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## INTRODUCTION THM 4T65-E

This booklet contains general description and overhaul procedures necessary to repair, overhaul or service the THM 4T65-E electronic overdrive automatic transaxle. This transaxle was introduced in the 1997 model year in several different models using the 3.8L supercharged engine and some models with the 3.8L and 3.4L engines. The THM 4T65-E is very similar to the 4T60-E and some of the parts are common with this unit. We wish to thank General Motors Corp. for the information and illustrations that have made this booklet possible.

The THM 4T65-E is a fully automatic Front Wheel Drive, electronically controlled transaxle. It provides four forward ranges including overdrive and all shifts are freewheeling. Shift points are controlled by the PCM via two shift solenoids. Oil pressure is regulated by the PCM via a Pressure Control Solenoid. Shift schedule and TCC apply rates are also controlled by the PCM and are influenced by many sensor inputs.

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*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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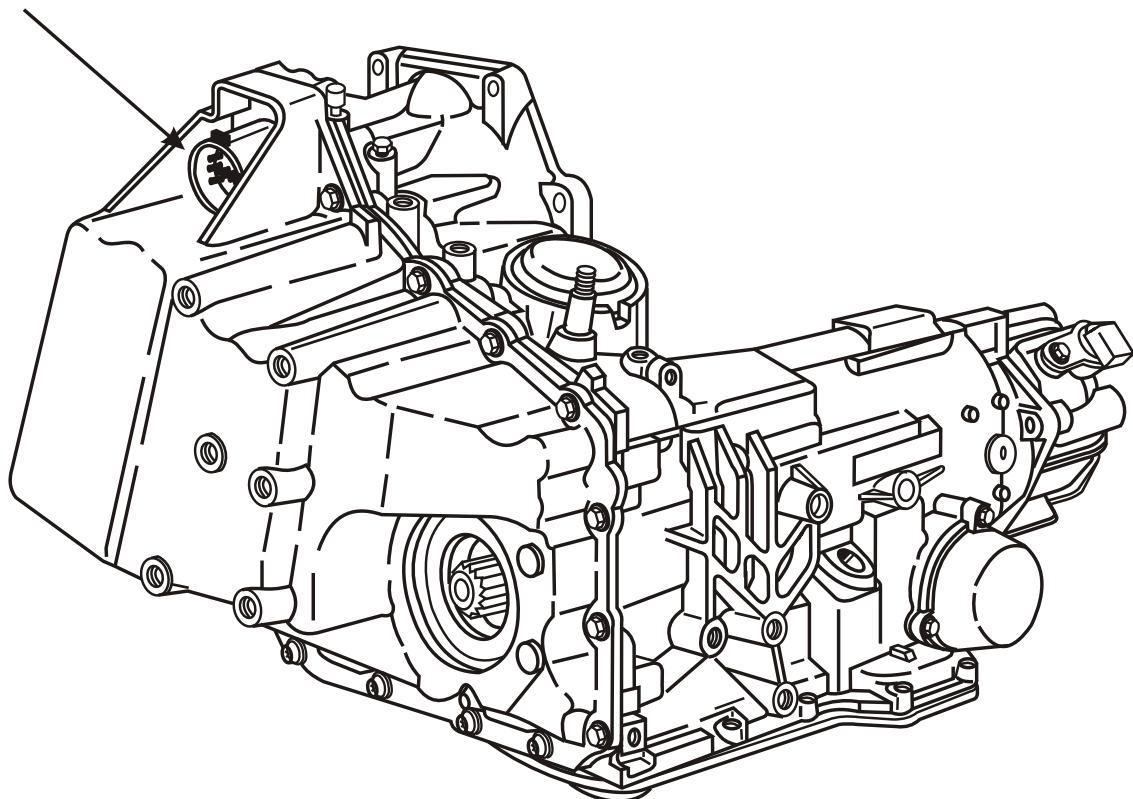
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## THM 4T65-E

TRANSAXLE CASE  
ELECTRICAL CONNECTOR



***FOUND IN THE FOLLOWING 1997 MODELS;***

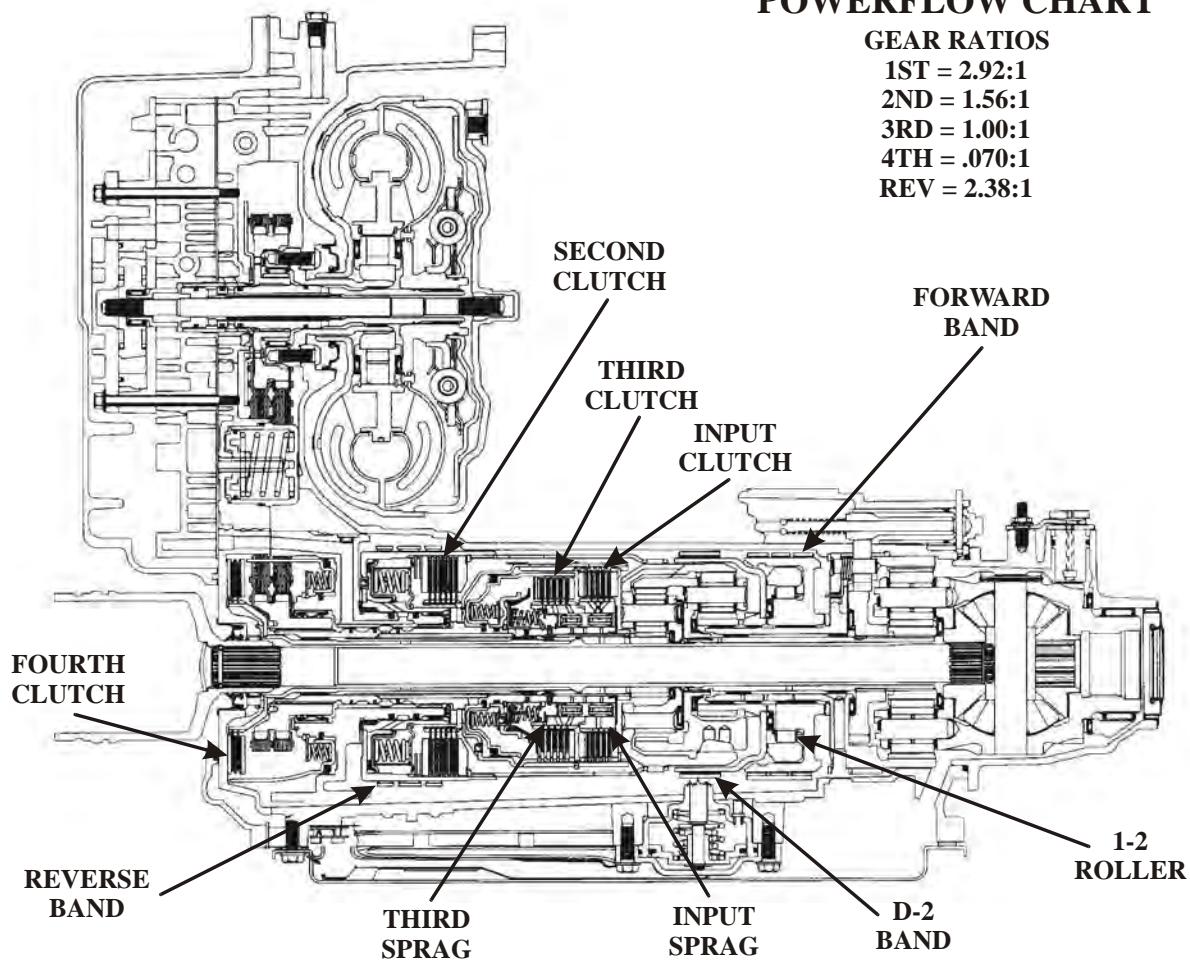
Buick Park Avenue (C-Body), 3.8L and 3.8L Supercharged  
Buick Rivera (G-Body), 3.8L and 3.8L Supercharged  
Oldsmobile Eighty Eight (H-Body), 3.8L Supercharged  
Pontiac Bonneville (H-Body), 3.8L Supercharged  
Buick Regal (W-Body), 3.8L Supercharged  
Chevrolet Lumina/Monte Carlo (W-Body), 3.4L V6 DOHC  
Pontiac Grand Prix (W-Body), 3.8L Supercharged

Figure 1

## POWERFLOW CHART

## GEAR RATIOS

1ST = 2.92:1  
2ND = 1.56:1  
3RD = 1.00:1  
4TH = .070:1  
REV = 2.38:1



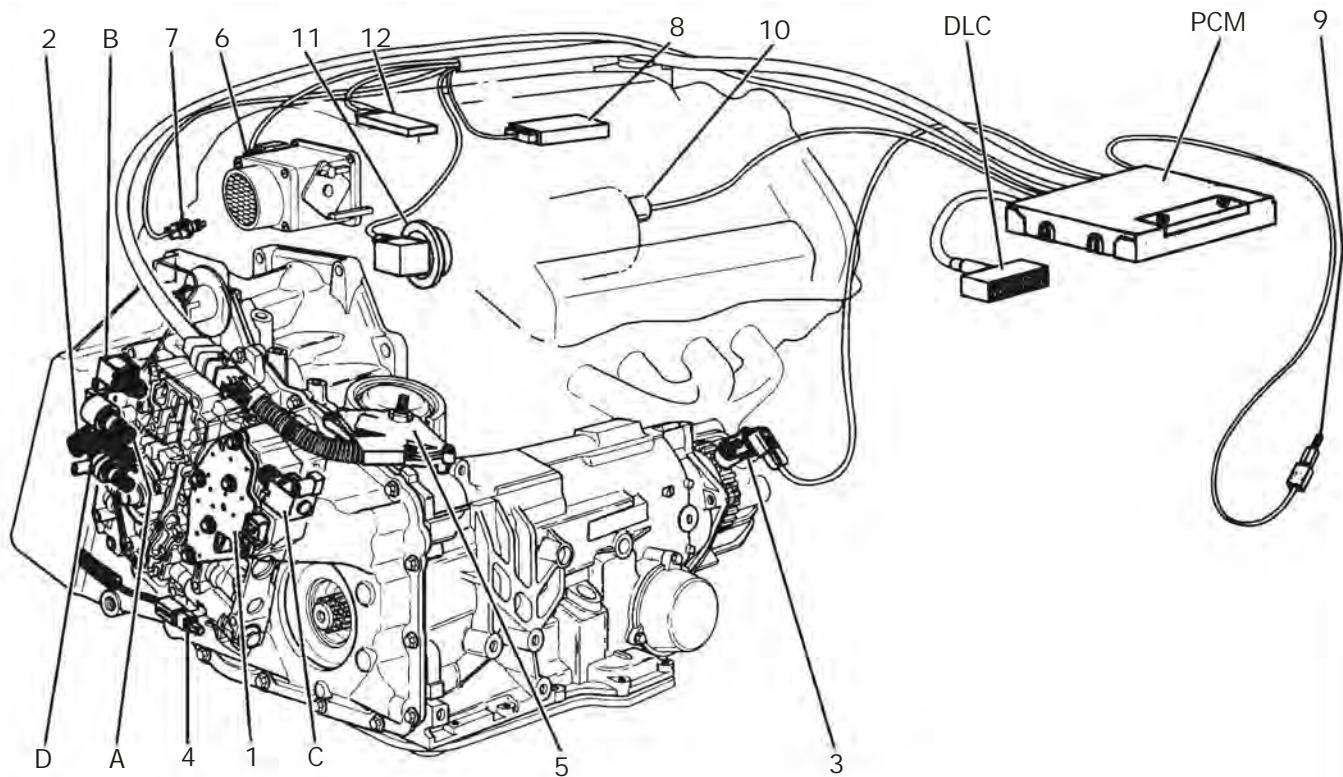
RANGE	INPUT CLUTCH	SECOND CLUTCH	THIRD CLUTCH	FOURTH CLUTCH	FORWARD BAND	D-2 BAND	REVERSE BAND	INPUT SPRAG	1-2 ROLLER	THIRD SPRAG
PARK	ON*							ON*		
REVERSE	ON						ON	HOLD		
NEUTRAL	ON*							ON*		
"D"- 1ST	ON				ON			HOLD	HOLD	
"D"- 2ND	ON*	ON			ON			F/W	HOLD	
"D"- 3RD		ON	ON		ON			F/W	F/W	HOLD
"D"- 4TH		ON	ON	ON	ON			F/W	F/W	F/W
"3"- 1ST	ON				ON			HOLD	HOLD	
"3"- 2ND	ON*	ON			ON			F/W	HOLD	
"3"- 3RD	ON	ON	ON		ON			HOLD	F/W	HOLD
"2"- 1ST	ON				ON	ON		HOLD	HOLD	
"2"- 2ND	ON*	ON			ON	ON		F/W	HOLD	
"1"- 1ST	ON		ON		ON	ON		HOLD	HOLD	HOLD

\* APPLIED BUT NOT EFFECTIVE

Figure 2

SHIFT SOLENOID CHART			
RANGE	1-2 SHIFT SOLENOID	2-3 SHIFT SOLENOID	GEAR RATIO
PARK	ON	ON	
REVERSE	ON	ON	2.38:1
NEUTRAL	ON	ON	
1ST GEAR	ON	ON	2.92:1
2ND GEAR	OFF	ON	1.56:1
3RD GEAR	OFF	OFF	1.00:1
4TH GEAR	ON	OFF	0.70:1

Ohms Resistance Chart			
Cavities	Component	Resistance @ 68°F	Resistance @ 190°F
A-E	1-2 Shift Solenoid	19-24W	24-31W
B-E	2-3 Shift Solenoid	19-24W	24-31W
T-E	TCC/PWM Solenoid	10-12W	13-15W
C-D	EPC Solenoid	3-5W	5-6W
S-V	Input Speed Sensor	893-1127W	1132-1428W
M-L	TFT Sensor	3164-3867W	225-285W
	Output Speed Sensor	981-1864W	



## INPUTS TO PCM

### INFORMATION SENSORS

1. TFP VALVE POSITION SWITCH
2. INPUT SHAFT SPEED SENSOR (ISS)
3. VEHICLE SPEED SENSOR (VSS)
4. TRANSMISSION FLUID TEMPERATURE (TFT) SENSOR
5. TRANSAXLE RANGE SWITCH
6. THROTTLE POSITION SENSOR (TPS)
7. ENGINE COOLANT TEMPERATURE (ECT) SENSOR
8. ENGINE SPEED SENSOR (IGNITION MODULE)
9. TCC BRAKE SWITCH
10. AIR CONDITIONING SWITCH
11. CRUISE CONTROL INFORMATION
12. MASS AIR FLOW SENSOR (MAS)

### ELECTRONIC CONTROLLERS

PCM = POWERTRAIN CONTROL MODULE  
DLC = DIAGNOSTIC LINK CONNECTOR

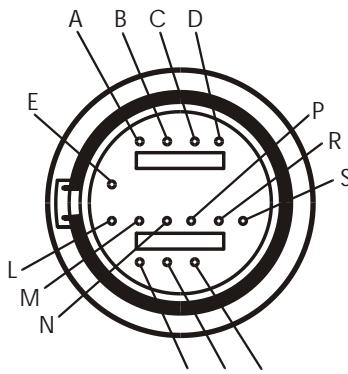
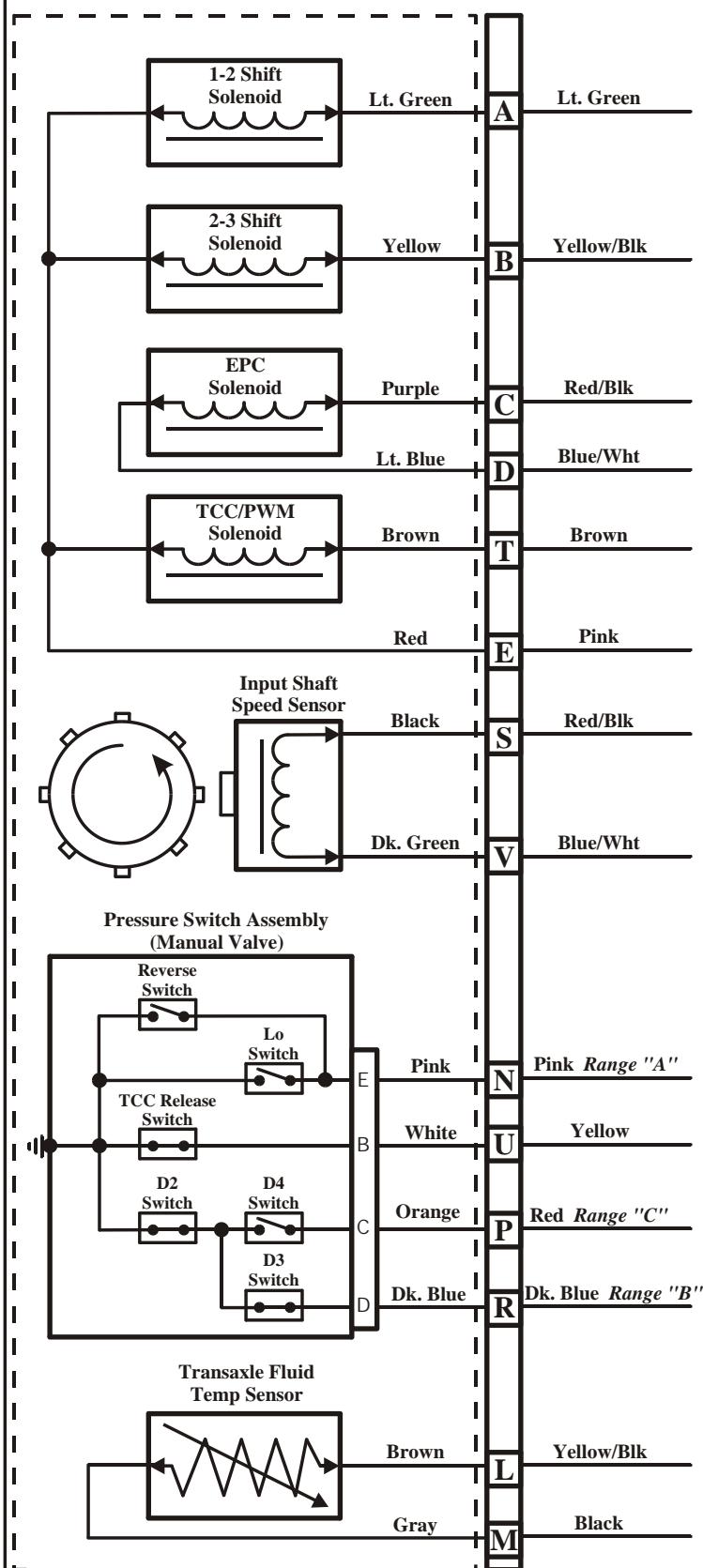
## OUTPUTS TO TRANS

### TRANSAXLE COMPONENTS

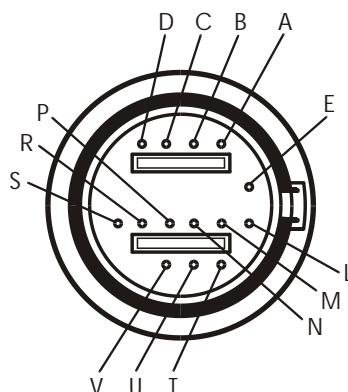
- A. PRESSURE CONTROL SOLENOID
- B. 1-2 SHIFT SOLENOID
- C. 2-3 SHIFT SOLENOID
- D. TCC/PWM SOLENOID

Figure 3

## WIRE SCHEMATIC AND RESISTANCE CHART



*View Looking Into  
Transaxle Case Connector*



*View Looking Into  
Vehicle Harness Connector*

Ohms Resistance Chart			
Cavities	Component	Resistance @ 68°F	Resistance @ 190°F
A-E	1-2 Shift Solenoid	19-24W	24-31W
B-E	2-3 Shift Solenoid	19-24W	24-31W
T-E	TCC/PWM Solenoid	10-12W	13-15W
C-D	EPC Solenoid	3-5W	5-6W
S-V	Input Speed Sensor	893-1127W	1132-1428W
M-L	TFT Sensor	3164-3867W	225-285W
	Output Speed Sensor	981-1864W	

Figure 4



# Technical Service Information

CASE CONNECTOR PIN FUNCTION		
Pin	External Wire Color	Function
A	Light Green	Ground signal from PCM for the 1-2 Shift Solenoid (A)
B	Yellow/Black	Ground signal from PCM for the 2-3 Shift Solenoid (B)
C	Red/Black	Electronic Pressure Control Solenoid, HIGH Control
D	Blue/White	Electronic Pressure Control Solenoid, LOW Control
E	Pink	Transaxle Solenoid 12V Power In
L	Yellow/Black	Transaxle Fluid Temperature (TFT) Sensor HIGH
M	Black	Transaxle Fluid Temperature (TFT) Sensor LOW
N	Pink	Pressure Switch Assembly, Range Signal "A"
P	Red	Pressure Switch Assembly, Range Signal "C"
R	Dark Blue	Pressure Switch Assembly, Range Signal "B"
S	Red/Black	Input Speed Sensor (ISS) signal HIGH
T	Brown	Ground signal from PCM for the TCC/PWM Converter Clutch Solenoid
U	Yellow	TCC Release Switch signal to the PCM
V	Blue/White	Input Speed Sensor (ISS) signal LOW

Figure 5

## TRANSAXLE INTERNAL ELECTRONIC CONTROLS

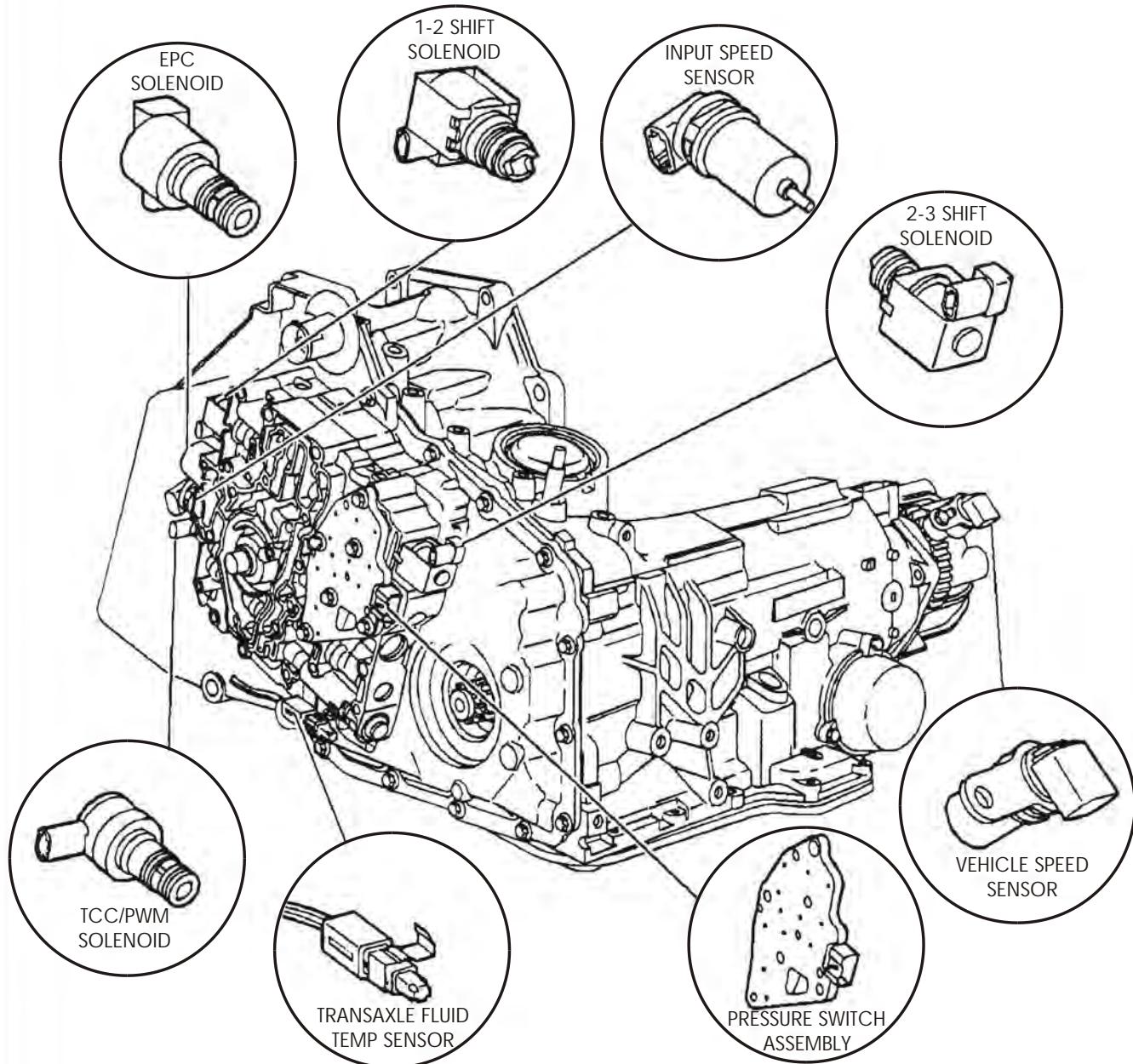


Figure 6



# Technical Service Information

DIAGNOSTIC TROUBLE CODE (DTC) IDENTIFICATION			
DTC	DESCRIPTION	DTC TYPE*	DEFAULT ACTION
P0218	Automatic Transmission Fluid Overtemperature	D	<ul style="list-style-type: none"><li>1 DTC P0218 is stored in PCM memory</li><li>2 Disable shift adapts</li></ul>
P0502	Vehicle Speed Sensor Circuit Low Input	B	<ul style="list-style-type: none"><li>1 DTC P0502 is stored in PCM memory</li><li>2 Maximum line pressure</li><li>3 Disable shift adapts</li><li>4 Calculate VSS from ISS and comanded gear</li></ul>
P0503	Vehicle Speed Sensor Circuit Performance	B	<ul style="list-style-type: none"><li>1 DTC P0503 is stored in PCM memory</li><li>2 Maximum line pressure</li><li>3 Disable shift adapts</li><li>4 Calculate VSS from ISS and comanded gear</li></ul>
P0560	System Voltage Malfunction	D	<ul style="list-style-type: none"><li>1 DTC P0560 is stored in PCM memory</li><li>2 Disable shift adapts</li><li>3 Inhibit TCC</li></ul>
P0711	Automatic Transmission Fluid Temperature Sensor Circuit Performance	B	<ul style="list-style-type: none"><li>1 DTC P0711 is stored in PCM memory</li><li>2 Disable shift adapts</li><li>3 The PCM calculates a default TFT from the ECT and IAT</li></ul>
P0712	Automatic Transmission Fluid Temperature Sensor Circuit Low Input	D	<ul style="list-style-type: none"><li>1 DTC P0712 is stored in PCM memory</li><li>2 Disable shift adapts</li><li>3 The PCM calculates a default TFT from the ECT and IAT</li></ul>
P0713	Automatic Transmission Fluid Temperature Sensor Circuit High Input	D	<ul style="list-style-type: none"><li>1 DTC P0713 is stored in PCM memory</li><li>2 Disable shift adapts</li><li>3 The PCM calculates a default TFT from the ECT and IAT</li></ul>
P0716	Automatic Transmission Input Speed Sensor Circuit Performance	B	<ul style="list-style-type: none"><li>1 DTC P0716 is stored in PCM memory</li><li>2 Disable shift adapts</li><li>3 The PCM calculates a default TFT from the ECT and IAT</li></ul>
P0717	Automatic Transmission Input Speed Sensor Circuit No Signal	B	<ul style="list-style-type: none"><li>1 DTC P0717 is stored in PCM memory</li><li>2 Disable shift adapts</li><li>3 The PCM calculates a default TFT from the ECT and IAT</li></ul>

**\*DTC TYPES**

A - Emission-related, turns the MIL "ON" after the 1st failure.

B - Emission-related, turns the MIL "ON" after two consecutive trips with failure.

D - Non-emission-related, no lamps and no message.

Figure 7



## Technical Service Information

### DIAGNOSTIC TROUBLE CODE (DTC) IDENTIFICATION

DTC	DESCRIPTION	DTC TYPE*	DEFAULT ACTION
P0719	TCC Brake Switch Circuit Low	D	<ol style="list-style-type: none"><li>1 DTC P0719 is stored in PCM memory</li><li>2 Disregards brake switch input for TCC operation under the following conditions<ol style="list-style-type: none"><li>a. Throttle position greater than 6%</li><li>b. Vehicle speed is greater than 44 MPH</li><li>c. Throttle position was previously greater than 12% while the vehicle speed was greater than 47 MPH</li><li>d. Brake switch has not been OFF for more than 2 seconds in this ignition cycle</li></ol></li></ol>
P0724	TCC Brake Switch Circuit High	D	<ol style="list-style-type: none"><li>1 DTC P0724 is stored in PCM memory</li><li>2 Disable shift adapts</li><li>3 Maximum line pressure</li></ol>
P0730	Undefined Gear Ratio	D	<ol style="list-style-type: none"><li>1 DTC P0730 is stored in PCM memory</li><li>2 Disable shift adapts</li><li>3 Maximum line pressure</li></ol>
P0741	Torque Converter Clutch System Stuck OFF	B	<ol style="list-style-type: none"><li>1 DTC P0741 is stored in PCM memory</li><li>2 Disable shift adapts</li><li>3 Inhibits TCC</li><li>4 Inhibits 4th gear in Hot Mode</li></ol>
P0742	Torque Converter Clutch System Stuck ON	A	<ol style="list-style-type: none"><li>1 DTC P0742 is stored in PCM memory</li><li>2 Disable shift adapts</li><li>3 TCC commanded ON at maximum capacity</li></ol>
P0748	Pressure Control Solenoid Electrical	D	<ol style="list-style-type: none"><li>1 DTC P0748 is stored in PCM memory</li><li>2 Disable shift adapts</li><li>3 Maximum line pressure</li></ol>
P0751	1-2 Shift Solenoid Performance	B	<ol style="list-style-type: none"><li>1 DTC P0751 is stored in PCM memory</li><li>2 Disable shift adapts</li><li>3 Maximum line pressure</li><li>4 Inhibits 3-2 downshifts when the vehicle speed is greater than 30 MPH</li></ol>
P0753	1-2 Shift Solenoid Electrical	A	<ol style="list-style-type: none"><li>1 DTC P0753 is stored in PCM memory</li><li>2 Disable shift adapts</li><li>3 Maximum line pressure</li><li>4 Inhibits 3-2 downshifts when the vehicle speed is greater than 30 MPH</li></ol>

#### \*DTC TYPES

A - Emission-related, turns the MIL "ON" after the 1st failure.

B - Emission-related, turns the MIL "ON" after two consecutive trips with failure.

D - Non-emission-related, no lamps and no message.

Figure 8



# Technical Service Information

DIAGNOSTIC TROUBLE CODE (DTC) IDENTIFICATION			
DTC	DESCRIPTION	DTC TYPE*	DEFAULT ACTION
P0756	2-3 Shift Solenoid Performance	A	<ul style="list-style-type: none"><li>1 DTC P0756 is stored in PCM memory</li><li>2 Disable shift adapts</li><li>3 Maximum line pressure</li><li>4 Defaults to 3rd gear</li><li>5 Inhibits TCC</li></ul>
P0758	2-3 Shift Solenoid Electrical	A	<ul style="list-style-type: none"><li>1 DTC P0758 is stored in PCM memory</li><li>2 Disable shift adapts</li><li>3 Maximum line pressure</li><li>4 Defaults to 3rd gear</li><li>5 Inhibits TCC</li></ul>
P1810	Automatic Transmission Fluid Pressure Manual Valve Position Switch Circuit Malfunction	B	<ul style="list-style-type: none"><li>1 DTC P1810 is stored in PCM memory</li><li>2 Disable shift adapts</li><li>3 Maximum line pressure</li><li>4 PCM assumes D4 for shifting</li></ul>
P1811	Maximum Adapt and Long Shift	D	<ul style="list-style-type: none"><li>1 DTC P1811 is stored in PCM memory</li><li>2 Disable shift adapts</li><li>3 Maximum line pressure</li></ul>
P1860	Torque Converter Clutch Pulse Width Modulation Solenoid Electrical	A	<ul style="list-style-type: none"><li>1 DTC P1860 is stored in PCM memory</li><li>2 Disable shift adapts</li><li>3 Inhibits TCC</li><li>4 Inhibits 4th gear in Hot Mode</li></ul>
P1887	Torque Converter Clutch Release Switch Circuit Malfunction	B	<ul style="list-style-type: none"><li>1 DTC P1887 is stored in PCM memory</li><li>2 Disable shift adapts</li><li>3 Inhibits TCC</li><li>4 Inhibits 4th gear in Hot Mode</li></ul>

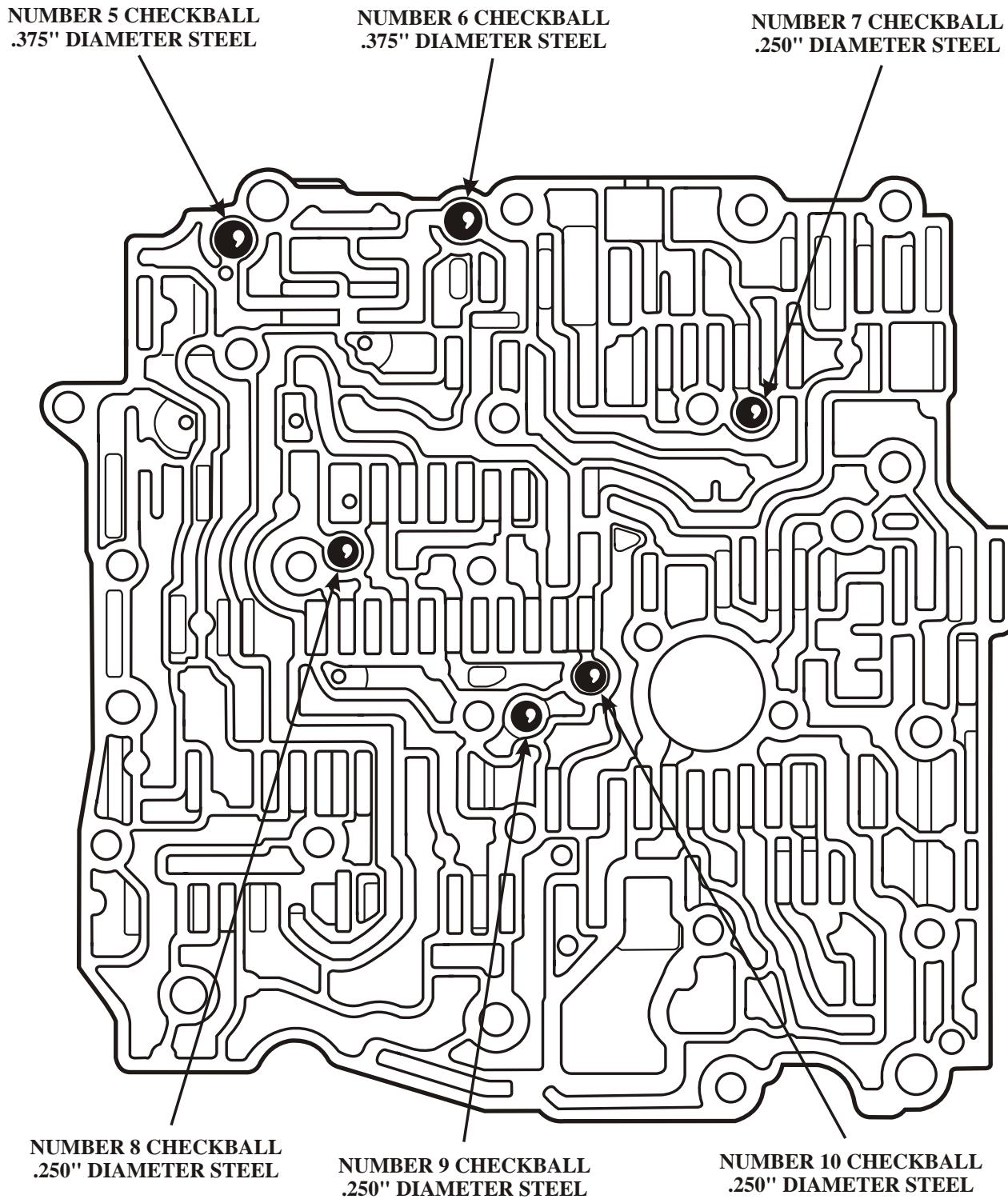
**\*DTC TYPES**

A - Emission-related, turns the MIL "ON" after the 1st failure.

B - Emission-related, turns the MIL "ON" after two consecutive trips with failure.

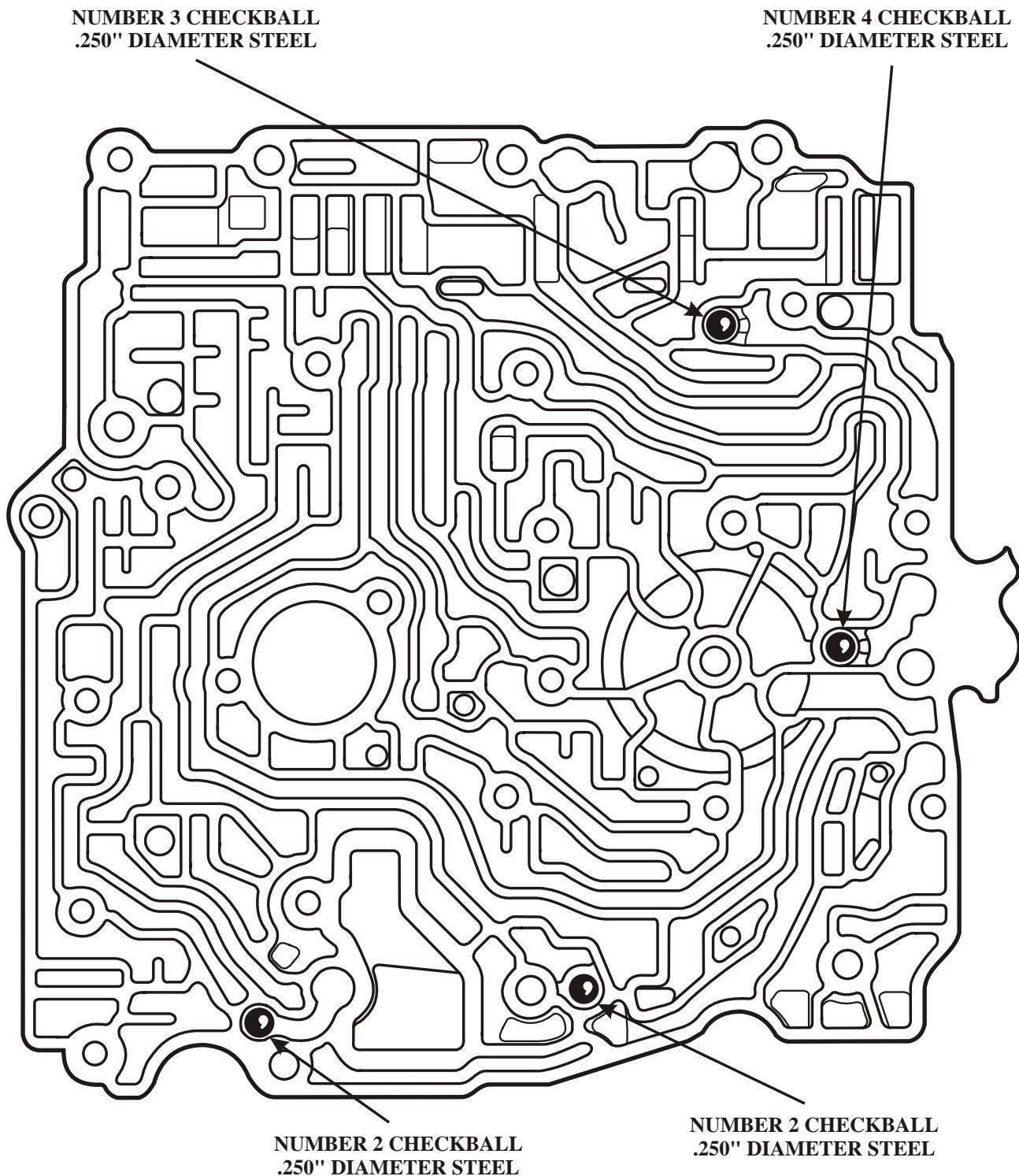
D - Non-emission-related, no lamps and no message.

Figure 9

**THM 4T65-E  
VALVE BODY CHECKBALL LOCATIONS**

**DESCRIPTION OF CHECKBALL FUNCTIONS FOUND ON PAGE 14.**

Figure 10

**THM 4T65-E  
CHANNEL PLATE CHECKBALL LOCATIONS**

**DESCRIPTION OF CHECKBALL FUNCTIONS FOUND ON PAGE 14.**

Figure 11



# Technical Service Information

## CHECKBALL FUNCTIONS

**Number 1 Checkball** - Separates converter clutch apply and converter clutch release oil passages.

**Number 2 Checkball** - Forces second clutch feed oil through an orifice in the spacer plate for 2nd clutch on both apply and release sides.

**Number 3 Checkball** - Blocks the PRN oil passage when the manual lever is in the D3, D2, or M1 ranges to prevent PRN oil from exhausting at the manual valve, and also allows PRN oil to apply the input clutch in Park, Reverse and Neutral.

**Number 4 Checkball** - Separates the 3rd clutch and Lo-1st oil passages.

**Number 5 Checkball** - Forces reverse servo feed oil through an orifice in the spacer plate, before entering the reverse servo feed passage. (3/8" Diameter Ball)

**Number 6 Checkball** - Forces D4 oil from the manual valve through an orifice in the spacer plate, before entering the forward servo feed passage. (3/8" Diameter Ball)

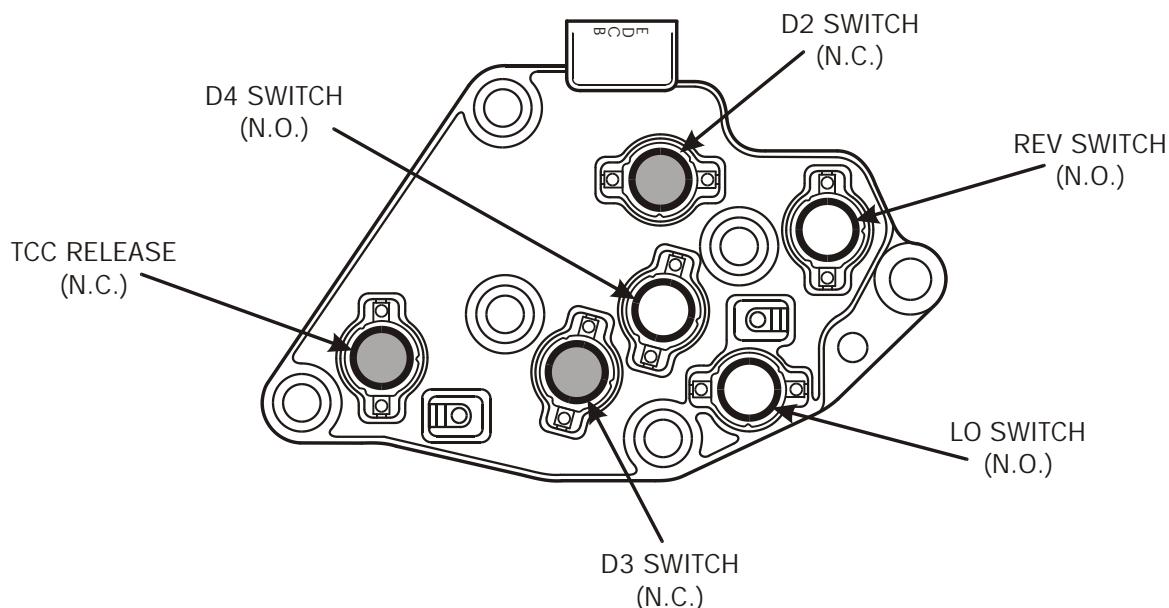
**Number 7 Checkball** - Blocks LO oil from the manual valve, from entering the Lo-1st passage, and routes it to the 1-2 shift valve and through an orifice in the spacer plate, before entering the Lo-1st passage.

**Number 8 Checkball** - Blocks D2 oil from the manual valve, from entering the manual 2-1 servo feed passage, and routes it to the 2-3 shift valve and through an orifice in the spacer plate before entering the manual 2-1 servo feed passage.

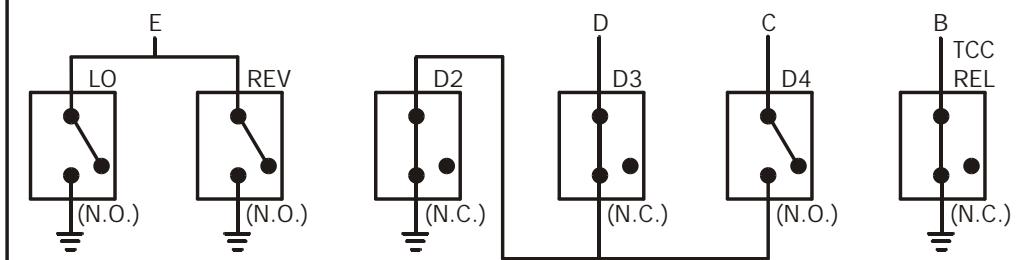
**Number 9 Checkball** - Forces 3rd clutch feed oil through an orifice in the spacer plate for 3rd clutch on both the apply and release side.

**Number 10 Checkball** - Separates line pressure and fourth clutch passages.

## PRESSURE SWITCH ASSEMBLY



### SWITCH LOGIC ENGINE OFF



RANGE INDICATOR	FLUID*						CIRCUIT**			
	REV	D4	D3	D2	LO	TCC	"E"	"D"	"C"	"B"
Park/Neutral	OP	OP	CL	CL	OP	OP	12	0	12	12
Reverse	CL	OP	CL	CL	OP	OP	0	0	12	12
Overdrive (D4)	OP	CL	CL	CL	OP	OP	12	0	0	12
Manual 3rd (D3)	OP	CL	OP	CL	OP	OP	12	12	0	12
Manual 2nd (D2)	OP	CL	OP	OP	OP	OP	12	12	12	12
Manual 1st (LO)	OP	CL	OP	OP	CL	OP	0	12	12	12
When TCC is ON	N/A	CL	CL	CL	N/A	CL	N/A	N/A	N/A	0



= Pressurized



= Exhausted

CL = Closed

OP = Open



12 = 12 Volts Seen

0 = 0 Volts Seen

Figure 12

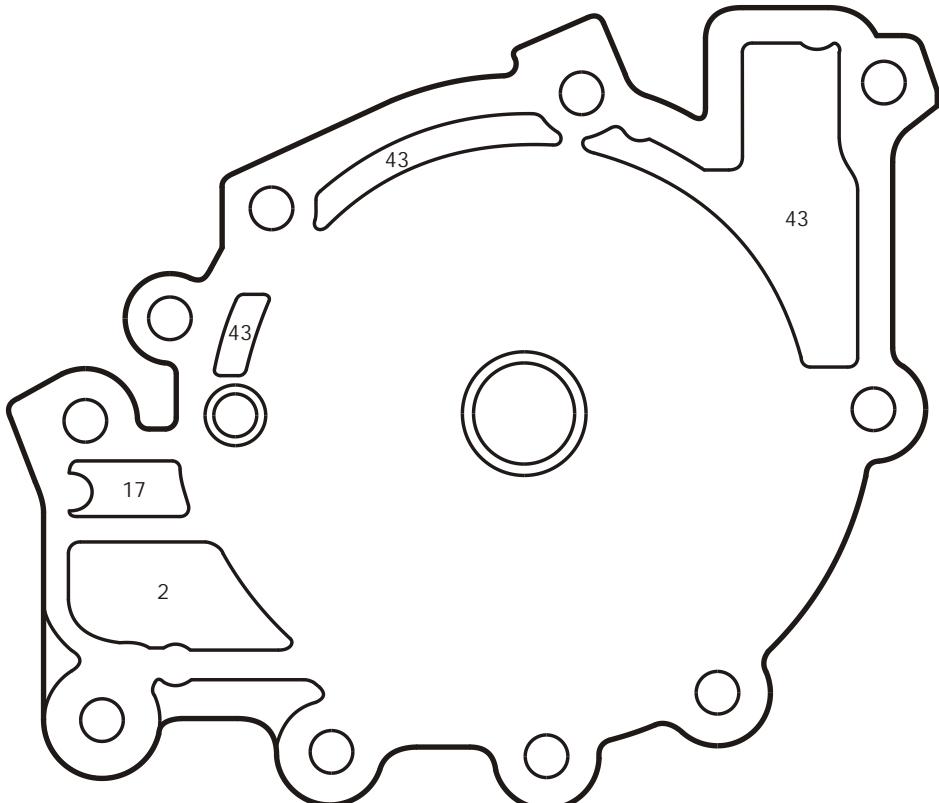
**PUMP COVER PASSAGES - PUMP BODY SIDE**

Figure 13

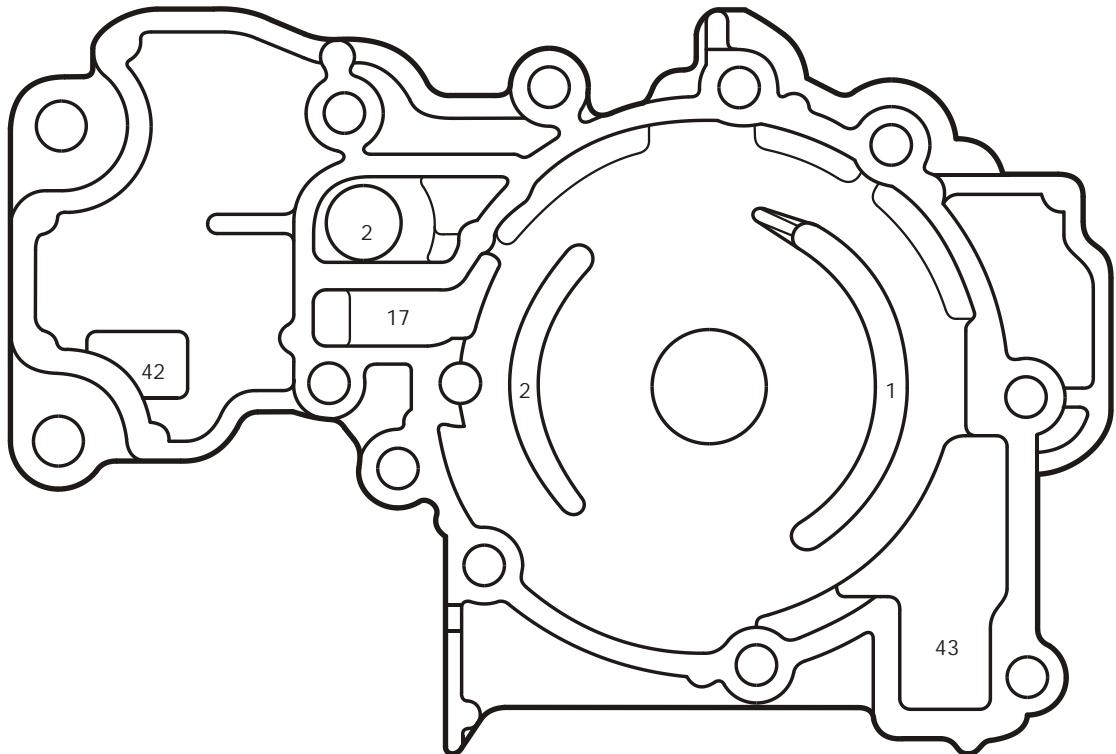
**PUMP BODY PASSAGES - PUMP COVER SIDE**

Figure 14

## PUMP BODY PASSAGES - VALVE BODY SIDE

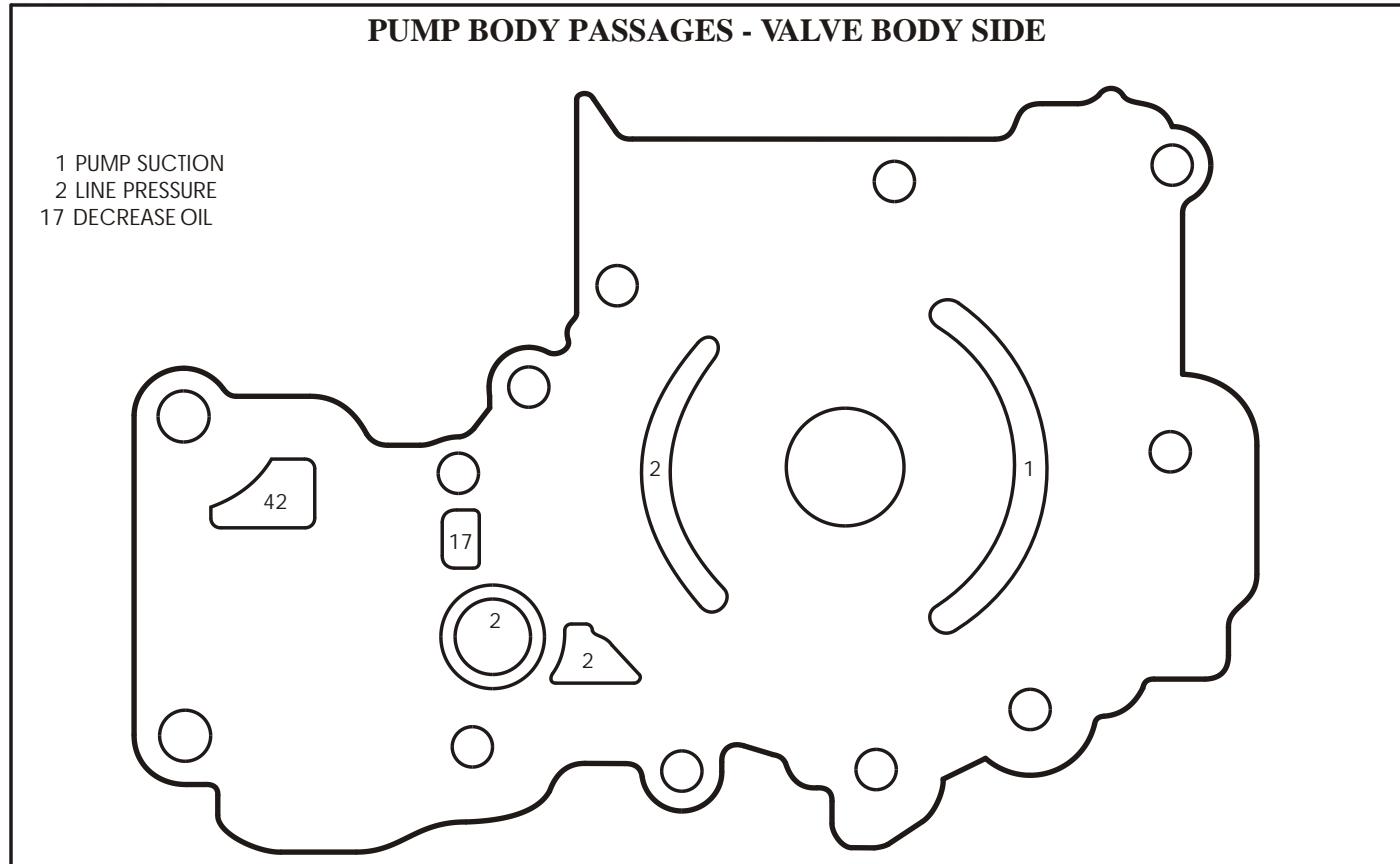


Figure 15

## OIL PUMP DRIVE SHAFT AND DRIVE SPROCKET SUPPORT PASSAGES

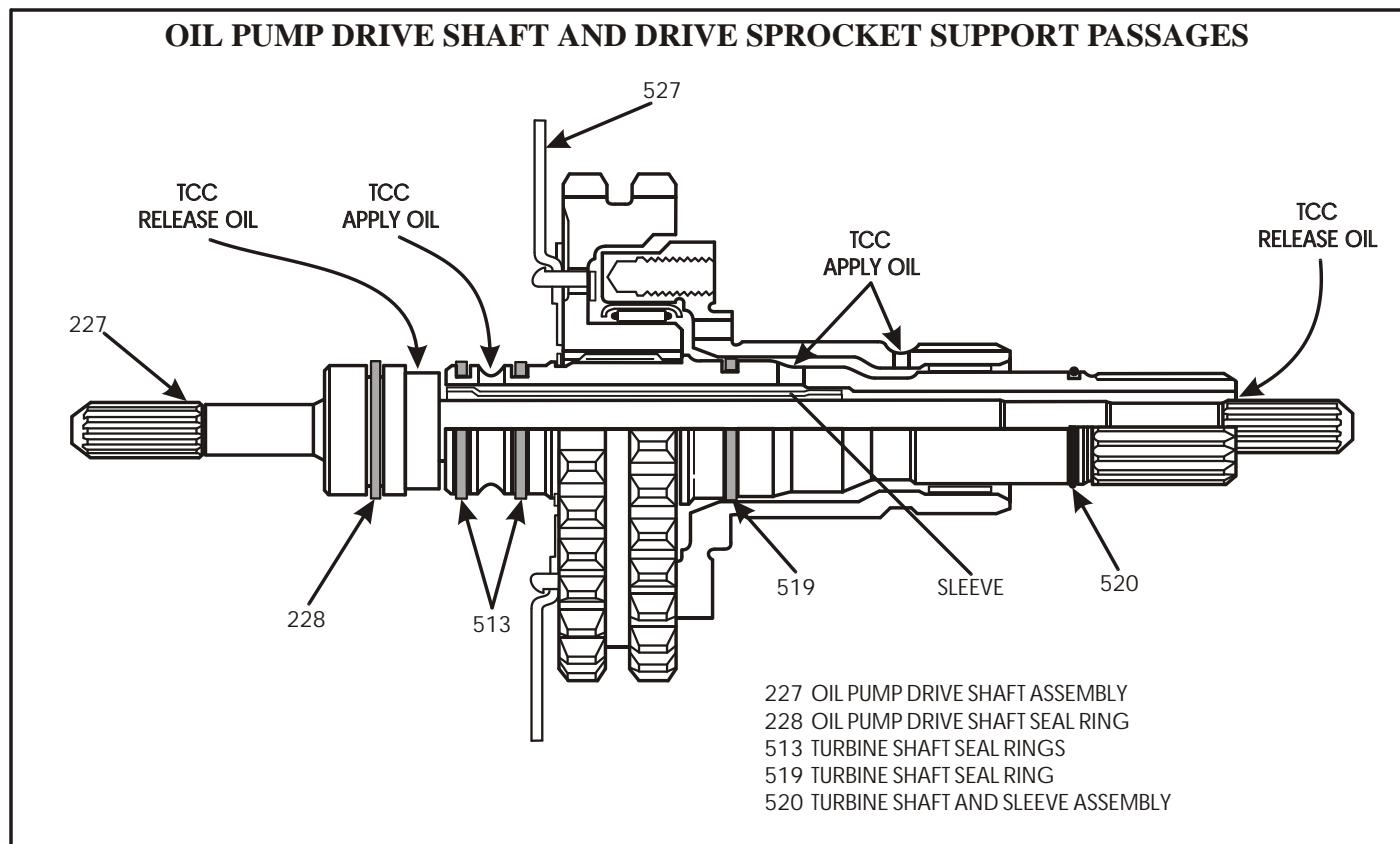


Figure 16

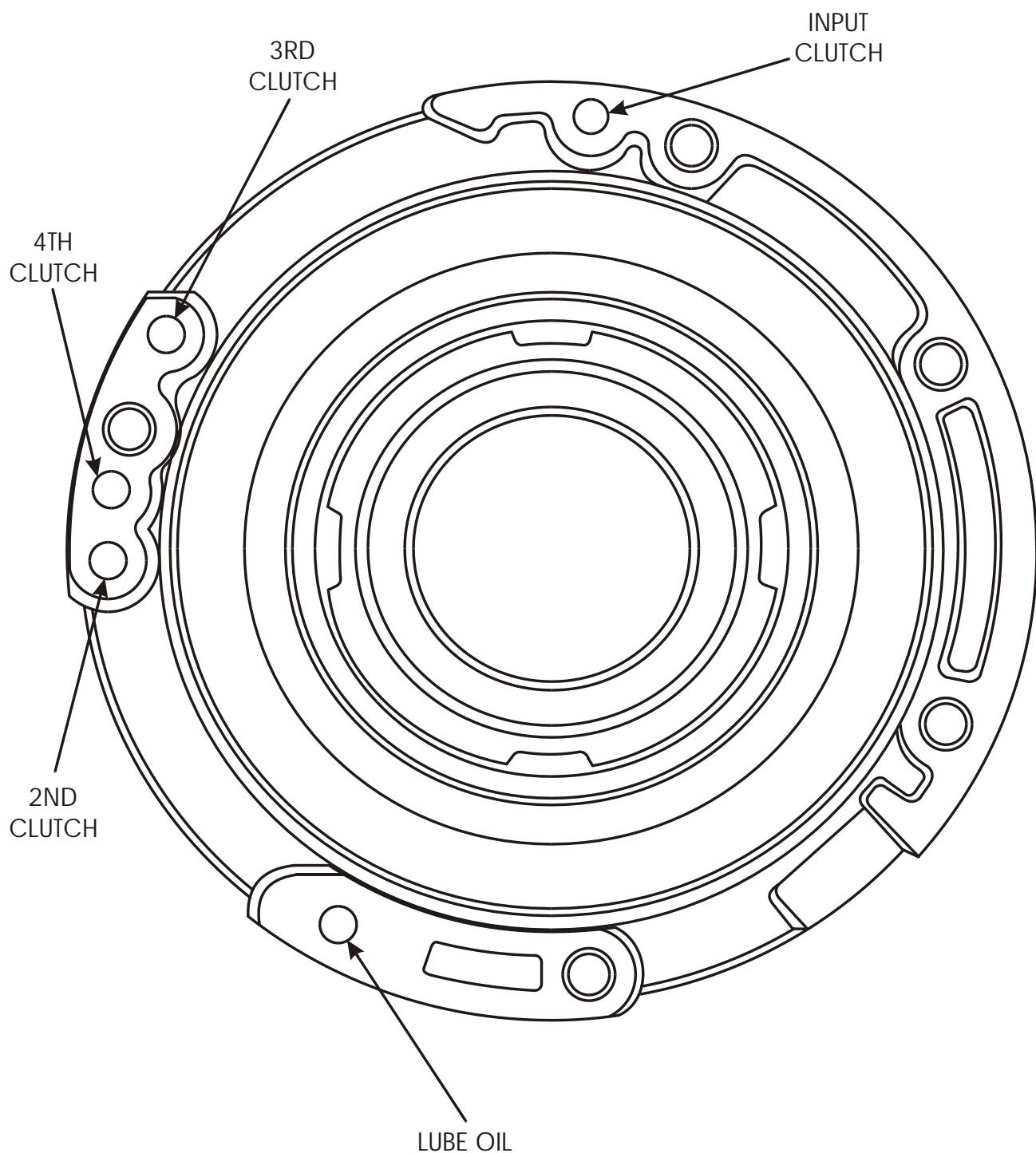
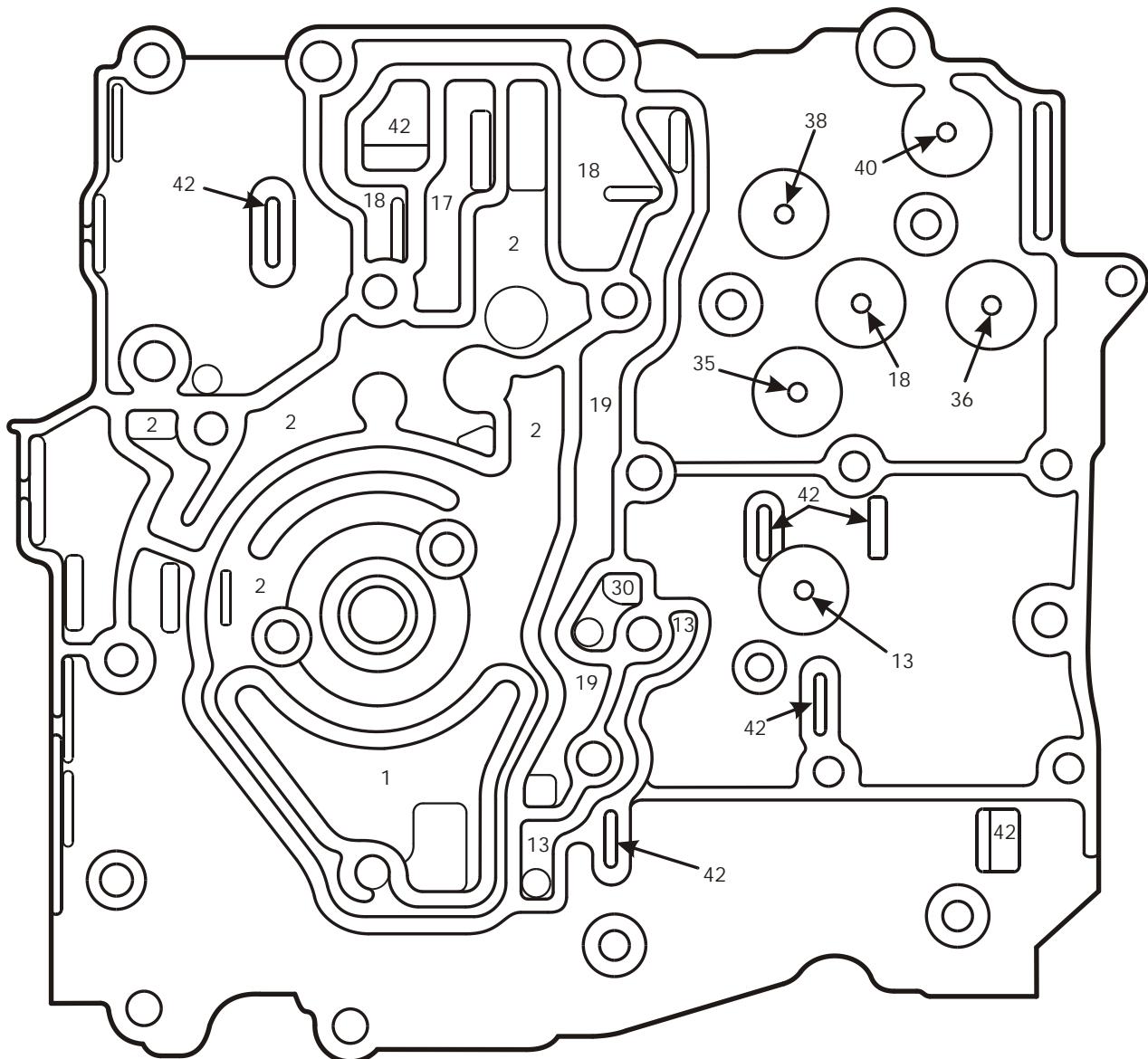
**DRIVEN SPROCKET SUPPORT PASSAGES**

Figure 17

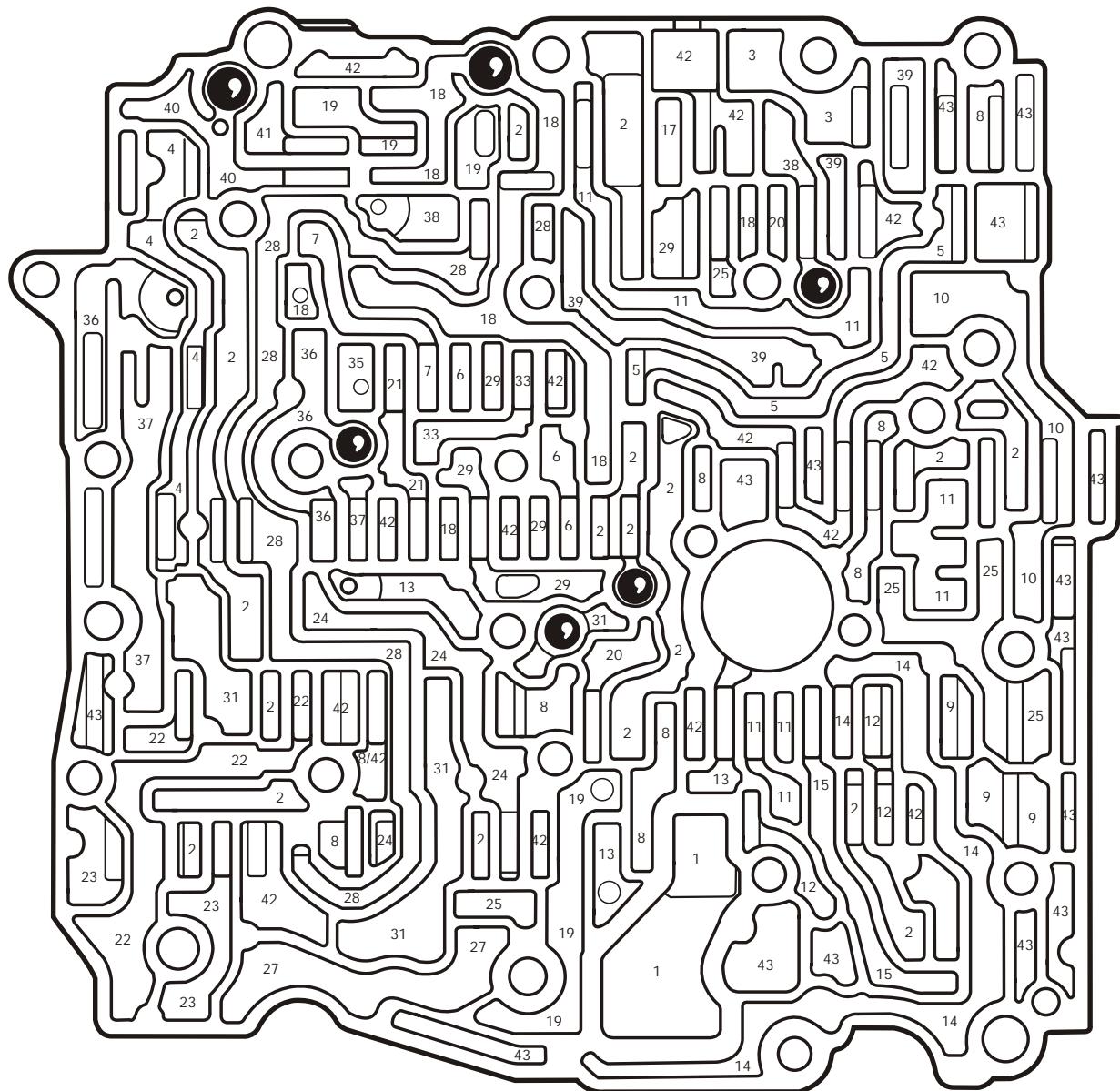
## VALVE BODY PASSAGES - OIL PUMP SIDE



- 1 PUMP SUCTION
- 2 LINE PRESSURE
- 13 TCC RELEASE OIL
- 17 DECREASE OIL
- 18 D4 OIL
- 19 FORWARD SERVO APPLY
- 30 3RD CLUTCH/EXHAUST
- 35 D3 OIL
- 36 D2 OIL
- 38 MANUAL LO
- 40 REVERSE OIL

Figure 18

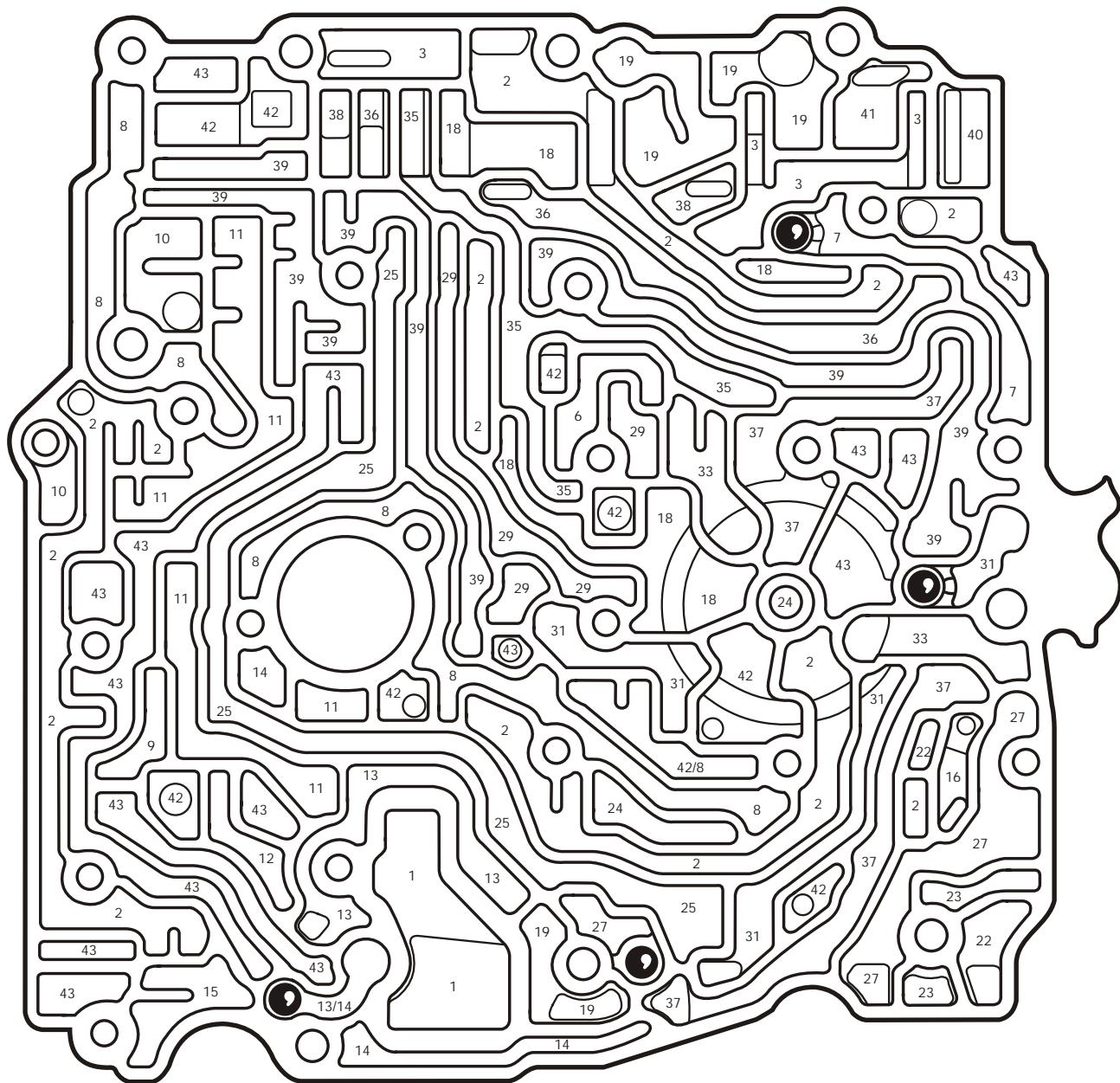
## VALVE BODY PASSAGES - CHANNEL PLATE SIDE



- |                            |                                |                     |
|----------------------------|--------------------------------|---------------------|
| 1 PUMP SUCTION             | 13 TCC RELEASE                 | 28 2-3 OFF SIGNAL   |
| 2 LINE PRESSURE            | 14 TCC APPLY                   | 29 3RD              |
| 3 PRN                      | 15 COOLER                      | 31 3RD CLUTCH       |
| 4 2-3 SIGNAL               | 17 DECREASE OIL                | 33 4TH CLUTCH       |
| 5 1-2, 3-4 SIGNAL          | 18 D4                          | 35 D3               |
| 6 INPUT CLUTCH FEED        | 19 FORWARD SERVO               | 36 D2               |
| 7 INPUT CLUTCH             | 20 LO/1ST                      | 37 MANUAL 2-1 SERVO |
| 8 TORQUE SIGNAL            | 21 AUXILIARY INPUT CLUTCH FEED | 38 LO               |
| 8/42 TORQUE SIGNAL/EXHAUST | 22 1-2 ACCUMULATOR             | 39 LO-1ST           |
| 9 TCC SIGNAL (PWM)         | 23 2-3 ACCUMULATOR             | 40 REVERSE          |
| 10 ACTUATOR FEED           | 24 3-4 ACCUMULATOR             | 41 REVERSE SERVO    |
| 11 CONVERTER FEED          | 25 2ND                         | 42 EXHAUST          |
| 12 TCC REGULATED APPLY     | 27 2ND CLUTCH                  | 43 CASTING VOID     |

Figure 19

## CHANNEL PLATE PASSAGES - VALVE BODY SIDE



- |                            |                    |                            |
|----------------------------|--------------------|----------------------------|
| 1 PUMP SUCTION             | 16 LUBE OIL        | 37 MANUAL 2-1SERVO         |
| 2 LINE PRESSURE            | 18 D4              | 38 LO                      |
| 3 PRN                      | 19 FORWARD SERVO   | 39 LO-1ST                  |
| 6 INPUT CLUTCH FEED        | 22 1-2 ACCUMULATOR | 40 REVERSE                 |
| 7 INPUT CLUTCH             | 23 2-3 ACCUMULATOR | 41 REVERSE SERVO           |
| 8 TORQUE SIGNAL            | 24 3-4 ACCUMULATOR | 42 EXHAUST                 |
| 9 TCC SIGNAL (PWM)         | 25 2ND             | 42/8 EXHAUST/TORQUE SIGNAL |
| 10 ACTUATORFEED            | 27 2ND CLUTCH      | 43 CASTING VOID            |
| 11 CONVERTER FEED          | 29 3RD             |                            |
| 12 TCC REGULATED APPLY     | 31 3RD CLUTCH      |                            |
| 13 TCC RELEASE             | 33 4TH CLUTCH      |                            |
| 13/14 TCC RELEASE/TCCAPPLY | 35 D3              |                            |
| 15 COOLER                  | 36 D2              |                            |

Figure 20

## SPACER LATE PASSAGES

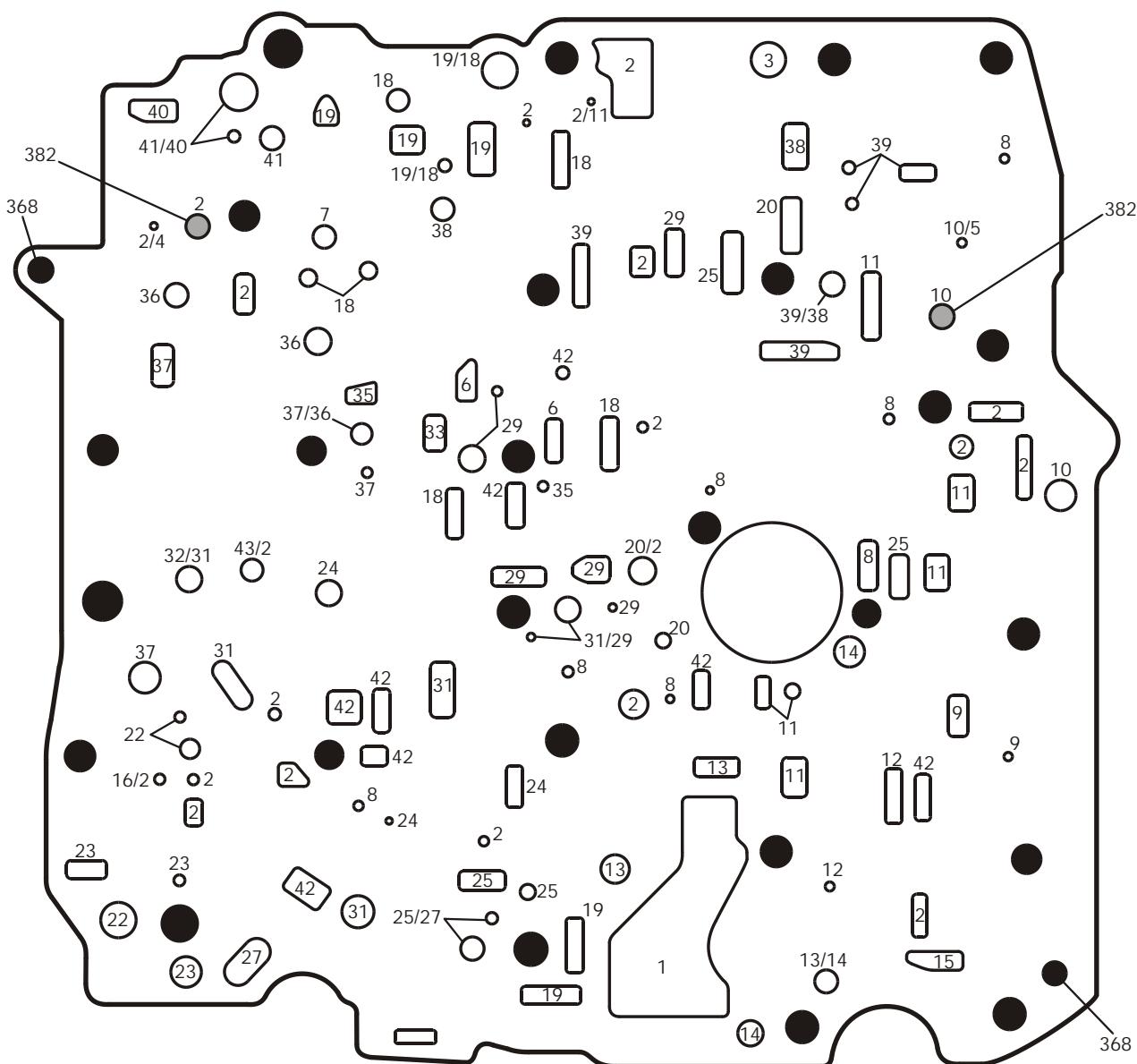
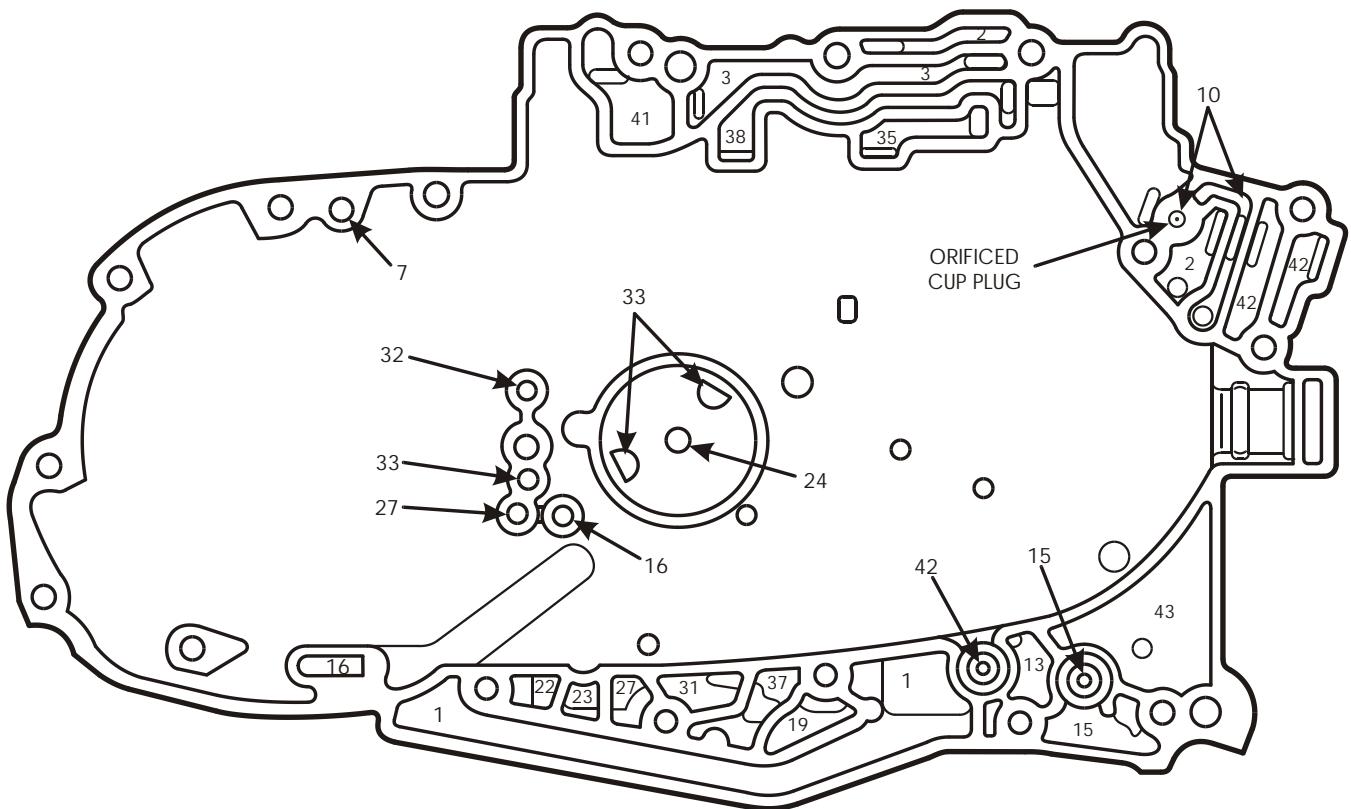


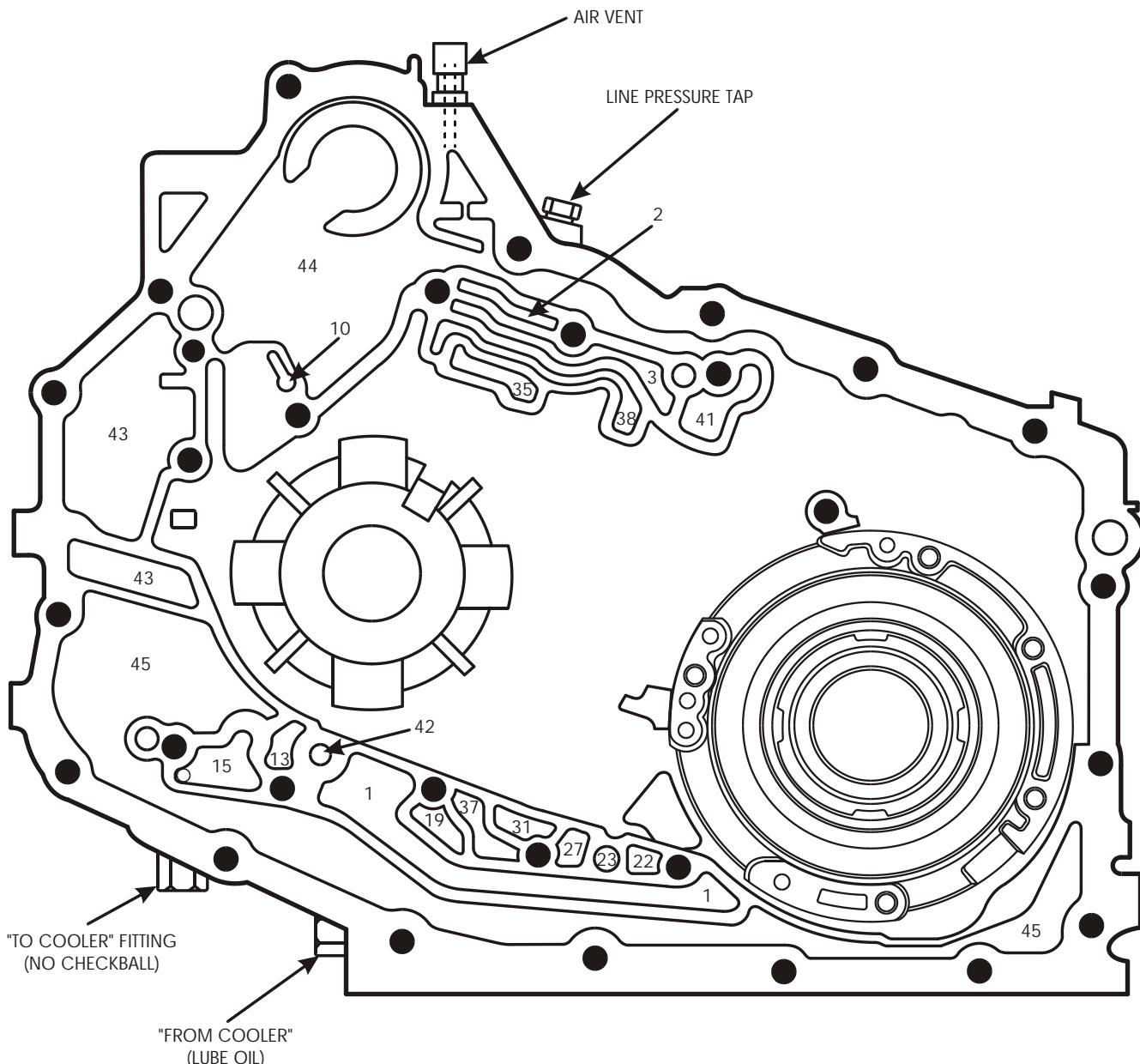
Figure 21

## CHANNEL PLATE PASSAGES - CASE SIDE



- |                       |                       |
|-----------------------|-----------------------|
| 1 PUMP SUCTION        | 24 3-4 ACCUMULATOR    |
| 2 LINE PRESSURE       | 27 2ND CLUTCH         |
| 3 PRN OIL             | 31 3RD CLUTCH         |
| 7 INPUT CLUTCH        | 32 3RD CLUTCH/LO-1ST  |
| 10 ACTUATOR FEED      | 33 4TH CLUTCH         |
| 13 TCC RELEASE        | 35 D3 OIL             |
| 15 TO COOLER          | 37 MANUAL 2-1 SERVO   |
| 16 LUBE               | 38 LO                 |
| 19 FORWARD SERVO FEED | 41 REVERSE SERVO FEED |
| 22 1-2 ACCUMULATOR    | 42 EXHAUST            |
| 23 2-3 ACCUMULATOR    | 43 CASTING VOID       |

## CASE PASSAGES - CHANNEL PLATE SIDE



- |                    |                        |
|--------------------|------------------------|
| 1 PUMP SUCTION     | 31 3RD CLUTCH          |
| 2 LINE PRESSURE    | 35 D3 OIL              |
| 3 PRN OIL          | 37 MANUAL 2-1 SERVO    |
| 10 ACTUATOR FEED   | 38 LO                  |
| 13 TCC RELEASE     | 41 REVERSE SERVO FEED  |
| 15 TO COOLER       | 42 EXHAUST             |
| 16 FROM COOLER     | 43 CASTING VOID        |
| 19 FORWARD SERVO   | 44 VENT                |
| 22 1-2 ACCUMULATOR | 45 THERMO ELEMENT EXH. |
| 23 2-3 ACCUMULATOR |                        |
| 27 2ND CLUTCH      |                        |

Figure 23

## CASE AND ACCUMULATOR HOUSING PASSAGES - BOTTOM SIDE

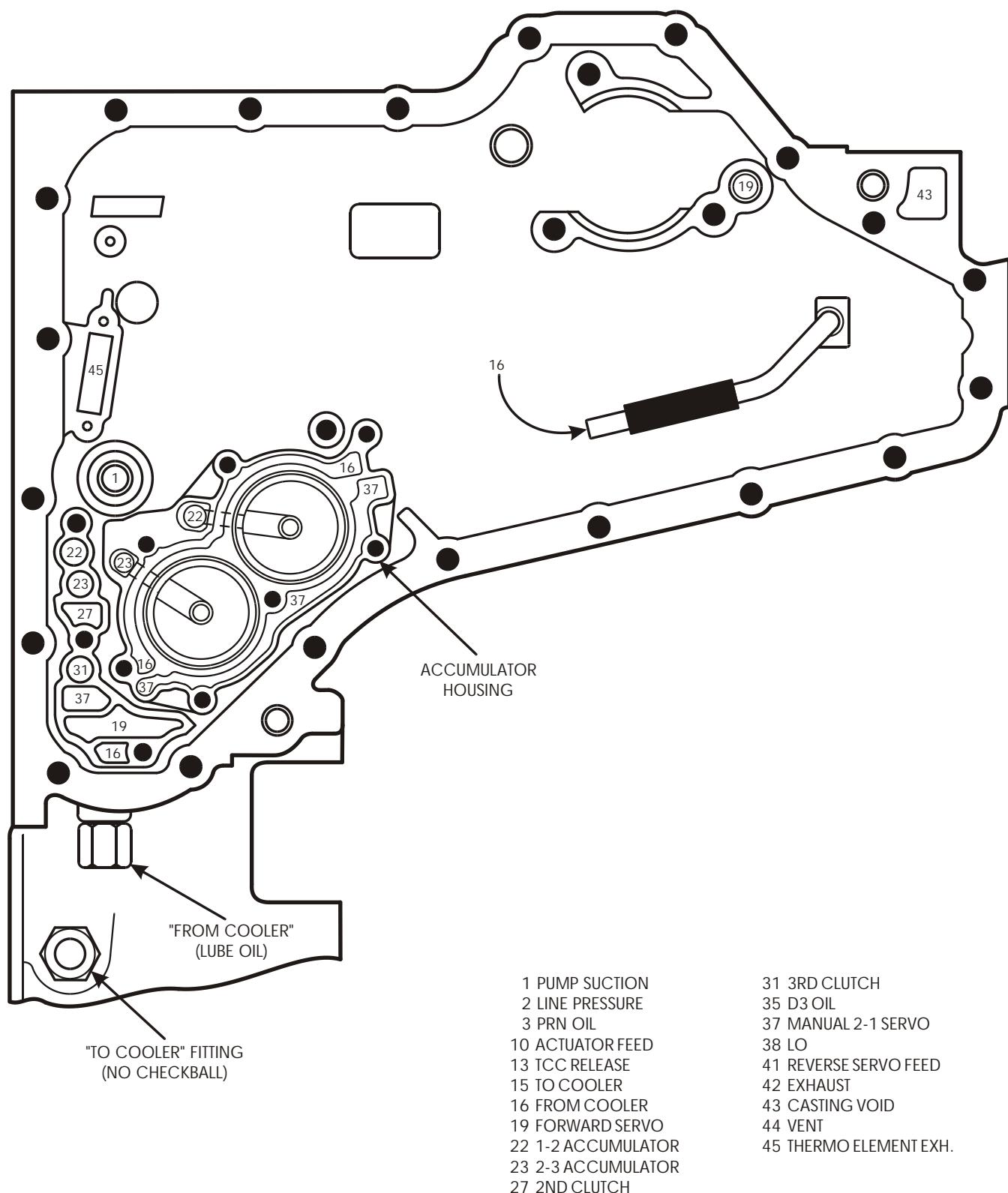


Figure 24

## ACCUMULATOR COVER AND MANUAL 2-1 SERVO COVER PASSAGES

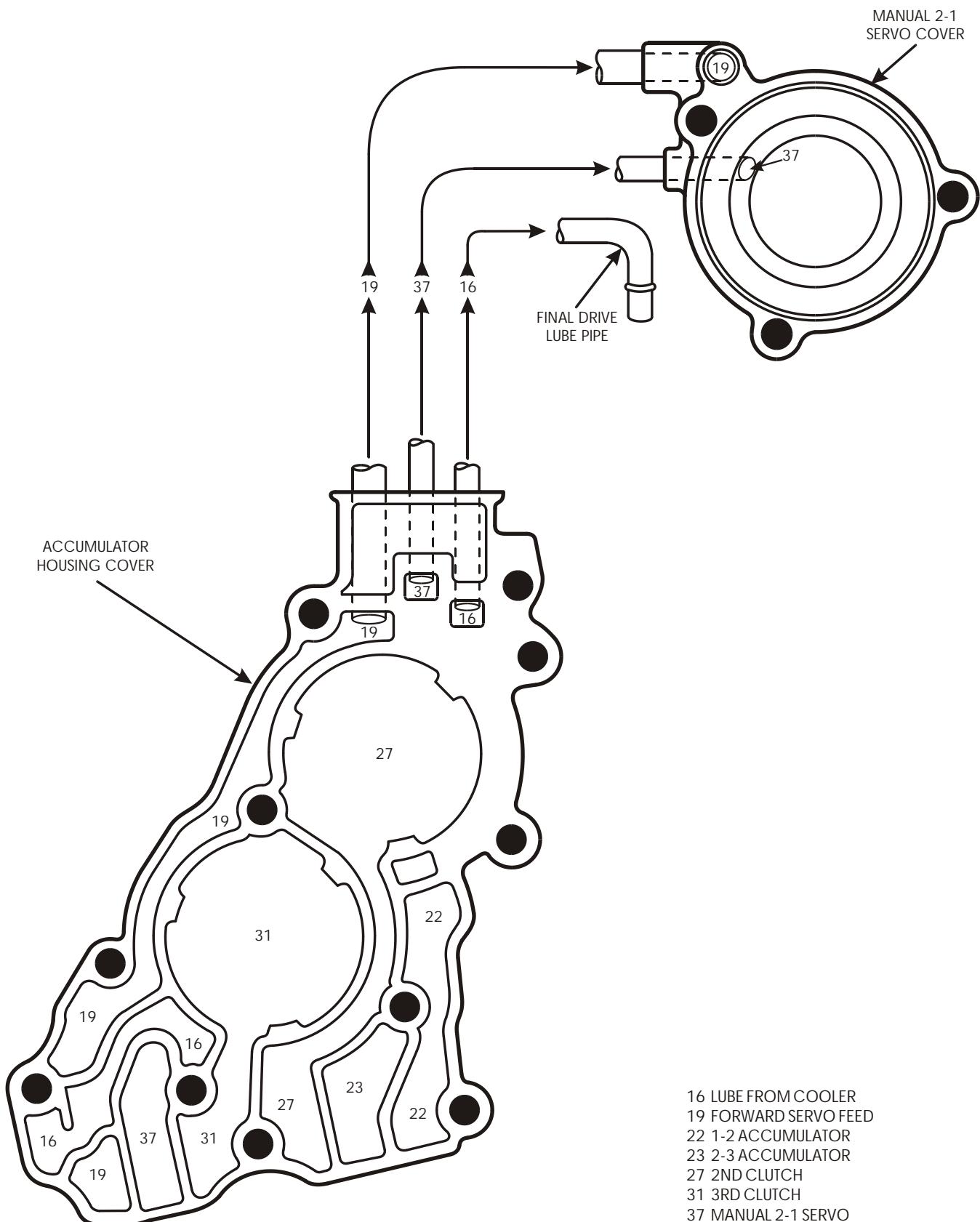


Figure 25



# Technical Service Information

## 1997 THM 4T65E MODELS

MODEL CODE	BODY	ENGINE/CAR LINE	F/D RATIO	SPRKTS DRV/EDRV/N	CONV CODE	CONV DIAM	"K" FCTR	IMS Y/N
7BDB	"C", "G"	3.8L, /Buick	3.05	35/35	JSFM	258mm	133	N
7BMB	"G"	3.8L - Supercharged /Buick	3.29	37/33	JSFM	258mm	133	N
7FBB	"G"	3.8L - Supercharged /Buick	3.29	37/33	JSFM	258mm	133	N
7FHB	"C", "G"	3.8L, /Buick	3.05	35/35	JSFM	258mm	133	N
7HKB	"W"	3.8L - Supercharged /Buick, Pont	3.29	37/33	JTFM	258mm	155	N
7MAB	"H"	3.8L - Supercharged /Olds, Pont	3.29	37/33	JSFM	258mm	133	N
7XAB	"W"	3.8L - Supercharged /Buick, Pont	3.29	37/33	JTFM	258mm	155	N
7YSB	"W"	3.4L, /Chevrolet	3.05	33/37	FJHB	245mm	177	N
7YWB	"H"	3.8L - Supercharged /Olds, Pont	3.29	37/33	JSFM	258mm	133	N

## 1998 THM 4T65E MODELS

8FCB	"C", "G"	3.8L - Supercharged /Buick	3.29	37/33	JSFM	258mm	133	N
8FDB	"H"	3.8L - Supercharged /Olds, Pont	3.29	37/33	JSFM	258mm	133	N
8FFB	"C"	3.8L, /Buick	3.05	35/35	JSFM	258mm	133	N
8KAB	"W"	3.8L, /Chevy, Police/Taxi	3.29	35/35	FLHB	245mm	163	N
8THB	"W"	3.8L, /Chev, Pont	3.29	35/35	FLHB	245mm	163	N
8TNB	"W"	3.8L, /Buick	3.05	35/35	FLHB	245mm	163	N
8TPB	"H"	3.8L, /Buick, Olds, Pont	3.05	35/35	FLHB	245mm	163	N
8XAB	"W"	3.8L - Supercharged /Buick, Pont	3.29	37/33	JTFM	258mm	155	N
8YCB	"W"	3.5L, /Oldsmobile	3.29	35/35	JXFM	258mm	164	N
8YFB	"H"	3.8L, /Buick, Olds, Pont	2.86	35/35	JSFM	258mm	133	N

"C" Body = Park Avenue/Ultra

"G" Body = Aurora, Riviera

"H" Body = Bonneville, Eighty Eight, LeSabre

"W" Body = Grand Prix, Intrigue, Lumina, Century, Monte Carlo, Regal

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## Technical Service Information

1999 THM 4T65E MODELS

"C" Body = Park Avenue/Ultra

"G" Body = Aurora, Riviera

"H" Body = Bonneville, Eighty Eight, LeSabre

"U" Body = Venture, Silhouette, Trans Sport

"W" Body = Grand Prix, Intrigue, Lumina, Cen

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## Technical Service Information

2000 THM 4T65E MODELS

"C" Body = Park Avenue/Ultra

"G" Body = Aurora, Riviera

"H" Body = Bonneville, Eighty Eight, LeSabre

"U" Body = Venture, Silhouette, Trans Sport

"W" Body = Grand Prix, Intrigue, Lumina, Century, Monte Carlo, Regal

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## Technical Service Information

2001 THM 4T65E MODELS

"C" Body = Park Avenue/Ultra

"G" Body = Aurora, Riviera

"H" Body = Bonneville, Eighty Eight, LeSabre

"U" Body = Venture, Silhouette, Trans Sport

"W" Body = Grand Prix, Intrigue, Lumina, Co

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Figure 29



## Technical Service Information

2002 THM 4T65E MODELS

"C" Body = Park Avenue/Ultra

"G" Body = Aurora, Riviera

"H" Body = Bonneville, Eighty Eight, LeSabre

"U" Body = Venture, Silhouette, Trans Sport

"W" Body = Grand Prix, Intrigue, Lumina, Century, Monte Carlo, Regal

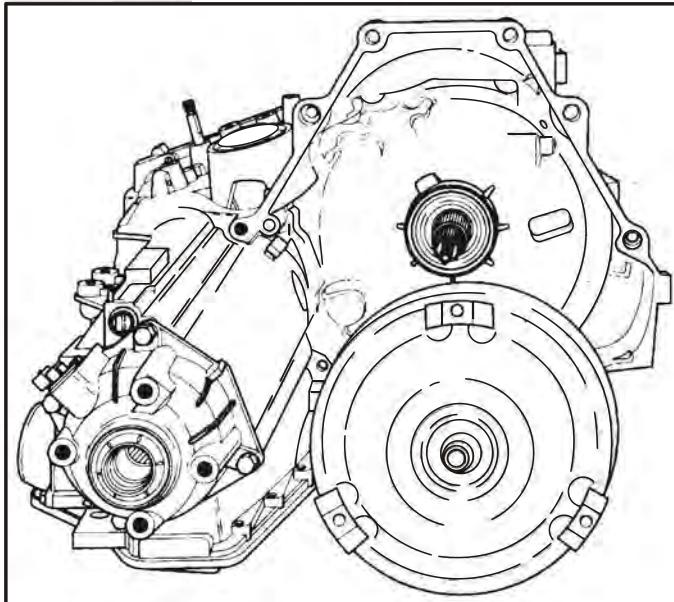


Figure 31

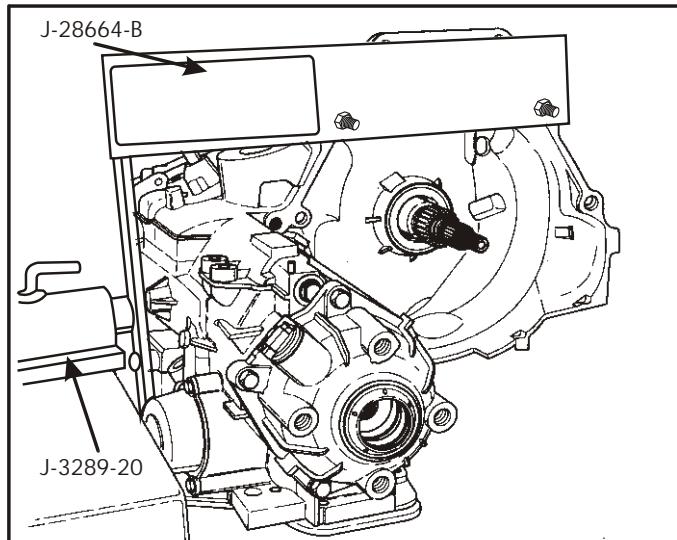


Figure 32

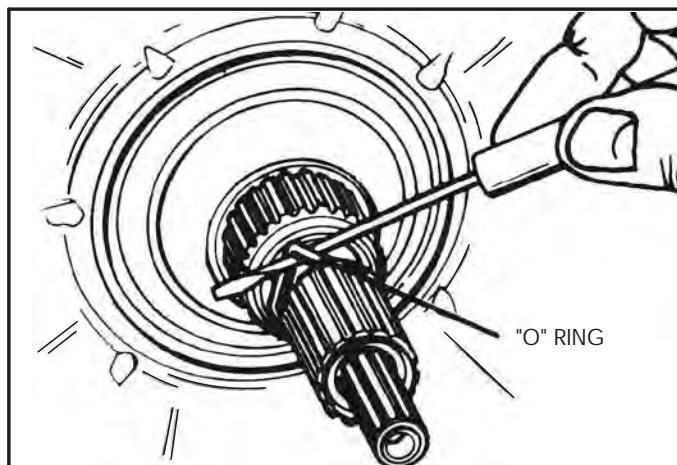


Figure 33

## TRANSAXLE DISASSEMBLY

### EXTERIOR COMPONENTS

1. Make sure the work area is adequate and clean for the layout and inspection of components.
  2. Thoroughly clean the exterior of transaxle.
  3. Remove the torque converter assembly shown in Figure 31.
  4. Install support fixture J-28664-B on transaxle as shown in Figure 31.
- Caution:** To avoid the possibility of personal injury and damage to the transaxle, install *All* the bolts for the support fixture.
5. Install transaxle and fixture into fixture base, as shown in Figure 31.
  6. Position transaxle with final drive housing pointing downward to allow fluid drainage.
  7. Remove and discard the turbine shaft "O" ring using a small screwdriver (See Figure 33).
  8. Use the support fixture as a pivot point to push the reverse servo cover downward with a large screwdriver, as shown in Figure 34.
  9. While the servo cover is compressed, use a small screwdriver to pry out the servo snap ring, as shown in Figure 34.
- Caution:** The Reverse Servo is under pressure.
10. Remove the servo cover "O" ring seal pulling it through the slot in the case and cutting, as shown in Figure 35.

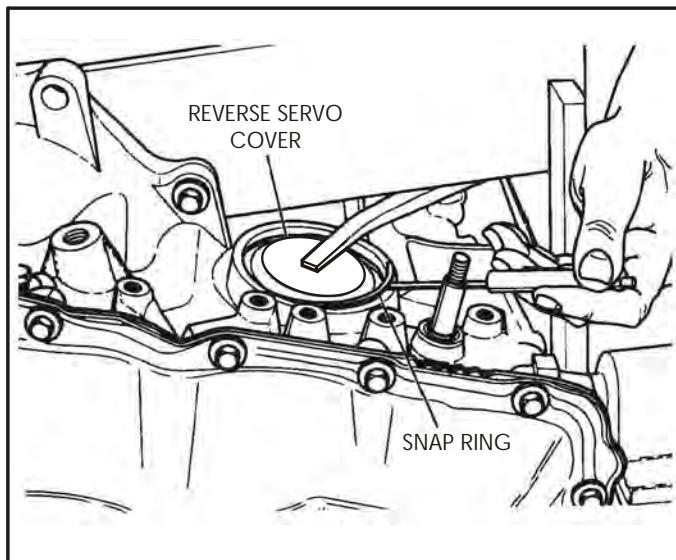


Figure 34

11. Remove the Reverse Servo Assembly, and then disassemble, as shown in Figure 37.
12. Remove the Vehicle Speed Sensor from the final drive housing using a 10mm socket, as shown in Figure 36. Take special care when removing the speed sensor assembly and set aside from the other transaxle components.

**Continued on next Page.**

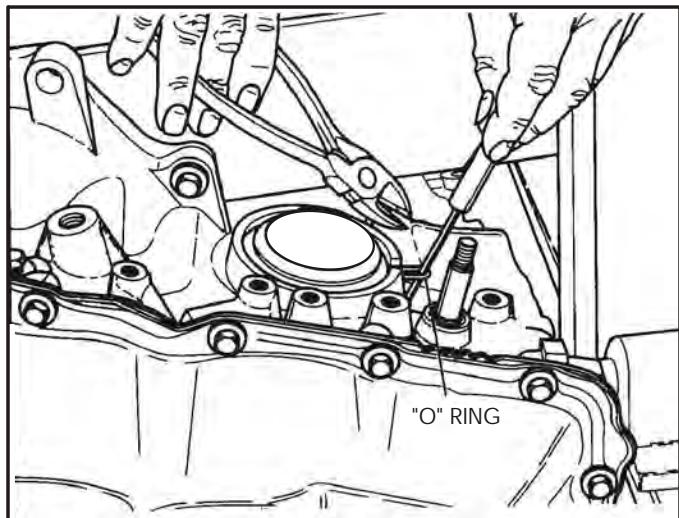


Figure 35

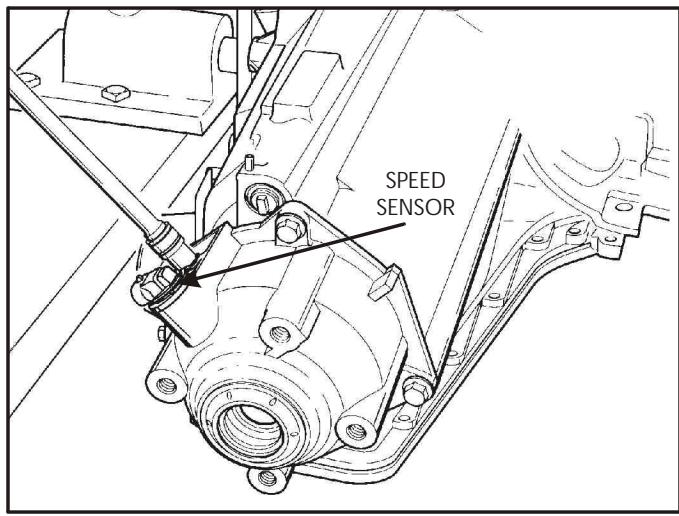


Figure 36

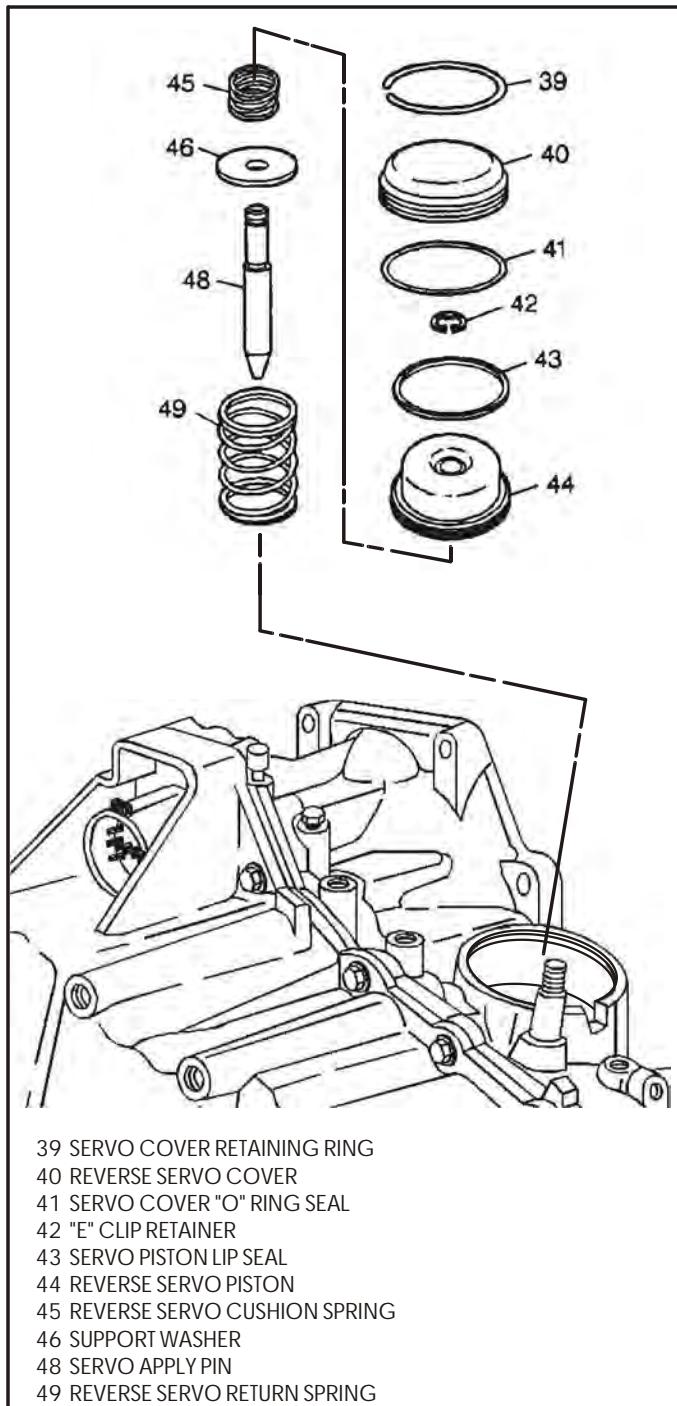


Figure 37

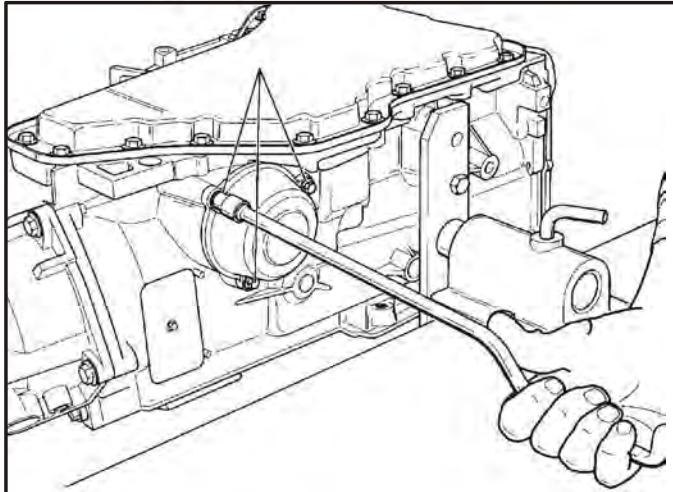


Figure 38

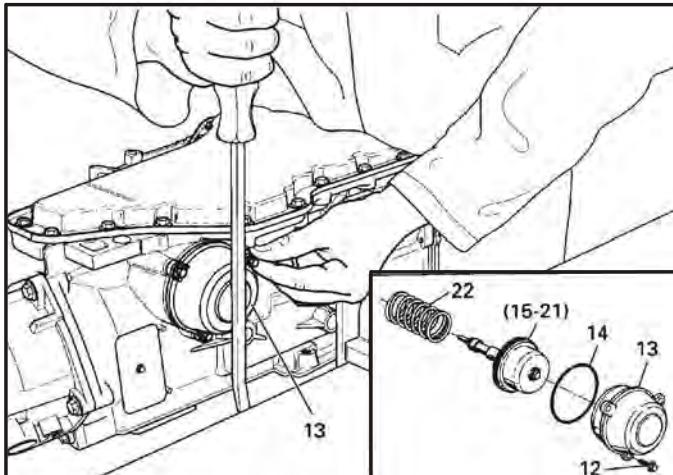


Figure 39

13. Rotate the transaxle so that the bottom pan is facing up as shown in Figure 38.
14. Using an 8mm socket, **loosen** the 3 Forward Servo Cover Retaining Bolts, as shown in Figure 38.  
**Caution: Loosen only**, as servo cover is under spring pressure.
15. Apply pressure to the servo cover using a large screwdriver with its end against the edge of the bench, as shown in Figure 39.
16. With pressure applied use your free hand to completely remove the bolts (See Figure 39). Once the bolts are removed, slowly relieve the pressure and remove the servo cover and the forward servo piston assembly, as shown in Figure 39.

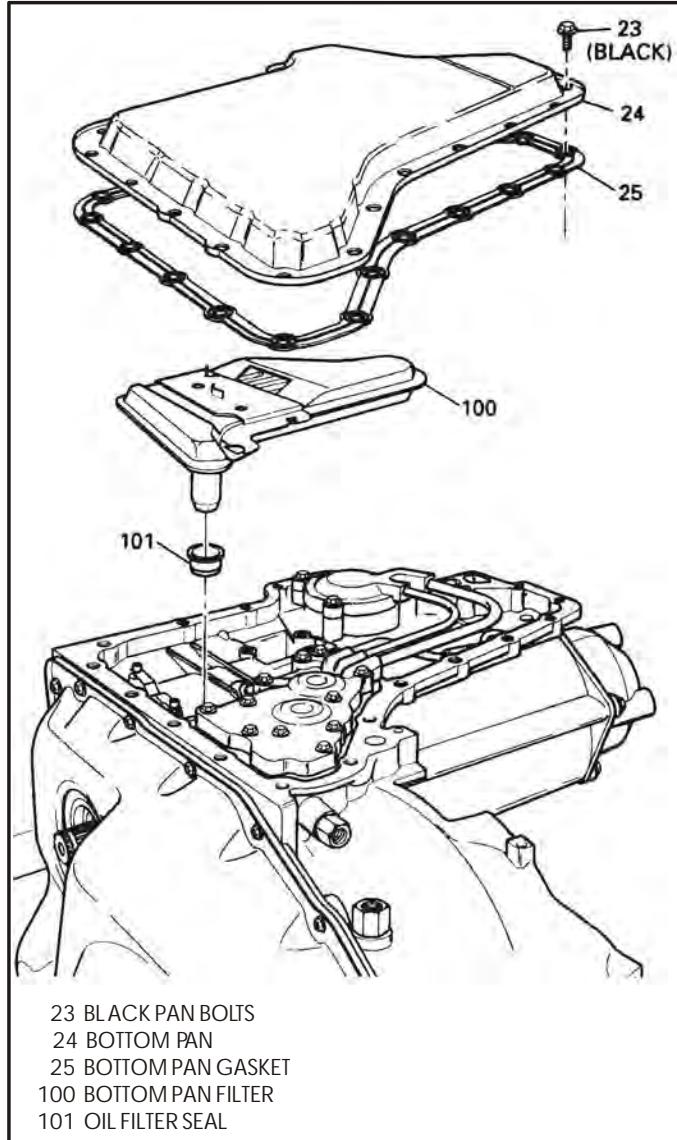


Figure 40

## BOTTOM PAN AND COMPONENTS

1. Remove the 20 bottom pan bolts using a 10mm socket (See Figure 40).
2. Remove the bottom pan filter by prying at the filter neck area with a large screwdriver.
3. Remove the bottom pan filter seal from case using the appropriate puller, to prevent damage to the transaxle case.
4. Remove the four bolts indicated in Figure 41 from the 1-2 and 2-3 accumulator assembly.
5. Remove the three bolts indicated in Figure 41 from the 2-1 manual servo cover
6. Pry the lube pipe retainer clip from the case using a large screwdriver, shown in Figure 41.
7. Remove lube pipe from final drive lube hole.

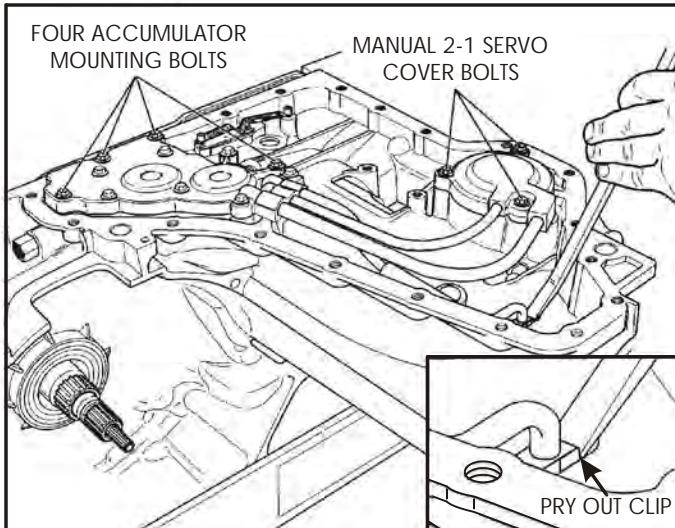


Figure 41

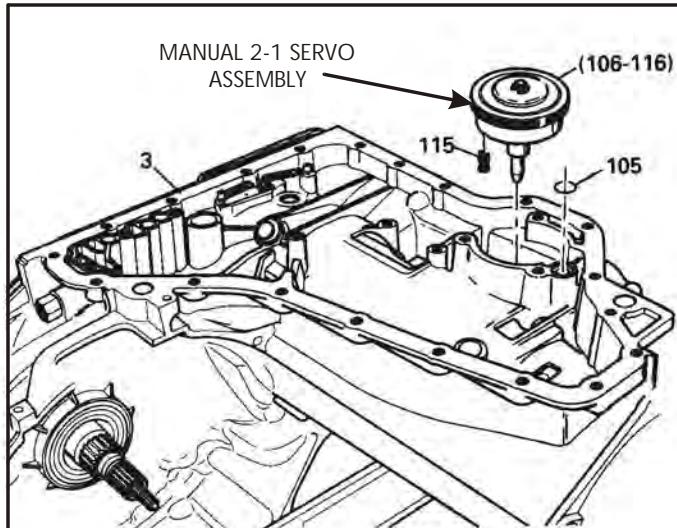


Figure 43

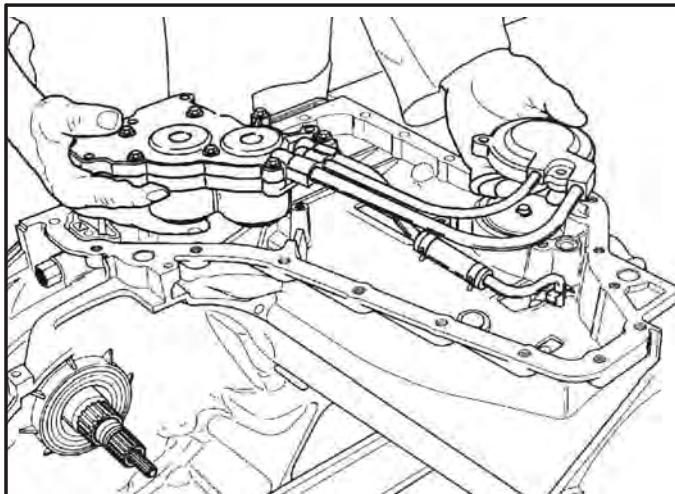


Figure 42

8. Lift the 1-2/2-3 accumulator assembly, pipe assembly and 2-1 manual servo cover from the case at the same time, as shown in Figure 42.
9. Remove the forward servo apply seal (105), from the case, as shown in Figure 43.  
Note: The forward servo lathe-cut seal may have remained in the servo cover.
10. Remove the 2-1 manual servo assembly from the case, as shown in Figure 43. Be careful so as not to damage the screen (115), during removal (See Figure 43).

## SIDE COVER AND COMPONENT PARTS

1. Rotate the transaxle so that the side cover is facing up, as shown in Figure 44.

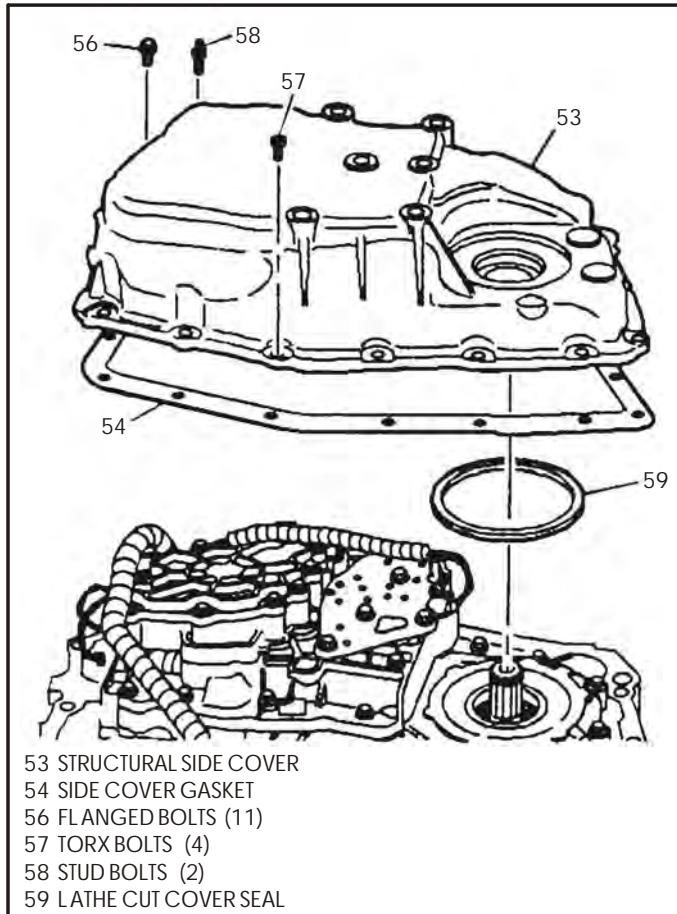


Figure 44

2. Remove 11 flanged bolts, 2 stud bolts, and 4 Torx bolts that are retaining side cover, shown in Figure 44.
3. Remove and discard side cover gasket and seal as shown in Figure 44.

**Continued on next Page.**

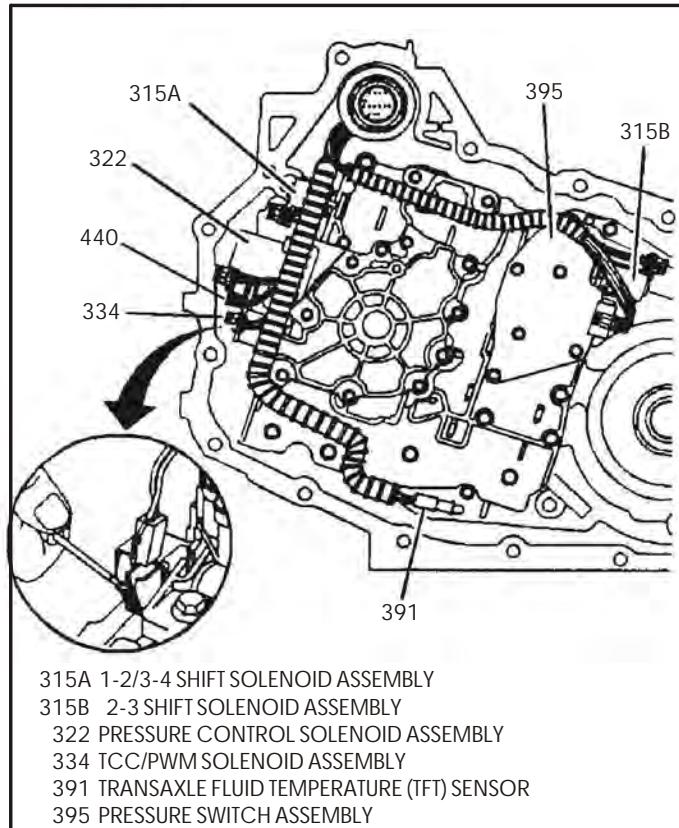


Figure 45

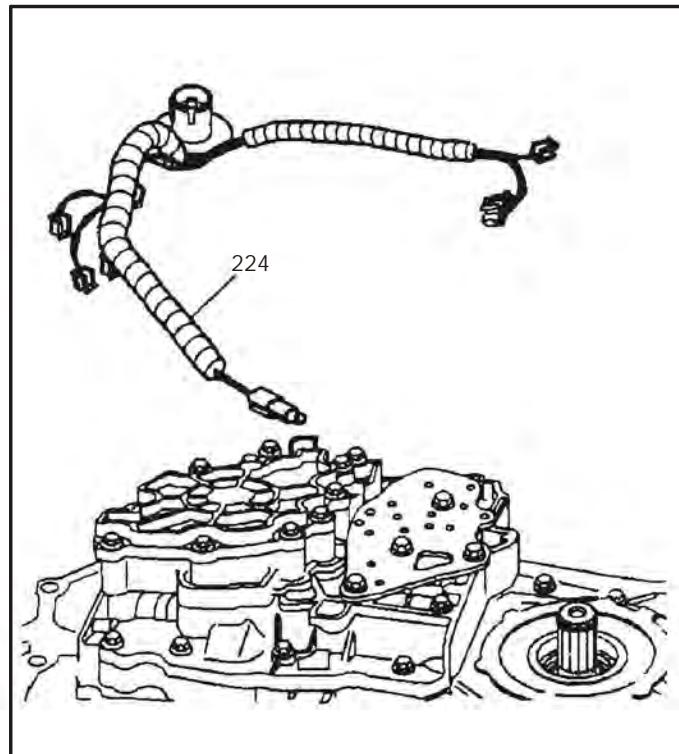


Figure 46

**Continued from Page 35.**

4. Using a small screwdriver, pry the tab out on the wiring harness electrical connectors and remove the connector on each of the internal components listed in Figure 45.
5. Gently pull the Transaxle Fluid Temperature (TFT) sensor (391) from its retaining clip, as shown in Figure 45.
6. Remove the internal wiring harness from the transaxle, as shown in Figure 46.
7. Remove the indicated oil pump bolts (206) and (207), as shown in Figure 47.
8. Do not remove the one oil pump cover bolt (205) at this time (See Figure 47).
9. Remove the one wiring harness retaining clip (390) for the TFT as shown in Figure 47.
10. Remove the oil pump assembly from the valve body, as shown in Figure 48, and set aside for now, with the pump resting on its cover.

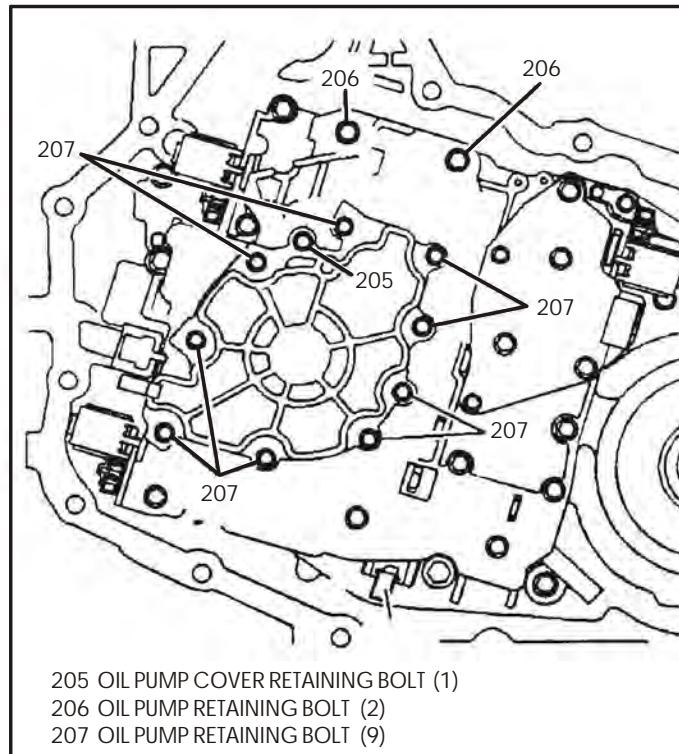


Figure 47

11. Remove the indicated valve body bolts that are shown in Figure 49.
12. Remove the Pressure Switch Assembly and set aside for now, as shown in Figure 50.

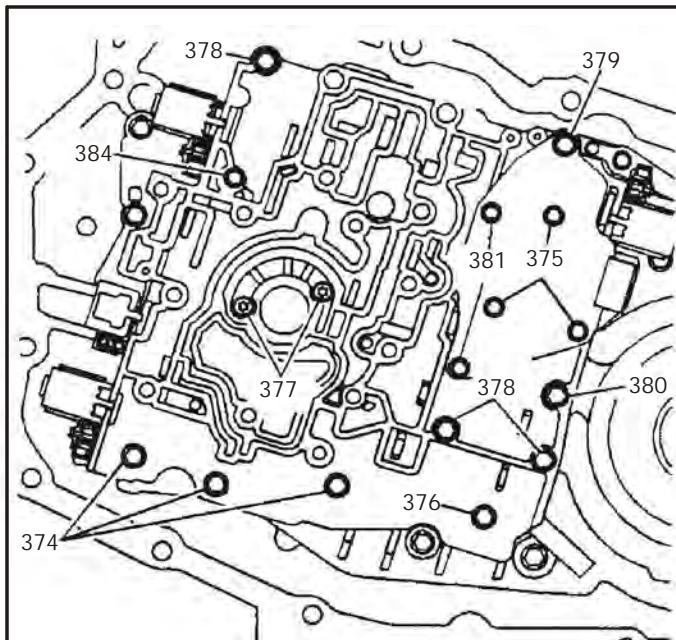


Figure 49

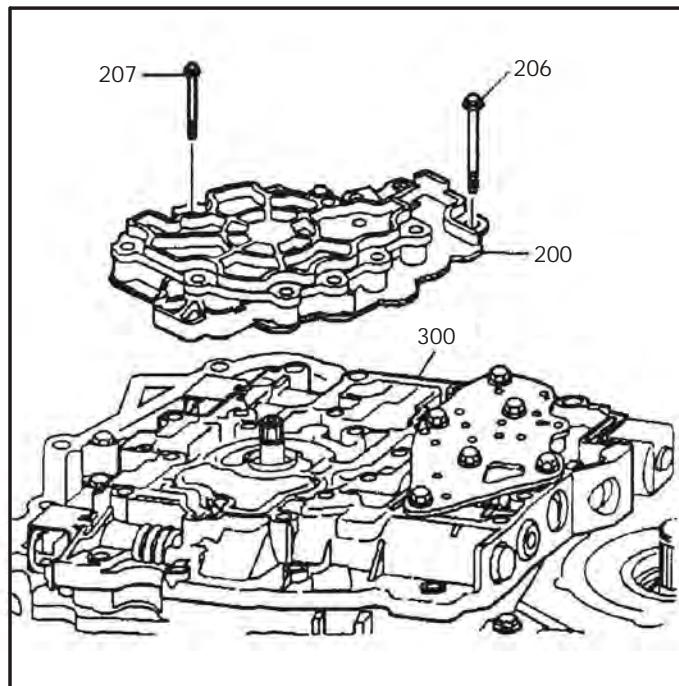


Figure 48

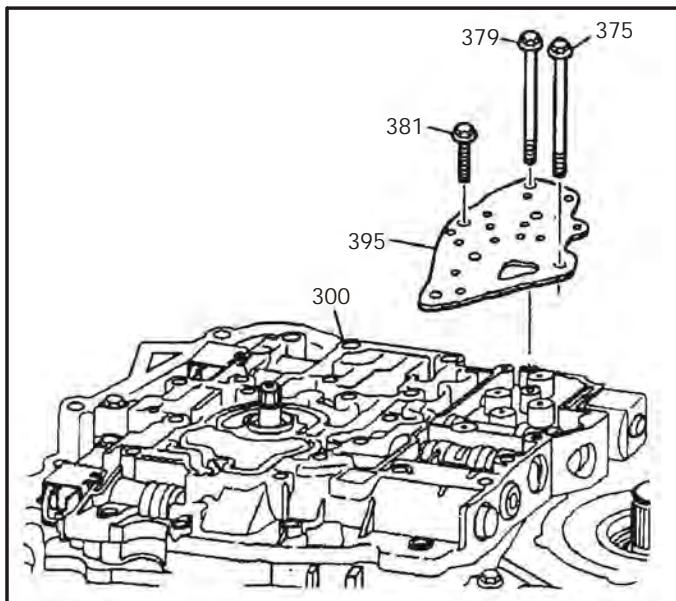


Figure 50

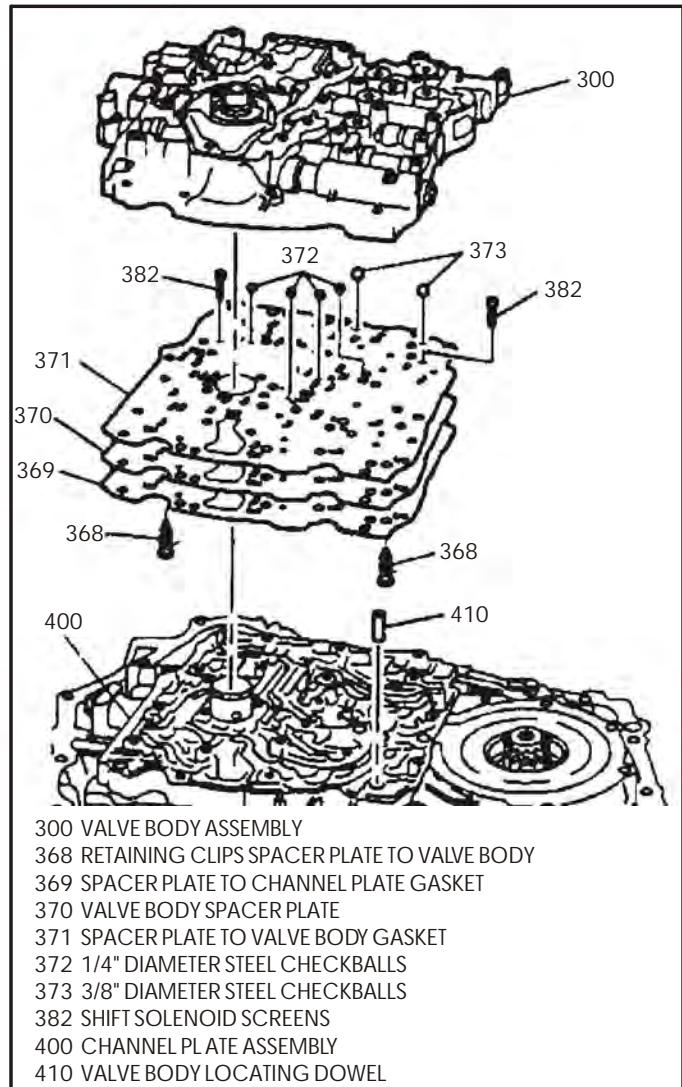


Figure 51

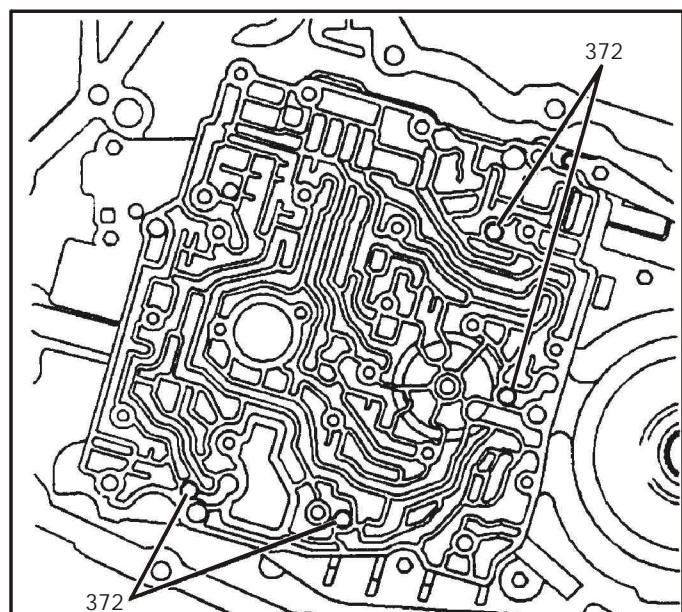


Figure 52

**Continued from Page 37.**

13. Remove the valve body from the transaxle ,as shown in Figure 51. The spacer plate and the spacer plate gaskets will come with the valve body, as they are retained by the plastic clips (368) shown in Figure 51.
14. Remove the plastic retaining clips from valve body, and remove spacer plate and discard the gaskets.
15. Remove the four 1/4" and the two 3/8" balls from the valve body (See Figure 51).  
*Note:* Refer to Page 12 for proper checkball locations in the valve body.
16. Remove the hollow valve body locating dowel (410) from channel plate (See Figure 51).
17. Remove the four 1/4" diameter checkballs from the channel plate, as shown in Figure 52.  
*Note:* Refer to Page 13 for proper checkball locations in the channel plate.
18. Remove the oil pump drive shaft, as shown in Figure 53.
19. Remove and discard the oil seal ring from the oil pump drive shaft.

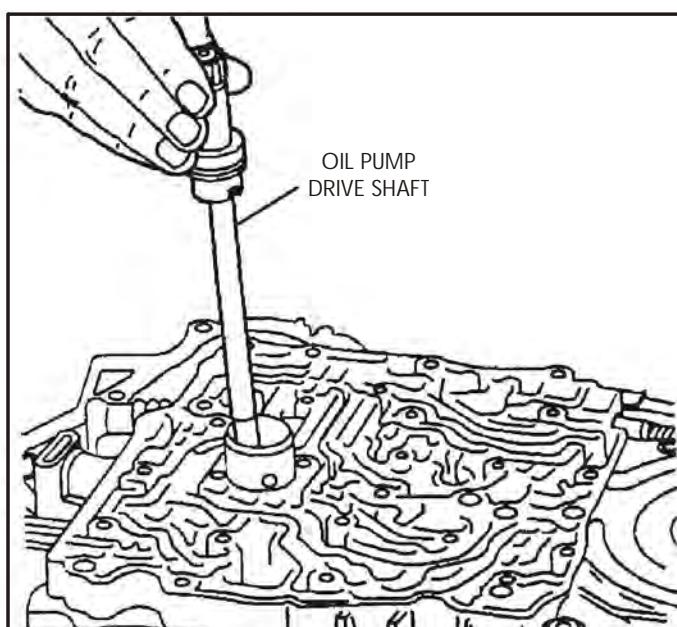


Figure 53

## FINAL DRIVE HOUSING & COMPONENTS

1. Remove the four bolts that retain the final drive housing (See Figure 56).
2. Remove the final drive housing from transaxle, remove and discard the axle seal and "O" ring seal (See Figure 56).
3. Rotate the differential carrier until the end of the output shaft can be seen and the differential cross shaft is in a horizontal position, as shown in Figure 54.

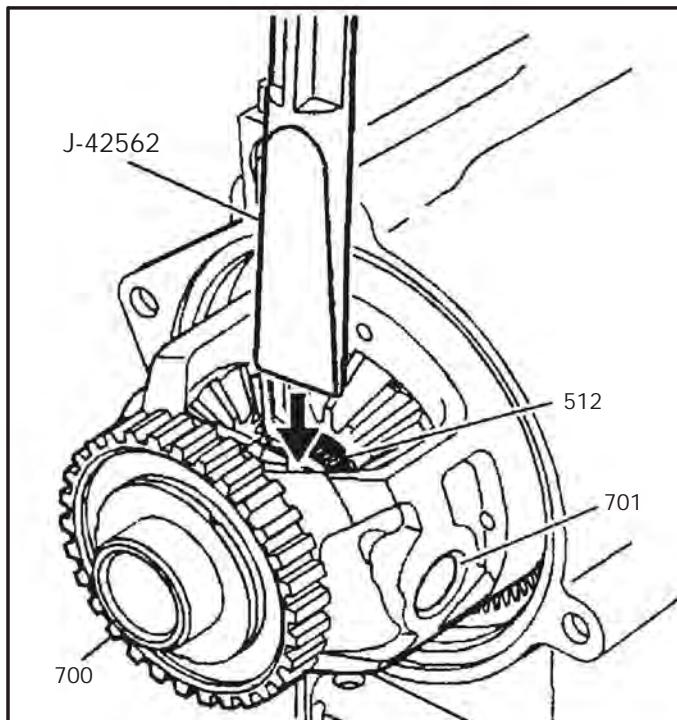


Figure 54

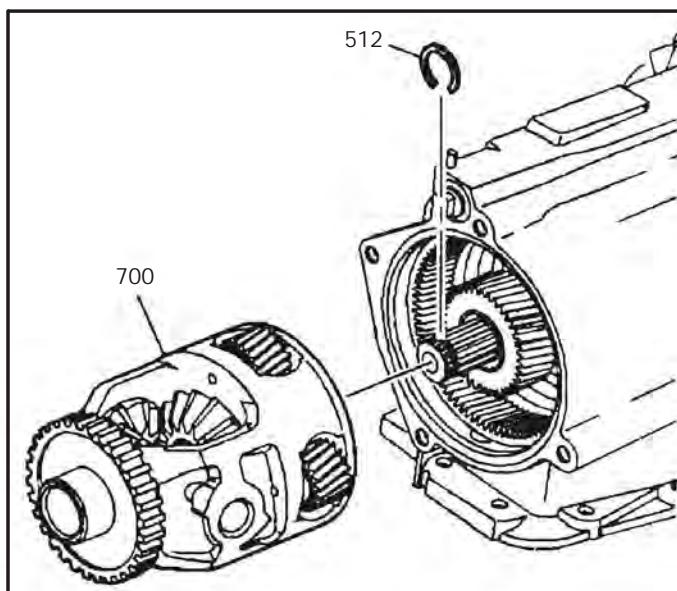


Figure 55

4. Place J-42562 Axle Removal Wedge between the end of output shaft and cross shaft as shown in Figure 54.
  5. Using a hammer, hit the end of the J-42562 axle removal tool to compress the output shaft compression ring (512) and push the output shaft through the differential side gear. Refer to Figure 54.
  6. Remove the final drive assembly, and remove the output shaft compression ring using snap ring pliers (See Figure 55).
- Note:** These compression rings should be discarded and replaced during rebuild.
7. This will allow removal of the output shaft.

**Continued on next Page.**

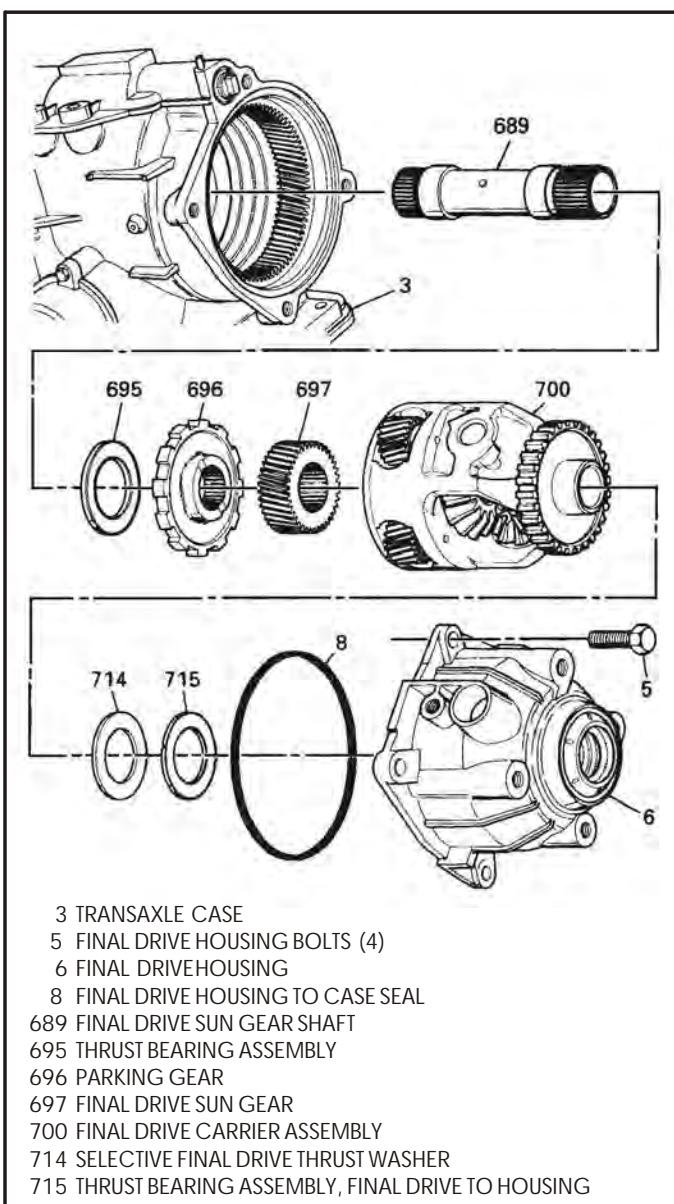


Figure 56

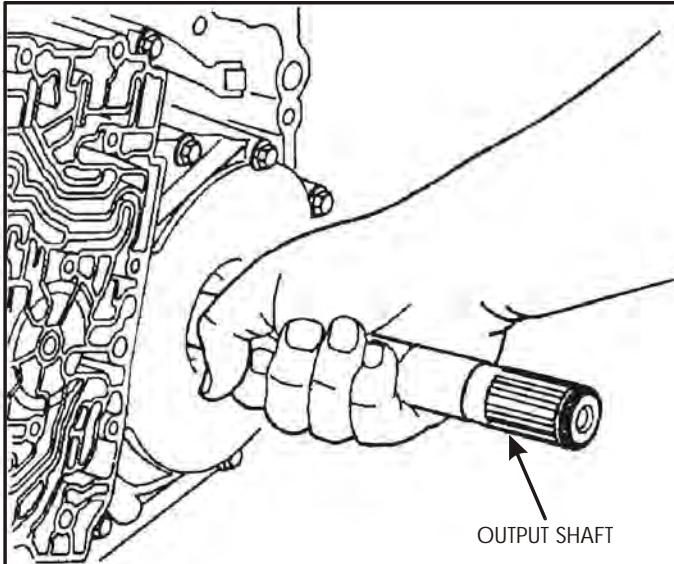


Figure 57

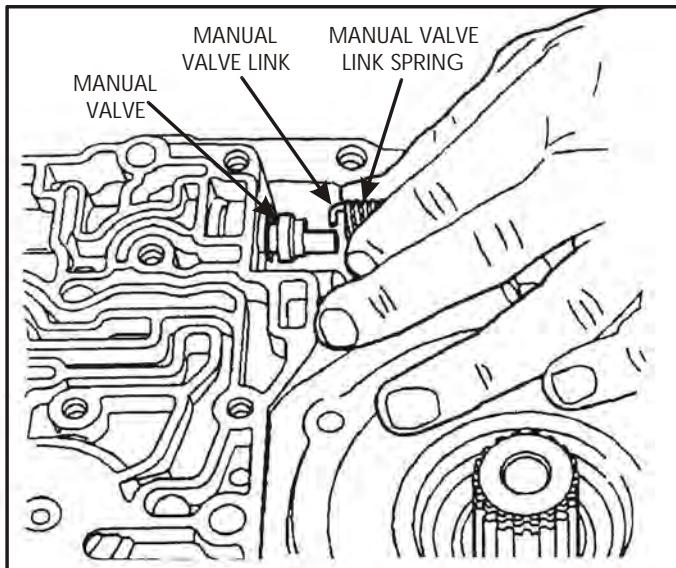


Figure 59

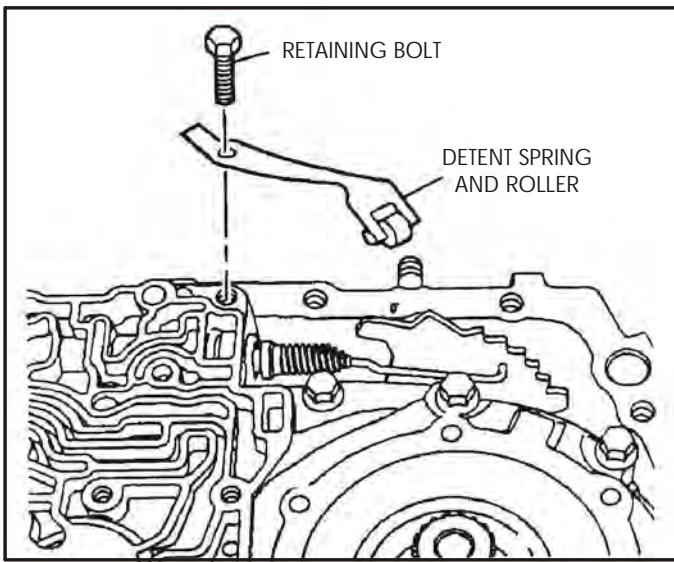


Figure 58

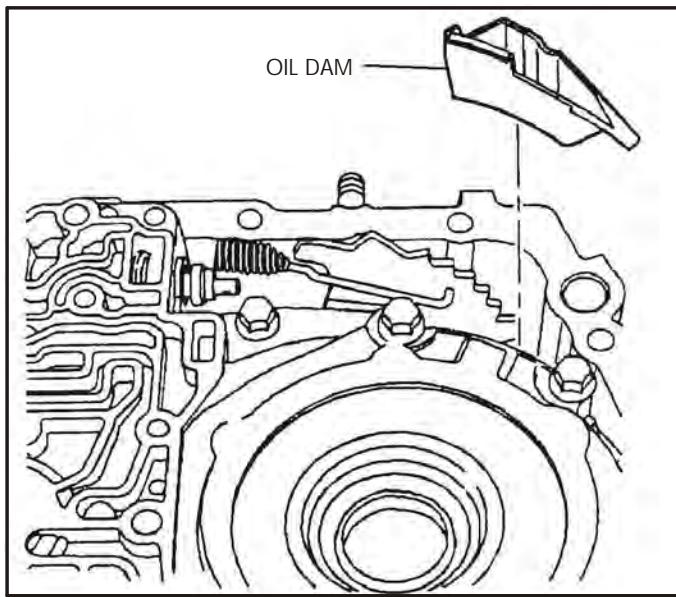


Figure 60

**Continued from Page 39.**

8. The output shaft can now be removed from the transaxle from the channel plate side, as shown in Figure 57.  
*Note:* Use care when removing so as not to damage the bearing on the output shaft.
9. Remove the bolt retaining the detent spring and roller assembly (See Figure 58).
10. Compress the manual valve link spring and disconnect the manual valve link from manual valve, as shown in Figure 59.
11. Remove the oil dam from the transaxle, as shown in Figure 60.

12. Remove the input speed sensor clip using a small screwdriver and prying the clip out of the channel plate, as shown in Figure 61.
13. Carefully remove the input speed sensor from the channel plate (See Figure 61).

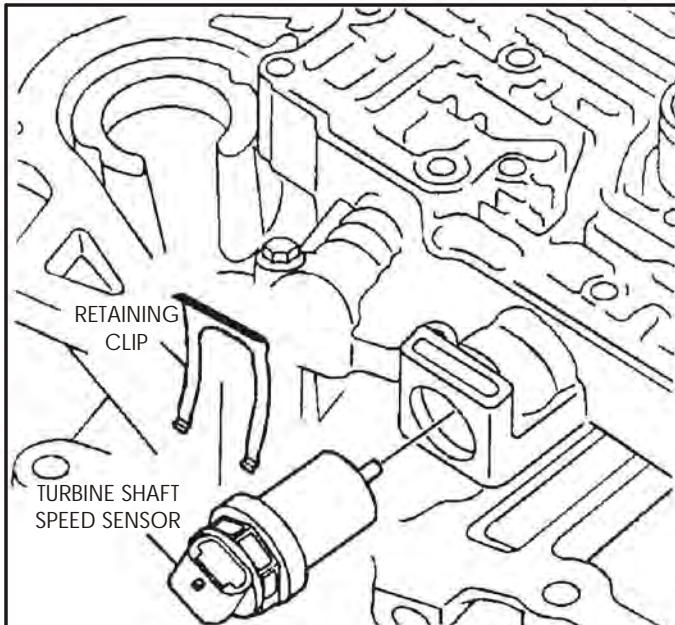


Figure 61

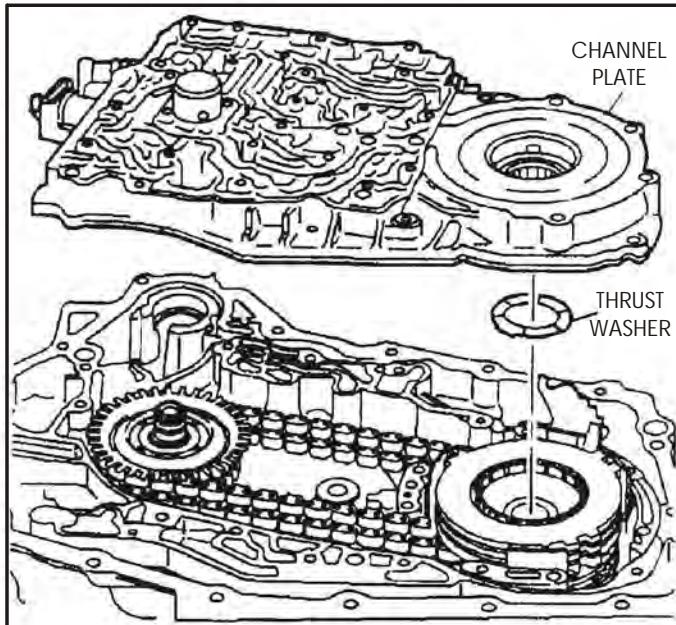


Figure 63

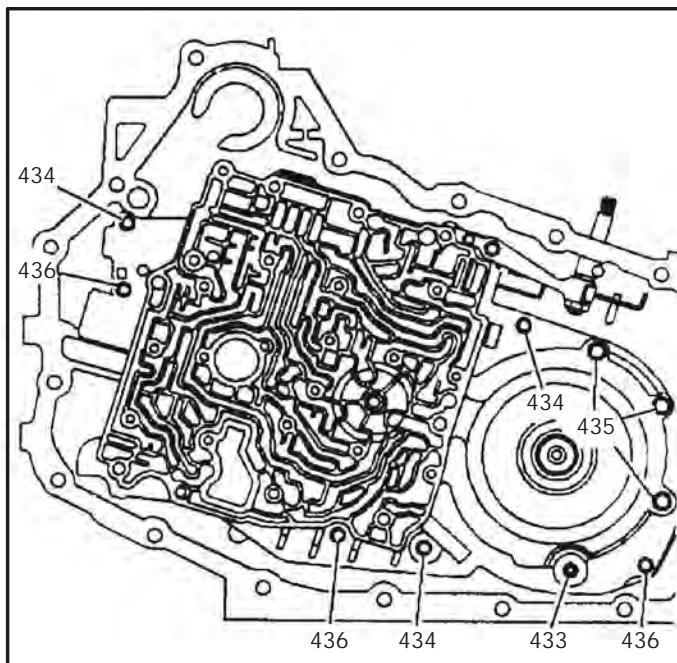


Figure 62

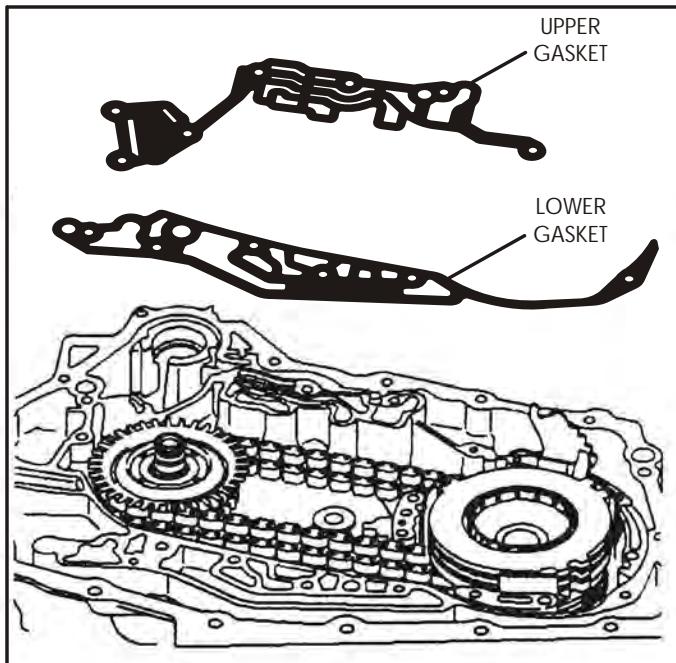


Figure 64

### CHANNEL PLATE AND INTERNAL CASE COMPONENTS

1. Remove the channel plate bolts indicated in Figure 62.
2. Remove the channel plate from the transaxle case, as shown in Figure 63.
3. Remove the channel plate to 4th clutch hub thrust washer (See Figure 63).
4. Remove and discard the upper and the lower channel plate gaskets (See Figure 64).

**Disassembly continued on next Page.**

# Technical Service Information

**Continued from Page 41.**

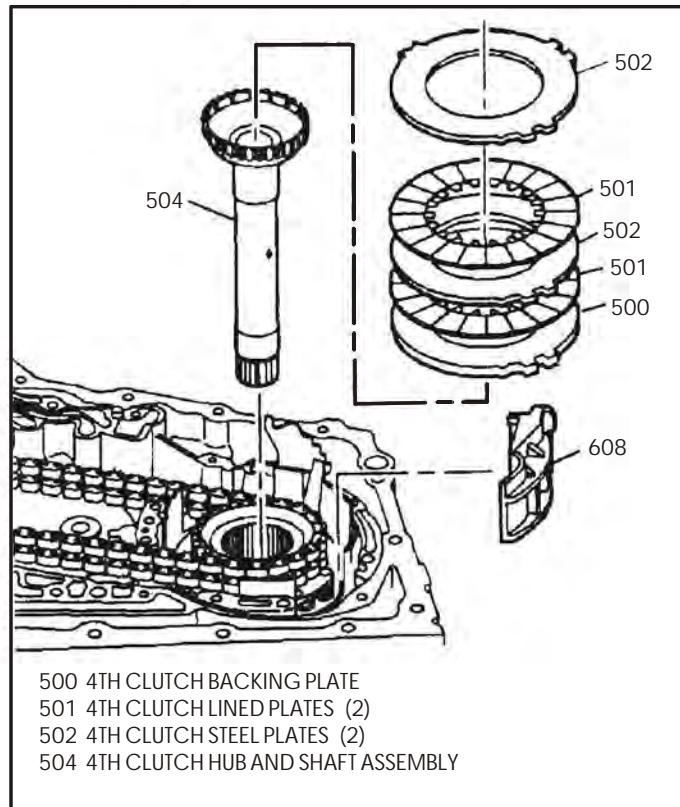


Figure 65

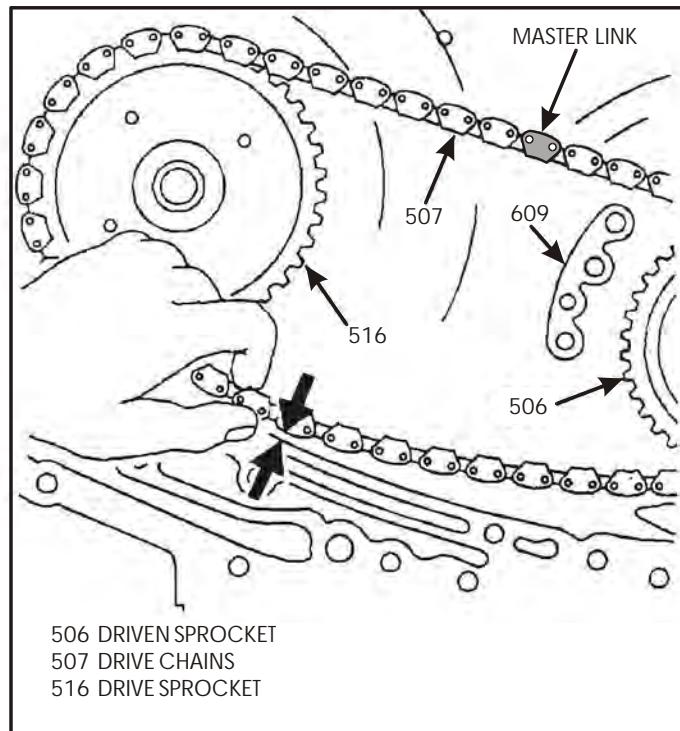


Figure 66

5. Remove the fourth clutch steel plates, fourth clutch lined plates and fourth clutch backing plate, as shown in Figure 65.
  6. Remove the fourth clutch hub and shaft, as shown in Figure 65.
  7. Remove the chain scoop (See Figure 65).
  8. Remove the 4th clutch shaft thrust washer (505) as shown in Figure 67.
- 9. Drive Chain Stretch Check.**
- A. Make sure that the driven sprocket support and both sprockets are fully seated.
  - B. Pull the drive chain toward the case at the location indicated in Figure 66.
  - C. Measure the distance between the case and the drive chain, as shown in Figure 66. If the distance is more than  $1/8"$ , the drive chain should be reused.
- If the distance is less than  $1/8"$ , replace the drive chain. Refer to Figure 66.

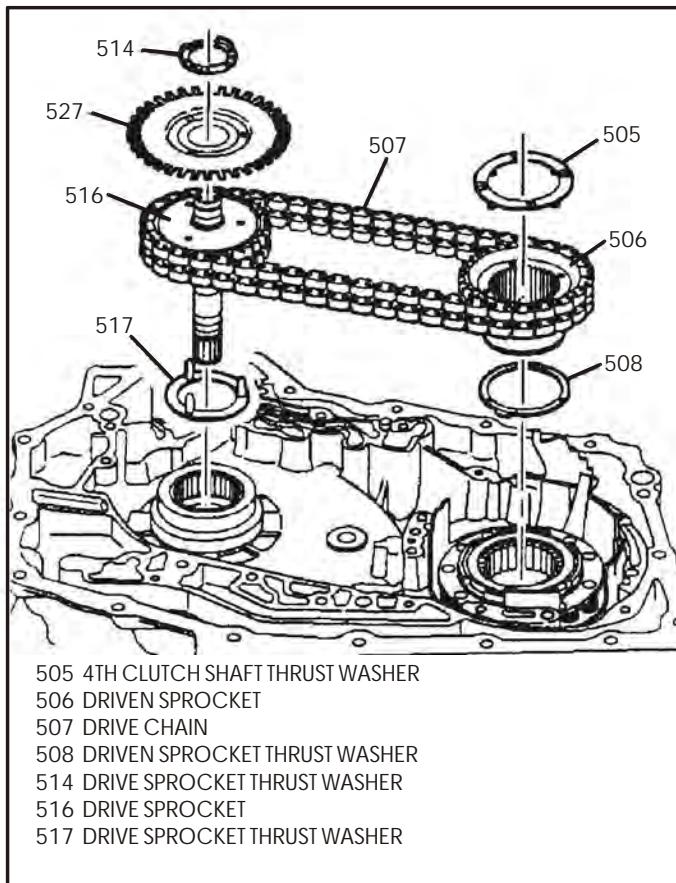


Figure 67

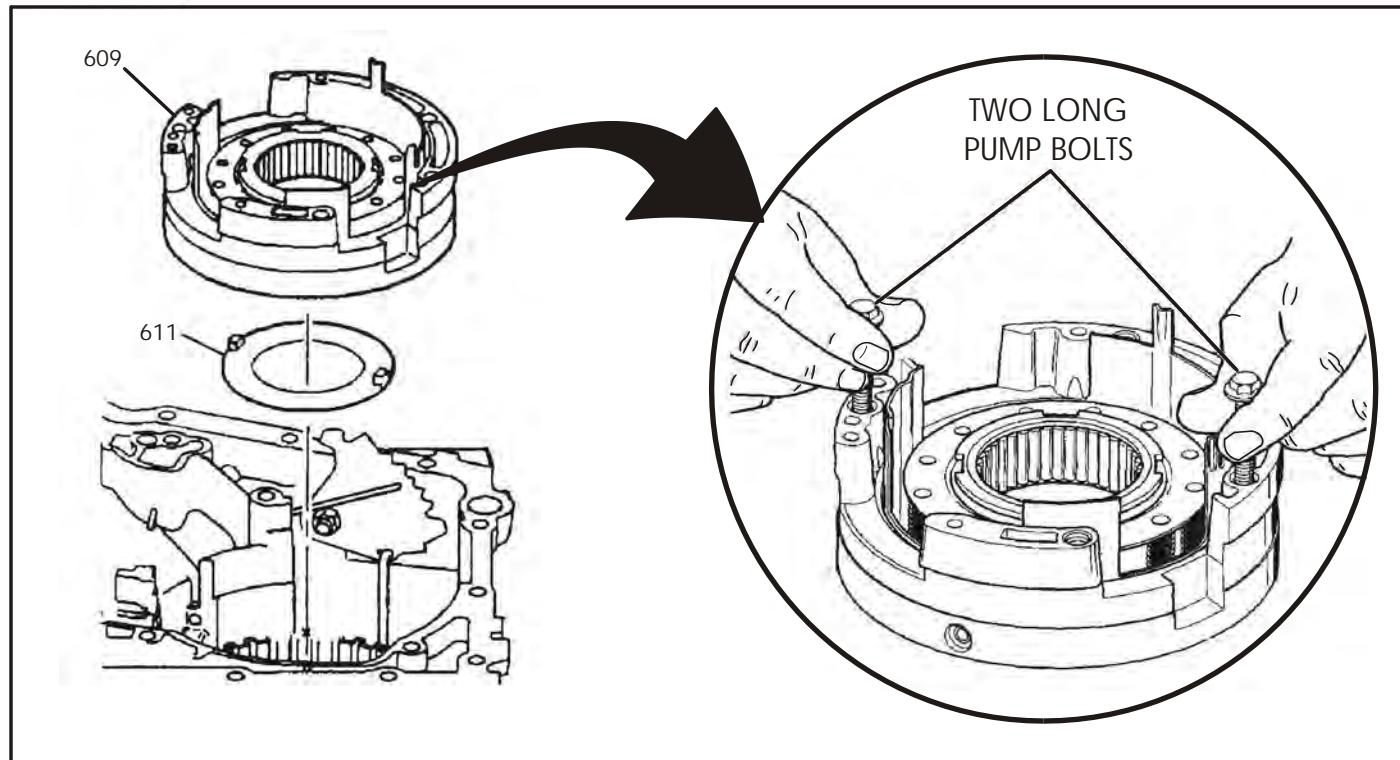


Figure 68

10. Remove the drive sprocket to channel plate thrust washer (514). It may be stuck to the channel plate. Refer to Figure 67.
11. Remove the input speed sensor reluctor wheel from the drive sprocket (See Figure 67).
12. Note the location of the master link on drive chain assembly. It is one link that is a different color than the rest. It may be facing up or down and must be in the same position for assembly. Refer to Figure 67.
13. Lift the drive and driven sprockets and drive chain assembly straight up out of the transaxle case, as shown in Figure 67.
14. It may be necessary to tap the turbine shaft gently with a rubber mallet.
15. Remove the drive sprocket thrust washer (517) and the driven sprocket thrust washer (508), as shown in Figure 67. They may be stuck to the sprockets.
16. Install the two large pump bolts (13mm) into the driven sprocket support assembly as shown in Figure 68.
17. Grasp the two bolts and lift with a twisting motion as you remove the sprocket support. Refer to Figure 68.
18. Remove the thrust washer (611) from the 2nd clutch housing. The washer may be stuck to the driven sprocket support assembly. Refer to Figure 68.

**Continued on next Page.**

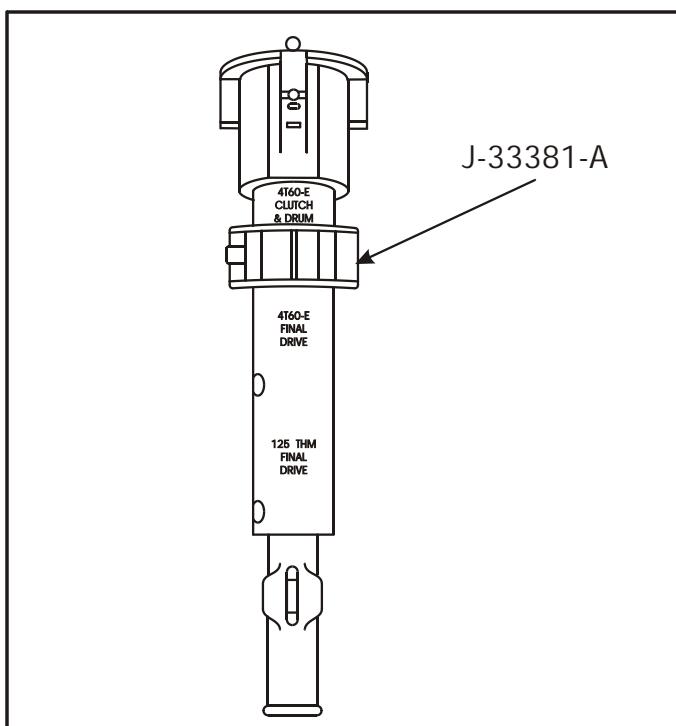


Figure 69

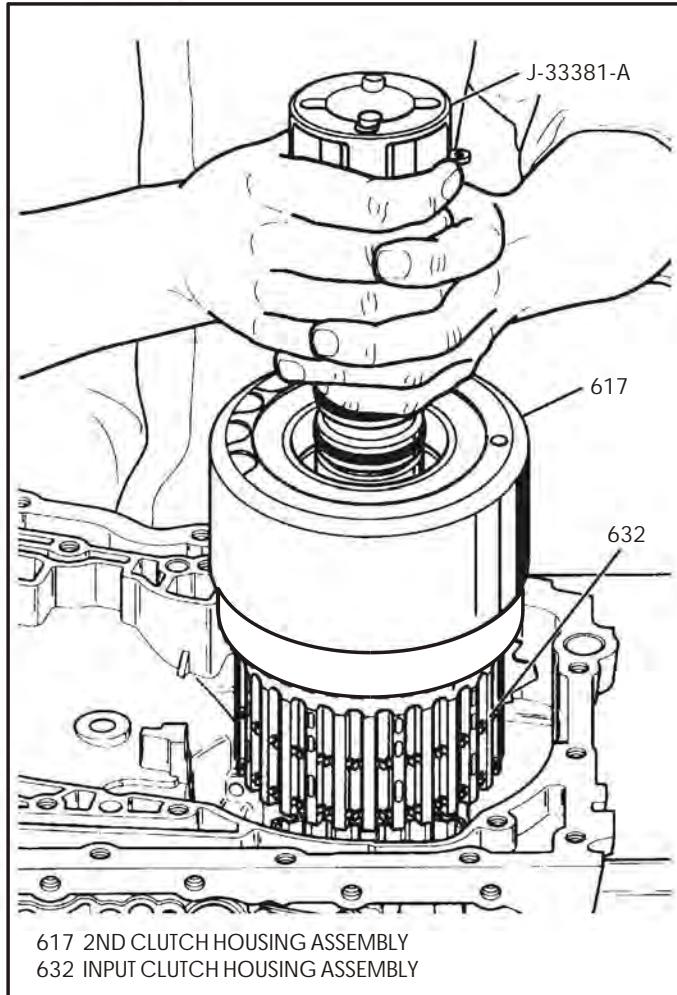


Figure 70

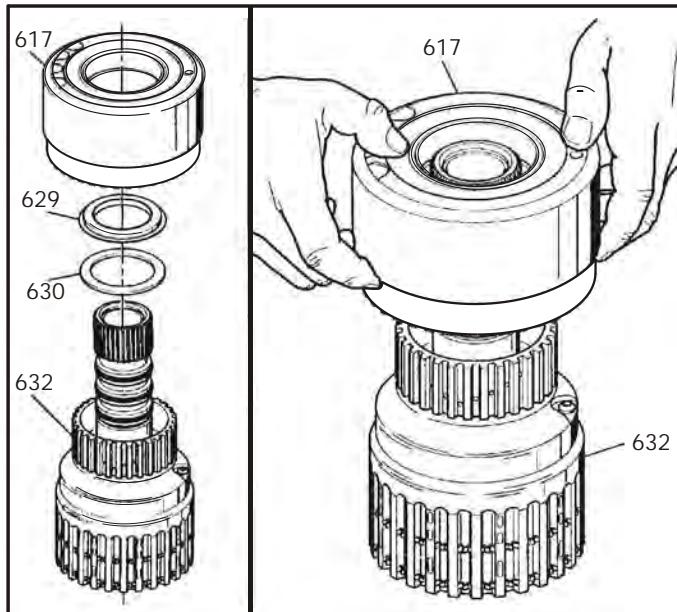


Figure 71

**Disassembly continued from Page 43.**

19. Adjust the collar on tool J-33381-A to the "4T60-E CLUTCH & DRUM" position, as it is shown in Figure 69, and ensure the threaded rod is fully loosened.
20. Install tool J-33381-A into the input housings shaft and tighten the threaded rod until the rod is finger tight (See Figure 70).
21. Lift straight up with the tool J-33381-A, shown in Figure 70, to remove the input housing, 2nd clutch housing and both sprag assemblies.
22. Place the entire assembly on the bench, remove tool J-33181-A from the assembly.
23. Remove the input clutch housing thrust bearing (629) and the selective thrust washer (630) from the input clutch housing (See Figure 71).
24. Remove the reverse band from the transaxle case if it did not come out with the drums, as shown in Figure 72.
25. Remove the reverse reaction drum from the transaxle, as shown in Figure 73.
26. Remove the input carrier from the transaxle, as shown in Figure 74.

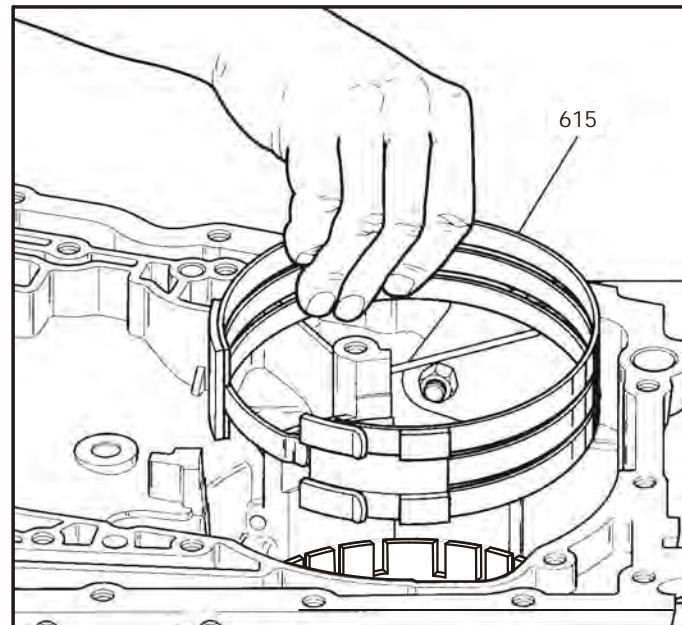


Figure 72

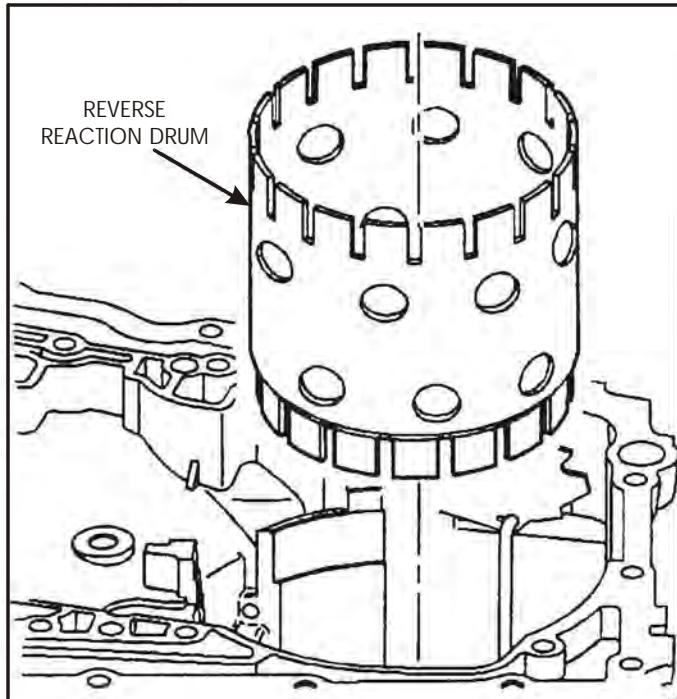


Figure 73

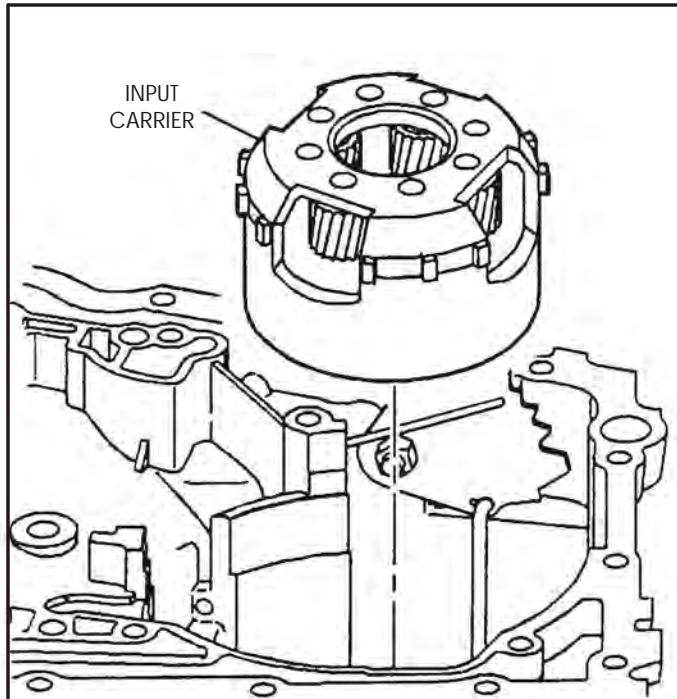


Figure 74

27. Remove the reaction carrier assembly along with the thrust bearing assembly, as shown in Figure 75.
28. The input carrier to final drive sun gear shaft lube dam may come out with the carrier if it did not come out with the input carrier. Refer to Figure 75.

**Continued on next Page.**

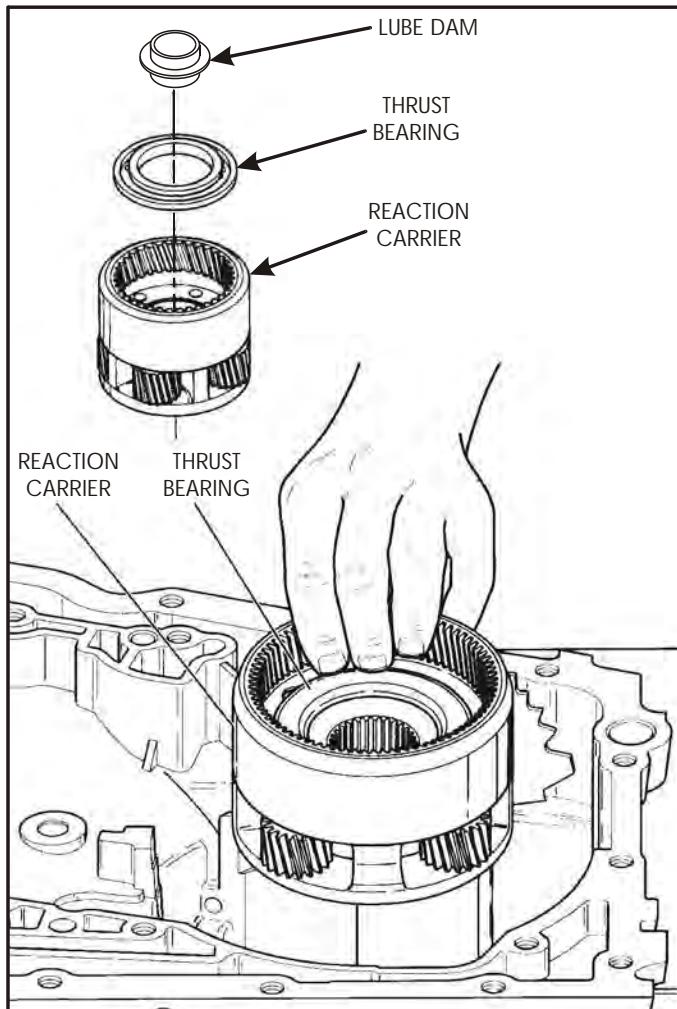


Figure 75

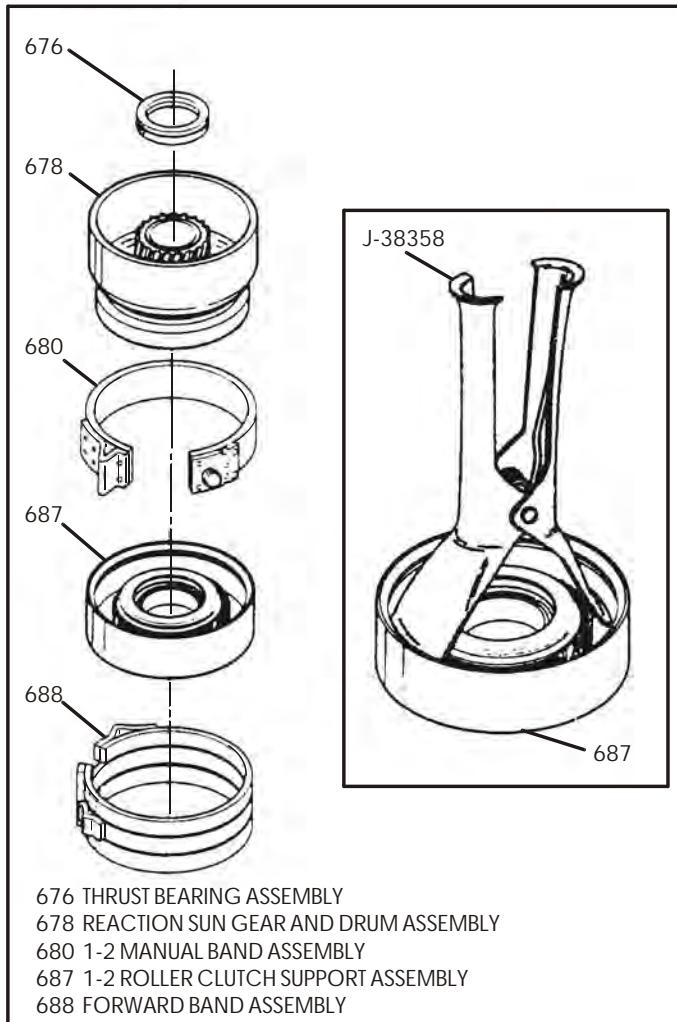


Figure 76

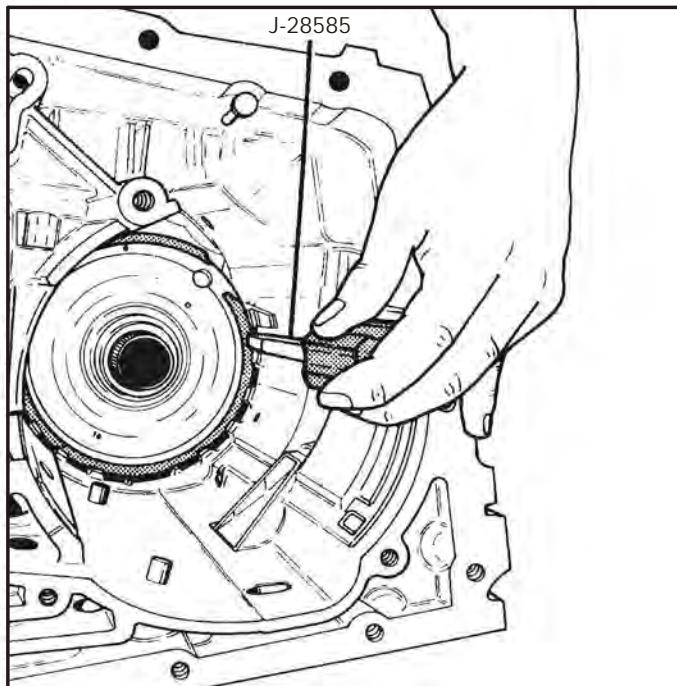


Figure 77

**Continued from Page 45.**

29. Remove the reaction sun gear thrust bearing, as shown in Figure 76.
30. Remove the reaction sun gear and drum, by lifting straight up (See Figure 76).
31. Remove the 2-1 manual band assembly from transaxle case (See Figure 76).
32. Remove the 1-2 roller clutch and support from transaxle case, using removal tool J-38358, as shown in Figure 76.
33. Remove the forward band assembly from the transaxle case by lifting on the side directly opposite the anchor pin (See Figure 76).
34. Remove final drive internal gear snap ring using tool J-38585, as shown in Figure 77.
35. Remove the final drive internal gear from the transaxle case by lifting straight up, as shown in Figure 78. The roller support thrust washer will be on the final drive internal gear.

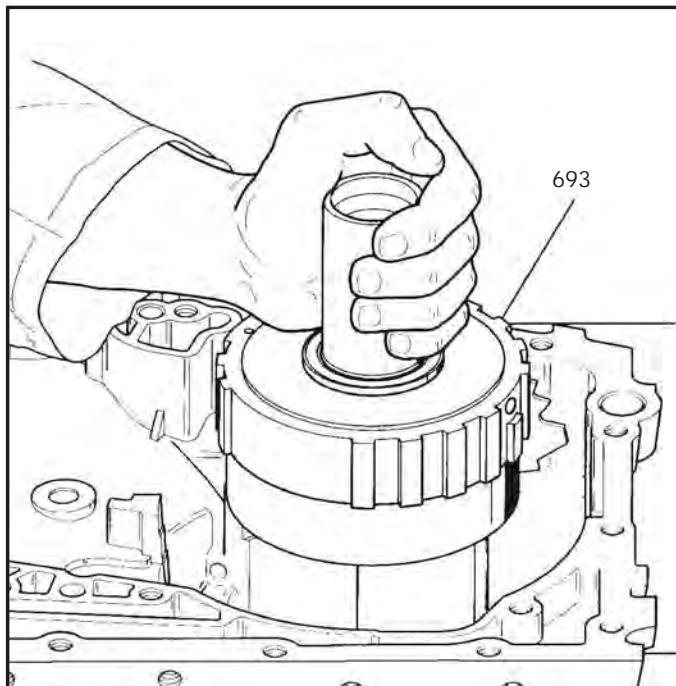


Figure 78

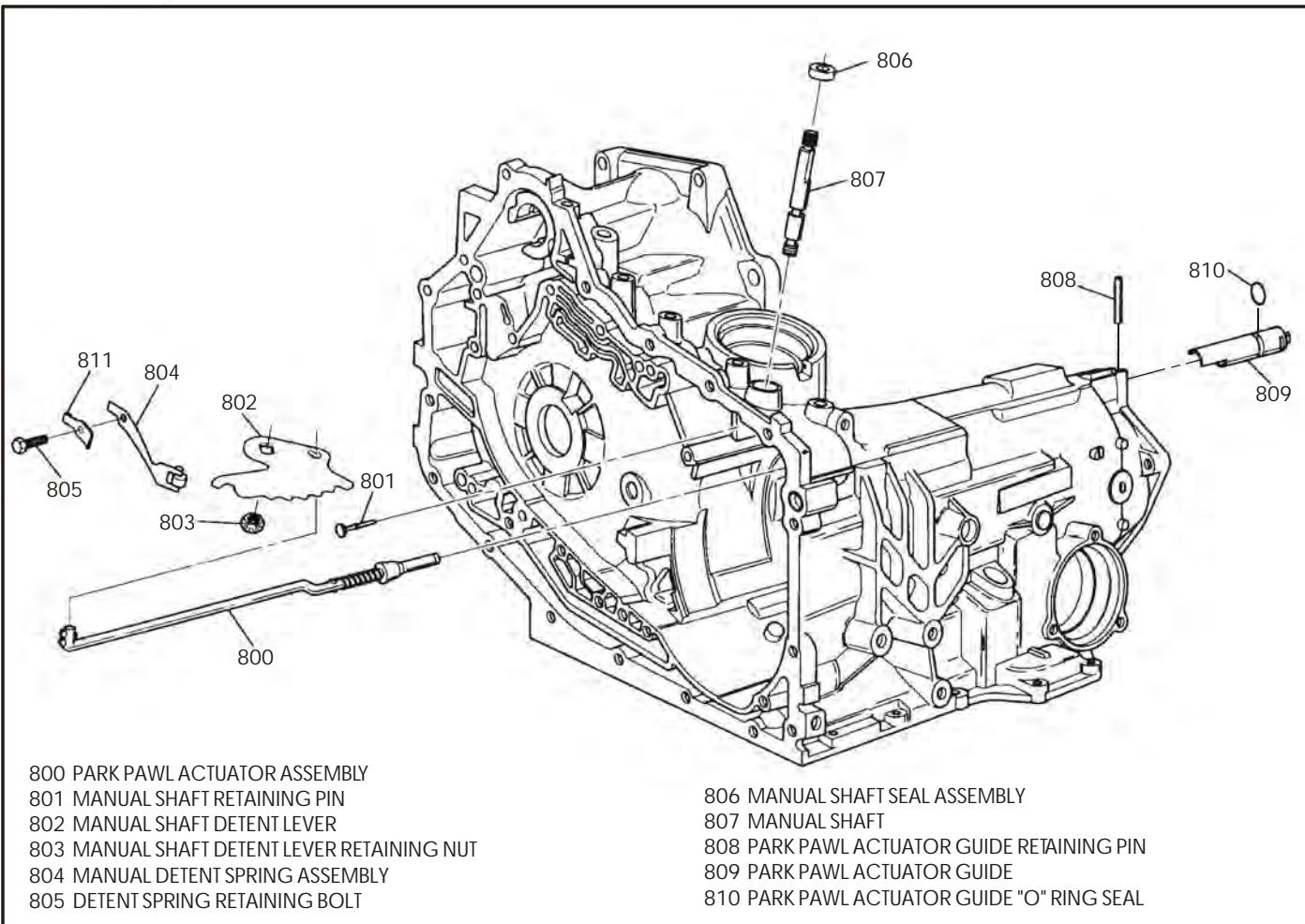


Figure 79

### INTERNAL PARKING LINKAGE

1. Remove the hex nut (803) from the manual shaft (807), and remove the inside detent lever (802) with the actuator rod (800), as it is shown in Figure 79.
2. Remove the manual shaft retaining pin (801) using diagonal cutting pliers with a piece of wood or rubber to protect the case, and pry the retaining pin out of case (See Figure 79).
3. Remove the manual shaft from the case, as shown in Figure 79.
4. Remove the actuator guide retaining pin (808) from the case and remove actuator guide, and replace the "O" ring seal (810). Refer to Figure 79.

### COMPONENT REBUILD TRANSAXLE CASE ASSEMBLY

1. Inspect the transaxle case thoroughly on the sealing surfaces , for stripped threads, porosity, cracks, and damaged snap ring grooves.
2. **Important:** Remove the large cooler fitting and inspect it closely for debris. This fitting has a checkball and spring inside, and is a favorite gathering place for debris.
3. Inspect drive sprocket support for following;
  - Splines for damage or wear.
  - Journal surface for damage or wear.
  - Bushing for damage or wear.
  - Make sure feed holes are open.
  - Bearing assembly for wear or damage.
4. If bearing replacement is necessary, use bearing puller and installation tools shown in Figure 80 to remove and replace the bearing.

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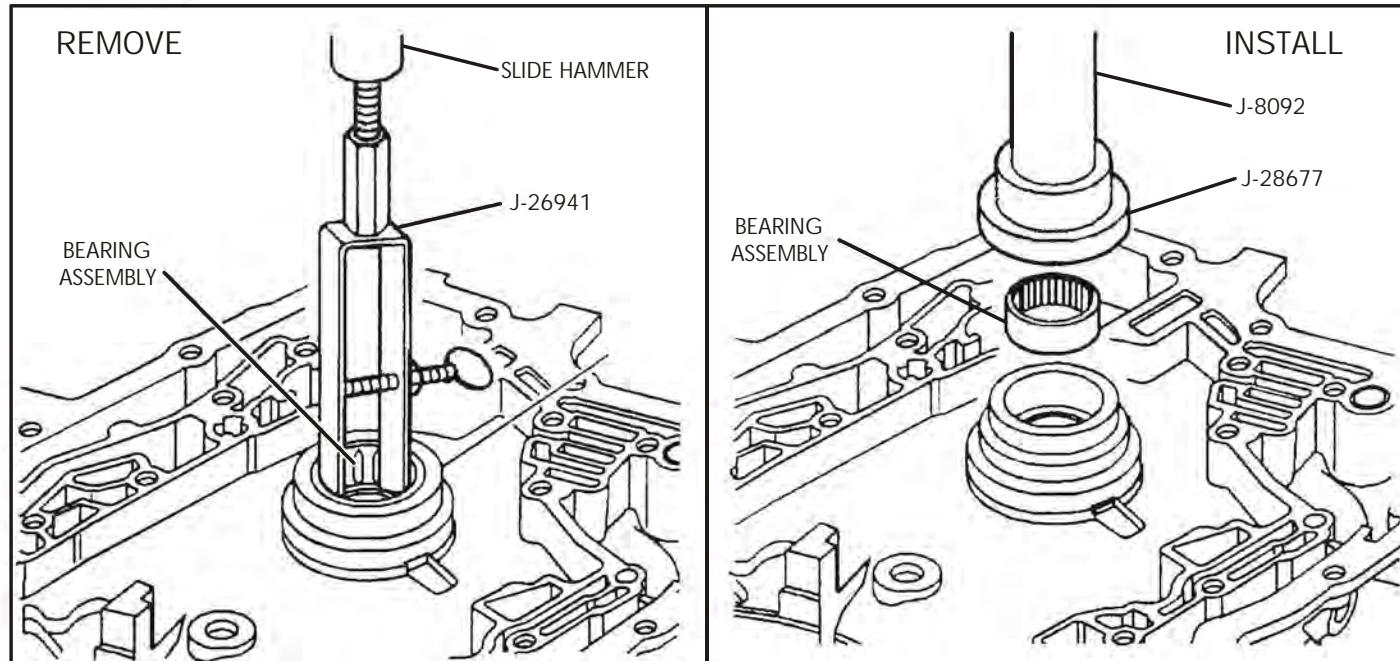


Figure 80

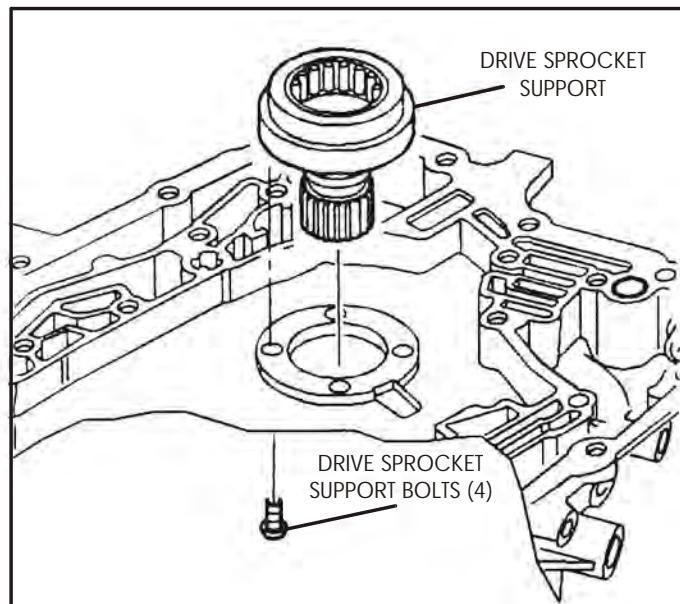
**Components continued from Page 47**

Figure 81

5. Install the drive sprocket support into the case and torque the four bolts to 18 ft.lb. Refer to Figure 81.
6. Install a new converter seal into case using tool J-28540 and a mallet, as shown in Figure 82.
7. Install a new manual shaft seal into the case, and use a 15mm socket to tap into position.
8. Install the manual shaft and its retaining pin (Nail) into the case (See Figure 79).
9. Install the inside detent lever and actuator rod onto the manual shaft (See Figure 79).
10. Install the retaining nut on the manual shaft and torque to 24 ft.lb. (See Figure 79).

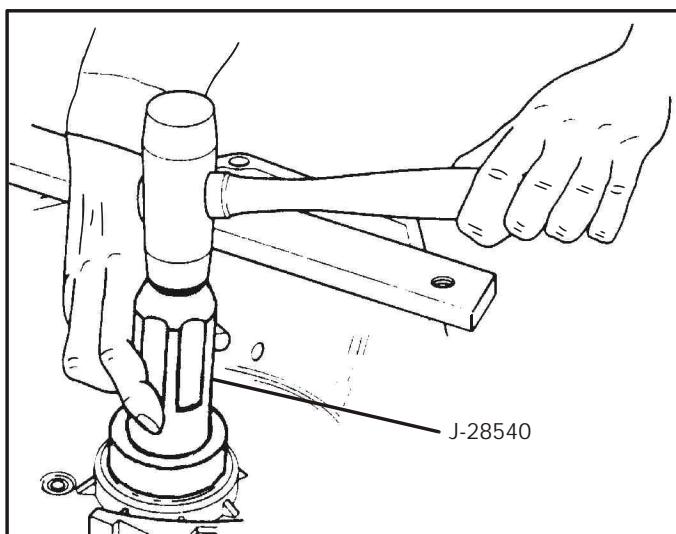


Figure 82

## COMPONENT REBUILD

### DIFFERENTIAL CARRIER ASSEMBLY

1. Inspect the differential carrier assembly for the following; Refer to Figure 85.
  - Damaged or worn teeth, bearing rollers, washers, or pins on the differential planet pinions.
  - Damaged or worn teeth, splines, or thrust washers on the differential side gears or the differential pinion gears.
  - Damage to the speed sensor reluctor wheel.
  - Damage to the differential pinion shaft or differential carrier housing.
2. Use a feeler gage to measure the differential pinion end play, as shown in Figure 83.  
**Specification:** End play shoul be .009"-.025".
3. If the end play check or component inspection indicates a problem, with a screwdriver remove the spiral snap ring, as shown in Figure 84.
4. Remove the 1st planetary pinion by removing the following; Refer to Figure 85.
  - The planetary pinion pin (712)
  - The pinion thrust washers (708)
  - The pinion gear needle bearings (709)
  - The needle bearing spacer (710)
  - The planetary pinion (711)
5. Remove the remaining differential planetary pinions in the same manner as above.

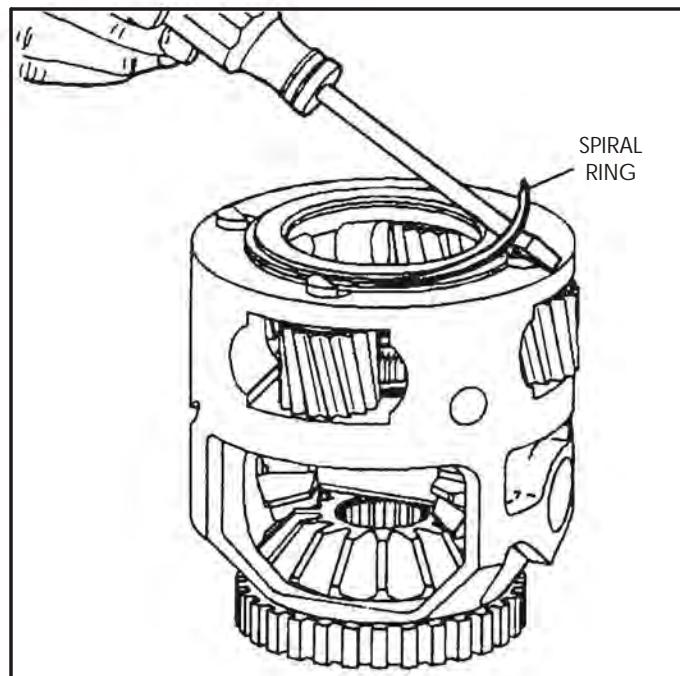


Figure 84

6. Remove the differential carrier sun gear thrust bearing assembly, as shown in Figure 85.  
**Note:** Some ratio final drive carriers, this will be a "*trapped*" bearing and cannot be removed without removing the planetary pinions.

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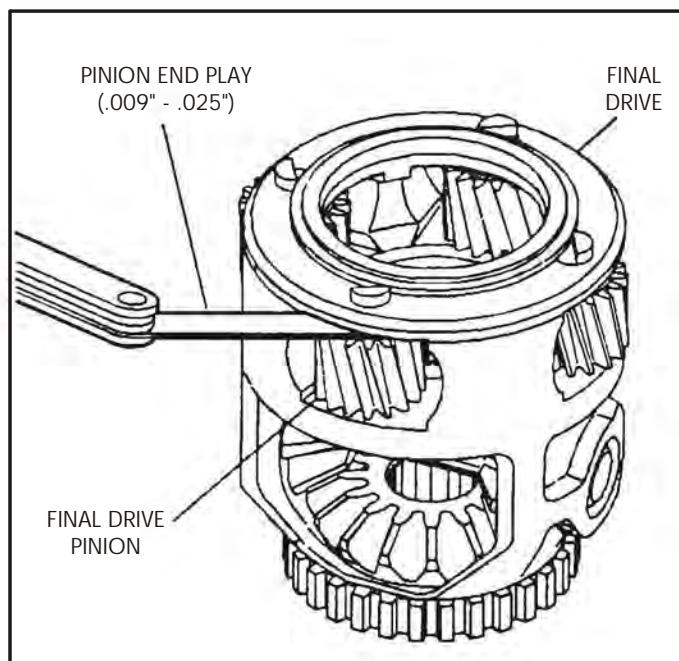


Figure 83

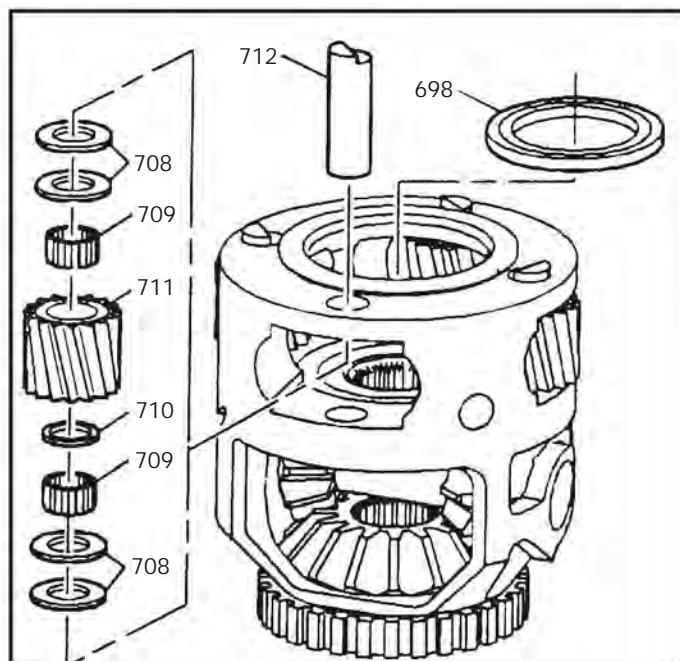


Figure 85

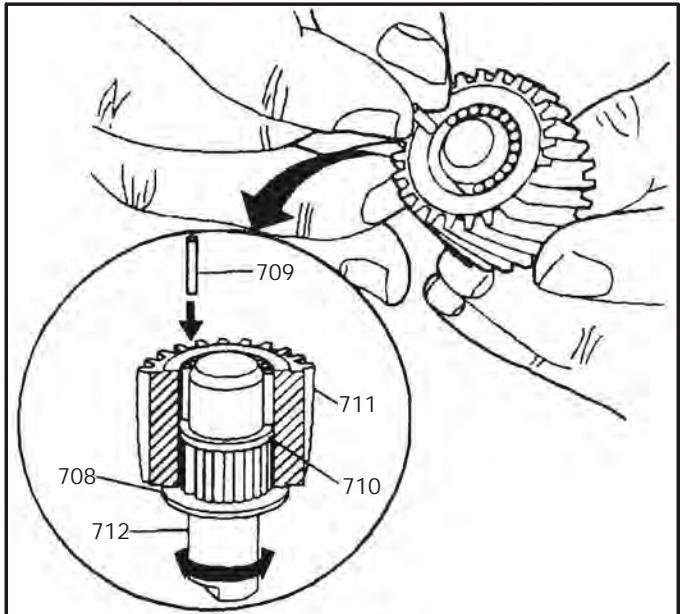


Figure 86

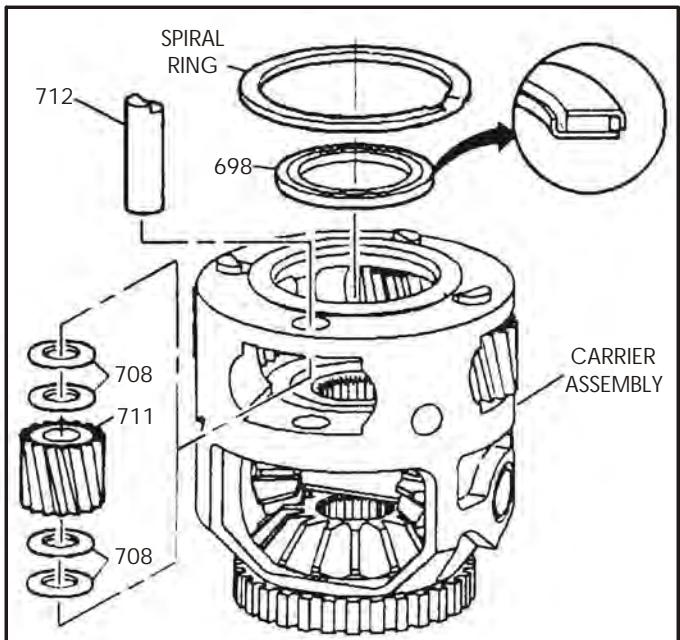


Figure 87

### Continued from Page 49.

7. Install the needle bearing rollers (709) one at a time into the pinion gear (711), as shown in Figure 86.
8. The number of needle rollers in the pinion gear is model dependent:
  - The 3.05/3.06 and 3.29/3.33 ratio carriers have two rows of 22 rollers, (44 Total).
  - The 2.86/2.84 ratio differential carriers have two rows of 18 rollers, (36 Total).
9. Use a washer (708) on the bottom of the pinion gear (711), and plenty of "Trans-Jel" in order to help hold the needle rollers (709) in place. Refer to Figure 86.
10. Occasionally twist the pinion gear pin (712) in order to help align the rollers (See Figure 86).
11. Install the differential carrier sun gear thrust bearing (698) into the carrier (See Figure 87). **Note:** Some ratio final drive carriers, this is a **trapped** bearing and **must** be installed **before** installing the pinion gears.
12. Remove each pinion gear pin from its pinion gear. Be careful not to move the rollers out of position.
13. Install two pinion gear washers (708) on each side of the pinion gear (711) and retain with "Trans-Jel" (See Figure 87).

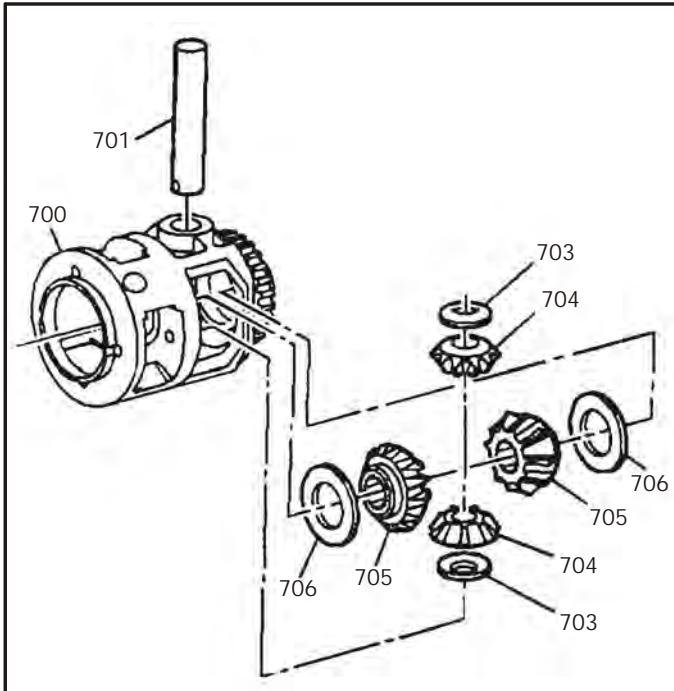


Figure 88

14. Install the pinion gear assemblies into final drive carrier housing (See Figure 87).
- Important:** Make sure that the pinions are installed in the same position and oriented top to bottom, as the way they were removed. If the gear is installed upside down, noise may result, because of the change in the gear wear pattern.
15. Install each planetary pinion gear pins (712).
  16. Install the spiral snap ring (See Figure 87).
  17. Install the differential side gear thrust washers onto the side gears and retain with "Trans-Jel". Refer to Figure 88.
  18. Install the side gears with the thrust washers into the differential carrier (See Figure 88).
  19. Install the differential pinion thrust washers on the pinion gears and retain with "Trans-Jel". Refer to Figure 88.
  20. Install the pinion gears with thrust washers into the differential carrier housing. Rotate pinion gears into position and install differential cross shaft (701) in carrier housing (See Figure 88).
  21. Align the hole in the cross shaft with the hole in the carrier housing and install roll pin that retains the cross shaft (See Figure 89).
  22. Use a drift punch and mallet to install the roll pin into the housing (See Figure 89).
  23. Do not remove the speed sensor rotor unless the rotor is damaged.
  24. If removal is necessary use puller J-22888 and a piece of metal stock in order to remove, as shown in Figure 90.

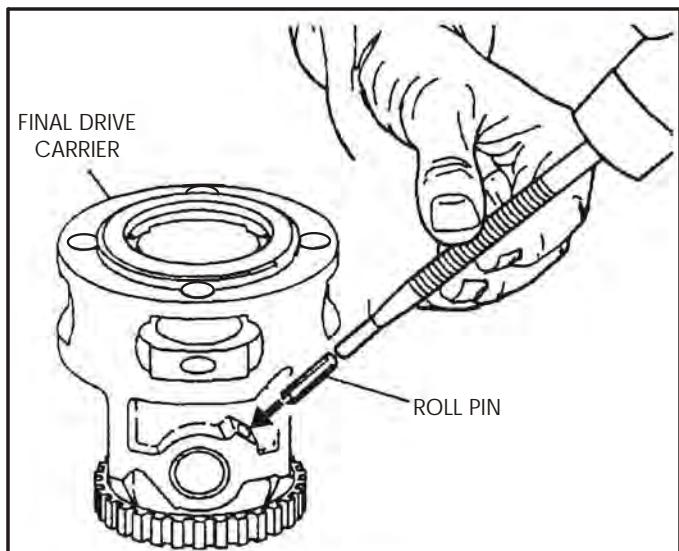


Figure 89

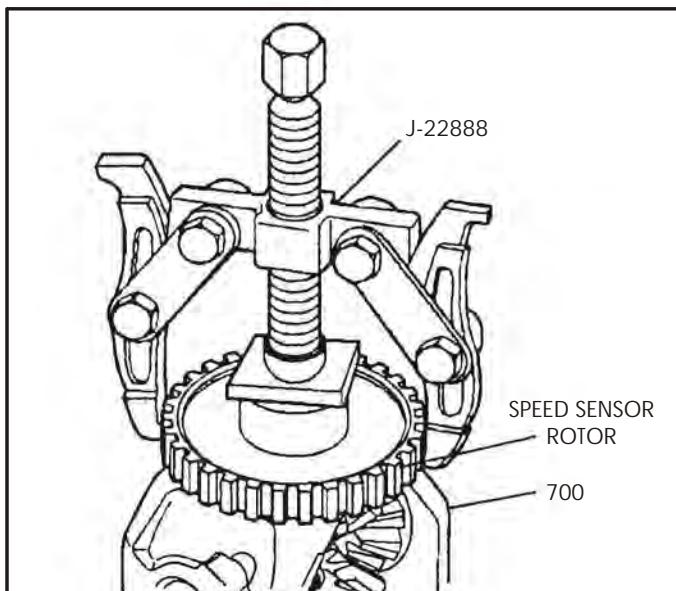


Figure 90

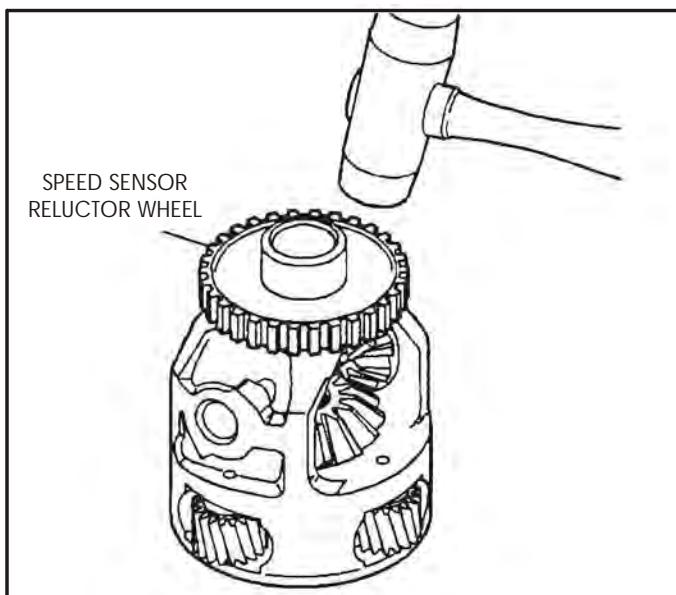


Figure 91

25. The new speed sensor rotor must be **warmed** before installation to expand it enough so as to prevent damage.
26. Use a plastic mallet to install the speed sensor rotor onto the differential carrier housing, as shown in Figure 91. Tap evenly around the speed sensor rotor with the mallet.
27. Set the completed final drive assembly aside for the final assembly process.

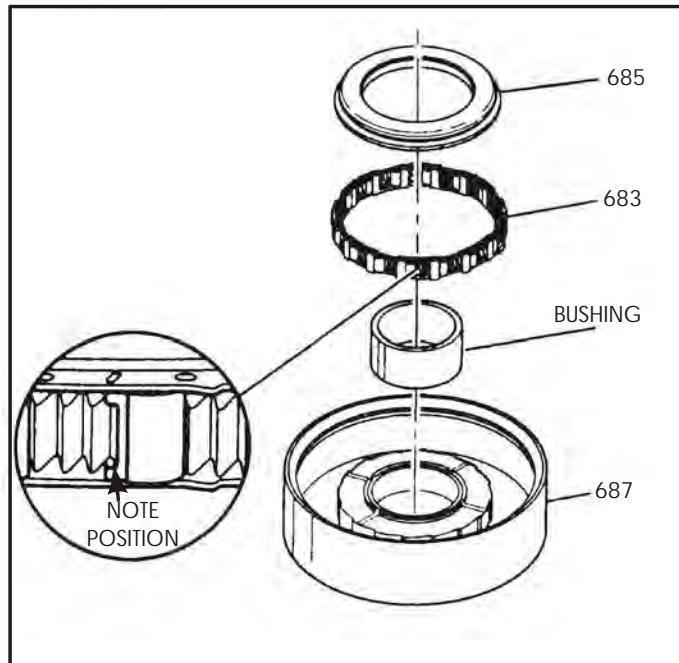
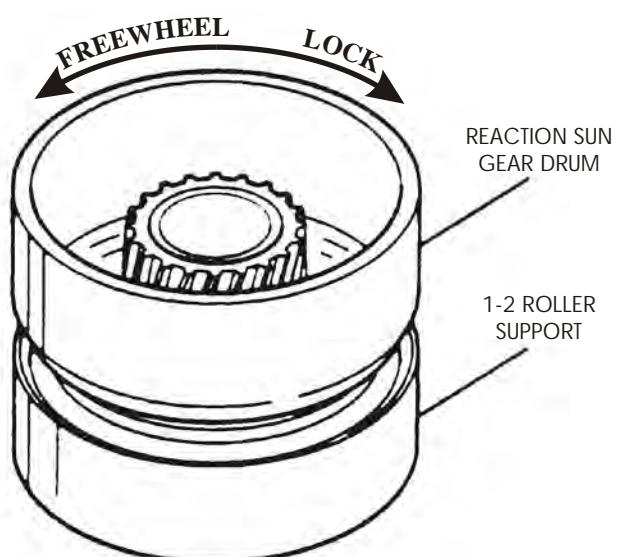


Figure 92

**1-2 ROLLER CLUTCH ASSEMBLY**

1. Use a small screwdriver to gently pry the thrust bearing (685) off of the 1-2 roller support, as shown in Figure 92.
2. Lift the 1-2 roller clutch assembly (683) out of 1-2 roller support (687), as shown in Figure 92.
3. Inspect the 1-2 roller support components for the following conditions;
  - Scored or burnt surface for the forward band area on the 1-2 roller support.
  - Damaged or worn bushing in 1-2 support.
  - Damaged or worn inner race on the support.
  - Damaged or worn 1-2 roller clutch assembly.
  - Damaged or worn thrust bearing.
4. Install the 1-2 roller clutch assembly (683) onto the inner race of the 1-2 support, as shown in Figure 92.  
Important: Note the position of the ribbon tabs for proper installation (See Figure 92).
5. Install the thrust bearing (685) onto the support by gently pressing down with hand pressure only (See Figure 92).
6. With the 1-2 roller clutch support assembly on the bench as shown in Figure 93, install the sun gear drum with the outer race onto the roller clutch by rotating counter clockwise until it is fully seated in the 1-2 roller support.
7. The reaction sun gear drum should freewheel counter clockwise and lock clockwise as shown in Figure 93.  
*Note:* This procedure is just to check for proper installation of the roller clutch assembly.
8. Remove the reaction sun gear drum from the 1-2 roller clutch support assembly and set both pieces aside for the final assembly process.

**1-2 ROLLER CLUTCH CHECK**

**REACTION SUN GEAR DRUM SHOULD FREEWHEEL COUNTERCLOCKWISE AND LOCK CLOCKWISE**

Figure 93

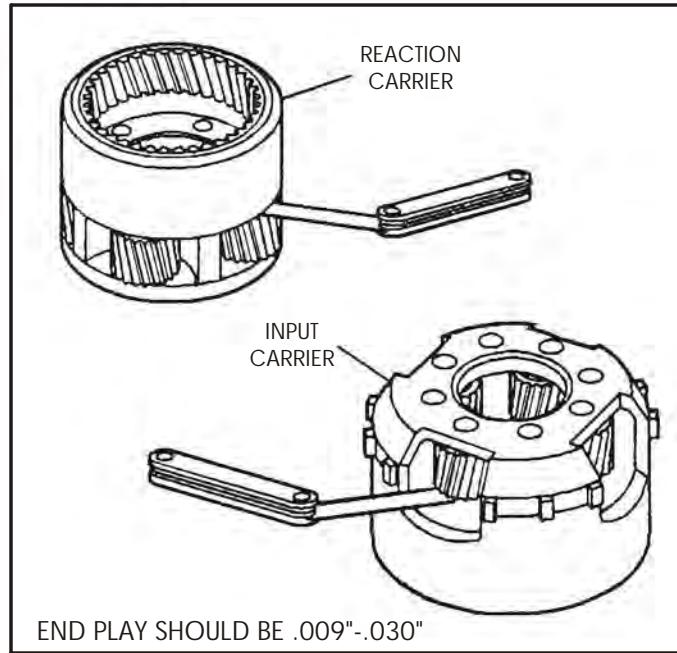


Figure 94

**INPUT AND REACTION CARRIERS**

1. Using a feeler gage, measure the pinion end play in the input carrier and reaction carrier, as shown in Figure 94.  
End play should be .009"-.030".
2. Inspect the planetary carriers for any damage, wear, or cracks in the pinion teeth or splines.
3. Inspect the thrust bearings for damage or wear. Refer to Figure 95.
4. Inspect the input carrier oil dam (673) for any cracks or damage (See Figure 95).
5. Install the oil dam into the input carrier, as shown in Figure 95.
6. Install thrust bearing (674) in the input carrier and retain with "Trans-Jel" (See Figure 95).
7. Install the input carrier into the reaction carrier with a twisting motion to engage the carriers pinions and ring gears, and set the complete assembly aside for the final assembly process.

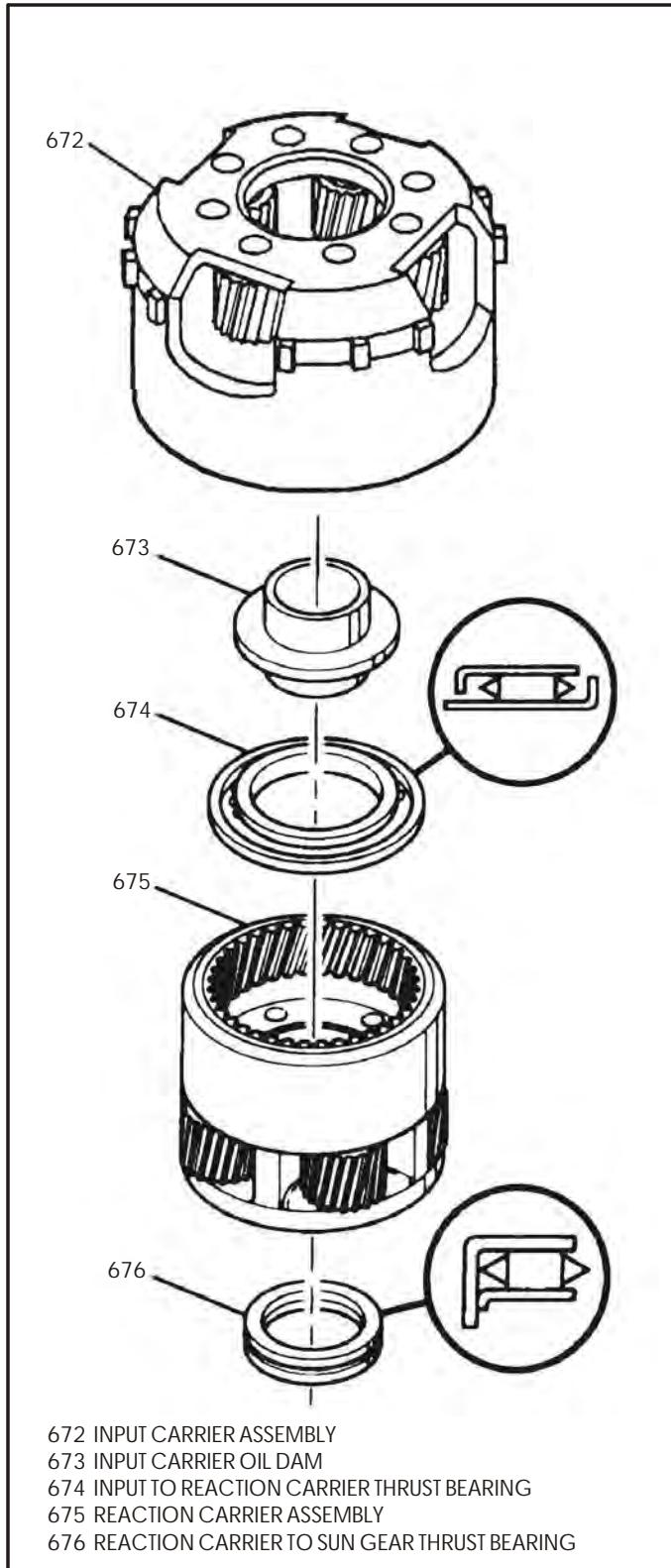
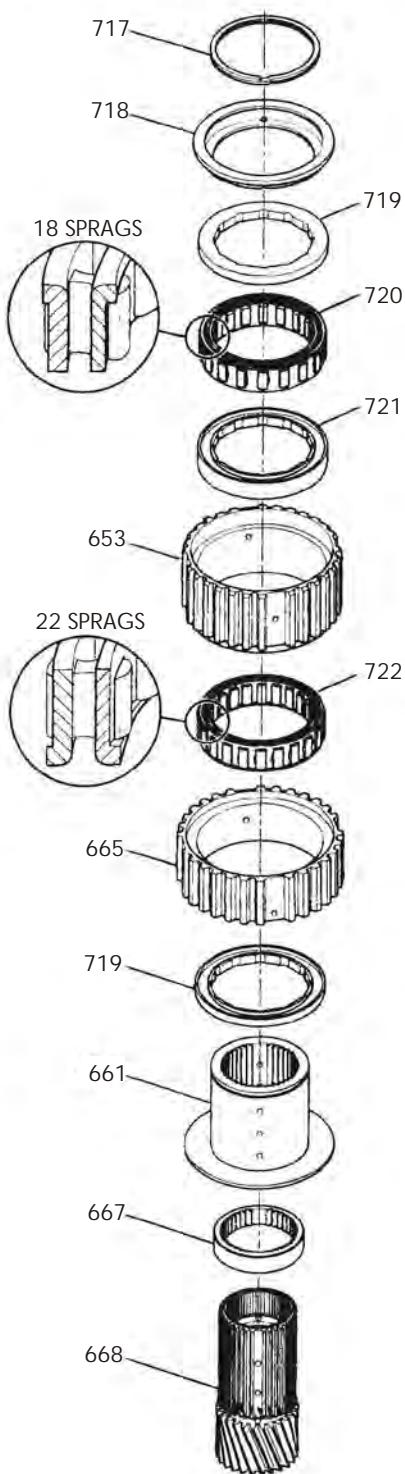


Figure 95

# Technical Service Information



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

Figure 96

## INPUT/3RD SPRAG ASSEMBLIES

1. Thoroughly clean and inspect all of the sprag parts illustrated in Figure 96.
2. Remove and discard the spiral retaining ring (717) shown in Figure 96. This spiral retaining ring should never be reused, always replace the ring with a new one.
3. Place the input clutch sprag outer race on a flat work surface with the machined step facing up, as shown in Figure 97.
4. Install one of the end bearings (719) into the outer race with the step facing up, as shown in Figure 97.
5. Insert the input clutch sprag assembly (722) in the outer race, as shown in Figure 97.  
**Note:** Position the input sprag so that the lip is facing **down**, as shown in Figure 97.
6. Place the 3rd clutch sprag outer race on a flat work surface with the machined step facing up, as shown in Figure 98.
7. Insert the center bearing (721) for the input and 3rd clutch into the 3rd clutch sprag outer race, as shown in Figure 98.
8. Insert the 3rd clutch sprag assembly (720) into the outer race, as shown in Figure 98.  
**Note:** Position the 3rd sprag so that the lip is facing **up**, as shown in Figure 98.
9. Place the input/3rd sprag inner race (661) on a flat work surface with the flange facing down, as shown in Figure 99.

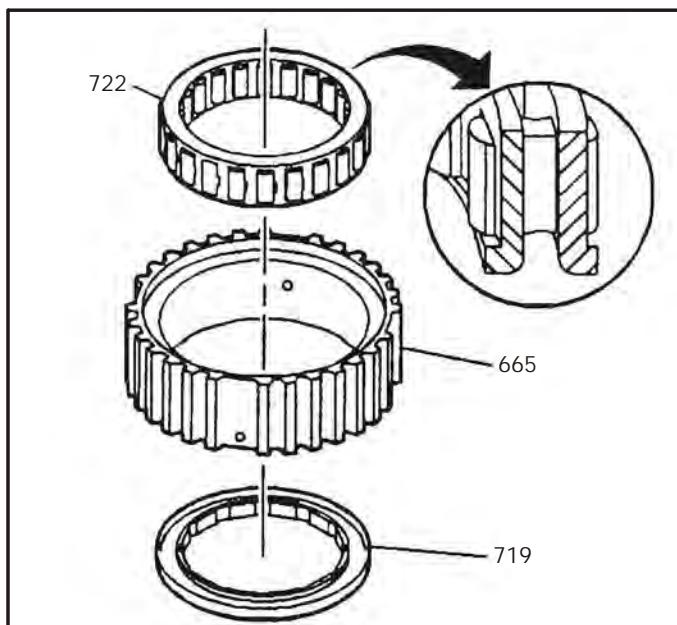


Figure 97

# Technical Service Information

10. Install the input sprag assembly and 3rd sprag assembly onto the inner race (661), as shown in Figure 99.
11. Install the sprag retainer (718) onto the inner race, as shown in Figure 99.
12. Install a **new** spiral snap ring. ***Do not*** attempt to reinstall the old spiral ring.  
**Important:** The tabs and the slots on the spiral snap ring **must** lock.
13. Install the sun gear spacer onto the input sun gear, as shown in Figure 100.

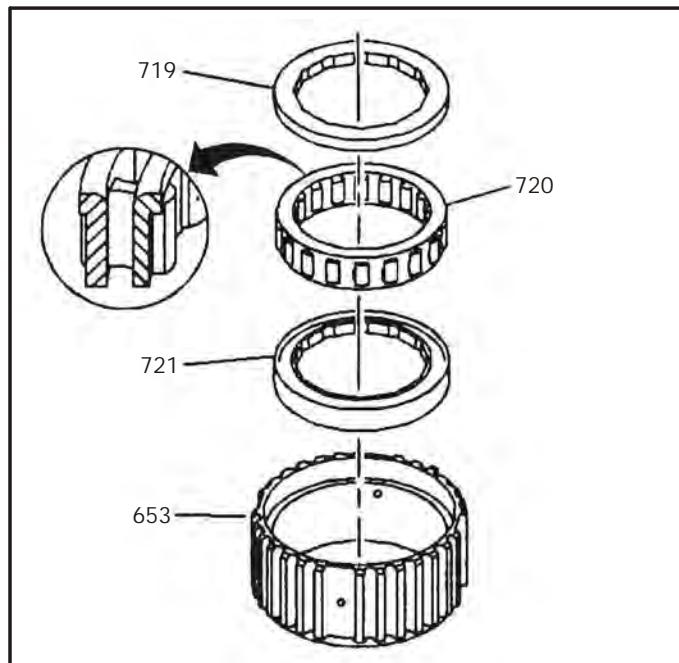


Figure 98

14. Install the inner race and input/3rd clutch sprag assembly onto the input sun gear, as shown in Figure 100.
- Important:** The blind splines on the input sun gear and the sprag inner race **must** be aligned, as shown in Figure 100.
15. Check for proper operation of the input/3rd clutch sprag assemblies, as shown below in Figure 101.

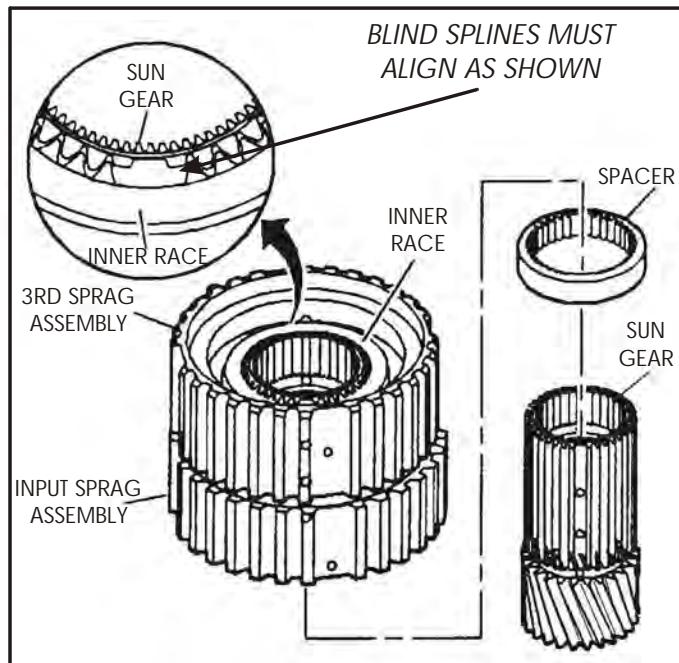


Figure 100

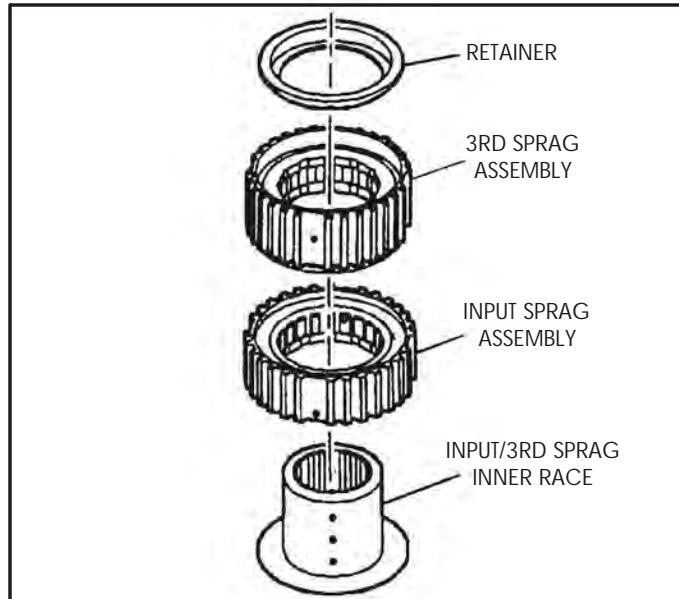


Figure 99

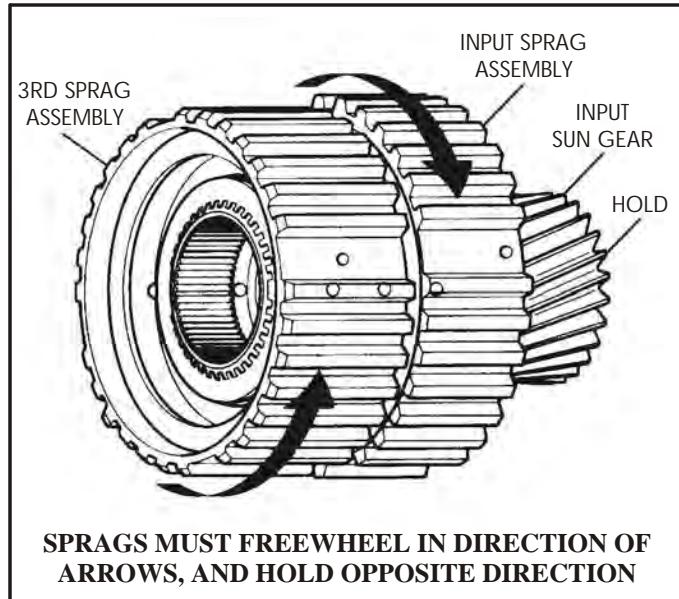
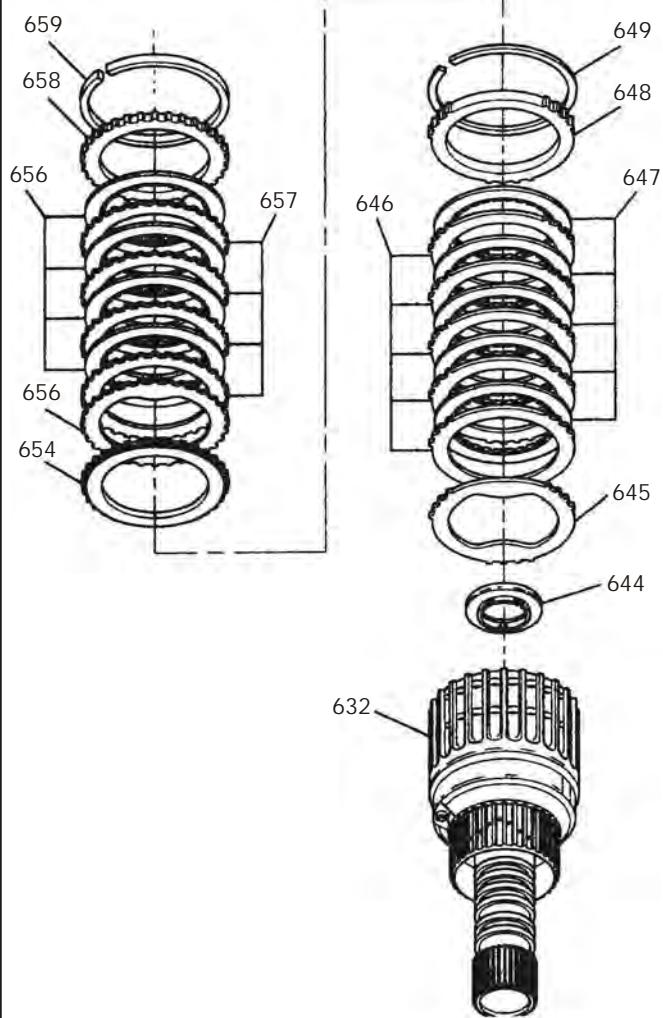


Figure 101



632 INPUT HOUSING ASSEMBLY  
 644 THRUST BEARING ASSEMBLY  
 645 3RD CLUTCH WAVE PLATE  
 646 3RD CLUTCH, S. S. PLATE, SPLINED O.D. (5 REQUIRED)  
 647 3RD CLUTCH, S. S. PLATE, SPLINED I.D. (5 REQUIRED)  
 648 3RD CLUTCH BACKING PLATE  
 649 3RD CLUTCH SNAP RING  
 654 INPUT CLUTCH APPLY PLATE  
 655 INPUT CLUTCH WAVE PLATE  
 656 INPUT CLUTCH FRICTION PLATES (4 REQUIRED)  
 657 INPUT CLUTCH STEEL PLATES (4 REQUIRED)  
 658 INPUT CLUTCH BACKING PLATE  
 659 INPUT CLUTCH SNAP RING

Figure 102

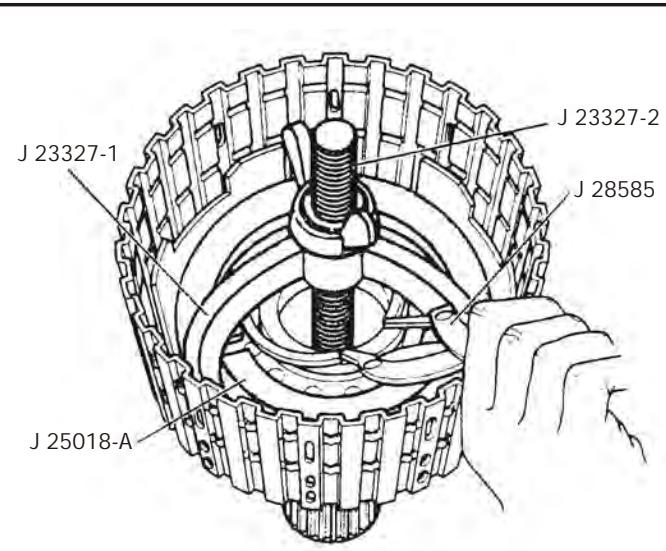
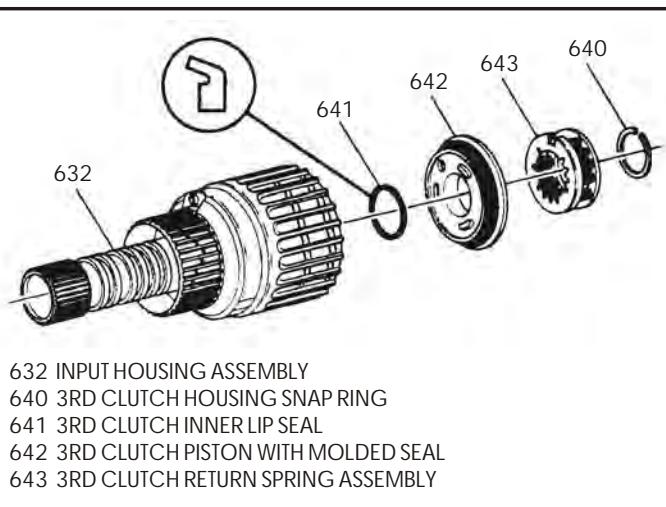


Figure 103



632 INPUT HOUSING ASSEMBLY  
 640 3RD CLUTCH HOUSING SNAP RING  
 641 3RD CLUTCH INNER LIP SEAL  
 642 3RD CLUTCH PISTON WITH MOLDED SEAL  
 643 3RD CLUTCH RETURN SPRING ASSEMBLY

Figure 104

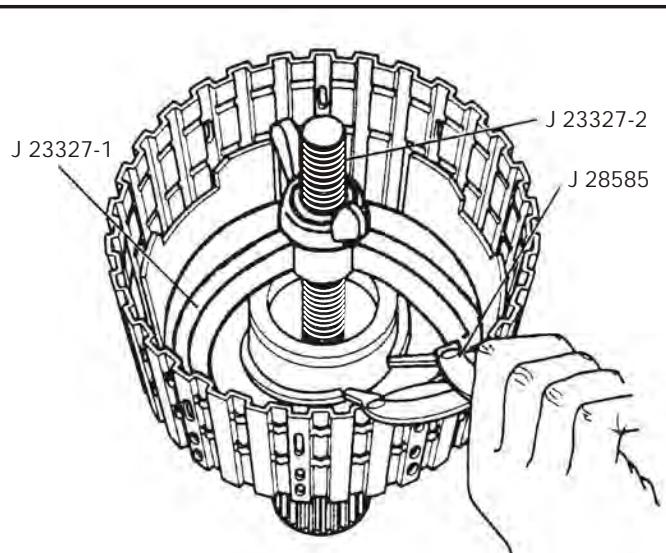


Figure 105

**INPUT/3RD CLUTCH HOUSING ASSEMBLY**

1. Remove and inspect thrust bearing assembly (644) that snaps into the input housing, shown in Figure 102.
2. Remove input clutch snap ring (659) and the input clutch backing plate (See Figure 102).
3. Remove the input clutch plates, both lined and steel plates, and wave plate.
4. Remove input clutch apply plate (654).
5. Remove the 3rd clutch snap ring (649), and the 3rd clutch single sided plates (646) and (647).
6. This unit uses the 10 pack single sided third plates, as shown in Figure 102.
7. Remove the 3rd clutch wave plate (645).
8. Using a spring compressor, compress the spring retainer inside of the housing and remove the snap ring, as shown in Figure 103.
9. Remove the return spring assembly.
10. Remove the molded seal 3rd clutch piston from the input housing, as shown in Figure 104.
11. Remove the 3rd clutch inner lip seal from the inner hub of input housing (See Figure 104).
12. Compress the 3rd clutch piston housing, and remove the snap ring, as shown in Figure 105.  
*Caution: Do not over expand snap rings.*
13. Remove the 3rd clutch piston housing.
14. Remove the "O" ring seal from the inner hub of the input housing.
15. Remove the input clutch return spring and the input clutch piston from the housing, as shown in Figure 106.
16. Remove and discard outer lip seal from the input clutch piston.
17. Remove and discard inner lip seal from the input clutch housing inner hub.
18. Inspect all parts for wear or damage.

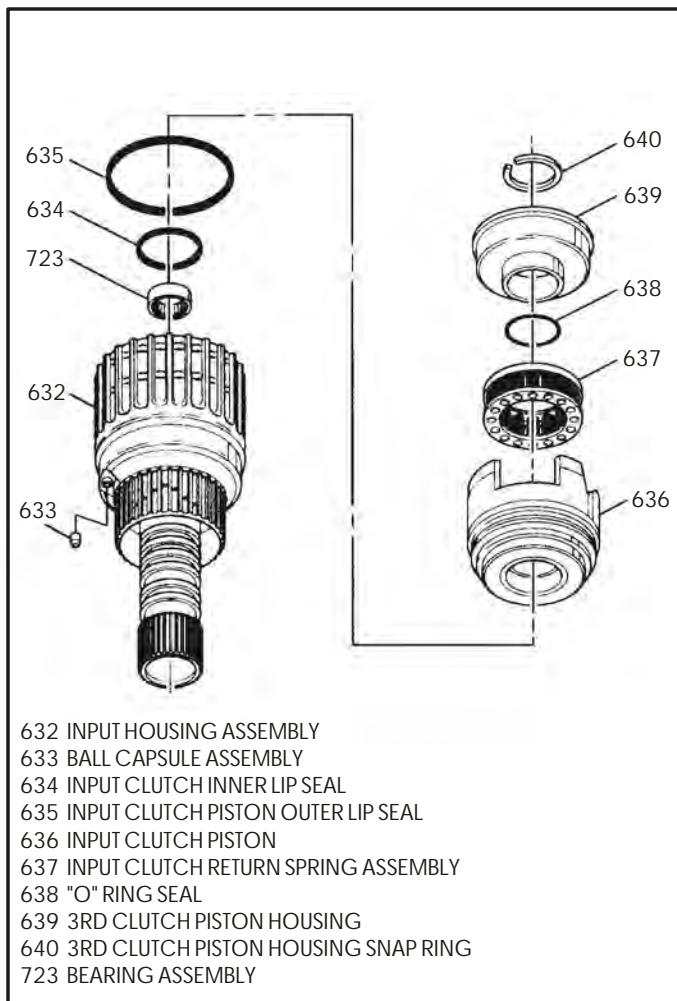


Figure 106

**Continued on next Page.**

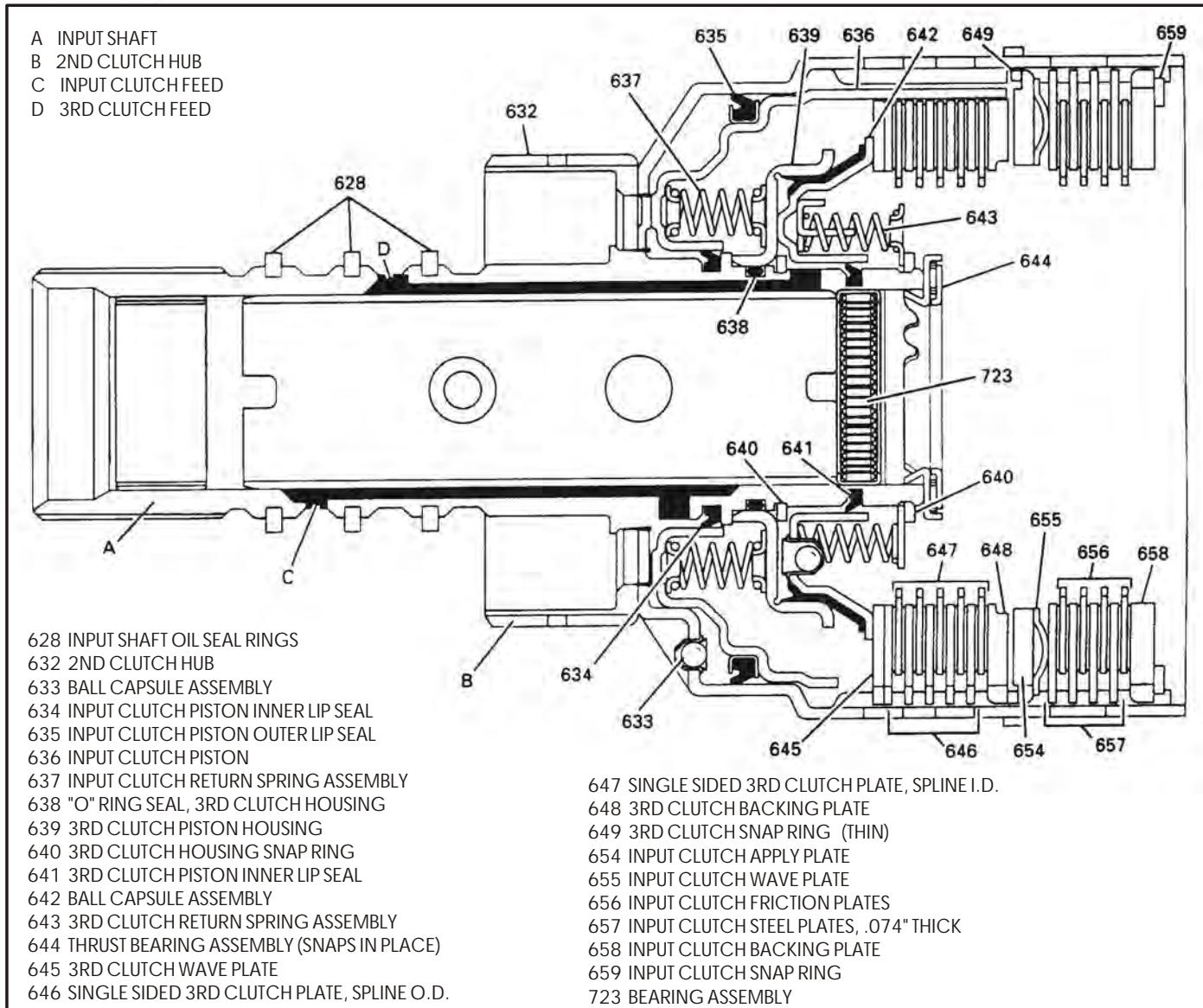


Figure 107

**Continued from Page 57.**

19. Install the input clutch inner lip seal into the housing in the direction shown in Figure 110, using J37361 installation tool (See Figure 110).
20. Install the "O" ring into the proper groove in the input housing, as shown in Figure 110.
21. Install the outer lip seal onto the input clutch piston with the lip facing down, as shown in Figure 108.
22. Lubricate both the inner and outer input clutch lip seals with a light coating of petrolatum.
23. Install the input clutch piston into the input housing by rotating into position, as shown in Figure 109.

24. Install the input clutch return spring assembly on top of the input clutch piston, as shown in Figure 109.
25. Lubricate the inside diameter of the 3rd clutch piston housing with petrolatum, and install it into the housing on top of the return spring and be careful not to damage the "O" ring. Refer to Figure 109.
26. Compress the 3rd clutch housing and install the snap ring, as shown in Figure 105.  
**Caution: Do not over expand snap ring.**
27. After the 3rd clutch housing snap ring has been installed, install the 3rd clutch piston inner lip seal into the housing, as shown in Figure 110.

**Continued on Page 60.**

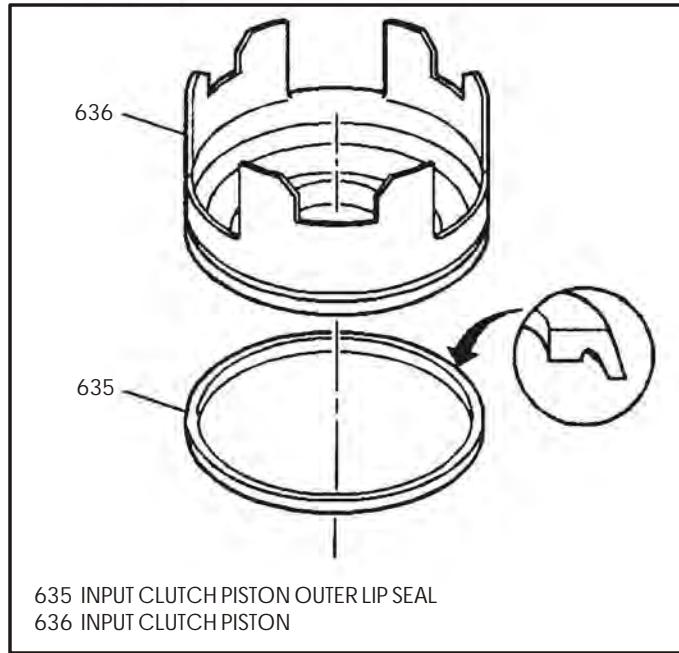


Figure 108

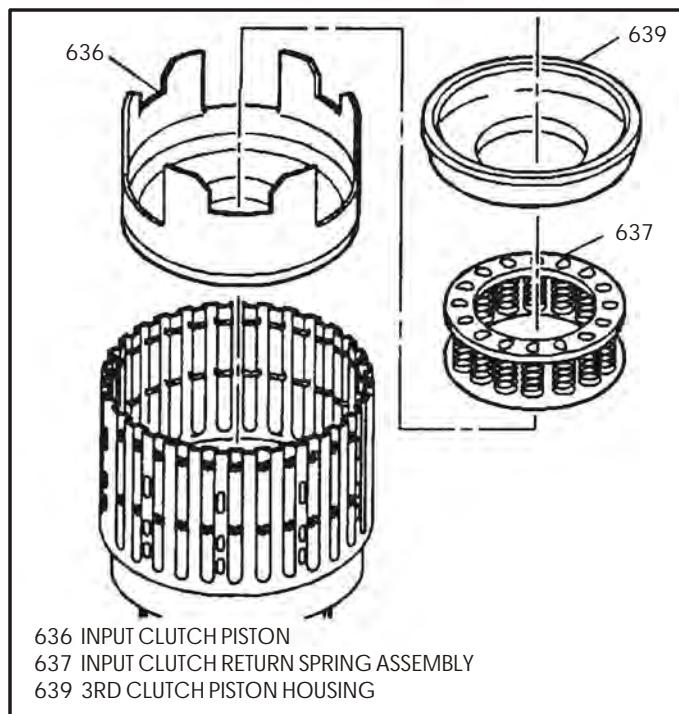


Figure 109

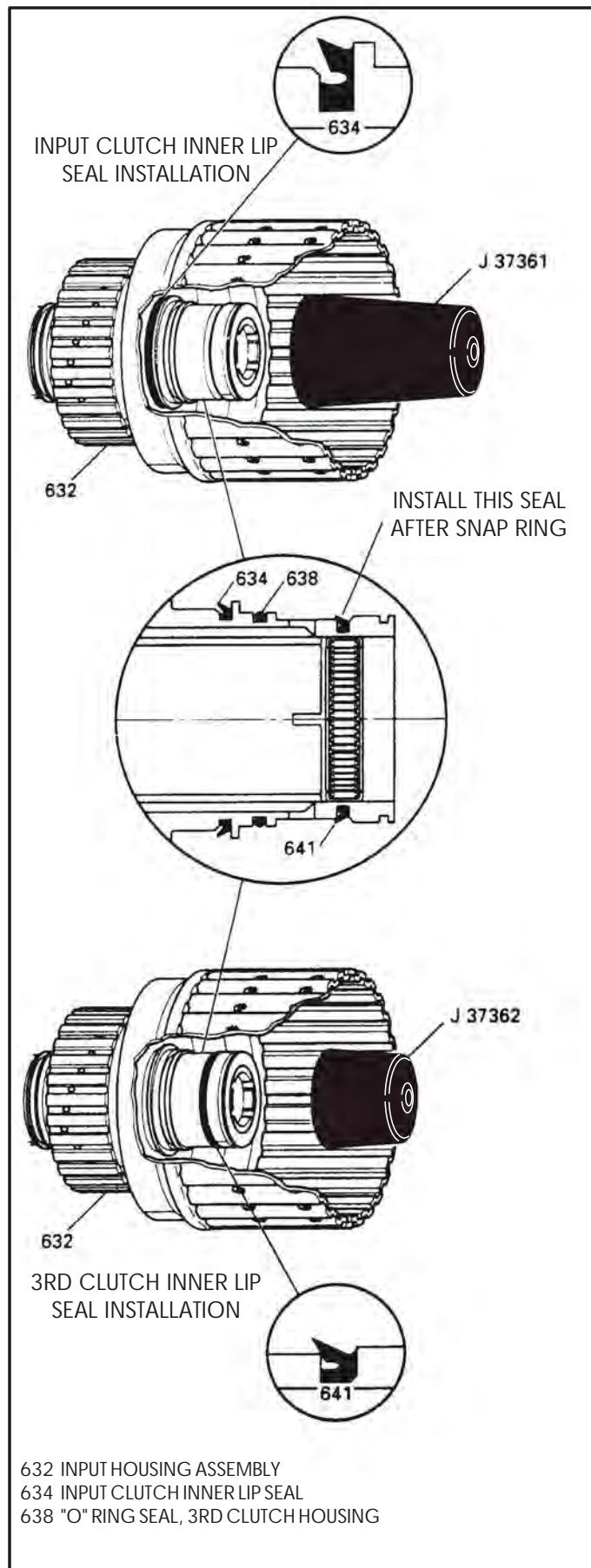


Figure 110

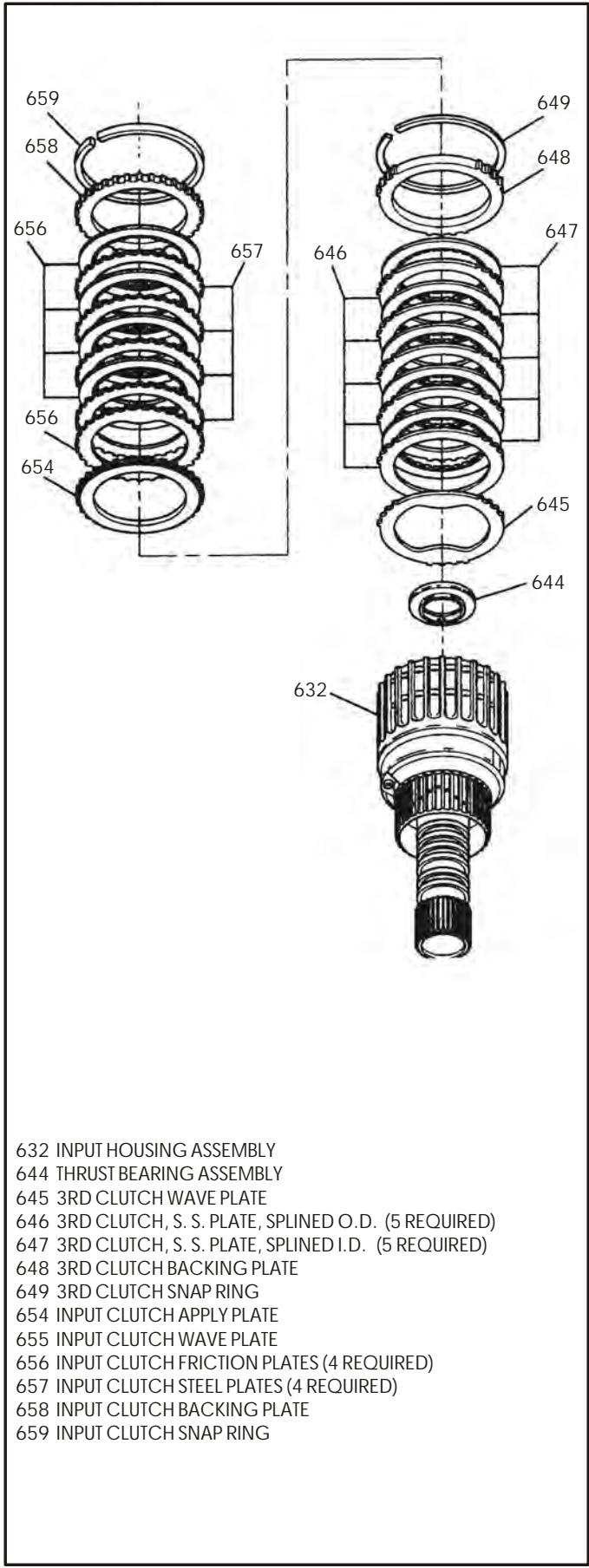


Figure 111

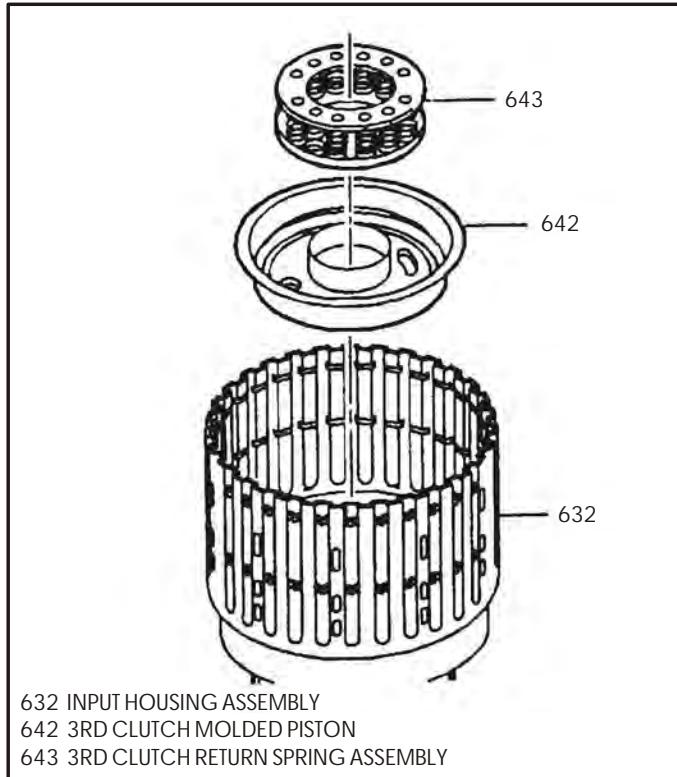


Figure 112

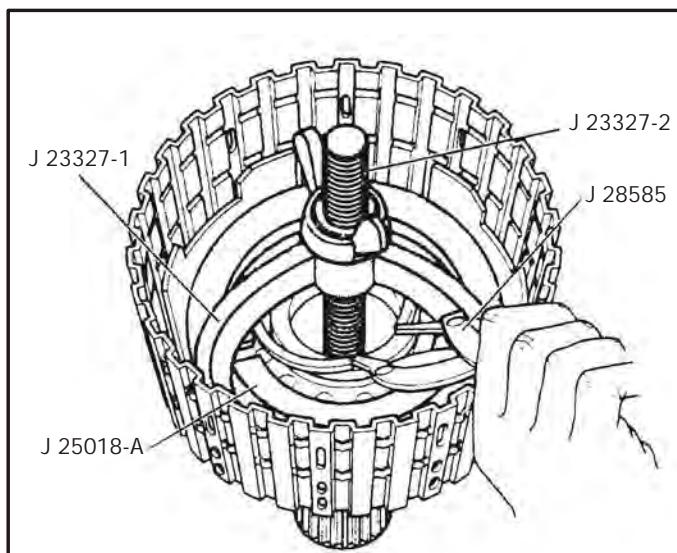


Figure 113

## Continued from Page 58.

28. Lubricate the 3rd clutch inner lip seal and the 3rd clutch molded piston with a light coating of petrolatum.
29. Install the 3rd clutch piston into the housing with a twisting motion (See Figure 112).

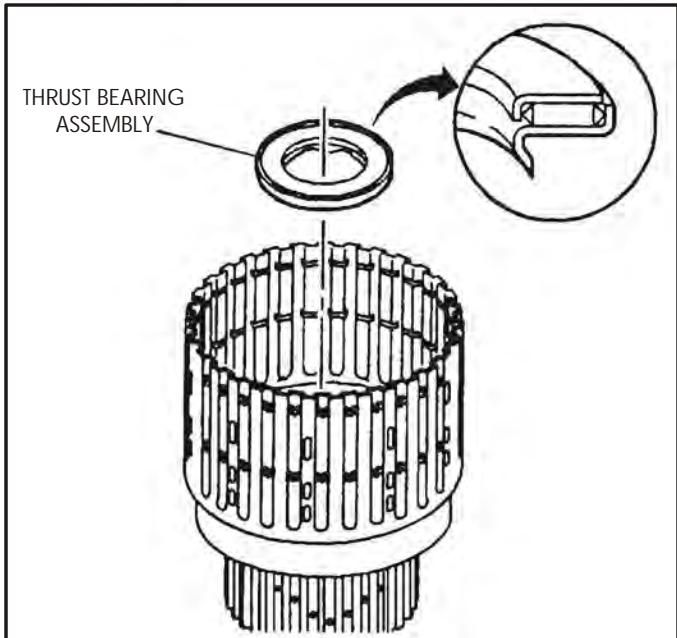


Figure 114

**Continued from Page 60.**

30. Install the 3rd clutch return spring assembly on top of the 3rd clutch piston (See Figure 112).
31. Compress the retainer and install the snap ring into the groove, as shown in Figure 113.  
***Caution: Do not over expand the snap ring.***
32. Install the 3rd clutch wave plate on top of the 3rd clutch piston in the housing.
33. Install the thrust bearing into the housing by snapping it into position (See Figure 114).
34. Install the 3rd clutch plates using Figure 115 as your reference. This pack **must** start with the wave plate, followed by a single sided, outside splined plate with, lining facing **up**, as shown in Figure 115. This pack requires 5 outside spline and 5 inside spline plates installed as shown in Figure 115.
35. Install the 3rd clutch backing plate with step on the inside diameter facing up, and install the 3rd clutch snap ring (See Figure 115).
36. Install the input clutch apply plate with step on the outside diameter facing down, as shown in Figure 115.
37. Install the input clutch wave plate and the input clutch plates, beginning with a steel plate on top of the wave and alternating with lined.
38. Install the input clutch backing plate with the flat side facing up, and the snap ring, as shown in Figure 115.

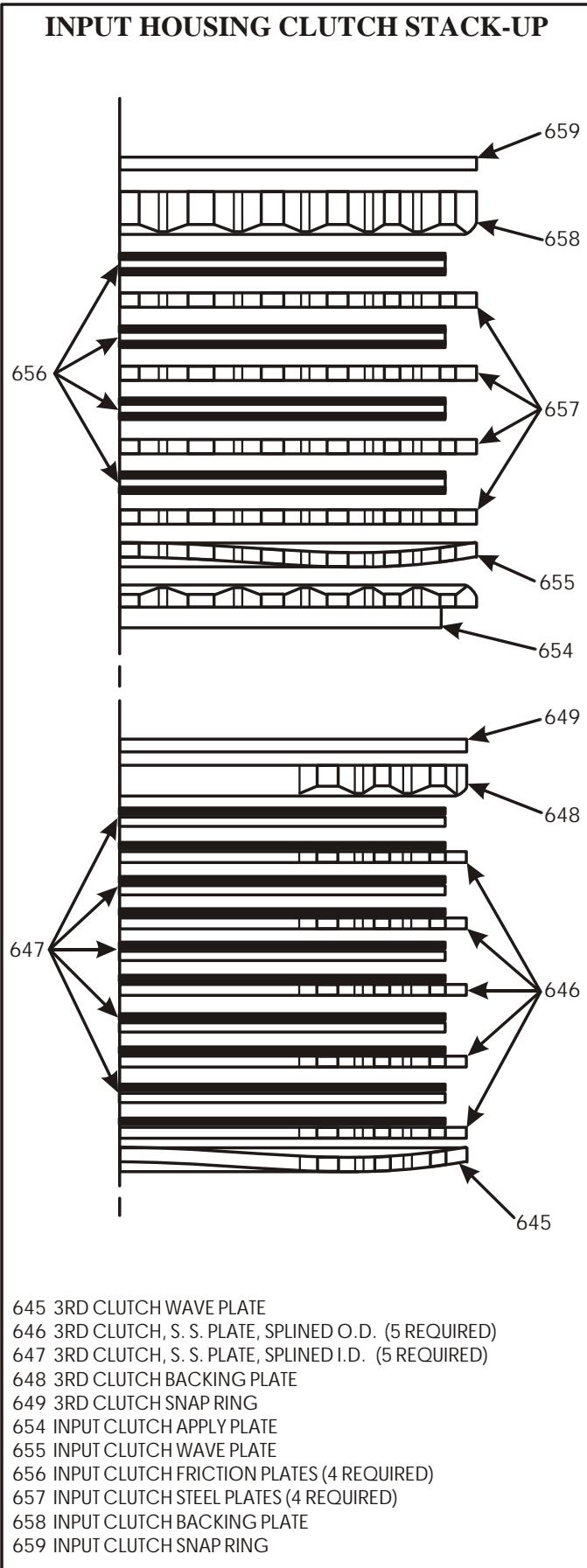
**Continued on next Page.**

Figure 115

**Continued from Page 61.**

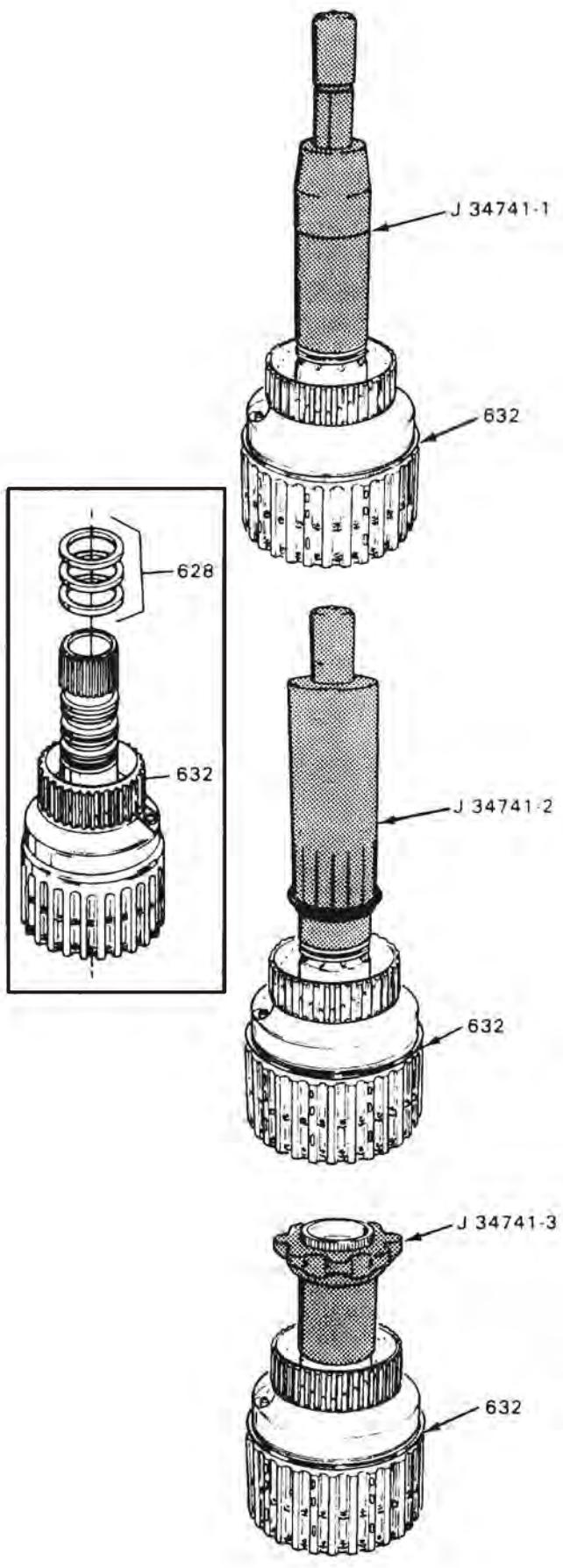


Figure 116

39. Cut the old solid Teflon seal rings with a sharp knife to remove them from the input shaft.
40. Inspect the seal grooves for nicks or burrs. Use a point file if necessary to remove small burrs.
41. Adjust the J-34741-1 tool so that the bottom of seal installer matches the bottom seal groove. Refer to Figure 116.
42. Lubricate the new solid seal ring and position it on the J-34741-1 installer.
43. Using J-34741-2 over the seal on J-34741-1, quickly push the seal into position in its groove on the input housing shaft (See Figure 116).
44. Repeat this procedure for the center seal and the top seal.
45. After all three solid seals are in place, re-size the seals with J-34741-3, gently working the re-sizing tool over the seals with a twisting motion (See Figure 116).
46. You can leave the re-sizing tool in place on the input housing until you are ready to install the input housing into the transaxle.

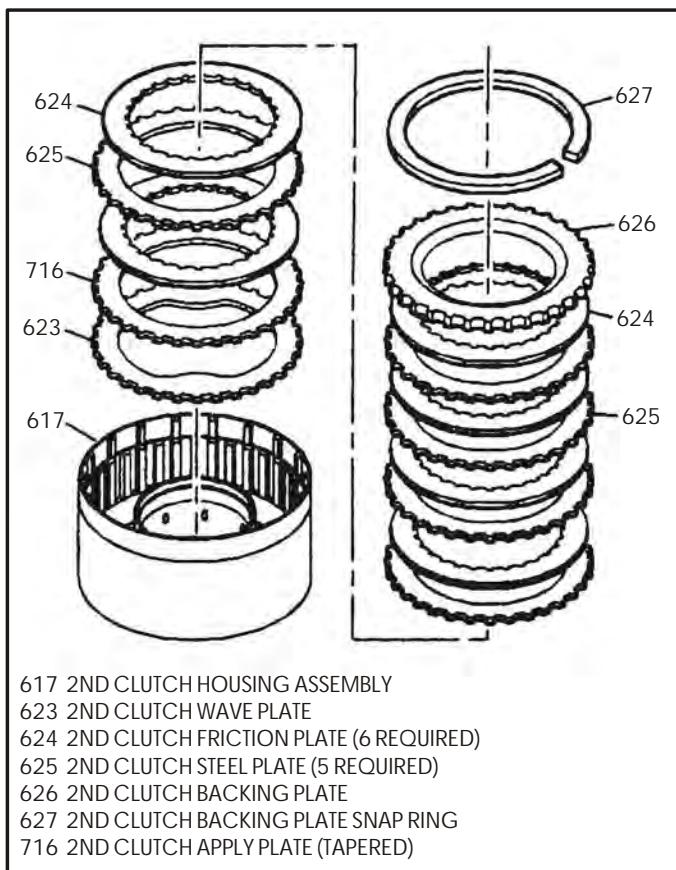


Figure 117

## 2ND CLUTCH HOUSING ASSEMBLY

1. Remove the snap ring from the top of the 2nd clutch housing, and remove the entire clutch pack, as shown in Figure 117.
2. Remove the snap ring from the top of the 2nd clutch return spring assembly, using a small screwdriver, and remove the return spring, as shown in Figure 118.
3. Remove the 2nd clutch molded piston (620), as shown in Figure 118.
4. Inspect all parts that are to be re-used for any wear and/or damage.
5. Replace molded 2nd clutch piston as necessary.
6. If replacement of the 2nd clutch housing ball capsule is necessary, remove it and replace it using a drift punch, as shown in Figures 119 and 120.

**Note:** *If the ball capsule is not leaking do not remove it from the housing.*

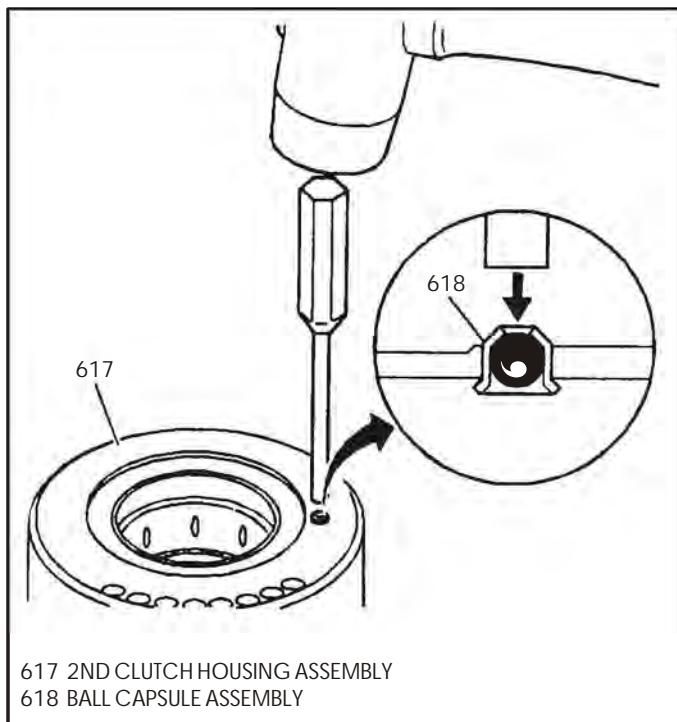


Figure 119

Continued on next Page.

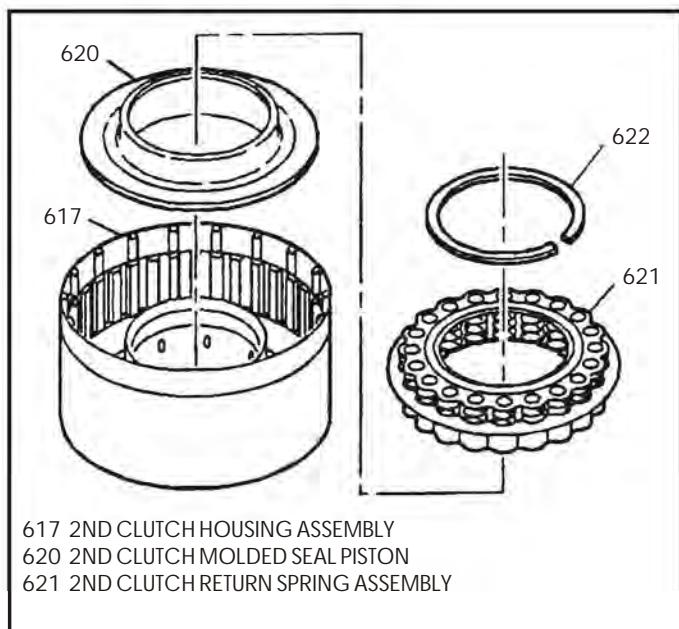


Figure 118

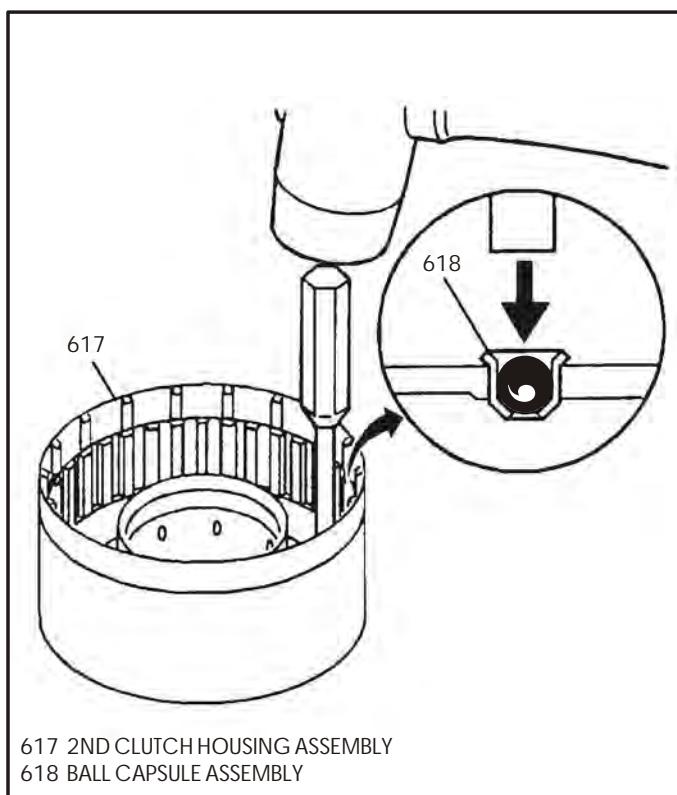


Figure 120

# Technical Service Information

**Continued from Page 63.**

7. Lubricate and install the molded 2nd clutch piston into the housing using the installation tools shown in Figure 121, if necessary.
8. Install the 2nd clutch return spring assembly into the housing in the direction shown in Figure 122.

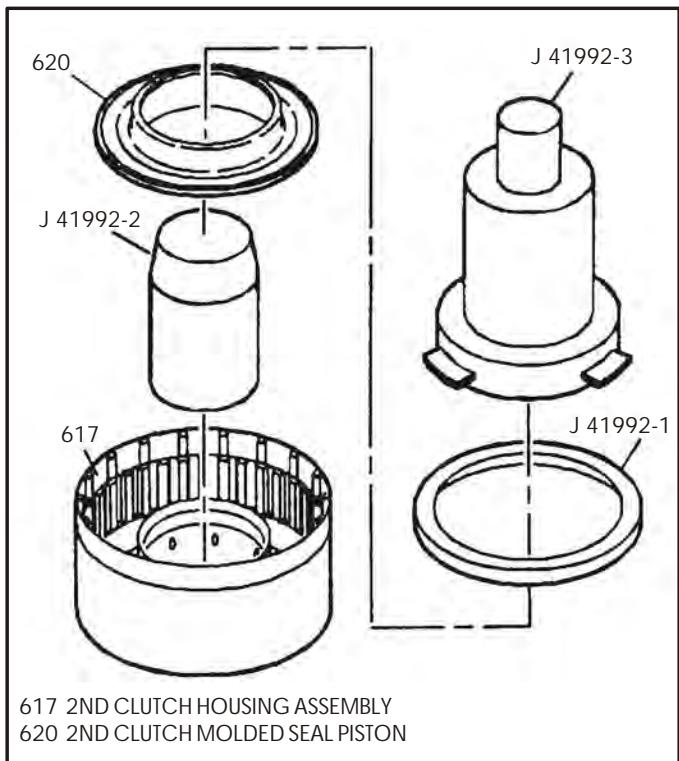


Figure 121

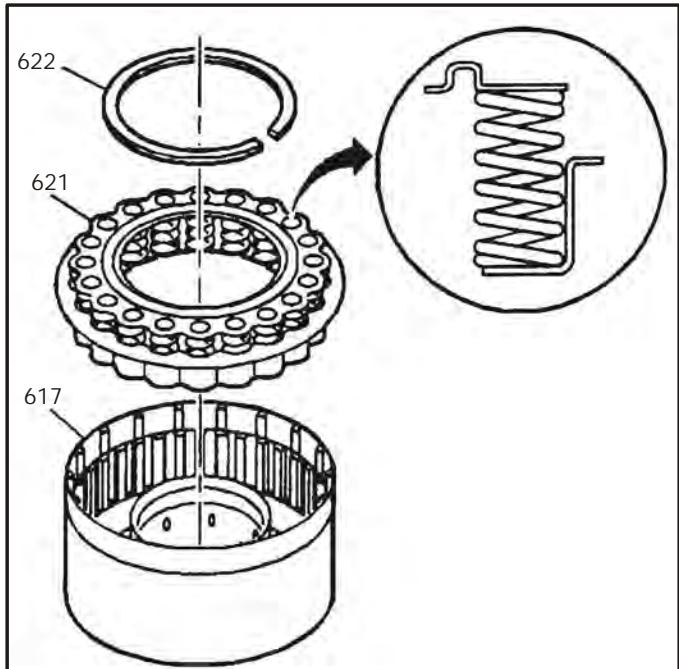


Figure 122

9. Install the 2nd clutch return spring snap ring ensuring that it is seated in the groove.
10. Install the 2nd clutch wave plate (623) into the 2nd clutch housing. Use Figure 123 as your reference for the proper stack-up.
11. Install the 2nd clutch apply plate into the drum with the marking "DN" or "DOWN" toward the piston (See Figure 123).
12. Install the 2nd clutch plates beginning with a friction plate and alternating with steel plates until you have installed 6 friction plates and 5 steel plates. Refer to Figure 123.
13. Install the 2nd clutch backing plate into the 2nd clutch housing.
14. Install the 2nd clutch backing plate snap ring into the housing (See Figure 123).
15. Set the completed 2nd clutch housing aside for final assembly.

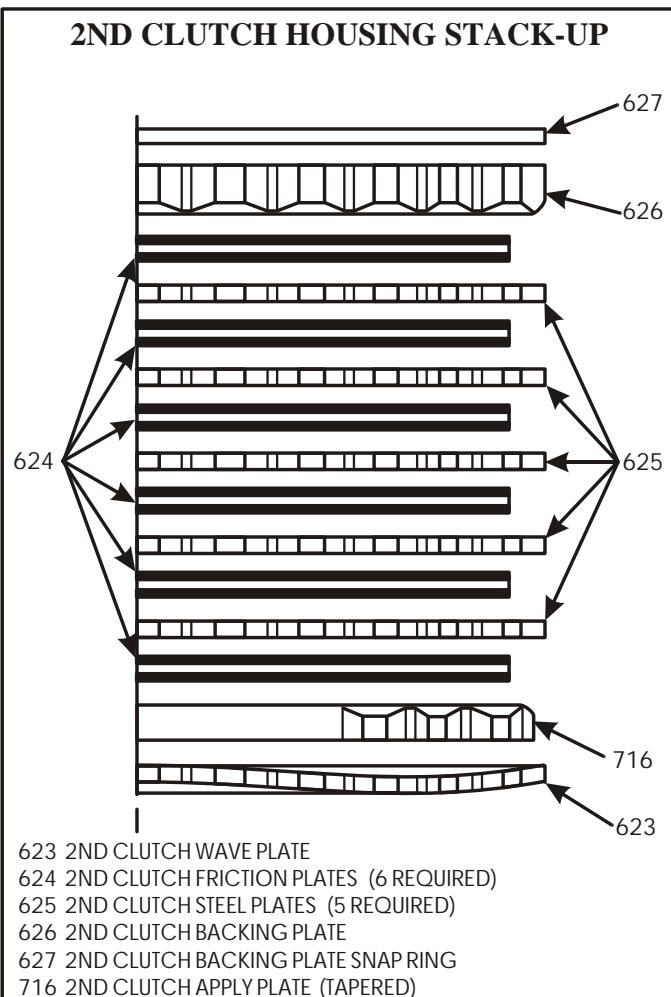


Figure 123

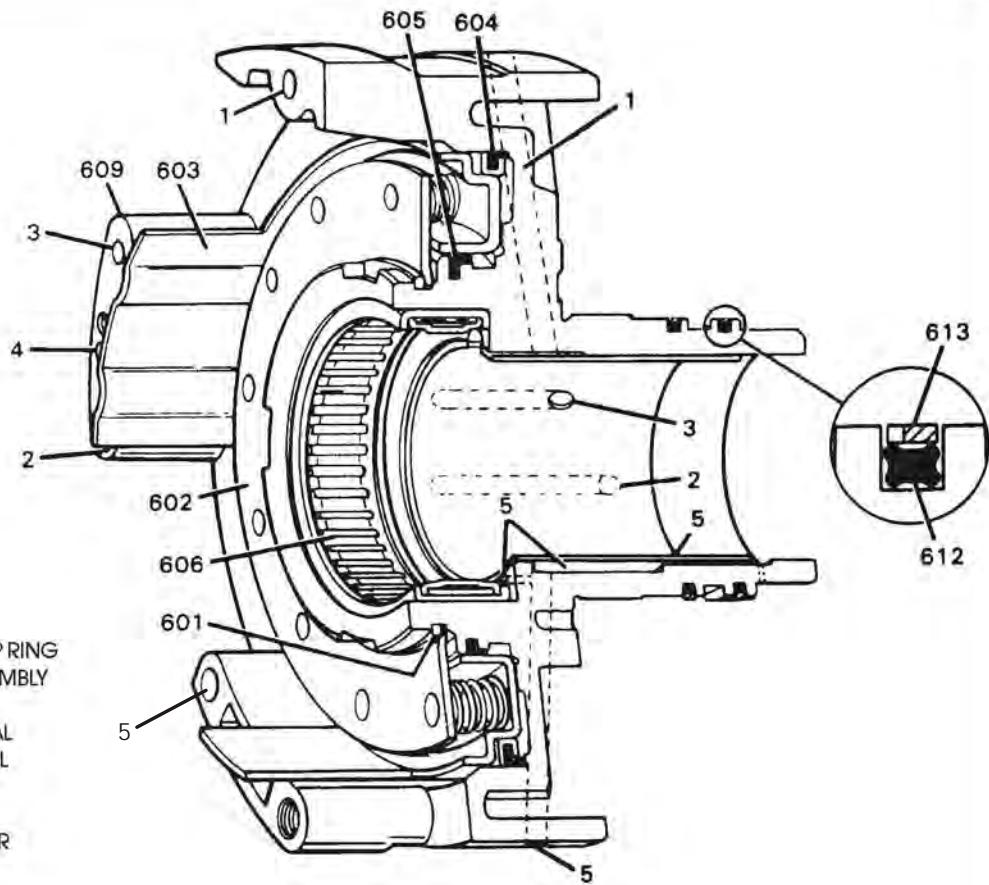


Figure 124

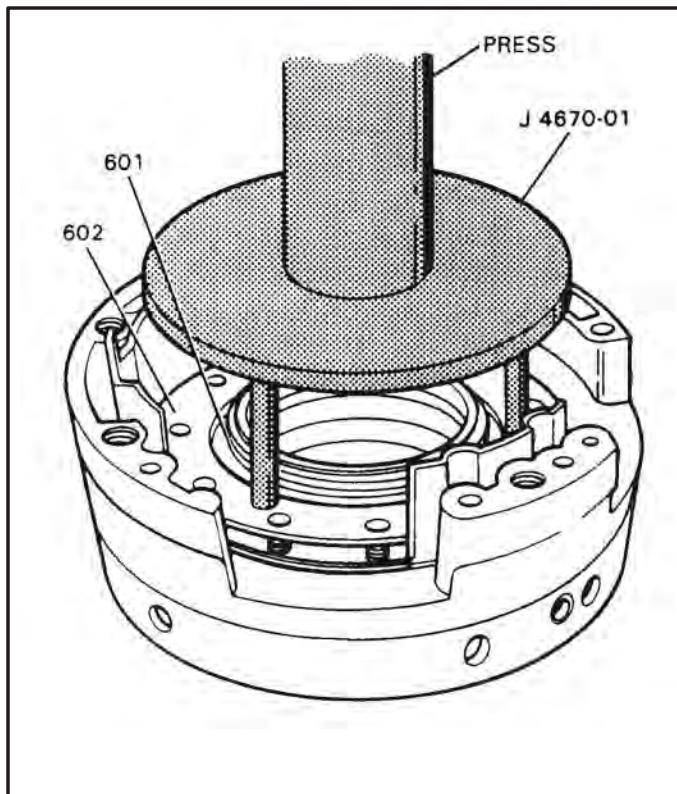


Figure 125

**DRIVEN SPROCKET SUPPORT ASSEMBLY**

1. Compress the 4th clutch return spring assembly as shown in Figure 125, remove the snap ring.
2. Remove the 4th clutch return spring assembly and the 4th clutch piston.
3. Remove and discard the outer seal from the 4th clutch piston.
4. Remove and discard the 4th clutch piston inner lip seal from the driven sprocket support.
5. Remove and discard the 2nd clutch seal rings and the 4 lobe rubber expanders below them. Refer to Figure 124.
6. Install new 4 lobe seals into the grooves on the driven sprocket support, using care so as not to twist the 4 lobe seals during the installation, as shown in Figure 124.
7. Install the 2nd clutch "Peak" seal rings into the grooves ensuring that the tabs are engaged into the slots in the support (See Figure 124).

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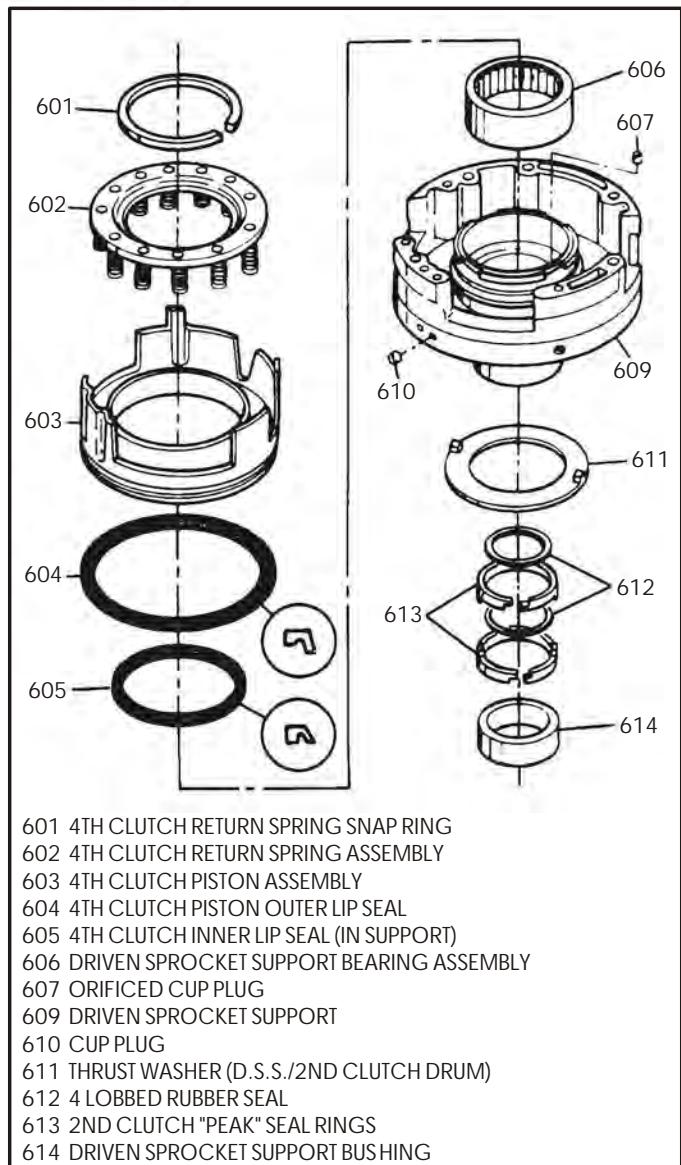


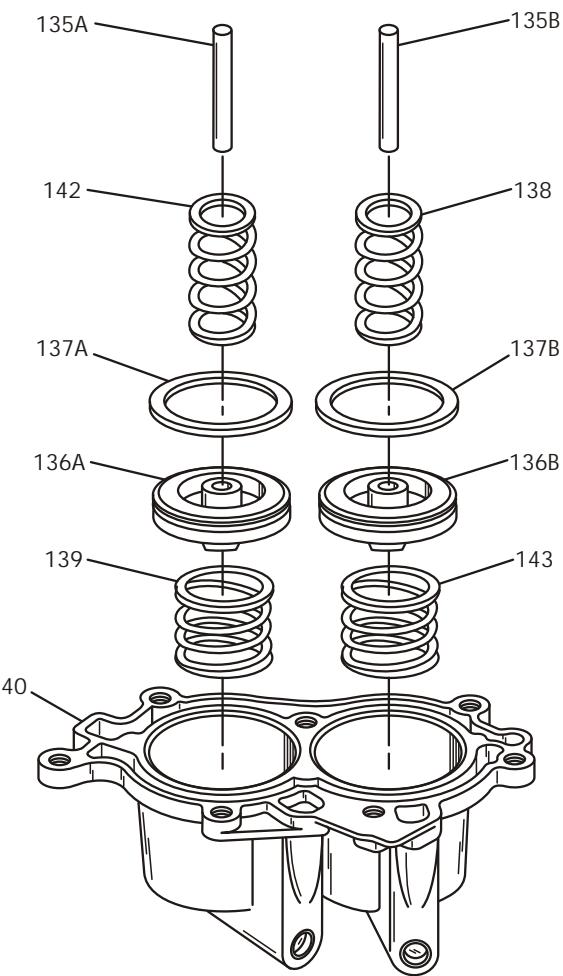
Figure 126

Continued from Page 65.

8. Install new inner lip seal onto the support and lubricate with petrolatum (See Figure 126).
9. Install new outer lip seal onto the 4th clutch piston and lubricate with petrolatum. Refer to Figure 126.
10. Install 4th clutch piston into the driven sprocket support until it fully seats (See Figure 126).
11. Install the 4th clutch return spring assembly in driven sprocket support (See Figure 126).
12. Compress the return spring and install the snap ring, as shown in Figure 125.
13. Set the completed driven sprocket support aside for final assembly.

**ACCUMULATOR HOUSING ASSEMBLY**

1. Inspect all accumulator parts shown in Figures 127, 128 and 129, for any wear or damage.
2. Install new accumulator seals onto the 1-2 and 2-3 accumulator pistons, and lubricate seals with light coat of petrolatum (See Figure 127).
3. Install the lower accumulator springs into the accumulator housing, as shown in Figure 127.  
*Note: Accumulator springs & colors are model dependent & should be noted on disassembly.*
4. Install both 1-2 and 2-3 accumulator pistons in the accumulator housing with the tabs facing down, as shown in Figure 127.
5. Install both accumulator piston pins through the pistons into the housing, shown in Figure 127.
6. Install the upper accumulator springs into the housing on top of the pistons (See Figure 127).  
*Note: Accumulator springs & colors are model dependent & should be noted on disassembly.*
7. Install the accumulator spacer plate and gasket assembly onto the accumulator housing, shown in Figure 128.
8. Install the accumulator housing cover onto the accumulator housing and install seven bolts, as shown in Figure 128.
9. Torque the seven accumulator housing bolts to 11 N.m or 97 in.lb.
10. Install the final drive lube pipe assembly and the servo apply pipes into the accumulator and 2-1 manual servo cover, shown in Figure 129.  
*Note: Install the pipes exactly as shown, as they can be installed wrong.*
11. Set the completed accumulator assembly aside for the final assembly process.



- 135A 1-2 ACCUMULATOR PISTON PIN
- 135B 2-3 ACCUMULATOR PISTON PIN
- 136A 1-2 ACCUMULATOR PISTON
- 136B 2-3 ACCUMULATOR PISTON
- 137A 1-2 ACCUMULATOR PISTON SEAL
- 137B 2-3 ACCUMULATOR PISTON SEAL
- 138 2-3 ACCUMULATOR UPPER SPRING
- 139 1-2 ACCUMULATOR LOWER SPRING
- 140 ACCUMULATOR HOUSING ASSEMBLY
- 142 1-2 ACCUMULATOR UPPER SPRING
- 143 2-3 ACCUMULATOR LOWER SPRING

Figure 127

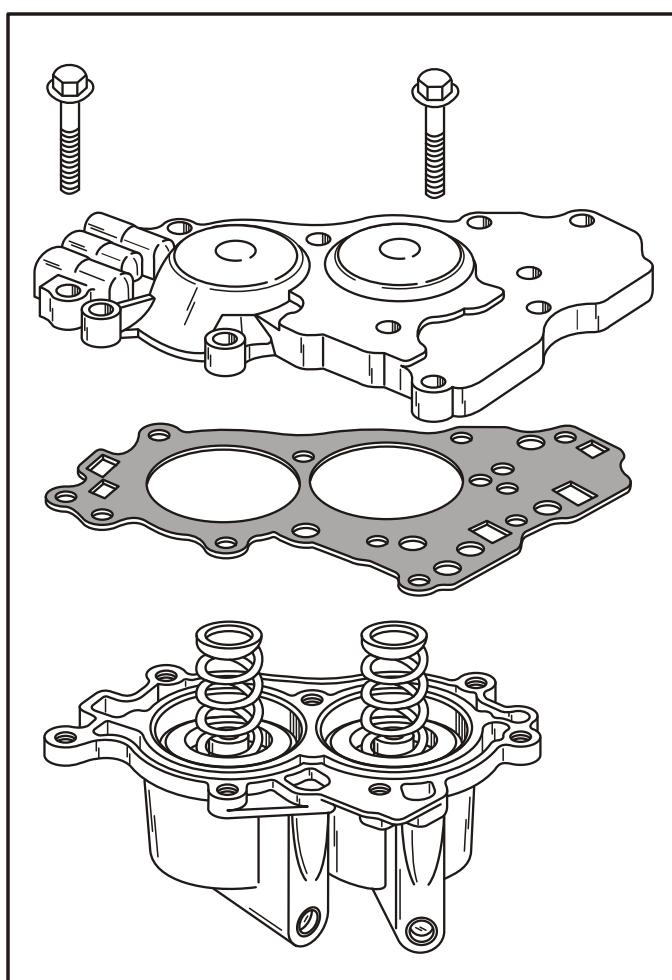


Figure 128

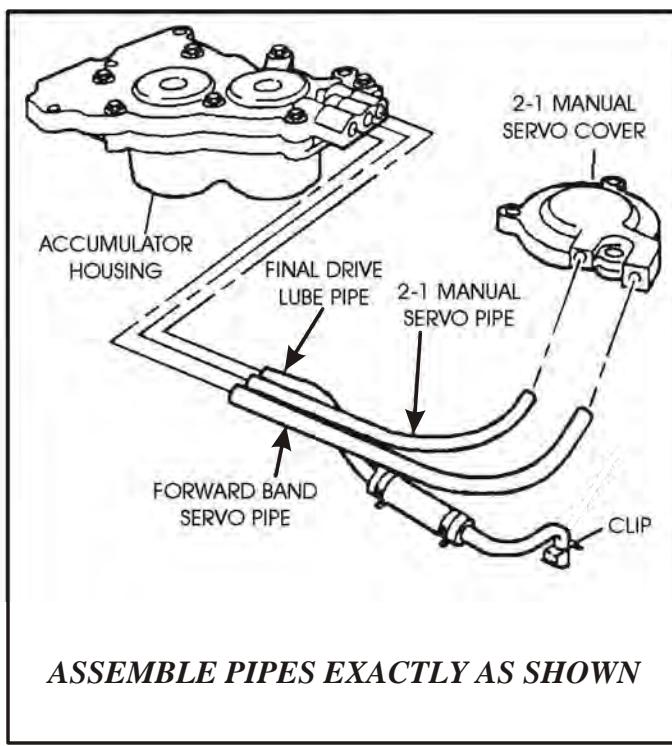


Figure 129

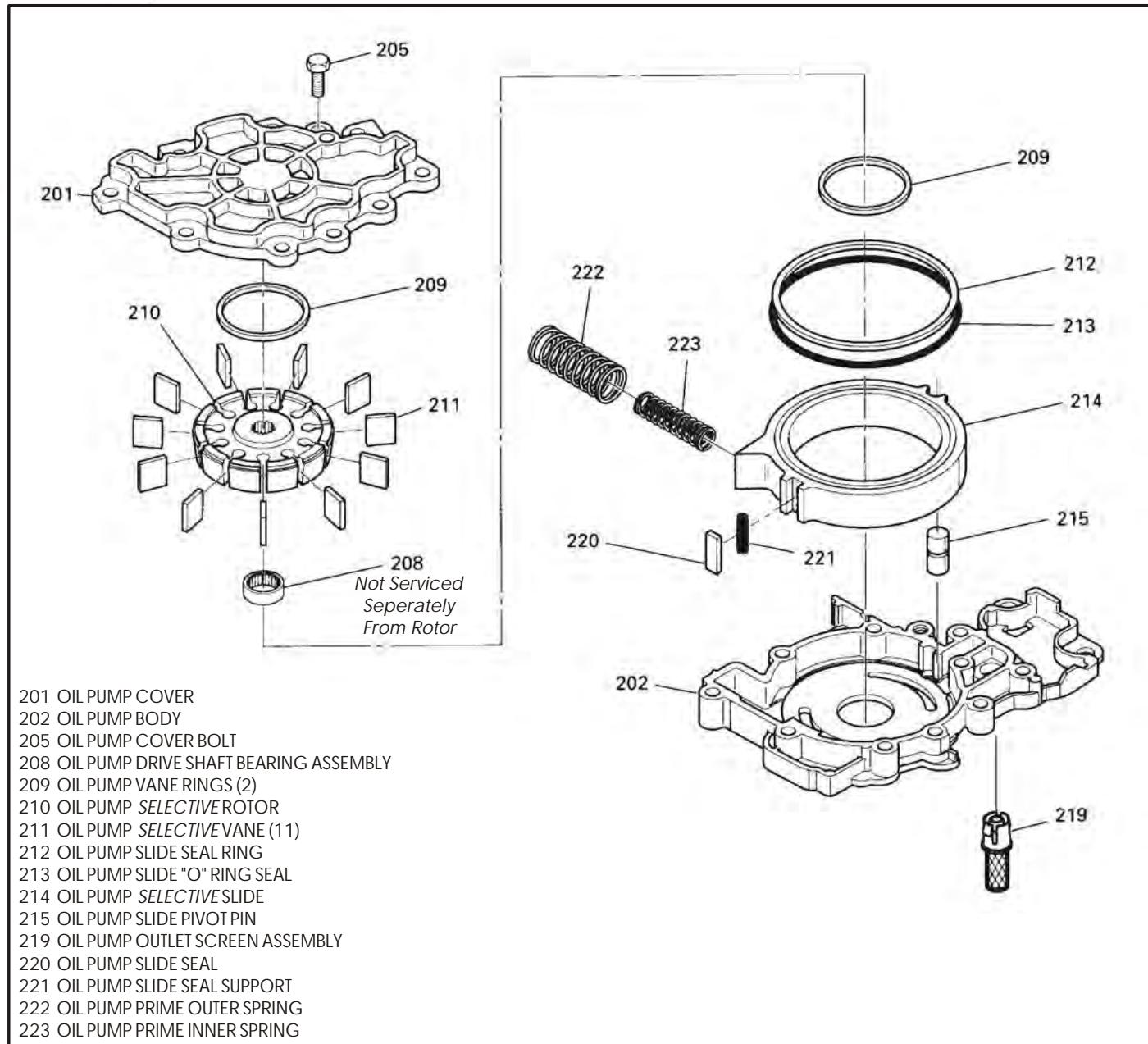


Figure 130

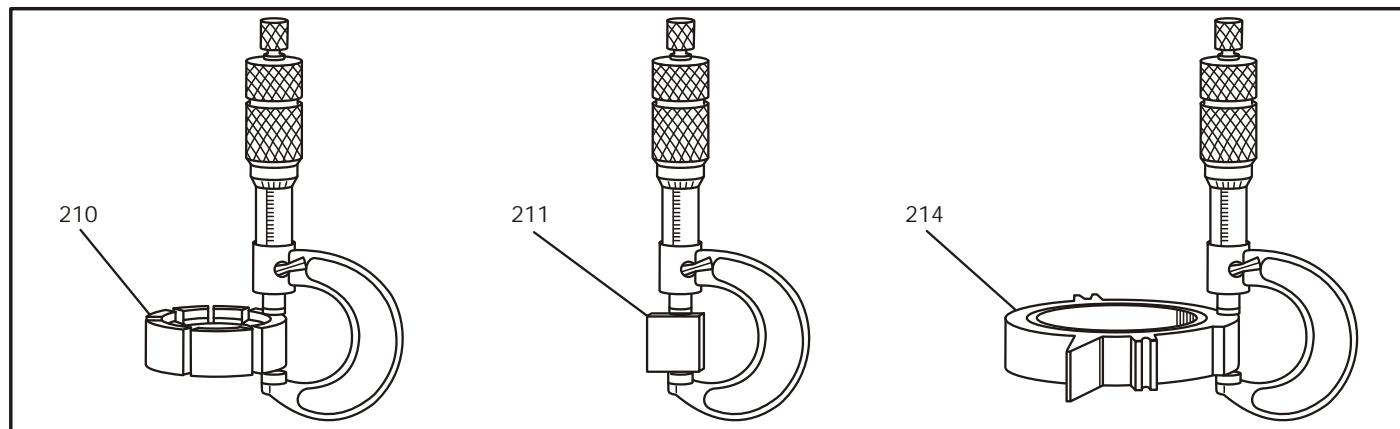


Figure 131



# Technical Service Information

## OIL PUMP ASSEMBLY

1. Inspect all oil pump components for any wear or damage. Use Figure 130 as a reference.
2. If replacement of the rotor, vanes or the slide becomes necessary, measure an undamaged section, as shown in Figure 131.
3. Select the proper replacement size component using the chart in Figure 132.
4. Install the pivot pin and the pump slide into the pump body. Refer to Figure 130.
5. Pull the slide towards pivot pin and install the slide seal and back-up seal.
6. Install the inner and outer slide springs.
7. Install one vane ring into the pump pocket.
8. Install the proper **tapered** rotor into the pump pocket with small diameter facing down, as shown in Figure 130.
9. Install 11 vanes into the rotor, ensuring that the vanes are flush with the top of rotor.
10. Install the second vane ring onto rotor inside of the vanes (See Figure 130).

11. Install the "O" ring seal and slide seal into the groove in the pump slide (See Figure 130).
12. Install the pump cover and retaining bolt, as shown in Figure 130, and torque the bolt to 8 N.m (70 in.lb.).
13. Ensure that the rotor will still turn freely.
14. Install the pump screen (219) into the pump body and set the completed oil pump assembly aside for the final assembly process.

The Oil Pump Assembly has a selective rotor, vanes and slide components. These components are chosen based on pump body dimensions. Oil pump body, rotor, vane and slide components are available in four different size classifications, with the following tolerances:

<b>Tapered Rotor Selection</b>	
Thickness (mm)	Thickness (in)
17.953-17.963	0.7068-0.7072
17.963-17.973	0.7072-0.7076
17.973-17.983	0.7076-0.7080
17.983-17.993	0.7080-0.7084

<b>Slide Selection</b>	
Thickness (mm)	Thickness (in)
17.957-17.967	0.7070-0.7074
17.967-17.977	0.7074-0.7078
17.977-17.987	0.7078-0.7081
17.987-17.997	0.7081-0.7085

<b>Oil Pump Body Depth</b>	
Thickness (mm)	Thickness (in)
18.000-18.010	0.7087-0.7091
18.010-18.020	0.7091-0.7094
18.020-18.030	0.7094-0.7098
18.030-18.040	0.7098-0.7102

<b>Vane Selection</b>	
Thickness (mm)	Thickness (in)
17.943-17.961	0.7064-0.7071
17.961-17.979	0.7071-0.7078

Rotor, vanes and slide **must** be chosen in the same size classification to match the oil pump body. Allowable rotor, vane and slide end play to the oil pump body are as follows:

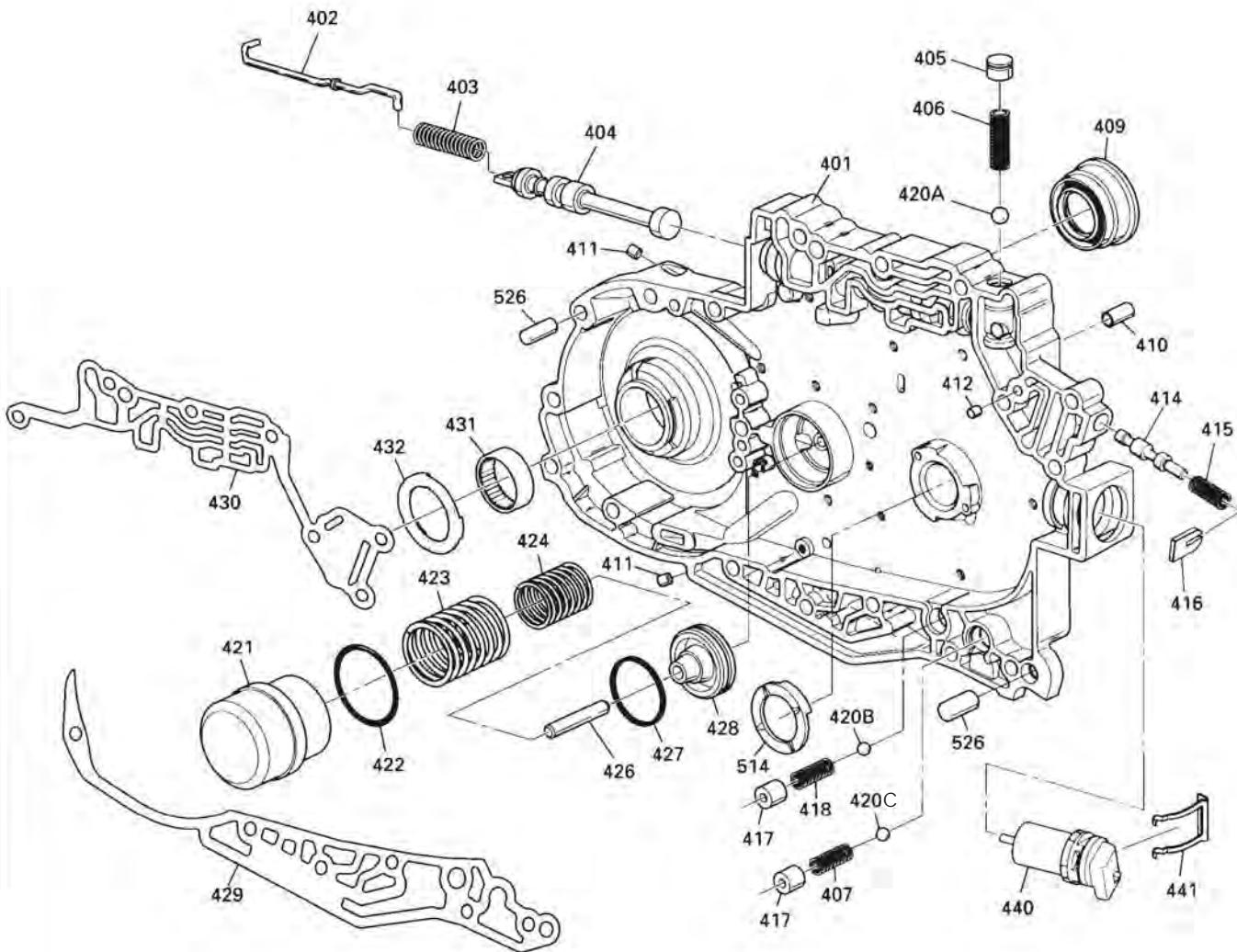
## SPECIFICATIONS

**Slide To Oil Pump Body End Play**  
**0.033mm-0.076mm (0.0013"-0.0030")**

**Rotor And Vane To Oil Pump Body End Play**  
**0.050mm-0.083mm (0.0020"-0.0033")**

Figure 132

## CASE COVER ASSEMBLY



401 CASE COVER ASSEMBLY  
 402 MANUAL VALVE LINK  
 403 MANUAL VALVE LINK RETAINER  
 404 MANUAL VALVE  
 405 LOW BLOW OFF BALL VALVE BORE PLUG  
 406 LOW BLOW OFF BALL VALVE SPRING  
 407 COOLER CHECKBALL VALVE SPRING  
 409 LEFT SIDE AXLE SEAL  
 410 VALVE BODY ALIGNMENT SLEEVE  
 411 BORE PLUG  
 412 ORIFICED CUP PLUG  
 414 ACTUATOR FEED LIMIT VALVE  
 415 ACTUATOR FEED LIMIT VALVE SPRING  
 416 ACTUATOR FEED LIMIT VALVE SPRING RETAINER  
 417 BALL VALVE RETAINER PLUG  
 418 TCC BLOW OFF BALL VALVE SPRING  
 420A LOW BLOW OFF BALL VALVE  
 420B TCC BLOW OFF BALL VALVE

421 3-4 ACCUMULATOR PISTON CYLINDER  
 422 3-4 ACCUMULATOR PISTON CYLINDER "O" RING SEAL  
 423 3-4 ACCUMULATOR PISTON OUTER SPRING  
 424 3-4 ACCUMULATOR PISTON INNER SPRING  
 426 3-4 ACCUMULATOR PISTON PIN  
 427 3-4 ACCUMULATOR PISTON SEAL RING  
 428 3-4 ACCUMULATOR PISTON  
 429 CASE COVER LOWER GASKET  
 430 CASE COVER UPPER GASKET  
 431 BEARING ASSEMBLY  
 432 FOURTH CLUTCH SHAFT THRUST WASHER  
 440 INPUT SPEED SENSOR ASSEMBLY  
 441 INPUT SPEED SENSOR RETAINER CLIP  
 514 DRIVE SPROCKET/CASE COVER THRUST WASHER  
 526 CASE COVER LOCATING DOWEL PIN (2)

Figure 133

## CASE COVER ASSEMBLY

1. Inspect all component parts and the case cover for any wear or damage. Use Figure 133 as a reference.
2. If replacement of case cover bearing becomes necessary, refer to Figures 134 for removal and installation of the bearing.
3. Install a new left hand axle seal into the case cover using axle seal driver J-34115, as shown in Figure 135.
4. Install a new seal onto the 3-4 accumulator piston (See Figure 133).

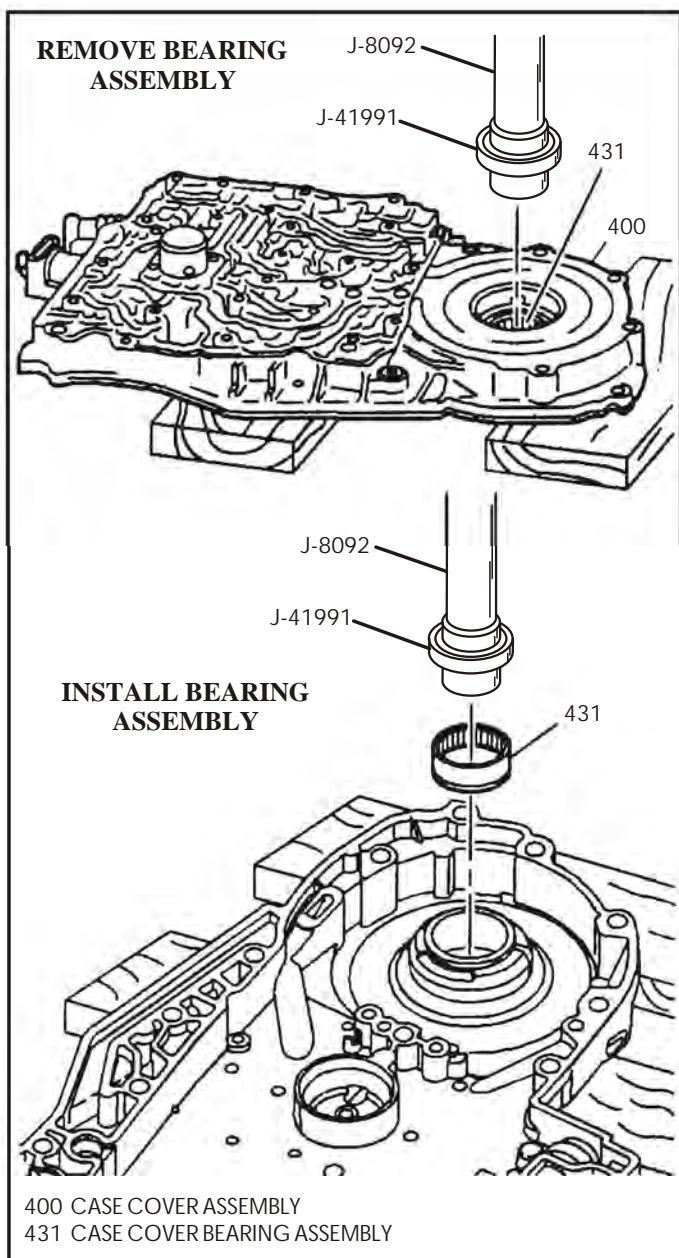


Figure 134

5. Lubricate with a light coating of petrolatum and install 3-4 accumulator piston into the case cover (See Figure 133).
6. Install a new "O" ring seal on 3-4 accumulator piston cylinder (See Figure 133).
7. Install the inner and the outer 3-4 accumulator springs into the 3-4 accumulator piston cylinder (See Figure 133).
8. Install the completed 3-4 accumulator cylinder assembly into the case cover using a twisting motion (See Figure 133).
9. Insert the 3-4 accumulator piston pin through the front of the case cover and into the piston.
10. Install thrust washer (432) onto the case cover and retain with petrolatum (See Figure 133).
11. Install thrust washer (514) onto the case cover and retain with petrolatum (See Figure 133).
12. Install the manual valve into case cover bore and set completed case cover assembly aside for the final assembly process.

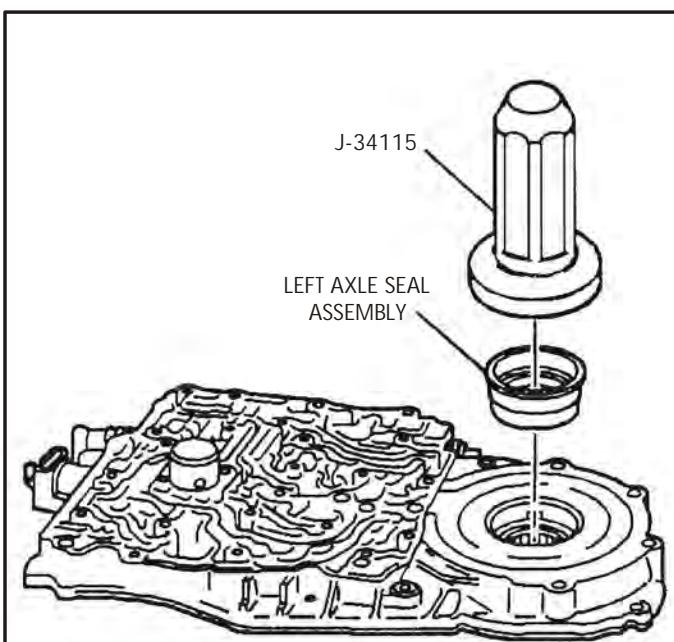


Figure 135

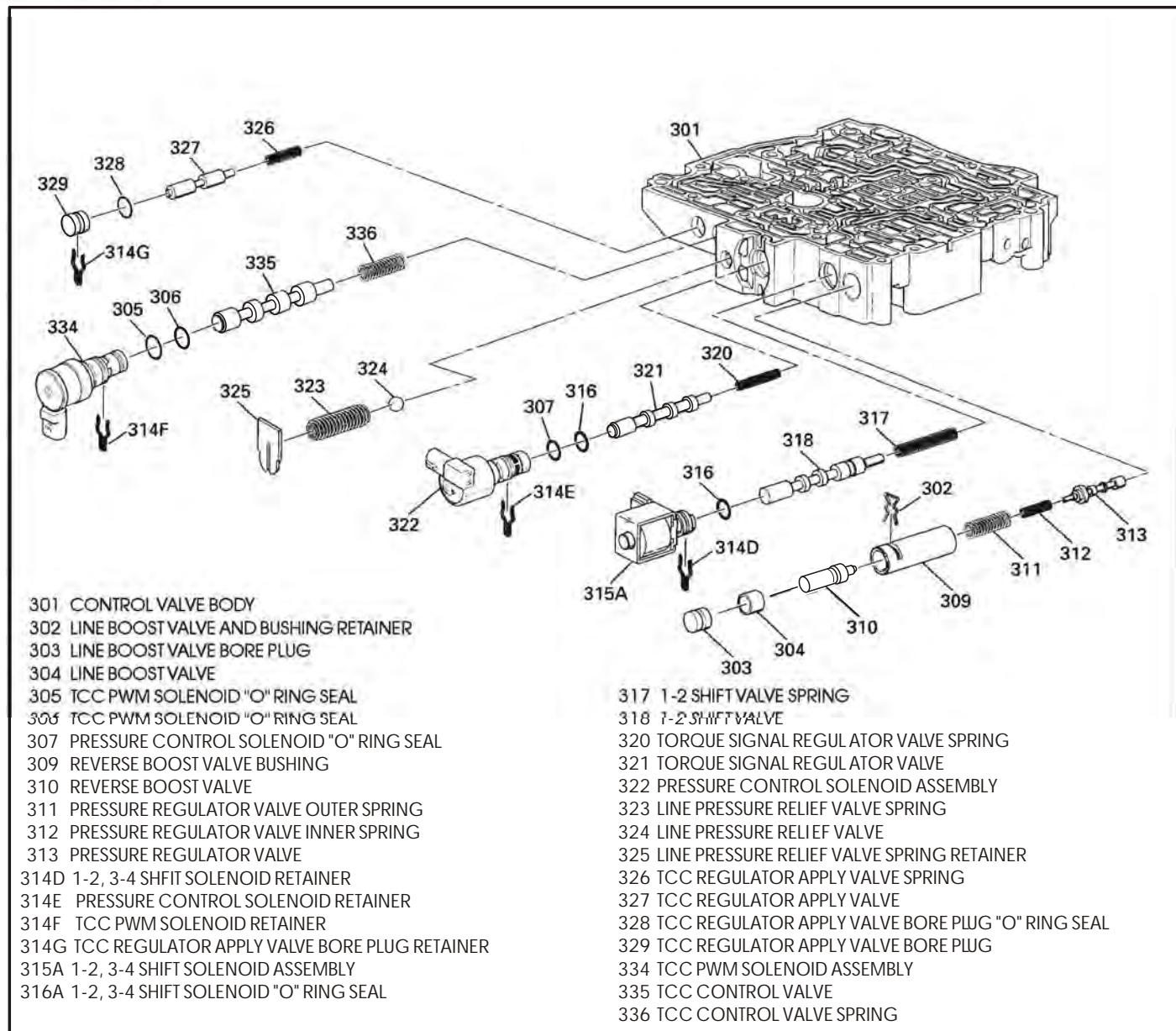
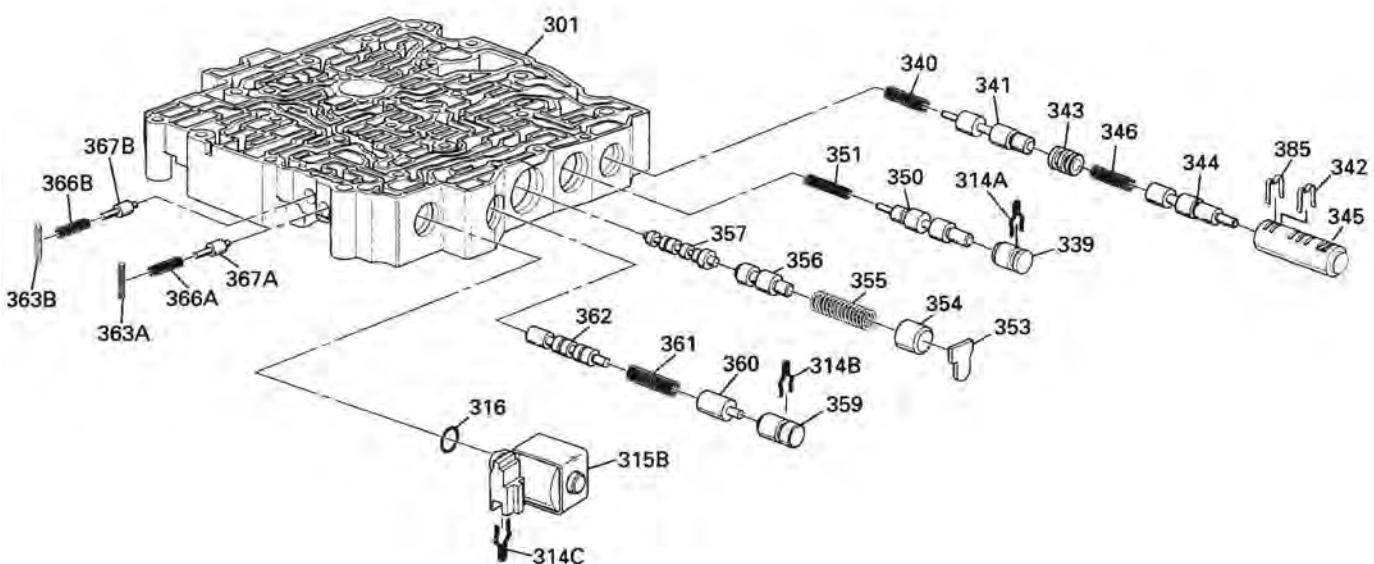


Figure 136

**VALVE BODY ASSEMBLY**

- Clean the valve body assembly in clean solvent thoroughly, and dry with compressed air.
- Note: Do Not clean the solenoids nor pressure switch assembly with the solvent.**
- Move the valves with a pick or a screwdriver to ensure any debris or dirt is dislodged.
- Position valve body on a clean and flat surface for disassembly.
- Remove valve trains, one at a time beginning in one corner of the valve body.
- Some valves are under spring pressure so cover the end of the bore when removing roll pins and/or retainers.

- Valves, springs, bushings and retainers should be laid out on a clean dry surface **exactly** the way they were removed.
- Use the illustrations in Figures 136 and 137, to reassemble the valves, springs, bushings in the proper order.
- Use extreme care when doing the valve body as some of the valves are aluminum and can be damaged very easily.
- Refer to the resistance chart on Page 6 to check all solenoids for the proper resistance values.



- 301 CONTROL VALVE BODY
- 314A 1-2, 3-4 ACCUMULATOR VALVE RETAINER
- 314B 4-3 MANUAL DOWNSHIFT VALVE RETAINER
- 314C 2-3 SHIFT SOLENOID RETAINER
- 315B 2-3 SHIFT SOLENOID ASSEMBLY
- 316 2-3 SHIFT SOLENOID "O" RING SEAL
- 339 1-2 ACCUMULATOR VALVE BORE PLUG
- 340 3-4 ACCUMULATOR VALVE SPRING
- 341 3-4 ACCUMULATOR VALVE
- 342 2-3 ACCUMULATOR VALVE BUSHING RETAINER
- 343 2-3 ACCUMULATOR VALVE BORE PLUG
- 344 2-3 ACCUMULATOR VALVE
- 345 2-3 ACCUMULATOR VALVE BUSHING
- 346 2-3 ACCUMULATOR VALVE SPRING
- 350 1-2 ACCUMULATOR VALVE
- 351 1-2 ACCUMULATOR VALVE SPRING

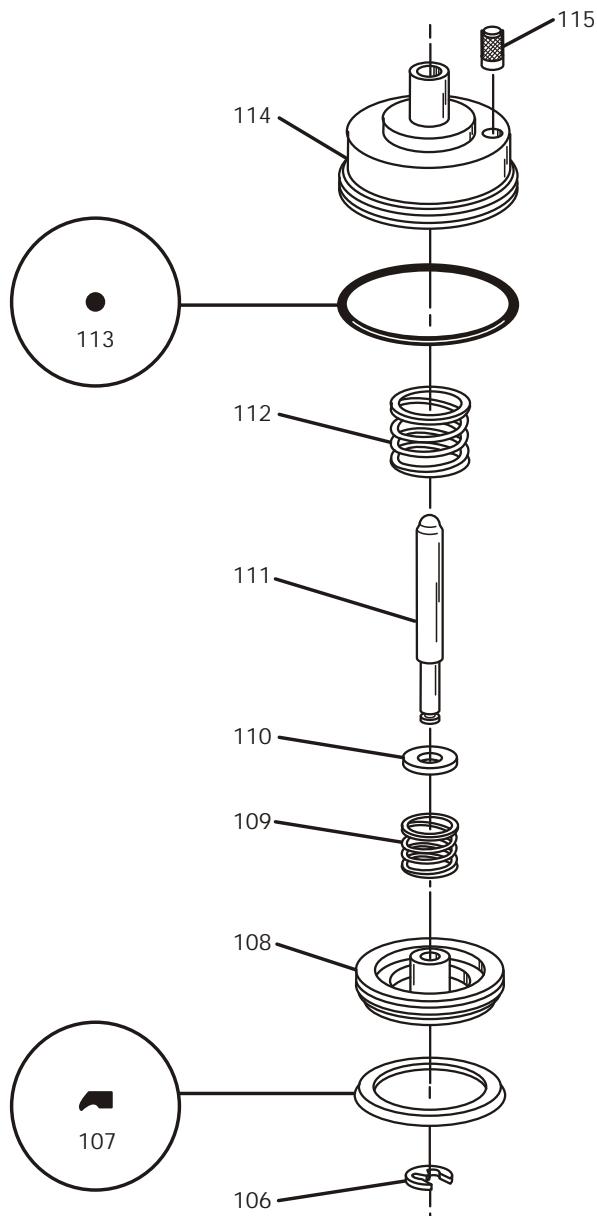
- 353 3-2 MANUAL DOWNSHIFT VALVE RETAINER
- 354 3-2 MANUAL DOWNSHIFT VALVE BORE PLUG
- 355 3-2 MANUAL DOWNSHIFT VALVE SPRING
- 356 3-2 MANUAL DOWNSHIFT VALVE
- 357 2-3 SHIFT VALVE
- 359 4-3 MANUAL DOWNSHIFT VALVE BORE PLUG
- 360 4-3 MANUAL DOWNSHIFT VALVE
- 361 4-3 MANUAL DOWNSHIFT VALVE SPRING
- 362 3-4 SHIFT VALVE
- 363A REVERSE SERVO BOOST VALVE BORE ROLL PIN
- 363B FORWARD SERVO BOOST VALVE BORE ROLL PIN
- 366A REVERSE SERVO BOOST VALVE SPRING
- 366B FORWARD SERVO BOOST VALVE SPRING
- 367A REVERSE SERVO BOOST VALVE
- 367B FORWARD SERVO BOOST VALVE
- 385 2-3 ACCUMULATOR VALVE RETAINER

Figure 137

10. Install new "O" ring seals on all solenoids as you install them into the valve body. Use light coat of petrolatum on "O" ring seals to assist in the installation.
  11. This would also be a good time to check the resistance value of both the input and output speed sensors, as they are in the same chart found on Page 6.
  12. Refer to Page 15 to check the open and closed status of the individual switches in the pressure switch assembly.
  13. After the switch has been checked, lay it with the completed valve body assembly, set both aside for the final assembly process.

## 2-1 MANUAL SERVO ASSEMBLY

1. Inspect all components of the 2-1 manual servo assembly, using Figure 138 as a reference.
2. Install the cushion spring retainer (110) and the cushion spring onto the servo apply pin. Refer to Figure 138.
3. Install new lip seal onto the 2-1 manual servo piston, with the lip facing the direction shown in Figure 138.
4. Install the piston assembly onto the servo apply pin and install the "E" clip onto the apply pin as shown in Figure 138.
5. Install new "O" ring seal (113) onto the servo housing and lubricate with a light coating of petrolatum (See Figure 138).
6. Install servo return spring (112) into the servo housing (See Figure 138).
7. Insert the 2-1 manual servo piston assembly through the return spring and into the manual servo housing (See Figure 138).
8. Install the manual servo filter (115) into servo housing, as shown in Figure 138.
9. Set the completed 2-1 manual servo assembly aside for the final assembly process.



106 RETAINING "E" CLIP  
 107 2-1 MANUAL SERVO PISTON LIP SEAL  
 108 2-1 MANUAL SERVO PISTON  
 109 2-1 MANUAL SERVO CUSHION SPRING  
 110 2-1 MANUAL SERVO CUSHION SPRING RETAINER  
 111 2-1 MANUAL SERVO PISTON APPLY PIN  
 112 2-1 MANUAL SERVO RETURN SPRING  
 113 2-1 MANUAL SERVO HOUSING "O" RING  
 114 2-1 MANUAL SERVO HOUSING  
 115 2-1 MANUAL SERVO FILTER

Figure 138

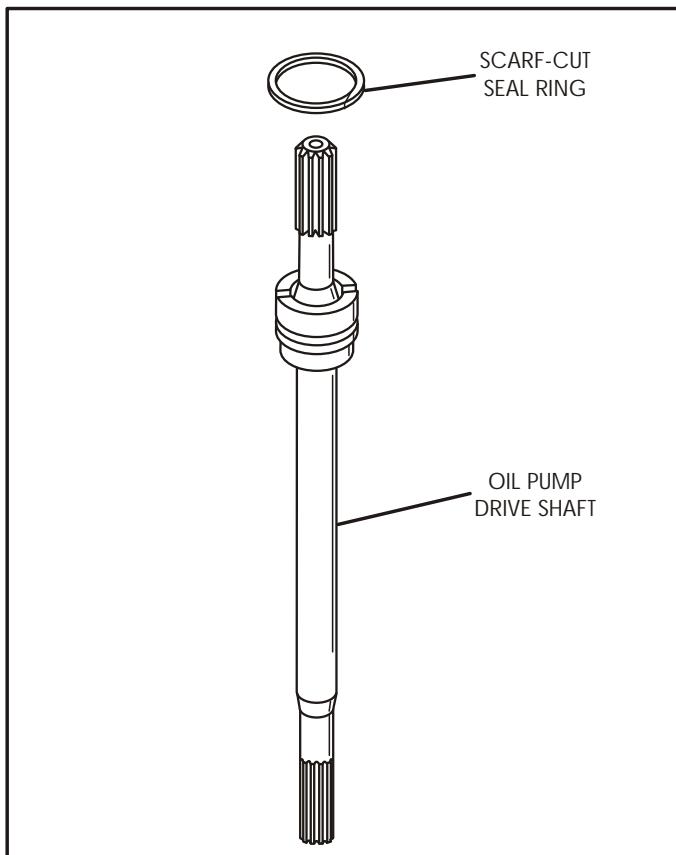


Figure 139

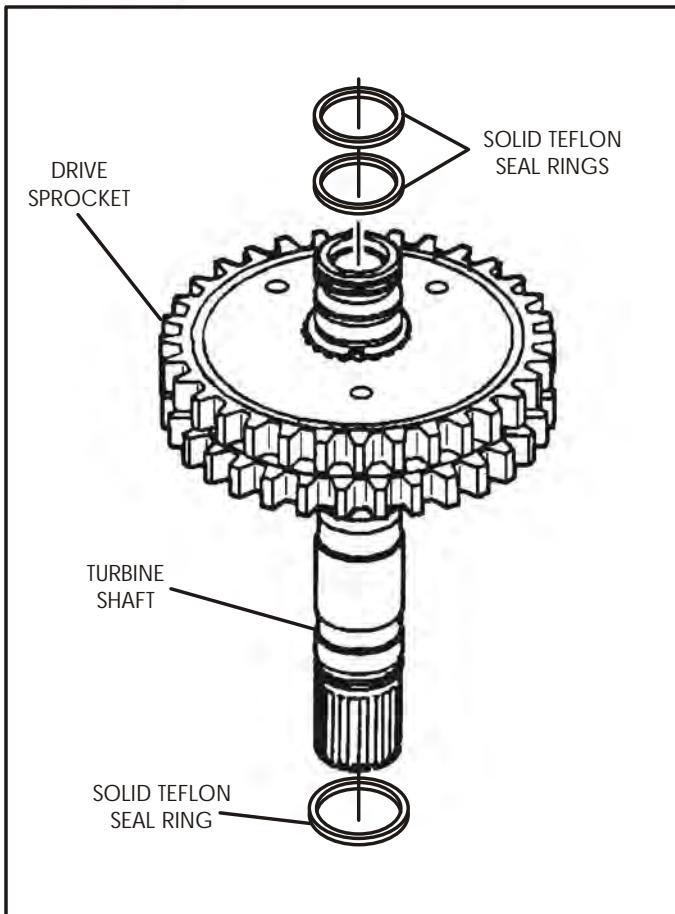


Figure 140

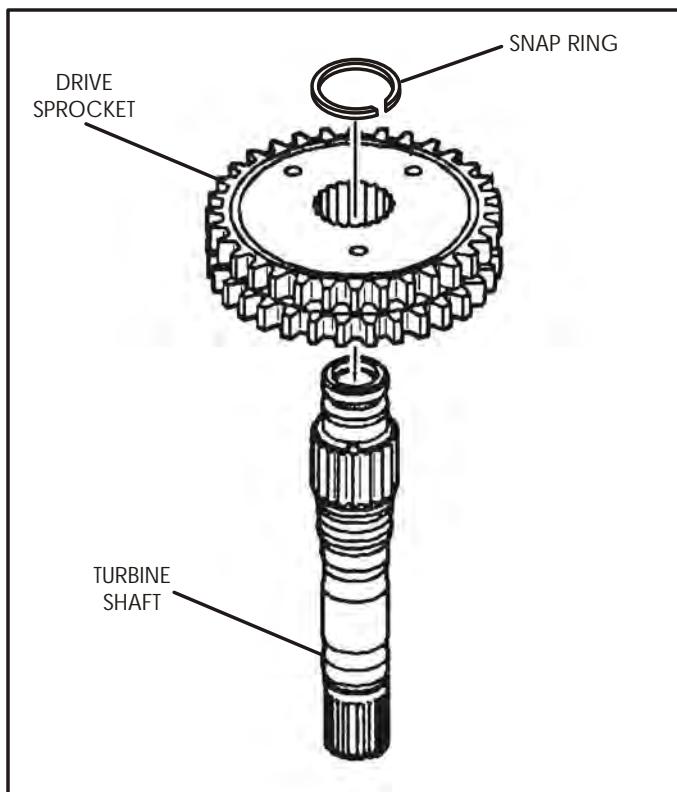


Figure 141

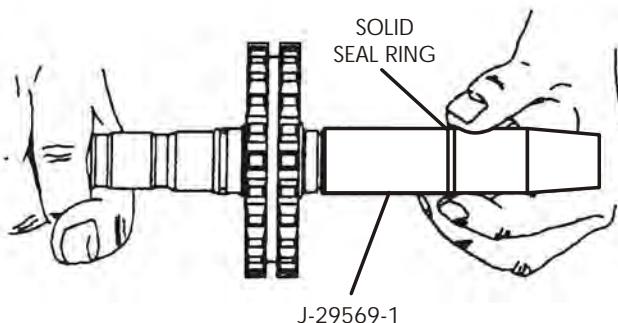
**OIL PUMP DRIVE SHAFT ASSEMBLY**

1. Inspect the oil pump drive shaft for any damage or wear, replace as necessary (See Figure 139).
2. Install new scarf-cut sealing ring into groove in the oil pump drive shaft (See Figure 139).
3. Set the oil pump drive shaft assembly aside for the final assembly process.

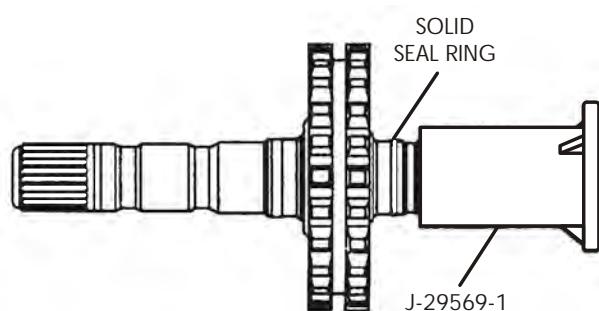
**TURBINE SHAFT, SPROCKETS AND DRIVE CHAIN ASSEMBLY**

1. Cut the three solid sealing rings from turbine shaft using a sharp knife (See Figure 140).
2. Remove snap ring retaining the drive sprocket on the turbine shaft and inspect the spline area of both turbine shaft and drive sprocket. Refer to Figure 141.
3. Install and re-size the two solid sealing rings on the case cover side of turbine shaft using the installation and re-sizing tools, as shown in Figure 142.

**Continued on next Page.**

**INSTALL SOLID SEAL RINGS**

J-29569-1

**RE-SIZE SOLID SEAL RINGS**

J-29569-1

Figure 142

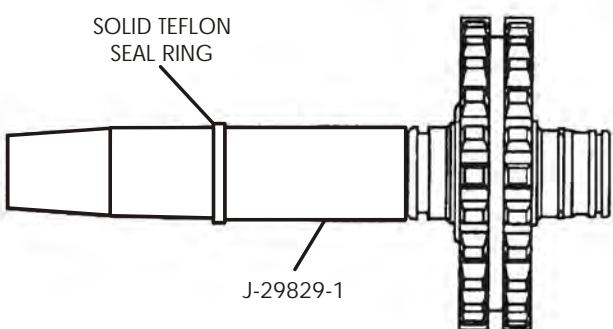
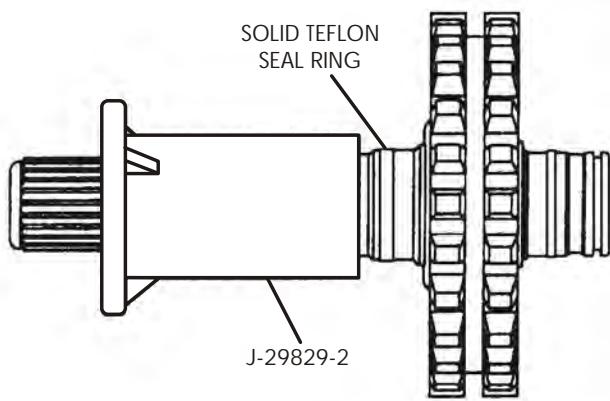
**INSTALL SOLID SEAL RING****RE-SIZE SOLID SEAL RING**

Figure 143

**Continued from Page 75.**

4. Install and re-size the solid sealing ring on the converter side of the turbine shaft, using the installation and re-sizing tools, as shown in Figure 143.
5. Inspect the driven sprocket assembly and the thrust washer for any wear or damage, replace as necessary (See Figure 144).
6. Install the driven sprocket thrust washer into the driven sprocket and retain with petrolatum (See Figure 144).
7. Install the drive sprocket thrust washer into the drive sprocket and retain with petrolatum, as shown in Figure 145.
8. Inspect the drive chain assembly for any wear or damage, replace as necessary. Refer to Figure 145.
9. Assemble the drive and driven sprockets into the drive chain assembly shown in Figure 145. Note: The drive chain must be installed in the correct direction.
10. Assemble the drive and driven sprockets into the drive chain assembly according to one of the following criteria:
  - A. If the original drive links are being installed, put both drive link assemblies with the master link (copper color) facing up or down, depends on the way it was found during dis-assembly.
  - B. If new drive chains are being installed, put both drive link assemblies with the master link (copper color) facing upward.
11. Set the completed drive chain and sprocket assembly aside for the final assembly process.

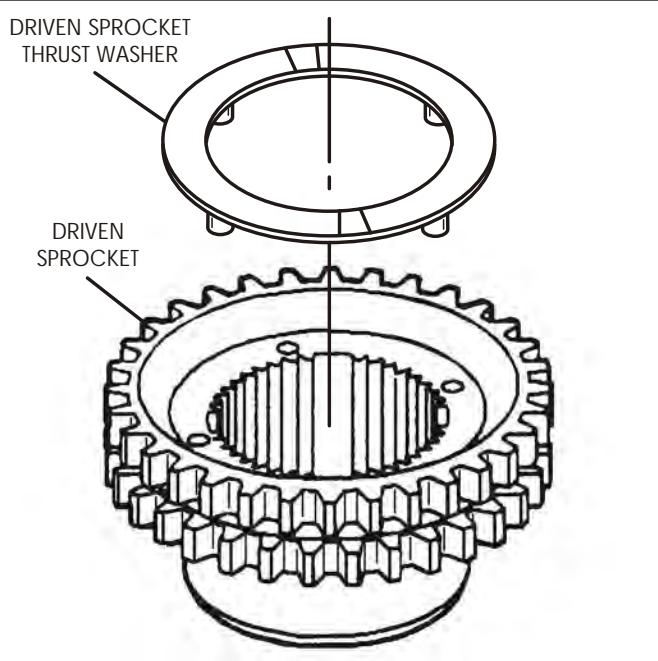


Figure 144

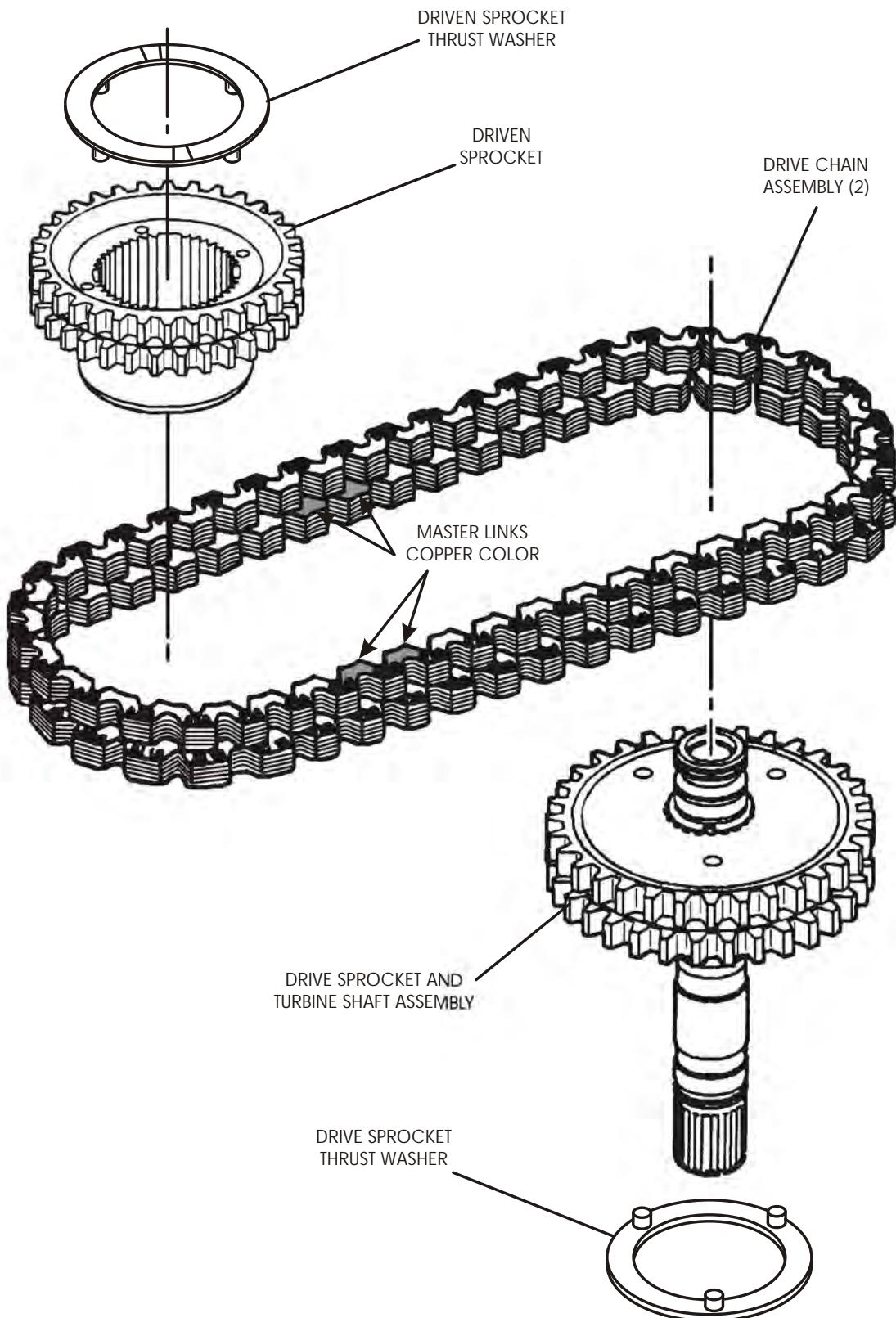


Figure 145

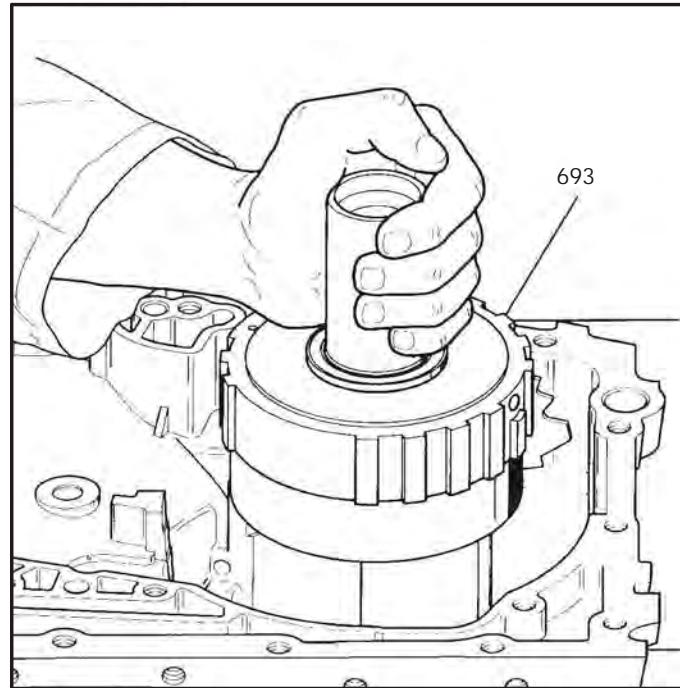


Figure 146

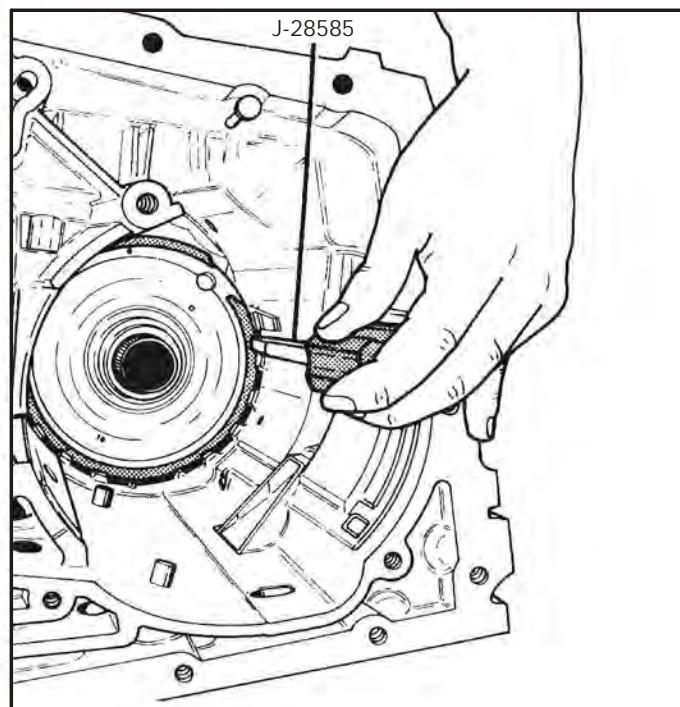


Figure 147

## TRANSAXLE ASSEMBLY

## CASE AND RELATED COMPONENTS

1. Rotate transaxle case so that case cover surface is facing up as shown in Figure 146.
  2. Install the final drive ring gear thrust washer on final drive ring gear and retain with petrolatum, as shown in Figure 146.
  3. Install the final drive ring gear into the lugs in transaxle case (See Figure 146).
  4. Install the final drive ring gear snap ring into the case groove, with the open end of the snap ring to the opening in case (See Figure 147).
  5. Rotate the transaxle to install the final drive, as shown in Figure 148.
  6. Install the park gear thrust bearing (695) onto the final drive ring gear in direction shown in Figure 148, and retain with petrolatum.
  7. Install thrust bearing (698) into the final drive carrier in direction shown in Figure 148.
- Note: Some final drive ratios, this bearing will be a trapped bearing.*
8. Install the final drive sun gear into the carrier with the step on the internal spline area facing up, as shown in Figure 148.
  9. Install the parking gear (697) on top of final drive sun gear, as shown in Figure 148.
  10. Install the final drive sun gear shaft through the park gear splines and the final drive sun gear splines (See Figure 149).
  11. Install the final drive selective thrust washer (714) onto the final drive carrier, as shown in Figure 148.
  12. Install the final drive thrust bearing (715) onto the final drive carrier in the direction shown in Figure 148.
  13. Install the completed final drive assembly into the transaxle case and engage with the final drive ring gear (See Figure 149).
  14. Install the final drive housing onto transaxle case without the "O" ring, and use only 2 bolts to retain it, as we may have to remove it again to install a different final drive selective thrust washer.
  15. Rotate transaxle so that final drive housing is pointing straight up.

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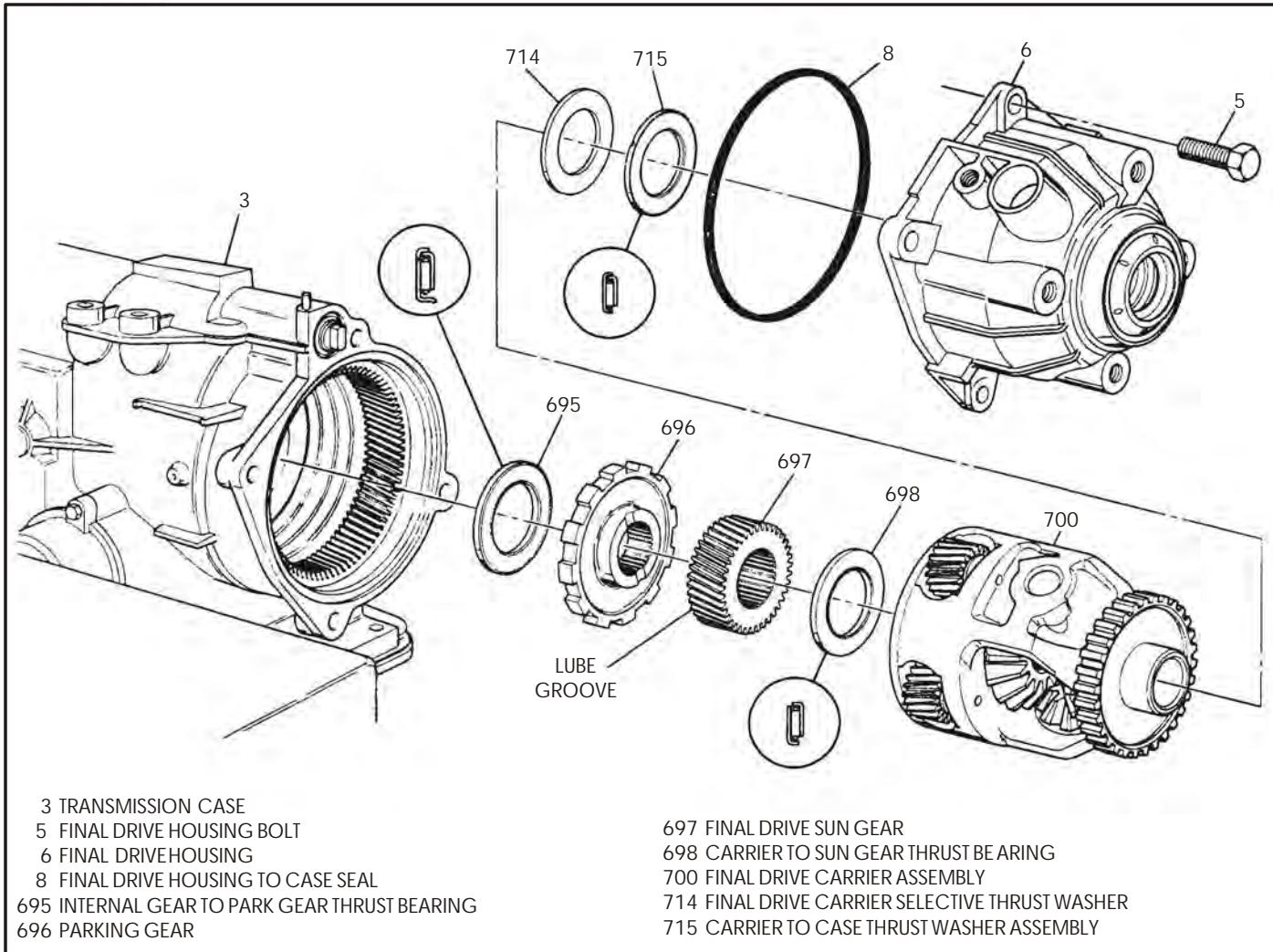


Figure 148

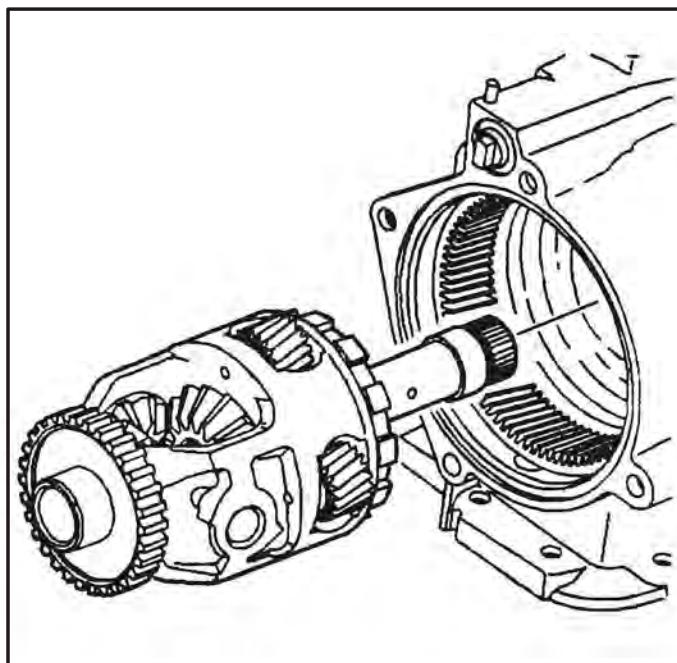


Figure 149

# Technical Service Information

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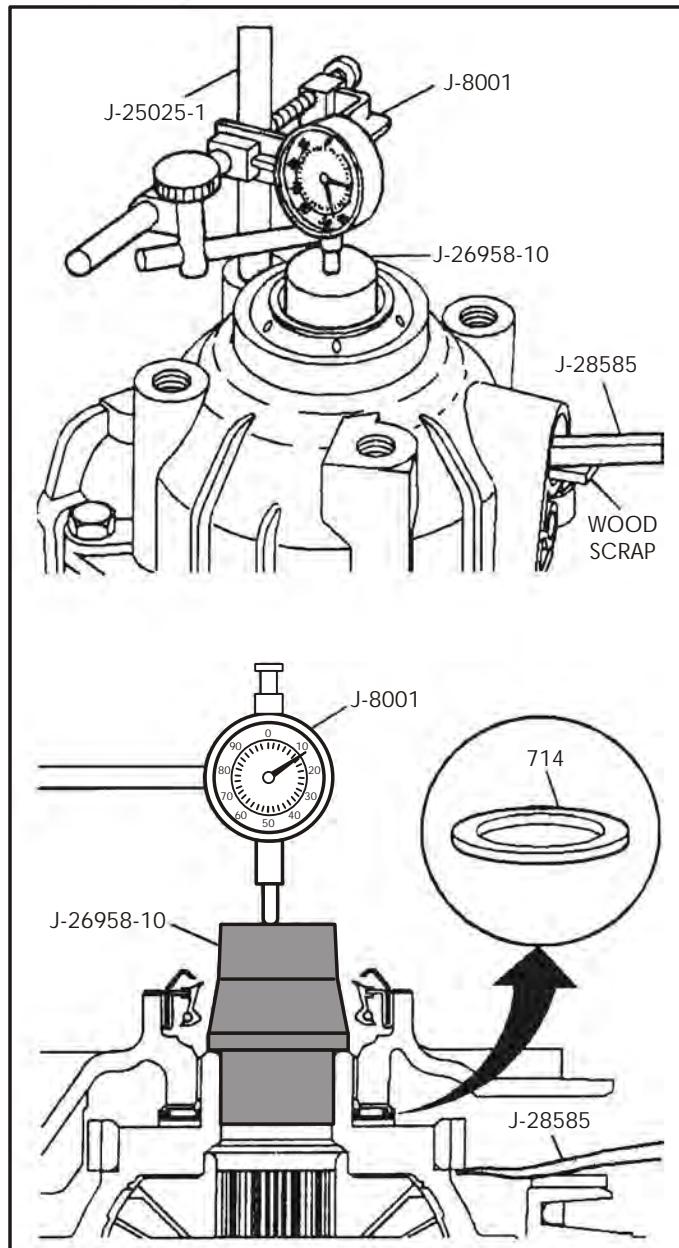


Figure 150

16. Insert tool J-26958-10 through the final drive housing axle seal, as shown in Figure 150.
17. Install dial indicator J-8001 onto transaxle and set up as shown in Figure 150.
18. Set the dial indicator to zero.
19. Use tool J-28585 or large screwdriver in order to lift the differential carrier. Pry up on vehicle speed sensor reluctor wheel through the speed sensor hole in the final drive housing, as shown in Figure 150.
20. Note the reading on the dial indicator. End play should be 0.12mm-0.62mm (.005"-.025").
21. If the dial indicator reading is less than 0.12mm (.005"), install the next smaller thrust washer, then recheck the clearance.
22. If dial indicator reading is more than 0.62mm (.025"), install the next larger thrust washer and then recheck clearance.
23. Use the chart in Figure 151 for identification of the various selective thrust washers for the final drive.
24. After the proper final drive end play has been achieved, install the final drive housing to case seal and install all four bolts.
25. Torque final drive housing bolts to 27 lb.ft.
26. Install new axle seal into final drive housing if not already done, using the installation tools shown in Figure 152.
27. Install new "O" ring on the output speed sensor and install into speed sensor hole in the final drive housing, as shown in Figure 153.
28. Torque speed sensor bolt to 98 lb.in.

<b>FINAL DRIVE SELECTIVE THRUST WASHER CHART</b>			
ID NUMBER	THICKNESS (mm)	THICKNESS (in)	COLOR I.D.
1	1.40-1.50	.055"-.059"	Orange
2	1.50-1.60	.059"-.062"	White
3	1.60-1.70	.062"-.066"	Blue
4	1.70-1.80	.066"-.070"	Pink
5	1.80-1.90	.070"-.074"	Brown
6	1.90-2.00	.074"-.078"	Green
7	2.00-2.10	.078"-.082"	Black
8	2.10-2.20	.082"-.086"	Purple
9	2.20-2.30	.086"-.091"	Purple/White
10	2.30-2.40	.091"-.095"	Purple/Blue

Figure 151

29. Remove the dial indicator set-up and install J-38358 and J-26958, along with the adapter J-26958-10, as shown in Figure 154.
- Note: Use all bolts to install loading tool.**
30. Turn the loading tool adjusting knob until all final drive end play has been removed.
31. Rotate transaxle so that the case cover surface is facing up.

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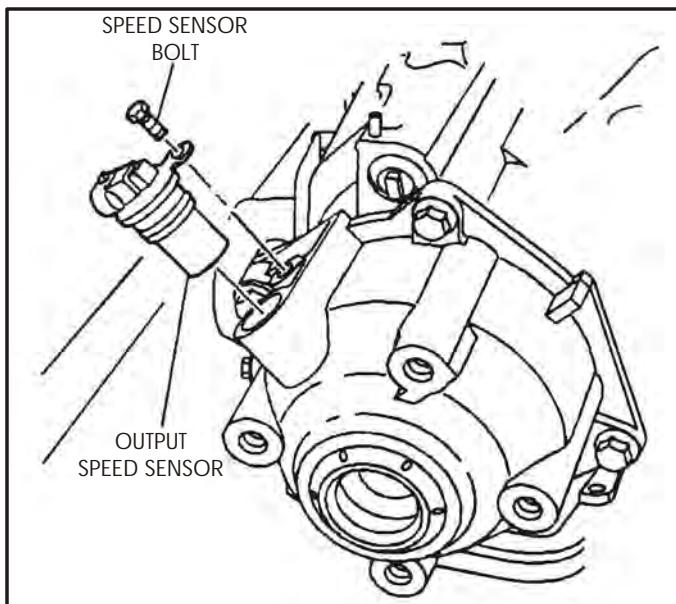


Figure 153

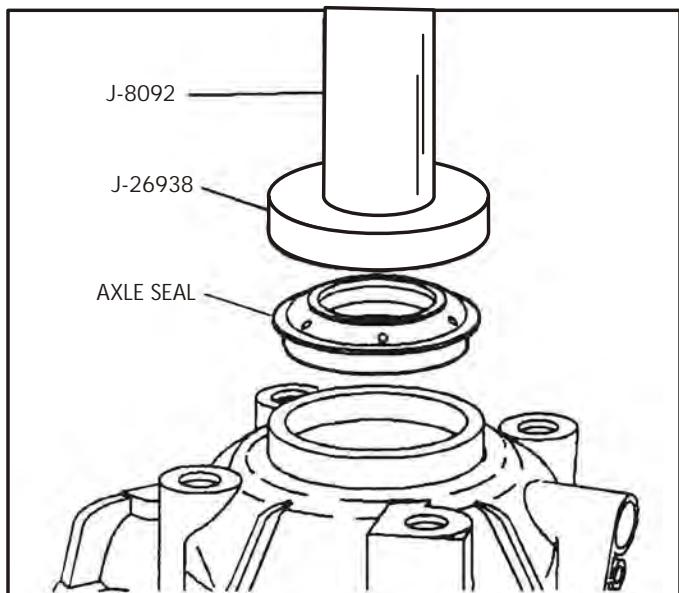


Figure 152

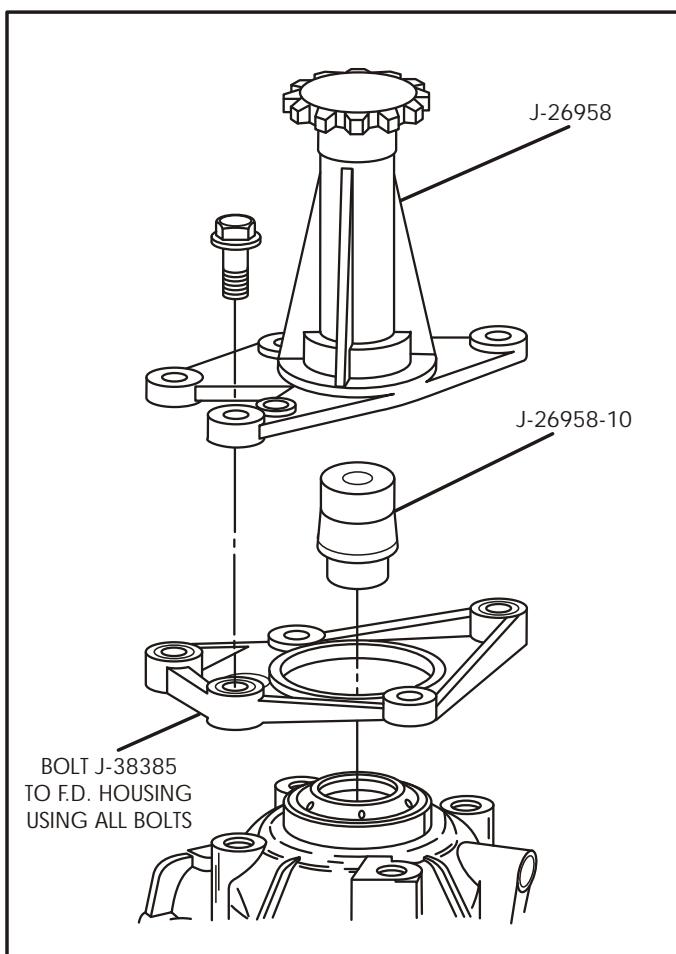


Figure 154

**Continued from Page 81.**

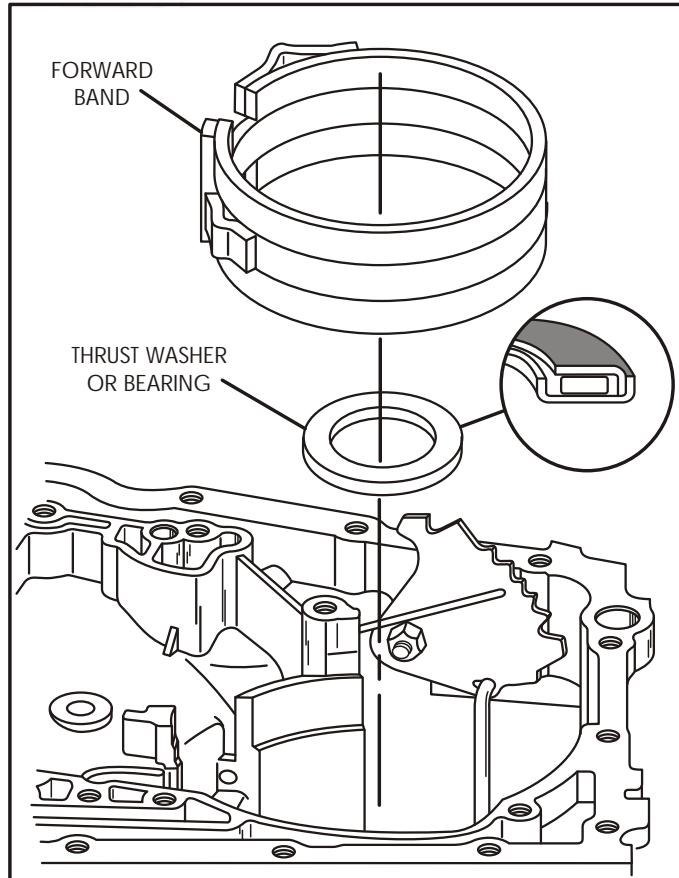


Figure 155

32. Ensure that final drive sun gear shaft is fully installed into the park gear and sun gear.
33. Install the thrust washer onto the final drive ring gear, as shown in Figure 155.  
*Note: The transaxle may have a thrust washer or thrust bearing in this position. If it has a thrust bearing, install with black side up, as shown in Figure 155.*
34. Install the forward band assembly into the case ensuring that it is engaged on the band anchor (See Figure 155).
35. Install the 1-2 roller clutch and support, using installation tool J-38385, shown in Figure 156.
36. **Caution:** The 1-2 roller clutch/support does not "Always" go all the way down. Lift up on the forward band just enough to let the support seat fully.
37. Install the 2-1 manual band into case ensuring that it is located on the band anchor pin. Refer to Figure 157.

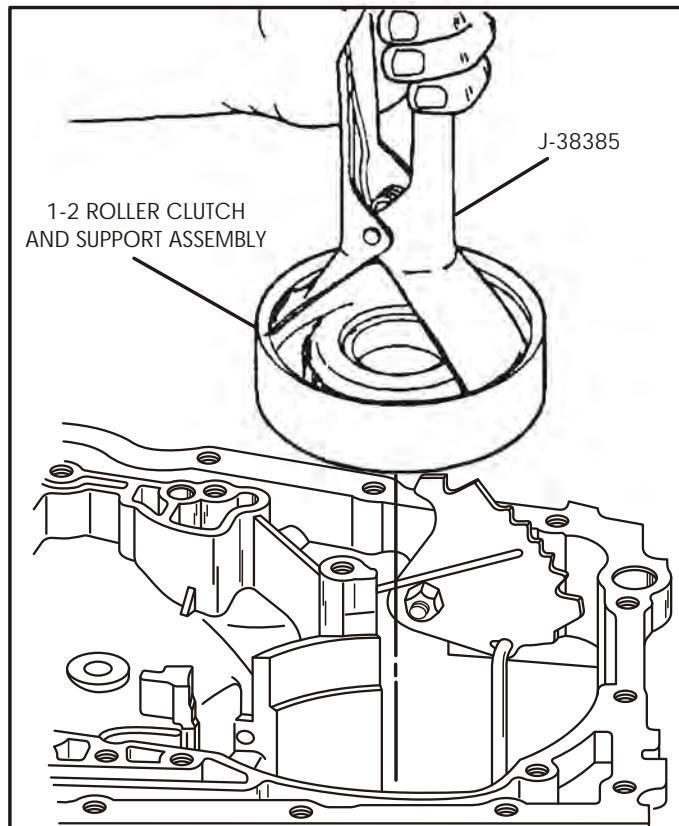


Figure 156

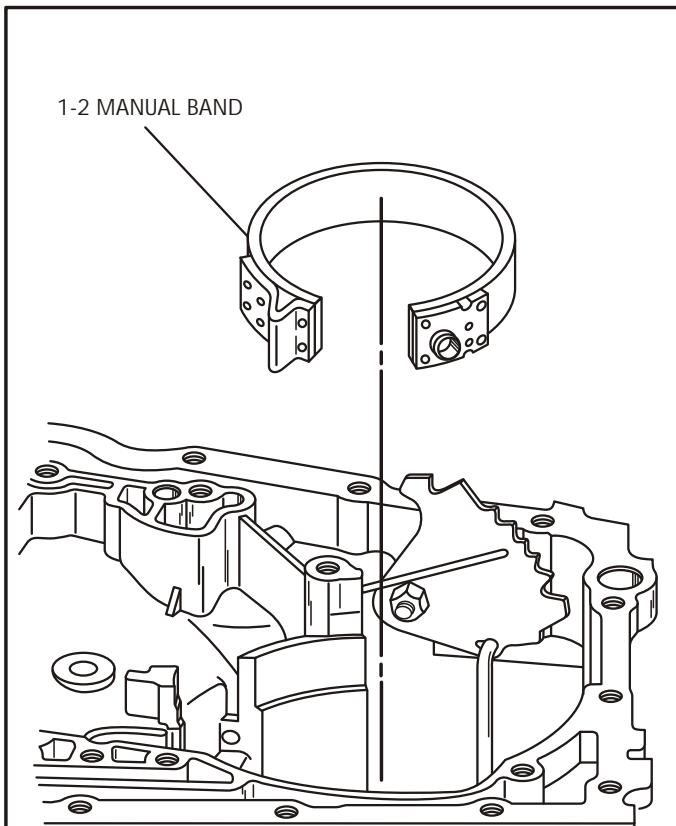


Figure 157

38. Install the reaction sun gear and drum assembly by rotating counter-clockwise into position, as shown in Figure 158.
39. The reaction sun gear should free-wheel in a counter-clockwise direction, and lock and turn the forward drum clockwise.
40. Install the thrust bearing on top of the reaction sun gear in the direction shown in Figure 159.
41. Install the reaction planetary carrier by rotating into position to engage the sun gear and the splines on the final drive sun gear shaft. Refer to Figure 159.
42. Install the oil dam into the input carrier and the thrust bearing into the input carrier in direction shown in Figure 160. Retain bearing assembly with petroleum.
43. Install the input carrier into case by rotating into position to engage the reaction carrier. Refer to Figure 160.

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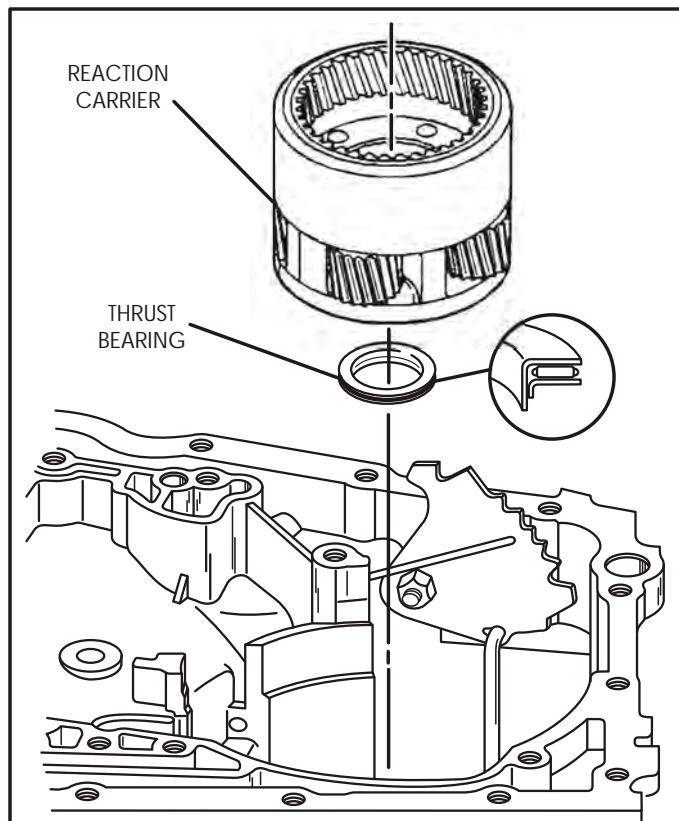


Figure 159

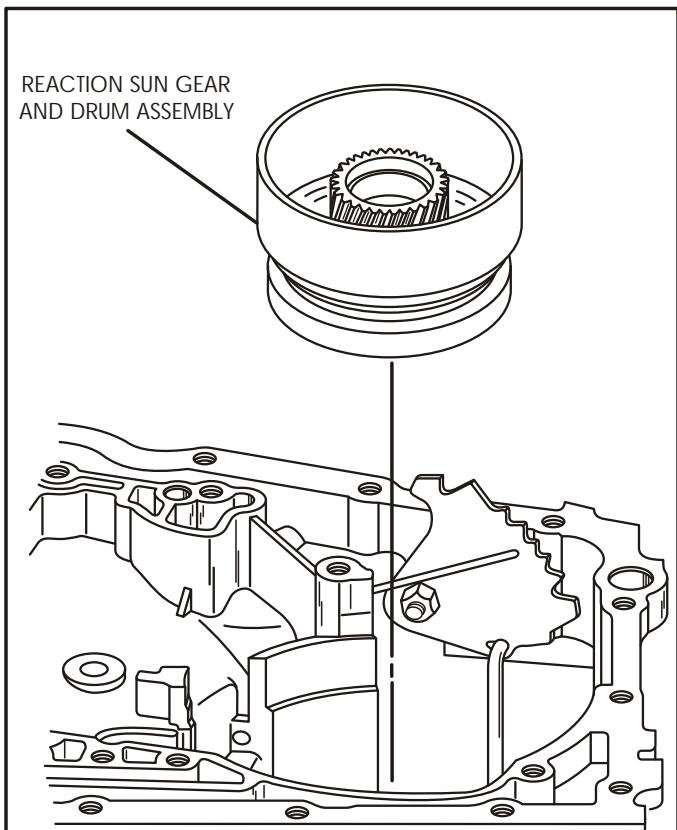


Figure 158

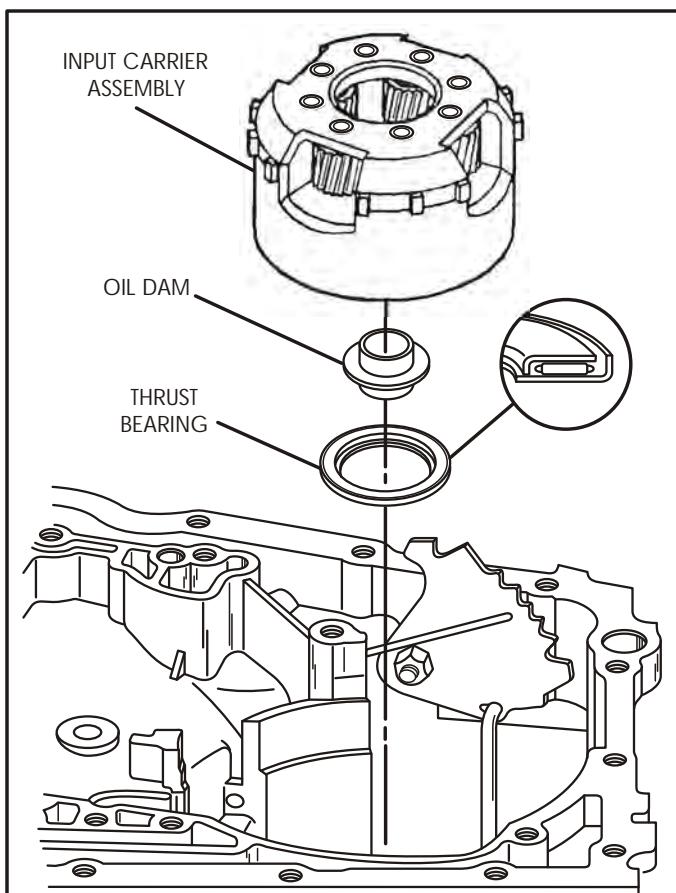


Figure 160

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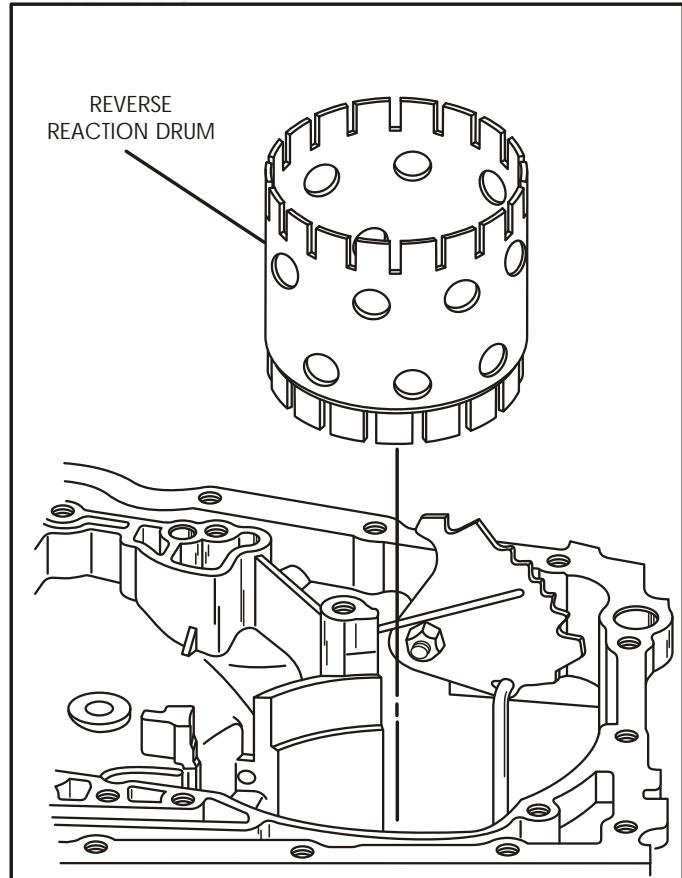


Figure 161

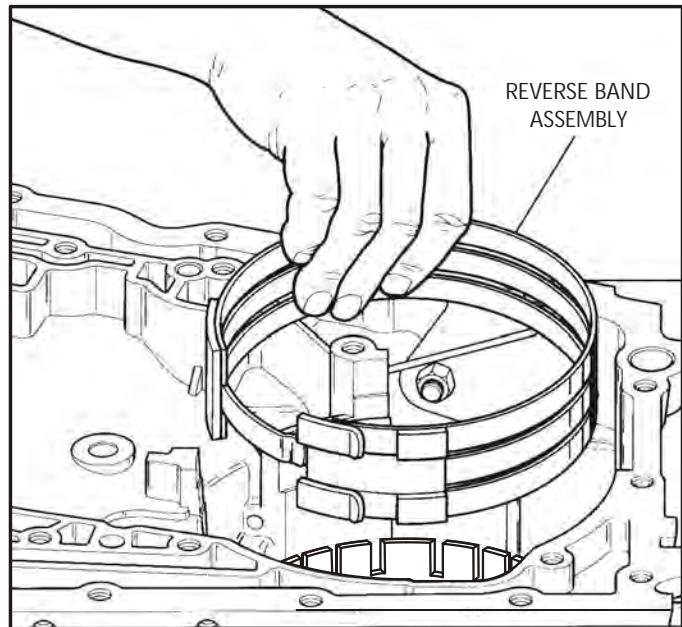


Figure 162

44. Install the reverse reaction drum into the case in the direction shown in Figure 161, engaging the drum onto the input carrier splines.
45. Install the reverse band assembly into the case and engage band end on the anchor pin. Refer to Figure 162.
46. Lay the pre-assembled input housing on its side and install the dual sprag assembly, by rotating back and forth, until all clutch plates engage the outer races and is fully seated.
47. Stand the entire assembly up on the input sun gear to insert installation tool.
48. Install the selective thrust washer into the input housing, as shown in Figure 163.
49. Install the thrust bearing on top of the selective washer, in the direction shown in Figure 163.
50. Set the adjustable collar on J-33381 tool to "440-T4 Clutch and Drum" position, as shown in Figure 165.

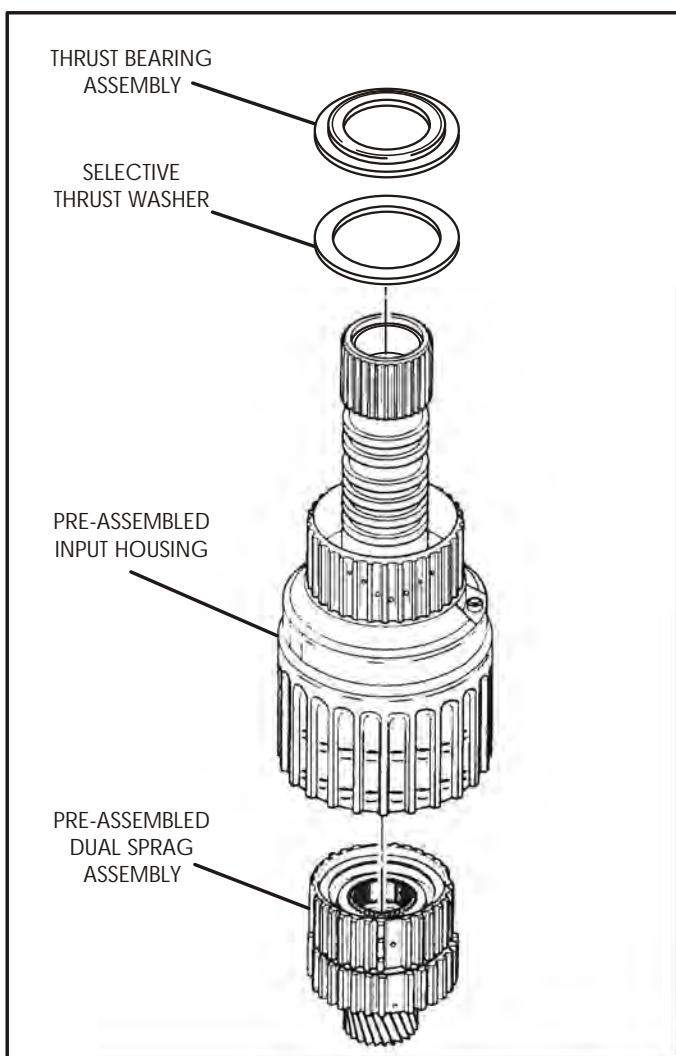


Figure 163

51. Install the J-33381 installation tool into input housing shaft and tighten the adjusting screw at top (See Figure 165).
52. Install the entire assembly into the case while rotating to engage the sun gear into the input carrier, as shown in Figure 164.
53. Remove the installation tool from housing.
54. Do not install the 2nd clutch housing at this time. We must first measure transaxle end play.

**Continued on Page 87.**

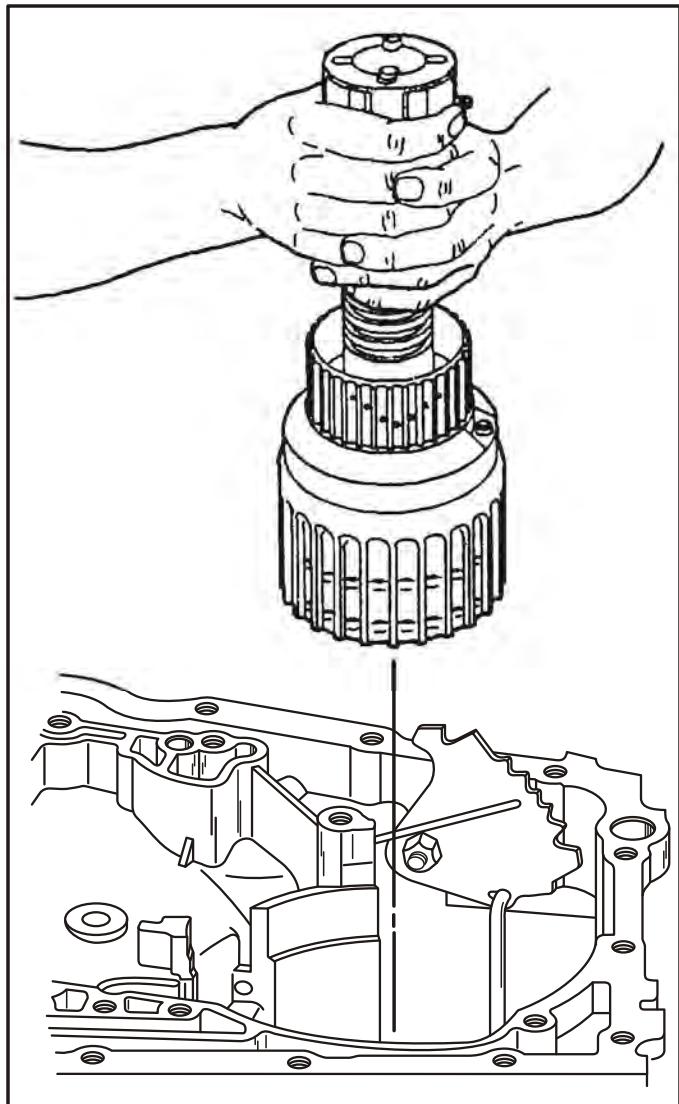


Figure 164

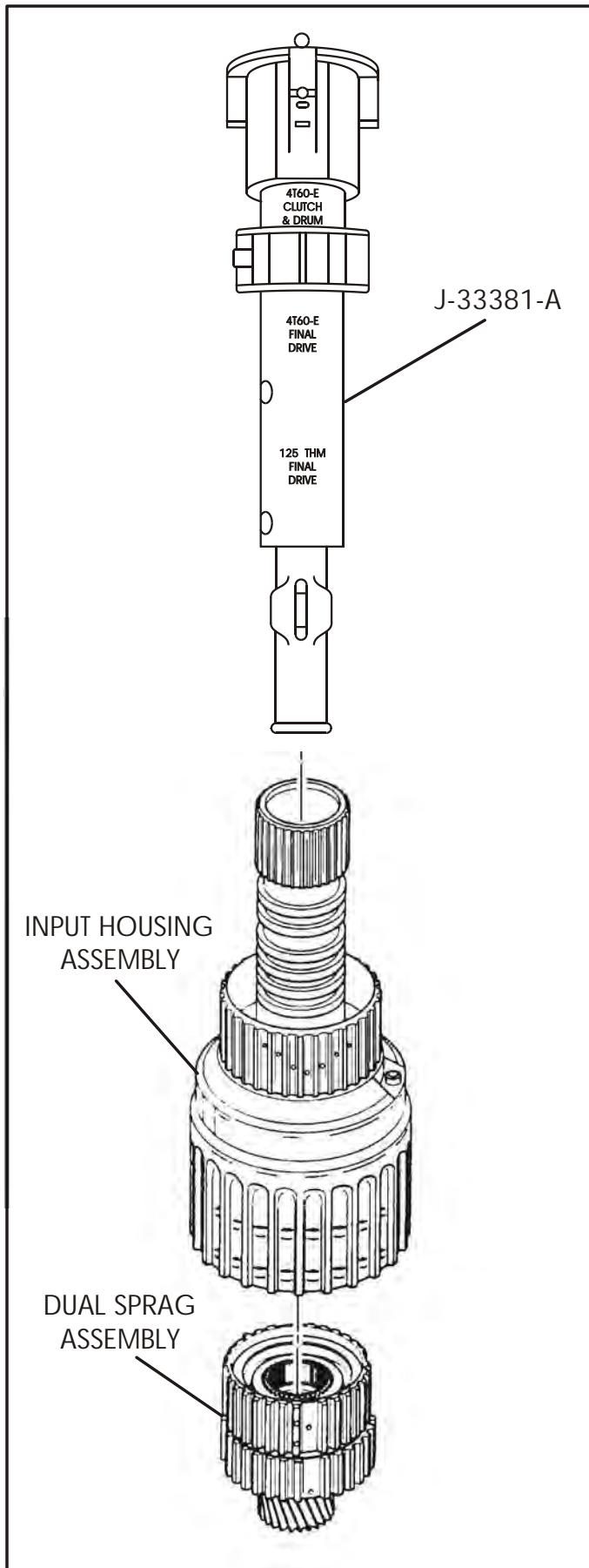
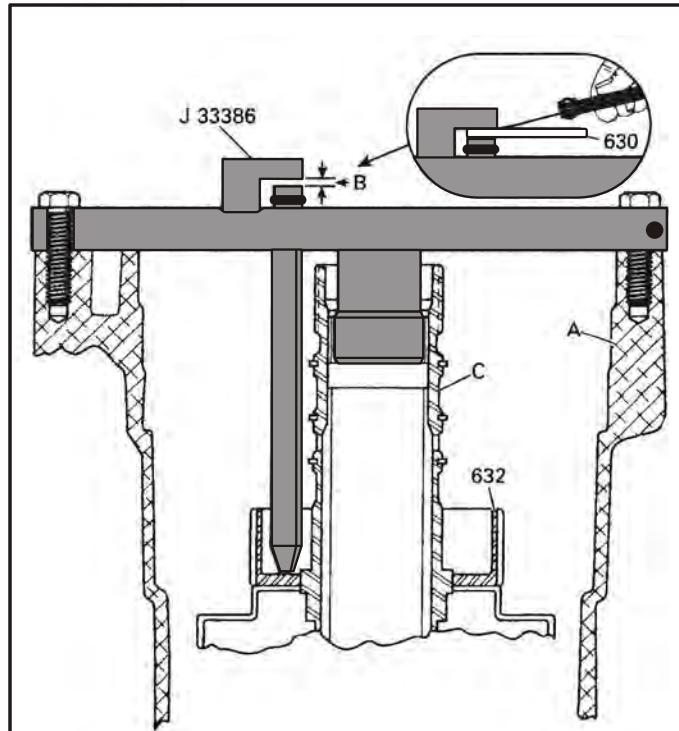


Figure 165



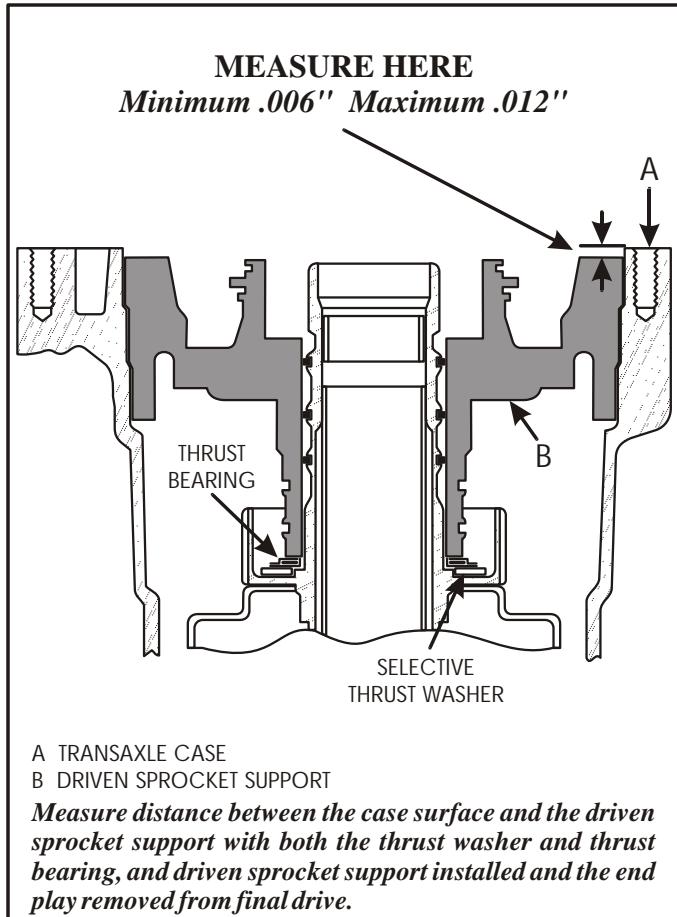
A TRANSAXLE CASE  
B INSERT SELECTIVE WASHER TO DETERMINE PROPER SIZE  
C INPUT SHAFT  
630 SELECTIVE THRUST WASHER  
632 INPUT HOUSING ASSEMBLY

*If a .006" feeler gage or larger can be inserted between thrust washer and tool, use next size larger thrust washer using the chart below.*

#### SELECTIVE THRUST WASHER CHART

I.D. NO.	THICKNESS		COLOR I.D.
	MM	INCHES	
1	2.90-3.00	.114" - .118"	ORANGE/GREEN
2	3.05-3.15	.120" - .124"	ORANGE/BLACK
3	3.20-3.30	.126" - .130"	ORANGE
4	3.35-3.45	.132" - .136"	WHITE
5	3.50-3.60	.138" - .142"	BLUE
6	3.65-3.75	.144" - .148"	PINK
7	3.80-3.90	.150" - .154"	BROWN
8	3.95-4.05	.156" - .159"	GREEN
9	4.10-4.20	.161" - .165"	BLACK
10	4.20-4.35	.167" - .171"	PURPLE
11	4.40-4.50	.173" - .177"	PURPLE/WHITE
12	4.55-4.65	.179" - .183"	PURPLE/BLUE
13	4.70-4.80	.185" - .189"	PURPLE/PINK
14	4.85-4.95	.191" - .195"	PURPLE/BROWN
15	5.00-5.10	.197" - .200"	PURPLE/GREEN

Figure 166



A TRANSAXLE CASE  
B DRIVEN SPROCKET SUPPORT

*Measure distance between the case surface and the driven sprocket support with both the thrust washer and thrust bearing, and driven sprocket support installed and the end play removed from final drive.*

Figure 167

#### MEASURE TRANSAXLE END PLAY

##### THERE ARE "TWO" METHODS OF MEASURING TRANSAXLE END PLAY

###### METHOD NO. 1

1. Ensure that loading tool has been tightened to remove all end play from final drive.
2. Install tool J-33386, as shown in Figure 166, and then measure with current thrust washer as shown in Figure 166 for proper selection.
3. If a .006" feeler gage, or larger, can be inserted between thrust washer and tool, use the next size thicker thrust washer.
4. Use the chart in Figure 166 to select the proper thickness thrust washer.
5. Change the selective thrust washer as necessary to obtain the proper clearance.

## METHOD NO. 2

1. Ensure that loading tool has been tightened to remove all final drive end play.
2. Install the current selective thrust washer and the input thrust bearing assembly onto the input housing, as shown in Figure 167.
3. Install the driven sprocket support in transaxle as shown in Figure 167, without the 2nd clutch drum.
4. Measure with feeler gage and straight edge, the distance between the driven sprocket support and the case surface, as shown in Figure 167.  
**Note: Driven Sprocket Support must always be below the transaxle case surface.**
5. Measurement should be minimum .006" and a maximum of .012" (See Figure 167).
6. Use the chart in Figure 166 to select the proper thickness thrust washer.
7. Change the selective thrust washer as necessary to obtain the proper clearance, and then remove the driven sprocket support, and continue with transaxle assembly process.

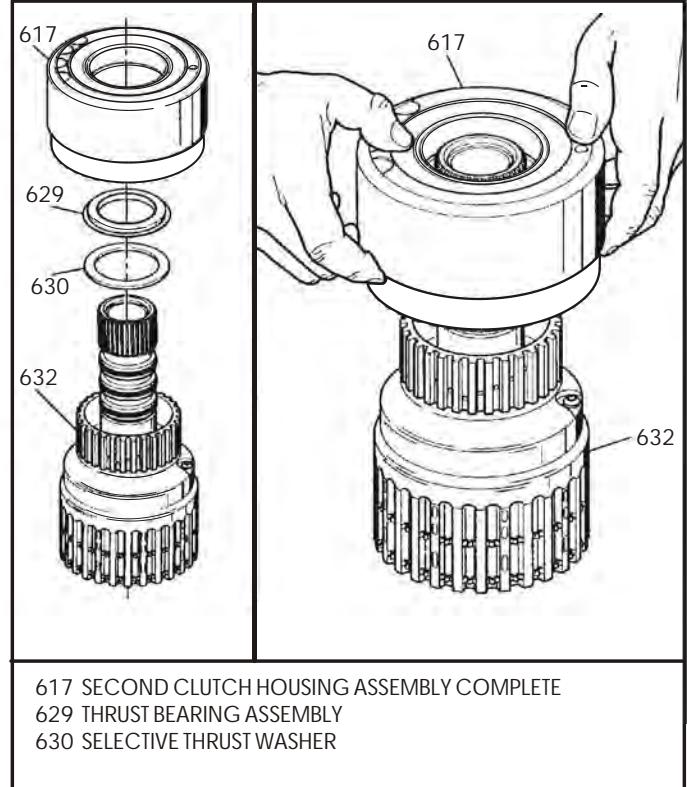


Figure 168

**Continued from Page 85.**

55. Once again stand the complete input housing assembly, with the dual sprag assembly in the housing up on the input sun gear, as shown in Figure 168.
56. Install the proper selective thrust washer onto the input housing as shown in Figure 168.
57. Install the thrust bearing assembly in direction shown in Figure 168 onto the selective washer.
58. Install the second clutch housing on the input housing by rotating back and forth until all of the second clutch lined plates are engaged and the drum is fully seated (See Figure 168).
59. Re-install tool J-33381-A into position shown through input housing and tighten the adjusting screw on top.
60. Install the entire assembly into the case while rotating, to engage the sun gear into the input carrier, and the splines on second clutch drum into reverse reaction drum (See Figure 169).

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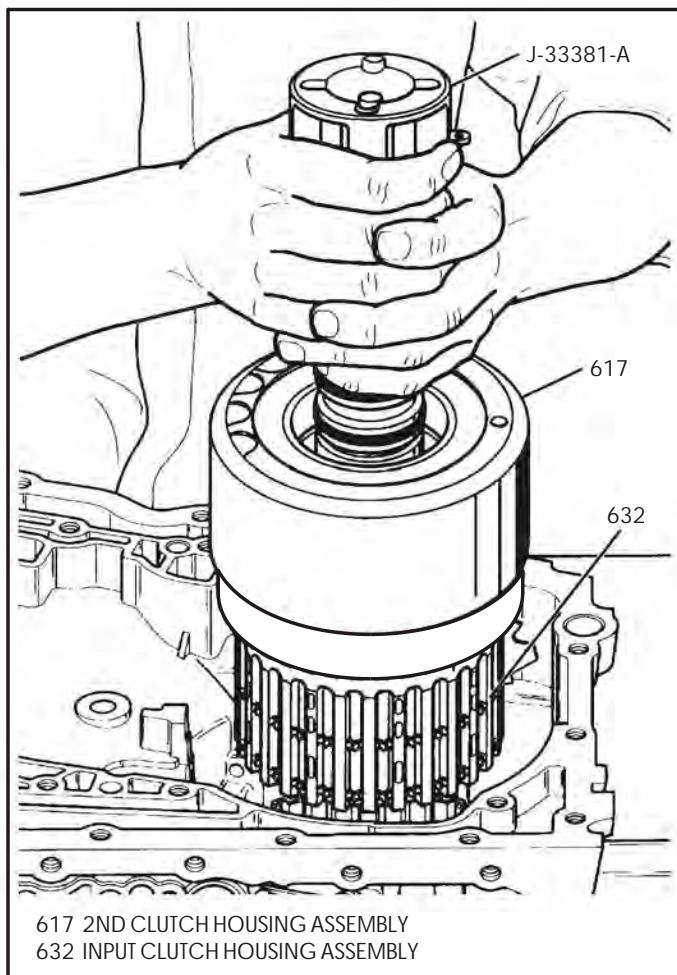


Figure 169

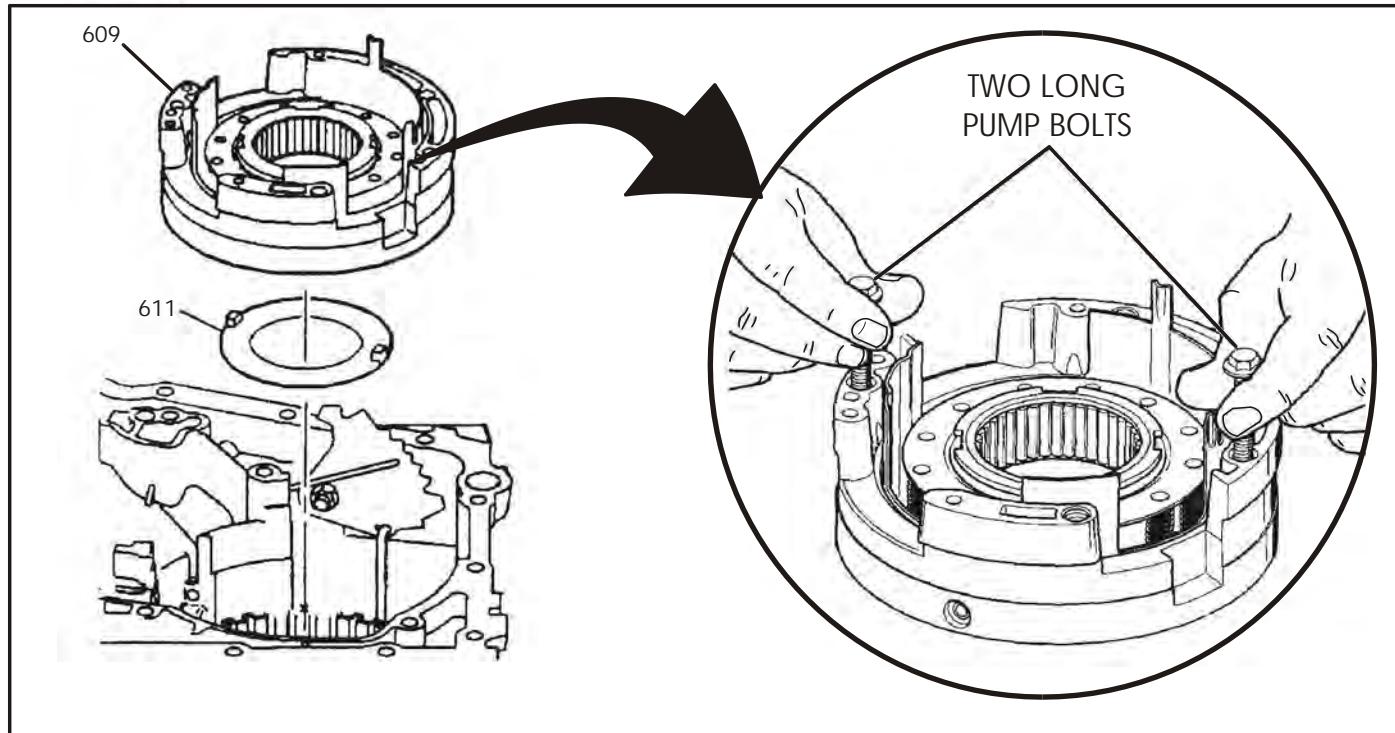


Figure 170

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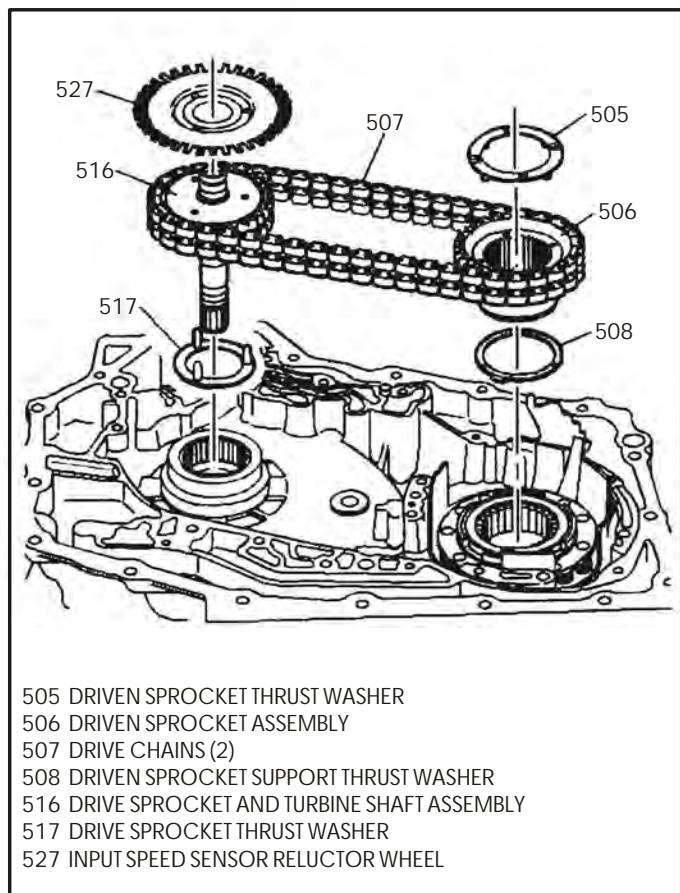


Figure 171

61. Ensure that the reverse band assembly is still engaged with the anchor pin in the case.
62. Ensure that the thrust washer (611) is still on the bottom of the driven sprocket support and retained with petrolatum (See Figure 170).
63. Install the driven sprocket support using the two long pump bolts as tools or handles to rotate and install (See Figure 170).
64. Remove the two pump bolts after you have the driven sprocket support aligned properly.
65. Install the thrust washer (508) onto the driven sprocket support and retain with small amount of petrolatum (See Figure 171).
66. Install the pre-assembled drive chains and sprocket assemblies into the case by hand, as shown in Figure 171. A slight rocking motion may be necessary to fully seat the sprockets into place.
67. Ensure that thrust washer (505) is still in place on the driven sprocket (See Figure 171).
68. Install the input speed sensor reluctor wheel on the drive sprocket, ensuring the 3 drive pins and the reluctor wheel are fully seated. Refer to Figure 171.

69. Ensure that the driven sprocket support and both sprockets are fully seated.
70. Pull the drive chain toward the case at location indicated in Figure 171.
71. Measure the distance between the case and the edge of the drive chain at the location indicated in Figure 171.
72. If the measurement is 3.2 mm (1/8") or greater, it is okay to re-use the drive chain.  
If the measurement is less than 3.2 mm (1/8"), replace the drive chain.
73. Measure both drive chains in the same manner as described above.
74. Install the 4th clutch hub and shaft assembly into transaxle, as shown in Figure 173.
75. Install the chain scoop between the case and driven sprocket support (See Figure 173).
76. Install the 4th clutch apply plate onto the 4th clutch piston, as shown in Figure 174.
77. Install a 4th clutch friction plate on the clutch hub against the apply plate (See Figure 174).
78. Install the remaining 4th clutch plates as shown in Figure 174.
79. There are two 4th clutch friction plates and two 4th clutch steel plates in this unit, as shown in Figure 174.

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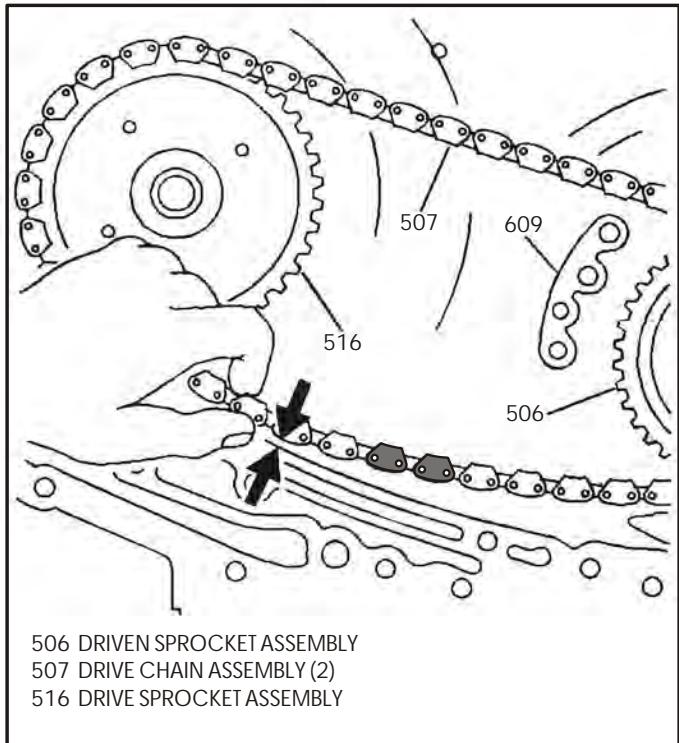


Figure 172

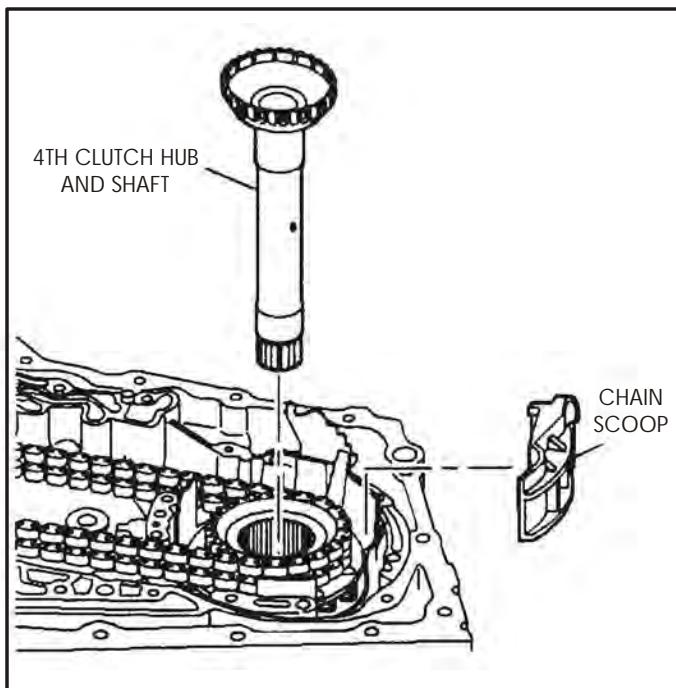


Figure 173

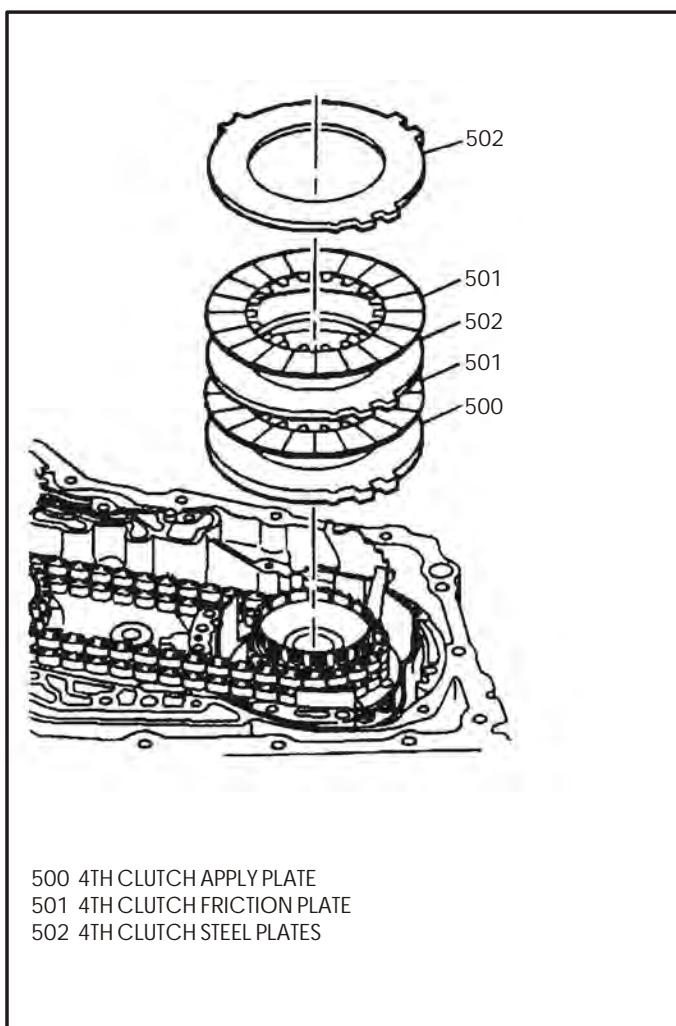


Figure 174

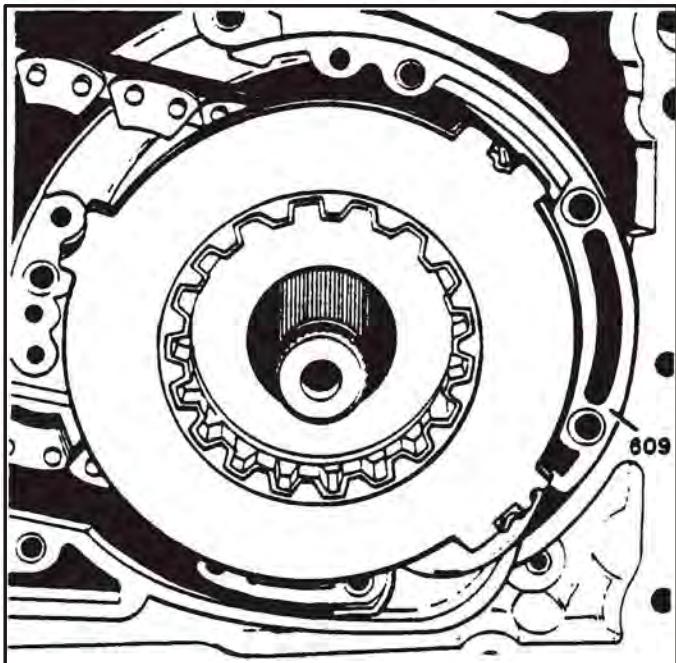


Figure 175

**Continued from Page 89.**

80. Align the 4th clutch piston in sprocket support and the driven sprocket support to the case, as shown in Figure 175.
81. Install the output shaft into the transaxle being careful not to damage any bushings, until it is engaged into the final drive splines. The output shaft can **usually** be tapped into position with a plastic mallet.

**Continued on next Page.**

82. If necessary remove the final drive housing to engage the splines in the side gear and install the snap ring clip after output shaft is installed.
  83. Install the case cover to case gaskets onto the case, as shown in Figure 176.
- Note: It is recommended that dowel pins be used as guides to keep gaskets in place.*
84. Install the pre-assembled case cover onto the transaxle, as shown in Figure 177, ensuring that thrust washers remain in place.
  85. Make sure the manual valve is held in place & push case cover down over the dowel pins in the case (See Figure 177).
  86. Install the case cover bolts in proper locations using the chart in Figure 178.
  87. Torque the M6 diameter bolts (433)(434)(436) and (805) to 11N.m (97 lb.in.). Refer to Figure 178 for bolt locations.
  88. Torque the 3 M8 diameter bolts (435) to 25N.m (18 lb.ft.). Refer to Figure 178 for bolt location.

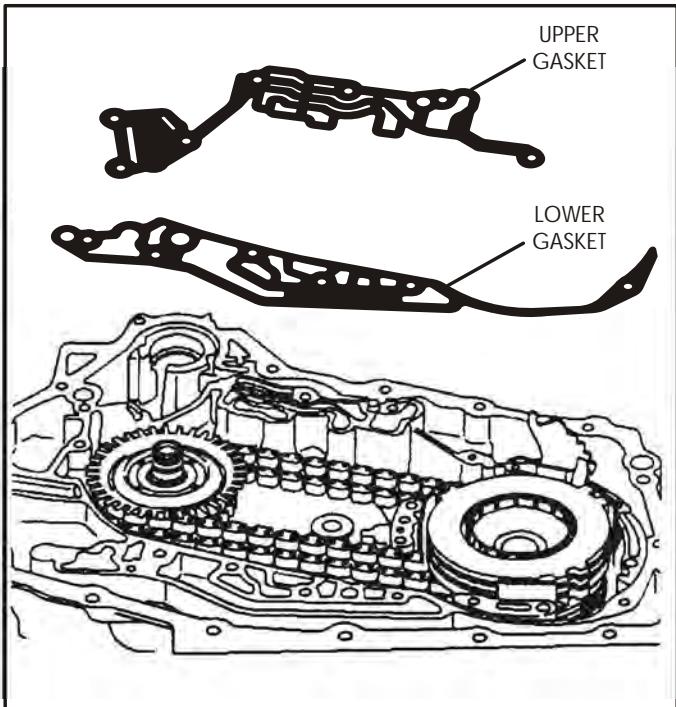


Figure 176

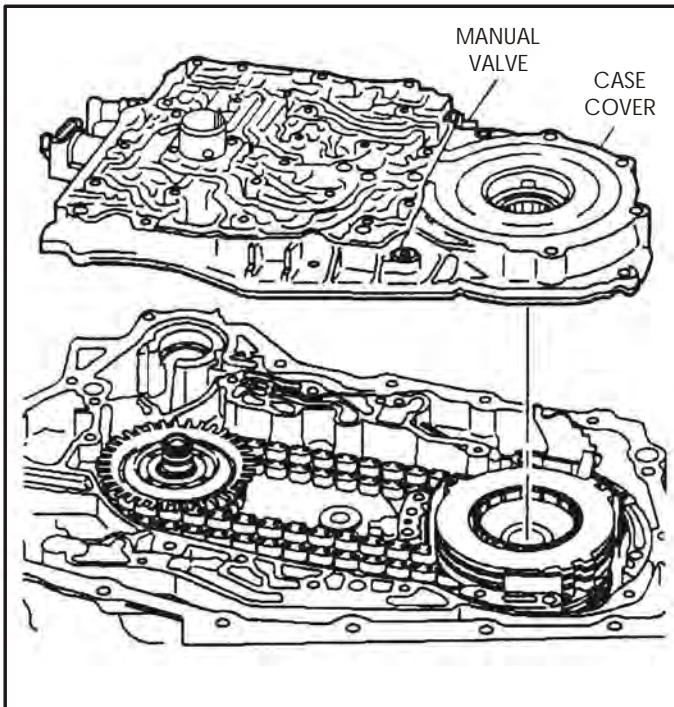
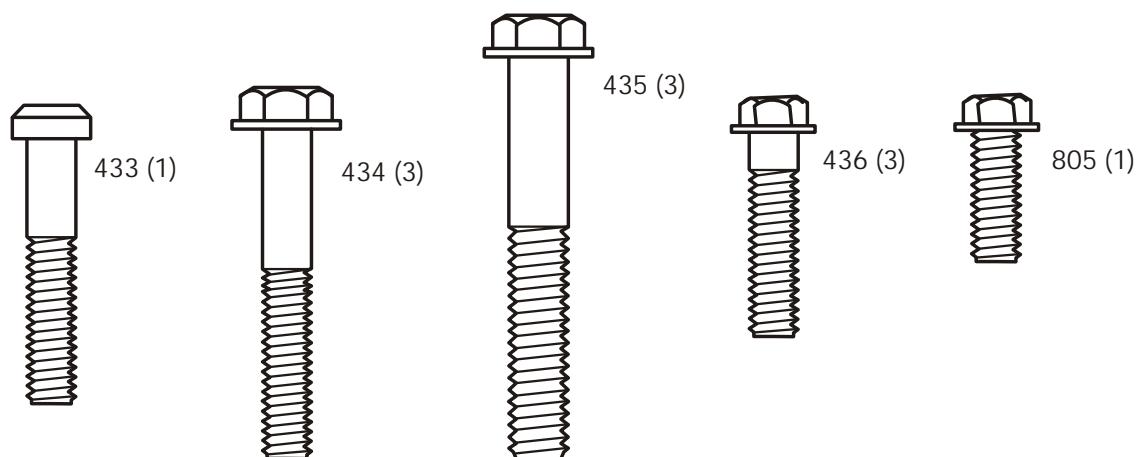
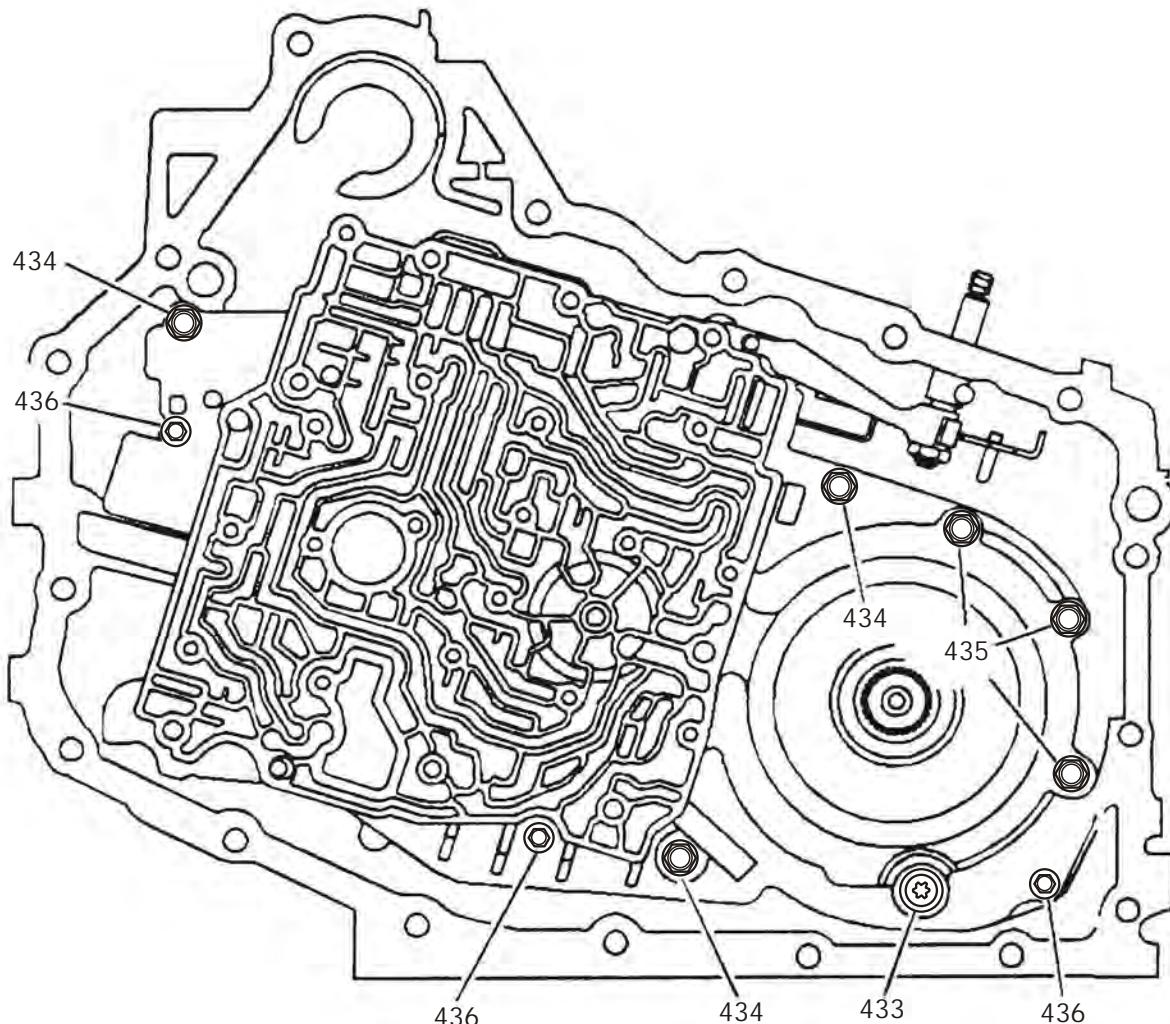


Figure 177



- 433 CASE COVER 30 TORX® HEAD BOLT, M6 X 1.0 X 32.0, 1 REQUIRED  
434 CASE COVER 10mm HEAD BOLT, M6 X 1.0 X 40.0, 3 REQUIRED  
435 CASE COVER 10mm HEAD BOLT, M8 X 1.25 X 50.0, 3 REQUIRED  
436 CASE COVER 8mm HEAD BOLT, M6 X 1.0 X 30.0, 3 REQUIRED  
805 DETENT SPRING 8mm HEAD BOLT, M6 X 1.0 X 16.0, 1 REQUIRED

Figure 178

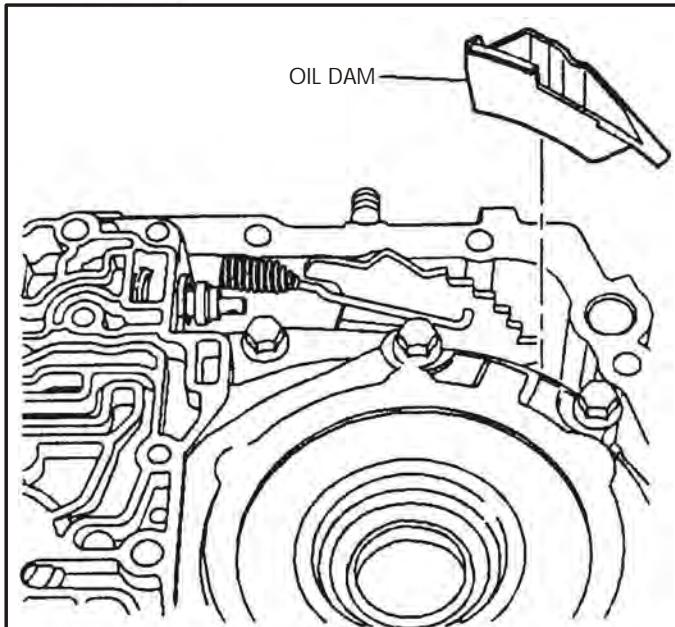


Figure 179

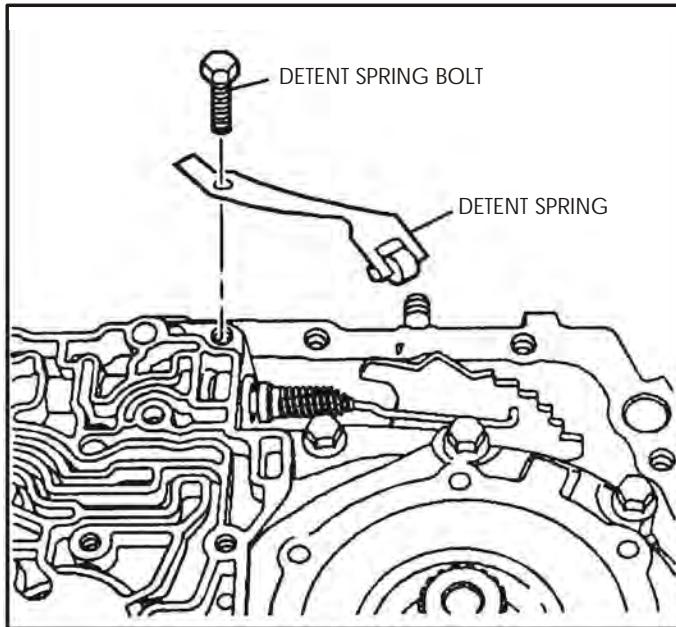


Figure 181

**Continued from Page 90.**

89. Install the oil dam between the case cover and transaxle case, as shown in Figure 179.
90. Pull back the manual valve spring (403) and connect the manual valve link (402) to manual valve (404), as shown in Figure 180.
91. Install the manual detent spring and bolt, as shown in Figure 181 and torque the bolt to 11 N.m (97 lb.in.)

92. Install the input speed sensor (440) into case cover, as shown in Figure 182.
93. Install the input speed sensor retainer (441) into the case cover, as shown in Figure 182.
94. Install four .250" (1/4") diameter checkballs in case cover, in locations shown in Figure 183.
95. Install the oil pump drive shaft into case cover, as shown in Figure 184.

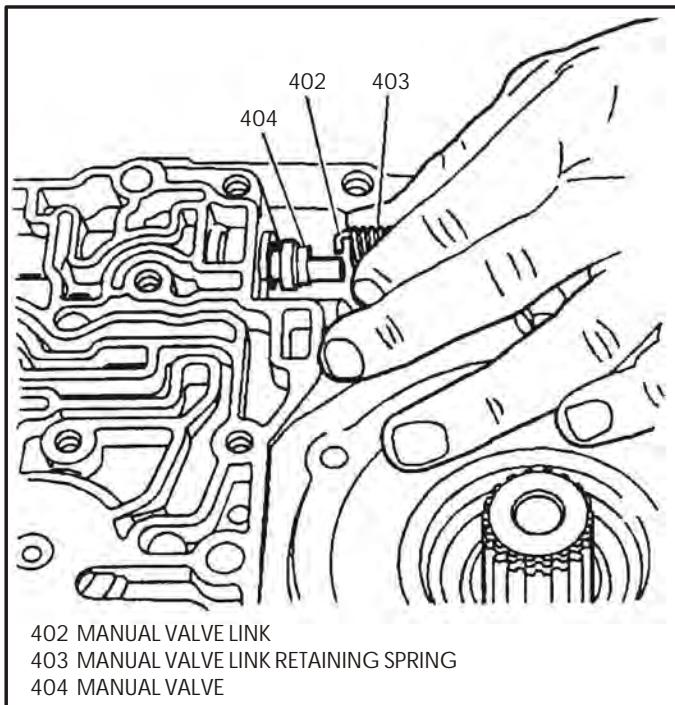


Figure 180

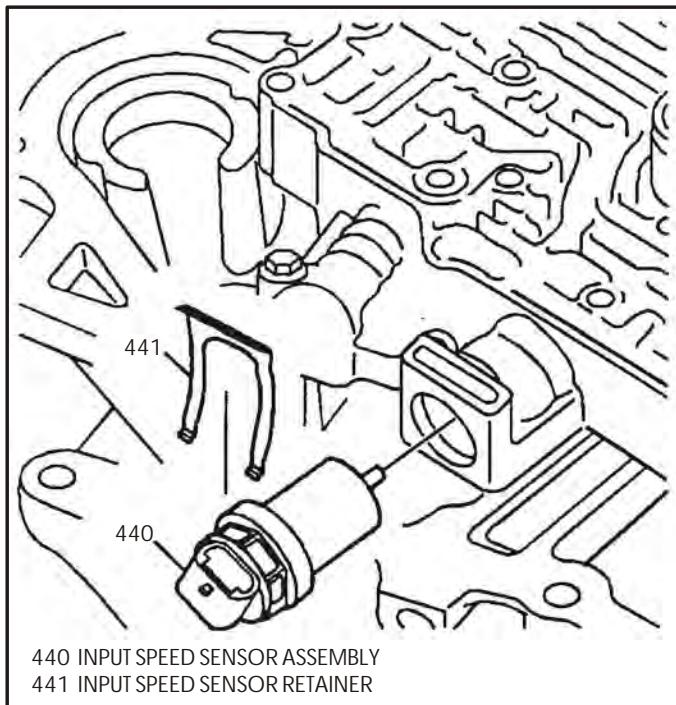


Figure 182

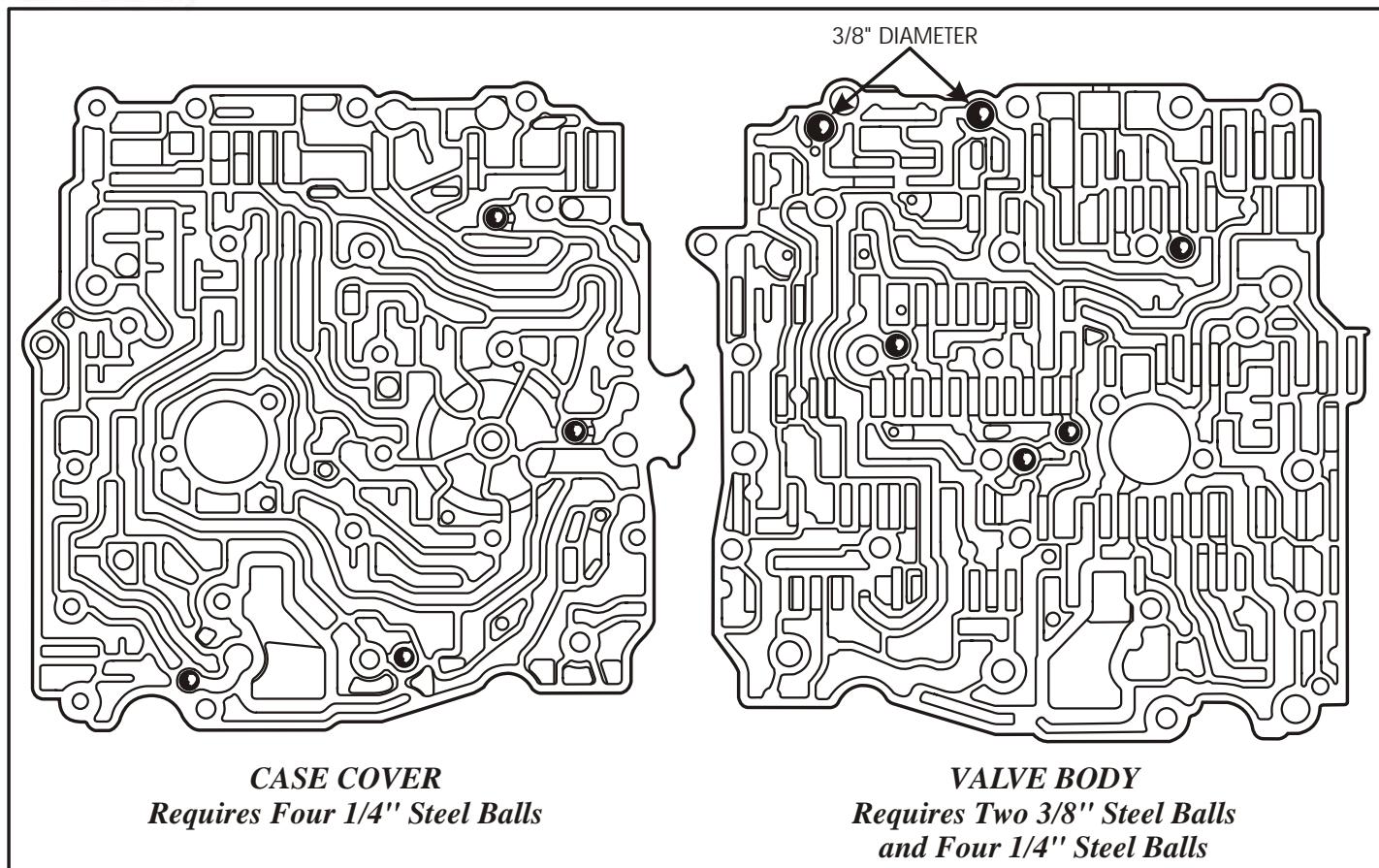


Figure 183

96. Install two .375" (3/8") diameter checkballs, and four .250" (1/4") diameter checkballs into valve body, in locations shown in Figure 183.

97. Ensure that two screens are in spacer plate and not damaged, as shown in Figure 185. Refer to Page 22 for accurate locations of screens.

**Continued on next Page.**

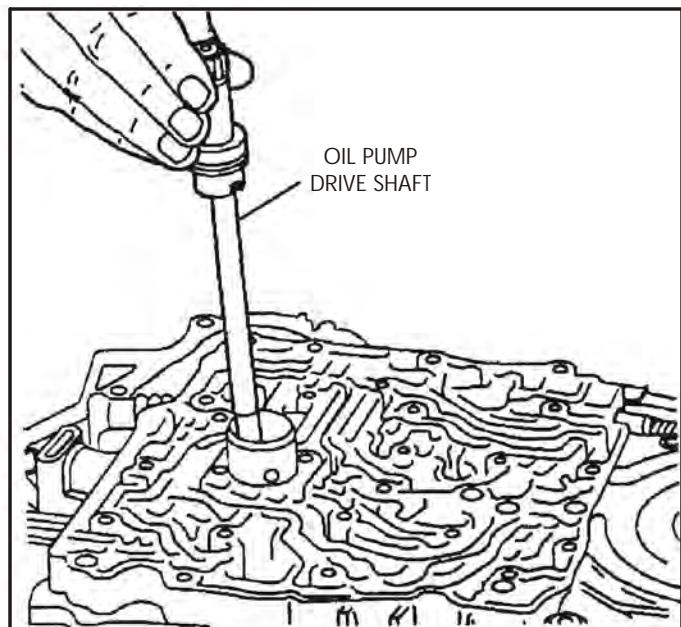


Figure 184

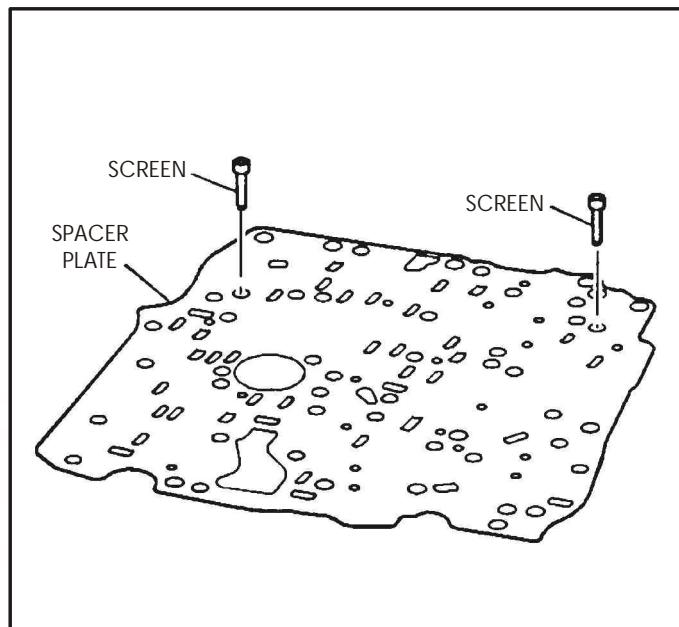


Figure 185

## Continued from Page 93.

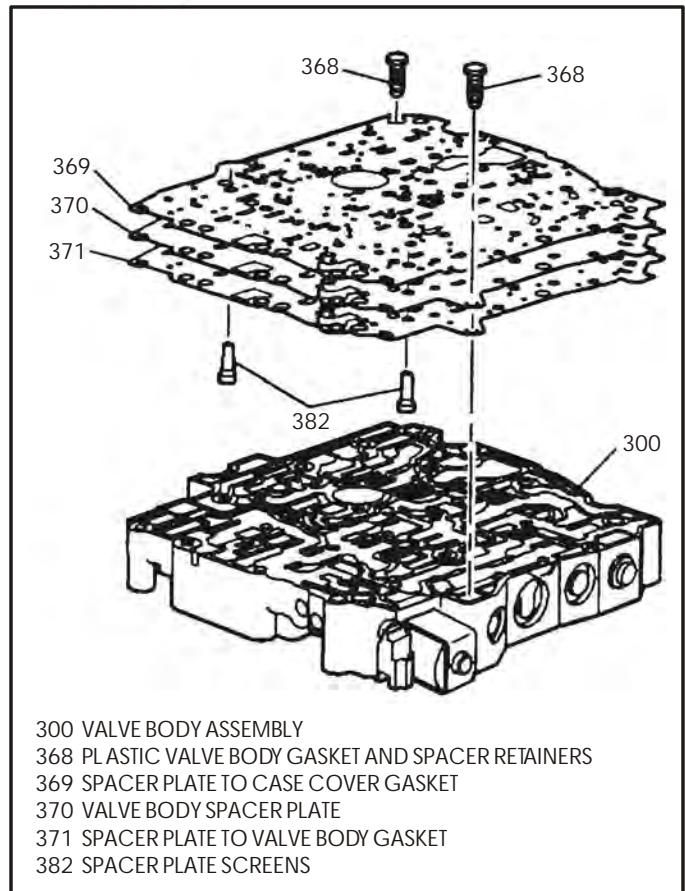


Figure 186

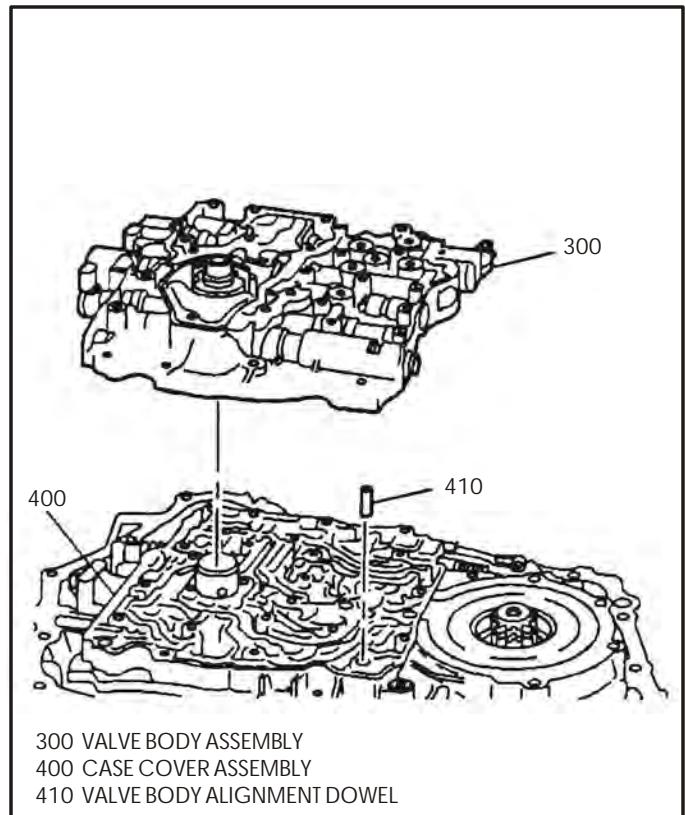


Figure 187

98. Install the spacer plate to valve body gasket identified with a "V" cut into the tab on gasket. Refer to Figure 186.
99. Install the spacer plate and screen assembly on top of valve body gasket, shown in Figure 186.
100. Install the spacer plate to case cover gasket identified with a "C" cut into the tab on gasket.
101. Install the two plastic retainers (368) through the spacer plate and gaskets, to hold them on valve body, as shown in Figure 186.
102. Install the valve body alignment dowel in case cover, in location shown in Figure 187.
103. Install the complete valve body and the spacer plate assembly onto the case cover using the valve body alignment dowel and turbine sleeve as guides (See Figure 187).
104. Ensure that checkballs do not fall out of valve body during assembly.
105. Install the pressure switch assembly onto the valve body, as shown in Figure 188.
106. Install the 17 valve body bolts using the chart in Figure 189 to determine proper locations.
107. Torque the valve body bolts in a spiral pattern starting with the bolts at the center of the valve body, using the torque spec's in Figure 189.

## Continued on Page 96.

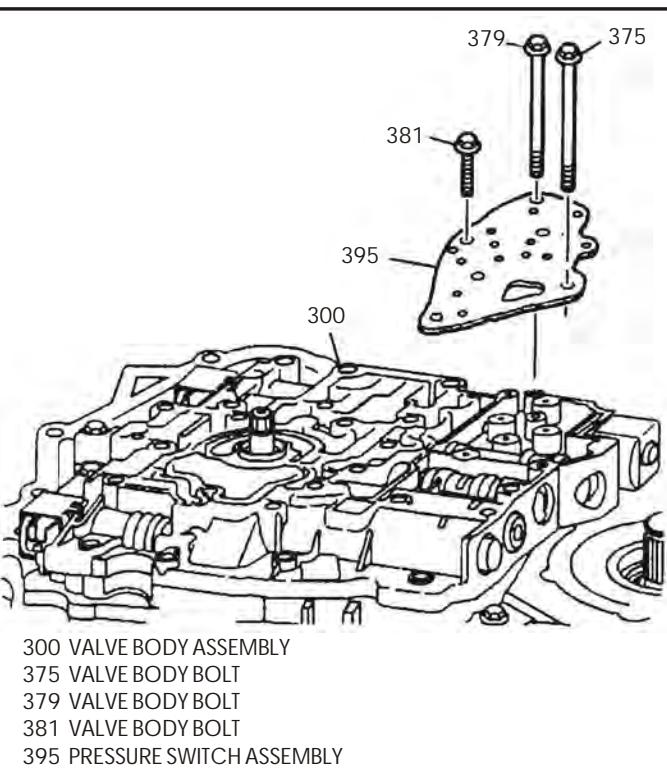
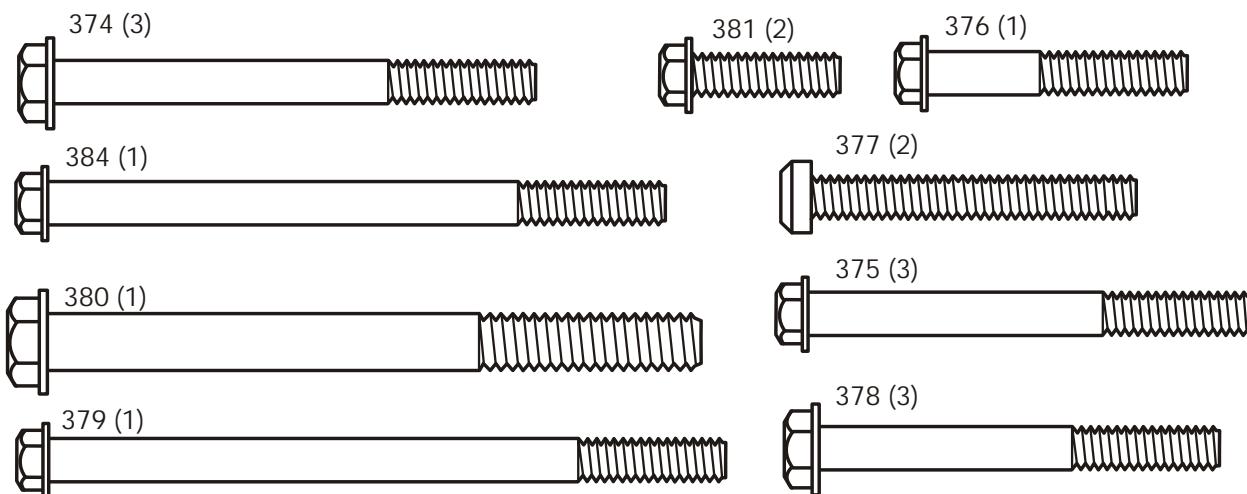
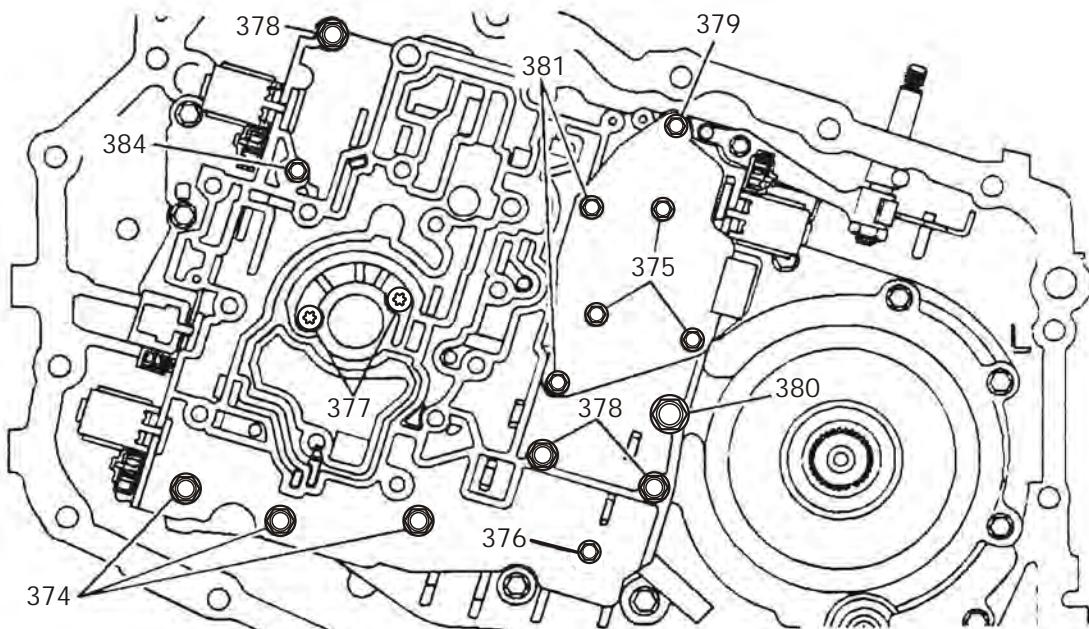


Figure 188



374 VALVE BODY 10mm HEAD BOLT, M6 X 1.0 X 65.0, 3 REQUIRED

Torque Specification = 12 N.m (106 lb.in.)

375 VALVE BODY 8mm HEAD BOLT, M6 X 1.0 X 60.0, 3 REQUIRED

Torque Specification = 12 N.m (106 lb.in.)

376 VALVE BODY 8mm HEAD BOLT, M6 X 1.0 X 30.0, 1 REQUIRED

Torque Specification = 12 N.m (106 lb.in.)

377 VALVE BODY 30 TORX® BOLT, M6 X 1.0 X 55.0, 2 REQUIRED

Torque Specification = 12 N.m (106 lb.in.)

378 VALVE BODY 10mm HEAD BOLT, M6 X 1.0 X 55.0, 3 REQUIRED

Torque Specification = 12 N.m (106 lb.in.)

379 VALVE BODY 8mm HEAD BOLT, M6 X 1.0 X 95.0, 1 REQUIRED

Torque Specification = 16 N.m (11 lb.ft.)

380 VALVE BODY 13mm HEAD BOLT, M8 X 1.25 X 90.0, 1 REQUIRED

Torque Specification = 25 N.m (18 lb.ft.)

381 VALVE BODY 8mm HEAD BOLT, M6 X 1.0 X 20.0, 2 REQUIRED

Torque Specification = 8 N.m (70 lb.in.)

384 VALVE BODY 8mm HEAD BOLT, M6 X 1.0 X 85.0, 1 REQUIRED

Torque Specification = 12 N.m (106 lb.in.)

Figure 189

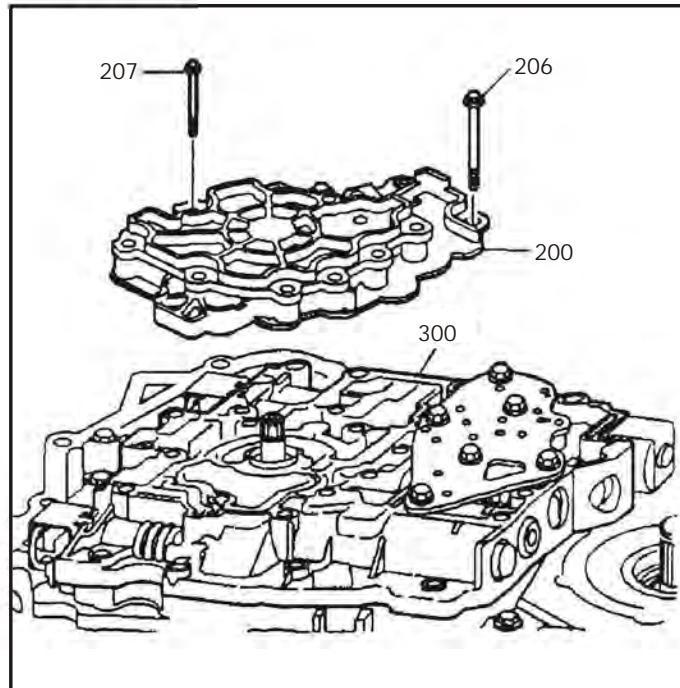


Figure 190

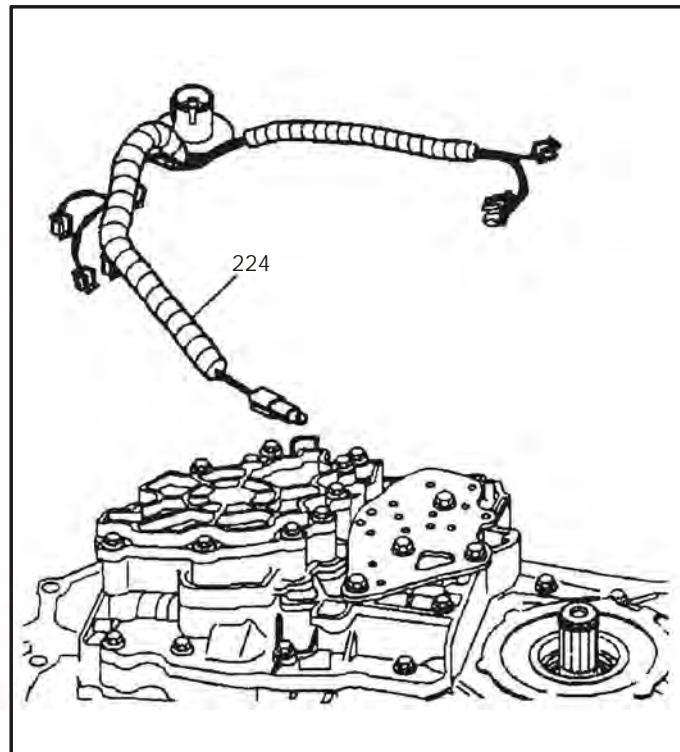


Figure 191

**Continued from Page 94.**

108. Install the pre-assembled oil pump assembly by rotating the oil pump drive shaft from the front to ensure that it is fully seated (See Figure 190).
109. Install the 11 oil pump bolts using the chart in Figure 192 to determine their proper locations.
110. Torque all the oil pump bolts in a spiral pattern starting with the bolts at the center of the pump using the torque specifications in Figure 192.
111. Install the internal wiring harness into the case by snapping the case connector into the location at top of case (See Figure 193).
112. Install the wire conduit into the metal bracket on the pump cover, as shown in Figure 193.
113. Install the top wire conduit through the plastic retaining bracket that is snapped into pressure switch assembly, as shown in Figure 193.
114. Install the connector with red and yellow wires onto Shift Solenoid "B" as shown in Figure 193.
115. Install the connector with red and Lt. green wires onto Shift Solenoid "A" as shown in Figure 193.
116. Install the connector with purple and Lt. blue wires onto EPC Solenoid, shown in Figure 193.
117. Install the connector with black and Dk. green wires onto Input Speed Sensor, as shown in Figure 193.
118. Install the connector with red and tan wires onto TCC/PWM Solenoid, as shown in Figure 193.
119. Ensure that the TFT Sensor is snapped into the bracket in the spacer plate at the bottom of case, as shown in Figure 193.
120. Install the remaining connector with four wires into the Pressure Switch Assembly, as shown in Figure 193.
121. ***Note: Ensure that oil pump drive shaft will still turn freely, after torquing pump.***

**Continued on Page 98.**

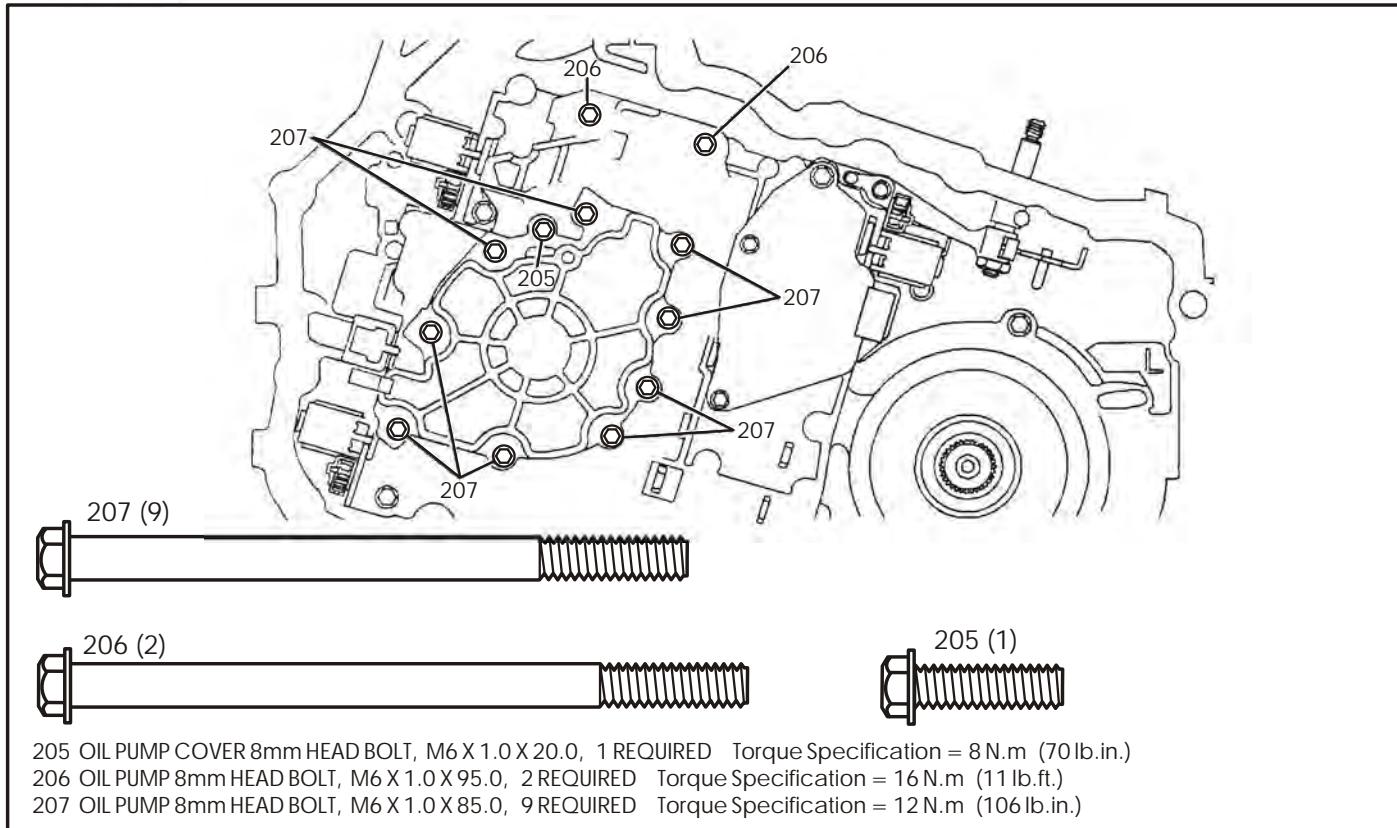


Figure 192

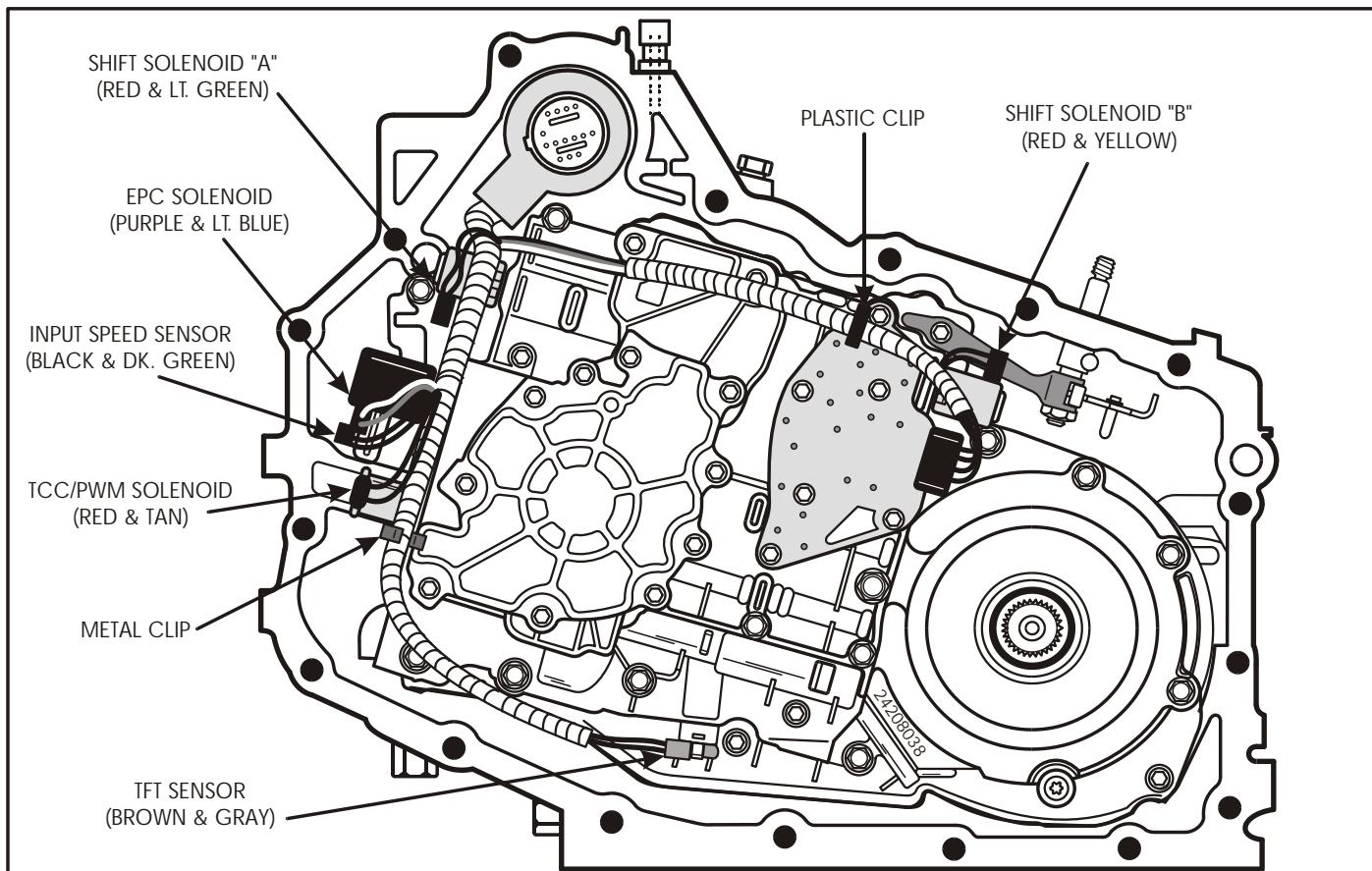


Figure 193

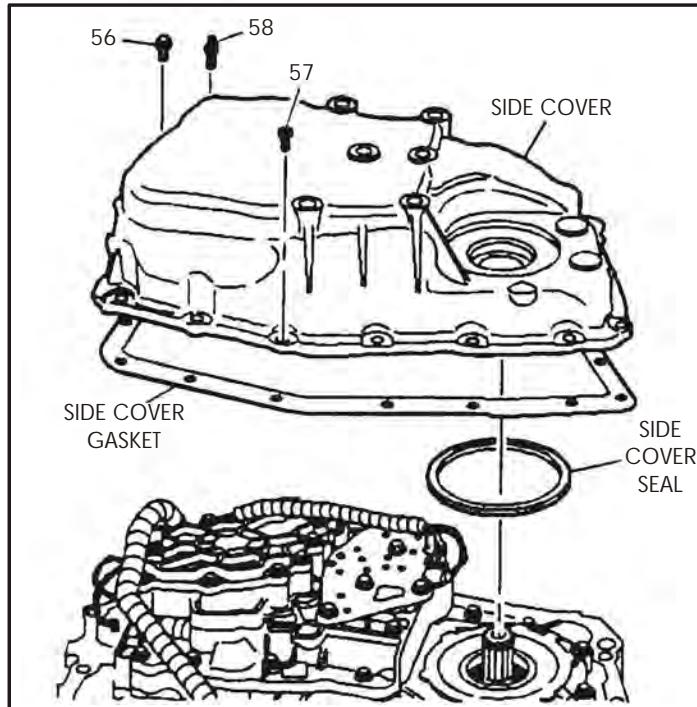


Figure 194

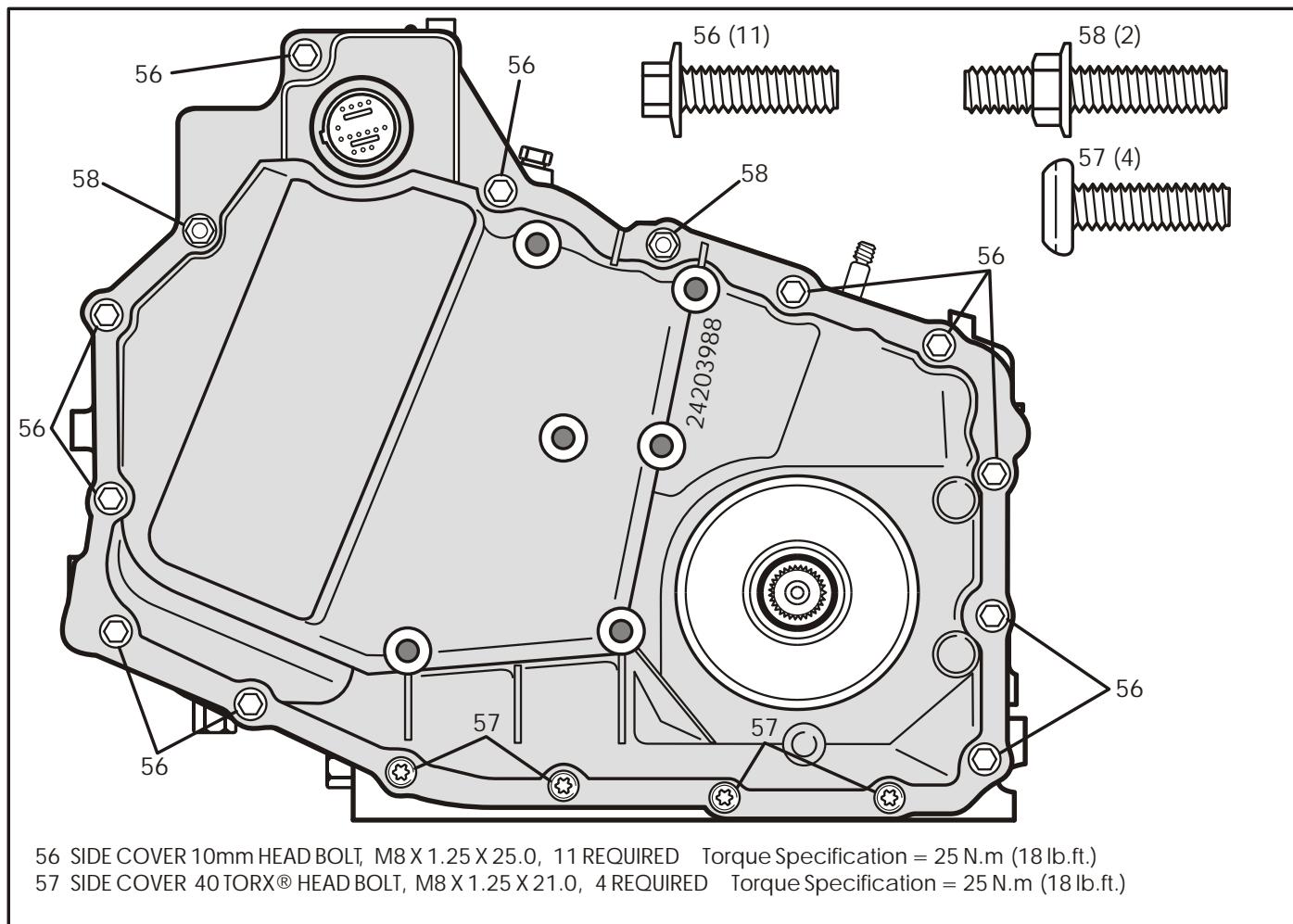


Figure 195

**Continued from Page 96.**

122. Install side cover gasket onto transaxle case surface, as shown in Figure 194.
123. Install the side cover lathe cut rubber seal into groove on inside of side cover and retain with petrolatum or adhesive (See Figure 194).
124. Install side cover assembly onto transaxle case ensuring no pinched wires (See Figure 194).
125. Install 17 side cover retaining bolts using the chart in Figure 195 to determine their proper locations.
126. Torque all side cover bolts using specifications found in Figure 195, to 25 N.m (18 lb.ft.).
127. Rotate transaxle so that bottom pan surface is facing up.

## ASSEMBLE BOTTOM PAN AND RELATED PARTS

1. Use tool J-34094-A in order to set the height of middle thermo element pin (See Figure 196).
2. Install the thermo element orifice plate around middle pin (123), as shown in Figure 197.
3. Use tool J-34094-A in order to set the height of of the outside pin and washer (120) that is the farthest from the accumulators, as shown in Figure 196.
4. Use tool J-34094-A in order to set the height of the second outside pin and washer (120) shown in Figure 196.
5. Carefully install thermo element (121) between the two outside pins, as shown in Figure 197.
6. The "V" in the thermo element (121) **must** contact the thermo element orifice plate (122) after installation (See Figure 197).
7. Install a new oil filter seal into transaxle case, using a socket and plastic mallet, as shown in Figure 198.

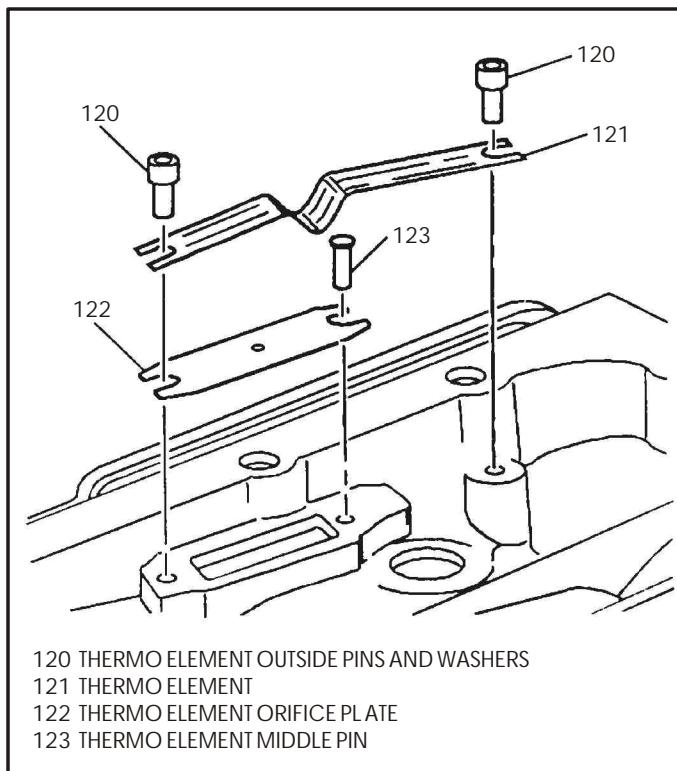


Figure 197

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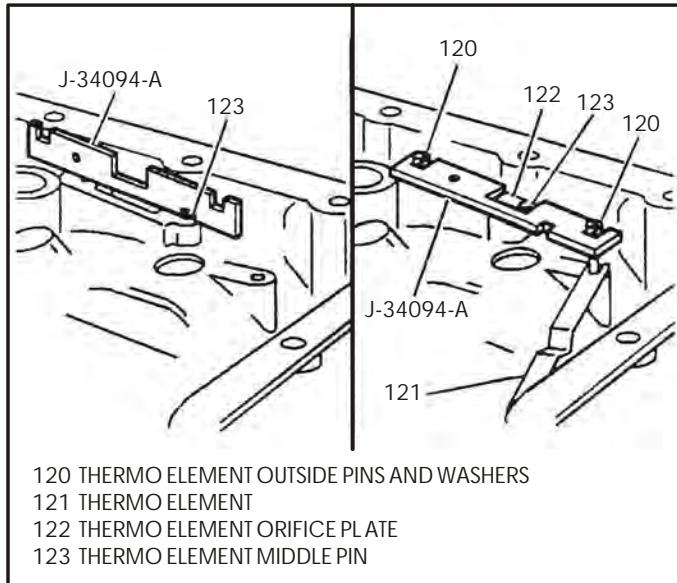


Figure 196

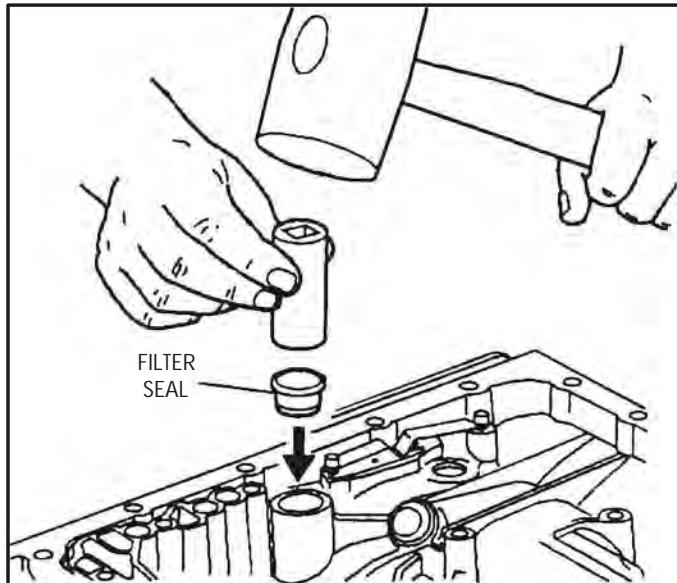


Figure 198

# Technical Service Information

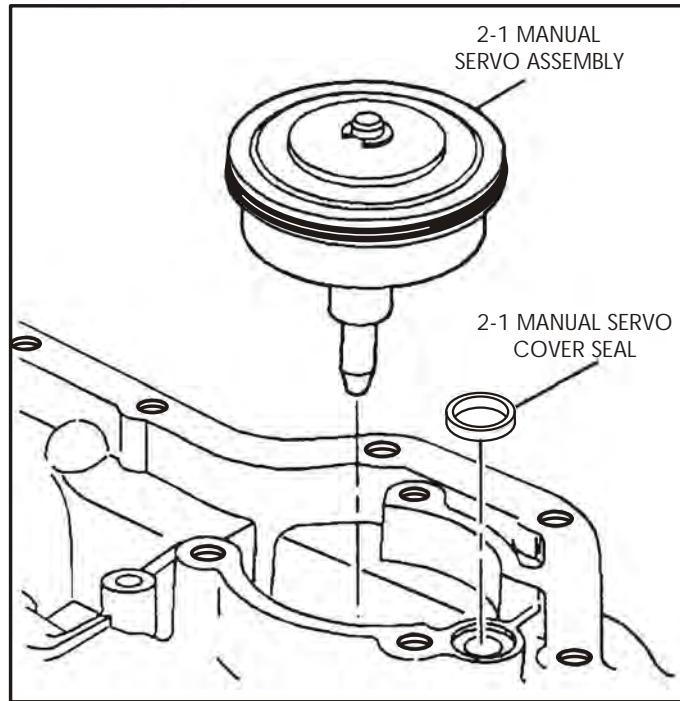


Figure 199

**Continued from Page 99.**

8. Install the pre-assembled 2-1 manual servo assembly into the case, as shown in Figure 199, with the servo screen oriented toward the side cover.  
*Note: Ensure that the servo pin engages the 2-1 manual band assembly.*
9. Install the 2-1 manual servo seal into the case cavity, as shown in Figure 199.
10. Ensure that the feed pipes are still assembled correctly in the pre-assembled accumulator housing and the 2-1 manual servo cover, shown in Figure 200.
11. Install the pre-assembled accumulator housing, 2-1 manual servo cover and feed pipe assembly onto the transaxle as an assembly, as shown in Figure 200.
12. Install the four retaining bolts in accumulator housing, and three retaining bolts in 2-1 manual servo cover, as shown in Figure 201.
13. Torque the three 2-1 manual servo cover bolts to 24 N.m (17 lb.ft.).
14. Torque the four accumulator housing bolts to 11 N.m (97 lb.in.).
15. Install the final drive lube pipe clip in position in the transaxle case, using a large screwdriver, as shown in Figure 201.
16. Assemble the forward servo assembly as shown in Figure 204.
17. Install new lip seal on the forward servo piston with the lip facing towards the servo cover, as shown in Figure 204.

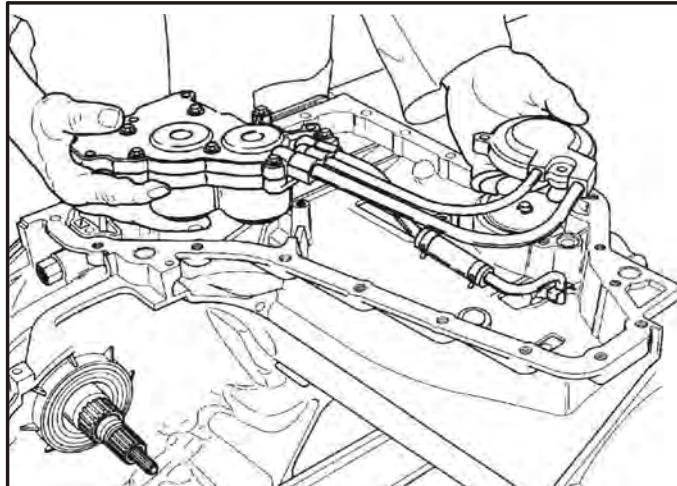


Figure 200

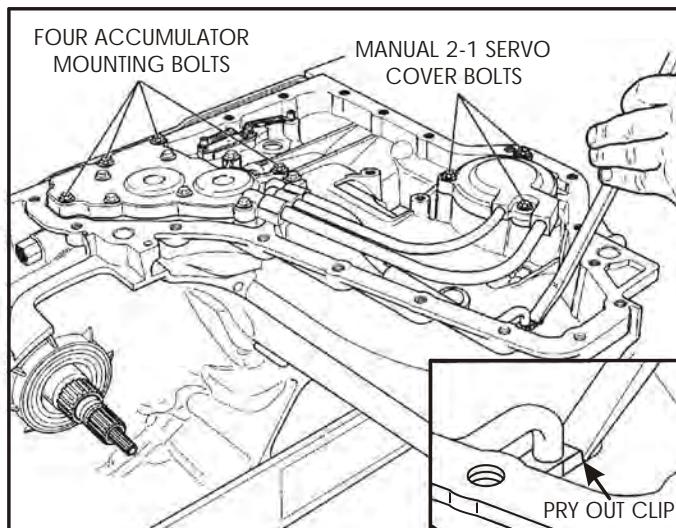


Figure 201

# Technical Service Information

18. Install the forward servo piston and apply pin assembly into the forward servo cover. Refer to Figure 202.
19. Install new servo cover seal on the forward servo cover and install the assembly into the transaxle case (See Figure 202).
- Note: Ensure that the apply pin is engaged on the forward band assembly.**
20. Pry servo cover in with large screwdriver, as shown in Figure 202, and start the three servo cover retaining bolts, **by hand**.
21. Turn the servo cover retaining bolts in evenly using a speed handle, as shown in Figure 203.
22. Torque the three servo cover retaining bolts to 10 N.m (89 lb.in.).

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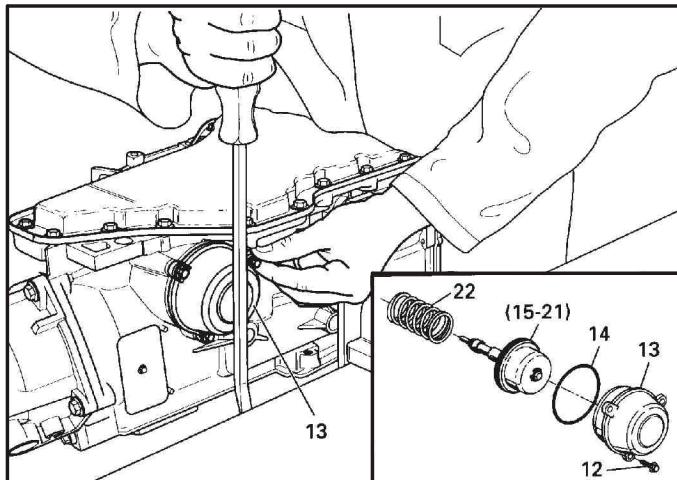


Figure 202

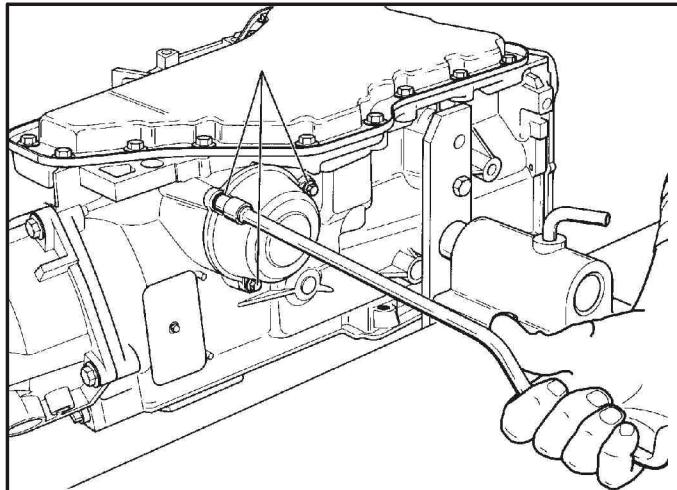


Figure 203

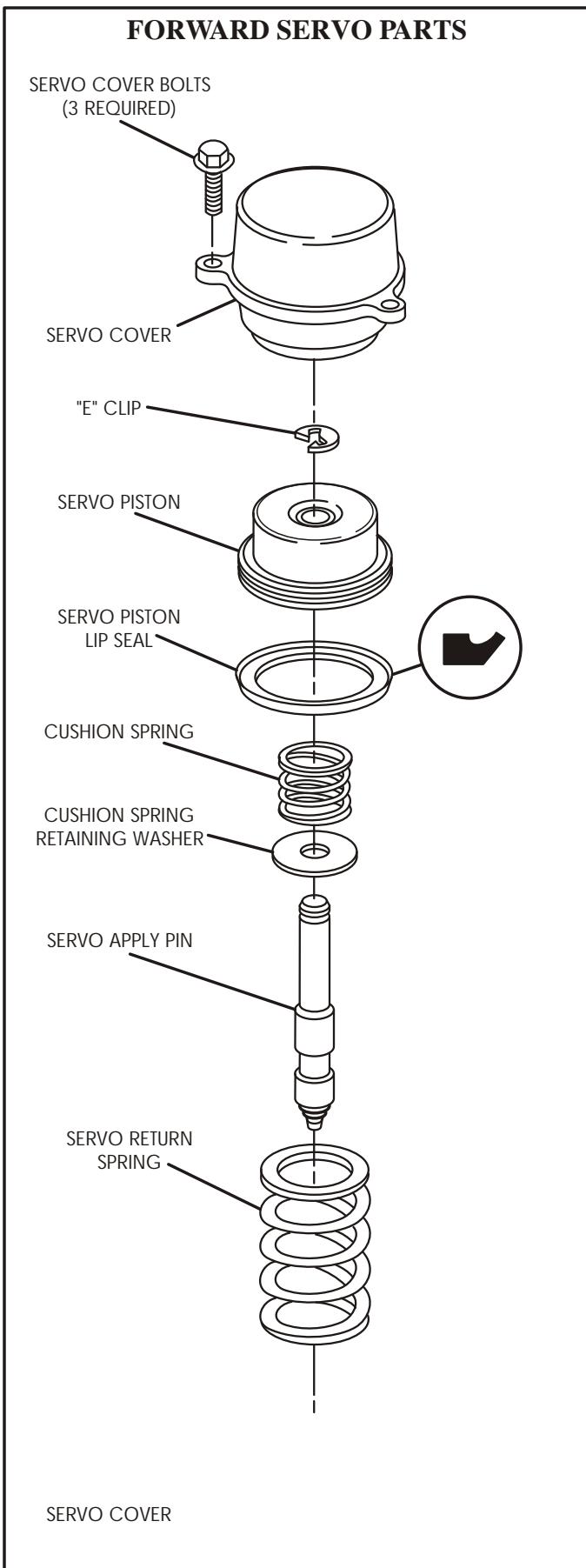


Figure 204

Continued from Page 101.

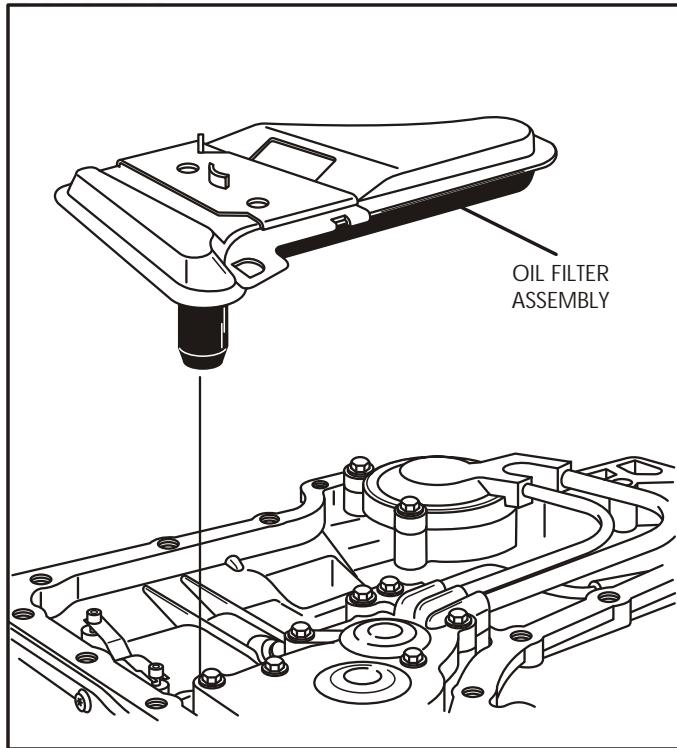


Figure 205

23. Install the bottom pan oil filter assembly into transaxle case as shown in Figure 205. Use a plastic mallet to **gently** tap the oil filter into the seal.
24. Install the bottom pan gasket on the transaxle case, as shown in Figure 206.  
**Note:** *This gasket is reusable as long as the bead on the gasket is not broken.*
25. Install the bottom pan onto the transaxle case, as shown in Figure 206.
26. Install the 20 bottom pan bolts and torque the bolts to 14 N.m (10 lb.ft.).
27. Rotate the transaxle in the fixture so that the bottom pan is facing down.
28. Assemble the reverse band servo as shown in Figure 207.
29. Install new lip seal on reverse servo piston, as shown in Figure 207, with the lip facing the servo cover.

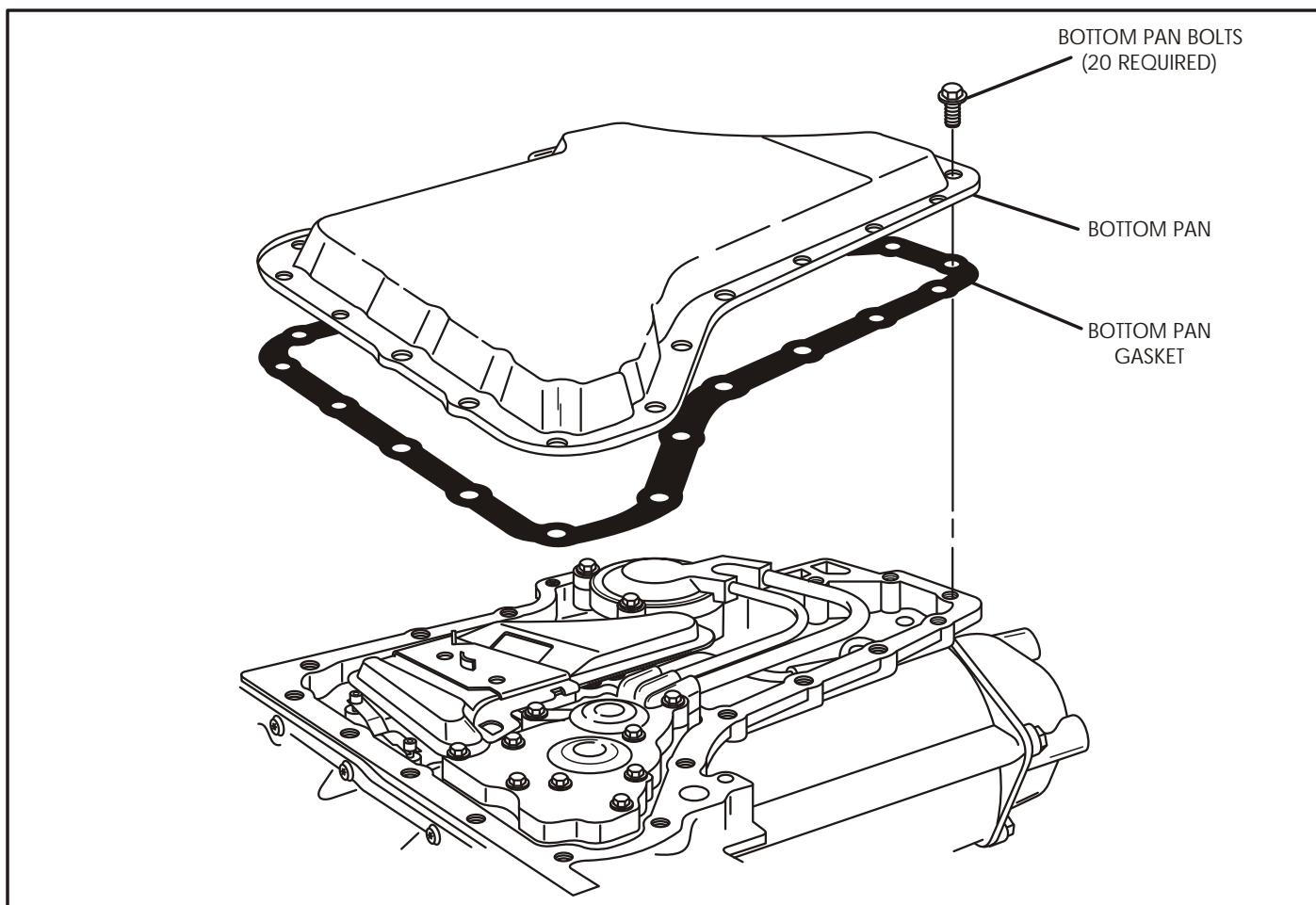


Figure 206

# Technical Service Information

30. Install the reverse servo piston assembly into the transaxle case bore as shown in Figure 207.
31. Install new "O" ring seal on the reverse servo cover and lubricate with petrolatum. Refer to Figure 207.
32. Install reverse servo cover and use the support fixture as a pivot point to push the servo cover downward with a large screwdriver, as shown in Figure 208.

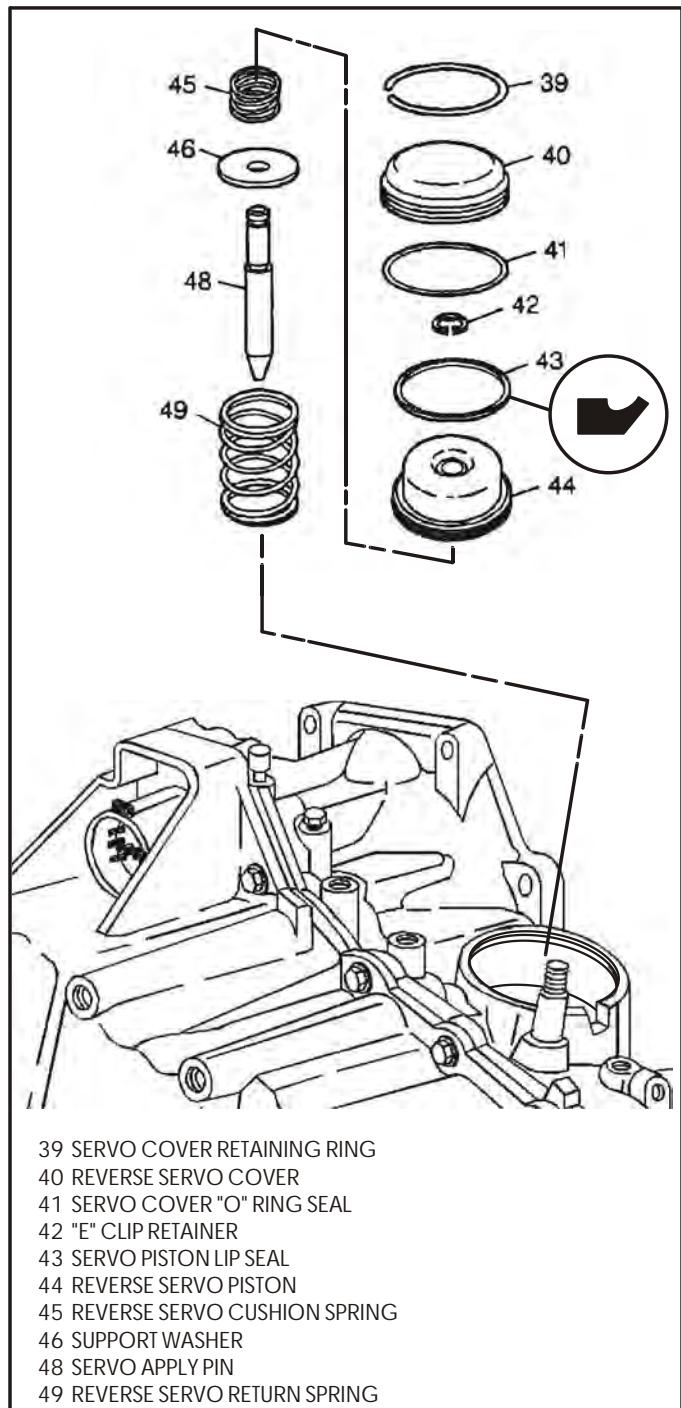


Figure 207

33. While the servo cover is compressed, use small screwdriver to install the servo cover snap ring, as shown in Figure 208.
34. Install new "O" ring seal into the groove in the turbine shaft and lubricate with transmission fluid, as shown in Figure 209.

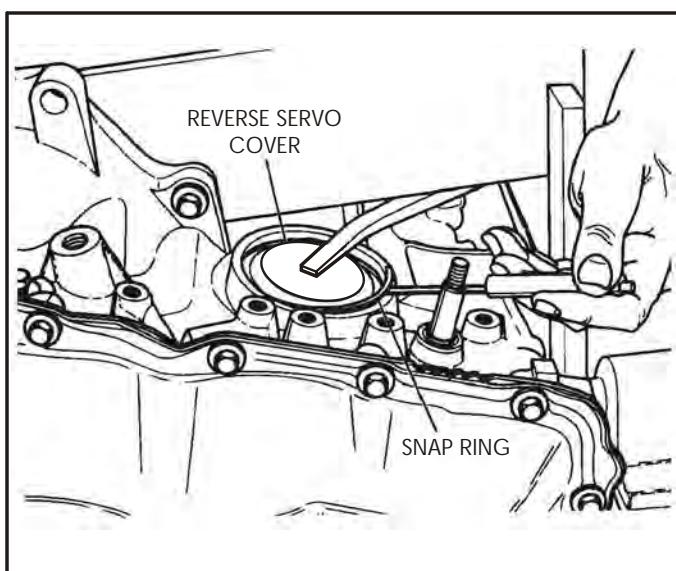


Figure 208

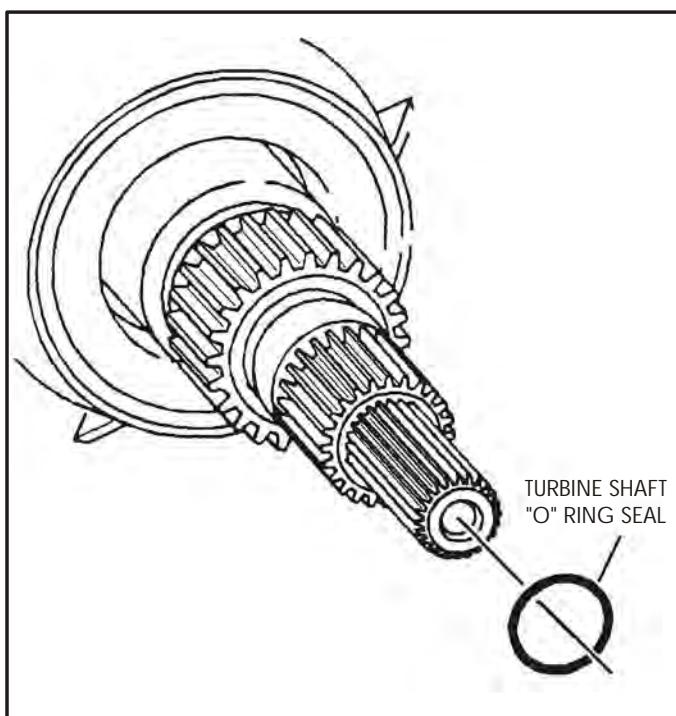


Figure 209

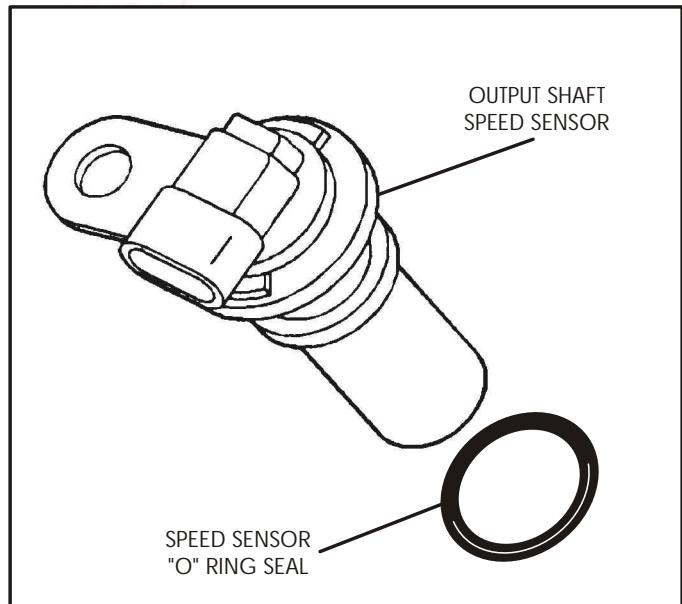
**Continued from Page 103.**

Figure 210

35. Install new "O" ring seal on the output speed sensor and lubricate with petrolatum, as shown in Figure 210.
36. Install the speed sensor into final drive housing and torque the bolt to 11 N.m (98 lb.in.), shown in Figure 211.
37. Inspect the torque converter for any damage to the hub, threads in converter lugs and replace the converter hub bushing as necessary. Refer to Figure 212.
38. Position the torque converter on the bench with flywheel lugs facing down (See Figure 213).
39. Install the end play measuring tools as shown in Figure 213 onto the converter.
40. Set the dial indicator to zero.
41. Lift J-35138 and record dial indicator reading. Torque converter end play should be, 0.5 mm (.020") or less. Replace as necessary.
42. Remove the transaxle from the bench fixture and remove mounting fixture (See Figure 214).
43. Install the torque converter into the transaxle, as shown in Figure 215, after pouring about two quarts of transmission fluid into converter.

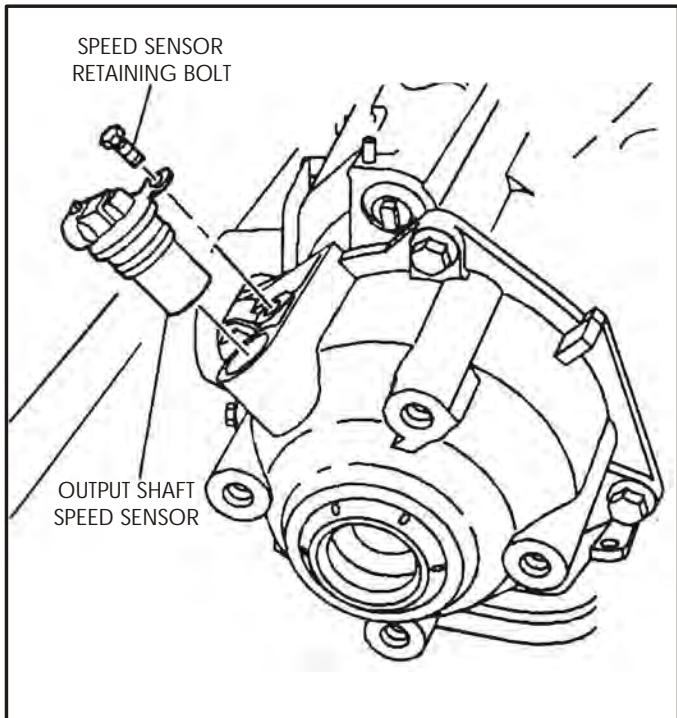


Figure 211

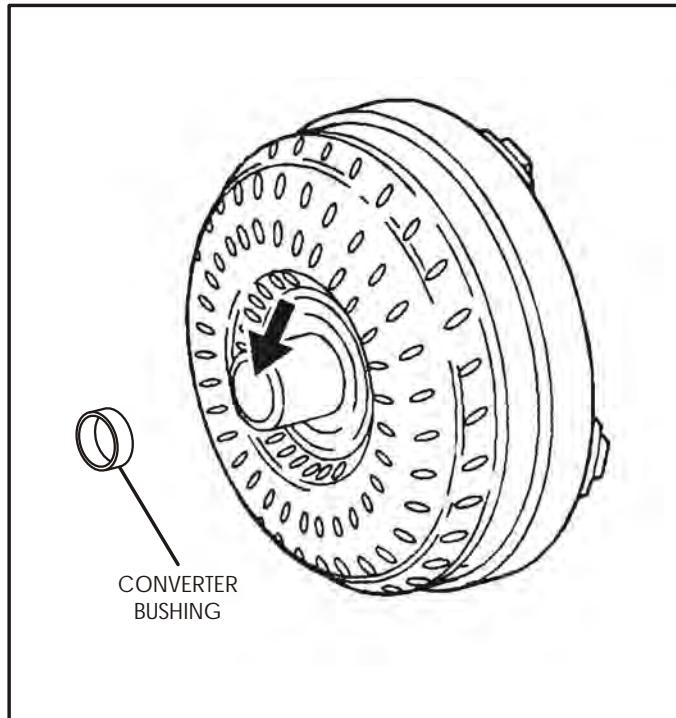


Figure 212

## Fluid Capacity Specifications (Approximate)

	Liters	Quarts
Bottom Pan Removal	7.0	7.4
Complete Rebuild	9.5	10.0
Completely Dry	12.7	13.4

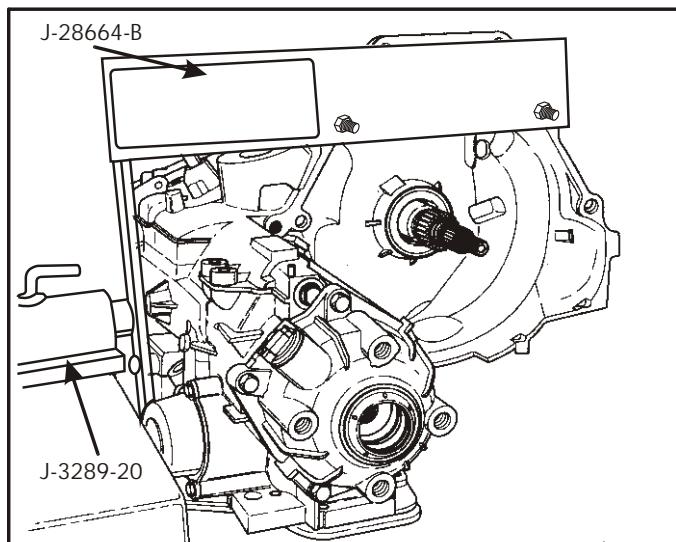


Figure 214

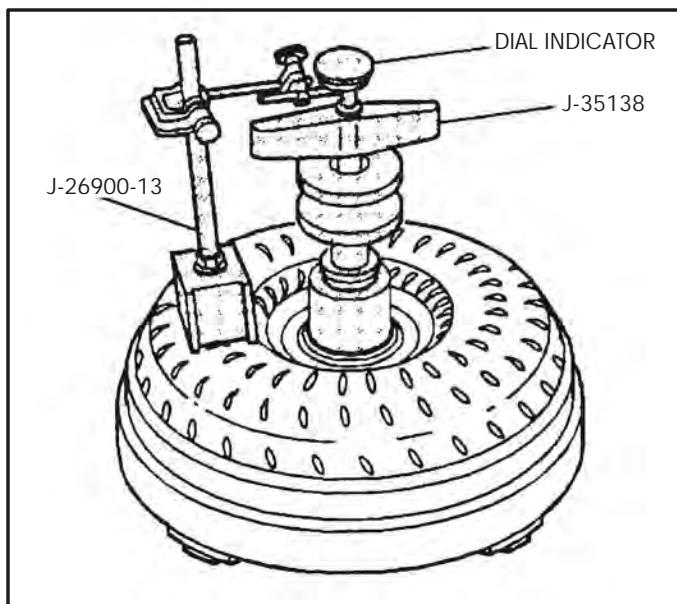


Figure 213

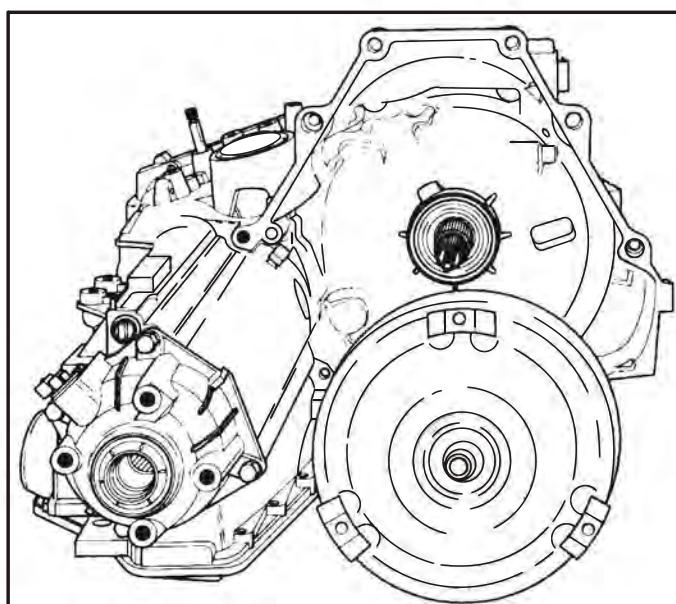


Figure 215



# Technical Service Information

## TORQUE SPECIFICATIONS

Num	Description of Use	Qty	Thread Size	N.m	Lb. Ft.	Lb. In.
5	Final Drive Housing Bolts	4	M10 X 1.5 X 35	36	26	-----
9	Vehicle Speed Sensor Bolt	1	M8 X 1.25 X 12	12	-----	106
12	Forward Servo Cover Bolts	3	M6 X 1.0 X 20	12	-----	106
23	Bottom Oil Pan Bolts	20	M6 X 1.0 X 17	14	10	-----
28	Cooler Line Fitting "To Cooler"	1	1/4 - 18 NPSF	38	28	-----
29	Cooler Line Fitting "From Cooler"	1	1/4 - 18 NPSF	38	28	-----
38	Transaxle Line Pressure Test Plug	1	1/8 - 27 NPTF	12	-----	106
56	Side Cover Bolts (Flange)	9	M8 X 1.25 X 25	25	18	-----
57	Side Cover Bolts (Torx ® Special)	4	M8 X 1.25 X 21	25	18	-----
58	Side Cover Bolts (Stud)	2	M8 X 1.25 X 24	25	18	-----
103	2-1 Manual Servo Cover Bolts	3	M8 X 1.25 X 25	24	17	-----
131	Accumulator Cover Bolts	11	M6 X 1.0 X 28	12	-----	106
205	Oil Pump Cover Retaining Bolt	1	M6 X 1.0 X 20	8	-----	70
206	Oil Pump Bolts	2	M6 X 1.0 X 95	16	11	-----
207	Oil Pump Bolts	9	M6 X 1.0 X 85	12	-----	106
374	Valve Body Bolts	3	M6 X 1.0 X 65	12	-----	106
375	Valve Body Bolts	3	M6 X 1.0 X 60	12	-----	106
376	Valve Body Bolts	1	M6 X 1.0 X 30	12	-----	106
377	Valve Body Bolts (Torx ®)	2	M6 X 1.0 X 45	12	-----	106
378	Valve Body Bolts	3	M6 X 1.0 X 55	12	-----	106
379	Valve Body Bolts	1	M6 X 1.0 X 95	16	11	-----
380	Valve Body Bolts	1	M8 X 1.25 X 90	25	18	-----
381	Valve Body Bolts	2	M6 X 1.0 X 20	8	-----	70
384	Valve Body Bolts	1	M6 X 1.0 X 85	12	-----	106
433	Case Cover Bolt (Torx ® Special)	1	M6 X 1.0 X 32	12	-----	106
434	Case Cover Bolts	3	M6 X 1.0 X 40	12	-----	106
435	Case Cover Bolts	3	M8 X 1.25 X 50	25	18	-----
436	Case Cover Bolts	3	M6 X 1.0 X 30	12	-----	106
524	Drive Sprocket Support Bolts	4	M8 X 1.25 X 24	25	18	-----
803	Manual Shaft Detent Lever Nut	1	M10 X 1.5	32	23	-----
805	Detent Lever Spring Bolt	1	M6 X 1.0 X 16	12	-----	106

Figure 216

# Technical Service Information

## SPECIAL TOOLS

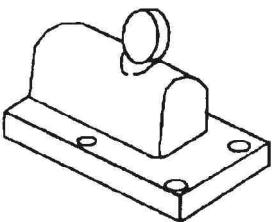
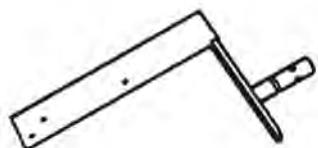
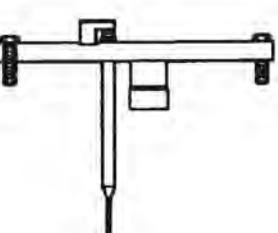
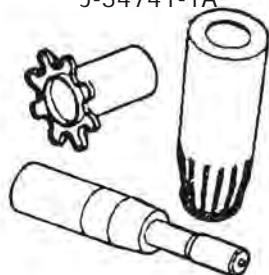
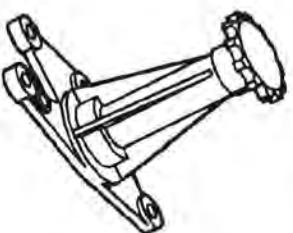
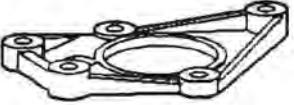
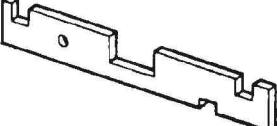
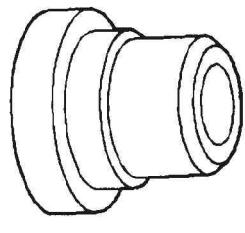
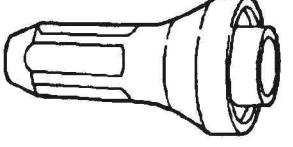
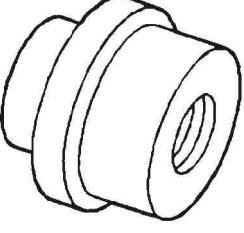
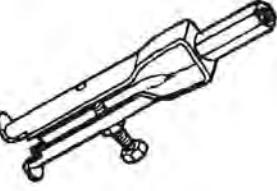
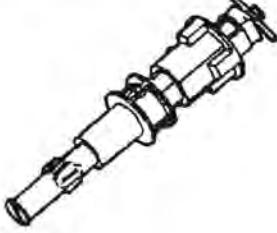
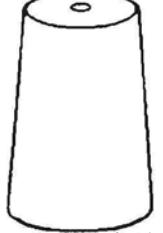
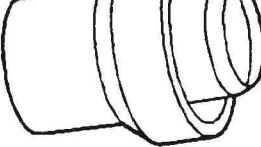
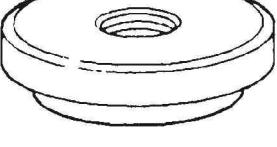
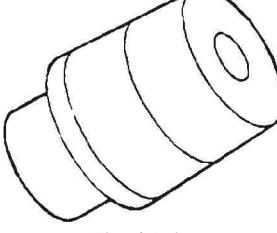
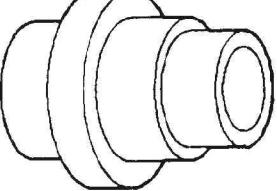
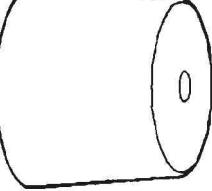
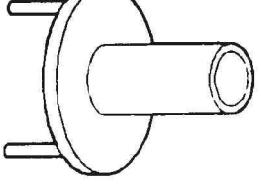
J-3289-20 	J-28664-B 	J-33386 	J-34741-1A 
Transmission Holding Fixture Base	Transmission Holding Fixture	Input Shaft End Play Tool	Input Seal Installation Set
J-26958 	J-38385 	J-34094-A 	J-25019-6 
Output Shaft Loading Tool	Output Shaft Loading Tool Adapter	Thermo Element Height Gage	Bushing Installer
J-28540 	J-28677 	J-29369-2 	J-33381-A 
Converter Seal Installer	Drive Sprocket Support Bearing Installer	Universal Bushing Remover	Clutch Drum/Final Drive Remover and Installer
J-37361 	J-29130 	J-34126 	J-26958-10 
Input Clutch Piston Seal Protector	Axe Seal Installer	Drive Sprocket Support Bearing Installer	Final Drive Adapter Plug
J-28698 	J-42562 	J-37362 	J-4670-01 
Pump Bearing Installer and Remover	Axe Removal Wedge	Third Clutch Piston Seal Protector	Fourth Clutch Spring Compressor

Figure 217

# Technical Service Information

## SPECIAL TOOLS

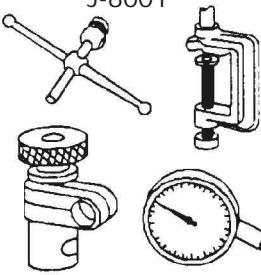
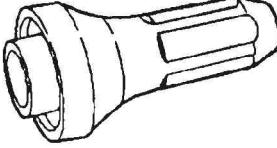
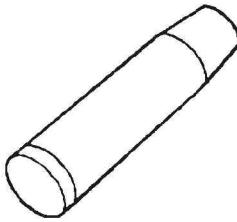
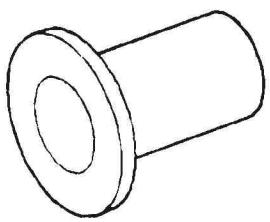
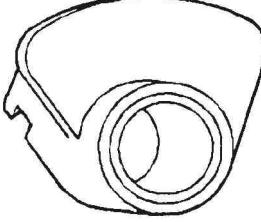
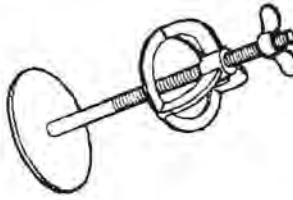
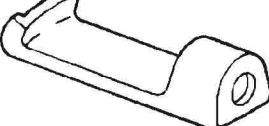
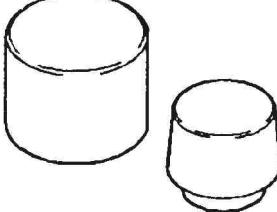
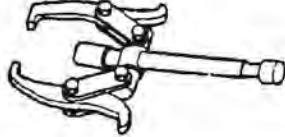
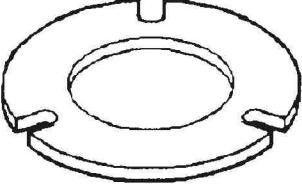
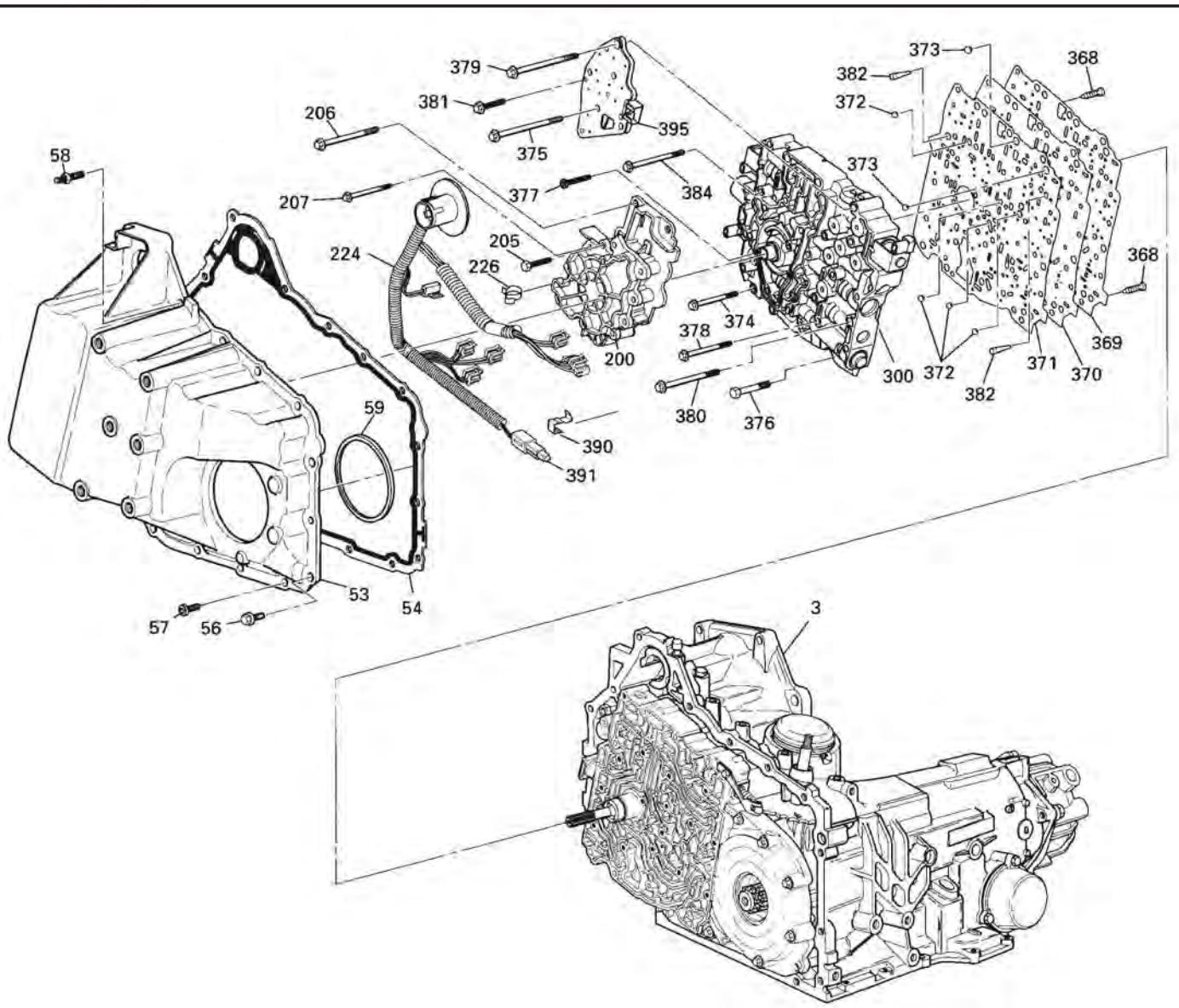
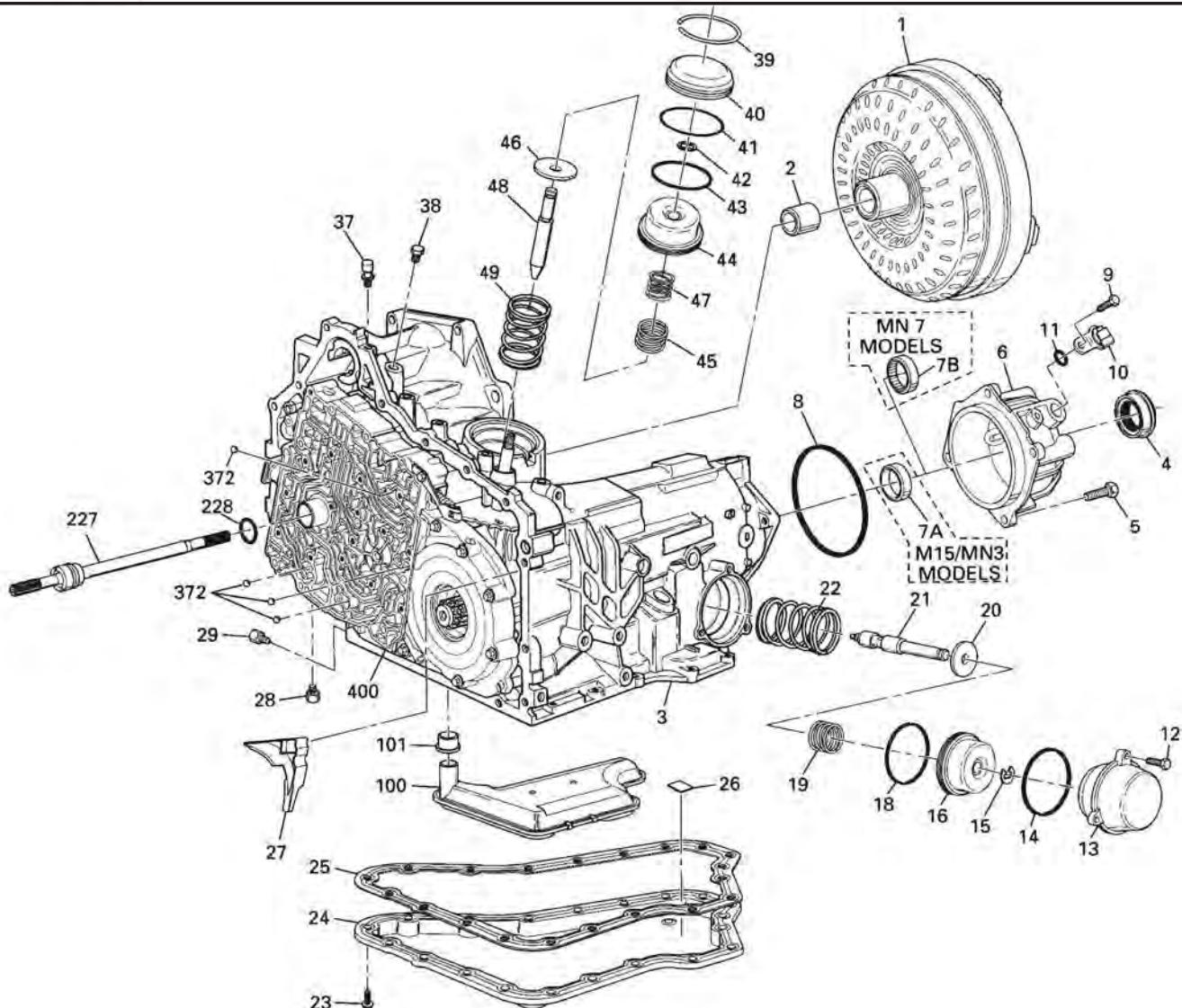
J-35138 	J-26900-13 	J-8001 	J-34115 
Torque Converter End Play Lifter	Magnetic Indicator Base	Dial Indicator	Left Axle Seal Installer
J-29569-1/J-29829-1 	J-29569-2/J-29829-2 	J-34129 	J-9186 
Turbine Shaft Solid Seal Installers	Turbine Shaft Solid Seal Resizers	Driven Sprocket Support Bearing Remover	Clutch Drum Spring Compressor
J-23129 	J-38358 	J-41022 	J-28585 
Seal Remover	1-2 Support Remover and Installer	Spiral Lock Snap Ring Installer	Snap Ring Remover
J-22888-D 	J-25018-A 	J-36850 	
Speed Sensor Rotor Puller	Third Clutch Spring Compressor Adapter	Assembly Lubricant	

Figure 218



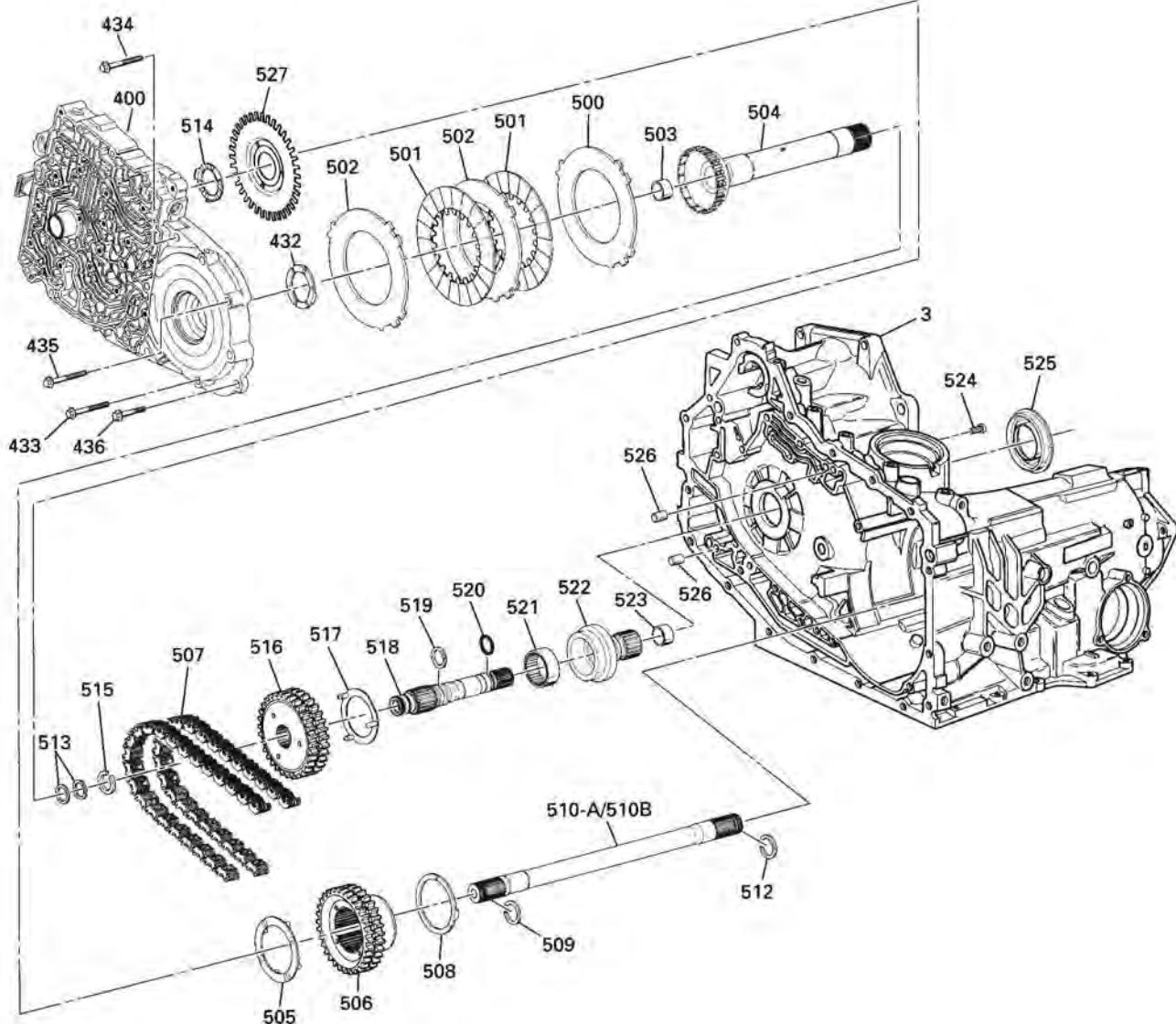
3 TRANSAXLE CASE ASSEMBLY	372 BALL CHECK VALVE, 1/4" DIAMETER
53 CASE SIDE COVER	373 BALL CHECK VALVE, 3/8" DIAMETER
54 CASE SIDE COVER GASKET	374 CONTROL VALVE BODY BOLT, M6 X 1.0 X 65 (3)
56 CASE SIDE COVER BOLTS (FLANGED), M8 X 1.25 X 25 (11)	375 CONTROL VALVE BODY BOLT, M6 X 1.0 X 60 (3)
57 CASE SIDE COVER BOLTS (TORX ®), M8 X 1.25 X 21 (4)	376 CONTROL VALVE BODY BOLT, M6 X 1.0 X 30 (1)
58 CASE SIDE COVER STUD, M8 X 1.25 X 24 (2)	377 CONTROL VALVE BODY TORX ® BOLT, M6 X 1.0 X 30 (2)
59 SIDE COVER TO CHANNEL PLATE SEAL	378 CONTROL VALVE BODY BOLT, M6 X 1.0 X 55 (3)
200 OIL PUMP ASSEMBLY	379 CONTROL VALVE BODY BOLT, M6 X 1.0 X 95 (1)
205 PUMP COVER BOLT, M6 X 1.0 X 20 (1)	380 CONTROL VALVE BODY BOLT, M8 X 1.25 X 90 (1)
206 PUMP BODY TO CASE BOLT, M6 X 1.0 X 95 (2)	381 CONTROL VALVE BODY BOLT, M6 X 1.0 X 20 (1)
207 OIL PUMP BOLT, M6 X 1.0 X 85 (9)	382 TCC/PWM SOLENOID SCREEN ASSEMBLY
224 INTERNAL WIRING HARNESS ASSEMBLY	384 CONTROL VALVE BODY BOLT, M6 X 1.0 X 85 (1)
226 WIRING HARNESS CLIP	390 TEMPERATURE SENSOR CLIP
300 CONTROL VALVE BODY	391 TRANSAXLE FLUID TEMPERATURE SENSOR
368 SPACER PLATE AND GASKET RETAINER	395 FLUID PRESSURE SWITCH ASSEMBLY
369 SPACER PLATE TO CHANNEL PLATE GASKET	
370 VALVE BODY SPACER PLATE	
371 VALVE BODY TO SPACER PLATE GASKET	

Figure 219



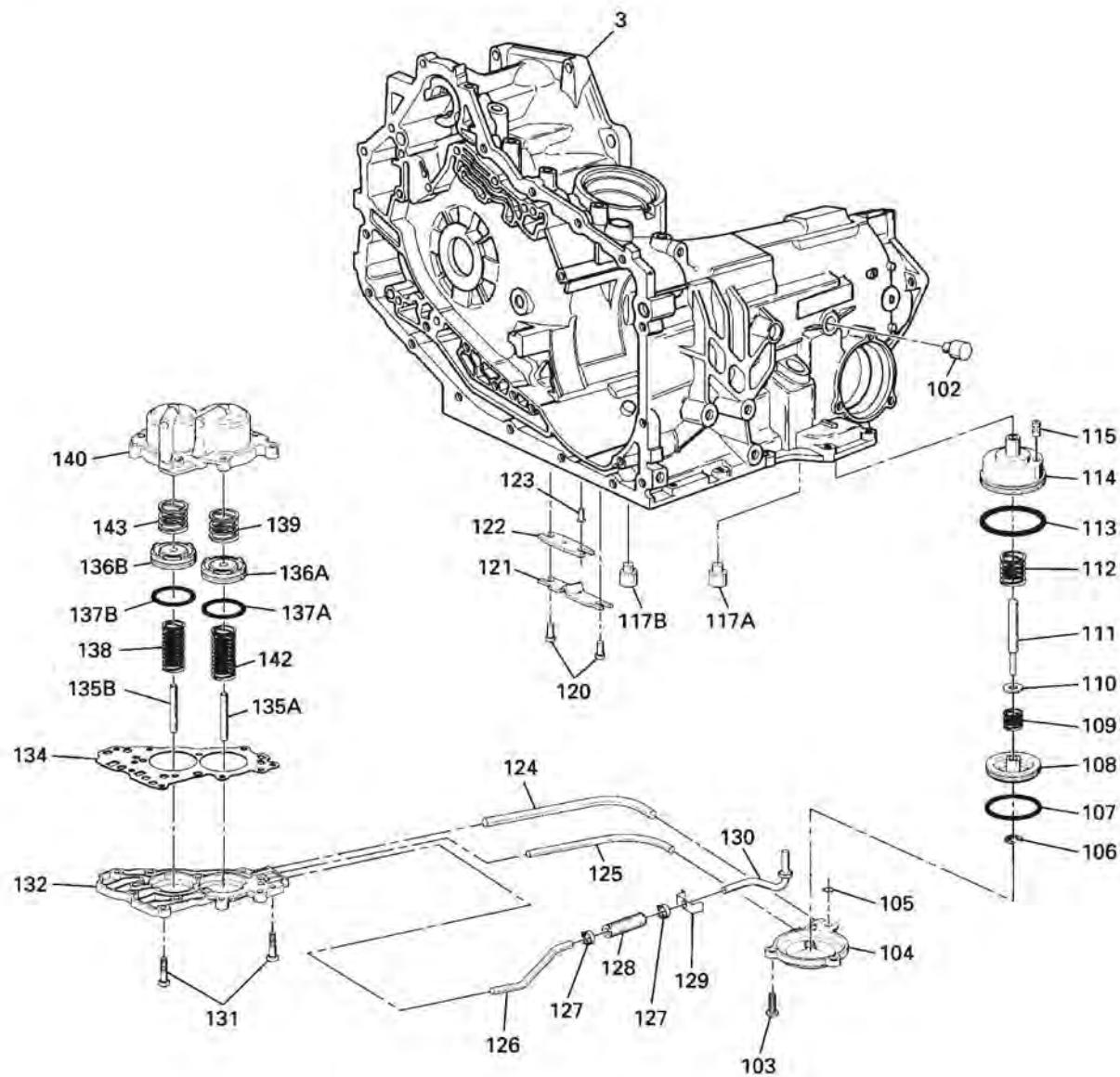
- MN 7 MODELS  
7B  
7A M15/MN3 MODELS

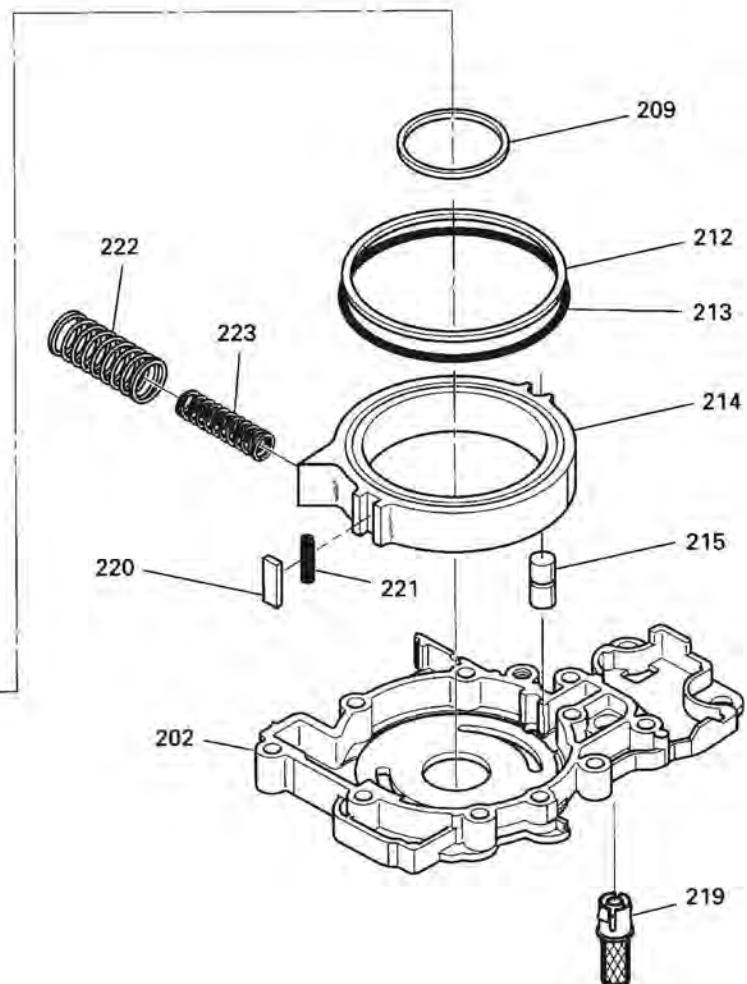
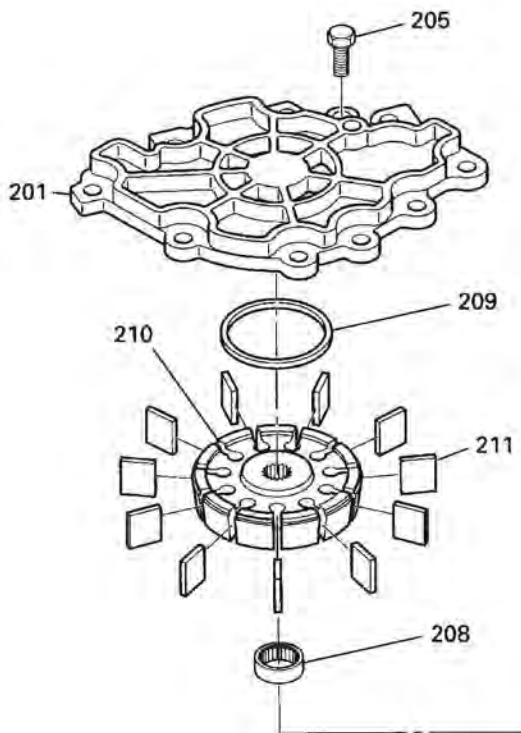
Figure 220



- 3 TRANSAXLE CASE ASSEMBLY  
 400 CASE COVER ASSEMBLY COMPLETE  
 432 4TH CLUTCH SHAFT THRUST WASHER  
 433 CASE COVER BOLT, TORX®, M6 X 1.0 X 32 (1)  
 434 CASE COVER BOLT, M6 X 1.0 X 40 (3)  
 435 CASE COVER BOLT, M8 X 1.25 X 50 (3)  
 436 CASE COVER BOLT, M6 X 1.0 X 30 (3)  
 500 4TH CLUTCH BACKING PLATE  
 501 4TH CLUTCH FIBER PLATE (2)  
 502 4TH CLUTCH STEEL PLATE (2)  
 503 4TH CLUTCH SHAFT BEARING ASSEMBLY  
 504 4TH CLUTCH HUB AND SHAFT ASSEMBLY  
 505 4TH CLUTCH HUB TO DRIVEN SPROCKET THRUST WASHER  
 506 DRIVEN SPROCKET ASSEMBLY  
 507 DRIVE CHAIN ASSEMBLY (2)  
 508 DRIVEN SPROCKET THRUST WASHER  
 509 OUTBOARD DRIVE SHAFT RETAINING RING  
 510 OUTPUT SHAFT  
 512 INBOARD DRIVE SHAFT RETAINING RING  
 513 TURBINE SHAFT SOLID SEAL RING (2)  
 514 DRIVE SPROCKET THRUST WASHER  
 515 DRIVE SPROCKET SNAP RING  
 516 DRIVE SPROCKET ASSEMBLY  
 517 DRIVE SPROCKET THRUST WASHER  
 518 TURBINE SHAFT ASSEMBLY  
 519 TURBINE SHAFT SOLID SEAL RING (1)  
 520 TURBINE SHAFT "O" RING SEAL  
 521 DRIVE SPROCKET SUPPORT BEARING ASSEMBLY  
 522 DRIVE SPROCKET SUPPORT  
 523 DRIVE SPROCKET SUPPORT BUSHING  
 524 DRIVE SPROCKET SUPPORT BOLT, M8 X 1.25 X 24 (4)  
 525 TORQUE CONVERTER OIL SEAL ASSEMBLY  
 526 CASE COVER DOWEL PINS  
 527 INPUT SPEED SENSOR RELUCTOR WHEEL

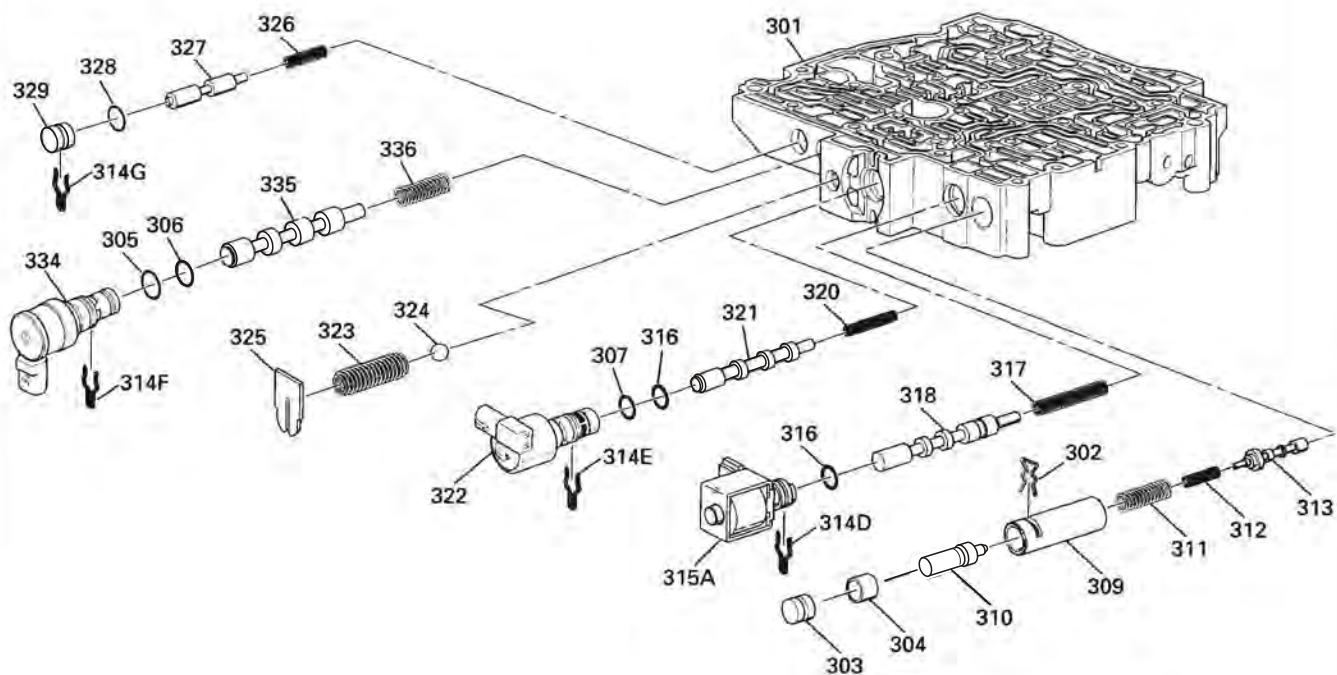
Figure 221





201 OIL PUMP COVER  
202 OIL PUMP BODY  
205 OIL PUMP COVER BOLT, M6 X 1.0 X 20 (1)  
208 OIL PUMP DRIVE SHAFT BEARING ASSEMBLY  
209 OIL PUMP VANE RING (2)  
210 OIL PUMP TAPERED ROTOR, SELECTIVE  
211 OIL PUMP VANES, SELECTIVE (11)  
212 OIL PUMP SLIDE OIL SEAL RING  
213 OIL PUMP SLIDE "O" RING SEAL  
214 OIL PUMP SLIDE, SELECTIVE  
215 OIL PUMP SLIDE PIVOT PIN  
219 OIL PUM OUTLET SCREEN ASSEMBLY  
220 OIL PUMP SLIDE SEAL  
221 OIL PUMP SLIDE SEAL SUPPORT  
222 OIL PUMP PRIME OUTER SPRING  
223 OIL PUMP PRIME INNER SPRING

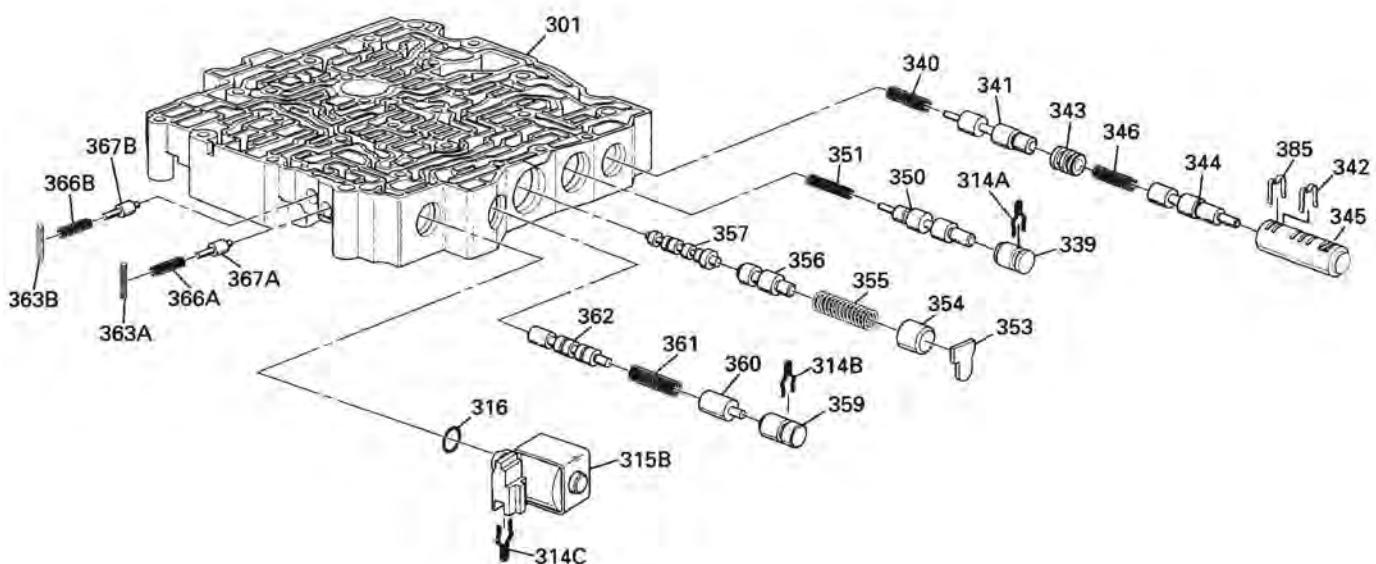
Figure 223



301 CONTROL VALVE BODY  
 302 LINE BOOST VALVE AND BUSHING RETAINER  
 303 LINE BOOST VALVE BORE PLUG  
 304 LINE BOOST VALVE  
 305 TCC PWM SOLENOID "O" RING SEAL  
 306 TCC PWM SOLENOID "O" RING SEAL  
 307 PRESSURE CONTROL SOLENOID "O" RING SEAL  
 309 REVERSE BOOST VALVE BUSHING  
 310 REVERSE BOOST VALVE  
 311 PRESSURE REGULATOR VALVE OUTER SPRING  
 312 PRESSURE REGULATOR VALVE INNER SPRING  
 313 PRESSURE REGULATOR VALVE  
 314D 1-2, 3-4 SHIFT SOLENOID RETAINER  
 314E PRESSURE CONTROL SOLENOID RETAINER  
 314F TCC PWM SOLENOID RETAINER  
 314G TCC REGULATOR APPLY VALVE BORE PLUG RETAINER  
 315A 1-2, 3-4 SHIFT SOLENOID ASSEMBLY  
 316A 1-2, 3-4 SHIFT SOLENOID "O" RING SEAL

317 1-2 SHIFT VALVE SPRING  
 318 1-2 SHIFT VALVE  
 320 TORQUE SIGNAL REGULATOR VALVE SPRING  
 321 TORQUE SIGNAL REGULATOR VALVE  
 322 PRESSURE CONTROL SOLENOID ASSEMBLY  
 323 LINE PRESSURE RELIEF VALVE SPRING  
 324 LINE PRESSURE RELIEF VALVE  
 325 LINE PRESSURE RELIEF VALVE SPRING RETAINER  
 326 TCC REGULATOR APPLY VALVE SPRING  
 327 TCC REGULATOR APPLY VALVE  
 328 TCC REGULATOR APPLY VALVE BORE PLUG "O" RING SEAL  
 329 TCC REGULATOR APPLY VALVE BORE PLUG  
 334 TCC PWM SOLENOID ASSEMBLY  
 335 TCC CONTROL VALVE  
 336 TCC CONTROL VALVE SPRING

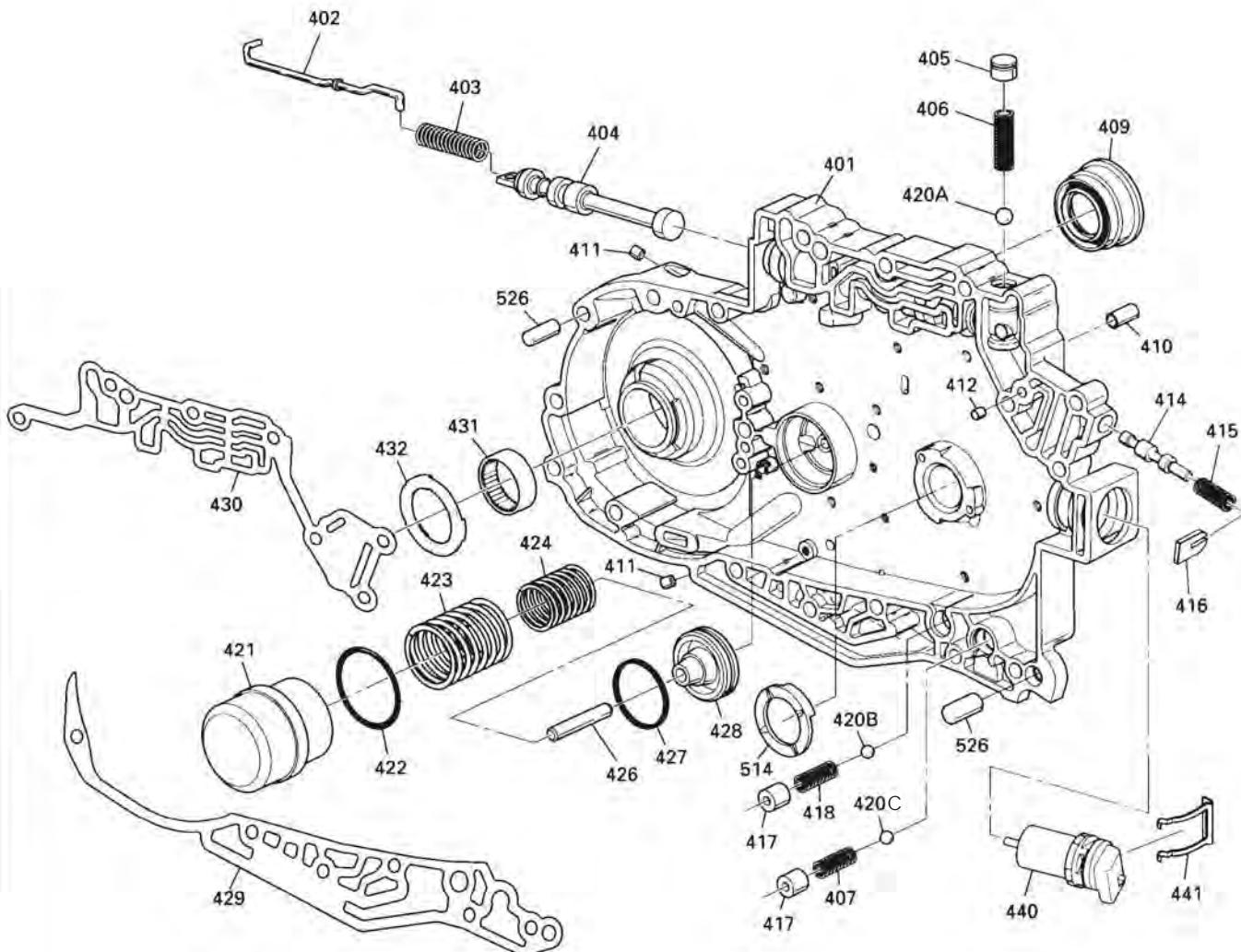
Figure 224



301 CONTROL VALVE BODY  
 314A 1-2, 3-4 ACCUMULATOR VALVE RETAINER  
 314B 4-3 MANUAL DOWNSHIFT VALVE RETAINER  
 314C 2-3 SHIFT SOLENOID RETAINER  
 315B 2-3 SHIFT SOLENOID ASSEMBLY  
 316 2-3 SHIFT SOLENOID "O" RING SEAL  
 339 1-2 ACCUMULATOR VALVE BORE PLUG  
 340 3-4 ACCUMULATOR VALVE SPRING  
 341 3-4 ACCUMULATOR VALVE  
 342 2-3 ACCUMULATOR VALVE BUSHING RETAINER  
 343 2-3 ACCUMULATOR VALVE BORE PLUG  
 344 2-3 ACCUMULATOR VALVE  
 345 2-3 ACCUMULATOR VALVE BUSHING  
 346 2-3 ACCUMULATOR VALVE SPRING  
 350 1-2 ACCUMULATOR VALVE  
 351 1-2 ACCUMULATOR VALVE SPRING

353 3-2 MANUAL DOWNSHIFT VALVE RETAINER  
 354 3-2 MANUAL DOWNSHIFT VALVE BORE PLUG  
 355 3-2 MANUAL DOWNSHIFT VALVE SPRING  
 356 3-2 MANUAL DOWNSHIFT VALVE  
 357 2-3 SHIFT VALVE  
 359 4-3 MANUAL DOWNSHIFT VALVE BORE PLUG  
 360 4-3 MANUAL DOWNSHIFT VALVE  
 361 4-3 MANUAL DOWNSHIFT VALVE SPRING  
 362 3-4 SHIFT VALVE  
 363A REVERSE SERVO BOOST VALVE BORE ROLL PIN  
 363B FORWARD SERVO BOOST VALVE BORE ROLL PIN  
 366A REVERSE SERVO BOOST VALVE SPRING  
 366B FORWARD SERVO BOOST VALVE SPRING  
 367A REVERSE SERVO BOOST VALVE  
 367B FORWARD SERVO BOOST VALVE  
 385 2-3 ACCUMULATOR VALVE RETAINER

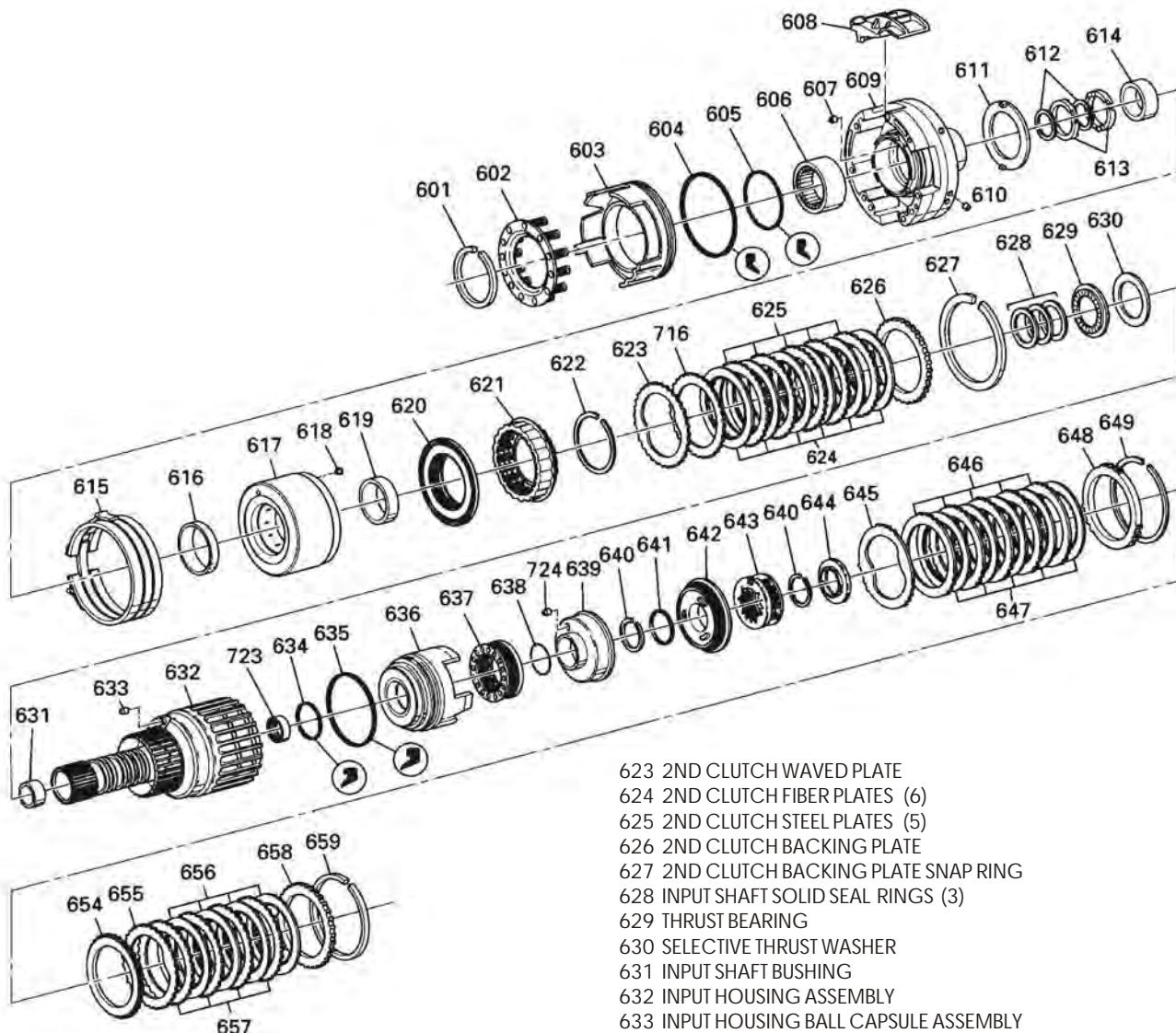
Figure 225



401 CASE COVER ASSEMBLY  
 402 MANUAL VALVE LINK  
 403 MANUAL VALVE LINK RETAINER  
 404 MANUAL VALVE  
 405 LOW BLOW OFF BALL VALVE BORE PLUG  
 406 LOW BLOW OFF BALL VALVE SPRING  
 407 COOLER CHECKBALL VALVE SPRING  
 409 LEFT SIDE AXLE SEAL  
 410 VALVE BODY ALIGNMENT SLEEVE  
 411 BORE PLUG  
 412 ORIFICED CUP PLUG  
 414 ACTUATOR FEED LIMIT VALVE  
 415 ACTUATOR FEED LIMIT VALVE SPRING  
 416 ACTUATOR FEED LIMIT VALVE SPRING RETAINER  
 417 BALL VALVE RETAINER PLUG  
 418 TCC BLOW OFF BALL VALVE SPRING  
 420A LOW BLOW OFF BALL VALVE  
 420B TCC BLOW OFF BALL VALVE

421 3-4 ACCUMULATOR PISTON CYLINDER  
 422 3-4 ACCUMULATOR PISTON CYLINDER "O" RING SEAL  
 423 3-4 ACCUMULATOR PISTON OUTER SPRING  
 424 3-4 ACCUMULATOR PISTON INNER SPRING  
 426 3-4 ACCUMULATOR PISTON PIN  
 427 3-4 ACCUMULATOR PISTON SEAL RING  
 428 3-4 ACCUMULATOR PISTON  
 429 CASE COVER LOWER GASKET  
 430 CASE COVER UPPER GASKET  
 431 BEARING ASSEMBLY  
 432 FOURTH CLUTCH SHAFT THRUST WASHER  
 440 INPUT SPEED SENSOR ASSEMBLY  
 441 INPUT SPEED SENSOR RETAINER CLIP  
 514 DRIVE SPROCKET/CASE COVER THRUST WASHER  
 526 CASE COVER LOCATING DOWEL PIN (2)

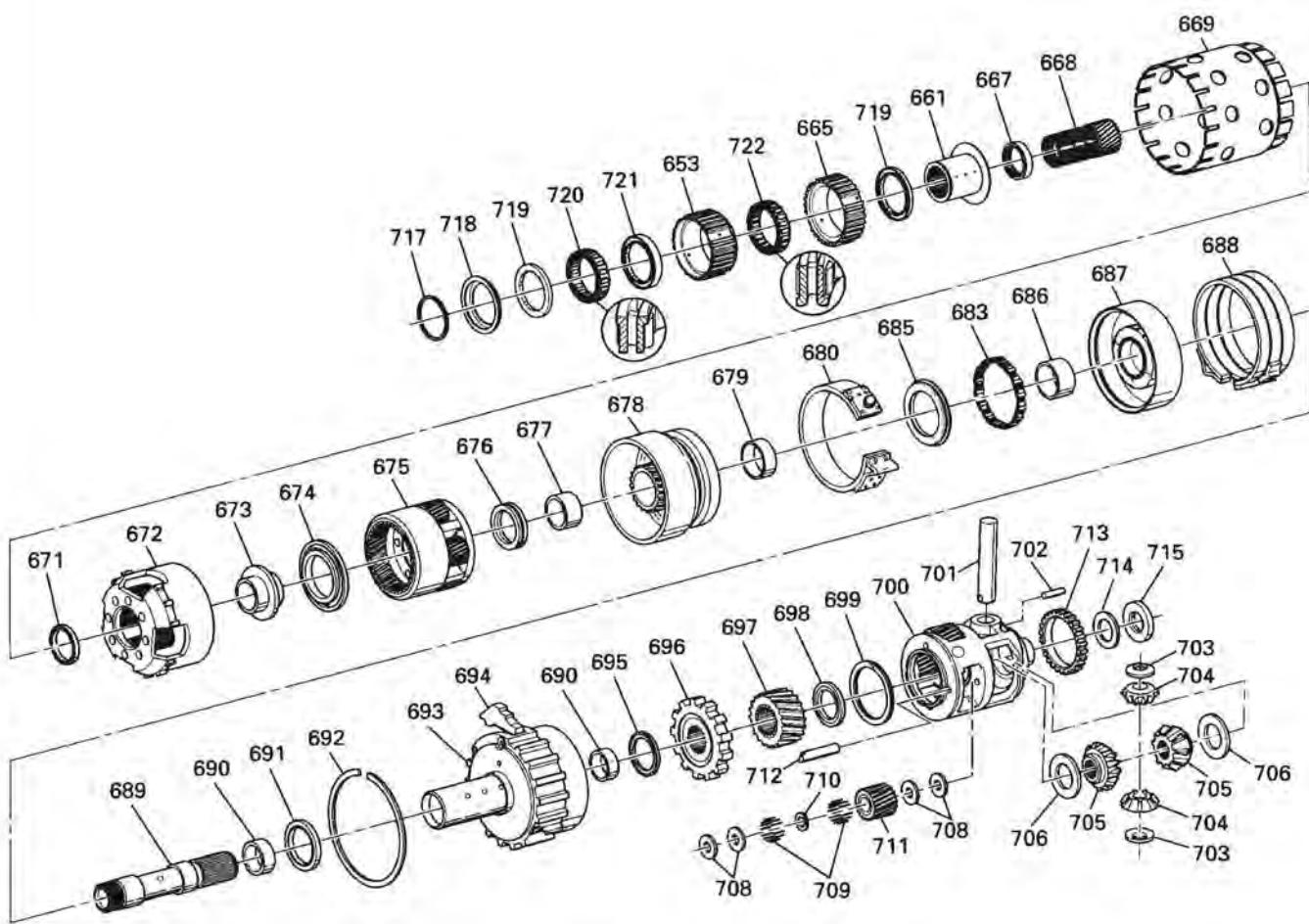
Figure 226



601 4TH CLUTCH RETURN SPRING SNAP RING  
 602 4TH CLUTCH PISTON RETURN SPRING ASSEMBLY  
 603 4TH CLUTCH PISTON ASSEMBLY  
 604 4TH CLUTCH PISTON OUTER LIP SEAL  
 605 4TH CLUTCH PISTON INNER LIP SEAL  
 606 DRIVEN SPROCKET SUPPORT BEARING ASSEMBLY  
 607 ORIFICED CUP PLUG  
 608 DRIVE CHAIN LUBE SCOOP  
 609 DRIVEN SPROCKET SUPPORT ASSEMBLY  
 610 CUP PLUG  
 611 D.S.S. TO 2ND CLUTCH DRUM THRUST WASHER  
 612 FOUR LOBED RUBBER RING  
 613 DRIVEN SPROCKET SUPPORT SEAL RINGS  
 614 DRIVEN SPROCKET SUPPORT BUS HING  
 615 REVERSE BAND ASSEMBLY  
 616 2ND CLUTCH HOUSING BUSHING (Not Serviced)  
 617 2ND CLUTCH HOUSING ASSEMBLY  
 618 2ND CLUTCH HOUSING BALL CAPSULE ASSEMBLY  
 619 2ND CLUTCH HOUSING BUSHING (Not Serviced)  
 620 2ND CLUTCH MOLDED SEAL PISTON  
 621 2ND CLUTCH APPLY RING AND RETURN SPRING ASSEMBLY  
 622 2ND CLUTCH RETURN SPRING SNAP RING

623 2ND CLUTCH WAVED PLATE  
 624 2ND CLUTCH FIBER PLATES (6)  
 625 2ND CLUTCH STEEL PLATES (5)  
 626 2ND CLUTCH BACKING PLATE  
 627 2ND CLUTCH BACKING PLATE SNAP RING  
 628 INPUT SHAFT SOLID SEAL RINGS (3)  
 629 THRUST BEARING  
 630 SELECTIVE THRUST WASHER  
 631 INPUT SHAFT BUSHING  
 632 INPUT HOUSING ASSEMBLY  
 633 INPUT HOUSING BALL CAPSULE ASSEMBLY  
 634 INPUT CLUTCH INNER LIP SEAL  
 635 INPUT CLUTCH PISTON OUTER LIP SEAL  
 636 INPUT CLUTCH PISTON ASSEMBLY  
 637 INPUT CLUTCH RETURN SPRING ASSEMBLY  
 638 3RD CLUTCH PISTON HOUSING "O" RING SEAL  
 639 3RD CLUTCH PISTON HOUSING  
 640 3RD CLUTCH PISTON HOUSING SNAP RING  
 641 3RD CLUTCH INNER LIP SEAL  
 642 3RD CLUTCH MOLDED SEAL PISTON ASSEMBLY  
 643 3RD CLUTCH RETURN SPRING ASSEMBLY  
 644 INPUT HOUSING THRUST BEARING ASSEMBLY  
 645 3RD CLUTCH WAVED PLATE  
 646 SINGLE SIDED 3RD CLUTCH PLATE, SPLINED O.D.  
 647 SINGLE SIDED 3RD CLUTCH PLATE, SPLINED I.D.  
 648 3RD CLUTCH BACKING PLATE  
 649 3RD CLUTCH BACKING PLATE SNAP RING  
 650 INPUT CLUTCH APPLY PLATE  
 651 INPUT CLUTCH WAVED PLATE  
 652 INPUT CLUTCH FIBER PLATES  
 653 INPUT CLUTCH STEEL PLATES  
 654 INPUT CLUTCH BACKING PLATE  
 655 INPUT CLUTCH BACKING PLATE SNAP RING  
 716 2ND CLUTCH APPLY PLATE (TAPERED)  
 723 INPUT CLUTCH HOUSING CAGED NEEDLE BEARING

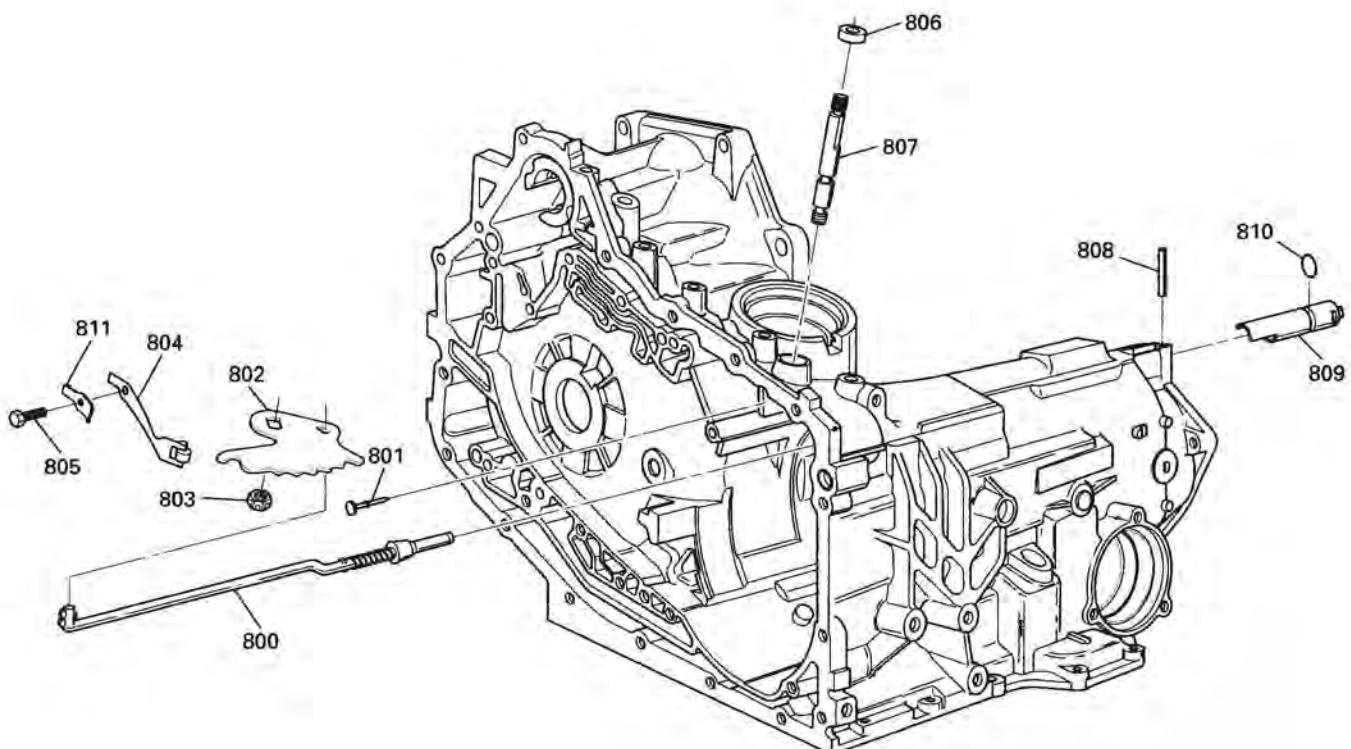
Figure 227



- 653 3RD CLUTCH SPRAG OUTER RACE
- 661 INPUT AND 3RD SPRAG INNER RACE
- 665 INPUT CLUTCH SPRAG OUTER RACE
- 667 INPUT SUN GEAR SPACER
- 668 INPUT SUN GEAR
- 669 REVERSE REACTION DRUM
- 671 INPUT SUN GEAR THRUST BEARING ASSEMBLY
- 672 INPUT CARRIER ASSEMBLY
- 673 INPUT CARRIER LUBE DAM
- 674 INPUT CARRIER/REACTION CARRIER THRUST BEARING
- 675 REACTION CARRIER ASSEMBLY
- 676 REACTION CARRIER/SUN GEAR THRUST BEARING
- 677 REACTION SUN GEAR BUSHING
- 678 REACTION SUN GEAR AND DRUM ASSEMBLY
- 679 REACTION SUN GEAR BUSHING
- 680 2-1 MANUAL BAND ASSEMBLY
- 683 1-2 ROLLER CLUTCH ASSEMBLY
- 685 THRUST BEARING ASSEMBLY
- 686 1-2 ROLLER CLUTCH SUPPORT BUSHING
- 687 1-2 ROLLER CLUTCH SUPPORT AND DRUM ASSEMBLY
- 688 FORWARD BAND ASSEMBLY
- 689 FINAL DRIVE SUN GEAR SHAFT
- 690 FINAL DRIVE INTERNAL RING GEAR BUSHING
- 691 THRUST WASHER
- 692 FINAL DRIVE INTERNAL RING GEAR SNAP RING
- 693 FINAL DRIVE INTERNAL RING GEAR

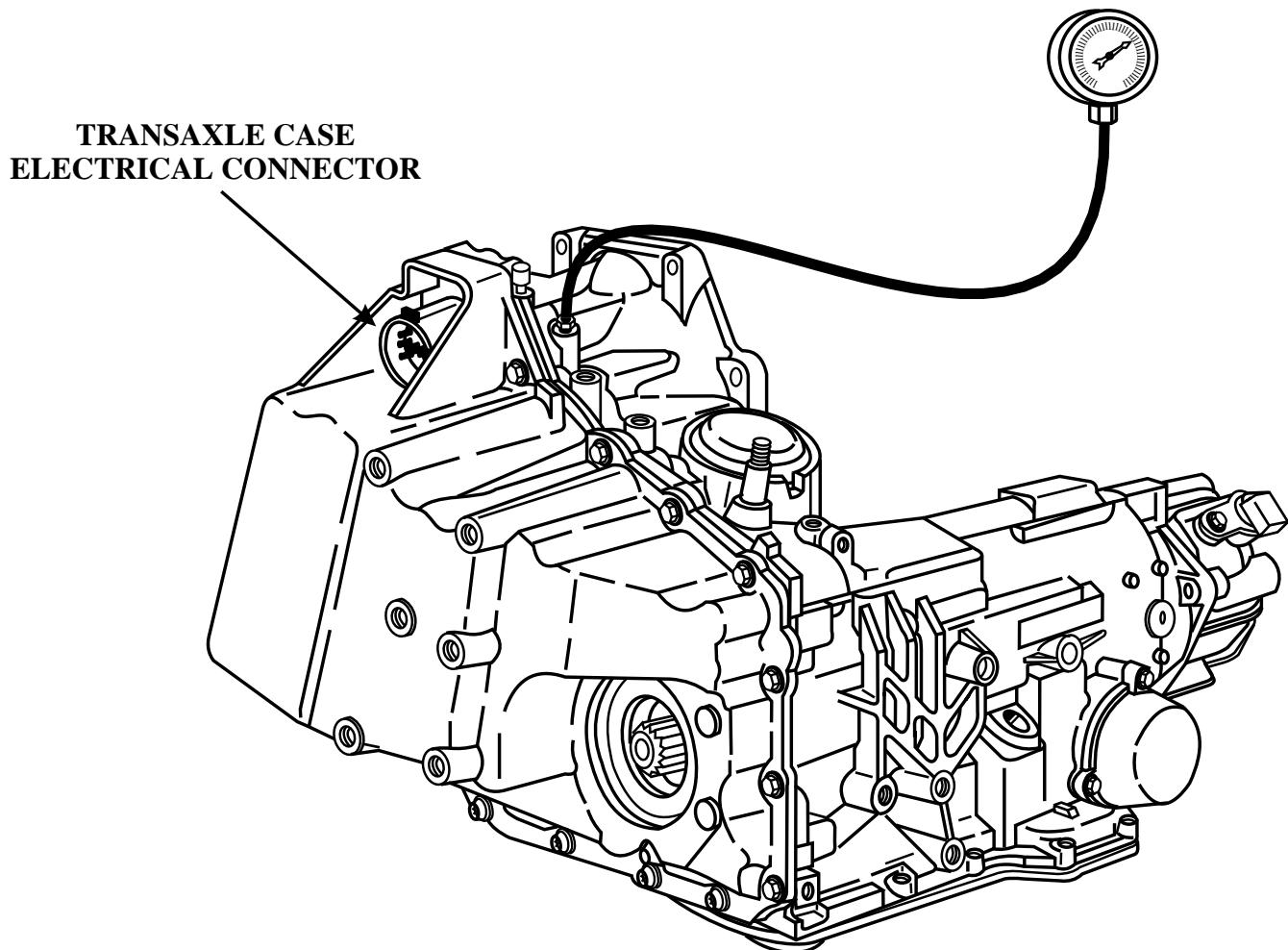
- 695 THRUST BEARING ASSEMBLY
- 696 PARKING GEAR
- 697 FINAL DRIVE SUN GEAR
- 698 THRUST BEARING ASSEMBLY
- 699 PINION GEAR PIN SPIRAL RETAINING RING
- 700 FINAL DRIVE CARRIER ASSEMBLY
- 701 DIFFERENTIAL PINION SHAFT
- 702 DIFFERENTIAL PINION SHAFT ROLLED RETAINING PIN
- 703 DIFFERENTIAL PINION THRUST WASHER
- 704 DIFFERENTIAL PINION GEARS
- 705 DIFFERENTIAL SIDE GEARS (MN7 Has Unique L Side/R Side)
- 706 DIFFERENTIAL SIDE GEAR BRONZE THRUST WASHERS
- 708 FINAL DRIVE CARRIER PINION STEEL THRUST WASHERS
- 709 FINAL DRIVE CARRIER PINION NEEDLE BEARINGS
- 710 PINION NEEDLE BEARING SPACERS
- 711 FINAL DRIVE CARRIER PLANETARY PINION GEARS
- 712 FINAL DRIVE CARRIER PLANETARY PINION GEAR PIN
- 713 VEHICLE SPEED SENSOR RELUCTOR WHEEL
- 714 FINAL DRIVE CARRIER/CASE THRUST WASHER (SELECTIVE)
- 715 FINAL DRIVE CARRIER/CASE THRUST BEARING ASSEMBLY
- 717 DUAL SPRAG SPIRAL LOCK RETAINING RING
- 718 3RD CLUTCH SPRAG OUTER RACE RETAINER
- 719 INPUT AND 3RD SPRAG END BEARINGS
- 720 3RD CLUTCH SPRAG ASSEMBLY
- 721 INPUT AND 3RD SPRAG CENTER BEARING
- 722 INPUT CLUTCH SPRAG ASSEMBLY

Figure 228



- 800 PARK PAWL ACTUATOR ASSEMBLY
- 801 MANUAL SHAFT RETAINING PIN (NAIL)
- 802 MANUAL SHAFT DETENT LEVER
- 803 MANUAL SHAFT DETENT LEVER RETAINING NUT
- 804 MANUAL SHAFT DETENT SPRING ASSEMBLY
- 805 DETENT SPRING RETAINING BOLT
- 806 MANUAL SHAFT SEAL ASSEMBLY
- 807 MANUAL SHAFT
- 808 PARK PAWL ACTUATOR GUIDE RETAINING PIN
- 809 PARK PAWL ACTUATOR GUIDE
- 810 PARK PAWL ACTUATOR GUIDE "O" RING SEAL

Figure 229

**THM 4T65-E LINE PRESSURE SPECIFICATIONS**

	RANGE	PRESSURE CONTROL SOLENOID AMPS (FROM SCAN TOOL)	PSI	KPA
"MINIMUM" LINE PRESSURE	P, R, N	1.0 Amp.	79-101	542-696
	D4, D3, D2	1.0 Amp.	74-86	512-592
	D1	1.0 Amp.	146-187	1005-1289
"MAXIMUM" LINE PRESSURE	P, R, N	0.0 Amp.	223-271	1540-1869
	D4, D3, D2	0.0 Amp.	167-203	1153-1400
	D1	0.0 Amp.	146-187	1005-1289

Figure 230