TRANSMISSION SEMINAR 1991

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TRANSMISSION SEMINAR

1991

This years seminar brings the latest information on transmission changes and complaints to you the field technicians in both a video and slide format along with this printed back-up material to help you in the shop. We cover the most often asked questions on the Mitsubishi, Honda, and Toyota transmissions coming in our hot line. This information will help you when the same type problems arise on the vehicles coming into your shop. We have put together information on the Ford E4OD transmission along with other Ford units with tech hints that will speed up the process when you go through the rebuilding procedure. The Chrysler overdrive units both the A-500/518 and the A-604 units are starting to appear in our shops, both under factory warranty and customer pay. We have listed many of the parts changes and updates that will be facing you during repairs.

ROBERT D. CHERRNAY
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MITSUBISHI KM 175 ELECTRICAL DIAGNOSIS

One of the toughest problems to solve in today's computer-controlled transmissions is whether the problem is caused by the computer or the transmission.

Let's take a look at the Mitsubishi K-175. In the event a problem comes up in this unit, the computer will fault the transmission to third-gear starts. A quick look at the solenoid application in this unit is as follows:

First gear — solenoids A and B
Second gear — solenoid B
Third gear — neither solenoid is applied
Fourth gear — solenoid A.

	Shift Control Solenoid Valve	
	A	B
1st gear	ON	ON
2nd gear	OFF	ON
3rd gear	OFF	OFF
4th gear	ON	OFF

So, third gear has both solenoids unpowered. That's why when the computer faults to third, in effect, it cuts power.

There are two other solenoids in this unit; one for TCC (converter clutch), and the other for shift feel by controlling line pressure in a similar fashion as the vacuum modulator on the THM 440-T4 or Mercedes transmissions.

While we are discussing shift feel, here is another similarity between vacuum and voltage

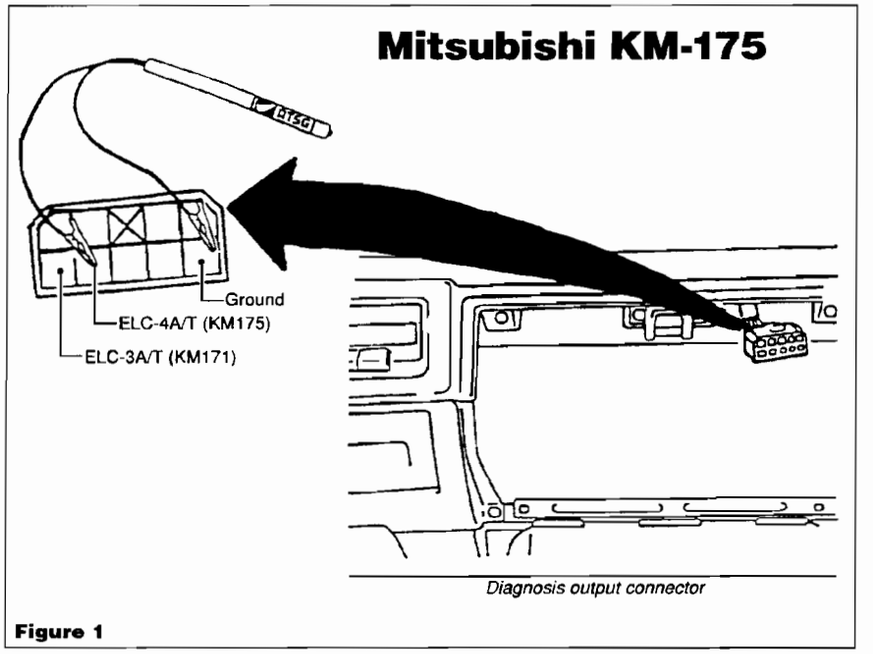


Figure 1

control of pressure. Low or no vacuum means high line pressure and low or no voltage means high line pressure. Keep that thought in mind because we'll refer to it later in diagnosing a problem.

There are several sensors that can control transmission-shift functions: The TPS (throttle-position sensor), the neutral-safety switch (also called the inhibitor switch) and the pulse generators (both A and B). The A generator tells the computer how fast the turbine shaft is turning in rpms. The B generator tells the computer how fast the output shaft is turning in rpms. Between these readings and the engine-tach sensor, the computer can pick up even slips in the transmission. We have some units in which the temperature sensor can give a problem in the transmission operation. This was in some of the early 1984 units. There's also a transmission-computer module that controls the transmission functions.

So let's look at at some of the checks and areas of inspection that should be made with the transmission faulting to third gear. This could be a problem for which the vehicle comes in the shop, or the problem occurs after overhaul. First let's see if it's an intermittent or consistent problem. If the unit faults to third, let's turn the key off for 15 seconds, then restart the vehicle and see if it shifts. If it shifts, it may continue for two or three minutes until it faults to third. You see, when we turn off the ignition, the computer memory of the transmission fault is erased and it will take two or three minutes for the computer to pick up the fault again.

The vehicle is provided with a diagnostic connector located in the

MITSUBISHI KM 175 ELECTRICAL DIAGNOSIS

upper right corner of the glove box (Figure 1). We can read diagnostic codes from the connector that will tell where the problem area is. Figure 2 shows how you can make your own test light with an LED 1 1/2 volts and a 520 ohm resistor. You also can use a commercial scanner.

There are checks that can be made of the sensors and inhibitor switch with a digital ohmmeter. But first let's make sure all the harness connections are connected properly. In some 1985 models a mistake can be made by connecting the airflow sensor with the pulse generator. So let's first look at the TPS. As you can see in Figure 3, there are three terminals on this connector. If we check resistance across terminals one and two, we should have a reading of 3.5K (3500) to 6.5K (6500) ohms. If you check terminals two and three, you should have a reading of 8% of the reading you got between one and two.

Have someone step down on the accelerator pedal and the reading should increase to 96% of the reading that you had between terminals one and two. That will tell you that the TPS is good. The pulse generators should have readings of 520 ohms each. Later models have 350-ohm generators. Note: when changing pulse generators, be sure to change them with the same value unit, otherwise the computer will fault to third because it's programmed for that particular value.

Figure 4 shows that there are four terminals on the pulse-generator connector. First we check terminals one and two. Let's say we get a reading of 510 ohms. Now we check terminals three and four and get a reading of 519 ohms. The generators are OK. The determining factor is that there is not more than a 20-ohm difference between the two generators. If it exceeds that, then generators must be replaced. When you check ohm readings that are specified in the repair manuals, you'll note they show the readings at specific temperatures usually 70° F., 20° C. As long as the readings fall within the specified percentages and differences, then we are in the ballpark.

When it comes to the neutral-safety switch, it is important that it

continues next page

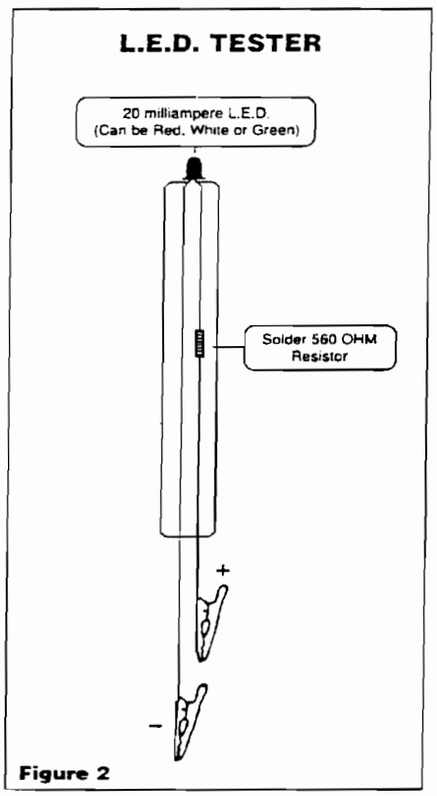


Figure 2

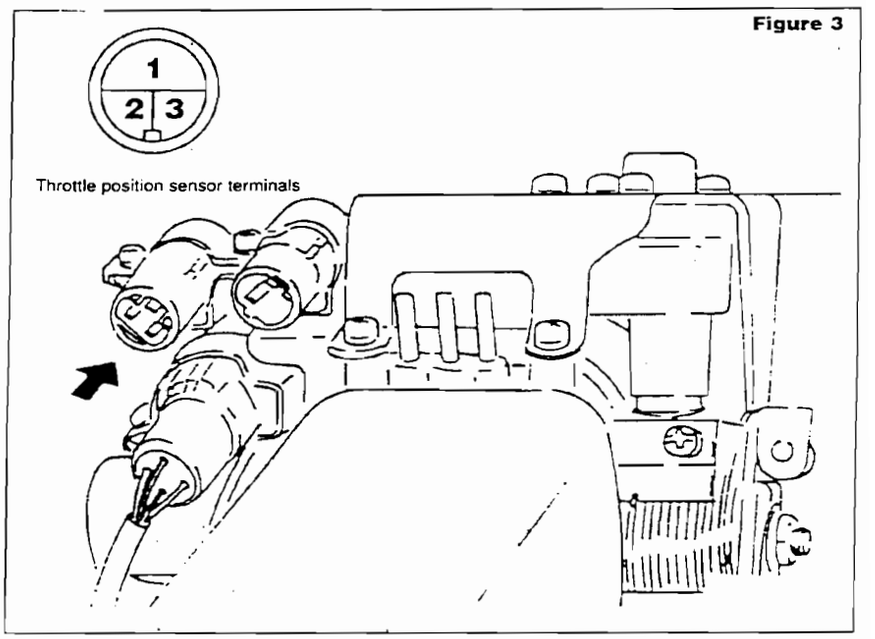


Figure 3

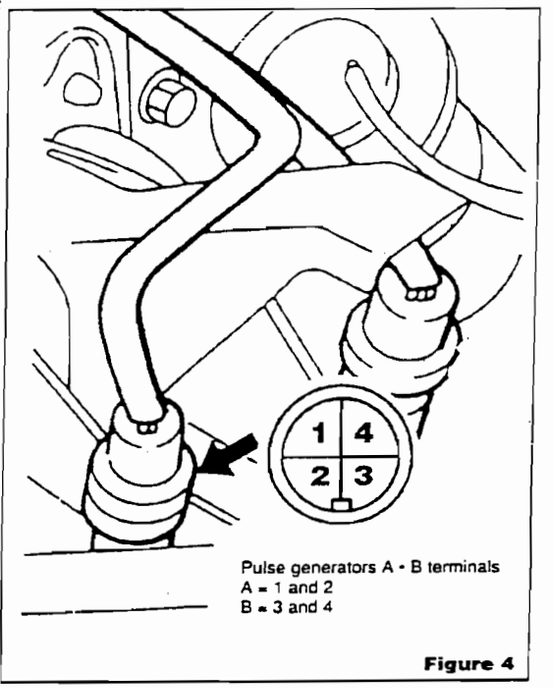


Figure 4

MITSUBISHI KM 175 ELECTRICAL DIAGNOSIS

is adjusted properly because the computer bases shifts on the position of this switch. The light codes are shown in Figure 5.

And, finally, there's a way to jump wires in solenoid harness. There are four solenoids, as we mentioned. Each wire is color coded for the solenoids: Solenoid A = orange; Solenoid B = yellow; Pressure regulator = blue; and the TCC = red. So if we were to hot-wire the A and B terminals in the sequence we mentioned, we could check the transmission to see if it shifts properly. Remember, I mentioned that low or no voltage to the pressure regulator solenoid will give high pressure. Since we have no power to that lead, the shift points will be firm. The computer varies the voltage to this solenoid 5 to 12 volts for shift quality. The TCC solenoid also can be checked. Keep in mind that in this unit, the converter damper (converter clutch) cycles, which means that it's not applied constantly so you can hear the solenoid apply/release, apply/release, etc. This constant cycle keeps fluid flowing through the TCC solenoid, keeping it clear of debris. ■

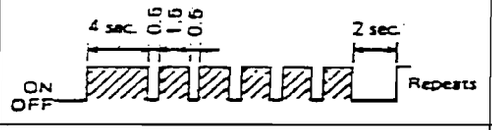
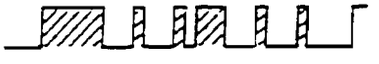
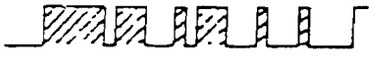
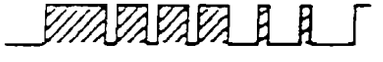
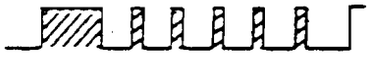
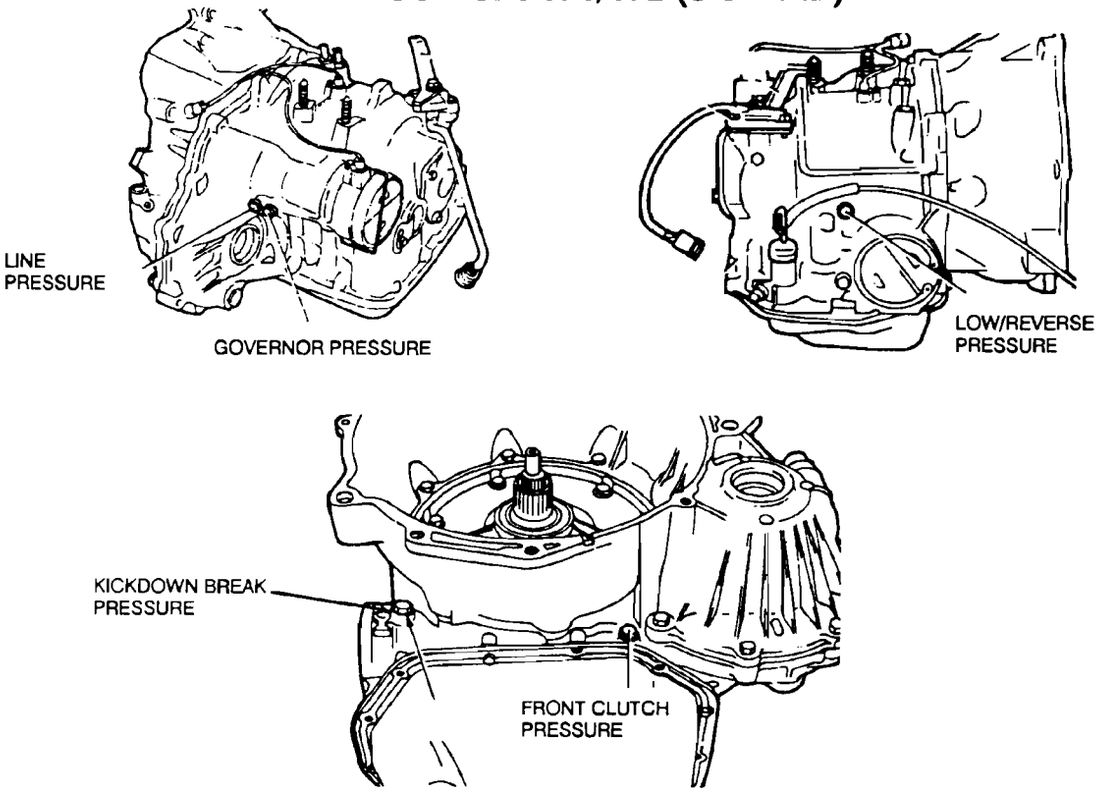
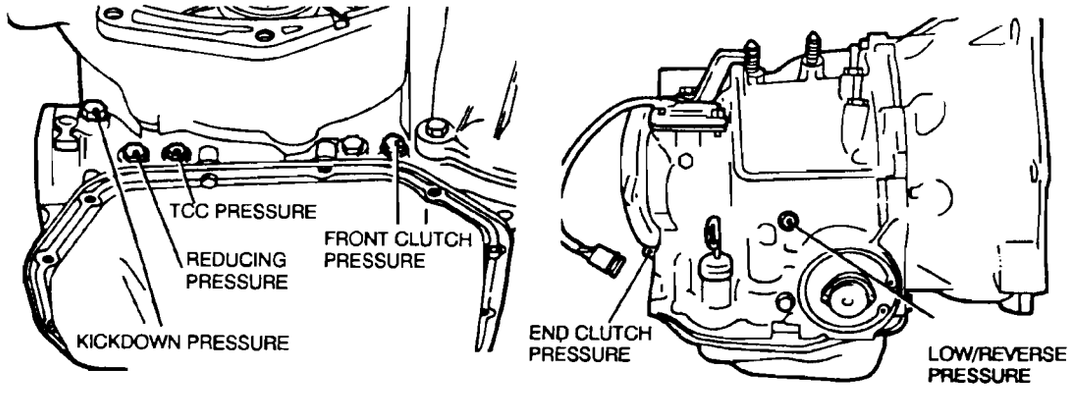
Number	Malfunction Indication Code	Diagnosis	Assumed Location
1		Microprocessor (computer) malfunction; not remedied by resetting.	• Low power-supply voltage (recharging system) Computer
2		First gear signal is detected at high vehicle speed.	• Pulse generator B • Computer
3		Vehicle speed detected by pulse generator B is much lower than actual vehicle speed.	• Pulse generator B • Computer
4		Operation of shift-control solenoid valve A differs from computer command.	• Shift-control solenoid valve A • Computer
5		Operation of shift-control solenoid valve B differs from computer command.	• Shift-control solenoid valve B • Computer
6		Shifting doesn't finish.	• Pulse generator A • Pressure-control solenoid valve • Computer
7		Pressure-control solenoid valve drive differs from computer command.	• Pressure-control solenoid valve • Computer
8		Damper clutch control solenoid valve is directly connected.	• Damper clutch control system • Computer
9		No ignition signal.	• Ignition coil • Ignition signal system • Computer

Figure 5

MITSUBISHI 171/172 (3 SPEED)



MITSUBISHI 175 (4 SPEED)

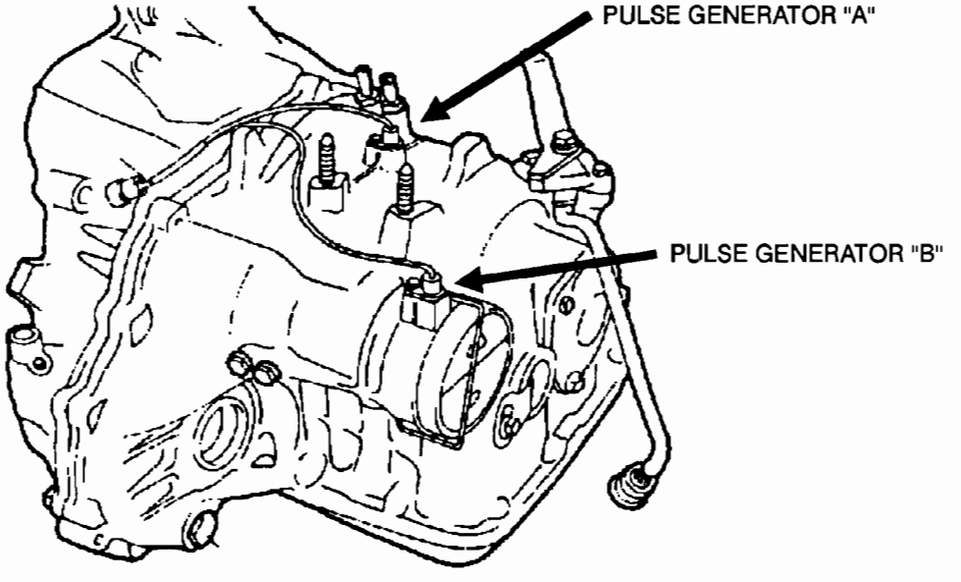


MITSUBISHI KM-175

COMPLAINT: LOCKED IN FAIL SAFE MODE SHOWING CODE 3 PULSE GENERATOR "B". CAN BE INTERMITTENT.

CAUSE: FLUCTUATING OHMS READING, SOME AS HIGH AS 3000 OHMS. PAY PARTICULAR ATTENTION TO PULSE GENERATORS NUMBERED 8201 TO 8619.

CORRECTION: REPLACED **BOTH** PULSE GENERATORS.



MITSUBISHI KM 175

HARD SHIFT SYMPTOMS

The KM 175 Automatic Transaxle in 1985-1987 Galant vehicles may exhibit one or more of the following hard shift symptoms.

- Harsh or hard 2-3 upshifts and/or 4-3 downshifts
- Harsh or hard 1-2 upshifts and/or 2-3 slipshifts.

These symptoms may be due to the kickdown servo piston not releasing properly. This is caused by hydraulic fluid leaking past the seal rings of the servo piston as a result of wear in the piston bore (figure 1). Because wear of the piston bore varies between vehicles, the severity of the symptoms will also vary.

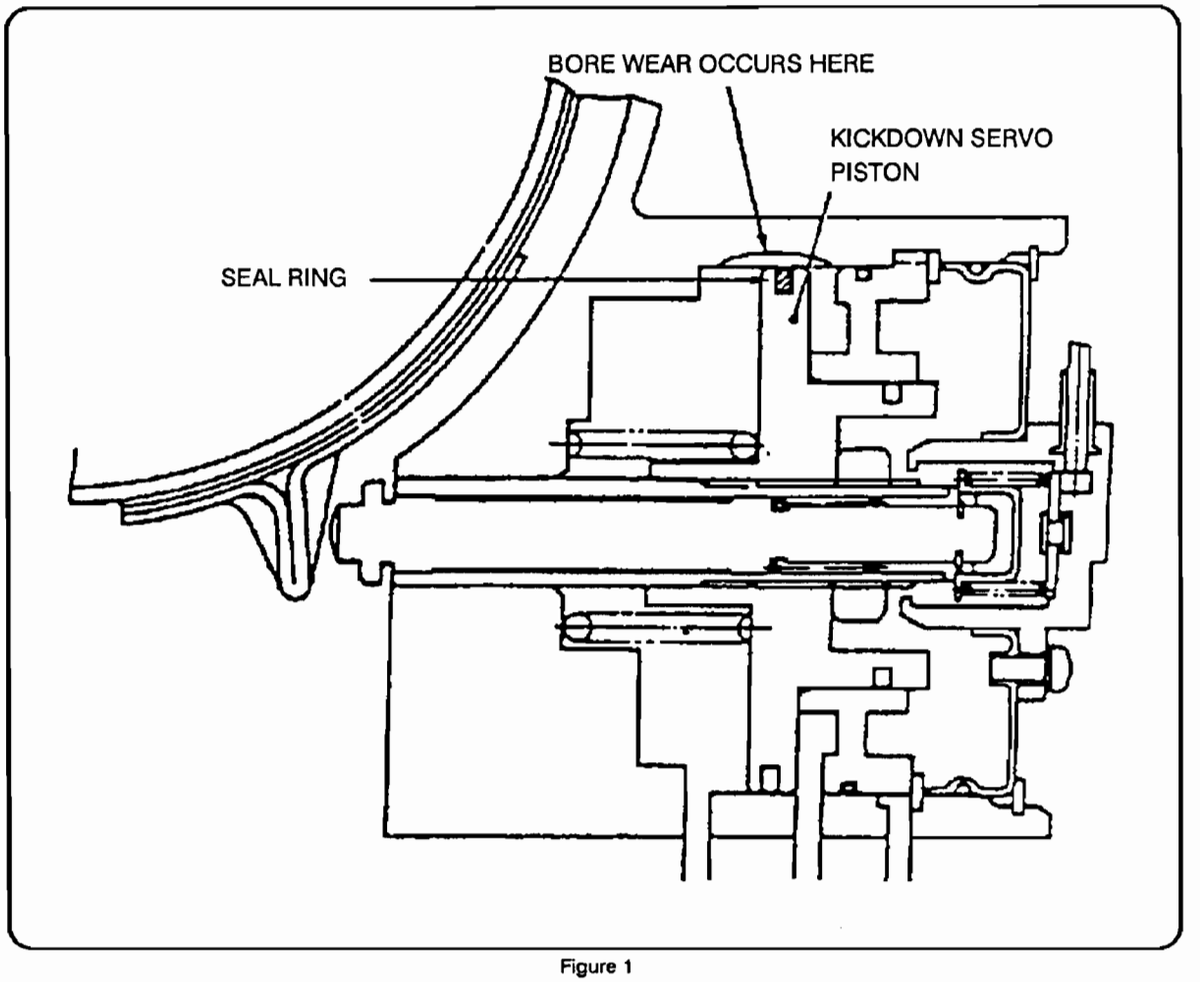


Figure 1

MITSUBISHI HARD SHIFT
CONTINUED

If hard shifts are still exhibited, remove the servo piston assembly from the transaxle and check the piston bore for wear (figure 2). If the bore wear is less than .023 in. the hard shift symptoms can be improved by installing a D-RING repair kit **(P/N MD728-665)**. This kit contains a rubber piston seal ring instead of the carbon material seal ring installed at the factory (figure 3).

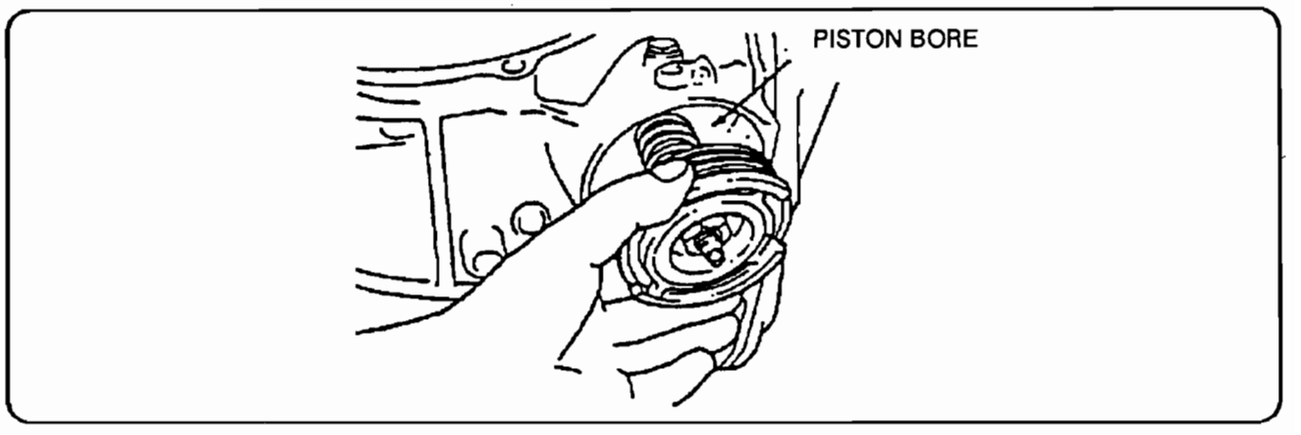


Figure 2

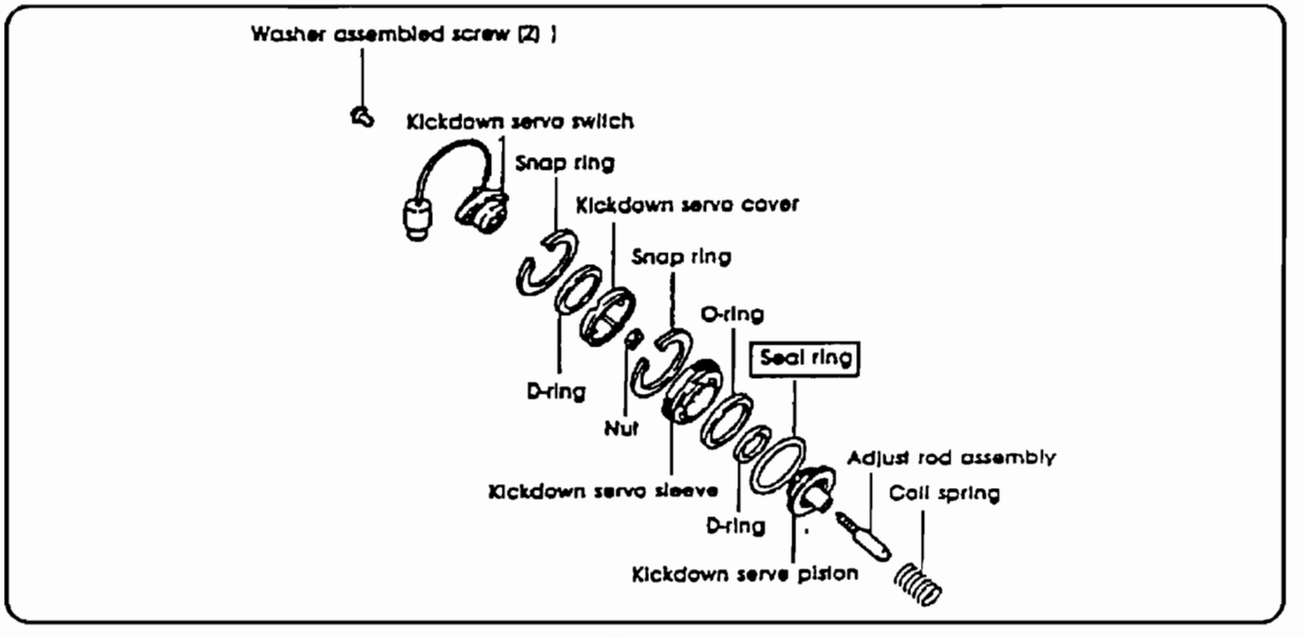


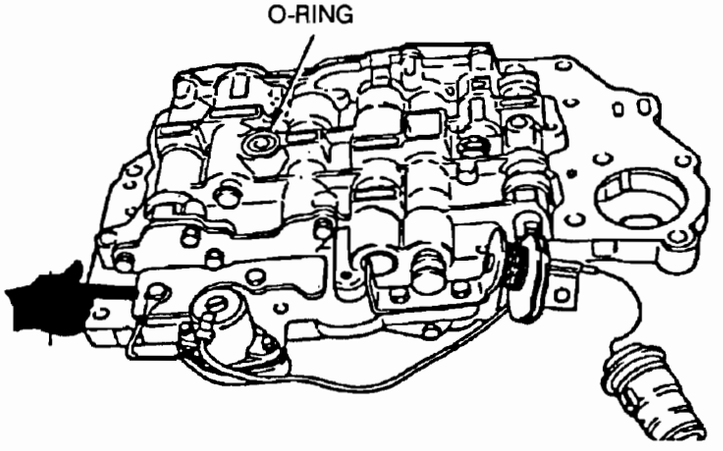
Figure 3

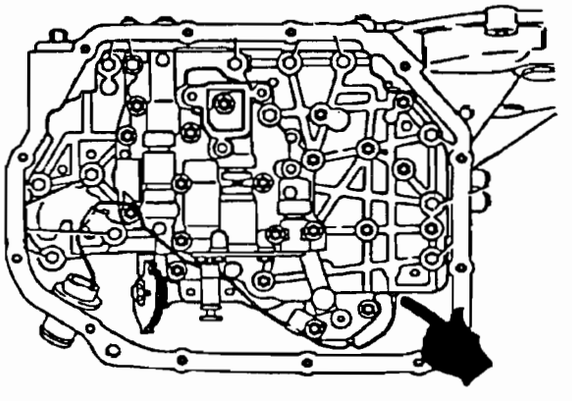
MITSUBISHI KM-171/172

COMPLAINT: ENGINE STALLS IN DRIVE OR REVERSE.

CAUSE: THE CAUSE MAY BE LOOSE GROUND WIRE TO VALVE BODY, OR LOOSE SOLENOID BOLTS.

CORRECTION: INSURE TIGHT CONNECTION OF GROUND WIRE FROM SOLENOID AND SOLENOID BOLTS ARE TIGHTENED PROPERLY.



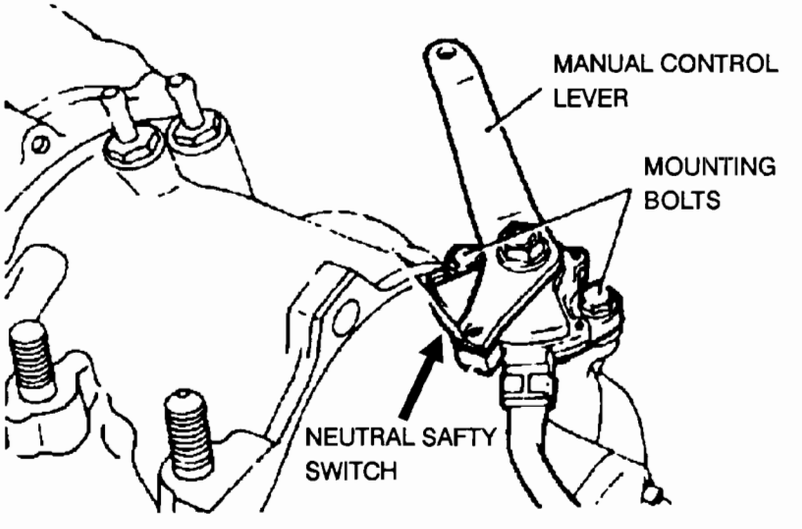


MITSUBISHI KM-171

COMPLAINT: SECOND GEAR STARTS, DELAYED - HARSH SHIFT INTO THIRD GEAR .

CAUSE: FAULTY OR WATER CONTAMINATED NEUTRAL SAFETY SWITCH.

CORRECTION: IN MOST CASES INHIBITOR SWITCH IS REPAIRABLE OTHERWISE, REPLACE THE SWITCH.

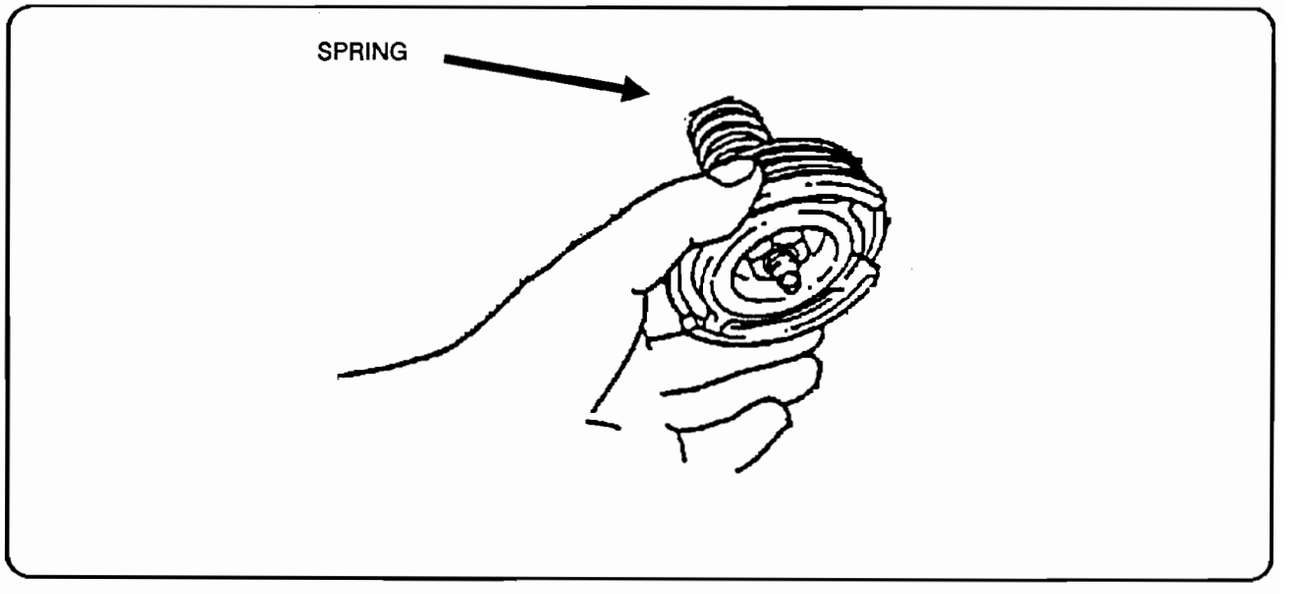


MITSUBISHI KM-175

COMPLAINT: SOFT OR DRAWN OUT 1-2 & 2-3 SHIFT.

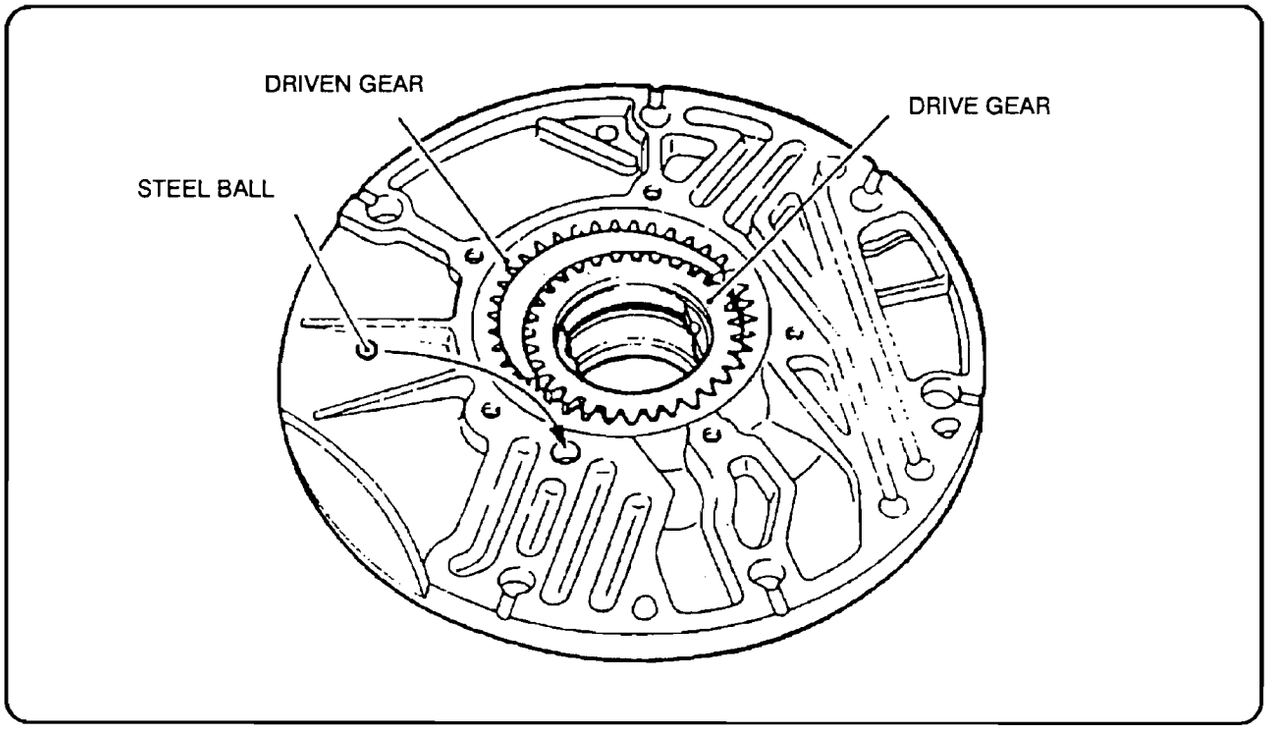
CAUSE: ORIGINAL SERVO SPRING TOO STRONG.

CORRECTION OBTAIN ORIGINAL F3A JATCO SERVO SPRING. CUT IT DOWN TO EXACTLY THE SAME HEIGHT AS THE KM-175 SPRING, FIT NEW SERVO SEALS AND REASSEMBLE.
TO ADJUST THE BAND CORRECTLY:
TORQUE TO 7.5 ft. lb., BACK OFF TO ZERO, REPEAT, THEN TORQUE TO 3.5 ft. lb. AND BACK OFF 2 TURNS.

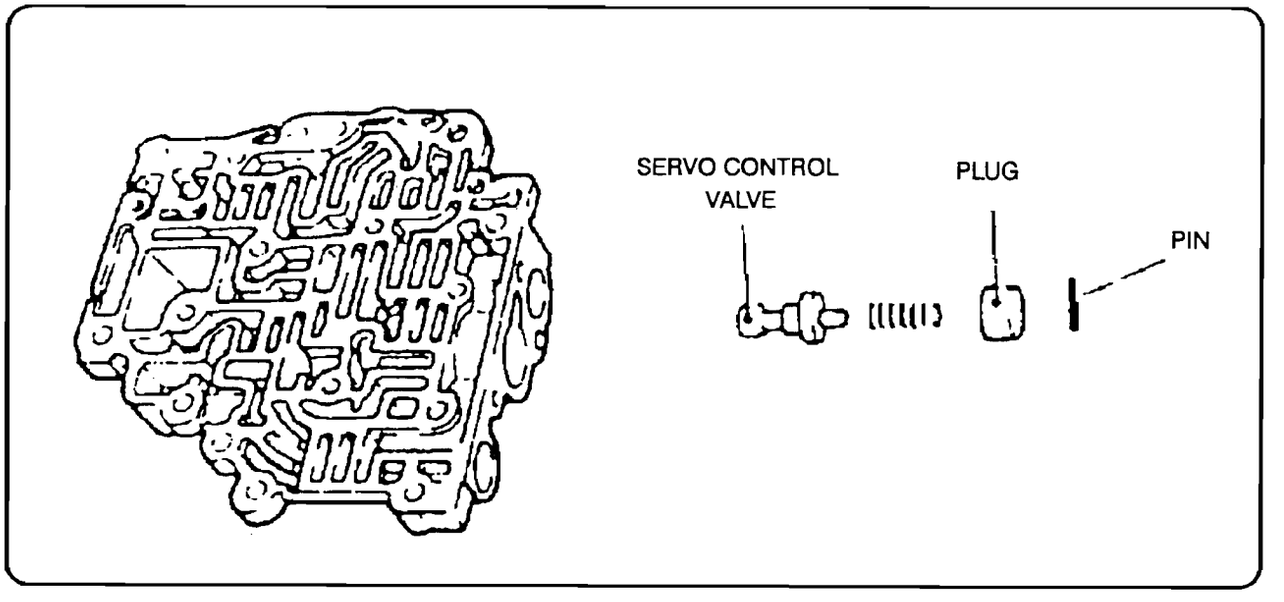


MITSUBISHI KM 175

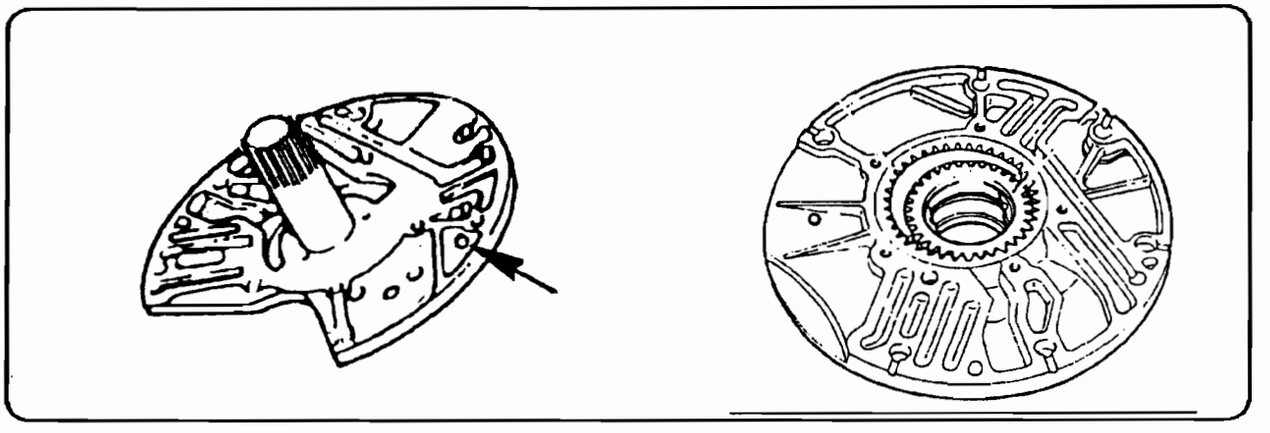
IF STEEL BALL IS LEFT OUT VEHICLE WLL HAVE NO FORWARD MOVEMENT



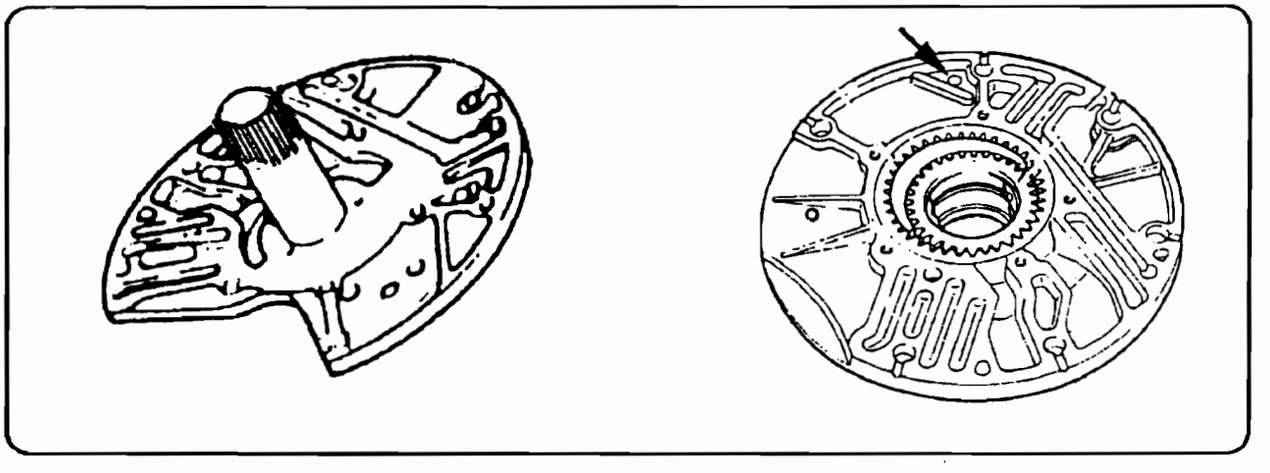
LATE KM 171 & 172 DO NOT HAVE THIS SERVO CONTROL VALVE



MITSUBISHI KM 1 71



PUMP STATOR WITH HOLE MUST GO WITH PUMP BODY WITHOUT CORRESPONDING BREATHER HOLE.



PUMP STATOR WITHOUT HOLE MUST GO WITH PUMP BODY WITH HOLE.

MIS-MATCH OF THESE PARTS CAN CAUSE EITHER HOLE LEAKING DIRECTLY OUT FRONT PUMP AREA OR BLOWING OIL OUT FILLER CAP.

MITSUBISHI KM 171 - 175

This Mitsubishi KM-171-2, which basically is a heavy-duty version of the KM-171, is similar to the KM-175 in the pump area. Both units use an aluminum spacer in the case between the pump and case (some KM-171 do not have the spacer, figure 1). Two gaskets are used in this application (figure 2). Both gaskets are the same (figure 3). In many of the gasket kits there are three gaskets. One of the gaskets is different from the other two (figure 4). Some technicians make the mistake of using one of each kind of gaskets instead of the required two that are alike. The result is that when the vehicle is cranked up the pump cannot draw up the fluid causing a no movement condition..

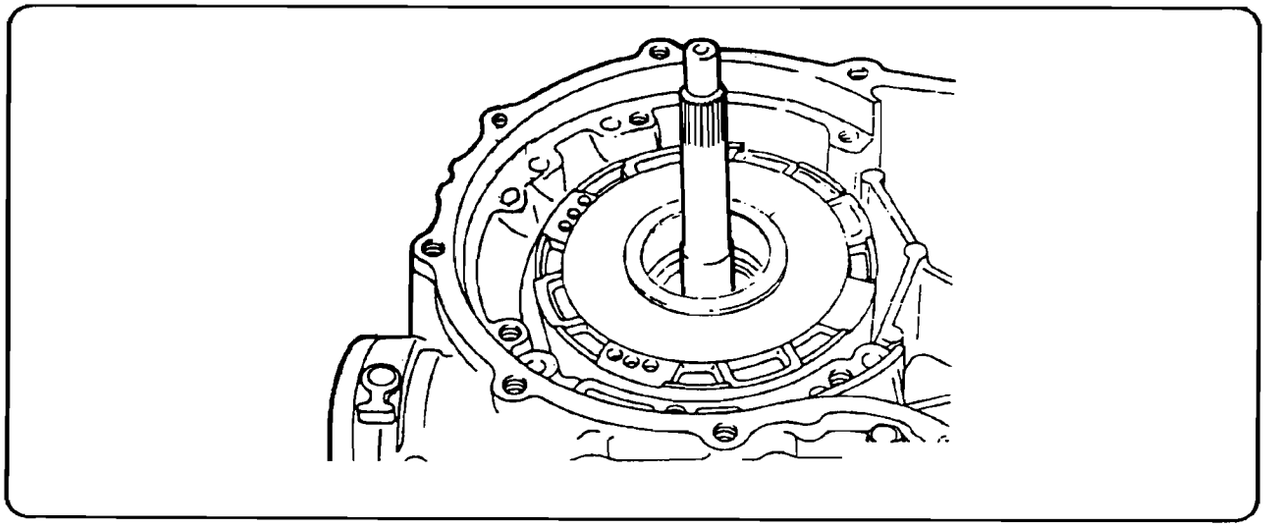


Figure 1

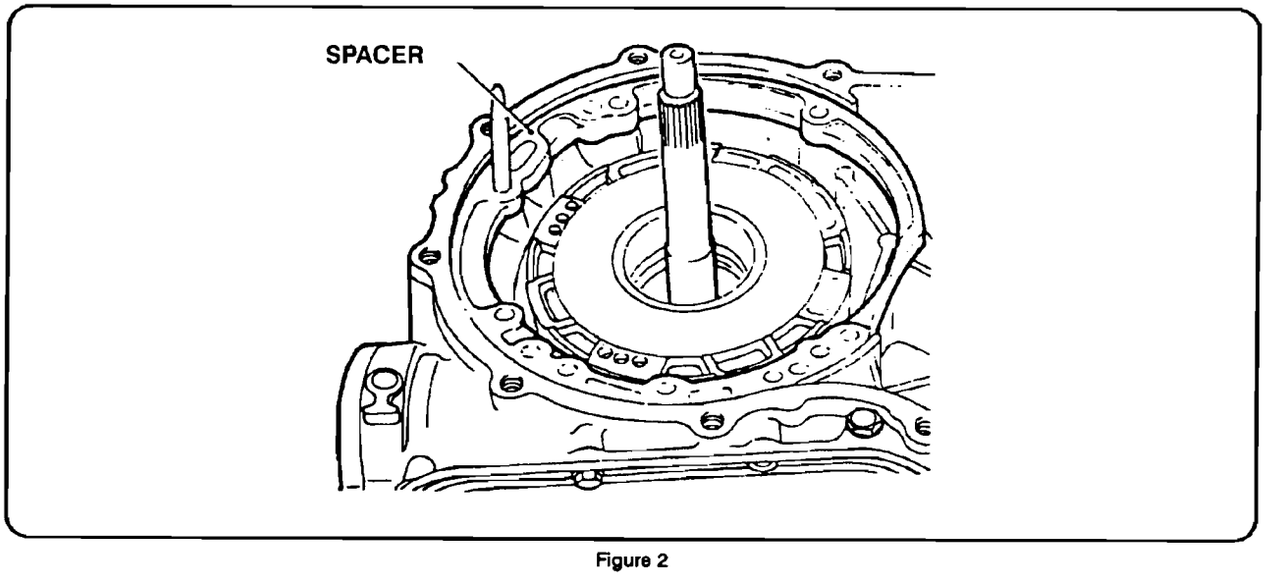


Figure 2

MITSUBISHI KM 171-175
PUMP GASKETS

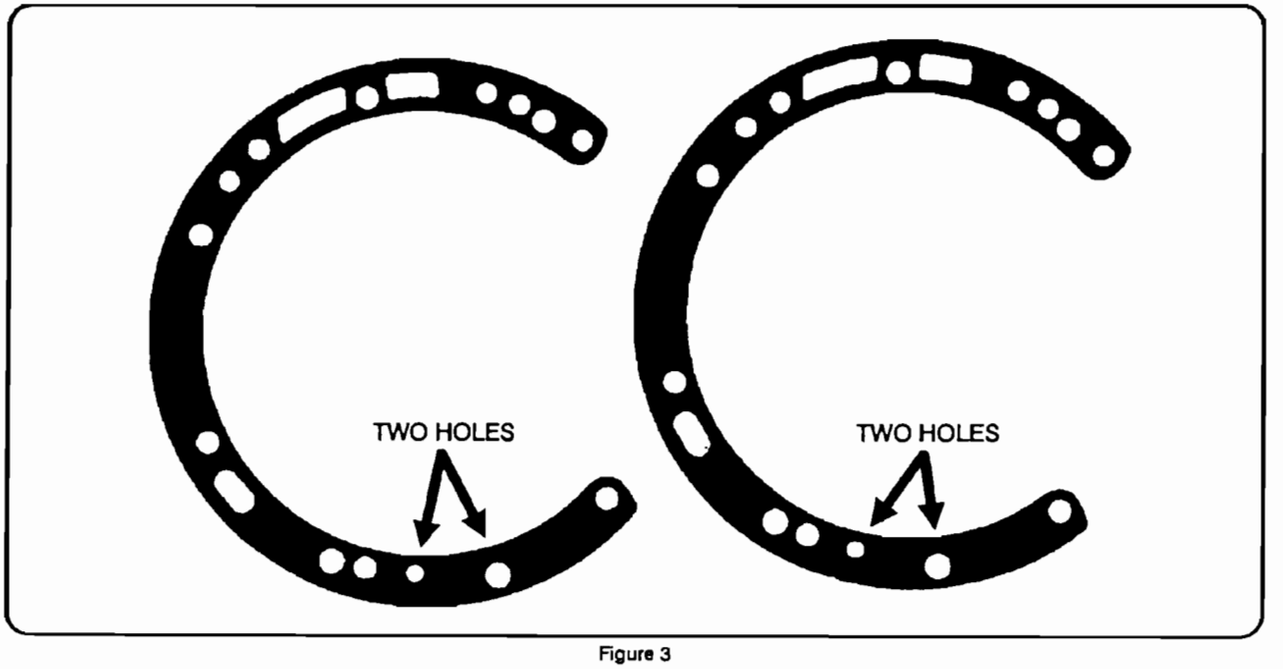


Figure 3

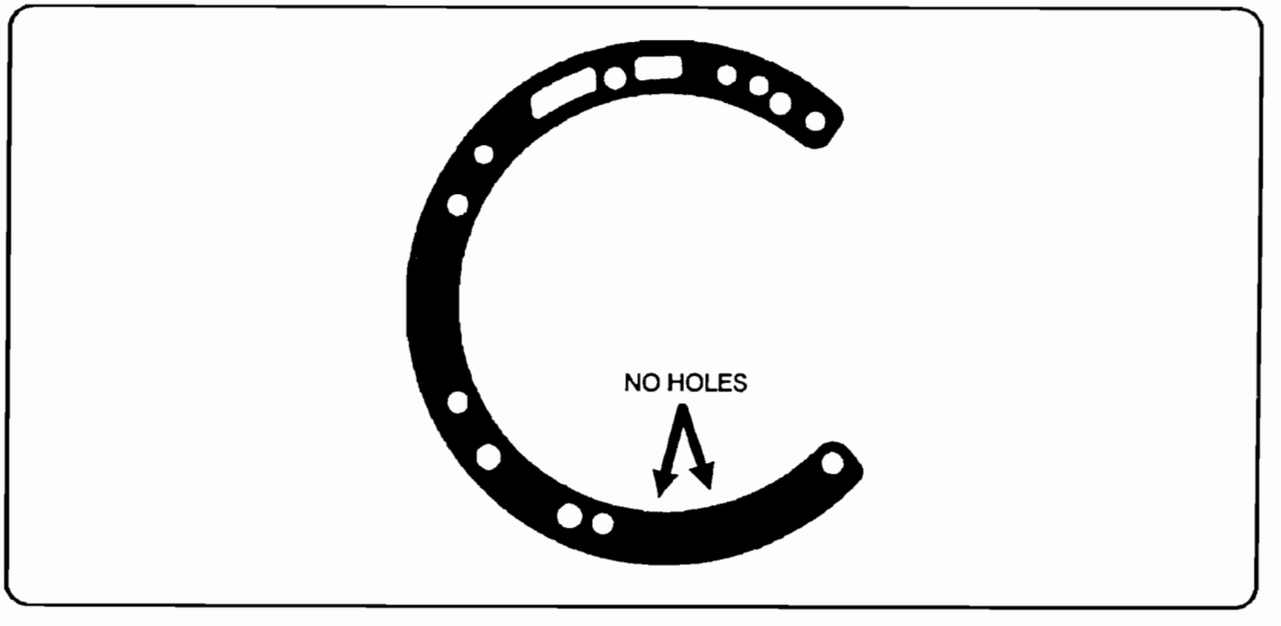
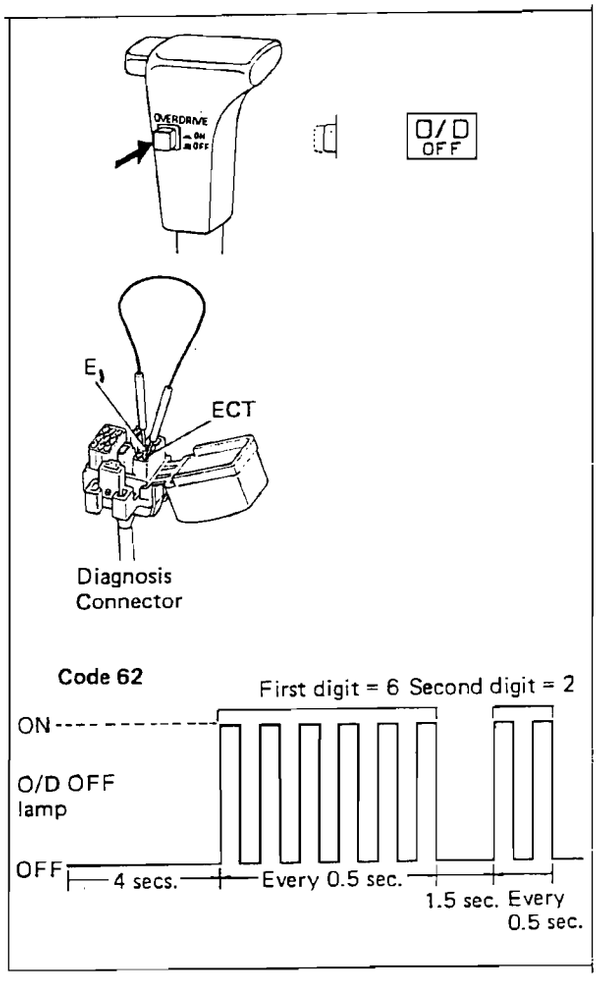


Figure 4

1. Using a service wire short terminals the ECT and E_1 in the diagnosis connector
2. O/D switch ON (push in).
3. Turn the ignition switch to ON (Do not start the engine.).
4. Wait for 4 seconds "O/D OFF" lamp off.
5. The lamp will then blink every 0.5 seconds. Count the number of blinks. This indicates the first digit of the code.
6. Next, after a 1.5 second pause, the lamp will blink every 0.5 seconds. This indicates the second number of code.
7. Record the diagnostic code.



	Shift Control Solenoid Valve	
	No. 1	No. 2
1st gear	ON	OFF
2nd gear	ON	ON
3rd gear	OFF	ON
4th gear	OFF	OFF

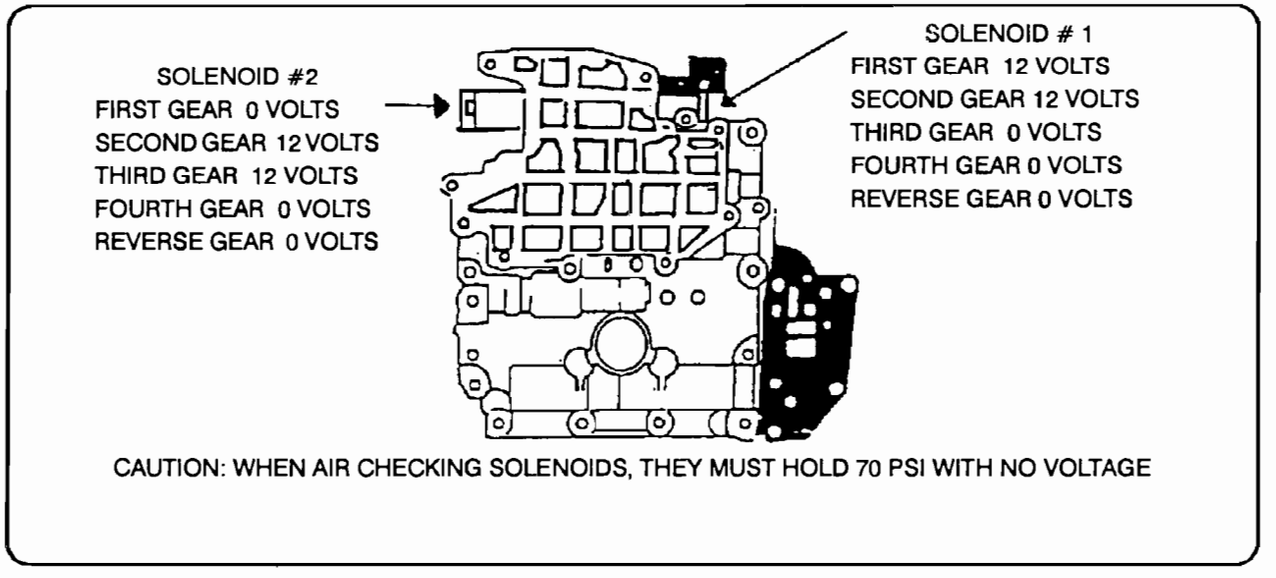
1. There are six diagnostic codes as shown in the table below.

Code No.	Light Pattern	Diagnosis System
Normal		Normal: this appears when none of the other codes are indicated.
42		Defective No. 1 speed sensor (in combination meter) Severed wire harness or short circuit
61		Defective No. 2 speed sensor (in ATM) Severed wire harness or short circuit
62		Defective No. 1 solenoid or short circuit Severed wire harness or short circuit
63		Defective No. 2 solenoid or short circuit Severed wire harness or short circuit
64		Defective No. 3 solenoid or short circuit Severed wire harness or short circuit

2. If more than one code is going to be output, the lamp will pause for 2.5 seconds, then indicate the next code as explained in steps (5) to (6) above.
3. After all codes have been output, the lamp will pause for 4 seconds, then repeat the above sequence until the memory is cleared

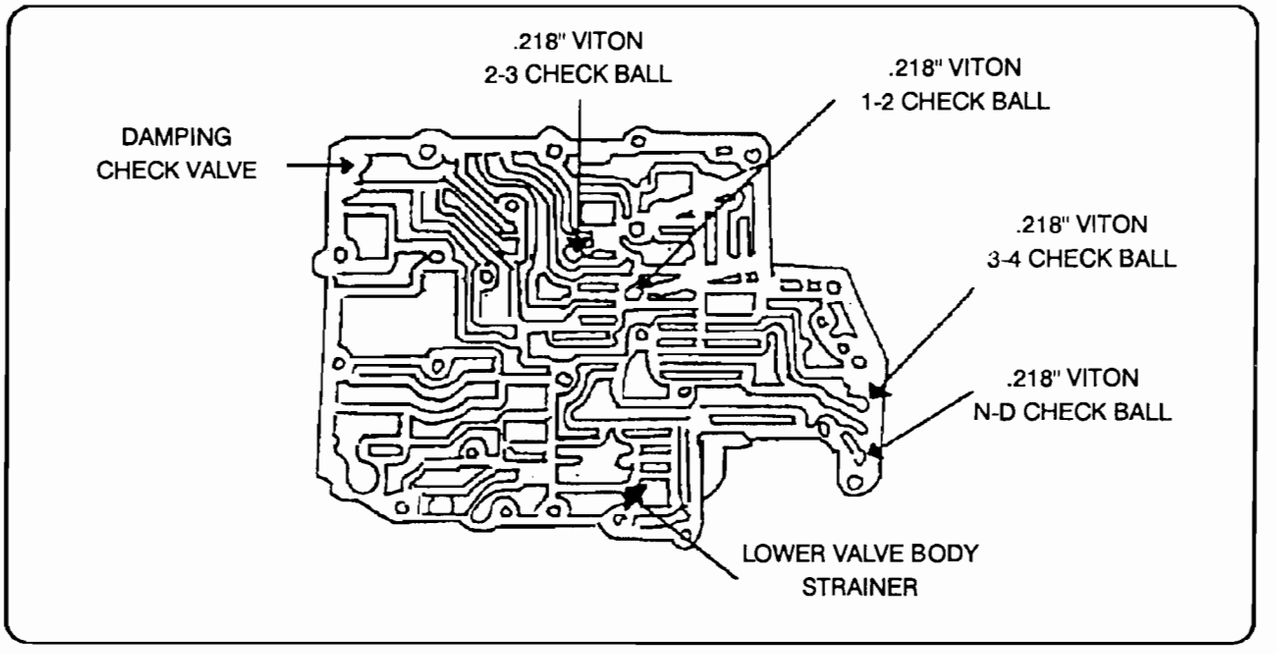
TOYOTA FRONT WHEEL DRIVE VALVE BODY

A130, A131 W/O SOLENOIDS
A140, A141 W/O SOLENOIDS



CAUTION: WHEN AIR CHECKING SOLENOIDS, THEY MUST HOLD 70 PSI WITH NO VOLTAGE

LOWER VALVE BODY CHANNEL CASTING CHECK BALL LOCATIONS

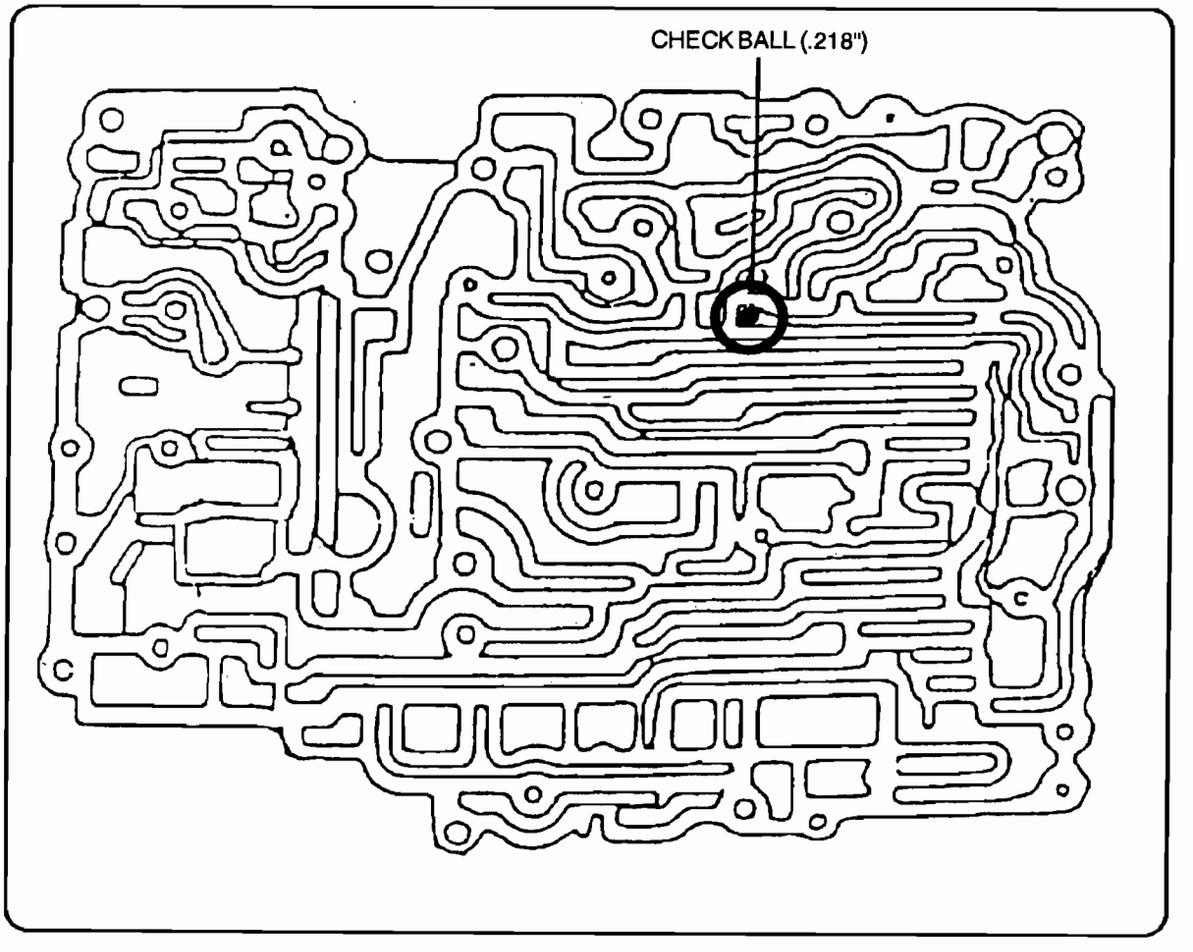


TOYOTA A43DL & A44DL

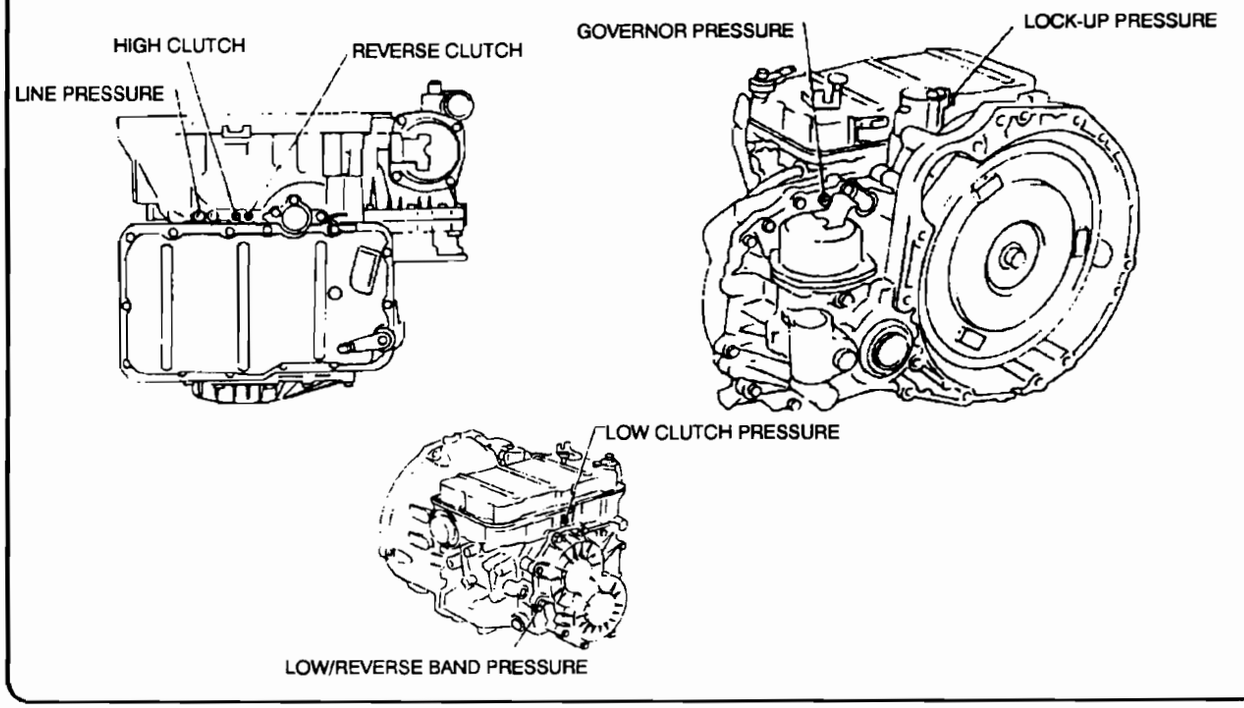
COMPLAINT: HARSH 1-2 SHIFT AT ALL THROTTLE POSITIONS.

CAUSE: VITON CHECK BALL MISSING, OR OFF LOCATION.

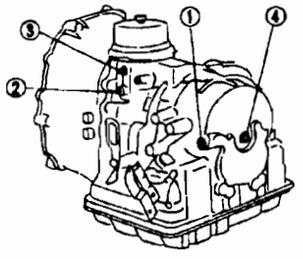
CORRECTION: INSTALL CHECK BALL IN PROPER LOCATION.



NISSAN RL4FO2A

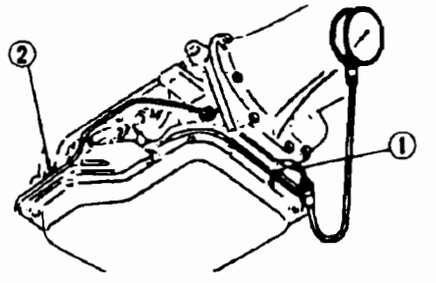


NISSAN RL3F01A



1. HIGH REVERSE PRESSURE
2. FORWARD CLUTCH PRESSURE
3. GOVERNOR PRESSURE
4. CONVERTER PRESSURE

NISSAN L3N71B



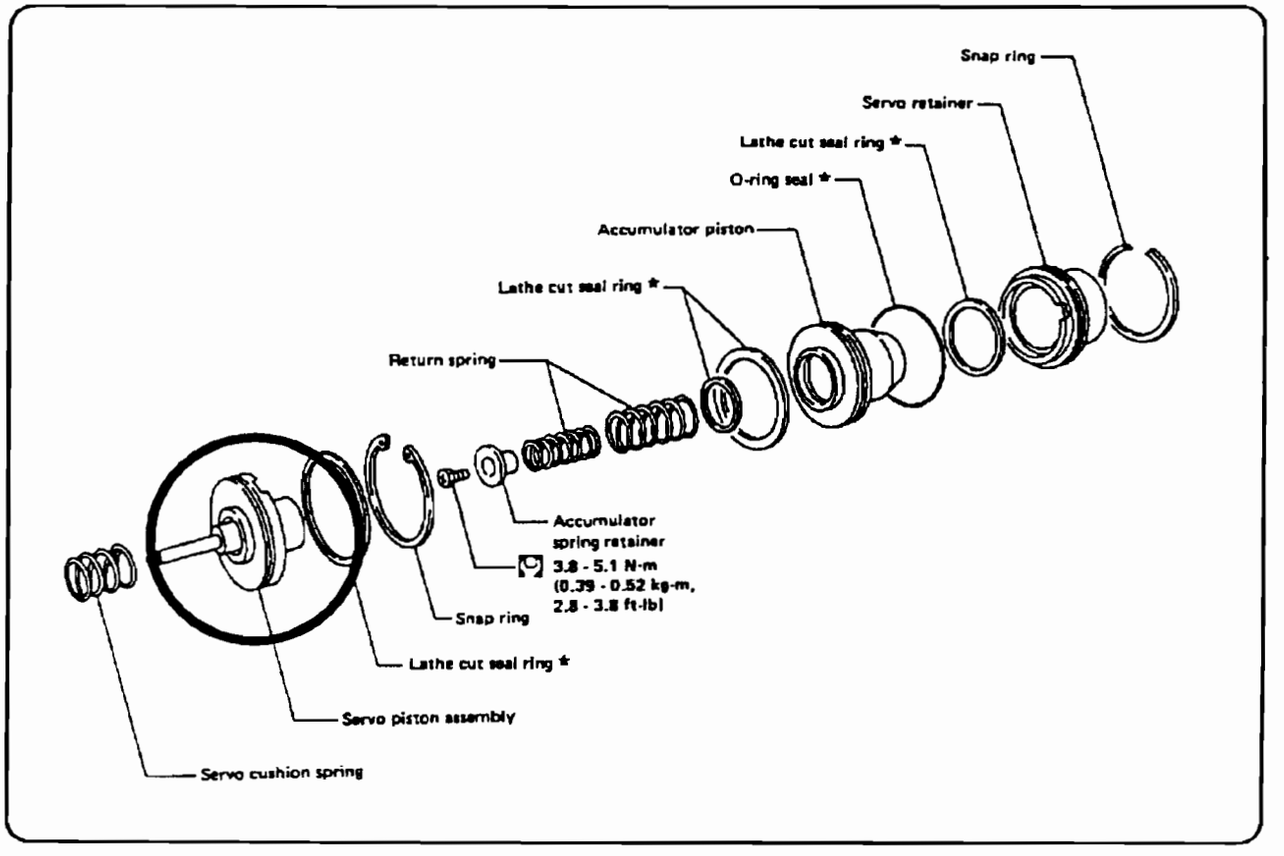
1. LINE PRESSURE
2. SERVO RELEASE PRESSURE

NISSAN RL4FO2A

COMPLAINT: NO SECOND GEAR, AFTER OVERHAUL.

CAUSE: SERVO PISTON PIN INSTALLED UPSIDE DOWN.

CORRECTION: INSTALL PISTON PIN AS SHOWN.

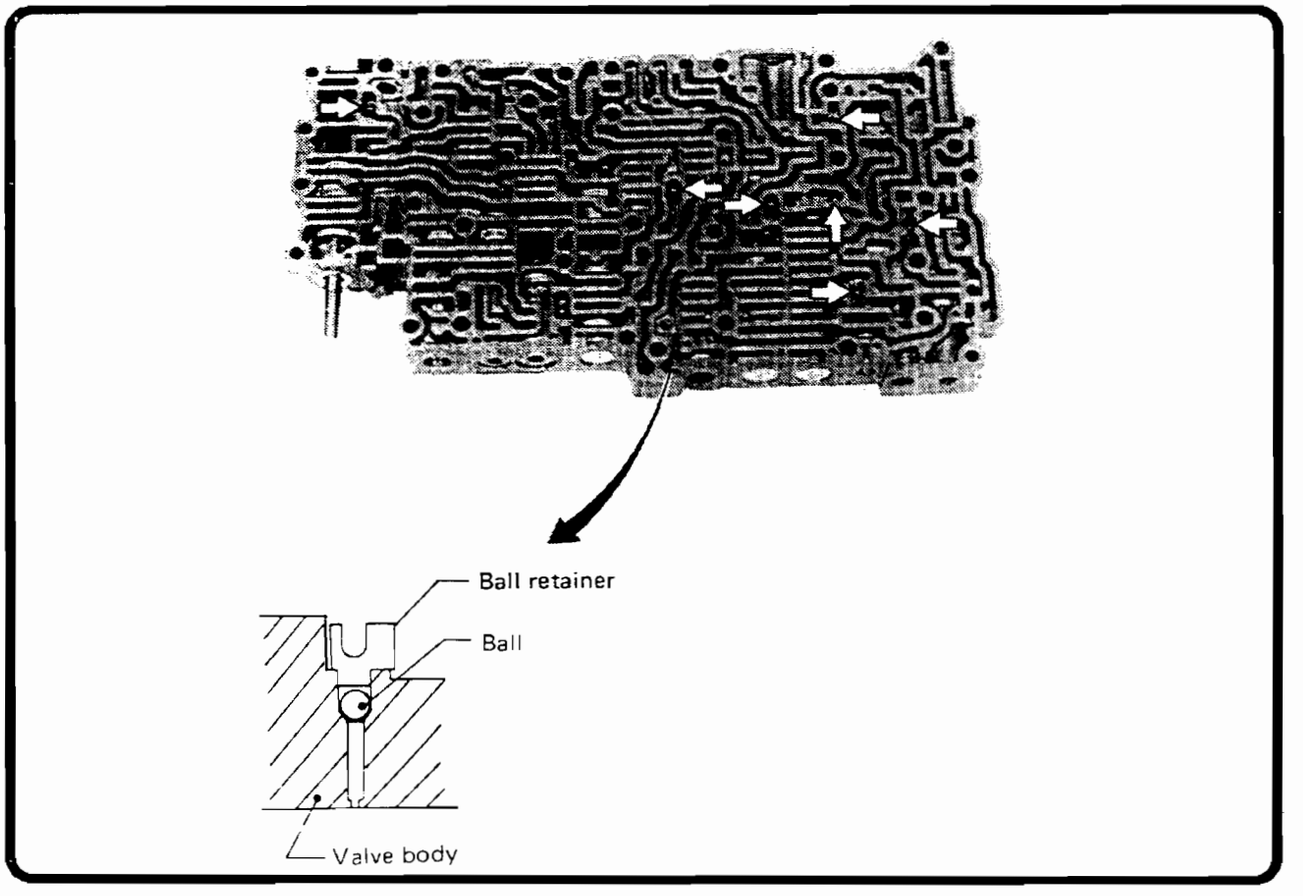


NISSAN RL4FO2A

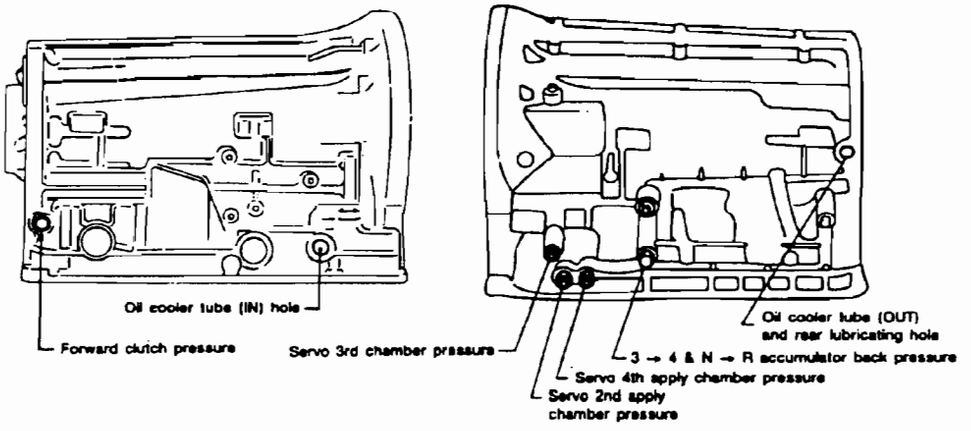
COMPLAINT: No forward movement.

CAUSE: The cause may be check ball and retainer off location or left out.

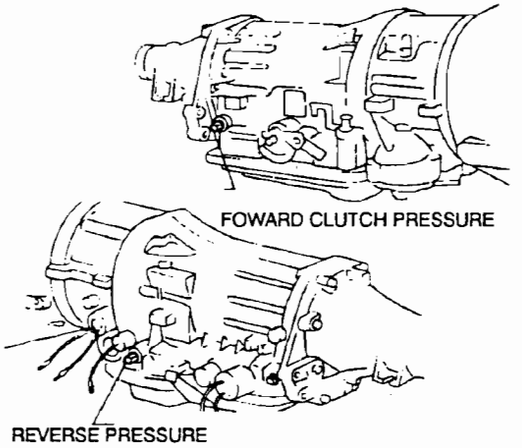
CORRECTION: Install check ball & retainer in proper location.

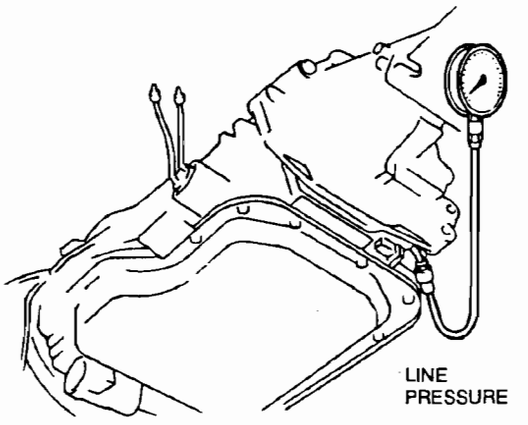


NISSAN RE4R01A

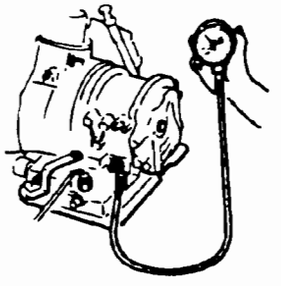


NISSAN L4N71B\E4N71B

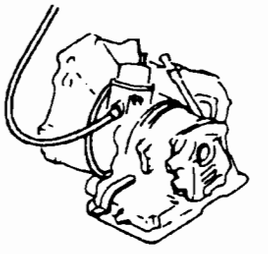




SPECTRUM KF-100



GOVERNOR PRESSURE

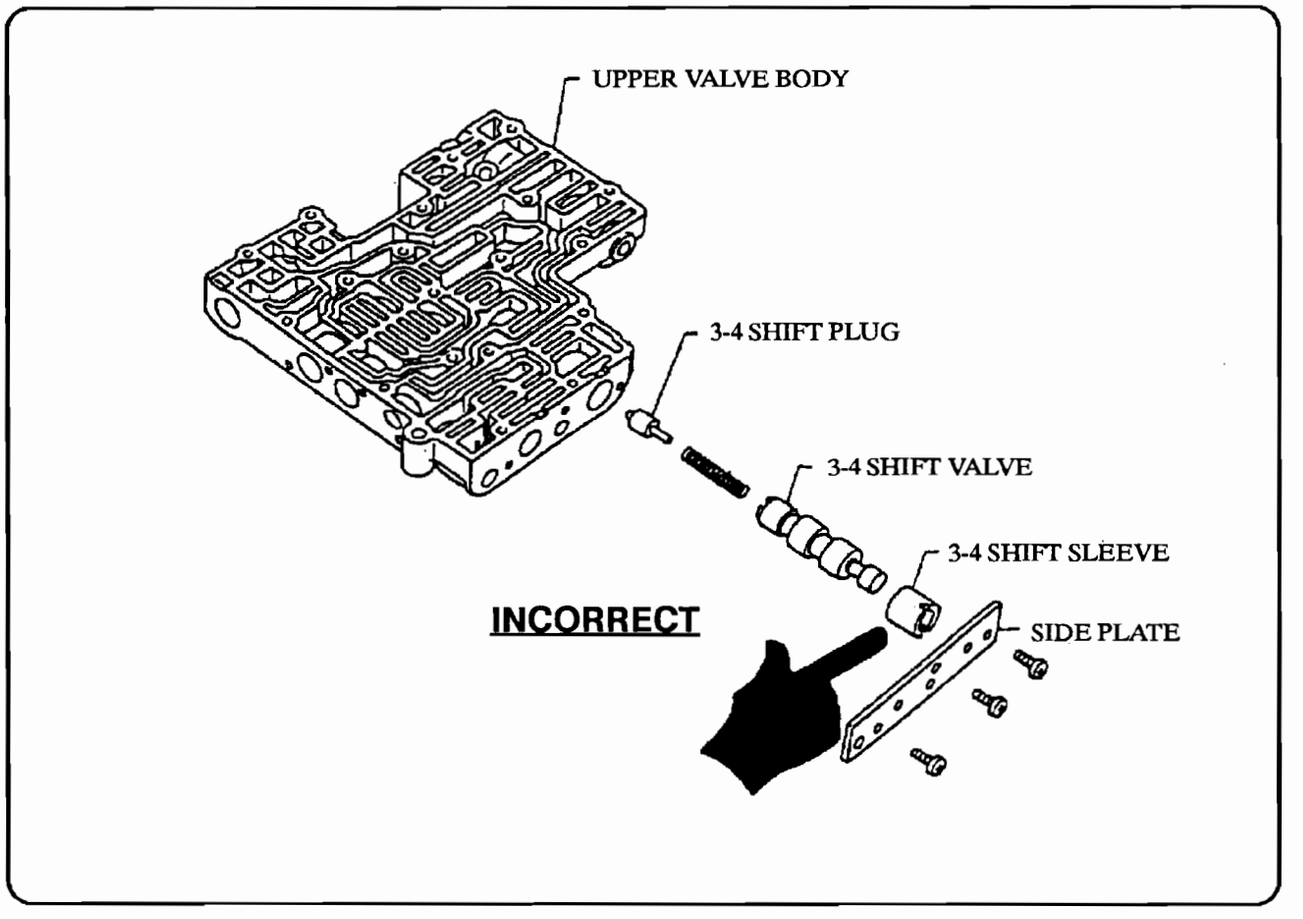


NISSAN L4N71B

COMPLAINT: NO 3-4 SHIFT AFTER OVERHAUL.

CAUSE: 3-4 SHIFT SLEEVE INSTALLED AS SHOWN IS (INCORRECT), NOTCHES SHOULD FACE VALVE.

CORRECTION: INSTALL 3-4 SHIFT SLEEVE WITH NOTCHES FACING 3-4 SHIFT VALVE.



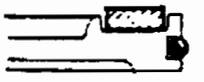
HONDA 4 SPEED

HARSH SHIFT

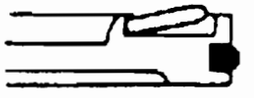
Use the figures below to insure that you have the spring washer (Cushion Plate) installed into the housing properly, as they go in different directions on the four speed Honda units, depending on model.

85-87 HONDA PRELUDE

1ST CLUTCH = GOES IN THIS DIRECTION (IT IS FLAT)



2ND CLUTCH
3RD CLUTCH = GOES IN THIS DIRECTION
4TH CLUTCH



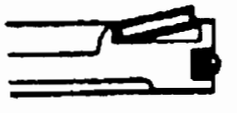
88-UP HONDA PRELUDE AND ACCURE LEGEND

1ST CLUTCH
3RD CLUTCH = GOES IN THIS DIRECTION
4TH CLUTCH

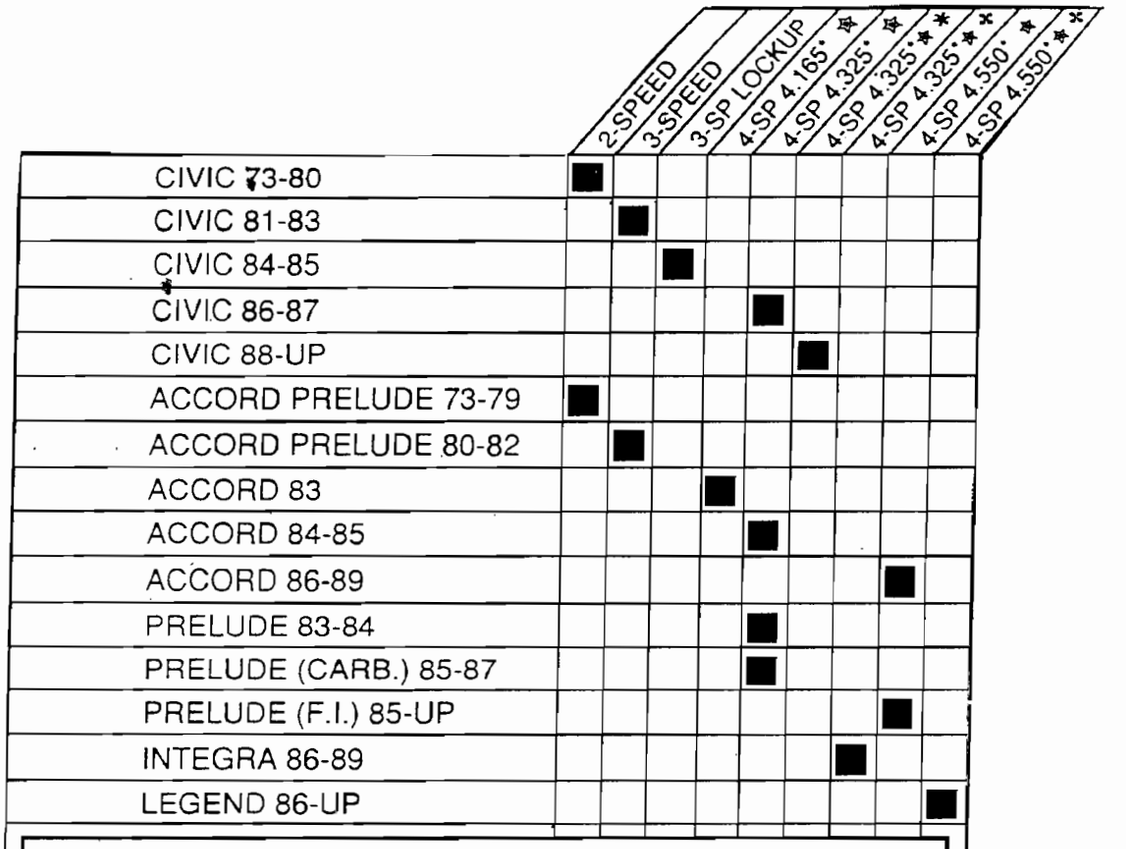
2ND CLUTCH = GOES IN THIS DIRECTION

88-UP ACCURA INTEGRA

1ST CLUTCH
2ND CLUTCH
3RD CLUTCH = GOES IN THIS DIRECTION
4TH CLUTCH



HONDA TRANSMISSION APPLICATION CHART



◆ NOTE: AXLE SEALS FOR 1985 ACCORD LXI (F.I.) NOT INCLUDED ORDER (1) 29305 AND (1) 29304 SEPARATELY.

⬰ NOTE: AXLE SEALS FOR 1988-UP PRELUDE NOT INCLUDED ORDER (1) 29413 AND (1) 29414 SEPARATELY.

≛ MEASUREMENT OF FRICTION PLATE ✣ ACURA * 1988-UP

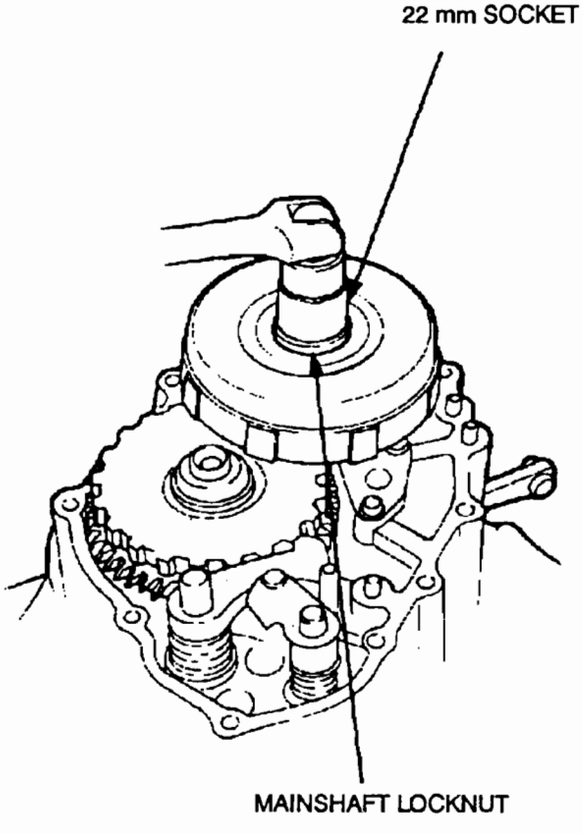
2-SPEED	3-SPEED ALL	4-SPEED	4-SPEED	4-SPEED 1988-UP	4-SPEED ACURA	4-SPEED	4-SPEED ACURA
	4.165" O.D.	4.165" O.D.	4.325" O.D.	4.325" O.D.	4.325" O.D.	4.550" O.D.	4.550" O.D.
1113	1114	1115	1115	1115	1115	1182	1183
2113	2114	2115	2115 ◆	2184	2185	2182 ⬰	2183

HONDA 4 SPEED

COMPLAINT: BIND UP IN REVERSE, ON OVERRUN TRANSMISSION WILL BIND UP.

CAUSE: MAINSHAFT LOCK NUT LOOSE.

CORRECTION REPLACE LOCK NUT USING LOCKTITE.



NOTE: THE MAINSHAFT LOCKNUT HAS LEFT HAND THREDS

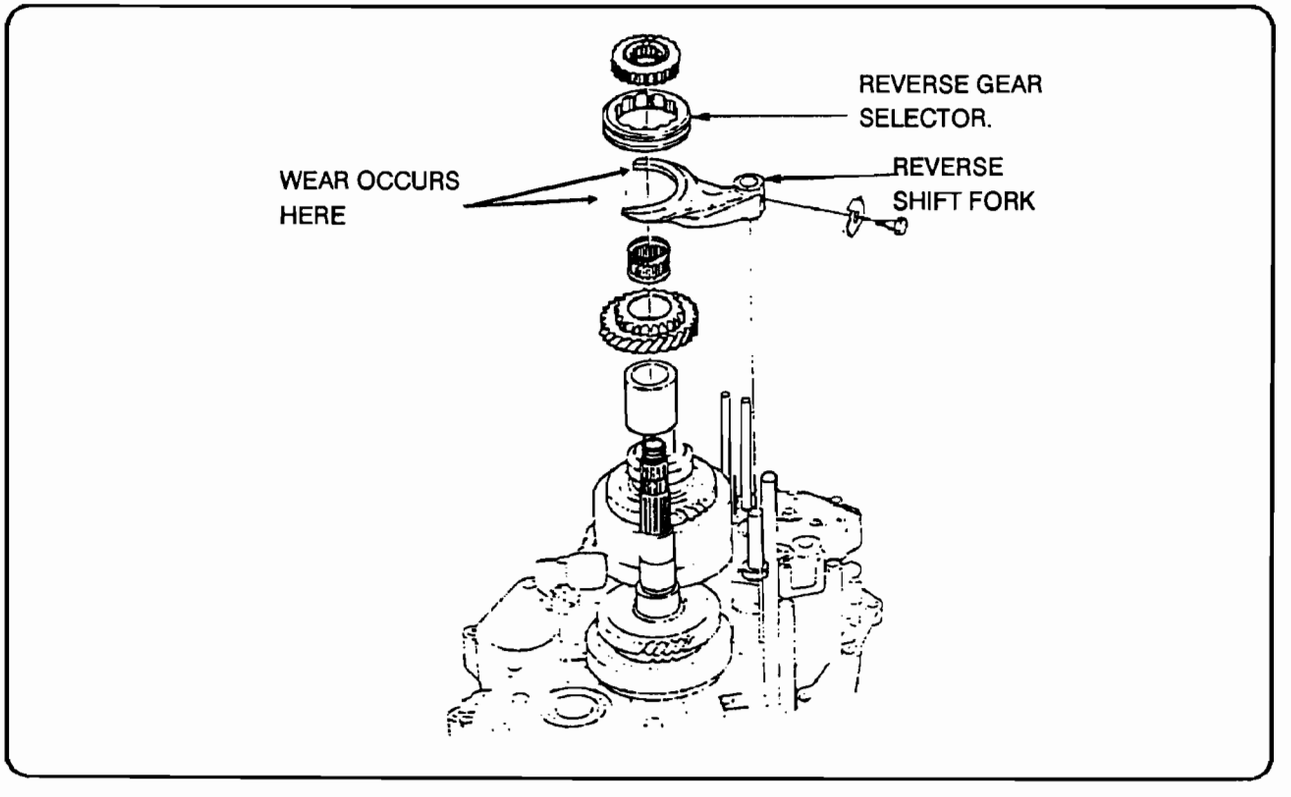
HONDA 4 SPEED

COMPLAINT: HARSH ENGAGEMENT FROM PARK TO DRIVE; DRIVE TO REVERSE; REVERSE TO DRIVE; CLANGING OR GEAR CLASHING NOISE.

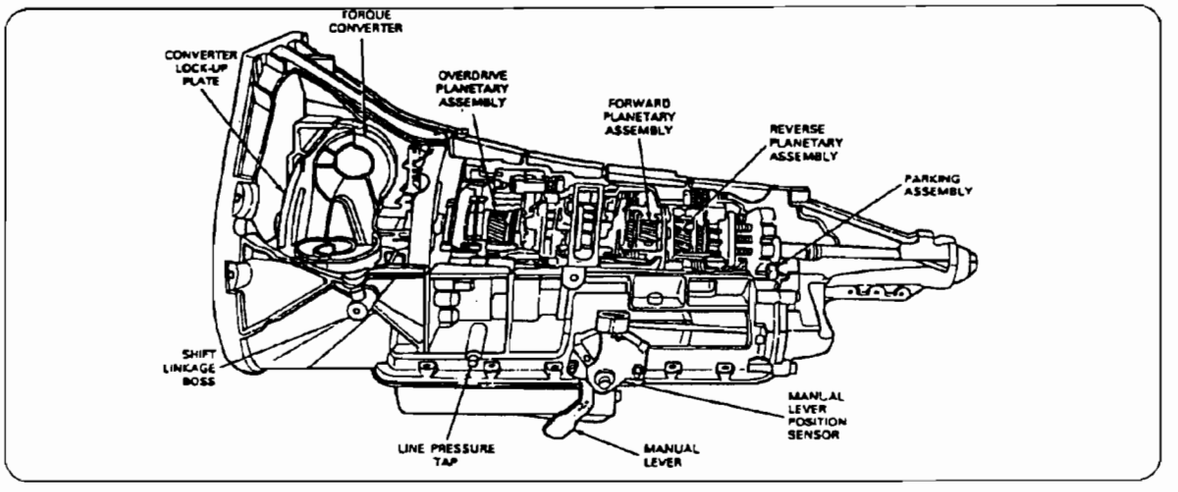
CAUSE: WORN REVERSE GEAR SELECTOR/WORN OR BENT FORK.

CORRECTION: REPLACE REVERSE GEAR SELECTOR AND/OR FORK.

When the inner teeth on the reverse selector gear wear down **(EVEN SLIGHTLY)** they won't mesh perfectly with the teeth on either the reverse hub gear, or the counter reverse gear, and will cause a harsh clanging-type noise when the reverse selector gear is moved between these two gears.
This is often overlooked when rebuilding the transmission because the wear is so slight, but is EXTREMELY CRITICAL to smooth drive engagement.



E4OD FEATURES



TRANSMISSION DESCRIPTION
- High torque capacity automatic four-speed with overdrive 4th gear.
- Torque converter clutch with spring damped piston plate.
- All non-synchronous shifts.
- Shift scheduling via on/off solenoids.
- Pressure control via current proportional variable force solenoid.

TORQUE CAPACITY
- 420 LB-FT Engine torque.
- 836 LB-FT Input torque.

APPLICATIONS
- 4.9L, 5.0, 5.8, 7.5 Gas Engines
- 7.3l Diesel Engines
- Econoline, F-series & Bronco

Gear Ratios
- 1st - 2.710 REV - 2.176
- 2nd - 1.538
- 3rd - 1.000
- 4th - 0.712

Drive Configuration
- 4x2 & 4x4

Transmission Weight Including Fluid
- Approx. 270 lbs depending on application

MAXIMUM INPUT/OUTPUT SPEED
- Up to 6000 rpm (actual shift speeds depends on application)

MAXIMUM GROSS COMBINED VEHICLE WEIGHT
- 26,000 lbs

MAXIMUM TRAILER TOWING CAPABILITY
- 20,000 lbs

GEAR SELECTOR POSITIONS

P, R, N, D, 2, 1
- Dash-mounted overdrive control switch for customer convenience.
- Manual 2 start-up and hold capability.

PLANETARY GEARS
- High contact ratio gears and improved gear manufacturing techniques for quiet operation.

PARK MECHANISM
- Increased torque capacity compatible with motorhomes and other applications up to 16,000 lbs

MANUFACTURING LOCATION
- Sharonville, Ohio

MANUFACTURING CAPACITY
- 500,000 per year

GENERAL OPERATION

The E4OD transmission is a fully automatic, electronically controlled unit with a three-element locking torque converter. The main operating components of the E4OD transmission include a converter clutch, six multiple-disk friction clutches, one band, two sprag one-way clutches and a roller one-way clutch providing the desired function of the three planetary gearsets.

A torque converter couples the engine to the transmission gearset via the input shaft and the torque converter impeller hub. The impeller hub provides engine rpm to the positive displacement pump. The flow from the pump is proportional to engine rpm, and the excess pump capacity is exhausted back to the pump inlet or to the sump.

All upshifts, downshifts, converter clutch applications and line pressure increases are controlled by the EEC-IV module on gas models or by the ECA on diesel models. The information is analyzed and the shift schedule is determined according to the conditions indicated by the various sensors (See Figure 1&2).

INPUT SENSORS

GAS MODELS ONLY
Throttle Position (TP) Sensor - The TP sensor is a potentiometer mounted on the throttle body. It consists of a lever fitted between the throttle valve and a variable resistor. The TP sensor detects the opening of the throttle plate and sends this information to the ECA as a varying voltage signal.

DEISEL MODELS ONLY
Fuel Injection Pump Lever (FIPL) Sensor - The FIPL sensor is a potentiometer similar to the TP sensor used on gasoline engines. The FIPL sensor is attached to the fuel injection pump and is operated by the throttle lever. It sends a varying voltage signal to the Transmission ECA module, telling the module how much fuel is being delivered to the engine.

GAS MODELS ONLY
Manifold Absolute Pressure (MAP) Sensor - The MAP sensor uses pressure to produce an electrical voltage signal. The frequency of this voltage signal varies with intake manifold pressure. The MAP sensor sends this to the ECA, which determines altitude from manifold. The ECA can then adjust the transmission shift schedule for different altitudes.

DIESEL MODELS ONLY
Barometric Pressure (BP) Sensor - The BP sensor operates in the same way as the MAP sensor, except that it measures barometric pressure instead of intake manifold pressure. The transmission ECA module uses the signal from the BP sensor to determine the altitude at which the vehicle is operating. The module then adjusts the E4OD shift schedule for the altitude, just as the EEC-IV ECA does on the vehicles with gasoline engines.

GAS MODELS ONLY
Profile Ignition Pickup (PIP) Sensor - The PIP signal is produced by a Hall-Effect device in the distributor. It tells the ECA the engine RPM and the crankshaft position.

DIESEL MODELS ONLY
Engine RPM Sensor - The engine rpm sensor indicates the engine speed with information from the fuel injection pump gear.

GAS & DIESEL MODELS

Brake On/Off (BOO) Switch - The BOO switch tells the ECA whether the brakes are applied or not. The switch is closed when the brakes are applied and open when they are not.

Manual Lever Position Sensor - This sensor tells the ECA which position the shift lever is in (P, R, N, D, 2 or 1). It is located on the outside of the transmission at the manual lever.

Vehicle Speed Sensor (VSS) - This VSS is a magnetic pickup that sends an AC signal to the ECA. This signal is proportional to the transmission output shaft rpm. The VSS signal tells the ECA what the vehicle speed is.

Transmission Oil Temperature (TOT) Sensor - The TOT sensor is a temperature-sensitive device called a thermistor. It sends a voltage signal that varies with the transmission oil temperature to the ECA. The ECA uses this signal to determine whether a cold start shift schedule is necessary. The cold start shift schedule lowers shift speeds to allow for the increased viscosity of the cold transmission fluid. The TOT sensor is located on the solenoid body in the transmission sump.

Overdrive Cancel Switch and Indicator Light - When the overdrive cancel switch is pressed, the indicator light comes on and a signal is sent to the ECA. The ECA then energizes solenoid 4, applying the coast clutch cancelling fourth gear operation.

FORD - E40D
ELECTRICAL DIAGNOSIS

The solenoid assembly on the E4OD contains five solenoids, and a Transmission Oil Temperature (TOT) sensor. Refer to Figure 6 for names and locations.The solenoids are activated by the EEC-IV module and together they shift the transmission through the various gears, control line pressure, and control the torque converter clutch. All five of the solenoids should be checked with a digital ohmmeter as follows:

SHIFT SOLENOID NO. 1;
- Connect the ohmmeter leads to pins 1 and 3 (See Figure 6), resistance should be 20-30 ohms.

SHIFT SOLENOID NO. 2;
- Connect the ohmmeter leads to pins 1 and 2 (See Figure 6), resistance should be 20-30 ohms.

COAST CLUTCH SOLENOID;
- Connect the ohmmeter leads to pins 1 and 5 (See Figure 6), resistance should be 20-30 ohms.

TCC SOLENOID;
- Connect the ohmmeter leads to pins 1 and 4 (See Figure 6), resistance should be 20-30 ohms.

ELECTRONIC PRESSURE CONTROL (EPC) SOLENOID;
- Connect the ohmmeter leads to pins 11 and 12 (See Figure 6) resistance should be 4.25-6.50 ohms.

To verify that there are no additional shorts in the circuit board, continue with the digital ohmmeter as follows:

1. Connect the ohmmeter leads to pin 1 and GROUND, ohmmeter should read NO CONTINUITY.
2. Connect the ohmmeter leads to pin 2 and GROUND, ohmmeter should read NO CONTINUITY.
3. Connect the ohmmeter leads to pin 3 and GROUND, ohmmeter should read NO CONTINUITY.
4. Connect the ohmmeter leads to pin 4 and GROUND, ohmmeter should read NO CONTINUITY.
5. Connect the ohmmeter leads to pin 5 and GROUND, ohmmeter should read NO CONTINUITY.
6. Connect the ohmmeter leads to pin 6 and GROUND, ohmmeter should read NO CONTINUITY.
7. Connect the ohmmeter leads to pin 7 and GROUND, ohmmeter should read NO CONTINUITY.

To check the transmission oil temperature (TOT) sensor, continue with the digital ohmmeter as follows:
1. Connect the ohmmeter leads to pins 7 and 8 (see Figure 6), and refer to the following chart for resistance readings.

32°F - 58°F	-----	37K - 100K Ohms
59°F - 104°F	-----	16K - 37K Ohms
105°F - 158°F	-----	5K - 16K Ohms
159°F - 194°F	-----	2.7K - 5K Ohms
195°F - 230°F	-----	.5K - 2.7K Ohms
231°F - 266°F	-----	.8K - 1.5K Ohms

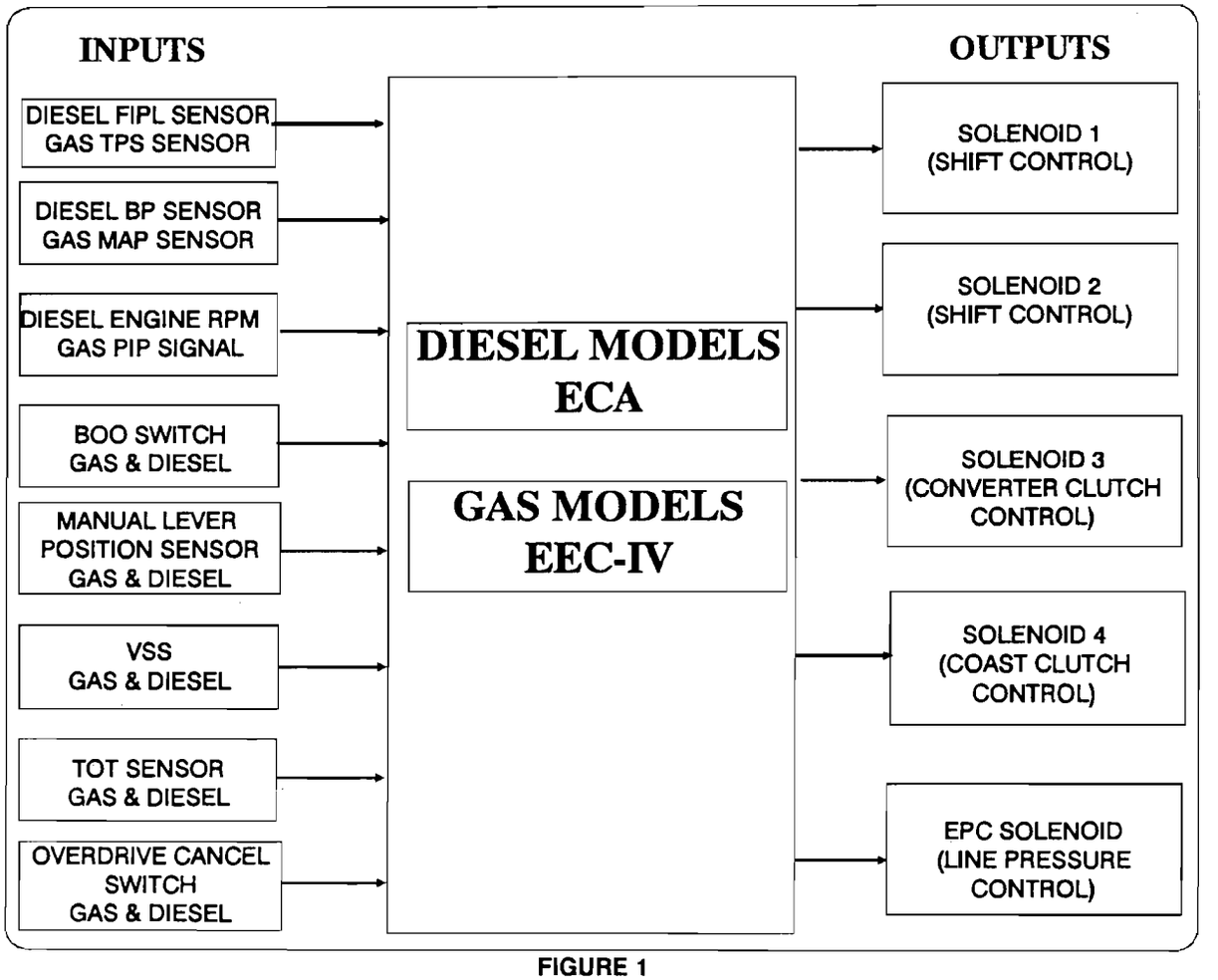


FIGURE 1

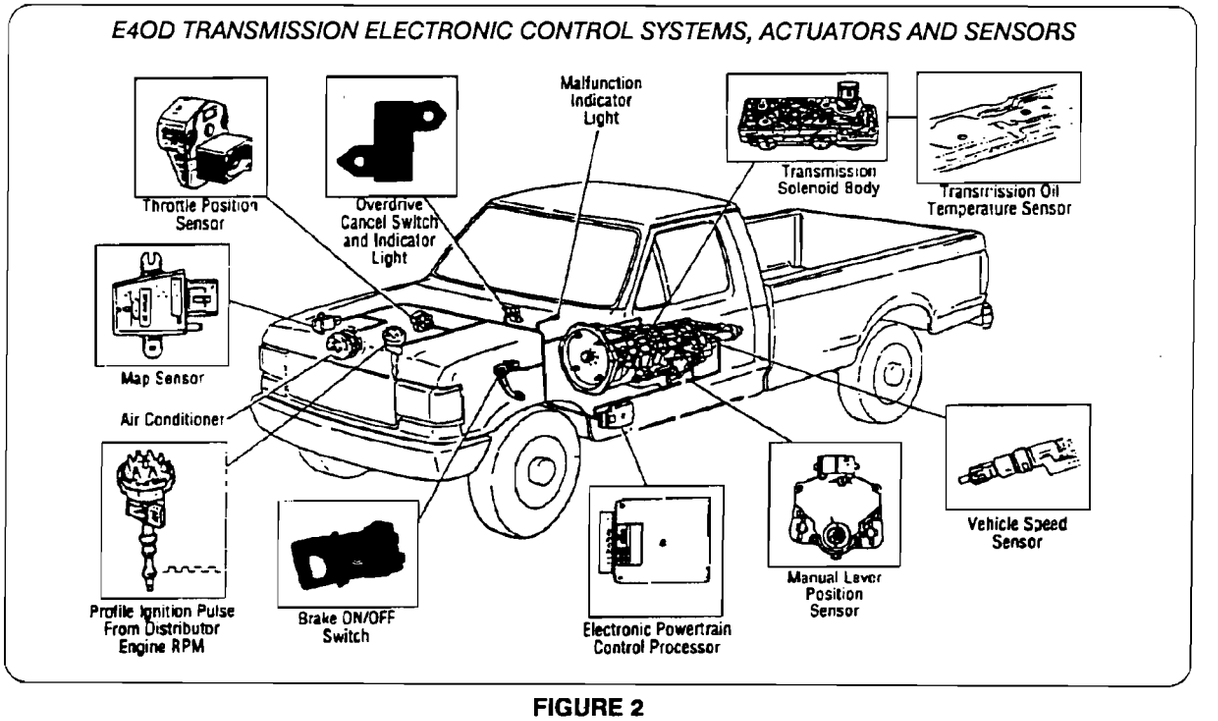


FIGURE 2

MLPS TESTING

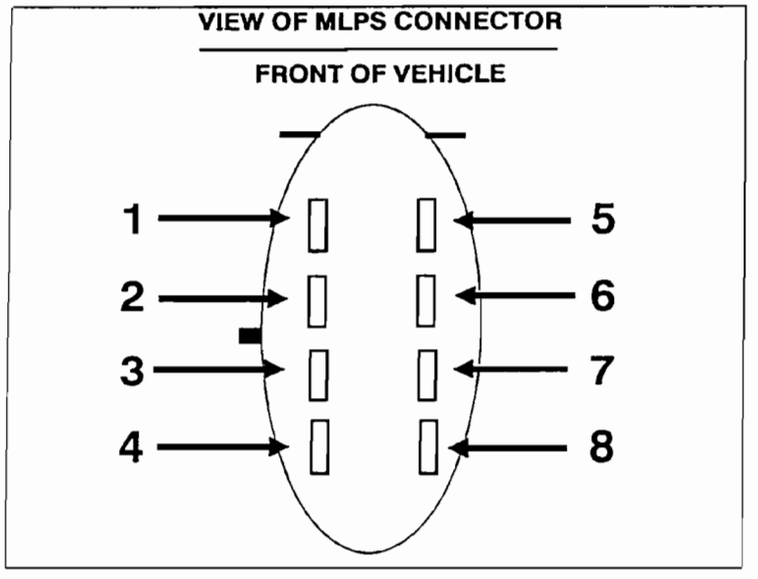


Figure 7

The amount of resistance across terminals 2 and 3 is what informs the computer what position the gear shift selector is in. Use an ohmmeter to verify that resistance is within specifications.

LEVER POSITION	RESISTANCE VALUE SHOULD BE
P	3769 - 4608 OHMS
R	1303 - 1594 OHMS
N	660 - 807 OHMS
D	361 - 442 OHMS
2	190 - 232 OHMS
1	80 - 95 OHMS

CONTINUITY CHECK

Use an ohmmeter or continuity tester to check for continuity in the the following manner: (refer to figure 7 for terminal location).

LEVER POSITION	CONTINUITY SHOULD EXIST BETWEEN TERMINALS
P	5 - 8
R	6 - 7
N	5 - 8
N	1 - 4

SOLENOID OPERATION

The ECA controls the E4OD transmission operation through four on/off solenoids and one Variable Force Solenoid (VFS) These solenoids are housed in the transmission solenoid body assembly (Fig. 3). The functions of these solenoids are as follows:

- Solenoids 1 and 2 provide gear selection of first through fourth gears by controlling the pressure to the three shift valves.
- Solenoid 3 provides converter clutch control by shifting the converter control valve.
- Solenoid 4 provides coast clutch control for overdrive lockout by shifting the coast clutch shift valve. Solenoid 4 can by activated either by pressing the overdrive cancel switch or by selecting the R, 1 or 2 range with the transmission selector lever.

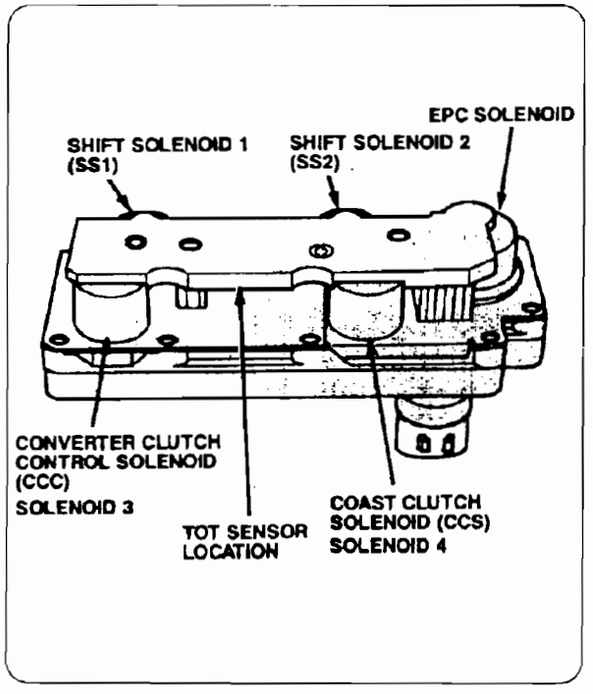


FIGURE 3

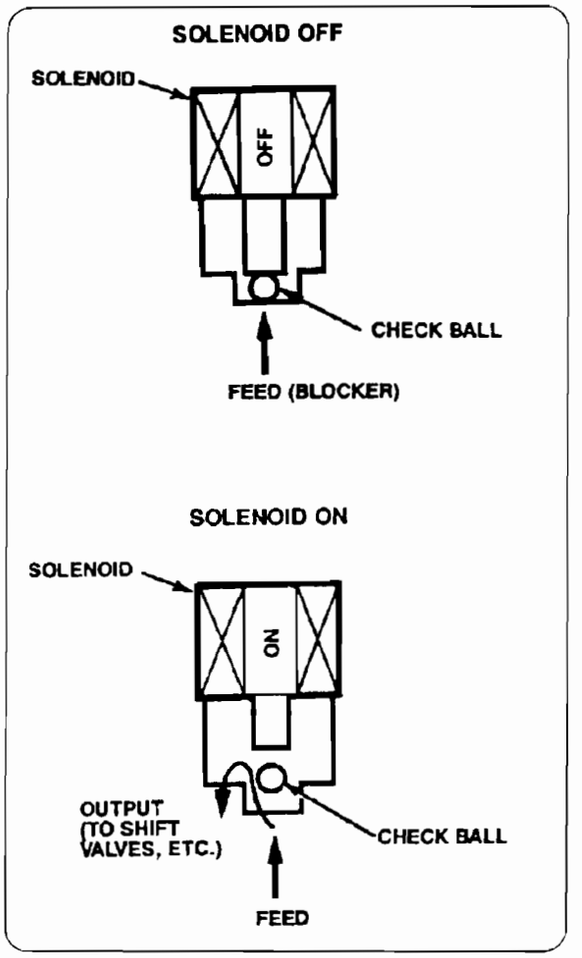


FIGURE 4

Solenoids 1 through 4 operate in the following manner, as shown in (Fig. 4).

- When the solenoid is off, the fluid pressure feed is blocked by a check ball. The check ball is held in place by the solenoid piston.
- When the solenoid is turned on by the ECA, the piston is pulled up, releasing the check ball and allowing fluid pressure to be applied to the check valves and/or other components controlled by the solenoid.

The operation of the E4OD transmission is the same with the Transmission Control System module and diesel engines as it is with the EEC-IV system and gasoline engines. The following chart (SEE FIGURE 5) shows solenoid 1 through 4 applications for the various shift selector positions.

Solenoid Applications Chart

Gear Selector Position	Gear	Shift Control		Converter Clutch Control Sol. 3	Coast Clutch Control Sol. 4
		Sol. 1	Sol. 2		
D	4	OFF	OFF	ON/OFF Based on EEC-IV Strategy	OFF
	3	OFF	ON		OFF
	2	ON	ON		OFF
	1	ON	OFF		OFF
D Overdrive Cancel Switch Pressed	3	OFF	ON		ON
	2	ON	ON		ON
	1	ON	OFF		ON
2	2	OFF	OFF		OFF
1	1	ON	OFF	OFF	OFF

FIGURE 5

Shift Solenoid Failure Modes

SS1 ALWAYS ON:

GEAR COMMAND	OBTAINED OD	2	1
1	1	2	1
2	2	2	1
3	2	2	1
4	1	2	1

SS1 ALWAYS OFF:

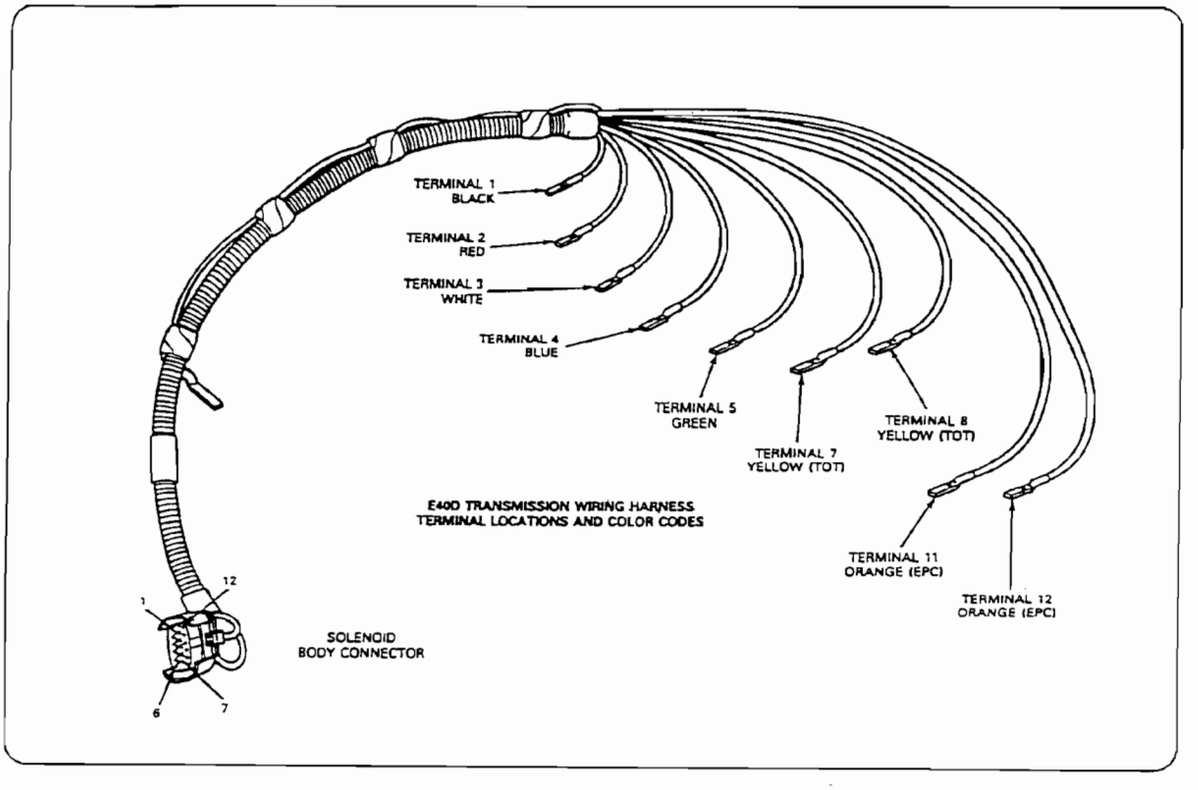
GEAR COMMAND	OBTAINED OD	2	1
1	4	2	2
2	3	2	2
3	3	2	2
4	4	2	2

SS2 ALWAYS ON:

GEAR COMMAND	OBTAINED OD	2	1
1	2	2	1
2	2	2	1
3	3	2	1
4	3	2	2

SS2 ALWAYS OFF:

GEAR COMMAND	OBTAINED OD	2	1
1	1	2	1
2	1	2	1
3	4	2	2
4	4	2	2


TERMINAL 1
BLACK
TERMINAL 2
RED
TERMINAL 3
WHITE
TERMINAL 4
BLUE
TERMINAL 5
GREEN
TERMINAL 7
YELLOW (TOT)
TERMINAL 8
YELLOW (TOT)
TERMINAL 11
ORANGE (EPC)
TERMINAL 12
ORANGE (EPC)
E40D TRANSMISSION WIRING HARNESS
TERMINAL LOCATIONS AND COLOR CODES
SOLENOID
BODY CONNECTOR
1
12
6
7

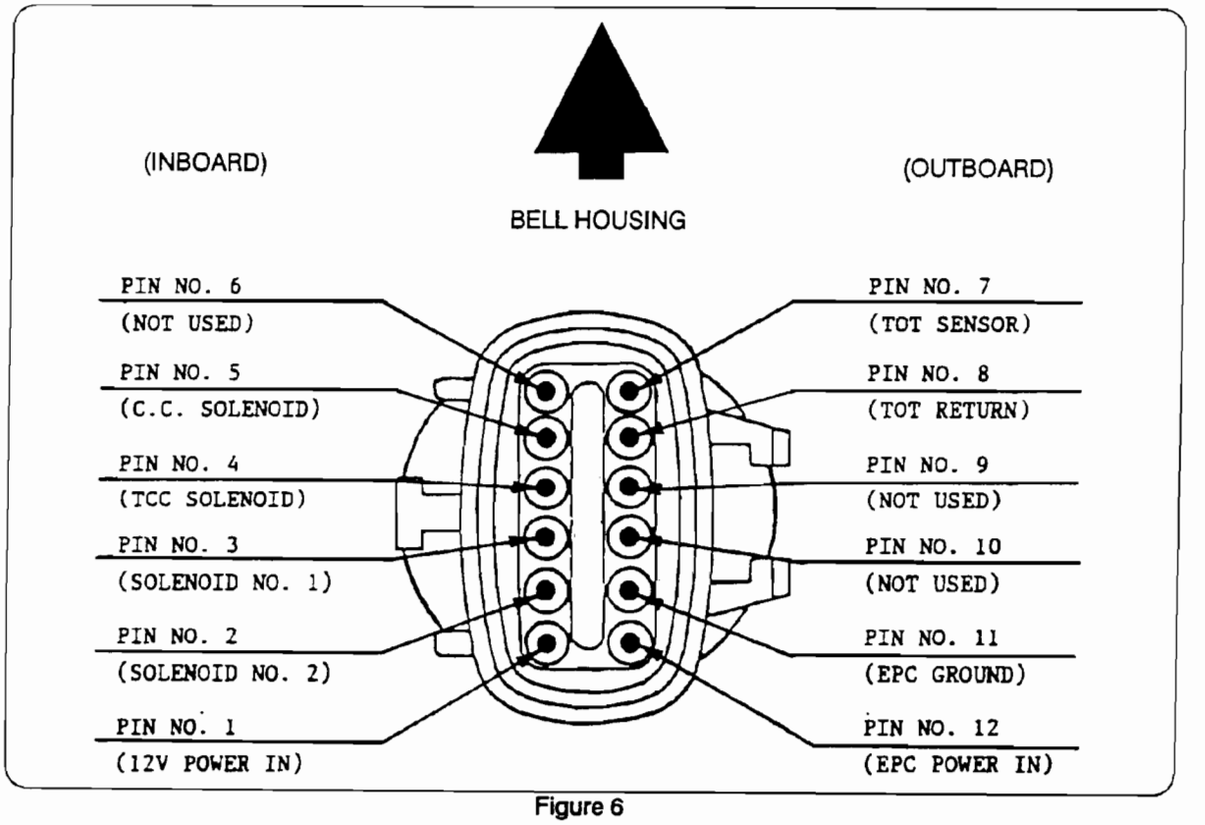

(INBOARD)
(OUTBOARD)
BELL HOUSING
PIN NO. 6
(NOT USED)
PIN NO. 5
(C.C. SOLENOID)
PIN NO. 4
(TCC SOLENOID)
PIN NO. 3
(SOLENOID NO. 1)
PIN NO. 2
(SOLENOID NO. 2)
PIN NO. 1
(12V POWER IN)
PIN NO. 7
(TOT SENSOR)
PIN NO. 8
(TOT RETURN)
PIN NO. 9
(NOT USED)
PIN NO. 10
(NOT USED)
PIN NO. 11
(EPC GROUND)
PIN NO. 12
(EPC POWER IN)

Figure 6

FORD - E4OD
BEARING & RACE CHANGE

CHANGE: The low roller clutch inner race and bearing required dimensional change.

REASON: Improved durability in this area.

PARTS AFFECTED:

1. Low Roller clutch inner race: The low roller clutch inner race height has been reduced by .030" to accomodate a revised hub to race bearing. The previous (before 2/24/89) inner race height was 1.043". The new design (after 2/24/89) inner race height is 1.013". (See Fig. 8)
2. Hub To Race Bearing: The original hub to race bearing was a 2 piece (open face) design, and the new design is a 3 piece closed design bearing. The thickness of the original 2 piece bearing is .110" thick, and the new design 3 piece bearing is .140" thick, to be compatible with the new design inner race.

INTERCHANGABILITY:

The early and late races and bearings are interchangeable as long as the race and bearing are either BOTH late or BOTH early, although the late design is preferred.

SERVICE INFORMATION:

2 PIECE BEARING (BEFORE 2-24-89)..... E7DZ-7D422-A
3 PIECE BEARING (AFTER 2-24-89)..... E6DZ-7A178-A

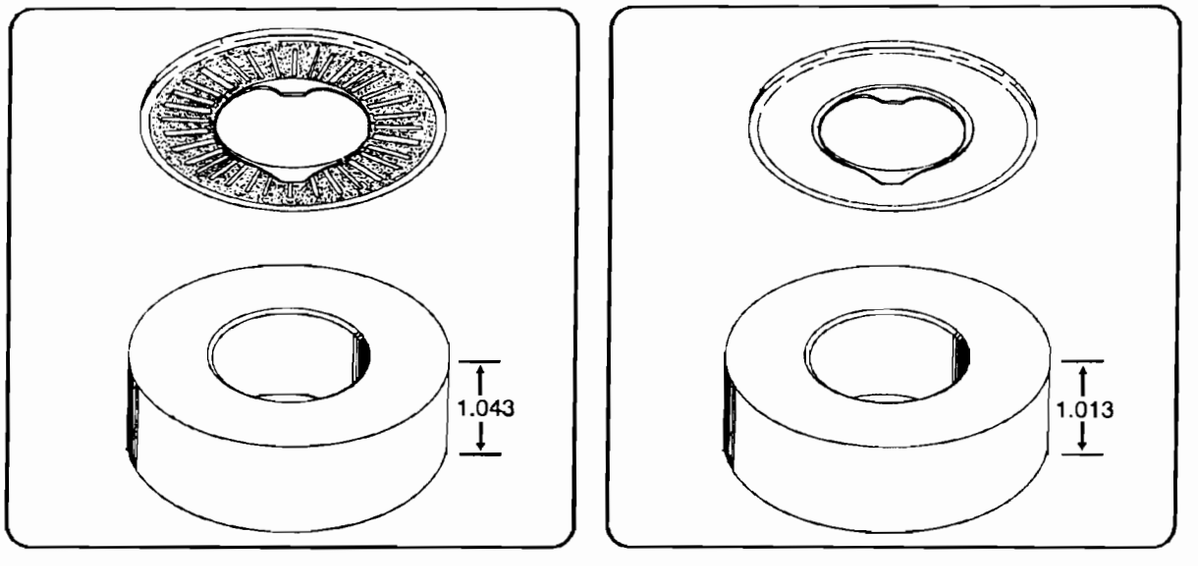


Figure 8

FORD - E4OD
OUTPUT SHAFT CHANGE

CHANGE: Portion of spline area on output shaft, behind park gear snap ring, was eliminated (see Figure 10).

REASON: To prevent park gear from moving rearward in case snap ring breaks, and provides more support for snap ring, to prevent snap ring breakage.

INTERCHANGABLITY: Will retro-fit to all previous models and is highly recommended.

SPECIAL NOTES: In mid-year 1989, a boss was added inside the extension housing, to act as a stop for the parking gear to eliminate the possibility of the parking gear disengaging from the splines in the event that the parking gear to shaft snap ring breaks.

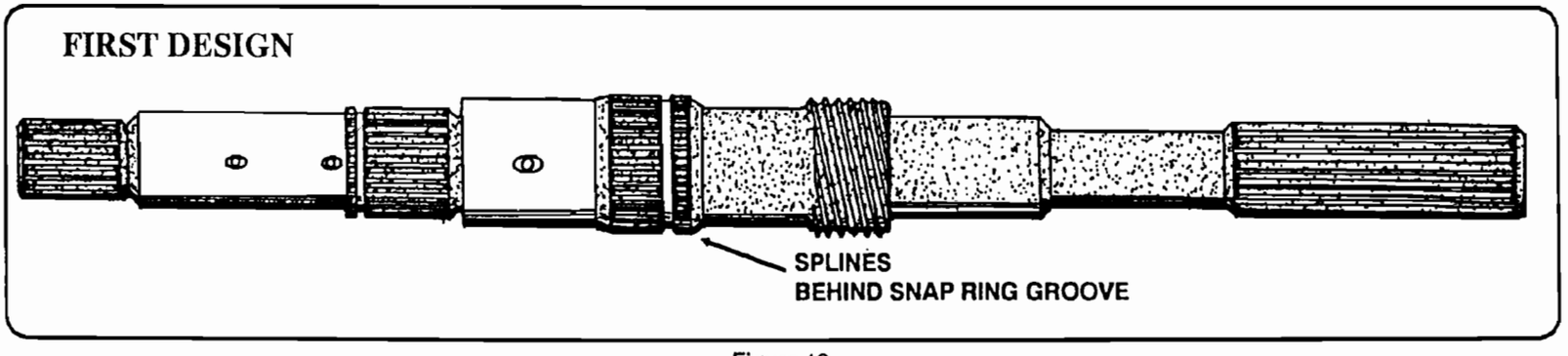
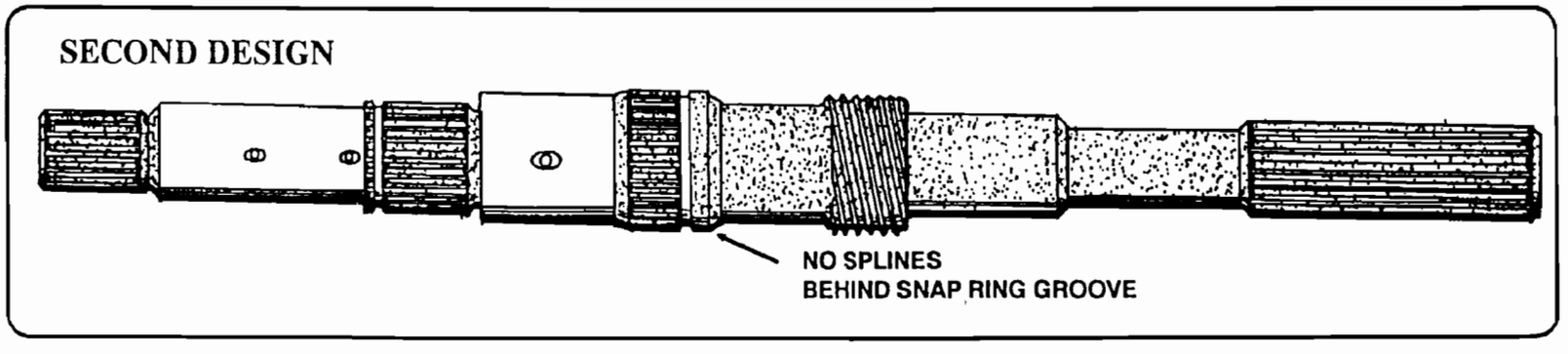
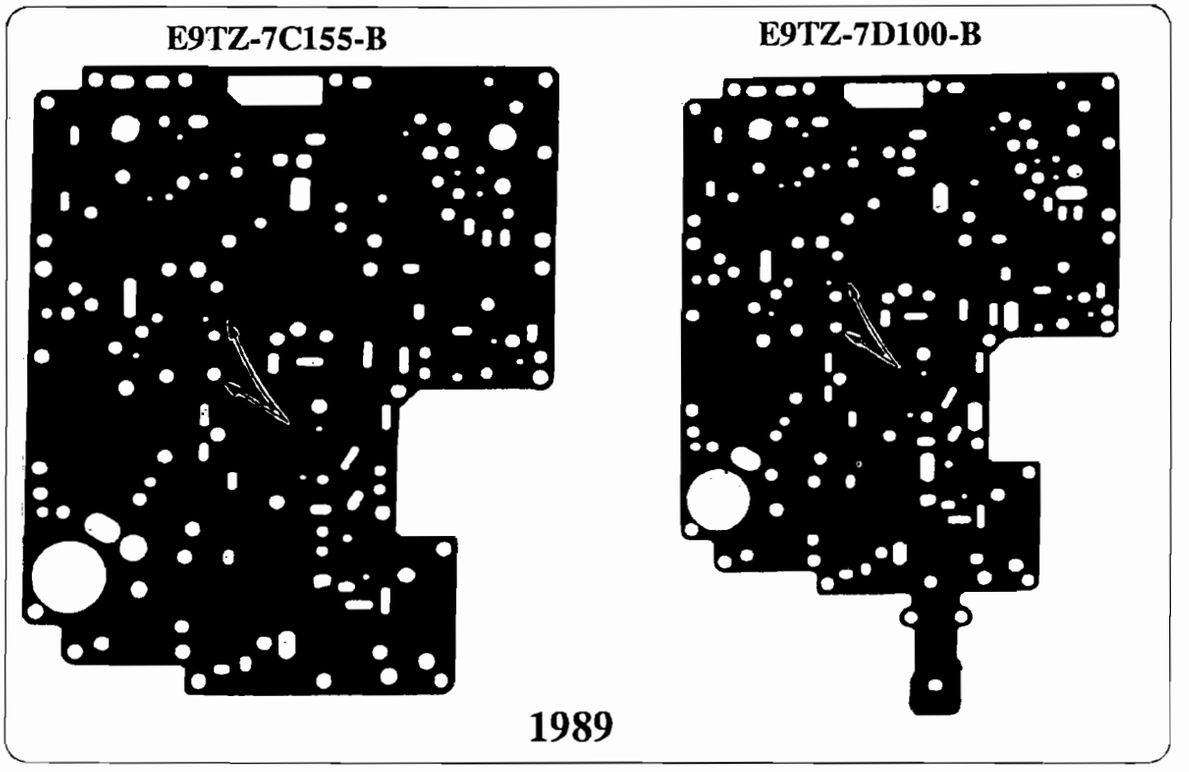


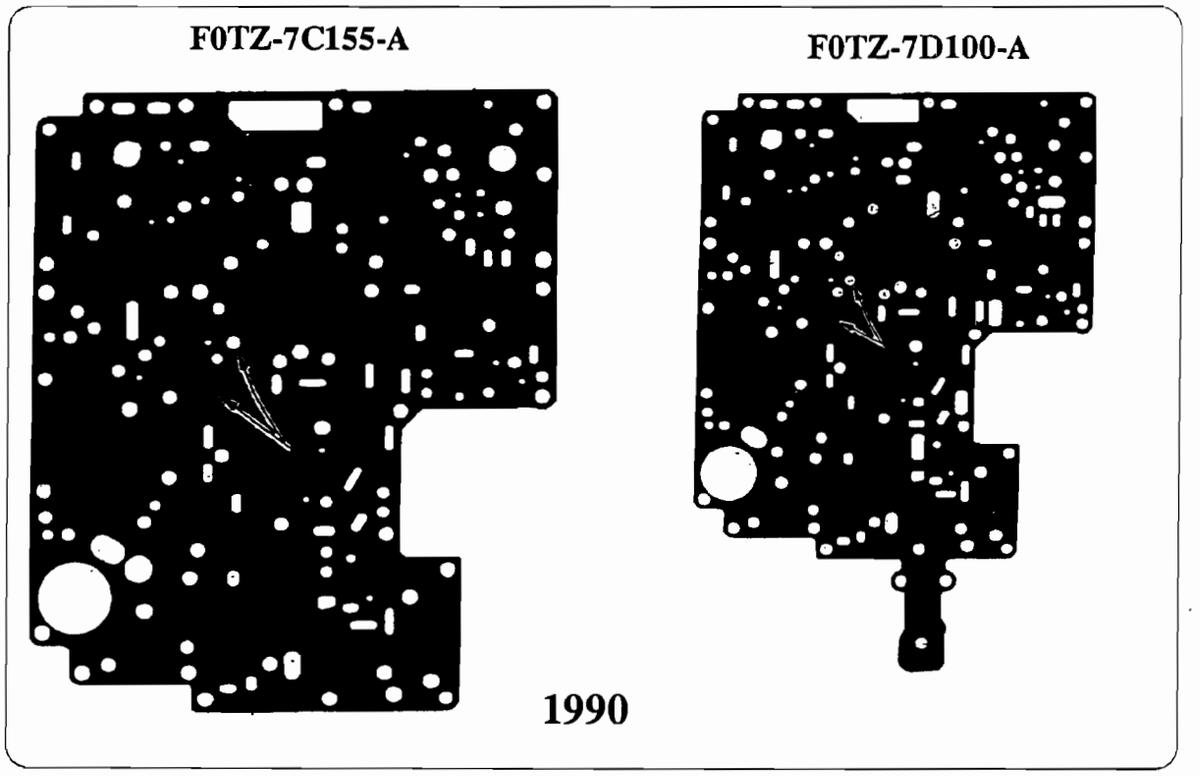
Figure 10





The 1989 and 1990 gaskets are different, and are not interchangeable. Note the differences indicated by the arrows.

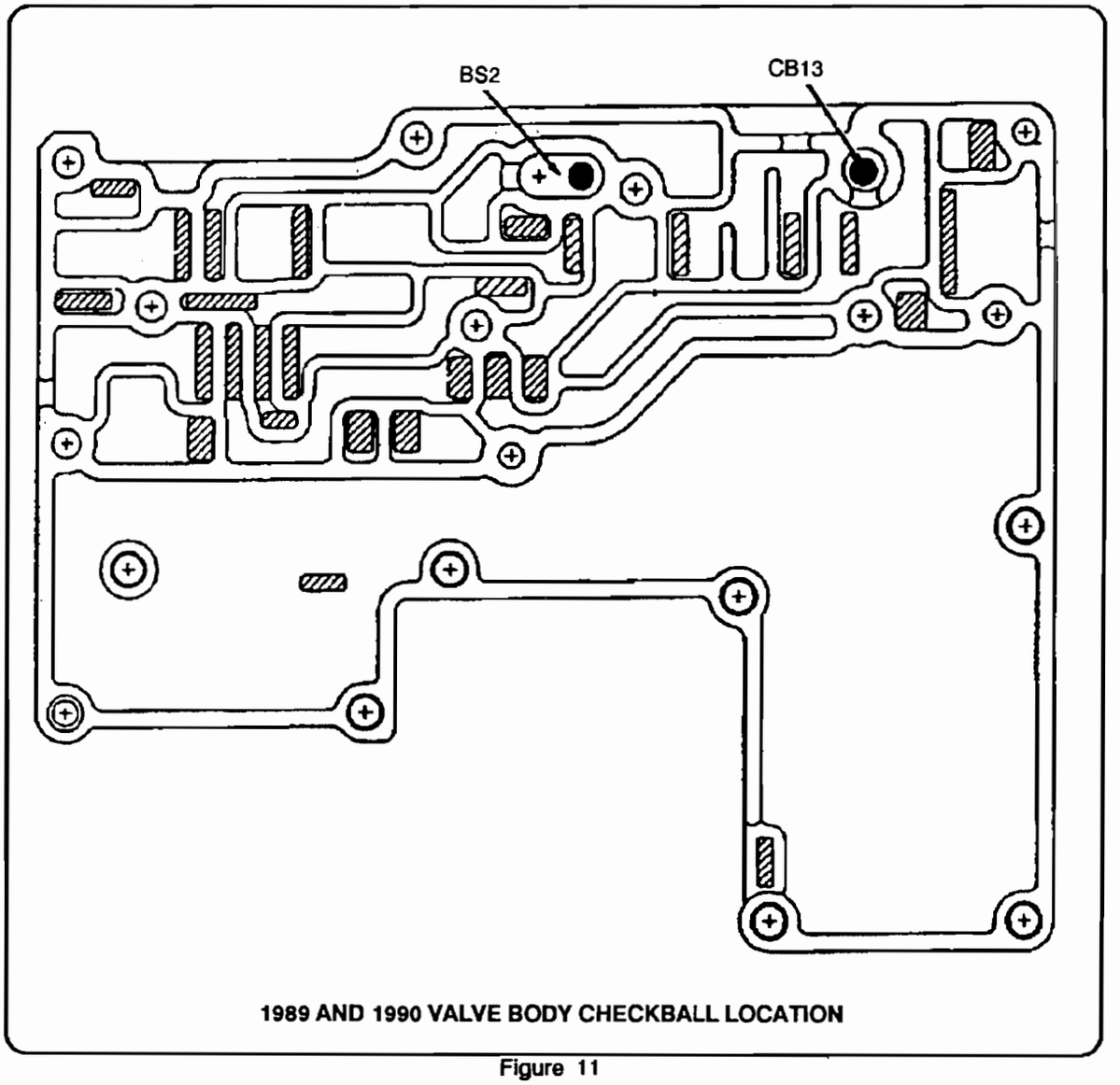
Figure 9



FORD - E4OD
CHECK BALL LOCATION CHANGE FOR 1990

There has been a change in check ball locations (CASE ONLY), for all 1990 model E4OD transmissions. Valve body locations remained the same as previous models.

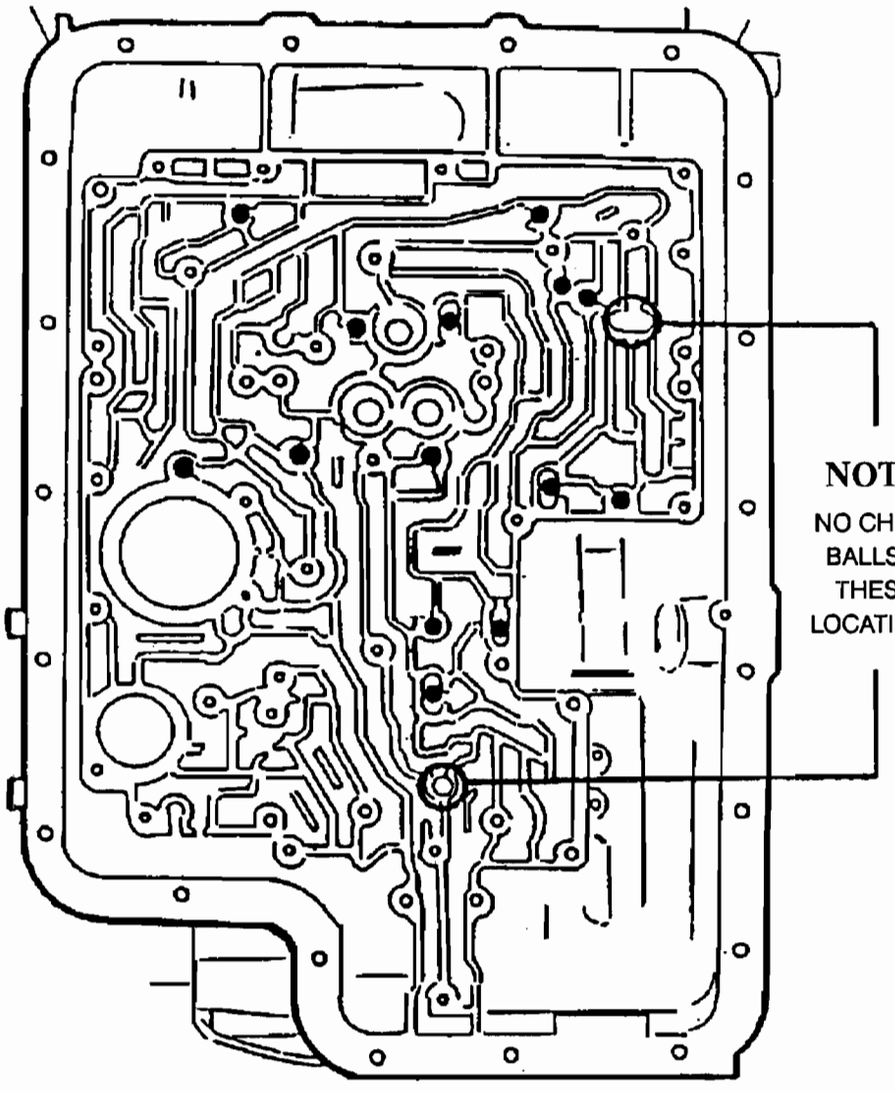
REFER TO FIGURE 11 FOR BOTH YEARS , FOR THE VALVE BODY CHECKBALL LOCATION.
REFER TO FIGURE 12 FOR "1989" CHECKBALL LOCATIONS.
REFER TO FIGURE 13 FOR "1990" CHECKBALL LOCATIONS.



1989 AND 1990 VALVE BODY CHECKBALL LOCATION

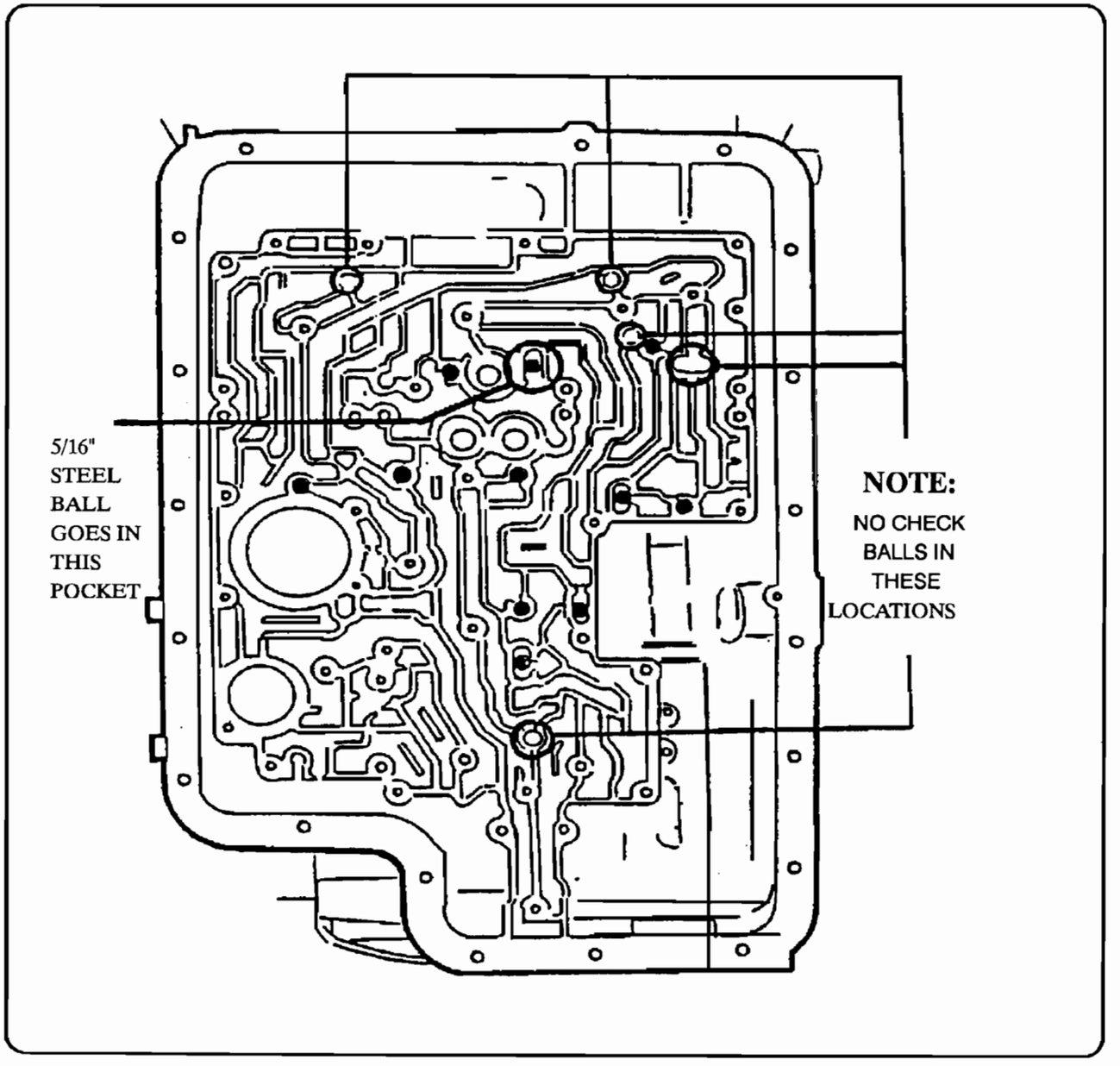
Figure 11

FORD E4OD
EARLY 1989 (14) CHECK BALL LOCATION

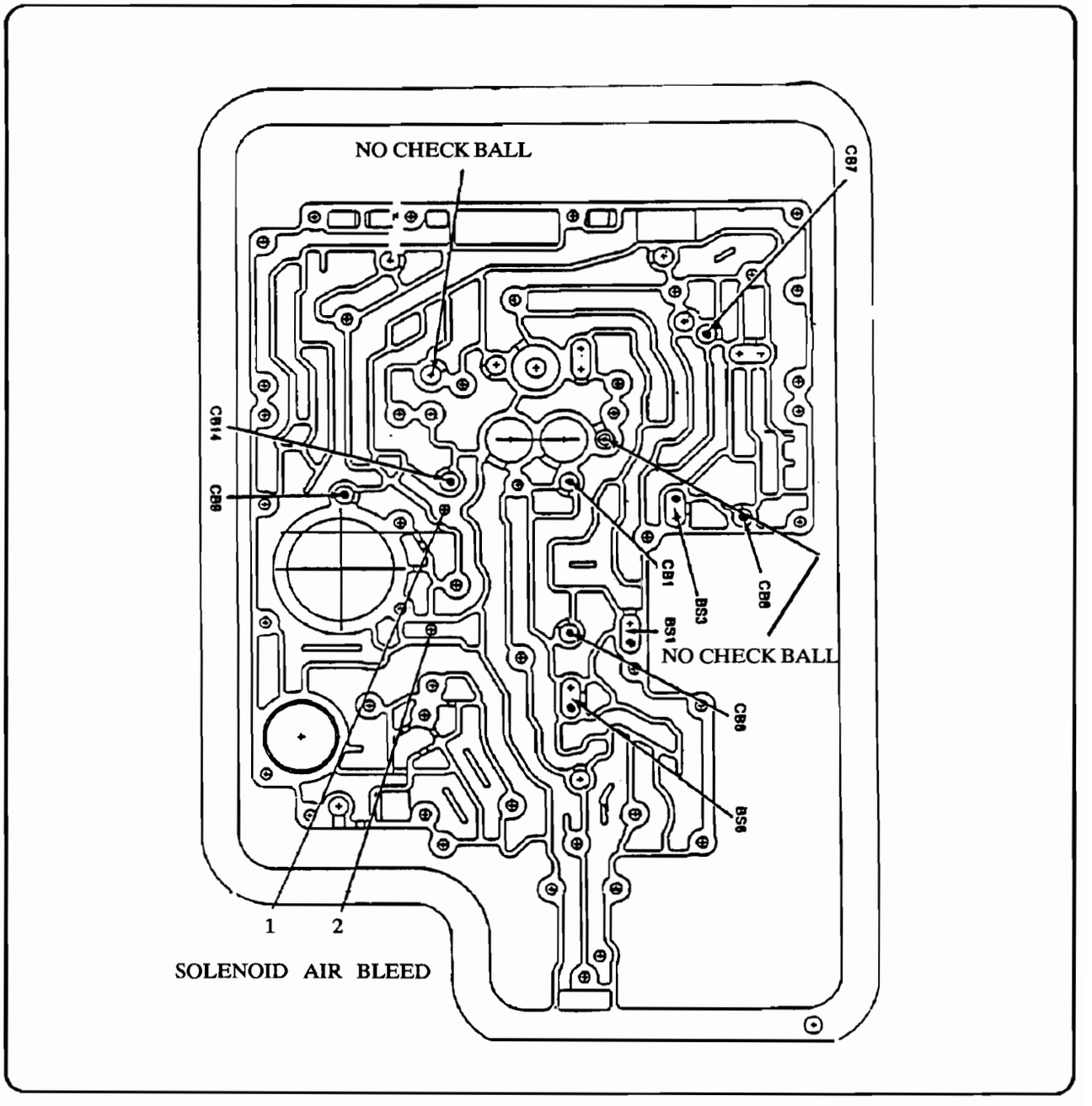


NOTES:

FORD E4OD
MID 1989 (10) CHECK BALL LOCATION



FORD E4OD
1990 - 91 (9) CHECK BALL LOCATION



FORD - E4OD
HARSH 3-4 SHIFT

COMPLAINT: Harsh 3-4 shift, or upon transmission dis-assembly the o/d piston return spring retaining ring (see figure 14) is dislodged from groove.

CAUSE: The cause may be insufficient ring tension.

CORRECTION: Replace ring with part number FOTZ-7A527-A.

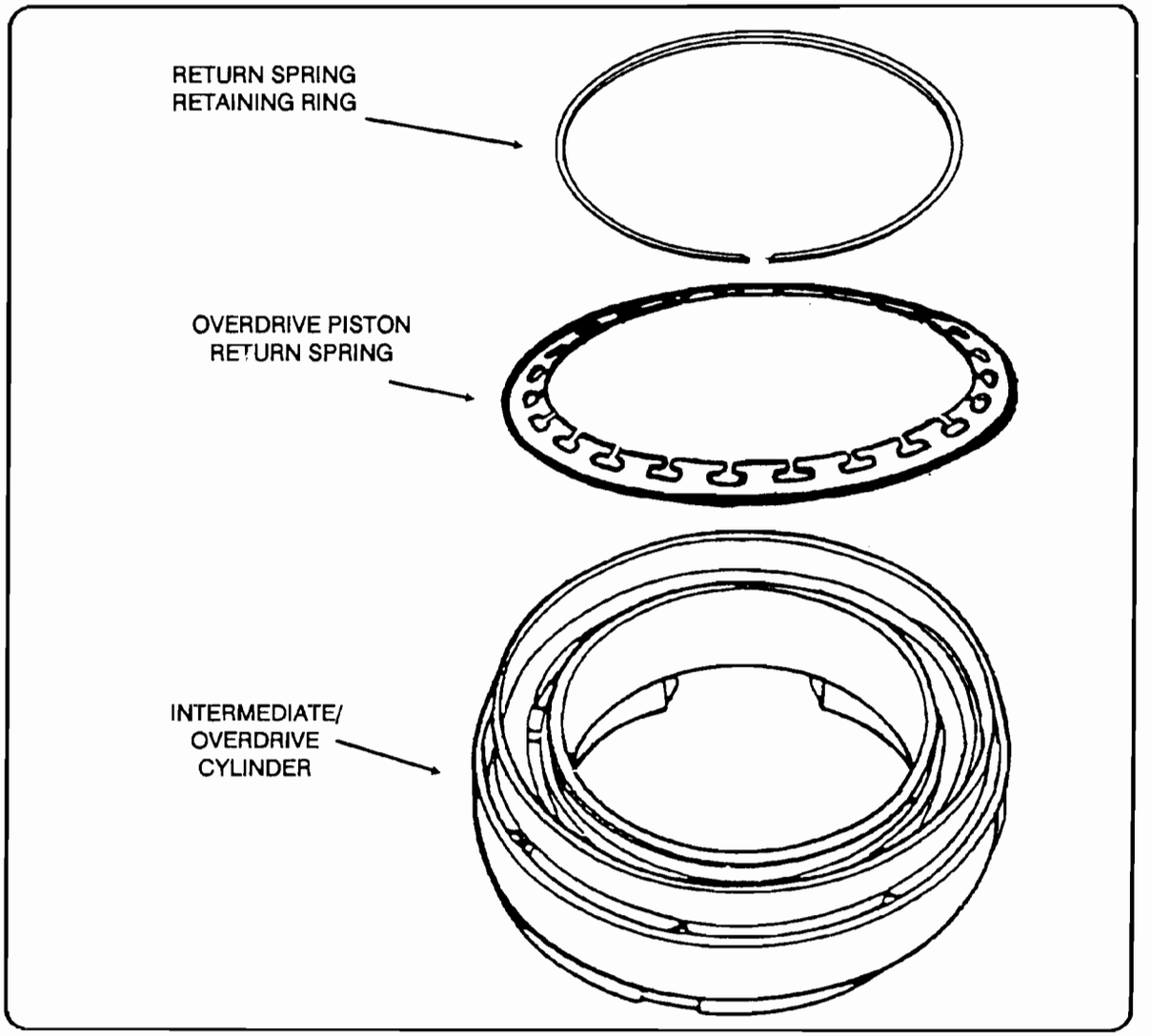


Figure 14

FORD - E4OD
OVERDRIVE SECTION FAILURE

COMPLAINT : Overdrive planetary and overdrive sprag failure due to lack of lube.

CAUSE : The cause may be a plugged or restricted lube passage in pump cover. There is a ball and spring under the orificed cup plug making this passage prone to clogging up.

CORRECTION: Clean out the lube passage.

To check for restricition blow into hole in pump cover (See Figure 15). Air should exit from hole in rear of stator shaft as shown in (Figure 16).

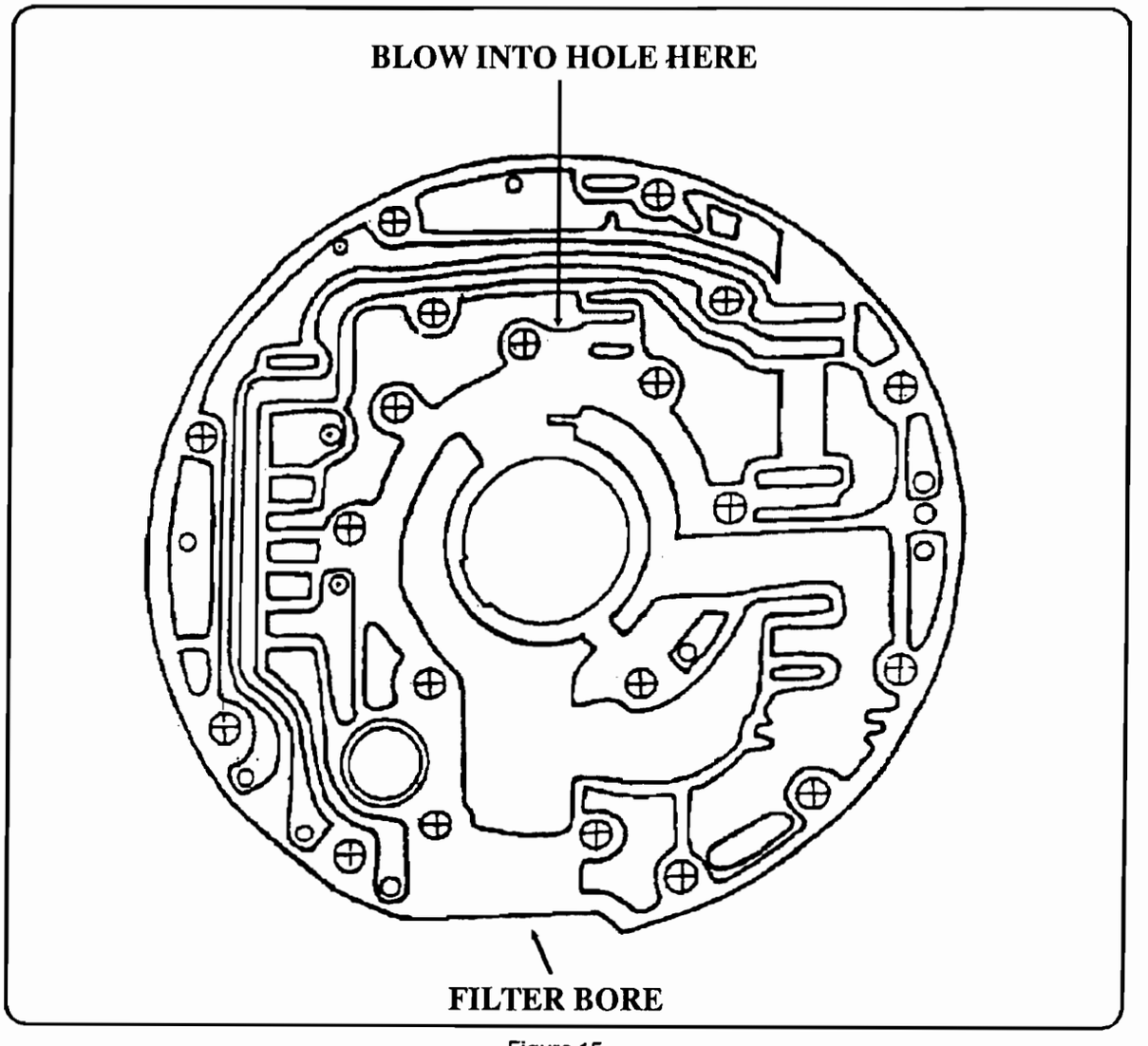


Figure 15

E4OD PUMP COVER

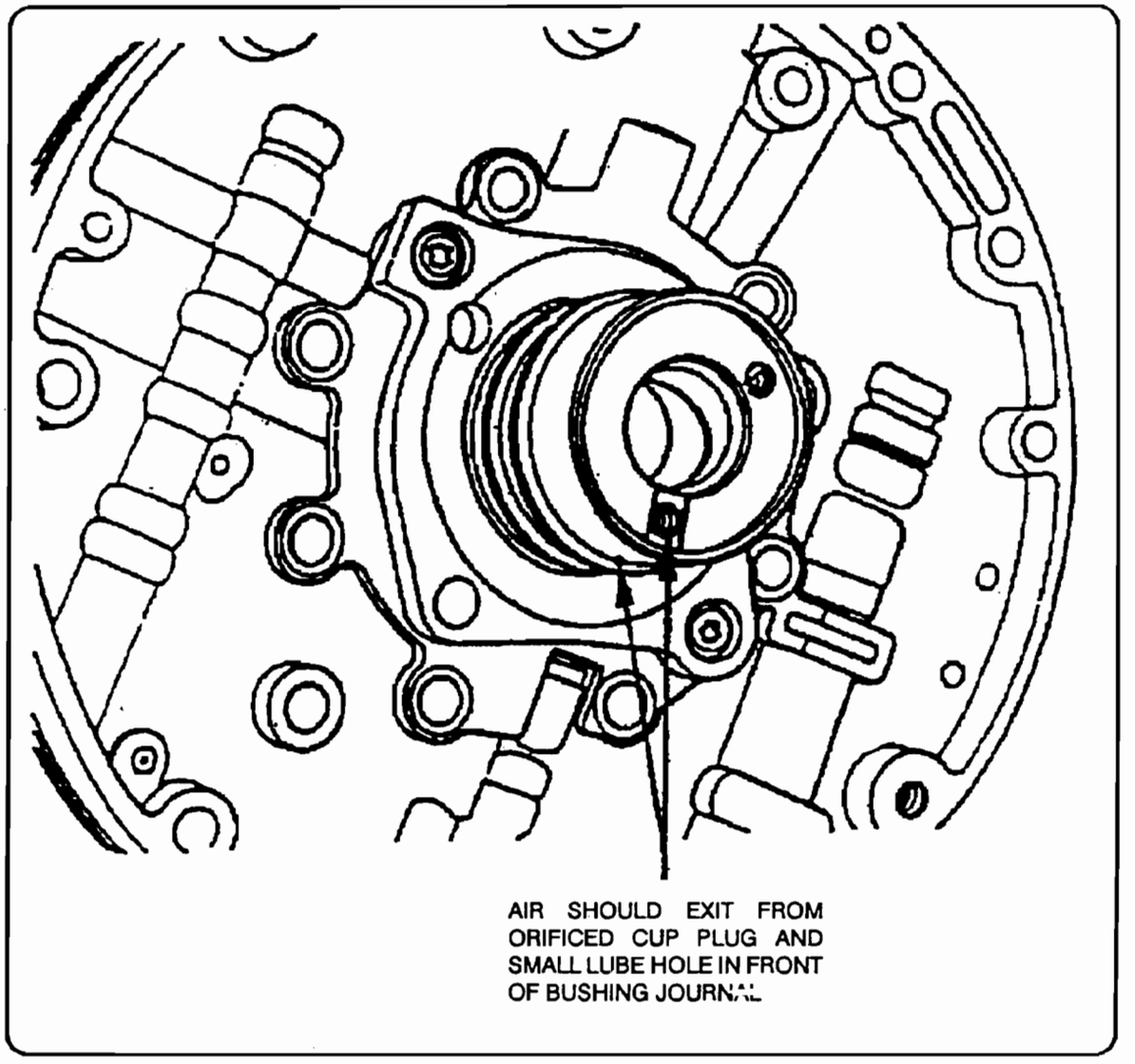
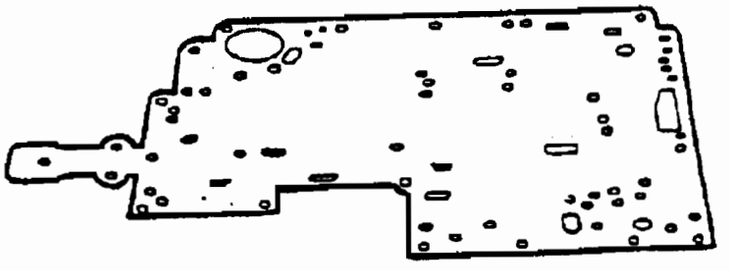
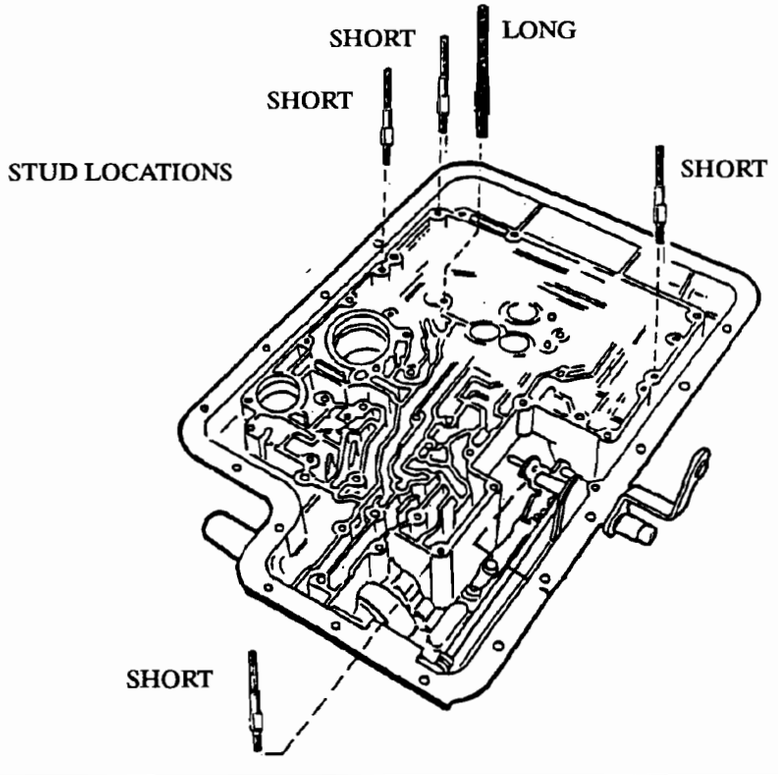


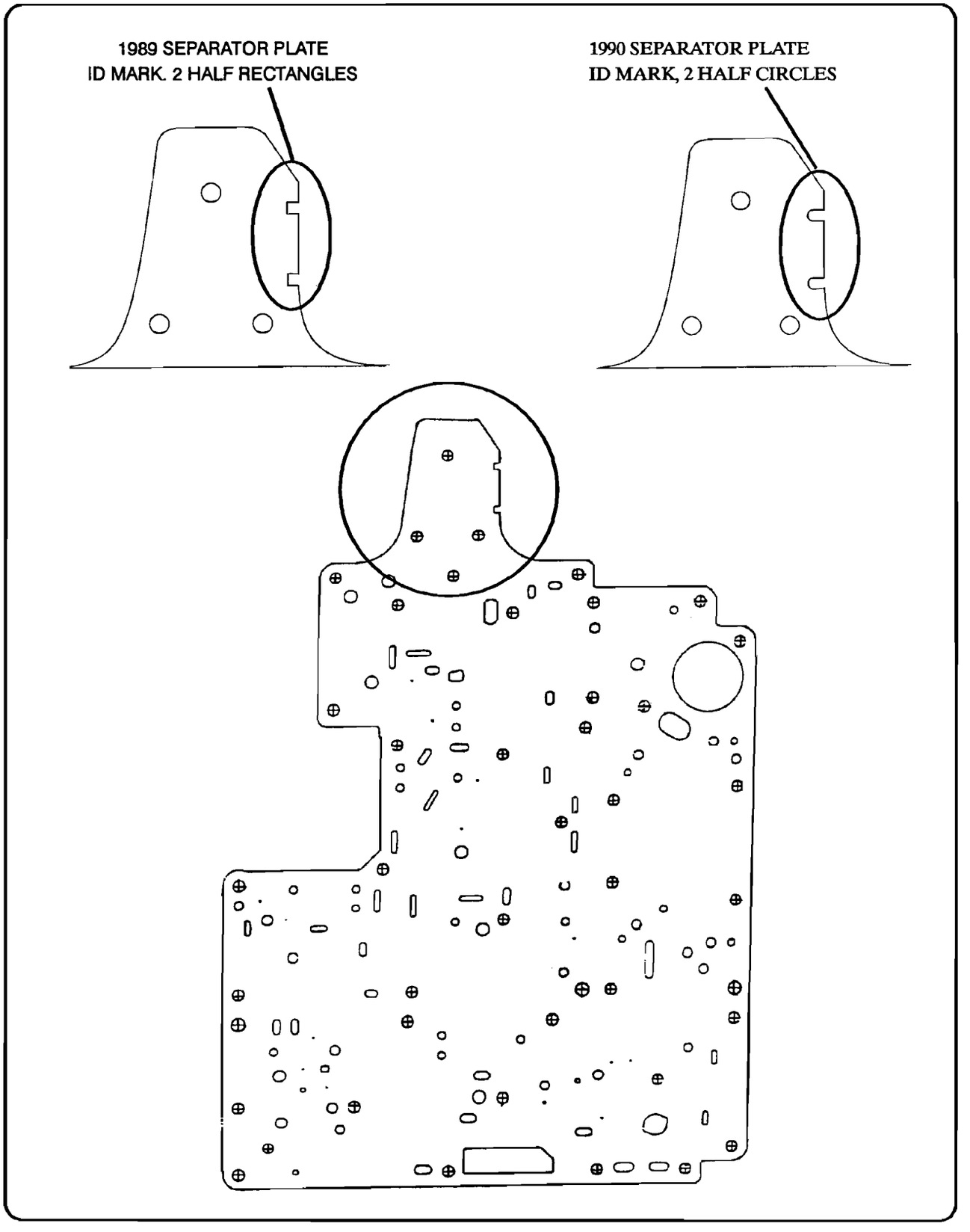
Figure 16

FORD E4OD

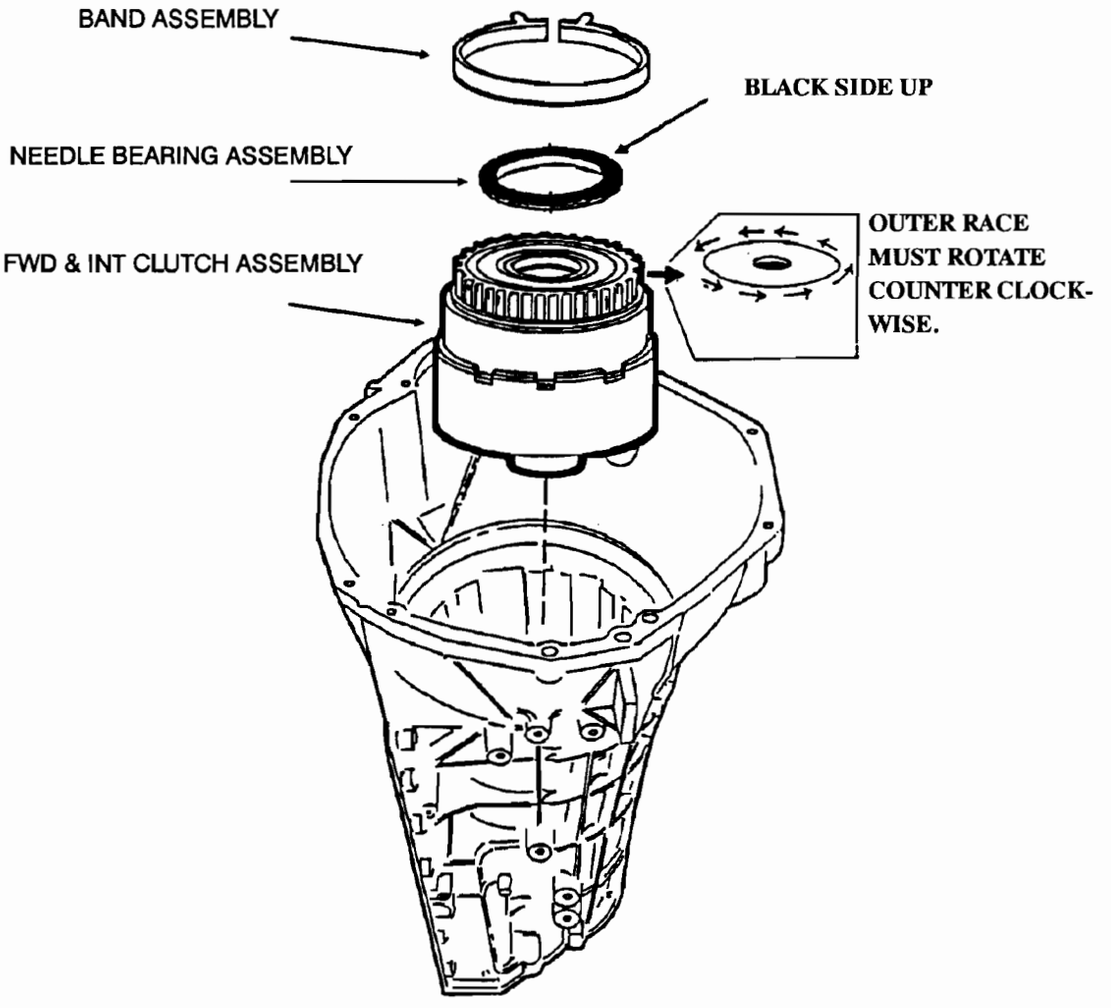
SEPARATOR PLATE GASKET






1989 SEPARATOR PLATE
ID MARK. 2 HALF RECTANGLES
1990 SEPARATOR PLATE
ID MARK, 2 HALF CIRCLES

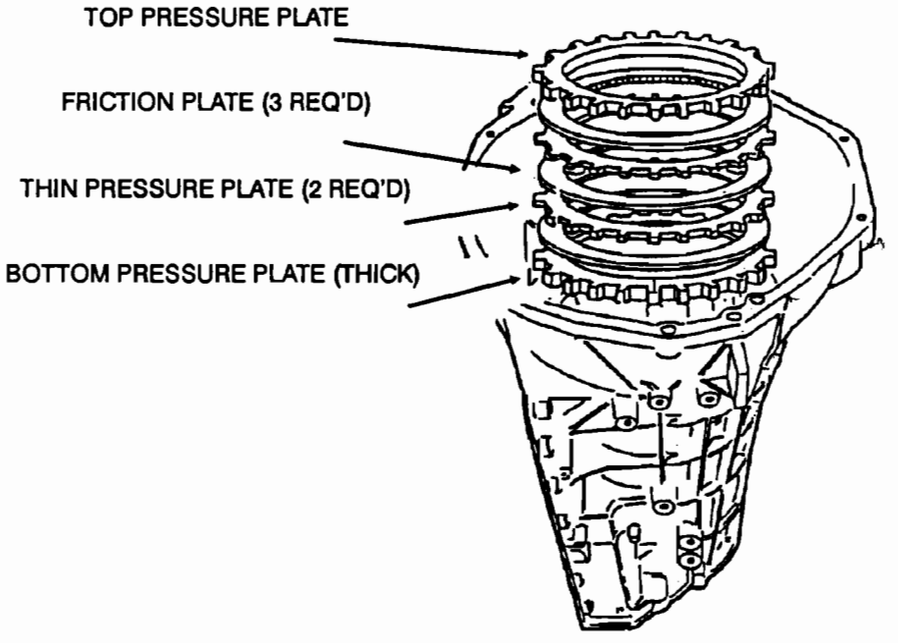
FORD E4OD



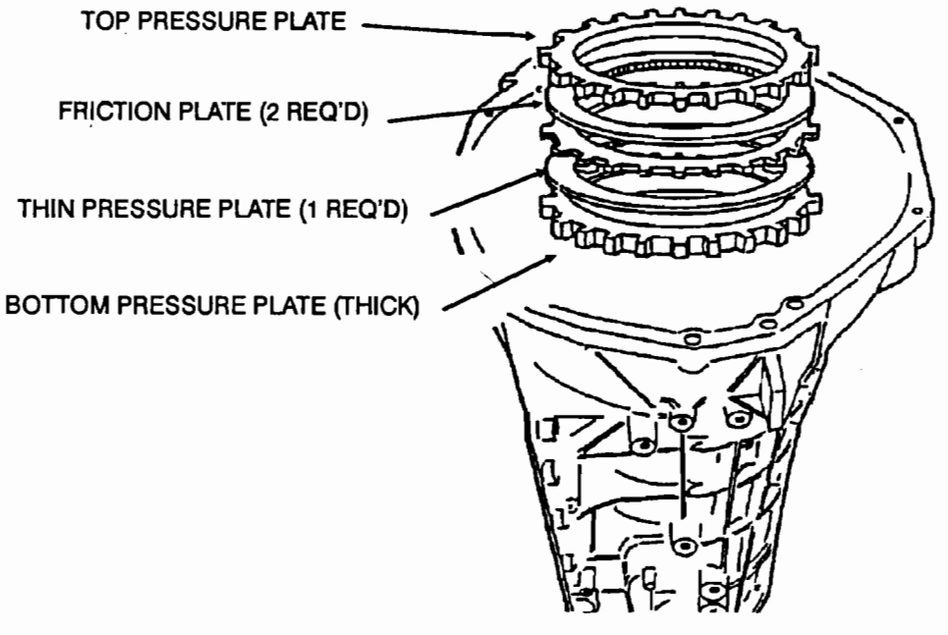
NOTES:

FORD E4OD

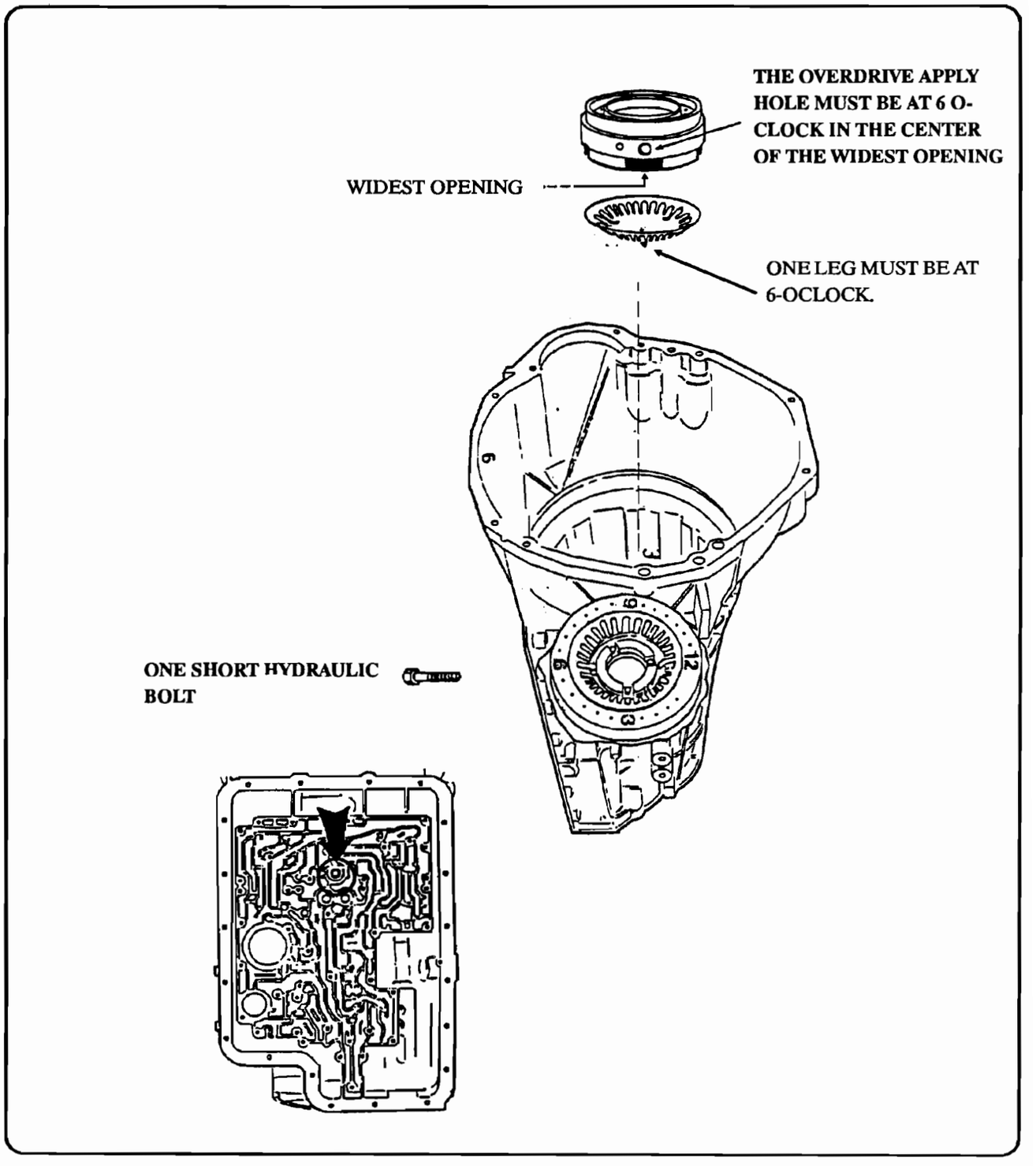
7.3 DIESEL
7.5L 460
5.8L 351



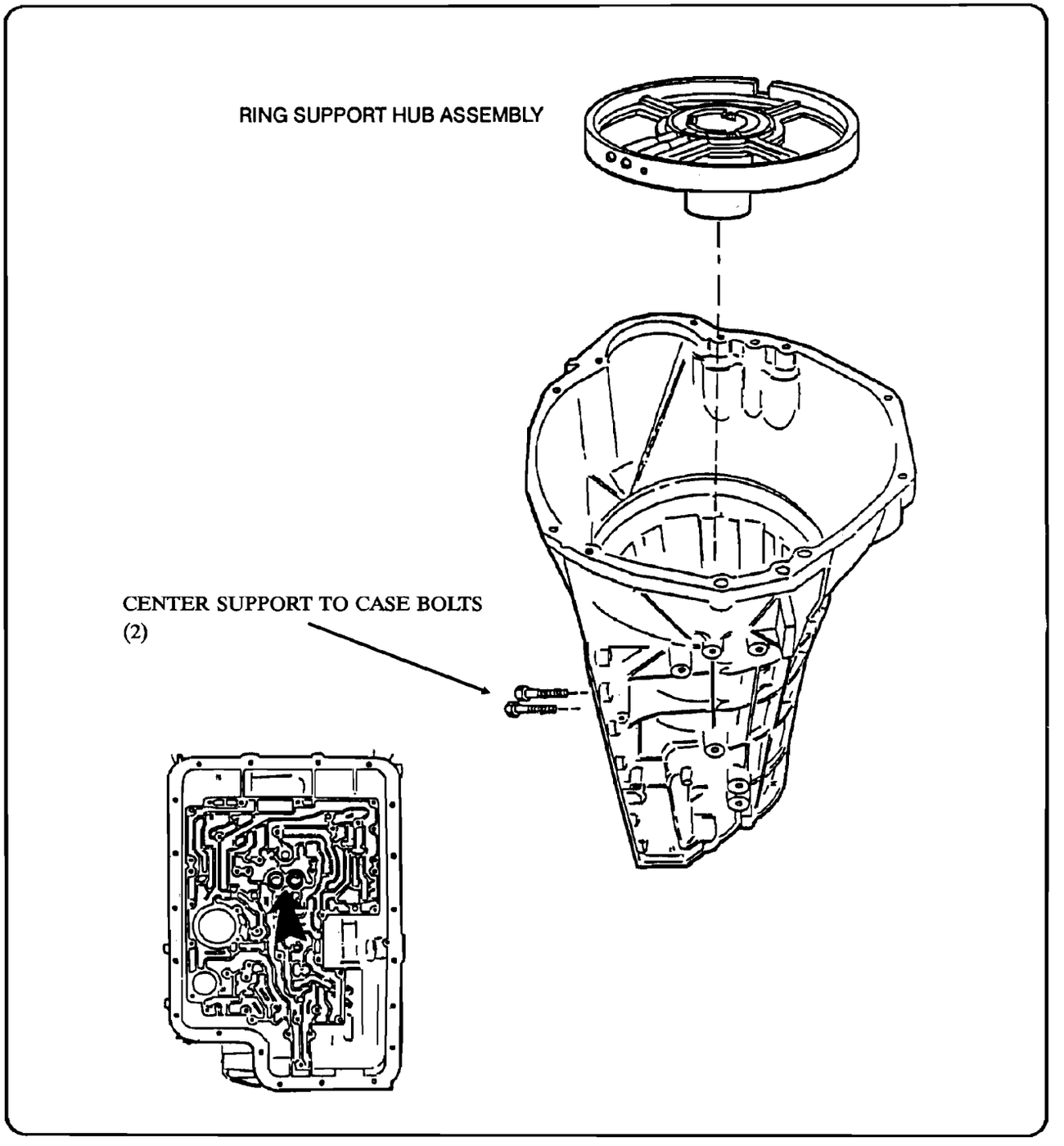
5.0L 302
4.9L 300



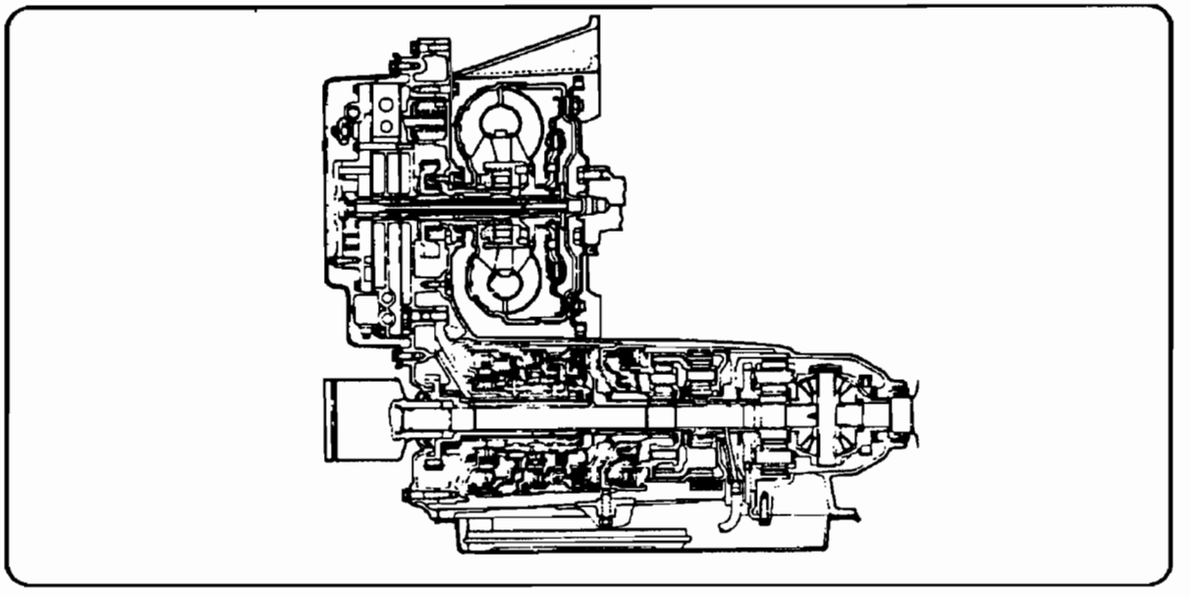
FORD E4OD


THE OVERDRIVE APPLY HOLE MUST BE AT 6 O-CLOCK IN THE CENTER OF THE WIDEST OPENING
WIDEST OPENING
ONE LEG MUST BE AT 6-OCLOCK.
ONE SHORT HYDRAULIC BOLT

FORD E4OD



AXOD 4 SPEED FRONT WHEEL DRIVE



Gear	Lo-Int Band	Overdrive Band	Forward Clutch	Intermediate Clutch	Direct Clutch	Reverse Clutch	Low One-Way Clutch	Direct One-Way Clutch
1st Gear Manual Low	Applied		Applied		Applied		Applied	Applied
1st Gear (Drive)	Applied		Applied				Applied	
2nd Gear (Drive)	Applied		Applied	Applied			Holding	
3rd Gear (Drive)			Applied	Applied	Applied			
4th Gear (Overdrive)		Applied		Applied	Applied			Holding
Reverse (R)			Applied			Applied	Holding	
Neutral (N)								
Park (P)								

GEAR RATIOS

1st - 2.77:1
2nd - 1.543:1
3rd - 1.00:1
4th - .694:1

FRICTION ELEMENTS

4 MULTIPLE DISK CLUTCH PACKS
2 ONE-WAY CLUTCHES
2 BANDS

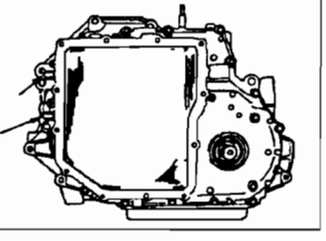
PRESSURE TAPS AVAILABLE

MAIN LINE
T.V.
FORWARD

COOLER FLOW

FEED

RETURN



AXOD GASKET IDENTIFICATION

The valve body, oil pump, and chain cover must also be matched, along with the proper gaskets. The gaskets "DO NOT" interchange between model years. Refer to the charts below for proper identification.

GASKET IDENTIFICATION

1986 Hydraulics = Plain black, without any ID marks.
1987 Hydraulics = White Stripe on pump and valve body gaskets.
1988 Hydraulics = Yellow Stripe on pump and valve body gaskets.
1989 Hydraulics = Yellow Stripe on pump and valve body gaskets.

PUMP IDENTIFICATION

1986 Hydraulics = Casting Number E6SP-7B324-AA.
1987 Hydraulics = Casting Number E7DP-7B324-AA.
1988 Hydraulics = Casting Number E8DP-7B324-AA.

SEE FIGURE 20 FOR CASTING NUMBER LOCATION

VALVE BODY IDENTIFICATION

1986 Hydraulics = Casting Number E6SP-7A092-AD.
1987 Hydraulics = Casting Number E7DP-7A092-BA.
1988 Hydraulics = Casting Number E8DP-7A092-AA.

SEE FIGURE 22 FOR CASTING NUMBER LOCATION

CHAIN COVER IDENTIFICATION

1986 Hydraulics = Casting Number E6SP-7G234-AA.
1987 Hydraulics = Casting Number E7DP-7G234-AA.
1988 Hydraulics = Catsing Number E8DP-7G234-AA.

SEE FIGURE 21 FOR CASTING NUMBER LOCATION

SPACER PLATES ARE IDENTIFIED BY THE NOTCHES ON THE EDGE OF THE PLATES (SEE FIGURES 23 & 24)

FORD - AXOD

NEW 10 CHECK BALL PUMP - 3.8L ENGINES ONLY

Make certain the correct number of check balls are installed in their proper locations during the reassembly process. Use the transaxle model tag attached to the top of the converter housing, (See Figure 29), for positive model identification. Refer to the following service information for the correct numbers of check balls, and proper placement of the check balls.

VALVE BODY CHECK BALL INFORMATION

The valve body has seven (7) check balls and the location of the check balls are the same for all models and all years.

REFER TO FIGURE 30 FOR LOCATIONS

OIL PUMP BODY CHECK BALL INFORMATION

1986-1990 TAURUS/SABLE, 3.0L ENGINES, ALL MODELS
1989 CONTINENTAL, 3.8L ENGINES, MODELS PNA-AB, PNA-AB3

THE OIL PUMP BODY ON THESE MODELS HAVE NINE (9) CHECKBALLS

REFER TO FIGURE 31 FOR LOCATIONS

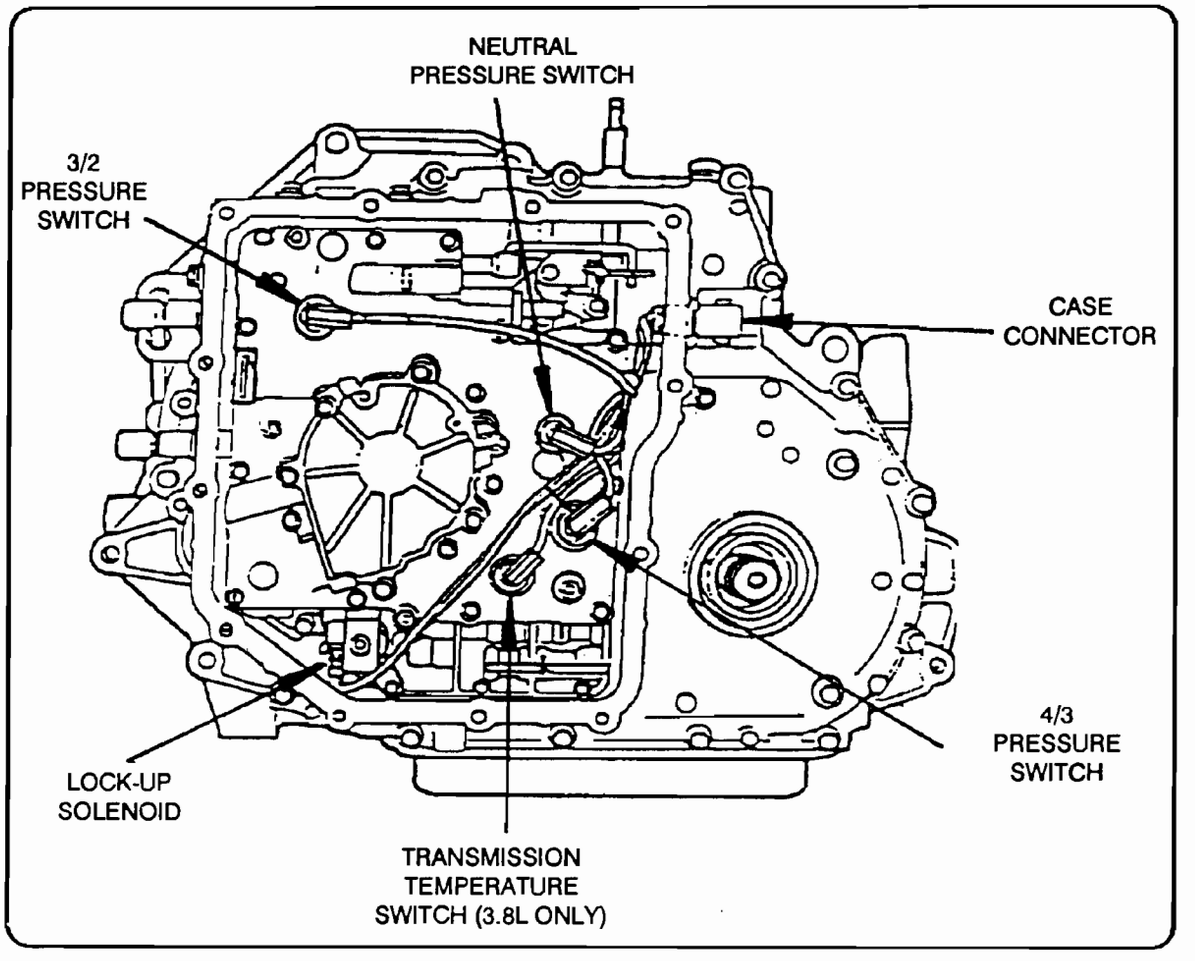
1989 CONTINENTAL, 3.8L ENGINES, MODELS PNA-AB4
1990 CONTINENTAL, 3.8L ENGINES, ALL MODELS
1990 TAURUS/SABLE, 3.8L ENGINES, ALL MODELS

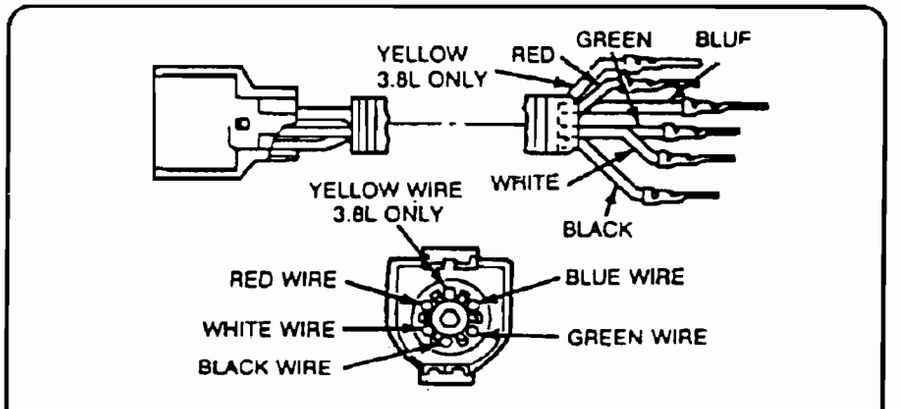
The oil pump body on these models have TEN (10) check balls, and require new pump gaskets that are identified by a "Light Blue" stripe.

REFER TO FIGURE 32 FOR LOCATIONS

SERVICE INFORMATION

CHECK BALLS (5 PER PACKAGE)	E7DZ-7E195-A
PUMP HOUSING TO PUMP SPACER GASKET (10 BALL)	E9OY-7G331-A
PUMP SPACER TO VALVE BODY GASKET (10 BALL)	E9OY-7A136-A





SERVICE TOOL JUMPER

CAUTION: DO NOT CONNECT A POWER SUPPLY WITH REVERSED POLARITY TO THESE WIRES OR SOLENOID DIODE WILL BE DAMAGED.

Figure 18

FORD - AXOD
OIL PUMP CASTING NUMBER

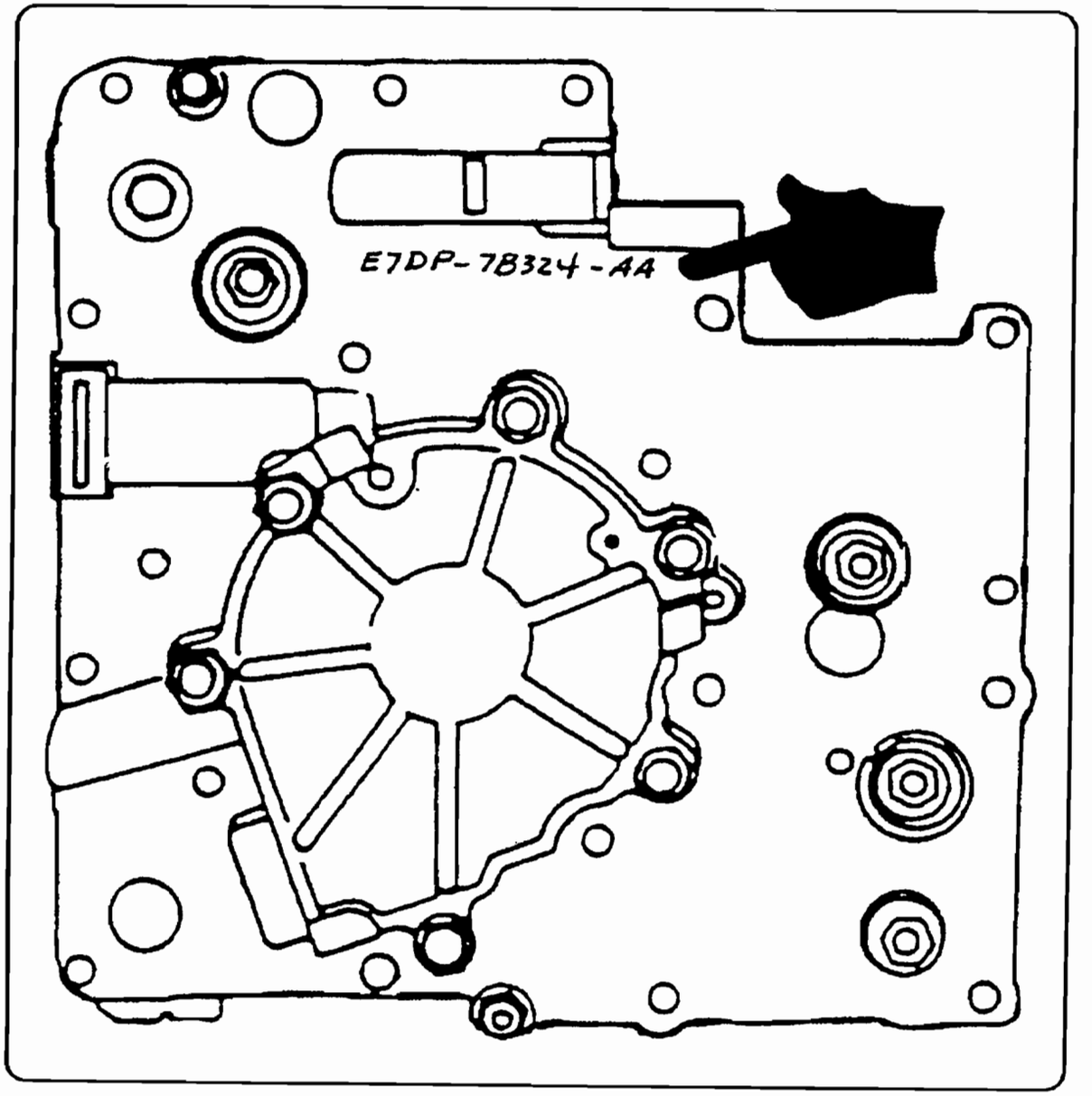


Figure 20

CHAIN COVER CASTING NUMBER LOCATION

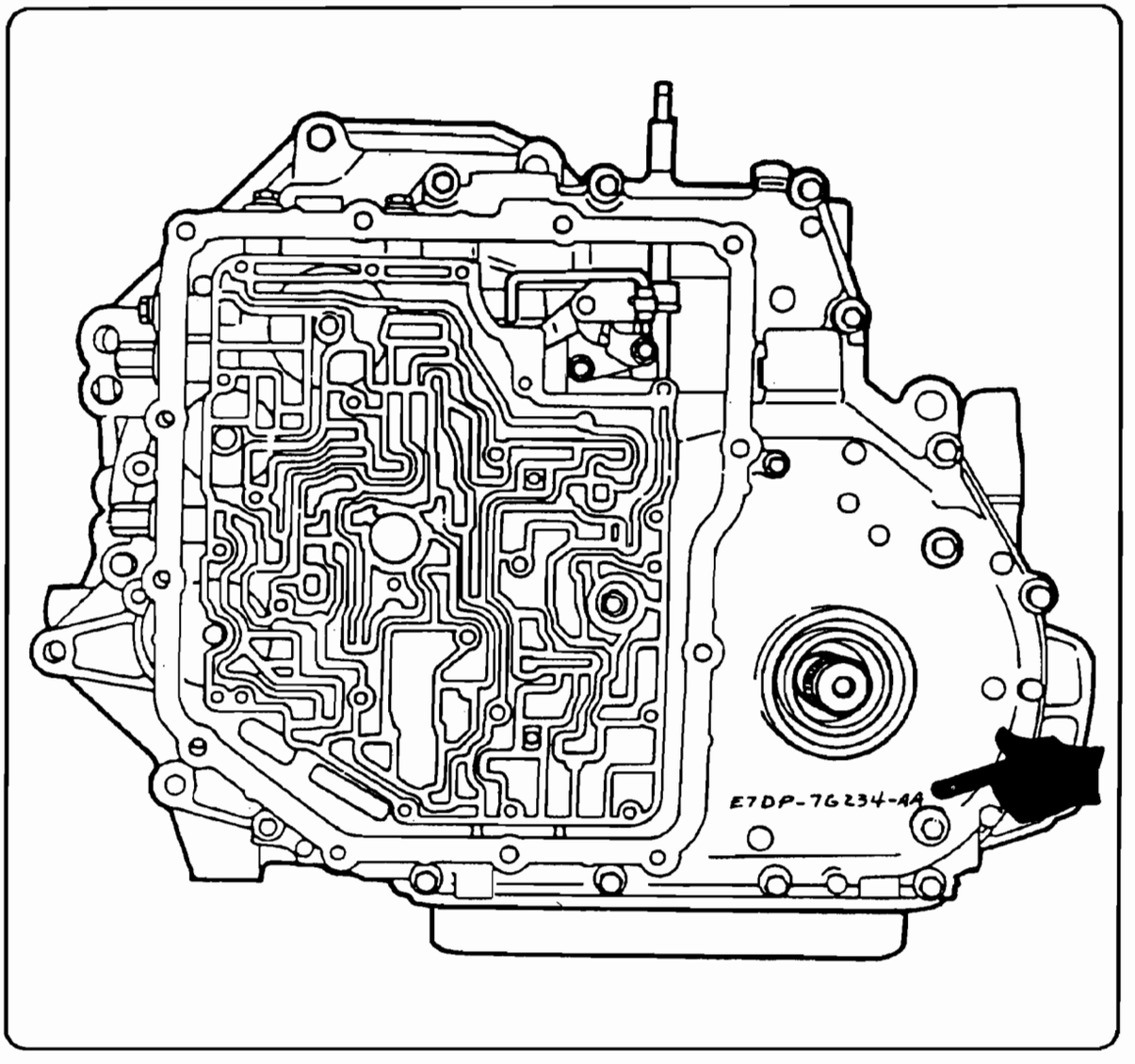


Figure 21

VALVE BODY CASTING NUMBER
LOCATED UNDER LOCK-UP SOLENOID

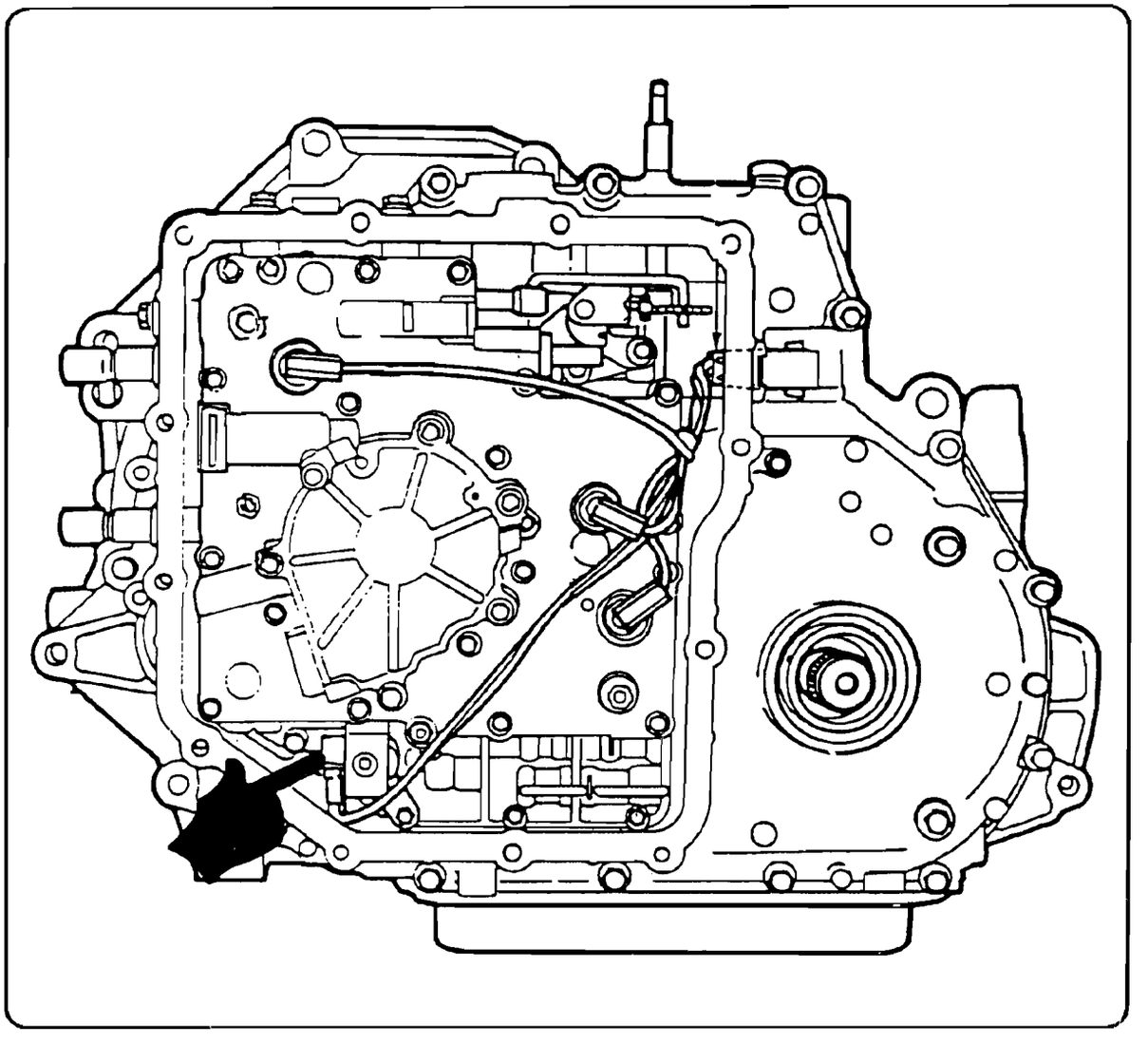


FIGURE 22

FORD - AXOD
SPACER PLATE IDENTIFICATION

SPACER PLATES WILL NOT INTERCHANGE FROM MODEL TO MODEL

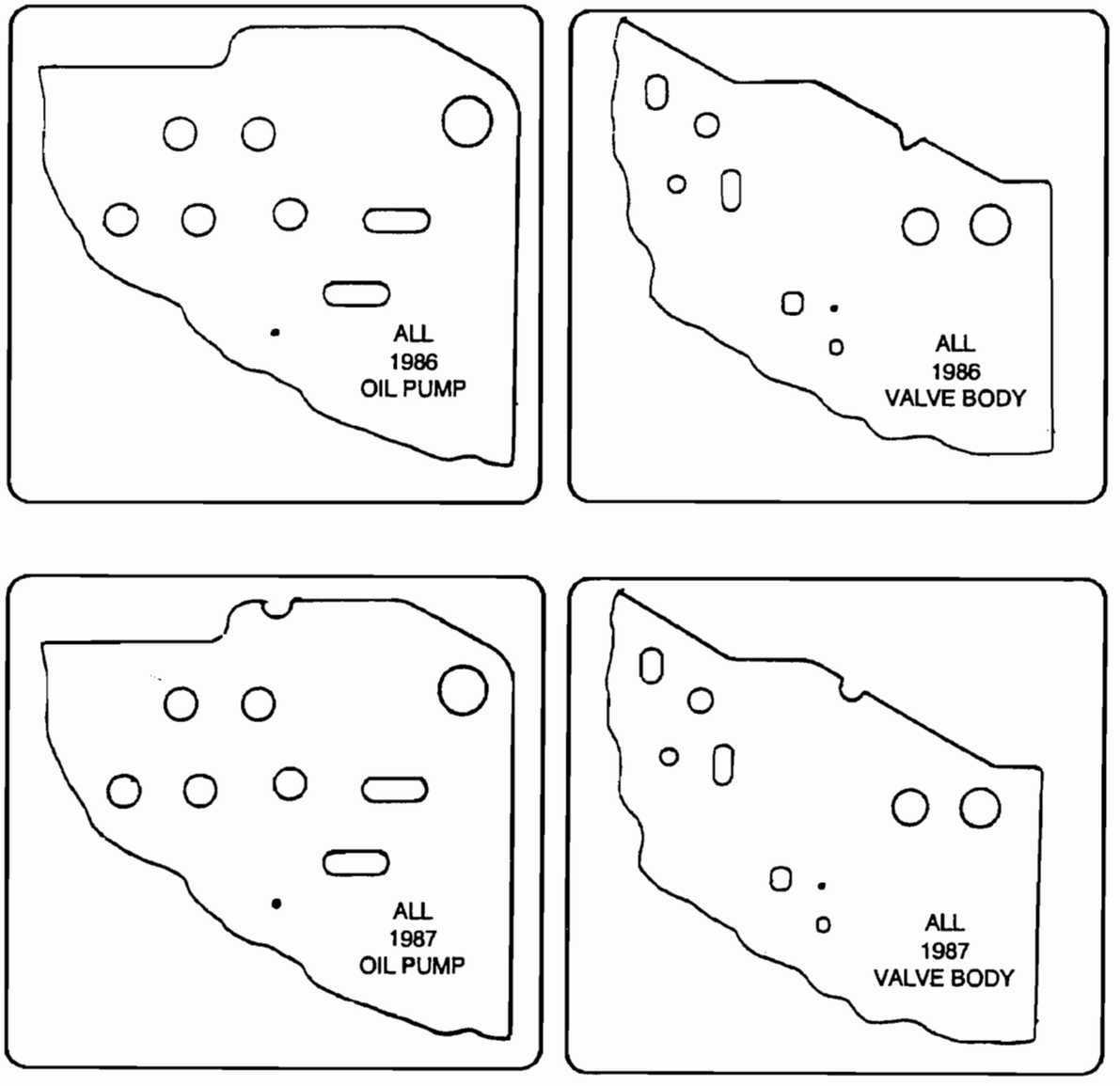


Figure 23

SPACER PLATES WILL NOT INTERCHANGE FROM MODEL TO MODEL

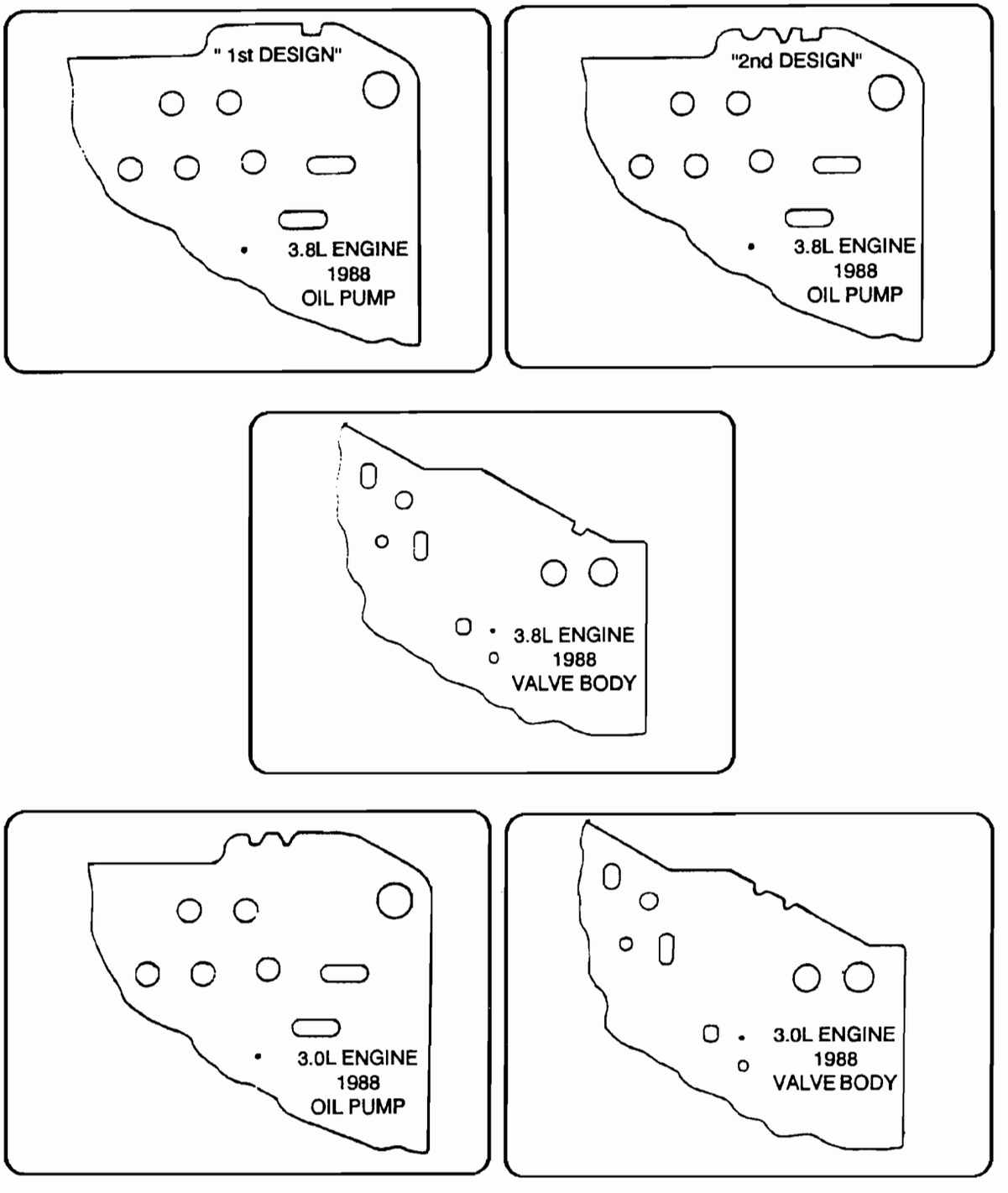
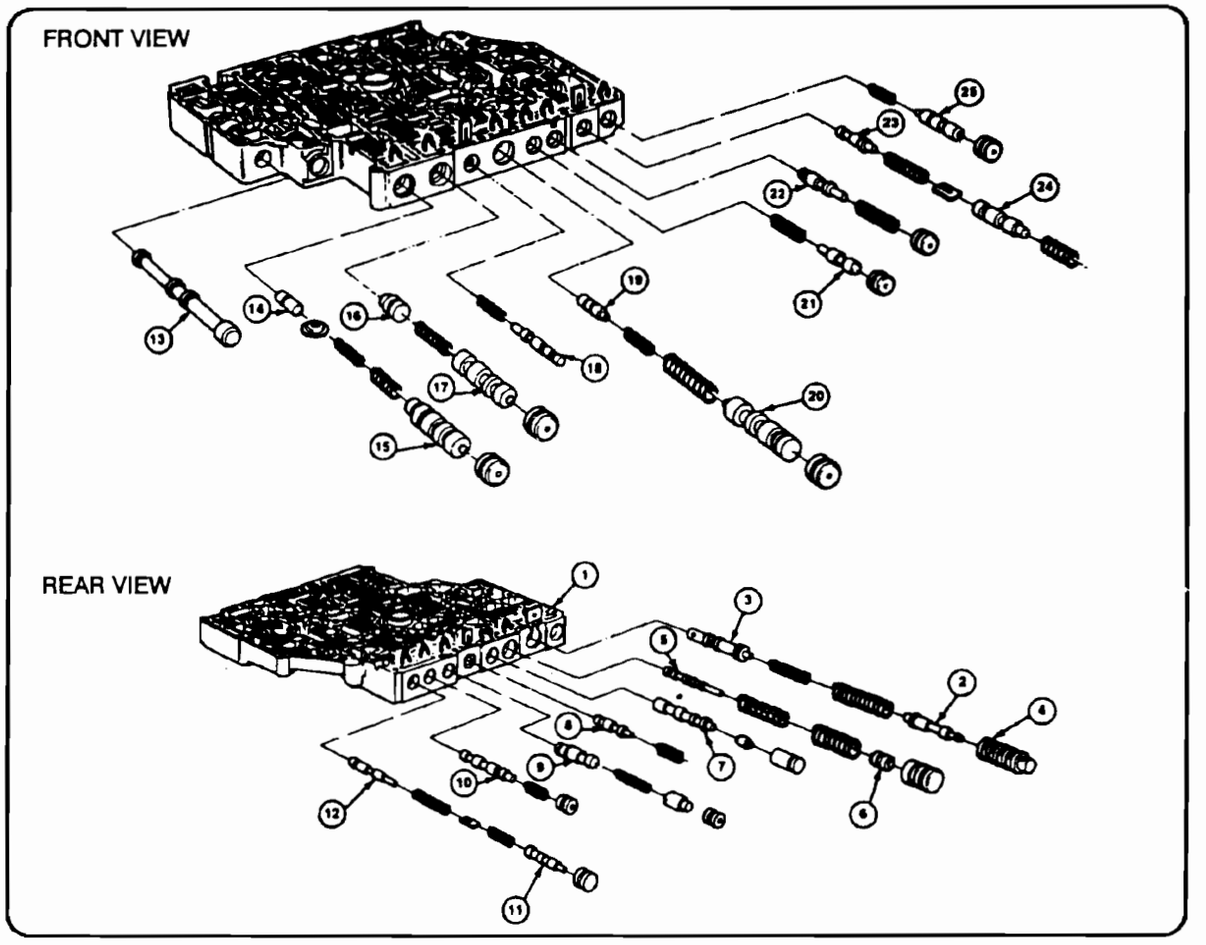


Figure 24

FORD - AXOD
CORRECT VALVE BODY LAYOUT



1.	VALVE BODY	14.	2-3 TV MODULATOR VALVE
2	THROTTLE VALVE (TV)	15.	2-3 SHIFT VALVE
3.	TV PLUNGER	16.	1-2 THROTTLE VALVE
4	TV VALVE SLEEVE	17.	1-2 SHIFT VALVE
5.	MAIN REGULATOR VALVE	18.	2-1 SCHEDULING VALVE
6.	MAIN REGULATOR BOOST VALVE	19.	3-4 TV MODULATOR VALVE
7	CONVERTER CLUTCH CONTROL VALVE	20.	3-4 SHIFT VALVE
8.	CONVERTER REGULATOR VALVE	21.	2-4 INHIBIT VALVE
9.	ACCUMULATOR REGULATOR VALVE	22.	3-2 CONTROL VALVE
10.	BACKOUT VALVE	23.	ND ENGAGEMENT VALVE
11.	TV/LINE MODULATOR VALVE	24.	TV LIMIT VALVE
12.	4-3 SCHEDULING VALVE	25.	2-3 SERVO REGULATOR VALVE

Figure 25

1-2, 3-4 AND N-D ACCUMULATORS

(TEST PORTS 1A, 1B, 2, 3, 14)

Apply air pressure to each accumulator feed test port. Accumulator should apply. Because of the cushioning effect of the accumulator release spring, application of the accumulator may not be felt or heard. The accumulator should hold air pressure without leakage and a dull thud should be heard when air pressure is removed, allowing accumulator to return to release position.

OVERDRIVE SERVO

(TEST PORT 4)

Apply air pressure to overdrive servo test port. Operation of servo is indicated by a tightening of the overdrive band around the overdrive drum. Because of the cushioning effect of the servo release spring, application of band may not be heard or felt. The servo should hold air pressure without leakage and a dull thud should be heard when air pressure is removed, allowing servo piston to return to release position.

INTERMEDIATE CLUTCH

(TEST PORT 5)

Apply air pressure to intermediate clutch test port. A dull thud can be heard, or movement of piston can be felt on case as piston is applied. If clutch seal(s) are leaking, a hissing sound will be heard.

DIRECT CLUTCH

(TEST PORT 6)

Apply air pressure to direct test port. A dull thud can be heard, or movement of piston can be felt on case as piston is applied. If clutch seal(s) are leaking, a hissing sound will be heard.

LUBE AND REAR LUBE

(TEST PORTS 7 & 13)

Apply air pressure to lube and rear lube test ports. These passages can only be checked for blockage. If either passage holds air pressure, check for an obstruction or damage.

REVERSE CLUTCH

(TEST PORT 9)

Apply air pressure to reverse test port. A dull thud can be heard, or movement of piston can be felt on case as piston is applied. If clutch seal(s) are leaking, a hissing sound will be heard.

LOW-INTERMEDIATE SERVO

(TEST PORTS 10 & 11)

Apply air pressure at low-intermediate servo feed test port. The low-intermediate band should tighten around sun gear of rear planetary gear set. Because of the cushioning effect of the servo release spring, application of band may not be heard or felt. The servo should hold air pressure without leakage and a dull thud be heard when air pressure is removed, allowing servo piston to return to released position. Apply air pressure to low-intermediate servo test port while continuing to pressurize the apply port. Servo piston should return to release position. The band should loosen and a dull thud be heard. Release the feed test port. The release port should hold pressure without leakage. Any leakage or failure of piston movement requires servo service.

GOVERNOR

(TEST PORT 12)

Apply air pressure to governor test port and listen for a sharp clicking or whistling noise. The noise indicates proper governor movement.

FORD - AXOD
AIR CHECK PORTS

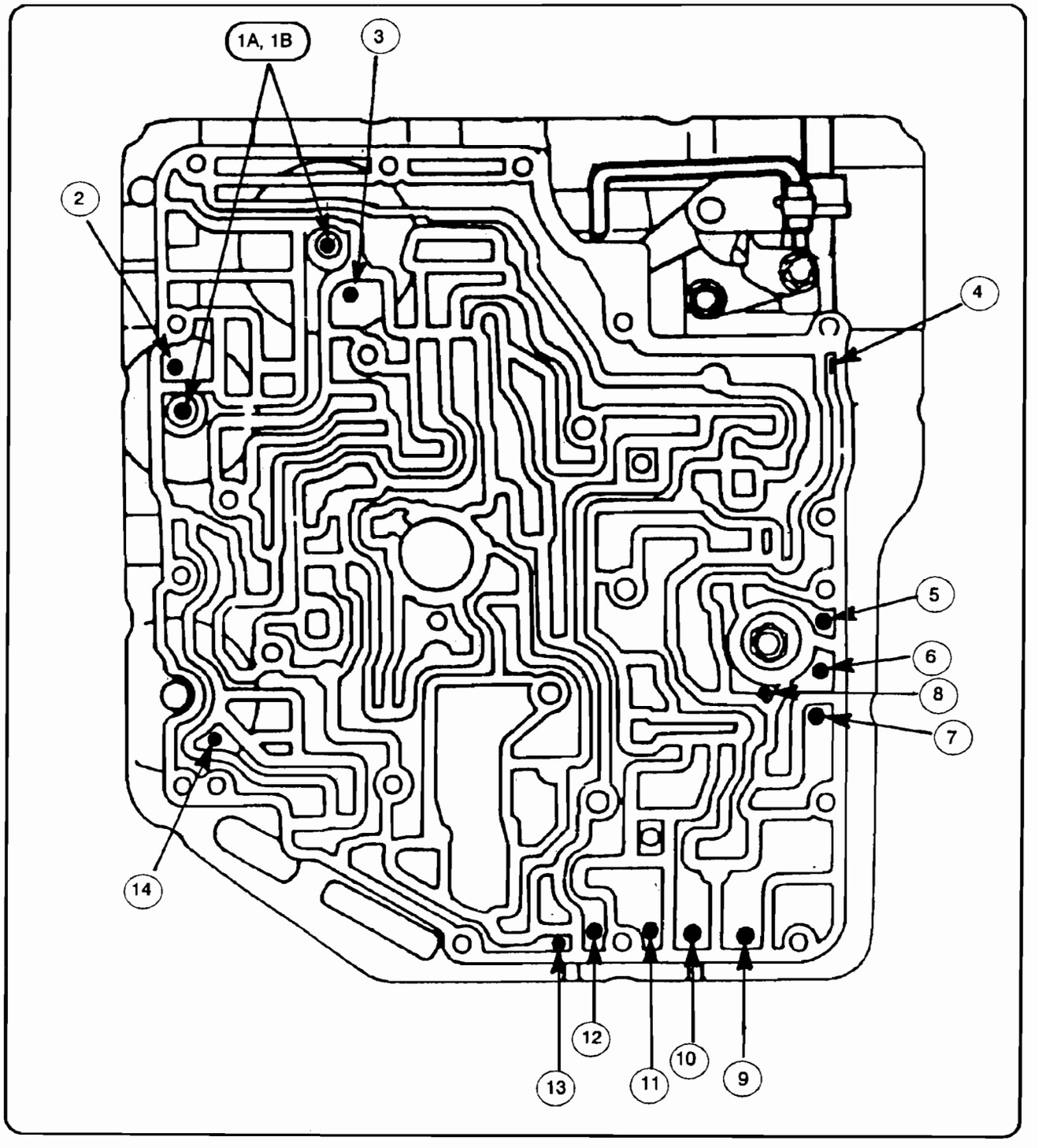


Figure 26

FORD - AXOD

SPROCKET RATIO IDENTIFICATION

	YEAR	ENGINE SIZE	DRIVE SPRKT	DRIVEN SPRKT
TAURS & SABLE	ALL	3.0L ENGINE	37T	36T
	ALL	3.8L ENGINE	38T	35T
LINCOLN CONTINENTAL	1988	3.8L ENGINE	38T	35T
	1989	3.8L ENGINE	37T	36T

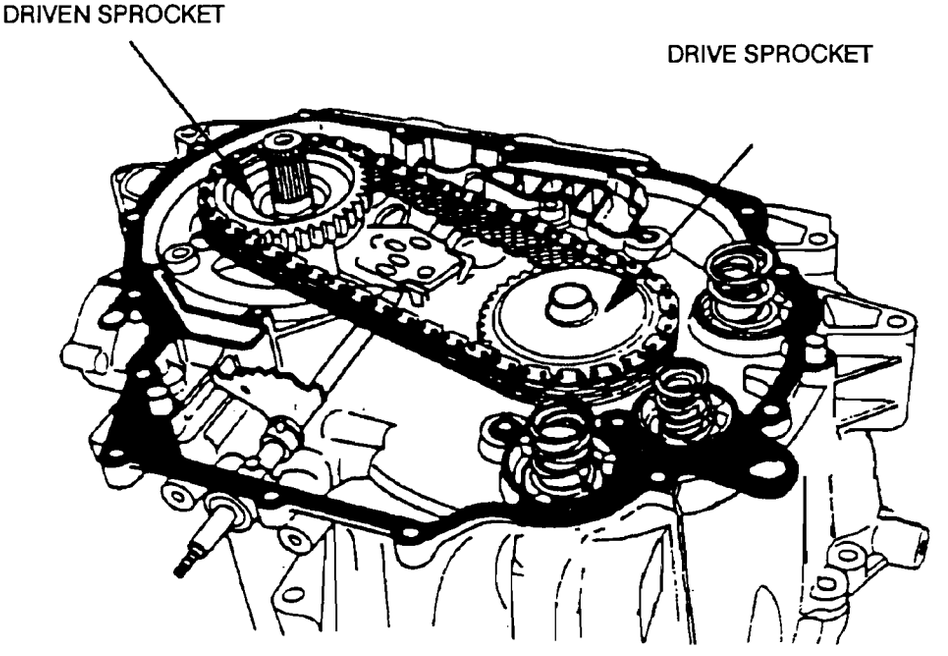


Figure 27

FORD - AXOD
ACCUMULATOR SPRING COLOR CODES

3.0L ENGINE

1986
1987
1988
1989

1-2 ACCUMULATOR = YELLOW\YELLOW
3-4 ACCUMULATOR = GREEN\GREEN
N-D ACCUMULATOR = ORANGE\BLUE

3.8L ENGINE

1988 1-2 ACCUMULATOR = BROWN/BROWN/LIGHT BROWN
3-4 ACCUMULATOR = PLAIN/PLAIN
N-D ACCUMULATOR = ORANGE/BLUE

1989 1-2 ACCUMULATOR = BROWN/PURPLE/PURPLE
3-4 ACCUMULATOR = WHITE/WHITE
N-D ACCUMULATOR = ORANGE/BLUE

AXOD ACCUMULATOR SPRING LOCATION

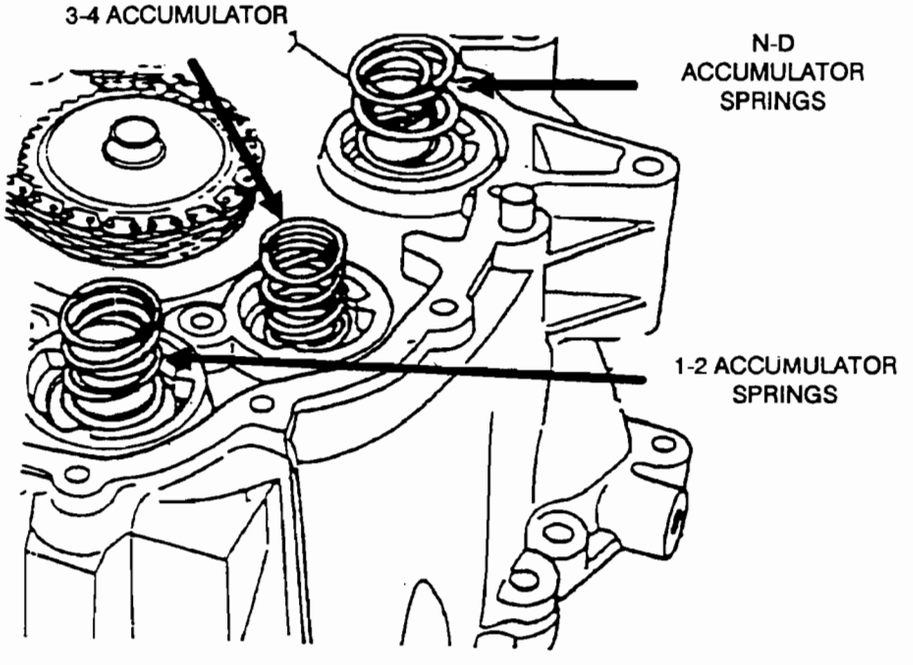


Figure 28

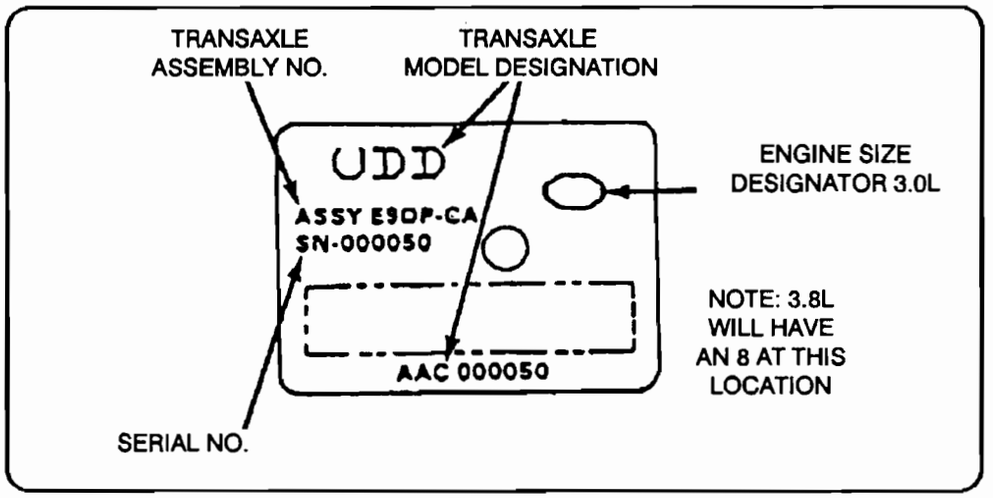


Figure 29

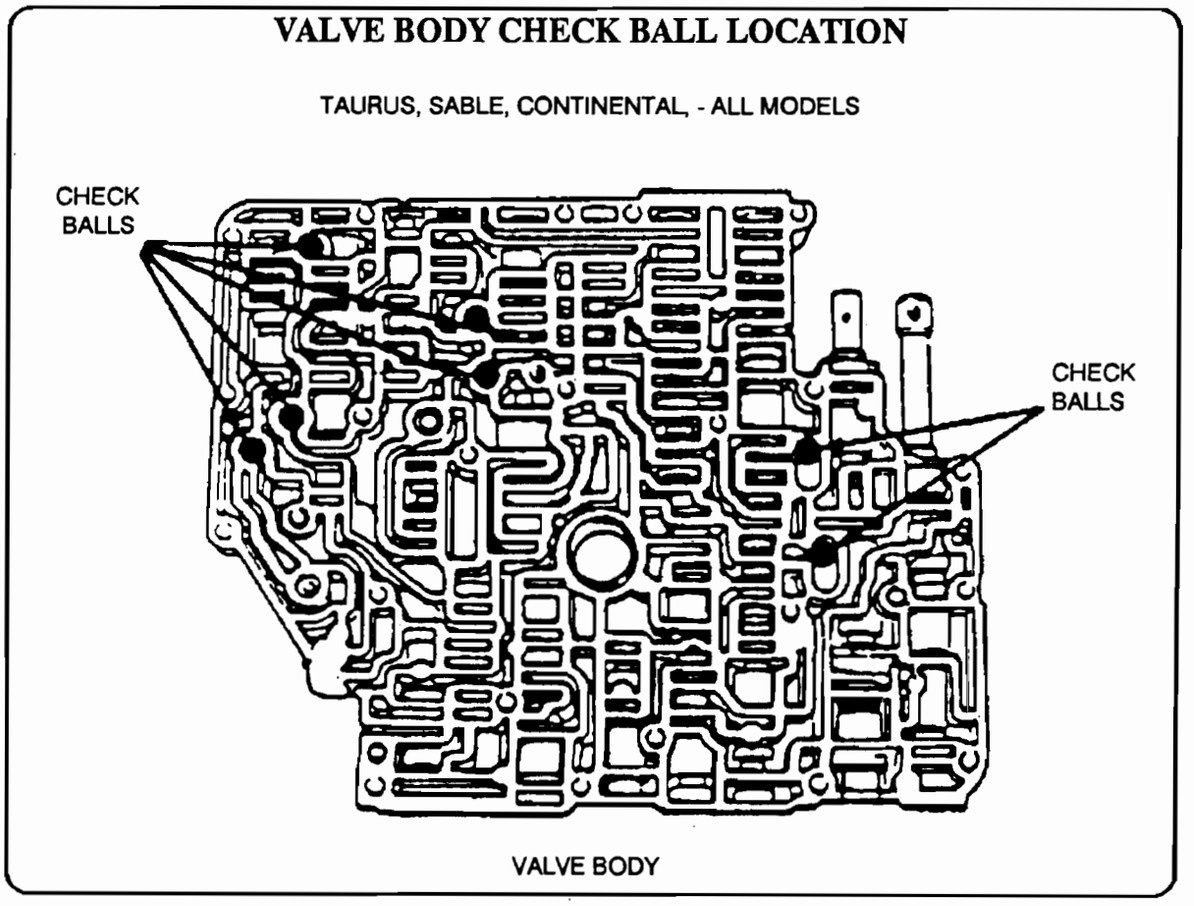


Figure 30

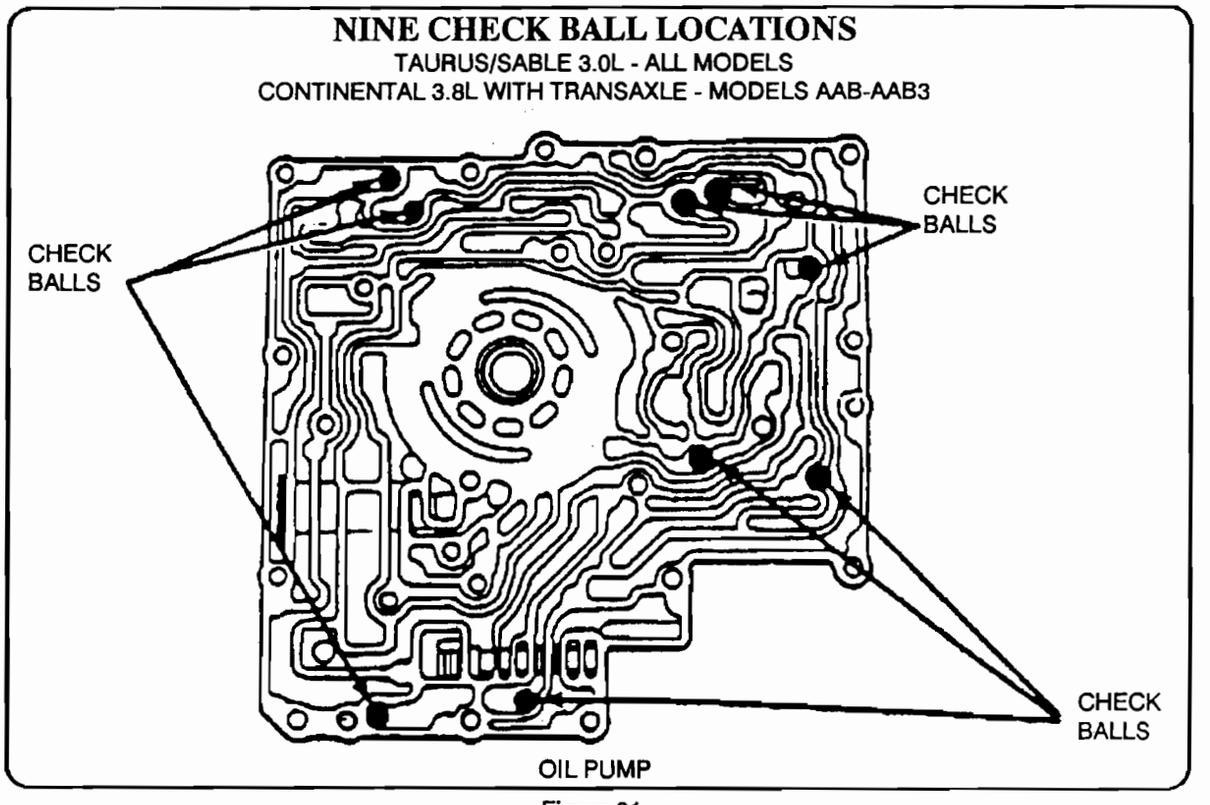


Figure 31

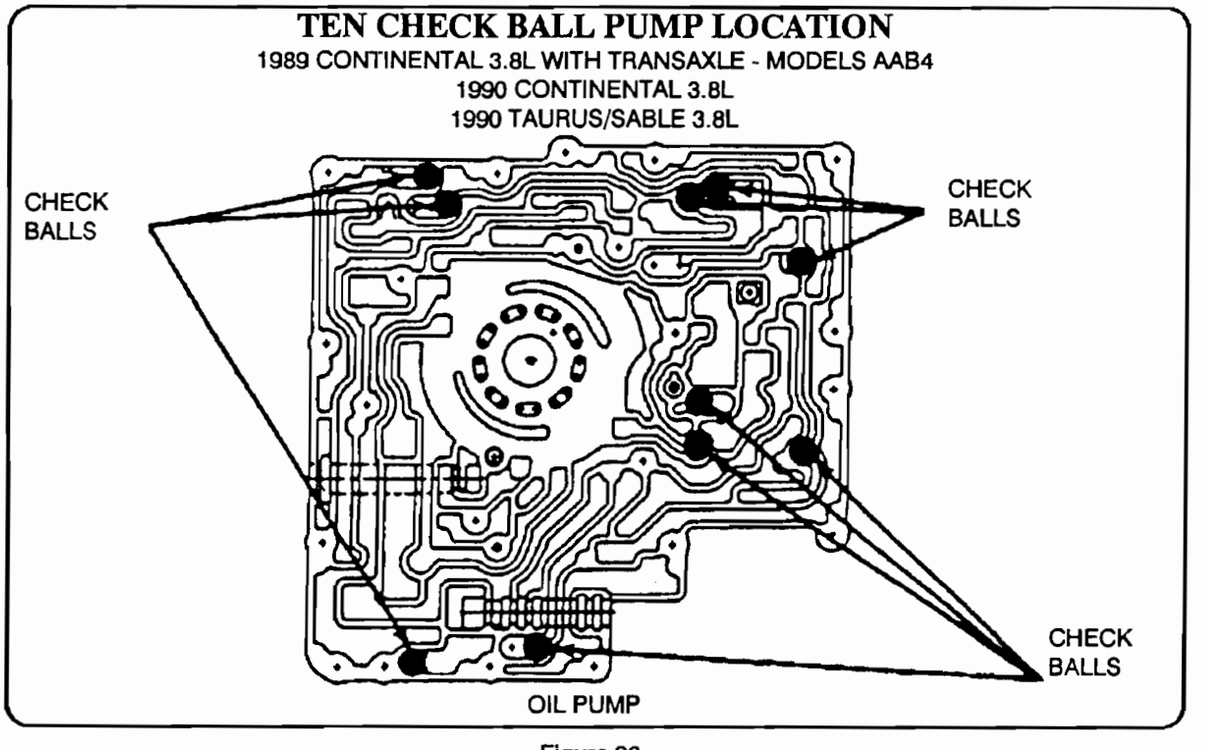


Figure 32

FORD - AXOD
FLARE ON 2-3 SHIFT

COMPLAINT: Flare or slip on 2-3 shift, or premature failure of direct clutches.

CAUSE: The cause may be cracked direct clutch piston. For procedure to check the piston, (see figure 33).

CORRECTION: Replaced the direct clutch piston.

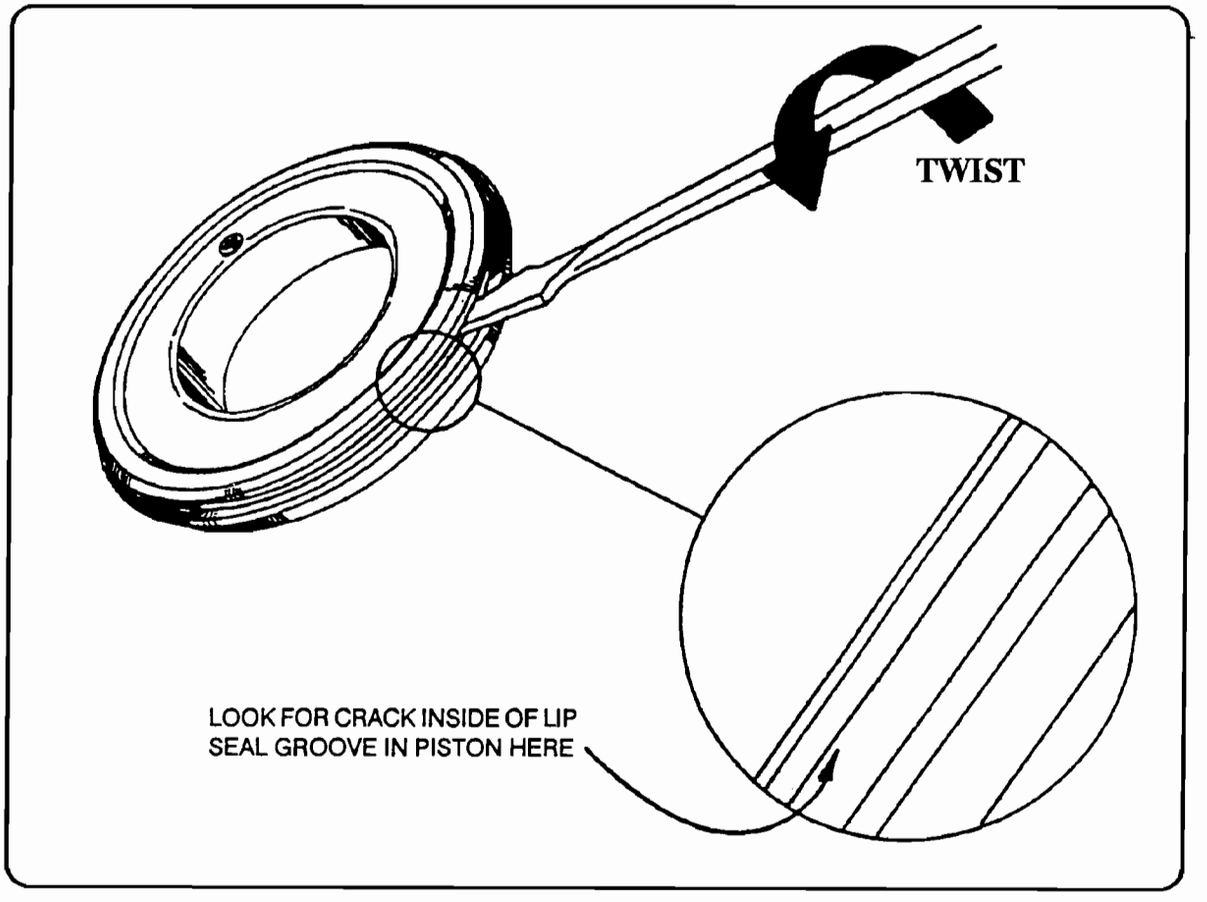


Figure 33

FORD - AXOD
NO 3-4 SHIFT

COMPLAINT: An extended 3-4 shift with possible direct clutch failure or a NO 3-4 shift condition.

CAUSE: This condition may be caused by a partially or fully blocked oil flow of direct piston check ball.

CORRECTION: Special care must be taken during the overhaul operation when re-assembling the direct clutch return spring over the direct clutch piston. Make sure that the notch in the spring bottom retainer (See Figure 35) is positioned properly over the check ball so it will not block or restrict oil flow of the piston check ball assembly.

INSTALL RETURN SPRING IN CYLINDER ALIGNING RETURN SPRING NOTCH WITH CHECK BALL IN PISTON.

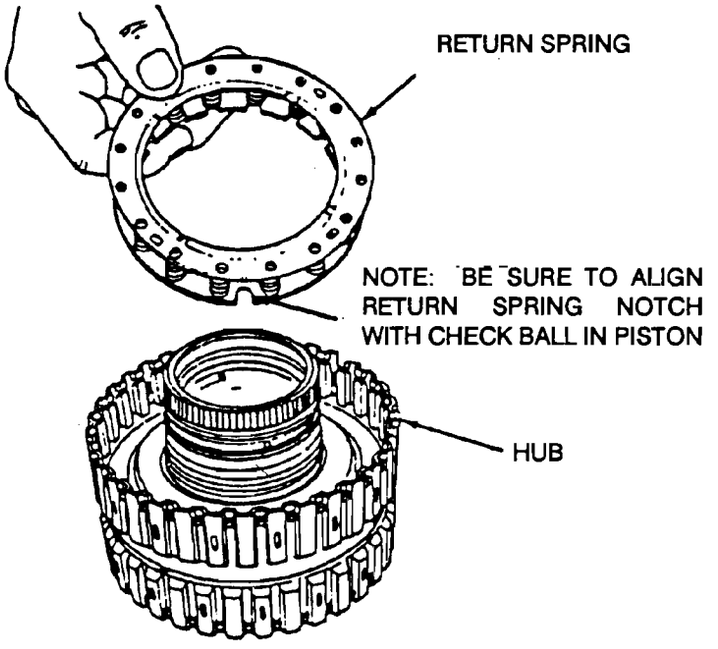
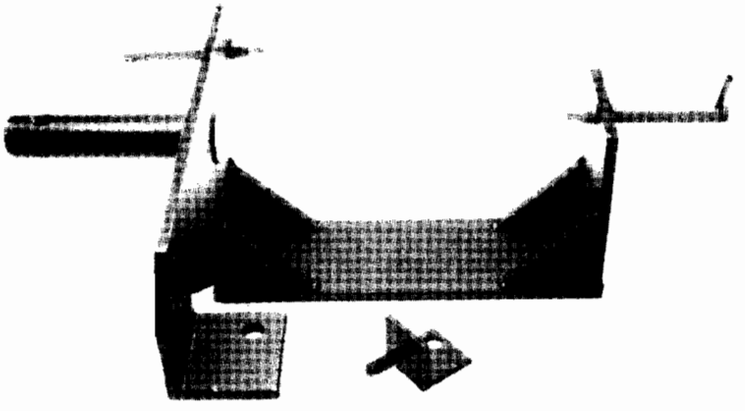
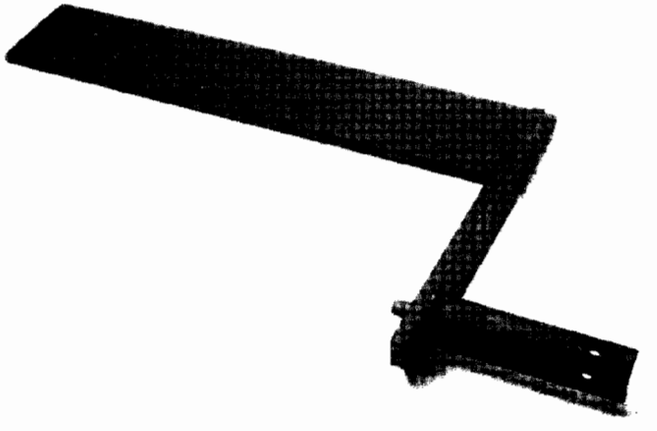


Figure 35

Can you afford not to have the right tools for today's transmissions?



E4OD
T-2800-F
Holding Fixture



AXOD
T-2409-F
Holding Fixture

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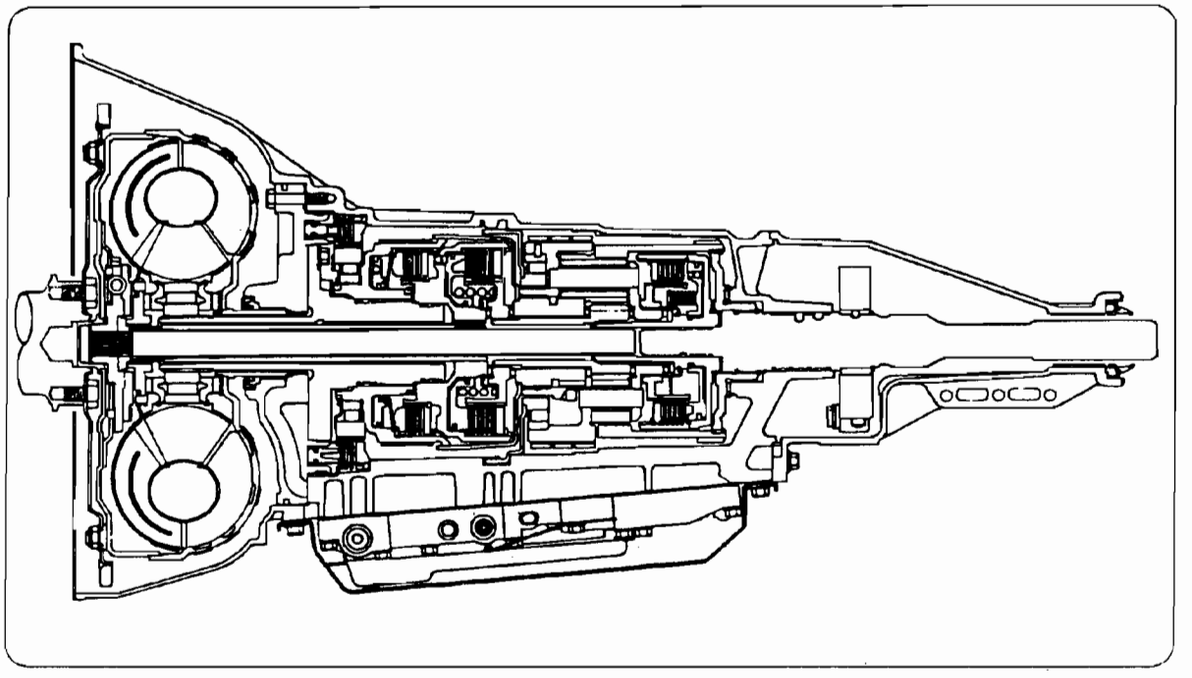
AOD 4 SPEED REAR DRIVE



Gear	Intermediate Friction Clutch	Intermediate Roller Clutch	Overdrive Band	Reverse Clutch	Forward Clutch	Planetary (Low) One-Way Clutch	Low and Reverse Band	Direct Clutch
1 Range Low					APPLIED	HOLDING	APPLIED	
O/D and 3 Range Low					APPLIED	HOLDING		
Second (Intermediate)	APPLIED	HOLDING			APPLIED	OVERRUNS		
Third (Direct)	APPLIED	OVERRUNS			APPLIED	OVERRUNS		APPLIED
Fourth (Overdrive)	APPLIED		APPLIED			OVERRUNS		APPLIED
Reverse				APPLIED			APPLIED	

GEAR RATIOS

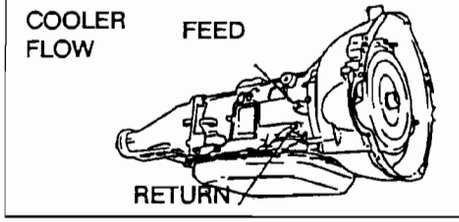
1st - 2.4:1
2nd - 1.47:1
3rd - 1.1:1
4th - .667:1

FRICTION ELEMENTS

4 MULTIPLE DISK CLUTCH PACKS
2 ONE-WAY CLUTCHES
2 BANDS

PRESSURE TAPS AVAILABLE

MAINLINE
FOWARD
DIRECT
T.V.



FORD - AOD
FACTORY AVAILABLE PARTS

TEFLON DIRECT DRUM RINGS E3AZ-7F274-A

6 CLUTCH DIRECT DRUM E8LY-7F283-A

SECOND DESIGN 3-4 SHIFT VALVE E5AZ-7F259-A
- Fits 1983 1/2 - 1985 AOD to address the concern of possible no forward movement after coast down from fourth. This is factory installed on 1985 & up models.

SECOND DESIGN - CONVERTER RELIEF VALVE E2AP-7E217-AA
- Fits all years and models, used to address a possible converter relief valve buzz. This is a factory installed production part on 1982 & up models.

DIRECT CLUTCH RETURN SPRING SET E5AZ-7F235-A
- Fits all years and models, the tension of this spring set was revised for smoother 2-3 shift and quicker release of the direct clutch pack. It is recommended that you use this part as replacement if spring set has been overheated or otherwise damaged.

SPRING AND GASKET KIT E9AZ-7D100-B
- Fits 1980-1990 AOD to address a concern of T.V. buzz noise.

PLATE AND VALVE KIT E9AZ-7A008-A
- Fits 1989 - 1990 AOD to address the concern of a 3-4 slide shift or premature failure of the overdrive band, or forward clutch and/or direct drum.

TRANSMISSION REPAIR KIT E9AZ-7L228-A
- Fits 1989 canender year build dates used in 1989 and 1990 models C-31 thru J-4 (See Figure 37). Consists of 1 valve body gasket, 3-4 shuttle valve, T.V. spring and separator plate. Used to address a concern of a T.V. buzz, a slide 3-4 shift or premature failure of forward or direct clutch, and/or overdrive band

AOD TRANSMISSION IDENTIFICATION TAG

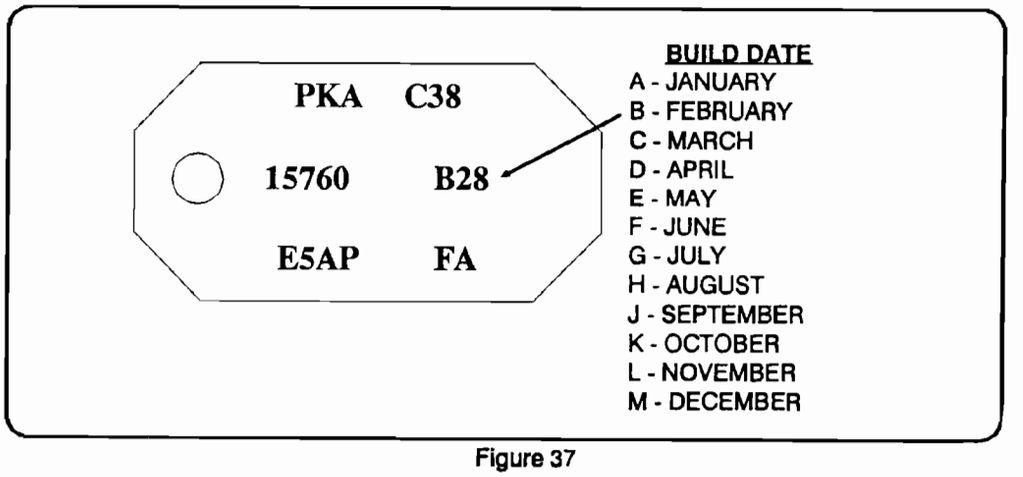
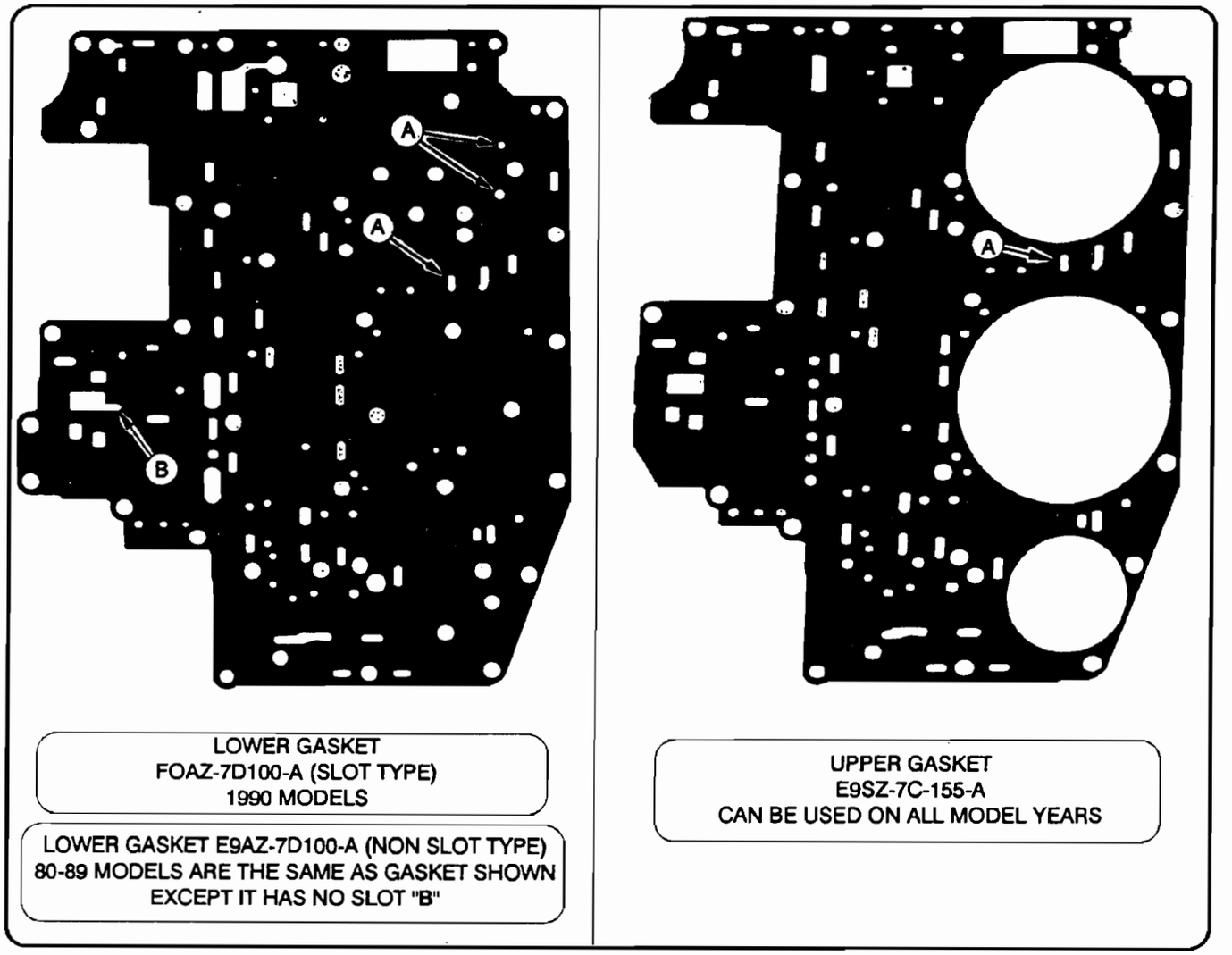


Figure 37

FORD - AOD
VALVE BODY GASKETS

1. Holes marked "A" were added for 1989 model transmissions, If gaskets are used on 1989 models that do not have these holes, it will result in a 1-3-4 upshift pattern (See Figure 38).

2. This slot (B), added for 1990 models. This slot type gasket is also included in part # E9AZ-7D100-B and #E9AZ-7L228-A,(see "factory available parts".) The slot type gasket can be used on early models **AS LONG AS THE THROTTLE VALVE SPRING IS CHANGED ALSO.** The above part numbers have the throttle spring and instructions included. An early "non slot" gasket used on a 1990 model may result in a reduction of throttle valve pressure and possible failure.



LOWER GASKET
FOAZ-7D100-A (SLOT TYPE)
1990 MODELS

LOWER GASKET E9AZ-7D100-A (NON SLOT TYPE)
80-89 MODELS ARE THE SAME AS GASKET SHOWN
EXCEPT IT HAS NO SLOT "B"

UPPER GASKET
E9SZ-7C-155-A
CAN BE USED ON ALL MODEL YEARS

Figure 38

FORD AOD

REPEATED PLANETARY FAILURE

COMPLAINT: Repeated burning of the planetary carrier, reverse sun gear & drive shell and forward sun gear. At times this will occur in less than 100 miles after rebuild.

CAUSE: The cause may be the converter drain back cross hole passage in the pump stator support blocked with debris, or the checkball stuck (See Figure 39).

CORRECTION: Inspect and air check the converter drain back passage in the pump stator support, and clean as necessary. If removal of the checkball and spring asssembly are necessary, refer to figure 39 for removal procedure.

SERVICE INFORMATION:

Spring and ball kit E5AZ-7A205-A

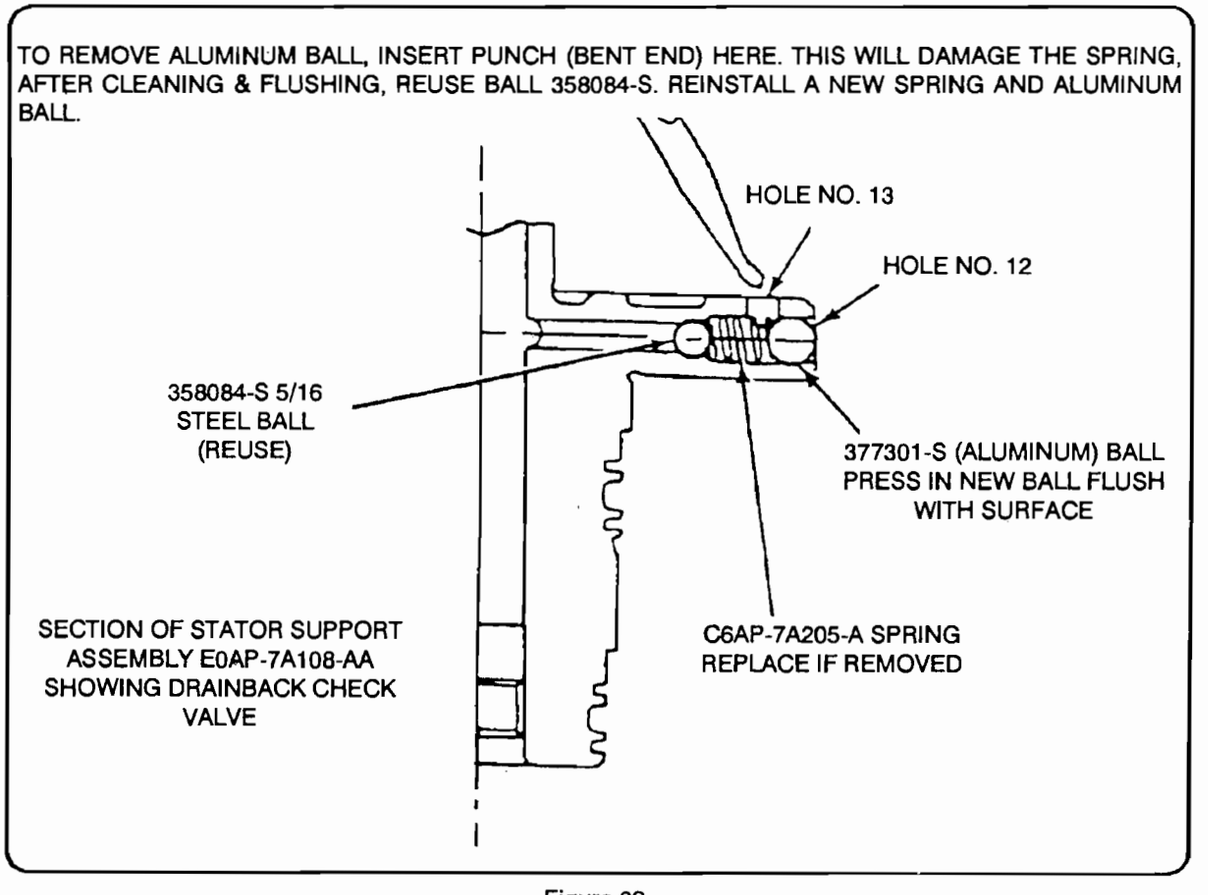


Figure 39

1989 FORD AOD

The 3-4 shift accumulator used in prior model year "AOD" transmissions is no longer used in 1989 "AOD" transmissions (See Figure 41) except on vehicles that are equipped with 5.8L engines. The accumulator feed hole in the main control assembly has been blocked.

Only use a 1989 control assembly to service a 1989 "AOD" transmission. The 1989 main control assembly can be used on all prior model year "AOD" transmissions even if the old main control assembly has a 3-4 shift accumulator.

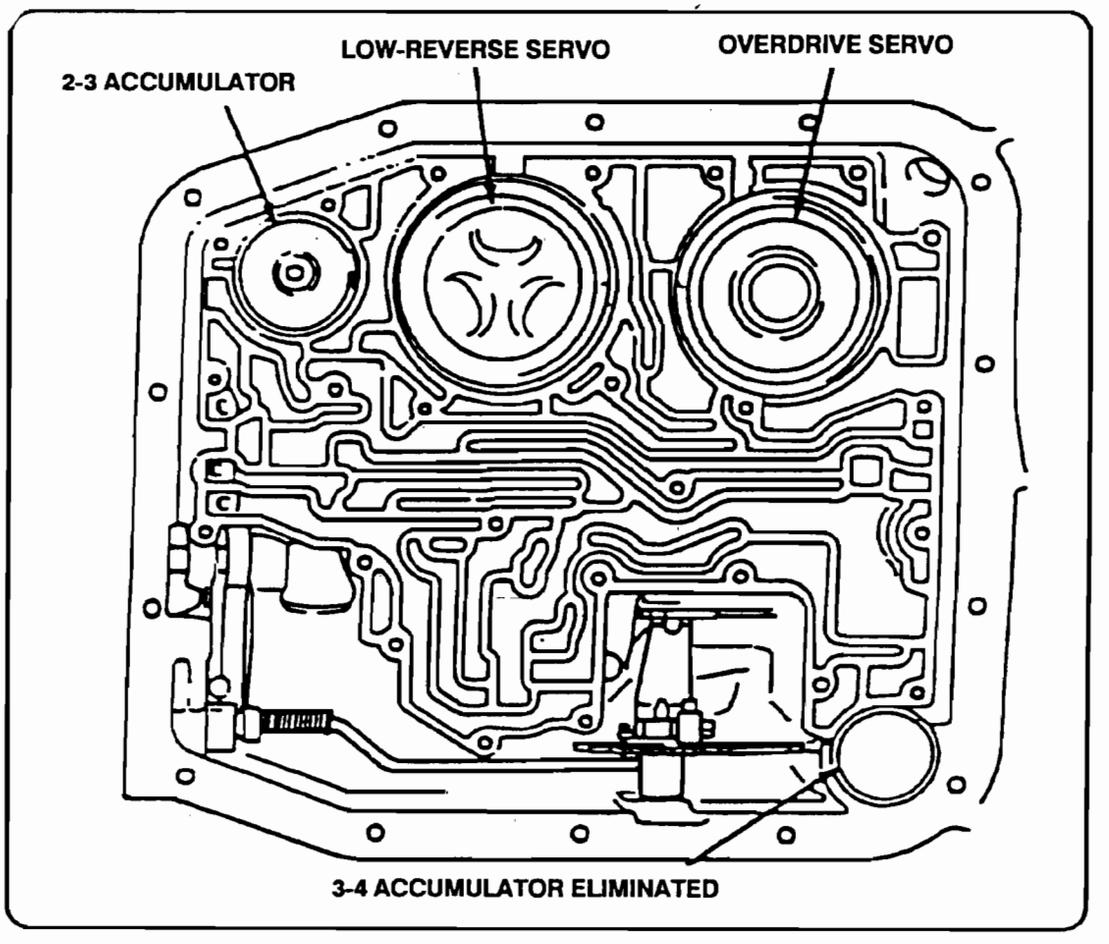


Figure 41

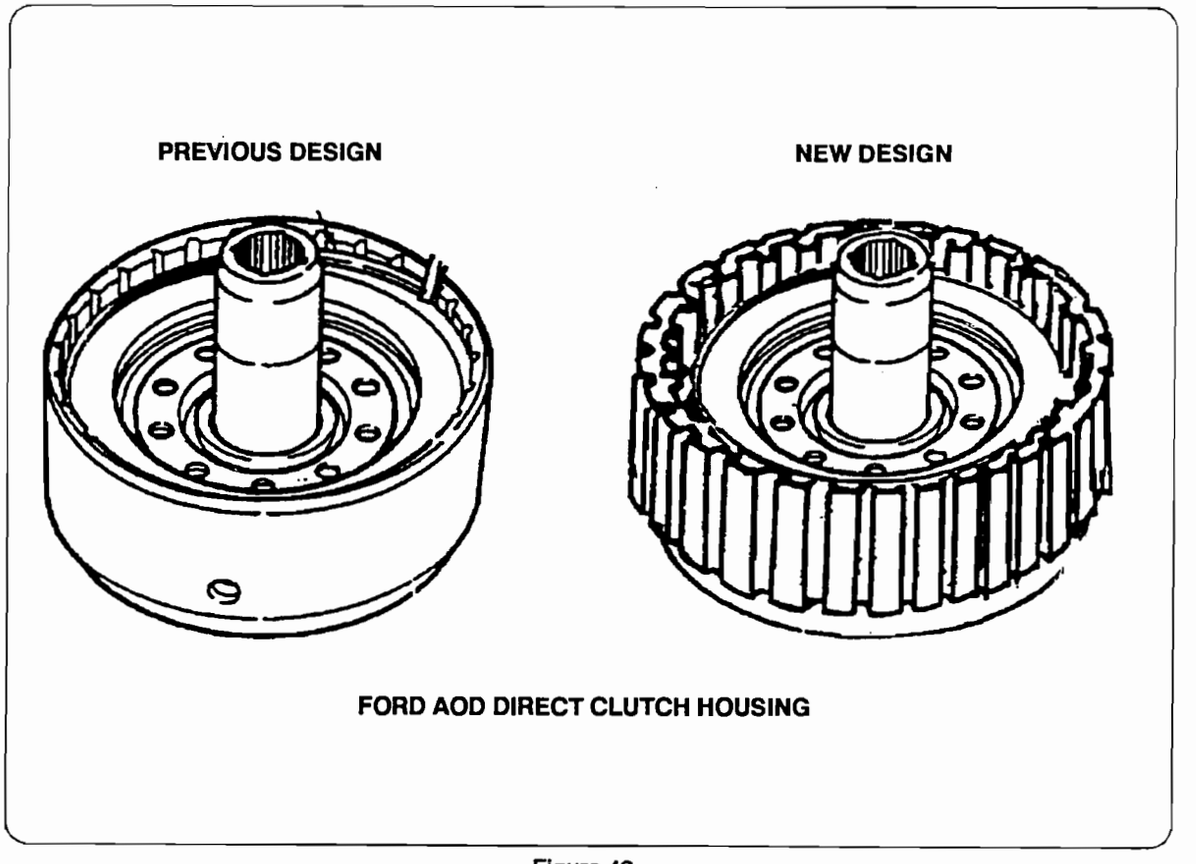
FORD AOD (1989) ONLY

"SQUAWK" ON 2-3 SHIFT

COMPLAINT: Clutch noise or "squawk" on the 2-3 shift, in 1989 models only.

CAUSE: In 1989 there was a new design stamped steel direct clutch housing (See Figure 42) introduced, that creates the noise.

CORRECTION: Install the previous design cast steel direct clutch housing.



FORD AOD DIRECT CLUTCH HOUSING

Figure 42

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BEAVERITE PRODUCTS, INC.

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CHRYSLER A604

NEW 4 RING STATOR

CHANGE: Beginning in April, 1989 a new Reaction Shaft Support (Stator) was introduced, with the addition of another ring groove and sealing ring. The old support has 3 sealing rings, and the new support has 4 sealing rings (See Figure 1).

REASON: Improved control of oil flow to the Underdrive (Forward) Clutch, the Overdrive (3-4) Clutch, and the Reverse Clutch.

PARTS AFFECTED:

(1) REACTION SHAFT SUPPORT - The new support is longer, and has 4 sealing rings, where the old support only has three (See Figure 1).

(2) INPUT SHAFT/CLUTCH HUB - The new Input Clutch Hub bore is machined deeper to accomodate the additional length of the reaction shaft, created by the added sealing ring (See Figure 2).
The "O" Ring grooves are also cut shallower than the old input clutch hub, which increases the groove diameter, and provides improved compression or "Crush", between the "O" rings and the input clutch retainer. (See Figure 2).

(3) INPUT SHAFT/CLUTCH HUB "O" RINGS - The new "O" Rings are "Teflon Coated" for greater tear resistance during the assembly process. The coatings also identify the locations for the "O" Rings. The orange ring goes to the front, and the green one goes to the rear (See Figure 2). The early "O" rings were black.

(4) INPUT CLUTCH RETAINER - The Input Clutch Retainer was modified, by machining off the "Lip" (See Figure 3), to allow more travel of the overdrive/reverse piston. The old Input Clutch Retainer can be machined at the local machine shop if necessary.

(5) SPACER PLATE - The new Spacer Plate has a larger (.105") overdrive clutch feed orifice to provide increased oil flow to the overdrive clutch circuit (See Figure 4).

(6) TRANSAXLE CONTROLLER - If the Transaxle Controller is part number 5234623 or 5234649, REPLACE it with a 5234678 controller.

INTERCHANGEABILITY:

ALWAYS UPDATE to the four ring reaction shaft support. There is now available a repair package, OEM part number 4549248, that includes the following:
1. Reaction Shaft Support.
2. Input Clutch Hub.
3. Input Clutch Hub "O" Rings.
4. Spacer PLate.

SERVICE INFORMATION:

Repair Package	4549248
Gasket Package	4504558
Controller (As Required)	5234678
"O" Ring (Orange)	6502272
"O" Ring (Green)	6502270
Input Clutch Retainer (No Lip)	4431609

CHRYSLER A-604

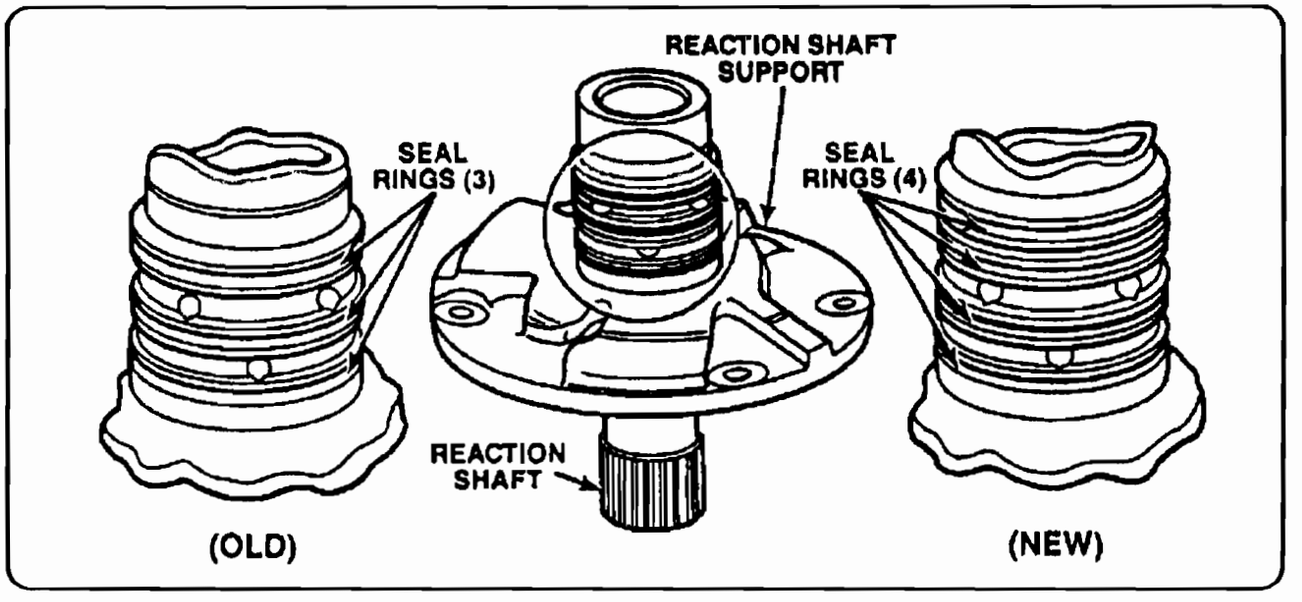


Figure 1

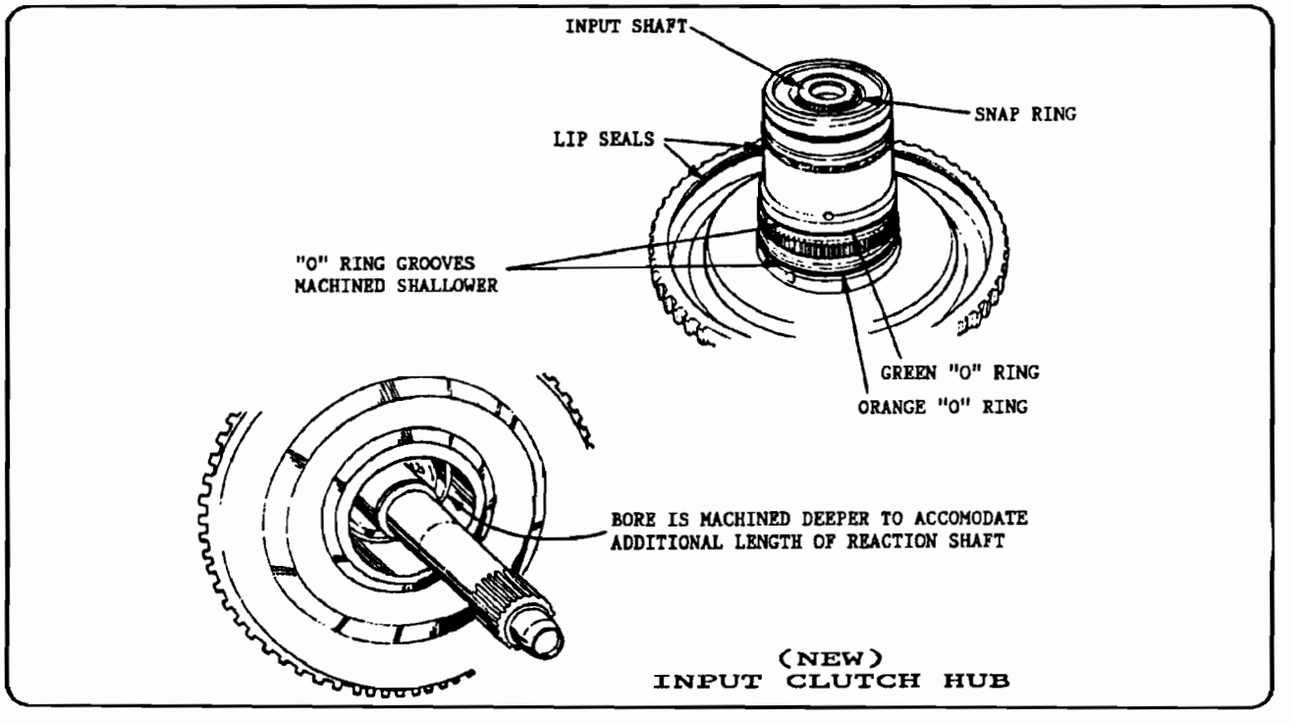


Figure 2

CHRYSLER A-604

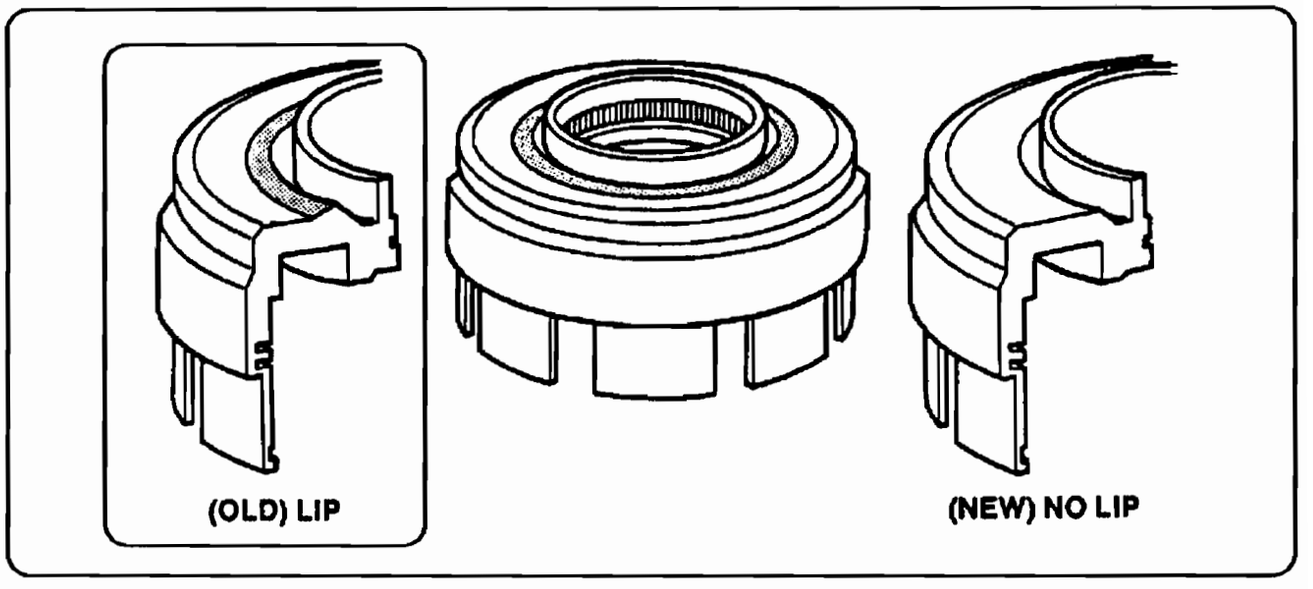
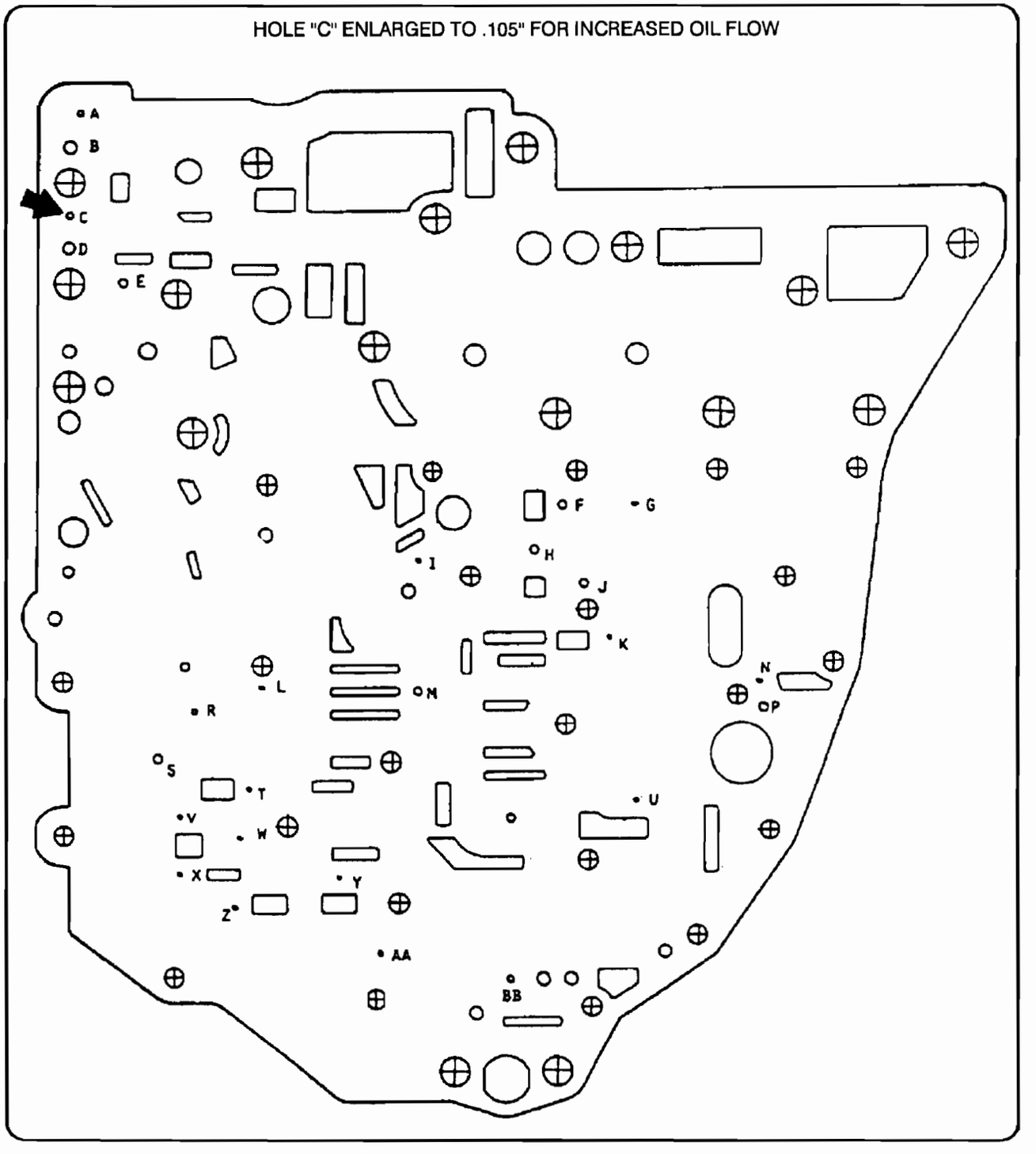


Figure 3

CHRYSLER A-604



CHRYSLER A-604

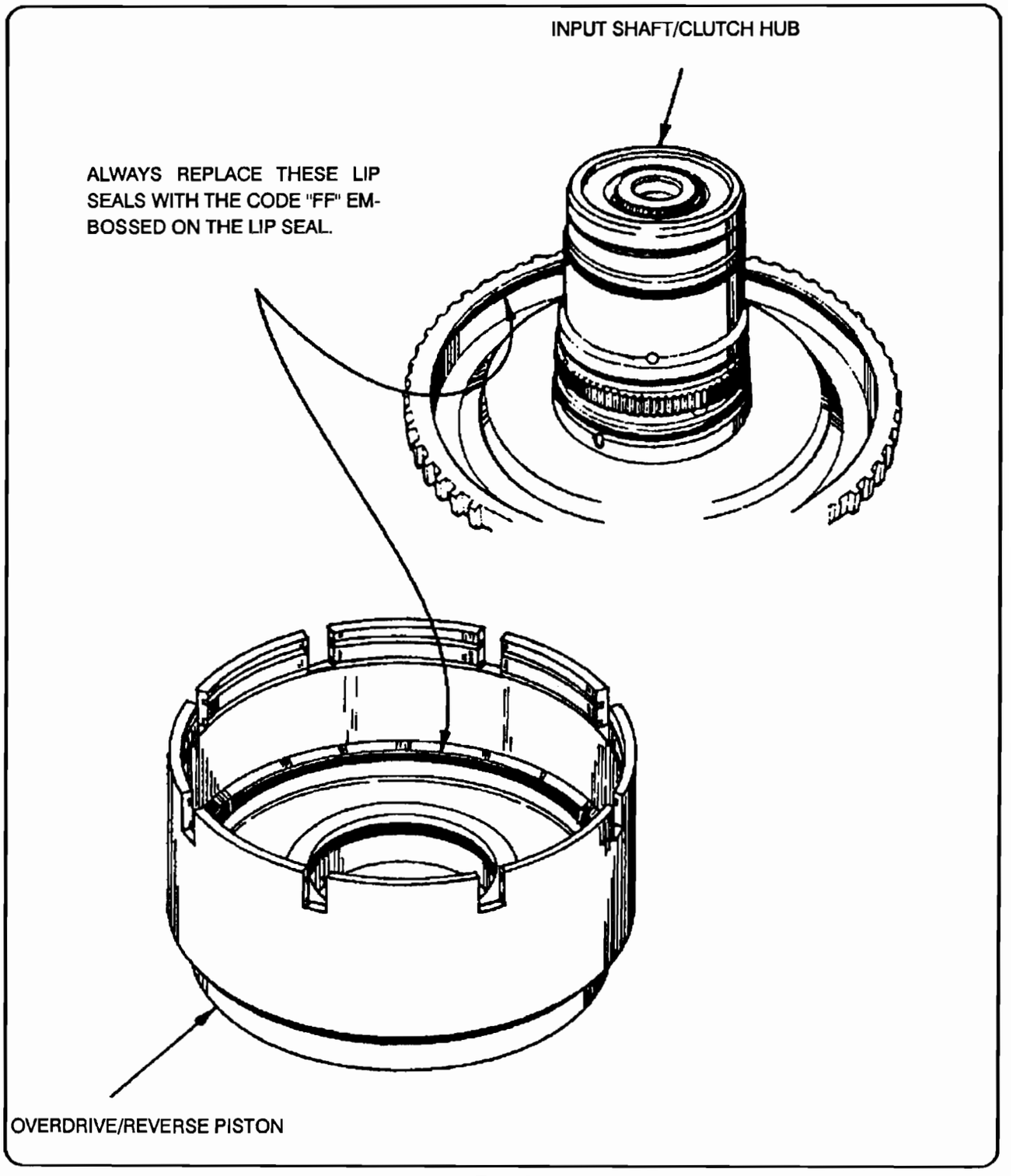
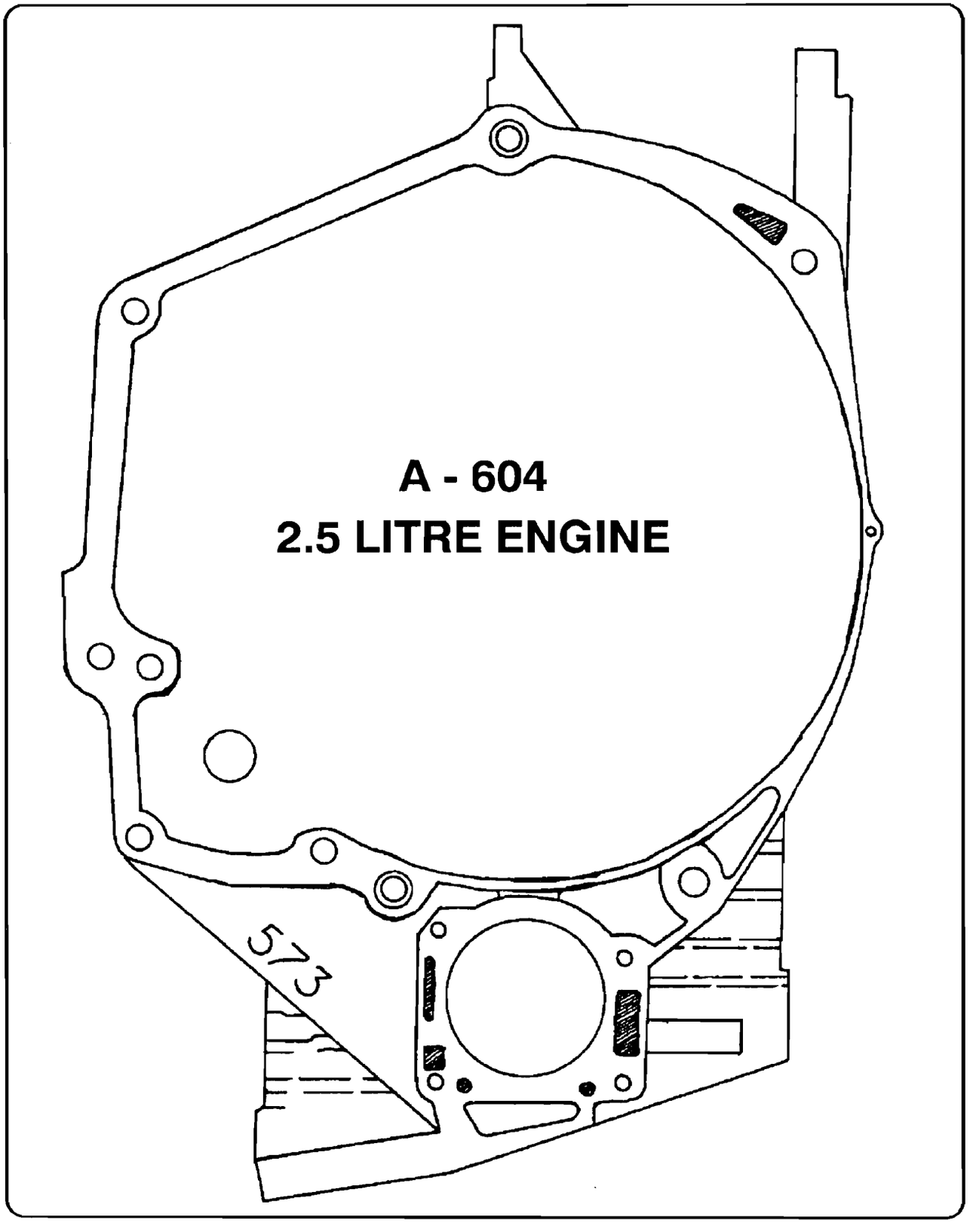
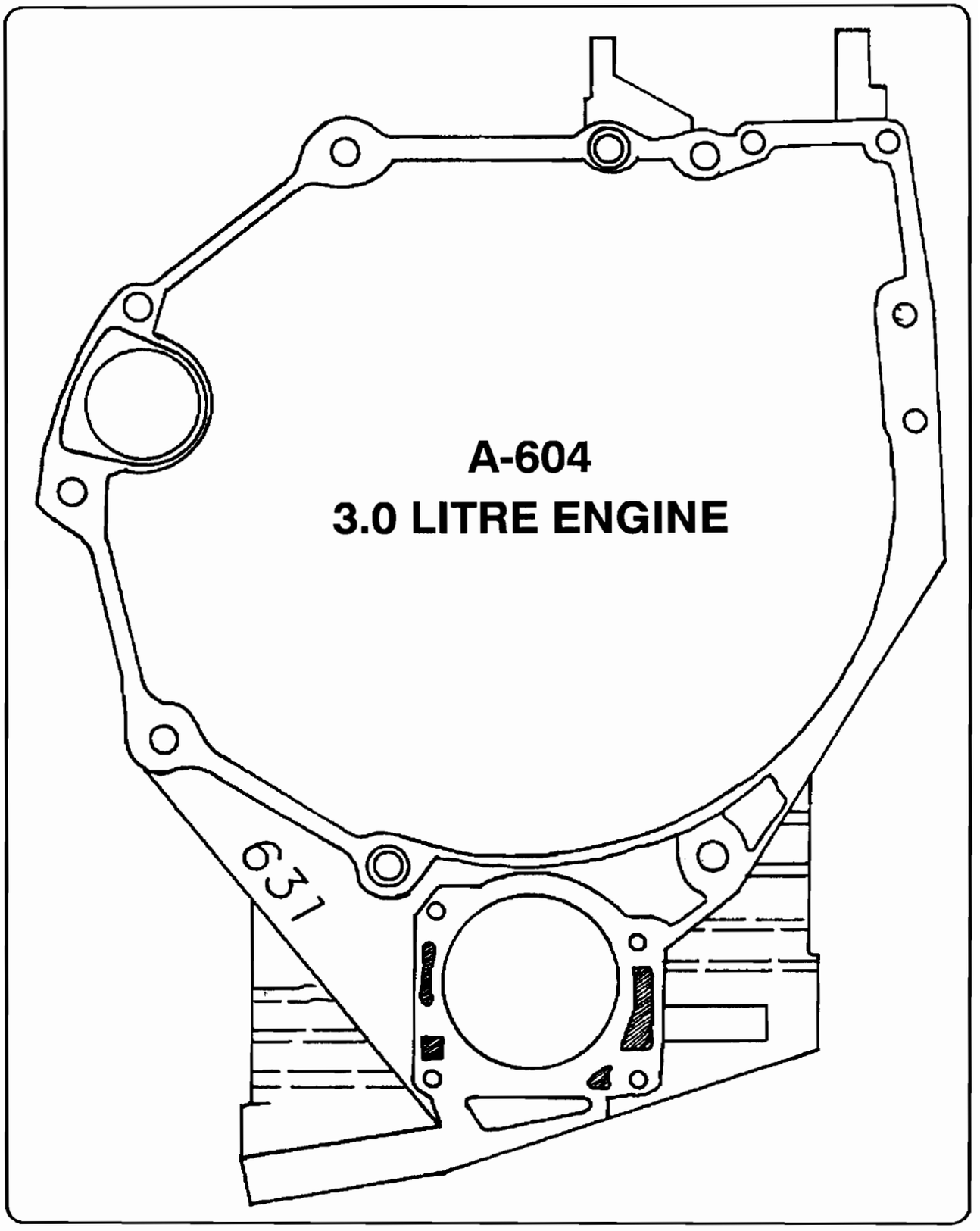
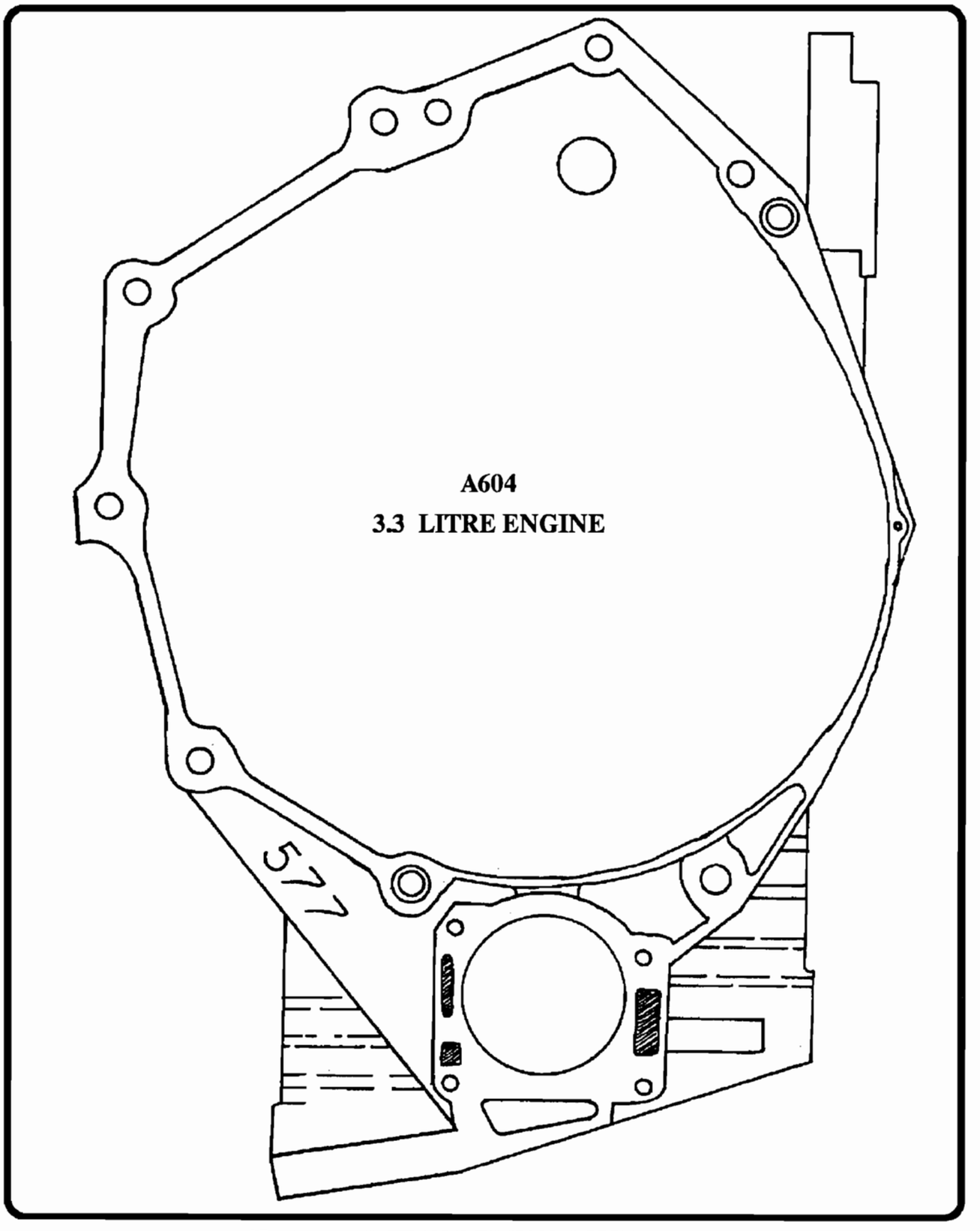


Figure 5


A - 604
2.5 LITRE ENGINE
573


A-604
3.0 LITRE ENGINE
631


A604
3.3 LITRE ENGINE
577

CHRYSLER A-604

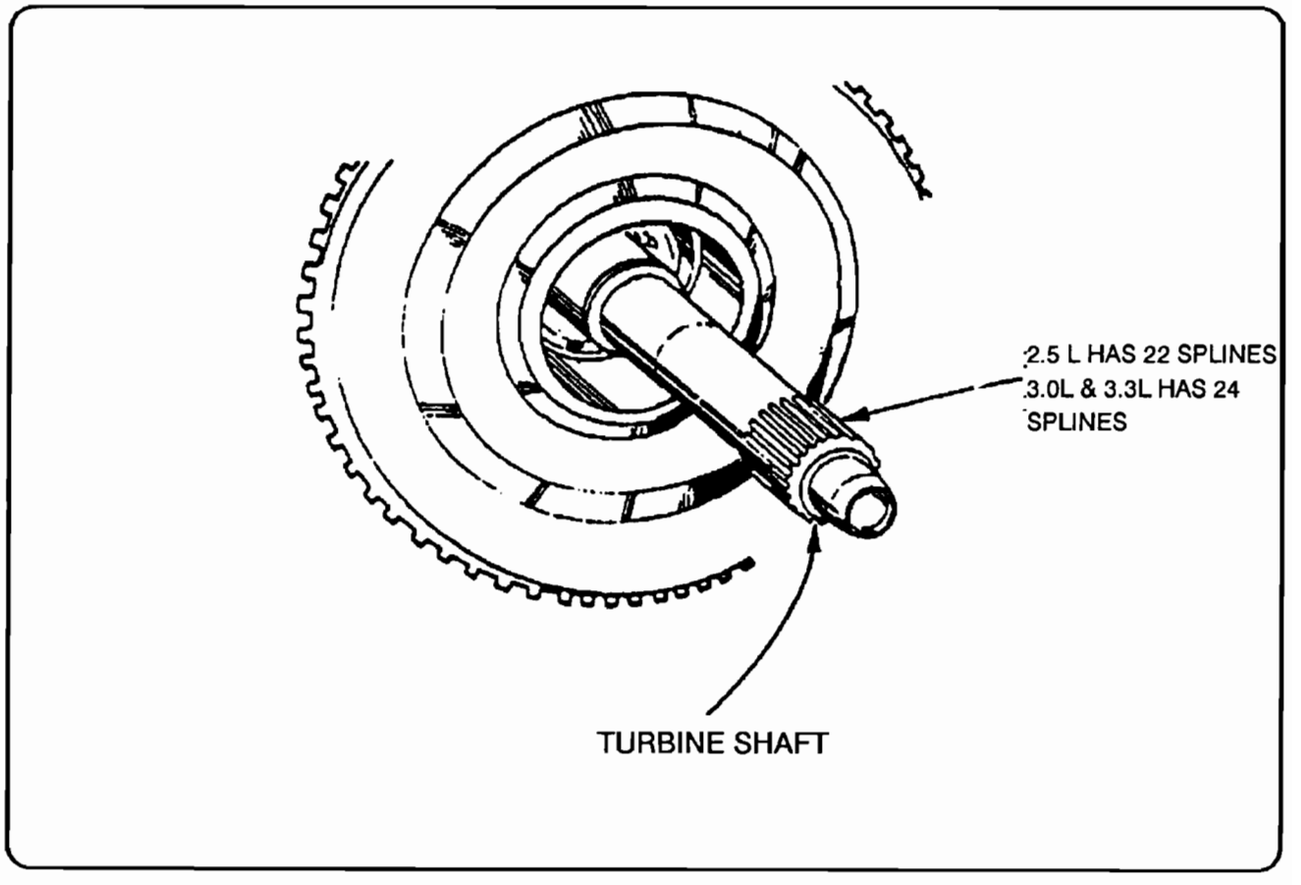


Figure 12

CHRYSLER A604

NEW OVERDRIVE/REVERSE PISTON

CHANGE: A new Overdrive/Reverse Piston has been introduced for 1990 1/4 model transaxles, and features four reaction plate slots instead of eight slots (See Figure 25).

REASON: By using four slots, it leaves more material intact between the slots on the piston compared to the eight slot piston. This added material makes the piston stronger and more rigid.

PARTS AFFECTED:

(1) OVERDRIVE/REVERSE PISTON - The new Overdrive/Reverse Piston has four slots, for the pressure plate lugs, instead of the previous eight slots and can be identified visually (See Figure 25).

The inside diameter of the new pistons bottom corner also has a larger radius to accomodate a new 1990 1/4 Input Clutch Retainer dimensional change (See Figure 26).

(2) OVERDRIVE/REVERSE PRESSURE PLATE - The new Overdrive/Reverse Pressure Plate has only four lugs on the outside diameter, instead of the previous eight, and can be identified visually (See Figure 27).

(3) INPUT CLUTCH RETAINER - The new Input Clutch Retainer has a new radius on the outside diameter, to reduce the chance of damage to the lip seal during assembly (See Figure 28). This retainer has no identification marks, and is tough to identify visually. The OEM part number did not change.

INTERCHANGEABILITY:

The new Overdrive/Reverse Piston, and four lug pressure plate will retro-fit back to all previous models, if it is used as an assembly. The piston and pressure plate must BOTH be used in these instances.

The revised Input Clutch Retainer WILL NOT work with the previous style 8 lug overdrive/reverse piston. Since the part number did not change, to replace an input clutch retainer built in 1990, before the change to the 4 lug overdrive/reverse piston, you MUST also change to the 4 lug design piston and pressure plate.

SERVICE INFORMATION:

Overdrive/Reverse Piston, 4 Slot	4531492
Overdrive/Reverse Pressure Plate, 4 Lug	4531556
Service Package, 4 Lug (Includes Both of the Above)	5241063
Overdrive/Reverse Piston, 8 Slot	4431613
Overdrive/Reverse Pressure Plate, 8 Lug	4377191

CHRYSLER A-604

OVERDRIVE / REVERSE PISTON

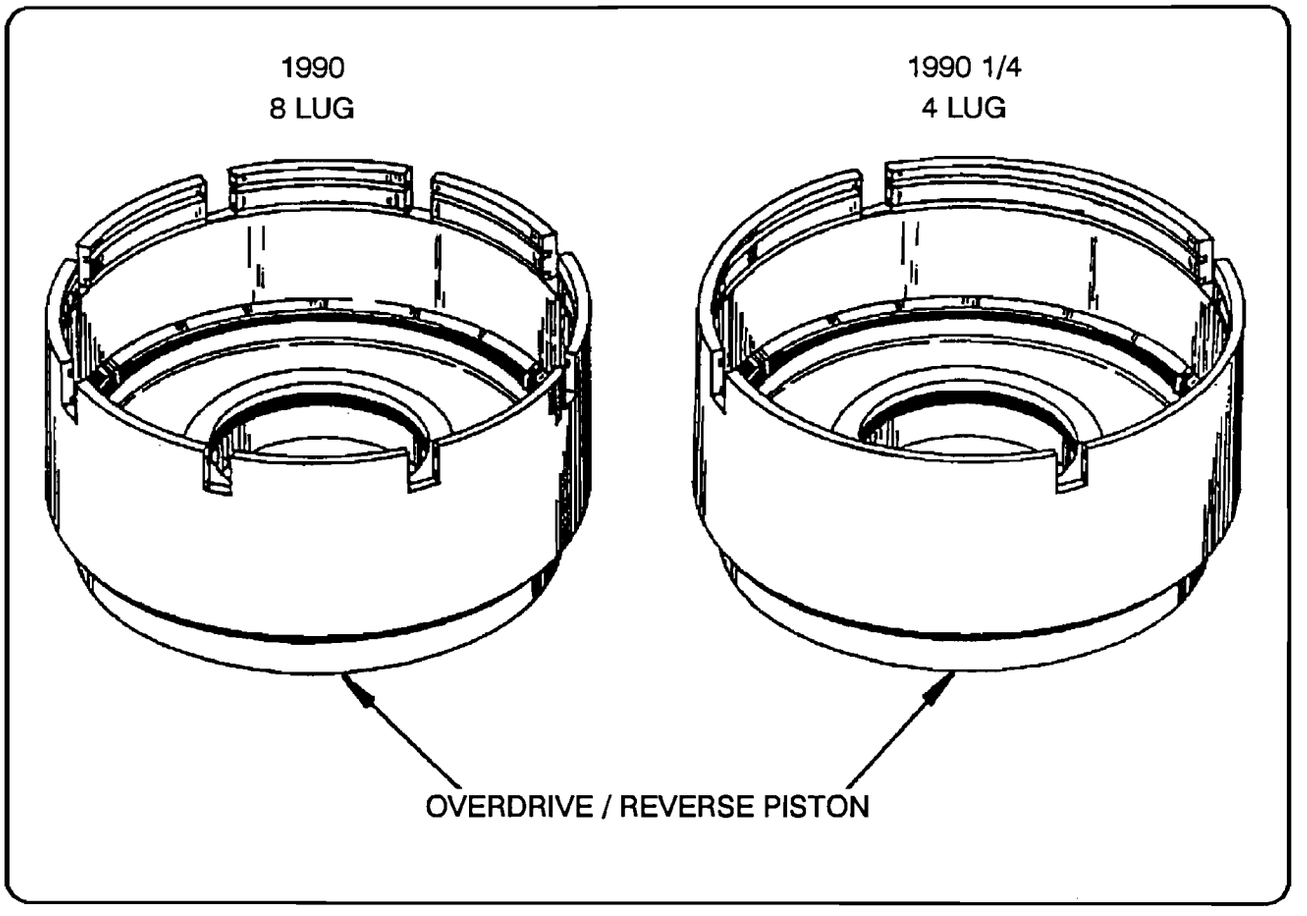


Figure 25

CHRYSLER A-604

1990 1/4 OVERDRIVE / REVERSE PISTON WITH FOUR SLOTS

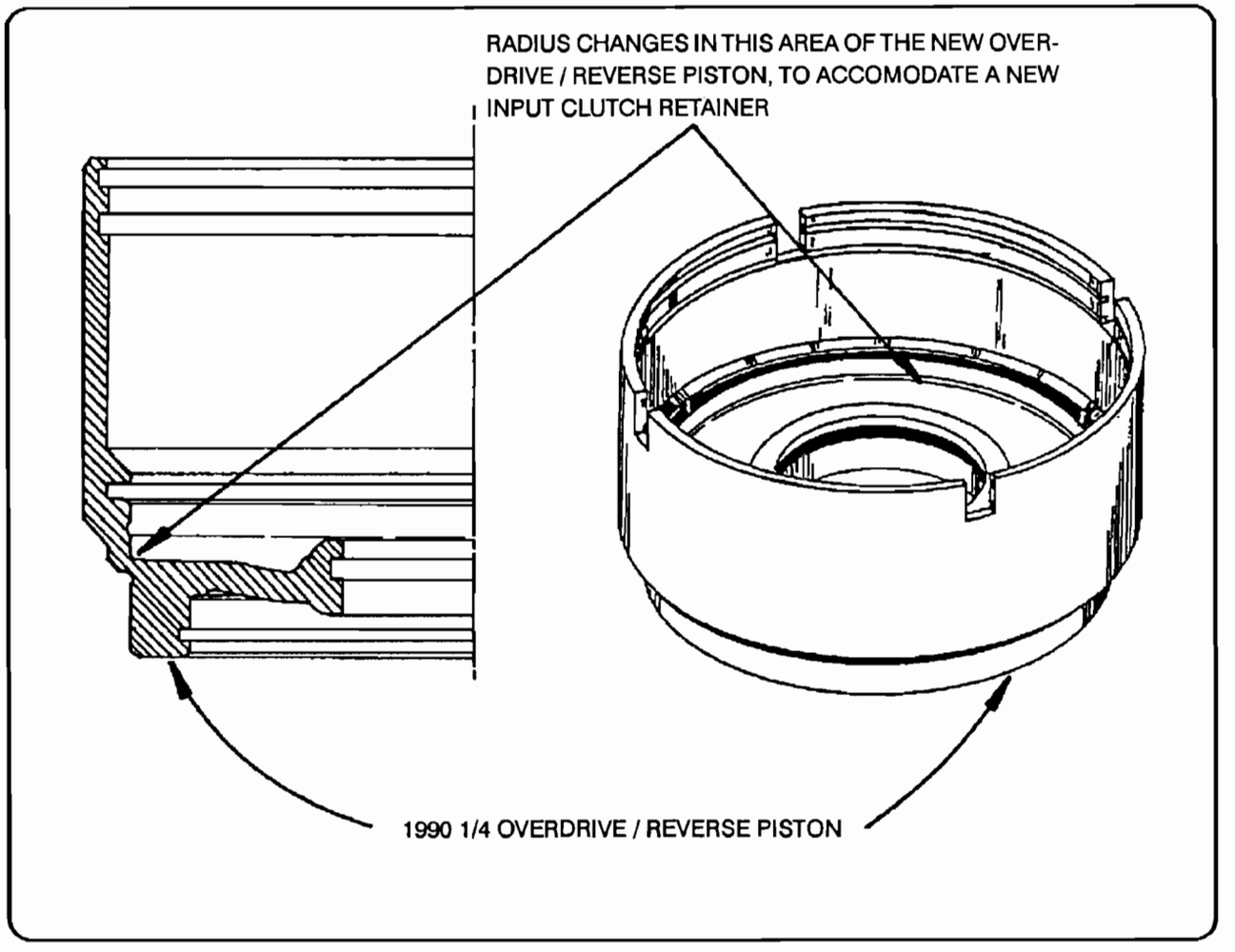
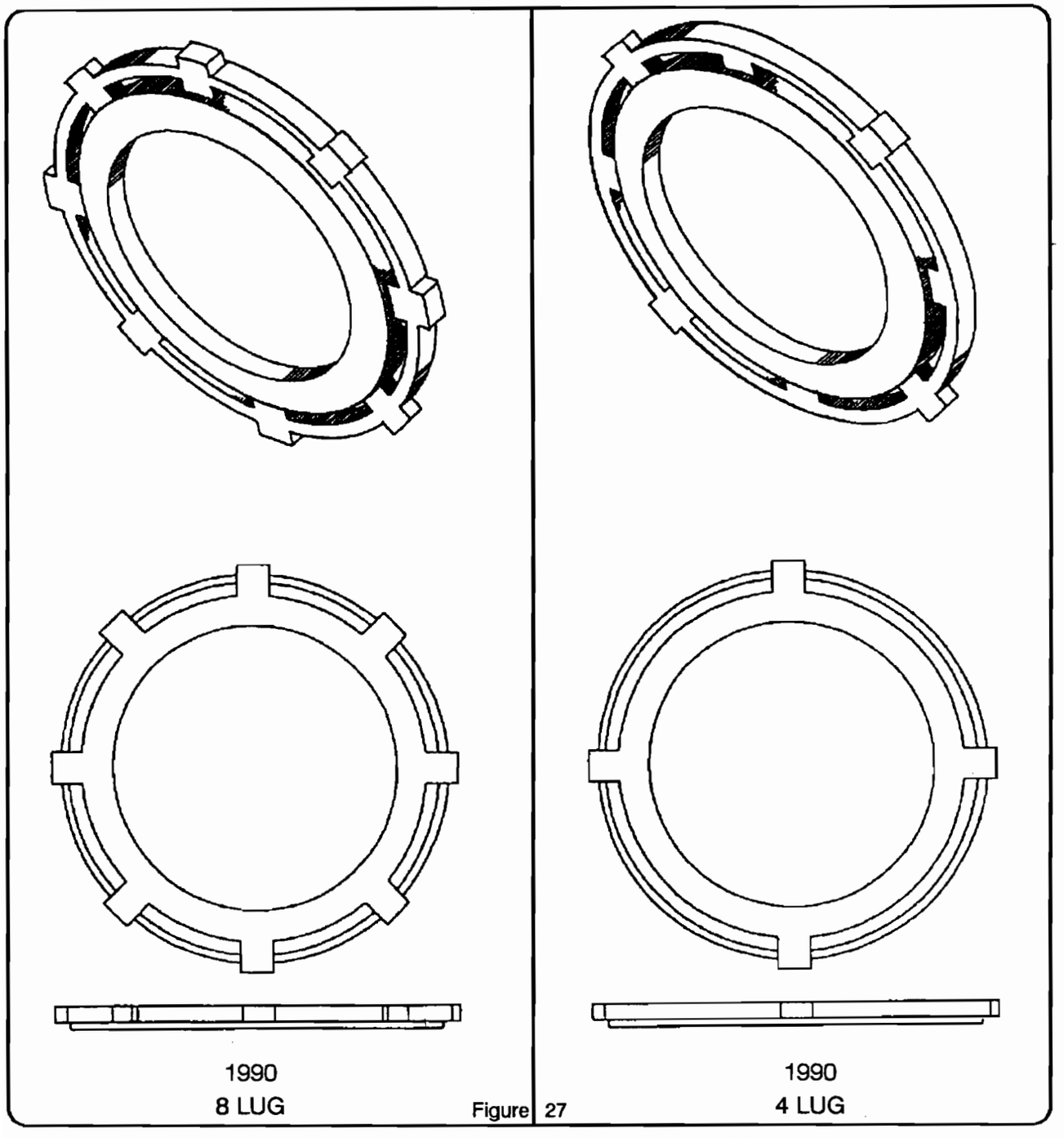


Figure 26

CHRYSLER A-604

OVERDRIVE / REVERSE PRESSURE PLATE



1990
8 LUG

1990
4 LUG

Figure 27

CHRYSLER A-604

1990 1/4 INPUT CLUTCH RETAINER

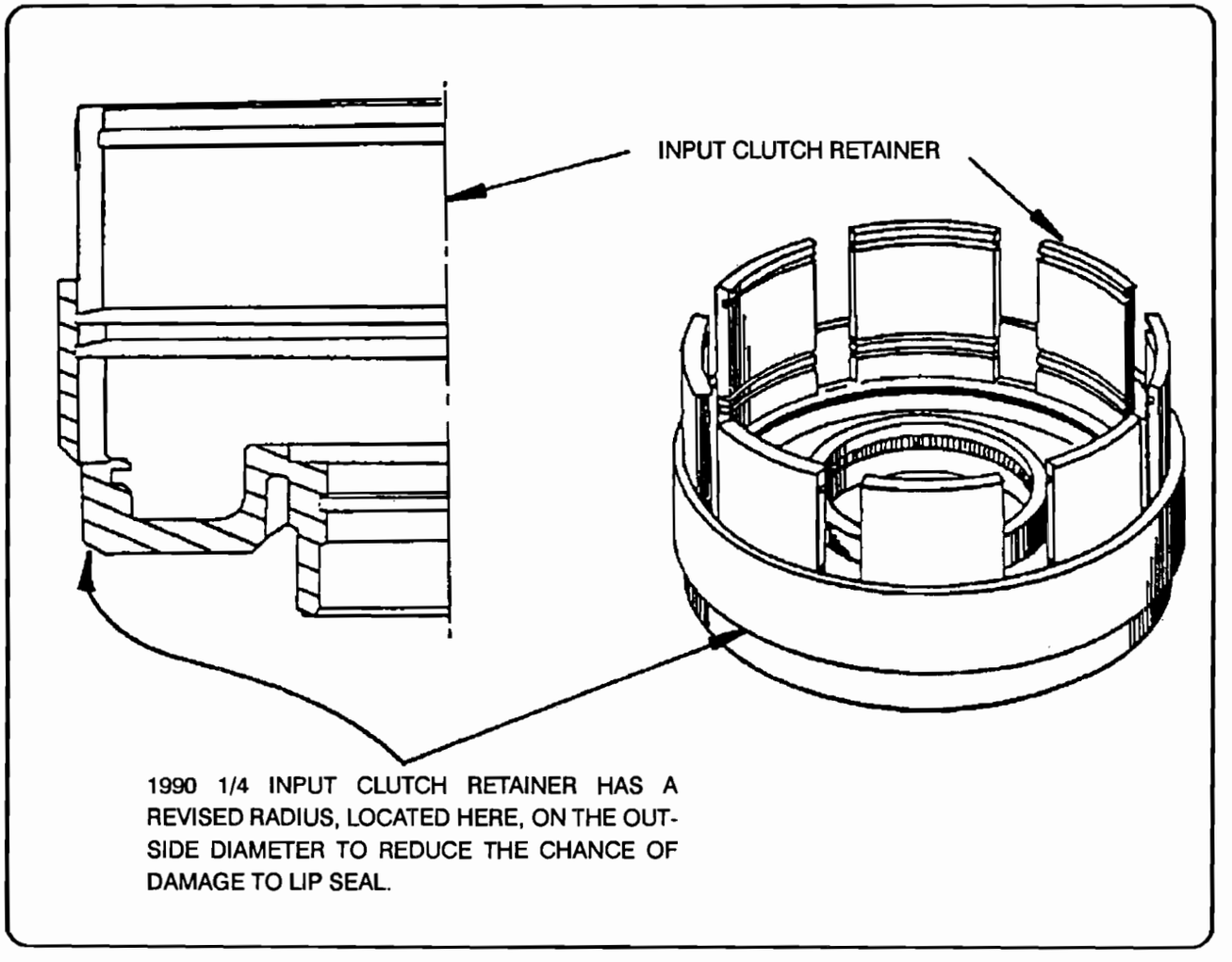


Figure 28

CHRYSLER A-604

1990 1/4 INPUT CLUTCH HUB

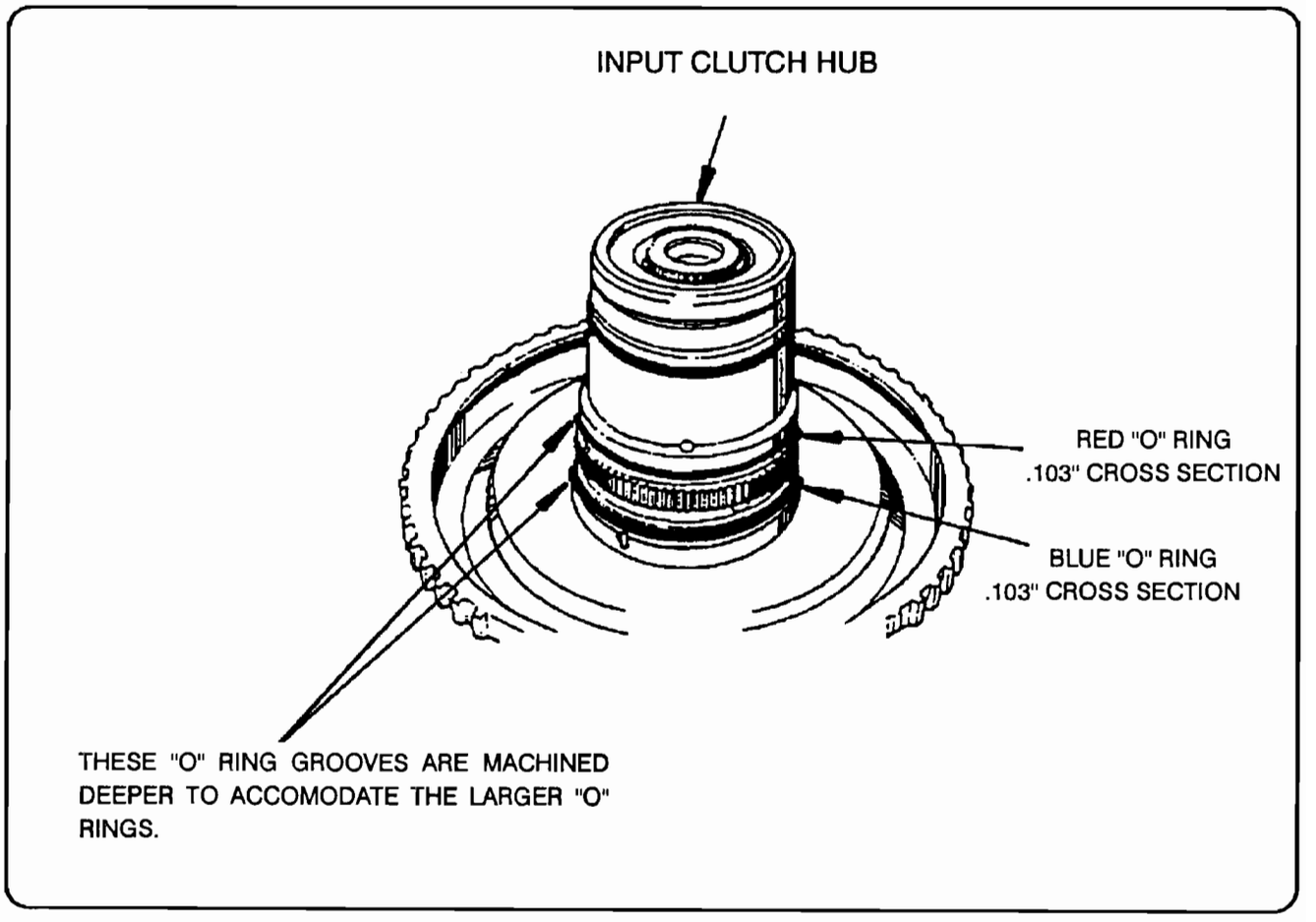


Figure 29

CHRYSLER A604

1990 1/4 INPUT CLUTCH HUB

CHANGE: For all 1990 1/4 model transaxles, the Input Clutch Hub, and the color coded "O" rings have once again been upgraded.

REASON: Improved overdrive and reverse clutch durability.

PARTS AFFECTED:

(1) INPUT CLUTCH HUB - The "O" ring grooves on the Input Clutch Hub are cut deeper to accomodate the larger cross section color coded "O" rings (See Figure 29).

(2) FRONT INPUT CLUTCH HUB "O" RING - This "O" ring now has a larger, .103" cross section and is color coded BLUE for identification purposes. Remember that this is the 3rd change on this "O" ring. The original "O" ring was BLACK with a .070" cross section, the 2nd design "O" ring was ORANGE with a .070" cross section, and the 3rd design "O" ring is BLUE with a .103" cross section

(3) REAR INPUT CLUTCH HUB "O" RING - This "O" ring now has a larger, .103" cross section and is color coded RED for identification purposes. Remember that this is the 3rd change on this "O" ring. The original "O" ring was BLACK with a .070" cross section, the 2nd design "O" ring was GREEN with a .070" cross section, and the 3rd design "O" ring is RED with a .103" cross section

INTERCHANGEABILITY:

You CANNOT interchange the 1990 1/4 Input Clutch Hub "O" Rings (BLUE and RED) with the 89-90 "O" rings (ORANGE and GREEN), nor with the original (BLACK) "O" rings.

The new Input Clutch Hub with the deeper "O" ring grooves, and the BLUE and RED "O" rings will retro-fit back to all previous models, but you MUST also use the 1990 input clutch retainer as well.

SERVICE INFORMATION:

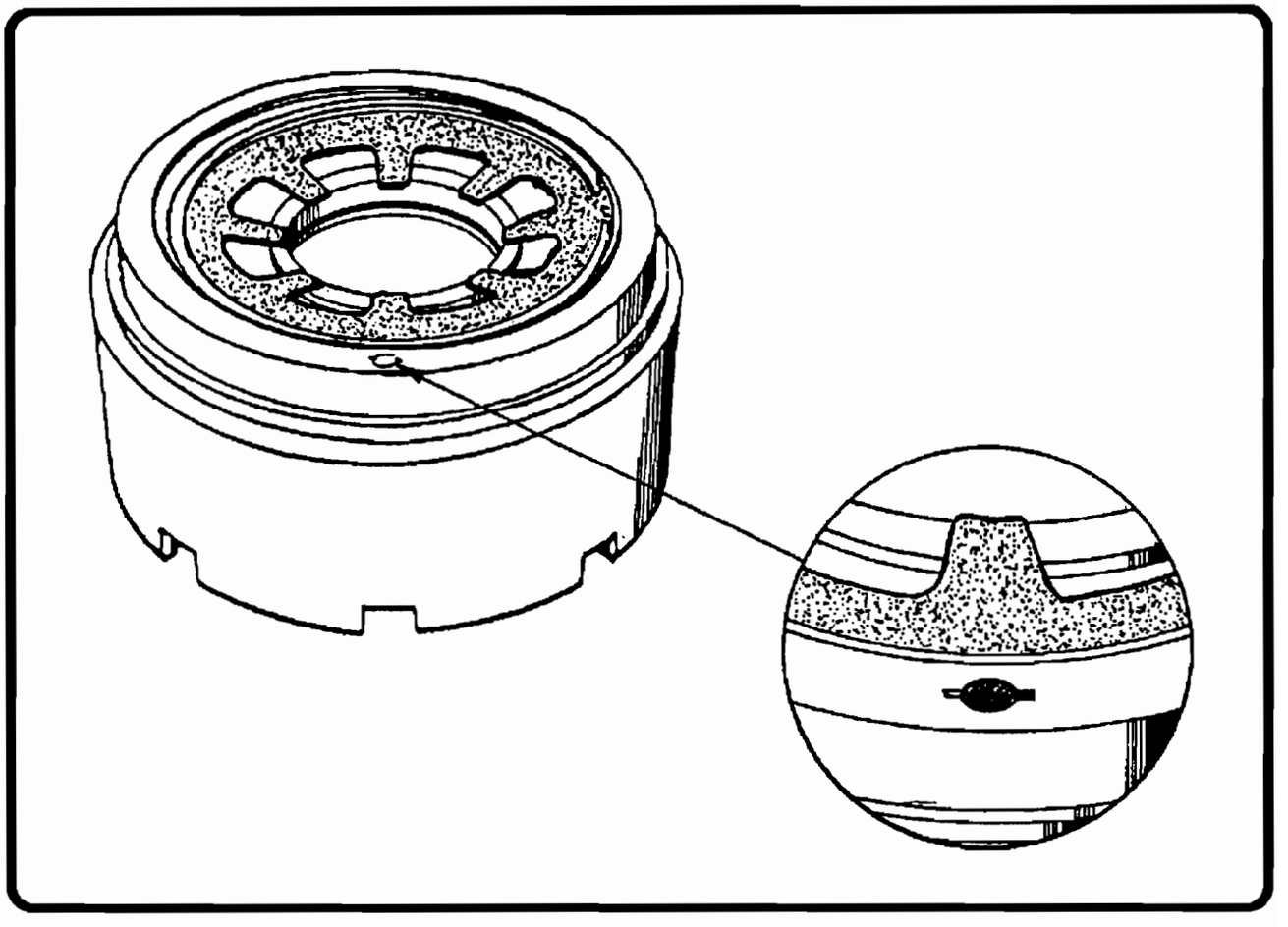
Input Clutch Hub, 90 1/4 (Deeper Grooves)	4531637
Input Clutch Hub, 1990 (Shallow Grooves)	4531655
Input Clutch Retainer, 1990	4505623
Front "O" Ring, BLACK .070" (Original)	6501574
Rear "O" Ring, BLACK .070" (Original)	6501548
Front "O" Ring, ORANGE .070" (89-90)	6502272
Rear "O" Ring, GREEN .070" (89-90)	6502270
Front "O" Ring, BLUE .103" (90 1/4)	6502271
Rear "O" Ring, RED .103" (90 1/4)	6502269

CHRYSLER A604
PREMATURE FAILURE OF O.D. AND REVERSE CLUTCHES

COMPLAINT: Premature failure of the overdrive and reverse clutch plates, and all lip seals and "O" rings are good.

CAUSE: The cause may be an orifice and screen assembly blown out of the overdrive/reverse piston.

CORRECTION: Replace the orifice/screen assembly with a new one, available under OEM part number 4531903, and stake the new assembly in place. They were not all staked in place at the factory.



CHRYSLER A500
PREMATURE OVERDRIVE CLUTCH FAILURE

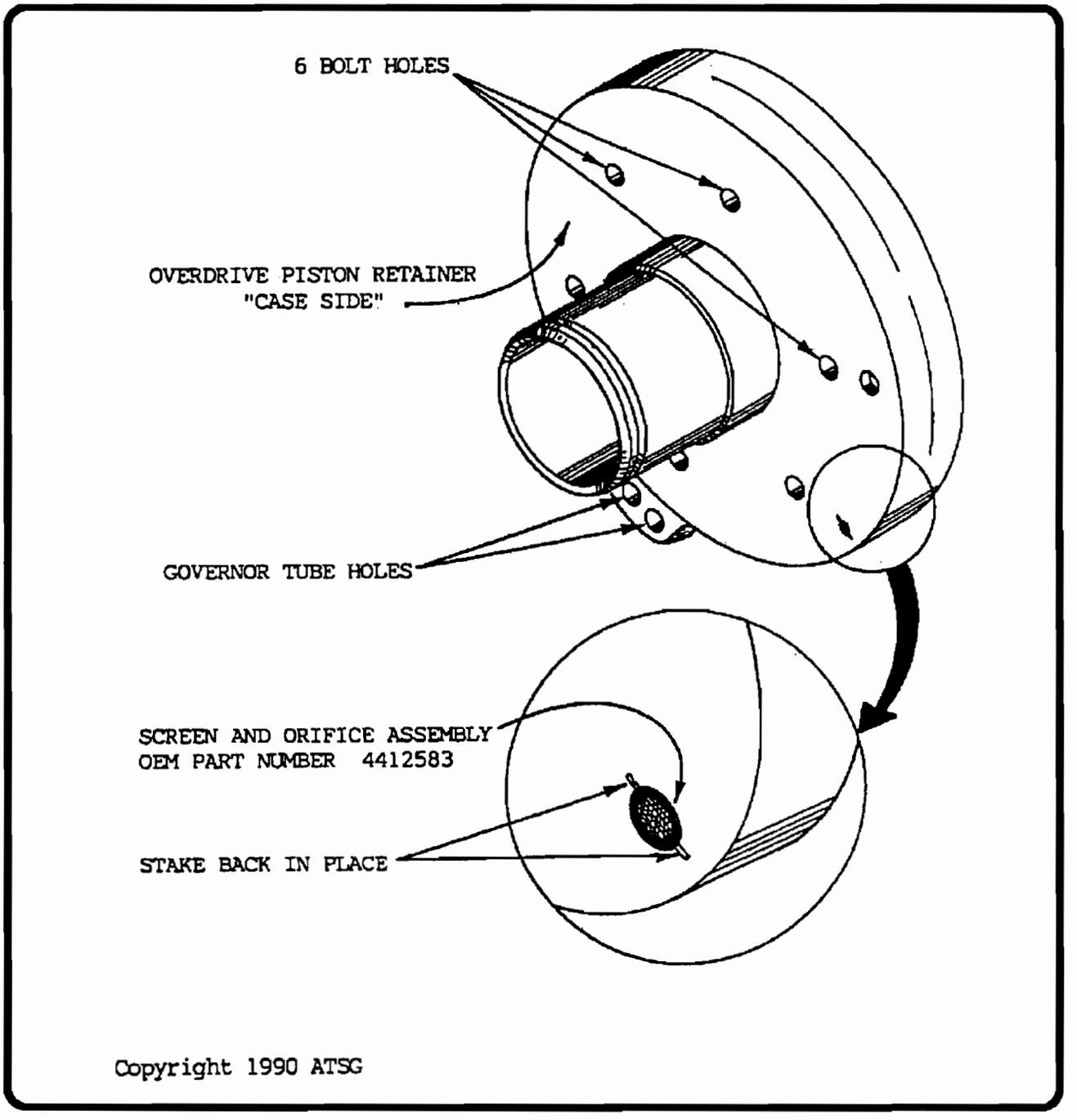
COMPLAINT: The overdrive clutches, located in the extension housing, "Wiped Out" at a very low mileage. Early symptoms may be a "Harsh" 3-4 shift, or a "Slipping" 3-4 shift.

CAUSE: The cause may be the Screen and Orifice Assembly blown out of the overdrive piston retainer (see figure on next page).

CORRECTION: Replace the Screen and Orifice Assembly with a new one, available under OEM part number 4412583, and make sure that you "STAKE" it in place after installation.

NOTE: This Screen and Orifice Assembly should be checked as a routine procedure, during a normal overhaul to insure that it has been "STAKED" in place. The factory did not start the staking process until MARCH, 1989.
"Don't let this one burn you".

A500 OVERDRIVE PISTON RETAINER

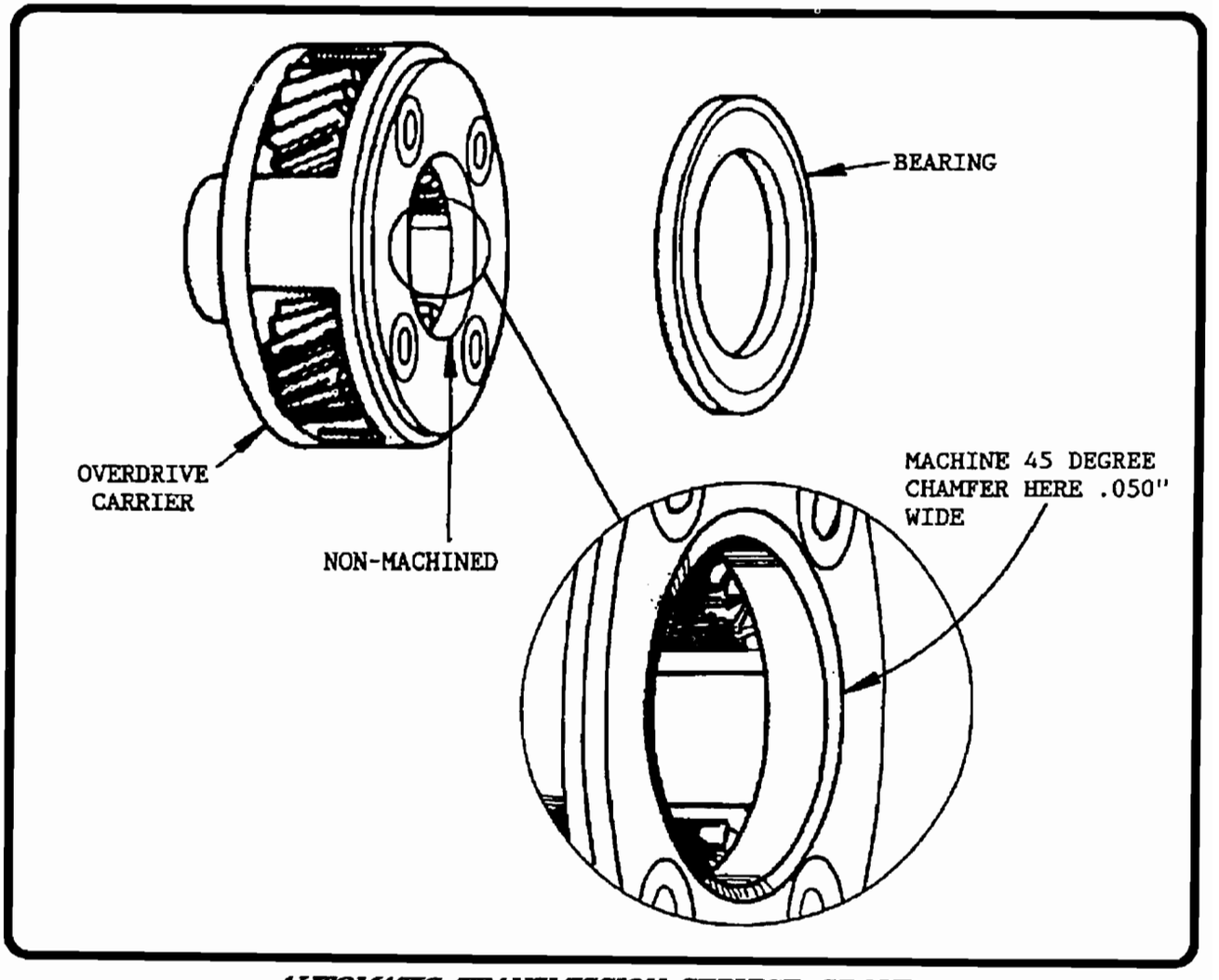


CHRYSLER A500
PREMATURE O.D. CARRIER FAILURE

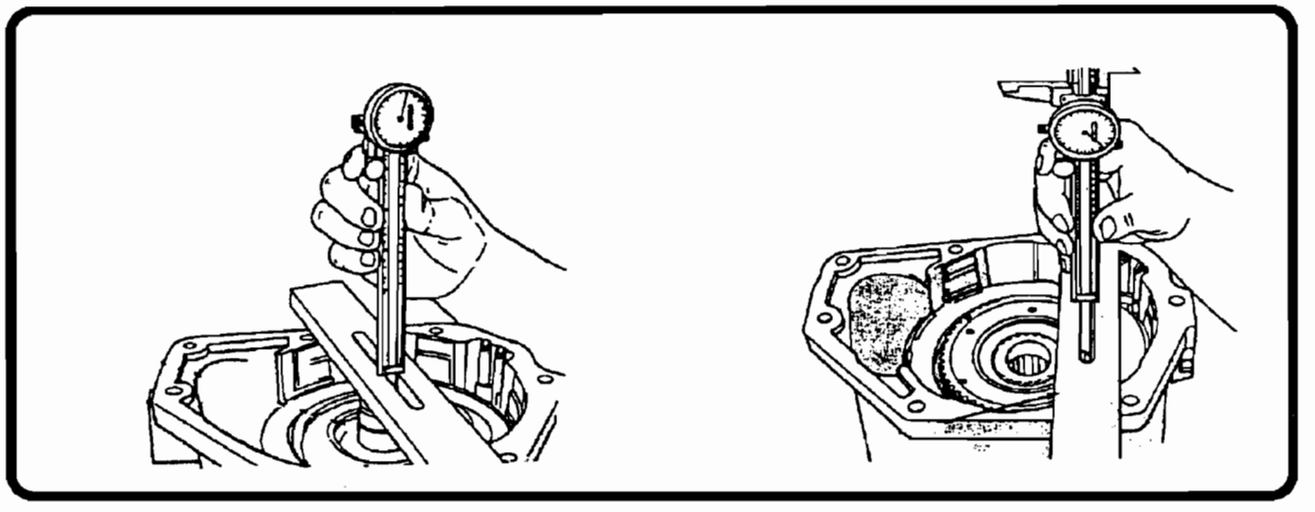
COMPLAINT: Premature failure of the overdrive carrier and bearing. The bearing is actually destroyed first and the bearing takes out the overdrive carrier.

CAUSE: The cause is lack of lube to the overdrive carrier bearing.

CORRECTION: Replace the bearing and carrier. BEFORE installing the new carrier, machine a chamfer on the inside diameter that is .050" wide as shown in figure below. This will provide more lube oil for the carrier bearing.



A500 END PLAY PROCEDURE



MEASURE FOR INTERMEDIATE SHAFT SPACER

Position overdrive unit vertically in a large vise. To determine the proper intermediate shaft spacer thickness, insert tool through the sun gear. Be sure tool bottoms against carrier spline shoulder. Position tool across overdrive face. Using dial caliper positioned over tool, measure distance .

Using this measurement, select the proper thickness spacer from the chart below:

MEASURE FOR OVERDRIVE PISTON SHIM

To determine the proper shim thickness for the overdrive piston: Position tool across overdrive case face. Using dial caliper positioned over tool, measure to the sliding hub bearing seat.

This measurement should be taken at four locations . Add all measurements together and divide by four (4). Using this measurement, select the proper thickness shim from the chart below.

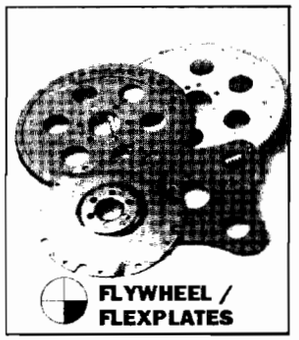
Intermediate Shaft Spacer Chart

Measurement (Inches)	Spacer Part Number	Spacer Thickness (Inches)
.7336-.7505	4431916	.159-.158
.7506-.7675	4431917	.176-.175
.7676-.7855	4431918	.194-.193
.7856-.8011	4431919	.212-.211

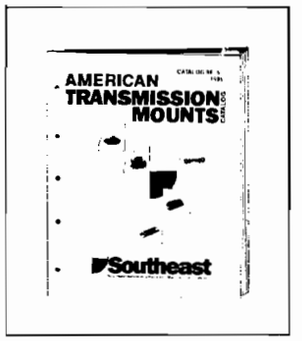
Overdrive Piston Shim Chart

Measurement (Inches)	Spacer Part Number	Spacer Thickness (Inches)
1.7500-1.7649	4431730	.108-.110
1.7650-1.7799	4431585	.123-.125
1.7800-1.7949	4431731	.138-.140
1.7950-1.8099	4431586	.153-.155
1.8100-1.8249	4431732	.168-.170
1.8250-1.8399	4431587	.183-.185
1.8400-1.8549	4431733	.198-.200
1.8550-1.8699	4431588	.213-.215
1.8700-1.8849	4431734	.228-.230
1.8850-1.8999	4431590	.243-.245

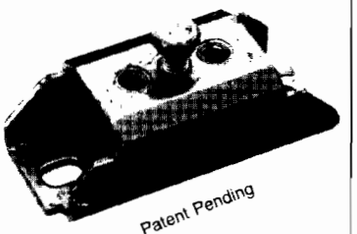
SPEEDO GEAR ASSEMBLY



FLYWHEEL / FLEXPLATES



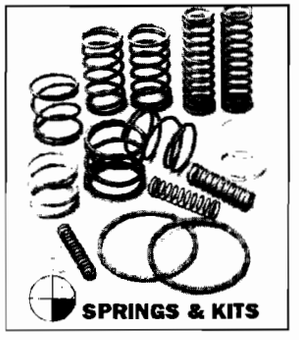
"NEW"



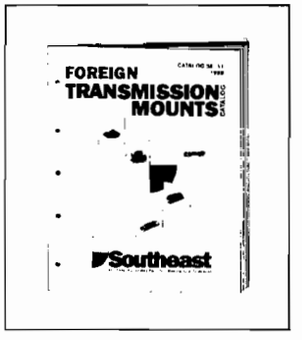
Patent Pending

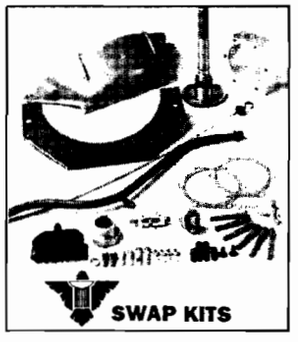
UNIVERSAL GM #2000 MOUNT FITS 80% PRE 1980 & 40% POST 1980

PLASTICS

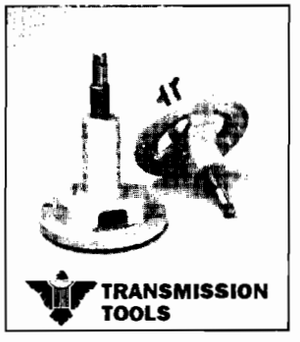


SPRINGS & KITS

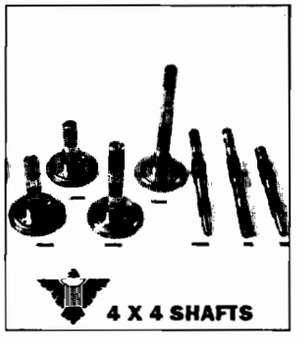




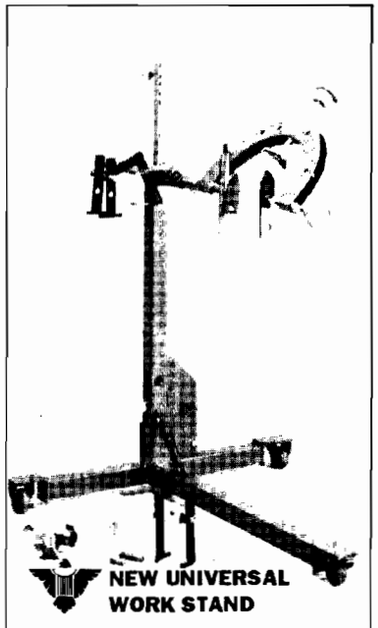
SWAP KITS



TRANSMISSION TOOLS



4 X 4 SHAFTS



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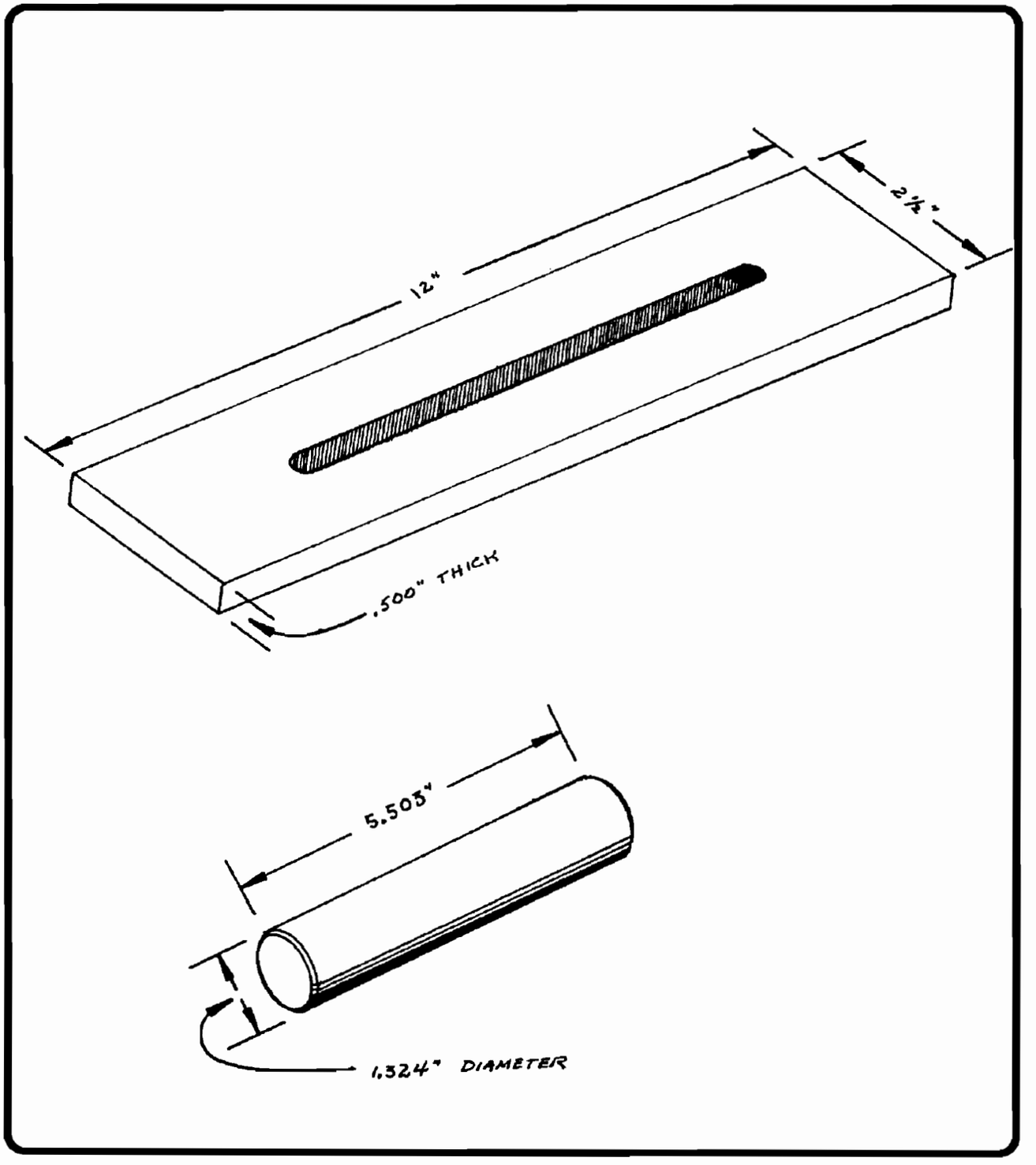
12"
2½"
.500" THICK
5.505"
1.324" DIAMETER