TRANSMISSION SEMINAR 1992

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TRANSMISSION SEMINAR
1992

This years seminar brings you "What's New For 92", along with the common complaints in a video and slide format, along with this printed back-up material to help you in your shop. We cover the most asked questions from the ATSG "Hotline" on the 4L60 (700-R4), 4T60 (440-T4), 4L80-E (400 Overdrive), and the Chrysler A604 (41TE). This information will help when the same type problems arise on the vehicles coming into your shop.

The 1991 model year saw the introduction of several new fully electronic controlled transmissions. In the transaxle category was the 4T60-E, which will eventually replace the 440-T4, and we still have a 4T80-E and a 4T40-E waiting in the wings. For the rear drive vehicles, we saw the 4L80-E (400 Overdrive), and the 4L60-E (700 Electronic Control), is scheduled to be released in 1993.

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YOU ASKED FOR PROOF!

And here are the results.

Report on the use of LUBEGARD® ATF Supplement added to General Motors Factory Fill Automatic Transmission Fluid (Reference Fluid).

Putting LUBEGARD® ATF Supplement to the test.

Wear, heat stability and frictional properties were tested at one of the two independent laboratories in the world certified by General Motors for Dexron® IIE testing. These tests represent the primary mechanical bench tests for Dexron® IIE approval.

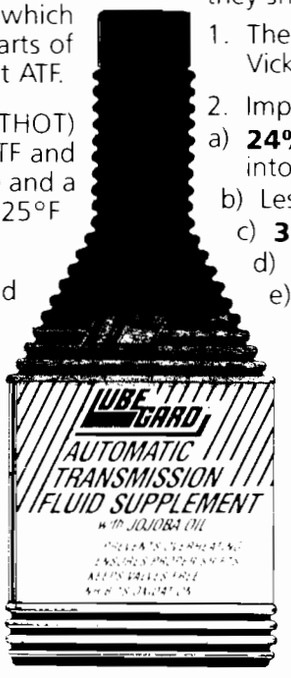
The ATF used was General Motors Factory Fill Automatic Transmission Fluid, the reference fluid for Dexron® IIE testing. LUBEGARD® ATF Supplement was added at the recommended level of 1 fluid oz per quart.

TESTS CONDUCTED

The tests run on the ATF with and without LUBEGARD® were:

1. Vickers® Sliding Vane Pump Wear Test which measures the wear on rubbing metal parts of a pump after 100 hours of pumping hot ATF.
2. Turbo Hydra-matic Oxidation Test (THOT) which measures the condition of the ATF and a bench stand transmission after twelve and a half days of running and shifting at 325°F with air injected into the fluid.
3. High Energy Friction Coefficient and Durability Test (HEFCAD) which measures the twisting (torque) of the motionless shaft of a set of automatic transmission clutches when stopping a flywheel moving at 3600 rpm on the other shaft in less than a second. The wheel is stopped and started 3 times per minute for 100 hours.

INTERNATIONAL LUBRICANTS INC



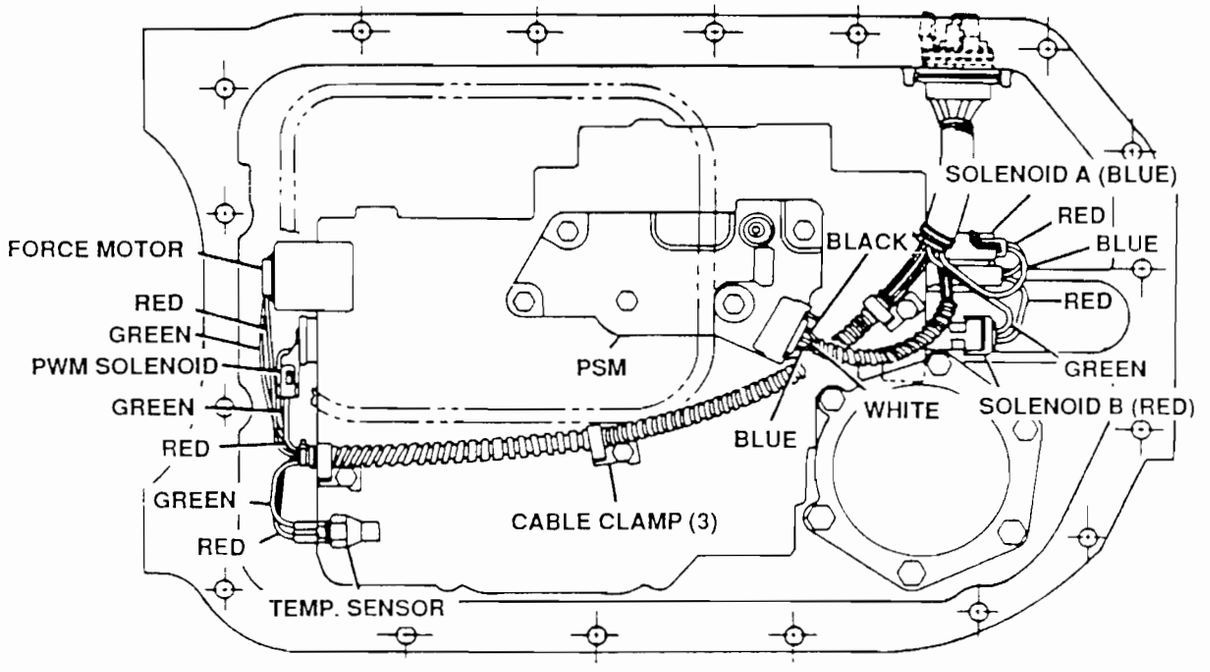
TEST RESULTS

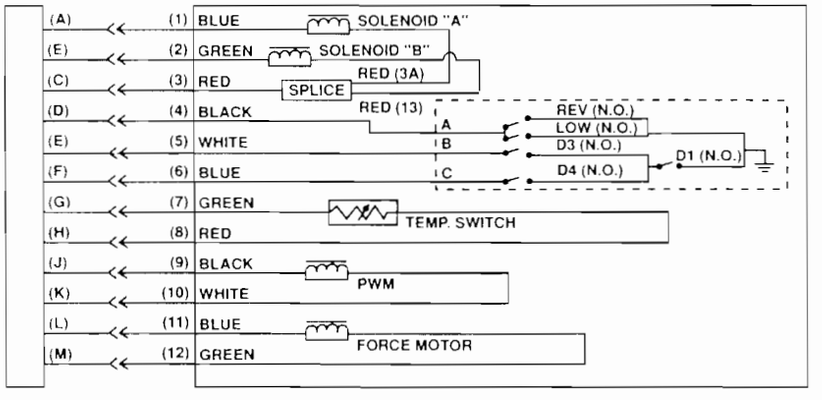
Test results on GM Factory Fill with LUBEGARD® were compared to GM Factory Fill without LUBEGARD®, they showed:

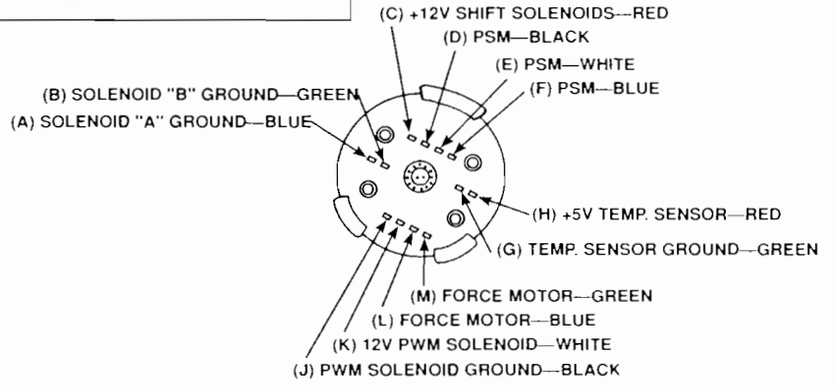
1. The wear on the contacting parts of the Vickers® Vane Pump was reduced **over 50%.**
2. Improvement in areas of Oxidative Stability:
   a) **24%** less oxidative breakdown of the ATF into acids.
   b) Less sludge formation.
   c) **30%** less oxygen uptake.
   d) **60%** less pentane insolubles.
   e) No penalty to transmission seals or fluid viscosity.
3. The following frictional improvements were:
   a) Smoother, more stable power transfer through the clutches with less shock, or torque peak, at the beginning or the end of clutch engagement.
   b) No sign of extra slipperiness that might cause excess clutch slippage and wear.

INTERNATIONAL LUBRICANTS, INC. is committed to providing the finest quality lubricants for the transmission industry. The tests conducted and presented in this report are factual. Requests for authenticity can be provided by writing to Int'l Lubricants,Inc , P.O. Box 24743, Seattle, WA 98124.

THM 4L80-E
COMPONENT LOCATIONS AND CONNECTIONS







Shift Solenoids

A shift solenoid is a two-port, feed bled device which consists of a coil/plunger-ball assembly The solenoid assembly works in conjunction with an orifice to pressurize the shift valve end chamber when voltage is applied to its coil. The controlled pressure then moves the shift valve against a spring causing a shift to occur. When voltage is no longer applied, the chamber is then opened to exhaust and the opposite shift valve action occurs. Shift solenoids eliminate the need for TV and governor pressures to control shift valve operation.

The 4L80-E transmission uses two shift solenoids: Solenoid A and Solenoid B.

Solenoid A

Solenoid A is attached to the valve body and is normally open to exhaust. The PCM/TCM activates the solenoid by providing a ground internally through one of its "Quad Driver Modules" Solenoid A is "ON" (exhaust closed) in 1st and 4th gears but "OFF" (exhaust open) in 2nd and 3rd. When the solenoid is on, pressure acts against the shift valves to force the valve to move. When the solenoid is off, spring pressure forces the shift valve to shuttle in the opposite direction in its bore. Solenoid A feeds the 1-2, and 3-4 shift valves

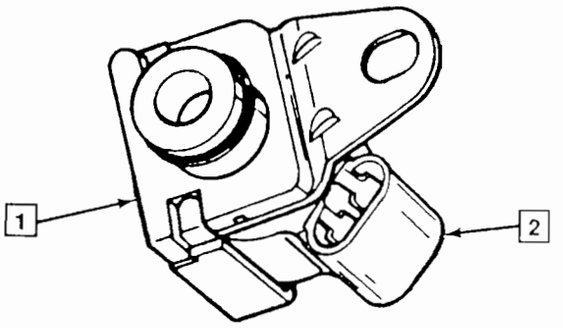
Solenoid B

Solenoid B is attached to the valve body and is also normally open to exhaust. The PCM/TCM activates the solenoid by providing a ground internally through one of its Quad Drive Modules Solenoid B is "ON" (exhaust closed) in 3rd and 4th gears and "OFF" (exhaust open) in 1st and 2nd gears. When the solenoid is on, pressure acts against the shift valve to force the valve to move. When the solenoid is off, spring pressure forces the shift valve to shuttle in the opposite direction in its bore. Solenoid B feeds the 2-3 shift valve

NOTICE: If both solenoids lose power, second gear only will result.

SHIFT SOLENOID ENERGIZATION

D4 RANGE	SOLENOID A		SOLENOID B	
1st	ON	0V	OFF	12V
2nd	OFF	12V	OFF	12V
3rd	OFF	12V	ON	0V
4th	ON	0V	ON	0V

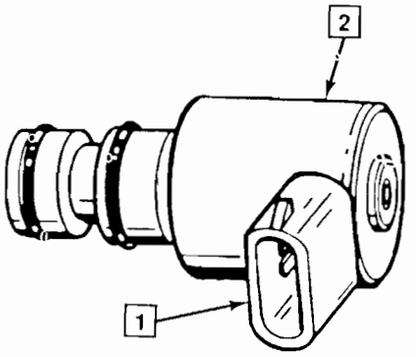


1 SHIFT SOLENOID
2 ELECTRICAL CONNECTOR

NOTICE: Shift solenoid resistance should measure 20 ohms minimum when measured at 20°C. Shift solenoid current flow should not exceed 0.75 amps. The shift solenoid should energize at a voltage of 7.5 volts or more (measured across the terminals). The shift solenoid should de-energize when voltage is one volt or less.

TCC (PWM) Solenoid

The TCC solenoid is a three-port assembly which uses (-) Duty Cycle, Pulse Width Modulation (Fixed 32 Hz) to control the rate of TCC apply-release. The solenoid's ability to "ramp" apply and release pressures result in a smoother apply and release of TCC in all conditions



1 ELECTRICAL CONNECTOR

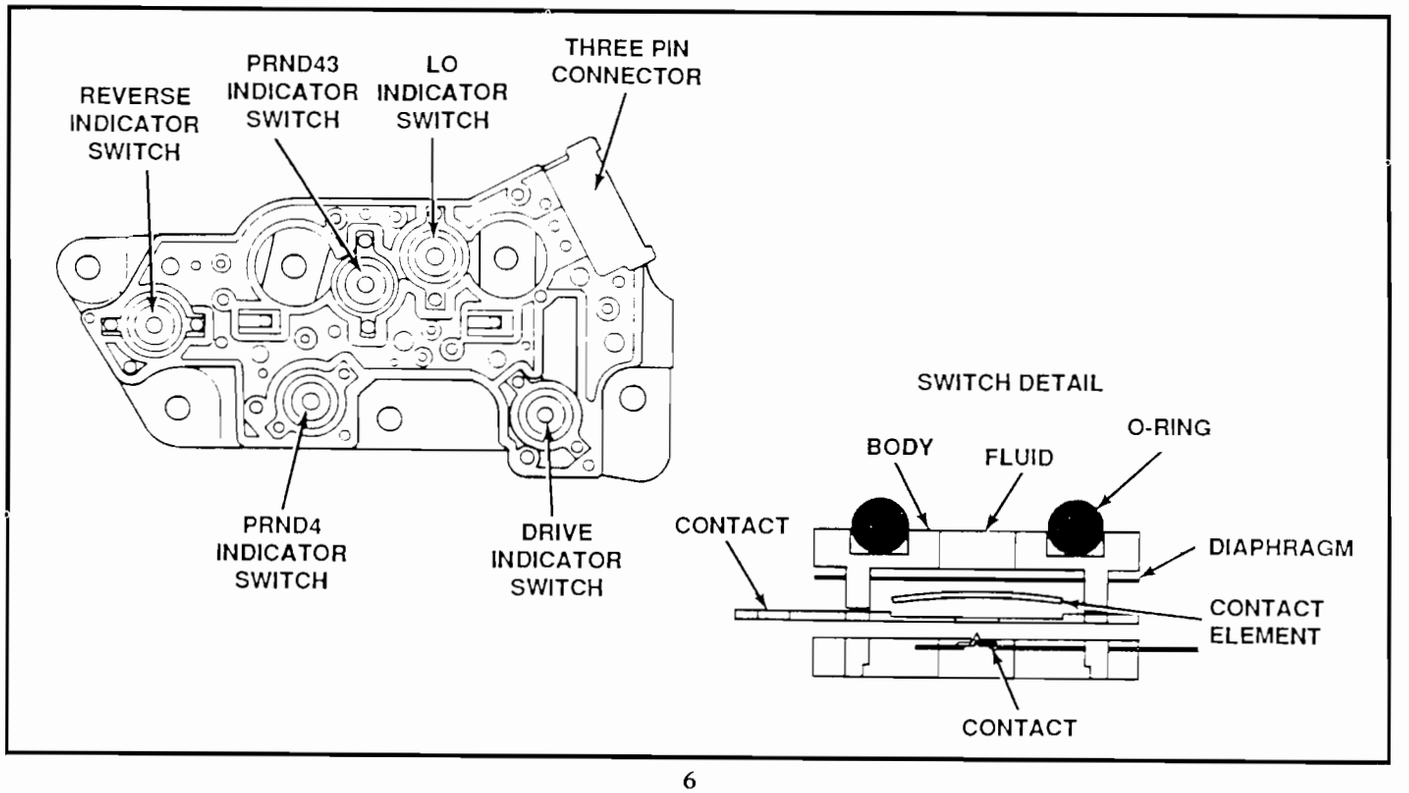
2 TORQUE CONVERTER CLUTCH SOLENOID (TCC)

The TCC solenoid is a normally closed valve, mounted to the valve body and used to control the position of the TCC apply valve.

NOTICE: TCC-PWM solenoid resistance should be 10 ohm minimum when measured at 20°C. Maximum solenoid current flow should not exceed 1.5 amps.

Pressure Switch Manifold (PSM)

The pressure switch manifold contains five normally open pressure switch assemblies which are used to indicate transmission manual valve range through the use of Binary code Each switch produces either an open or a ground for the three PCM/TCM signal lines, depending on which switches have pressure applied to them. The sequence of which switches are open and which switches are closed will be used by the PCM/TCM to determine actual manual valve position (except park/neutral). This input is used for line pressure, TCC and shift solenoid control. The pressure switch manifold is attached to the valve body.



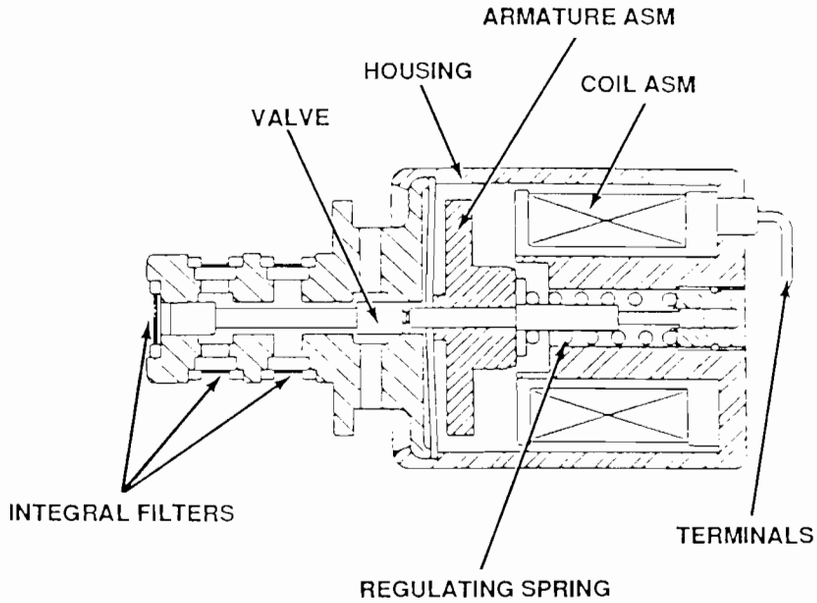
Force Motor

A Force Motor (also known as a Variable Force Solenoid, VFS) is a three-port, spool valve, electronic pressure regulator that controls pressure based on current flow through its coil-winding The Force Motor is attached to the valve body and controls main line pressure by moving a pressure regulator valve against spring pressure. The Force Motor eliminates the need for a TV cable or vacuum modulator to adjust line pressure according to engine load changes. The Force Motor position is controlled by a combination of two methods: High side and Low side control. One terminal of the Force Motor receives a fixed frequency (292.5 Hz) signal which varies in positive (+) Duty Cycle. This feed circuit to the Force Motor is called "Force Hi." The opposite terminal of the Force Motor is called "Force Low"

Force Low is used to provide a ground for the solenoid. It is through this combination of "Force Hi" and "Force Low" circuitry that actual Force Motor current is finely controlled This advanced control method assures instantaneous control of line pressure when changes in TPS and adaptive learning occur.

NOTICE: Force Low will remain at ground potential unless excessive current flow occurs (1.5A). When a shorted circuit causes high current flow, the PCM/TCM will control a field effect transistor (QDM) in the Force Low-High circuits to limit current flow. This current limiting process protects the PCM/TCM from damage from shorted circuits.

Force High	Force Low	Line Pressure
+ 0% Duty Cycle	0 Amps	Maximum
+40% Duty Cycle	1.1 Amps @ 4-5 V	Minimum



Transmission Input Speed Sensor (TISS)

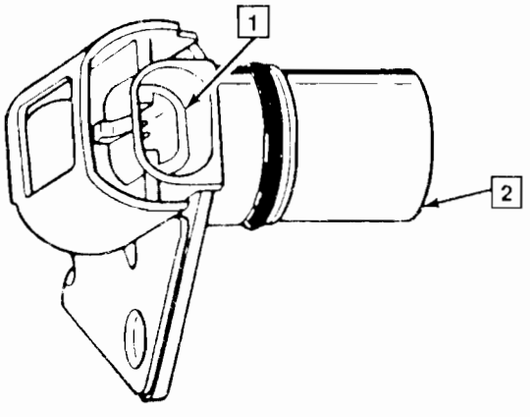
The input speed sensor is mounted on the driver's side of the transmission case, just forward of the center of the case. The sensor consists of a permanent magnet surrounded by a coil of wire. The sensor mounts into the case and maintains a slight air gap (0.045-0.109 in.) between itself and the forward clutch housing. An AC voltage signal is induced in the input sensor by rotating the forward clutch housing, which contains 31 serrations cut in its outside diameter The voltage output and frequency will vary with housing speed:

- Low speed = low Hz and voltage amplitude
- High speed = high Hz and voltage amplitude.

NOTICE: Sensor resistance should be 1260–1540 ohms when measured at 20°C. Output voltage will vary with speed from a minimum of 0.5 Volts AC at 100 RPM, to more than 100 Volts AC at 8000 RPM.

Inside the PCM/TCM, this analog signal is changed to a digital signal. This digital signal is then compared by the processor to a fixed clock signal internally within the PCM/TCM to determine actual turbine speed. The PCM/TCM uses input speed for control of line pressure and speed calculation.

NOTE: A faulty TISS circuit can set a code 68.



1 ELECTRICAL CONNECTOR
2 SENSOR

Transmission Speed Sensor

Transmission Output Speed Sensor (TOSS)

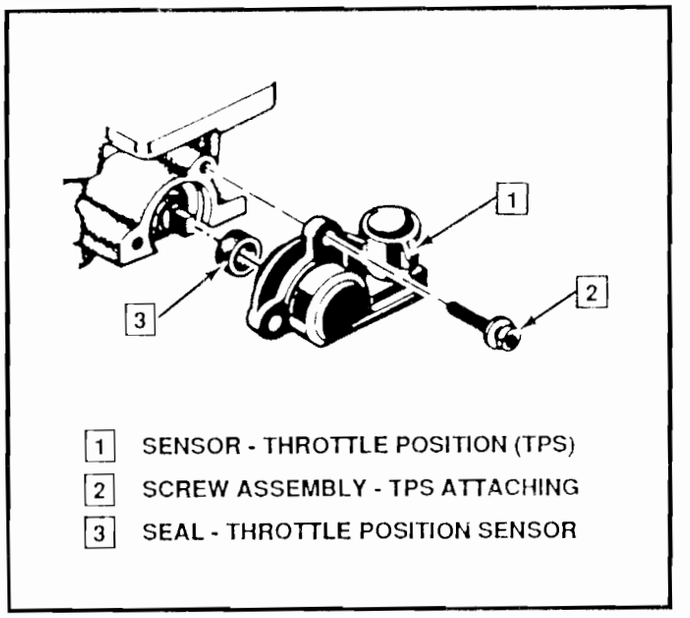
The output speed sensor is also mounted on the driver's side of the transmission case, but this sensor is toward the rear of the case. The sensor consists of a permanent magnet surrounded by a coil of wire The sensor mounts into the case and maintains a slight air gap (0.045–0.109 in.) between itself and a pressed fit 40 toothed ring mounted to the rear carrier assembly. The output speed sensor can then measure the speed of the rear carrier which is attached to the transmission output shaft. As the rear carrier is rotated, an AC signal is induced in the rear sensor, which varies in frequency and voltage output.

- Low speed = low Hz and voltage amplitude
- High speed = high Hz and voltage amplitude.

NOTICE: Sensor resistance should be1260–1540 ohms when measured at 20°C. Output voltage will vary with speed from a minimum of 0.5 Volts AC at 100 RPM to more than 100 Volts AC at 8000 RPM.

PCM/TCM Inputs

1. Throttle position sensor (TPS)
2. Barometric pressure (BARO) (1993 and later models)
3. Transmission temperature sensor (Trans-temp)
4. Coolant sensor (CTS) (PCM only)
5. System voltage (BATT)
6. Engine speed (RPM)
7. Transmission input speed sensor (TISS)
8. Transmission output speed sensor (TOSS)
9. Pressure switch manifold (PSM)
10. Brake switch (BRK SW)
11. A/C on/off (A/C)
12. Mode switch (Non-GM)
13. Diagnostic request



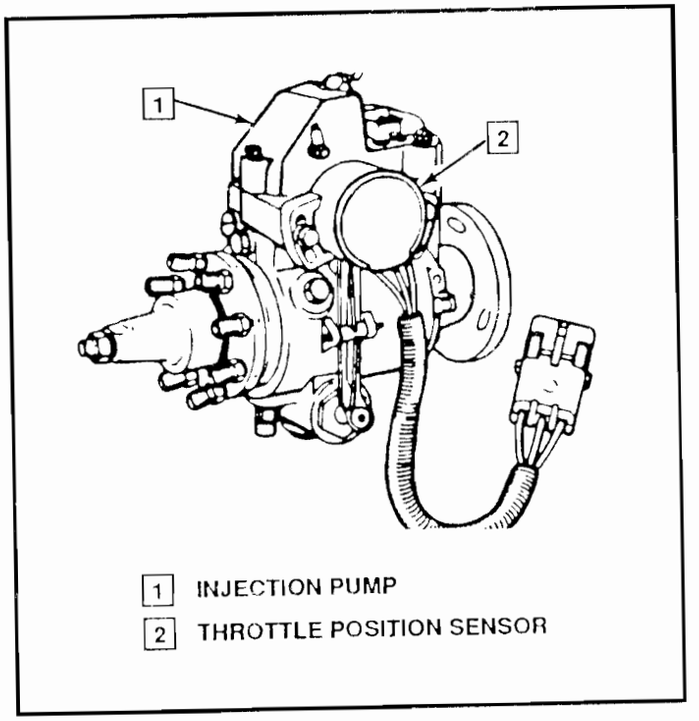
Throttle Position Sensor (TPS), All Gas Engines

Throttle Position Sensor (TPS) Input Information

The Throttle Position Sensor (TPS) is mechanically connected to the throttle shaft of the TBI unit or the injector pump on diesel applications

The sensor is a potentiometer with one end of the sensor resistor strip connected to a five volt supply from the PCM/TCM. The other end of the resistor strip is connected to ground. A third terminal is the signal circuit to the PCM/TCM: This terminal is connected to a movable contact inside the TPS. The movable contact moves up or down the resistor strip which varies the voltage value to the PCM/TCM. As the throttle is depressed, the voltage will increase from approximately .5V to 4.5V When the throttle is released, the reverse will occur. Inside the PCM/TCM, the sensor voltage value is converted to a percentage for use by the controller in determining throttle opening. This percentage is used in determining:

1. Shift Pattern – low volt = low % = earlier shift, high volt = high % = later shift
2. Main Line Pressure – low volt = low % = minimum psi high volt = high % = maximum psi



Throttle Position Sensor (TPS), 6.2L Diesel

Coolant Temperature Sensor (CTS)

The coolant temperature sensor is a Negative Temperature Coefficient (NTC) thermistor, mounted in the engine cooling system and used on gasoline engine equipped vehicles only. Low coolant temperature produces high sensor resistance while high coolant temperatures cause low sensor resistance. The PCM supplies a five volt signal to the sensor, then measures the voltage drop across the sensor (Figure 2-8). The process compares sensor voltage reading to calibrated values to determine actual temperature of the engine. At a normal engine operating temperature of 85°C – 95°C (184°F – 203°F), the voltage measures about 2.05 volts at the PCM.

The PCM uses engine temperature to inhibit TCC as well as control line pressure and shift times.

DEGREES °C	DEGREES °F	SENSOR RESISTANCE (OHMS)	VOLTAGE DROP ACROSS SENSOR (VOLTS)
-40	-40	INF. TO LOOK	5
-8	+18	14570	3.93
0	32	9560	3.56
10	50	5910	2.98
20	68	3760	2.41
30	86	2300	1.86
40	104	1589	1.40
50	122	942	3.69
60	140	730	3.27
70	158	455	2.87
80	176	349	2.44
90	194	252	2.05
100	212	180	1.70
110	230	136	1.39
120	248	108	1.15

–NOTE–
AN ECM INTERNAL SHUNT CIRCUIT WILL COME INTO PLAY AS TEMPERATURE INCREASES BEYOND 50 C. AS TEMPERATURE IS DECREASING, INTERNAL SHUNT COMES IN AT 40°C. THERE IS A 10°C. OVERLAP.

Diagnostics

The PCM/TCM constantly monitors most of the inputs and outputs used for transmission control. Within the software calibration of the PCM/TCM each input/output is assigned a specific tolerance or window for proper operation. The PCM/TCM constantly monitors the inputs/outputs and compares their values to the window. If an input/output goes outside of that specific window and other specific requirements are met, a malfunction code will be stored by the PCM/TCM.

Currently, a total of 19 codes relate to the transmission control system. Access to malfunction codes can be attained by two methods: manually and with a scan tool.

Code Index

Code Number	Description	Actions
14	Engine Temp High	PCM/TCM substitutes default temp of 90°C (195°F) and TCC applies when engine is cold
15	Engine Temp Low	Same as 14
21	TPS Voltage High	Maximum Line Pressure Harsh/Firm Shifts Fixed Shift Points 4th Gear Inhibited TCC Inhibited
22	TPS Voltage Low	Same as 21
24	Output Speed Low	Maximum Line Pressure 2nd Gear Operation Only
28	PSM Invalid Combination	High Line Pressure 4th Gear Inhibited TCC Inhibited
*33	BARO High	
*34	BARO Low	
*37	Brake Switch Stuck ON	
*38	Brake Switch Stuck OFF	
39	TCC Stuck OFF	None
53	System Voltage High	2nd Gear Only Maximum Line Pressure TCC Inhibited

Code Index (Cont'd)

Code Number	Description	Actions
58	Transmission Temp High	Substitutes Default Temp of 130°C (265°F). Harsh Shifts TCC in 2nd, 3rd and 4th
59	Transmission Temp Low	Substitutes Default Temp of 130°C (265°F). Harsh Shifts TCC in 2nd, 3rd and 4th
68	Overdrive Ratio Incorrect	High Line Pressure 4th Gear Inhibited TCC Inhibited
*69	TCC Stuck ON	
*71	Engine Speed Low	
*72	Output Speed Low	
73	Force Motor Current Incorrect	Maximum Line Pressure
*74	Input Speed Low	
75	System Voltage Low	Maximum Line Pressure 2nd Gear Only TCC Inhibited
*77	Mode Select Switch	
*79	Transmission Hot	
81	QDM Fault, B Solenoid	Maximum Line Pressure 2nd Gear Only TCC Inhibited
82	QDM Fault, A Solenoid	2nd and 3rd Gears Only or 1st and 4th Gears Only
83	QDM Fault, TCC	None
85	Undefined Ratio	Maximum Line Pressure
86	Solenoid B, Stuck ON	Actions Inhibited
87	Solenoid B, Stuck OFF	Actions Inhibited
*89	Maximum Adaptive Learning and Long Shift	

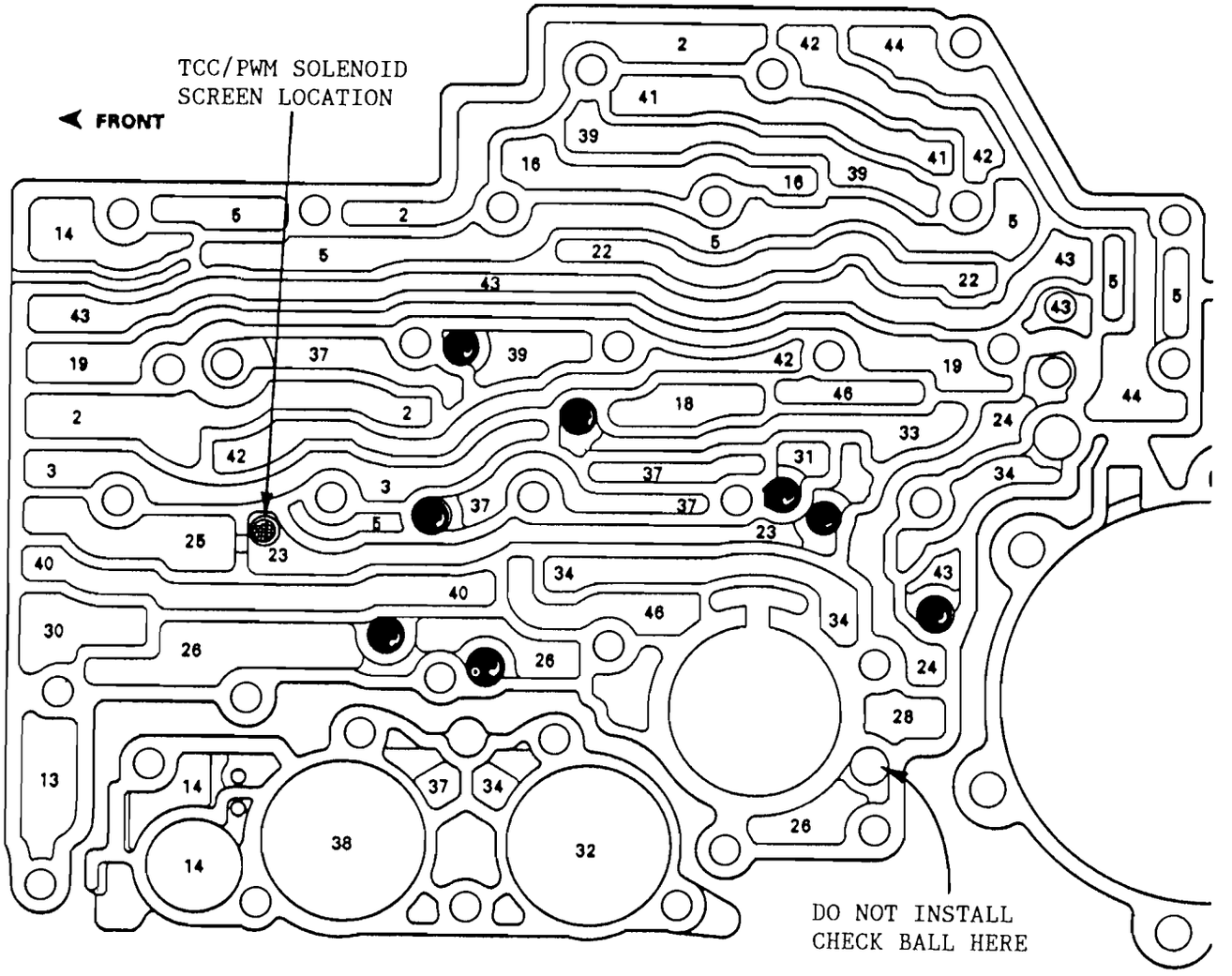
* Codes have been masked. These codes are not available for scan or manual diagnostics for the 1991 model year.

4L80-E
SOLENOID A & B MECHANICAL FAILURE DIAGNOSIS
(ASSUMES OD RANGE IS SELECTED)
(AND NO DEFAULTS PRESENT)

COMMANDED GEAR	SOLENOID A MECHANICAL FAULT	SOLENOID B NORMAL	ACTUAL GEAR
1st	OFF	OFF	2nd
2nd	OFF	OFF	2nd
3rd	OFF	ON	3rd
4th	OFF	ON	3rd
1st	ON	OFF	1st
2nd	ON	OFF	1st
3rd	ON	ON	4th
4th	ON	ON	4th

COMMANDED GEAR	SOLENOID A NORMAL	SOLENOID B MECHANICAL FAULT	ACTUAL GEAR
1st	ON	OFF	1st
2nd	OFF	OFF	2nd
3rd	OFF	OFF	2nd
4th	ON	OFF	1st
1st	ON	ON	4th
2nd	OFF	ON	3rd
3rd	OFF	ON	3rd
4th	ON	ON	4th

THM 4L80-E
CASE CHECKBALL LOCATIONS



ALL CHECK BALLS .250" DIAMETER (8 TOTAL)

1 SUCTION
2 LINE
3 REGULATED APPLY
4 ORIFICED REGULATOR APPLY
5 ACTUATOR FEED
6 ORIFICED ACTUATOR FEED
7 CONVERTER FEED
8 REGULATED CONVERTER FEED
9 TCC TOGGLE
10 CONVERTER RELEASE
11 CONVERTER APPLY
12 COOLER
13 LUBE
14 TORQUE SIGNAL
15 ORIFICED TORQUE SIGNAL
16 PRN (PARK REVERSE NEUTRAL)
17 PRND 4-3
18 PRND 4
19 DRIVE
20 FILTERED ACTUATOR FEED
21 SIGNAL "A"
22 SIGNAL "B"
23 2-2 DRIVE
24 2ND CLUTCH
25 FILTERED 2-3 DRIVE
26 ACCUMULATOR
27 ORIFICED ACCUMULATOR
28 SECOND ACCUMULATOR
29 THIRD CLUTCH ACCUMULATOR
30 TCC SIGNAL
31 FRONT BAND APPLY
32 THIRD ACCUMULATOR
33 THIRD CLUTCH FEED
34 THIRD CLUTCH
35 THIRD / REVERSE
36 FOURTH CLUTCH FEED
37 FOURTH CLUTCH
38 FOURTH ACCUMULATOR
39 D 3-2-1
40 OVERRUN CLUTCH
41 D 2-1
42 LO
43 REVERSE
44 REAR BAND APPLY
45 EXHAUST
46 ORIFICED EXHAUST
47 VOID

HYDRA-MATIC 4L80-E

BUZZING NOISE IN PARK AND/OR NEUTRAL

COMPLAINT: Some Hydra-matic 4L80-E/4L80-EHD transmissions may exhibit a buzzing or vibration noise while the selector lever is in the park or neutral position.

CAUSE: The cause may be, line pressure instability in the pressure regulator valve line-up located in the pump cover.

CORRECTION: The correction requires two steps:

STEP 1. There is now available from OEM, a new service package that includes an "Added" isolater spring, inside of the current pressure regulator spring (See Figure 30).
The new service package is available under OEM part number 8682998. Refer to Figure 30 for proper assembly.

NOTE: Ensure that the snap ring is installed with the flat side facing away from the boost sleeve.

STEP 2. Install a 9/32" diameter cup plug, with a .075" orifice hole drilled in the center of the cup plug, into the torque signal passage of the pump cover (See Figure 29).

SERVICE INFORMATION:

Pressure Regulator Service Package 8682998
9/32" Cup Plug, (Local Hardware Item)

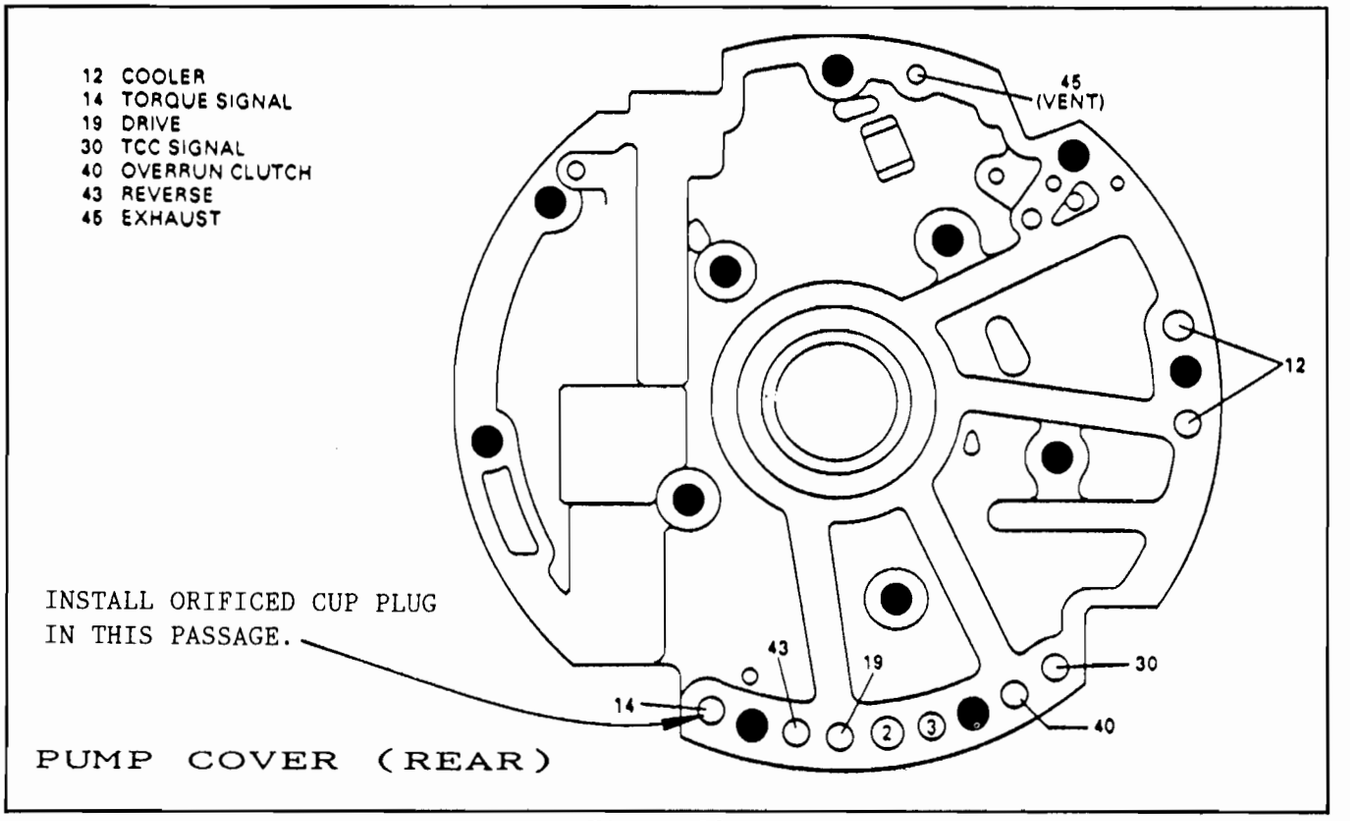
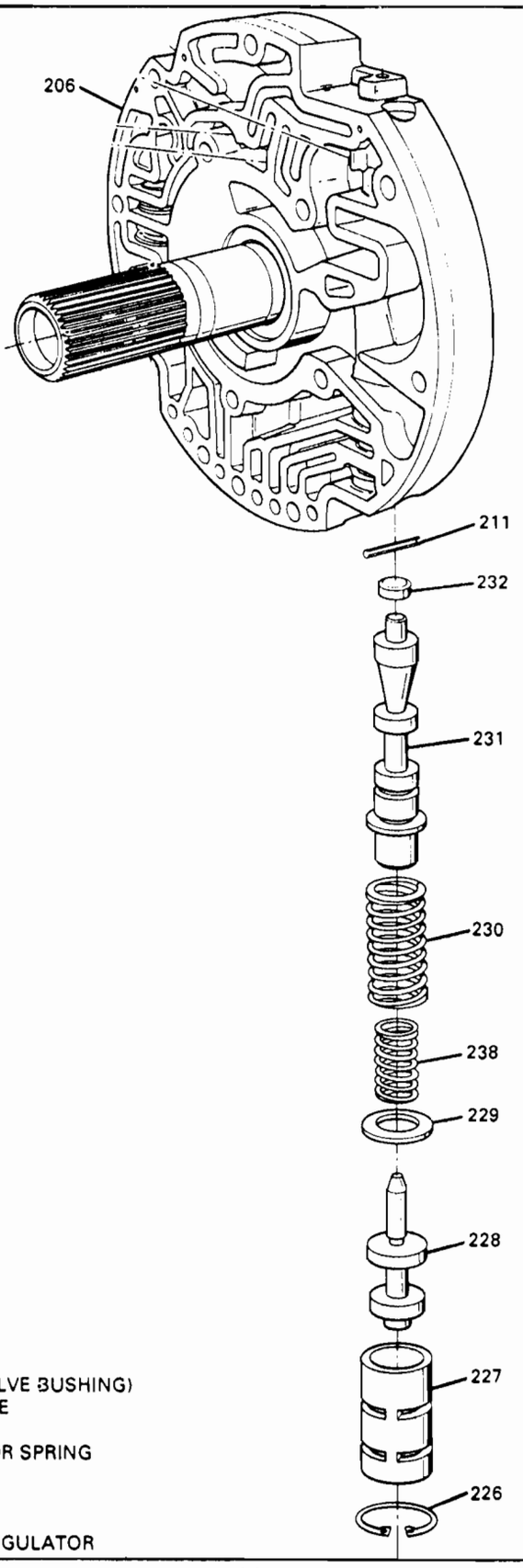


Figure 29



206 COVER, PUMP
211 PIN, COILED SPRING (3)
226 RING, RETAINER (REV. BOOST VALVE BUSHING)
227 BUSHING, REVERSE BOOST VALVE
228 VALVE, REVERSE BOOST
229 RETAINER, PRESSURE REGULATOR SPRING
230 SPRING, PRESSURE REGULATOR
231 VALVE, PRESSURE REGULATOR
232 PLUG, PRESSURE REGULATOR
238 SPRING, ISOLATOR PRESSURE REGULATOR

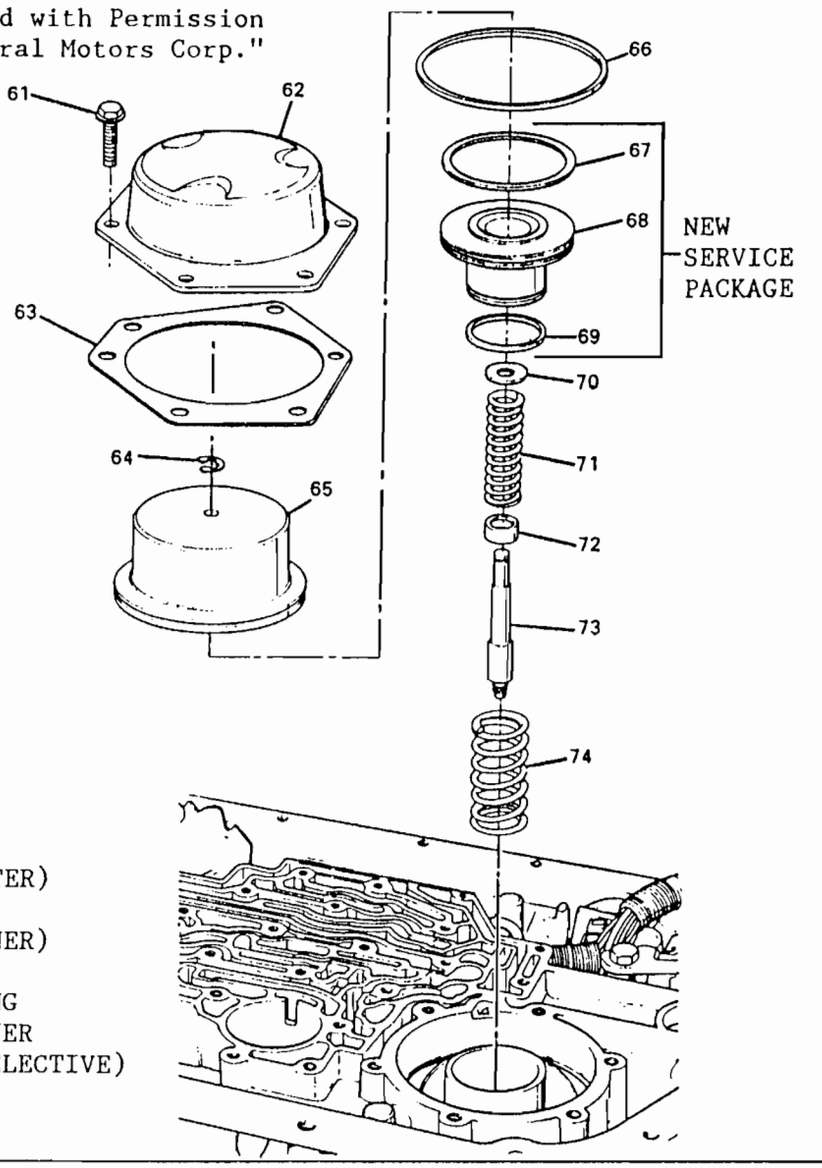
Figure 30

THM 4L80-E/4L80-EHD
1-2 SLIDE BUMP FEEL

COMPLAINT: Some THM 4L80-E transmissions may exhibit a 1-2 slide and/or harsh double bump feel.

CAUSE: The cause may be, fluid leaking past the 1-2 accumulator piston seals. The 1-2 accumulator piston is located inside of the reverse servo piston (See Figure 1).

CORRECTION: Install a new design 1-2 accumulator piston and ring assembly to eliminate this condition. The new service package is available under OEM part number 8680929. Refer to Figure 1 for assembly.



61 REVERSE SERVO COVER BOLT
62 REVERSE SERVO COVER
63 REVERSE SERVO COVER GASKET
64 "E" CLIP
65 REVERSE SERVO PISTON
66 REVERSE SERVO PISTON SEAL
67 1-2 ACCUM. PISTON SEAL (OUTER)
68 1-2 ACCUMULATOR PISTON
69 1-2 ACCUM. PISTON SEAL (INNER)
70 SERVO PISTON WASHER
71 REVERSE SERVO CUSHION SPRING
72 REVERSE SERVO SPRING RETAINER
73 REVERSE SERVO APPLY PIN (SELECTIVE)
74 1-2 ACCUMULATOR SPRING

Figure 1

THM 4L80-E
DELAYED UPSHIFTS IN 4WD LOW

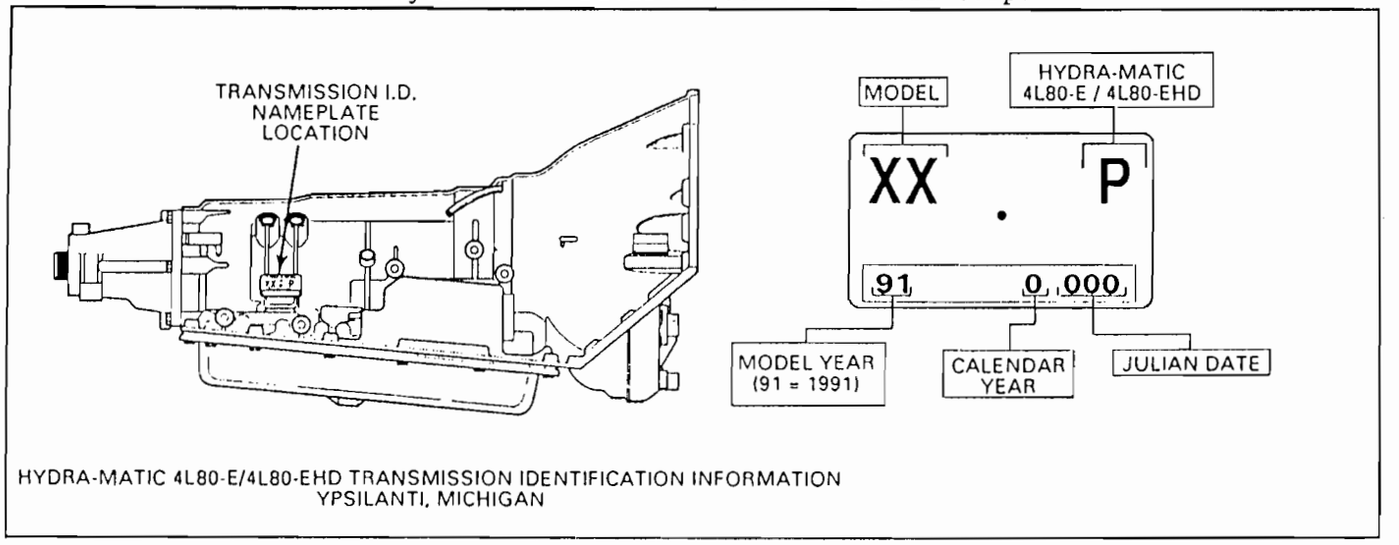
COMPLAINT: Some 1991 THM 4L80-E Transmissions, with Four Wheel Drive, may exhibit delayed upshifts and generate trouble code 85, when four wheel drive low is selected on the transfer case selector lever. Transmission models affected are ACP, BJP, CKP, DLP.

CAUSE: This condition may be caused by the Powertrain Control Module (PCM) on gasoline models, or the Transmission Control Module (TCM) on diesel engine models, selecting the output speed sensor located on transfer case instead of the output speed sensor from transmission.

CORRECTION: A new PROM for the PCM/TCM has been released for all K and V trucks. Check the broadcast code on the current PCM/TCM and install the proper part number new PROM, selected from the Service Information listed below.
Beginning on January 15, 1991 (Julian Date 015) all ACP, BJP, CKP, and DLP transmission model applications were built with the new PROM. Use Figure 1 for Julian Date location, to determine if your vehicle needs the new PROM installed.

SERVICE INFORMATION:

BODY	ENGINE	CURRENT PCM/TCM BROADCAST CODE	PART NUMBER NEW MEM-CAL PROM
K	4.3L V6	AWBD	16161422
K	5.7L V8	AWBK	16161192
K	5.7L V8	AWBL	16161196
K	5.7L V8	AWBM	16161201
K	5.7L V8	AWBN	16161205
V	5.7L V8	AWBP	16161217
V	5.7L V8	AWBR	16161433
K/V	6.2L DIESEL	AWRS	16161710
K	7.4L V8	AWAM	16161151
K	7.4L V8	AWAN	16161156
K	7.4L V8	AWAP	16161166
K	7.4L V8	AWAR	16161427
K	7.4L V8	AWAT	16161173
K	7.4L V8	AWYN	16161178
V	7.4L V8	AWAW	16161183
V	7.4L V8	AWAY	16161187
V	7.4L V8	AWYP	16161225
V	7.4L V8	AWBB	16161230

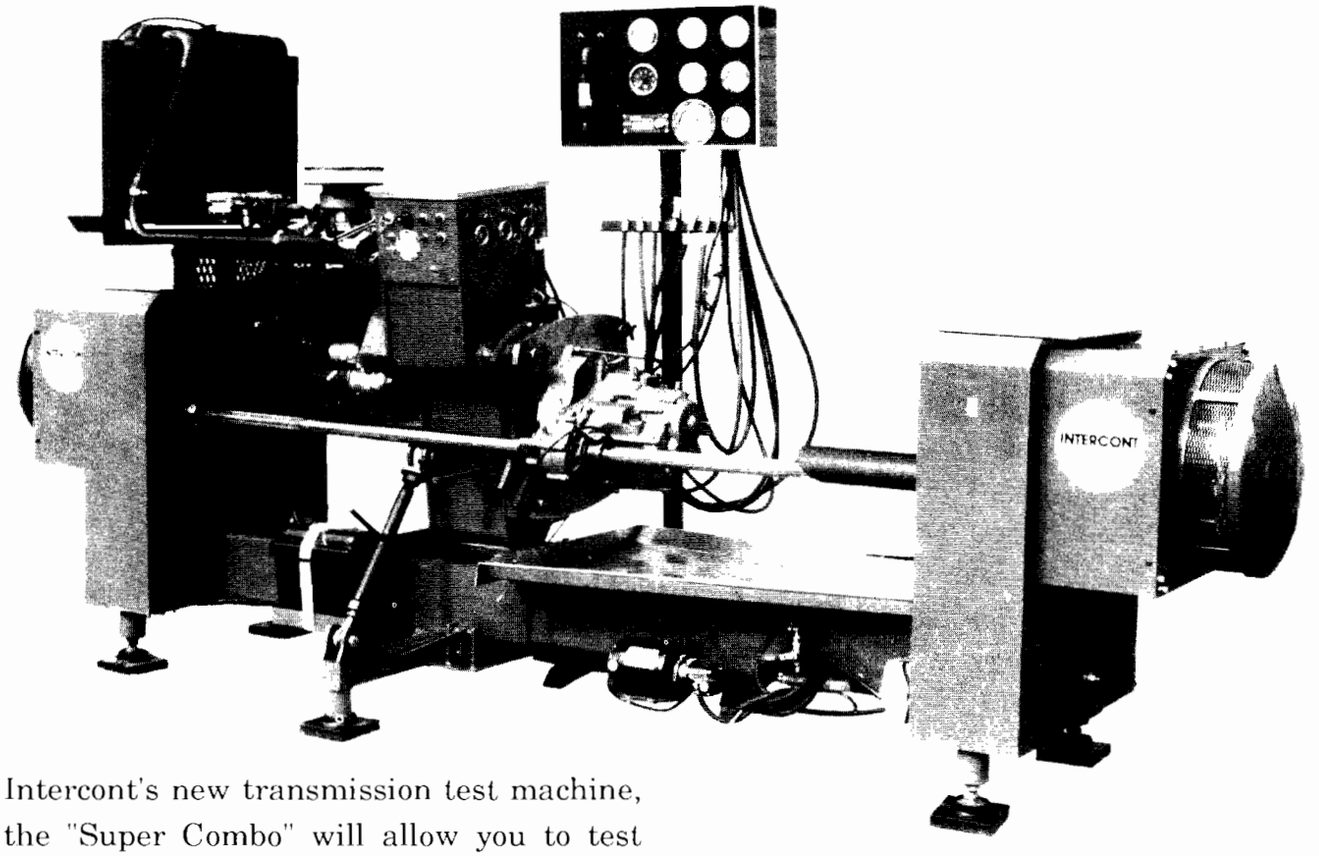


HYDRA-MATIC 4L80-E/4L80-EHD TRANSMISSION IDENTIFICATION INFORMATION
YPSILANTI, MICHIGAN

Figure 1

TEST YOURSELF

with Intercont's new Super Combination Transmission Test Machine



Intercont's new transmission test machine, the "Super Combo" will allow you to test virtually every transmission known. With an exclusive 1:1 gear ratio from a gas powered engine, the "Super Combo" is designed to test right hand rotations, rear wheel drive, and even the left hand rotation Honda transmission.

Hand-built by skilled professionals, the "Super Combo", as well as all of Intercont's quality products, is built to withstand day-to-day use for years. At Intercont, we know the problems associated with testing transmission effectively, so we build the solutions.

Call your Intercont sales representative at 1-800-749-3939 for more details about the "Super Combo" or other quality testing and washing equipment.

THM 4L60 (700-R4)

PREMATURE 3-4 CLUTCH FAILURE

COMPLAINT: Premature 3-4 clutch failure on 1988 to 1992 model 700-R4 transmissions, and can occur as early as 200 miles on the unit.

CAUSE: The cause may be too much spring pressure for available 3-4 clutch oil pressure to overcome.

CORRECTION: Remove and discard the 3-4 Load Release Spring Assemblies, on ALL vehicles so equipped (See Figure 1).
Drill hole marked "D" in the spacer plate out to .093", as shown in Figure 2. This hole was eliminated on 1988 and later 5.7L models. If your spacer plate does not have this hole, use the gasket as a template and drill it to .093" (See Figure 2).
Set the 3-4 clutch clearance to .050"-.060".

NOTE: WITH THE 3-4 LOAD RELEASE SPRINGS REMOVED, IT ALLOWS YOU TO INSTALL THE STEEL PLATES IMPROPERLY. PROPER INSTALLATION IS WITH THE STEEL PLATES INSTALLED SO THAT THE LOAD RELEASE SPRINGS WOULD FIT, IF WE WERE GOING TO USE THEM.

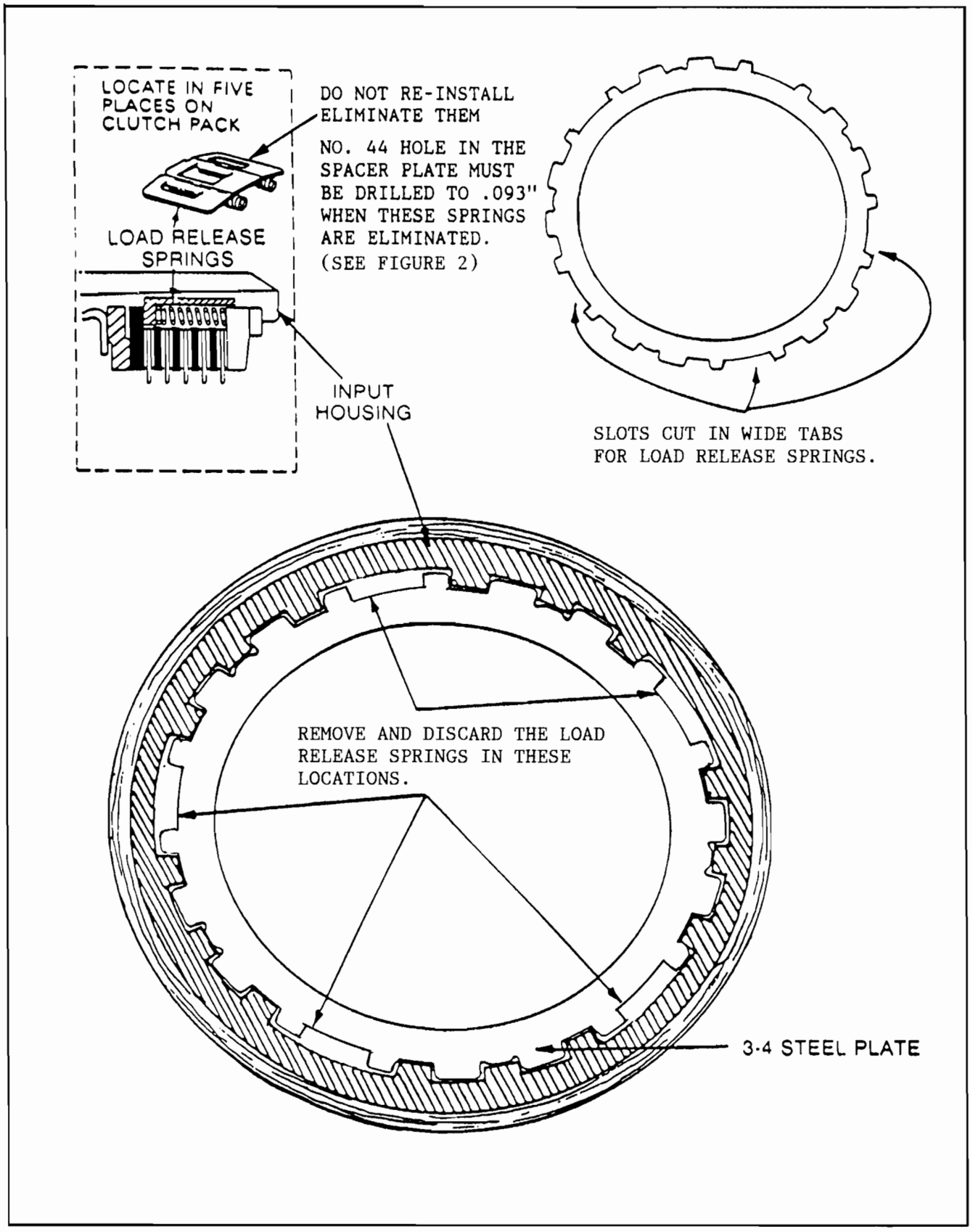

LOCATE IN FIVE PLACES ON CLUTCH PACK
DO NOT RE-INSTALL ELIMINATE THEM
NO. 44 HOLE IN THE SPACER PLATE MUST BE DRILLED TO .093" WHEN THESE SPRINGS ARE ELIMINATED. (SEE FIGURE 2)
LOAD RELEASE SPRINGS
INPUT HOUSING
SLOTS CUT IN WIDE TABS FOR LOAD RELEASE SPRINGS.
REMOVE AND DISCARD THE LOAD RELEASE SPRINGS IN THESE LOCATIONS.
3-4 STEEL PLATE

Figure 1

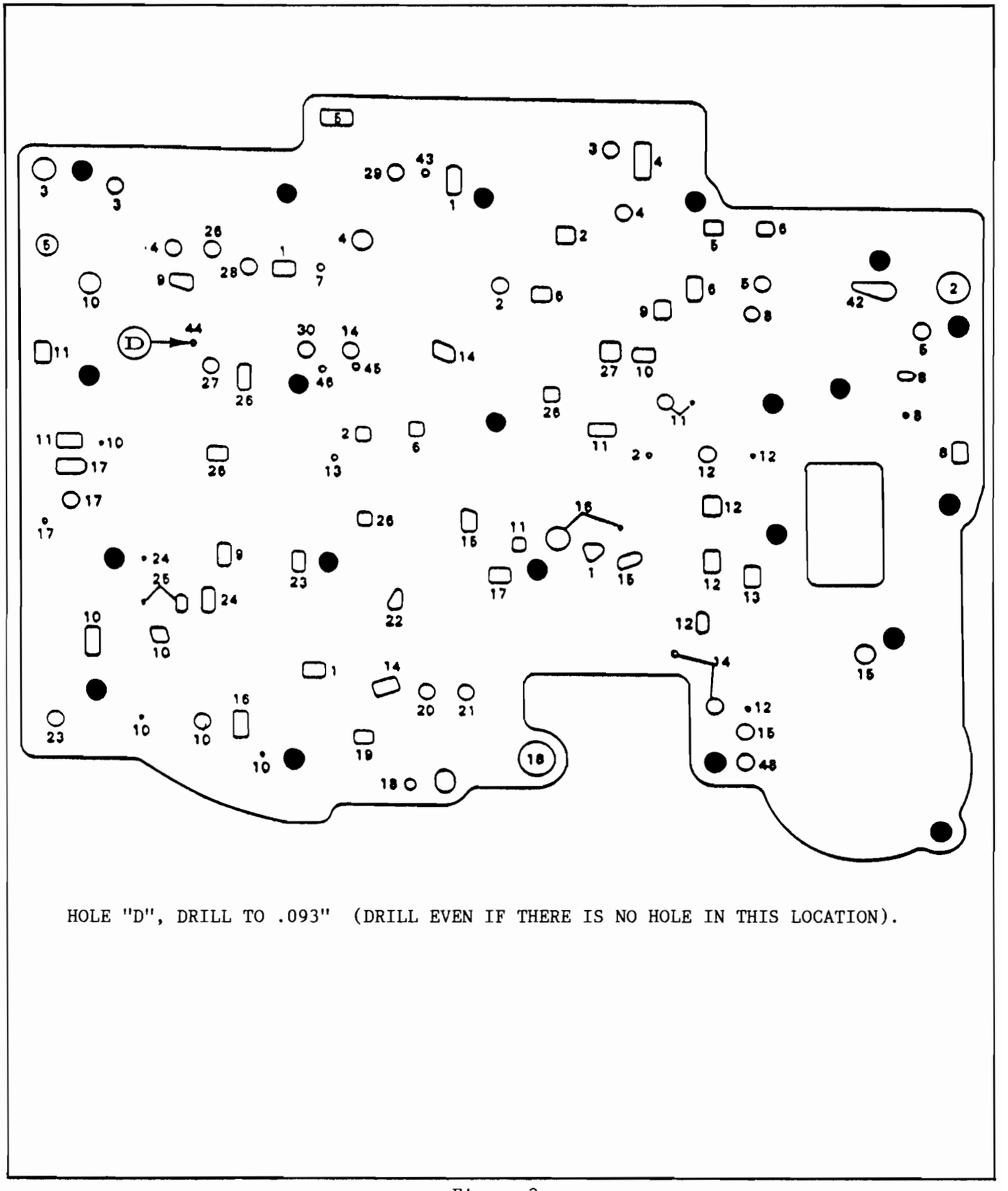

HOLE "D", DRILL TO .093" (DRILL EVEN IF THERE IS NO HOLE IN THIS LOCATION).

Figure 2

THM 4L60 (700-R4)

SOFT UPSHIFTS AND OTHER THINGS

COMPLAINT: Soft and/or mushy upshifts regardless of throttle position.

CAUSE: Not enough feed oil to the 2-4 band, and the 3-4 clutch pack.

CORRECTION: Drill the holes in the spacer plate, as shown in Figure 3, as follows:

HOLE "A", DRILL TO .110".
This will improve the 1-2 shift.

HOLE "B", DRILL TO .086".
This will improve the 2-3 shift. DO NOT drill any larger than .086" as a larger hole will create a flare on the 2-3 shift on some models.

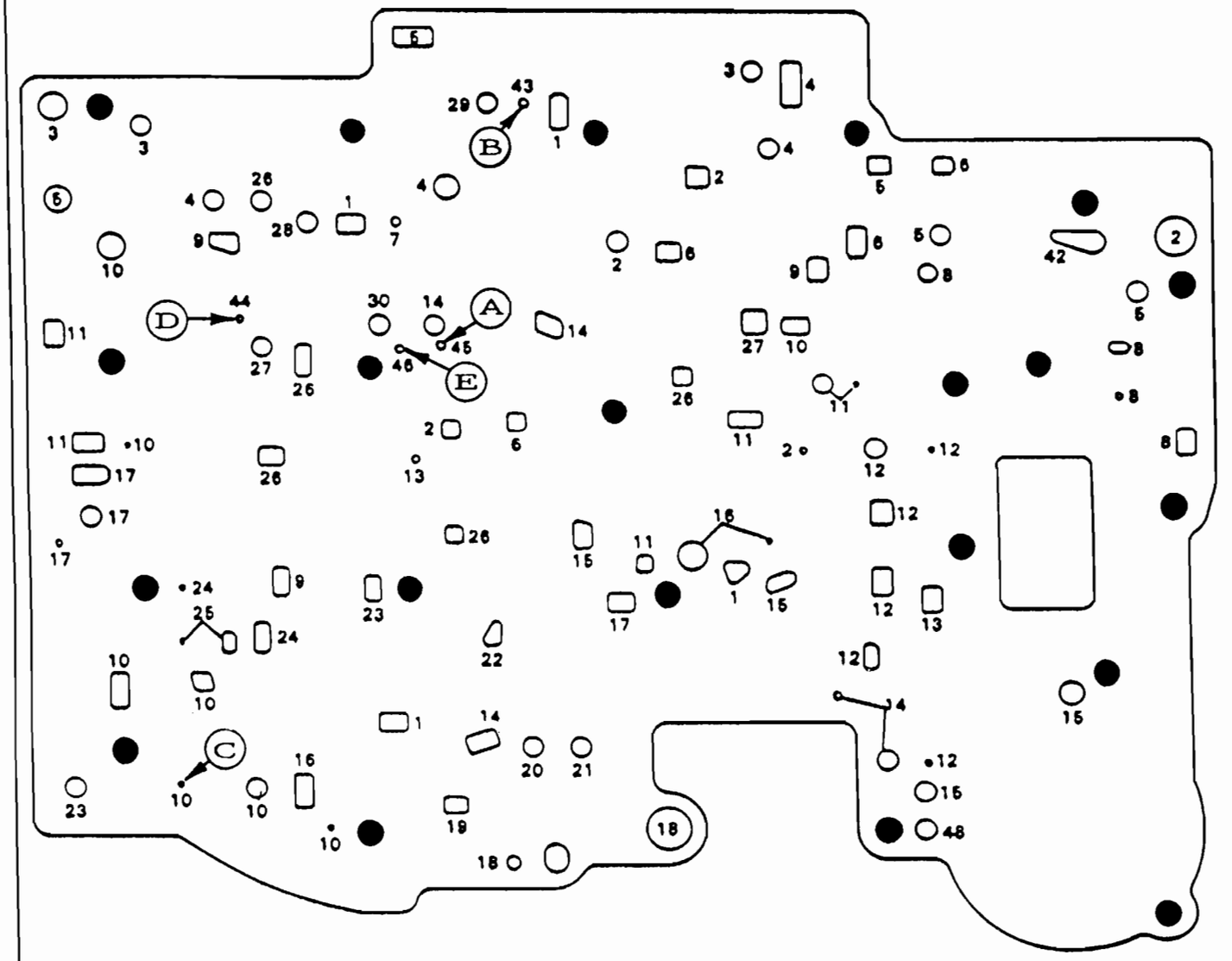
HOLE "C", DRILL TO .055".
This will prevent the T.V. valve from hydraulically locking.

HOLE "D", DRILL TO .093".
This will help prevent the 3-4 clutches from burning. This hole was eliminated on the 1988 and later 5.7L models. If your spacer plate does not have this hole, use the gasket as a template and drill it to .093".

HOLE "E", MAKE SURE THIS HOLE IS NOT COVERED WITH YOUR GASKETS.
If this hole is covered by the gaskets, it will create the following:

(1) Shifts 1-3 in drive, after initial upshift pattern. First set of upshifts are normal, and will be again, after setting awhile.
(2) Delayed (5 Seconds) 4-2, or 3-2 kickdown.
(3) Delayed (5 Seconds) manual downshift from D3 to D2. (Stays in 3rd)
(4) Binds in reverse, after upshifting to 3rd gear. Normal operation after setting for a while.
(5) Binds in manual Lo, after upshifting to 3rd gear. Normal operation after setting for a while.
(6) Results in burnt 3-4 clutch plates. They are usually wiped out on the road test, as this is the exhaust hole for the 3-4 clutch.

THM 700-R4



HOLE "A", DRILL TO .110"
HOLE "B", DRILL TO .086"
HOLE "C", DRILL TO .055"
HOLE "D", DRILL TO .093" (DRILL EVEN IF THERE IS NO HOLE IN THIS LOCATION)
HOLE "E", MAKE SURE THIS HOLE IS NOT COVERED WITH YOUR GASKETS.

Figure 3

1987 THM 700-R4 SPACER PLATE CHART						
PART NO.	8663589	8667064	8663595	8663587	8663763	8663593
I.D. CODE	AF	AP	AM	AD	AN	AK
FITS THESE MODELS	MUM TJM TKM MDM MKM MLM	MHM TNM TRM	MWM TUM TXM MZM MPM	FAM MMM MAM MRM MXM MFM	TSM	YFM
PART NO.	8663592	8663585	8667703	8663590	8663764	8667525
I.D. CODE	AJ	AB	AZ	AG	AO	AU
FITS THESE MODELS	YLM	YTM	YWM	YKM	YPM	YNM
PART NO.	8663584	8667061	8663591	8663588	8667063	8663594
I.D. CODE	AA	AS	AH	AE	AT	AL
FITS THESE MODELS	YZM YMM	YSM	PAM PBM PCM YAM	PRM MTM MCM	TAM TBM YXM	YDM

1988 THM 700-R4 SPACER PLATE CHART						
PART NO.	8667353	8667354	8667355	8667356	8667357	8667358
I.D. CODE	BH	BE	BD	BF	BM	BA
FITS THESE MODELS	PAM PBM PCM MHM TNM	MCM PRM MTM	FAM MAM MFM FMM MRM MXM	MDM MKM MLM TJM TKM	MPM MWM TUM TXM MZM	YZM
PART NO.	8667359	8667360	8667363	8667364	8667475	8667700
I.D. CODE	BL	BG	BT	BB	BU	BX
FITS THESE MODELS	YDM	YKM	YXM TAM TBM	YTM	YNM	YMM
PART NO.	8667367	8667704	8667825			
I.D. CODE	BO	BZ	BS			
FITS THESE MODELS	YPM	YWM	THM TLM			

1989 THM 700-R4 SPACER PLATE CHART						
PART NO.	8673053	8673136	8673137	8667825	8673139	8673135
I.D. CODE	BC	BN	BP	BS	BV	BW
FITS THESE MODELS	HBM HHM	MCM PRM	MDM MKM MLM TJM TKM	THM TLM	MPM MWM MZM TUM TXM	FMM MAM MFM MRM MXM
PART NO.	8673138	8673165	8673160	8673164	8673166	8673163
I.D. CODE	BY	CB	CC	CD	CG	CH
FITS THESE MODELS	MHM PAM PBM PCM TNM	FKM	YDM	YTM	YXM	YPM
PART NO.	8673238	8673206	8673352	8673353	8673499	8673500
I.D. CODE	CK	CL	CM	CO	CW	CX
FITS THESE MODELS	YNM	HDM	FXM	YZM	HCM	HFM

1990 THM 700-R4 SPACER PLATE CHART						
PART NO.	8673053	8673136	8673137	8667825	8673139	8673135
I.D. CODE	BC	BN	BP	BS	BV	BW
FITS THESE MODELS	HBM	MBM SAM	CCM CFM KLM WBM	SHM SPM TLM	CHM CJM KCM KRM RAM WCM	CAM CBM KMM MJM MNM WAM
PART NO.	8673164	8673238	8673206	8673352	8673401	8673441
I.D. CODE	CD	CK	CL	CM	CN	CS
FITS THESE MODELS	BAM	BPM	HDM	FUM	MSM	FBM
PART NO.	8673509	8673510	8673511	8673499	8673500	8673645
I.D. CODE	CT	CU	CV	CW	CX	CZ
FITS THESE MODELS	YDM	FTM	FZM	HCM	HLM	HJM
PART NO.	8673633	8673440				
I.D. CODE	DA	DB				
FITS THESE MODELS	LAM LBM LCM LDM LFM	DBM				

1991 THM 700-R4 SPACER PLATE CHART						
PART NO.	8673053	8667825	8673135	8673165	8673238	8673352
I.D. CODE	BC	BS	BW	CB	CK	CM
FITS THESE MODELS	HBM	SHM TLM	MJM MNM WAM	FYM	BJM	FUM
PART NO.	8673401	8673441	8673509	8673510	8673551	8673499
I.D. CODE	CN	CS	CT	CU	CV	CW
FITS THESE MODELS	MSM	FBM	YHM	FTM	FZM	HCM
PART NO.	8673500	8673655	8673653	8673654	8676590	8676591
I.D. CODE	CX	DC	DD	DG	DH	DJ
FITS THESE MODELS	HLM	CCM CFM KLM WBM	CAM CBM KMM	SAM	DAM	BCM
PART NO.	8677426	8677719	8677720	8677704	8678207	8678042
I.D. CODE	DK	DM	DN	DO	DP	DS
FITS THESE MODELS	DBM	HDM	HJM	SFM	2DDM 92 MODEL	BBM BHM
PART NO.	8678328	8678567	8679298	8680144	8680371	
I.D. CODE	DT	DU	DV	EA	EB	
FITS THESE MODELS	LHM	LAM LBM LCM LDM LFM	AAM	CNM CYM KWM RCM RDM	AMM APM	

1992 THM 700-R4 SPACER PLATE CHART						
PART NO.	8673053	8667825	8673165	8673238	8673441	8673510
I.D. CODE	BC	BS	CB	CK	CS	CU
FITS THESE MODELS	HBM	SHM TLM	FUM	BFM	FBM	FTM
PART NO.	8673511	8673500	8673655	8673653	8673654	8676590
I.D. CODE	CV	CX	DC	DD	DG	DH
FITS THESE MODELS	FZM	HLM	CCM CFM KHM WBM	CAM CBM KMM MJM MNM WAM	SAM	ACM
PART NO.	8676591	8679435	8677719	8677720	8677704	8678207
I.D. CODE	DJ	DL	DM	DN	DO	DP
FITS THESE MODELS	BCM	TWM	HDM	HJM	SFM	DDM
PART NO.	8678042	8678328	8678567	8679298	8679492	8680144
I.D. CODE	DS	DT	DU	DV	DY	EA
FITS THESE MODELS	BBM BHM	LHM	LBM LCM LDM LFM	AAM	TAM TBM	CJM CHM KJM WCM
PART NO.	8680678	8680677	8680502	8680503	8680770	8680828
I.D. CODE	EC	ED	EE	EG	EH	EJ
FITS THESE MODELS	YAM YCM	YDM	BAM	BWM	ADM AKM	MMM MSM
PART NO.	8681061					
I.D. CODE	EK					
FITS THESE MODELS	CPM					

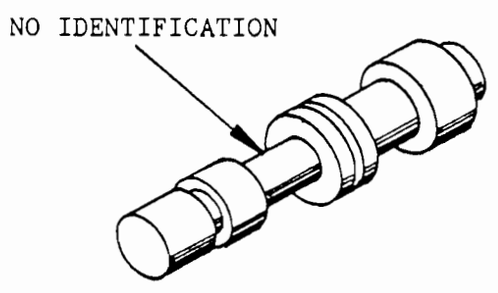
THM 4L60 (700-R4)

LOSS OF BOOST OIL AT WIDE OPEN THROTTLE (SLIPS AT WIDE OPEN THROTTLE)

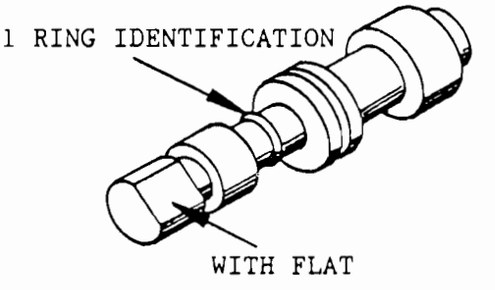
COMPLAINT: Transmission slippage at wide open throttle positions only. At light to medium throttle positions, all shifts are OK.

CAUSE: The cause may be a mis-matched line bias valve, and spacer plate. Beginning in 1987, a 2nd design line bias valve was introduced that has a "Flat" on the small land (See Figure 4).
This change required that the detent hole in the spacer plate be eliminated (See Figure 5).
If the 2nd design line bias valve (With Flat) is installed with the 1st design spacer plate (With Detent Hole), all T.V. oil will be exhausted at 3/4 to full throttle positions.

CORRECTION: Install matching line bias valve and spacer plate.
Line bias valve WITHOUT flat, requires spacer plate WITH detent hole. (Refer to Figures 4 and 5).
Line bias valve WITH flat, requires spacer plate WITHOUT detent hole. (Refer to Figures 4 and 5).

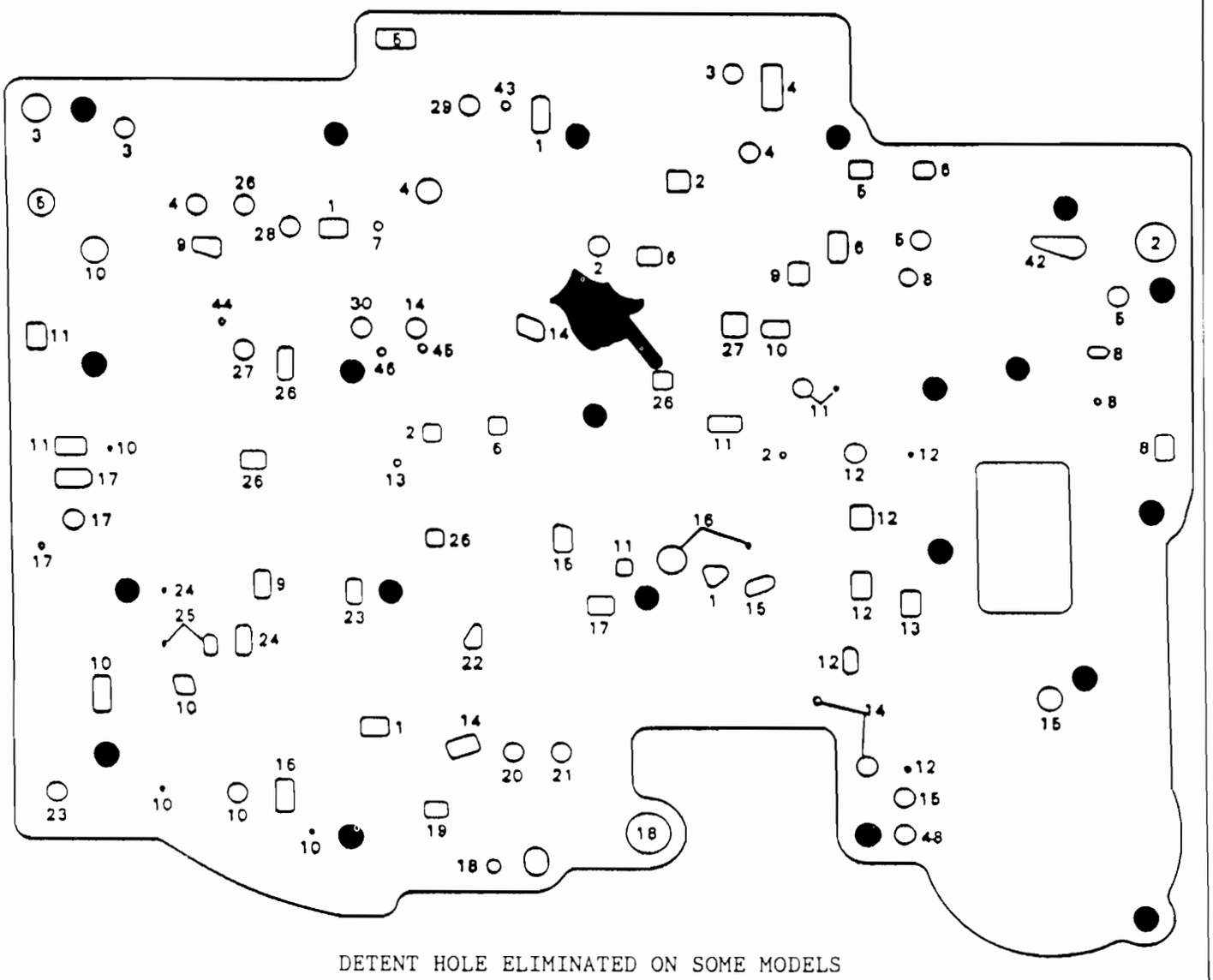


1ST DESIGN
LINE BIAS VALVE



2ND DESIGN
LINE BIAS VALVE

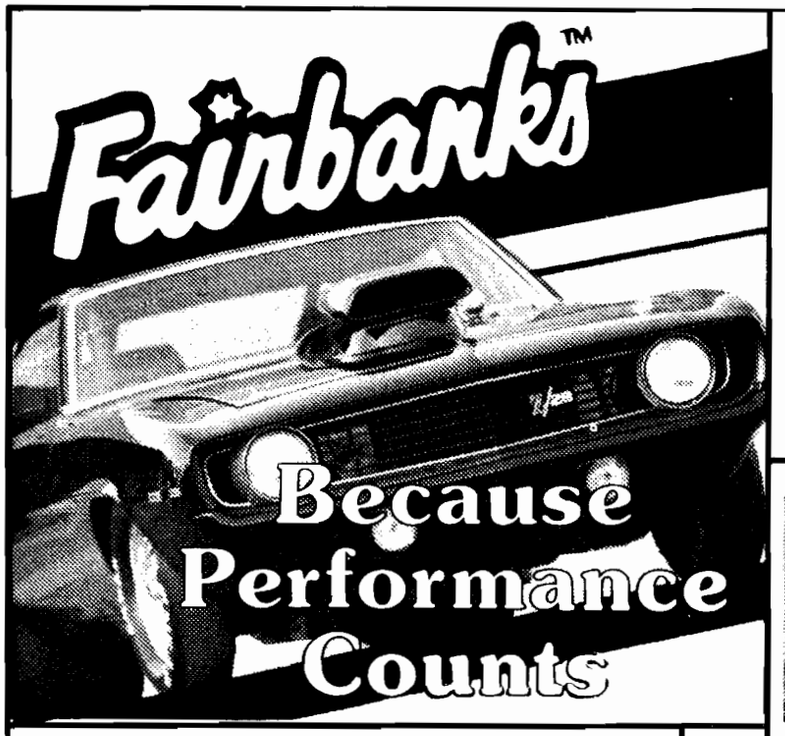
Figure 4



DETENT HOLE ELIMINATED ON SOME MODELS

1 LINE
2 D4
3 D2
4 LO
5 REVERSE
6 GOVERNOR
7 LO - 1ST FEED
8 LO/REVERSE
9 3RD ACCUMULATOR
10 T.V.
11 M.T.V.
12 ACCUMULATOR
13 4TH SIGNAL
14 2ND CLUTCH
15 3-4 ACCUMULATOR
16 T.V.F.
17 OVERRUN CLUTCH
18 T.V. EX.
19 D3/PART THROTTLE
20 PART THROTTLE
21 D3
22 4TH CLUTCH
23 C.C. SIG.
24 MOD. UP
25 MOD. DOWN
26 DETENT
27 3-4 CLUTCH
28 DETENT/LO
29 RND4-3
30 3RD CLUTCH
31 IDENTIFICATION
42 D4 ABUSE
43 3RD FEED
44 3-2 HIGH SPEED
45 2ND FEED
46 3RD CL. EXHAUST
47 4TH FEED
48 1-2 ACCUMULATOR

Figure 5



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700R4 & 2004R HIGH GEAR LOCK-UP KIT

Lock-Up Delay System

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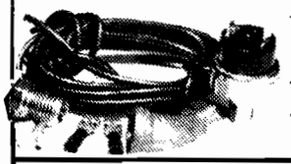

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THM 4L60 (700-R4)
1-2 SHIFT VALVE LINE-UP

CHANGE: Revised 1-2 shift valve line-up in the main valve body, and a revised 3-4 throttle valve and sleeve (See Figure 6).

REASON: This change reduced internal leakage, thus improving consistency for the 1-2 and 3-4 shifts, and allows engine braking at a higher speed during a manual 2-1 downshift.

PARTS AFFECTED:

(1) 1-2 SHIFT VALVE LINE-UP - The 1-2 shift valve line-up changes from 4 valves and 2 sleeves, to 2 valves and 1 sleeve. The Lo-Range Downshift Valve(321), Lo-Range Control Sleeve(320), and the 1-2 Lo-Range Upshift Valve(353) have been eliminated from 1988 and later models (Figure 6).
NOTE: The valve bodies are easy to identify WITHOUT dis-assembly.
82-87 MODELS: The end of the 1-2 shift T.V. sleeve is flat. (Refer to Figure 7).
88-92 MODELS: The end of the 1-2 shift T.V. sleeve has a rectangular "Boss" cast on the end of it. (Refer to Figure 7).

(2) 3-4 THROTTLE VALVE - The 3-4 throttle valve and sleeve have been revised. (See Figure 6).

(3) MAIN VALVE BODY CASTING - One roll pin hole eliminated and machining changes will not allow you to interchange the 1-2 shift valve line-ups. (See Figure 7).

(4) SPACER PLATE - Spacer plate has been revised to accomodate the new valve body. There is now a "Two" letter code on all 87 and later spacer plates. Refer to pages 9 thru 14 for spacer plate charts.

(5) NUMBER 9 CHECKBALL - The number 9 checkball, located in the bathtub in the case next to the manual shaft, has been ELIMINATED on all 1988 and later models.
NOTE: INSTALLING THE NUMBER 9 CHECKBALL IN ANY 1988 OR LATER MODEL CASE MAY BURN THE LOW/REVERSE CLUTCH.

INTERCHANGEABILITY:

(1) The 1988 and later valve body assembly CANNOT be used on ANY previous models.

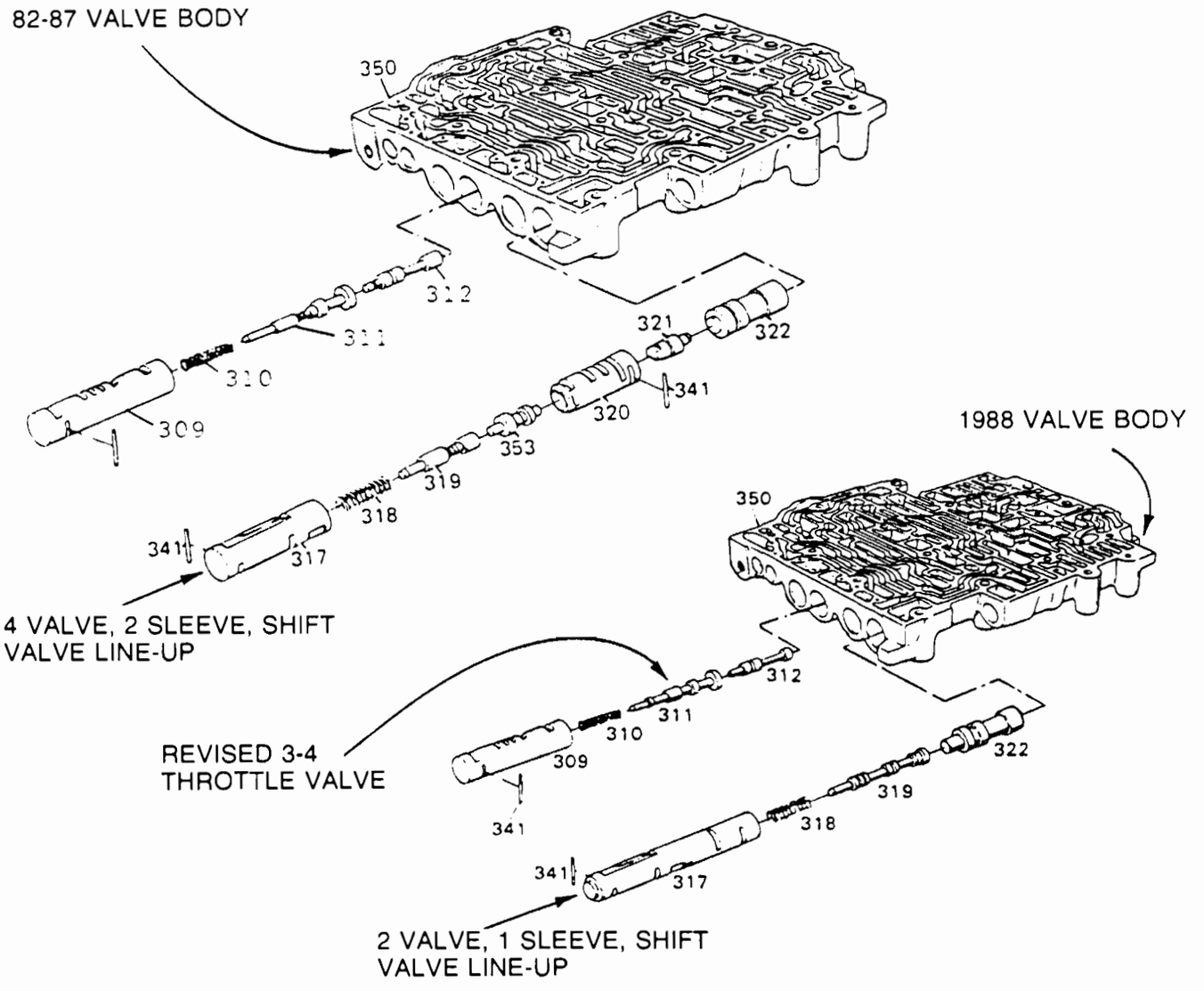
(2) The spacer plates are now unique, refer to pages 9 thru 14 for charts.

(3) DO NOT install the number 9 checkball in any 1988 or later models.

(4) The 1-2 shift valve line-ups WILL NOT interchange between castings.

SERVICE INFORMATION:

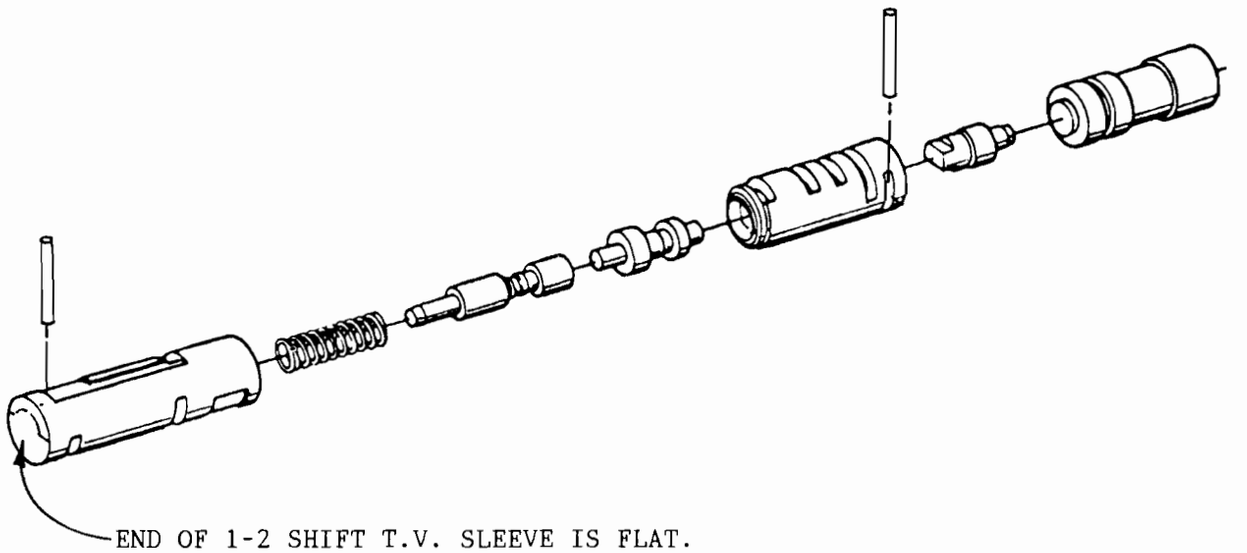
For spacer plate part numbers and application, see pages 9 thru 14.



309 SLEEVE, 3-4 THROTTLE VALVE
310 SPRING, 3-4 THROTTLE VALVE
311 VALVE, 3-4 THROTTLE
312 VALVE, 3-4 SHIFT
317 SLEEVE, 1-2 THROTTLE VALVE
318 SPRING, 1-2 THROTTLE VALVE
319 VALVE, 1-2 THROTTLE
320 SLEEVE, LO RANGE DOWNSHIFT
321 VALVE, LO RANGE DOWNSHIFT
322 VALVE, 1-2 SHIFT
341 PIN, COILED RETAINING
350 BODY, CONTROL VALVE
353 VALVE, LO RANGE UPSHIFT

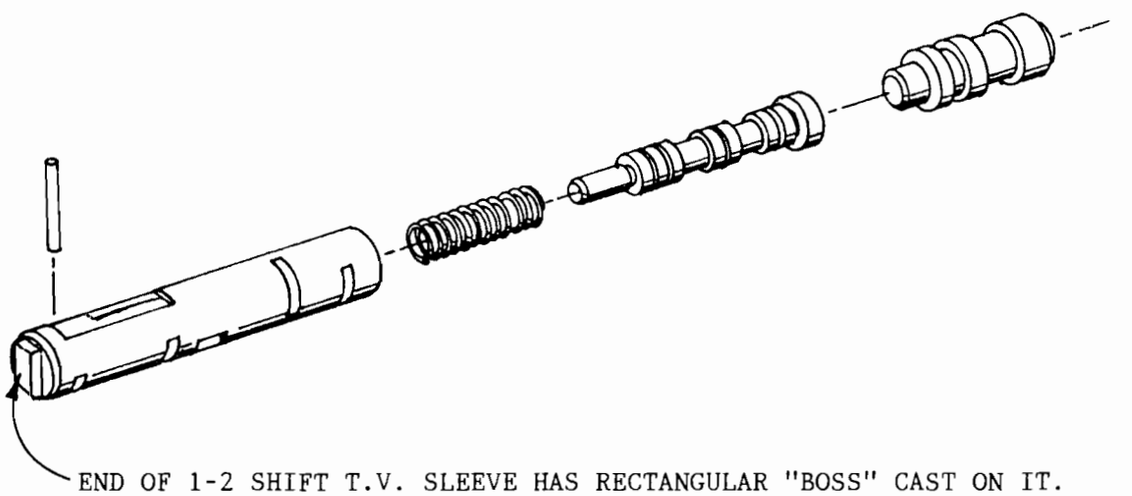
Figure 6

82-87 MODELS ONLY



END OF 1-2 SHIFT T.V. SLEEVE IS FLAT.

88-92 MODELS ONLY



END OF 1-2 SHIFT T.V. SLEEVE HAS RECTANGULAR "BOSS" CAST ON IT.

Figure 7

THM 4L60 (700-R4)
T.C.C. THROTTLE VALVE BORE ELIMINATED

CHANGE: Converter clutch throttle valve bore in valve body casting eliminated, starting with the production of 1989 model THM 700-R4 transmissions.

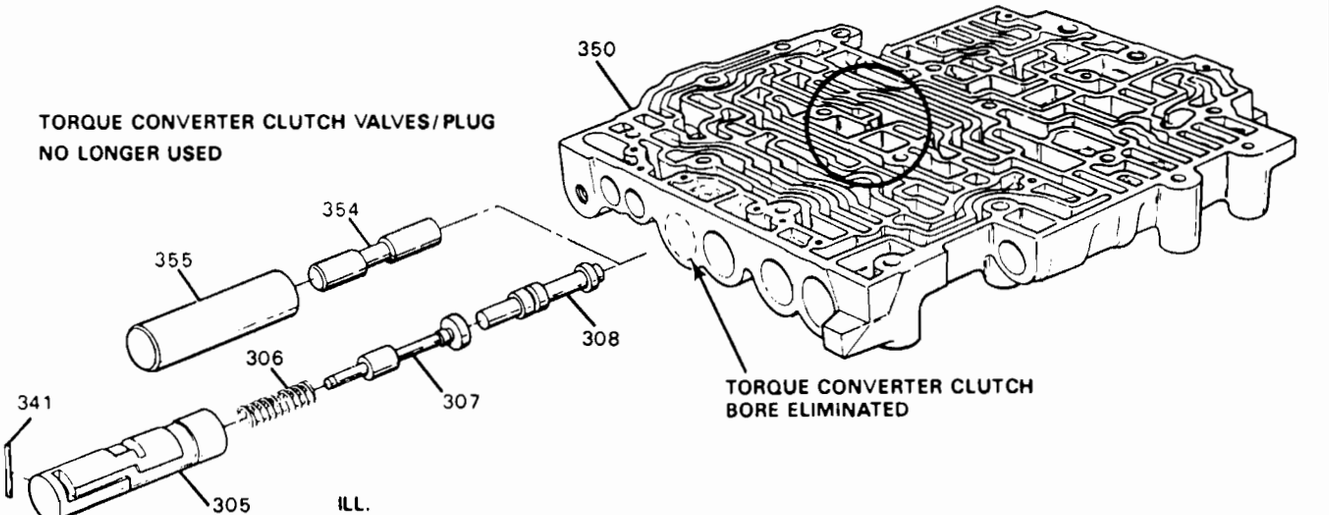
REASON: No current production models using the converter clutch throttle valve, so the TCC bore in valve body is not needed.

PARTS AFFECTED:

(1) VALVE BODY CASTING - The new valve body casting will no longer have the TCC bore, and now contains a "Notch" in the worm track area allowing 2nd clutch oil into the TCC Signal circuit (See Figure 8).

INTERCHANGEABILITY:

(1) Not interchangeable with 1987 or earlier model transmissions, is compatable with 1988 and later models only.



ILL. NO.	DESCRIPTION
305	SLEEVE, CONVERTER CLUTCH THROTTLE
306	SPRING, CONVERTER CLUTCH THROTTLE
307	VALVE, CONVERTER CLUTCH THROTTLE
308	VALVE, CONVERTER CLUTCH SHIFT
341	PIN, COILED SPRING
350	BODY, CONTROL VALVE
354	PLUG, CONVERTER CLUTCH SHIFT VALVE BORE
355	PLUG, CONVERTER CLUTCH T.V. BUSHING BORE

Figure 8

THM 4L60 (700-R4)

PUMP COVER (STATOR) INTERCHANGEABILITY

Beginning on February 9, 1987 (Julian Date 040), a reverse apply package was introduced on ALL THM 700-R4 transmissions.

Basically the orifice for the reverse input clutch was moved from the stator shaft (.095" Feed Hole), to the new reverse input housing (See Figures 9 & 10).

This now provides two different stators, both made for the forward clutch oil pipe, that WILL NOT interchange.

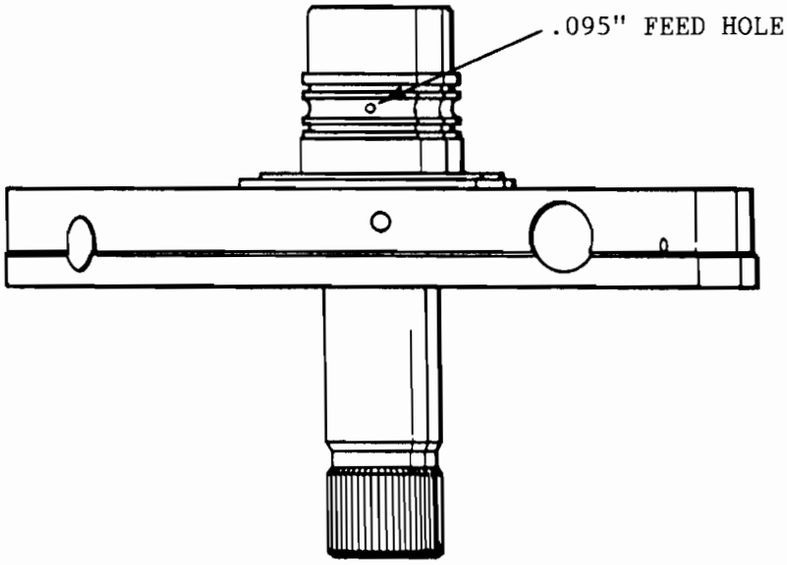
INTERCHANGEABILITY:

(1) EARLY STATOR (.095" Feed Hole) - CANNOT be used with the new reverse input housing, which is the one with the aluminum piston. You will have installed "Two" orifices for the reverse input clutch, and the result will be delay to reverse (Refer to Figures 9 & 10).

(2) LATE STATOR (.215" Feed Hole) - Can POSSIBLY be used on all previous models. This combination may create a harsh reverse as we now have no orifice for the reverse input clutch (Refer to Figures 9 & 10).

When used with 82-86 models you MUST install a cup plug in the feed hole for the forward clutch oil pipe (See Figure 11).

EARLY PUMP COVER



LATE PUMP COVER

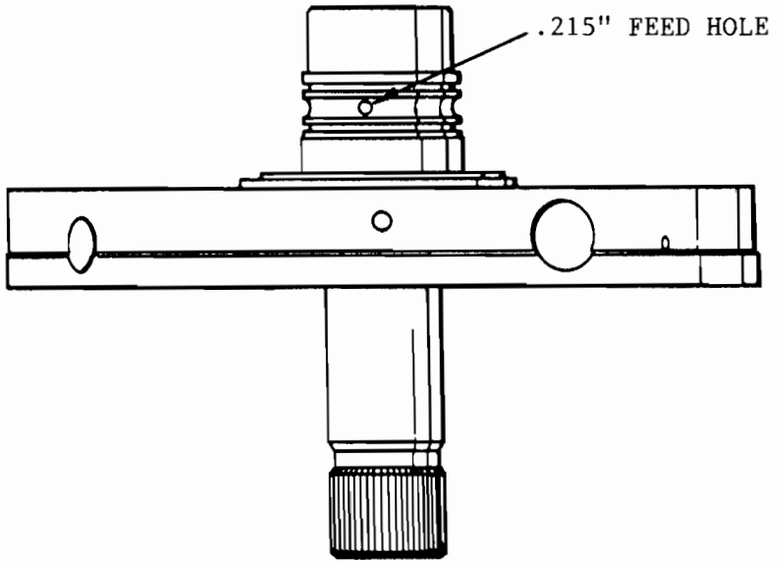
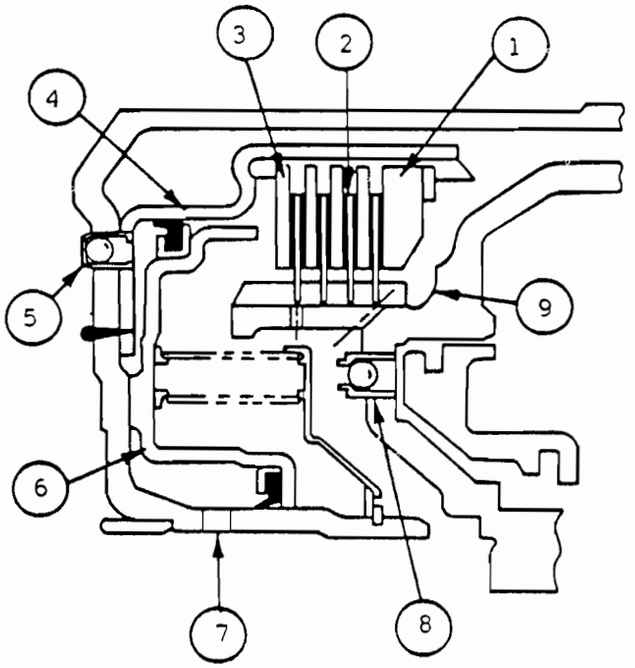
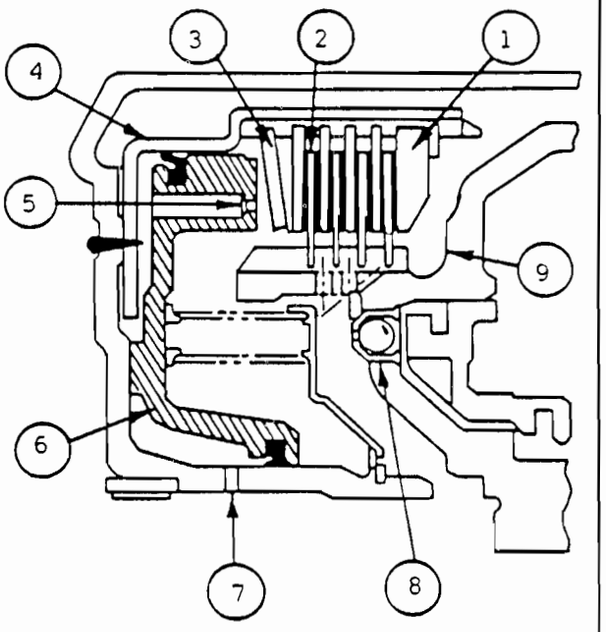


Figure 9

EARLY REVERSE INPUT HOUSING (STEEL PISTON)

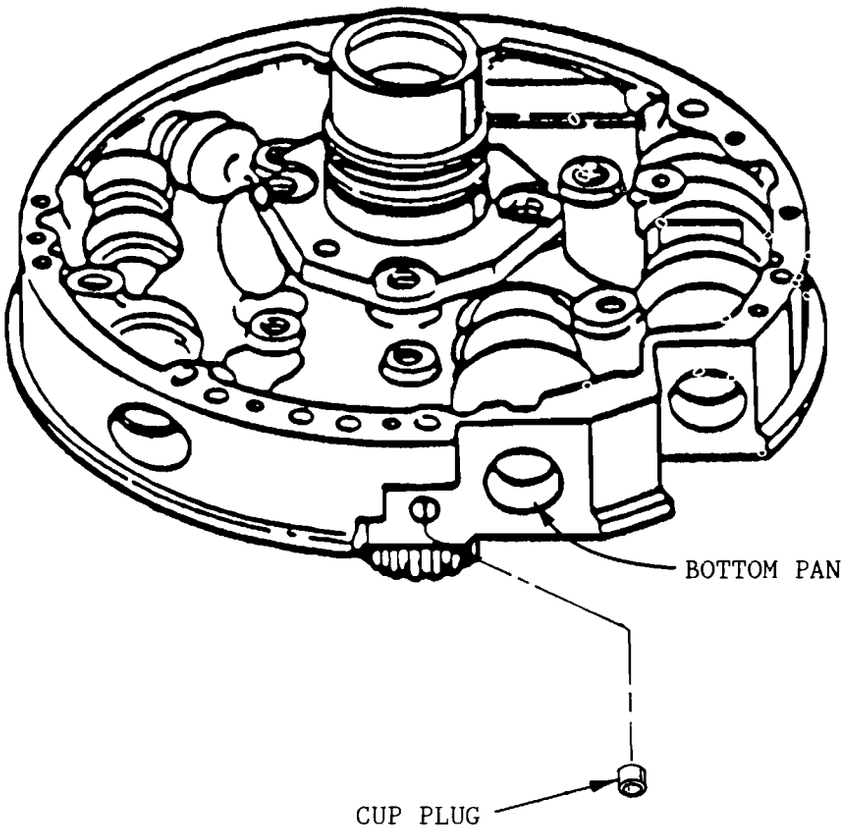


LATE REVERSE INPUT HOUSING (ALUMINUM PISTON)



(1) Backing Plate – Changed to Selective Plate
(2) Thinner Lined Clutch Plates (.010")
(3) Wave Plate – Changed to Belleville(Cone Shaped) Plate
(4) Clutch Housing – Revised for New Piston
(5) Reverse Housing Ball Capsule – Replaced by Piston Orifice
(6) Reverse Input Piston – Changed to Cast Aluminum(Revised Lip Seals)
(7) Feed Hole is Downsized to .095" and Now Round
(8) Input Housing Ball Capsule – Revised for Profile Change
(9) Input Housing – Profile Changed for Better Lubrication

Figure 10



CUP PLUG MUST BE INSTALLED IN THIS LOCATION,
WHEN USED WITH 82-86 MODEL TRANSMISSIONS.

Figure 11

THM 700-R4
NO FOURTH GEAR

COMPLAINT: No 4th gear; 2nd and 4th pressure lower than line pressure.

CAUSE: The cause could be the bleed orifice cup plug missing from the case in the bottom of the 3-4 accumulator bore (see Figure 11a.)

CORRECTION: Install bleed orifice cup plug, OEM Part Number 8628864.

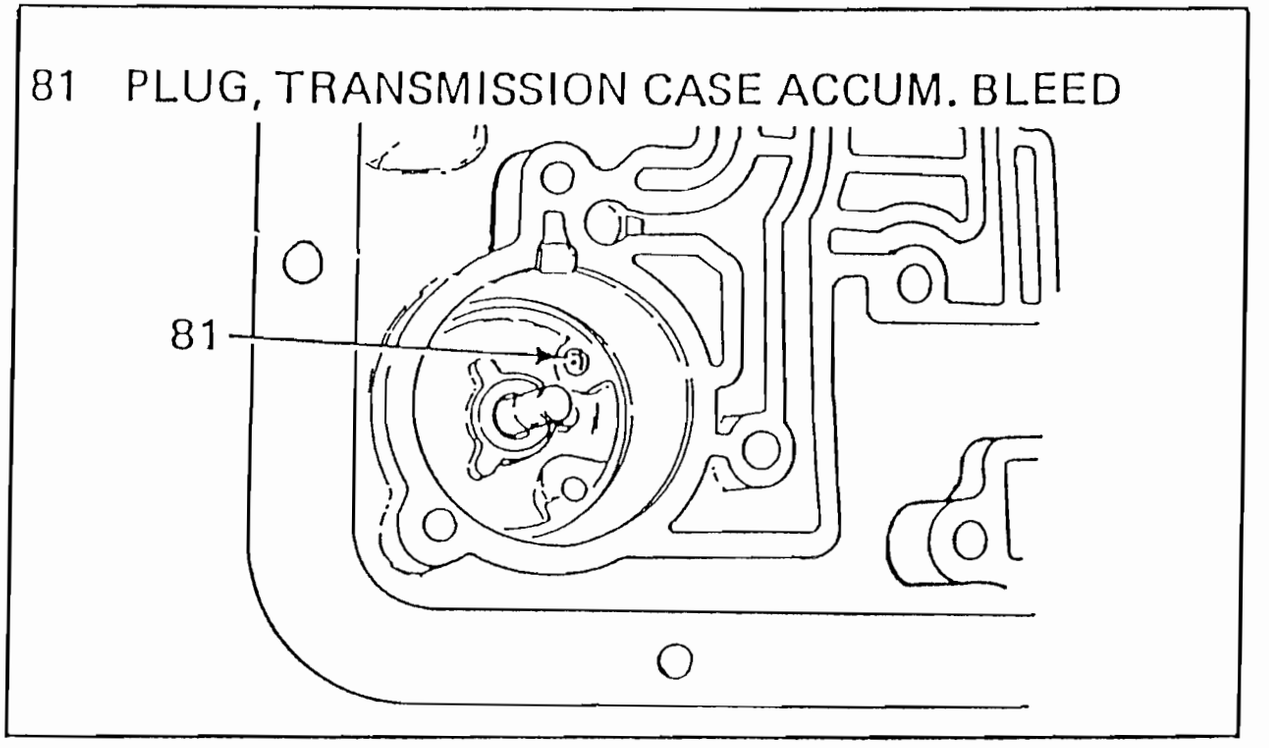


Figure 11a

THM 4L60 (700-R4)

NEW DESIGN LUBE SEAL AND OUTPUT SHAFT

CHANGE: New design input housing to output shaft seal and revised lube hole location in the output shaft.

REASON: Increased lube oil flow to the Input Housing/Input Sun Gear Bearing. (See Figure 12).

PARTS AFFECTED:

(1) INPUT HOUSING LUBE SEAL - Now made of a soft rubber material instead of the previous hard plastic, is Red Oxide in color, and helps retain lube oil even in mis-alignment conditions because of soft material. (Refer to Figures 12 and 13).

(2) OUTPUT SHAFT - Revised lube hole location. New design can be identified by lube hole in the chamfer at the front of the output shaft. Previous design has the lube hole located on the pilot at the front of output shaft (See Figure 13). The new design output shaft now aims lube oil directly at the Input Housing/Sun Gear Bearing, greatly increasing the durability of the bearing (See Figure 12).

INTERCHANGEABILITY:

(1) THE NEW DESIGN SEAL (SOFT RUBBER) "WILL NOT" WORK WITH THE PREVIOUS DESIGN OUTPUT SHAFT. The lube hole in the pilot of the output shaft will tear the new style seal, and/or block the hole completely.

(2) The previous design seal (Hard Plastic) "WILL" work with "ALL" shafts including the new design output shaft.

(3) The new design output shaft and seal will retro fit back to any 700-R4 transmission ever built.

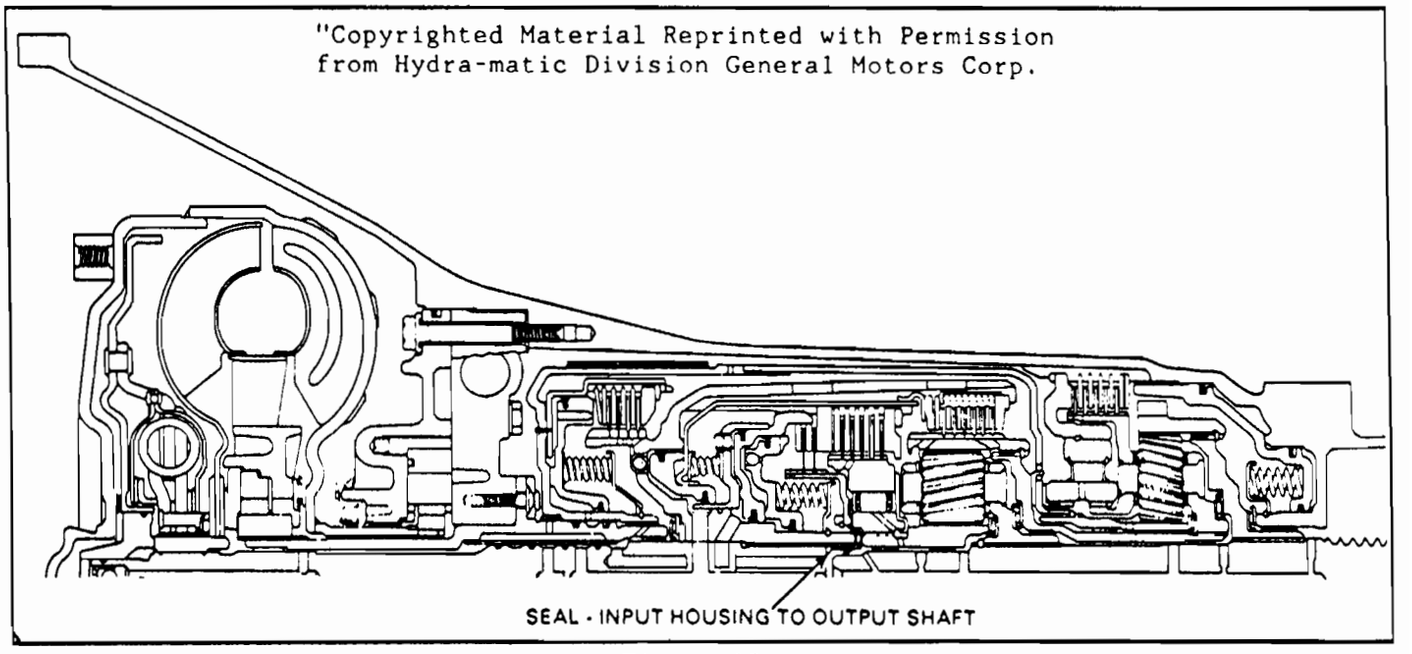


Figure 12

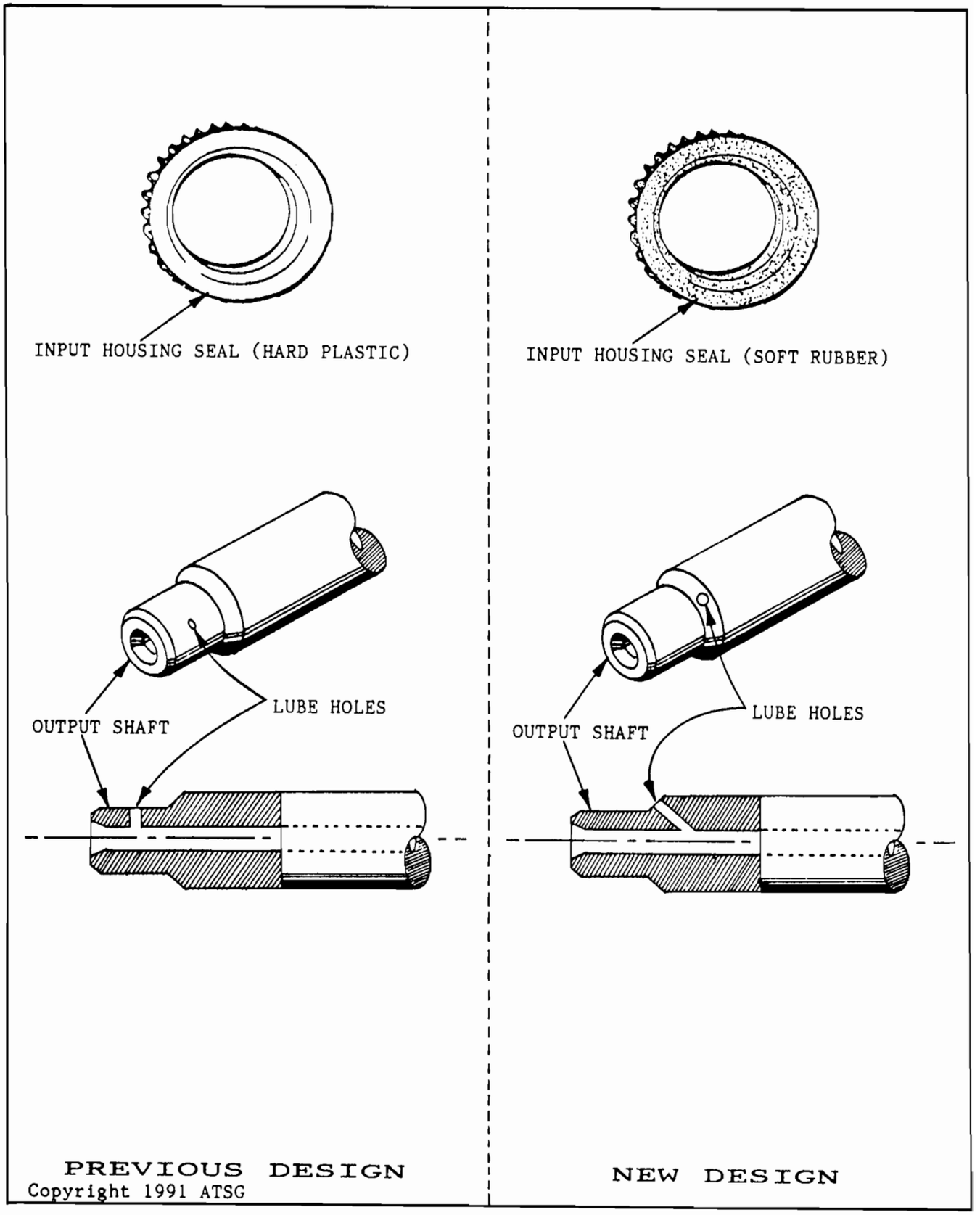


Figure 13

THM 4L60 (700-R4)

3-2 COASTDOWN CLUNK (CORVETTE ONLY)

COMPLAINT: Some 1990 and 1991 Corvettes may experience a 3-2 coastdown clunk, and can be felt around 10-15 MPH while lightly braking to a stop. It is most noticeable in the D3 range, but can also occur in D4 range.

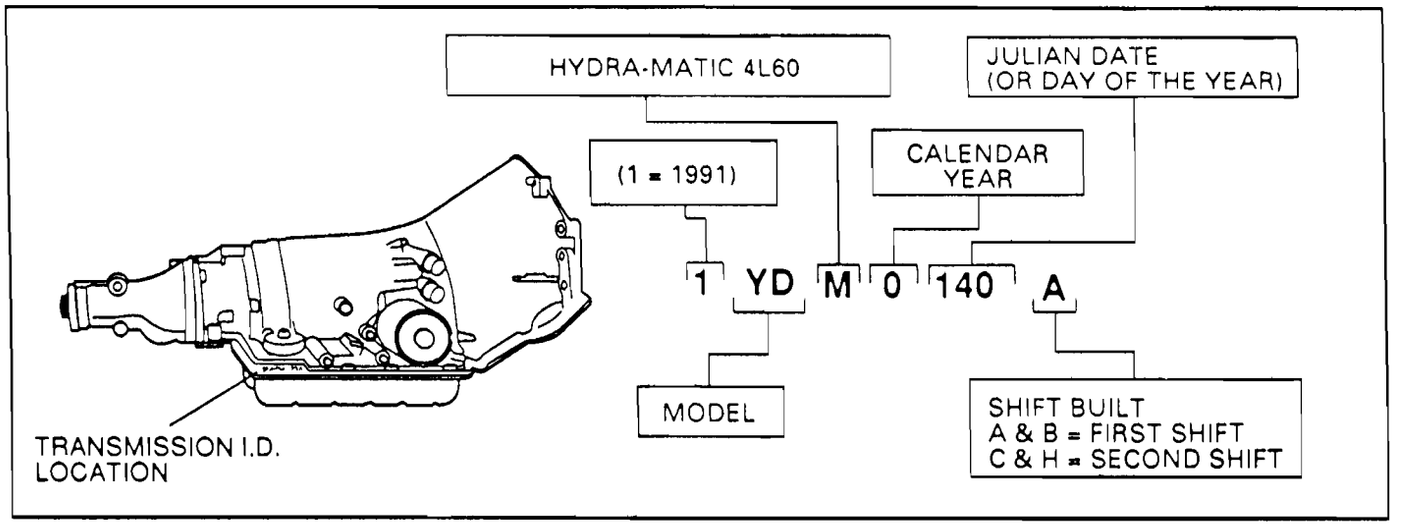
CAUSE: The cause may be, timing of the release of the 3-4 clutch and re-apply of the 2-4 band. A new conical 2-4 servo cushion assist spring has been released to alleviate this condition, along with enlarging the 3rd clutch exhaust hole in the spacer plate.

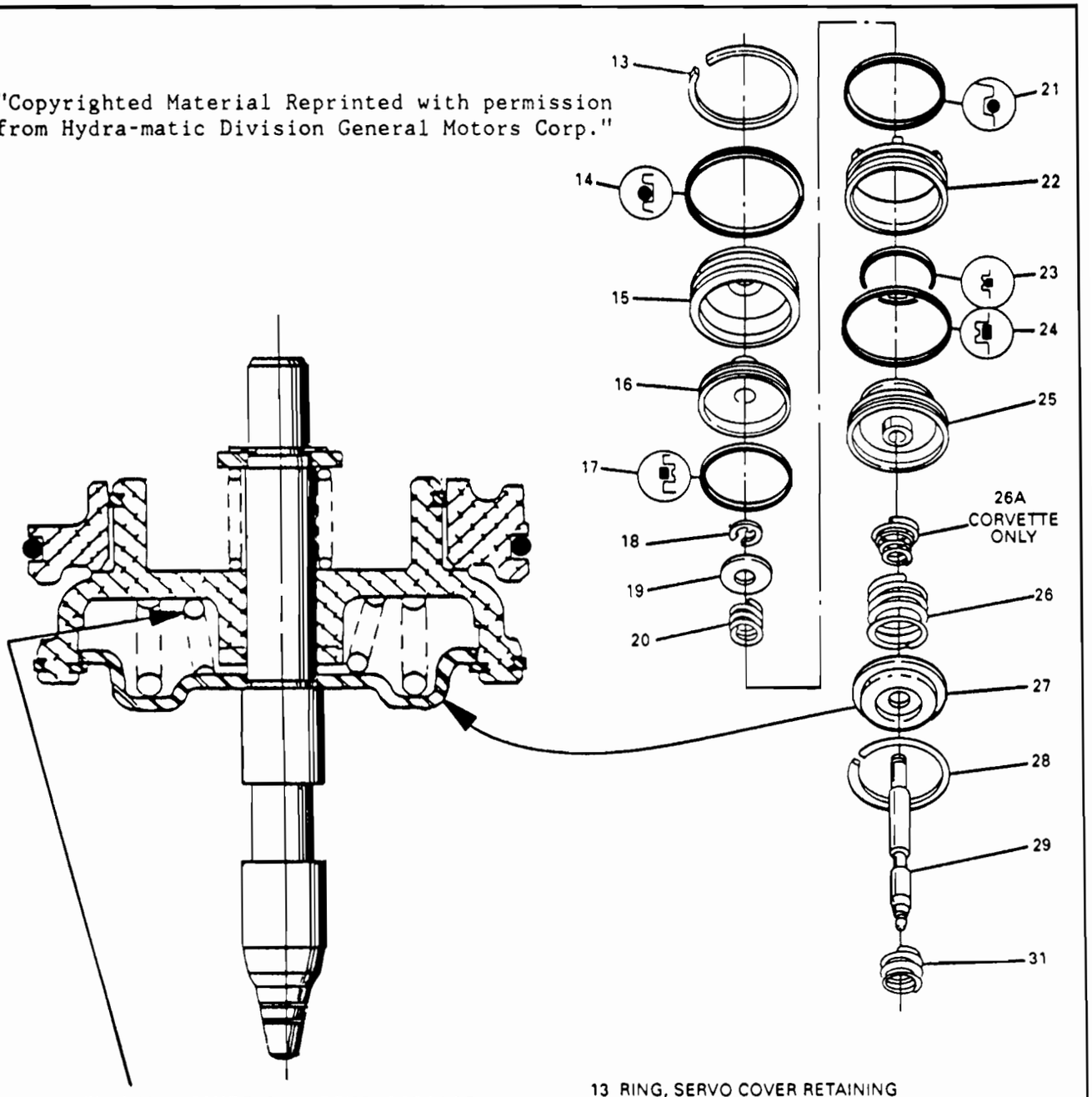
CORRECTION: (1) Install the new conical 2-4 servo cushion assist spring, OEM part number 8681195, inside of the current servo cushion spring with the small end towards the retainer, as shown in Figure 14.
(2) Enlarge the 3rd clutch exhaust hole in the spacer plate to .093", as shown in Figure 15.

SERVICE INFORMATION:

Conical 2-4 Servo Cushion Assist Spring 8681195

NOTE: Beginning May 20, 1991 (Julian Date 140), all 1YHM models were built using the new servo cushion assist spring and spacer plate. Use the Figure below to determine if the modification is necessary in your transmission.





INSTALL CONICAL SPRING 8681195 WITH SMALL DIAMETER TOWARD THE RETAINER AS SHOWN.

13 RING, SERVO COVER RETAINING
14 SEAL, "O" RING (2-4 SERVO COVER)
15 COVER, 2-4 SERVO
16 PISTON, 4TH APPLY
17 RING, OIL SEAL (4TH APPLY PISTON - OUTER)
18 RING, RETAINER (APPLY PIN)
19 WASHER, SERVO APPLY PIN
20 SPRING, SERVO APPLY PIN
21 SEAL, "O" RING
22 HOUSING, SERVO PISTON (INNER)
23 RING, OIL SEAL (2ND APPLY PISTON - INNER)
24 RING, OIL SEAL (2ND APPLY PISTON - OUTER)
25 PISTON, 2ND APPLY
26 SPRING, SERVO CUSHION
26A SPRING, SERVO CUSHION ASSIST (CORVETTE ONLY)
27 RETAINER, SERVO CUSHION SPRING
28 RING, RETAINER (2ND APPLY PISTON)
29 PIN, 2ND APPLY PISTON
31 SPRING, SERVO RETURN

Figure 14

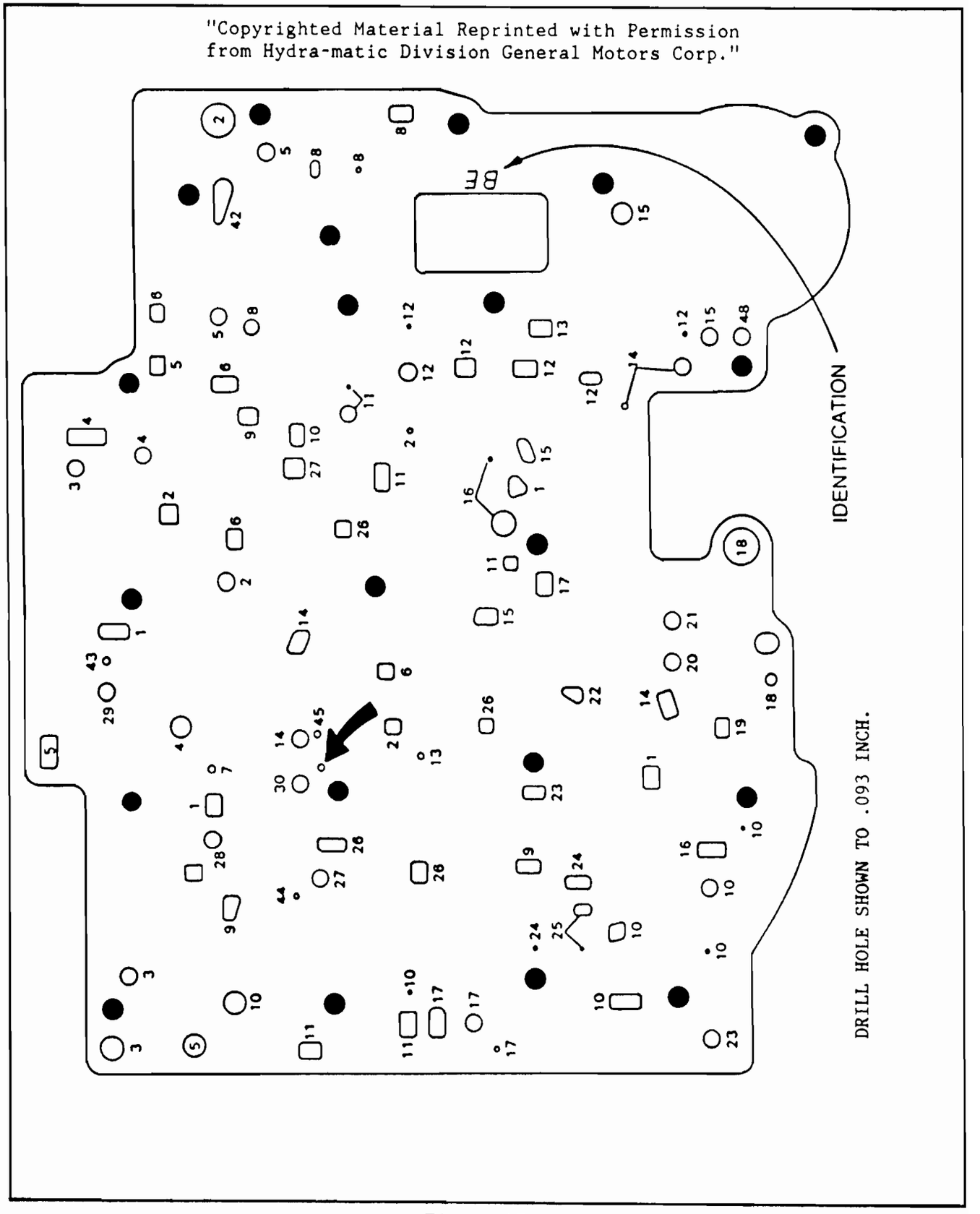


Figure 15

THM 4T60 (440-T4) AND 4T60-E

NO MOVEMENT (COLD ONLY)

COMPLAINT: Some THM 4T60 (440-T4) and 4T60-E Transaxles may exhibit a no move condition while the transaxle fluid is cold, and after warm the transaxle will perform fine.

CAUSE: The cause may be, a cut and/or rolled input clutch piston outer lip seal (See Figure 16).

CORRECTION: Replace the input clutch piston outer lip seal, and inspect the seal groove for any damage. Replace the input clutch piston as necessary.

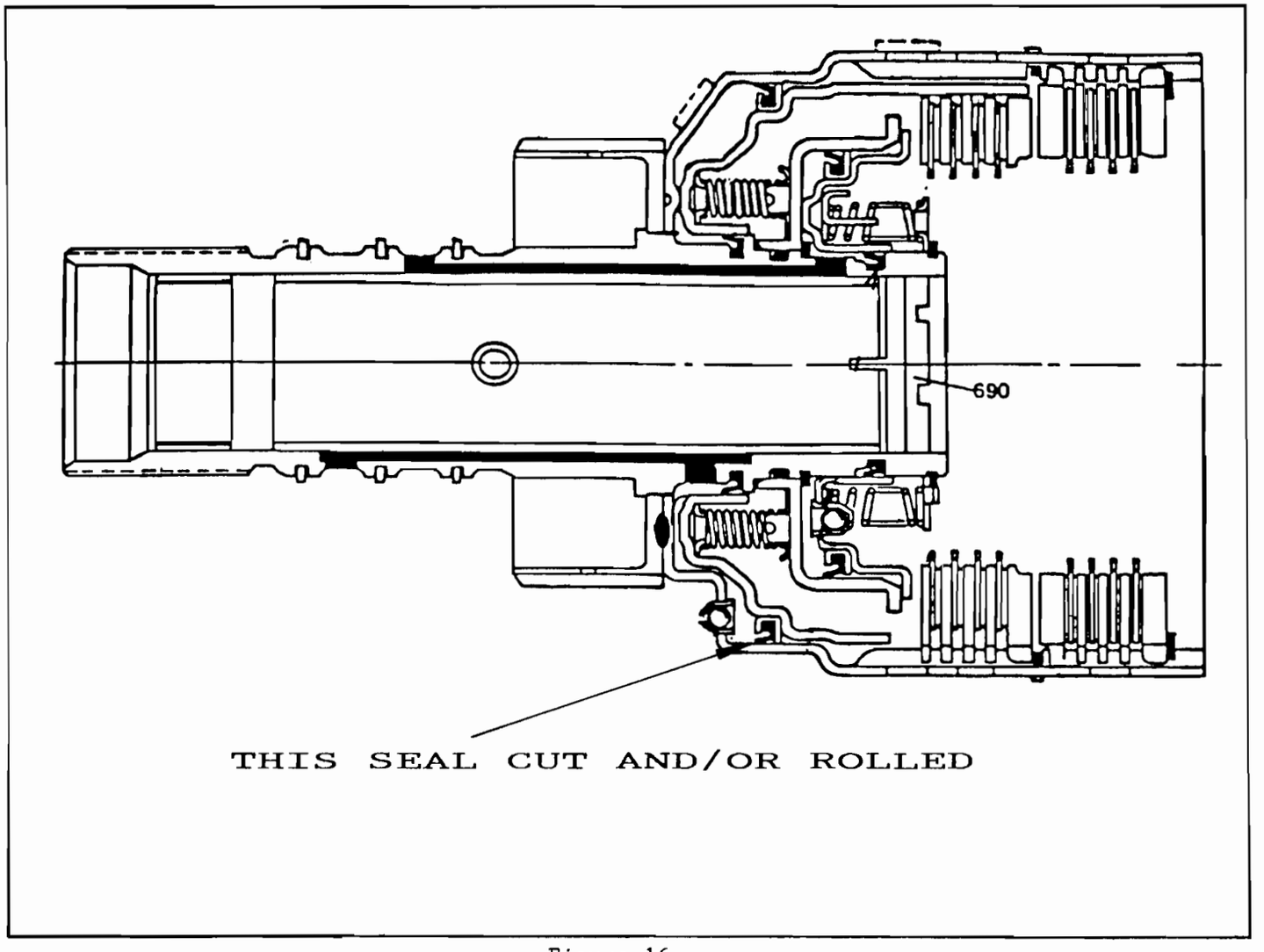


Figure 16

THM 4T60 (440-T4)

THE ULTIMATE 2ND CLUTCH

COMPLAINT: Premature failure of the second clutch pack.

CAUSE: The cause may be, lack of clamping force of the 2nd clutch. The 1991 molded 2nd clutch piston, and new 2nd clutch drum, have a larger area for 2nd clutch oil pressure to work against.

CORRECTION: Install the 1991 2nd clutch drum, 1991 molded 2nd clutch piston, the 1991 apply ring & return spring assembly, and the 1991 2nd clutch apply plate. Use Figures 17 & 18 for proper assembly procedure.
NOTE: It is also recommended that the previous style support ring be modified by machining approx .100" from inside diameter, so that it will now fit the 1989 backing plate, and stake in place as we done on the previous models.

SERVICE INFORMATION:

2nd Clutch Housing (1991 Model)	8651919
2nd Clutch Piston (Molded Design)	8678494
2nd Clutch Return Spring Asm (1991 Model)	8675319
2nd Clutch Apply Plate (1991 Model)	8675227

1991 2ND CLUTCH STACK

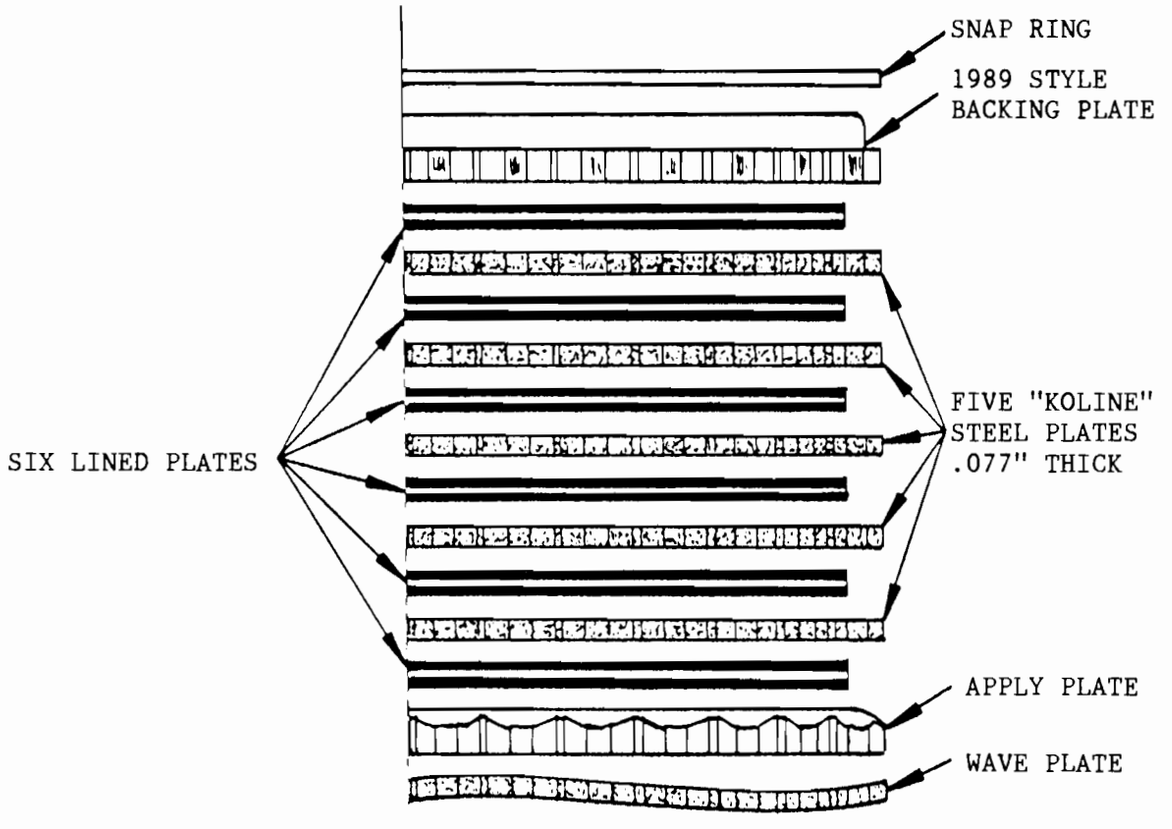
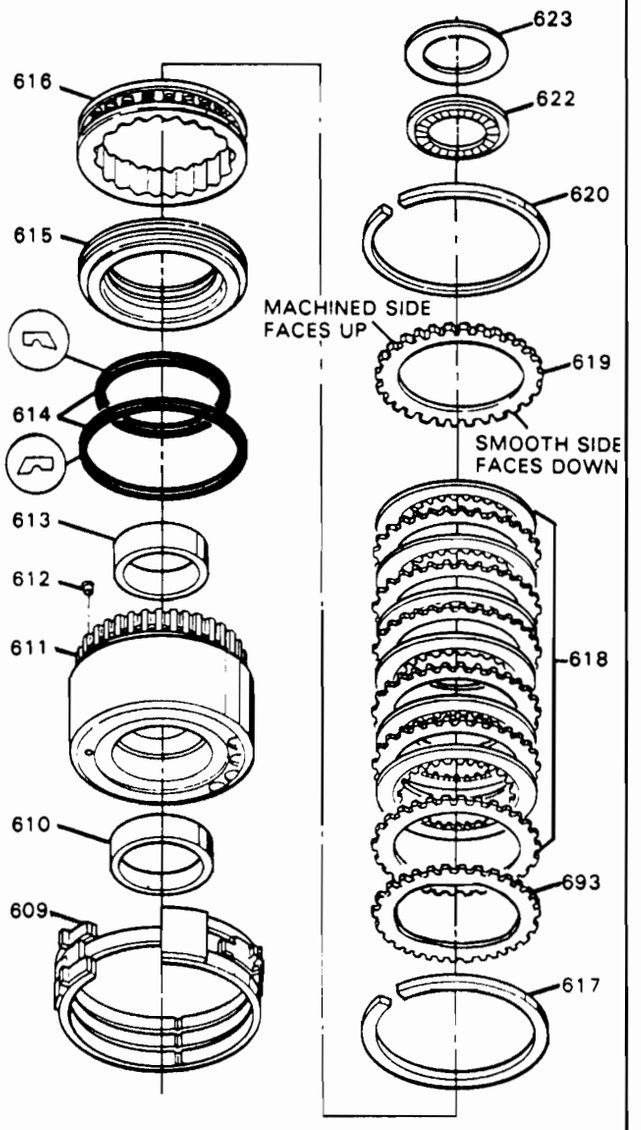
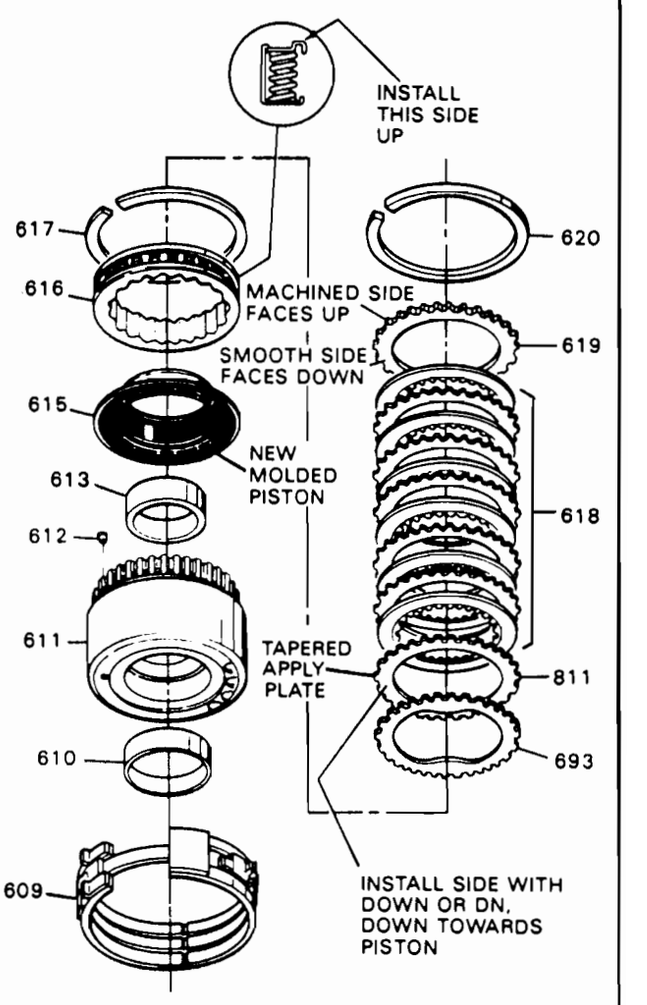


Figure 17



609 BAND, REVERSE
610 BUSHING, 2ND CLUTCH (FRONT)
611 HOUSING, 2ND CLUTCH
612 RETAINER & BALL ASSEMBLY
613 BUSHING, 2ND CLUTCH (REAR)
614 SEALS, 2ND CLUTCH PISTON
615 PISTON, 2ND CLUTCH
616 APPLY RING & SPRING RETURN
617 RING, SNAP (2ND CLUTCH HUB)
618 PLATE ASSEMBLY, 2ND CLUTCH
619 PLATE, BACKING SUPPORT RING
620 RING, SNAP
622 BEARING, THRUST (SUPPORT/SELECTIVE THRUST WASHER)
623 WASHER, THRUST (SELECTIVE)
693 PLATE, 2ND CLUTCH WAVED

1990 MODEL



609 BAND, REVERSE
610 BUSHING, 2ND CLUTCH (FRONT)
611 HOUSING, 2ND CLUTCH
612 RETAINER & BALL ASSEMBLY
613 BUSHING, 2ND CLUTCH (REAR)
615 PISTON, 2ND CLUTCH
616 APPLY RING & SPRING RETURN
617 RING, SNAP (2ND CLUTCH HUB)
618 PLATE ASSEMBLY, 2ND CLUTCH
619 PLATE, BACKING SUPPORT RING
620 RING, SNAP
693 PLATE, 2ND CLUTCH (WAVED)
811 PLATE, APPLY (TAPERED)

1991 MODEL

Figure 18

THINK OF THEM AS CASH MACHINES ON WHEELS.

Losing valuable time and income due to superficially worn hard parts or non-sealing soft parts? Then bank on the original Answermatic, or our new Hydraulic Circuit Analyzer.

- *Eliminate no-goes and come-backs*
- *Locate small cracks and imperfections in seconds*
- *Custom calibrate your transmissions*
- *Adapts to electronic transmissions*
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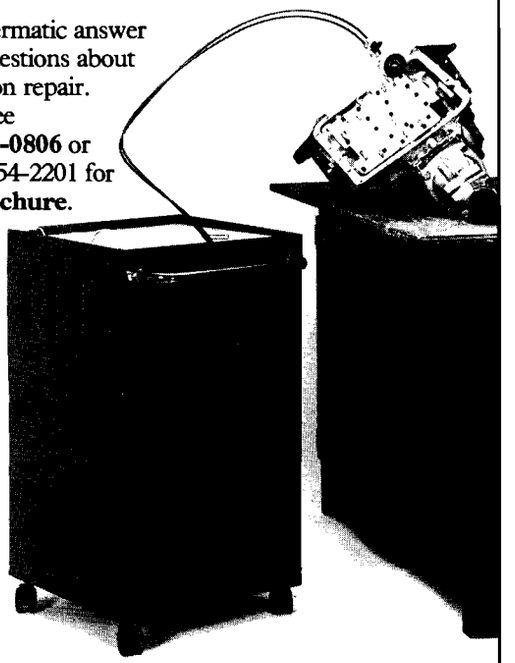
Let Answermatic answer all your questions about transmission repair. Call toll free **1-800-322-0806** or fax (516) 254-2201 for a **free brochure.**



Answermatic's Hydraulic Circuit Analyzer uses ATF under pressure to completely test units before or after rebuilding.

Answermatic, Inc.™

Patent #4809544. Other patents pending.

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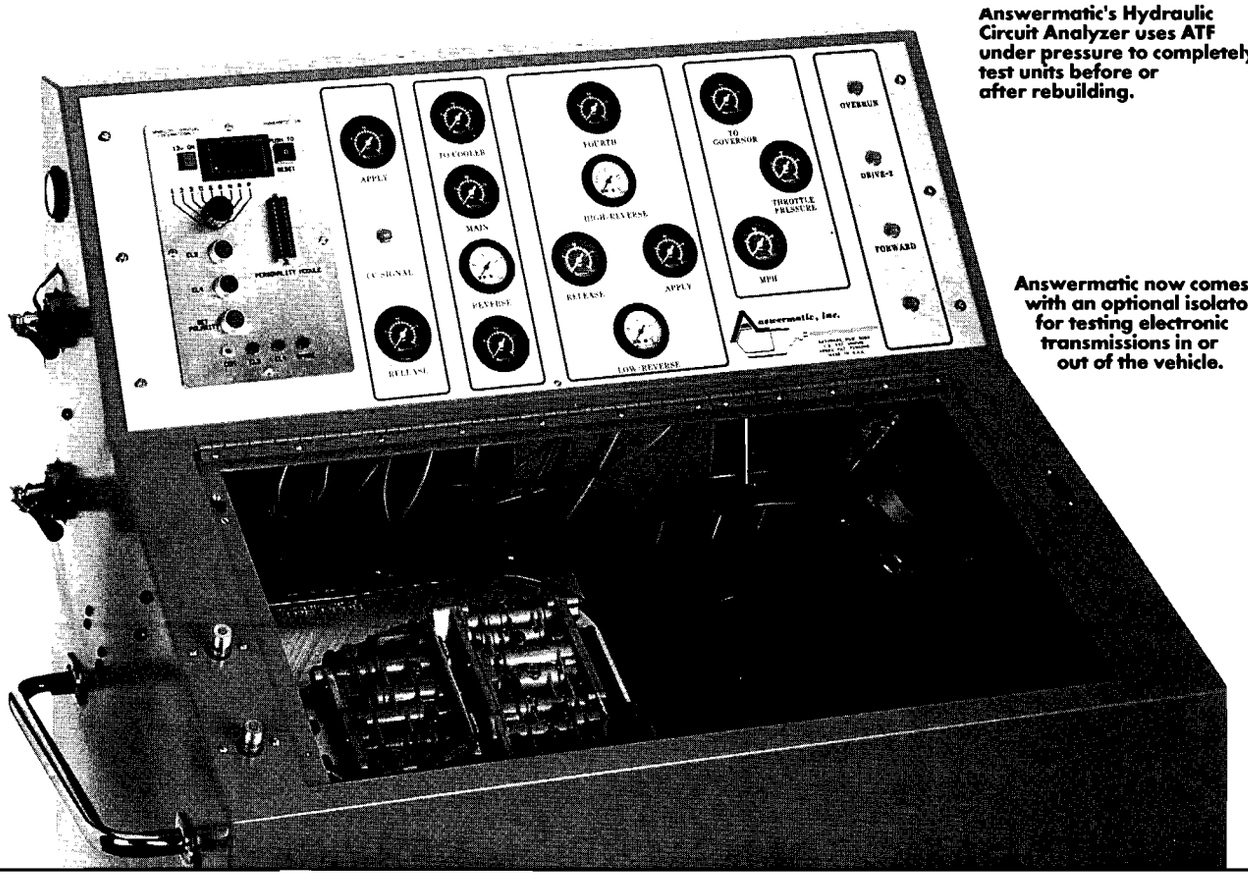


Answermatic now comes with an optional isolator for testing electronic transmissions in or out of the vehicle.

THM 4T60 (440-T4)

SPACER PLATE IDENTIFICATION

Proper spacer plate identification and selection is a MUST on the THM 440-T4. There are 2 different line-ups for the 3-2 line control valve, located in the channel plate, on all 1985 1/2 and later hydraulics. The 2 piece 3-2 line control valve is used on 4.1L and 4.5L Cadillac, and 3.8L Buick engines (See Figure 19). The "Plug" that is also shown (Figure 19), is used on 3.0L Buick, and 2.8L Chevrolet engines.

This also affects the valve body spacer plate, and makes the spacer plate on these models non-interchangeable.

Refer to Figure 20 for the specific holes in the spacer plate to identify which valve line-up the spacer plate is compatable with.

THESE SPACER PLATES WILL NOT INTERCHANGE.

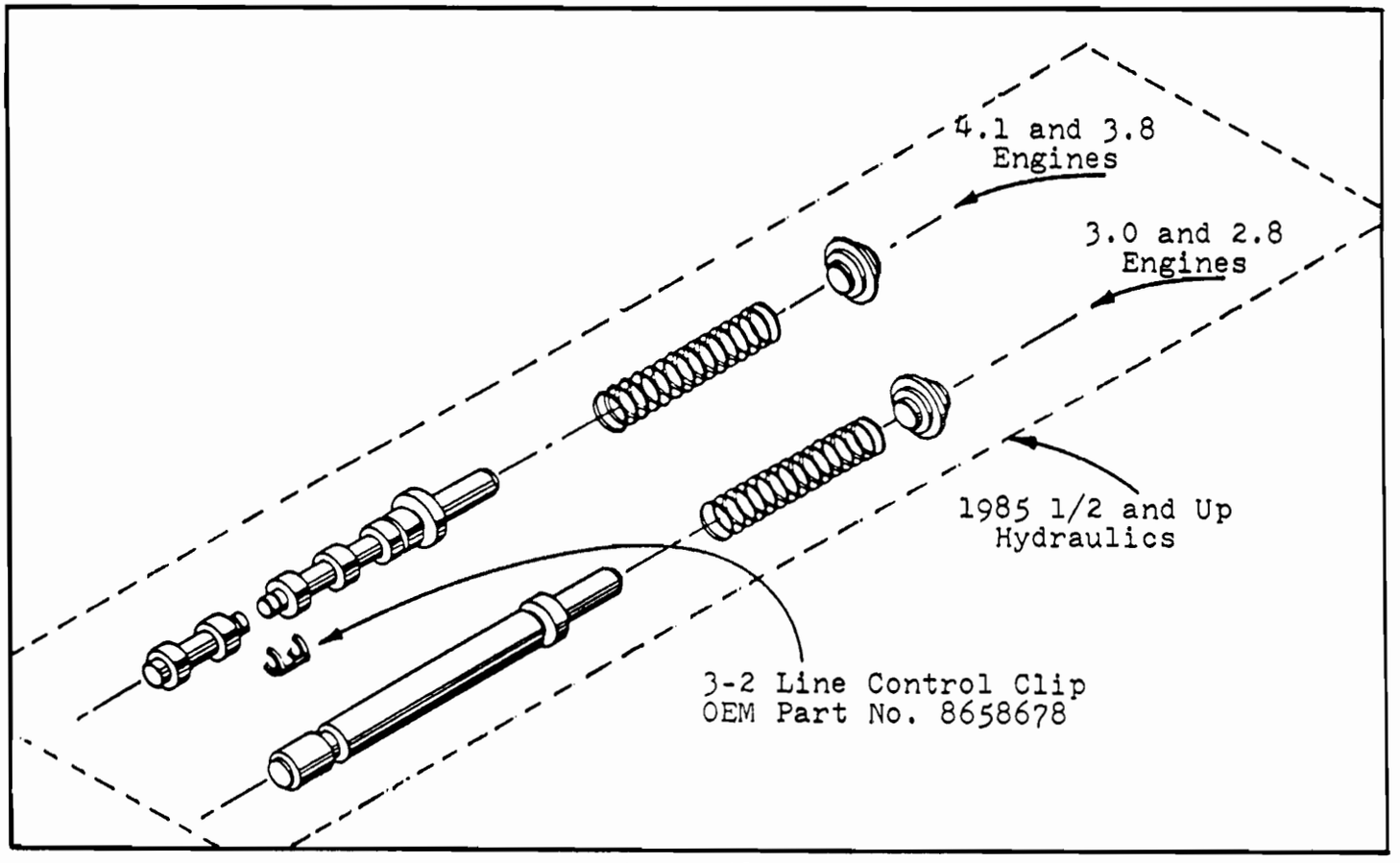
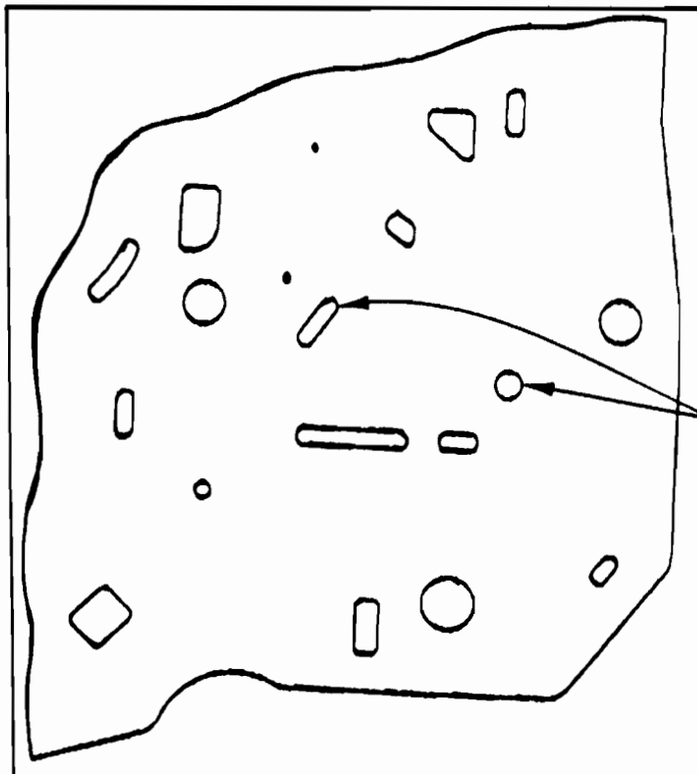
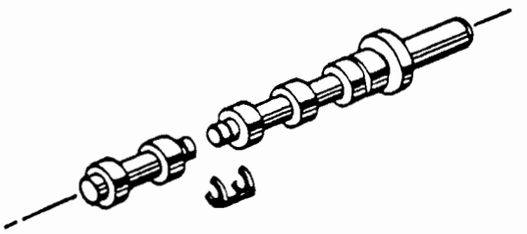


Figure 19

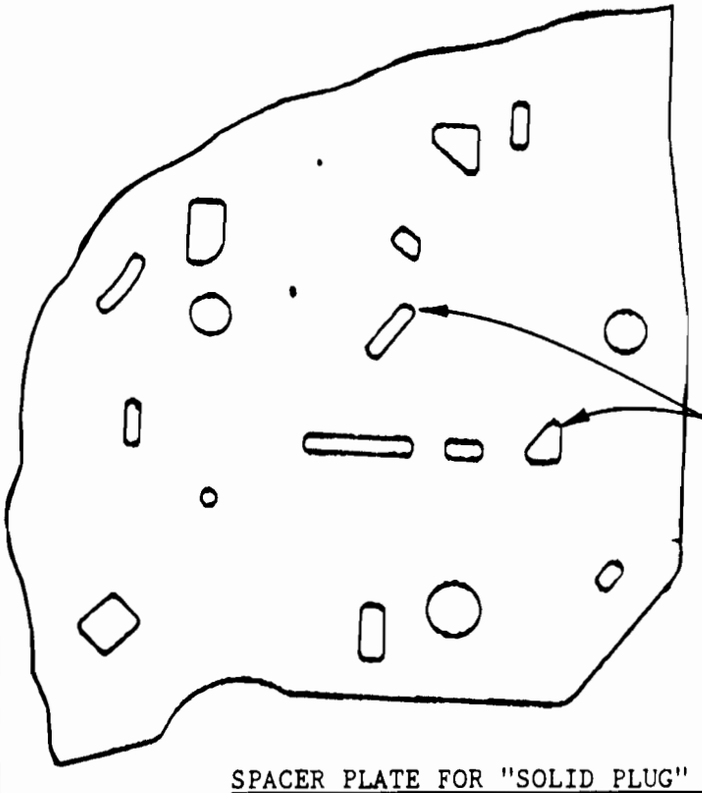


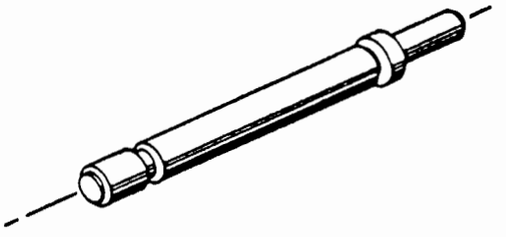


THE SPACER PLATE MUST HAVE THESE TWO HOLES WITH THE "2 PIECE" 3-2 CONTROL VALVE LINE-UP IN CHANNEL PLATE.

USED IN THE FOLLOWING:
- 4.5L CADILLAC ENGINE
- 4.1L CADILLAC ENGINE
- 3.8L BUICK ENGINE
- 3.3L BUICK ENGINE
- 3.1L TURBOCHARGED

SPACER PLATE FOR "2 PIECE" 3-2 LINE CONTROL VALVE ONLY.





THE SPACER PLATE MUST HAVE THESE TWO HOLES WITH THE "SOLID PLUG" 3-2 LINE CONTROL VALVE LINE-UP IN THE CHANNEL PLATE.

USED IN THE FOLLOWING:
- 3.1L PONTIAC ENGINE
- 3.0L BUICK ENGINE
- 2.8L CHEVROLET ENGINE

SPACER PLATE FOR "SOLID PLUG" 3-2 LINE CONTROL VALVE ONLY

Figure 20

THM 4T60 (440-T4)

EARLY UPSHIFTS AND NO PASSING GEAR

COMPLAINT: Early upshift pattern (Regardless of Throttle Position), and no forced (Part or Full Throttle) downshifts.

CAUSE: The cause may be, a loss of T.V. pressure due to a mis-matched spacer plate and T.C.C. Regulator Valve.

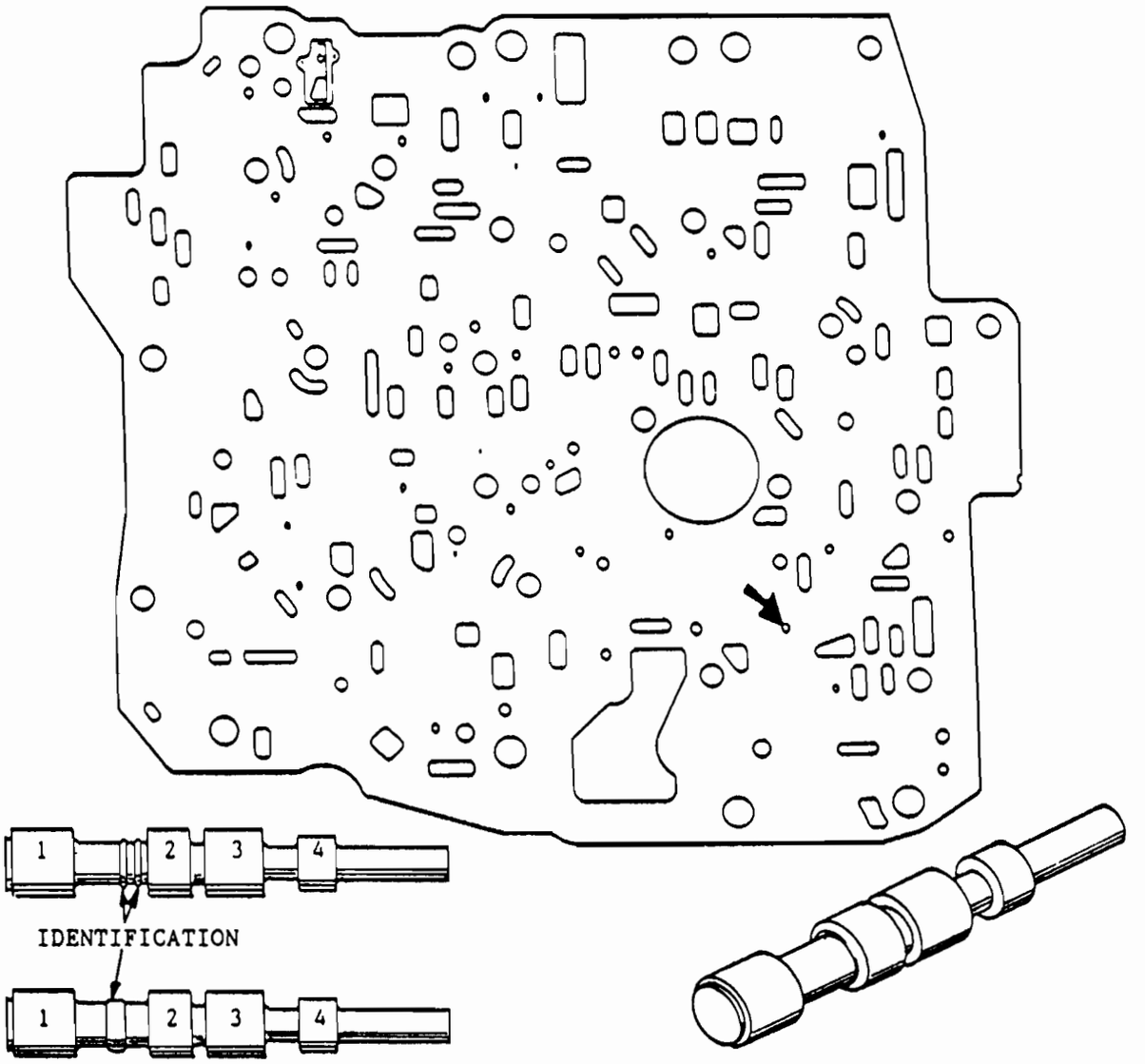
THERE ARE TWO TOTALLY DIFFERENT TYPES OF CONVERTER CLUTCH REGULATOR VALVE SYSTEMS.

(1) T.V. CONTROLLED TCC REGULATOR VALVE - On this system lands one, two, and three are all the same diameter, and requires a spacer plate WITH a T.V. hole, as shown in Figure 21. There are currently two different styles of the T.V. controlled converter regulator valve as shown in Figure 21. The 1st design is identified by "2 Narrow Rings", and the 2nd design is identified by a "Wide Band". The 2nd design valve improves TCC apply feel because land No. 2 is .018" longer than the 1st design. Refer to Figure 21 to compare the length.

(2) NON T.V. CONTROLLED TCC REGULATOR VALVE - On this system lands one and two are the same diameter, but land three is .052" smaller in diameter (See Figure 22). This system requires a spacer plate WITHOUT a T.V. hole by arrow, as shown in Figure 22.

IF THE NON T.V. CONTROLLED CONVERTER REGULATOR VALVE IS MIS-MATCHED WITH A SPACER PLATE "WITH" THE T.V. HOLE, ALL T.V. PRESSURE WILL BE EXHAUSTED AND EARLY UPSHIFTS AND NO KICKDOWN WILL BE THE RESULT.

CORRECTION: Install spacer plate and T.C.C. regulator valve that are compatable with one another. Refer to Figures 21 and 22.



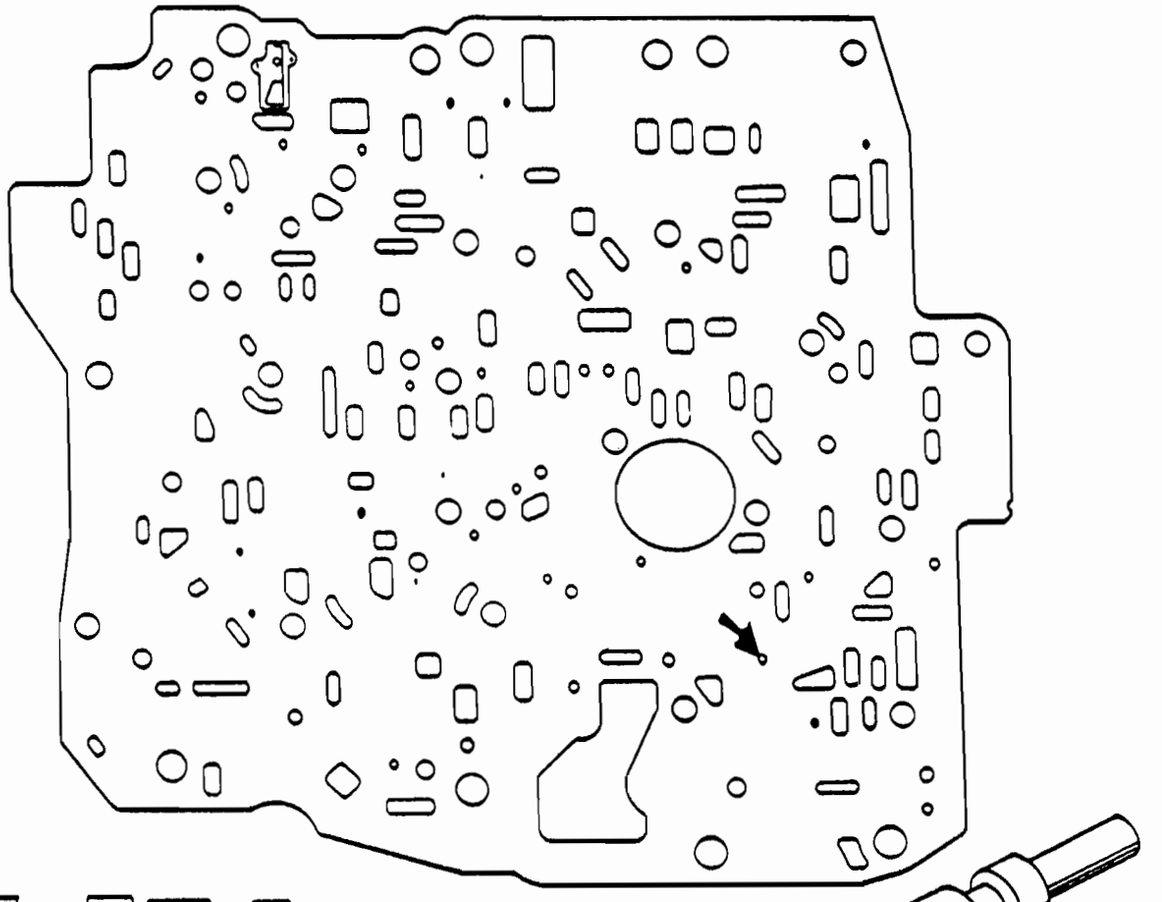
I.D.		LAND 1	LAND 2	LAND 3	LAND 4
2 RINGS	Diameter	.387"	.387"	.387"	.315"
(NARROW)	Length	.335"	.222"	.333"	.197"
WIDE BAND	Diameter	.387"	.387"	.387"	.315"
	Length	.335"	.240"	.333"	.197"

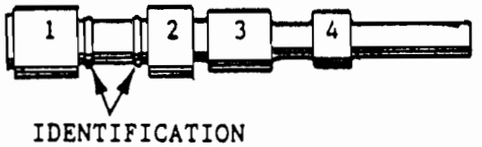
THIS TYPE OF CONVERTER CLUTCH REGULATOR VALVE REQUIRES SPACER PLATE WITH HOLE SHOWN BY ARROW ABOVE.

NOTE: LAND 3 IS THE SAME SIZE AS LAND 1 AND LAND 2.

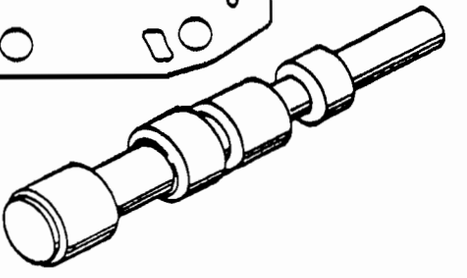
T.V. CONTROLLED T.C.C. REGULATOR VALVE

Figure 21





IDENTIFICATION



I.D.		LAND 1	LAND 2	LAND 3	LAND 4
2 RINGS	Diameter	.387"	.387"	.335"	.315"
(WIDE)	Length	.335"	.222"	.333"	.197"

THIS TYPE OF CONVERTER CLUTCH REGULATOR VALVE REQUIRES SPACER PLATE WITHOUT HOLE SHOWN BY ARROW ABOVE.

NOTE: LAND 3 IS SMALLER THAN LAND 1 AND LAND 2.

NON T.V. CONTROLLED REGULATOR VALVE

Figure 22

THM 4T60 (440-T4)

CONVERTER CLUTCH APPLY ON 1-2 SHIFT

COMPLAINT: The converter clutch applies immeadiately after the transaxle has shifted to 2nd gear, and cannot be released with the brake pedal. The converter clutch will apply on the 1-2 shift even with the wire harness disconnected from the transaxle

CAUSE: The cause may be one of the following:

(1) The TCC screen and orifice assembly missing from its location in the spacer plate (See Figure 23).

(2) The TCC screen and orifice assembly "Melted" and usually found in the TCC solenoid, blocking the exhaust passage. Usually an aftermarket product, not OEM.

(3) The TCC solenoid blocked with foreign material.

(4) TCC solenoid for Canadian application, which is self grounded, installed on a computer controlled transaxle (See Figure 24). NOTE: Will not lock-up with wire harness disconnected.

CORRECTION: (1) Install the TCC screen and orifice assembly, with the "O" ring, in its proper location in spacer plate (See Figure 23). OEM part numbers are found below.

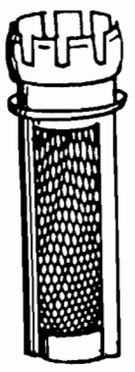
(2) Replace TCC screen and orifice assembly with <u>OEM PART NUMBER 8658060</u>, and replace TCC solenoid assembly with the proper part number.

(3) Replace the TCC solenoid assembly with the proper part number.

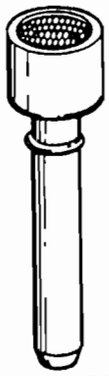
(4) Install the <u>PROPER</u> TCC solenoid assembly. If your valve body is equipped with the TCC Throttle Valve line-up, it requires the self grounded solenoid, I.D. stamped 732 (See Figure 24). If your valve body is not equipped with the TCC Throttle Valve line-up, it requires the computer controlled solenoid, I.D. stamped 419 (See Figure 24).

SERVICE INFORMATION:

"Early" Model TCC Screen	8646474
"Late" Model TCC Screen and Orifice Assembly	8658060
ECM Controlled TCC Solenoid Assembly	8646419
NON-ECM TCC Solenoid Assembly (Canadian)	8656732



"EARLY" MODEL TCC SCREEN
(ORIFICE IN SPACER PLATE)
8646474



"LATE" MODEL TCC SCREEN
AND ORIFICE ASSEMBLY
8658060

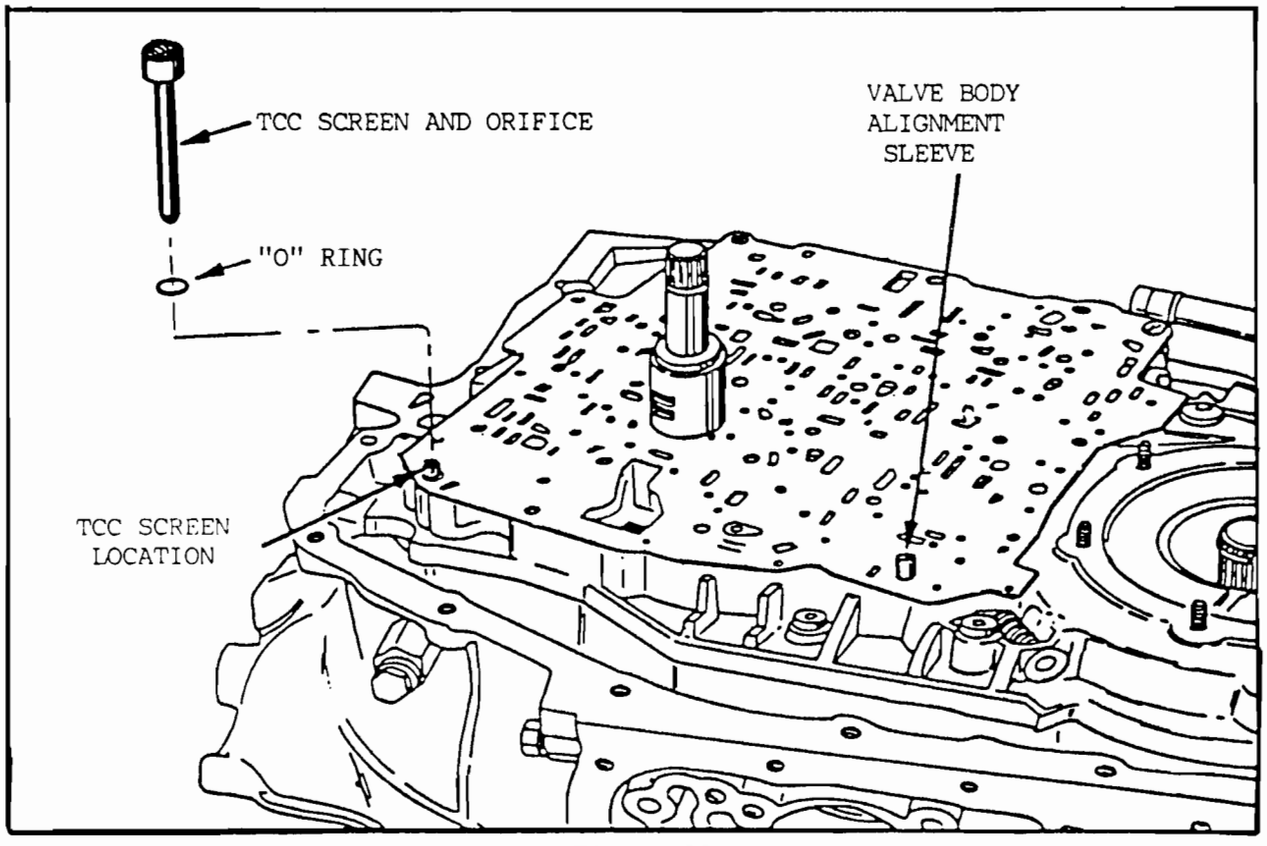
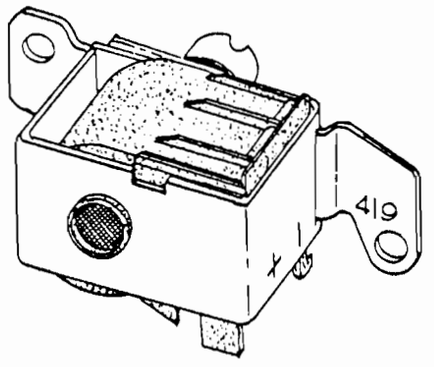


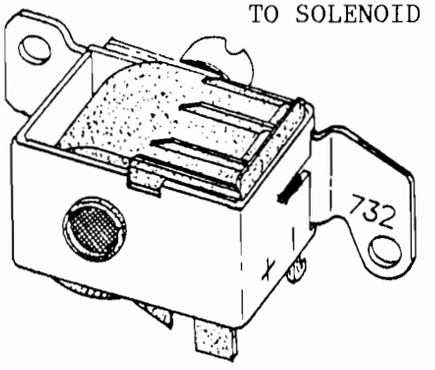
Figure 23



I.D. STAMPED 419

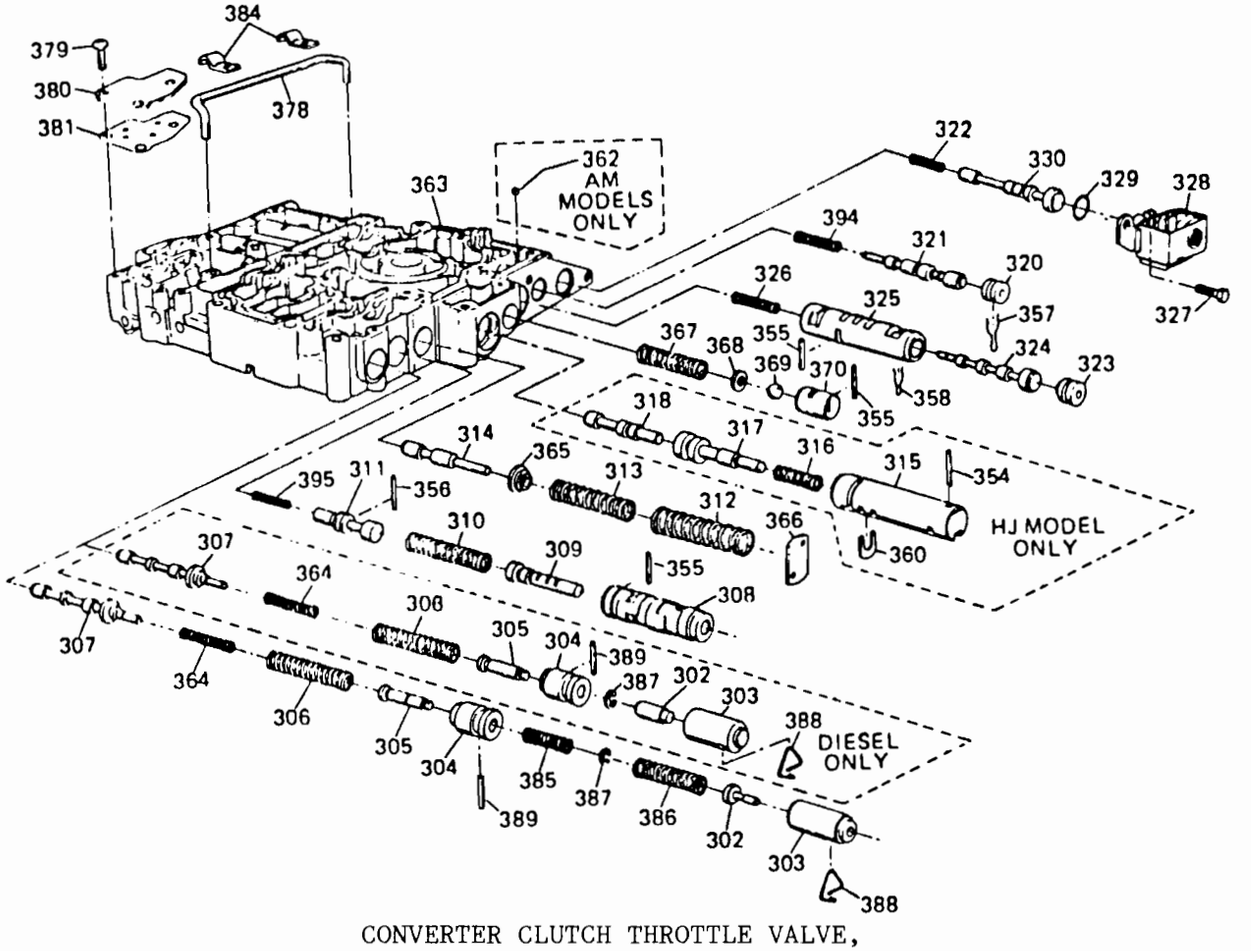
ECM SOLENOID

WIRE SOLDERED
TO SOLENOID CASE



I.D. STAMPED 732

NON-ECM SOLENOID



CONVERTER CLUTCH THROTTLE VALVE,
FOUND IN NON-ECM UNITS ONLY.

Figure 24

THM 4T60 AND THM 4T60-E
NEW DESIGN INPUT CARRIER

The reaction carrier and input carrier pinion gear end play specifications have been changed for service. The previous specification was .009" to .024" and the new specification is .009" to .030", and can be checked with a feeler gage as shown in Figure 25.

Double steel pinion washers have replaced the previously used bronze and steel washer combination used to space the pinion gear from the input carrier housing. The new design double steel washer combination will service all models back to the 1984 model year. The new specification pertains to both the bronze to steel combination, and the new steel to steel combination.

The steel to steel input carrier was implemented into production on both the 4T60 and 4T60-E transaxles during the week of April 15, 1991 (Julian Date 098). The first design reaction carrier (Bronze/Steel) is still in current assembly line production (See Figure 26).

SERVICE INFORMATION:

Input Carrier Assembly (New Design) 8668580

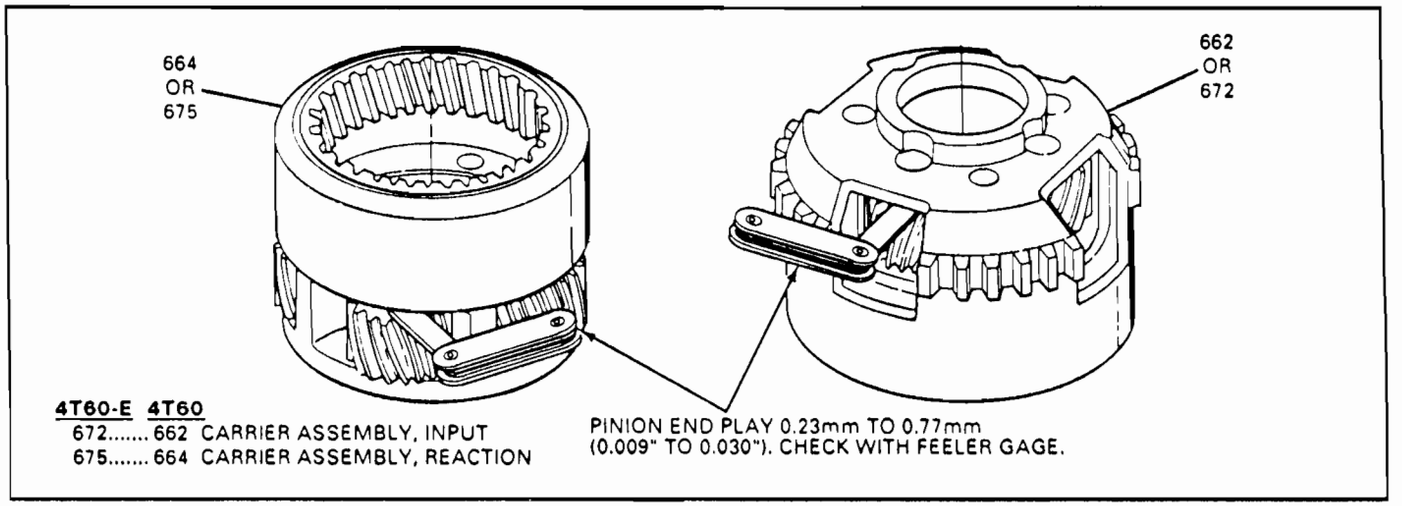


Figure 25

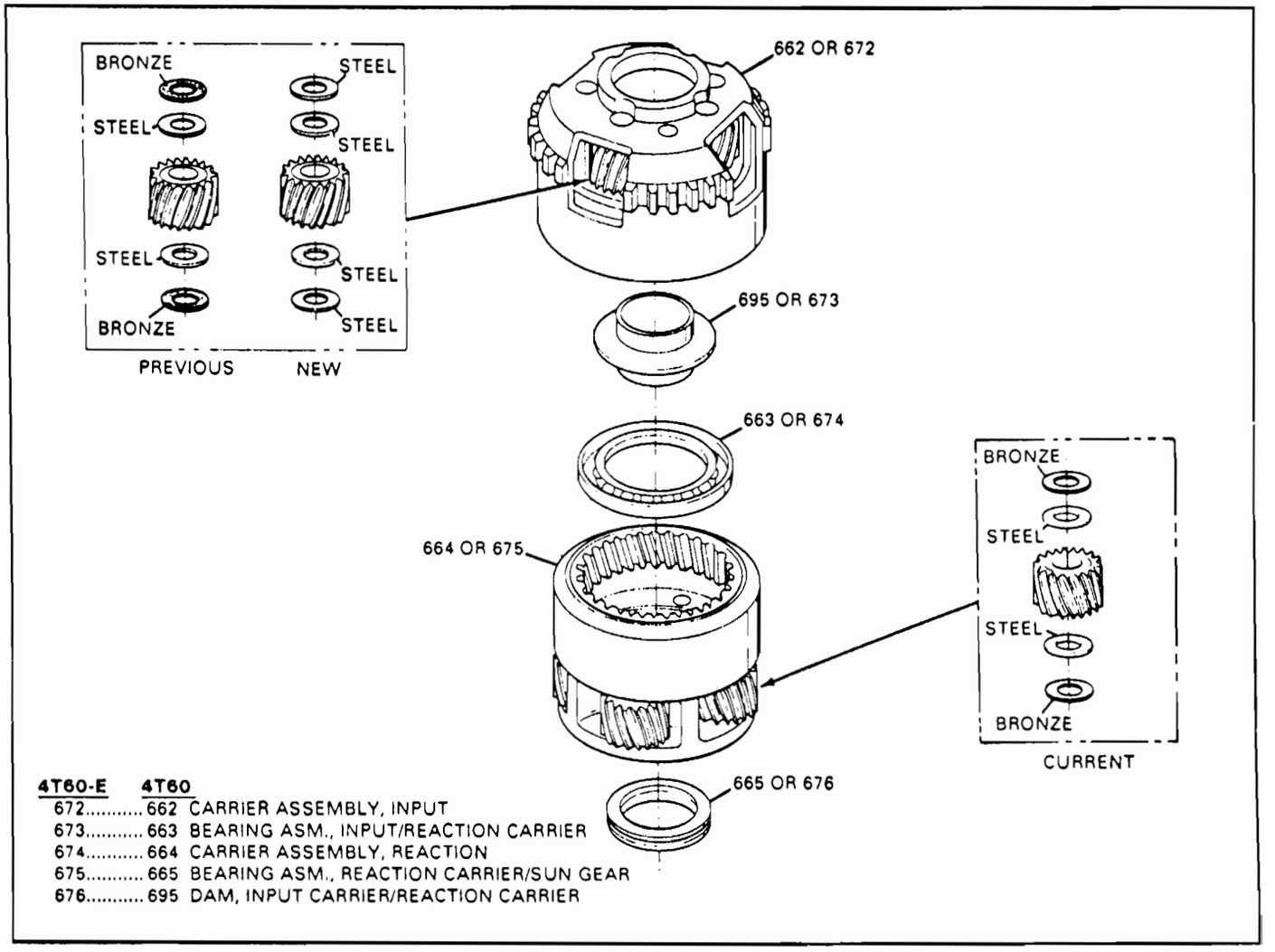


Figure 26

THM 4T60 (440-T4)

HARSH 3-2 FORCED DOWNSHIFT DOUBLE BUMP FEEL TO REVERSE

COMPLAINT: A harsh 3-2 forced downshift and/or a double bump feel when selector lever is placed in reverse.

CAUSE: A band must be applied on either of these shifts, so the cause may be too much piston travel, or band clearance.

CORRECTION: Install the servo piston and servo cover, without the seal or "O" ring, and install the servo cover snap ring. Push in on the servo cover and with a ruler, measure the distance between the servo cover and snap ring, as shown in Figure 27.
This will actually measure piston travel, and this distance should be 1/8" minimum to 3/16" maximum. Change the selective band apply pin as necessary to obtain this dimension.
This should be done on both the 1-2 and reverse servo.

PUSH IN ON SERVO COVER AND MEASURE THIS DISTANCE BETWEEN SERVO COVER AND SNAP RING.

1/8" MINIMUM TO 3/16" MAXIMUM

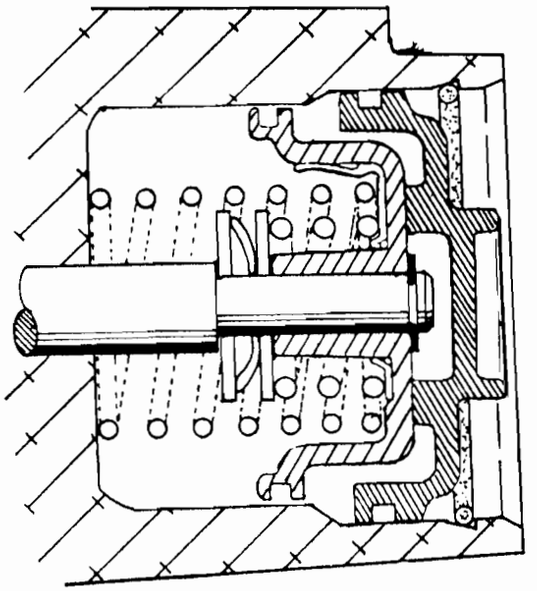


Figure 27

THM 4T60 (440-T4)

BUZZING NOISE

COMPLAINT: Transaxle has a buzzing noise, that increases with engine RPM, and sounds like pressure regulator or converter noise. The buzzing noise is apparent even with the vehicle setting still with the transaxle in gear.

CAUSE: The cause may be a defective oil pump drive shaft and/or the bearing in the valve body that the pump shaft rides in. Inspect the bearing journal on the oil pump drive shaft (See Figure 28).
A defective oil pump drive shaft bearing is not easily detected without destroying the bearing, may as well replace it.

CORRECTION: Replace the oil pump drive shaft as necessary, and our recommendation is to replace the bearing on every rebuild.

SERVICE INFORMATION:

Oil Pump Drive Shaft 8656624
Oil Pump Drive Shaft Bearing 8644516

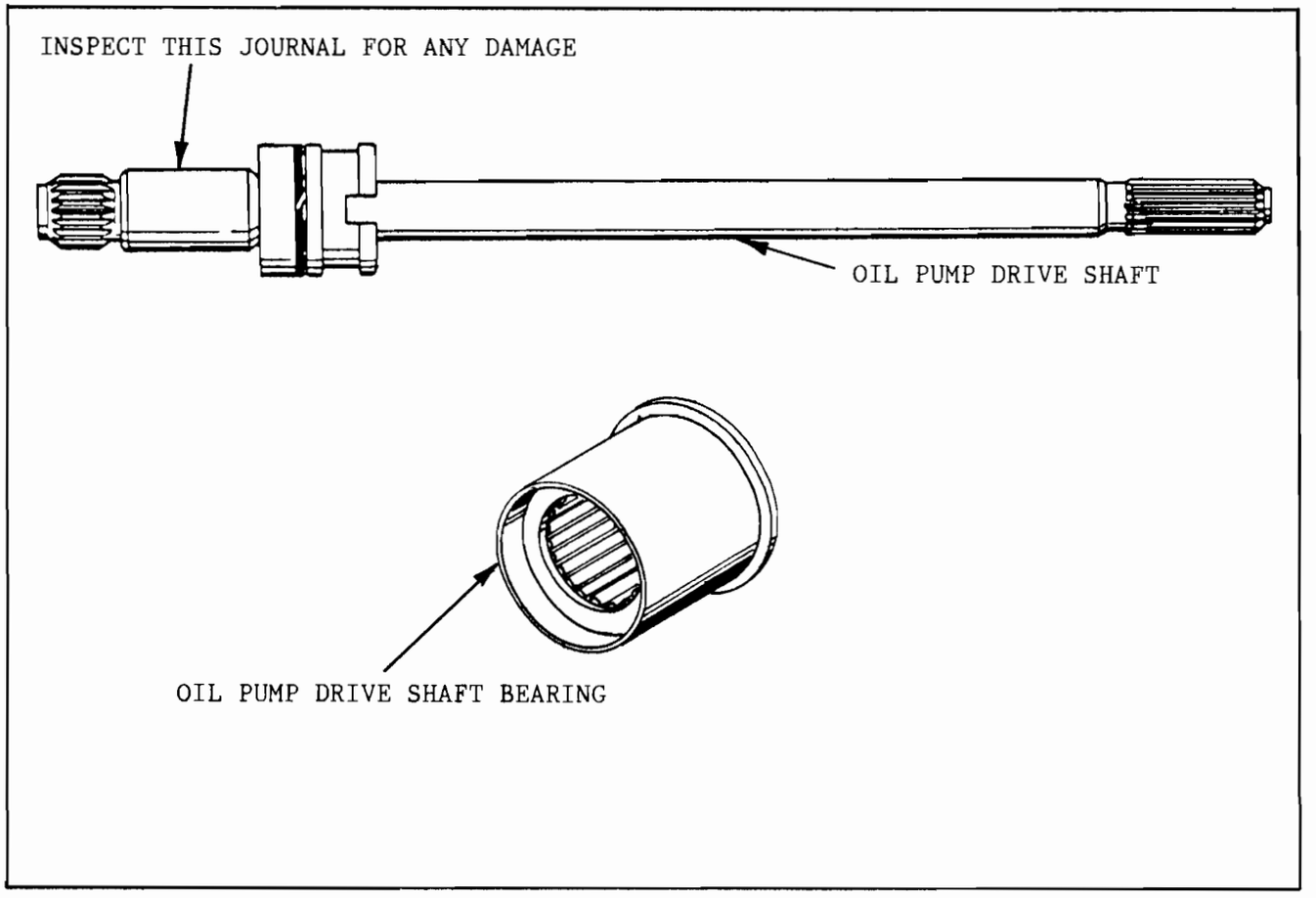
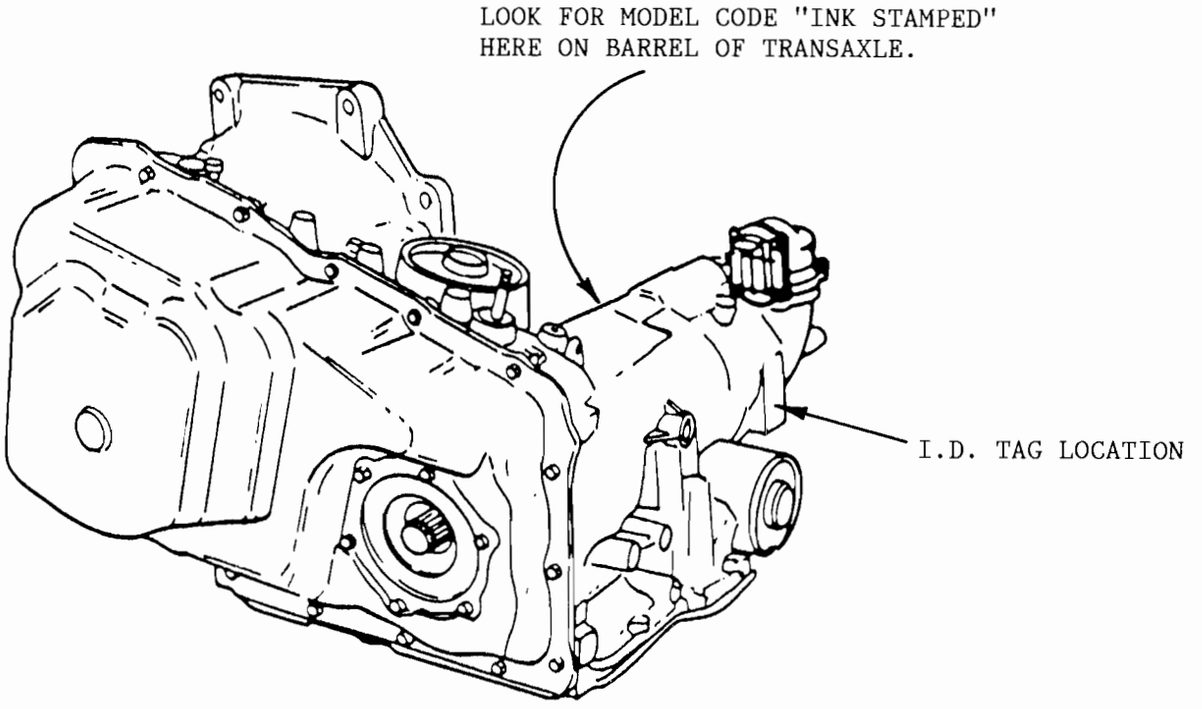
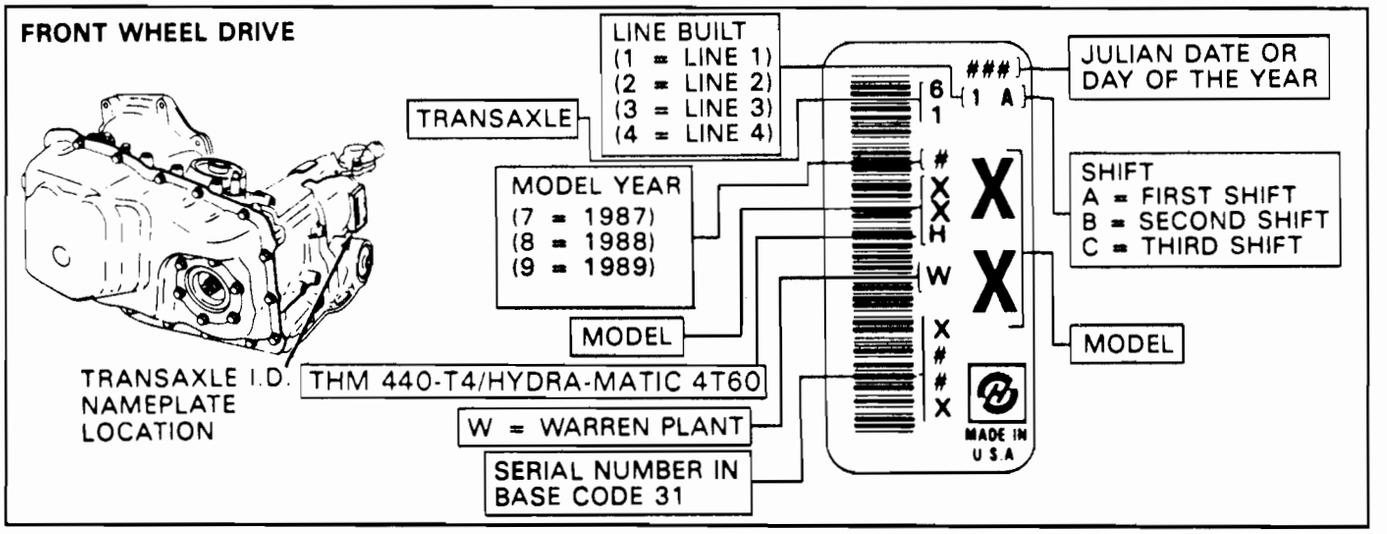


Figure 28


LOOK FOR MODEL CODE "INK STAMPED"
HERE ON BARREL OF TRANSAXLE.
I.D. TAG LOCATION


FRONT WHEEL DRIVE
TRANSAXLE I.D. NAMEPLATE LOCATION
LINE BUILT
(1 = LINE 1)
(2 = LINE 2)
(3 = LINE 3)
(4 = LINE 4)
TRANSAXLE
MODEL YEAR
(7 = 1987)
(8 = 1988)
(9 = 1989)
MODEL
THM 440-T4/HYDRA-MATIC 4T60
W = WARREN PLANT
SERIAL NUMBER IN BASE CODE 31
JULIAN DATE OR DAY OF THE YEAR
SHIFT
A = FIRST SHIFT
B = SECOND SHIFT
C = THIRD SHIFT
MODEL
MADE IN U.S.A.

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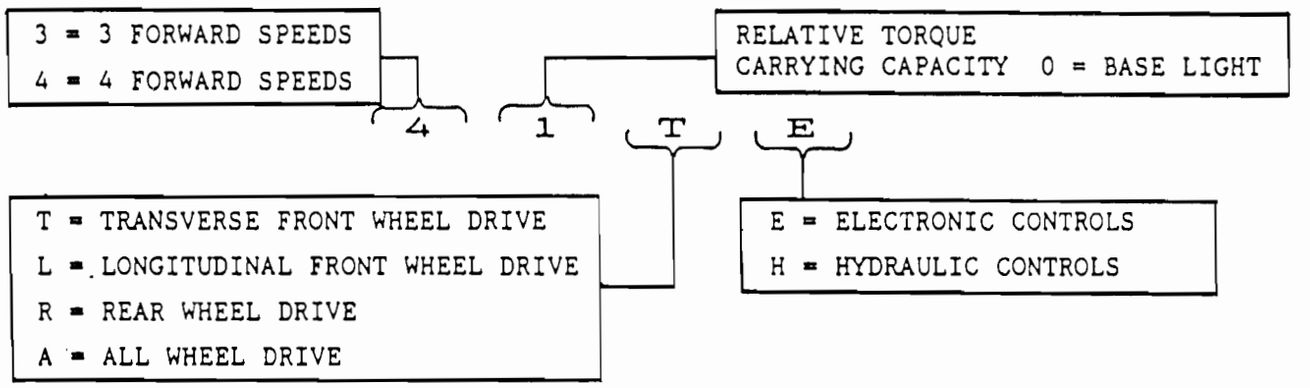
NEW DESIGNATION SYSTEM FOR CHRYSLER PRODUCTS



PREVIOUS DESIGNATION	NEW DESIGNATION
A404	30TH
A413/A670	31TH
A604 LD	40TE
A604	41TE
A604 AWD	41AE
A606	42LE
A904	30RH
A998	31RH
A999	32RH
A727	36RH
A727 HD (Diesel)	37RH
NONE	38RH
A500/MMC (A904 FRONT)	40RH
A500/CORP (A999 FRONT)	42RH
A500SE	42RE
A518	46RH
A518SE	46RE
A618	47RH
NONE	48RH/E

CHRYSLER A604

UNDEFINED FAULT CODES STORED

COMPLAINT: There are times when a strange or undefined fault code will be stored in the computer. Examples are "B9" and "A6".

CAUSE: At times the computer will give the fault codes in the "Hex System" of numbering. In the "Hex System" of numbering, any number above nine becomes a letter.

A = 100
B = 110
C = 120
D = 130
E = 140
F = 150

CORRECTION: To "Decode" the Hex System of numbering, proceed as follows, using the chart above.

(1) Add the "CONVERTED" first digit, to the second digit.
(2) Subtract 80 from the total, will equal fault code.

EXAMPLE OF FAULT CODE B9:
1. B = 110, PLUS 9, = 119.
2. 119 MINUS 80 = 39.
3. SEE ATSG HANDBOOK, FOR FAULT CODE 39.

EXAMPLE OF FAULT CODE A6:
1. A = 100, PLUS 6, = 106.
2. 106 MINUS 80 = 26.
3. SEE ATSG HANDBOOK, FOR FAULT CODE 26.

LATEST CONTROLLER NUMBERS

CONTROLLER, 1989-1991 (ALL MODELS) 4672105

CONTROLLER, 1992 ALL MODELS EXCEPT, NEW YORKER, 5TH AVENUE, AND IMPERIAL.. 4672203
(WILL NOT RETRO FIT TO ANY EARLIER MODEL YEARS)
CONTROLLER, 1992 NEW YORKER, 5TH AVENUE, AND IMPERIAL MODELS ONLY..... 4672216
(WILL NOT RETRO FIT TO ANY EARLIER MODEL YEARS)

CHRYSLER A604 (41TE)

IDENTIFICATION AND INTERCHANGE

It will be imperative that you identify the transaxle properly. The transaxle is identified by the "Last 3 Digits" of the OEM part number, and is found on a sticker located on the rear gear cover (See Figure 33). Then refer to the chart in Figure 36 for proper applications.

If the gear cover sticker is missing, or painted over, there is also a bar code label located on the case directly above the PRNODL and neutral safety switches, or sometimes on the bell housing (See Figure 34). Then refer to the chart in Figure 36 for proper applications.

The most permanent form of identification is an "Etching", in the case, near the rear gear cover (See Figure 35). It may be necessary to remove the rear gear cover to see the part number, but if the vehicle has been in service for some time, this may be the only means of identification. Then refer to the chart in Figure 36 for proper applications.

This transaxle is also found behind 3 different engine applications, 2.5 Litre, 3.0 Litre, and 3.3 Litre engines. They all have different bolt patterns. Refer to Figures 38, 39, and 40 for the bell housing patterns.

The 2.5 Litre engine uses a turbine shaft and torque converter that has only 22 splines. The 3.0 Litre and 3.3 Litre engines both use a turbine shaft and torque converter that has 24 splines. Refer to Figure 41, and be carefull.

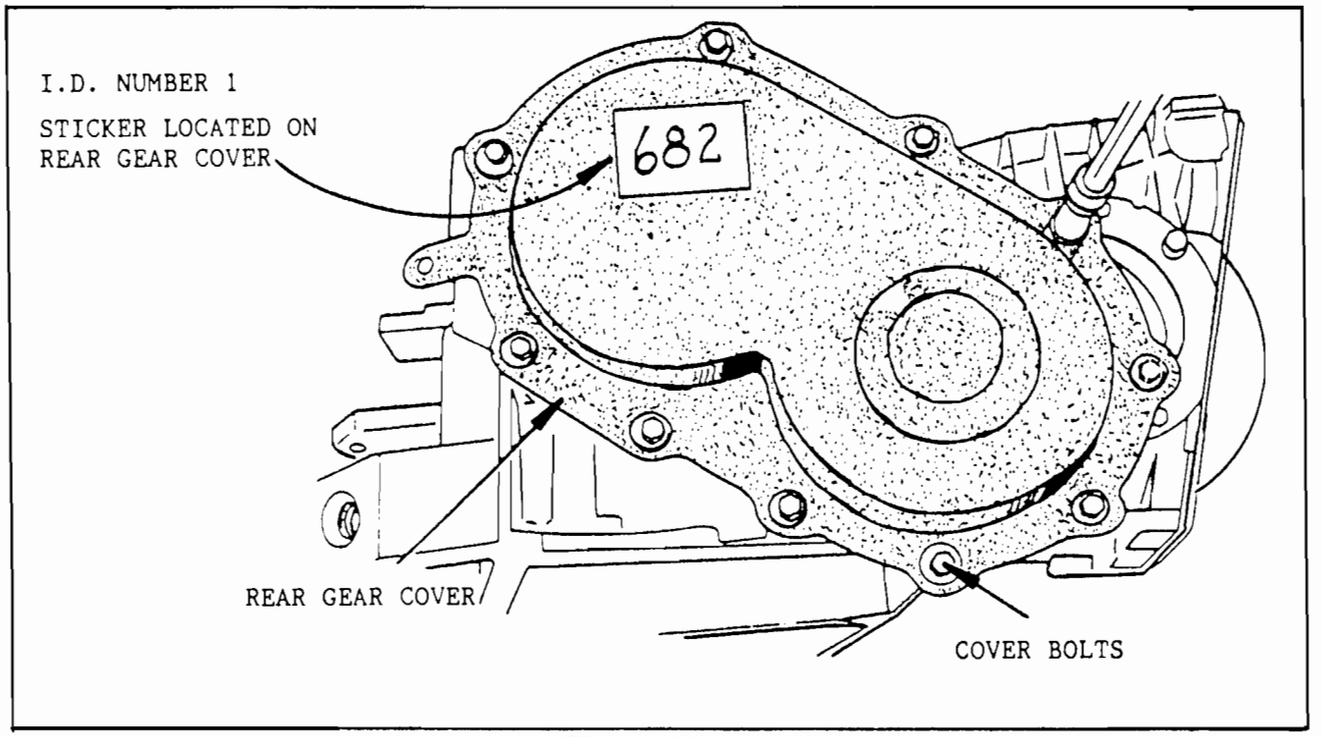


Figure 33

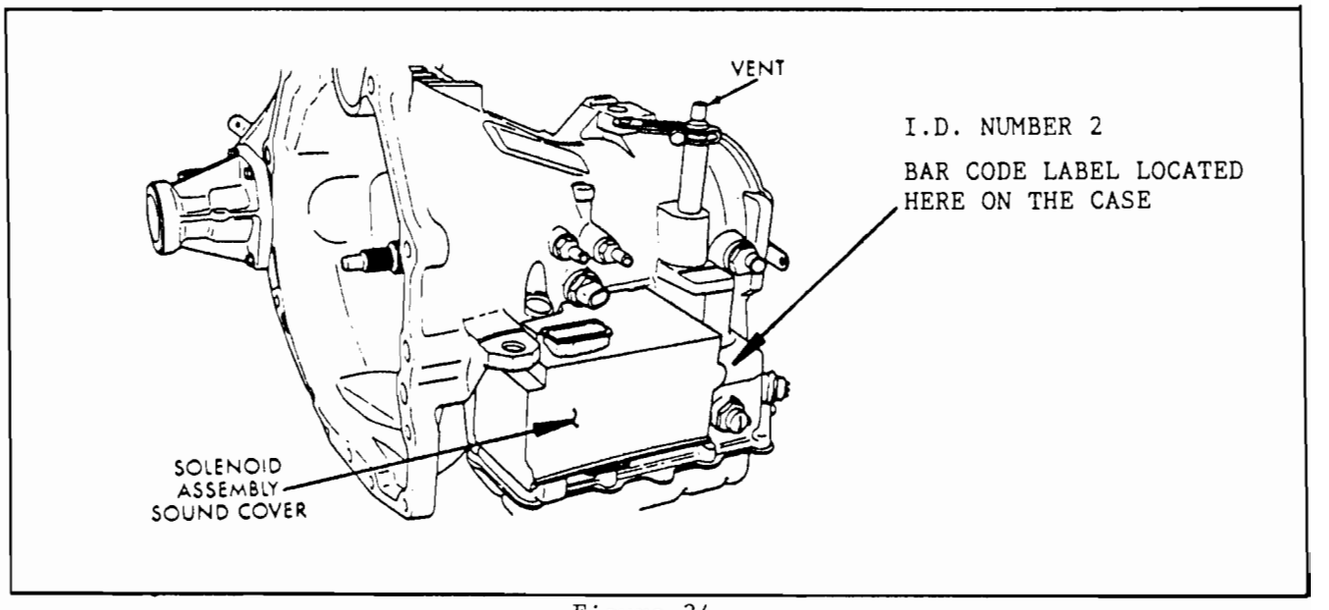


Figure 34

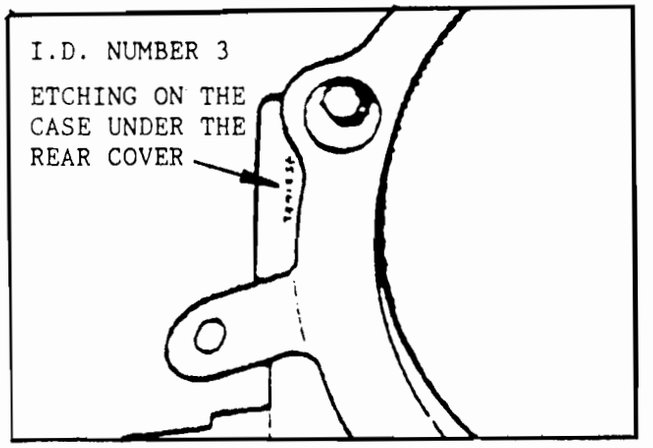
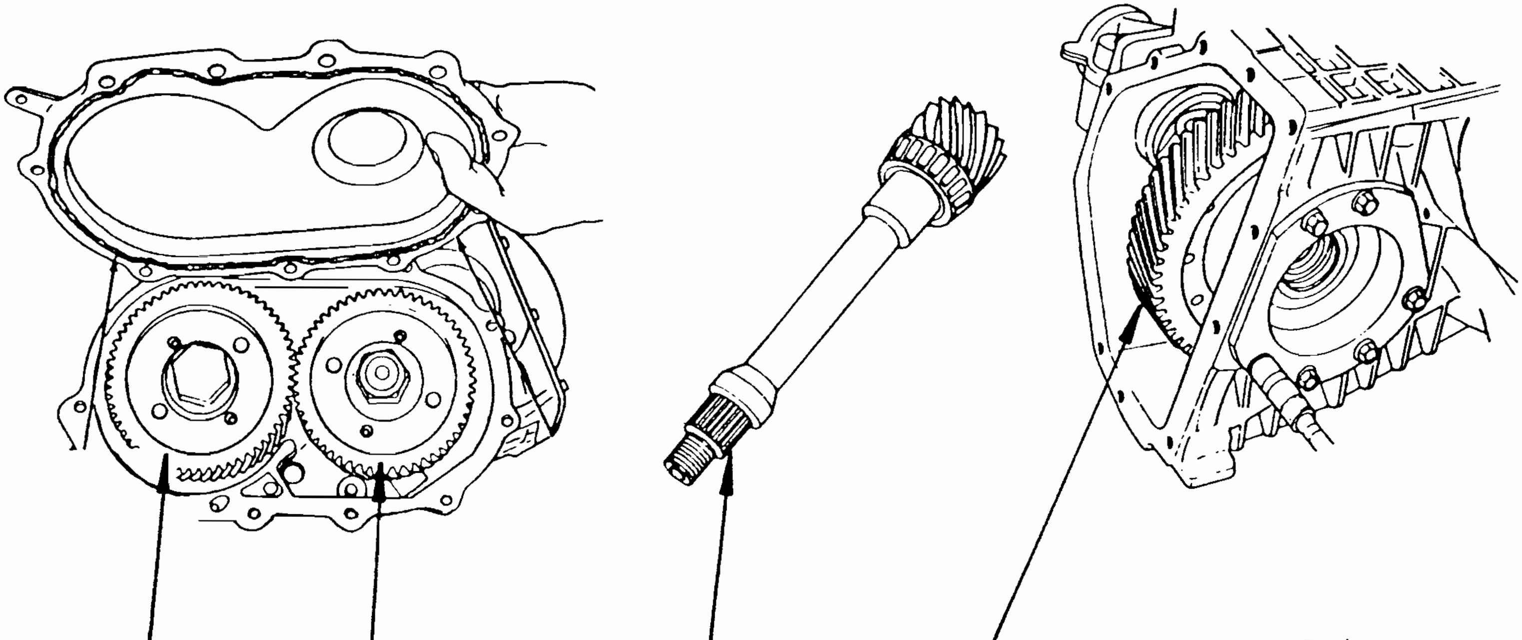


Figure 35

1989	1989 1/2	1990	1990 1/4	APPLICATION
4446 (659)	4531 (664)	4531 (551)	4531 (681)	3.0L 2.36 RATIO
----------	----------	4531 (630)	4531 (682)	3.3L 2.36 RATIO
----------	----------	4531 (553)	4531 (683)	2.5L 2.52 RATIO
----------	----------	4531 (554)	4531 (684)	2.5L 2.72 RATIO
----------	----------	4531 (555)	4531 (685)	2.5L TURBO 2.36 RATIO
----------	----------	4531 (635)	4531 (686)	2.5L TURBO 2.52 (MEX)

Figure 36



OUTPUT SHAFT GEAR	TRANSFER SHAFT GEAR	TRANSFER SHAFT	RING GEAR	OVERALL GEAR RATIO
55T 4377112	58T 4412276	17T 4377126	59T 4431655	2.52
55T 4377112 4531579 SP	58T 4412276 4531578 SP	16T 4377128	60T 4431660	2.72
59T 4377113 4531577 SP	54T 4412277 4531576 SP	16T 4377128	60T 4431660	2.36

Figure 37

SP = SHOT PEENED

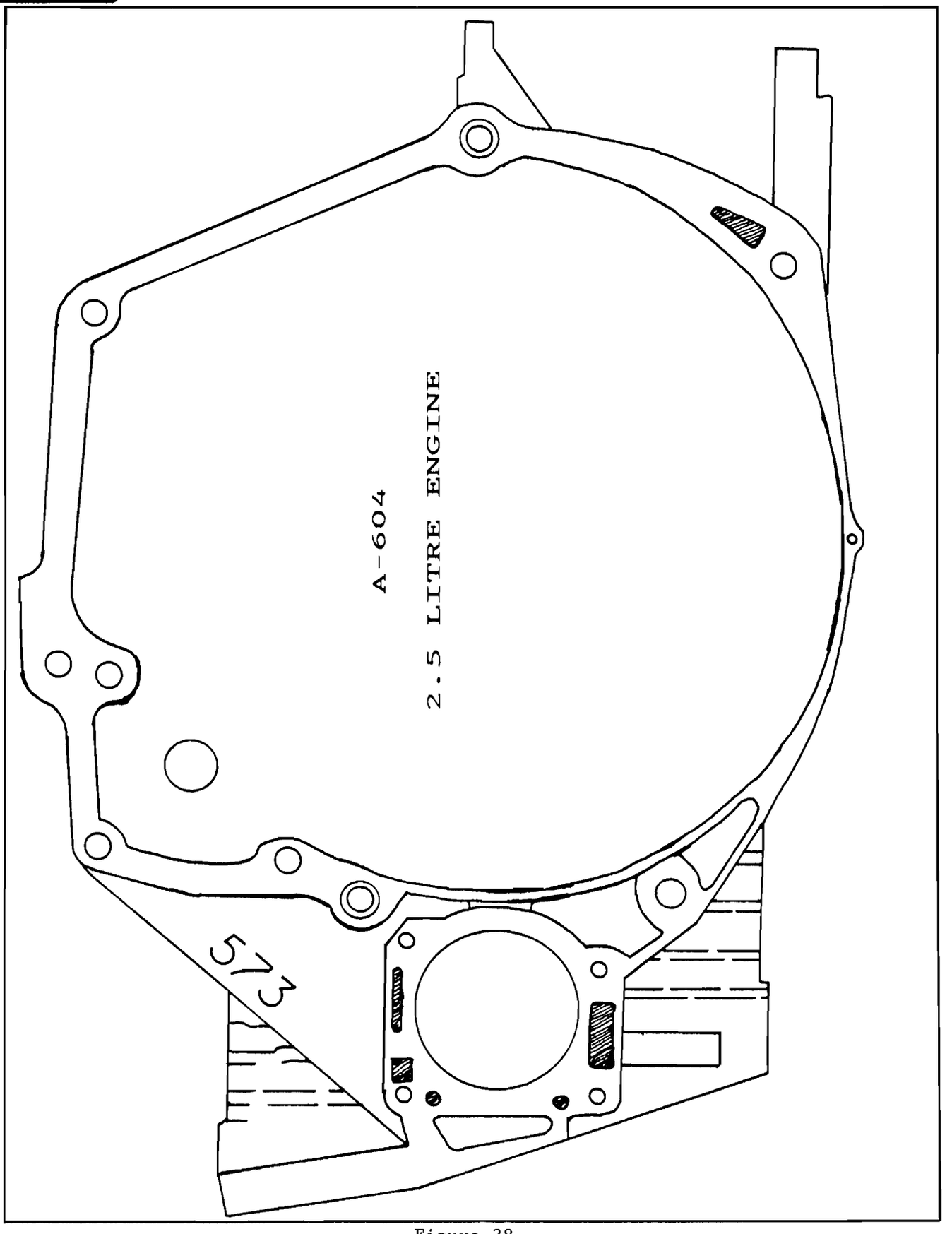


Figure 38

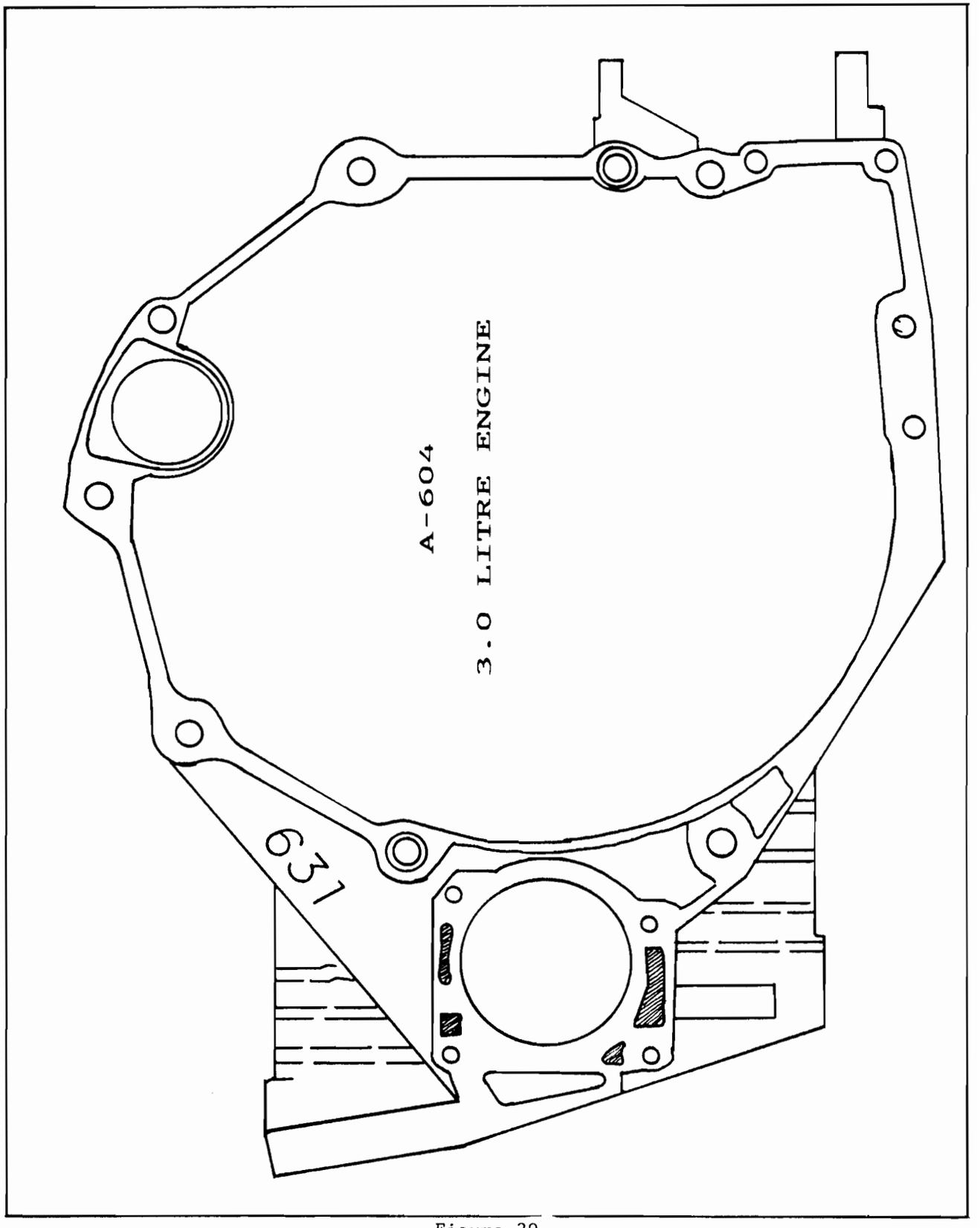


Figure 39

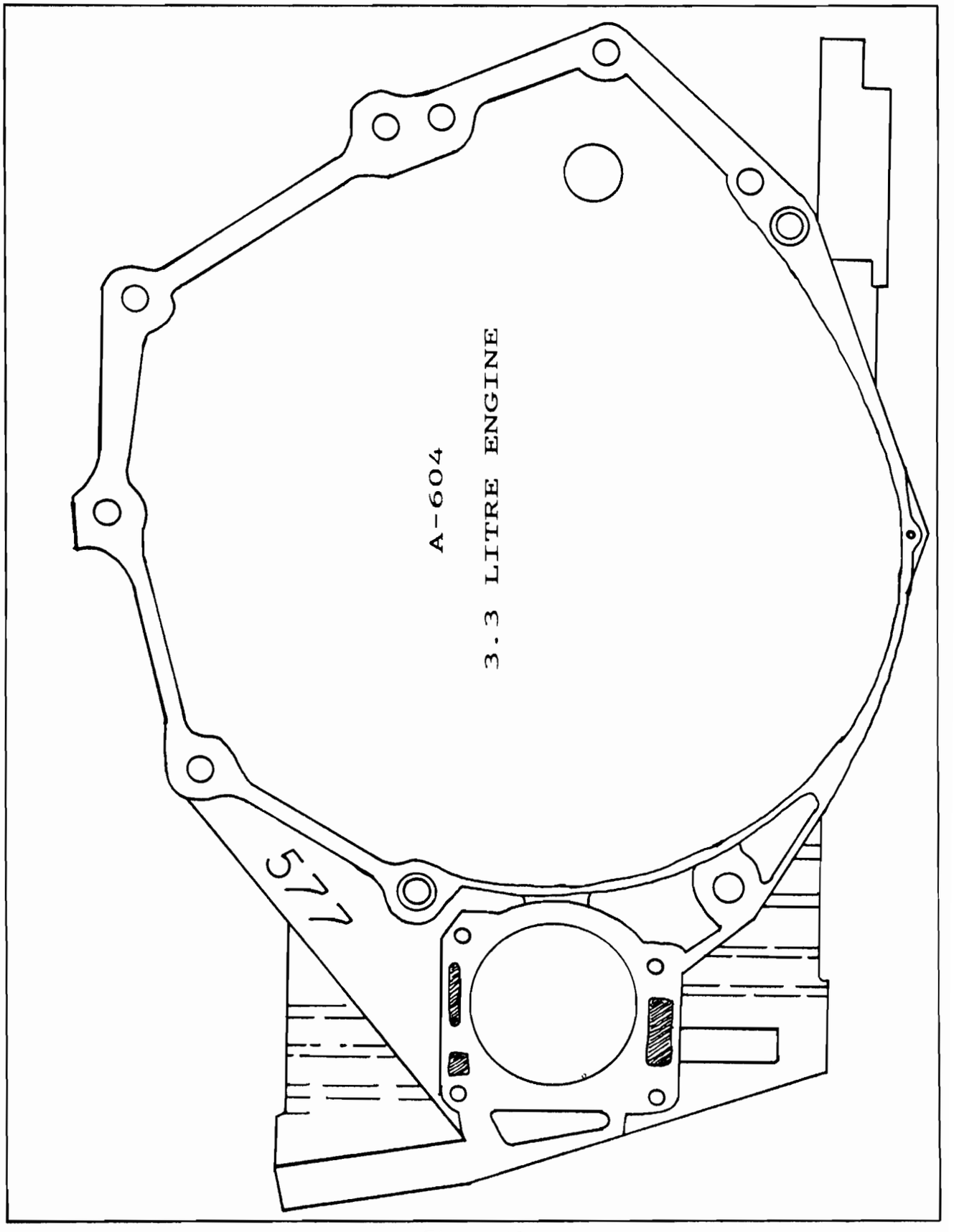


Figure 40

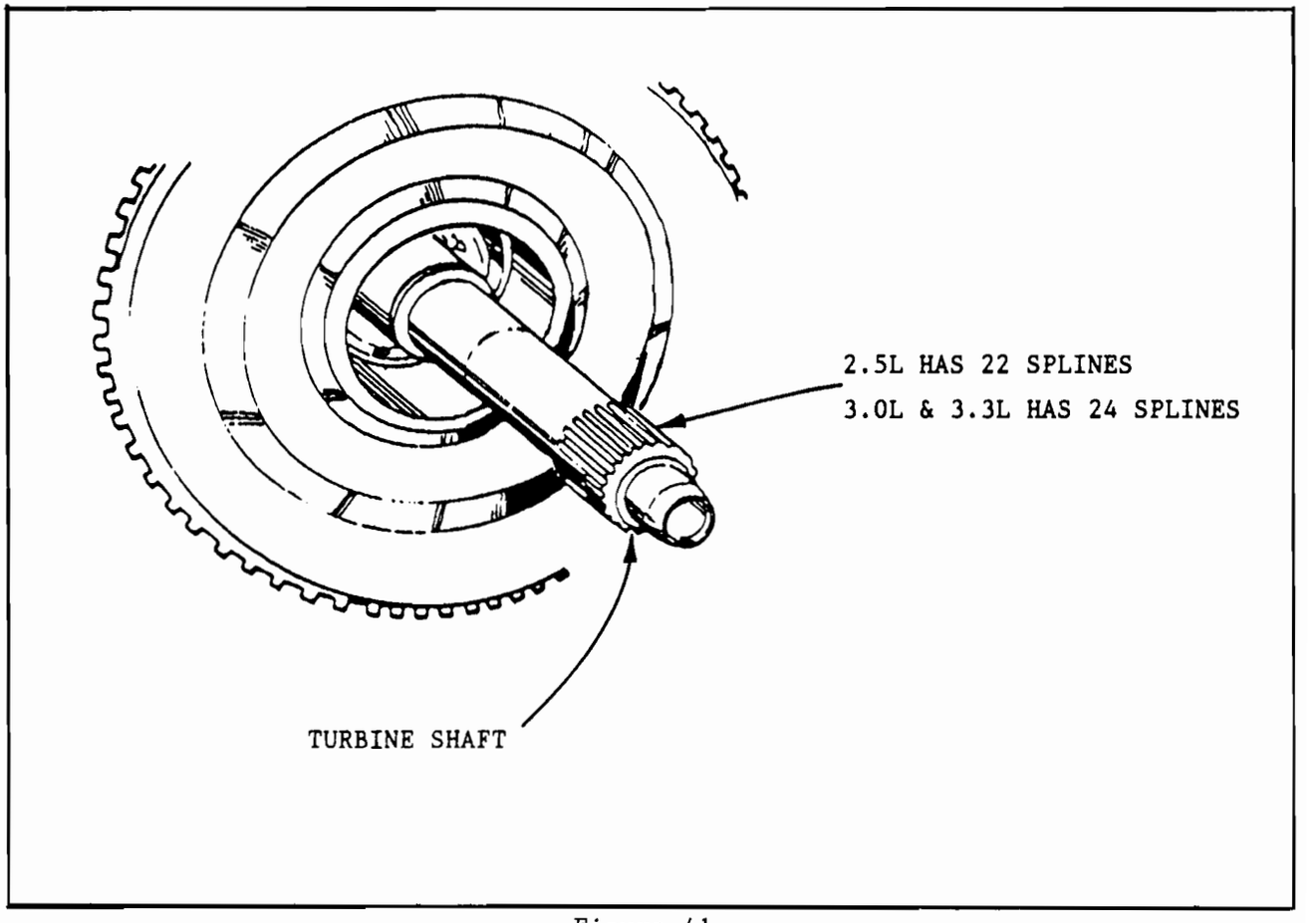


Figure 41

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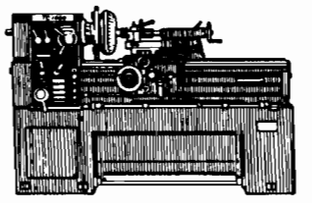
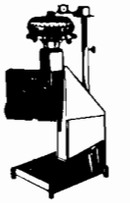
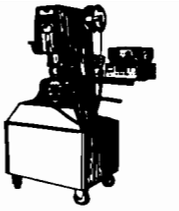
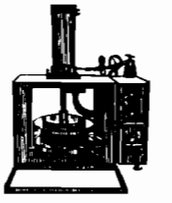

TCRS-Special Application Lathe

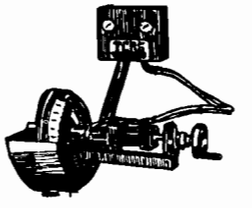

TCRS-Comp. Balancer w/ Ford, GM and Chrysler Tooling

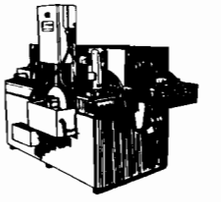

Precision Tooling Package


TCW-Auto-Weld Aligner

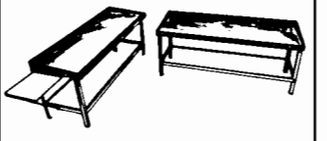

TCRS Special Application Welder
U.S. Pat. No. 4,831,234


TCB-Piston Bonder


TCRS-Super Tanker Air Test


Production Conveyor Washer


TCRS-Air Test Leaker
U.S. Pat. No. 4,788,857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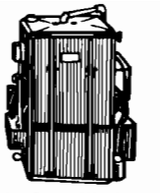

Jet Spray Washer

CHRYSLER A604

NEW PRNODL AND NEUTRAL SAFETY SWITCHES

CHANGE: PRNODL Switch and Neutral Safety Switch have been changed for the 1990 model year, as well as the vehicle wiring harness connectors. Refer to Figure 42 for location of switches on the transaxle.

REASON: Positive locking mechanism, with a weathertight seal, to prevent the connection from becoming loose.

PARTS AFFECTED:

(1) PRNODL SWITCH AND CONNECTOR - The PRNODL Switch and its wiring harnness connector have changed for 1990, and can be identified visually (See Figure 43). These PRNODL Switches WILL NOT intechange with one another.

(2) NEUTRAL SAFETY SWITCH AND CONNECTORS - The Neutral safety Switch and its wiring harness connector have changed for 1990, and can be identified visually (See Figure 44). These Neutral Safety Switches WILL NOT interchange with one another.

INTERCHANGEABILITY:

The 1989 and 1990 Switches are not compatable with one another and WILL NOT interchange between these model years.

NOTE: Each of the new for 1990 switches may look similar at first glance, but the PRNODL switch features a "Coarse" thread, while the Neutral Safety Switch is black and features "Fine" threads. (See Figure 43 - 44).

SERVICE INFORMATION:

PRNODL Switch (1989 Model)	5234022
PRNODL Switch (1990 Model)	5234393
NEUTRAL SAFTEY SWITCH (1989 Model)	3747361
NEUTRAL SAFTEY SWITCH (1990 Model)	5234319

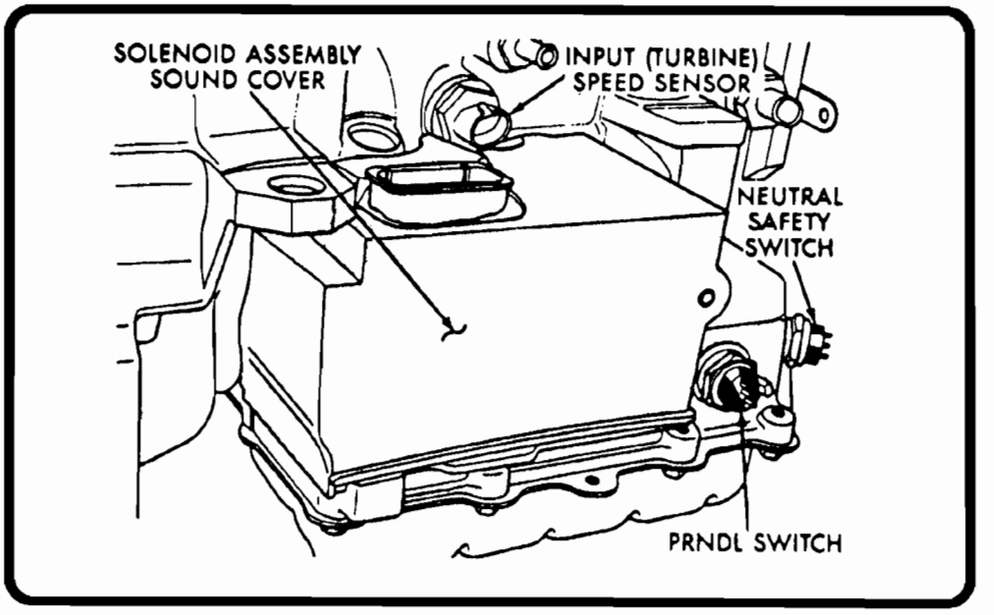
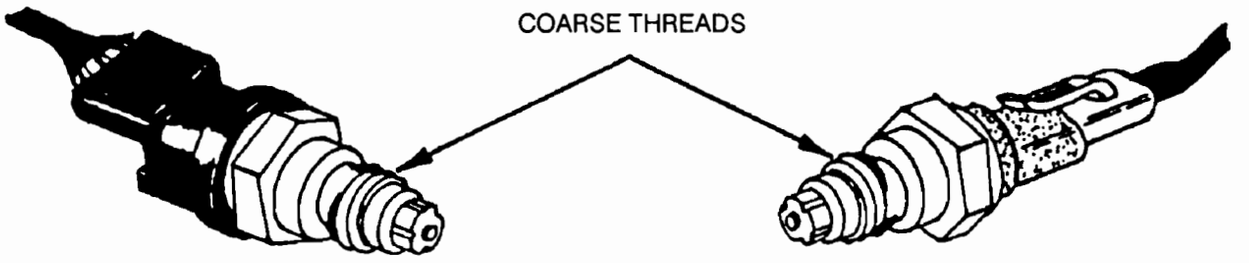


Figure 42

PRNODL SWITCH AND CONNECTOR



1989

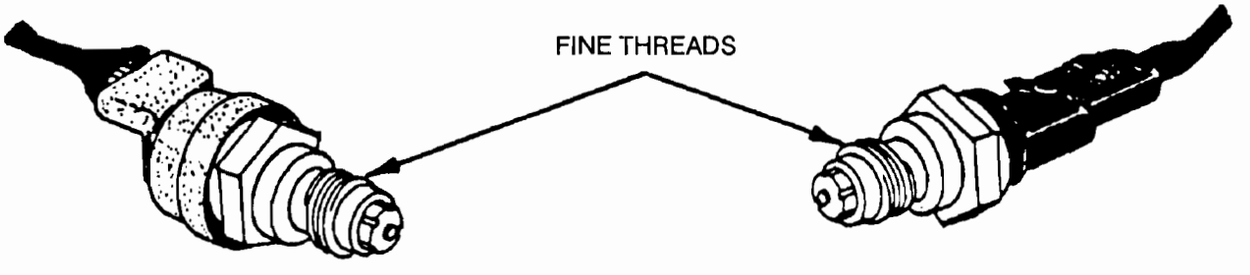
PART NUMBER
5234022

1990

PART NUMBER
5234393

Figure 43

NEUTRAL SAFETY SWITCH AND CONNECTOR



1989

PART NUMBER
3747361

1990

PART NUMBER
5234319

Figure 44

CHRYSLER A604
FOUR DISC OVERDRIVE CLUTCH ASSEMBLY

CHANGE: A running change for 1990 model A604 transaxles was the introduction of a four (4) disc Overdrive Clutch Assembly, to replace the previous three (3) disc assembly (See Figure 45).

REASON: Higher horsepower (3.3L V-6) engines introduced in New Yorker, Dynasty, Imperial, Caravan, and Voyager models

PARTS AFFECTED:

(1) OVERDRIVE LINED PLATES - Now uses 4 lined plates instead of the previous 3 lined plates and the lined plates for 1990 models are .014" thinner than the 1989 lined plates (See Figure 45), to help accomodate the extra lined plate. The 1989 lined plates will measure .083" - .088" thick, and the new lined plates will measure .069" - .074" thick (See Figure 45).

(2) OVERDRIVE STEEL PLATES - Now uses 3 steel plates instead of the previous 2 steel plates. The new steel plates are .030" thinner, and measure .068" - .072" thick. The previous steel plates measure .098" - .102" thick (See Figure 45).

(3) UNDERDRIVE/OVERDRIVE REACTION PLATES - The 1989 Underdrive/Overdrive Reaction Plates have always been available in 4 different thicknesses to obtain proper clutch clearance. For 1990, each plate was reduced in thickness by .040", to help accomodate the extra overdrive plates (See Figure 46).

(4) INPUT CLUTCH RETAINER - The Underdrive/Overdrive reaction plate tapered snap ring groove was moved "Down" by .040" (Can be detected visually) to accomodate the thinner underdrive/overdrive reaction plates (Figure 47). Another change that occured at the same time is the underdrive clutch outer lip seal groove depth is .040" "Shallower" to accomodate a new underdrive clutch outer lip seal (See Figure 48).

(5) UNDERDRIVE/OVERDRIVE TAPERED SNAP RING - The thickness of this snap ring was reduced by .010" . The 1990 snap ring is easily identified, as they will be Green , or White, in color. The previous snap rings were blue in color. They will not interchange.

(6) UNDERDRIVE CLUTCH OUTER LIP SEAL - The lip seal cross section has been reduced by .040" (Smaller in Overall Diameter) to accomodate the change in the depth of the groove in the input clutch retainer (See Figure 48). The OEM part number is printed on the seal for identification. The 1989 (Large) is 4377173, and the 1990 (Small) is 4531408. This will confirm that you have the proper seal for this location (See Figure 48).

INTERCHANGEABILITY:

None of the parts listed above will interchange with one another between 1989 and 1990 model years. It is imperative that you "Positively" I.D. each part to insure that you are assembling with compatable parts.

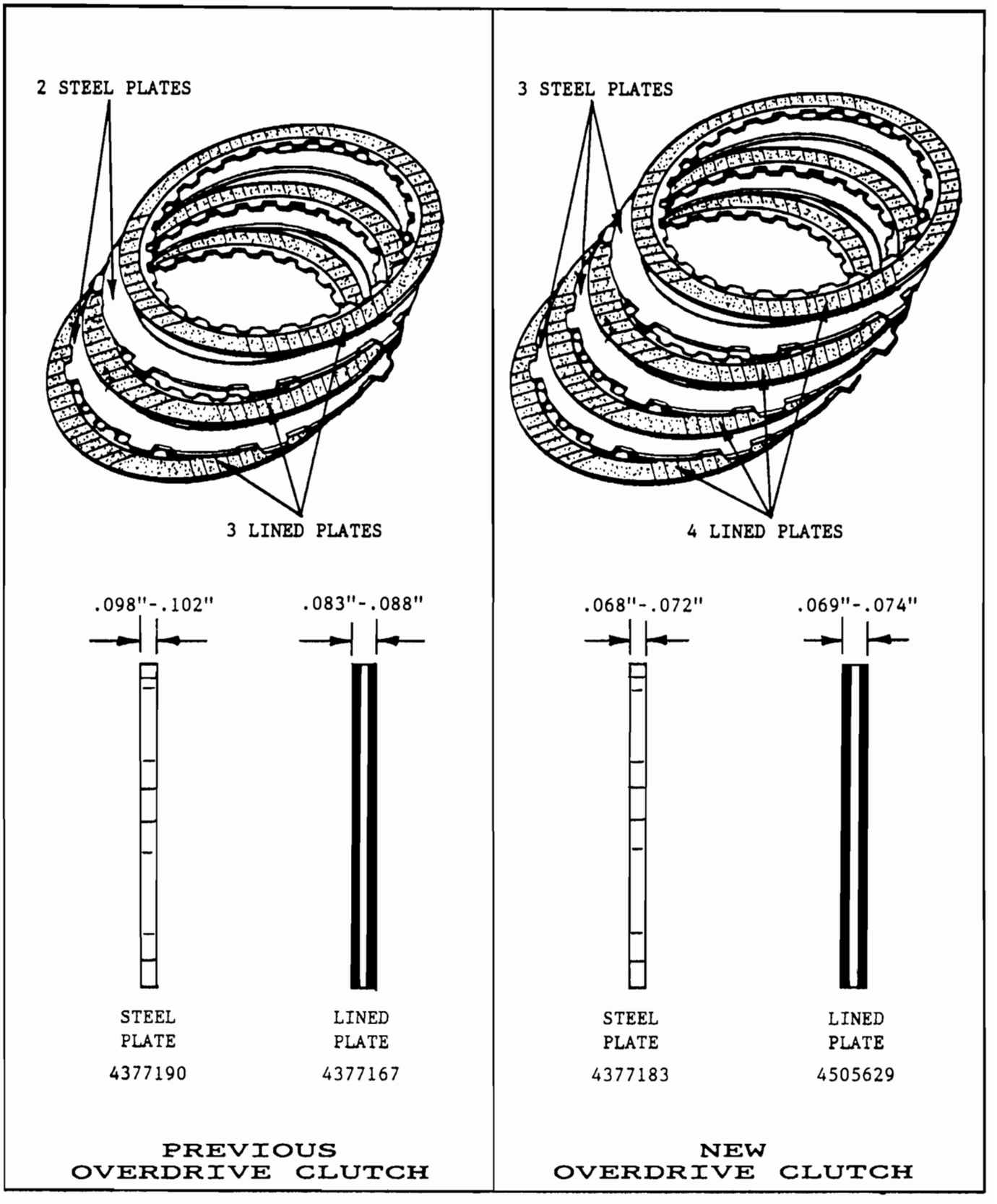
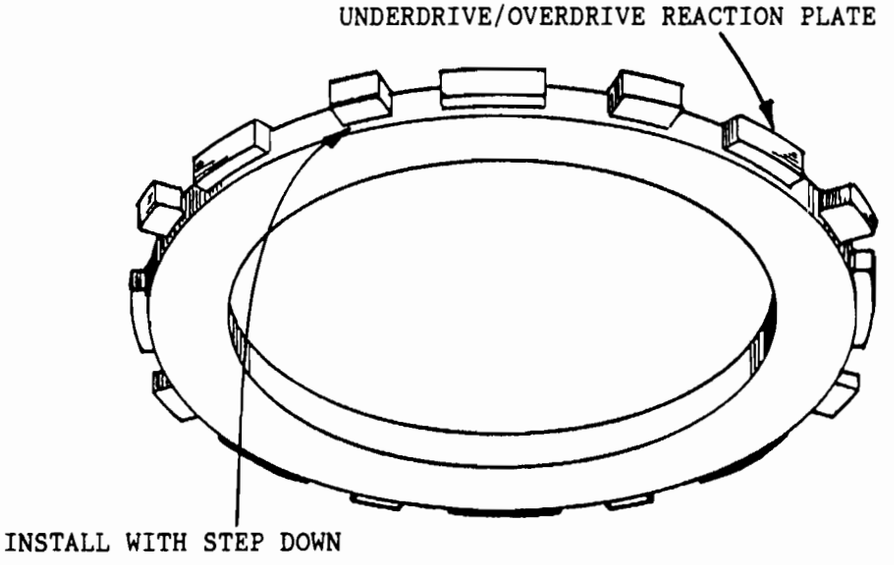

2 STEEL PLATES
3 LINED PLATES
.098"-.102"
.083"-.088"
STEEL PLATE
4377190
LINED PLATE
4377167
PREVIOUS OVERDRIVE CLUTCH
3 STEEL PLATES
4 LINED PLATES
.068"-.072"
.069"-.074"
STEEL PLATE
4377183
LINED PLATE
4505629
NEW OVERDRIVE CLUTCH

Figure 45

UNDERDRIVE/OVERDRIVE REACTION PLATES (SELECTIVE)



1989 MODEL YEAR

.254"-.258" THICKNESS	4377185
.274"-.277" THICKNESS	4377186
.293"-.297" THICKNESS	4377187
.312"-.316" THICKNESS	4377188

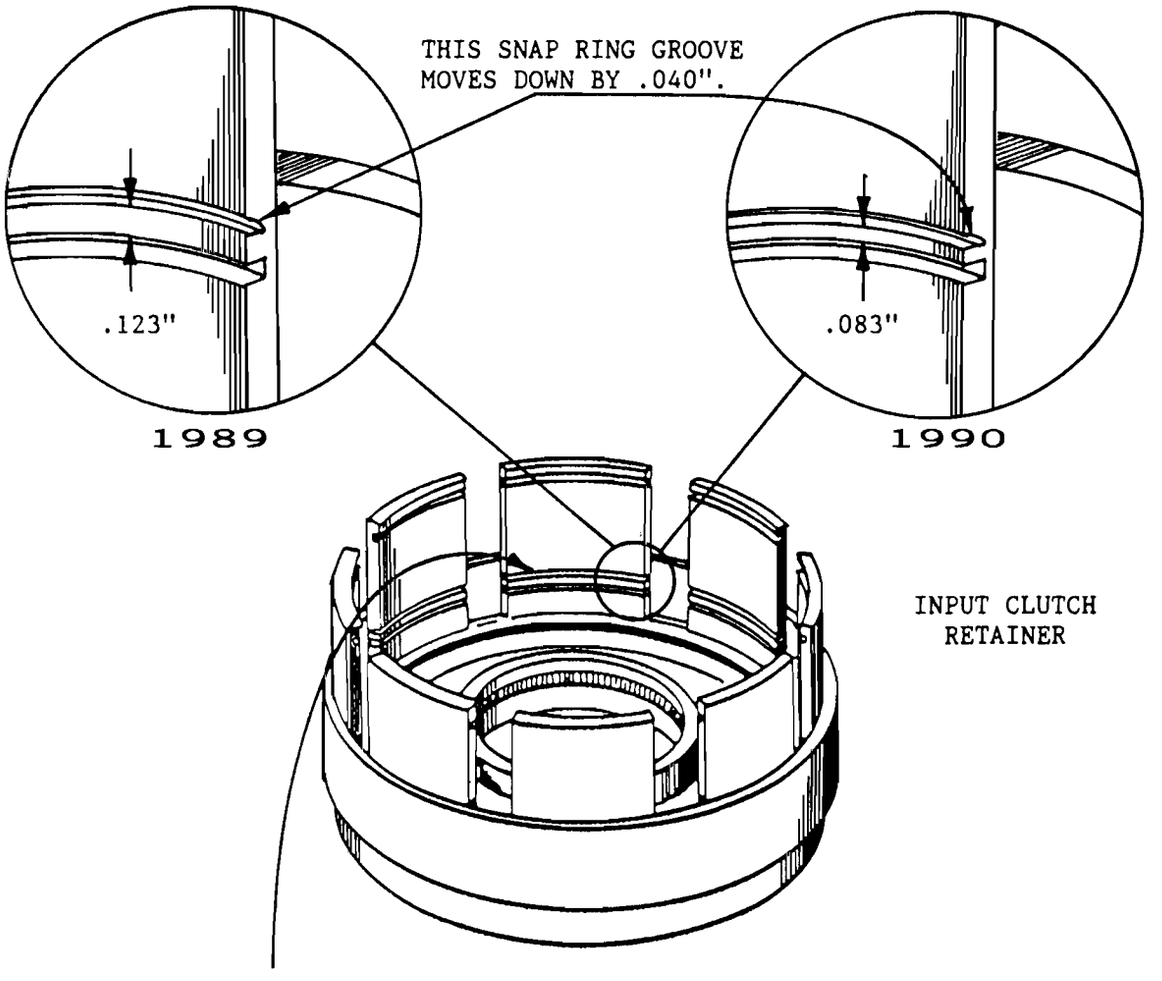
1990 MODEL YEAR

.215"-.219" THICKNESS	4531570
.234"-.238" THICKNESS	4531569
.253"-.257" THICKNESS	4531568
.273"-.277" THICKNESS	4531567

FOR 1990, EACH REACTION PLATE WAS REDUCED IN THICKNESS BY .040", TO ACCOMODATE THE EXTRA OVERDRIVE PLATES.

Figure 46

INPUT CLUTCH RETAINER



1989 INPUT CLUTCH RETAINER 4431609

1990 INPUT CLUTCH RETAINER 4505623

Figure 47

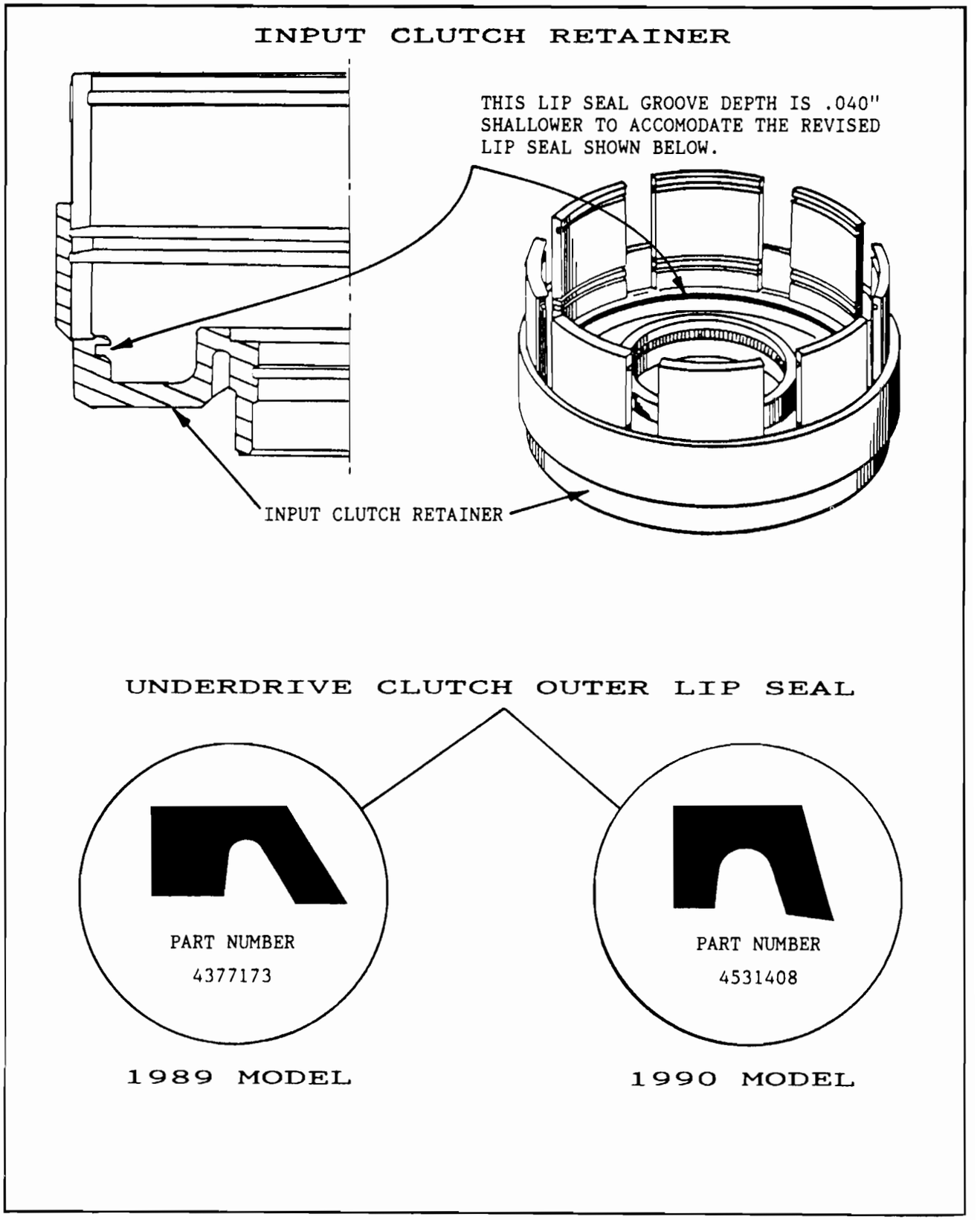

INPUT CLUTCH RETAINER
THIS LIP SEAL GROOVE DEPTH IS .040" SHALLOWER TO ACCOMODATE THE REVISED LIP SEAL SHOWN BELOW.
INPUT CLUTCH RETAINER
UNDERDRIVE CLUTCH OUTER LIP SEAL
PART NUMBER
4377173
PART NUMBER
4531408
1989 MODEL
1990 MODEL

Figure 48

SERVICE INFORMATION:

1989 MODEL YEAR:

Overdrive Lined Plates	4377167
Overdrive Steel Plates	4377190
Underdrive/Overdrive Reaction Plates (Selective)	
.254"-.258" Thick	4377185
.274"-.277" Thick	4377186
.293"-.297" Thick	4377187
.312"-.316" Thick	4377188
Input Clutch Retainer	4431609
Underdrive/Overdrive Tapered Snap Ring (BLUE)	4377189
Underdrive Clutch Outer Lip Seal	4377173

1990 MODEL YEAR:

Overdrive Lined Plates	4505629
Overdrive Steel Plates	4377183
Underdrive/Overdrive Reaction Plates (Selective)	
.215"-.219" Thick	4531570
.234"-.238" Thick	4531569
.253"-.257" Thick	4531568
.273"-.277" Thick	4531567
Input Clutch Retainer	4505623
Underdrive/Overdrive Tapered Snap Ring (GREEN or WHITE)	4531411
Underdrive Clutch Outer Lip Seal	4531408

CHRYSLER A604
ASSEMBLY OF 2/4 AND L/R CLUTCH PACKS

Extra attention is needed when assembling the Low/Reverse clutch pack and the Two/Four clutch pack into the case, as both of the clutch packs are very similar, but are not compatable with one another.

THINGS TO WATCH FOR:

(1) Both clutch packs, on the steel plates, have the same profile, but the thicknesses are different (See Figure 49).
   A. 2/4 STEEL PLATE THICKNESS IS .100" (4 Required).
   B. L/R STEEL PLATE THICKNESS IS .070" (5 Required).

(2) Both clutch packs, on the lined plates, have the same tooth count and the same lining, but the thicknesses are different (See Figure 49).
   A. 2/4 LINED PLATE THICKNESS IS .085" (4 Required).
   B. L/R LINED PLATE THICKNESS IS .070" (5 Required).

There are 5 lined plates and 5 steel plates in the Low/Reverse clutch pack.
There are 4 lined plates and 4 steel plates in the Two/Four clutch pack.
There is also a common pressure plate used between the clutch packs.

We have provided you with proper clutch stack up for these clutch packs, to assist you with proper assembly for the 2/4 and L/R clutch packs. Refer to Figure 50 for proper assembly procedures.

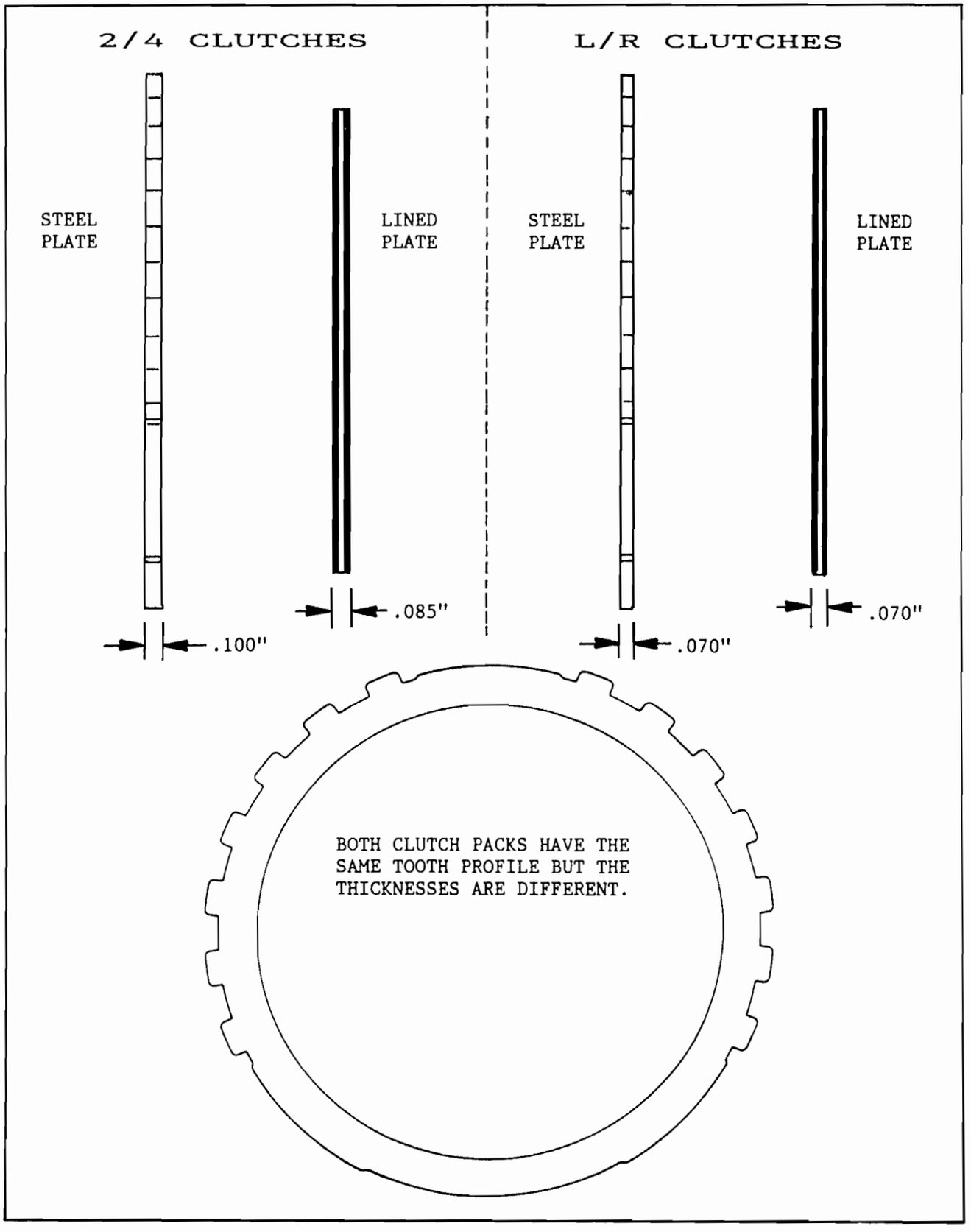
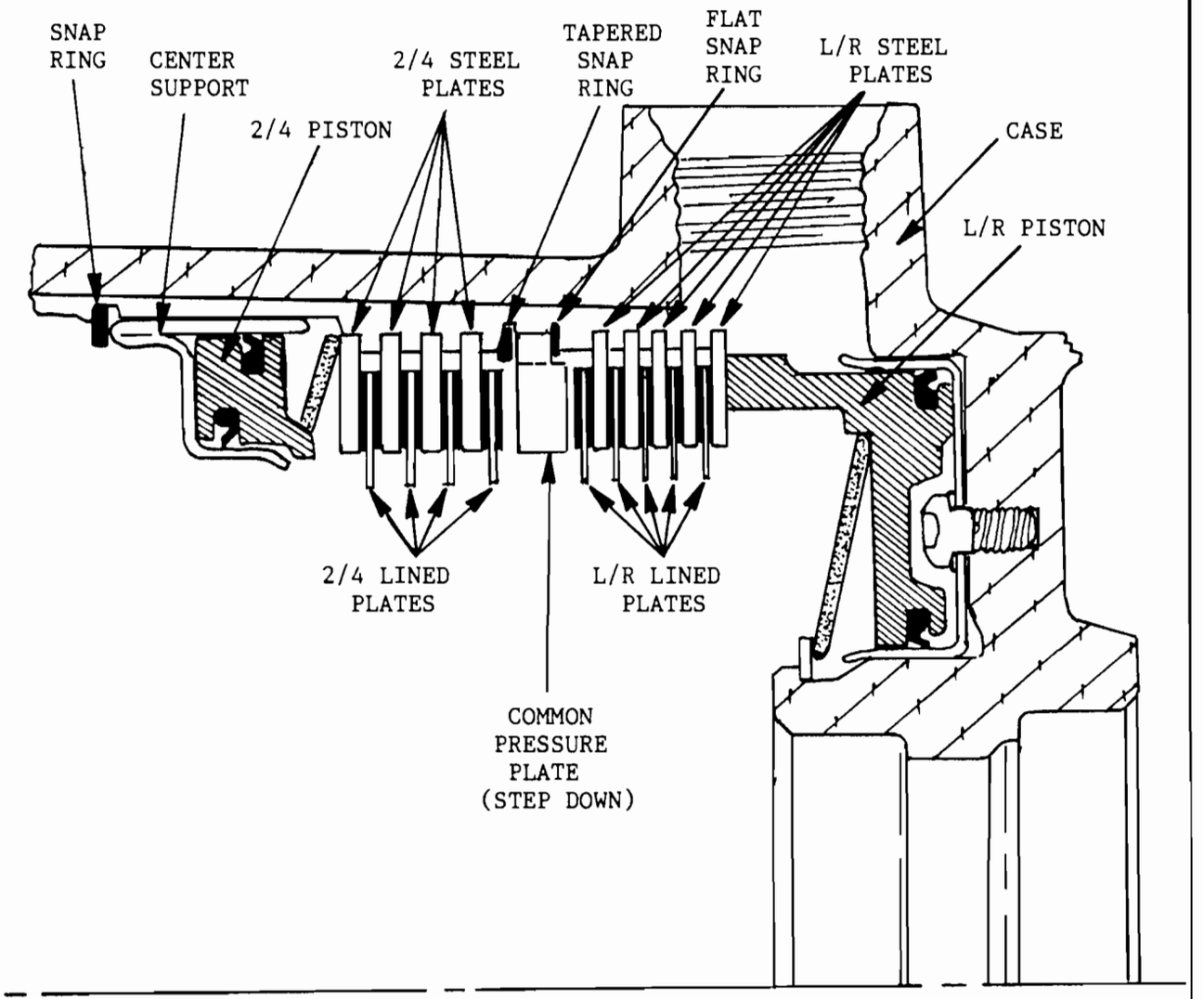


Figure 49

AUTOMATIC TRANSMISSION SERVICE GROUP

TWO/FOUR AND LOW/REVERSE CLUTCH PLATES



LOW/REVERSE CLUTCH PACK TAKES 5 STEEL PLATES (.070") AND 5 LINED PLATES (.070")

TWO/FOUR CLUTCH PACK TAKES 4 STEEL PLATES (.100") AND 4 LINED PLATES (.085")

LOW/REVERSE CLUTCH PACK CLEARANCE IS .042" TO .065" AND IS SET WITH THE COMMON SELECTIVE PRESSURE PLATE, AVAILABLE IN SEVEN THICKNESSES.

TWO/FOUR CLUTCH PACK CLEARANCE IS .030" TO .104" AND IF NOT WITHIN SPEC, THE CLUTCH IS NOT ASSEMBLED PROPERLY.
THERE IS NO ADJUSTMENT FOR THE TWO/FOUR CLUTCH CLEARANCE.

Figure 50

CHRYSLER A604
COOLER BYPASS CHECK VALVE ASSEMBLY
CHANGE FOR 1991

CHANGE: Beginning in 1991 model A604 transaxles, there has been a "Cooler Bypass Check Valve Assembly" added in the transaxle case behind the oil pump (See Figure 51 & 52).

REASON: Lack of cooler oil flow in extreme cold climates, because of transaxle fluid "Jelling" (0° Farenheit or below).

PARTS AFFECTED:

(1) COOLER BYPASS CHECK VALVE - Added into the case cooler passage behind the oil pump (See Figure 52). If cooler oil flow is restricted, or blocked, the new check valve will open, and allow cooler feed oil direct into the lube circuit to prevent transaxle damage. Normal operation is resumed after oil temperature is again warm enough to flow through the cooler (See Figure 51).
NOTE: Customers should be advised to let the vehicle warm-up thoroughly before attempting to drive the vehicle, especially in the colder climates.

(2) TRANSAXLE CASE - The new case has added material between the two cooler line fittings, to accomodate the machining process needed for the new cooler bypass check valve assembly (See Figure 52).

(3) VALVE BODY SPACER PLATE - Lube feed hole in spacer plate has been enlarged to .112", as shown in Figure 53.

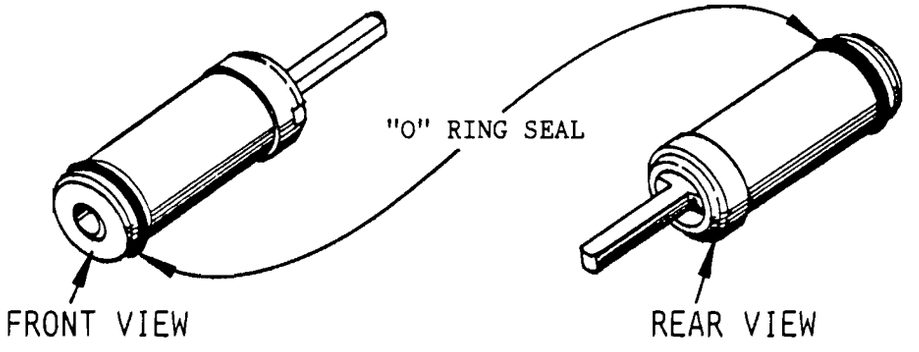
INTERCHANGEABILITY:

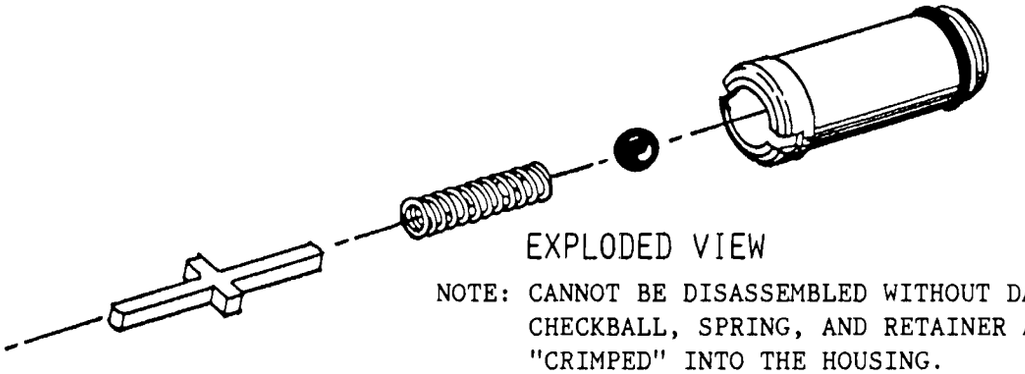
The cooler by pass check valve assembly "WILL NOT" retro-fit back to previous models, unless the new transaxle case is installed at the same time.

The lube feed hole in the spacer plate can be drilled to .112" on all models to improve oil flow (See Figure 53).

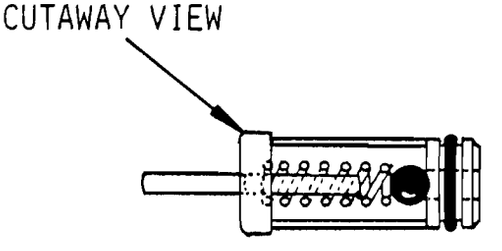
SERVICE INFORMATION:

Cooler Bypass Check Valve Assembly	4539880
Transaxle Case Assembly, 3.0L (1991)	4567015
Transaxle Case Assembly, 3.3L (1991)	4567016
Transaxle Case Assembly, 2.5L (1991)	4567017





NOTE: CANNOT BE DISASSEMBLED WITHOUT DAMAGE. CHECKBALL, SPRING, AND RETAINER ARE "CRIMPED" INTO THE HOUSING.



COOLER BYPASS CHECK VALVE ASSEMBLY

Figure 51

AUTOMATIC TRANSMISSION SERVICE GROUP

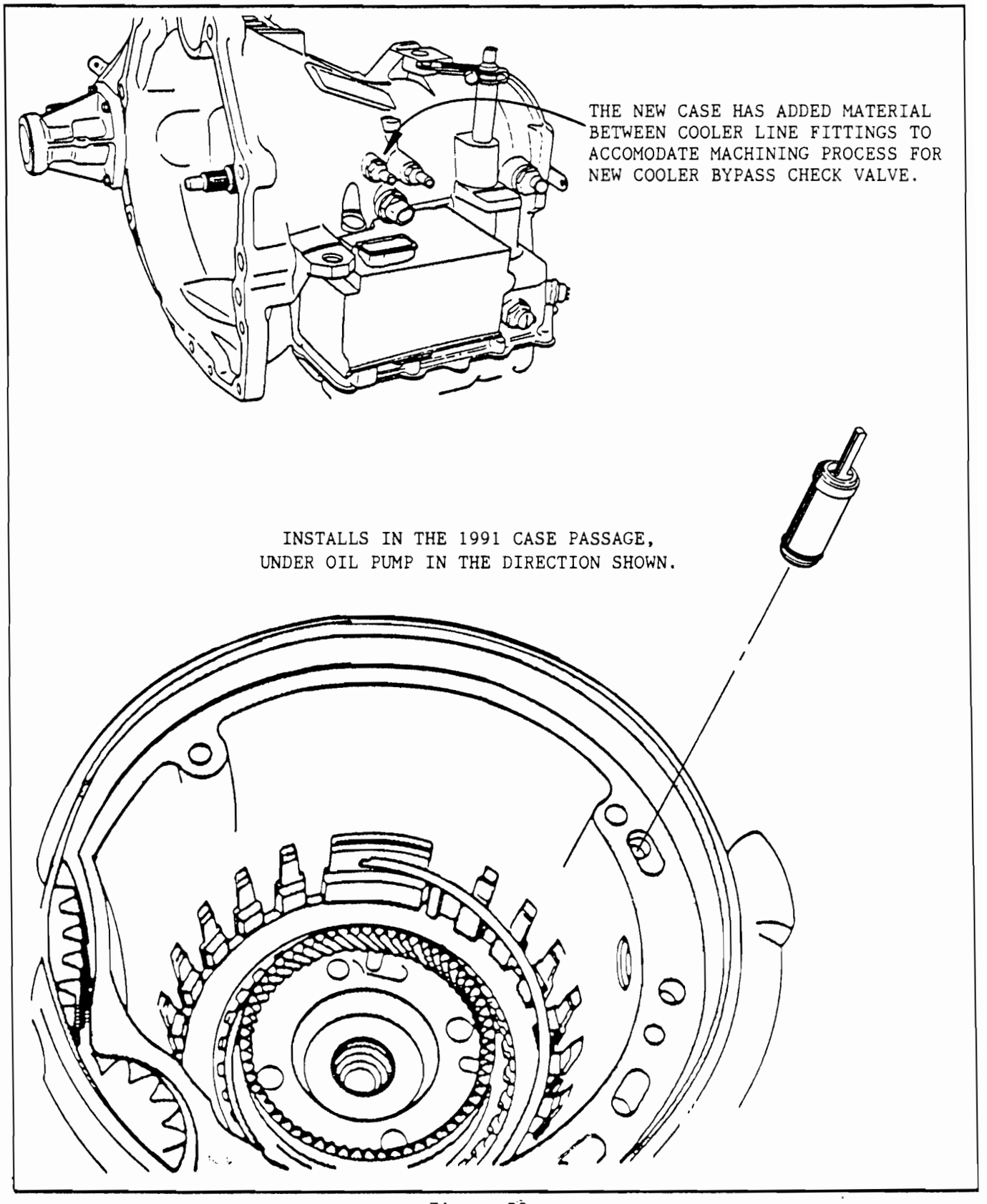


Figure 52

AUTOMATIC TRANSMISSION SERVICE GROUP

CHRYSLER A604
FAILURE DUE TO LACK OF LUBE OIL

COMPLAINT: On 1989 and 1990 Chrysler models, equipped with the A604 transaxle, under extremely cold ambient operating temperatures (0° F or Below), transmission fluid may get cold enough to resist flow through the transmission oil cooler. The transaxle may fail prematurely due to lack of lubrication

CAUSE: Not enough lube flow to the transaxle because of restriction.

CORRECTION:

(1) Install a pressure actuated bypass cooler valve assembly, now available from OEM under the part number 5252836, that will bypass the transmission oil cooler if it becomes restricted (See Figure 54).

(2) Drill the hole marked "V" in the spacer plate to .112" as shown in Figure 53. This can be done on all models regardless of bypass valve installation, to improve lube flow to the transaxle.

(3) Refer to the appropriate instruction sheet, included in the manual, as installation procedures vary depending on vehicle model.
NOTE: THE BYPASS VALVE (5252836) IS DIRECTIONAL. IF IT IS NOT CONNECTED TO THE TRANSAXLE OIL COOLER HOSES IN THE CORRECT OIL FLOW DIRECTION, THE BYPASS VALVE WILL NOT FUNCTION (SEE FIGURE 54).

SERVICE INFORMATION:

Pressure Actuated Cooler Bypass Valve Package.....5252836
Mounting Bracket (Mini-Vans Only).....4333568

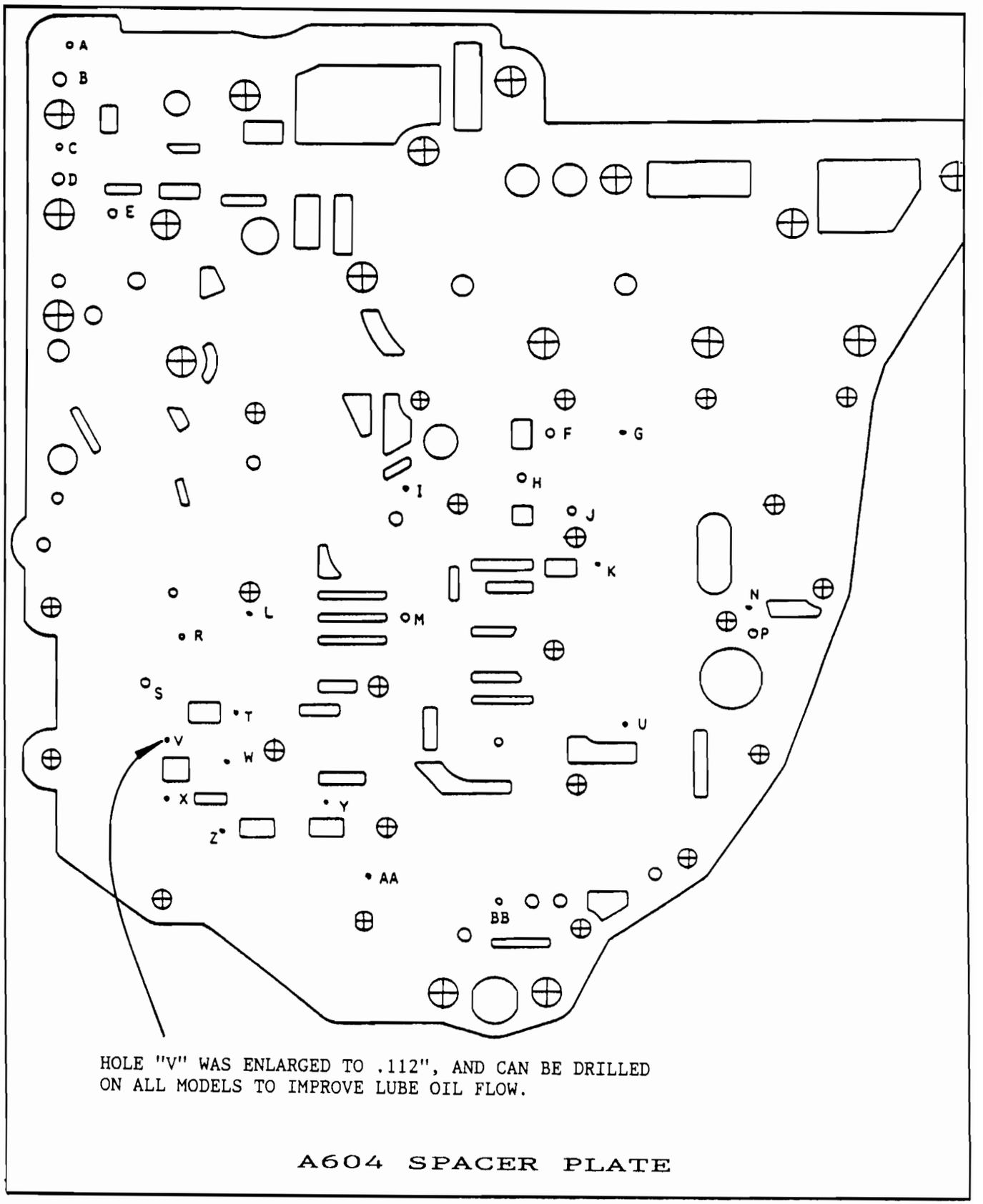
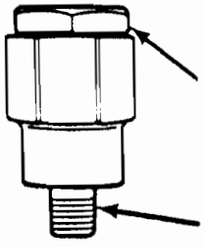


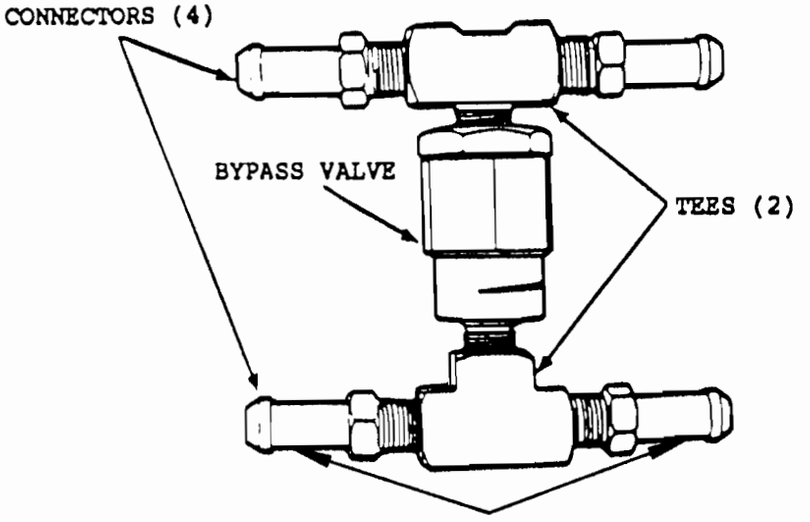
Figure 53

AUTOMATIC TRANSMISSION SERVICE GROUP



THE FEMALE (THREADED HOLE) END OF THE VALVE MUST BE CONNECTED TO THE TRANSMISSION OIL COOLER "OUT" (FROM COOLER) HOSE

THE MALE (PIPE NIPPLE) END OF THE VALVE MUST BE CONNECTED TO THE TRANSMISSION OIL COOLER "IN" (TO COOLER) HOSE



THIS SIDE OF THE BYPASS VALVE ASSEMBLY "MUST" BE CONNECTED TO THE TRANSMISSION OIL COOLER "IN" (TO COOLER) HOSE.

NOTE: THE BYPASS VALVE IS DIRECTIONAL. IF IT IS NOT CONNECTED TO THE TRANSAXLE OIL COOLER HOSES IN THE CORRECT OIL FLOW DIRECTION, - THE BYPASS VALVE WILL NOT FUNCTION.

Figure 54

INSTALLATION INSTRUCTIONS (GENERAL)

1. Using thread sealer on all connections, assemble the supplied bypass valve, tees, and hose connectors as shown in Figure 54.

2. Raise the vehicle on a hoist for working access to the transmission oil cooler hoses, that are routed along the inboard side of the left front frame rail.

3. Place an oil drain pan under the vehicle to catch oil leakage. Oil loss will be very minimal.

4. Referring to Figure 55, follow the cooler hoses routed from the transaxle to CLEARLY INDENTIFY THE COOLER "IN" (TO COOLER) HOSE.

5. Install the bypass valve assembly as per the following instruction sheets, as installation procedures vary depending on vehicle model.

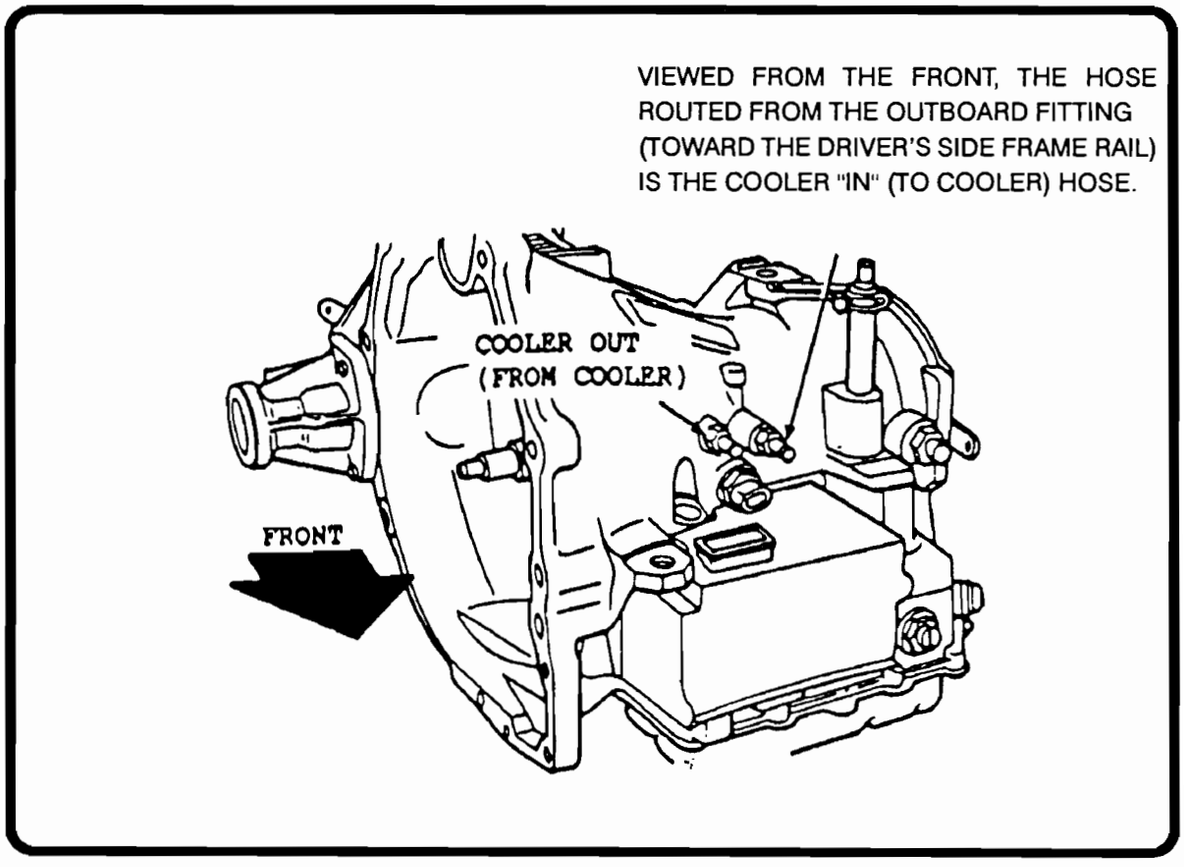


Figure 55

INSTALLATION INSTRUCTIONS
PASSENGER CAR BODIES WITHOUT BENDIX ABS

1. Measure up 2 1/2 inches from the bottom of the frame rail, as shown in Figure 56, and drill a 1/4 inch hole in the frame rail.

2. Pushing the cooler hoses against the frame, identify and cut the cooler "IN" (to cooler) hose at the drilled hole (Figure 56) and allow the fluid to drain. Cut only one hose at a time as not to get them mixed.

3. The hoses are banded together with tape at several locations. Unwrap tape bands, as required, to allow hose flexibility for connection to the bypass valve assembly.

4. Slide two of the supplied clamps over the hose ends and install the hoses onto the cooler "IN" (to cooler) side of the bypass valve assembly (Refer to Figure 54).

5. REFER TO FIGURE 54, TO IDENTIFY THE MALE (PIPE NIPPLE) END OF THE VALVE. THIS END OF THE VALVE ASSEMBLY "MUST" BE CONNECTED TO THE COOLER "IN" (TO COOLER) HOSE.

6. Now cut the other hose, cooler "out" (from cooler) at the drilled hole (Figure 56), allow oil to drain, and connect the hose ends to the bypass valve assembly connectors in the same manner as above.

7. Cut the supplied foam tube and wrap it around the bypass valve (Figure 57).

8. Tighten the supplied "Push-in" tie strap around the foam tubing and cut off the excess strap (See Figure 57).

Continued On Next Page:

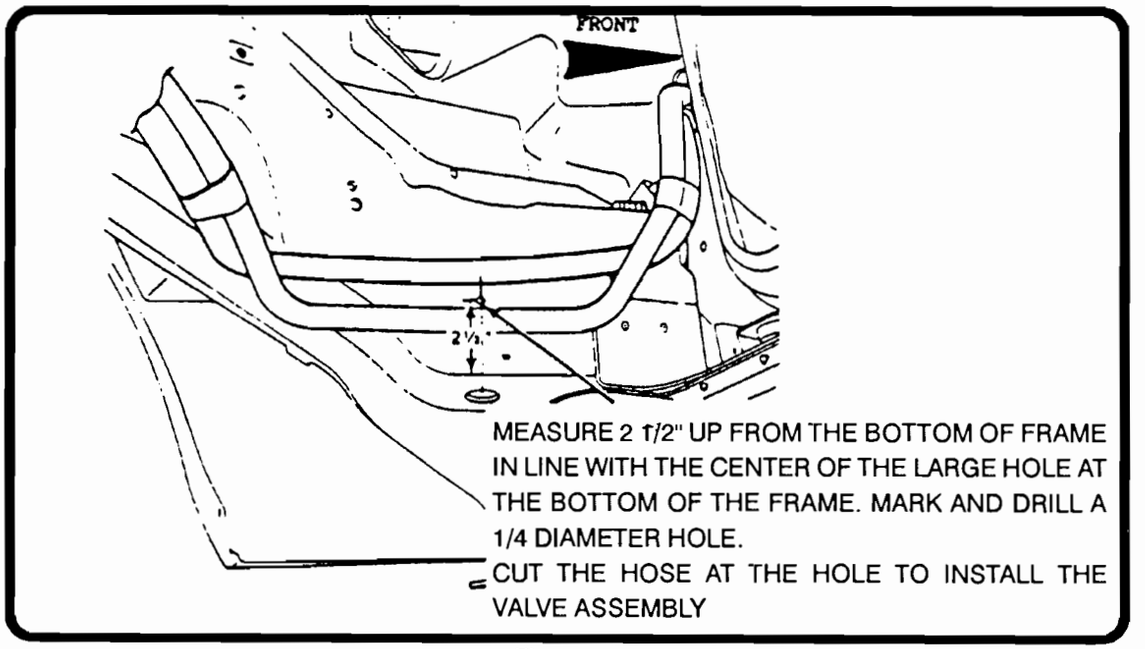


Figure 56

INSTALLATION INSTRUCTIONS
PASSENGER CAR BODIES WITHOUT BENDIX ABS (CONTINUED)

9. Engage the "Push-in" tie strap into the drilled 1/4" hole (See Figure 57).

10. The bypass valve assembly MUST be positioned vertically (See Figure 57).

11. Tighten all hose clamps.

12. Install the other supplied tie strap to secure the bypass valve assembly to the frame rail, as shown in Figure 57, and cut off excess tie strap.

13. Start the engine and inspect for leaks. Check transaxle fluid level and fill as necessary.

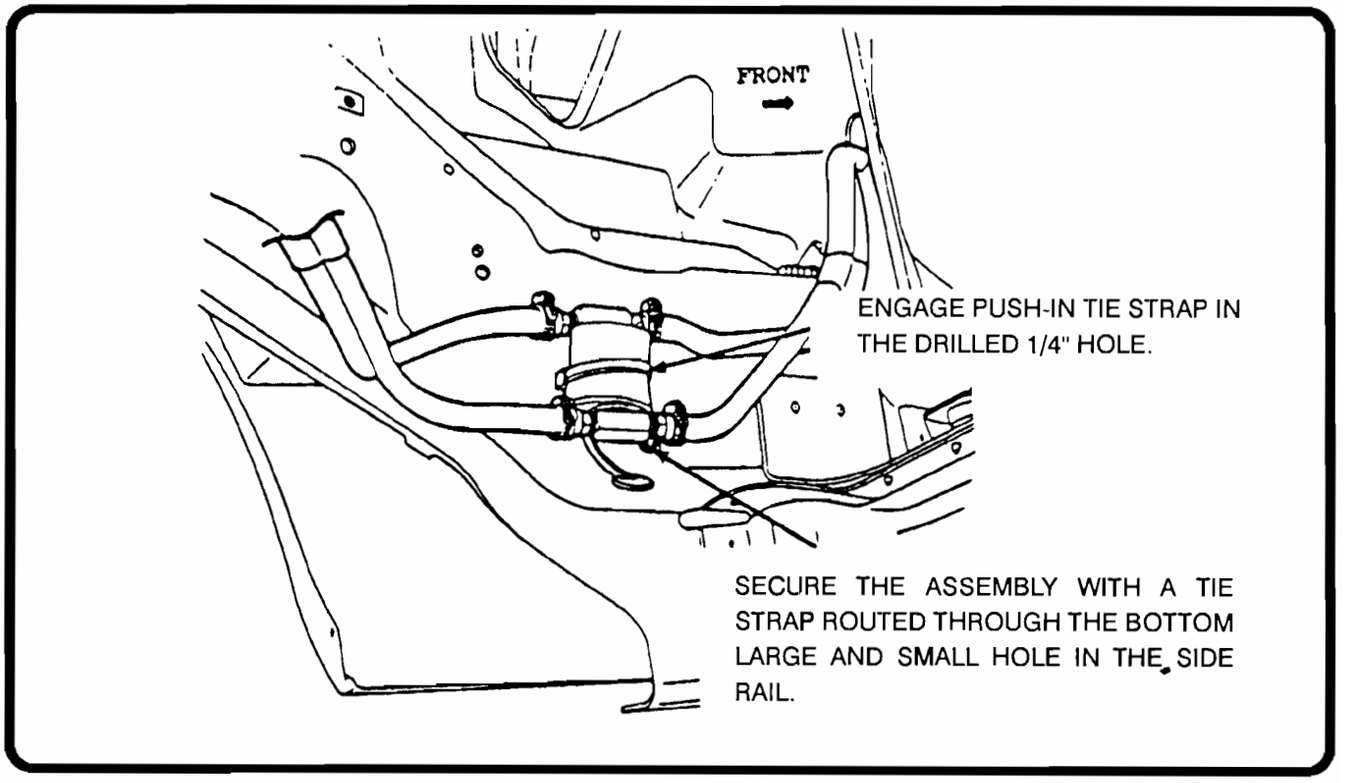


Figure 57

INSTALLATION INSTRUCTIONS
PASSENGER CAR BODIES WITH BENDIX ABS

1. The existing cooler hoses are retained by a clip at the ABS Module, as shown in Figure 58. Drilling of a hole is not required on this model.

2. Mark the hoses at the rear edge of the clip at the ABS Module, and then remove the retaining clip.

3. Identify and cut the cooler "in" (to cooler) hose at your mark, and allow the oil to drain. Cut only one hose at a time so as not to get them mixed up.

4. Slide two of the supplied clamps over the hose ends and install the hoses onto the cooler "in" (to cooler) side of the bypass valve assembly (Refer To Figure 54).

5. REFER TO FIGURE 54, TO IDENTIFY THE MALE (PIPE NIPPLE) END OF THE VALVE. THIS END OF THE VALVE ASSEMBLY "MUST" BE CONNECTED TO THE COOLER "IN" (TO COOLER) HOSES.

6. Now cut the other hose, cooler "out" (from cooler) at your mark, and allow the oil to drain, and connect the hose ends to the bypass valve assembly in the same manner as above.

7. Re-install the retaining clip to support the bypass valve assembly, as shown in Figure 58, and tighten all hose clamps and retaining clips.

8. The bypass valve assembly must be positioned vertically (See Figurte 58).

9. Start the engine and inspect for leaks, check transaxle fluid level and fill as necssary.

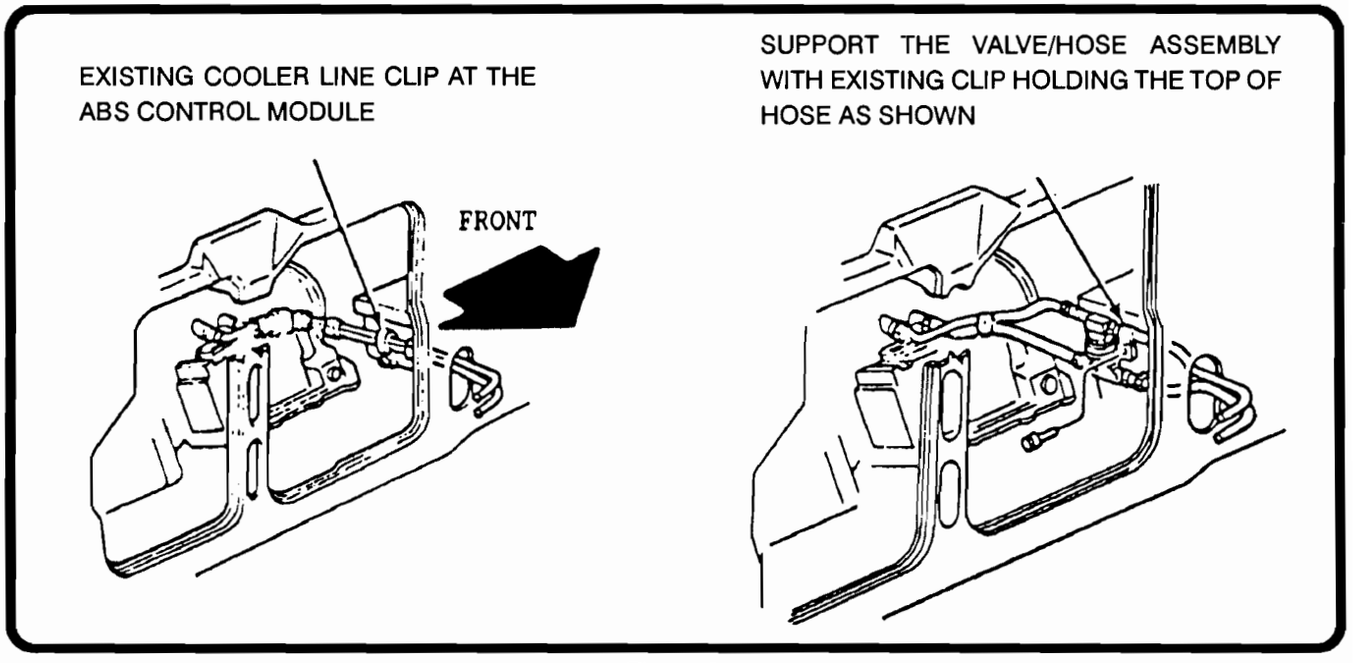


Figure 58

INSTALLATION INSTRUCTIONS
ALL MINI-VANS ONLY

1. All mini-vans require the purchase of an additional bracket, OEM part number 4333568, as well as the cooler bypass valve package.

2. Mark the cooler hose in line with the center of the large hole in the bottom of the frame rail, as shown in Figure 59.

3. Identify and cut the cooler "in" (to cooler) hose at your mark, and allow the oil to drain. Cut only one hose at a time so as not to get them mixed up.

4. Slide two of the supplied clamps over the hose ends and install the hoses onto the cooler "in" (to cooler) side of the bypass valve assembly (Refer To Figure 54).

5. REFER TO FIGURE 54, TO IDENTIFY THE MALE (PIPE NIPPLE) END OF THE VALVE. THIS END OF THE VALVE ASSEMBLY "MUST" BE CONNECTED TO THE COOLER "IN" (TO COOLER) HOSES.

6. Now cut the other hose, cooler "out" (from cooler) at your mark, and allow the oil to drain.

7. Install bracket, OEM part number 4333568, to retain the upper cooler hose, using the existing lower battery tray bolt, as shown in Figure 59.

8. Connect the other hose ends to the bypass valve and hose assembly (same as above).

9. Tighten all clamps, and position the valve and hose assembly in the clip as shown in Figure 59.

10. Since the bypass valve assembly will be clear of the frame rail with this installation, the anti-rattle foam tape and tie strap are not required.

11. Start the engine and inspect for leaks. Check transaxle fluid level and fill as necessary.

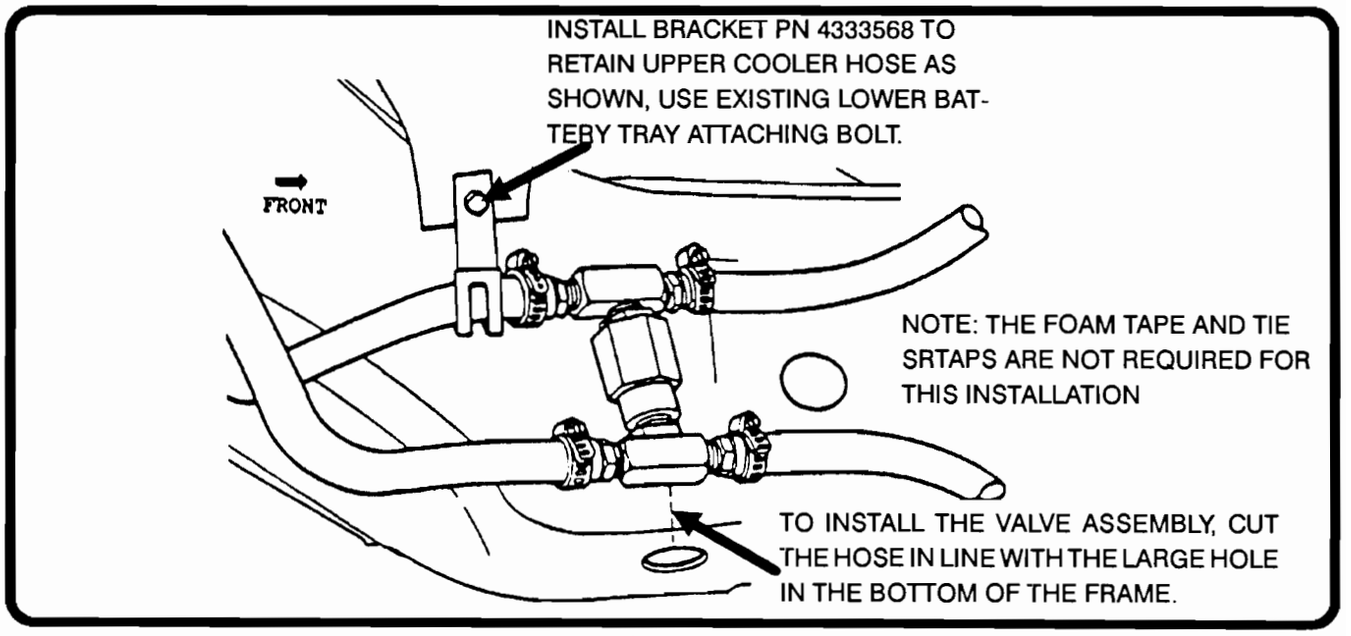


Figure 59

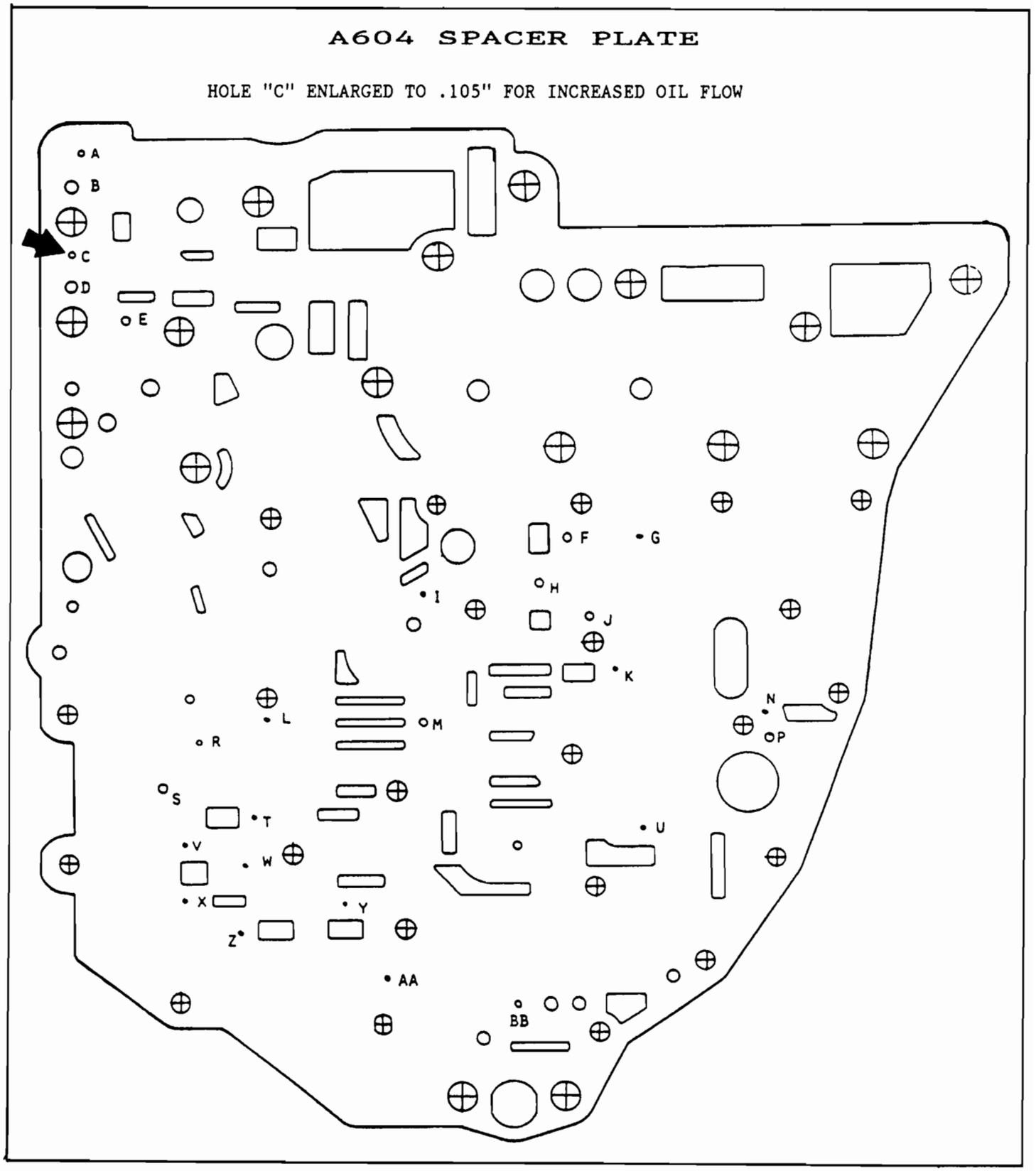

A604 SPACER PLATE
HOLE "C" ENLARGED TO .105" FOR INCREASED OIL FLOW
A
B
C
D
E
F
G
H
I
J
K
L
M
N
P
R
S
T
U
V
W
X
Y
Z
AA
BB

Figure 60

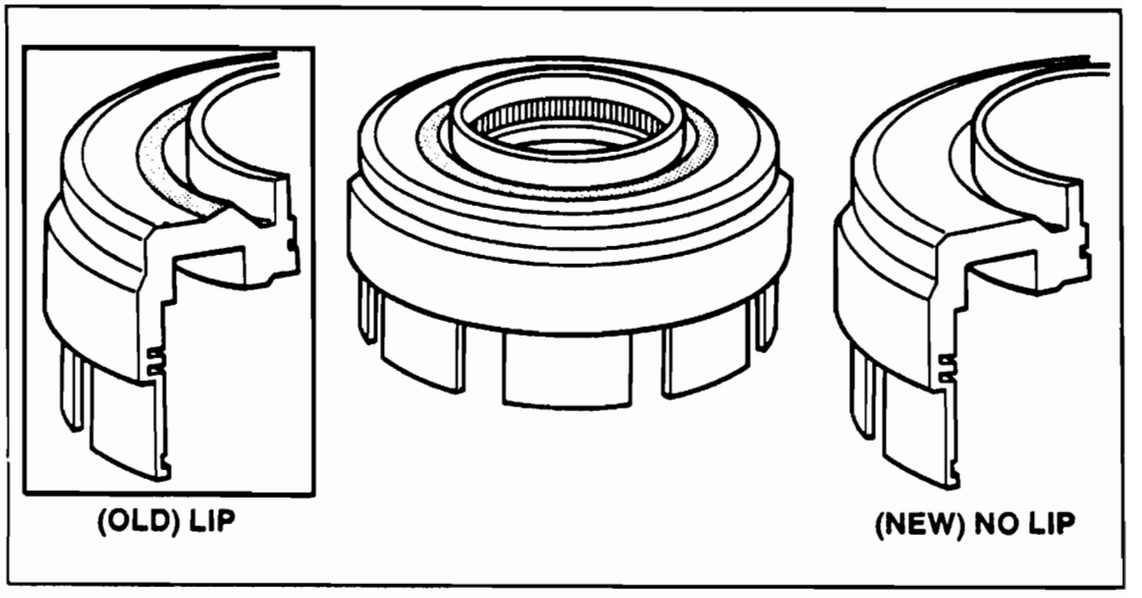


Figure 61

CHRYSLER A604

DIAGNOSTIC FAULT CODE CHART

FAULT	CODE	LIMP-IN
INTERNAL A604 CONTROLLER	11	YES
BATTERY WAS DISCONNECTED	12	NO
INTERNAL A604 CONTROLLER	13	YES
EATX RELAY OUTPUT ALWAYS ON	14	YES
EATX RELAY OUTPUT ALWAYS OFF	15	YES
INTERNAL A604 CONTROLLER	16	YES
INTERNAL A604 CONTROLLER	17	YES
ENGINE SPEED SIGNAL CIRCUIT	18	YES
BUS COMUNICATION WITH ENGINE CONTROLLER	19	NO
SWITCHED BATTERY	20	YES
OD PRESSURE SWITCH CIRCUIT	21	YES
2/4 PRESSURE SWITCH CIRCUIT	22	YES
2/4 AND OD PRESSURE SWITCH CIRCUITS	23	YES
L/R PRESSURE SWITCH CIRCUIT	24	YES
L/R AND OD PRESSURE SWITCH CIRCUITS	25	YES
L/R AND 2/4 PRESSURE SWITCH CIRCUITS	26	YES
ALL PRESSURE SWITCH CIRCUITS	27	YES
CHECK PRNODL SIGNAL	28	NO
THROTTLE POSITION SIGNAL	29	NO
OD HYDRAULIC PRESSURE SWITCH	31	YES
2/4 HYDRAULIC PRESSURE SWITCH	32	YES
OD AND 2/4 HYDRAULIC PRESSURE SWITCH	33	YES
FAULT IMMEDIATELY AFTER SHIFT	36	YES
SOLENOID SWITCH VALVE (STUCK IN LU POSITION)	37	NO
LOCKUP CONTROL	38	NO
GEAR RATIO ERROR	39	YES
L/R SOLENOID CIRCUIT ERROR	41	YES
2/4 SOLENOID CIRCUIT ERROR	42	YES
OD SOLENOID CIRCUIT ERROR	43	YES
UD SOLENOID CIRCUIT ERROR	44	YES
INTERNAL A604 CONTROLLER	45	NO
3-4 SHIFT ABORT	46	NO
SOLENOID SWITCH VALVE (STUCK IN L/R POSITION)	47*	YES
GEAR RATIO ERROR IN REVERSE	50*	YES
GEAR RATIO ERROR IN 1ST	51*	YES
GEAR RATIO ERROR IN 2ND	52*	YES
GEAR RATIO ERROR IN 3RD	53*	YES
GEAR RATIO ERROR IN 4TH	54*	YES
TURBINE SENSOR ERROR	56*	YES
OUTPUT SENSOR ERROR	57*	YES
SENSORS GROUND ERROR	58*	YES
INADEQUATE L/R ELEMENT VOLUME	60*	NO
INADEQUATE 2/4 ELEMENT VOLUME	61*	NO
INADEQUATE OD ELEMENT VOLUME	62*	NO
INADEQUATE UD ELEMENT VOLUME	63*	NO

*DENOTES NEW FOR 1991