"2000" SEMINAR INFORMATION
"FIXES TODAY FOR Y2K"

INDEX
GM & FORD

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INTRODUCTION

ATSG welcomes you to the year 2000 and WOW the changes we have seen in this 20th century! One of the more significant changes seen is how ATSG's Tech team continues to remain on the cutting edge of today's ever-changing automotive technology. This means valuable and useful information to those who attend ATSG's seminars presenting information in both Video and Slides all in Manuals that can be brought back to the shop to be used the very next business day. That is why for the year 2000, ATSG is proud to present another well orchestrated DO NOT MISS seminar appropriately named "FIXES TODAY FOR Y2K!"

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

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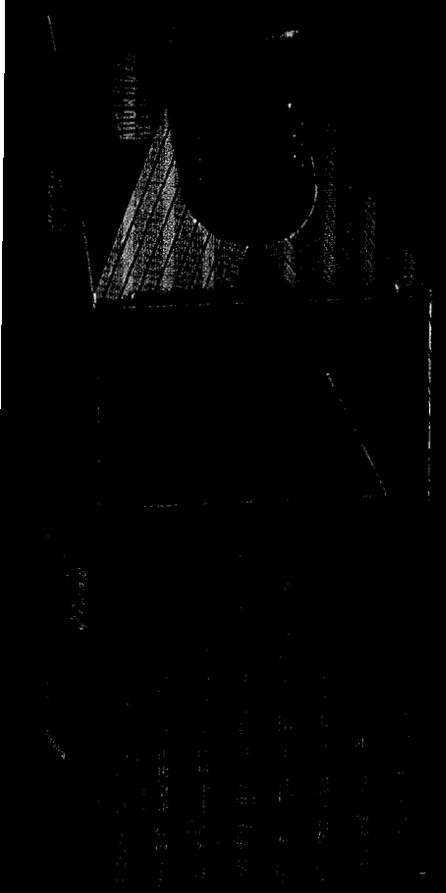

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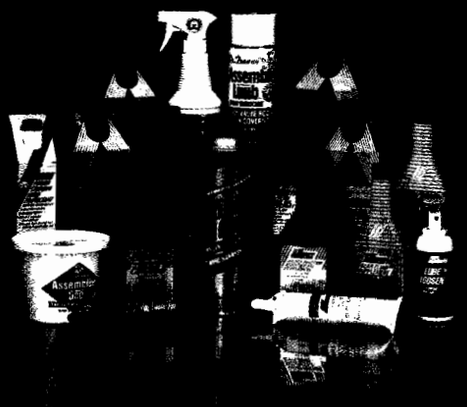


Here are some other reasons to choose LUBEGARD®

GENERAL MOTORS

ELECTRONICALLY CONTROLLED CLUTCH CAPACITY (EC³)

In the 1996 model year a new type of TCC control system was introduced into GM vehicles equipped with 3.8 DOHC engines and the 4T60E transmission and is now in most GM car, truck and van applications except those vehicles equipped with the 4L80E and the 4T80E transmissions.

This system is known as, **E**lectronically **C**ontrolled **C**lutch **C**apacity (**ECCC**), or **EC CUBED** for short.
This system was designed so that the converter clutch pressure plate would not fully lock to the converter cover which means that this converter clutch was ***designed to SLIP!*** The ECCC system was introduced in order to reduce the possibility of noise, vibration or chuggle caused by TCC apply.

It is however, a controlled slip, meaning that what the technician was used to seeing on the scan tool as far as TCC duty cycle and TCC slip in the previous TCC system is now quite different and may lead the technician into thinking there is a transmission component slipping.

When viewing the scan tool data with the previous type of TCC control system, TCC duty cycle usually began after the shift into 4th gear, after which, the TCC slip would (if everything was working the way it should), drop to zero and at this point in time TCC duty would be at or about 100% and the converter clutch would now be fully locked to the front of the converter housing.
The only time duty cycle would change would be in a "no torque demand" cruise condition, at which time the duty cycle would drop to about 60% while keeping the TCC slip near zero.
If throttle was increased, the TCC duty cycle would immediately rise back up to about 100% to maintain a near zero TCC slip condition.
This is no longer the case with the EC Cubed TCC control system.

The ECCC system is designed to allow 10 to 60 rpm of slippage, depending on vehicle model. TCC duty cycle will begin as soon as the shift to 2nd gear is made and the scan tool will indicate about 20 rpm of slip.
The movie in figure 1 shows a 4T65E transmission with EC Cubed TCC in first gear, TCC slip is high, there is zero TCC duty cycle. In figure 2 a shift to second gear is made, and now there is 20 rpm of slip and TCC duty cycle is 50%.
In figure 3 a shift is made to third gear and TCC slip is now at 42 rpm and TCC duty cycle is 63%.
NOTE: Notice, due to the slip allowed by the computer the input and output rpm are NOT the same in third gear!
Finally, the movie in figure 4 indicates a shift to fourth has been made and TCC slip is now brought to zero and TCC duty cycle is at 100%.

This small amount of slip will be maintained throughout 3rd and 4th gears as well UNTIL 55mph (88kmh) to 65mph (105kmh) when full TCC application will take place and TCC slip will be near zero. A similar type of TCC operation will be seen during coast down shifts as well.

The technician can expect to see a very active duty cycle through the entire range of TCC operation with the exception of steady cruising speed.
This means that duty cycle will be changing continuously as the system controls slip which means two important concerns to the technician. The first concern is the TCC duty cycle timing and TCC slip factors that the technician will view on the scan tool.

GENERAL MOTORS

ELECTRONICALLY CONTROLLED CLUTCH CAPACITY (EC³)

Due to the fact that a certain degree of slip is acceptable, when does slip become unacceptable?
If the computer sees TCC slip reach 130 rpm, code P1870 will be stored.

The second concern with slip is the heat generated as a result of this slip, which means there must be a change in the converter clutch material in order to withstand the heat. The previous design converter clutch material was either a cellulose based material or in some applications it was Kevlar®. The cellulose based cannot tolerate slip with out being destroyed. The Kevlar® can withstand more heat, but with constant slip it to would eventually succumb to destruction.

The converter clutch material used with the ECCC system is a woven carbon fiber which allows slippage with little effect on the converter clutch since this material is highly conductive and transfers the heat generated by slip to the converter housing.
It now becomes apparent that a converter with a cellulose based clutch material would be instantly destroyed if installed in a vehicle with ECCC and a ECCC converter put into a vehicle with a conventional TCC control system would produce TCC application feel that would be severely harsh with a washboard effect.
The cellulose based, the Kevlar® converter clutch and the carbon fiber converter clutch materials are shown in figure 5.

Many thanks to Dynamic Manufacturing Co. for their assistance in providing this information.

GENERAL MOTORS
ELECTRONICALLY CONTROLLED CLUTCH CAPACITY (EC³)

FIRST GEAR

1998 BUICK		A/C	
3.8L V6 BUICK SFI		A/T	
** CODES AND DATA.		OK TO DRIVE	**
(NO CODES AVAILABLE IN THIS MODE)		ENGINE RPM	2656
-46 OUTPUT RPM	1398	VEHICLE SPEED (MPH)	17
INPUT RPM	2301	ECT (°F)	196
TFT (V)	2.45	TFT (°F)	179
TORQUE SIGNAL (PSI)	32	GEAR RATIO	2.92
THROTTLE %	38	TP (V)	1.61
TCC DUTY CYCLE %	0	TCC SLIP (RPM)	356
ACTUAL PCS AMP	0.58	DES PCS AMP	0.58
BRAKE REQUEST	NO	BRAKE SW	OPEN
BATTERY (V)	14.3	TCC REL PRESS	YES
PRESS CTRL %	35	SHIFT MODE	NORMAL
CURRENT GEAR	1ST	CURRENT TAP (PSI)	-11
1-2 SOLENOID	ON	2-3 SOLENOID	ON
RANGE A	OFF	RANGE B	ON
RANGE C	ON	TRAC. CTRL	INACTIVE
TFP RANGE	D4	A/C CLUTCH	OFF
1-2 SHIFT (SEC)	0.28	2-3 SHIFT (SEC)	0.35
3-4 SHIFT (SEC)	0.03	CRUISE	DISABLED
IMS A/B/C/P	OFF/ON/ON/OFF	ENGINE RUN TIME	00:7:12
SHIFT ADAPT	NO	HOT MODE	NO

Figure 1

SECOND GEAR

1998 BUICK		A/C	
3.8L V6 BUICK SFI		A/T	
** CODES AND DATA.		OK TO DRIVE	**
(NO CODES AVAILABLE IN THIS MODE)		ENGINE RPM	2234
-44 OUTPUT RPM	1506	VEHICLE SPEED (MPH)	29
INPUT RPM	2274	ECT (°F)	196
TFT (V)	2.45	TFT (°F)	179
TORQUE SIGNAL (PSI)	65	GEAR RATIO	1.57
THROTTLE %	39	TP (V)	1.63
TCC DUTY CYCLE %	50	TCC SLIP (RPM)	20
ACTUAL PCS AMP	0.53	DES PCS AMP	0.52
BRAKE REQUEST	NO	BRAKE SW	OPEN
BATTERY (V)	13.9	TCC REL PRESS	NO
PRESS CTRL %	30	DES PCS AMP	0.49
CURRENT GEAR	2ND	SHIFT MODE	NORMAL
1-2 SOLENOID	OFF	2-3 SOLENOID	ON
RANGE A	OFF	RANGE B	ON
RANGE C	ON	TRAC. CTRL	INACTIVE
TFP RANGE	D4	A/C CLUTCH	OFF
1-2 SHIFT (SEC)	0.28	2-3 SHIFT (SEC)	0.35
3-4 SHIFT (SEC)	0.03	CRUISE	DISABLED
IMS A/B/C/P	OFF/ON/ON/OFF	ENGINE RUN TIME	00:7:34
SHIFT ADAPT	NO	HOT MODE	NO

Figure 2

GENERAL MOTORS
ELECTRONICALLY CONTROLLED CLUTCH CAPACITY (EC³)

THIRD GEAR

1998 BUICK		A/C	
3.8L V6 BUICK SFI		A/T	
** CODES AND DATA.		OK TO DRIVE	**
(NO CODES AVAILABLE IN THIS MODE)		ENGINE RPM	2390
-42 OUTPUT RPM	2351	VEHICLE SPEED (MPH)	31
INPUT RPM	2348	ECT (°F)	196
TFT (V)	2.45	TFT (°F)	179
TORQUE SIGNAL (PSI)	49	GEAR RATIO	1.00
THROTTLE %	31	TP (V)	1.45
TCC DUTY CYCLE %	65	TCC SLIP (RPM)	42
ACTUAL PCS AMP	0.63	DES PCS AMP	0.62
BRAKE REQUEST	NO	BRAKE SW	OPEN
BATTERY (V)	14.3	TCC REL PRESS	NO
PRESS CTRL %	37	SHIFT MODE	NORMAL
CURRENT GEAR	3RD	CURRENT TAP (PSI)	-16
1-2 SOLENOID	OFF	2-3 SOLENOID	OFF
RANGE A	OFF	RANGE B	ON
RANGE C	ON	TRAC. CTRL	INACTIVE
TFP RANGE	04	A/C CLUTCH	OFF
1-2 SHIFT (SEC)	0.28	2-3 SHIFT (SEC)	0.35
3-4 SHIFT (SEC)	0.03	CRUISE	DISABLED
IMS A/B/C/P	OFF/ON/ON/OFF	ENGINE RUN TIME	00:7:52
SHIFT ADAPT	NO	HOT MODE	NO

Figure 3

FOURTH GEAR

1998 BUICK		A/C	
3.8L V6 BUICK SFI		A/T	
** CODES AND DATA.		OK TO DRIVE	**
(NO CODES AVAILABLE IN THIS MODE)		ENGINE RPM	2296
-40 OUTPUT RPM	2968	VEHICLE SPEED (MPH)	64
INPUT RPM	2972	ECT (°F)	196
TFT (V)	2.45	TFT (°F)	179
TORQUE SIGNAL (PSI)	52	GEAR RATIO	0.71
THROTTLE %	45	TP (V)	2.15
TCC DUTY CYCLE%	100	TCC SLIP (RPM)	0
ACTUAL PCS AMP	0.51	DES PCS AMP	0.52
BRAKE REQUEST	NO	BRAKE SW	OPEN
BATTERY (V)	14.3	TCC REL PRESS	NO
PRESS CTRL %	38	SHIFT MODE	NORMAL
CURRENT GEAR	4TH	CURRENT TAP (PSI)	-14
1-2 SOLENOID	ON	2-3 SOLENOID	OFF
RANGE A	OFF	RANGE B	ON
RANGE C	ON	TRAC. CTRL	INACTIVE
TFP RANGE	04	A/C CLUTCH	OFF
1-2 SHIFT (SEC)	0.28	2-3 SHIFT (SEC)	0.35
3-4 SHIFT (SEC)	0.03	CRUISE	DISABLED
IMS A/B/C/P	OFF/ON/ON/OFF	ENGINE RUN TIME	00:8:01
SHIFT ADAPT	NO	HOT MODE	NO

Figure 4

GENERAL MOTORS

ELECTRONICALLY CONTROLLED CLUTCH CAPACITY (EC³)

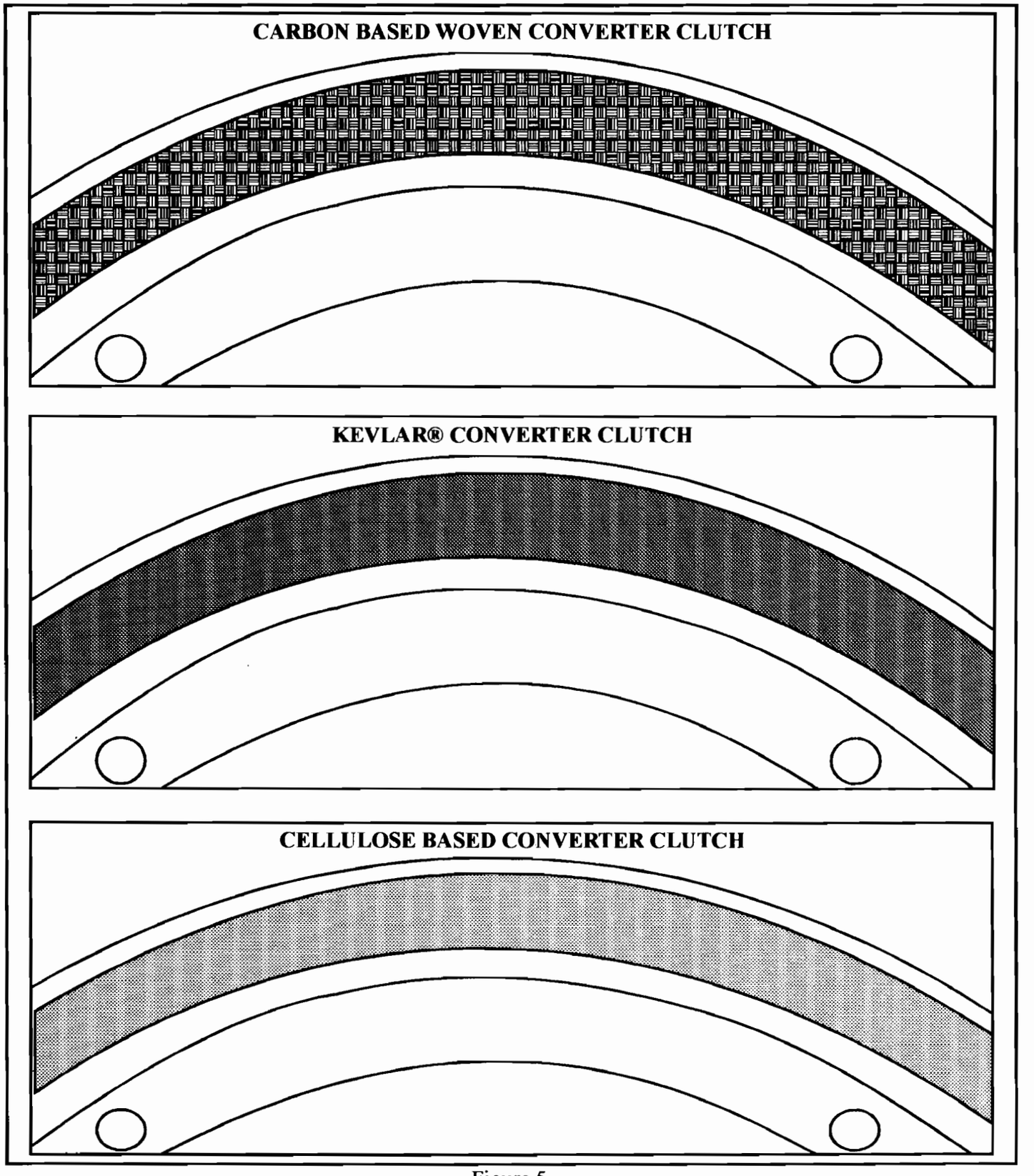


Figure 5

THM 4T60-E

TAPERED ROTOR PUMP CASTING IDENTIFICATION AND INTERCHANGE

CHANGE: Beginning at the start of production for 1994 models, all THM 4T60-E transaxles were produced with a new design "Tapered" pump rotor and new design pump casting with location changes for the suction passage. Refer to Figures 1, 2 and 4. Beginning at the start of production for 1996 models, another new "Light Weight" pump casting was introduced that also requires the tapered rotor. Refer to Figures 1, 2 and 5.

REASON: New tapered rotor increases pump capacity and reduces cavitation for improved durability, and the random vane spacing reduces a noise concern.

PARTS AFFECTED:

(1) PUMP ROTOR - New design is now "Tapered" instead of the previous straight rotor, as shown in Figure 1. The "L" Body and "N" Body vehicles were built using the random spacing of the rotor vanes (34°, 40° and 46°) similar to the 4L60-E design. All other models will use a "Tapered" rotor with equal spacing of the rotor vanes (40°) as shown in Figure 1. All slides, rotors and vanes are still selective sizes.

(2) PUMP BODY - The new design pump body for the tapered rotor has the suction slot in the pump pocket re-sized and moved closer to the center hole for the oil pump drive shaft as shown in Figure 2.

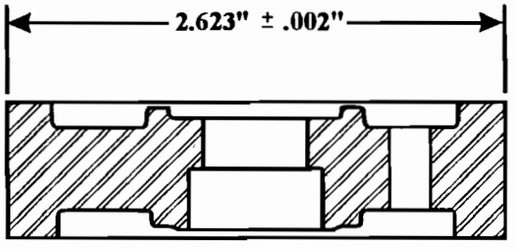
INTERCHANGEABILITY:

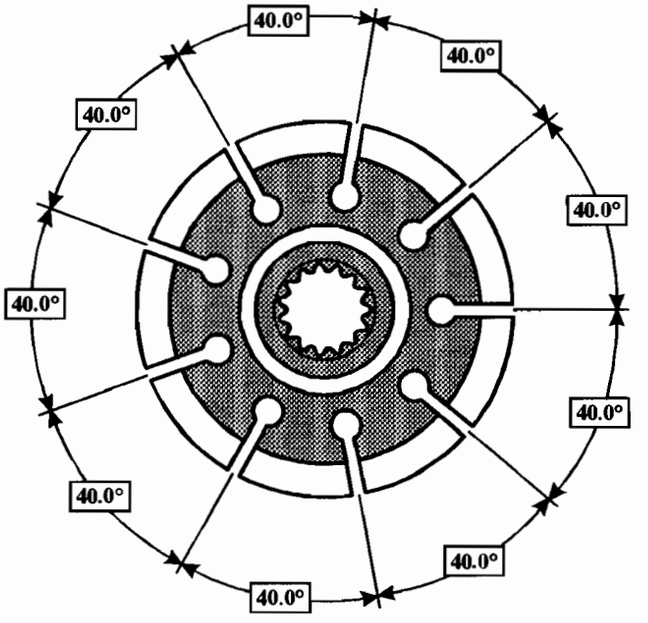
(1) 1ST DESIGN PUMP CASTING - This pump casting can use either the straight rotor or the new design tapered rotor, as the tapered rotor will retro-fit back in all models of the 4T60-E transaxle. This pump casting can be identified with the presence of two threaded holes for the pump cover and by the casting number, as shown in Figure 3.

(2) 2ND DESIGN PUMP CASTING - This pump casting ***requires*** the tapered rotor as the suction slot in the pump pocket was re-sized and moved closer to the center hole for the oil pump drive shaft, as shown in Figure 4. This pump casting can be identified by the presence of only one threaded hole for the pump cover and by the casting number, as shown in Figure 4. This pump casting, with the tapered rotor will back service all models of the 4T60-E transaxle, but will not replace the 3rd design pump body.

(3) 3RD DESIGN PUMP CASTING - This pump casting also ***requires*** the tapered rotor as the suction slot is in the same position as the 2nd design casting and is obviously a much lighter weight pump with the removal of much material, as shown in Figure 5. This pump also has a different casting number, and does not have any threaded holes for the pump cover, as shown in Figure 5. This pump casting ***will not*** retro-fit back on the first design valve body as it leaves open the second clutch passage.

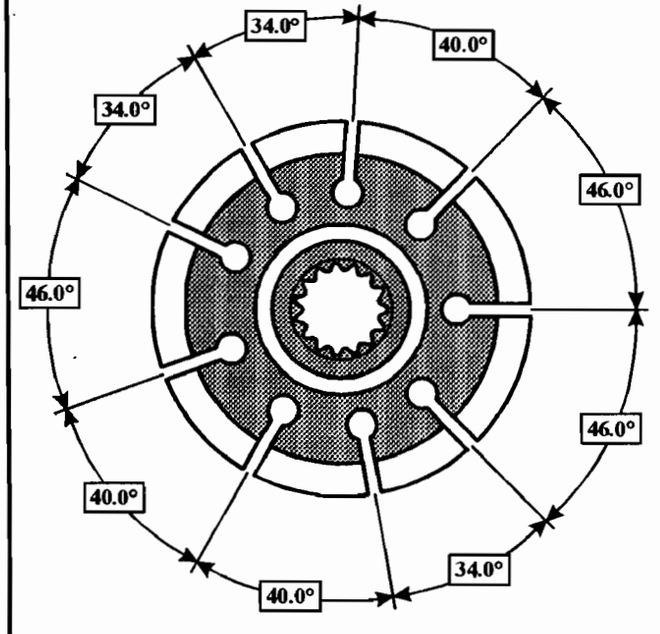
PREVIOUS DESIGN "STRAIGHT" PUMP ROTOR

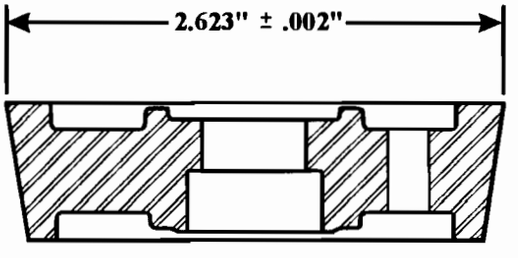




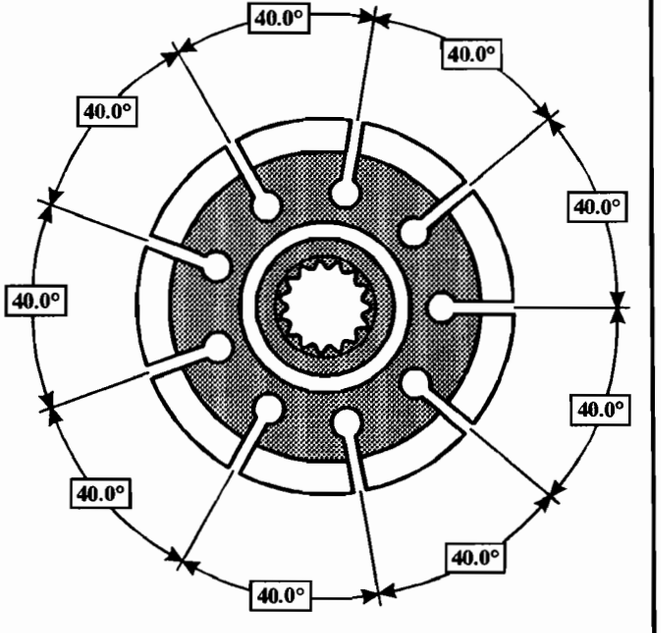
NEW DESIGN "TAPERED" PUMP ROTOR

L & N CAR





A, H, C, K, U & W CAR



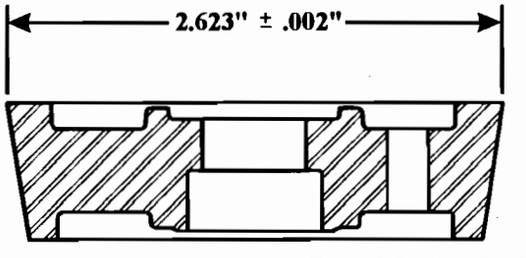


Figure 1

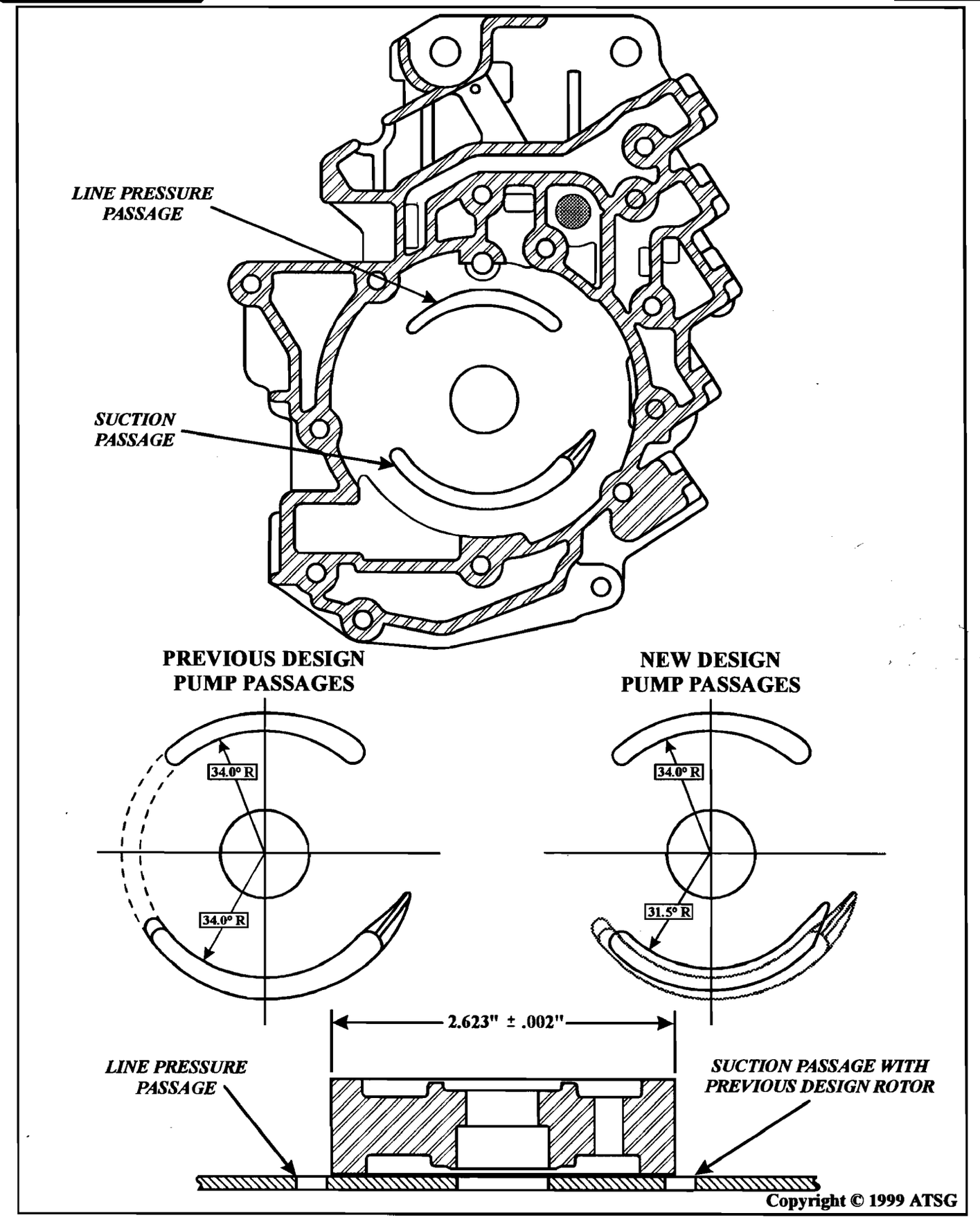
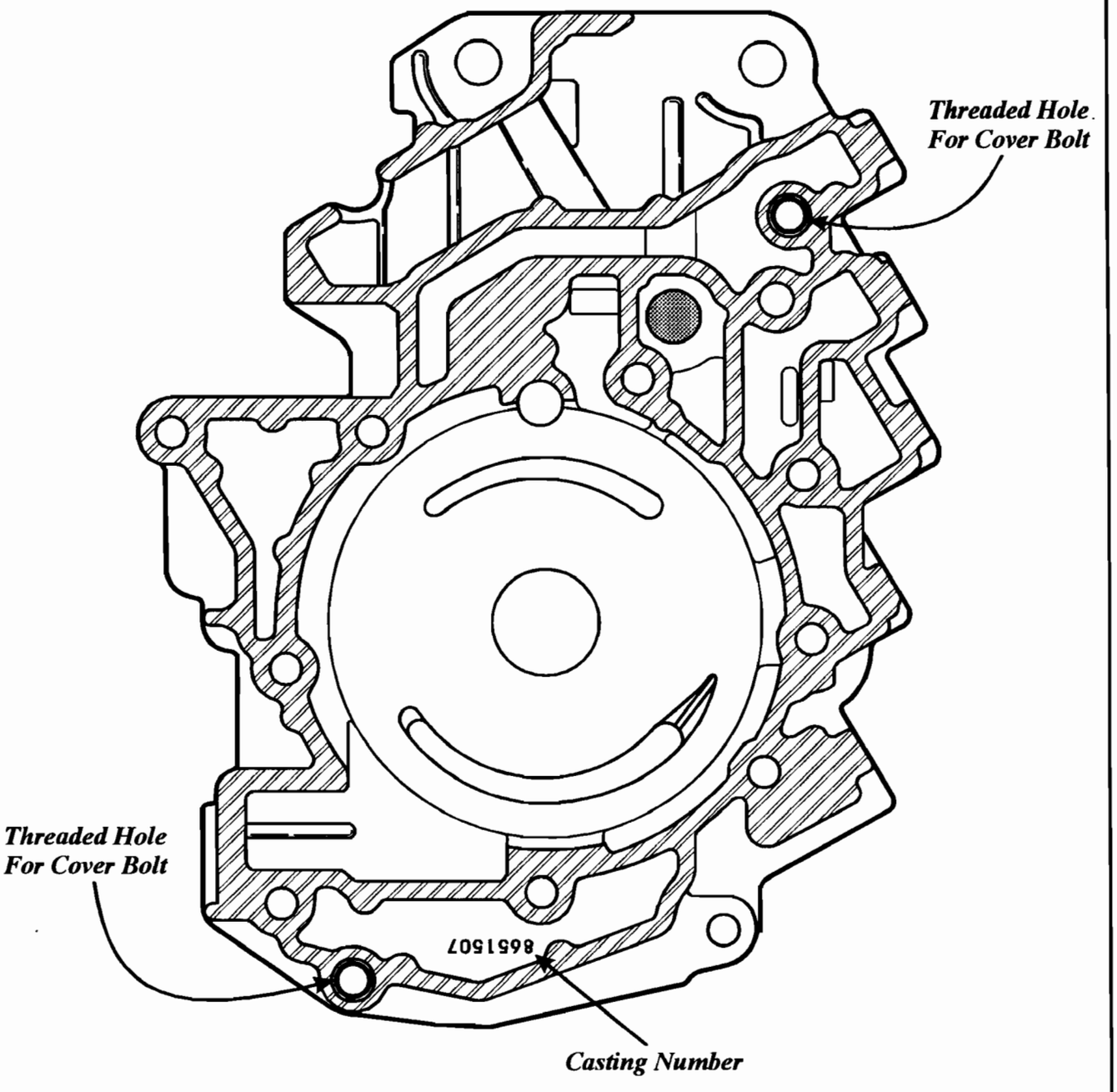

LINE PRESSURE PASSAGE
SUCTION PASSAGE
PREVIOUS DESIGN PUMP PASSAGES
NEW DESIGN PUMP PASSAGES
34.0° R
34.0° R
34.0° R
31.5° R
2.623" ± .002"
LINE PRESSURE PASSAGE
SUCTION PASSAGE WITH PREVIOUS DESIGN ROTOR
Copyright © 1999 ATSG

Figure 2

"1ST DESIGN" PUMP BODY CASTING



THIS PUMP CASTING CAN USE EITHER STRAIGHT OR TAPERED ROTOR

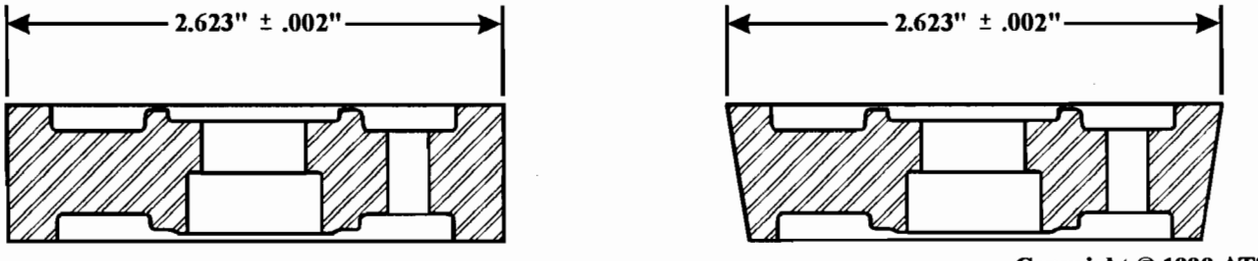


Figure 3

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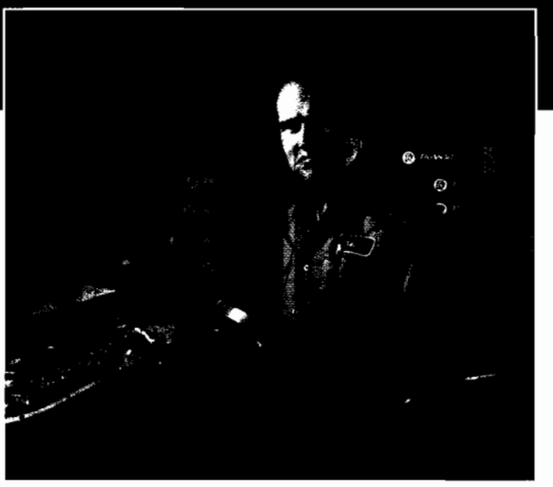

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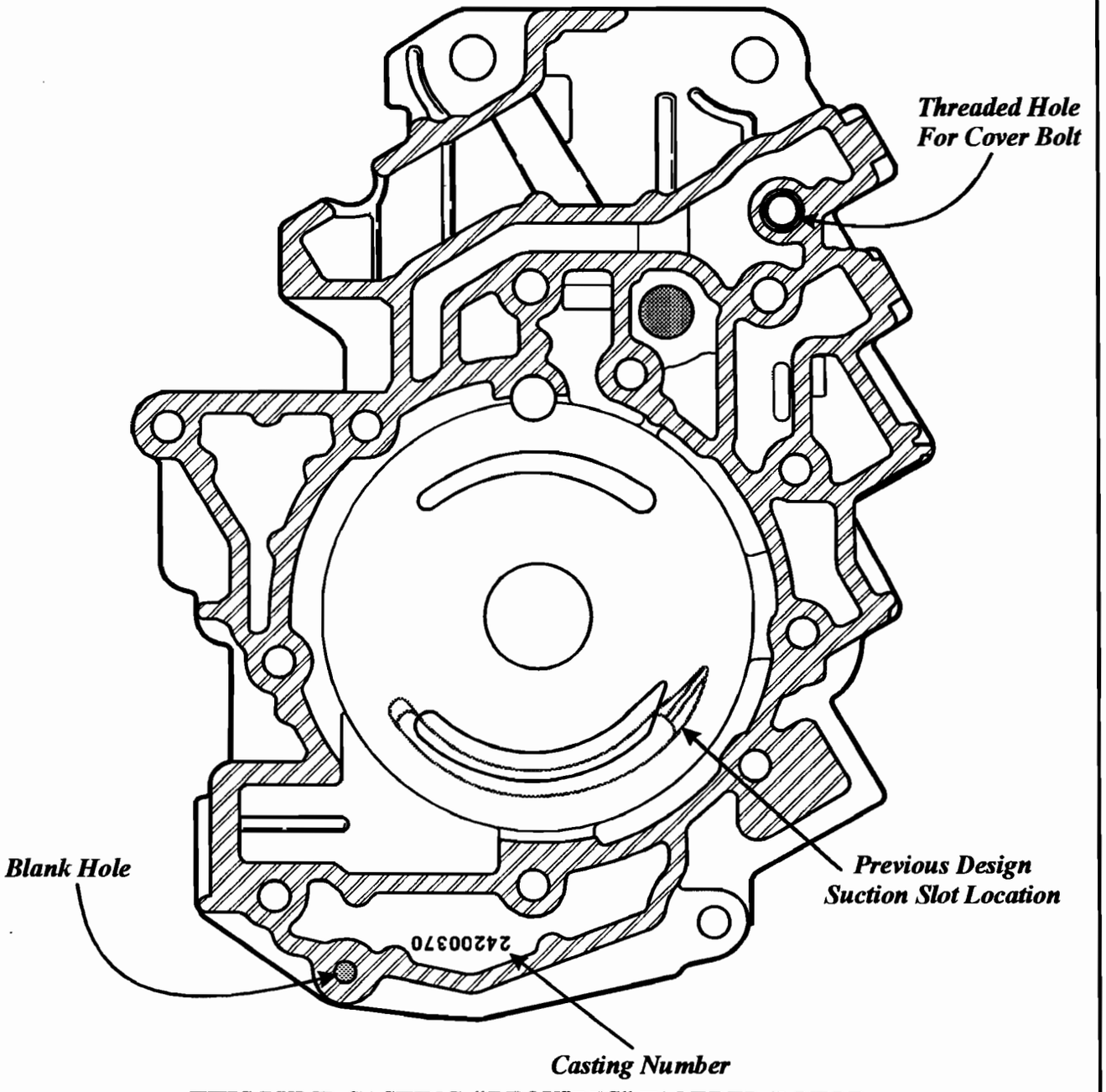
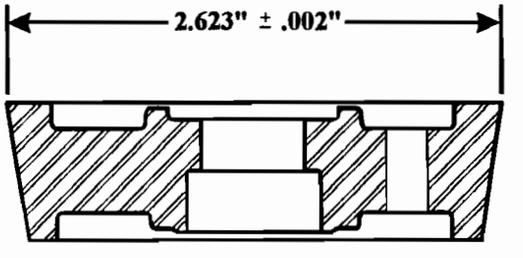
"2ND DESIGN" PUMP BODY CASTING



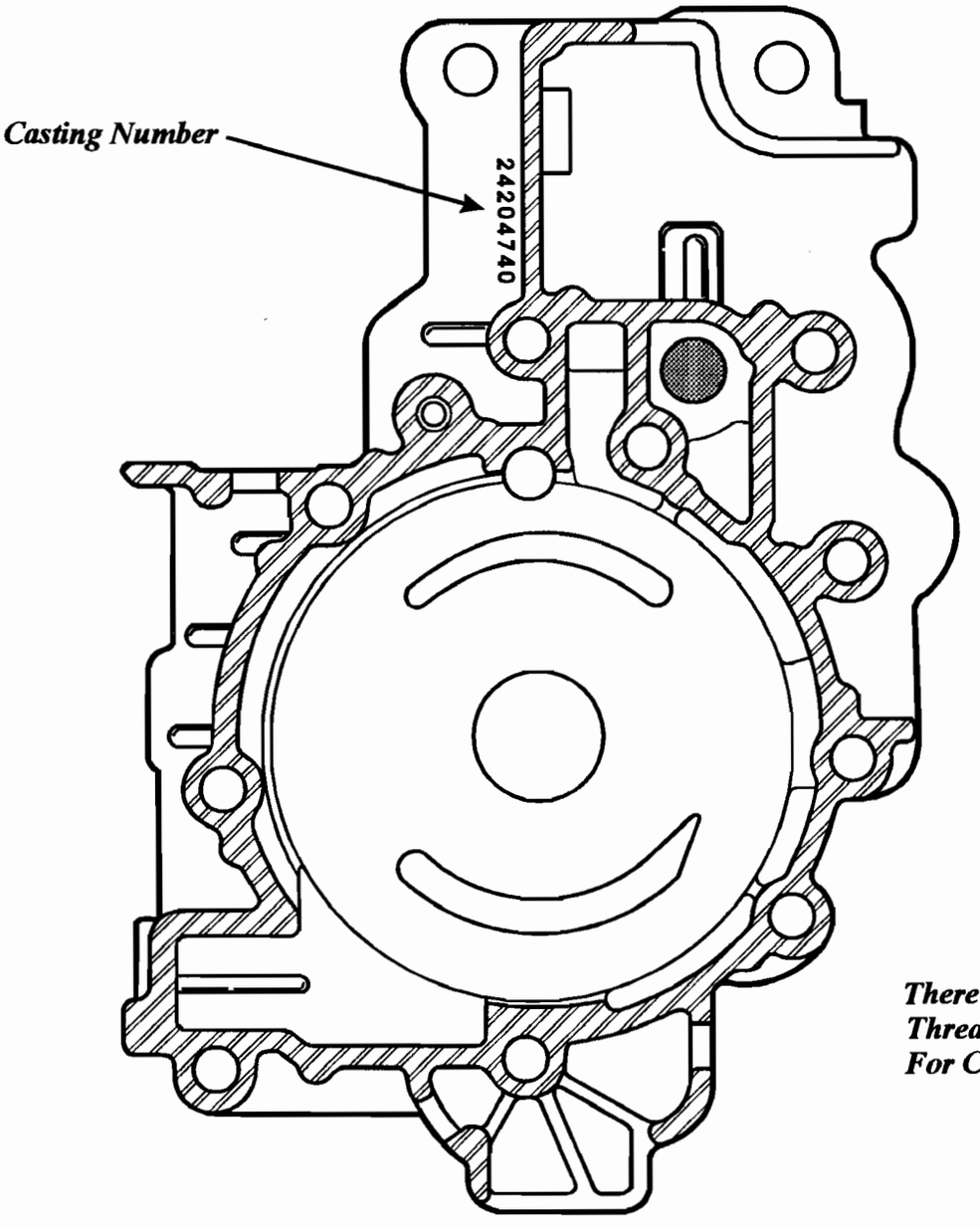
THIS PUMP CASTING *"REQUIRES"* TAPERED ROTOR



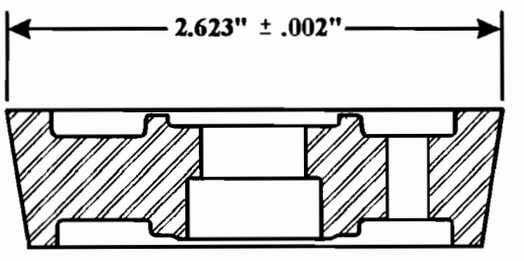
If the previous design straight pump rotor is used in this casting, the rotor will cover a portion of the "suction slot" as shown in Figure 2, and result in transaxle damage.

Figure 4

"3RD DESIGN" PUMP BODY CASTING



THIS PUMP CASTING *"REQUIRES"* TAPERED ROTOR AND *"WILL NOT"* BACK SERVICE PREVIOUS MODELS.



If the previous design straight pump rotor is used in this casting, the rotor will cover a portion of the "suction slot" as shown in Figure 2, and result in transaxle damage.

Figure 5

THM 4L60-E
NEW DESIGN 1-2 ACCUMULATOR PISTON

CHANGE: Beginning on May 11, 1998 (Julian Date 131) all THM 4L60-E transmissions were built with a new design plastic 1-2 Accumulator Piston, and an ovate (oval) wire outer accumulator spring, to replace the previous design aluminum piston and round wire outer accumulator spring, as shown in Figure 1.

REASON: More cost effective than the aluminum piston.

PARTS AFFECTED:

(1) 1-2 ACCUMULATOR PISTON - Now manufactured out of plastic instead of the previous aluminum, which necessitated a dimensional change, as the plastic piston is thicker as shown in Figure 1.

(2) 1-2 ACCUMULATOR OUTER SPRING - Now manufactured out of an ovate (oval) wire instead of the previous design round wire, to eliminate coil bind as shown in Figure 1.

INTERCHANGEABILITY:

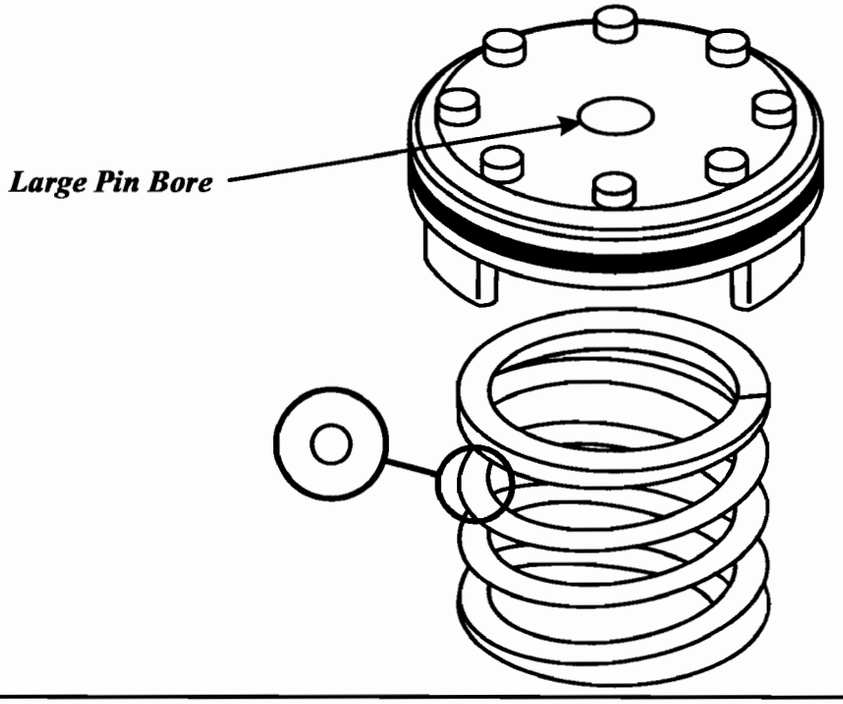
The different 1-2 Accumulator Pistons and Outer Springs are not interchangeable. When replacing these parts you must remove the 1-2 Accumulator Assembly and inspect for the presence of either the aluminum or plastic 1-2 accumulator piston.
The plastic piston must use the ovate wire outer spring, and the aluminum piston must use the round wire outer spring to ensure against coil bind and spring breakage.
Refer to "Service Information" below for the proper service package part numbers if replacement is necessary.

SERVICE INFORMATION:

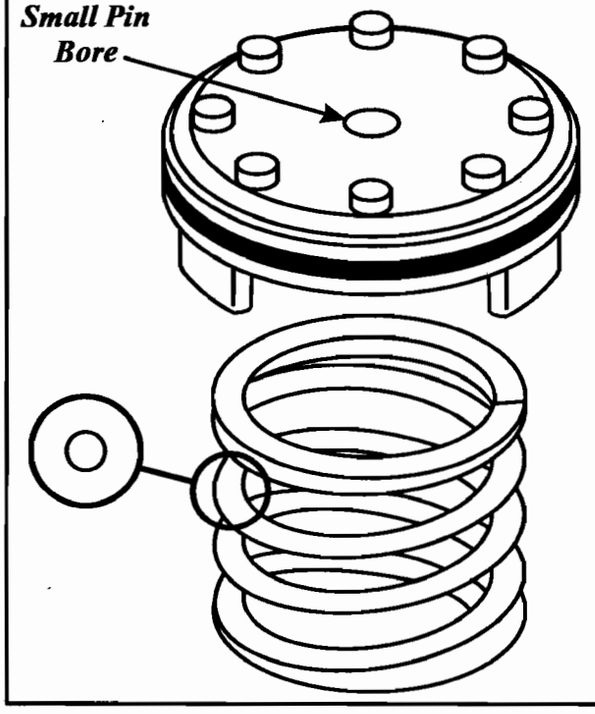
1-2 Accum. Piston Service Package, 4L60, (1982-1993 Aluminum) 24204495
1-2 Accum. Piston Service Package, 4L60-E, (1994-1997 Aluminum)..... 24204496
1-2 Accum. Piston Service Package, 4L60-E, (1998-1999 Plastic) 24214343

Note: All service packages include the proper outer spring.

Aluminum 1-2 Accumulator Piston
"Round Wire" Outer Spring
1982-1993 Only
Part Number 24204495



Aluminum 1-2 Accumulator Piston
"Round Wire" Outer Spring
1994-1997 Only
Part Number 24204496



Plastic 1-2 Accumulator Piston
"Ovate Wire" Outer Spring
1998-1999 Only
Part Number 24214343

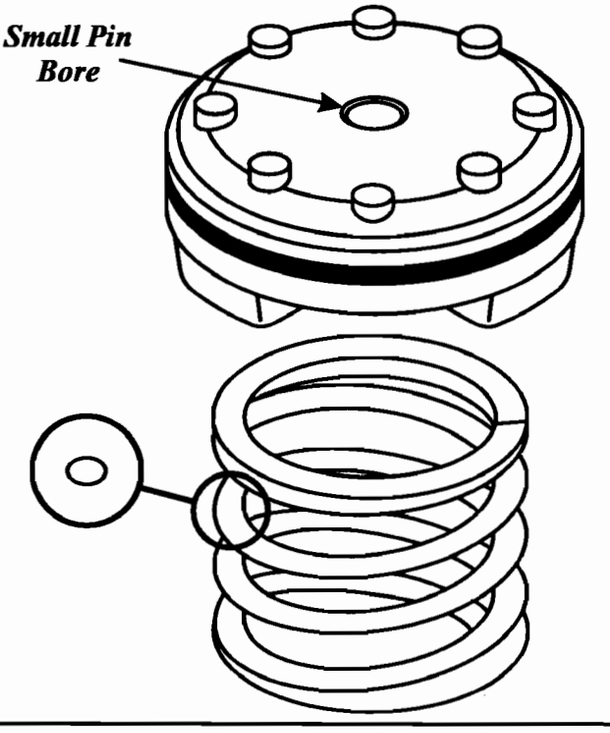


Figure 1

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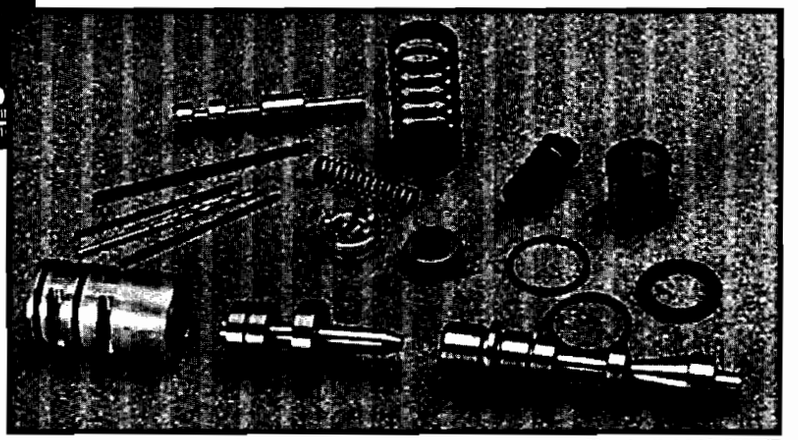
The 4L80E Shift Correction Package!

Improve overall transmission performance with Superior Transmission Parts' new 4L80E Shift Correction Package. For **normal or heavy duty applications**, the 4L80E Kit comes with a complete custom pressure regulator valve train and a custom anti-shudder converter clutch control valve.



Helps To Eliminate:
- Runaway high pressure
- Erratic pressure rise
- Converter shudder
- Inconsistent shift feel
- Premature unit failure
- Shift solenoid filter blow-out
- Full time lube

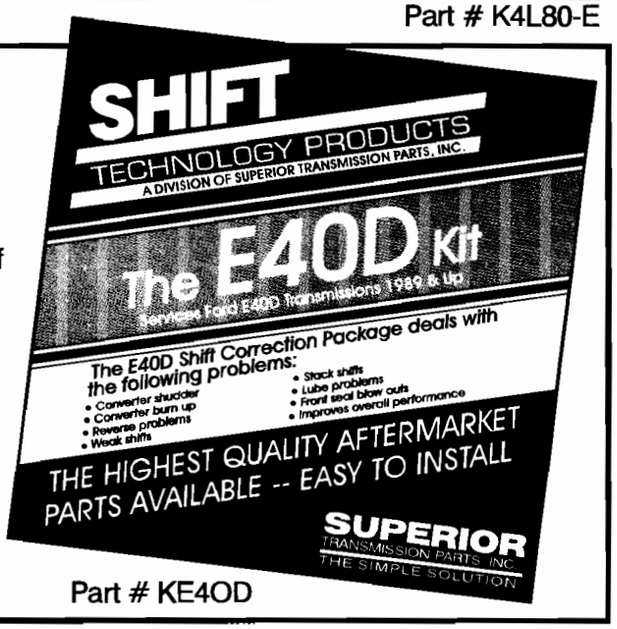
Part # K4L80-E

Be Sure To Try Our E4OD Kit!

Like all Superior Shift Correction Packages, the popular E4OD Kit offers simple solutions to today's complex transmission problems. Featuring quality parts, consistent performance and easy-to-use instructions, it's easy to see why the Superior line of Shift Correction Packages is fast becoming the first choice of rebuilders everywhere.

The E4OD Shift Correction Package helps to eliminate the following Problems:

- Converter shudder
- Stacked shifts
- Converter burn up
- Lube problems
- Reverse problems
- Front seal blow outs
- Weak shifts
- Improves overall performance



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THM 4L80-E/4L80-EHD

NEW SHIFT SOLENOID ASSEMBLIES

CHANGE: As a running change during production for the 1999 model year, all 4L80E/4L80EHD transmissions were built with revised Shift Solenoids.

REASON: Revised plastic material for seats in the Shift Solenoids, for improved durability.

PARTS AFFECTED:

(1) SHIFT SOLENOID "A" - Revised plastic material in the seat area, and connector is still Black in color, and the color of plastic for snout where the "O" ring goes is still Brown just like the previous design (See Figure 1).

(2) SHIFT SOLENOID "B" - Revised plastic material in the seat area, and connector is still Gray in color, and the color of plastic for snout where the "O" ring goes is still Brown just like the previous design (See Figure 1).

INTERCHANGEABILITY:

The new design Shift Solenoids, will retro-fit back on ***all*** previous models.

SERVICE INFORMATION:

Shift Solenoid "A" (Black connector, Brown snout) 10478147
Shift Solenoid "B" (Gray connector, Brown snout) 10478148

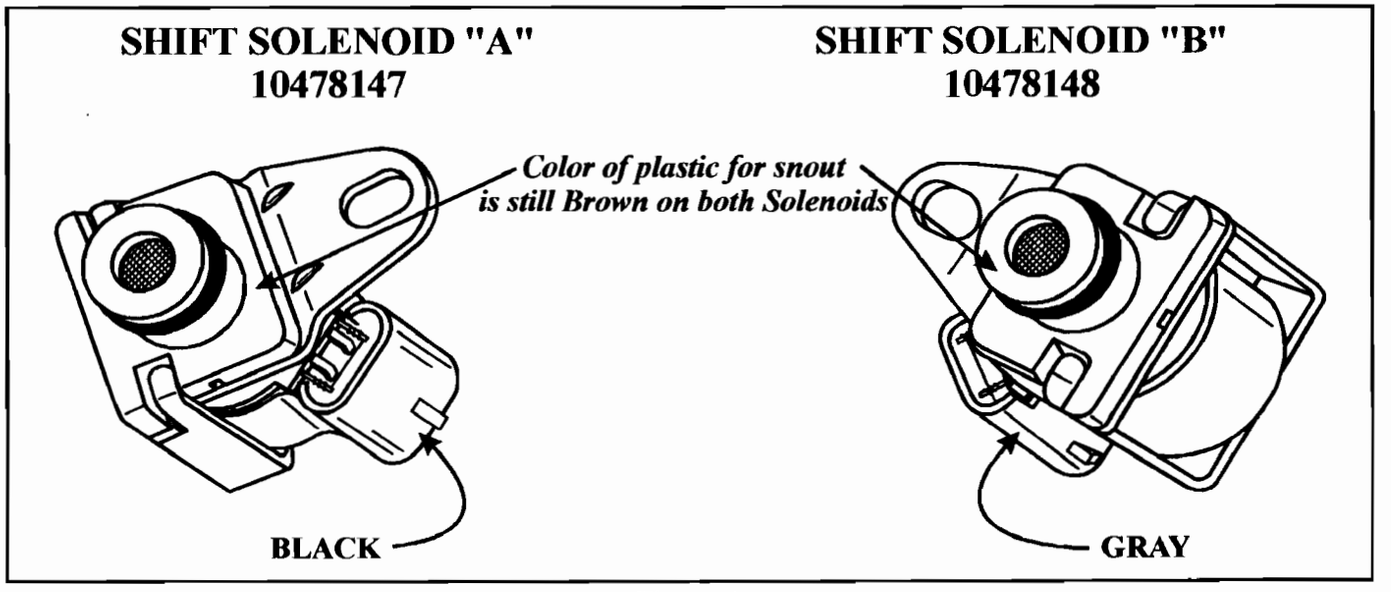


Figure 1

THM 4L80-E/4L80-EHD

CENTER GEAR BOX DIFFERENCES ON CENTER LUBE TRANSMISSIONS

CHANGE: Beginning at the start of production for all 1997 model 4L80E/4L80EHD transmissions were produced with center lube, in addition to front and rear lube. ATSG Bulletin No. 97-38 covers some of the changes that occured. This bulletin covers changes thar occured in the center gear box area that was not covered in bulletin 97-38.

REASON: Provides a more desirable distribution of lube flow to the center of transmission.

PARTS AFFECTED:

(1) SUN GEAR SHAFT - Has revised bushing journals to accommodate the new center support, as shown in Figure 1, and ***must*** be used with the new center support.

(2) SUN GEAR - Has larger lubrication passages on the inside splines of the sun gear, and the new design has a smaller hole between the gears, as shown in Figure 2.

(3) REAR RING GEAR SHAFT - The lube holes that were cross drilled in the previous shaft, as well as the lube passage through the center, have been eliminated in the new design shaft, as shown in Figure 3.

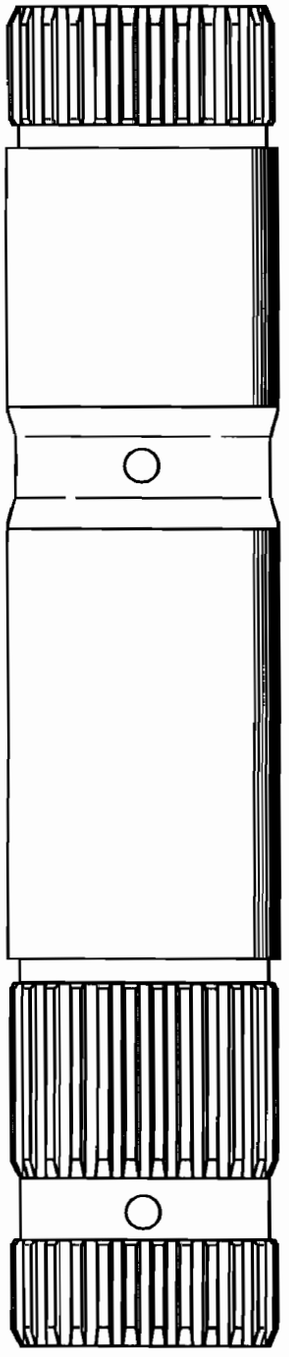
(4) REAR INTERNAL RING GEAR - New design level has lube passages cut through the area where the shaft splines into the ring gear, and lube passages cut into the bearing race that goes on the internal ring gear in this location, as shown in Figure 4.

(5) OUTPUT SHAFT - New design has eliminated the lube hole that was present in the previous models, as shown in Figure 5.

INTERCHANGEABILITY:

None of the parts listed will interchange with any of the previous design level parts, and none of the previous design level parts can be used in the center lube design level units.

PREVIOUS DESIGN LEVEL SUN GEAR SHAFT



1997-UP DESIGN LEVEL SUN GEAR SHAFT

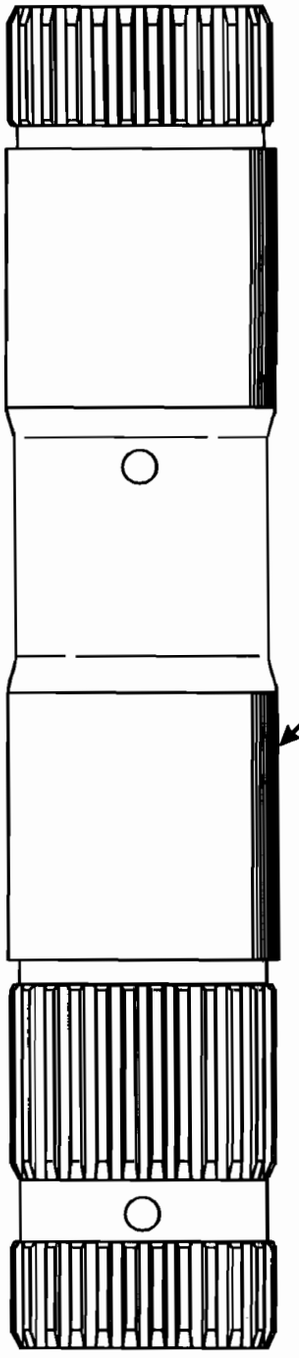


Figure 1

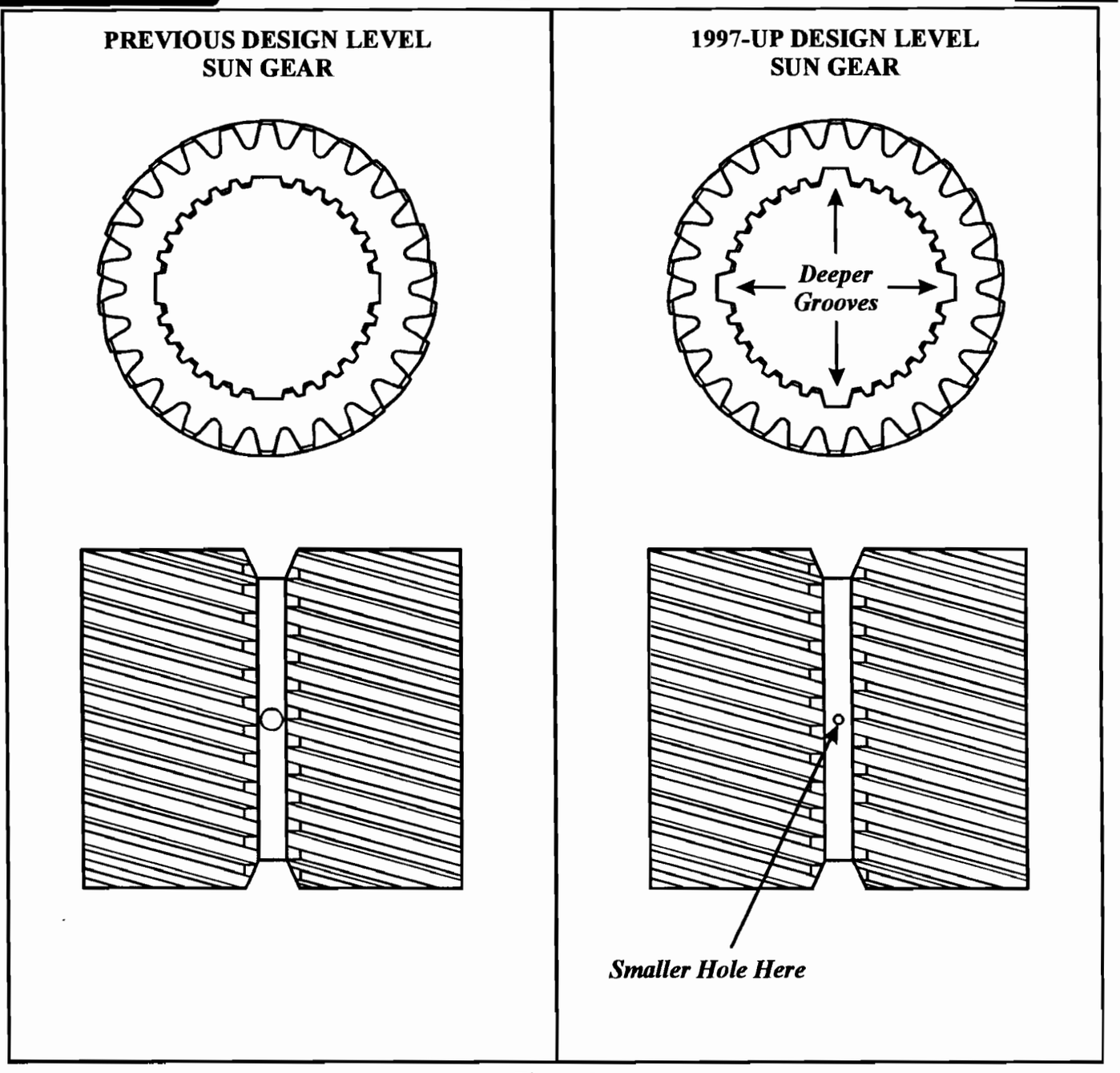


Figure 2

SLIDE

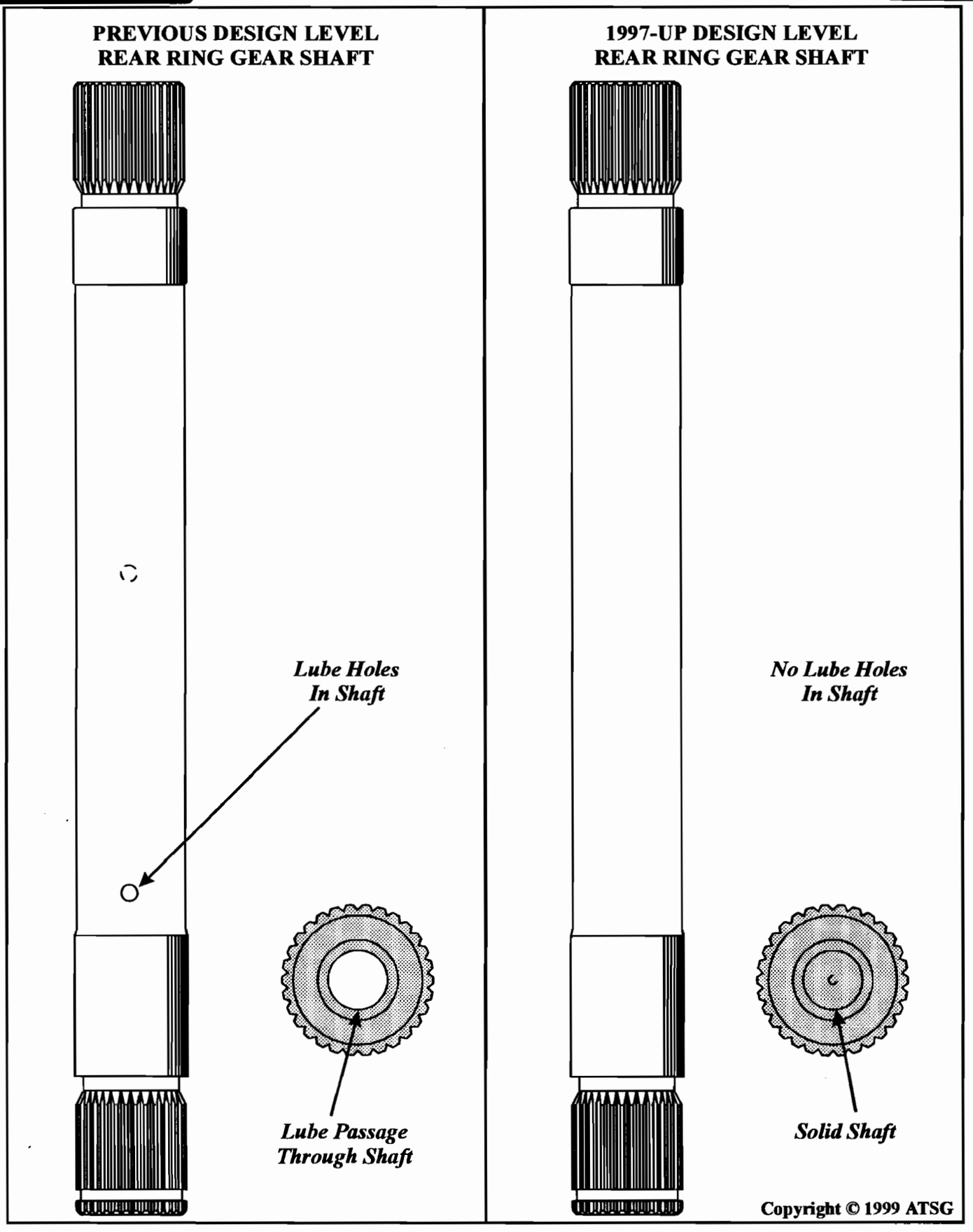
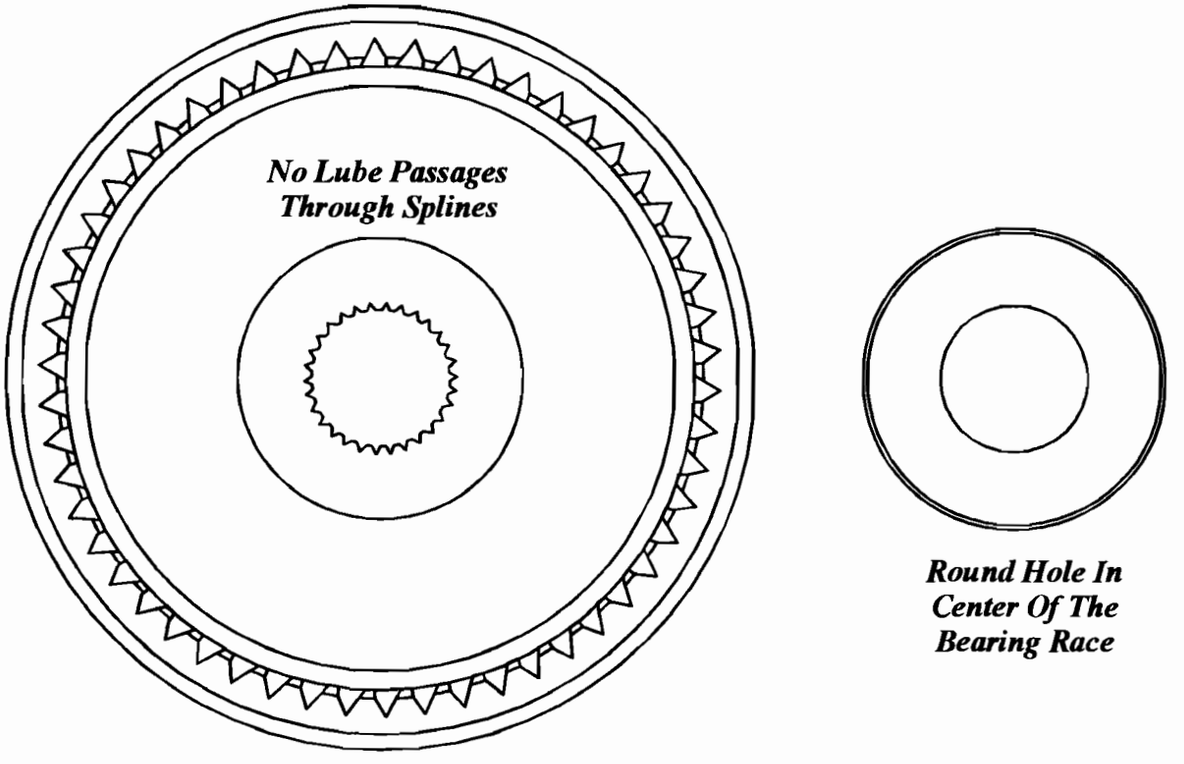


Figure 3

PREVIOUS DESIGN LEVEL
REAR RING GEAR AND BEARING RACE



1997-UP DESIGN LEVEL
REAR RING GEAR AND BEARING RACE

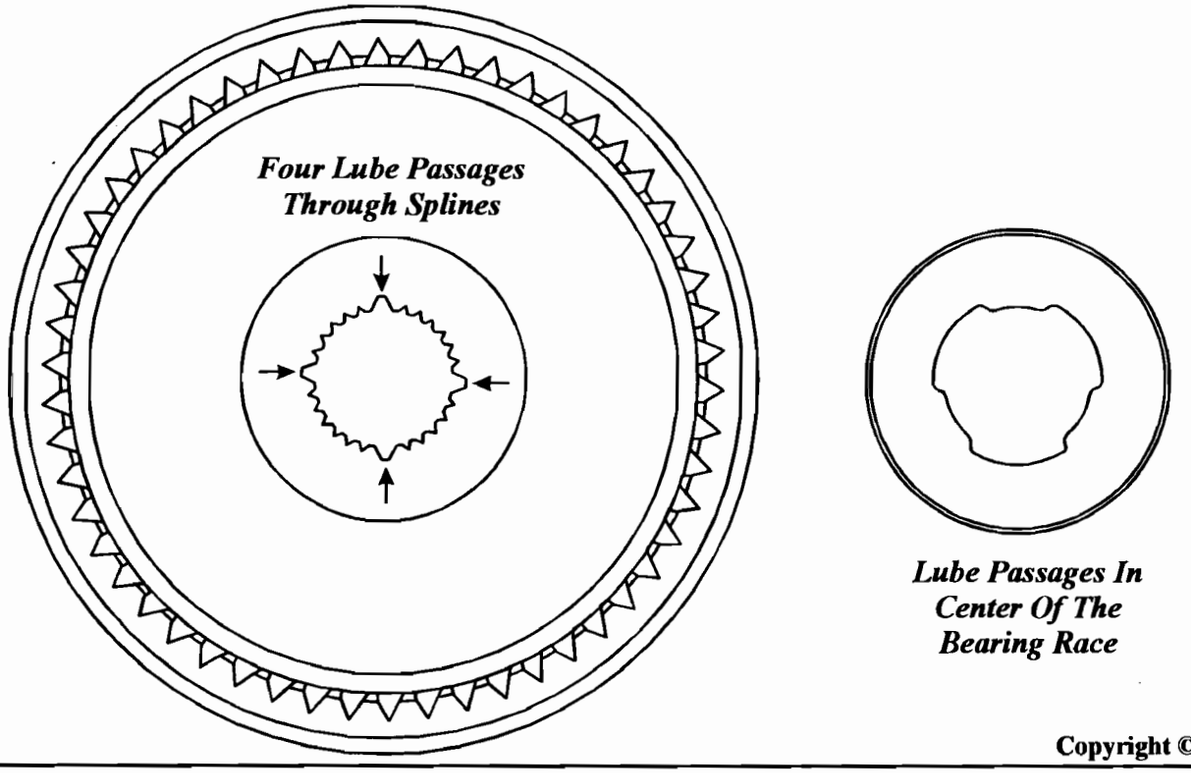


Figure 4

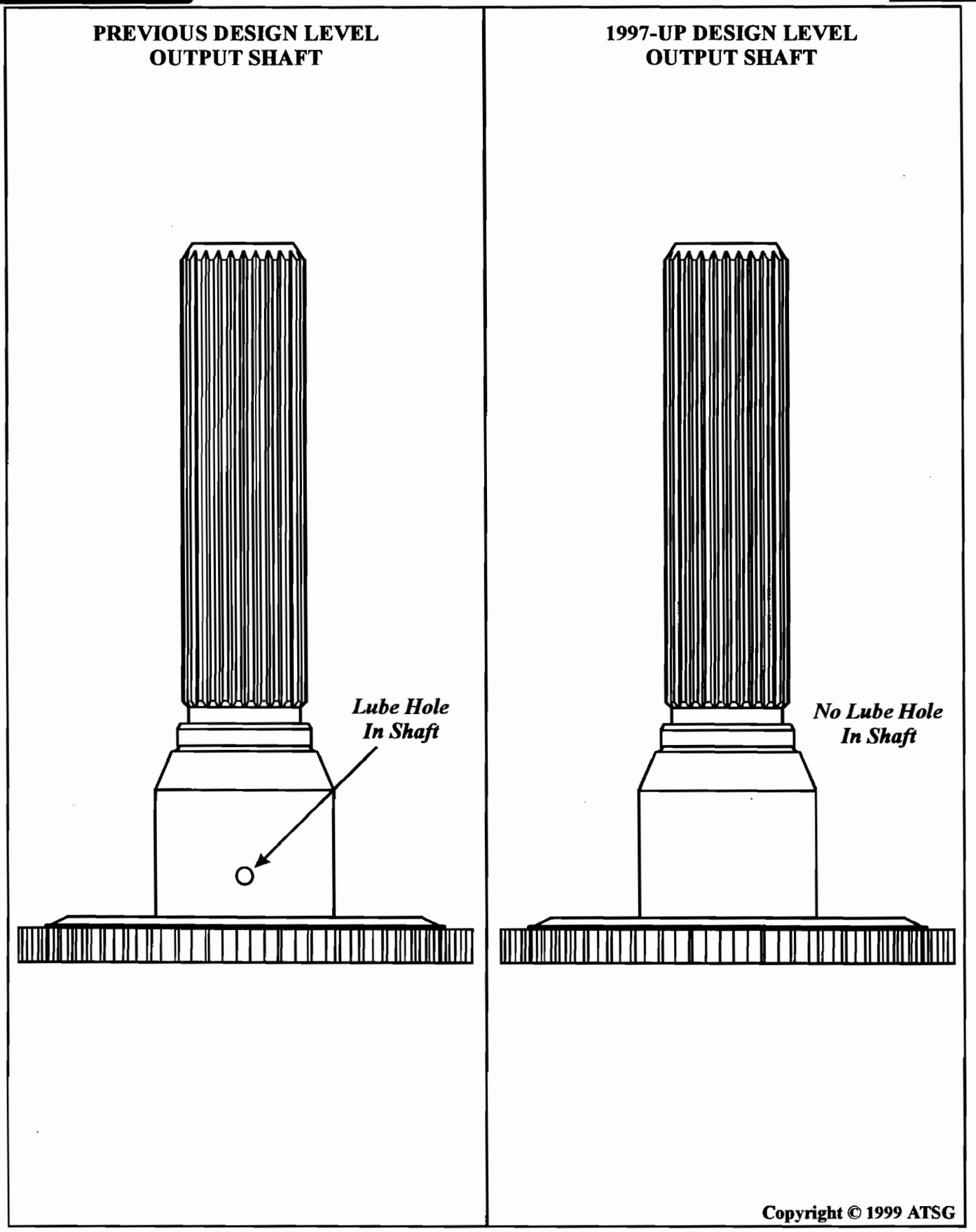

PREVIOUS DESIGN LEVEL
OUTPUT SHAFT
Lube Hole
In Shaft
1997-UP DESIGN LEVEL
OUTPUT SHAFT
No Lube Hole
In Shaft
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Figure 5

ACDelco®

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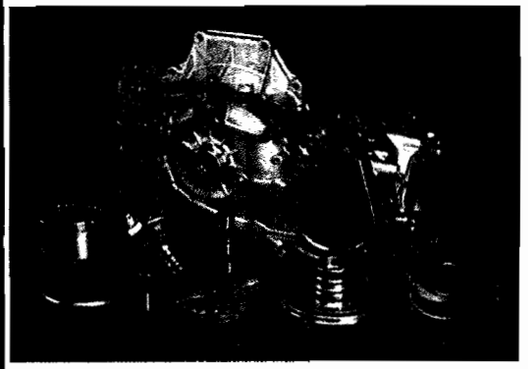
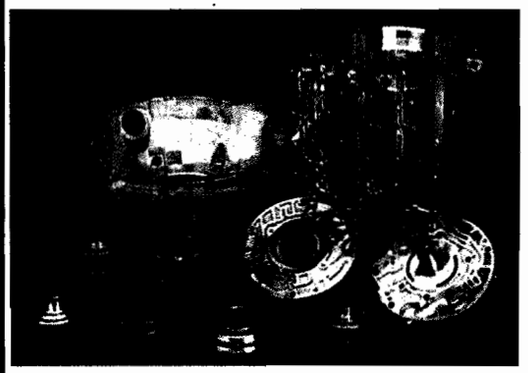
The SEATAC Difference





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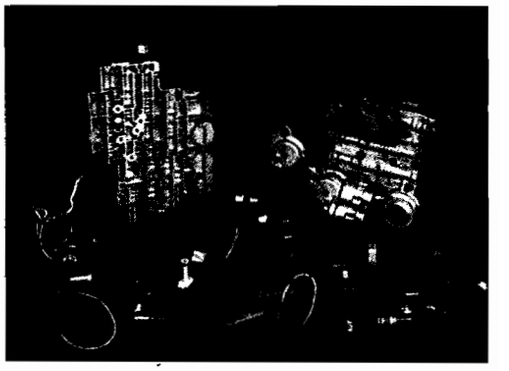

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G. M. DIESELS
WHAT IS A CODE "88"

COMPLAINT: After TCM replacement a no 3-4 shift and no TCC occurs with a code 88 stored.

CAUSE: A code 88 indicates that Top Dead Center is offset by plus or minus two degrees. This can be caused by a pump priming problem or that the TCM has lost its memory (i.e. disconnected battery). When a TCM has been replaced or loses its memory, it will need to be flashed with the required TDC OFFSET parameters to eliminate code 88. Once new parameters are set, code 88 will be erased and Overdrive and TCC will be restored.

CORRECTION: Have the TCM flashed with new TDC OFFSET parameters. Note: If codes 91-98 are present, they too will need to be addressed. These are cylinder balance fault codes. An injector balance test can be performed with a factory scanner for each cylinder. The injection pump should also be checked for timing.

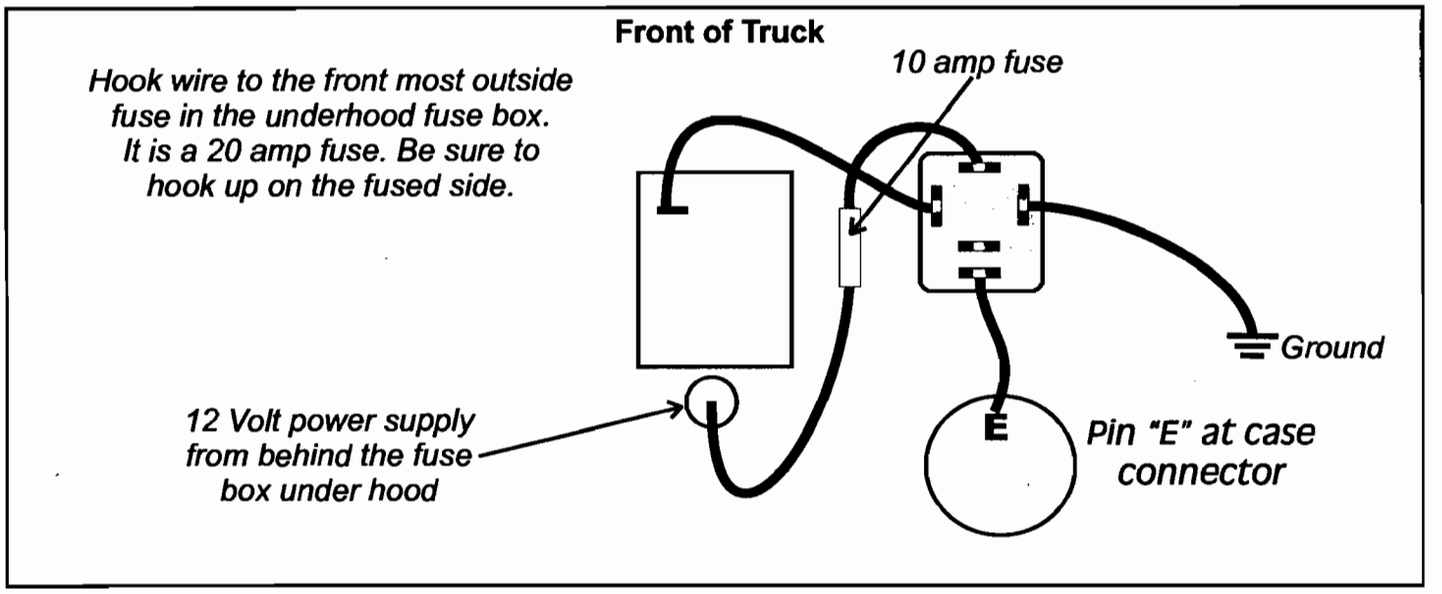
G.M. PICK UPS
IGNITION SWITCH REPLACEMENT

COMPLAINT: No solenoid supply voltage at pin E in the case connector.

CAUSE: G.M. Trucks with 4L60-E and 4L80-E transmissions can loose voltage to the solenoids at pin E because of a faulty ignition switch. The most common switch to go bad are on vehicles with air bags. Apparently the switch was made smaller to accommodate room for the air bag making it prone to premature wear. Ignition switches can be as high as $200.00 plus dollars and requires a couple of hours of work to replace the switch.

CORRECTION: One method is to just simply replace the switch. Dan Tucker from Pine Bluff Arkansas has developed a less expensive method both in parts and time. In his own words, this is what he does:

The relay I use is a Ford Bosh relay part number F0AZ-14NO89-A (it is the least expensive relay I could find, though many vendors make it such as Standard...part # Ry115). I excite the relay with the ignition fuse under the hood in the under hood fuse box. It is located on the drivers side. The ignition fuse that is on a separate circuit from the PRNDL's circuit is the FRONT MOST OUTSIDE small fuse in the underhood box. It is normally a 20 amp fuse. You can get an "add a circuit fuse tap" and get the IGNITION voltage you need to excite the relay. Since the relay draws very low amps, the ignition circuit will never "feel" the draw of the added relay. The next step is to ground the relay. This is easily done by grounding it to the master cylinder mounting stud. You then need a 12 volt power source to send to the "E" terminal through the relay. This can be found behind the underhood fuse box. Now all you got to do is run the relay switched wire to the transmissions "E" terminal. The "E" terminal is most easily accessed at the transmission's case connector. Just splice it into the existing "E" wire. Do NOT cut the "E" wire. We always hole punch and attach a laminated business card with a brief description on the back of the added circuit, to the relay. This way, if someone down the road works on it, they aren't in the dark. The whole job takes about 20 minutes, and the fix is BETTER than new. We make up several relay and harnesses up at a time, which greatly reduces the time. Below is the drawing.



GM 4L80E

STUCK IN FIRST GEAR, NO VEHICLE SPEED SIGNAL

COMPLAINT: The transmission is stuck in first gear, when scanning for codes on 1991-93 trucks and vans, there are no codes stored. On 1994 trucks and vans a code 74 is stored for "no input speed sensor signal".
When data is displayed on the scan tool, in addition to no input rpm, no output rpm is seen and with the vehicle moving forward, the scan tool data display indicates vehicle speed is 0 mph.

CAUSE: 1991-94 trucks and vans equipped with the 4L80E transmission has computer strategy that will ***not allow the PCM to look at output rpm if there is no input rpm.***
Without input rpm the PCM ignores output rpm causing the PCM to not see any vehicle speed signal when the vehicle moves in a forward direction, and therefore the PCM has no reason to shift the transmission out of first gear.

It wasn't until the 1994 model year that the PCM acquired the ability to store a code 74 when no input speed sensor signal was seen.
On 1995 and later trucks and vans the computer strategy was changed to eliminate this problem. On those trucks and vans there will be output rpm and vehicle speed even though there is no input speed signal.

CORRECTION: When a no upshift condition exists, do not assume it is a vehicle speed system problem.
On 1991-93 trucks and vans scan for data and make certain you have an input rpm signal. On 1994 vehicles, if code 74 is stored with the above symptoms, that is a definite indicator that the input speed sensor is causing the problem.

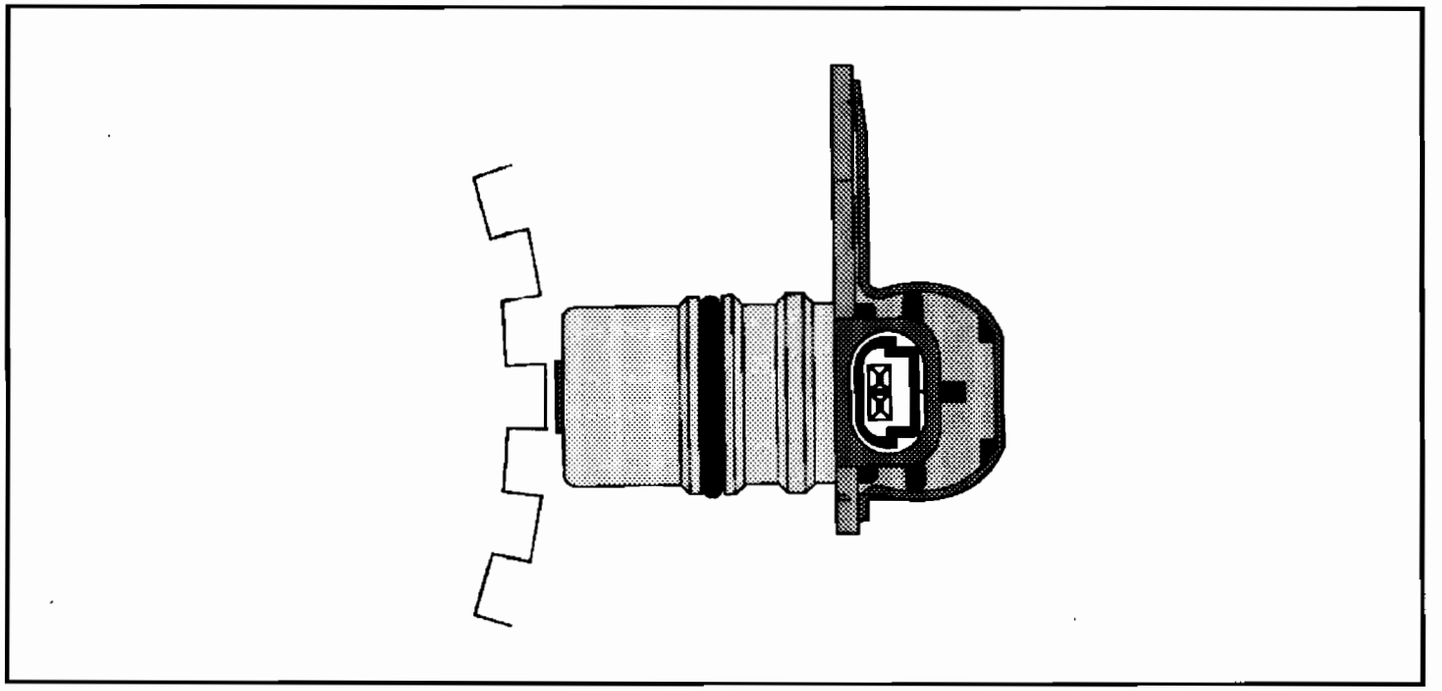


Figure 1

DIGITAL RATIO ADAPTER CONTROLLER (DRAC)

VEHICLE SPEED BUFFER

The Digital Ratio Adapter Controller ("DRAC") or what is now called the Vehicle Speed Buffer, receives an AC voltage signal from the vehicle speed sensor (VSS), it then converts this AC voltage signal to a digital signal which can be interpreted by the PCM/TCM (Refer to Figure 1) as well as changing the frequency of that signal which can then be used to upshift the transmission, and is also used for Speedometer Operation and Accuracy, the ABS System, Cruise Control and other systems dependant on a vehicle speed signal as well as shift timing calibration and speedometer accuracy on vehicles equipped with four wheel drive when 4W Low is selected.

Vehicle Speed Sensor locations for the 4L80E and 4L60E transmissions in both 2 wheel and 4 wheel drive models can be identified in figures 2 and 3.

The "DRAC" also allows changes in tire size and axle ratio to be easily adapted to the vehicle systems by utilizing "DRAC" modules of different calibrations.

The "DRAC" helps the vehicle computer to calculate vehicle speed by pulsing a voltage signal sent to it by the PCM/TCM at an extremely rapid speed and the PCM/TCM will calculate vehicle speed by monitoring the time between these pulses.

One of the problems the technician has to be aware of is, the owner of the vehicle may change tire and wheel size or change the differential to a different axle ratio which would affect transmission operation as well as the other systems that depend on the "DRAC" for their operation.

Of course, if you are expected to diagnose and repair the "DRAC" the first thing you have to do is **FIND IT!**

The Drac shown in figure 4 would be extremely difficult to find unless you know where to look, as you can see ***it is an integral part of the speedometer cluster!*** This is found on 1991 "C" and "K" trucks with 4L80E transmission only, however, it was used on earlier trucks that are equipped with the 4L60 (700-R4) transmission that have a PM Generator for a speed sensor.

When a problem occurred with the internal Drac, it was replaced as an assembly, and although the internal parts were never made available at the parts counter, the illustration in figure 5 shows the internal parts and how it is calibrated according to the tire chart also shown.

To diagnose the internal Drac use the schematic and diagnostic tree in figure 6. The location of the external Drac for the 1992 and later "C" and "K" trucks is shown in figure 7, the location of the Drac in 1991 and later "G" Vans is shown in figure 8. In figure 9 the location of the Drac for the 1991 "R" and "V" trucks is shown, make note that even though this is a 1991 pickup truck, the "R/V" series used an externally mounted Drac and is **NOT** to be confused with the 1991 "C/K" pickup truck models. 1991 was the last year for the "R/V" models.

In figures 10, 11 and 12 are the Drac locations for the "P" series vans and "P" series commercial chassis and motor home models. The schematic and diagnostic tree for the 1992 and later "C/K", "G" and "P" series vehicles can be found in figure 13.

The location of the Drac in the 1993-94 "M" and "L" Vans can be found in figure 14 and the 1995 model Drac location can be found in figure 15.

NOTE: Any 1995 and later truck or van equipped with an external Drac that is mentioned in this material, is NON-OBDII. Any truck that is OBDII certified will NOT have an external Drac because this function is performed internally within the Vehicle Control Module (VCM). Car models never had an external drac.

In figure 16 the location of the Drac for the 1993 and later "S" and "T" Trucks can be found. The schematic and diagnostic tree for the "M/L" Vans and the "S" truck only is shown in figure 17. (The "T" Truck diagnostics can be found in the four wheel drive section).

DIAGNOSTIC TIP: When diagnosing the codes stored by a malfunctioning vehicle speed system, it is important to know that code 24 is a loss of vehicle speed signal from a stop, while code 72 is far more difficult because it means there was a loss of vehicle speed signal "on the fly" or, intermittently. Codes 24 and 72 are usually generated by circuit 437 malfunctions. With the start of the 1994 model year, you will notice an additional circuit in the schematics which indicates miles per hour to the computer. A malfunction in these circuits will usually generate code 16 and is ***ALMOST*** always a faulty Drac.

The four wheel drive section begins with figure 18 and will require some additional diagnostics.

DIGITAL RATIO ADAPTER CONTROLLER (DRAC)

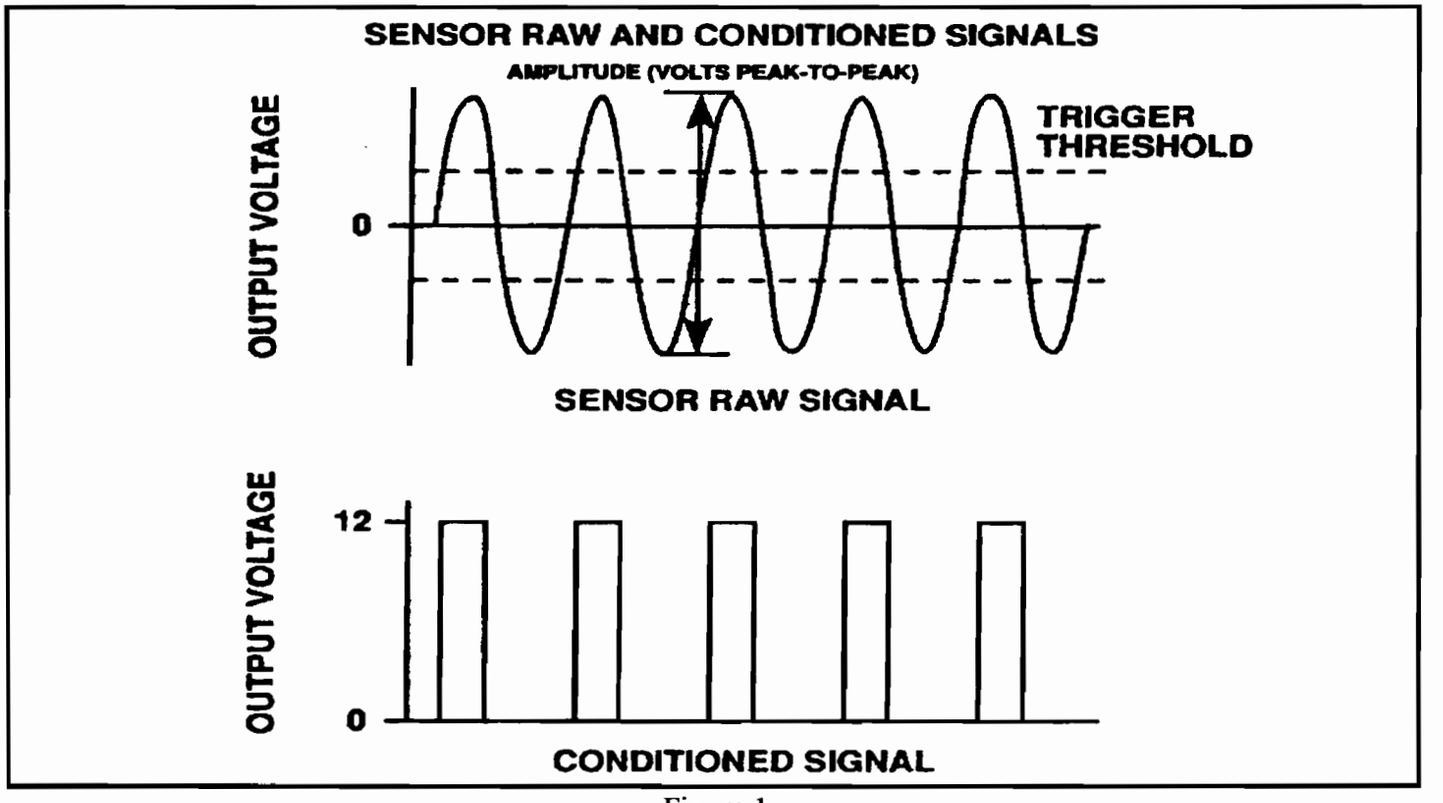


Figure 1

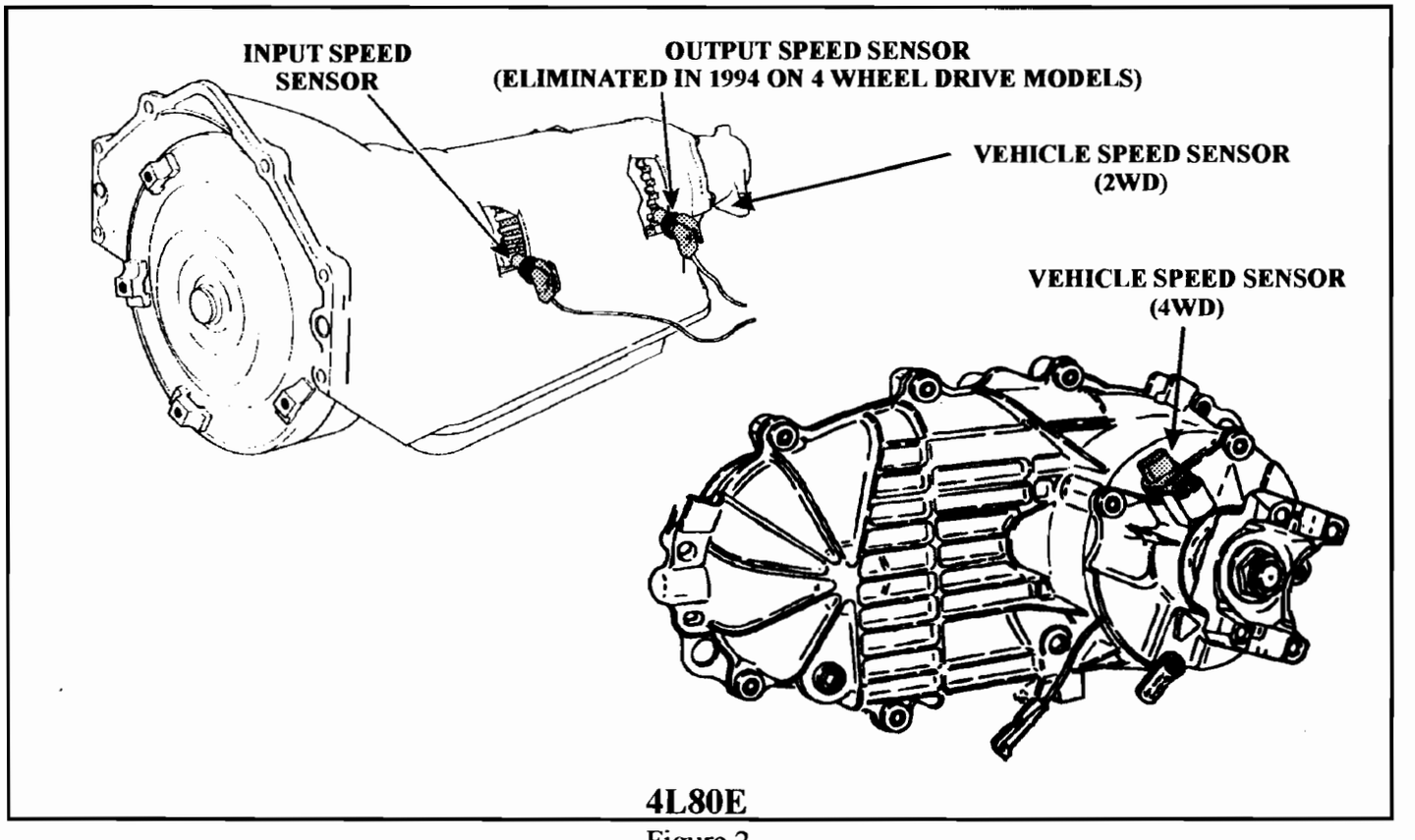
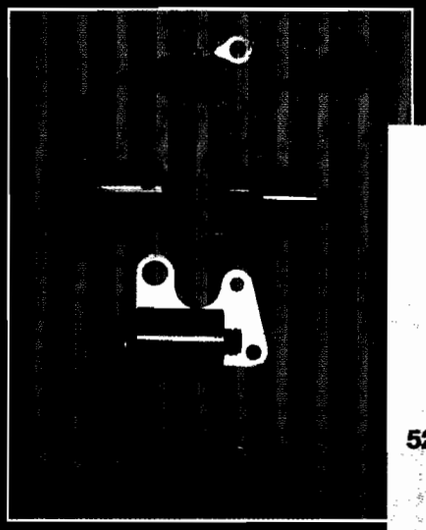


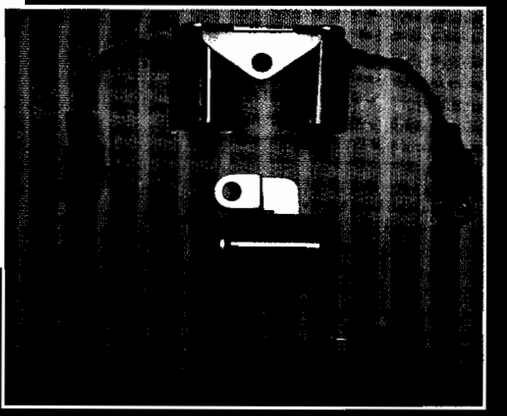
Figure 2

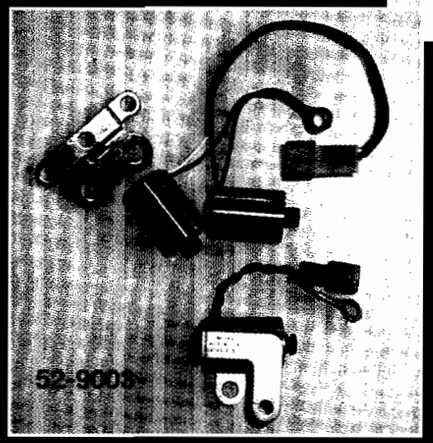
Rostra Introduces Four New Solenoid Kits for Toyota



52-9001 Three solenoids; 2 shift solenoids, and 1 lock-up solenoid for the Toyota A240E and A241E transmissions

52-9002 Three solenoids; 2 shift solenoids, and 1 lock-up solenoid for the Toyota A340E, 340F, and 340H transmissions





52-9003 Three solenoids; 2 shift solenoids, and 1 lock-up solenoid for the Toyota A540E transmissions

52-9004 Three solenoids; 2 shift solenoids, and 1 lock-up solenoid for the Toyota A245E and A246 transmissions

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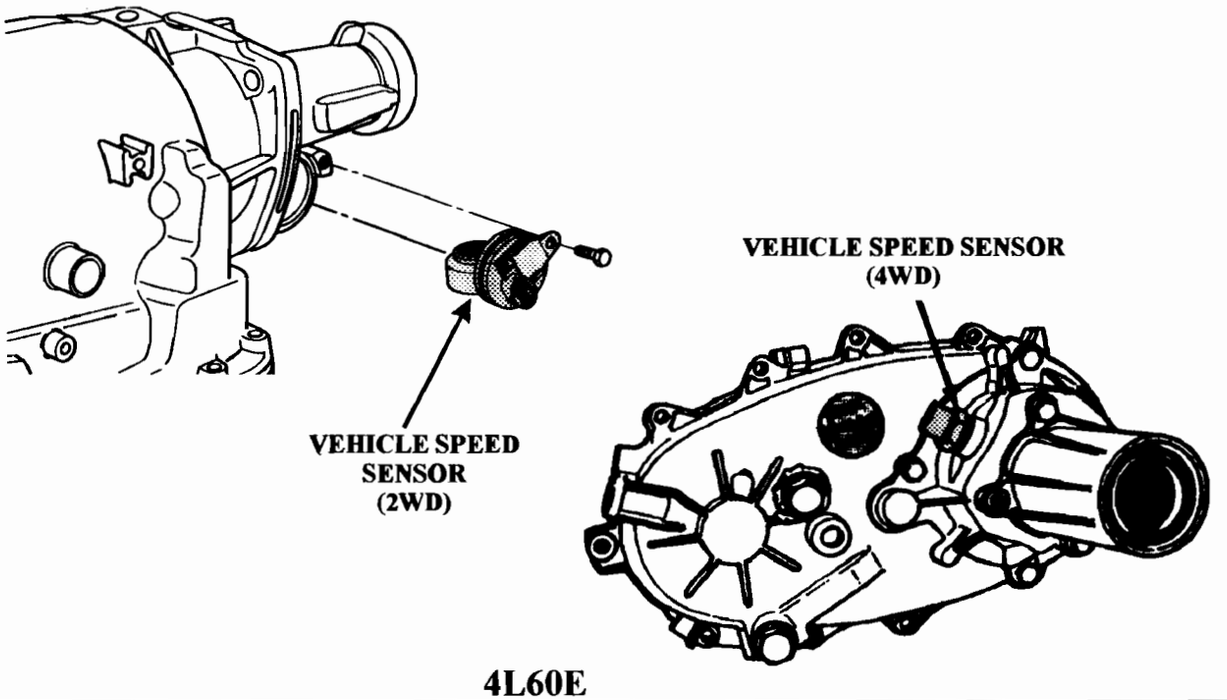


4L60E

Figure 3

1991 "C & K" TRUCK ONLY

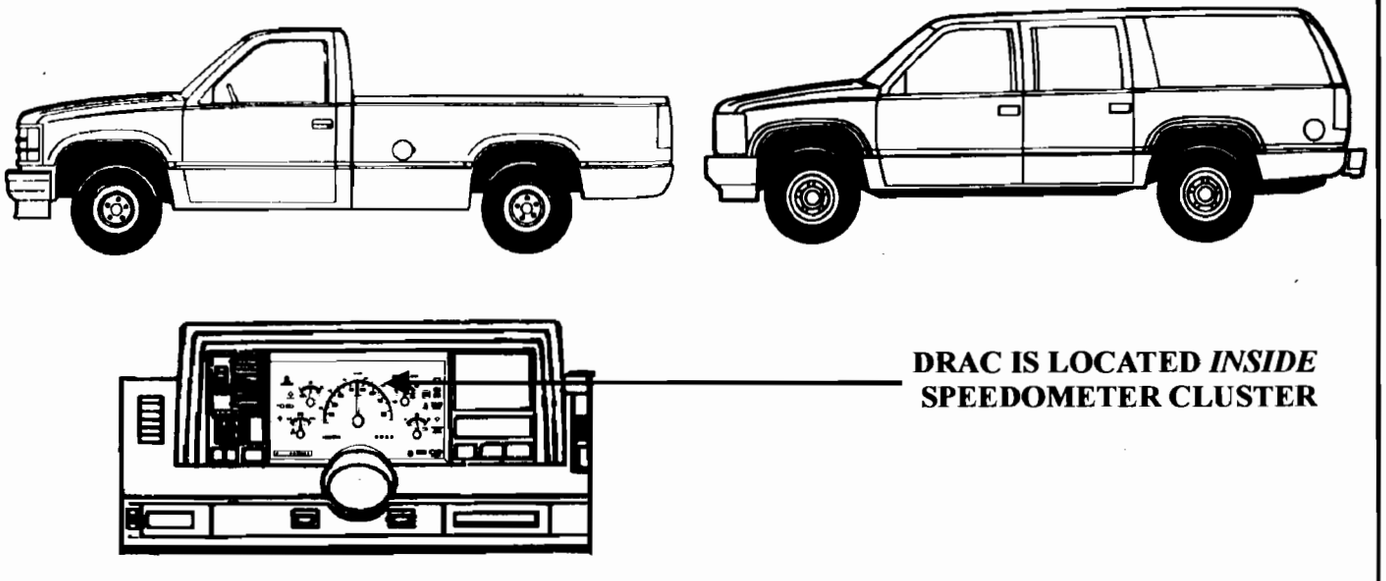


Figure 4

DRAC LOCATION AND DIAGNOSIS

1991 "C & K" SERIES 4L80E DRAC CALIBRATION

SPEEDOMETER CALIBRATION CHART

AXLE RATIO	TIRES	RPO	HWY/OOR AT/ALS	PINS TO REMOVE
2.73	P205/75R15	(YCE,YCG)	ALS	1,4,5
(GU2)	P235/75R15	(YFL,YFN,YFM)	ALS	3,5
	P195/75R15	(YAR,YAS)	ALS	1,2,4,5
	P225/75R15	(YET,YEV,YEU)	ALS	2,3,5
3.08	P205/75R15	(YCE,YCG)	ALS	3,5
(GU4)	P195/75R15	(YAR,YAS)	ALS	2,3,6
	P225/75R15	(YET,YEV,YEU)	ALS	6
	P235/75R15	(YFL,YFN,YFM)	ALS/OOR	2,3,4,5
3.42	P205/75R15	(YCE,YCG)	ALS	1,3,4,6
(GU5)	P195/75R15	(YAR,YAS)	ALS	1,2,3,4,6
	P225/75R15	(YET,YEV,YEU)	ALS	1,4,6
	P235/75R16	(YFL,YFN,YFM)	ALS	4,6
	LT225/75R16	(YHE,YHV,YHP,YHQ)	ALS	2,3,6
	LT245/75R16	(YHH,YBK,YBL)	ALS	2,6
	LT265/75R16	(YGL,YGM)	OOR	1,2,3,4,5
	LT225/75R16	(YHR,YHJ,YHN)	OOR	2,3,6
	LT245/75R16	(YGK,YBN,YBX)	OOR	2,6
	7.50-16LT	(YPF)	HWY	1,2,3,4,5
3.73	P205/75R15	(YCE,YCG)	ALS	1,3,5,6
(GF4)	P195/75R15	(YAR,YAS)	ALS	1,2,3,5,6
	P225/75R15	(YET,YEV,YEU)	ALS	1,5,6
	P235/75R15	(YFL,YFN,YFM)	ALS	1,2,3,4,5
	LT225/75R16	(YHE,YHV,YHQ,YHP)	ALS	2,3,4,6
	LT245/75R16	(YHH,YBK,YBL)	ALS	2,4,6
	7.50-16LT	(YGF)	HWY	2,3,6
	LT245/75R16	(YGK,YBN,YBX)	OOR	2,4,6
	LT265/75R16	(YGL,YGM)	OOR	2,3,6
	LT225/75R16	(YHR,YHS,YHN)	OOR	1,3,4,6
4.10	LT245/75R16	(YHH,YBK,BYL)	ALS	1,2,5,6
(GT5)	LT225/75R16	(YHP,YHQ)	ALS	1,2,3,5,6
	7.50-16LT	(YPF)	HWY	1,2,3,4,5
	LT225/75R16	(YHR)	OOR	2,3,5,6
	LT245/75R16	(YGK,YBN,YBX)	OOR	2,5,6
	LT225/75R16	(YGL,YGM)	OOR	1,2,3,4,5
4.56	LT225/75R16	(YHR)	OOR	1,7
(HC4)	LT225/75R16	(YHP,YHQ)	ALS	2,7
	LT245/75R16	(YHH)	ALS	3,4,5,6
	LT245/75R16	(YGK)	OOR	3,4,5,6
	7.50-16LT	(YPF)	HWY	4,5,6

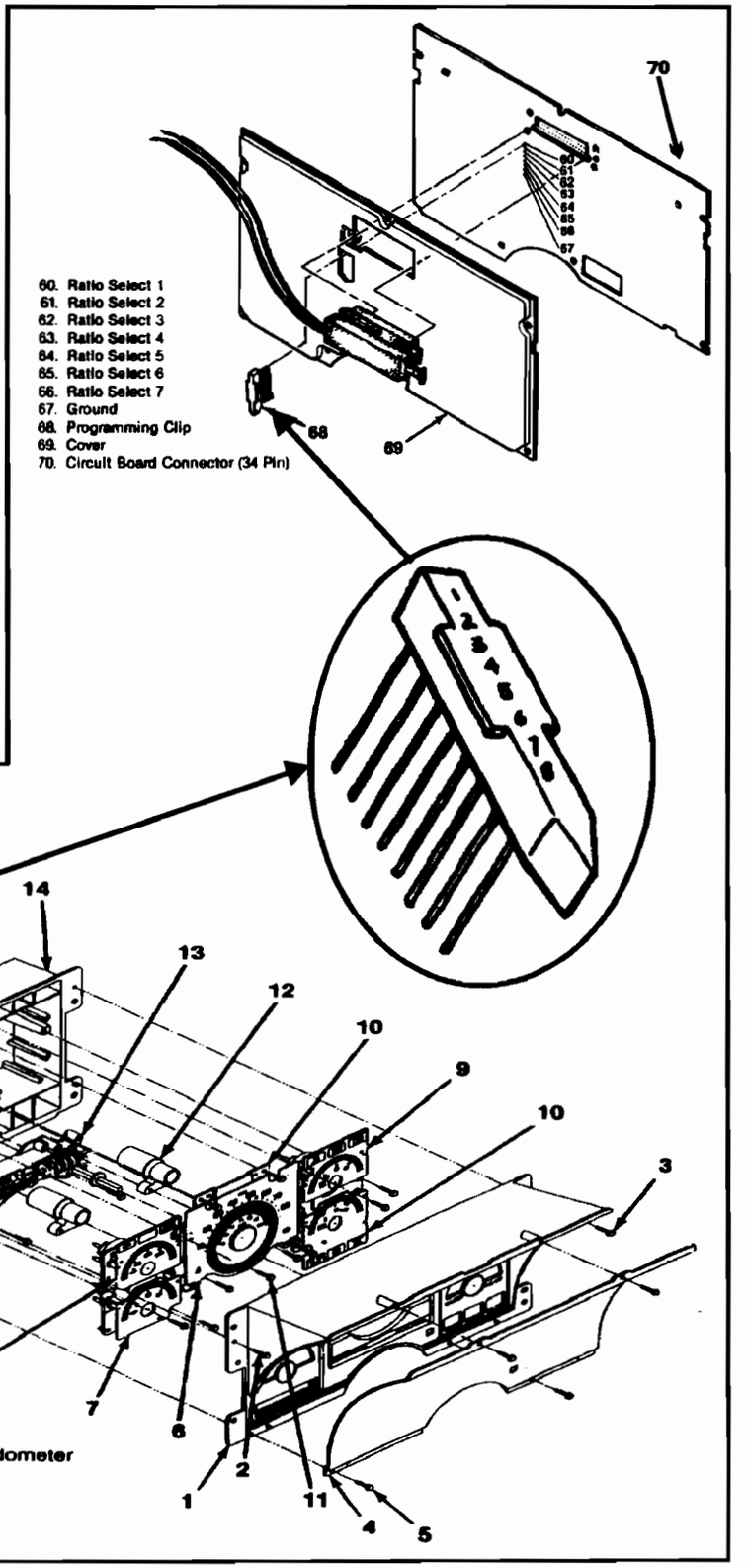


Figure 5

1991 "C/K" TRUCK *ONLY* WITH INTERNAL DRAC WITH 4L80E

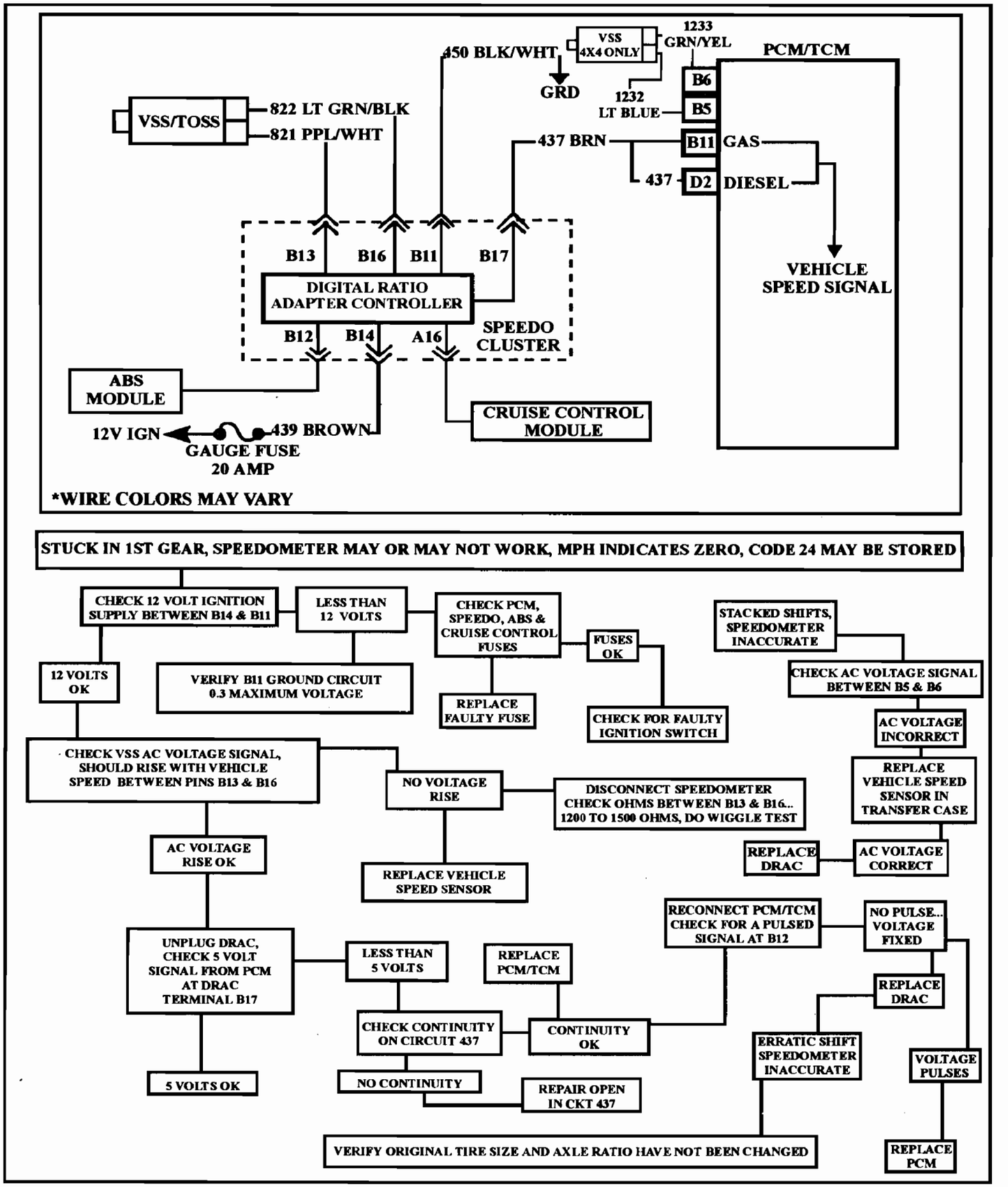
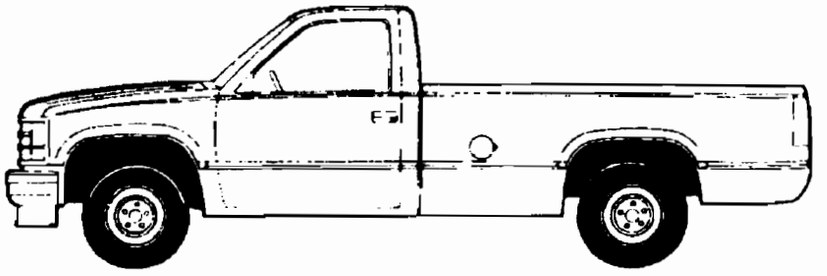


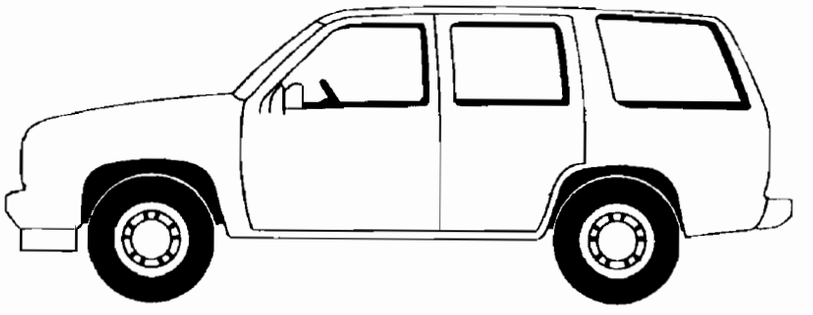
Figure 6

Automatic Transmission Service Group

DRAC LOCATION AND DIAGNOSIS

1992 & LATER "C & K" SERIES TRUCKS NON-OBDII





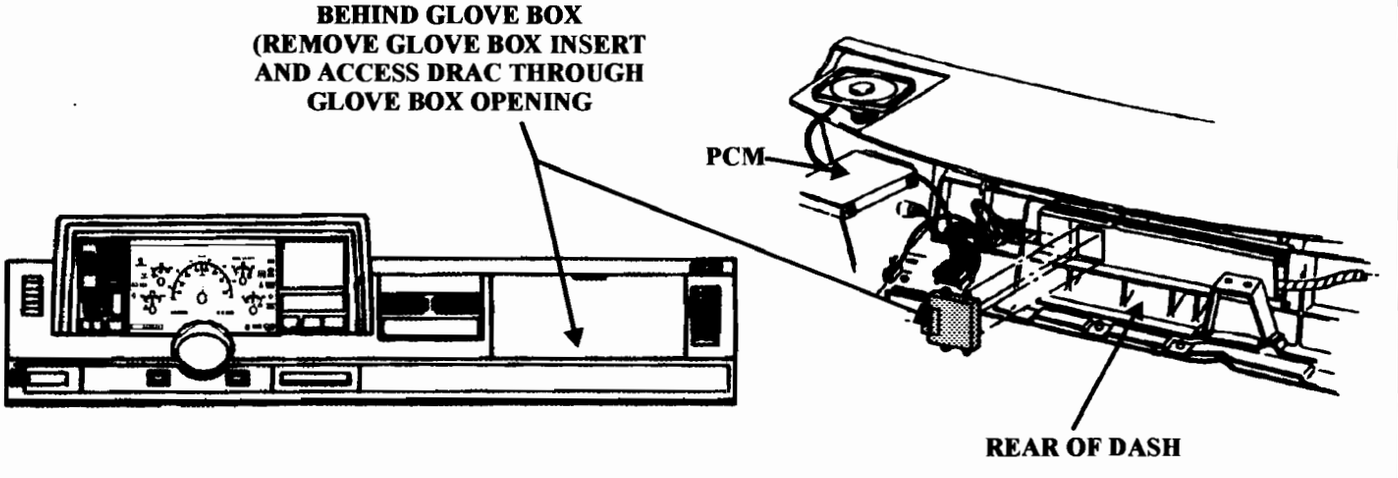
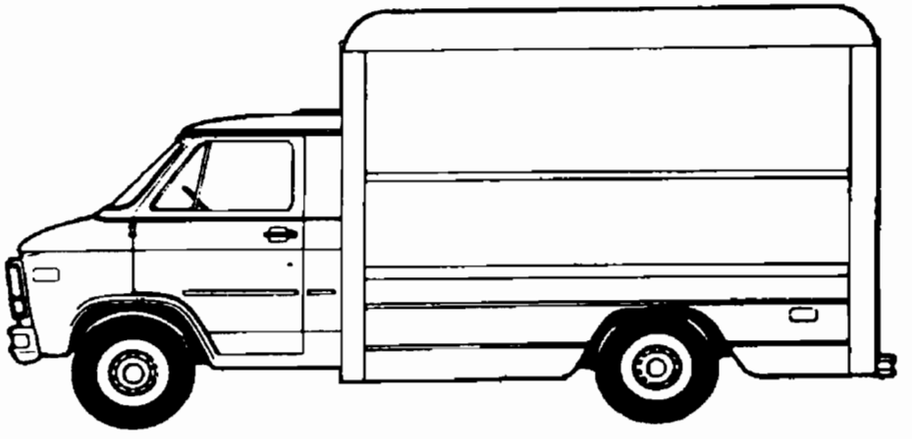
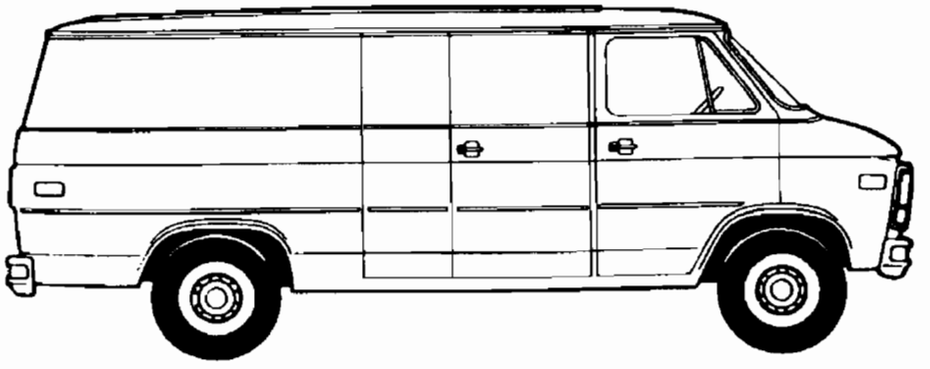


Figure 7

DRAC LOCATION AND DIAGNOSIS

1991 & LATER NON-OBDII "G" SERIES VAN





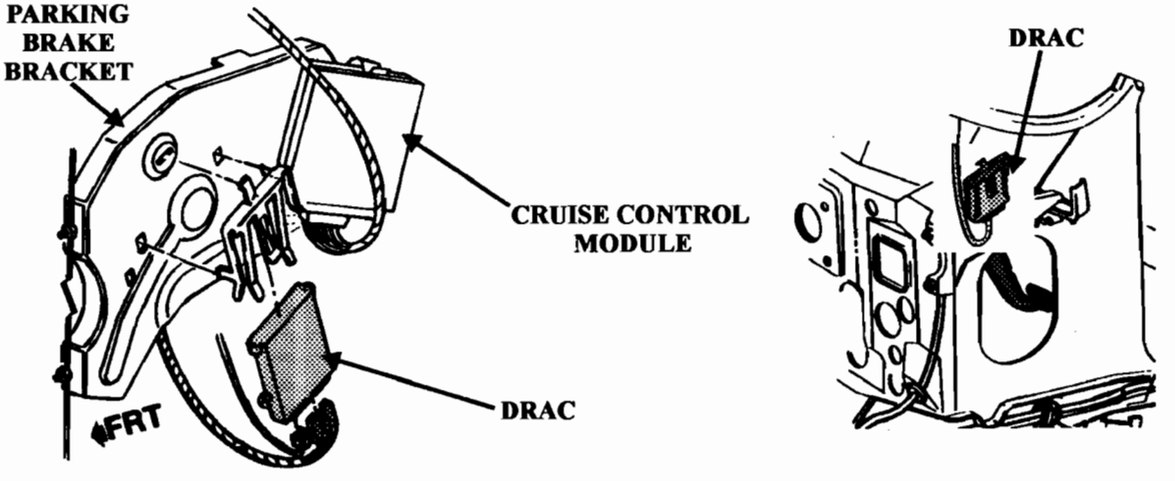


Figure 8

DRAC LOCATION AND DIAGNOSIS

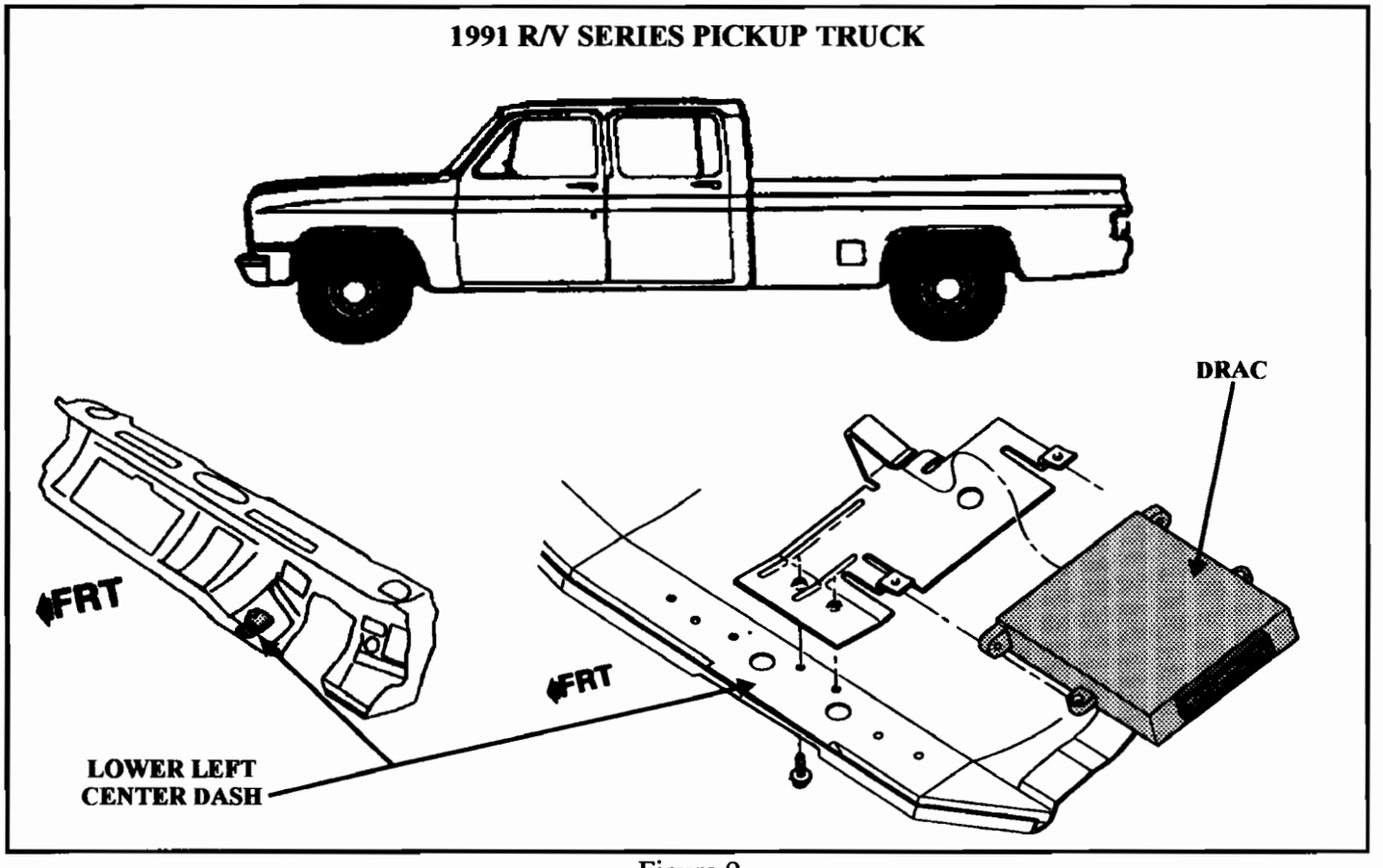


Figure 9

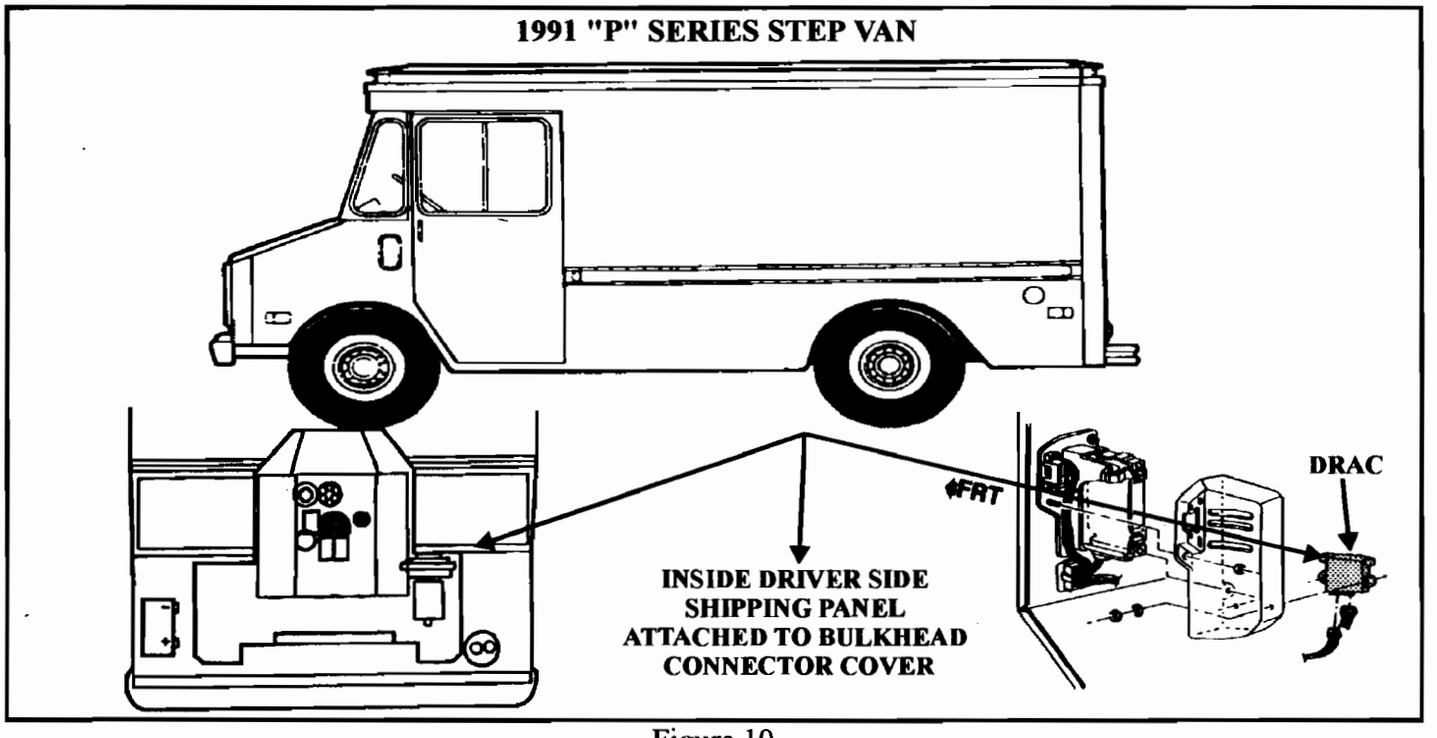


Figure 10

DRAC LOCATION AND DIAGNOSIS

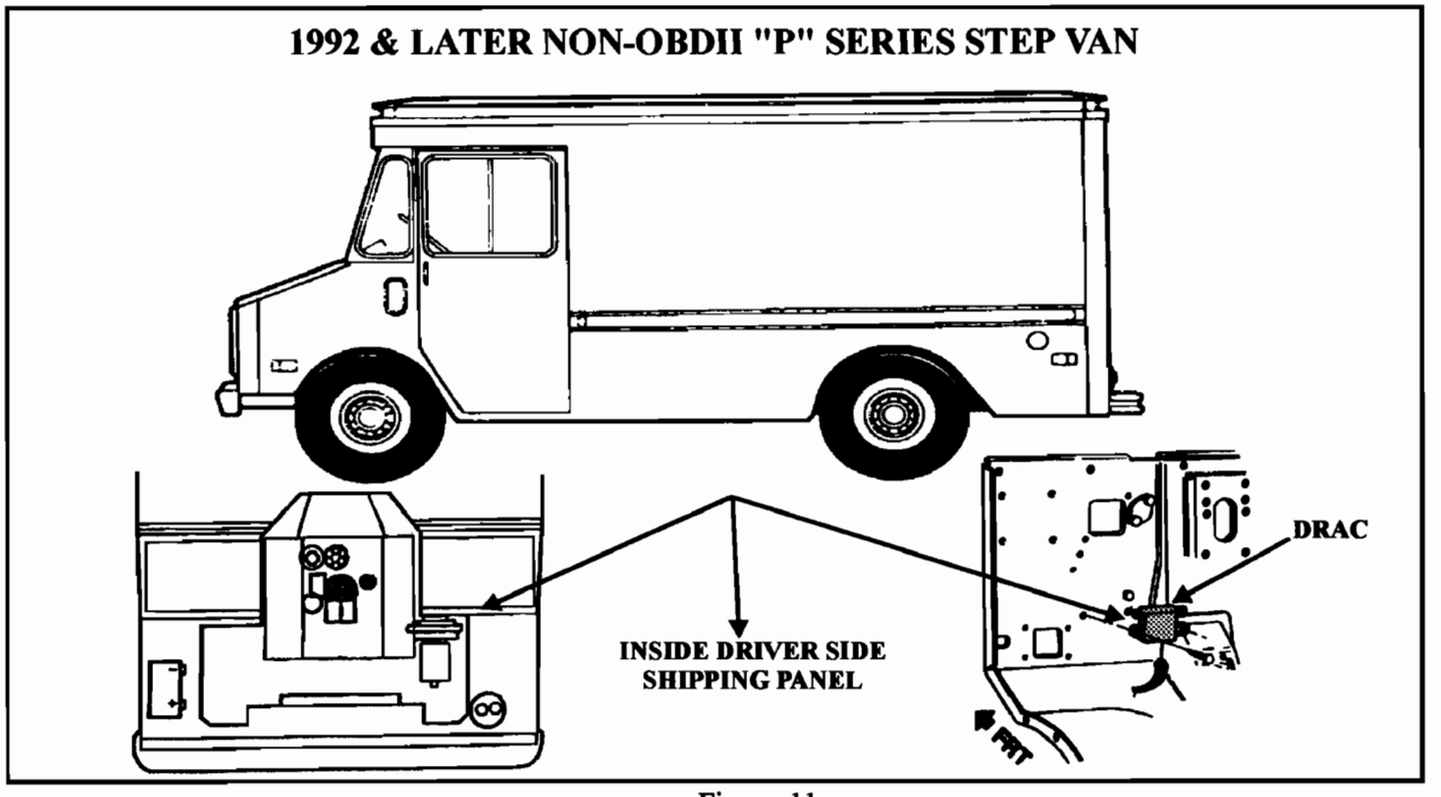


Figure 11

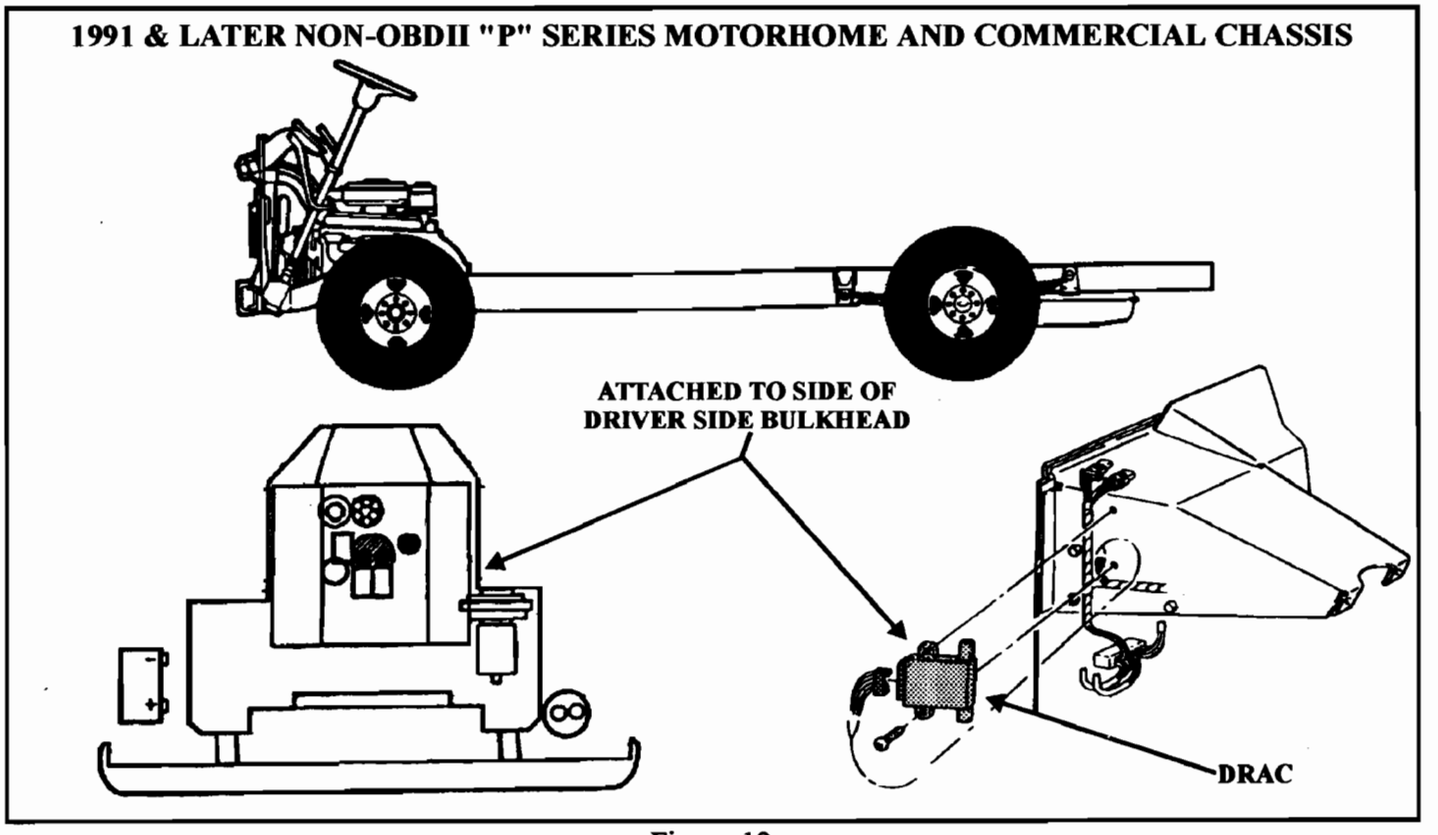
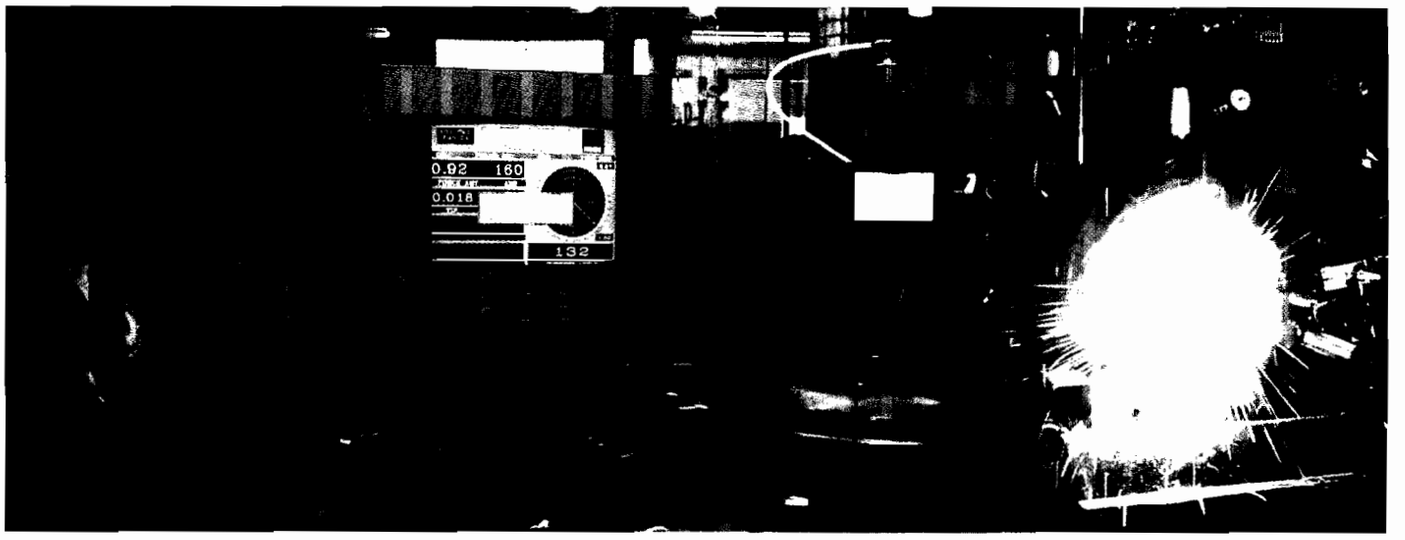


Figure 12



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SLIDE

1991 "R" & 1992 & LATER "C" NON-OBDII 2WD TRUCKS
1991 & LATER "G & P" NON-OBDII VANS WITH EXTERNAL DRAC

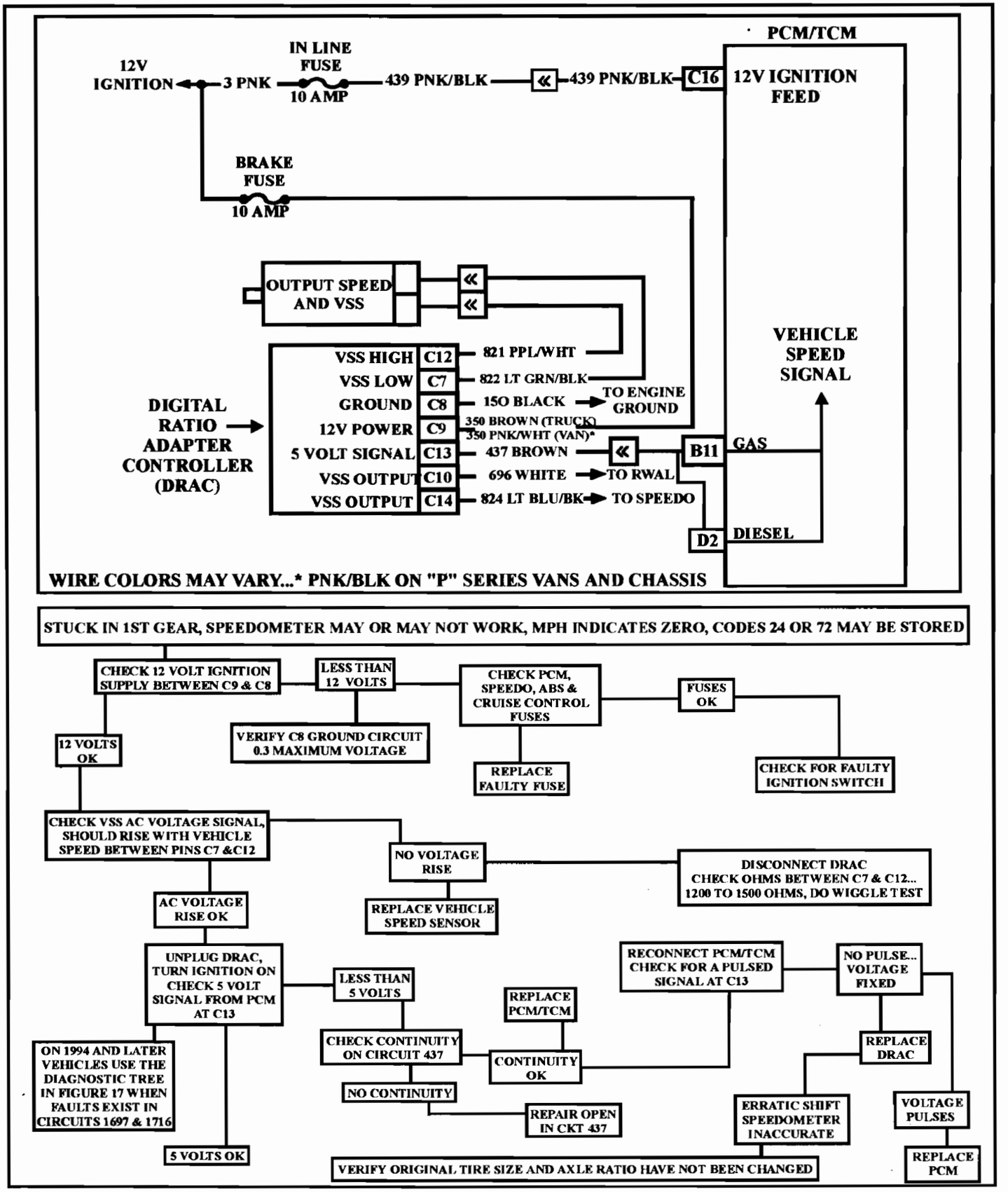
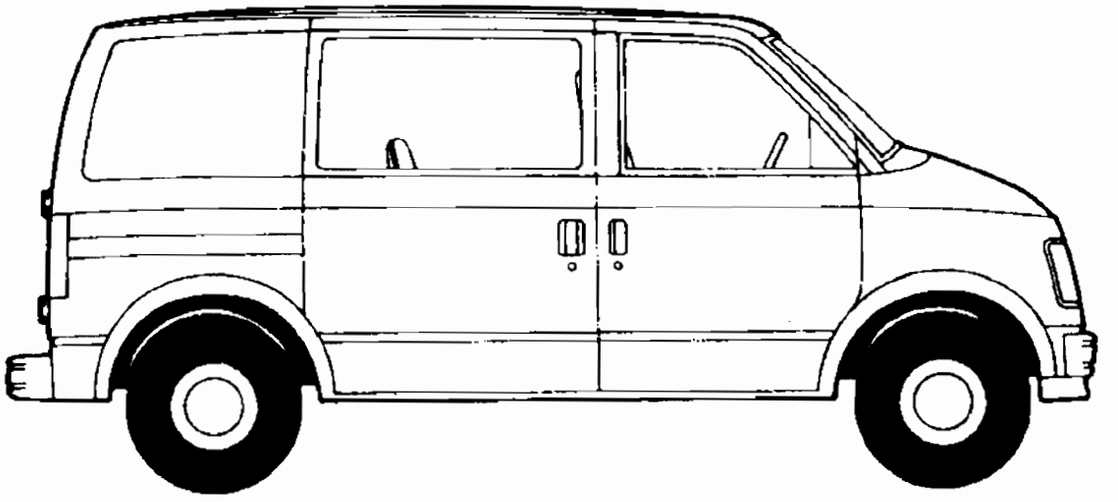
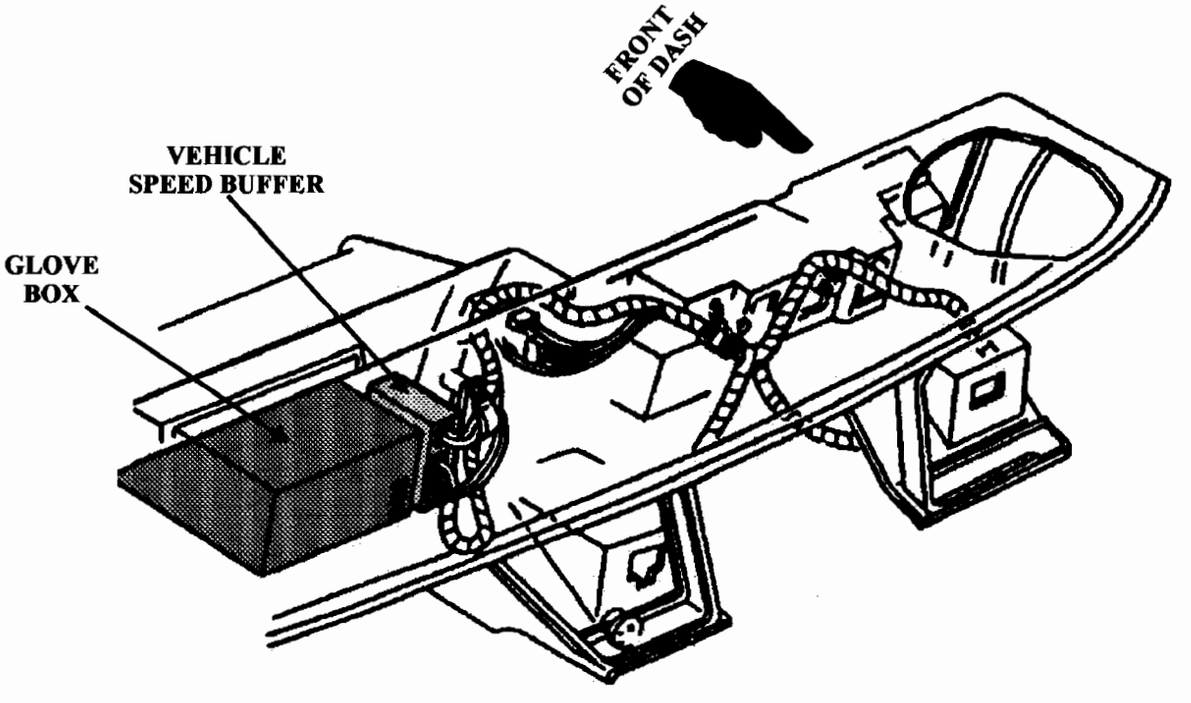


Figure 13

DRAC LOCATION AND DIAGNOSIS

1993-94 "M & L" VANS NON-OBDII



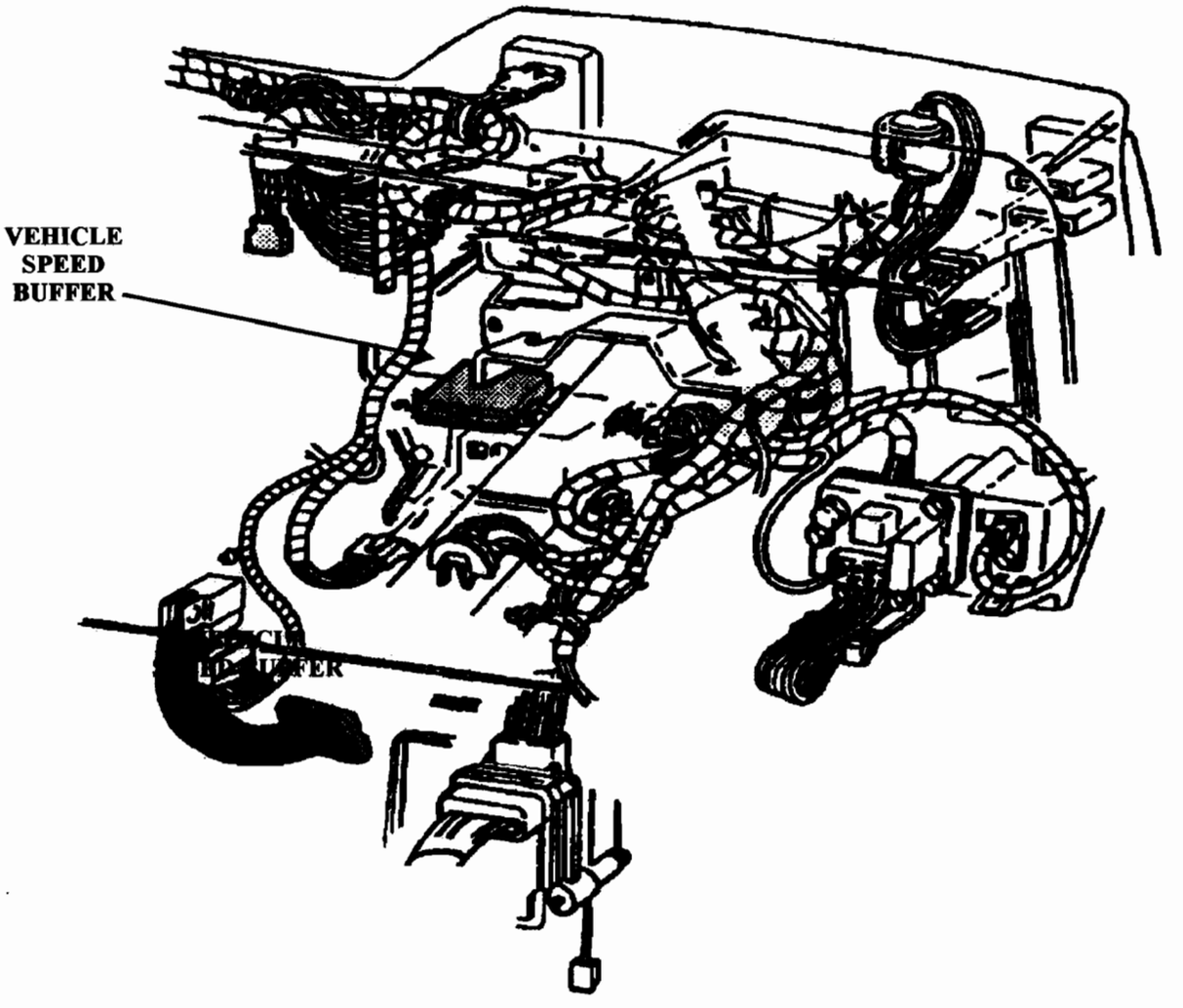


VIEW IS FROM REAR OF DASHBOARD

Figure 14

DRAC LOCATION AND DIAGNOSIS

1995 "M & L" VANS NON-OBDII

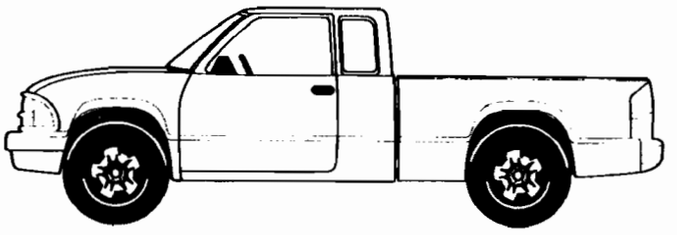


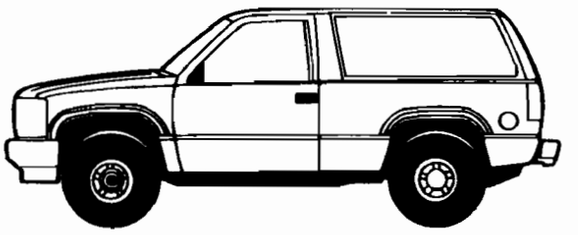
VIEW IS FROM DRIVER'S SIDE REAR OF DASHBOARD

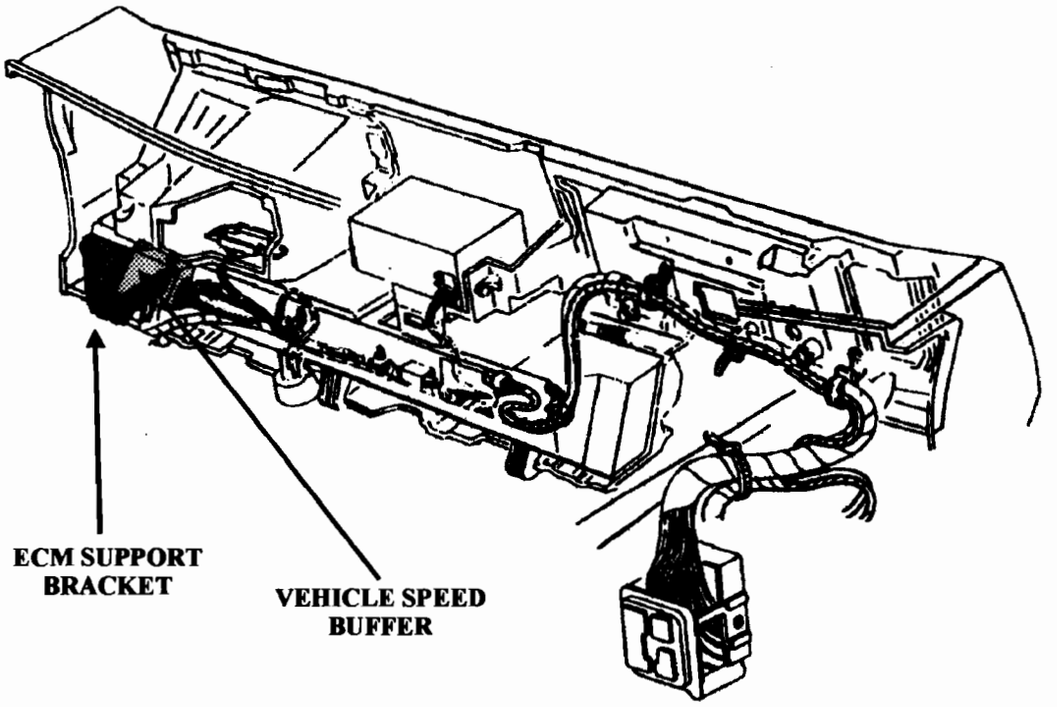
Figure 15

DRAC LOCATION AND DIAGNOSIS

1993 & LATER "S & T" TRUCKS NON-OBDII







VIEW IS FROM REAR OF DASHBOARD

Figure 16

1993 & LATER 2WD "S" TRUCKS NON-OBDII WITH 4L60E
1993 & LATER "M & L" VANS NON OBDII WITH 4L60E

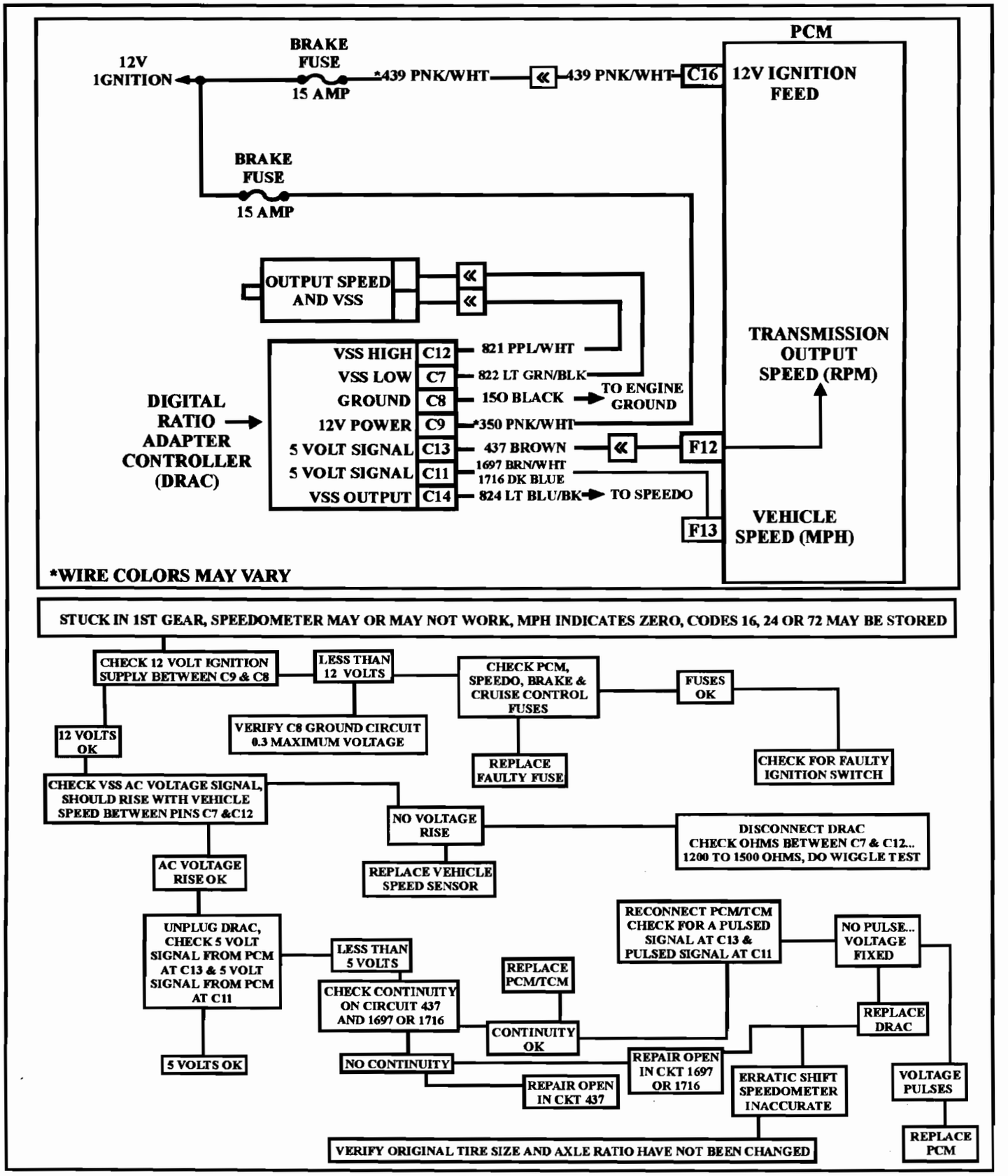
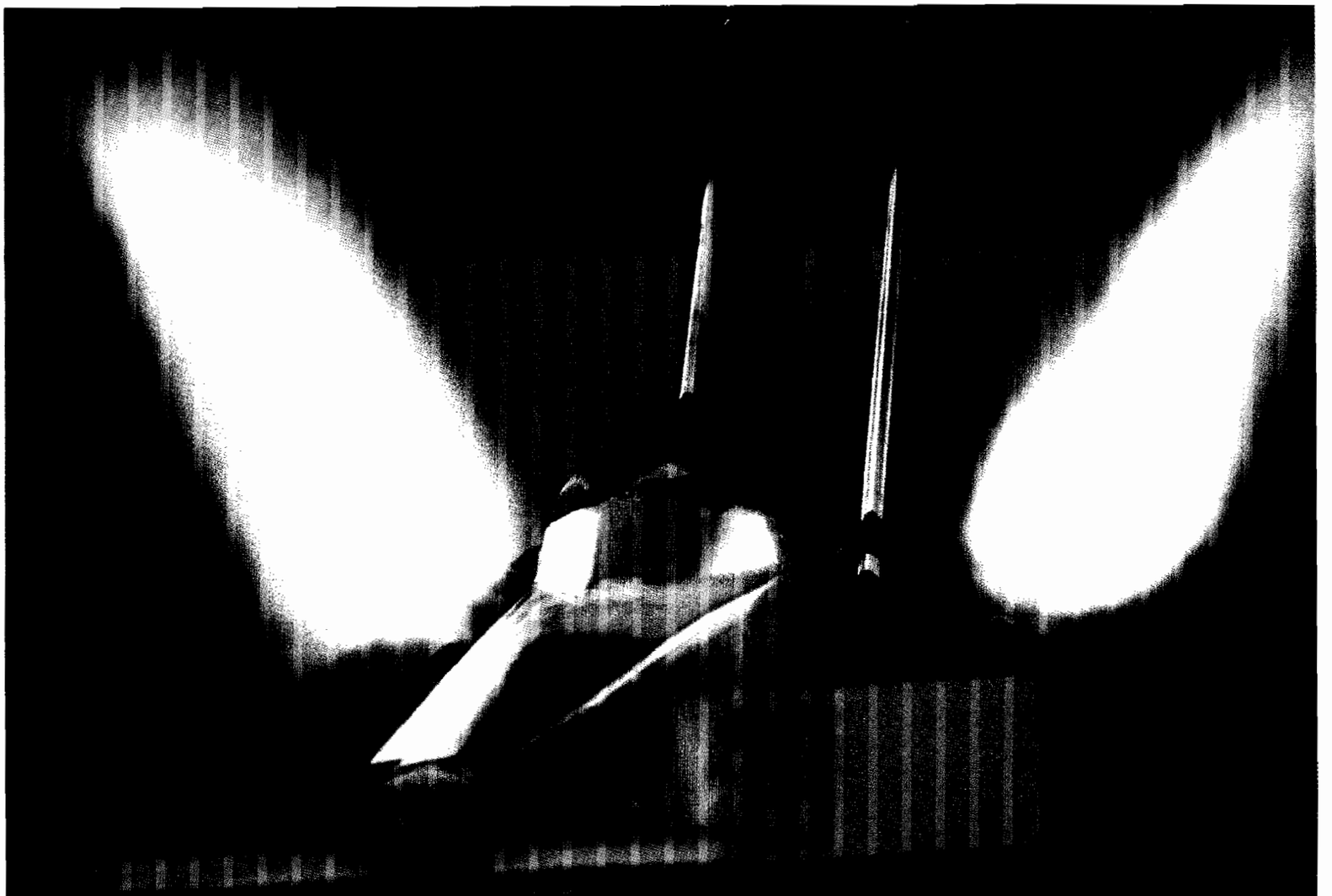


Figure 17



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4 WHEEL DRIVE SECTION

1991-93 4WD "K & V" TRUCKS WITH EXTERNAL DRAC WITH 4L80E

The 1991-93 4x4 vehicles indicated above equipped with the 4L80E transmission, utilize a 4WD system whereby when 4 wheel low is selected, the gear reduction is seen by the computer by comparing output shaft speed to prop shaft speed via the VSS in the transfer case and the output shaft speed sensor. At this time the computer switches strategy to allow for the gear reduction in 4 wheel low so that shift timing and speedometer operation is accurate. Otherwise it is the Transmission Output shaft Speed Sensor that upshifts the transmission, it is the VSS in the transfer case that calibrates shift timing and speedometer accuracy in 4 wheel low only, as seen in figure 18.
The diagnostics for this type of system require some additional diagnostic steps due to the TOSS being the speed sensor that upshifts the transmission and is "HARD WIRED" to the PCM/TCM and is internally buffered by the PCM/TCM and the VSS in the transfer case which is wired to the Drac and is responsible for the gear reduction calibration to compensate for shift timing and speedometer accuracy that is necessary when 4 wheel low is selected. The schematic and diagnostic tree for this system can be found in figure 19.

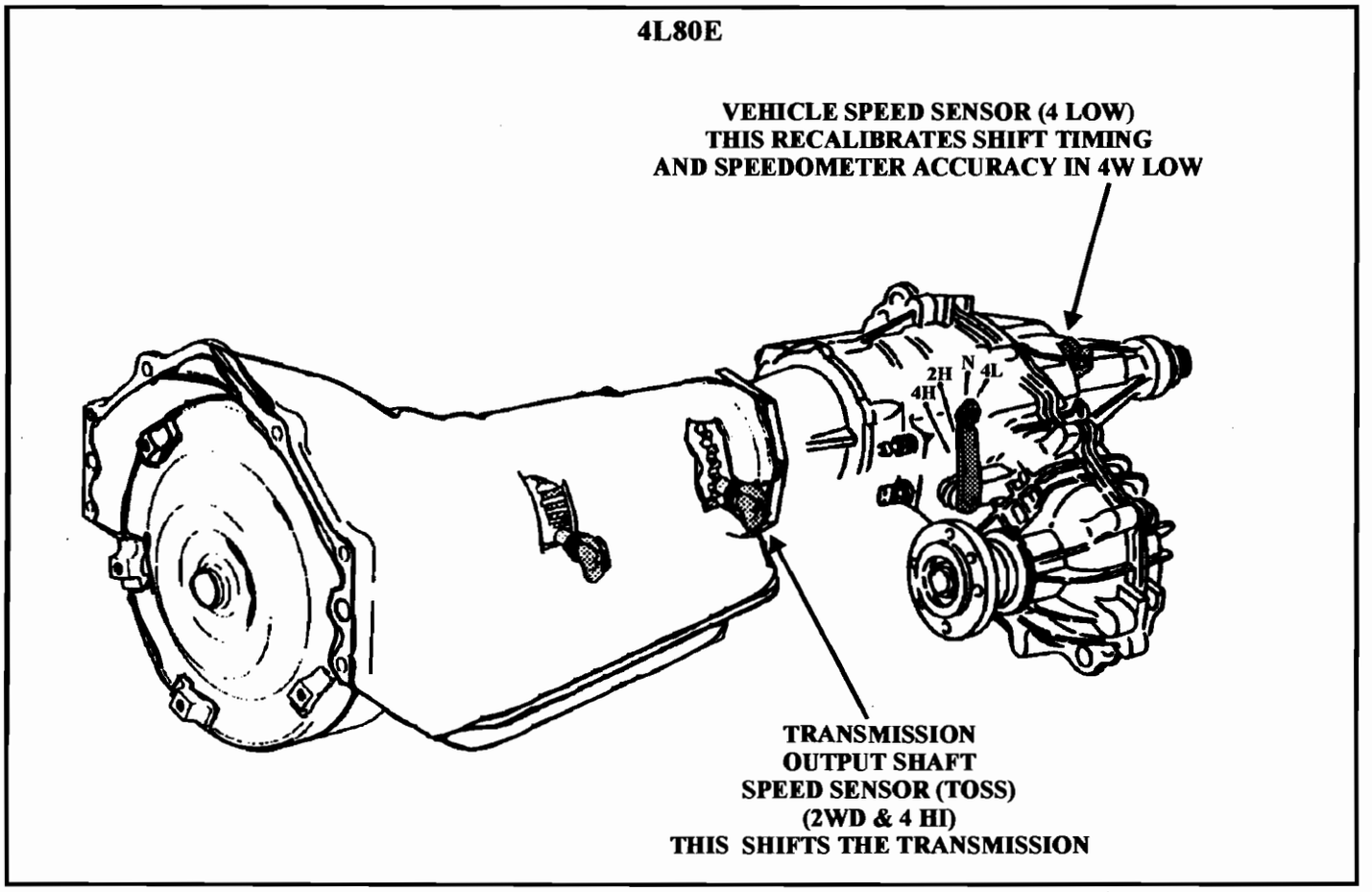
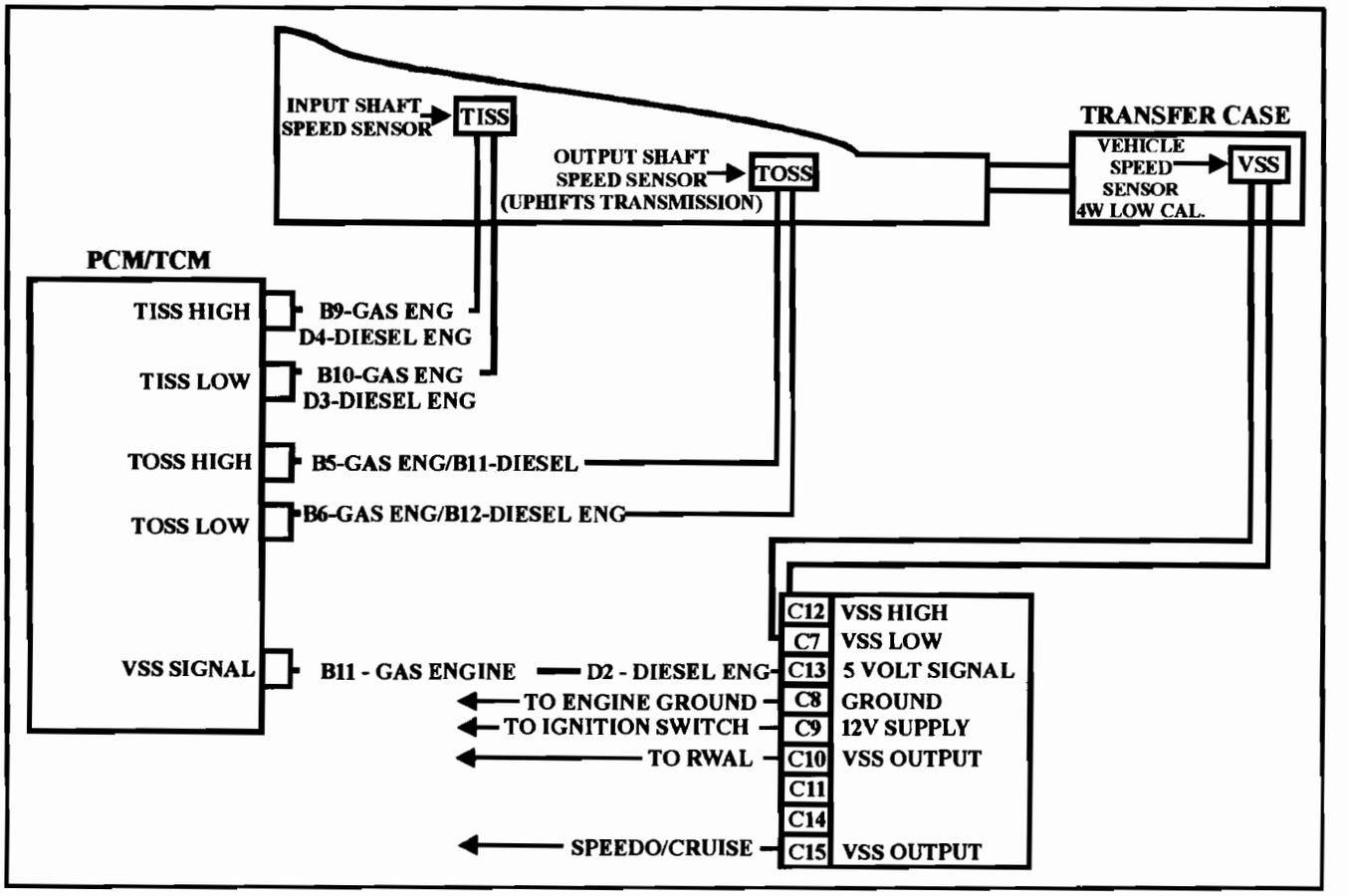


Figure 18

1991-93 4WD "K & V" TRUCKS WITH EXTERNAL DRAC WITH 4L80E



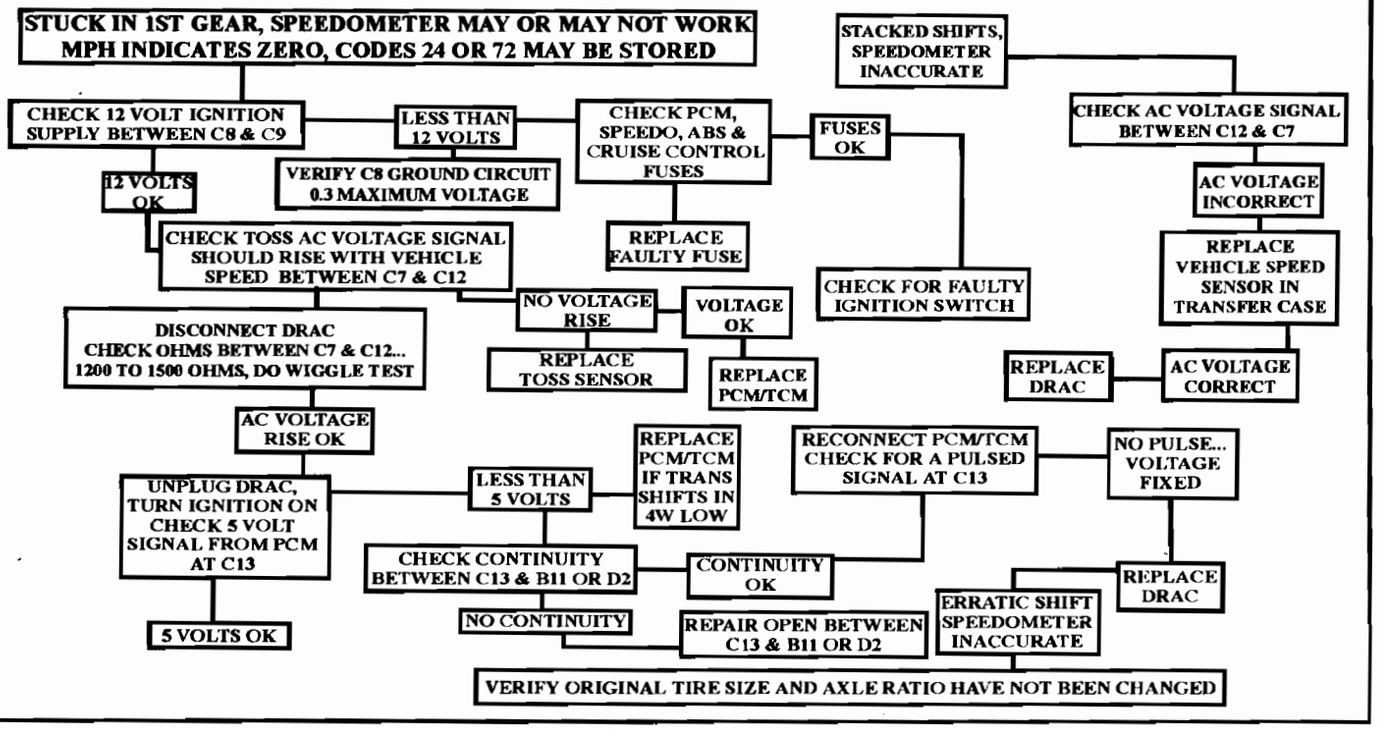


Figure 19

4 WHEEL DRIVE SECTION

1994 & LATER 4WD "K" TRUCKS NON-OBDII WITH 4L80E
1993 & LATER 4WD "K" TRUCKS NON-OBDII WITH 4L60E

The1994 & later 4x4 vehicles indicated above with 4L80E transmission and the 1993 and later 4x4 vehicles indicated above with 4L60E transmission that are non-OBDII, utilize a ***4WD Low Switch,*** located in the transfer case to signal the computer that 4W LOW has been selected. It does this by supplying 12V to the PCM when in 2WD or 4W HI modes. When 4W LOW is selected the 4W LOW switch grounds it's 12V signal changing it to ZERO VOLTS. The computer, recognizing this voltage difference, then changes its strategy which adjusts for correct shift timing and speedometer operation in order to compensate for the gear reduction that occurs when 4W Low is selected.

Vehicles equipped with the 4L80E transmission may have a dummy speed sensor located in the output speed sensor location, there is no wiring for this speed sensor, it is there only to plug the hole!

Later models will have a plug in this location, the TOSS function on 1994 and later vehicles with the 4L80E transmission was eliminated, the VSS in the transfer case along with the 4W Low Switch takes over the functions of calibrating vehicle speed signal input, shift timing and speedometer operation and accuracy in all transfer case modes as shown in figure 20.

1993 and later vehicles equipped with the 4L60E transmission will have the VSS in the transfer case ONLY and the 4W Low Switch located there as well. Circuit diagnosis for this type of system is illustrated in figure 21.

NOTE: ***Just because the vehicle you are working on is a 2WD model and it is stack shifting, it is wired for a 4 Wheel Low Switch which could be grounded somewhere causing this problem. Be sure to check the status of the 4W Low Switch parameter on your scan tool, if it says "YES", look for a grounded circuit!***

The VSS system diagnostics for 1993 and later 4WD NON-OBDII "T" trucks become more involved and vary depending on whether it is equipped with a mechanically shifted transfer case or an electronically shifted transfer case.

The schematic and diagnostic tree for the mechanically shifted transfer case model can be found in figure 22, and, the schematic and diagnostic tree for the electronically shifted transfer case model can be found in figure 23.

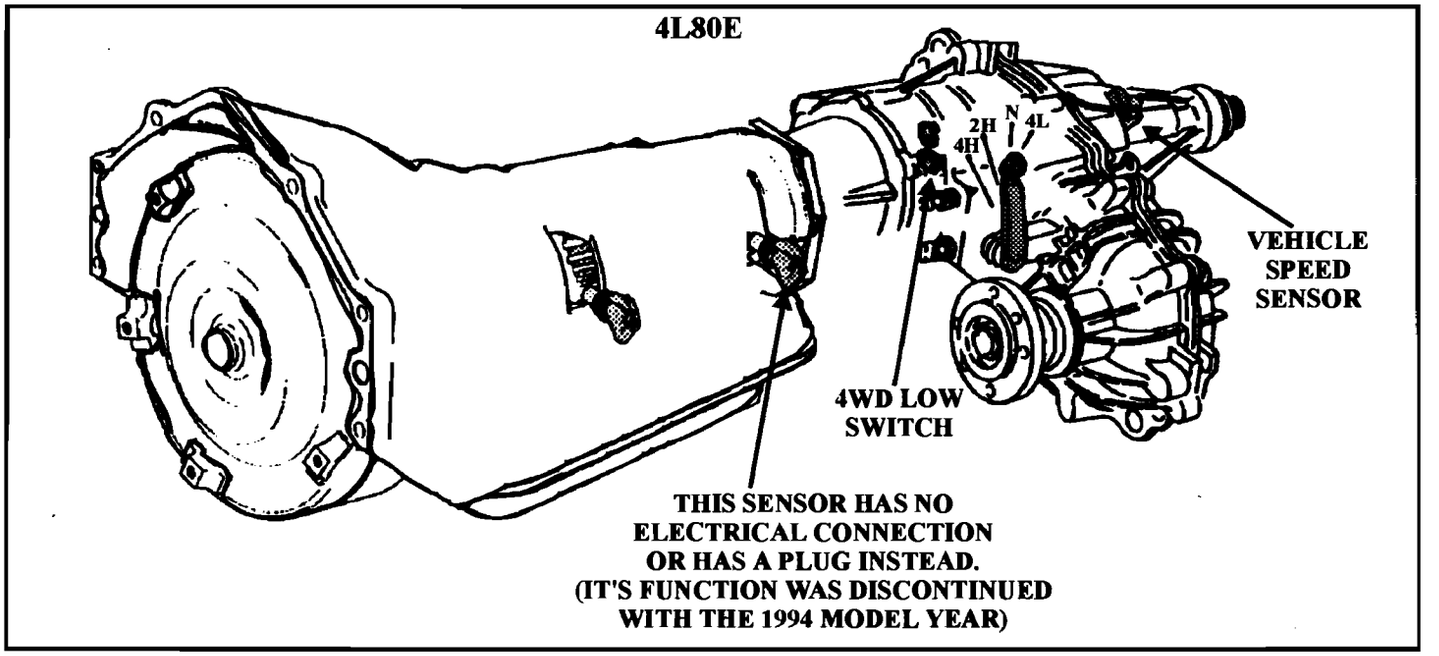


Figure 20

SLIDE

1994 & LATER 4WD "K" TRUCKS NON-OBDII WITH 4L80E
1993 & LATER 4WD "K" TRUCKS NON-OBDII WITH 4L60E

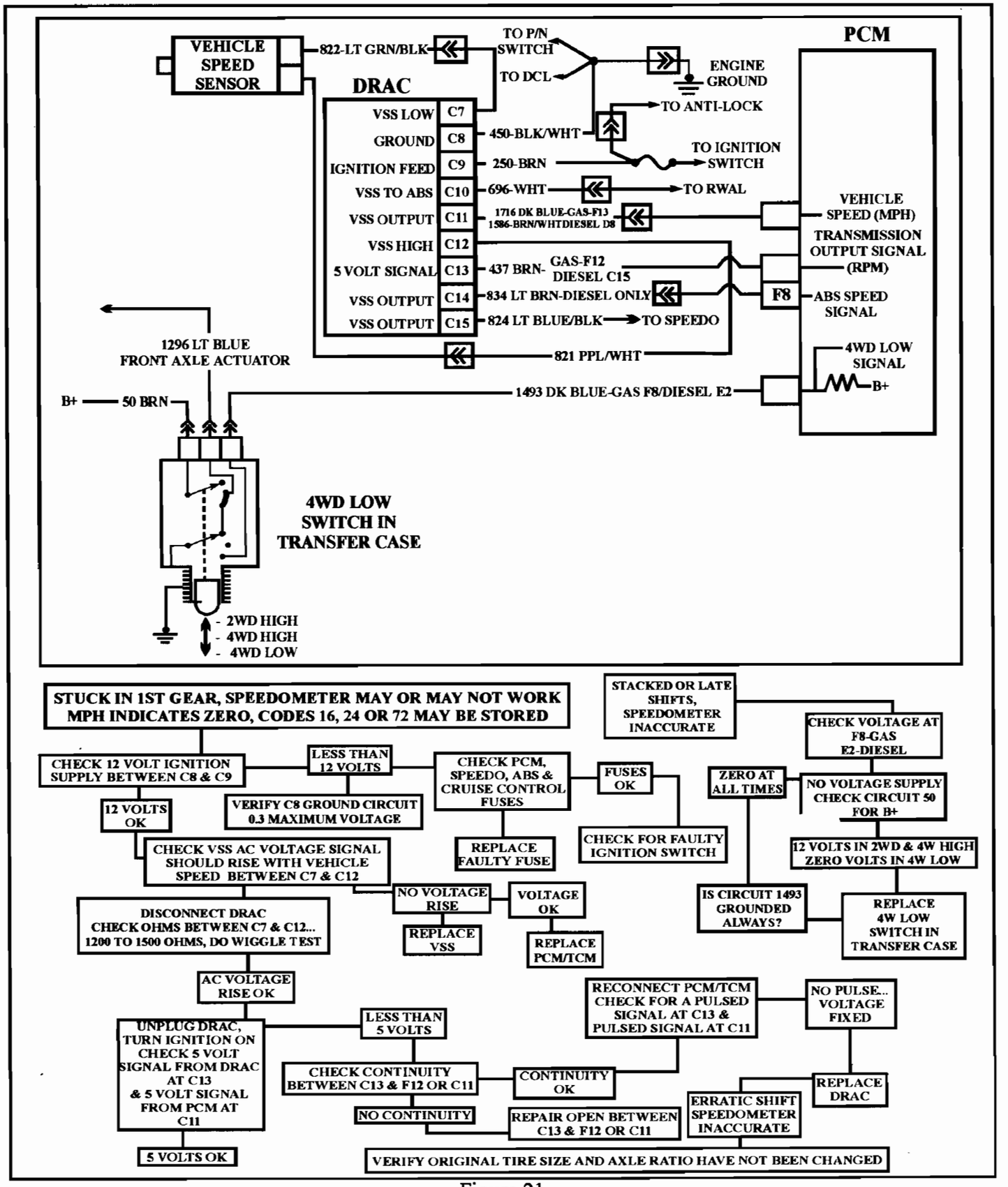


Figure 21

1993 & LATER 4WD "T" TRUCKS NON-OBDII WITH MECHANICAL SHIFT TRANSFER CASE

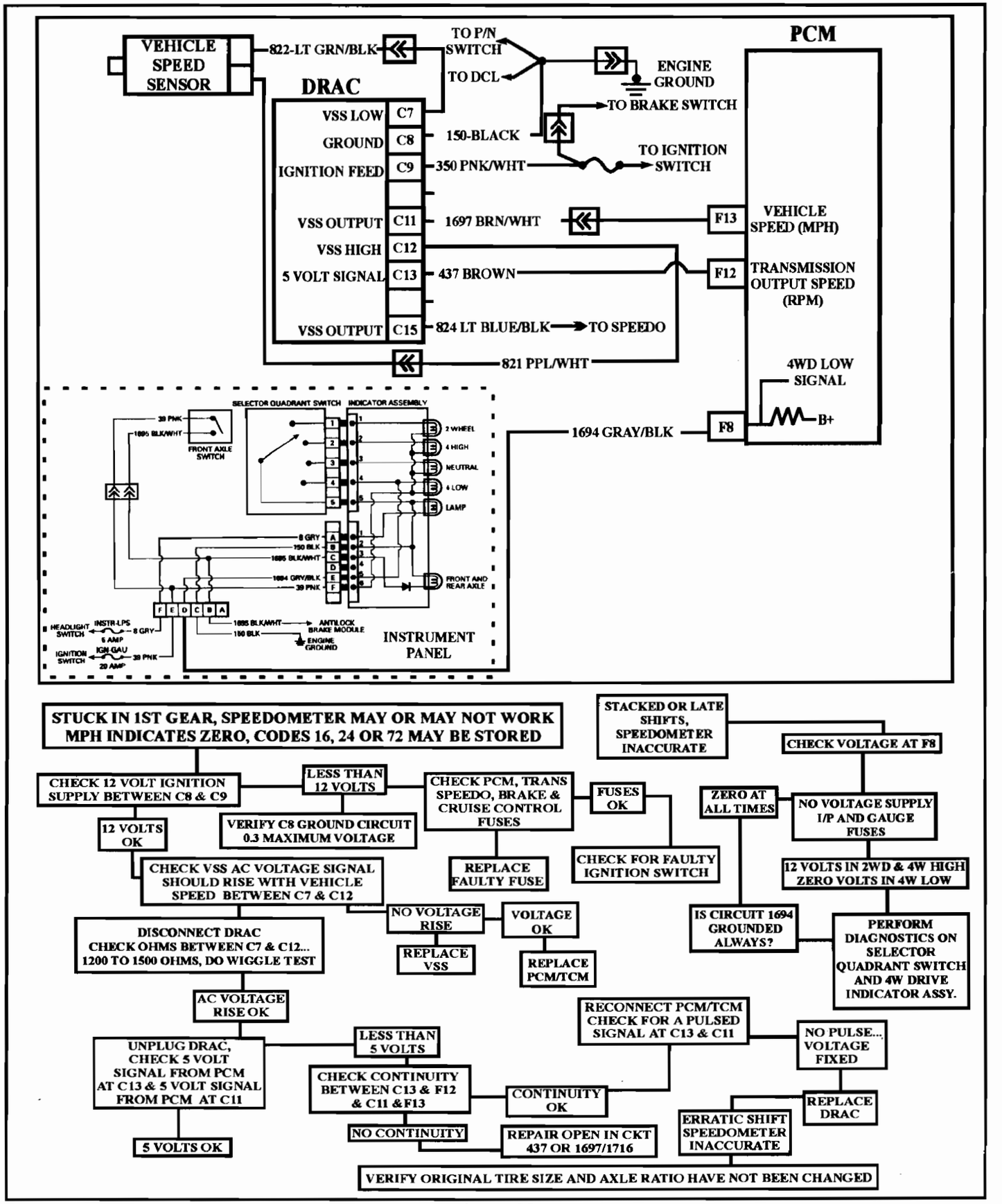


Figure 22

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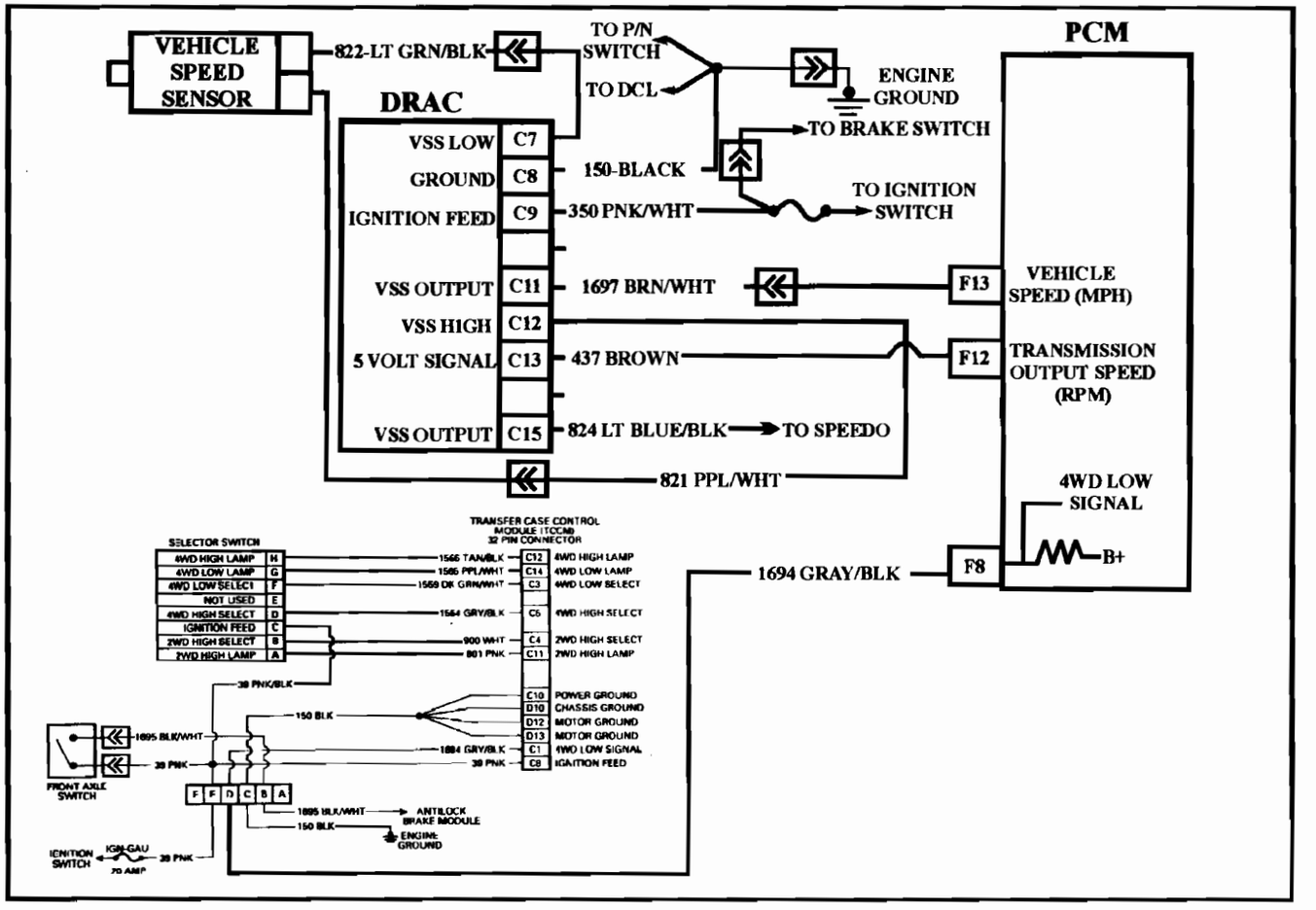
1993 & LATER 4WD "T" TRUCKS NON-OBDII WITH ELECTRIC SHIFT TRANSFER CASE



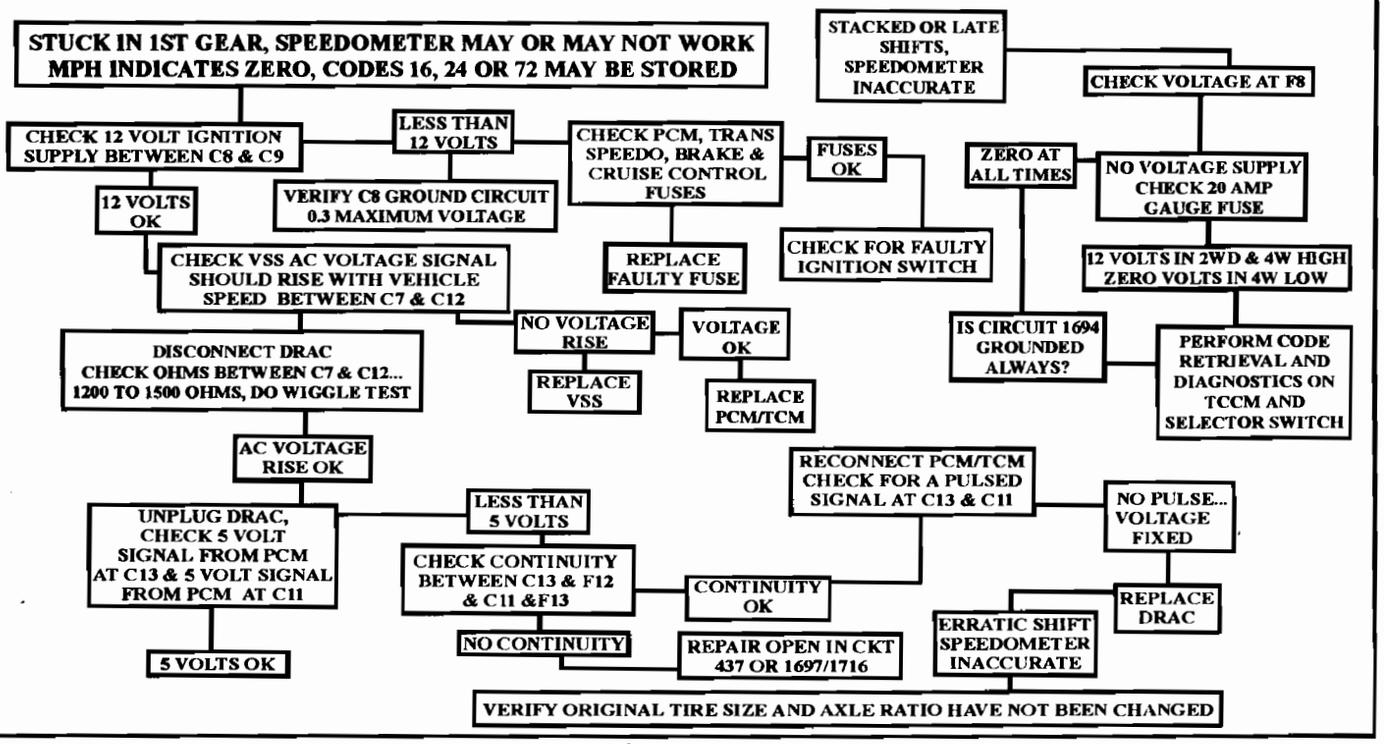


Figure 23

Automatic Transmission Service Group

ALLISON 1000/2000 SERIES
PRELIMINARY INFORMATION

Allison Transmission has now developed a family of two new automatic transmissions, refered to as the 1000 Series and the 2000 Series, for light duty (8600-19850 GVW) and medium duty (19850-30000 GVW) commercial trucks. These two new transmissions are scheduled to start appearing in General Motors vehicles for the 2000 model year and come in two wheel drive and four wheel drive configurations, as shown in Figure 1. Both the 1000 and 2000 Series are available with an optional PTO gear. The PTO gear is driven off of the torque converter, and thus is turbine driven. Engine driven performance can be obtained by engaging the torque converter clutch during neutral PTO operation. PTO mounting provisions are in the form of a standard SAE 6 bolt pad on each side of the transmissions main case, as shown in Figure 1.

The 1000 and 2000 Series transmissions both have helical cut planetary gear systems to minimize noise concerns and come in two different gear ratio configurations. The 1000 Series uses closer steps to improve the shift quality that we now expect from an automatic transmission. The 2000 Series uses wider steps to accommodate the greater vehicle weights associated with the 2000 Series. The gear ratios for both of the new units are shown in Figure 2.

The 1000 and 2000 Series transmissions have a Park position, Reverse, Neutral and five forward speeds with 5th gear being overdrive, and are completely electronic shift controlled. Notice in Figure 2 that the standard General Motors case connector has been utilized, and the Park/Neutral switch is exactly the same switch used currently on the THM 4L60-E transmission. Two different bottom pan configurations are also provided to make these units even more versitile, and the dimensions have been provided in Figure 3. The 1000 and 2000 Series transmissions utilize five clutch packs (No Bands-No Freewheels) to obtain the five forward gears and reverse. We have provided you with a cut-away illustration to identify the clutch packs and their location in the unit, and a clutch application and solenoid chart to assist you in diagnosis as shown in Figure 4.

The illustration in Figure 5 identifies the six solenoids on the valve body that are used to control the shifting from gear to gear, shift feel as it is clutch to clutch, and the converter clutch apply and release. A solenoid resistance chart and terminal identification has been provided in Figure 6, and a wiring schematic of the internal wire harness and colors is shown in Figure 7.

Both of the new units also utilize the familiar GM Pressure Switch Assembly with the normally open and normally closed switches, and temperature sensor. We have provided you with terminal identification and function in Figure 8. Figure 9 illustrates the bottom side showing switch location and whether they are "Normally Open" or "Normally Closed". The Pressure Switch Assembly bolts to the main valve body as shown in Figure 10.

Air pressure test passages have been provided for you in Figure 11, and Figures 12 thru 14 will show you retainer locations, and the only screen in the valve body. Notice that there are not any checkballs.

We should have a manual available soon.

ALLISON 1000/2000 SERIES TRANSMISSION

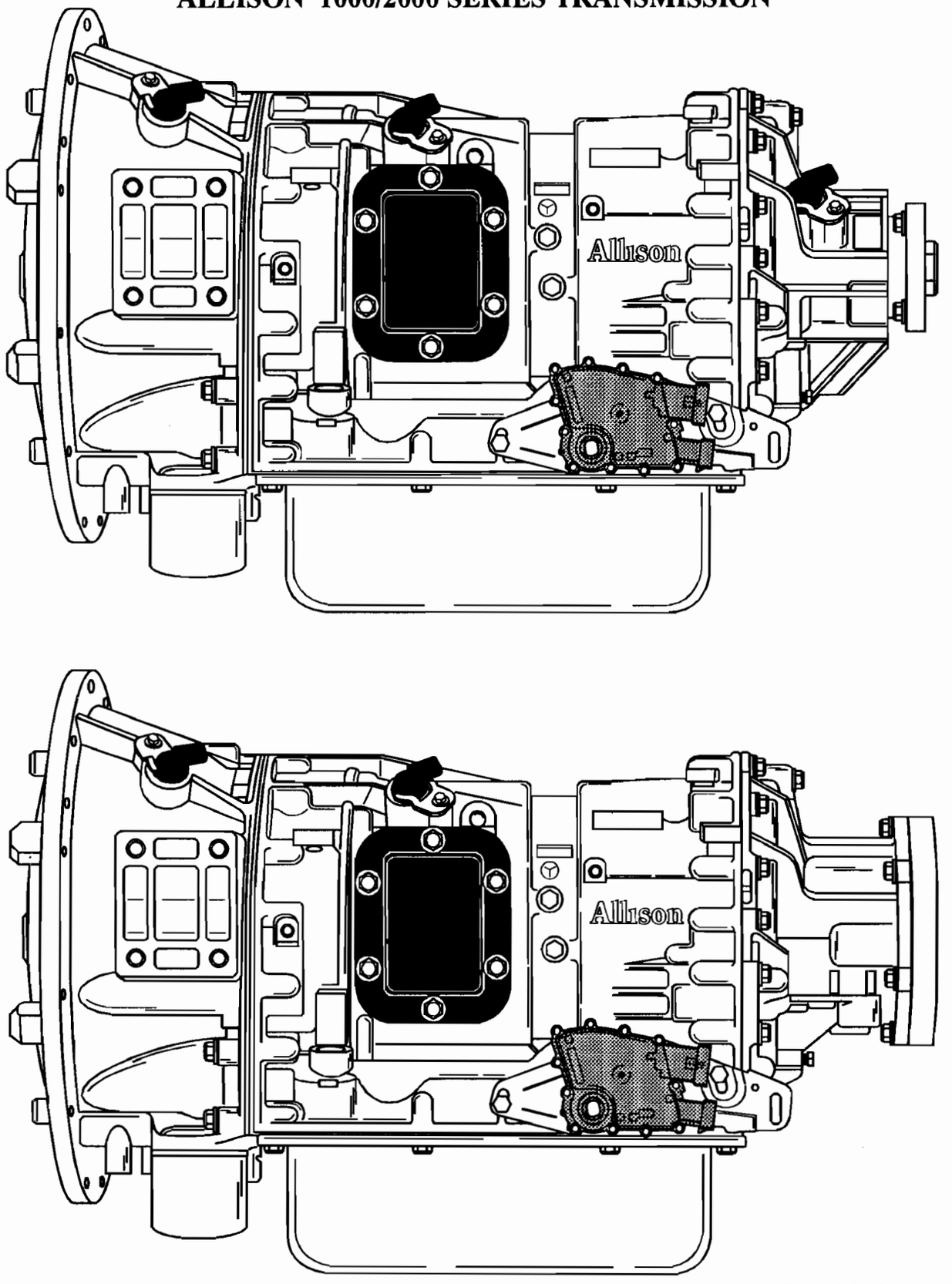


Figure 1

GEAR	*1000 Series Ratios*	*2000 Series Ratios*
First	*3.10*	*3.51*
Second	*1.81*	*1.90*
Third	*1.41*	*1.44*
Fourth	*1.00*	*1.00*
Fifth	*0.71*	*0.74*
Reverse	*4.49*	*5.09*

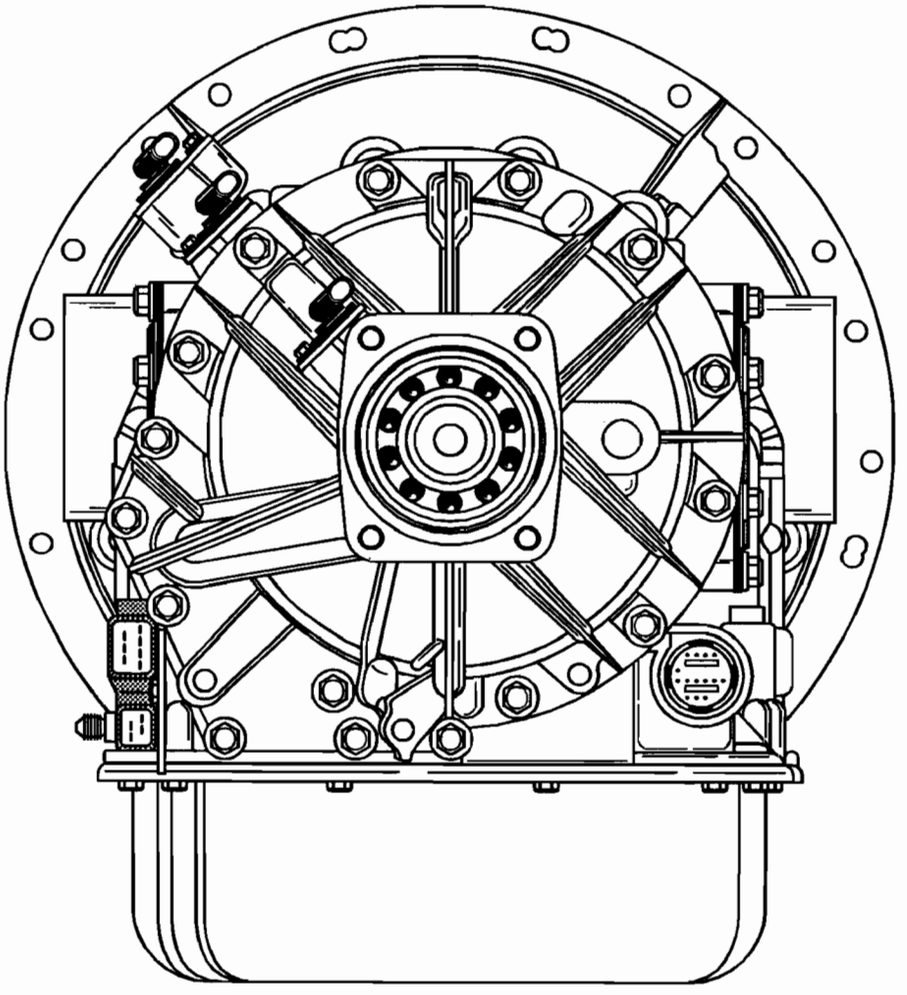


Figure 2

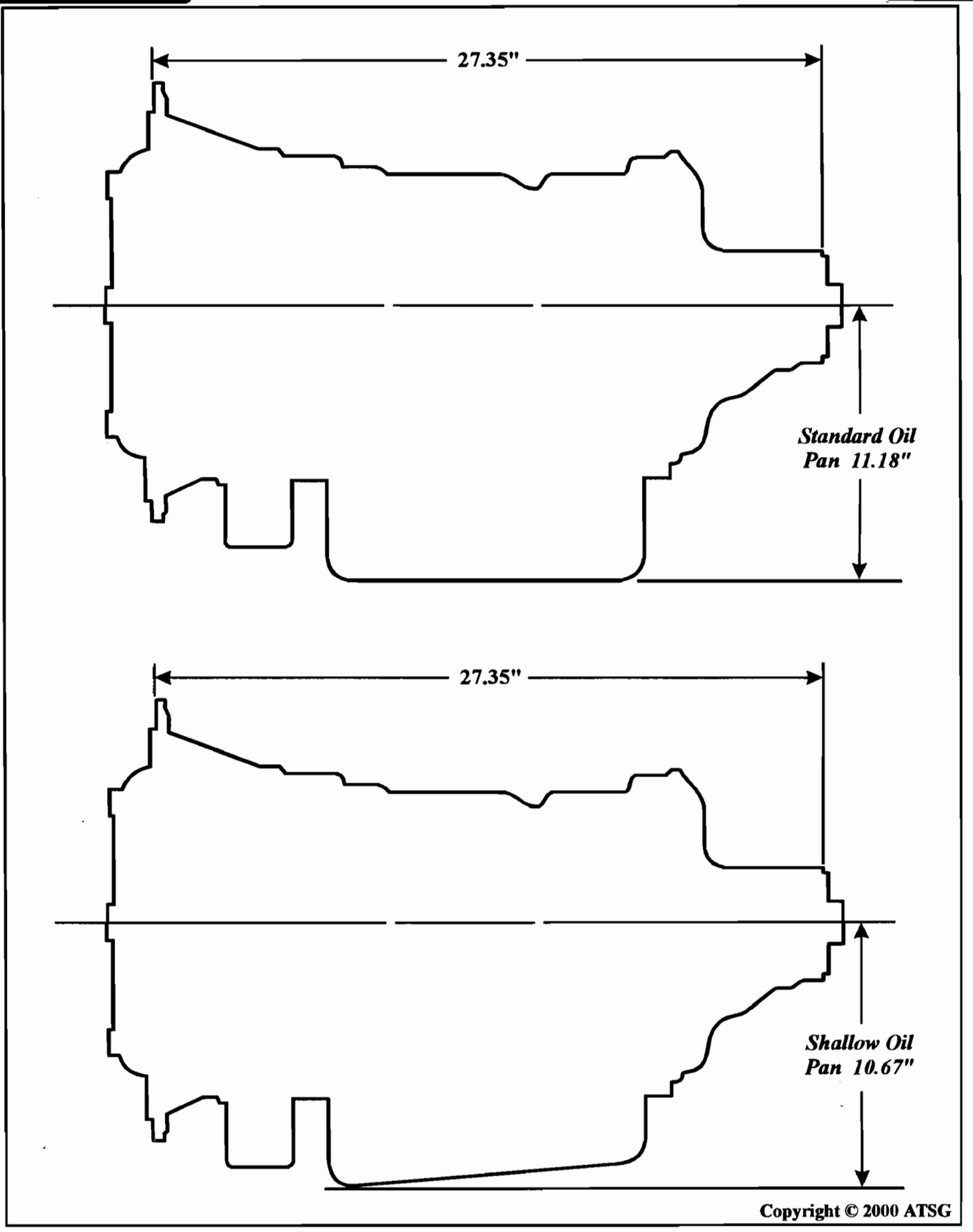

27.35"
Standard Oil Pan 11.18"
27.35"
Shallow Oil Pan 10.67"
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Figure 3

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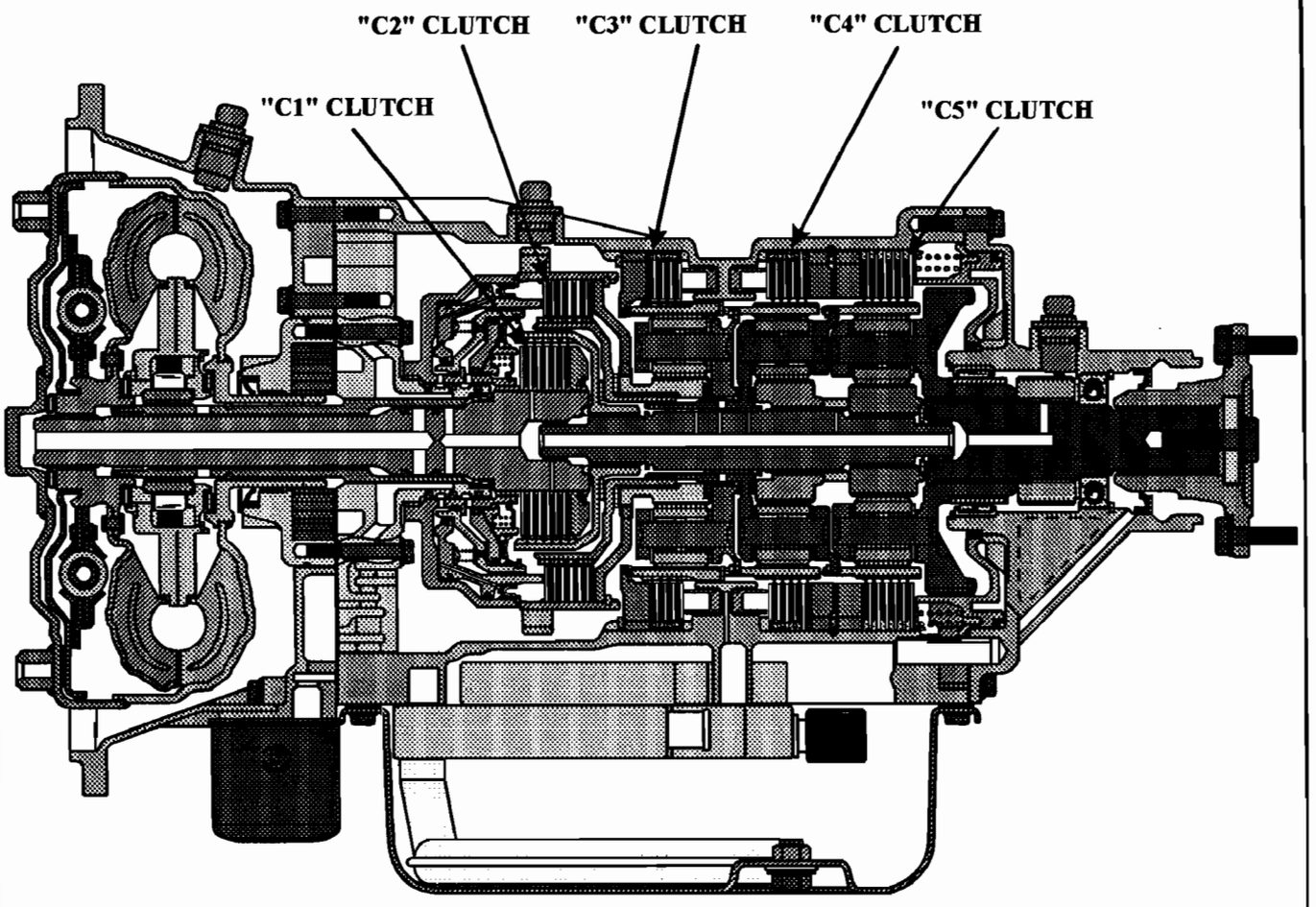
ALLISON 1000/2000 SERIES TRANSMISSION



Range	C1 Clut	C2 Clut	C3 Clut	C4 Clut	C5 Clut	Sol "A"	Sol "B"	Sol "C"	Sol "D"	Sol "E"	Sol "F"	Ratios 1000	Ratios 2000
Park					*ON*	**	**	*X*	*X*	*X*			
Reverse			*ON*		*ON*	**	**		*X*	*X*		*4.49*	*5.09*
Neutral					*ON*	**	**	*X*	*X*	*X*			
OD-1st	*ON*				*ON*	**	**		*X*			*3.10*	*3.51*
OD-2nd	*ON*			*ON*		**	**				*	*1.81*	*1.90*
OD-3rd	*ON*		*ON*			**	**	*X*			*	*1.41*	*1.44*
OD-4th	*ON*	*ON*				**	**	*X*		*X*	*	*1.00*	*1.00*
OD-5th		*ON*	*ON*			**	**			*X*	*	*0.71*	*0.74*

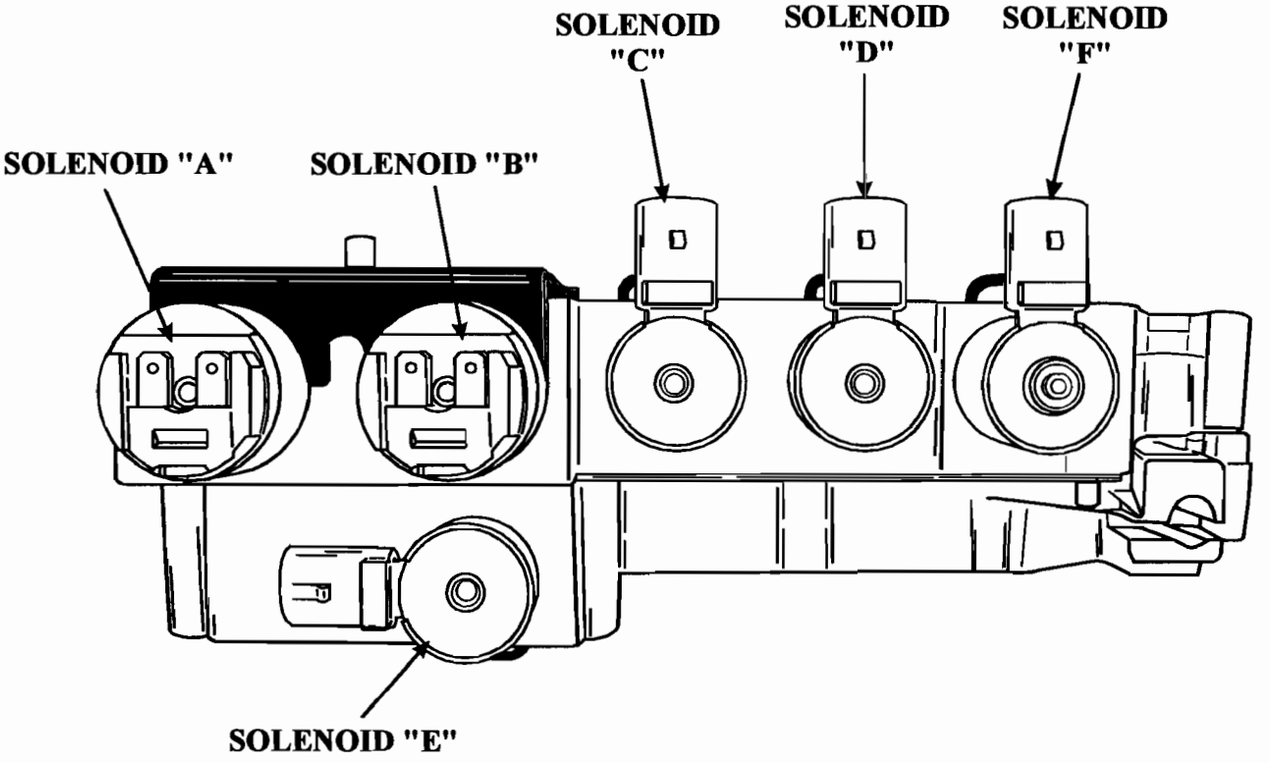
X = Electrical Power Applied To Solenoid

** = Apply Solenoid "F" To Apply Converter Clutch*

*** = Solenoids "A" and "B" are "Trim" solenoids used to control oncoming, off-going, and holding pressure to the five clutch packs.*

Figure 4

SOLENOID I.D.



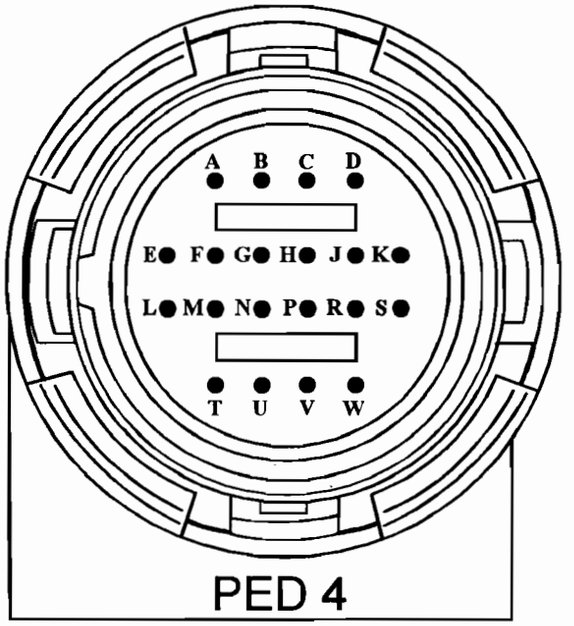
Solenoid's "A" and "B" are clutch pressure control solenoids and are "Normally Closed"

Solenoid's "C", "D" and "E" are shift solenoids and are "Normally vented"

Solenoid "F" is the TCC pwm solenoid

Figure 5

SOLENOID AND TEMP. SENSOR RESISTANCE CHART



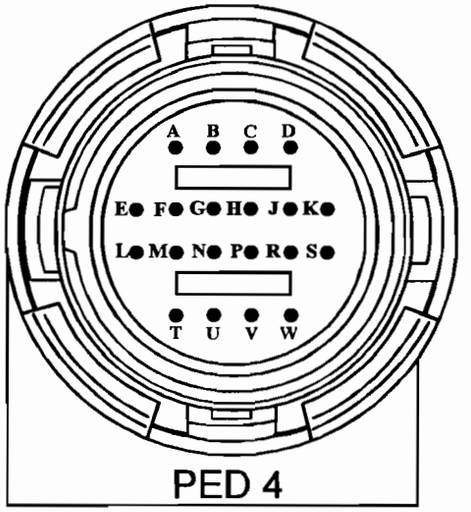
CONNECTOR FACE VIEW AS IN THE VEHICLE

Solenoid	*Terminals*	*Resistance In Ohms*
A	L and M	6 Ω
B	N and P	6 Ω
C	C and W	22 Ω
D	C and B	22 Ω
E	C and A	22 Ω
F	J and S	11 Ω
TEMP SENSOR	H and G	2.8K Ω @ 72° F

All Ohms readings are actual at room temperature.

Figure 6

INTERNAL WIRE SCHEMATIC



CONNECTOR FACE VIEW

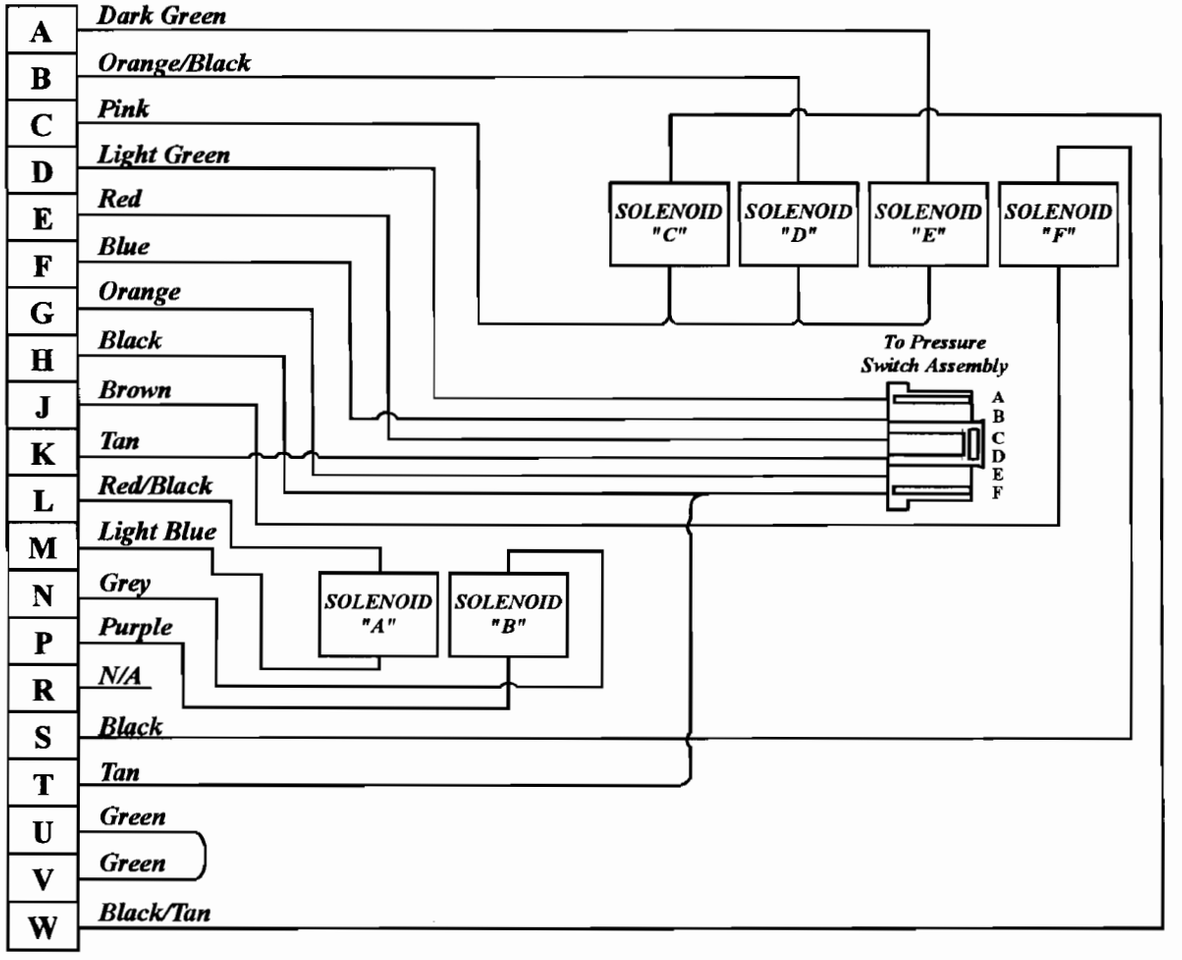
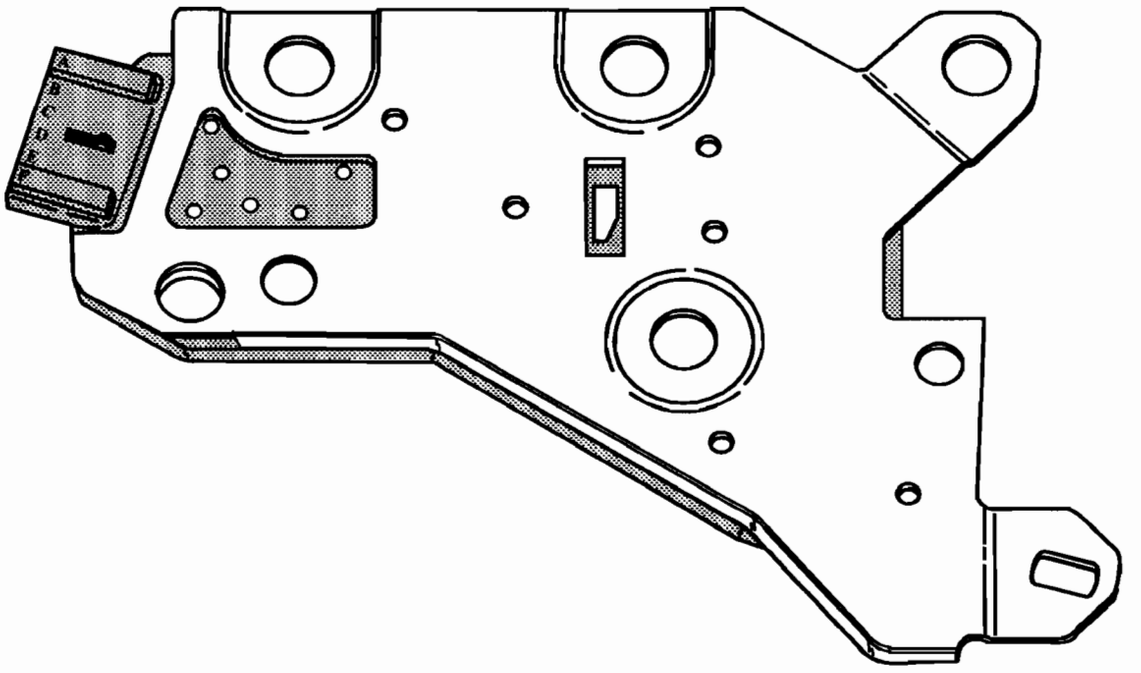


Figure 7

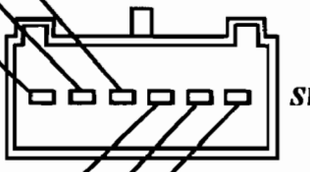
PRESSURE SWITCH ASSEMBLY TERMINAL IDENTIFICATION



(A) RANGE "A" SIGNAL TO PCM (CASE CONNECTOR TERMINAL "D")

(B) RANGE "B" SIGNAL TO PCM (CASE CONNECTOR TERMINAL "F")

(C) RANGE "C" SIGNAL TO PCM (CASE CONNECTOR TERMINAL "E")



VIEW LOOKING INTO SWITCH ASSEMBLY CONNECTOR

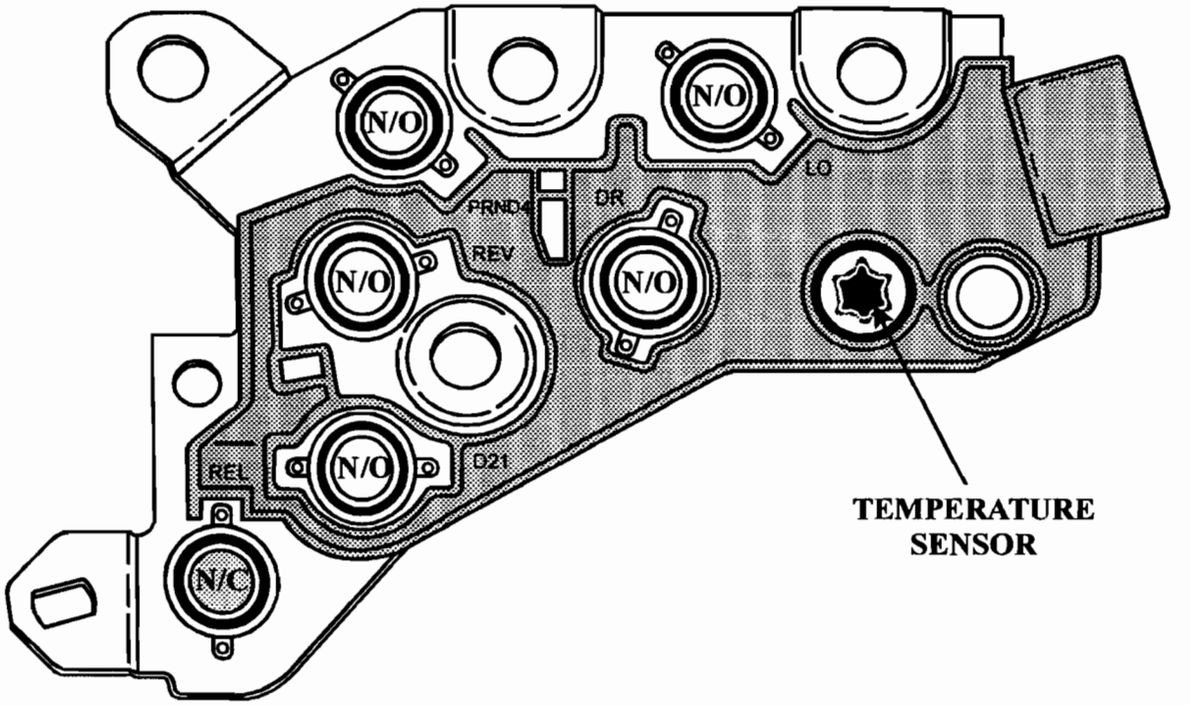
(F) TEMP SENSOR (CASE CONNECTOR TERMINAL "H")

(E) TEMP SENSOR (CASE CONNECTOR TERMINAL "G")

(D) TCC. RELEASE SWITCH TO PCM (CASE CONNECTOR TERMINAL "K")

Figure 8

PRESSURE SWITCH ASSEMBLY "BOTTOM SIDE"



Five "Normally Open" (N/O) Switches
One "Normally Closed" (N/C) Switch

Figure 9

Wesco

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Power Steering & Rack Pinion Kits

USED AND REBUILD TRANSMISSIONS

WE EXPORT

ALLISON SERIES 1000/2000 COMPLETE VALVE BODY

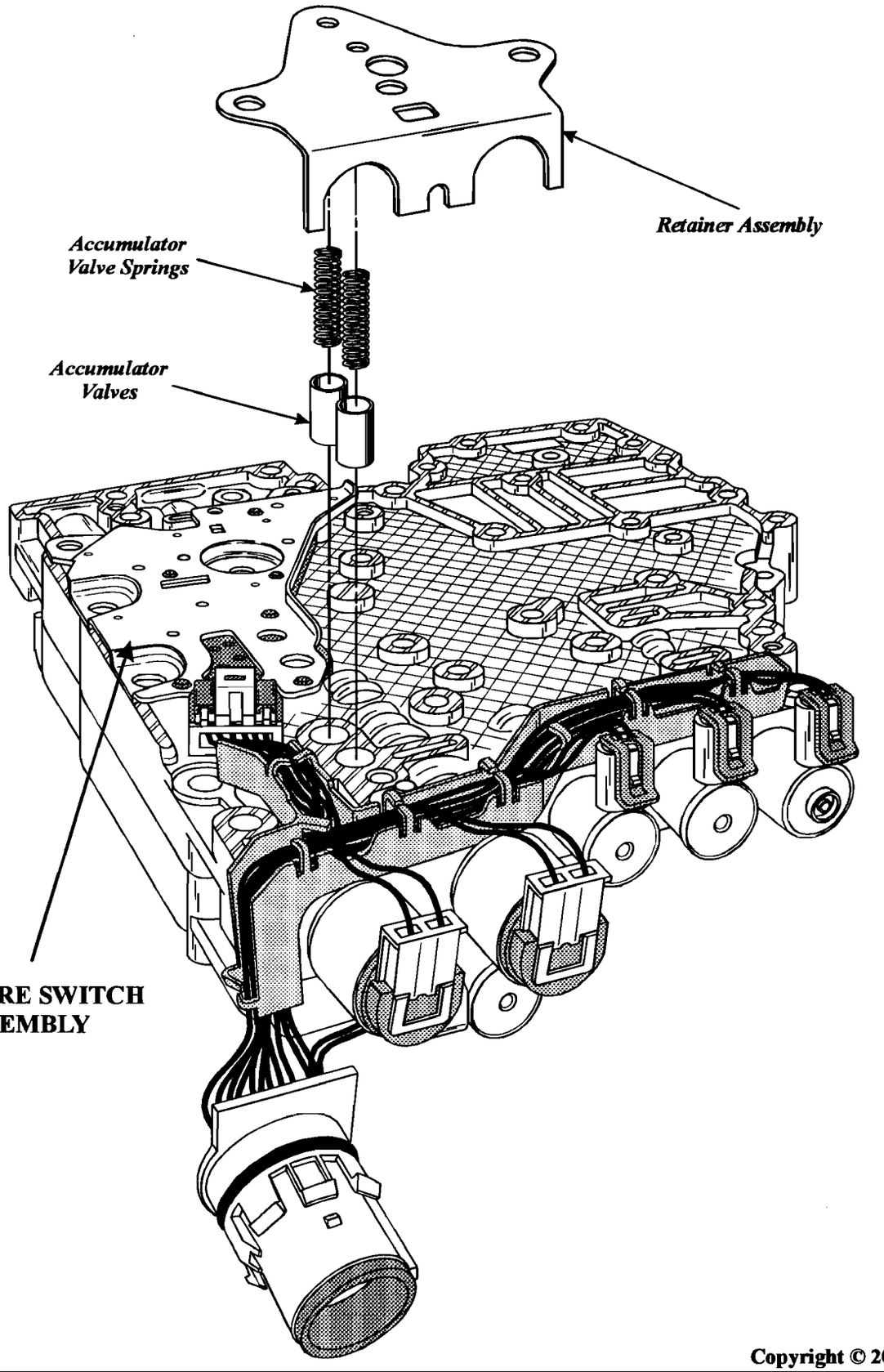


Figure 10

AIR PRESSURE TEST PORTS

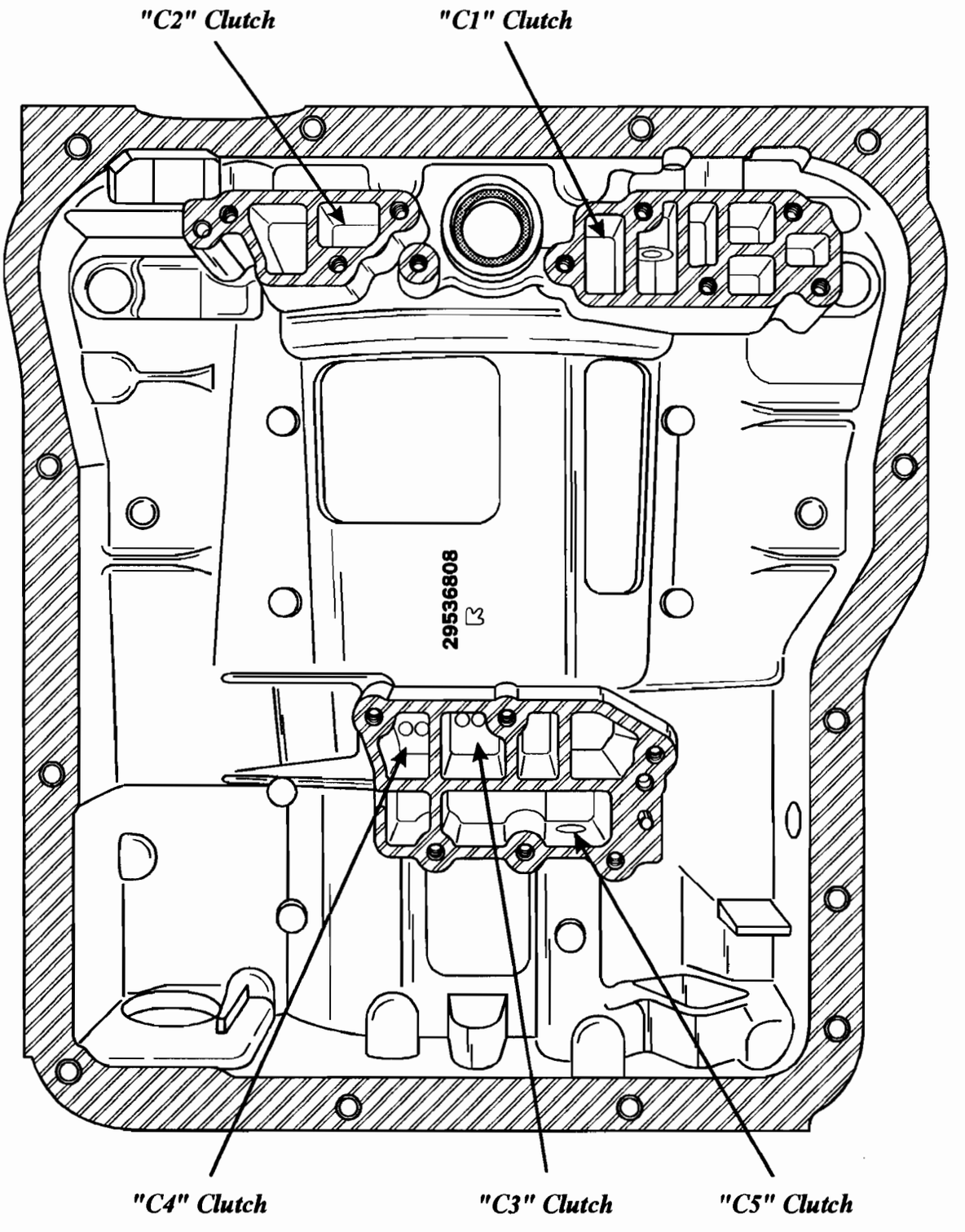


Figure 11

ALLISON 1000/2000 SERIES
UPPER VALVE BODY RETAINER LOCATIONS

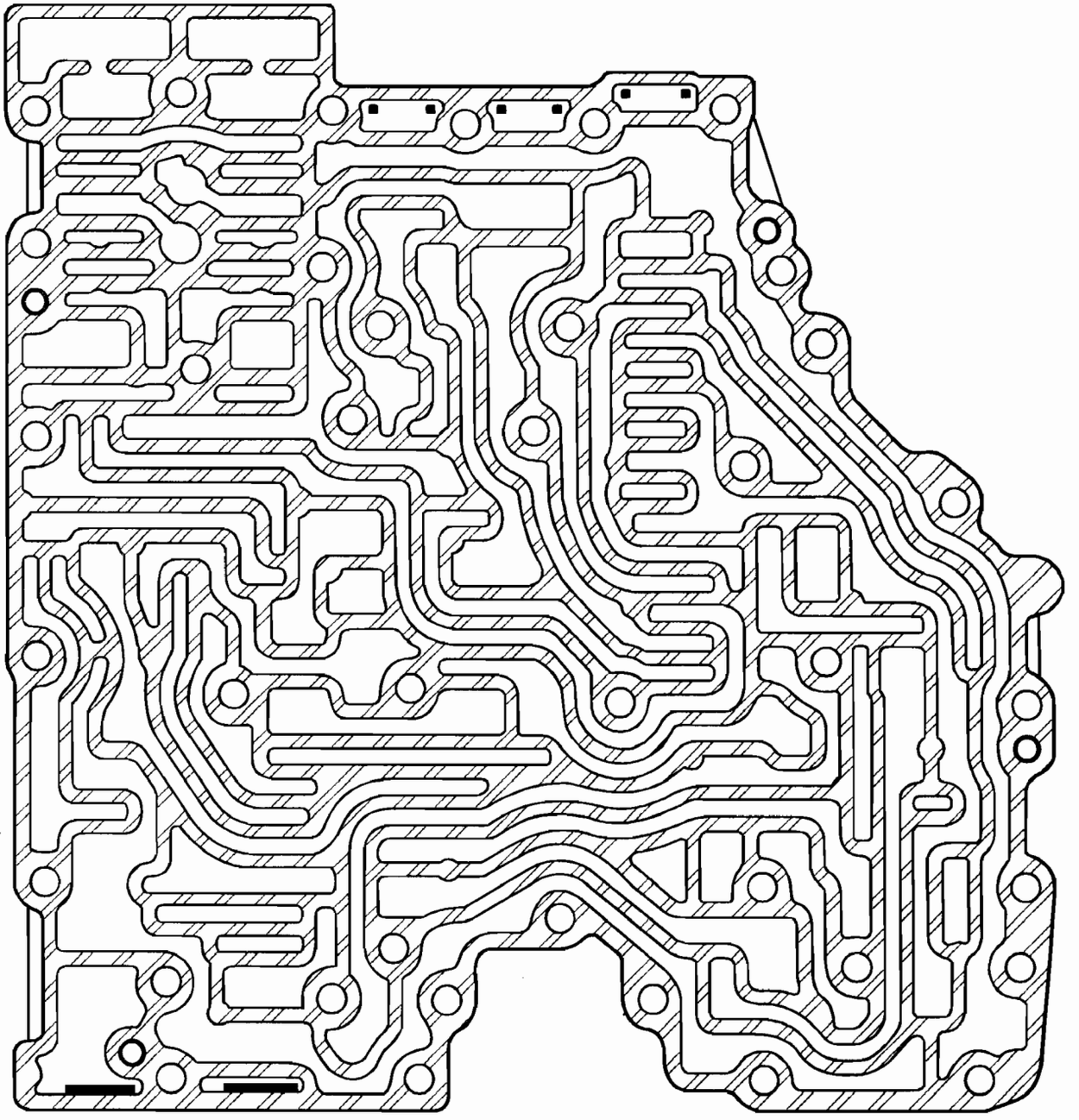


Figure 12

TYPICAL SPACER PLATE

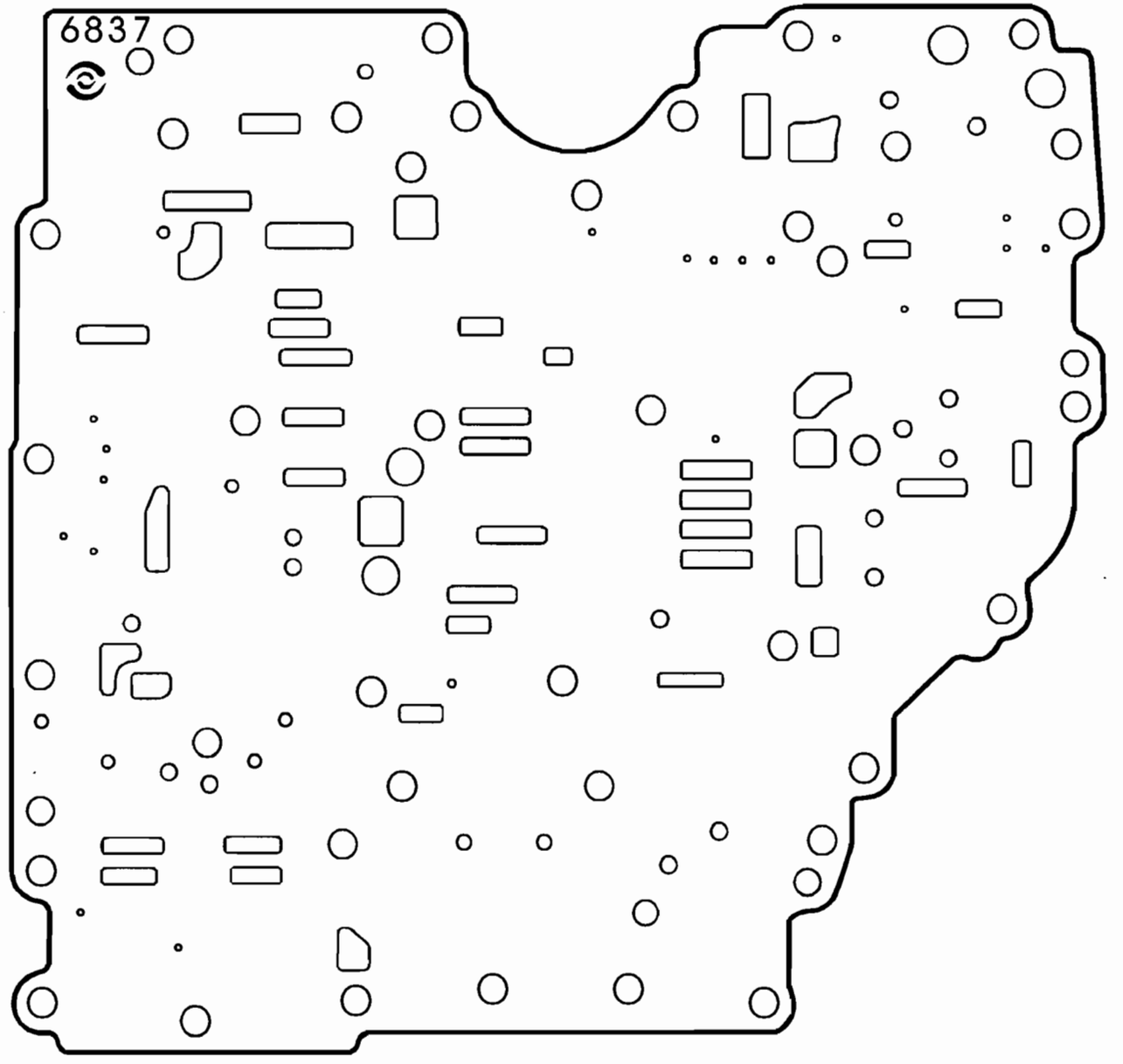


Figure 13

ALLISON 1000/2000 SERIES
LOWER VALVE BODY RETAINER AND SCREEN LOCATION

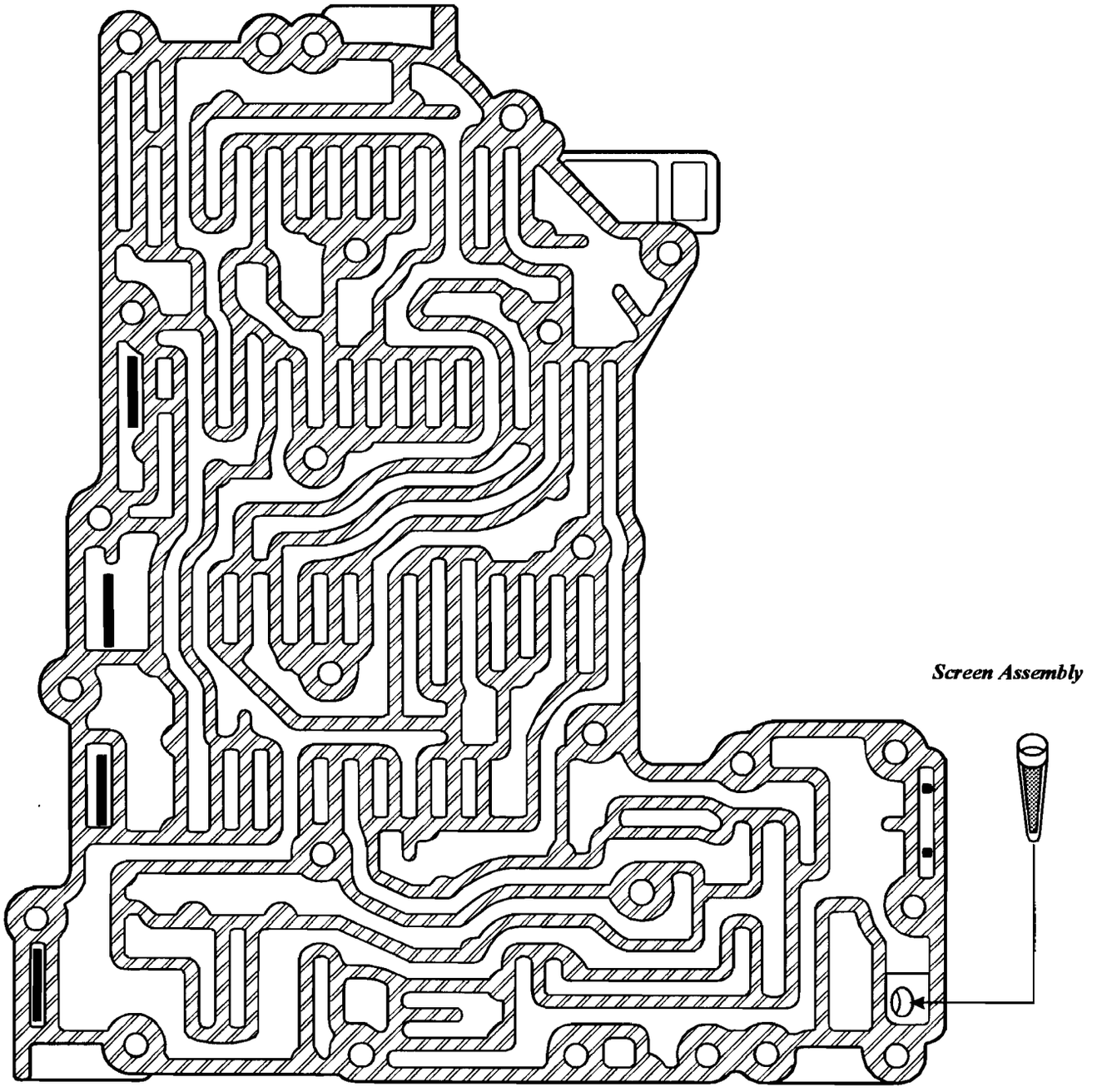
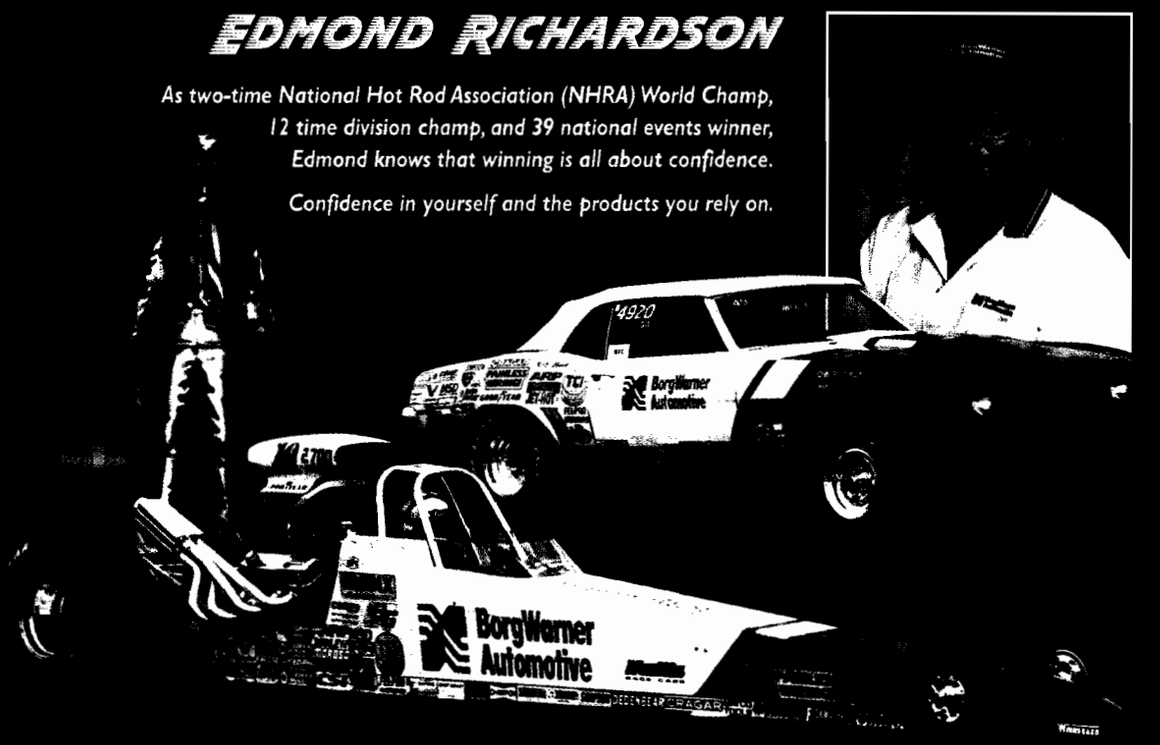


Figure 14

EDMOND RICHARDSON

As two-time National Hot Rod Association (NHRA) World Champ, 12 time division champ, and 39 national events winner, Edmond knows that winning is all about confidence.

Confidence in yourself and the products you rely on.



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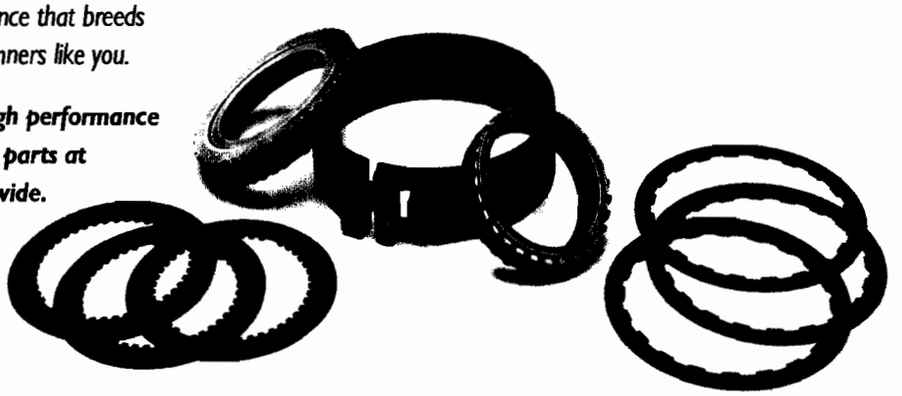
Two-time National Hot Rod Association (NHRA) World Champion Edmond Richardson loves driving with Borg-Warner's powerful line-up of high performance racing products.

Borg-Warner is the market leader in automatic transmission system technology. We design and manufacture our parts to meet or exceed rigid OEM specs for over 80 transmissions world-wide, including Edmond's extreme duty applications – like GM's powerglide band for racing-only transmissions, racing grooved high-energy clutch plates, sprags for racing torque converters, pro-stock transmissions and high performance automatics.

So, whether Edmond's lighting up the race track or handling the demands of daily driving, he's confident he's using the best parts available because Borg-Warner parts are the original parts designed for his transmissions.

That's the kind of confidence that breeds world champions. And winners like you.

Ask for Borg-Warner high performance automatic transmission parts at fine distributors nationwide.



BorgWarner

Borg-Warner Automotive Automatic Transmission Systems Corporation 1140 North DuPage Avenue Lombard, IL 60148 **www.bwauto.com**

CADILLAC

4T60 CODE 39 VCC ENGAGEMENT/ELECTRICAL PROBLEM

COMPLAINT: Reoccurring diagnostic trouble code 39, VCC engagement or electrical problem. The converter has been replaced with another VCC converter or a Buick FY9Bconverter and the code remains. The solenoid has been changed as well. No visual problems are observed with the valve body, channel plate, accumulator, sealing rings, pump and pump shaft.

CAUSE: One cause may be a defective brake switch (See Figure 1). The brake switch may not be expected as the converter clutch apply is felt before the code is stored. Before the code is stored, the converter clutch apply can be released when the brake is depressed. The problem with the brake switch is that it does not allow the full battery voltage to be sent to the solenoid (See Figure 2). When the computer grounds the solenoid, insufficient current draw is detected and the computer produces code 39.

CORRECTION: The wiring diagram in figure 2 shows how battery voltage is supplied to the Brake Switch on terminal A. The voltage goes through the switch and out terminal B which then supplies voltage to the transaxle at the A terminal in the case connector. Voltage at the A terminal in the case connector can be observed with a volt meter. If less than 10 volts is observed, a check should be made at the Brake Switch to verify that the proper voltage is being supplied to the switch at terminal A. If battery voltage is seen at terminal A of the Brake Switch connector and less than 10 volts on the B terminal, replace to brake switch.

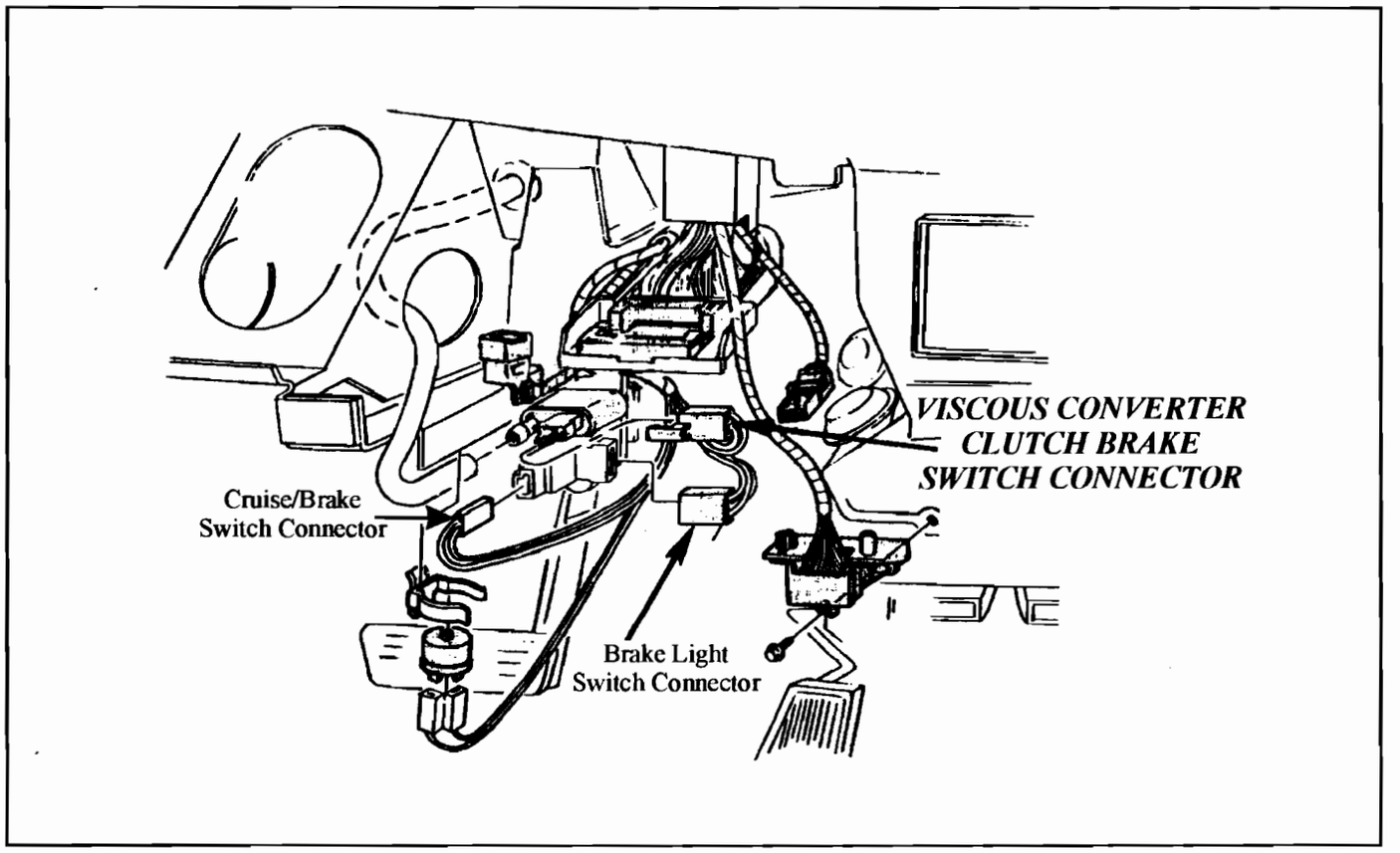
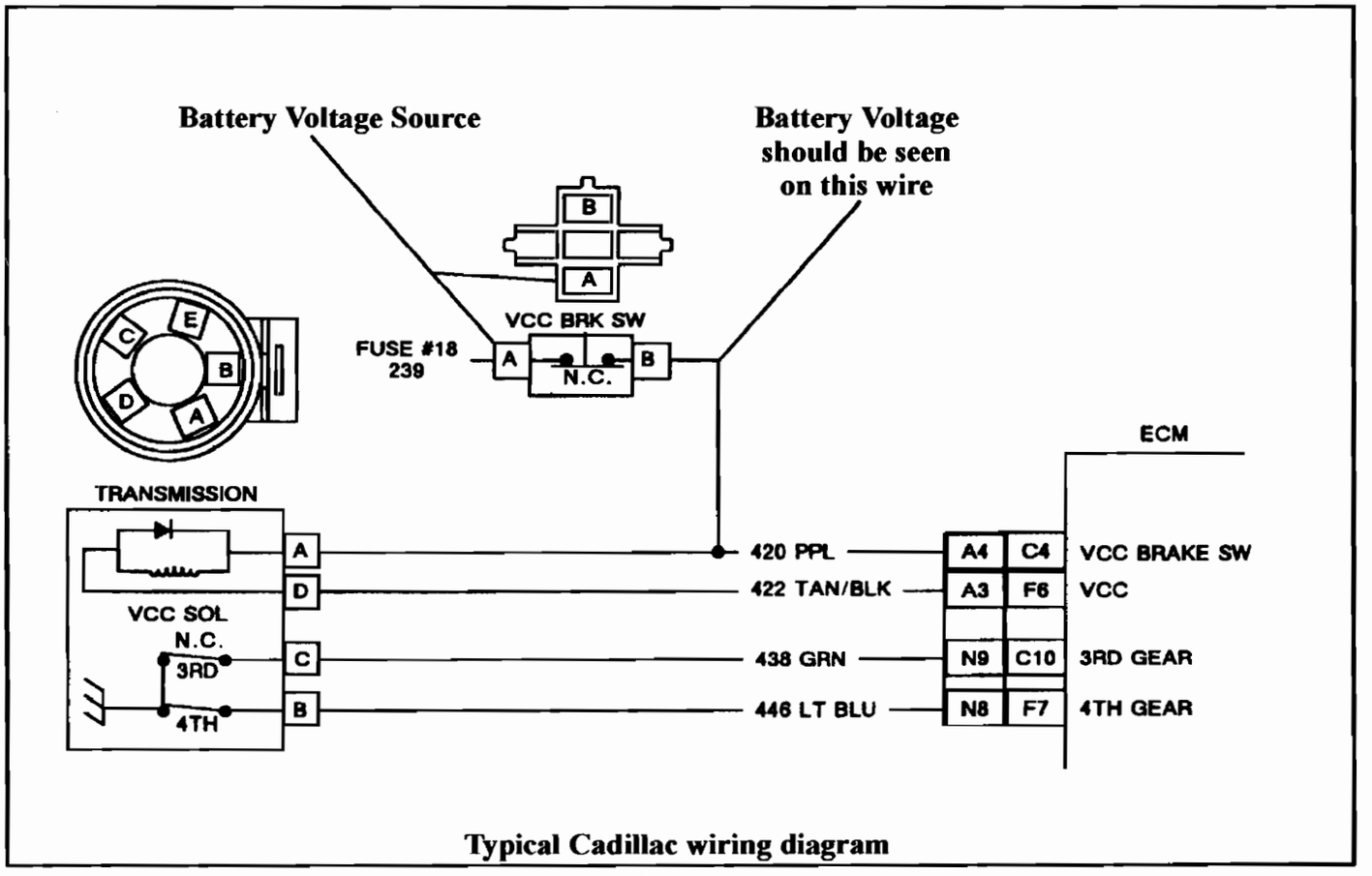


Figure 1



Typical Cadillac wiring diagram

Figure 2

THM 4T80-E

MIL INDICATOR LAMP ILLUMINATED AND DTC CODE P0503 STORED

COMPLAINT: Some owners of 1998-1999 Cadillac or 1998-1999 Auroras equipped with the 4T80-E transaxle, built prior to January 21, 1999 (Build Year 9, Julian Date 021), (See Figure 1) may comment on one of the following conditions: Speedometer fluctuates or is inoperative; Cruise Control is inoperative; Decreased fuel economy; Malfunction Indicator Lamp (MIL) indicator lamp is illuminated and Diagnostic Trouble Code (DTC) P0503 is stored in PCM memory. This DTC is Vehicle Speed Sensor Intermittent.

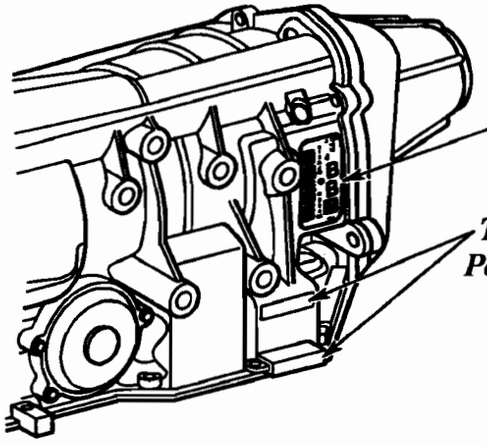
CAUSE: The cause may be, an air gap variation between the output speed sensor and the differential carrier created by movement of the final drive internal ring gear relative to the transaxle case. This also causes wear of the bushing in the final drive housing.
Some affected transaxles may have a mis machined final drive internal ring gear on the outside diameter and a final drive internal ring gear snap ring, with a corner break at the thickest side as shown in Figure 3. Some vehicles with the 3.11 or the 3.71 final drive ratio carrier may also have one or more planet pinions with mis-machined gear teeth, as shown in Figure 2.

CORRECTION: Inspect and replace as necessary all of the parts and concerns listed above, using the part numbers found in "Service Information" below. We have also provided you with a chart for final drive ratio information for the various models, as the ratios ***will not*** interchange from model to model.

SERVICE INFORMATION:

Final Drive Internal Ring Gear 8677862
Final Drive Housing (Bushing not serviced) 8683544
Final Drive Housing Seal 8679017
Final Drive Ring Gear Snap Ring 8681080
Final Drive Carrier, 3.11 Ratio (Pinions not serviced) 24205234
Final Drive Carrier, 3.71 Ratio (Pinions not serviced)..... 24205233
Bottom Pan Gasket 24209512

TAG IN TRUNK	FINAL DRIVE RATIO	RING GEAR	SUN GEAR	PINION GEAR	VEHICLE
FV4	3.71:1	114 TEETH	42 TEETH	36 TEETH	*Cadillac*
FV3	3.11:1	114 TEETH	54 TEETH	30 TEETH	*Cadillac*
FQ2	3.48:1	114 TEETH	46 TEETH	34 TEETH	*Aurora*



Transaxle I.D. Tag Location

Transaxle V.I.N. Possible Locations

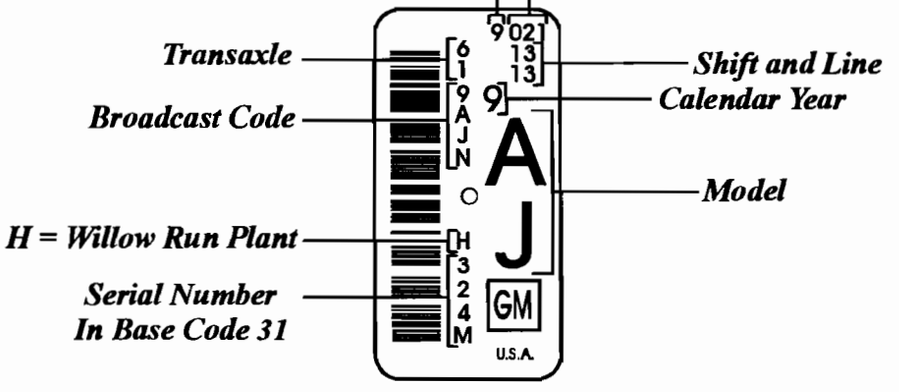
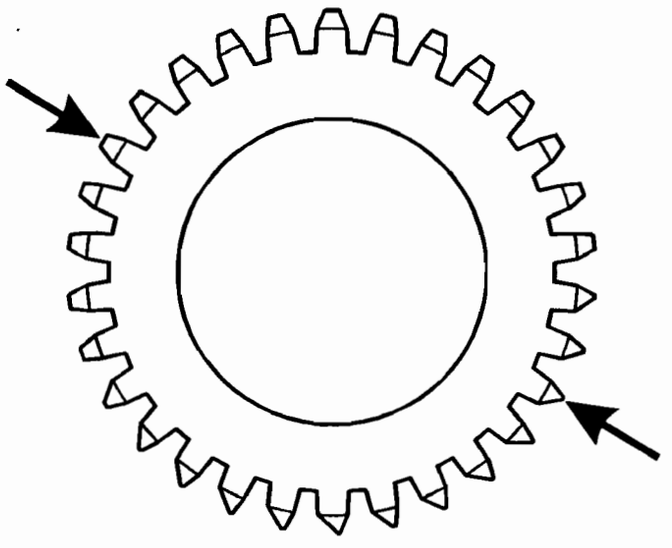


Figure 1



Some teeth may be sharp edged and some may be flat. Replace the carrier assembly if any teeth on any pinion are mis-shaped.

Figure 2

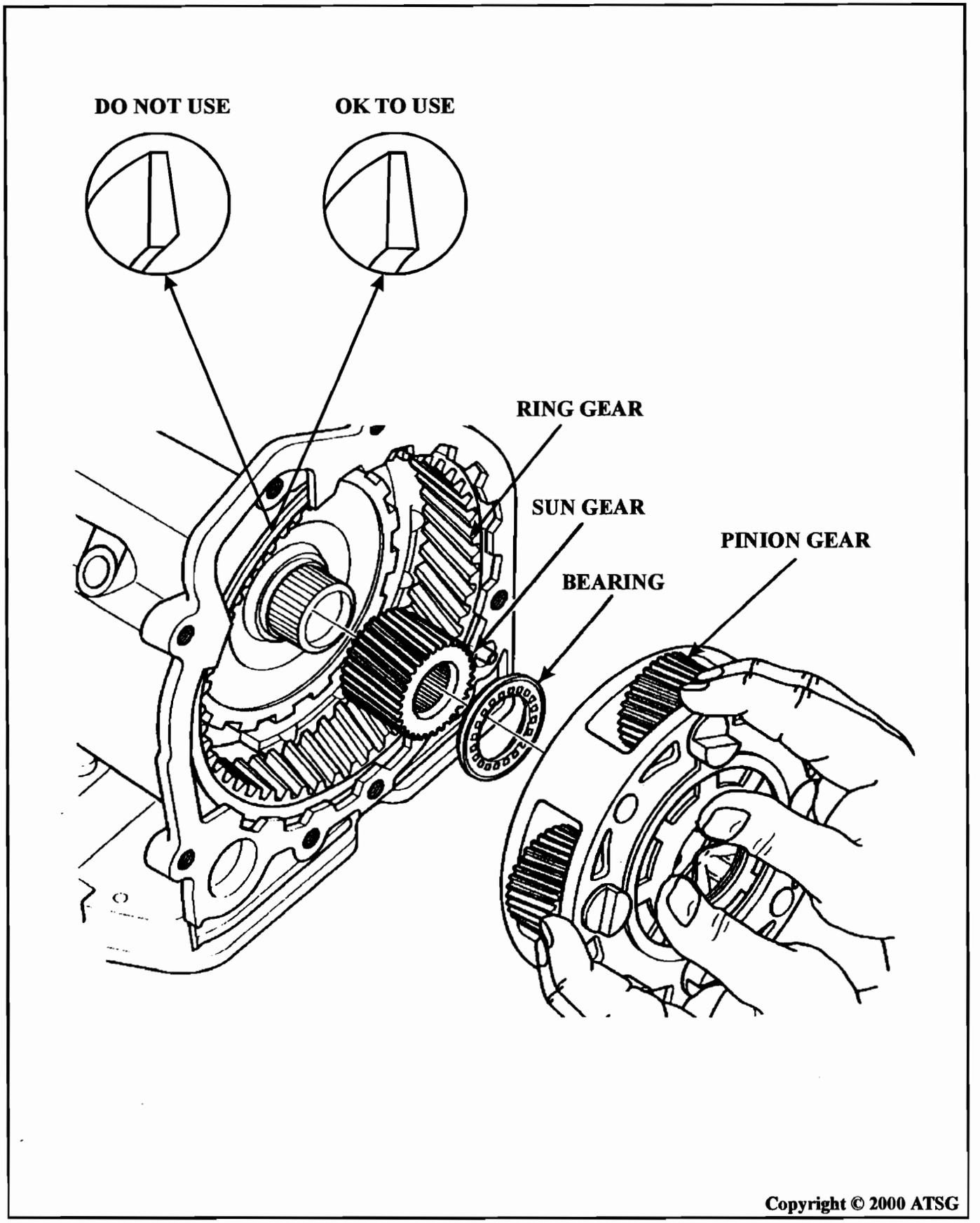

DO NOT USE
OK TO USE
RING GEAR
SUN GEAR
PINION GEAR
BEARING
Copyright © 2000 ATSG

Figure 3

Is it TASC Force Approved?

FOR PEACE OF MIND...

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THM 4T80-E
FINAL DRIVE IDENTIFICATION

COMPLAINT: There may be several different complaints and/or trouble codes stored, such as but not limited to, gear ratio error, converter clutch slippage, internal component slipping, and usually right after a salvage yard unit has been installed.

CAUSE: The cause may be, the wrong unit installed, as there are two different final drive ratios for the 4T80-E in Cadillacs, 3.71 ratio and 3.11 ratio, that ***will not*** interchange. There is now another gear ratio to contend with in the Oldsmobile Aurora (See Figure 1).

CORRECTION: The first thing that must be done is to determine which final drive ratio belongs in the vehicle that you have. This can be done only by refering to the component identification tag located in the trunk. Next to the word "Trans" will be one of 3 codes, either FV4, FV3, or FQ2. After you have this information, refer to the chart in Figure 1 to determine the proper amount of teeth on the final drive components, and install the proper final drive assembly for the vehicle.

Oldsmobile Aurora has been added to the final drive chart in Figure 1.

4T80-E FINAL DRIVE IDENTIFICATION

TAG IN TRUNK	FINAL DRIVE RATIO	RING GEAR	SUN GEAR	PINION GEAR	VEHICLE
FV4	3.71:1	114 TEETH	42 TEETH	36 TEETH	*Cadillac*
FV3	3.11:1	114 TEETH	54 TEETH	30 TEETH	*Cadillac*
FQ2	3.48:1	114 TEETH	46 TEETH	34 TEETH	*Aurora*

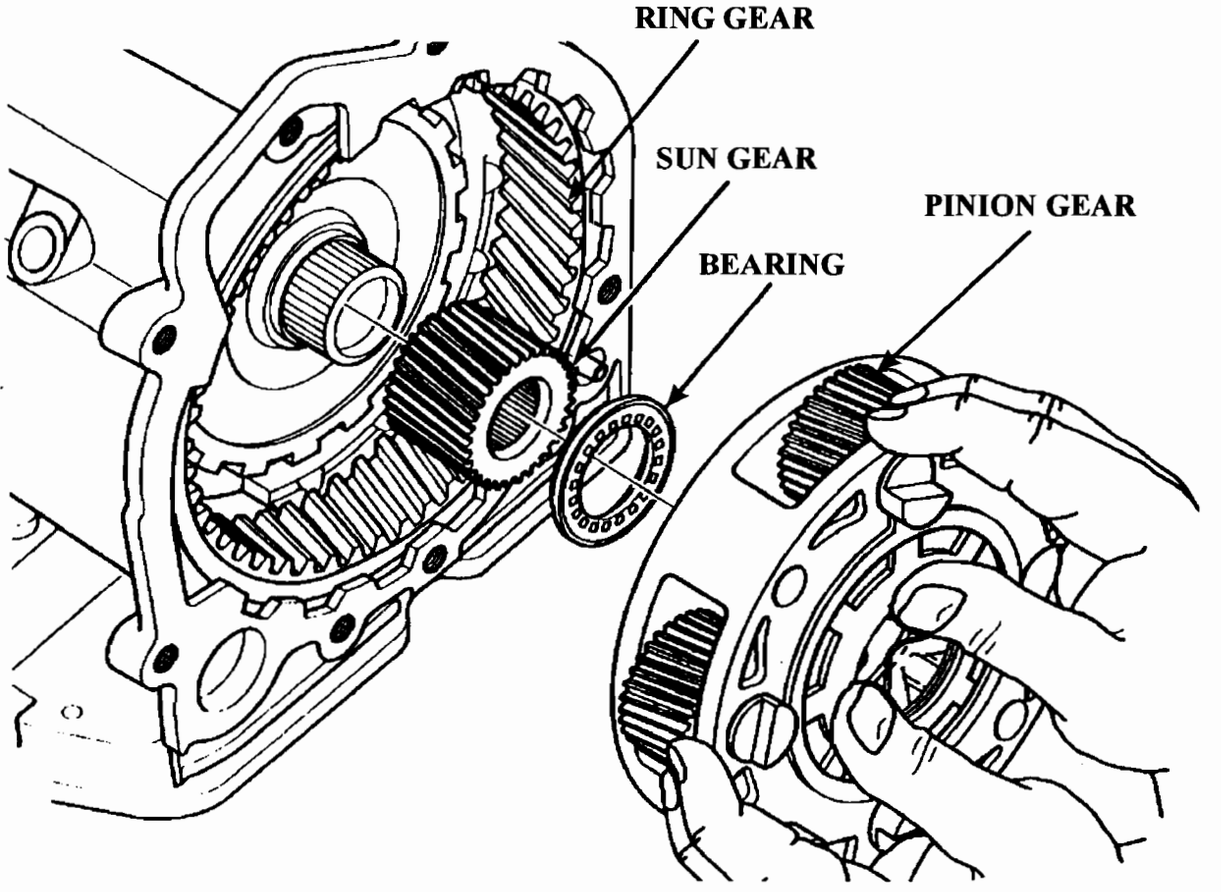


Figure 1

SATURN
WHINE NOISE IN 2ND GEAR "ONLY"

COMPLAINT: Some 1998 or 1999 Saturn vehicles equipped with the Base Automatic (MP6) transaxle, built after 1998 VIN WZ312775 through 1999 VIN XZ114349 may exhibit excessive "whine" noise in 2nd gear only that is related to vehicle speed. The pitch increases with vehicle speed and becomes audible soon after the 1-2 upshift, and is present until the tranaxle shifts to 3rd gear. The noise is most noticeable while driving the vehicle in the Manual D2 range.

CAUSE: The cause may be, an improperly machined gear surface on the 2nd/Reverse Drive Gear.

CORRECTION: Remove the transaxle from the vehicle, using the appropriate service manual, and replace the 2nd/Reverse Drive Gear with OEM part number 21003233. Refer to Figures 1 and 2.

2ND/REVERSE DRIVE GEAR
SATURN PART NUMBER 21003233

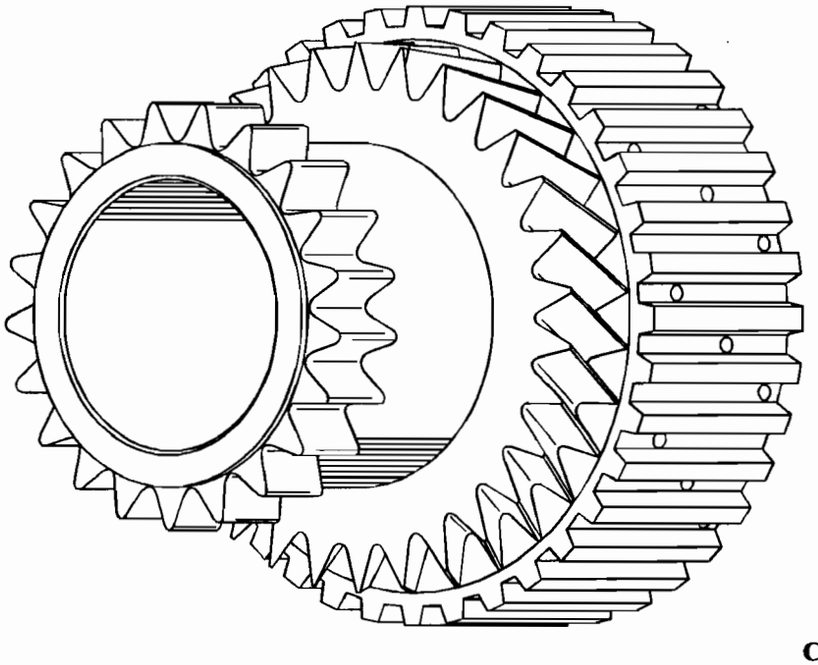


Figure 1

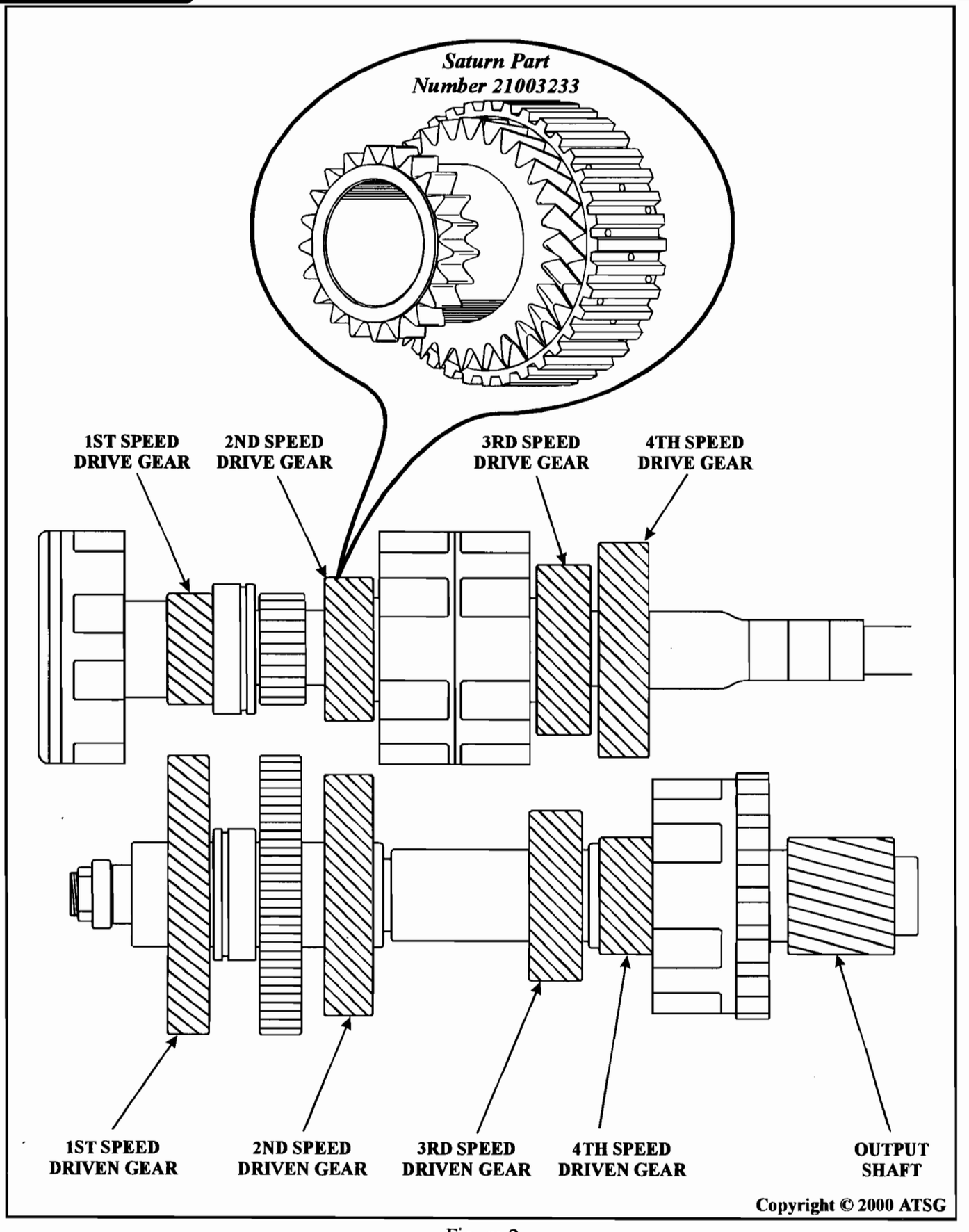

Saturn Part
Number 21003233
1ST SPEED
DRIVE GEAR
2ND SPEED
DRIVE GEAR
3RD SPEED
DRIVE GEAR
4TH SPEED
DRIVE GEAR
1ST SPEED
DRIVEN GEAR
2ND SPEED
DRIVEN GEAR
3RD SPEED
DRIVEN GEAR
4TH SPEED
DRIVEN GEAR
OUTPUT
SHAFT
Copyright © 2000 ATSG

Figure 2

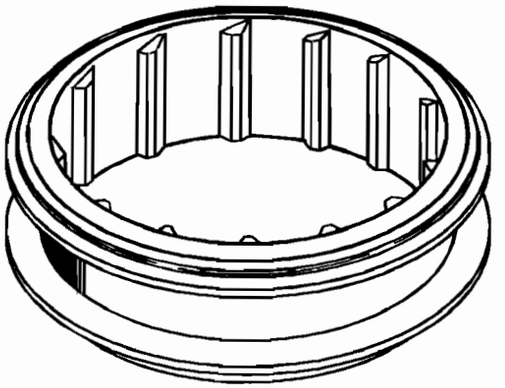
SATURN TAAT
GRIND OR BIND IN REVERSE

COMPLAINT: After overhaul, vehicles equipped with TAAT transaxles, may exhibit a grinding condition on Reverse application or a binding condition in Reverse.

CAUSE: The cause may be, during overhaul the Dog Clutch Sleeve or the Dog Clutch Hub, as shown in Figure 1, were installed incorrectly.

CORRECTION: Install the Dog Clutch Hub with the "Wide Slots" torwards 2nd Driven gear as shown in Figure 2. Install the Dog Clutch Sleeve with the I.D. groove torward Reverse Driven gear as shown in Figure 2.

DOG CLUTCH SLEEVE



DOG CLUTCH HUB

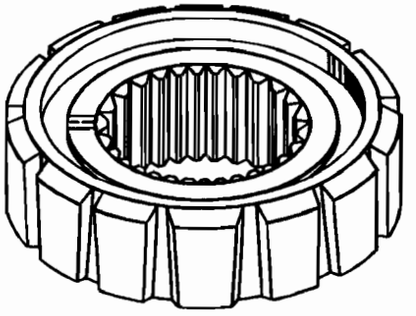


Figure 1

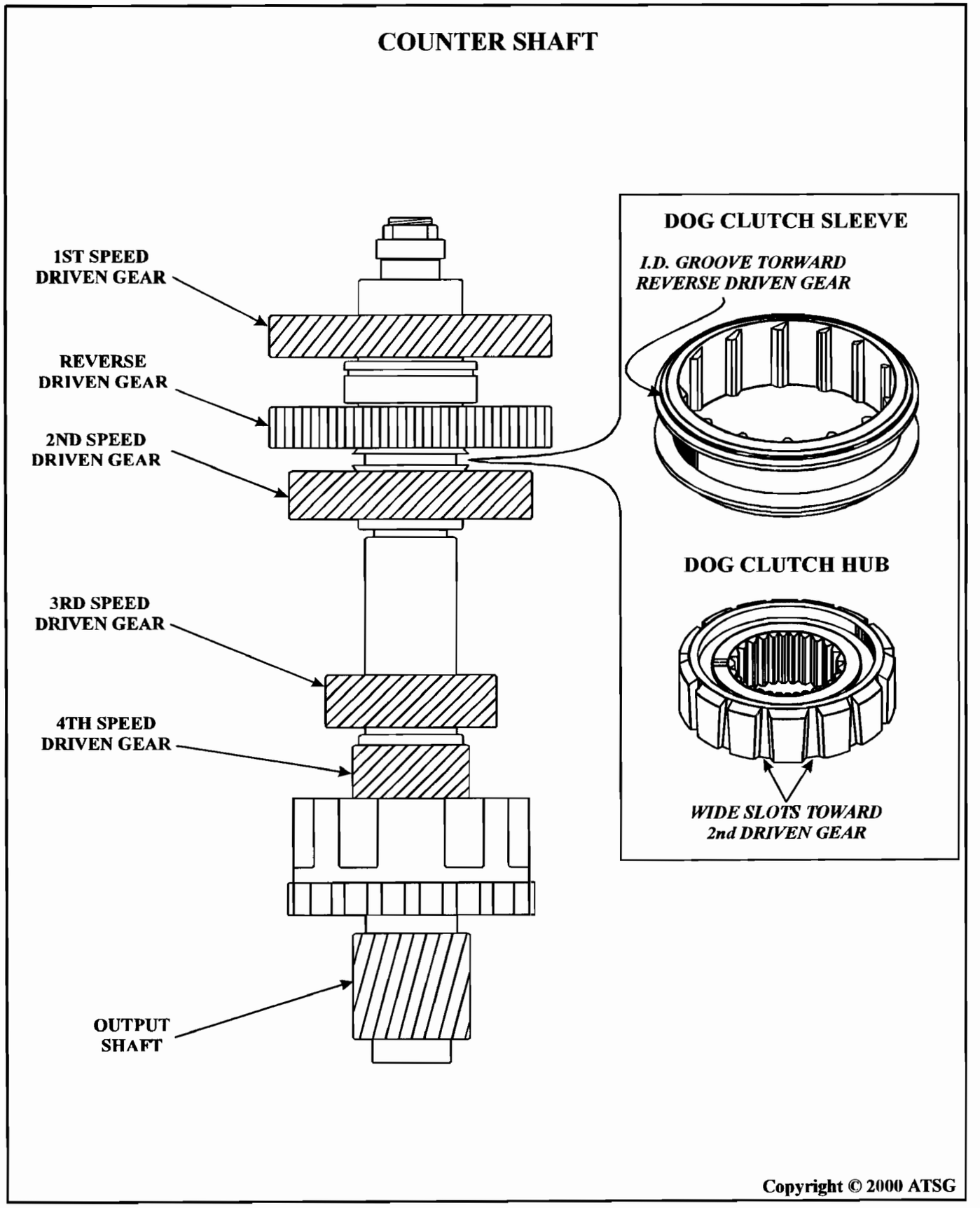

COUNTER SHAFT
1ST SPEED DRIVEN GEAR
REVERSE DRIVEN GEAR
2ND SPEED DRIVEN GEAR
3RD SPEED DRIVEN GEAR
4TH SPEED DRIVEN GEAR
OUTPUT SHAFT
DOG CLUTCH SLEEVE
I.D. GROOVE TORWARD REVERSE DRIVEN GEAR
DOG CLUTCH HUB
WIDE SLOTS TOWARD 2nd DRIVEN GEAR
Copyright © 2000 ATSG

Figure 2

SATURN

ERRATIC SHIFT PATTERN, AFTER REBUILD OR AFTER REPROGRAMING PCM

COMPLAINT: ***After rebuild,*** the vehicle exhibits one of the following "Erratic Upshift" patterns:

A. Shifts 1st to 3rd, with no 2nd or 4th.
B. Starts in 2nd, with no 1st, and upshifts to 3rd and 4th.
C. Shifts from 1st to 4th, with no 2nd or 3rd.

This condition usually occurs after one complete upshift pattern from 1st to 2nd to 3rd to 4th, and will normally store one or more of the following Diagnostic Trouble Codes (DTC), depending on the particular "Gear Ratio Error":

1991-1995 Model Years	***1996-2000 Model Years***
DTC 16 = No 1st Gear	DTC P0730 = No Gears Available
DTC 18 = No Gears Available	DTC P0731 = No 1st Gear
DTC 22 = No 2nd Gear	DTC P0732 = No 2nd Gear
DTC 23 = No 3rd Gear	DTC P0733 = No 3rd Gear
DTC 24 = No 4th Gear	DTC P0734 = No 4th Gear

These Diagnostic Trouble Codes may be set after replacing the complete transaxle assembly, after replacing individual gear components, or after reprograming the PCM.

CAUSE: The cause may be, a mis-match of gear train parts (Drive and Driven Gears), between the 1st design "MP6" Base Transaxle, and the 2nd design "MP6" Base Transaxle, or the "MP7" Performance Transaxle.

Another cause may be, incorrect calibration installed due to a wrong VIN in the PCM. If the wrong calibration has been installed, a gear ratio table may be used by the PCM which will not match the actual gear ratios and result in DTCs setting.

CORRECTION: When rebuilding a Saturn transaxle, and gear train replacement is necessary, ***ensure*** that the replacement gears have the ***exact*** same tooth counts as the originals. Refer to the charts in Figures 1 and 2 for the proper gear tooth counts for the model that you are rebuilding.

Important Note: Refer to Figure 3 to identify the transaxle design level and type of transaxle. They are as follows: ***"MP6" Base = 1st Design***
"MP6" Base (With "SV") = 2nd Design
"MP7" = Performance Version

If the incorrect calibration or VIN information has been written to the PCM, reprogram the PCM with the proper VIN and calibration information. Compare the VIN plate on the dash to VIN identified in the PCM. Obviously they must match.

GEAR TOOTH COUNTS AND GEAR RATIOS

All SOHC Engines Use MP6 Transaxle *All SOHC Engines Use MP6 Transaxle*

GEAR	1991-1993 1st Design* MP6 Base	1993-1994 2nd Design** MP6 Base	1991-1994 Performance MP7 Base	1995-1999 2nd Design MP6 Base	1995-1999 Performance MP7 Base
1st Drive	21	19	19	19	19
1st Driven	47	48	48	48	48
2nd Drive	30	30	27	30	27
2nd Driven	38	38	42	38	42
3rd Drive	37	37	33	37	33
3rd Driven	30	30	34	30	34
4th Drive	42	42	40	42	40
4th Driven	25	25	28	25	28
Reverse Drive	21	21	21	21	21
Reverse Driven	40	40	40	40	40
Output Shaft	15	15	15	16	16
Ring Gear	62	62	62	65	65
1st Gear	2.24	2.53	2.53	2.53	2.53
2nd Gear	1.27	1.27	1.56	1.27	1.56
3rd Gear	0.81	0.81	1.03	0.81	1.03
4th Gear	0.60	0.60	0.70	0.60	0.70
Reverse Gear	2.35	2.35	2.35	2.35	2.35
Final Drive	4.13	4.13	4.13	4.06	4.06

* *Vehicles built prior to, and including VIN PZ156139*
** *Vehicles built after, and including VIN PZ156140*

Figure 1

INDIVIDUAL DRIVE AND DRIVEN GEAR IDENTIFICATION

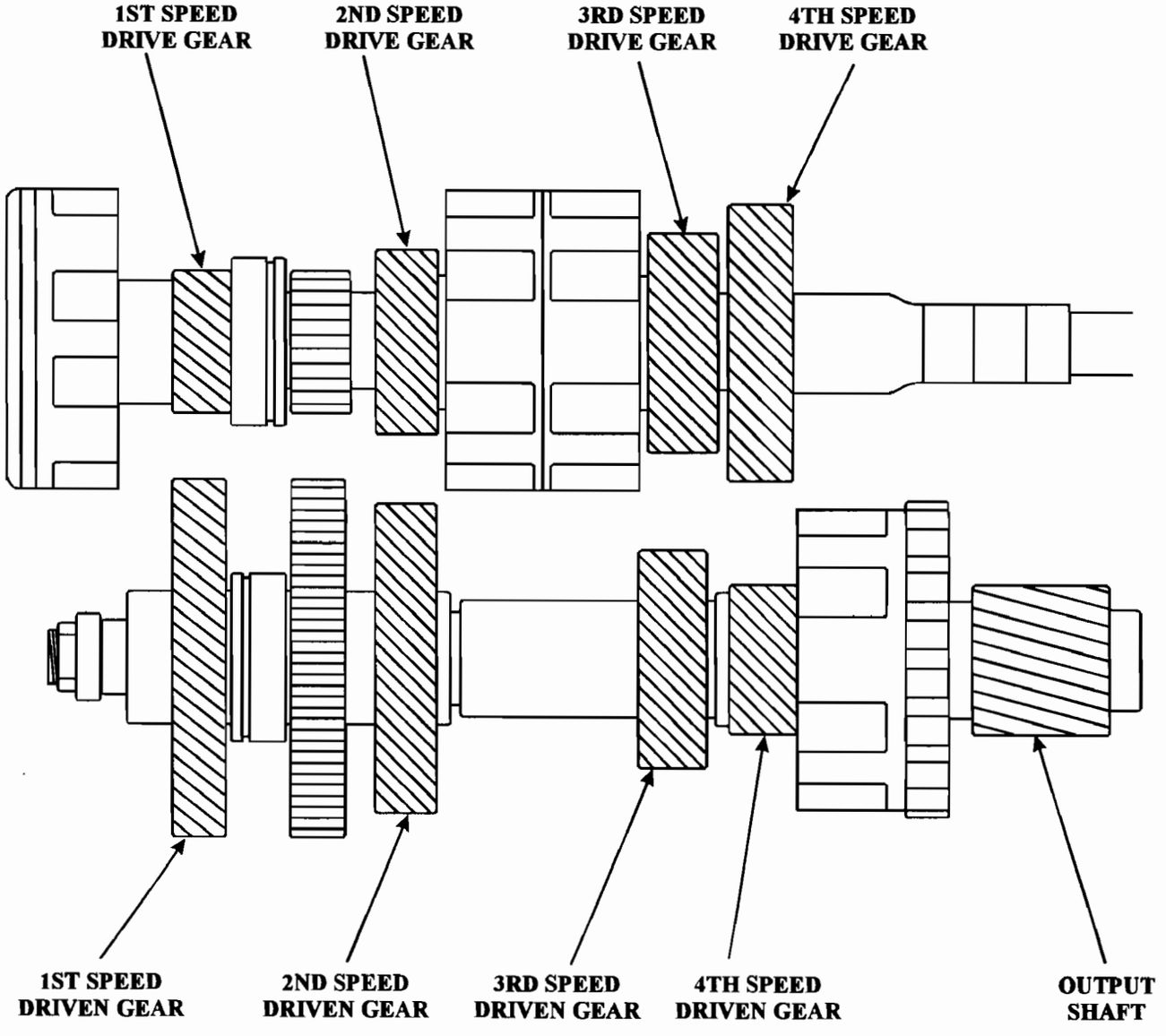
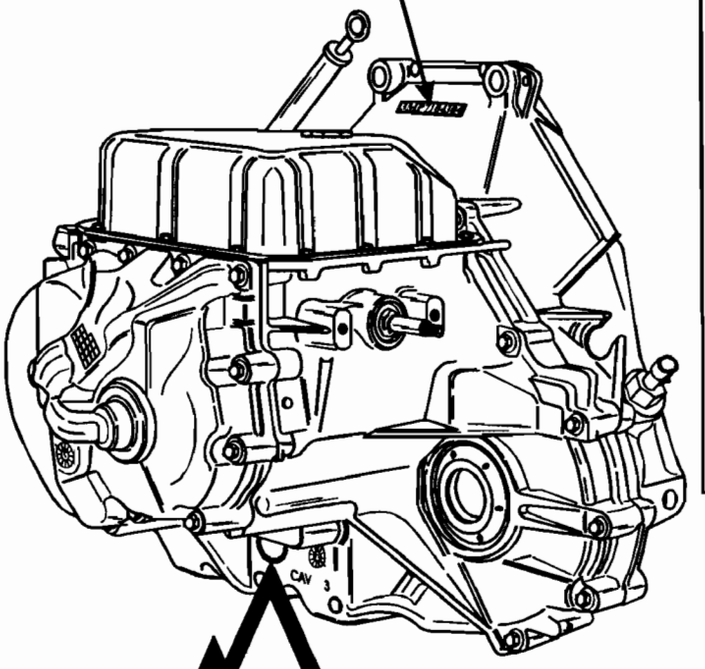


Figure 2

STAMPED IDENTIFICATION CODE CAN BE FOUND IN THIS AREA



IDENTIFICATION CODE DESCRIPTION

3	MP7	1	043	0	4
1	2	3	4	5	6

1 = Model Year (3 = 93)

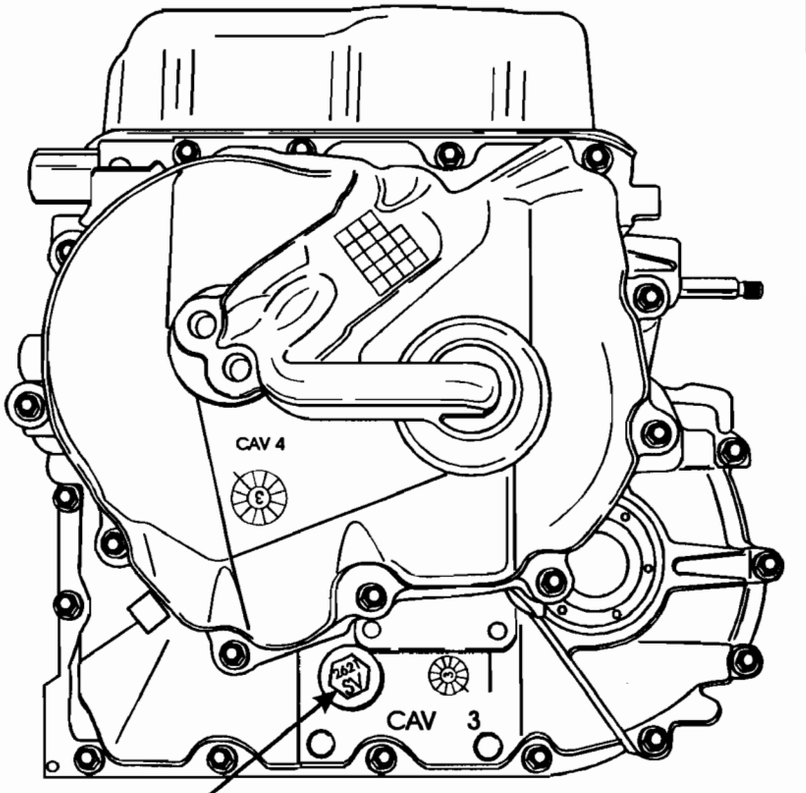
2 = Model Code:
- **MP2 = Base Manual**
- **MP3 = Performance Manual**
- **MP6 = Base Automatic**
- **MP7 = Performance Automatic**

3 = Plant Code (1 = Spring Hill, TN)

4 = Julian Date (043 = Feb. 12)

5 = Hour of Day (0 = Midnight)

6 = Update Code (Increments 0 - 9)



Identification "SV" here is 2nd design level

Figure 3

FORD 4R70W
INTERNAL HARNESS AND CASE CONNECTOR CHANGES FOR 1998

CHANGE: Beginning at the start of production for 1998 models, all Ford AODE/4R70W transmissions were built using a molded circuit board to replace the previous internal wire harness assembly, as shown in Figure 1.

REASON: More economical to produce and install and increased durability.

PARTS AFFECTED:

(1) CASE CONNECTOR - Now produced to accommodate the new molded circuit board assembly and case connector pin functions have changed. Refer to Figures 1, 2, and 3.

(2) INTERNAL HARNESS - Changed to a molded circuit board, as shown in Figure 1.

(3) EPC SOLENOID - Connector changes to accommodate the new molded circuit board.

(4) SHIFT SOLENOID ASSEMBLY - Connector changes to accommodate the new circuit board.

(5) TCC SOLENOID ASSEMBLY - Connector changes to accommodate the new circuit board.

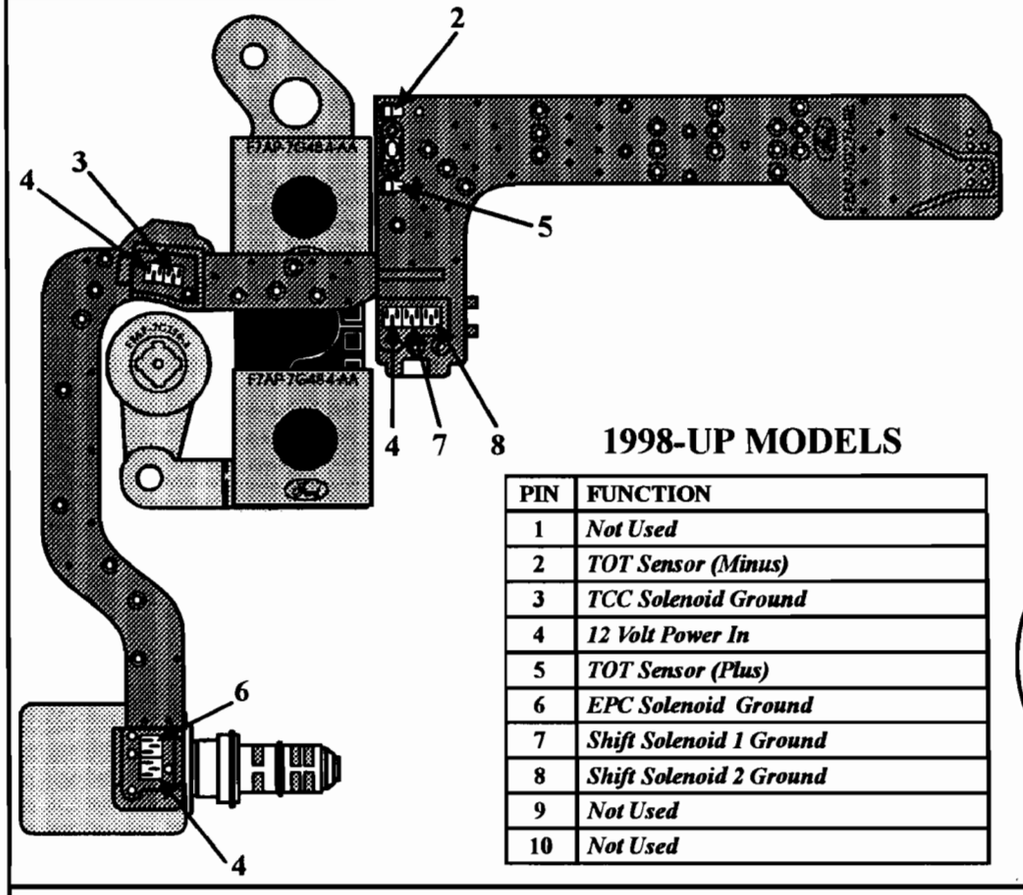
INTERCHANGEABILITY:

(1) 1992-1997 internal harness and solenoid assemblies ***must*** be used on 92-97 models. Refer to "Service Information" below for the current part numbers.

(2) 1998-Up internal harness and solenoid assemblies ***must*** be used on 1998-Up models. Refer to "Service Information" below for the current part numbers.

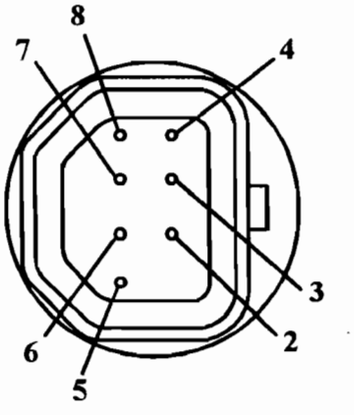
SERVICE INFORMATION:

Internal Wiring Harness and Case Connector Assy, 92-97 Models	F2VY-7G276-A
Case Connector for Molded Internal Wiring, 1998-Up Models	F8AZ-7G276-AA
Molded Internal Wiring Assembly, 1998-Up Models	F8AZ-7G276-BA
Shift Solenoid Assembly, 92-97 Models	F7AZ-7G484-AA
Shift Solenoid Assembly, 1998-Up Models	F8AZ-7G484-AA
EPC Solenoid Assembly, 92-97 Models	F6AZ-7G383-AA
EPC Solenoid Assembly, 1998-Up Models	F8AZ-7G383-AA
TCC Solenoid Assembly, 92-97 Models	F5AZ-7G136-A
TCC Solenoid Assembly, 1998-Up Models	F8AZ-7G136-AA

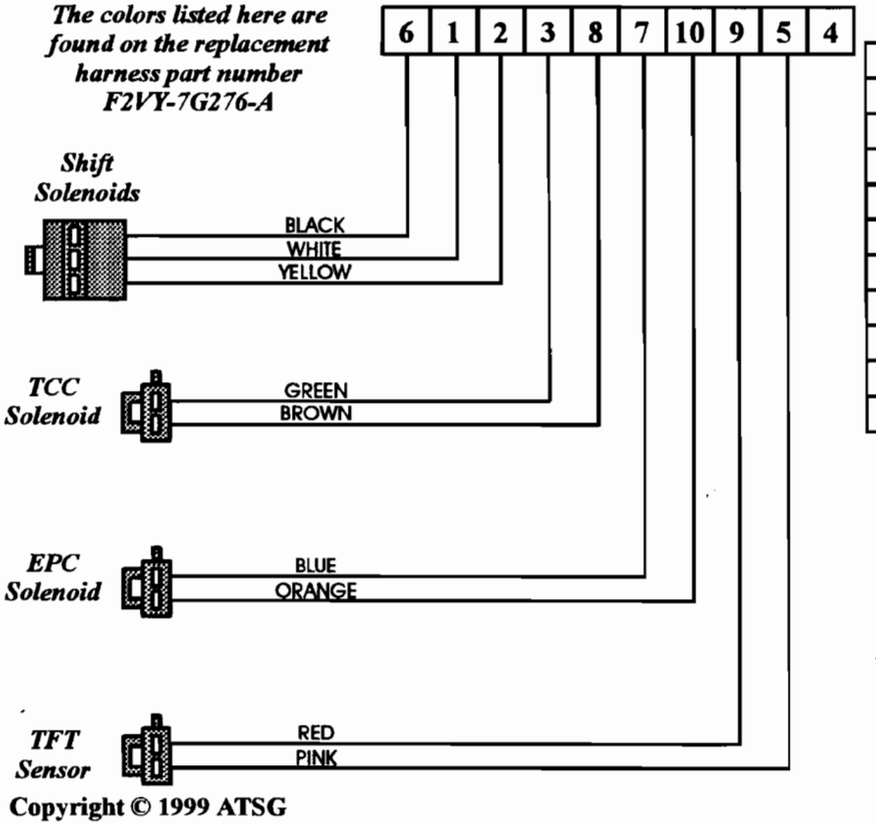


1998-UP MODELS

PIN	FUNCTION
1	*Not Used*
2	*TOT Sensor (Minus)*
3	*TCC Solenoid Ground*
4	*12 Volt Power In*
5	*TOT Sensor (Plus)*
6	*EPC Solenoid Ground*
7	*Shift Solenoid 1 Ground*
8	*Shift Solenoid 2 Ground*
9	*Not Used*
10	*Not Used*



The colors listed here are found on the replacement harness part number F2VY-7G276-A



1992-1997 MODELS

PIN	FUNCTION
1	*Shift Solenoid 1 Ground*
2	*Shift Solenoid 12V Power*
3	*TCC Solenoid Ground*
4	*Not Used*
5	*TOT Sensor*
6	*Shift Solenoid 2 Ground*
7	*EPC Solenoid 12V Power*
8	*TCC Solenoid 12V Power*
9	*TOT Sensor Return*
10	*EPC Solenoid Ground*

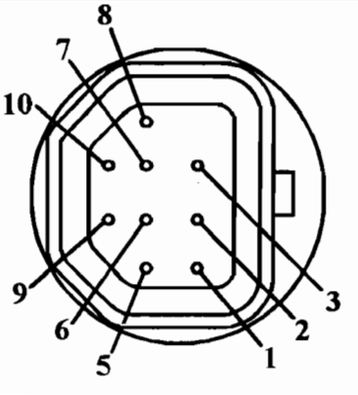
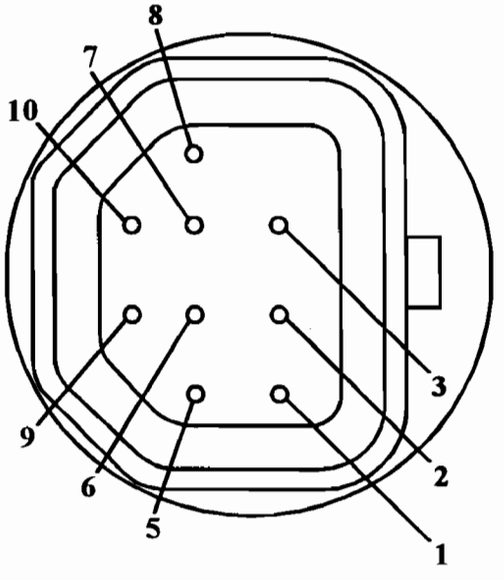
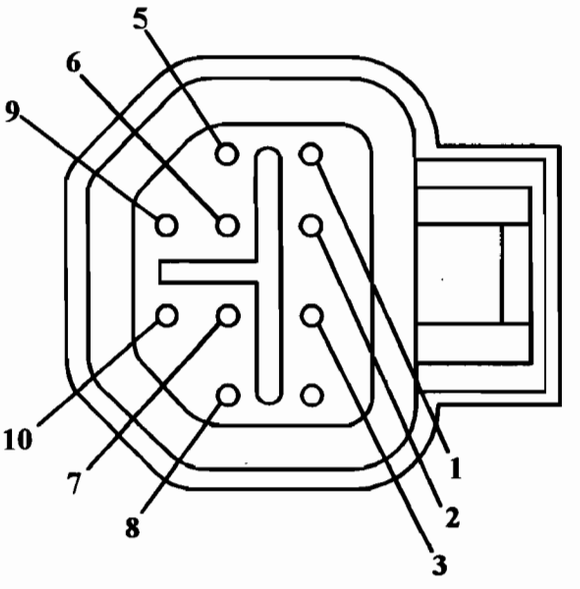


Figure 1

VIEW LOOKING INTO THE 92-97 TRANSMISSION CASE CONNECTOR



VIEW LOOKING INTO THE 92-97 VEHICLE HARNESS CONNECTOR



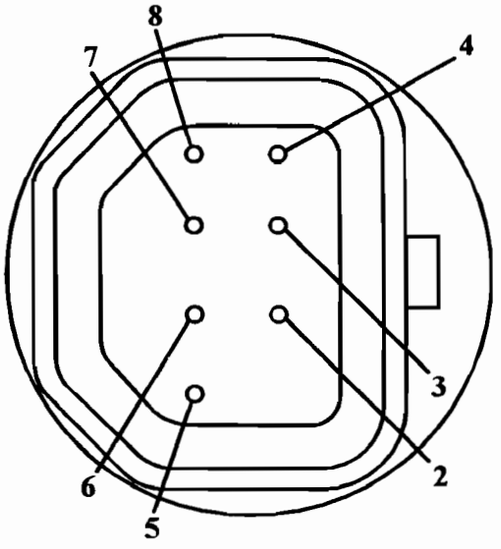
PIN NO.	IDENTIFICATION	INTERNAL COLOR	EXTERNAL COLOR	CIRCUIT NUMBER	EEC IV ECM PIN NUMBER 92-95	EEC V ECM PIN NUMBER 96-97
1	*SS-1 Ground Signal*	*WHITE*	*ORG - YEL*	*237*	*51*	*27*
2	*Shift Solenoid Power 12V*	*WHT - BLK*	*RED*	*361*	*37 & 57*	*71 & 97*
3	*MCC Ground Signal*	*GREEN*	**	*480*	*53*	*54*
4	*NOT USED*					
5	*TOT -*	*WHT - RED*	*GRY - RED*	*923*	*49*	*91*
6	*SS-2 Ground Signal*	*BLACK*	*PPL - ORG*	*315*	*52*	*1*
7	*EPC Power In*	*WHT - BLU*	*RED*	*361*	*37 & 57*	*71 & 97*
8	*MCC Power In*	*WHT - GRN*	*RED*	*361*	*37 & 57*	*71 & 97*
9	*TOT +*	*RED*	*ORG - BLK*	*359*	*46*	*37*
10	*EPC Ground Signal*	*BLUE*	*WHT - YEL*	*925*	*38*	*81*

** *TAN - WHT, BRN - ORG, PPL - YEL, DEPENDING ON YEAR AND MODEL.*

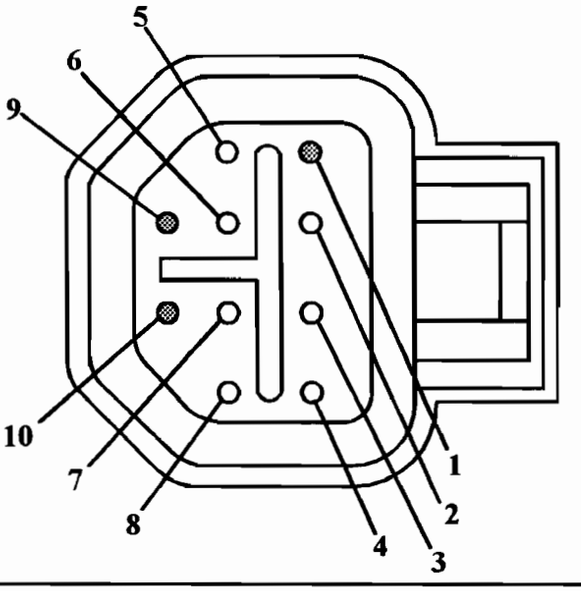
SOLENOID	PIN NO.	RESISTANCE
SHIFT SOLENOID - 1	*1 & 2*	*20 - 30 OHMS*
SHIFT SOLENOID - 2	*6 & 2*	*20 - 30 OHMS*
TORQUE CONVERTER CLUTCH	*3 & 8*	*1.0 - 3.0 OHMS*
(SOME 1995 MODELS)	*3 & 8*	*10 - 16 OHMS*
EPC SOLENOID	*7 & 10*	*2.48 - 5.66 OHMS*

Figure 2

VIEW LOOKING INTO THE 1998-UP TRANSMISSION CASE CONNECTOR



VIEW LOOKING INTO THE 1998-UP VEHICLE HARNESS CONNECTOR



PIN NO.	IDENTIFICATION	INTERNAL COLOR	EXTERNAL COLOR	CIRCUIT NUMBER	EEC-V ECM PIN NUMBER 1998-UP
1	*NOT USED*				
2	*TOT -*	*CIRCUIT BOARD*	*GRY - RED*	*359*	*91*
3	*MCC GROUND SIGNAL*	*CIRCUIT BOARD*	*PPL - YEL*	*126*	*54*
4	*SOLENOID POWER IN 12V*	*CIRCUIT BOARD*	*RED*	*361*	*71 & 97*
5	*TOT +*	*CIRCUIT BOARD*	*ORG - BLK*	*923*	*37*
6	*EPC GROUND SIGNAL*	*CIRCUIT BOARD*	*WHT - YEL*	*925*	*81*
7	*SS-1 GROUND SIGNAL*	*CIRCUIT BOARD*	*ORG/YEL*	*237*	*6*
8	*SS-2 GROUND SIGNAL*	*CIRCUIT BOARD*	*PPL - ORG*	*315*	*11*
9	*NOT USED*				
10	*NOT USED*				

SOLENOID	PIN NO.	RESISTANCE
SHIFT SOLENOID - 1	*4 & 7*	*20 - 30 OHMS*
SHIFT SOLENOID - 2	*4 & 8*	*20 - 30 OHMS*
TORQUE CONVERTER CLUTCH	*4 & 3*	*1.0 - 3.0 OHMS*
(SOME MODELS)	*4 & 3*	*10 - 16 OHMS*
EPC SOLENOID	*4 & 6*	*2.48 - 5.66 OHMS*

Figure 3

FORD 4R70W

INTERMITTENT TCIL ILLUMINATION DTCS P0741, P0750, P0755 AND P1746 MAY BE STORED IN MEMORY

COMPLAINT: Intermittent Transmission Control Indicator Lamp (TCIL) or Malfunction Indicator Lamp (MIL) illumination may occur on some vehicles equipped with the 4R70W transmission. Diagnostic Trouble Codes (DTCs) P0741, P0750, P0755 and P1746 may be stored in the processors memory.

CAUSE: The cause may be, the solenoid interconnect molded lead frame not being fully seated on the solenoid pack or the bulkhead interconnect clips not being fully seated between the solenoid interconnect molded lead frame and bulkhead interconnect.

CORRECTION: Refer to the following service procedure:

(1) Perform the normal diagnosis routines for the DTCs retrieved from processor memory.

(2) Remove the transmission oil pan per the appropriate model Workshop Manual.

(3) Verify that the solenoid interconnect molded lead frame is fully seated on all the solenoid connectors as shown in Figure 1. If the solenoid interconnect molded lead frame is fully seated, then gently remove the solenoid interconnect molded lead frame, valve body and the bulkhead interconnect.

(4) With the bulkhead interconnect removed, push down on the terminal cover and check to see if any of the terminals are slightly protruding above the plastic cover as shown in Figure 2. Gently pry off the terminal cover using a small screwdriver (See Figure 3). With the terminal cover off, inspect the bulkhead interconnect for spreading terminals as shown in Figure 4.

(5) Replace parts as necessary using the part numbers listed below and reassemble unit.

SERVICE INFORMATION:

Bulkhead Interconnect (Case Connector) F8AZ-7G276-AA
Solenoid Interconnect (Internal Molded Harness) F8AZ-7G276-BA

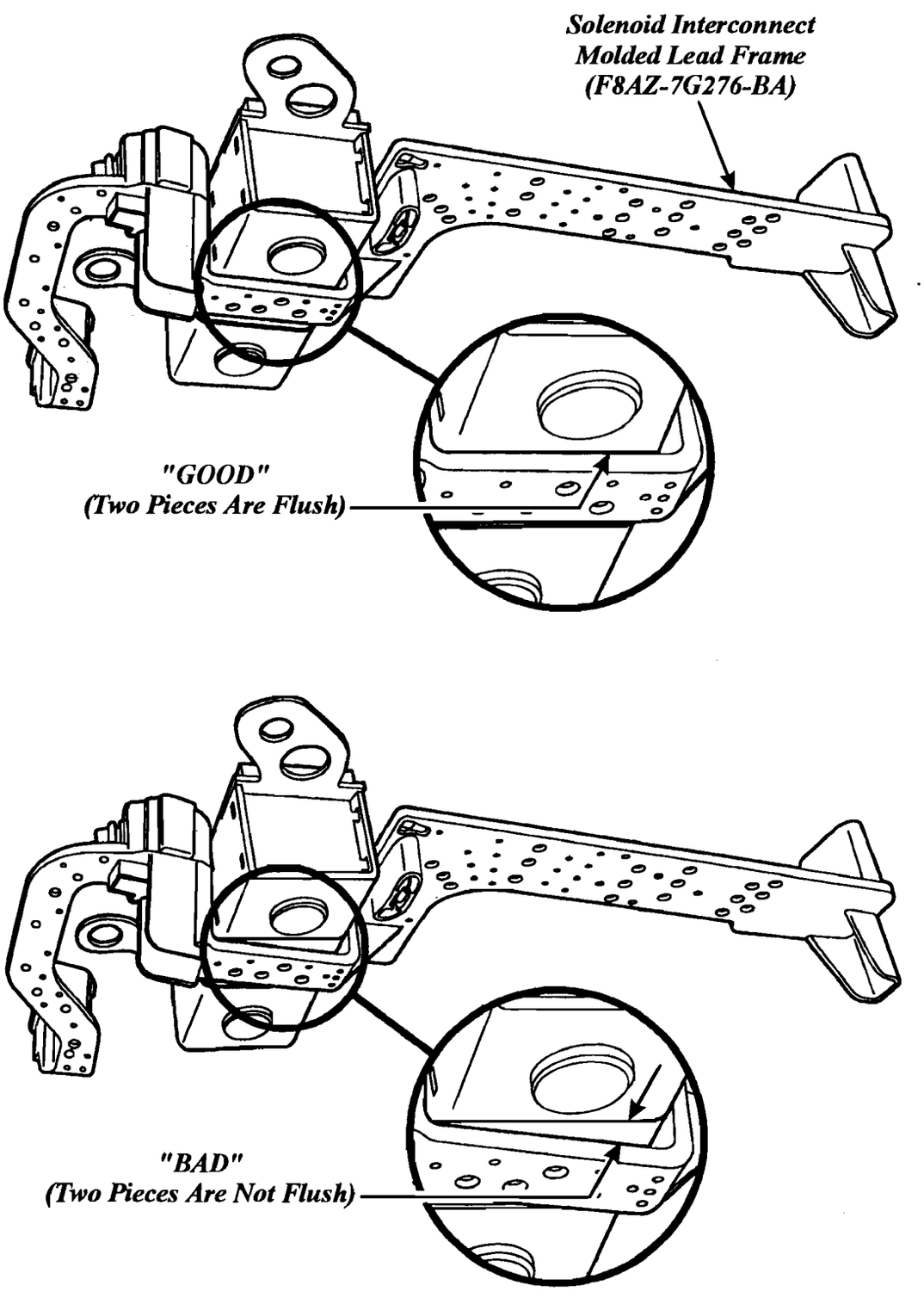


Figure 1

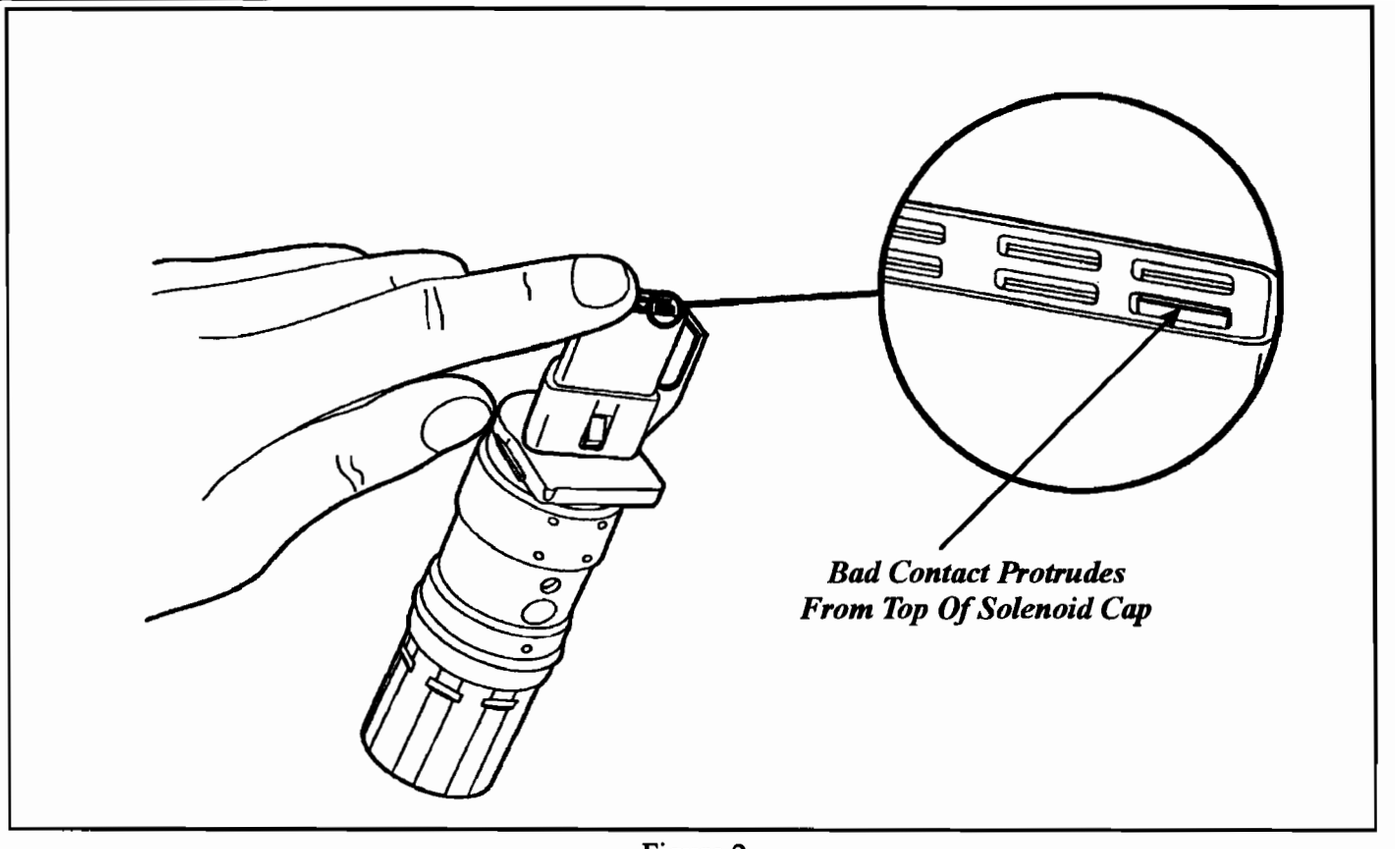


Figure 2

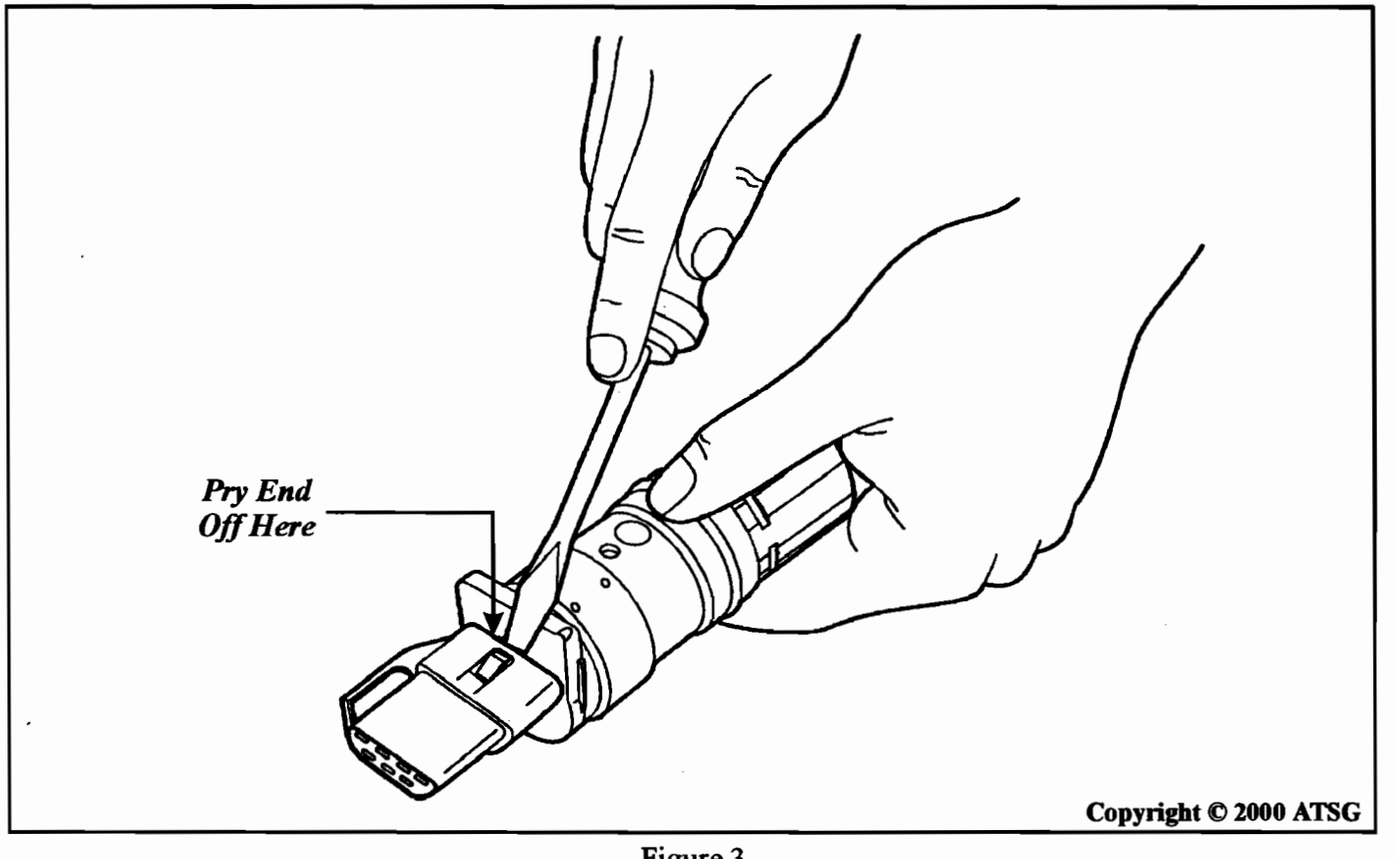


Figure 3

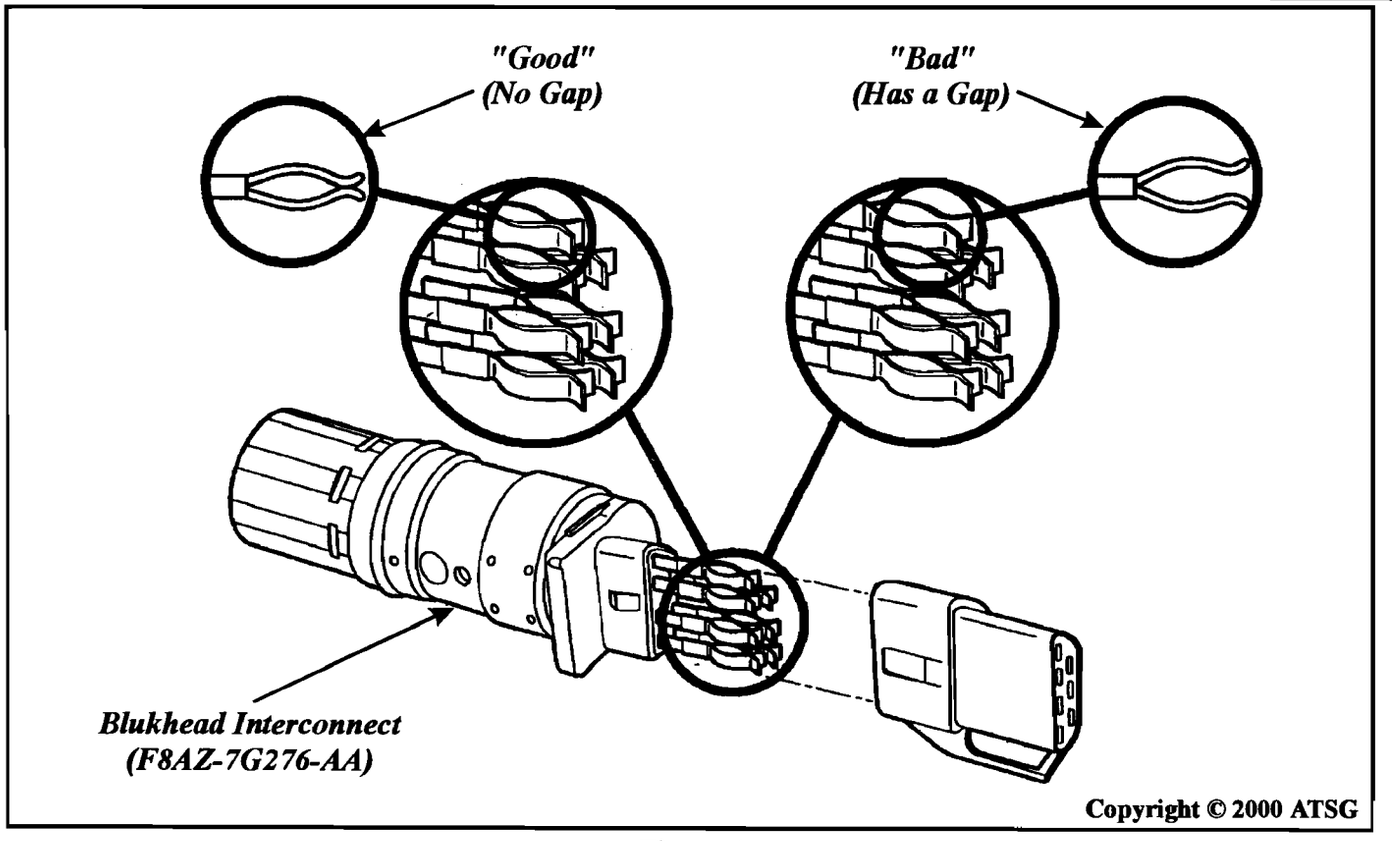

"Good"
(No Gap)
"Bad"
(Has a Gap)
Blukhead Interconnect
(F8AZ-7G276-AA)
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Figure 4

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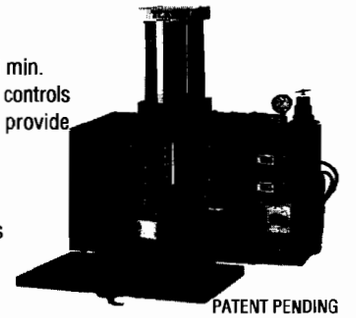

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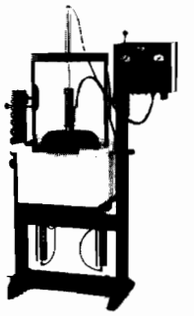

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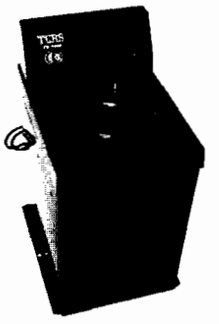
- Fluid or dry balance
- Add life to your shelf converters-no rust build-up
- Computer touch key pad for entering torque converter diam.



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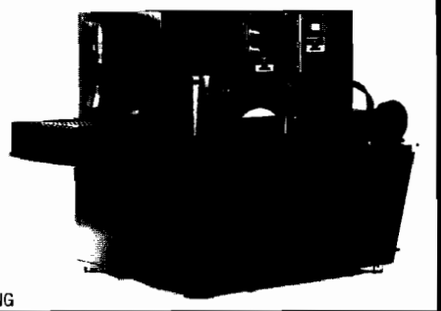

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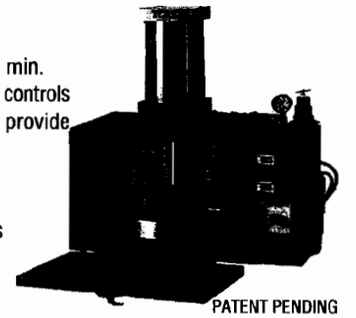

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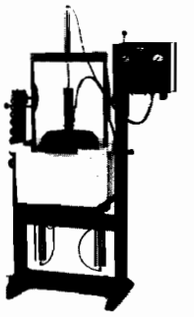

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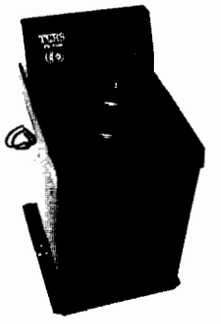

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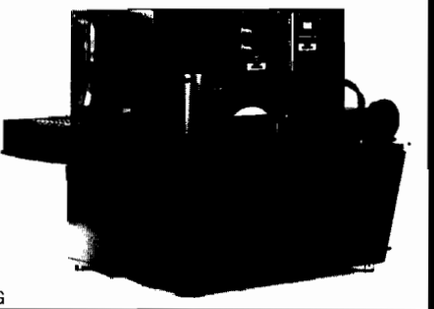

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4R100 CASE *"NON-PTO" AND "PTO"*

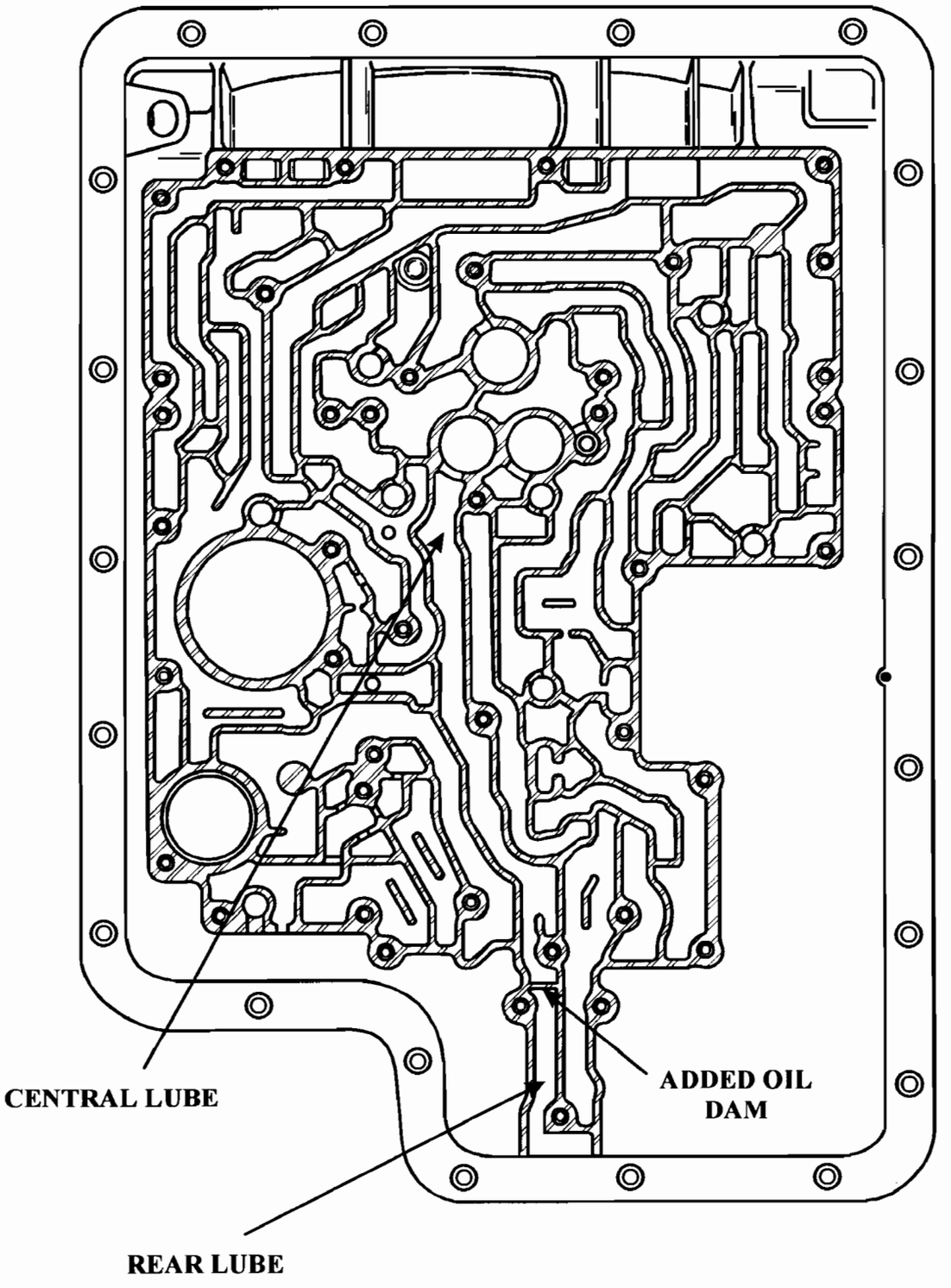

Figure 1

4R100 MAIN SPACER PLATE *"NON-PTO"*

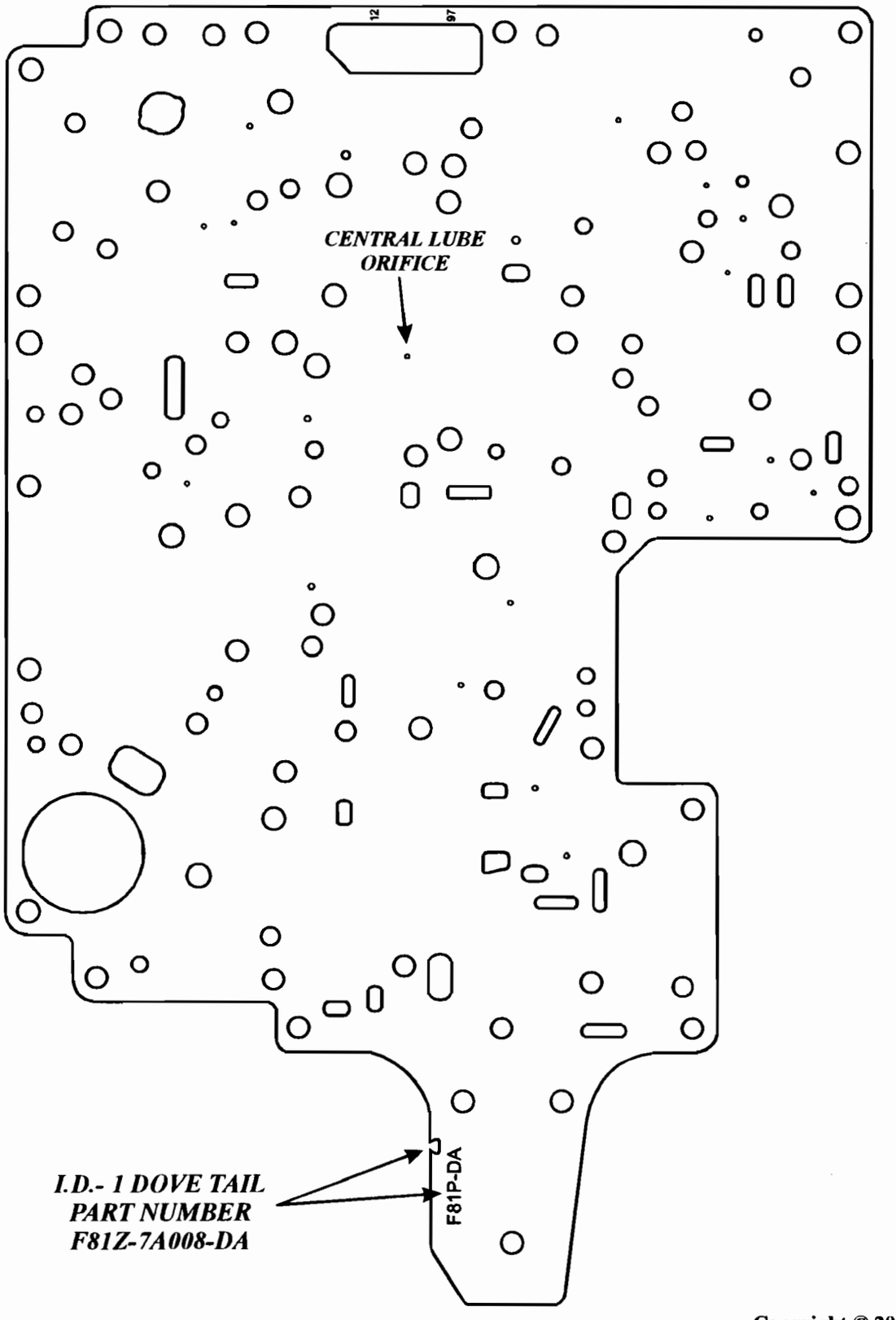

Figure 2

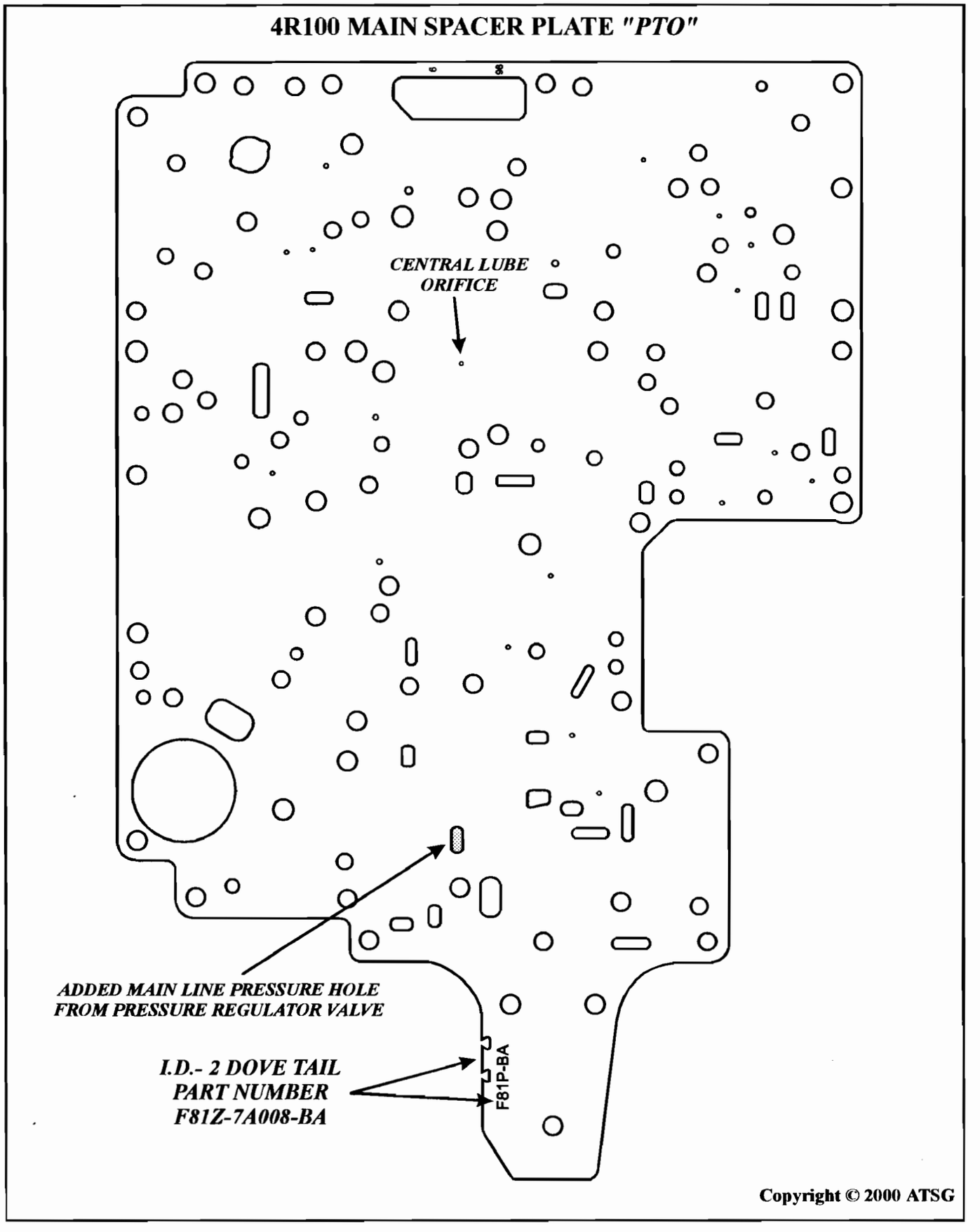
4R100 MAIN SPACER PLATE *"PTO"*
CENTRAL LUBE ORIFICE
ADDED MAIN LINE PRESSURE HOLE FROM PRESSURE REGULATOR VALVE
I.D.- 2 DOVE TAIL PART NUMBER F81Z-7A008-BA
F81P-BA
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Figure 3

"UPPER SIDE" 4R100 MAIN VALVE BODY *"NON-PTO"*

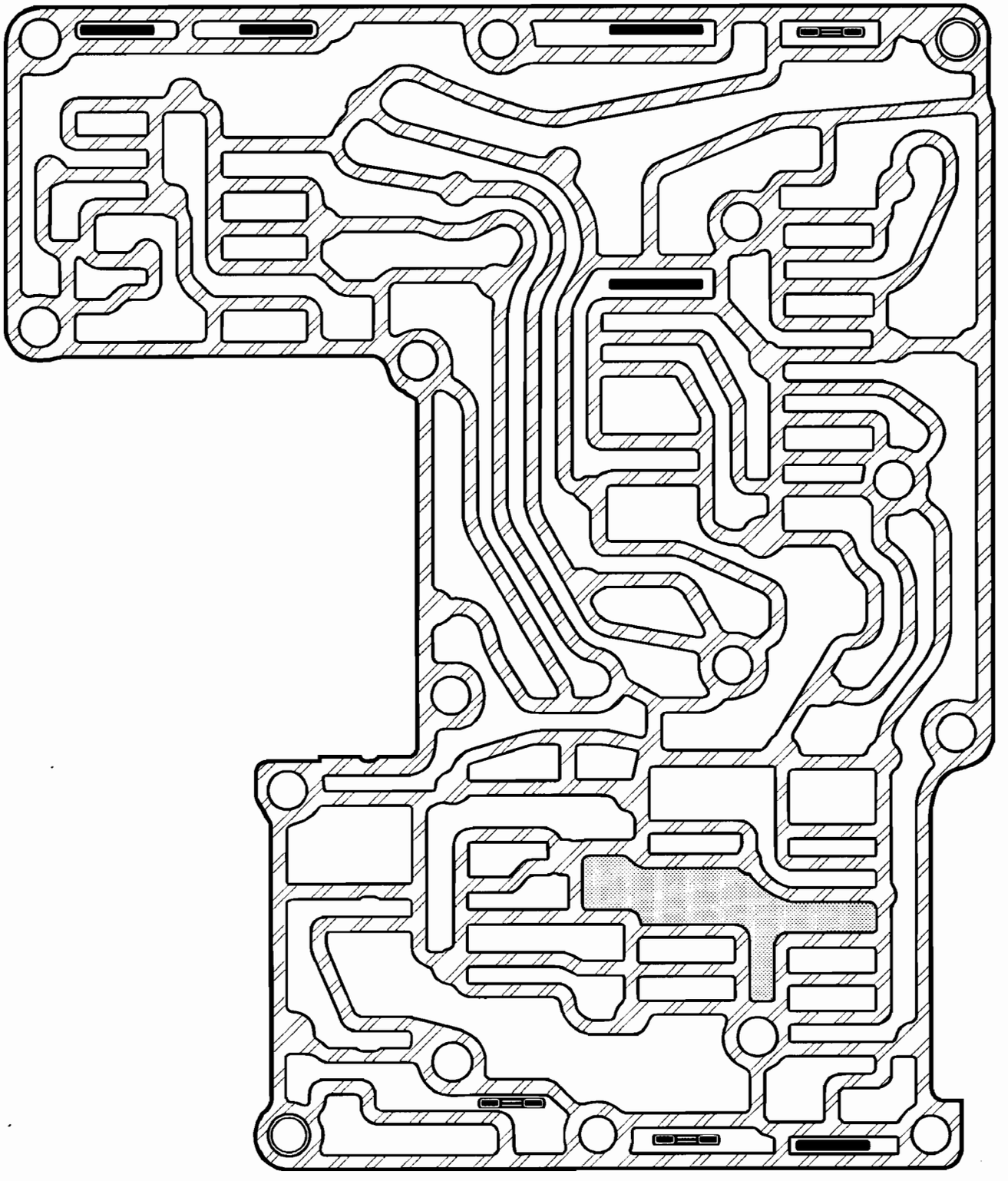

Figure 4

"UPPER SIDE" 4R100 MAIN VALVE BODY *"PTO"*

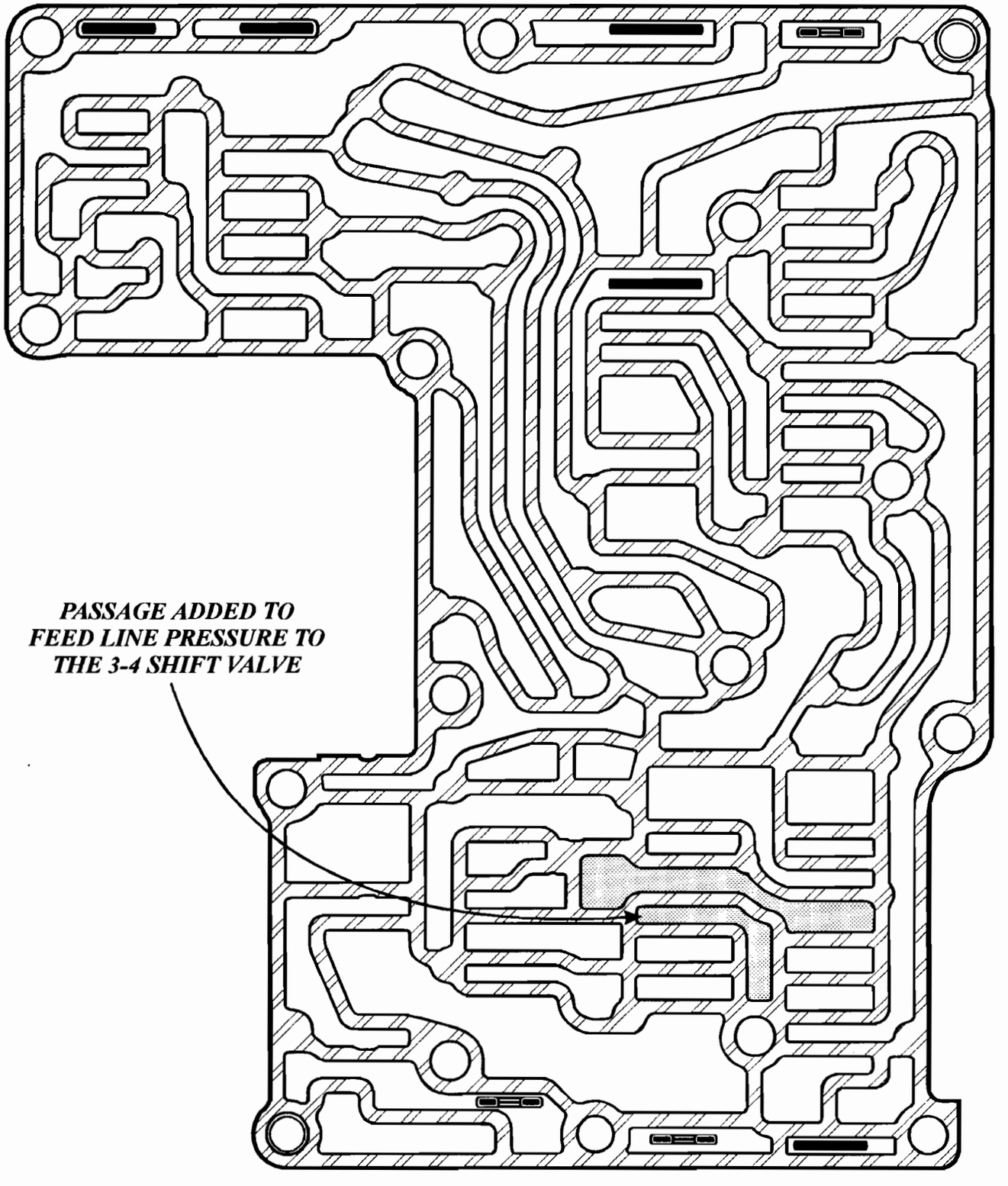

Figure 5

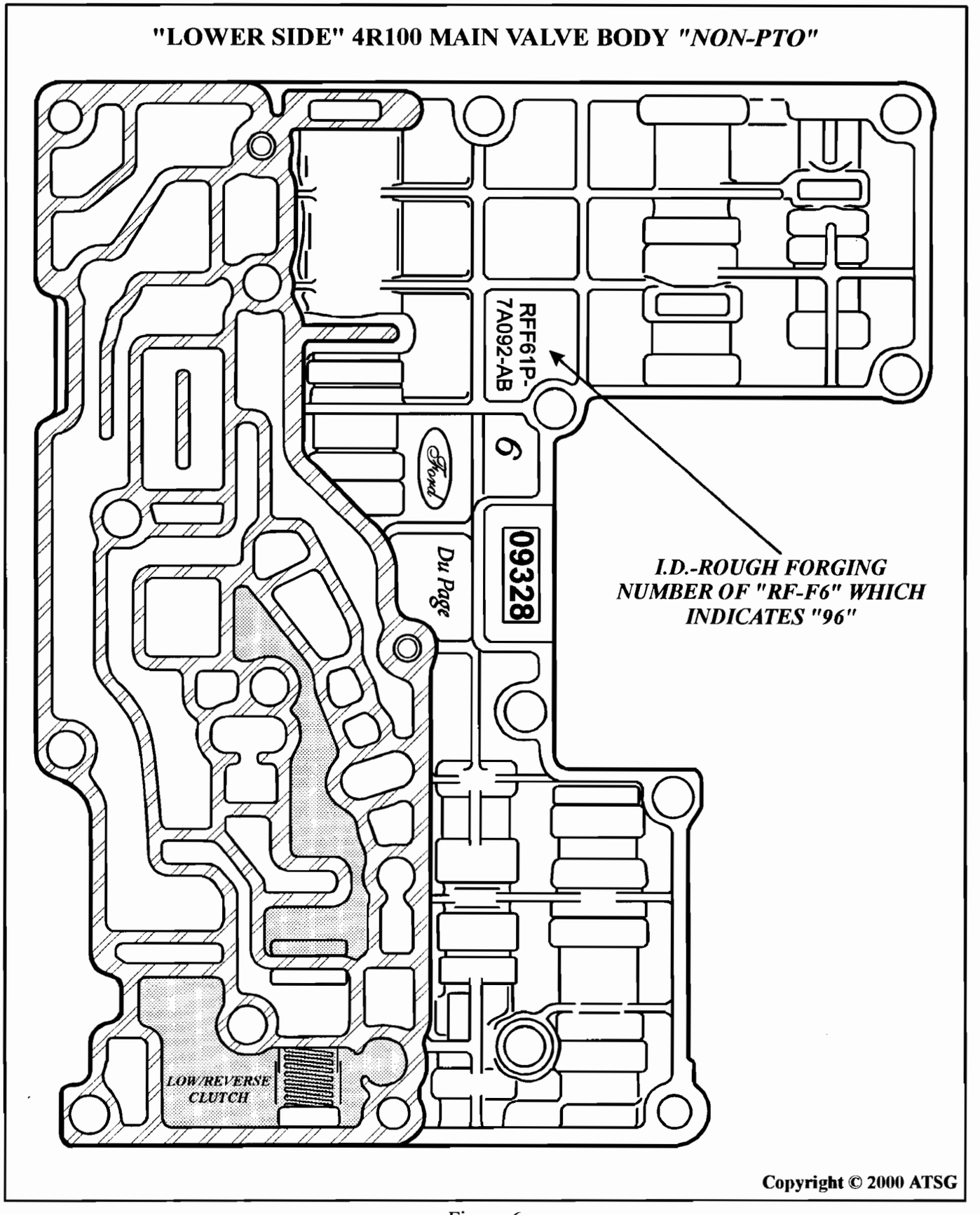
"LOWER SIDE" 4R100 MAIN VALVE BODY *"NON-PTO"*
RFF61P-7A092-AB
6
Ford
Du Page
09328
I.D.-ROUGH FORGING NUMBER OF "RF-F6" WHICH INDICATES "96"
LOW/REVERSE CLUTCH
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Figure 6

"LOWER SIDE" 4R100 MAIN VALVE BODY *"PTO"*

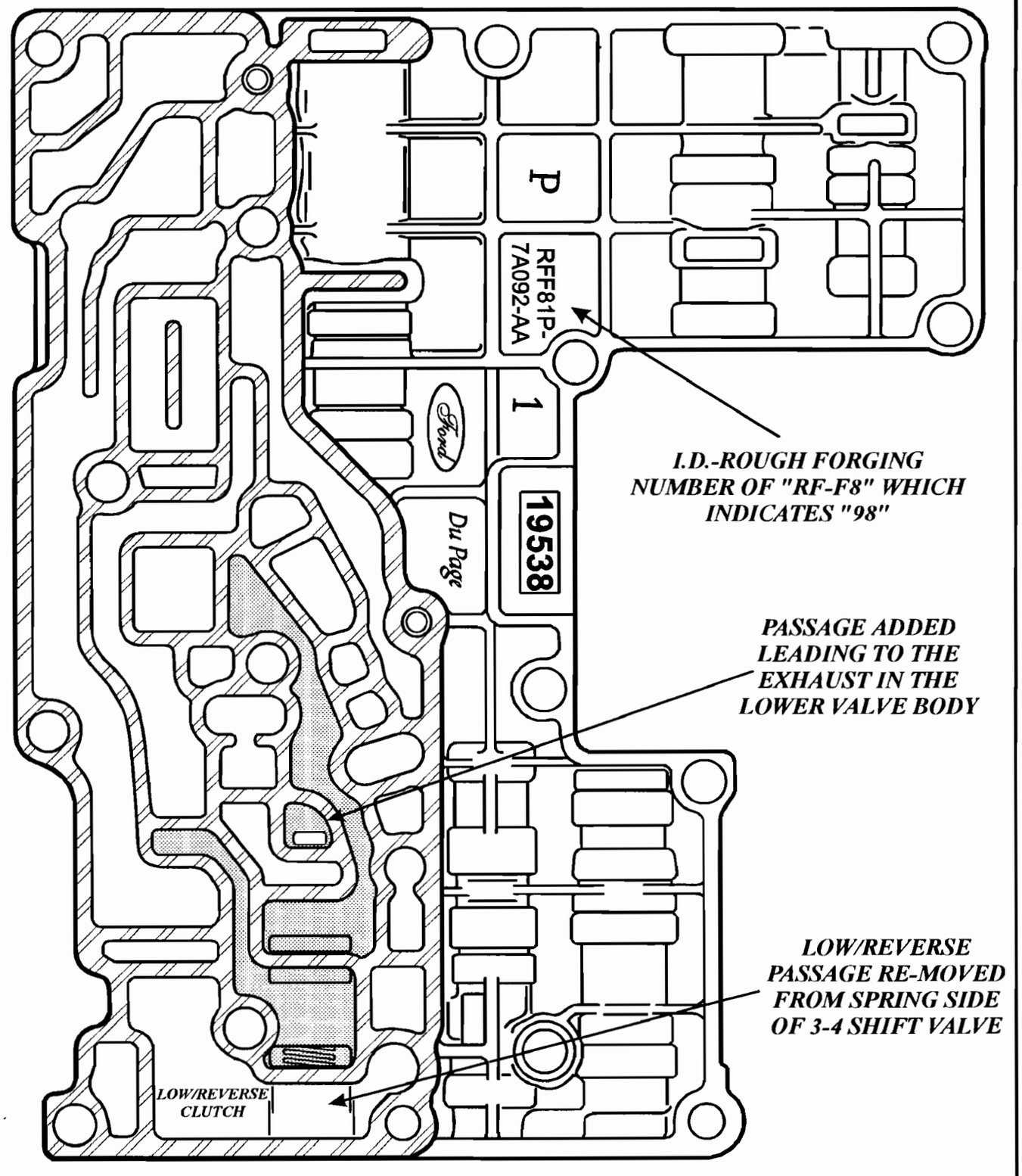

Figure 7

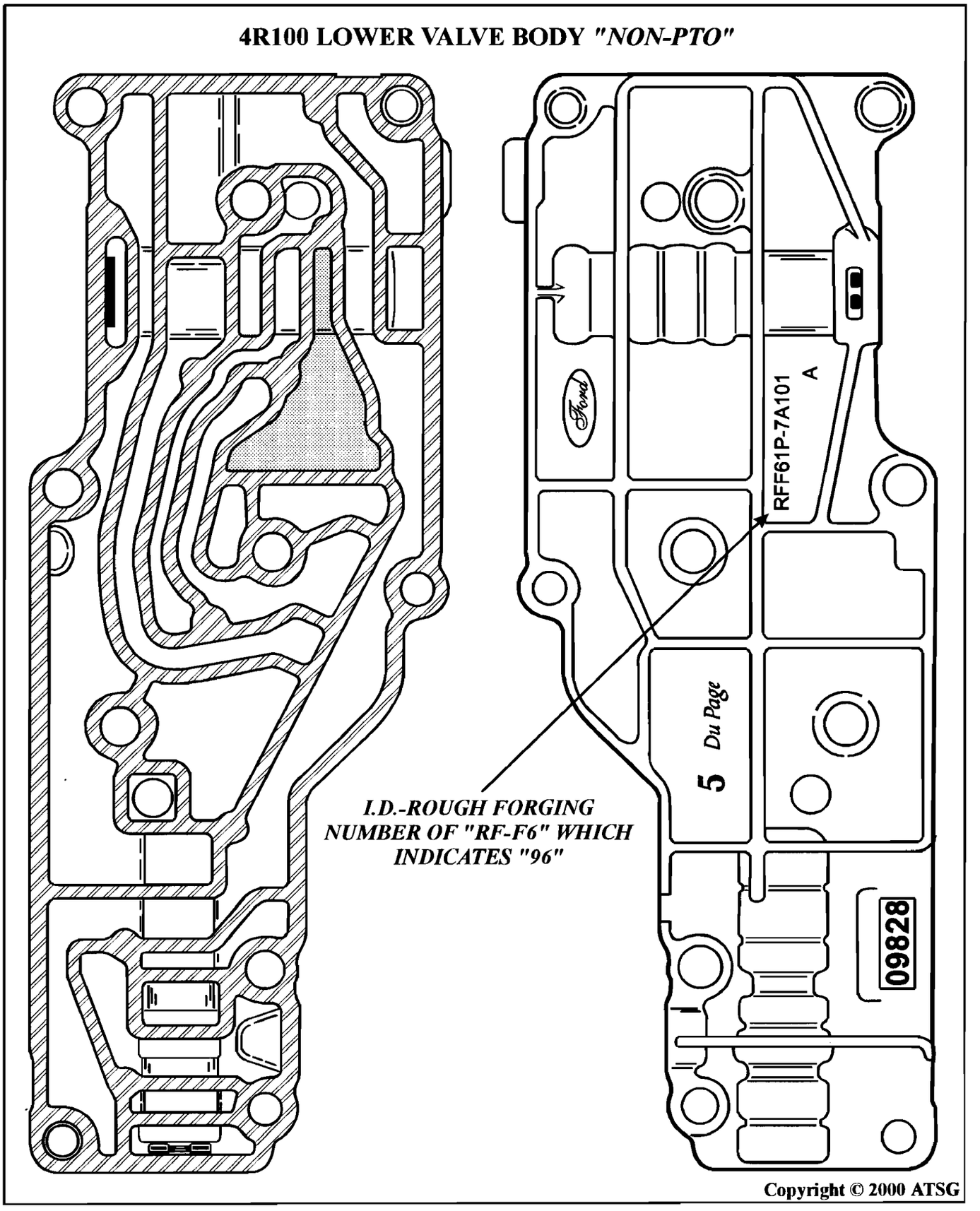
4R100 LOWER VALVE BODY *"NON-PTO"*
Ford
RFF61P-7A101
A
5 Du Page
09828
I.D.-ROUGH FORGING NUMBER OF "RF-F6" WHICH INDICATES "96"
Copyright © 2000 ATSG

Figure 8

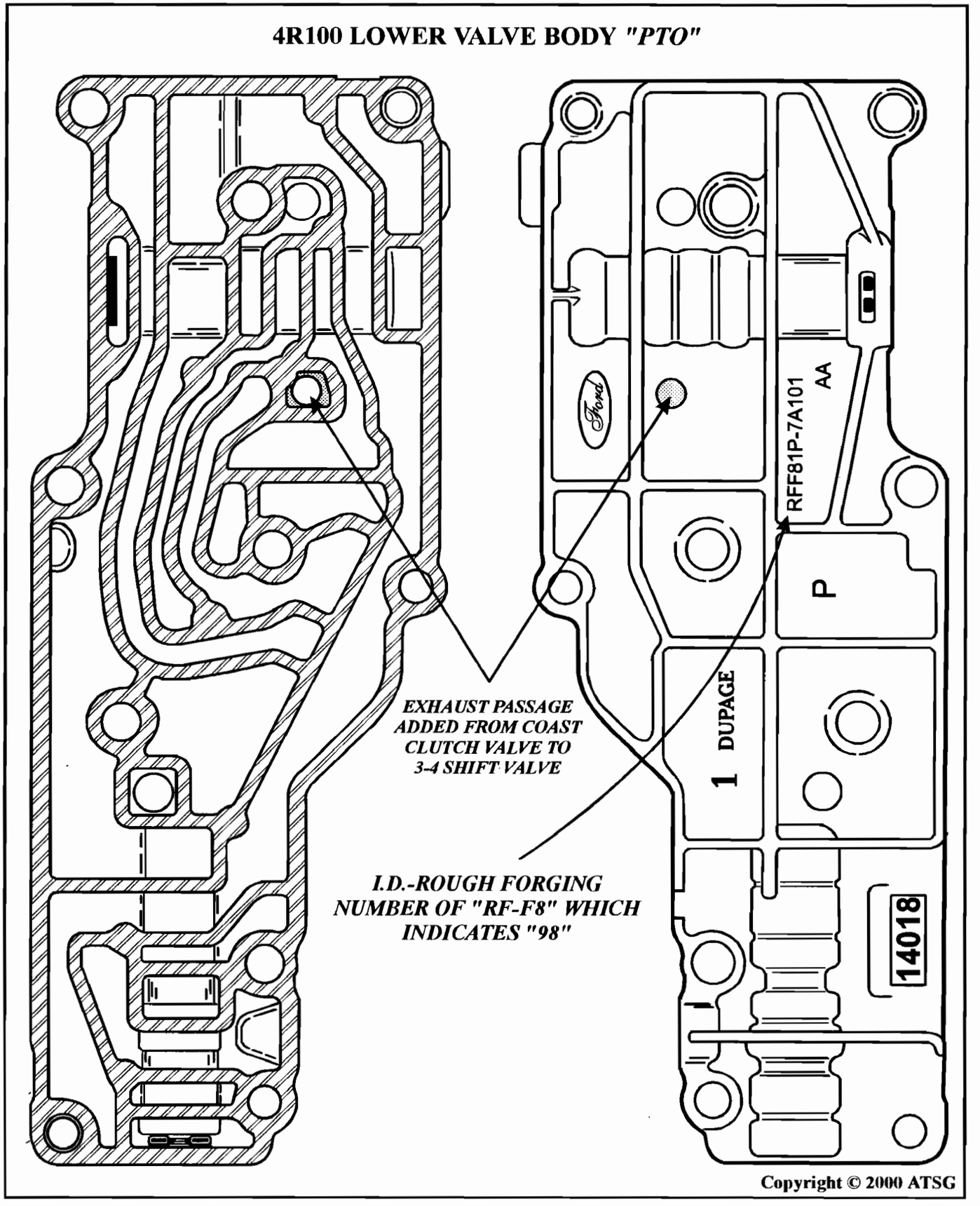
4R100 LOWER VALVE BODY *"PTO"*
EXHAUST PASSAGE ADDED FROM COAST CLUTCH VALVE TO 3-4 SHIFT VALVE
I.D.-ROUGH FORGING NUMBER OF "RF-F8" WHICH INDICATES "98"
RFF81P-7A101 AA
P
1 DUPAGE
14018
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Figure 9

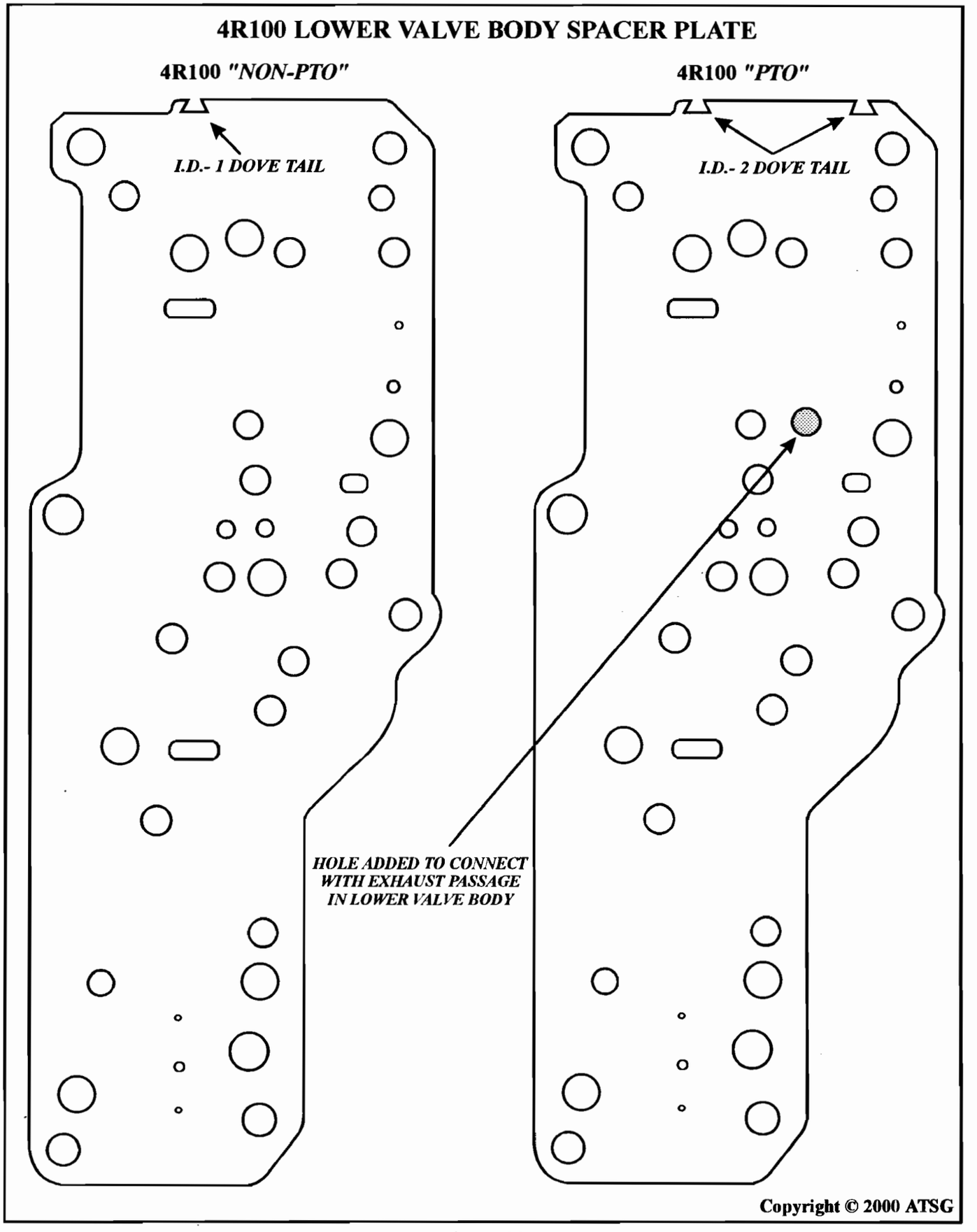
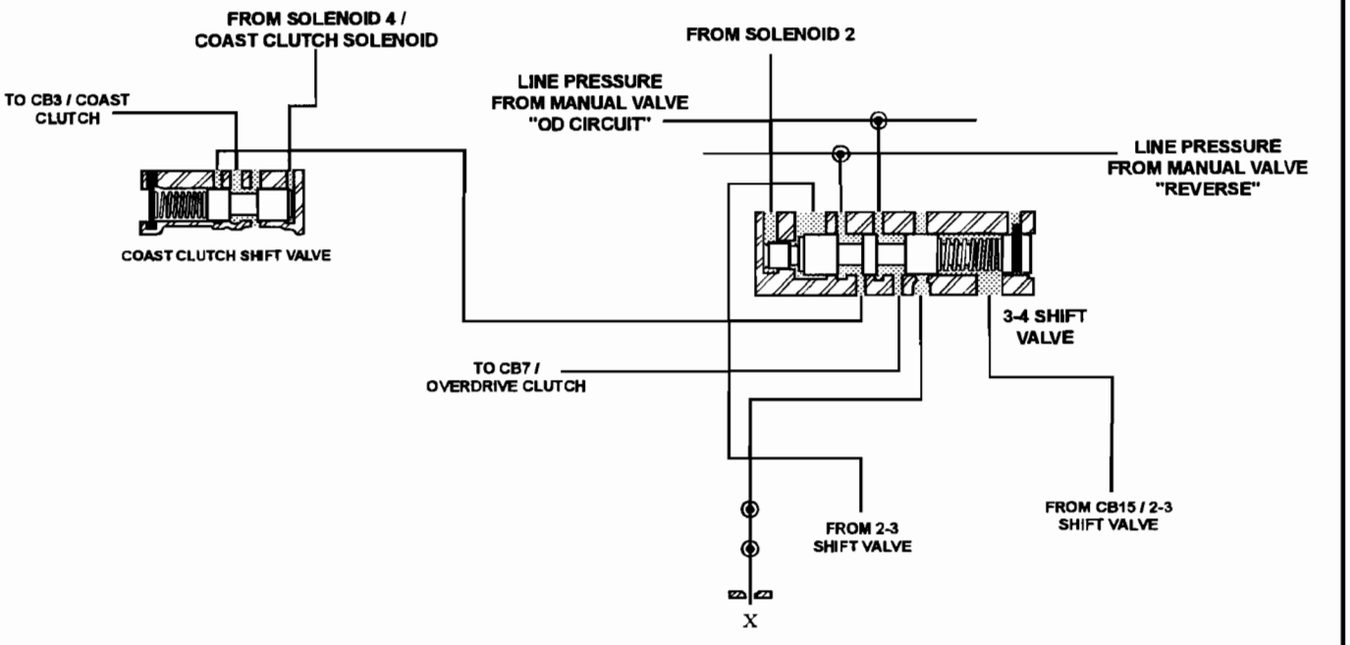

4R100 LOWER VALVE BODY SPACER PLATE
4R100 "NON-PTO"
4R100 "PTO"
I.D.- 1 DOVE TAIL
I.D.- 2 DOVE TAIL
HOLE ADDED TO CONNECT WITH EXHAUST PASSAGE IN LOWER VALVE BODY
Copyright © 2000 ATSG

Figure 10

"NON-PTO" 3-4 SHIFT VALVE HYDRAULIC CIRCUIT



"PTO" 3-4 SHIFT VALVE HYDRAULIC CIRCUIT

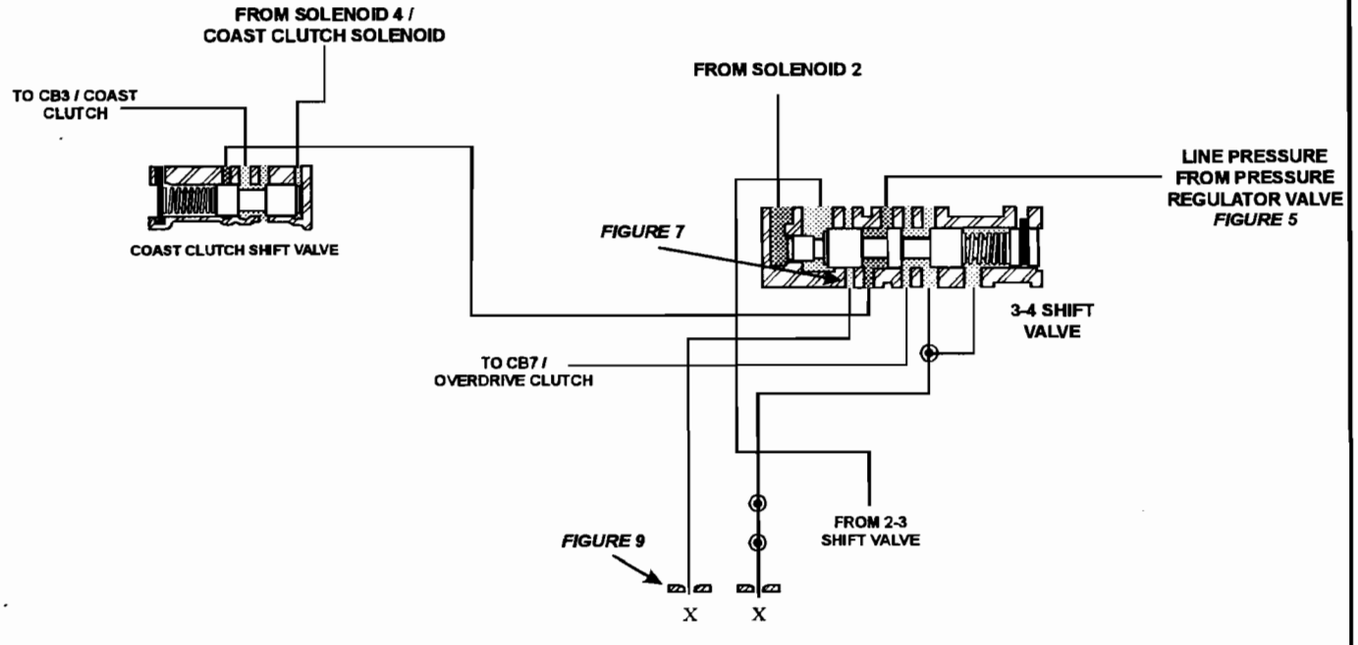


Figure 11

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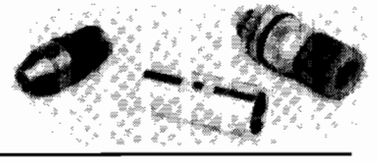

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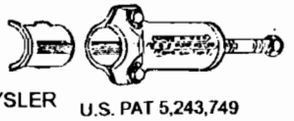
BIG 3
FRONT PUMP PULLER
FORD, G.M., CHRYSLER



U.S. PAT 5,243,749

NEW

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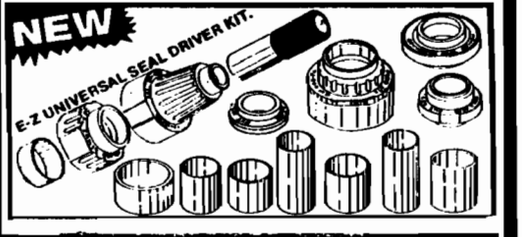
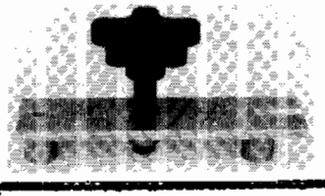


E-Z SQUEEZE® SERVO PISTON REMOVER FOR: FORD AOD-E



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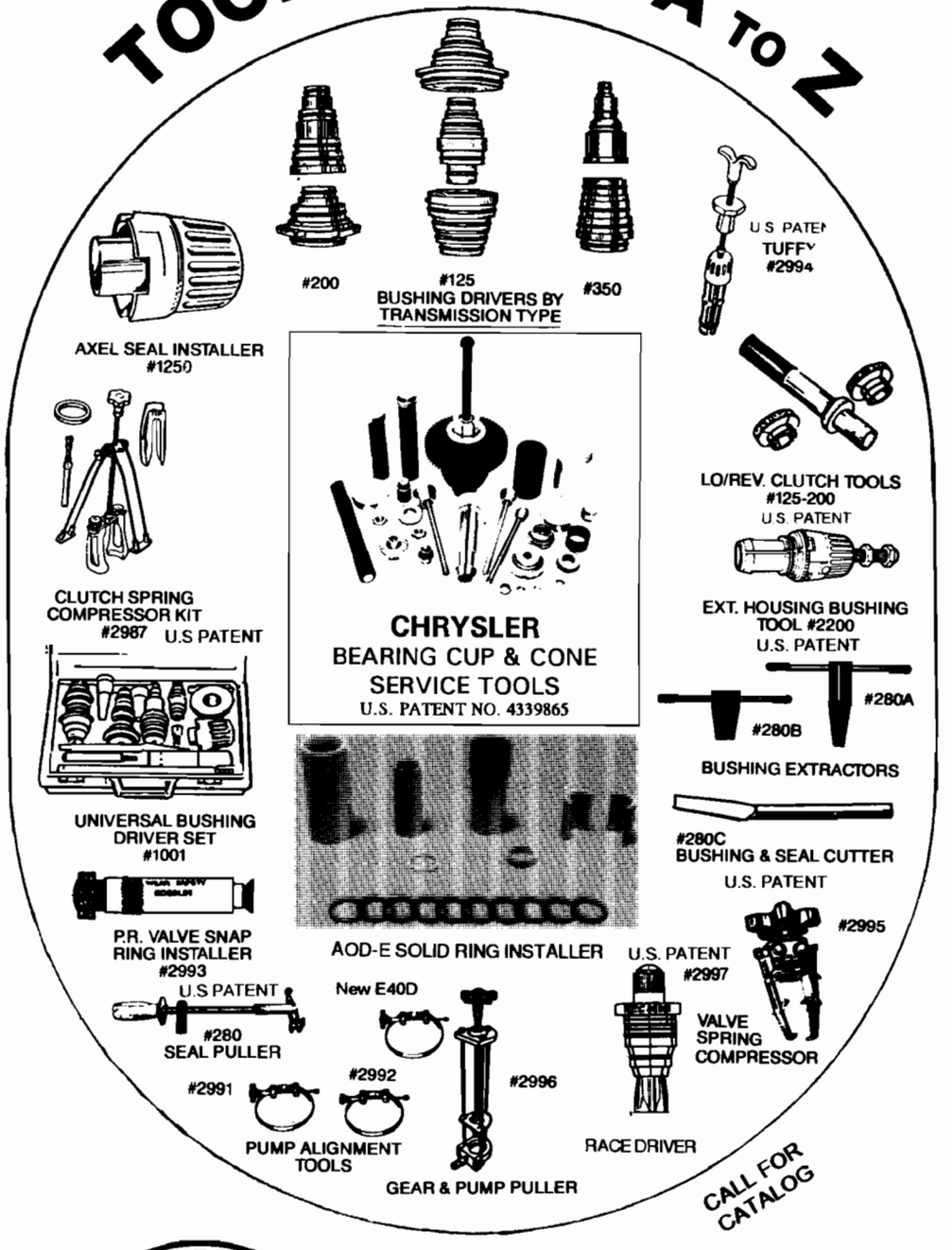

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FORD's NEW 5R55N TRANSMISSION

PRELIMINARY INFORMATION

(Adapted from Ford Bulletin 99-8-13)

Ford's new 5R55N is a 5 speed rear wheel drive non-synchronous transmission (See Figure 1). Currently this transmission is installed in the 2000 Lincoln LS and the Jaguar X200. The internal components are similar to the 5R55E transmission. However, the 5R55N shares very few components to the 5R55E as major upgrades took place through its development.

Electro-Hydraulic Shift Control Features

- Torque Converter Clutch Modulation for smooth clutch engagement and shift.
- Full electronic shift control by our new 32-bit Powertrain Electronic Controller (PTEC) for smooth and responsive powertrain performance.
- Closed Loop Shift Control, Electronic Clutch Pressure Control and Engine Torque modulation for smooth shift.
- Adaptive Shift Control for consistent shift quality throughout the life of the vehicle.
- Reactive Shift Scheduling to react to throttle position and the rate of throttle change.
- Overdrive (5th gear) lockout in automatic mode in D4 shifter position (Figure 2).
- Manual Shift Capability (***Optional*** Select Shift Transmission (SST) (Figure 3) to allow the driver to control the transmission shift point by tapping the shift lever forward or rearward.
- Three speed sensors for precise shift control (Transmission Speed Sensor (TSS), Idle Speed (ISS), and Output Shaft Speed Sensor (OSS) (See Figure 4).
- Integrated Solenoid Body Assembly (Figure 5), contains: three Pressure Control Solenoids (PCS A, B & C), four Shift Solenoids (SS A, B, C & D), Torque Converter Clutch (TCC) Solenoid, and a Transmission Fluid Temperature (TFT) Sensor.
- Reverse Pressure Switch (Figure 5) to detect pressure in the main control valve body (mounted on the main control).

Hydraulic/Mechanical Features

- Wide ratio span 5speed with close ratio steps for smooth shift quality and improved performance:

Gear	1st	2nd	3rd	4th	5th	Reverse	Ratio Span
Ratio	3.25	2.44	1.55	1.00	0.75	3.07	4.33

- Three One Way Clutches for smooth nonsynchronous shift.
- Engine braking capability during coast operation in all gears.
- One piece die cast aluminum case with the reenforcement ribs to minimize powertrain Noise, Vibration & Harshness (NVH).
- Fixed output flange to minimize driveline disturbances.
- High capacity torque converter clutch to maximize the lockup capability in all throttle conditions.

5R55N *Continued*

- Brazed torque converter blades for high speed capability and improved efficiency.
- Dedicated air-to-oil transmission cooler for low transmission operating temperature.
- High output trochocentric pump with flow control capability.
- Friction on steel plates (single sided clutch plates).
- New design Reverse Servo Piston Assembly.
- Semi-synthetic fluid for improved durability MERCON® V for service.
- Transmission fluid leveling pipe which eliminates the need of conventional fill tube and dipstick. This new feature requires a special fluid fill procedure as described in the transmission Workshop Manual.
- Adapter plate between the torque converter and flywheel assembly (V8 application only).
- Single bolt transmission rear mount.
- Transmission wire harness with five connectors.

MODEL COMPLEXITY

Transmission Assembly (-7000-)	Model Code (ID Tag Color)	Vehicle Application	Engine	Axle Ratio
XR8P-AC	RJL-D (Apricot)	Jaguar X200	4.0L, V8	3.31
XR8P-BC	RJL-C (Light Green)	Jaguar X200	3.0L, V6	3.31
XW4P-AC	RJL-B (Yellow)	Lincoln LS	3.9L, V8	3.58
XW4P-BC	RJL-A (White)	Lincoln LS	3.0L, V6	3.58

Valve Body and Case

- Figure 7 is a view of the valve body providing the Technician with all retainer locations.
- Figure 8 is a view of the valve body providing the Technician with all check ball and check valve locations.
- Figure 9 is a view of the case providing the Technician with the location for the spring loaded lube seal.

Non-Syncounous Up-Shift

- Unlike the 5R55E, the 5R55N uses a sprag on the back side of the sun gear which will be used to make the non-syncrounous shift. Figure 10 provides a view of the sprag providing the Technician with its proper rotation and hold direction.
- Figure 11 is a view of the single sided clutch plates which will be used to hold the sun gear through the sprag providing the ability of having a non-syncrounous upshift

5R55N *Continued*

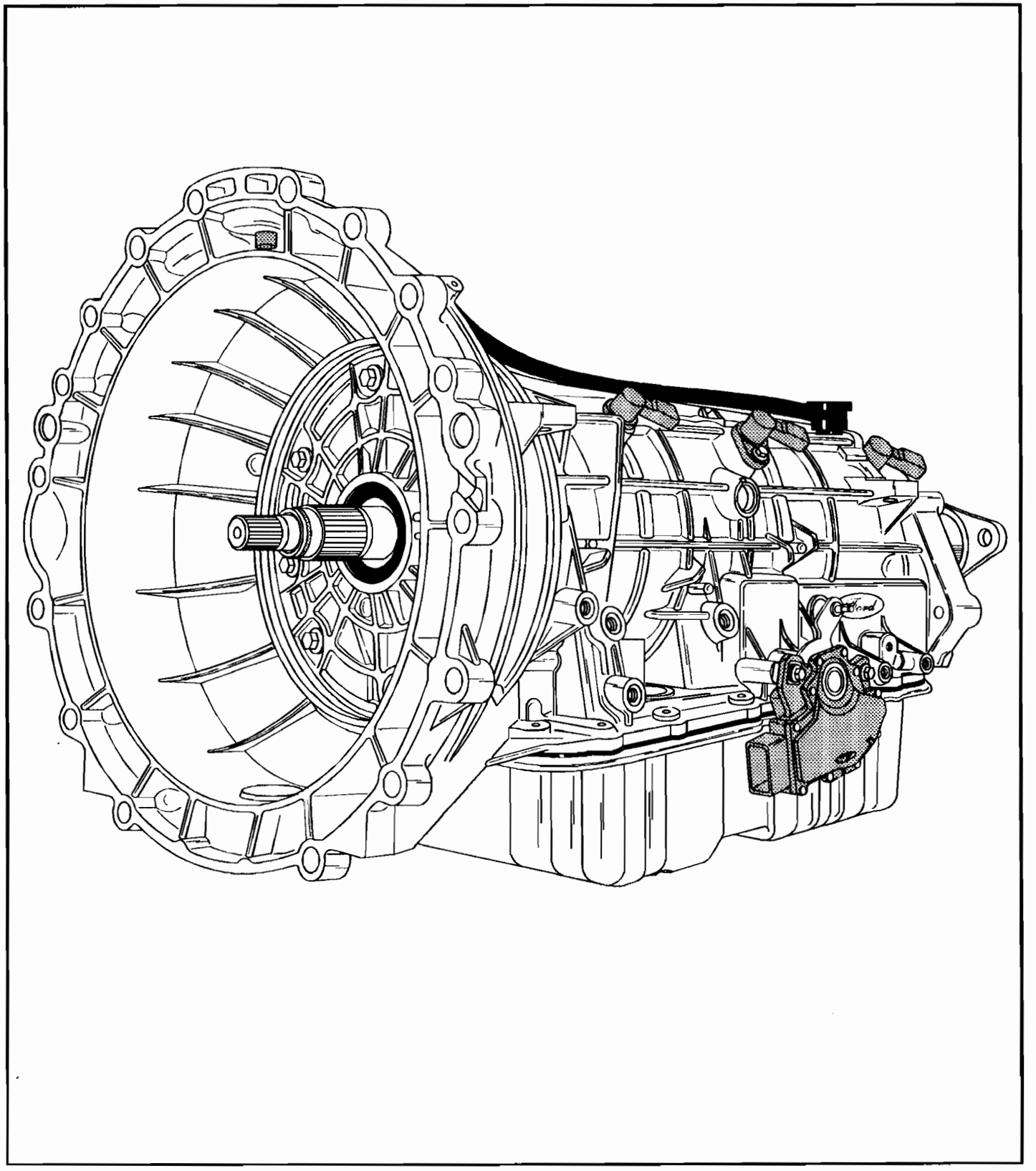


Figure 1

5R55N *Continued*

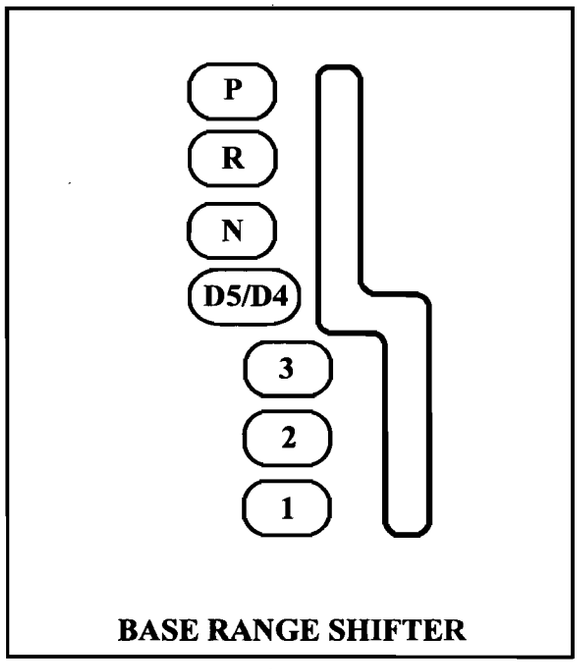


Figure 2

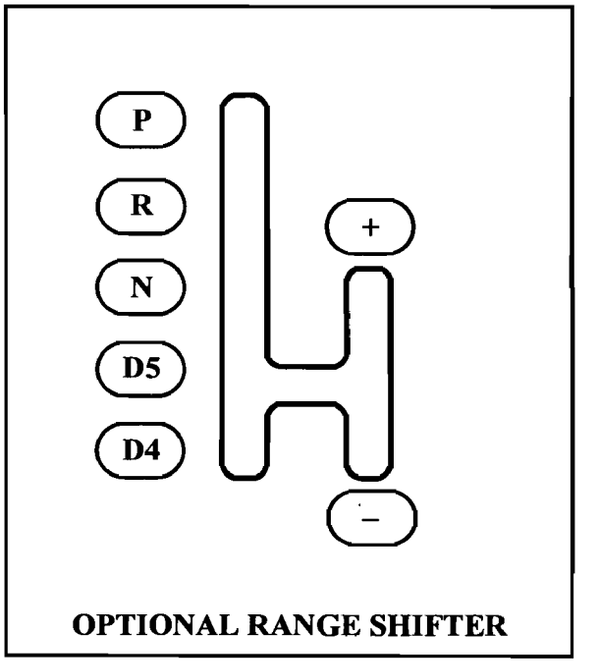


Figure 3

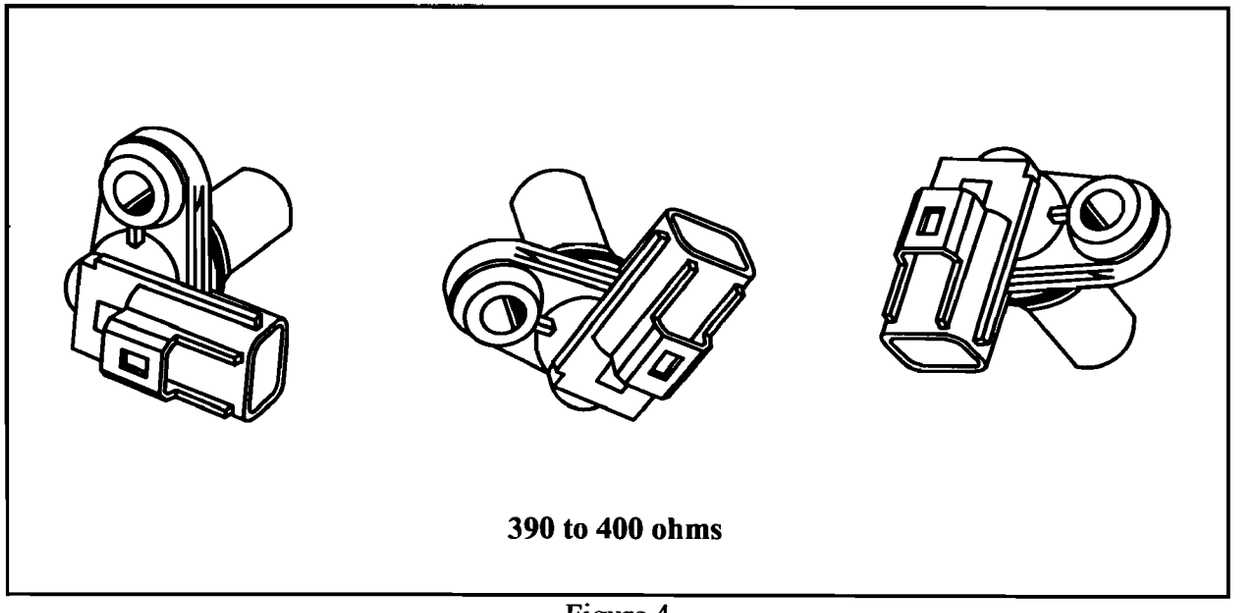


Figure 4

5R55N *Continued*

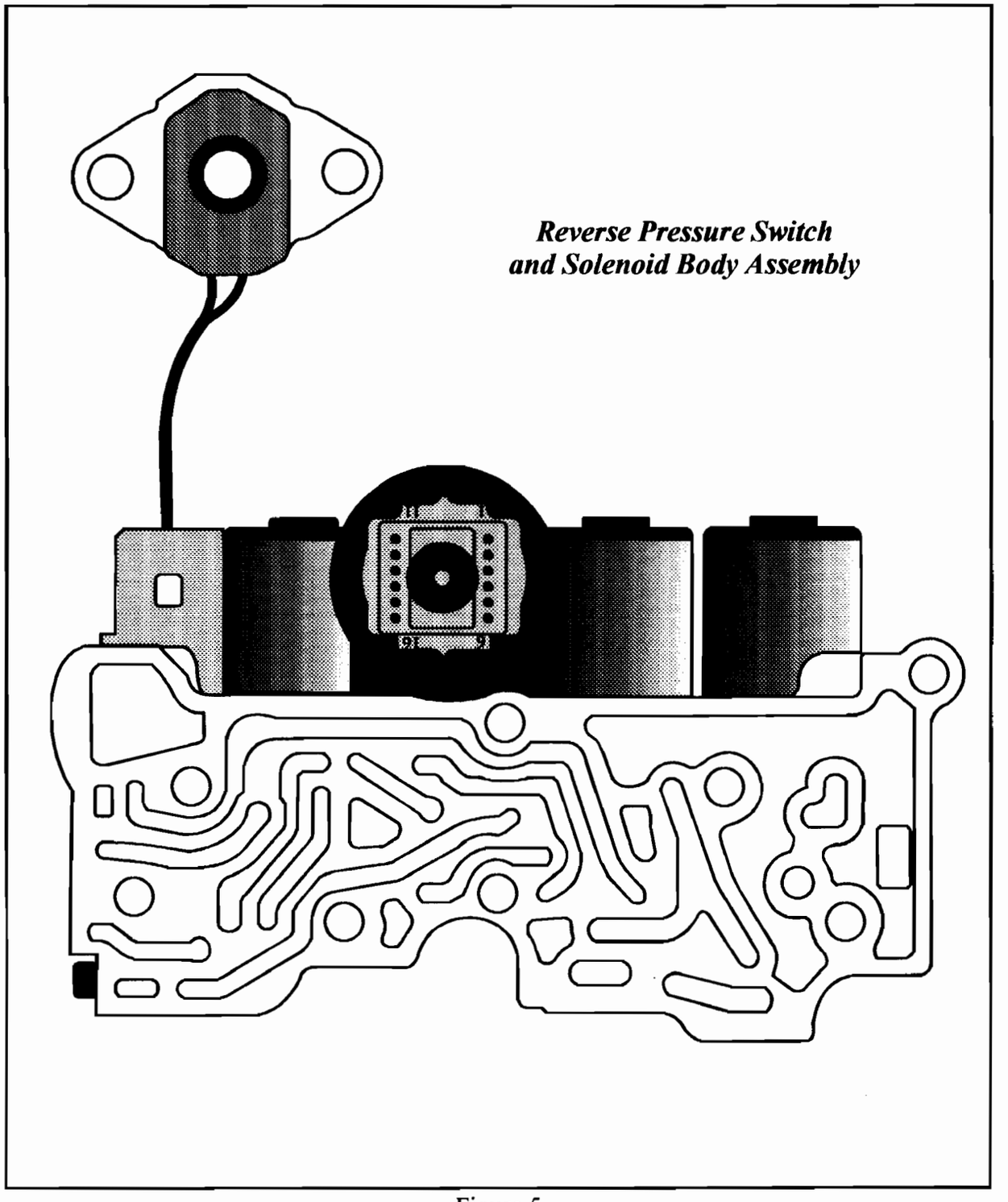
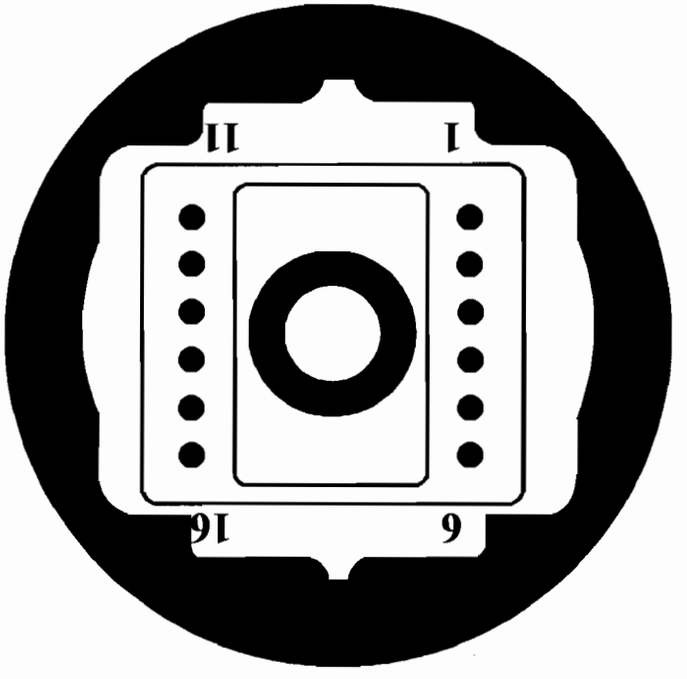


Figure 5

5R55N *Continued*



RESISTANCE CHECK CHART			
DEVICE	**POSITIVE TERMINAL**	**NEGATIVE TERMINAL**	**VALUE**
PCS PCS PCS	3	1 4 11	5 ohms 5 ohms 5 ohms
SS SS SS SS		5 6 15 16	24 ohms 24 ohms 24 ohms 24 ohms
TCCS		14	10 ohms
R.P.S.	13	12	Open/Close
T.F.T	2	12	34.93K ohms @ 75° F

Figure 6

FORD 5R55N
VALVE BODY RETAINER LOCATION

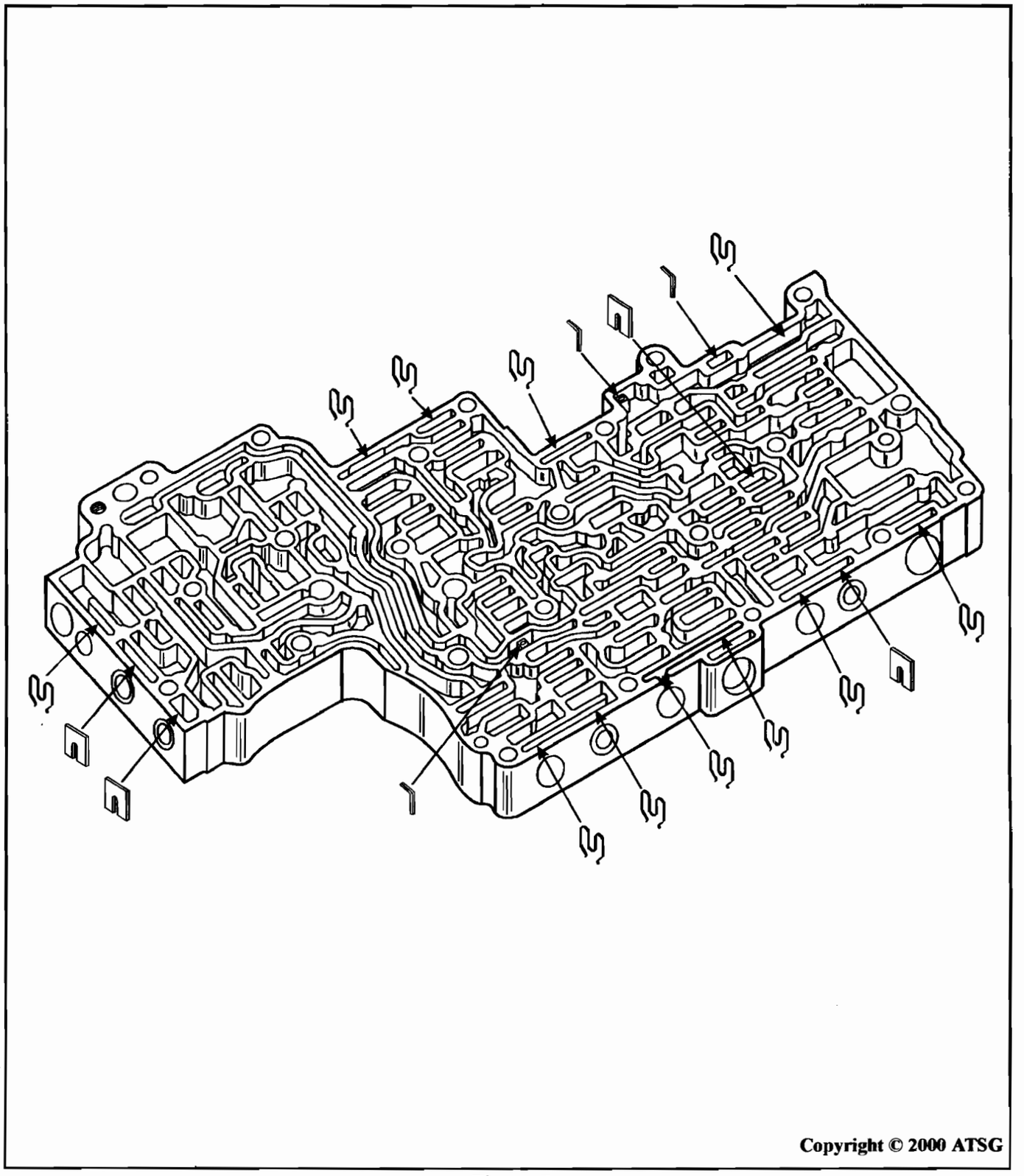


Figure 7

FORD 5R55N
VALVE BODY CHECK BALL LOCATION

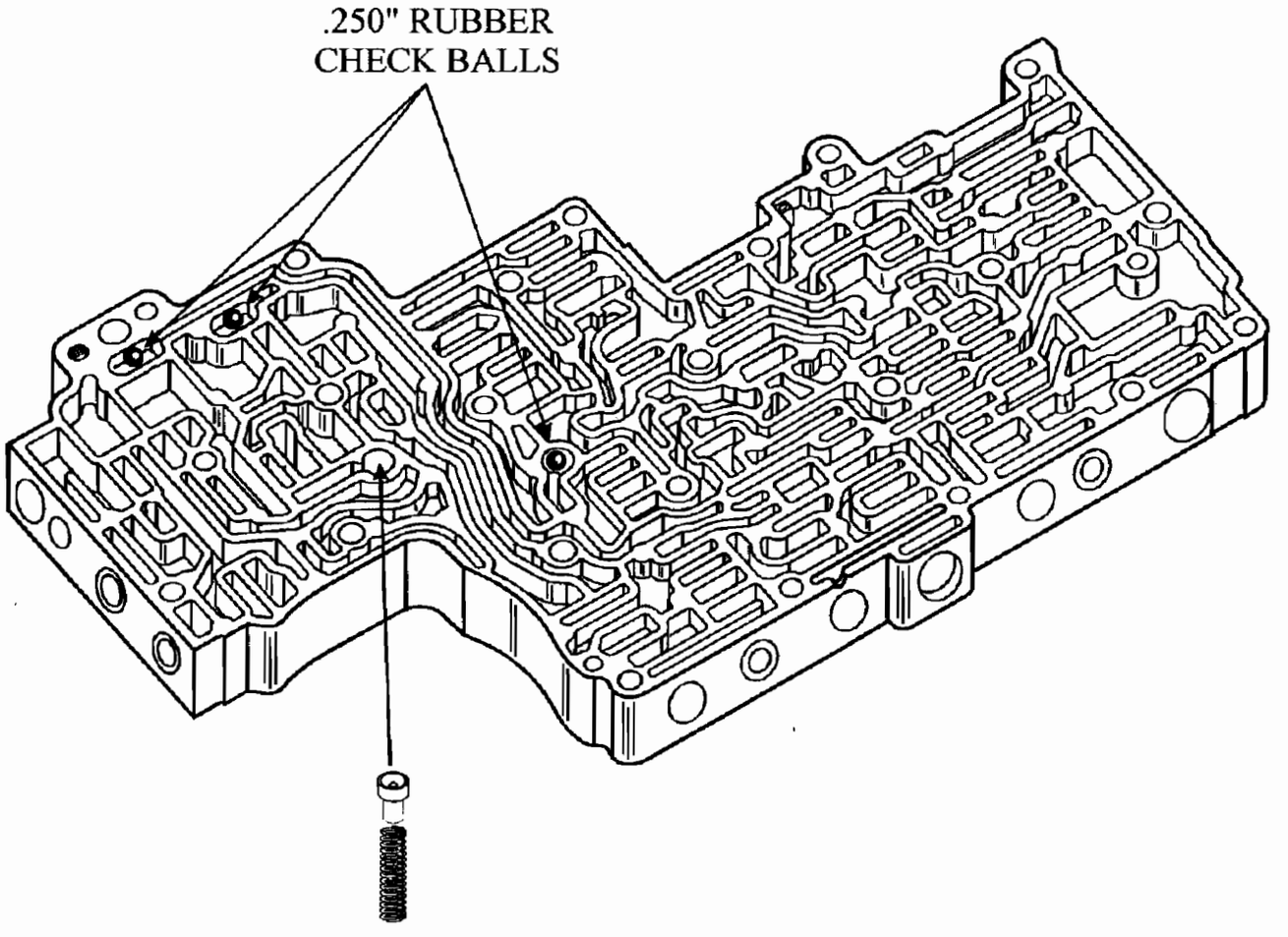


Figure 8

FORD 5R55N SUPPORT SEAL AND SPRING LOCATION

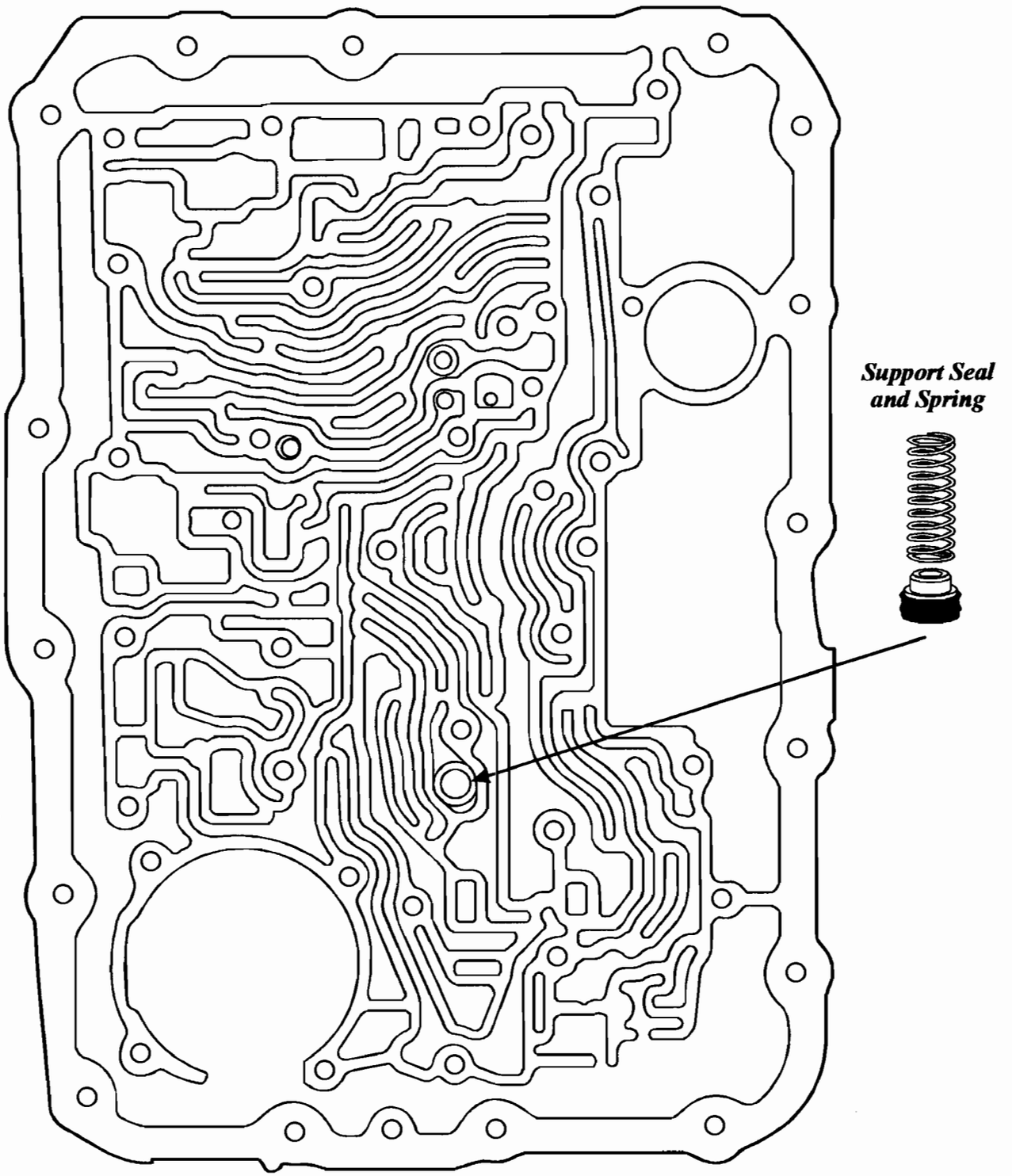


Figure 9

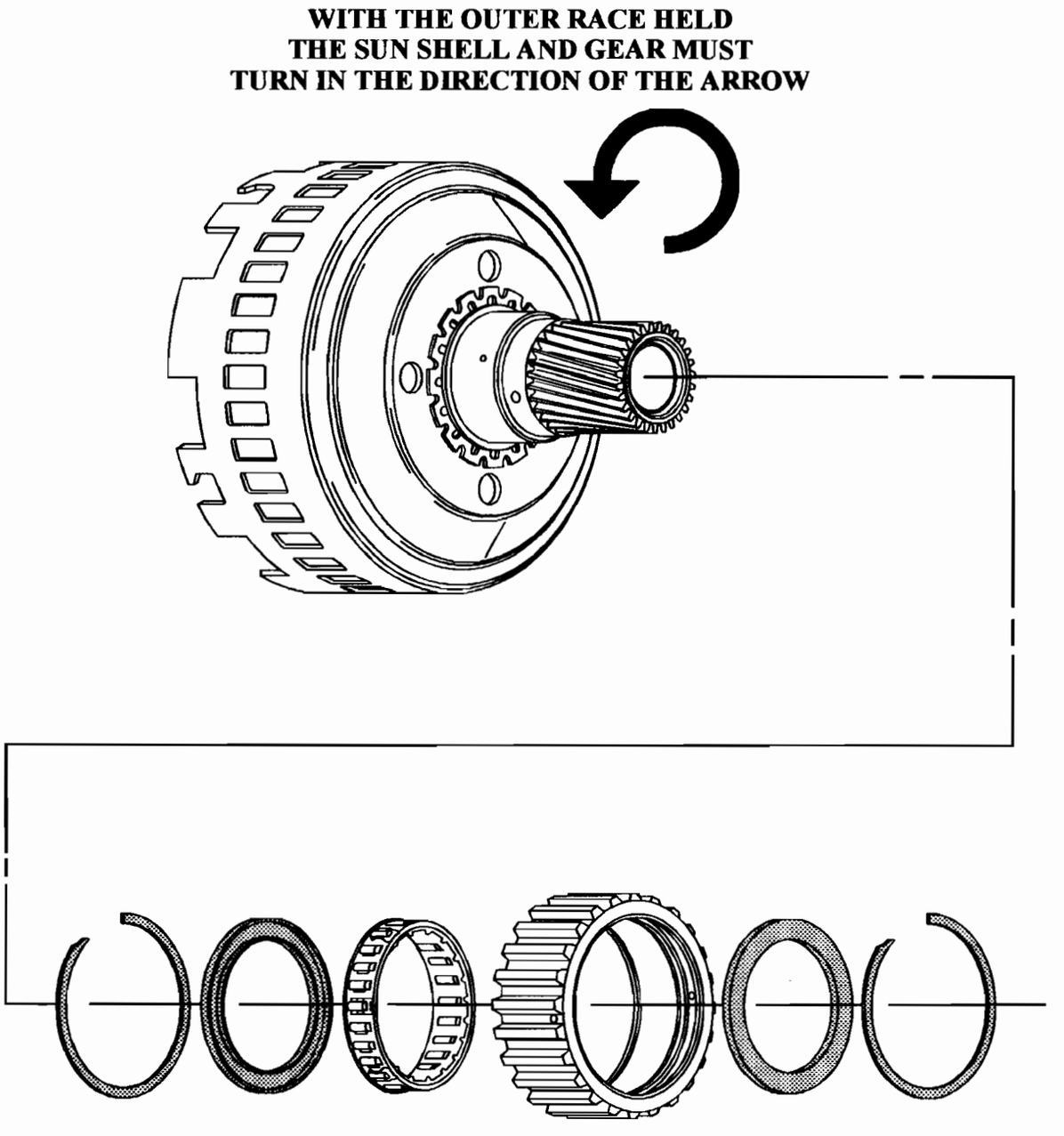


Figure 10

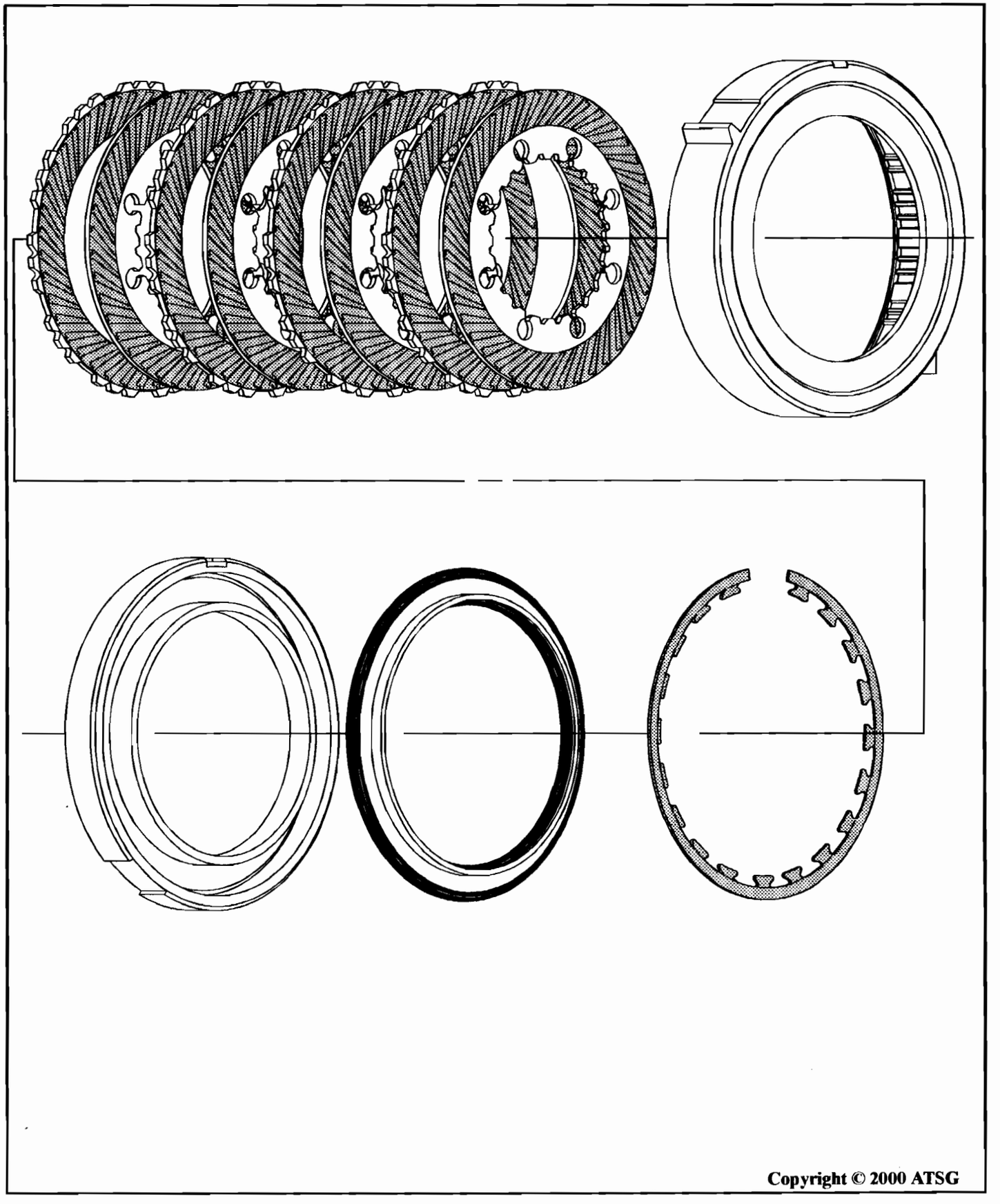


Figure 11

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