

# Technical Service Information

## 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).

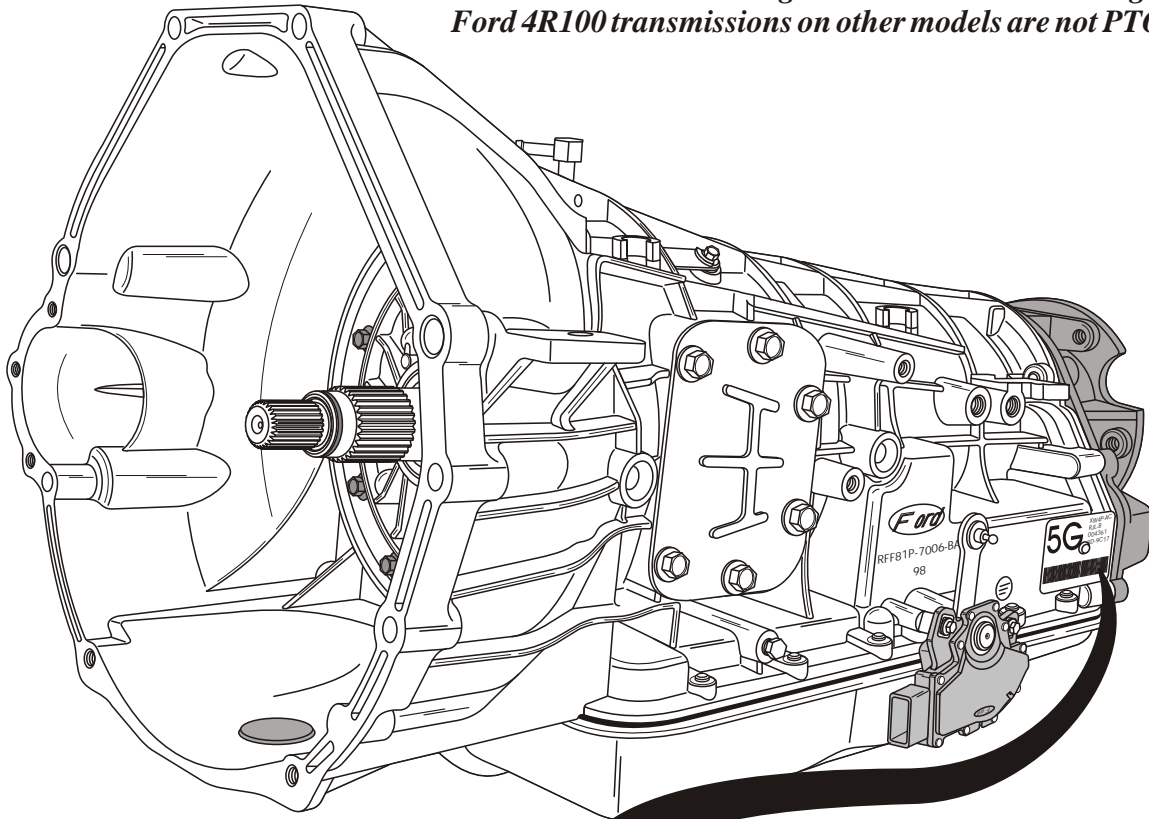
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# Technical Service Information

## 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.*



	Year	Month	Day
BD-	9	C	17
Build Date	9=1999	A=Jan	
	0=2000	B=Feb	
	1=2001	C=Mar	
	2=2002	D=Apr	
	3=2003	E=May	
		F=Jun	
		G=Jul	
		H=Aug	
		J=Sep	
		K=Oct	
		L=Nov	
		M=Dec	

①	XW4P-AC
②	RJL-B
③	004361
④	BD-9C17

5G	
6520	004361 4 X 4

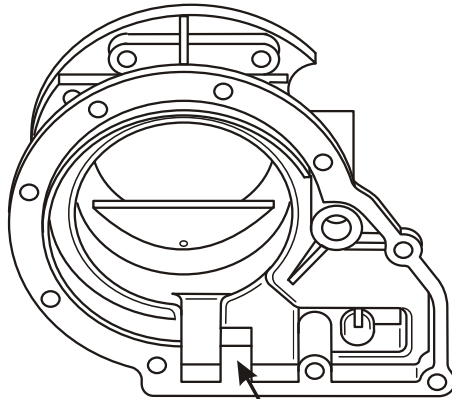
1	Assembly Part Number, Prefix And Suffix
2	Transmission Model
3	Serial Number
4	Build Date (Year, Month, Day)

Figure 1

# Technical Service Information

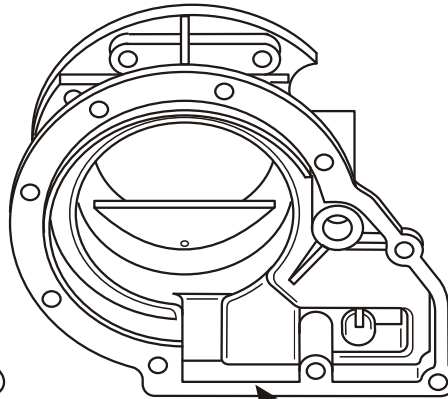
## EXTENSION HOUSINGS

**4R100 TYPICAL  
4 WHEEL DRIVE**



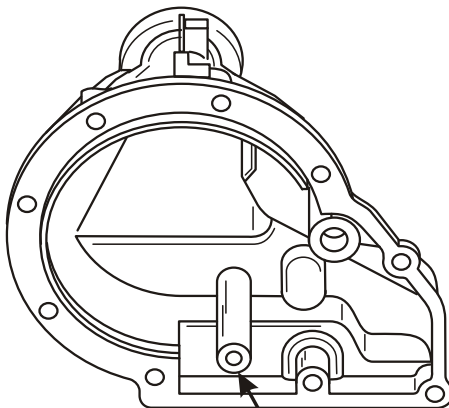
**SHOULDER**

**E40D 4X4 WITHOUT  
LUBE PLUG**



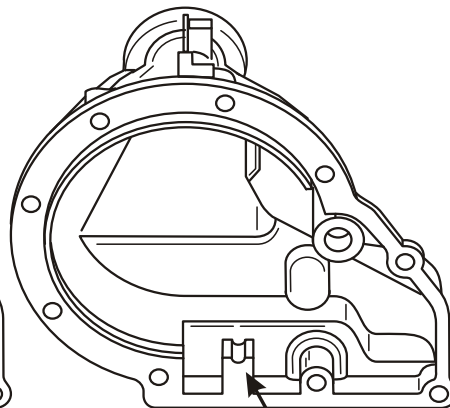
**NO SHOULDER**

**FORD 4R100  
6.8L AND 7.3L  
2 WHEEL DRIVE**



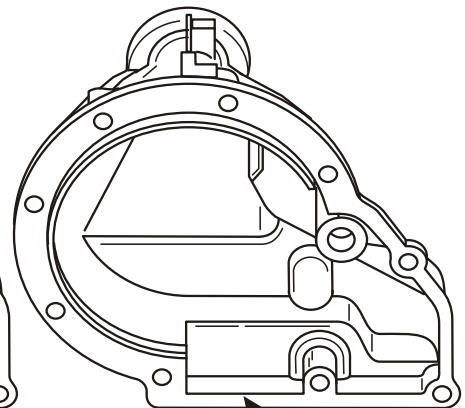
**ADDED BOSS**

**ALL OTHER  
2 WHEEL DRIVE  
APPLICATIONS**



**SHOULDER**

**E40D WITHOUT  
LUBE PLUG**



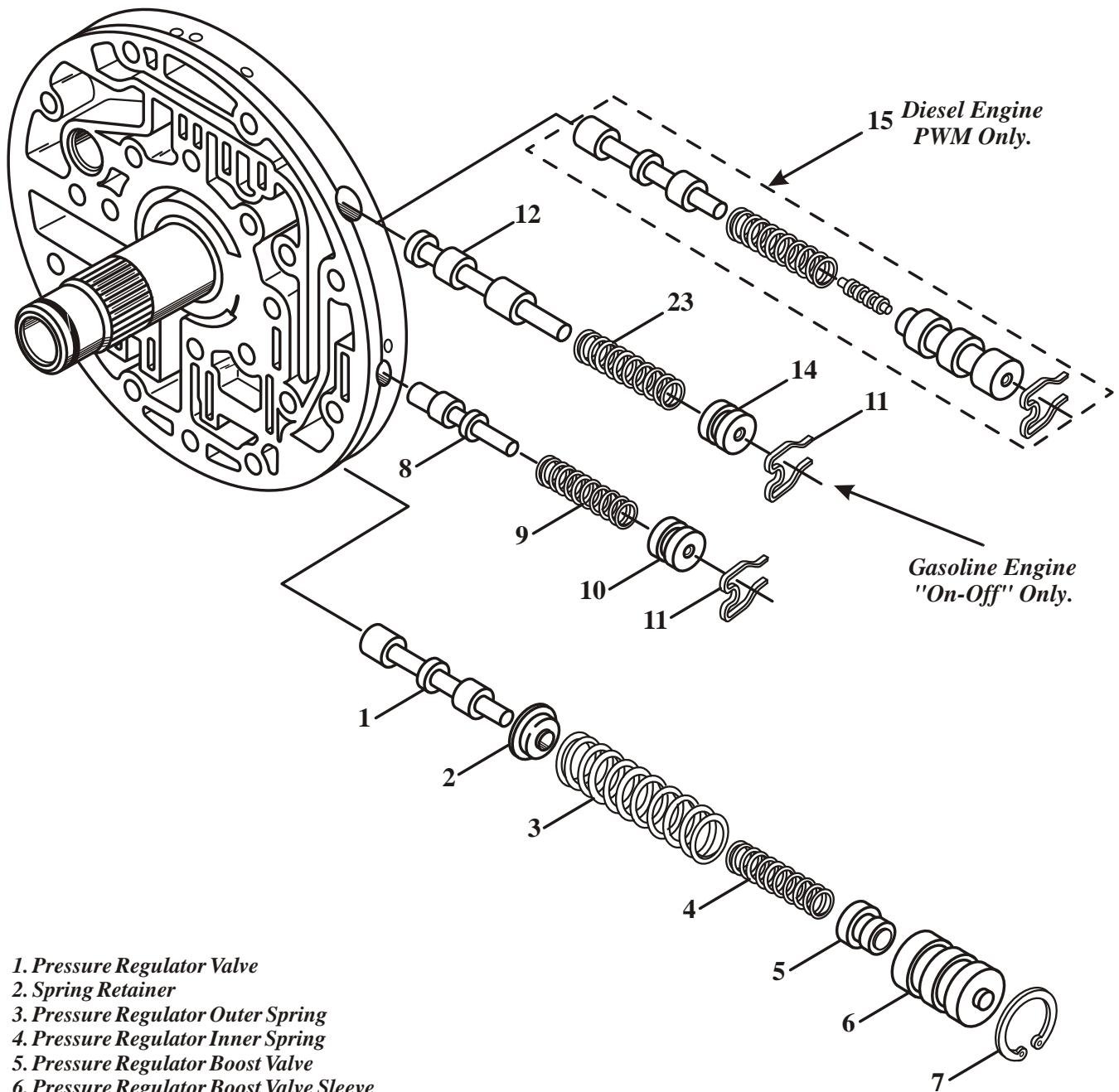
**NO SHOULDER**

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

Figure 5

# Technical Service Information

## 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)

Figure 9

# Technical Service Information

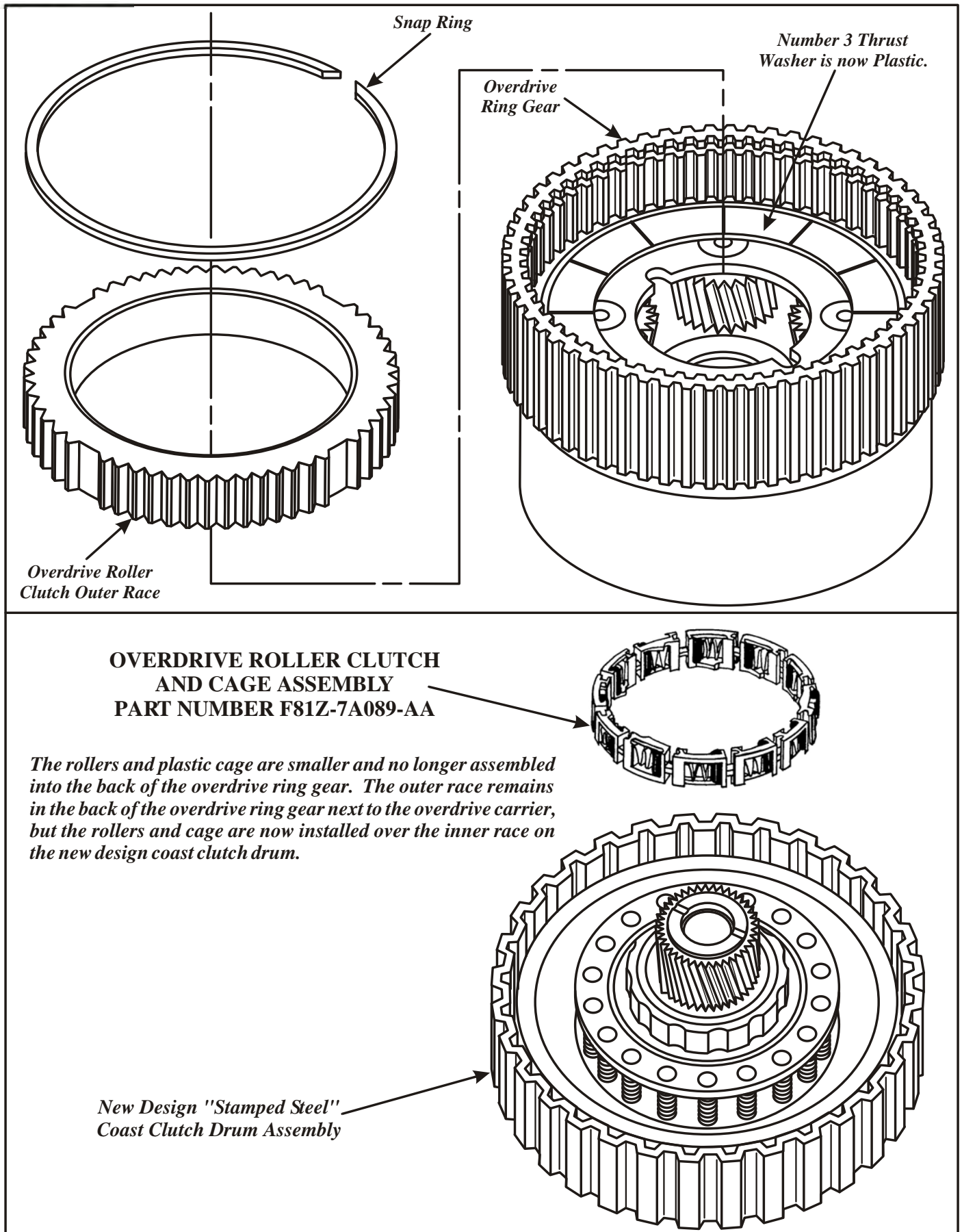


Figure 13

# Technical Service Information

## *Shift Solenoid Application Chart*

<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	*	*
Ⓓ	1	ON	OFF	*	*
Ⓓ	2	ON	ON	*	*
Ⓓ	3	OFF	ON	*	*
Ⓓ	4	OFF	OFF	*	*
Ⓓ Cancel	<i>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

<i>PCM Gear Commanded</i>	<i>Selector Lever Position</i>		
	Ⓓ	2	1
	<i>Actual Gear Obtained</i>		
1st	4	2	1
2nd	3	2	2
3rd	3	2	2
4th	4	2	2

### SHIFT SOLENOID "B" ALWAYS OFF

<i>PCM Gear Commanded</i>	<i>Selector Lever Position</i>		
	Ⓓ	2	1
	<i>Actual Gear Obtained</i>		
1st	1	2	1
2nd	1	2	1
3rd	4	2	2
4th	4	2	2

### SHIFT SOLENOID "A" ALWAYS ON

<i>PCM Gear Commanded</i>	<i>Selector Lever Position</i>		
	Ⓓ	2	1
	<i>Actual Gear Obtained</i>		
1st	1	2	1
2nd	2	2	1
3rd	2	2	1
4th	1	2	1

### SHIFT SOLENOID "B" ALWAYS ON

<i>PCM Gear Commanded</i>	<i>Selector Lever Position</i>		
	Ⓓ	2	1
	<i>Actual Gear Obtained</i>		
1st	2	2	1
2nd	2	2	1
3rd	3	2	2
4th	3	2	2

Figure 21

# Technical Service Information

## 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 29. 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 29.
- (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.

Continued on Page 36

# Technical Service Information

## 4R100 MAIN SPACER PLATE "PTO"

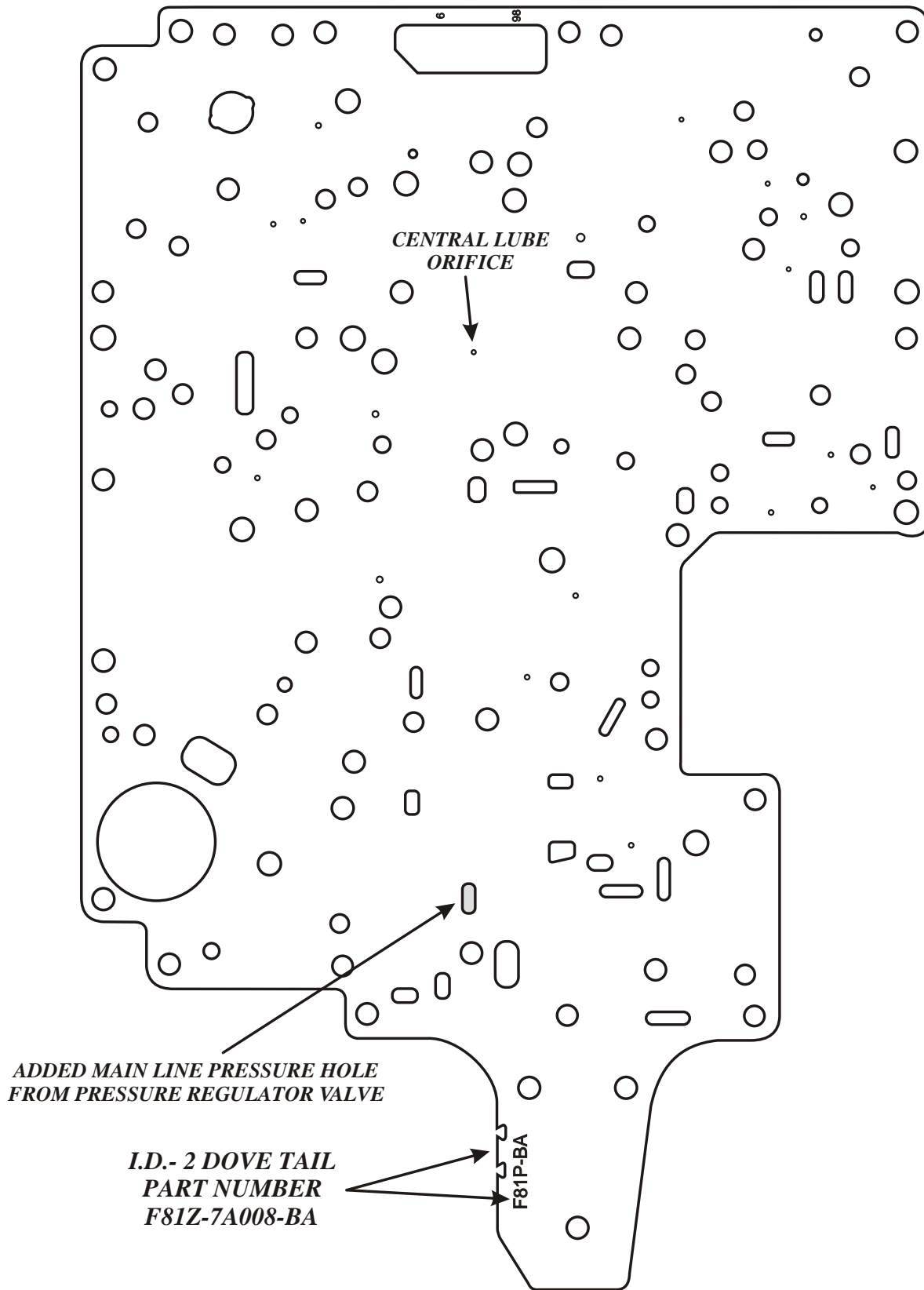


Figure 32



# Technical Service Information

## FORD 4R100 "PWM" AND "NON-PWM" PUMP DIFFERENCES

**CHANGE:** Beginning at the start of production in 1999, the 4R100 transmission was offered with two different torque converter clutch application strategies. A "PWM" (Pulse Width Modulated) version, was added in V-10 gas powered vehicles and all diesel, and a "NON-PWM" version, offered in all other gas powered vehicles. This required two different solenoid packs as well as two different pump assemblies.

**REASON:** For smooth converter apply on V-10 gas and diesel engine models.

### PARTS AFFECTED:

#### (1) PUMP ASSEMBLY:

- The pump cover assembly had the rear of the Converter Clutch Valve bore enlarged approximately .070" to accommodate the enlarged land of the Converter Clutch Valve, as shown in Figure 41.  
A .036" orifice and an air bleed were added to the TCC Solenoid signal passage, as shown in Figure 43.
- The Converter Clutch Control Valve's rear spool was enlarged approximately .070". There was also a bushing and valve added to the end of the valve train, as shown in Figure 41.  
A hole was added to the pump cover to connect the Converter Clutch Control Valve Bushing to Converter Regulator Valve oil, as shown in Figure 43.
- The Converter release orifice in the NON-PWM pump cover, as shown in Figure 42, was removed from the PWM pump cover, as shown in Figure 43.  
Refer to Figure 44 for the NON-PWM pump hydraulic circuit.  
Refer to Figure 45 for the PWM pump hydraulic circuit with all hydraulic changes shown.

#### SOLENOID PACK:

- The PWM solenoid pack requires a Pulse Width Modulated torque converter clutch solenoid and the NON-PWM solenoid pack requires an on-off torque converter clutch solenoid.
- (2) • Refer to Figure 46 to identify the differences between the two solenoid packs.

### INTERCHANGABILITY:

*None of the parts listed above are interchangeable from model to model.*

### SERVICE INFORMATION:

"NON-PWM" Pump assy. (with "Cast Iron" coast clutch drum).....	F81Z-7A103-AA
"NON-PWM" Pump assy. (with "Stamped Steel" coast clutch drum).....	F81Z-7A103-BA
"PWM" Pump assy. (with "Stamped Steel" coast clutch drum).....	F81Z-7A103-CA
"NON-PWM" Solenoid Pack.....	F81Z-7G391-BA
"PWM" Solenoid Pack.....	F81Z-7G391-AB

# Technical Service Information

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

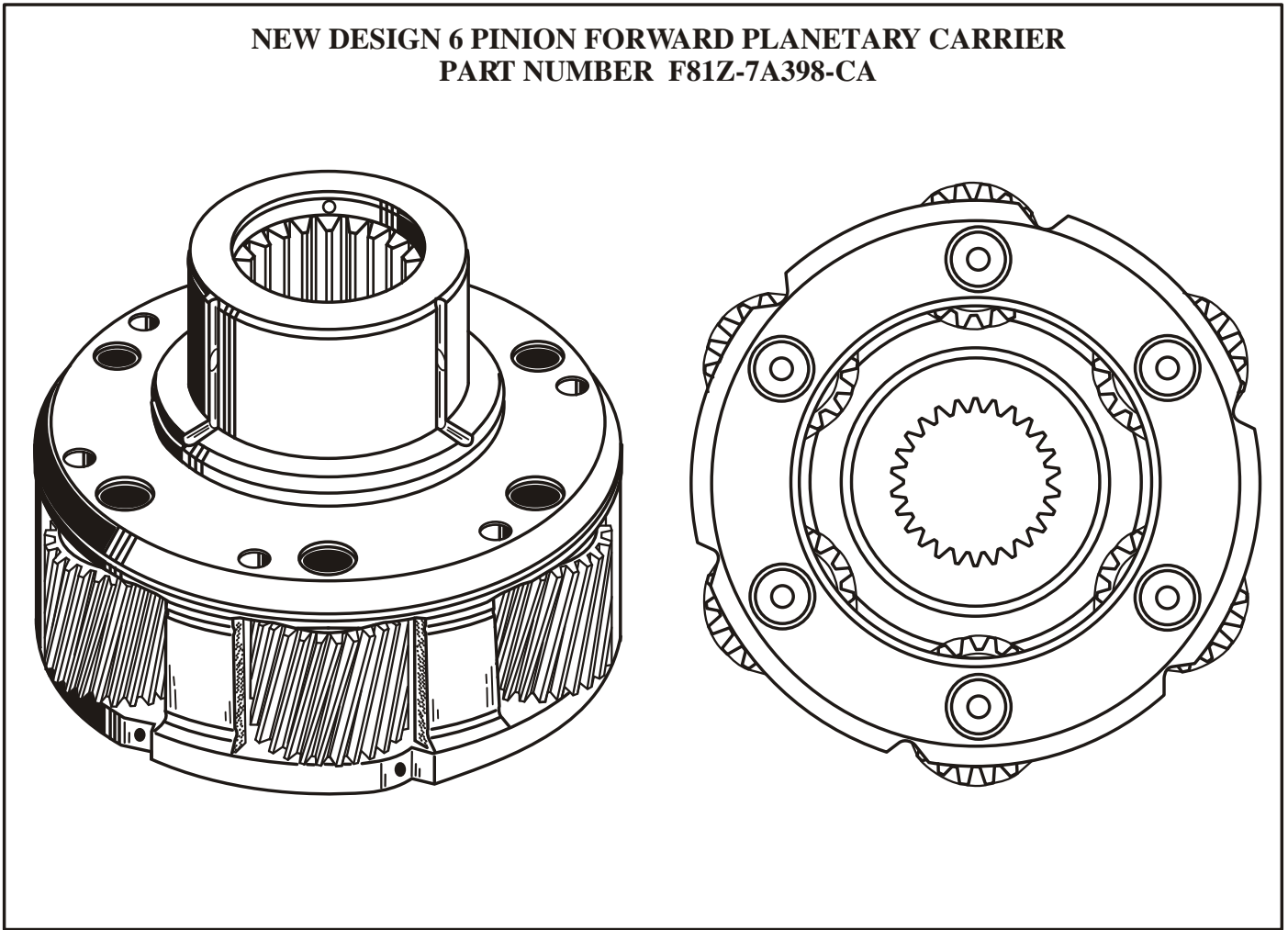


Figure 47

# Technical Service Information

## FORD 4R100 HYDRAULIC PASSAGE IDENTIFICATION

The following pages provide you with hydraulic passage identification in Figure 55 through Figure 64 for the transmission case, all valve bodies and all oil pump configurations. The legend for the abbreviations is found in Figure 54.

<b>PASSAGE IDENTIFICATION LEGEND</b>
<b>1-R = 1st-Reverse</b>
<b>1-R/M2 = 1st-Reverse/Manual 2</b>
<b>C-CL = Coast Clutch</b>
<b>CONV = Converter</b>
<b>D-CL = Direct Clutch</b>
<b>EPC = Electronic Pressure Control</b>
<b>EX = Exhaust</b>
<b>F-CL = Forward Clutch</b>
<b>INT-CL = Intermediate Clutch</b>
<b>L/R-CL = Low/Reverse Clutch</b>
<b>M123/R = Manual 1, 2, 3/Reverse</b>
<b>OD = Overdrive</b>
<b>OD234 = Overdrive 2nd, 3rd, 4th</b>
<b>OD34/R = Overdrive 3rd, 4th/Reverse</b>
<b>PRN1 = Park, Reverse, Neutral, 1st</b>
<b>PRN1/M2 = Park, Reverse, Neutral, 1st/Manual 2</b>
<b>R/1 = Reverse/1st</b>
<b>R/M2 = Reverse/Manual 2</b>
<b>R/M2/S2 = Reverse/Manual 2/Solenoid 2</b>
<b>R = Reverse</b>
<b>S1 = Solenoid 1</b>
<b>S2 = Solenoid 2</b>
<b>S3 = Solenoid 3</b>
<b>S4 = Solenoid 4</b>
<b>S4/1-R/M2 = Solenoid 4/1st-Reverse/Manual 2</b>
<b>SRV = Solenoid Regulator Valve</b>

Figure 54

# Technical Service Information

## "LOWER SIDE" 4R100 MAIN VALVE BODY "PTO" MODELS ONLY

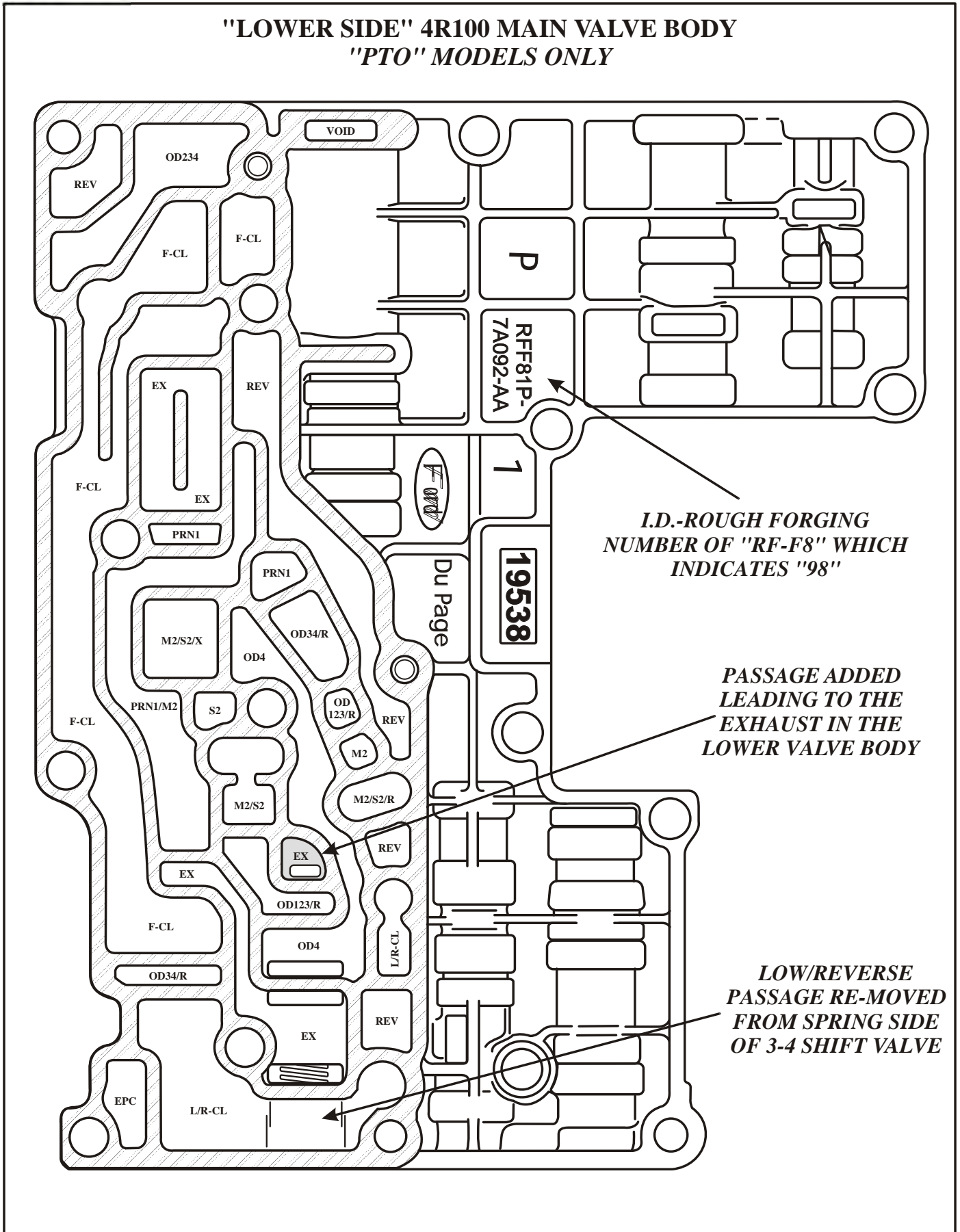
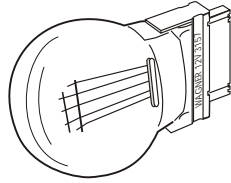


Figure 59

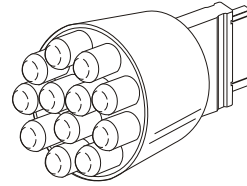
# Technical Service Information



**FACTORY STYLE  
INCANDESCENT BULB**

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Figure 67



**AFTERMARKET  
LED BULB**

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Figure 68

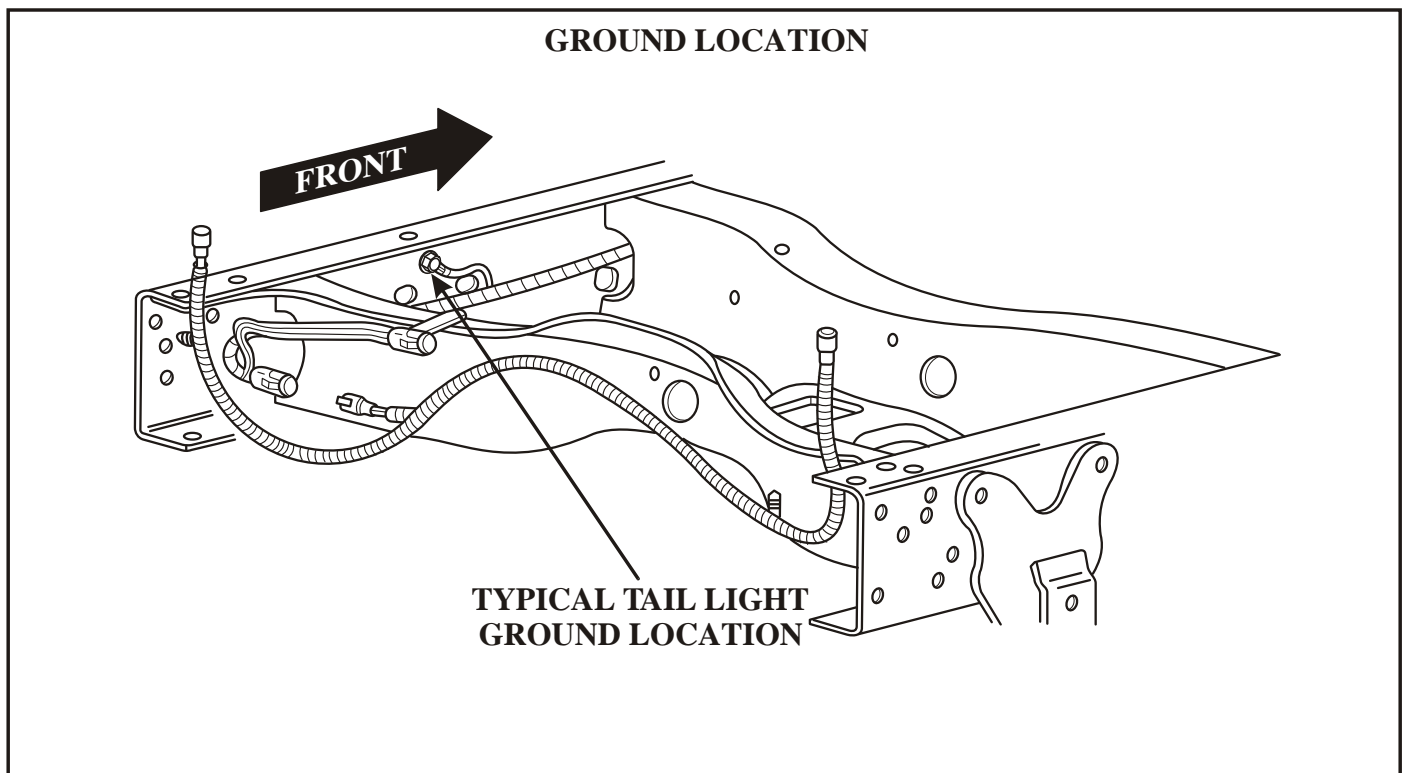


Figure 69

# Technical Service Information

## "SPECIAL" MAIN SPACER PLATE REQUIRED FOR MODIFIED 4R100 CASE

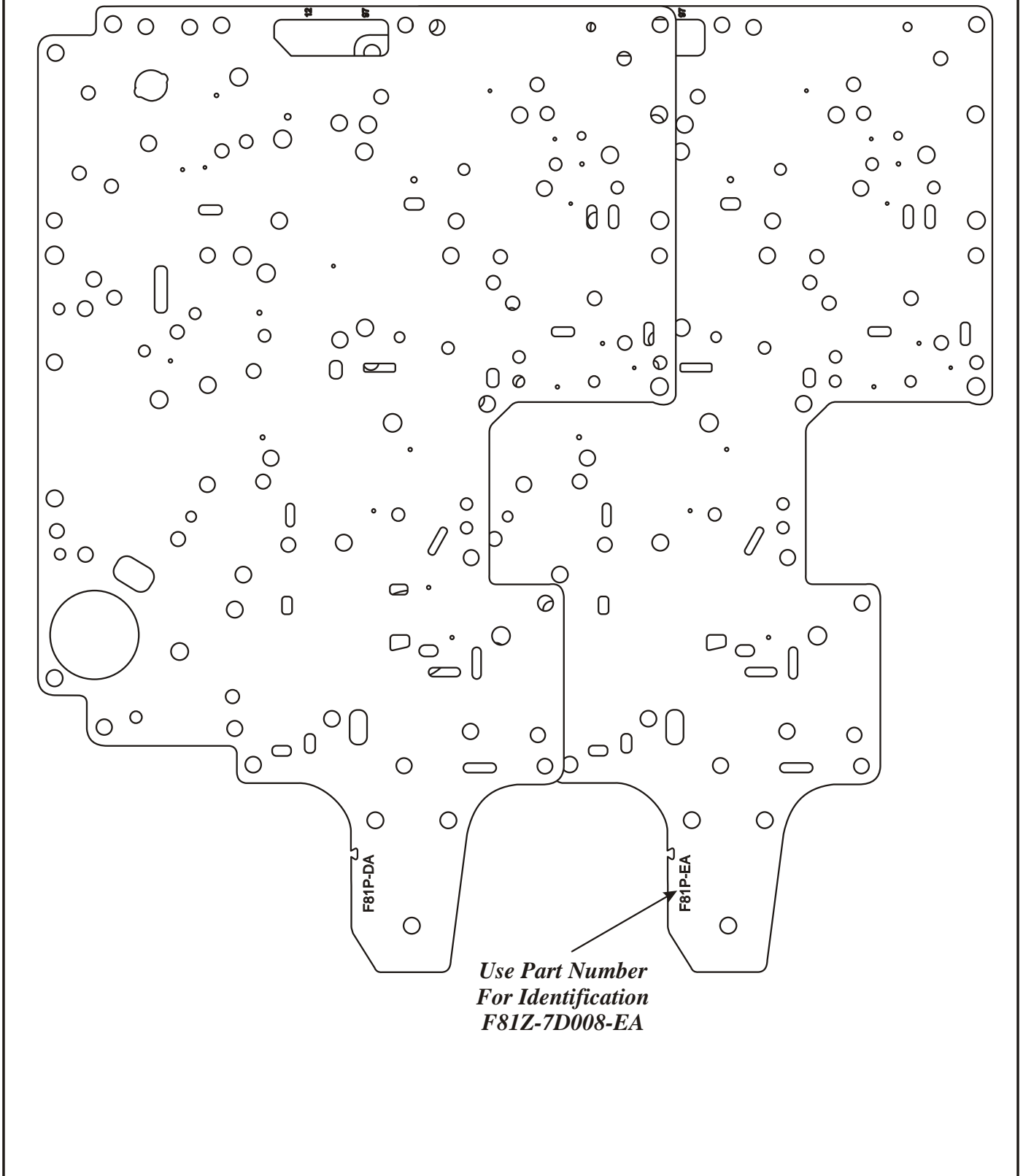


Figure 72

# Technical Service Information

## CASE AND VALVE BODY GASKETS REQUIRED FOR MODIFIED 4R100 CASE

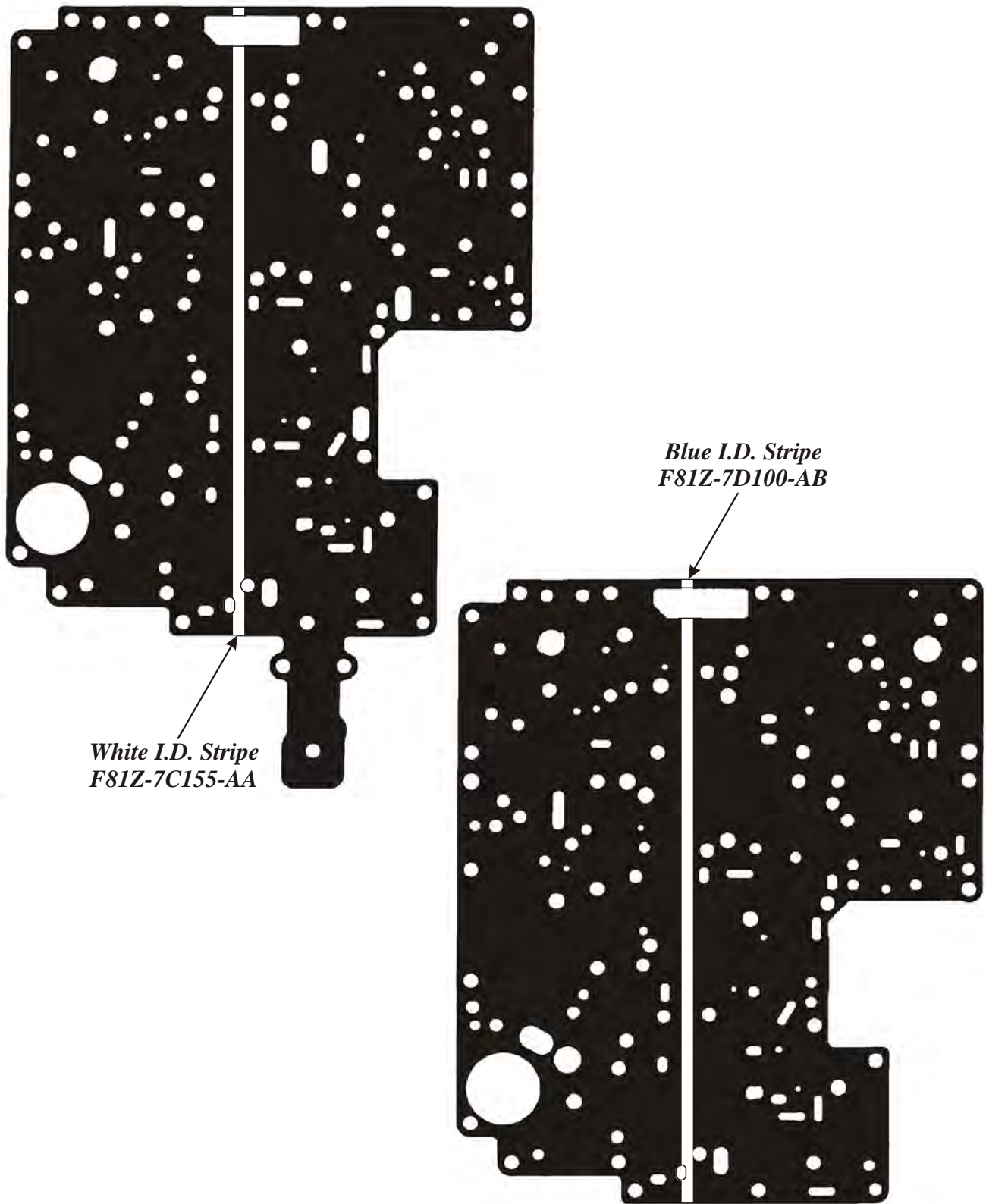


Figure 73