



1997 SEMINAR INFORMATION

"THE RIGHT DIRECTION FOR '97"

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AUTOMATIC TRANSMISSION SERVICE GROUP
9200 S. DADELAND BLVD.
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MIAMI, FL 33156
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Automatic Transmission Service Group



"THE RIGHT DIRECTION FOR '97"

INTRODUCTION

Technical Director Bob Cherrnay sets the theme this year as the "RIGHT DIRECTION IN '97" with valuable information on both video tape and technical manuals to bring back to the shop and use the very next business day. Information will once again be presented on Import, General Motors, Ford and Chrysler vehicles covering topics from Factory updates to electrical tips. This is another DO NOT MISS seminar by ATSG! Welcome and enjoy the "Right Direction in '97".

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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A SECOND CHANCE.



INTRODUCING
THE TORRINGTON
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1997 SEMINAR INFORMATION VIDEO

4

NEW EQUIPMENT

SNAP-ON® VANTAGE

The Snap-on® Vantage, graphing digital multimeter, is a new diagnostic tool which can help discover glitches in sensors and other electronic components that would otherwise go undetected.

The Vantage as can be seen in Figure 1 utilizes the same user friendly format as the Snap-on scanner, but that's where the similarity ends.

MULTIMETER

The Vantage can be used as a digital multimeter as illustrated in Figure 2. In this mode some of the values the Vantage is capable of are, AC and DC Volts, Ohms, Amps, Diode Check, Hertz Frequency and Duty Cycle.

In this mode the displayed values are updated **3 TIMES PER SECOND**.

GRAPHING MULTIMETER

The Vantage can also be used as a graphing multimeter which means, any value that is seen in the digital multimeter mode, can be seen in a graph known as a **HISTOGRAM**.

This can be viewed generically or can be configured to apply to a specific make of vehicle.

The histogram in Figure 3 has vertical lines coming down from the graphed linear pattern.

These lines are called "dropouts", which indicate the slightest imperfection in the sensors operation regardless of how fast this "GLITCH" takes place.

CODE RETRIEVAL

In this mode the vantage can be used to RETRIEVE CODES on vehicles where a scanner cannot communicate with the on board system.

Connect the Vantage to the correct terminals in the diagnostic connector and the digital square waves can be viewed as shown in Figure 4.

WAVEFORM VIEWER®

The Vantage can also be used as a waveform viewer which can allow the user to view a sensors raw signal as seen in Figure 5. The waveform viewer can be used as a generic viewer or can be configured for a specific vehicle.

In this example the Vantage is in the dual screen mode which means that 2 sensor wave forms can be viewed at the same time.

DIAGNOSTIC DATABASE

The Vantage also contains its own data base, for example, if a sensor is to be checked, but the connector hook-ups are not known, the Vantage will show you where to connect the meters leads as shown in Figure 6. In this example the Vantage was configured for a 1994 Mitsubishi Galant Throttle Position Sensor and as seen on the screen, the TPS information is given in detail.

NEW EQUIPMENT

SNAP-ON VANTAGE

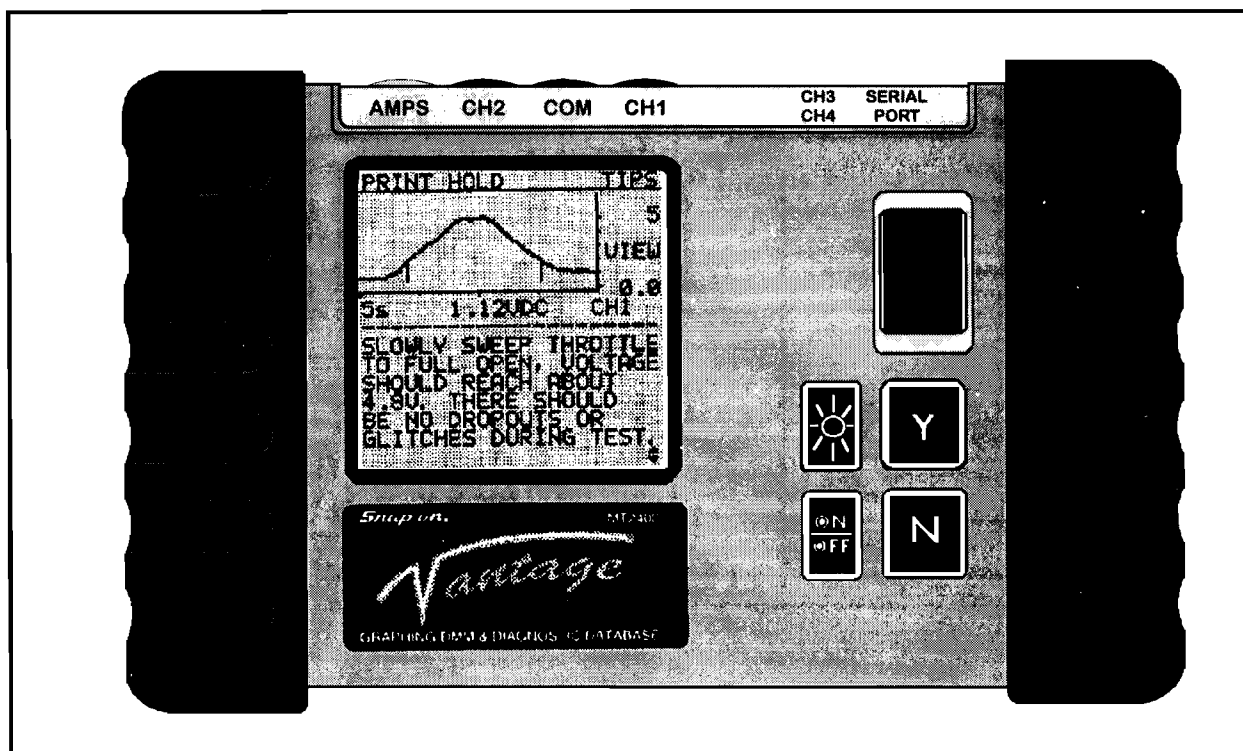


Figure 1

MULTIMETER

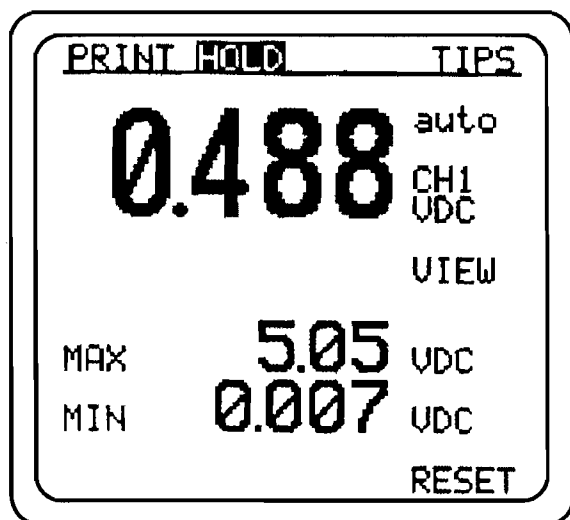


Figure 2

GRAPHING MULTIMETER

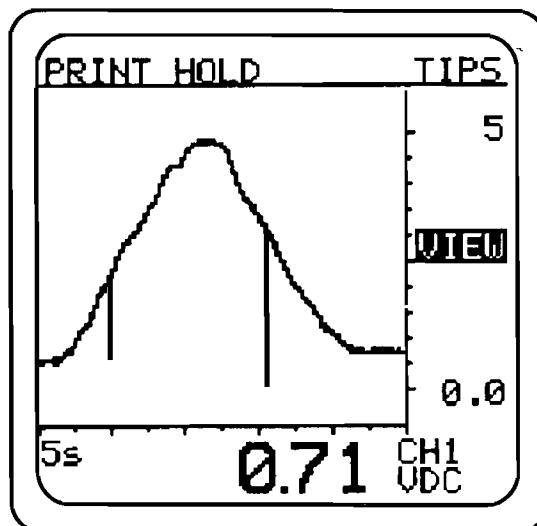


Figure 3

NEW EQUIPMENT

SNAP-ON VANTAGE

CODE RETRIEVAL

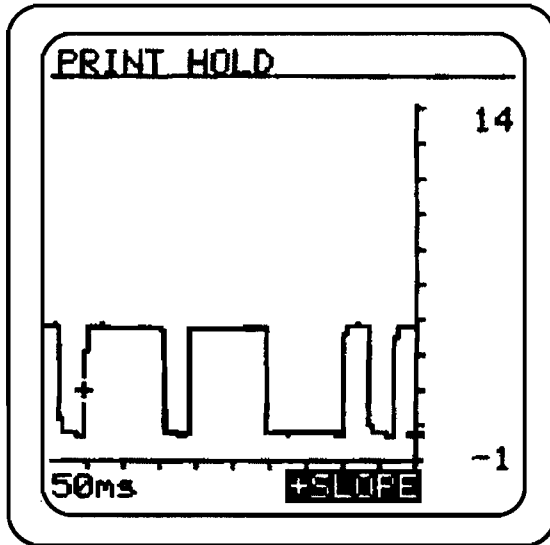


Figure 4

WAVEFORM VIEWER

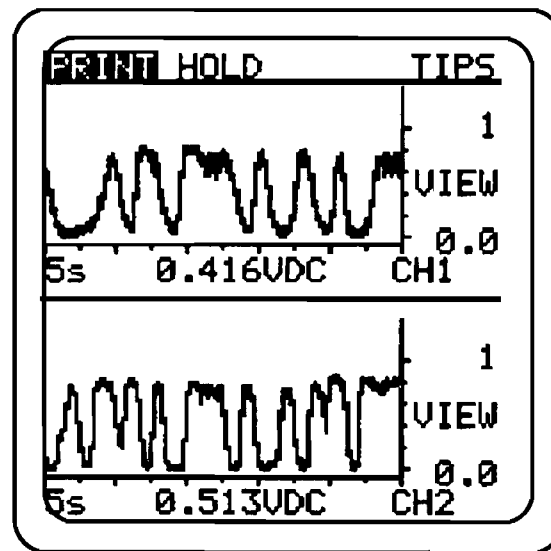


Figure 5

DIAGNOSTIC DATABASE

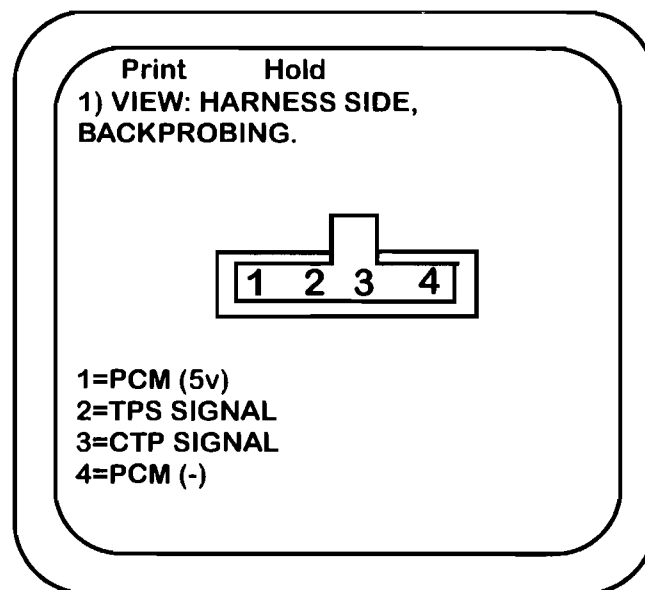


Figure 6



NEW EQUIPMENT

TranX 2000®

Zoom Technology has introduced it's new TranX 2000 Transmission Analyzer which has the capabilities to monitor the commands given by the on board computer or to manually operate the transmission independently of the on board system. (Refer to Figure 1)

The TranX 2000 can also operate the solenoids on the bench and can measure sensor output values when used in conjunction with a multimeter.

MONITOR MODE

Connect the TranX between the on board computer and the transmission connector as illustrated in Figure 2 and allow the TranX to monitor the computer, set the select test switch to "MONITOR COMPUTER"

In this mode the TranX monitors signals coming from the computer and displays the gear these signals are calling for in the window marked "GEAR".

If the signals are wrong, or not reaching the transmission, a "U" will be displayed instead of the gear, in the window marked "GEAR".

Pressure control solenoid duty cycle displays the percentage of duty called for by the computer and is displayed in the window marked "PRESSURE % DUTY".

SHIFT TEST MODE

Setting the select test switch to "SHIFT TEST", start the engine and use the "GEAR ARROWS" to manually shift the transmission.

The gear you select is displayed above the arrows in the window marked "GEAR". As you shift the transmission, the individual solenoid LED's will illuminate when the solenoid is engaged.

Using the "SELECT CHANNEL" switch, you can read the Amps, Volts or Ohms, in the window marked "AMPS, VOLTS, OHMS", of the solenoids as you are shifting the transmission.

Line pressure can be adjusted using the "PRESSURE % DUTY" arrows. Line pressure is adjusted in 1% increments.

Using the "MIN/MAX" button before pressing the "UP/DOWN" arrow will quickly result in maximum or minimum line pressure. If you hold the arrow button, pressure will rapidly go up or down.

The 1% increment adjustment allows you to use a pressure gauge with a greater amount of accuracy when checking line pressure while the % of duty will be displayed in the window marked "PRESSURE % DUTY".

Special functions such as Lock-up and Coast Clutch can be selected using the "FUNCTION" switches. PWM Lock-up or downshift solenoids can be adjusted using the "FUNCTION % DUTY" arrows just as explained in the line pressure test above.

On certain vehicles, some special functions will be blocked out under some conditions which would damage the transmission.

SOLENOID TEST MODE

The individual solenoid test allows you to isolate each solenoid and electronically test for shorts, opens and resistance problems.

NOTE: The vehicle should not be running for this test if the solenoids are being tested with the transmission in the vehicle.



NEW EQUIPMENT

TranX 2000®

SOLENOID TEST MODE continued.....

Use the gear selector arrows to go through solenoid channels. As you go up and down through the Channels, the output is automatically displayed for that channel.

Select Volts, Ohms or AMPS by pressing the button on the keypad to display the Voltage, Resistance or Current of the solenoids you are testing.

These tests can also be performed on the bench in order to prevent a troublesome solenoid from being installed into the transmission.

SENSOR TEST MODE

Various sensors can be tested using the "SENSOR MODULE A" LED indicators and test points can be used to measure various outputs from the individual sensor with a multimeter.

Sensors which run through the case connector are wired through the individual dedicated transmission harness.

A special alligator clip set is provided to patch in to sensors which are wired separately from the case connector.

In other words you have at your disposal a **MINI BREAKOUT BOX!**

NEW EQUIPMENT

TranX 2000

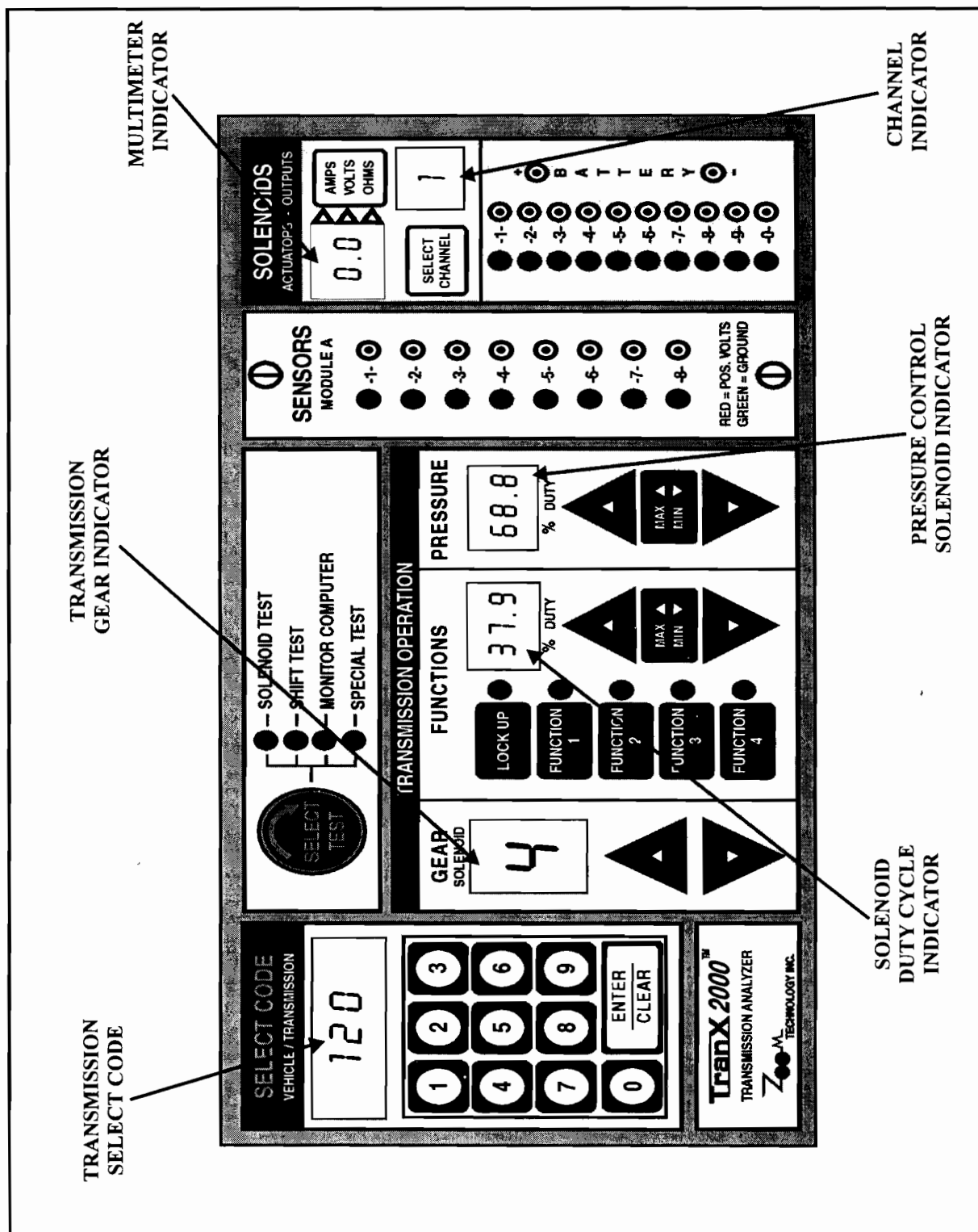


Figure 1

NEW EQUIPMENT

TranX 2000

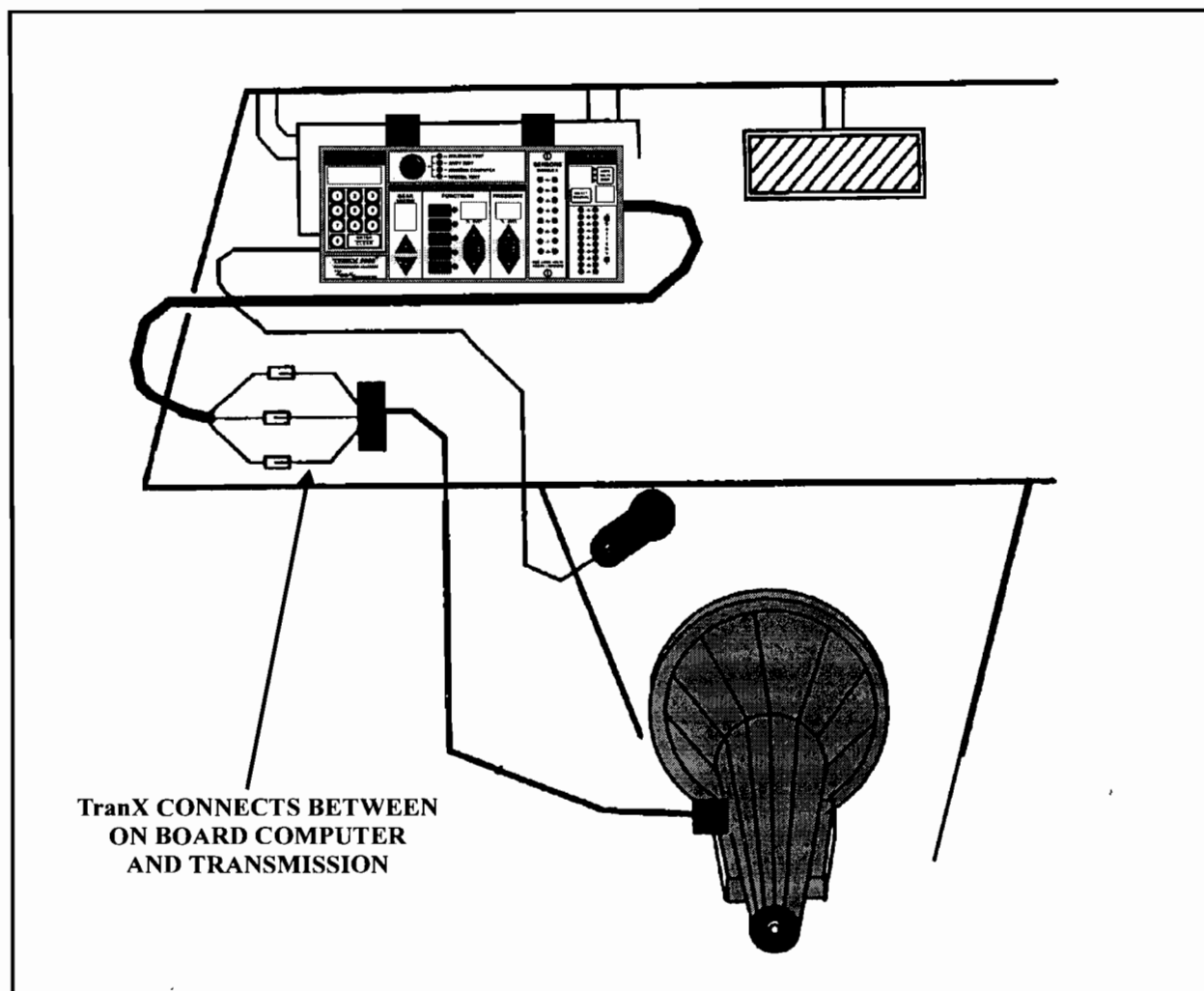


Figure 2



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—Mike Weinberg, President of Rockland Standard Gear

We not only have the largest inventory of OEM standard transmission parts, we race these parts. Mike, our President, races an IMSA car with one of our transmissions in it. So, if you need technical advice backed-up from a company that knows standard transmissions, we're your company. We stock standard transmission parts for practically every model of car and truck. We offer technical support to any customer who buys our parts. Rockland Standard Gear, the answer to all of your standard transmission problems.



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MX17

VALVE BODY GASKET CHANGE

COMPLAINT: The transaxle will shift from first to third automatically and manually and will have no reverse.

CAUSE: The valve body gaskets used in 1994 (Refer to Figure 1) and earlier MX17 transaxles found in GEO METRO, SUZUKI SWIFT and DAIHATSU CHARADE automobiles **CANNOT** be used in 1995 models. In 1995 the valve body gaskets changed (Refer to Figure 2) and if used in the 1994 and earlier models, will cause the above complaint.

CORRECTION: Match the valve body gaskets to the spacer plate to insure that the correct valve body gaskets have been installed.

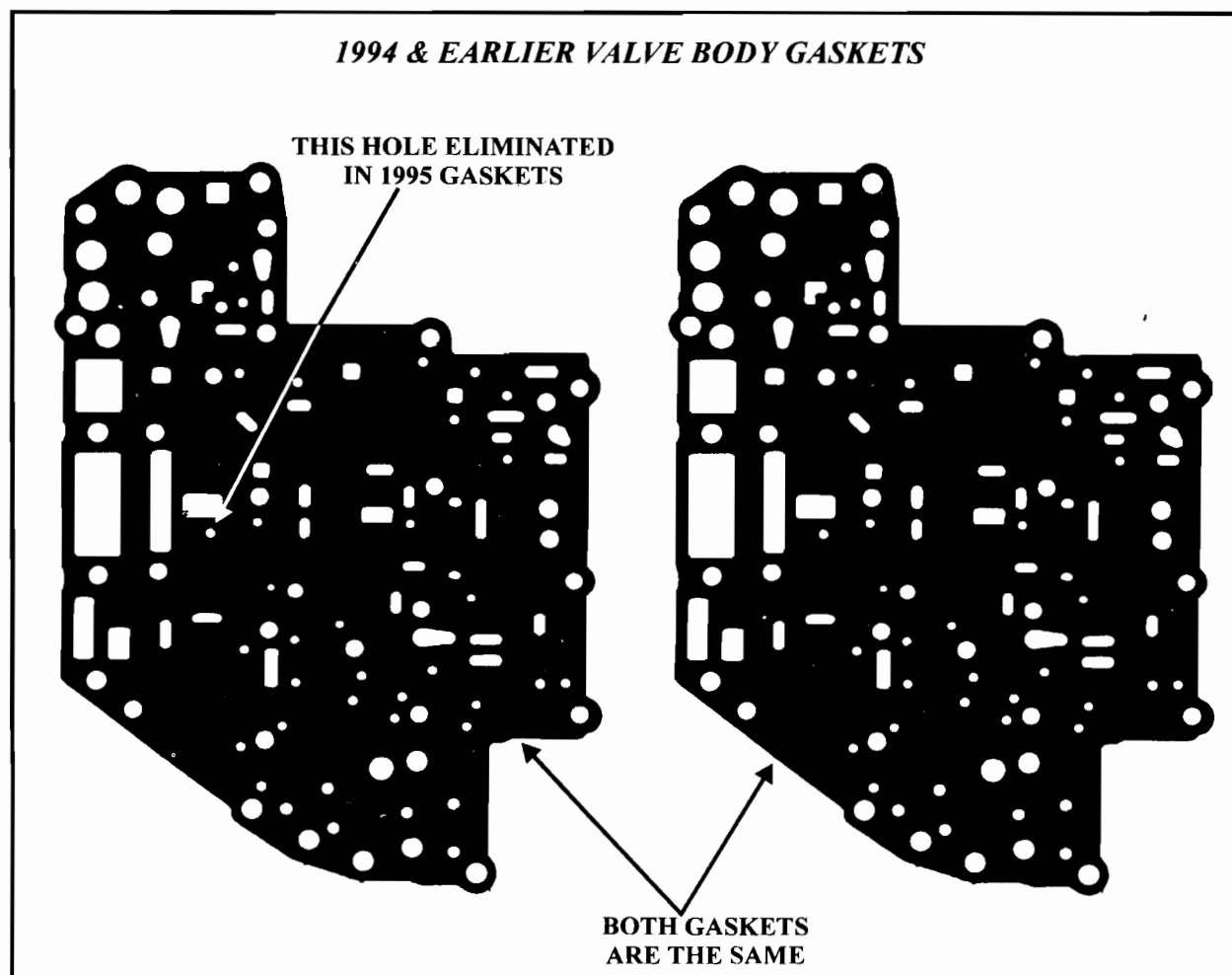


Figure 1

MX17

VALVE BODY GASKET CHANGE

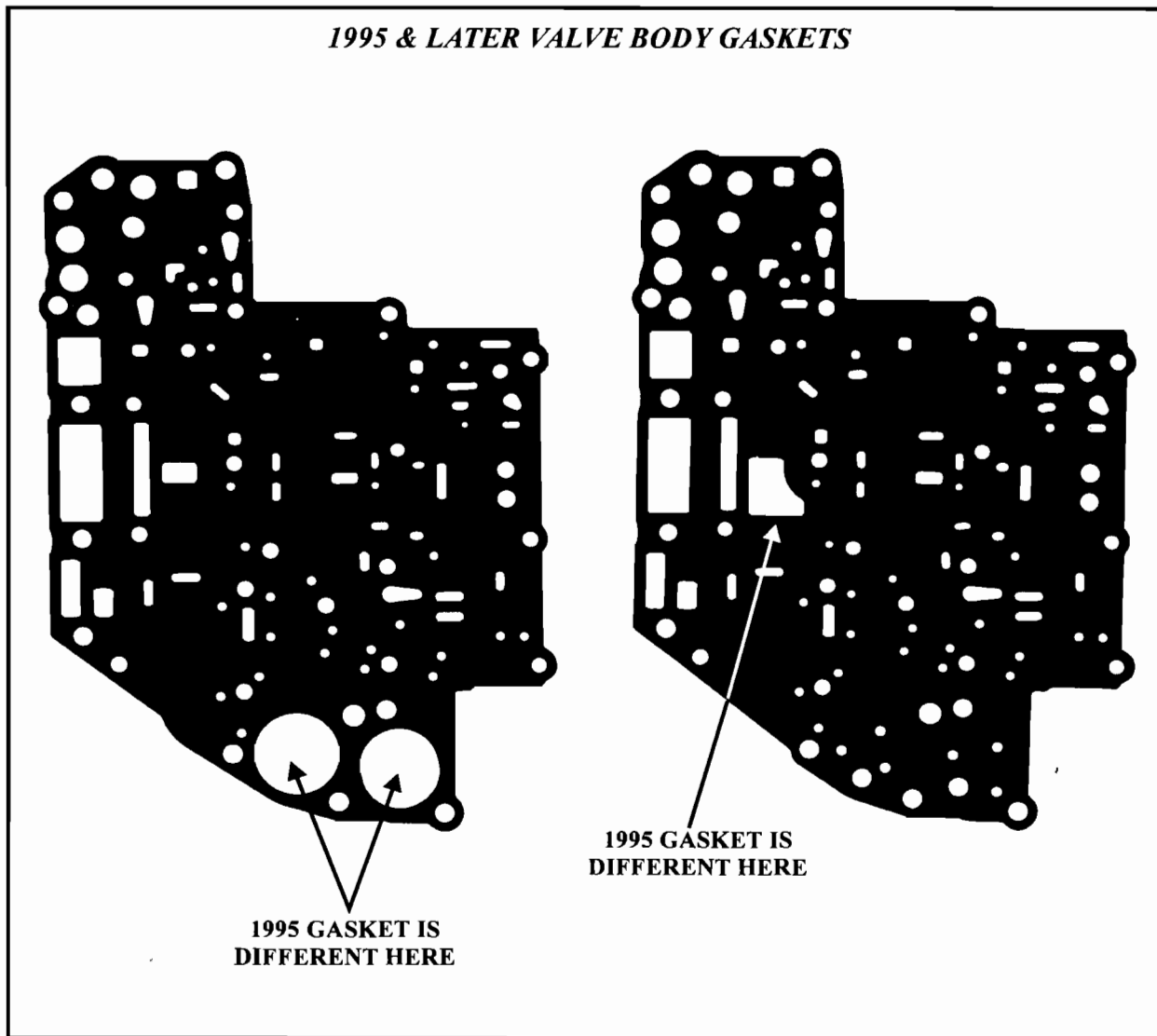


Figure 2



HONDA CIVIC CVT TRANSAXLE PRELIMINARY INFORMATION

BASIC OPERATION:

The **HONDA CIVIC** Continuously Variable Transmission (**CVT**) is a fully electronically controlled transmission which provides a reverse gear and various speeds forward with stepless gear change. Hydraulic operation is available in the event of an electronic control system failure.

The flywheel is of the dual mass type which absorbs shock and vibration through a combination of springs and viscous clutch chambers. Engagement is provided by a combination of friction clutch elements and steel belt driven moveable sheave pulleys and a planetary gearset. (Refer to Figure 1)

Electronic control is provided by Transmission Control Module, a variety of sensors and four solenoids. Hydraulic control is provided by a chain driven pump and a control valve body.

HYDRAULIC CONTROL:

The friction clutch elements consist of a **START CLUTCH**, which is a pulsed clutch, permitting engine idle without "creep" while allowing a controlled slip from a standing start and full apply to provide maximum power transferal during periods of torque demand.

The **FORWARD CLUTCH** locks the drive pulley to the input shaft in order to provide a mechanical link to the final drive for forward movement.

When the **REVERSE CLUTCH** is applied, the planetary gearset reverses the rotation of the drive pulley which causes the drive pulley to turn in the opposite direction of the input shaft providing backward movement.

A chain driven, high capacity, low friction **OIL PUMP** is used to provide the necessary 200 to 330 PSI of oil pressure needed to operate the opening and closing of the pulley sheaves. (Refer to Figures 2 and 3).

The **VALVE BODY** consists of the **MAIN** valve body, the **SECONDARY** valve body, the **PL REGULATOR** valve body, the **START CLUTCH CONTROL** valve body, the **SHIFT** valve body and the **MANUAL** valve body. These various valve body components contain the necessary valving and solenoids that provide the different gear and ratio changes.

ELECTRONIC CONTROL:

The electronic control system consists of the **TRANSMISSION CONTROL MODULE** and **FOUR SOLENOIDS**; the **SHIFT CONTROL LINEAR** solenoid, the **PH-PL LINEAR** solenoid, the **START CLUTCH LINEAR** solenoid and the **REVERSE INHIBITOR** solenoid. The system also contains **FOUR SPEED SENSORS** which input to the TCM the **DRIVEN PULLEY** speed, **DRIVE PULLEY** speed, **SECONDARY SHAFT** speed and **VEHICLE** speed. (Refer to Figures 4 and 5)

The system also utilizes **TPS** and **MAP** sensors as well as **ENGINE RPM**, **BRAKE SWITCH** input and **SELF DIAGNOSIS** capability. (Refer to Figures 6 and 7)

FAIL-SAFE OPERATION:

The **CVT** can be driven on hydraulics only, should the electronic control system fail. Under these conditions the **PITOT REGULATOR VALVE** is closed, blocking oil from the start clutch.

When engine rpm increases, the **PITOT FLANGE** forces oil into the **PITOT TUBE** (Refer to Figure 8) which allows oil to the start clutch, controlling pressure which is proportional to engine rpm.

HONDA CIVIC CVT TRANSAXLE

PRELIMINARY INFORMATION

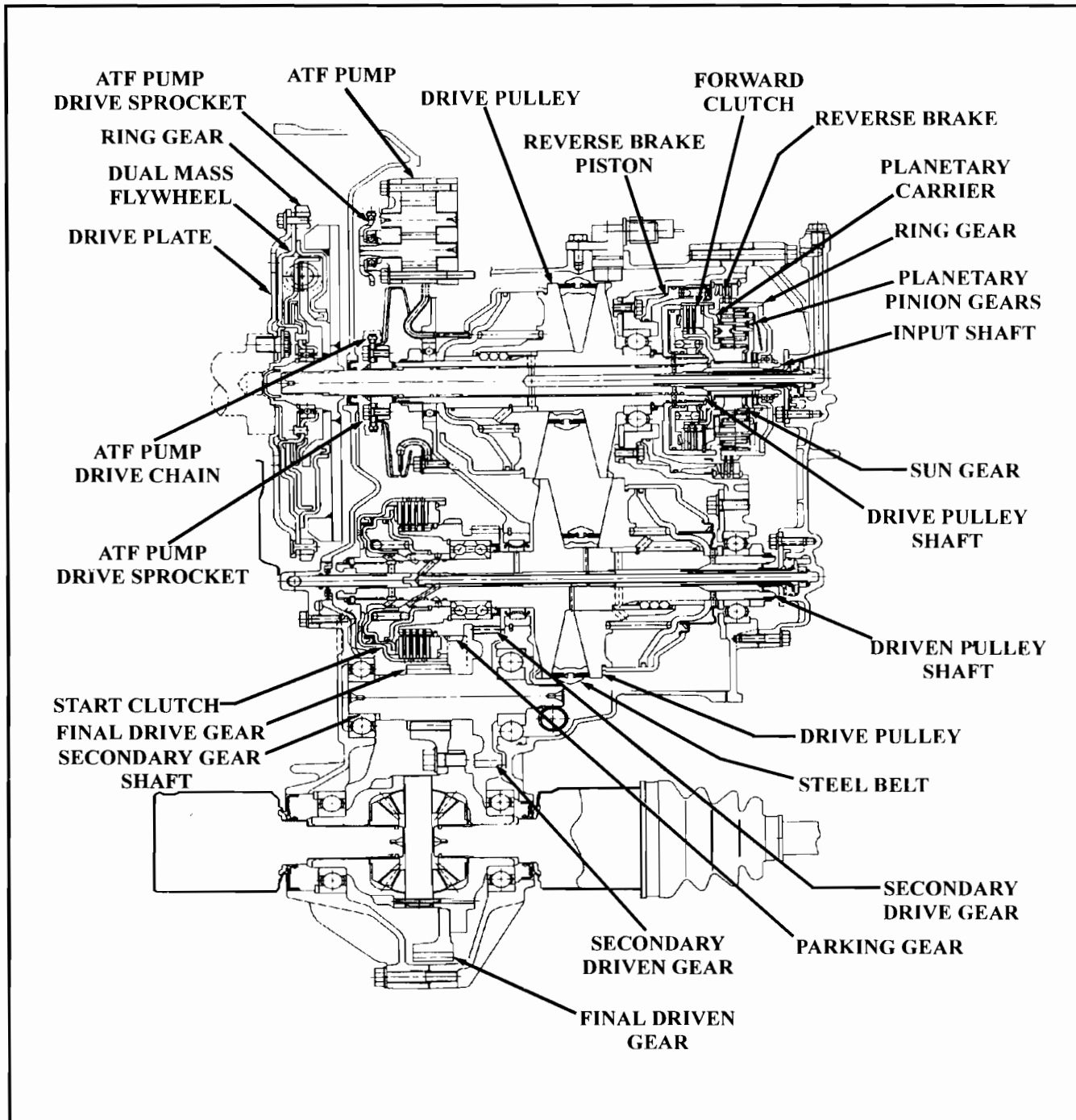


Figure 1

HONDA CIVIC CVT TRANSAXLE

PRELIMINARY INFORMATION

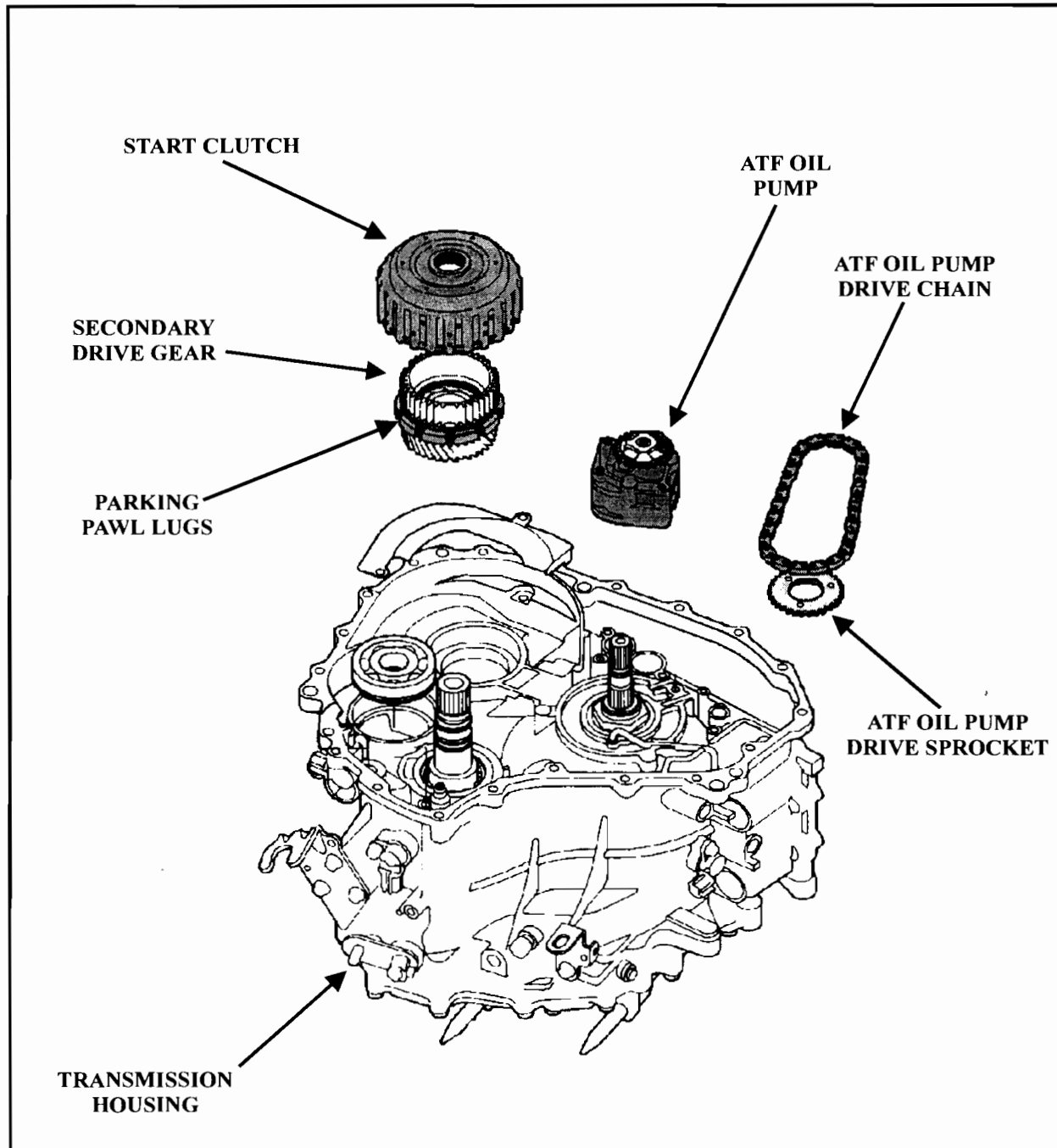


Figure 2

HONDA CIVIC CVT TRANSAXLE

PRELIMINARY INFORMATION

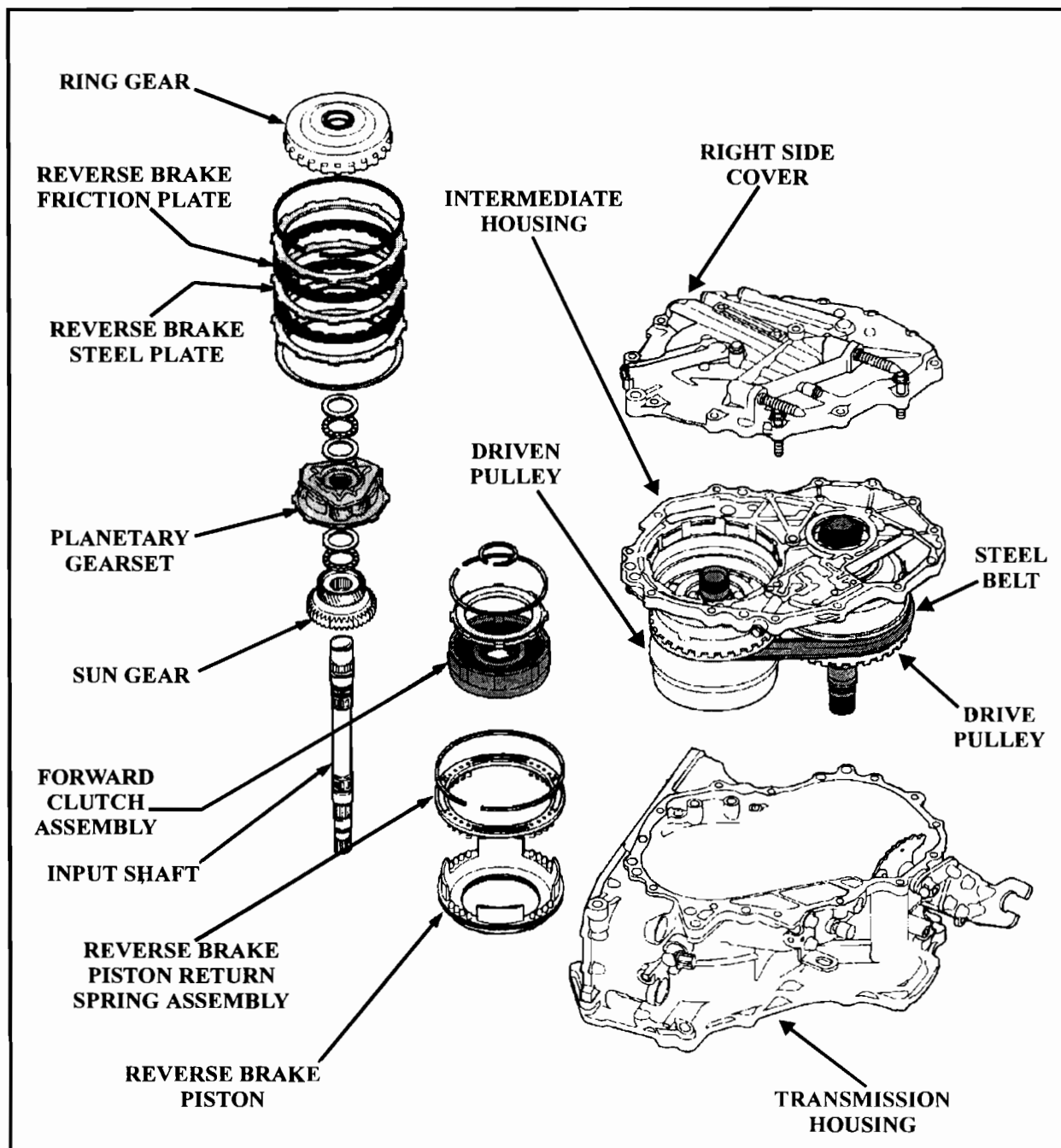


Figure 3

HONDA CIVIC CVT TRANSAXLE

PRELIMINARY INFORMATION

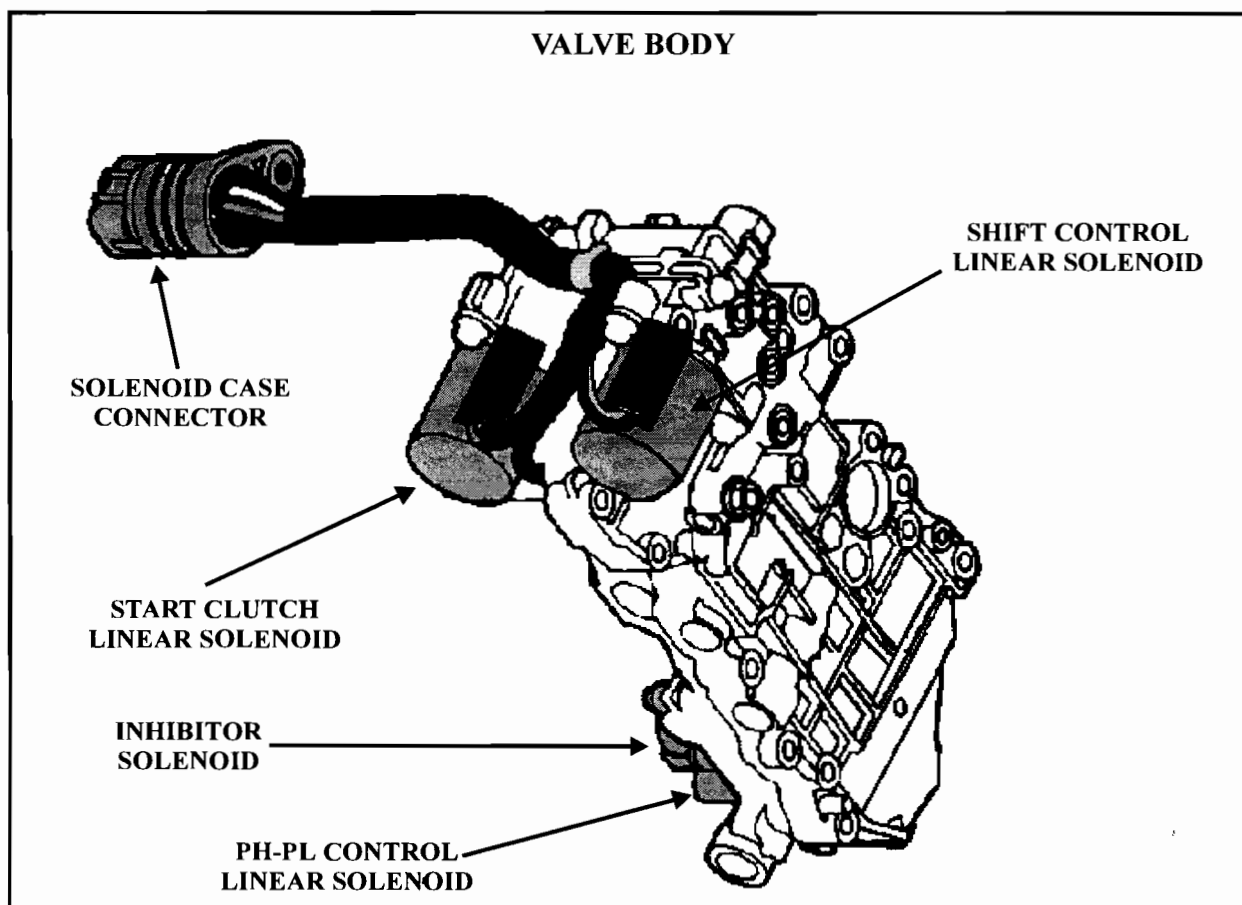


Figure 4

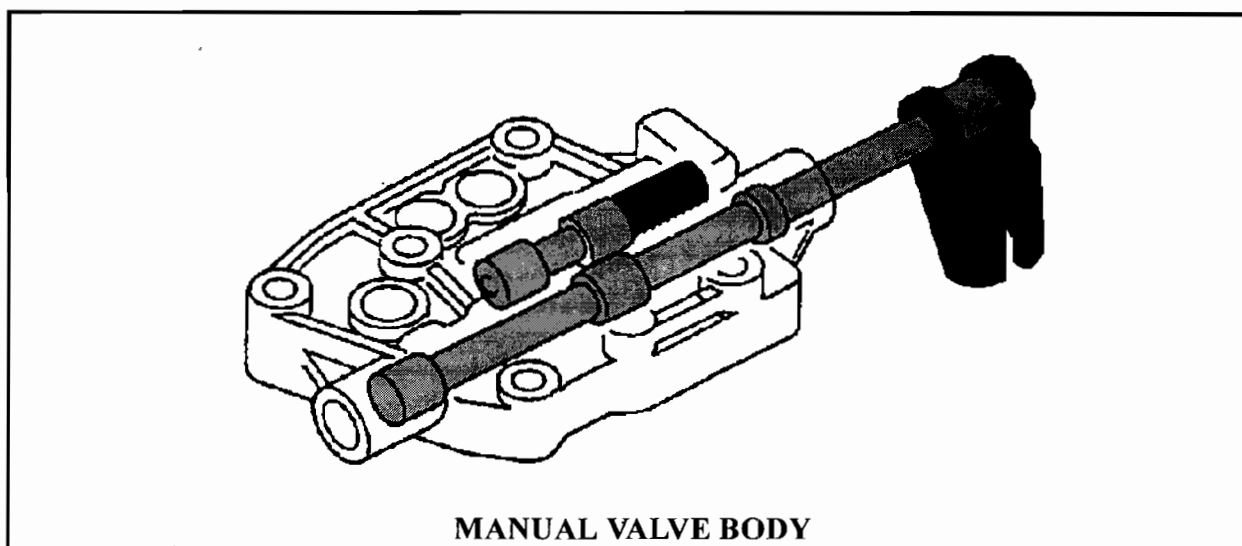


Figure 5

HONDA CIVIC CVT TRANSAXLE

PRELIMINARY INFORMATION

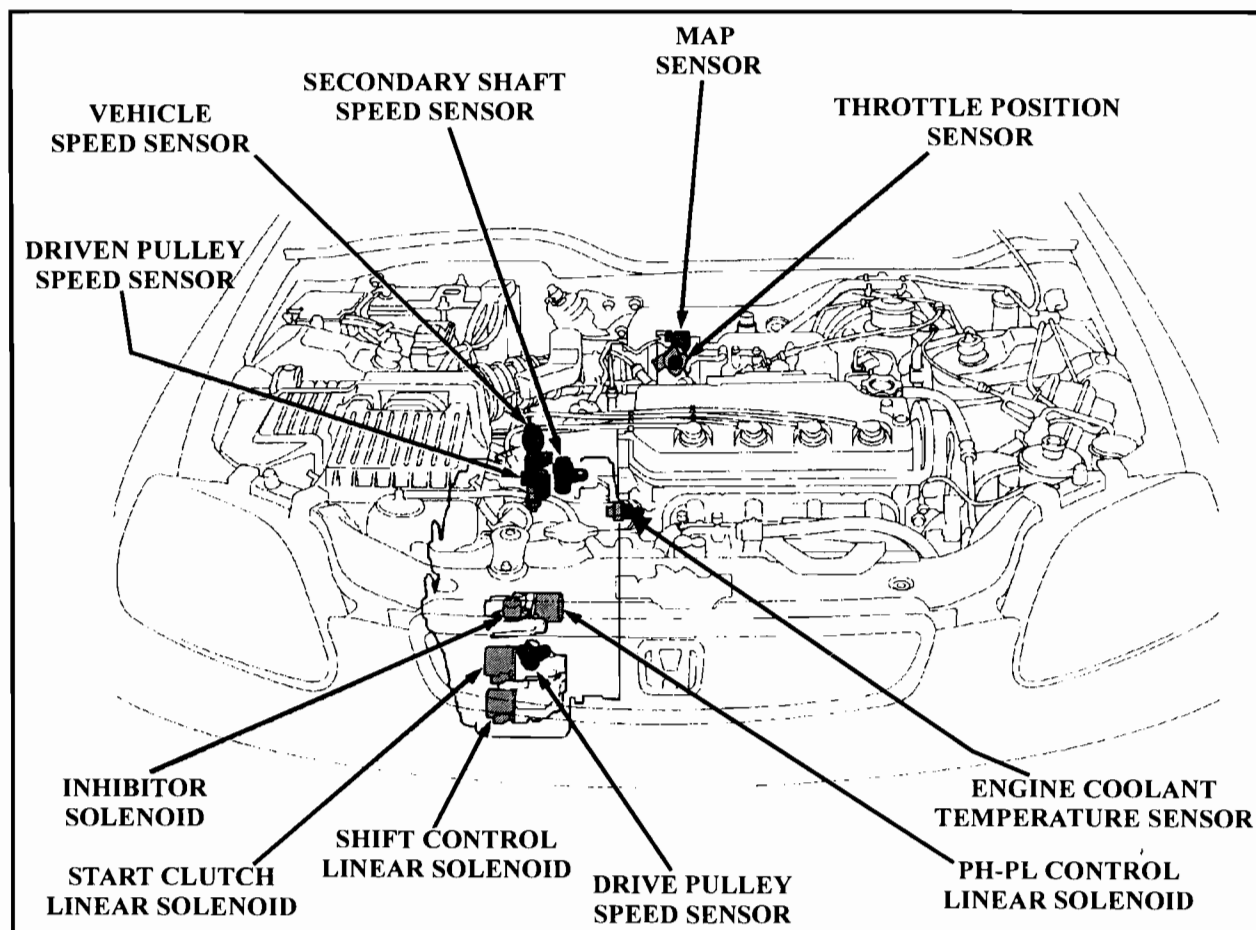


Figure 6

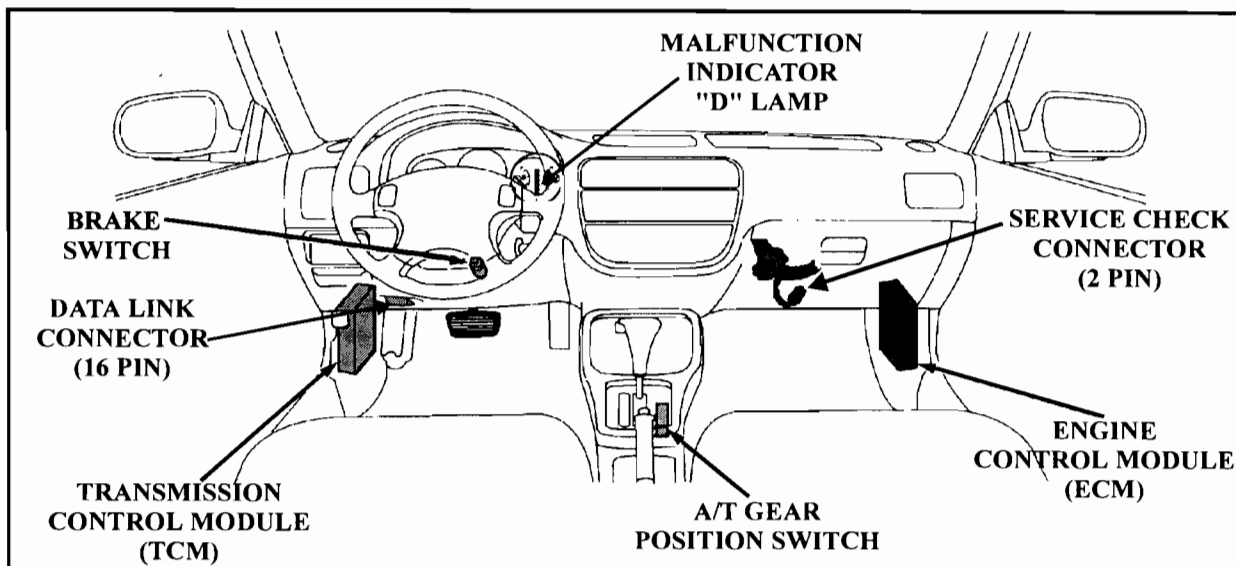


Figure 7

Automatic Transmission Service Group

HONDA CIVIC CVT TRANSAXLE

PRELIMINARY INFORMATION

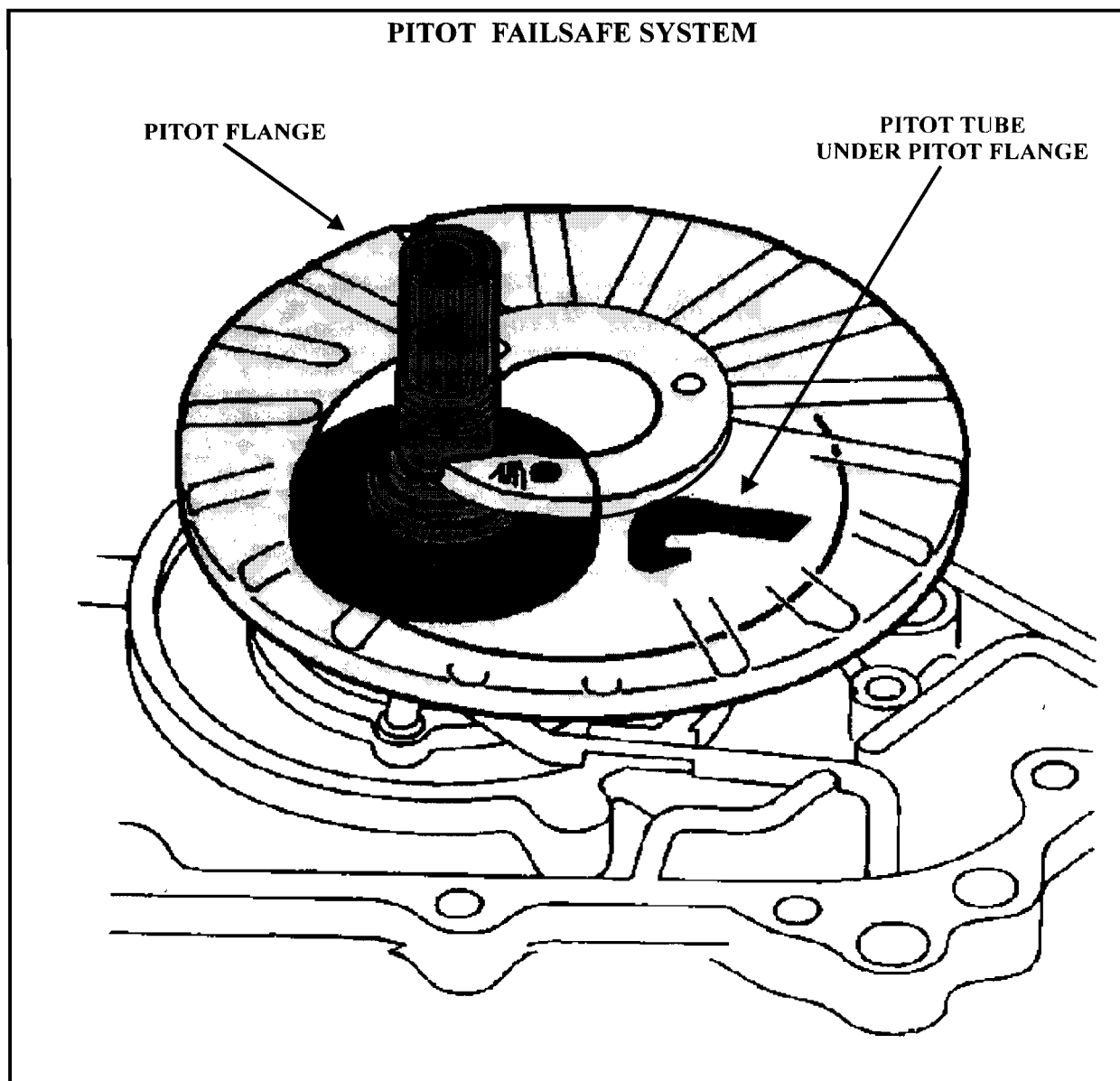
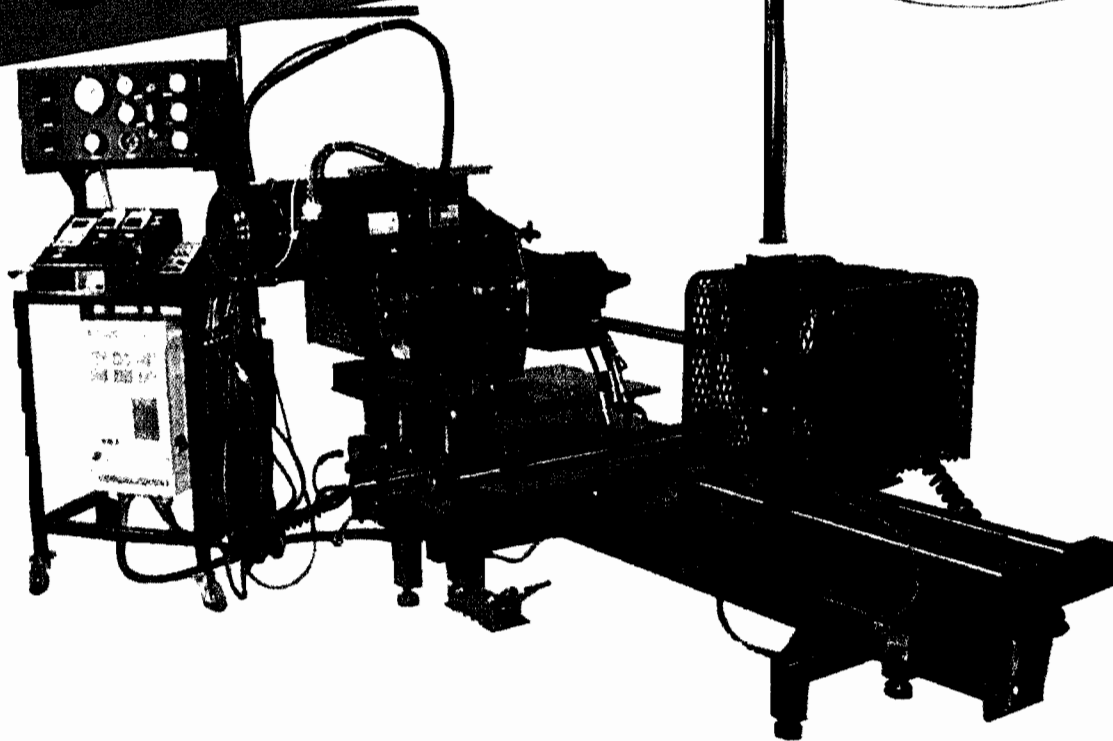


Figure 8

THE NEW GENERATION



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

Taking a step forward, we have developed the New Generation in automatic transmission testers. The electric drive, with variable electromagnetic loading, allows you to mount and test RWD and transverse FWDs and also longitudinal FWD, such as the 42LE (606) and ZF.

The variable electromagnetic loading is a unique way of using magnetic fields and spinning rotors to create variable loading on the transmission output. It eliminates the need of brake pads and the concern of brake dust. Also the unit, being friction free, does not create heat build-up in the rotors or flywheel, which can create brake fade. The magnetic loading is very reliable and repeatable.

The reversing of rotation on the electric drive, accompanied with the CROSS SLIDE, allows mounting and testing left hand and clockwise units such as Hondas and left hand counterclockwise units such as Mitsubishi.

You can now mount and test all these unit configurations on one frame for your convenience using a minimal amount of floor space.

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

New Patents Pending and Applied For

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HONDA/ACURA HARSH SHIFT COMPLAINTS

COMPLAINT: Harsh upshift, especially the 1-2 shift, and/or harsh garage shifts.

CAUSE: The bottom steel plate in each clutch pack will have a groove cut into it by the dished belleville spring on top of the clutch piston, which will increase clutch clearance or cause the belleville spring to get caught in groove worn into the bottom steel plate, resulting in the harsh shift complaint. (Refer to Figure 1)
The groove worn into the steel plate may as deep as .013" which will result in a failure to FULLY COMPRESS the belleville spring causing the spring to not fully cushion the clutch pack on the shift.

CORRECTION: A new **WAVED** cushion spring, available from ALTO PRODUCTS, will avoid the above mentioned problems thereby preventing this particular cause of harsh shift complaints. (Refer to Figure 2)

NOTE: Availability at this time is limited to transaxles that use 116mm frictions only. The following units use 116mm frictions: F4; K4; PY8A; MY8A; G4; L5; PL5X; P1; RO; MPRA; MPWA; MP7A.

SERVICE INFORMATION:

Waved Cushion Spring.....Alto Part # 58767A

HONDA/ACURA HARSH SHIFT COMPLAINTS

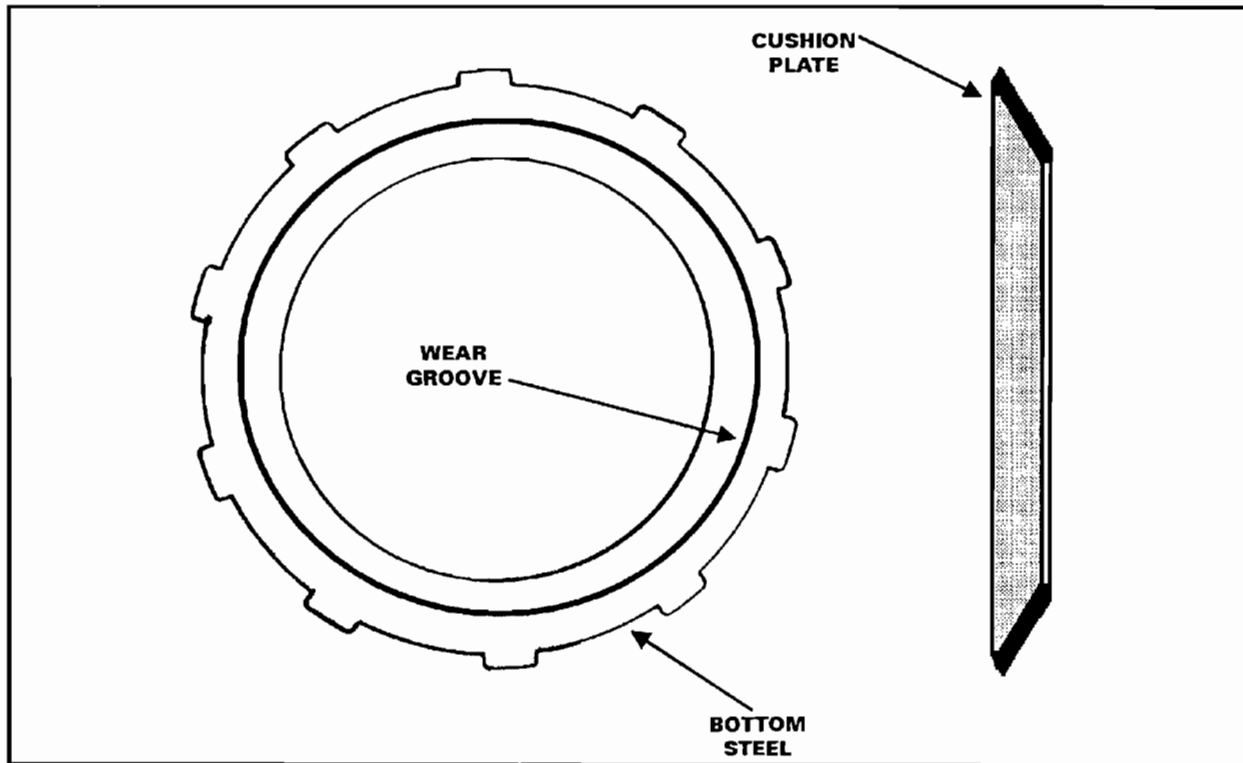


Figure 1

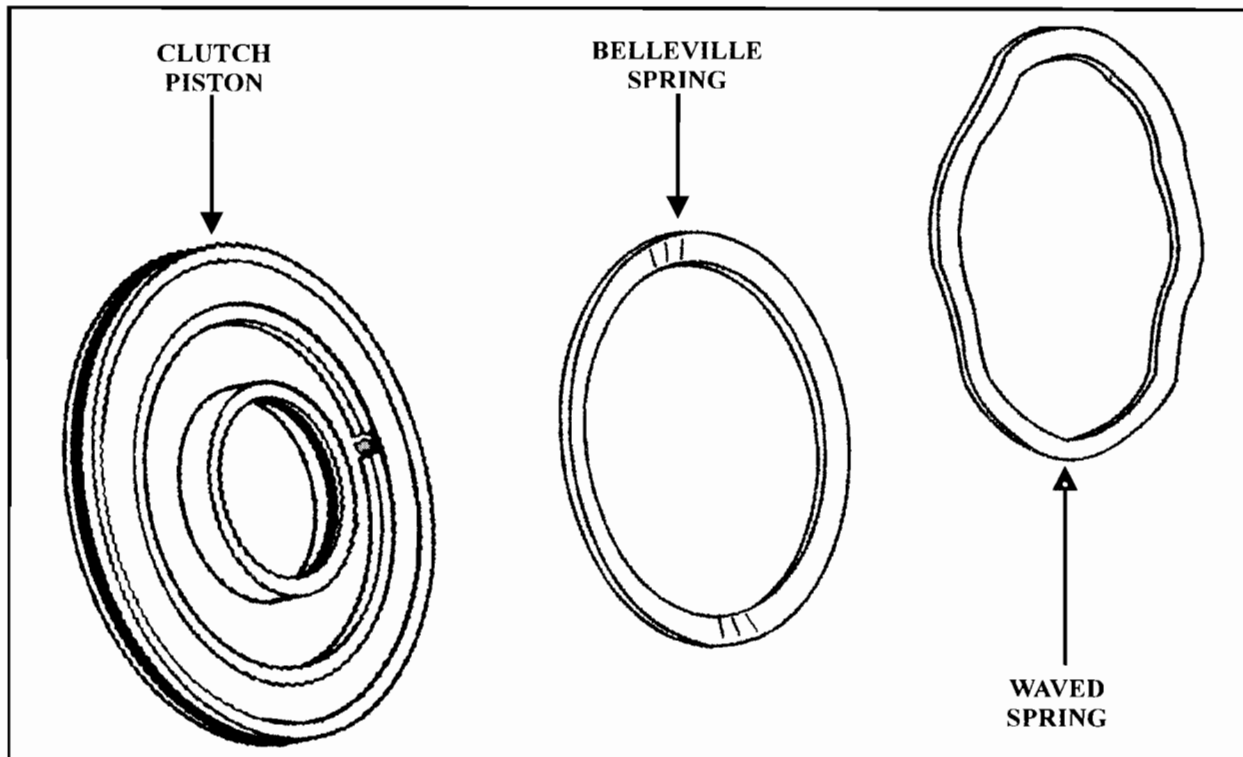


Figure 2



HONDA/ACURA

FEED TUBE BUSHING REPLACEMENT

COMPLAINT: Unexplainable clutch chatter and/or premature clutch failure. Transaxle may also not want to move in reverse or take off in low gear, but will take off in manual second.

CAUSE: The cause may be worn or missing feed tube bushings that are located down in the center of the main, counter and secondary shafts. (Refer to Figure 1)

CORRECTION: These bushing can be replaced with new bushings, but, this can be a difficult operation due to the difficulty in removing the old bushings and being certain that the new bushings are not damaged during installation and that they are installed at the ***CORRECT HEIGHT*** so that none of the lube holes in the shafts are blocked.

A new tool has been produced by Recon Parts Corp. that will make this job much easier to remove and install new feed tube bushings. (Refer to Figure 2)

TECH TIP: Wrap the bottom of the feed tube once around with cellophane tape. (Do not overlap the ends of the tape)
Insert the selected feed tube into the appropriate shaft, if the tape is not cleanly scraped off by the feed tube bushing, the bushing requires replacement.

SERVICE INFORMATION:

Feed Tube Remover/Installer.....Recon Part # T-1925

HONDA/ACURA FEED TUBE BUSHING REPLACEMENT

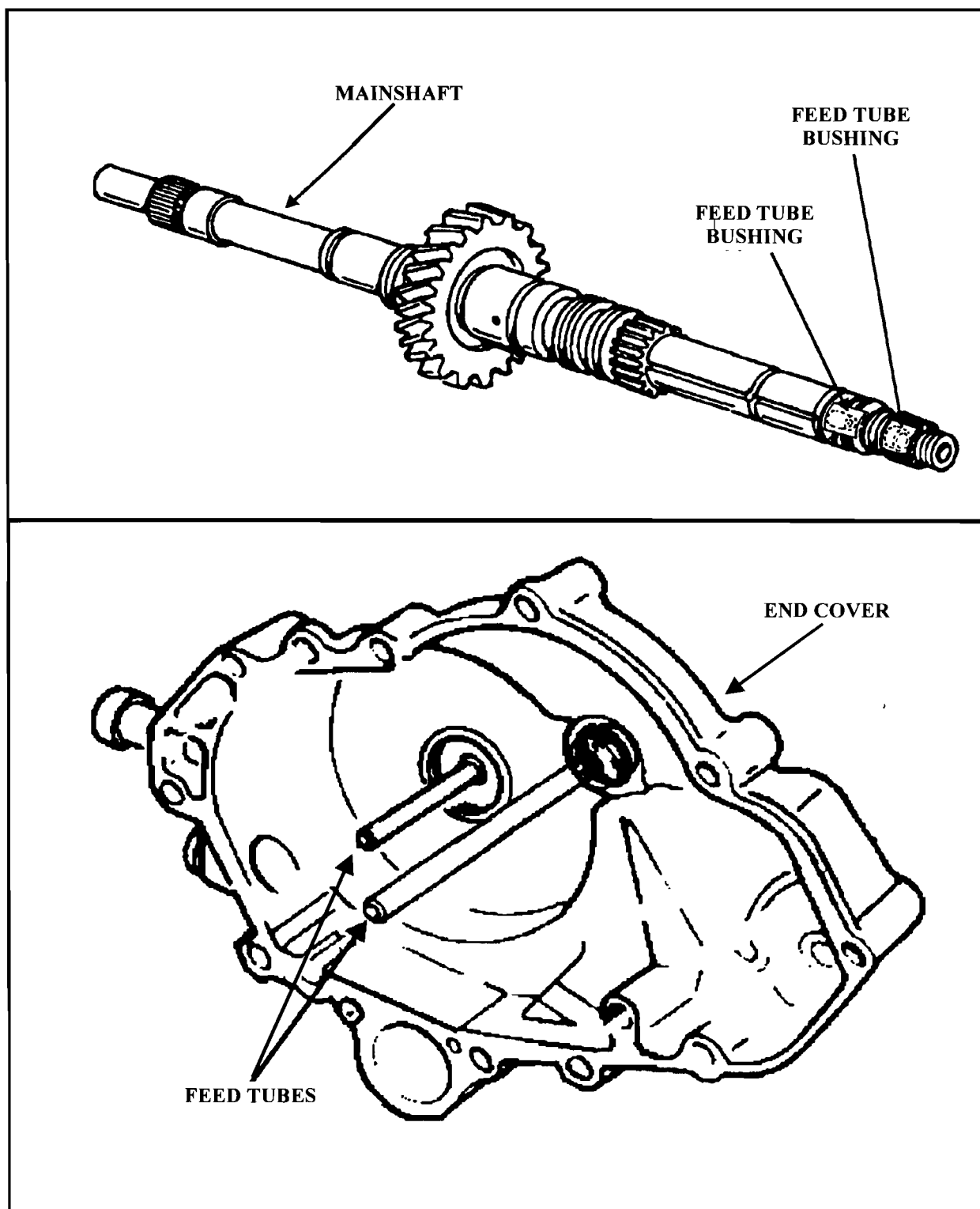


Figure 1

HONDA/ACURA FEED TUBE BUSHING REPLACEMENT

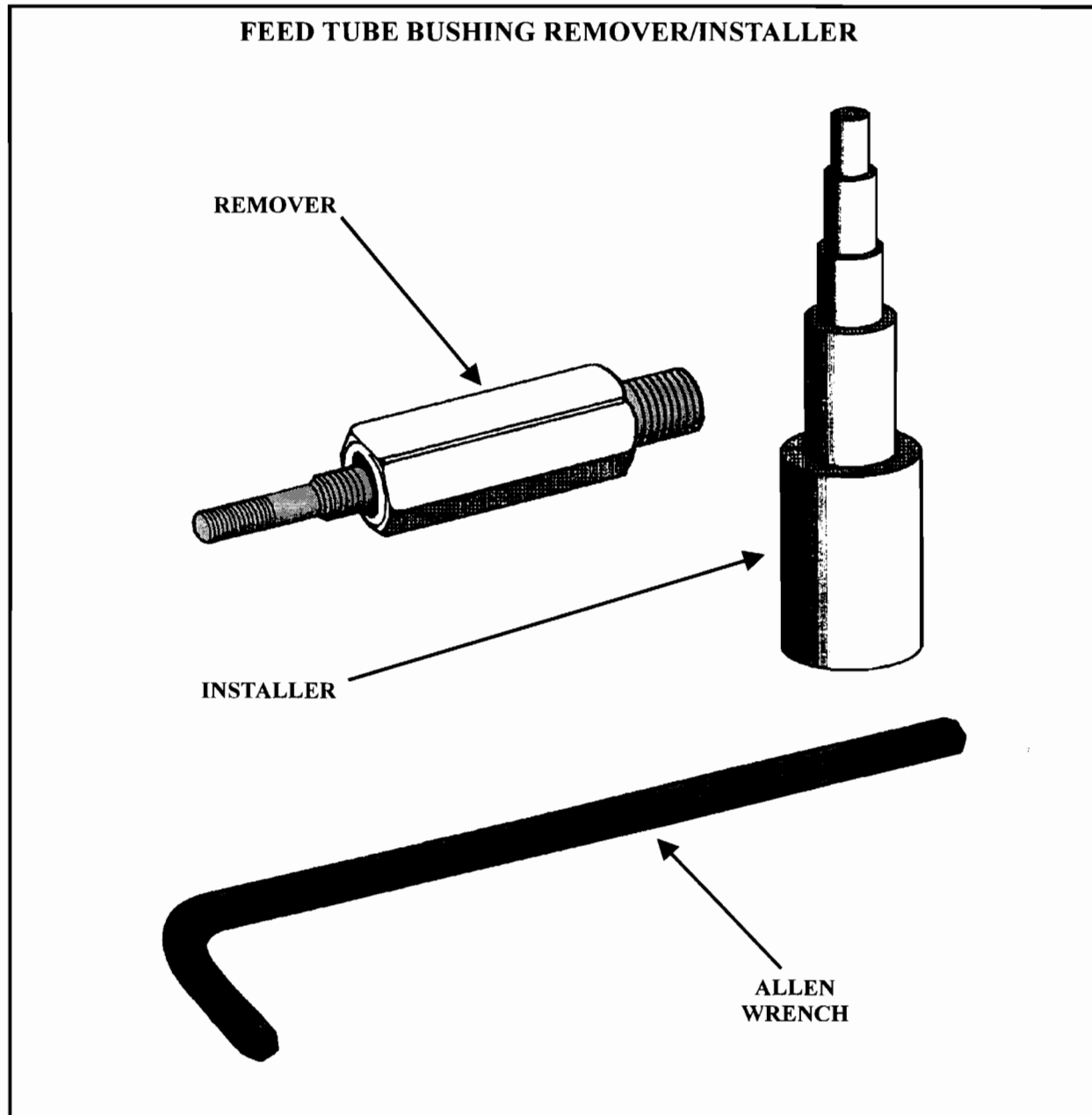


Figure 2

MAZDA

"HOLD MODE" OPERATION

There are currently "Two" "Hold Mode" upshift strategies. The "First Design" which includes 1988-1993 vehicles equipped with R4A-EL, N4A-EL, G4A-EL and GF4A-EL. The "Second Design" includes vehicles equipped with F4A-EL and G4AX-EL (All Wheel Drive). Refer to Figure 1 for transmission to vehicle application guide, and Figure 2 for 1st and 2nd design upshift strategie charts.

1st DESIGN TRANSMISSION TO VEHICLE APPLICATION	
G4A-EL	88-93 626& MX6
GF4A-EL	93-96 (2.5V6) 626& MX6, 95-96 (2.5V6) MILLENIA
N4A-EL	88-91 929, 89-92 RX7
R4A-EL	(3.0V6) MPV, 90-93 (2.6L4) PICKUP, 92-95 929, 93-96 RX7
R4AX-EL	90-93 (2.6L4) PICKUP 4WD, (3.0V6) MPV 4WD

NOTE: 87 Models are equipped with O.D. Cancel .

2nd DESIGN TRANSMISSION TO VEHICLE APPLICATION	
F4A-EL	323 & PROTEGE
G4AX-EL	323 AWD

Figure 1

1st DESIGN UPSHIFT STRATEGY

RANGE	HOLD	GEARS OBTAINABLE
D	OFF	1st, 2nd, 3rd, 4th
S	OFF	1st, 2nd, 3rd
L	OFF	1st, 2nd
D	ON	2nd, 3rd
S	ON	2nd
L	ON	1st

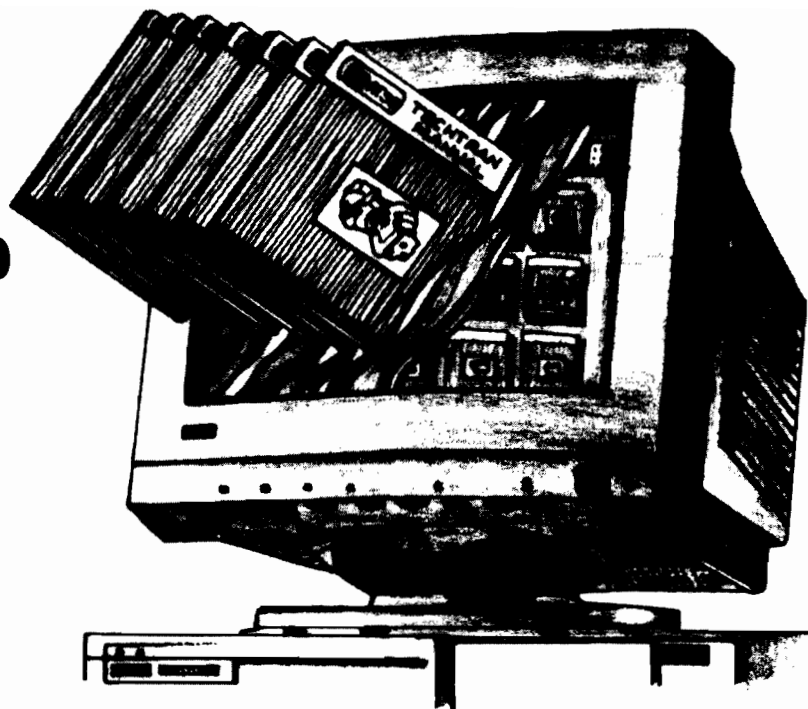
1st DESIGN UPSHIFT STRATEGY

RANGE	HOLD	GEARS OBTAINABLE
D	OFF	1st, 2nd, 3rd, 4th
S	OFF	1st, 2nd, 3rd
L	OFF	1st, 2nd
D	ON	1st, 2nd, 3rd
S	ON	2nd
L	ON	1st

NOTE: There are NO upshifts or "Full Throttle" downshifts, for 1st or 2nd Design, other than what has been listed above.

Figure 2

Another First ...



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DOMESTIC TRANSMISSIONS

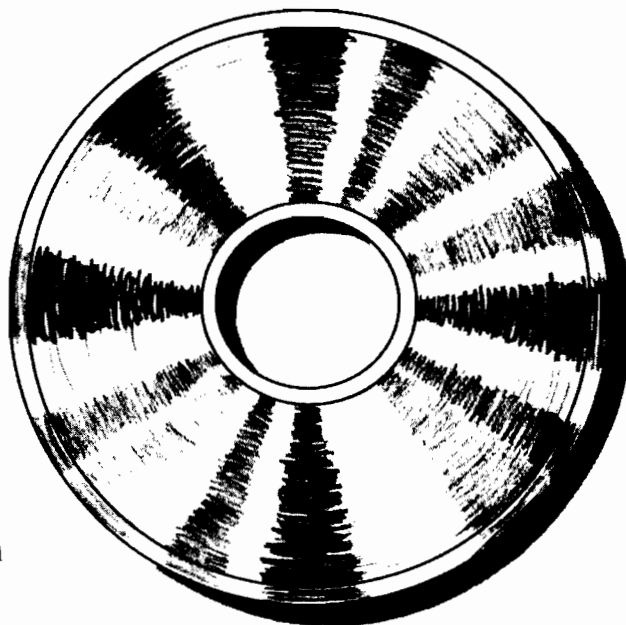
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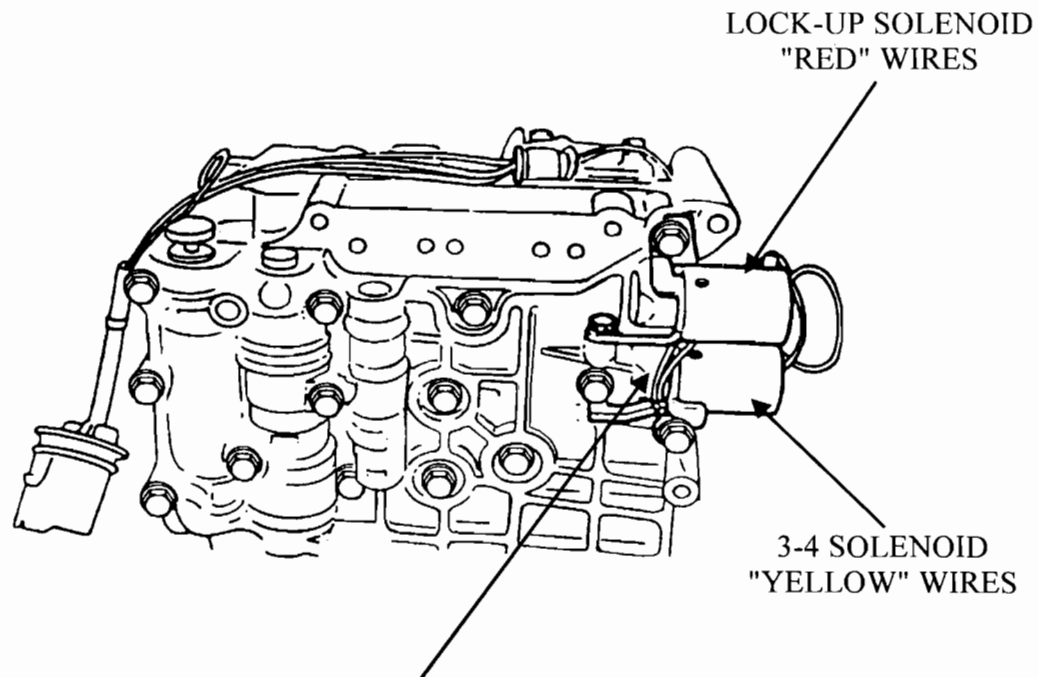
**MAZDA/FORD
G4A-EL
3RD GEAR SHIFT SHUTTLE**

COMPLAINT: Vehicles equipped with G4A-EL transmissions may exhibit a hunting sensation or shift shuttle, between the speeds of 25-35 mph. This sensation normally happens, while in 3rd gear, right before the 3-4 shift.

CAUSE: The cause may be, the 3-4 shift solenoid is partially stuck open, the 3-4 shift solenoid "O-ring" is damaged or the 3-4 shift valve bore plug is leaking. This may cause the 3-4 shift valve to **block** Coast Clutch apply oil and to exhaust Servo Release oil. Computer strategy, while in 3rd gear under 25MPH., commands the 1-2 solenoid **off** which in turn **blocks** Servo apply oil. At speeds above 25MPH., while in 3rd gear, computer strategy commands the 1-2 solenoid to be **on** which turns **on** Servo apply pressure in preparation for the upshift to 4th gear. When 1-2 solenoid application occurs, while in 3rd gear above 25 MPH., drum speed or pulse generator output may drop because of the lack of Servo Release oil. When the computer recognizes that Pulse Generator input or drum speed has dropped it may turn the 1-2 solenoid **off**. This on and off cycling of the 1-2 solenoid may continue until the upshift to 4th occurs.

CORRECTION: Refer to Figure 1 to identify the 3-4 shift solenoid placement and to check its mechanical function. Apply air pressure to the end of the solenoid as shown in Figure 1 to ensure that the 3-4 shift solenoid is closed and check the O-ring for damage. With the 3-4 solenoid removed, air check the 3-4 shift valve through the hole where the 3-4 solenoid is placed and ensure that there is no air leakage from the bore plug. Refer to Figure 2 for 3-4 shift valve and bore plug location.

3-4 SOLENOID LOCATION



APPLY AIR PRESSURE HERE, WITH THE 3-4 SOLENOID REMOVED,
TO CHECK THE 3-4 SHIFT VALVE BORE PLUG FOR LEAKS

3-4 SHIFT SOLENOID MECHANICAL FUNCTION

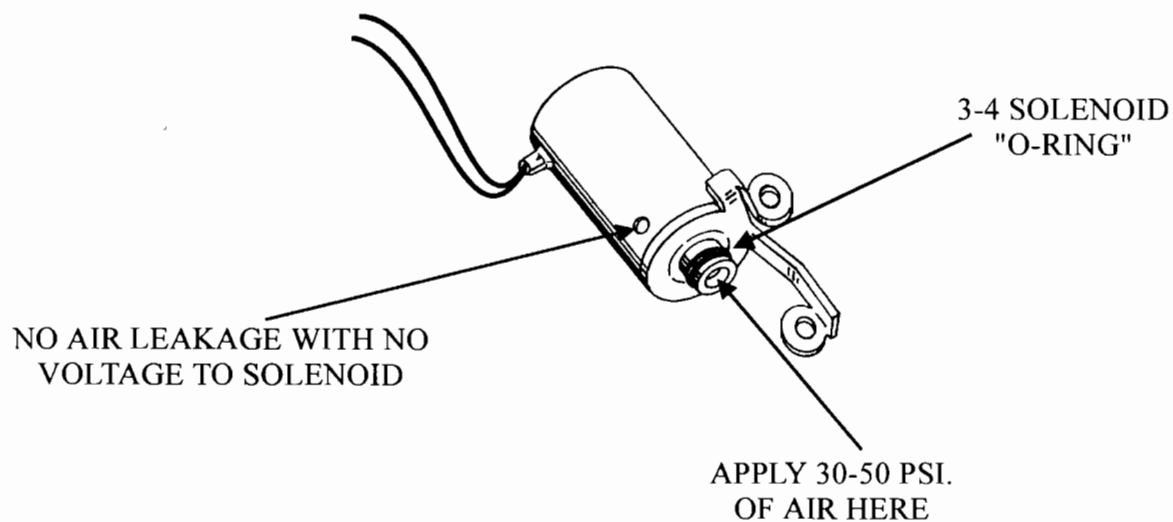


Figure 1

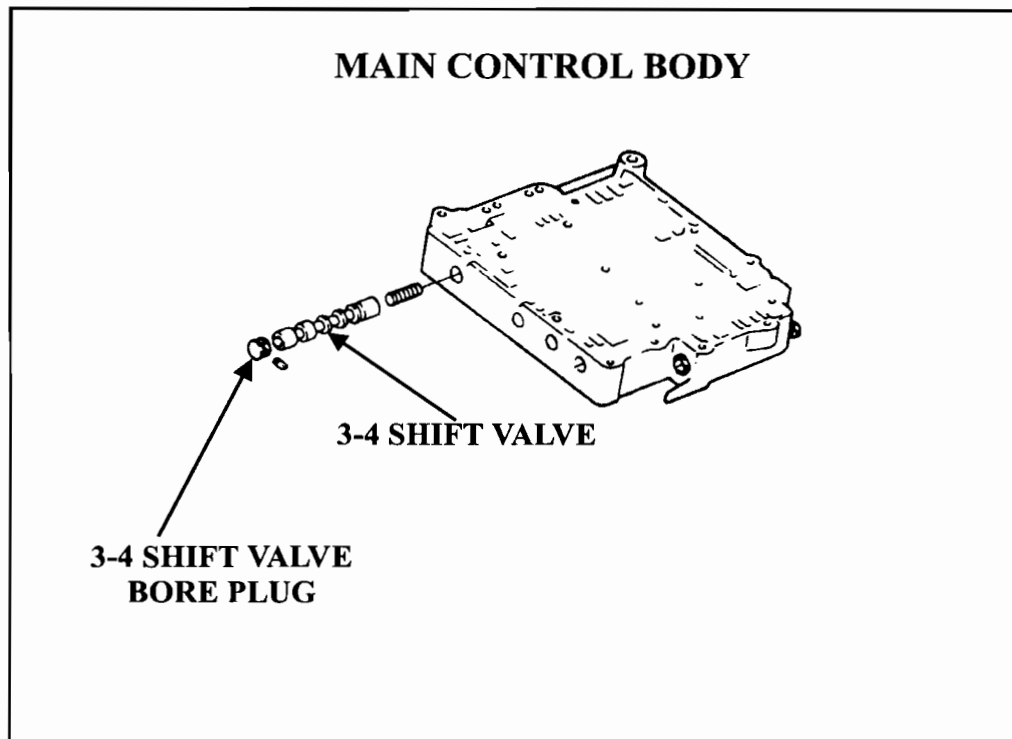


Figure 2

**MAZDA / FORD
G4A-EL / F4EAT
STALLS IN DRIVE ONLY**

COMPLAINT: Before or after overhaul, vehicle exhibits engine stall in the Drive range selection *only*.
Although this may appear as a "Lock-up" problem it may be "Engine" related.

CAUSE: The cause may be a cracked "Air Cleaner To Intake Manifold Tube" allowing cold air to rush into the "Throttle Body" and "Mass Air Flow Sensor" causing the engine to stumble and die. This normally happens only in the Drive position because when Drive is selected the engine and transmission shift towards the firewall, stretching the tube apart. When Reverse is selected the engine and transmission are shifted away from the firewall, sealing up the cracks in the tube.

CORRECTION: Remove the "Air Cleaner To Intake Manifold Tube," located between the throttle body and the air cleaner box, and inspect for cracks as shown in Figure 1. If cracks are found, duct tape can be used as a temporary fix until the tube can be replaced. Secure hose clamps and make sure that all engine and transmission mounts are good.

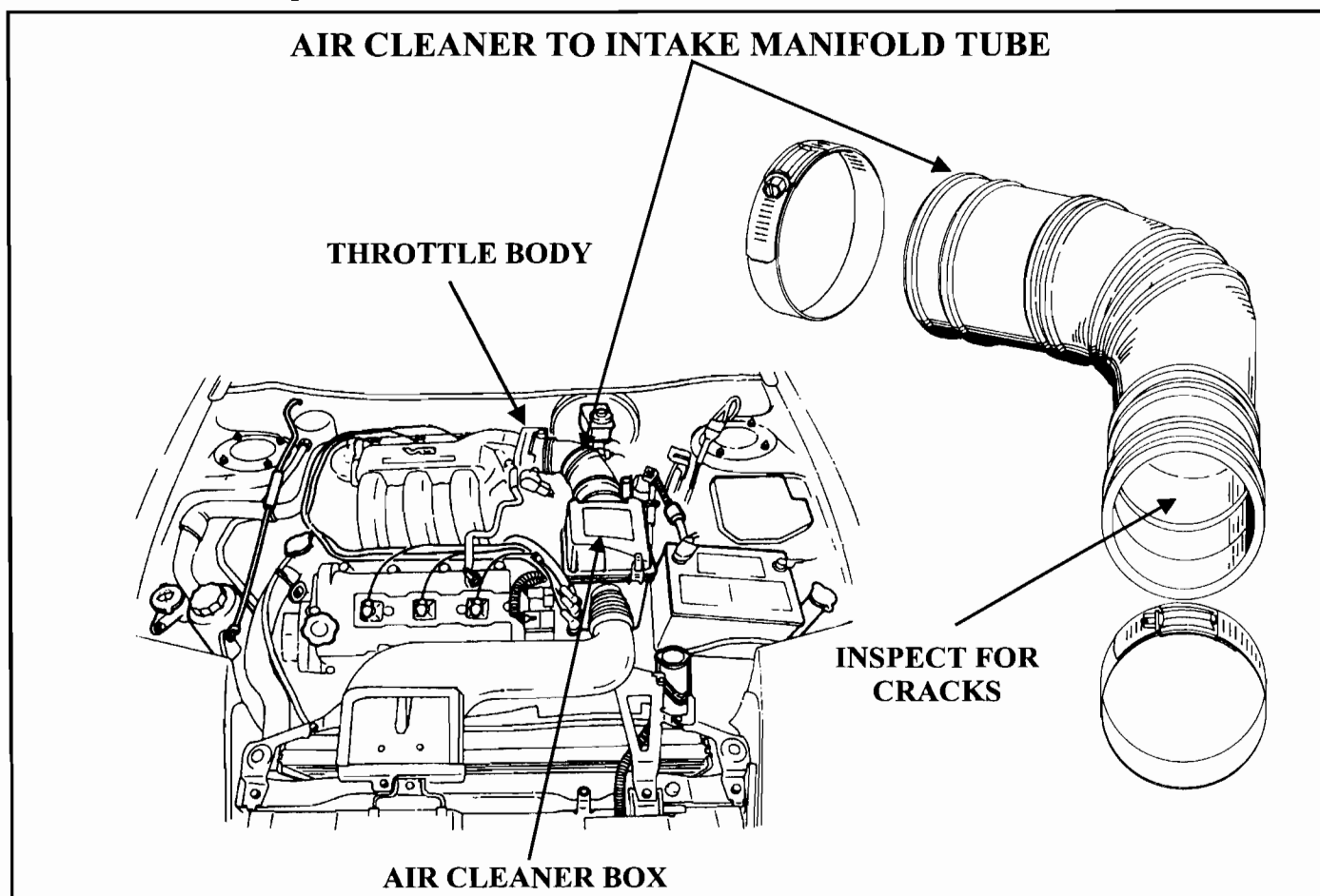


Figure 1



MAZDA/FORD F4AEL/F4EAT SHIFTS 1-3 IN "D"

COMPLAINT: The vehicle exhibits a 1-3 upshift, or a slipping condition in 2nd and 4th gear, when driving with the selector lever in the "D" position.

CAUSE: The cause may be, *any one of the following*:

A. Hydraulic/Mechanical

1. A "Clogged" 1-2 shift solenoid.
2. A stuck 1-2 shift valve in the valve body.
3. A mis-located checkball in the premain section of the valve body.
4. The 1-2 shift solenoid wire connected to the lock-up solenoid.
5. A "Clogged" 2-4 servo feed orifice, located in the case.
6. A worn 2-4 servo cover and/or servo piston.
7. A defective or burnt band.

B. Electrical

1. A 1-2 shift solenoid circuit error (Trouble Code 60), preventing band application, or a 3-4 shift solenoid circuit error (Trouble Code 62), which may electronically prevent the 1-2 shift solenoid to activate.

QUALIFICATION:

Install a pressure gage on the 2-4 servo apply port and the line pressure port, as shown in Figure 1. "Back-Probe" into the 1-2 solenoid wire, as shown in Figure 2, with the *positive* lead of your volt meter. Place the *negative* lead of your volt meter to the case or a know good body ground. Run the vehicle on the lift up to approximately 45 mph, while watching the volt meter and the 2-4 pressure gage. If the volt meter rises from 0 to 12 volts at the time the 1-2 or 3-4 shift should occur, and the pressure gage stays at 0 psi, or does not match line pressure (Within 10 PSI), refer to Correction A, Hydraulic/Mechanical which are the most likely possibilities.

If the volt meter and the 2-4 pressure gage both stay at 0 psi at all times, then refer to Correction B, Electrical which are the most likely possibilities. If the volt meter rises to 12 volts and the 2-4 pressure gage matches line pressure, replace the band.

CORRECTION "A", HYDRAULIC/MECHANICAL

1. Refer to Figure 3 to identify, and check the 1-2 shift solenoid for the proper resistance value and mechanical operation. All of the solenoids are "Normally Closed". When 12 volts is applied to the solenoids, they should open to exhaust.

Note: It may be necessary to compare the amount of air exhausting while you have the 12 volts applied, to the amount of air you are using as input, to ensure that you do not have a solenoid that is partially clogged.

Continued on next Page



CORRECTION A, HYDRAULIC/MECHANICAL (Continued)

2. Inspect the 1-2 shift valve, shown in Figure 4, for freedom of movement in the bore. After the valve body is reassembled, air check the 1-2 shift valve from the 1-2 shift solenoid bore and listen for the shift valve snapping back and forth in its bore when the air pressure is turned on and off.
3. Ensure that there are only two checkballs in the "Main" valve body, and that they are in their proper locations, as shown in Figure 5.
4. Ensure that the solenoids are in their proper locations and the internal wire color to the solenoids using the chart in Figure 3.
5. Air check the servo through the 2-4 servo apply passage, as shown in Figure 6. If the servo cannot be applied, or is slow to apply, remove the 2-4 servo orifice assembly from the case, using a 10mm "Hex" socket, thoroughly clean and reassemble. (See Figure 6).
6. Inspect the 2-4 servo piston, seals, and the servo cap bore where the piston rides for damage and/or scoring. Replace parts as necessary.
7. Replace the 2-4 band assembly, and inspect the surface of the Sun Gear Drum where the band rides, for any damage or wear. Replace as necessary.

CORRECTION B, ELECTRICAL:

Troubleshooting a 1-2 or 3-4 Shift Solenoid circuit error:

1. While checking for trouble codes, give extra attention to the length of the needle sweep if you are using a volt meter, or the length of the flash if you are watching the "Hold" light. Trouble Code "6", vehicle speed sensor, can be easily confused with Trouble Code "60", 1-2 shift solenoid circuit error. Refer to Figure 7 for trouble code identification.
2. Disconnect and clean both the 12 pin and 6 pin connectors that are shown in Figure 2.
3. Disconnect the battery for 30 seconds to clear the computers memory, and retest for any trouble codes that may be present.
4. If trouble code re-appears, disconnect the 12 pin female harness connector, shown in Figure 2, and check for 13-27 ohms resistance between terminal 5 and ground (for 1-2 shift solenoid), or terminal 6 and ground (for 3-4 shift solenoid). If 13-27 ohms resistance is seen, go to step 6. If 13-27 ohms resistance is not seen, go to step 5.
5. Disconnect the 6 pin connector and check for 13-27 ohms resistance between terminal 3, of the case (Male) connector and ground (for 1-2 shift solenoid), or terminal 5, of the case (Male) connector and ground (for 3-4 shift solenoid). Refer to Figure 2. If 13-27 ohms resistance is not seen, remove the pan and check connections and the wiring to the solenoid and the solenoid location itself (See Figure 3). If 13-27 ohms resistance is seen, the wiring or connections between the 6 pin and the 12 pin connector may be faulty.

Continued on next Page



CORRECTION B, ELECTRICAL: (Continued)

6. Locate the computer connector pin for the 1-2 and/or 3-4 shift solenoid and check for 13-27 ohms resistance between that pin and ground. If 13-27 ohms resistance is seen, the problem may exist in the solenoid driver inside the computer.

Before replacing the computer, let's go one step further for some "Cheap Insurance". Apply 12 volts to the solenoid, using a jumper wire with a 5 amp fuse from the vehicle fuse panel (See Figure 8). Using a DVOM, set to mA/A, measure the amperage draw of the solenoid in question (See Figure 8). We know that the solenoids on this transmission operate with a 12 volt signal, and we know that the resistance of the solenoid we are testing is 16 ohms. With a simple math equation we can know what the amperage draw of the solenoid *should* be.

Example: $12 \text{ volts} \div 16 \text{ ohms} = .75 \text{ amps}$. This simple test can also be done from the 12 pin or 6 pin connectors if necessary. If the 5 amp fuse blows or the amperage draw did not work, the wiring or connectors may be at fault. If necessary run a new wire and retest. If the amperage draw is correct, replace the computer.

SERVICE INFORMATION: (Mazda Part Numbers)

1-2 Shift Solenoid (Type 1)	FU62-21-285
1-2 Shift Solenoid (Type 2)	FU61-21-285B
2-3 & 3-4 Shift Solenoid (Sold as Set Type 3)	FU62-21-280A
2-3 & 3-4 Shift Solenoid (Sold as Set Type 3)	FU61-21-280C
Lock-Up Solenoid	FU01-21-243C

SPECIAL NOTE:

There are three different manufacturers for these solenoids as listed below.

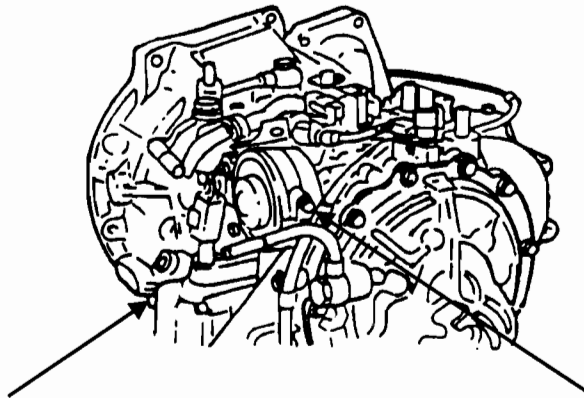
Type 1 = Manufactured by Mitsubishi

Type 2 = Manufactured by NOK

Type 3 = Manufactured by Fujikoshi

The case of the solenoid will reflect the manufacturer. Even though there are different manufacturers which carry different part numbers, they will interchange with no problems, within the solenoid group you are ordering.

PRESSURE PORT LOCATIONS



LINE PRESSURE PORT
"L" STAMPED IN CASE

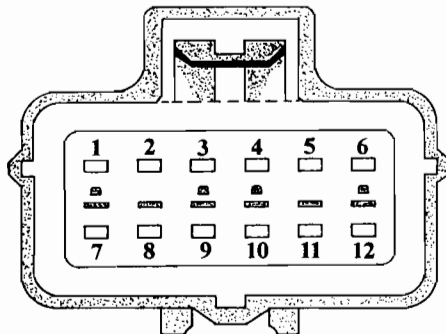
2-4 SERVO APPLY PORT

NOTE: LINE PRESSURE IS NORMALLY 60PSI. AT IDLE AND 150 PSI. AT STALL

Figure 1

CONNECTORS

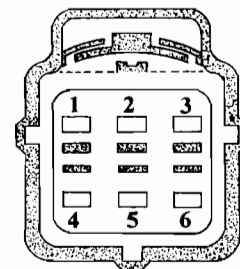
12 PIN (FEMALE)



PIN 5 = 1-2 SOLENOID RED/YELLOW STRIPE

PIN 6 = 3-4 SOLENOID BLUE/RED STRIPE

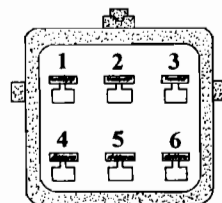
6 PIN (FEMALE)



PIN 1 = 1-2 SOLENOID RED/YELLOW STRIPE

PIN 5 = 3-4 SOLENOID BLUE/RED STRIPE

6 PIN CASE (MALE)

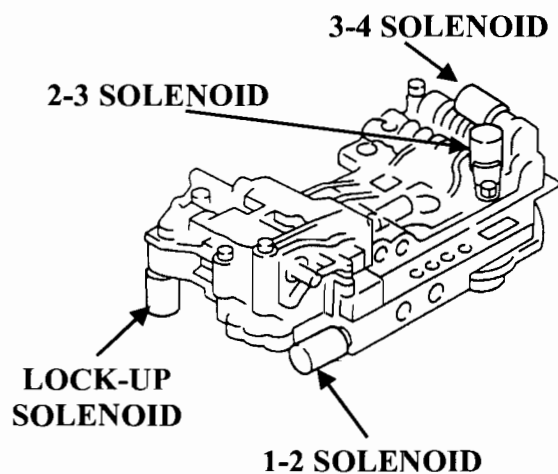


PIN 3 = 1-2 SOLENOID GREEN (INTERNAL)

PIN 5 = 3-4 SOLENOID YELLOW (INTERNAL)

Figure 2

1-2 SOLENOID LOCATION AND OPERATION

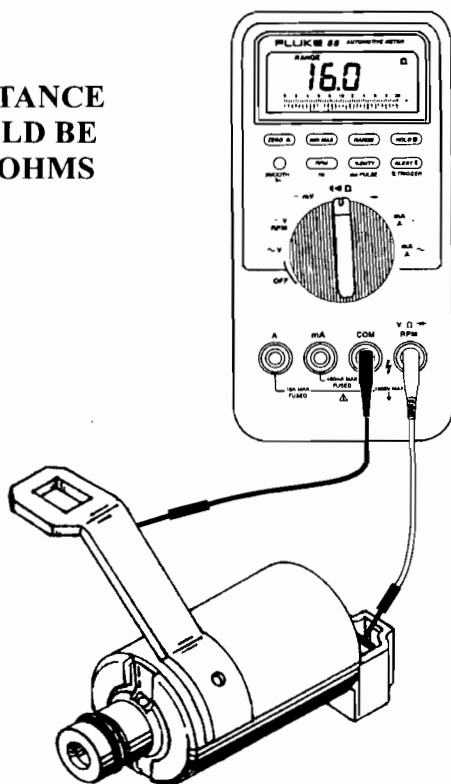


SOLENOID	INTERNAL WIRE COLOR
1-2	GREEN
2-3	BLUE
3-4	YELLOW
LOCK-UP	WHITE

NOTE: REMOVE SOLENOID FROM HOLE IN VALVEBODY TO AIR CHECK SHIFT VALVE

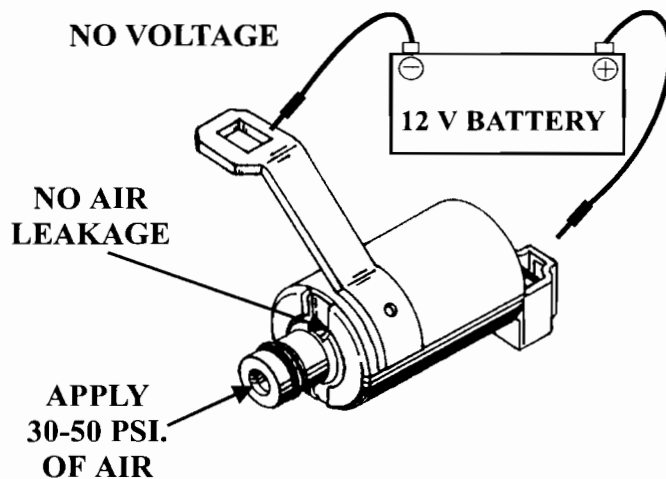
OHM TEST

**RESISTANCE
SHOULD BE
13-27 OHMS**



MECHANICAL OPERATION

NO VOLTAGE



APPLY 12 VOLTS

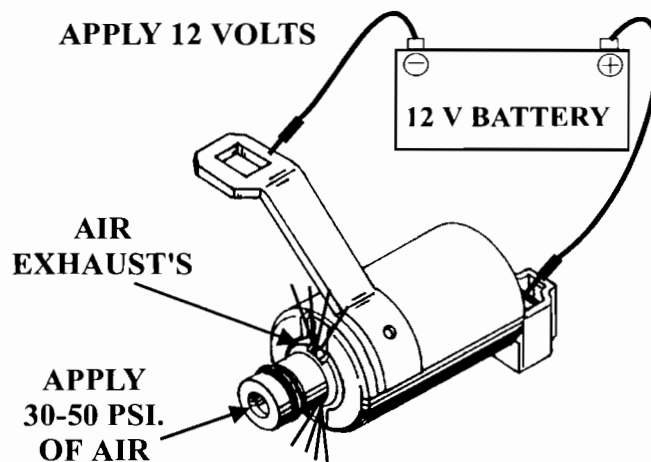


Figure 3

LOWER VALVE BODY

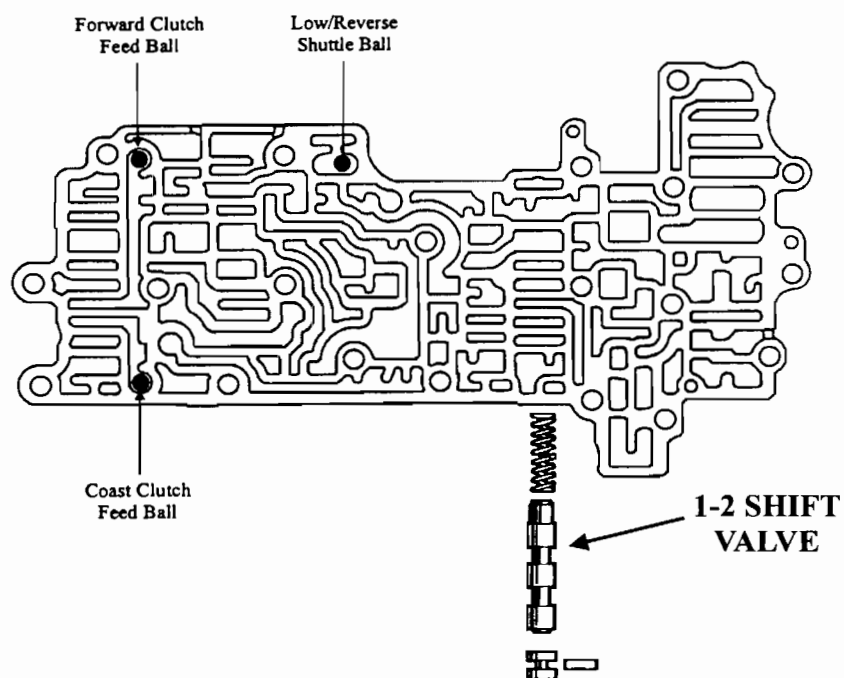


Figure 4

MAIN VALVE BODY CHECK BALL LOCATIONS

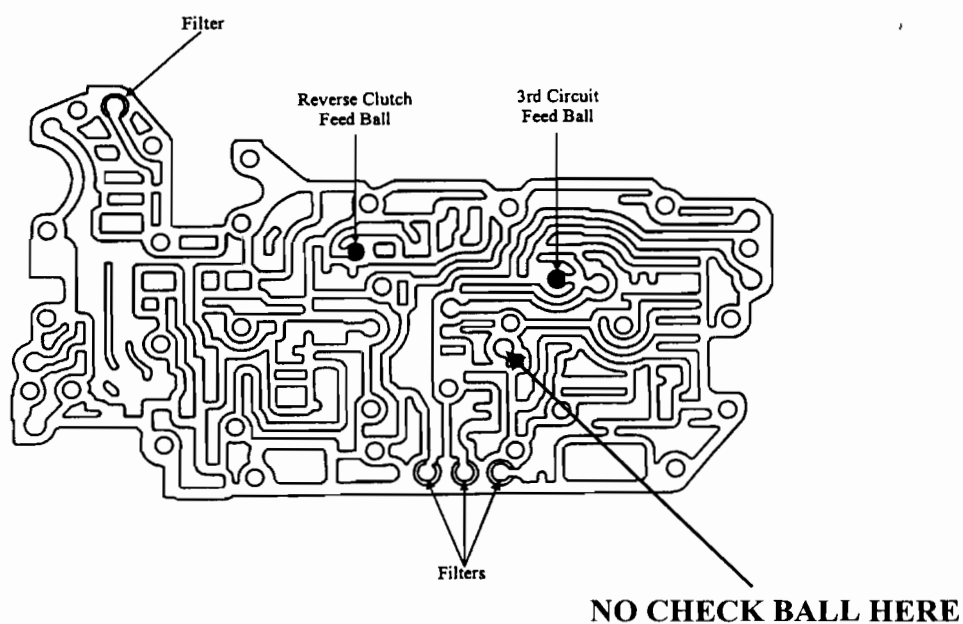
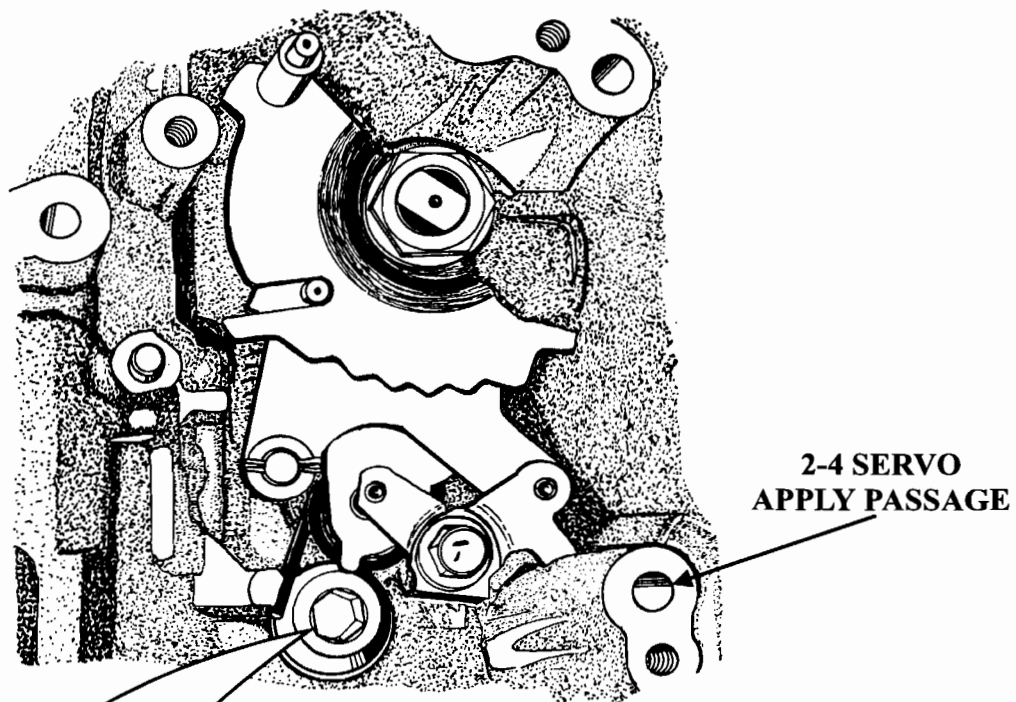
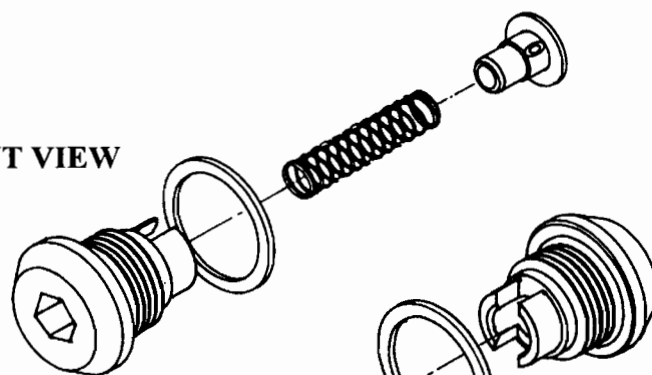


Figure 5

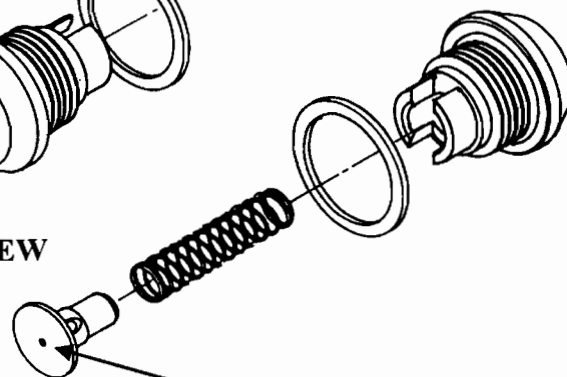
2-4 SERVO ORIFICE LOCATION



FRONT VIEW



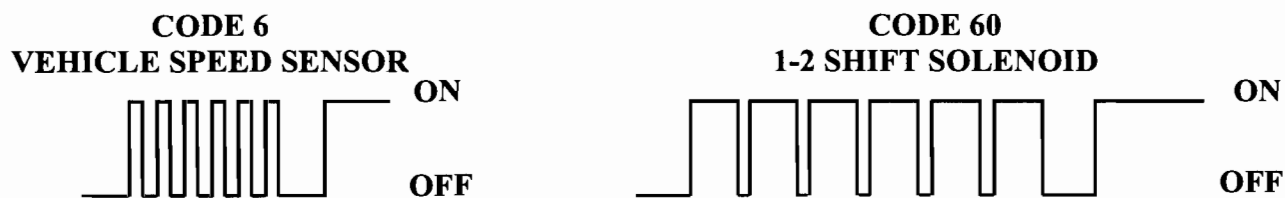
REAR VIEW



**ENSURE THAT 2-4 SERVO ORIFICE
IS FREE OF DEBRIS**

Figure 6
Automatic Transmission Service Group

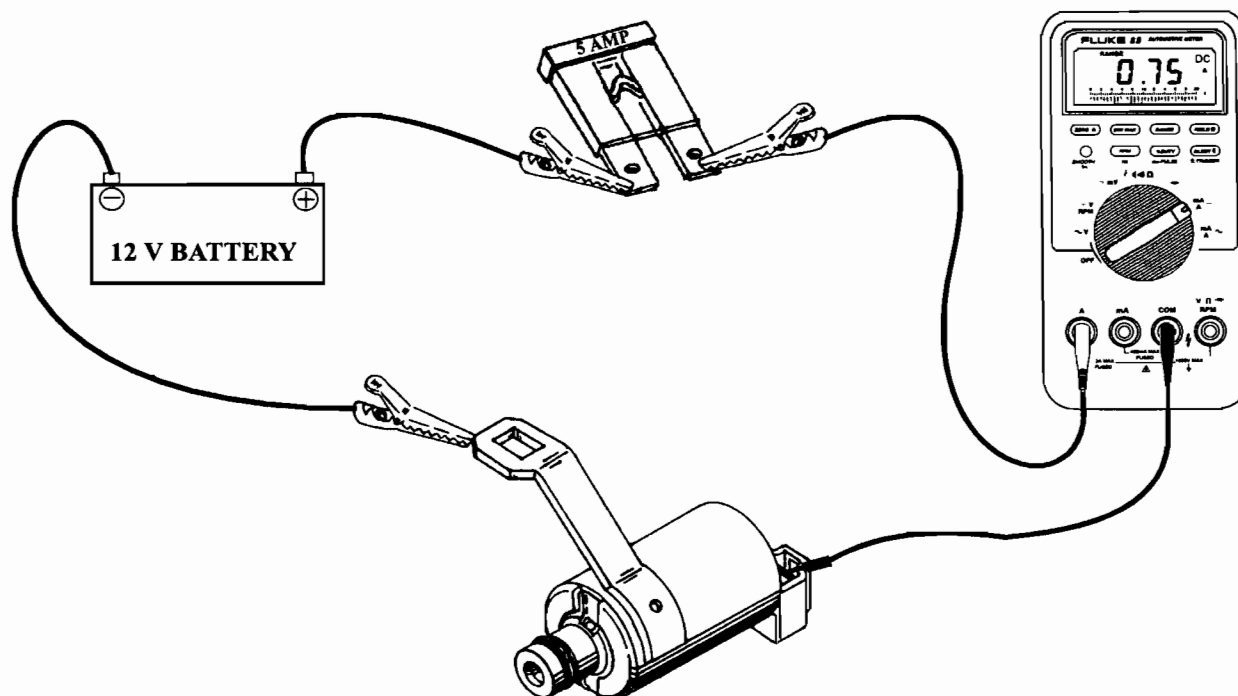
CODE IDENTIFICATION



6 SHORT FLASHES OR SWEEPS OF THE VOLT METER = CODE 6
6 LONG FLASHES OR SWEEPS OF THE VOLT METER = CODE 60

Figure 7

LOAD TESTING THE CIRCUIT



$$12 \text{ volts} \div 16 \text{ ohms} = .75 \text{ amps}$$

Figure 8

MAZDA / FORD
GF4A-EL
SOLENOID AND TERMINAL I.D.

COMPLAINT: After overhaul, vehicles equipped with GF4A-EL may exhibit a pulsating sensation on forward application, wrong gear starts, downshift's to 1st at higher speeds or no Reverse. The O.D. or HOLD light may also be flashing.

CAUSE: The cause may be that the wire harness conduit, or protective coating, was removed and solenoid harness connectors may now be attached to the wrong solenoid.

CORRECTION: Refer to Figure 1 for solenoid identification and location on the valve body, and the Mazda part numbers. Refer to Figure 2 for wire color, harness and solenoid connector color and terminal identification.

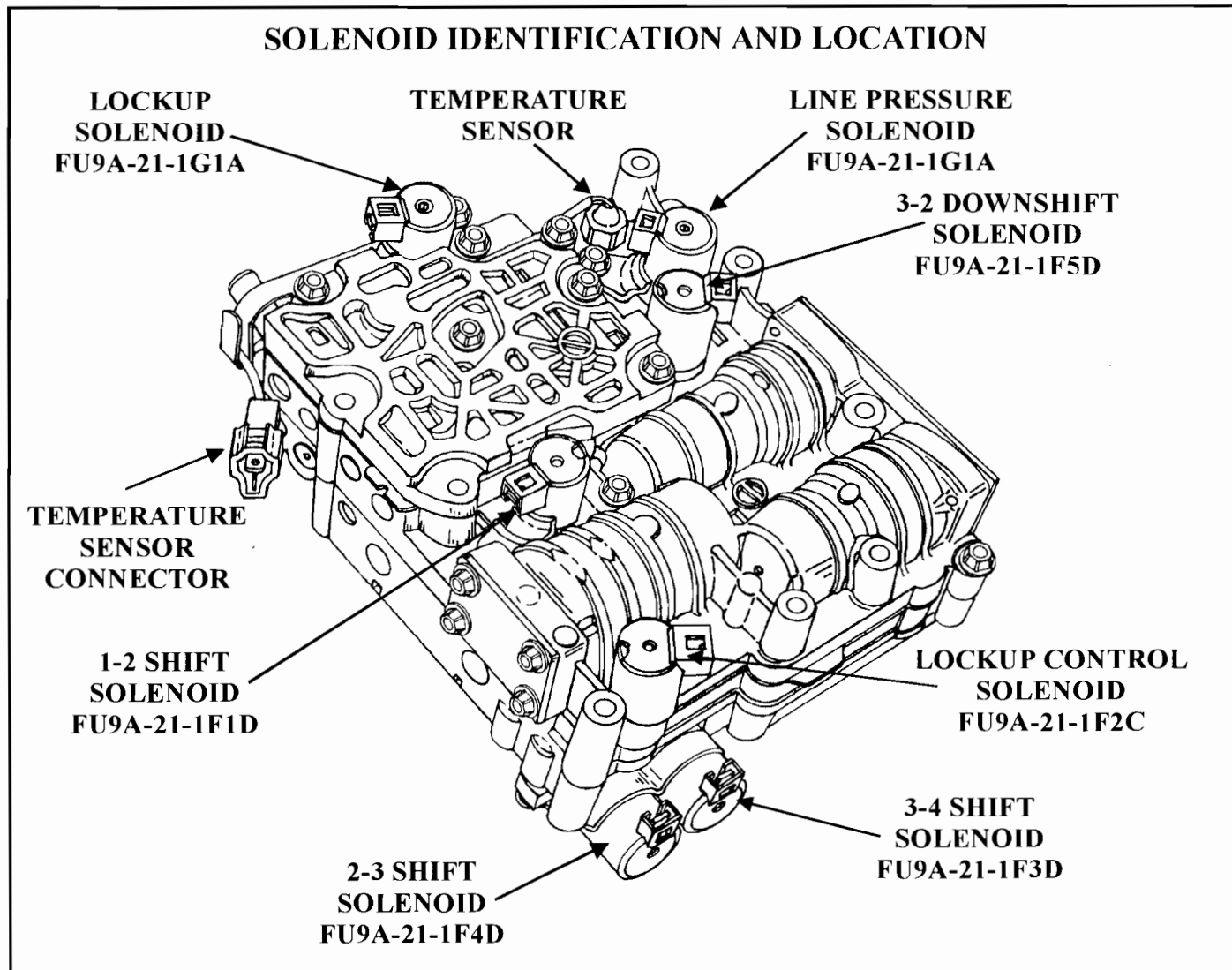
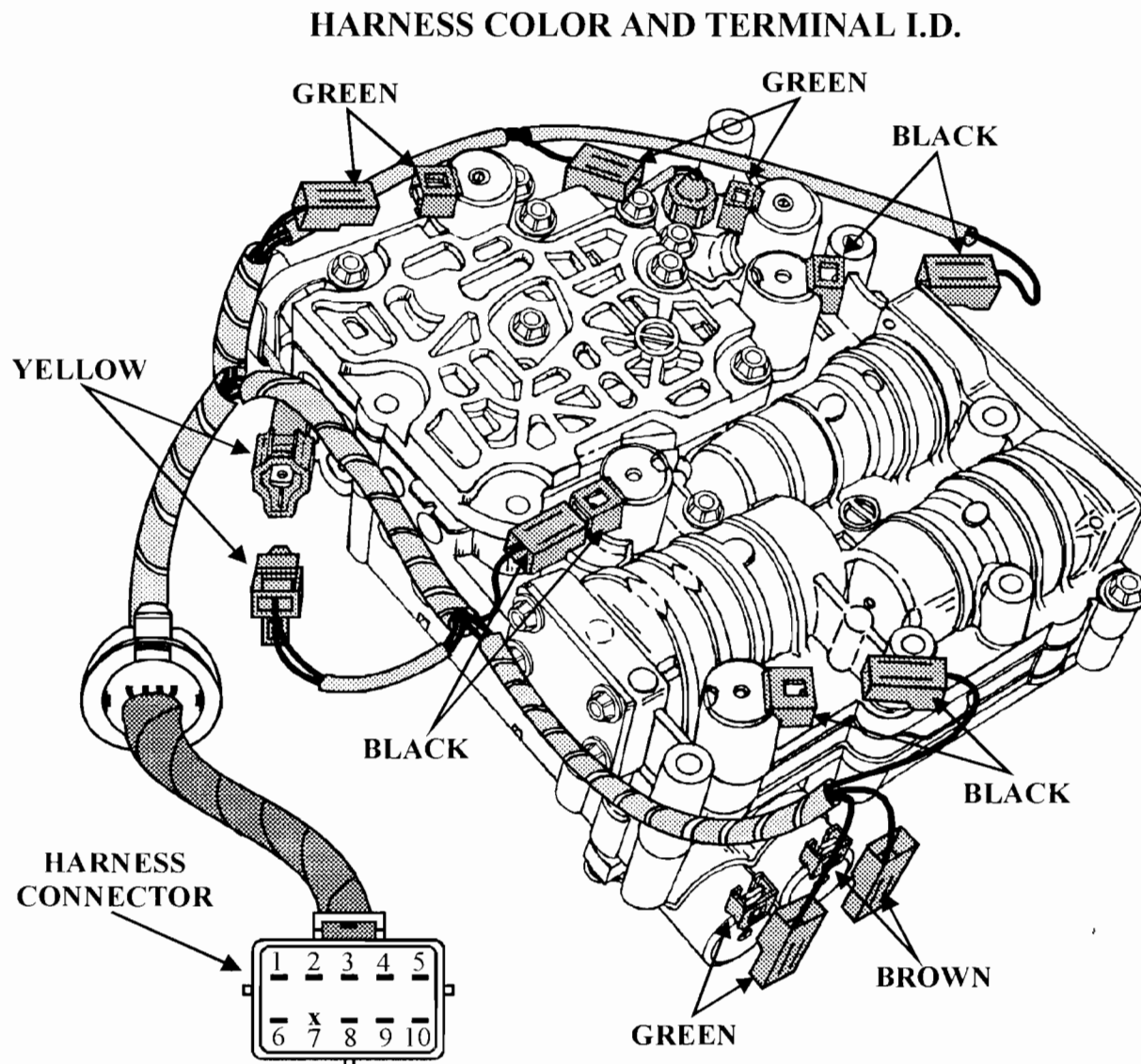


Figure 1
Automatic Transmission Service Group



TERMINAL	IDENTIFICATION	WIRE COLOR	CONNECTOR COLOR
1	TEMP.SENSOR	WHITE	YELLOW
2	LINE PRESSURE	BLUE	GREEN
3	3-2 DOWNSHIFT	BLACK	BLACK
4	3-4 SHIFT	BROWN	BROWN
5	1-2 SHIFT	BLACK	BLACK
6	TEMP.SENSOR	WHITE	WHITE
7	N / A	N / A	N / A
8	LOCKUP	YELLOW	GREEN
9	LOCKUP CONTROL	WHITE	BLACK
10	2-3 SHIFT	GREEN	GREEN

Figure 2



SLIDE

**MAZDA/FORD
GF4A-EL
NO REVERSE**

COMPLAINT: Vehicles equipped with GF4A-EL transmissions may exhibit a "No Reverse condition, before or after overhaul.

CAUSE: The cause may be:

1. A faulty "Vehicle Speed Sensor," signaling the computer that the vehicle is in motion. At that point the computer may apply the 1-2 shift solenoid and block the passage to the "Low Reverse Clutch." (See Figure 1)
2. A stuck 1-2 shift valve or "leaky" bore plug at the end of the 1-2 shift valve, allowing the 1-2 shift valve to block the passage to the "Low Reverse Clutch." (See Figure 1) **NOTE: This may also cause 2nd gear starts in Drive.**
3. A 1-2 solenoid that is stuck open, allowing the 1-2 shift valve to block the passage to the "Low Reverse Clutch." (See Figure 1) **NOTE: This may also cause 2nd gear starts in Drive.**
4. A Low Reverse or Reverse clutch failure.

QUALIFICATION:

Unplug the harness connector from the Vehicle Speed Sensor and place the selector in the Reverse position (See Figure 2). If Reverse engages go to Correction 1, most likely possibilities. If Reverse does not engage go to Correction 2 , 3 and 4, most likely possibilities.

CORRECTION:

1. Replace the Vehicle Speed Sensor.
2. Inspect the 1-2 shift valve as shown in Figure 3 for free movement in its bore. Air check the 1-2 shift valve, from the hole where the 1-2 shift solenoid is placed. Listen for the sound of the 1-2 shift valve snapping back and forth and ensure **no** air leakage from the bore plug at the end of the 1-2 shift valve line up.
3. Apply air pressure to the 1-2 shift solenoid, as shown in Figure 4, and ensure that there is **no** leakage when there is no voltage applied to the solenoid, replace if necessary. **NOTE: It may be necessary to apply 12 volts to the solenoid several times to ensure that the solenoid is closing every time the voltage is removed.** Inspect the O-ring on the solenoid and replace if necessary.
4. Inspect Low Reverse or Reverse clutch assembly's for wear and repair as needed.

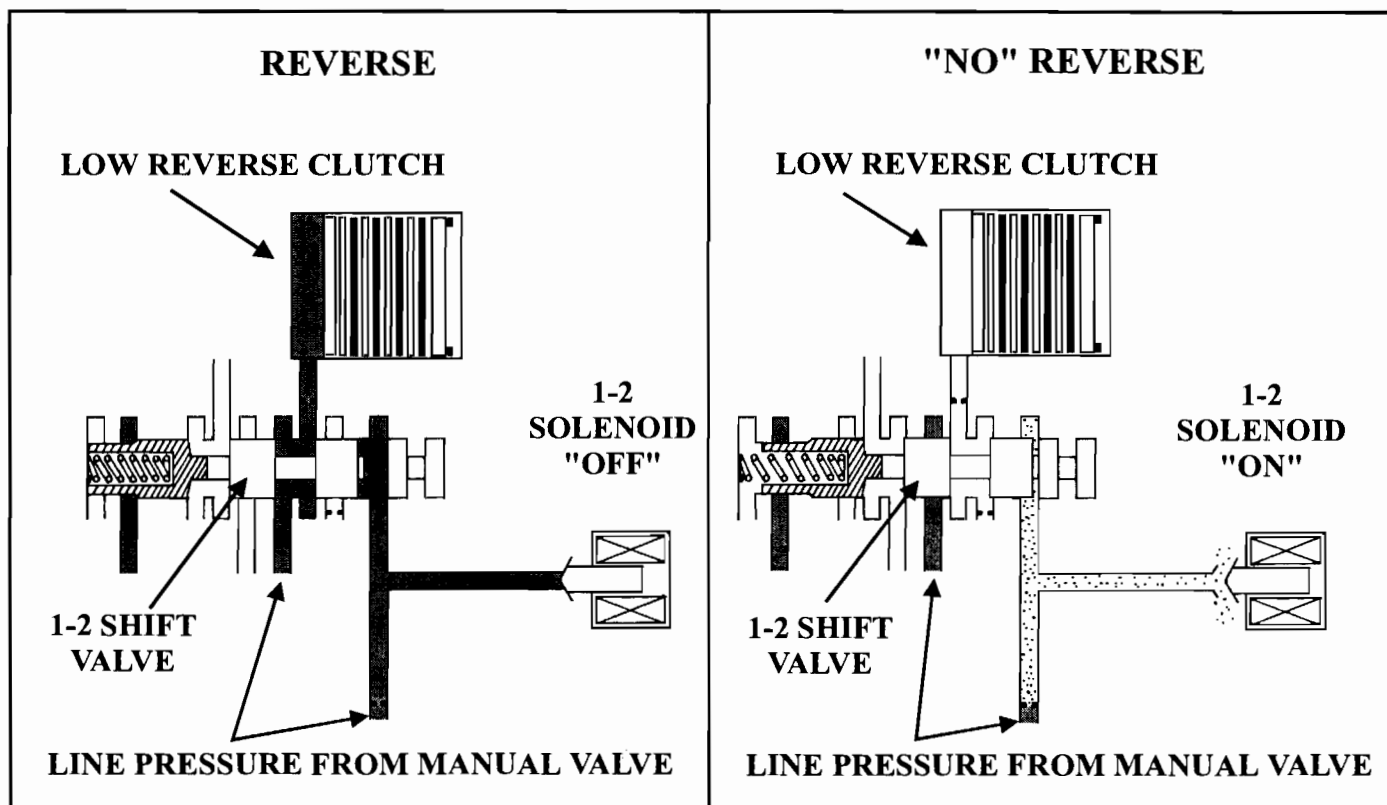


Figure 1

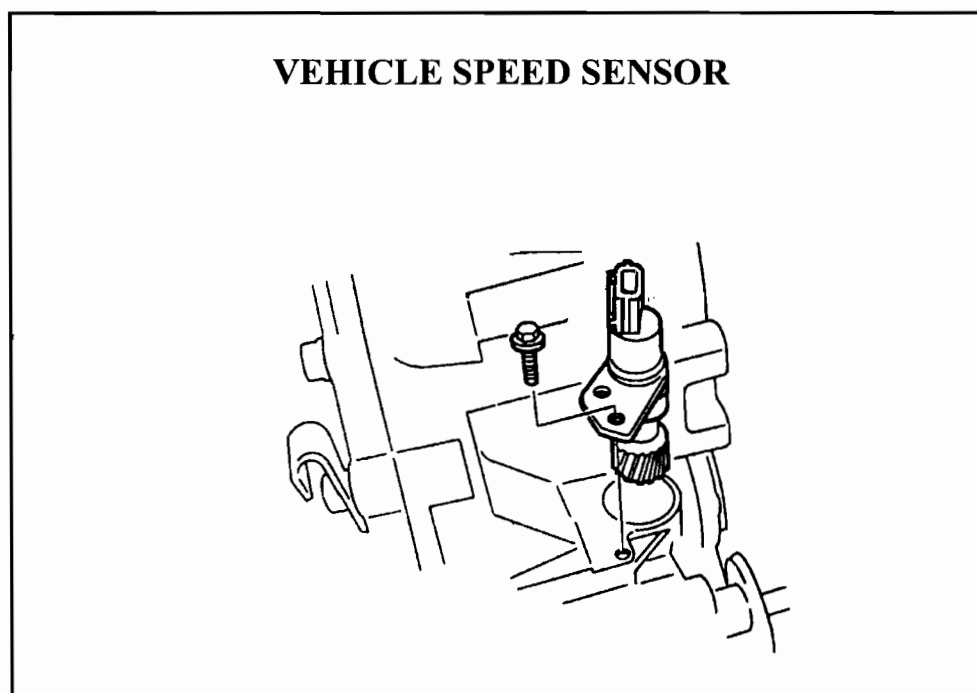


Figure 2

MAIN CONTROL VALVE BODY

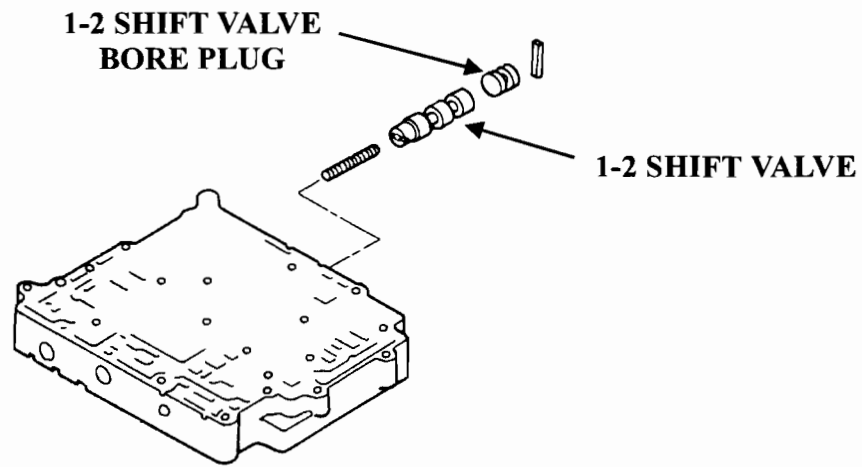
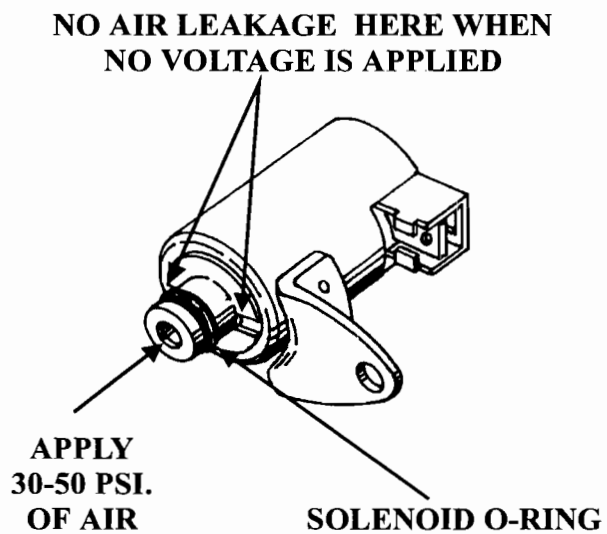


Figure 3

1-2 SOLENOID MECHANICAL CHECK



1-2 SOLENOID LOCATION

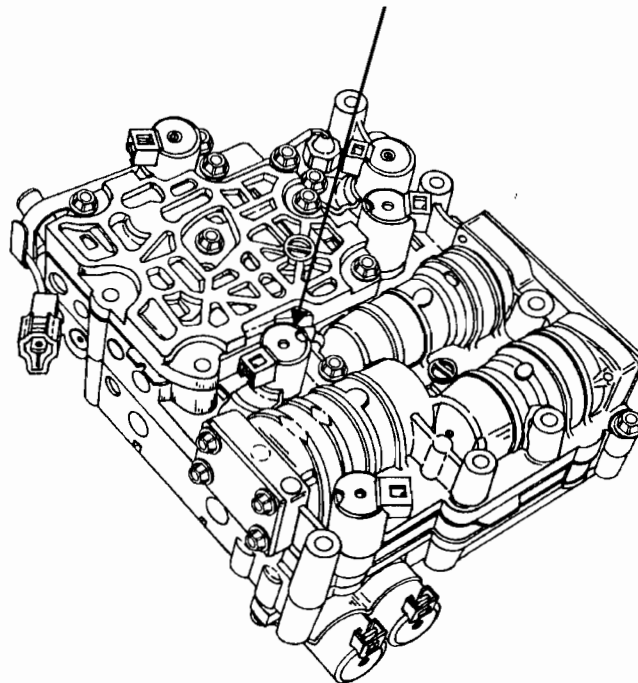


Figure 4

Time-Saving Tools Designed for You, The Transmission Technician.

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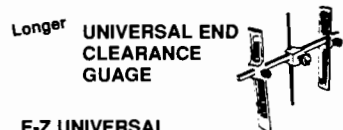
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PULLER



FORD, G.M., CHRYSLER
U.S. PAT 5,243,749

NEW

E-Z UNIVERSAL DRIVER KIT



NISSAN RL4F02A
CONVERTER SEAL DRIVER



RIGHT AND LEFT AXLE
SEAL INSTALLER

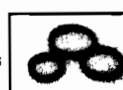


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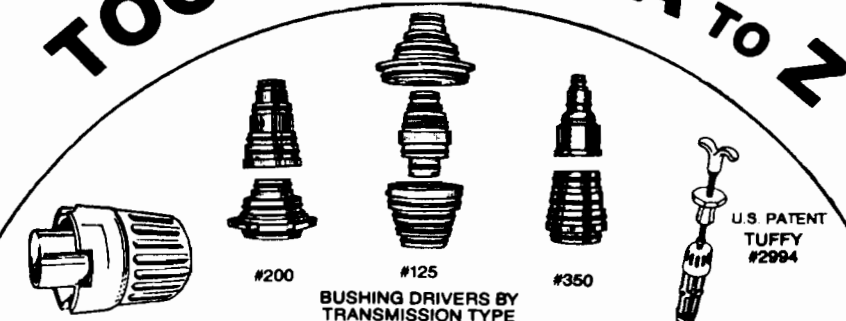


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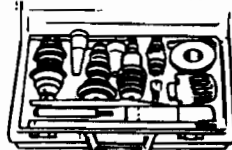
FOR FORD & MAZDA



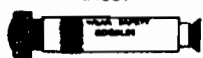
AXEL SEAL INSTALLER
#1250



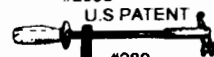
CLUTCH SPRING
COMPRESSOR KIT
#2987 U.S. PATENT



UNIVERSAL BUSHING
DRIVER SET
#1001



P.R. VALVE SNAP
RING INSTALLER
#2993



#2991

SEAL PULLER

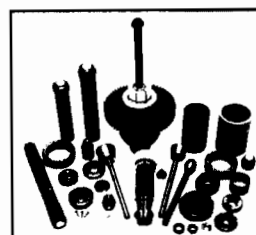
#2992

PUMP ALIGNMENT
TOOLS

#2996

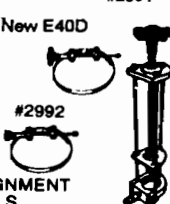
GEAR & PUMP PULLER

BUSHING DRIVERS BY
TRANSMISSION TYPE



CHRYSLER
BEARING CUP & CONE
SERVICE TOOLS
U.S. PATENT NO. 4339865

CHRYSLER A604
TRANSFER SHAFT
SNAPP-RING TOOL
#2604



U.S. PATENT

#2997

RACE DRIVER

#2995

VALVE SPRING
COMPRESSOR

#2996

U.S. PATENT

#2997

RACE DRIVER

#2995

VALVE SPRING
COMPRESSOR

#2996

U.S. PATENT

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ALL NISSAN ELECTRONIC UNITS 3RD GEAR STARTS

COMPLAINT: Before and/or after rebuild, any Nissan unit with electronic controls, exhibits a 3rd gear start condition. Energizing the solenoids by using jumper wires, or using an external transmission shift control box, enables the transmission to start in 1st gear and shift up through the ranges normally. There may, or may not be, solenoid trouble codes stored in the computers memory.

CAUSE: The cause may be, a defective solenoid pack that can be verified with a resistance check on the solenoids with your DVOM, using the chart and illustrations in Figure 2.

CORRECTION: Replace the solenoid pack with the appropriate part number as listed below in the "Service Information" section. The part numbers that are listed are Nissan, but will also fit the Mazda units as well.

SERVICE INFORMATION:

Solenoid Pack (Rear Wheel Drive Models) 31940-41X-09
Solenoid Pack (Front Wheel Drive Models) 31940-27X-66

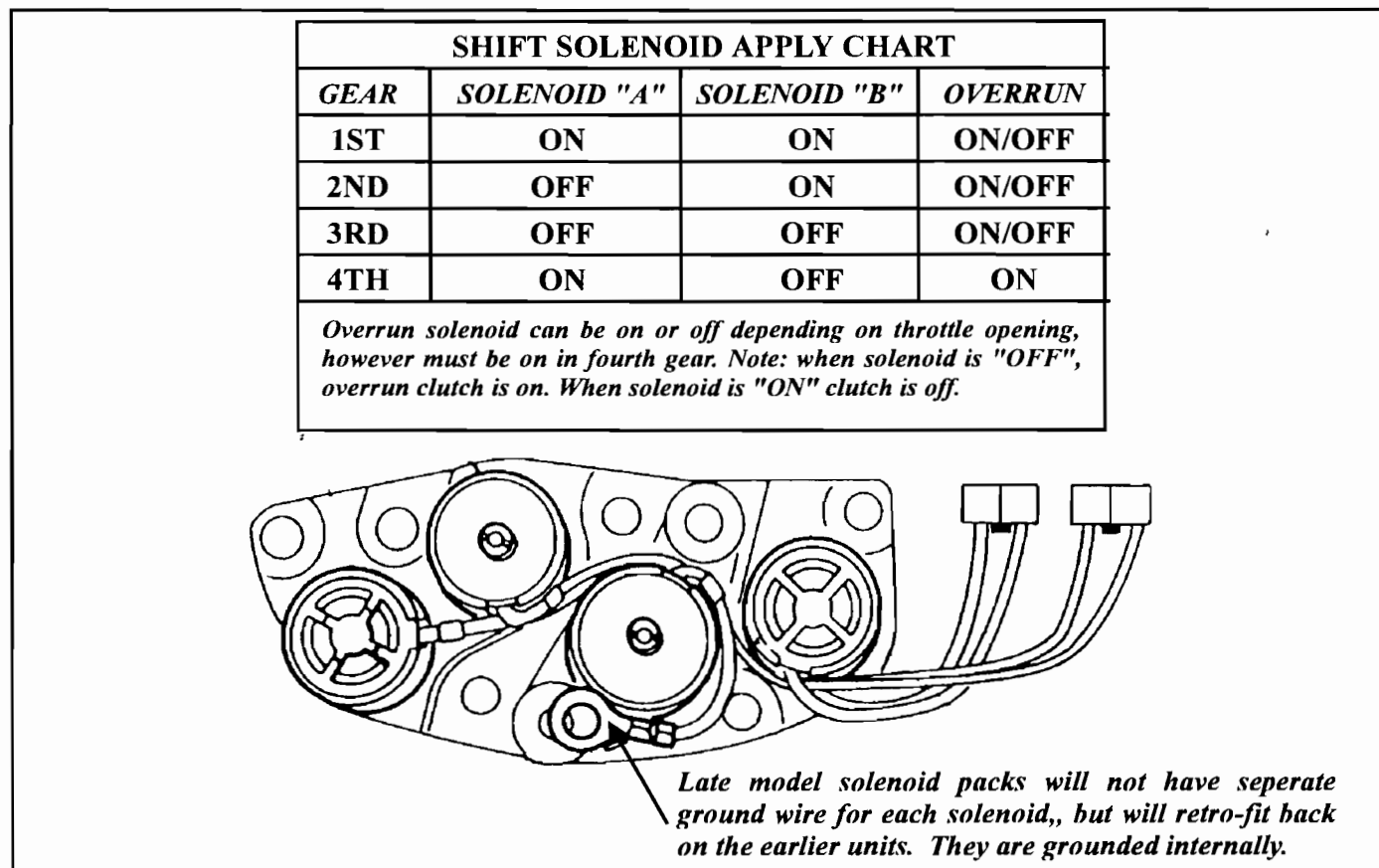
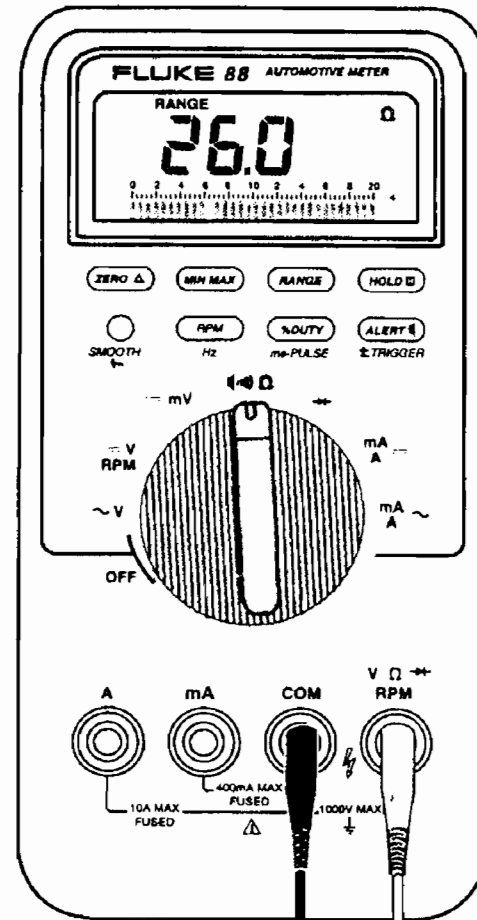


Figure 1

CHECKING NISSAN SOLENOIDS

SOLENOID RESISTANCE CHART	
Solenoid	Ohms Resistance
Shift "A"	20 - 40
Shift "B"	20 - 40
Overrun (RE4R01A Only)	20 - 40
Lock-up	10 - 16
EPC	2.5 - 5.0



RE4FO2A SOLENOID LOCATION
IS SHOWN BELOW

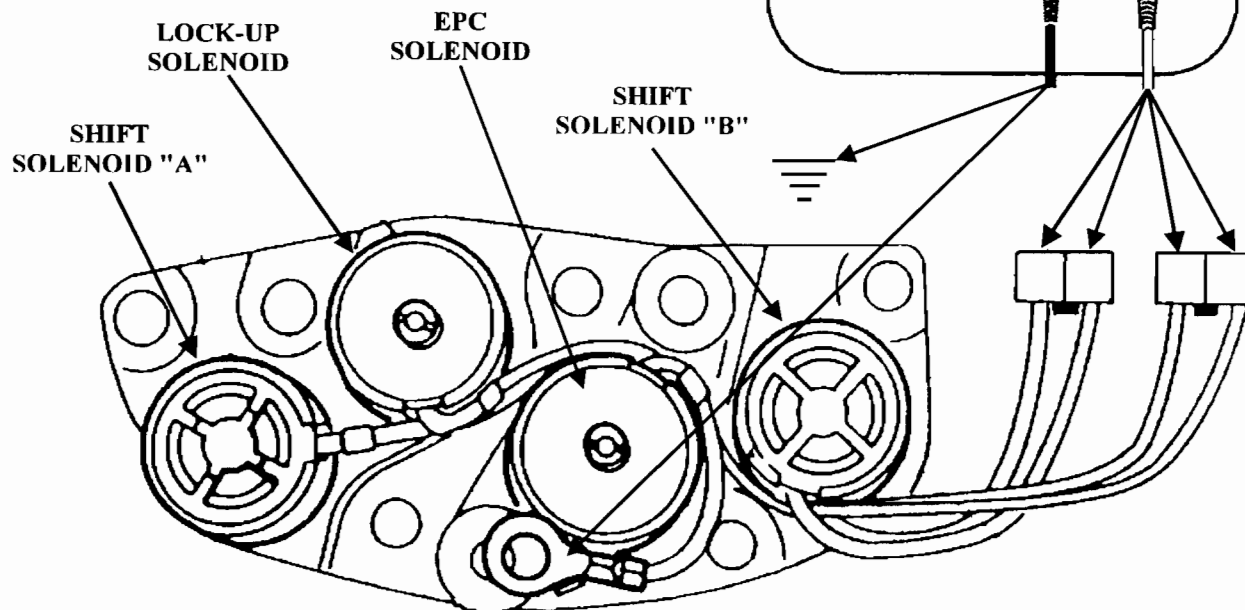


Figure 2

FORD VILLAGER/NISSAN QUEST 4F20E/RE4F04A SLIPS, DELAYS OR NO REVERSE

COMPLAINT: *After overhaul*, vehicle exhibits a slip, delay and or "NO Reverse."

CAUSE: The cause may be, during overhaul the tube seal for the "Low and Reverse" oil transfer tube was damaged on disassembly and not replaced or the tube seal was installed backwards. The "Low and Reverse" oil transfer tube is located under the valve body and is attached to the case with three bolts. NOTE: The tube seal normally will *not* fall out of the case, when the tube is removed and is *not* always provided in overhaul kits.

CORRECTION: Refer to Figure 1 to identify the location of the "Low and Reverse" oil transfer tube and the identification and correct installation of the tube seal.

SERVICE INFORMATION:

"LOW AND REVERSE OIL TRANSFER TUBE SEAL"(FORD#).....F3XY-7G085-A

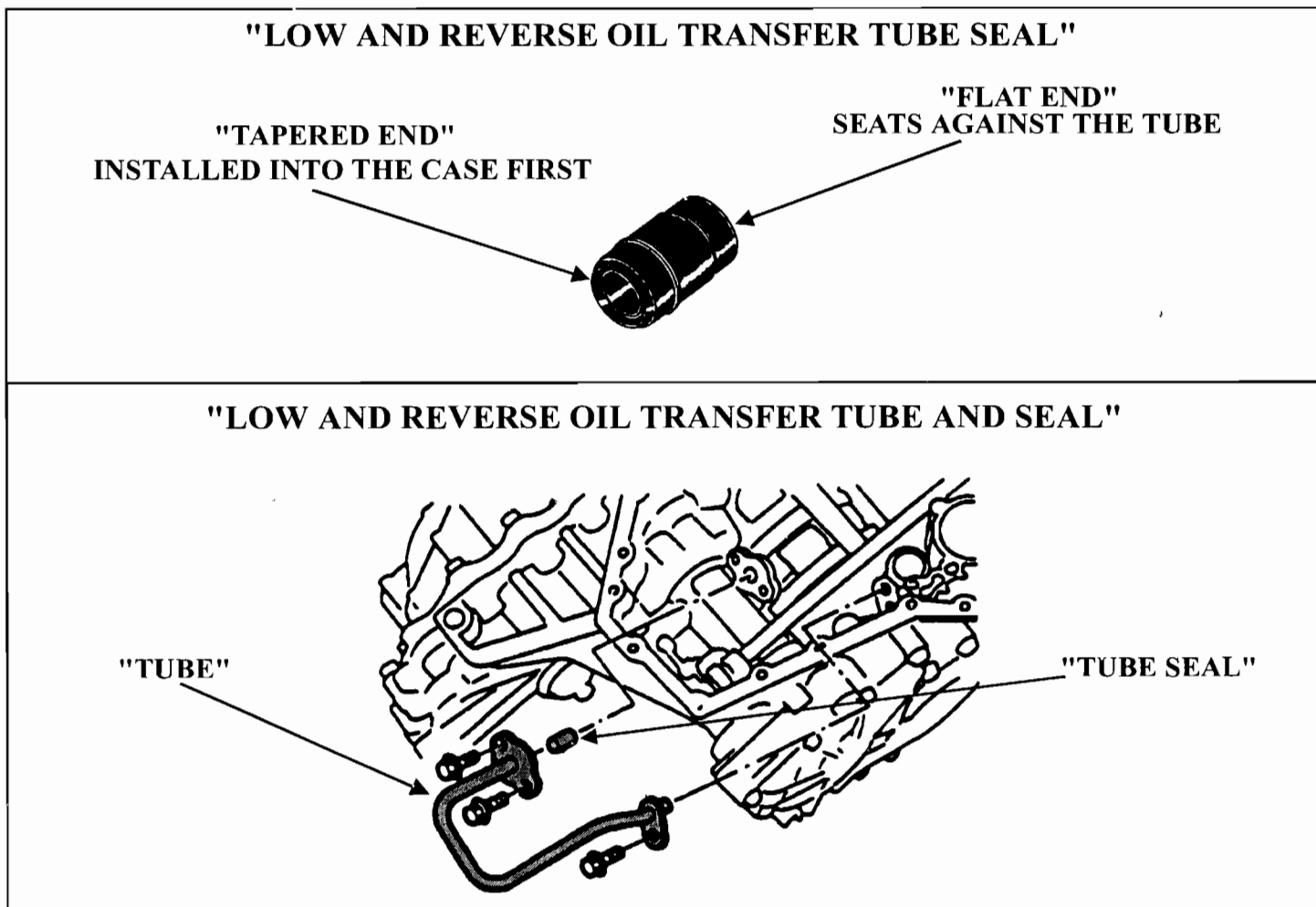


Figure 1

NISSAN RE4R01A AND RE4F04A SHIFT CYCLING 4-3-4

COMPLAINT: Vehicle exhibits a "Cycling" condition from 4th to 3rd to 4th gear. This condition may appear before and/or after rebuild.

CAUSE: The cause may be, a loose or broken, "D" range signal wire to the inhibitor switch, a bent or corroded pin in the harness connector, or a defective inhibitor switch.

CORRECTION: Check the inhibitor switch and the connectors for any bent and/or corroded pins. If the connectors and pins are good, inspect the wires in the harness from the computer to the inhibitor switch, for any opens or shorts to ground with your DVOM. Refer to Figures 1 and 2 for locations of the inhibitor switch and views of the connectors on the RE4R01A and RE4F04A.

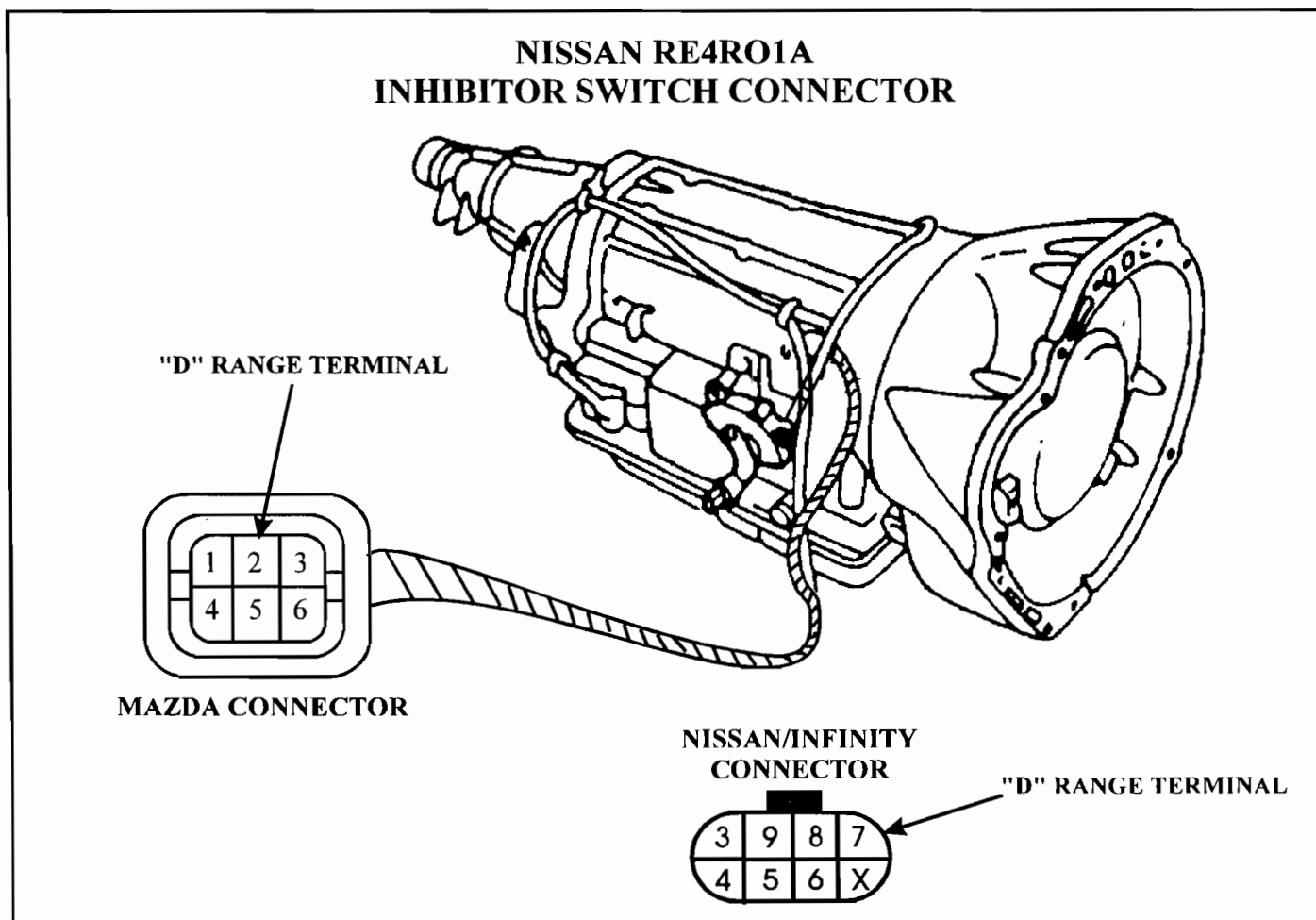


Figure 1

NISSAN RE4FO4A
INHIBITOR SWITCH CONNECTORS

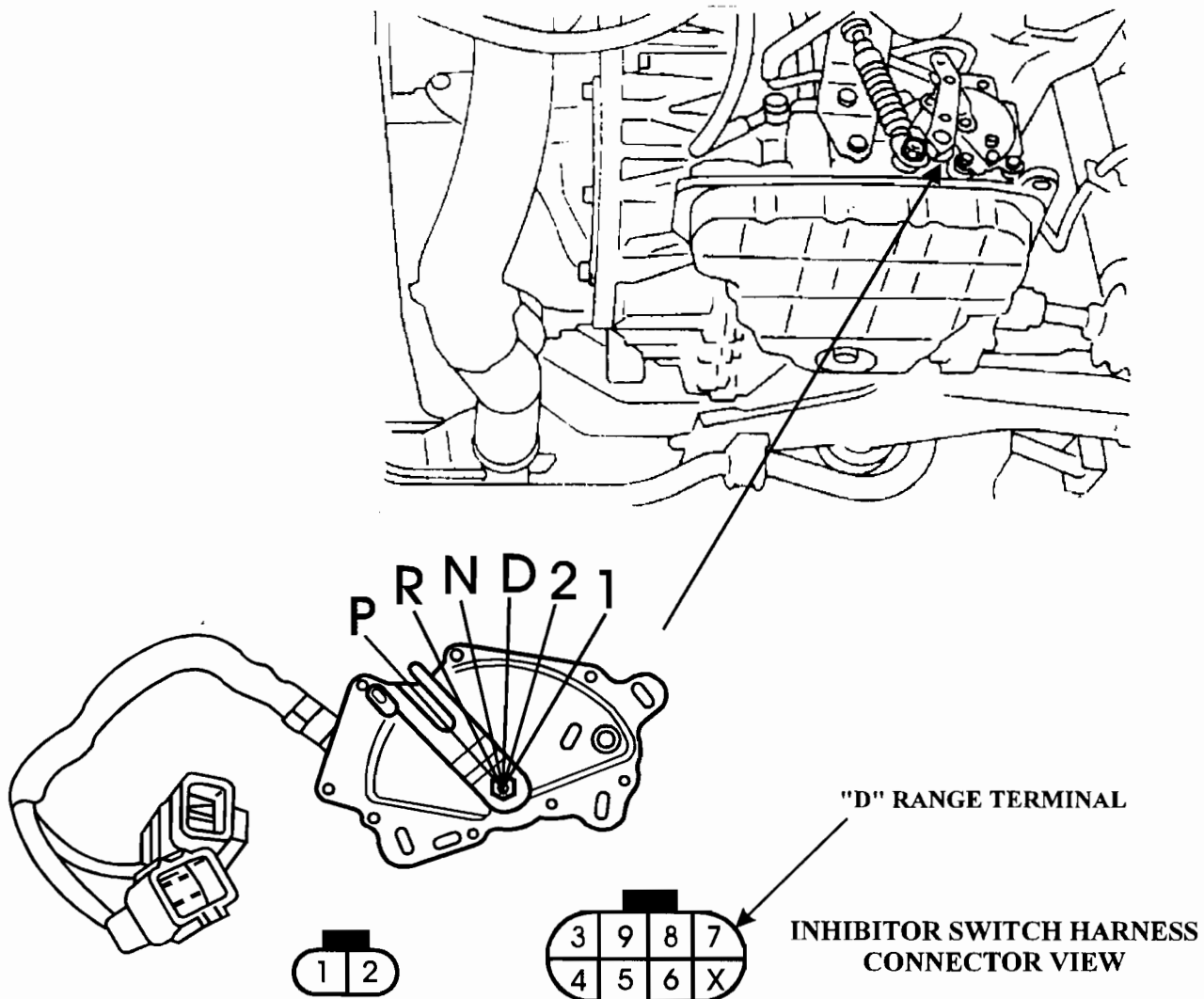


Figure 2

ISUZU JR403E PROPER FORWARD SPRAG ROTATION

Some repair manuals are very confusing on which way the forward sprag should freewheel and which way that it should lock on the following transmissions: Isuzu JR403E, Nissan RL4F03A/V, RE4F03A/V, RE4F04A/V, Ford 4F20E. When the Forward Sprag is properly assembled, the internal ring gear should freewheel in a clockwise direction, and lock in a counter-clockwise direction, as shown in Figure 1.

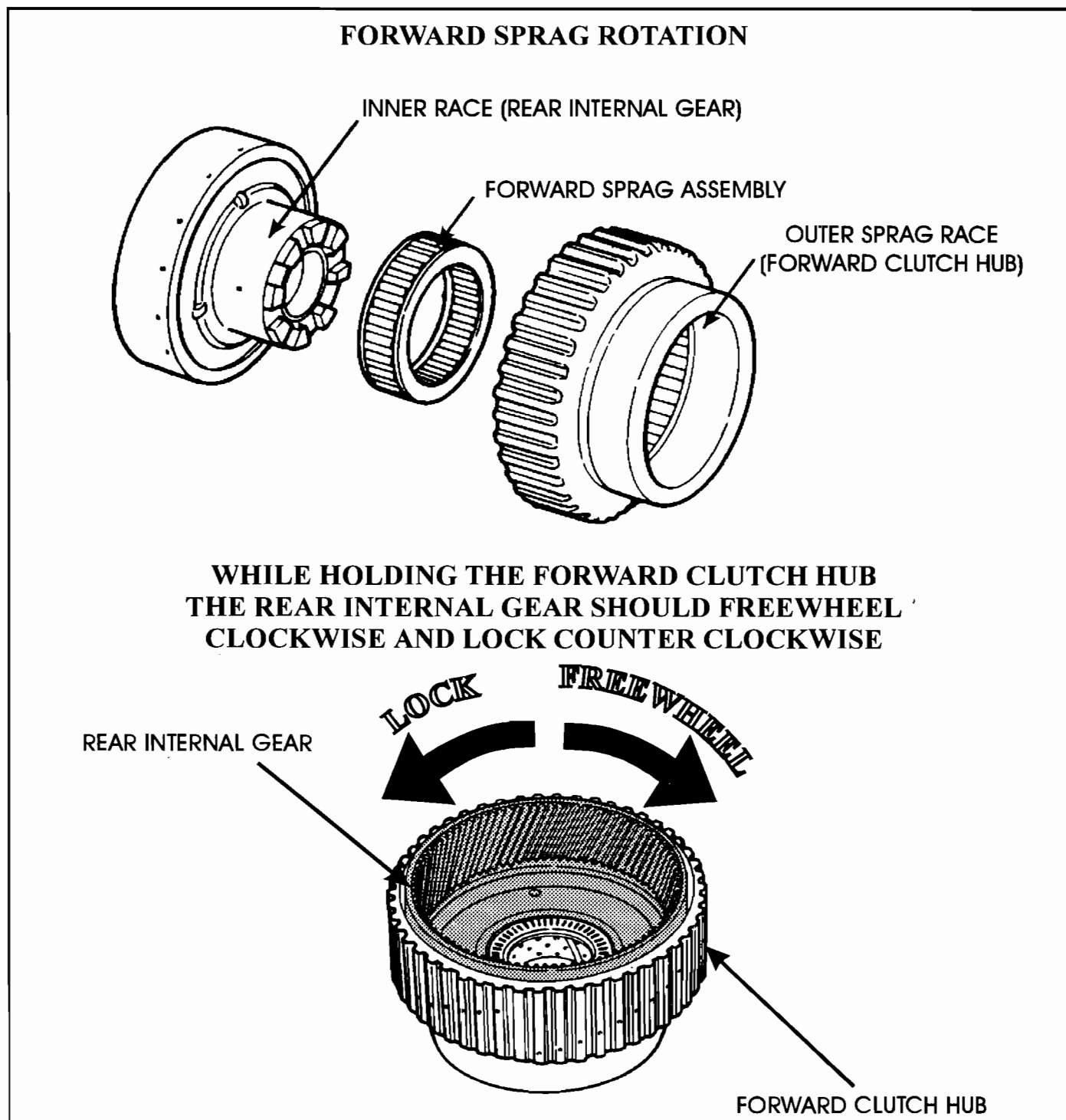


Figure 1



JR403E ELECTROMATIC

LATE AND HARSH UPSHIFTS

COMPLAINT: All upshifts are late and harsh. Coast down shifts and kickdown are not affected.

CAUSE: The cause of this problem is a stretched throttle cable which runs from the throttle pedal to the injector body lever. Due to the fact that the cable is so long,, the cable eventually stretches which causes the Throttle Position Sensor to drop in voltage before the throttle actually responds. The reason for this is, the TPS is mounted on the throttle pedal and responds to pedal movement before the cable opens the throttle. as shown in Figure 1. TPS voltage in these vehicles starts at 4.3 volts at closed throttle and ranges to 0.8 volts at wide open throttle. This allows the Transmission Control Unit to send late shift timing signals and an increase in line pressure at relatively low speed because the TCM thinks the throttle opening is greater than it is. (Refer to Figure 2)

CORRECTION: Replace the throttle cable.

JR403E ELECTROMATIC LATE AND HARSH UPSHIFTS

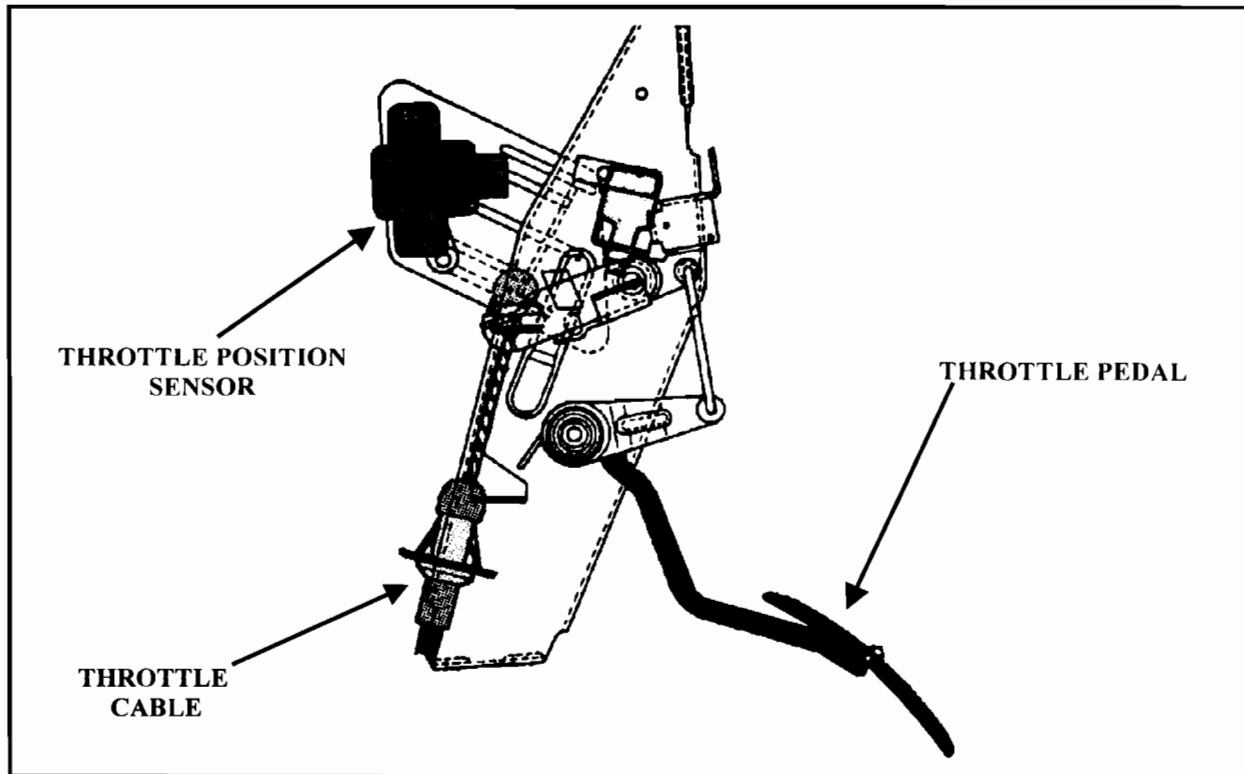


Figure 1

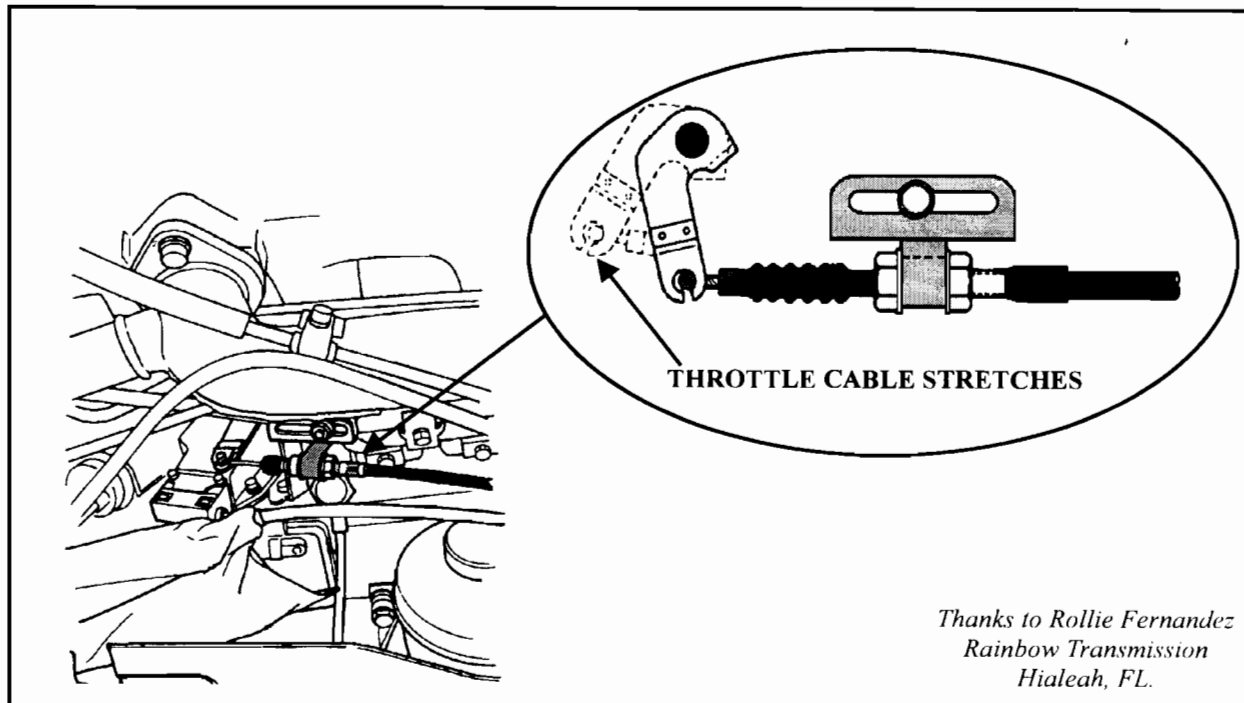


Figure 2

Thanks to Rollie Fernandez
Rainbow Transmission
Hialeah, FL.

JR403E ELECTROMATIC SLIPS IN 2ND AND 4TH GEAR

COMPLAINT: The vehicle exhibits poor 1-2 and 3-4 shift quality and/or slips in 2nd and 4th gear.

CAUSE: The cause is 2-4 band servo cover bolt fracture. Cracking of the overdrive servo piston also occurs as shown in Figure 1.
The servo cover retaining bolts are not hard enough, causing them to stretch and break, as illustrated in Figure 2, resulting in the servo cover coming loose, thereby creating a serious hydraulic leak within the servo circuit.
When this occurs, the overdrive servo piston will cock during its travel and due to lack of support, the servo piston will crack, adding to the severity of the above complaint.

CORRECTION: Replace the cracked overdrive servo piston and secure servo cover with new hardened bolts and torque to 6 foot pounds.

NOTE: The overdrive servo piston should also be replaced if the center of the piston is worn as shown in Figure 2

SERVICE INFORMATION:

Overdrive Servo Piston.....Part # 8-97039481-0
Hardened Servo Cover Retaining Bolts (4 Required).....Part # 8-97107-000-0

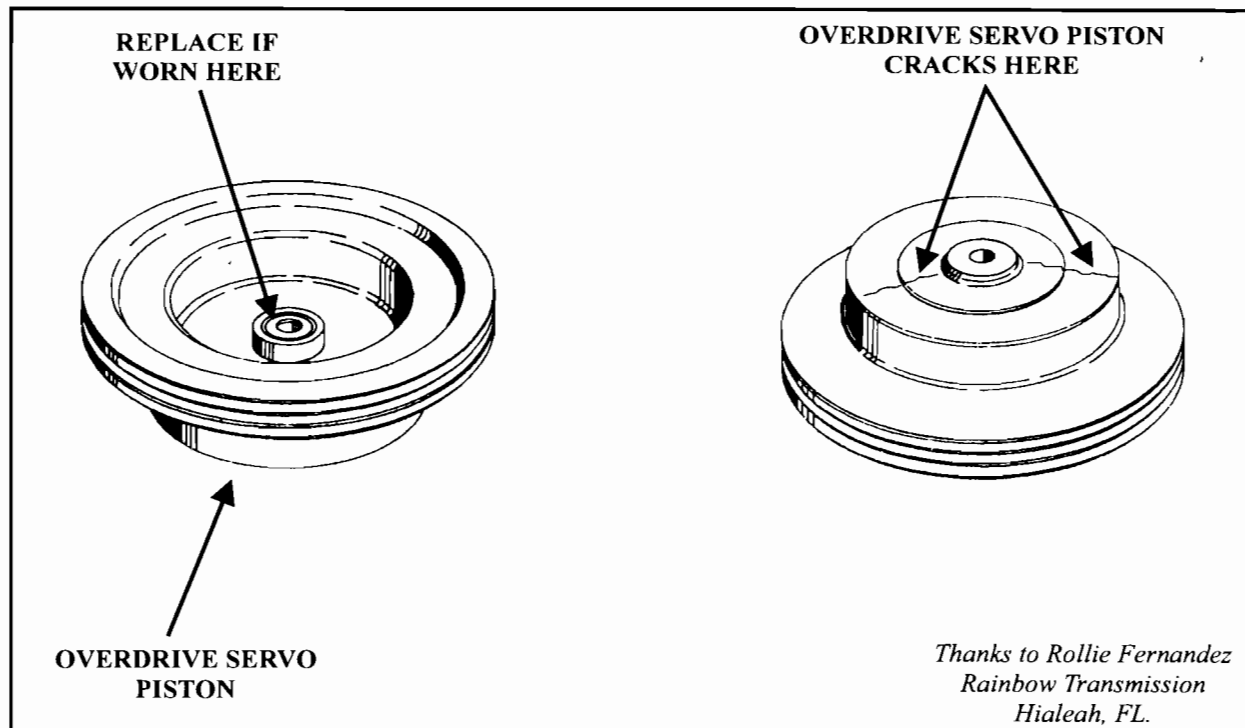


Figure 1

**JR403E ELECTROMATIC
SLIPS IN 2ND AND 4TH GEAR**

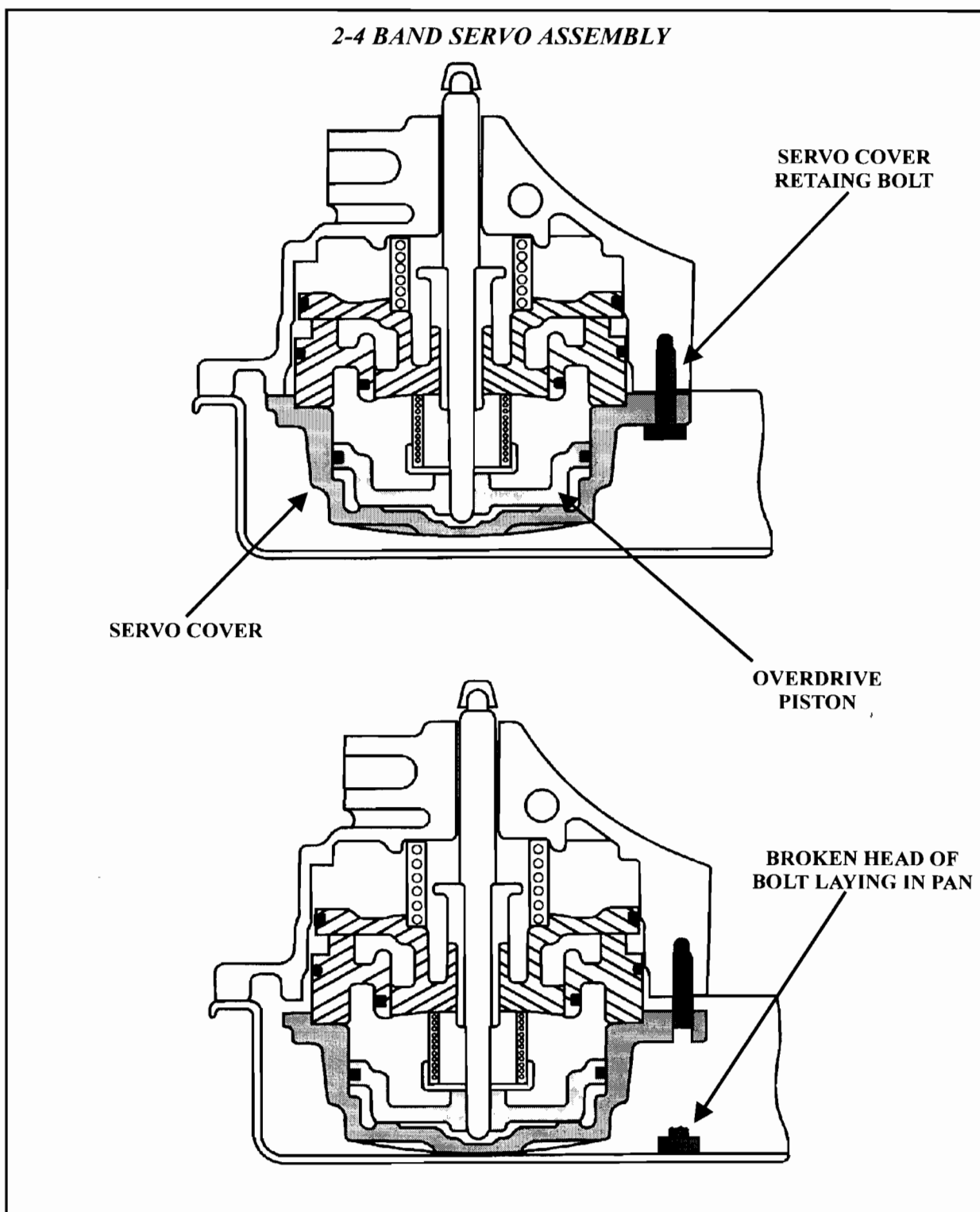


Figure 2

CHRYSLER JEEP

AW4

2-3 FLAIR/REVERSE DELAY

COMPLAINT: 1987-1989 Jeep vehicles equipped with AW4 transmissions may exhibit a flair on the 2-3 upshift or a delay on Reverse application.

CAUSE: The cause may be:
A worn spacer plate, where the direct clutch shuttle ball seats, causing a loss of direct clutch pressure. (See Figure 1)

CORRECTION: Replace the spacer plate.

SERVICE INFORMATION:

SPACER PLATE PART NUMBER.....83503770

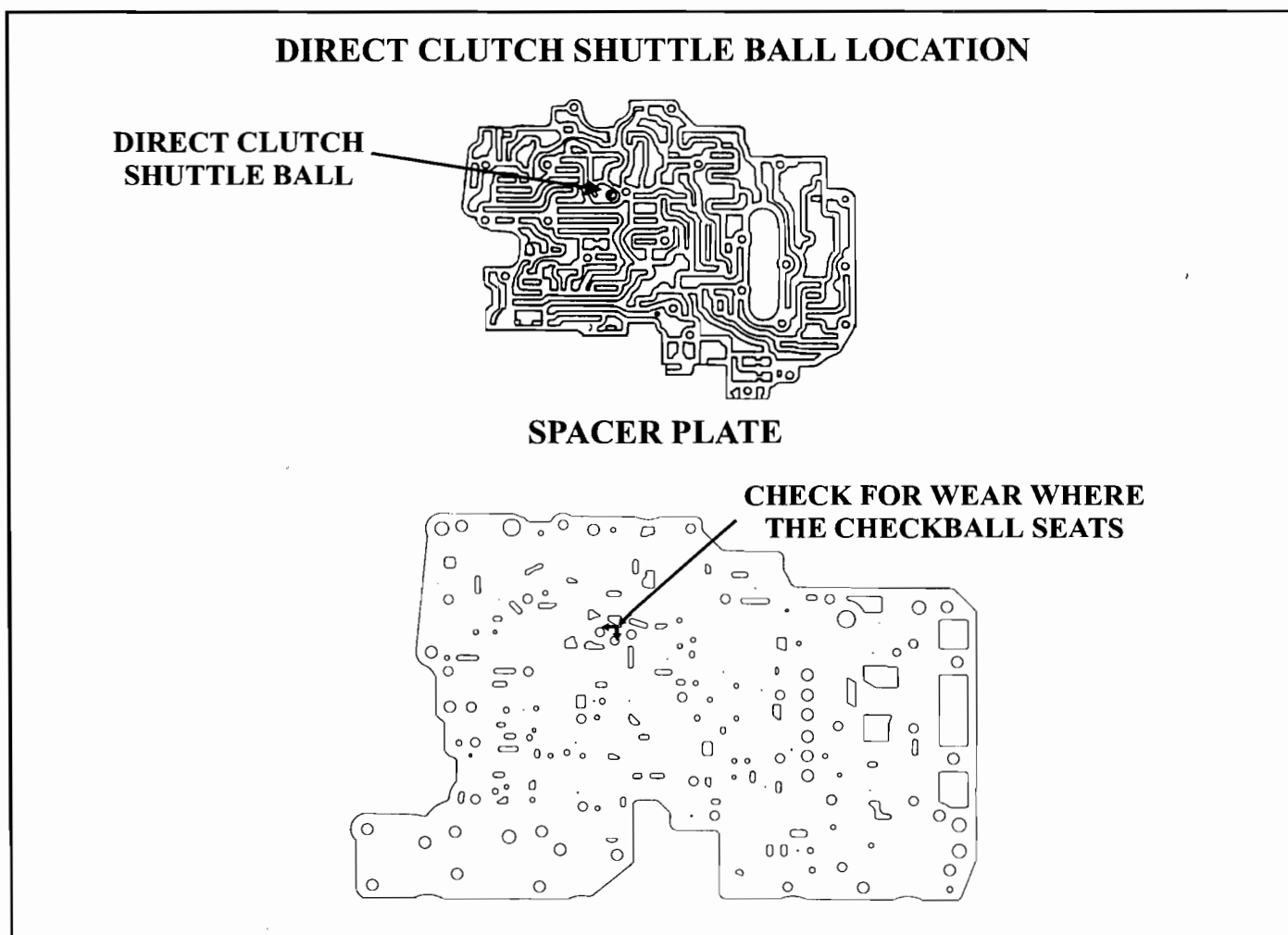


Figure 1

V.W. AUDI 096-097**NO MOVEMENT IN THE "D" POSITION**

COMPLAINT: After overhaul, an 096 - 097 transaxle has no forward movement in the "D" range. When the selector lever is moved to either the "3" "2" or "1" range the transaxle will have forward movement. No electrical problems are evident.

CAUSE: One cause may be the manual valve in the valve body being out of adjustment.

CORRECTION: Adjust the manual valve as follows: Move the selector to the park position, make sure the parking gear is fully engaged. Loosen the small adjusting bolt enough so that the adjusting arm will move freely. Push the manual selector control arm that is attached to the manual valve back into the bore as far as it will go (Follow the direction of the arrow in Figure 1). When the manual valve is at the stop, hold the manual valve tight against the stop. Coat the locking bolt with a small amount of thread lock and tighten to 31 in lbs.

**PUSH VALVE DOWN INTO THE BORE
IN THE DIRECTION OF THE ARROW**

**TIGHTEN ADJUSTING BOLT
TO 31in. lbs.**

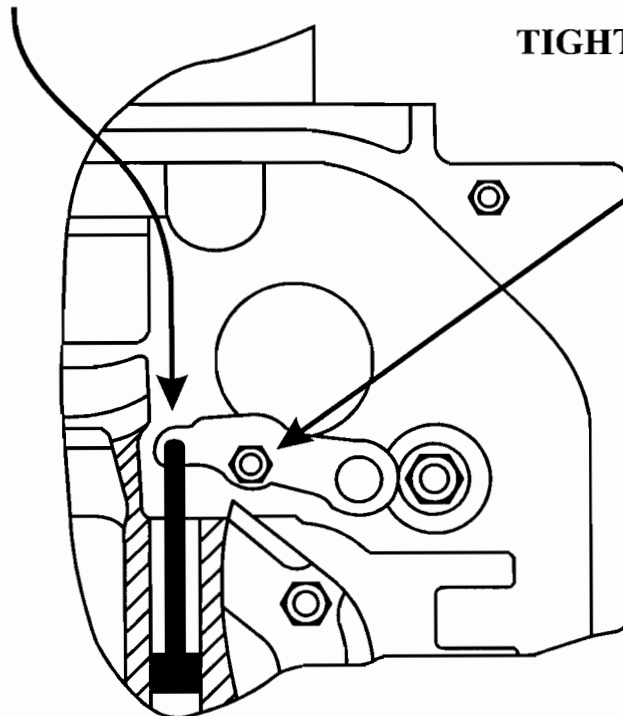
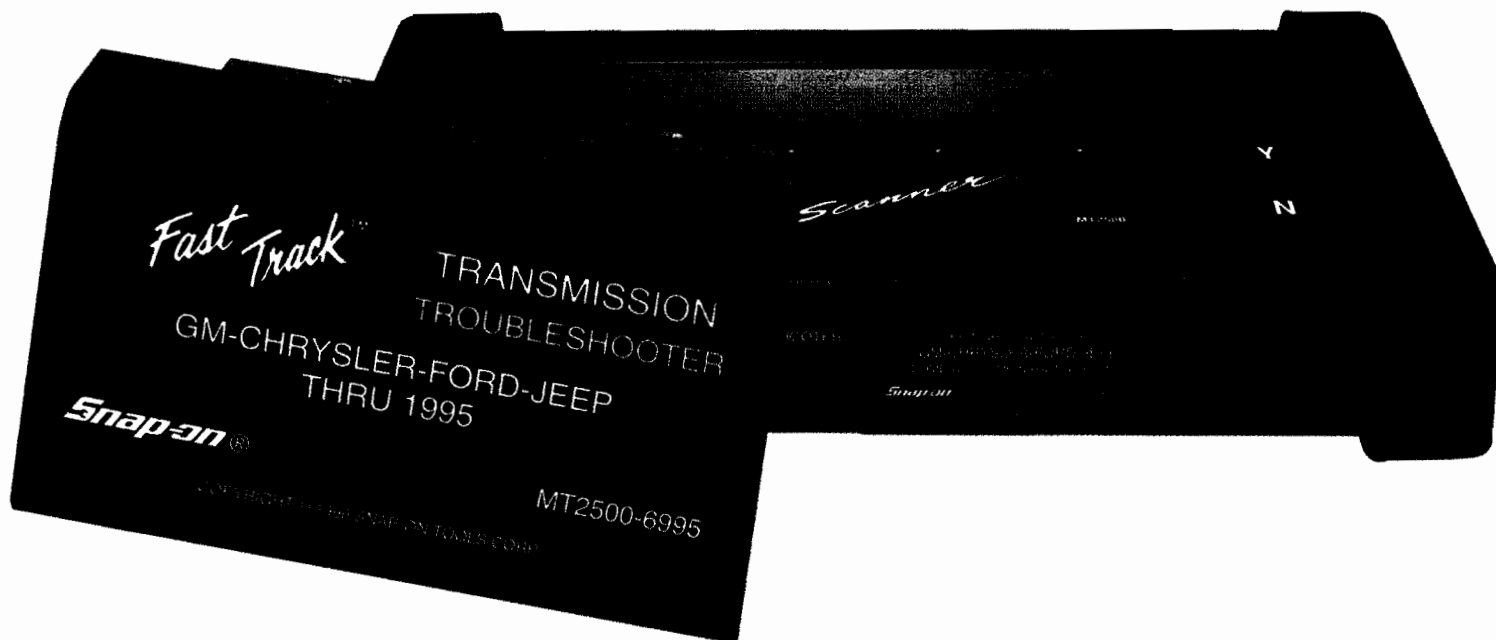


Figure 1

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AUDI/PASSAT 096-097 SLIPPING, HARSH SHIFTS, ERRATIC SHIFTS

COMPLAINT: A Volkswagon Audi or Passat equipped with the 096-097 transaxle may exhibit a harsh or soft shift condition, erratic shifts, and/or flared or slipping shifts.

CAUSE: The cause may be, solenoids that are partially clogged with debris, or solenoids that are open, and not closing properly. Refer to Figure 3 for solenoid application and function.

CORRECTION: ATSG has found that cleaning the solenoids is very effective in correcting the common complaints listed above. The following procedure is recommended during every rebuild.

- (1) Unplug the solenoid harness from the solenoids, remove the bolts retaining the control valve assembly to the transaxle and place the valve body on a clean work surface. Remove the bolts from the solenoid retaining brackets, and remove only one solenoid (See Figure 1). Leave the remaining solenoids in their respective bores and clean one solenoid at a time, as this will help eliminate the possibility of mixing valves and springs in the wrong bores.
- (2) Place the solenoid on work area with the end that goes into the valve body facing down. Using a small screwdriver or scribe, carefully pry the triangular shaped brass retainer out of the solenoid bore (See Figure 2).

Continued on next Page.

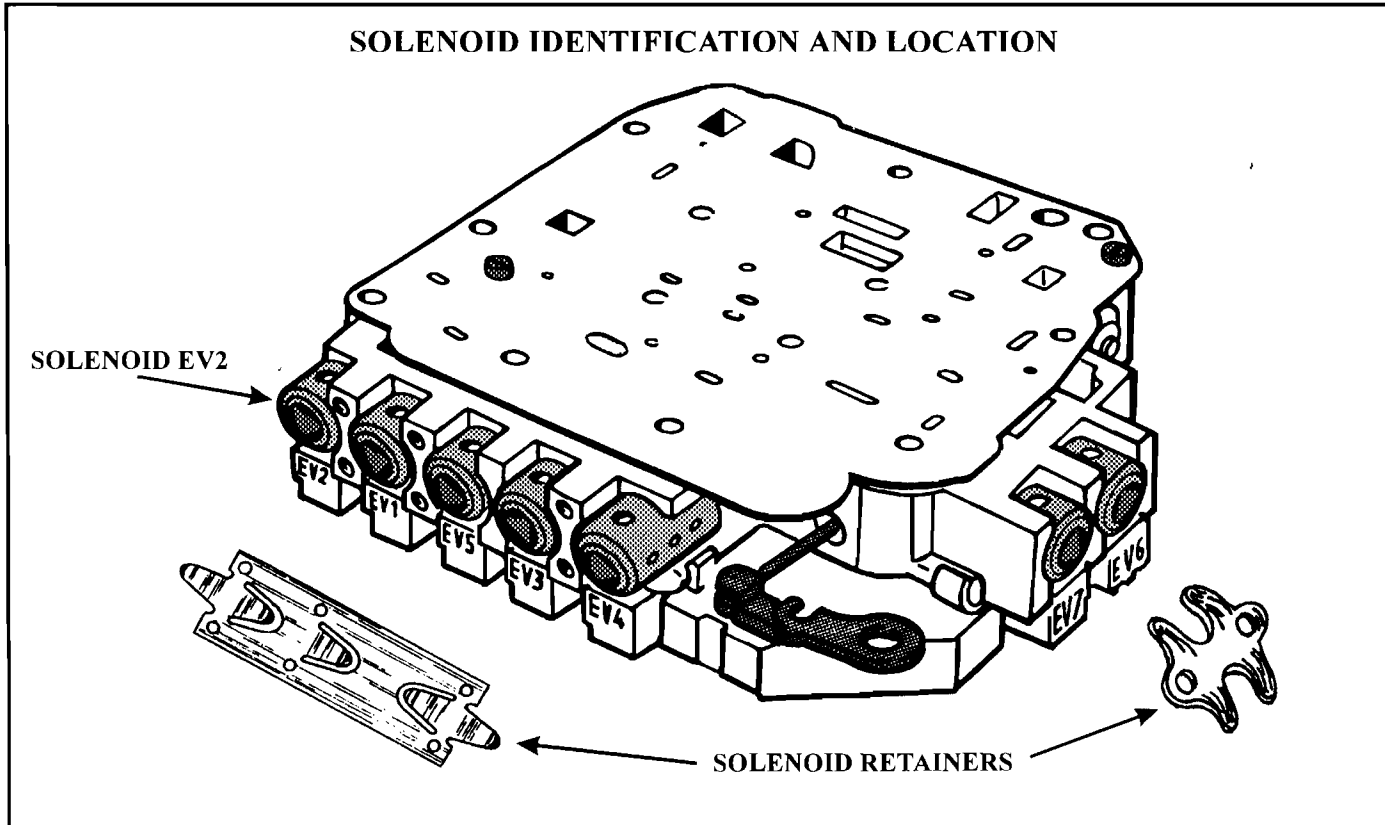


Figure 1

CORRECTION: (Continued)

- (3) Remove the large .280" diameter ball from the solenoid (See Figure 2). Inspect the solenoid ball carefully. The ball should be completely smooth, with no pitted areas and no visible flat spots. Clean all debris as necessary.
- (4) Inspect the inside diameter of the solenoid bore for damage or scoring from the ball valve. Polish the inside bore with Scotch-brite®, as shown in Figure 2. If the solenoid bore cannot be polished smooth, the solenoid should be discarded.
- (5) Inspect the ball seat in the bottom of the solenoid bore for embedded debris and/or damage. If the seat is in good condition, place a steel .250" diameter ball onto the seat, with the solenoid resting *on* a vise, not in the jaws. Using a drift punch and a small hammer, lightly tap the steel checkball several times to "renew" the seat in the solenoid, allowing the ball valve to have a better seal.
- (6) Remove the steel checkball and re-install the .280" diameter, copper colored ball valve back into the solenoid bore. Gently press the triangular shaped brass retainer into the solenoid, and gently stake in place (See Figure 2).
- (7) Repeat the above steps for each solenoid as necessary. Refer to Figure 3 for each solenoids application and description of its particular function. Refer to Figure 1 for solenoid identification and its location in the valve body.

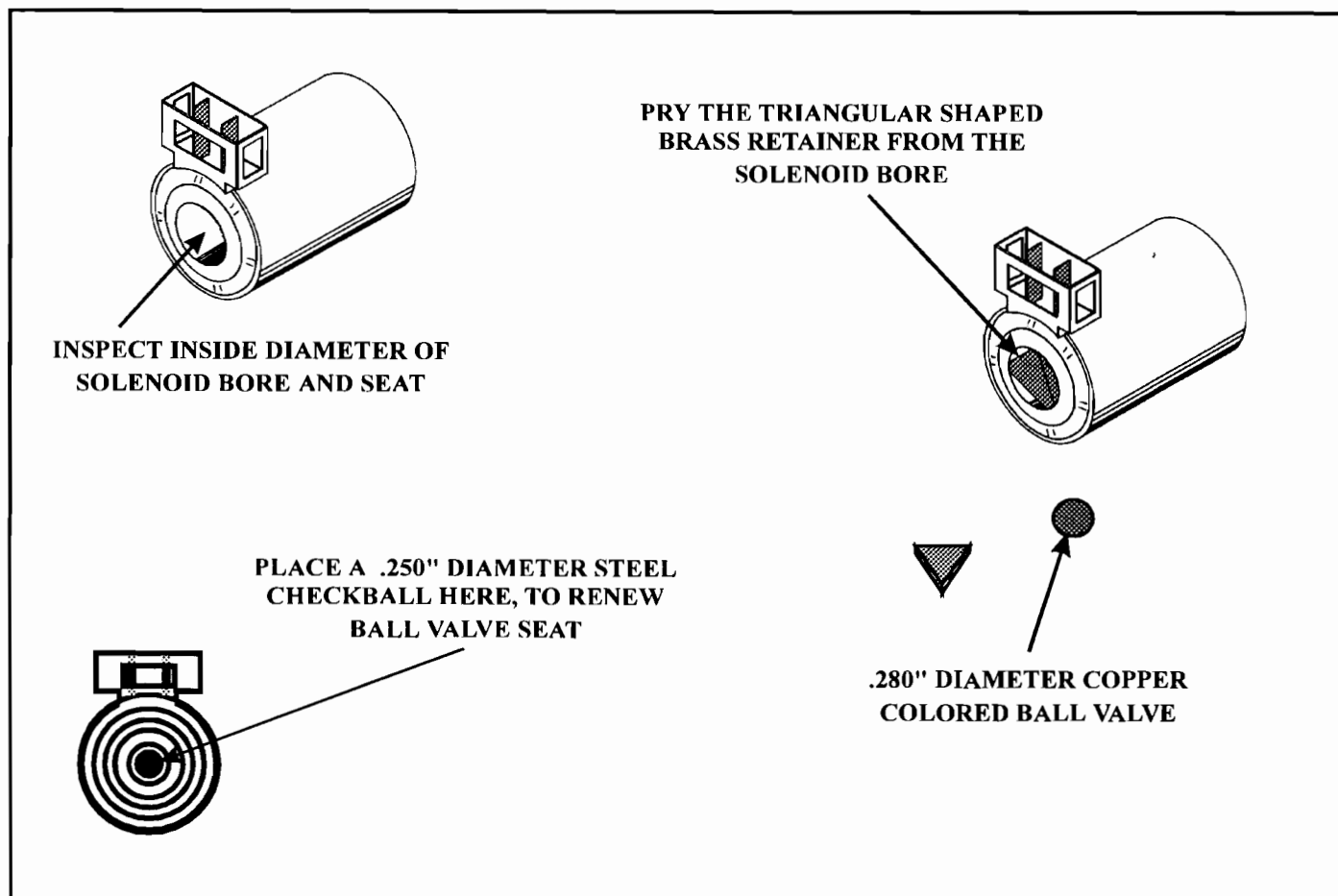


Figure 2

AUDI/PASSAT APPLICATION AND SOLENOID CHART

RANGE	GEAR	Internal Transaxle Components						Transaxle Solenoids						
		B1 CLUT	LOW ROLLR	K3 CLUT	K1 CLUT	K2 CLUT	B2 CLUT	EV1	EV2	EV3	EV4	EV5	EV6	EV7
P	PRK												EPC	
R	REV	ON				ON						ON-B	EPC	
N	NEU												EPC	
D4	1ST		HOLD		ON						ON	ON-B	EPC	
	2ND				ON		ON		ON		ON	ON-B	EPC	
	3RD-H				ON	ON						ON-B	EPC	
	3RD-M			ON	ON	ON				ON			EPC	ON-B
	4TH			ON			ON	ON	ON	ON	ON		EPC	ON-B
D3	1ST		HOLD		ON						ON	ON-B	EPC	
	2ND				ON		ON		ON		ON	ON-B	EPC	
	3RD-H				ON	ON						ON-B	EPC	
	3RD-M			ON	ON	ON				ON			EPC	ON-B
D2	1ST		HOLD		ON						ON	ON-B	EPC	
	2ND				ON		ON				ON	ON-B	EPC	
L	1ST	ON	HOLD		ON							ON-B	EPC	

RANGE	GEAR	DESCRIPTION OF SOLENOID FUNCTIONS
P	PRK	No solenoids are energized in Park.
R	REV	Solenoid EV5 is energized briefly to cushion the garage shift to reverse.
N	NEU	No solenoids are energized in Neutral.
D4	1ST	Solenoid EV4 is energized to exhaust pressure in the K2 clutch. Solenoid EV5 is energized briefly to cushion the garage shift to drive forward.
	2ND	Solenoid EV2 is energized to apply the B2 clutch. Solenoid EV4 is energized to exhaust pressure in the K2 clutch. Solenoid EV5 is energized briefly to cushion the 1-2 shift.
	3RD-H	Solenoid EV5 is energized briefly to cushion the 2-3 (Hydraulic) shift.
	3RD-M	Solenoid EV3 is energized to apply the K3 clutch. Solenoid EV7 is energized briefly to cushion the shift to Mechanical 3rd gear.
	4TH	Solenoid EV1 is energized to exhaust pressure in the K1 clutch. Solenoid EV2 is energized to apply the B2 clutch. Solenoid EV3 is energized to apply the K3 clutch. Solenoid EV4 is energized to exhaust pressure in the K2 clutch. Solenoid EV7 is energized briefly to cushion the shift from Mechanical 3rd gear to 4th.
IN ADDITION		Solenoid EV7 is energized briefly to cushion all coast and forced downshifts.

Figure 3

MERCEDES 722.3 - 722.4 SLIPPING AND/OR NO REVERSE

COMPLAINT: Before and/or after rebuild, any Mercedes equipped with the 722.3 - 722.4 transmission may exhibit a chattering in reverse, slipping in reverse, or no reverse.

CAUSE: The cause may be, a stuck or sticking *Accumulator Switching On Control Valve*, a collapsed or broken *Accumulator Switching On Control Valve Spring*, a missing, cut, or leaking seal ring on the accumulator piston, or a cracked *Accumulator Switching On Piston* (See Figure 1).

CORRECTION: Remove and disassemble the valve body. Inspect and replace as necessary, the parts and concerns listed above, as shown in Figure 1.

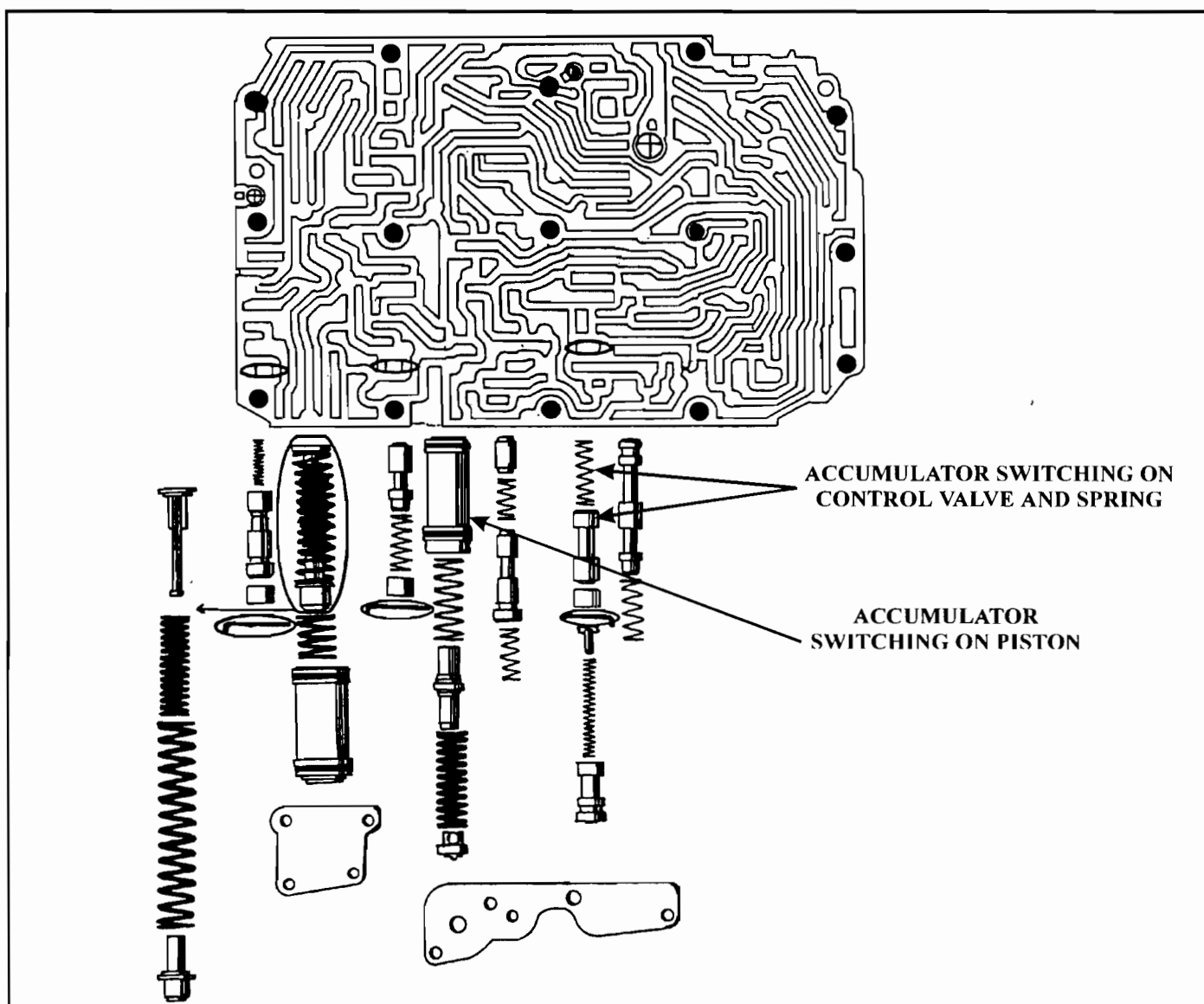


Figure 1



MERCEDES BENZ 722.4

DELAY OR SLIP ON TAKE-OFF MOMENTARY BIND-UP IN REVERSE NO OR FLARED 3-4 SHIFT

COMPLAINT: The transmission will delay during forward engagement, slip on initial take off or exhibit a momentary bind-up condition in reverse.
The transmission can also neutralize when coming to a stop and experience a severe reengagement when stepping back into the throttle. A no or flared 3-4 shift can also occur.

CAUSE: 1984 to 1994 Mercedes Benz 190 models with 722.4 automatic transmission can be equipped with one of **TWO** different sized B2 band servo piston diameters.
This means that there are **TWO** different sized servo piston seal diameters.
The use of the incorrect servo piston and seal combination can cause the above complaints. (Refer to Figure 1)

CORRECTION: Check the B2 band servo piston casting number in the chart below for proper identification.
The seal should rotate freely when installed correctly and the piston should return on its own when installed in the B2 bore.

NOTE: It is recommended that the edges of the piston seal groove be machined with a 15° chamfer to allow more oil to get under the seal in order to guaranty greater seal expansion. (Refer to Figure 2)
If the B2 piston has come from the factory with the 15° chamfer, it will NOT be necessary to perform the above procedure.

DIMENSION OF	PISTON CASTING # 201 277 00 38	PISTON CASTING # 201 277 01 38
	PISTON SEAL # 201 277 00 55	PISTON SEAL # 202 277 00 55
SEAL "T" CROSS SECTION	.104"-2.65mm	.136"-3.45mm
PISTON DIAMETER WO/SEAL	2.870"-72.88mm	2.807"-71.30mm
PISTON DIAMETER W/SEAL	2.950"-75.00mm	2.950"-75.00mm

MERCEDES BENZ 722.4
DELAY OR SLIP ON TAKE-OFF
MOMENTARY BIND-UP IN REVERSE
NO OR FLARED 3-4 SHIFT

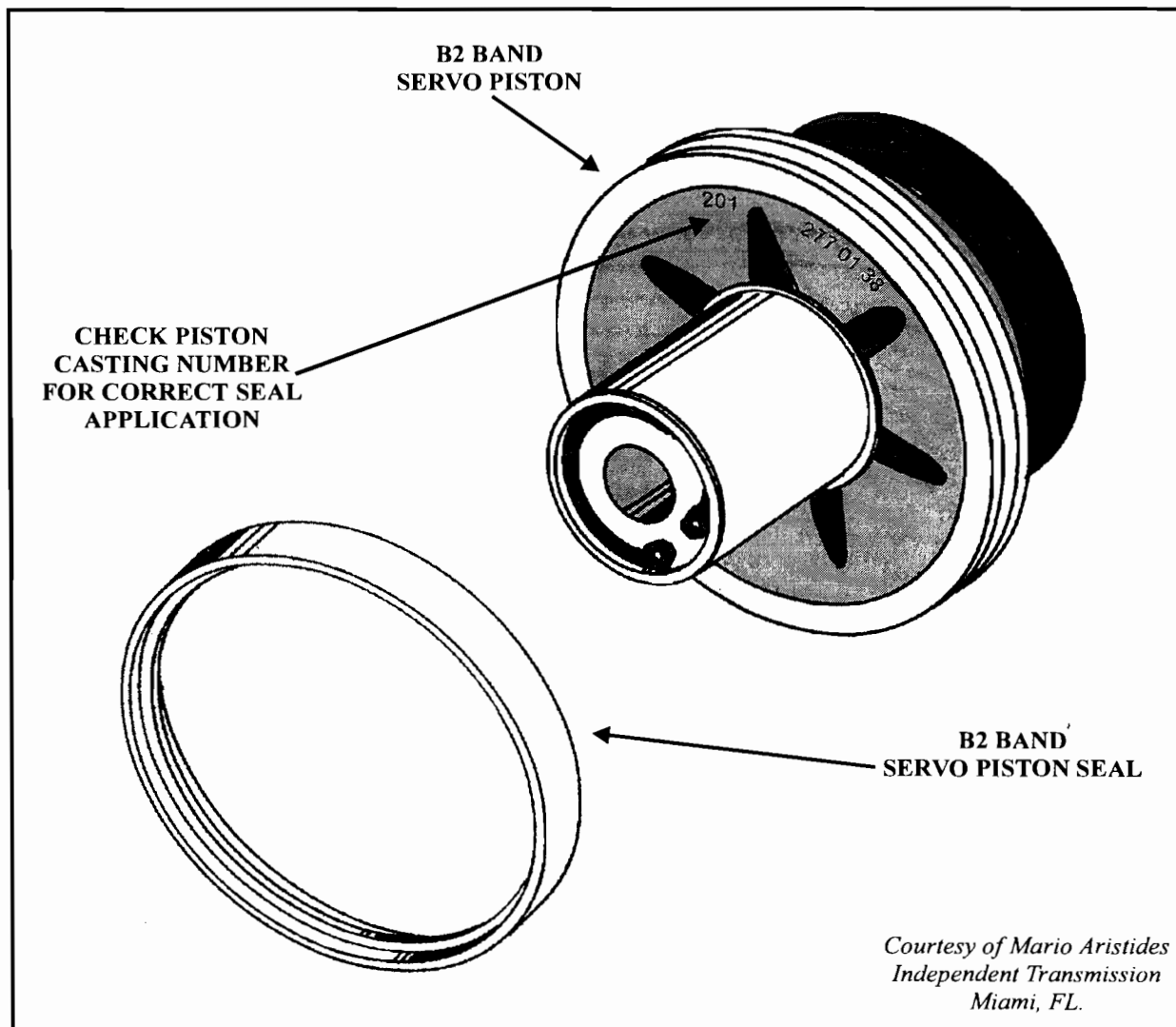
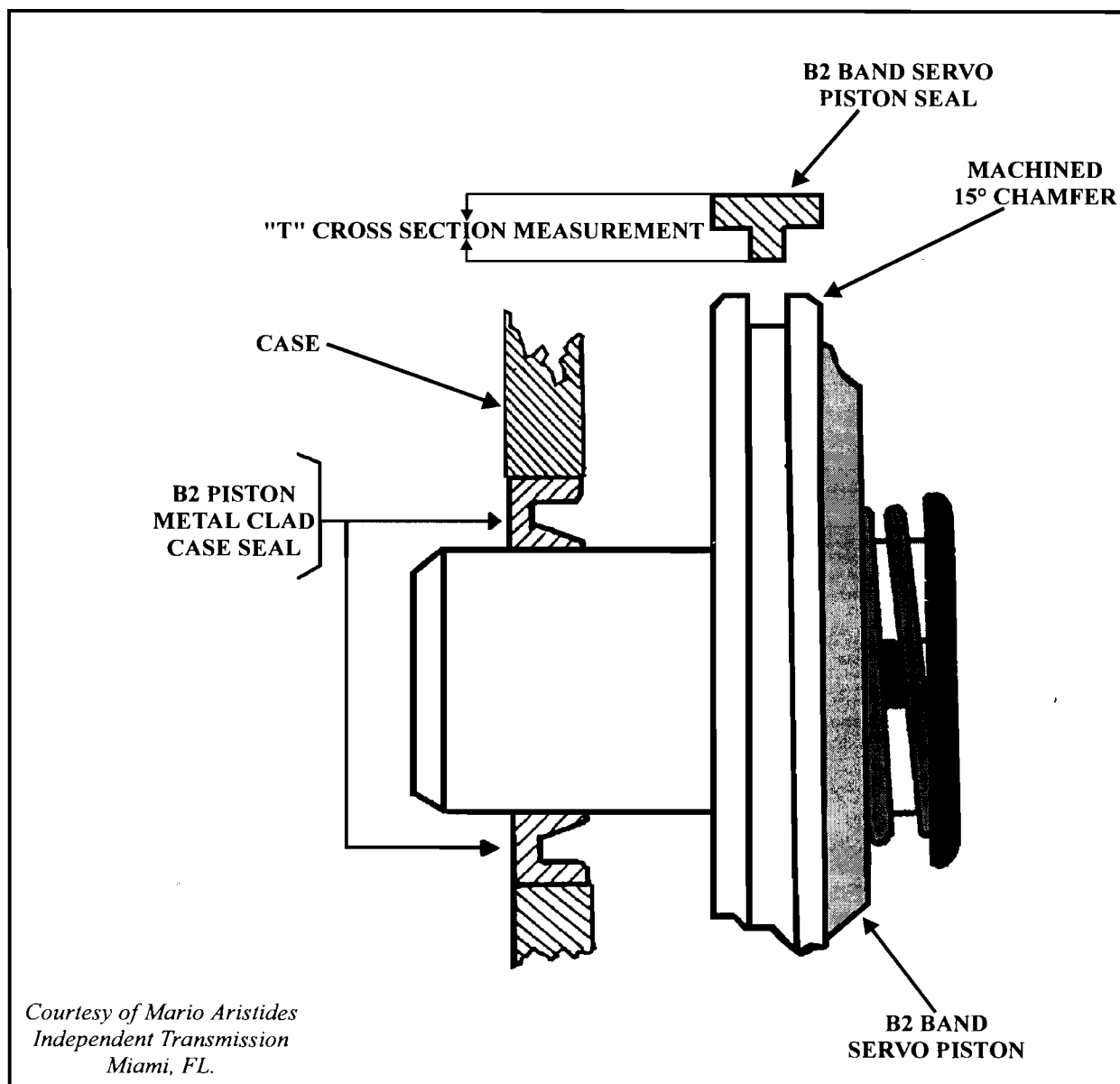


Figure 1

MERCEDES BENZ 722.4
DELAY OR SLIP ON TAKE-OFF
MOMENTARY BIND-UP IN REVERSE
NO OR FLARED 3-4 SHIFT



*Courtesy of Mario Aristides
Independent Transmission
Miami, FL.*

Figure 2

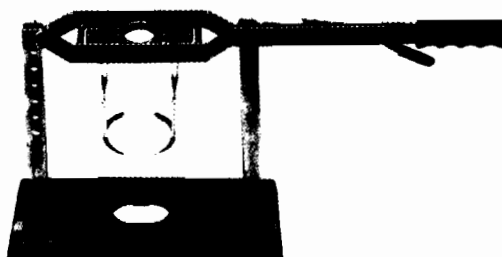
DEMAND THE BEST



T-0025-A
RINGLOC SNAP RING
PLIERS



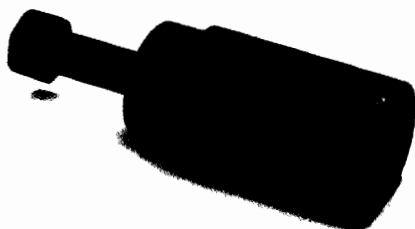
T-1703
FRONT PUMP SPRING LOADER
TOOL FOR GM 700R4, 2004R
AND 440-T4



T-0158-SP
SNAPRESS CLUTCH
SPRING COMPRESSOR



T-0157
QUICK LOCK
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BMW ELECTRONIC TRANSMISSION DIAGNOSTIC TOOL 1987 AND LATER SYSTEMS

COMPLAINT: Diagnosing BMWs with electronically controlled automatic transmissions has been a problem since the motronic system appeared in 1987. The vehicle may be in limp mode and the transmission warning lamp may be illuminated, OR, neither of those may be present but, the transmission just doesn't work right. At this point in time the technician is not certain how to approach this situation.

CAUSE: The information available for system operation as well as reasonably affordable diagnostic equipment was virtually non-existent

CORRECTION: The manufacturer is releasing more information all the time and to further help the technician a NEW hand held diagnostic tool is now available to communicate with the BMW electronic control systems shown in Figure 1.

The BMW Diagnostic Tool will plug into the diagnostic connector as illustrated in Figure 2, on any 1987 to present system equipped with 35, 55 or 88 pin control units.

It will adapt to 3 series, 5 series, 7 series and 8 series vehicles equipped with 4HP22/24 (early version), 4HP22/24 (late version), 4L30E, 5HP18, and 5HP30.

The tool has the ability to **RECALL CODES**, **CLEAR CODES** and **COMPONENT ACTIVATION**. This is especially helpful when diagnosing a computer controlled transmission such as the 5HP30 which contains a record **8 SOLENOIDS**.

The BMW Diagnostic Tool can be purchased from the tools distributor,
CONTACT MARIO ARISTIDES, PHONE...305-666-3544

FAX.....305-666-8238

BMW ELECTRONIC TRANSMISSION DIAGNOSTIC TOOL 1987 AND LATER SYSTEMS

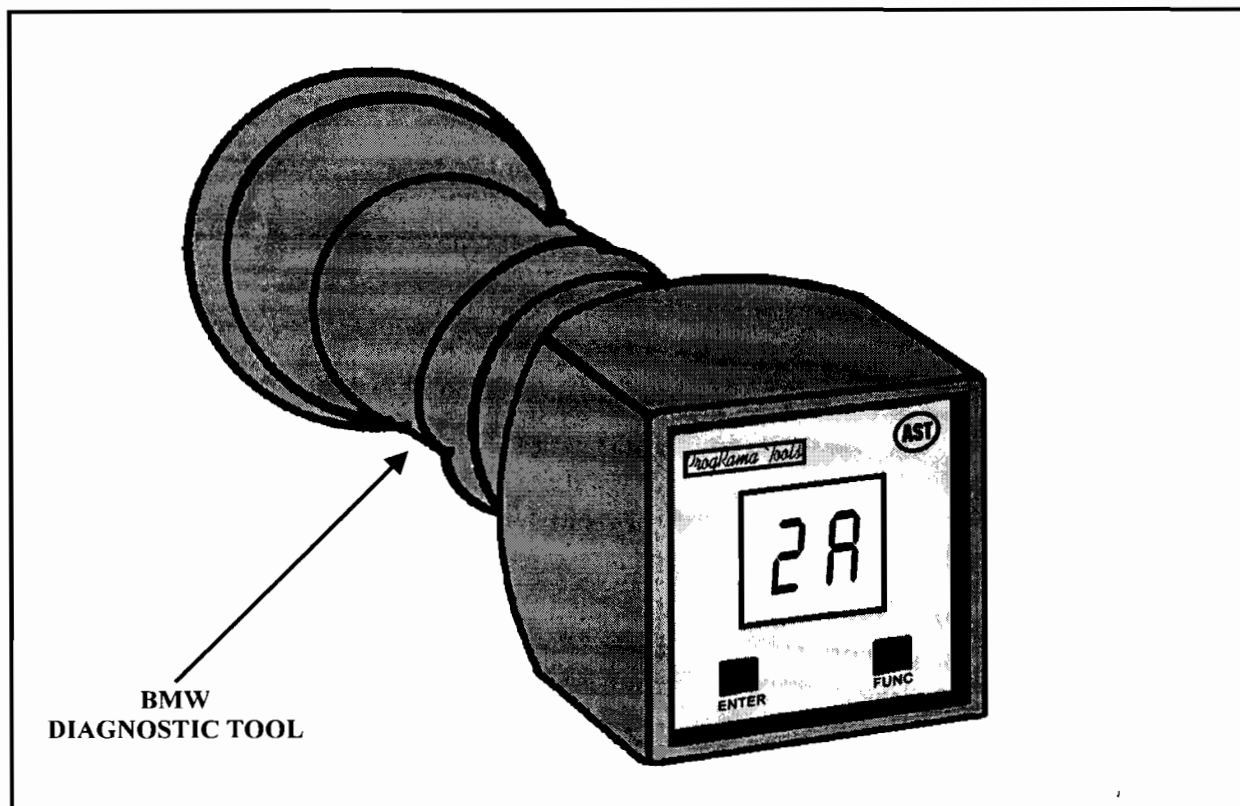


Figure 1

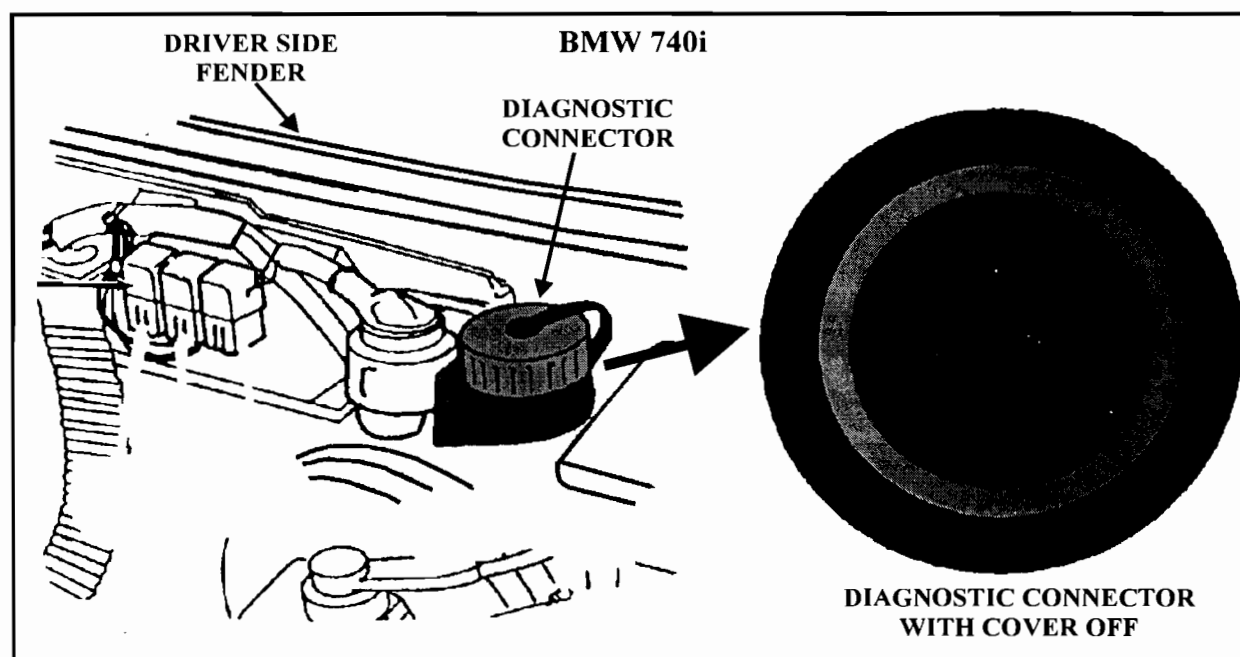


Figure 2



ZF 4HP22/ZF 4HP22/24EH

INSTALLATION OF CLUTCH CYLINDER AND LUBE CASE SEALS

COMPLAINT: There is some confusion concerning the use of the rubber clutch cylinder case seals and as to whether or not the rubber lube seal is used and where it is located.

CAUSE: Insufficient information from the manufacturer.

CORRECTION: Figure 1 illustrates the location and circuit for each of the clutch cylinder seals. This model does NOT use the lube seal.
The model in Figure 2 shows the location of the required lube seal.
The illustration in Figure 2 also indicates that the 2 governor seals are not used on electronic models due to the absence of a governor.
The location of the clutch cylinder case seals and their springs and retaining rings are shown in Figure 3.
In Figure 4 the location of the lube seal is shown. Notice how the case is indented to accept the alignment tab of the lube seal. The indentation is a fast way of knowing if the lube seal is required or not.

SERVICE INFORMATION:

Clutch Cylinder Sealing Sleeves.....	Part # 0734 317 003
Lube Sealing Sleeve.....	Part # 1043 301 514
Retaining Snap Rings.....	Part # 0630 502 079
Compression Spring.....	Part # 0301 323 087

NOTE: The above part numbers are **ZF** part numbers which are obtained from a **ZF Distributor**.

*Thanks to Mario Aristides
Independent Transmission
Miami, FL.*

ZF 4HP22/ZF 4HP22/24EH

INSTALLATION OF CLUTCH CYLINDER AND LUBE CASE SEALS

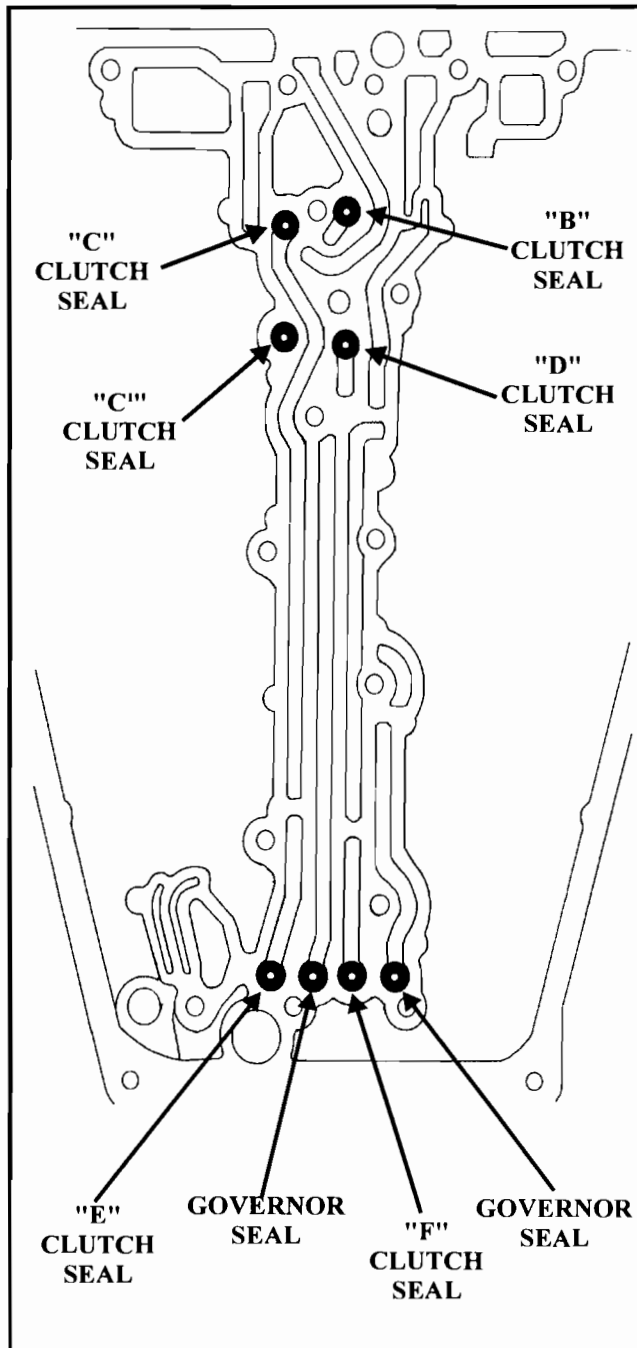


Figure 1

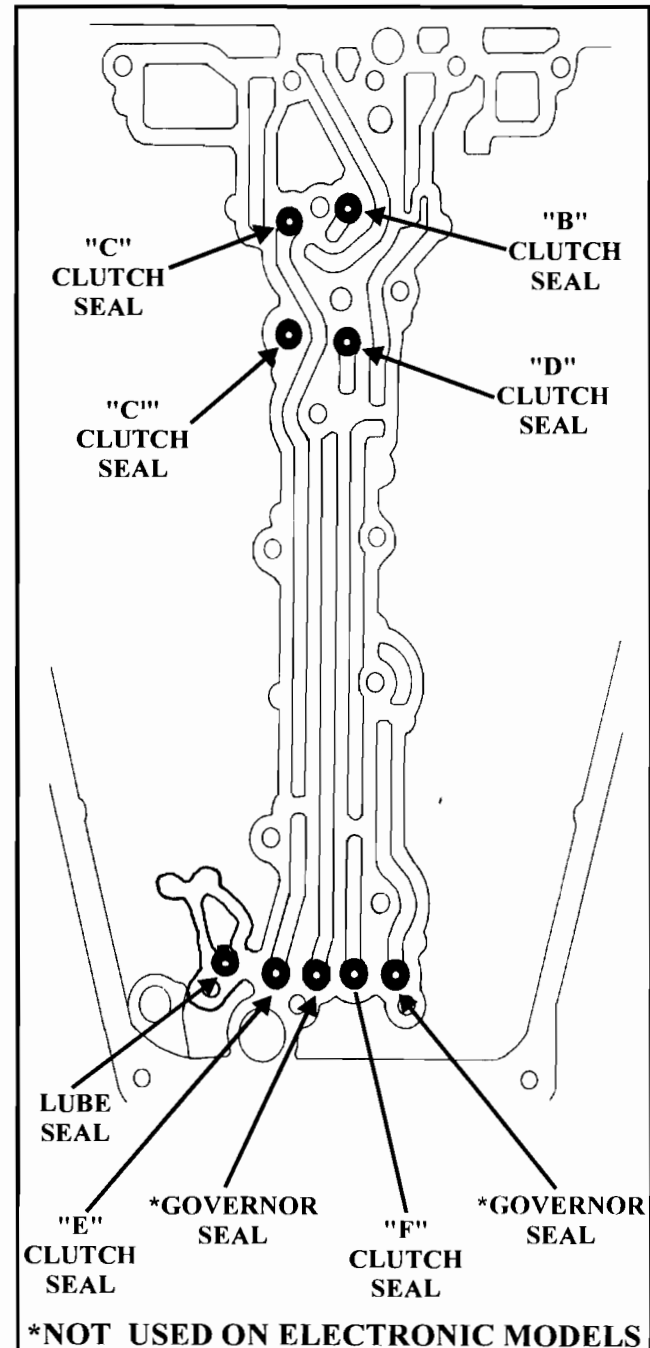


Figure 2

ZF 4HP22/ZF 4HP22/24EH

INSTALLATION OF CLUTCH CYLINDER AND LUBE CASE SEALS

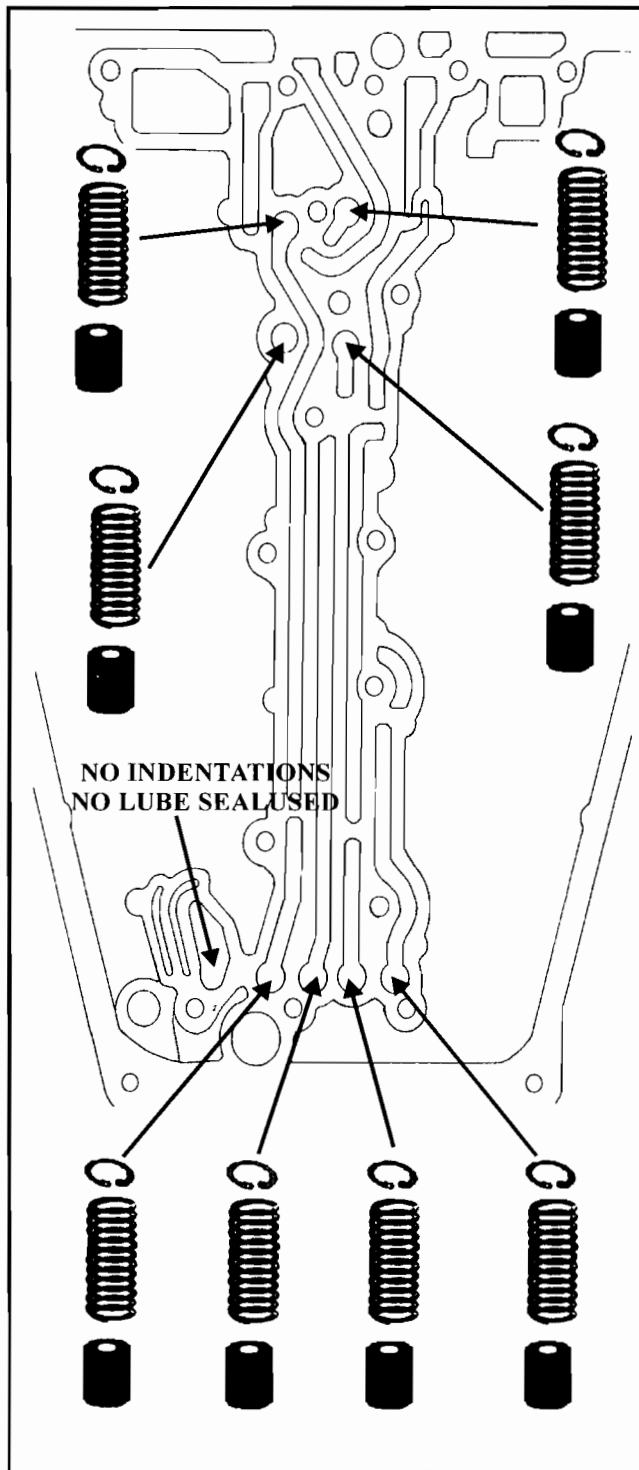


Figure 3

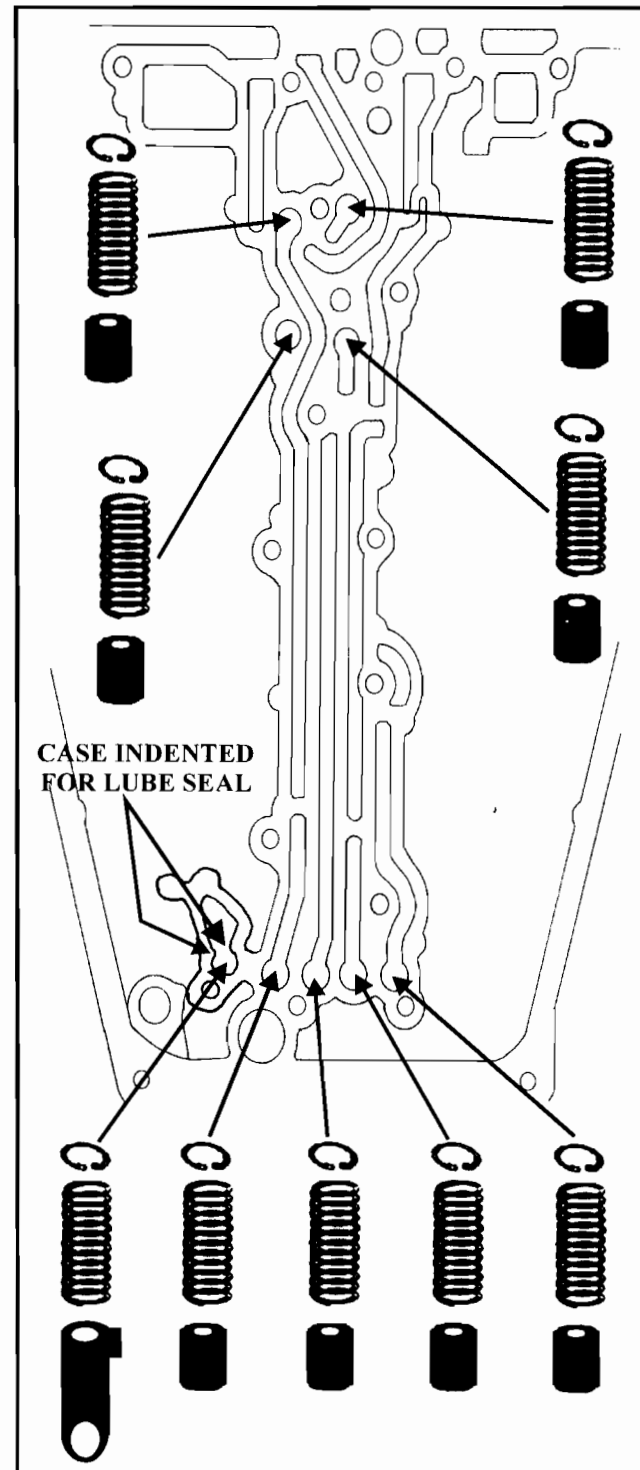


Figure 4

ZF 5HP 30**ATF FLUID LEVEL MAINTENANCE**

The ZF 5 HP 30 (A5S 560 Z) which is found in 1995 and later BMW 540i, 740 840, 750 and 850 models equipped with V8 engines, is a rear wheel drive, 5 speed transmission.

This transmission is factory filled with a synthetic fluid which BMW feels will require ***NO MAINTENANCE*** throughout the life of the transmission.

However, should the transmission require some type of service that necessitates refilling the unit, the first thing that will be noticed is, there is ***NO FILLER TUBE!***

The procedure for checking or refilling the transmission is as follows:

1. Let the vehicle run for 10 to 15 minutes in order to get the ATF temperature to 30° to 50°C (85° to 122°F). The internal expansion tank shown in Figure 1 will compensate for any rise in fluid level due to thermal expansion.
2. Raise the vehicle and remove the check/fill plug in the center of the oil pan. (Refer to Figure 1)
3. Fill with correct fluid until oil overflows the check/fill plug opening and loosely install plug.
4. Start engine, turn head lamps on and place mode switch to the "WINTER" position to raise engine RPM.
5. Allow excess oil to drain from the check/fill plug opening.
6. Reinstall the check/fill plug and tighten.

*Thanks to Mario Aristides
Independent Transmission
Miami, FL.*

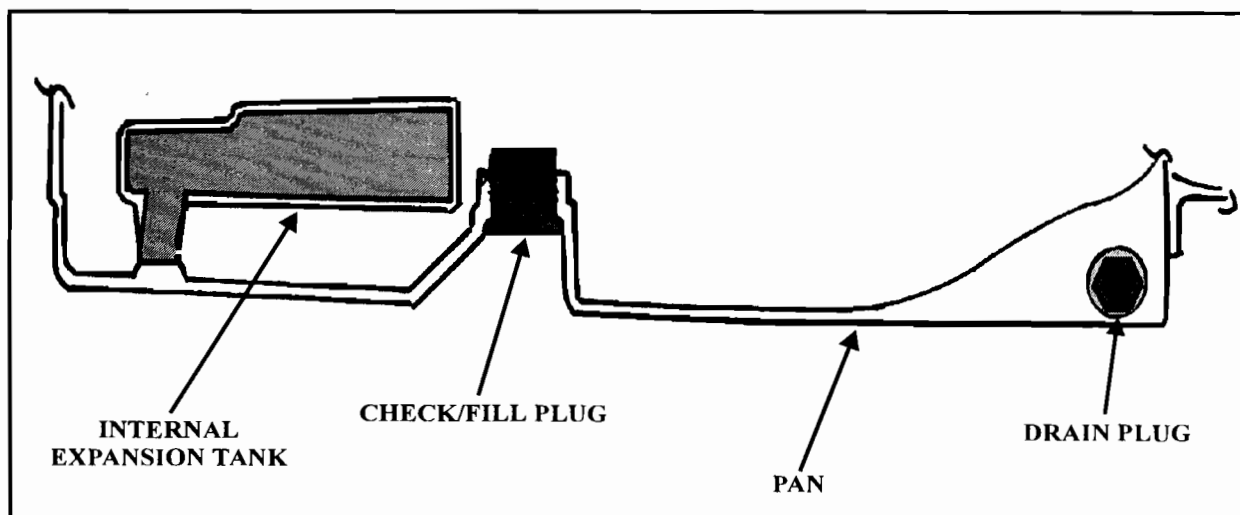


Figure 1



ZF 4HP-14, 4HP-18, 4HP-22

VALVE BODY RETAINER LOCATIONS VALVE BODY CHECKBALL LOCATIONS VALVE BODY ORIFICE LOCATIONS

4HP-18

Refer to Figure 1 for Upper and Lower Valve Body Retainer locations.

Refer to Figure 2 for Main Valve Body Retainer, Orifice, and Checkball locations.

Refer to Figure 3 for Transfer Plate Orifice, and Checkball locations.

4HP-14

Refer to Figure 4 for Main Valve Body Retainer, Orifice, and Checkball locations.

Refer to Figure 5 for Transfer Plate Orifice, and Checkball locations.

4HP-22

Refer to Figure 6 for Lower Front Valve Body Retainer locations.

Refer to Figure 7 for Lower Rear Valve Body Retainer locations.

Refer to Figure 8 for Upper Right Valve Body Retainer locations.

Refer to Figure 9 for Upper Left Valve Body Retainer locations.

Refer to Figure 10 for "Peugot Non-Turbo" Lower Rear Valve Body Orifice, and Checkball locations.

Refer to Figure 11 for "Peugot Non-Turbo" Lower Front Valve Body Orifice, and Checkball locations.

Refer to Figure 12 for "Prugot Non-Turbo" Upper Right Valve Body Checkball locations.

Refer to Figure 13 for "Peugot Non-Turbo" Channel Plate Orifice, and Checkball locations.

Refer to Figure 14 for "Peugot Turbo Diesel" Lower Rear Valve Body Orifice, and Checkball locations.

Refer to Figure 15 for "Peugot Turbo Diesel" Lower Front Valve Body Orifice, and Checkball locations.

Refer to Figure 16 for "Peugot Turbo Diesel" Upper Right Valve Body Checkball locations.

Refer to Figure 17 for "Peugot Turbo Diesel" Channel Plate Orifice, and Checkball locations.

Refer to Figure 18 for "Volvo" Lower Rear Valve Body Orifice, and Checkball locations.

Refer to Figure 19 for "Volvo" Lower Front Valve Body Orifice, and Checkball locations.

Refer to Figure 20 for "Volvo" Upper Right Valve Body Checkball locations.

Refer to Figure 21 for "Volvo" Channel Plate Orifice, and Checkball locations.

4HP-18 VALVE BODY RETAINER LOCATIONS

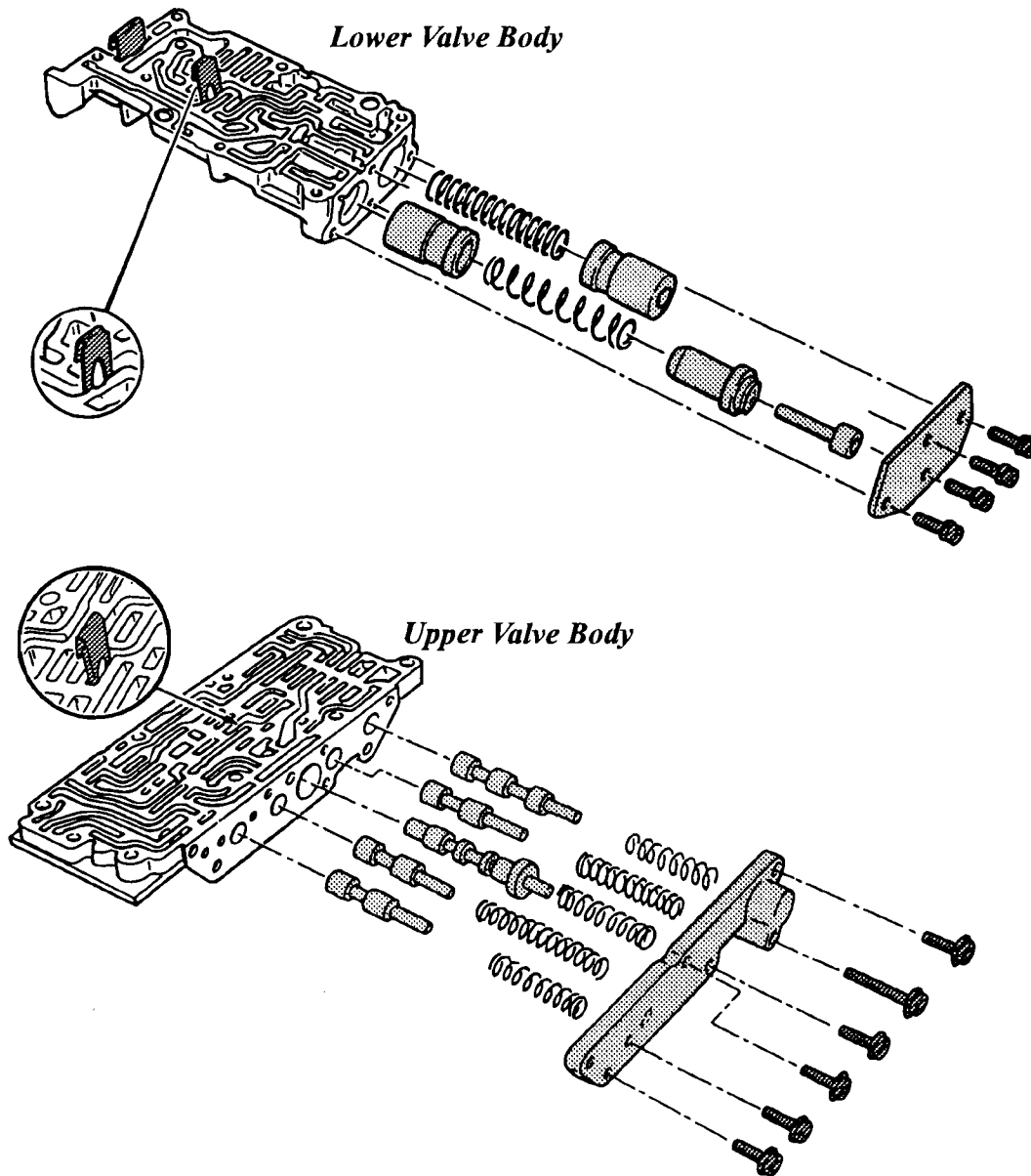


Figure 1

4HP-18 RETAINER AND ORIFICE LOCATIONS

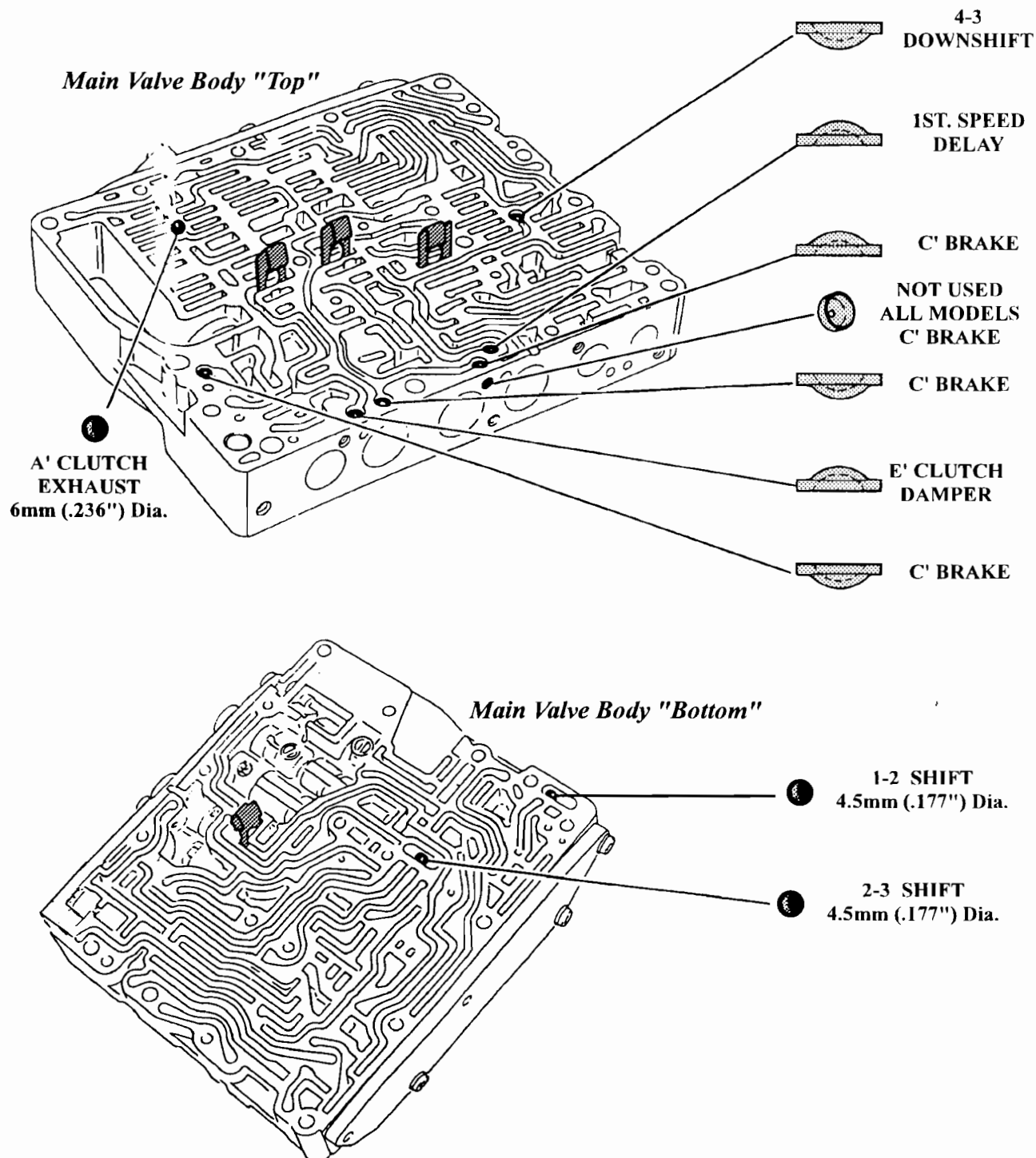


Figure 2

4HP-18 RETAINER AND ORIFICE LOCATIONS

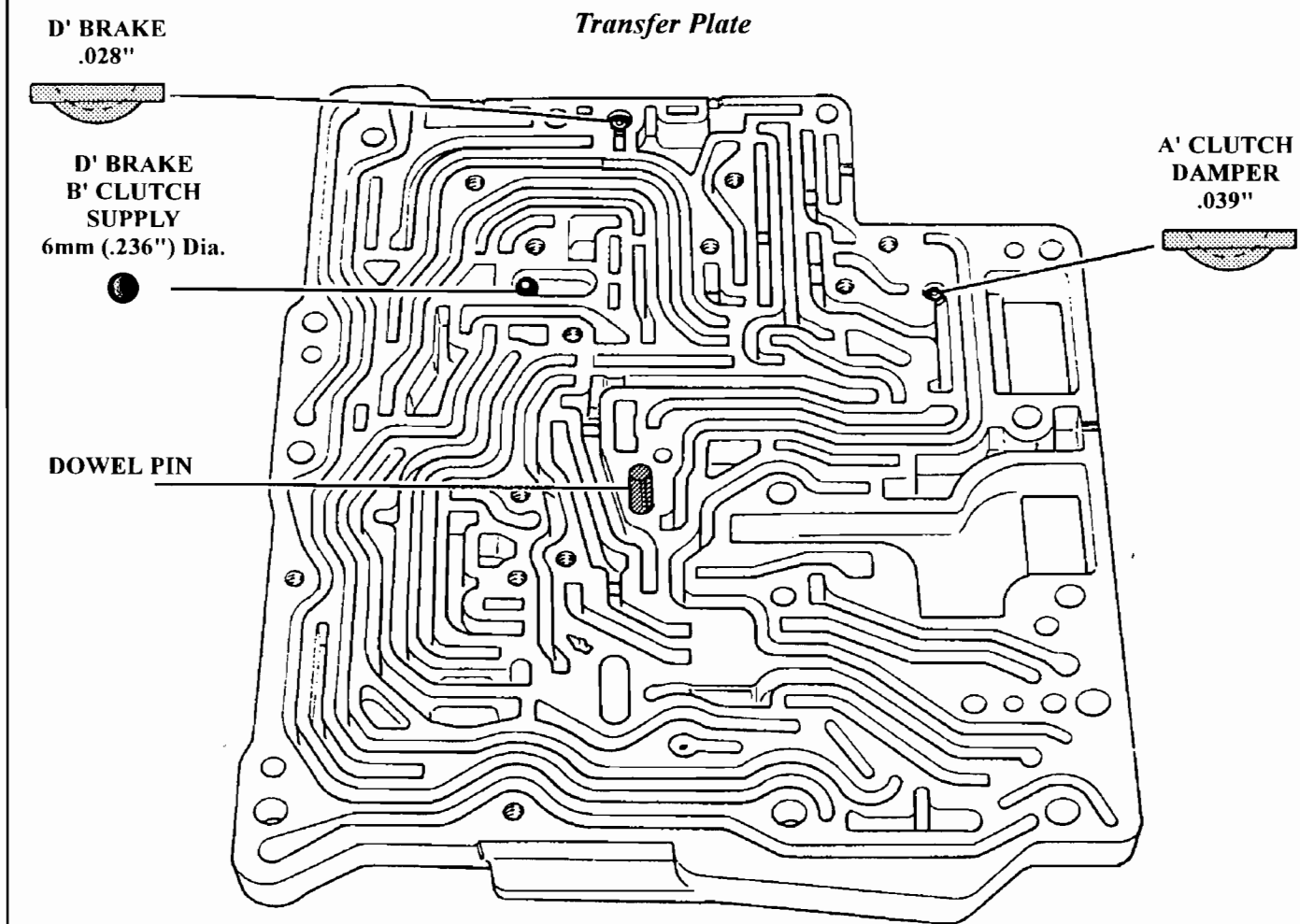


Figure 3

4HP-14 RETAINER AND ORIFICE LOCATIONS

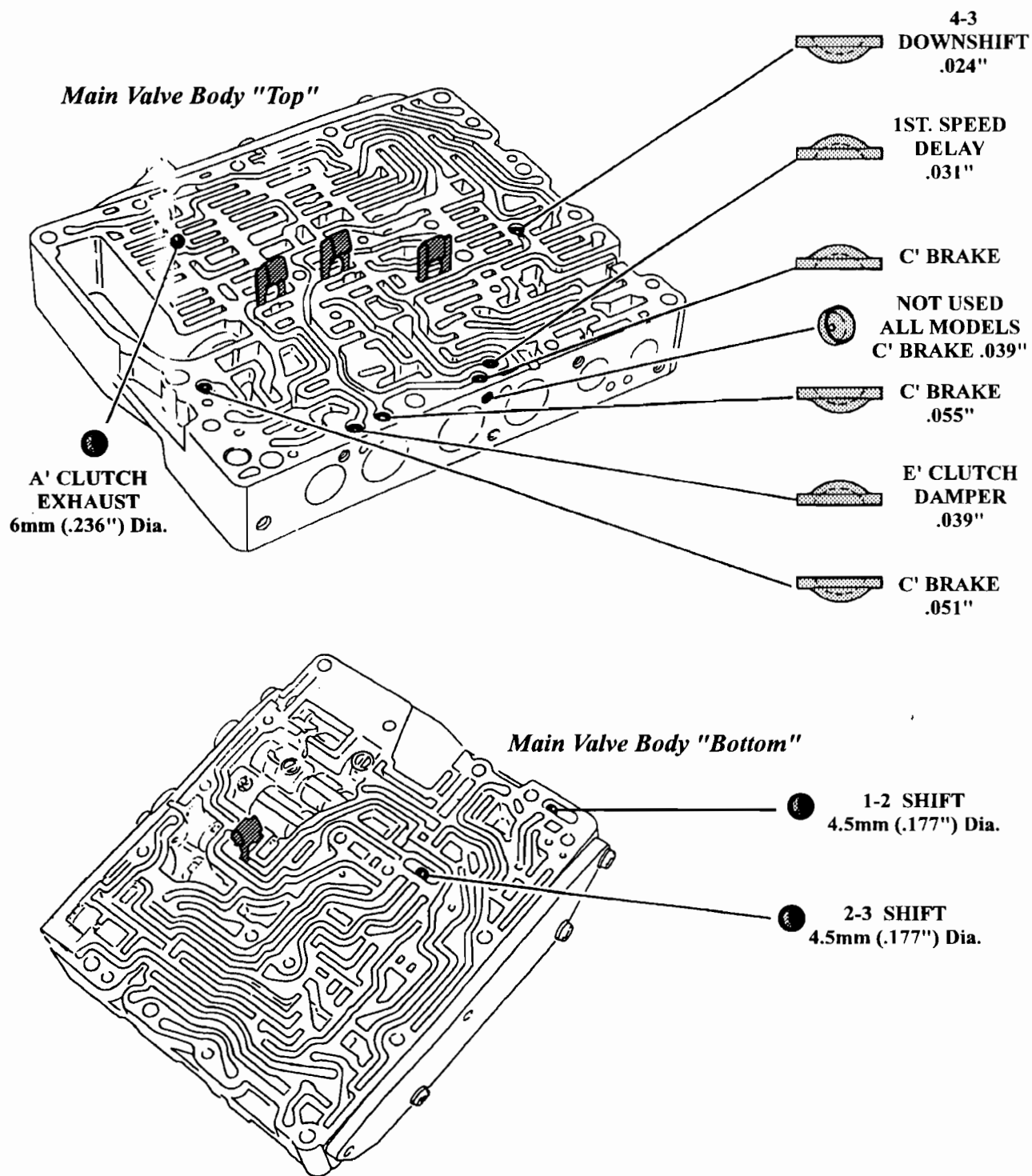


Figure 4

4HP-14 RETAINER AND ORIFICE LOCATIONS

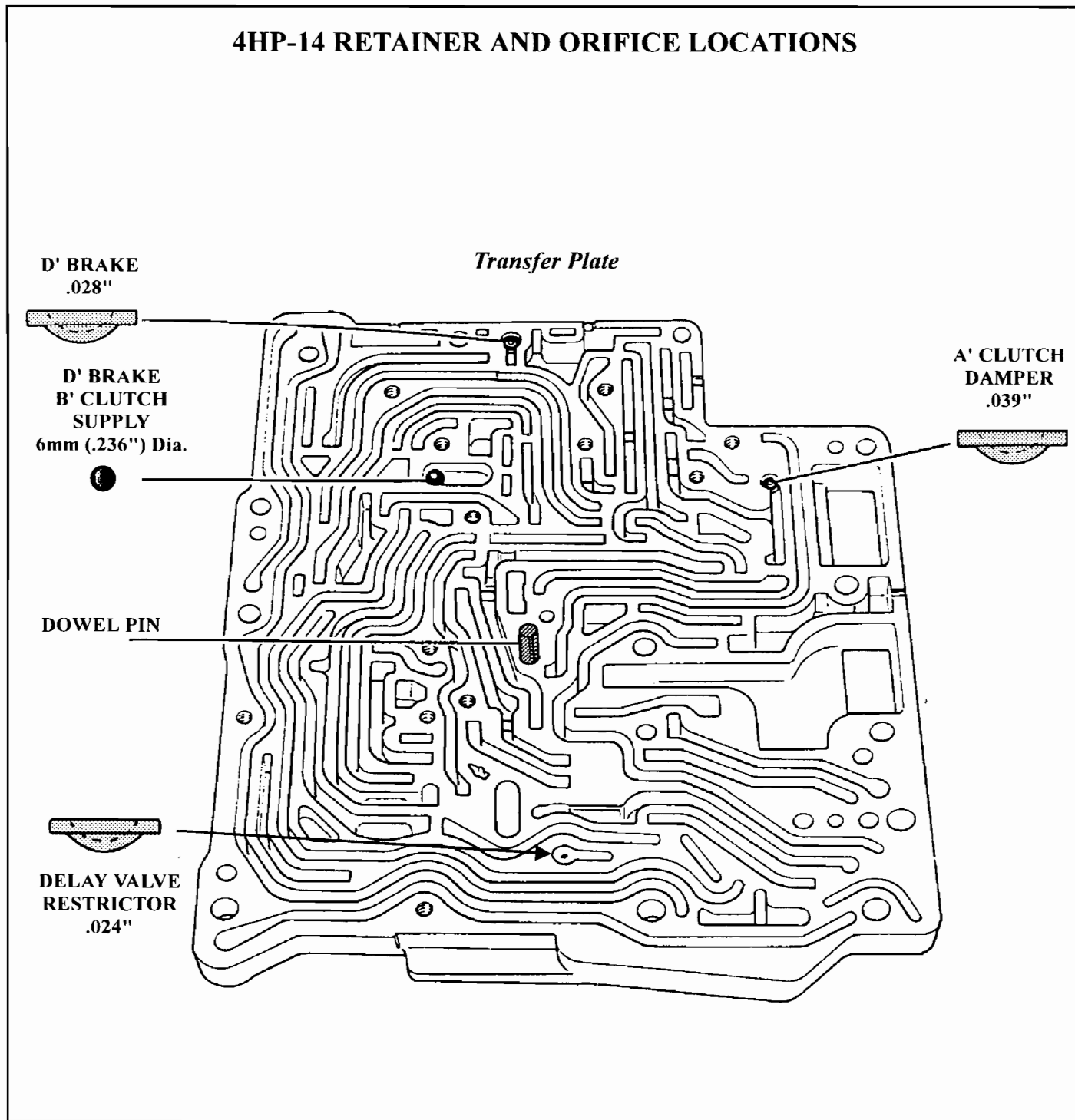


Figure 5

4HP-22 VALVE BODY RETAINER LOCATIONS

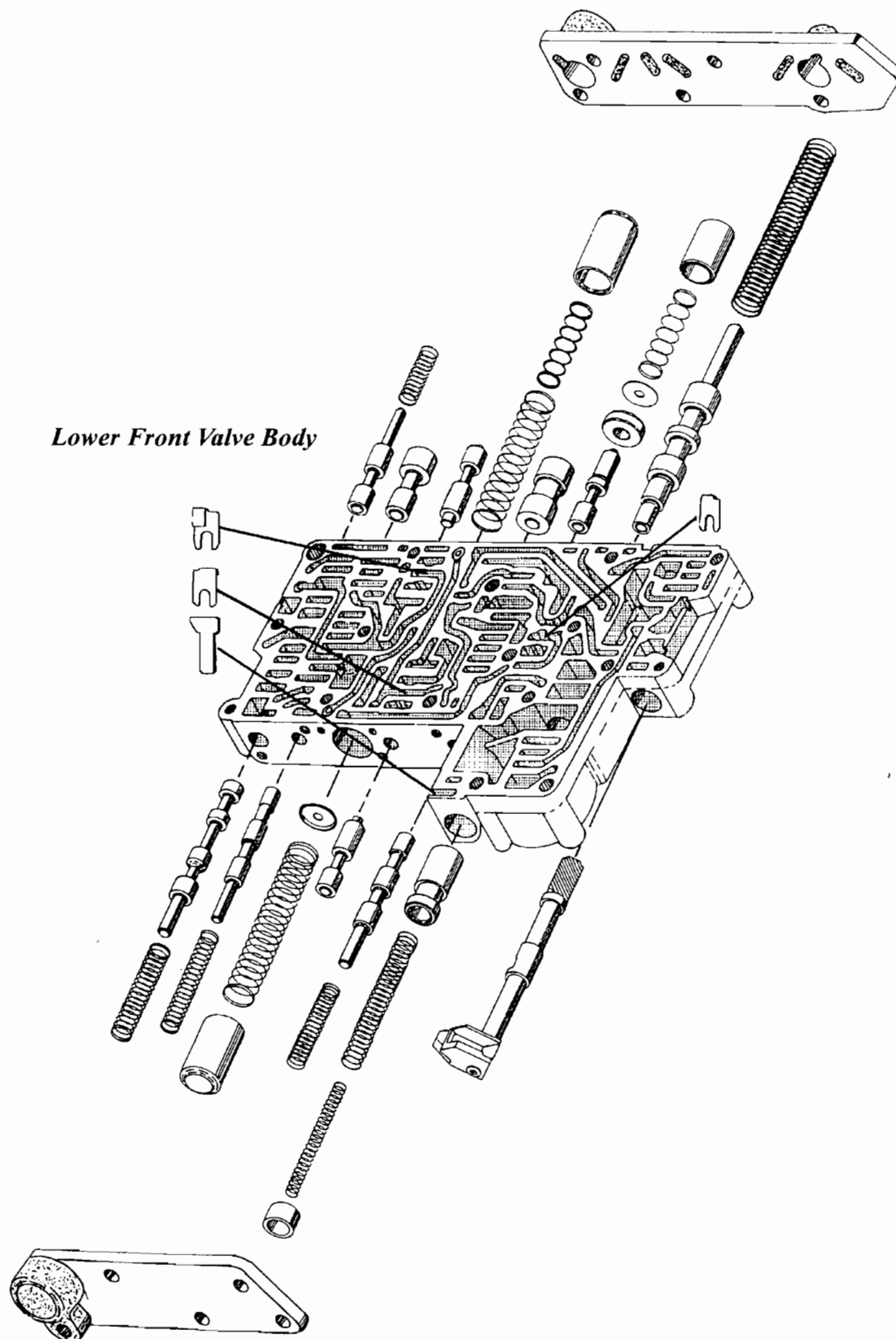


Figure 6

4HP-22 VALVE BODY RETAINER LOCATIONS

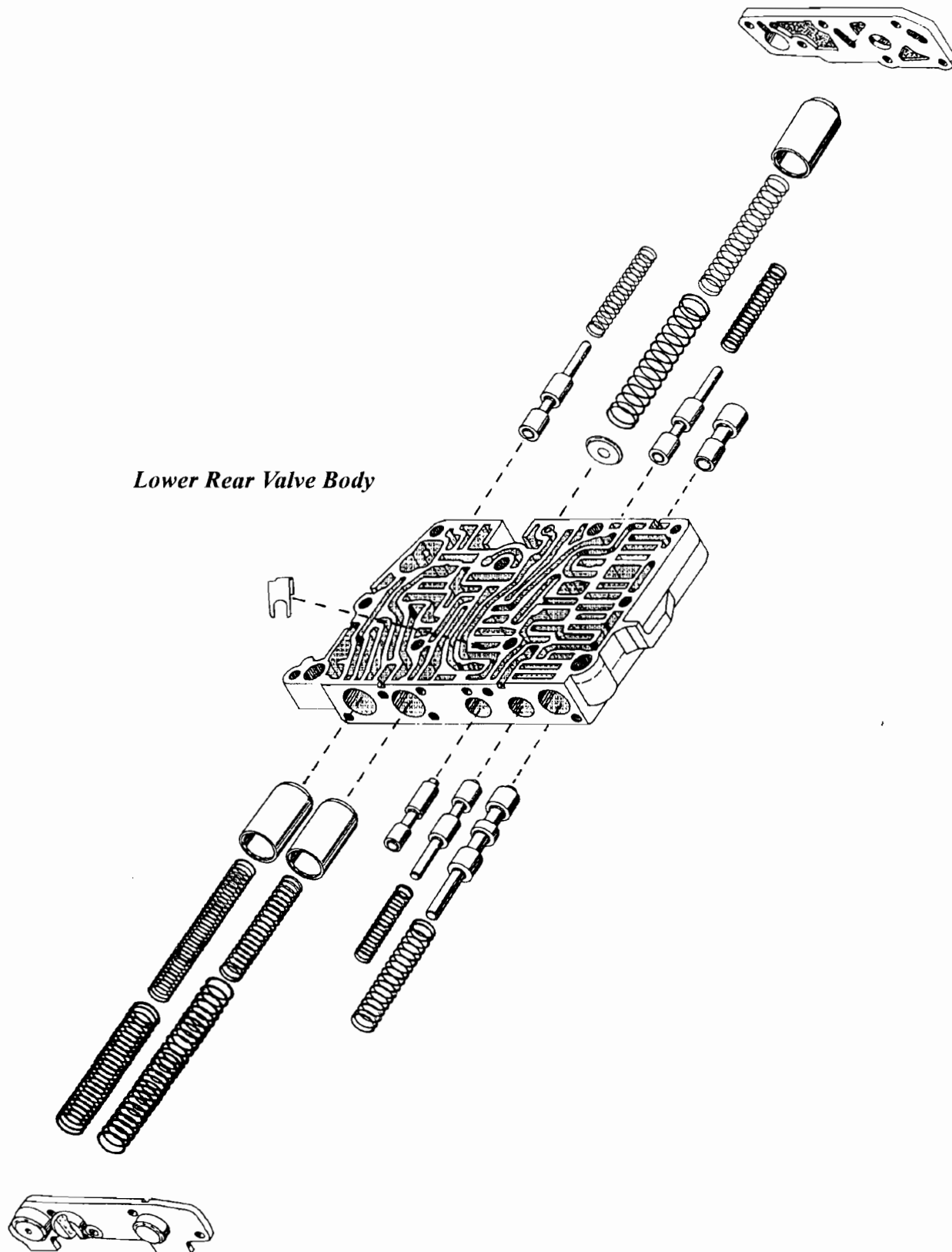


Figure 7

4HP-22 VALVE BODY RETAINER LOCATIONS

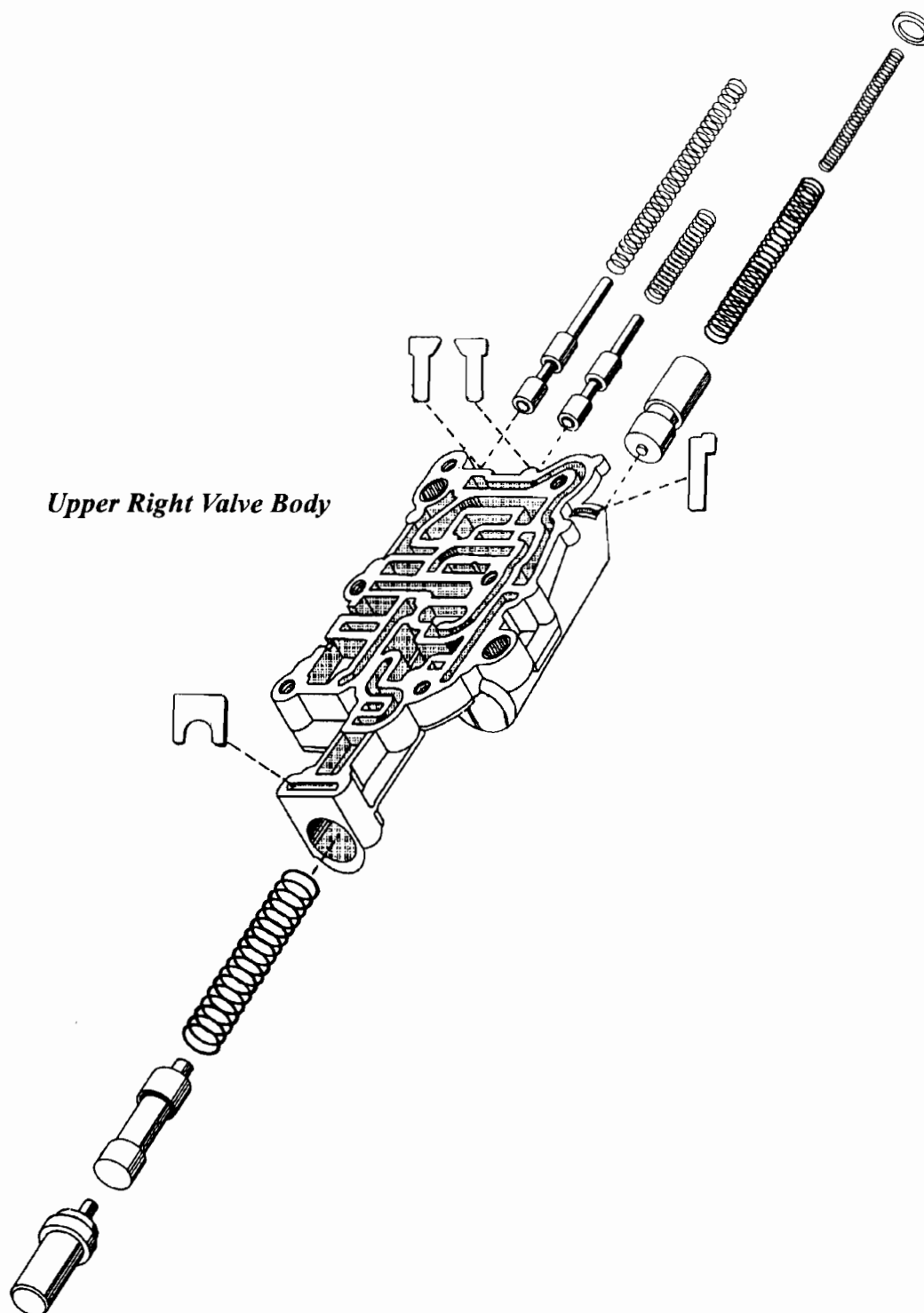


Figure 8

4HP-22 VALVE BODY RETAINER LOCATIONS

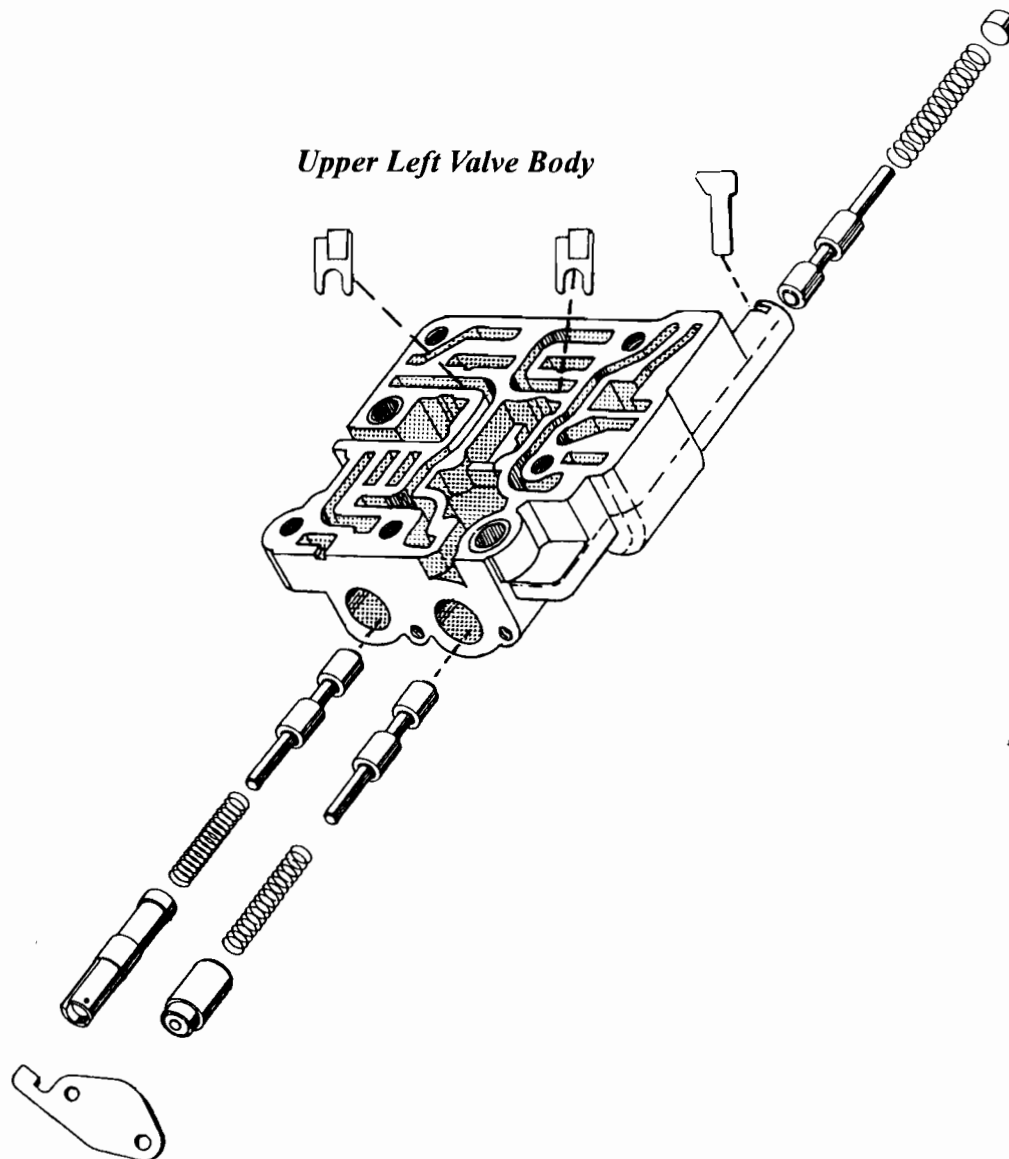


Figure 9

**4HP-22 CHECKBALL AND ORIFICE LOCATIONS
PEUGOT NON-TURBO**

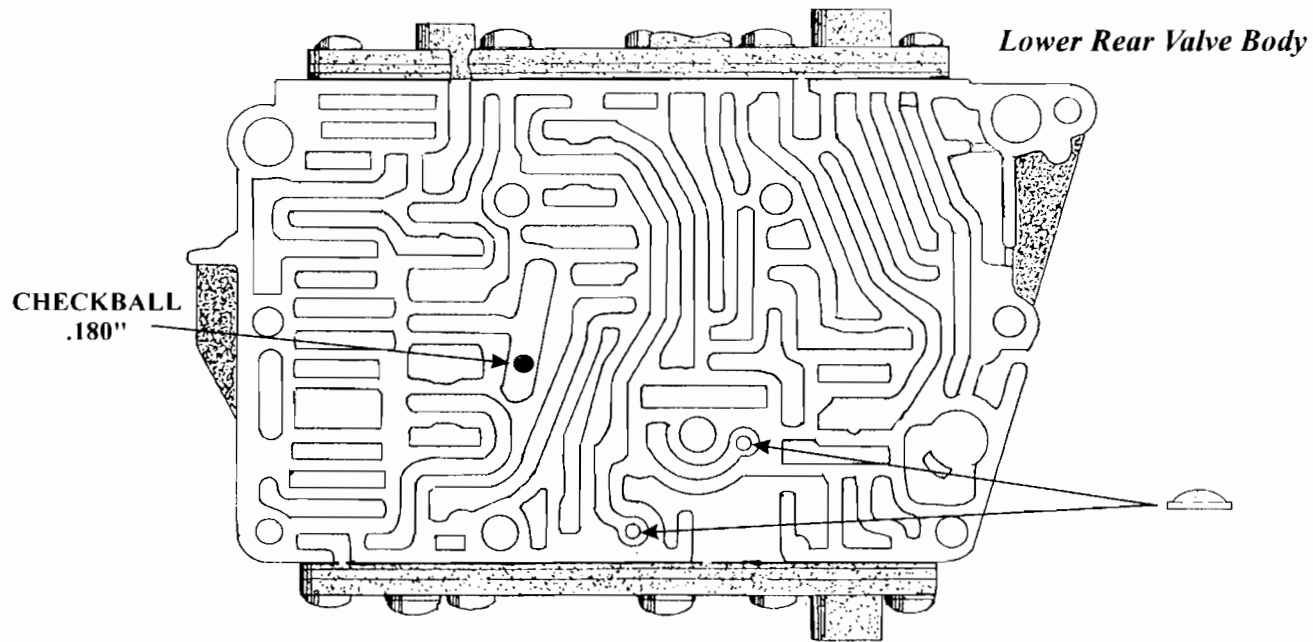


Figure 10

**4HP-22 CHECKBALL AND ORIFICE LOCATIONS
PEUGOT NON-TURBO**

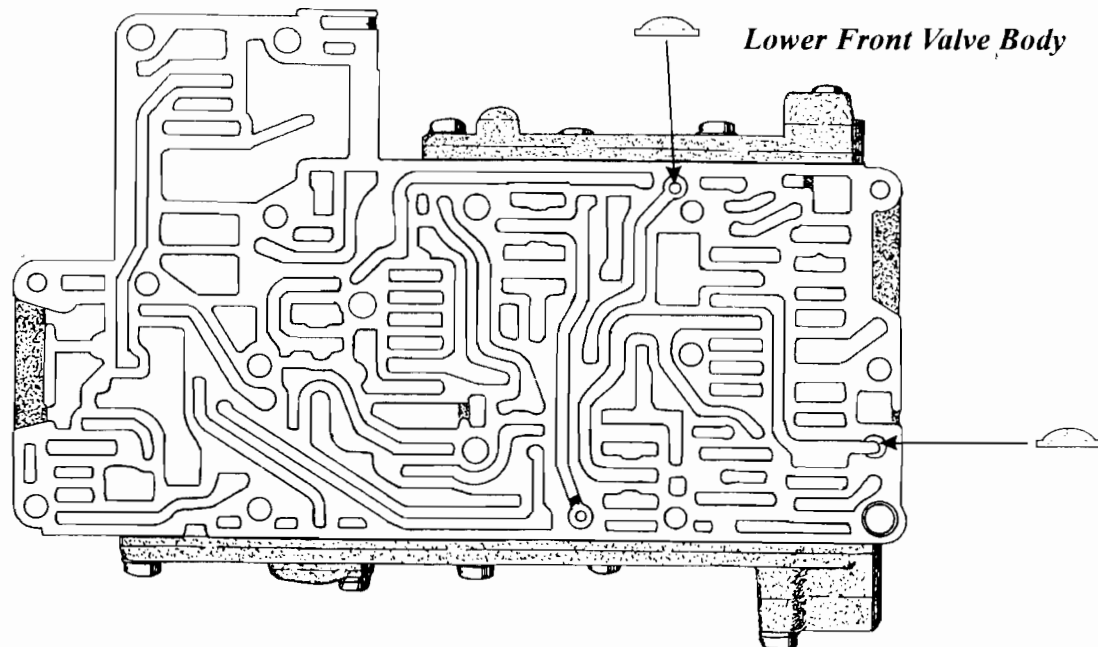


Figure 11

**4HP-22 CHECKBALL AND ORIFICE LOCATIONS
PEUGOT NON-TURBO**

Upper Right Valve Body

CHECKBALL
.180"

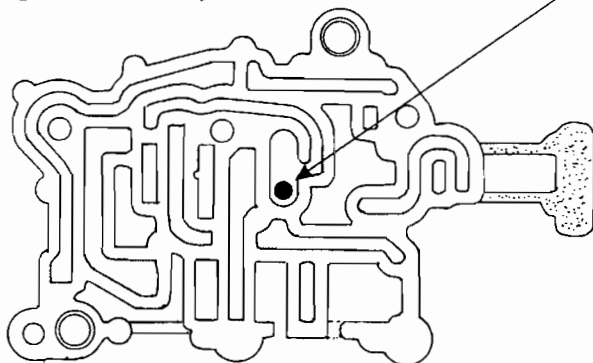


Figure 12

**4HP-22 CHECKBALL AND ORIFICE LOCATIONS
PEUGOT NON-TURBO**

CHECKBALL
.180"

Channel Plate

CHECKBALL
.240"

CHECKBALL
.180"

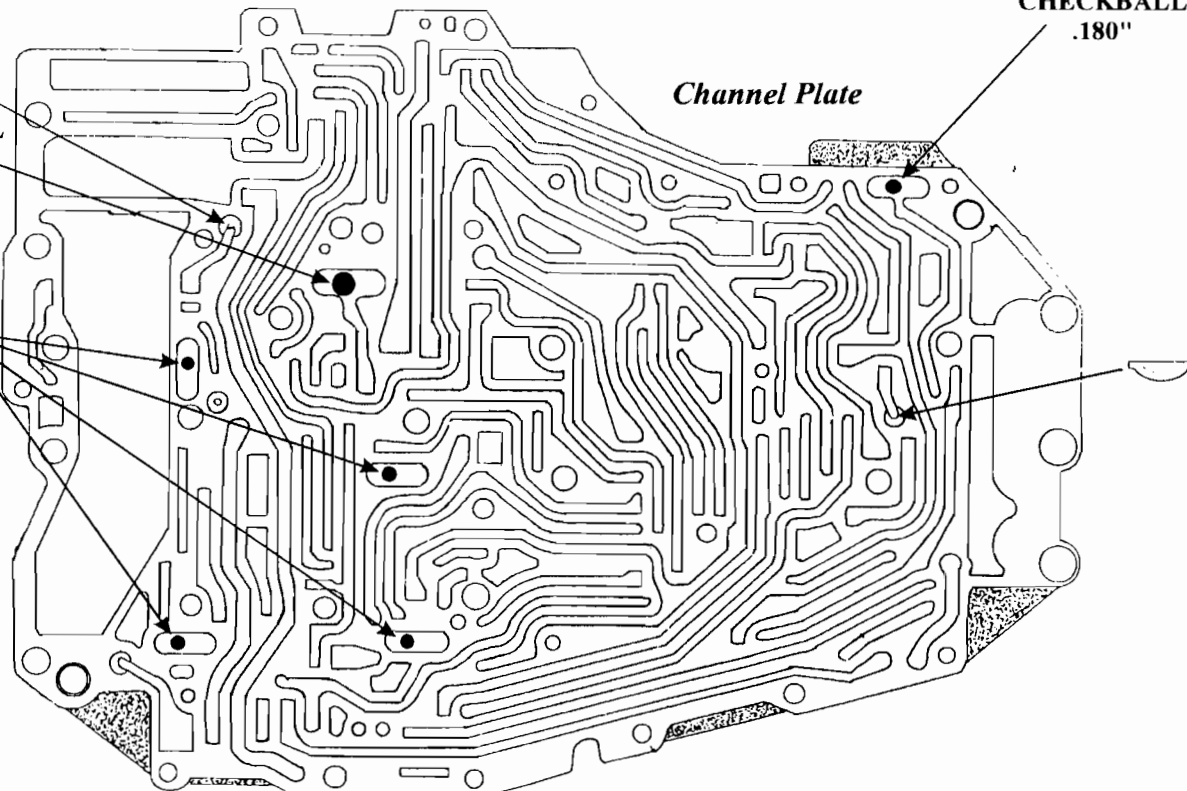


Figure 13

**4HP-22 CHECKBALL AND ORIFICE LOCATIONS
PEUGOT TURBO DIESEL**

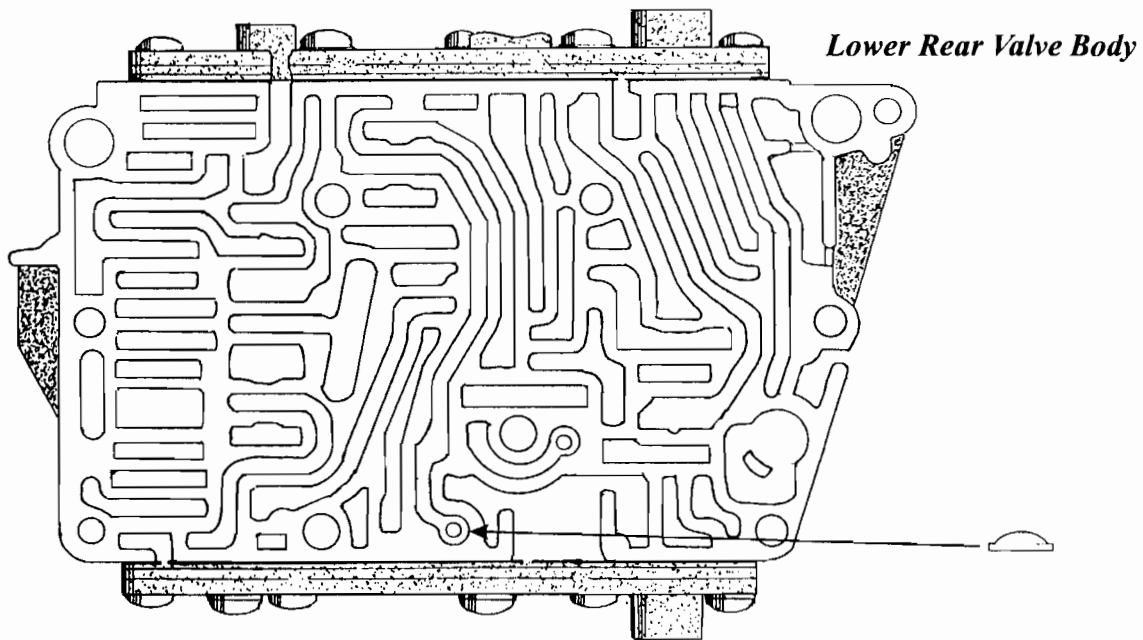


Figure 14

**4HP-22 CHECKBALL AND ORIFICE LOCATIONS
PEUGOT TURBO DIESEL**

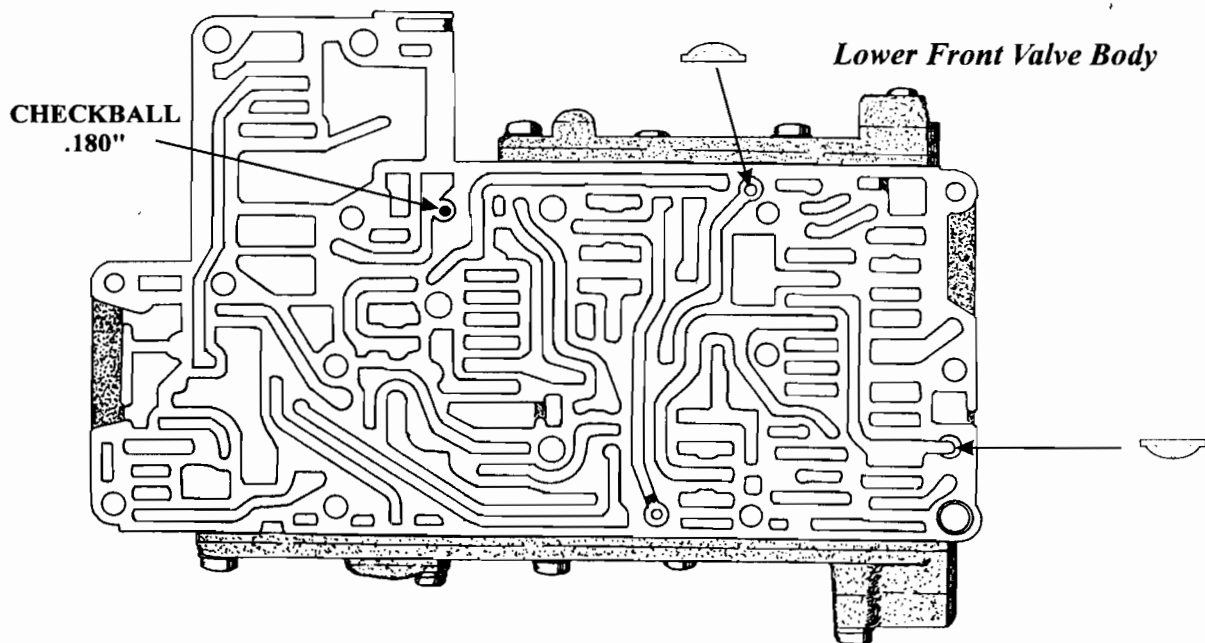


Figure 15

**4HP-22 CHECKBALL AND ORIFICE LOCATIONS
PEUGOT TURBO DIESEL**

Upper Right Valve Body

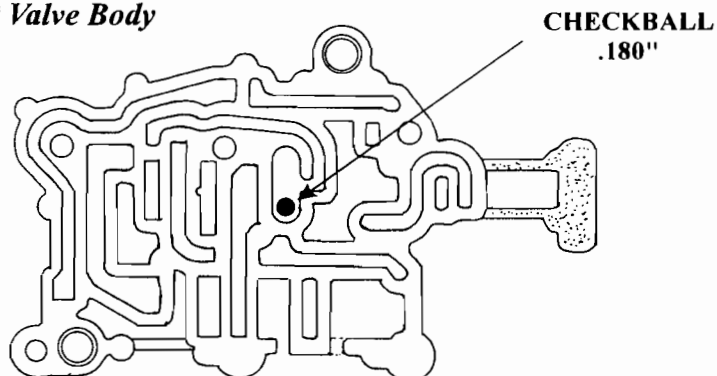


Figure 16

**4HP-22 CHECKBALL AND ORIFICE LOCATIONS
PEUGOT TURBO DIESEL**

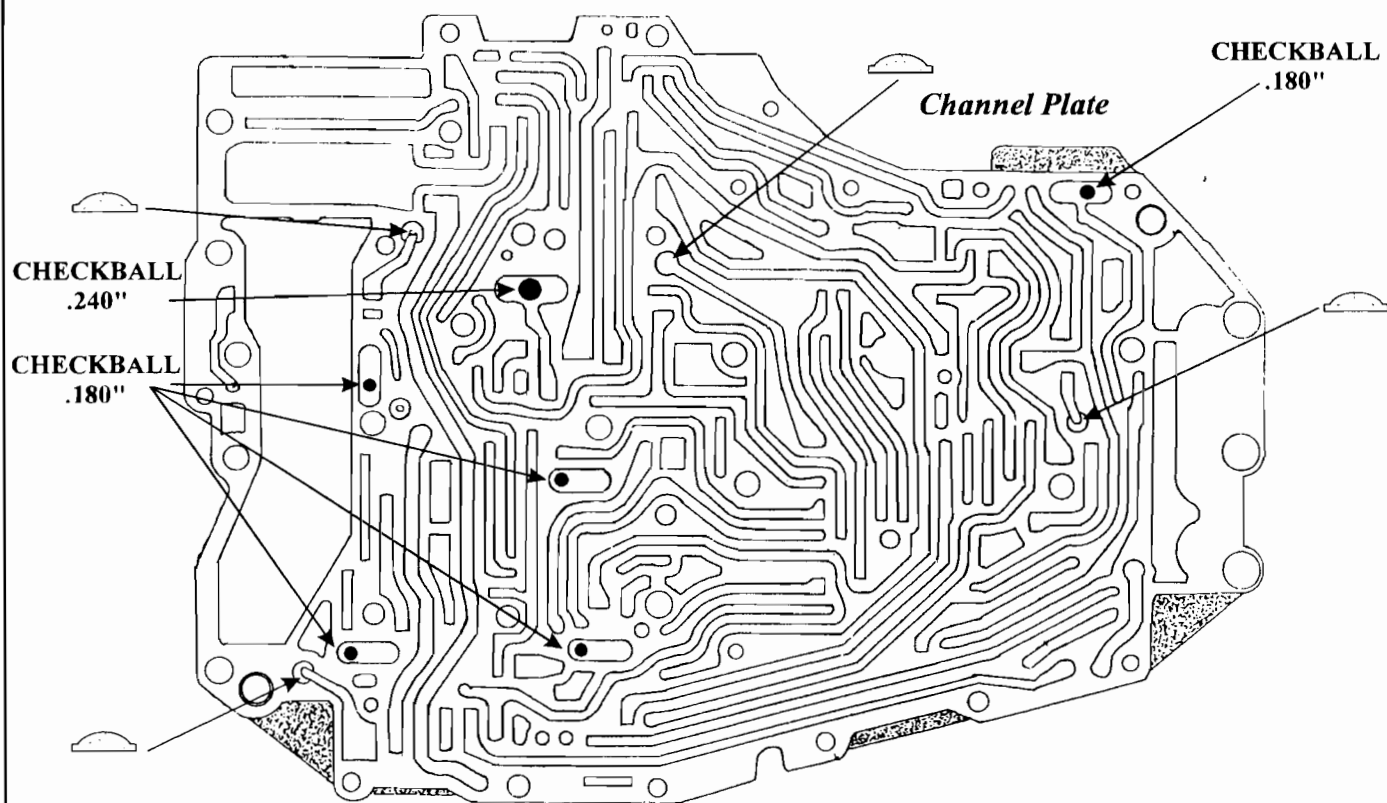


Figure 17

**4HP-22 CHECKBALL AND ORIFICE LOCATIONS
VOLVO**

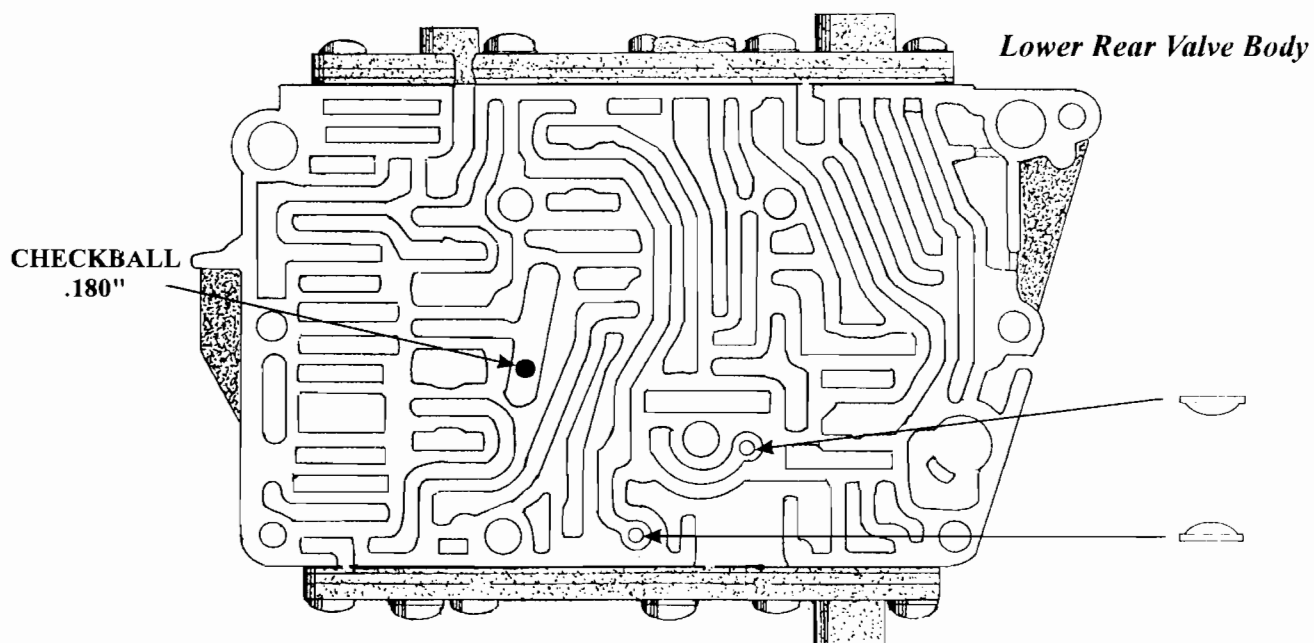


Figure 18

**4HP-22 CHECKBALL AND ORIFICE LOCATIONS
VOLVO**

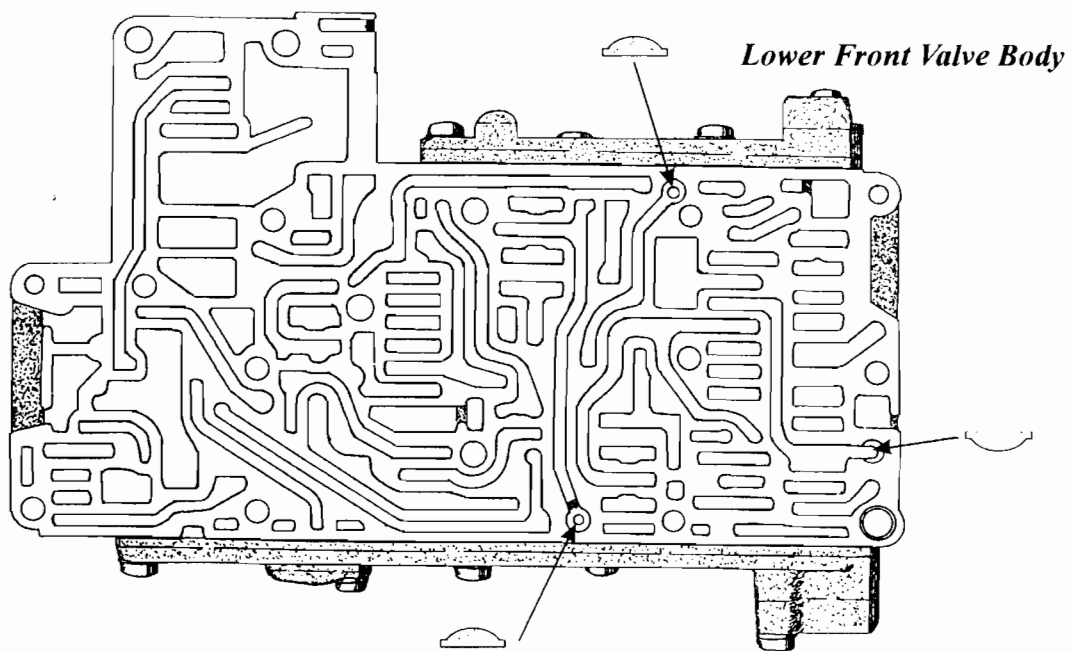


Figure 19

4HP-22 CHECKBALL AND ORIFICE LOCATIONS
VOLVO

Upper Right Valve Body

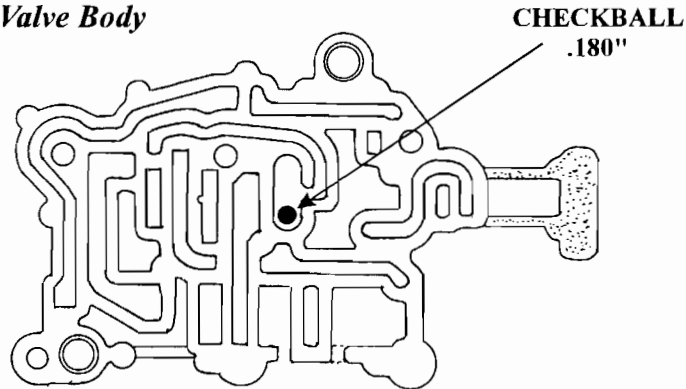


Figure 20

4HP-22 CHECKBALL AND ORIFICE LOCATIONS
VOLVO

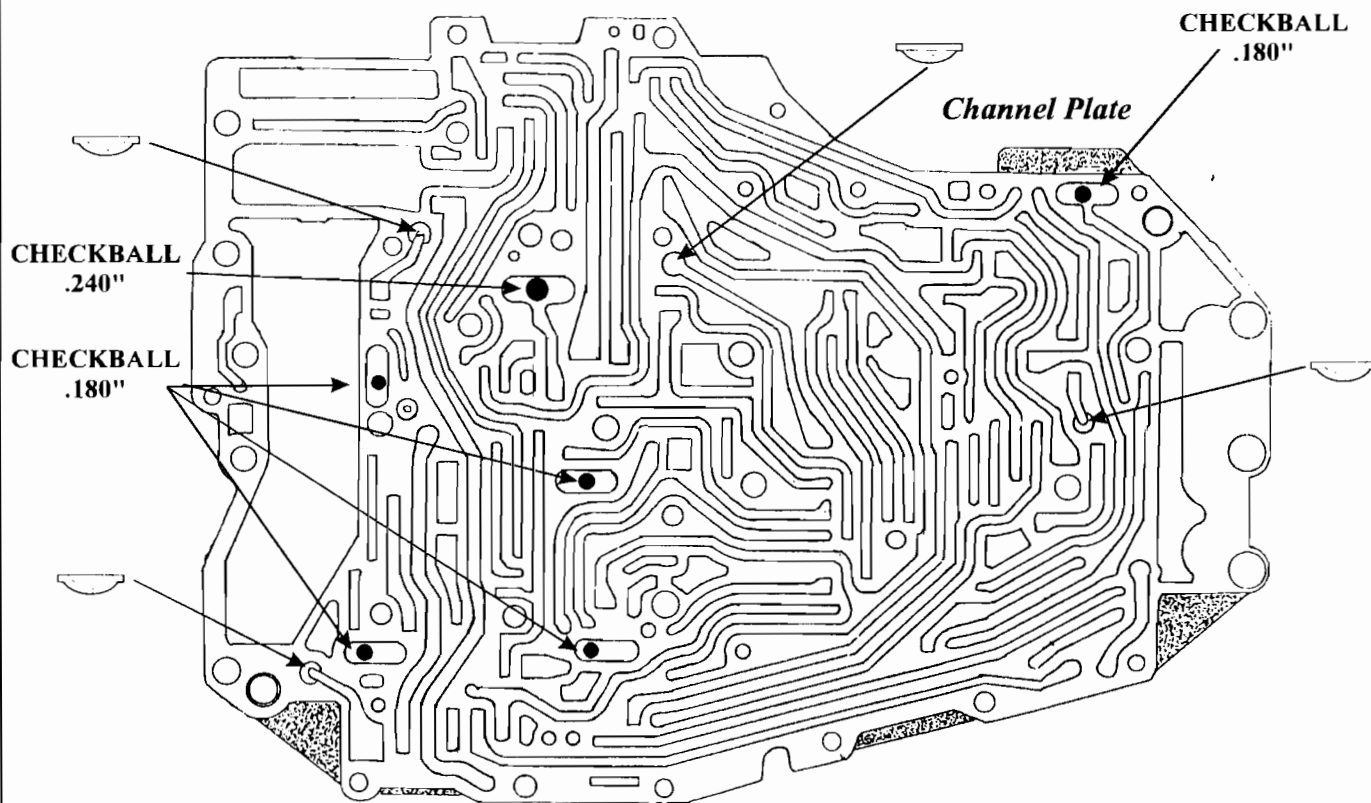


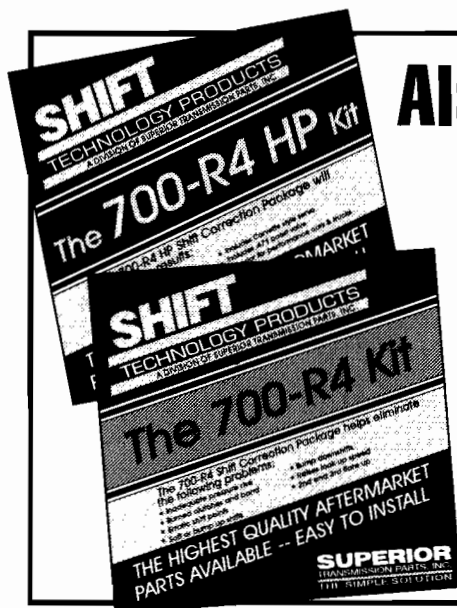
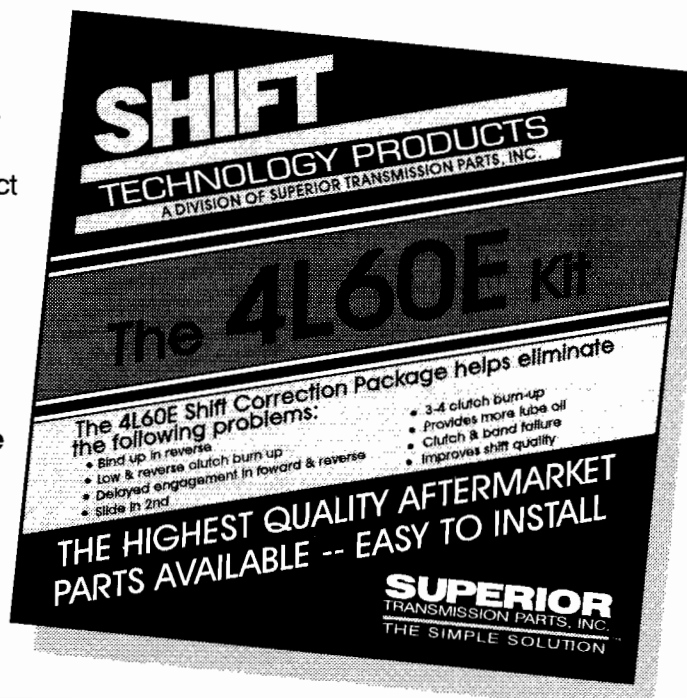
Figure 21

The New 4L60E Shift Correction Package!

Our new Shift Correction Package for the 4L60E transmissions provide one more good reason to make the shift to Superior. Like all Superior valve body products they are easy to install, feature simple instructions, use only quality-made parts and offer consistent product performance.

The 4L60E Shift Correction Package helps to eliminate the following problems:

- bind up in reverse
- low & reverse clutch burn up
- delayed engagement in forward & reverse
- slide in 2nd
- 3-4 clutch burn up
- provides more lube oil
- clutch & band failure
- improves shift quality.



Also Available For The 700-R4

The 700-R4 High Performance Package is designed to deliver the following:

- Super positive shifts
- Stabilizes 4-3 shift
- Raises lockup speed
- Includes .471 boost valve
- Includes Corvette style servo
- Superior for performance cars and trucks

The 700-R4 Shift Correction Package helps eliminate the following problems:

- Inadequate pressure rise
- Burned clutches and bands
- Erratic shift points
- Bump downshifts
- Soft or bump upshifts
- Raises lock-up speed
- Second and third flare up

**Ask Your Distributor
Or Call:
800-451-3115**

Make The Shift To...



SUPERIOR
TRANSMISSION PARTS, INC.
THE SIMPLE SOLUTION

SUPERIOR *Exclusive*

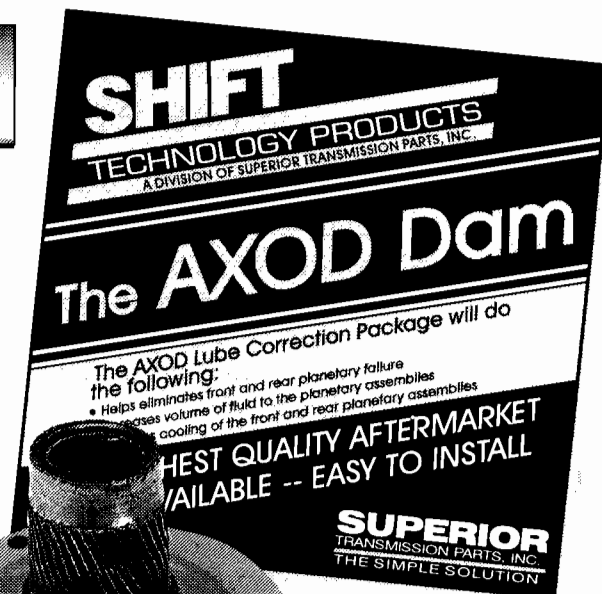
Tired of AXOD Planetary Failure?

Introducing The AXOD Dam, the simple solution to AXOD lube problems.

The AXOD Dam was developed to help eliminate planetary failure in the AXOD and AXOD-E transmissions. This simple, yet effective, product allows AXOD planetaries to run cooler and last much, much longer. (KAXOD-L)

When properly installed, the Lube Dam floods the section between the reverse cylinder and the rear planet support, where the front and rear planetary assemblies are located. By flooding this section, lube oil has adequate time for heat exchange from the pinions to the lube oil. The pinions and needle bearings run in an oil bath, ensuring total lubrication. Since the amount of lubrication is increased dramatically, better cooling is assured.

Superior Transmission Parts, Inc. Holds Patent Number 5,558,591 For The AXOD DAM



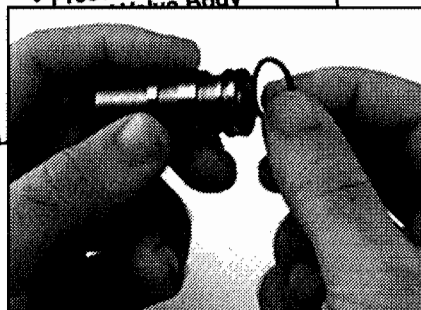
The AXOD Dam virtually eliminates planetary failure.

Hardened Steel Boost Valve For AXOD — Now Available

NEW!

SHIFT The Simple Solution
TECHNOLOGY PRODUCTS
A DIVISION OF SUPERIOR TRANSMISSION PARTS, INC.
AXOD Boost Valve & Sleeve
CORRECTS

- Worn Out Boost Valve
- Pressure Exhausting
- Valve Body



As AXOD transmissions rack up higher mileage they begin showing the same signs of boost valve wear that are commonly seen in the AXOD-E. To address this problem Superior is now offering a case hardened steel replacement boost valve and sleeve for the AXOD which help to prevent loss of pressure rise and intermittent shifting problems.

**Ask Your
Distributor
Or Call:
800-451-3115**

Make The Shift To...



SUPERIOR
TRANSMISSION PARTS, INC.
THE SIMPLE SOLUTION™

4L60E REOCCURING CODES

DTC's 81, 82, 66,67, 84 and 85

COMPLAINT: Some or all of codes 81, 82, 66, (84 on B & D Bodies) and 67 (85 on B & D Bodies) have been stored by the vehicles computer. After replacing all the related solenoids and clearing the codes, the above codes immediately return and computer replacement also does NOT cure the problem.

CAUSE: This problem is most commonly caused by a poor fit between the pin cavities in the vehicle harness plug and the transmission connector pins. The pin cavities have expanded causing a poor connection which is commonly caused by wiggling the connector back and forth while trying to get it unplugged from the transmission connector or through normal wear due to vibration and corrosion.

NOTE: When disconnecting the connector, squeeze the connector tabs as shown in Figure 1 and pull straight up trying not to twist, wiggle or pry off the connector. These actions can bend the pins and enlarge the cavities. Care should also be taken when reconnecting the connectors to insure that none of the pins have been pushed out of the connector.

CORRECTION: First, check the pin cavities for good pin retention by using a #59 wire gauge drill bit, which measures .041 in diameter. Insert the drill bit into the pin cavities of the vehicle harness plug making certain the drill bit has a good drag in the cavity as shown in Figure 2. If the drill bit fits loosely, the vehicle harness plug will have to be replaced. Cavity and circuit identification for 1993-94 connectors are shown in Figures 3 and 4. Cavity and circuit identification for 1995 and later connectors are shown in Figures 5 and 6. The next step is to verify circuit integrity. This is done by checking the resistance for the complete circuit in question.

- 1-Make certain that all connections are connected.
- 2-Locate the vehicles computer. A computer locator guide can be found in Figures 7 to 26.
- 3-Disconnect the plug from the computer that contains the wire for the circuit in question.

The example used here is a reoccurring code 66 which is a 3-2 control solenoid circuit fault in a 1994 GMC "C" Truck.
- 4-Referring to Figure 27, disconnect the WHITE wire at terminal E2. This will be the negative side of the circuit. This is where the BLACK lead of the ohm meter will go.

The positive side of the circuit is the PINK wire at pin "E" at the transmission case connector. This is where the positive lead of the ohm meter will go.



4L60E REOCCURRING CODES

DTC's 81, 82, 66,67, 84 and 85

5-This circuit should have 10-15 ohms. With the multimeter connected as described above, gently manipulate the wiring and case connector while watching the ohm meter. Make certain that the ohms value does not change.

NOTE: This is best done with the pan removed in order to probe the internal wiring harness.

6-If the ohms value DOES change, then there is a wiring or connector problem.

7-If the ohms value DOES NOT change, the solenoid quad driver located inside the computer may be at fault.

CAUTION: When probing connector terminals, always back probe the terminals to avoid expanding the connector cavities as shown in Figure 28.

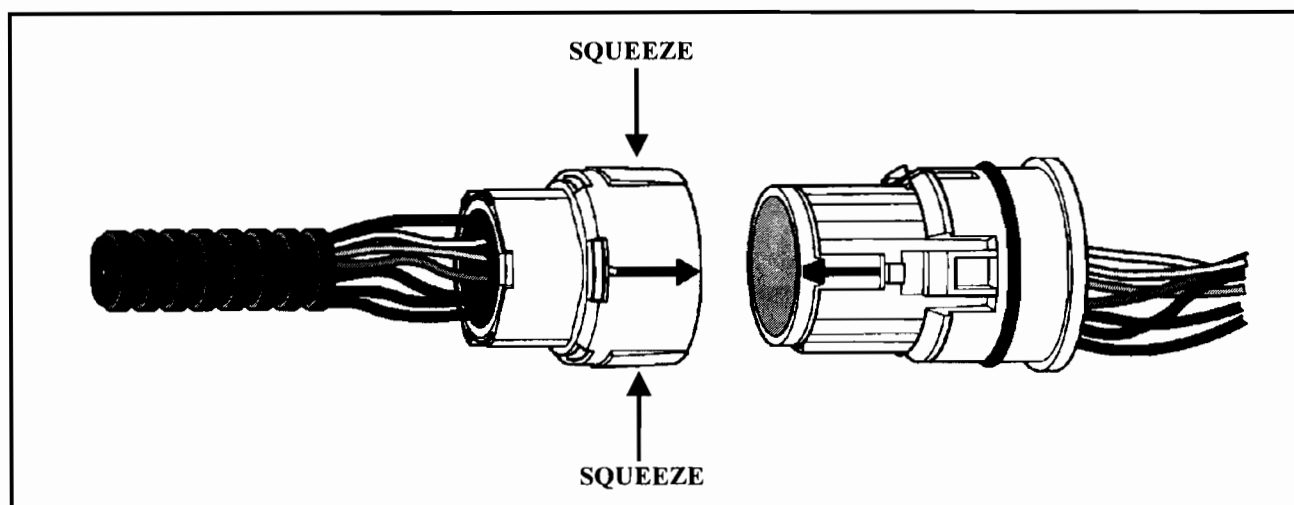
4L60E REOCCURRING CODES**DTC's 81, 82, 66, 67, 84 and 85**

Figure 1

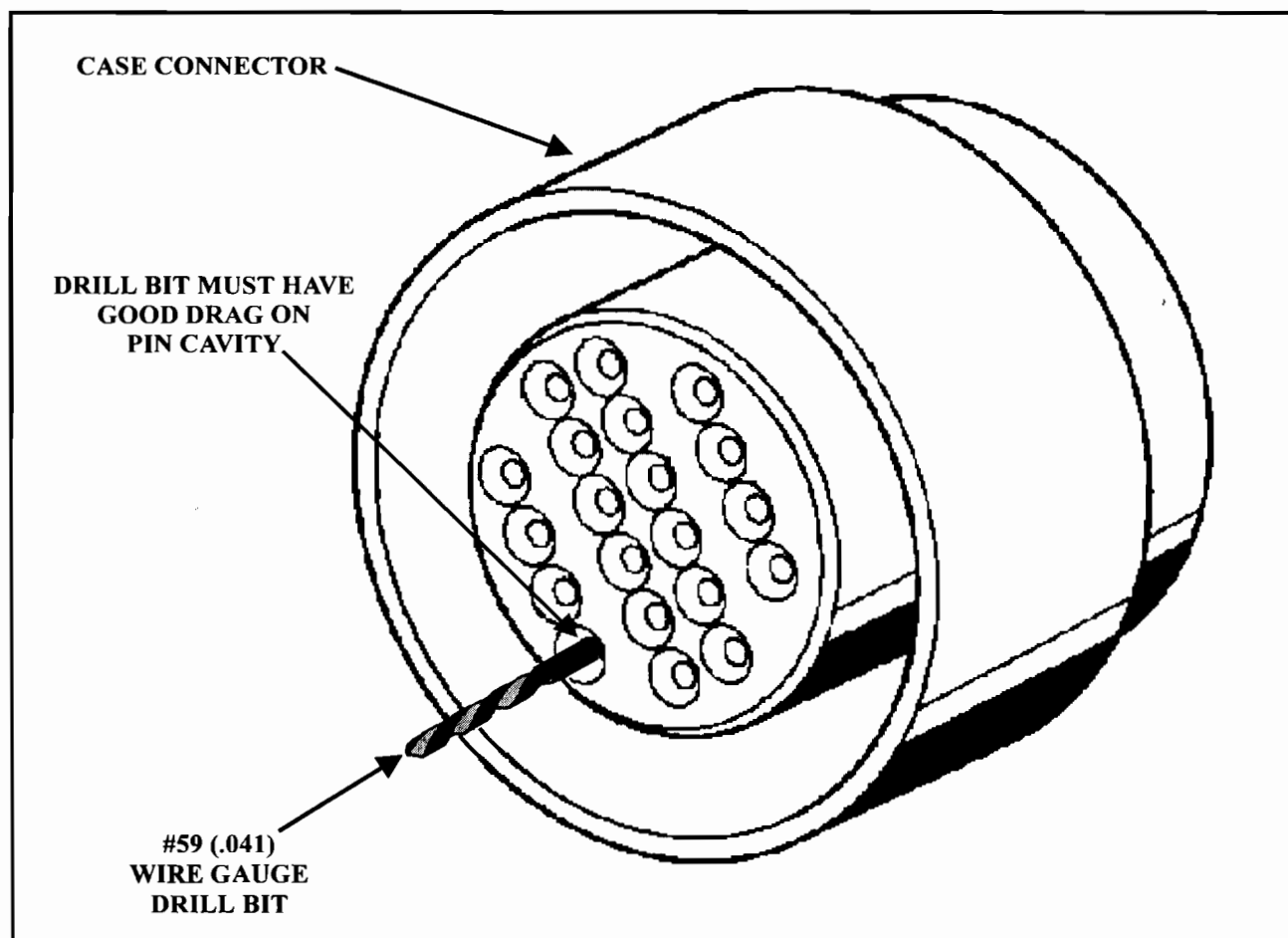


Figure 2

4L60E REOCCURRING CODES

DTC's 81, 82, 66, 67, 84 and 85

1993-94 TRANSMISSION WIRING

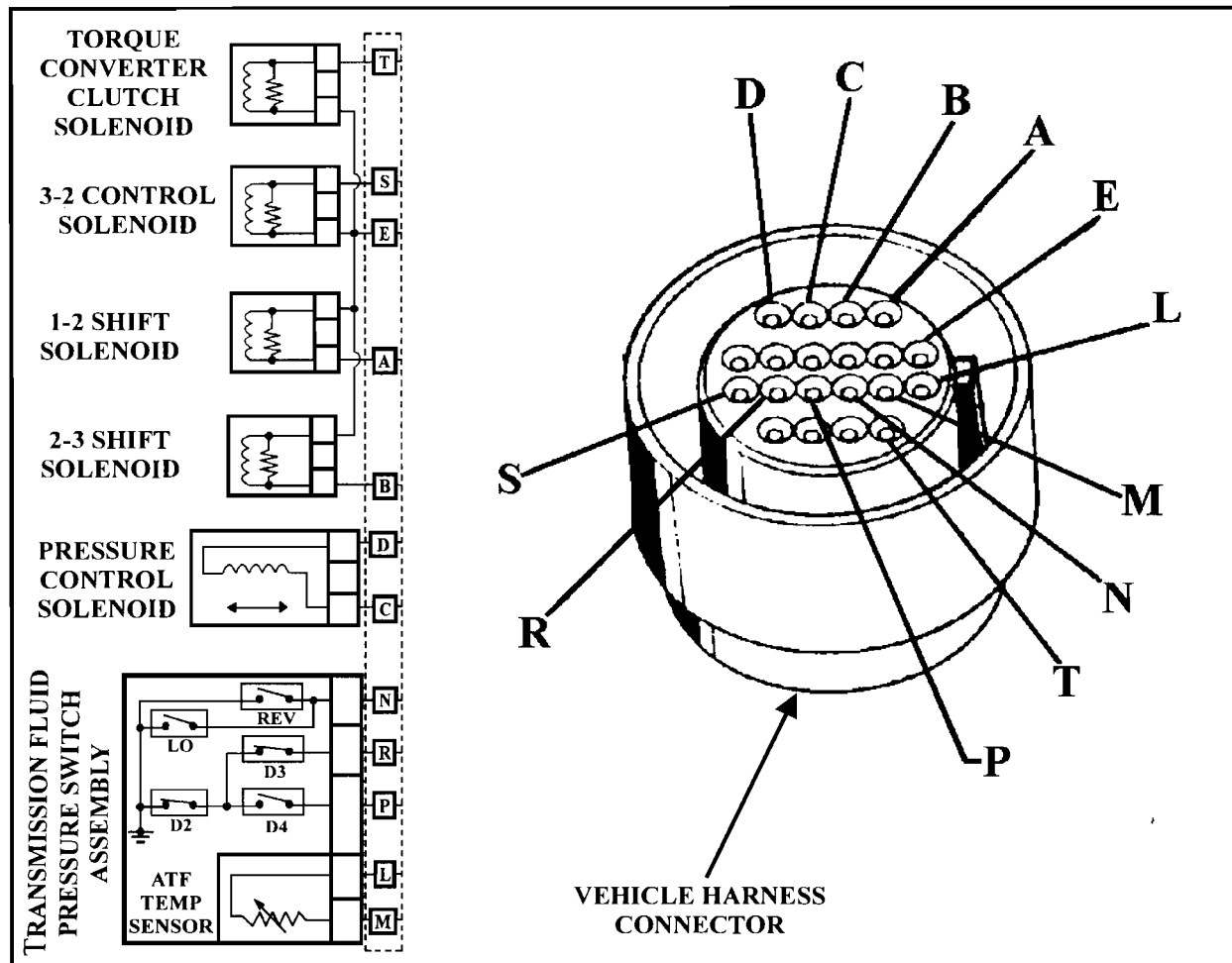


Figure 3

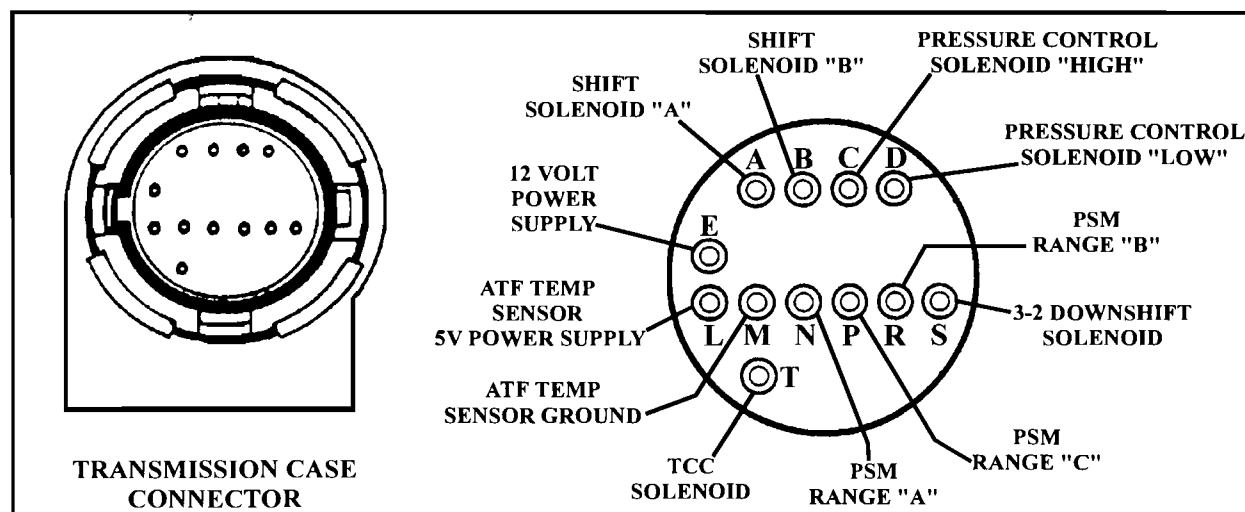


Figure 4

4L60E REOCCURRING CODES

DTC's 81, 82, 66, 67, 84 and 85

1995-97 TRANSMISSION WIRING

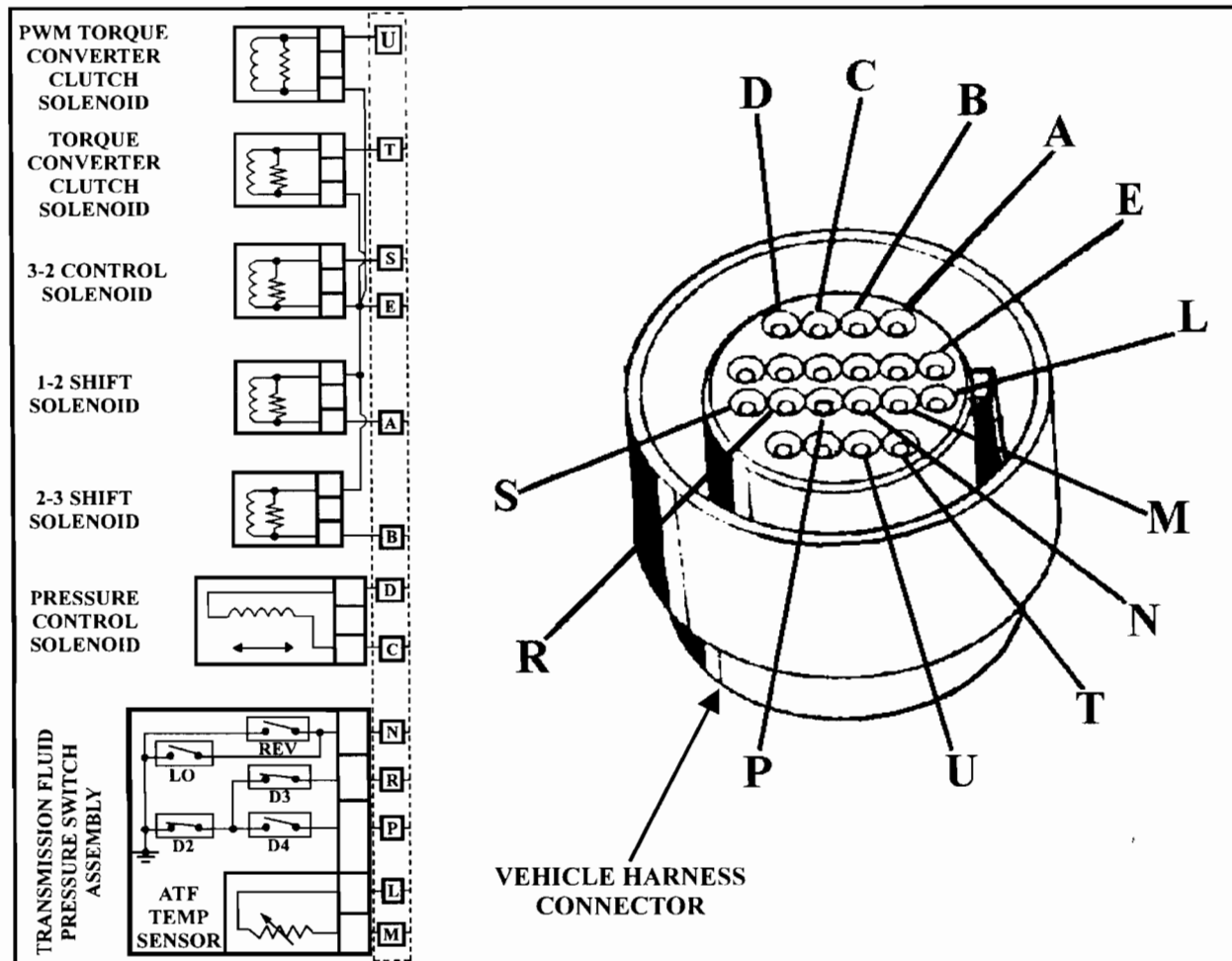


Figure 5

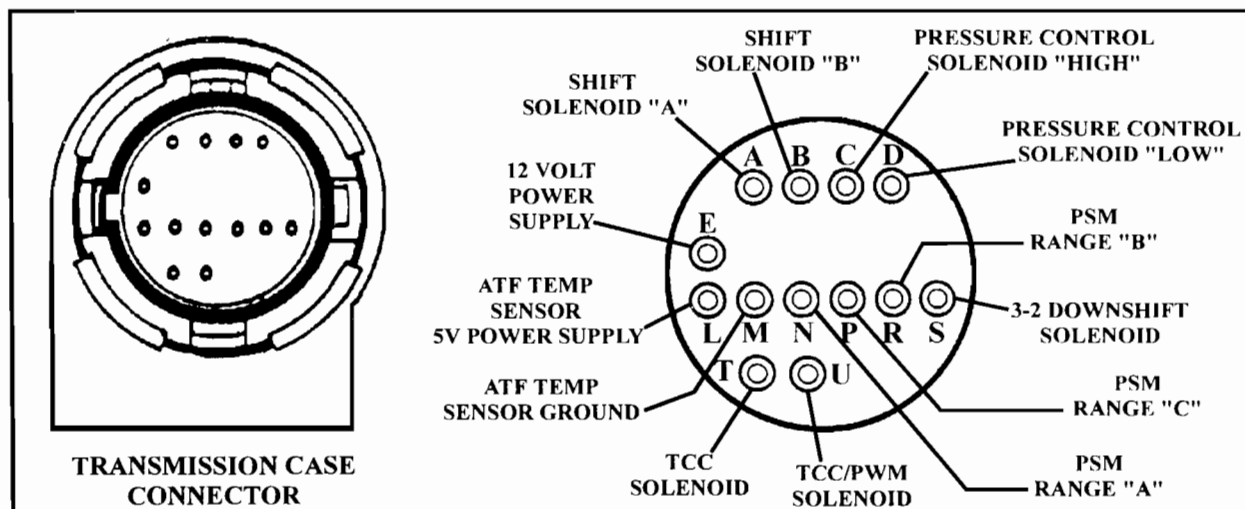


Figure 6

4L60E COMPUTER LOCATOR

1993 - 1996 "C" & "K" TRUCKS
(NON VCM CONTROLLED)

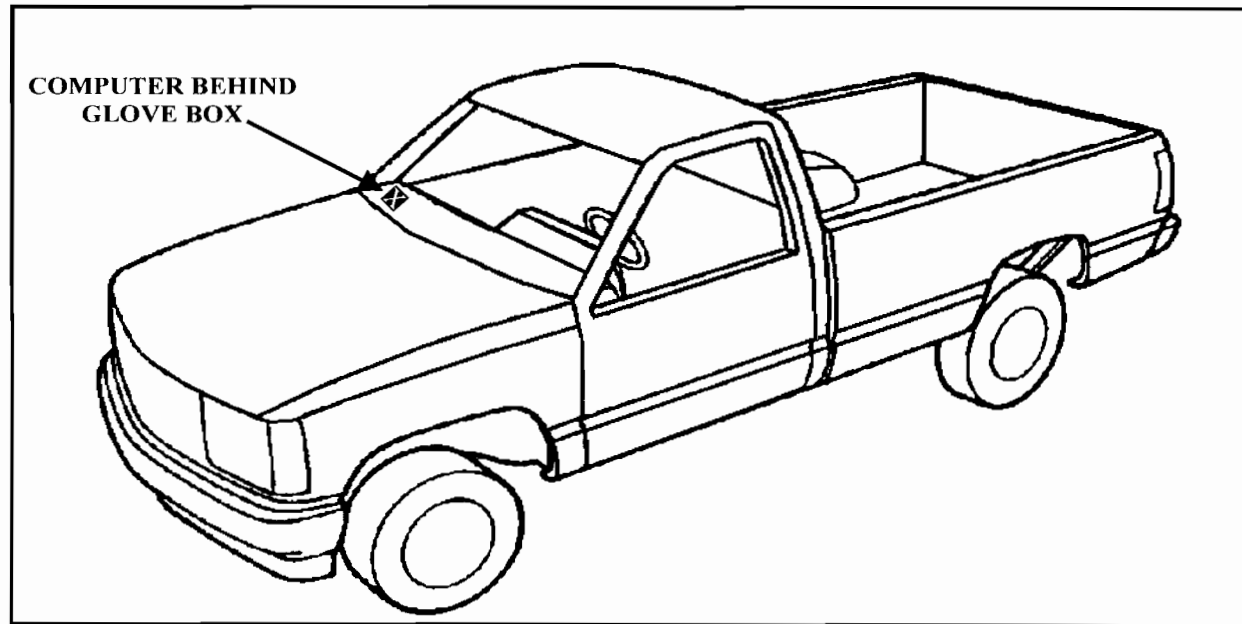


Figure 7

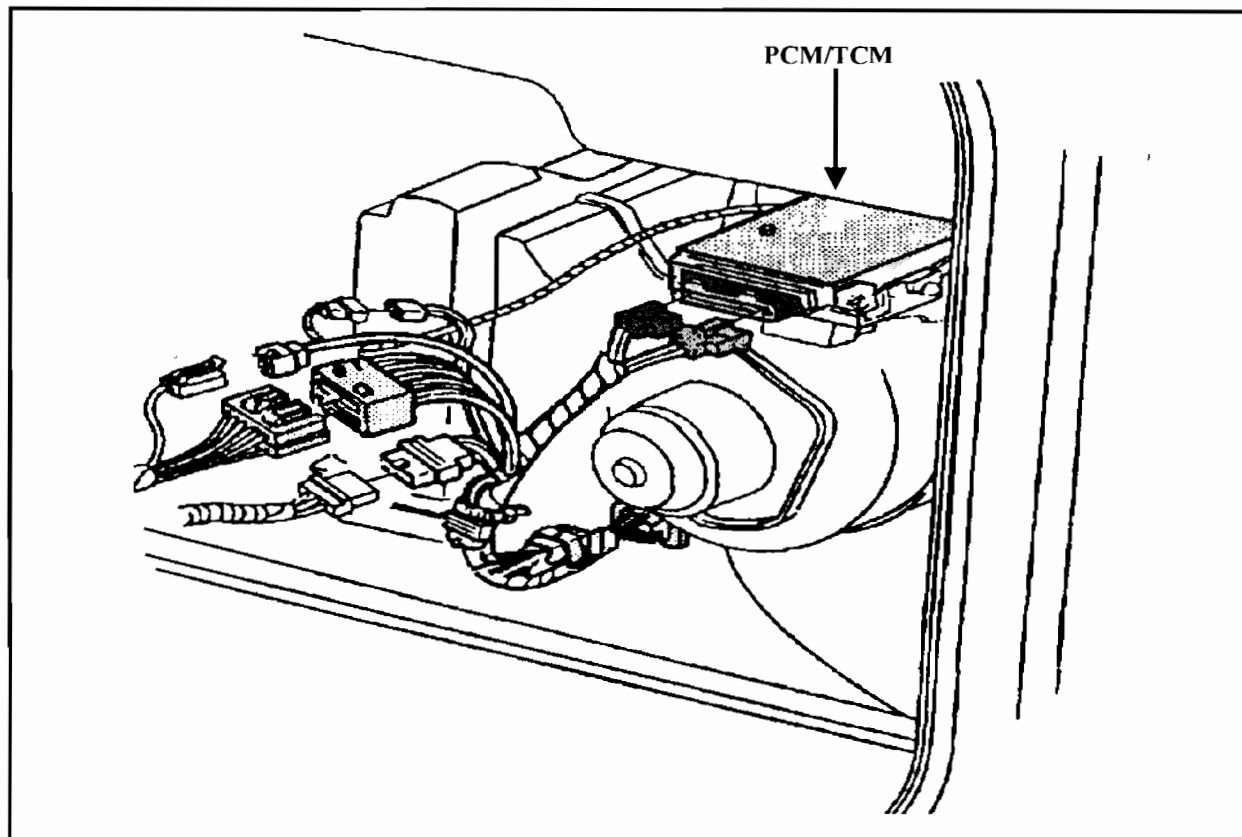


Figure 8

4L60E COMPUTER LOCATOR

1993 - 1996 "G" VANS
(NON VCM CONTROLLED)

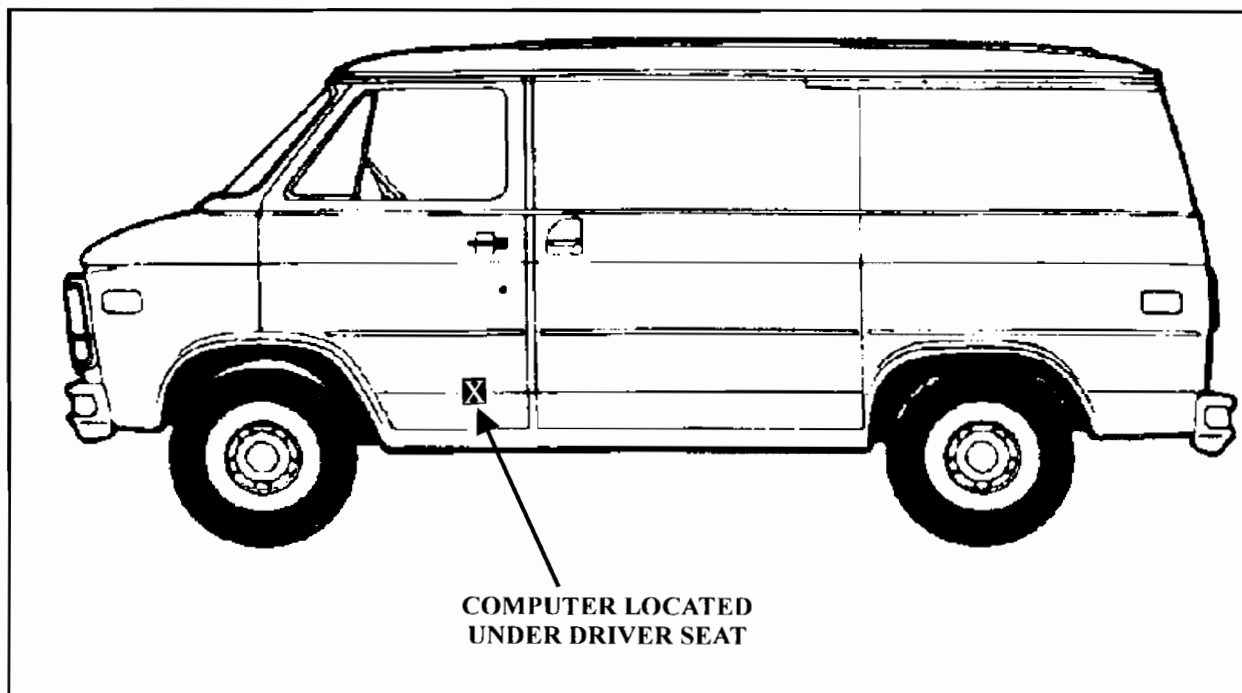


Figure 9

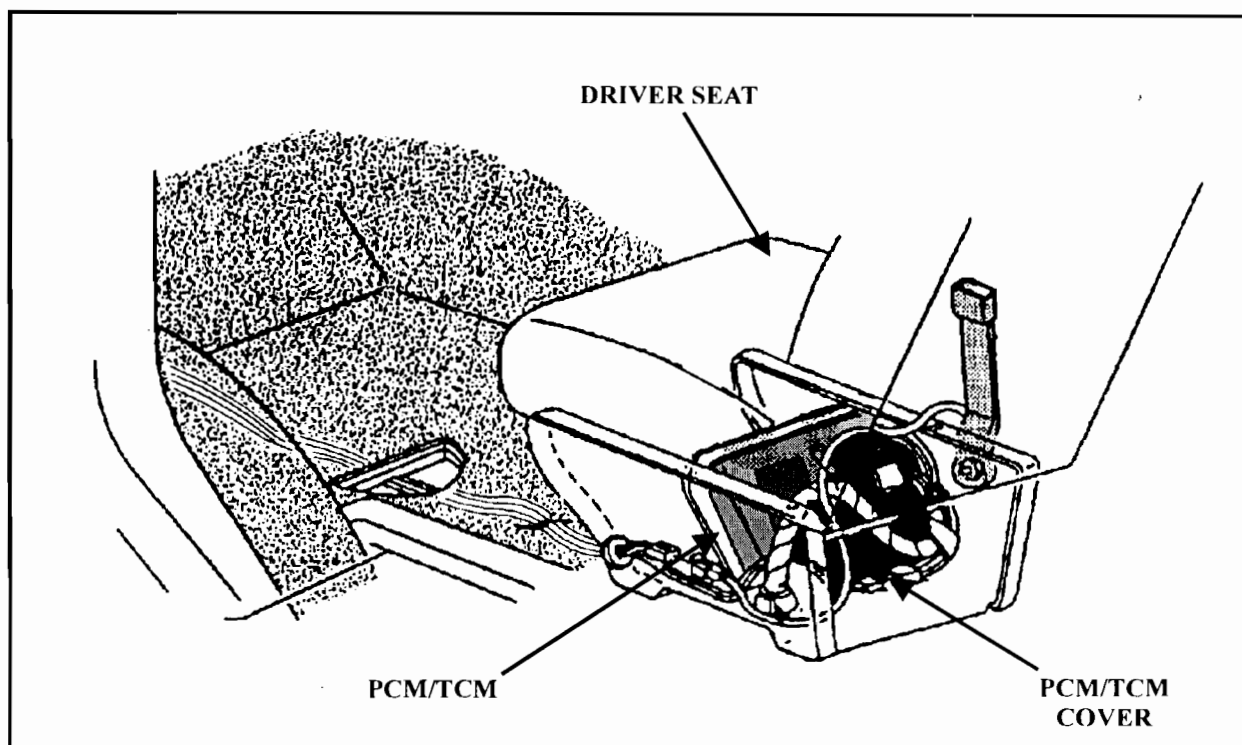


Figure 10

4L60E COMPUTER LOCATOR

1993 - 1995 "S" & "T" TRUCKS
(NON VCM CONTROLLED)

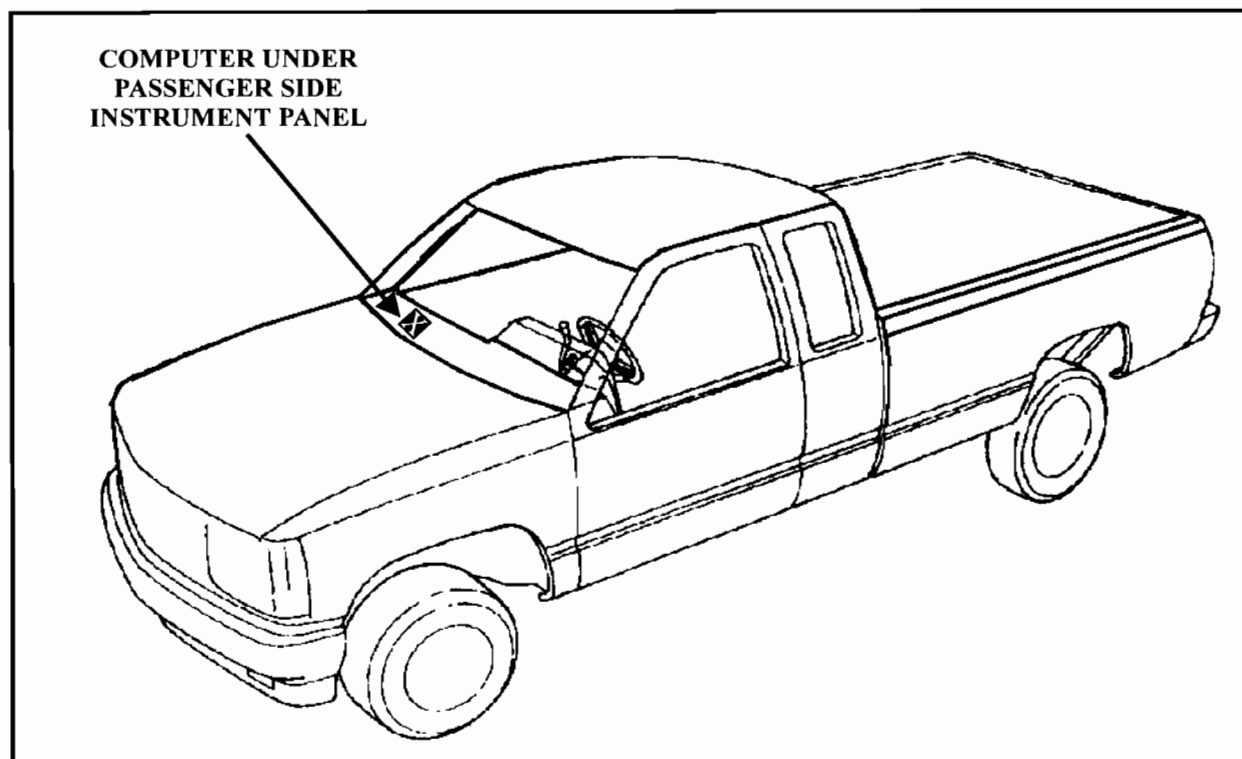


Figure 11

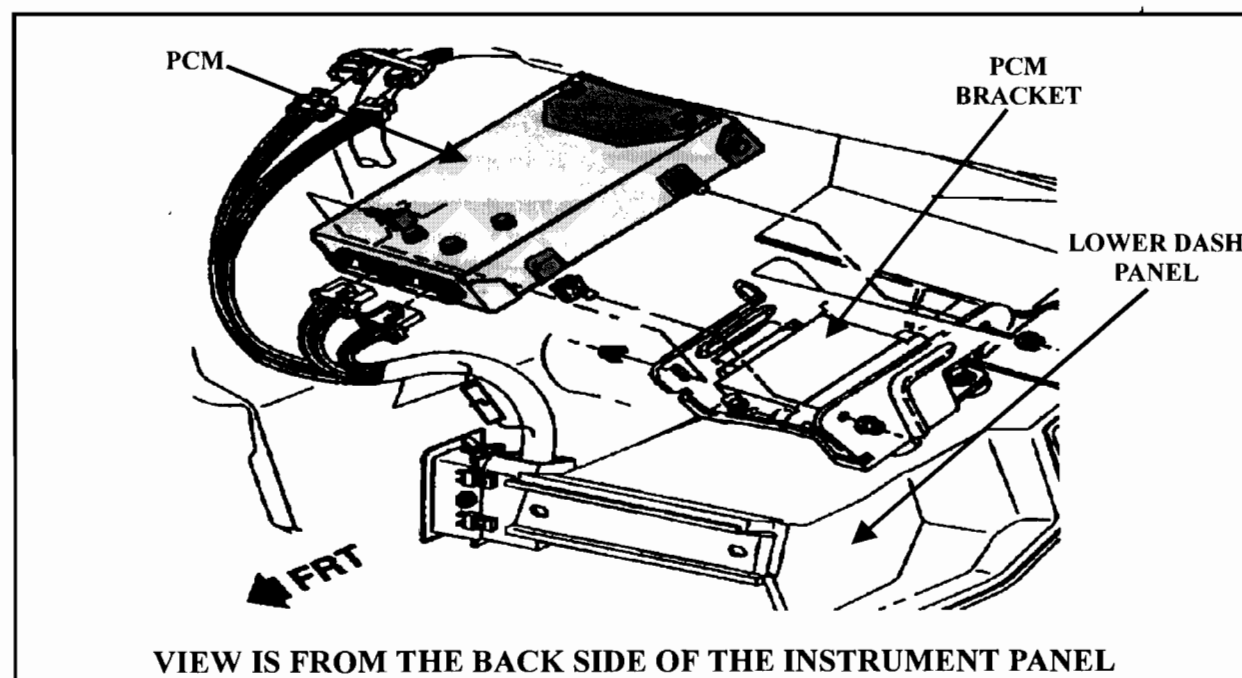


Figure 12

4L60E COMPUTER LOCATOR

1993 - 1995 "M" & "L" VANS
(NON VCM CONTROLLED)

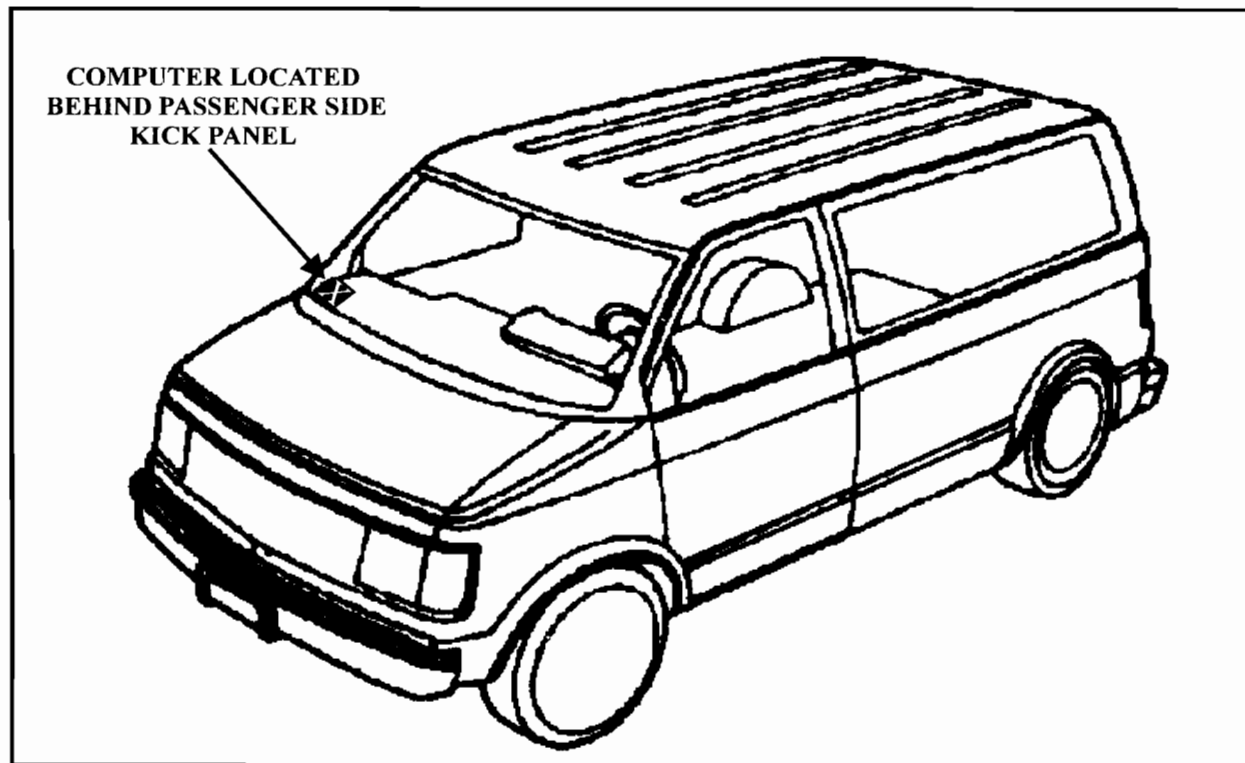


Figure 13

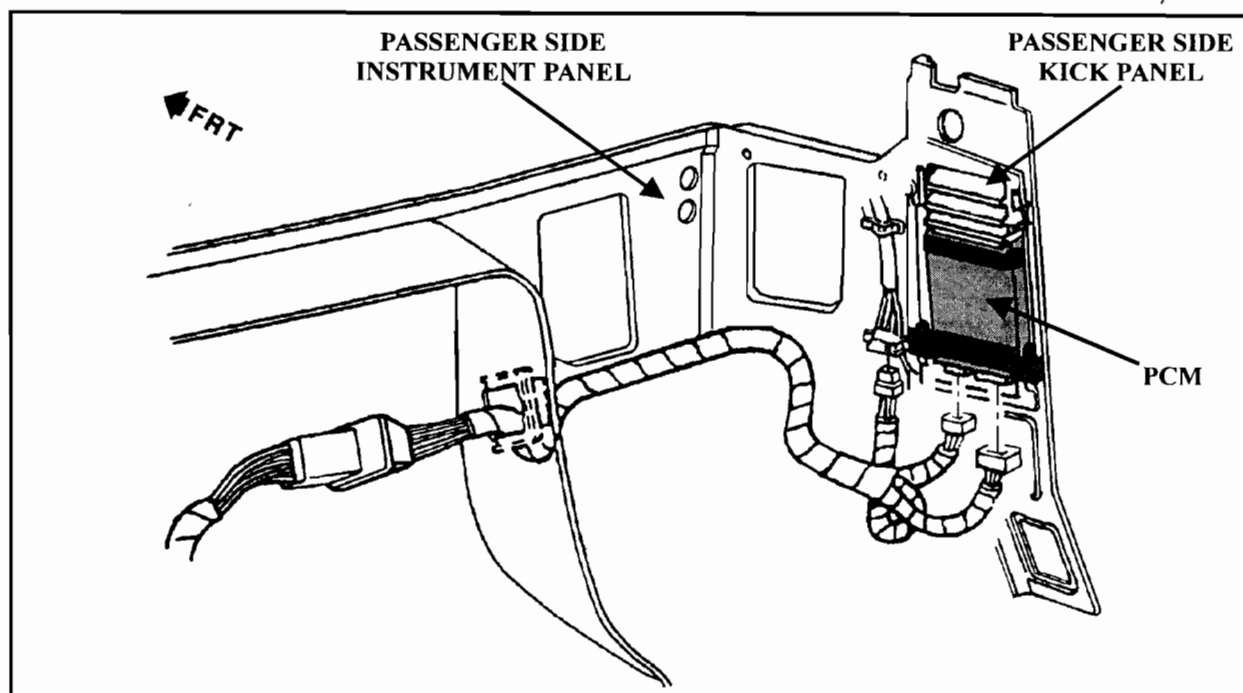


Figure 14

4L60E COMPUTER LOCATOR

1996 TRUCKS AND VANS
(VCM CONTROLLED)

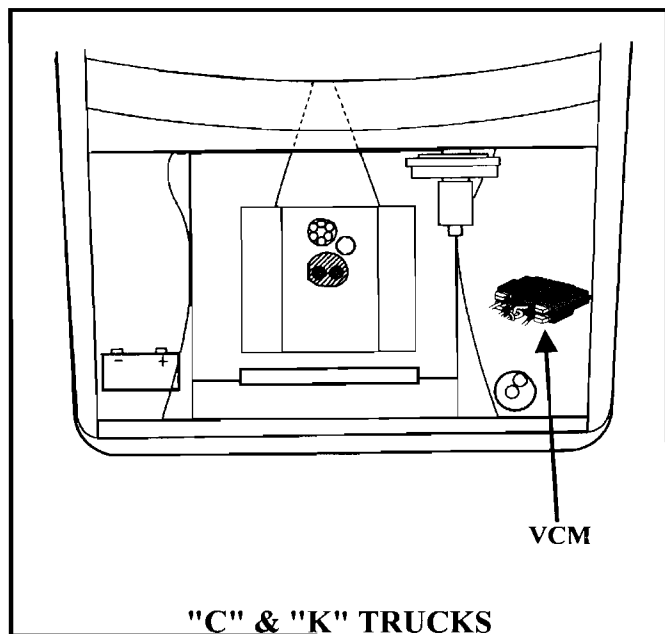


Figure 15

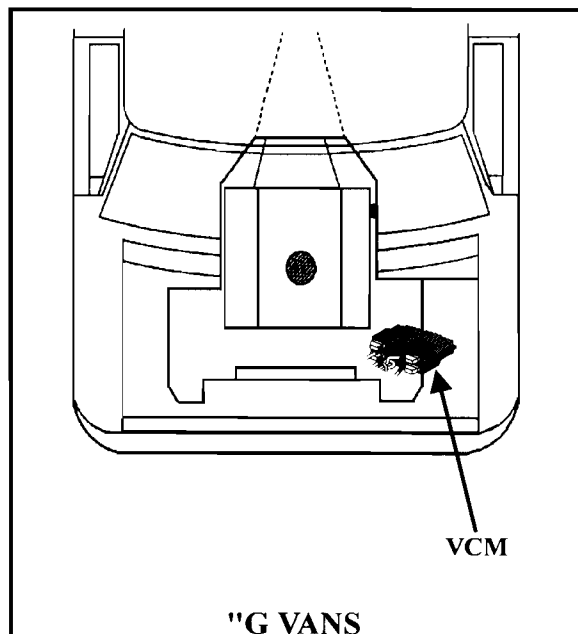


Figure 16

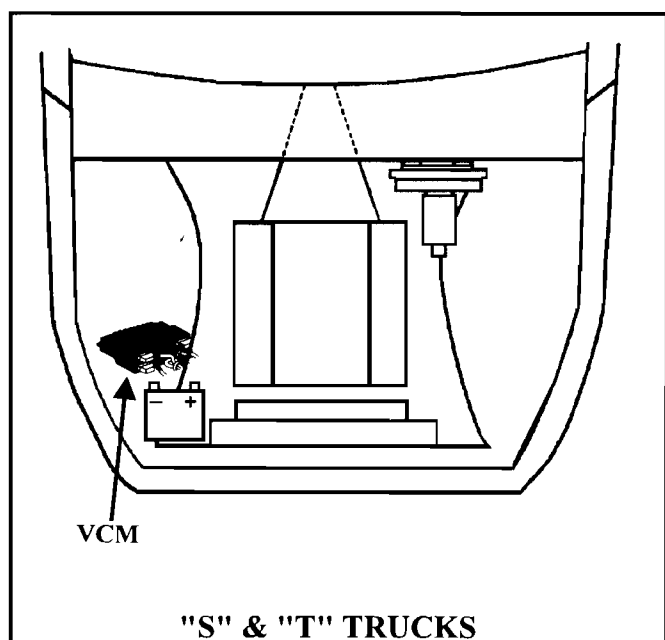


Figure 17

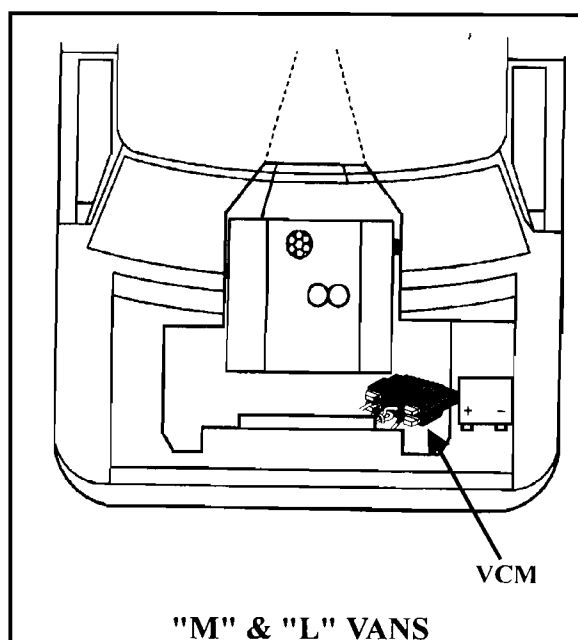


Figure 18

4L60E COMPUTER LOCATOR

1996 TRUCKS AND VANS
(VCM CONTROLLED)

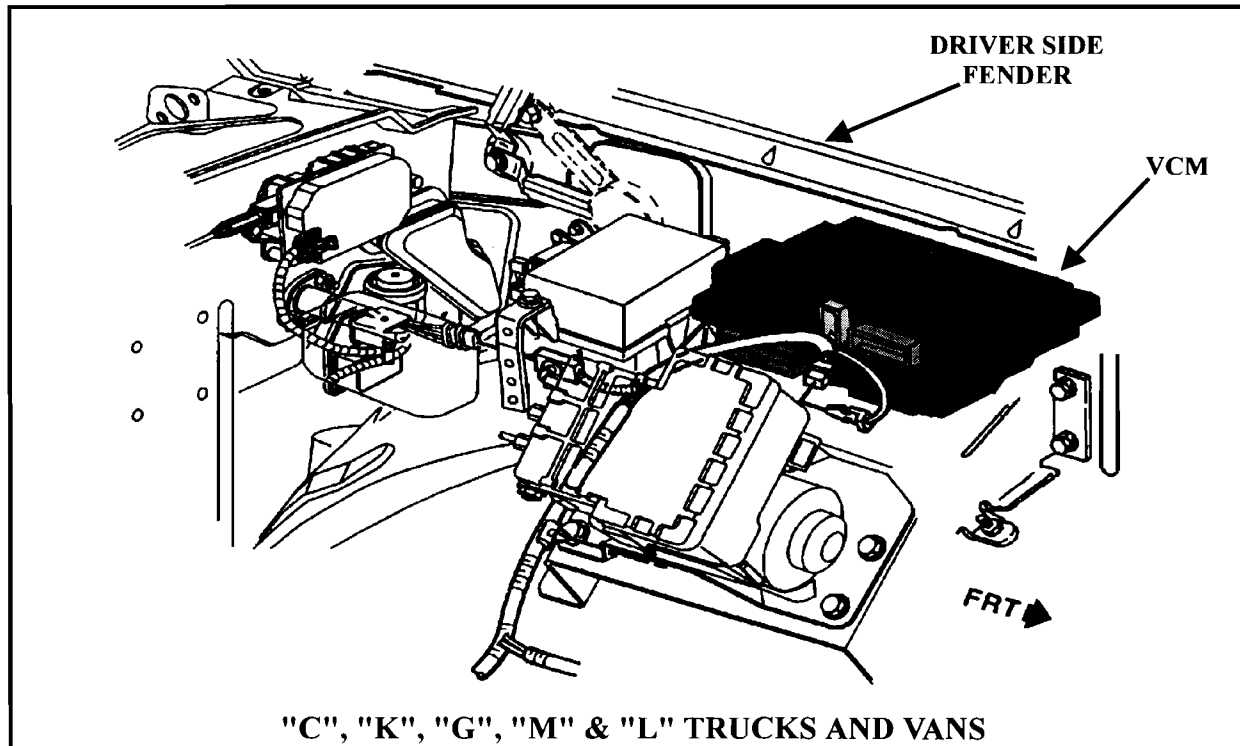


Figure 19

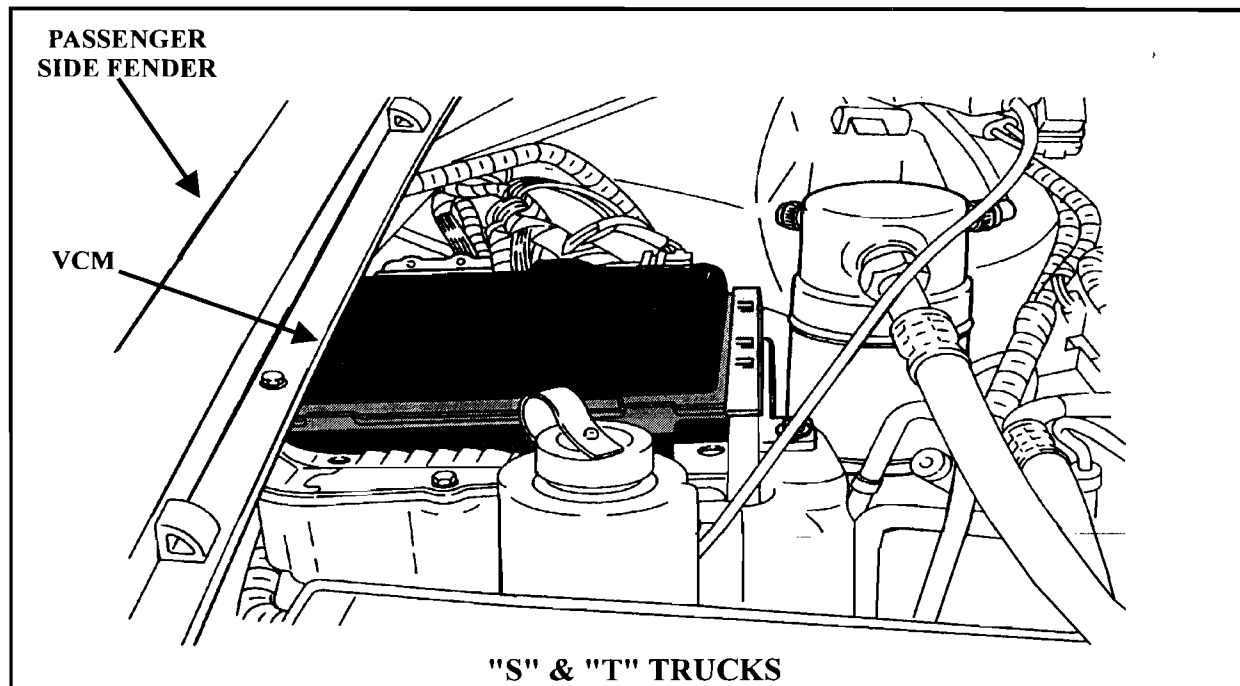


Figure 20

4L60E COMPUTER LOCATOR
1994-1996 "B" & "D" CARS

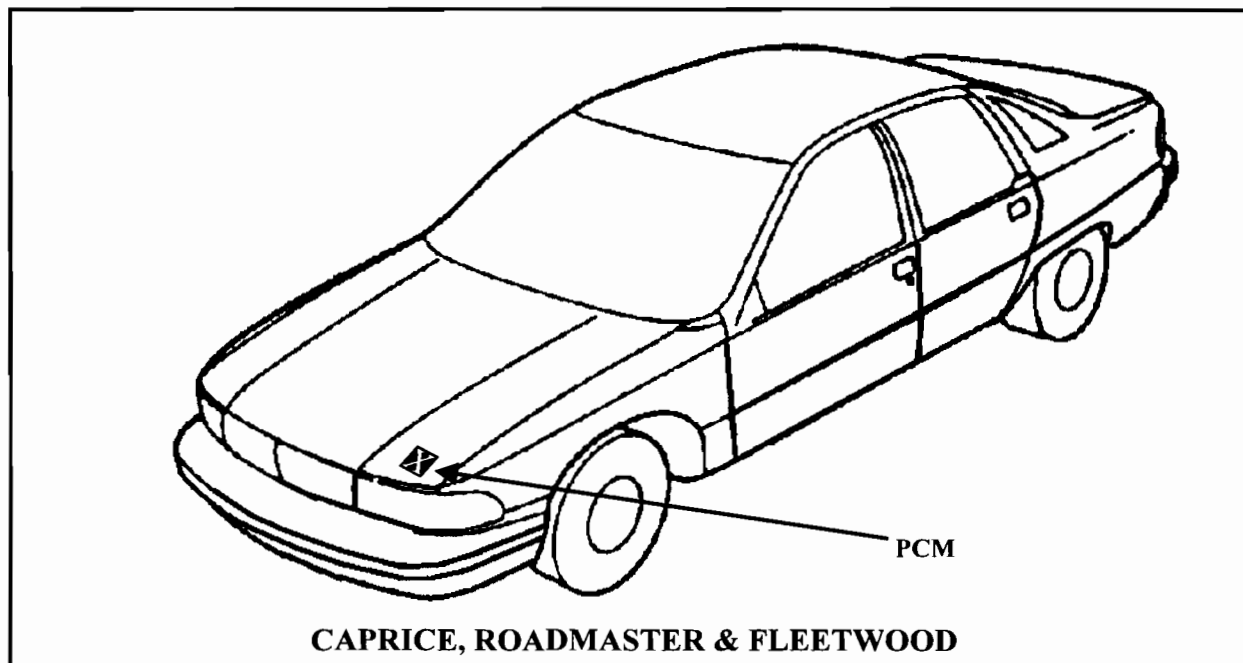


Figure 21

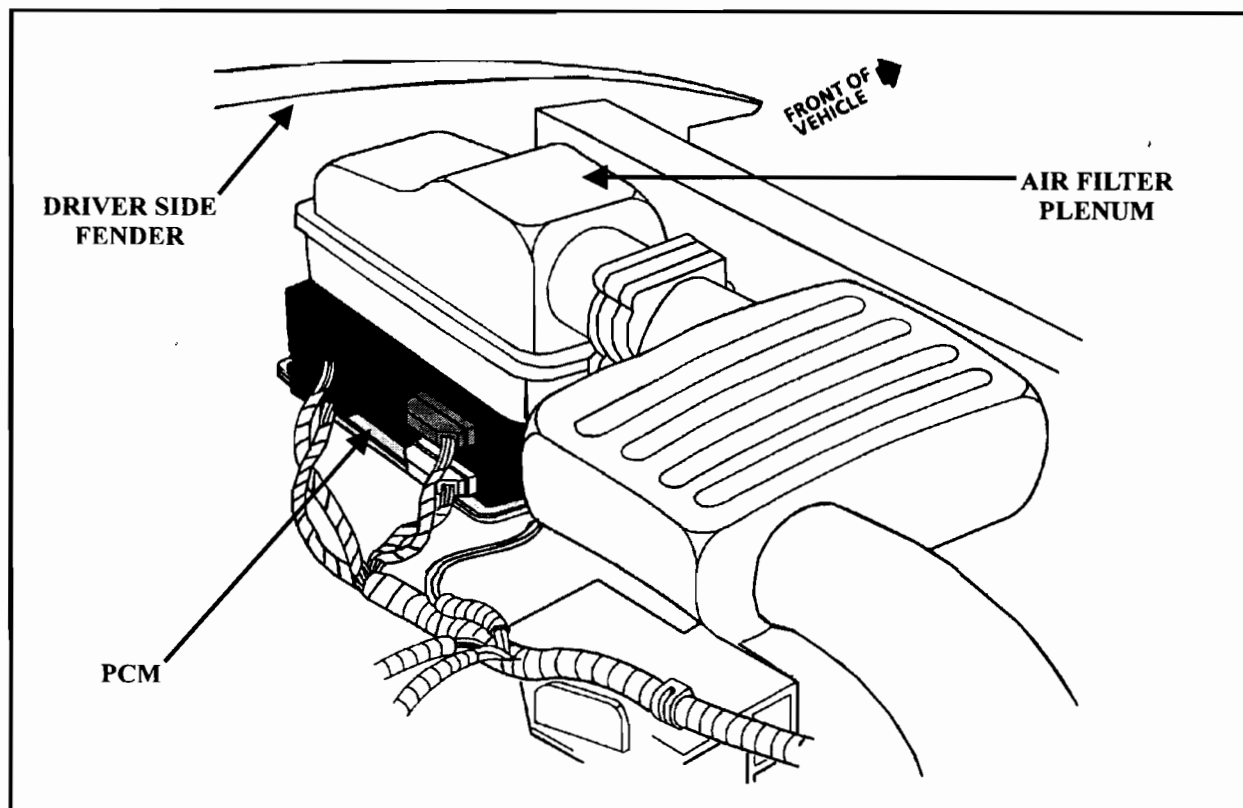


Figure 22

4L60E COMPUTER LOCATOR

1994-1996 "F" CARS

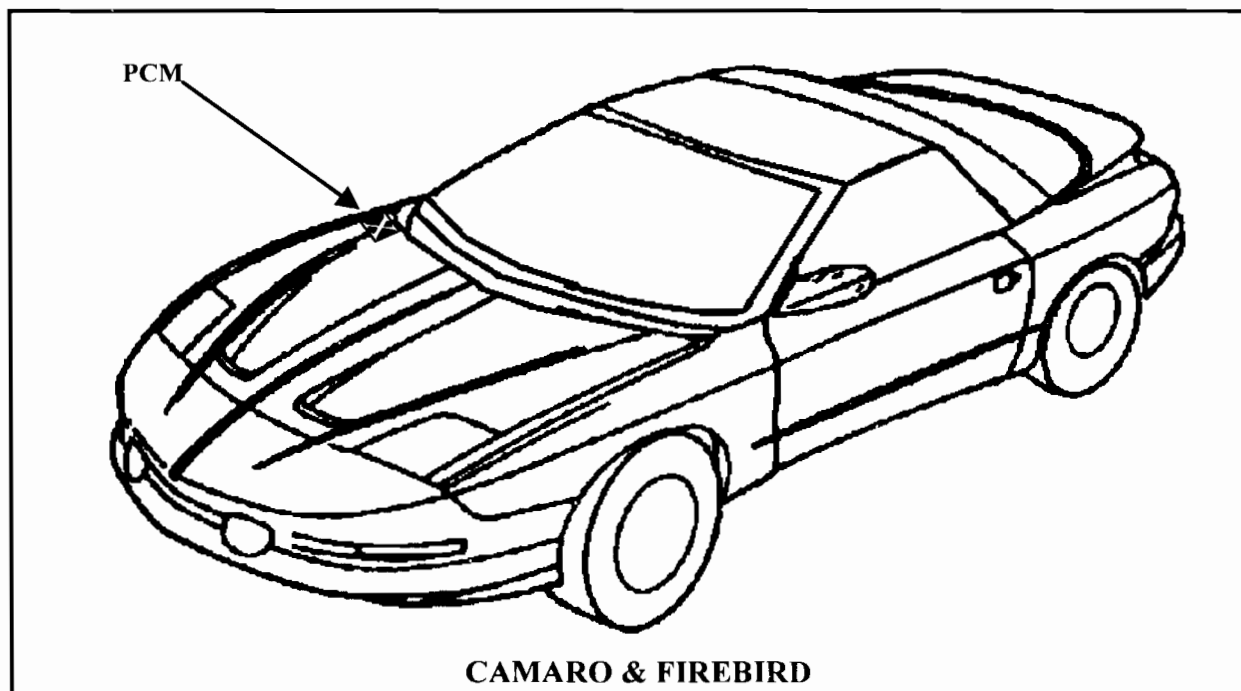


Figure 23

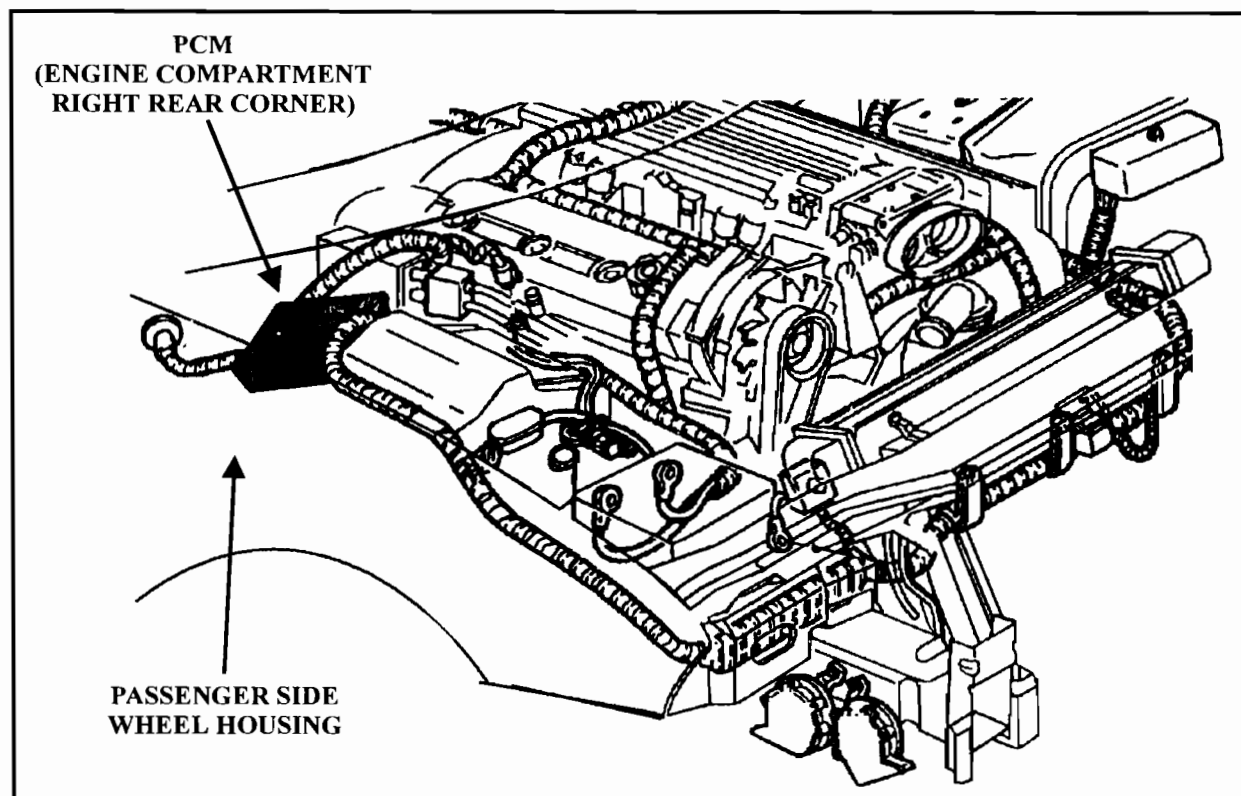


Figure 24

4L60E COMPUTER LOCATOR
1994-1996 "Y" CARS

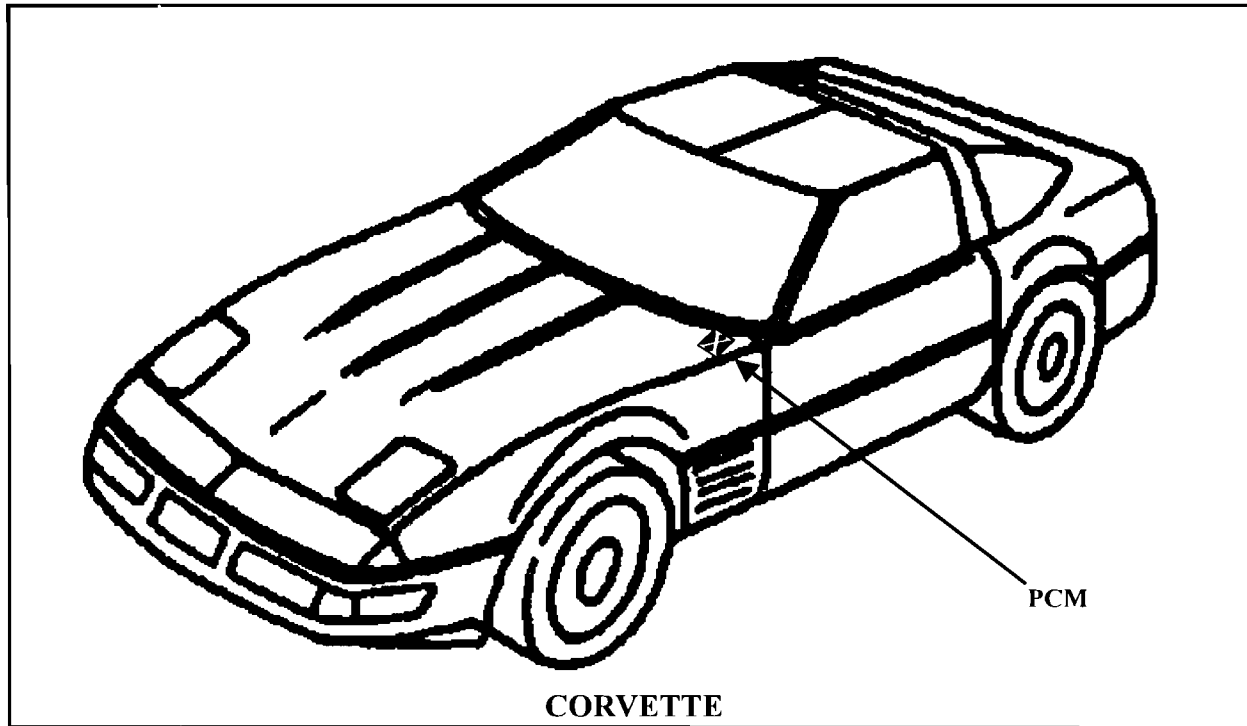


Figure 25

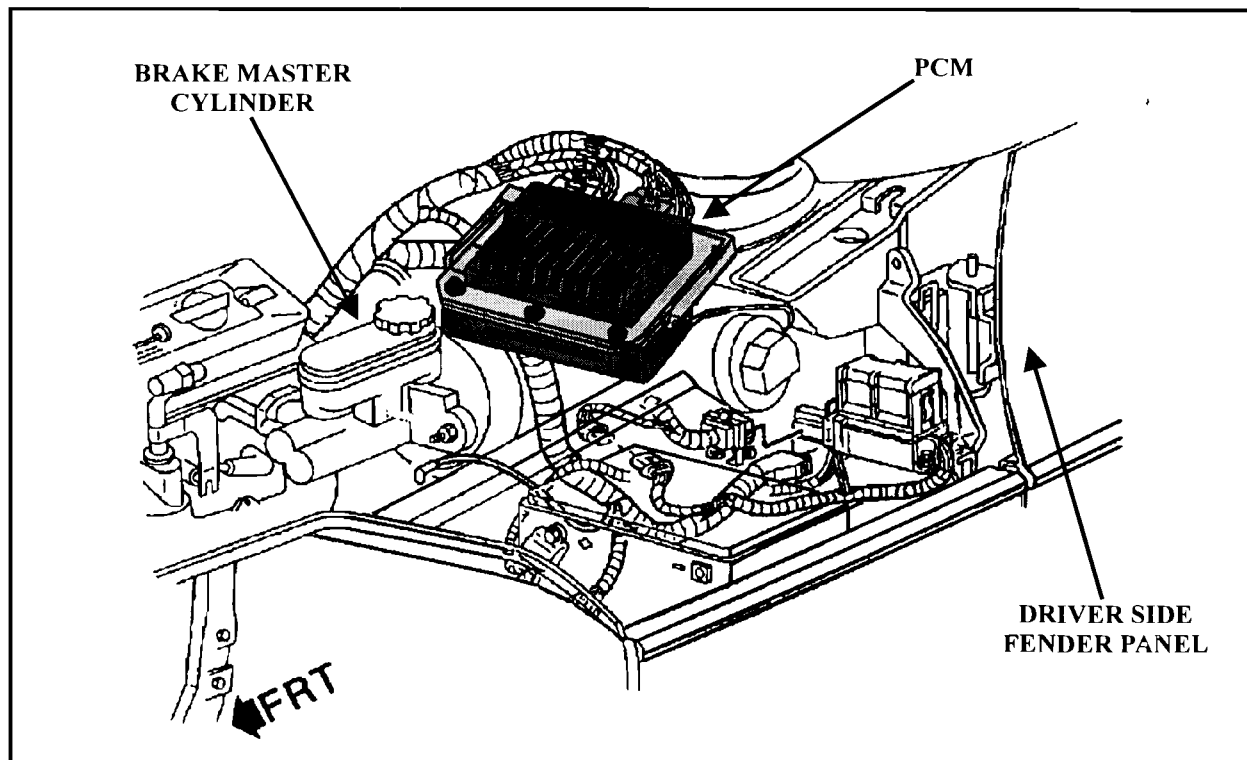


Figure 26

4L60E REOCCURRING CODES

DTC's 81, 82, 66, 67, 84 and 85

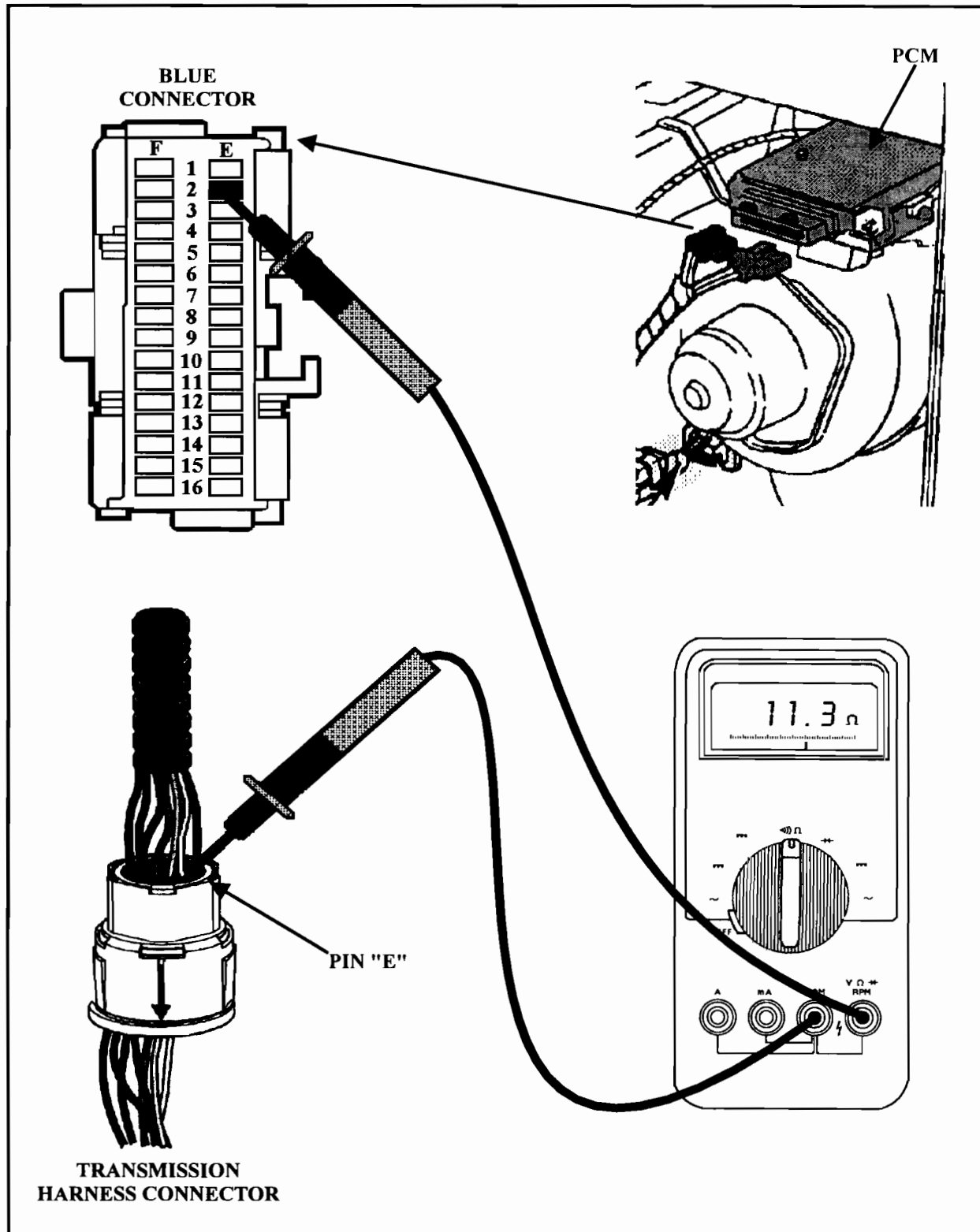


Figure 27

4L60E REOCCURRING CODES

DTC's 81, 82, 66, 67, 84 and 85

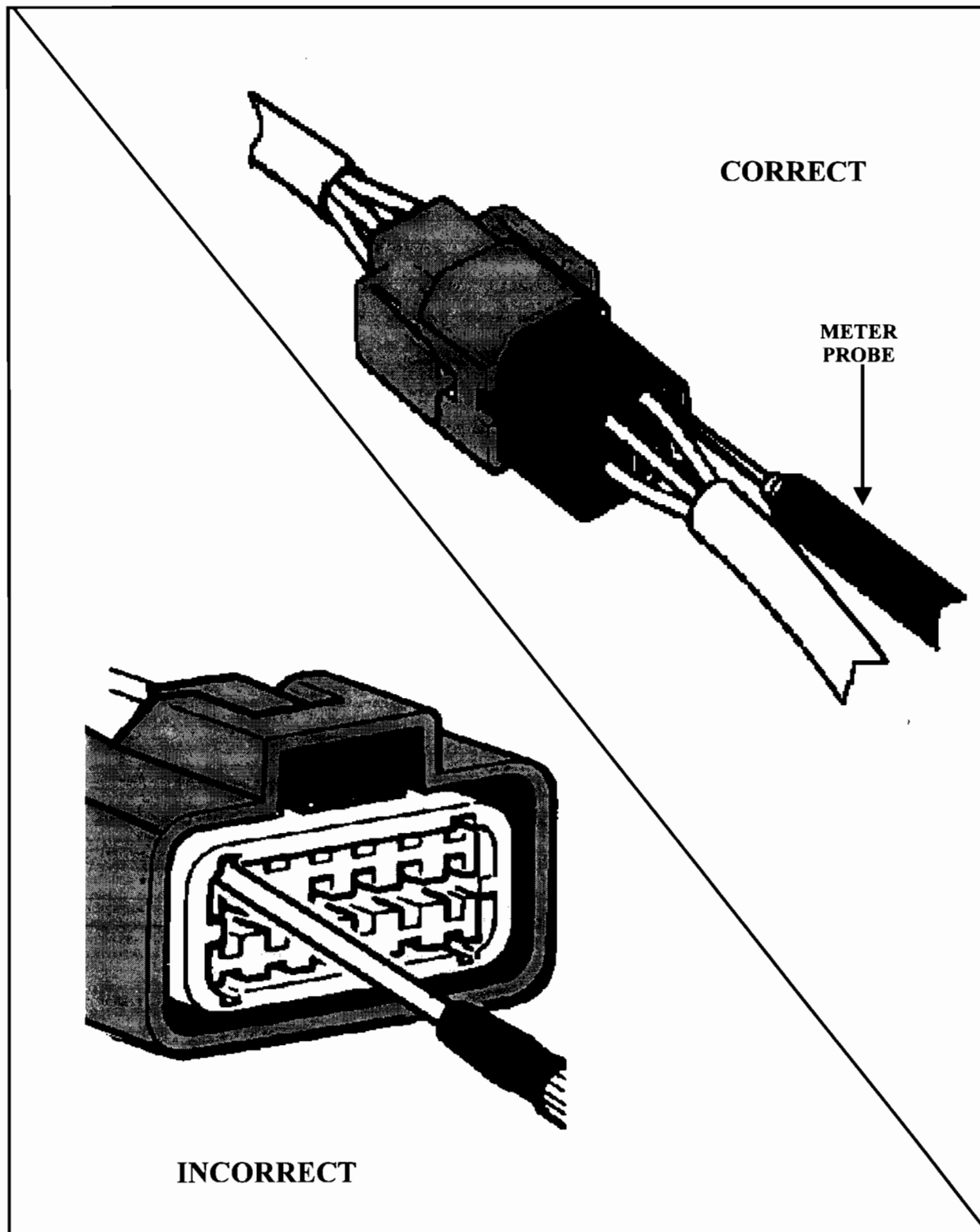


Figure 28



THM 4L60 AND 4L60-E PREMATURE 3-4 CLUTCH FAILURE

COMPLAINT: After rebuild, the vehicle exhibits premature 3-4 clutch failure, sometimes in as little as 2000 miles of use. Usually associated with Police, Taxi, or heavy duty use.

CAUSE: The cause may be, not using the high energy clutch plates, and the thick (.106") steel plates, or not enough line pressure rise with throttle opening.

CORRECTION NUMBER 1:

Install the latest design 3-4 clutch pack from General Motors that allows the use of the thickest (.106") steel plates and requires the following parts:

1. New design 3-4 Apply Ring with shorter legs (See Figure 1).
2. New design one piece 3-4 Apply Plate (See Figure 2).
3. New design .106" thick 3-4 Steel Plates, 5 required (See Figure 3).
4. New design high energy 3-4 Friction Plates, 6 required (See Figure 3).
5. New design 3-4 Selective Backing Plate, as they are thinner (See Figure 4).
6. Re-install the 3-4 Load Release Springs in the late design stack-up (See Figure 5).
7. **Note:** Ensure that you have .050"-.070" clutch clearance (See Figure 4).

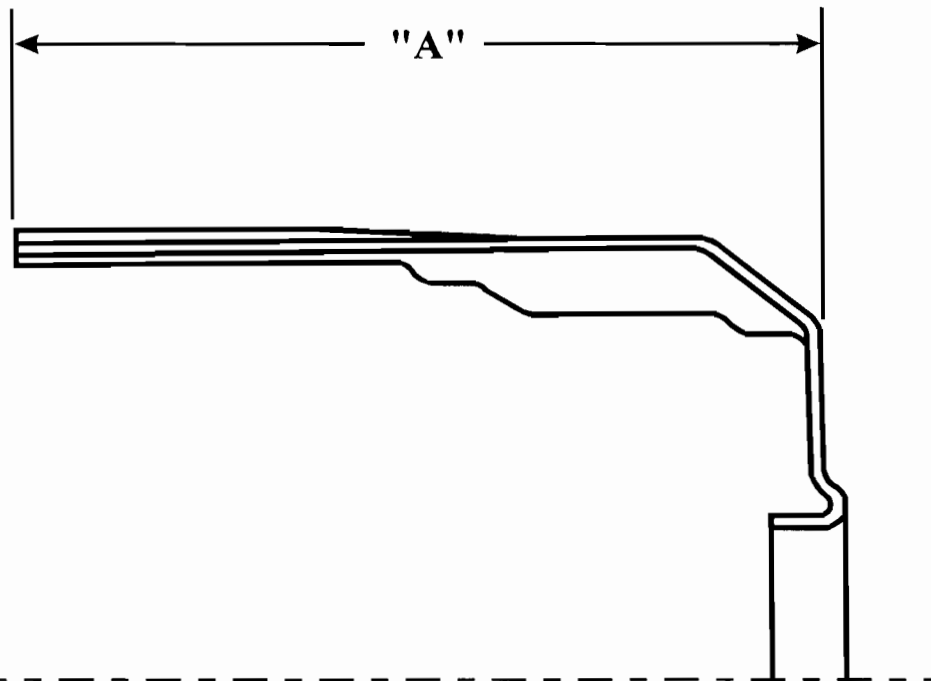
CORRECTION NUMBER 2:

There is now available from Trans-Go® a new Vacuum Modulator Kit, that **does solve** the line pressure rise with throttle opening problems that are associated with the 4L60-E. This new kit replaces the EPC (Force Motor) with a vacuum modulator and includes all necessary parts for the installation.

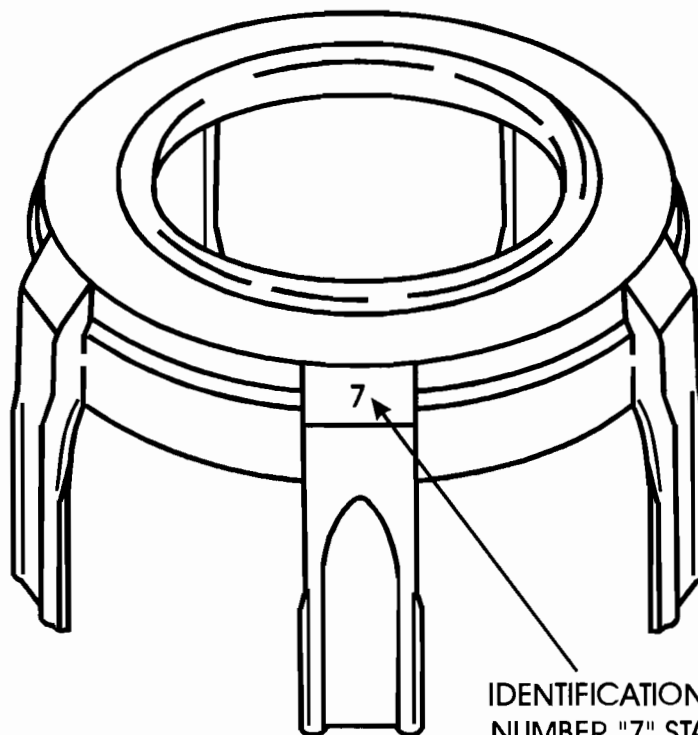
SERVICE INFORMATION:

3-4 Clutch Apply Ring (New Design)	8685043
3-4 Clutch Apply Plate (New Design)	8685044
3-4 Clutch Steel Plates (.106" Thick)	8685045
3-4 Clutch Backing Plate (Selective .227", Stamped "A")	8685046
3-4 Clutch Backing Plate (Selective .192", Stamped "B")	8685047
3-4 Clutch Backing Plate (Selective .157", Stamped "C")	8685048
3-4 Load Release Springs	8667424
3-4 Clutch Service Package (1987-1994)	
Includes parts listed above, plus the 2050 friction plates	8690923

NEWEST DESIGN LEVEL 3-4 APPLY RING



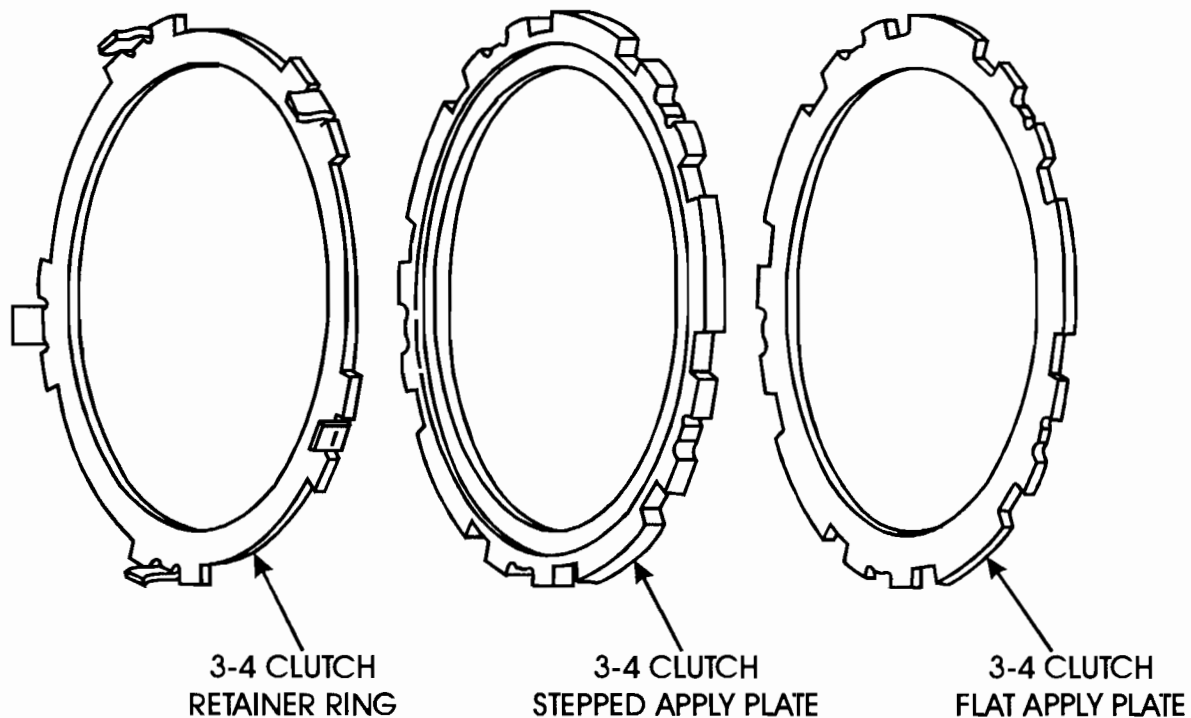
DIMENSION "A" ON NEW DESIGN IS 3.671" - 3.682" (93.26mm - 93.52mm)



IDENTIFICATION FOR NEW DESIGN IS
NUMBER "7" STAMPED ON ONE LEG.

Figure 1

PREVIOUS DESIGN LEVEL APPLY PLATES



NEWEST DESIGN LEVEL APPLY PLATE

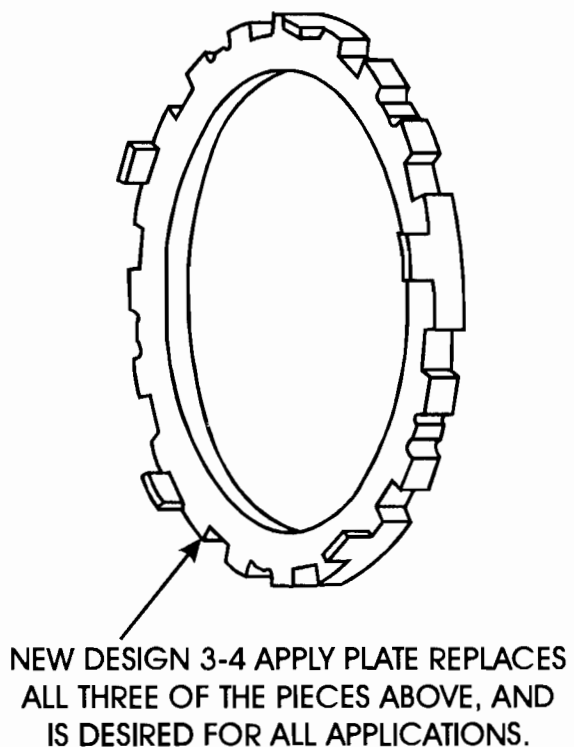


Figure 2

3-4 CLUTCH LINED AND STEEL PLATES

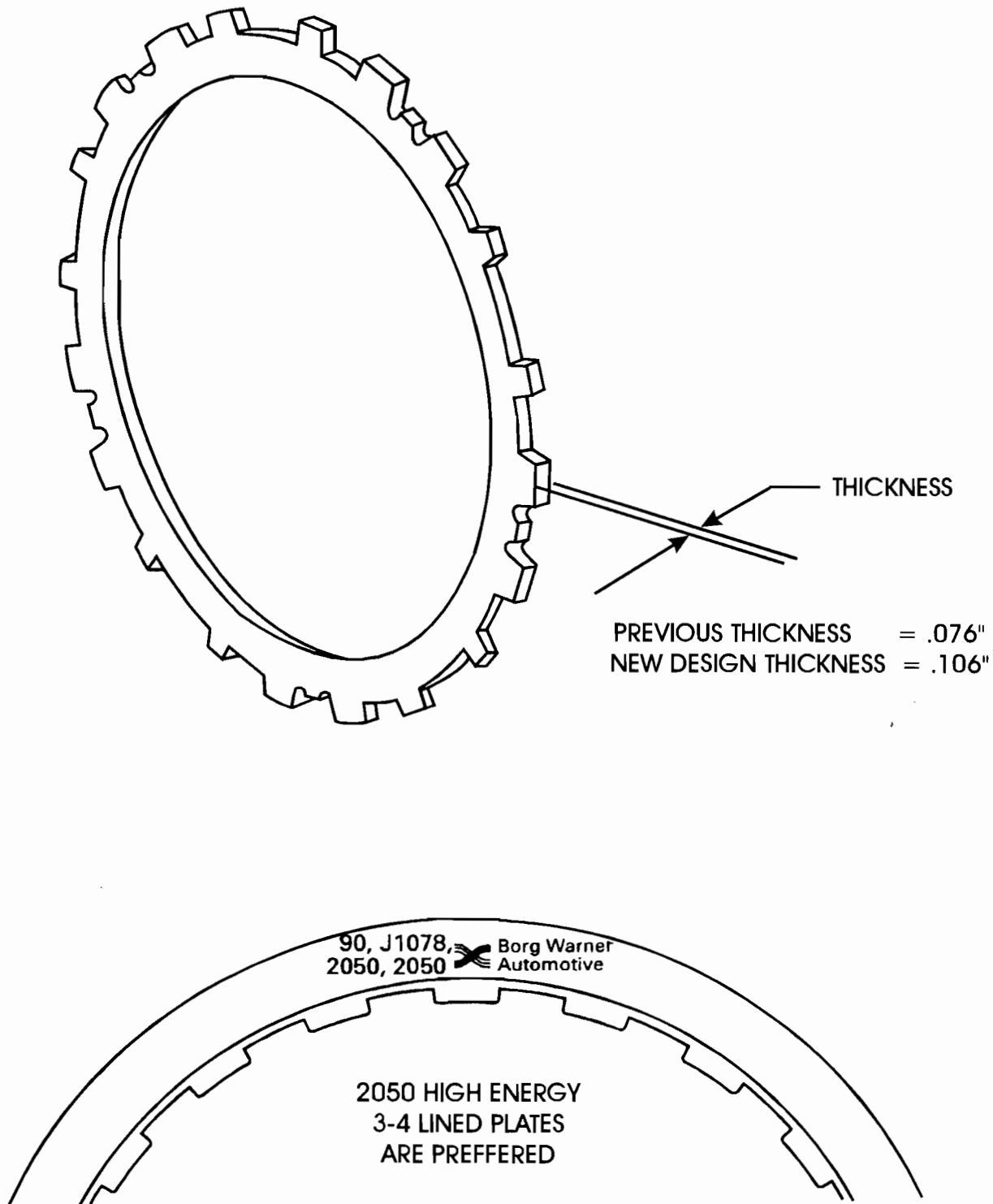
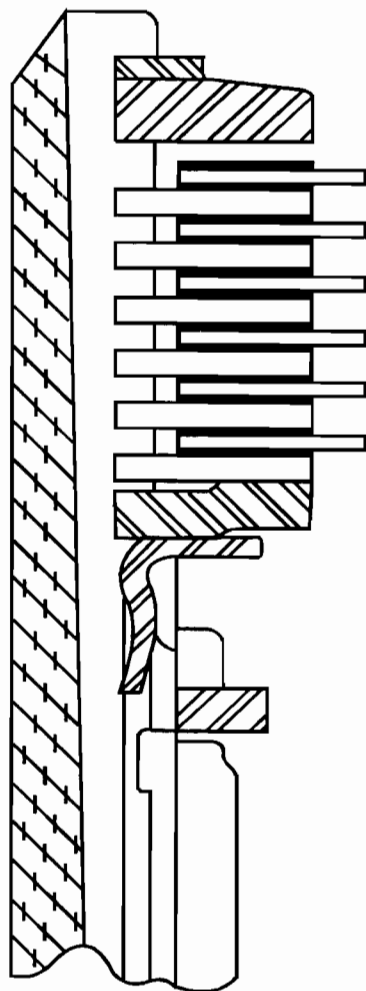


Figure 3

3-4 CLUTCH STACK-UP

PREVIOUS DESIGN



NEW DESIGN

CHECK FOR .050" - .070"
CLEARANCE HERE

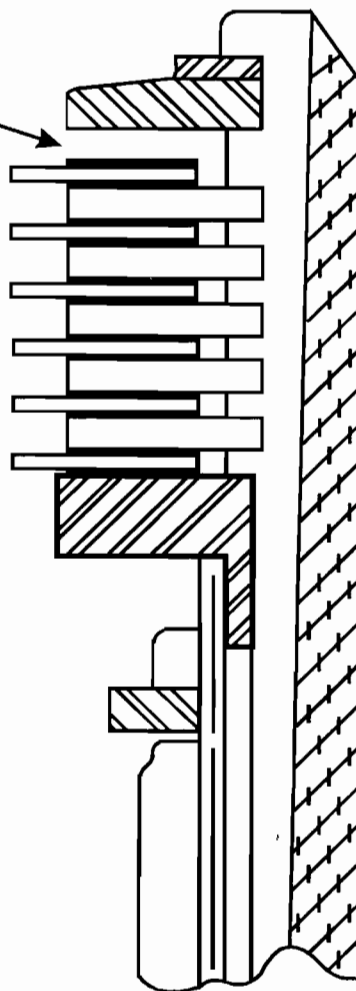


Figure 4

**RE-USE THE 3-4 LOAD RELEASE SPRINGS
IN THE NEW DESIGN CLUTCH PACK ONLY**

Re-install the 3-4 load release springs when you are using the .106" thick steel plates, 2050 high energy lined plates, new design 3-4 apply ring, new design one piece apply plate, and new design backing plate.

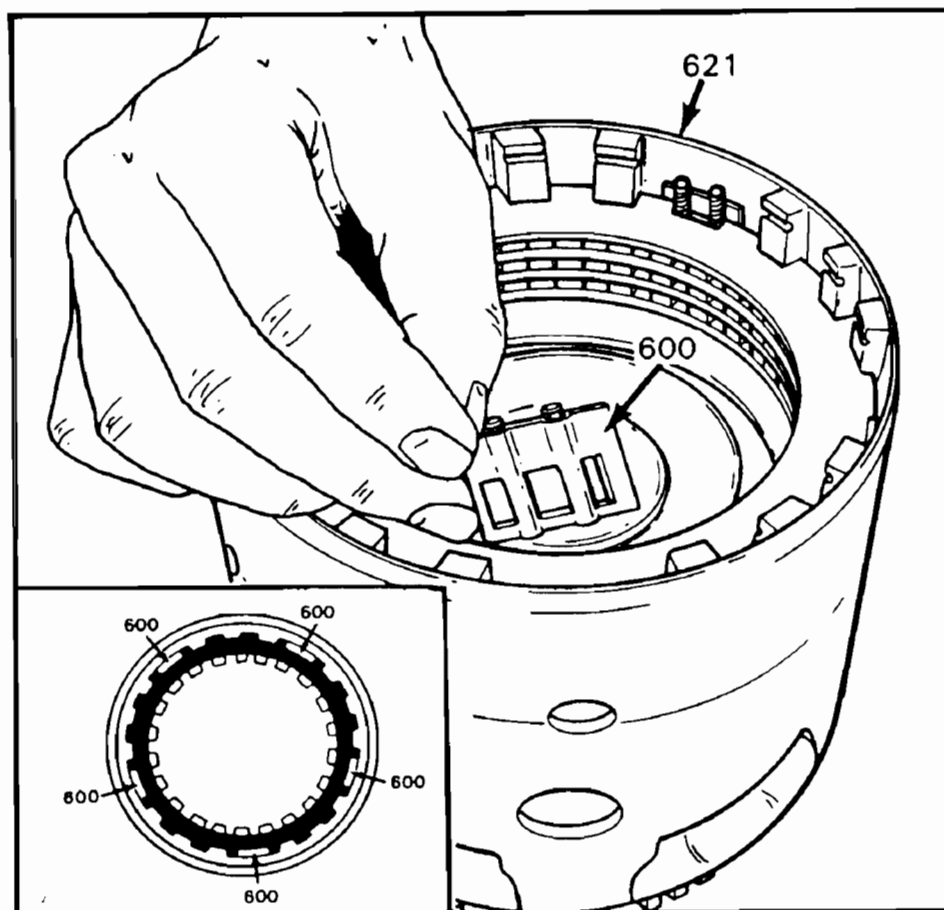


Figure 5

JOIN THE

HEAVYWEIGHTS



leave the guesswork to the other guys

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THM 700-R4 (4L60) OIL PUMP INTERCHANGE

CHANGE: All THM 700-R4 (4L60) transmissions built after June 27, 1984 were built with a new design casting for both the Pump Body and Pump Cover Assembly as shown in Figure 1.

REASON: To reduce pump fluid leaks and a "Moaning" noise created by the small leak.

PARTS AFFECTED:

- (1) PUMP BODY - Oil dam added in the line pressure passage to stop the channels from spreading in that particular area during higher line pressure conditions. The casting changes can easily be seen in Figure 1.
- (2) PUMP COVER - Oil dam added in the line pressure passage to correspond with the oil dam added in the pump body. The casting changes can be easily seen in Figure 1.

INTERCHANGEABILITY:

- (1) The new design Pump Body, *with oil dam*, will function with the previous design Pump Cover, but is not recommended.
- (2) The new design Pump Cover, *with oil dam*, **CANNOT** be used with the previous design Pump Body, unless modifications are made. Loss of main line pressure will be the result

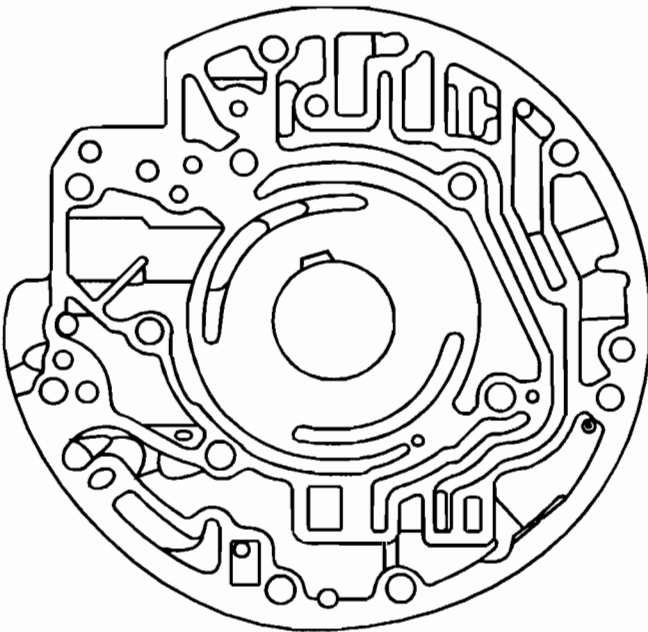
PUMP COVER MODIFICATION:

To use the new design Pump Cover (With Oil Dam), with the previous design Pump Body (Without Oil Dam), you **must** plug the hole marked "A" in Figure 1. We do this with a 10-32 machine screw, with some material ground off of the sides of the head for clearance. This will give you a slot to screw it into hole marked "A", which you must thread. Install with some Loctite® on the threads.

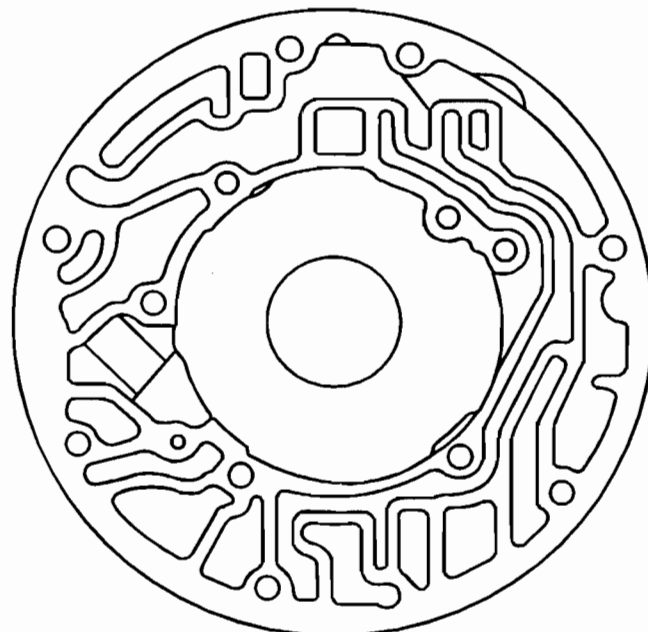
However, if you are experiencing any pump leakage or strange noises, you should use the "Dam Type" Pump Body and Cover.

PREVIOUS DESIGN CASTING

PUMP COVER

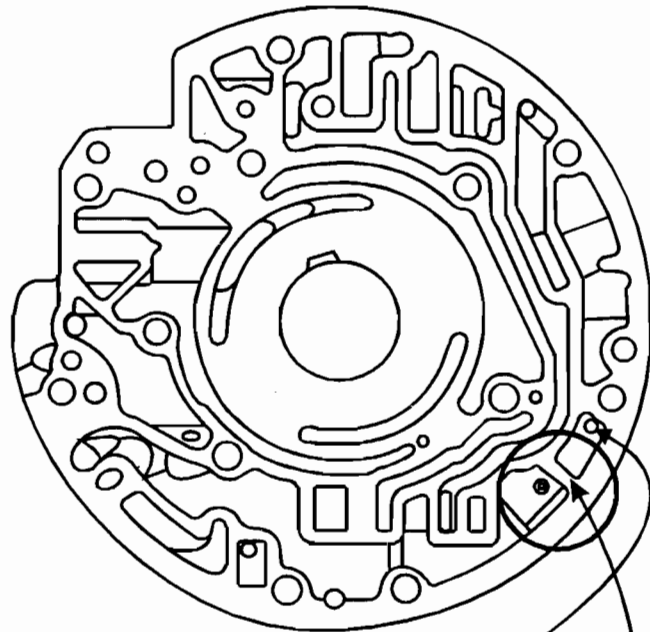


PUMP BODY



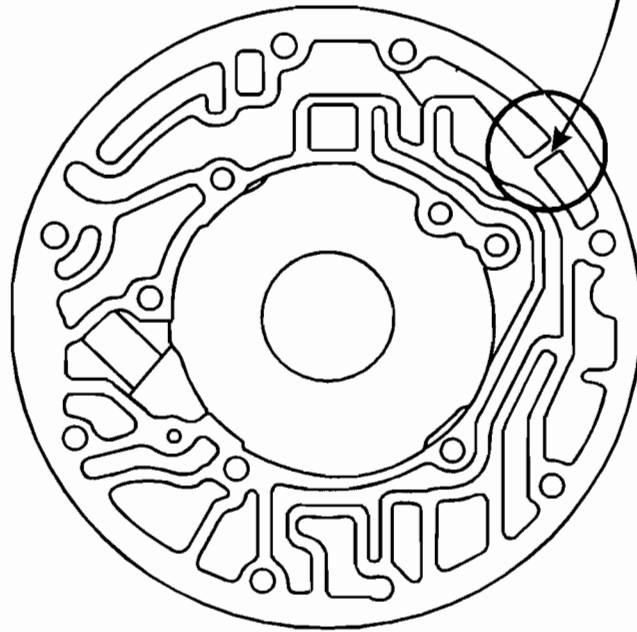
NEW DESIGN CASTING

PUMP COVER



"A"
ADDED
OIL DAM

PUMP BODY





THM 4L60-E
STAMPED STEEL, MOULDED RUBBER,
FORWARD AND OVERRUN PISTONS ADDED FOR 1997

CHANGE: Beginning at the start of production for 1997 models, all THM 4L60-E transmissions will be built with stamped steel, moulded rubber seals for both forward and overrun clutch pistons, as shown in Figure 1. The 3-4 clutch stamped steel piston was introduced in 1993.

REASON: Cost savings and increased durability.

PARTS AFFECTED:

- (1) FORWARD CLUTCH PISTON - Now manufactured of stamped steel with moulded rubber inner and outer seals, for increased durability against cracking (See Figure 1).
- (2) OVERRUN CLUTCH PISTON - Now manufactured of stamped steel with moulded rubber inner and outer seals, for increased durability and cost savings (See Figure 1).
- (3) 3-4 CLUTCH PISTON - Now manufactured of stamped steel with moulded rubber inner and outer seals, for increased durability and cost savings (See Figure 1).

INTERCHANGEABILITY:

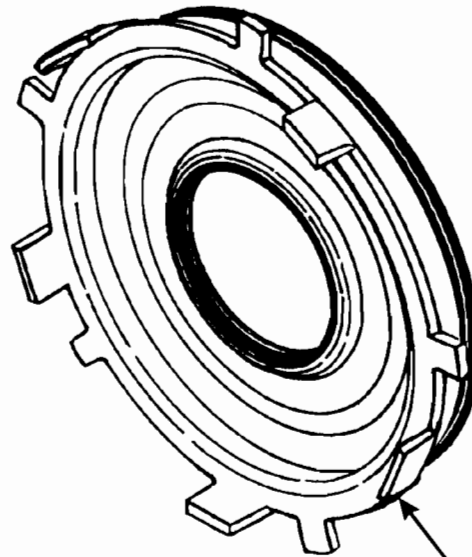
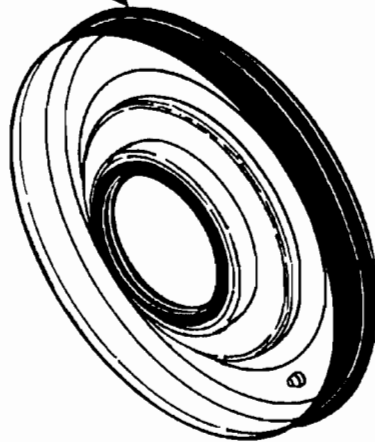
All of the pistons listed above, the Forward Clutch Piston, the Overrun Clutch Piston, and the 3-4 Clutch Piston will retro-fit back on all previous models, including the THM 700-R4 transmission.

SERVICE INFORMATION:

Forward Clutch Piston (Stamped Steel, Moulded Rubber)	24205272
Overrun Clutch Piston (Stamped Steel, Moulded Rubber)	24205273
3-4 Clutch Piston (Stamped Steel, Moulded Rubber)	24200290

ALL PISTONS IN THE INPUT HOUSING ARE NOW
STAMPED STEEL, WITH MOULDED RUBBER SEALS

OVERRUN CLUTCH PISTON
PART NO. 24205273



FORWARD CLUTCH PISTON
PART NO. 24205272

3-4 CLUTCH PISTON
PART NO. 24200290

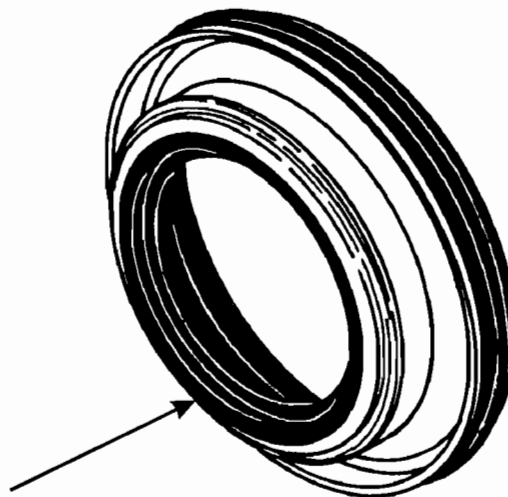


Figure 1