil, which would be catastrophic. Refer to Figure 5.

Continued on next Page.

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PARTS AFFECTED: (Continued)

- (6) **MANUAL SHIFT LEVER** - There are two different external shift levers for this unit, one for Non-PTO transmissions and one for transmissions with the PTO option, as shown in Figure 6. We have provided you with the "Stamping" number as well as the OEM part number for both, as shown in Figure 6.
- (7) **COOLER BYPASS VALVE** - Similar to the Cooler Bypass Valve on the E4OD that provides lubrication to the transmission in case of blocked or partially blocked coolers. We have given you OEM part numbers for both and both bypass valves are illustrated in Figure 7.
- (8) **TRANSMISSION COOLERS** - Most F-Series vehicles over 8500 GVW equipped with the 4R100 transmission have an external "Oil-To-Air" cooler **only**. Due to the internal design of the "Oil-To-Air" cooler, it cannot be adequately flushed to remove contaminants, and requires replacement during transmission rebuild. The only exception is that F-Series vehicles over 8500 GVW equipped with the 5.4L engine also uses a radiator "In-Tank" cooler in addition to the "Oil-To-Air" cooler. Refer to Figure 8 for transmission cooler information.
- (9) **FRONT PUMP COVER** - The pump cover is basically the same as the E4OD, but has a different valve line-up in the Converter Clutch Control Valve bore. The gasoline applications all have an "On-Off" lock-up solenoid and the 7.3L diesel applications all have a Pulse Width Modulated (PWM) lock-up solenoid. This changes the Converter Clutch Control Valve line-ups in the pump cover, as shown in Figure 9.
- (10) **FRONT PUMP STATOR SHAFT** - With the addition of the PTO gear on the front of the coast clutch drum, it was necessary to move the coast clutch sealing ring grooves up on the pump stator shaft to accommodate the coast clutch drum moving. There are currently three different Pump Stator Shafts used in production and all three are illustrated in Figure 10. One is the current E4OD shaft which is used with the "Cast Iron" coast clutch drum with 5.4L and 6.8L engines **without** the PTO option. Two is the shaft with the relocated sealing rings and a bushing in the pump tower, which is used with the "Stamped Steel" coast clutch drum with 5.4L and 6.8L engines **without** the PTO option. Third is the shaft with the relocated sealing rings and a caged needle bearing in the pump tower, which is used with the "Stamped Steel" coast clutch drum with 6.8L and 7.3L engines **with** the PTO option. Refer to Figure 10.
- (11) **COAST CLUTCH DRUM AND STEEL PLATES** - There is now a revised "Stamped Steel" coast clutch drum introduced with the 4R100 transmission. There are currently three different coast clutch drums used in production and all three are illustrated in Figure 11. One is the current E4OD coast clutch drum which is "Cast Iron" and uses the current steel plates. Two is the new design "Stamped Steel" coast clutch drum without the PTO gear pressed on it and uses a new design coast clutch steel plate to accommodate the new drum. Third is the new design "Stamped Steel" coast clutch drum with the PTO gear pressed on it and uses the new design coast clutch steel plates to accommodate the new drum. The new design "Stamped Steel" coast clutch drum now has the overdrive roller clutch inner cam made on the drum and the overdrive sun gear is pressed into the new design drum, which changes the assembly process of the overdrive roller clutch. Refer to Figure 11.
- (12) **COAST CLUTCH PISTON** - The coast clutch piston in the new design coast clutch drum is now a stamped steel, molded rubber seals assembly and is illustrated in Figure 12. The new design piston assembly requires a new seal protector tool, Rotunda No. 307-387, to install the piston and seal assembly into the new design stamped steel coast clutch drum (See Figure 12).

Continued on next Page.

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PARTS AFFECTED: (Continued)

- (13) OVERDRIVE ROLLER CLUTCH - The overdrive roller clutch inner cam is now made onto the new design coast clutch drum, instead of being splined like the previous models were, and is illustrated in Figure 13. The new design overdrive roller clutch assembly is now assembled onto the inner cam on the new design drum. The overdrive roller clutch outer race is still located in the overdrive ring gear next to the overdrive carrier and the number 13 thrust washer between the two is now plastic, but the cage and roller assembly are now assembled over the inner race on the new design coast clutch drum. Refer to Figure 13.
- (14) OVERDRIVE FRICTION PLATES - Now have wider teeth to accommodate the new design stamped steel coast clutch drum assembly when it is used, as illustrated in Figure 14.
- (15) VALVE BODY CHECKBALL LOCATIONS - Valve body checkball locations are illustrated in Figure 15 and now has two 1/4" checkballs and two 5/16" checkballs. This of course changes the lower valve body spacer plate as illustrated in Figure 16. The new design spacer plate has only one hole over the bathtub where the checkball was removed. The case checkball locations remain the same as the 1996-Up configuration, and this illustration is included for reference and shown in Figure 17.
- (16) VALVE LINE-UPS IN VALVE BODY - Have changed from the previous models and are illustrated in Figure 18, with a valve description and legend shown in Figure 19.
- (17) SOLENOID BODY - There are now two different Solenoid Bodies, depending on whether you have a gasoline or diesel model. Since the diesel models now have a Pulse Width Modulated (PWM) converter clutch application, the resistance on the converter clutch solenoid in the Solenoid Body is going to be different. We have included the OEM part numbers for both solenoid bodies and resistance charts for all solenoids in Figure 20, and you will find solenoid application and pin function charts in Figures 21 and 22.
- (18) TROUBLE CODES - Abbreviations are listed in Figure 23 and OBD II Trouble Codes are listed in numerical order in Figures 24 through 28.

INTERCHANGEABILITY:

All of the parts listed above are model sensitive, and some of the parts listed above cannot be intermixed with E4OD parts. With this unit you will have to be very carefull if replacement of the various components becomes necessary.

SERVICE INFORMATION:

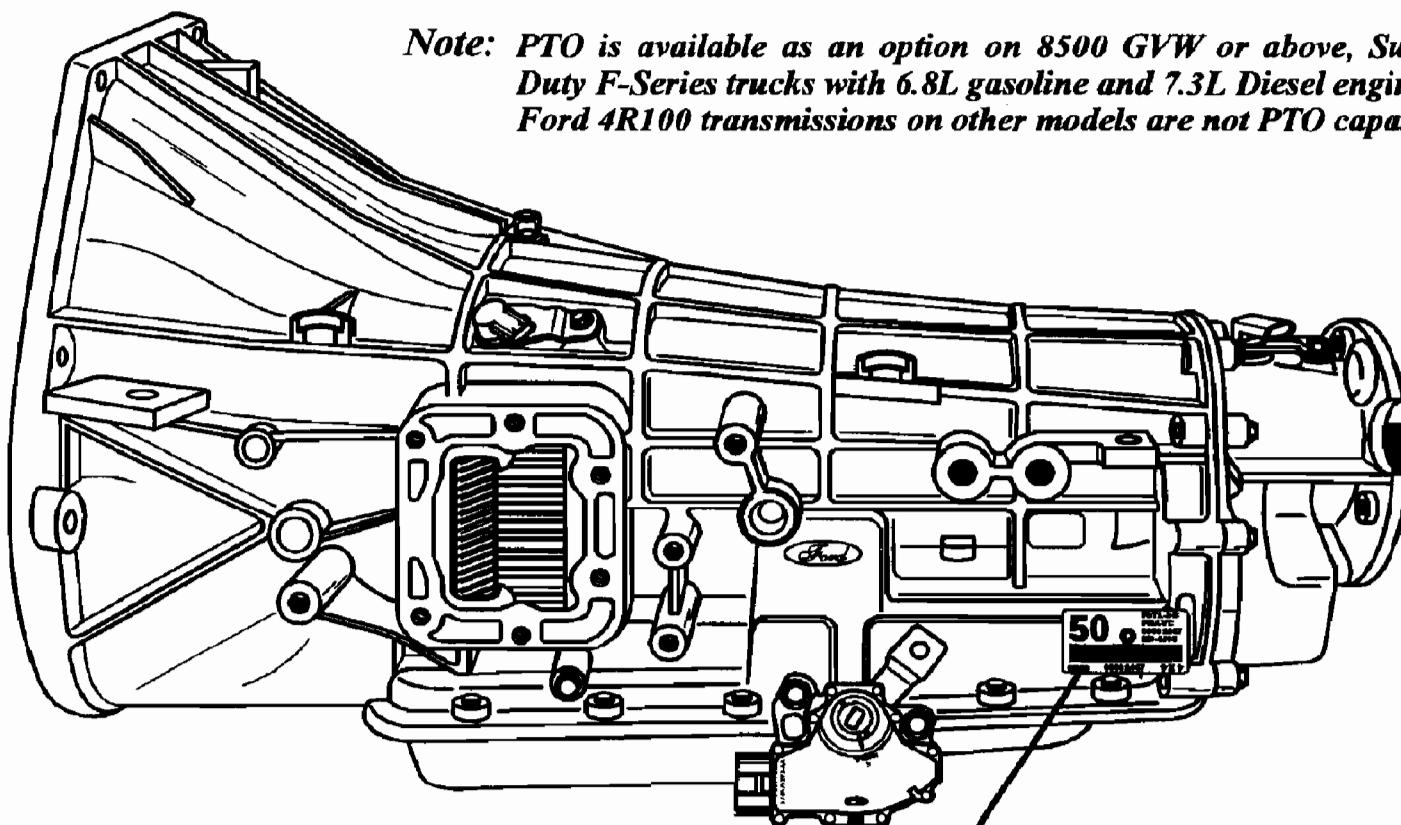
Turbine Shaft Speed Sensor (PTO Models Only)	F81Z-7M101-BA
Turbine Shaft Speed Sensor (Non-PTO Models Only)	F81Z-7M101-AA
Output Shaft Speed Sensor (All Models)	F81Z-7M101-AA
Lube Orifice Plug (Plastic)	F81Z-7E380-AA
External Manual Shift Lever (With PTO Option)	F81Z-7A256-AA
External Manual Shift Lever (Without PTO Option)	F7UZ-7A256-BB
Cooler Bypass Valve Assembly	F81Z-7H322-AA
Coast Clutch Piston (New Design)	F81Z-7A262-AA
Solenoid Body Assembly (Gasoline Engine Only)	F81Z-7G391-BA
Solenoid Body Assembly (Diesel Engine Only)	F81Z-7G391-AB
Overdrive Roller Clutch And Cage Assembly	F81Z-7A089-AB

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FORD 4R100

WITH POWER TAKE OFF OPTION

Note: PTO is available as an option on 8500 GVW or above, Super Duty F-Series trucks with 6.8L gasoline and 7.3L Diesel engines. Ford 4R100 transmissions on other models are not PTO capable.



F4 = 1994

F5 = 1995

F6 = 1996

F7 = 1997

F8 = 1998

F9 = 1999



Assembly Part Number (Prefix and Suffix)

Transmission Model

Serial Number

Build Date - (Year, Month, Day)

A = JAN

B = FEB

C = MAR

D = APR

E = MAY

F = JUN

G = JUL

H = AUG

J = SEP

K = OCT

L = NOV

M = DEC

IDENTIFICATION TAG LOCATION AND INFORMATION

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Figure 1

Automatic Transmission Service Group

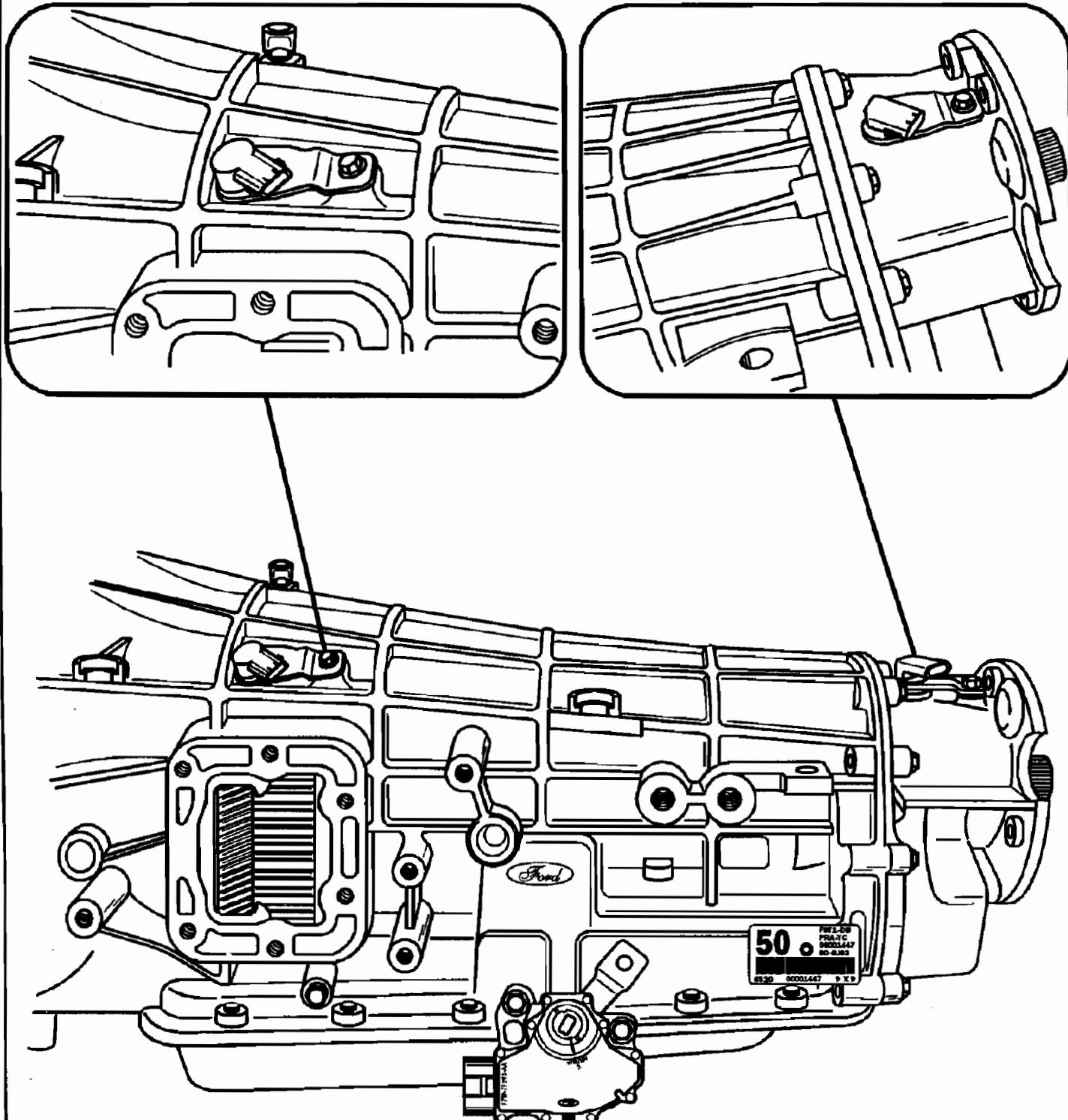
Turbine Shaft Speed Sensor

PTO Models Only = 496-1244 Ohms Resistance
Part Number F81Z-7M101-BA

Non PTO Models Only = 781-1979 Ohms Resistance
Part Number F81Z-7M101-AA

Output Shaft Speed Sensor

All Models = 781-1979 Ohms Resistance
Part Number F81Z-7M101-AA

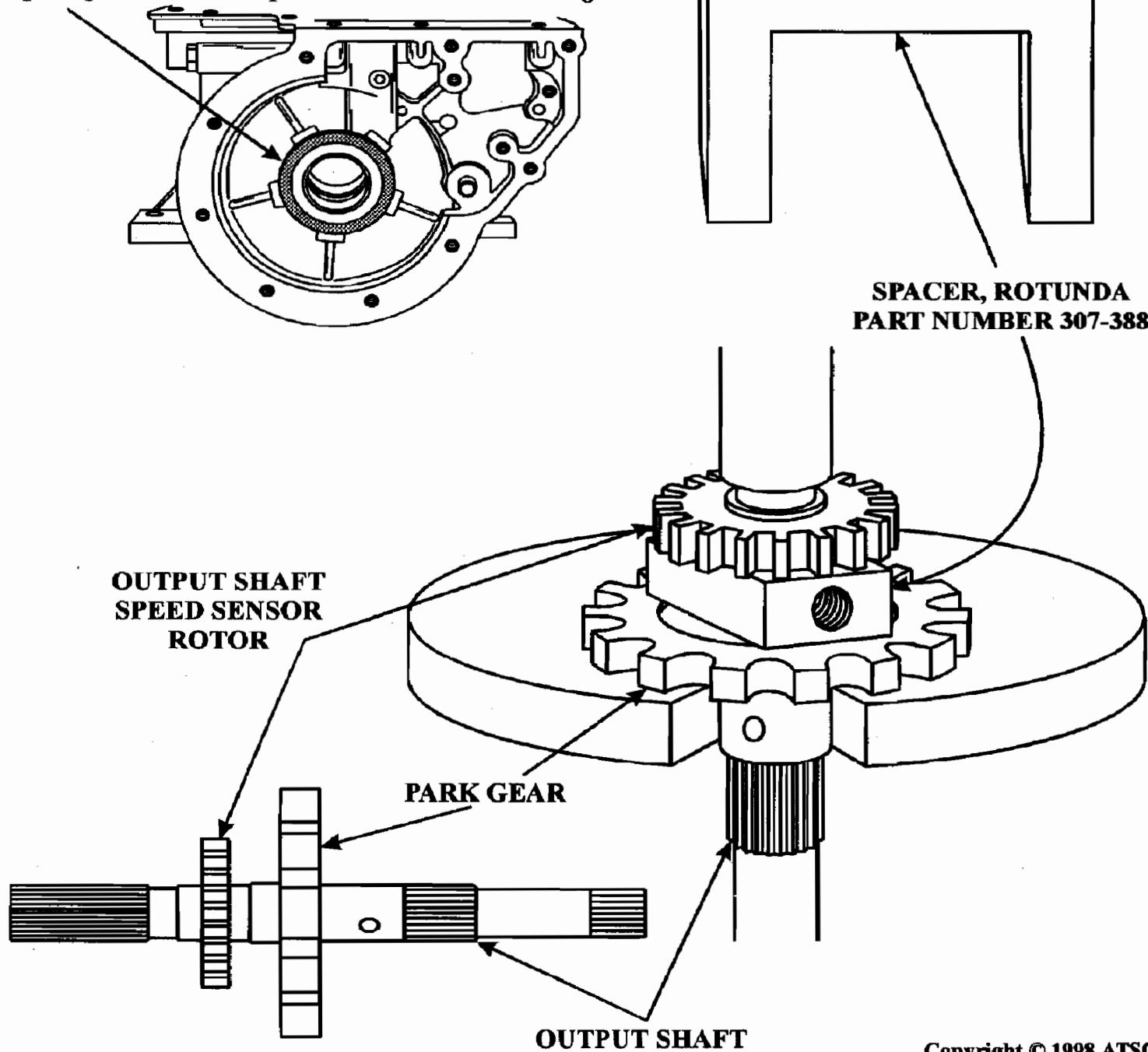


**FORD 4R100
OUTPUT SHAFT SPEED SENSOR ROTOR**

Output Shaft Speed Sensor Rotor is press fit to the output shaft and requires new Spacer Tool, Rotunda No. 307-388 for spacing the speed sensor rotor the proper distance from the park gear, if it was removed from the output shaft during service.

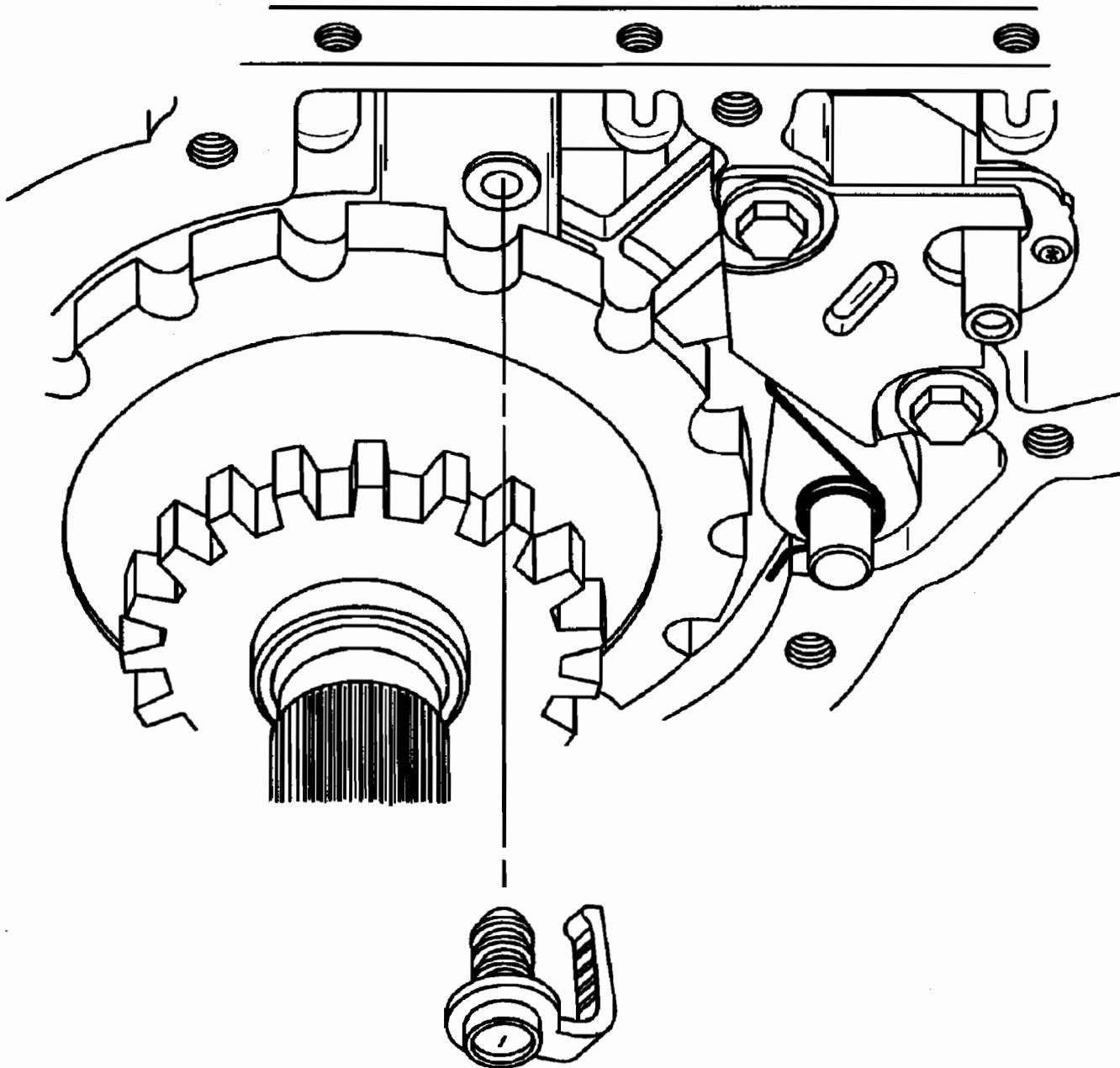
PARK GEAR

The Park Gear is also press fit to the output shaft, and the number 13 thrust washer, between the case and the park gear has been replaced with a needle bearing.



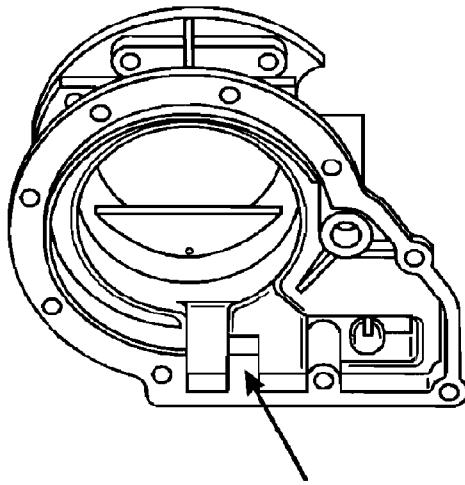
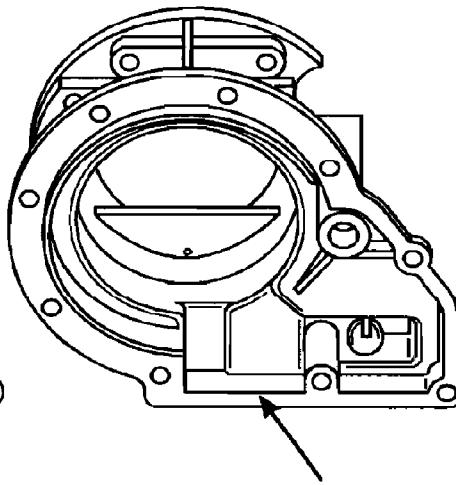
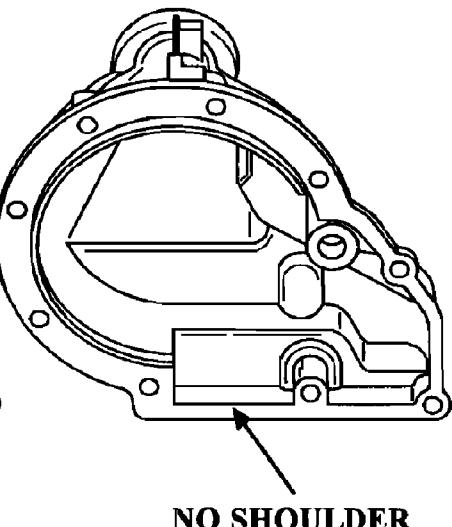
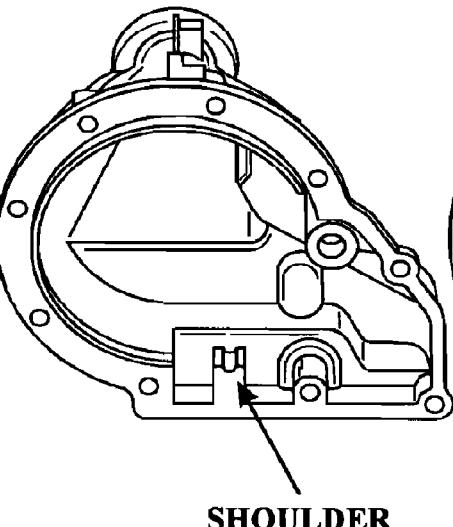
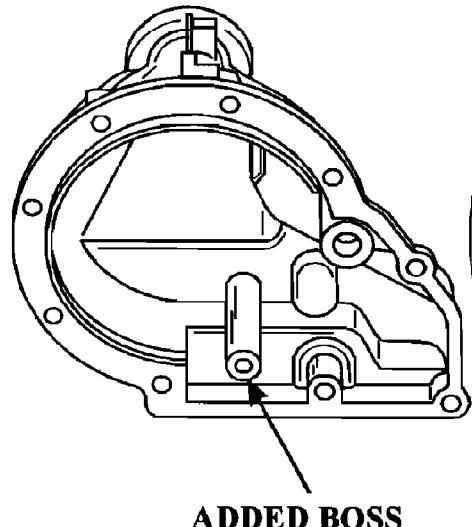
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Figure 3
Automatic Transmission Service Group

FORD 4R100
LUBE ORIFICE LOCATION

LUBE ORIFICE PLUG
FORD PART NUMBER
F81Z-7E380-AA

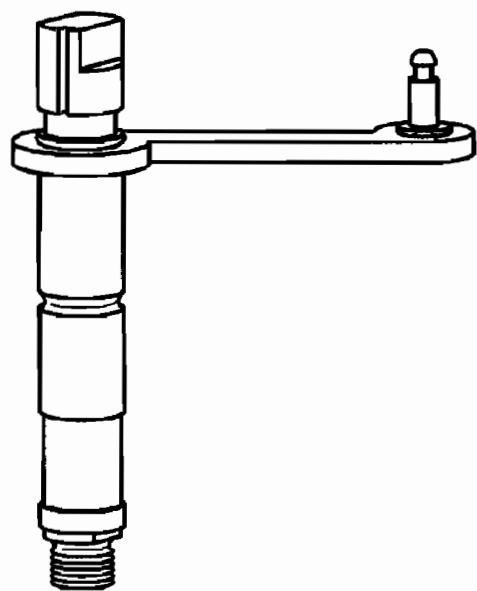
EXTENSION HOUSINGS

4R100 TYPICAL
4 WHEEL DRIVEE4OD 4X4 WITHOUT
LUBE PLUGFORD 4R100
6.8L AND 7.3L
2 WHEEL DRIVEALL OTHER
2 WHEEL DRIVE
APPLICATIONSE4OD WITHOUT
LUBE PLUG

NOTE: Extension Housings are model sensitive. Refer to Ford Motor Co. parts list for proper part numbers.

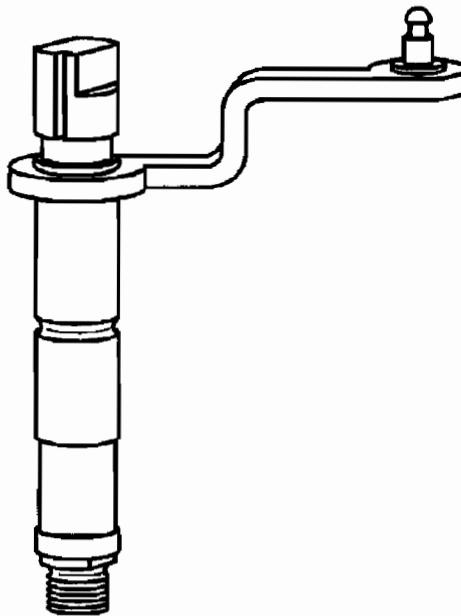
**FORD 4R100
MANUAL SHIFT LEVERS**

**"With" PTO OPTION
STAMPED F81P-AA**



**FORD PART NUMBER
F81Z-7A256-AA**

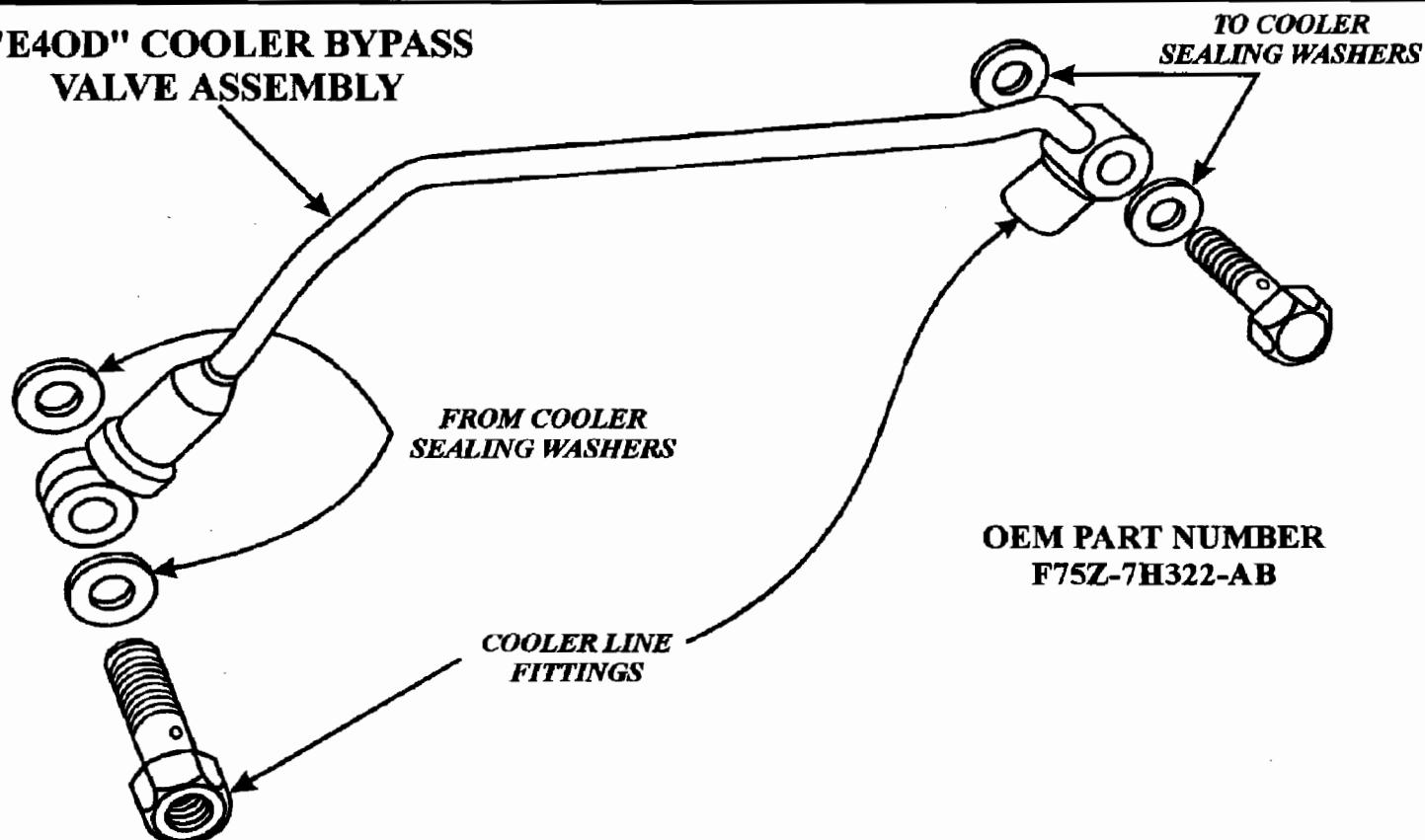
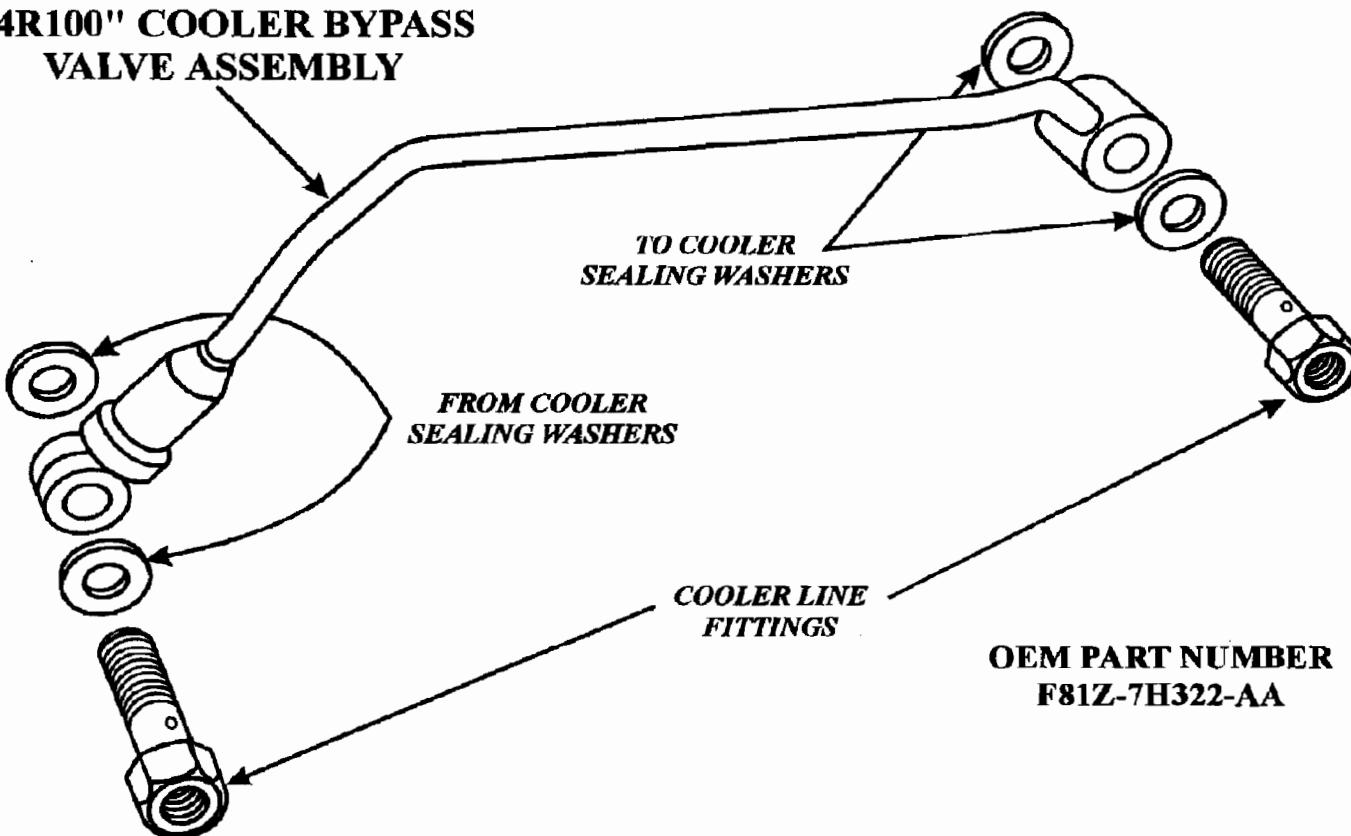
**"Without" PTO OPTION
STAMPED F75P-BB**



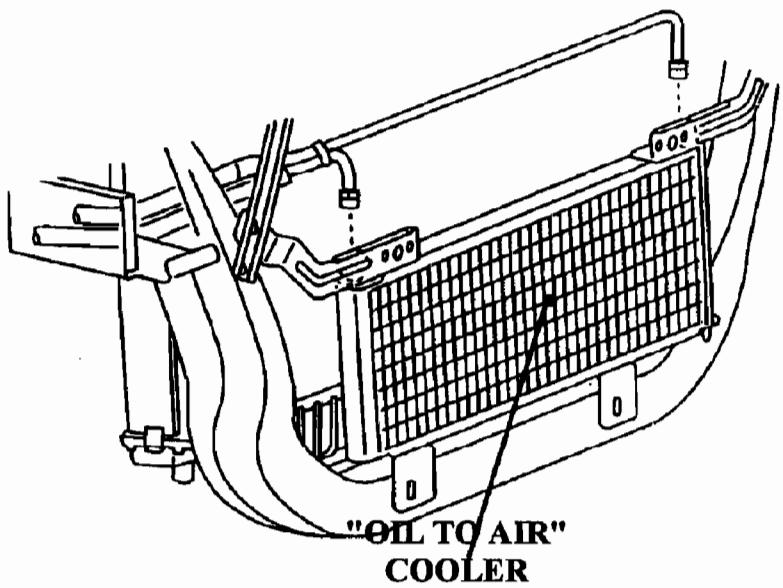
**FORD PART NUMBER
F7UZ-7A256-BB**

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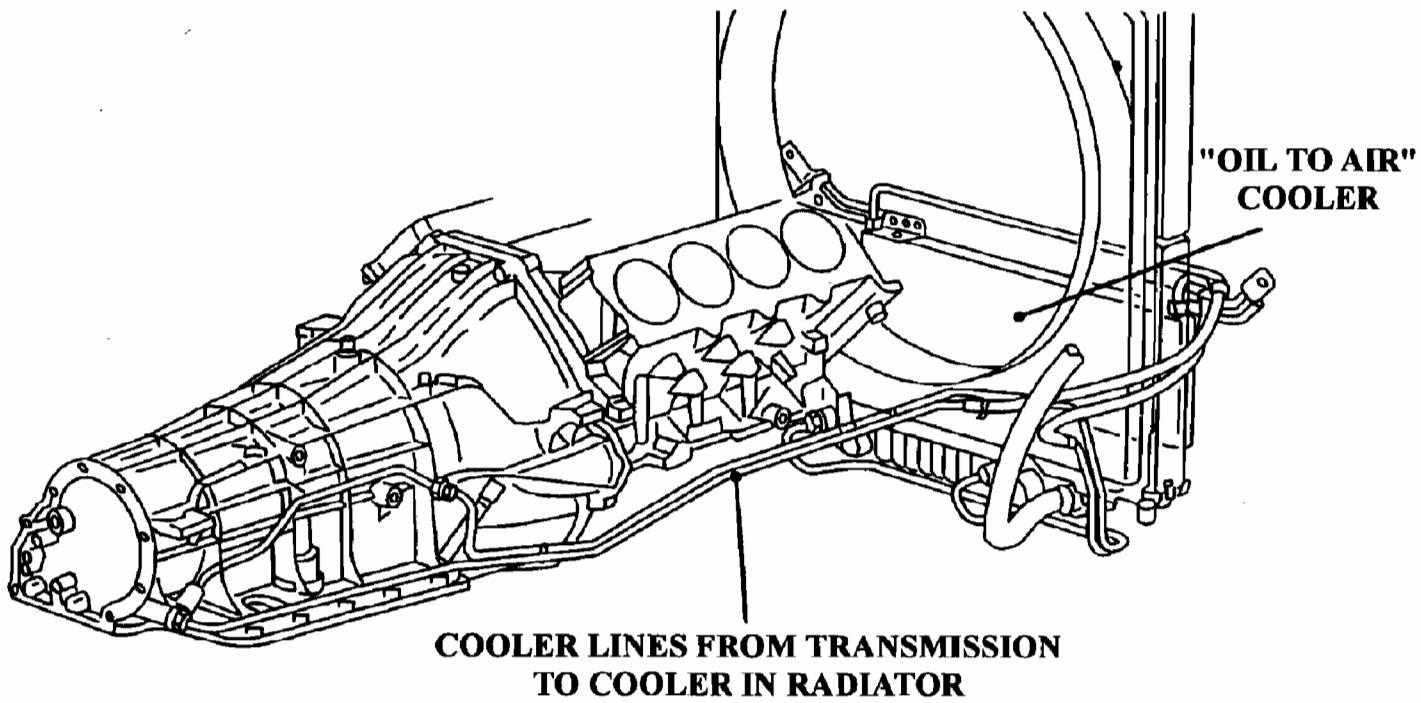
Figure 6

**"E4OD" COOLER BYPASS
VALVE ASSEMBLY****"4R100" COOLER BYPASS
VALVE ASSEMBLY**

Most F-Series vehicles over 8500 GVW equipped with the 4R100 transmission have an external "Oil-To-Air" cooler only. Due to the internal design the "Oil-To-Air" cooler cannot be adequately flushed to remove contaminants, and requires replacement during transmission rebuild.

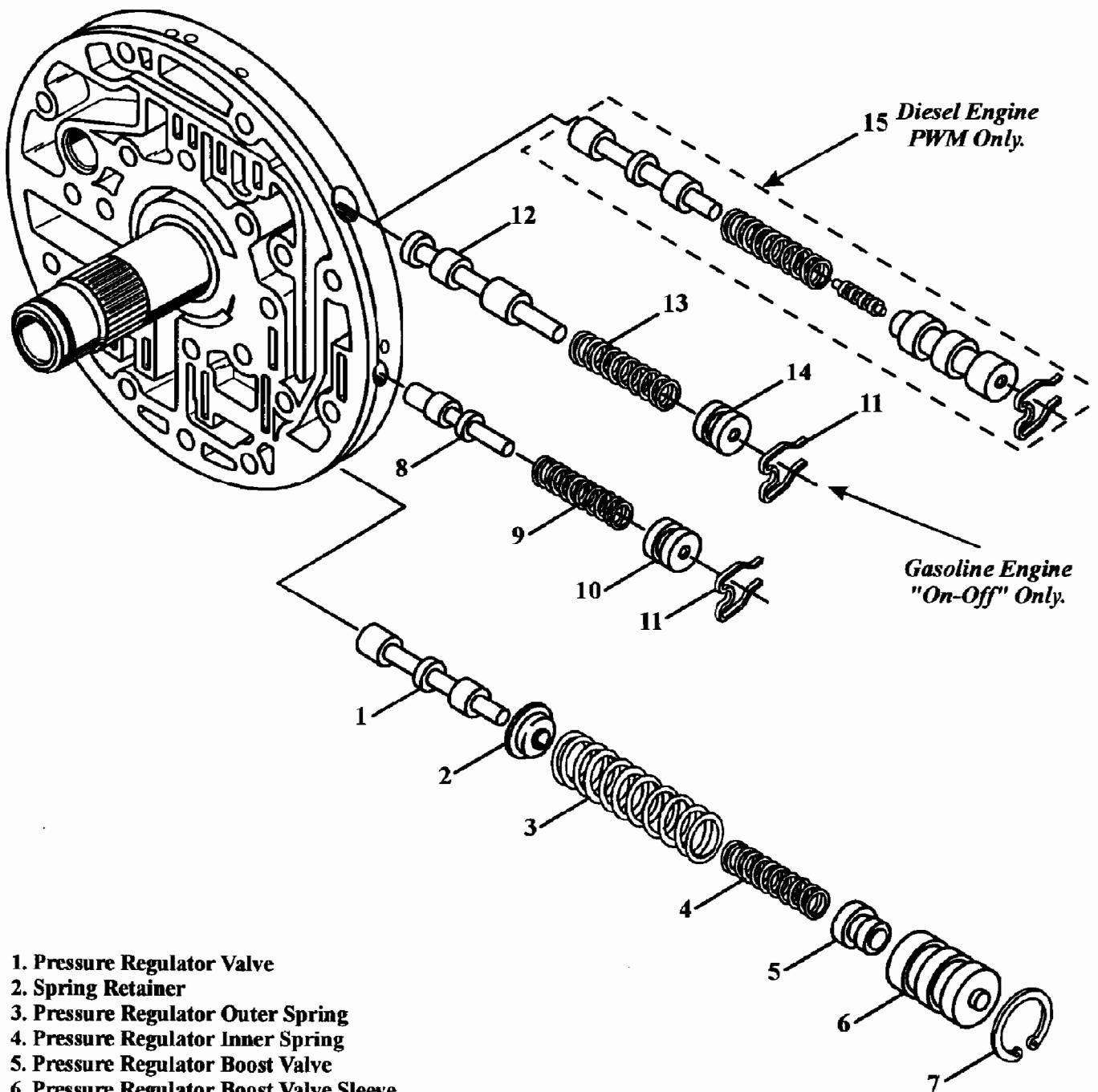


The only exception is that F-Series vehicles over 8500 GVW equipped with the 5.4L engine also uses a radiator "In-Tank" cooler in addition to the "Oil-To-Air" cooler.

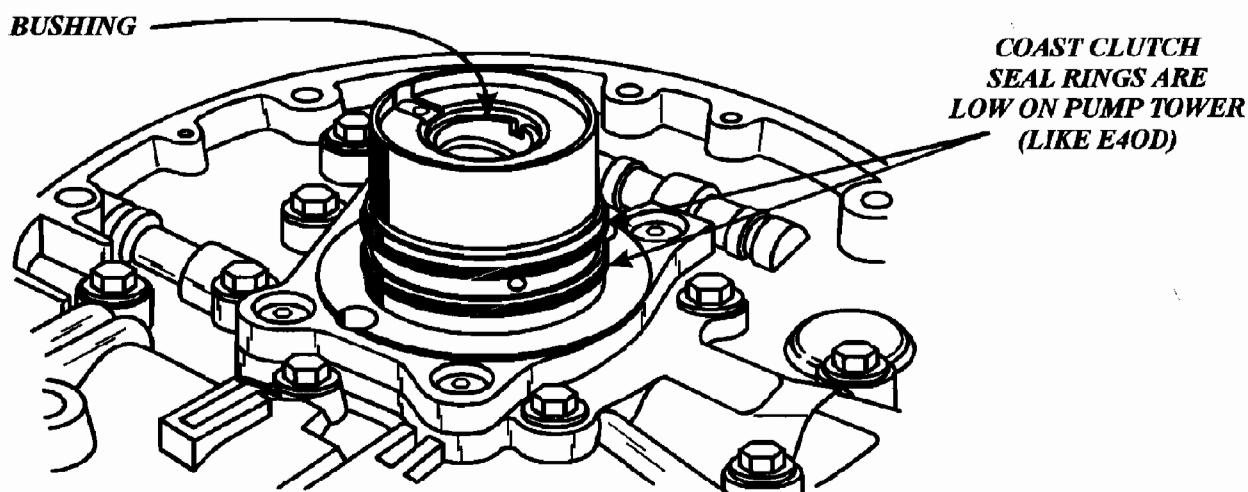


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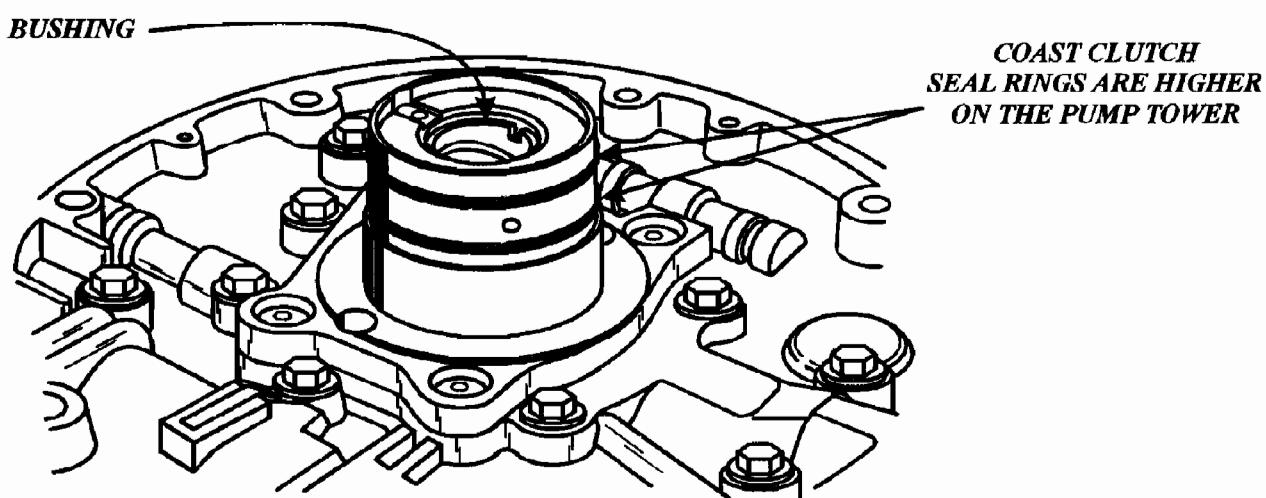
Figure 8

FORD 4R100
VALVE LINE-UPS IN PUMP ASSEMBLY

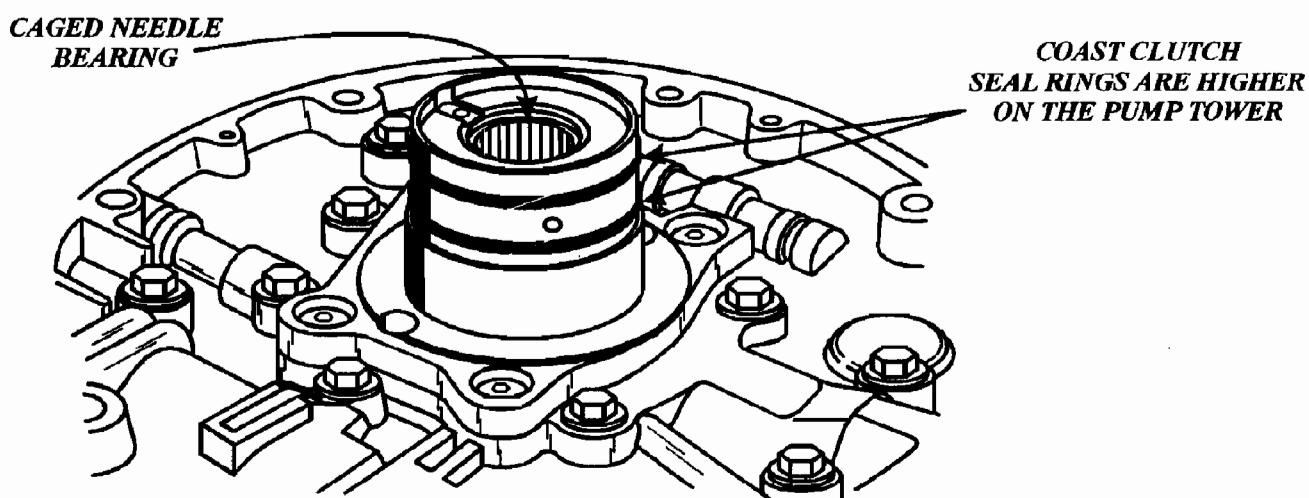
1. Pressure Regulator Valve
2. Spring Retainer
3. Pressure Regulator Outer Spring
4. Pressure Regulator Inner Spring
5. Pressure Regulator Boost Valve
6. Pressure Regulator Boost Valve Sleeve
7. Snap Ring
8. Converter Clutch Regulator Valve
9. Converter Clutch Regulator Spring
10. Converter Clutch Regulator Bore Plug
11. Bore Plug Retainer
12. Converter Clutch Control Valve (Gas "On-Off" Only)
13. Converter Clutch Control Spring (Gas "On-Off Only")
14. Converter Clutch Control Bore Plug
15. Converter Clutch Control Line-up (Diesel "PWM" Only)



USED WITH THE "CAST IRON" COAST CLUTCH DRUM
WITH 5.4L AND 6.8L "WITHOUT" PTO OPTION

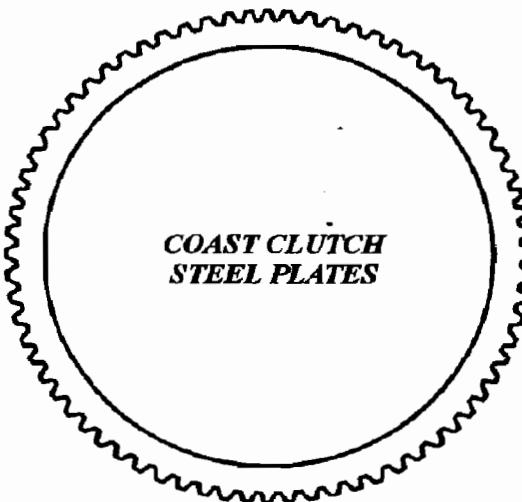
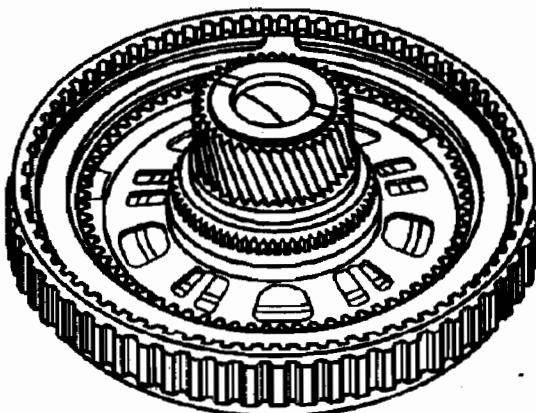


USED WITH THE "STAMPED STEEL" COAST CLUTCH DRUM
WITH 5.4L AND 6.8L "WITHOUT" PTO OPTION

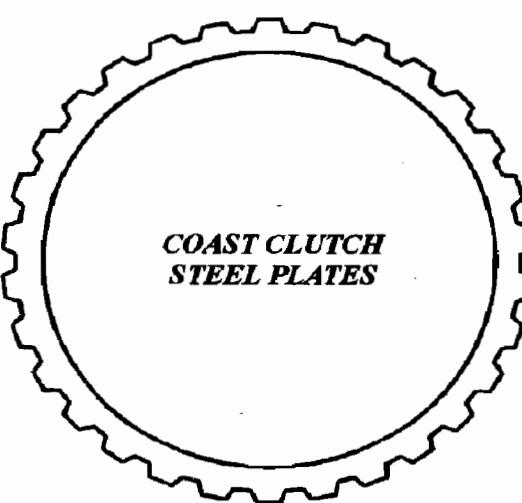
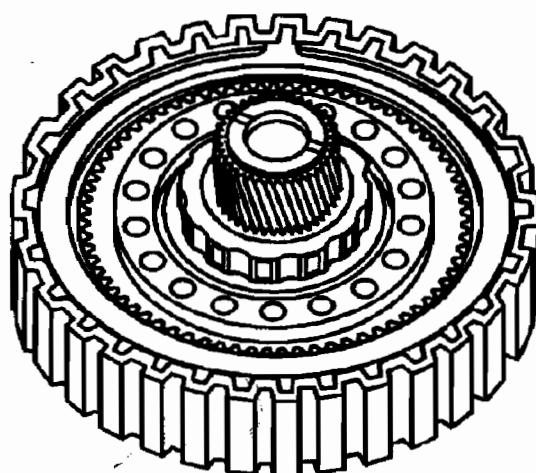


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WITH 6.8L AND 7.3L "WITH" PTO OPTION

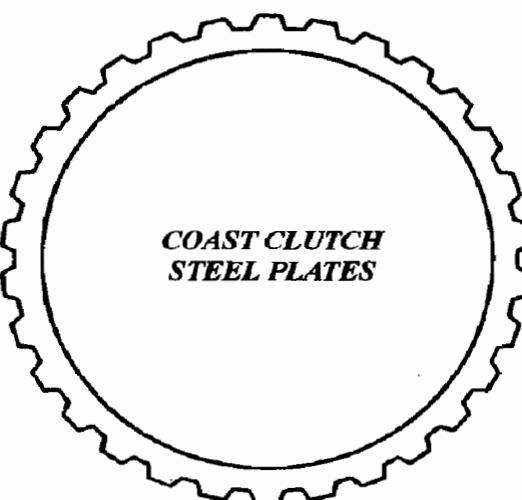
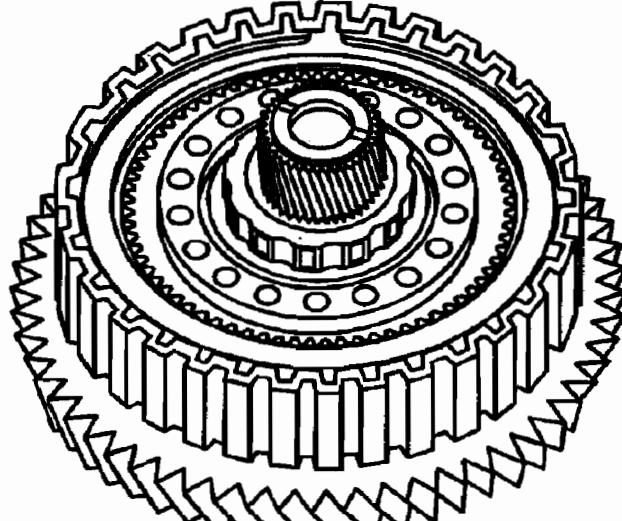
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"CAST IRON" COAST CLUTCH DRUM USED
WITH 5.4L AND 6.8L "WITHOUT" PTO OPTION



"STAMPED STEEL" COAST CLUTCH DRUM USED
WITH 5.4L AND 6.8L "WITHOUT" PTO OPTION

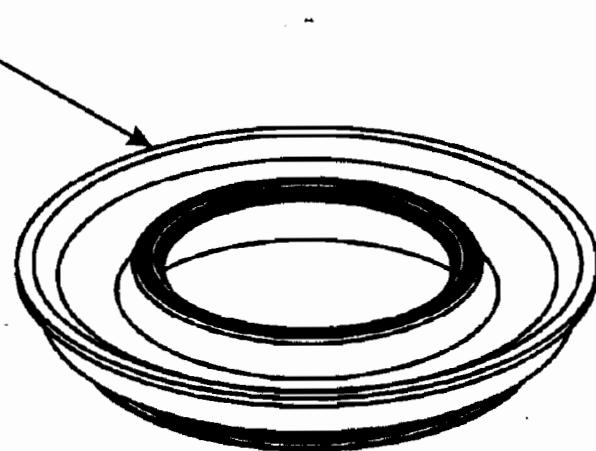


"STAMPED STEEL" COAST CLUTCH DRUM USED
WITH 6.8L AND 7.3L "WITH" PTO OPTION

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**STAMPED STEEL MOLDED RUBBER COAST CLUTCH PISTON
FOR NEW DESIGN COAST CLUTCH DRUM**

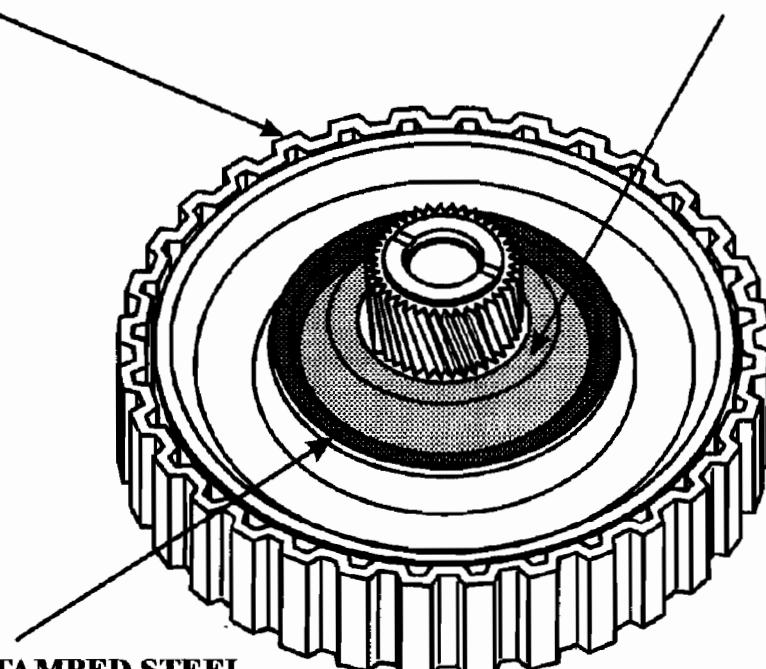
**NEW DESIGN STAMPED STEEL,
MOLDED RUBBER SEAL PISTON
OEM PART NUMBER F81Z-7A262-AA**

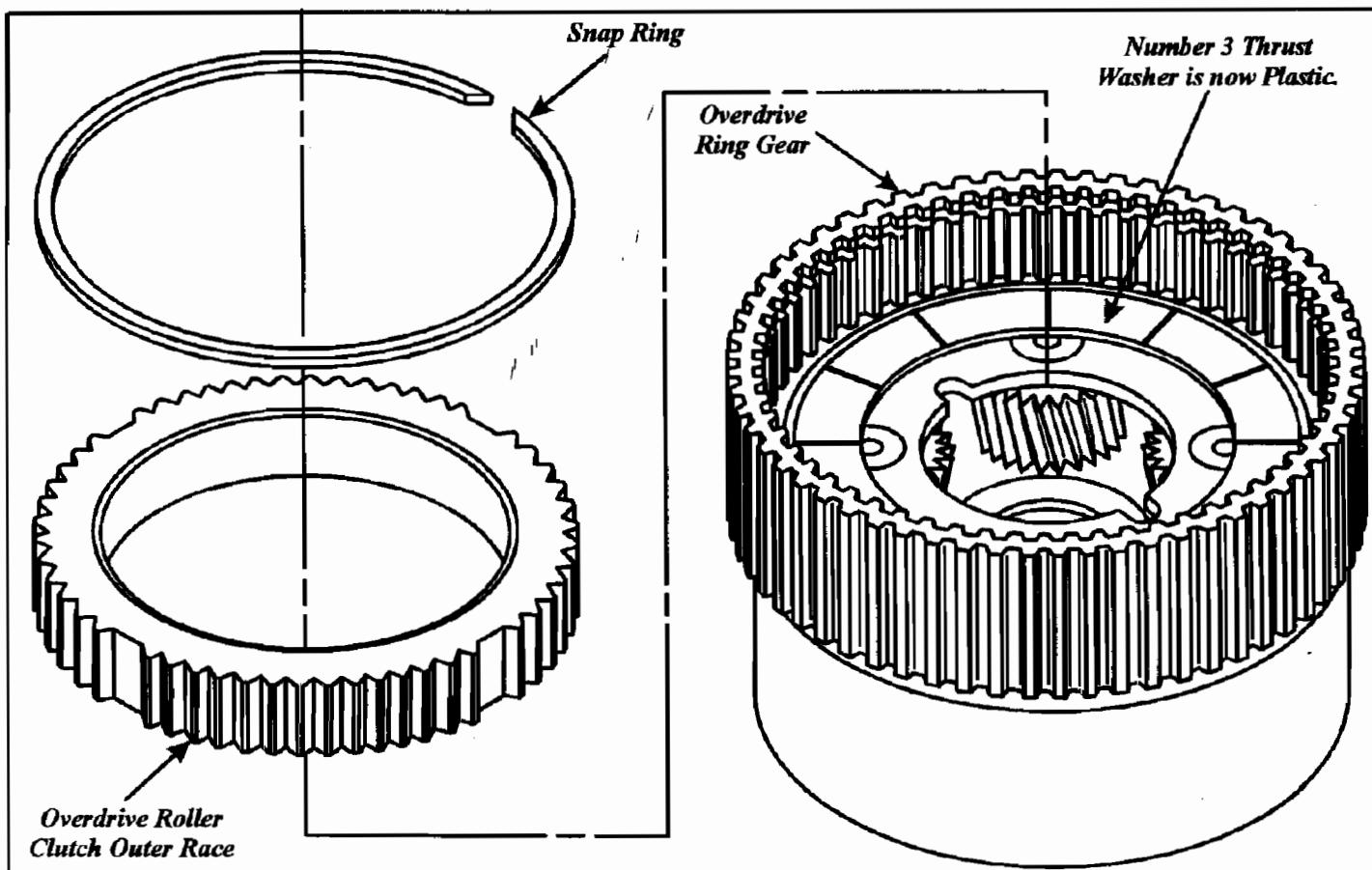


**NEW DESIGN STAMPED STEEL
COAST CLUTCH DRUM**

**LIP SEAL PROTECTOR
ROTUNDA NO. 307-387**

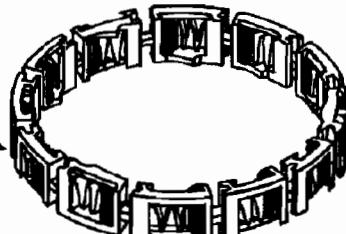
**NEW DESIGN STAMPED STEEL
MOLDED RUBBER PISTON**



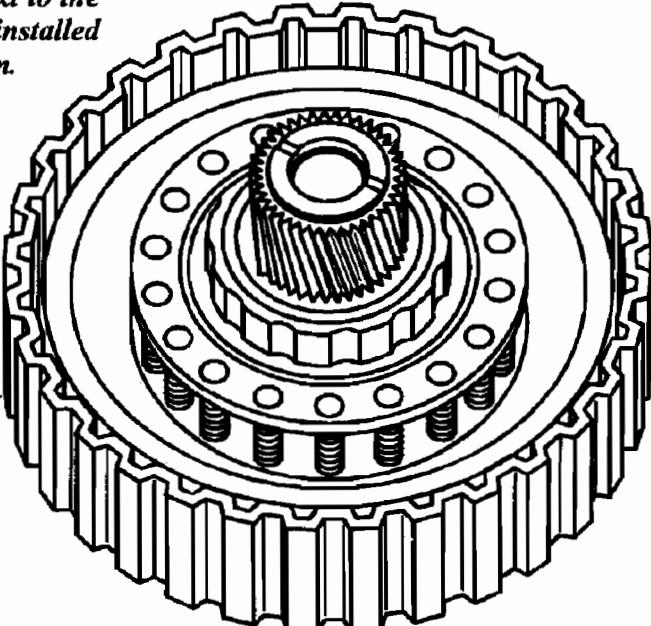


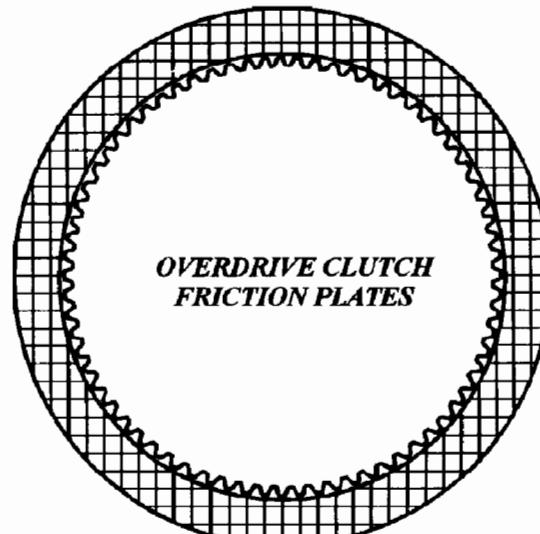
**OVERDRIVE ROLLER CLUTCH
AND CAGE ASSEMBLY
PART NUMBER F81Z-7A089-AA**

The rollers and plastic cage are smaller and no longer assembled into the back of the overdrive ring gear. The outer race remains in the back of the overdrive ring gear next to the overdrive carrier, but the rollers and cage are now installed over the inner race on the new design coast clutch drum.

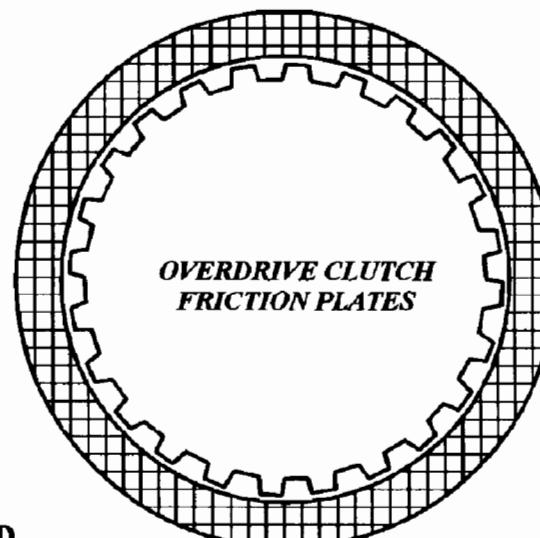
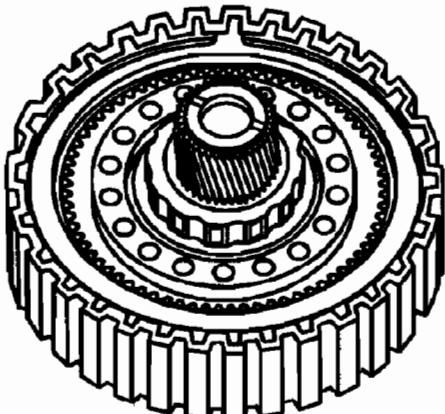


New Design "Stamped Steel"
Coast Clutch Drum Assembly

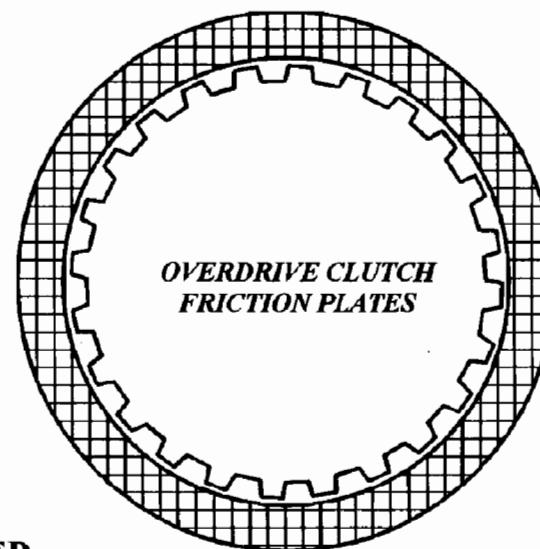
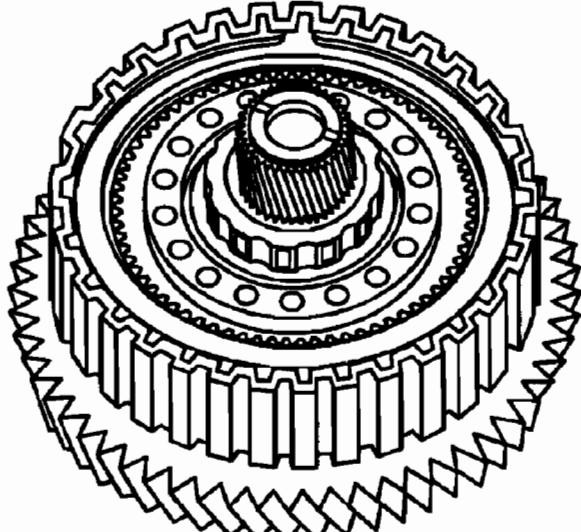




"CAST IRON" COAST CLUTCH DRUM USED
WITH 5.4L AND 6.8L "WITHOUT" PTO OPTION



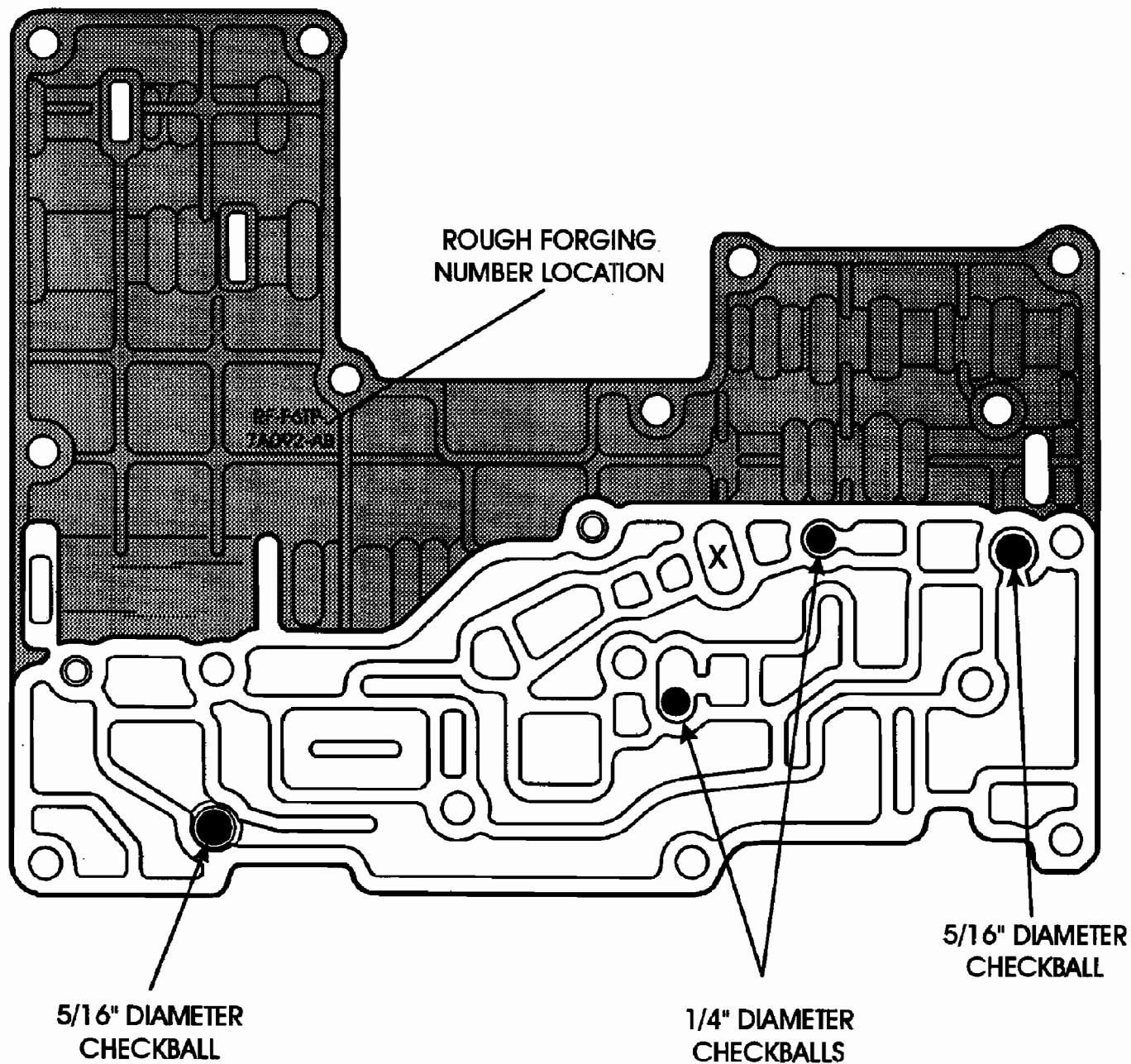
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WITH 5.4L AND 6.8L "WITHOUT" PTO OPTION

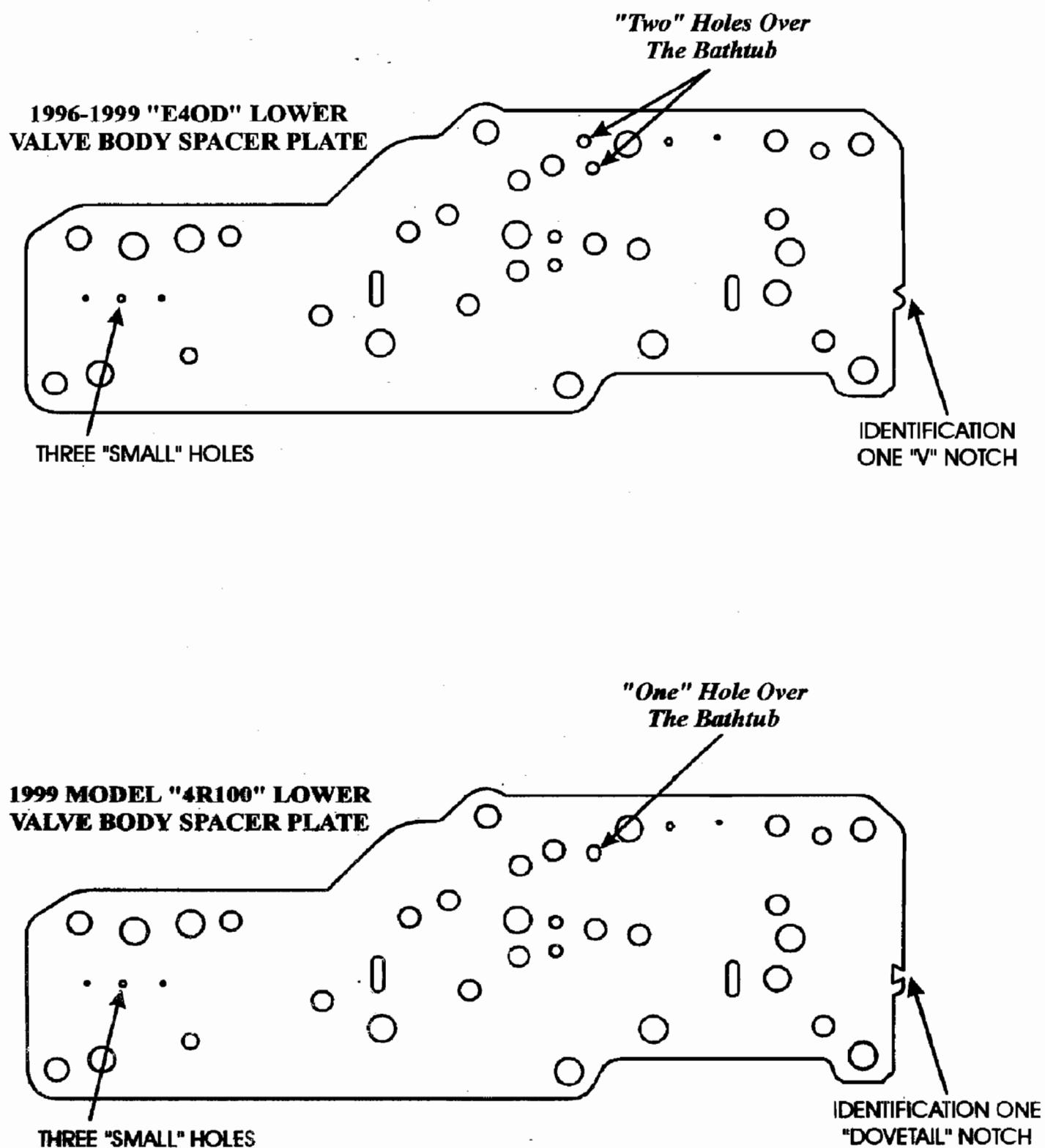


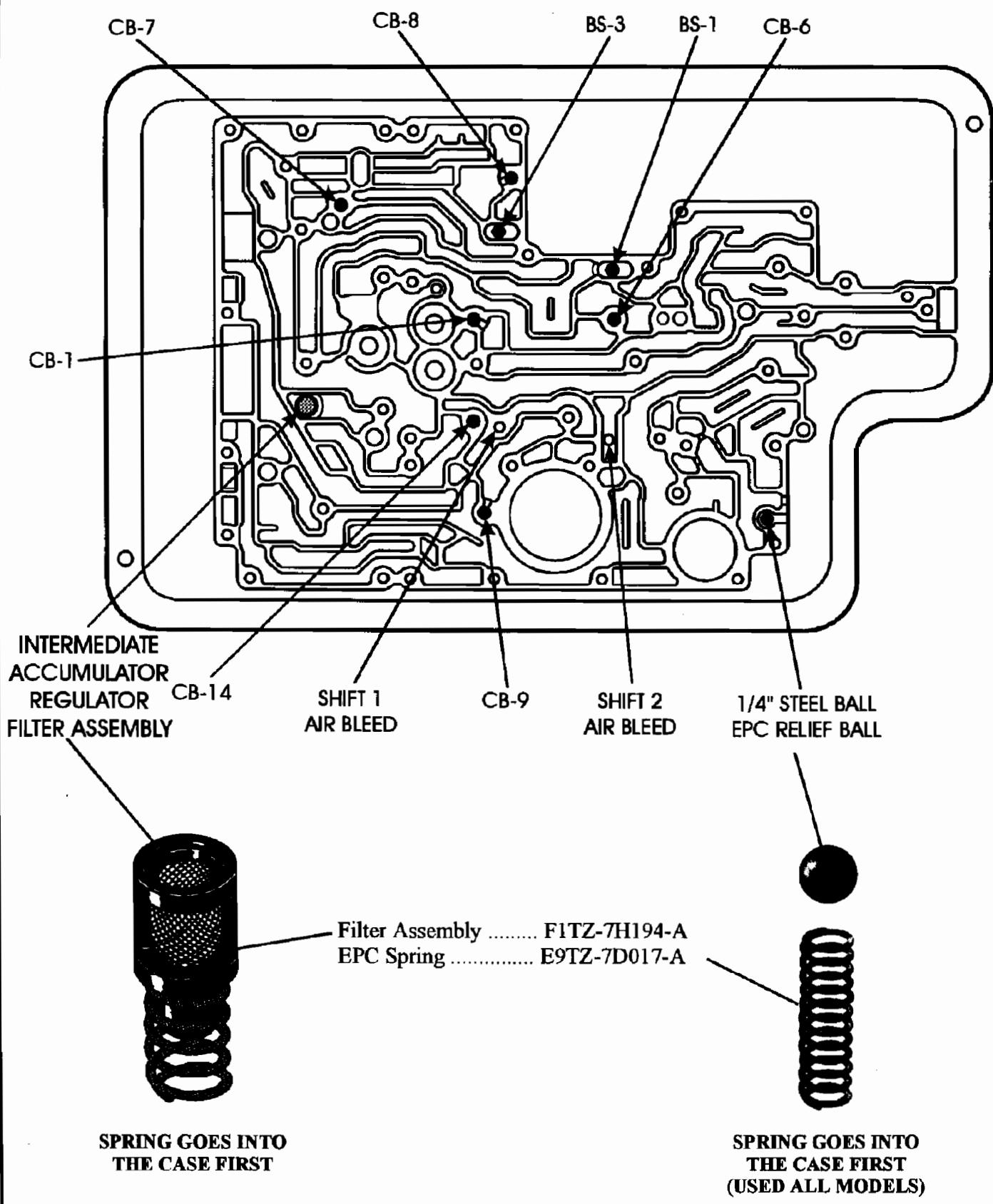
"STAMPED STEEL" COAST CLUTCH DRUM USED
WITH 6.8L AND 7.3L "WITH" PTO OPTION

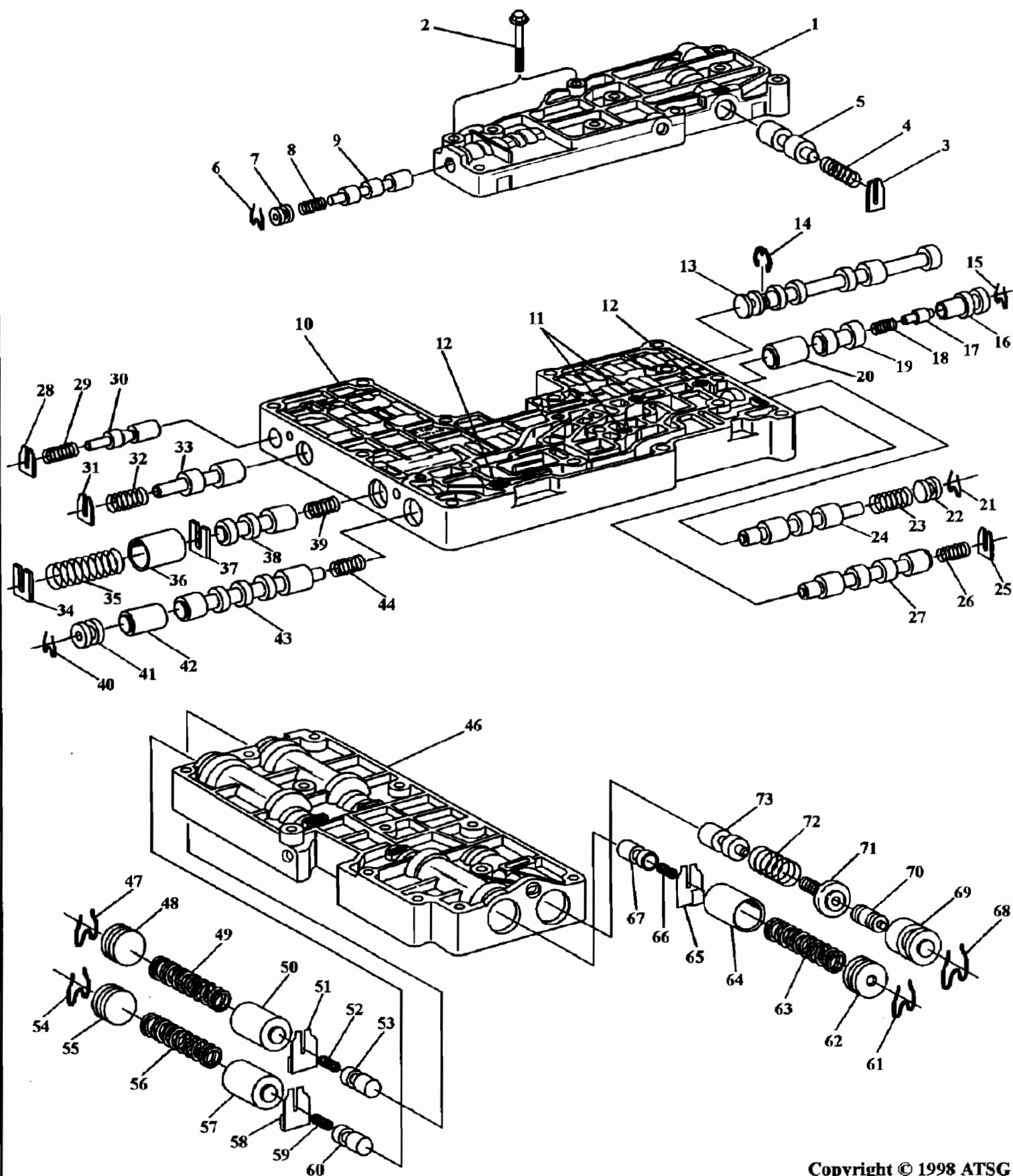
FORD 4R100

4R100 VALVE BODY CHECKBALL LOCATIONS
REQUIRES TWO 1/4" RUBBER BALLS,
AND TWO 5/16" RUBBER BALLS





**1999 4R100 CASE CHECKBALL LOCATIONS
REQUIRES EIGHT (5/16") RUBBER BALLS**

FORD 4R100
MAIN, LOWER, AND ACCUMULATOR VALVE BODIES DISASSEMBLED

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Figure 18
Automatic Transmission Service Group

FORD 4R100

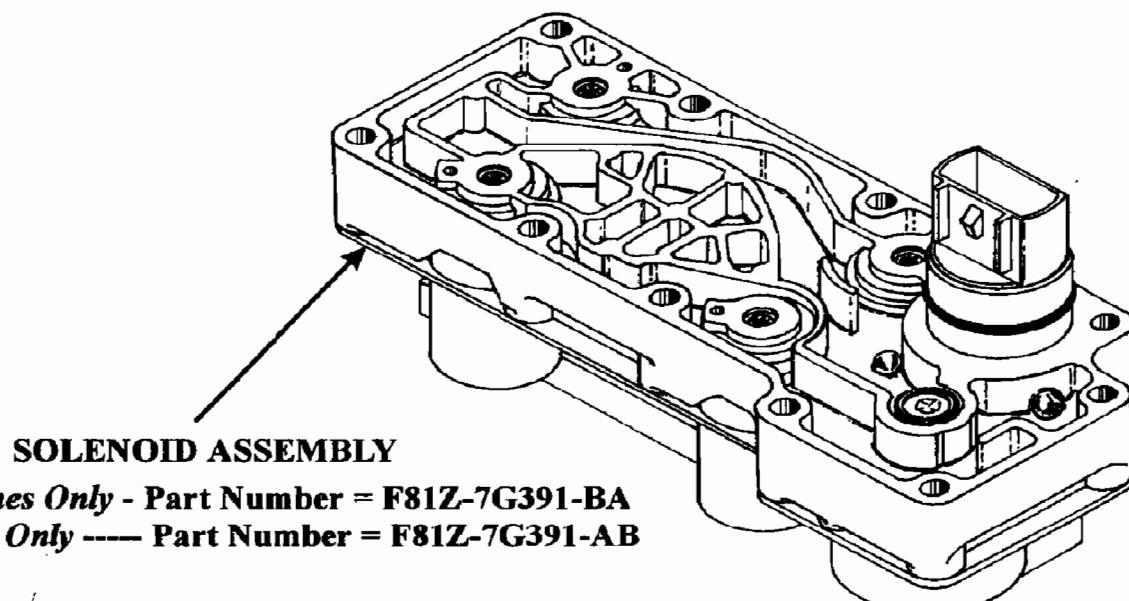
MAIN, LOWER, AND ACCUMULATOR VALVE BODY LEGEND

Item	Description	Item	Description
1	Lower Valve Body	47	Spring Clip Bore Plug Retainer
2	Hex Head Bolt, M1 X 36 (2 Required)	48	Direct Clutch Accumulator Regulator Plunger Bore Plug
3	Retaining Plate	49	Direct Clutch Accumulator Regulator Plunger Spring
4	Manual 1-2 Transition Valve Spring	50	Direct Clutch Accumulator Regulator Plunger
5	Manual 1-2 Transition Valve	51	Direct Clutch Accumulator Regulator Valve Retainer
6	Spring Clip Bore Plug Retainer	52	Direct Clutch Accumulator Regulator Valve Spring
7	Engagement Valve Bore Plug	53	Direct Clutch Accumulator Regulator Valve
8	Engagement Valve Spring	54	Spring Clip Bore Plug Retainer
9	Engagement Valve	55	O.D. Clutch Accumulator Regulator Plunger Bore Plug
10	Main Valve Body	56	O.D. Clutch Accumulator Regulator Plunger Spring
11	Checkball 1/4", 2 Required (7E195)	57	O.D. Clutch Accumulator Regulator Plunger
12	Checkball 5/16", 2 Required (7E195)	58	O.D. Clutch Accumulator Regulator Valve Retainer
13	Manual Control Valve	59	O.D. Clutch Accumulator Regulator Valve Spring
14	Manual Valve ZE Clip	60	O.D. Clutch Accumulator Regulator Valve
15	Spring Clip Bore Plug Retainer	61	Spring Clip Bore Plug Retainer
16	Low Reverse Modulator Valve Sleeve	62	Int. Clutch Accumulator Regulator Plunger Bore Plug
17	Low Reverse Modulator Valve Plunger	63	Int. Clutch Accumulator Regulator Plunger Spring
18	Low Servo Modulator Valve Spring	64	Int. Clutch Accumulator Regulator Plunger
19	Low Servo Modulator Valve	65	Int. Clutch Accumulator Regulator Valve Retainer
20	Low Reverse Modulator Valve	66	Int. Clutch Accumulator Regulator Valve Spring
21	Spring Clip Bore Plug Retainer	67	Int. Clutch Accumulator Regulator Valve
22	3-4 Shift Valve Bore Plug	68	Spring Clip Bore Plug Retainer
23	3-4 Shift Valve Spring	69	Line Pressure Modulator Plunger Sleeve
24	3-4 Shift Valve	70	Line Pressure Modulator Plunger
25	Retaining Plate	71	Line Pressure Modulator Spring And Retainer Assembly
26	2-3 Shift Valve Spring	72	Line Pressure Modulator Valve Spring
27	2-3 Shift Valve	73	Line Pressure Modulator Valve
28	Retaining Plate		
29	Solenoid Regulator Valve Spring		
30	Solenoid Regulator Valve		
31	Retaining Plate		
32	Coast Clutch Shift Valve Spring		
33	Coast Clutch Shift Valve		
34	Retaining Plate		
35	4-3-2 Shift Timing Control Valve Plunger Spring		
36	4-3-2 Shift Timing Control Valve Plunger		
37	Retaining Plate		
38	4-3-2 Shift Timing Valve		
39	4-3-2 Shift Timing Valve Spring		
40	Spring Clip Bore Plug Retainer		
41	1-2 Shift Valve Bore Plug		
42	1-2 Shift Valve		
43	Drive 2 Valve		
44	1-2 Shift Valve Spring		
46	Accumulator Valve Body (7E422 Model Sensitive)		

VIDEO
FORD 4R100
SOLENOID RESISTANCE CHARTS

<i>Solenoid Resistance Chart</i>		
<i>Solenoid</i>	<i>Solenoid Body Pin Numbers</i>	<i>Resistance</i>
<i>Shift Solenoid "B" (2)</i>	<i>1 and 2</i>	<i>20-30 Ohms</i>
<i>Shift Solenoid "A" (1)</i>	<i>1 and 3</i>	<i>20-30 Ohms</i>
<i>TCC Solenoid, Gasoline (On-Off)</i>	<i>1 and 4</i>	<i>20-30 Ohms</i>
<i>TCC Solenoid, Diesel (PWM)</i>	<i>1 and 4</i>	<i>10-20 Ohms</i>
<i>Coast Clutch Solenoid</i>	<i>1 and 5</i>	<i>20-30 Ohms</i>
<i>Electronic Pressure Control Solenoid</i>	<i>11 and 12</i>	<i>3.0-5.0 Ohms</i>
<i>Transmission Fluid Temp Sensor</i>	<i>7 and 8</i>	<i>See Chart Below</i>

<i>Transmission Fluid Temperature</i>		
<i>°C</i>	<i>°F</i>	<i>Resistance</i>
<i>-40 to -20</i>	<i>-40 to -4</i>	<i>1062k - 284k Ω</i>
<i>-19 to -1</i>	<i>-3 to 31</i>	<i>284k - 100k Ω</i>
<i>0 - 20</i>	<i>32-68</i>	<i>100k - 37k Ω</i>
<i>21-40</i>	<i>69-104</i>	<i>37k - 16k Ω</i>
<i>41-70</i>	<i>105-158</i>	<i>16k - 5k Ω</i>
<i>71-90</i>	<i>159-194</i>	<i>5k - 2.7k Ω</i>
<i>91-110</i>	<i>195-230</i>	<i>2.7k - 1.5k Ω</i>
<i>111-130</i>	<i>231-266</i>	<i>1.5k - 0.8k Ω</i>
<i>131-150</i>	<i>267-302</i>	<i>0.8k - 0.54k Ω</i>



*Gasoline Engines Only - Part Number = F81Z-7G391-BA
 Diesel Engines Only ---- Part Number = F81Z-7G391-AB*

<i>Shift Solenoid Application Chart</i>					
<i>Selector Lever Range</i>	<i>Commanded Gear</i>	<i>Shift Solenoid "A"</i>	<i>Shift Solenoid "B"</i>	<i>TCC Solenoid</i>	<i>Coast Clutch Solenoid</i>
P/R/N	1	ON	OFF	*	*
(D)	1	ON	OFF	*	*
(D)	2	ON	ON	*	*
(D)	3	OFF	ON	*	*
(D)	4	OFF	OFF	*	*
<i>(D) Cancel First Through 3rd Gear Only, SSA, SSB, TCC, Same as Overdrive, CCS Always On.</i>					
MANUAL 2	2	*	*	*	ON
MANUAL 1	2	OFF	OFF	OFF	ON
MANUAL 1	1	ON	OFF	OFF	ON

* Controlled by PCM

SHIFT SOLENOID "A" ALWAYS OFF

PCM Gear Commanded	Selector Lever Position		
	(D)	2	1
	Actual Gear Obtained		
1st	4	2	1
2nd	3	2	2
3rd	3	2	2
4th	4	2	2

SHIFT SOLENOID "B" ALWAYS OFF

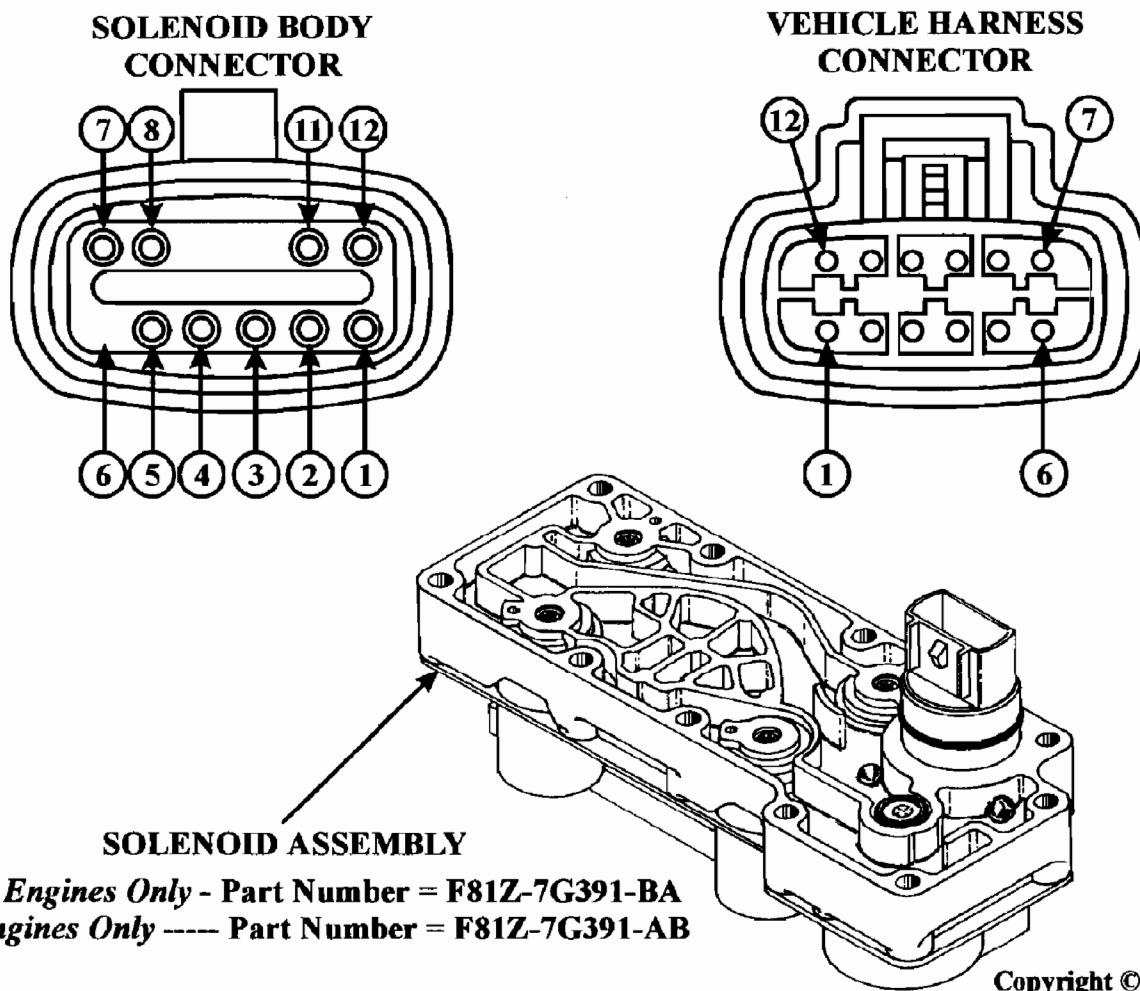
PCM Gear Commanded	Selector Lever Position		
	(D)	2	1
	Actual Gear Obtained		
1st	1	2	1
2nd	1	2	1
3rd	4	2	2
4th	4	2	2

SHIFT SOLENOID "A" ALWAYS ON

PCM Gear Commanded	Selector Lever Position		
	(D)	2	1
	Actual Gear Obtained		
1st	1	2	1
2nd	2	2	1
3rd	2	2	1
4th	1	2	1

SHIFT SOLENOID "B" ALWAYS ON

PCM Gear Commanded	Selector Lever Position		
	(D)	2	1
	Actual Gear Obtained		
1st	2	2	1
2nd	2	2	1
3rd	3	2	2
4th	3	2	2

FORD 4R100
SOLENOID BODY PIN IDENTIFICATION AND FUNCTION

Gasoline Engines Only - Part Number = F81Z-7G391-BA
Diesel Engines Only ---- Part Number = F81Z-7G391-AB

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Solenoid Connector Pin Identification and Function

Pin No.	Description	PCM Connector Pin	
		Gas & Diesel (Cal)	Diesel (49 State)
1	Vehicle Power In For Solenoids (VPWR)	71, 97	71, 97
2	Shift Solenoid "B" (2) Ground from PCM	11	1
3	Shift Solenoid "A" (1) Ground from PCM	6	27
4	Converter Clutch Solenoid Ground from PCM	54	28
5	Coast Clutch Solenoid Ground from PCM	20	53
6	Not Used		
7	Transmission Fluid Temp Sensor	37	37
8	Transmission Fluid Temp Sensor (Signal Return)	91	91
9	Not Used		
10	Not Used		
11	Electronic Pressure Control (EPC)	81	81
12	Vehicle Power In For EPC Solenoid (VPWR)	71, 97	71, 97

Figure 22

1999 FORD 4R100

Abbreviation Description

Abbreviation	Description	Abbreviation	Description
4X4L	4X4 Low Switch	MIL	Malfunction Indicator Lamp
ABS	Antilock Brake System	OCT ADJ	Octane Adjust
A/C	Air Conditioning	OSS	Output Shaft Sensor
ACCS	Air Conditioning Clutch Status	PCM	Powertrain Control Module
AP	Accelerator Pedal Position Sensor	PIP	Profile Ignition Pickup
ARPMDES	Ancillary Engine Speed Desired	RPM	Engine Speed
BARO	Barometric Pressure Sensor	SCCS	Speed Control Command Switch
BOO	Brake ON/OFF Switch	SS1	Shift Solenoid "1"
BPA	Brake Pressure Applied	SS2	Shift Solenoid "2"
BPP	Brake Pedal Position	SSA	Shift Solenoid "A"
CCS	Coast Clutch Solenoid	SSB	Shift Solenoid "B"
CPP	Clutch Pedal Position	SPOUT	Spark Output
CRUISE	Cruise Control Mode (Driving)	TCC	Torque Converter Clutch
DLC	Data Link Connector	TCIL	Trans Control Indicator Lamp
DTC	Diagnostic Trouble Code	TCS	Transmission Control Switch
DTC CNT	Diagnostic Trouble Code Count	TFT	Transmission Fluid Temperature
DTR	Digital Transmission Range Sensor	TP	Throttle Position Sensor
EBP	Exhaust Back Pressure	TSS	Turbine Shaft Speed Sensor
ECT	Engine Coolant Temperature	VPWR	Vehicle Power Supply
EOT	Engine Oil Temperature	VREF	Vehicle Reference Voltage
EPC	Electronic Pressure Control	VSS	Vehicle Speed Sensor
EPR	Exhaust Pressure Regulator	WOT	Wide Open Throttle
FUEL PW	Fuel Pulse Width		
GPC	Glow Plug Control Duty Cycle		
IAT	Intake Air Temperature		
ICP	Injector Control Pressure Sensor		
IPR	Injector Pressure Regulator		
IVS	Idle Validation Switch		
KAM	Keep Alive Memory		
KAPWR	Keep Alive Power		
KOEO	Key On Engine Off		
KOEO	Key On Engine Running		
MAF	Mass Air Flow Sensor		
MAP	Manifold Absolute Pressure Sensor		Copyright © 1998 ATSG

Figure 23

VIDEO

1999 FORD 4R100

Diagnostic Trouble Code Chart

<i>Diagnostic Code</i>	<i>Description</i>	<i>Symptom</i>
P0102 P0103	MAF sensor system fails to operate in a normal manner, which may cause a transmission concern.	High EPC pressure. Firm shifts and engagements. May flash TCIL.
P0107 P0108	BARO sensor circuit signal higher or lower than expected.	Firm shift feel, late shifts at higher altitudes.
P0122	(TP) Throttle Position sensor or (AP) Accelerator Pedal Position sensor below specification during normal operation.	Harsh engagements, firm shift feel, abnormal shift schedule, abnormal TCC operation or does not engage.
P0123	(TP) Throttle Position sensor or (AP) Accelerator Pedal Position sensor above or below normal specifications during normal operation.	Harsh engagements, firm shift feel, abnormal shift schedule, abnormal TCC operation or does not engage.
P0235	MAP sensor or circuit open, shorted to ground or to 5V.	Firm shift feel, late shifts at higher altitudes.
P0236	MAP sensor signal higher or lower than expected or no response due to vacuum hose circuit damaged, disconnected or restricted.	Firm shift feel, late shifts at higher altitudes.
P0237	MAP sensor out of On-Board Diagnostics range. No response during Dynamic Response (Goose) test.	Rerun On-Board Diagnostics and perform "Goose" test when asked.
P0340 P0341 P0344	(DI) Distributor Ignition circuit concern or (CKP) Crankshaft Position sensor failure.	Engine will stall or will not run. May flash TCIL.
P0500 P0503	Insufficient or intermittent vehicle speed input from VSS/ABS.	Harsh engagements, firm shift feel, abnormal shift pattern, unexpected downshifts may occur at closed throttle, abnormal TCC operation or engages only at WOT. May flash TCIL.
P0571	(BPP) Brake Pedal Position switch failure, or not connected.	Failed off. TCC will not disengage when brake is applied.
P0703	(BPP) Brake Pedal Position switch failure, or not connected.	Failed off. TCC will not disengage when brake is applied.
P0705	(DTR) Digital Transmission Range sensor circuit malfunction.	Harsh engagements, firm shift feel. May flash TCIL.
P0708	(DTR) Digital Transmission Range sensor circuit malfunction.	Slight increase in EPC pressure.
P0712	TFT sensor circuit grounded, exceeds scale set for temperature of 315°F.	Harsh engagements, firm shift feel, abnormal shift schedule, abnormal TCC operation or does not engage.

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Figure 24
Automatic Transmission Service Group

1999 FORD 4R100

Diagnostic Trouble Code Chart

<i>Diagnostic Code</i>	<i>Description</i>	<i>Symptom</i>
P0713	TFT sensor circuit open, exceeds scale set for temperature of minus 40°F.	TCC and stabilized shift schedule may be enabled sooner after cold start. May flash TCIL.
P0715	Insufficient input from TSS sensor.	Set DTC, Flash TCIL and Flash MIL.
P0717	TSS sensor signal intermittent.	Set DTC, Flash TCIL.
P0718	TSS sensor signal noisy.	Set DTC.
P0720	Insufficient input from OSS sensor.	Set DTC, Flash TCIL and Flash MIL.
P0721	OSS sensor signal noisy.	Set DTC.
P0722	OSS sensor signal intermittent.	Set DTC, Flash TCIL.
P0731	1-2 shift error because of SSA, SSB, or internal transmission components.	Improper gear selection depending on failure mode and transmission range selector position. Refer to shift solenoid operation chart.
P0732	2-3 shift error because of SSA, SSB, or internal transmission components.	Improper gear selection depending on failure mode and transmission range selector position. Refer to shift solenoid operation chart.
P0733	3-4 shift error because of SSA, SSB, or internal transmission components.	Improper gear selection depending on failure mode and transmission range selector position. Refer to shift solenoid operation chart.
P0741	The PCM picked up an excessive amount of TCC slippage during normal operation.	TCC slippage/erratic or no torque converter clutch operation. Flash TCIL.
P0743	TCC Solenoid circuit failure.	<i>Short Circuit:</i> Engine stalls in "D" or "2" at idle with brake applied. <i>Open Circuit:</i> TCC never engaged.
P0750	SSA circuit failure.	Improper gear selection depending on failure mode and transmission range selector position. Refer to shift solenoid operation chart.
P0755	SSB circuit failure.	Improper gear selection depending on failure mode and transmission range selector position. Refer to shift solenoid operation chart.

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Diagnostic Trouble Code Chart

<i>Diagnostic Code</i>	<i>Description</i>	<i>Symptom</i>
P0781	1-2 shift error because of SSA, SSB, or internal transmission components.	Improper gear selection depending on failure mode and transmission range selector position. Refer to shift solenoid operation chart.
P0782	2-3 shift error because of SSA, SSB, or internal transmission components.	Improper gear selection depending on failure mode and transmission range selector position. Refer to shift solenoid operation chart.
P0783	3-4 shift error because of SSA, SSB, or internal transmission components.	Improper gear selection depending on failure mode and transmission range selector position. Refer to shift solenoid operation chart.
P1100 P1101	MAF sensor system fails to operate in a normal manner, which may cause a transmission concern.	High EPC pressure. Firm shifts and engagements. May flash TCIL.
P1111	System Pass.	No Codes Detected.
P1120	Throttle Position Sensor voltage lower than expected.	Harsh engagements, firm shift feel, abnormal shift schedule, abnormal TCC operation or does not engage.
P1124	Throttle Position Sensor out of On-Board Diagnostics range during KOEO test.	TP sensor (Gas Engines) not at idle position during KOEO test.
P1280	Injection Control Pressure (ICP) sensor circuit failure (Diesel Engine), or out of range low.	May result in firm shifts.
P1281	Injection Control Pressure (ICP) sensor circuit failure (Diesel Engine), or out of range high.	May result in firm shifts.
P1460 P1463 P1464	A/C switch error.	<i>Failed On:</i> EPC pressure slightly low with A/C off. <i>Failed Off:</i> EPC pressure slightly low with A/C on.
P1500	Insufficient or intermittent vehicle speed input from VSS/ABS.	Harsh engagements, firm shift feel, abnormal shift pattern, unexpected downshifts may occur at closed throttle, abnormal TCC operation or engages only at WOT. May flash TCIL.

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Diagnostic Trouble Code Chart

<i>Diagnostic Code</i>	<i>Description</i>	<i>Symptom</i>
P1702	Digital Transmission Range (DTR) sensor signal intermittent.	Erratic harsh shift engagements.
P1703	(BPP) Brake Pedal Position switch not actuated during KOER test.	Failed on or not connected, TCC will not engage at less than one-third throttle opening.
P1704	Digital Transmission Range (DTR) sensor misaligned or failed electronically.	Increase in EPC pressure.
P1705	Digital Transmission Range (DTR) sensor not run in park or neutral during On-Board Diagnostics KOEO or KOER tests.	Rerun On-Board Diagnostics.
P1711	Transmission not at operating temperature during On-Board Diagnostics.	Warm vehicle to normal operating temperature and rerun On-Board Diagnostics.
P1713	No change in TFT sensor - Low range.	May flash TCIL.
P1714	SSA mechanical failure detected.	Improper gear selection depending on failure mode and transmission range selector position. Refer to shift solenoid operation chart.
P1715	SSB mechanical failure detected.	Improper gear selection depending on failure mode and transmission range selector position. Refer to shift solenoid operation chart.
P1718	No change in TFT sensor - High range.	May flash TCIL.
P1728	Excessive amount of transmission slippage has been detected.	Transmission slippage, erratic or no TCC operation. May flash TCIL.
P1729	4X4 Low switch circuit failure.	Early or delayed shift schedule.
P1740	TCC solenoid mechanical failure detected.	Harsh shift, may flash TCIL.
P1744	The PCM picked up an excessive amount of TCC slippage during normal operation.	TCC slippage/erratic or no torque converter clutch operation. Flash TCIL.
P1746	Failure of the EPC control pressure driver located inside the PCM.	Open circuit causes maximum EPC pressure, harsh engagements and shifts. May flash TCIL.
P1747	EPC shorted circuit failure, or PCM.	Shorted circuit causes minimum EPC pressure, limits engine torque with partial fuel shut off and heavy misfire. Flashing TCIL.

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1999 FORD 4R100

Diagnostic Trouble Code Chart

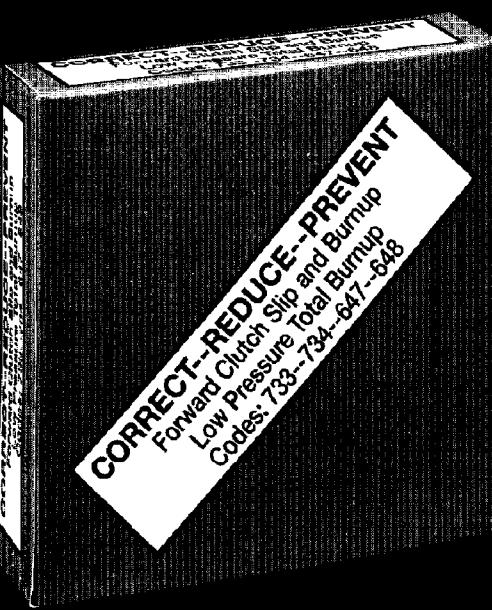
<i>Diagnostic Code</i>	<i>Description</i>	<i>Symptom</i>
P1754	CCS circuit failure.	<i>Failed Off:</i> No third gear engine braking in O.D. cancel. <i>Failed On:</i> Third gear engine braking in O.D. range. Coast clutch may be damaged causing eventual failure.
P1760	EPC signal intermittent short.	Short circuit causes minimum EPC pressure.
P1780	TCS not cycled during the On-Board Diagnostics or the circuit is open or shorted.	No overdrive cancel when switch is cycled.
P1781	4X4 Low switch circuit failure.	Early or delayed shift schedule.
P1783	Transmission Fluid Temperature has exceeded 270°F.	Slight increase in EPC pressure. May flash TCIL.

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- **Low Pressure Total Burnup**

INCLUDES:

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FORD 4R100

POWER-TAKE-OFF DESCRIPTION AND OPERATION

DESCRIPTION:

Beginning at the start of production for 1999 models, Ford Motor Company introduced a new 4R100 transmission in some F250, F350, F450 and F550 Super Duty Trucks, equipped with the 5.4L, 6.8L and 7.3L engines. Basically the new 4R100 is a revised version of the previous E4OD transmission with a Power-Take-Off (PTO) window on the left side of the transmission case, right behind the front pump. Refer to Figure 1. The revisions that have occurred have created many major engineering changes that have affected many internal and external parts that will create service concerns and diagnostic concerns.

PTO REQUIREMENTS:

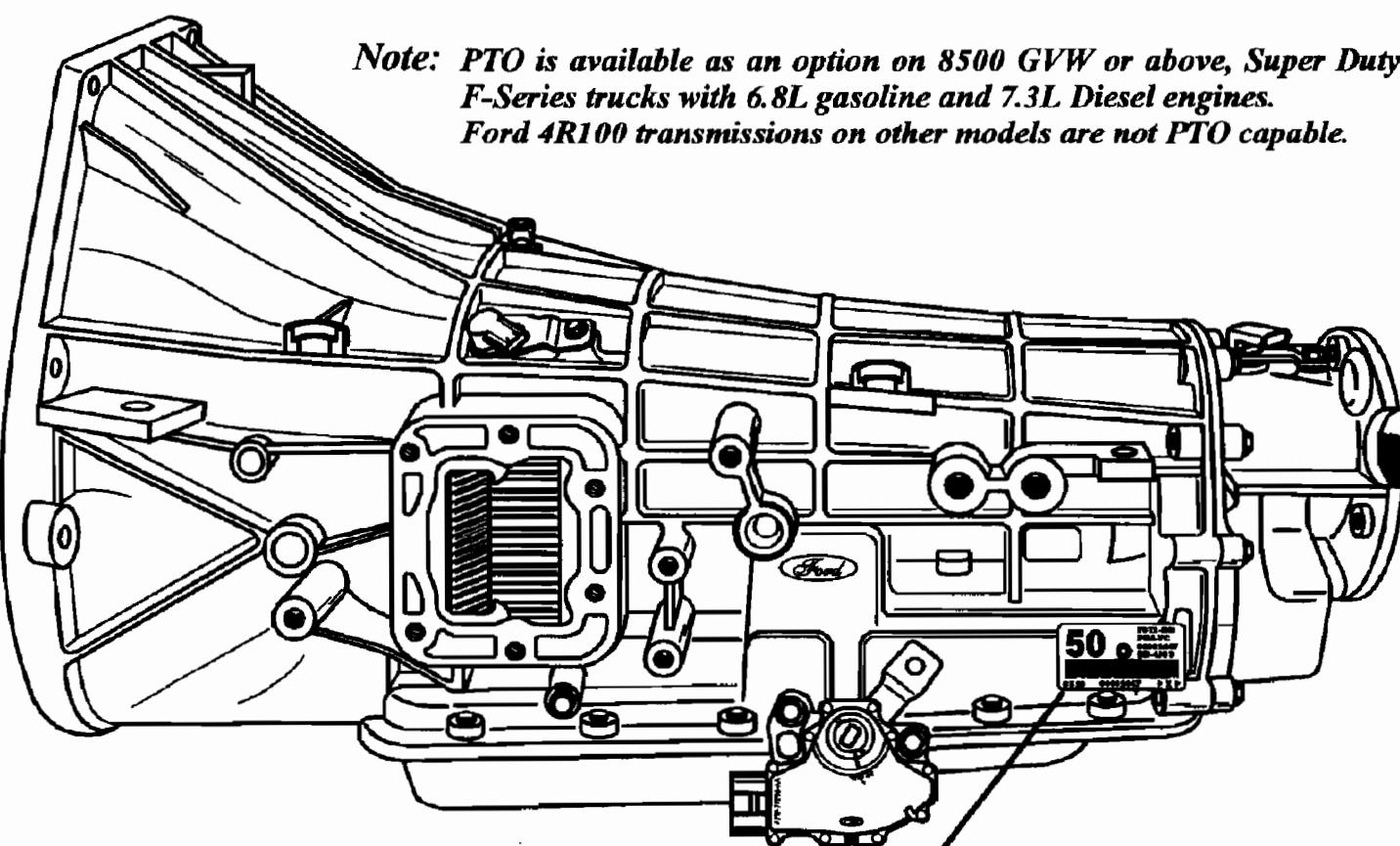
- (1) Obviously the case must be PTO capable with the cast-in window in the transmission where the PTO unit mounts to the transmission, as shown in Figure 1.
- (2) Designed for use during Mobile (Some Models) or Stationary conditions.
- (3) PTO is available as an option *only* on 8500 GVW or above, Super Duty F-Series trucks with 6.8L Gasoline and 7.3L Diesel engines. Ford 4R100 transmissions on other models *are not* PTO capable.
- (4) Battery voltage **must** be supplied to the Electronic Engine Control (EEC) input pin 4 on gasoline models, or pin 66 on diesel models, *when PTO is engaged*. The processor uses this information to raise EPC pressure to approximately 55 PSI so that you do not smoke the coast clutch. *This voltage must be provided by the PTO installer.*

CONDITIONS FOR PTO OPERATION (General):

- (1) The vehicle is not in the crank or start mode.
- (2) The transmission range selector **must** be in P, R, O.D, 2 or 1 position. The PTO will not operate when selector is in the neutral position.
- (3) PTO operation is inhibited when in cranking mode, neutral, or 4th gear.
- (4) Transmission only operates 1st through 3rd gears. Computer strategy does not allow 4th gear to engage, even if selected.
- (5) Transmission Fluid Temperature Sensor reading is up to operating temperature.

**FORD 4R100
WITH POWER TAKE OFF OPTION**

Note: PTO is available as an option on 8500 GVW or above, Super Duty F-Series trucks with 6.8L gasoline and 7.3L Diesel engines. Ford 4R100 transmissions on other models are not PTO capable.

**F4 = 1994****F5 = 1995****F6 = 1996****F7 = 1997****F8 = 1998****F9 = 1999****F8T1-DB****PRA-YC****00001447****BD-8J03***Assembly Part Number (Prefix and Suffix)**Transmission Model**Serial Number**Build Date - (Year, Month, Day)***A = JAN****G = JUL****B = FEB****H = AUG****C = MAR****J = SEP****D = APR****K = OCT****E = MAY****L = NOV****F = JUN****M = DEC****IDENTIFICATION TAG LOCATION AND INFORMATION**

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DIESEL ENGINE PTO OPERATION:**"AUXILIARY" POWERTRAIN CONTROL MODULE
7.3L DIESEL ENGINE (ONLY)**

- The Auxiliary Powertrain Control Module (APCM) commands the Electronic Engine Control (EEC) module to increase the idle speed during PTO operation. The APCM controls engine speed from 1200 to 2500 RPM.
- The Auxiliary Powertrain Control Module is a separate option, *it does not come standard* with a PTO capable transmission, and is for 7.3L diesel applications only.
- Intended for stationary use only, and in stationary operation the PTO requires an engine idle speed of 1200 RPM. During stationary PTO operation on the 7.3L diesel, the EEC increases the idle to 1200 RPM automatically.
- During stationary PTO operation, the Torque Converter Clutch (TCC) engages once the RPM reaches 1200-1300 RPM.
- The following conditions **must** be met before the idle speed is increased:
 1. Parking brake must be engaged for all applications.
 2. No hydraulic brake actuation.
 3. Accelerator pedal must be in the idle position.
 4. Vehicle speed must be zero MPH.
 5. Brake lights must be functional.

**AUXILIARY POWERTRAIN CONTROL MODULE****CHARGE PROTECTION**

Charge Protection is used for maintaining battery charge.

In Charge Protection mode, the battery voltage is monitored and the engine idle speed is increased as necessary, so the battery charge is maintained as required.

Charge Protection can be activated from in-cab and can be programmed to activate automatically on engine start-up.

APPLICATION

- Exclusively for light trucks with the 7.3L Diesel Engine.
- Intended for Stationary Use Only.
- Order Guide Option Code 961.

KITS INCLUDE

- Aux. Powertrain Control Module.
- Mounting Hardware and Bracket.
- Wiring Harness.
- Instruction Booklet.
- Operators Card.

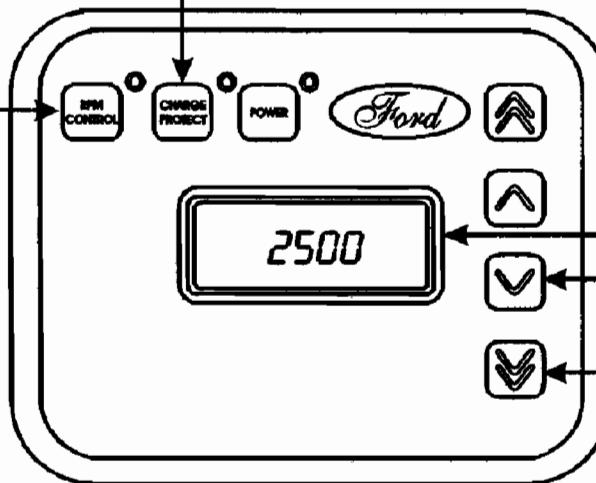
RPM CONTROL

RPM Control is used for elevating idle speed.

RPM Control mode can be activated from in-cab and can be programmed to activate automatically on engine start-up.

The programmable speed presets range from 1300 to 2500 RPM.

This is the recommended method of elevating idle speed for PTO operations.



LCD screen displays the current engine speed or battery voltage.

Each Single Arrow key contains a preset speed allowing for four programmable RPM settings.

The Double Arrow keys can also be used to manually raise or lower the engine speed at a faster or slower rate.

GASOLINE ENGINE PTO OPERATION:

- (1) PTO installer must obtain a "High Idle Throttle Control" from an aftermarket source.
- (2) Auxiliary Powertrain Control Module seen on the previous page **does not** work on the gasoline engine models. APCM module works **only** on the 7.3L diesel engine.
- (3) For stationary PTO operation an engine idle speed of 1300 RPM is required.
- (4) The Torque Converter Clutch (TCC) engages once the engine reaches 1300 RPM.

TRANSMISSION FUNCTIONS DURING PTO OPERATION:

- (1) Shift Solenoid "B" (2) is turned on, the coast clutch activates and does not allow 4th gear operation during PTO operation.
- (2) The Electronic Pressure Control (EPC) pressure is raised to approximately 55 PSI. This is why the coast clutch will be smoked in a short period of time if the battery voltage wire is not applied to EEC input pin 4 (gasoline) or pin 66 (diesel) when the PTO is engaged.
- (3) The Transmission Control Indicator Lamp (TCIL) illuminates.
- (4) When the PTO is turned ON, the transmission operates only in 1st through 3rd gears. Overdrive 4th gear is not allowed by the strategy.
- (5) The transmission shift schedule is **early** and shift feel is **very firm**.

DIAGNOSIS CONCERNS WITH PTO EQUIPPED VEHICLES:

- (1) **Always** ensure that PTO is turned OFF, before any diagnosis procedures begin.
- (2) **Never** perform any transmission special tests (i.e. pressure test, stall test etc.) when the PTO is turned ON.
- (3) If a transmission concern or symptom goes away with the PTO turned OFF, it is most likely **not a transmission concern**.
- (4) On Board Diagnostics operate normally during PTO operation with the exception of the engine misfire monitor. The circuit checks made by the PCM and Failure Mode Effect Management (FMEM) capability will continue. The PTO **must** be turned OFF to access Diagnostic Trouble Codes (DTC's) and perform OBD tests.
- (5) **No testing with the PTO turned ON.**

FORD E4OD NEW DESIGN FRONT PUMP FOR 1995 MODELS

CHANGE: Beginning at the Start Of Production for all 1995 model E4OD transmissions, Ford Motor Co. introduced an increased displacement Front Pump Assembly, 1.70 cu in/rev, versus 1.50 cu in/rev for previous models.

REASON: To provide additional flow for more robust converter clutch functions and additional lube flow, both of which will greatly increase transmission durability.

PARTS AFFECTED:

- (1) FRONT PUMP BODY - Gerotor bore has an increased diameter to accommodate the new design level outer gerotor. Previous outer gerotor diameter was 3.950" and the new design level outer gerotor diameter is 4.083". Refer to Figures 1 and 2. Also, the two holes in the suction cavity were increased from .312" to .400", as shown in Figures 1 and 2.
Another way to identify the new pump body is with the "Rough Forging Number" F5TP-7A105-AA, and is found on the front seal side of the pump body.
All of the oil passages in the new design Front Pump Body remained the same as previous years and are identified in Figure 4.
- (2) OUTER GEROTOR - The lobes on the Outer Gerotor changed from the previous 11 lobes to 10 lobes on the new design, to accommodate the changes on the inner gerotor. The diameter of the Outer Gerotor also changed from 3.950" to 4.083". Refer to Figures 1 and 2.
The changes on both the inner and outer gerotor increased the cavity between the gerotors for increased pump volume, as shown in Figure 3.
- (3) INNER GEROTOR - The lobes on the Inner Gerotor changed from the previous 10 lobes to 9 lobes on the new design, to accommodate the changes on the outer gerotor. Refer to Figures 1 and 2. The changes on both the inner and outer gerotor increased the cavity between the gerotors for increased pump volume, as shown in Figure 3.
- (4) FRONT PUMP COVER - Received casting changes with added ribs in strategic places to increase torque retention when the two halves are torqued properly. The Pump Body to Pump Cover bolts should be torqued to 18-23 ft.lbs, with the alignment ring in place.
The easiest way to identify the new design level Pump Cover is with the "Rough Forging Number" F5TP-7B324-AA, and is located on the back side of the Pump Cover.
All of the oil passages in the new design Pump Cover remained the same as previous years and are identified in Figure 5. Internal pump cover passages are identified in Figure 6.

Continued on next Page.

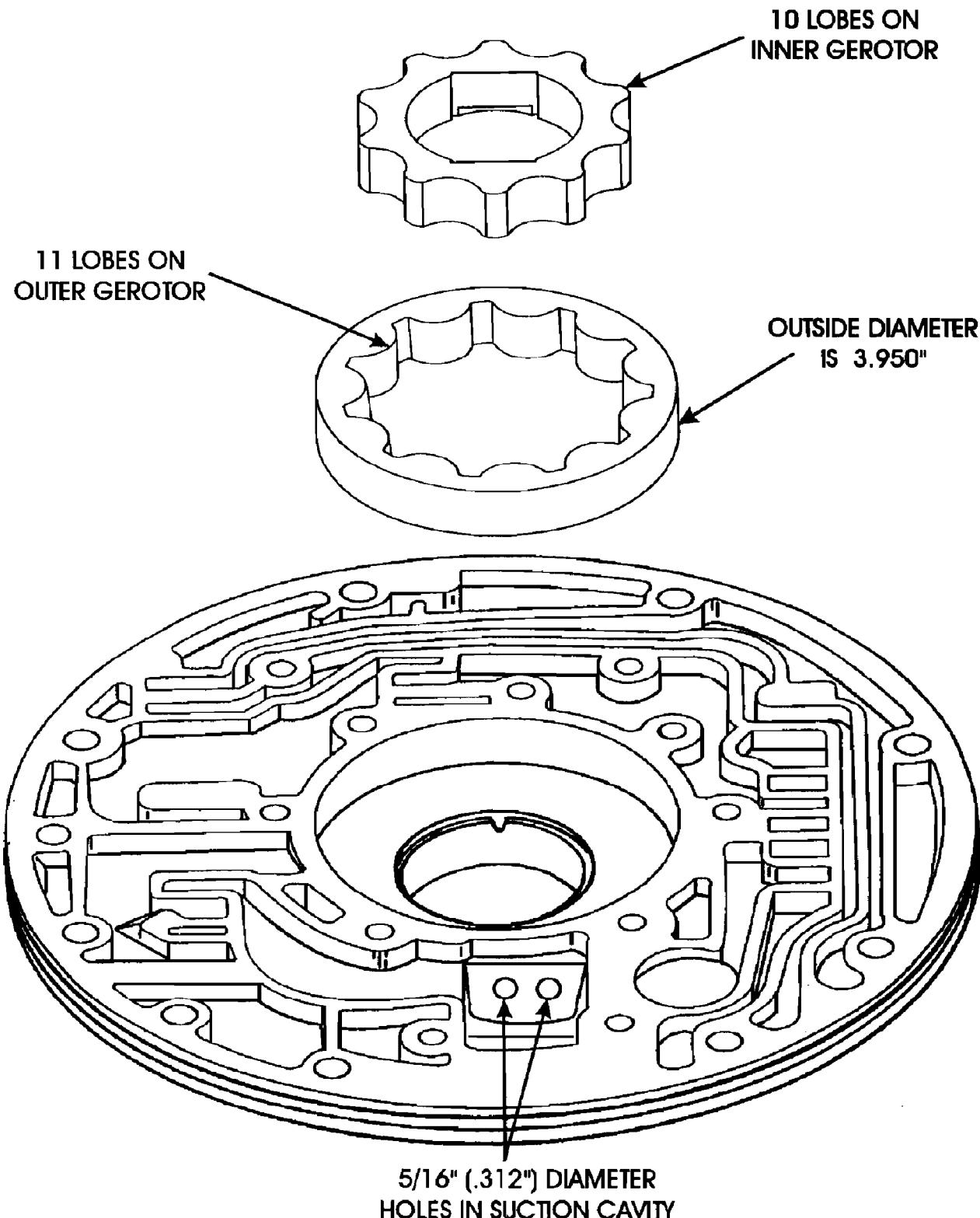
INTERCHANGEABILITY:

- (1) The new design level Front Pump Assembly will retro-fit back to all previous models, when used as an assembly, and is recommended for all rebuilds. The new design Front Pump Assembly is available under OEM part number F5TZ-7A103-A.
- (2) The new design level and previous design level gerotors will not interchange in any way.

SERVICE INFORMATION:

Front Pump Assembly (New 1995 Design) **F5TZ-7A103-A**

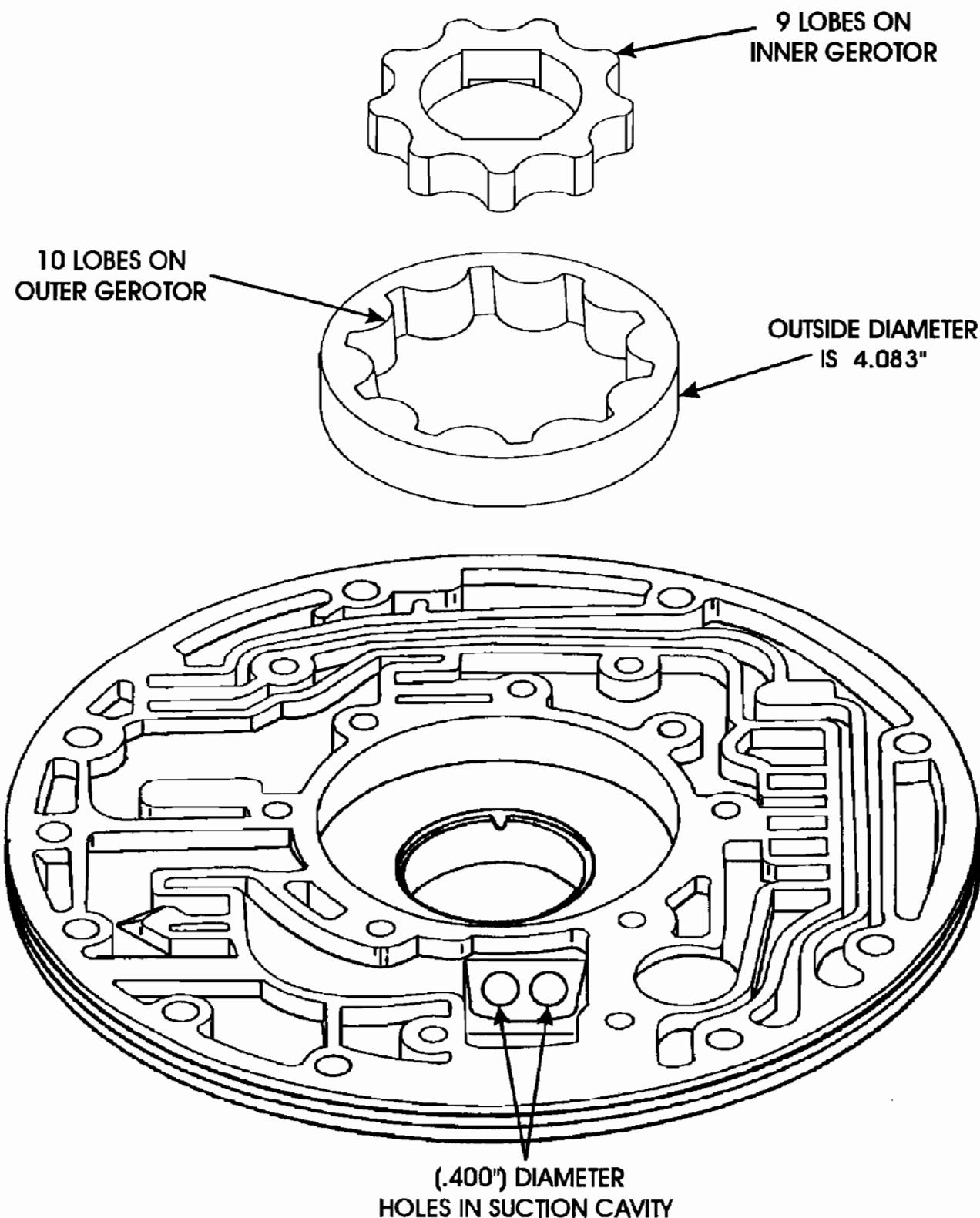
1989-1994 PUMP BODY AND GEARS
ROUGH FORGING NO. E9TP-7A105-BA
(PREVIOUS DESIGN)



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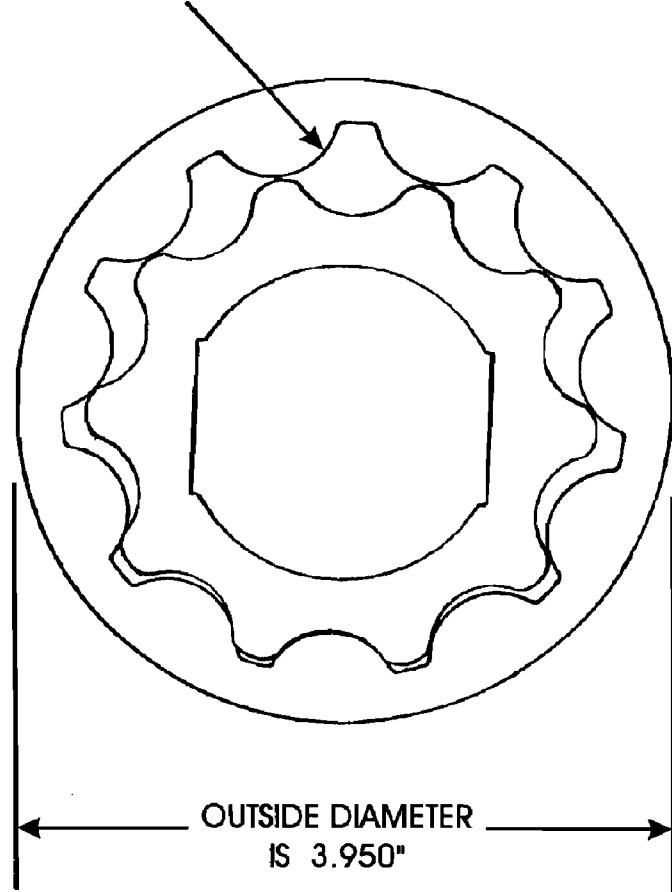
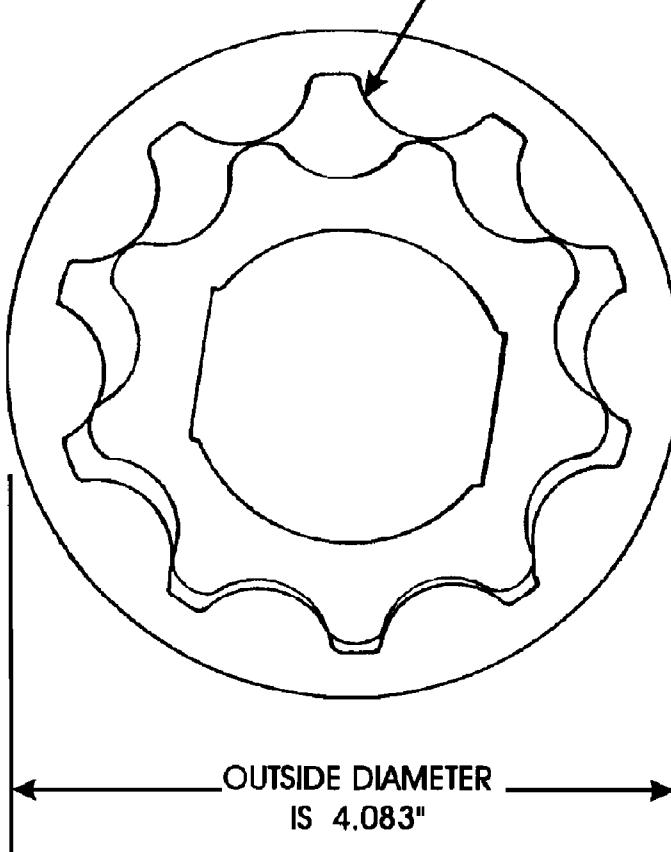
Figure 1

**1989-1994 PUMP BODY AND GEARS
ROUGH FORGING NO. F5TP-7A105-AA
(NEW DESIGN)**



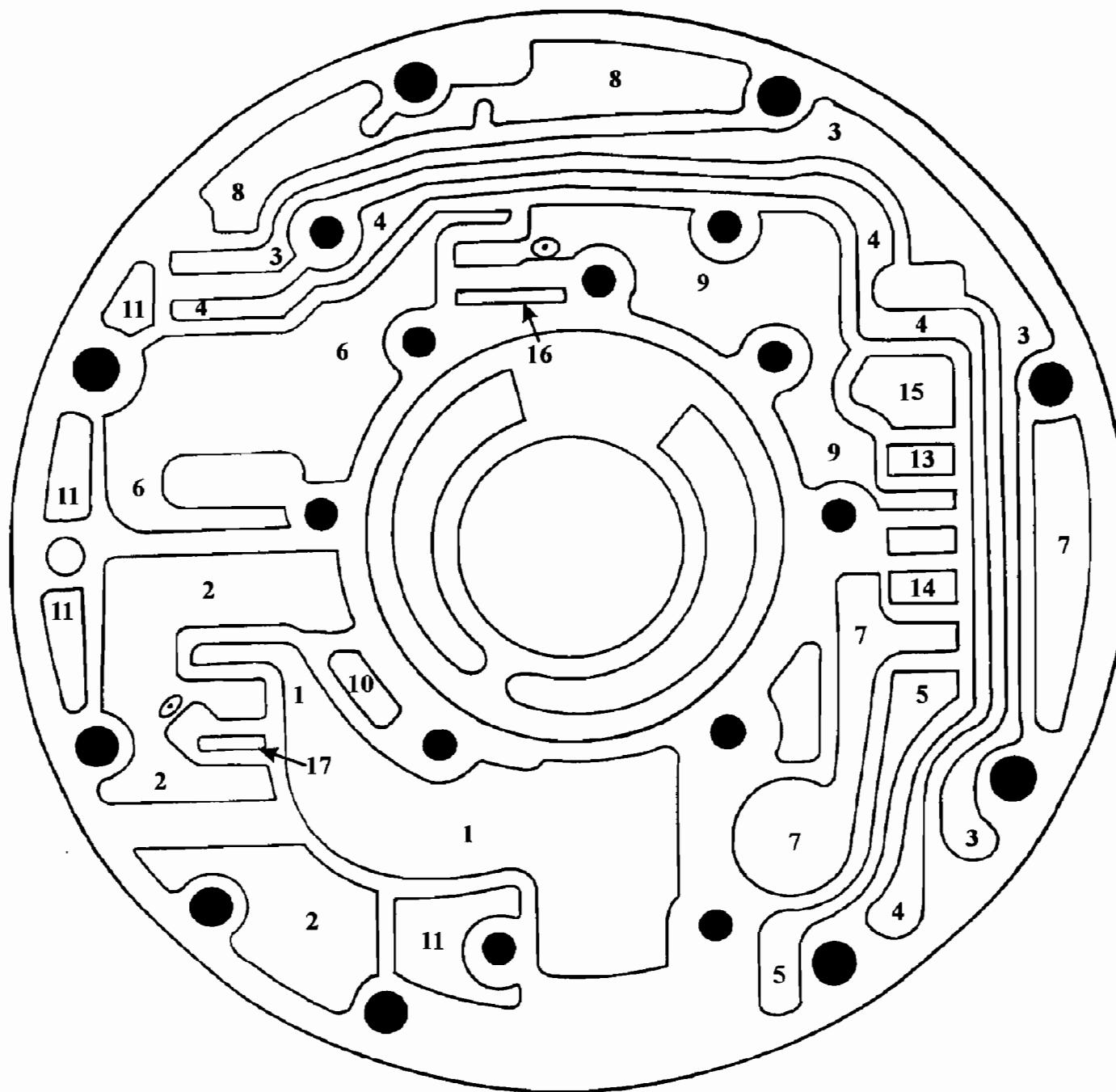
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Figure 2

**1989-1994 PUMP GEARS
(PREVIOUS DESIGN)****10 LOBES ON INNER GEAR
11 LOBES ON OUTER GEAR****1995-UP PUMP GEARS
(NEW DESIGN)****9 LOBES ON INNER GEAR
10 LOBES ON OUTER GEAR**SMALLER CAVITY THAN
NEW DESIGN PUMPLARGER CAVITY BETWEEN GEARS
FOR INCREASED PUMP VOLUME

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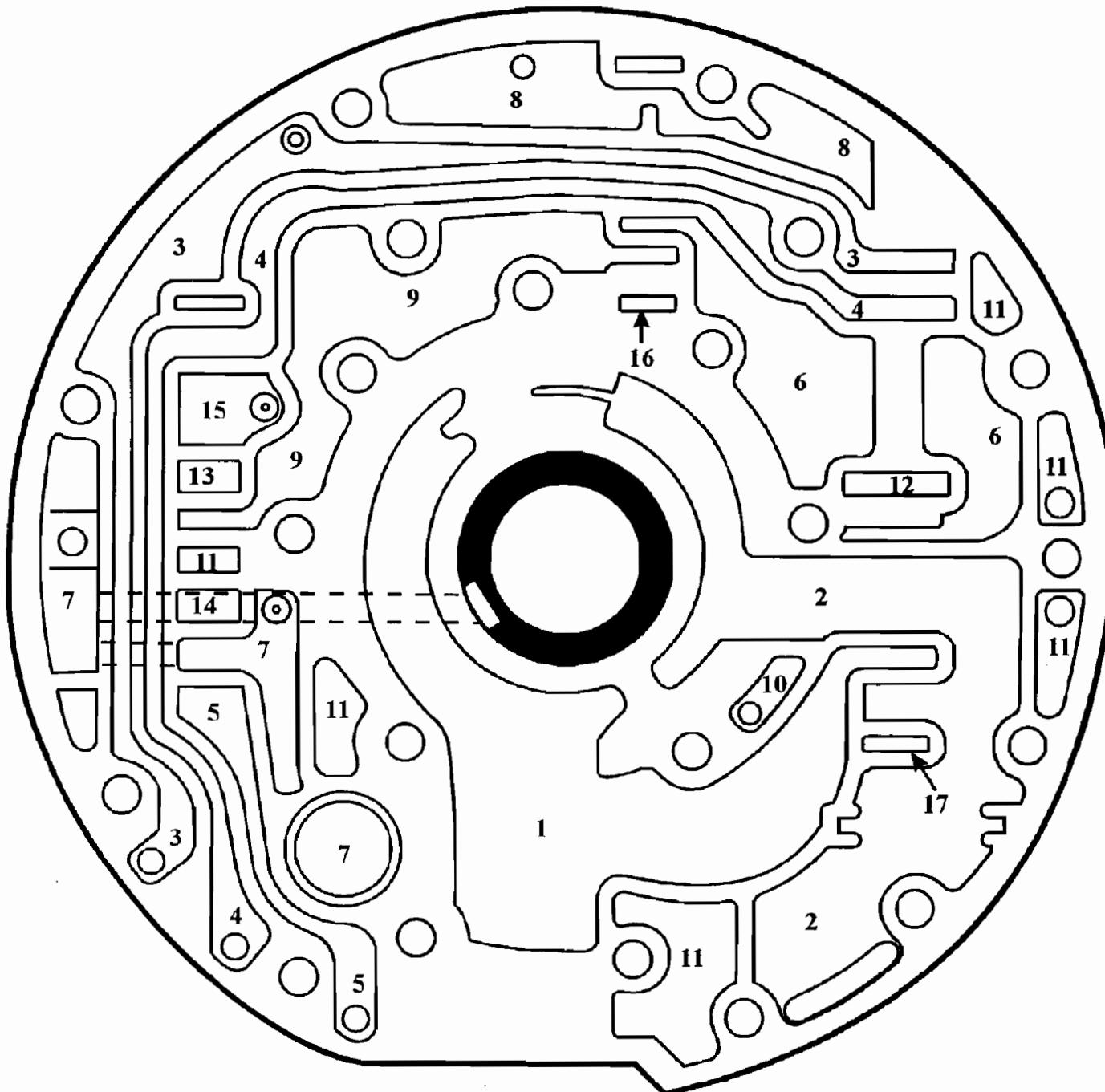
Figure 3

**E4OD PUMP BODY
OIL PASSAGE IDENTIFICATION**

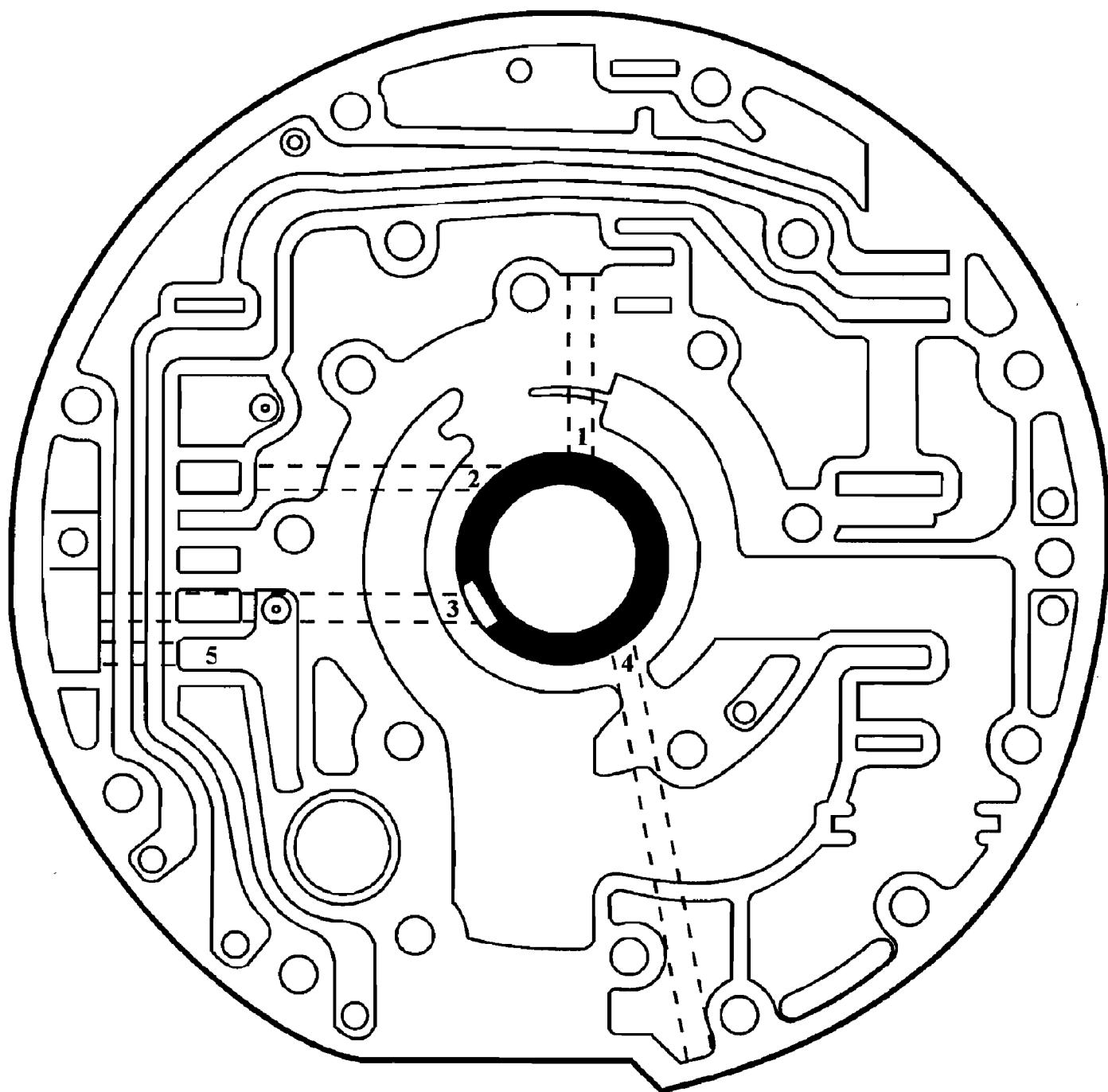
1. PUMP SUCTION
2. LINE PRESSURE
3. EPC BOOST
4. MANUAL 1ST AND REVERSE BOOST
5. CONVERTER CLUTCH SIGNAL
6. CONVERTER FEED
7. TO COOLER
8. VENT
9. REGULATED CONVERTER FEED
10. PUMP SEAL DRAIN
11. VOID
12. EXHAUST
13. CONVERTER RELEASE
14. CONVERTER APPLY
15. RELEASE OIL EXHAUST
16. TCC REGULATOR VALVE BALANCE
17. P.R. VALVE BALANCE

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Figure 4

E4OD PUMP COVER
OIL PASSAGE IDENTIFICATION

1. PUMP SUCTION
2. LINE PRESSURE
3. EPC BOOST
4. MANUAL 1ST AND REVERSE BOOST
5. CONVERTER CLUTCH SIGNAL
6. CONVERTER FEED
7. TO COOLER
8. VENT
9. REGULATED CONVERTER FEED
10. PUMP SEAL DRAIN
11. VOID
12. EXHAUST
13. CONVERTER RELEASE
14. CONVERTER APPLY
15. RELEASE OIL EXHAUST
16. TCC REGULATOR VALVE BALANCE
17. P.R. VALVE BALANCE

E4OD PUMP COVER INTERNAL
PASSAGE IDENTIFICATION

1. FRONT LUBE SUPPLY
2. CONVERTER RELEASE
3. CONVERTER APPLY
4. COAST CLUTCH FEED
5. TO COOLER



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FORD E4OD/4R100 NEW FRONT PUMP ASSEMBLY FOR 1997-1998 MODELS

CHANGE: Ford Motor Company for the 1999 Model Year, has renamed the E4OD transmission when they added the PTO window to the case. Many changes were made to the internal parts including the Oil Pump Assembly. These new oil pumps have now been found in some models of the 1997-1998 E4OD transmissions, from the factory assembly line.

REASON: Preparing the Oil Pump Assembly to accomodate two different converter clutch valve line-ups.

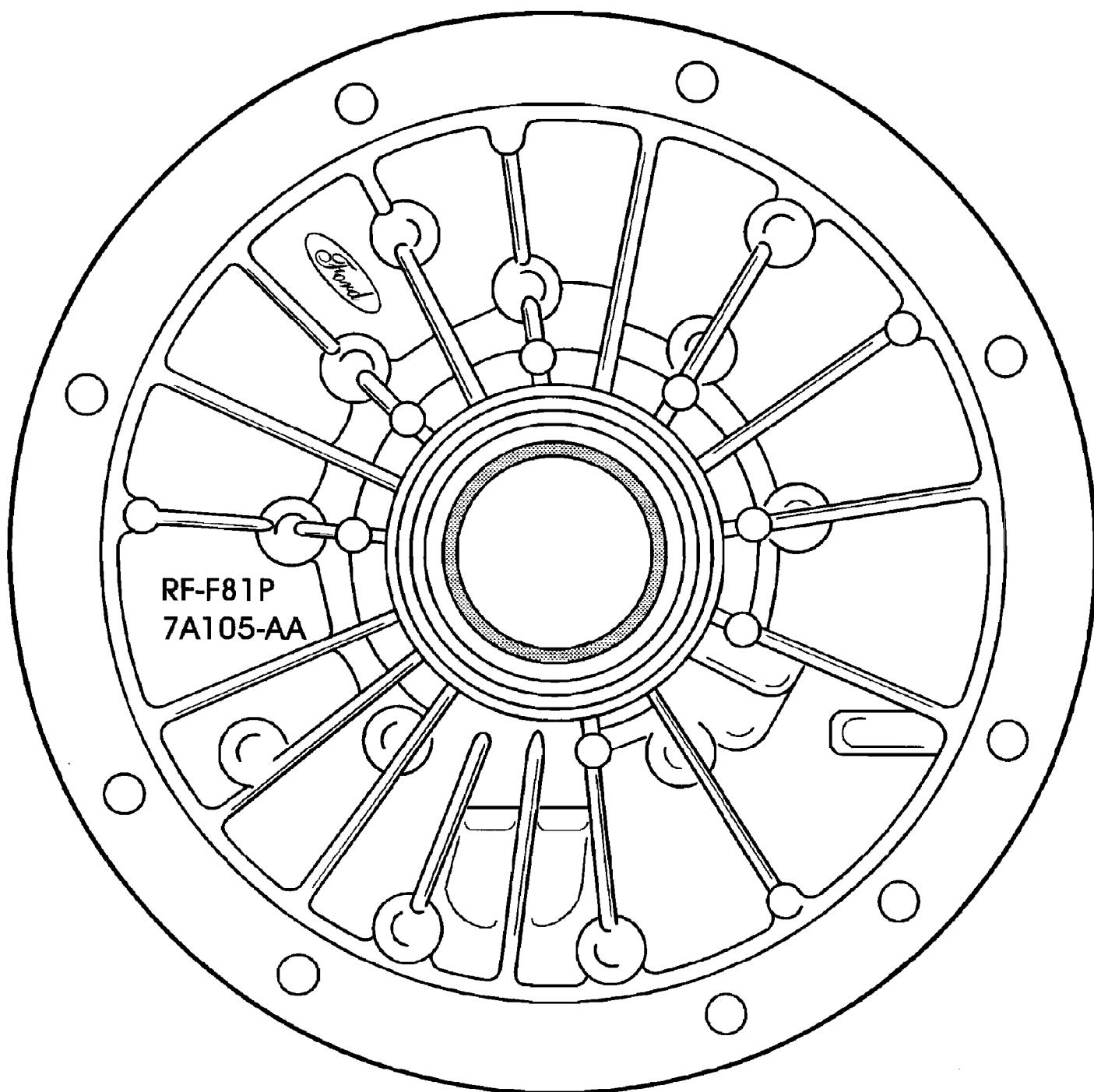
PARTS AFFECTED:

- (1) OIL PUMP BODY - Now has different worm tracks to accomodate the new pump cover assembly and is identified by the rough forging number RF-F81P-7A105-AA, and is cast into the pump body in the location shown in Figure 1. The worm track side of the new pump body and the previous pump body are shown in Figure 2.
- (2) OIL PUMP COVER - Now has different worm tracks to accomodate two different styles of converter clutch valve line-ups, and has one added bolt to clamp the pump halves together. The worm track side of the new pump cover and the previous pump cover are illustrated in Figure 3, and casting number on new pump cover is RF-F81P-7B324-AA for identification.
- (3) TCC LINE-UP - There are now two different Converter Clutch Control Valve Line-Ups in the oil pump cover depending on whether it is gasoline or diesel engine. Both of these valve line-ups are illustrated in Figure 4.
- (4) STATOR SHAFT ASSEMBLY - There are now three different Stator Shaft Assemblies with different sealing ring and bushing configurations, to accomodate the PTO and a new coast clutch housing, as illustrated in Figure 5, and are model dependent.
- (5) COAST CLUTCH HOUSING - There is now a "Stamped Steel" coast clutch housing that may or may not have a PTO gear pressed onto the housing, that is used in addition to the previous cast iron coast clutch housing, depending on the model and engine size, and is illustrated in Figure 6. This also changes the coast clutch steel plates and the fourth clutch friction plates, as shown in Figures 6 and 7.

INTERCHANGEABILITY:

This new Oil Pump Assembly will retro-fit back to previous models, as long as you have the proper valve line-up in the converter clutch control valve bore. The pump halves *cannot* be inter-mixed because of the major worm track differences. All other parts listed above are model dependent and *great care must be used* when parts replacement is necessary.

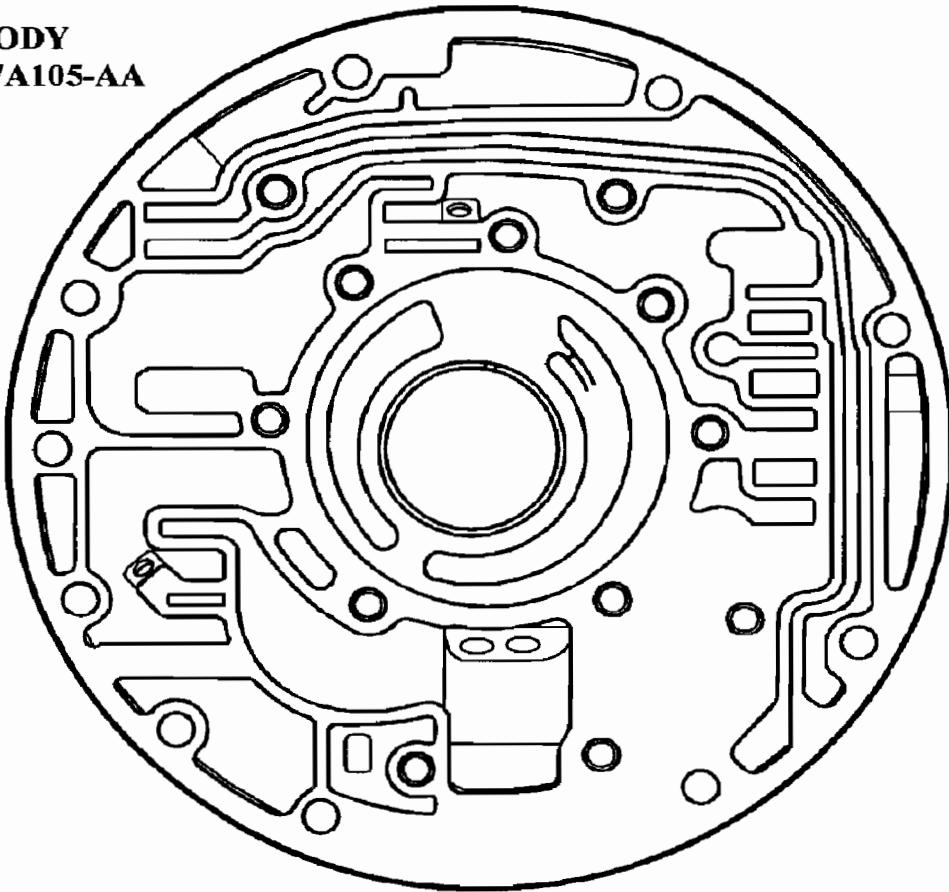
Note: For information on additional changes in this unit refer to 4R100 Information.

1998 E4OD PUMP BODY
FRONT SIDE

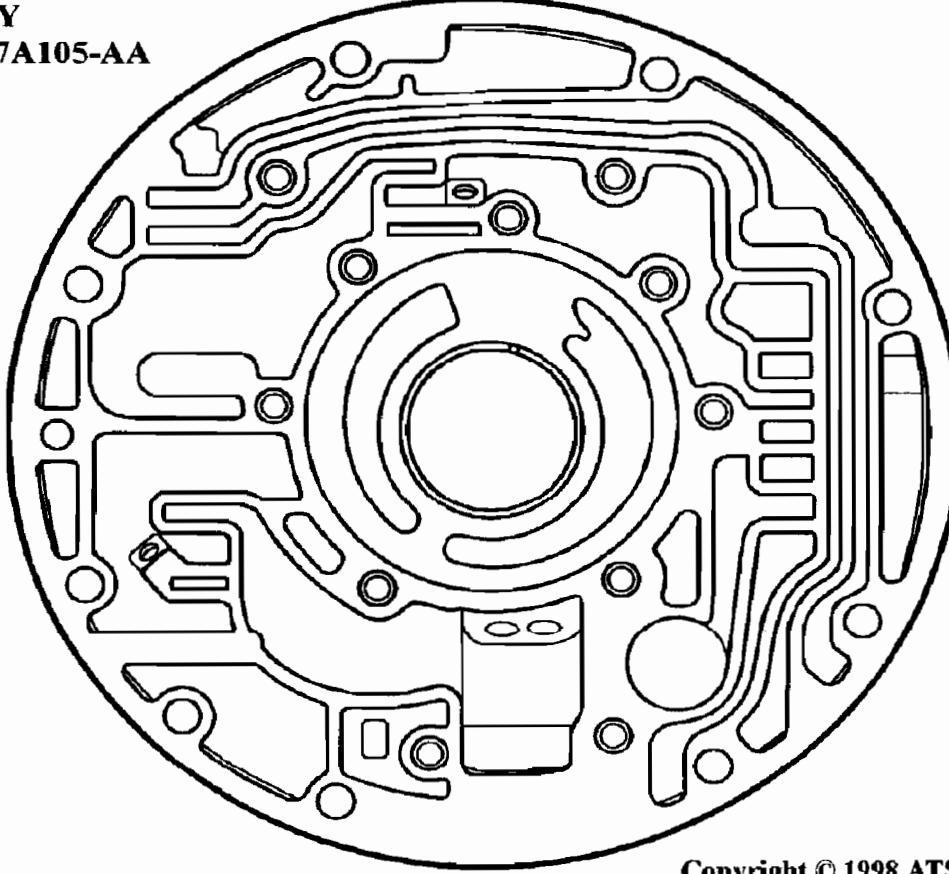
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Figure 1

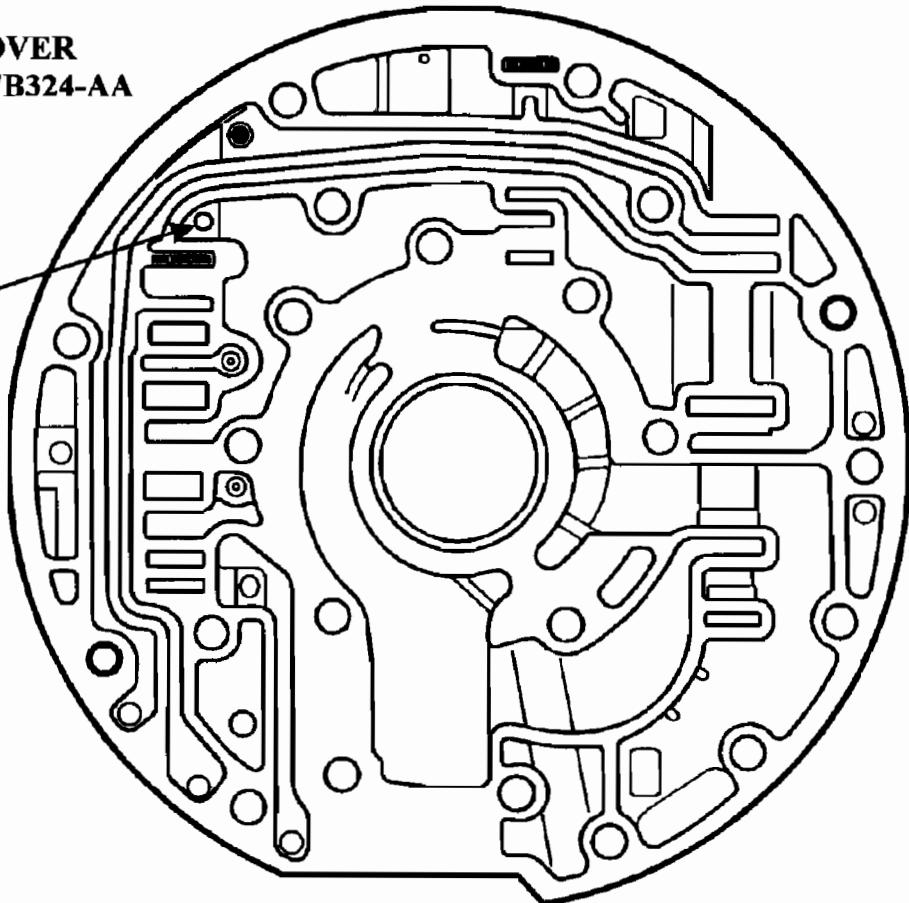
1998 E4OD/4R100 PUMP BODY
CASTING NUMBER RF-F81P-7A105-AA
WORM TRACK SIDE



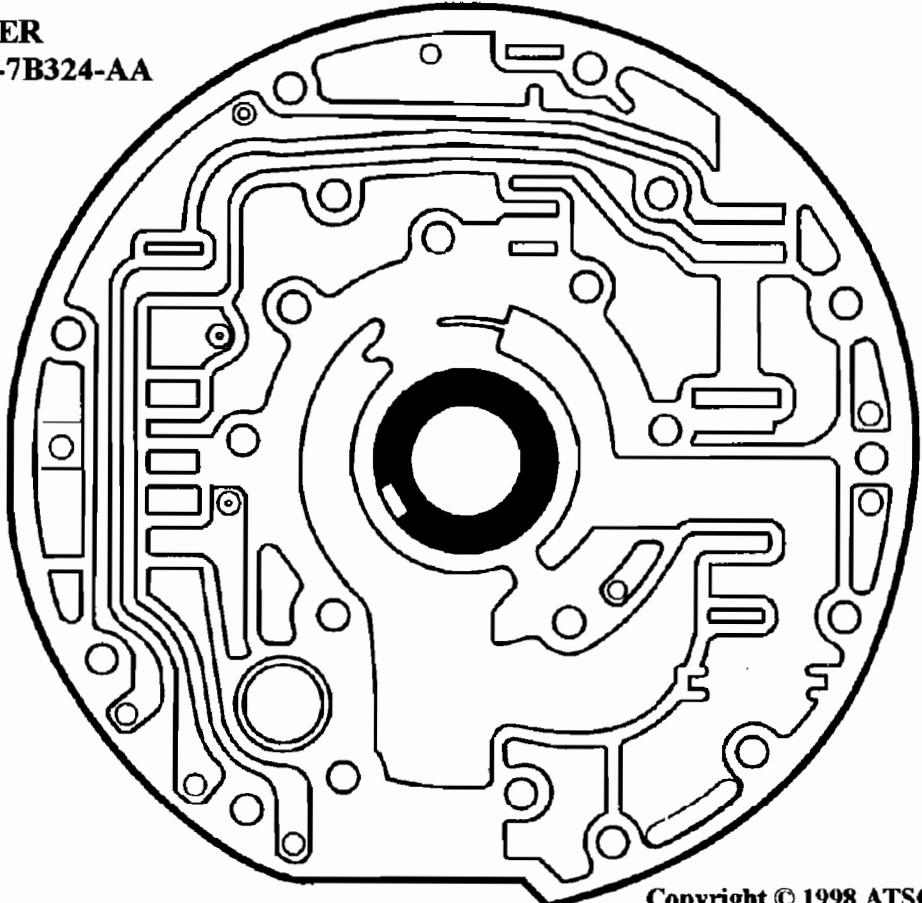
1995 E4OD PUMP BODY
CASTING NUMBER RF-F5TP-7A105-AA
WORM TRACK SIDE

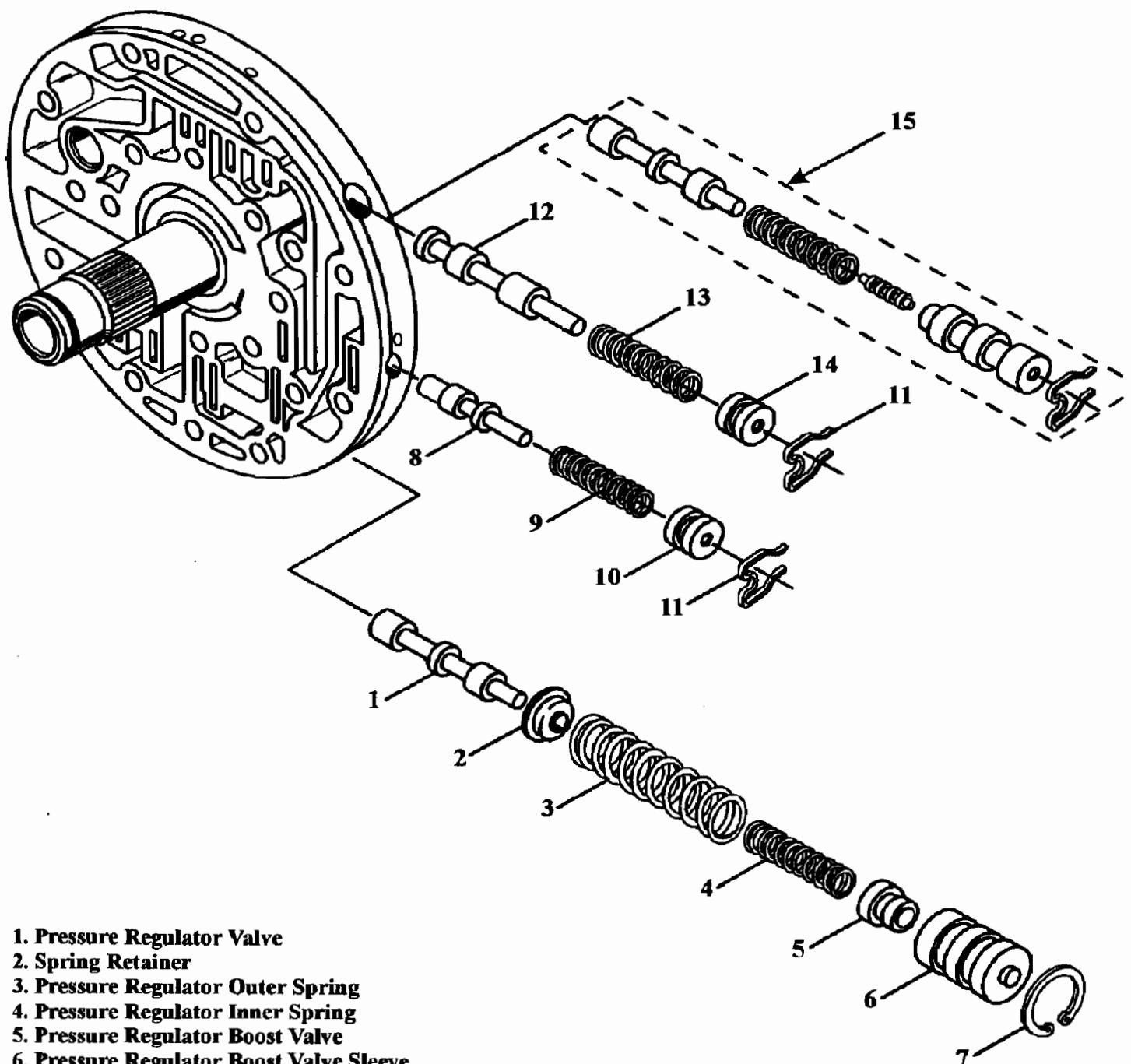


1998 E4OD/4R100 PUMP COVER
CASTING NUMBER RF-F81P-7B324-AA

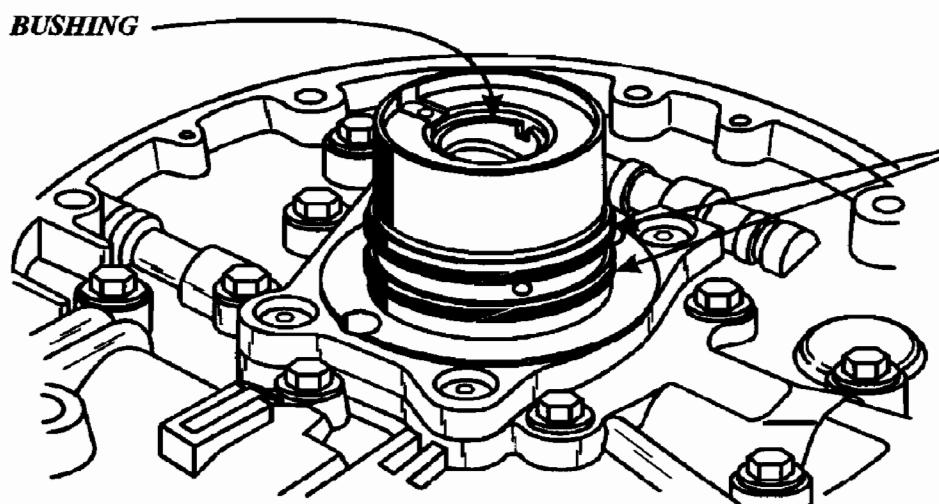


1995 E4OD PUMP COVER
CASTING NUMBER RF-F5TP-7B324-AA

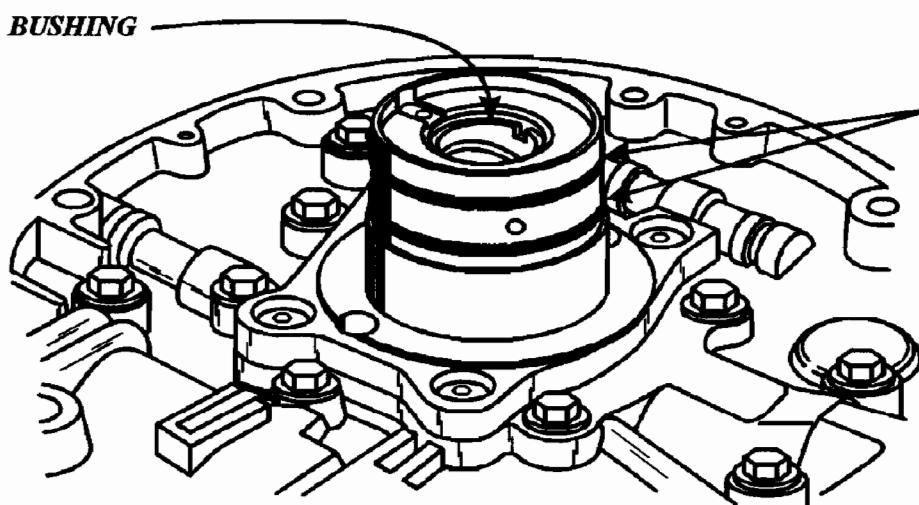


FORD 4R100
VALVE LINE-UPS IN PUMP ASSEMBLY

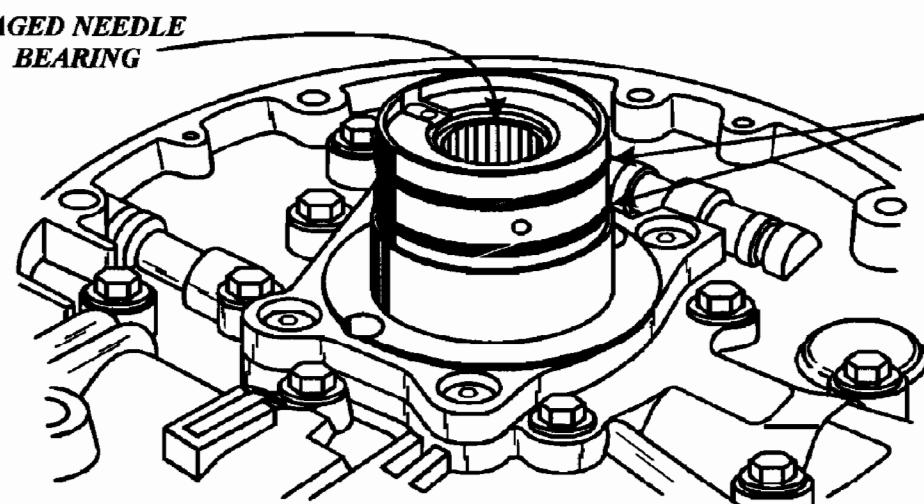
1. Pressure Regulator Valve
2. Spring Retainer
3. Pressure Regulator Outer Spring
4. Pressure Regulator Inner Spring
5. Pressure Regulator Boost Valve
6. Pressure Regulator Boost Valve Sleeve
7. Snap Ring
8. Converter Clutch Regulator Valve
9. Converter Clutch Regulator Spring
10. Converter Clutch Regulator Bore Plug
11. Bore Plug Retainer
12. Converter Clutch Control Valve (Gas "On-Off" Only)
13. Converter Clutch Control Spring (Gas "On-Off Only")
14. Converter Clutch Control Bore Plug
15. Converter Clutch Control Line-up (Diesel "PWM" Only)



USED WITH THE "CAST IRON" COAST CLUTCH DRUM
WITH 5.4L AND 6.8L "WITHOUT" PTO OPTION



USED WITH THE "STAMPED STEEL" COAST CLUTCH DRUM
WITH 5.4L AND 6.8L "WITHOUT" PTO OPTION



USED WITH THE "STAMPED STEEL" COAST CLUTCH DRUM
WITH 6.8L AND 7.3L "WITH" PTO OPTION

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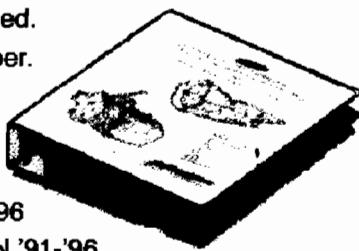
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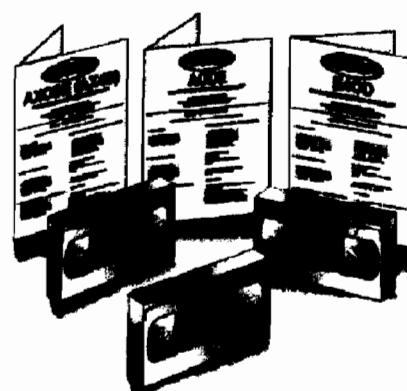
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 - AXODE/AX4S/AX4N '91-'96
 - C6 '89-'96
 - CD4E '94-'96
 - E4OD '89-'96
 - 4EAT '89-'96
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Electronic Transmission Diagnostic Video - a two part, 50 minute video that discusses the Ford electronic systems and the electronic tools to diagnose the system. Part one uses an animated character "ZAP" to show how the Ford EEC IV and V systems control the transmission. Part two shows the advanced diagnostic tools needed to properly diagnose and repair electronically controlled transmissions.

Diagnosis and Service Tips Video - produced in 1993 and is 55 minutes long. The tape covers diagnosis using the transmission tester tool and factory approved routines through-out the video. Special emphasis is placed on the AXODE transmission.

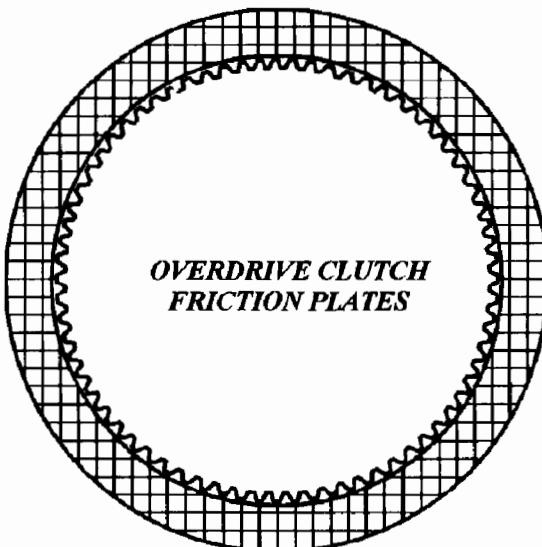
E4OD Video - produced in 1992 is 56-minutes long and divided into two parts. The first part covers diagnosis of the electronics that control the E4OD and product updates. Part two includes disassembly and reassembly, highlighting all areas that require special attention to ensure a "fix it right the first time" repair.

This is the most correct and complete information on

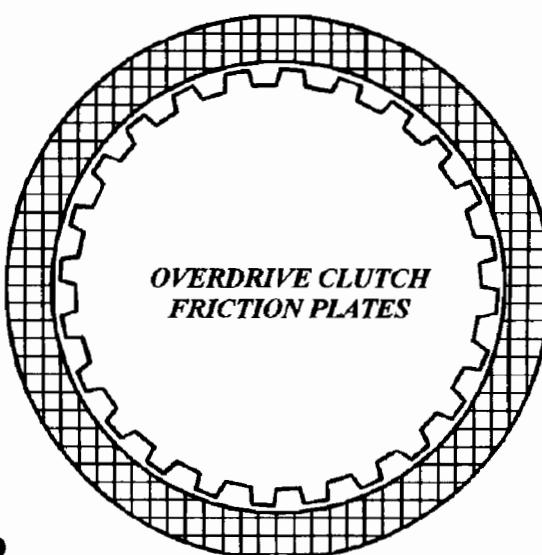
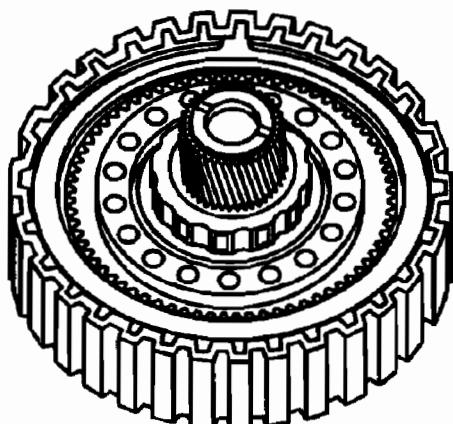


Powertrain Products

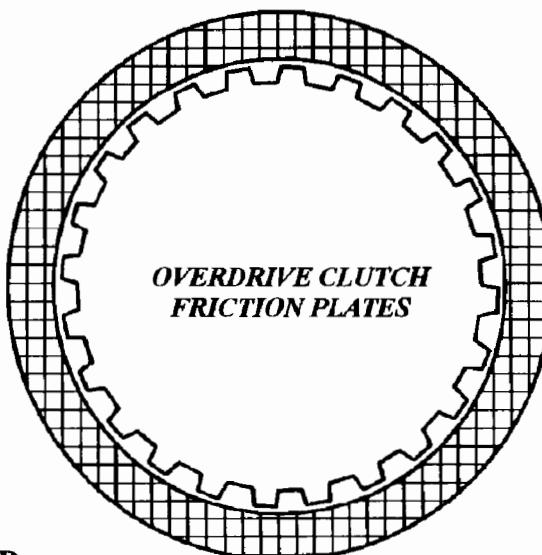
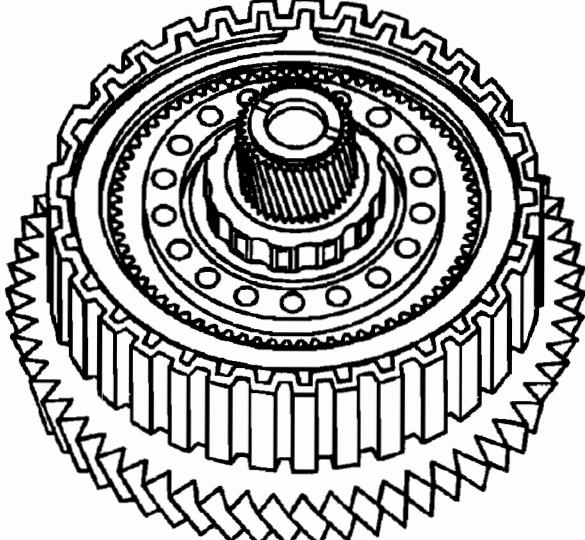
The Kit Consists of 3 Videos and 3 Laminated Cards.



"CAST IRON" COAST CLUTCH DRUM USED
WITH 5.4L AND 6.8L "WITHOUT" PTO OPTION



"STAMPED STEEL" COAST CLUTCH DRUM USED
WITH 5.4L AND 6.8L "WITHOUT" PTO OPTION



"STAMPED STEEL" COAST CLUTCH DRUM USED
WITH 6.8L AND 7.3L "WITH" PTO OPTION

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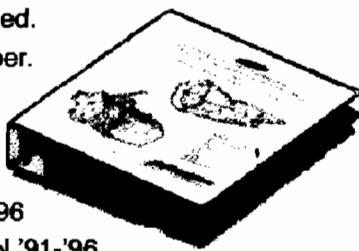
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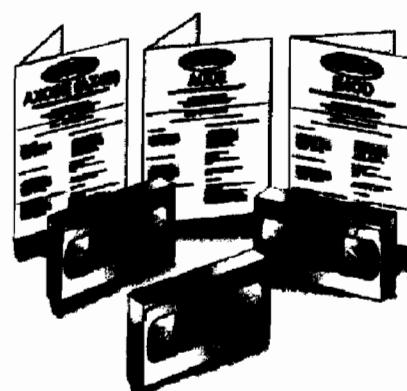
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 - A4LD '89-'96
 - AODE/4R70W '92-'96
 - AXODE/AX4S/AX4N '91-'96
 - C6 '89-'96
 - CD4E '94-'96
 - E4OD '89-'96
 - 4EAT '89-'96
 - 4F20E '93-'96



**ORDER
ITEM #19**

TRANSMISSION INFORMATION KIT

3 TAPE KIT ORDER ITEM #15



Electronic Transmission Diagnostic Video - a two part, 50 minute video that discusses the Ford electronic systems and the electronic tools to diagnose the system. Part one uses an animated character "ZAP" to show how the Ford EEC IV and V systems control the transmission. Part two shows the advanced diagnostic tools needed to properly diagnose and repair electronically controlled transmissions.

Diagnosis and Service Tips Video - produced in 1993 and is 55 minutes long. The tape covers diagnosis using the transmission tester tool and factory approved routines through-out the video. Special emphasis is placed on the AXODE transmission.

E4OD Video - produced in 1992 is 56-minutes long and divided into two parts. The first part covers diagnosis of the electronics that control the E4OD and product updates. Part two includes disassembly and reassembly, highlighting all areas that require special attention to ensure a "fix it right the first time" repair.

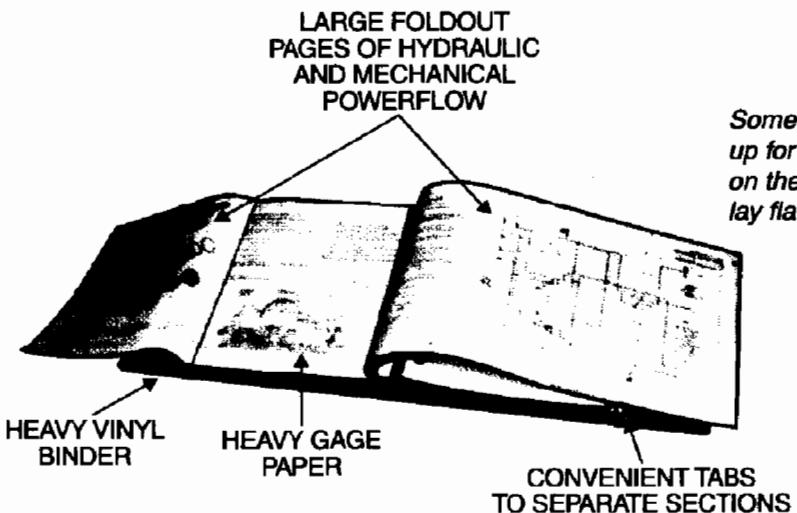
This is the most correct and complete information on



Powertrain Products

The Kit Consists of 3 Videos and 3 Laminated Cards.

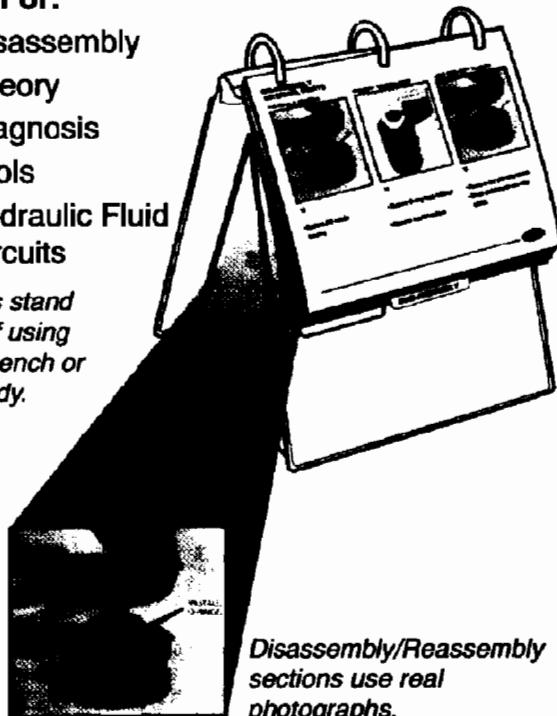
TRANSMISSION REFERENCE MANUAL BINDERS



Sections For:

- Disassembly
- Theory
- Diagnosis
- Tools
- Hydraulic Fluid Circuits

Some binders stand up for ease of using on the work bench or lay flat for study.



Disassembly/Reassembly sections use real photographs.

- Covers '85-'93
- 232 photos
- 14 pages of color hydraulic fluid circuits
- 453 total pages

ORDER ITEM #11

- Two binders
- 363 photos
- 16 pages of color hydraulic fluid circuits
- All pages in full color
- 413 total pages

ORDER ITEM #9

- Covers '91-'96
- Two binders
- 357 photos
- 8 pages of color hydraulic fluid circuits
- 460 total pages

ORDER ITEM #21

- Covers '92-'96
- Two binders
- 219 photos
- 18 pages of color hydraulic fluid circuits
- 413 total pages

ORDER ITEM #20

- Two binders
- 332 photos
- 9 pages of color hydraulic fluid circuits
- 95 full color pages
- 575 total pages

ORDER ITEM #12

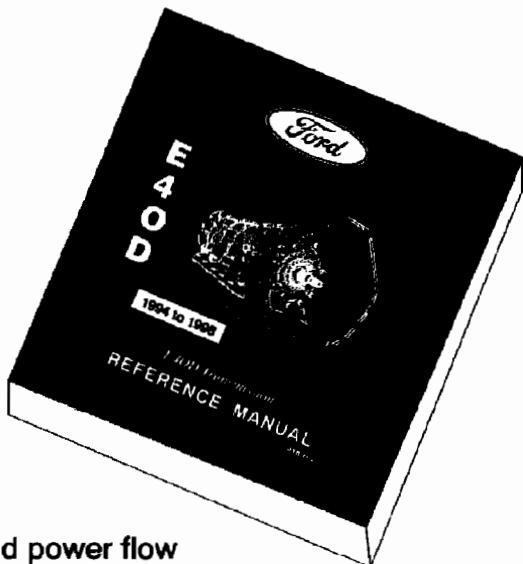
- Covers '89-'93
- 248 photos
- 33 pages of color hydraulic fluid circuits
- 446 total pages

ORDER ITEM #1

ONE EACH OF THE ITEMS ABOVE - ORDER ITEM #16

NEW E4OD TRANSMISSION REFERENCE MANUAL 1994-1998

ORDER ITEM #2



- One convenient binder
- Generous use of color
- 149 pages of theory and power flow
- 474 Pages
- 18 Full Color Oil Flows
- 378 Photos
- Covers 1994-1998

For earlier 1989-1993
Transmissions order
Reference Manual #1

- The 1994-1998 E4OD Reference Manual contains design and service upgrades from 1994 to the introduction of the 4R100.
- This book contains an expanded theory and power flow section for easier diagnosis.
- Hydraulic fluid flows are newly designed, in full color and easier to read.
- Learn how the ball bearing center support and other changes service past models.

ORDERING INSTRUCTIONS

- RETAIL SALES
- INTERNAL FORD MOTOR SALES
- INSTITUTIONAL SALES

FORD Internal ICBA Sales

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36200 Plymouth Road
Livonia, MI 48150
ICBA form questions call: 734-523-5809

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- Please indicate the quantities and totals in the appropriate columns.
- Include your check or money order (payable in U.S. funds) with this order form.
- Visa/MC orders are accepted by mail or fax (734) 414-2971, attn: Marisa. Your statement will reference - Gage, the Ford delivery agent.
- To order by **phone**, call the **Order Desk: (734) 459-5140**.
- For shipping information outside U.S., call the Order Desk.
- Applicable taxes are included in your purchase price for U.S. sales.
- Allow 2 to 3 weeks for delivery.

ORDER
FORM



TECHNICAL PUBLICATIONS ORDER FORM 1998-B

Item #	Description	Price Each	Qty	Extended Price
1	E4OD Reference Manual Binder "89-93" --- PTB 201	69.95		
2	E4OD Reference Manual Binder 1994-1998 --- PTB 802	69.95		
9	CD4E Reference Manual Binder --- PTB 306	69.95		
11	A4LD Reference Manual Binder --- PTB 304	69.95		
12	AX4N Reference Manual Binder --- PTB 407	69.95		
15	Transmission Information Kit --- PTK 418 (<i>see page 1</i>)	29.95		
16	Master Kit of the 6 Binders (<i>Items 1, 9, 11, 12, 20, 21</i>) (E4OD, AODE/4R70W, AXODE/AX4S, CD4E, A4LD, AX4N)	299.95		
19	Comprehensive TSB --- PTB 609	69.95		
20	AODE/4R70W Reference Manual Binder --- PTB 606	69.95		
21	AXODE/AX4S Reference Manual Binder --- PTB 605	69.95		

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U.S. Orders only, add 10% Shipping/Handling
(minimum \$5.00)
(Orders outside U.S. see Ordering Instructions)

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Total

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FORD E4OD/4R100 NEW DESIGN 6 PINION FORWARD AND REVERSE PLANETARY CARRIER

CHANGE: Beginning at the start of production for all 1998 model E4OD transmissions, *some models* will be equipped with a new design 6 pinion forward planetary carrier (See Figure 1), and a new design 6 pinion reverse planetary carrier (See Figure 2).

REASON: Increased torque carrying capacity and increased planetary carrier durability.

PARTS AFFECTED:

- (1) FORWARD PLANETARY CARRIER - Now has 6 pinions instead of the previous 4 pinions for increased torque carrying capacity and increased durability (See Figure 1).
- (2) REVERSE PLANETARY CARRIER - Now has 6 pinions instead of the previous 4 pinions for increased torque carrying capacity and increased durability (See Figure 2).

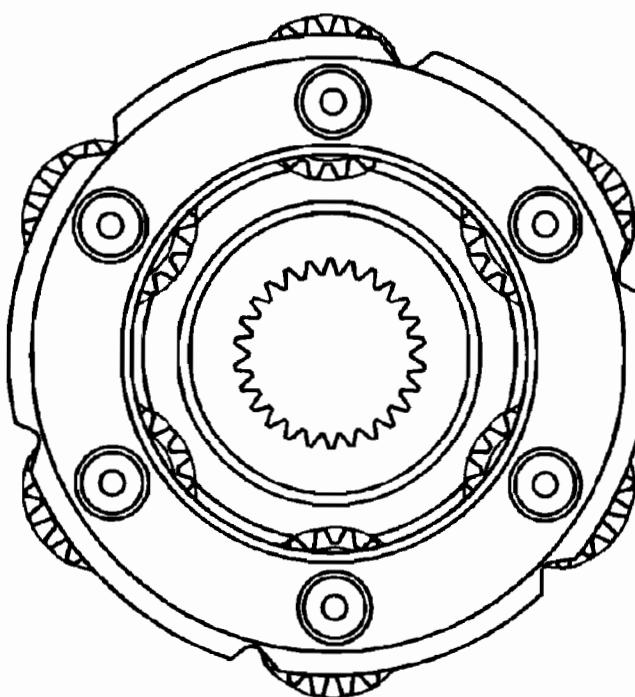
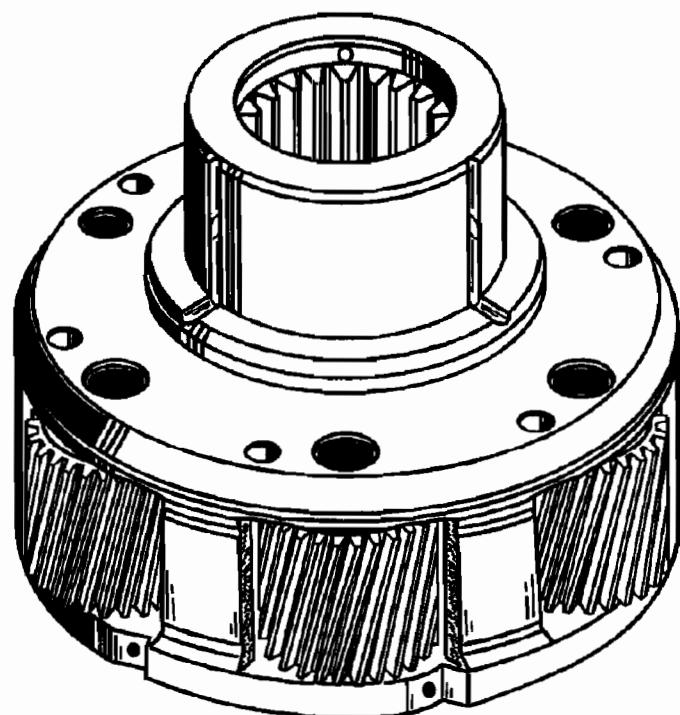
INTERCHANGEABILITY:

The new design forward planetary carrier *will back service all models* of the E4OD, but it *does require* the latest design forward ring gear hub and bearing assembly, as there are no holes for the previous design thrust washer (See Figure 1).

The new design reverse planetary carrier *will back service all models* of the E4OD, but it *does require* the latest design reverse clutch hub and three tang thrust washer for both sides, as shown in Figure 2.

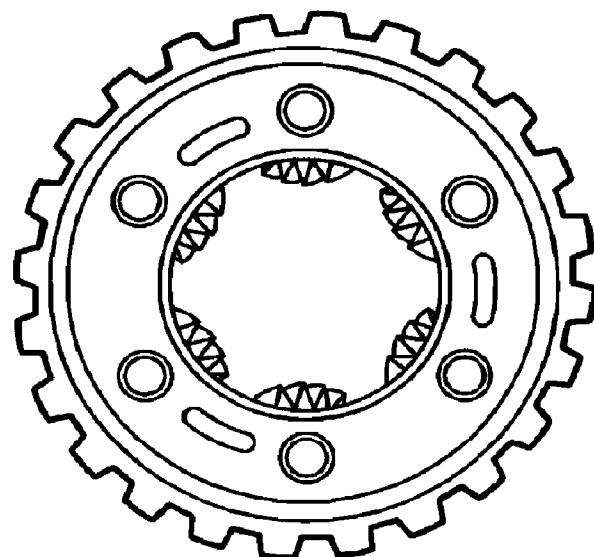
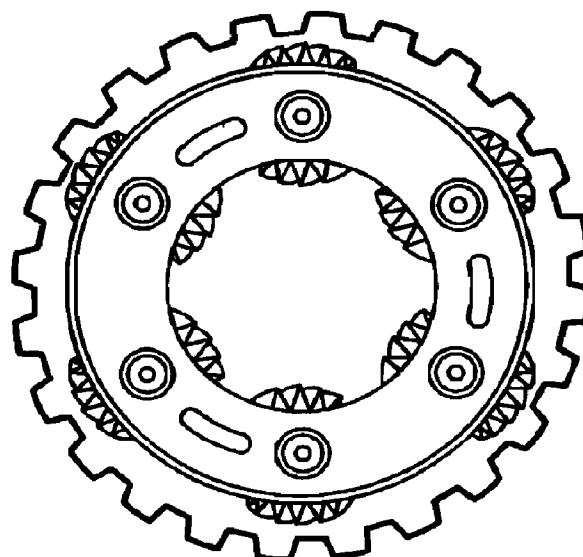
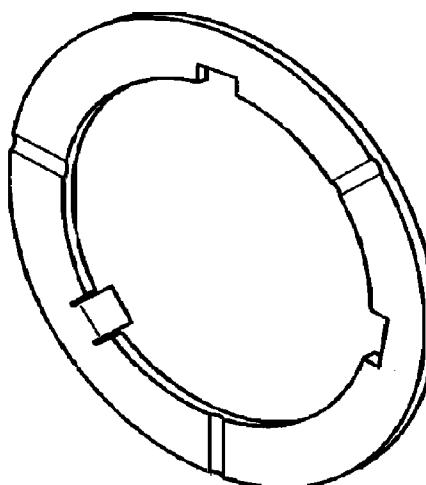
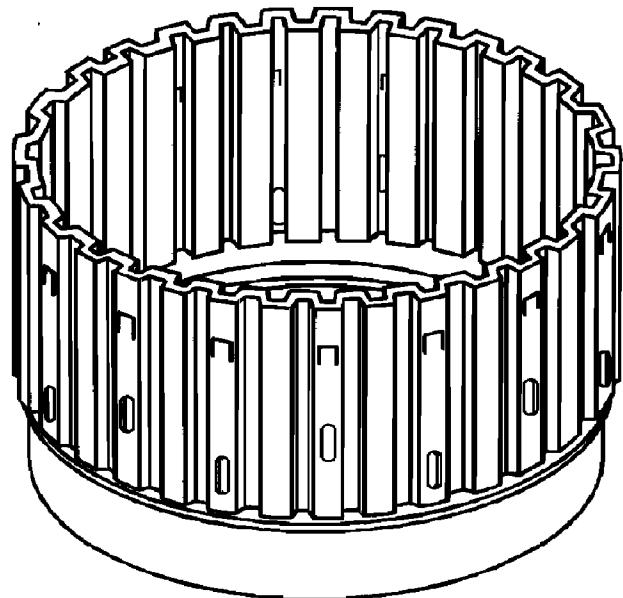
SERVICE INFORMATION:

Forward Planetary Carrier (6 Pinion)	F81Z-7A398-CA
Reverse Planetary Carrier (6 Pinion)	F81Z-7D006-AA

NEW DESIGN 6 PINION FORWARD PLANETARY CARRIER
PART NUMBER F81Z-7A398-CA

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Figure 1

**NEW DESIGN 6 PINION REVERSE PLANETARY CARRIER
PART NUMBER F81Z-7D006-AA***Front View**Rear View***REQUIRES 1997-UP DESIGN LEVEL
REVERSE CLUTCH HUB ASSEMBLY****REQUIRES 3 TANG THRUST WASHERS
ON BOTH SIDES OF REAR CARRIER
PART NUMBER F0TZ-7A166-D**

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Figure 2

FORD E4OD

ADDED LUBE ORIFICE PLUG FOR SOME 1997 MODELS

CHANGE: Beginning on 7/24/97, a new design transmission case and extension housing were released for production for 1997 model Econoline, Expedition, F Super Duty, F150-350 Series Trucks and 1998 Navigator vehicles. (See Figures 1 and 2).

REASON: Improved lubrication distribution to extension housing bushing.

PARTS AFFECTED:

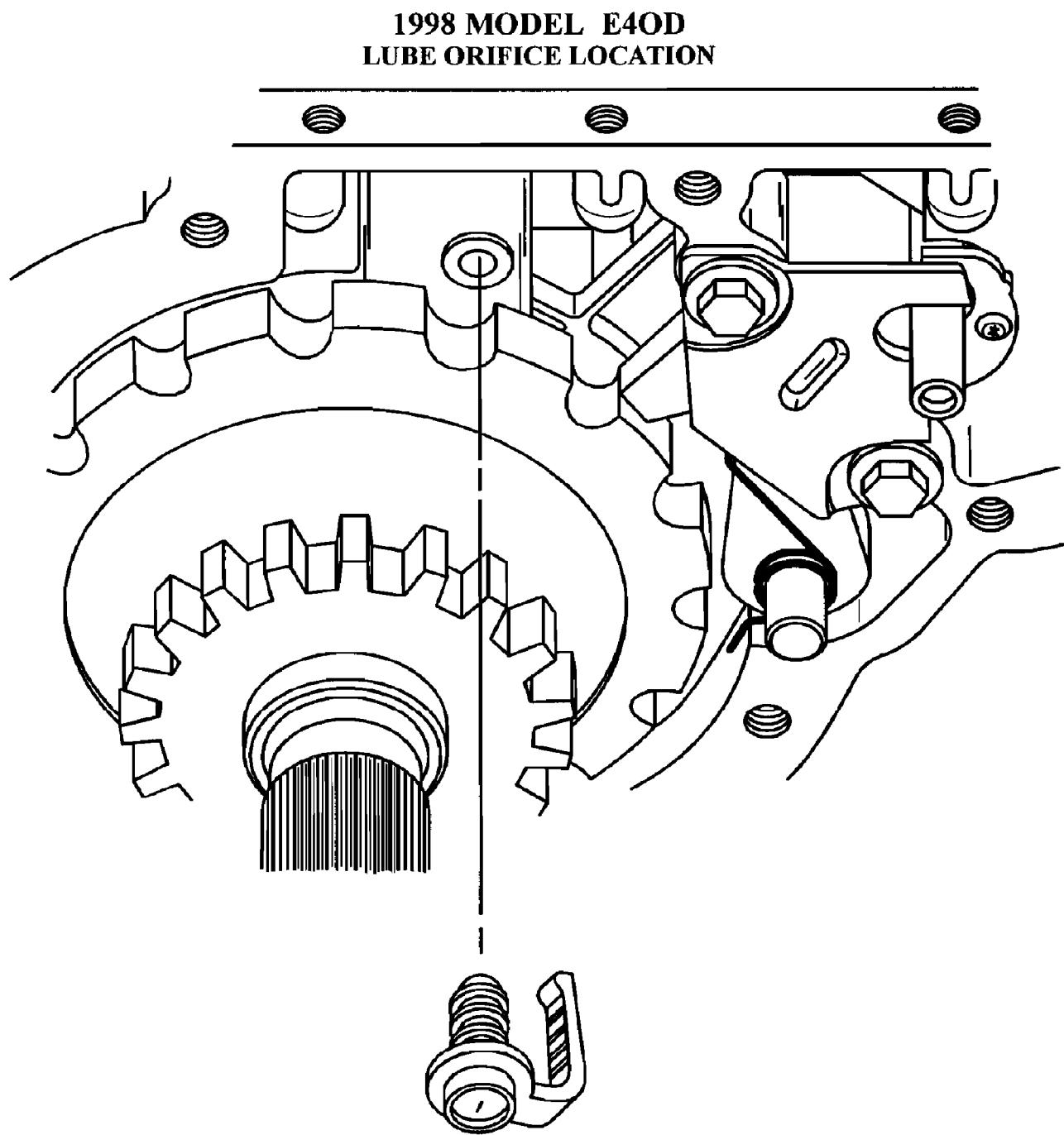
- (1) TRANSMISSION CASE - Added passage at the rear of transmission case to accept the added plastic lube orifice plug, as shown in Figure 1.
- (2) EXTENSION HOUSING - Added cast-in shoulder/boss that retains the added lube orifice plug in the transmission case, as shown in Figure 2.

INTERCHANGEABILITY: (97-23-13)

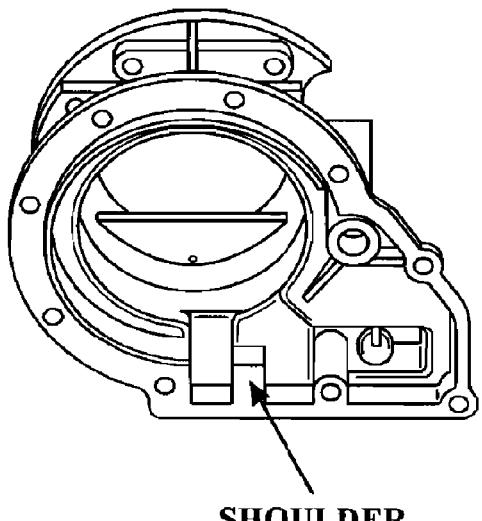
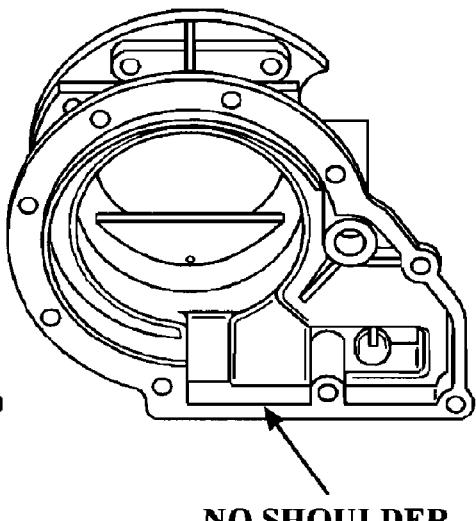
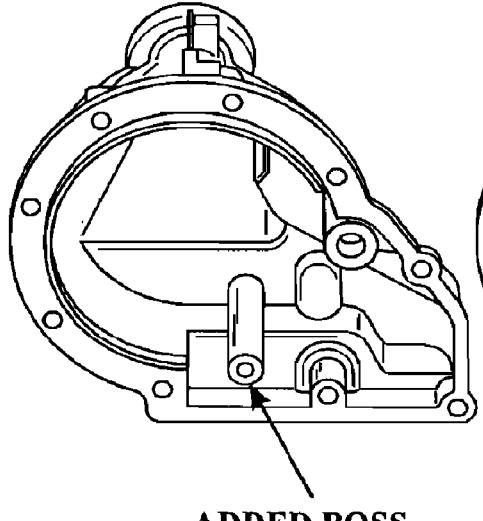
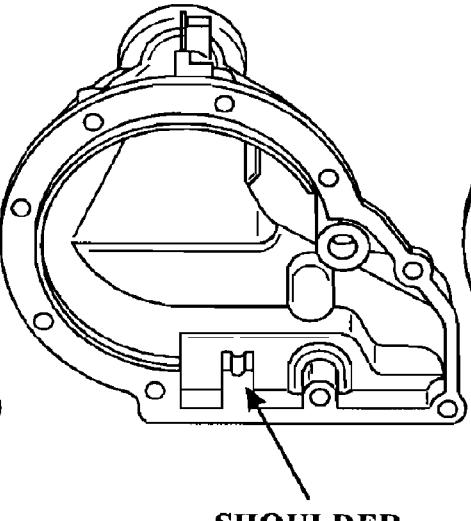
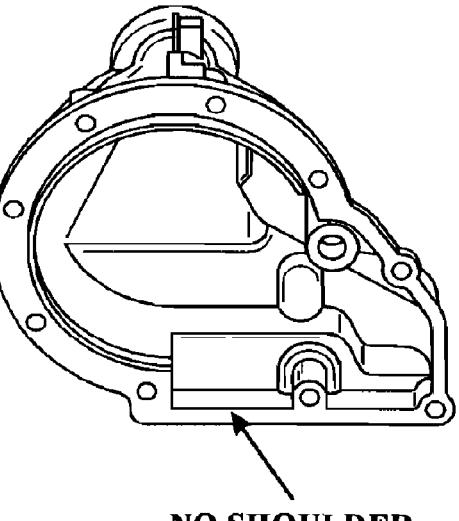
- (1) The new design extension housing *with* the added cast-in shoulder or boss will service *any* E4OD transmission case, past or present (See Figure 2).
- (2) The previous design extension housing *without* the cast-in shoulder or boss can only be used on transmission cases built prior to 7/24/97 not having the lube orifice plug (See Figure 2).

SERVICE INFORMATION:

Extension Housing, 5.4L, 6.8L, 7.3L, 2 Wheel Drive	F85Z-7A039-DA
Extension Housing, 4 Wheel Drive	F7TZ-7A039-AA
Extension Housing, Super Duty	F7UZ-7A039-BA
Transmission Case, 5.4L, 6.8L	F75Z-7005-BB
Transmission Case, 7.3L	F7UZ-7005-BA
Lube Orifice Plug, All	F81Z-7E380-AA



LUBE ORIFICE PLUG
FORD PART NUMBER
F81Z-7E380-AA

**TYPICAL
4 WHEEL DRIVE****E4OD 4X4 WITHOUT
LUBE PLUG****FORD 4R100
6.8L AND 7.3L
2 WHEEL DRIVE****ALL OTHER
2 WHEEL DRIVE
APPLICATIONS****E4OD WITHOUT
LUBE PLUG**



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Builders from coast to coast agree that Superior's patented AXOD Dam and our popular Shift Correction Packages are a winning combination when working on AXOD & AXOD-E transmissions.

Our AXOD & AXOD-E Kits help address the damaging effects of wear and improve overall transmission performance by supplying you with replacement parts that help compensate for already existing wear. The AXOD Dam was developed to virtually eliminate planetary

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FORD AODE/4R70W

DEEP PAN FILTER IDENTIFICATION

COMPLAINT: There is some confusion in selecting the correct filter for AODE and 4R70W deep pan transmissions which can result in a neutral condition especially on cornering, or a slipping or no move condition.

CAUSE: At the start of production for the 1996 model year both 2WD and 4WD vehicles equipped with AODE/4R70W transmissions are fitted with a new "DEEP PAN" and require the new design filter with a pick-up tube located on the pan side of the filter as shown in figure 1.

The OE part number is **F6AZ-7A098-A** or Filtran part number **F-256B**.

This filter must be used with the new design "DEEP PAN" and can be identified by the "S" stamped in the filter casing and can also be seen in figure 1.

The previous design 4WD filter, part number **F4TZ-7A098-A**, should NEVER be used in a 1996 or later "DEEP PAN" unit because the pick-up tube is 1/8" longer than the new design "DEEP PAN" filter as shown in figure 2.

This is why the new design filter has an "S" stamped in the filter casing, the "S" means "SHORT" pick-up tube.

The standard depth pan filter is illustrated in figure 3, OE part number **F2VY-7A098-A** or Filtran part number **F-230**, and should ONLY be used in the shallow pan application.

CORRECTION: When replacing the filter on a 1996 or later AODE/4R70W be sure to use the filter with the "S" stamped on it and a pick-up tube that measures .085" (21.97mm) in length.

The new design "DEEP PAN" filter can be used in an earlier 4WD unit without any problem, especially since it is a common practice to overfill these units by 1 quart.

When replacing the filter on any standard depth pan unit, be sure to use the filter shown in figure 3.

A very special thanks to Wayne Ferrell of SPX FILTRAN, for his help and generosity, in compiling this information.

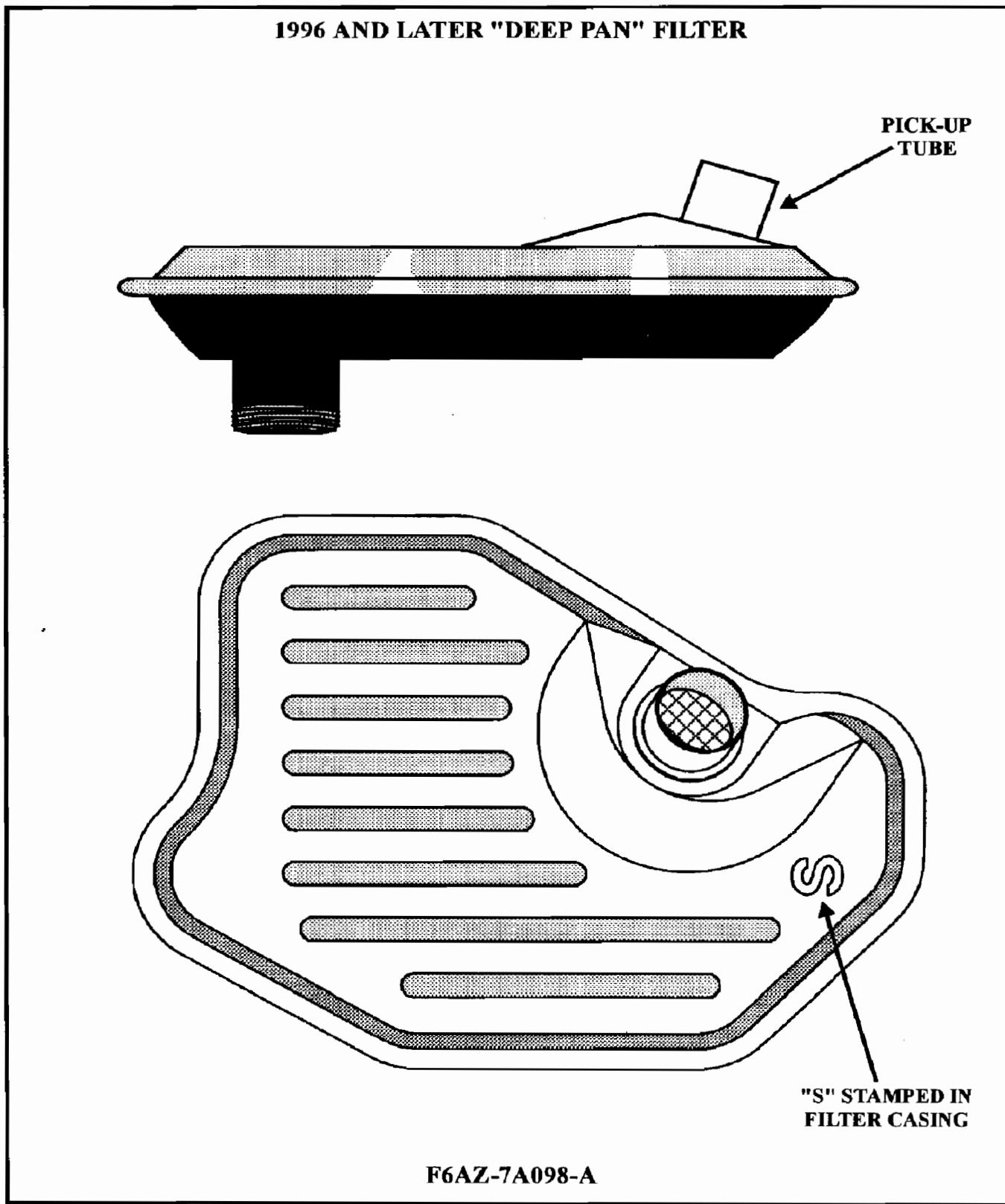
FORD AODE/4R70W
DEEP PAN FILTER IDENTIFICATION

Figure 1

FORD AODE/4R70W
DEEP PAN FILTER IDENTIFICATION

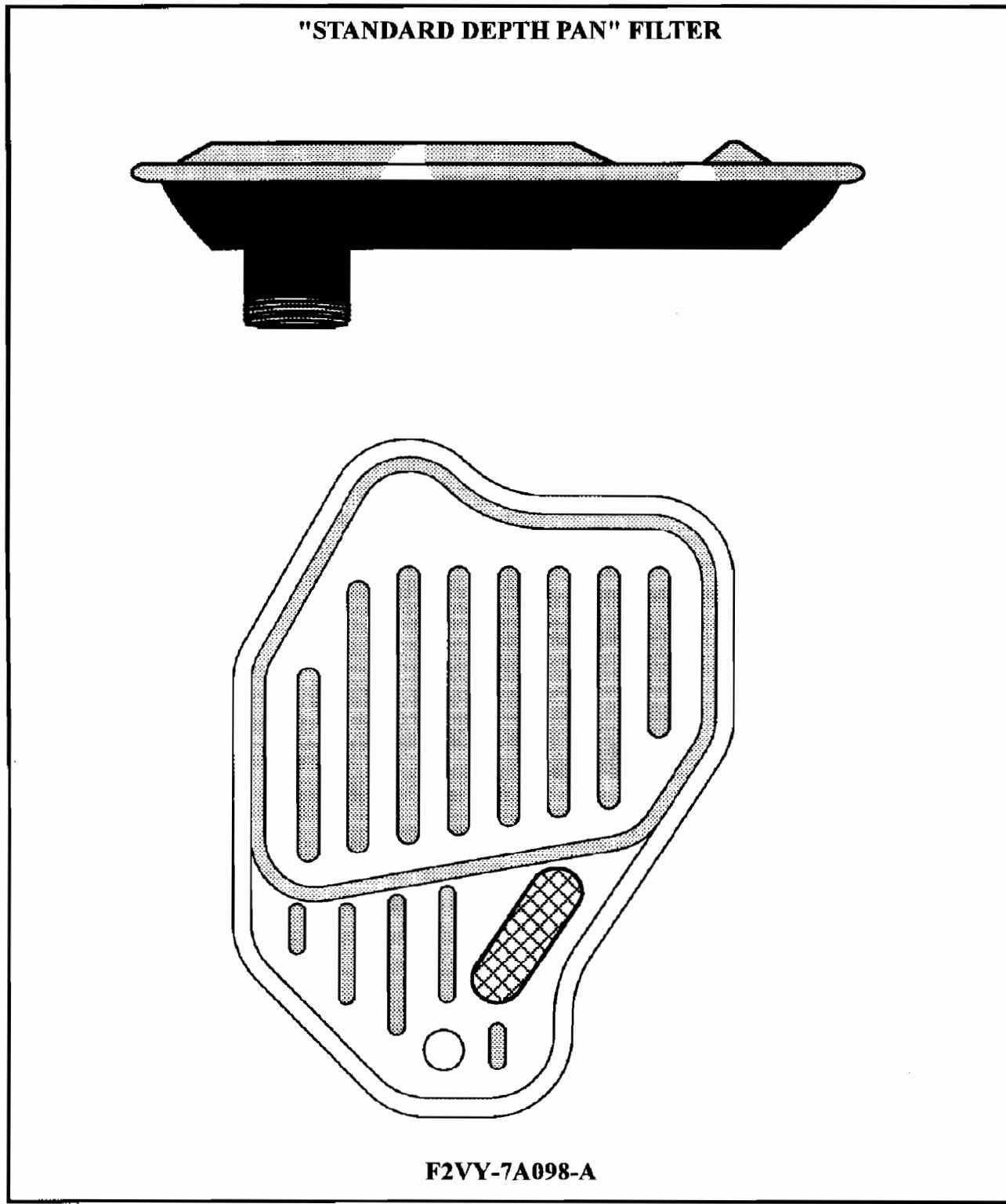


Figure 3

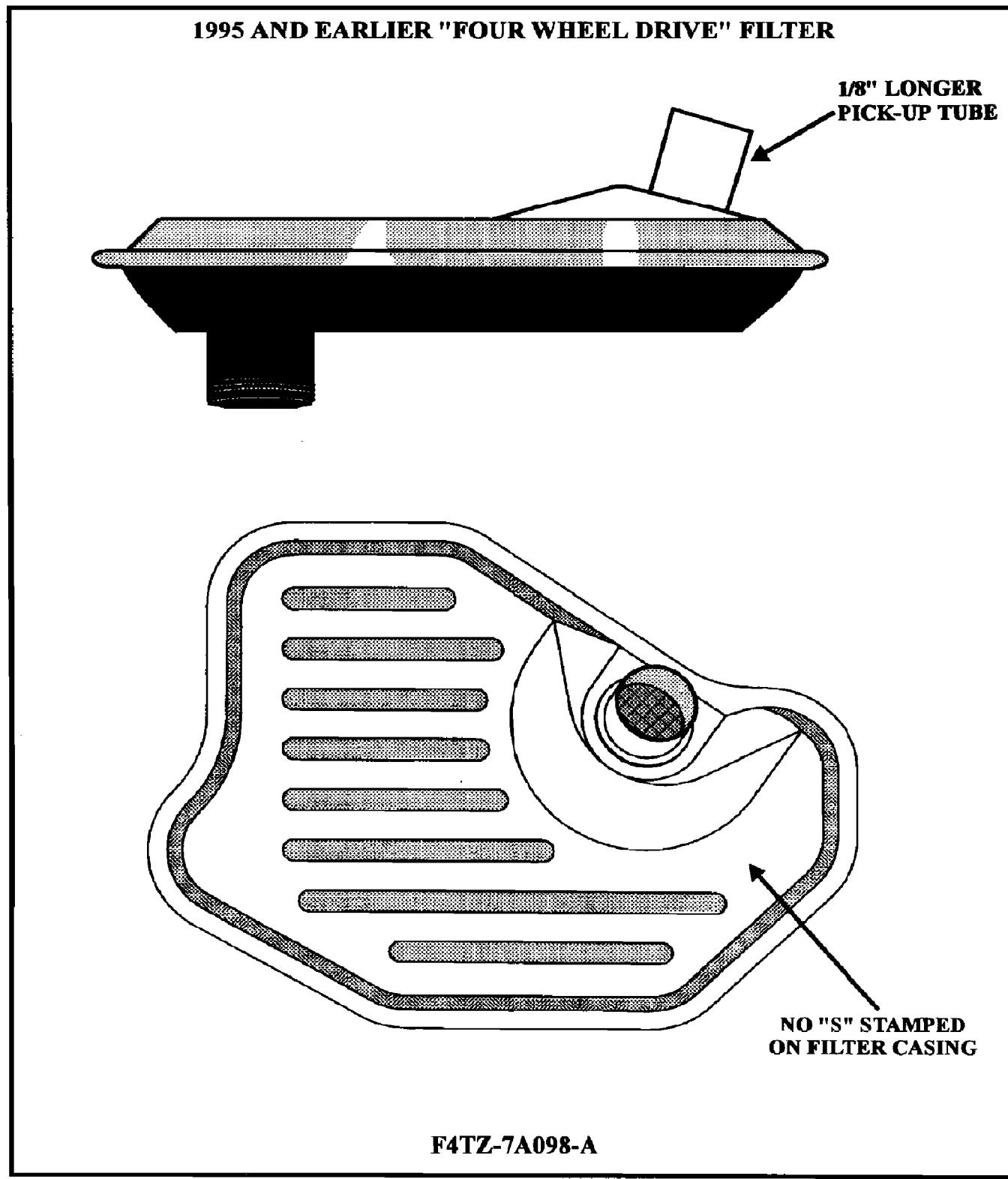
FORD AODE/4R70W
DEEP PAN FILTER IDENTIFICATION

Figure 2

Drive us on the drive



Drive is the all-new transmission parts flyer program from ATC, designed to bring you the best deals and the most current information. There's nothing like **Drive** in the business! We'll deliver **Drive** to your shop every quarter free of charge. And look for insert updates in transmission trade publications.

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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 1 and 2).

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

PARTS AFFECTED:

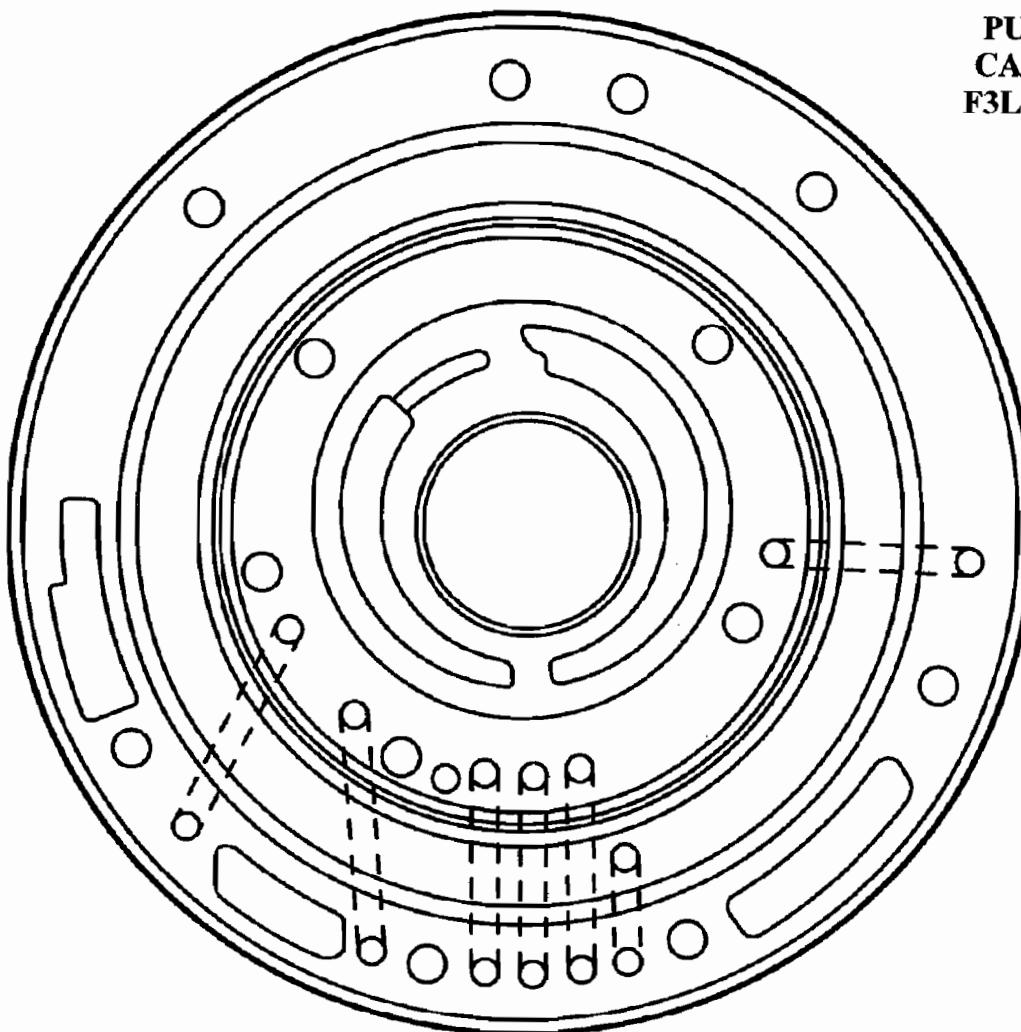
- (1) OIL PUMP BODY - Has an added pressure passage in pump body, shown in Figure 2, and is easily identified by casting number F5AP-7A105-AA located on the front side of pump body.
- (2) OIL PUMP STATOR - Has a much enlarged pressure passage in pump stator as illustrated in Figure 2, and is easily identified by casting number F4AP-7A109 located on back side of the pump stator.

INTERCHANGEABILITY:

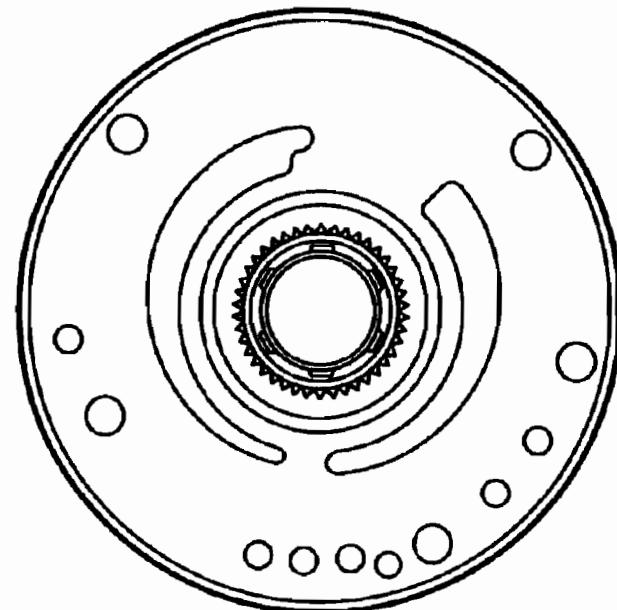
None of the parts listed above should be intermixed with one another. With the new design oil pump being so much more efficient than the previous design, it is **highly** recommended to use the new design pump assembly on **all** models of the AODE/4R70W transmission.

SERVICE INFORMATION:

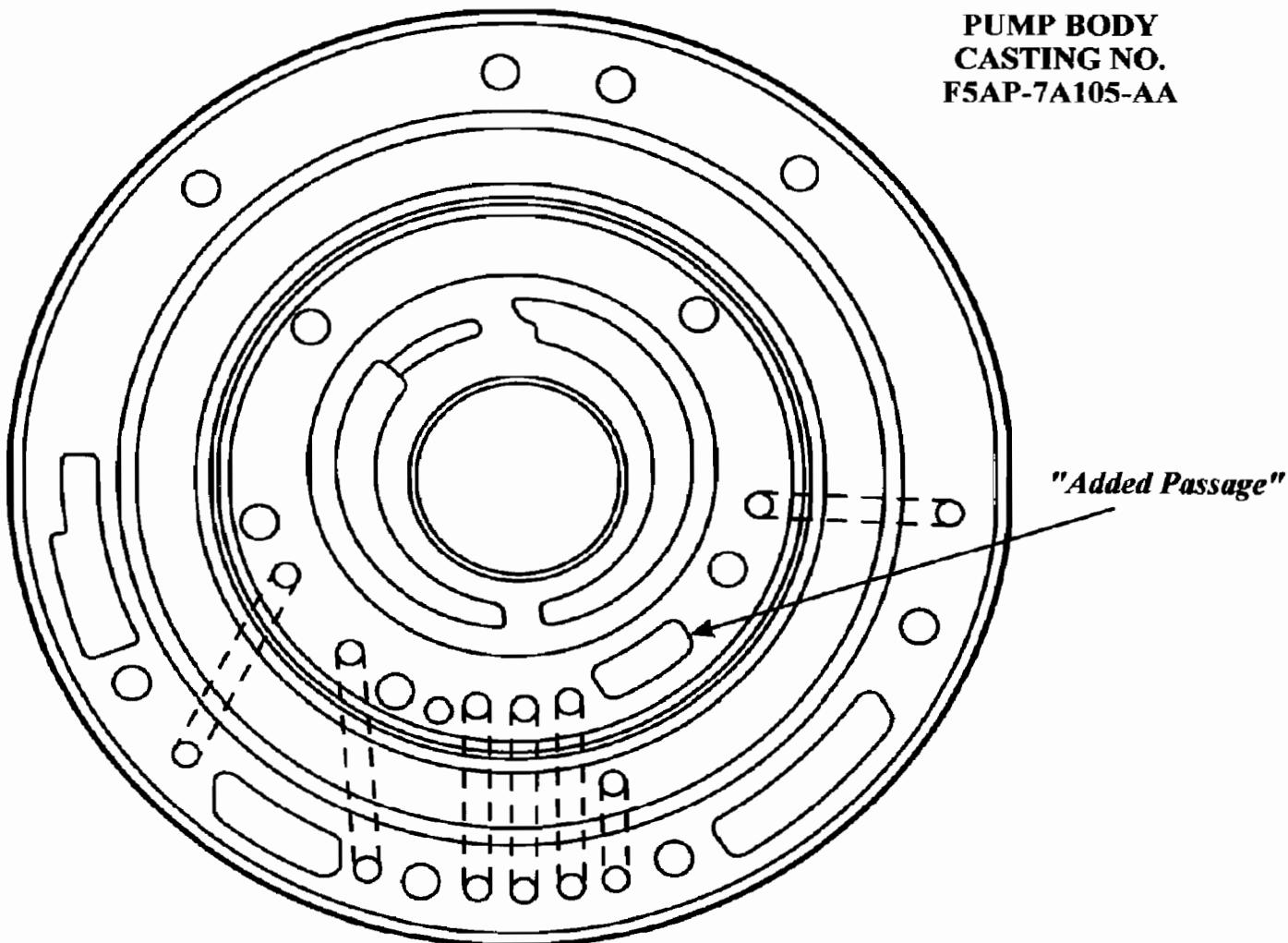
Oil Pump Assembly (New Design) F4AZ-7A103-A



PUMP BODY
CASTING NO.
F3LP-7A105-AA



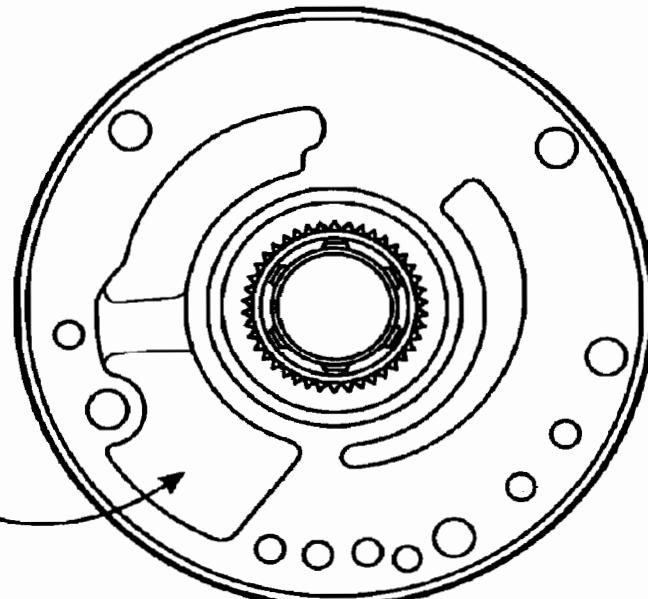
PUMP STATOR
CASTING NO.
F2VP-7A109



PUMP BODY
CASTING NO.
F5AP-7A105-AA

PUMP STATOR
CASTING NO.
F4AP-7A109

*Pressure Passage
Enlarged*



FORD AODE/4R70W CHECKBALL LOCATIONS CHANGE FOR 1996-UP MODELS

CHANGE: Beginning in the 1996 model year Ford Motor Company changed the checkball locations in the main valve body on AODE/4R70W transmissions. 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. Refer to Figures 1, 2 and 3.

REASON: Improved 4-3 and 4-2 downshifts.

PARTS AFFECTED:

- (1) VALVE BODY CASTING - Worm track configuration changed to accommodate the new checkball locations, as shown in Figures 1, 2 and 3.
- (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.

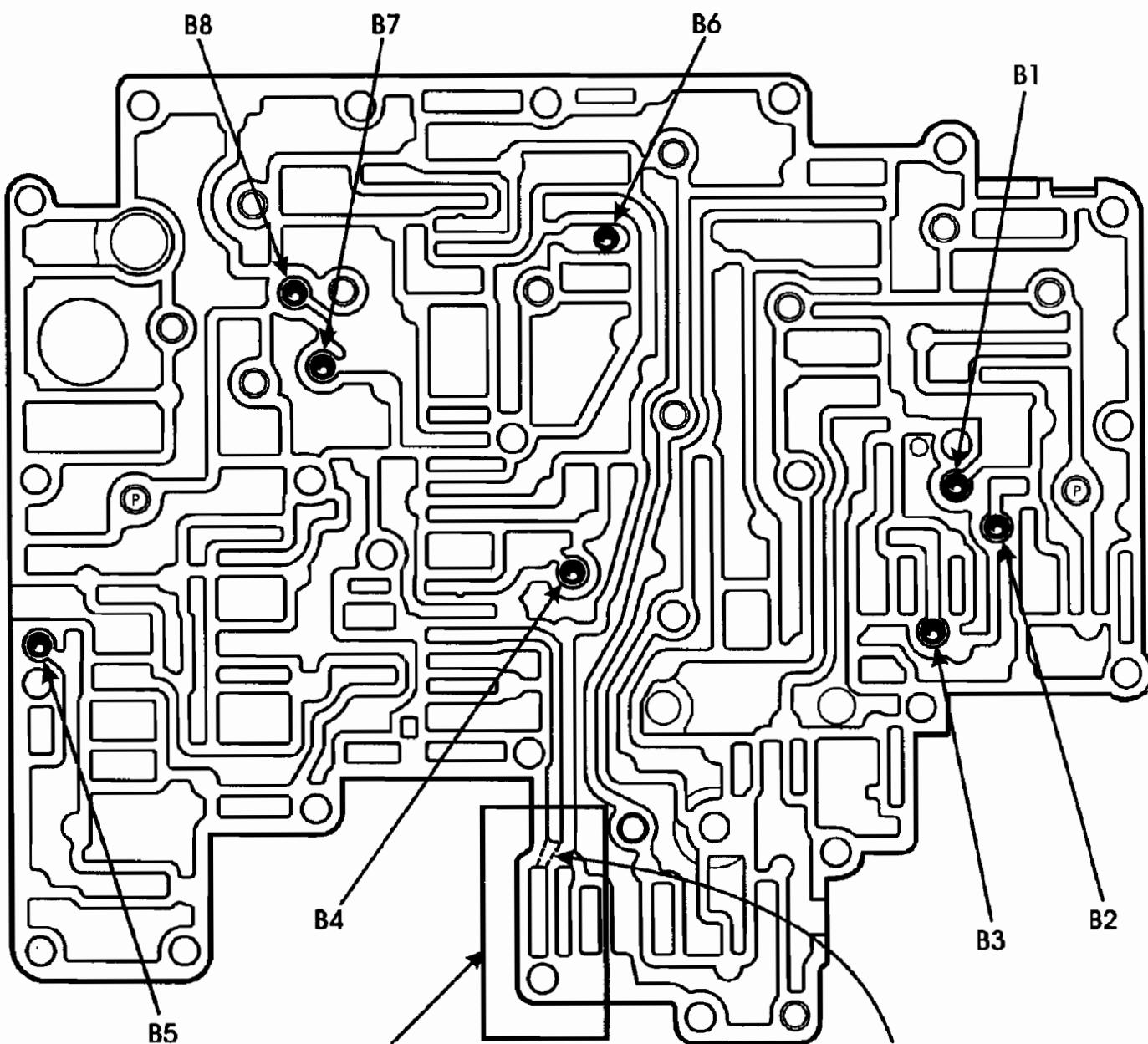
INTERCHANGEABILITY:

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.

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

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.

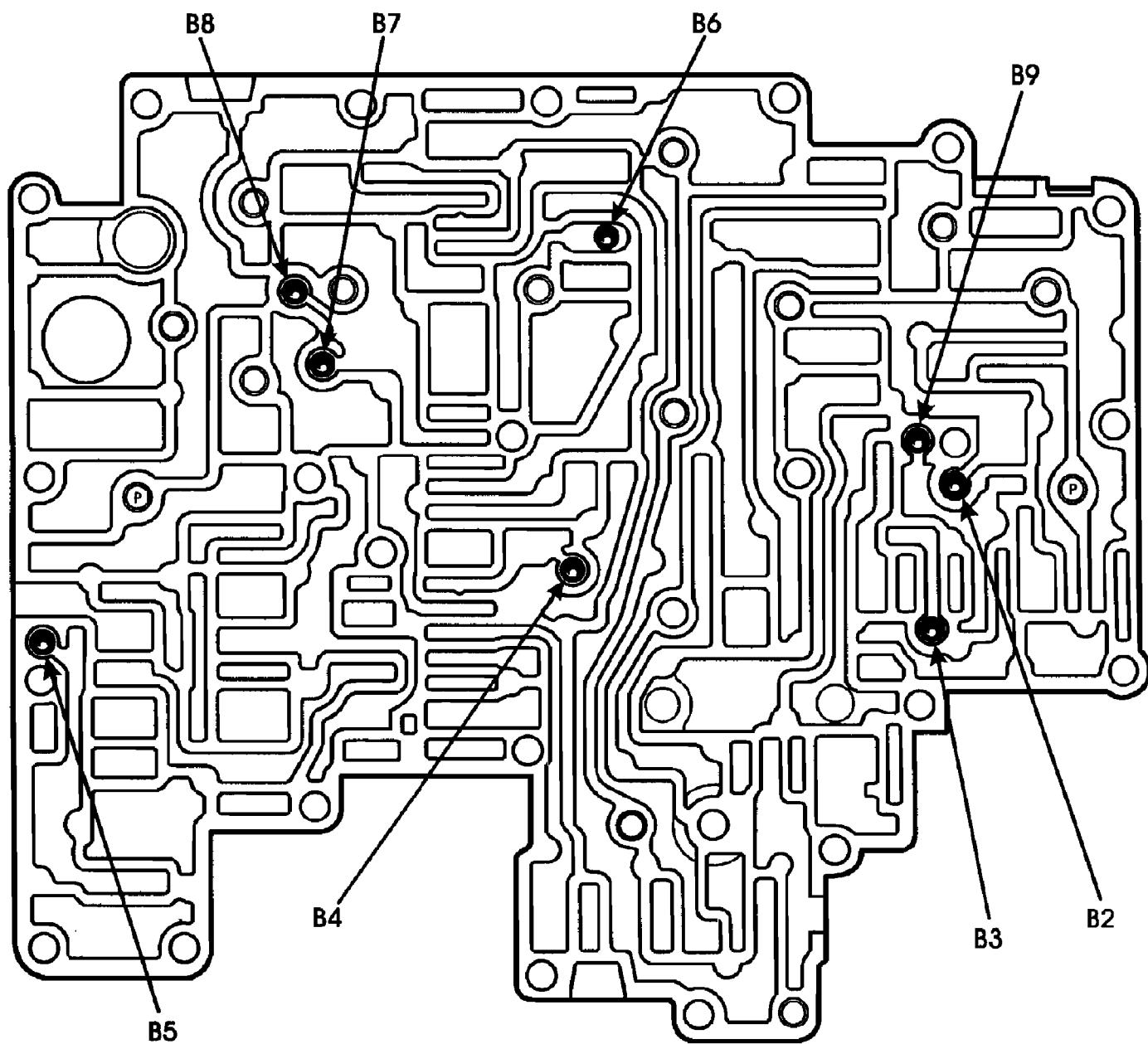
B5 - In the Reverse circuit near orifice number one.

B6 - Shuttle ball between the Low and Reverse circuits.

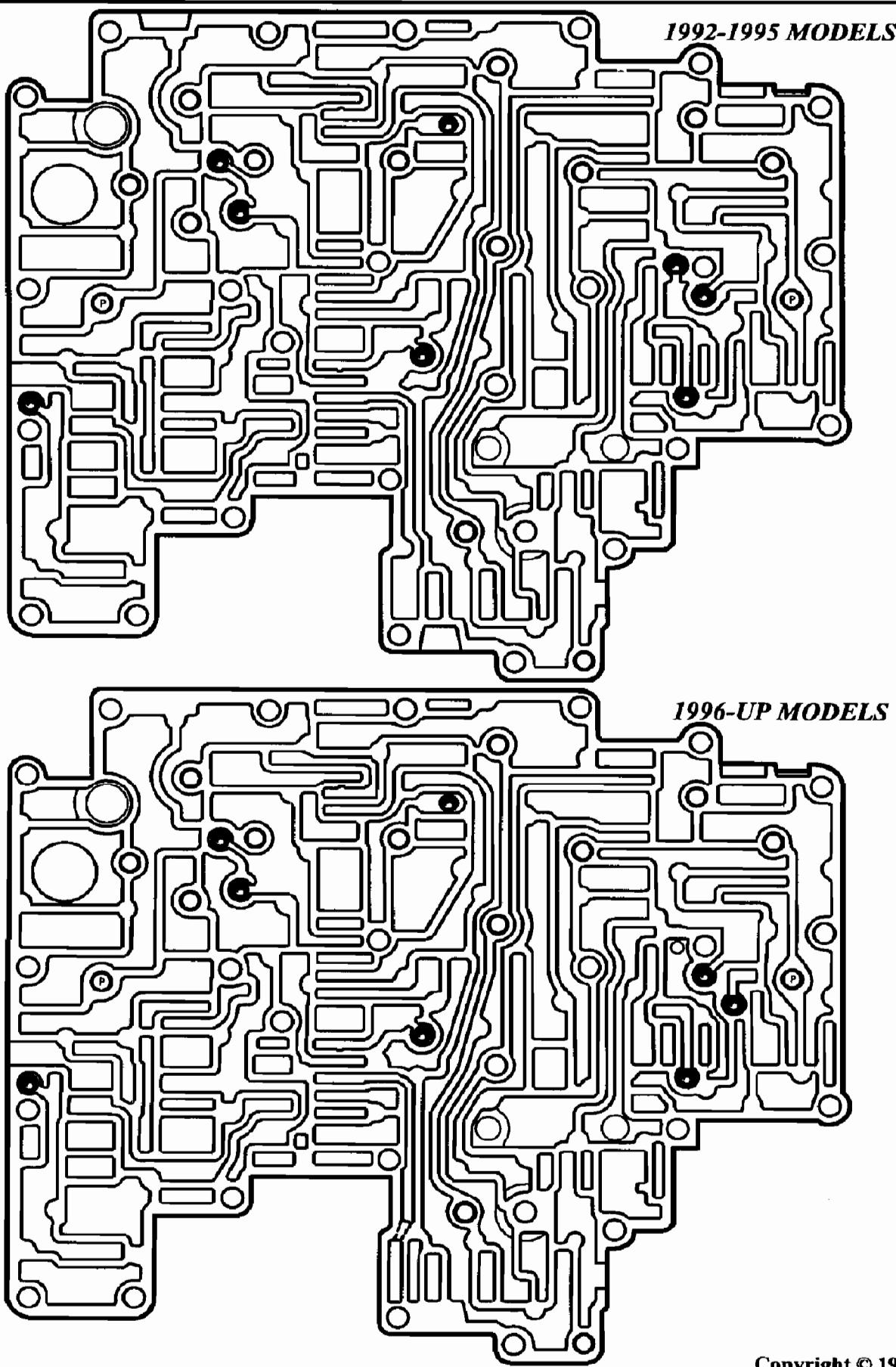
B7 - Between the L234 and Torque Converter Clutch circuits.

B8 - Between the L234 and Intermediate Clutch circuits.

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).



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Figure 3

FORD

VEHICLE HARNESS CONNECTOR REPAIR KITS AVAILABLE

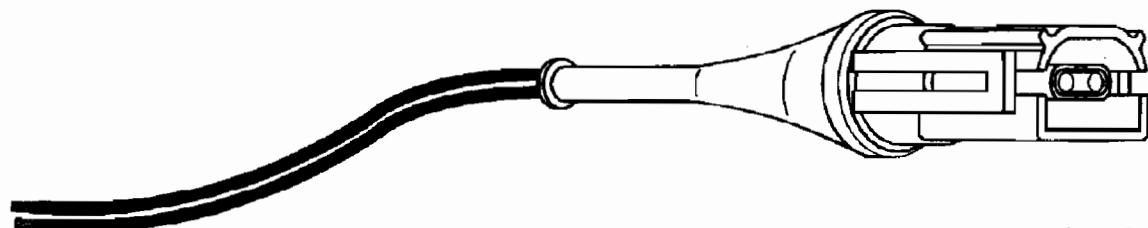
Ford Motor Company has now made available Vehicle Harness Connector Repair Kits for several different transmissions and several different locations. We have listed the OEM part numbers below and several illustrations of the contents of the service packages that are available.

SERVICE INFORMATION:

Speed Sensor Harness Repair Package (Various Models)	F2PZ-14A464-A
Case Connector Harness Repair Package (E4OD)	F2PZ-14A464-B
MLP Sensor Harness Repair Package (Various Models)	F2PZ-14A464-C
Top Case Connector Harness Repair Package (91-92 AXODE)	F2PZ-14A464-D
Side Case Connector Harness Repair Package (91-92 AXODE)	F2PZ-14A464-E
Case Connector Harness Repair Package (86-90 AXOD)	F2PZ-14A464-F
Case Connector Harness Repair Package (AODE, 4R70W, AXODE, AX4S, AX4N)	F2PZ-14A464-G

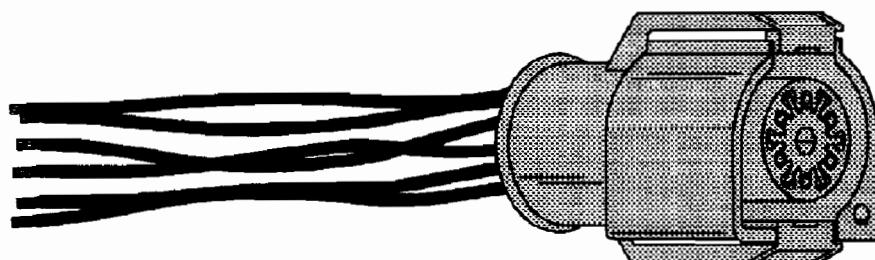
SPEED SENSOR CONNECTOR REPAIR PACKAGE PART NUMBER F2PZ-14A464-A

*Use For 1986 Taurus/Sable, Continental, Aerostar, Ranger, Explorer.
1989 Econoline, F Series Trucks, Bronco.
1992 Crown Victoria, Grand Marquis, Town Car.
1993 Lincoln Mark VIII.
1994 Mustang, Thunderbird, Cougar, Probe.*



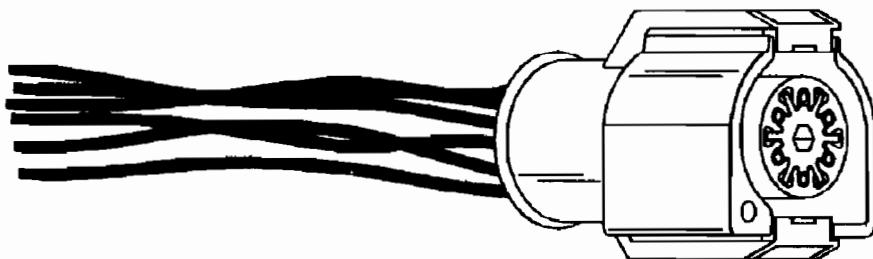
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Figure 1

**AXODE TOP CASE CONNECTOR REPAIR PACKAGE
PART NUMBER F2PZ-14A464-D***Use For 1991-1992 Taurus/Sable and Continental*

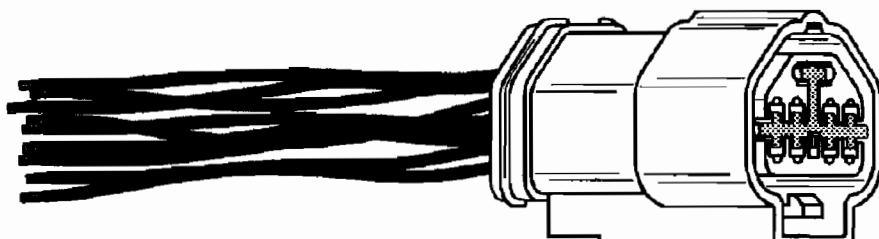
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Figure 2

**AXODE SIDE CASE CONNECTOR REPAIR PACKAGE
PART NUMBER F2PZ-14A464-E***Use For 1991-1992 Taurus/Sable and Continental*

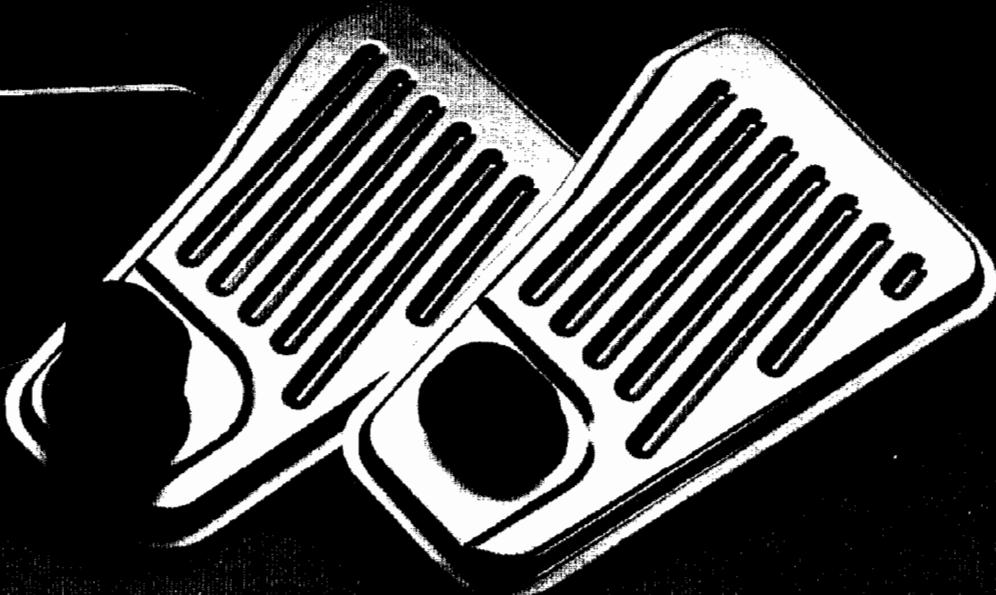
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Figure 3

**AODE, 4R70W, AXODE, AX4S, AX4N CASE CONNECTOR REPAIR PACKAGE
PART NUMBER F2PZ-14A464-G***Use For 1992 Crown Victoria, Grand Marquis, Town Car.**1993 Mark VIII, Taurus/Sable, Continental.**1994 Thunderbird, Cougar, Mustang, Econoline, F series Trucks, Bronco.*

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Figure 4



Sealed seam security.

The Filtran E4OD filter is sealed at the filter media edges, fluid bypass and connection areas, and no other E4OD filter features Filtran Synapristan™ depth filtration media, developed and tested for cleaner and more efficient fluid flow.

The Filtran E4OD filter also offers a permanent ethylene acrylate multi-lip outlet tube seal to prevent

leakage at the filter outlet connection.

No other E4OD automatic transmission filter can deliver this kind of performance. So the next time you service a Ford E4OD transmission, install the only filter that's sealed for security — the automatic transmission filter from Filtran.

SPX FILTRAN



*Look for this Mark of Quality
on every transmission filter you install.*

FORD AXOD-E (1991-1992 ONLY)
ELECTRICAL DIAGNOSIS (UPDATED)**EPC SOLENOID:**

Wires for the Electronic Pressure Control solenoid are fed through pins 1 and 6 of the "Black/Gray" case connector, located on top of the transaxle (See Figure 1). Ohmmeter across terminals 1 and 6 should read 2.5-6.5 Ohms resistance.

—CAUTION! —POPPED A COMPUTER LATELY? —CAUTION!

MODULATED LOCK-UP SOLENOID (MLUS):

Wires for the Modulated Lock-Up Solenoid (MLUS) are fed through pins 4 and 5 of the "Gray" case connector, located on top of the transaxle (See Figure 1). Ohmmeter across terminals 4 and 5 should read 0.75-2.0 Ohms resistance if you have MLUS. The Modulated Lock-Up Solenoid (MLUS) is found on the *Lincoln Only* for the 1991 model year. Taurus/Sable for 1991 are the regular Lock-Up Solenoid (LUS) that is described below. *All models for 1992 model year are MLUS.*

LOCK-UP SOLENOID (LUS):

Wires for the Lock-Up Solenoid (LUS) are fed through pins 4 and 5 of the "Black" case connector, located on top of the transaxle (See Figure 1). Ohmmeter across terminals 4 and 5 should read 16-40 Ohms resistance if you have LUS. The Lock-Up Solenoid (LUS) is found on the *Taurus/Sable Only* for the 1991 model year. Lincoln for 1991 is the Modulated Lock-Up Solenoid (MLUS) that is described above. *All models for 1992 model year are MLUS.*

—CAUTION! —CAUTION! —CAUTION! —CAUTION! —CAUTION!

TRANSAXLE OIL TEMPERATURE SENSOR (TOT):

Wires for the Transaxle Oil Temperature (TOT) sensor are fed through pins 2 and 3 of the "Black/Gray" case connector, located on top of the transaxle (See Figure 1). Ohmmeter across terminals 2 and 3 should read the approximate resistance listed in the chart below. Resistance should decrease if transaxle is heated, and should increase if transaxle is allowed to cool. Oil pan that is warm to the touch is about 105°F-158°F.

°C	°F	TOT SENSOR (OHMS)
0-20	32-58	100k - 37k
21-40	59-104	37k - 16k
41-70	105-158	16k - 5k
71-90	159-194	5k - 2.7k
91-110	195-230	2.7k - 1.5k
111-130	231-266	1.5k - 0.8k
131-150	267-302	0.8k - 0.5k

SHIFT SOLENOID 1:

Wires for Shift Solenoid 1 are fed through pins 5 and 6 of the "White" case connector, located on the side of the transaxle (See Figure 1). Ohmmeter across terminals 5 and 6 should read 12-30 Ohms resistance.

SHIFT SOLENOID 2:

Wires for Shift Solenoid 2 are fed through pins 1 and 2 of the "White" case connector, located on the side of the transaxle (See Figure 1). Ohmmeter across terminals 1 and 2 should read 12-30 Ohms resistance.

SHIFT SOLENOID 3:

Wires for Shift Solenoid 3 are fed through pins 3 and 4 of the "White" case connector, located on the side of the transaxle (See Figure 1). Ohmmeter across terminals 3 and 4 should read 12-30 Ohms resistance.

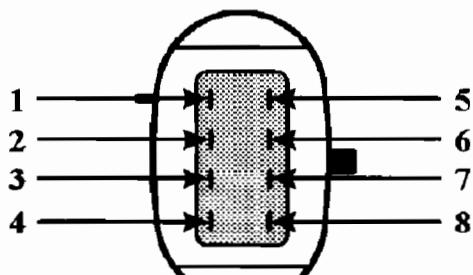
TURBINE SPEED SENSOR:

The Turbine Speed Sensor is located on the channel plate next to the left hand axle seal. With Ohmmeter across the two terminals of the TSS, there should be 100-200 Ohms resistance.

MANUAL LEVER POSITION SENSOR (MLPS):

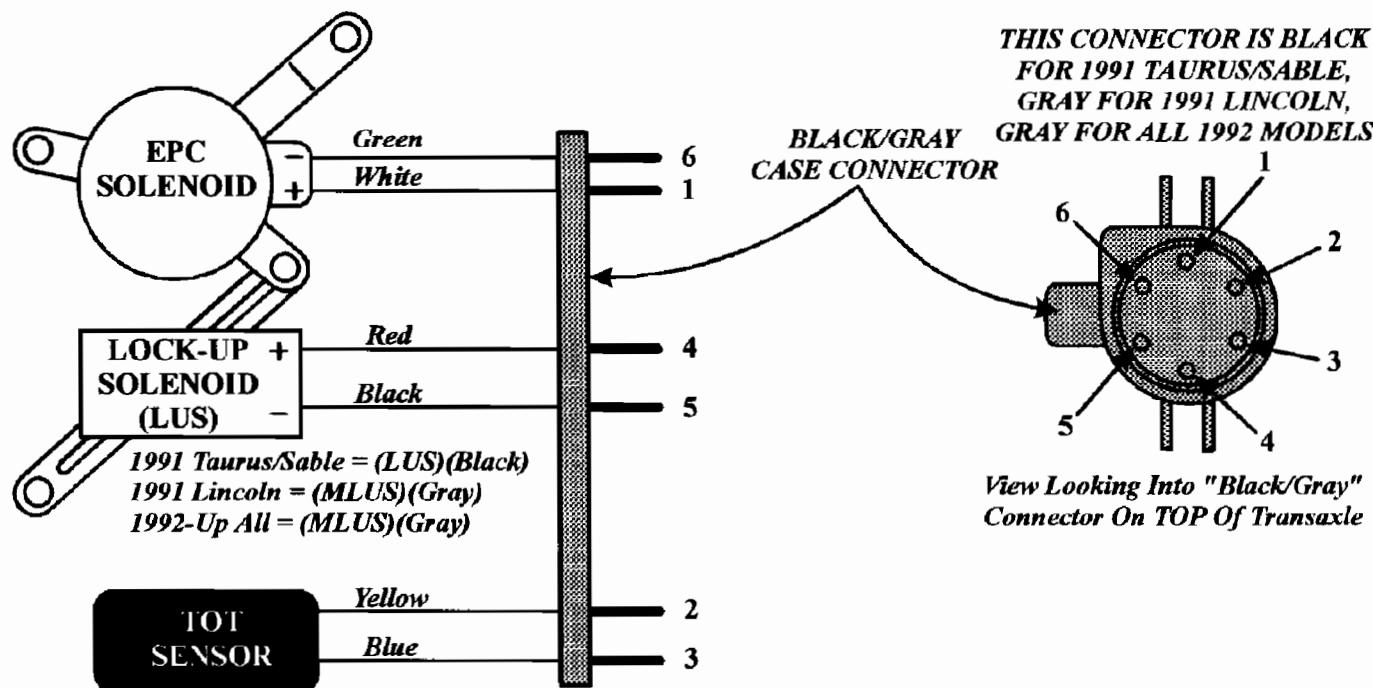
The Manual Lever Position Sensor is checked across pins 2 and 3 of the sensor as shown in illustration below. With Ohmmeter across pins 2 and 3 the resistance reading should correspond to the chart below.

Lever Position	Ohms Resistance
P -----	3769-4608
R -----	1303-1594
N -----	660-807
D -----	361-442
2 -----	190-232
1 -----	80-95

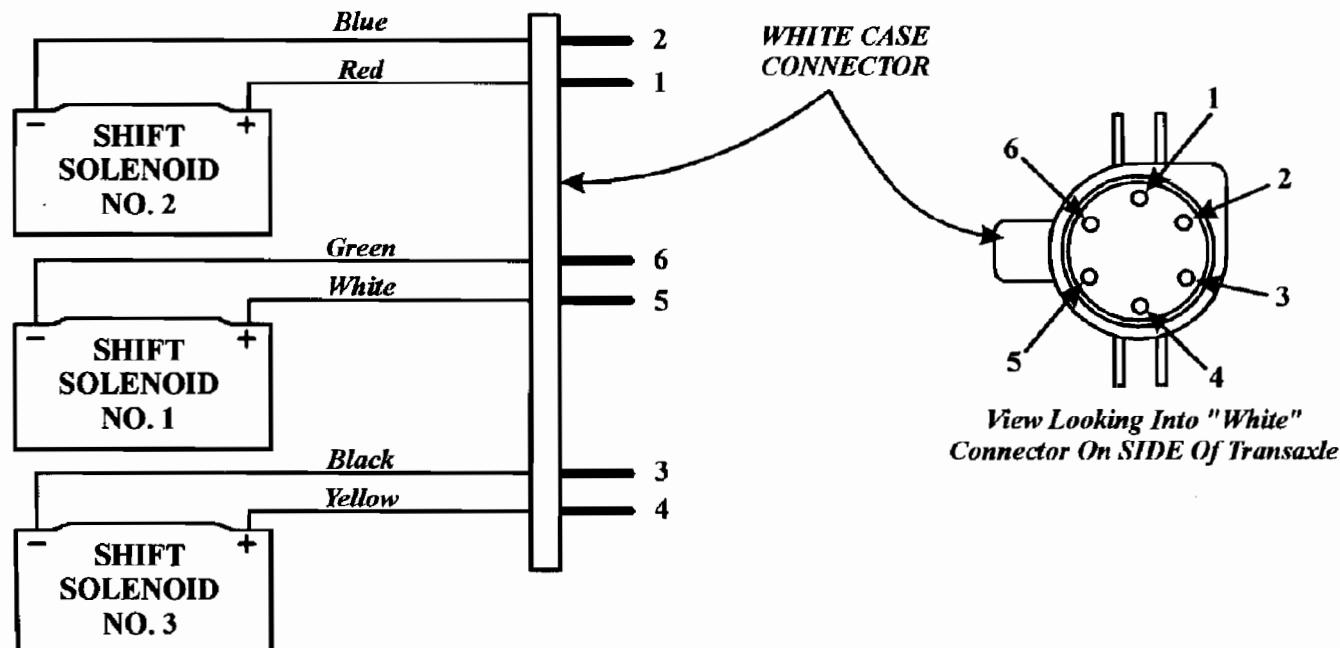


(View Looking Into MLPS)

1991-1992 AXOD-E INTERNAL WIRE SCHEMATIC



The 1991-1992 AXOD-E transaxle has 2 case connectors, 1 Black or Gray in color on the top of the transaxle, and 1 White in color on the side of the transaxle.



FORD AX4S/AXODE

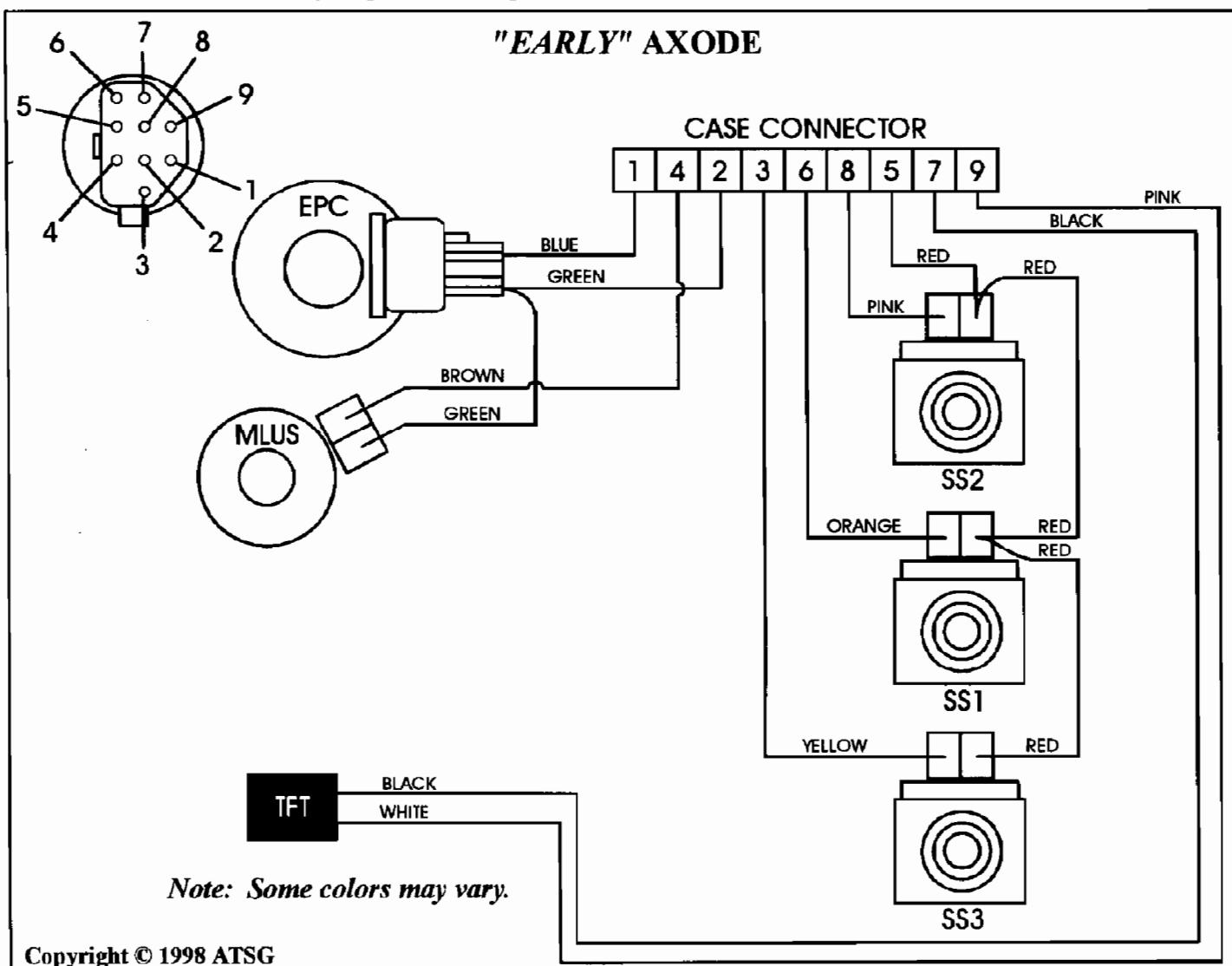
HARSH SHIFTS, CLICKING NOISE, TIE-UP ON SHIFTS
1993-UP AFTER REBUILD

COMPLAINT: *After rebuild*, harsh shifts (High Line) and/or a "Clicking" or cycling noise may be heard from the side cover area, that is usually accompanied by an ON/OFF bind-up sensation that coincides with the "Clicking" noise. These symptoms may be accompanied with Diagnostic Trouble Code (DTC) 652 (MLUS Shorted or Open Circuit), DTC 624 (EPC Circuit Failure), and/or one Shift Solenoid DTC 621, 622, or 624.

CAUSE: The cause may be, solenoid wire connectors installed on the wrong solenoids.

CORRECTION: Connect the internal wiring harness connectors to their proper solenoids, using the wire colors, as shown in Figure 1 and 2. Proper connection of solenoids can also be verified externally through the case connector using the Ohms chart in Figure 2.

NOTE: The internal wire harness normally is secured by wire-ties which would prevent improper connection of solenoids, however, not all wire harnesses have the wire ties necessary to prevent this problem and the chart must be used.

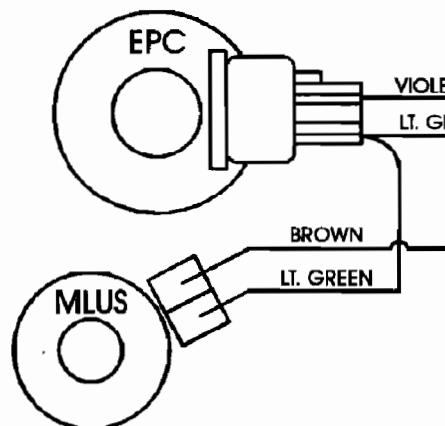


SHIFT SOLENOID RESISTANCE CHART
AND TFT SENSOR RESISTANCE CHART
FOR BOTH AX4S AND AX4N

SOLENOID	SOLENOID RESISTANCE (OHMS)
SS1	15 - 25
SS2	15 - 25
SS3	15 - 25
MLUS	.98 - 1.6
EPC	3.23 - 5.50
TSS	100 - 200
VSS	190 - 250

°C	°F	TFT SENSOR (OHMS)
0-20	32-58	100k - 37k
21-40	59-104	37k - 16k
41-70	105-158	16k - 5k
71-90	159-194	5k - 2.7k
91-110	195-230	2.7k - 1.5k
111-130	231-266	1.5k - 0.8k
131-150	267-302	0.8k - 0.5k

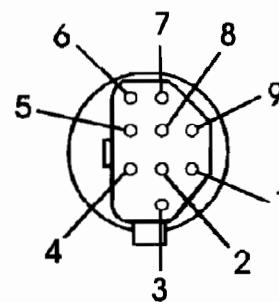
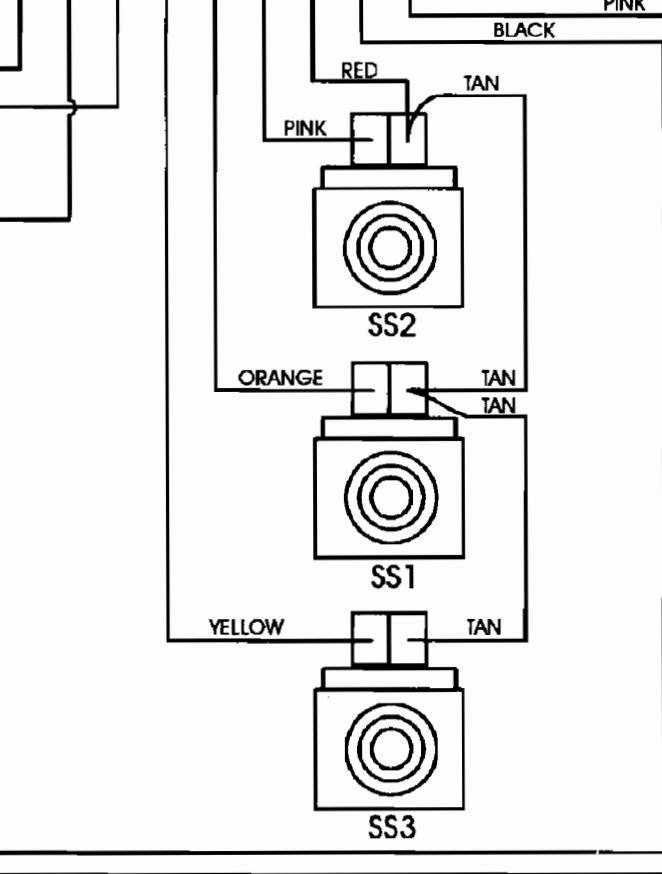
1. EPC GROUND (VIOLET)
2. EPC AND MLUS POWER (LT GREEN)
3. SS3 GROUND (YELLOW)
4. MLUS GROUND (BROWN)
5. SHIFT SOLENOID POWER (RED)
6. SS1 GROUND (ORANGE)
7. TFT (BLACK)
8. SS2 GROUND (PINK)
9. TFT RETURN (PINK)



"LATE" AXODE

CASE CONNECTOR

1 4 2 3 6 8 5 7 9



Note: Some colors may vary.

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Figure 2

FORD AX4S/AX4N**FILTER USAGE IDENTIFICATION**

COMPLAINT: There is a great deal of confusion when matching the correct filter/pan/gasket combination especially when a damaged pan requires replacement or the transmission has been incorrectly serviced.

CAUSE: Seven different pans are used between the AX4S and AX4N transmissions, three for the AX4S and four for the AX4N. In addition there are two different types of pan gaskets used and three identical looking filters with three different types of seals.
The correct combination must be used to avoid cavitation, slipping and neutralization around turns.

CORRECTION: The illustration in figure 1 shows the configuration of the filter and all three are the same in that respect.

Where the filters differ is in the type of seal they use. The first uses a **SHORT ORANGE** seal (Figure 2), the second (Figure 3), uses a **TALL ORANGE** seal and the third, (Figure 4) uses a **GREENLIP** seal.

Figure 5 illustrates the "Disposable" Cork gasket which is to be used with the pan with the "*extruded torque limiters*" in the pan rail.

The "Reusable" Elastomeric gasket has "*self contained torque limiters*" as seen in figure 6 and is to be used with the pan that has flat pan rails.

NOTE: It is the pan depth/gasket combination which determines which filter seal is to be used.

The chart in figure 7 lists the filter seal/pan/gasket combinations for the original equipment manufacturer.

If the technician is unsure that the correct combination of filter seal/pan/gasket is being used in the transmission being worked on, refer to the chart in figure 8 for the practical applications.

Special thanks to Dave Gombash of AAMCO tech for his assistance in providing this information.

A very special thanks to Wayne Ferrell of SPX FILTRAN, for his help and generosity, in compiling this information.

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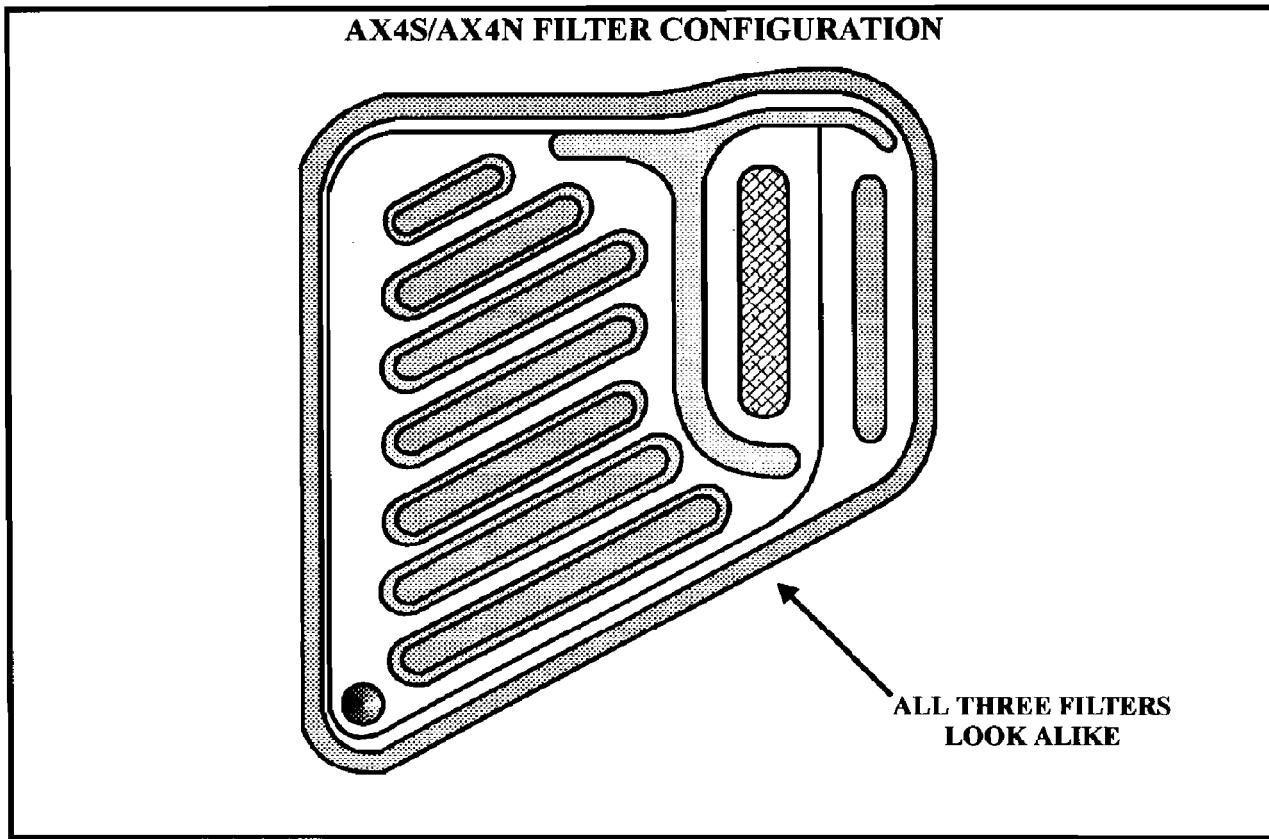
FORD AX4S/AX4N
FILTER USAGE IDENTIFICATION

Figure 1

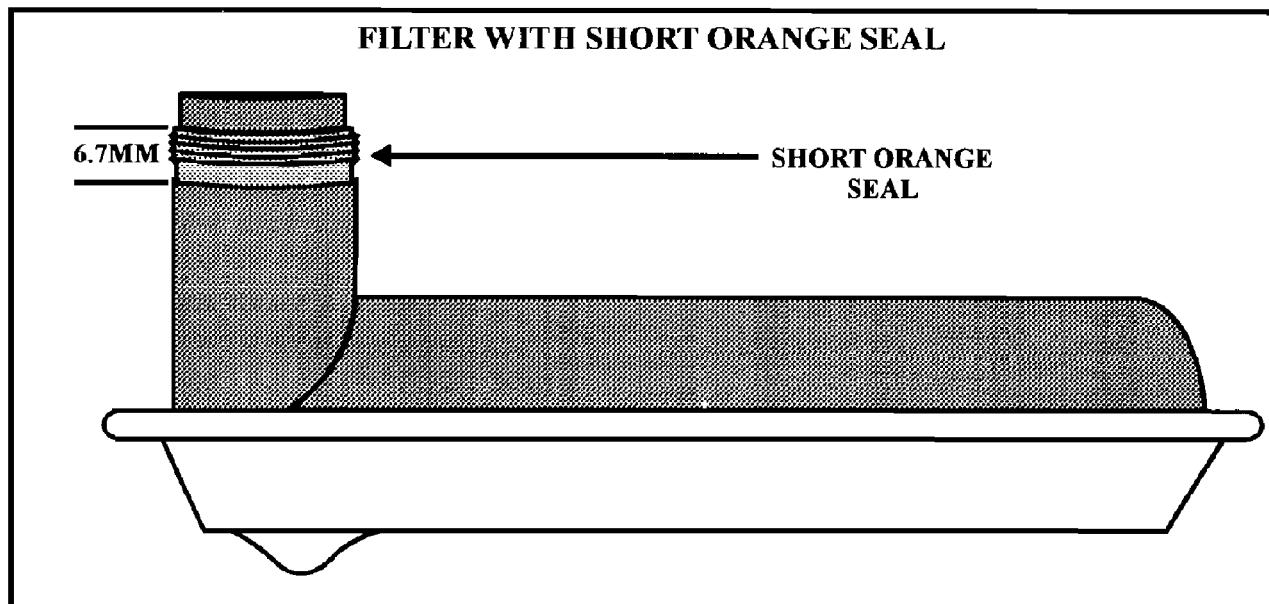


Figure 2

FORD AX4S/AX4N

FILTER USAGE IDENTIFICATION

FILTER WITH TALL ORANGE SEAL

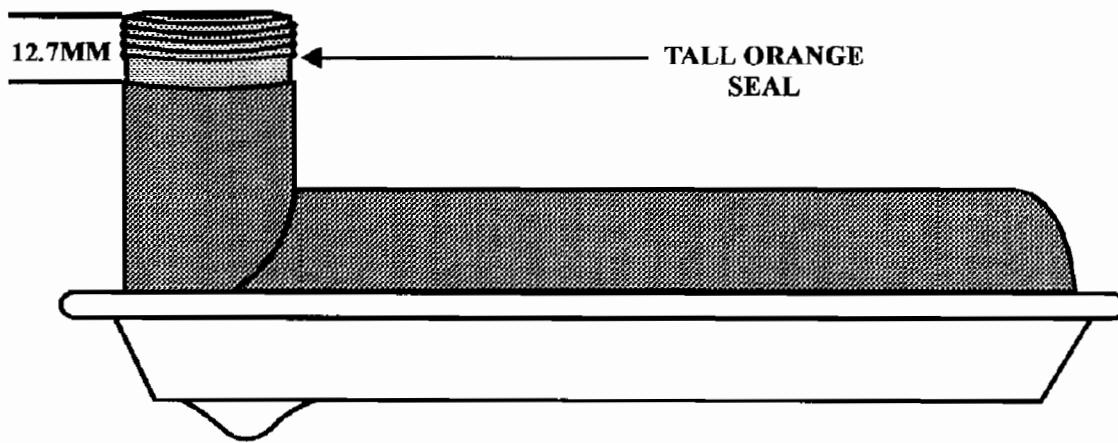


Figure 3

FILTER WITH GREEN LIP SEAL

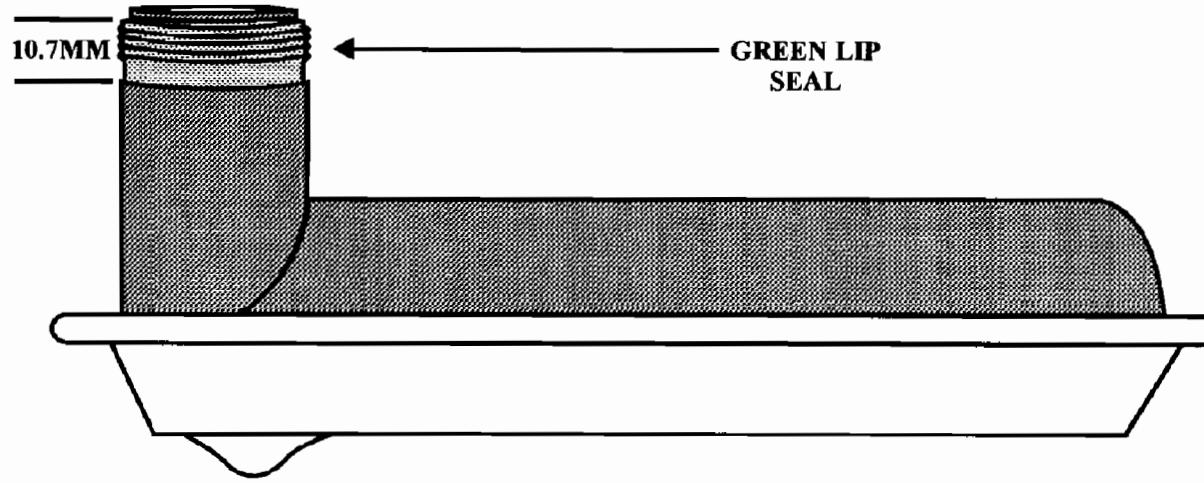


Figure 4

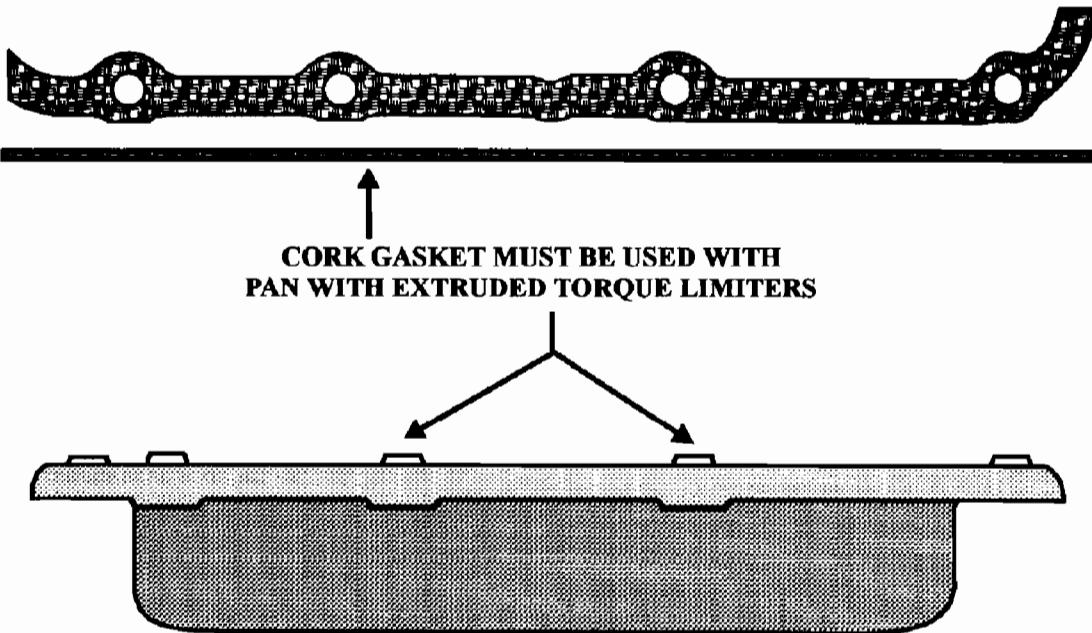
FORD AX4S/AX4N**FILTER USAGE IDENTIFICATION****CORK GASKET/PAN WITH EXTRUDED TORQUE LIMITERS**

Figure 5

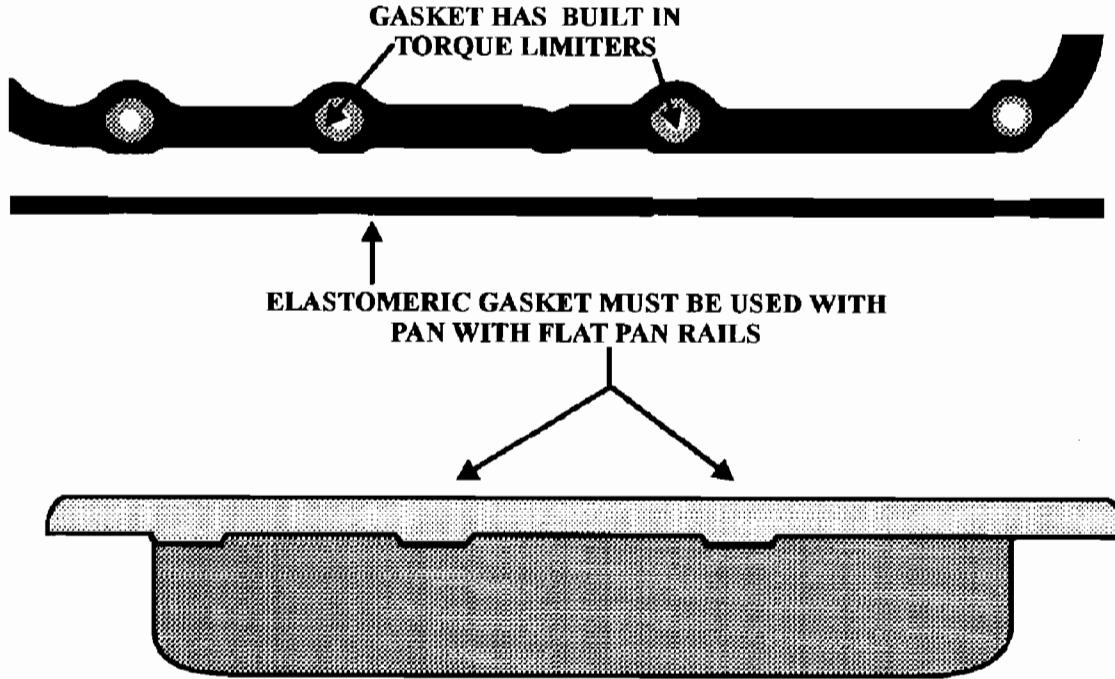
ELASTOMERIC GASKET/PAN WITH FLAT RAILS

Figure 6

FORD AX4S/AX4N

FILTER USAGE IDENTIFICATION

OE FILTER APPLICATION CHART

AXOD/AX4S			
VEHICLE APPLICATION	SHORT ORANGE SEAL	TALL ORANGE SEAL	GREEN LIP SEAL
1986-95 TAURUS/SABLE	CORK GASKET		
1996 & LATER TAURUS/SABLE			ELASTOMERIC GASKET
1993-95 TAURUS SHO		CORK GASKET	
1995 WINDSTAR	CORK GASKET		
1996 WINDSTAR			ELASTOMERIC GASKET
1988-94 CONTINENTAL	CORK GASKET		

AX4N			
VEHICLE APPLICATION	SHORT ORANGE SEAL	TALL ORANGE SEAL	GREEN LIP SEAL
1994½-95 TAURUS/SABLE		CORK GASKET	
1996 TAURUS/SABLE			CORK GASKET
1996½ & LATER TAURUS/SABLE			ELASTOMERIC GASKET
1996½ & LATER TAURUS SHO		ELASTOMERIC GASKET	
1995-96 CONTINENTAL		CORK GASKET	
1996½ & LATER CONTINENTAL	CORK GASKET	ELASTOMERIC GASKET	

Figure 7

FORD AX4S/AX4N**FILTER USAGE IDENTIFICATION****PRACTICAL FILTER APPLICATION CHART**

AXOD/AX4S		
PAN IDENTIFICATION	GASKET TYPE	FILTER SEAL TYPE
Stamped "AXOD METRIC"	CORK GASKET	TALL ORANGE SEAL
Stamped "AXOD SHO"	CORK GASKET	SHORT ORANGE SEAL
Stamped "REUSABLE GASKET"	ELASTOMERIC GASKET	GREEN LIP SEAL

AX4N		
PAN IDENTIFICATION	GASKET TYPE	FILTER SEAL TYPE
Stamped "AX4N"	CORK GASKET	TALL ORANGE SEAL
Stamped "AX4N METRIC"	CORK GASKET	GREEN LIP SEAL
Stamped "AX4N" "REUSABLE GASKET"	ELASTOMERIC GASKET	TALL ORANGE SEAL
Stamped "AX4N METRIC" "REUSABLE GASKET"	ELASTOMERIC GASKET	GREEN LIP SEAL

Figure 8

FORD AX4N METALLIC "CLUNK" NOISE DURING REVERSE ENGAGEMENT

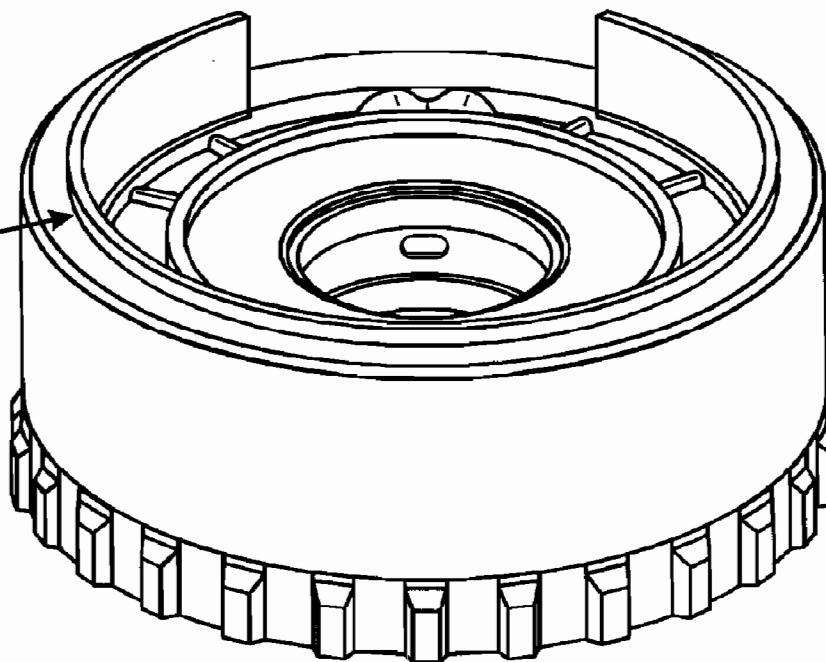
COMPLAINT: Some models of the 1994-1996 Taurus/Sable and 1995-1996 Continental, equipped with the AX4N transaxle may exhibit a metallic clunk noise coming from the transaxle during engagement to reverse. Upon inspection you will usually find that the lip on the previous design rear planetary support is damaged due to contact with the final drive ring gear and there may also be damage to the number 16 thrust washer on top of the return spring assembly for low/intermediate clutch pack.

CAUSE: The cause may be, the final drive ring gear contacting the internal case surface during reverse engagement.

CORRECTION: There is now available from Ford Motor Company a new design Rear Planetary Support, under OEM Part Number F6DZ-7A130-A, with the "Lip" removed and an added spacer that should reduce the possibility of final drive ring gear to case contact during reverse engagement. Refer to Figure 1 for illustrations of the previous and new design rear planetary supports. If it is necessary to replace the number 16 thrust washer, you must purchase service package part number F5DZ-7H266-A that includes the return spring assembly for the low/intermediate clutch. It is not available individually (See Figure 2). The new spacer is installed on top of the case shoulder, after final drive ring gear has been install into the case, and then install the final drive and planetary support as an assembly as shown in Figure 3.

SERVICE INFORMATION:

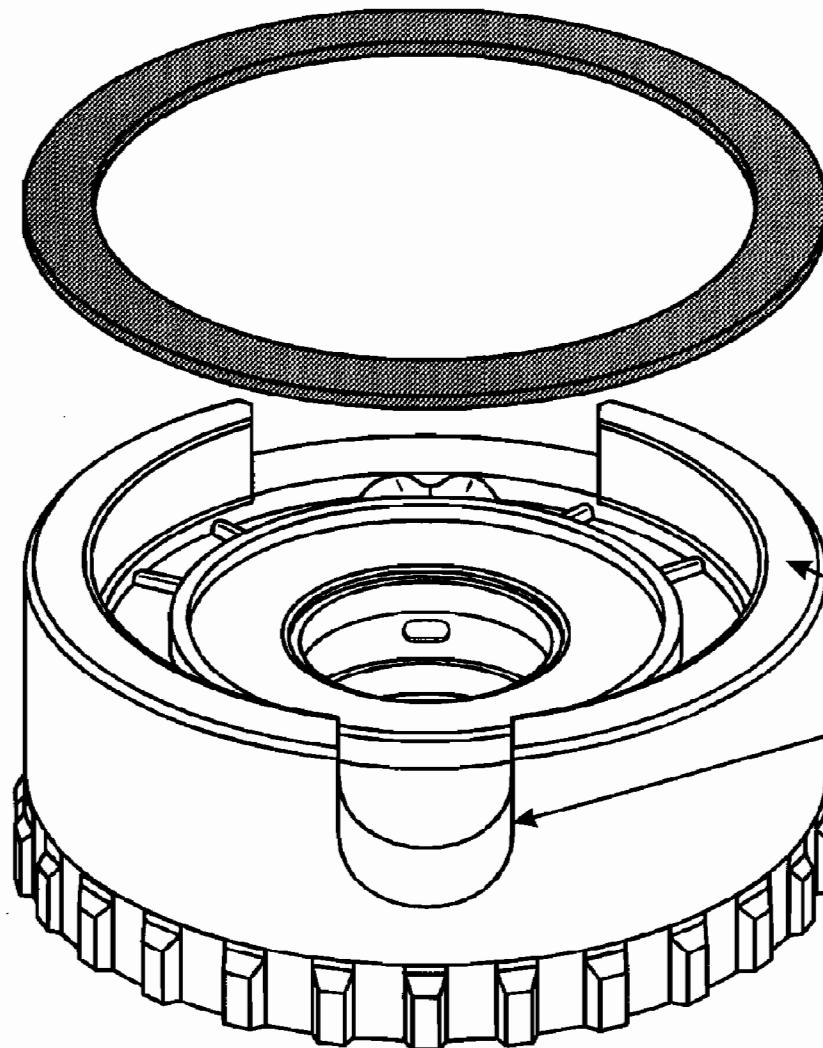
Rear Planetary Support with Spacer (New Design)	F6DZ-7A130-CA
Low/Inter. Return Spring and No. 16 Thrust Washer	F5DZ-7H266-A

**PREVIOUS DESIGN REAR
PLANETARY SUPPORT***"Step" On Previous Design*

**NEW DESIGN REAR
PLANETARY SUPPORT
PART NO. F6DZ-7A130-CA**

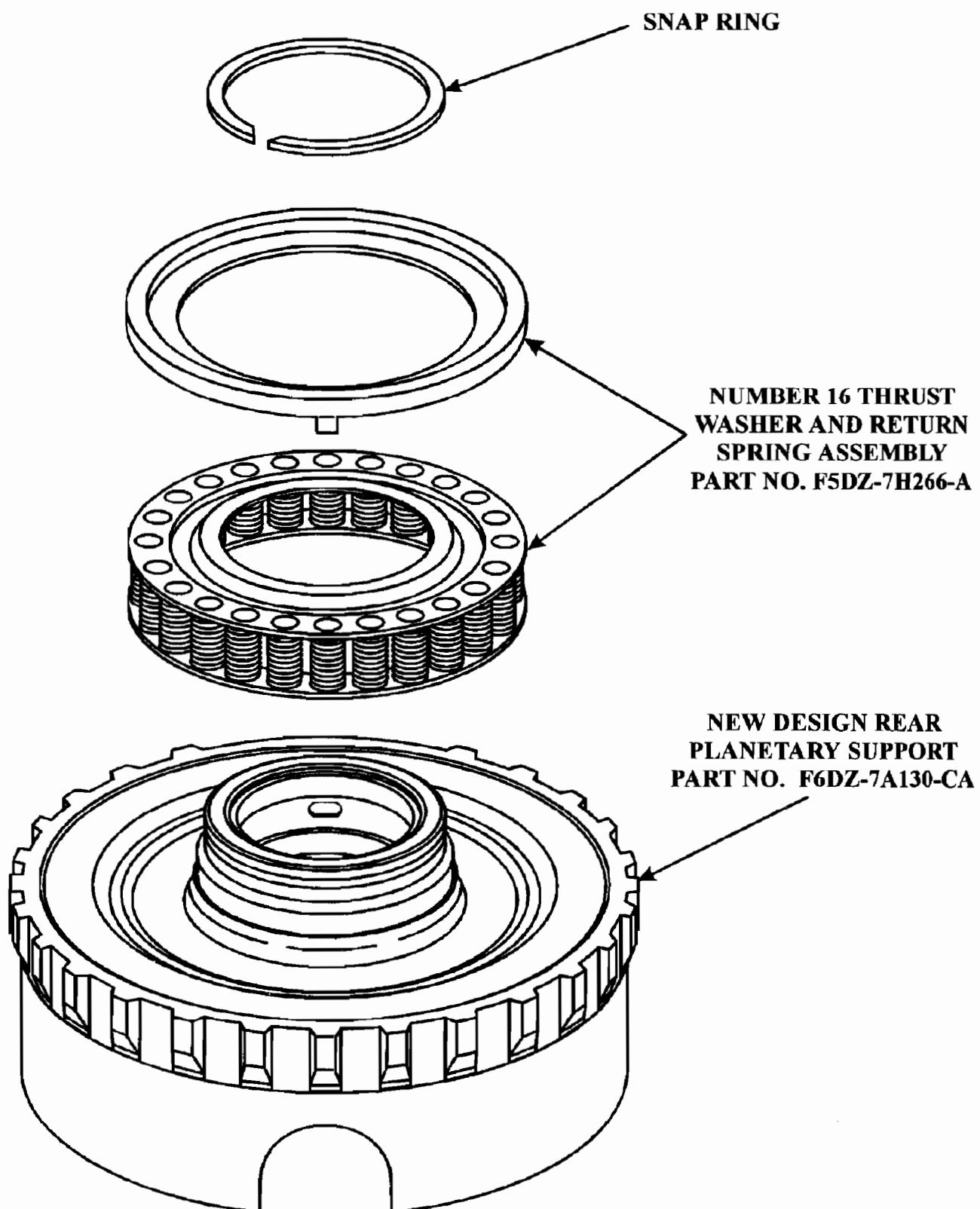
"Added" Spacer Plate

*No Step On New Design
Planetary Support And
There Is Added Window*



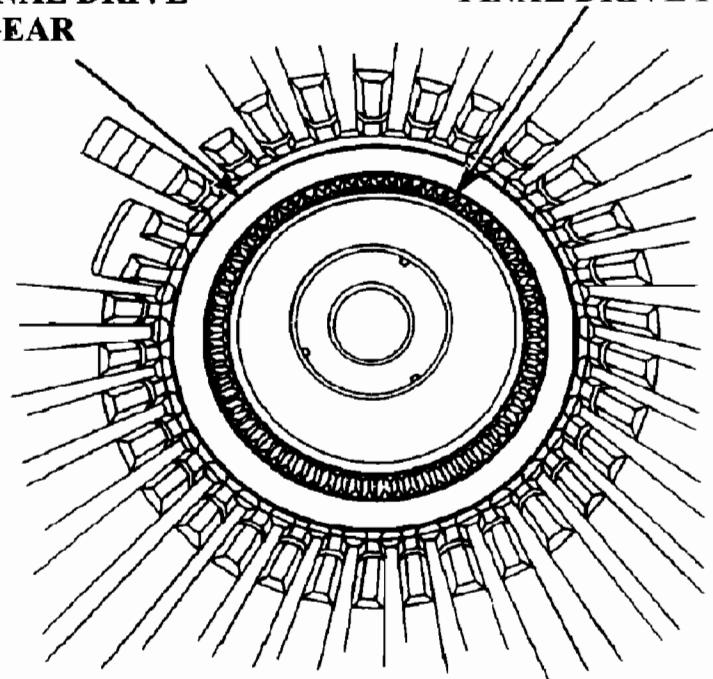
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Figure 1

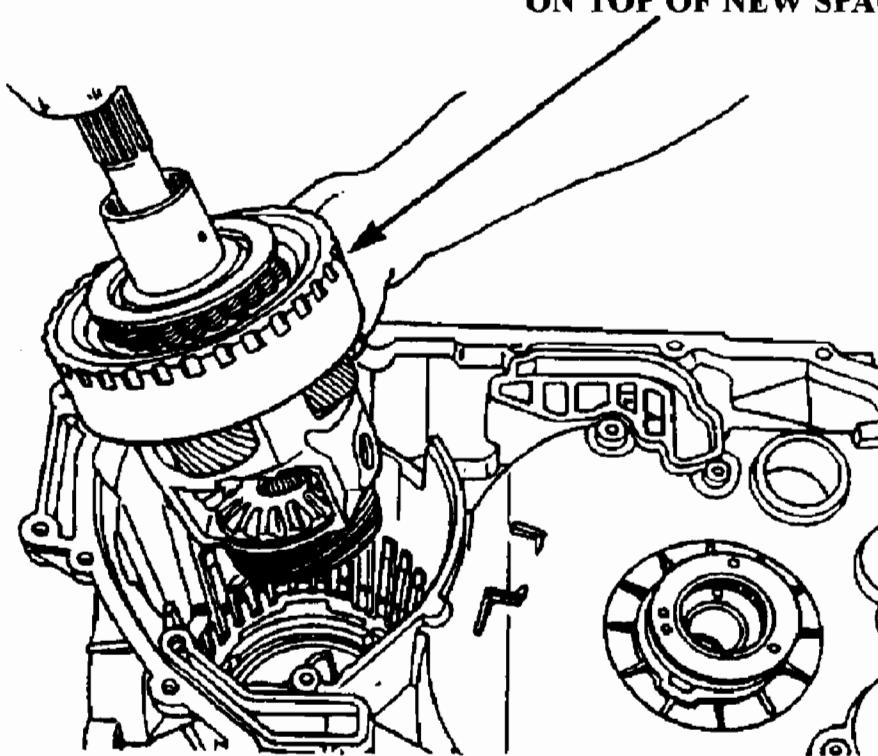


INSTALL NEW SPACER
ON TOP OF FINAL DRIVE
RING GEAR

FINAL DRIVE RING GEAR



THEN INSTALL THE
FINAL DRIVE ASSEMBLY
ON TOP OF NEW SPACER



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Figure 3

THE NEW GENERATION



With 30 years experience, we are the most reliable and technically advanced company in the industry.

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Patent #4,520,659 #4,592,228

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**FORD AX4N
NO FOURTH GEAR**

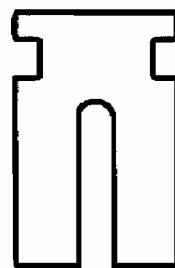
COMPLAINT: Ford Motor Company vehicles equipped with the AX4N Transaxle may exhibit a no fourth gear up-shift condition.

CAUSE:

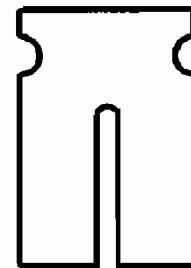
The cause may be, that the Forward Clutch Control Valve sticking in an up-shifted position. **EXPLANATION:** At engine start-up, SS3 oil pushes the Forward Clutch Control Valve into an up-shifted position, allowing Main Line pressure to pass through the "K" orifice, through the Forward Clutch Control Valve, through the 3-4 and 1-2 Shift Valves, and into the Forward Clutch. Mainline Pressure from the OD D 2 L Circuit , passing through the 2-3 Shift Valve also acts upon the Forward Clutch Control Valve in First and Second Gear, to help keep the Forward Clutch Control Valve in an up-shifted position. When the 2-3 up-shift takes place, SS3 is energized, which cuts off the SS3 oil to the Forward Clutch Control Valve, and the OD D 2 L Circuit oil to the Forward Clutch Control Valve is cut off by the movement of the 2-3 Shift Valve. At this time, the Forward Clutch Control Valve Should move to a down-shifted position, allowing the Forward Clutch oil to exhaust through the 3-4 Shift Valve, and through the exhaust passage through the downshifted Forward Clutch Control Valve. If the Forward Clutch Control Valve sticks in the up-shifted position, Forward Clutch oil will still be present at the 3-4 Shift Valve, preventing the 3-4 Shift Valve from moving, and preventing a 3-4 up-shift from taking place.

CORRECTION:

After all electrical systems have been checked and verified for proper operation, remove the Valve Body, check the Forward Clutch Control Valve for sticking, and for debris that may be obstructing the valve movement. See Figure 2. **Note:** The Forward Clutch Control Valve retainer may be bent or broken, which can cause the valve to stick. Replace if necessary. An updated retainer can be purchased from Ford, under part number



Old Retainer



Updated Retainer

Ford Part Number F8DZ-7F194-AA

Figure 1

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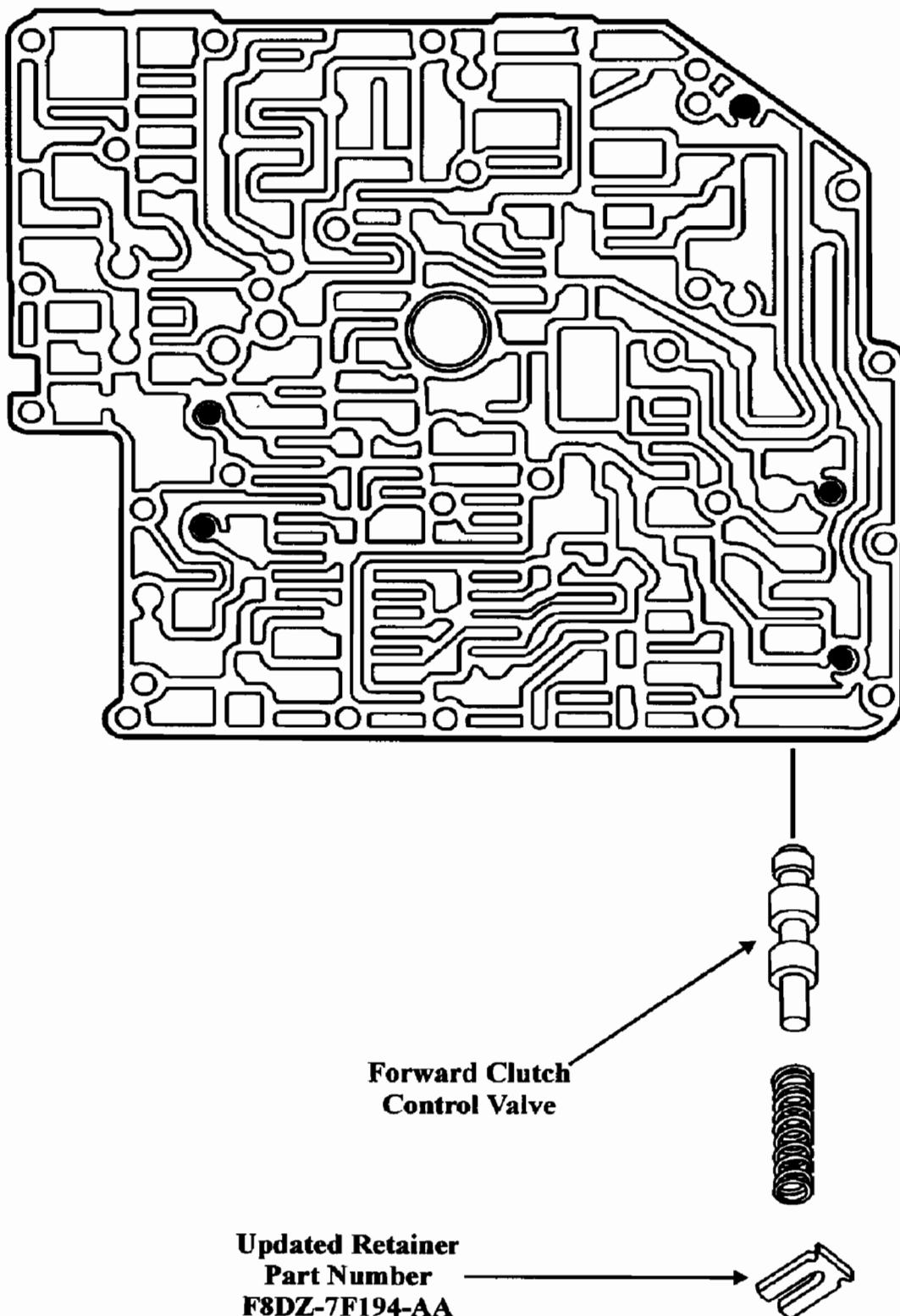


Figure 2

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**FORD AX4N
HARSH REVERSE ENGAGEMENT**

COMPLAINT: Before and/or after rebuild, the vehicle may exhibit a harsh Reverse Engagement.

CAUSE: The cause may be a missing B1 checkball from the valve body. A missing B1 checkball will allow Reverse Clutch oil to flow un-orificed into the Reverse Clutch, causing the engagement to be harsh.

CORRECTION: To correct this condition, install a 5/16 - .313 inches checkball at the B1 location. See Figure 1.

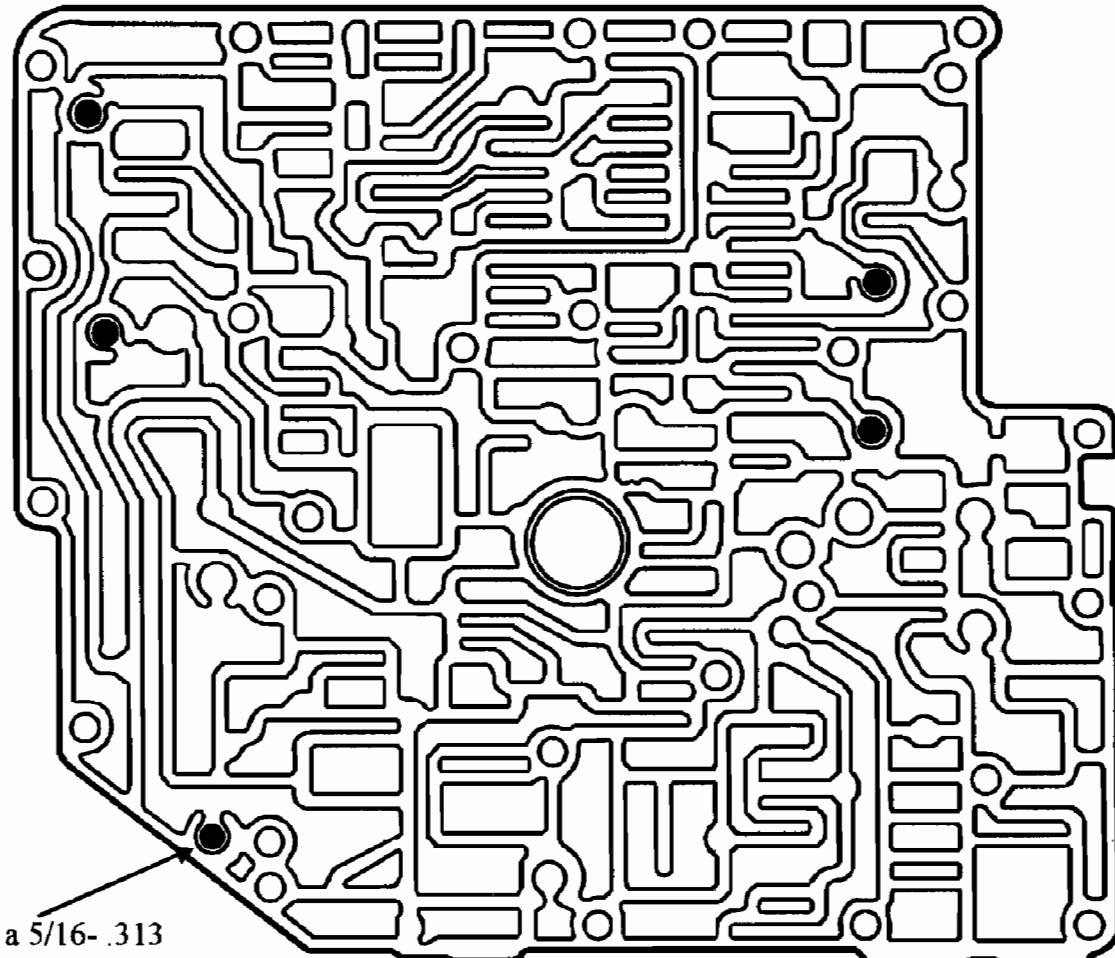


Figure 1

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**FORD AX4N
HARSH 1-2 SHIFT**

COMPLAINT: Before and/or after rebuild, the vehicle may exhibit a harsh 1-2 upshift.

CAUSE: The cause may be a missing B10 checkball from the valve body. A missing B10 checkball will allow Intermediate Clutch oil to flow un-orificed into the Intermediate clutch, causing the shift to be harsh.

CORRECTION: To correct this condition, install a 5/16 - .313 inches checkball at the B10 location. See Figure 1.

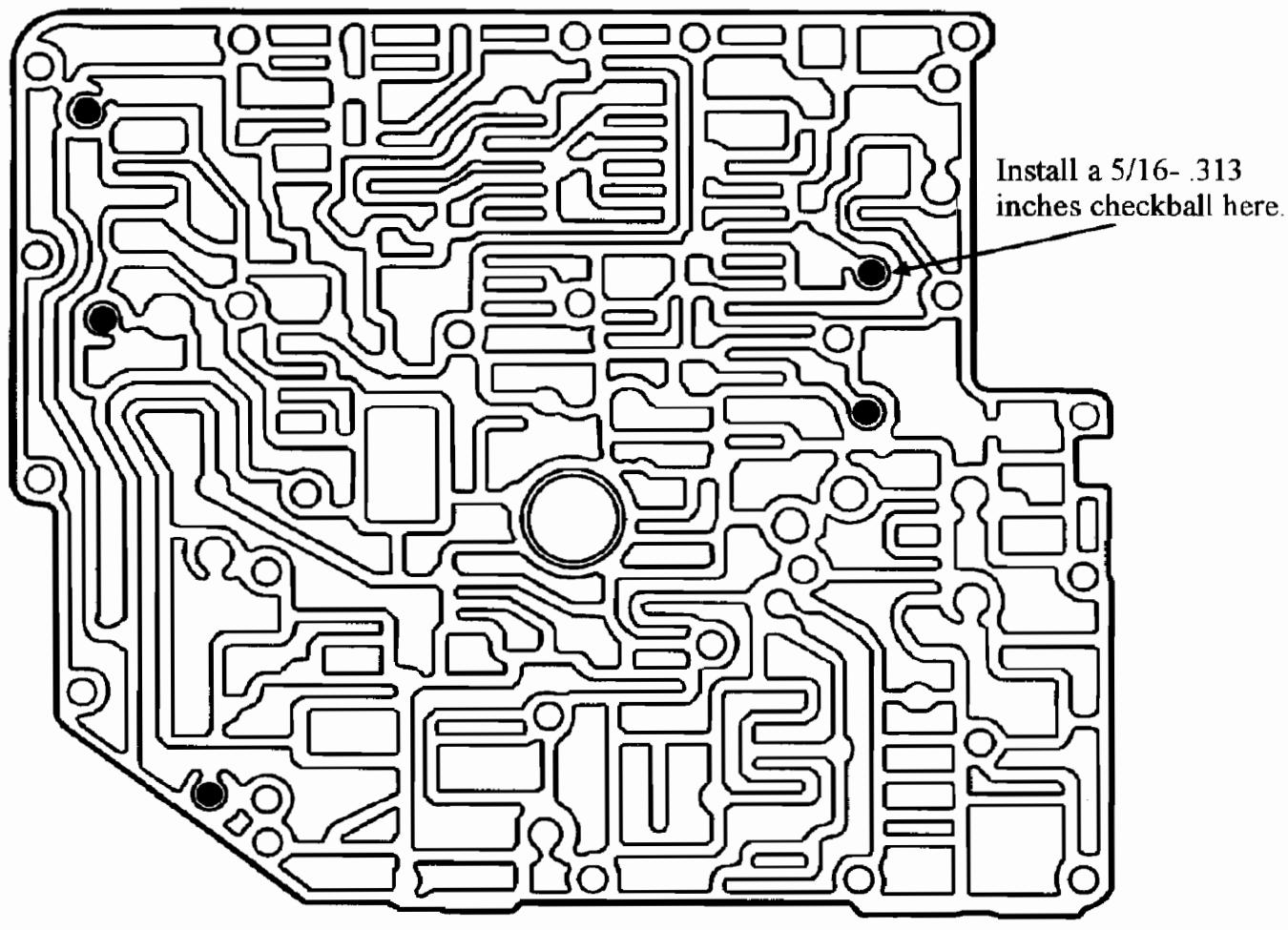


Figure 1

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FORD CD4E

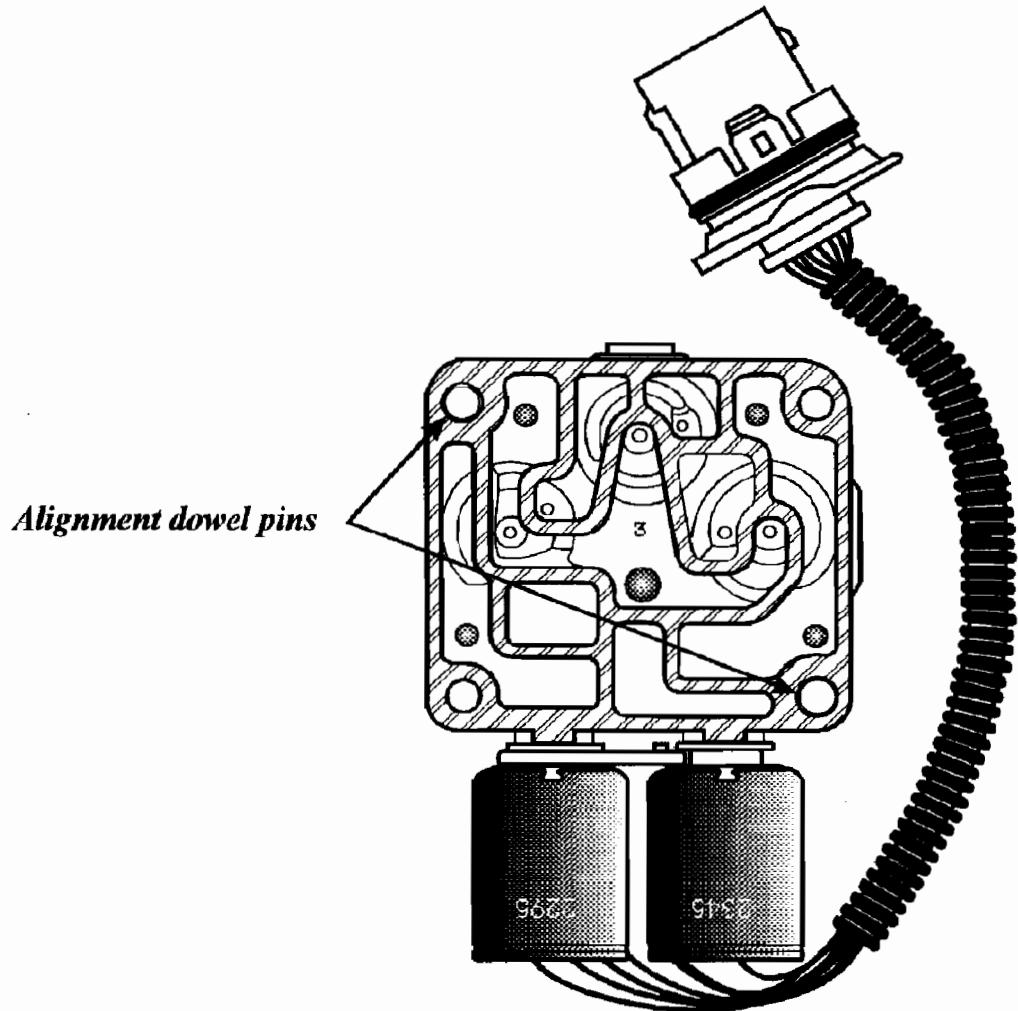
NO REVERSE & MOVES IN MANUAL LOW ONLY

COMPLAINT: After rebuild or solenoid body replacement, the vehicle exhibits a no reverse condition and moves forward in the manual low range only. If the wheels are off the ground, forward movement may be detected in other forward ranges as well.

CAUSE: The cause may be, the solenoid body filter gasket has been installed incorrectly.

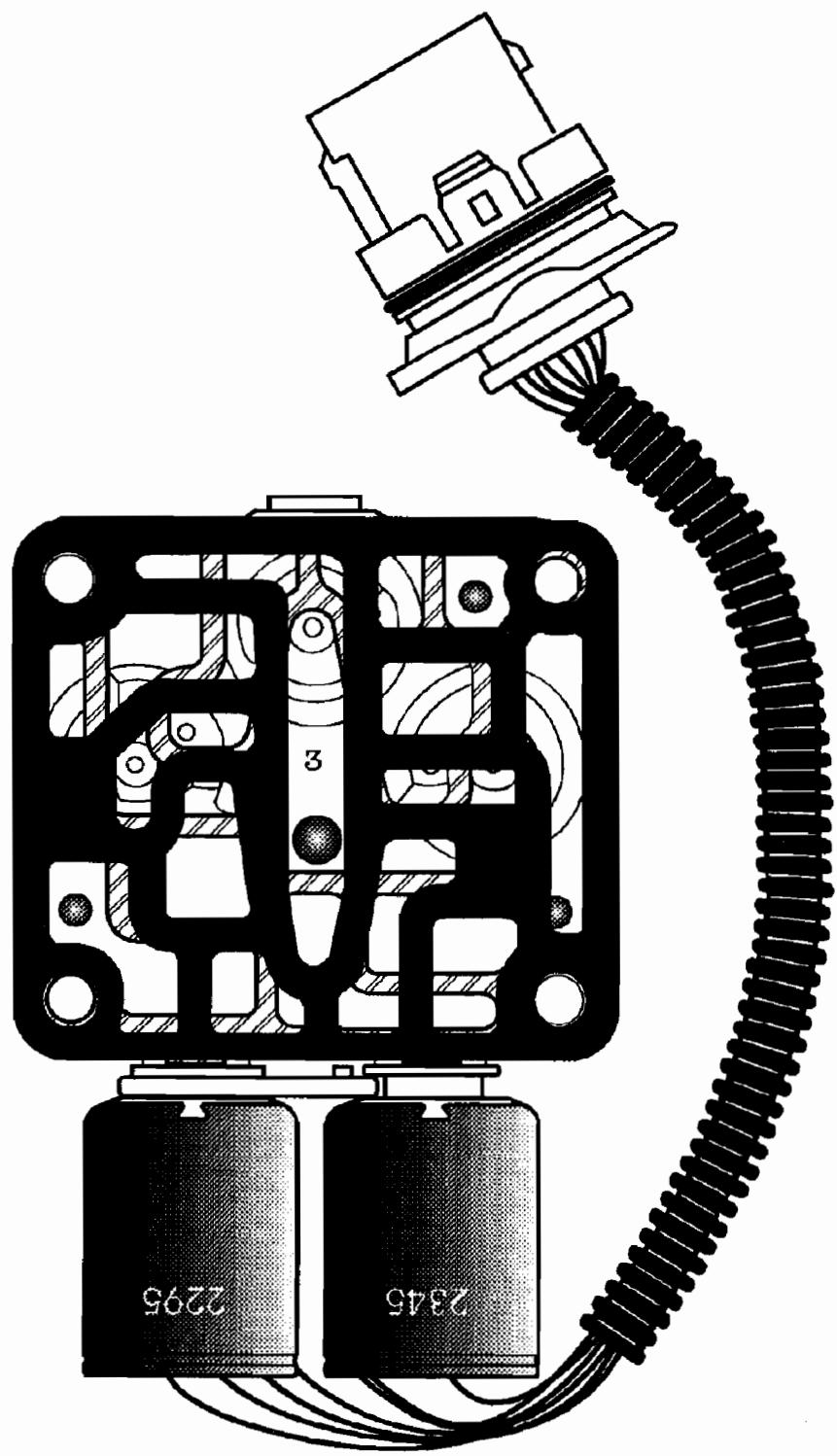
CORRECTION: The solenoid body has two alignment dowel pins in opposite corners (See Figure 1). This allows the possibility of the solenoid filter gasket to be installed in two different positions. Figure 2 shows the **INCORRECT** positioning of the filter gasket. Figure 3 shows the **CORRECT** filter gasket position.

SOLENOID BODY

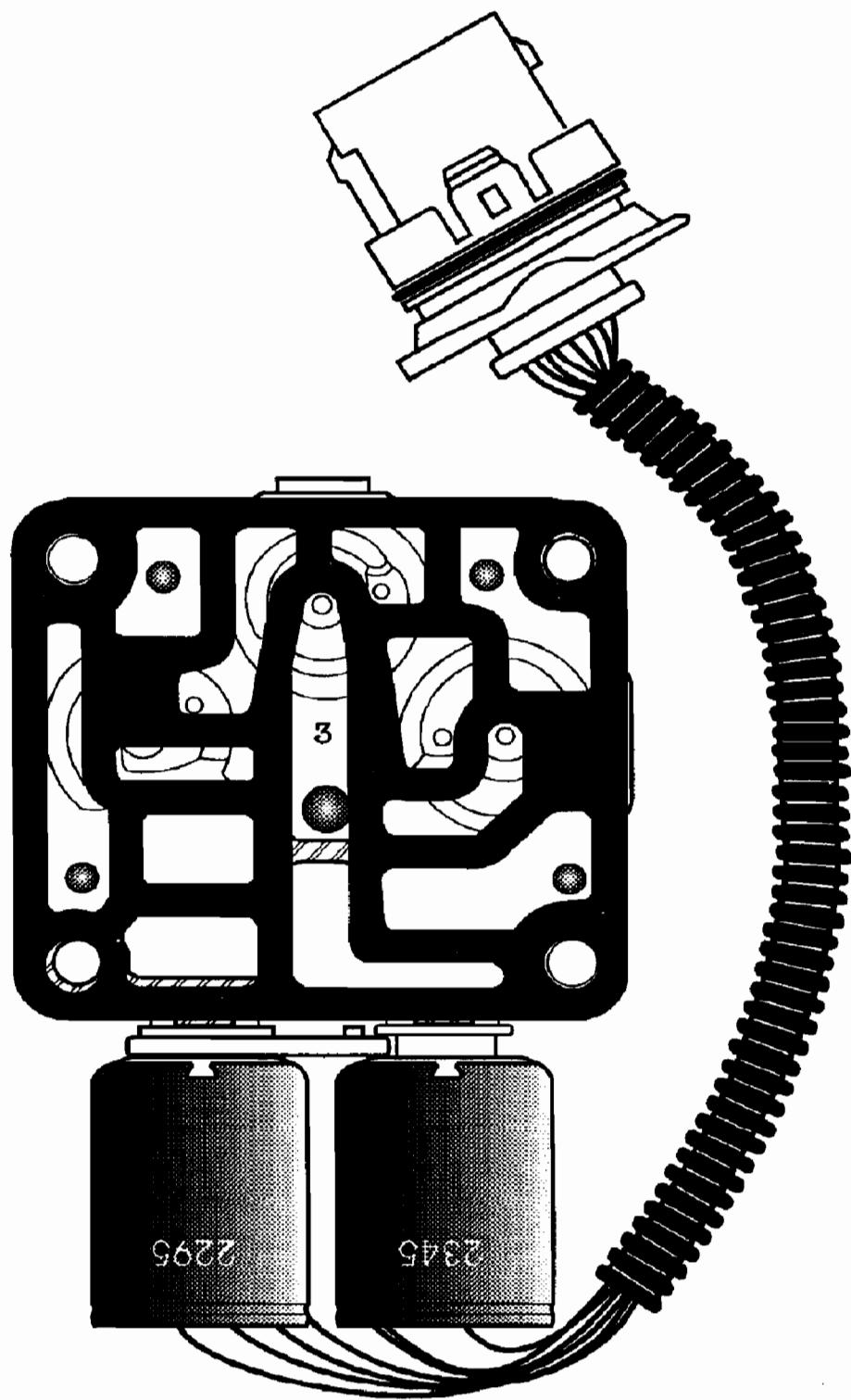


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Figure 1



"INCORRECT" POSITIONING OF THE SOLENOID FILTER GASKET



"CORRECT" POSITIONING OF THE SOLENOID FILTER GASKET

MAZDA / FORD CD4E ERRATIC UPSHIFTS AND DOWNSHIFTS

COMPLAINT: Vehicles equipped with CD4E transaxles may exhibit erratic upshifts or downshifts, wrong gear starts with no upshifts and / or no reverse with or without a flashing M.I.L (malfunction indicator lamp). Upon trouble code retrieval, one or more of the following codes may be present: 522, 634, 659, 667, 668, 675.

CAUSE: The cause may be, a faulty Transmission Range Switch.

CORRECTION: Refer to Figure 1 for the location of the Transmission Range Switch and refer to Figure 2 for terminal I.D. and to test the switch in each range for the correct ohm and voltage value. Replace the switch if it fails this test.

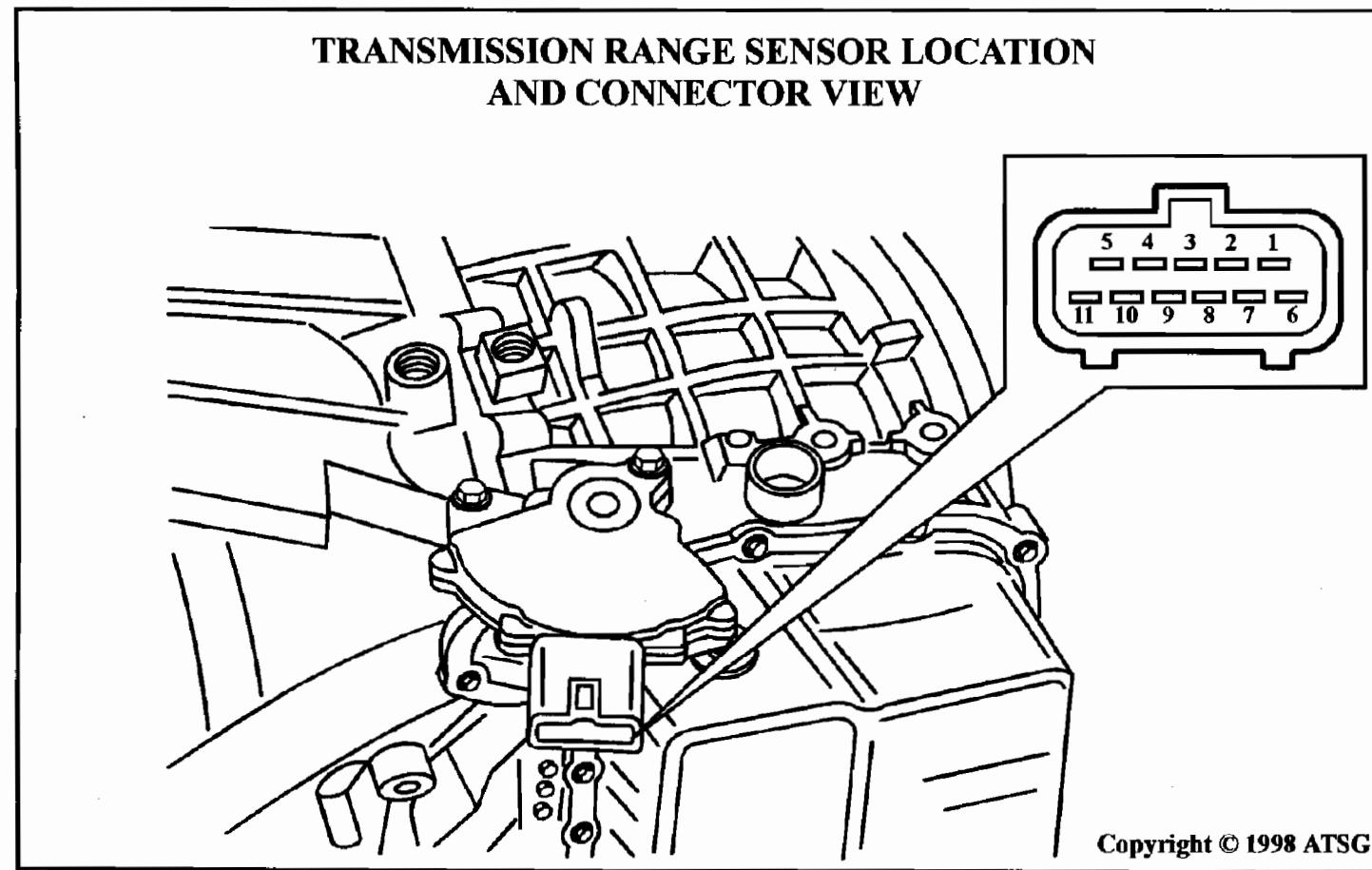
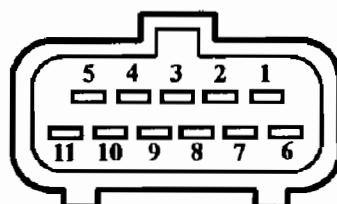


Figure 1

TRANSMISSION RANGE SENSOR CHECK



TERMINAL IDENTIFICATION AND FUNCTION

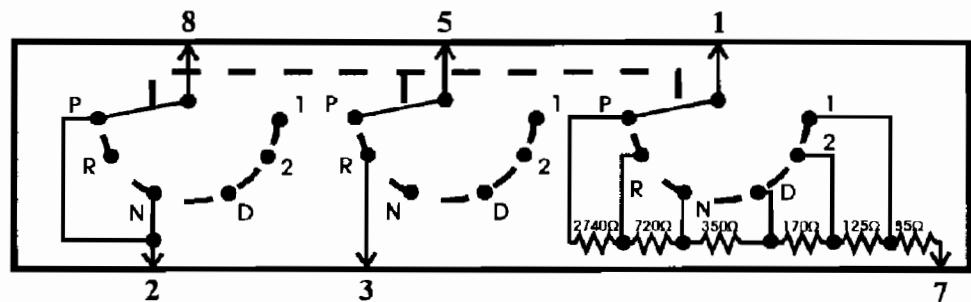
PIN	CIRCUIT FUNCTION
1	SENSOR SIGNAL RETURN
2	STARTER MOTOR OUTPUT
3	BACKUP LAMP OUTPUT
4	NOT USED
5	FUSED ACCESORY FEED
6	NOT USED
7	MANUAL LEVER POSITION SIGNAL
8	STARTER SIGNAL
9	NOT USED
10	NOT USED
11	NOT USED

CONNECT OHM METER BETWEEN TERMINALS 1 & 7 TO CHECK RESISTANCE

RANGE	RESISTANCE MIN.	RESISTANCE MAX.	VOLTAGE RANGE
PARK	3770	4607	3.97-4.85v
REVERSE	1304	1593	3.24-3.46v
NEUTRAL	660	807	2.55-3.11v
DRIVE	361	442	1.88-2.30v
2	190	232	1.23-1.51v
1	78	95	0.61-0.75v

BACK PROBE VOLTMETER LEADS INTO THE TWO WIRES IN TERMINALS
1 & 7 TO CHECK VOLTAGE

TRANSMISSION RANGE SWITCH SCHEMATIC



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Figure 2

FORD CD4E

NEW "WAVE" PLATE ADDED TO FORWARD CLUTCH ASSEMBLY

CHANGE: Beginning on January 5 1998, all CD4E transaxles were built with an added wave plate in the forward clutch pack that has created many engineering changes to related parts. This bulletin will help you identify the various design levels that the new parts have created, and the part numbers for the new design level parts.

REASON: Wave plate added to cushion the forward clutch engagement.

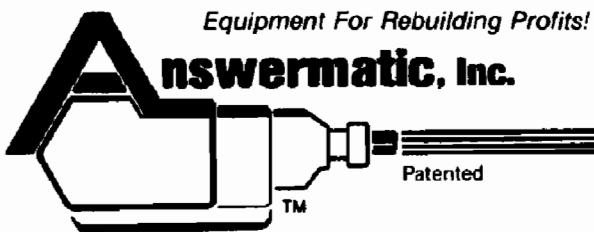
PARTS AFFECTED:

- (1) **FORWARD/COAST/DIRECT CLUTCH HOUSING** - There is a new forward clutch snap ring groove location to help accommodate the addition of the wave plate. This has now created two new clutch housings, one for the 4 cylinder and one for the V6 cylinder, just for the 1998 1/2 models. Identification and approximate dimensions are provided on the new design level clutch housings in Figure 1.
However, we still have 3 different previous design level clutch housings to contend with, which creates a total of five different clutch housings. Identification and approximate dimensions are provided on the previous design level clutch housings in Figures 2 and 3.
- (2) **FORWARD CLUTCH RETURN SPRING** - Now has a single open coil design return spring instead of the previous multiple spring design as shown in Figure 4.
- (3) **COAST CLUTCH PISTON** - Has been made 2.25mm (.089") **taller** to accommodate the addition of the wave plate in forward clutch, as shown in Figure 5.
- (4) **FORWARD CLUTCH PISTON** - Has been made 0.5mm (.020") **taller** to help accommodate for the addition of the wave plate, and positive identification can be made by the casting number on the piston. New casting number will have **RFF8RP** prefix, as shown in Figure 5.
- (5) **FORWARD ONE-WAY CLUTCH OUTER RACE** - Has been made 2.0mm (.079") **thinner** than the previous design level to accommodate the addition of the wave plate in the forward clutch, as shown in Figure 5.
- (6) **COAST CLUTCH PRESSURE PLATE** - Has been made 4.3mm (.169") **thinner** to help accommodate the addition of the wave plate in forward clutch, as shown in Figure 5.
- (7) **FORWARD CLUTCH WAVE PLATE** - Added to the forward clutch pack to help cushion the forward clutch apply, as shown in Figure 5. A valve body calibration change was also made and is coordinated with the new clutch design level.
- (8) **FORWARD CLUTCH SNAP RING** - Has always been selective to achieve the proper clutch clearance, but the above changes necessitated a new set of selective snap ring thickness to ensure the proper clutch clearance. Refer to Figure 8 for dimensions and part numbers.

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VBT 4000
Shown with
optional
Fluid
Heating
System.

Answermatic®
Patent #4809544, 4998437.
Other patents pending.

VBT 4000

PARTS AFFECTED: (Continued)

- (9) **FORWARD ONE-WAY CLUTCH AND SUN GEAR ASSEMBLY** - The forward sprag and sun gear assembly is available only as a complete service package of all of the pieces shown in Figure 6 under OEM part number F8RZ-7A089-AA. However, many of the service package parts have revised dimensions that you need to be aware of and are as follows:
- (A) **Coast Clutch Hub Retaining Ring** - No changes. Refer to Figure 6.
 - (B) **Coast Clutch Hub** - Has been made **.053 taller** to accommodate changes in the forward clutch pack, as shown in Figure 6.
Previous Design = .592".
New Design = .640".
 - (C) **Forward Sprag Outer Race** - Has been made **.077 narrower** to accommodate the changes in the forward clutch pack, as shown in Figure 6.
Previous Design Cage = .693".
New Design Cage = .616".
 - (D) **Thick End Bearing** - Has been made **.020" thinner** to accommodate the changes in the forward clutch pack, as shown in Figure 6. Both end bearings now the same.
Previous Design = .134" (Black in color)
New Design = .114" (Gold in color).
 - (E) **Forward Sprag Assembly** - Has been made **.050" narrower** to accommodate the changes in the forward clutch pack, as shown in Figure 6.
Previous Design = .593", Sprag Elements = .372".
New Design = .543", Sprag Elements = .307"
 - (F) **Thin End Bearing** - Has been made **.003" thinner** to accommodate the changes in the forward clutch pack, as shown in Figure 6. Both end bearings now the same.
Previous Design = .117" (Black in color).
New Design = .114" (Gold in color).
 - (G) **Forward Sprag Retainer** - No Changes. Refer to Figure 6.
 - (H) **Forward Sprag Retaining Ring** - No Changes. Refer to Figure 6.
 - (J) **Forward Sprag Inner Race And Sun Gear Assembly** - Has been made **.075" shorter** to accommodate the changes in the forward clutch pack, as shown in Figure 6.
Previous Design = 1.760".
New Design = 1.685".

INTERCHANGEABILITY:

Most of the parts listed in this bulletin will not interchange with previous design level parts because of dimensional changes in the parts concerned. Extra care should be exercised when it is necessary to replace any of the parts listed above.



1999 SEMINAR INFORMATION

SLIDE

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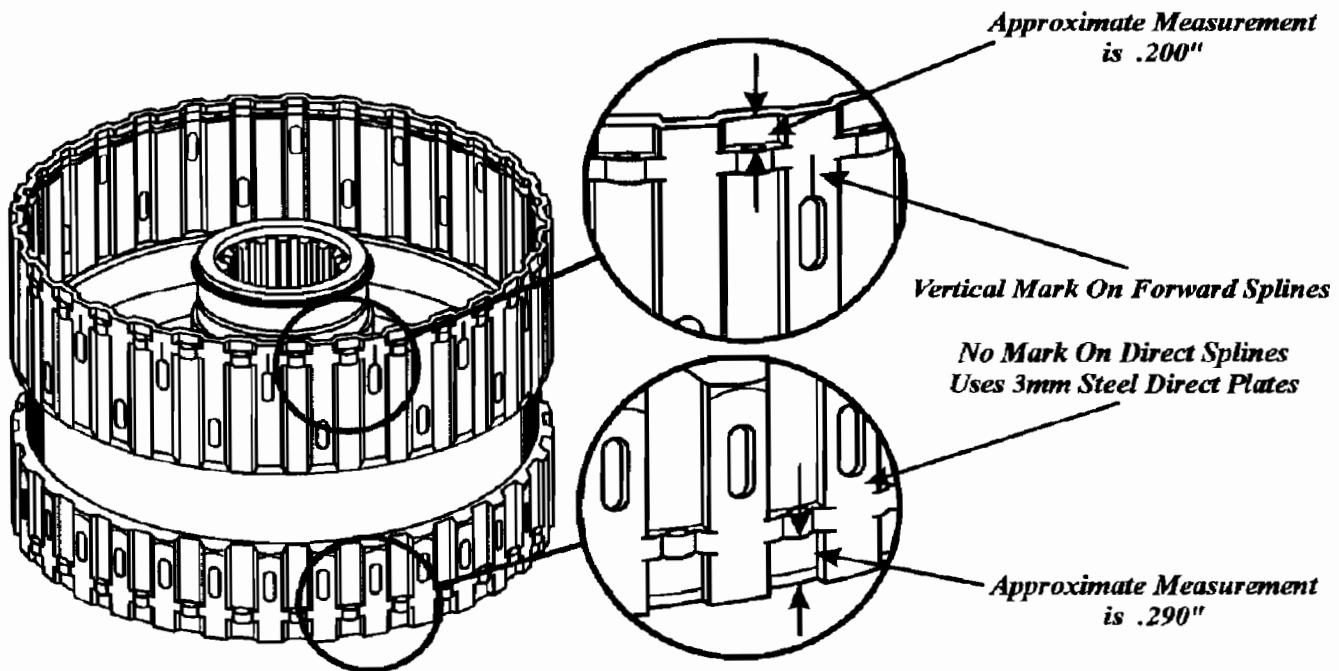
SERVICE INFORMATION:

Forward/Coast/Direct Clutch Housing, 4 Cyl, 1998 1/2 and Beyond	F8RZ-7G120-AA
Forward/Coast/Direct Clutch Housing, V6 Cyl, 1998 1/2 and Beyond	F8RZ-7G120-BA
Forward/Coast/Direct Clutch Housing, 4 Cyl, 3mm Direct Steels, Prior to 1998	F5RZ-7G120-A
Forward/Coast/Direct Clutch Housing, V6, 2mm Direct Steels, Prior to 1998	F4RZ-7G120-A
Forward/Coast/Direct Clutch Housing, 4 Cyl, 2mm Direct Steels, Prior to 1998	F7RZ-7G120-AA
Forward Clutch Return Spring Assembly (New Design)	F8RZ-7G299-AA
Coast Clutch Piston and Seal Assembly (New Design)	F8RZ-7A262-BA
Forward Clutch Piston Assembly (New Design)	F8RZ-7A262-AB
Coast Clutch Pressure Plate (New Design)	F8RZ-7B066-AA
Forward Sprag and Sun Gear Assembly (New Design)	F8RZ-7A089-AA
Forward Clutch Wave Plate (New Design)	F8RZ-7E085-AA
Forward Clutch Selective Snap Ring, 1.48mm (.058")	F8RZ-7D483-AA
Forward Clutch Selective Snap Ring, 1.64mm (.065")	F8RZ-7D483-BA
Forward Clutch Selective Snap Ring, 1.80mm (.071")	F8RZ-7D483-CA
Forward Clutch Selective Snap Ring, 1.97mm (.078")	F8RZ-7D483-DA

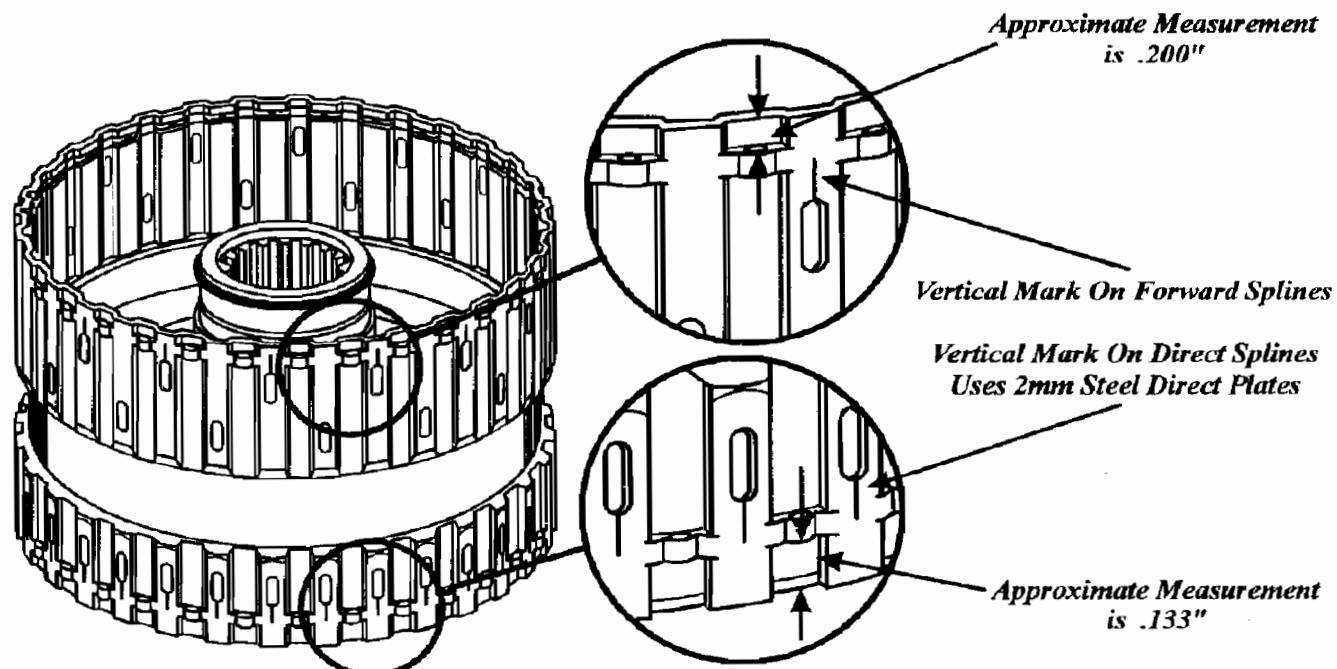
SPECIAL NOTE:

Refer to Figure 7 to ensure that you have the new design level parts assembled correctly.

CD4E COAST/FORWARD/DIRECT CLUTCH HOUSING
OEM PART NUMBER F8RZ-7G120-AA
FITS 4 CYL 1998-1/2 AND BEYOND



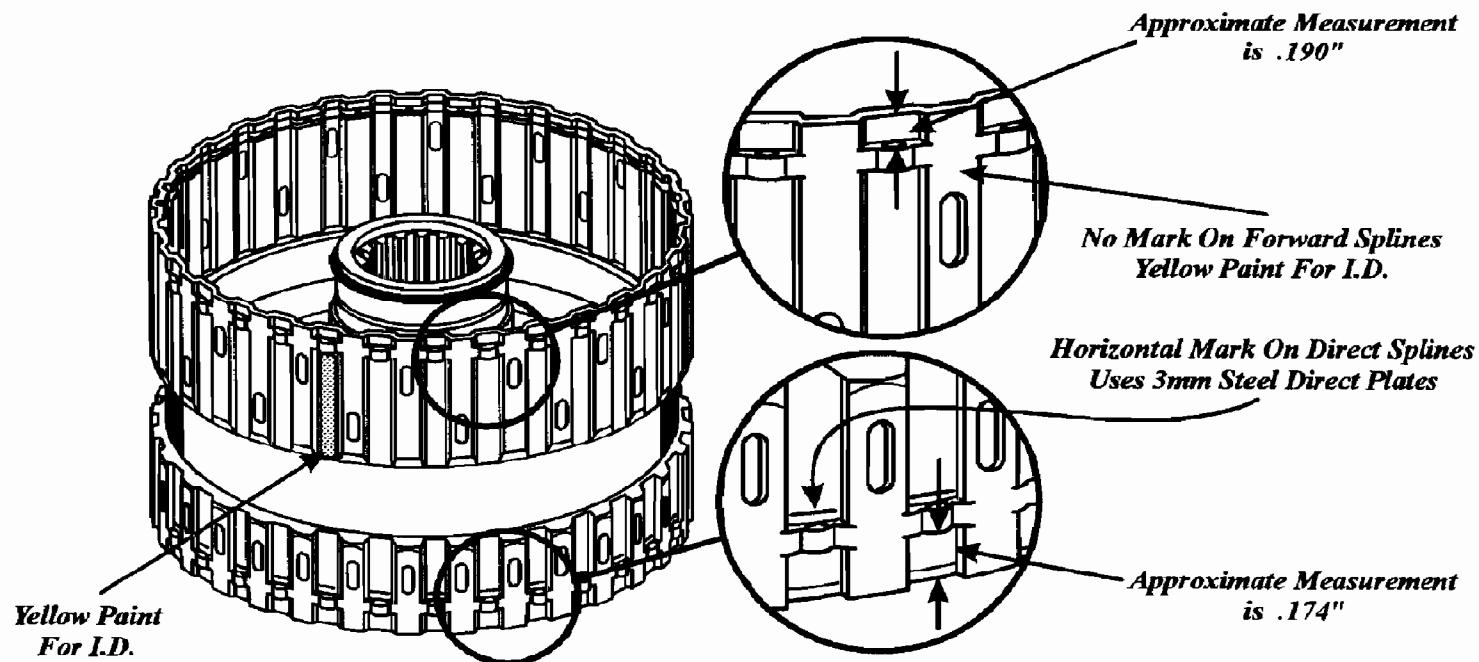
CD4E COAST/FORWARD/DIRECT CLUTCH HOUSING
OEM PART NUMBER F8RZ-7G120-BA
FITS V6 CYL 1998-1/2 AND BEYOND



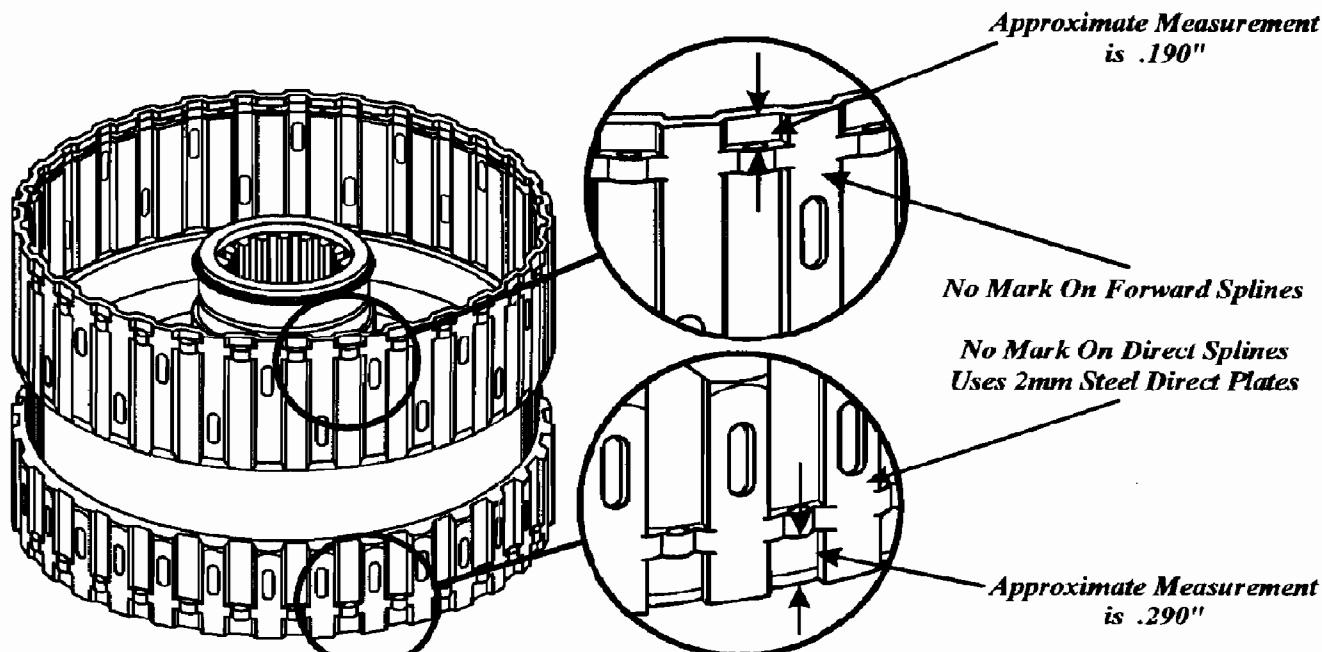
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Figure 1

CD4E COAST/FORWARD/DIRECT CLUTCH HOUSING
OEM PART NUMBER F5RZ-7G120-A
FITS 4 CYL PRIOR TO 1998-1/2



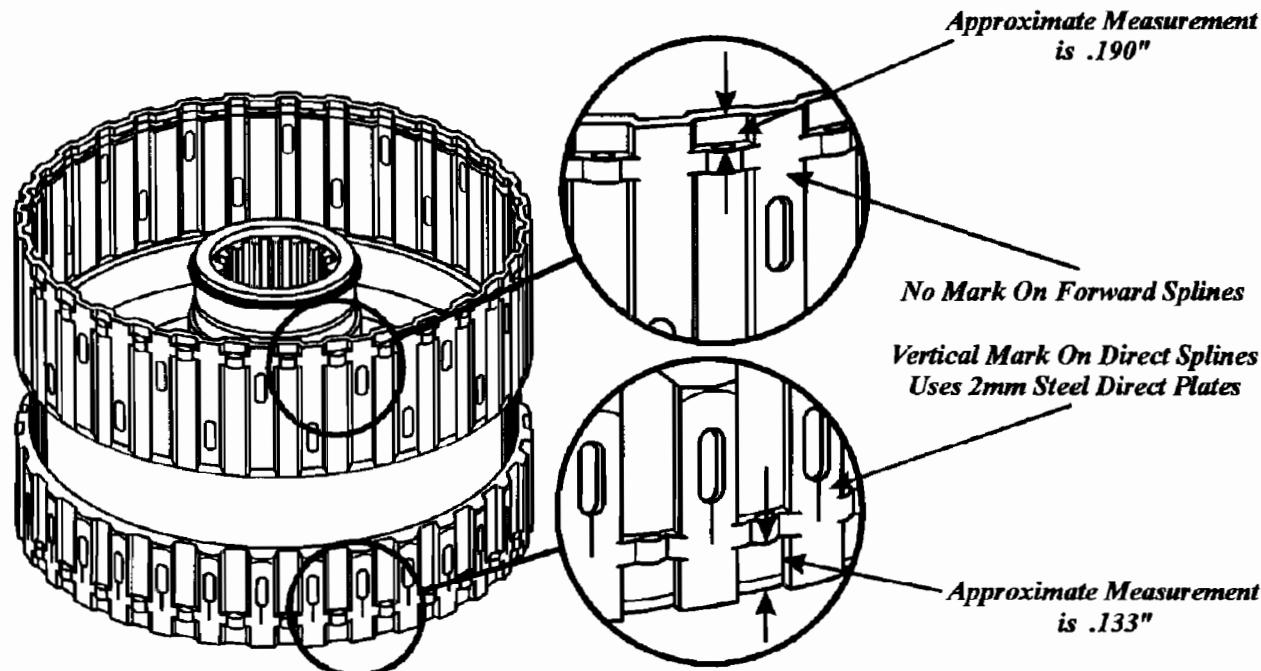
CD4E COAST/FORWARD/DIRECT CLUTCH HOUSING
OEM PART NUMBER F7RZ-7G120-AA
FITS 4 CYL PRIOR TO 1998-1/2



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Figure 2

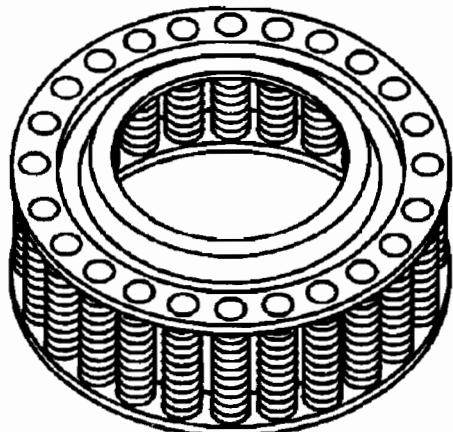
CD4E COAST/FORWARD/DIRECT CLUTCH HOUSING
OEM PART NUMBER F4RZ-7G120-A
FITS V6 CYL PRIOR TO 1998-1/2



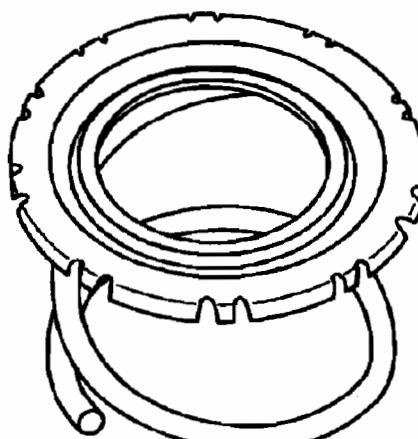
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Figure 3

**FIRST DESIGN CLUTCH
RETURN SPRING ASSEMBLY**



**NEW DESIGN CLUTCH
RETURN SPRING ASSEMBLY**

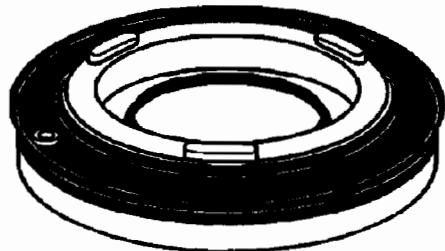


**OEM PART NUMBER
F8RZ-7G299-AA**

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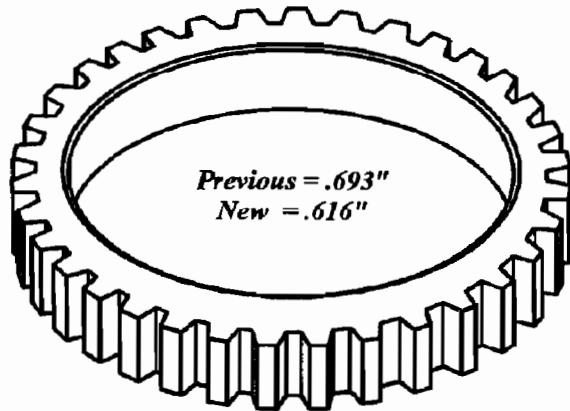
Figure 4

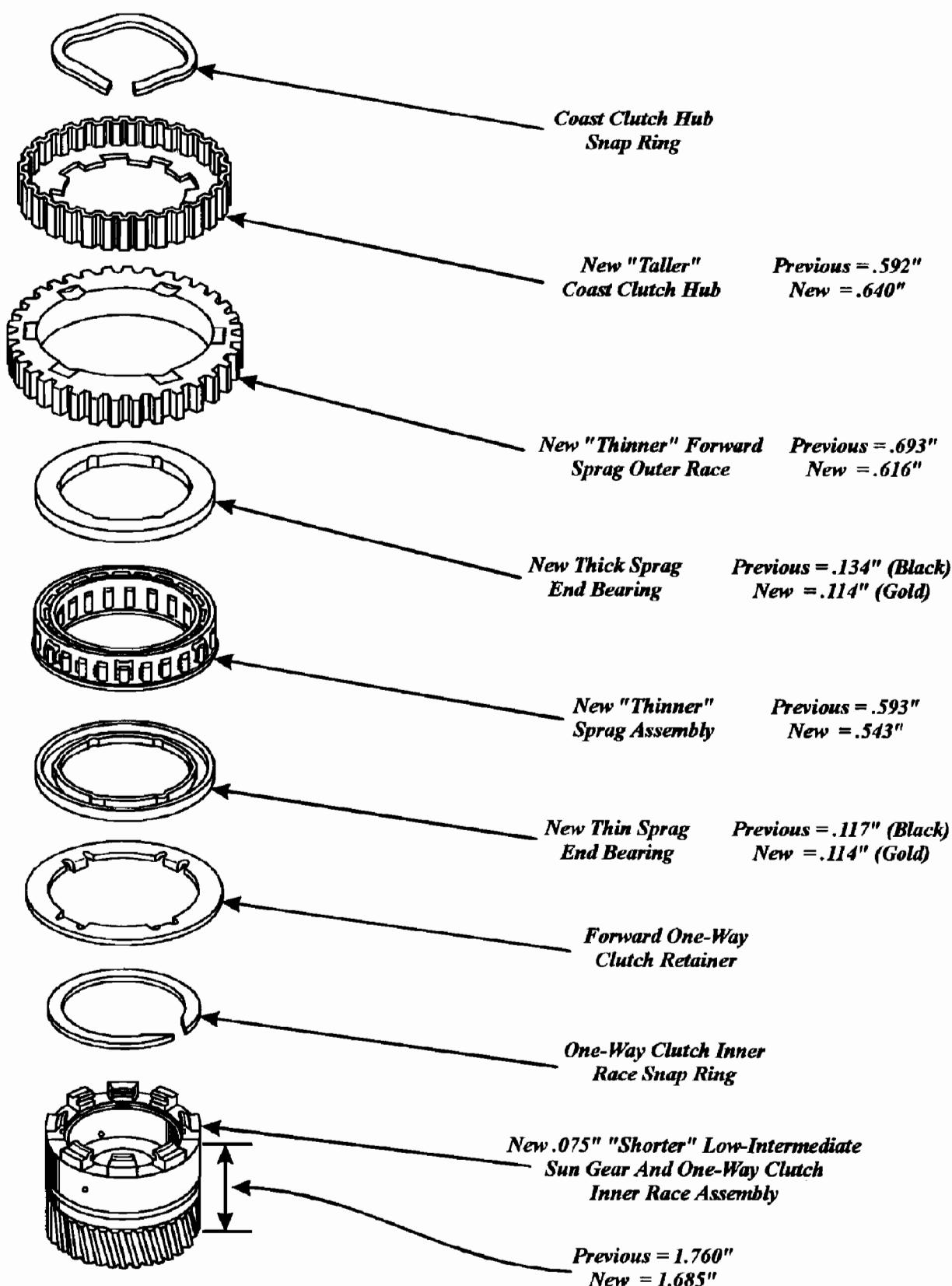
COAST CLUTCH PISTON ASSEMBLY
.100" *Taller Than Previous Design*
Stamped "F8RP"



OEM PART NUMBER
F8RZ-7A262-BA

ONE-WAY CLUTCH OUTER RACE
.077" *Thinner Than Previous Design*



LOW/INTERMEDIATE SPRAG AND SUN GEAR ASSEMBLY
PART NUMBER F8RZ-7A089-AA

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Figure 6

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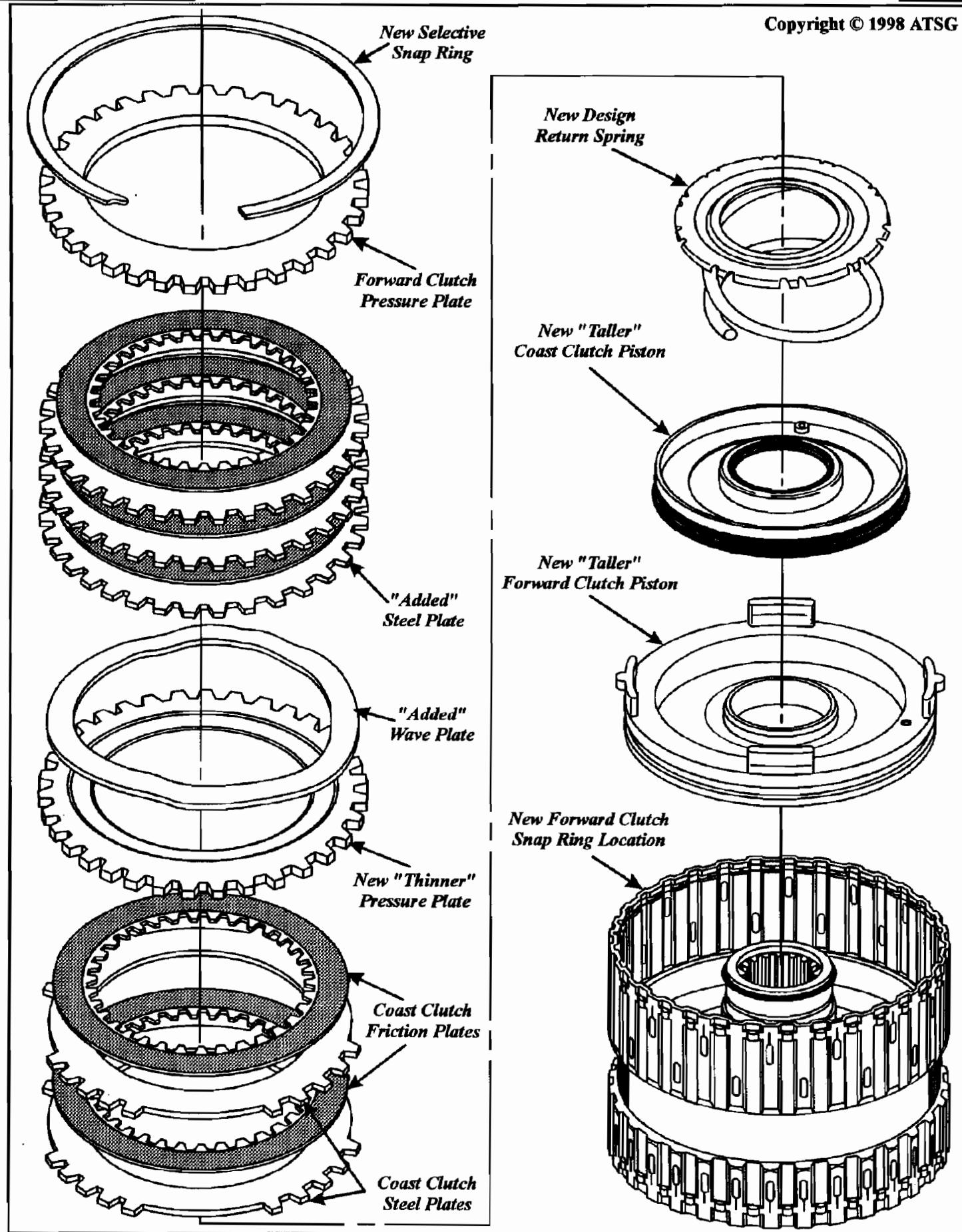
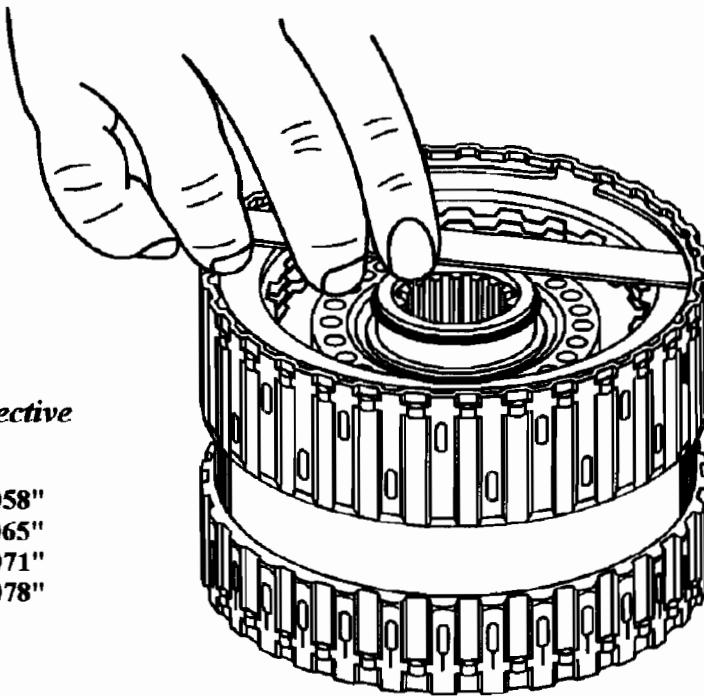


Figure 7

MEASURE FORWARD CLUTCH CLEARANCE

Forward Clutch clearance should be .012" - .038". If clearance is not within specification, select and install the proper thickness forward clutch snap ring from the chart below



*Forward Clutch Selective
Snap Rings*

F8RZ-7D483-AA = .058"
F8RZ-7D483-BA = .065"
F8RZ-7D483-CA = .071"
F8RZ-7D483-DA = .078"

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Figure 8

FORD CD4E RATIO IDENTIFICATION

COMPLAINT: After installing a good used salvage yard unit into the vehicle, it immediately sets a Trouble Code 628 or OBD Code P0740, and defined by Ford as a converter clutch slip error.

CAUSE: The wrong ratio transaxle has been installed into the vehicle, and there are several different ways that this mistake can be made.

CORRECTION: For current Drive Chain application, identification and current part numbers, refer to Figure 1. For Drive and Driven Sprocket application, identification and current part numbers, refer to Figure 2. For Final Drive application and identification, illustrations are provided in Figure 3. We have provided a quick reference chart below.

Contour/Mystique 2.0L, 4Cyl.

The following are requirements, anything else results in Gear Ratio Errors:

1. 3/4" Drive Chain with 45 links and 90 pins.
2. 57 Tooth Drive Sprocket and 52 Tooth Driven Sprocket for a Chain Ratio of 0.912.
3. 86 Tooth Final Drive Ring Gear and 26 Tooth Sun Gear for a Final Drive Ratio of 4.308.

Contour/Mystique 2.5L, 6Cyl.

The following are requirements, anything else results in Gear Ratio Errors:

1. One inch Drive Chain with 46 links and 92 pins.
2. 55 Tooth Drive Sprocket and 54 Tooth Driven Sprocket for a Chain Ratio of 0.982.
3. 74 Tooth Final Drive Ring Gear and 26 Tooth Sun Gear for a Final Drive Ratio of 3.846.

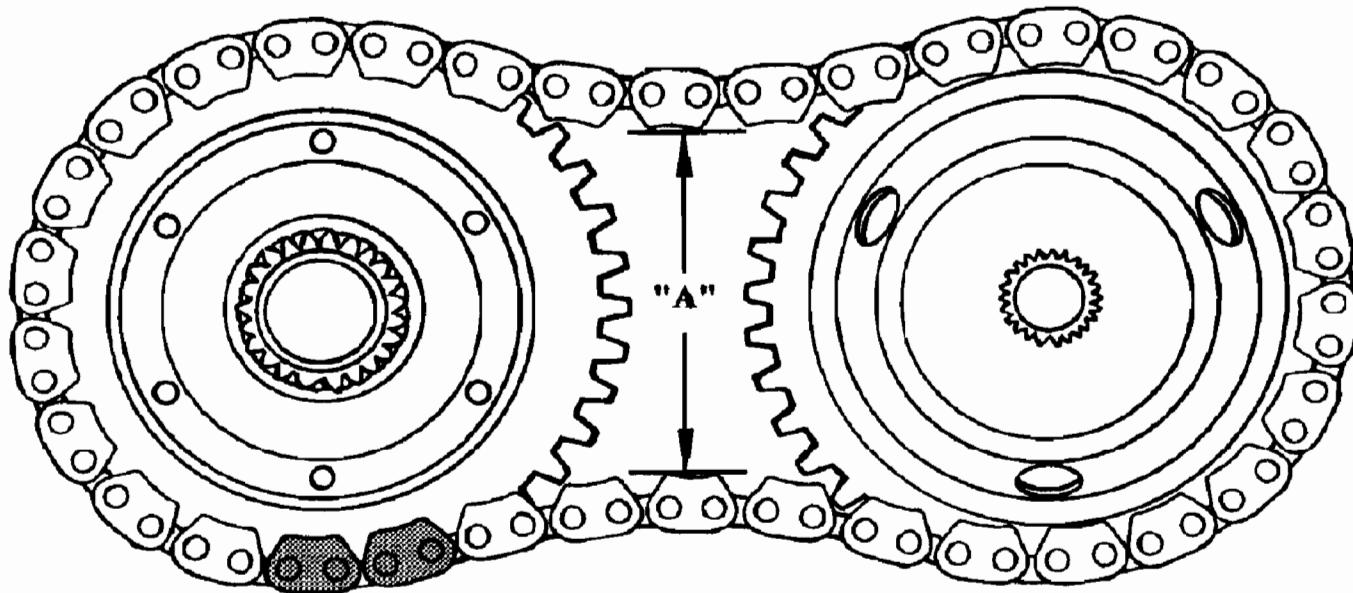
Probe 2.0L, 4Cyl.

The following are requirements, anything else results in Gear Ratio Errors:

1. 3/4" Drive Chain with 46 links and 92 pins.
2. 55 Tooth Drive Sprocket and 54 Tooth Driven Sprocket for a Chain Ratio of 0.982.
3. 74 Tooth Final Drive Ring Gear and 26 Tooth Sun Gear for a Final Drive Ratio of 3.846.

FORD CD4E DRIVE CHAIN AND SPROCKET RATIO IDENTIFICATION

**SQUEEZE CHAIN TOGETHER AND MEASURE DIMENSION "A".
IF DISTANCE BETWEEN CHAIN TEETH IS 5-1/2" OR LESS,
THEN REPLACE THE DRIVE CHAIN**



Contour/Mystique 2.0L, 4Cyl.

Drive Chain, 3/4" Wide, 45 Links, 90 Pins F6RZ-7G249-AA

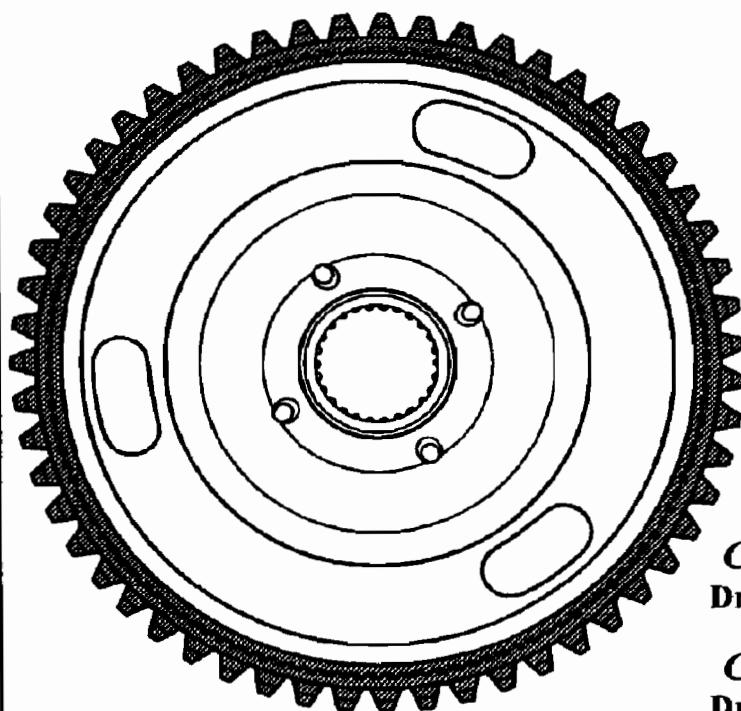
Contour/Mystique 2.5L, 6Cyl.

Drive Chain, 1" Wide, 46 Links, 92 Pins F6RZ-7G249-CA

Probe 2.0L, 4Cyl.

Drive Chain, 3/4" Wide, 46 Links, 92 Pins F6RZ-7G249-BA

CD4E DRIVE SPROCKET IDENTIFICATION

*Contour/Mystique 2.0L, 4Cyl.*

Drive Sprocket, 57T, .615" Wide F3RZ-7A153-A

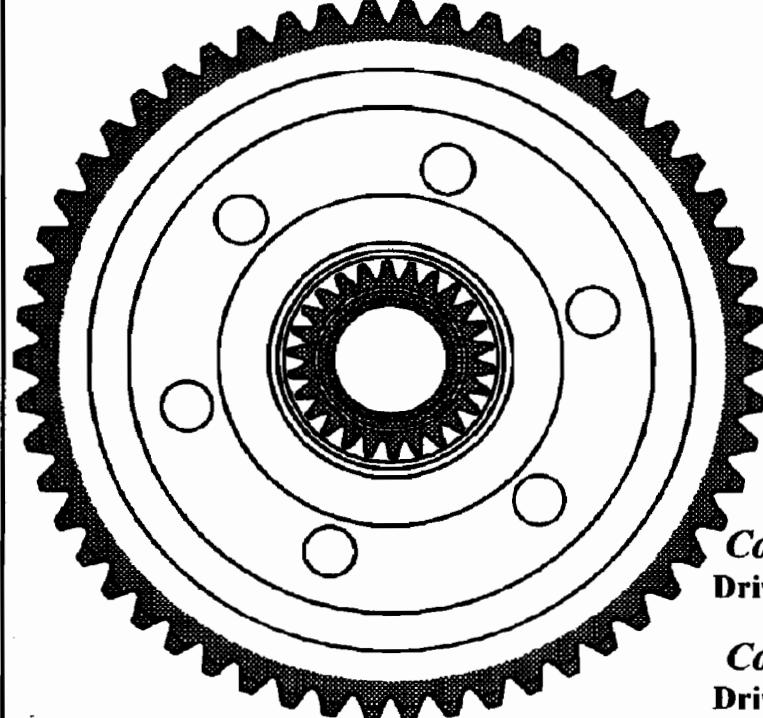
Contour/Mystique 2.5L, 6Cyl.

Drive Sprocket, 55T, .855" Wide F3RZ-7A153-B

Probe 2.0L, 4Cyl.

Drive Sprocket, 55T, .615" Wide F4RZ-7A153-C

CD4E DRIVEN SPROCKET IDENTIFICATION

*Contour/Mystique 2.0L, 4Cyl.*

Driven Sprocket, 52T, .615" Wide ... F3RZ-7G132-A

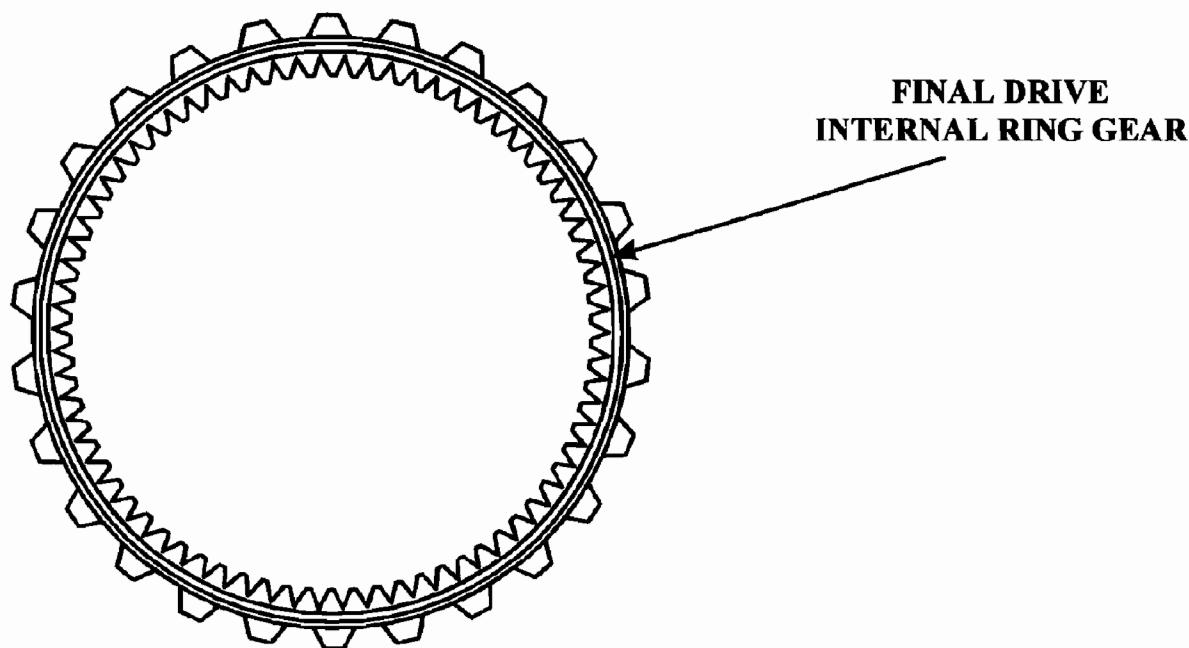
Contour/Mystique 2.5L, 6Cyl.

Driven Sprocket, 54T, .855" Wide ... F4RZ-7G132-B

Probe 2.0L, 4Cyl.

Drive Sprocket, 54T, .615" Wide F4RZ-7G132-A

CD4E FINAL DRIVE IDENTIFICATION



Contour/Mystique 2.0L, 4Cyl.

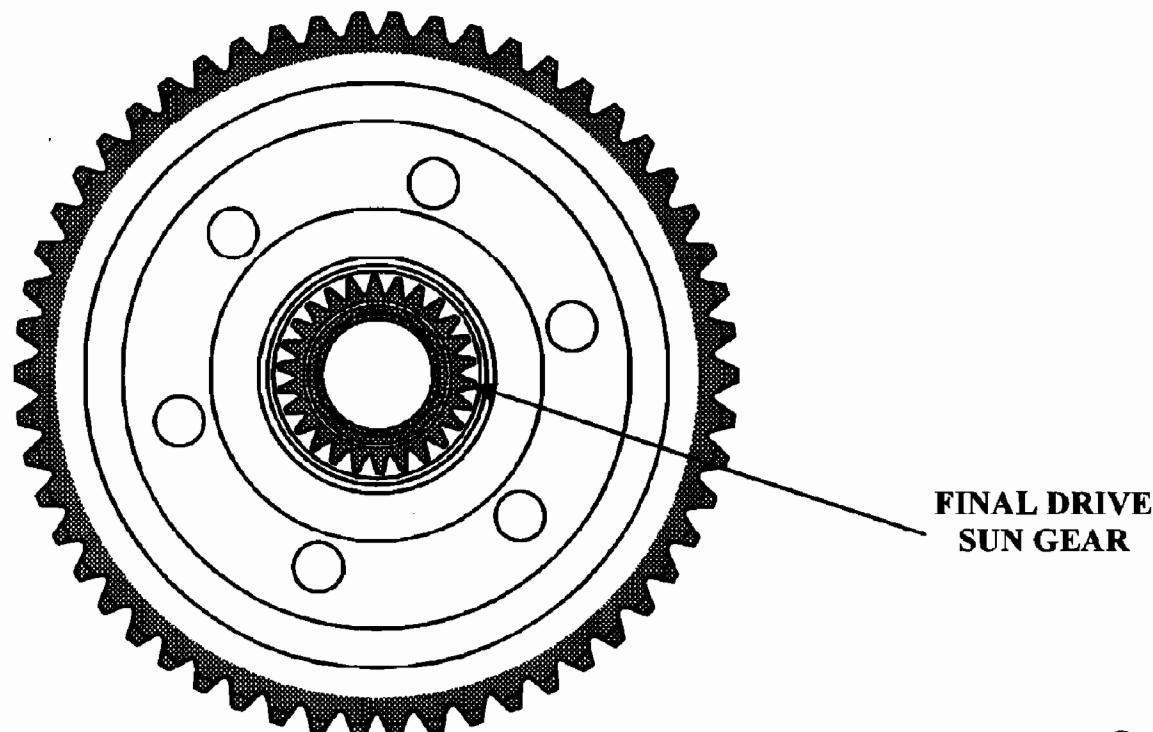
Requires, 86T Ring Gear, 26T Sun Gear Which = 4.308 Final Drive Ratio.

Contour/Mystique 2.5L, 6Cyl.

Requires, 74T Ring Gear, 26T Sun Gear Which = 3.846 Final Drive Ratio.

Probe 2.0L, 4Cyl.

Requires, 74T Ring Gear, 26T Sun Gear Which = 3.846 Final Drive Ratio.



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Figure 3

FORD 5R55E OVERDRIVE DRUM SPEED (ODS) SENSOR ELIMINATED

CHANGE: The Overdrive Drum Speed (ODS) Sensor, located in the transmission at the front of the case, was eliminated as a running change during the 1997 model year. Refer to Figure 1.

REASON: To eliminate erratic operation and malfunctions.

PARTS AFFECTED:

- (1) OVERDRIVE DRUM SPEED SENSOR - Eliminated during the 1997 production year.
- (2) TRANSMISSION CASE - New service cases will not have an Overdrive Drum Speed Sensor hole in the case. New service part number for the case is F77Z-7005-DB.

SERVICE PROCEDURE:

During the transmission rebuilding process, disconnect the ODS sensor connector, cut off the connector end and splice the wires together. Shrink wrap the wire ends and secure the wires to the harness with a tie-wrap. This should reduce the possibility of stray signals affecting the operation of the transmission. Leave the sensor installed if you are using the original case. The new service cases will not have the ODS sensor hole in the case.

SERVICE INFORMATION:

5R55E Transmission Case, No ODS Hole) F77Z-7005-DB

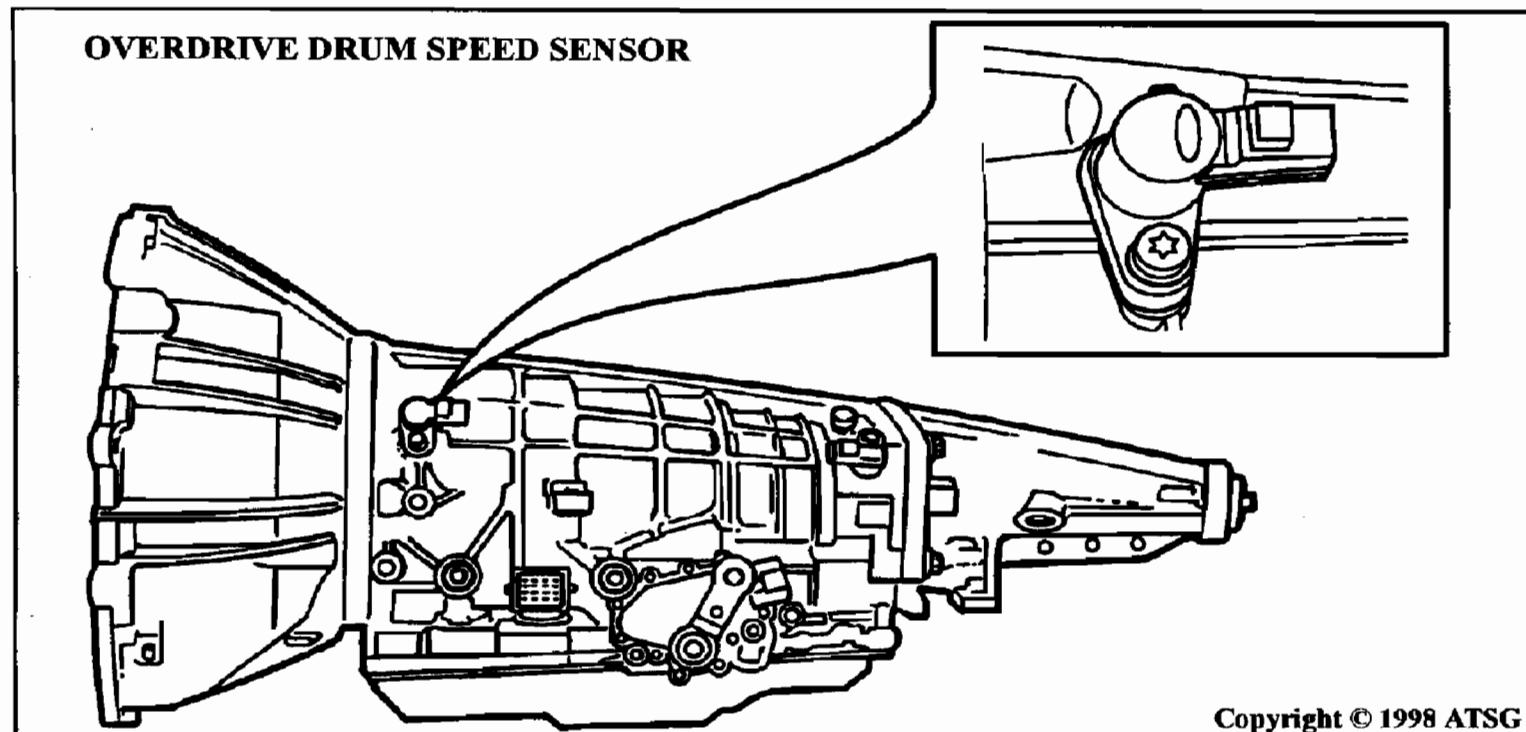


Figure 1

FORD 4R44E/4R55E

CASE CONNECTOR PIN IDENTIFICATION AND INTERNAL WIRE COLORS

COMPLAINT: Somehow, the internal wires that go through the transmission case connector get removed or disconnected from the internal side of the connector, and no one has a hint as to which cavities they must be put back into.

CAUSE: Ford Motor Company did not provide any type of locking tab on the wire terminals where the wires plug into the case connector on the internal side of the case connector. Extreme care must be used when removing the valve body to ensure that the wire terminals are not accidentally pulled out of the case connector

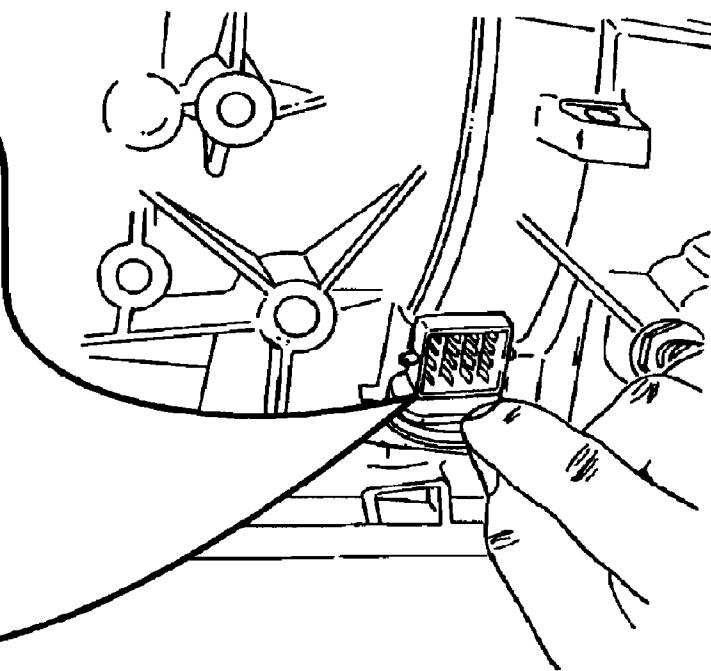
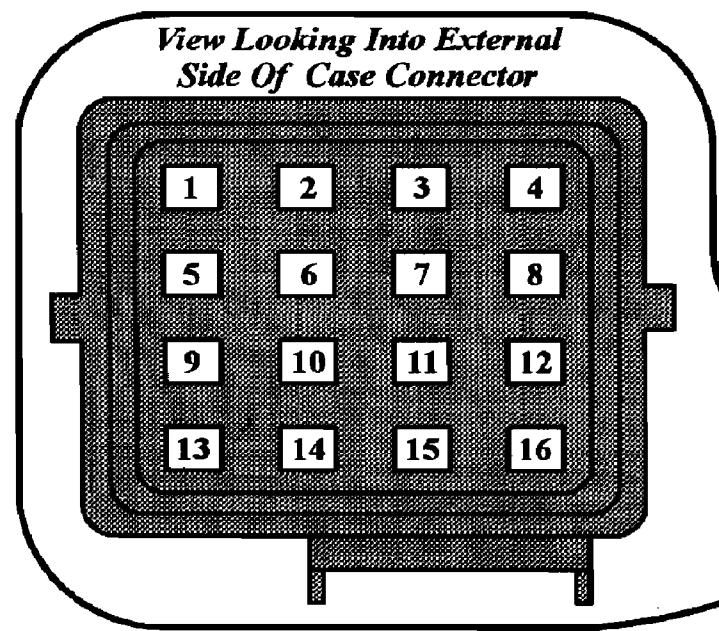
CORRECTION: The cause does not really matter at this point, we must get it back together. There is a connector pin identification chart in Figure 1. There is an internal wire schematic that includes the internal wire colors and which cavities that they belong in, illustrated in Figure 2. Figure 3 identifies the location of all of the solenoids and fluid temperature sensor on the valve body.

PIN	WIRE COLOR	DESCRIPTION
1	BLACK	CONVERTER CLUTCH SOLENOID (12V IN)
2	RED	TURBINE SHAFT SENSOR
3	WHITE	TURBINE SHAFT SENSOR
4	RED	TRANS FLUID TEMP
5	PURPLE	CONVERTER CLUTCH SOLENOID (GROUND)
6	NOT USED	NOT USED
7	YELLOW	SHIFT SOLENOID 3 (GROUND)
8	RED	TRANS FLUID TEMP
9	ORANGE	COAST CLUTCH SOLENOID (GROUND)
10	WHITE	SHIFT SOLENOID POWER 12V (CCS, SS1, SS2, SS3)
11	GREEN	ELECT. PRESSURE CONTROL (VOLTAGE)
12	BLUE	ELECT. PRESSURE CONTROL (GROUND)
13	NOT USED	NOT USED
14	BROWN	SHIFT SOLENOID 2 (GROUND)
15	NOT USED	NOT USED
16	GRAY	SHIFT SOLENOID 1 (GROUND)

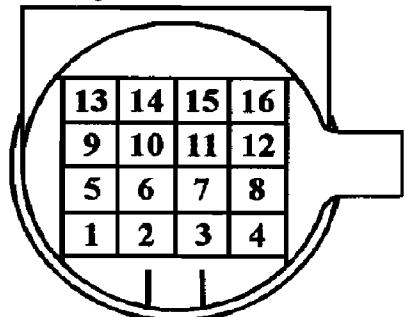
Wire Colors May Vary!

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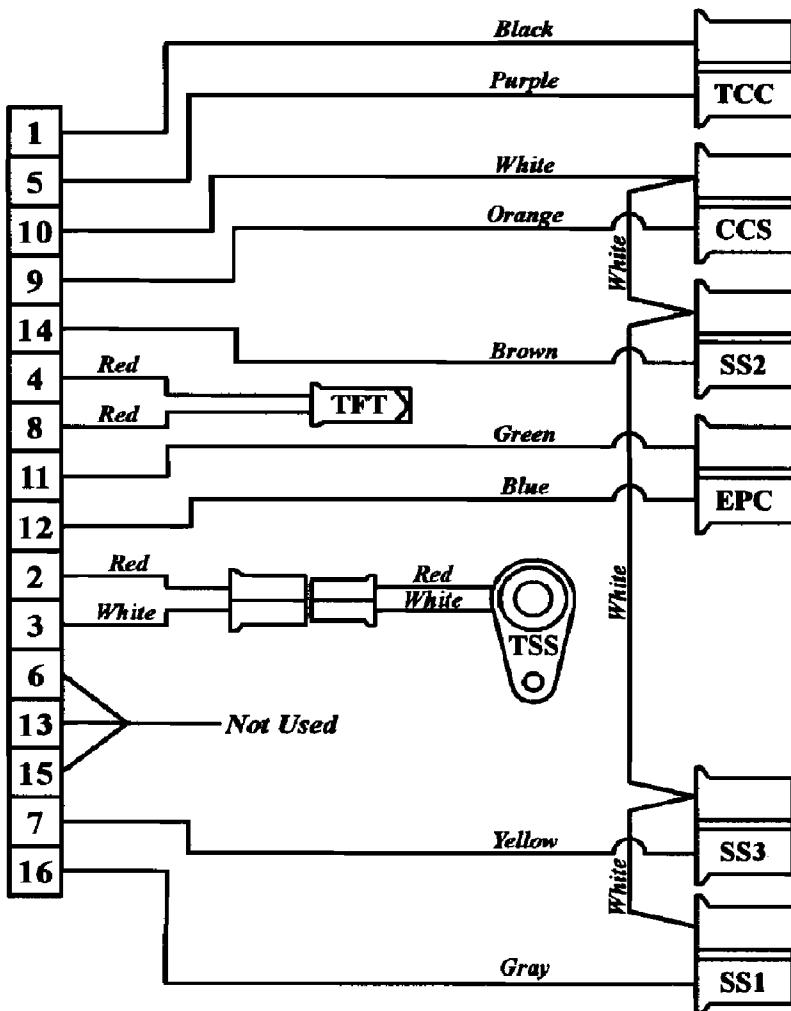
Figure 1



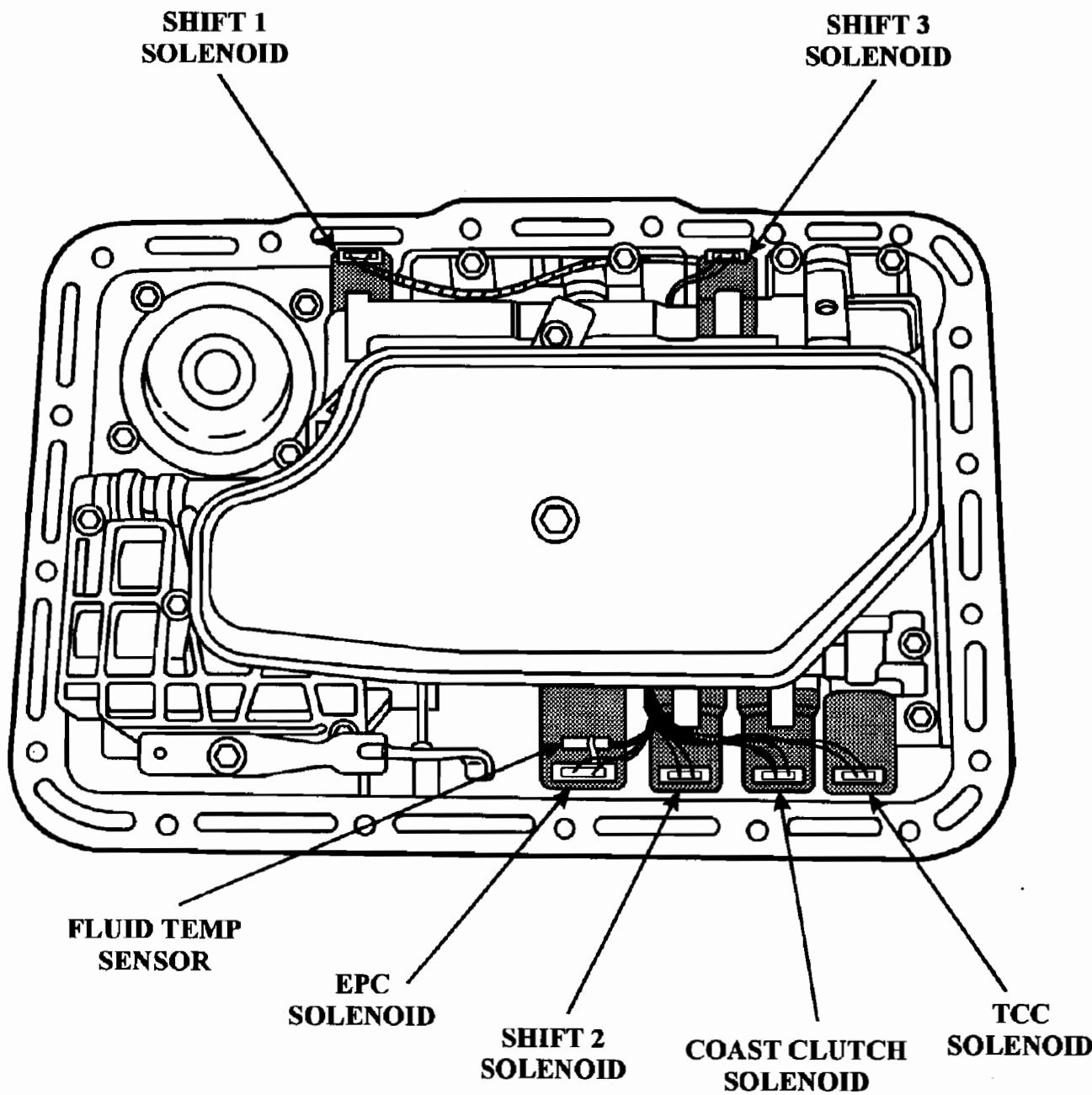
View Looking At Internal Side Of Case Connector



Wire Colors May Vary!



FORD 4R44E/4R55E SOLENOID LOCATIONS



**41TE and 42LE
NEW INPUT CLUTCH RETAINER**

CHANGE: A running change for 1996 model 41TE and 42LE transaxles was the introduction of thicker snap rings located inside the Input Clutch Retainer.

REASON: Increased durability.

PARTS AFFECTED:

(1) **INPUT CLUTCH RETAINER** - The Input Clutch Retainer snap ring grooves which are used to hold the UD/OD reaction plate in place changed dimensionally to accommodate the thicker design snap rings. Originally, 1989 Input Clutch Retainers carried three Overdrive frictions. The tapered snap ring used on top of the reaction plate measured .070" in thickness. In 1990, the Retainer was re-designed to accept a fourth Overdrive friction plate. The UD/OD reaction plate tapered snap ring groove was moved "Down" by .040" to make room for the added lined and steel plates. At this time the tapered snap ring was decreased in thickness to .060" (See Figure 1). To determine the difference between a first design and second design Retainer, measurements can be taken measuring the distance between the snap ring grooves as shown in Figure 1. If the distance is approximately .123", than it is a Retainer designed for three Overdrive Clutches. If the distance is approximately .083", than it is a Retainer designed for four Overdrive Clutches. Soon after this change occurred, the tapered snap ring was breaking on a more frequent basis. A change was made to increase the tapered snap ring to .075" in an attempt to resolve the problem. No dimensional changes took place with the Input Clutch Retainer. However, to accommodate the thicker snap ring, the reaction plate received a relief cut across the top of the lug to make room for the installation of the thicker snap ring as shown in Figure 1.

The running 1996 change increased the thickness of the tapered snap ring again as well as for the first time the lower flat snap ring. To accommodate this change, the upper and lower snap ring grooves had to be made wider to accept the thicker snap rings. To determine the difference between a second design and third design Retainer, the snap ring grooves must be measured from outer edge to outer edge as the distance between the grooves did not change (See Figure 2). The second design retainer will measure a distance of approximately .285". The new third design Retainer with the thicker snap rings will measure a distance of approximately .310".

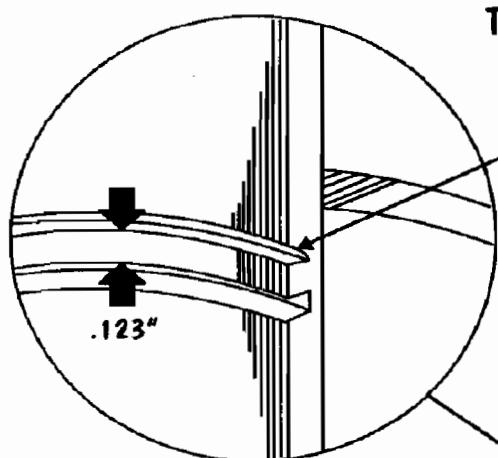
- (2) **THE FLAT UD/OD REACTION PLATE SNAP RING** - The flat snap ring located under the UD/OD Reaction plate went from .060" in thickness to .075" in thickness.
- (3) **THE TAPERED UD/OD REACTION PLATE SNAP RING** - The tapered snap ring located on top of the UD/OD Reaction Plate went from .075" in thickness to .090" in thickness.
- (3) **THE UD/OD REACTION PLATE** - The UD/OD reaction plate received a larger relief cut across the top of the lug to make room for the installation of the thicker snap ring as shown in Figure 3.
NOTE: This relief cut is so wide the friction surface area has been reduced. The outside edge of the friction will extend beyond the surface area of the plate and not make contact with the reaction plate.

SERVICE INFORMATION:

Input Clutch Retainer.....04886300
Includes the Retainer, both snap rings and two reaction plates for UD clutch clearance.

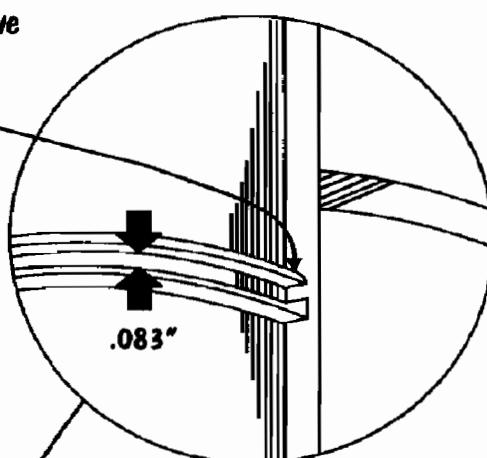
INPUT CLUTCH RETAINER

1989

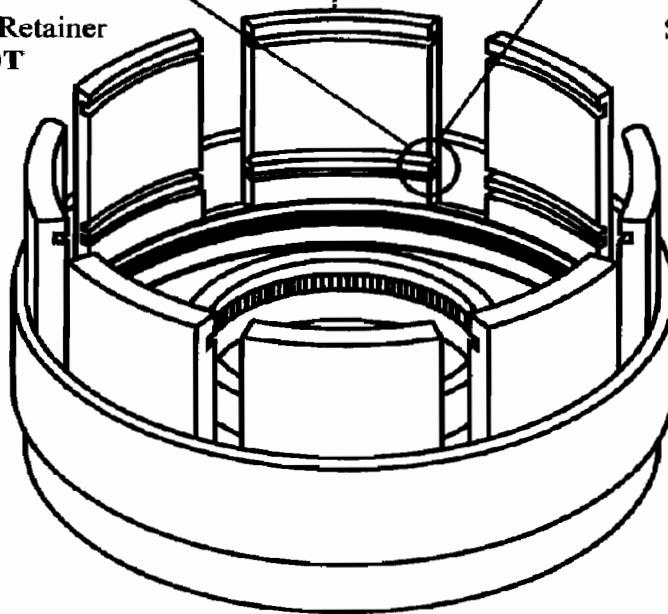


First design Input Clutch Retainer using 3 OD Frictions. NOT recommended to use.

1990

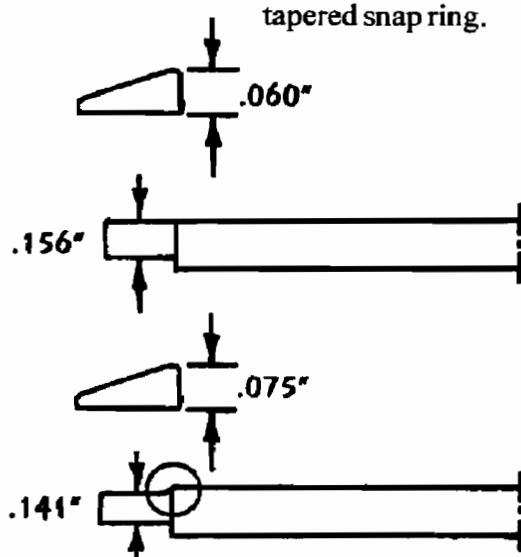
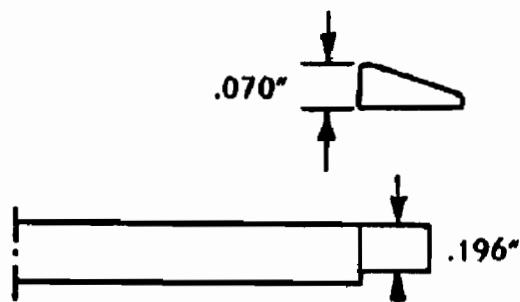


Second design Input Clutch Retainer uses 4 OD Frictions.



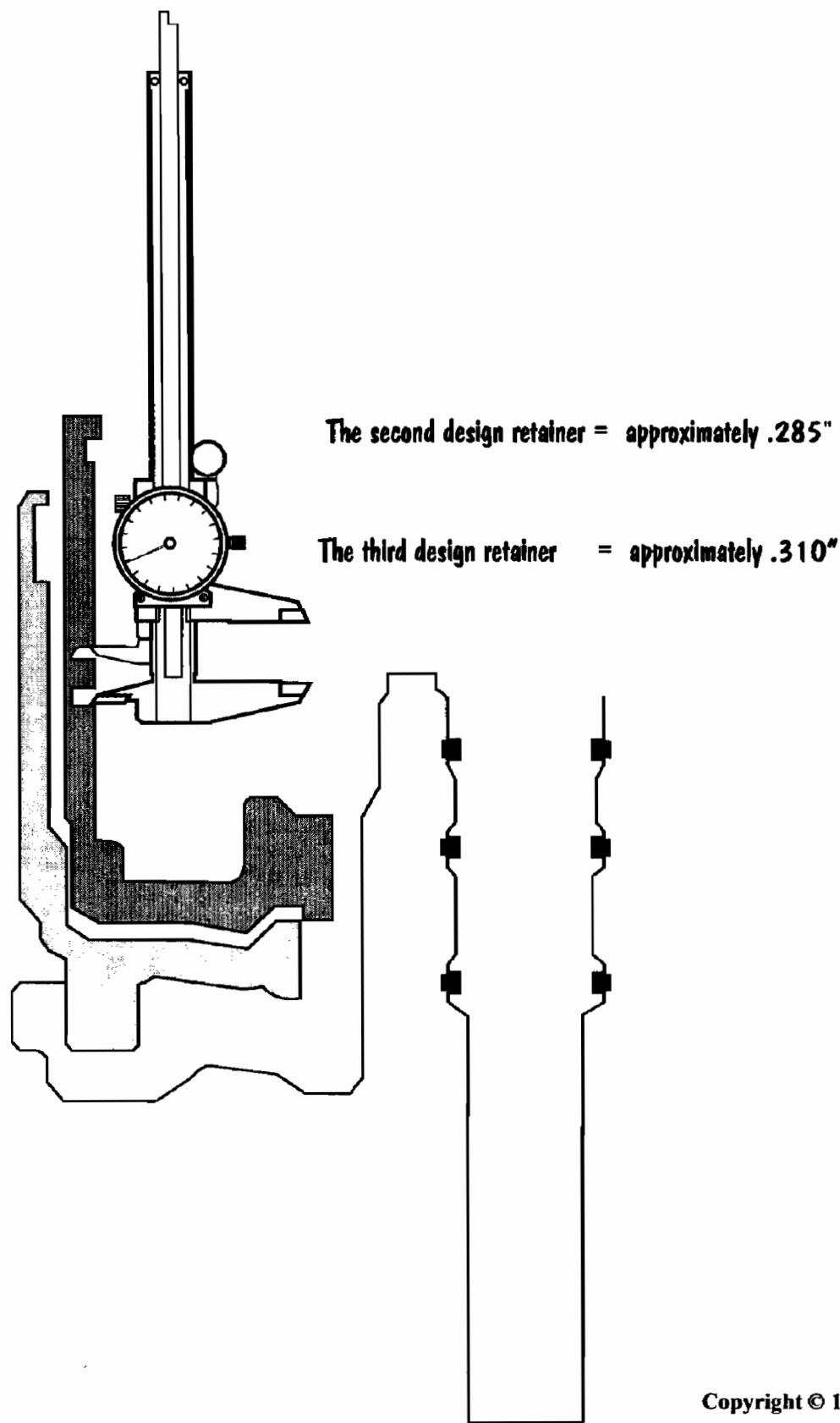
If the 1st design drum is to be used, only a .196" thick lug reaction plate is used with this style drum as well as a .070" tapered snap ring.

Originally the 2nd design retainer used a .156" thick lug reaction plate with a .060" tapered snap ring. This is NOT recommended to use. Only use a .141" thick lug reaction plate with a .075" tapered snap ring.



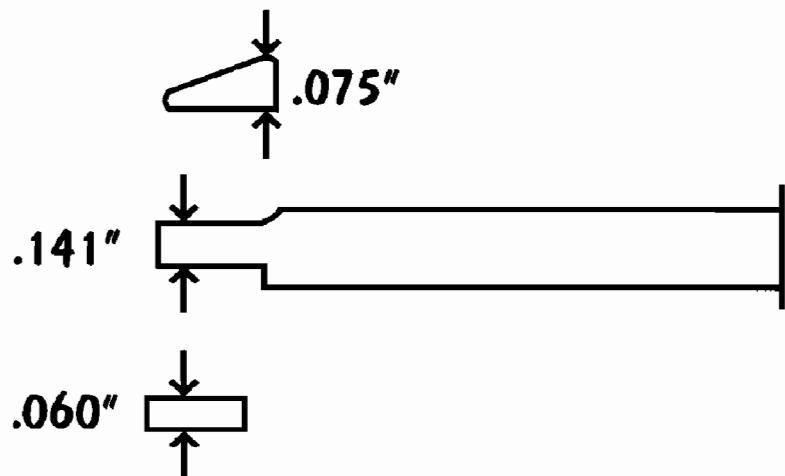
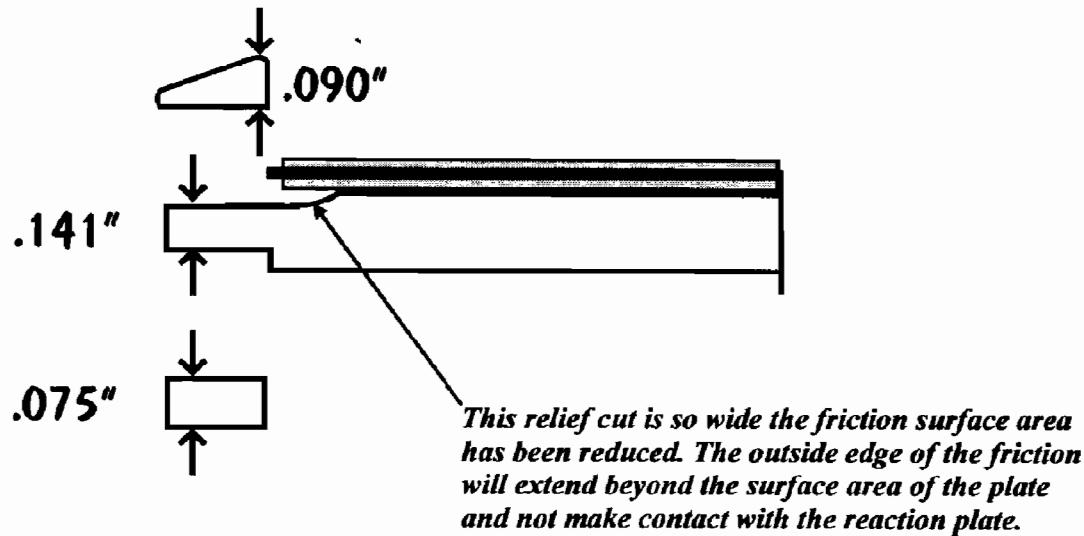
Copyright © 1998 ATSG

Figure 1



Copyright © 1998 ATSG

Figure 2

Previous Design Relief Cut UD/OD Reaction Plate*New Design Relief Cut UD/OD Reaction Plate*

CHRYSLER A500/42RE SERIES TRANSMISSIONS

NO REVERSE OR BINDS UP ON THE 3-4 SHIFT

COMPLAINT: After rebuild, a no reverse condition exists or a bind up on the 3-4 shift occurs.

CAUSE: One cause may be the incorrect assembly of the Overdrive Direct Clutch. There are two different thickness steels and pressure plates available and not knowing the differences can allow for the incorrect assembly of the pack.

CORRECTION: STEP # 1: Identify the top pressure plate you are using by measure the lug thickness. The first design pressure plate lug thickness measures approximately .215" in thickness. The second design pressure plate lug thickness measures approximately .085" in thickness (See Figure 1).

STEP # 2: Identify the steel plates you are using. The first design steels measures approximately .070" in thickness. The second design measures approximately .055" in thickness (See Figure 1).

STEP # 3: IF ALL FIRST DESIGN STEELS AND PRESSURE PLATE are being used, use the chart in figure 2 to identify the Overdrive Direct Clutch Drum you have as well as the number of clutches and steels needed for that drum IF ALL SECOND DESIGN STEELS AND PRESSURE PLATE are being used, use the Chart in Figure 3 to identify the Overdrive Direct Clutch Drum you have as well as the number of clutches and steels needed for that drum

SPECIAL NOTE: Always measure to determine the correct thickness Overdrive Piston shim. An incorrect shim may also cause the same complaint listed above.

SERVICE INFORMATION:

.085" design pressure plate.....	4461183
.055" design steels.....	4864053
.215" design pressure plate.....	4461031
.070" design steels.....	4461054

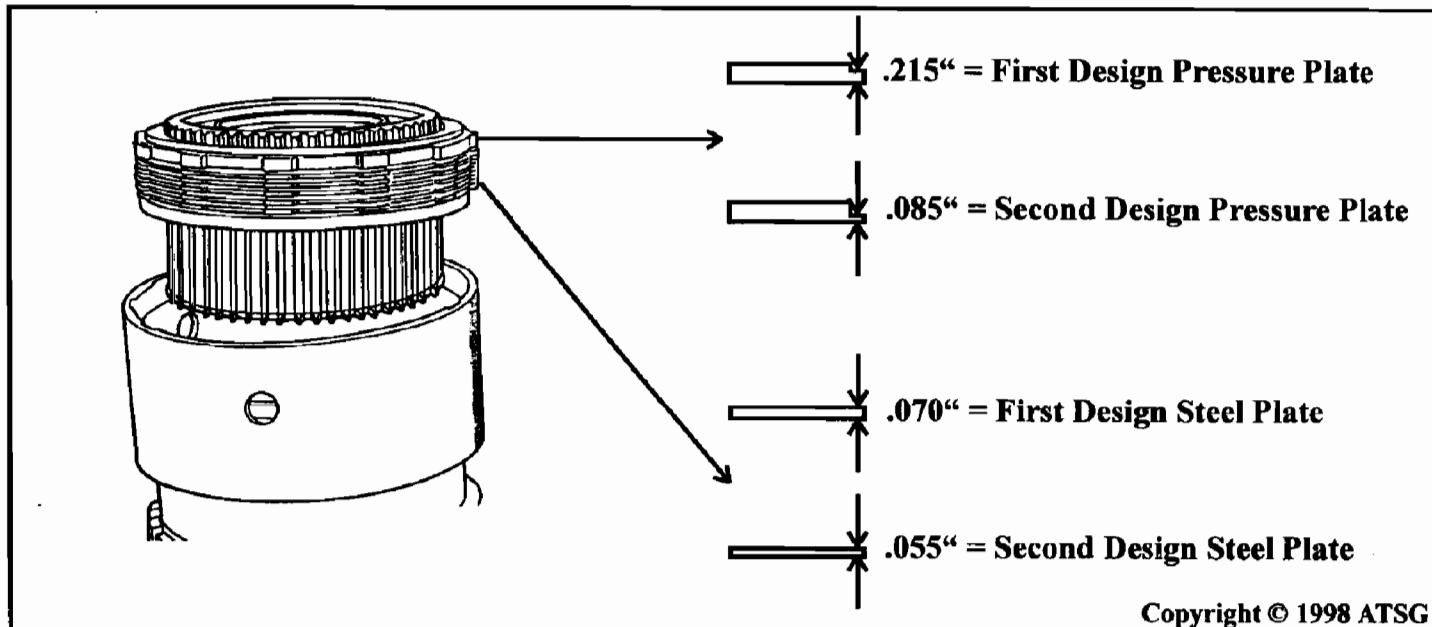


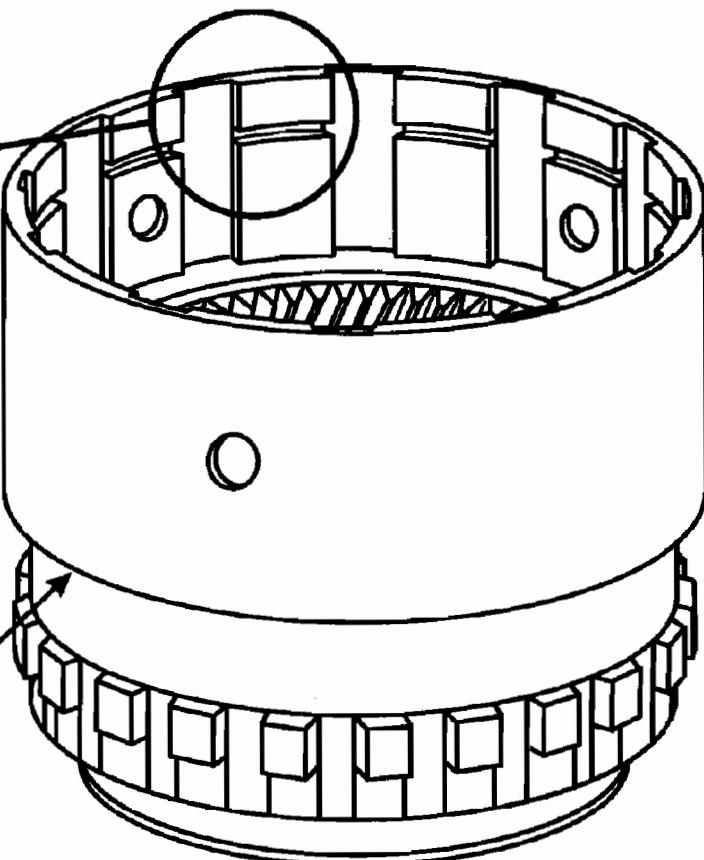
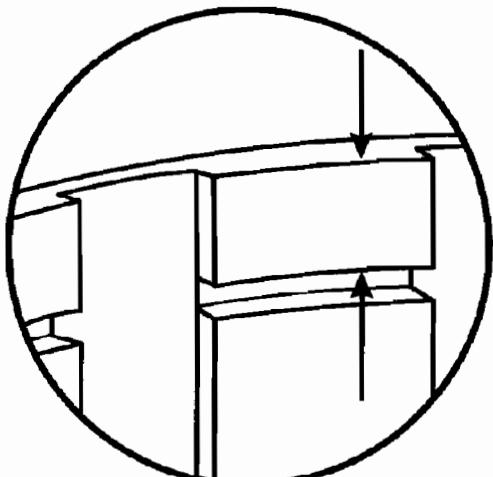
Figure 1

CHRYSLER A500/42RE SERIES TRANSMISSIONS

NO REVERSE OR BINDS UP ON THE 3-4 SHIFT

There are currently four different Overdrive/Direct clutch housings dependent on the engine size and the transmission model you are working on. If it becomes necessary to replace the drum, measure the distance between the top of snap ring groove and the top of the housing, as shown below, and use the chart below to determine the amount of friction plates and steel plates for the model you are working on. Choosing the wrong amount may create a tie-up on the 3-4 shift, or a no reverse condition. The number of lined and steel plates are based upon FIRST DESIGN PARTS.

TRANSMISSION	LINED	STEEL	MEASUREMENT
A500 (40RH) 3.9L	5	4	.485"
A500 (42RH) 5.2L	6	5	.350"
A518 (46RH)	8	7	.100"
A618 (47RH)	9	8	.090"



MEASURE THE DISTANCE BETWEEN
TOP OF THE DRUM AND TOP OF THE
SNAP RING GROOVE AS SHOWN

OVERDRIVE/DIRECT CLUTCH HOUSING

Figure 2

CHRYSLER A500/42RE SERIES TRANSMISSIONS

NO REVERSE OR BINDS UP ON THE 3-4 SHIFT

There are currently four different Overdrive/Direct clutch housings dependent on the engine size and the transmission model you are working on. If it becomes necessary to replace the drum, measure the distance between the top of snap ring groove and the top of the housing, as shown below, and use the chart below to determine the amount of friction plates and steel plates for the model you are working on. Choosing the wrong amount may create a tie-up on the 3-4 shift, or a no reverse condition. **The number of lined and steel plates are based upon SECOND DESIGN PARTS.**

TRANSMISSION	LINED	STEEL	MEASUREMENT
A500 (40RH) 3.9L	6	5	.485"
A500 (42RH) 5.2L	8	7	.350"
A518 (46RH)	10	9	.100"
A618 (47RH)	11	10	.090"

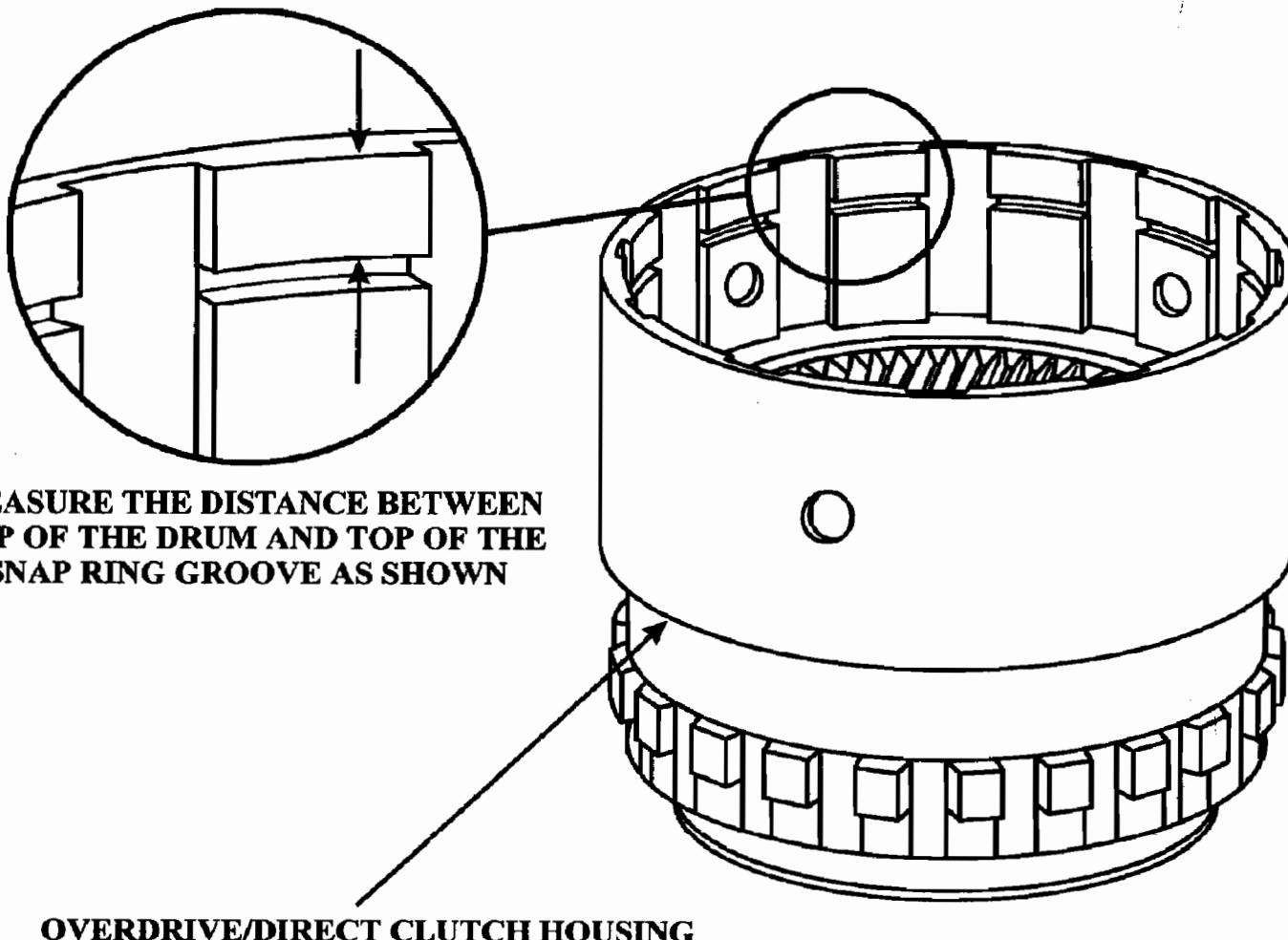


Figure 3

OBD II CODE INTERPRETATION

PO742....TCC STUCK ON**SYSTEM THAT GENERATED CODE**

P = Powertrain
C = Chassis
B = Body
U = Network

0 = GENERIC CODE

Meant to be same code and
same fault on all vehicles.

1 = MANUFACTURER SPECIFIC

Code meaning will vary from
manufacturer to manufacturer.

2 = RESERVED FOR FUTURE USE**3 = RESERVED FOR FUTURE USE****SYSTEM AREA AFFECTED**

- 1 = Fuel/Air Metering
- 2 = Injector Circuits
- 3 = Ignition/Misfire
- 4 = Emissions
- 5 = Vehicle/Idle Speed
- 6 = Output Controls
- 7 = Transmission Controls
- 8 = Reserved

INDICATES THE TYPE
OF FAULT THAT
GENERATED THE CODE
(Open, Short, ETC.)



1999 SEMINAR INFORMATION

SLIDE

141

41TE & 42LE OBDII DIAGNOSTIC TROUBLE CODE LIST

Fault Code	Description	Limp-in Set	MIL Illumination Late Models Only	OBDII Codes
11	Internal TCM	YES	YES	P0700
12	Battery was disconnected	YES	NO	P1792
13	Internal TCM	YES	YES	P0700
14	Transmission Relay Output Always On	YES	YES	P1767
15	Transmission Relay Output Always Off	YES	YES	P1768
16	Internal TCM	YES	YES	P0605
17	Internal TCM	YES	YES	P0605
18	Engine Speed Sensor Circuit	YES	YES	P0725
19	BUS Communication with Engine Module	YES	NO	P0600
20	Switched Battery	YES	YES	P1765
21	OD Pressure Switch Sensor Circuit	YES (Pre-96)	YES	P1780
22	2/4 Pressure Switch Sensor Circuit	YES	YES	P1781
23	2/4 & OD Pressure Switch Sensor Circuit	YES (Pre-96)	N/A	P1782
24*	L/R Pressure Switch Circuit	NO	YES	P1783
25	LR & OD Pressure Switch Sensor Circuit	YES (Pre-96) N/A (96/97)	N/A	P1784
26	L/R & 2/4 Pressure Switch Sensor Circuit	YES (Pre-96) N/A (96/97)	N/A	P1785
27	All Pressure Switch Circuits	YES (Pre-96) N/A (96/97)	N/A	P1786
28	Check Shifter Signal	NO	NO	P0705
29*	Throttle Position Sensor	NO	YES	P0120

* In 1997, Codes 24, 29, 37, 47, and 50 thru 58 can take up to 5 minutes of substituted gear operation to illuminate the MIL. When using the DRBIII, these faults can be found in "OBD II" Diagnostics, "One Trip Faults". They are OBD II codes waiting to mature.

41TE & 42LE OBDII DIAGNOSTIC TROUBLE CODE LIST

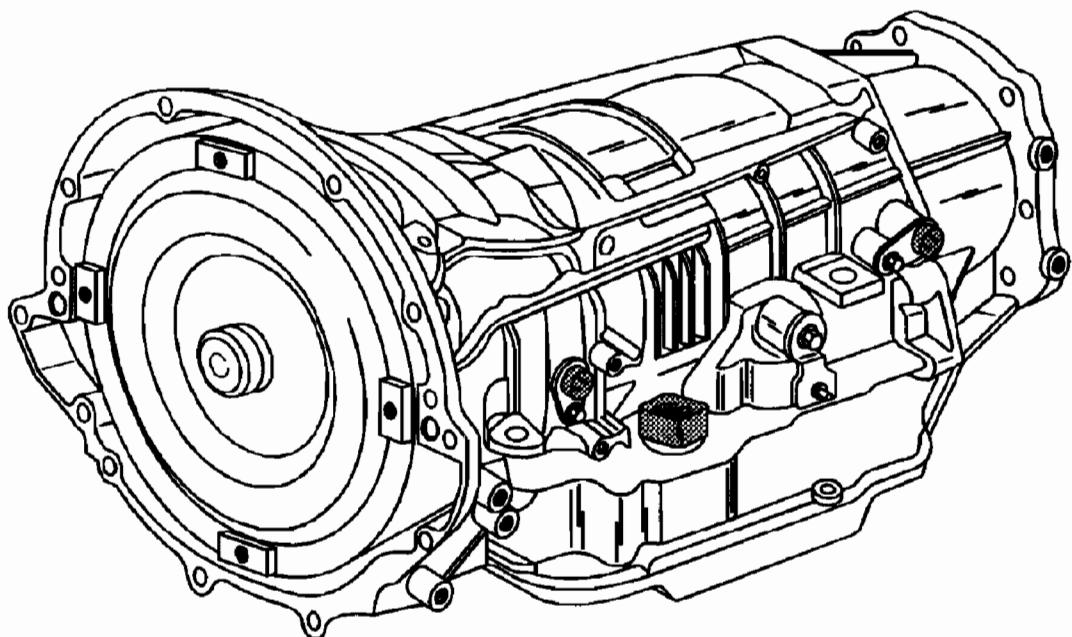
Fault Code	Description	Limp-in Set	MIL Illumination Late Models Only	OBDII Codes
31	OD Hydraulic Pressure Switch Circuit	YES	YES	P1787
32	2/4 Hydraulic Pressure Switch Circuit	YES	YES	P1788
33	2/4 & OD Hydraulic Pressure Switch Circuit	YES	YES	P1789
35	Loss of Prime	NO	NO	P1791
36	Fault Immediately After Shift	NO	NO	P1790
37 *	Solenoid Switch Valve Stuck in the TCC Position	NO	YES	P1775
38 *	TCC Apply Failure	NO	YES	P0740
41	LR Solenoid Circuit	YES	YES	P0750
42	2/4 Solenoid Circuit	YES	YES	P0755
43	OD Solenoid Circuit	YES	YES	P0760
44	UD Solenoid Circuit	YES	YES	P0765
45	Internal TCM	NO	YES	P1795
46	3-4 Shift Abort	NO	NO	P0783
47*	Solenoid Switch Valve Stuck in the L/R Position	YES	YES	P1776
48	TRD Link Communication Error	NO	NO	P1793

* In 1997, Codes 24, 29, 37, 47, and 50 thru 58 can take up to 5 minutes of substituted gear operation to illuminate the MIL. When using the DRBIII, these faults can be found in "OBD II" Diagnostics, "One Trip Faults". They are OBD II codes waiting to mature.

41TE & 42LE OBDII DIAGNOSTIC TROUBLE CODE LIST

Fault Code	Description	Limp-in Set	MIL Illumination Late Models Only	OBDII Codes
50*	Gear Ratio Error in Reverse	YES	YES	P0730
51*	Gear Ratio Error in 1st	YES	YES	P0731
52*	Gear Ratio Error in 2nd	YES	YES	P0732
53*	Gear Ratio Error in 3rd	YES	YES	P0733
54*	Gear Ratio Error in 4th	YES	YES	P0734
56*	Input Speed Sensor Error	YES	YES	P0715
57*	Output Speed Sensor Error	YES	YES	P0720
58*	Speed Sensor Ground	YES	YES	P1794
60	Inadequate L/R Clutch Volume	NO	NO	P1770
61	Inadequate 2/4 Clutch Volume	NO	NO	P1771
62	Inadequate OD Clutch Volume	NO	NO	P1772
70	Autostick Sensor Circuit	NO	NO	P1796
71	Manual Shift Overheat	NO	NO	P1797
72	Temperature Sensor	NO	NO	P0710
73	Worn Out/Burnt Transaxle Fluid	NO	NO	P01798
74	Calculated Oil Temp. in Use	NO	NO	P01799
75	Repairing High Temperature Operations Activated	NO	NO	N/A
76	Repairing Power-Up At Speed	NO	NO	N/A

* In 1997, Codes 24, 29, 37, 47, and 50 thru 58 can take up to 5 minutes of substituted gear operation to illuminate the MIL. When using the DRBIII, these faults can be found in "OBD II" Diagnostics, "One Trip Faults". They are OBD II codes waiting to mature.

**JEEP GRAND CHEROKEE 45RFE TRANSMISSION
FOUND BEHIND 4.7L ENGINE FOR 1999**

CLUTCH APPLICATION CHART

SELECTOR POSITION	LO/REV CLUTCH	UD CLUTCH	SECOND CLUTCH	OD CLUTCH	FOURTH CLUTCH	REVERSE CLUTCH	LOW OVERRUN CLUTCH	GEAR RATIO
PARK	ON							
REVERSE	ON					ON		3.00:1
NEUTRAL	ON							
OD-1ST	ON*	ON					HOLD	3.00:1
OD-2ND		ON	ON					1.67:1
2ND PRIME		ON			ON			1.50:1
OD-3RD		ON		ON				1.00:1
OD-4TH				ON	ON			0.75:1
OD-LIMP		ON		ON				1.00:1
(2)-1ST	ON*	ON					HOLD	3.00:1
(2)-2ND		ON	ON					1.67:1
(2)-LIMP		ON	ON					1.67:1
(1)-1ST	ON*	ON					HOLD	3.00:1

* L/R Clutch is on only with the output shaft speed below 150 RPM.

SOLENOID CHART

	N.O.	N.C.	N.O.	N.O.	N.O.	N.C.	
SELECTOR POSITION	LR/CC SOLENOID	UD SOLENOID	OD SOLENOID	2nd CLUT SOLENOID	4th CLUT SOLENOID	Multi-Select SOLENOID	Variable Force SOLENOID
P/N Under 8	ON					ON	Modulating
P/N Over 8						ON	Modulating
REVERSE							Modulating
REV-Block						ON	Modulating
OD-1ST	ON					ON	Modulating
OD-2ND	*			ON		ON	Modulating
2ND PRIME	*				ON	ON	Modulating
OD-3RD	*						Modulating
OD-4TH	*	ON			ON		Modulating
(1)-1ST Or Autostick	ON					ON	Modulating
FAILSAFE	OFF	OFF	OFF	OFF	OFF	OFF	OFF

* Modulating (EMCC) if the Converter Clutch has been signaled.

PRESSURE SWITCHES

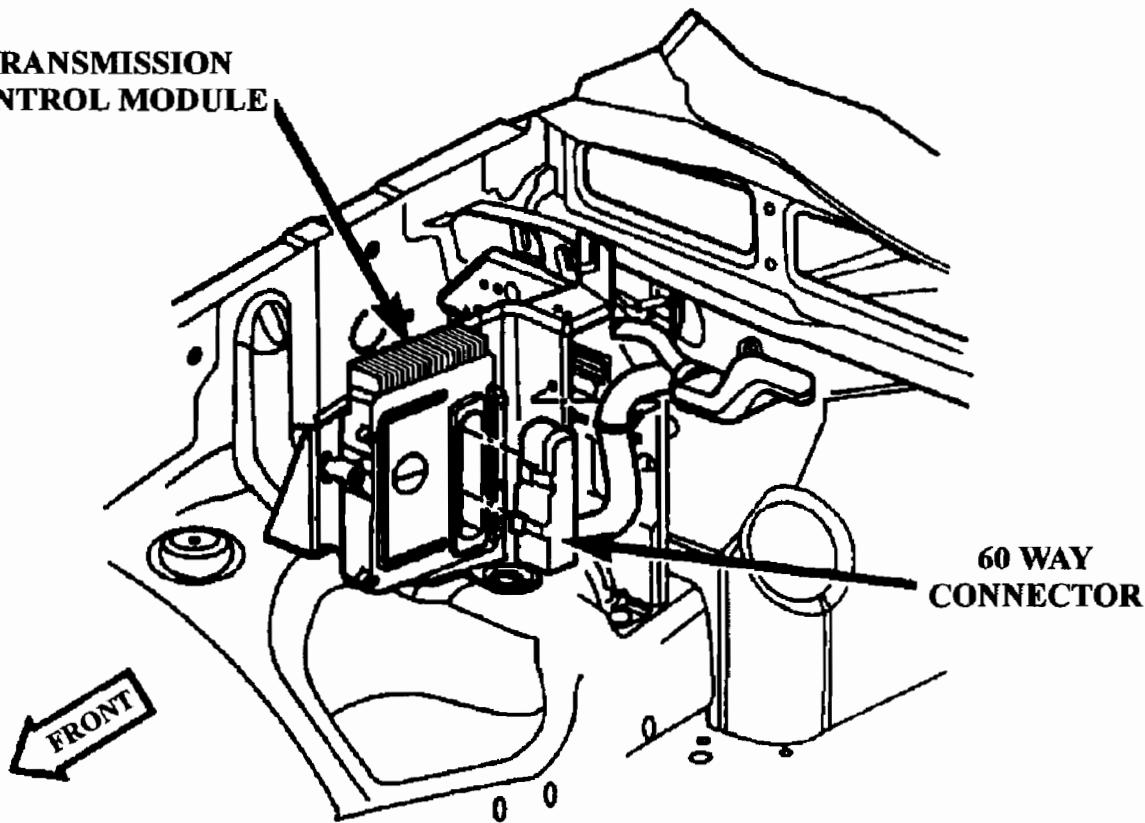
The pressure switches are located inside the solenoid and pressure switch assembly and are only serviced by replacing the complete assembly.

The Transmission Control Module (TCM) is located as shown below and relies on five pressure switches to monitor pressure in the Low/Rev, 2nd Clutch, 4th Clutch, Underdrive, and Overdrive hydraulic circuits. The primary function of these switches is to help the TCM detect when the clutch circuit hydraulic failures occur. The switches close at 23 psi and open at 11 psi, and indicate whether or not pressure exists. The switches are continuously monitored by the TCM for the correct states (Open or Closed) in each gear as shown in the chart below.

SWITCH CHART

	<i>Low/Rev</i>	<i>2nd Clut</i>	<i>4th Clut</i>	<i>Underdrive</i>	<i>Overdrive</i>
<i>Park/Neut</i>	<i>Closed</i>	<i>Open</i>	<i>Open</i>	<i>Open</i>	<i>Open</i>
<i>Reverse</i>	<i>Open</i>	<i>Open</i>	<i>Open</i>	<i>Open</i>	<i>Open</i>
<i>First</i>	<i>Closed*</i>	<i>Open</i>	<i>Open</i>	<i>Closed</i>	<i>Open</i>
<i>Second</i>	<i>Open</i>	<i>Closed</i>	<i>Open</i>	<i>Closed</i>	<i>Open</i>
<i>2nd Prime</i>	<i>Open</i>	<i>Open</i>	<i>Closed</i>	<i>Closed</i>	<i>Open</i>
<i>Third</i>	<i>Open</i>	<i>Open</i>	<i>Open</i>	<i>Closed</i>	<i>Closed</i>
<i>Fourth</i>	<i>Open</i>	<i>Open</i>	<i>Closed</i>	<i>Open</i>	<i>Closed</i>

* L/R is closed if output speed is below 150 RPM in Drive and Manual 2.
L/R is open in Manual 1.

**TRANSMISSION
CONTROL MODULE**

CLUTCH VOLUME INDEXES

An important function of the TCM is to monitor Clutch Volume Indexes (CVI). CVIs represent the volume of fluid needed to compress a clutch pack properly.

The TCM monitors gear ratio changes by monitoring the Input and Output Speed Sensors. The Input Speed Sensor sends an AC voltage signal to the TCM that represents input shaft rpm. The Output Speed Sensor provides the TCM with output shaft speed information.

By comparing these two inputs, the TCM can determine actual gear ratio. This is important to the CVI calculation because the TCM determines CVIs by monitoring how long it takes for a gear change to occur.

Gear ratios can be determined by using the DRB Scan Tool and reading the Input/Output Speed Sensor values in the "Monitors" display. Gear ratio can be obtained by dividing the Input Speed Sensor value by the Output Speed Sensor value.

For example, if the input shaft is turning at 1000 rpm and the output shaft is turning at 500 rpm, the TCM can determine that the gear ratio is 2:1. In 3rd gear the gear ratio changes to 1:1. The gear ratio changes as clutches are applied and released. By monitoring the length of time it takes for a gear ratio to change following a shift request, the TCM can determine the volume of fluid used to apply or release a friction element.

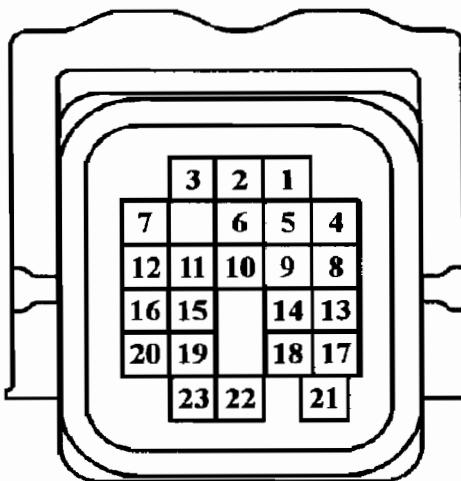
The volume of transmission fluid needed to apply the friction elements are continuously updated for the adaptive controls. As friction material wears, the volume of fluid needed to apply the friction element increases.

Certain mechanical problems within the transmission assembly such as broken return springs, out of position snap rings, excessive clutch pack clearance, or improper assembly can cause inadequate or out-of-range CVI readings. Also defective Input/Output Speed Sensors, wiring and poor connections may cause these same conditions. The following chart identifies the proper CVIs, when they are monitored and updated and the proper clutch pack clearances.

CLUTCH VOLUMES AND CLEARANCES

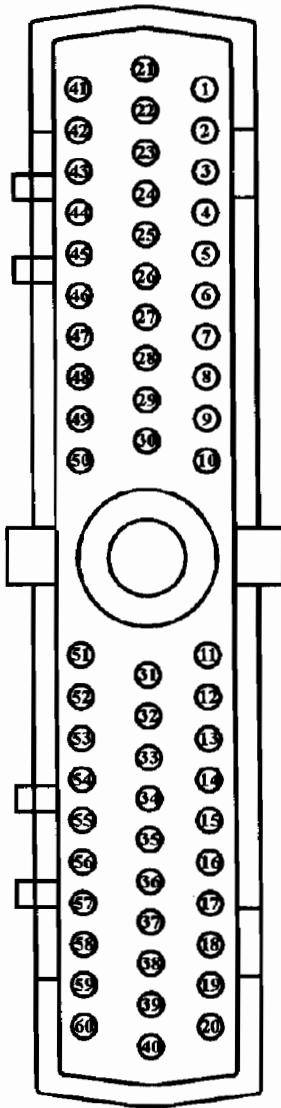
CLUTCH	WHEN UPDATED	PROPER VOLUME	CLUTCH CLEARANCE
Low/Reverse	2-1 or 3-1 Downshift	82 to 134	1.14-1.91mm (.045"-.075")
2nd Clutch	3-2 Kickdown shift	25 to 64	0.53-1.27mm (.021"-.050")
Overdrive	2-3 Upshift	30 to 64	1.01-1.65mm (.040"-.065")
4th Clutch	3-4 Upshift	30 to 64	0.81-1.35mm (.032"-.053")
Underdrive	4-3 Kickdown shift	44 to 92	0.76-1.60mm (.030"-.063")
Reverse	Not Monitored	Not Monitored	0.81-1.24mm (.032"-.049")

23-WAY CASE CONNECTOR PIN CAVITY IDENTIFICATION AND FUNCTION

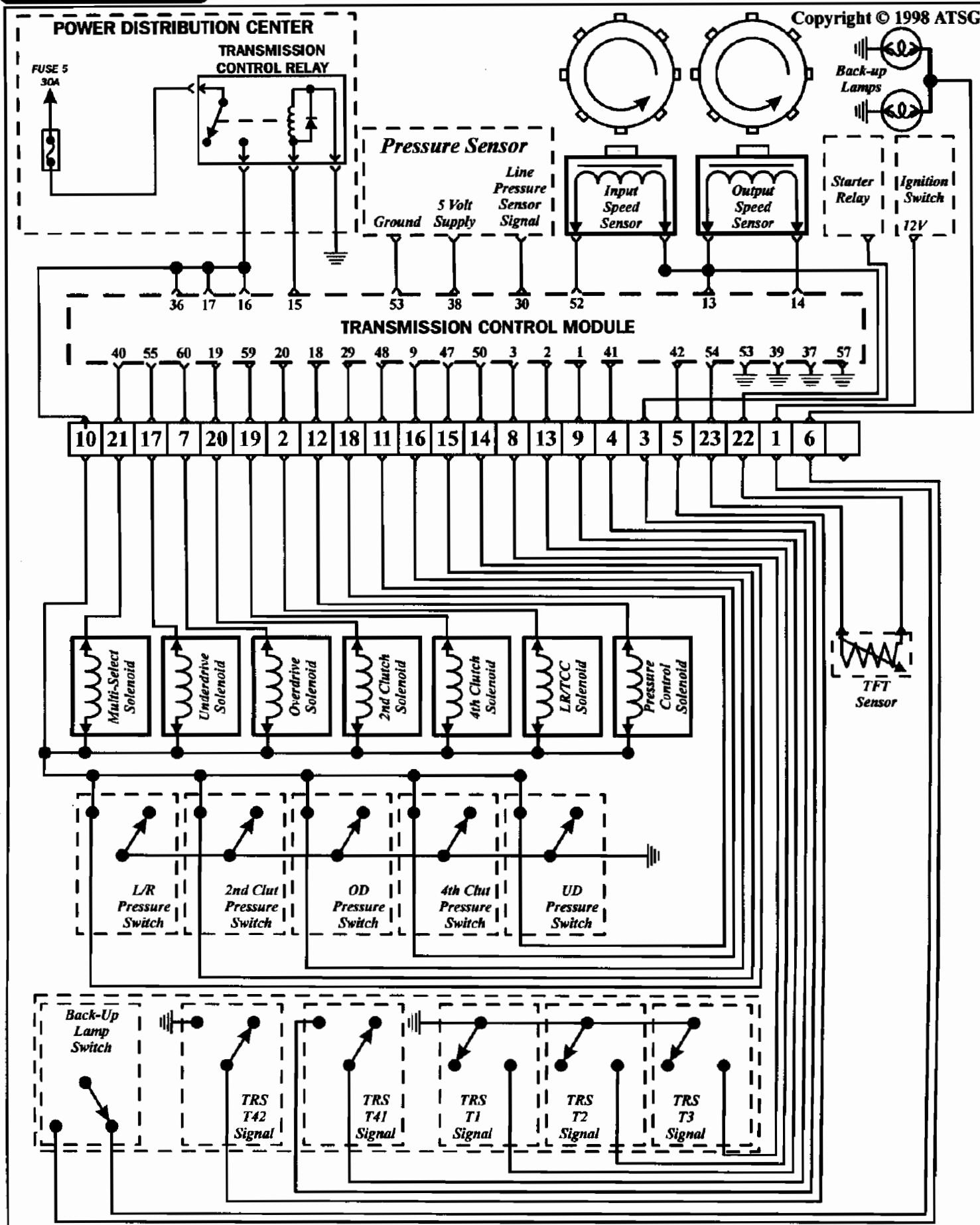


PIN CAVITY	WIRE COLOR	FUNCTION
1	White/Tan	Fused Ignition Switch Battery Voltage
2	Lt. Green	LR/TC Clutch Solenoid Control
3	Brown/Yellow	Park/Neutral Position Switch Signal
4	White	Transmission Range Sensor (T41) Signal
5	Violet/White	Transmission Range Sensor (T42) Signal
6	Violet/Black	Back-Up Lamp Feed
7	Brown	Overdrive Clutch Solenoid Control
8	Violet	Transmission Range Sensor (T3) Signal
9	Lt. Green/Black	Transmission Range Sensor (T1) Signal
10	Red	Transmission Control Relay Output
11	Dk. Blue	4th Clutch Pressure Switch Signal
12	Yellow/Dk. Blue	Line Pressure Control Solenoid Control
13	Tan/Black	Transmission Range Sensor (T2) Signal
14	Brown/Lt. Blue	Low/Reverse Clutch Pressure Switch Signal
15	Lt. Blue	2nd Clutch Pressure Switch Signal
16	Orange/Black	Overdrive Clutch Pressure Switch Signal
17	Pink	Underdrive Clutch Solenoid Control
18	Gray	Underdrive Clutch Pressure Switch Signal
19	Dk. Green/White	4th Clutch Solenoid Control
20	White/Dk. Blue	2nd Clutch Solenoid Control
21	Violet/Lt. Green	Multi-Select Solenoid Control
22	Dk. Blue/Black	Speed Sensor Ground
23	Violet	Transmission Oil Temperature Sensor Signal

60-WAY CONNECTOR PIN CAVITY IDENTIFICATION AND FUNCTION

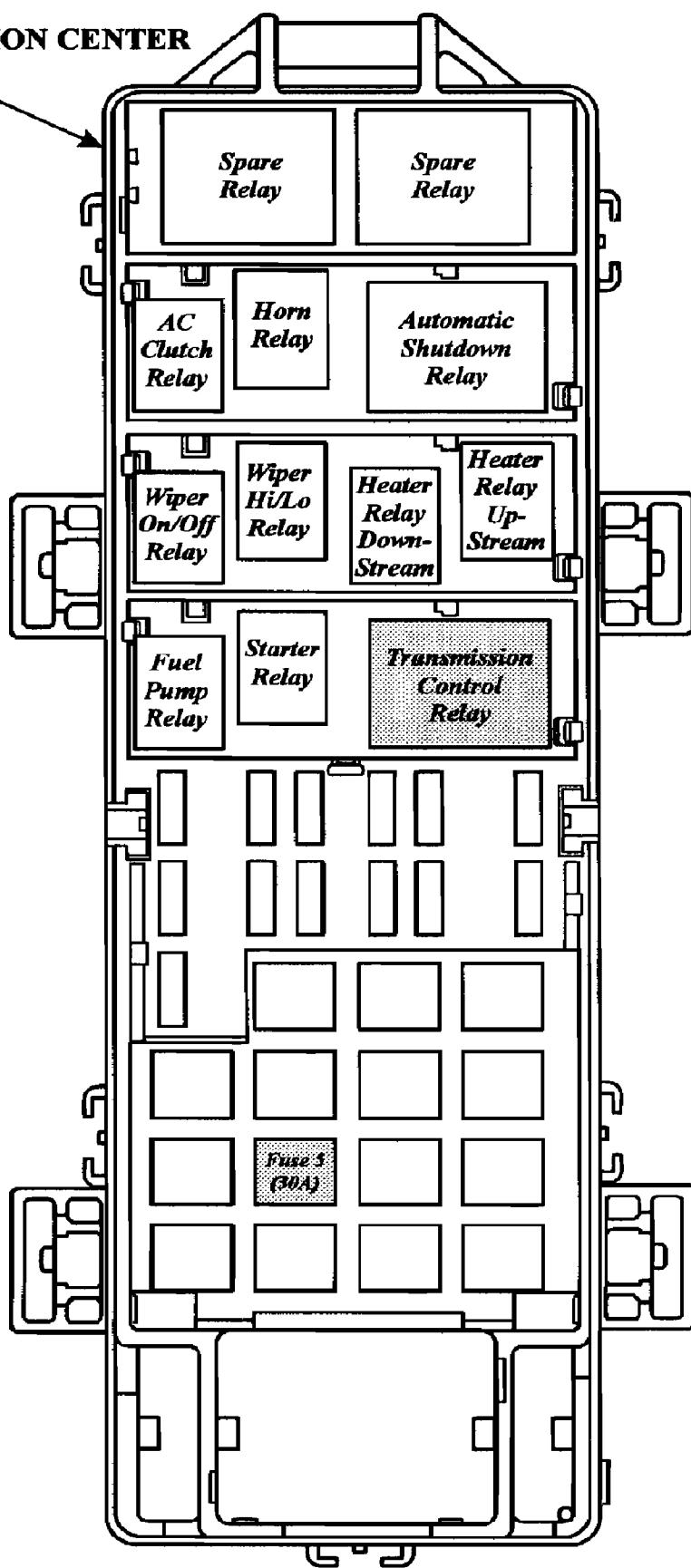


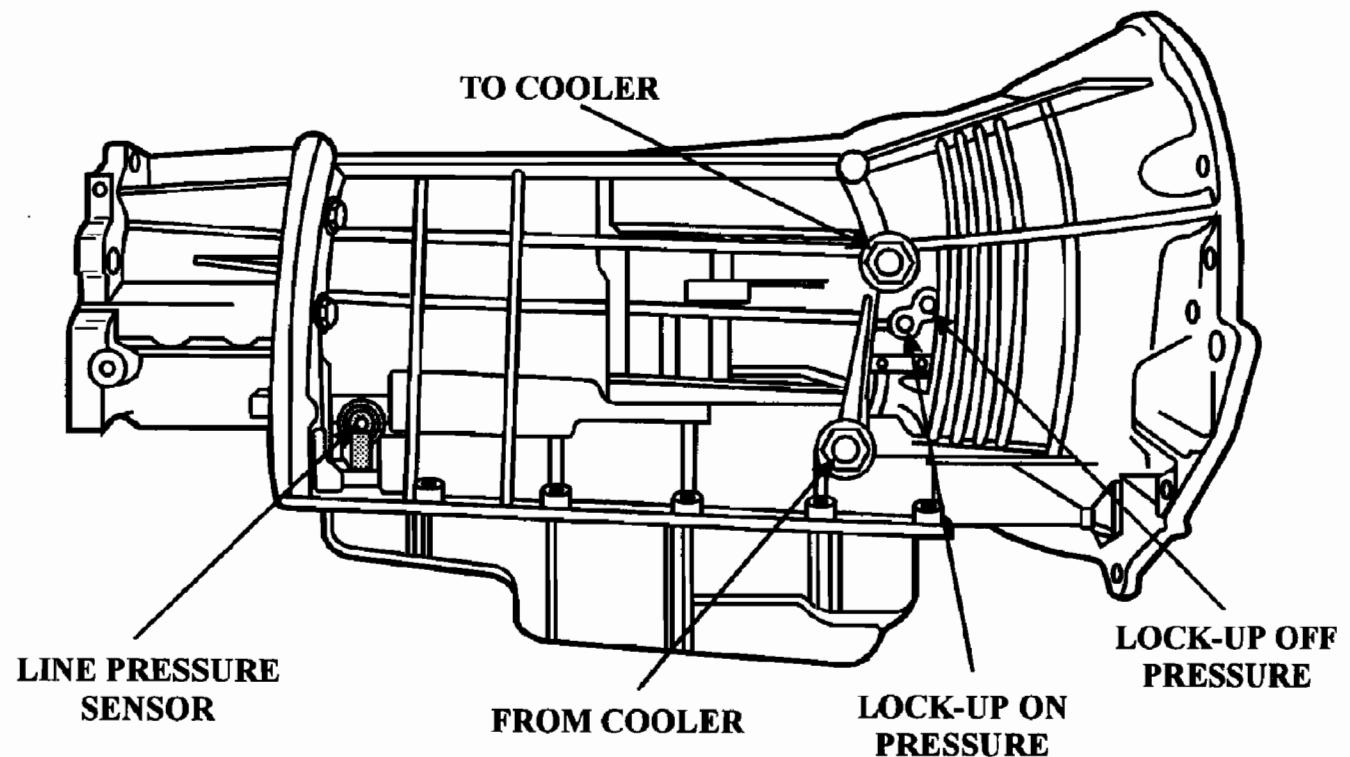
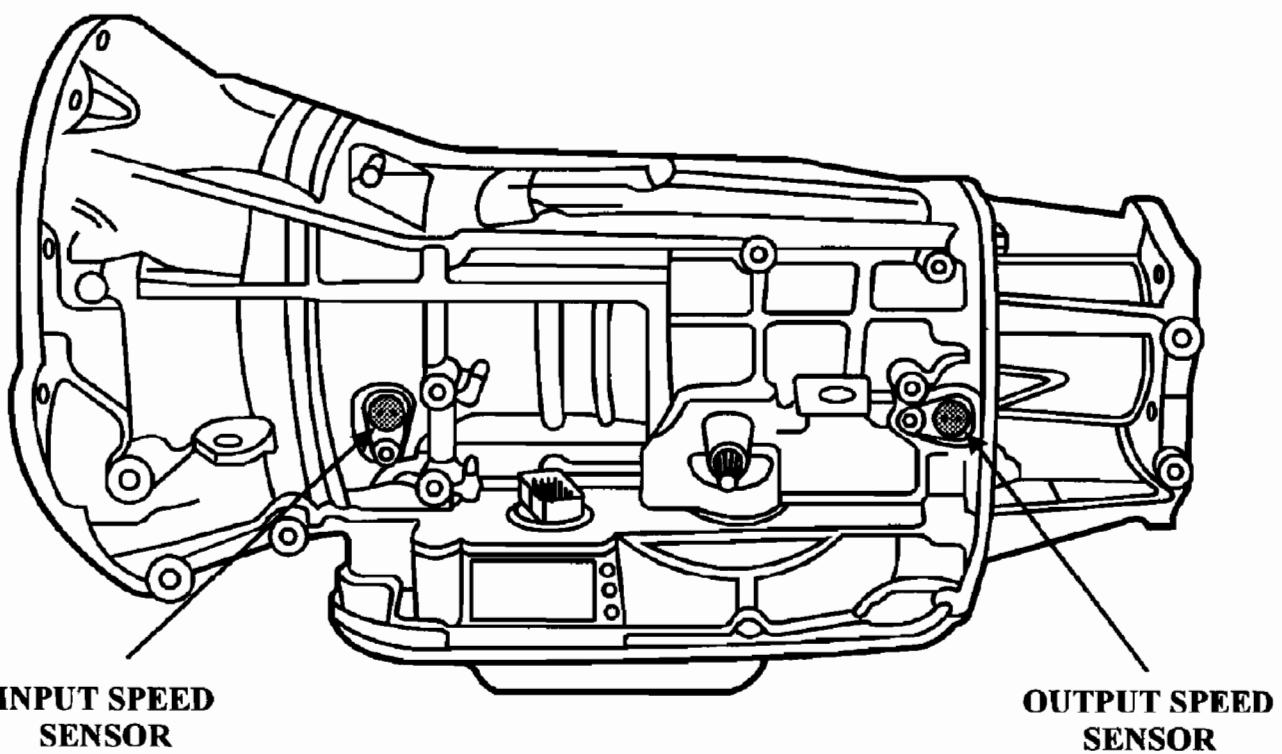
PIN CAVITY	WIRE COLOR	FUNCTION
1	Lt. Green/Black	Transmission Range Sensor T1 Signal
2	Tan/Black	Back-up Lamp Relay Control
3	Violet	Transmission Range Sensor T3 Signal
6	Gray/Black	Crankshaft Position Sensor Signal
7	Pink	SCI Transmit
8	Red	Fused Ignition Switch Output (Start)
9	Orange/Black	Overdrive Clutch Pressure Switch Signal
10	Yellow/Dk. Green	Torque Management Request
11	Orange/Dk. Blue	Fused Ignition Switch Output (Start-Run)
12	Brown	Overdrive Clutch Solenoid Control
13	Dk. Blue/Black	Speed Sensor Ground
14	Lt. Green/White	Output Speed Sensor Signal
15	Pink/Yellow	Transmission Control Relay Control
16	Red	Transmission Control Relay Output
17	Red	Transmission Control Relay Output
18	Yellow/Dk. Blue	Line Pressure Control Solenoid Control
19	White/Dk. Blue	2nd Clutch Solenoid Control
20	Lt. Green	L/R-TCC Clutch Solenoid Control
28	White/Orange	Vehicle Speed Sensor Signal
29	Gray	Underdrive Clutch Pressure Switch Signal
30	Violet/Tan	Line Pressure Sensor Signal
36	Red	Transmission Control Relay Output
37	Black/Yellow	Ground
38	Gray/Lt. Blue	5 Volt Supply
39	Black/Yellow	Ground
40	Violet/Lt. Green	Multi-Select Solenoid Control
41	White	Transmission Range Sensor (T41) Signal
42	Violet/White	Transmission Range Sensor (T42) Signal
43	Yellow/Violet	PCI Bus
46	Lt. Green	SCI Recieve
47	Lt. Blue	2nd Clutch Pressure Switch Signal
48	Dk. Blue	4th Clutch Pressure Switch Signal
49	Violet/White	Overdrive Off Switch Signal
50	Brown/Lt. Blue	Low/Reverse Clutch Pressure Switch Signal
51	Black/Lt. Blue	Sensor Ground
52	Red/Black	Input Speed Sensor Signal
53	Black/Red	Ground
54	Violet	Transmission Oil Temperature Sensor Signal
55	Pink	Underdrive Clutch Solenoid Control
56	Red/White	Fused Battery Voltage
57	Black/Yellow	Ground
59	Dk. Green/White	4th Clutch Solenoid Control
60	Brown	Overdrive Clutch Solenoid Control



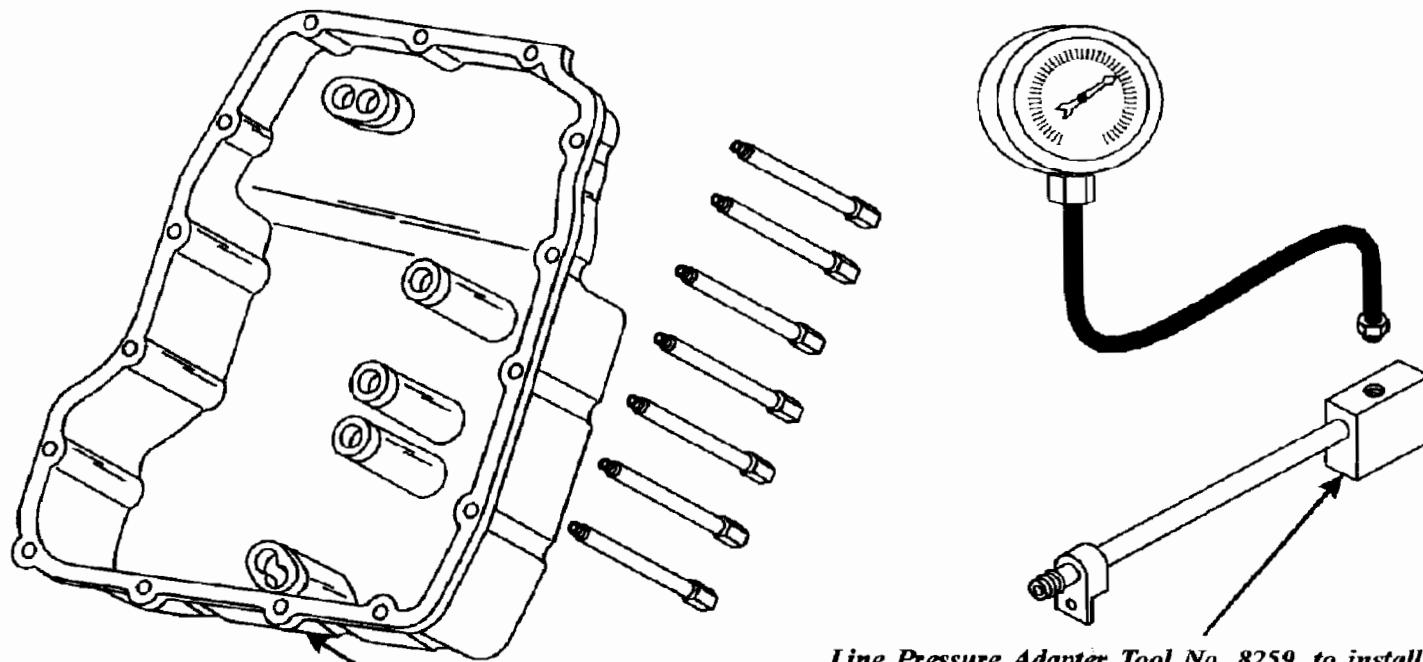
TRANSMISSION CONTROL RELAY AND FUSE LOCATIONS

POWER DISTRIBUTION CENTER



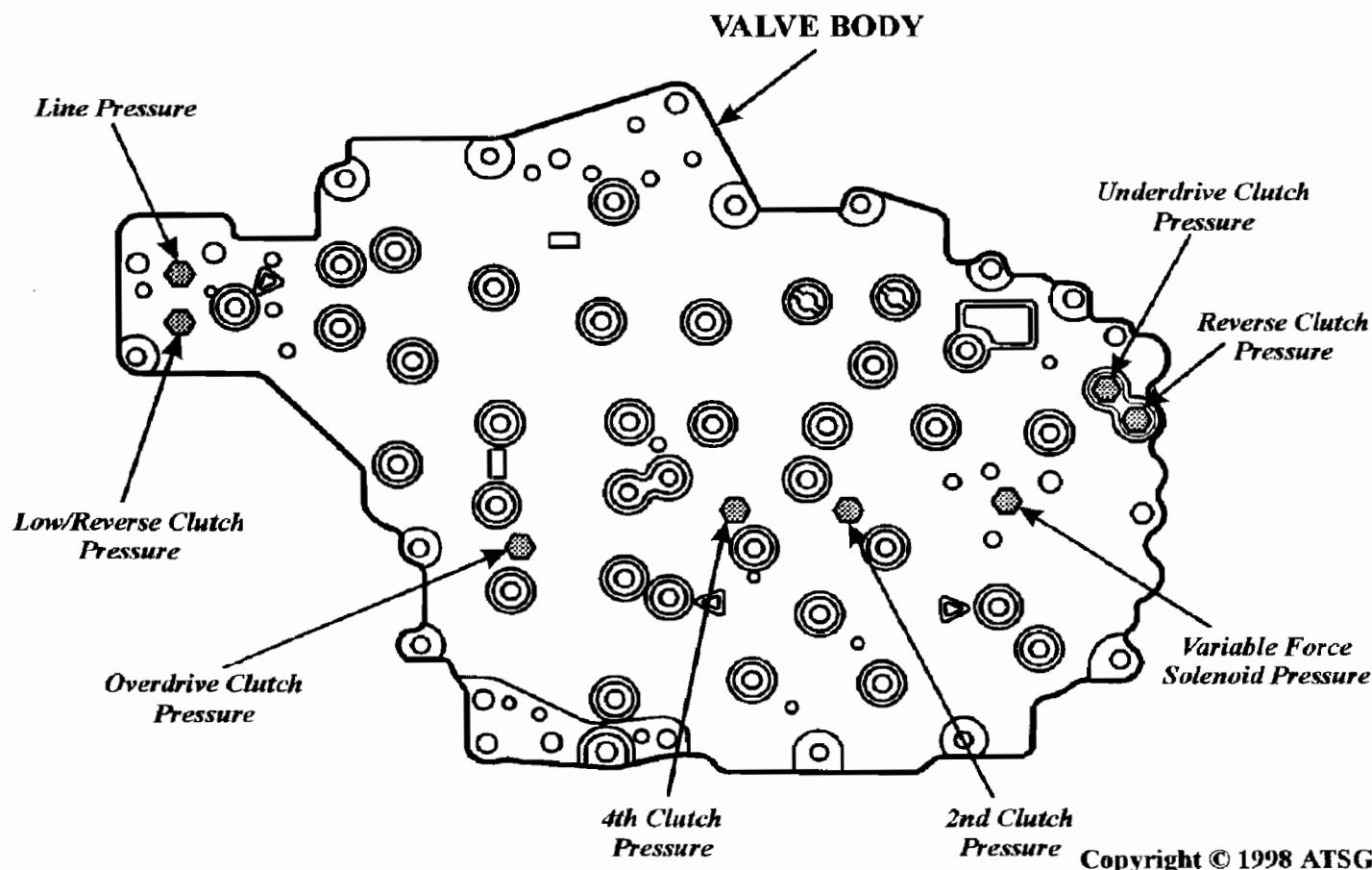


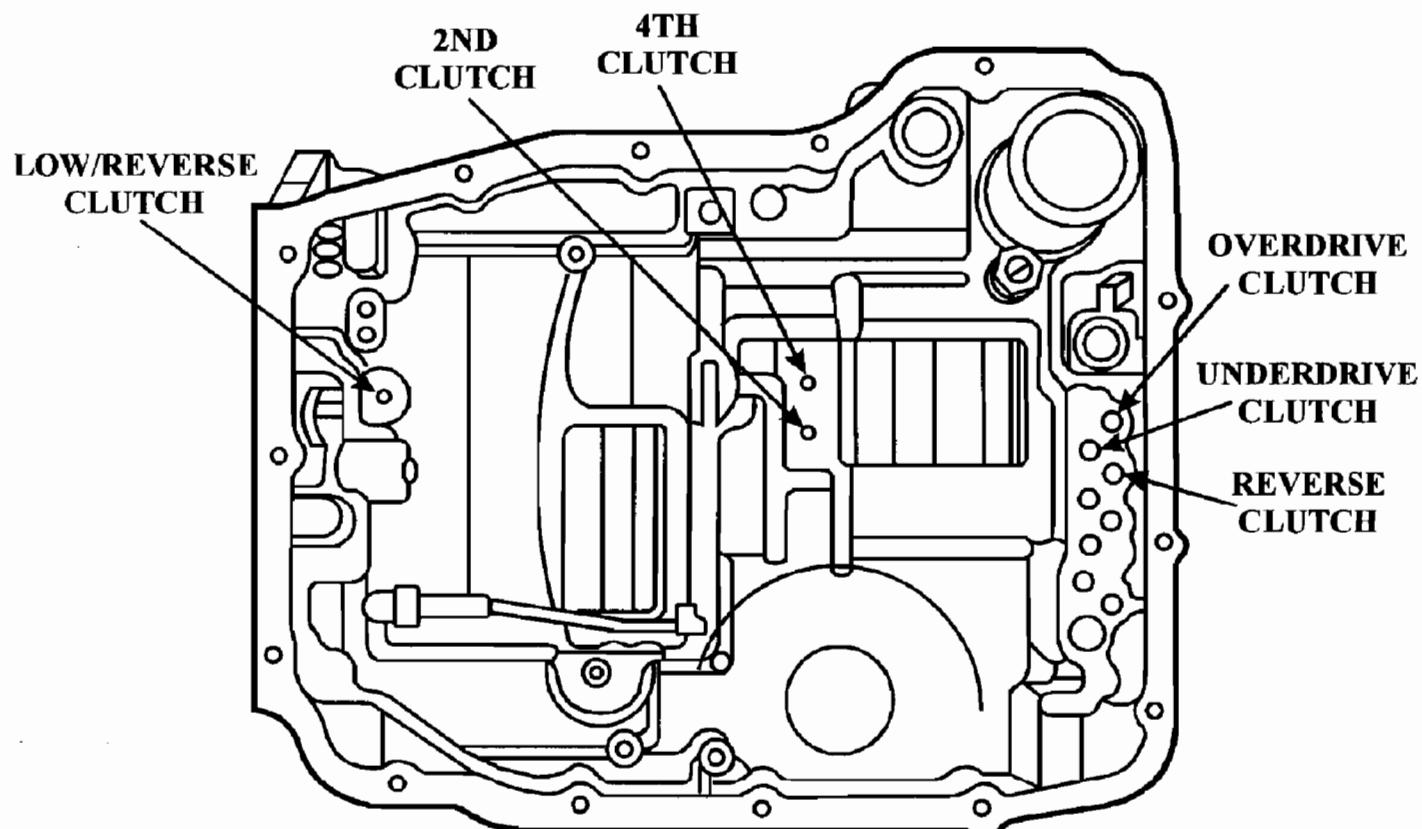
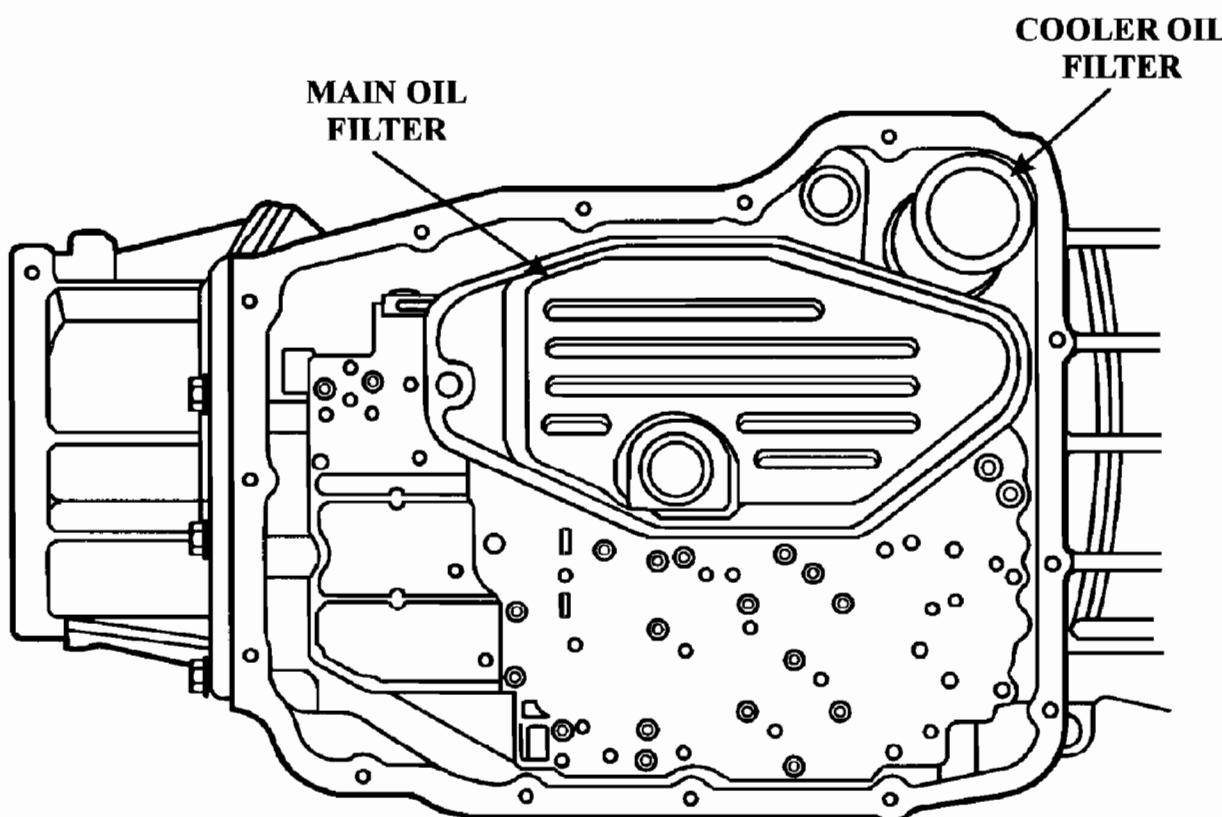
MANDATORY TOOLS NEEDED FOR CHECKING PRESSURES ON 45RFE



Pressure Tap Adapter Tool No. 8258, to check oil pressures through the valve body taps.

Line Pressure Adapter Tool No. 8259, to install into the line pressure sensor circuit, and then reinstall the sensor and pressure gage.

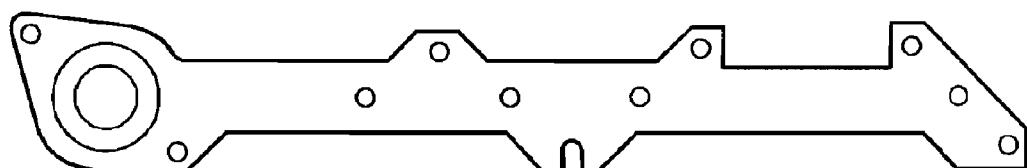
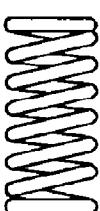
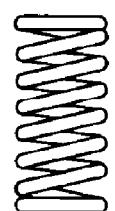
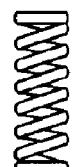
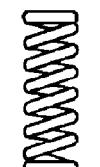
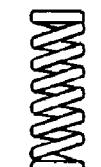
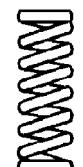
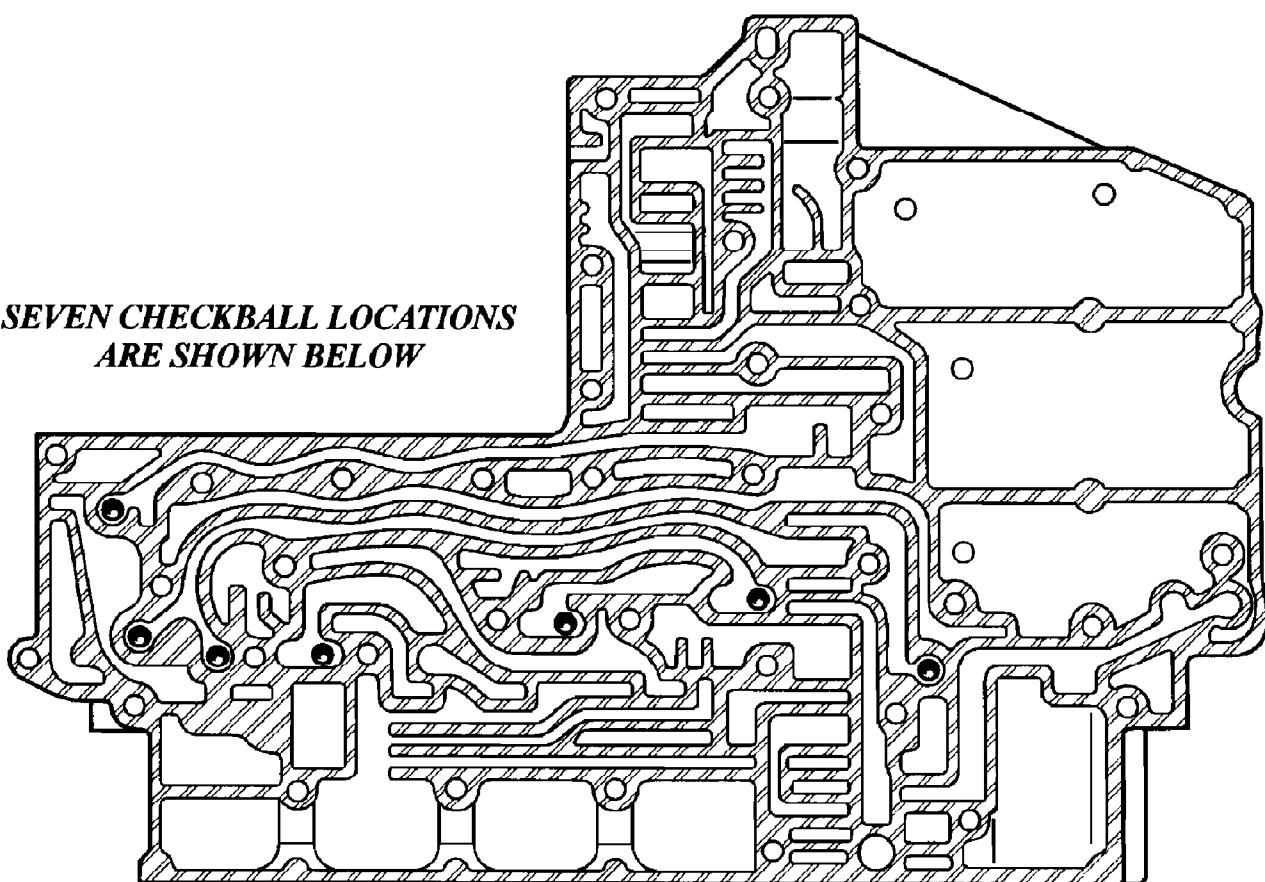




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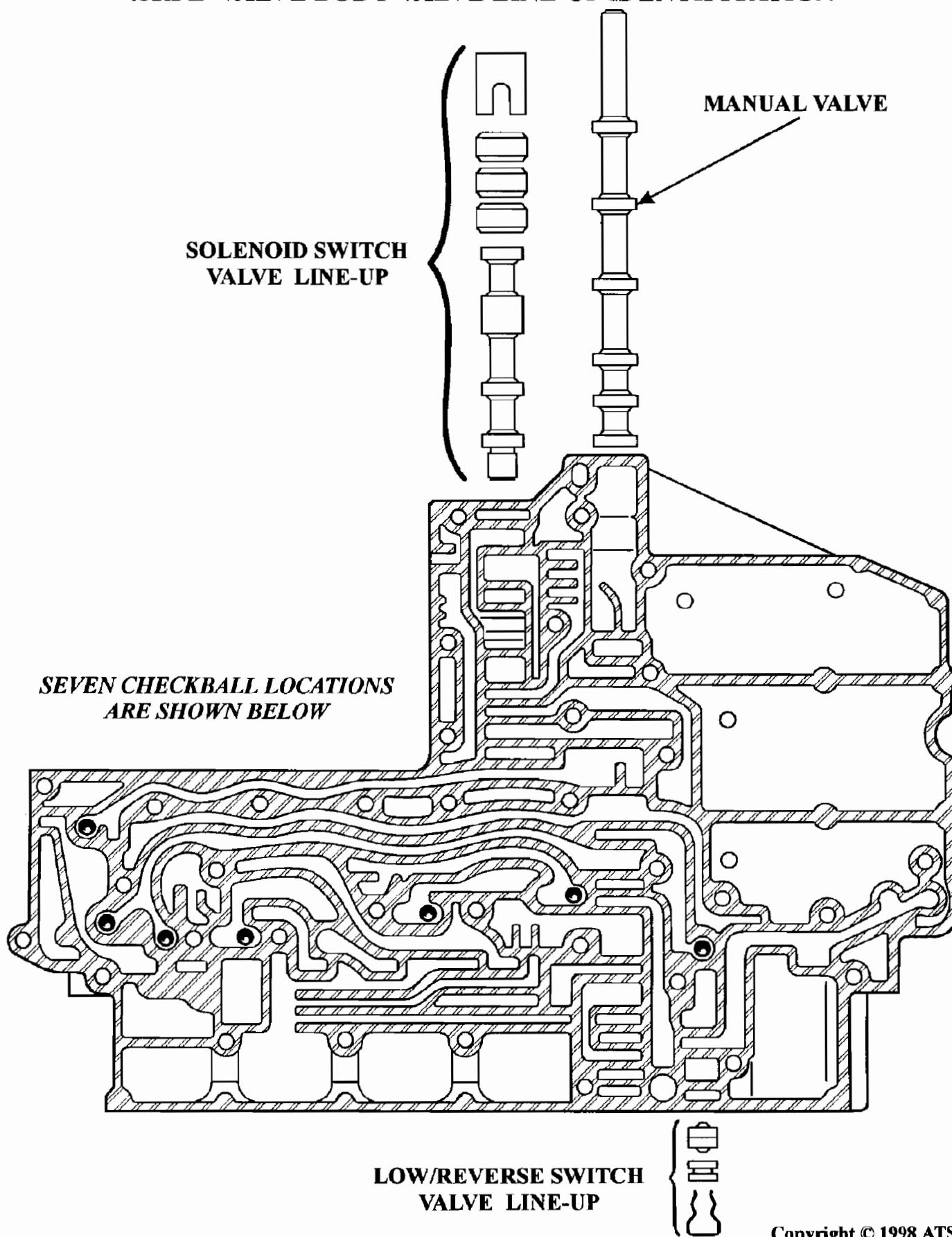
45RFE ACCUMULATOR LOCATIONS

SEVEN CHECKBALL LOCATIONS
ARE SHOWN BELOW



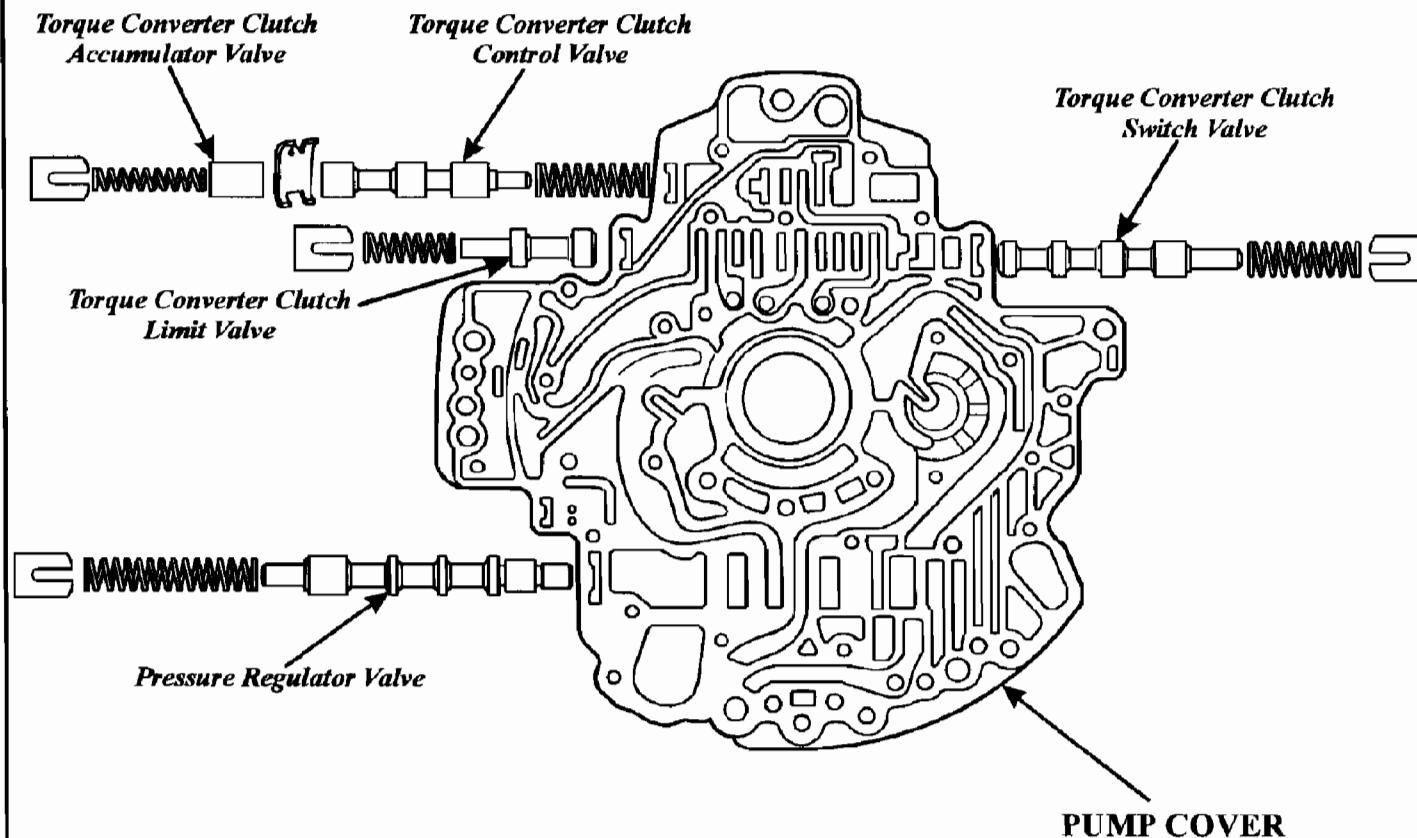
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45RFE VALVE BODY VALVE LINE-UP IDENTIFICATION



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VALVE LINE-UP IDENTIFICATION AND LOCATIONS IN PUMP COVER



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45RFE OIL PUMP BODY AND GEARS

