"2005" SEMINAR INFORMATION

INDEX

GM & Ford

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"Out by Five in 2005" Seminar Information

Introduction

Welcome to ATSG's "Out by Five in 2005" technical training seminar. We would like to dedicate this manual to all the vendors who travel and support ATSG seminars throughout the USA and Canada. Their presence at the seminar provides an added depth to the show allowing you to speak face to face with people who represent the products you buy. They are there to promote their products but also, they are there to hear what you have to say. You as a technician make a difference in the industry. They want to hear your ideas and suggestions. Never hold back on positive input that can better our industry. We invite you as a technician present at the show to take full advantage of the vendor's presence. Ask them questions and pick up their materials. Most have give-away products so you can try out their goods and have first hand experience. On behalf of ATSG, we want to thank them all!

The information and part numbers contained in this booklet have been carefully compiled from industry sources known for their reliability, but ATSG does not guarantee its accuracy.

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Schaffer

GENERAL ELECTRONIC REPAIR

DEAD COMPUTER

COMPLAINT: Dead computer with obviously blown replaceable parts

CAUSE: It is possible that the blown part is the root problem. It is also possible that the blown part is only a symptom of another problem, or the blown part has caused another problem.

CORRECTION: Locate the obviously blown part by simple visual inspection of the computer circuit board. Some internal computer problems are difficult or impossible to repair, and some are fairly simple. The first snag in replacement of a part is identification and obtaining the part. This is possible on most larger parts, and many smaller common parts. Generally this is not possible on chips and other OEM custom parts, and many unlabeled parts.

With the exception of multi lead devices (such as chips) this repair does not require a great deal of soldering skills. If you are not familiar with soldering at all then this repair is not recommended. To replace chips and Surface Mount Devices ("SMD") requires a great deal of soldering skill, specialized equipment, and experience. To learn this type of soldering a "Micro Miniature Circuit Board Repair" IEEE certification is recommended. See your local Electronics vocational/technical school.

You will need a fairly low power soldering iron (30 Watts or less). Do not even think about attempting this type of repair with large heavy duty soldering equipment. You will also need small cleaning tools, and rosin core (electronic) solder. Acid core solder, the type used in plumbing, may not be used. A good magnifying glass and a small rotary tool may also be helpful.

You will also need some desoldering tools and supplies. A desoldering iron, or "solder sucker," or braided desoldering wick.

The first step is to locate the blown part. This should be fairly obvious.

The next step is identifying the part. If the printing on the part is still visible, that is best. Diodes may often be identified by their size and shape. Without labels it is difficult to identify resistors and capacitors. Often they are in a row of identical parts, so you may get the specs from a neighboring part. On resistors sometimes the color bands may be seen on the unaffected side.

Chips and specialized parts cannot be found without the numbers on them. Even with the numbers on them, they often cannot be cross referenced to commonly available parts. Most automotive OEM's use Application Specific Integrated Circuits (ASICs) in their computers. ASICs are not available at all, even from the chip manufacturer (usually part of an ASIC manufacturing contract).

Once you have identified the blown part, and obtained a replacement, the repair is fairly straightforward. Unsolder the old part, clean the area, and solder in the new part.

After the part has been replaced, test the computer in the car. If there is no change in the symptoms, then the blown part was only an indication (or the originating cause) of another problem.

Remember to observe proper ESD protection while working on the insides of a computer.

MANY GM VEHICLES

QUAD DRIVER FAULTS

COMPLAINT: Quad Driver Faults can be difficult to troubleshoot and often cause unnecessary computer replacement.

CAUSE: A Quad Driver is an Integrated Circuit Chip ("IC") which is part of the computer and not a replaceable part. This chip has one signal called "status" or "fault" which becomes active whenever there is any overvoltage, undervoltage, or overcurrent condition on any of the four devices being driven by the quad driver (see figure 1). It is this signal which causes the Quad Driver error code. The Quad Driver error code does NOT tell you which device is causing the problem. In some older computers that is as far as the onboard diagnostics go. Most newer computers begin a more specific diagnostic routine when a Quad Driver error occurs in an attempt to determine which driven device is causing the error condition. The vast majority of the time, a Quad Driver Error is not a problem with the Quad Driver, but is a problem with one of the driven devices.

CORRECTION: Proper troubleshooting technique for a Quad Driver Error code is to follow the procedure for ANY OTHER CODES PRESENT FIRST. If the Quad Driver error code refers to a specific driven device, repair that device. If not, a performance code which normally would not be considered an electrical problem may be an electrical problem when accompanied by a Quad Driver error.

If no other codes are present, and the Quad Driver error code does not refer to a specific device, each of the driven devices must be checked using resistance, voltage, and/or current measurements.

After all other codes have been repaired, and/or all driven devices have tested good or been repaired, computer replacement may be considered.

QUAD DRIVER FAULTS

TYPICAL QUAD DRIVER

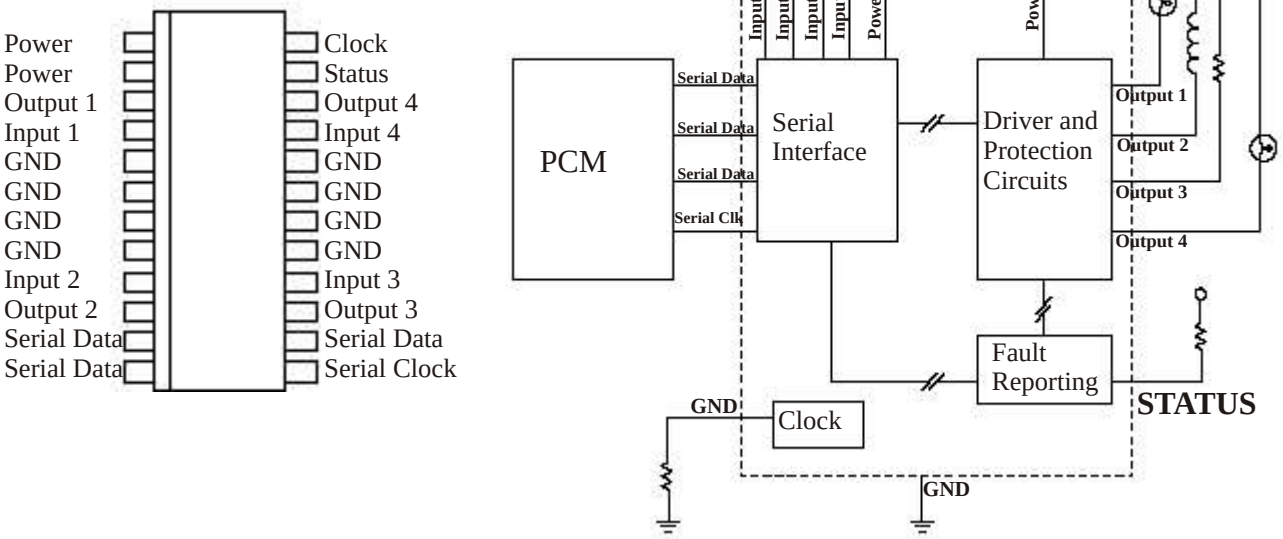


Figure 1

4L80-E

OVERDRIVE GEAR SET FAILURE

COMPLAINT: Immediately after overhaul the vehicle returns to the shop after a road test at hi-way speeds and a total failure of the overdrive planetary gear set is evident.

CAUSE: During the overhaul process either the transmission casing or the oil pump or pump cover was replaced using incompatible parts causing a loss of lube oil to the overdrive gear train.

CORRECTION: The transmission casing had a casting change for the 2004 model year.
The oil pump cover has been modified with the addition of an aluminum plug.
The change in the case casting will allow lube oil designated for the overdrive planetary gear set to exhaust back to the sump if the oil pump cover has not been modified with the installation of an aluminum plug to prevent this from happening.
When the transmission casing or pump requires replacement then care must be taken to properly identify which case will be used for the repair and/or determine if a pump modification is necessary.
The earlier design 1997 - 2003 "center lube" type casing can be identified externally by the presence of two bosses in the front cooler line fitting area. (See figure 1)
The later design 2004 casing can be identified externally by the presence of only one boss at the front cooler line area. (See figure 2) ***This case must use the pump with the aluminum plug present in the pump cover.***
With the transmission on the bench and the oil pump removed, the most important difference in these castings can be observed. Notice that the later design case has no aluminum or "blind hole" area present in the casing (See figure 3) as there was in the previous design "center lube" case. (See figure 4)

Note: *For 1991 - 1996 casings there would be a passage drilled at this location (See figure 5) for lube oil to return from the oil cooler via the lower front case cooler line fitting and back in to the pump for distribution to the internal lubrication circuits. With 1997 - 2003 cases, this passage was not drilled and would prevent lube oil for the overdrive section from exhausting back to the sump even though the corresponding front lube passage in the re-designed oil pump remained open.*

To modify the oil pump for use with the 2004 casing you must first acquire ***part # 24232339*** from your local GM dealer. This service package will include an aluminum plug, pump gasket and o-ring, and a turbine shaft o-ring as a kit.
Using figure 6 as a guide, remove the existing cup plug in the oil pump cover front lube passage by driving it out with a hammer and a punch, taking care not to damage the pump cover.
Insert the aluminum plug into the front lube hole. Seat the plug flush or no more than 1/16th of an inch below the pump cover outer diameter.
With a small chisel point tool, stake the plug in a cross pattern using figure 7 as a guide.
Make sure that the plug does not protrude outside of the pump cover or move under light pressure.

4L80-E

OVERDRIVE GEAR SET FAILURE

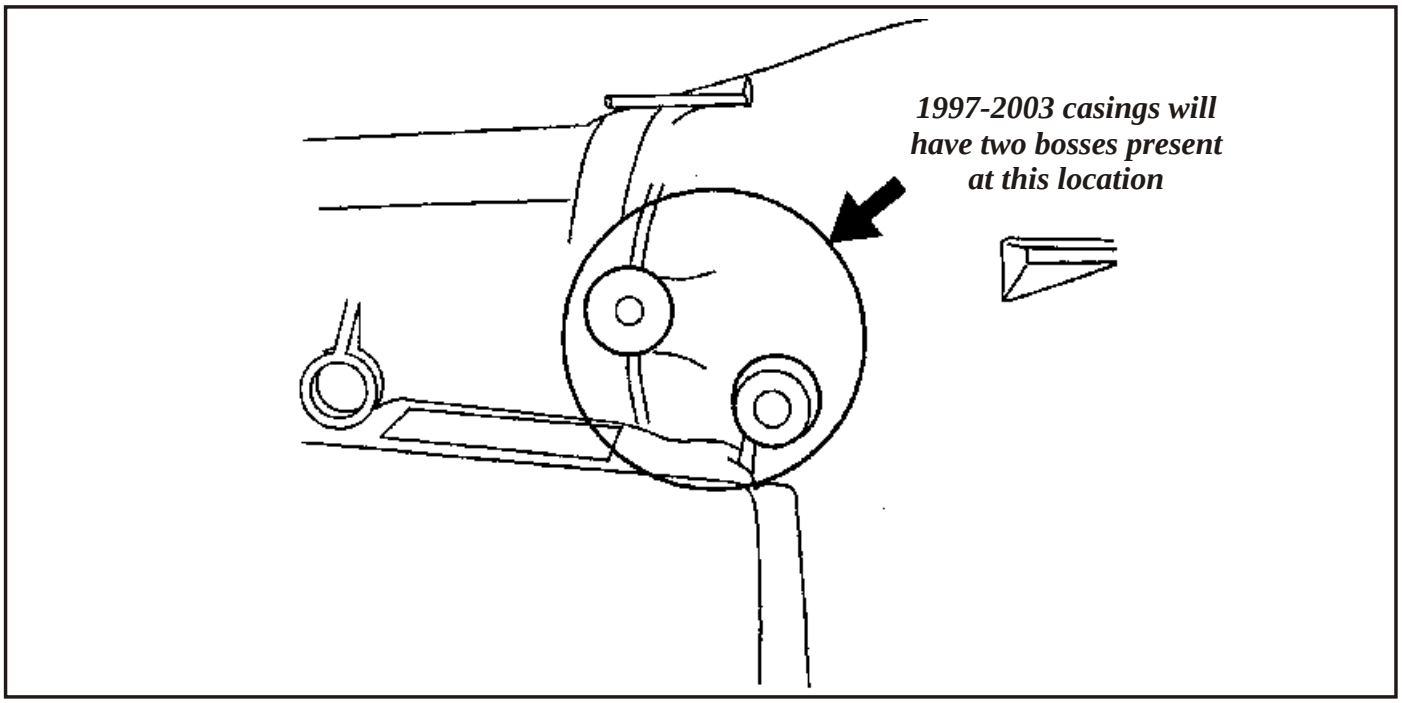


Figure 1

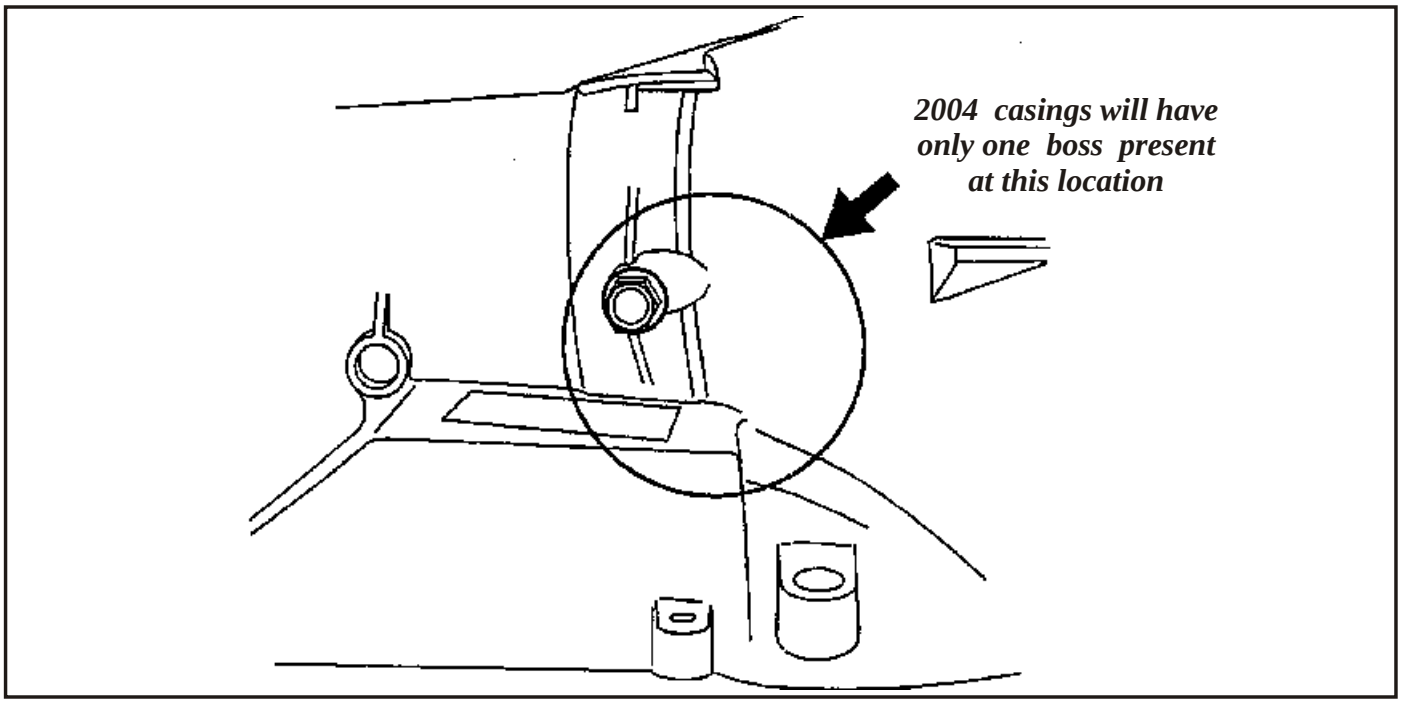


Figure 2

4L80-E

OVERDRIVE GEAR SET FAILURE

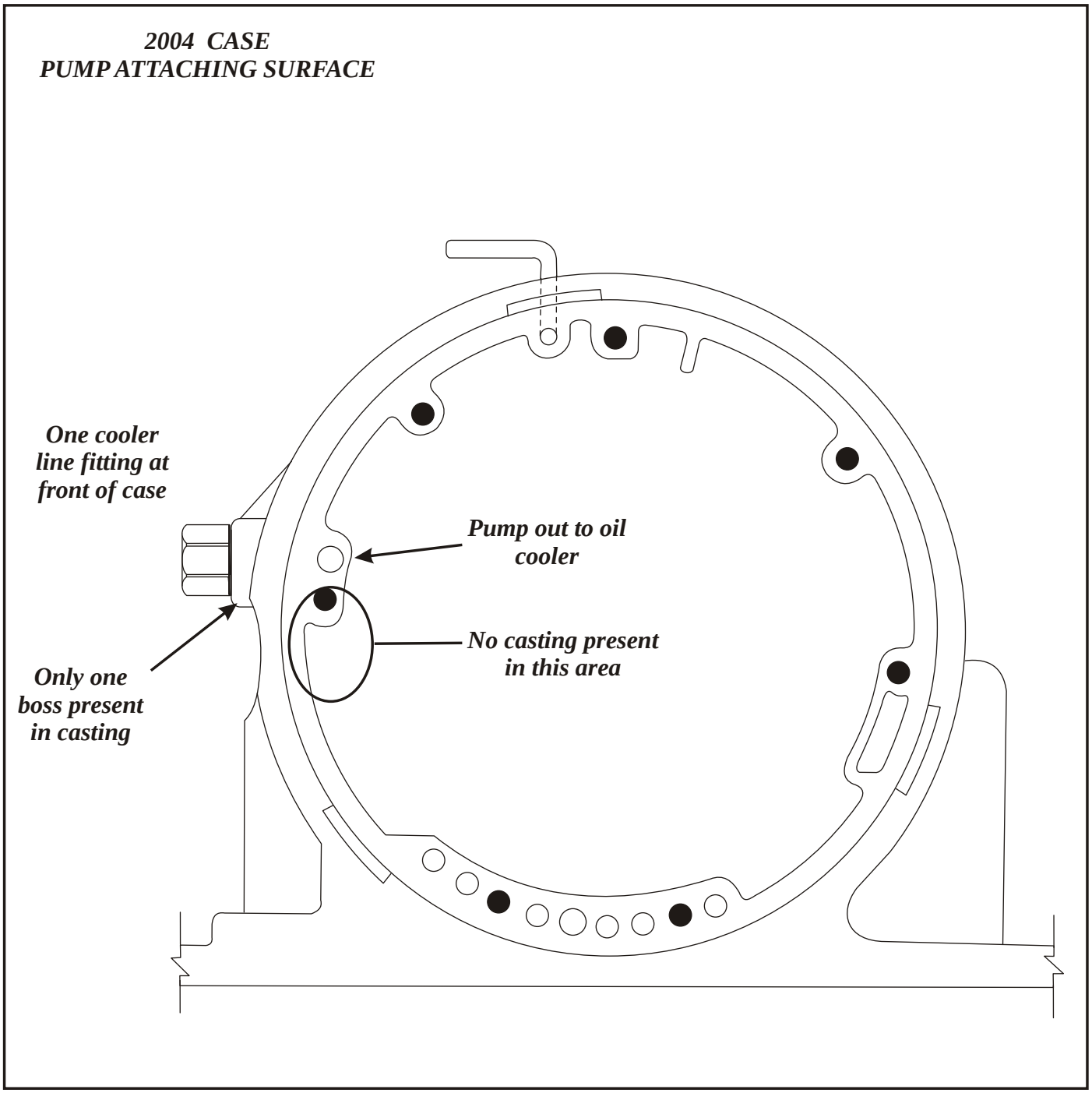


Figure 3

4L80-E

OVERDRIVE GEAR SET FAILURE

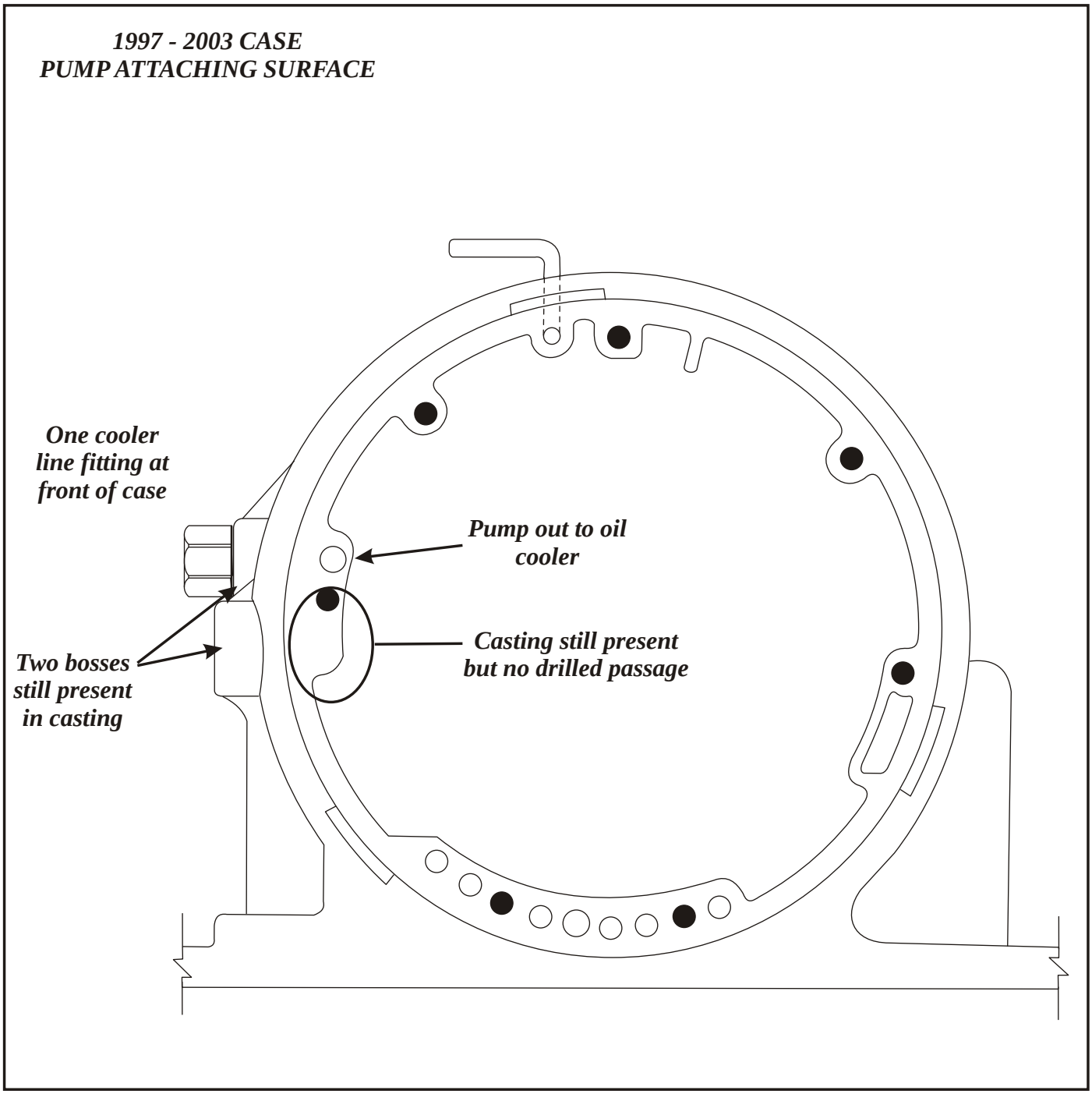


Figure 4

4L80-E

OVERDRIVE GEAR SET FAILURE

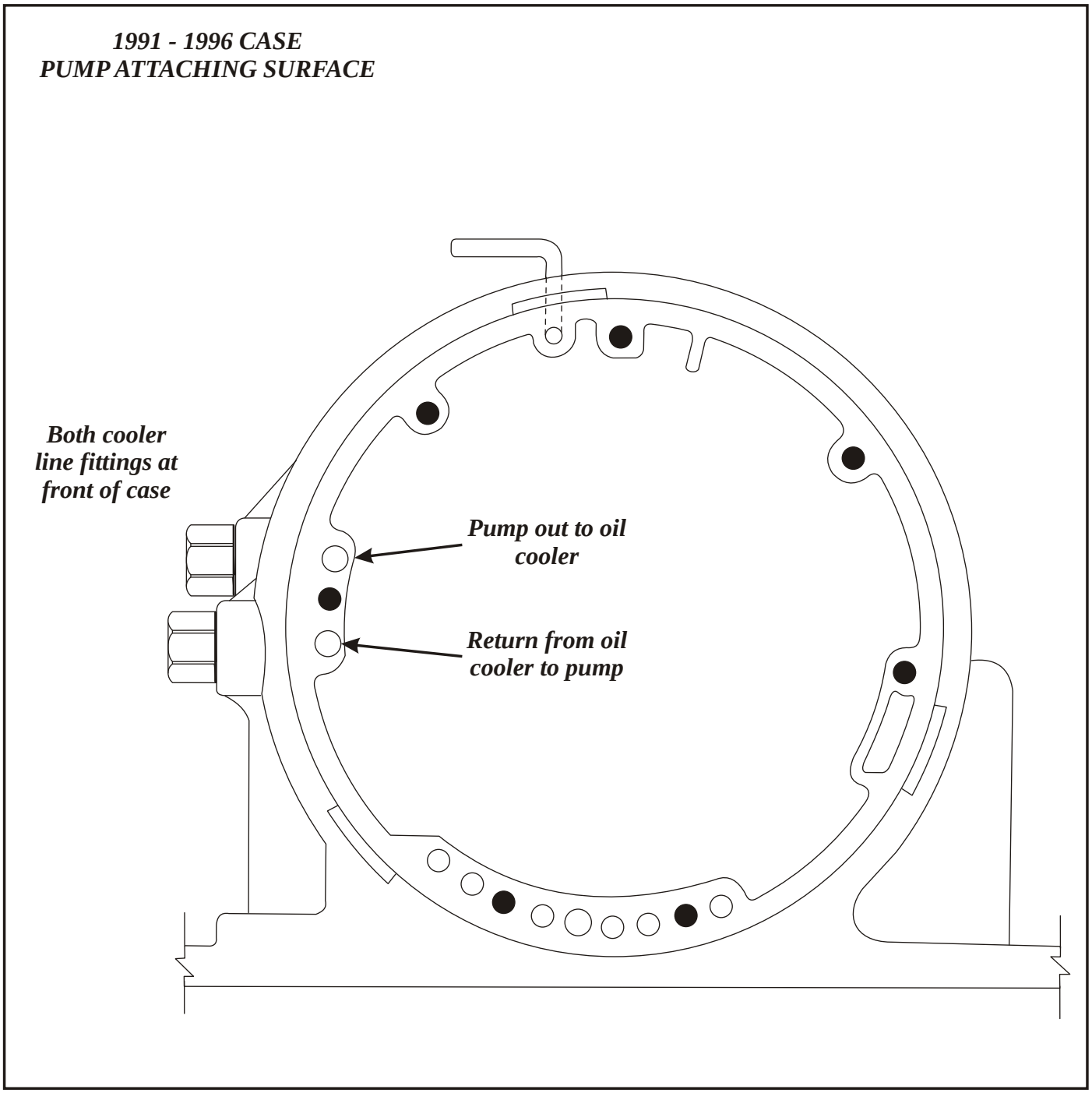


Figure 5

4L80-E

OVERDRIVE GEAR SET FAILURE

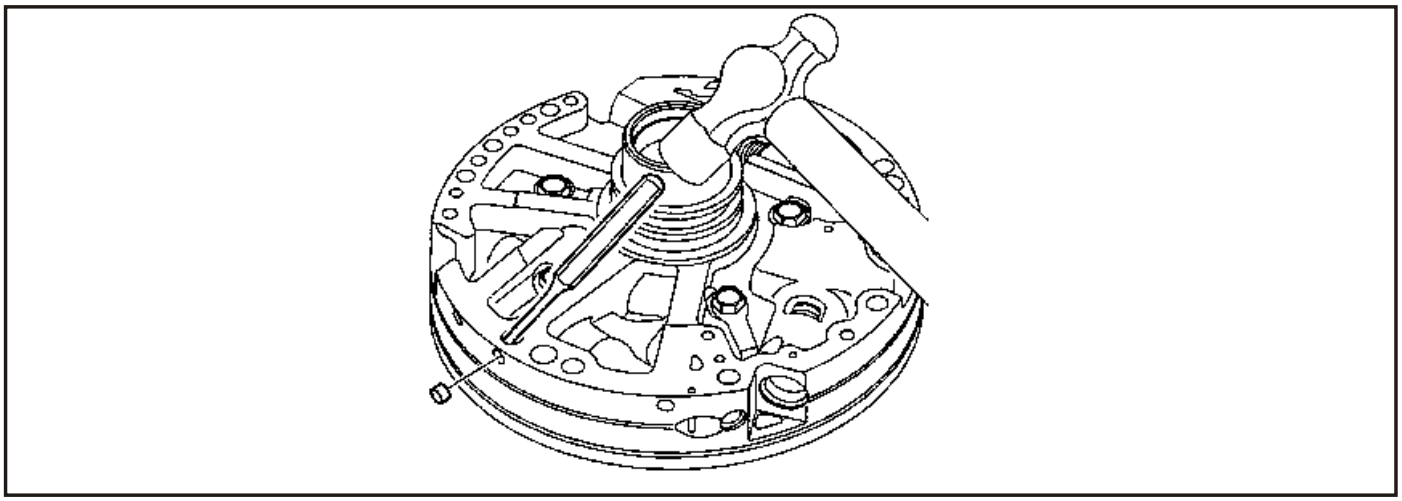


Figure 6

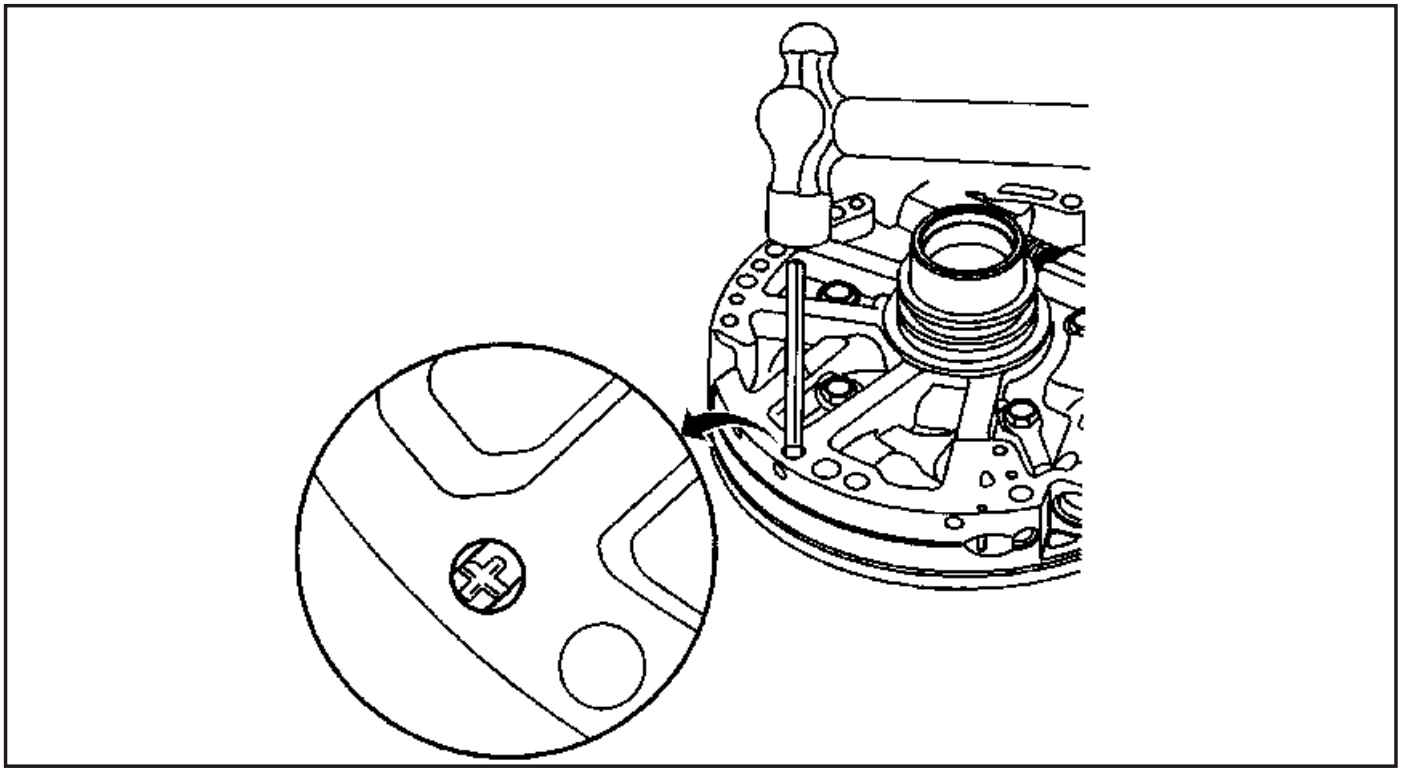


Figure 7

4L80-E

ENGINE STUMBLE/STALL ON ENGAGEMENT

COMPLAINT: Immediately after overhaul the engine will stumble or stall out completely when the shifter is placed into Overdrive or Reverse.

CAUSE: During the overhaul process the original 1997 or later design sun gear shaft was replaced with a 1996 or earlier design sun gear shaft. This was the only piece replaced in the main planetary gear train. All other related gear train parts remain original.

CORRECTION: The sun gear shafts used in 1997 and later center lube transmissions have a shortened bushing journal when compared to the earlier design. Using the earlier design shaft with the longer bushing journal will create a restriction in the oil cooler/lube circuit and cause the converter clutch to drag.

Disconnect the rear cooler line from the case fitting. Place a suitable piece of hose on to the end of the cooler line so as not to bend or kink the line and then direct the open end of the hose into a clean bucket or suitable container.

Start the engine and with the brakes applied, shift the transmission into gear. If the condition is eliminated, the restriction is internal to the transmission.

Replace the sun gear shaft with the proper part for your application. (See figure 8)

Note: If you are able to keep the engine from stalling out completely and attempt to take the vehicle for a road test, then severe damage to the main planetary gear train will be the result.

4L80-E

ENGINE STUMBLE/STALL ON ENGAGEMENT

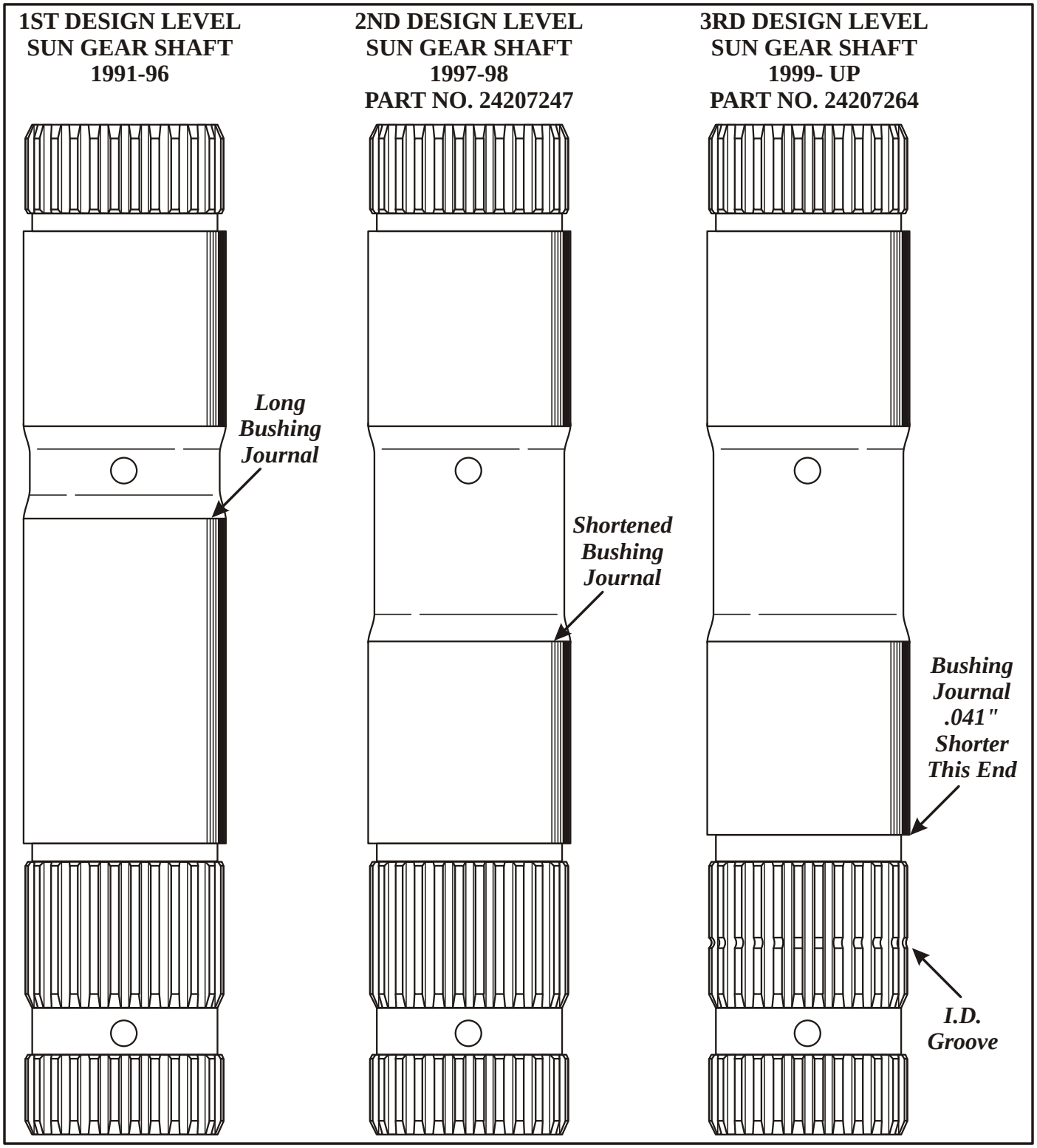


Figure 8

4L80-E

CASE COOLER LINE FITTINGS

COMPLAINT: Technicians may have difficulty locating replacement case cooler line fittings or the small retaining clips.

CAUSE: When the transmission was being removed, installed or overhauled, the technician noticed that the original case cooler line fittings or retaining clips were damaged or missing altogether.

CORRECTION: 1997 and later center lube transmissions had the oil cooler return line relocated to direct oil returning to the transmission from the cooler directly into the center support at the middle area of the case instead of returning to the pump as in the 1996 and earlier units. This change also made a redesign of the case fittings necessary. The profile of the rear fitting was changed to make it longer so that the inner end will fit into a seal in the center support. At the same time, the front fitting as well as the rear fitting, was modified for quick connect / disconnect in place of the earlier flared line / threaded type. (See figure 9)
Parts personnel may indicate over the phone that the item is not available, or they are not able to provide the correct piece unless you visit the dealer yourself and actually point to the item from an exploded view. Use the part numbers listed under Service Information.

SERVICE INFORMATION :

The OEM part numbers at the time of this printing are as follows:

Retaining clip only - 24205103
Front fitting with clip - 24205102
Rear fitting with clip - 24207013

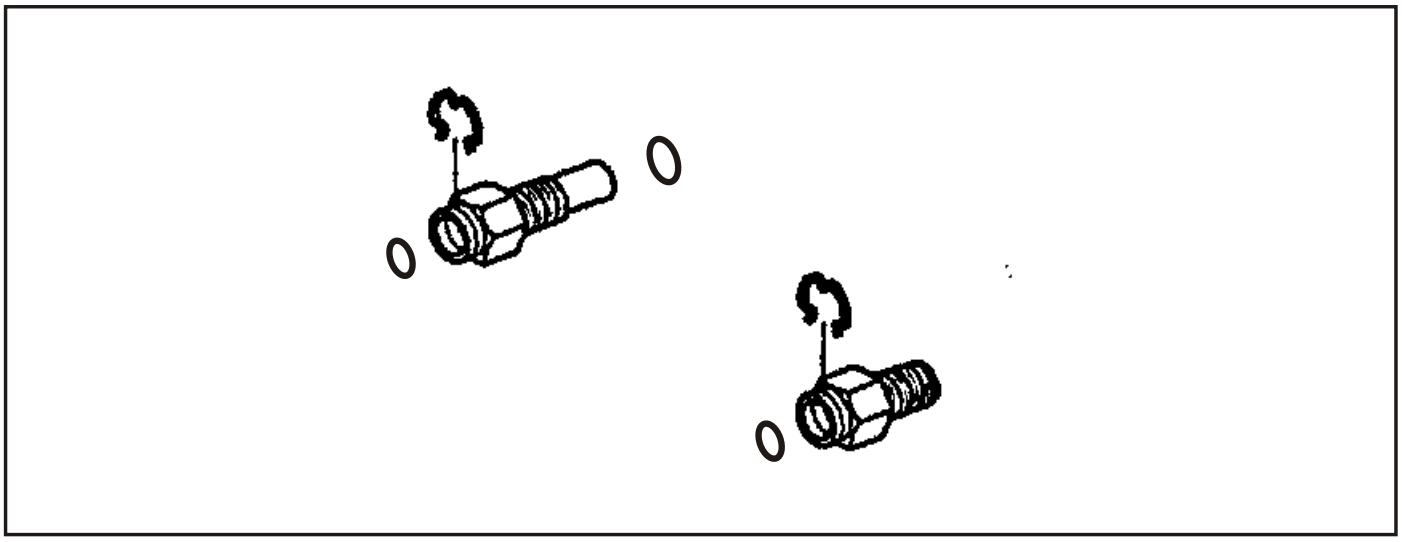


Figure 9

Alto

THM 4L80-E

CENTER GEAR BOX CHANGES FOR 1999 MODELS ("REVISED INFORMATION")

CHANGE: Beginning at the start of production for all 1999 model THM 4L80E transmissions, the planetary pinions on both carriers were produced 10% thicker than the previous models, as shown in Figure 1. This engineering change required the addition of a .041" shim in the gear train to re-center the sun gear in the new planetary pinions and affected several internal parts, that may create some confusion, and thus some mis-assembly concerns.

REASON: Increased durability and reliability.

PARTS AFFECTED:

(1) PLANETARY PINION GEARS - Were increased in length by approximately .075" in both front and rear carriers, as shown in Figure 1, for increased durability.

(2) ADDED .041" SHIM - There was a .041" shim added between the thrust bearing and the rear internal ring gear, to re-center the sun gear in the revised planetary pinion gears, as shown in Figure 2.

(3) CENTER SUPPORT - Required a .041" recess to be machined into the center support bearing surface, to accommodate the sun gear being re-centered in the revised planetary pinion gears, as shown in Figure 3.

SPECIAL NOTE: Sometime in 2000 G.M. eliminated the only visual identification (recess eliminated) from the updated center support and it now "Requires" measurement for identification, as shown Figure 3.

(4) SUN GEAR SHAFT - Required that .041" be removed from the bottom of the rear bushing journal, to accommodate the re-centering of the sun gear in the revised planetary pinion gears, as shown in Figure 4. Notice that revised sun gear shaft can be identified with a groove cut into the shaft splines, as shown in Figure 4.

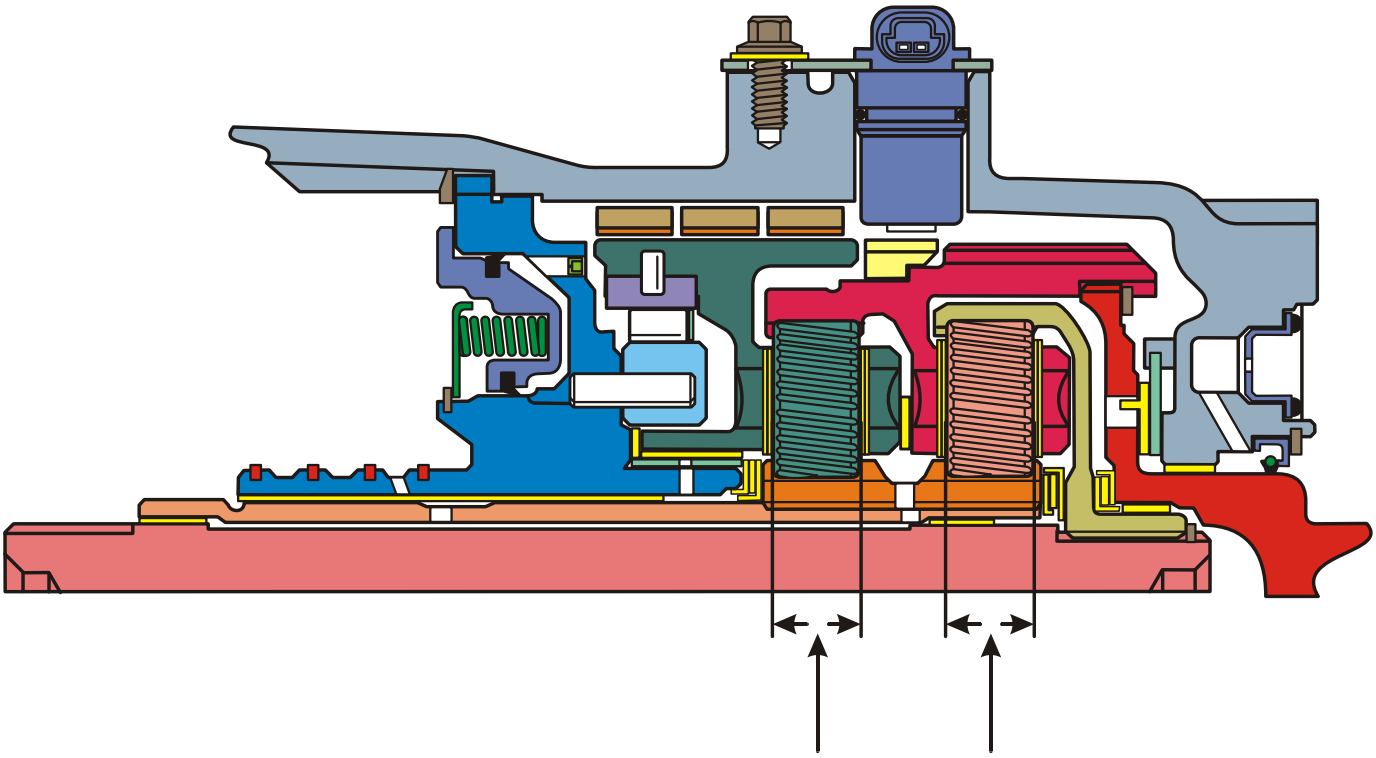
INTERCHANGEABILITY:

None of the parts listed above will interchange with any of the previous design level parts, and none of the previous design level parts can be used in the 1999 and later units.
However, when all pieces listed above are used as a service package, they can be used to back service "Center Lube" model 4L80-E transmissions.
The Sun Gear, Main Shaft, Rear Internal Ring Gear and all Thrust Bearings remained the same, as shown in Figures 5, 6, and 7.

SPECIAL NOTE: Some mis-assembly examples are illustrated in Figure 8 with some dimensional checks to prevent this from happening to you.

SERVICE INFORMATION:

Reaction (Front) Carrier Assembly (99 Design Level) 24202051
Output (Rear) Carrier Assembly (99 Design Level) 24202052
Washer, .041" (99 Design Level) 24211821
Center Support Assembly (99 Design Level) 24217454
Sun Gear Shaft Assembly (99 Design Level) 24207264



Increased In Length By 10% And Shim Added To Re-Center Sun Gear

Figure 1

SPX

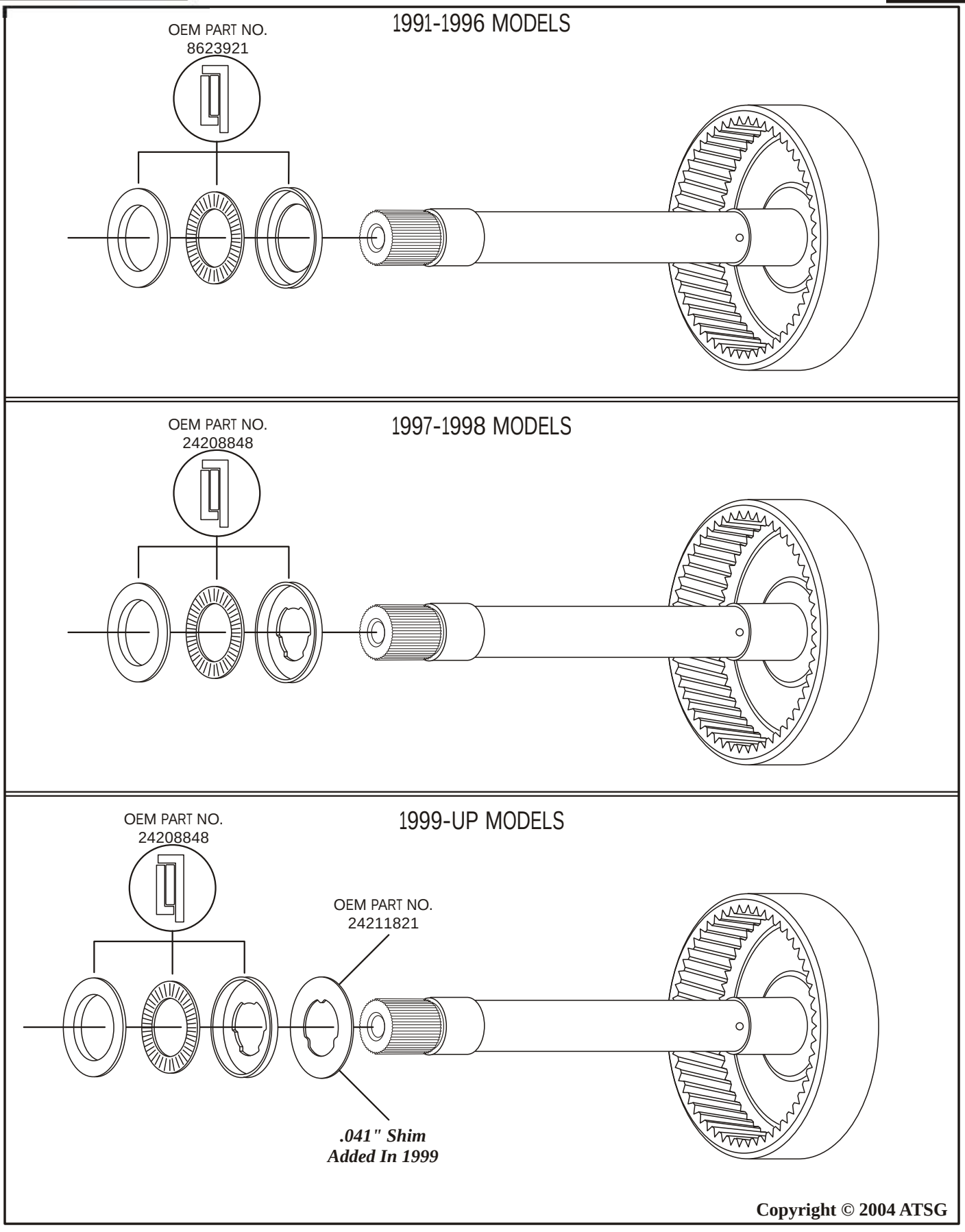
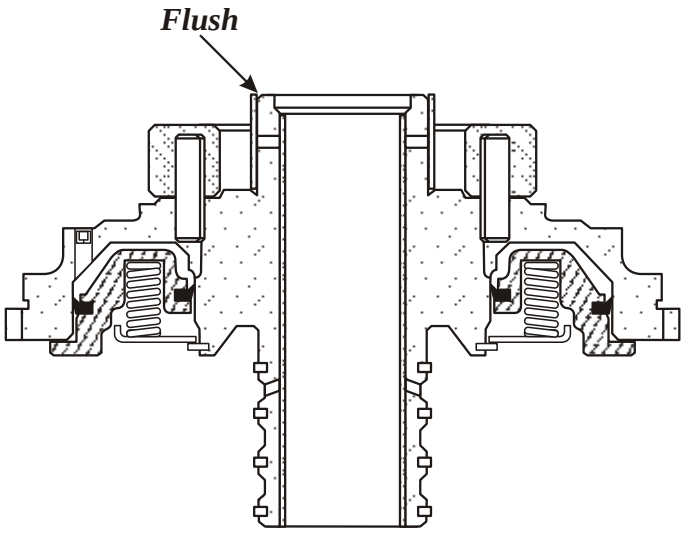
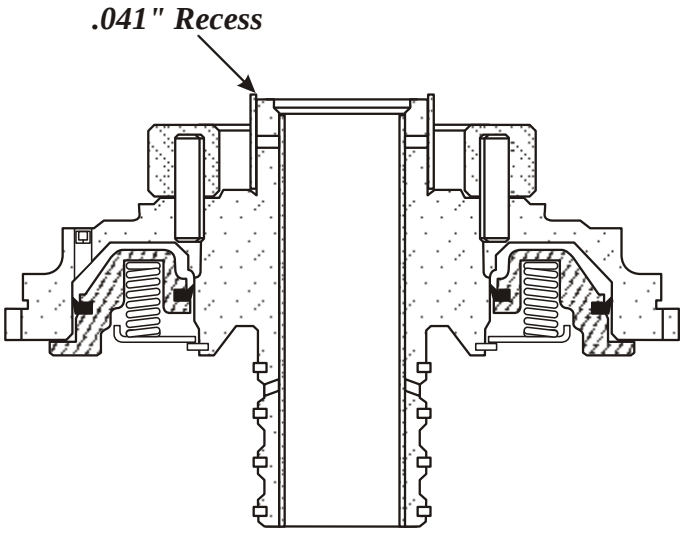

1991-1996 MODELS
OEM PART NO.
8623921
1997-1998 MODELS
OEM PART NO.
24208848
1999-UP MODELS
OEM PART NO.
24208848
OEM PART NO.
24211821
.041" Shim
Added In 1999
Copyright © 2004 ATSG

Figure 2

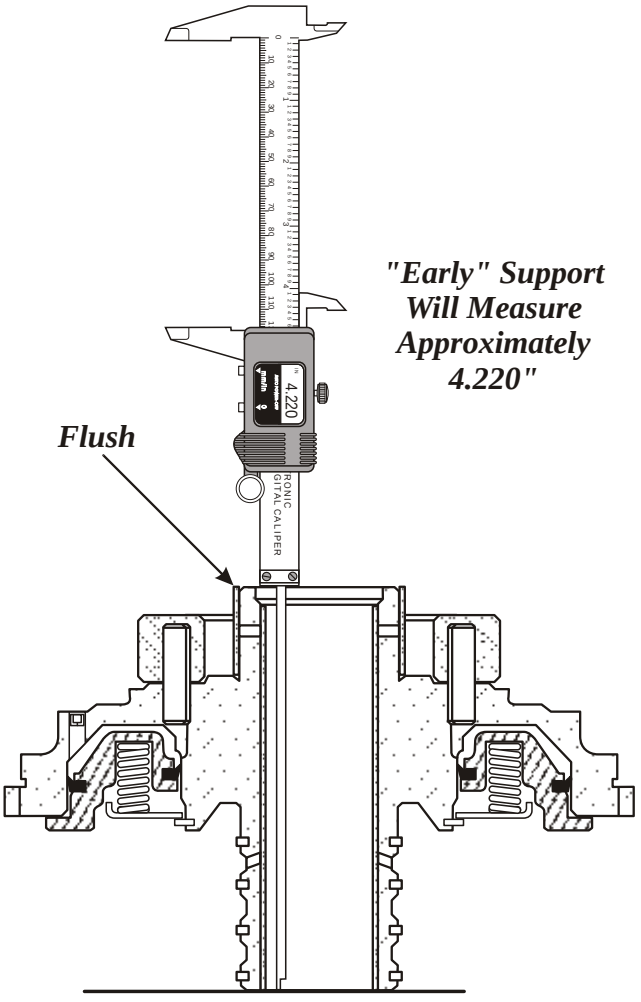
1997-98 DESIGN LEVEL CENTER SUPPORT



1999 DESIGN LEVEL CENTER SUPPORT



2000 & LATER DESIGN LEVEL CENTER SUPPORT



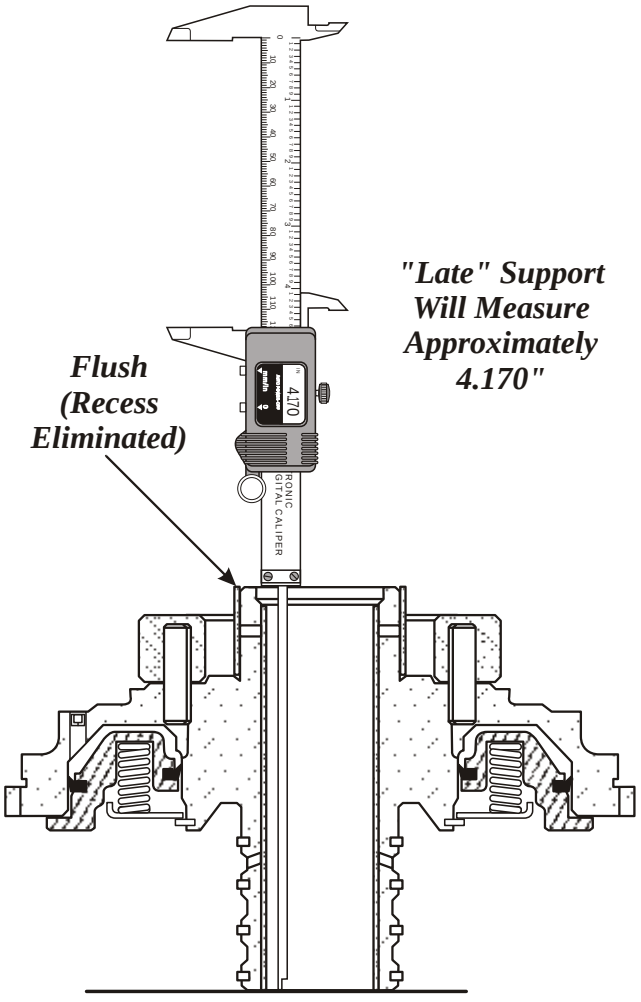


Figure 3

1ST DESIGN LEVEL
SUN GEAR SHAFT
1991-96

2ND DESIGN LEVEL
SUN GEAR SHAFT
1997-98
PART NO. 24207247

3RD DESIGN LEVEL
SUN GEAR SHAFT
1999- UP
PART NO. 24207264

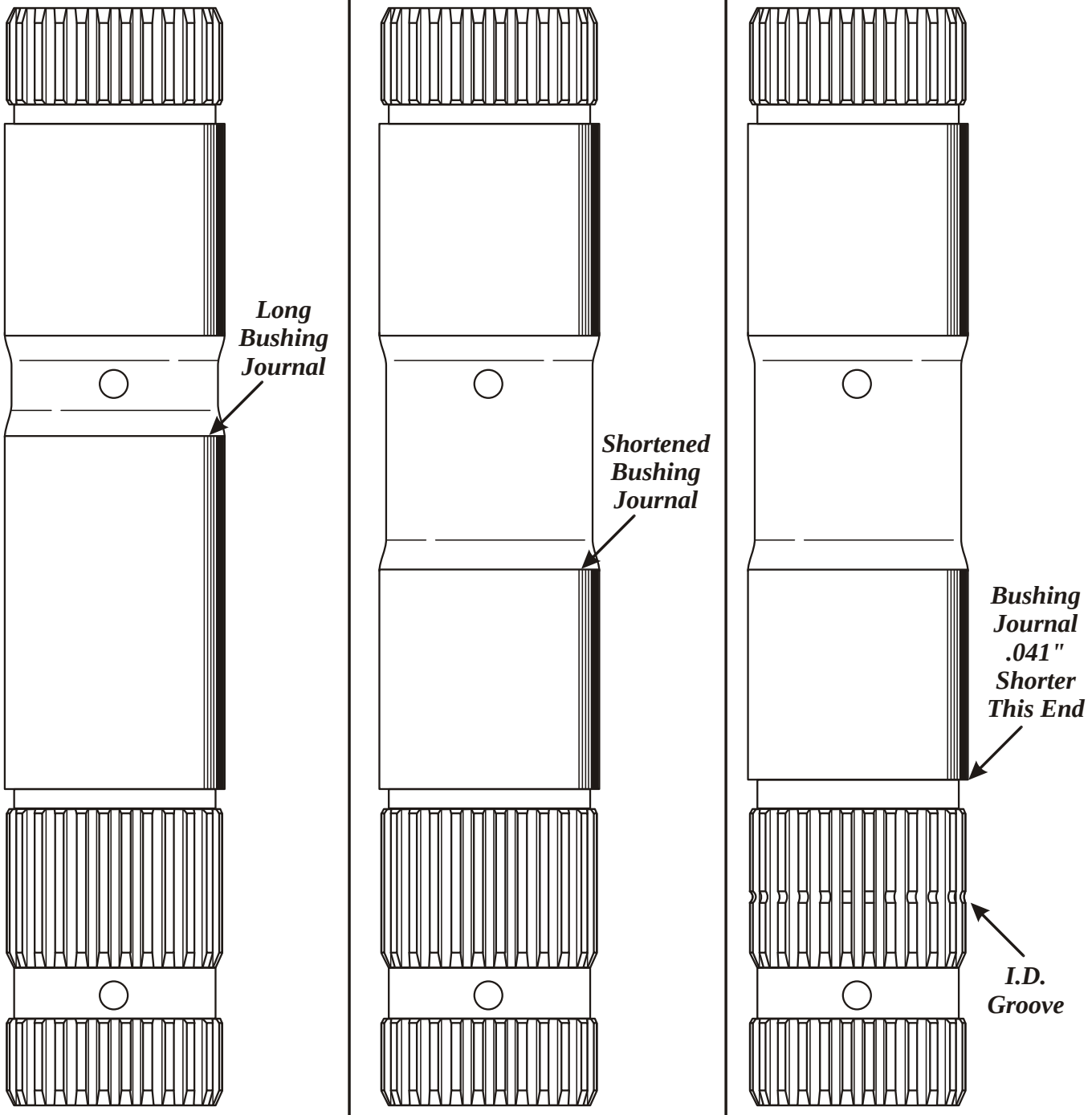
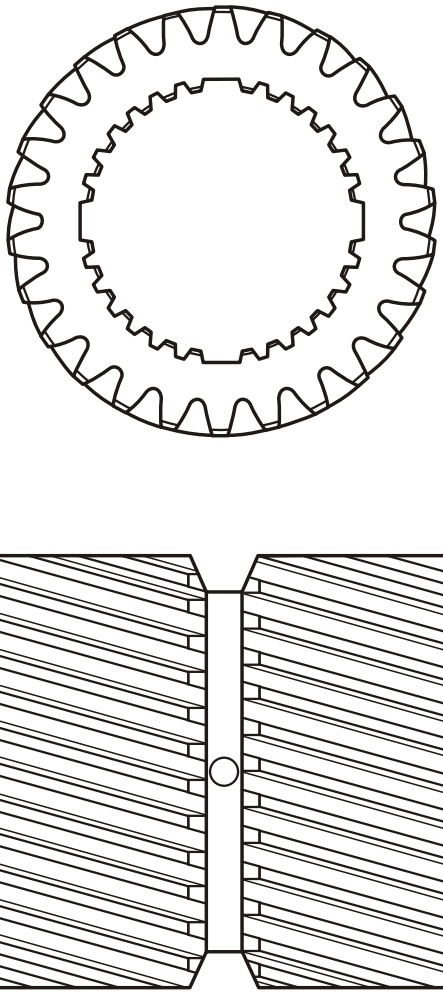


Figure 4

PREVIOUS DESIGN LEVEL SUN GEAR



1997-UP DESIGN LEVEL SUN GEAR

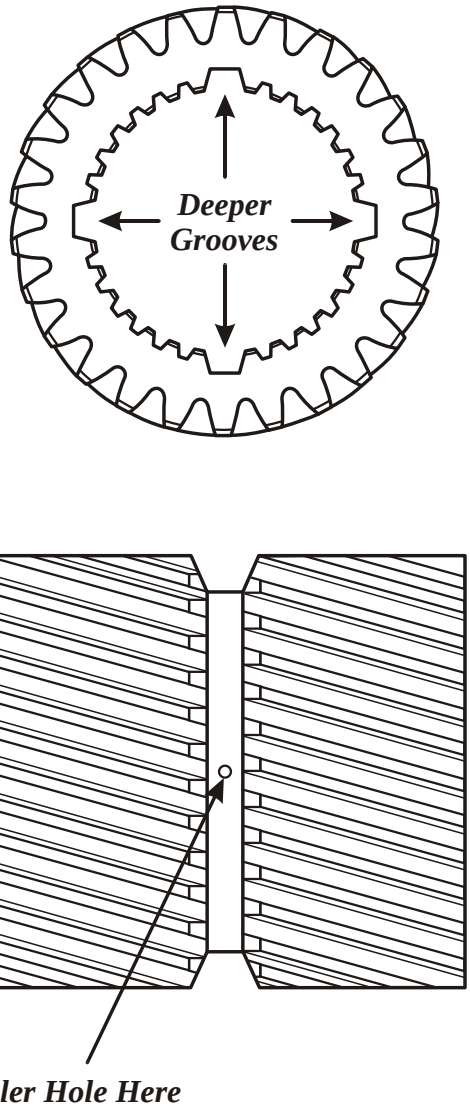
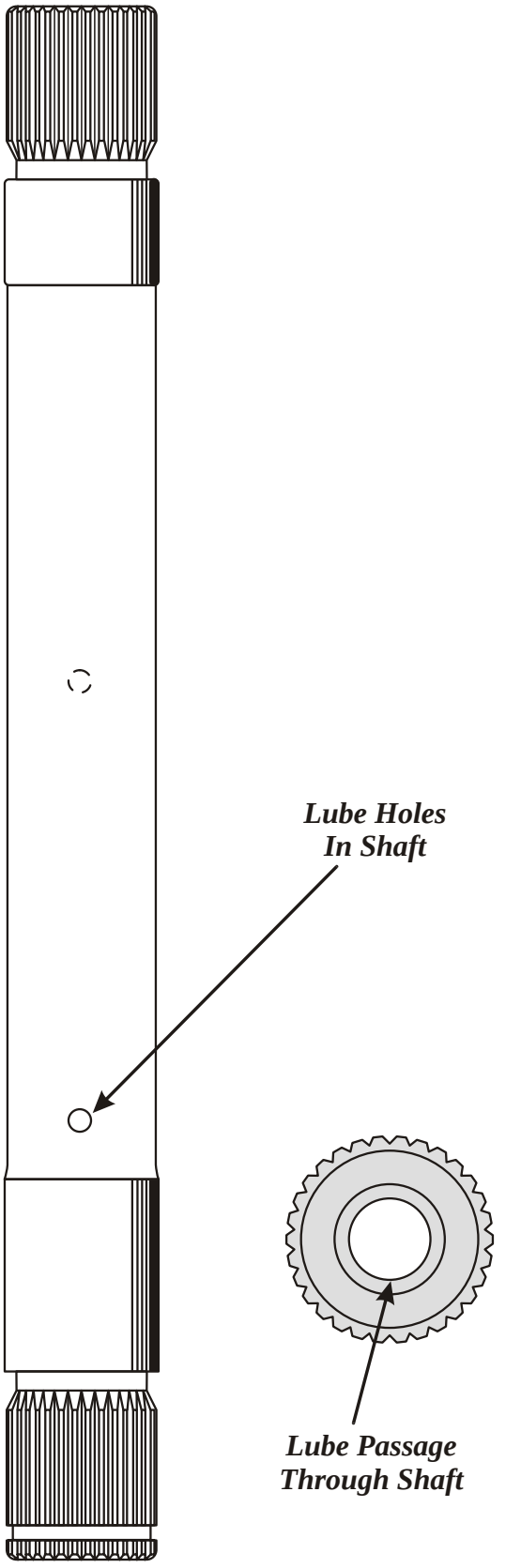


Figure 5

PREVIOUS DESIGN LEVEL
REAR RING GEAR SHAFT



1997-UP DESIGN LEVEL
REAR RING GEAR SHAFT

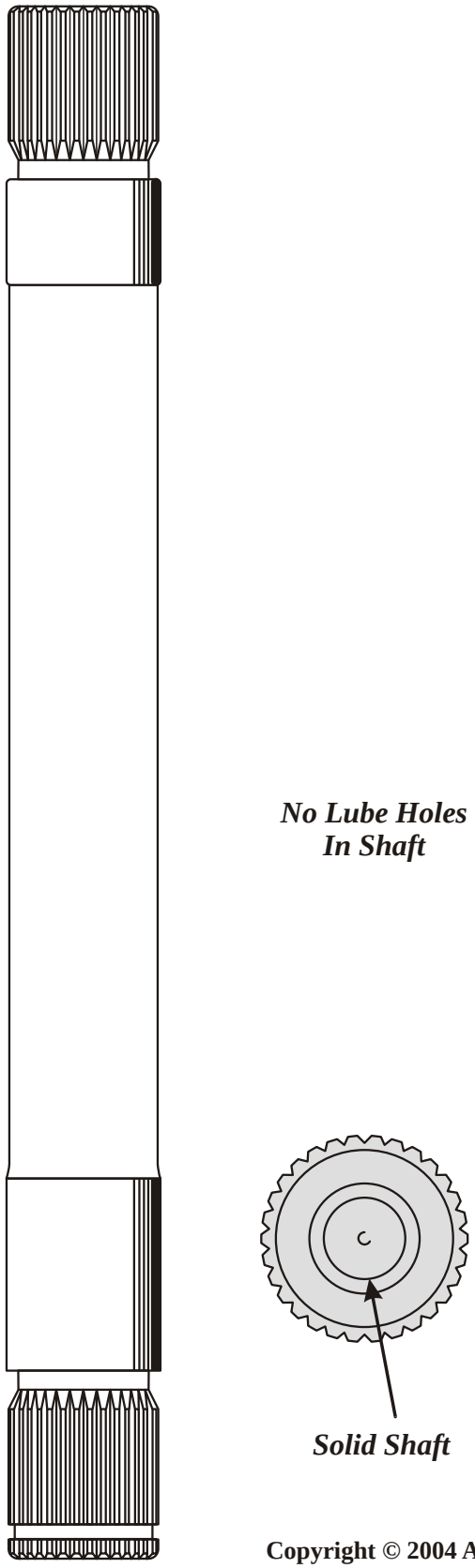
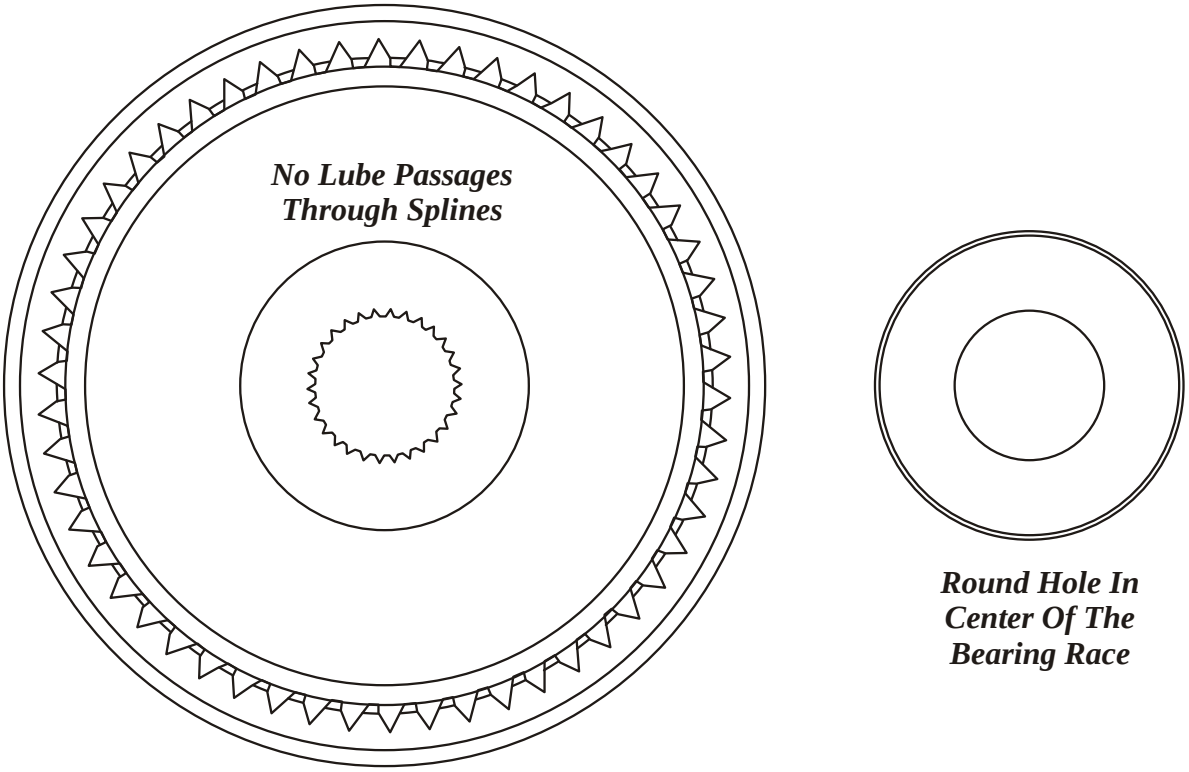


Figure 6

PREVIOUS DESIGN LEVEL
REAR RING GEAR AND BEARING RACE



1997-UP DESIGN LEVEL
REAR RING GEAR AND BEARING RACE

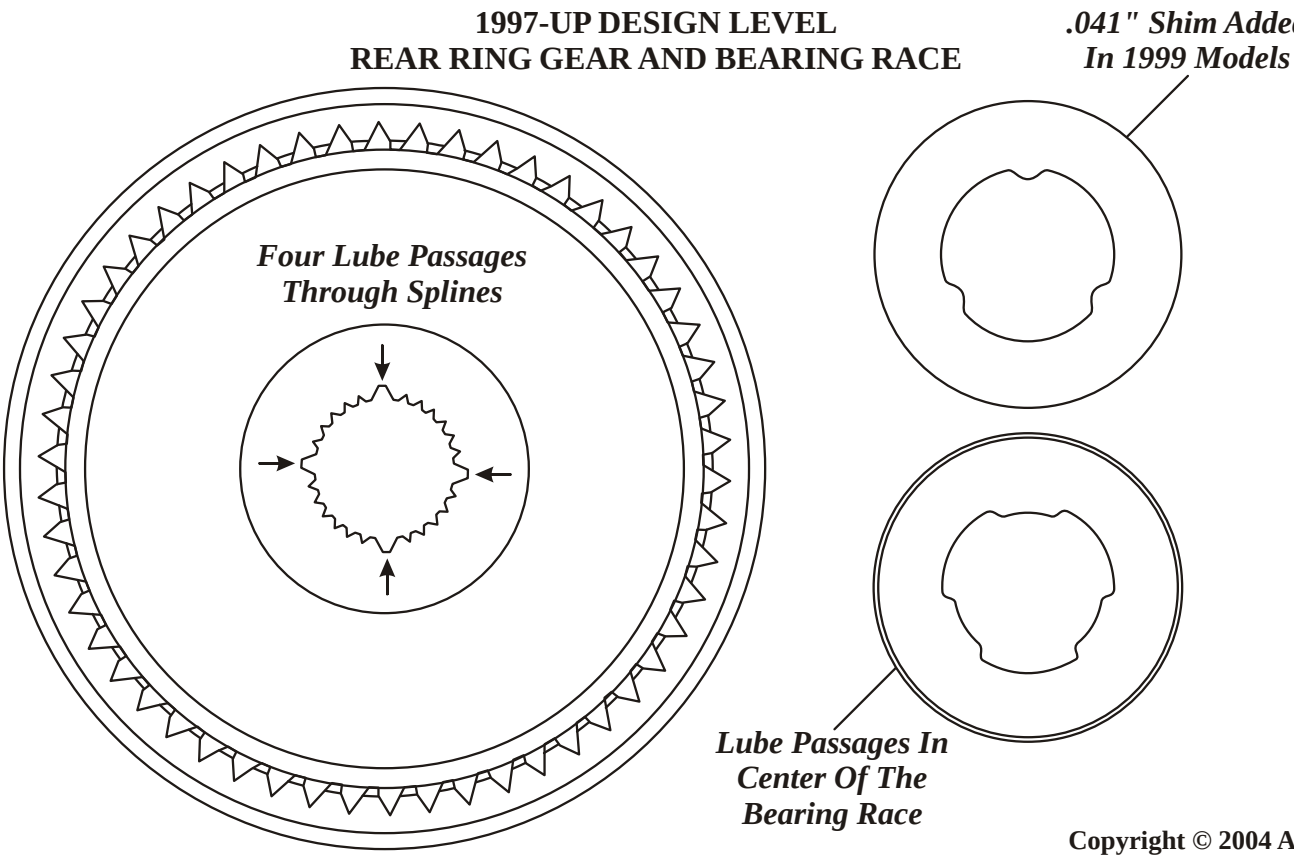
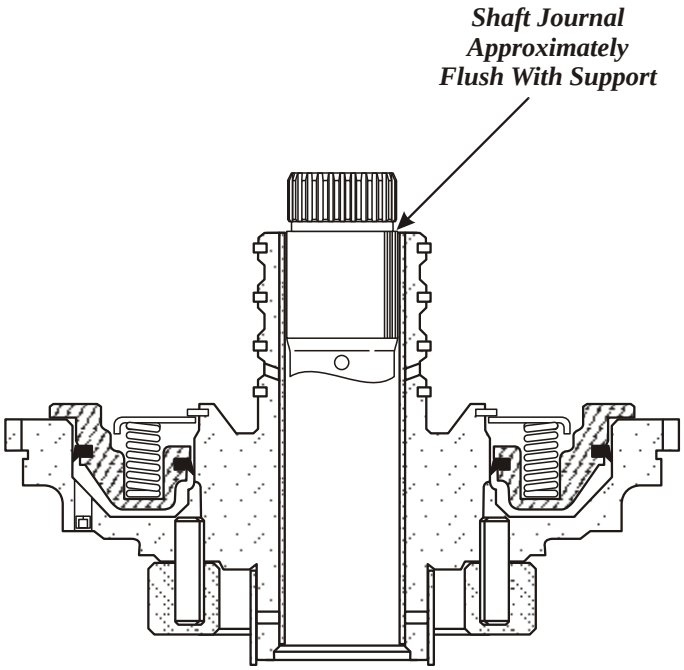
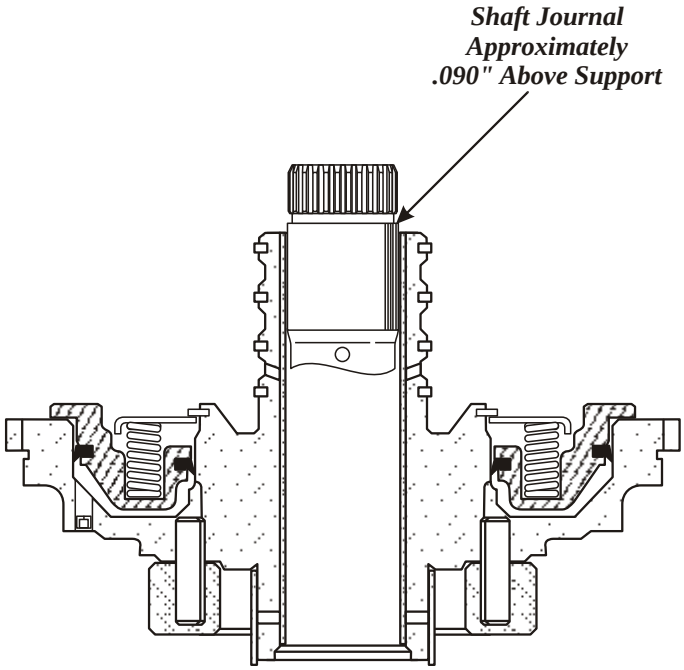


Figure 7

1999 SUN GEAR SHAFT
WITH 1997-98 CENTER SUPPORT
AND NO .041" SHIM



1997-98 SUN GEAR SHAFT
WITH 1999 CENTER SUPPORT
AND WITH .041" SHIM



"CORRECT ASSEMBLY"
WITH PROPER
SUN GEAR SHAFT
AND CENTER SUPPORT

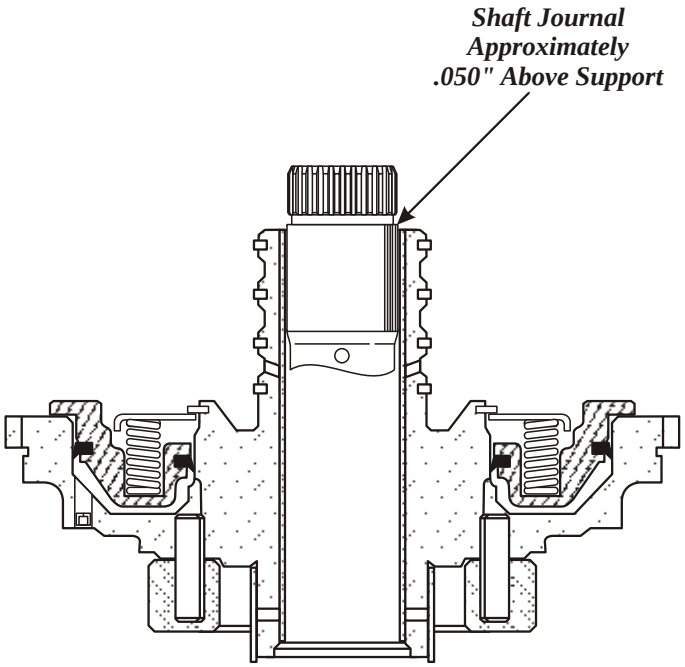


Figure 8

GM TRUCKS WITH 6.5L DIESEL ENGINE & 4L80E

SHIFT SHUTTLE

COMPLAINT: A 1999 Chevy truck with a 6.5 liter diesel engine and 4L80E transmission came in with a complaint of a 2-3, 3-2 and a 3-4, 4-3 shift shuttle at cruising speed with 25% or greater throttle opening. No codes were stored and a diagnostic check of the Accelerator Pedal Position Sensor (APPS) showed no faults.

CAUSE: The Optical/Fuel Temperature Sensor was the cause of the above complaint as shown in Figure 1. This sensor is responsible for fuel metering as well as injector pump timing. Its signal is compared to the Crankshaft Sensor for diagnostic purposes.

CORRECTION: A quick and easy way to see if this sensor is causing the complaint is to simply unplug it, and see if the shift shuttle condition is gone. If it is, replace the Optical/Fuel Temperature Sensor shown in Figure 2 at its location on top of the injector pump.

NOTE: The engine will be difficult to start, but once it's running you will be able to perform the road test with the sensor disconnected.

Many thanks to Anthony Bellino from Gibraltar Transmissions, Staten Island, N.Y. for sharing his experience with us.

A special thanks to Gary Carne from Freeway Transmissions, Salt Lake City, Utah for the excellent photo of the sensor.

Superior

Sonnax

GM TRUCKS WITH 6.5L DIESEL ENGINE & 4L80E

SHIFT SHUTTLE

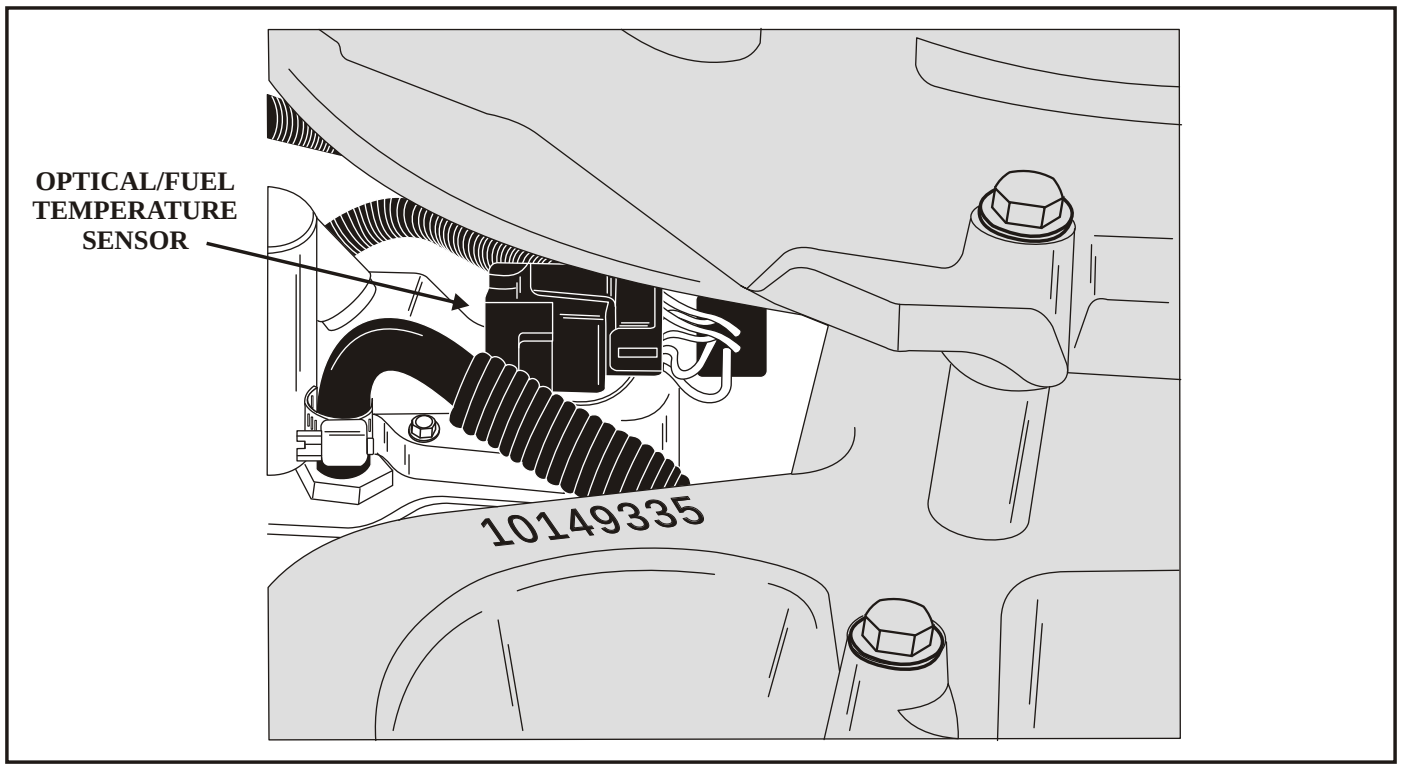


Figure 1

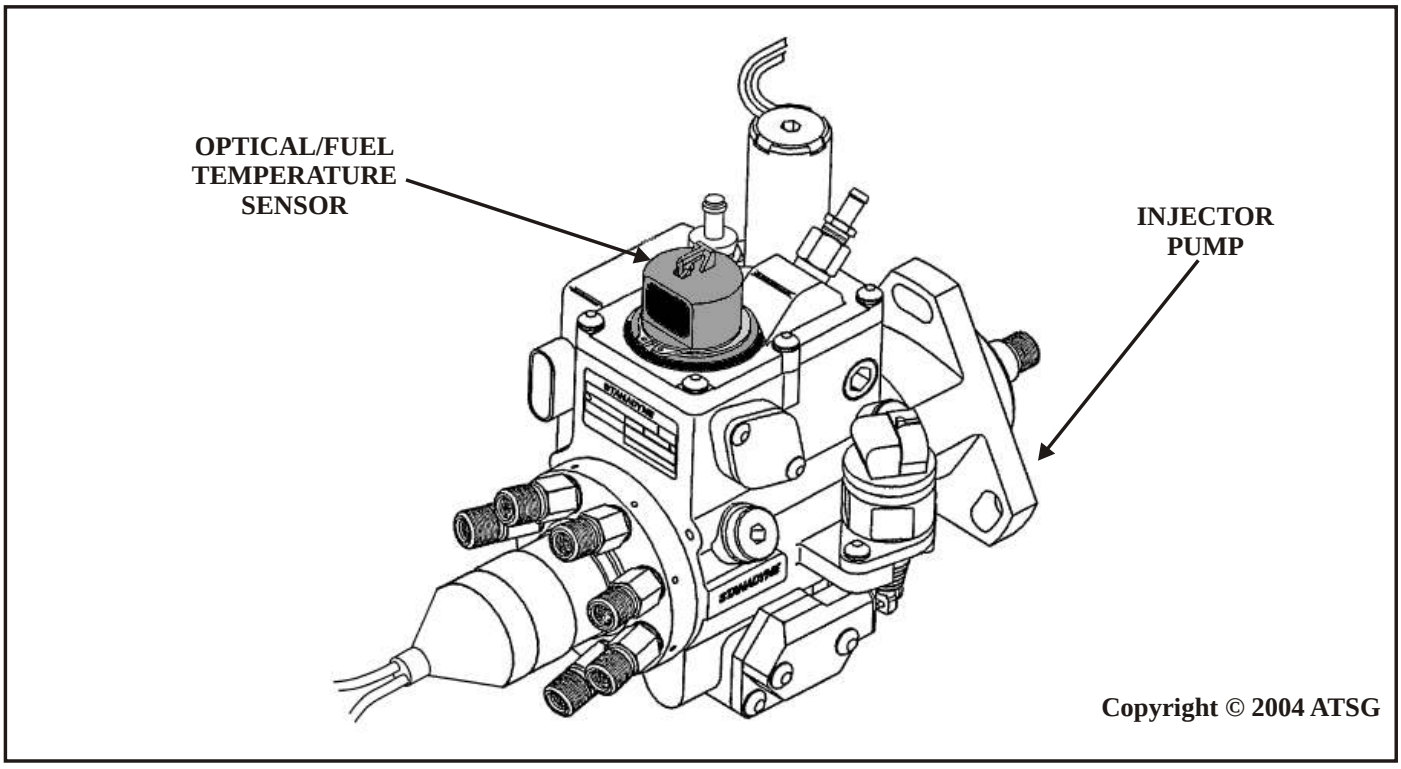


Figure 2

WIT

THM 4L60-E/4L65-E AND THM 4L80-E
NEW PRESSURE CONTROL SOLENOID

CHANGE: Beginning at the start of production for 2003 model 4L60-E and 4L65-E transmissions, and start of production for 2004 model 4L80-E transmissions, the Pressure Control Solenoid (PCS) was changed to a new design solenoid with a revised internal harness connector, as shown in Figure 1.

REASON: Eliminates mis-assembly concerns on the factory assembly line.

PARTS AFFECTED:

(1) PRESSURE CONTROL SOLENOID - Solenoid redesigned with a new design connector, as shown in Figure 1.

(2) INTERNAL WIRE HARNESS - Harness connector changed to accommodate the new solenoid connector, as shown in Figure 1.

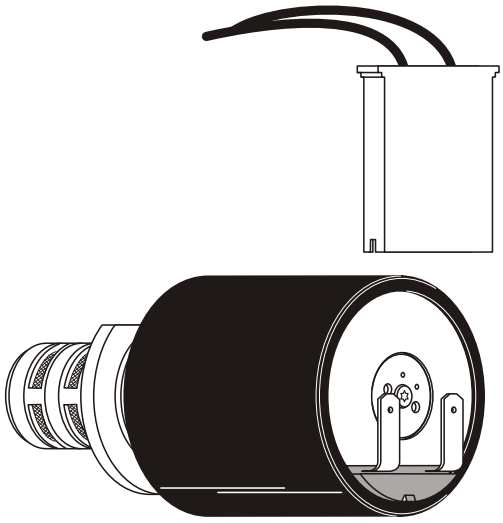
INTERCHANGEABILITY:

Will interchange as long as the internal harness used is compatable with the solenoid.

SERVICE INFORMATION:

Pressure Control Solenoid (2003 Design) 24224905
4L60-E/4L65-E, Internal Wire Harness (2003 Design) 24222891
4L80-E, Internal Wire Harness (2004 Design) 24224906

PREVIOUS DESIGN



NEW DESIGN

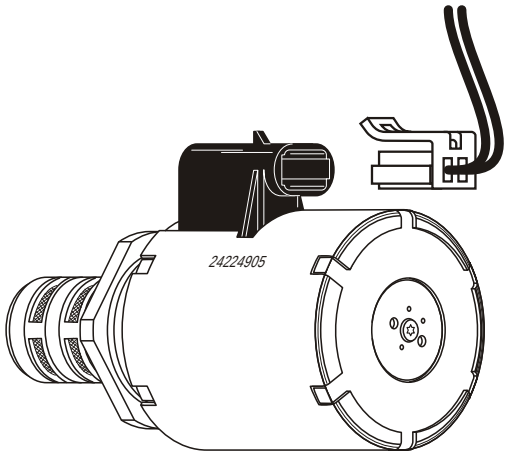


Figure 1

GM 4L60/65E & 4L80/85E

SHIFT STABILIZATION & TOW/HAUL MODE

SHIFT STABILIZATION

Selected GM trucks and vans are programmed with a feature called "Shift Stabilization". The purpose of Shift Stabilization is to reduce shift busyness during operating conditions that would otherwise result in frequent upshifts and downshifts such as towing or high altitude grade climbing.
The Shift Stabilization feature will determine if and when to delay upshifts. Shift Stabilization only affects upshifts, not downshifts.

This feature is a program that is internal to the vehicles computer. Shift Stabilization is operational in Normal Mode, Cruise Mode and Tow/Haul Mode.

Shift Stabilization calculates the required torque at the wheels in the current gear as well as the maximum torque available at the wheels in the next higher gear. If the torque in the higher gear is not sufficient, the transmission will remain in the current gear. If the torque in the higher gear is greater than or equal to the required torque, then the upshift is allowed.
High throttle opening will disable Shift Stabilization and normal downshifts will occur. Shift Stabilization occurs in the 4L60E for 2-3 and 3-4 shifts only while in the 4L80E it occurs for the 1-2, 2-3 and the 3-4 upshifts.

TOW/HAUL MODE

The purpose of the Tow/Haul Mode feature is to reduce the frequency and improve shifting when pulling a heavy load. This is most apparent in city traffic. Without Tow/Haul Mode, the transmission may upshift on a closed throttle off throttle situation. This reduces shift busyness.
Tow/Haul Mode also provides the same solid shift feel when pulling a heavy load as when the vehicle is unloaded. It also improves control of vehicle speed while requiring less throttle pedal activity when pulling a heavy load.

Tow/Haul Mode is selected via a switch at the end of the Manual shift lever, (Refer to Figure 1), or on the shifter console. A lamp on the instrument panel will illuminate to indicate that Tow/Haul Mode has been selected, (Refer to Figure 2). Tow/Haul Mode must be re-selected every time the ignition is cycled.

Tow/Haul Mode is designed to be most effective when the vehicle and load combined weight is at least 75% of the vehicle's Gross Combined Weight Rating (GCWR).
Operation of Tow/Haul Mode in a lightly loaded or "no load" vehicle will not cause any damage, but may result in uncomfortable shift qualities and reduced fuel economy. Tow/Haul Mode only affects shift points below 55 mph (88 km/h).

SHIFT STABILIZATION & TOW/HAUL MODE

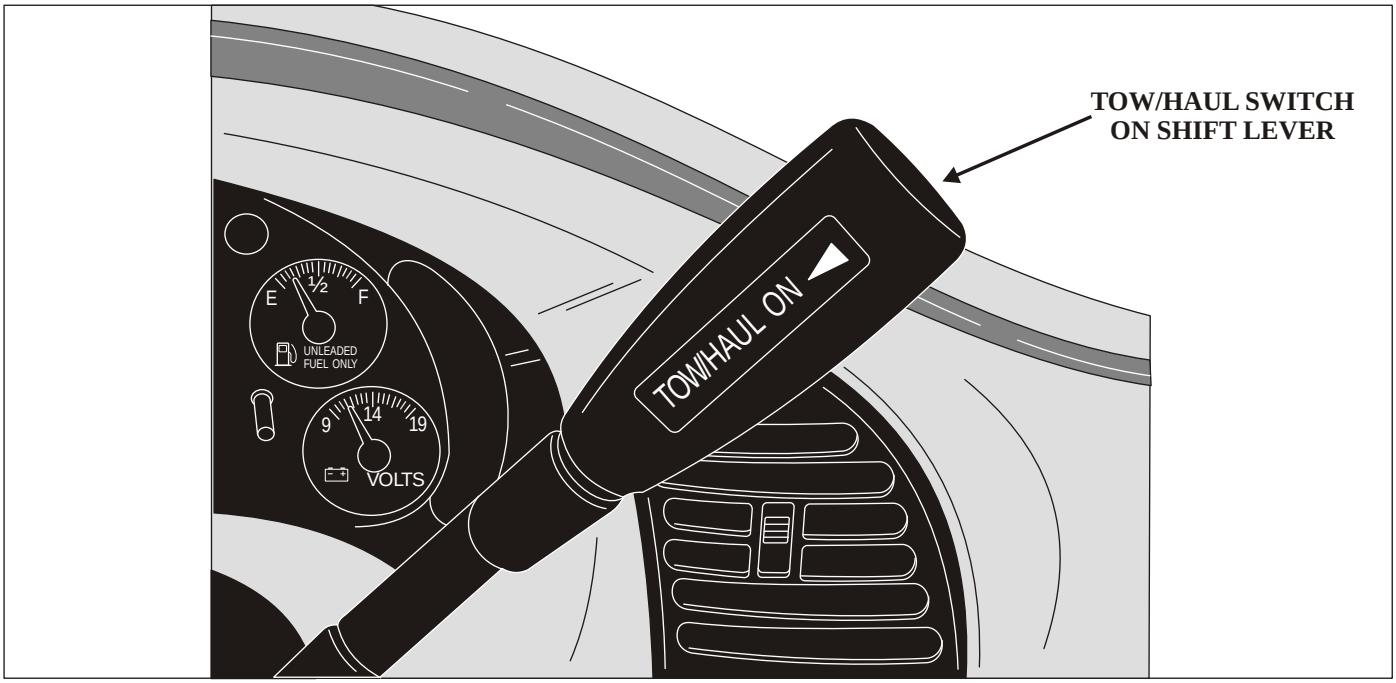


Figure 1

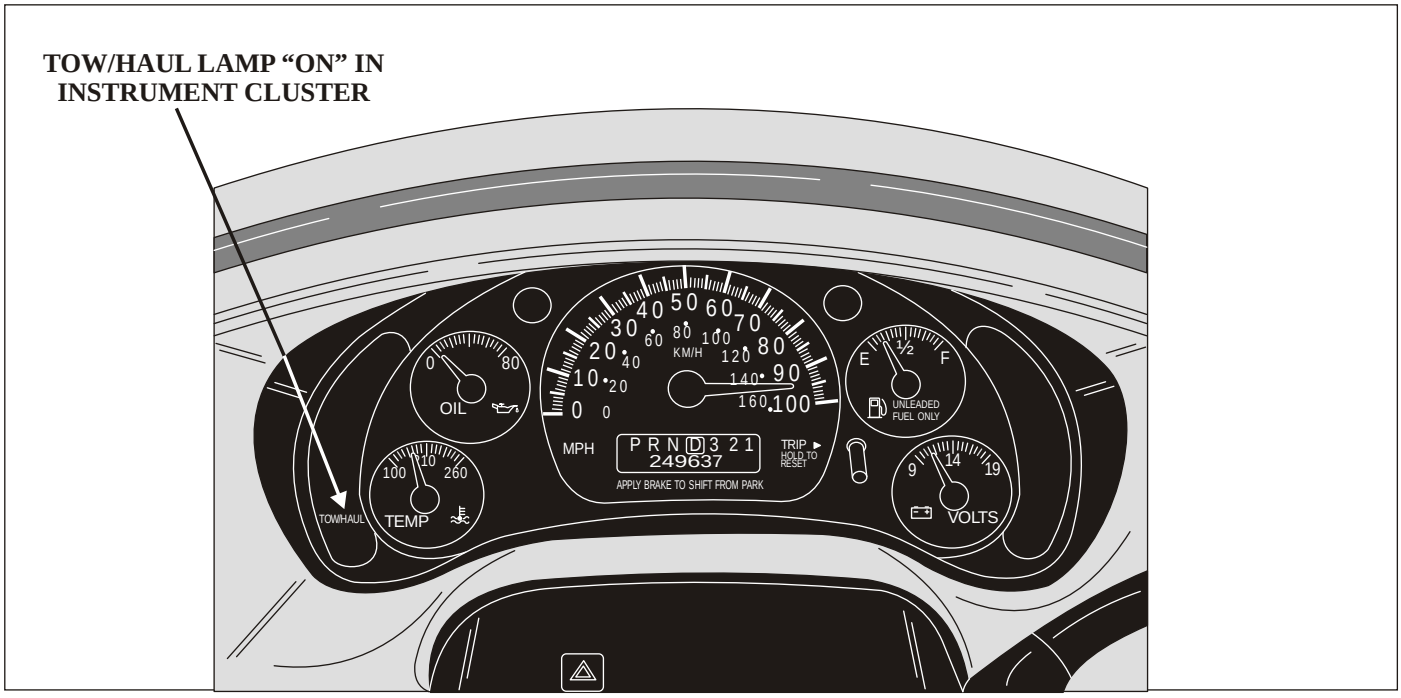


Figure 2

THM 4L60-EHD
NEW "HARDENED" SUN SHELL AND THRUST BEARING

CHANGE: Beginning at the start of production for model year 2001, General Motors introduced a new transmission designated THM 4L60-EHD with many engineering changes. Currently this unit is found in all 2001 Cadillac Escalade and any vehicle with 6.0L engine or larger, that was previously equipped with the THM 4L60-E transmision. One of the changes includes a new design sun gear shell and thrust bearing to replace the previous design washer, as shown in Figures 1 and 2.

Special Note:
General Motors has now released a new Sun Gear Shell with hardened splines and the part numbers are shown below in "Service Information".

REASON: Increased durability and reliability.

PARTS AFFECTED:

(1) SUN GEAR SHELL - The holes in the sun shell for the previous thrust washer have been eliminated, as shown in Figures 1 and 2, to accommodate the new thrust bearing.

(2) REACTION CARRIER SHAFT - Modified on the rear surface to accommodate the added thrust bearing, as shown in Figures 3 and 4.

(3) THRUST BEARING - Added for increased durability, as shown in Figures 3 and 4.

INTERCHANGEABILITY:

Will Not interchange with any previous design parts, but ***Will*** retro-fit back on any previous model 4L60-E transmission, ***when used as a service package.***

Special Note:
General Motors has now released a new Sun Gear Shell with hardened splines and the part numbers are shown below in "Service Information".

SERVICE INFORMATION:

Sun Gear Shell (Bearing Design "Hardened")	24229825
Reaction Carrier Shaft (New Design)	24217157
Sun Shell Thrust Bearing (New Design)	24217328
Sun Gear Shell (Washer Design "Hardened")	24228345

PREVIOUS DESIGN
SUN SHELL AND WASHER

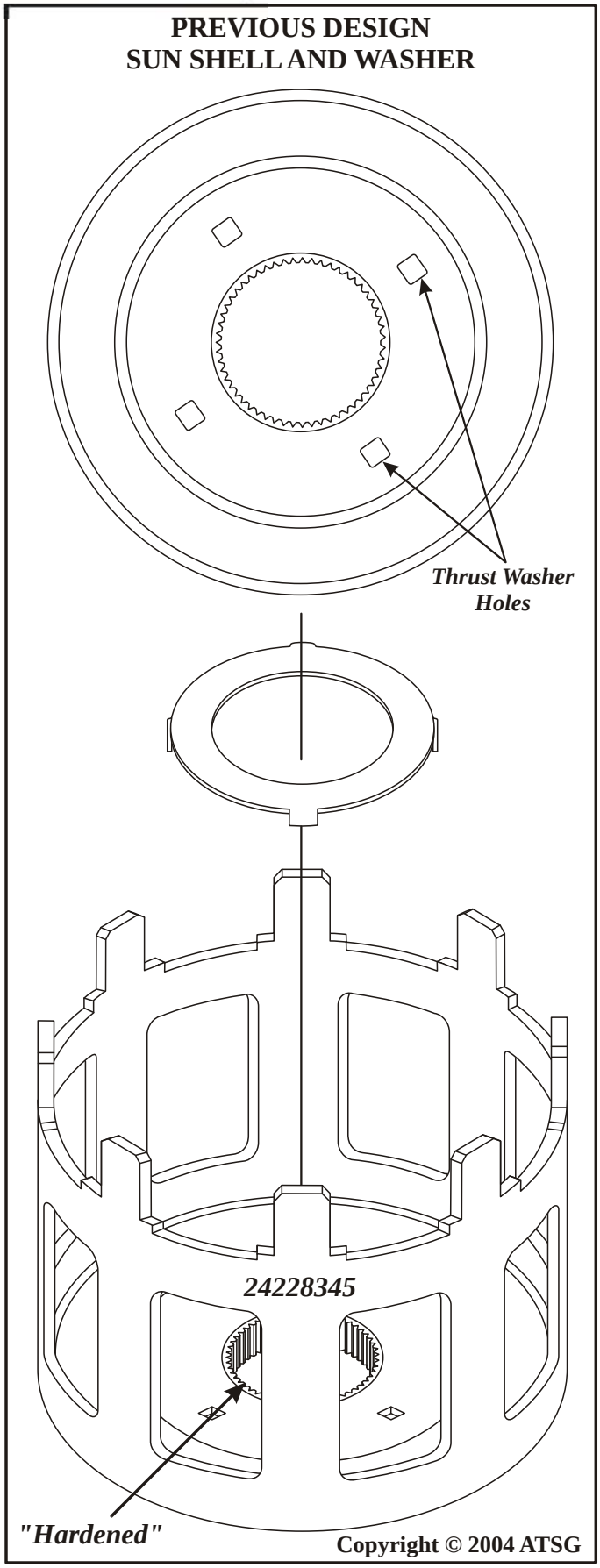


Figure 1

NEW DESIGN
SUN SHELL AND BEARING

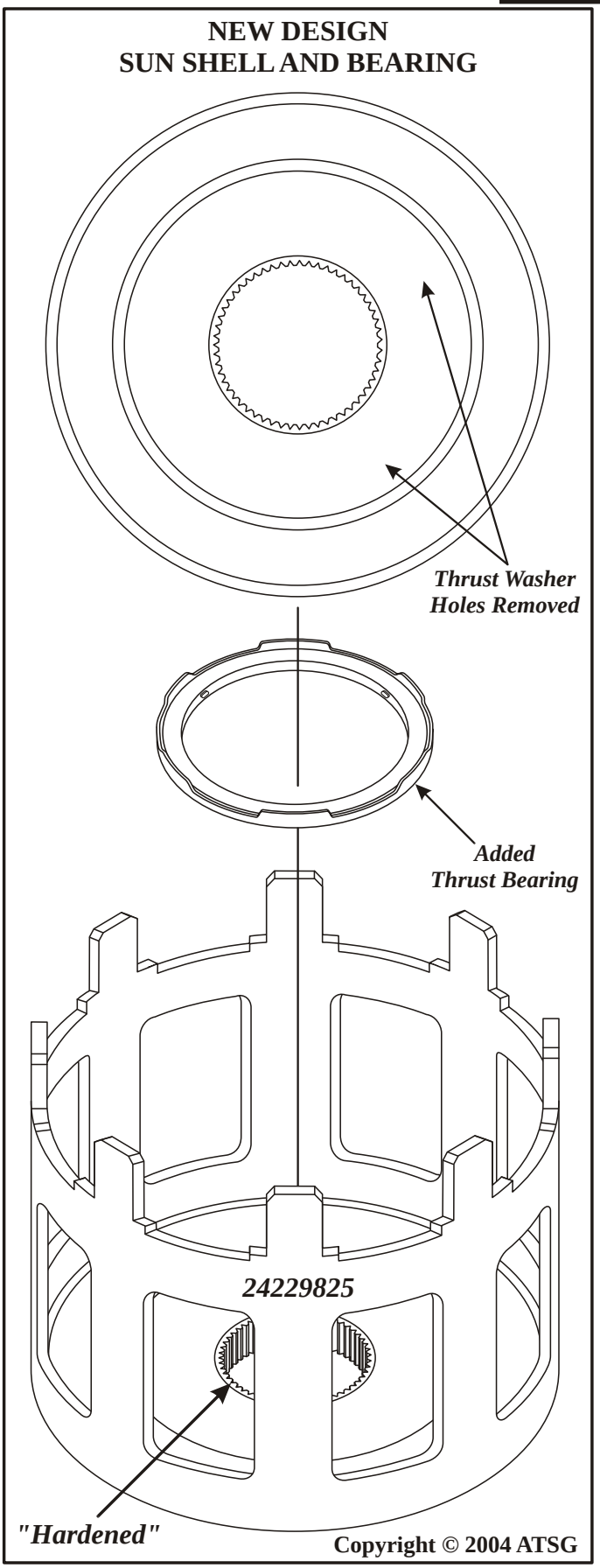


Figure 2

THM 4L60-E REACTION SHAFT AND NEW THRUST BEARING

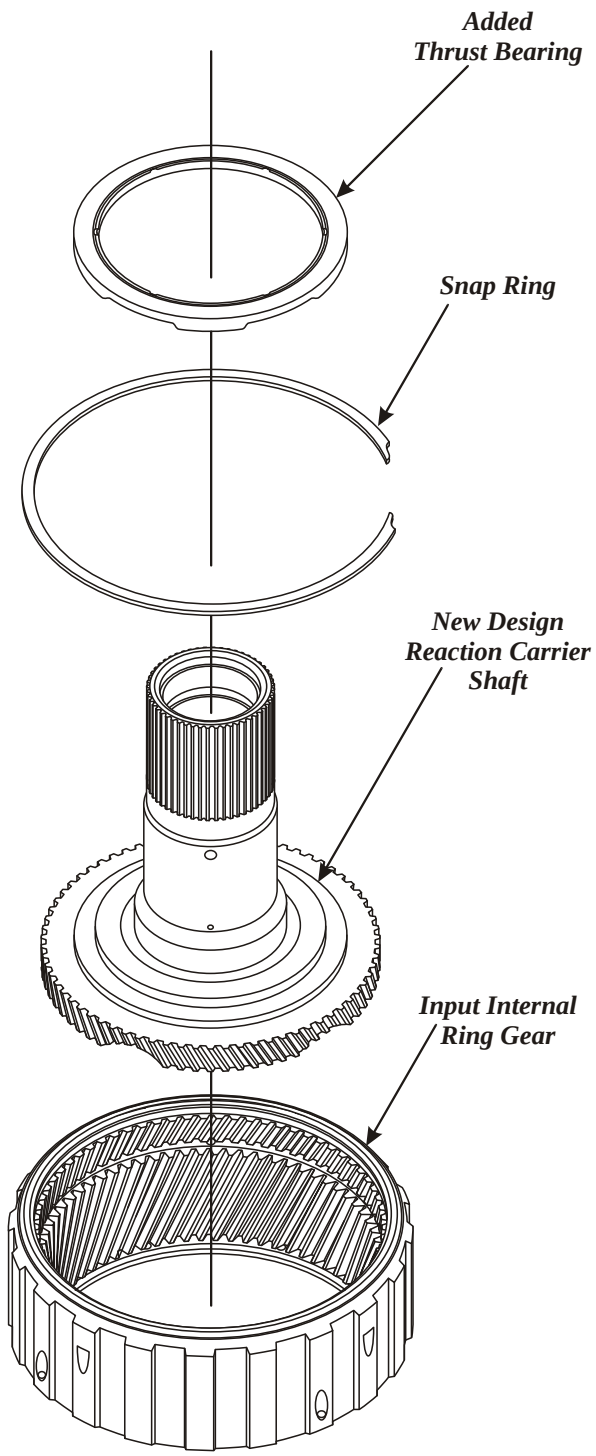
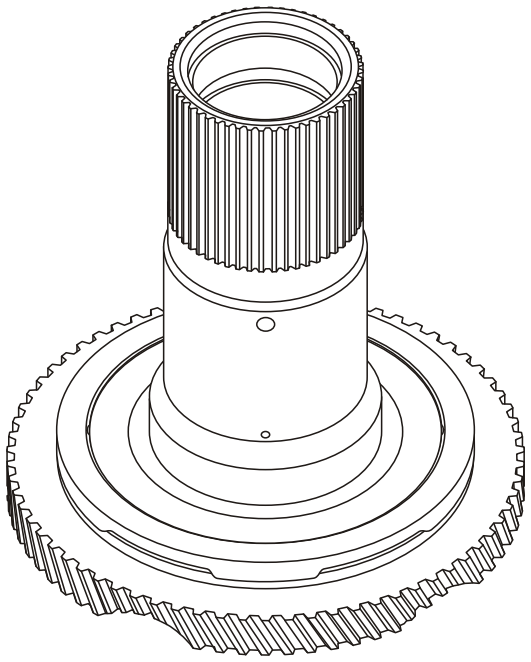


Figure 3

THM 4L60-E REACTION SHAFT WITH BEARING INSTALLED



Thrust Bearing Is Installed With "Lips" Facing Down And Snaps Into Place As Shown

Figure 4

2001-03 "C/K" TRUCK WITH 4L60E TRANSMISSION

SLIPPING 1-2 SHIFT OR SHUDDER

COMPLAINT: Trucks built before August 5, 2003 may have a complaint of slipping, shudder or a vibration on the 1-2 shift.

CAUSE: A 12 Hz electrical feedback from the charging circuit may be affecting the proper operation of the transmissions pressure control solenoid. This causes a fluctuation of line pressure which causes the above complaints when line pressure dips below normal.

CORRECTION: ***First, with the complaint present, disconnect the four (4) way connector (with 2 or 3 wires in the connector) from the alternator. If the complaint no longer exists perform the procedure listed below.***
The alternator will require the installation of an external "Sense Lead" which is accomplished by adding a wire from the alternator four wire connector to the alternator output "BAT" terminal. The procedure is as follows as seen in figure 1:

(1) Disconnect the negative cable from the battery/batteries.
(2) Slide the protective boot on the alternator "BAT" terminal aside and remove the retainer and wire cable from the "BAT" terminal.
(3) Unplug the alternator 4 cavity connector from the top of the alternator.
(4) Inspect cavity "D" on the alternator connector for a ***red*** cavity plug.
  (a) If a ***red*** cavity plug is present, it is not necessary to replace the generator connector.
    Remove the ***red*** cavity plug and continue with step 9.
  (b) If a red cavity plug is NOT present, continue with the next step.
(5) Remove and save the ***orange*** weather-pack seal from the 4 way connector.
(6) Remove the 2 or 3 wires from the 4 way connector.
  (a) On vehicles without Supplemental Brake Assist (SBA), install a ***red*** cavity plug into cavity "A" of the new 4 way connector.
  (b) On some 2003 models with "SBA", install the ***dark blue*** (circuit 5668) wire of the vehicle wire harness into cavity "A" of the new 4 way connector.
(7) Install the ***brown*** (circuit 25) wire of the vehicle wire harness into cavity "B" of the new 4 way connector.
(8) Install the ***gray*** (circuit 23) wire of the vehicle wire harness into cavity "C" of the new 4 way connector.
(9) Obtain a piece of 0.8mm (18 gauge) **black** wire, 254mm long (8") long.
(10) Install a ***red*** terminal seal, and terminal end, on one end of the new ***black*** wire.
(11) Install the new ***black*** wire into cavity "D" of the new 4way connector.
(12)Reinstall the connector seal from the original connector, to the new connector.
(13) Plug the 4 way connector into the alternator.
(14) Route the ***black*** wire to the alternator "BAT" terminal, sliding the wire into the small end to the output terminal boot along side the alternator output wire.
(15) Crimp and solder the ring terminal on the open end of the new ***black*** wire.
(16) Place the alternator output wire and the new ***black*** wire onto the alternator "BAT" terminal and install the retainer. Connect and tighten the "BAT" terminal retainer to 80 in. lb. (9 N.m).
(17) Connect and tighten battery cable to 13 ft. lbs. (17 N.m).

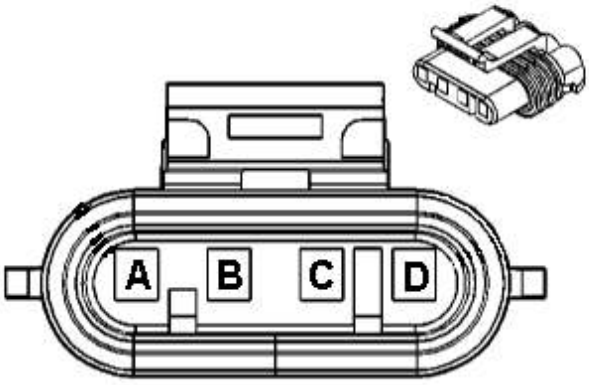
2001-03 "C/K" TRUCK WITH 4L60E TRANSMISSION

SLIPPING 1-2 SHIFT OR SHUDDER

SERVICE INFORMATION:

Terminal.....12048074
Cavity Plug.....12059168
Red Wire Seal.....12048086
Ring Terminal.....12103514
Connector.....12186568

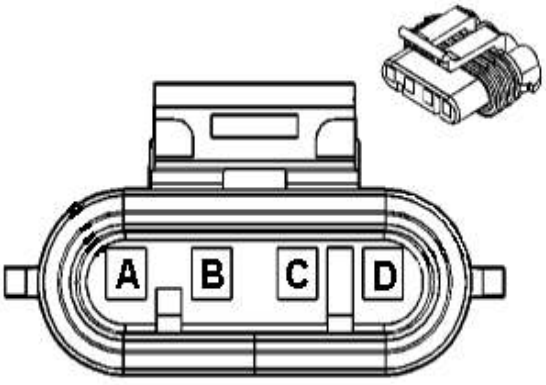
BEFORE REWIRING



4 Way Connector using 3 Wires

Pin	Wire Color	Cir cuit No.	Function
A	DK BLU	5668	Engine On Signal
B	BRN	25	Charge Indicator Control
C	GRY	23	Generator Field Duty Cycle Signal
D	—	—	Not Used

AFTER REWIRING



Pin	Wire Color	Cir cuit No.	Function
A	DK BLUE	5668	Engine On Signal
B	BROWN	25	Charge Indicator Control
C	GRAY	23	Generator Field Duty Cycle Signal
D	BLACK	—	"BAT" TERMINAL

Figure 1

GM TRUCKS & VANS WITH 4L80E

GARAGE SHIFT ENGINE STALL

COMPLAINT: As the vehicle comes to a stop or when shifting from park to drive or reverse, 1998 to 2000 Chevrolet and GMC C/K trucks and G vans with the 4L80E transmission,may experience engine stall. On some occasions the engine may surge as well.

CAUSE: The transmission calibration programmed into the VCM is causing the above complaint.

CORRECTION: Have the vehicle computer re-programmed with the latest software as the example shows in Figure 1. This information is found by going to the GM Calibration website which is calid.gm.com and entering the vehicles VIN number.

GM Service and Parts Operations

Vehicle Calibration Information

VIN: 1GCEC19V0XZ144977 **Calibration Selection**

☑Operating System	☑ Engine	☑ Engine Diagnostic	☒ Transmission	☑ Transmission Diagnostic	☑ Fuel System	☑ System	☑ Speedometer

◉ **9358565**

Calibration History for: Engine

Part Number	CVN	Bulletin #	Description
9358565	0000D4A6	00-07-30-006	NEW CALIBRATION TO ADDRESS A STALL OR SURGE WHEN COMING TO A STOP OR WHEN SHIFTING TO DRIVE OR REVERSE

Figure 1

THM 4L60-E/4L65-E

NEW OIL PUMP TO CASE SEAL FOR 2004 MODELS

CHANGE: An improved oil pump to case seal design has been implemented on the 4L60-E/4L65-E family of transmissions, to replace the previous design "D" ring seal, as shown in Figure 1. The complete design was implemented in three phases, beginning in September, 2002 and completion in March 2004.

REASON: To eliminate damage to the previous design "D" ring seal during assembly.

PARTS AFFECTED:

(1) OIL PUMP BODY - Beginning in September 2002, the "D" ring seal groove moved 1.6mm (.063") inward on the pump body to place the sealing surface deeper into the case bore. The relocated pump body groove can be identified by measuring the groove location, as shown in Figure 2. Pump bodies that measure 2.3mm (.090"), as shown in Figure 2, are the ones with the relocated seal groove. Pump bodies that measure 3.9.. (.153"), as shown in Figure 2, are the prior to September 2002 design.

(2) TRANSMISSION CASE - Phase 1 also machined a modified case chamfer leading into the pump case bore, as shown in Figure 3. Phase 2 modified the case casting and again the machined chamfer into the pump bore. The casting change left additional material in the surrounding pump bore to allow deeper bore machining in order to create the necessary sealing surface for the new stamped steel molded rubber design seal, as shown in Figure 3.

(3) OIL PUMP TO CASE SEAL - Beginning in March 2004, the new stamped steel molded rubber seal is used to seal the pump assembly to the case, as shown in Figure 3 and 4.

(4) OIL PAN BOLTS - Beginning in January, 2004, 1.0 mm (.040") shorter pan bolts were put into production units in preparation for Phase 3. As a result of the modified casting and the deeper pump bore machining, the area between the oil pan mounting surface and the pump bore was decreased. Because of the reduced material in this area, it was necessary to use the shorter pan bolts. Early pan bolts, before November 2002, should not be used with the modified case design, since they are 1.0 mm (.040") longer and could deform the oil seal chamfer surface in the case bore. Refer to Figure 4 for pan bolt differences.

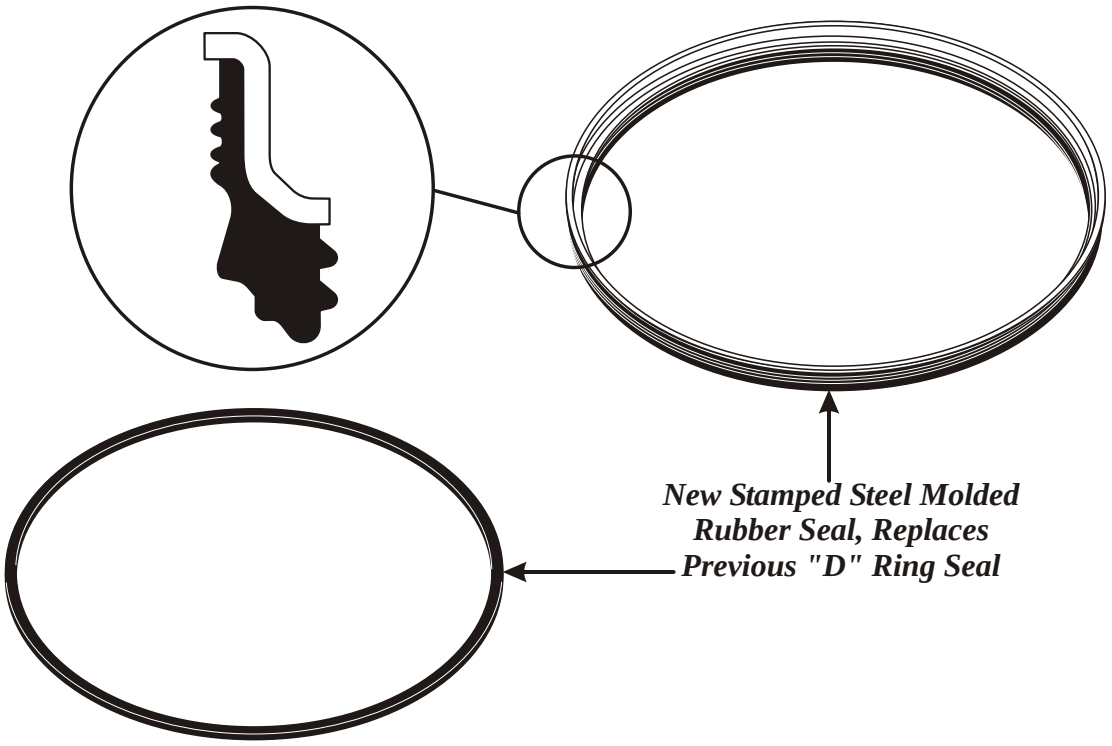
INTERCHANGEABILITY:

We have provided you with a chart in Figure 1, to help eliminate mis-assemblies.

Special Note:

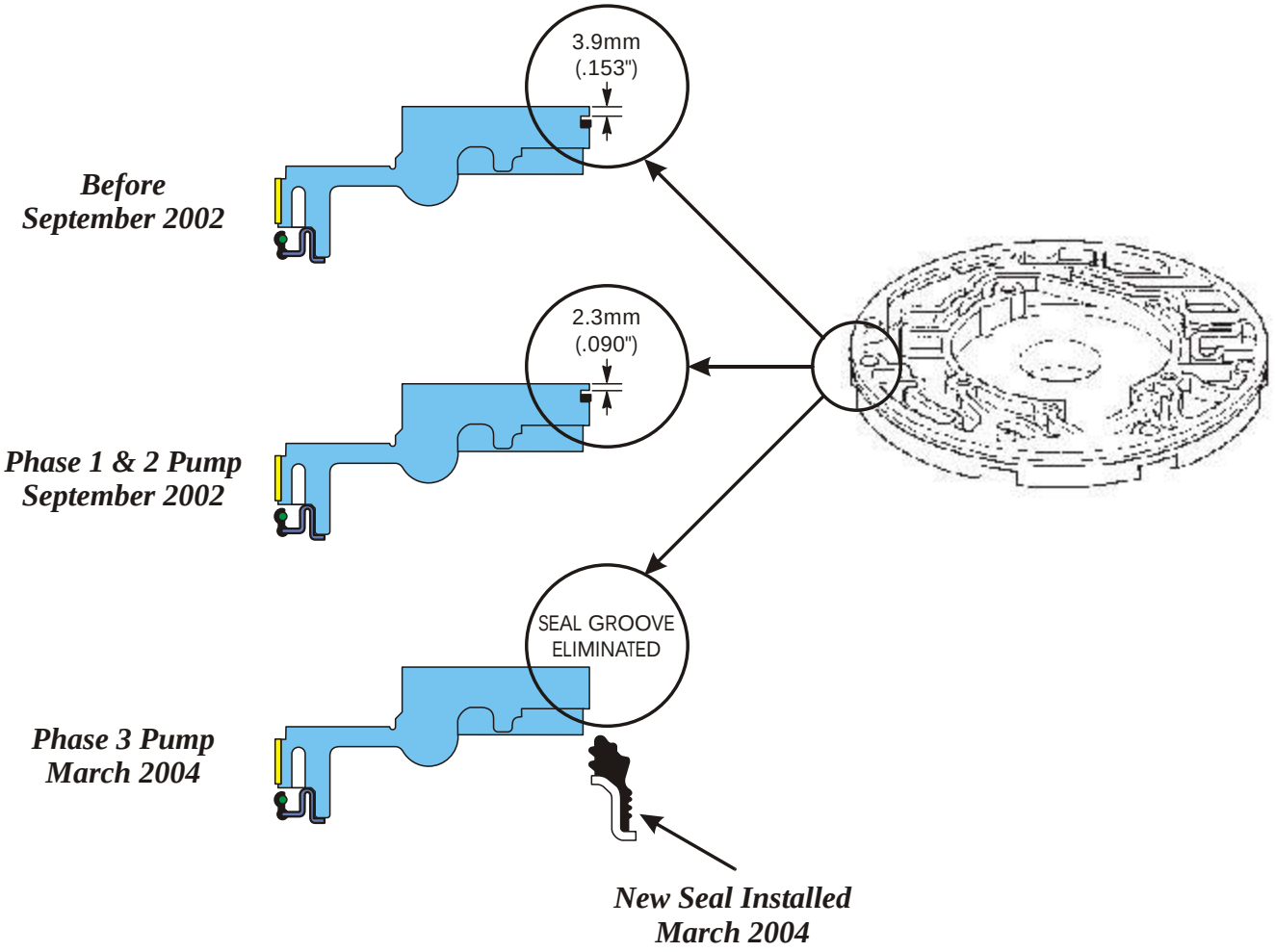
Beginning in March 2004, the "D" ring seal groove and the "D" ring were eliminated, and at the same time the new stamped steel molded rubber pump to case seal was implemented, which changes the assembly process. Unlike the "D" ring seal, the new seal is installed after the pump assembly is properly positioned and torqued in place. Seating the seal is accomplished when the bell housing is installed, which presses the seal into position between the pump and the case bore, as shown in Figure 4.

NEW OIL PUMP TO CASE SEAL



Component	*Case Prior To July 2002*	*Phase 1 Case Modified Chamfer After Jan. 2003*	*Phase 2 Case Modified Casting After Nov. 2003*	*Phase 3 Case And New Seal After March, 2004*
Pump Body 24230111 ***Without "D" ring seal groove***	*DO NOT USE*	*DO NOT USE*	*DO NOT USE*	*"MUST" USE*
Pump Body 24230110 ***Relocated "D" ring seal groove***	*MAY USE*	*USE*	*USE*	*DO NOT USE*
"D" Ring Seal 24210605	*USE*	*USE*	*USE*	*DO NOT USE*
New Stamped Steel Molded Rubber Seal 24226315	*DO NOT USE*	*DO NOT USE*	*DO NOT USE*	*"MUST" USE*
Previous Pan Bolt 8657000 M8 X 1.25 X 18.9 ***(Before Jan, 04)***	*USE*	*USE*	*DO NOT USE*	*DO NOT USE*
New Pan Bolt 24226008 M8 X 1.25 X 17.9 ***(After Jan, 04)***	*MAY USE*	*MAY USE*	*MAY USE*	*"MUST" USE*

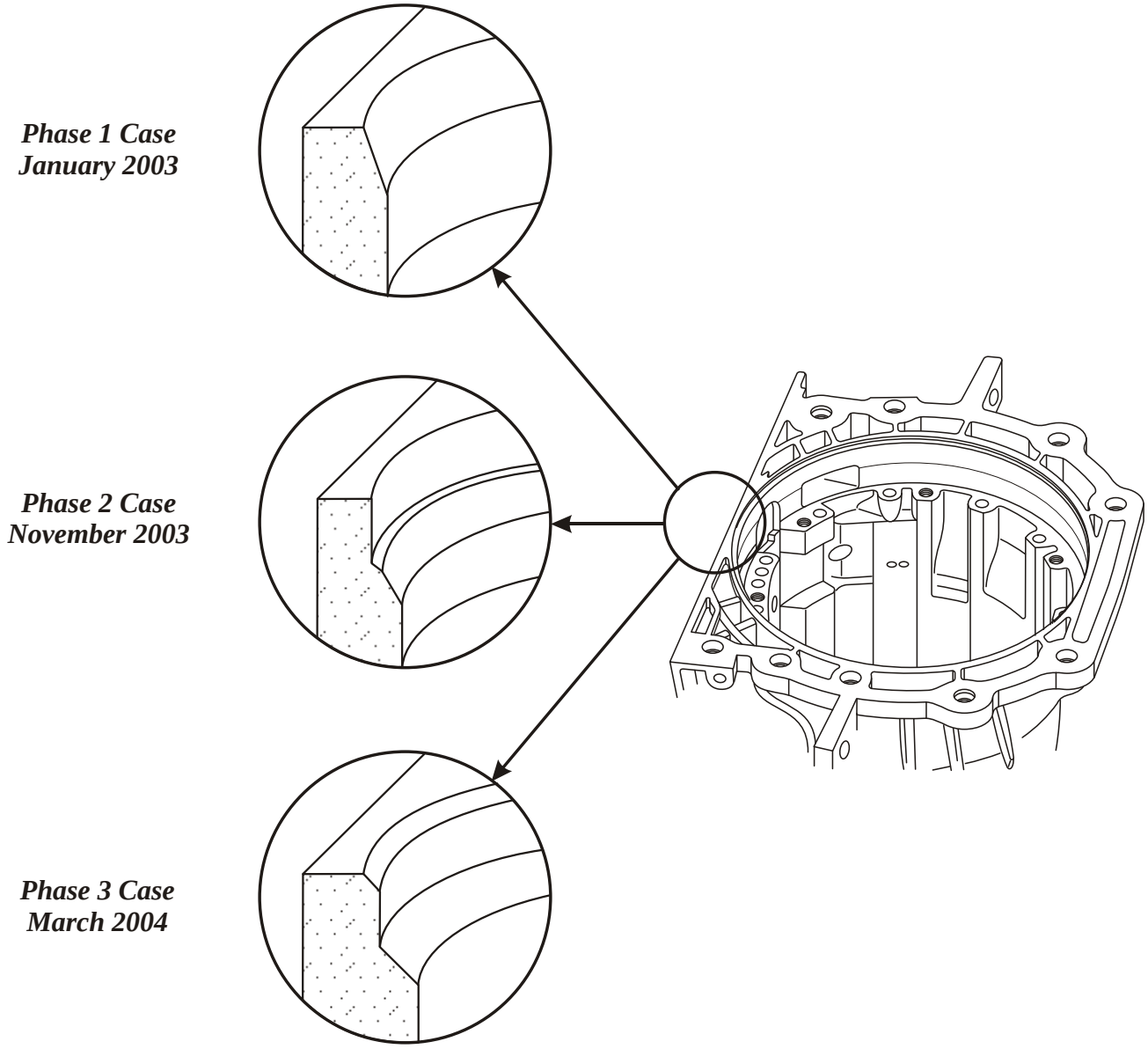
Figure 1



Phase 1 Pump Body:
Beginning in September 2002, the "D" ring seal groove moved 1.6mm (.062") inward on the pump body to place the sealing surface deeper into the case bore. The relocated pump body groove can be identified by measuring the groove location, as shown above.

Phase 3 Pump Body:
Beginning in March 2004, the "D" ring seal groove and the "D" ring were eliminated, and at the same time the new stamped steel molded rubber pump to case seal was implemented, which changes the assembly process. Unlike the "D" ring seal, the new seal is installed after the pump assembly is properly positioned and torqued in place. Seating the seal is accomplished when the bell housing is installed, which presses the seal into position between the pump and the case bore. Refer to Figure 4.

Figure 2

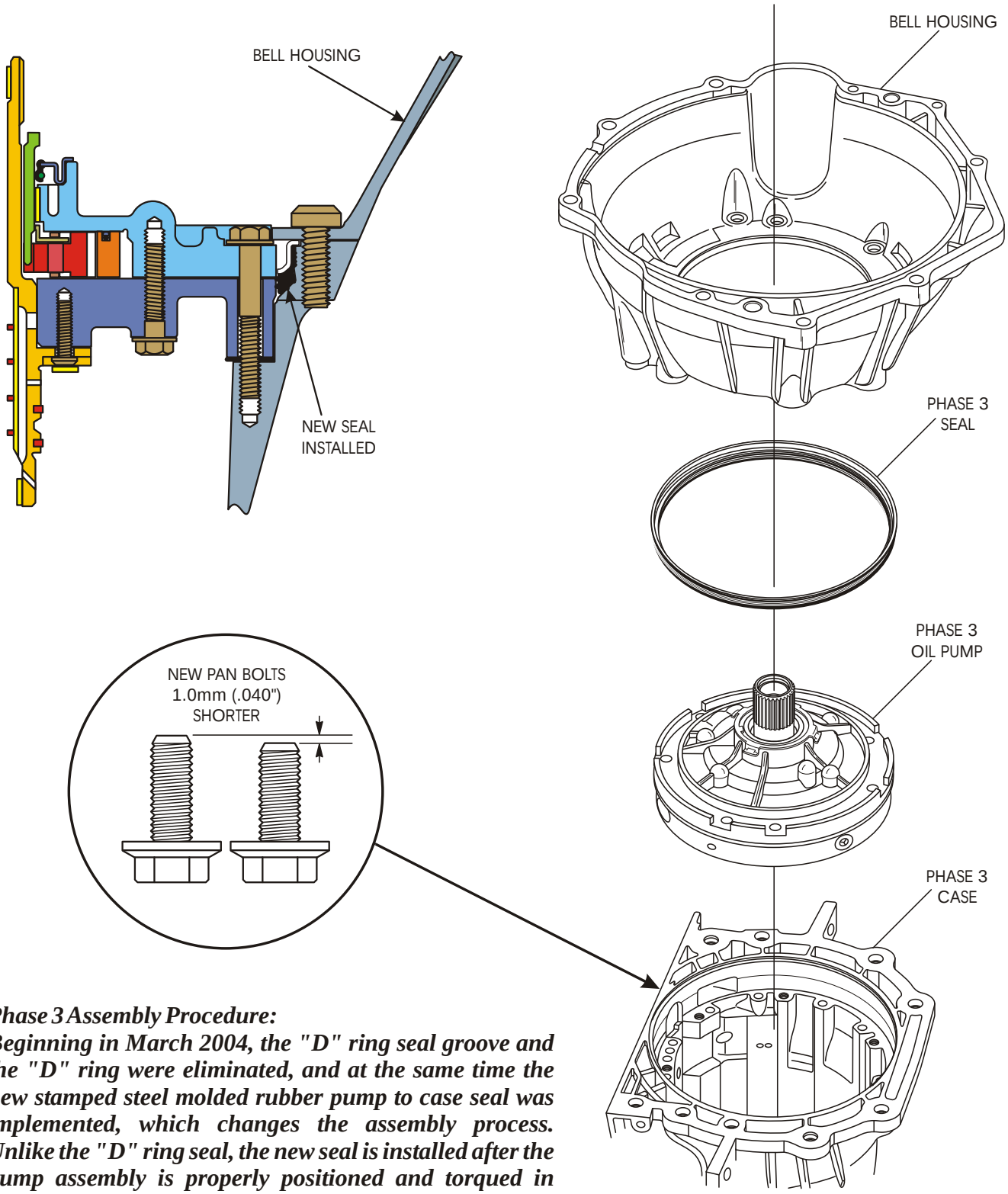


Phase 1 Case:
Revised machining with a case chamfer leading into the pump bore. This chamfer is designed to help eliminate possible "D" ring damage during pump installation on the assembly line.

Phase 2 Case:
The case casting and the chamfer into the case bore were both modified. The casting change left additional material in the surrounding pump bore to allow deeper bore machining in order to create the necessary sealing surface for the new pump seal design. The leading surface into the pump bore was also machined with a modified chamfer.

Figure 3

PHASE 3 COMPONENTS



Phase 3 Assembly Procedure:
Beginning in March 2004, the "D" ring seal groove and the "D" ring were eliminated, and at the same time the new stamped steel molded rubber pump to case seal was implemented, which changes the assembly process. Unlike the "D" ring seal, the new seal is installed after the pump assembly is properly positioned and torqued in place. Seating the seal is accomplished when the bell housing is installed, which presses the seal into position between the pump and the case bore, as shown above.

Figure 4

THM 4L60-E

NEW PARK/NEUTRAL BACK-UP FOR ALL 2004 MODELS

CHANGE: At the start of production for 2004 vehicles, equipped with the THM 4L60-E transmission, have a revised Park/Neutral Back-Up (PNBU) switch which was implemented with one 12 pin connector instead of the previous design two connectors (See Figure 2). 2000-2003 models are shown in Figure 3.

REASON: Improved reliability and durability.

PARTS AFFECTED:

(1) PARK/NEUTRAL BACK-UP SWITCH - Now has only one connector instead of the previous two connector switch, as shown in Figure 1.

(2) PARK/NEUTRAL BACK-UP SWITCH CONNECTOR - Revised vehicle harness connector to accommodate the revised PNBU Switch, as shown in Figure 2.

INTERCHANGEABILITY:

Will not interchange with any previous models.

SERVICE INFORMATION:

Park/Neutral Switch (1996-2003 Models)	29540479
Park/Neutral Switch (2004-Up Models)	24221125

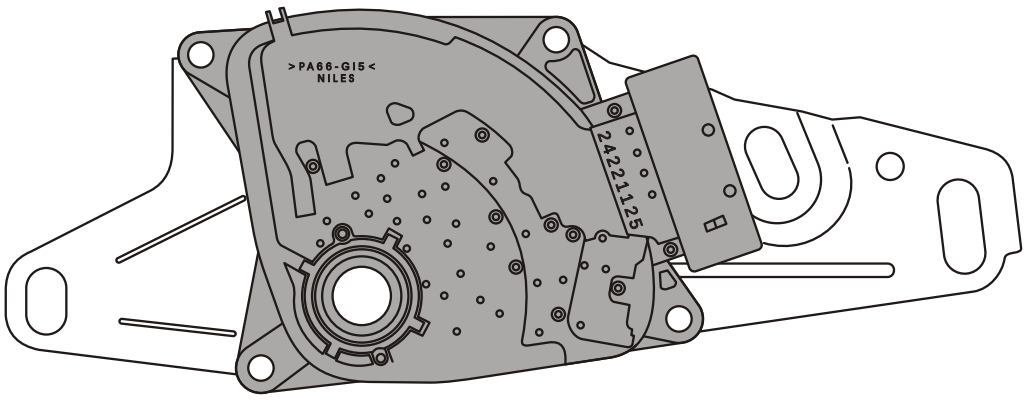
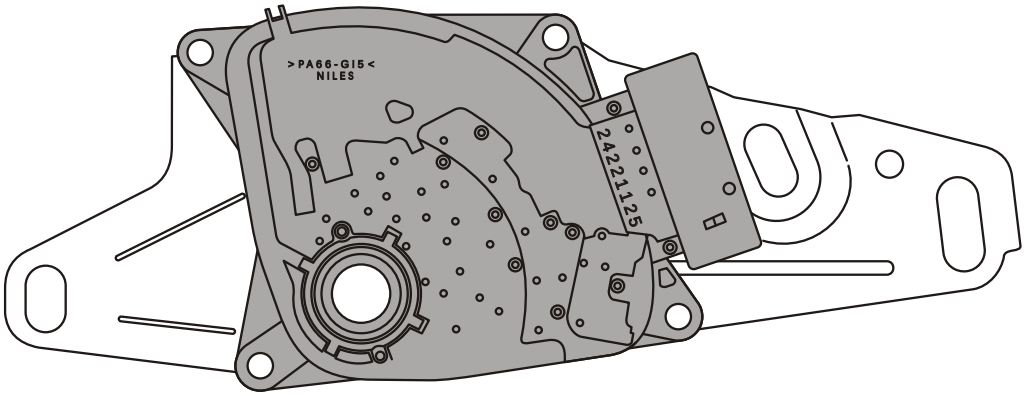


Figure 1

2004 PARK/NEUTRAL BACK-UP SWITCH

PIN	*Wire Color*	*Circuit*	*Function*
1	*Dk Green*	*1433*	*Clutch Start Switch*
2	--------	--------	*Not Used*
3	--------	--------	*Not Used*
4	*Yellow*	*772*	*Transmission Range Switch "B"*
5	*Black/White*	*771*	*Transmission Range Switch "A"*
6	*Gray*	*773*	*Transmission Range Switch "C"*
7	*Black/White*	*451*	*Ground*
8	*White*	*776*	*Transmission Range Switch "P"*
9	*Lt Green*	*275*	*Park/Neutral Position Switch Signal*
10	*Gray*	*1524*	*Back-Up Lamp Supply Voltage*
11	*Pink*	*839*	*Ignition 1 Voltage*
12	*Purple*	*639*	*Ignition 1 Voltage*



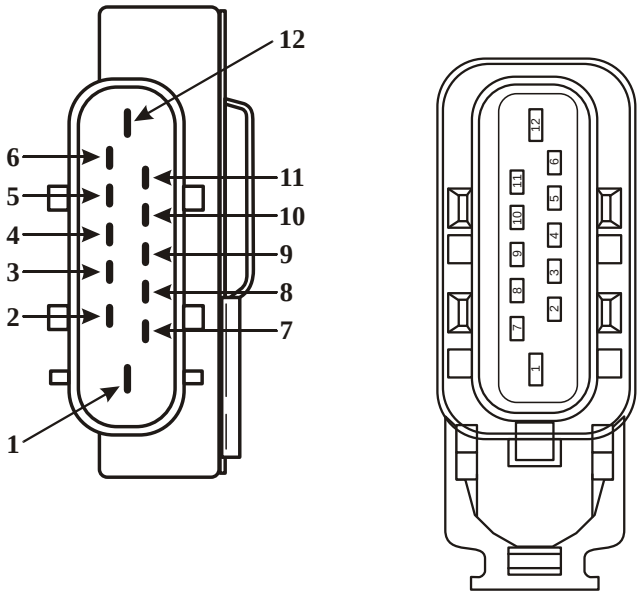
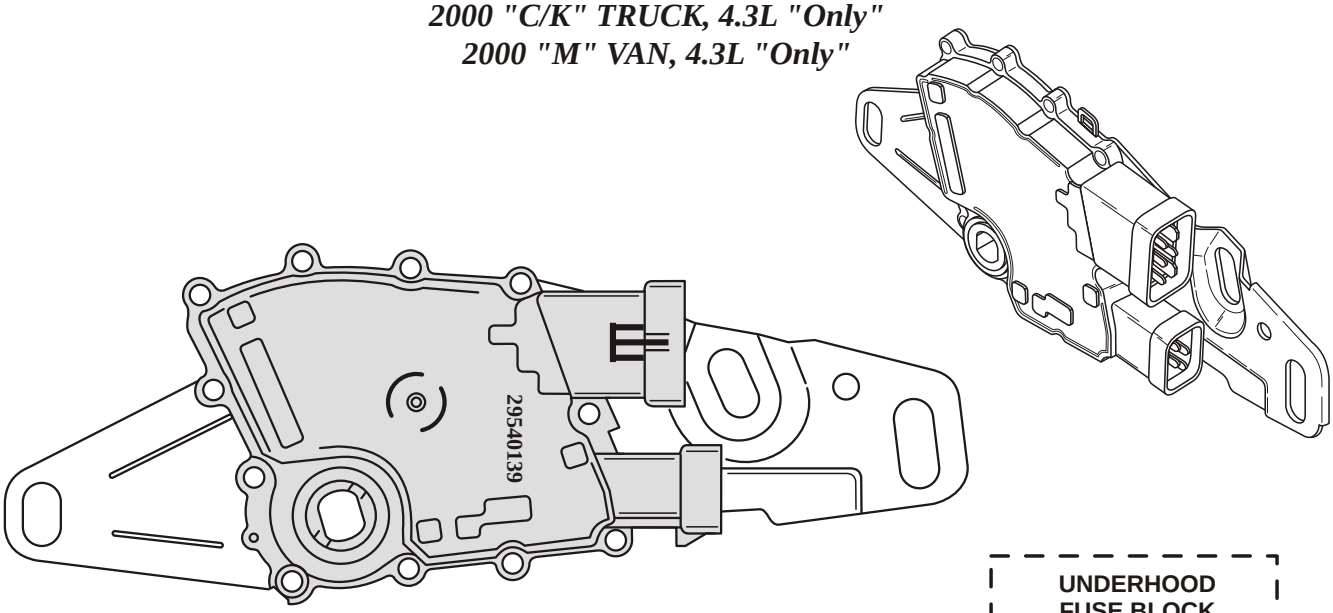


Figure 2

2000-2003 PARK/NEUTRAL BACK-UP SWITCH

2000 "S/T" TRUCK, 4.3L "Only"
2000 "C/K" TRUCK, 4.3L "Only"
2000 "M" VAN, 4.3L "Only"



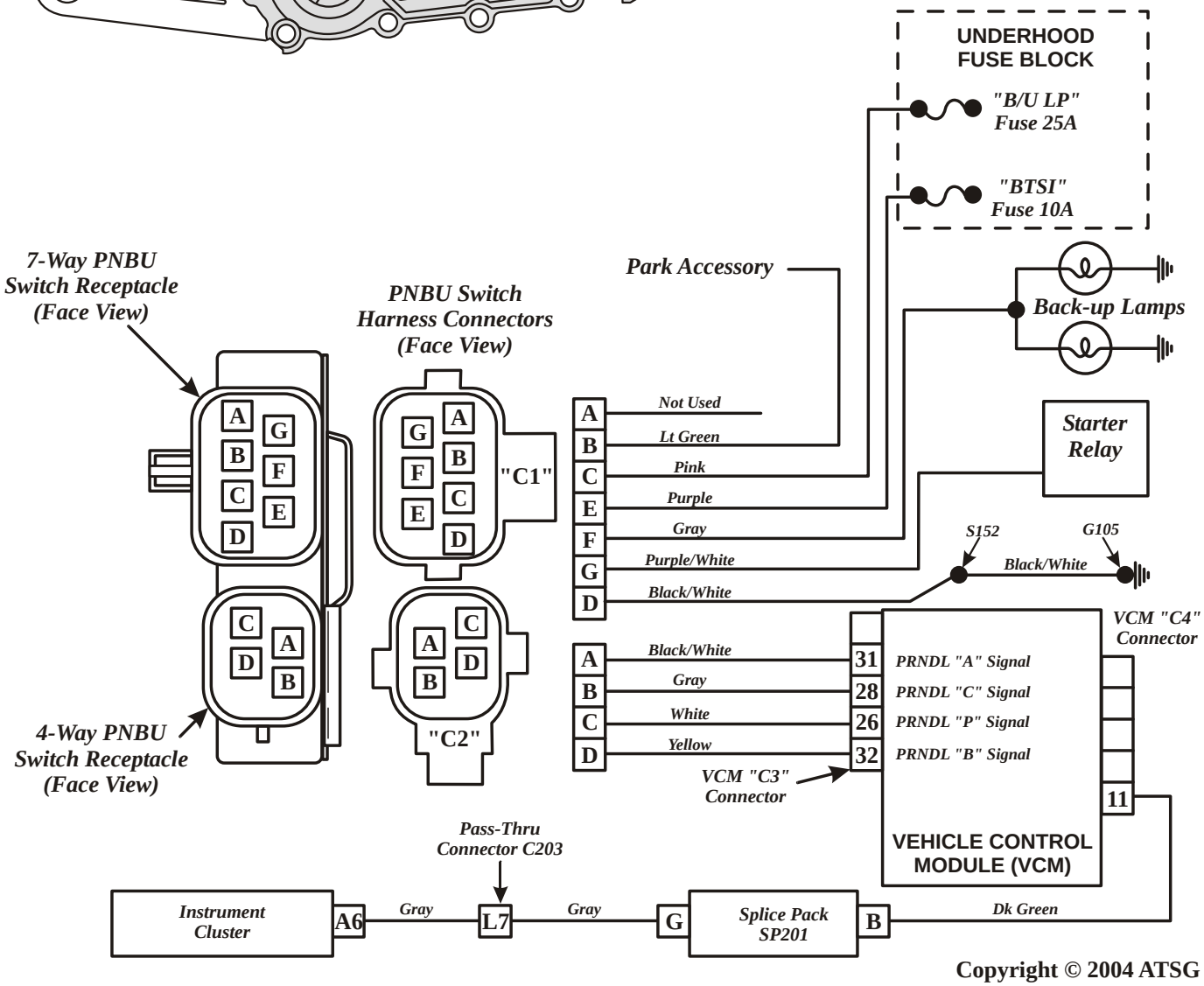


Figure 3

4L60-E

STACKED SHIFTS / EARLY TCC / 1995 - 2000 T SERIES TRUCKS

COMPLAINT: The customer brings the vehicle to the shop with complaints of erratic shifting, stacked shifts, the engine is lugging or no passing gear. The concern is verified after a road test. The PCM/VCM may or may not store a P1875 fault code for a four wheel drive low switch circuit malfunction.

CAUSE: The cause may be a malfunctioning transfer case shift control module (TCCM) or a short to ground on circuit 1694.

CORRECTION: The PCM (Powertrain Control Module) for some 1995 models, or the VCM (Vehicle Control Module) for most 1995 and all 1996 to 2000 model year trucks, provides 12 volts from the engine computer to the transfer case shift control module via circuit 1694. (See wire diagram in figure 1) When the driver selects 4 wheel drive low range, the TCCM internally grounds circuit 1694 and the voltage on circuit 1694 drops to zero. The PCM/VCM uses this information to alter shift scheduling while the vehicle is in 4 wheel drive low range to prevent an engine over speed condition.

Check the status of the indicator lights at the transfer case select switch assembly to verify that only high range has been selected.

Start the engine and monitor the 4 wheel drive low switch with a scan tool to see if the data indicates ON/YES or ENABLED. If data is not available, then monitor the voltage on circuit 1694 at terminal F8/Connector 2 with a PCM, or at terminal 23/Connector 4 with a VCM. (See figure 3 for PCM/VCM location) There should be 12 volts on the wire when operating in high range and zero voltage when in low range. (See figures 4 and 5 for connector and terminal I.D.)

If zero voltage is seen even though the indicator lights at the select switch display that high range has been selected, then locate and disconnect the harness at the TCCM (See figure 2 for TCCM location) and recheck circuit 1694 at PCM/VCM. If 12 volts is now seen then the TCCM is faulty. Replace the TCCM.

If circuit 1694 still does not show 12 volts at the PCM/VCM, then cut the wire two or three inches from the PCM/VCM connector and recheck the wire protruding from the connector at the PCM/VCM. If 12 volts is now observed then the wire between the PCM/VCM and the TCCM is shorted to ground. Cut the other end of the wire at the TCCM connector and run a new wire in place of the existing wire. Solder and shrink wrap your connections and tape the old wire back into the harness to ensure a quality repair. Recheck the voltage on the wire after your repair and road test to verify proper operation.

If 12 volts is still not evident on the wire at the PCM/VCM connector then the PCM or VCM would be suspect and require replacement.

Note: 1 - All OEM control module connectors have terminal identification embossed into the plastic at the wire side of the connector.

2 - All of these voltage tests are made with the key on or engine running.

4L60-E

STACKED SHIFTS / EARLY TCC / 1995 - 2000 T SERIES TRUCKS

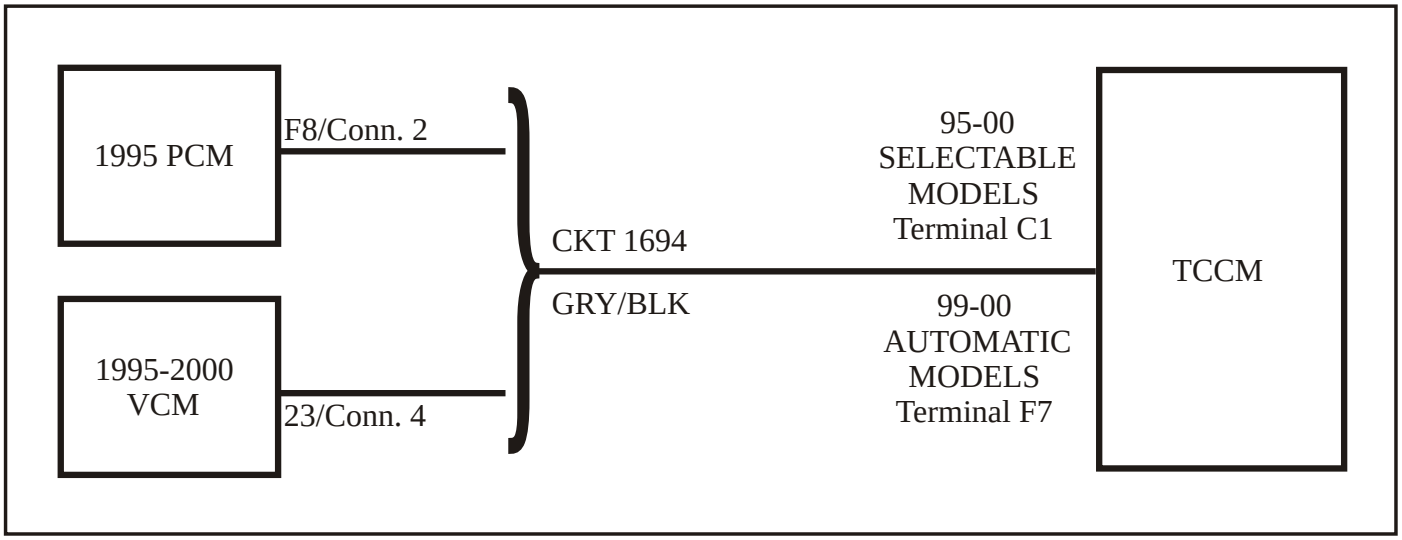


Figure 1

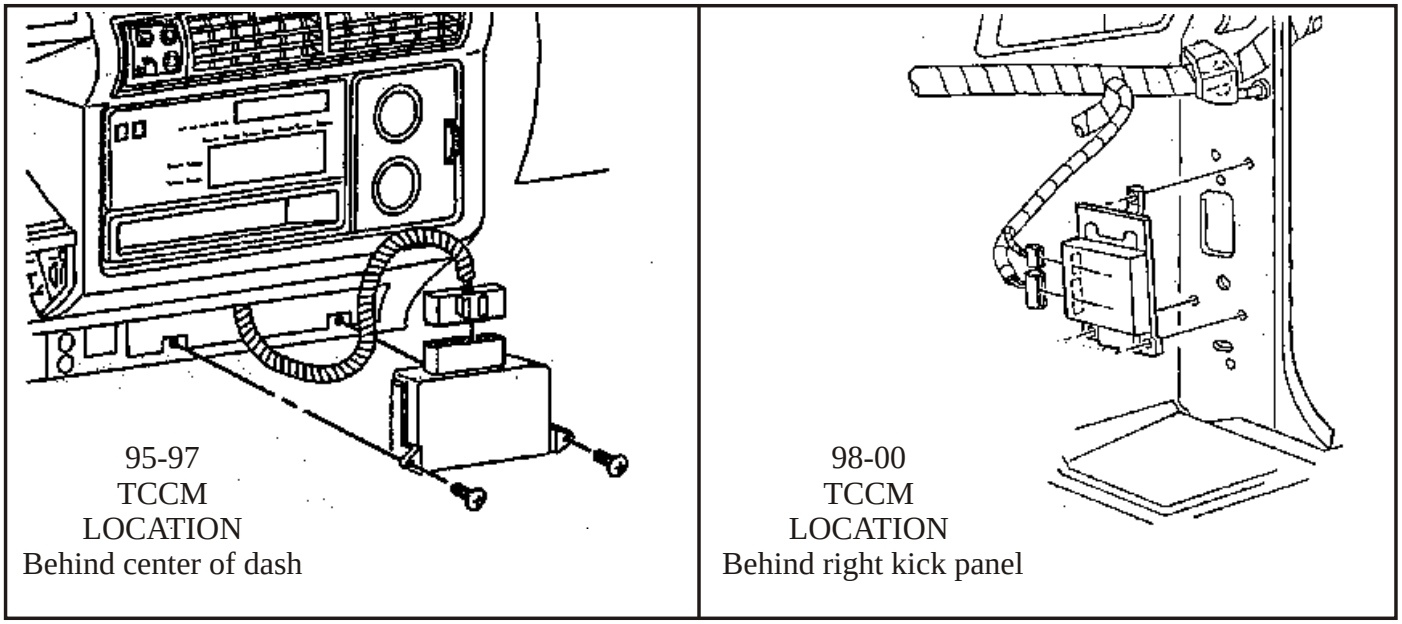
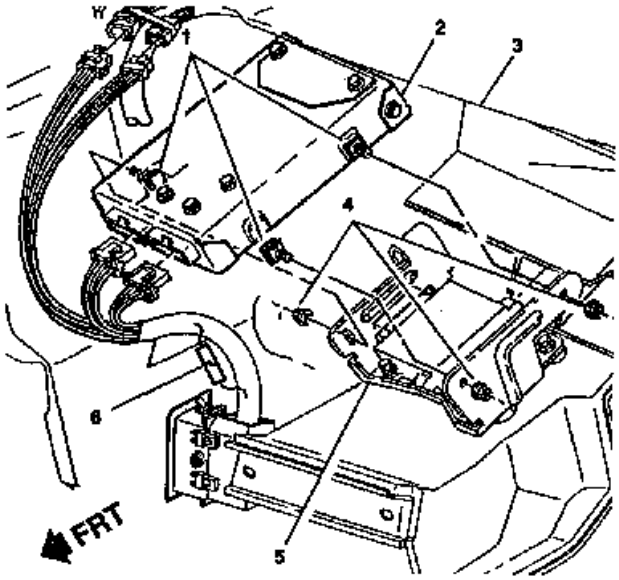


Figure 2

4L60-E

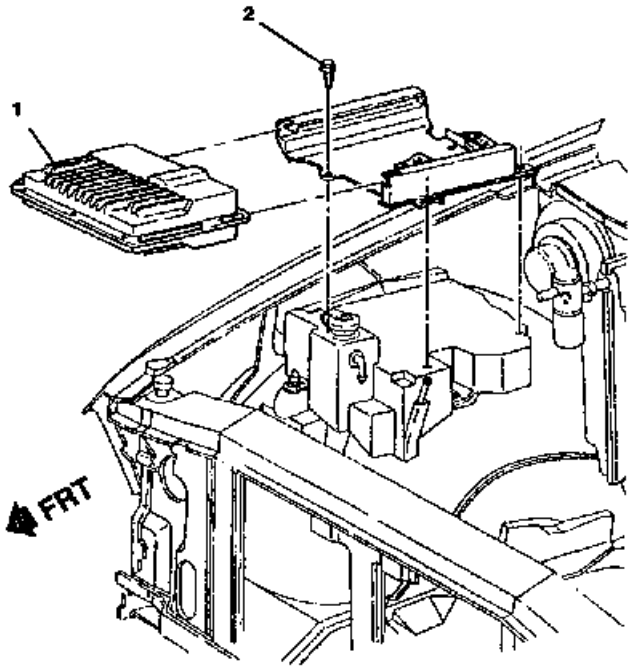
STACKED SHIFTS / EARLY TCC / 1995 - 2000 T SERIES TRUCKS

PCM LOCATION
1995 only
Below lower right of glove box above hush panel



1 BOLT/SCREW
2 CONTROL MODULE
3 INSTRUMENT PANEL
4 NUT - TIGHTEN TO 2.8 N•m (19.0 lb. in.)
5 BRACKET
6 SET TIMING CONNECTOR

VCM LOCATION
1995 - 2000
Engine compartment above right fender well



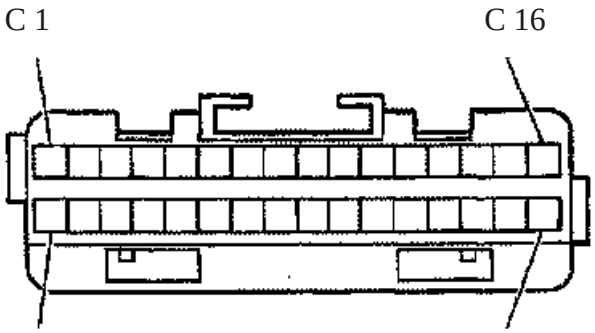
1 VEHICLE CONTROL MODULE (VCM – A)
2 VCM CRADLE BOLT – TIGHTEN 9 TO 11 N•m (7 to 8 lb. ft.)

Figure 3

4L60-E

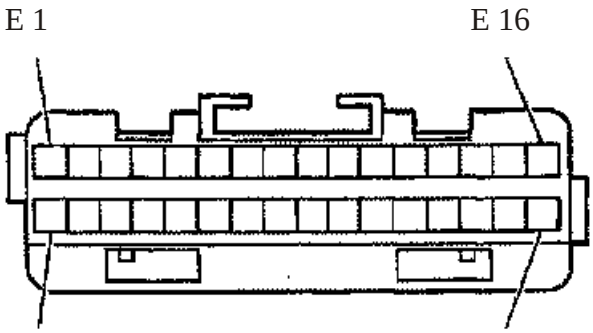
STACKED SHIFTS / EARLY TCC / 1995 - 2000 T SERIES TRUCKS

SELECTABLE MODELS
1995 - 2000
TCCM CONNECTOR



Terminal C 1
GRAY/BLACK
CKT 1694

AUTOMATIC MODELS
1999 - 2000
TCCM CONNECTOR

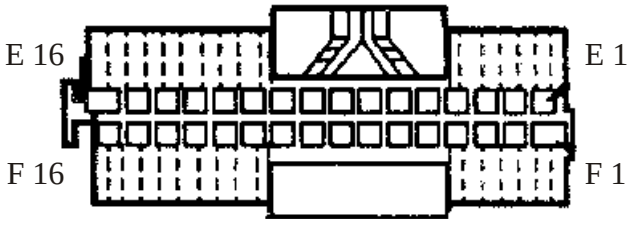


Terminal F 7
GRAY/BLACK
CKT 1694

Figure 4

1995 only with PCM
32 Pin E-F Connector 2

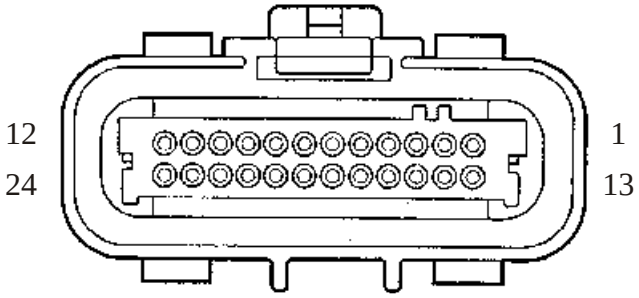
BLUE



Terminal F 8
GRAY/BLACK
CKT 1694

1995 - 2000 with VCM
24 Pin Connector 4

BLACK



Terminal 23
GRAY/BLACK
CKT 1694

Figure 5

GM 5L40E / BMW A5S360R

LOW & ERRATIC LINE PRESSURE

COMPLAINT: The transmission slips through the gears, line pressure is low and unstable. Inspection of the internal transmission parts indicates that clutch damage is present.

CAUSE: The Actuator Feed Limit Valve (AFL) bore is severally worn and the anodized valve is damaged, (Refer to Figure 1 Below).

CORRECTION: Since no repair kits are available at this time for this transmission a valve body will be required.

SERVICE INFORMATION:

The AFL valve regulates line pressure to the pressure control solenoid and the shift solenoids. The AFL valve keeps line pressure from flooding the solenoid circuits. At some point during normal operations line pressure and AFL pressure will be the same. When the valve wears the solenoids are starved for oil resulting in the above mentioned conditions.

FRONT VALVE BODY

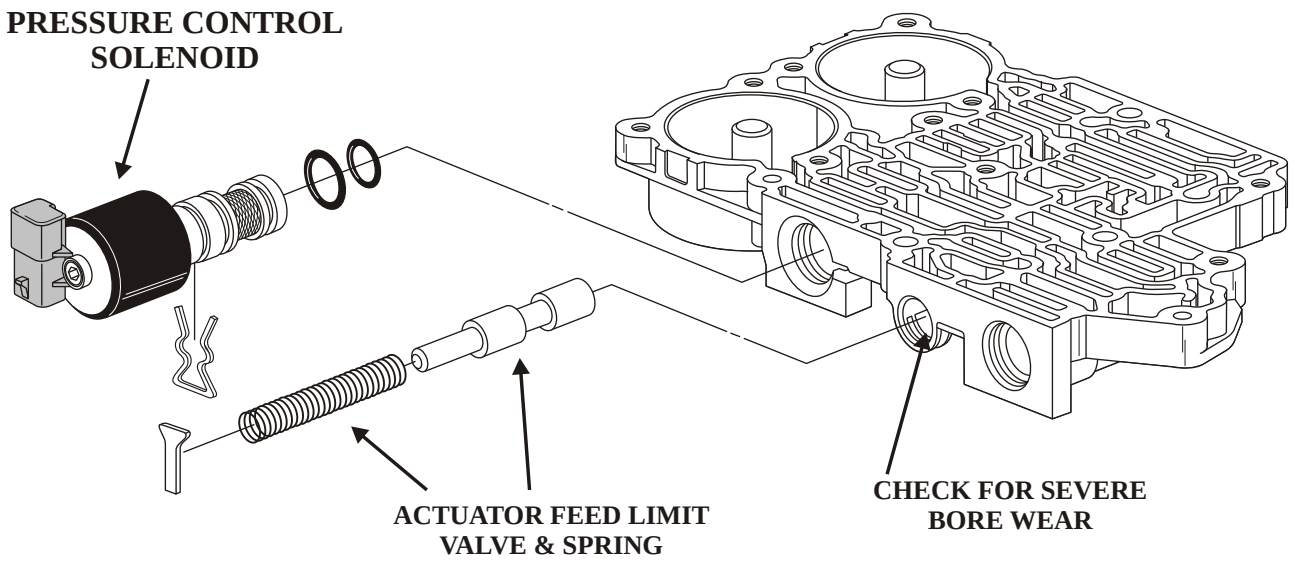


Figure 1

GM 5L40E / BMW A5S360R

DELAYED FORWARD ENGAGEMENT

COMPLAINT: Some BMW "E" series and Cadillac CTS models built from 09/02 to 12/03 may exhibit a delayed engagement from park to drive when cold. The delay may last anywhere from two to thirty seconds.

CAUSE: The forward drum (C1) was manufactured with improper tolerances that cause the clutch piston to not make a good seal between it and the clutch housing when the vehicle is parked for a prolonged period of time, such as overnight. Therefore on the initial start, the forward clutch does not apply.

CORRECTION: Since internal parts are not available, a reman transmission will be necessary. Because the manufacturer does not disclose any build code information, it is impossible to tell which drum would be a good one if used parts are acquired.

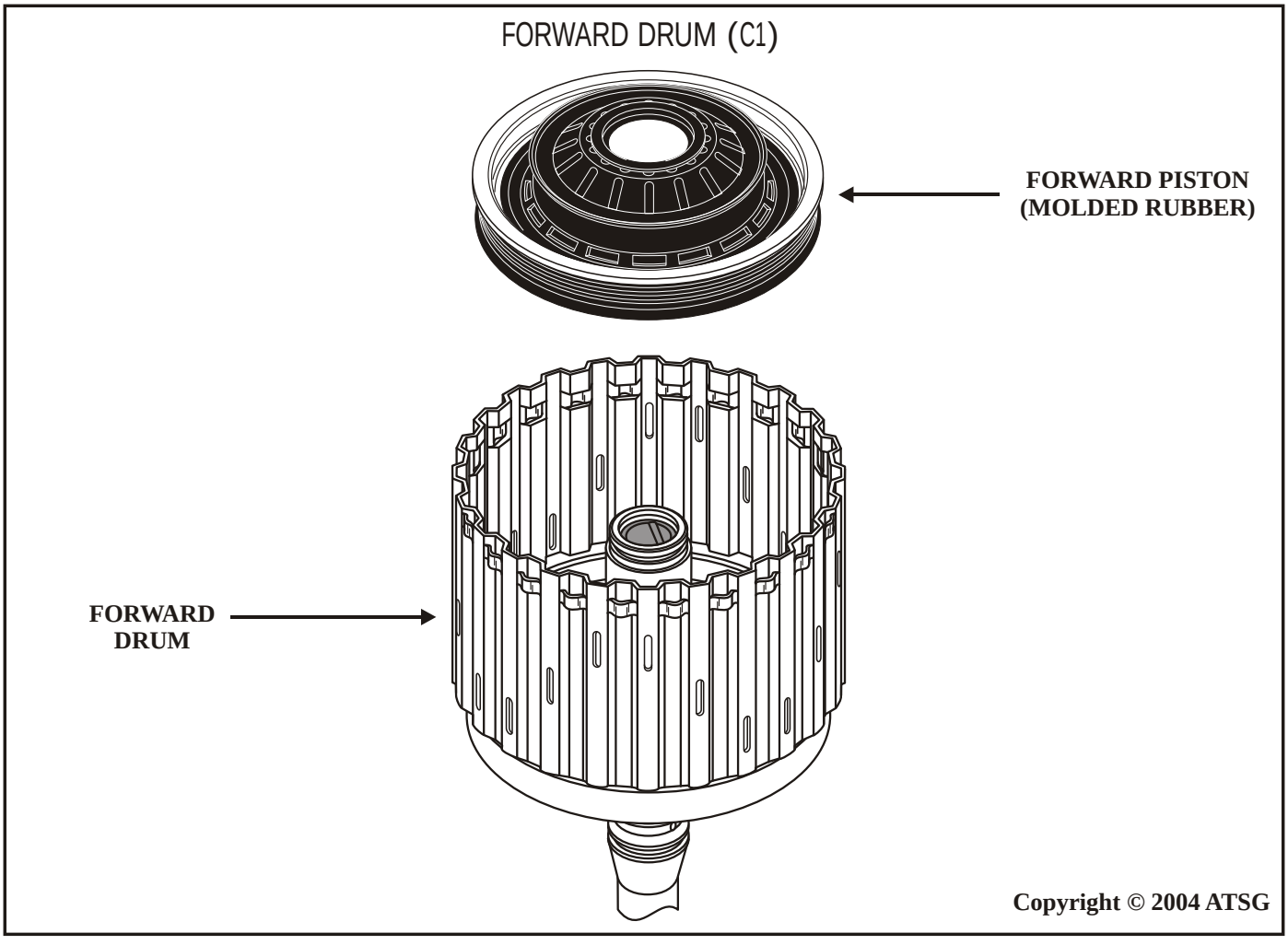


Figure 1

GM 5L40E / BMW A5S360R

5TH GEAR RATIO ERROR CODES

COMPLAINT: The "MIL" Lamp is illuminated with code 55 or P0735 stored for a "Gear Ratio Error in 5th Gear. There are no complaints of slipping or driveability.

CAUSE: The Direct/Reverse clutch housing has cracked in the thrust washer area where it contacts the pump (Refer to Figure 1 Below).

CORRECTION: Currently, no internal parts are available. A good used part or a remanufactured transmission will be required.

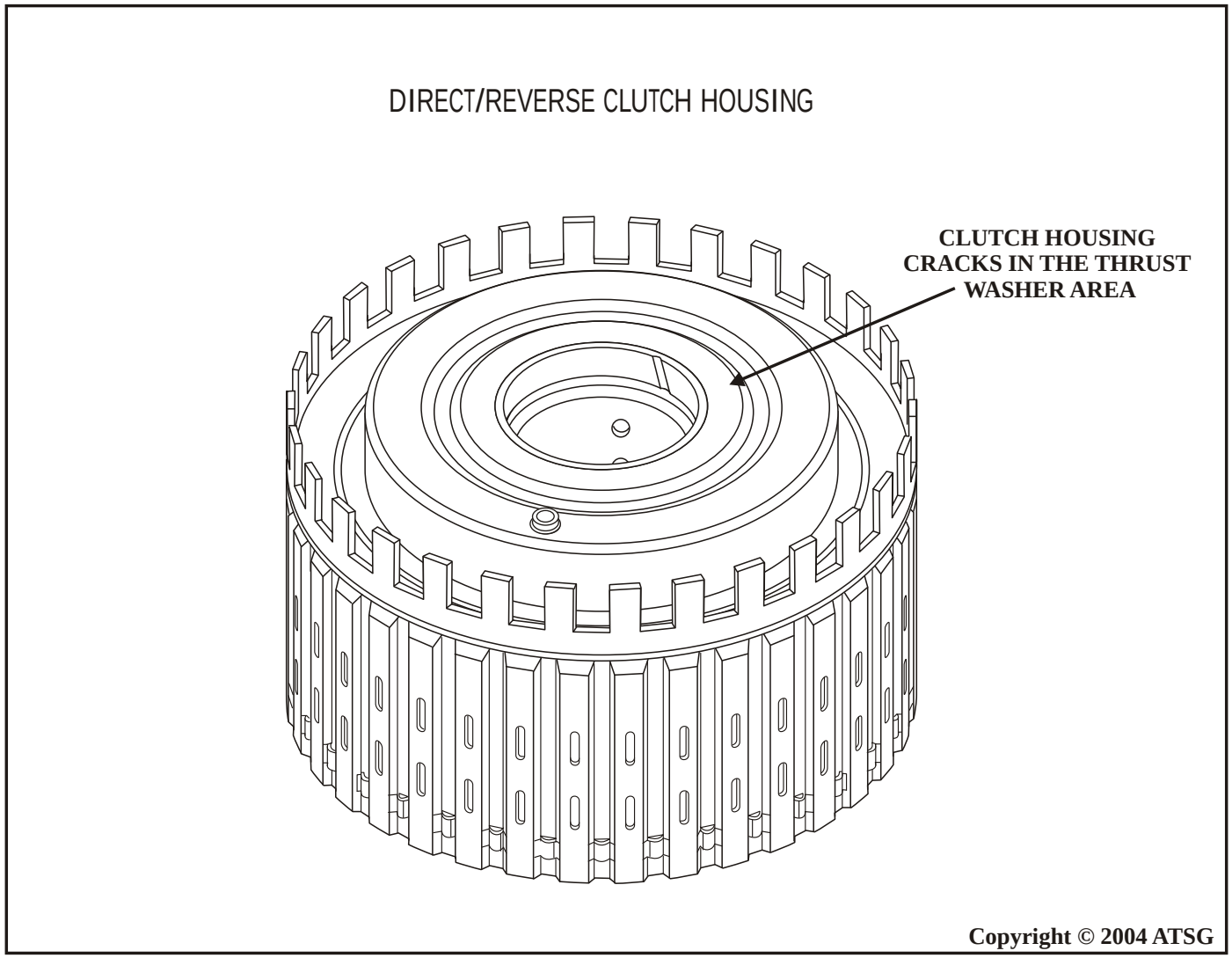


Figure 1

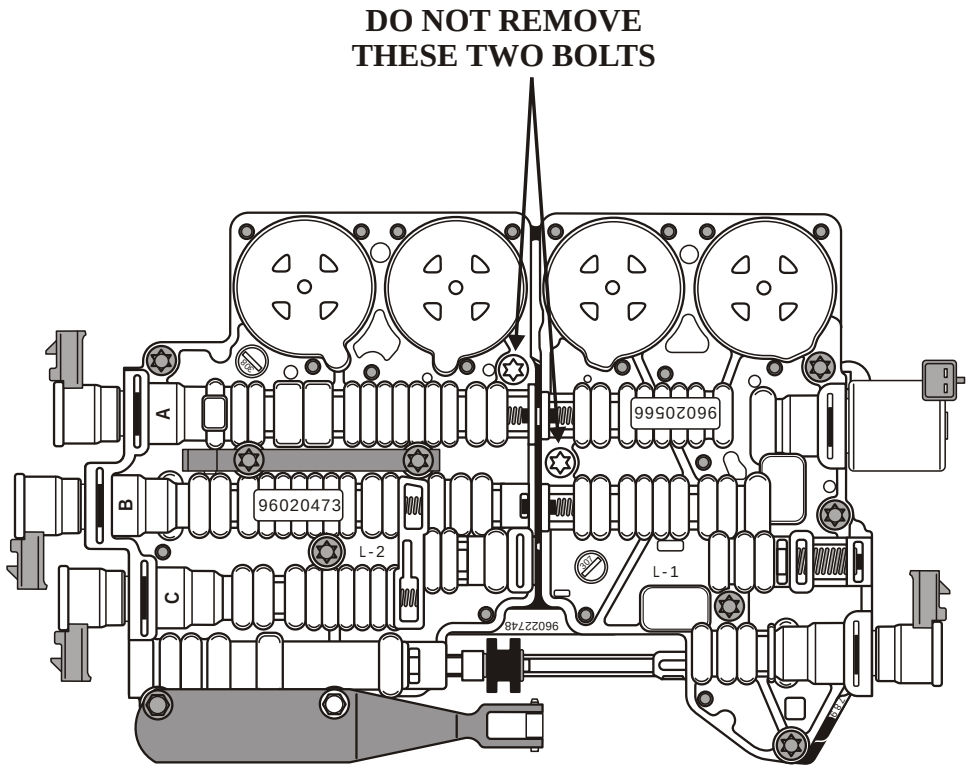
GM 5L40E / BMW A5S360R

VALVE BODY DISASSEMBLY TIP

COMPLAINT: During removal of the valve body from the case, the upper and lower halves come apart causing the small parts to fall out.

CAUSE: The valve body bolts were incorrectly removed.

CORRECTION: DO NOT REMOVE the TWO BOLTS shown in Figure 1 until the valve body is on the bench for service.



ONLY REMOVE THE SHADED BOLTS WHEN REMOVING THE VALVE BODY FROM THE CASE

Figure 1

4T65E INTERNAL MODE SWITCH

PROPER ALIGNMENT

COMPLAINT: After overhaul and installation of the transmission back into the vehicle, the vehicle would not start in park or neutral. The transmission also would start in second gear and would make a 2-3 shift only. No codes were stored.
When the scan tool was connected and the IMS parameters were viewed, the range indication readings were erratic. The normal parameter readings for the IMS can be seen in the scan tool screen capture in figure 1 along with the IMS range chart in figure 2.
When the individual circuits were checked using the method that was shown in the ATSG 2001 seminar video in the white manual, they checked good. Circuit identification for the IMS at the transmission case connector can be seen in figure 3. The IMS circuits at the PCM can be seen in figure 4.

CAUSE: When the detent spring was installed during the overhaul, it was not indexed in its proper location at the IMS which can be seen in figure 5. When this is done the IMS can move across the detent lever ¼" in either direction. therefore movement of the shift lever is not synchronized with the IMS causing the above complaints.

CORRECTION: Install the detent spring at the IMS as shown in figure 6. ***It is the detent spring roller that properly indexes the IMS.*** When the IMS and detent spring are indexed correctly, there will be no movement of the IMS across the detent lever.
NOTE: This type of IMS can also be found on the 4T80E and 5L40E.

Autotrans Group

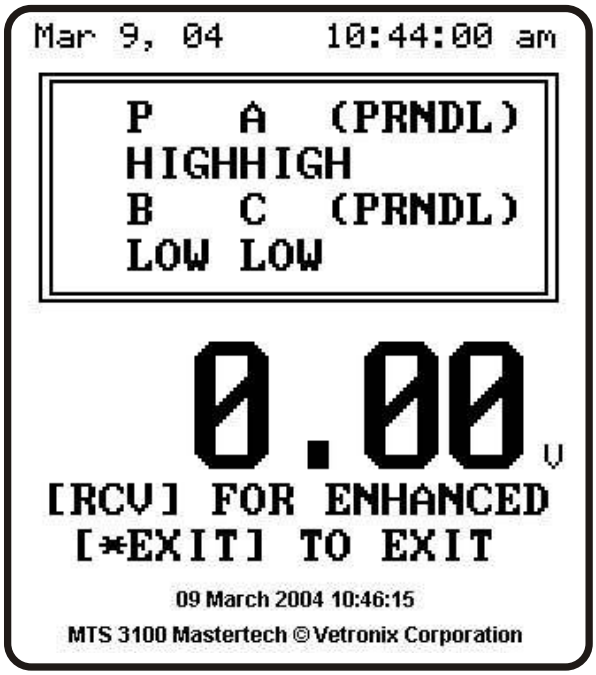


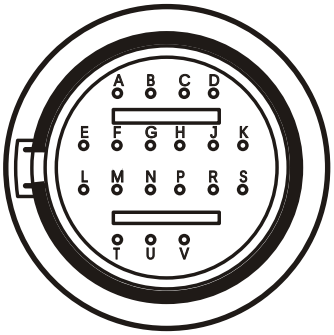
Figure 1

INTERNAL MODE SWITCH LOGIC				
GEAR SELECTOR POSITION	SCAN TOOL IMS RANGE			
	A	B	C	P
PARK	*LOW*	*HI*	*HI*	*LOW*
PARK/REVERSE	*LOW*	*LOW*	*HI*	*LOW*
REVERSE	*LOW*	*LOW*	*HI*	*HI*
REVERSE/NEUTRAL	*HI*	*LOW*	*HI*	*HI*
NEUTRAL	*HI*	*LOW*	*HI*	*LOW*
NEUTRAL/DRIVE 4	*HI*	*LOW*	*LOW*	*LOW*
DRIVE 4	*HI*	*LOW*	*LOW*	*HI*
DRIVE 4/DRIVE 3	*LOW*	*LOW*	*LOW*	*HI*
DRIVE 3	*LOW*	*LOW*	*LOW*	*LOW*
DRIVE 3/DRIVE 2	*LOW*	*HI*	*LOW*	*LOW*
DRIVE 2	*LOW*	*HI*	*LOW*	*HI*
DRIVE 2/DRIVE 1	*HI*	*HI*	*LOW*	*HI*
DRIVE 1	*HI*	*HI*	*LOW*	*LOW*
ILLEGAL RANGES	*HI*	*HI*	*HI*	*HI*
	LOW	*HI*	*HI*	*HI*
	HI	*HI*	*HI*	*LOW*

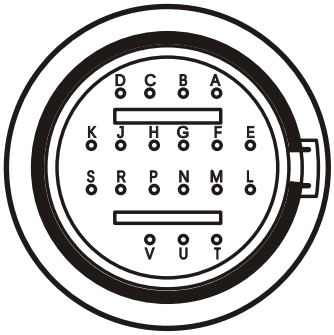
HI = Ignition Voltage
LOW = 0 Voltage

Figure 2

TRANSAXLE CASE CONNECTOR PIN IDENTIFICATION



View Looking Into
Transaxle Case Connector



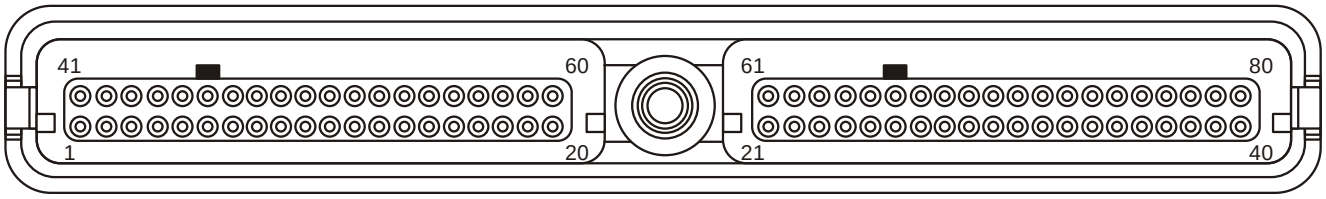
View Looking Into
Vehicle Harness Connector

CASE CONNECTOR PIN FUNCTION

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

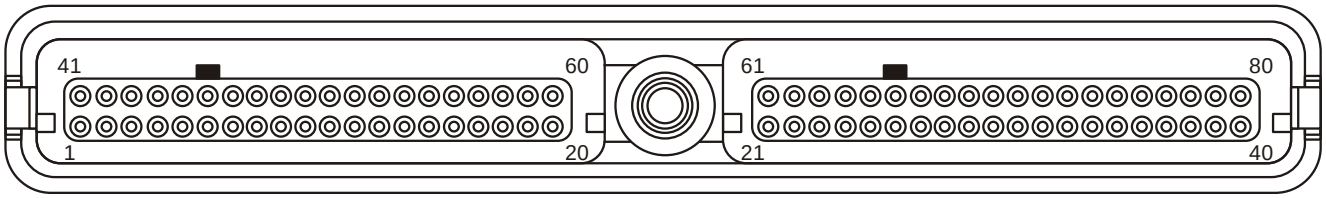
Figure 3

C1 "BLUE" PCM CONNECTOR



Pin No.	Wire Color	Circuit	Description
4	*Lt Green*	*1222*	*Shift Solenoid "A" Ground Signal*
20	*Red*	*1642*	*Battery Feed*
22	*Pink*	*1224*	*Transaxle Fluid Pressure Switch "A" Input*
44	*Yellow/Black*	*1223*	*Shift Solenoid "B" Ground Signal*
56	*Black/White*	*451*	*PCM Ground*
57	*Black/White*	*451*	*PCM Ground*
60	*Black/White*	*451*	*PCM Ground*
62	*Dk Blue/White*	*1231*	*Input Shaft Speed Sensor, Low*
63	*Red/Black*	*1230*	*Input Shaft Speed Sensor, High*
68	*Yellow*	*772*	*Internal Mode Switch Signal "B"*

C2 "WHITE" PCM CONNECTOR



Pin No.	Wire Color	Circuit	Description
16	*White*	*776*	*Internal Mode Switch Signal "P"*
17	*Red*	*1225*	*Transaxle Fluid Pressure Switch "C" Input*
18	*Black/White*	*771*	*Internal Mode Switch Signal "A"*
35	*Black*	*808*	*Transaxle Fluid Temperature Sensor Ground*
45	*Red/Black*	*1228*	*Pressure Control Solenoid, High*
46	*Lt Blue/White*	*1229*	*Pressure Control Solenoid, Low*
56	*Gray*	*773*	*Internal Mode Switch Signal "C"*
57	*Dk Blue*	*1225*	*Transaxle Fluid Pressure Switch "B" Input*
63	*Yellow*	*657*	*TCC Release Switch*
68	*Yellow/Black*	*1227*	*Transaxle Fluid Temperature Sensor*
78	*Brown*	*418*	*TCC PWM Solenoid Control*

Figure 4

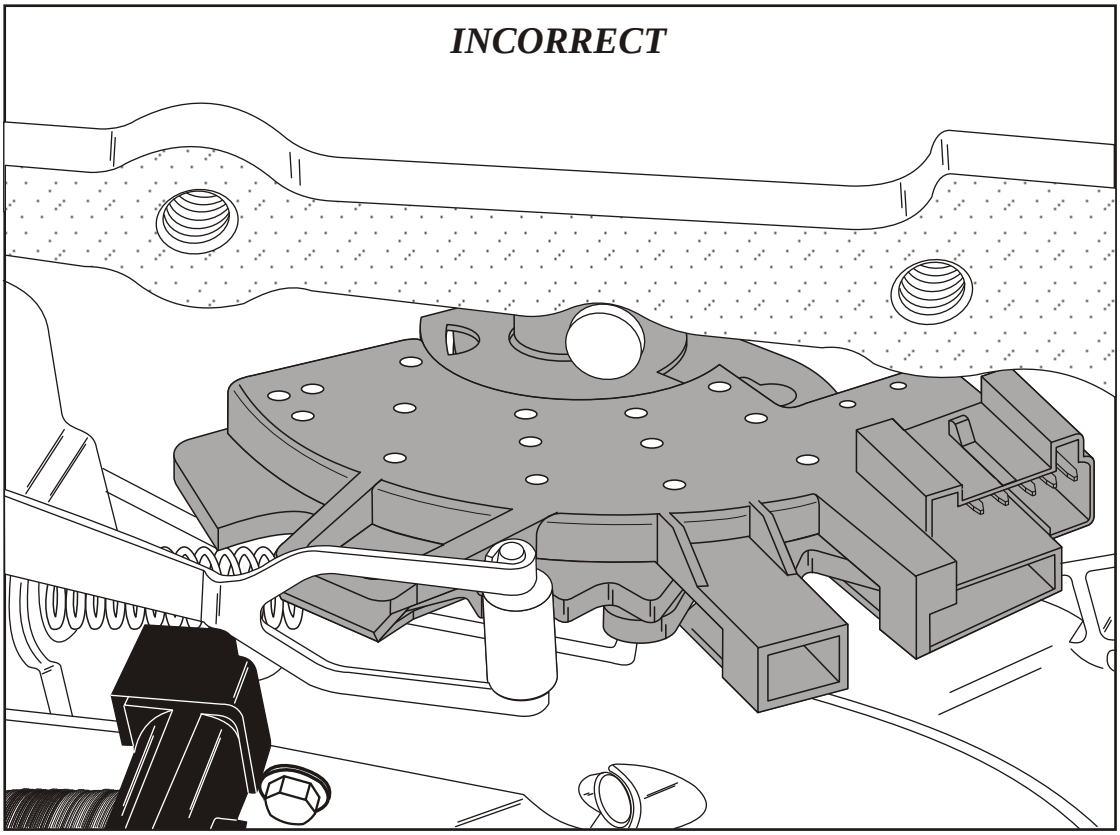


Figure 5

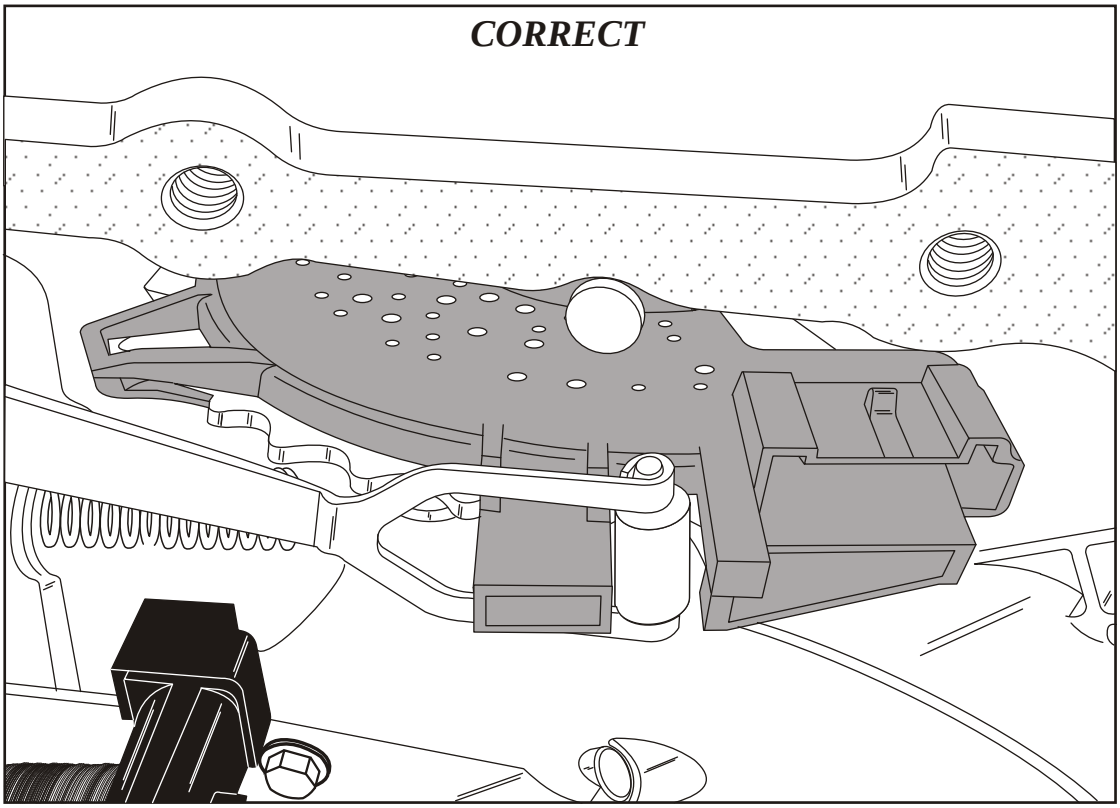


Figure 6

THM 4T65-E

DTC P0742 TCC STUCK "ON"

COMPLAINT: Before or after overhaul, a vehicle equipped with the THM 4T65E automatic transaxle, logs OBDII code P0742 “TCC Stuck On”. When this code is set, the PCM will command TCC on at full capacity, and also freeze the shift adapt strategy.

CAUSE:

(1) This condition may be caused ***mechanically*** by a sticking or defective TCC release switch located in the pressure switch assembly

(2) This problem may be caused ***electrically*** by a short to ground of the TCC release switch, or the external wire from PCM to terminal "U" at the case connector, or the internal wire from terminal "U" to terminal "B" on the pressure switch assembly.

(3) This condition may be caused ***hydraulically*** by a clogged TCC PWM solenoid.
Note: Installing a TCC PWM solenoid from a 4L60E on this vehicle will react the same as a clogged solenoid. (TCC immeadiately on top of 2nd gear).

CORRECTION: ***To correct this problem it must first be established whether the trouble is mechanical, hydraulic, or electrical in nature before the problem can be resolved and many scanners no longer give you TCC release switch information.***

Pressure Switch Operation And Function:

The pressure switch assembly located on the valve body of the 4T65E transaxle, is a switch assembly containing six fluid pressure switches. Three of these pressure switches; (D4, LO, and REV), are normally open switches, while the other three switches; (D3, D2, and TCC Release) are normally closed switches. These switches with the exception of the TCC Release switch are used by the PCM to determine the position of the Manual Valve in the transmission. The TCC Release switch, which is the one we are interested in, is normally closed and completed to ground. It is used as an additional aid for the PCM to confirm the ON/OFF status of the Torque Converter Clutch during operation of the vehicle.

Diagnosis Procedure:

(1) Back probe terminal "U" with the positive lead from DVOM, as shown in Figure 1, and the negative lead from DVOM to a known good ground.

(2) Observe the DVOM. We should have continuity at this point, since we now know that the TCC Switch is normally closed and completed to ground.

(3) Start the engine leaving the selector lever in the Park position. TCC release oil should now open the normally closed switch and we should show no continuity on the DVOM. This would mean that the switch and wiring is operating properly and the most likely problem is the TCC/PWM solenoid is clogged or restricted. If you still show continuity, with the engine running, continue to step (4).

(4) Turn the engine off and disconnect the vehicle harness connector from the transaxle. Locate the vehicles PCM, locate and disconnect the “Clear” C1 connector at the PCM.
(Refer to appropriate service manual for exact location of PCM as location will vary model to model).

Continued on next Page

Diagnosis Procedure:

(5) Connect the positive lead from DVOM to terminal "U" on the vehicle harness connector, as shown in Figure 2, and the negative lead from DVOM to a known good ground.

(6) There should be no continuity on the DVOM. If you do have continuity, the wire from the transaxle case connector to the PCM is grounded and ***must*** be repaired or replaced. If you do not have continuity, continue to step (7).

(7) You now have it narrowed down to the Pressure Switch Assembly (PSA) with a defective TCC switch, or an internal wiring harness that is grounded internally. Either way we have to take it apart.

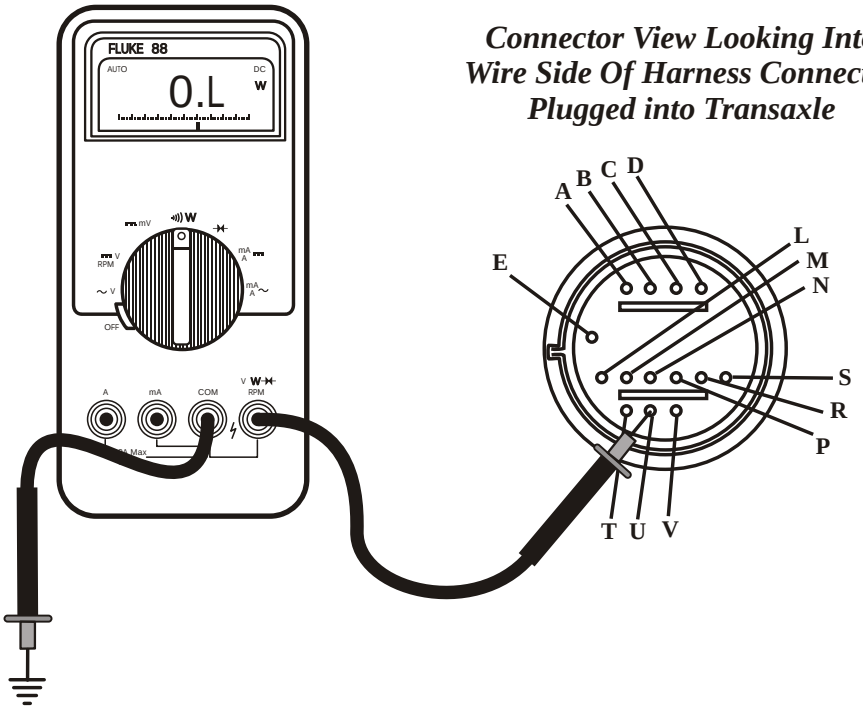
(8) To check the internal harness for a short to ground, refer to Figure 3. To check the Pressure Switch Assembly, refer to Figure 4.

SPECIAL NOTE:

1. For Pressure Switch Assembly description and operation, refer to Figure 5.
2. If you are trying to diagnos the TCC Release switch using a scanner, refer to Figure 6, as many scanners are not capable of viewing the TCC switch.
3. Refer to Figure 7, 8, and 9 for hydraulic schematics of the TCC circuit in various configurations.

SERVICE INFORMATION:

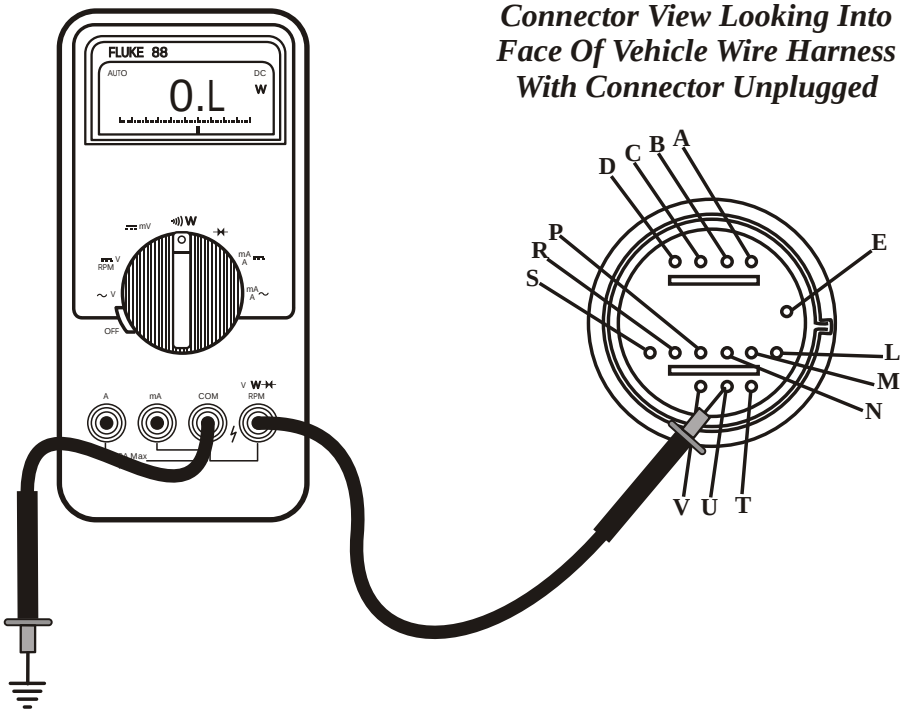
TCC/PWM Solenoid (Purple Paint I.D.) 24214974



Connector View Looking Into Wire Side Of Harness Connector Plugged into Transaxle

Figure 1

CHECKING FOR GROUNDED WIRE FROM PCM TO TRANSAXLE CASE CONNECTOR



Connector View Looking Into Face Of Vehicle Wire Harness With Connector Unplugged

Figure 2

CHECKING INTERNAL WIRE HARNESS

Diagnosis Procedure:

(1) Disconnect the Pressure Switch Assembly (PSA) connector from the Pressure Switch Assembly, as shown below.

(2) Connect the positive lead from DVOM to terminal "B" on the PSA connector, as shown below, and the negative lead from DVOM to a good ground, such as valve body or oil pump.

(3) There should not be continuity. If you do have continuity, it will be necessary to replace the Internal Wire Harness. If there is no continuity Internal harness is OK.

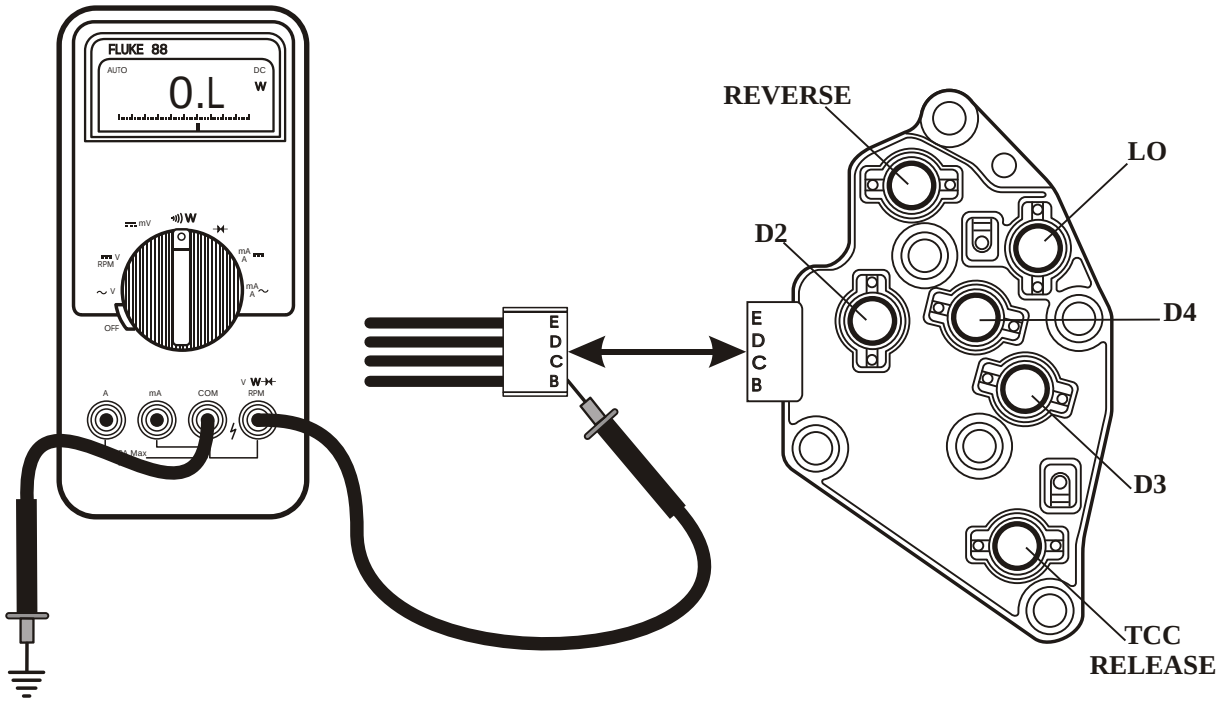


Figure 3

CHECKING THE PRESSURE SWITCH ASSEMBLY

Diagnosis Procedure:

(1) Remove the Pressure Switch Assembly (PSA) and place it on a flat work surface, as shown below.

(2) Using the DVOM, set the meter to check for continuity or resistance, place the positive lead of the meter on Terminal "B" at the PSA connector and place the negative lead of the meter to the metal contact of the TCC Release Switch, as shown below.

(3) The meter should indicate continuity, or approximately .5 ohms resistance. Press down firmly in the center of the switch contact, using the eraser end of a pencil, and check the meter again. The meter should now indicate no continuity, or an open circuit. If the meter does not indicate an open circuit, after pressing the switch contact, replace the Pressure Switch Assembly.

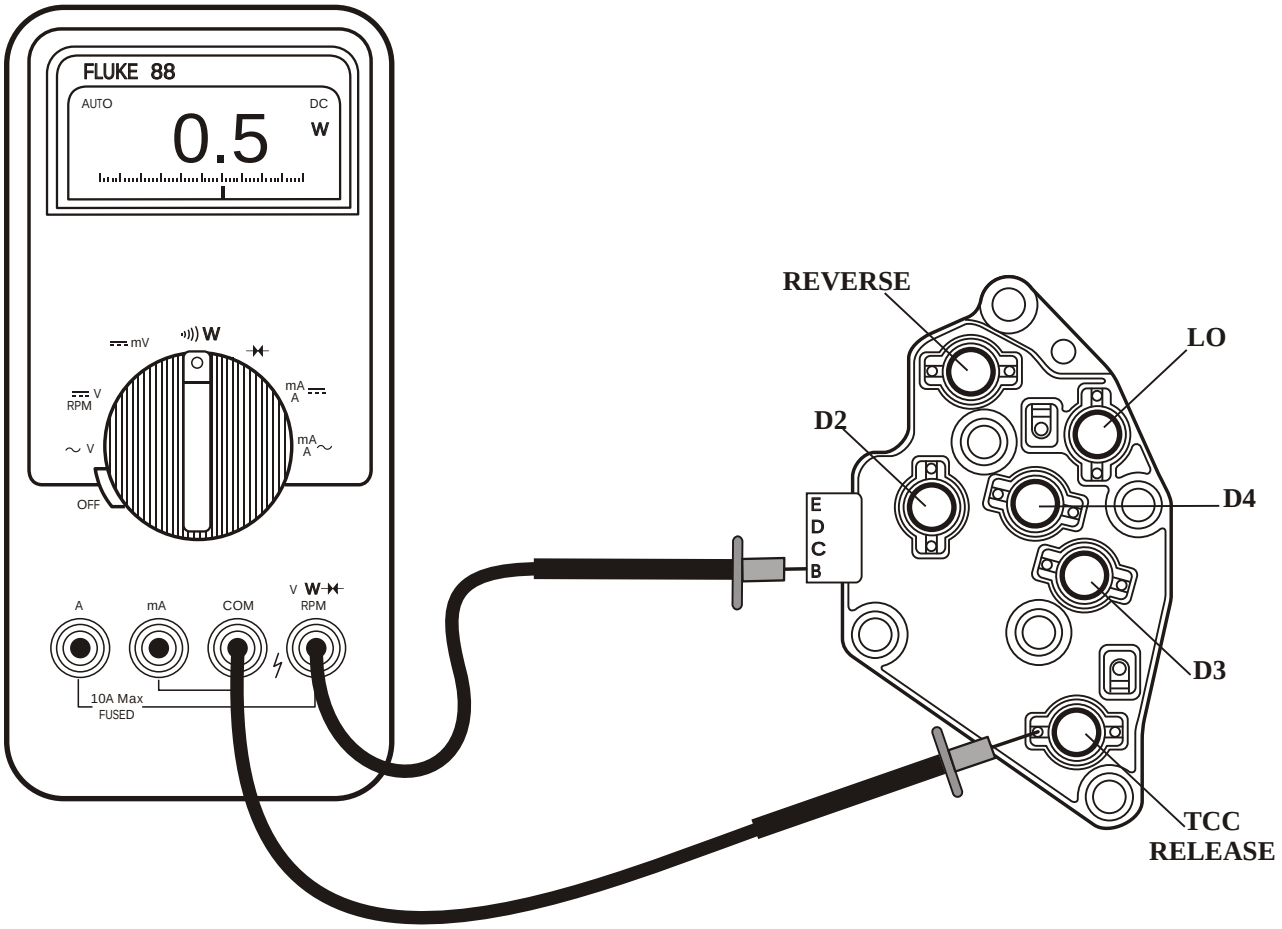


Figure 4

PRESSURE SWITCH ASSEMBLY DESCRIPTION AND OPERATION

The Pressure Switch Assembly (PSA) located on the valve body of the 4T65E transaxle, is a switch assembly containing six fluid pressure switches. Three of these pressure switches; (D4, LO, and REV), are normally open switches, while the other three switches; (D3, D2, and TCC Release) are normally closed switches. These switches with the exception of the TCC Release switch are used by the PCM to determine the position of the Manual Valve in the transmission. The TCC Release switch, which is the one we are interested in, is used as an additional aid for the PCM to confirm the ON/OFF status of the Torque Converter Clutch during operation of the vehicle.
Figure 6 on the following page illustrates the indications shown on a scan tool in each range when checking the range parameters E, D, C, and TCC Release. "HI" indicates the switch is open, while "LO" indicates the switch is closed when viewing the datastream on the scanner.

Many scanners do not have the capability of viewing the TCC Release Switch!!!

Note: When viewing scanner parameter for TCC Release, the indication on the scan tool may show a; ("0" open) and ("1" closed), or ("P2" open) and ("P1" closed), or ("HI" open) and ("LO" closed), depending on the scanner manufacturer.

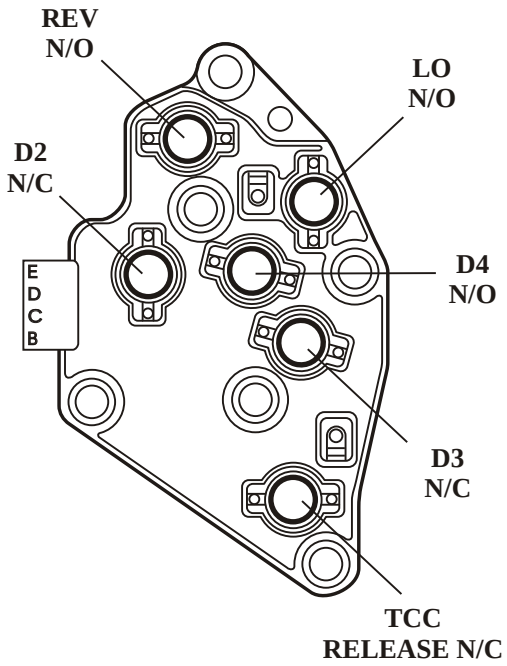


Figure 5

RANGE INDICATOR	*CIRCUIT*			
	E	*D*	*C*	*TCC*
PARK/NEUTRAL	*HI*	*LO*	*HI*	*HI*
REVERSE	*LO*	*LO*	*HI*	*HI*
OVERDRIVE	*HI*	*LO*	*LO*	*
MANUAL THIRD	*HI*	*HI*	*LO*	*
MANUAL SECOND	*HI*	*HI*	*HI*	*
MANUAL FIRST	*LO*	*HI*	*HI*	*HI*

TCC Release Switch information is not available on many scanners.

HI = Indicates an open switch as identified on the scanner.
LO = Indicates a closed switch as identified on the scanner.
**** = Indicates whether TCC release oil is present (HI), or not present (LO).***
TCC On will = (LO).
TCC Off will = (HI).

Connect the scanner and locate the parameter for TCC release. The TCC release switch in the pressure switch assembly is a normally closed switch. The switch is held open by the presence of torque converter release pressure at the switch. Refer to Figure 5 for description and operation of the PSA. With the scanner connected and the vehicle started in park, the indication on the scanner should show the switch to be open, as release oil should be present. Depending on the scanner, the indication shown may : ("0"-open) and ("1"-closed), ("P2"-open) and ("P1"-closed) or ("HI"-open) and ("LO"-closed). Refer to the chart above for the pressure switch assembly readings on the scanner.

If the scanner shows the switch to be closed, the trouble will be caused by either a stuck TCC release switch, or a short to ground on the signal wire from the TCC release switch to the computer. Refer to Figure 2 to check for a shorted wire in the TCC release switch circuit. Refer to Figure 3 to check for shorted internal harness Refer to Figure 4 to check for a stuck TCC release switch.

If the indication on the scanner shows the switch to be open, hold the brake and place the selector lever in the drive position. Allow the wheels to spin and watch the scanner as the vehicle up-shifts into second gear. If the indication on the scanner changes from open to closed with the shift into second gear, check the parameter for TCC duty cycle and see what the reading shows. A reading of 0% duty cycle would indicate that the computer has not commanded lock-up. If the computer has not commanded lock-up, but TCC release oil has exhausted, (noted by the change in state of the TCC release switch on the scanner) this could indicate a clogged TCC PWM solenoid. Refer to Figures 7, 8, and 9 for TCC PWM hydraulic circuit description.

CAUTION:

A vehicle equipped with ABS "CANNOT" be run on a lift.

Figure 6

The hydraulic diagram shown in Figure 7 represents the transmission in either; Park, Reverse, Neutral, or Drive 1st. Gear, including Manual Low. When you look at the feed from second gear to the TCC PWM solenoid, you will notice the lack of oil pressure in the circuit. This is because oil pressure is present only when the second clutch is applied, which would be 2nd, 3rd, and 4th gears on this transaxle. With no oil pressure at the second clutch, the TCC control valve stays at rest in it's bore away from the spring. This results in oil pressure being present at the TCC Release Switch in the Pressure Switch Assembly, keeping the Release Switch open.

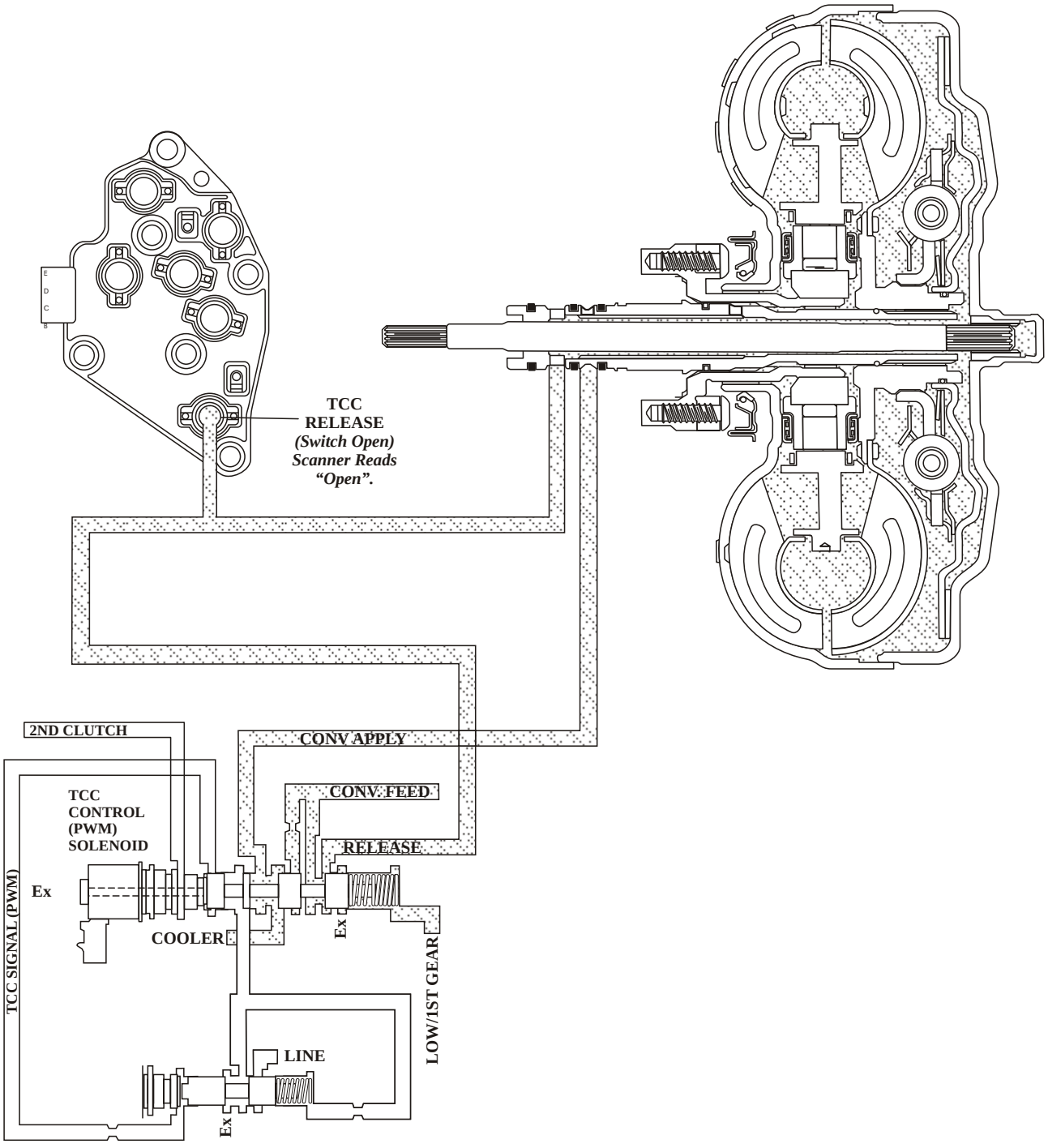
The hydraulic diagram shown in Figure 8 represents the transmission in Drive 2nd. Gear, 3rd. Gear, and 4th. Gear, with the Torque Converter Clutch ***Released***. Notice the presence of 2nd gear oil pressure in the circuit. With the solenoid "OFF" and not energized, the solenoid should exhaust 2nd clutch pressure so that the pressure in the solenoid doesn't become great enough to cause the TCC valve to stroke inward against the spring. Lock-up will not be engaged at this time.

The hydraulic diagram shown in Figure 9 also represents the transmission in Drive 2nd. Gear, 3rd. Gear, and 4th. Gear, Torque Converter Clutch ***applied***. If for some reason the TCC solenoid is not capable of exhausting 2nd clutch oil pressure, the result will be the TCC control valve overcoming spring tension and moving into the lock-up position. TCC release oil will exhaust through the valve, the converter clutch will engage with the shift into second gear. Replacing the TCC PWM solenoid should correct the problem.

It has been found that although identical in appearance, a new factory TCC PWM solenoid for the 4L60E has been used in the 4T65E in different instances. Even though the solenoids look identical, they ***"Will Not" interchange.***

CAUTION:
Use "ONLY" the TCC PWM Solenoid for a 4T65-E transaxle, identified by a purple splotch of paint on the canister for identification, and available under OEM part number 24214974.

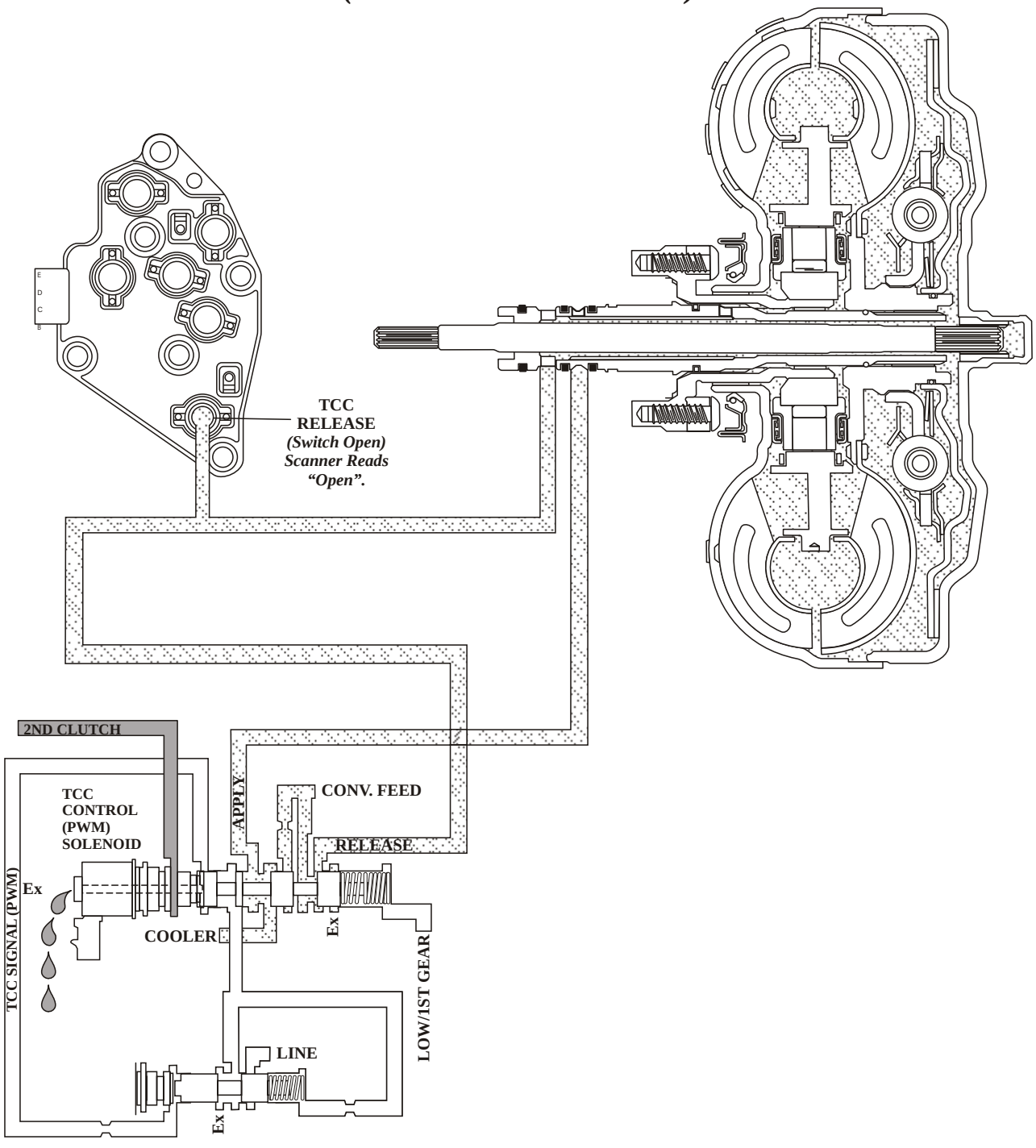
TCC HYDRAULIC CIRCUIT IN PARK, REVERSE, NEUTRAL AND DRIVE 1ST. GEAR



This diagram shows the transmission in either Park, Reverse, Neutral, or Drive 1st gear including Manual Low.
Notice that Lo/1st oil is routed to the spring side of the TCC valve and with no second clutch oil fed to the TCC/PWM solenoid, converter clutch apply is prevented

Figure 7

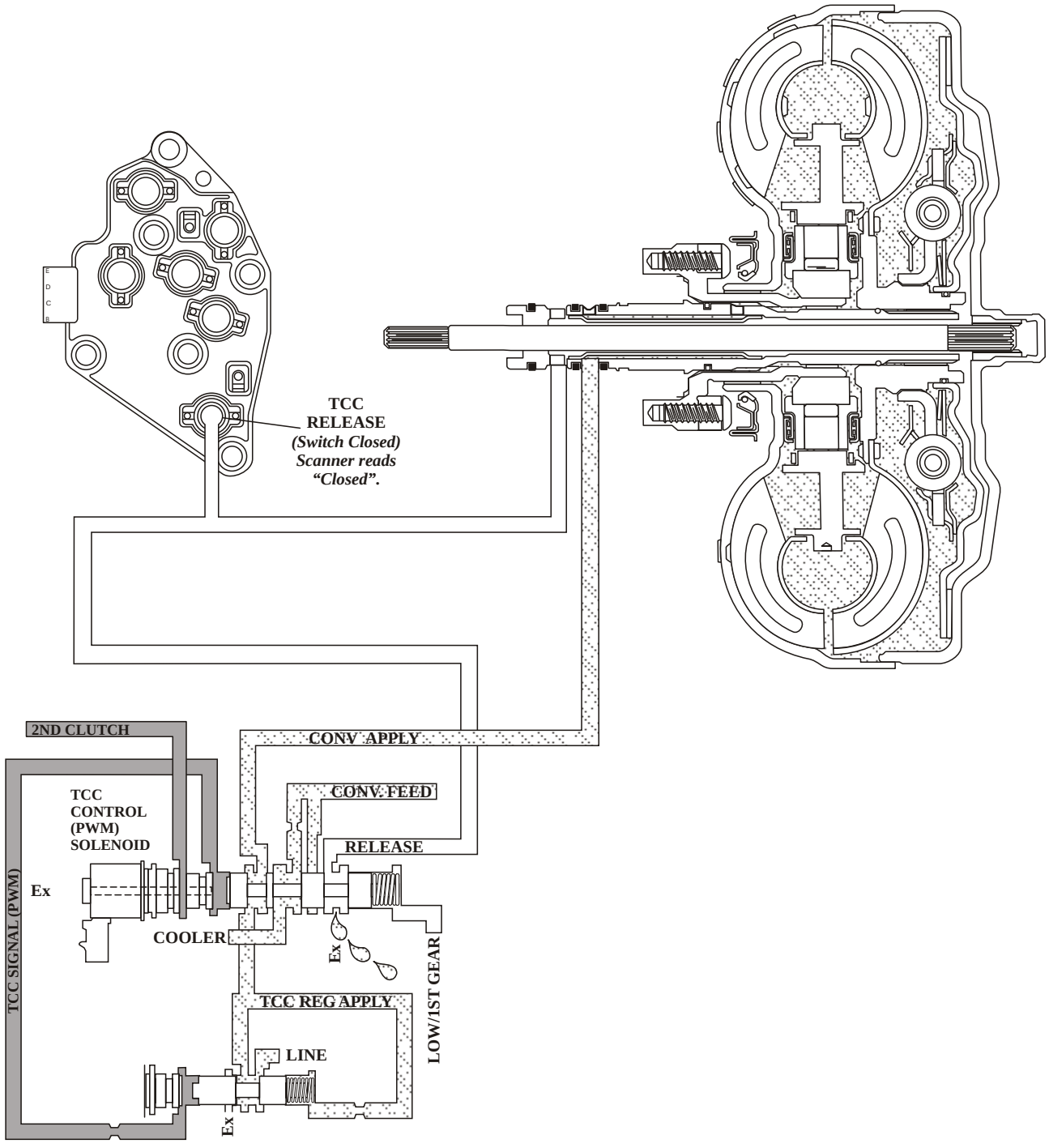
TCC HYDRAULIC CIRCUIT IN DRIVE 2ND 3RD AND 4TH GEARS
(Converter Clutch Released)



This diagram shows the transmission in 2nd, 3rd, or, 4th gear, with converter clutch released. Notice the TCC PWM solenoid is exhausting the TCC signal oil (2nd Clutch) and pressure is not high enough to overcome spring pressure on the TCC valve, so the release oil is not exhausted.

Figure 8

TCC HYDRAULIC CIRCUIT IN DRIVE 2ND 3RD AND 4TH GEARS
(Converter Clutch Applied)



This diagram shows the transmission in 2nd, 3rd, or, 4th gear, with converter clutch applied. Notice the TCC PWM Solenoid is energized and not exhausting the TCC signal oil, (2nd Clutch) and TCC signal oil is pushing TCC valve to the right, causing release oil to exhaust at the valve.

Figure 9

ALLISON 1000/2000 SERIES TRANSMISSIONS

MODULATED LINE PRESSURE

CHANGE: Beginning with June 2003 production, a ***Modulated Main Line Pressure*** feature has been added to the Allison 1000/2000 series of transmissions.

REASON: To provide additional cooler flow and reduce pump noise at the engine idle rpm range.

PARTS AFFECTED:

(1) The Main Valve Body, (Figure 1), has changed as well as the Separator Plate, (Figure2).
(2) The Shift Valve Body has changed, (Refer to Figures 3 and 4).
(3) The Control Main Regulator Valve has changed, (See Figure 5).
(4) The Main Pressure Regulator Valve has changed depending on application as shown in Figure 6.
(5) The Control Main Regulator and Control Main Relief Springs have changed demensionally as shown in Figure 7.
(6)A Modulated Main Valve Body has been added to accommodate the "G" Solenoid as seen in Figure 8).
(7) The internal wiring harness has been changed to accommodate the "G" Solenoid, (See Figure 9).
(8) This feature also includes the addition of Solenoid "G" as well as the additional circuitry from case connector terminal "R" to the "J2" (RED) TCM connector at terminal 30 as shown in Figure 10.
(9) The basic Seal and Gasket Kit have also changed, (Not shown).
(10) Six (6) new gold colored bolts (65mm x 1.0 mm) will be required if this feature is back servicing a transmission that did have the Modulated Main Line Pressure feature previously, (Not shown).
(11) The availability of Version "DEE" software will be required for this feature to be automatically recognized by the Transmission Control Module.

INTERCHANGEABILITY:

All components will back service all previous models when used as a complete assembly. Version "DEE" software can be downloaded to the existing TCM, however this will change the Calibration Identification Number (CIN) from the previous #18 to #19. The TCM ID tag should be altered to reflect this change.

SERVICE INFORMATION:

Internal Wiring Harness*.....*29539792
Separator Plate*.....*29539793
Modulated Main Valve Body Assembly*.....*29539797
Modulated Main Valve Body (Without Solenoid)*.....*29539796
Shift Valve Body*.....*29539798
Main Valve Body*.....*29539803
Control Main Valve Body*.....*29541152
Control Main Regulator & Control Relief Spring*.....*29531153
Main Pressure Regulator Valve*.....*29542361
Control Valve Assembly Kit*.....*29541572
Basic Seal & Gasket Kit*.....*29542704

ALLISON 1000/2000 SERIES TRANSMISSIONS

MODULATED LINE PRESSURE

SERVICE INFORMATION

continued: ***Solenoid "G".....29536833***
Solenoid "G" Retaining Clip.....29534518
65 mm x 1.0 mm Longer Gold Colored Bolts, Six (6) Required.....29537508

DIAGNOSTIC NOTE:

Diagnostic Trouble Code "P2810" has been added to indicate a Solenoid "G" electrical circuit fault.

MODULATED LINE PRESSURE

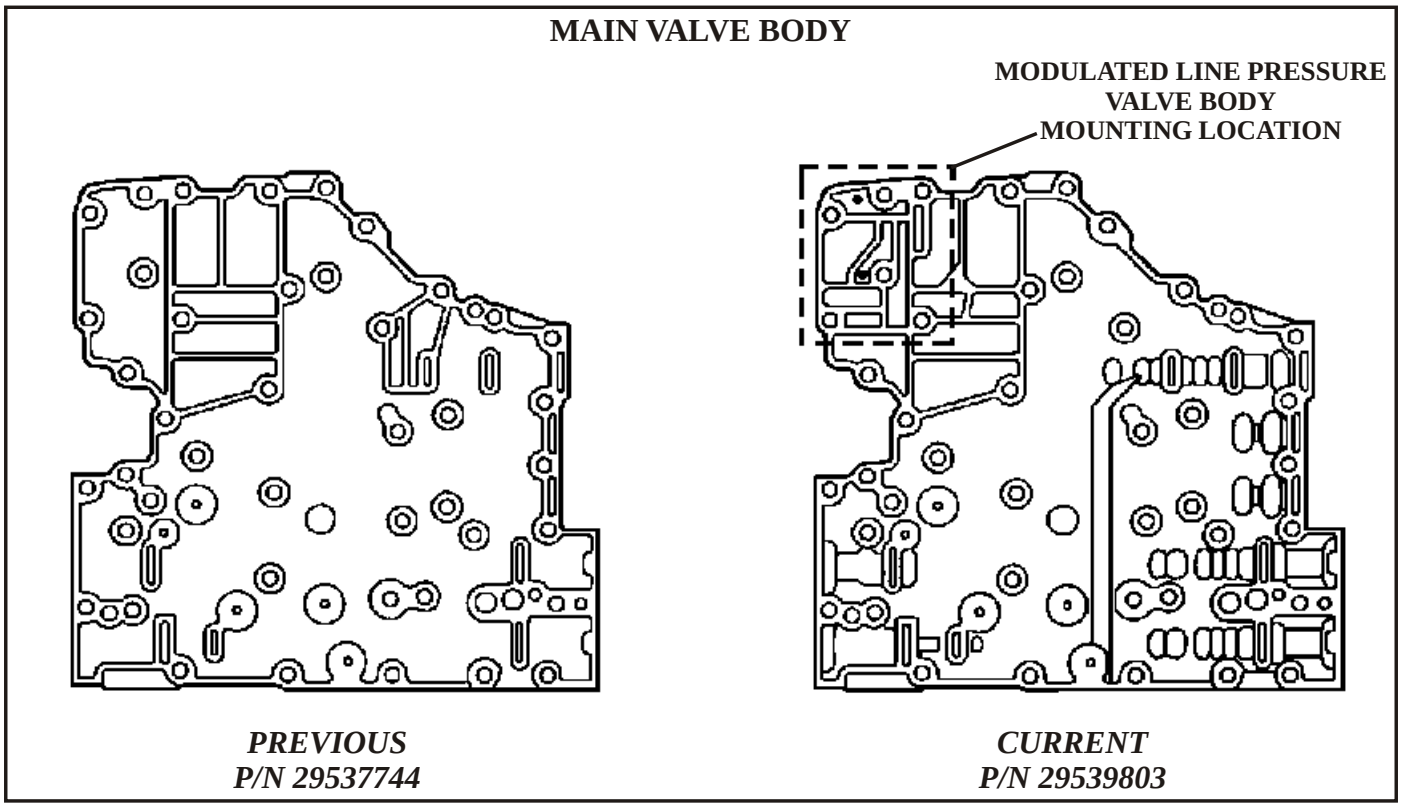


Figure 1

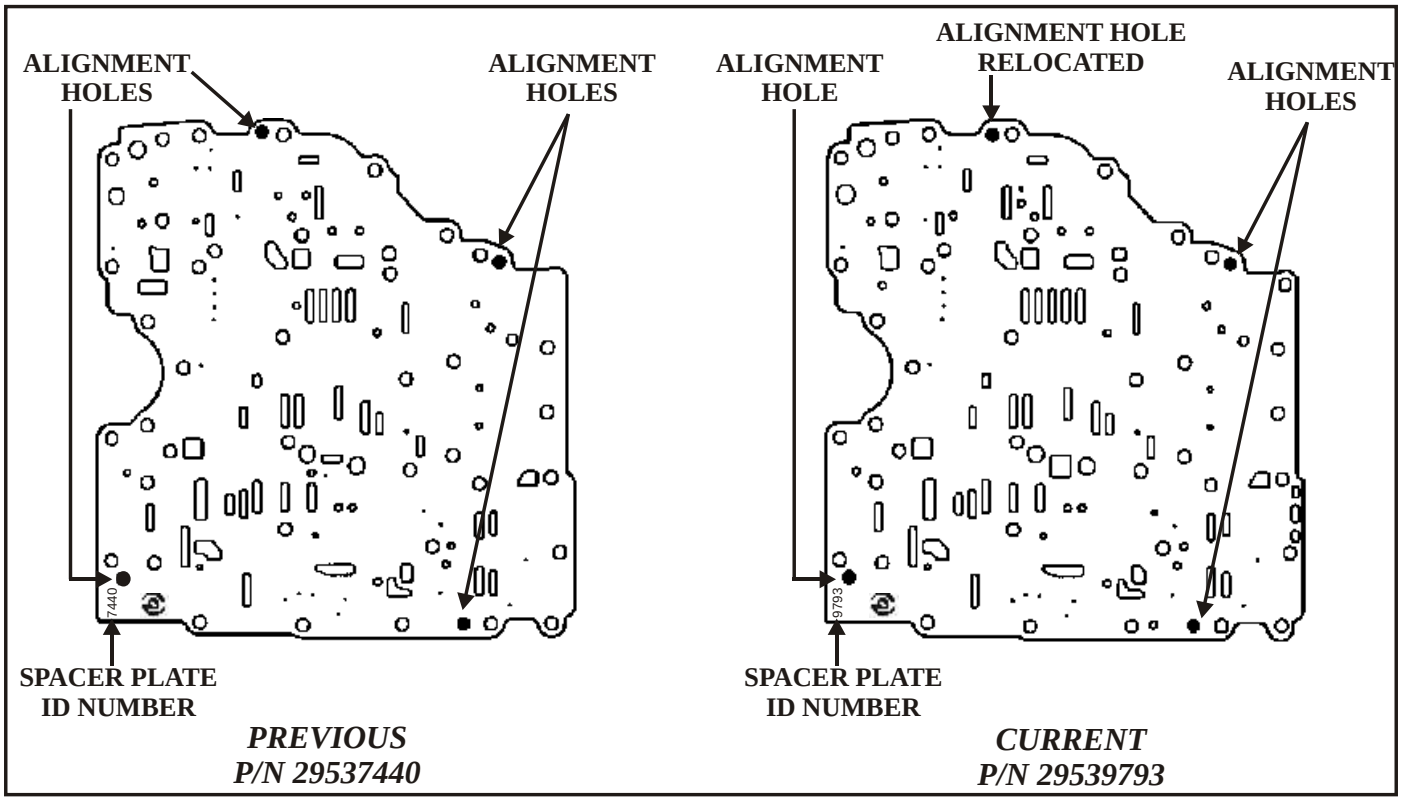
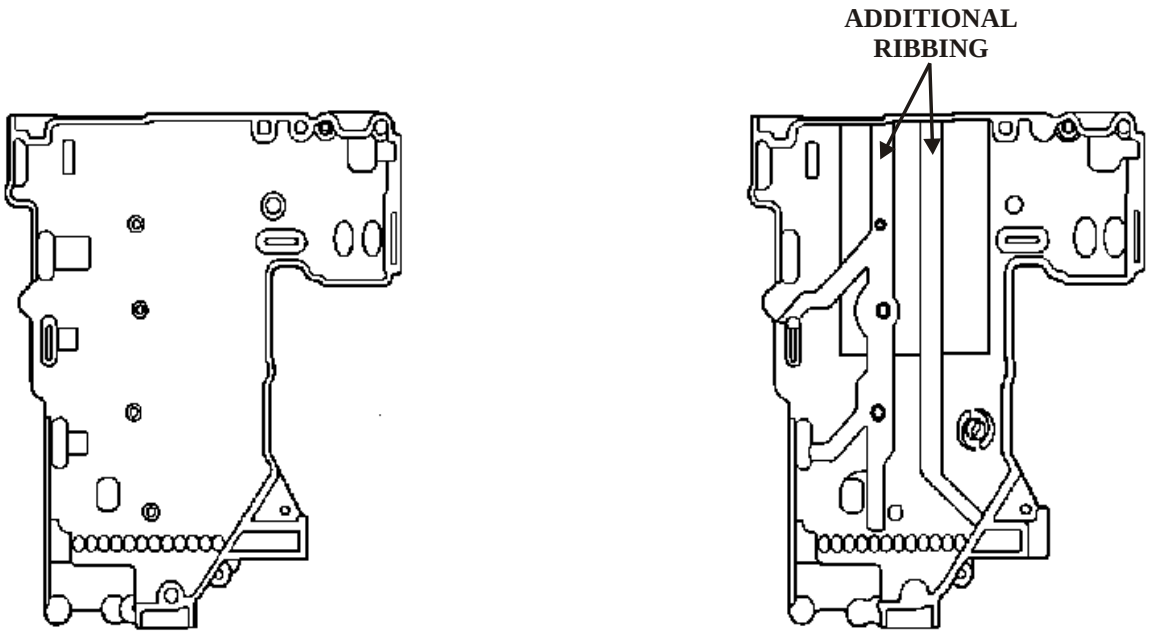


Figure 2

MODULATED LINE PRESSURE

SHIFT VALVE BODY

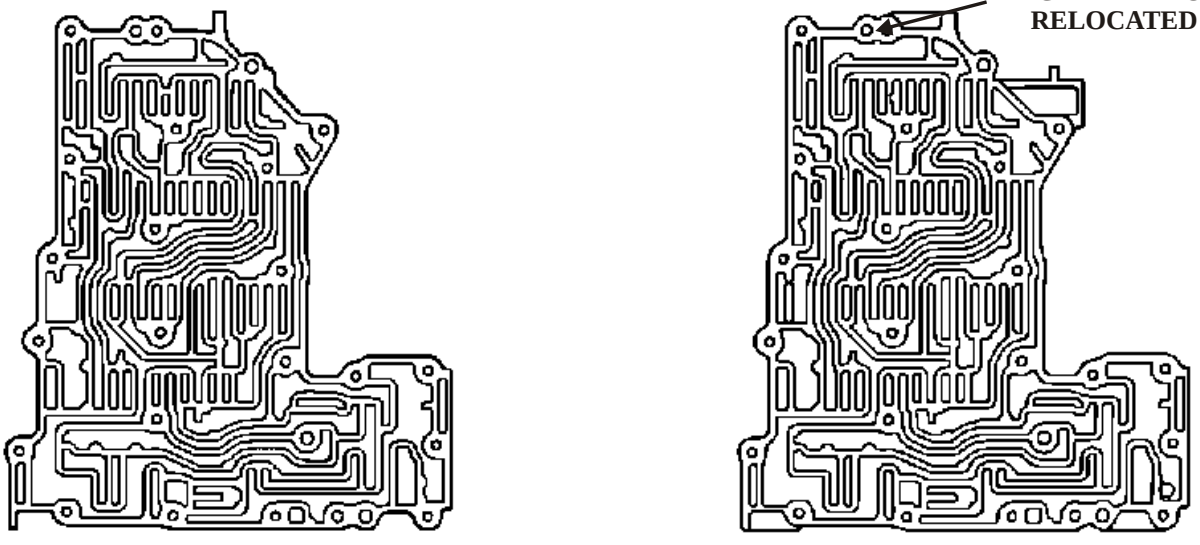


PREVIOUS
P/N 29536838

CURRENT
P/N 29539798

Figure 3

SHIFT VALVE BODY



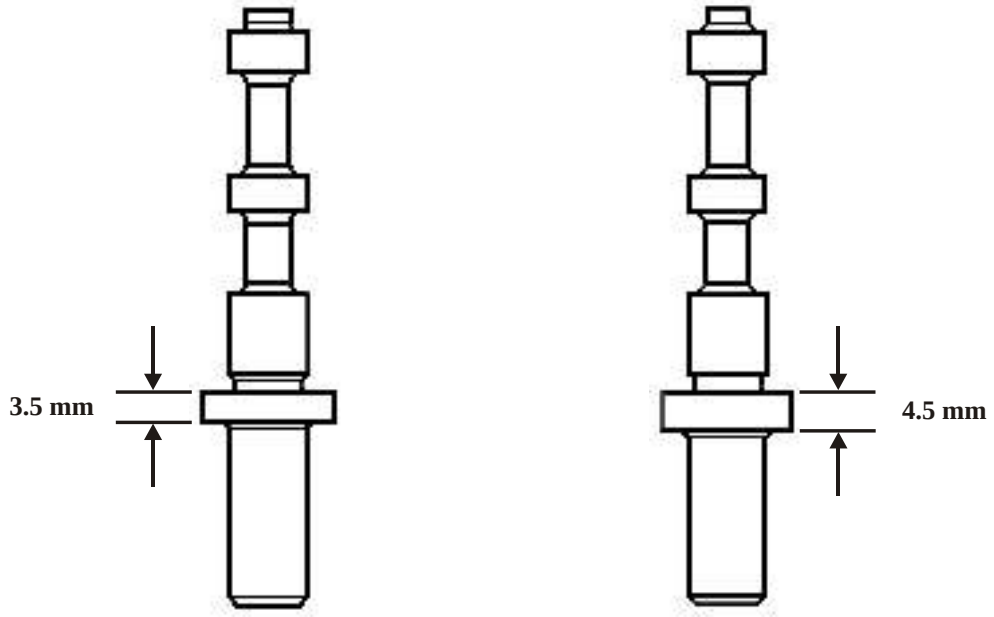
PREVIOUS
P/N 29536838

CURRENT
P/N 29539798

Figure 4

MODULATED LINE PRESSURE

CONTROL MAIN REGULATOR VALVE

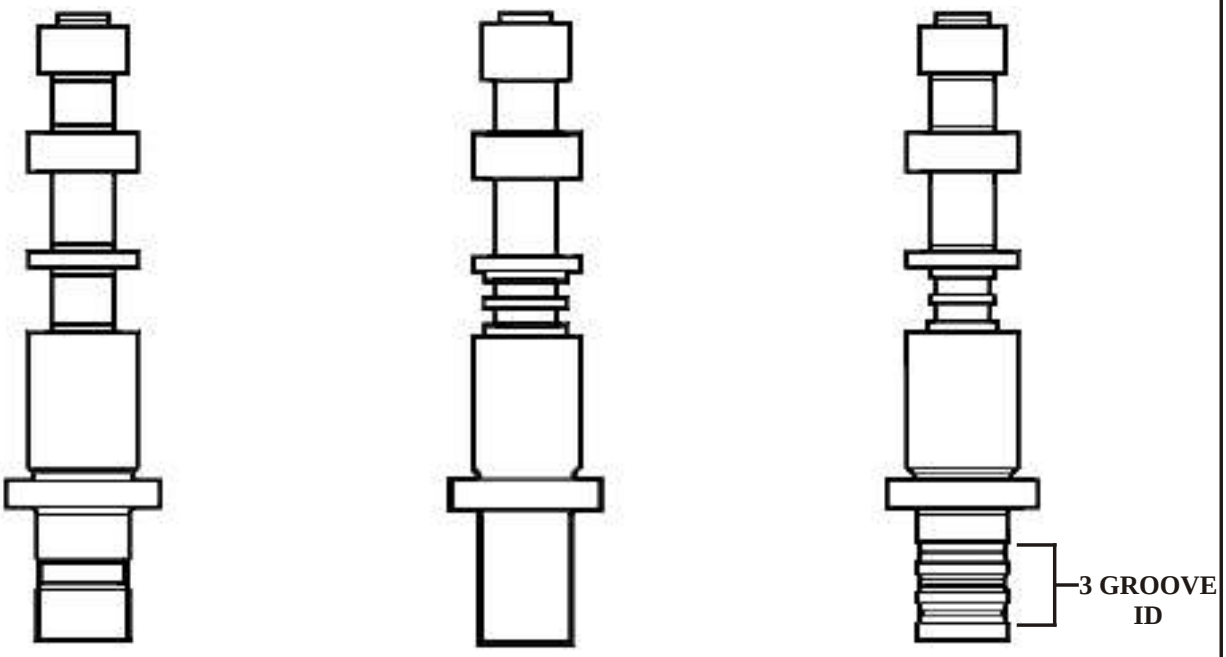


PREVIOUS
P/N 29537315

CURRENT
P/N 29539792

Figure 5

MAIN PRESSURE REGULATOR VALVE



PREVIOUS & CURRENT
P/N 29531323
(Used in pickup trucks only)

PREVIOUS
P/N 29540486

CURRENT
P/N 29542361

(Used in commercial and all applications EXCEPT pickup trucks)

Figure 6

MODULATED LINE PRESSURE

CONTROL MAIN REGULATOR & CONTROL MAIN RELIEF SPRINGS

Figure 7

MODULATED MAIN VALVE BODY

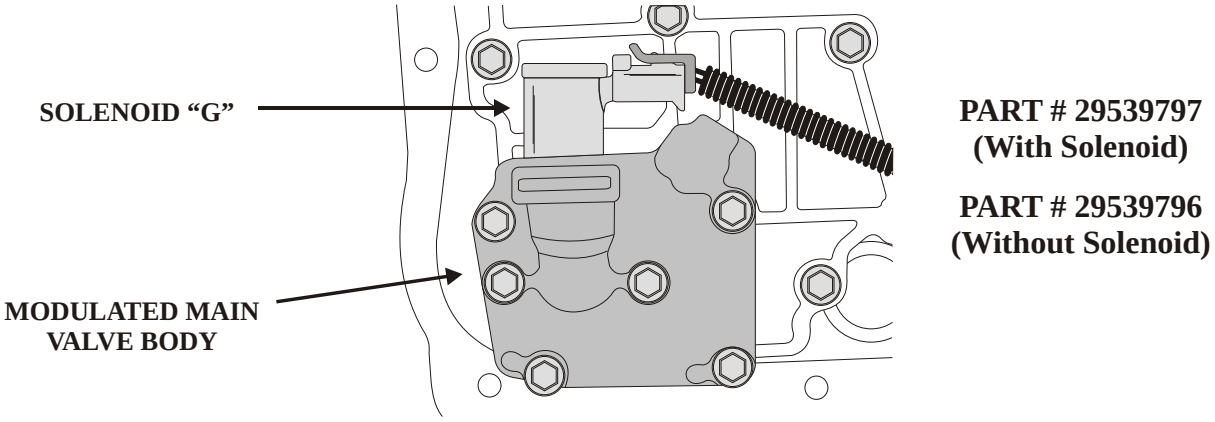


Figure 8

INTERNAL WIRE HARNESS

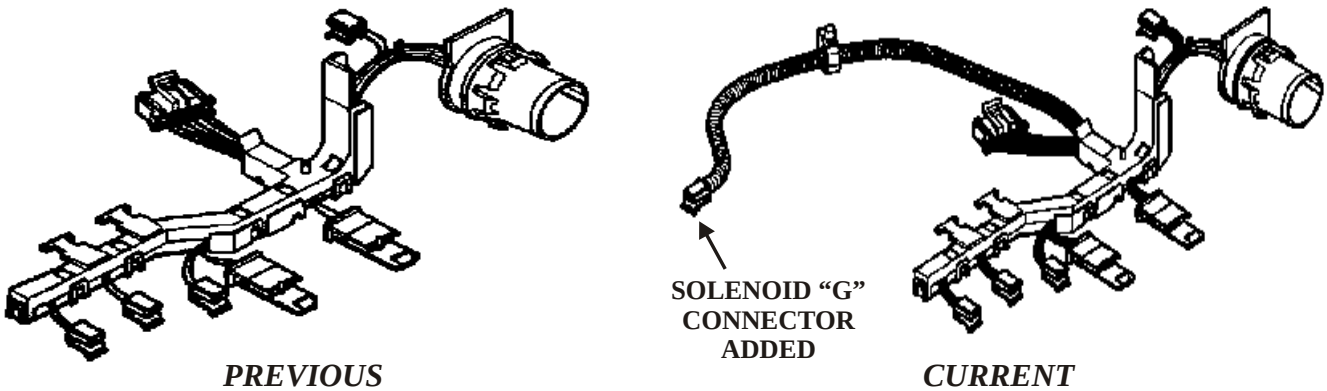


Figure 9

MODULATED LINE PRESSURE

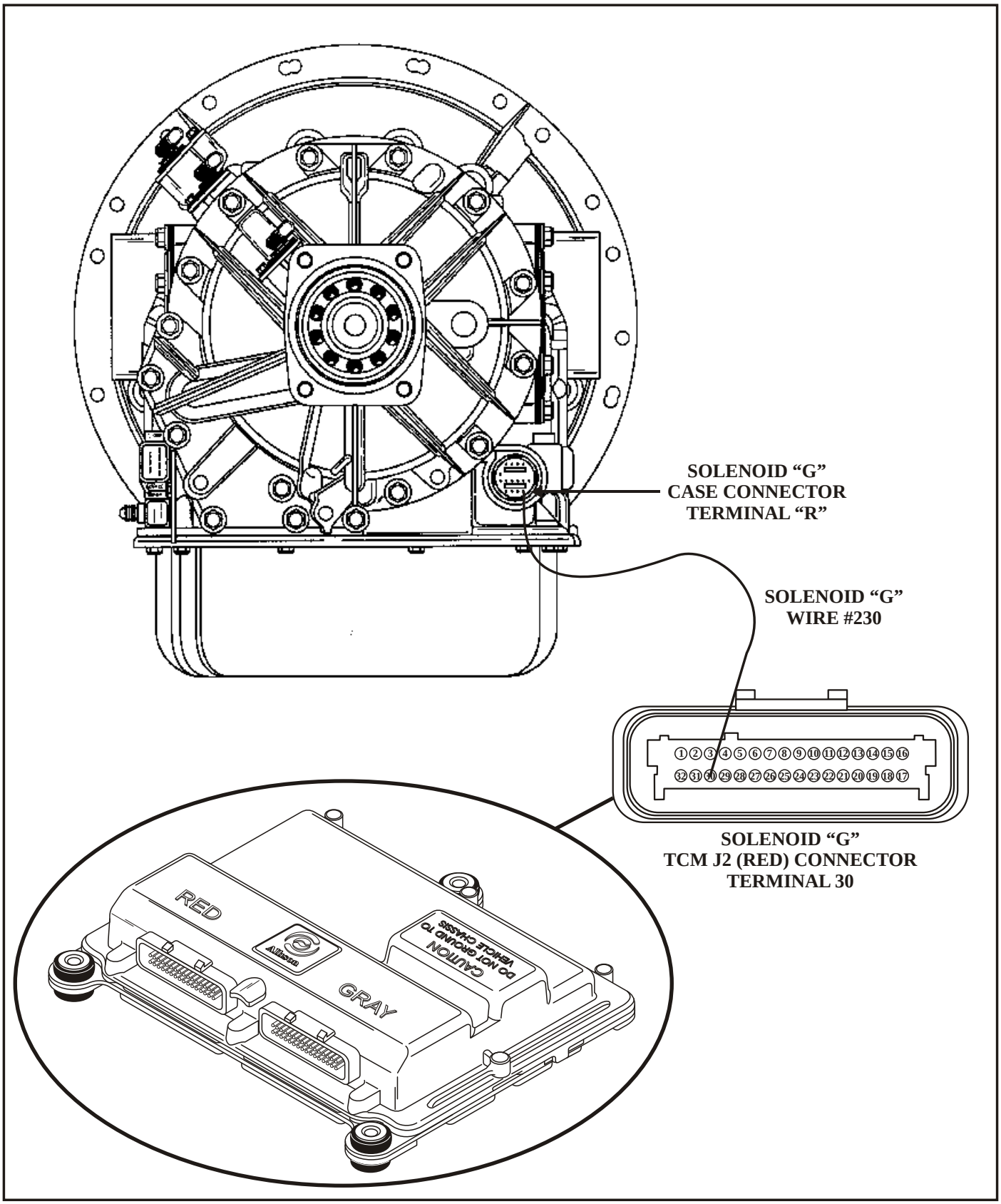


Figure 10

JR403E ELECTROMATIC

ATF LEAKING FROM THE VENT

COMPLAINT: After overhaul, during which the pump was replaced, transmission fluid is leaking from the vent. Since the pump was replaced with a good used pump, pump cavitation can be eliminated as the cause of the venting problem. Cooler flow when hot has been verified as adequate. Lockup applies at the correct time and functions normally. The transmission is not overfull.

CAUSE: The replacement pump did not match the case that it went into which is the cause of the above complaint. There are two (2) different pump and case designs and they vent differently.

CORRECTION: The case in figure 1 is an ***early*** case, ***notice*** that the vent tube is located on the driver side. The case in figure 2 is a ***late*** case, ***notice*** that the vent tube is located on the passenger side and the driver side location is cast shut. The vent hose on the late case runs through the case mounting area as seen in figure 3.

The pump mounting area in the case shown in figure 4 is a smooth mounting area encompassing the vent pipe, this is the ***early*** case. The pump mounting area in the case shown in figure 5 has channels cut in the pump mounting surface with the vent pipe on the opposite side of the case, this is the ***late*** case.

The pump shown in figure 6 is an ***early*** pump and goes with the ***early*** case, ***notice*** the highlighted area, it is recessed. The pump shown in figure 7 is a ***late*** pump and goes with the ***late*** case, ***notice*** the highlighted area, it is raised and contains air bleed holes.
The early and late pumps and cases cannot be interchanged, doing so will result in the above mentioned complaints.

SERVICE INFORMATION:

The parts mentioned in this bulletin as well as any other parts for the JR403E Electromatic or Aisin Sieki 450-43LE transmissions are available from RC Truck Parts, 305-863-3933 or E-Mail to rctrucks1@aol.com or on the web at rc-truckparts.com.

A very special thanks to Roly Farradas of Rainbow Transmission in Hialeah, FL. for sharing this information and parts to make this bulletin possible.

ATF LEAKING FROM THE VENT

EARLY CASE

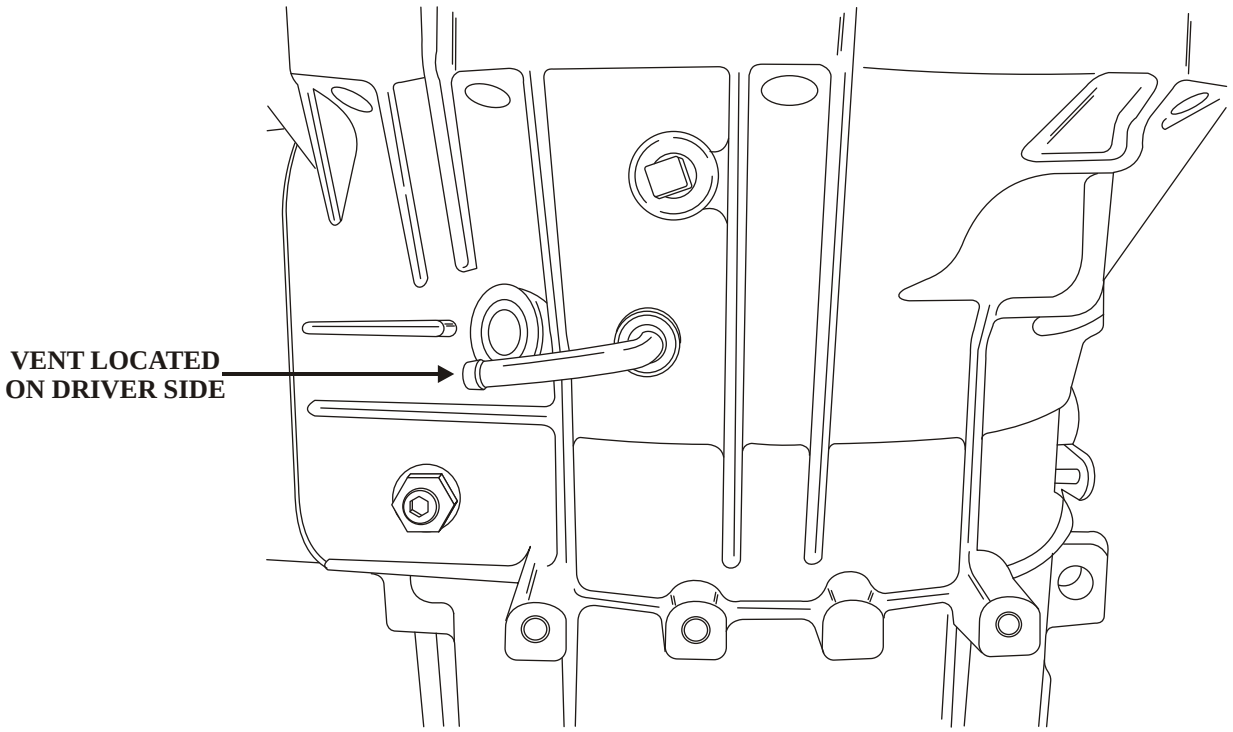


Figure 1

LATE CASE

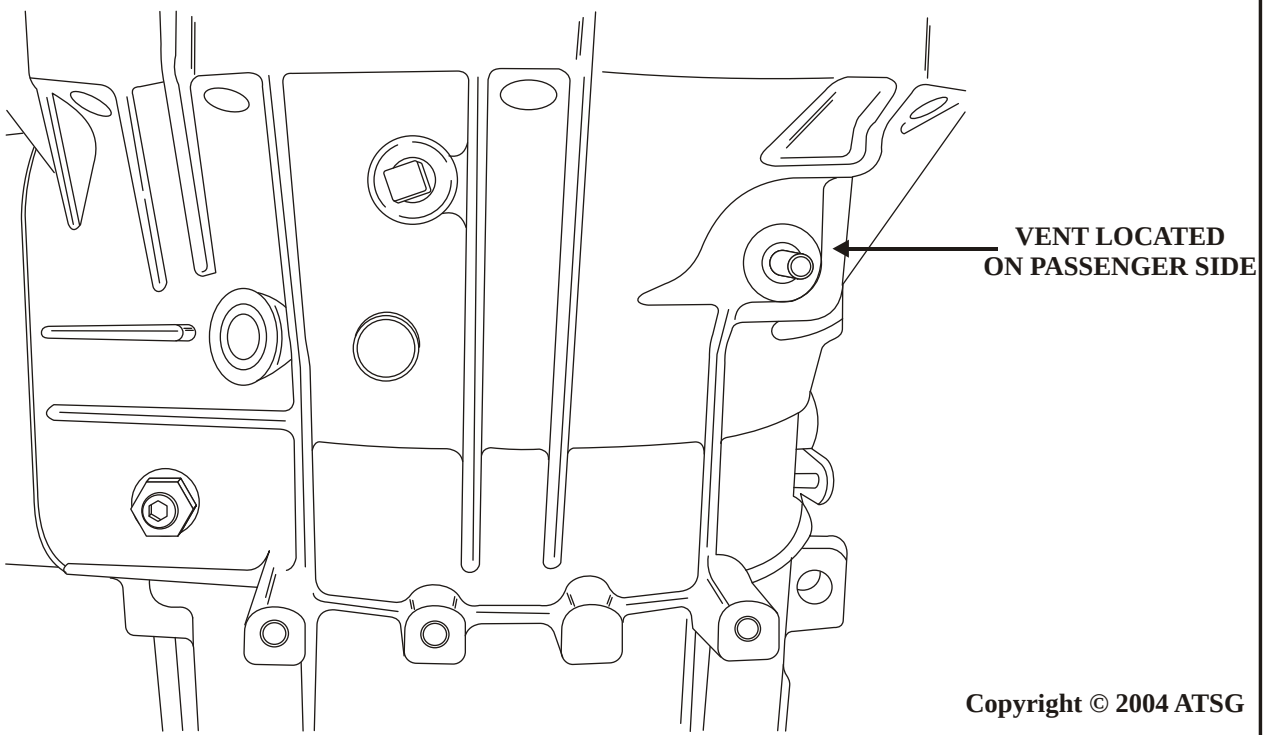


Figure 2

ATF LEAKING FROM THE VENT

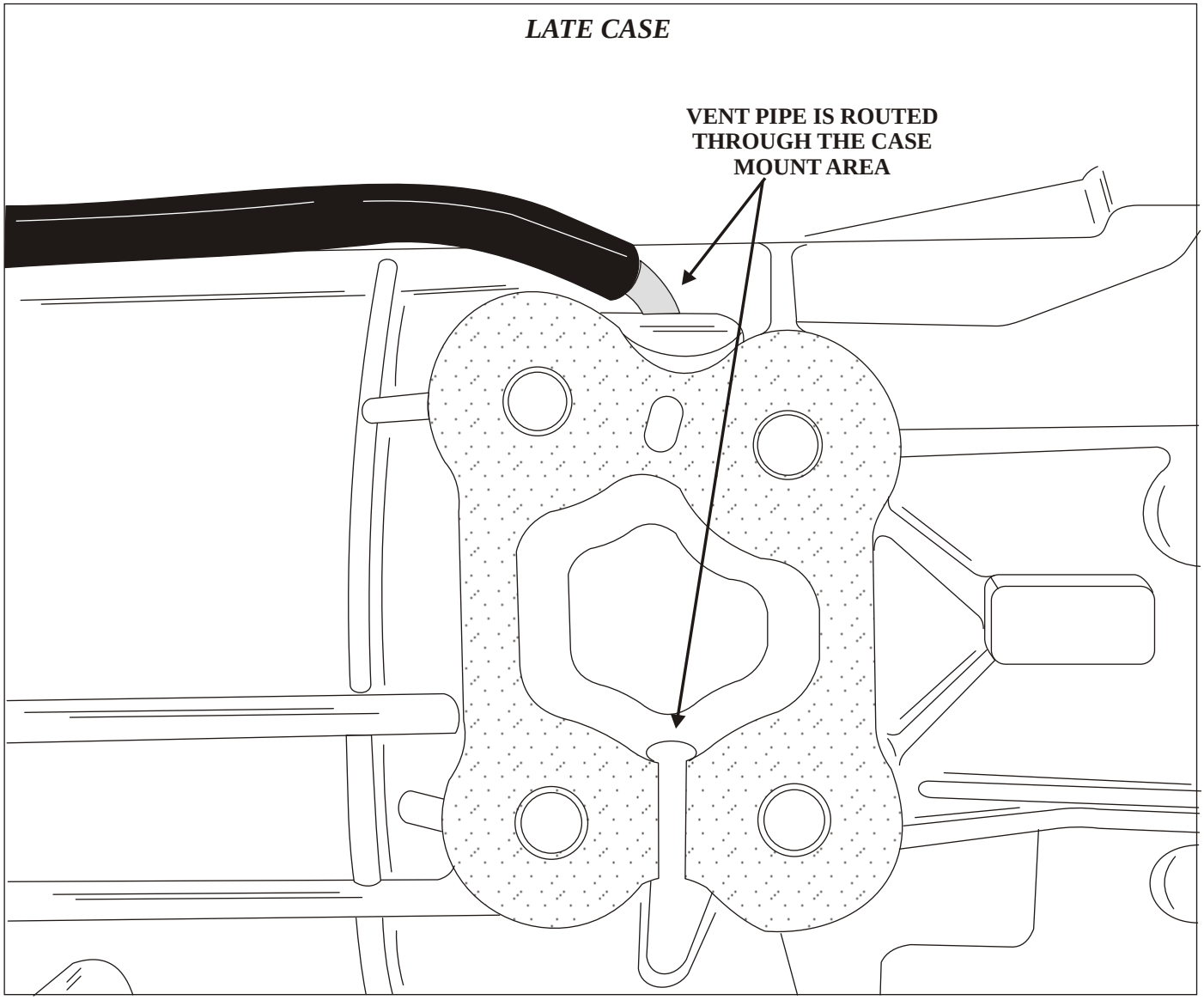


Figure 3

ATF LEAKING FROM THE VENT

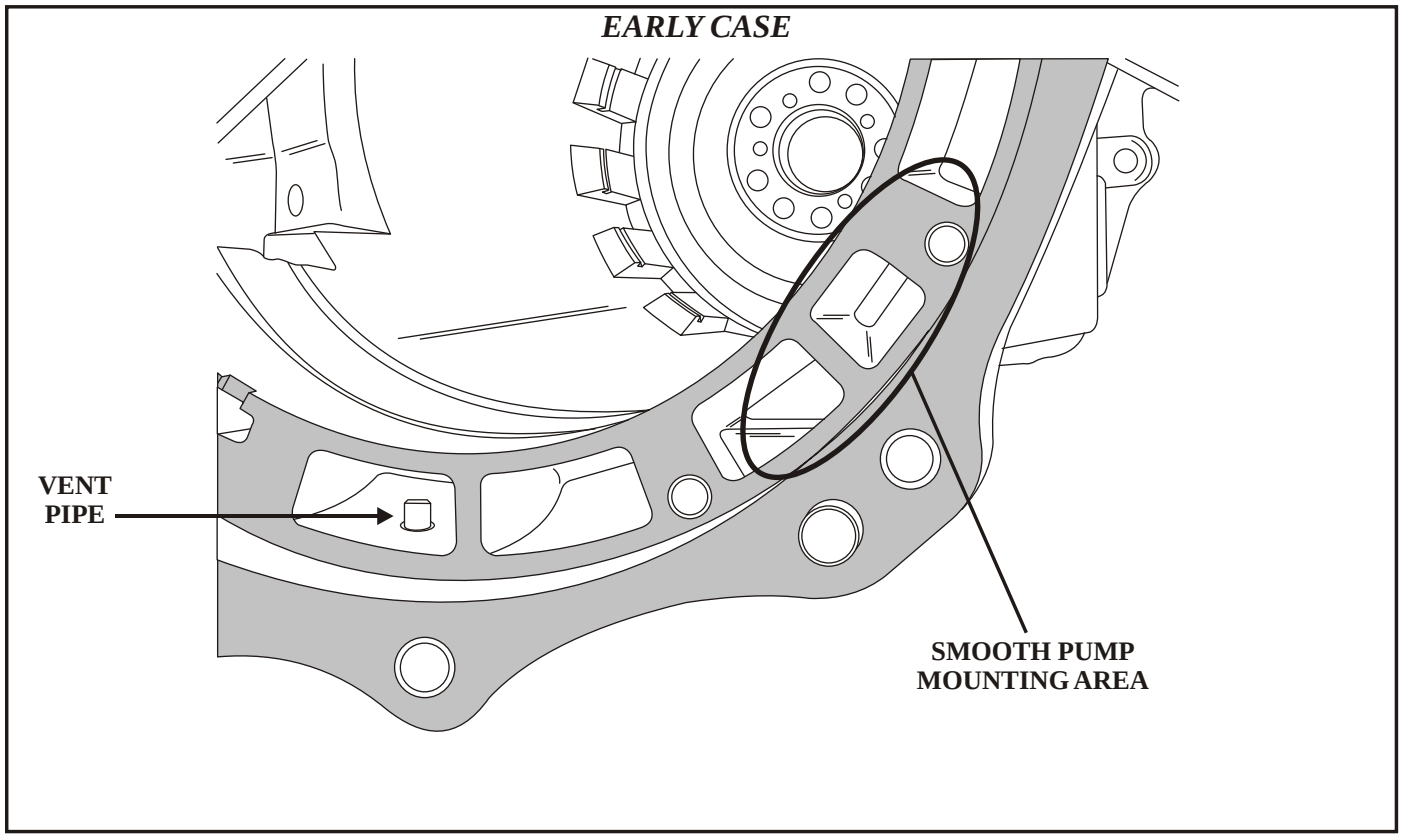


Figure 4

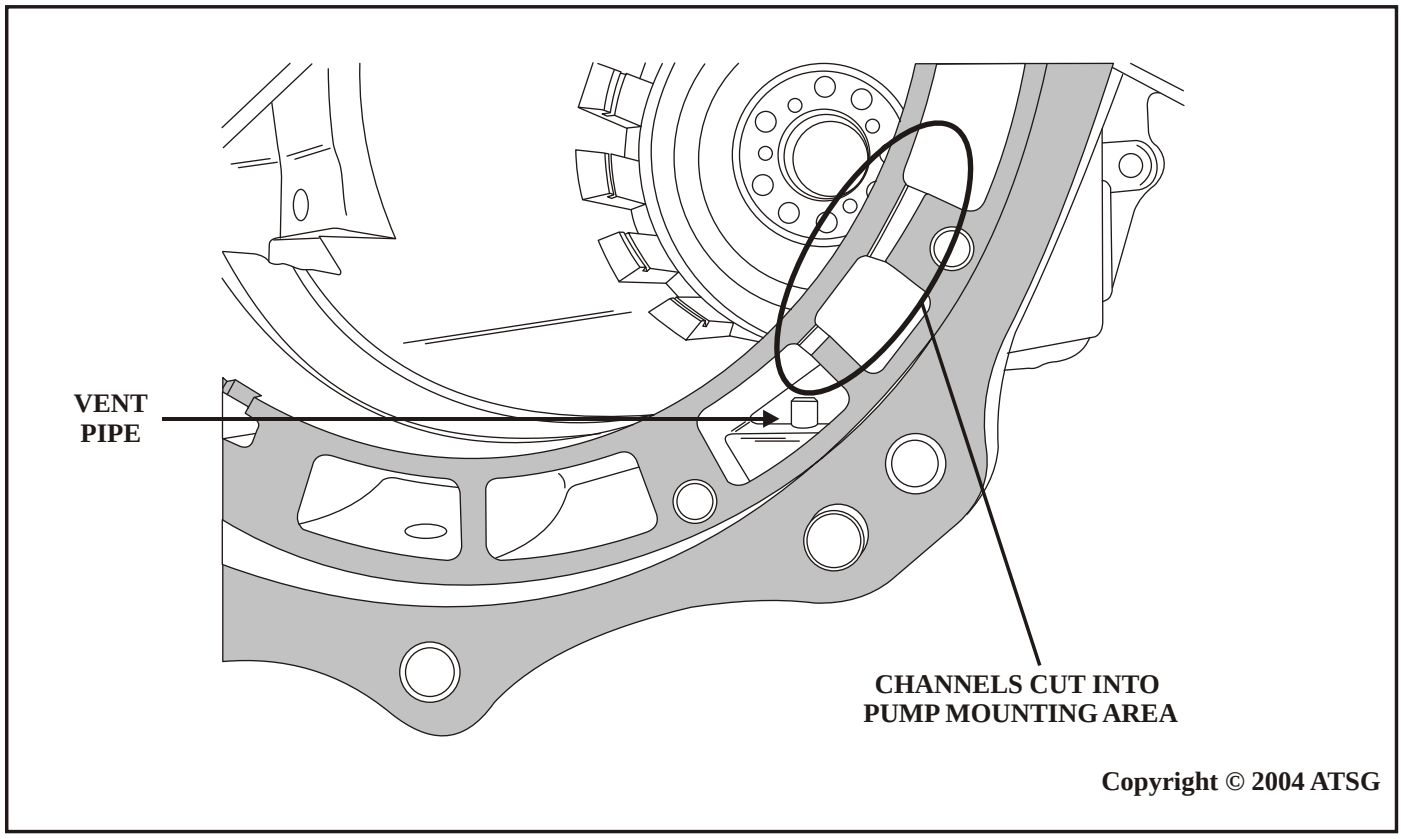


Figure 5

ATF LEAKING FROM THE VENT

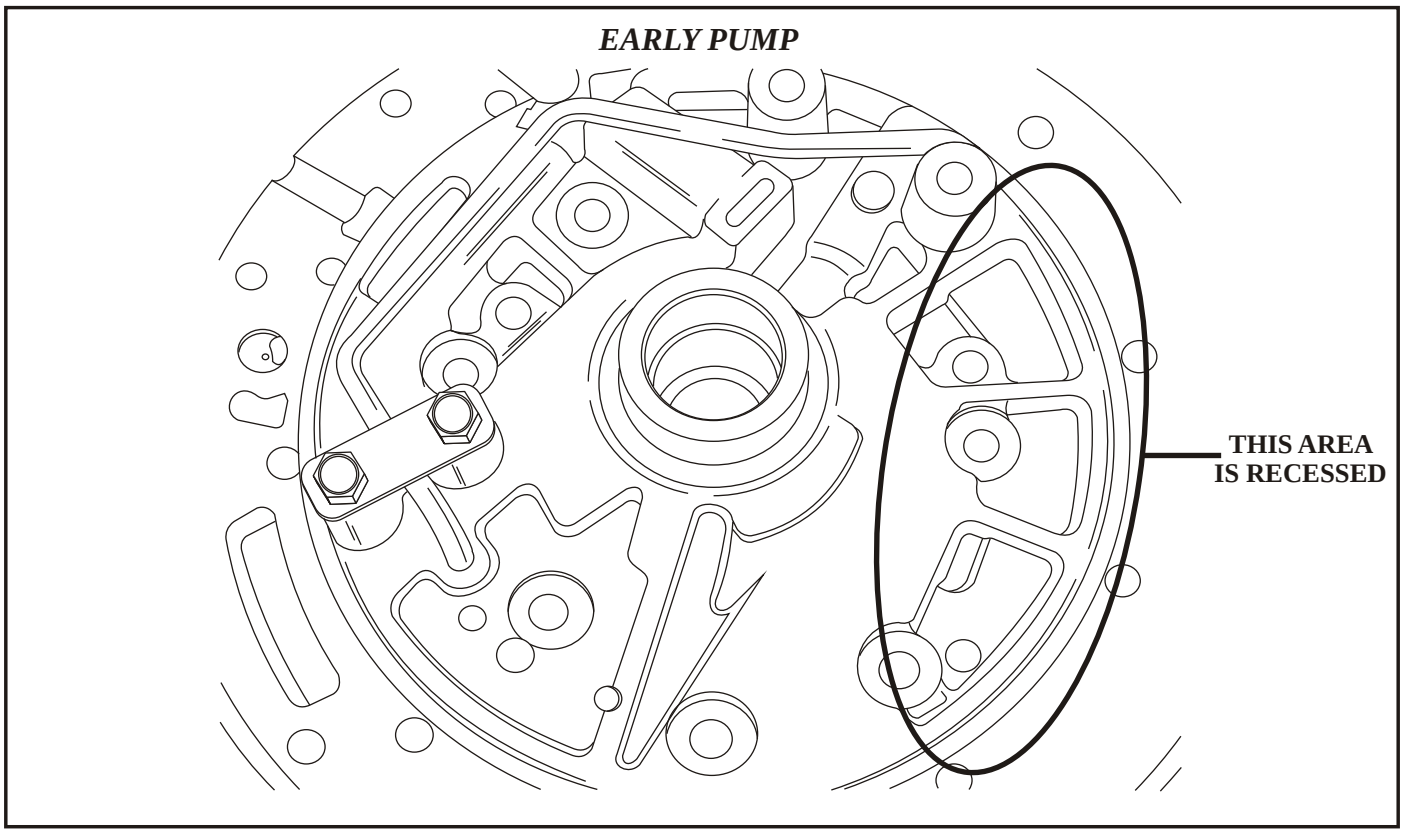


Figure 6

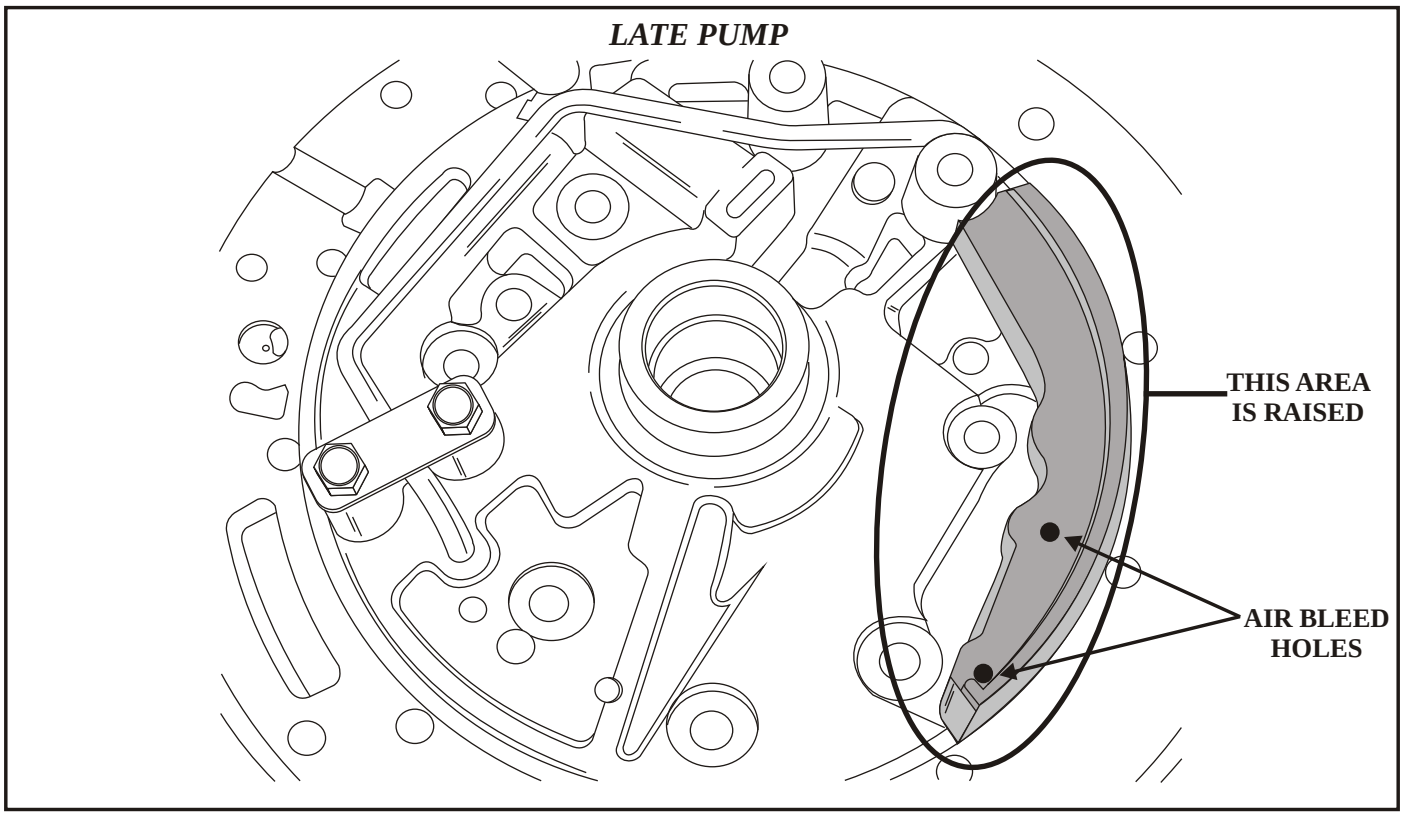


Figure 7

2000 & LATER ISUZU NPR; CHEVY FORWARD; GMC TILTMASTER

TPS RELEARN PROCEDURE

COMPLAINT: The transmission is stacked shifting and has no kickdown. Code 21, for a TPS circuit fault is stored. All TPS circuits check within specs and adjusting the TPS does not allow code 21 to be cleared or the complaints to disappear.

CAUSE: These vehicles require a TPS relearn procedure whenever the engine, injection pump, accelerator cable, throttle linkage, throttle position sensor or kickdown switch are replaced. Failure to do so will result in the above complaints.

CORRECTION: The following procedure is used for the TPS voltage relearn:

Clearing TCM Memory of Current TPS Voltage

1. Turn starter switch to the "ON" position.
2. Turn the overdrive switch to the "ON" position.
3. Place the selector lever in the manual "1" range.
4. Depress the accelerator pedal fully, listen for the kickdown switch click.
5. Depress the brake pedal, (brake switch "ON").
If the memory is successfully cleared, the "Check Trans" lamp flashes 5 times.

Preparation For Relearn

1. Turn the starter switch to the "ON" position.
2. Connect terminals 4 and 11 of the Data Link Connector as seen in Figure 1, the "Check Trans" lamp begins flashing at 0.4 second intervals.
3. Place selector lever in the "P" range.

WOT Voltage Relearn

1. Depress accelerator pedal fully.
2. With the accelerator pedal still at WOT, depress brake pedal for more than 3 seconds.
3. The "Check Trans" lamp should now flash intermittently, then illuminate for 3 seconds, then flash 6 times slowly, then flash intermittently again. At this time, release the brake and accelerator pedals. The "Check Trans" lamp should illuminate for 3 seconds. If it does not, do the "Clear Memory" procedure above and repeat the WOT relearn procedure beginning with item 2 under "Preparation".

Idle Position Voltage Relearn

1. Start the engine.
2. Depress the accelerator pedal slowly 3 times.
3. Remove the jumper wire from the Data Link Connector. At this time the "Check Trans" lamp should stop flashing. If it does not, or there is mis-operation, begin the procedure again from the start.

2000 & LATER ISUZU NPR; CHEVY FORWARD; GMC TILTMASTER

TPS RELEARN PROCEDURE

CORRECTION: **Confirmation of Relearn**
contiued: ***Stop the engine. Turn the starter switch to the "ON" position, the "Check Trans" lamp should begin flashing again. Depress the accelerator pedal fully and release the pedal slowly.***

NOTE: ***If the WOT voltage is out of spec, or the TCM did not learn any value, the "Check Trans" lamp will continue to flash continuously. In this case begin the relearn procedure over again. If the relearn was successful, The flashing will stop.***

NOTE: This manual relearn procedure is complicated at best. If it must be done multiple times because of unsuccessful attempts, it may be wise to have it done at the dealer or by a TECH II or Mastertech scan tool that you have or can acquire.

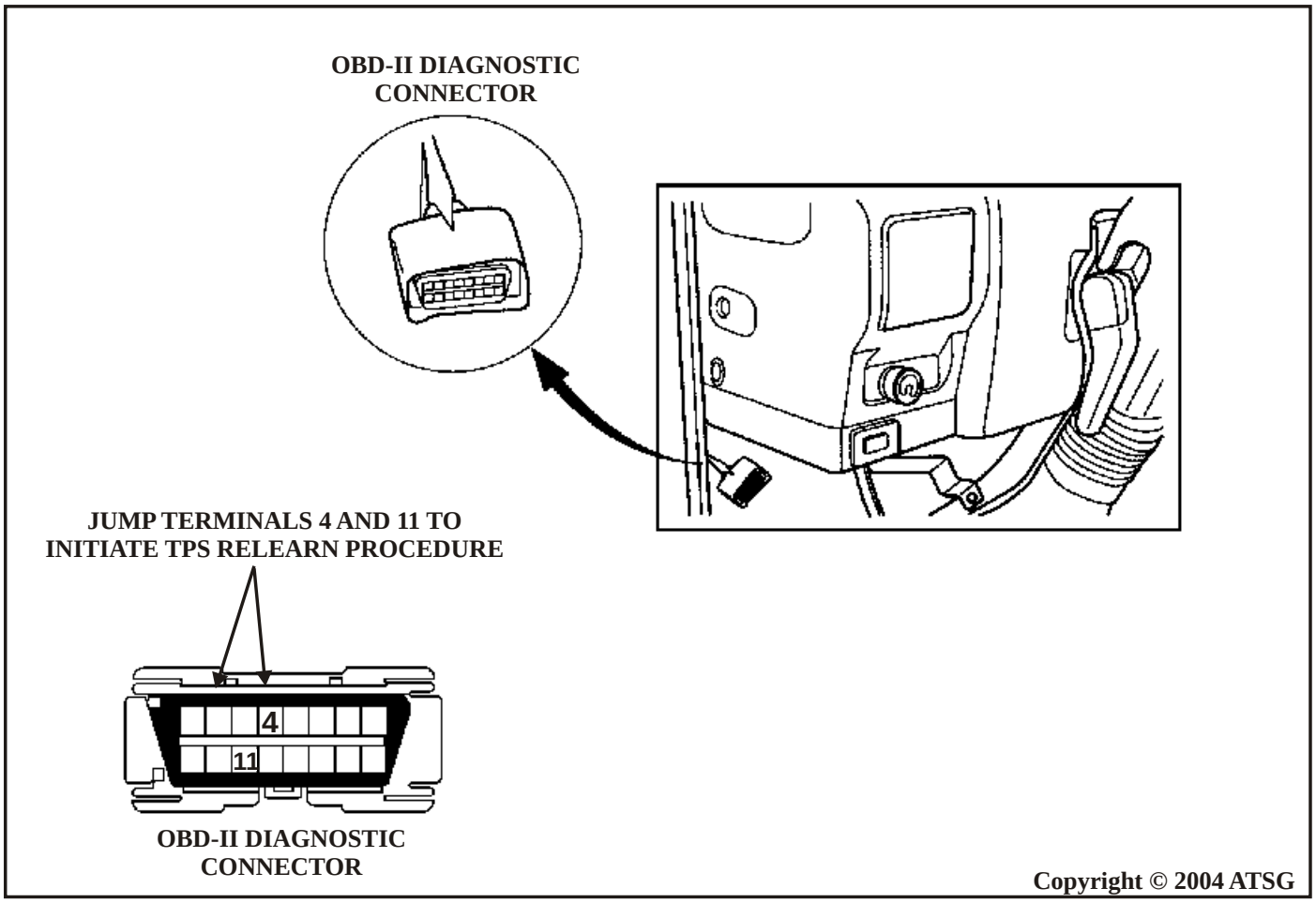


Figure 1

AISIN SEIKI 450-43LE

FLYWHEEL/FLEXPLATE ALIGNMENT

COMPLAINT: After flywheel and or flexplate replacement, the vehicle returns after a short period of time with the transmission leaking out the front and a vibration complaint.
Upon removal of the converter, a check of the front seal area reveals that the pump bushing is severely worn.

CAUSE: One or more of the flywheel bolts have bottomed out against the flexplate causing the flywheel, flexplate and converter assembly to have excessive run out resulting in the above complaints as seen in Figure 1.

CORRECTION: The flywheel has a white paint mark on it from the factory. The flexplate has a drilled dimple in it from the factory. Line the white paint mark on the flywheel up with the drilled dimple in the flexplate, (Refer to Figure 2), and then bolt it to the crankshaft.

N**ote:** It is a good practice to mark the flywheel to flexplate relation before removal just in case the factory marks are illegible.

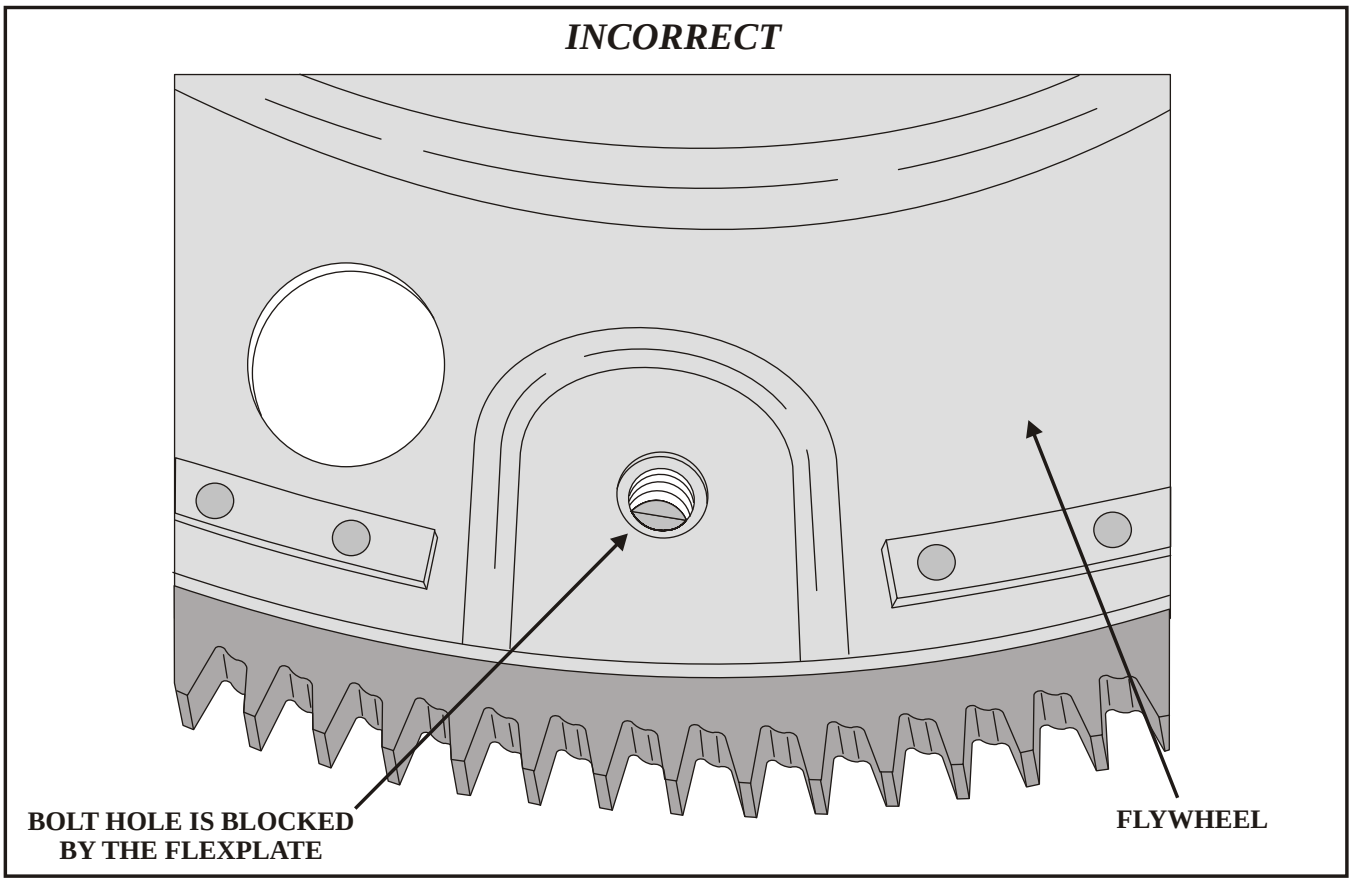


Figure 1

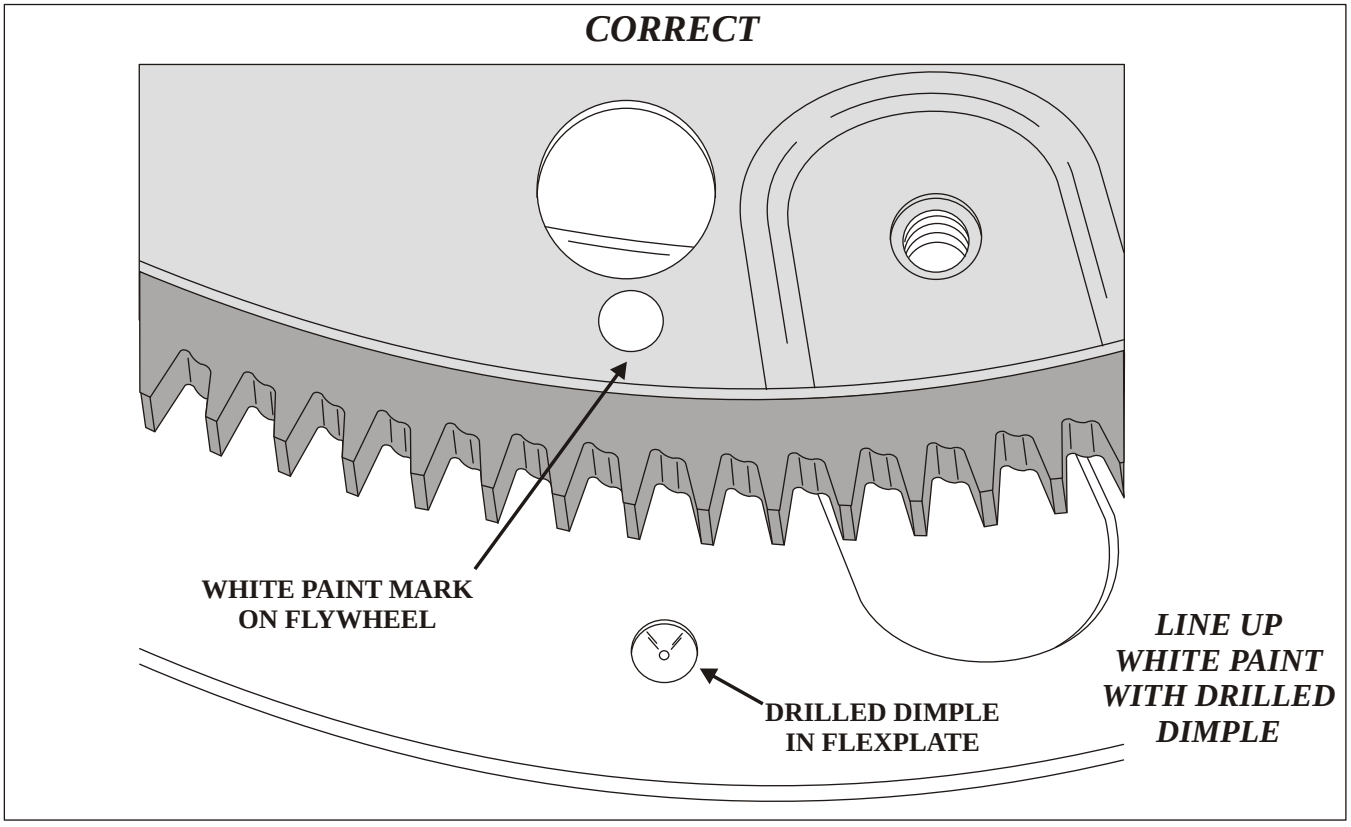


Figure 2

Phoenix

FORD MASS AIR FLOW SENSOR (MAF)

SHIFT TIMING & FEEL CONCERNS

COMPLAINT: Long drawn out shifts, intermittent harsh shifts, or soft early shifts. Poor engine performance, knock or lack of power under heavy engine loads. Fuel system running rich at idle and lean during higher Rpms. Barometric pressure (BARO) sensor readings higher than normal for present area altitude. May or may not store codes, see figure 1.

CAUSE: Incorrect Mass Air Flow (hot wire type) sensor (MAF) signal. Caused by dirty or contaminated Mass Air Flow sensor. No Mass Air Flow sensor signal or failed MAF sensor.

CORRECTION: Check air filter and container for dirt and debris. Replace filter if necessary and clean container. Clean or replace MAF sensor if necessary. The Mass Airflow Sensor measures the volume of airflow into the engine, past a thin heated wire. This wire is kept at a temperature of approximately 392 degrees. The increase of airflow will cool the sensor wire. The amount of voltage required to keep the wire at 392 degrees is the signal the PCM calculates to determine engine load. This signal greatly affects line pressure and shift timing. This sensor also affects the engines Long Term Fuel Trim and may not set any codes. A contaminated MAF sensor can over estimate air flow at idle causing the fuel system to go rich and under estimate airflow at high air flows and cause the fuel system to go lean. What this means is Long Term Fuel Trim will learn lean (negative) corrections at idle and rich (positive) corrections at higher air flows. This would be most noticeable at wide-open throttle or high engine load conditions, with symptoms of engine knock and/or lack of power. If the sensor fails the vehicle will go into Failure Mode and Effects Management (FMEM). The PCM will use the TPS sensor to create a MAF signal and the TPS and RPM sensors will determine engine load. Which is why it is better to check the signal at the sensor using a DVOM. The sensor output should read 0.8 to 1.0 volt at idle and increase smoothly to approximately to 4.5 volts at wide open throttle. An air filter that isn't changed often enough might be contaminating the sensor signal wire. Some after market air filters require an oil to be sprayed onto the filter. If an excessive amount of oil is used an oily film can develop on the thin wire affecting the performance of the sensor. The sensor can be cleaned with isopropyl alcohol, carburetor cleaner or brake clean. Make sure that any rubber gaskets or seals are removed prior to cleaning. An incorrect MAF sensor reading will also affect the signal from the Barometric Pressure sensor (BARO). At high air flows, a contaminated MAF sensor will under estimate airflow and cause the PCM to believe the vehicle is operating at a higher altitude. The BARO Sensor PID can be viewed with a scan tool. The correct BARO sensor reading can be viewed in the chart provided in figure 2. The Barometric pressure for your area can also be found on the Internet at Weather.com.

FORD MASS AIR FLOW SENSOR (MAF)

OBDI DTCs
181, 189 (Fuel system lean Bank 1 or 2)
179, 188 (Fuel system rich Bank 1 or 2)
171, 172, 173 (HO2S11 lack of switching Bank 1)
175, 176, 177 (HO2S21 lack of switching Bank 2)
184, 185 (MAF higher/lower than expected)
186, 187 (Injector pulse width higher/lower than expected)

OBDII DTCs
P0171, P0174 (Fuel system lean, Bank 1 or 2)
P0172, P0175 (Fuel system rich, Bank 1 or 2)
P1130, P1131, P1132 (HO2S11 lack of switching Bank 1)
P1150, P1151, P1152 (HO2S21 lack of switching Bank 2)

Figure 1

BAROMETRIC PRESSURE REFERENCE

BAROMETRIC PRESSURE (In. Hg.)	BAROMETRIC PRESSURE (kPa)	BARO/MAP PID (Hz)	ALTITUDE ABOVE SEA LEVEL (Ft.)
3.5	11.8	89.3	↑
5	16.9	92.8	
10	33.8	104.6	
15	50.7	117.0	14,000
20	67.5	129.6	10,000
21	70.9	132.5	9,000
22	74.3	135.4	8,000
23	77.7	138.3	7,000
24	81.1	141.1	6,000
25	84.4	144.0	5,000
26	87.8	146.9	4,000
27	91.2	149.8	3,000
28	94.6	152.8	2,000
29	97.9	155.8	1,000
30	101.3	158.9	0 (Sea Level)
31	104.7	162.0	
31.87	107.7	164.7	↓

Figure 2

FORD EXPLORER; MOUNTAINEER; TAURUS; SABLE; WINDSTAR & LINCOLN CONTINENTAL

WHINNING NOISE FROM THE TORQUE CONVERTER AREA

COMPLAINT: Buzzing or whining noise coming from bell housing area on Ford Explorer, Mountaineer, Taurus, Sable, Windstar and Lincoln Continental.

CAUSE: Camshaft Position Sensor/Synchronizer assembly bearing failure due to lack of lubrication. The synchronizer assembly lube hole becomes clogged cutting off oil to the area between the synchronizer body and shaft causing it to run dry.

CORRECTION: Replace with an OE assembly from Ford Motor Co. The Camshaft Position sensor is located on top of the Camshaft Synchronizer in the back of the engine block centered just in front the of the transmission bell housing held in by two bolts (See Figure 1). The PCM uses this sensor to control Fuel Injector timing. When this sensor begins to fail it can cause a loud whining or buzzing noise. Because of its location you may think the converter is the problem on an Explorer or Mountaineer. On a Taurus, Sable or Windstar it is easily mistaken for a bad EPC. This one has tricked several technicians into spending countless man-hours changing torque converters or EPC solenoids trying to correct the source of the noise. Line pressure should be checked before changing the EPC solenoid. A steady pressure gauge needle with a reading of 60 to 75 psi will verify that the solenoid is working correctly. If the gauge is reading low and the needle is very erratic verify that the correct filter is being used. There are three different length filter neck seals for an AX4S and AX4N transmission. You may or may not notice any engine performance problems or find any codes stored. ***A good test is to place your finger on top of the sensor with the engine running to feel if the vibration or buzz is coming from a bad sensor.*** Remove the sensor/synchronizer assembly and dis-assemble it. Check for signs of rust and scoring, (Refer to Figures 2 and 3). Replacing this sensor/synchronizer assembly on an Explorer or Mountaineer is much easier with the transmission removed because of the tight area in which the sensor is located. Other wise the Intake Manifold will have to be removed.

IMPORTANT NOTE:

The Cam Synchronizer must be installed in the correct position as it is timed to the engine much like a distributor, failure to do so will result in a poorly performing engine. Installation tools are available from Ford Motor Company or mark its position with paint.

SERVICE INFORMATION:

Base Ford Part Number for Camshaft Position Sensor.....6B288
Base Ford Part Number for Camshaft Position Synchronizer.....12A362

Special thanks to John Parmentor from Centereach Transmission

WHINNING NOISE FROM THE TORQUE CONVERTER AREA

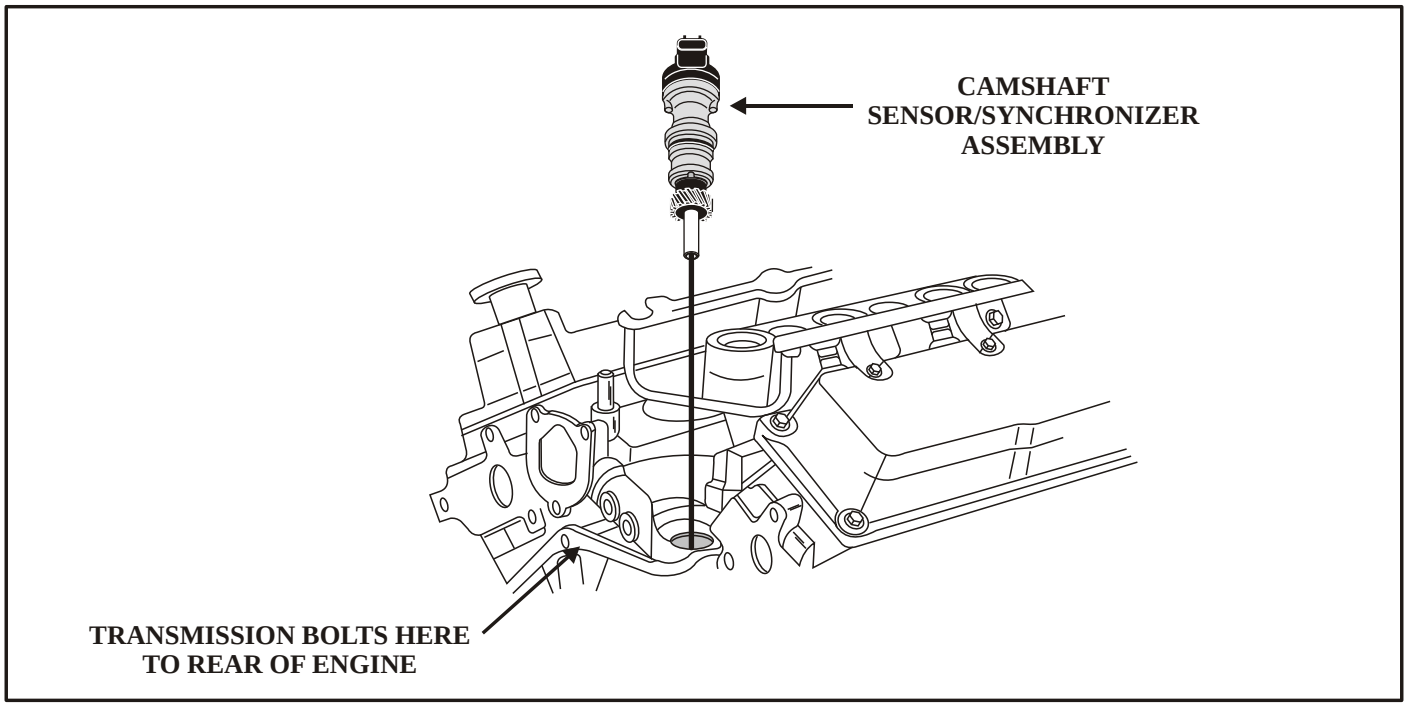


Figure 1

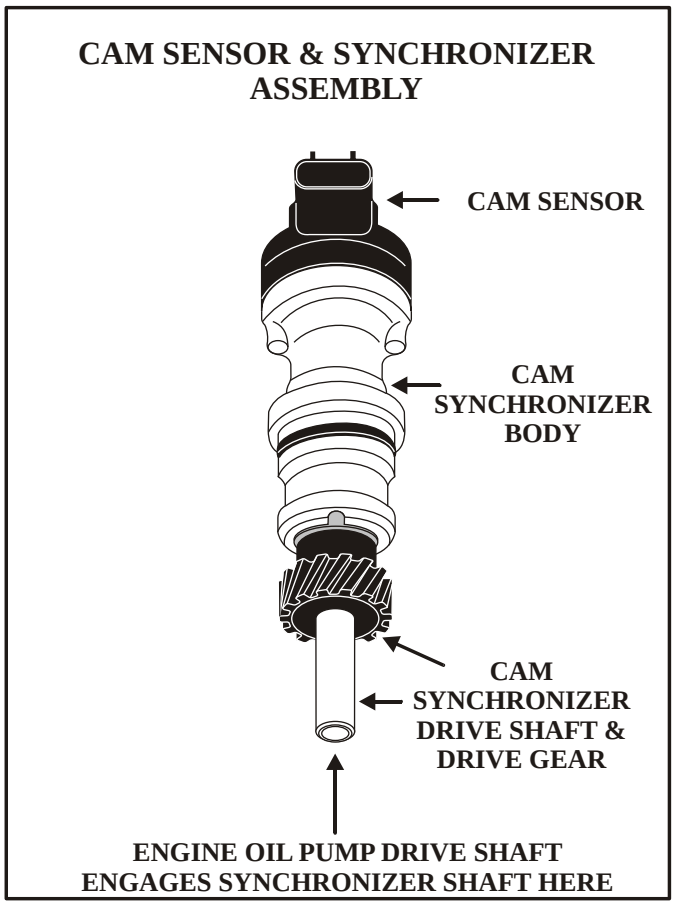


Figure 2

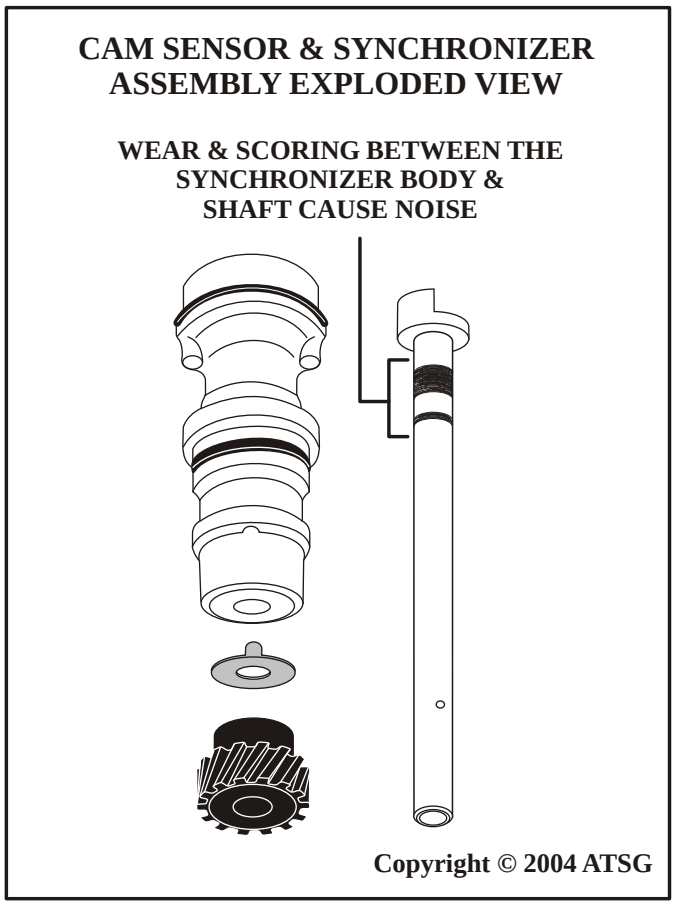


Figure 3

FORD 5R55N, 5R55W, 5R55S

DELAYED OR NO ENGAGEMENT

COMPLAINT: Before and/or after overhaul, the vehicle exhibits an intermittent delayed engagement, or no engagement in either direction. The frequency and severeness of this concern may increase in lower ambient temperatures, and may engage when the throttle is snapped to the wide open position and back to idle. The vehicle may then operate normally until the following morning after cool down and it is restarted.

CAUSE NO. 1: The above concern could be oil leaking past the o-ring that belongs on the relief valve sleeve between the pump plate and sleeve, as shown in Figure 1, or the "O" ring totally missing. This "O"-ring is very thin with minimal compression against the pump plate.

CAUSE NO. 2: The cause may be, the Line Pressure Relief Valve Assembly (Flow Control Valve) located in the pump stator, as shown in Figure 1, stuck in the open position due to extreme bore wear in the relief valve sleeve. Figure 2 shows the area prone to wear causing the valve to stick in the open position, and lodged onto the ridge at the end of the worn area. The partial hydraulic schematic in Figure 3, will show that if the valve were to stick in the open position, the oil from the pressure side of the pump would follow the path of least restriction and return to the suction side of the pump. The oil pressure would then be severely compromised through out the rest of the unit.
Caution: If this valve assembly is disassembled for inspection, it "Must" be re-assembled with the tab on cap opposite the exhaust holes, as shown in Figure 2.

CORRECTION NO. 1:
Adding an A4LD pump bolt washer in the pocket of the pump under the sleeve would help raise the sleeve up to compress the o-ring tighter creating a better seal (See Figure 1).
Caution: Be careful not to raise the sleeve above the pump surface, ***"Only"*** the o-ring.

CORRECTION NO. 2:
At the time of this printing, a complete pump assembly will be necessary, as Ford does not service the relief valve assembly separately. These are available from OEM or from many aftermarket Hard Parts Suppliers, or you could rob one from another pump if you happen to have one. Keep in mind though, it may be in the same shape. An aftermarket valve is available from Superior Transmission Parts.

NOTE: A simple air test can be performed to check the integrity of the flow valve by removing the line pressure service port plug and blowing air into the service port as shown in Figure 4.
If air and/or fluid is forced out of the vent, (Refer to Figure 5), the flow valve is faulty or the o-ring is missing. If the air test holds pressure then the flow valve is good, however it is recommended that it be changed at the time of overhaul as it is a high failure item.

SERVICE INFORMATION:
Superior now has a replacement flow control valve assembly available for this unit under Superior part number K060.

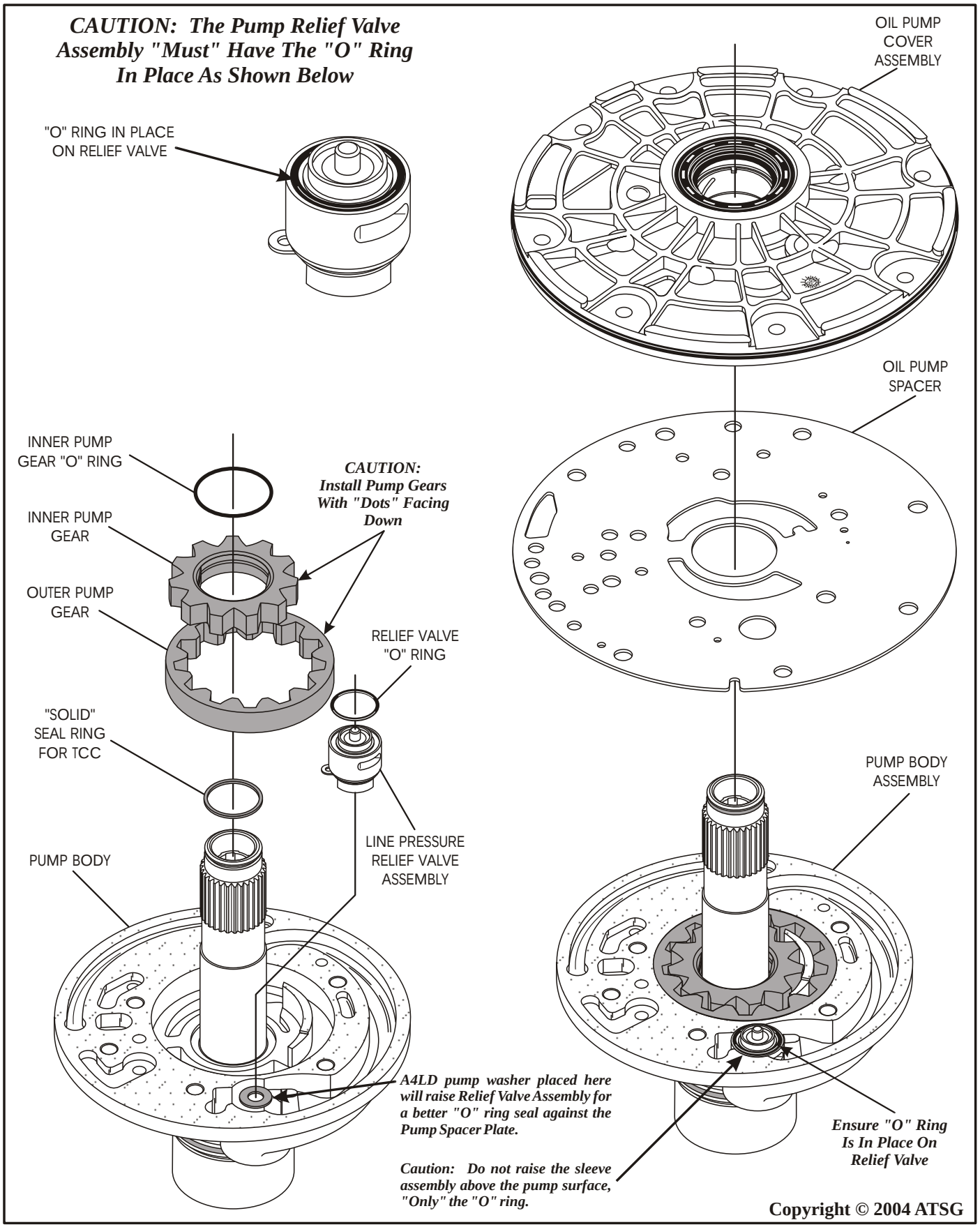

CAUTION: The Pump Relief Valve Assembly "Must" Have The "O" Ring In Place As Shown Below
"O" RING IN PLACE ON RELIEF VALVE
OIL PUMP COVER ASSEMBLY
OIL PUMP SPACER
INNER PUMP GEAR "O" RING
INNER PUMP GEAR
OUTER PUMP GEAR
CAUTION: Install Pump Gears With "Dots" Facing Down
RELIEF VALVE "O" RING
"SOLID" SEAL RING FOR TCC
LINE PRESSURE RELIEF VALVE ASSEMBLY
PUMP BODY
PUMP BODY ASSEMBLY
A4LD pump washer placed here will raise Relief Valve Assembly for a better "O" ring seal against the Pump Spacer Plate.
Caution: Do not raise the sleeve assembly above the pump surface, "Only" the "O" ring.
Ensure "O" Ring Is In Place On Relief Valve
Copyright © 2004 ATSG

Figure 1

LINE PRESSURE RELIEF VALVE ASSEMBLY

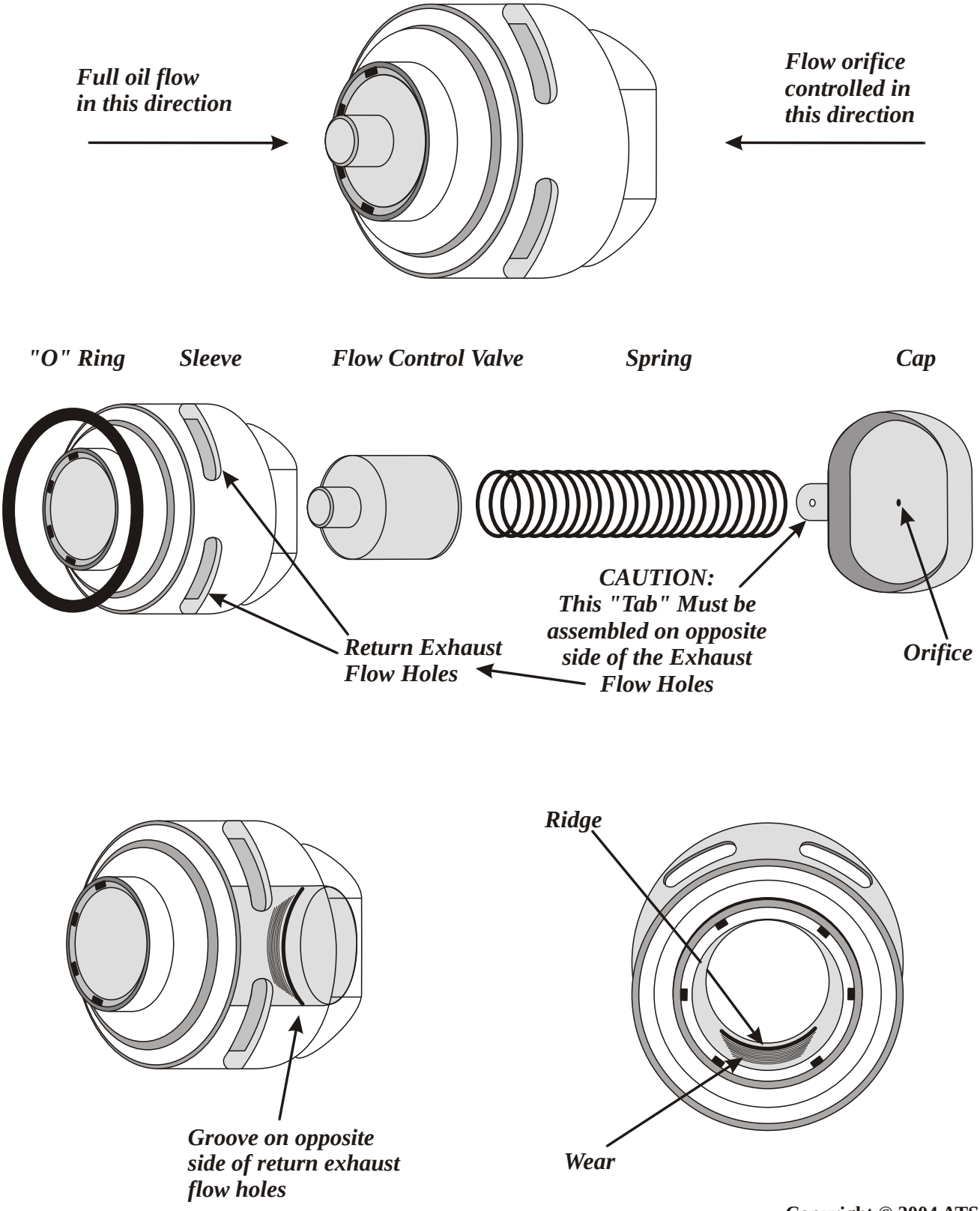


Figure 2

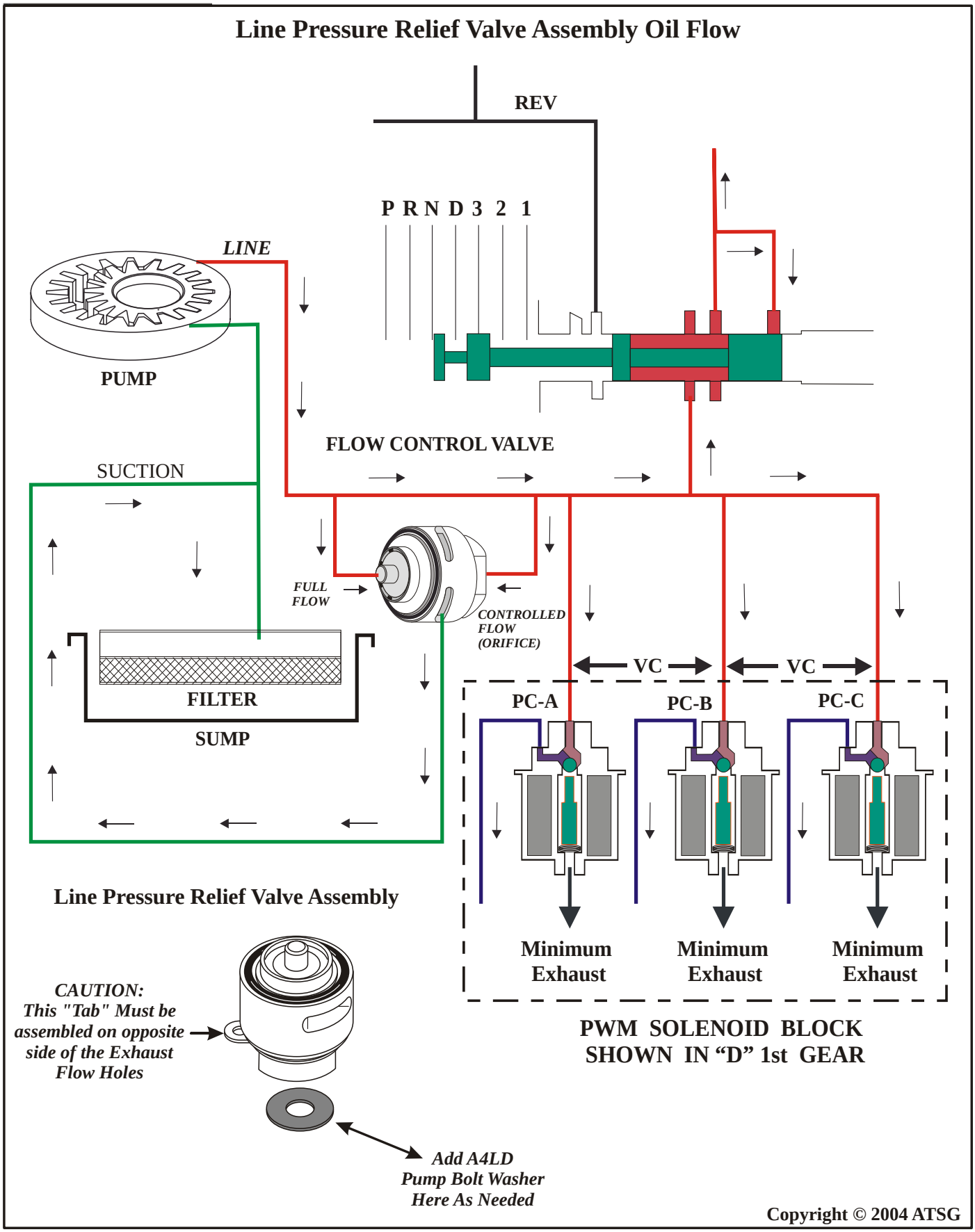
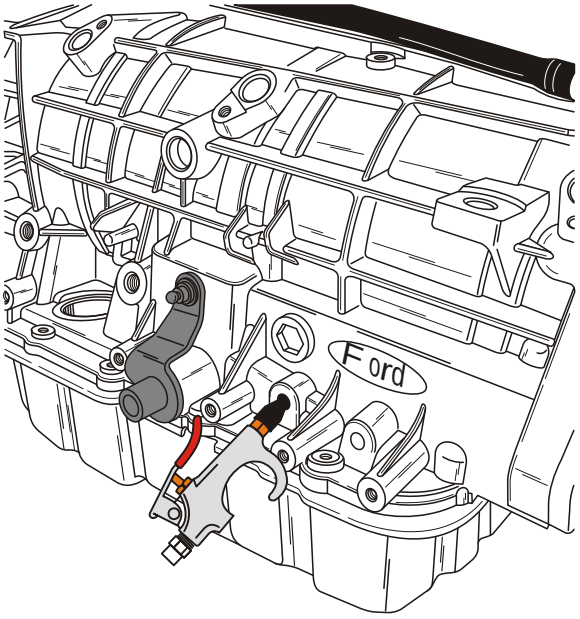

Line Pressure Relief Valve Assembly Oil Flow
REV
P R N D 3 2 1
LINE
PUMP
FLOW CONTROL VALVE
SUCTION
FULL FLOW
CONTROLLED FLOW (ORIFICE)
FILTER
SUMP
VC
VC
PC-A
PC-B
PC-C
Minimum Exhaust
Minimum Exhaust
Minimum Exhaust
PWM SOLENOID BLOCK SHOWN IN "D" 1st GEAR
Line Pressure Relief Valve Assembly
CAUTION: This "Tab" Must be assembled on opposite side of the Exhaust Flow Holes
Add A4LD Pump Bolt Washer Here As Needed
Copyright © 2004 ATSG

Figure 3

PUMP FLOW CONTROL VALVE AIR TEST

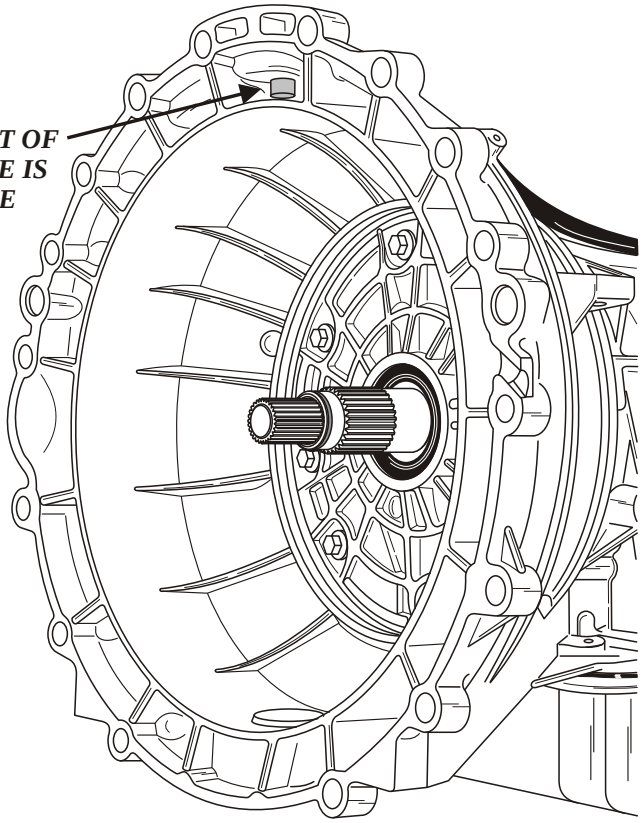


BLOW AIR INTO LINE PRESSURE SERVICE PORT

STEP 1

Figure 4

IF AIR OR OIL COME OUT OF VENT, THE FLOW VALVE IS FAILED OPEN OR THE O-RING IS MISSING



STEP 2

Figure 5

FORD 5R55N AND 5R55W/S
SOLENOID BODY GASKET IDENTIFICATION

COMPLAINT: Installing the wrong solenoid body gasket onto a 5R55W/S usually creates a no reverse condition and the gaskets are almost identical, as shown in Figure 1.

CAUSE: Currently, most aftermarket gasket sources package the 5R55N gasket into the 5R55W/S gasket pack by mistake. They are currently in the process of correcting this error.

CORRECTION: Ensure that you install the correct solenoid body gasket during overhaul or repair. Use the illustrations in Figure 1 to identify the different solenoid blocks and the different solenoid gaskets. Refer to Figure 2 for the proper assembly procedure.

SPECIAL NOTE:

None of the parts shown in Figure 1 will interchange with one another, nor will the solenoid packs correctly assembled interchange between the 5R55N and 5R55W/S.

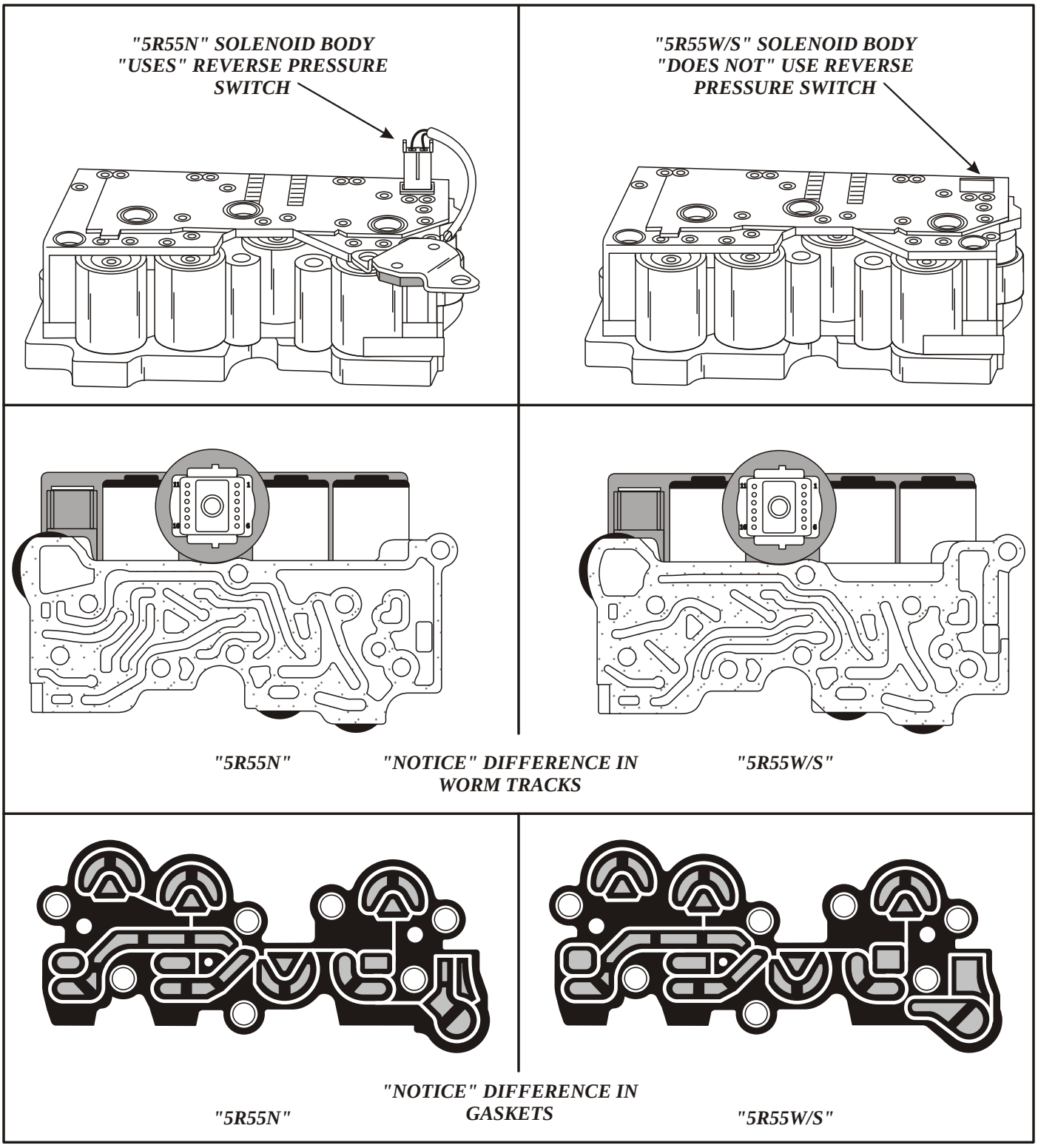
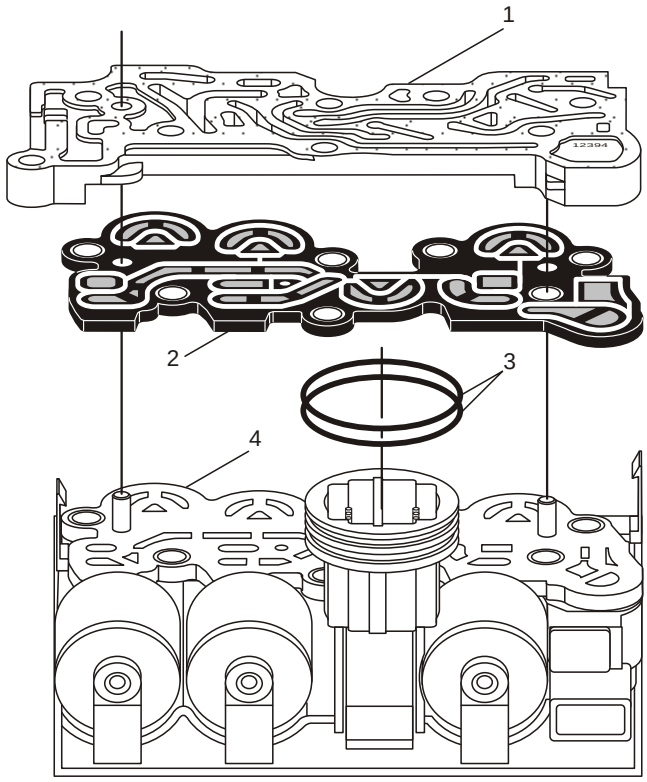


Figure 1

Transgo

5R55W/S SOLENOID BODY IS ILLUSTRATED



1. SOLENOID BODY WORM TRACK PLATE
2. SOLENOID BODY TO WORM TRACK PLATE GASKET
3. SOLENOID BODY TO CASE "O" RINGS (2 REQUIRED)
4. SOLENOID BODY ASSEMBLY

Figure 2

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FORD 5R55N

REVISED CHECKBALL LOCATIONS

CHANGE: Ford Motor Co. eliminated one of the checkballs in the 5R55N transmission as a running change during the 2000 model year. The early version, which requires 3 checkballs, is illustrated in Figure 1, and the late version, which requires 2 checkballs,is shown in Figure 2.

REASON: Improved driveability and pleaseability.

PARTS AFFECTED:

(1) VALVE BODY CASTING - The valve body casting changed in the location of the checkball that was eliminated, as shown in Figure 1 and 2.

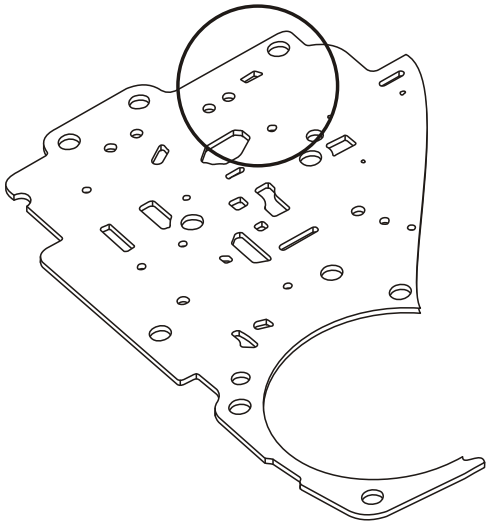
(2) VALVE BODY SPACER PLATE - The valve body spacer plate was modified to accommodate the elimination of the one checkball, as shown in Figure 1 and 2.

INTERCHANGEABILITY:

The spacer plates "Cannot" be interchanged between the early and late style valve bodies.

The "Late Style" valve body and spacer plate as a package will retro-fit back on all models of the 5R55N transmission and is recommended.

"EARLY STYLE" 3 CHECKBALL VALVE BODY AND SPACER PLATE



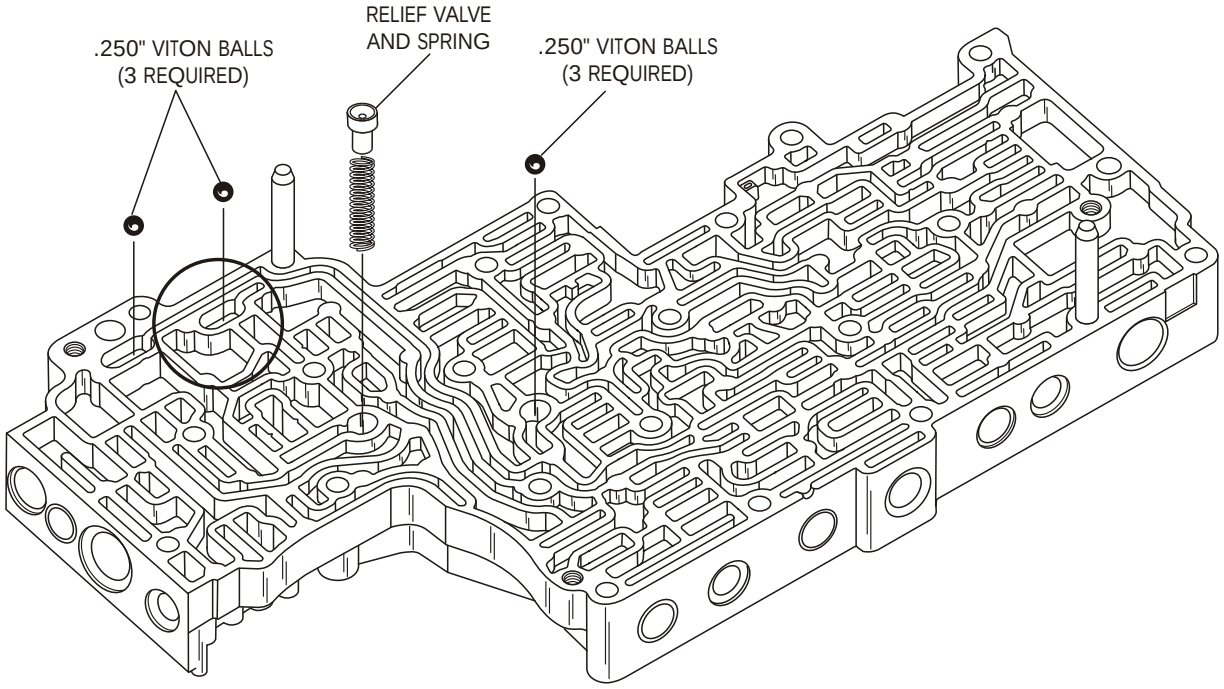
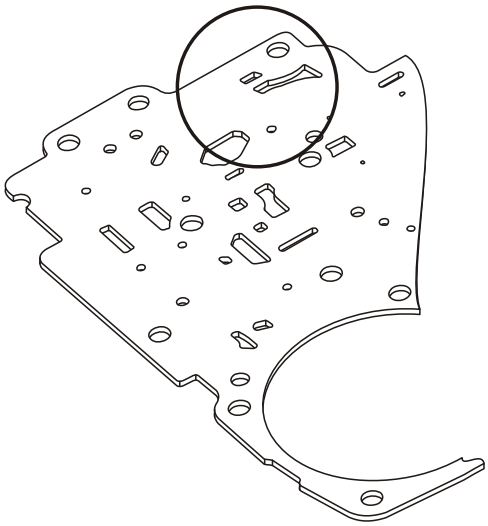


Figure 1

"LATE STYLE" 2 CHECKBALL VALVE BODY AND SPACER PLATE



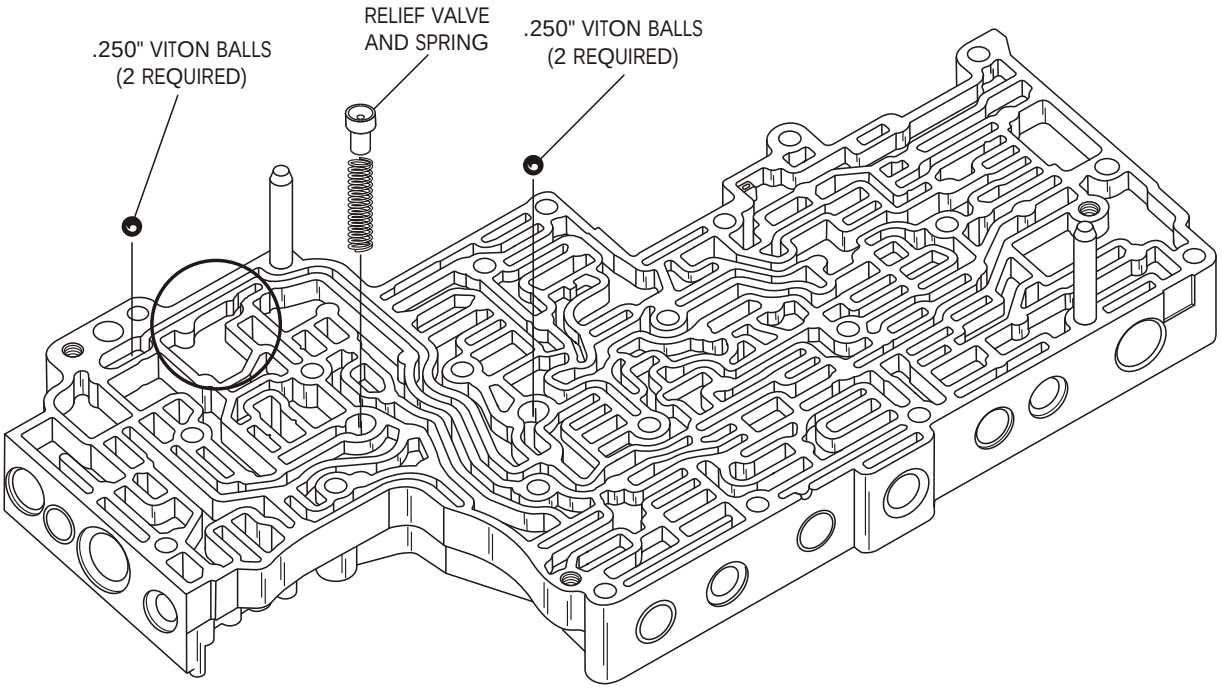


Figure 2

FORD 5R55W/S

SLIPPING 2ND & 3RD GEARS

COMPLAINT: After overhaul, the transmission slips badly in 2nd and 3rd gears. Pressure checks are within spec.

CAUSE: During assembly of the transmission, the overdrive and intermediate band struts were installed backwards. This causes the band struts to act as wedges between the case and the drums. This results in the bands not being able to make full contact with the drums and also damages the case in the servo bore areas.

CORRECTION: Refer to Figure 1 below for the correct band strut assembly.

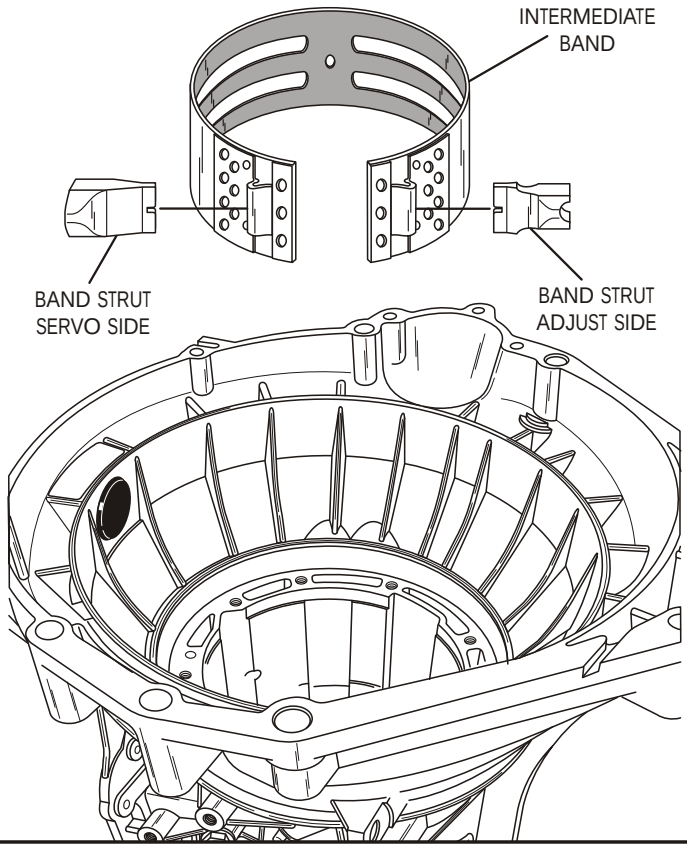


Figure 1

FORD 5R55W/S

NO 2nd OR 5th

COMPLAINT: Vehicles equipped with the 5R55W/S transmission may exhibit a no 2nd or no 5th gear condition , before or after overhaul.

CAUSE: The cause may be, that the band struts were installed upside down, or the servo bore is worn. The Overdrive servo is fed thru the center of the apply pin. Wear in the case, where the servo pin rides, may cause a pressure loss, creating the band failure. See Figure 1.

CORRECTION: To correct this condition , refer to Figure 1 for the correct assembly of the band struts. Replace the case or re-sleeve the case where the pin rides and install a bushing for a new sealing surface. ***Northland transmission Inc. has a Re-boring kit available to repair the case bore, with a bushing, to fix the leak.***
Phone: 715-458-2617

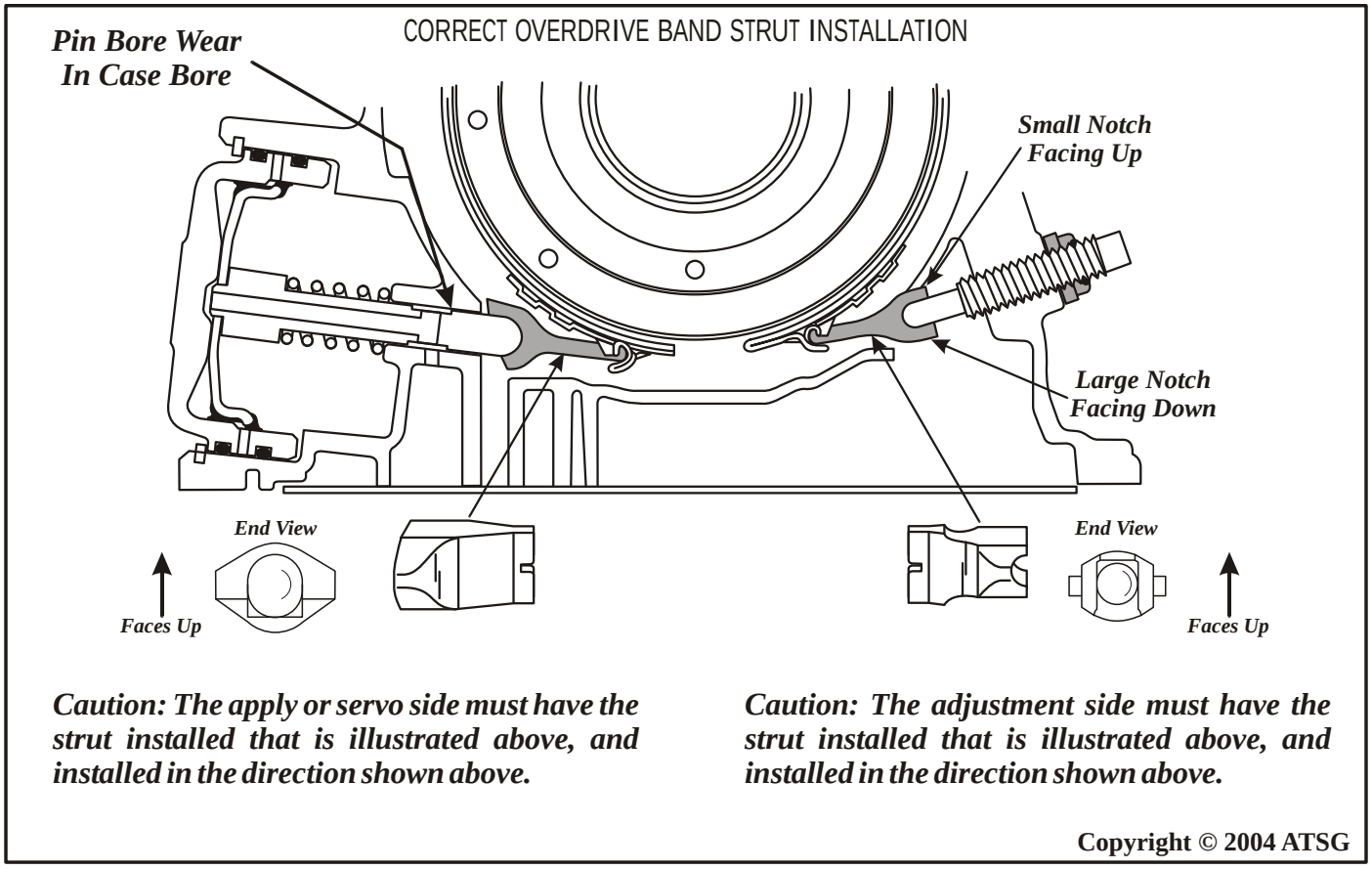


Figure 1

FORD 4R70W

LOSS OF OVERDRIVE (POLICE PACKAGE ONLY)

COMPLAINT: Some 2001 to 2002 Crown Victorias equipped with the "Police Package" may have a complaint of "no fourth gear" after a high speed 4-2 forced downshift (kickdown). The overdrive band may be burnt and in need of replacement.

CAUSE: The original PCM calibration did not allow the overdrive band to fully release during a high speed 4-2 forced downshift.

CORRECTION: The PCM should be reprogrammed with the latest software level as shown in the chart in Figure 1. For shops that are performing Ford factory reprogramming, an "Authorized Modification" decal (Refer to Figure 2) should be placed adjacent to the vehicles emission information sticker.
List the date and TSB number on the decal and cover it with a clear plastic decal shield.

SERVICE INFORMATION:
Use software level B19.4 or later as per TSB 02-15-5.
Authorized Modification Decals, (25 per package).....FPS-8262

LOSS OF OVERDRIVE (POLICE PACKAGE ONLY)

RECALIBRATION CROSS REFERENCE				
MODEL YEAR/ OLD TEAR TAG #	**OLD CALIBRATION**	**OLD PART NUMBER**	**NEW CALIBRATION**	**NEW PART NUMBER**
2001-2002/OFT2	1FB1PP0506	1W7A-12A650-FC	1FB1PP0506	1U7Z-12A650-DSA
2001-2002/BXT6	1FB1GP0511	1W7F-12A650-EG	1FB1GP0511	1U7Z-12A650-DZA
2002 - LWB/KSNO	2FB1GL0500	2W7A-12A650-LA	2FB1GL0500	2U7Z-12A650-BJA

Figure 1

Ford AUTHORIZED MODIFICATIONS

THE FOLLOWING MODIFICATIONS HAVE BEEN MADE:

Reprogrammed Powertrain Control Module (PCM) per TSB 02-15-5

THESE MODIFICATIONS HAVE BEEN APPROVED, AS APPROPRIATE, BY EPA AND CARB

DEALER NUMBER: **DATE:**

CHANGE AUTHORITY:

FPS 8262 9/78 **FORD MOTOR COMPANY** **PRINTED IN U.S.A.**

Figure 2

FORD 4R70W

LOSS OF EPC PRESSURE

COMPLAINT: The transmission is slipping in all gears as well as during shifts. When line pressure is checked, the gauge indicates little or no line rise. A check of EPC pressure reveals a near zero reading. EPC solenoid amperage is correct and replacement of the EPC solenoid did not cure the complaint.
The long term complaint may be premature failure of the forward clutch should the cause be minimal at the time of overhaul. This would result in a small but steady loss of EPC pressure.

CAUSE: EPC pressure is routed to the Pressure Regulator Valve along side a circuit Ford identifies as the Boost Circuit. These oil passages can be identified in both the valve body and the case as seen in Figures1 and 2.This is illustrated by the hydraulic schematic shown in Figure 3. This circuit is routed back to the inlet side of the pump. When the Pressure Regulator Valve or its bore is worn, (See Figure 4), EPC pressure is allowed to be sucked away by the suction side of the pump (See Figure 5 & 6) preventing any line pressure rise from occurring when the throttle is opened.

A quick test can be performed to verify if this condition exists. Remove the pan and filter. Blow compressed air into the TV pressure port in the case. It is normal to see some leakage around the EPC solenoid, but if you see oil forced out of the filter neck bore by the air pressure, (Refer to Figure 7), PR valve and/or bore wear is the reason.

CORRECTION: Always check the Pressure Regulator Valve and its bore for wear during the repair process. If it is worn use one of the repair kits that are available to repair this condition, or replace the valve body.
It is always a good idea to also check the revere boost valve sleeve for wear, as this is a common wear item.

Many thanks to Chris Colucci from CNS Transmissions in Walnut, MS for his perseverance in solving this mystery.

LOSS OF EPC PRESSURE

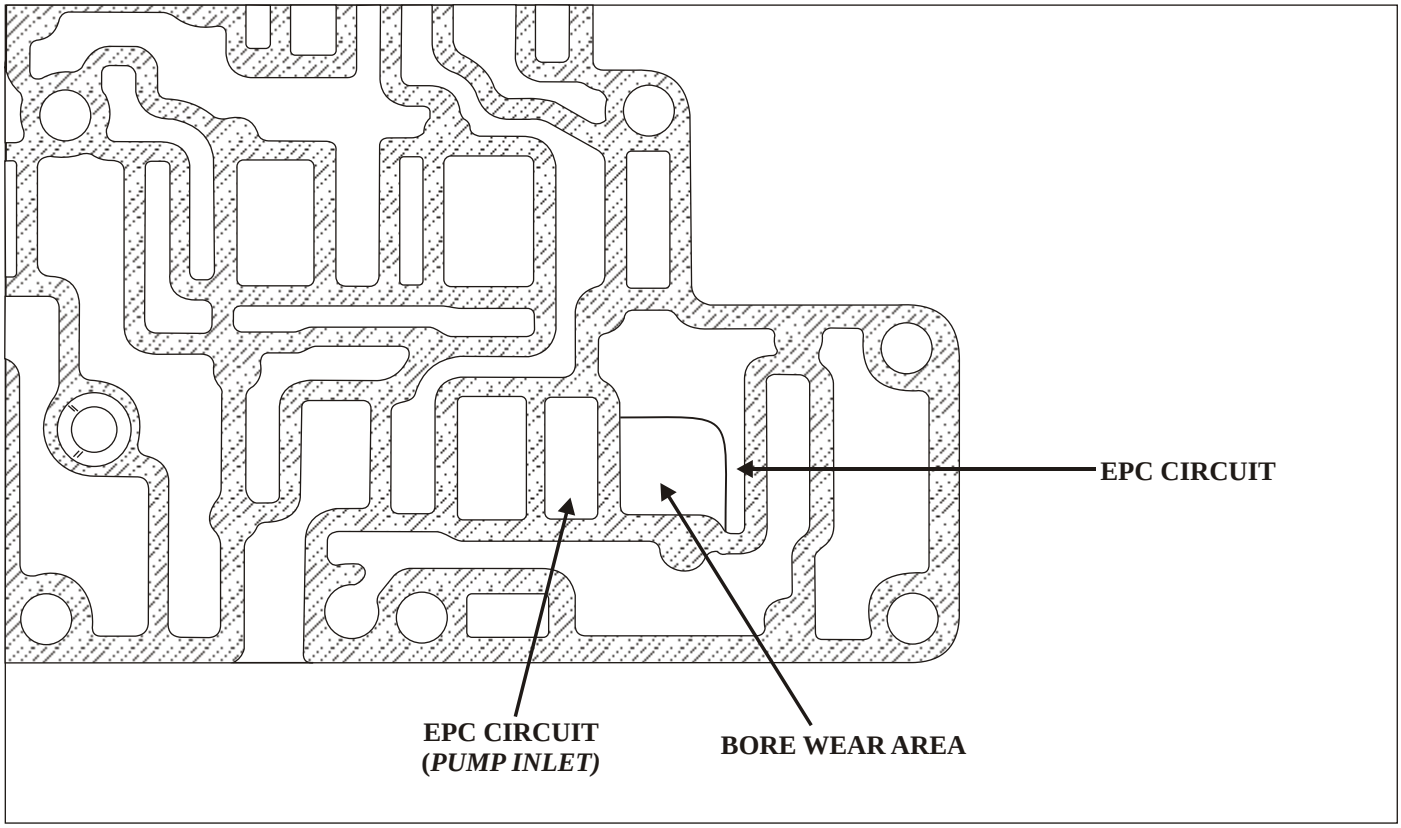


Figure 1

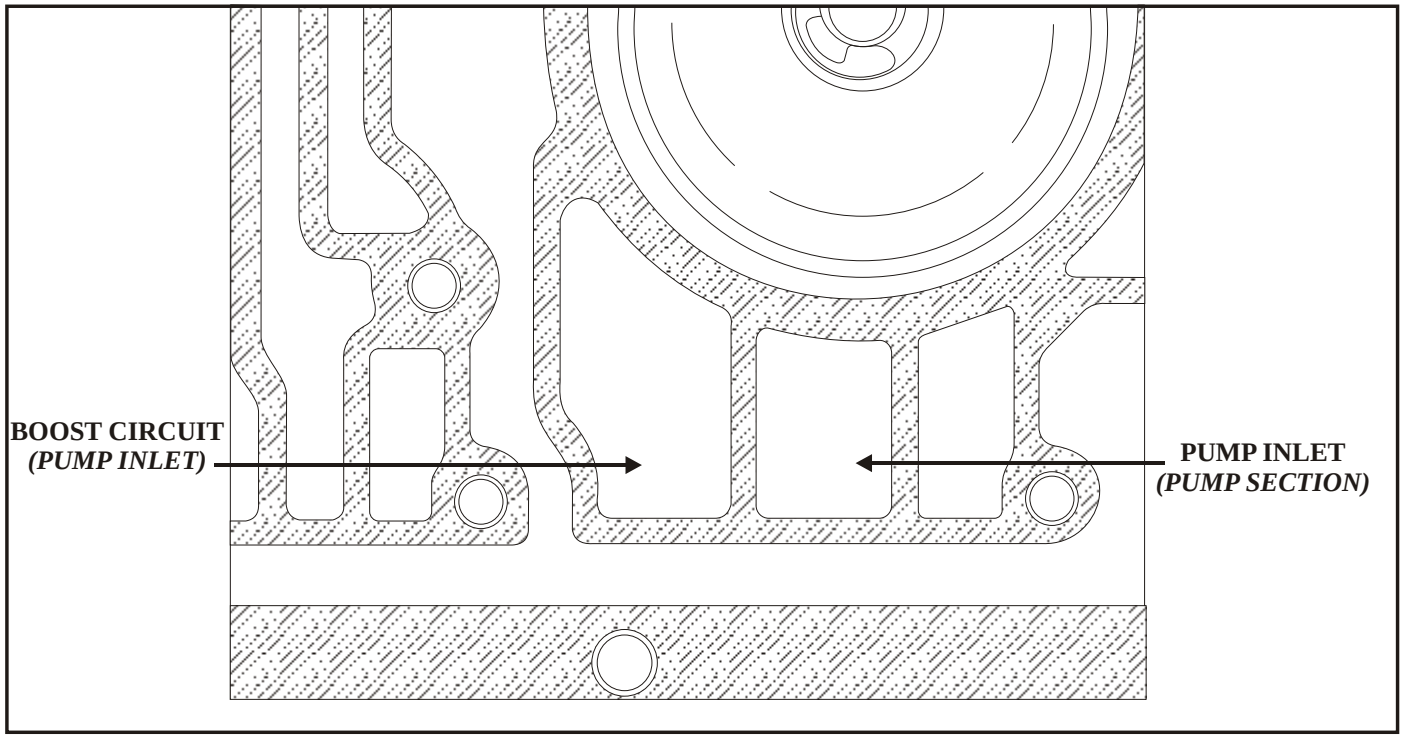


Figure 2

LOSS OF EPC PRESSURE

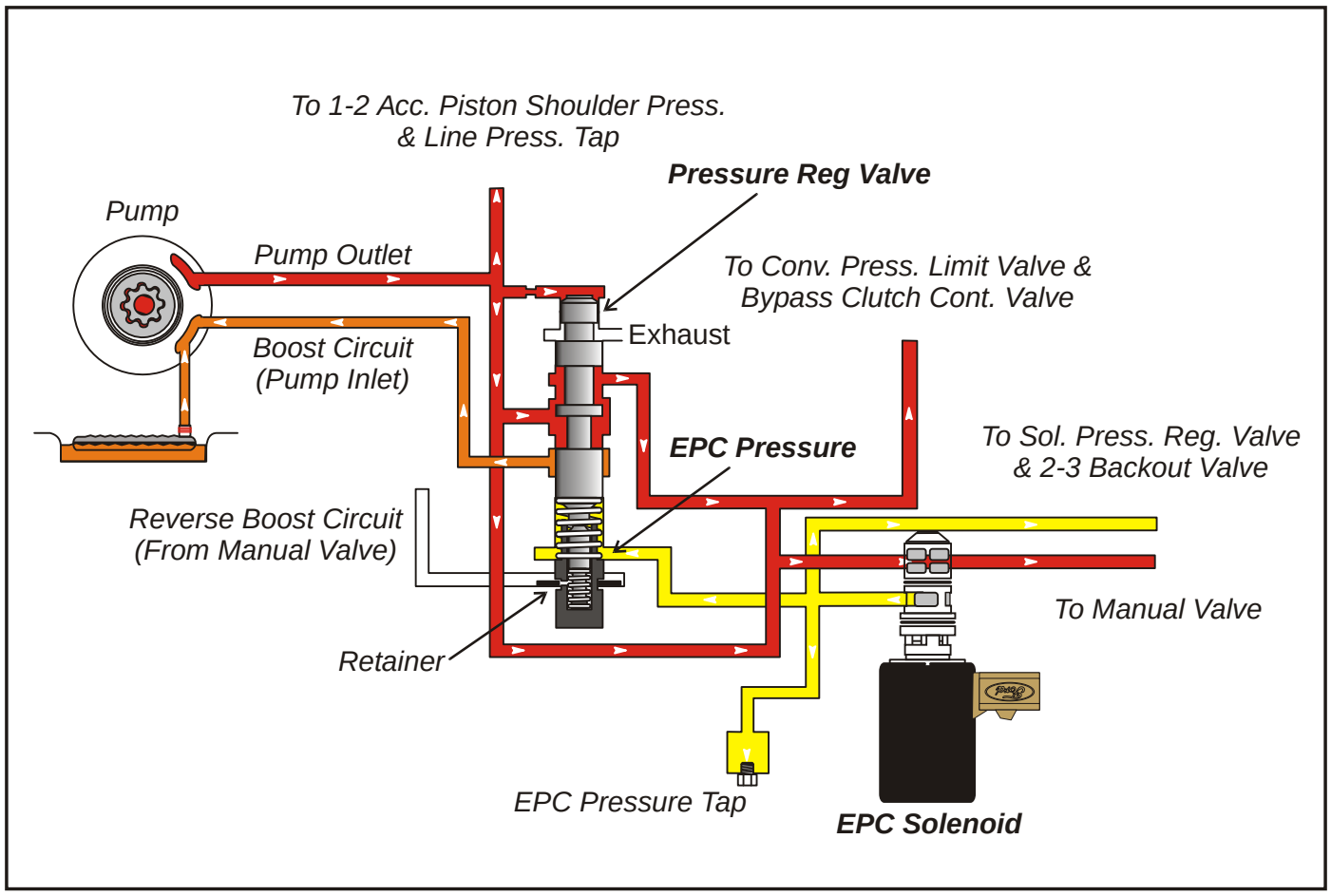


Figure 3

LOSS OF EPC PRESSURE

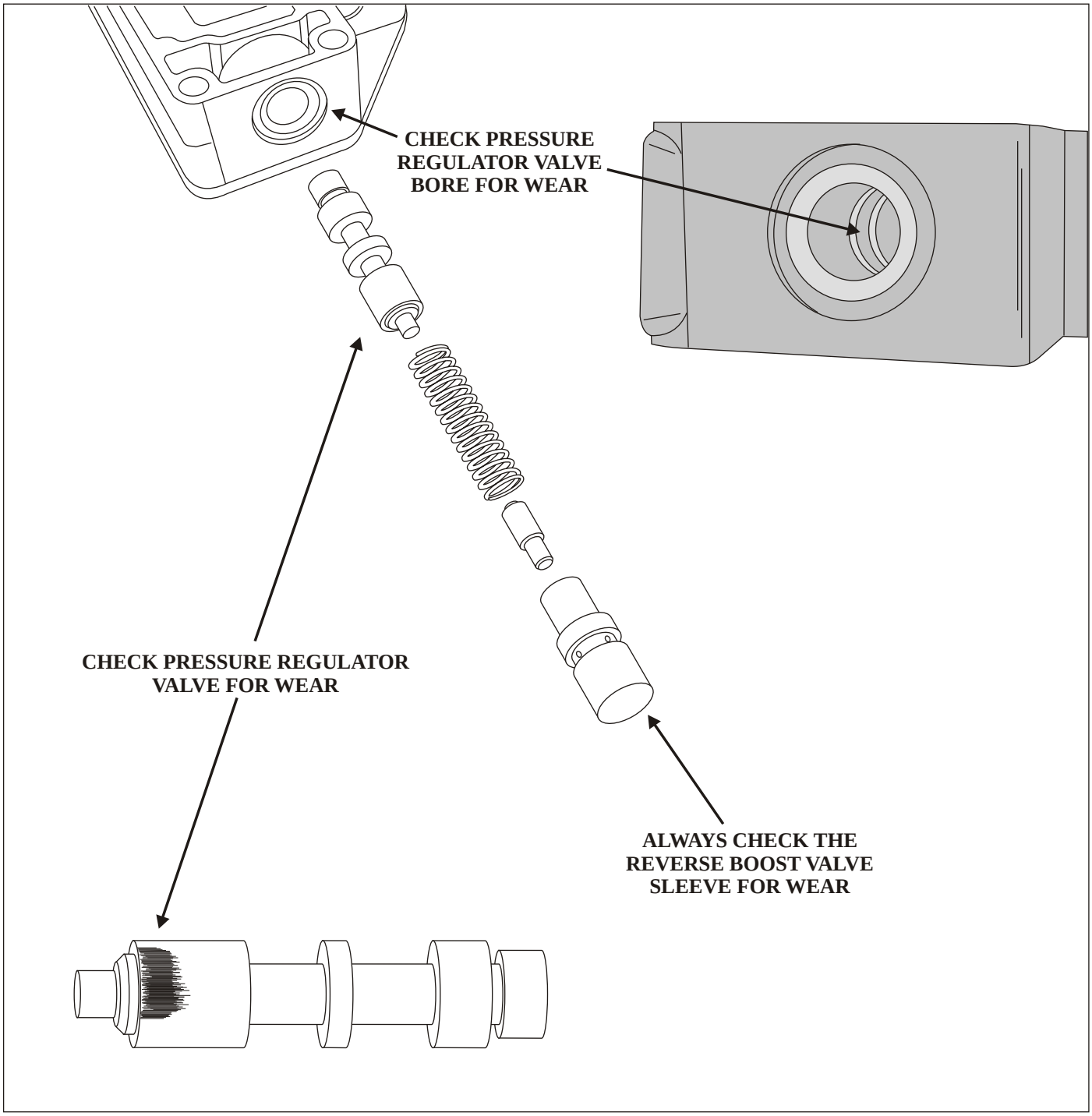


Figure 4

LOSS OF EPC PRESSURE

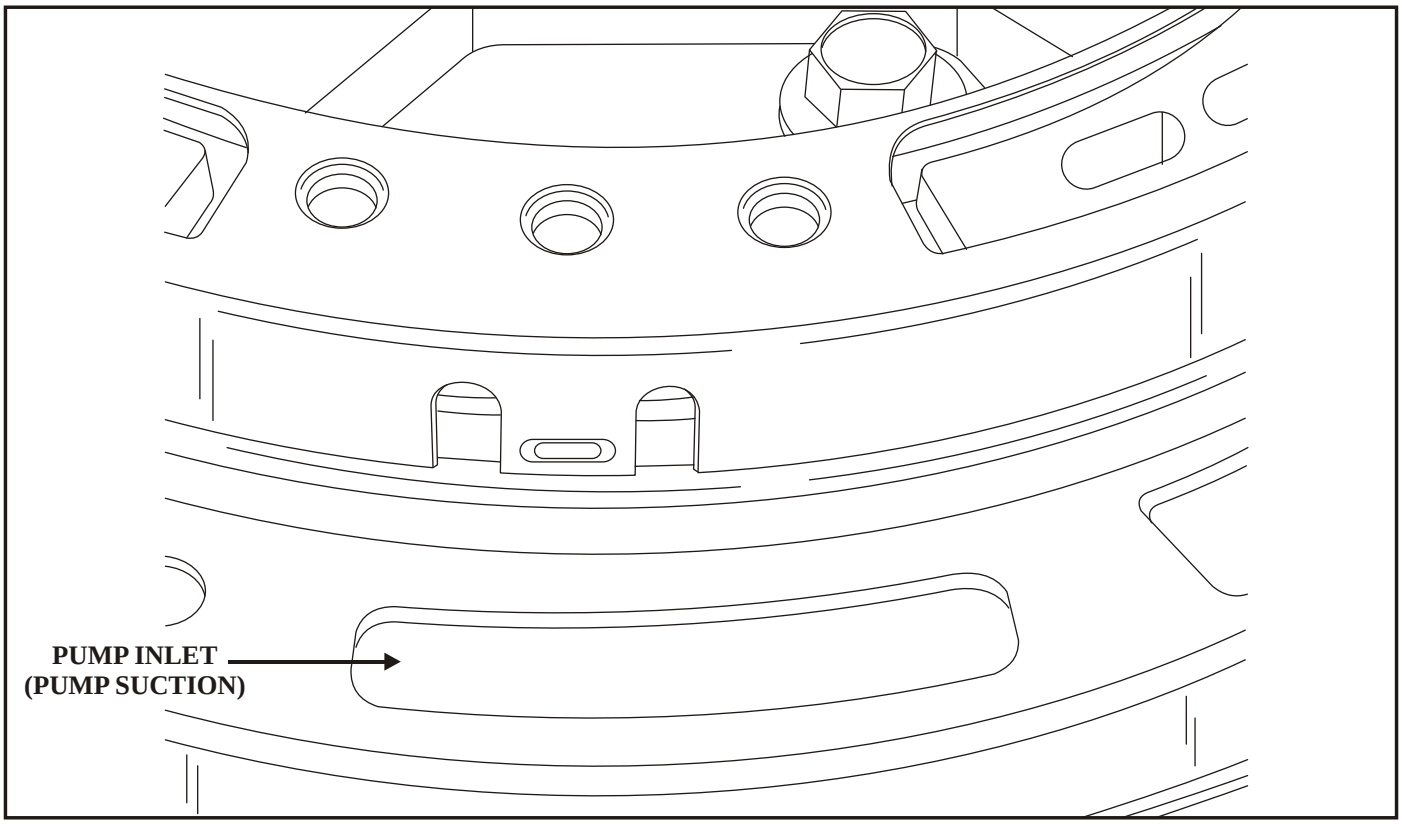


Figure 5

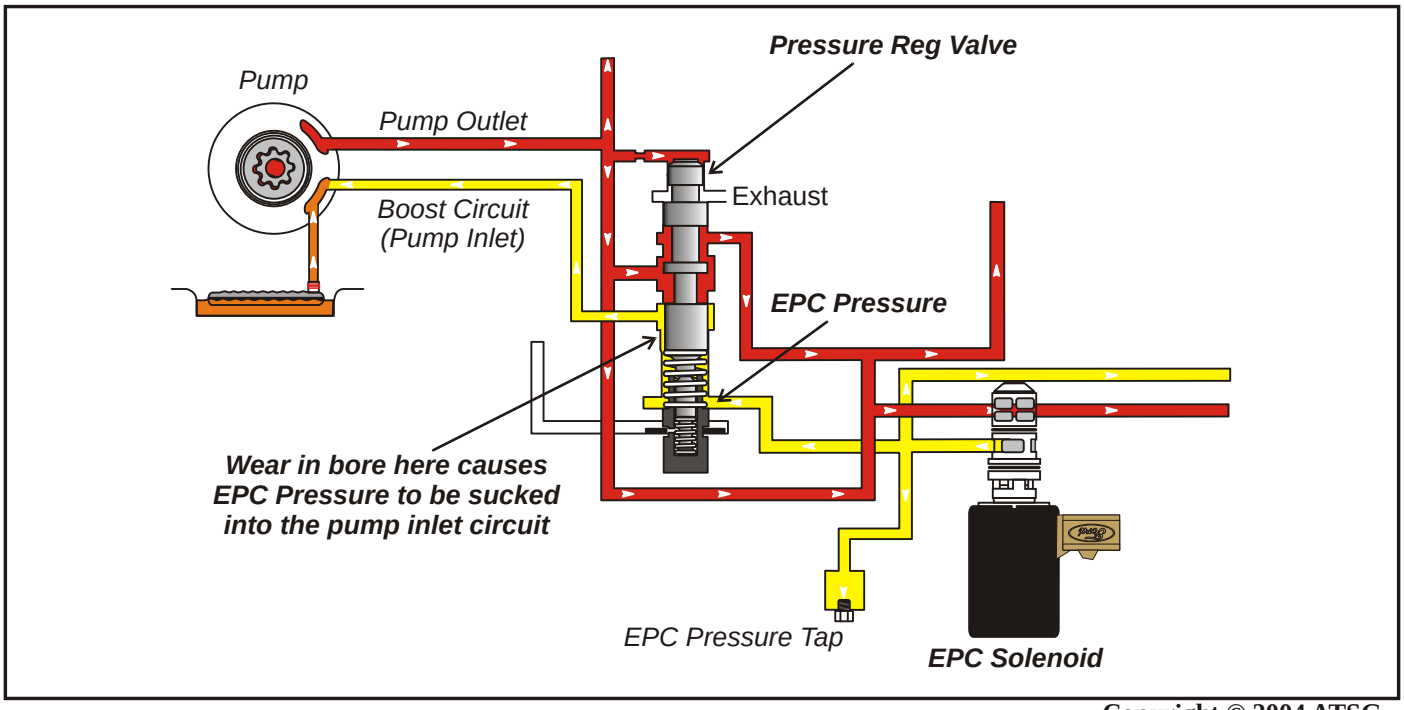


Figure 6

LOSS OF EPC PRESSURE

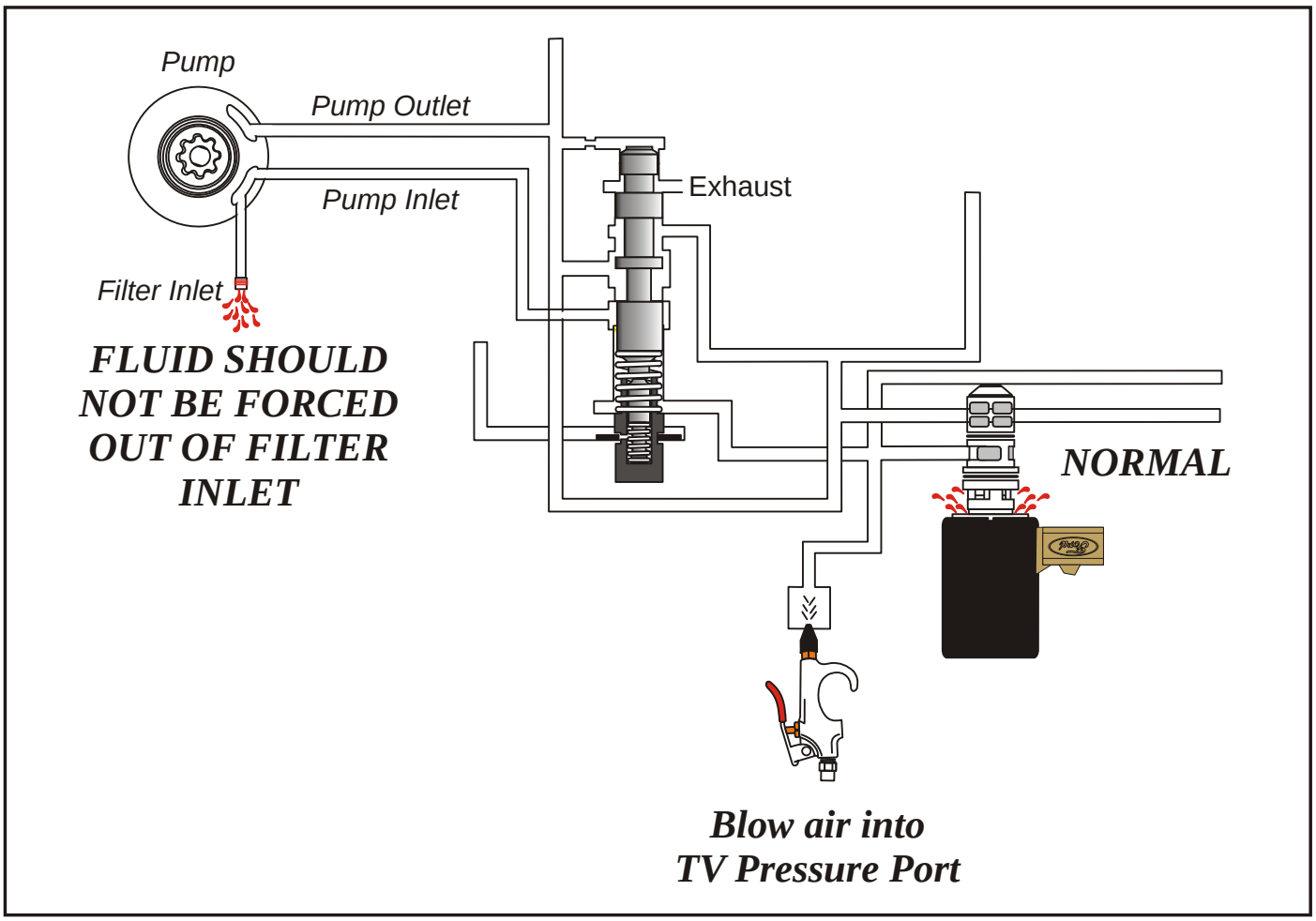


Figure 7

Zoom

Rostra

Transtech

BC

Life Automotive