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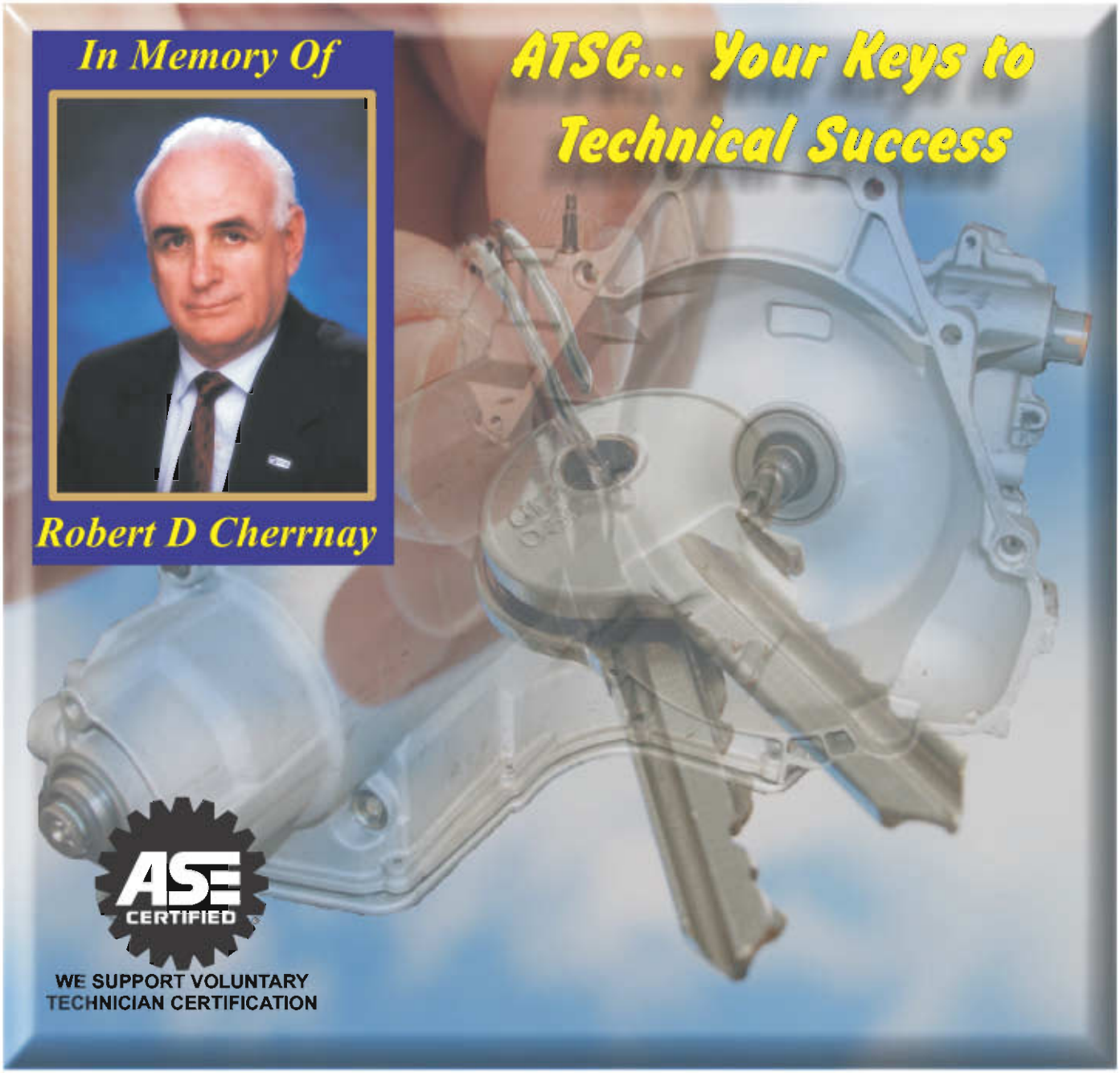
AUTOMATIC TRANSMISSION SERVICE GROUP

"GREAT TECH AGAIN" IN 2010



"2010" TRANSMISSION SEMINAR

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THE E40D/4R100 INTERMEDIATE Z PAK® IS THE IDEAL DROP-IN REPLACEMENT FOR HEAVY DUTY WORK VEHICLES, POWERSTROKE DIESELS, RV'S AND MODIFIED APPLICATIONS. THE Z PAK® DESIGN REDUCES CLUTCH PACK ENGAGEMENT TEMPERATURES BY 34% AND ENGAGEMENT STRESS BY 41%. THE X-32™ FRICTION MATERIAL OFFERS OPTIMUM TEMPERATURE STABILITY AND CAPACITY UNDER EXTREME CONDITIONS.

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"Great Tech Again in 2010" Seminar Information

ATSG Seminars

Welcome to the ATSG "Great Tech Again in 2010" Technical Training Seminar. This year's seminar is dedicated to Mr. Robert D. Cherrnay the founder of ATSG who passed away October 12th, 2009 at the age of 76 and is survived by his two sons and his daughter. Mr. Cherrnay ran and operated a transmission shop for over 20 years in Miami Florida called "Singer Transmissions" with his partner Diz Singer. After Diz passed away he continued to operate the business as its sole owner. During this time he became the Technical Director for the Automatic Transmission Rebuilder's Association (ATRA) in 1978. While being the Technical Director, he conducted many seminars throughout the country who on occasions had the assistance of a gentleman named C. W. Smith. He then went on and launched the Automatic Transmission Service Group (ATSG) in 1985 which has become a premier technical support group world wide. He retired in 2002 having set in place a great technical team at ATSG which produces outstanding technical information in the form of a technical hot line service, seminars, manuals and bulletins continuing to aid the industry in the diagnostic and repair of automatic transmissions. And it is in his name and honor we welcome you to *Great Tech Again in 2010* where you will receive hard to be had information that will help you be successful in your shop.

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

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ATSG

excerpt from 1999 ATSG Book

FORD AODE / 4R70W

(Another Use For LUBEGARD® Highly Modified ATF Supplement)

ISSUE: In the Ford AODE and 4R70W, a shudder or vibration may occur under light-to-moderate acceleration above 35 mph in third or fourth gear, or during a 3-4 upshift or a 4-3 downshift. This condition may be caused by the converter clutch. The condition normally is noticed on vehicles with 20,000 or more miles when the torqueconverter clutch engages or disengages and the vehicle is under light load.

ACTION: It has been found that by changing the vehicles transmission fluid and adding the LUBEGARD Highly Friction Modified ATF Supplement you can ELIMINATE the PROBLEM. The vehicle may have to be driven up to 100 miles for the condition to be corrected.

SAVE TIME, SPACE and MONEY with LUBEGARD

PATENTED TECHNOLOGY LXE SYNTHETIC SINCE 1993

LUBEGARD® HIGHLY FRICTION MODIFIED TRANSMISSION FLUID SUPPLEMENT

PART # 61910

- Eliminates the need for multiple OEM fluids
- Converts DEXRON®/MERCON® ATF into any highly friction modified ATF
- Recommended for use in Ford AODE & 4R70W with shudder problems that do NOT require MERCON® V ATF
- Same benefits as LUBEGARD Red elevated operating temperatures up to 40°F
- Extends fluid life
- Eliminates transmission fluid foaming and oxidation
- Reduces wear throughout the transmission

MAKE	MANUFACTURER'S ATF	MAKE	MANUFACTURER'S ATF
Acura	Honda Genuine / Z-1	Kia, Hyundai, Mitsubishi	SP III ATF
Chrysler	MOPAR® ATF +3™(7176) ATF +4™ (9602)	Lexus	Toyota Type T, T II & T IV
Chrysler/Dodge	MOPAR® ATF+3™(7176) ATF + 4™ (9602)	Mitsubishi	Mitsubishi Diamond SP/SP III
Eagle	MOPAR® ATF+3™(7176) ATF + 4™ (9602)	Plymouth	MOPAR® ATF+3™ (7176) ATF+4™ (9602)
Honda	Honda Genuine / Z-1	Saturn	Saturn Transaxle Fluid
Hyundai	SP III	Sterling	Sterling ATF
Jeep	MOPAR® ATF+3™(7176) ATF +4™ (9602)	Toyota	Toyota Type T, T II & T IV

LUBEGARD® M-V AUTOMATIC TRANSMISSION FLUID SUPPLEMENT

PART # 62005

- Eliminates the need for MERCON® V ATF
- Enhances DEXRON®/MERCON® ATF to perform Like a MERCON® V ATF
- Same benefits as LUBEGARD Red

Car and Truck Makes	Manufacturer's ATF
FORD	MERCON® V
LINCOLN	
MERCURY	
MAZDA	
And all other makes that require MERCON® V ATF	

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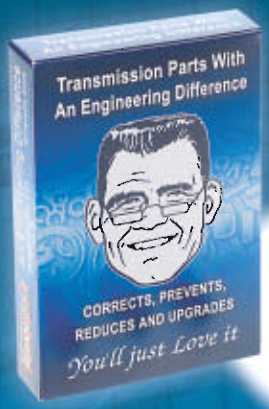


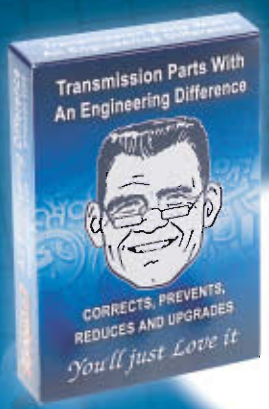
5R1-PLUG-PS

5R110 Pressure Switch Plugs

Kit Includes

Five new Aluminum Plugs and O-Rings to either replace a switch or a plastic dummy plug.

Fixes: Repeat Clutch Failure, Caused By Blown Out Pressure Switches.



E4-VL-23

Three Steel 2-3 Shift Valves

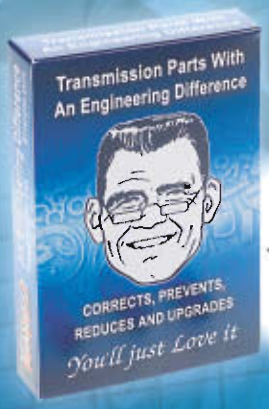
Replacement:

2-3 Shift Valve for Casting code F6 E40D and 4R100 valve bodies.

Fixes: Repeated stuck 2-3 shift valve that causes no 3rd or 4th but reverse is OK.

Fits: 95-1/2 up E40D & 4R100 with F6 VB Casting Code

Fixes: 3 Valve Bodies

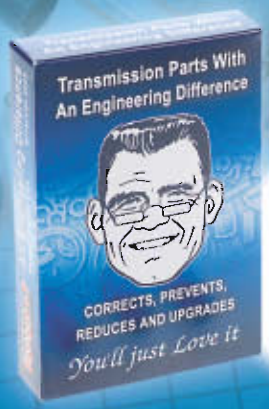


SK® AWF21

Reduces/Corrects/Prevents

Rough shifts, Bump-Bump downshifts above 30 mph hot, Part throttle downshift bang, Flares during up-shifts & kick-down, Rough coast downshifts. No pressure rise, TCC slip/shudder. Poor shift quality.

Fits: 05-06 Ford Fusion & 500, 05-06 Mazda 6
06 Lincoln Zephyr, 06 Mercury Milan,
05-06 Mercury Montego



SK® 09G

Reduces/Corrects/Prevents

Harsh Shifts, Cut Loose, Rough Coasting Downshifts, Slow Pressure Rise, TCC Slip

Fits: Audi A2, A4 06 2.0L, Audi TT 03-04 1.8L
BMW Mini Clubman 08 1.6L
BMW Mini Cooper 02 1.6L
VW Beetle 05 1.8-2.5L, Jetta 05 1.9-2.5L
Passat 06 2.0L & 3.6L, Touran 03 1.6-2.0L

It just ain't FIXED *without it!*

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Product Support
626-443-7451

G.M. 4T45E
HARSH SHIFTS DTC P0010-P0011

COMPLAINT: Some Chevrolet Cobalt vehicles equipped with the 2.4L engine (Variable Valve Timing) and the 4T45E transaxle, may exhibit a check engine light that is on with Diagnostic Trouble codes P0010 Intake Camshaft Position Actuator Solenoid Control Circuit fault or P0011Intake Camshaft Position Actuator Solenoid System performance fault, along with harsh shifts.

CAUSE: The cause may be low engine oil or a faulty Intake CMP actuator causing a performance problem with the actuator. Both of these codes can raise line pressure as the PCM will drop the amperage for the Pressure Control Solenoid causing the shifts to be harsh. (This is not a Transmission problem!).

CORRECTION: To correct this condition, clear diagnostic trouble codes and verify that the engine oil level is correct. This is the first step in the diagnostic tree, as low engine oil can cause improper control of the Intake CMP actuator. Drive the vehicle to see if the code resets, if the P0010 resets, refer to the appropriate factory manual to check the electrical circuit of the actuator.

Special Thanks to
Dino at Lee Myles

4L60E SERIES TRANSMISSIONS
HARSH 1-2 & 3-4 SHIFTS

COMPLAINT: After overhaul, an extremely harsh 1-2 shift is felt as well as a very firm 3-4 shift, this was not an original complaint.

CAUSE: The accumulator valve sleeve located in the valve body was installed 180 degrees out of position. This blocks D4 oil (line pressure) and torque signal to the accumulator valve. This prevents the valve from supplying regulated accumulator pressure to the 1-2 and 3-4 accumulator pistons. When a shift into 2nd and 4th is made, 2nd gear and 4th gear oil is routed to their respective accumulator pistons. Without having regulated accumulator pressure opposing band apply pressure, the accumulator pistons bottom out in the bore causing the band to apply abruptly.

When the sleeve is 180 degrees out of position as shown in Figure 1, the end of the roll pin cannot be seen.

CORRECTION: When the sleeve is in its correct position, the end of the pin can be seen (Figure 2). This positions the feed ports in the sleeve to face the valve body passages (Figure 2) allowing D4 oil to be regulated into accumulator pressure supplying the accumulator pistons with pressure to oppose band apply pressure for a controlled apply of the band.

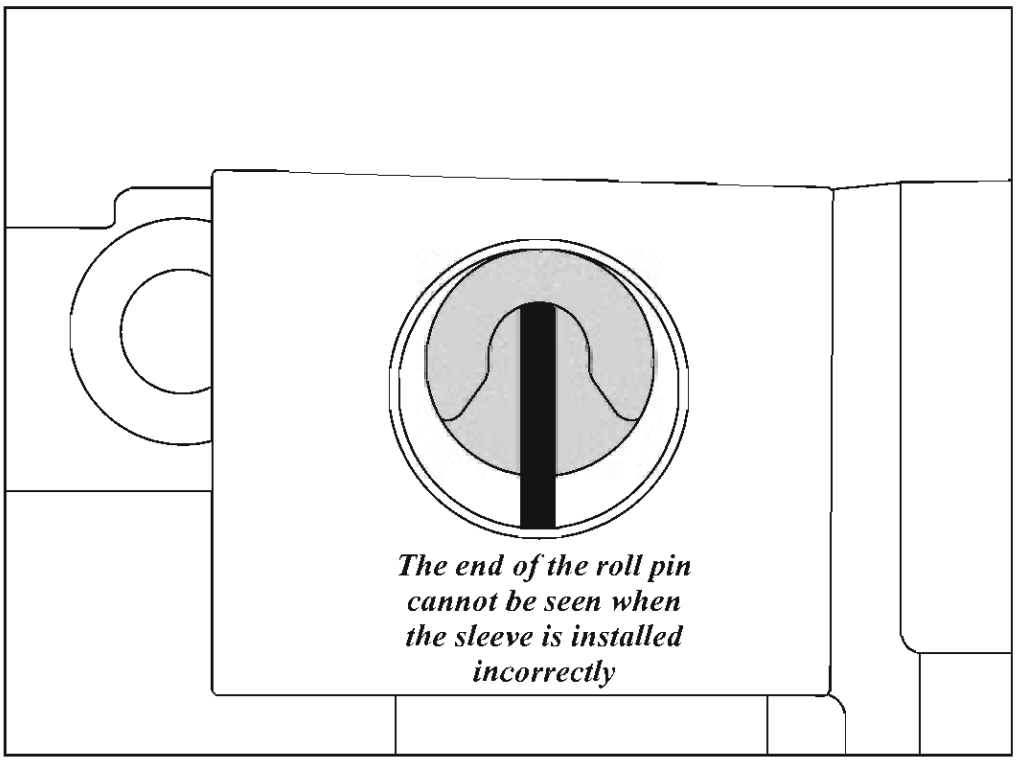
SERVICE INFORMATION:

2003-2007 Escalade, Avalanche, Silverado, Suburban, Tahoe, Sierra, Yukon and Yukon XL

Update accumulator valve conversion kit.....24255821

HARSH 1-2 & 3-4 SHIFTS

INCORRECT



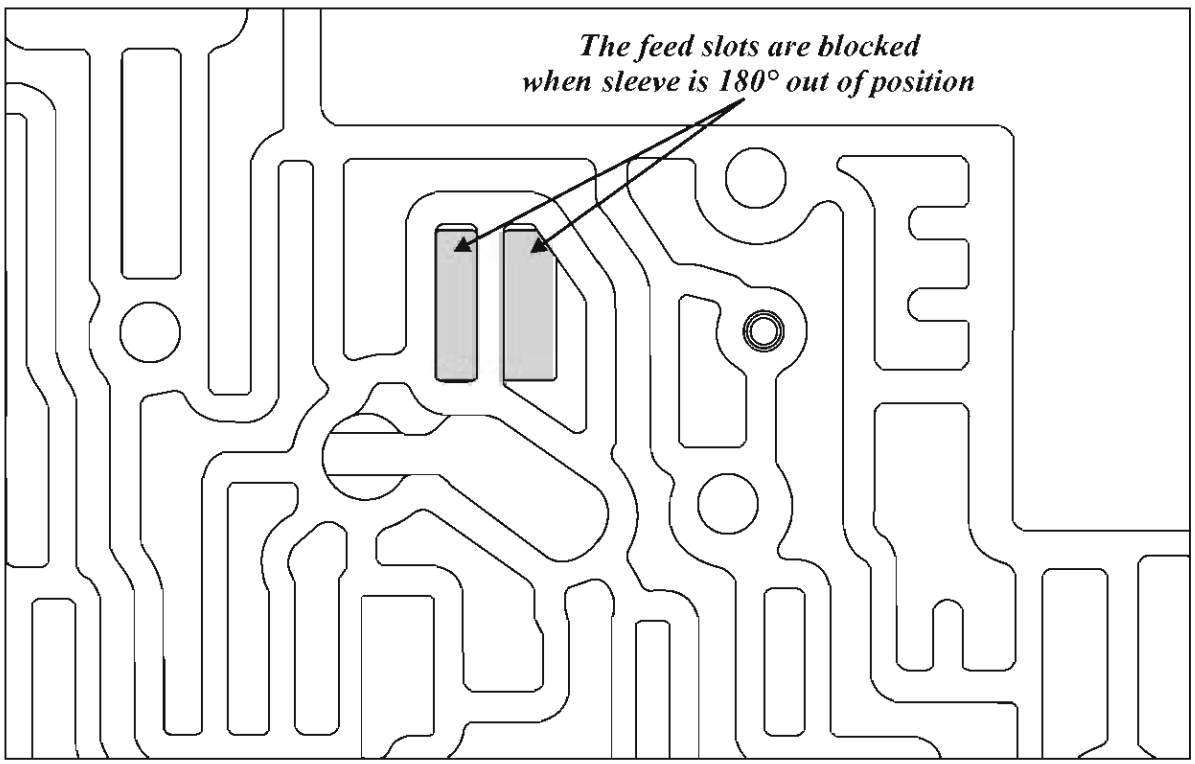
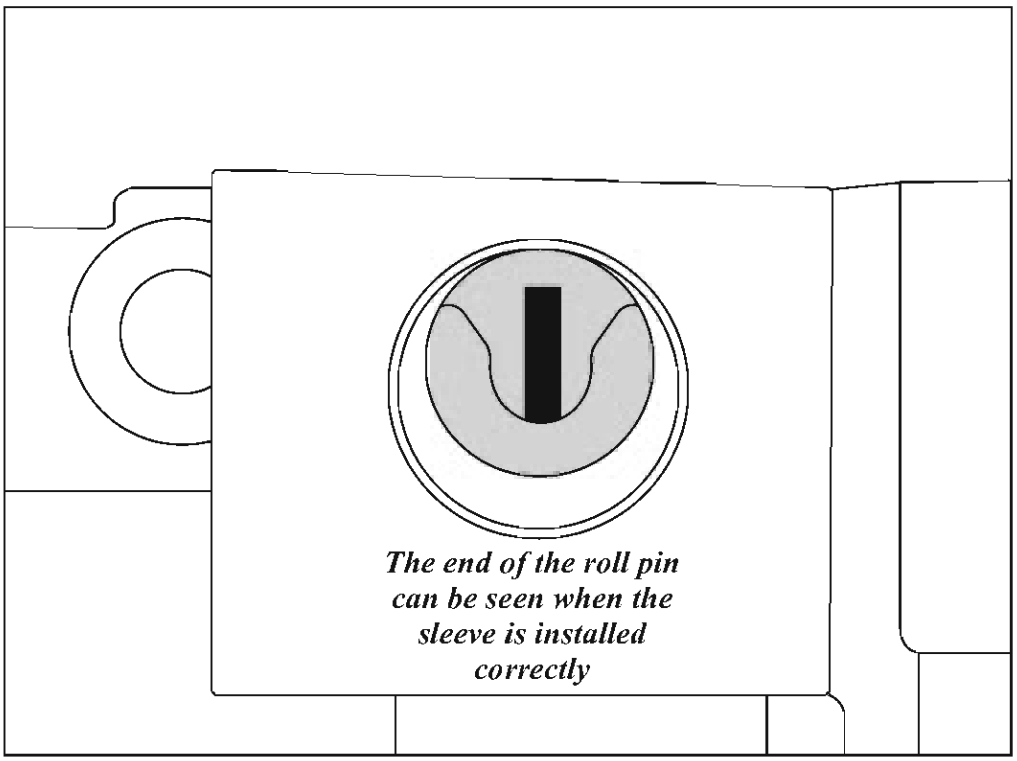


Figure 1

HARSH 1-2 & 3-4 SHIFTS

CORRECT



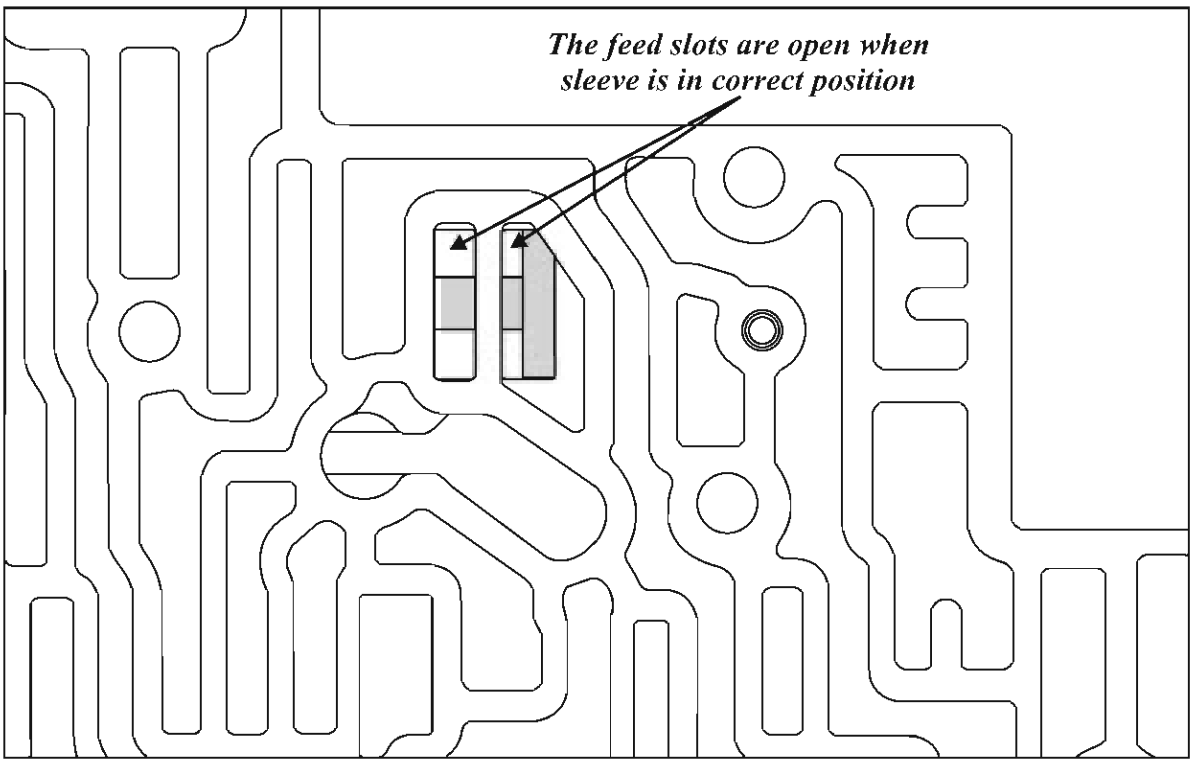


Figure 2

2004 & LATER GM "T" TRUCK
4L60E TPD MODEL CHANGES

CHANGE: Beginning with the 2004 model year and continuing to the present, Chevy Colorado, GMC Canyon and 2006 and later Hummer H3 Four Wheel Drive trucks have had various changes made to the 4L60E TPD model transmission components

REASON: To allow for front drive shaft clearance.

PARTS AFFECTED:

(1) The 1-2 accumulator assembly has been elongated in order to move it further away from the pan rail, Refer to Figure 1.

(2) The valve body casting has had the rear corner near the pressure control solenoid cut off as seen in Figure 2.

(3) The pressure control solenoid has been rotated so the solenoid connector is closer to the valve body as seen in Figure 3.

(4) A new filter has been designed with an angular corner to allow clearance for the newly positioned pressure control solenoid, See Figure 4.

(5) The transmission oil pan has been made concave on the front driveshaft side to allow for clearance between the front drive shaft and the oil pan, Refer to Figure 5.

INTERCHANGEABILITY:

All components changes from the TPD model can fit any 4L60E series transmission. The above mentioned vehicles must use the TPD model components.

SERVICE INFORMATION:

The TPD Model Sump Filter.....24226101

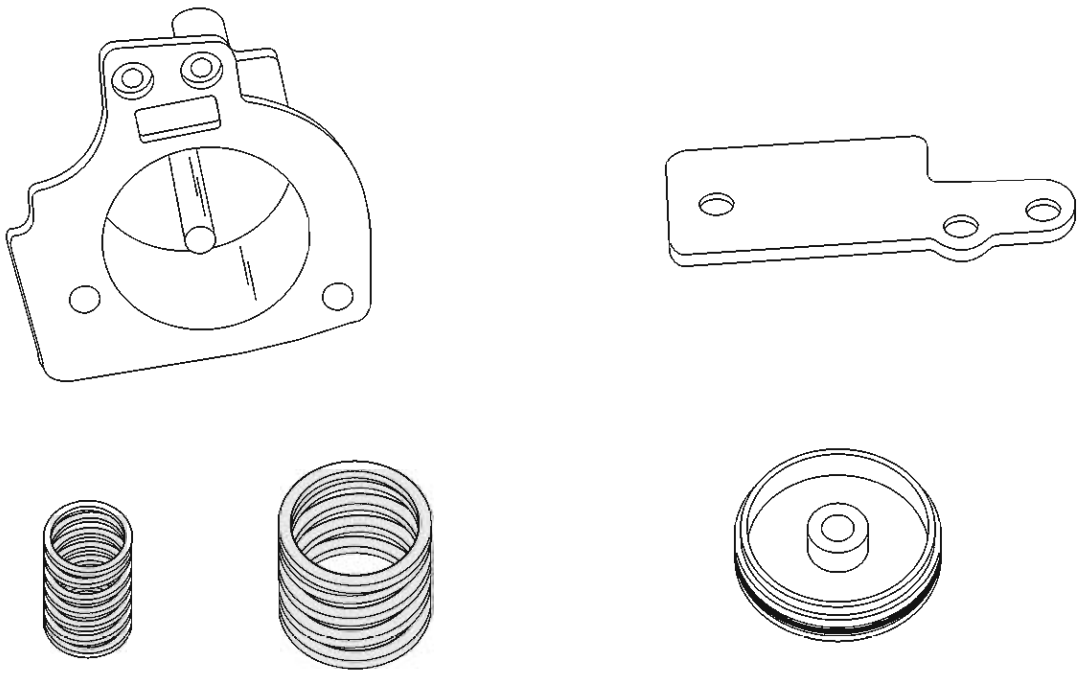
NOTE: Filtran has a filter available for the TPD model 4L60E.

A very special thanks to Bill Weaver of Transcolonial Auto Service, Chagrin Falls, Ohio for taking the time and effort to take and send photos that made this bulletin possible.

Many thanks to Chris Tartik of Filtran for providing information about filter availability and for supplying a sample filter.

2004 & LATER GM "T" TRUCK
4L60E TPD MODEL CHANGES

4L60E *(Standard Models)* 1-2 ACCUMULATOR ASSEMBLY



4L60E *(TPD Model)* 1-2 ACCUMULATOR ASSEMBLY

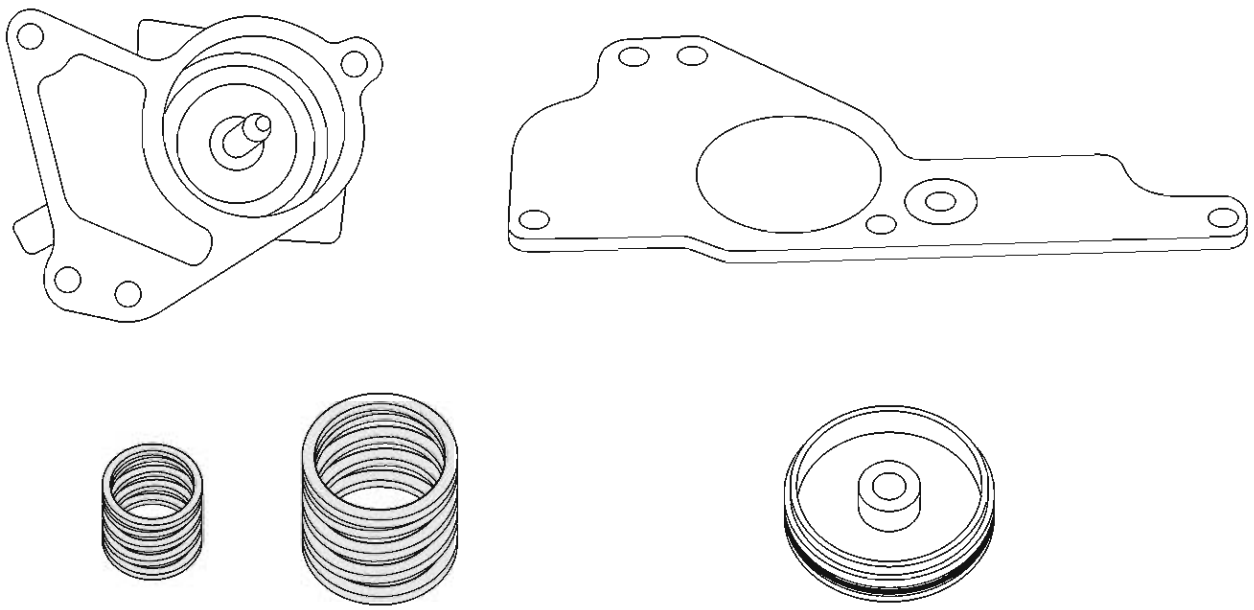


Figure 1

2004 & LATER GM "T" TRUCK
4L60E TPD MODEL CHANGES

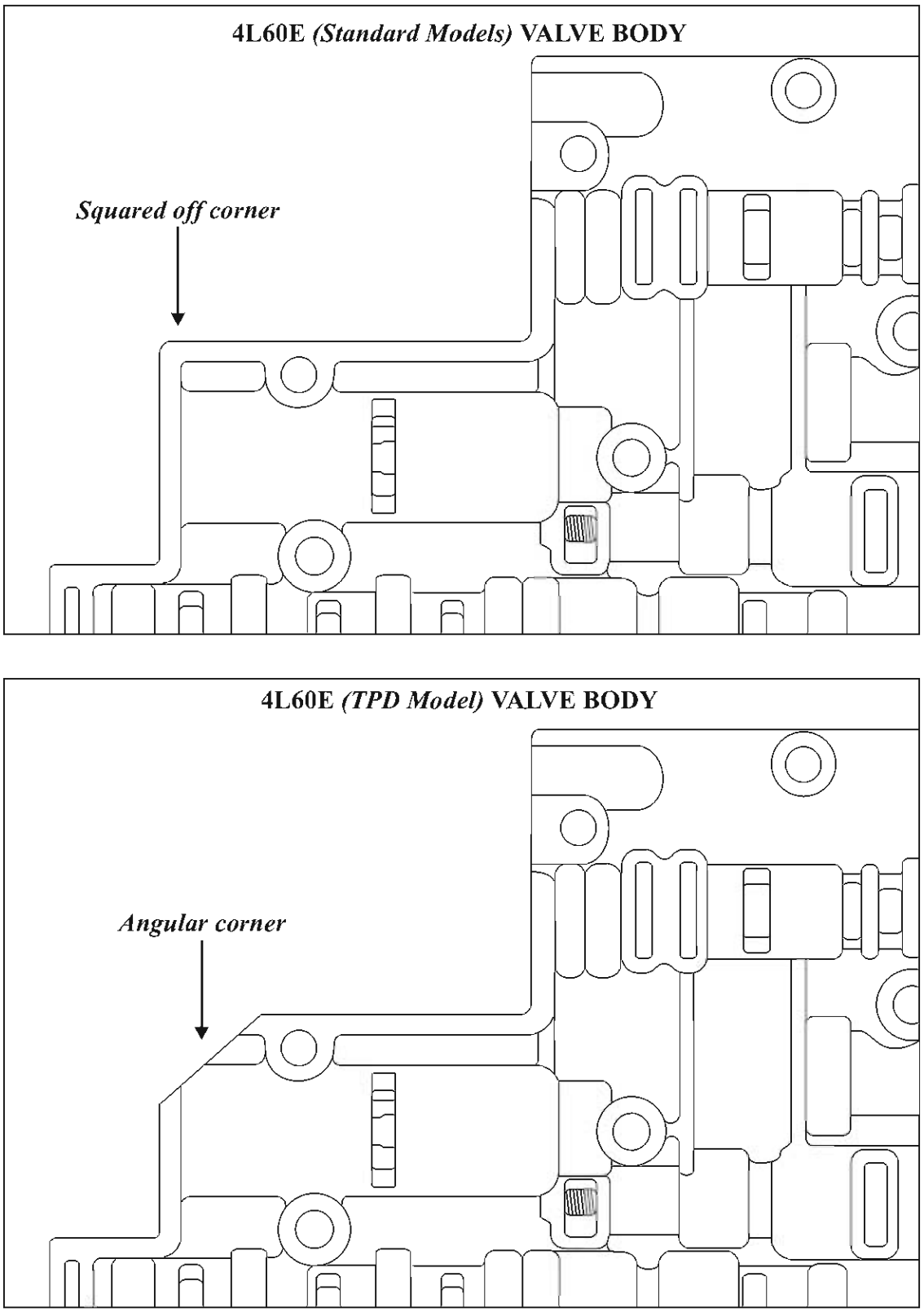
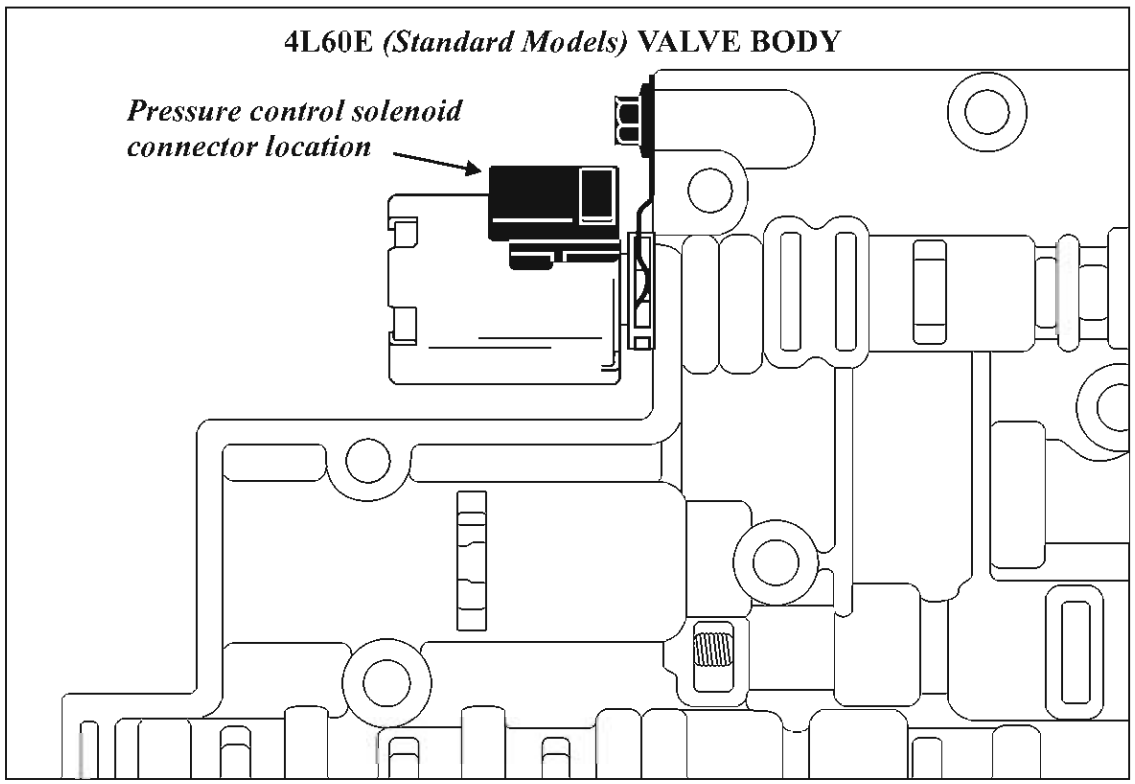


Figure 2

2004 & LATER GM "T" TRUCK
4L60E TPD MODEL CHANGES



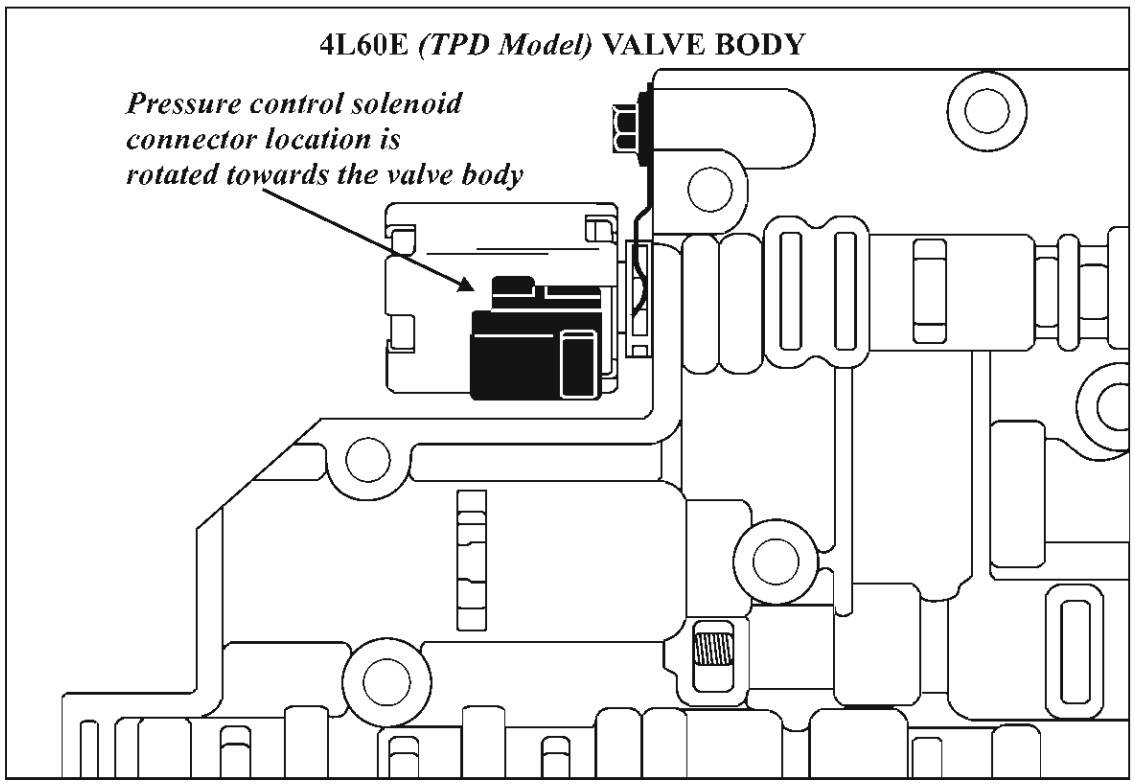
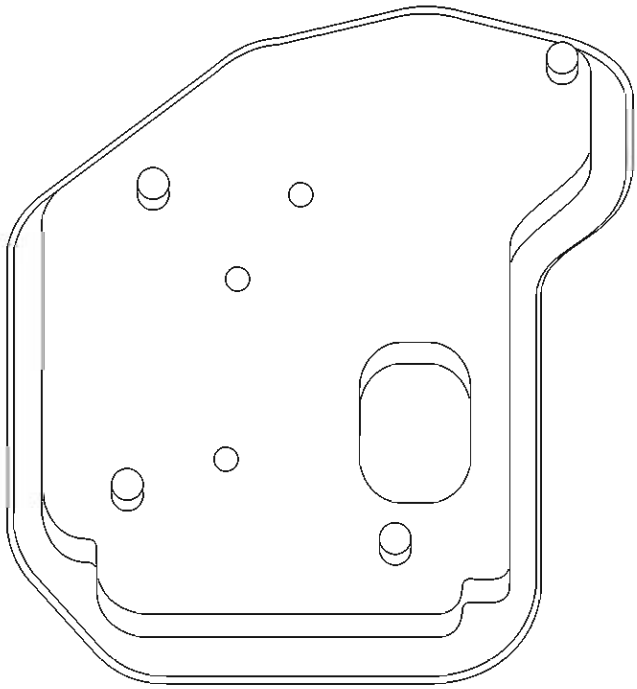


Figure 3

2004 & LATER GM "T" TRUCK
4L60E TPD MODEL CHANGES

4L60E *(Standard Models)* SUMP FILTER



4L60E *(TPD Model)* SUMP FILTER

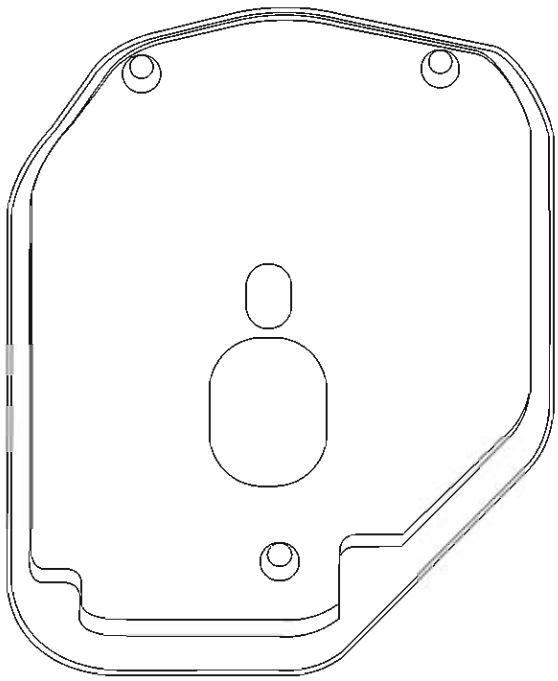


Figure 4

2004 & LATER GM "T" TRUCK
4L60E TPD MODEL CHANGES

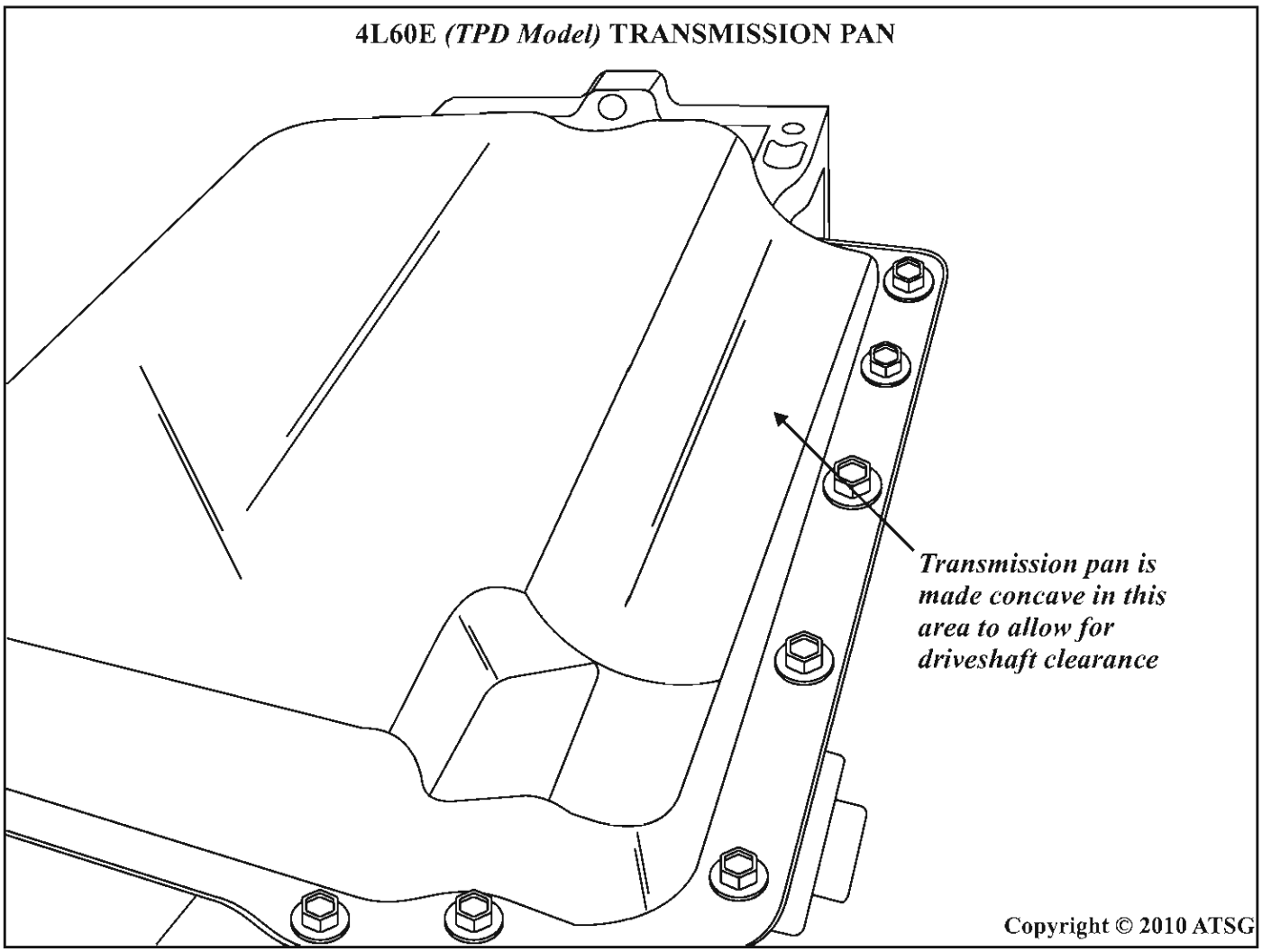


Figure 5

4L65E M33 PARTIAL HYBRID TRANSMISSION
AUXILIARY PUMP FILTER

COMPLAINT: When servicing a 2005-2007 Chevy Partial Hybrid Truck, an attempt is made to replace the auxiliary pump filter as shown in Figure 1, the shop finds that the filter is not available separately. The filter only comes with the pump from GM at a cost of $835.00.

CAUSE: The pump is made in Germany by Bosch and is only sold as a complete assembly with the filter. The auxiliary pump is necessary because when the PHT comes to a stop, the engine shuts off. The auxiliary pump keeps the forward clutch pressurized so there is no delay when the driver steps on the throttle.

CORRECTION: The auxiliary pump filter has now been made available separately from SPX FILTRAN.

SERVICE INFORMATION:

Check with your parts distributor for availability, the SPX FILTRAN part number for the filter is 806741.

Many thanks to Don Stone from AAA Quality Transmissions in Stuart, FL. for the heads up info and photos, and to Chris Tartik from SPX Filtran for the filter information and for providing a sample filter.

4L65E M33 PARTIAL HYBRID TRANSMISSION
AUXILIARY PUMP FILTER

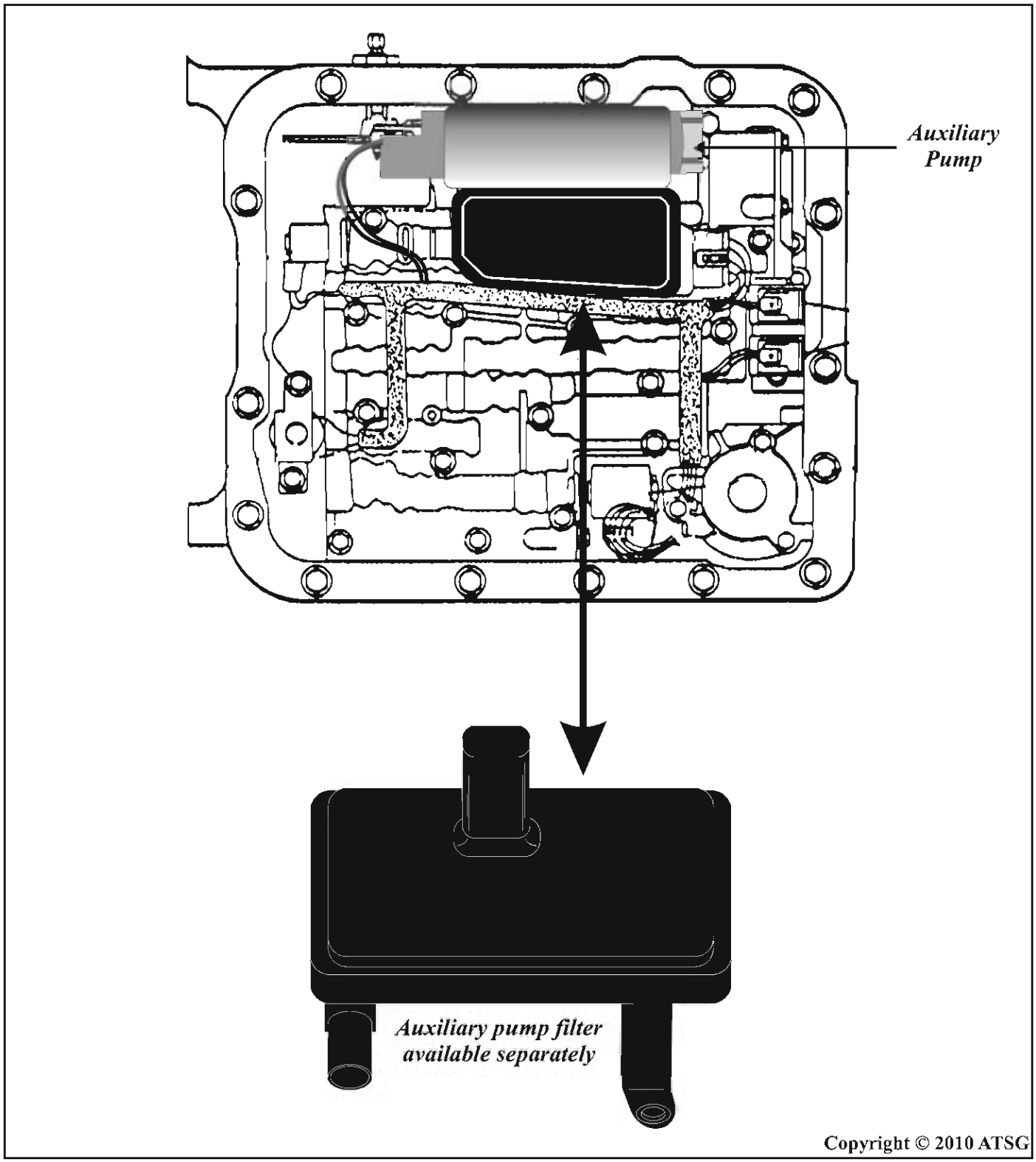


Figure 1

GM 4L80E
OUTPUT CARRIER IDENTIFICATION UPDATE

COMPLAINT: At the start of the 1999 model year with 4L80-E transmissions, significant changes to the center gear case were made for durability reasons.
Incorrect parts compatibility can lead to complaints of gear noise, hard part failure due to incorrect clearances in the center gear case area and premature TCC application.
ATSG, in an attempt to clear up all this confusion, put together a seminar bulletin in 2005 showing all compatible combinations.
However, we neglected to provide a quick and easy method to identify the actual differences between the various output carriers that appear the same at a glance but are not. This will be provided here.

CORRECTION: The area to look at for planetary identification is the inside diameter of the carrier where the pinion gears are. Shown in Figure 1 is a Turbo 400 output carrier, notice the thickness of the web between the pinion gears, that's the instant identification.
A number of years ago, when 4L80E rear carriers were in short supply, the technician could use a 400 carrier as long as it was one with the long park lugs. In addition, if an output speed sensor was functional, the 400 carrier would have to be machined down to accept the speed sensor tone ring. Unless it was being used in a 1994 to1998 Four Wheel Drive application which did not require a functional output speed sensor due to it's function being discontinued.

Shown in Figure 2 is the 1991 - 1998 4L80E rear carrier, once again notice the thickness of the web between the pinion gears. These carriers came with or without a speed sensor tone ring depending on whether it was Two or Four Wheel Drive. The thickness (or height) of the pinion gears on these carriers is 0.710".

Shown in Figure 3 is the 1999 and later rear carrier, this is the time period when the center gear case components changed to improve the durability of this area as explained in the 2005 seminar material.
Notice the thickness of the web between the pinion gears, it's thicker than the 1991 - 1998 carrier. In addition the thickness of the pinion gears was increased .075" to 0.785 in order to center the sun gear which was raised by .041".

SERVICE INFORMATION:
In order to make the 2005 Seminar material or ATSG Bulletin #04-33 complete, it is suggested that this bulletin be reproduced and placed in both locations.

GM 4L80E
OUTPUT CARRIER IDENTIFICATION UPDATE

TURBO 400

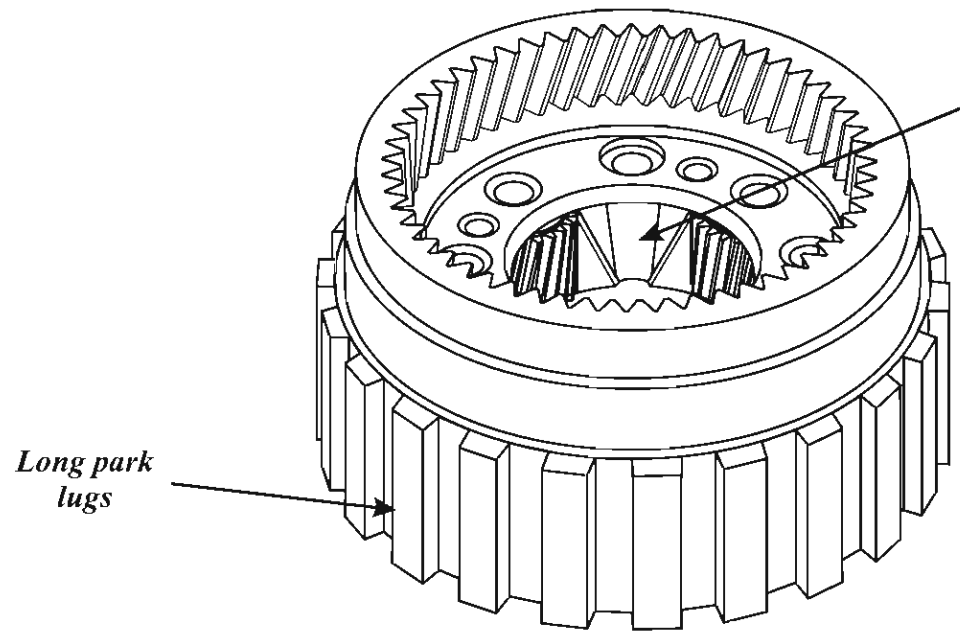


Figure 1

1991 - 1998 4L80E

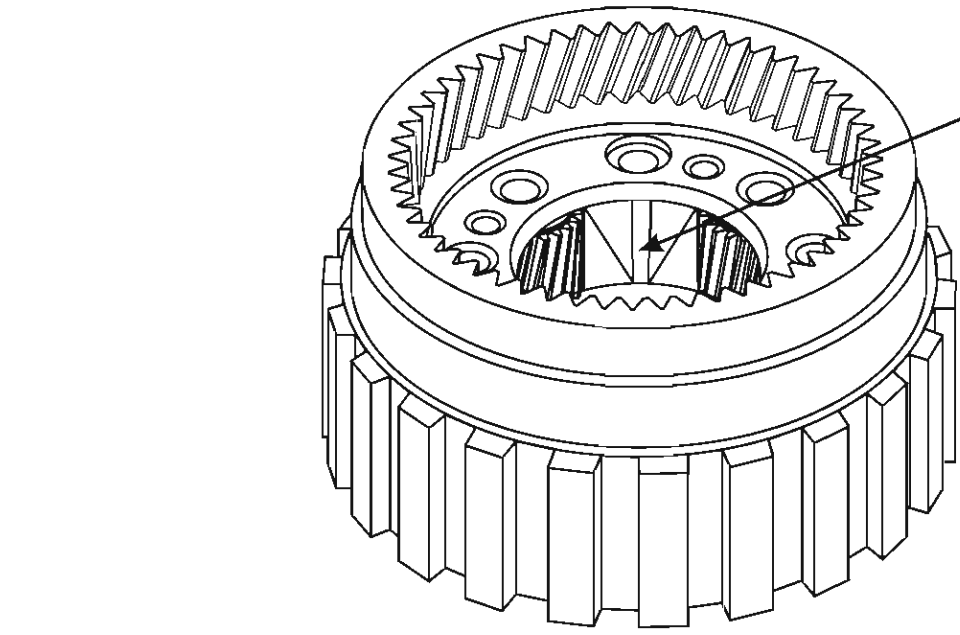


Figure 2

GM 4L80E
OUTPUT CARRIER IDENTIFICATION UPDATE

1999 & LATER 4L80E

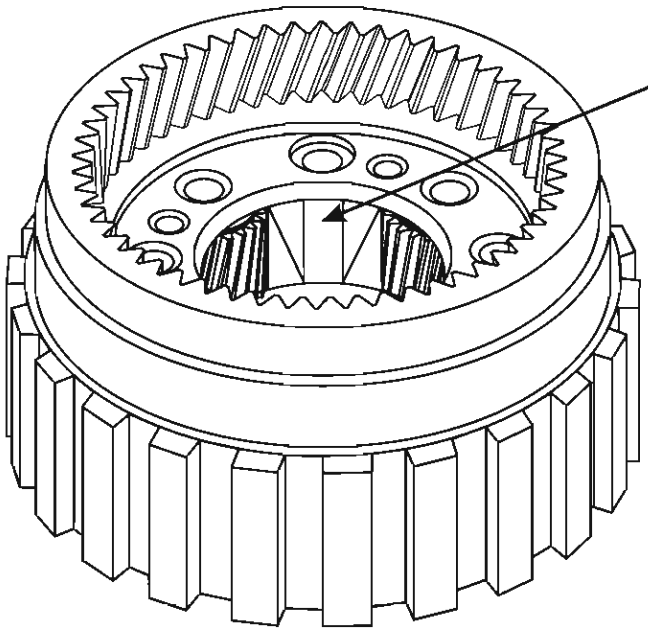


Figure 3

GM 4L80-E
P0894 TCC SLIP

COMPLAINT: Some 2009 Model vehicles equipped with the 4L80-E transmission may exhibit a complaint of the check engine light on and a Diagnostic trouble code P0894 component slip, and the Torque converter Clutch is not holding when TCC slip is observed on the scan tool.

CAUSE: The cause may be, the Torque Converter Clutch lining has fallen off of the Damper assembly, from improper bonding or faulty adhesive, as shown in Figure 1.

CORRECTION: To correct this condition, replace the lining on the Damper assembly, with the correct bonding process or replace the Torque Converter with a reman.

TORQUE CONVERTER DAMPER ASSEMBLY

Special Thanks to Chris Spick at Lawrence Transmissions

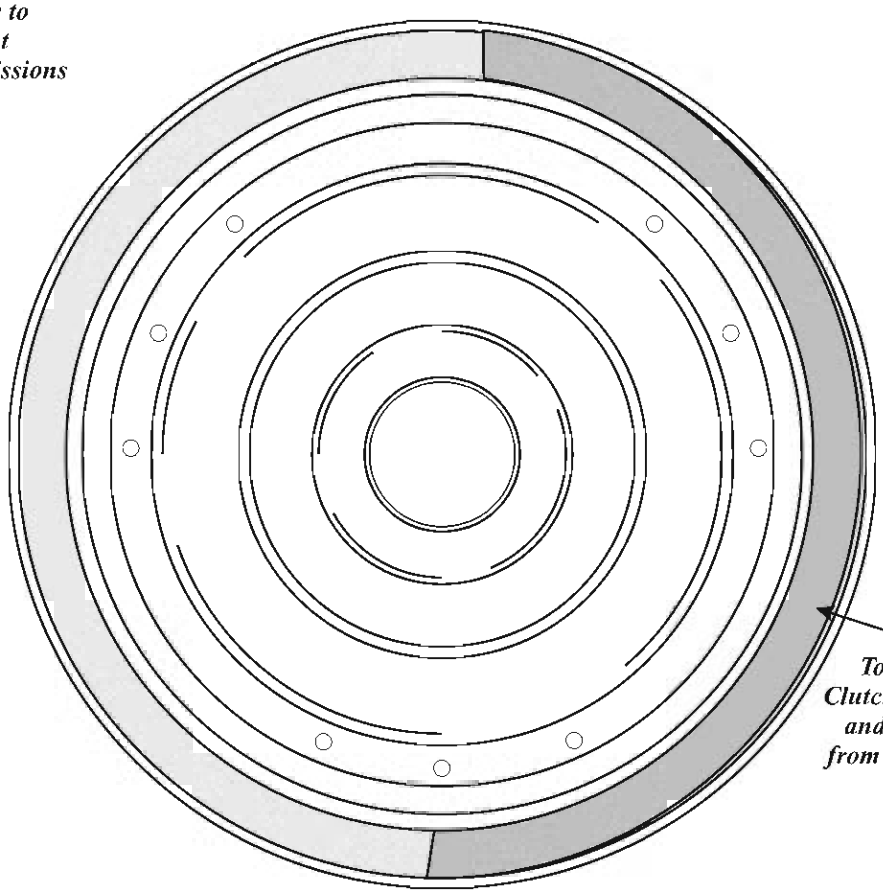


Figure 1

VT20/25-E
DELAYED FORWARD ENGAGEMENT

COMPLAINT: Before and after repairs, a slight delayed engagement into drive occurs when cold and becomes worse as fluid temperature increases.

CAUSE: Pressed into the Input Shaft Assembly is an Input Fluid Passage Seal (Figure 1) that loses its sealing capabilities and often times goes overlooked during repairs.

CORRECTION: Replace the Input Fluid Passage Seal. At the time of printing, this seal is included in a Precision kit.

Additional causes for delayed forward engagement can be due to compromised sealing rings on the input shaft, a mechanically failed Neutral Idle/TCC On-Off Solenoid (Figure 2) and/or a problem with the Forward and Reverse Clutch valve in the valve body (Figure 3). In these cases, TCC and Reverse engagement problems may also accompany the delayed in Forward complaint.

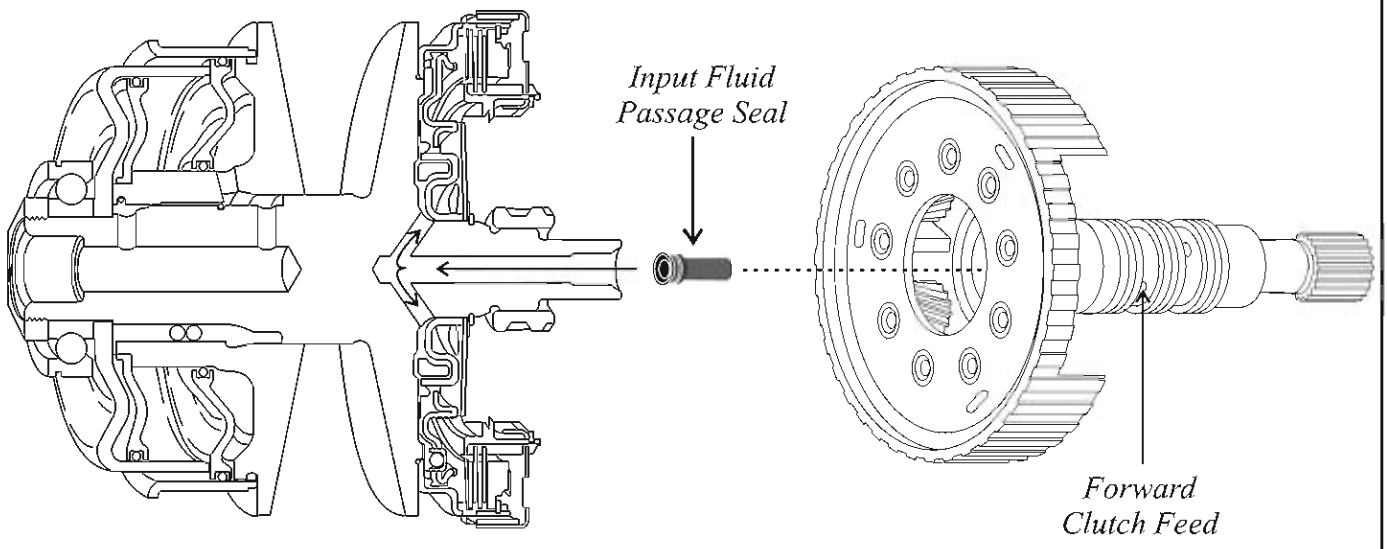
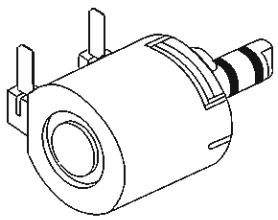


Figure 1



The Neutral Idle/TCC Clutch Control Solenoid Valve. A normally low, 3 port linear pressure control solenoid that controls the fluid pressure used to apply the forward and reverse clutches as well as the torque converter clutch.

The Solenoid should measure between 3.5 and 4.1 ohms at 68° F.

Figure 2

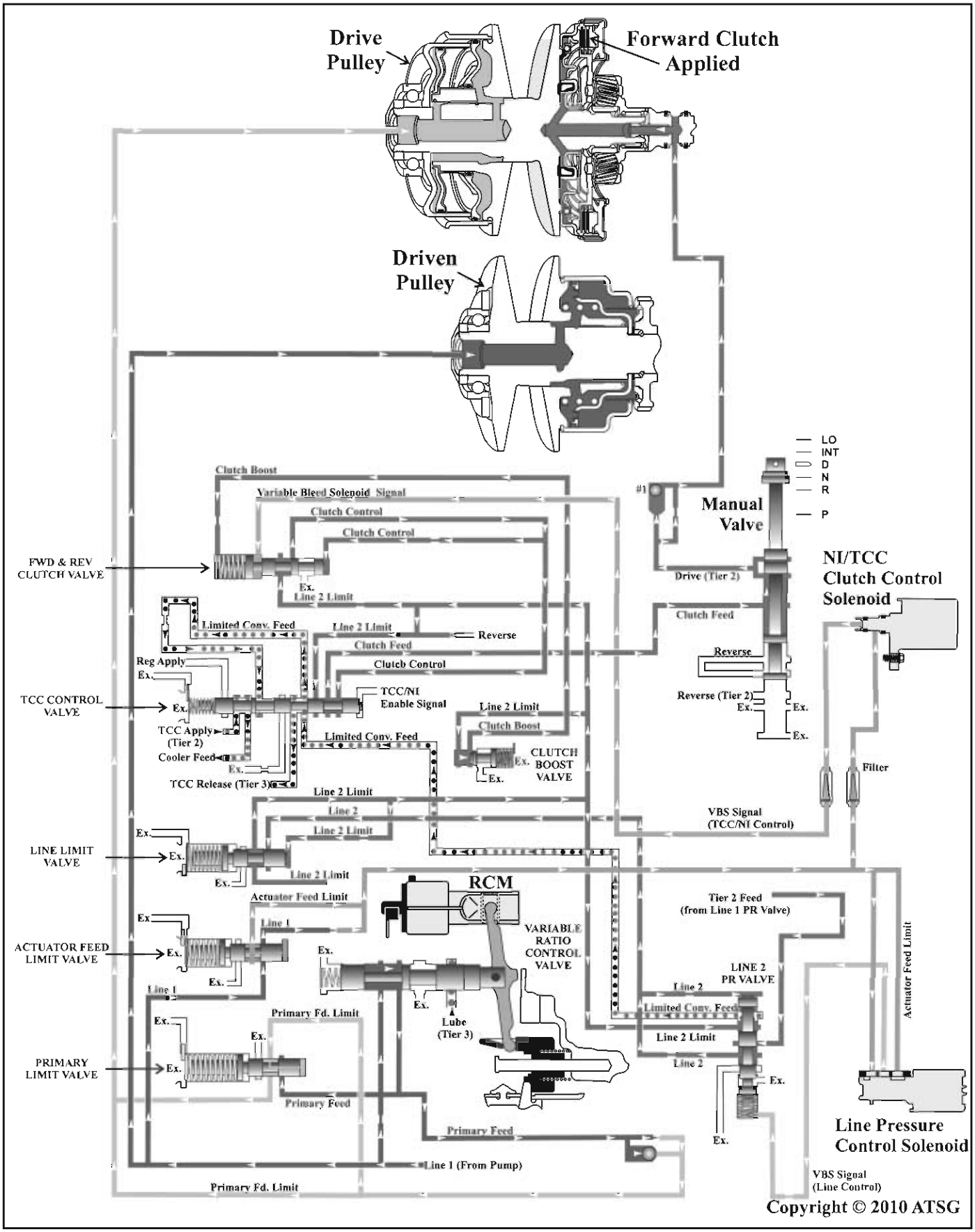

Drive Pulley
Forward Clutch Applied
Driven Pulley
LO
INT
D
N
R
P
Manual Valve
#1
NI/TCC Clutch Control Solenoid
Clutch Boost
Variable Bleed Solenoid Signal
Clutch Control
Clutch Control
FWD & REV CLUTCH VALVE
Ex.
Line 2 Limit
Limited Conv. Feed
Line 2 Limit
Reverse
Clutch Feed
Clutch Control
Reg Apply
Ex.
TCC CONTROL VALVE
Ex.
TCC/NI Enable Signal
TCC Apply (Tier 2)
Cooler Feed
Ex.
TCC Release (Tier 3)
Limited Conv. Feed
Line 2 Limit
Clutch Boost
CLUTCH BOOST VALVE
Ex.
Ex.
Line 2 Limit
Line 2
Line 2 Limit
LINE LIMIT VALVE
Ex.
Ex.
Ex.
Line 2 Limit
Actuator Feed Limit
RCM
Ex.
Line 1
ACTUATOR FEED LIMIT VALVE
Ex.
Ex.
VARIABLE RATIO CONTROL VALVE
Ex.
Line 1
Ex.
Lube (Tier 3)
Primary Fd. Limit
Ex.
Ex.
PRIMARY LIMIT VALVE
Ex.
Primary Feed
Primary Feed
Line 1 (From Pump)
Primary Fd. Limit
Drive (Tier 2)
Clutch Feed
Reverse
Reverse (Tier 2)
Ex.
Ex.
Ex.
Filter
VBS Signal (TCC/NI Control)
Tier 2 Feed (from Line 1 PR Valve)
LINE 2 PR VALVE
Line 2
Limited Conv. Feed
Line 2 Limit
Line 2
Ex.
Ex.
Actuator Feed Limit
Line Pressure Control Solenoid
VBS Signal (Line Control)
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Figure 3

VT20/25-E
NOISE IN FORWARD AND REVERSE AFTER REPAIRS

COMPLAINT: After internal repairs were made to the CVT VT20/25-E which required the disassembly of the Variable Drive Pulley Assembly, a pronounced rumbling noise is heard in both forward and reverse ranges accompanied with a jerking sensation of the vehicle.

CAUSE: The stationary sheave face of the Variable Drive Pulley Assembly has a shaft with three key way slots in it which is used to index and lock the moveable sheave face of the Variable Drive Pulley Assembly to the shaft. Two steel 6mm balls per slot are used as the key in these slots (Figure 1). But during disassembly, these balls fall away not giving the technician a chance to see their appropriate location as on this shaft there are three shorter slots with a passage connecting to the Drive Pulley Primary Feed Limit Apply fluid circuit.

With the three key way slots being much longer in length than the slots connecting to the apply fluid circuit, it has caused some technicians to believe that the two balls per slot needs to be positioned in the shorter slots rather than the longer slots (Figure 2). When this occurs, some of the balls move out of position traveling through the Drive Pulley Primary Feed Limit Apply fluid circuit ending in an apply piston cavity. The pressure and force in this area causes the balls to roll around and beat against the piston making the rumbling noise and jerking sensation (Figure 2). Eventually the damage is severe enough to cause the piston seals to rip and drive pulley pressure drops. The belt then slips across the face of the sheaves damaging both the belt and sheave faces.

CORRECTION: A new or "good experienced" Variable Drive Pulley Assembly will need to be acquired along with a belt and if the "good experienced" pulley assembly is taken apart to install new seals, place the key way balls in the longer slots.

Note: Disassembly of the Variable Driven Pulley Assembly is also possible and it too uses 6mm steel balls as key ways in long slots. The difference here is that it uses three balls per slot (Figure 3).

Thanks goes to Mike at Lee Myles Transmissions in Miami, Florida

VARIABLE DRIVE PULLEY ASSEMBLY

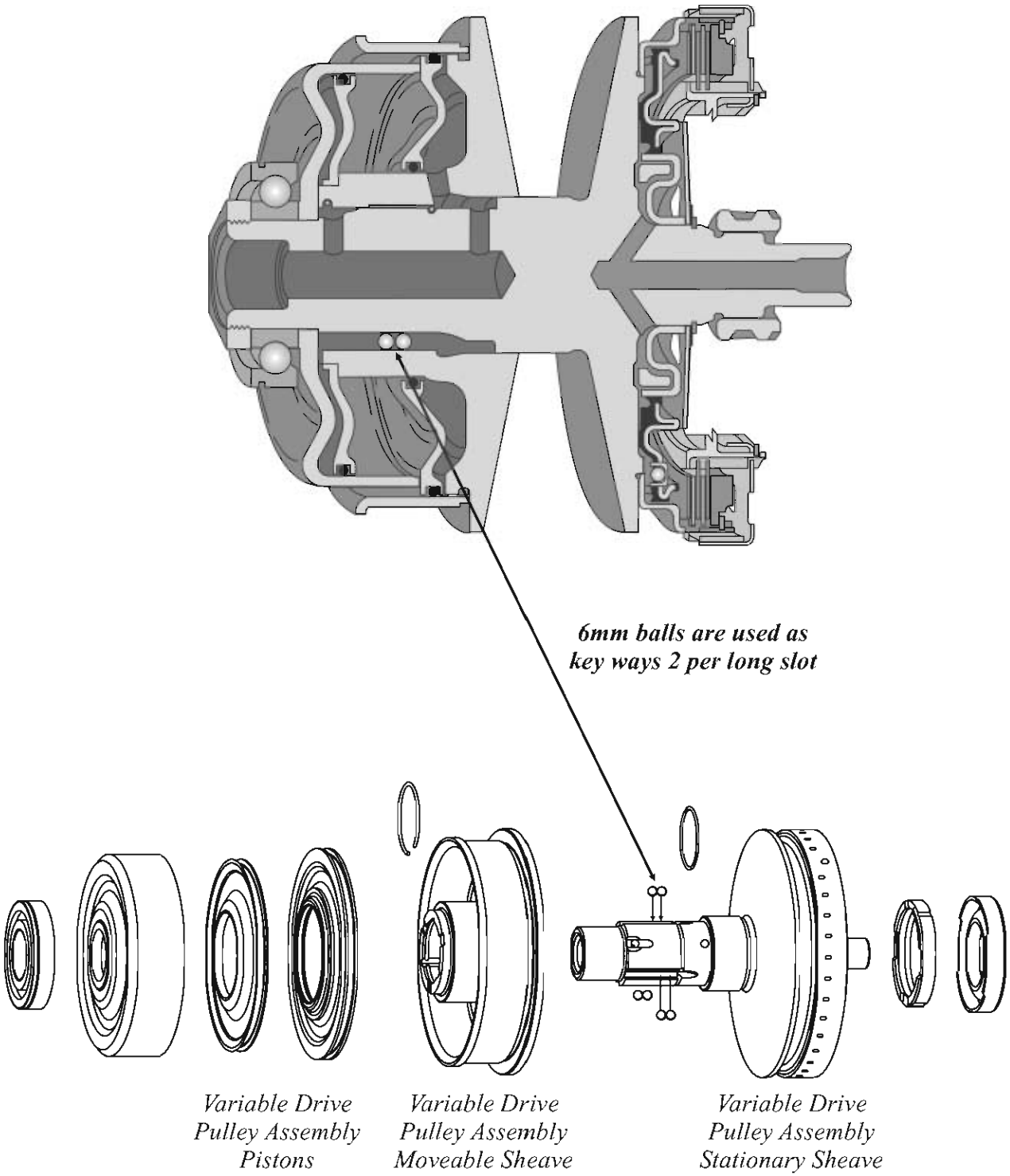


Figure 1

VARIABLE DRIVE PULLEY ASSEMBLY

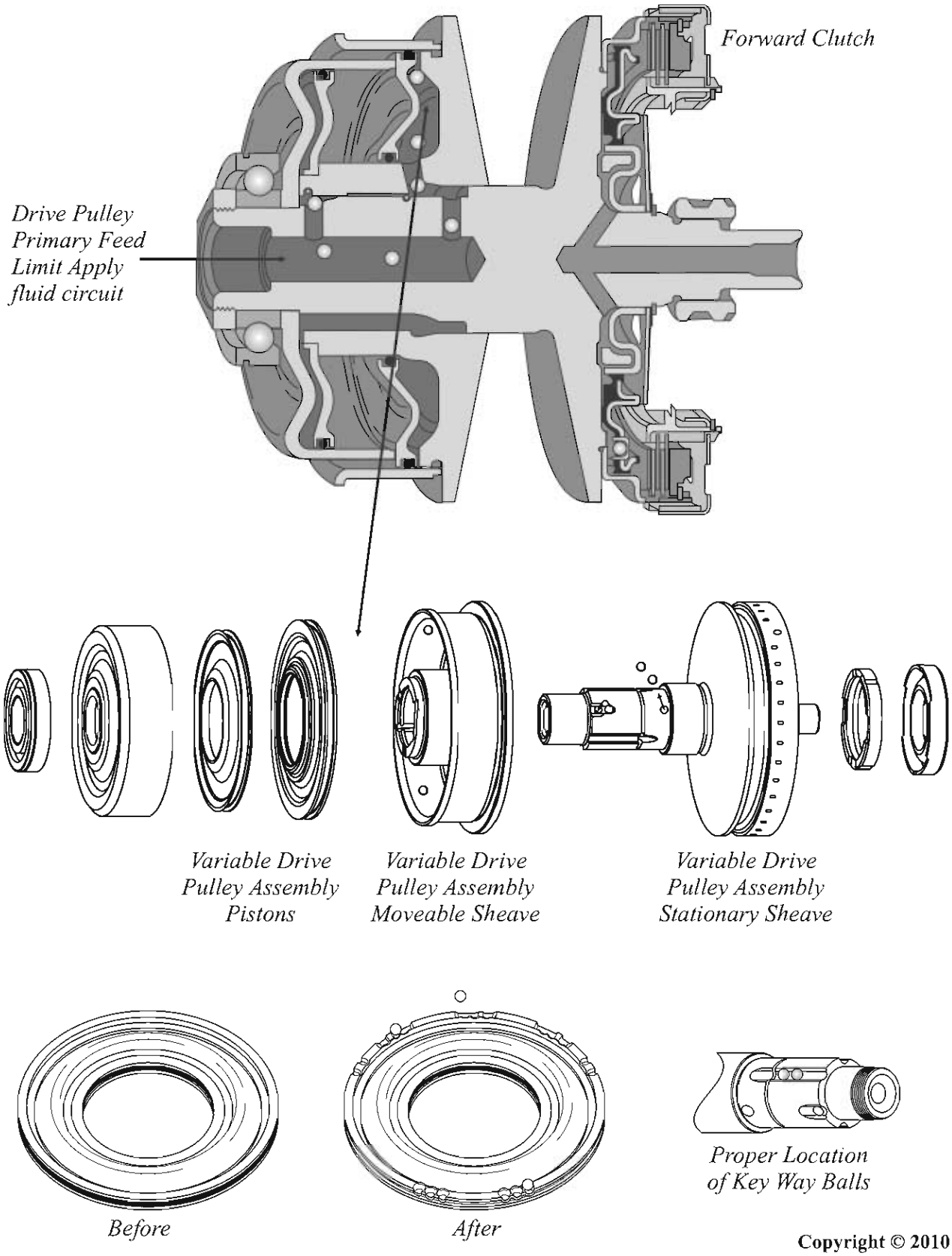


Figure 2

VARIABLE DRIVEN PULLEY ASSEMBLY

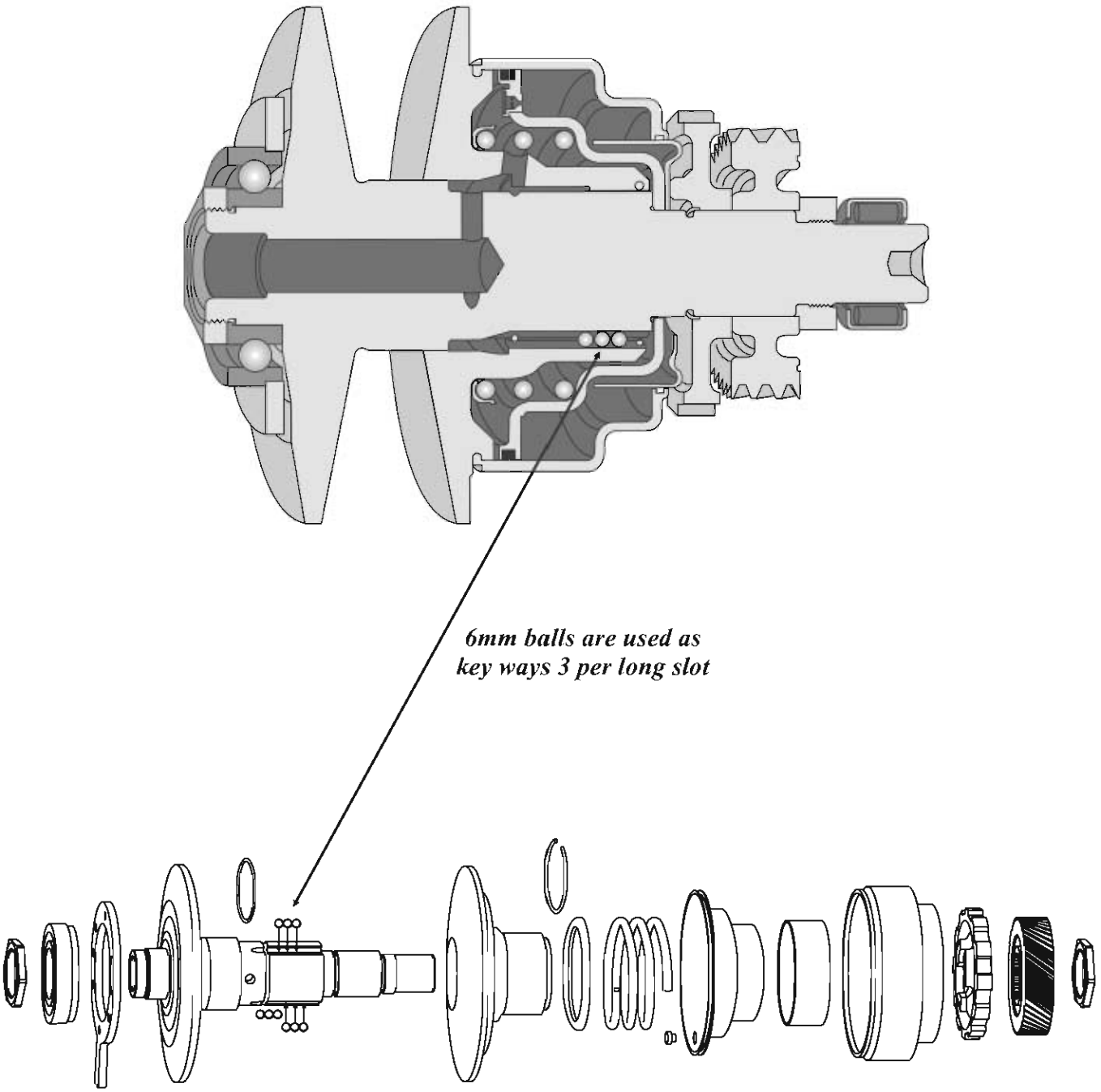


Figure 4

ALLISON 1000/2000 SERIES
NO FORWARD MOVEMENT

COMPLAINT: After overhaul there is no forward movement yet reverse functions normally. Various gear ratio error codes are present. The technician also complained that when the pump was bolted down, the geartrain was locked up.

CAUSE: During the overhaul procedure, the stator support shaft was replaced, Allison calls this part a ground sleeve. The technician failed to press the shaft all the way into the pump cover housing. This removes the end play and mis-aligns the C1 clutch feed holes.

CORRECTION: Make certain the stator support shaft is pressed all the in as shown in Figure 1. The C1 clutch passages are also identified in Figure 1.
Once the pump is assembled after stator support replacement, air check the C1 clutch to insure that the pump cover feed holes, (Refer to Figure 2), line up with the C1 clutch drum feed holes. The C1 feed oil travels through the clutch backfill valve through the pump cover and then in between the stator support shaft and the ring tower.

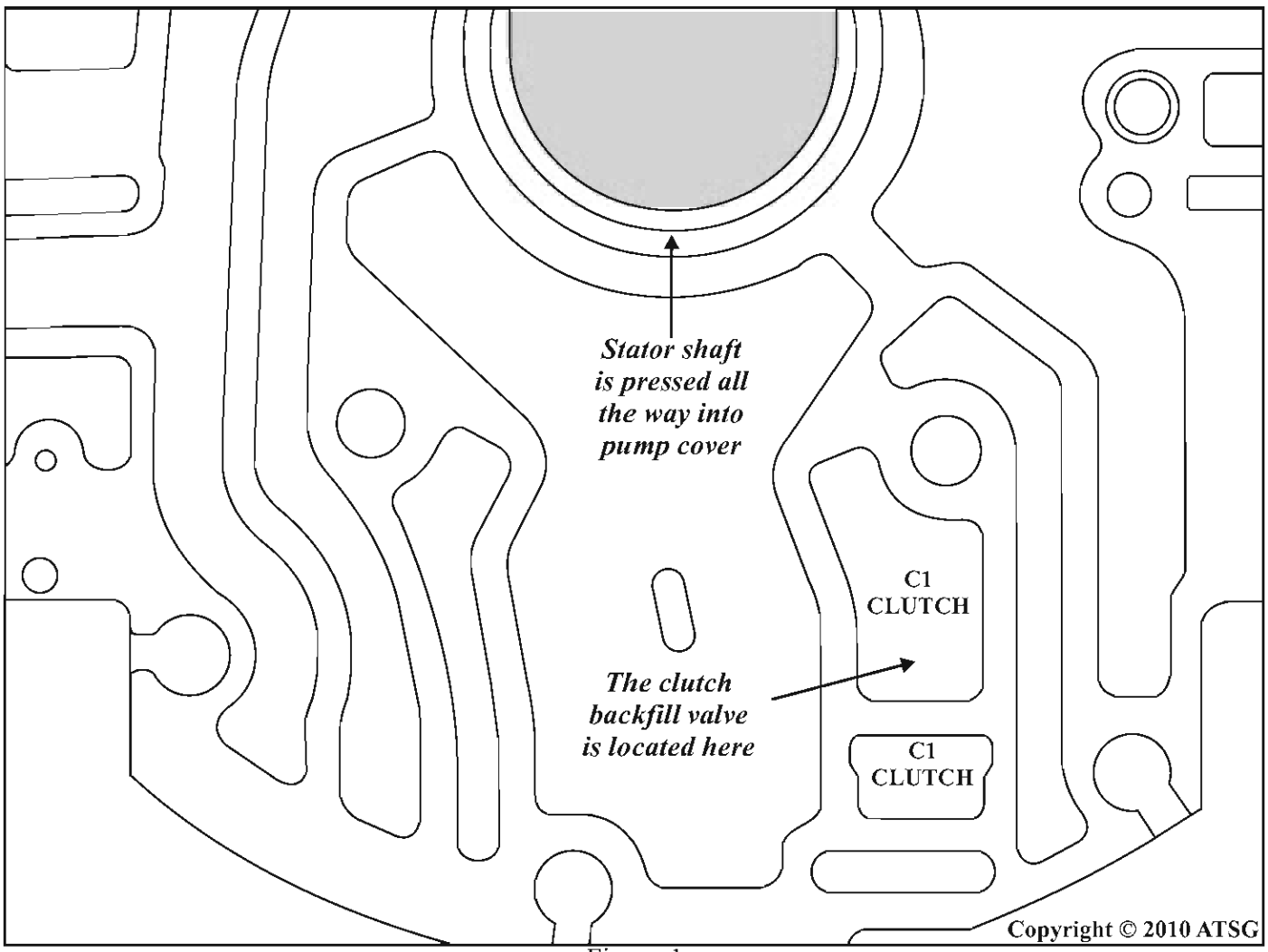


Figure 1

ALLISON 1000/2000 SERIES
NO FORWARD MOVEMENT

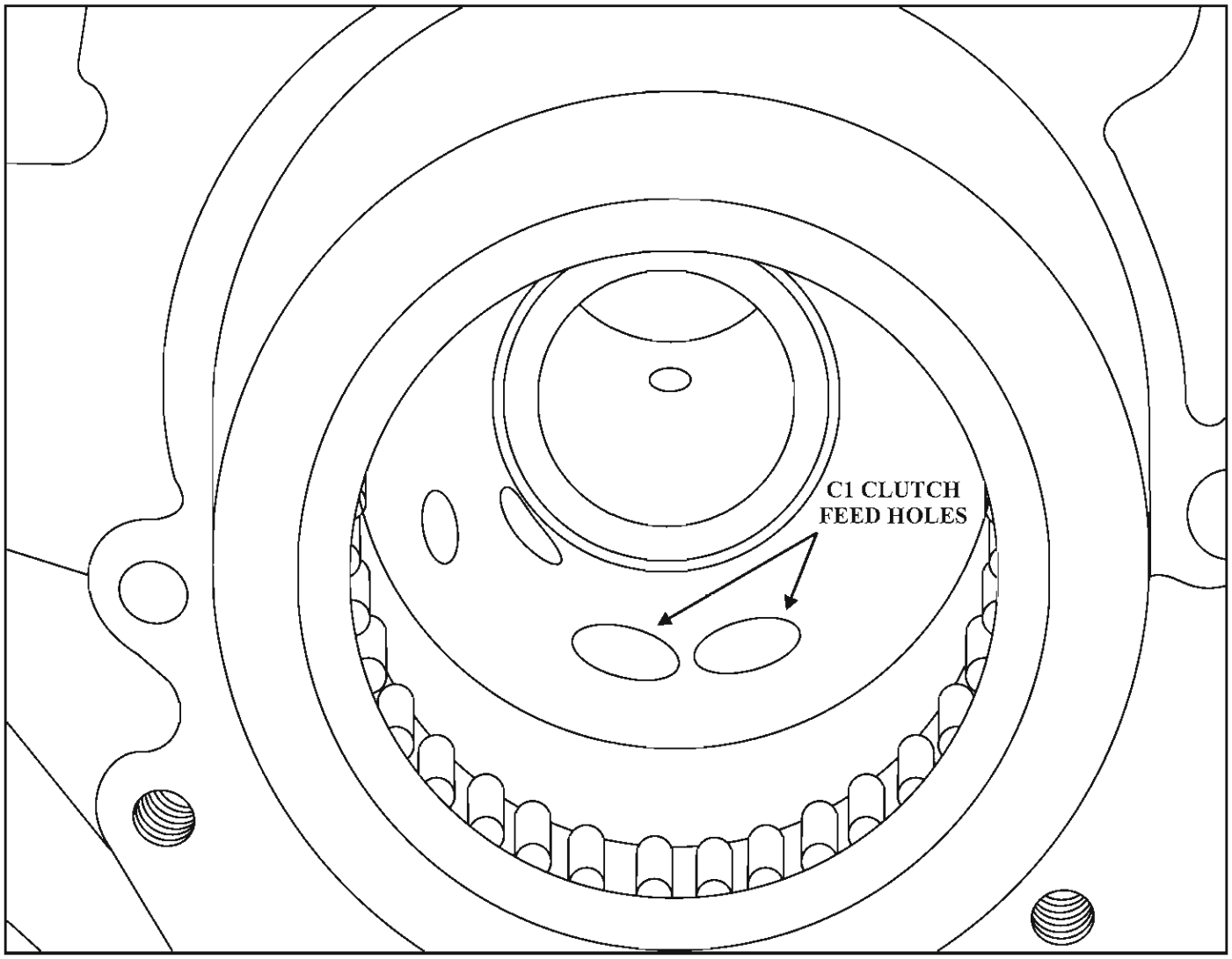
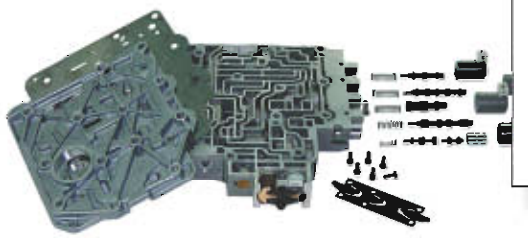


Figure 2

AT HFT YOU GET THE RIGHT PART THE FIRST TIME,

HARDPARTS FOR TRANSMISSIONS



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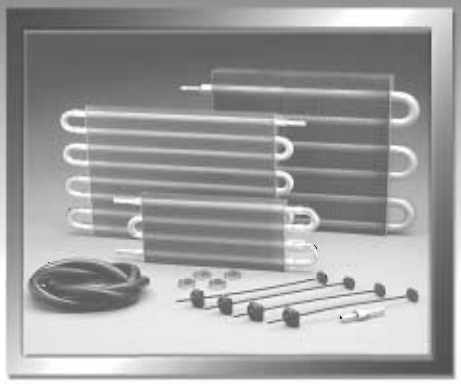

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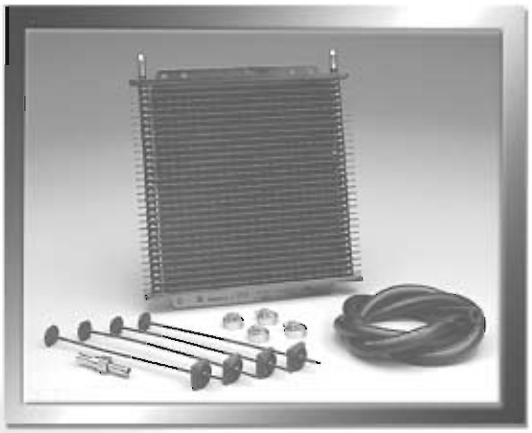

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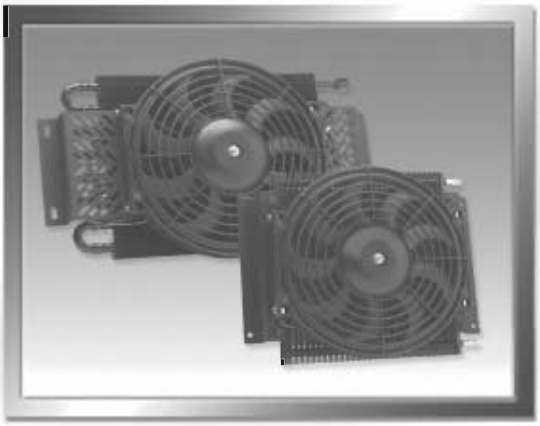

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AISIN SEIKI 450-43LE
PREMATURE FORWARD CLUTCH FAILURE

COMPLAINT: After overhaul, during the road test the truck begins to slip on initial take-off. As the truck is driven further, it begins to slip in all forward gears. Upon dis-assembly of the transmission, the forward clutch (C1) is badly burnt.

CAUSE: **#1** The forward clutch accumulator cover located in the rear of the transmission case was left loose, (See Figure 1), which results in a significant leak in the forward clutch circuit resulting in the above complaint.

#2 The forward clutch accumulator gasket was misaligned which creates a leak in the forward clutch circuit resulting in the above complaint.

CORRECTION:

#1 Be sure to tighten the forward clutch accumulator cover bolts to 6 ft. lbs.

#2 Install the forward accumulator gaskets as shown in Figures 2 and 3.

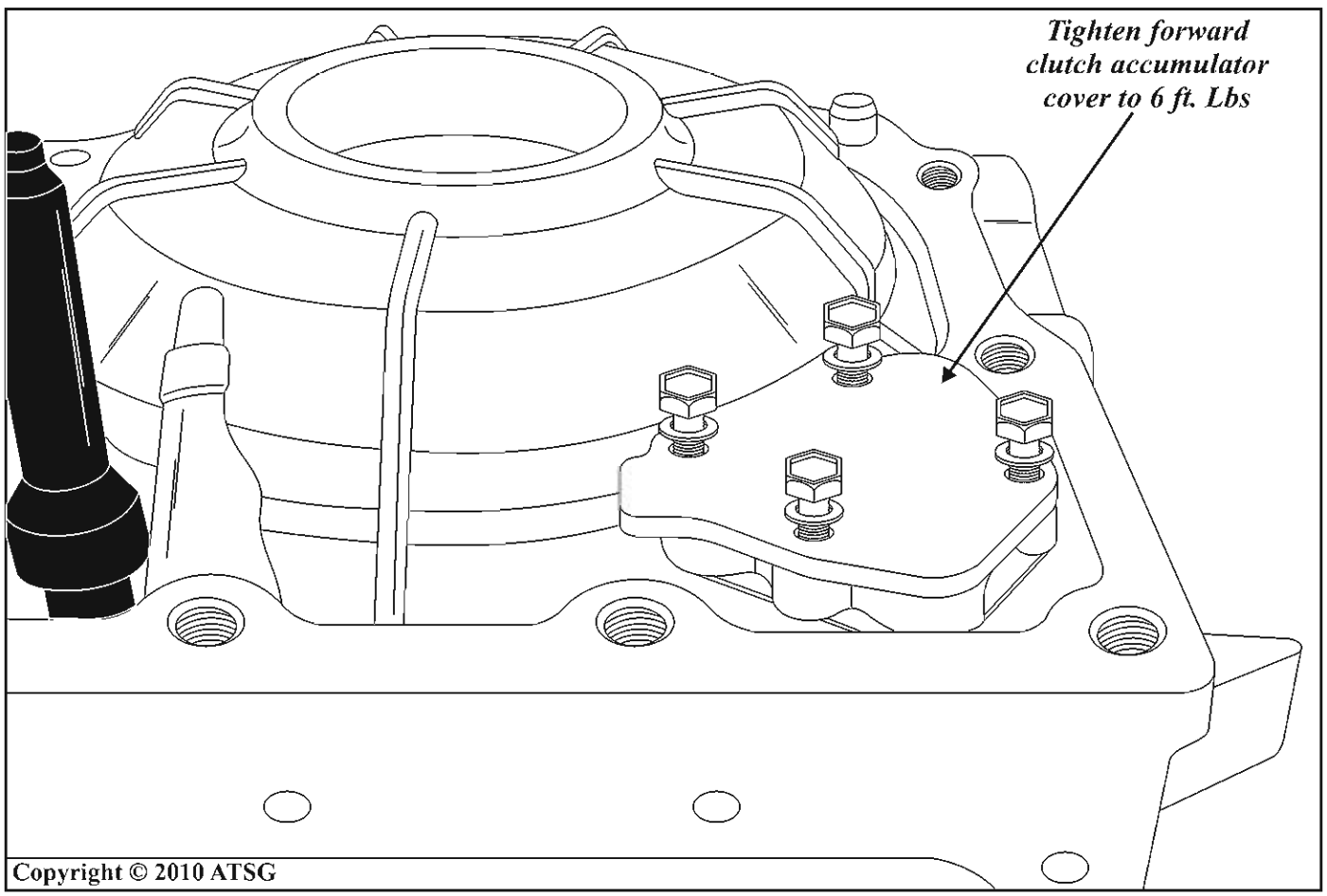


Figure 1

AISIN SEIKI 450-43LE
PREMATURE FORWARD CLUTCH FAILURE

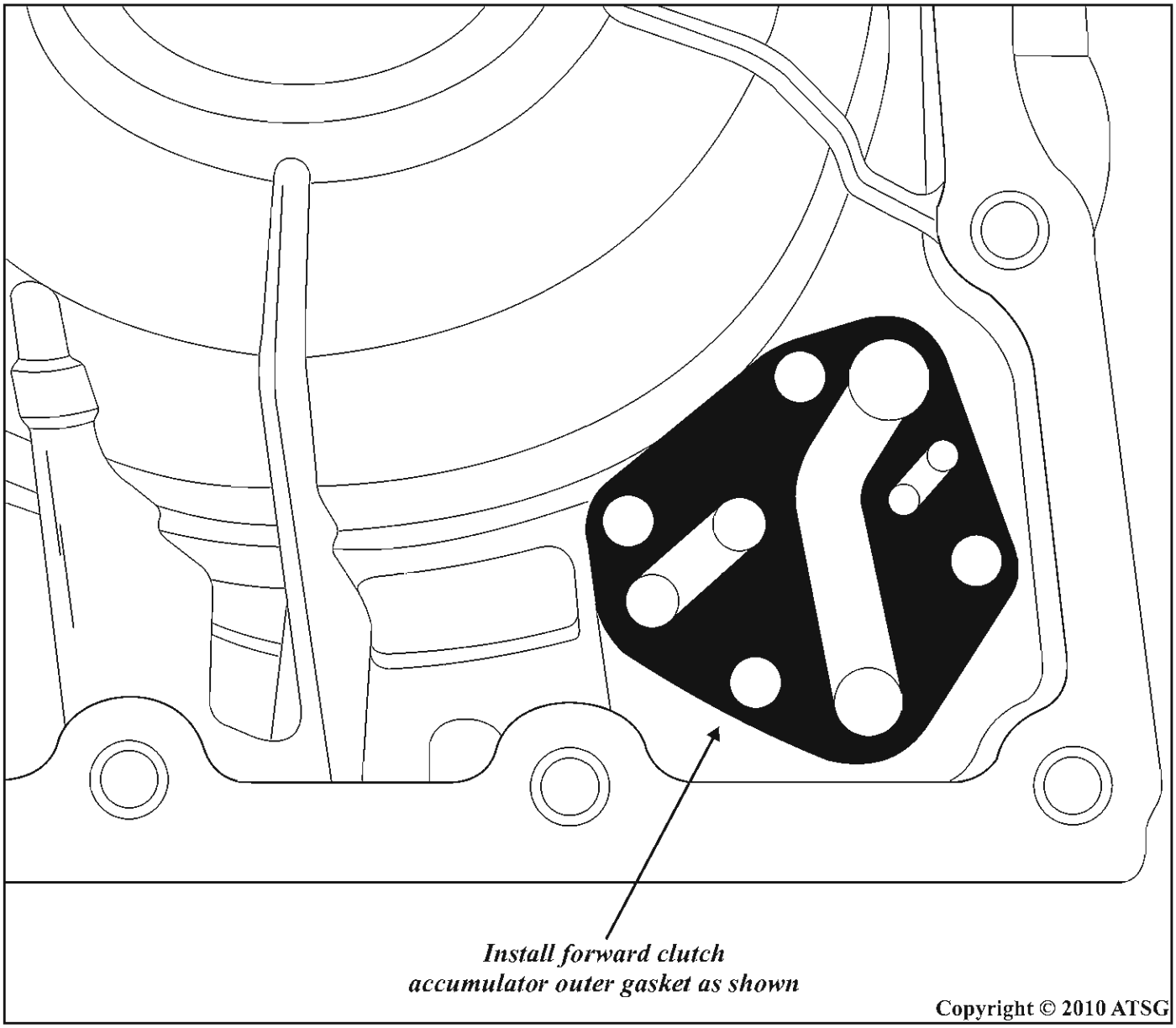


Figure 2

AISIN SEIKI 450-43LE
PREMATURE FORWARD CLUTCH FAILURE

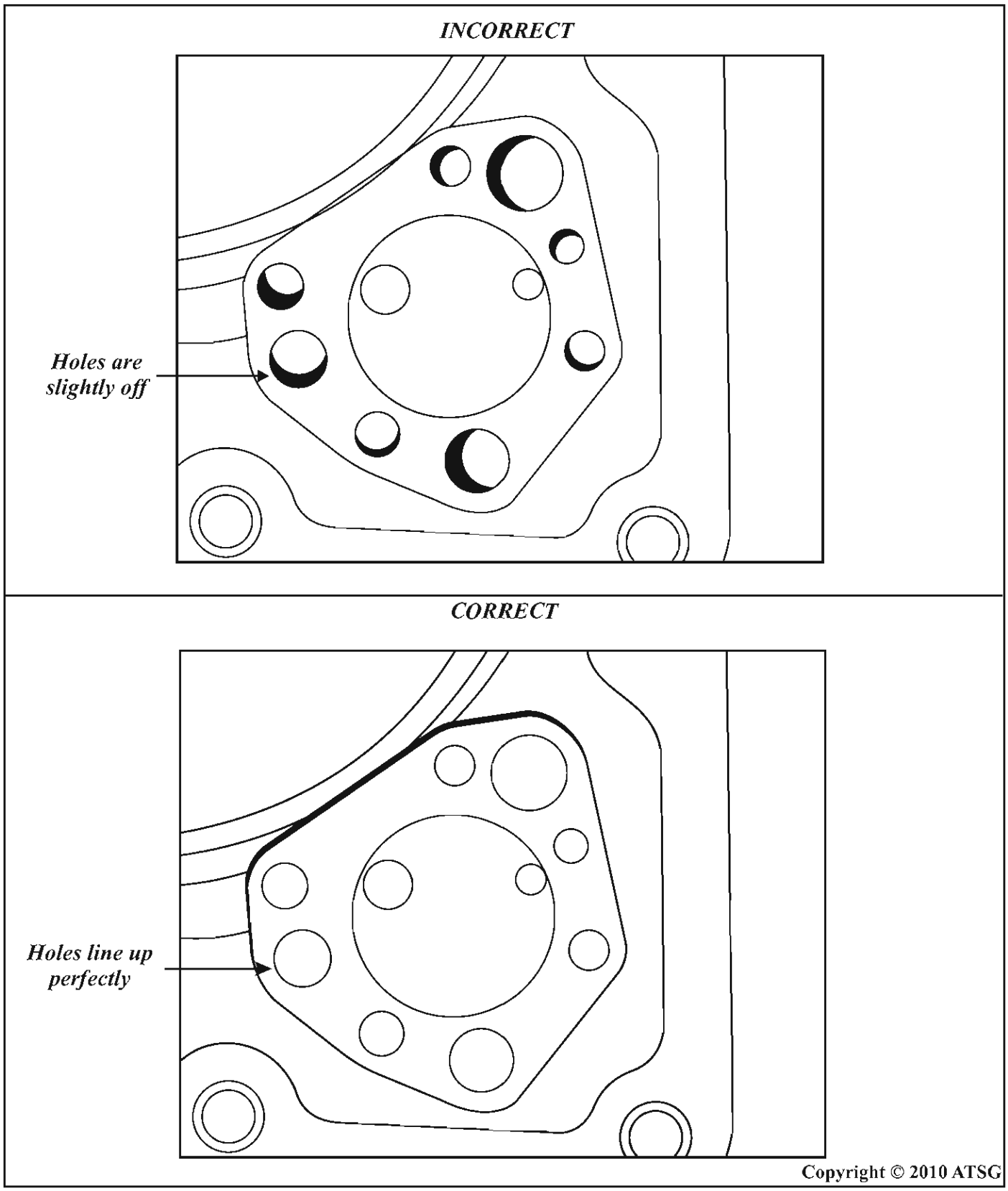


Figure 3

ISUZU NPR A465
SHIFT ADAPT MANUAL RELEARN PROCEDURE

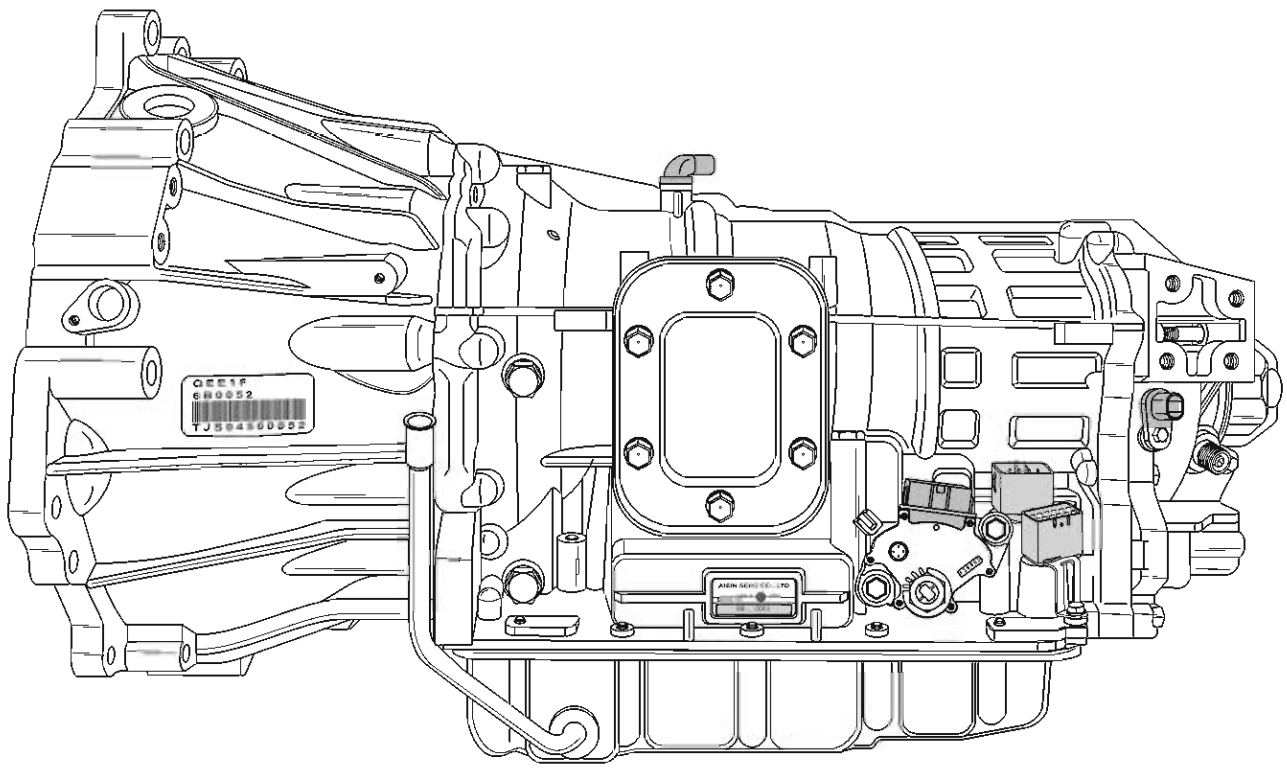
The vehicle must remain stopped with ATF temp at 104°F to 194°F.
If any part of the procedure is in error, the AT Over Temp Lamp will blink at which point the ignition will have to be turned off and the procedure will have to be started over again.

1. Make certain all accessories are turned off.
2. Set parking brake.
3. Check fluid level and adjust accordingly.
4. Make certain ATF Temp is as described above.
5. Start the engine.
6. Move shifter from Neutral to Drive Five (5) times.
7. Connect a jumper wire between pins 4 & 11 in the DLC. The "CHECK TRANS" Lamp should start blinking "ON" for 1 second and then "OFF" for 2 seconds.
8. Apply brake pedal with left foot. IMPORTANT: The brake pedal must be applied for the rest of the relearn procedure.
9. Verify the engine is at idle and the OD Switch is pressed in, (OD Enabled).
10. Move the shifter from Drive to Manual 2 Three (3) times.
11. Make certain the "CHECK TRANS" Lamp flashes ON and OFF every 0.4 seconds.
12. Pull the OD Switch out (OD Disabled).
13. Verify the "CHECK TRANS" Lamp blinks a series of 0.2 second blinks, followed by a series of 0.5 second blinks followed by a series of 0.2 second blinks, (This is learning step 1).
14. When the "CHECK TRANS" Lamp fast, increase the engine speed to 1000-1500 rpm.
15. Push the OD Switch in (OD Enabled). Verify the "CHECK TRANS" Lamp blinks slowly.
16. Wait until the "CHECK TRANS" Lamp goes out. Now let the engine rpm return to idle, (This is learning step 2).
17. Move the shifter to Reverse.
18. Pull the OD Switch out, (OD Disabled). Verify the "CHECK TRANS" Lamp a series of 0.5 second blinks followed by a series of 0.2 second blinks.
19. When the lamp blinks quickly, increase engine speed to 1000 to 1500 rpm.
20. Push the OD Switch in, (OD Enabled). The "CHECK TRANS" Lamp will start to blink slowly.
21. When the "CHECK TRANS" Lamp starts blinking one (1) second ON followed by two (2) seconds OFF, let the engine return to idle. Two (2) long blinks followed by two (2) short blinks, followed by three (3) long blinks followed by a two (2) second pause, ending with a one (1) second blink, (This is learning step 4).
22. Place the transmission in Park and release the brake pedal.
23. Disconnect the jumper wire from the DLC.
24. Turn the ignition OFF and ON again. Make certain no warning lamps are on.

AS6 / AS68RC
PRELIMINARY INFORMATION

The following information is for the AS6 / AS68RC six speed Medium Duty Truck transmission. It is found in the Isuzu cab over, and 07 and up Dodge incomplete chassis. There is information on both versions in the following pages. The operational characteristics displayed are for the Dodge, which are similar to the Isuzu. The Valve Body information and specifications are from an Isuzu application, and are very similar to the Dodge.

AS6 / AS68RC
ISUZU AND DODGE TRUCKS



GENERAL DESCRIPTION

Beginning in model year 2007 Daimler-Chrysler introduced a new rear drive transmission that is manufactured by Aisin Seiki in Japan and referred to as the AS68RC by Chrysler. It is a six speed, rear wheel drive (RWD) automatic transmission and found in Dodge 3500, 4500, and 5500 chassis, with the Cummins 6.7L diesel engine. Refer to Figure 1 for the definitions of AS68RC.

Primary reason was to assist Dodge's re-entry into the commercial truck market with its 26,000 lb GCVW rating. This is accomplished through the use of a multi-plate torque converter clutch and heavy duty gear train housed in a conventional transmission case assembly, as shown in Figure 3.

The primary mechanical components of the AS68RC are as follows:

- ***Three Driving Clutch Packs.***
- ***Two Brake Clutch Packs.***
- ***One One-Way Sprag Clutch.***
- ***Three Planetary Gear Sets.***
- ***Torque Converter Multi-Disc Lock-up Clutch***

Fuel efficiency is provided by clutch to clutch shifting, an on-demand torque converter clutch, and the use of two overdrive ratios. Refer to Figure 3 for component locations and identification of each component. The AS68RC provides six forward and one reverse range. With the selective lever in D (Drive), all forward ranges are available when the O/D and Tow/Haul features are Off.

Fully electronic shift and torque converter clutch controls optimize transmission operation, fuel economy, and towing capability. The Transmission Control Module (TCM) has the capability to alter shift schedules, line pressure, and the apply and release of the torque converter clutch. The TCM receives information from several electronic sensors and based on that information will output to the following solenoids located on the valve body.

- ***Four Linear (PWM) Solenoids.***
- ***Four On/Off Shift Solenoids.***

The TCM also communicates with the Engine Control Module (ECM) and the Totally Integrated Power Module (TIPM) via the CAN-C bus. The TCM is a stand alone module located located under driver side dash next to the steering shaft.

The AS68RC can also accommodate a variety of Power Take Off (PTO) accessories and is available in 2WD and 4WD versions.

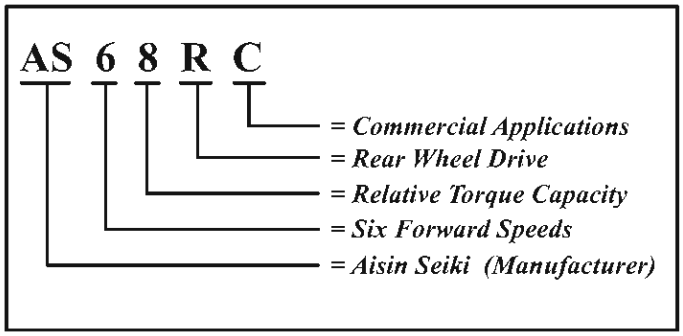
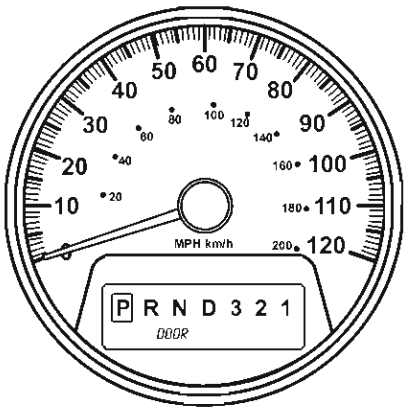


Figure 1



Instrument Panel (Speedometer)

Figure 2

AS68RC Shift Quadrant

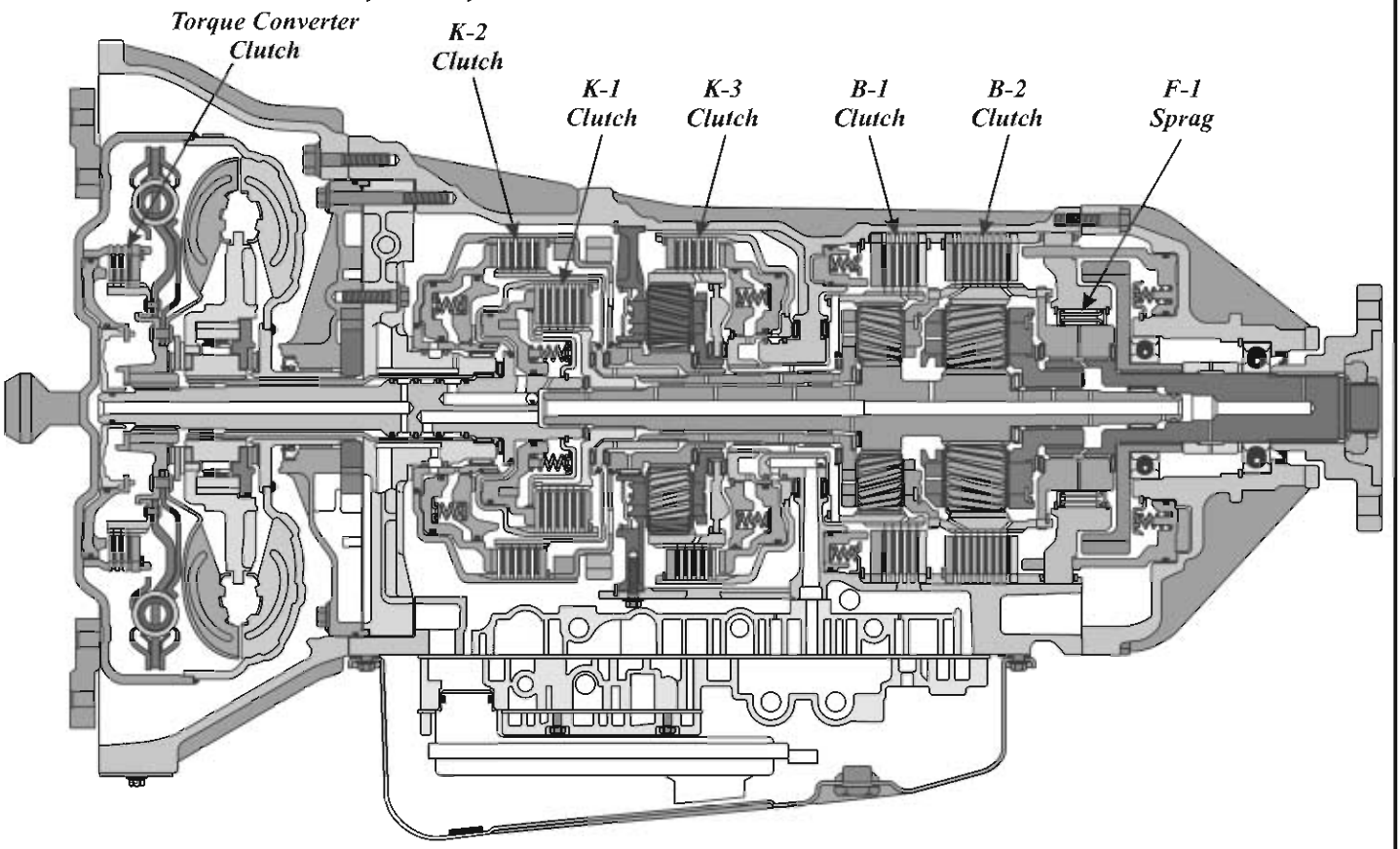
The AS68RC shift quadrant indicator is located in the speedometer housing, as shown in Figure 2 and is equipped with a column shift lever. Shift lever positions are as follows:

P When the Park position is selected, there is no powerflow through the transaxle. The parking pawl is engaged which locks the output shaft to the case. The engine can be started and the ignition key can be removed.

R When the Reverse position is selected, the vehicle can be operated in a rearward direction at a reduced gear ratio.

N When the Neutral position is selected, there is no powerflow through the transaxle. The output shaft is free to rotate and the engine can be started. This position can also be selected while the vehicle is moving to restart the engine, if necessary.

AS68RC INTERNAL COMPONENT IDENTIFICATION AND LOCATION



COMPONENT APPLICATION CHART

RANGE	K-1 Clutch	K-2 Clutch	K-3 Clutch	B-1 Clutch	B-2 Clutch		F-1 Sprag		Torq Conv Clutch	Gear Ratio
Park					On					
Reverse			On		On					3.54
Neutral					On					
"D"-1st	On				On		Hold			3.74
"D"-2nd	On			On					Applied*	2.00
"D"-3rd	On		On						Applied*	1.34
"D"-4th	On	On							Applied*	1.00
"D"-5th		On	On						Applied*	0.77
"D"-6th		On		On					Applied*	0.63

* TCC is available in 2nd thru 6th gear, based on throttle position, fluid temp and vehicle speed.

Figure 3

AS68RC Shift Quadrant (Cont'd)

D The Drive position is the normal position for most forward gear operations. The Drive position provides automatic upshifts and downshifts, apply and release of the converter clutch, and maximum fuel economy during normal operation. Drive range allows the transmission to operate in each of the six forward gear ratios, with the O/D and Tow/Haul in Off position. Downshifts are available for safe passing, by depressing the accelerator.

3 Manual "3" position prevents transmission from shifting above 3rd gear, and adds more performance and engine braking for hilly terrain. Manual 3 can be selected at any vehicle speed, but will not downshift until vehicle speed calibrated into the TCM has been reached, to prevent engine over-speed.

2 Manual "2" position prevents transmission from shifting above 2nd gear, and provides engine braking for hilly terrain. Manual 2 can be selected at any vehicle speed, but will not downshift until vehicle speed calibrated into the TCM has been reached, to prevent engine over-speed.

1 Manual "1" position prevents transmission from shifting above 1st gear, and provides maximum engine braking. Manual 1 can be selected at any vehicle speed, but will not downshift until vehicle speed calibrated into the TCM has been reached, to prevent engine over-speed.

AS68RC Tow/Haul and O/D Off

The "Tow/Haul" and "O/D Off" button is located on the end of the manual selector lever, as shown in Figure 4. Pressing the button once enables the Tow/Haul mode and the "Tow/Haul" lamp will be illuminated. In Tow/Haul mode 6th gear is disabled and all upshifts will be delayed. Closed throttle downshifts, for improved engine braking, may occur during steady braking conditions.

Pressing the button a second time enables the O/D-Off mode, where all 5th and 6th gear operation is inhibited (No overdrive ratios), and the O/D Off lamp will be illuminated. Tow/Haul and O/D Off lamps are located just to the right of the temperature gauge, as shown in Figure 4.

Pressing the button a third time will restore normal operation. Normal operation is the default on start-up, the switch must be pressed after each key start if Tow/Haul mode is desired.

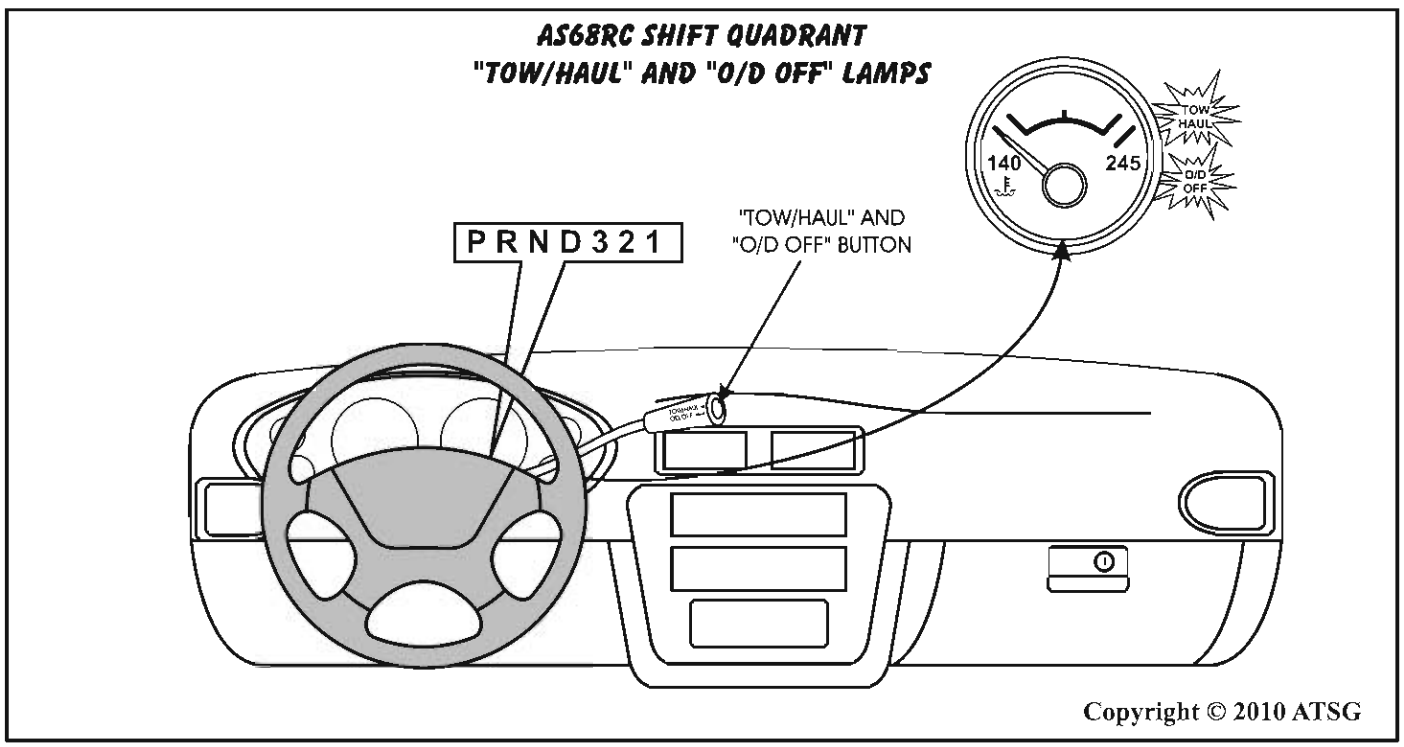


Figure 4

IDENTIFICATION TAG LOCATION

Transmission identification numbers are included in the bar code label located on the torque converter housing. There is also a stamped steel identification tag riveted to the left side of the transmission case, as shown in Figure 5. This tag also includes build date information. This information is necessary when any replacement parts are needed.

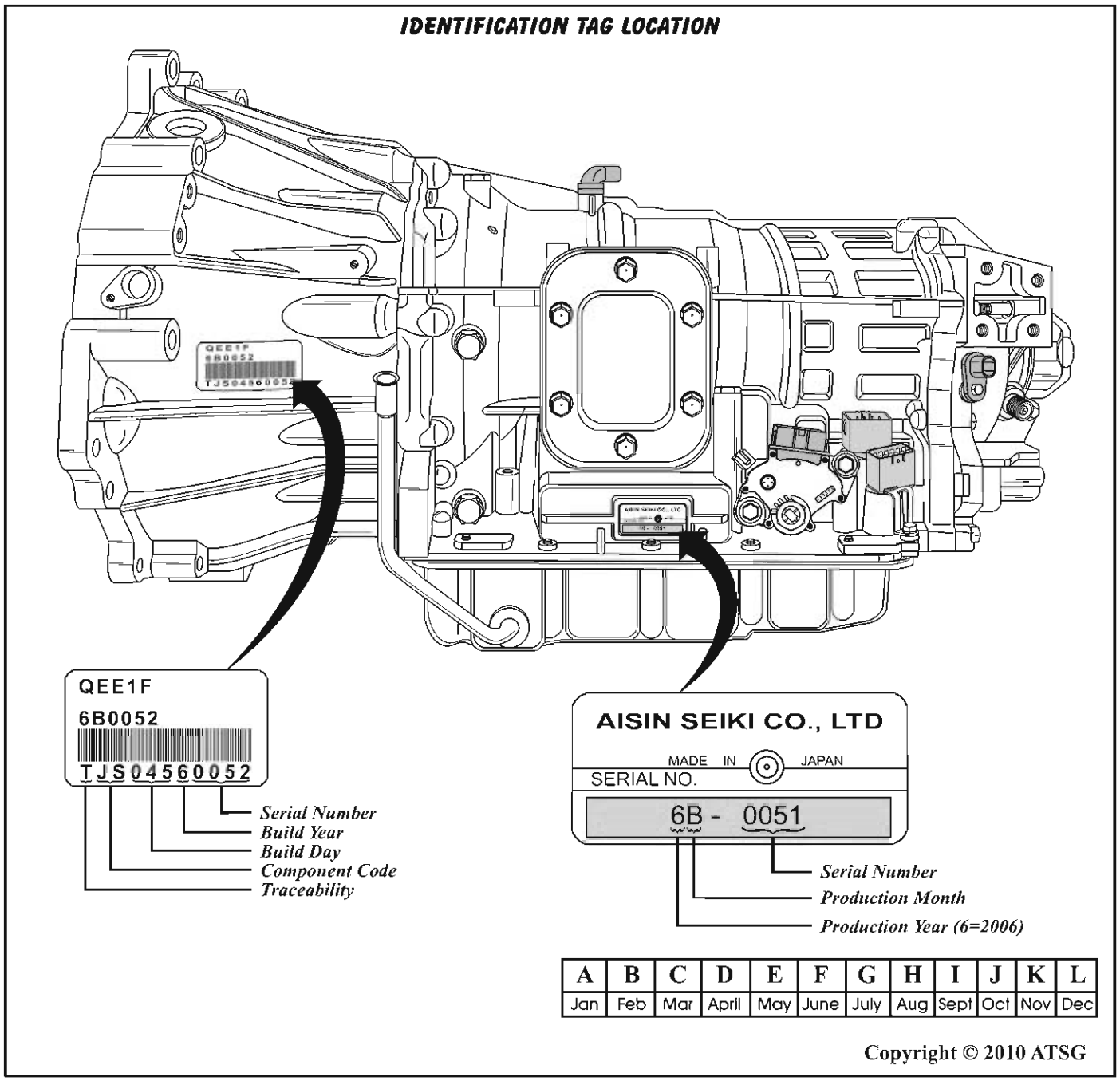


Figure 5

EXTREMELY VERSATILE TRANSMISSION

The Aisin Seiki 6 Speed transmission, at the time of this printing, is found in the Isuzu NPR, Daimler-Chrysler 3500, 4500, 5500, and possibly replacing the AW450-43LE unit in Mitsubishi Fuso, and the Tiltmaster trucks.

The Aisin Seiki TR80 transmission can be adapted to virtually any type vehicle that is in need of the 26000 GCVW torque capacity rating. The TR80 transmission is equipped with a bolt-on converter housing that makes it adaptable to any engine size. The case is cast so that it can accommodate a variety of Power Take Off (PTO) accessories, with PTO openings available on either side, or on both sides. The bolt-on extension housing has several different mounting options available on the side and bottom of the housing and comes in 2WD and 4WD versions. Some models also use a speedometer gear and adapter in the extension housing, as shown in Figure 6. The Daimler-Chrysler version uses a mount on the bottom of the extension housing and a cross member. The Isuzu NPR uses the mounting holes on the top left and right sides of the extension housing, as shown in Figure 6 and 7.

There are also at least two different dip stick tube locations, as shown in Figure 6.

The turbine shaft speed sensor has two different locations, as shown in Figure 7. The Isuzu NPR mounts on the top center of the case, and the Daimler-Chrysler models is located on the driver side of the transmission, within the area of the unfinished casting for an additional PTO. Notice also that the transmission vent exhausts to the inside of the converter housing (See Figure 7).

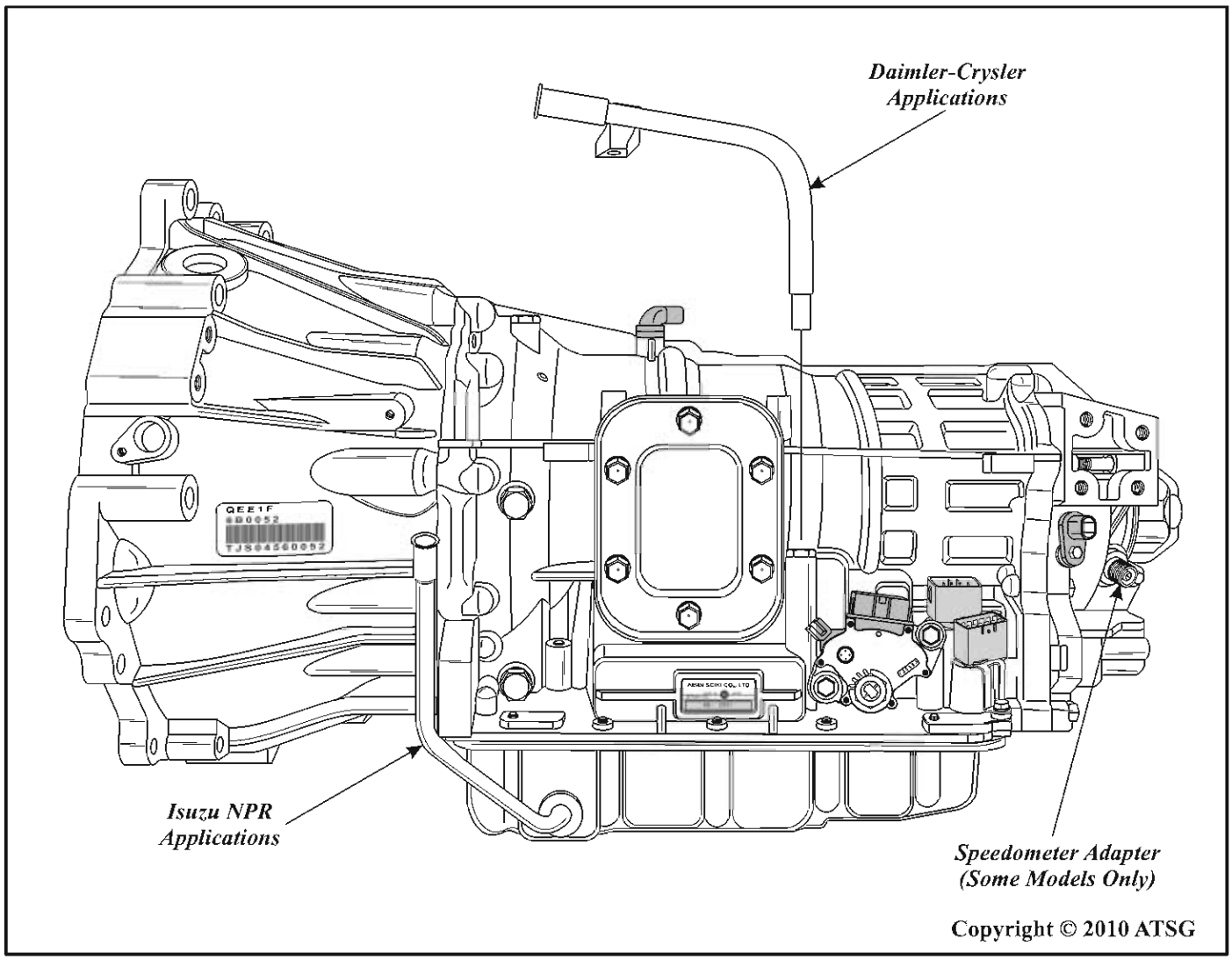
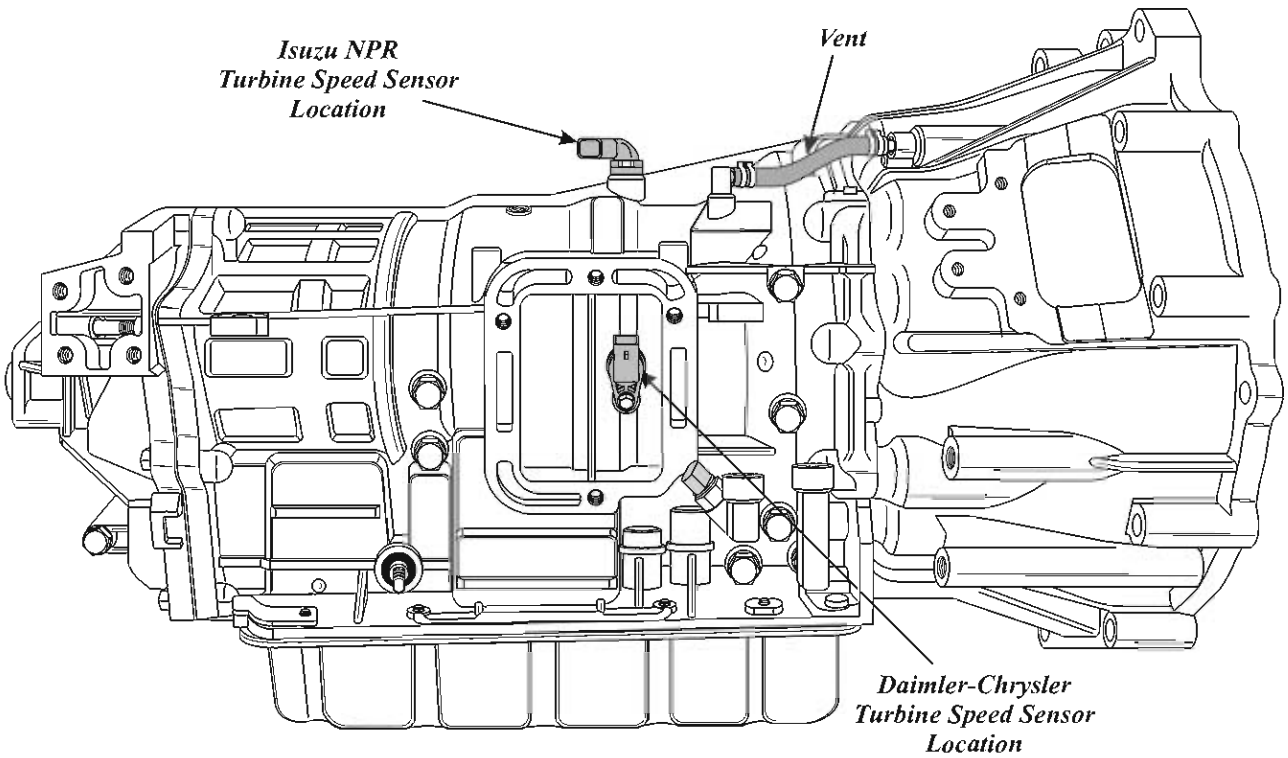


Figure 6



NOTE: Daimler-Chrysler Turbine Speed Sensor is located on the driver side as the active PTO window is located on the right hand side of the transmission.

Figure 7

EXTERNAL ELECTRONIC COMPONENTS

Input (Turbine) Speed Sensor

The Input Speed Sensor (ISS) is a magneto resistive speed sensor that generates a DC square wave signal that the TCM interprets as rotational speed. The ISS measures the speed of the sun gear for the P1 planetary. The P1 sun gear and the PTO drive gear are an assembly. The PTO drive gear serves as the tone wheel for the ISS. The ISS generates 69 pulses per revolution.

The ISS is primarily used by the TCM to monitor torque converter clutch application and slippage, and is the primary input for converter clutch pressure regulation.

The TCM also uses ISS signal with the Output Speed Sensor (OSS) signal to determine actual gear ratio. Both speed sensors share a common 8 volt supply from the TCM. The ISS is illustrated in Figure 8.

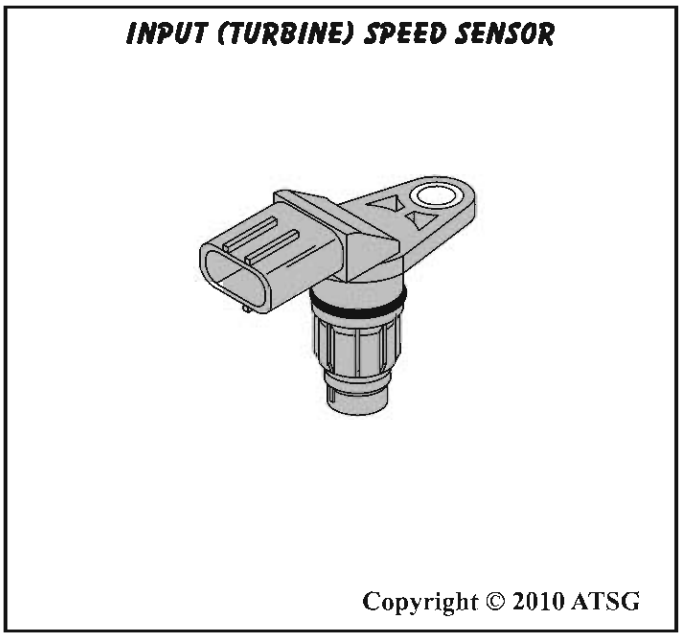


Figure 8

EXTERNAL ELECTRONIC COMPONENTS (CONT'D)

Output Speed Sensor

The Output Speed Sensor (OSS) is located on the driver side of the transmission and located in the extension housing, as shown in Figure 10. The OSS is a magneto-resistive speed sensor that generates a DC square wave signal that the TCM interprets as rotational speed. The OSS measures the speed of the parking gear teeth attached to the output shaft, providing the vehicle speed signal. The ABS system provides back-up vehicle speed should the OSS fail. The OSS generates 16 pulses per revolution.

The TCM uses the OSS signal to constantly monitor output shaft speed. It is used with the ISS signal to determine actual gear ratio. The OSS signal is compared to the vehicle speed signal from ABS to validate vehicle speed. Both speed sensors share a common 8 volt supply from the TCM. The OSS is illustrated in Figure 9.

OUTPUT SPEED SENSOR

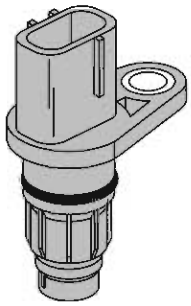


Figure 9

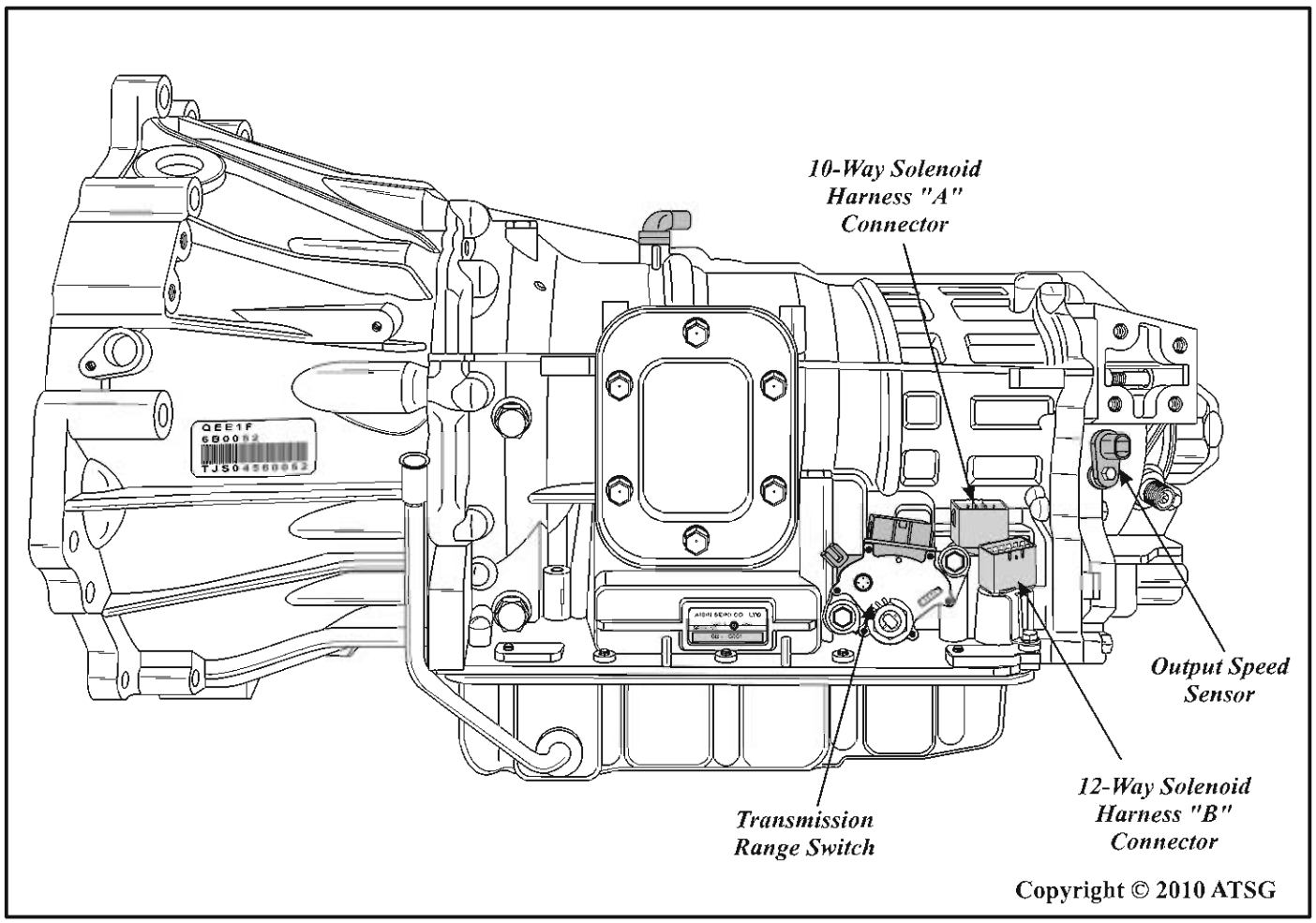


Figure 10

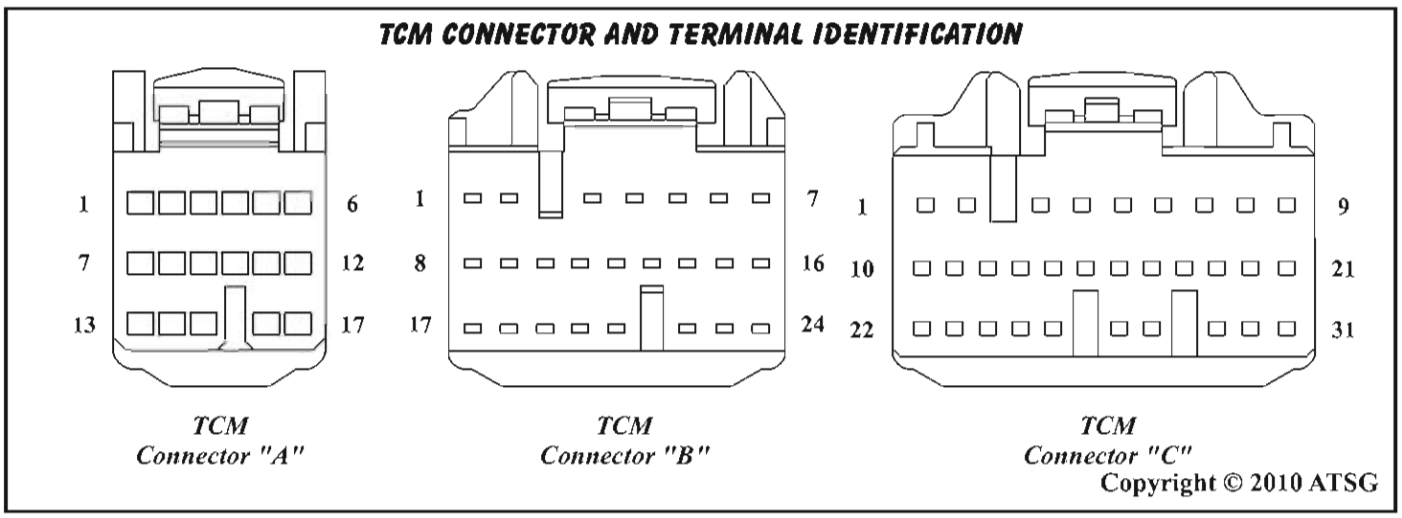


Figure 11

EXTERNAL ELECTRONIC COMPONENTS (CONT'D)

Transmission Case Connectors

The Aisin Seiki AS68RC uses two transmission case connectors with an internal wire harness for each, as shown in Figure 13. One of them is a 10 terminal connector referred to as "Solenoid A Harness" and the other is a 12 terminal connector referred to as "Solenoid B Harness".

Refer to Figure 12 for a solenoid resistance chart for each of the eight solenoids used in this unit.

Solenoid Resistance Chart	
Solenoid	*Resistance*
Linear Solenoid "A"	*5.5 - 7.5 Ohms*
Linear Solenoid "B"	*5.5 - 7.5 Ohms*
Linear Solenoid "C"	*5.5 - 7.5 Ohms*
Linear Solenoid "D"	*5.5 - 7.5 Ohms*
On/Off Shift Solenoid 1	*14 - 16 Ohms*
On/Off Shift Solenoid 2	*14 - 16 Ohms*
On/Off Shift Solenoid 3	*14 - 16 Ohms*
On/Off Shift Solenoid 4	*14 - 16 Ohms*

Figure 12

Transmission Range Switch

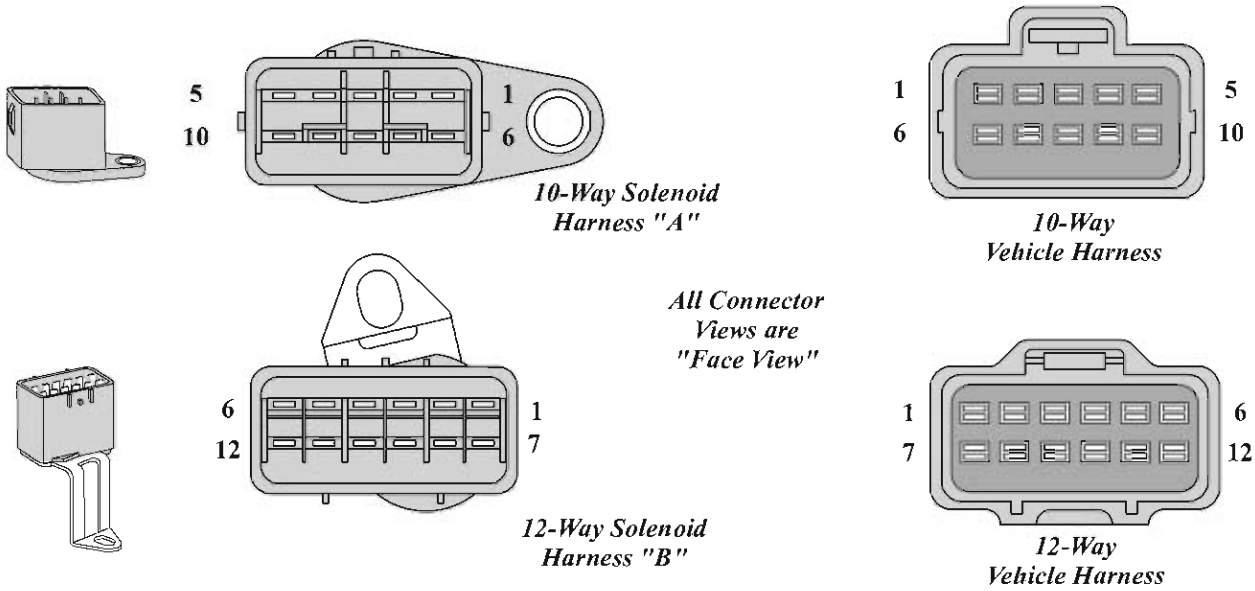
On the Aisin Seiki AS68RC (Chrysler) models a Transmission Range Switch (TRS) is used that has seven detent positions (P R N D 3 2 1), as shown in Figure 14. Although the charts in Figure 14 are used to check the integrity of the switch's range selection, using an ohmmeter, the best method is to check the switch in the vehicle with a voltmeter.

By looking at the chart in Figure 14, it can be seen that terminal 4 is the common terminal for all range selections. This is the voltage supply into the switch. Terminals 6 and 10 are used for starting purposes only. With the ignition switch "ON" there must be battery voltage at terminal 4. If there is not, this must be repaired first. If voltage is present, it should exit the assigned terminal for each range selection.

The TRS switch can also be checked for shorts. With the ignition switch "OFF", using an ohmmeter at the same terminals shown in the Figure 14 chart, the reading should be less than 2 ohms resistance.

A complete wiring schematic from transmission to the TCM is shown in Figure 15 and 16. TCM connector identification is shown in Figure 11.

SOLENOID CONNECTOR AND TERMINAL IDENTIFICATION



10-Way Solenoid Connector "A"

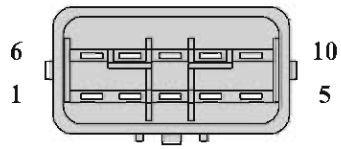
Terminal	Function	TCM Conn. Number	Outside Wire Color	Inside Wire Color
1	Pressure Switch Number 7 (1/4" NPT)	C10	Dk Green/Violet	White
2	Pressure Switch Number 5 (1/8" NPT)	A11	Yellow/Dk Blue	Lt Green
3	TFT Sensor Voltage Signal	B15	Dk Green/Orange	Pink
4	Power Voltage for Linear Solenoid "C"	C5	Yellow/Brown	Dk Blue
5	Ground for Linear Solenoid "A"	C7	Dk Green/Lt Green	Black
6	Pressure Switch Number 8 (1/8" NPT)	C26	Dk Green/White	Black
7	Pressure Switch Number 4 (1/8" NPT)	A5	Dk Green/Brown	Orange
8	TFT Sensor Return	C28	Yellow/White	Tan
9	Ground for Linear Solenoid "C"	C15	Yellow/Pink	White
10	Power Voltage for Linear Solenoid "A"	C6	Dk Green/Tan	Yellow

12-Way Solenoid Connector "B"

Terminal	Function	TCM Conn. Number	Outside Wire Color	Inside Wire Color
1	Pressure Switch Number 1 (1/4" NPT)	A6	Dk Green/Brown	Tan
2	Pressure Switch Number 6 (1/8" NPT)	A16	Dk Green/Orange	Yellow
3	On/Off Shift Solenoid 2 Power	C22	Dk Green/Yellow	Black
4	On/Off Shift Solenoid 4 Power	B19	Dk Green/Lt Blue	Orange
5	Power Voltage for Linear Solenoid "D"	C30	Yellow/Gray	Dk Blue
6	Ground for Linear Solenoid "B"	C8	Yellow/Red	Tan
7	Pressure Switch Number 2 (1/4" NPT)	A17	Dk Green/Red	Pink
8	Pressure Switch Number 3 (1/8" NPT)	A12	Dk Green/Pink	Black
9	On/Off Shift Solenoid 3 Power	C3	Dk Green/Dk Blue	Yellow
10	On/Off Shift Solenoid 1 Power	C1	Dk Green/Gray	Lt Green
11	Ground for Linear Solenoid "D"	C31	Yellow/Pink	White
12	Power Voltage for Linear Solenoid "B"	C9	Yellow/Brown	Pink

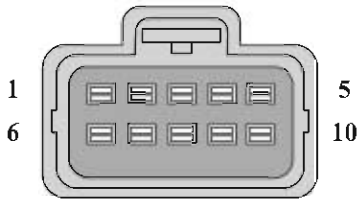
Figure 13

TRANSMISSION RANGE SWITCH TERMINAL IDENTIFICATION

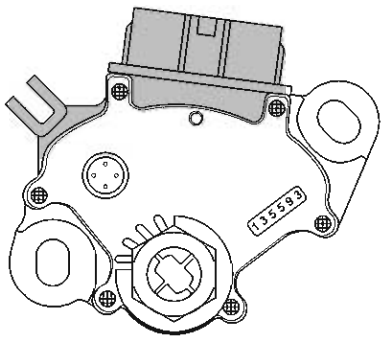


Transmission Range Switch Connector

All Connector Views are "Face View"



Transmission Range Switch Vehicle Harness Connector



Range	TRS 10-Way Connector									
	4	5	9	1	8	2	7	3	10	6
P	●	●							●	●
R	●	●	●							
N	●	●	●	●					●	●
D	●	●	●	●	●					
3	●	●	●	●	●	●				
2	●	●	●	●	●	●	●			
1	●	●	●	●	●	●	●	●		

10-Way Transmission Range Switch Connector

Terminal	*Function*	*TCM Conn. Number*	*Outside Wire Color*
1	*Transmission Range Switch "Neutral"*	*C29*	*Dk Green/Dk Blue*
2	*Transmission Range Switch "3"*	*C18*	*Dk Green/Dk Blue*
3	*Transmission Range Switch "1"*	*C16*	*Dk Green/Dk Blue*
4	*Power In From Integrated Power Module (IPM)*	*(IPM) B1*	*Pink/White*
5	*Transmission Range Switch "Park"*	*C20*	*Yellow/Dk Blue*
6	*To Ground At "G100"*		*Black/Lt Green*
7	*Transmission Range Switch "2"*	*C17*	*Dk Green/Yellow*
8	*Transmission Range Switch "Drive"*	*C19*	*Dk Green/Lt Blue*
9	*Transmission Range Switch "Reverse"*	*C21*	*Dk Green/Dk Blue*
10	*Park/Neutral Switch Input To Integrated Power Module (IPM)*	*(IPM) B2*	*Yellow/Dk Blue*

Figure 14

TYPICAL AS68RC SOLENOID AND PRESSURE SWITCH WIRE SCHEMATIC

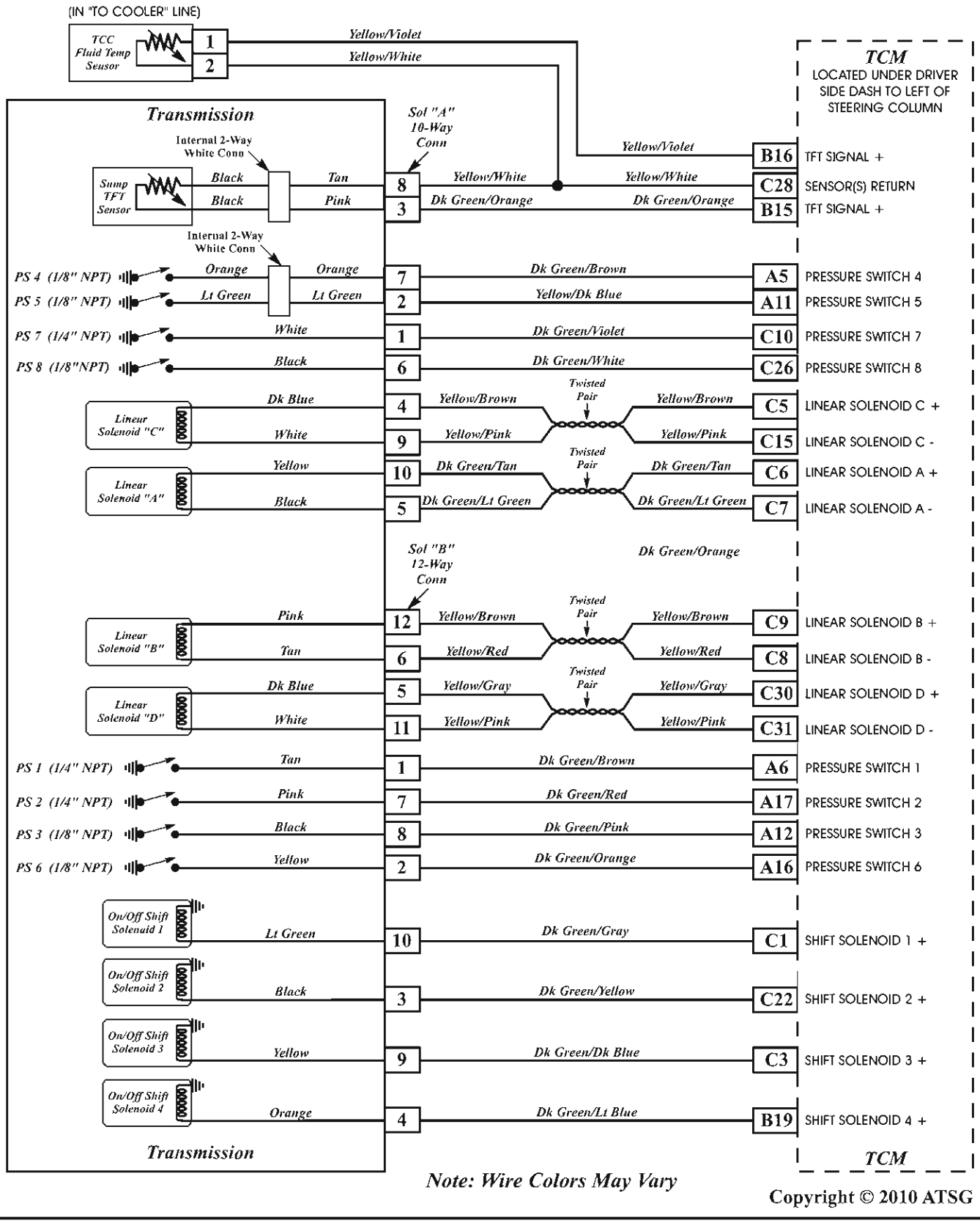


Figure 15

TYPICAL AS68RC RANGE SWITCH WIRE SCHEMATIC

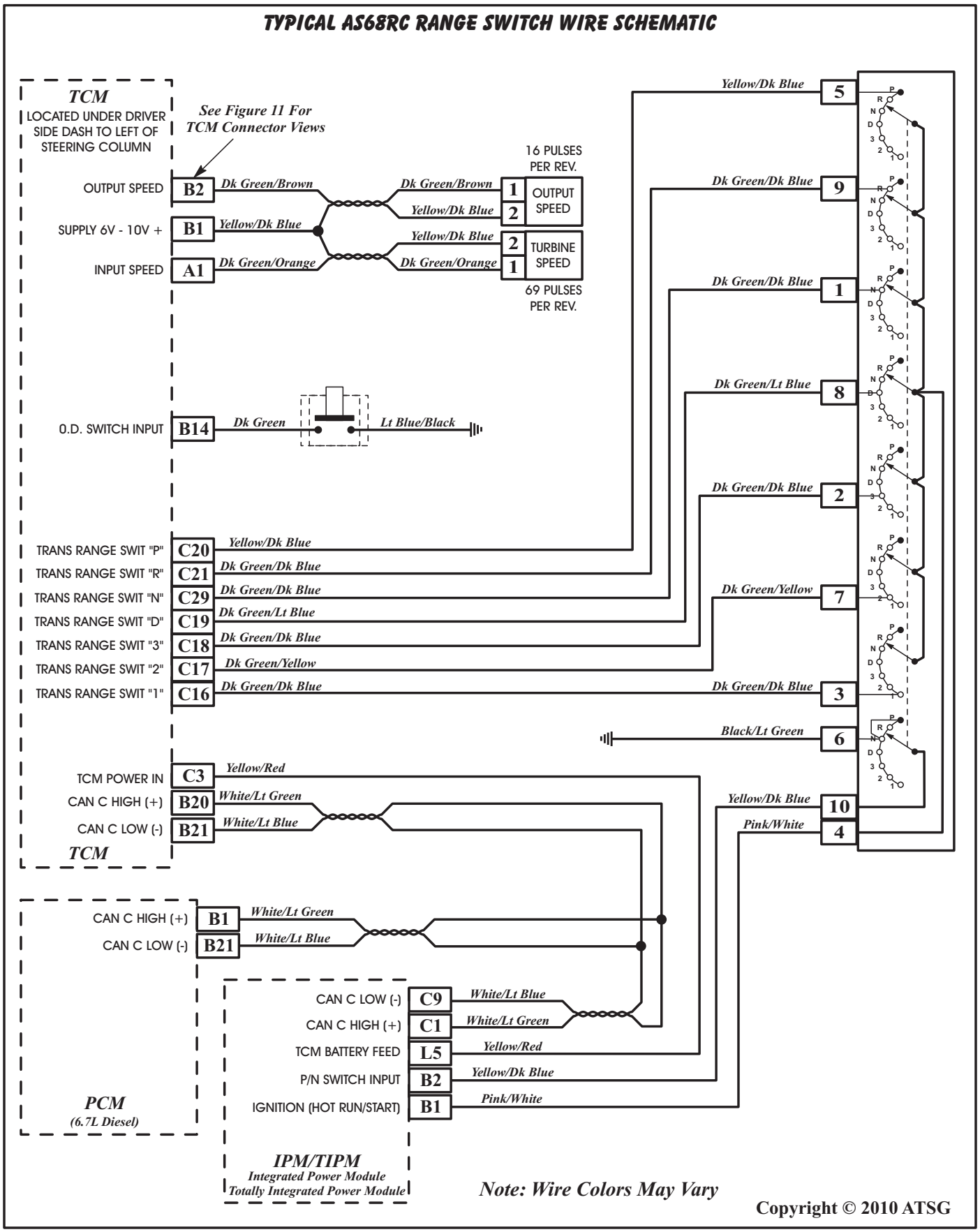


Figure 16

EXTERNAL ELECTRONIC COMPONENTS (CONT'D)

Converter Out Fluid Temperature Sensor

The torque converter out thermistor is mounted externally on the passenger side of the transmission, in the "To Cooler" fitting, as shown in Figure 18. Torque converter out temperature sensor monitors torque converter fluid temperature, which is typically much hotter than sump fluid temperature and determines appropriate TCC lock-up strategy.

INTERNAL ELECTRONIC COMPONENTS

Sump Fluid Temperature Sensor

The sump thermistor is located on the valve body under the linear solenoid bracket, as shown in Figure 17. Temperatures above and below normal operating range result in modified shift points until normal operating temperatures are resumed.

Both temperature sensors are Negative Thermal Coefficient (NTC) sensor, which means an increase in temperature results in a decrease in sensor resistance.

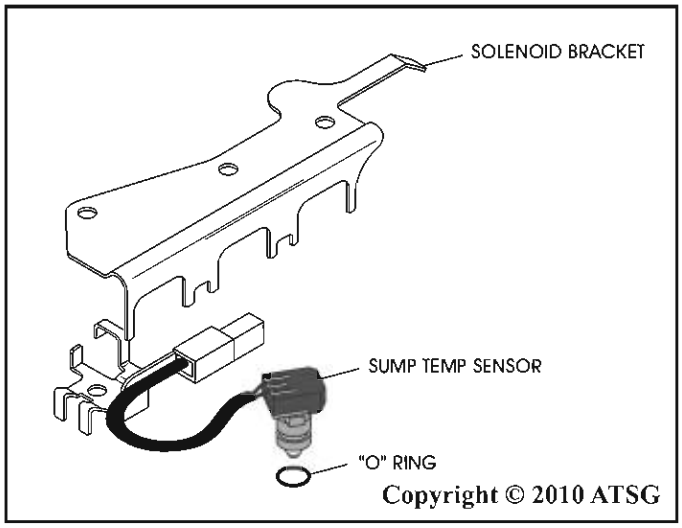


Figure 17

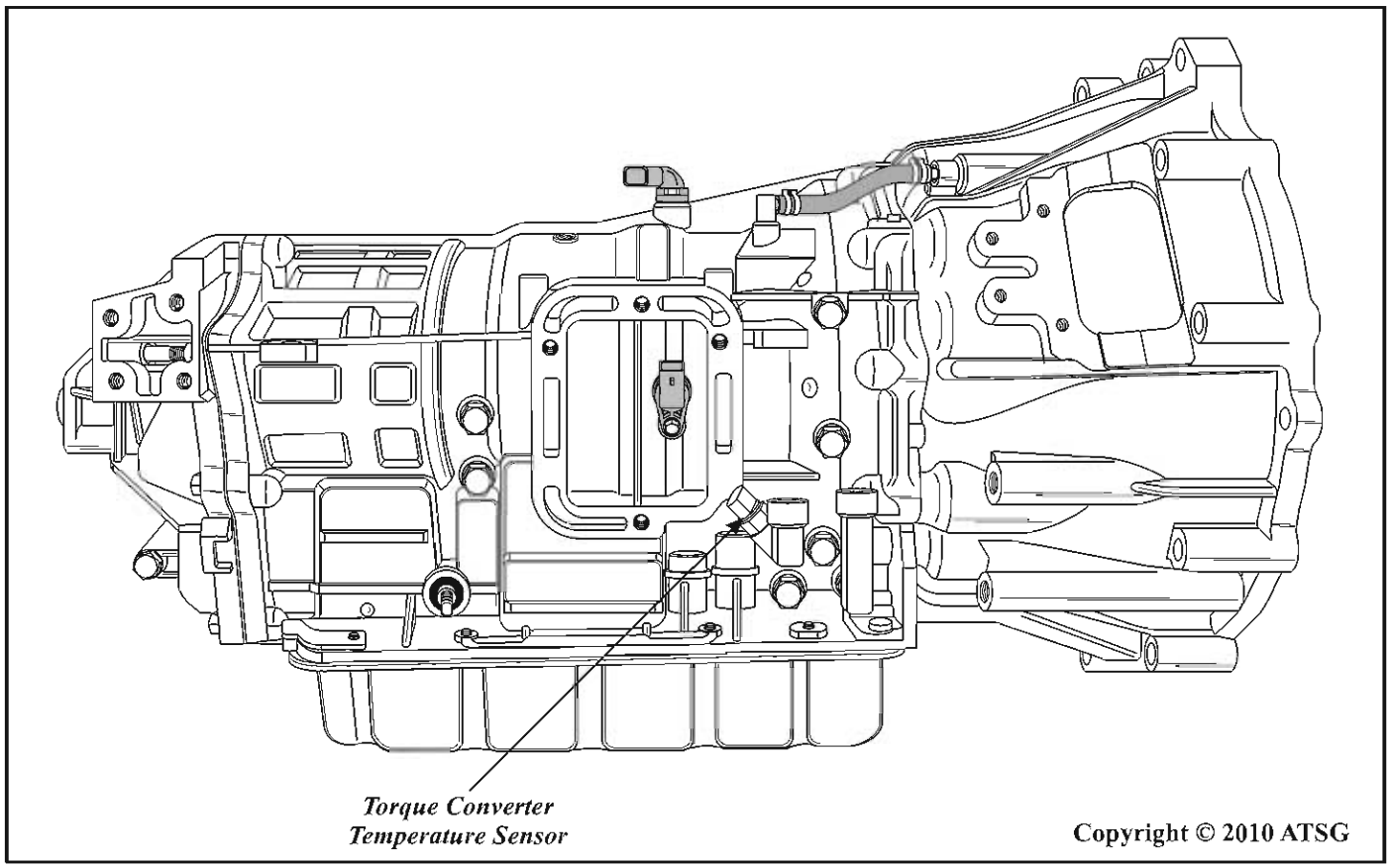


Figure 18

INTERNAL ELECTRONIC COMPONENTS

Control and Shift Solenoid Operation

There are a total of eight solenoids located on the valve body in the locations shown in Figure 19, along with the wire colors that are connected to each of the solenoids. The sump fluid temperature sensor location is also shown under the linear solenoid bracket.

There are four linear solenoids (PWM) and four On/Off Shift solenoids, as shown in Figure 19. The TCM uses the APP and OSS sensor signals as the primary influences on shift control. Based on a predetermined shift map, On/Off solenoids and Linear (PWM) solenoids are activated as needed to provide the appropriate gear.

All shifts are performed by means of clutch to clutch control where one clutch is engaged as another is disengaged (No double-swap shifts).

Linear (PWM) Solenoids "A", "C", "D"

These three solenoids operate in the same manner, as shown in Figure 20, based on commands from the TCM. All three of these linear solenoids are "Normally-Vented".

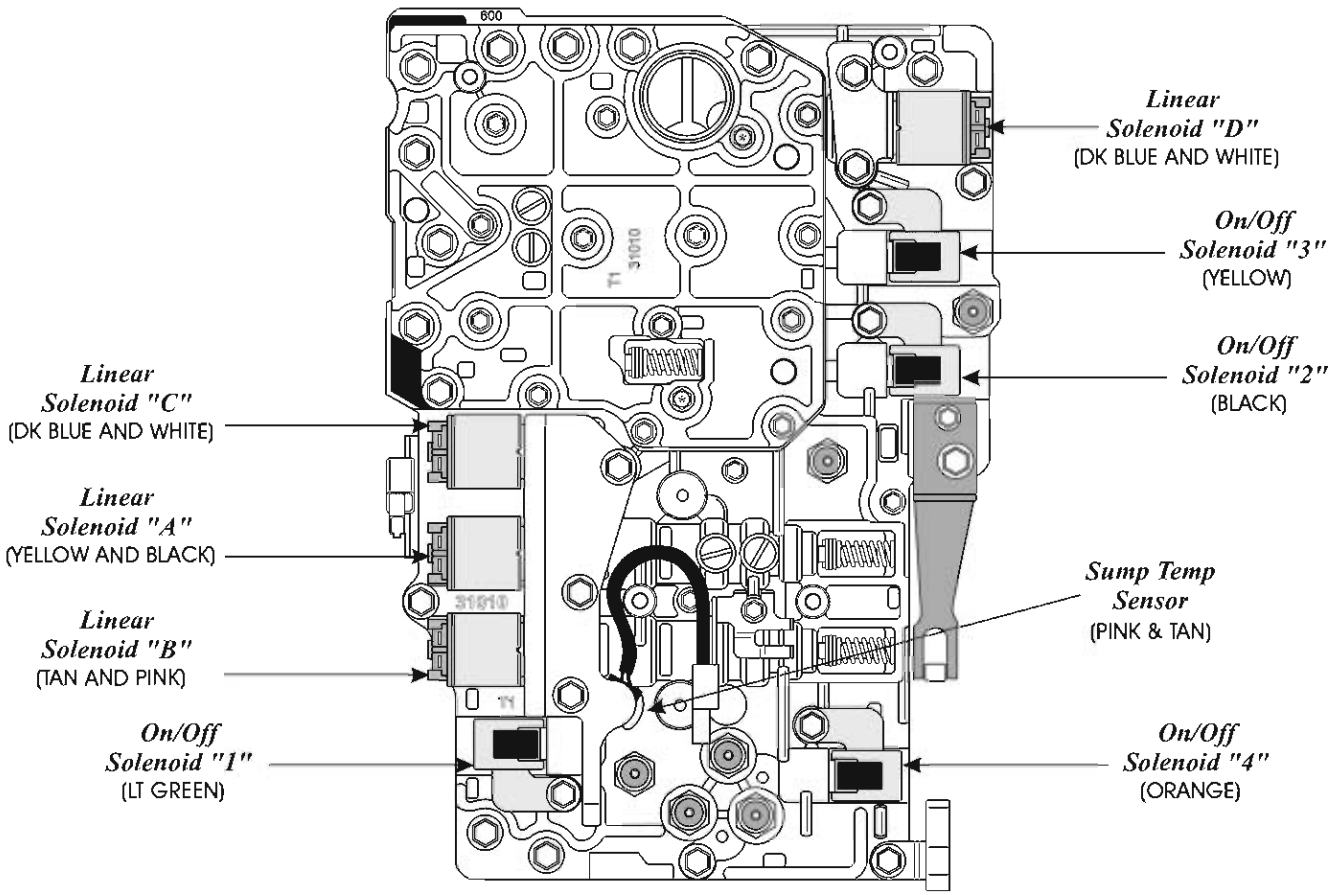
Linear (PWM) Solenoid "A"controls clutch pressures to the B1, K1 and K2 clutches.

Linear (PWM) Solenoid "C" is a multi-tasking solenoid, it controls Forward and Reverse engagements and torque converter clutch apply pressure.

Linear (PWM) Solenoid "D" controls the main line pressure.

Refer to Figure 20 for operational checks.

SOLENOID IDENTIFICATION



Currently The Solenoids "Are Not" Serviced Separately!

Figure 19

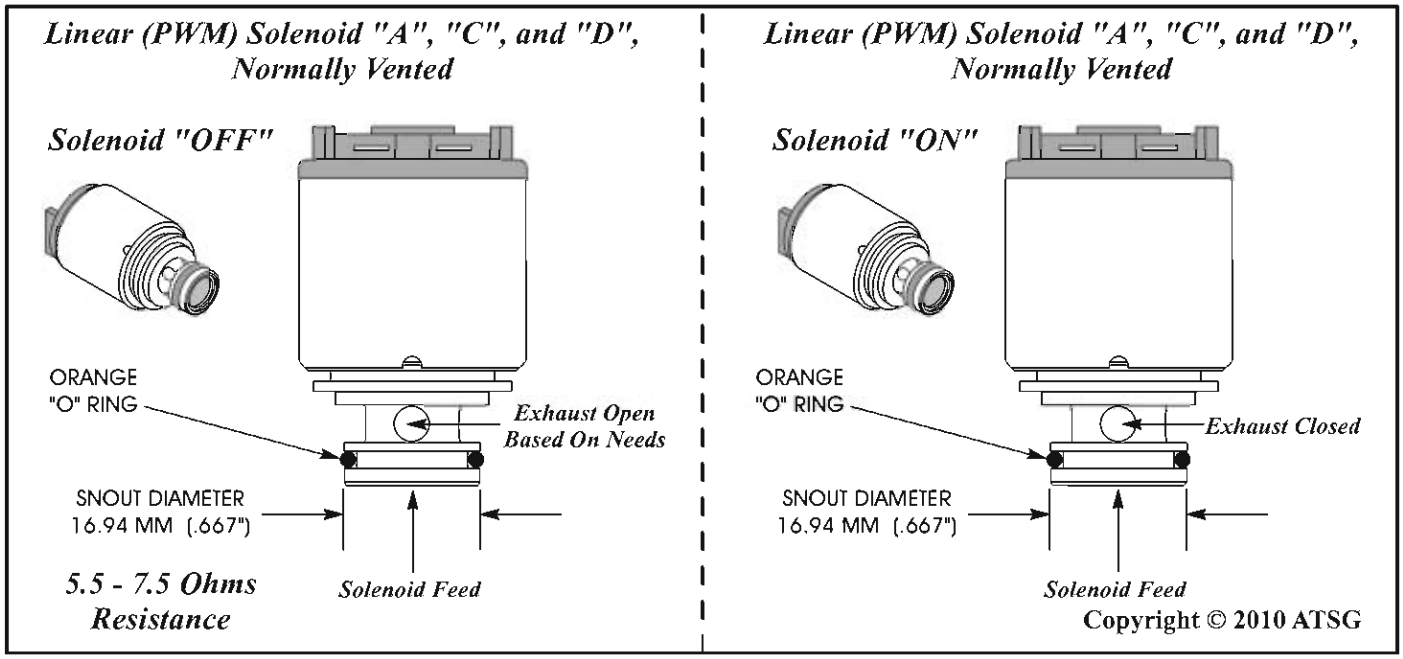


Figure 20

INTERNAL ELECTRONIC COMPONENTS (CONT'D)

Linear (PWM) Solenoid "B",

Linear (PWM) Solenoid "B" operates exactly the opposite of the other linear solenoids, in that it is "Normally Applied", as shown in Figure 21 The solenoid snout is also smaller in diameter than the other three and requires a different color "O" ring.

Linear (PWM) Solenoid "B" controls the clutch pressure to B2 and K3 clutches, based on the commands from the TCM.

Refer to Figure 21 for operational checks on Linear (PWM) Solenoid "B".

Continued on next Page

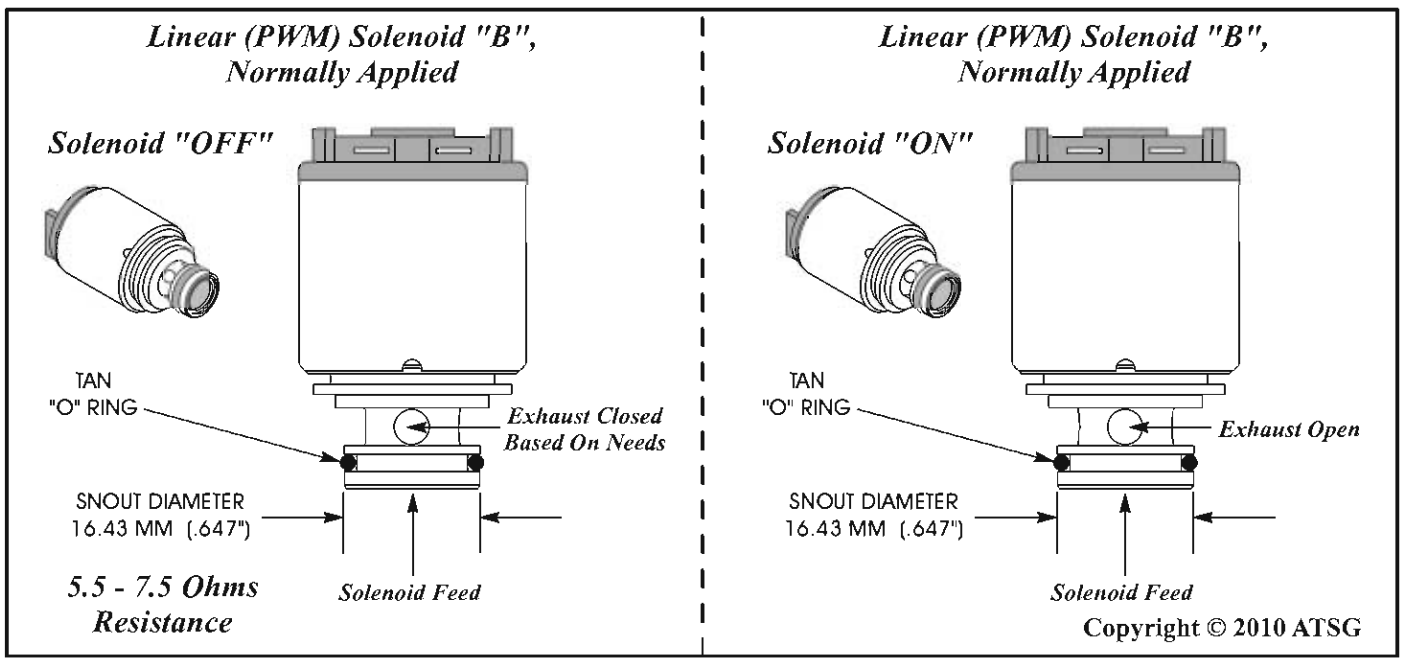


Figure 21

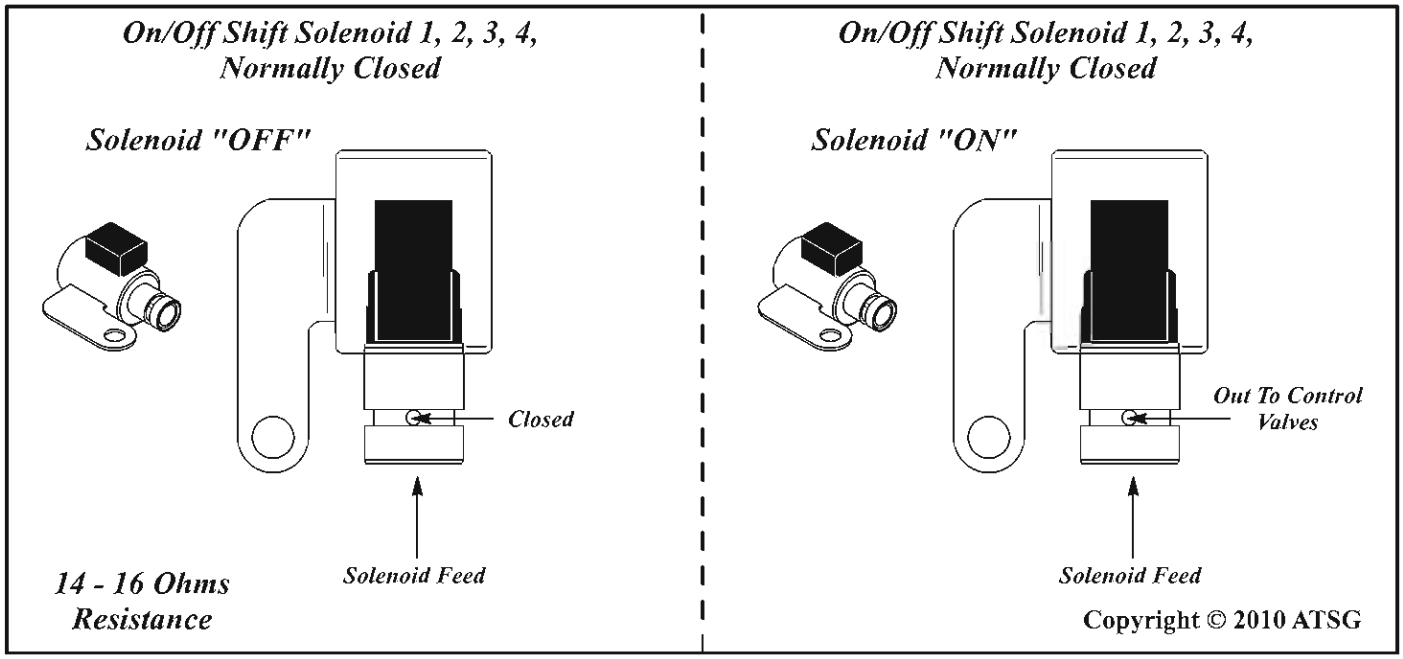


Figure 22

INTERNAL ELECTRONIC COMPONENTS (CONT'D)

On/Off Shift Solenoids 1, 2, 3, 4,

These solenoids all operate in exactly the same manner, as shown in Figure 22, based on commands from the TCM. All four of the On/Off solenoids are "Normally Closed".

These four solenoids operate in conjunction with the linear (PWM) solenoids to provide the proper gear ratio for the current road conditions.

Refer to Figure 22 for operational checks.

INTERNAL ELECTRONIC COMPONENTS (CONT'D)

Pressure Switches

The AS68RC transmission is equipped with eight "Normally Open" pressure switches that are mounted in the valve body. These pressure switches monitor various hydraulic circuits to verify proper valve operation. Refer to Figure 23 for their various locations, identification, and wire color that belongs on the switch, as well as testing procedures, for proper function of the switches.

Notice that three of the switches are 1/4" NPT and five of the switches are 1/8" NPT. NPT stands for National Pipe Thread.

Daimler/Chrysler part numbers are as follows:
1/8" NPT pressure switch is 68019699AA (5 Req.).
1/4" NPT pressure switch is 68019700AA (3 Req.).

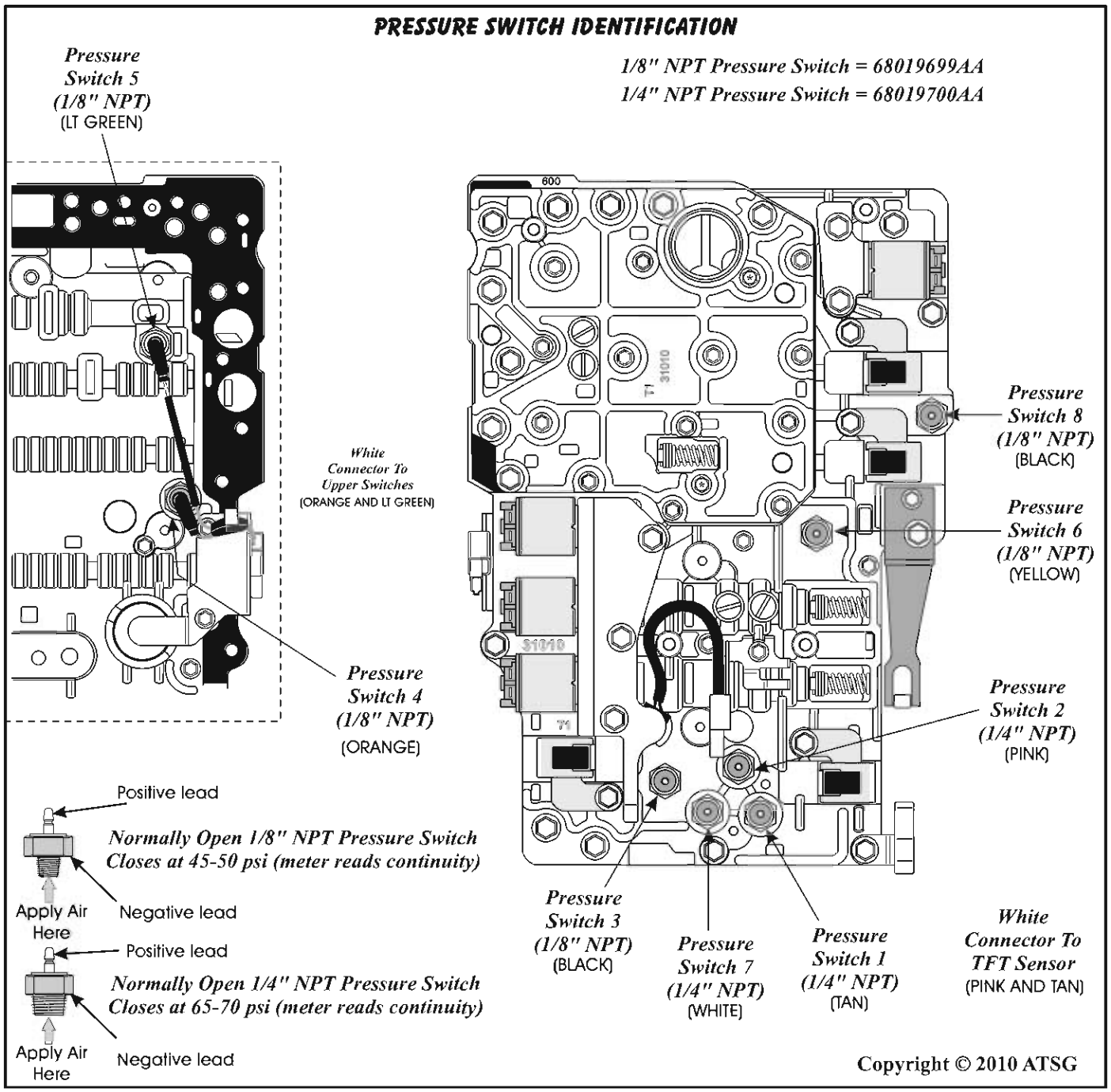


Figure 23

AS68RC SHIFT SOLENOID APPLICATION CHART

	On/Off Solenoids (1)				Linear (PWM) Solenoids (2)				Pressure Switches (3)							
RANGE	S1	S2	S3	S4	"A"	"B"	"C"	"D"	PS-1	PS-2	PS-3	PS-4	PS-5	PS-6	PS-7	PS-8
Park	Off	On	On	On	Low	High	Low	High	O	O	O	C	C	C	O	O
Reverse (HT)	On	Off	On	On	Low	Low	Low	Low	O	C	C	O	C	C	O	O
Reverse	On	On	On	On	Low	Low	High	Low	O	C	C	C	C	C	C	O
Neutral	Off	On	On	On	Low	High	Low	High	O	O	O	C	C	C	O	O
Neut/Dr (T)	Off	On	On	On												
Dr-1st (Stop)	Off	On	On	On	Low	High	High	Low	O	O	O	C	C	C	C	C
Dr-1st	Off	Off	On	On	Low	High	Low	Low	O	O	O	O	C	C	O	C
Dr/1-2 (T)	Off	Off	On	On												
Dr-2nd	Off	Off	Off	Off	High	High	Low	High	C	O	O	O	O	O	O	C
Dr/2-3 (T)	Off	Off	Off	On												
Dr-3rd	On	Off	Off	Off	Low	Low	Low	High	O	C	C	O	O	O	O	C
Dr/3-4 (T)	On	Off	Off	On												
Dr-4th TCC	On	On	Off	Off	High	High	Low	High	C	O	C	C	O	O	O	C
Dr/4-5 (T)	On	On	Off	On												
Dr-5th TCC	Off	On	Off	On	Low	Low	High	High	O	C	O	C	O	O	O	C
Dr/5-6 (T)	Off	On	Off	On												
Dr-6th TCC	Off	On	Off	On	High	High	High	High	C	O	O	C	O	O	O	C
Man-1st	Off	Off	On	On	Low	Low	Low	Low	O	C	O	O	C	C	O	C

(T) = Transition.
(HT) = High Torque

(1) All On/Off solenoids are normally closed and allow no fluid through the solenoid.
(2) Linear (PWM) solenoids "A", "C", and "D" are Normally-Vented. Linear (PWM) solenoid "B" is Normally-Applied. (Low and High refer to PWM Duty Cycle).
(3) All pressure switches are normally open and closed when oil pressure is applied, C = Closed (Grounded), O = Open (12V).

Figure 24

Default "Limp-In" Mode

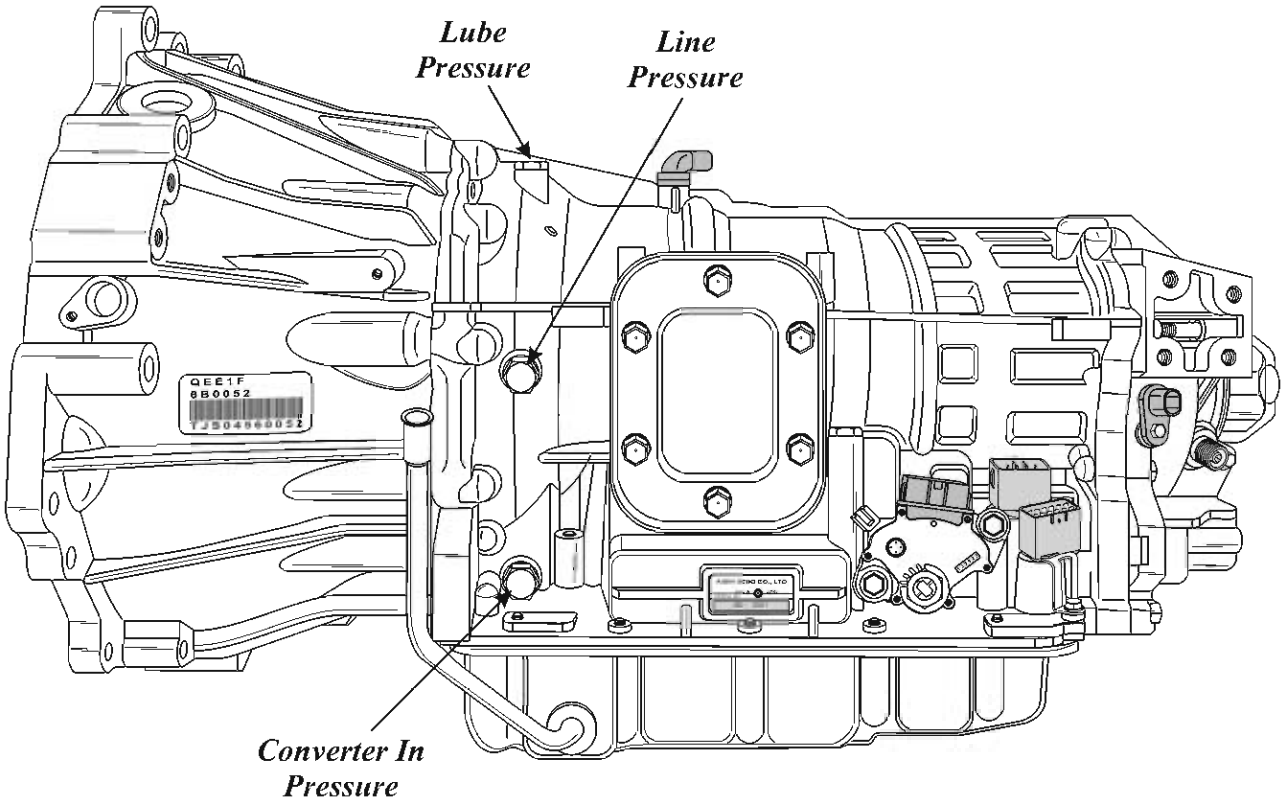
The "Limp-In" gear ranges available in the AS68RC are 5th gear, 3rd gear and reverse.

If the fault occurs when in 4th, 5th or 6th gear, the transmission will default to 5th gear and remain there until it is safe enough to downshift to 3rd.

If the fault occurs when in 1st, 2nd or 3rd gear, the transmission will default to 3rd gear and will not upshift to any higher gear.

Reverse is available in either default range. Default operation is indicated by the MIL lamp being illiminated and the transmission will have extremely harsh garage shifts, Park to Reverse & Park to Drive.

PRESSURE TAP LOCATIONS



Line Pressure Specifications							
	Line	K1	K2	K3	B1	B2*	TCC On
Park	110-250	0	0	0	0	70	0
Reverse	250	0	0	85-250	0	110-250	0
Neutral	115-250	0	0	0	0	70	0
First	250	75-250	0	0	0	110-250	0
Second	115	115	0	0	115	0	0
Third	115	115	0	115	0	0	115
Fourth	115	115	115	0	0	0	115
Fifth	115	0	115	115	0	0	115
Sixth	115	0	115	0	115	0	115

Checked at 1500 RPM
* Need OSS signal in Manual L - Raise rear wheels or Transfer Case in Neutral.

Figure 25

PRESSURE TAP LOCATIONS

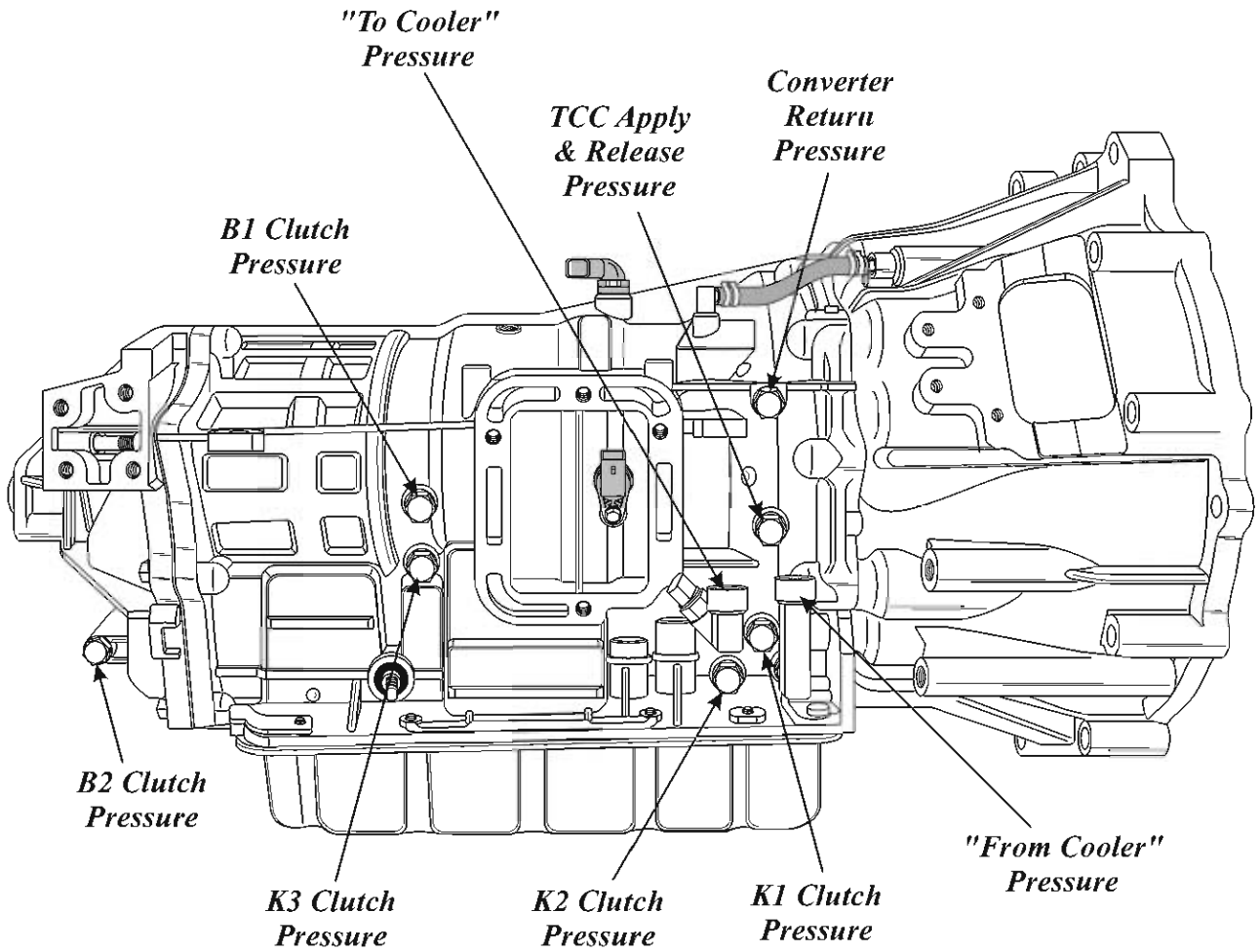


Figure 26

Keep Your Torque HOT and Your Transmission COOL

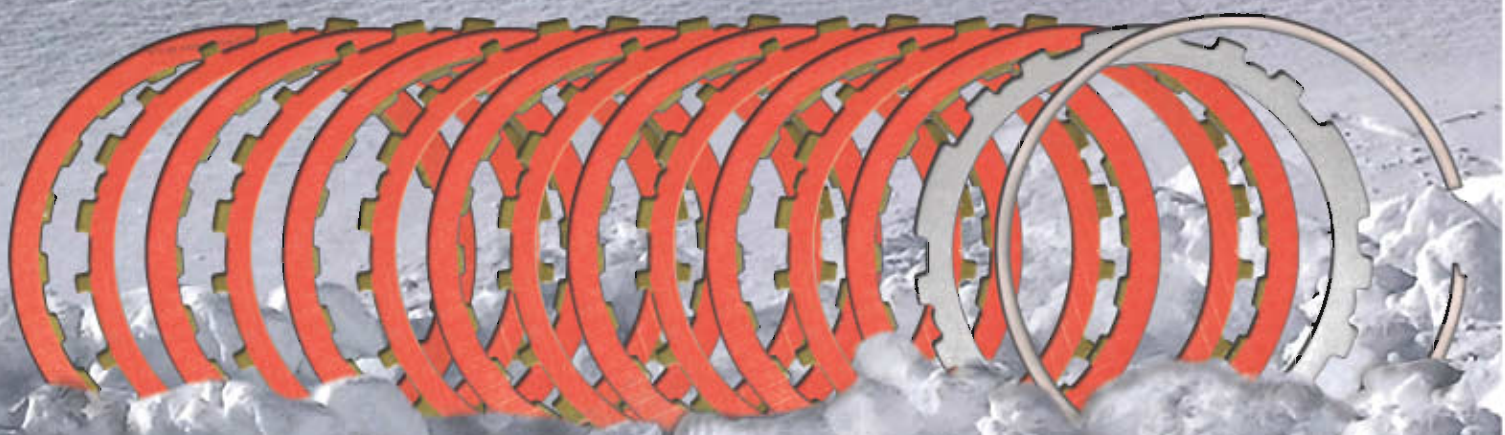
The Original Alto

A-PACK

Featuring 14 Friction Elements

Alto is the pioneer in clutch plate innovation. Alto introduced the original OEI® PowerPack® solution 25 years ago and is pleased to announce the new 4L60, 4L60E, 4L65E 3/4 Clutch Alto **A-Pack. Alto Part No. 057757A**

LIFETIME WARRANTY



Elevated Heat Management • Extended Durabilty • Superior Coefficient of Friction

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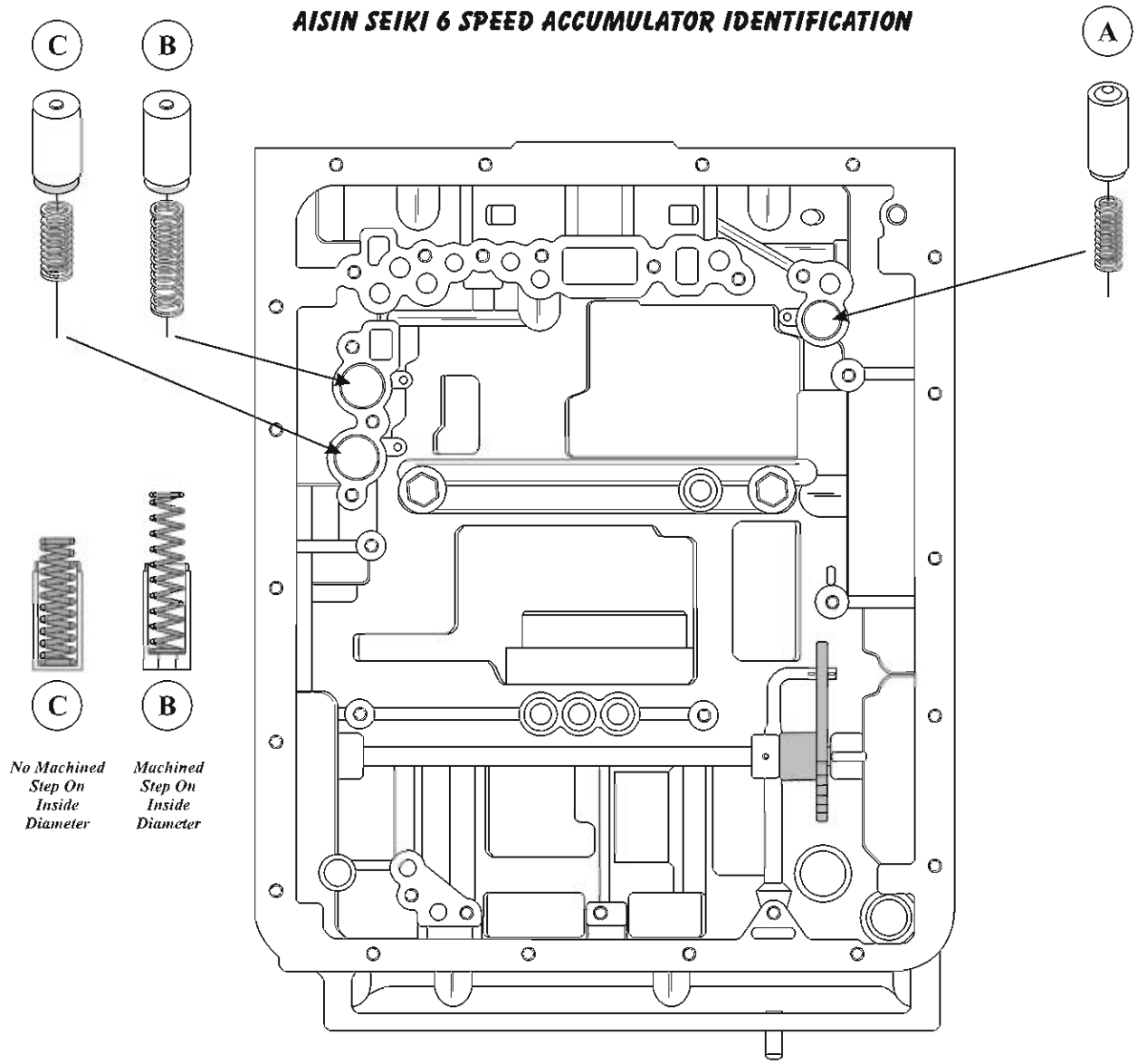
AISIN SEIKI 6 SPEED ACCUMULATOR IDENTIFICATION



Notice that accumulator "B" piston has a machined step on the inside diameter and requires the long blue spring. Accumulator "C" piston does not have the machined step and requires the shorter yellow spring.

The bore in the case for accumulator "B" is deeper than the bore for accumulator "C". When the accumulators are installed correctly, accumulator piston "B" will stick out of case approximately 3/4" and accumulator piston "C" will be almost flush with the case. Note: these two accumulators are used for Forward and Reverse engagements and are connected in the same oil circuit.

Note: These are Isuzu calibrations. Chrysler calibrations may be different.

CASE ACCUMULATOR SPRING SPECIFICATIONS

ACCUMULATOR "A" Free Length = 1.720" Spring Diameter = .433" Wire Diameter = .075" Approx Coils = 13 (PURPLE)	ACCUMULATOR "A" Piston Height = 1.471" Piston Diameter = .630"
ACCUMULATOR "B" Free Length = 2.590" Spring Diameter = .598" Wire Diameter = .060" Approx Coils = 12 (BLUE)	ACCUMULATOR "B" Piston Height = 1.460" Piston Diameter = .786" Machined Step Inside
ACCUMULATOR "C" Free Length = 1.987" Spring Diameter = .598" Wire Diameter = .103" Approx Coils = 12 (YELLOW)	ACCUMULATOR "C" Piston Height = 1.500" Piston Diameter = .786" NO Machined Step Inside

Figure 27

Superior Simple Solutions They Just Keep Coming!

Superior's New Accumu-Seal™ Piston Replacements Are Tight As A Drum.

Say goodbye to accumulator bore leakage and the corresponding loss of pressure in Toyota and Lexus U140-240 and U150-250 and say hello to a piston that fits as tight as a drum.

Our new Accumu-Seal™ Technology provides the simple solution for worn bores in Toyota and Lexus valve body castings and helps to eliminate burnt clutches, slips, flares and shifting issues.

U150-250 Series **– Burnt direct clutches, 2-3 flares, excess heat, burnt 2nd and 4th and 5th gear shifting concerns.**

U140-240 Series **– Reverse slip, burnt 2nd, 3rd and overdrive issues**

Each Accumu-Seal Kit™ includes six patent-pending ringed pistons, plus a specially designed patent-pending Accumulator Buddy™ bore brush to clean and prep the accumulator bore surface before inserting the newly designed pistons with Teflon® sealing rings.

Each kit contains three fixes for U140-240 series (2 needed per fix) or two fixes for U150-250 Series (3 needed per fix)

PROUDLY MADE IN THE USA!

Part # K089

Superior's New 722.6/NAG1 End Play Adjustment Package

NEW

Save time, money and headaches with the new 722.6/NAG1 End Play Adjustment Package. Using the specially designed Shaft Shims you can confidently adjust the input shaft even when the rear end play is "good to go".

The 722.6/NAG1 End Play Adjustment Package lets you adjust both end plays when planetary gear sets and other hard parts are changed.

Stop waiting for dealers to special order the rear shims or taking a chance that a unit may not be set to spec.

Each kit contains three sets of four input shims (IS) in four sizes and three sets of four output shims (OS) also in four sizes – total of 24 shims.

Part # K090

The SUPERIOR 4F27E Kit

Part # K4F27E

Helps eliminate soft shifts and flairs, premature band failure, Code P0741 (T.C.C. slippage), broken solenoid P.R. valve spring

618/48RE Low Reverse Super Servo

Part # K086

Stabilizes piston so it will not flip or break in the bore, made of 6061-T6 billet aluminum for strength, steel servo pin included

The SUPERIOR 48RE Kit

Part # K48RE

Helps eliminate Code 740, Inadequate Line Pressure, Premature Clutch Failure, No-Stick Throttle Valve, Slow Engagements

COMING SOON!

727/518/618 Super Servo

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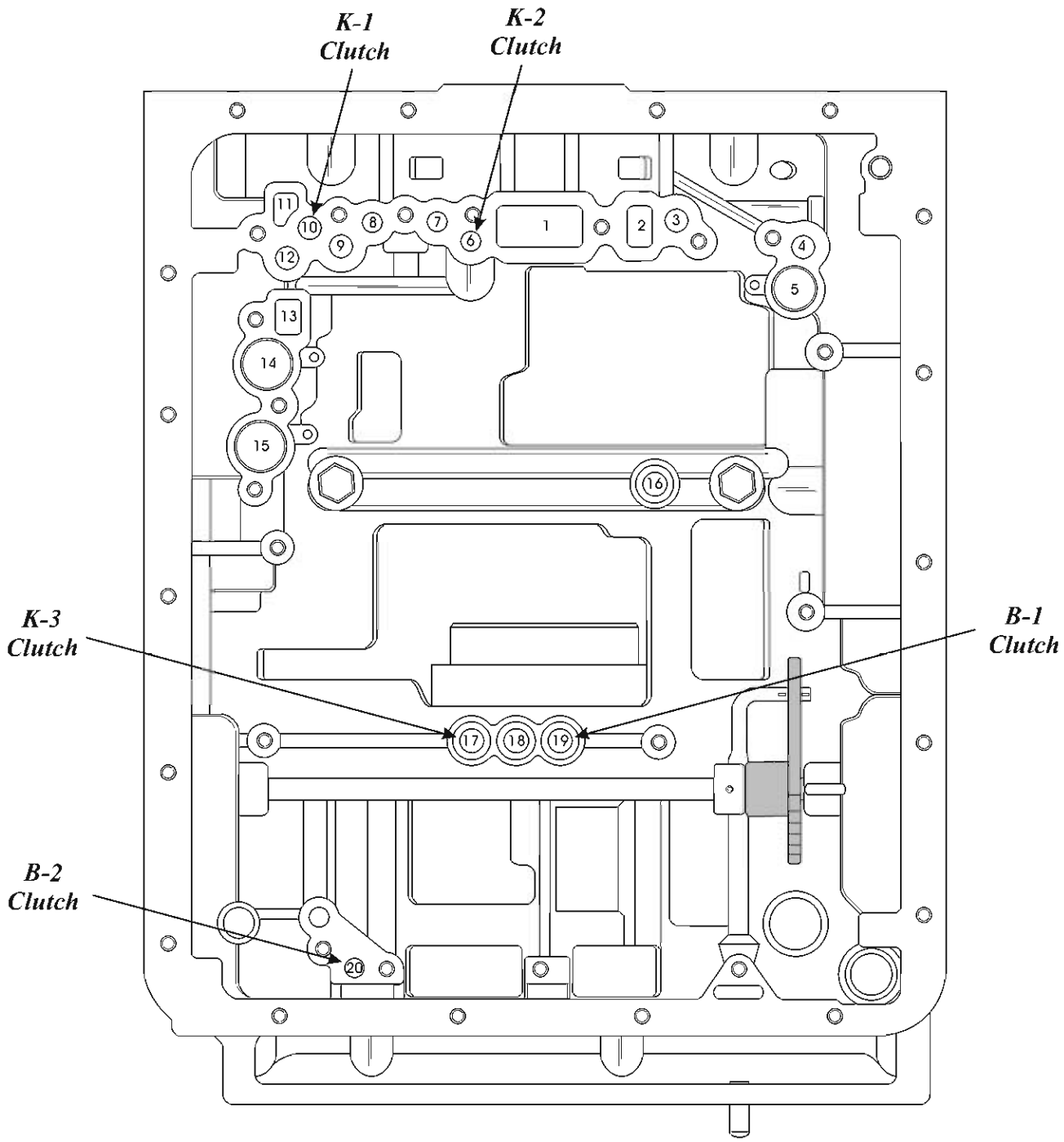
AIR CHECKS AND CASE PASSAGE IDENTIFICATION, VALVE BODY SIDE



1 PUMP INLET (SUCTION).
2 PUMP OUTLET (LINE).
3 CONVERTER IN.
4 PRESSURE CONTROL SOLENOID TO P.R. VALVE.
5 PRESSURE CONTROL SOLENOID DAMPER PISTON.
6 K-2 CLUTCH.
7 LUBE TO PLANETARY PISTONS.
8 CONVERTER CLUTCH APPLY AND RELEASE.
9 CONVERTER RETURN.
10 K-1 CLUTCH.
11 "FROM" COOLER.
12 SECONDARY REG. PRESSURE TO LOCK-UP CONTROL VALVE.
13 "TO" COOLER.
14 NEUTRAL TO DRIVE AND REVERSE ACCUMULATOR.
15 NEUTRAL TO DRIVE AND REVERSE ACCUMULATOR.
16 LUBE.
17 K-3 CLUTCH.
18 LUBE.
19 B-1 CLUTCH.
20 B-2 CLUTCH.

Figure 28

EAGLE PRECISION PRODUCTS

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Web site: www.eagleprecisionproducts.com
E-mail: bwr@eagleprecisionproducts.com

Company Profile

Eagle Precision Products LLC is an ISO 9002-certified direct manufacturer of precision metallic/non-metallic stampings, precision shims, washers, brackets, fasteners ond gaskets for tronsportation, aviation, oil, gos and

heating/plumbing industries. We are a job shop and will build to customer print and specificotions and can handle bath long and shart runs. Eagle's more than 26 years af toal-building experience includes pragressive- and com-paund-die manufacture as well as CNC-machining and laser-cutting capabilities. We reverse-engineer as well as prototype as required.

The People

Bruce Reger.....Founder and president
Jash Reger.....VP of sales & marketing
Randy Menhart.....Operations manager

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Company Philosophy

Our philosophy of business is one of joint relotionships. Business is nothing but a series of those relationships. Over the post 35 yeors we've discovered that if you don't develop ond maintoin a relotionship, you can't keep the business. We like to think thot as you develop a relatianship with a customer you try ta help, because when they're a winner we're a winner toa.

Eagle is always laaking for new customers for our steel plates, shims and other praducts we can produce. Our strang suit is helping that guy starting a business ar the guy who needs the help fram a supplier that we affer. It's always the case: If he's successful sa are we. People help people. And, let's keep this business here in America. That's what we want ta accomplish.

The Eagle Precision Products management team (from left): Josh Reger, Bruce Reger, Dave Pongrocz, Randy Menhart. We are your source for steel plates.

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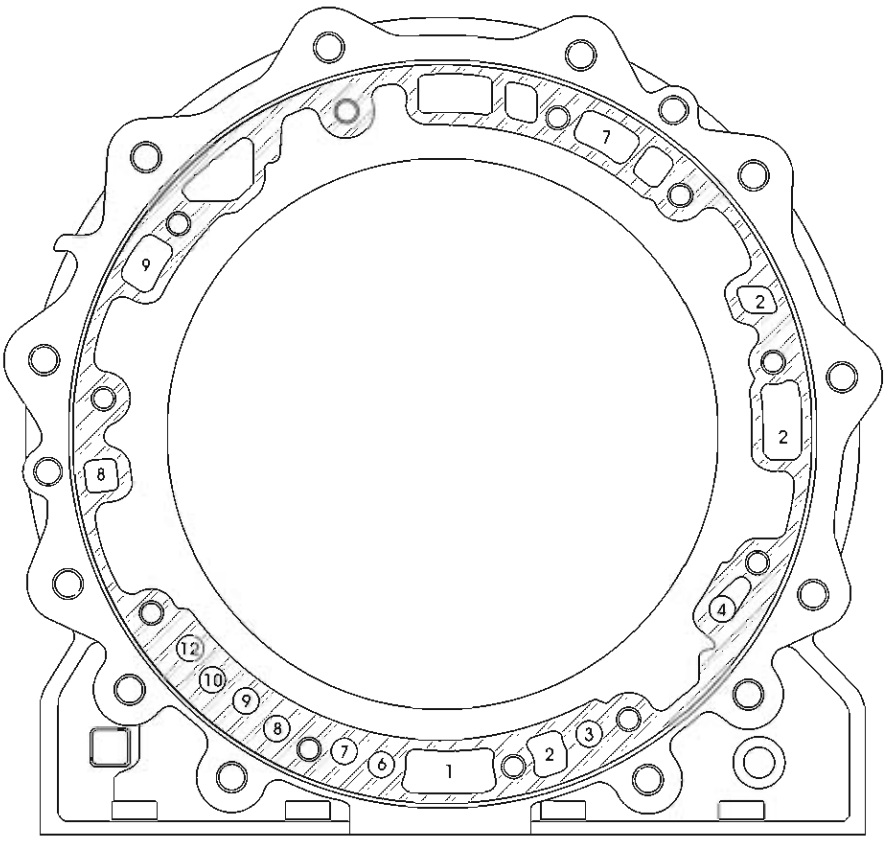
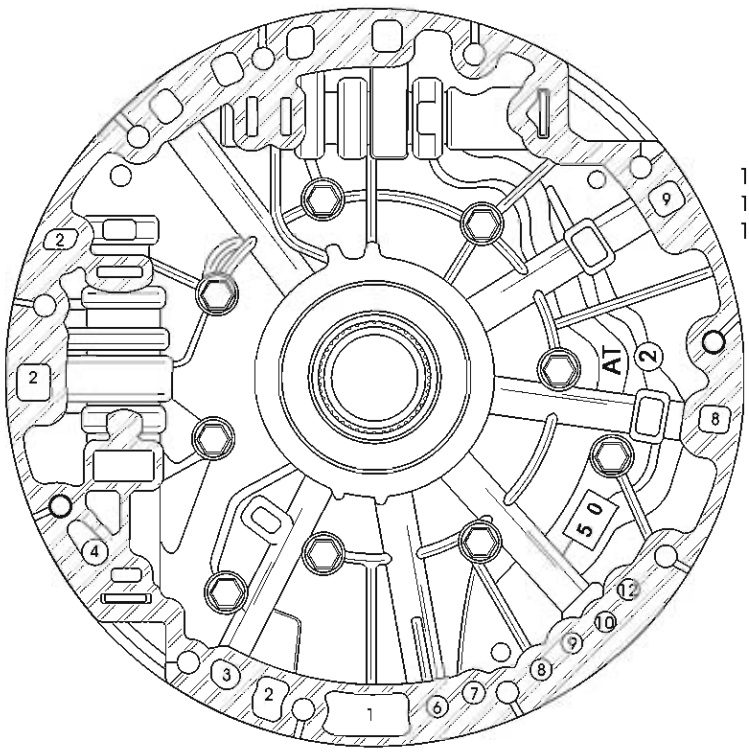


CASE PASSAGE I.D.
FRONT OF CASE

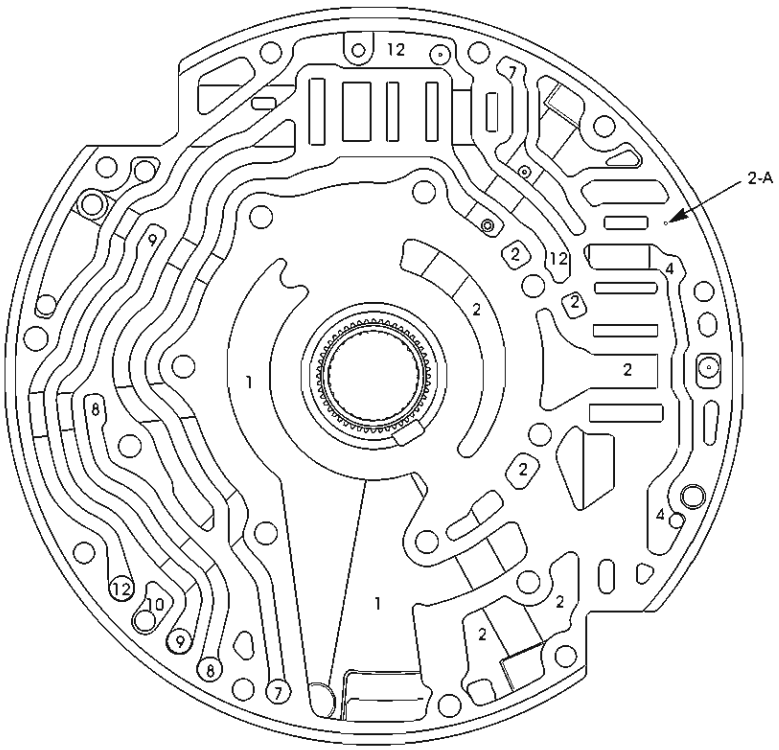
1 PUMP INLET (SUCTION).
2 PUMP OUTLET (LINE).
3 CONVERTER IN.
4 PRESSURE CONTROL SOLENOID TO P.R. VALVE.
5 N/A
6 K-2 CLUTCH.
7 LUBE TO PLANETARY PINIONS / CANCEL PRESSURE.
8 TCC APPLY AND RELEASE.
9 CONVERTER RETURN.
10 K-1 CLUTCH.
11 N/A
12 SECONDARY REG. FEED TO LOCK-UP CONTROL VALVE.

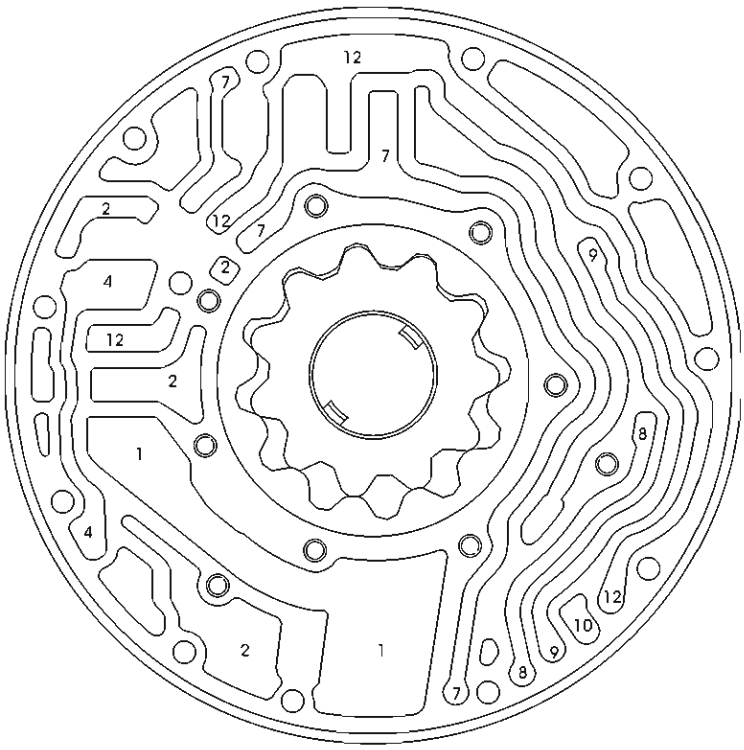


PUMP PASSAGE I.D.
REAR OF PUMP

Figure 29

PARTIAL PUMP PASSAGE I.D.





1 PUMP INLET (SUCTION).
2 PUMP OUTLET (LINE).
3 CONVERTER IN.
4 PRESSURE CONTROL SOLENOID TO P.R. VALVE.
5 N/A
6 K-2 CLUTCH.
7 LUBE TO PLANETARY PINIONS / CANCEL PRESSURE.
8 TCC APPLY AND RELEASE.
9 CONVERTER RETURN.
10 K-1 CLUTCH.
11 N/A
12 SECONDARY REGULATOR PRESSURE.

2-A LINE PRESSURE TO PRESSURE REG. BALANCE ORIFICE

Figure 30

VALVE BODY ASSEMBLY

The valve body is retained to the transmission case with 19 bolts of six different lengths, as shown in Figure 31. An additional bolt that fastens the detent spring must also be removed to relieve the tension on the inside detent lever for easier removal and installation.

There are a total of 19 different lengths of valve body bolts throughout the valve body. Refer to Figure 32, 33 and 34 for their lengths and locations. Illustration numbers, (example: 980), are referring to the exploded views in figures 31, 35 and 39.

VALVE BODY RETAINING BOLTS EXPLODED VIEW

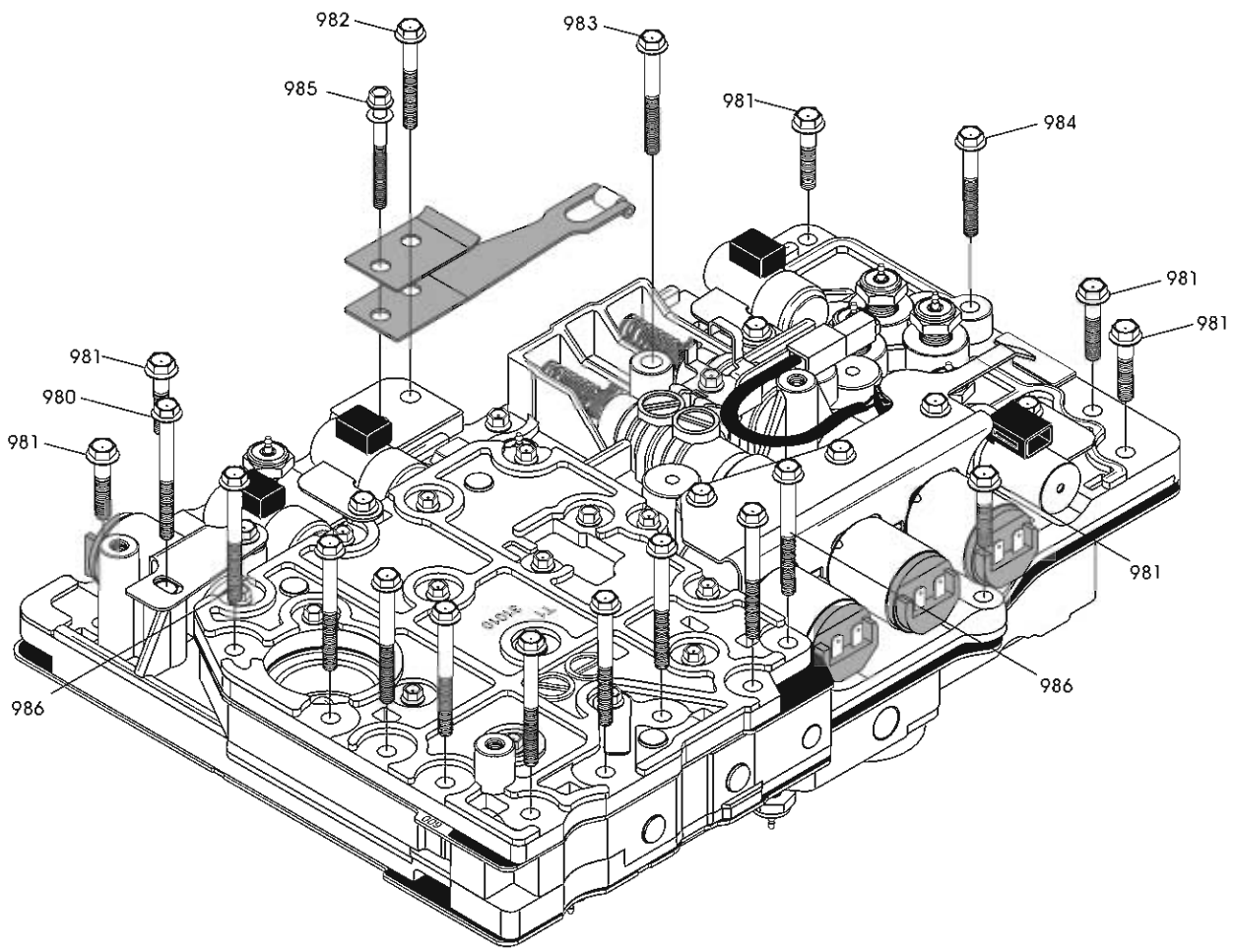
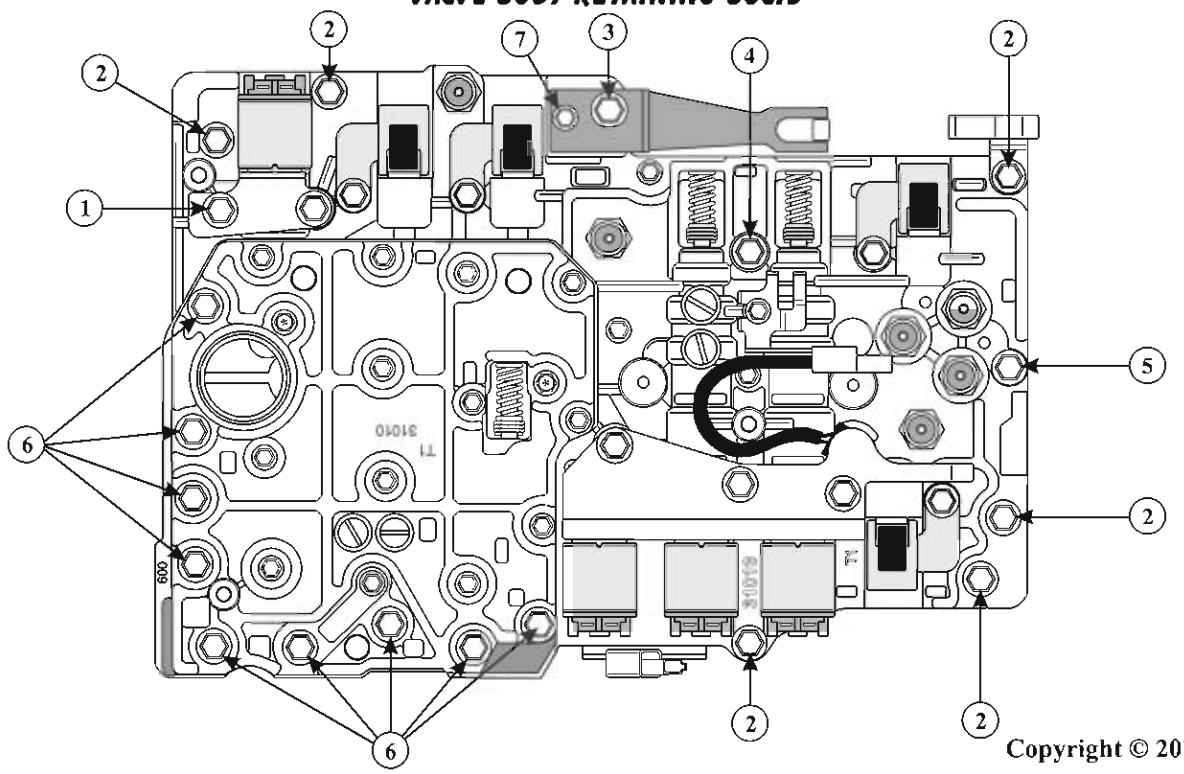


Figure 31

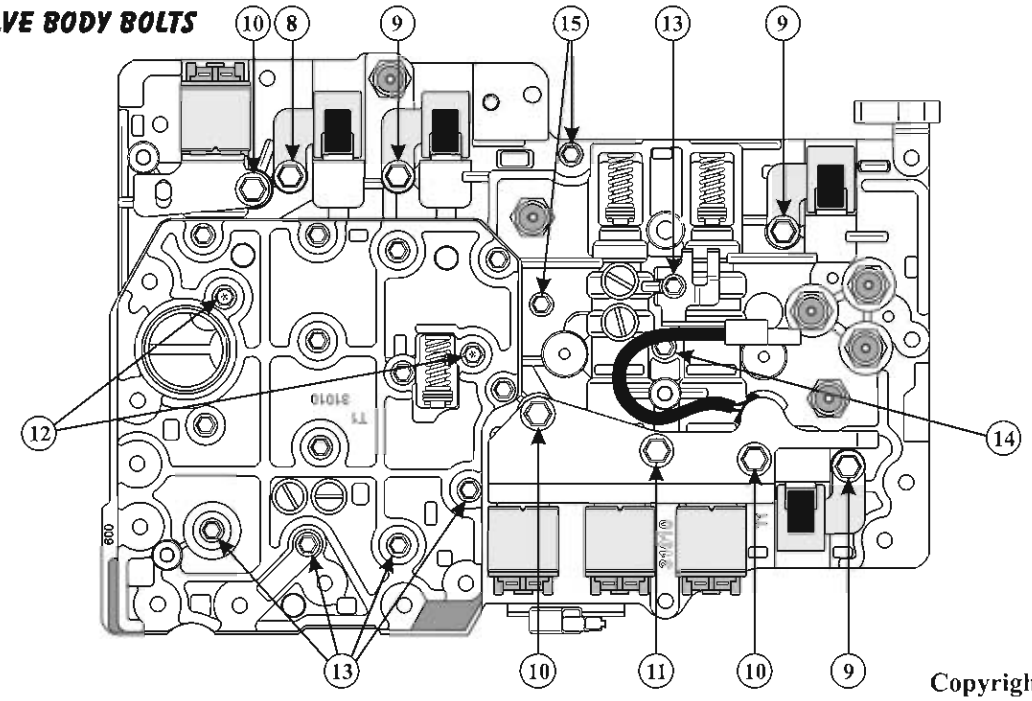
VALVE BODY RETAINING BOLTS



Reference Number	*Quantity*	*Head Size*	*Appearance*	*Length*
(1)	1	*10 mm*	ILLUSTRATION NO. 980	*58.0 mm (2.284") With Flange*
(2)	6	*10 mm*	ILLUSTRATION NO. 981	*31.2 mm (1.228") With Flange*
(3)	1	*10 mm*	ILLUSTRATION NO. 982	*43.0 mm (1.692") With Flange*
(4)	1	*10 mm*	ILLUSTRATION NO. 983	*50.0 mm (1.968") With Flange*
(5)	1	*10 mm*	ILLUSTRATION NO. 984	*41.2 mm (1.622") With Flange*
(6)	9	*10 mm*	ILLUSTRATION NO. 985	*56.2 mm (2.212") With Flange*
(7)	1	*8 mm*	ILLUSTRATION NO. 986	*41.5 mm (1.634") With Wave Washer*

Figure 32

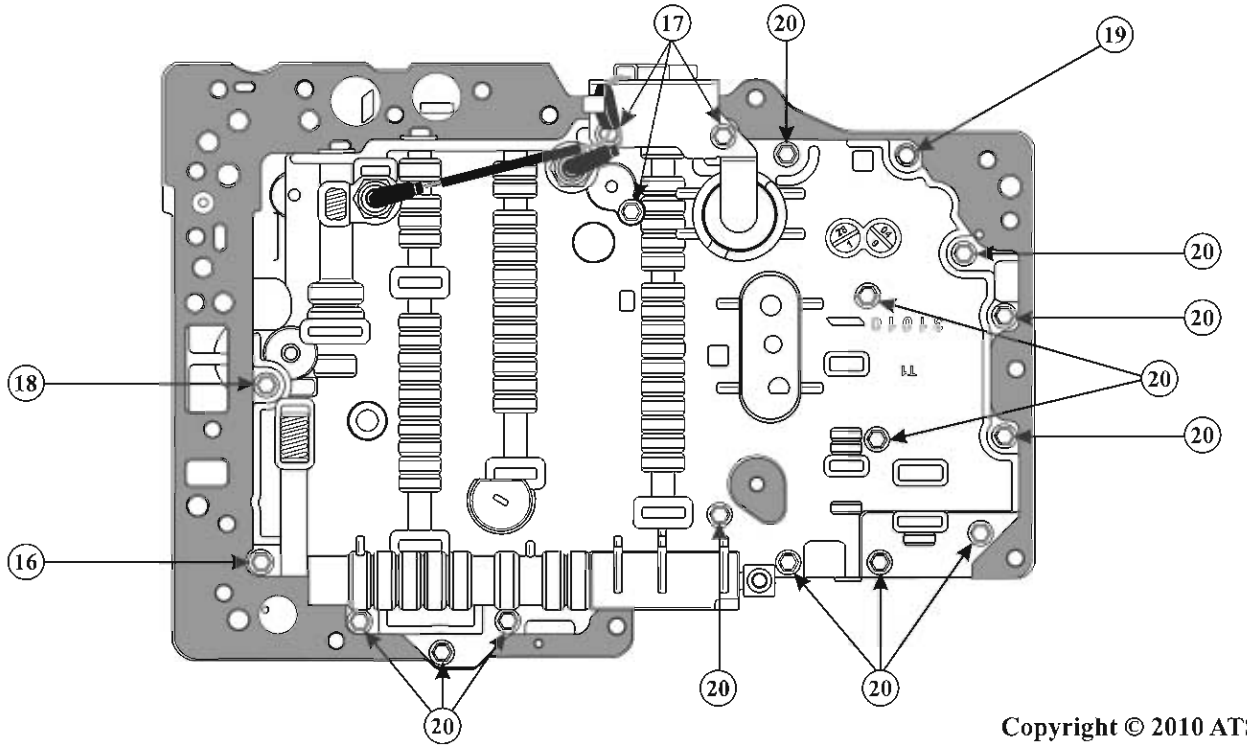
LOWER VALVE BODY BOLTS



Reference Number	*Quantity*	*Head Size*	*Appearance*	*Length*
(8)	1	*10 mm*	ILLUSTRATION NO. 987	*41.7 mm (1.642") With Flange*
(9)	3	*10 mm*	ILLUSTRATION NO. 988	*12.4 mm (.490") With Flange*
(10)	3	*10 mm*	ILLUSTRATION NO. 989	*25.0 mm (.984") With Flange*
(11)	1	*10 mm*	ILLUSTRATION NO. 990	*58.0 mm (2.284") With Flange*
(12)	2	*8 mm*	ILLUSTRATION NO. 991	*21.3 mm (.840") With Washer*
(13)	14	*8 mm*	ILLUSTRATION NO. 992	*55.0 mm (2.165") With Washer (13 In Cover, 1 In TFT Brkt)*
(14)	1	*8 mm*	ILLUSTRATION NO. 993	*37.6 mm (1.480") With Washer*
(15)	2	*8 mm*	ILLUSTRATION NO. 994	*29.4 mm (1.157") With Washer*

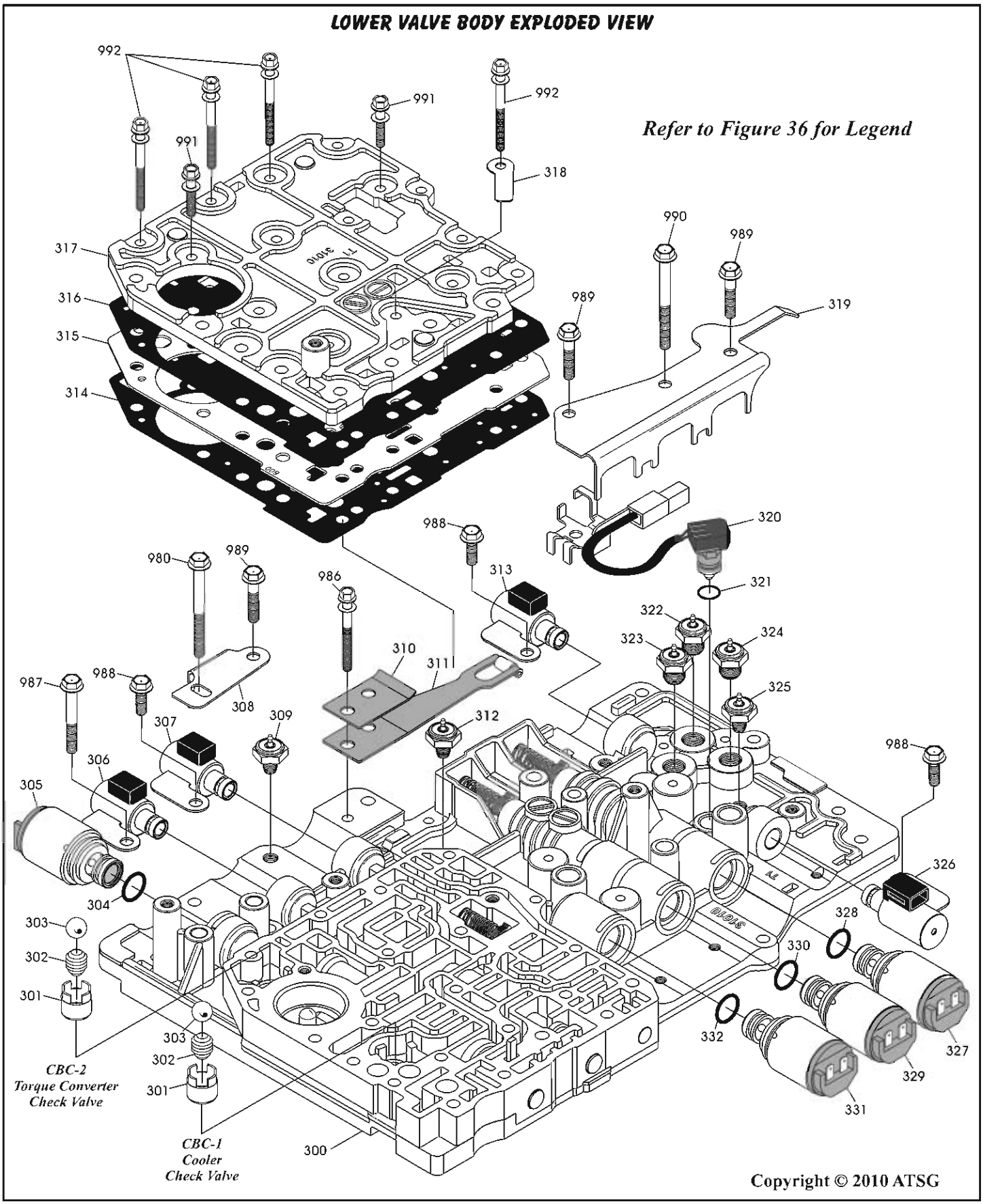
Figure 33

UPPER VALVE BODY BOLTS



Reference Number	*Quantity*	*Head Size*	*Appearance*	*Length*
(16)	1	*8 mm*	ILLUSTRATION NO. 995	*24.5 mm (.965") With Washer*
(17)	3	*8 mm*	ILLUSTRATION NO. 996	*42.3 mm (1.665") With Washer*
(18)	1	*8 mm*	ILLUSTRATION NO. 997	*40.0 mm (1.575") With Wave Washer*
(19)	1	*8 mm*	ILLUSTRATION NO. 998	*37.0 mm (1.457") With Wave Washer*
(20)	13	*8 mm*	ILLUSTRATION NO. 999	*37.5 mm (1.476") With Washer*

Figure 34


LOWER VALVE BODY EXPLODED VIEW
Refer to Figure 36 for Legend
992
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980
989
986
310
311
308
309
312
987
988
307
306
305
304
303
302
301
303
302
301
CBC-2
Torque Converter
Check Valve
CBC-1
Cooler
Check Valve
300
988
326
328
330
332
327
329
331
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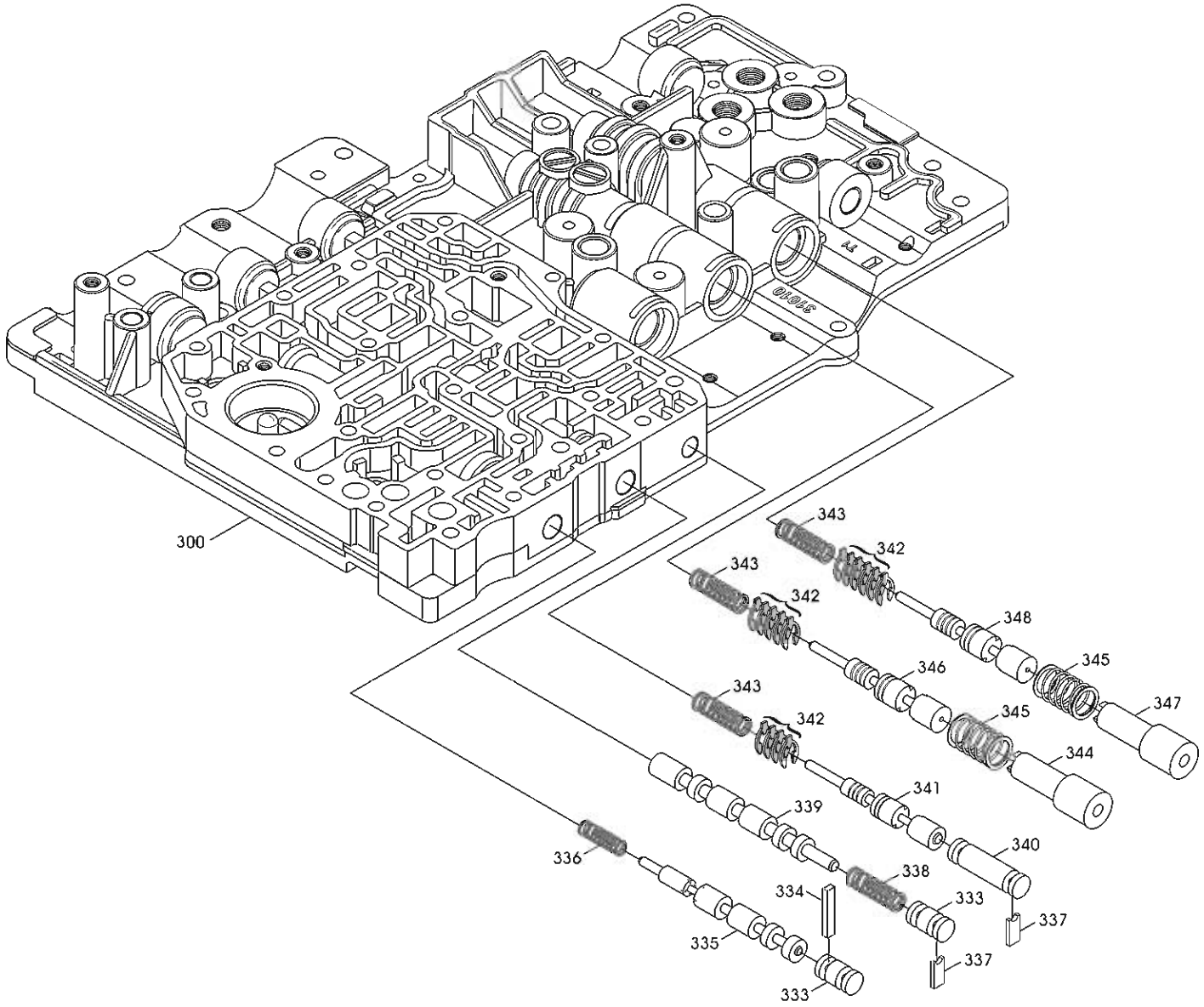
Figure 35

Figure 35 and 38 Legend

300 LOWER VALVE BODY CASTING.
301 LARGE CHECK BALL CAPSULE (2 REQUIRED).
302 LARGE CHECK BALL CAPSULE SPRING (2 REQUIRED) (WHITE).
303 LARGE CHECK BALL, 11 MM (.499") DIAMETER (2 REQUIRED).
304 LINEAR SOLENOID "D" "O" RING (ORANGE).
305 LINEAR SOLENOID "D", LINE PRESSURE, (SNOUT DIAMETER = .667").
306 ON/OFF SHIFT SOLENOID 3 (NO "O" RING USED).
307 ON/OFF SHIFT SOLENOID 2 (NO "O" RING USED).
308 LINEAR SOLENOID "D" RETAINING BRACKET.
309 PRESSURE SWITCH EIGHT (1/8" NPT).
310 DETENT SPRING COVER PLATE.
311 DETENT SPRING.
312 PRESSURE SWITCH SIX (1/8" NPT).
313 ON/OFF SHIFT SOLENOID 4 (NO "O" RING USED).
314 COVER PLATE SPACER TO LOWER VALVE BODY GASKET.
315 COVER PLATE SPACER PLATE.
316 COVER PLATE SPACER TO COVER PLATE GASKET.
317 COVER PLATE.
318 RETAINING PLATE (LOCK-UP CONTROL RETAINER).
319 LINEAR SOLENOID "B", "A", & "C" RETAINING BRACKET.
320 SUMP TEMPERATURE SENSOR & BRACKET ASSEMBLY.
321 SUMP TEMPERATURE SENSOR "O" RING.
322 PRESSURE SWITCH ONE (1/4" NPT).
323 PRESSURE SWITCH TWO (1/4" NPT).
324 PRESSURE SWITCH SEVEN (1/4" NPT).
325 PRESSURE SWITCH THREE (1/8" NPT).
326 ON/OFF SHIFT SOLENOID 1 (NO "O" RING USED).
327 LINEAR SOLENOID "B", SHIFT PRESSURE, (SNOUT DIAMETER = .647").
328 LINEAR SOLENOID "B" "O" RING (BROWN).
329 LINEAR SOLENOID "A", SHIFT PRESSURE, (SNOUT DIAMETER = .667").
330 LINEAR SOLENOID "A" "O" RING (ORANGE).
331 LINEAR SOLENOID "C", MULTIPLE TASK, (SNOUT DIAMETER = .667").
332 LINEAR SOLENOID "C" "O" RING (ORANGE).
349 SMALL CHECK BALL CAPSULE.
350 SMALL CHECK BALL SPRING (ORANGE).
351 SMALL CHECK BALL, 10 MM (.393").
352 ACCUMULATOR VALVE SPRING, 3 REQUIRED (RED).
353 ACCUMULATOR VALVES, LONG WITH DIMPLE, (.471" DIAMETER).
354 ACCUMULATOR VALVE SPRING, 2 REQUIRED (LT. GREEN).
355 ACCUMULATOR VALVES, SHORT WITH DIMPLE, (.491" DIAMETER).
356 LOWER VALVE BODY TO SPACER PLATE GASKET.
357 MAIN VALVE BODY SPACER PLATE.
358 SPACER PLATE TO UPPER VALVE BODY GASKET.
980 LINEAR SOLENOID "D" RETAINING BOLT (SEE BOLT CHART).
987 ON/OFF SHIFT SOLENOID 3 RETAINING BOLT (SEE BOLT CHART).
988 ON/OFF SHIFT SOLENOID RETAINING BOLT (SEE BOLT CHART).
989 LINEAR SOLENOID RETAINING BRACKET BOLT (SEE BOLT CHART).
990 LINEAR SOLENOID RETAINING BRACKET BOLT (SEE BOLT CHART).
991 COVER PLATE BOLTS (SEE BOLT CHART).
992 COVER PLATE BOLTS (SEE BOLT CHART.

Figure 36

LOWER VALVE BODY EXPLODED VIEW



300 LOWER VALVE BODY CASTING.
333 VALVE TRAIN BORE PLUG (2 REQUIRED).
334 LOCK-UP CONTROL VALVE BORE PLUG RETAINER.
335 LOCK-UP CONTROL VALVE.
336 LOCK-UP CONTROL VALVE SPRING (PINK).
337 BORE PLUG RETAINERS (2 REQUIRED).
338 SHIFT VALVE NUMBER 4 SPRING (BLUE).
339 SHIFT VALVE NUMBER 4.
340 CONTROL VALVE NUMBER 3 BORE PLUG.
341 CONTROL VALVE NUMBER 3, K1 AND K3, (LARGE DIA. = .440").
342 CONTROL VALVE CLIPS (CALIBRATES SPRING PRESSURE).
343 CONTROL VALVE SPRING (3 REQUIRED) (YELLOW).
344 CONTROL VALVE NUMBER 1 PLUNGER (LARGE DIA. = .668").
345 CONTROL VALVE PLUNGER SPRING (2 REQUIRED) (BLUE).
346 CONTROL VALVE NUMBER 1, K1, K2 AND B3, (LARGE DIA. = .471").
347 CONTROL VALVE NUMBER 2 PLUNGER (LARGE DIA. = .648").
348 CONTROL VALVE NUMBER 2, K3 AND B2, (LARGE DIA. = .431").

LOWER VALVE BODY SPRING SPECIFICATIONS

SPRING NUMBER 336	SPRING NUMBER 343 (3)
Free Length = 1.230"	Free Length = 1.334"
Spring Diameter = .319"	Spring Diameter = .361"
Wire Diameter = .030"	Wire Diameter = .033"
Approx Coils = 12 (PINK)	Approx Coils = 11 (YELLOW)
SPRING NUMBER 338	SPRING NUMBER 345 (2)
Free Length = 1.585"	Free Length = .925"
Spring Diameter = .434"	Spring Diameter = .582"
Wire Diameter = .034"	Wire Diameter = .037"
Approx Coils = 9 (8LUE)	Approx Coils = 5 (8LUE)

Figure 37

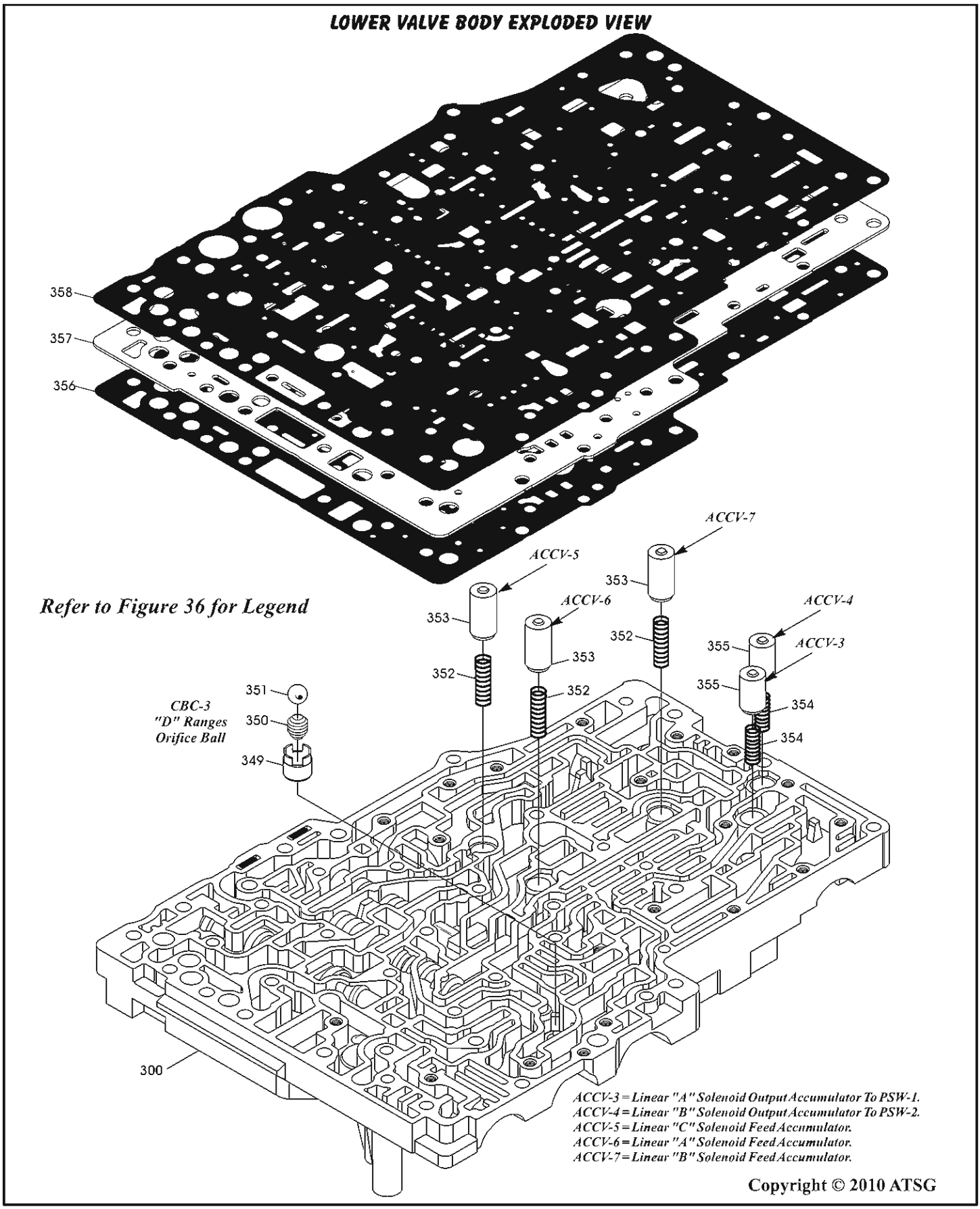

LOWER VALVE BODY EXPLODED VIEW
358
357
356
Refer to Figure 36 for Legend
ACCV-7
ACCV-5
ACCV-6
ACCV-4
ACCV-3
353
352
355
354
351
350
349
CBC-3
"D" Ranges
Orifice Ball
300
ACCV-3 = Linear "A" Solenoid Output Accumulator To PSW-1.
ACCV-4 = Linear "B" Solenoid Output Accumulator To PSW-2.
ACCV-5 = Linear "C" Solenoid Feed Accumulator.
ACCV-6 = Linear "A" Solenoid Feed Accumulator.
ACCV-7 = Linear "B" Solenoid Feed Accumulator.
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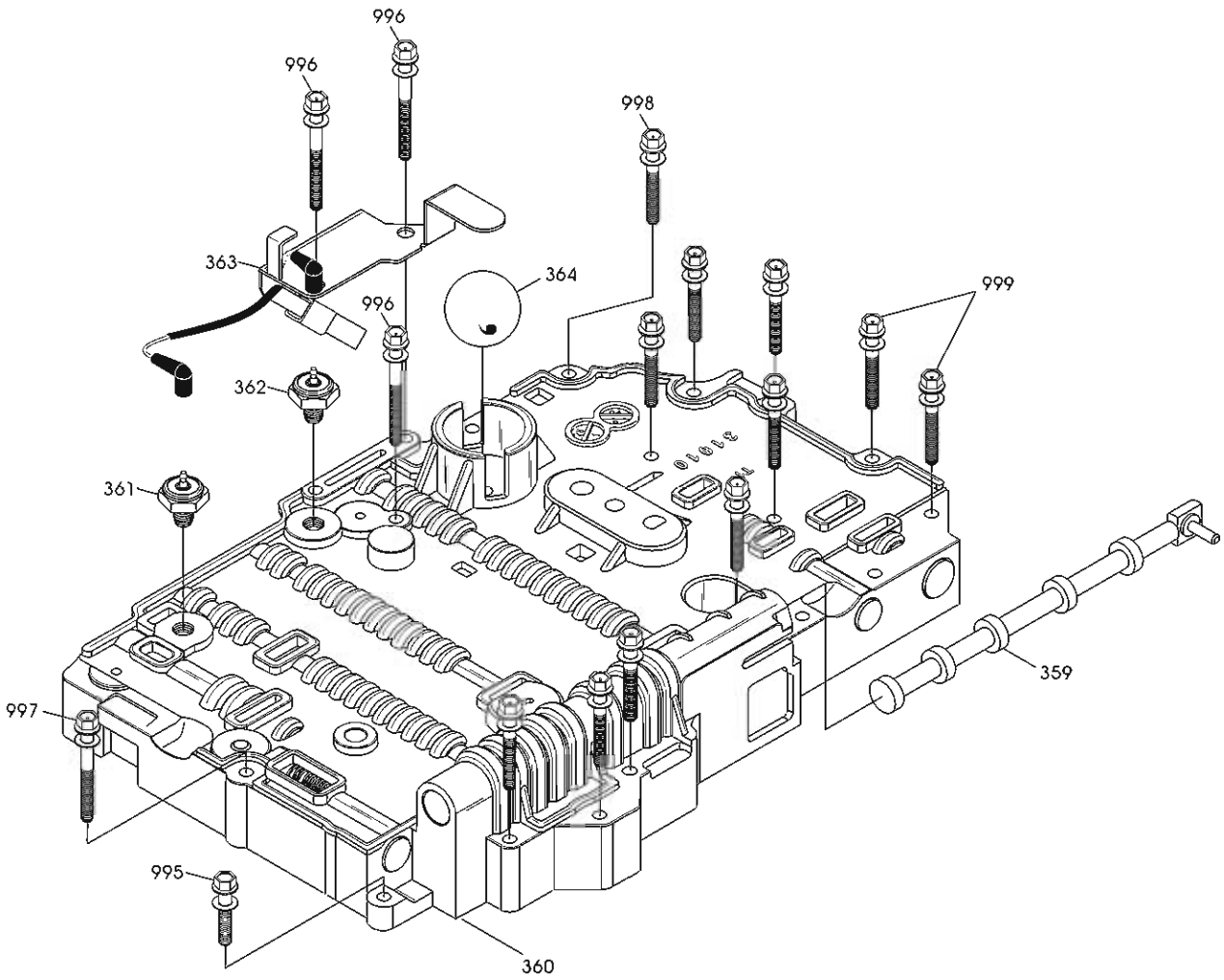
Figure 38

There are a couple of things to be aware of when assembling the upper valve body and are shown in Figure 40. Notice the bore plug retainer for valve number 372. Even though it is the same as all the other retainers, it installs laying on its side, as shown in Figure 40. Installed like you ***think*** it should go, it will protrude past the valve body surface.

Also, valves 375 and 381 are both the same diameter and will install, but ***cannot*** be interchanged because of the valve land configuration. Install them as shown in Figure 40.

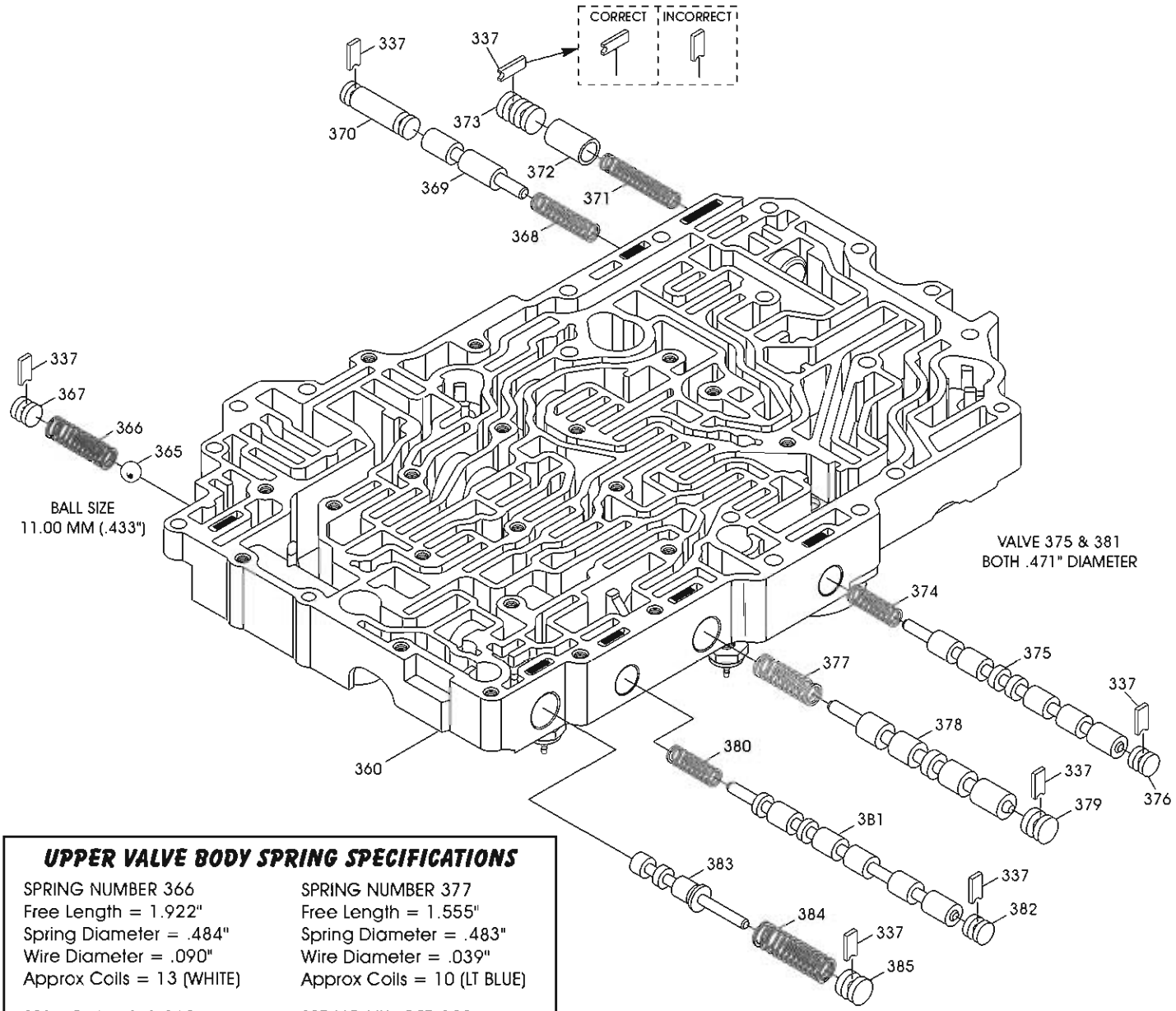
UPPER VALVE BODY EXPLODED VIEW



359 MANUAL VALVE.
360 UPPER VALVE BODY CASTING.
361 PRESSURE SWITCH FIVE (1/8" NPT).
362 PRESSURE SWITCH FOUR (1/8" NPT).
363 PRESSURE SWITCH HARNESS AND DRAIN BALL RETAINING BRACKET.
364 DRAIN BALL, 27 MM (1.062") DIAMETER.
995 VALVE BODY BOLT (SEE BOLT CHART).
996 RETAINING BRACKET BOLTS (SEE BOLT CHART).
997 VALVE BODY BOLT (SEE BOLT CHART).
998 VALVE BODY BOLT (SEE BOLT CHART).
999 VALVE BODY BOLTS (SEE BOLT CHART).

Figure 39

UPPER VALVE BODY EXPLODED VIEW



UPPER VALVE BODY SPRING SPECIFICATIONS

SPRING NUMBER 366
Free Length = 1.922"
Spring Diameter = .484"
Wire Diameter = .090"
Approx Coils = 13 (WHITE)

SPRING NUMBER 368
Free Length = 1.645"
Spring Diameter = .395"
Wire Diameter = .032"
Approx Coils = 11 (RED)

SPRING NUMBER 371
Free Length = 1.500"
Spring Diameter = .348"
Wire Diameter = .023"
Approx Coils = 17 (DK BLUE)

SPRING NUMBER 374
Free Length = 1.560"
Spring Diameter = .435"
Wire Diameter = .039"
Approx Coils = 10 (LT GREEN)

SPRING NUMBER 377
Free Length = 1.555"
Spring Diameter = .483"
Wire Diameter = .039"
Approx Coils = 10 (LT BLUE)

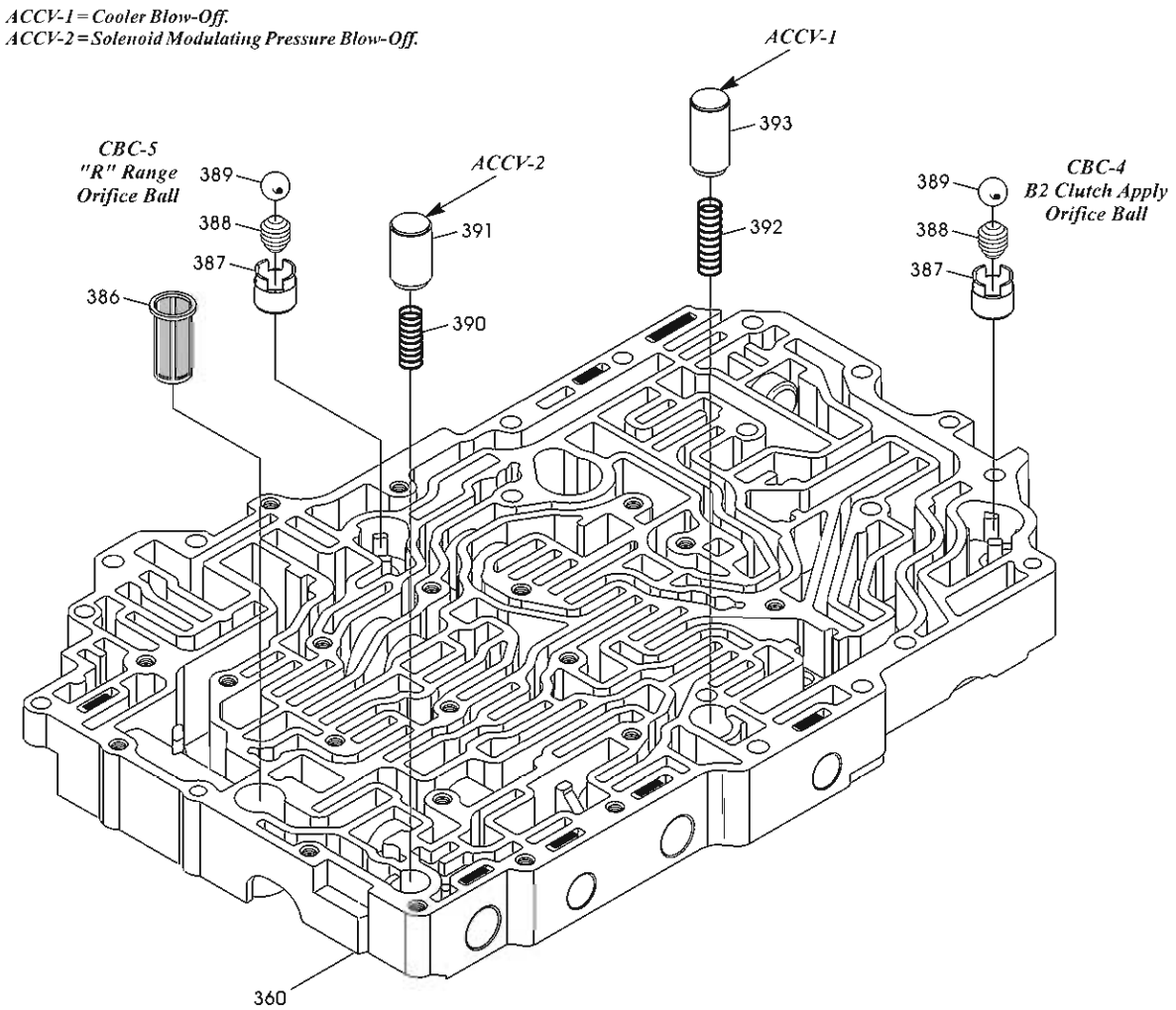
SPRING NUMBER 380
Free Length = 1.585"
Spring Diameter = .433"
Wire Diameter = .035"
Approx Coils = 9 (BLUE)

SPRING NUMBER 384
Free Length = 2.265"
Spring Diameter = .528"
Wire Diameter = .055"
Approx Coils = 12 (PINK)

Refer to Figure 41 for Legend

Figure 40

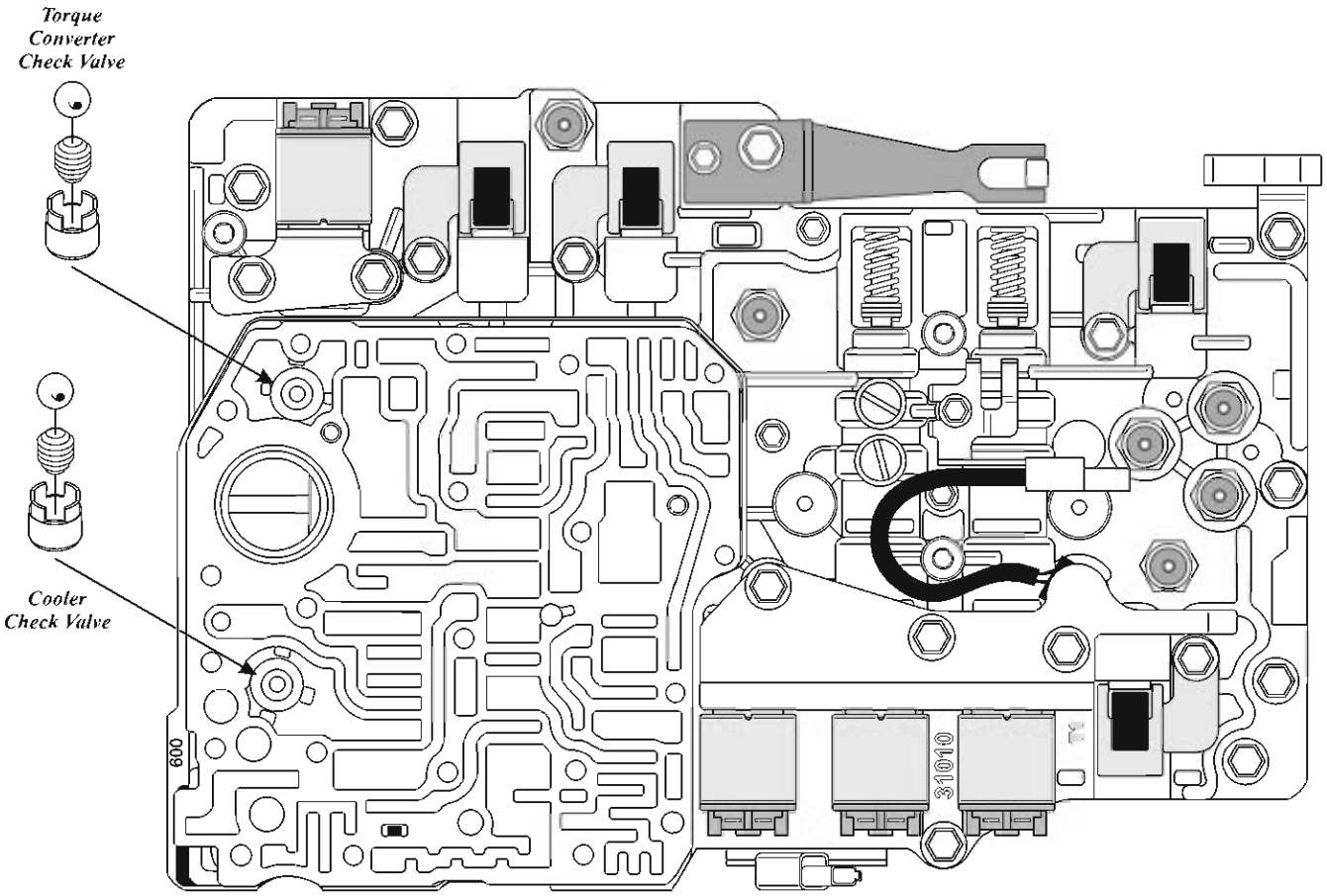
UPPER VALVE BODY EXPLODED VIEW



337 BORE PLUG RETAINERS (7 REQUIRED).
360 UPPER VALVE BODY CASTING.
365 LINE PRESSURE BLOW-OFF BALL, 11 MM (.433") DIAMETER.
366 LINE PRESSURE BLOW-OFF BALL SPRING (WHITE).
367 LINE PRESSURE BLOW-OFF BORE PLUG.
368 GAIN CHANGE VALVE SPRING (RED).
369 GAIN CHANGE VALVE.
370 GAIN CHANGE VALVE BORE PLUG.
371 COMBINED DRAIN VALVE SPRING (DK BLUE).
372 COMBINED DRAIN VALVE.
373 COMBINED DRAIN VALVE BORE PLUG *(NOTE RETAINER DIRECTION)*.
374 SHIFT VALVE NUMBER 1 SPRING (LT GREEN).
375 SHIFT VALVE NUMBER 1.
376 SHIFT VALVE NUMBER 1 BORE PLUG.
377 SHIFT VALVE NUMBER 2 SPRING (LT BLUE).
378 SHIFT VALVE NUMBER 2.
379 SHIFT VALVE NUMBER 2 BORE PLUG.
380 SHIFT VALVE NUMBER 3 SPRING (BLUE).
381 SHIFT VALVE NUMBER 3.
382 SHIFT VALVE NUMBER 3 BORE PLUG.
383 MODULATOR VALVE.
384 MODULATOR VALVE SPRING (PINK).
385 MODULATOR VALVE BORE PLUG.
386 PLASTIC SCREEN.
387 SMALL CHECK BALL CAPSULE (2 REQUIRED).
388 SMALL CHECK BALL SPRING, 2 REQUIRED, (ORANGE).
389 SMALL CHECK BALL, 10 MM (.393") DIAMETER (2 REQUIRED).
390 ACCUMULATOR VALVE SPRING (WHITE).
391 ACCUMULATOR VALVE, SHORT W/O DIMPLE, .470" DIAMETER.
392 ACCUMULATOR VALVE SPRING (LT BLUE).
393 ACCUMULATOR VALVE, LONG W/O DIMPLE, .510" DIAMETER.

Figure 41

LOWER VALVE BODY FILTER SIDE

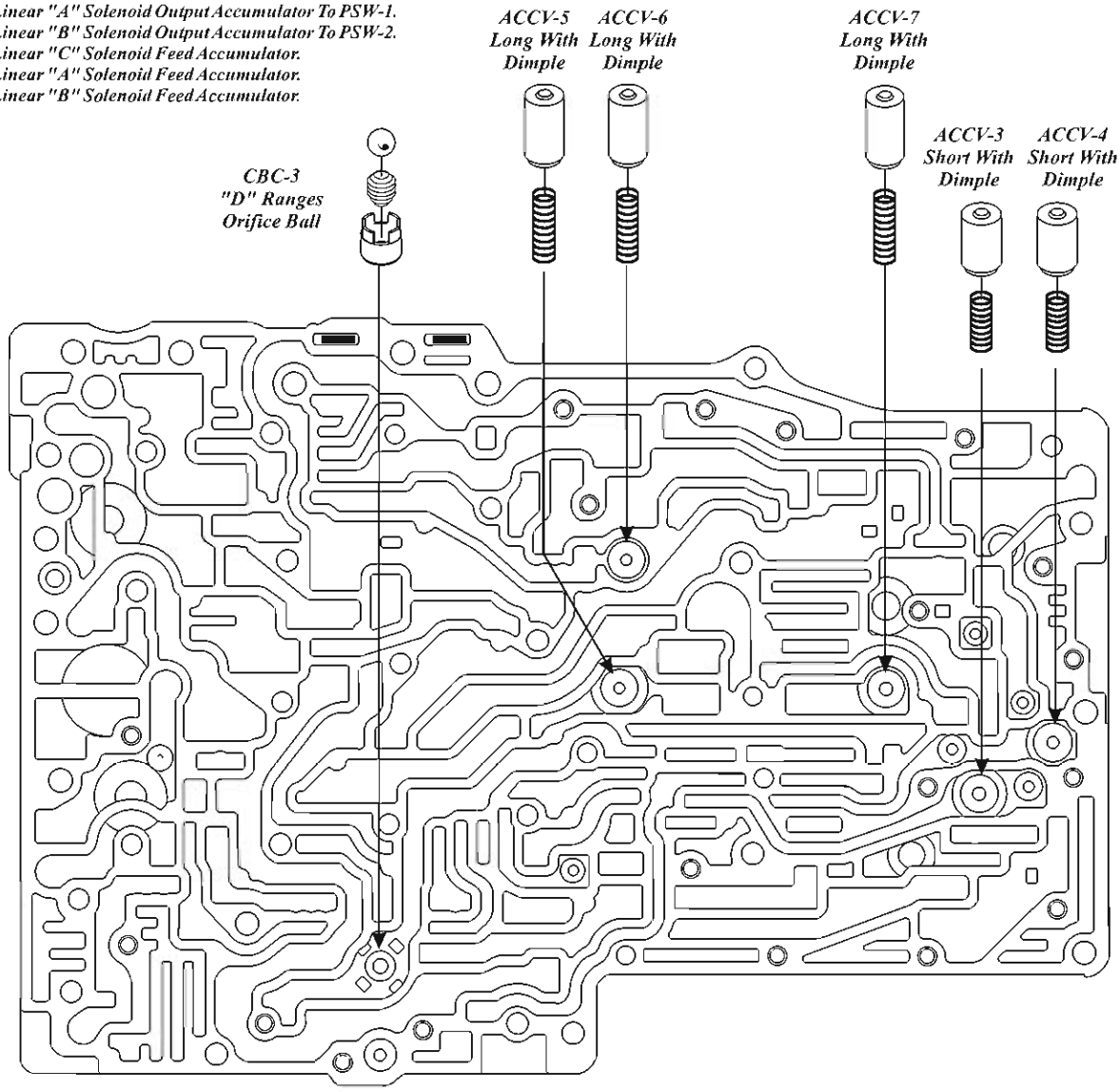


Check Ball And Capsule
CHECK BALL DIAMETER = .499"
CAPSULE DIAMETER = .667"
SPRING FREE LENGTH = .758" (WHITE PAINT)
SPRING WIRE DIAMETER = .019" (WHITE PAINT)
SPRING APPROX. COILS = 8 (WHITE PAINT)

Figure 42

LOWER VALVE BODY SPACER PLATE SIDE

ACCV-3 = Linear "A" Solenoid Output Accumulator To PSW-1.
ACCV-4 = Linear "B" Solenoid Output Accumulator To PSW-2.
ACCV-5 = Linear "C" Solenoid Feed Accumulator.
ACCV-6 = Linear "A" Solenoid Feed Accumulator.
ACCV-7 = Linear "B" Solenoid Feed Accumulator.



"Long" Accumulator Piston (With Dimple)
PISTON DIAMETER = .471"
PISTON OVERALL LENGTH = .996"
SPRING FREE LENGTH = 1.140" (RED PAINT)
SPRING WIRE DIAMETER = .049" (RED PAINT)
SPRING APPROX. COILS = 10 (RED PAINT)

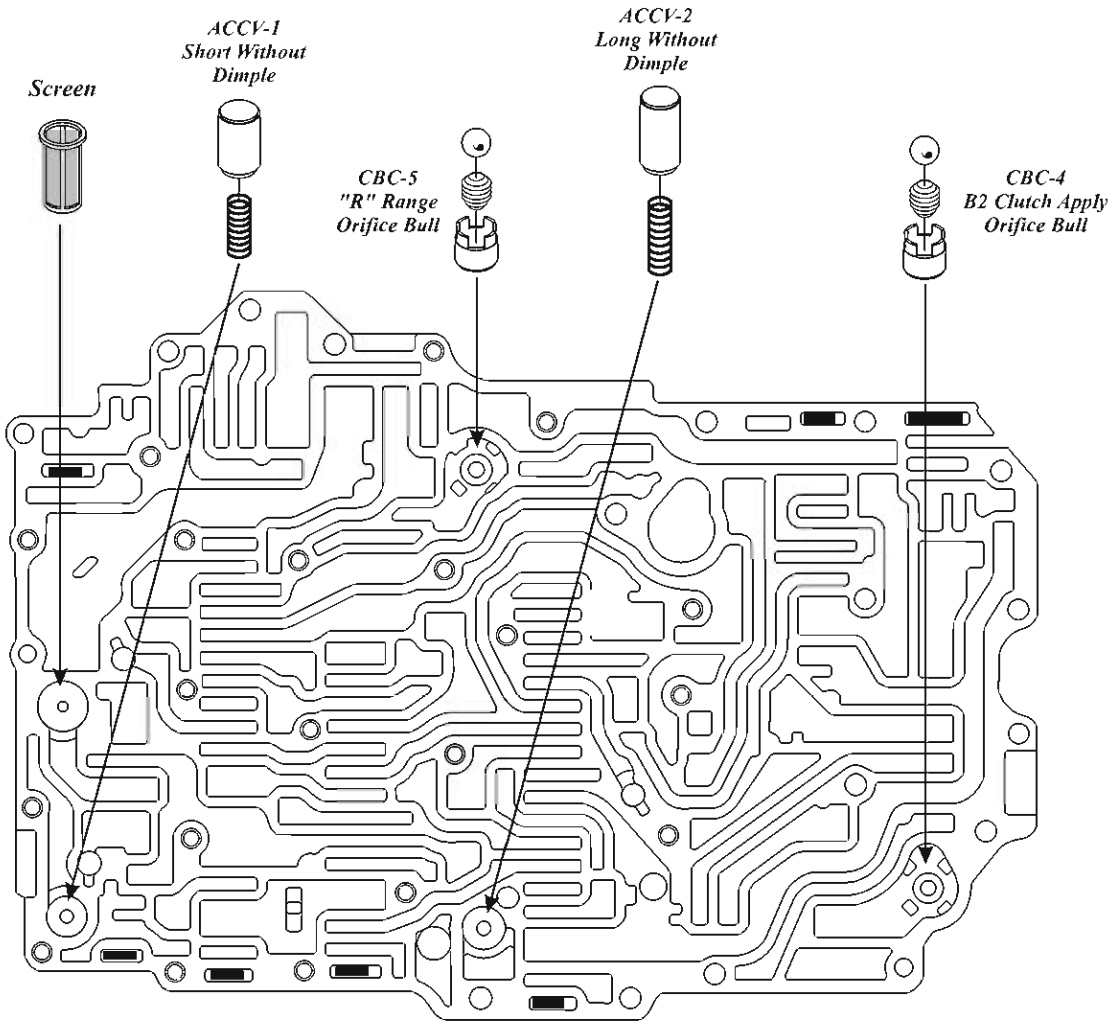
"Short" Accumulator Piston (With Dimple)
PISTON DIAMETER = .491"
PISTON OVERALL LENGTH = .785"
SPRING FREE LENGTH = .895" (LT GREEN PAINT)
SPRING WIRE DIAMETER = .063" (LT GREEN PAINT)
SPRING APPROX. COILS = 9 (LT GREEN PAINT)

Check Ball And Capsule
CHECK BALL DIAMETER = .393"
CAPSULE DIAMETER = .526"
SPRING FREE LENGTH = .502" (ORANGE PAINT)
SPRING WIRE DIAMETER = .014" (ORANGE PAINT)
SPRING APPROX. COILS = 7 (ORANGE PAINT)

Figure 43

UPPER VALVE BODY SPACER PLATE SIDE

ACCV-1 = Cooler Blow-Off.
ACCV-2 = Solenoid Modulating Pressure Blow-Off.



"Long" Accumulator Piston (Without Dimple)
PISTON DIAMETER = .510"
PISTON OVERALL LENGTH = .913"
SPRING FREE LENGTH = 1.325" (LT BLUE PAINT)
SPRING WIRE DIAMETER = .054" (LT BLUE PAINT)
SPRING APPROX. COILS = 13 (LT BLUE PAINT)

"Short" Accumulator Piston (Without Dimple)
PISTON DIAMETER = .470"
PISTON OVERALL LENGTH = .650"
SPRING FREE LENGTH = .932" (WHITE PAINT)
SPRING WIRE DIAMETER = .047" (WHITE PAINT)
SPRING APPROX. COILS = 11 (WHITE PAINT)

Check Ball And Capsule
CHECK BALL DIAMETER = .393"
CAPSULE DIAMETER = .526"
SPRING FREE LENGTH = .502" (ORANGE PAINT)
SPRING WIRE DIAMETER = .014" (ORANGE PAINT)
SPRING APPROX. COILS = 7 (ORANGE PAINT)

Figure 44

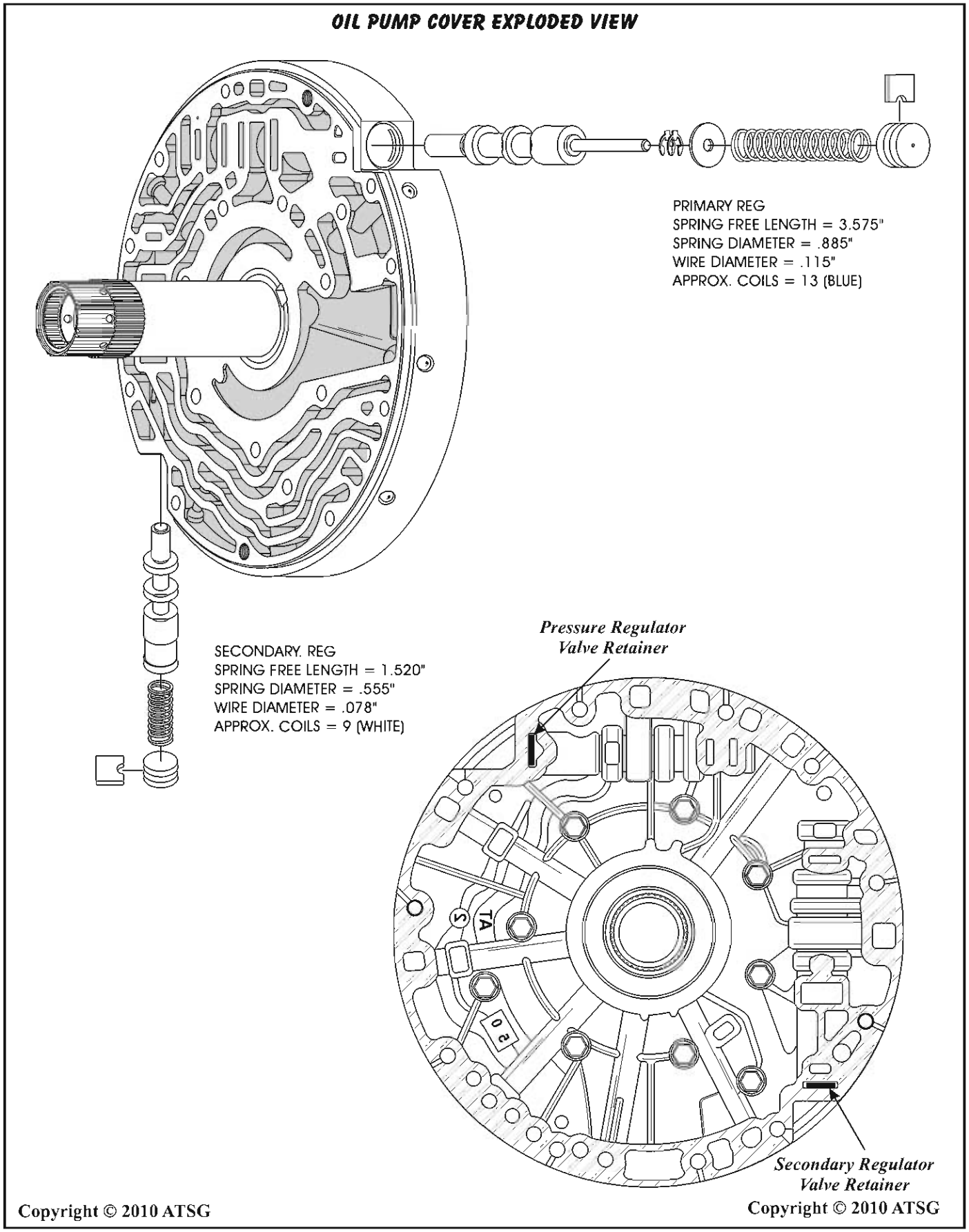

OIL PUMP COVER EXPLODED VIEW
PRIMARY REG
SPRING FREE LENGTH = 3.575"
SPRING DIAMETER = .885"
WIRE DIAMETER = .115"
APPROX. COILS = 13 (BLUE)
SECONDARY. REG
SPRING FREE LENGTH = 1.520"
SPRING DIAMETER = .555"
WIRE DIAMETER = .078"
APPROX. COILS = 9 (WHITE)
Pressure Regulator Valve Retainer
Secondary Regulator Valve Retainer
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Figure 45

OIL PUMP BODY EXPLODED VIEW

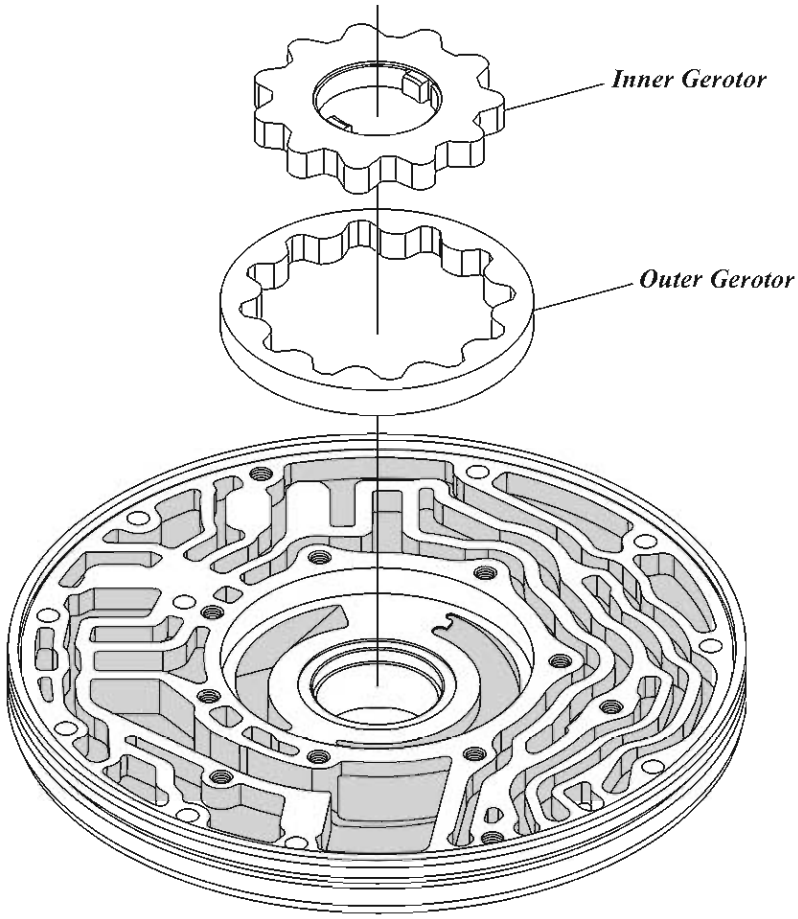


Figure 46

DAIMLER/CHRYSLER AS68RC DIAGNOSTIC TROUBLE CODES	
DTC	**DESCRIPTION**
P0560	*System Voltage Malfunction*
P0613	*Transmission Control Module (TCM)*
P0702	*Transmission Control System Electrical*
P0706	*Transmission Range Switch Rationality and Pressure Switch N0. 8*
P0707	*Transmission Range Switch Circuit Low*
P0708	*Transmission Range Switch Circuit High*
P0711	*Transmission Fluid Temperature Sensor A (Sump), Circuit Performance*
P0712	*Transmission Fluid Temperature Sensor A (Sump), Circuit Low*
P0713	*Transmission Fluid Temperature Sensor A (Sump), Circuit High*
P0717	*Input Speed Sensor Circuit, No Signal*
P0722	*Output Speed Sensor Circuit, No Signal*
P0730	*Incorrect Gear Ratio*
P0745	*Line Pressure Solenoid (Linear Solenoid "D") Electrical*
P0746	*Clutch Pressure Control Solenoid (Linear Solenoid "A") Performance or Stuck Off*
P0748	*Clutch Pressure Control Solenoid (Linear Solenoid "A") Electrical*
P0751	*On/Off Shift Solenoid 1 (A), Performance or Stuck Off*
P0756	*On/Off Shift Solenoid 2 (B), Performance or Stuck Off*
P0761	*On/Off Shift Solenoid 3 (C), Performance or Stuck Off*
P0766	*On/Off Shift Solenoid 4 (D), Performance or Stuck Off*
P0776	*Clutch Pressure Control Solenoid (Linear Solenoid "B") Performance or Stuck Off*
P0778	*Clutch Pressure Control Solenoid (Linear Solenoid "B") Electrical*
P0796	*Clutch Pressure Control Solenoid (Linear Solenoid "C") Performance or Stuck Off*
P0798	*Clutch Pressure Control Solenoid (Linear Solenoid "C") Electrical*
P0973	*On/Off Shift Solenoid 1 (A), Control Circuit Low*
P0974	*On/Off Shift Solenoid 1 (A), Control Circuit High*
P0976	*On/Off Shift Solenoid 2 (B), Control Circuit Low*
P0977	*On/Off Shift Solenoid 2 (B), Control Circuit High*
P0979	*On/Off Shift Solenoid 3 (C), Control Circuit Low*
P0980	*On/Off Shift Solenoid 3 (C), Control Circuit High*
P0982	*On/Off Shift Solenoid 4 (D), Control Circuit Low*
P0983	*On/Off Shift Solenoid 4 (D), Control Circuit High*
P1679	*TCU Not Calibrated*
P1720	*Loss Of Output Speed*
P2741	*Transmission Fluid Temperature Sensor B (Torque Converter Out), Circuit Performance*
P2742	*Transmission Fluid Temperature Sensor B (Torque Converter Out), Circuit Low*
P2743	*Transmission Fluid Temperature Sensor B (Torque Converter Out), Circuit High*
P2757	*TCC Pressure Control Solenoid (Linear Solenoid "C") Performance or Stuck Off*
U0001	*High Speed (CAN) Communication Bus*
U0100	*Lost Communication with TCM/ECM*
U0121	*Lost Communication with Anti-Lock Brake System (ABS) Control Module*
U0141	*Lost Communication with Totally Integrated Power Module (TIPM)*
U01400	*Implausible TPS Signal Received*
U01401	*Implausible Engine Speed Signal Received*
U140D	*Implausible Wheel Speed Signal Received*
C1400	*Implausible Wheel Speed Signal Received*

Figure 48

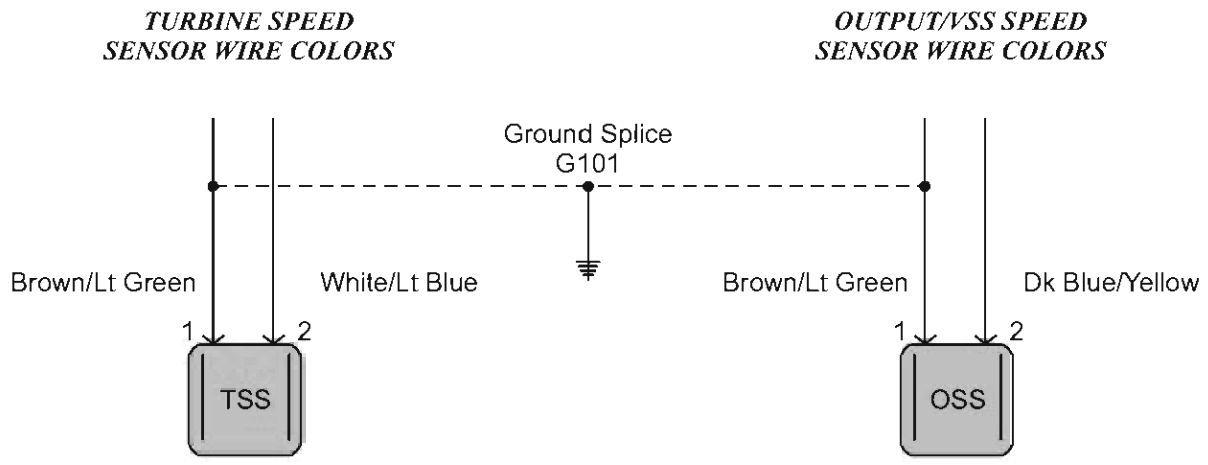
FORD/MAZDA CD4E
PERSISTENT GEAR RATIO ERRORS 2001 & UP

COMPLAINT: After overhaul, 2001 and up vehicles equipped with the CD4E transaxle may exhibit a complaint of gear ratio error codes P0731, P0732, P0733 or P0734 , and the transmission tries to shift to third but then downshifts back to second or first gear. After clearing these codes, they immediately return during the road test. The Speedometer also will read in Park if the engine is revved up, and or it is noticed that the Speedometer is about 15-20 MPH slow.

CAUSE: The cause may be that during installation of the transmission, the Turbine Speed Sensor harness connector was connected to the Output/Vehicle Speed Sensor, and the Output/Vehicle speed sensor harness connector was connected to the Turbine Speed Sensor, as the connectors are identical and the harnesses are long enough to cross-connect. The previous design VSS was on the opposite side of the trans which made it impossible to cross-connect.The new design OSS/VSS arrived in 2001 and up models.

CORRECTION: Refer to Figure 1 for a sample wiring schematic showing the wire colors for these two sensors. Figure 2 shows the location of the previous design and new design Vehicle Speed Sensor locations. Refer to Figure 3 for a close up of the TSS and VSS and their connectors. Verify that the correct harness is connected to the correct sensor.

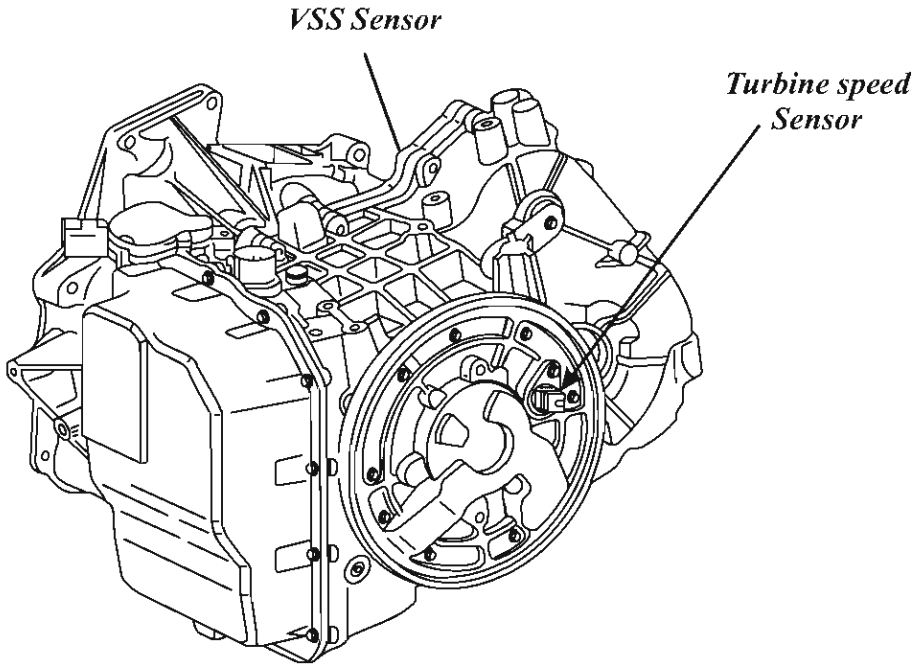
TURBINE AND OUTPUT SENSOR WIRE COLORS



Note: Wire colors provided above are from a 01-02 Ford Escape, colors may vary.

Figure 1

PREVIOUS DESIGN TSS AND VSS LOCATIONS



NEW DESIGN TSS AND VSS LOCATIONS

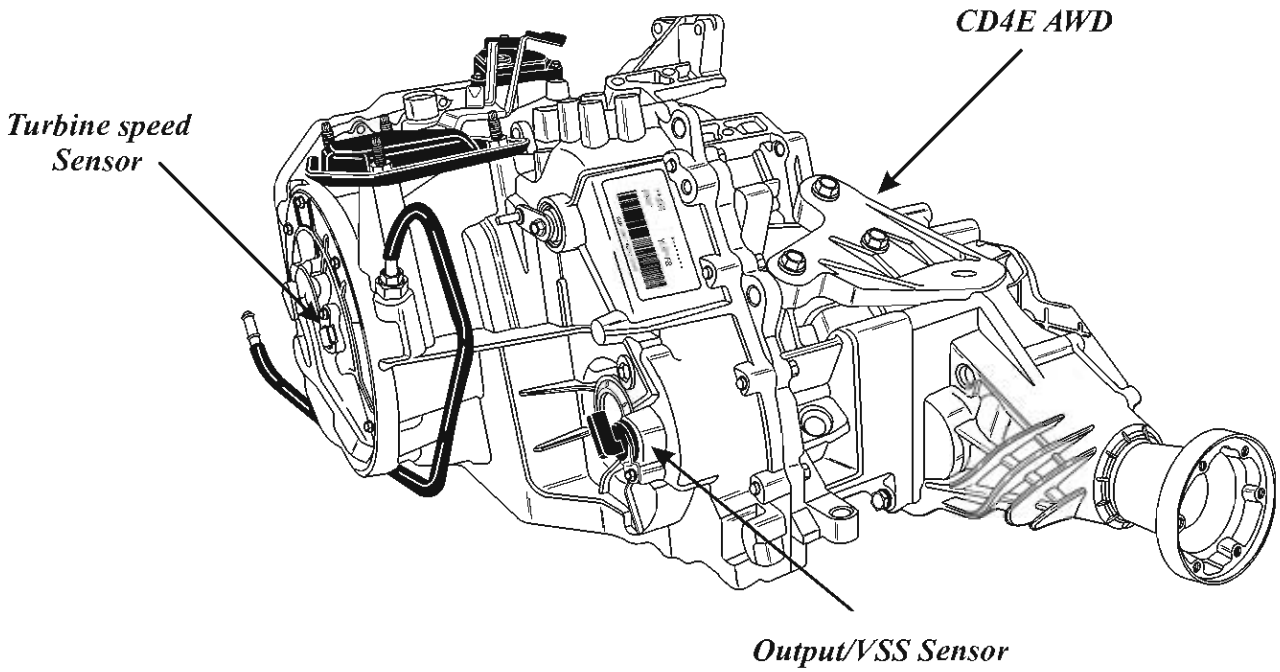
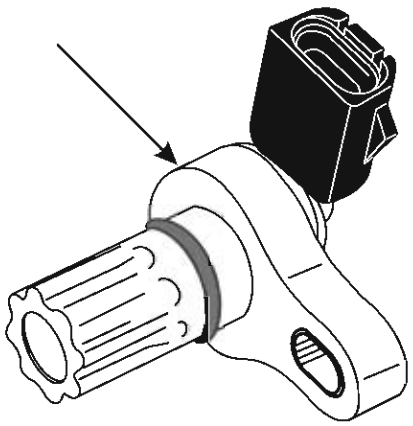


Figure 2

FORD/MAZDA CD4E
PERSISTENT GEAR RATIO ERRORS 2001 & UP

SENSOR I.D.

Turbine Sensor



Output/VSS Sensor

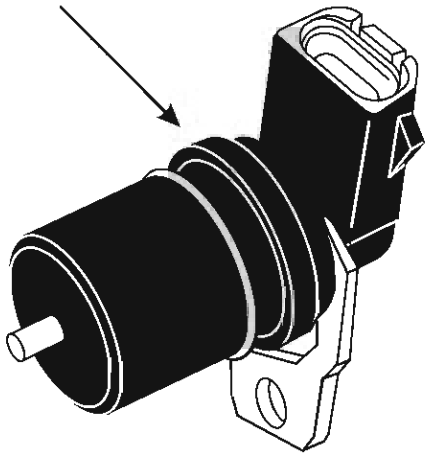


Figure 3

FORD 4R70W/4R75E
DIRECT CLUTCH FAILURE

COMPLAINT: The vehicle may come into the shop slipping in third gear, upon disassembly of the transmission the direct clutch is found to be badly burnt. The transmission is rebuilt and the vehicle is released.
The vehicle returns within the warranty period with the same complaint, upon disassembly of the transmission, the direct clutches are once again badly burnt.
Upon closer inspection, the technician notices that the spacer plate has very fine cracks in the area of the 2-3 accumulator. The technician attributes this to the 2-3 accumulator cover hitting the spacer plate, this is not the root cause of the problem.

CAUSE: For the 2001 model year Ford eliminated the 2-3 Capacity Modulator and Orifice Control valve lineup and the bore was cast shut. At the same time the small stiffener plate was also eliminated because it was assumed that with that valve lineup, the additional support was not necessary.
When examining the damaged spacer plate, the technician sees a small crater surrounded by cracks just above the 2-3 accumulator cover, (See Figure 1), it is assumed that the accumulator cover is hitting the spacer plate, it is actually the other way around.
In the area of the valve body where the small stiffener plate has been eliminated, oil cross leaks into those unused cavities, this oil will flex the spacer plate upwards as much as .010" and will be forced against the 2-3 accumulator cover. This is what causes the crater and the cracks.
Those unused cavities are forward and direct clutch passages, so when forward clutch oil which is equivalent to line pressure cross leaks into the direct clutch passage, (Refer to Figure 2), it will put a drag on the direct clutches and burn them.
This can be verified by observing a pressure gauge on the direct clutch pressure port when the transmission is not in third gear. If a significant amount of oil is present, it is the spacer plate flexing.

CORRECTION: Sonnax® has a repair kit that provides the small stiffener plate as well as installation instructions. The kit is installed in Figure 3.
When drilling the holes for the stiffener plate bolts, you will notice that there are two counter sunk holes in the valve body, (See Figure 4), use these a pilot holes to insure correct location of the bolt holes (*makes you wonder why Ford put those there*).

SERVICE INFORMATION:
Sonnax® Spacer Plate Repair Kit.....76507F-01K

FORD 4R70W/4R75E
DIRECT CLUTCH FAILURE

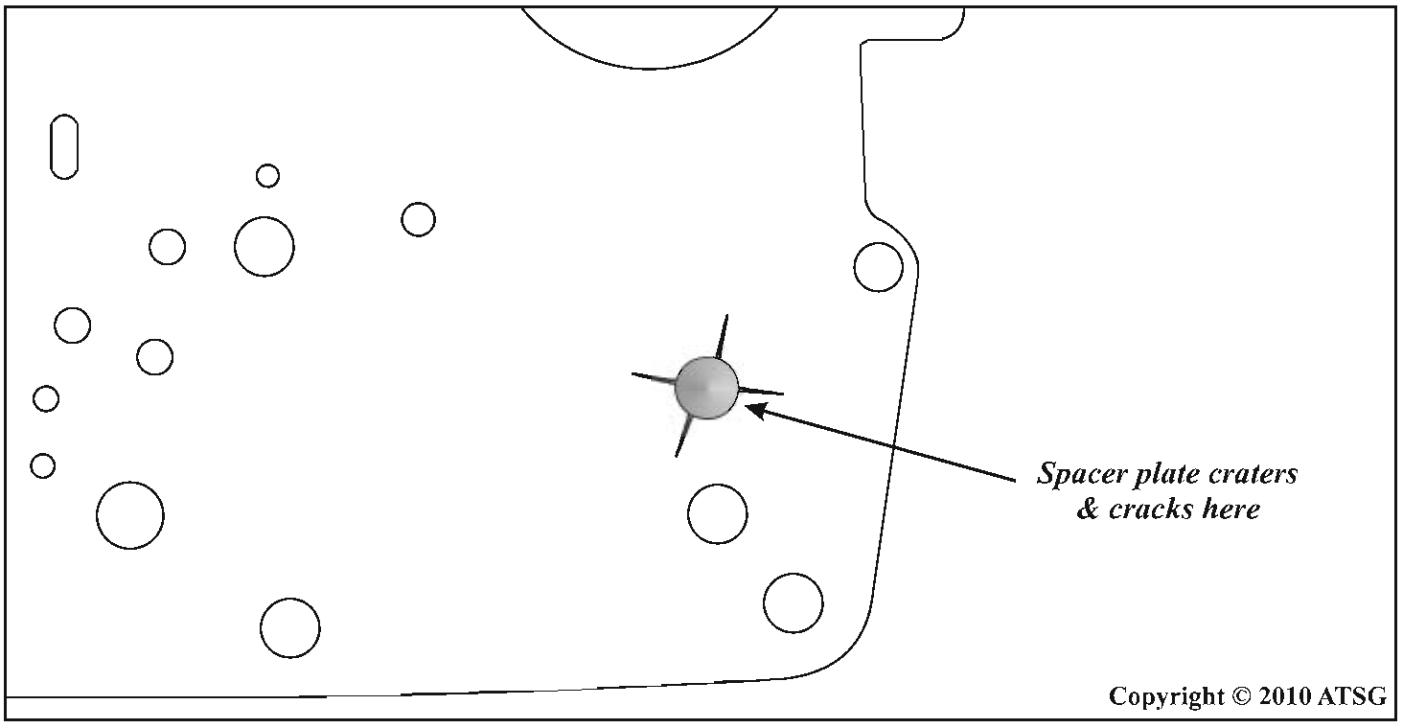


Figure 1

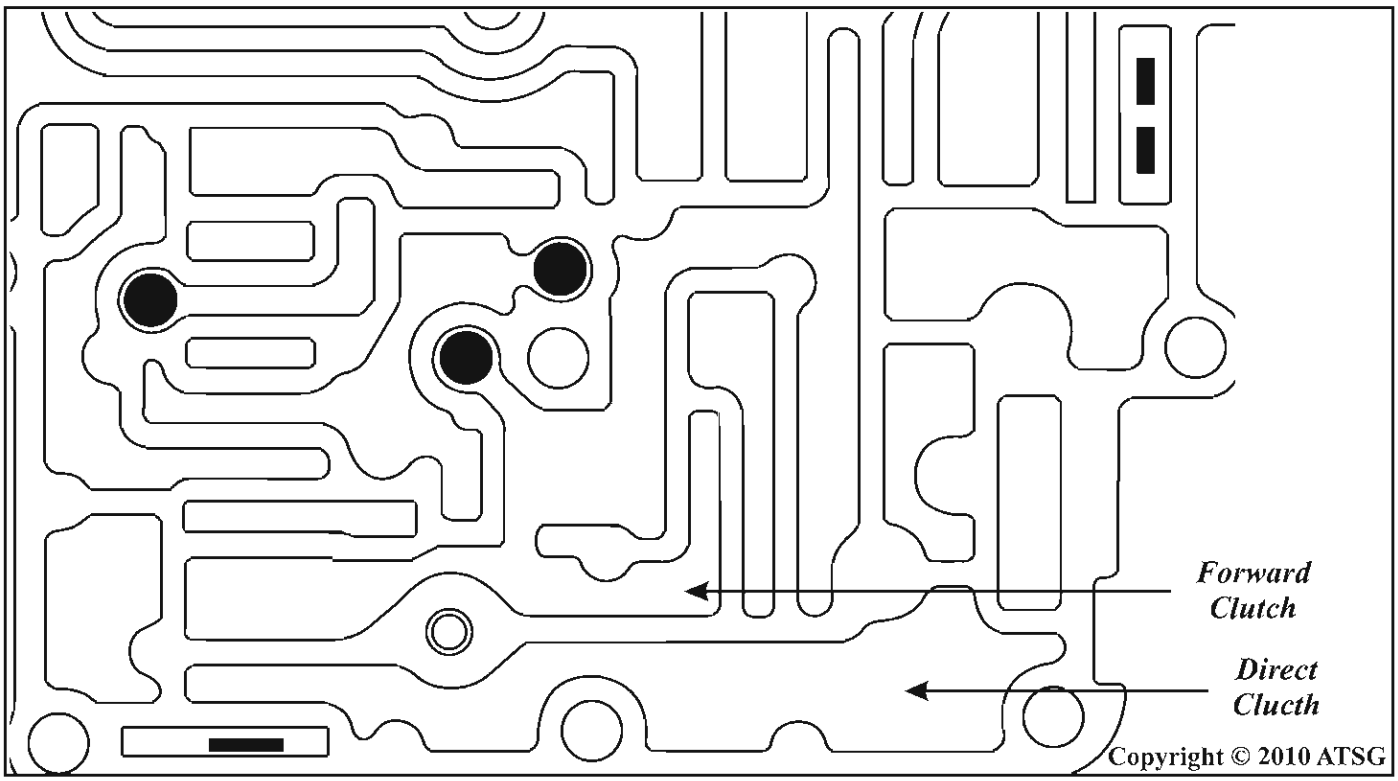


Figure 2

FORD 4R70W/4R75E
DIRECT CLUTCH FAILURE

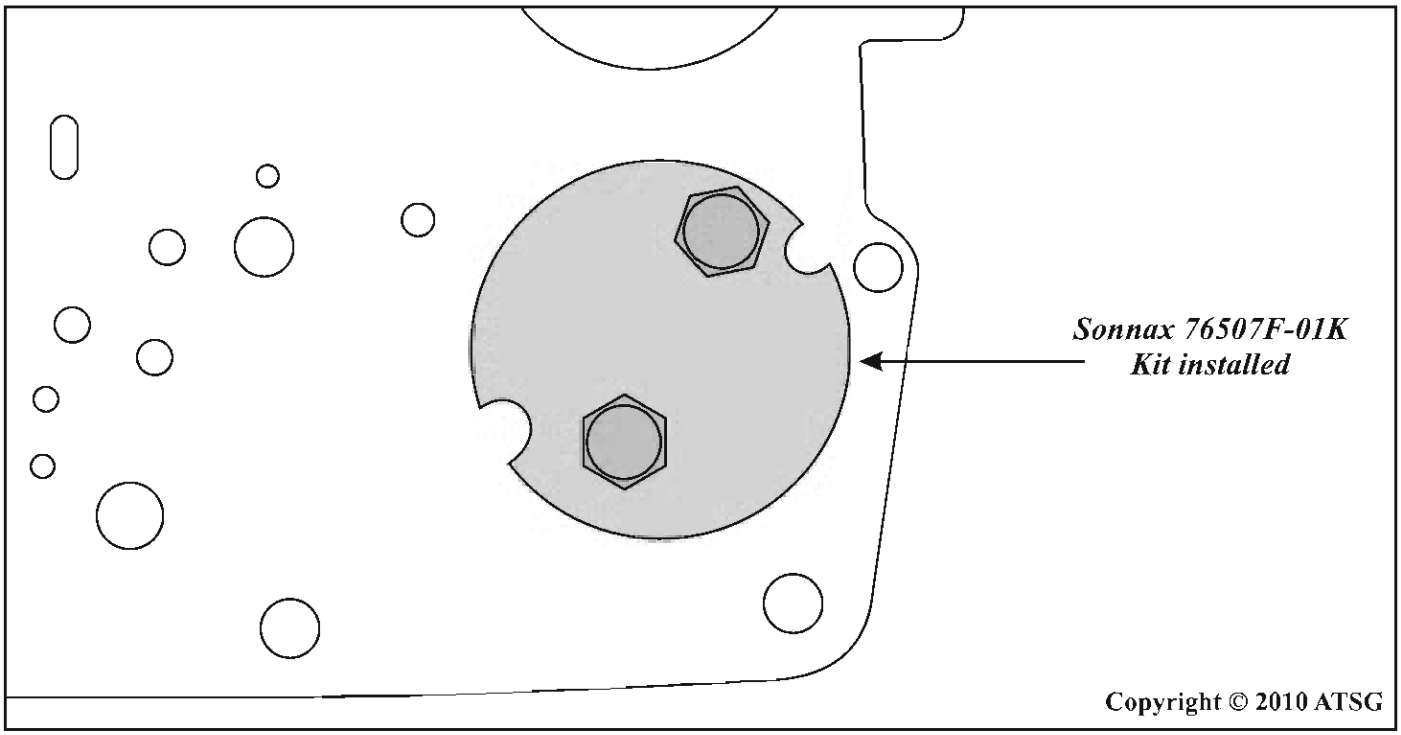


Figure 3

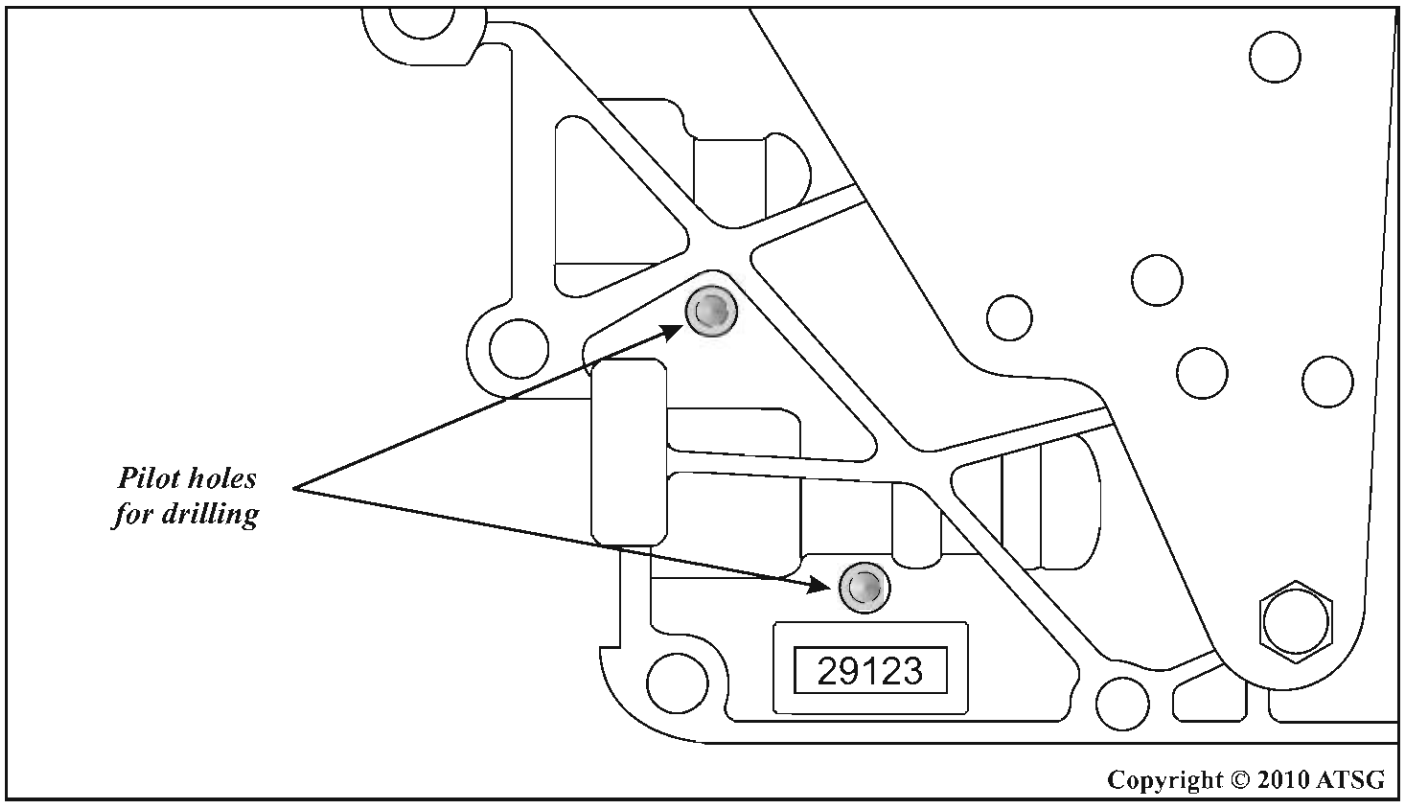


Figure 4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Remanufactured
Torque Converters
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800.727.4461
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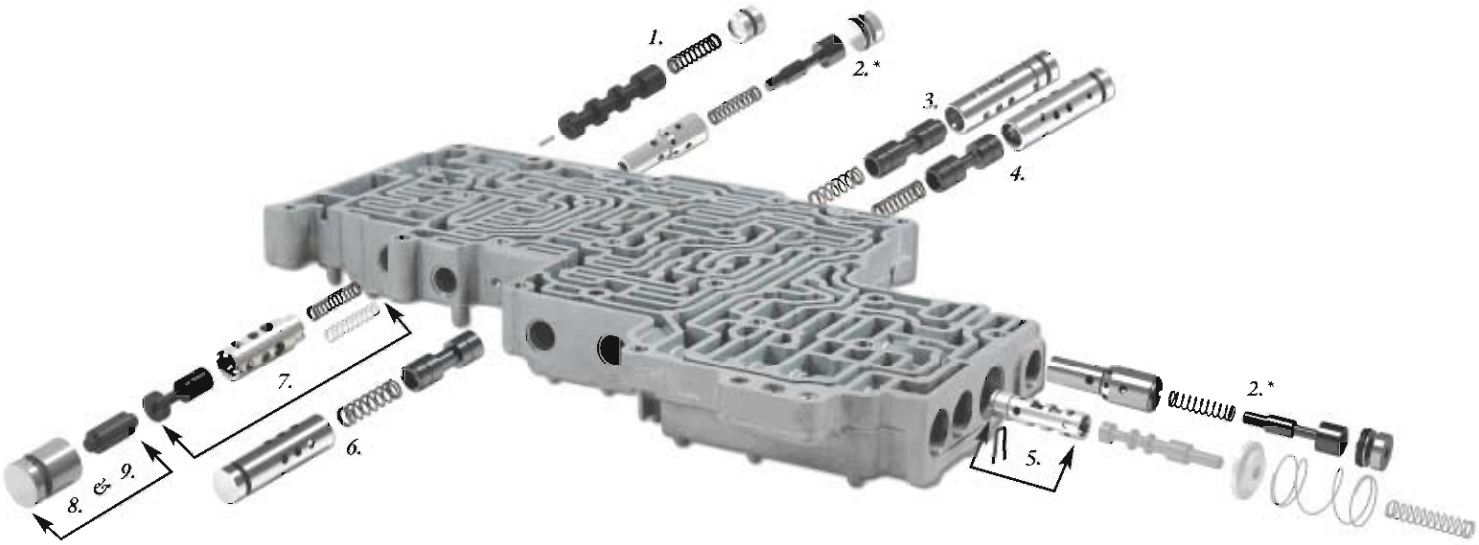
Sonnax has the 5R55W/S Under Control!



PROBLEM	SOLUTION	Tool Required	Part Number
• Excess TCC slip, Code 741 • TCC lining comes off	1. Oversized TCC Control Valve Kit	F-56947J-TL2 & VB-FIX	56947J-05K
• Line pressure concerns • Slipping upshifts	2. VFS Modulator Control Valve & Sleeve Kit	F-56947J-TL19 & VB-FIX	56947J-19K *Fits 2 Locations!*
• Delayed reverse engagement • Loss of 4th and/or 5th	3. Reverse Modulator Valve & Sleeve Kit	F-27741-TL13 & VB-FIX	56947J-23K
• Slipping or loss of reverse • Burned direct clutch	4. Reverse Engagement Valve & Sleeve Kit	F-27741-TL13 & VB-FIX	56947J-29K
• Delayed engagements • High line pressure in reverse	5. Pressure Regulator Sleeve & Clip	56947J-TL9	56947J-09K
• Slipping or loss of forward gears • Burned forward clutch	6. Forward Engagement Valve & Sleeve Kit	F-27741-TL13 & VB-FIX	56947J-26K
• Excess TCC slippage • Codes 741 & 1783	7. TCC Modulator Valve & Sleeve Kit	F-56947J-TL15 & VB-FIX	56947J-15K
• High TCC slip RPM at increasing load • Slip codes • Elevated fluid temperature	8. Increased Ratio TCC Modulator Sleeve & Plunger Assemblies 9. OEM Ratio		56947J-03K 56947J-01K

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FORD 5R55W/S
OVERDRIVE CARRIER FAILURE

COMPLAINT: Upon disassembly of the transmission, the overdrive carrier is found to be discolored, it is an obvious lube circuit problem. The cooler may be flushed or bypassed during the repair procedure and the transmission is rebuilt with special attention to bushing condition and unit end play.
Unfortunately, the vehicle comes back in a relatively short time period, and upon transmission disassembly the replacement overdrive carrier is discolored just like the original part.

CAUSE: What was overlooked during the first rebuild was a small orifice cup plug in the top of the stator, (See Figure 1). This cup plug is part of the front lube circuit. There was debris in this passage which blocked the hole in the cup plug preventing lube oil from reaching the overdrive carrier.

CORRECTION: A standard rebuild procedure should be to blow this passage out with a rubber tipped blow gun as seen in Figure 2, and to flush with a pressurized cleaning chemical and then blow it out again until this passage is clear.
The lube orifice can be air checked to insure it is not clogged by blowing air into the passage shown in figure 3 when the pump is assembled.

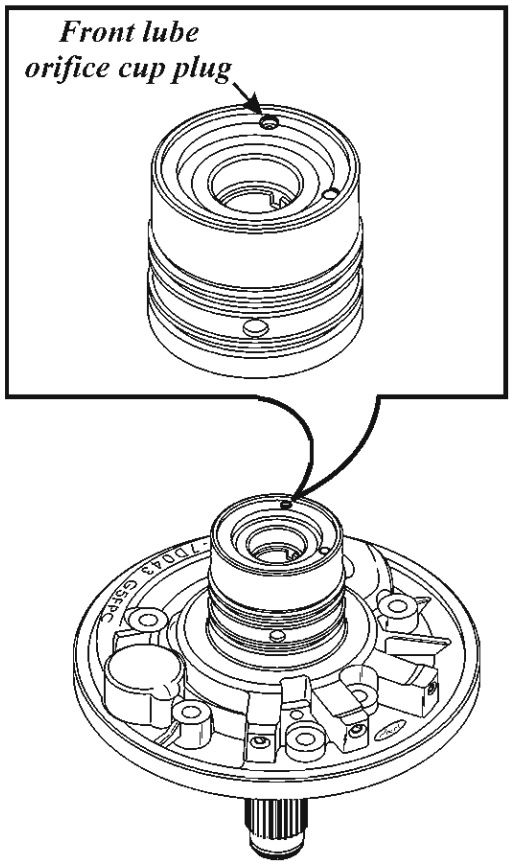
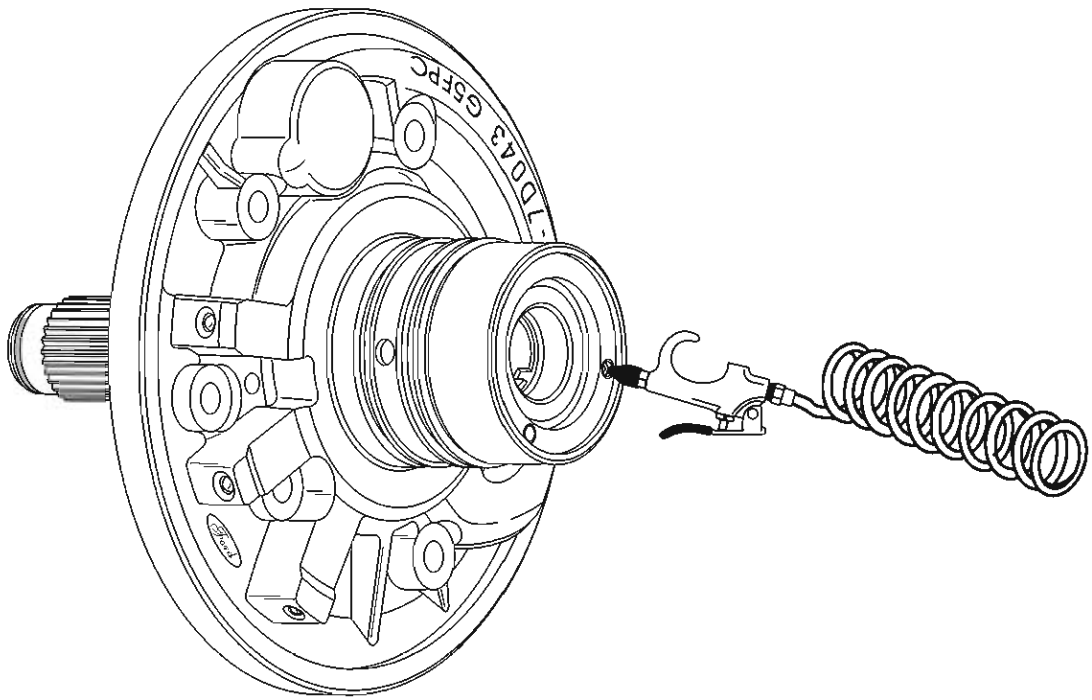


Figure 1

FORD 5R55W/S
OVERDRIVE CARRIER FAILURE



CLEAN & BLOW THROUGH THE LUBE PASSAGE UNTIL IT IS CLEAR

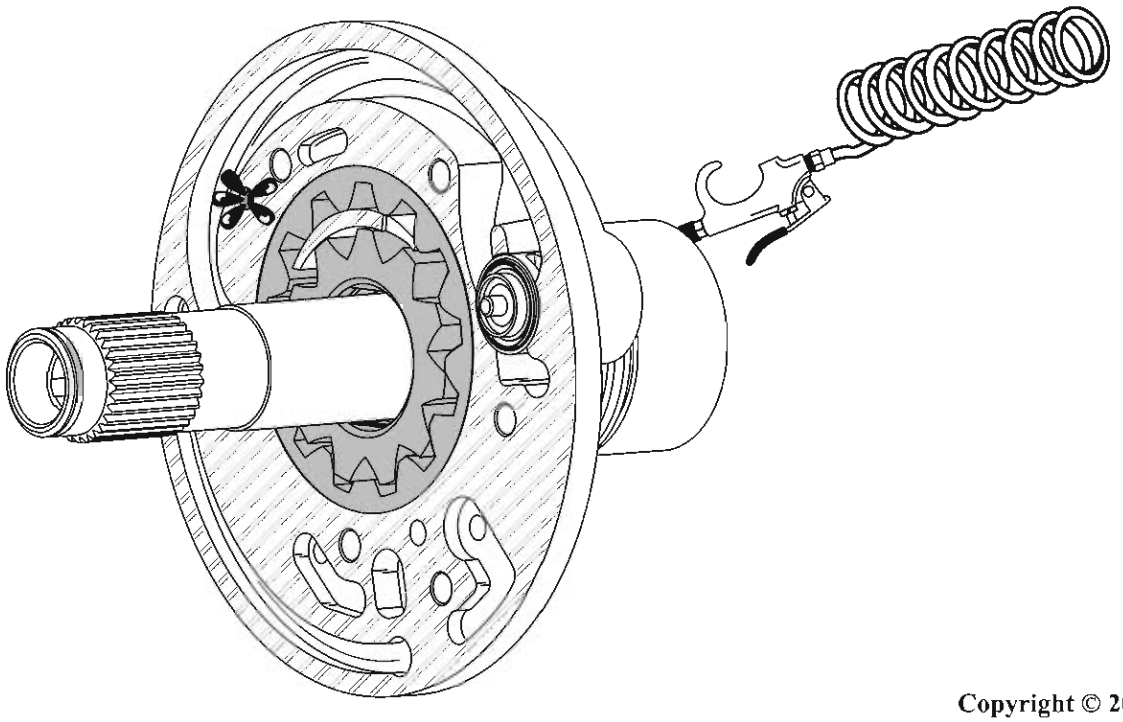


Figure 2

FORD 5R55W/S
OVERDRIVE CARRIER FAILURE

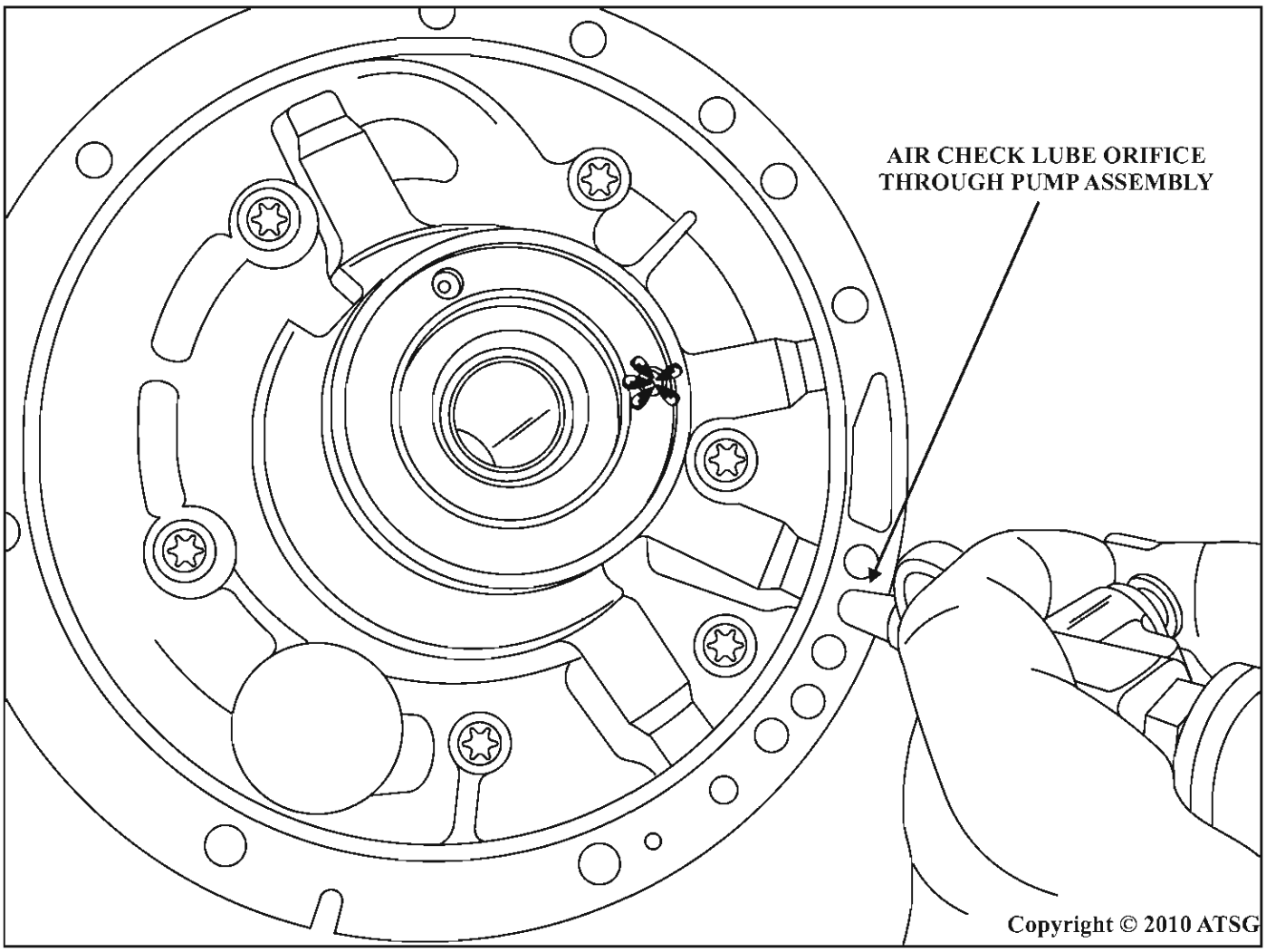


Figure 3

FORD/LINCOLN/MERCURY 6R60
PRELIMINARY INFORMATION

Beginning at the start of production for the model year 2005 for Lincoln Navigator and 2006 for Explorer and Mountaineer (4.6LV-8), and 2007 for Expedition, Ford/Lincoln/Mercury introduced a new 6 speed Rear Wheel Drive transmission designated as the 6R60, shown in Figure 1.This transmission is based on the ZF6HP26 that has been in existence since 2002, although there are numerous differences and similarities.

This Transmission features, a four element Torque Converter with Lock-up Clutch, 3 driving clutches referred to as clutch A, B and E, 2 brake clutches referred to as clutch C and D, a Lepelletier Planetary Gear Train, and a Mechatronics Module.

Mechanically, the six forward speeds and reverse are accomplished through the use of what is known as a Lepelletier planetary gear train, 3 driving clutches and 2 holding clutches as seen in the application chart displayed in Figure 2.

Electrically and hydraulically, this gear box is controlled by what is known as "The Mechatronic Module." This is a combination of a transmission control module and valve body configured as one unit. In other words, the computer for the transmission is mounted onto the valve body and is submerged in transmission fluid. As a result of this Mechatronic Module technology, the pass through case connector from the module to the vehicle harness will basically contain only power, ground and CAN Bus network wiring.

In addition to six forward speeds, there is a ***torque converter clutch*** strategy to further enhance fuel economy. The Torque Converter uses a three plate lockup clutch design which is slip- controlled in all forward gears (1 through 6).

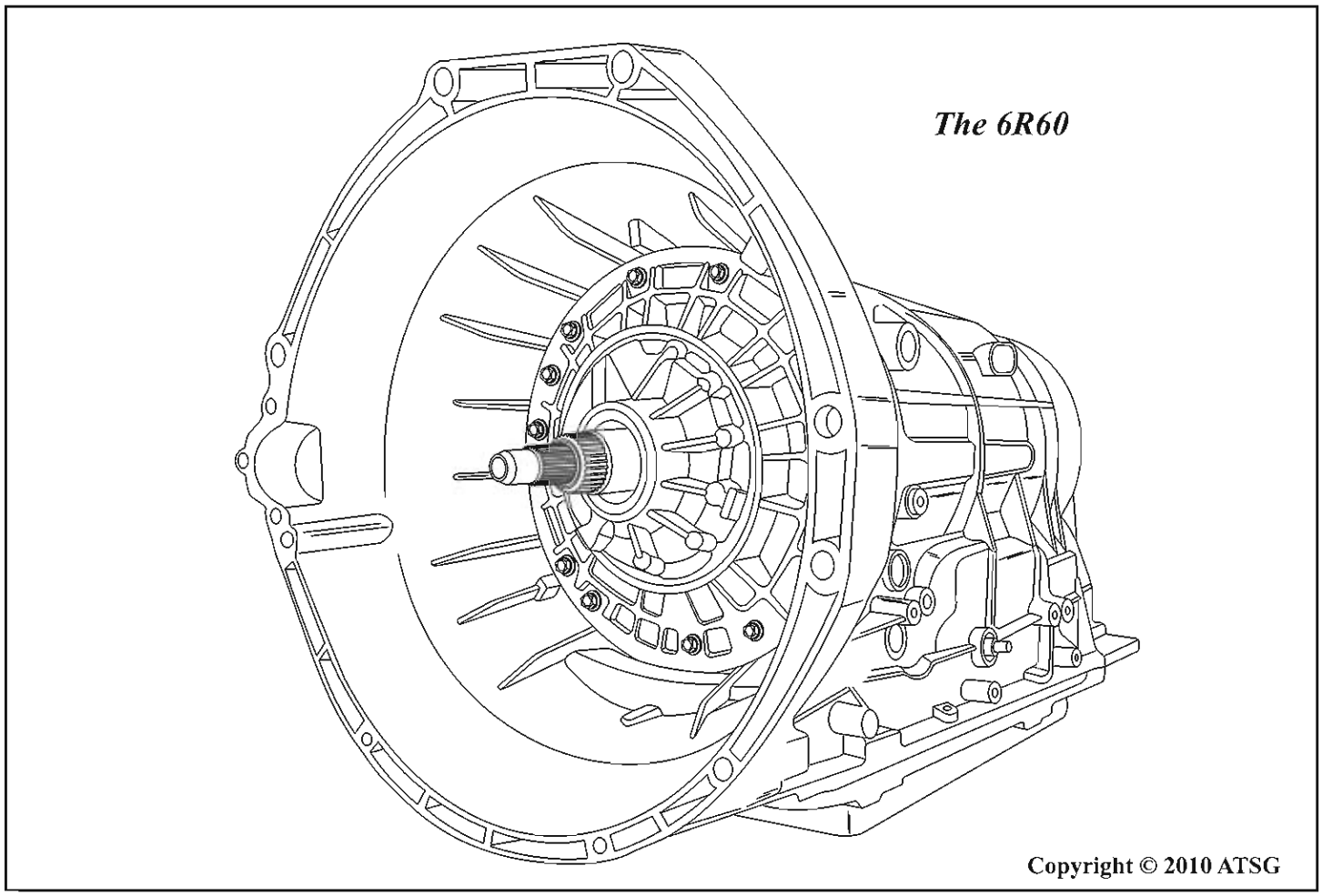
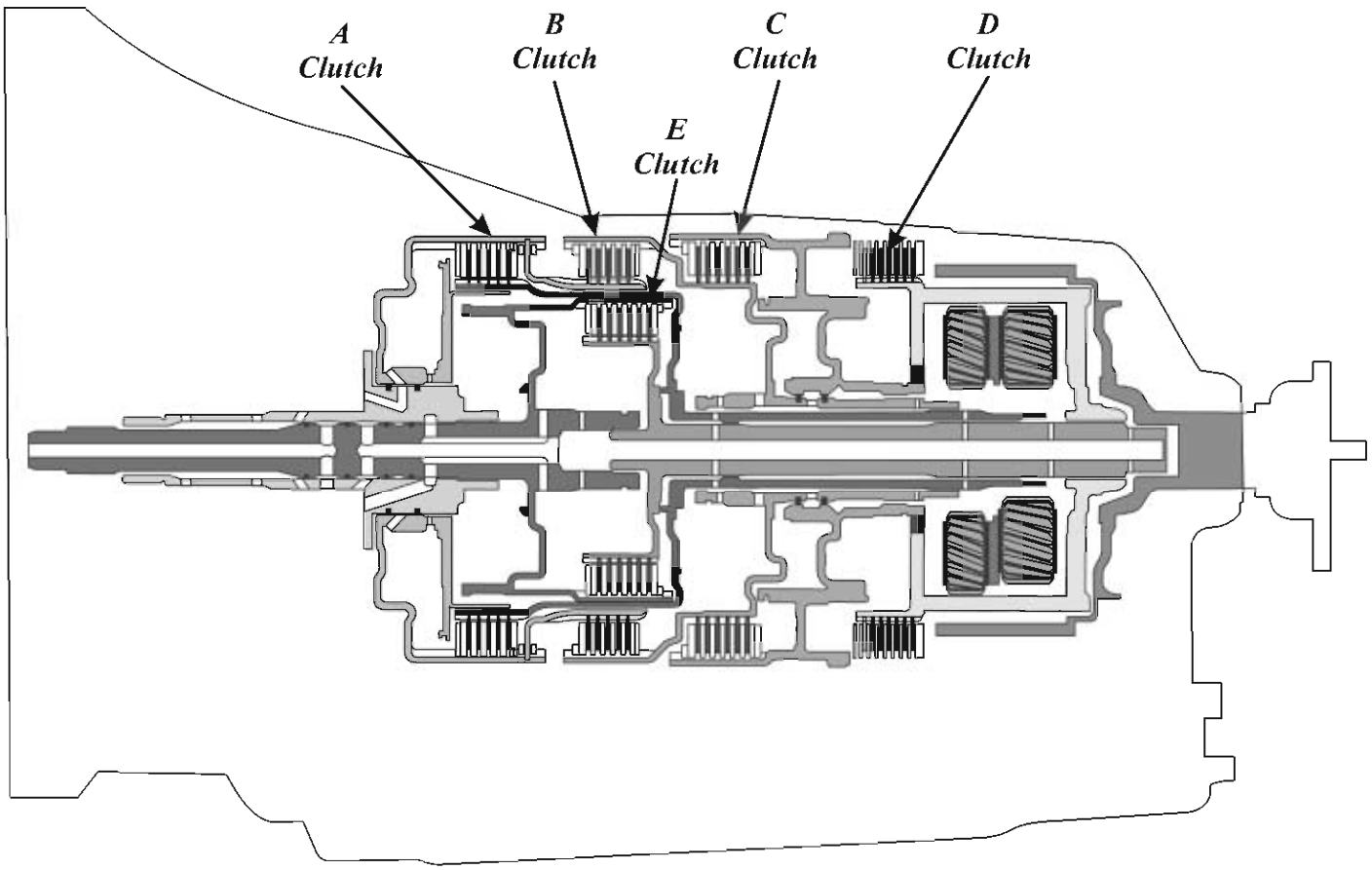


Figure I

6R60
INTERNAL COMPONENT IDENTIFICATION AND LOCATION



COMPONENT APPLICATION CHART

RANGE	A Clutch	B Clutch	E Clutch	C Clutch	D Clutch	Torq Conv Clutch	GEAR RATIO	
Park					Applied			
Reverse		Applied			Applied		3.40	
Neutral					Applied			
"D"-1st	Applied				Applied		4.17	
"D"-2nd	Applied			Applied		Applied*	2.34	
"D"-3rd	Applied	Applied				Applied*	1.52	
"D"-4th	Applied		Applied			Applied*	1.14	
"D"-5th		Applied	Applied			Applied*	0.87	
"D"-6th			Applied	Applied		Applied*	0.69	

** TCC IS AVAILABLE IN 2ND THRU 6TH GEAR, BASED ON THROTTLE POSITION, FLUID TEMP AND VEHICLE SPEED.*

Figure 2

Operational Strategy

The converter clutch will not engage until transmission fluid and engine temperature are at operating temp. Slip control is dependent upon various factors such as engine load, vehicle speed, the selected gear shift program and transmission fluid temperature.

There are three modes of TCC application. Full release, Controlled modulation and Full apply. The converter clutch will fully apply in any gear during speeds of 50 mph (80 km/h) or greater and will disengage at speeds below 12 mph (20 km/h) or at full load or kick-down conditions.

The converter clutch is designed with small channels in the lining to allow the fluid to quickly reduce temperatures after the clutch fully engages.

SHIFT QUADRANTS

P= Parking pawl engaged
R= Reverse
N= Neutral
D= 1st thru 6th gear automatic up and downshifts
3= 3rd gear hold- with coast braking
2= 2nd gear hold- with coast braking
1= 1st gear hold- with coast braking

As seen in Figure 2 of the clutch application chart, this gearbox requires only 5 clutch packs with which 6 gears and reverse are obtained. Clutch packs A, B and E are the driving clutches while Clutch packs C and D are holding or brake clutches. Since clutch packs A, B and D are rotational, there is a tendency to have centrifugal force creep the clutch on when it is not in use which could cause premature damage to the pack. As a preventive measure, a balance area is provided in each of these clutch packs in front of the piston. A slight amount of fluid pressure is supplied to this area which is used to balance centrifugal head oil behind the apply piston neutralizing its affect. This feature is referred to as "***dynamic pressure balance.***" This feature also assists in greater engagement and disengagement control of the clutch pack which ultimately improves gear shift comfort.

Operational Strategy Contd.

G M's 6L80 operates in a similar manner regarding both the clutch application and dynamic pressure balance they call the ***Compensator Feed Fluid***. One deviation is that the 6L80 uses a low sprag while the 6R60 does not use any free wheel devices. All shifting scheduling is executed with an overlap strategy. So each shift is controlled by the computer via the solenoids and regulating valves to release one clutch while applying the oncoming clutch overlapping them with various pressures and time to accommodate the amount of torque at the time of the shift.

Mechanical Components

These clutches drive and hold different parts of the planetary gear sets known as the ***Lepelletier Planetary Gear Train.*** This set up consists of a single planetary carrier and a double planetary carrier.

The single planetary (input) carrier is located behind the front pump (Figure 3). Its sun gear (#1) splines to the pump stator support holding it stationary at all times (Figure 4). The internal ring gear is being driven by the turbine (input) shaft through the E clutch drum as the drum has the internal ring gear on the back side of it (Figure 5).

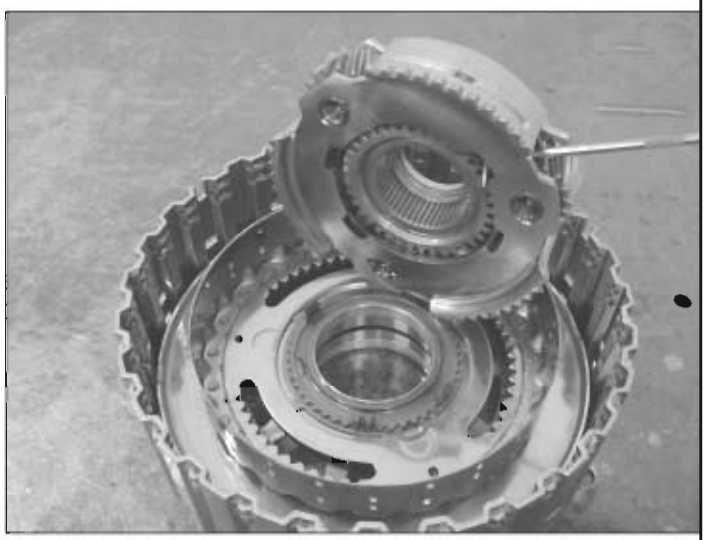


Figure 3

Mechanical Components

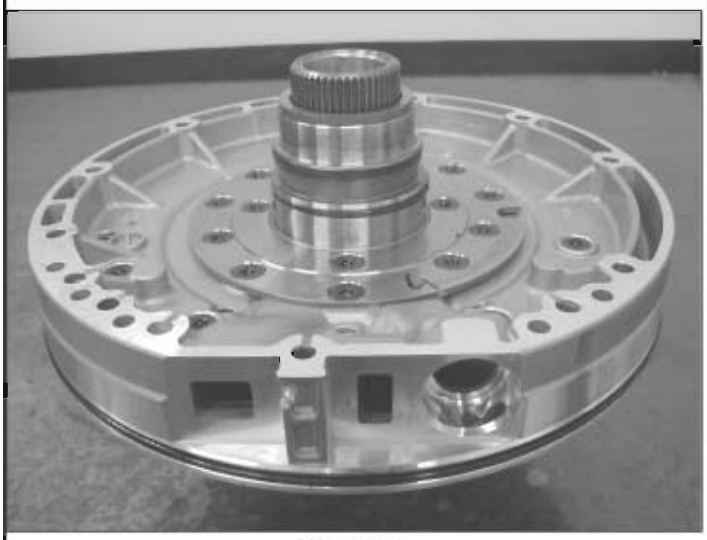


Figure 4

Figure 5

The carrier is then linked to the A clutch drum as seen in Figure 3. So the front powerflow begins with the turbine shaft being driven by the converter which drives the internal ring gear that is integral to the turbine shaft. The internal ring gear then drives the pinions around the stationary sun gear causing the carrier to drive the A clutch drum in a reduction. When the A clutch applies, it will then drive a rear sun gear (#3) in the rear planetary in that reductive rotation. When the B clutch applies, it locks onto the A clutch drum which then drives a front (or middle #2) sun gear in the rear planetary in the same reductive speed.

Mechanical Components Contd.

The double planetary (output) carrier is located in the back of the transmission where its' internal ring gear drives the output shaft (Figure 6). The rear sun gear (#3) in this double planetary assembly is driven by the A clutch and meshes with three short pinions. The front sun gear (#2) which meshes with three long pinions in this double planetary assembly is driven by the B clutch (Figure 7) while the C clutch is used to hold the # 2 sun gear stationary.

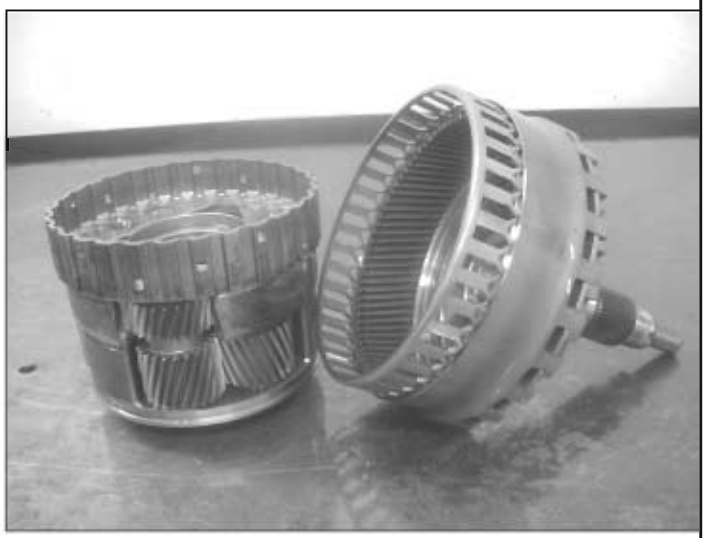


Figure 6

The E clutch drum drives the carrier assembly (Figure 7) while the D clutch is used to hold it stationary.

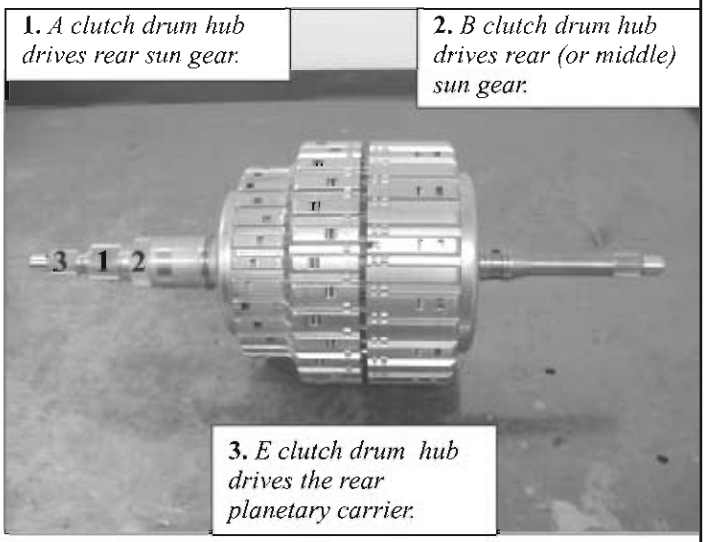


Figure 7

Planetary Powerflow

Powerflow in first gear: The A clutch is applied and is driven in a reduction through the front planetary assembly via the turbine shaft. The A clutch in turn inputs torque to the small rear (#3) sun gear. The D clutch is also applied holding the double planetary output carrier stationary. This causes the small rear (#3) sun gear to drive the short pinions, the short pinions drive the long pinions and the long pinions drive the internal ring gear and output shaft in an approximate reduction ratio of 4.17:1 (Figure 8).

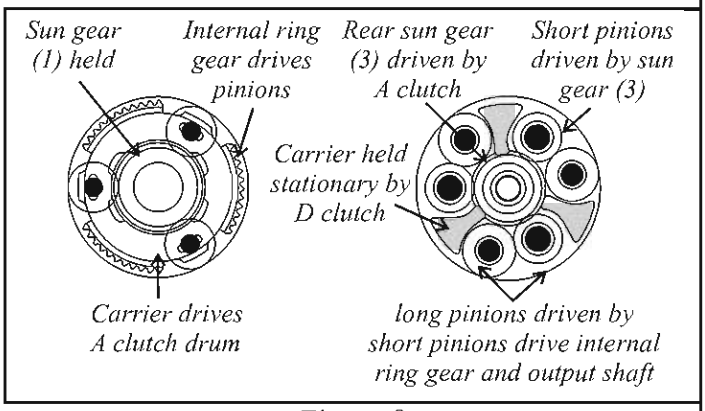


Figure 8

Powerflow in 2nd gear: With the A clutch still applied, the turbine shaft is driving the A clutch drum in a reduction. The A clutch drum continues to drive the small rear (#3) sun gear in the double planetary output carrier. The D clutch is released and the C clutch is applied which holds the larger front (#2) sun gear in the double planetary output carrier stationary. The reaction of the short pinions being driven by the A clutch and the long pinions being forced to walk around the stationary sun gear, causes the internal ring gear and output shaft to rotate in an approximate reduction ratio of 2.34:1 (Figure 9).

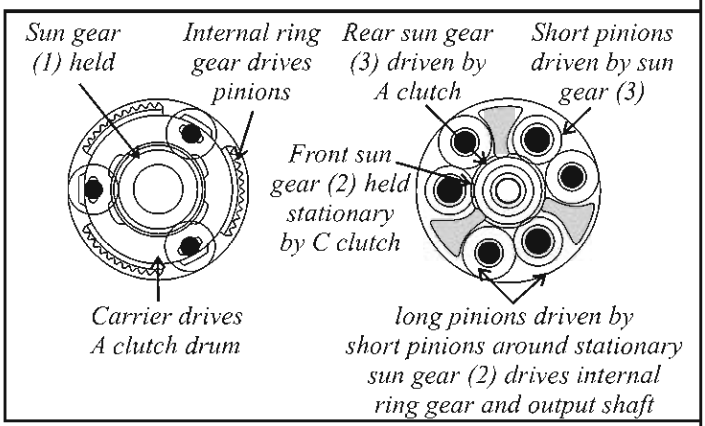


Figure 9

Powerflow in 3rd gear: Once again the A clutch is applied as it is in 1st and 2nd. The C clutch is released and the B clutch is applied. This now drives both sun gears in the same direction and at the same speed inside the double planetary output carrier. This causes the pinons, the carrier and internal ring gear to rotate as 1 complete assembly driving the output shaft in an approximate reduction ratio of 1.52:1 (Figure 10).

The reason for the overall ratio continuing to be in a reduction rather than a 1:1 ratio is that both the A and B clutch drums are rotating in a reduction when compared to turbine shaft speed. *(See explanation on the previous page under the single planetary (input) carrier heading on page 4).*

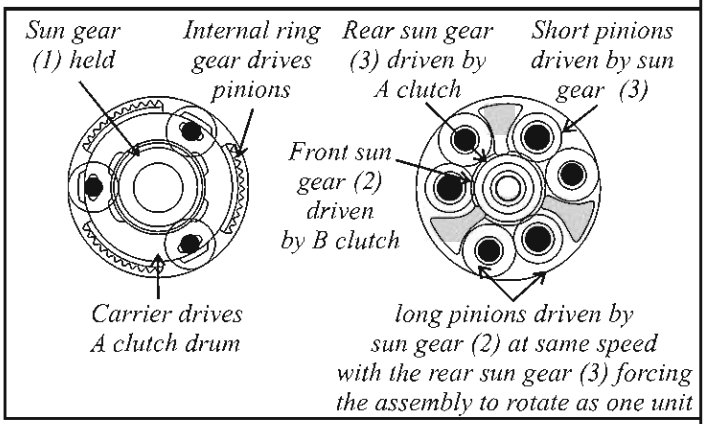


Figure 10

Planetary Powerflow Contd.

Powerflow in 4th gear: The A clutch still applied drives the small rear (#3) sun gear. The B clutch is released and the E clutch applies driving the double planetary output carrier at turbine shaft speed. The action of the carrier forcing the pinions to rotate around a reductive spinning sun gear causes the internal ring gear and output shaft to rotate in an approximate reduction ratio of 1.14:1 (Figure 11).

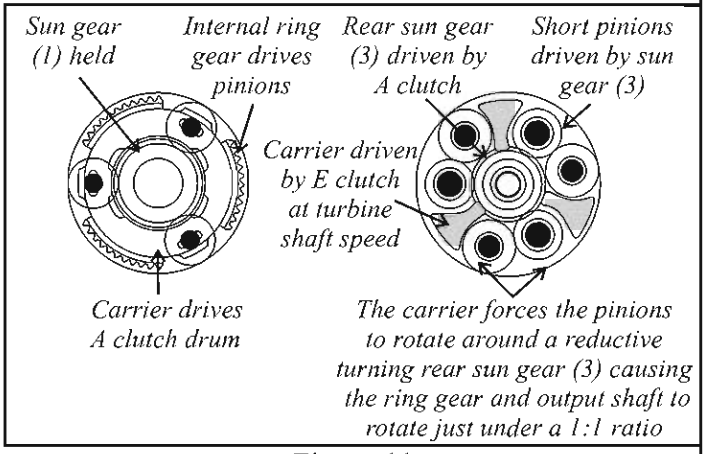


Figure 11

Powerflow in 5th gear: The A clutch is released and the B clutch is applied which drives the larger front (#2) sun gear in the double planetary output carrier. The E clutch is still applied driving the double planetary output carrier at turbine shaft speed. The reaction of the long pinions being forced to rotate around a reductive spinning sun gear (#2) causes the internal ring gear and output shaft to rotate in an approximate overdrive ratio of 0.87:1 (Figure 12).

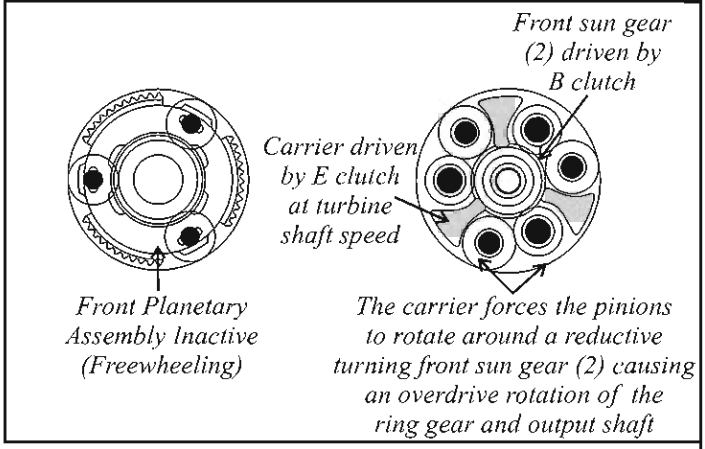


Figure 12

Powerflow in 6th gear: The B clutch is released while the E clutch is still applied driving the double planetary output carrier at turbine shaft speed. The C clutch applies which now holds the larger (#2) sun gear in the double planetary output carrier. The reaction of the double planetary output carrier spinning at turbine shaft speed forcing the long pinions to rotate around a stationary larger (# 2) sun gear, causes the rear internal ring gear and output shaft to rotate in an approximate overdrive ratio of 0.69:1 (Figure 13).

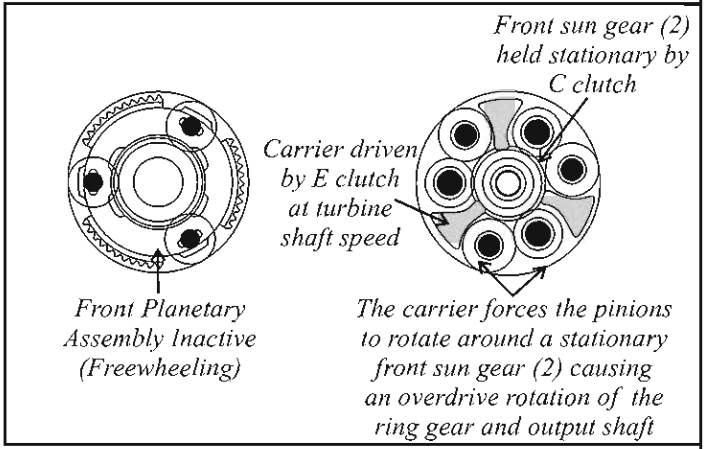


Figure 13

Planetary Powerflow Contd.

Powerflow in reverse: The B clutch is applied driving the larger front (#2) sun gear in the double planetary output carrier. The D clutch is also applied which holds the double planetary output carrier. This causes the sun gear to drive the long pinions in an opposite rotation of the turbine shaft. The long pinions then drives the internal ring gear and output shaft in a reverse reduction ratio of approximately 3.40:1 (Figure 14).

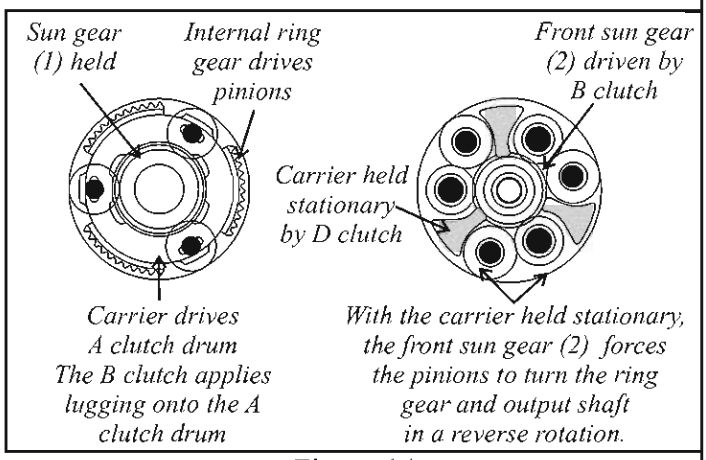
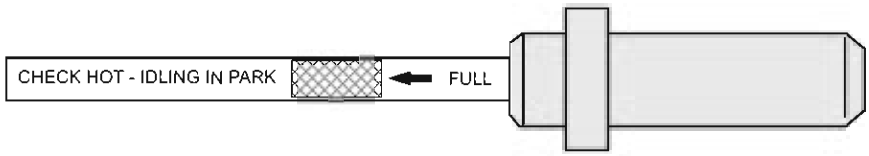


Figure 14

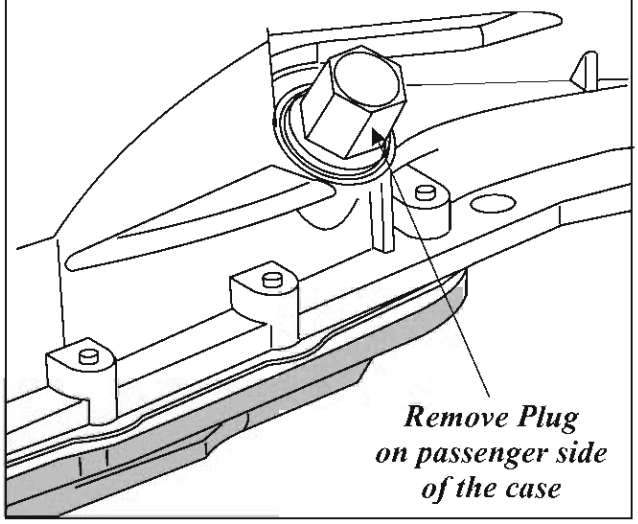
FLUID CHECK AND CAPACITY



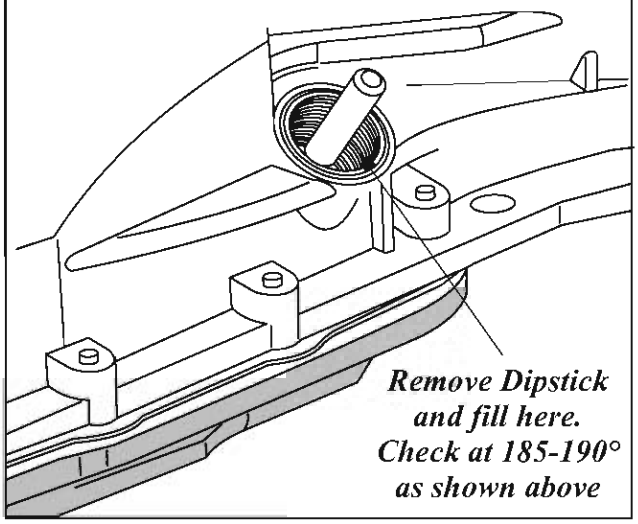
CHECK AT185-190°

USE MERCON SP ONLY

FLUID FILL PLUG



DIPSTICK



DRY FILL IS APPROXIMATELY 11.2 QUARTS
FLUID CHANGE IS APPROXIMATELY 3.5 QUARTS

Figure 15

Mechatronic Module and Solenoid I.D..

The ***Mechatronic Module*** is located in the oil sump on top of the Valve Body. The electronic module is completely sealed and oil tight, and is designed to withstand temperatures up to 284°F (140° C). It manages the complete electronic control of the transmission and is considered to be an integral part of the valve body making it not replaceable separately. Refer to Figure 18 for a connector view and pin-out of the Mechatronic Module.

The electronic control module contains a Micro-Position Switch which monitors the position of the Manual Valve via the Transmission Range Sensor. It also contains the Turbine and Output Speed Sensors, the Temperature Sensor and the Transmission Control Module (Figure 16).

The valve body contains all the valves, springs, dampers and solenoids. The 6R60 has 6 Variable Force Solenoids and 1 On/Off solenoid (Figure 17).

The SSE (SS1) solenoid is identified by a ***white*** cap and contains an inlet, outlet and exhaust port. When the solenoid is energized, the inlet is open to the outlet port and the exhaust is blocked. When the solenoid turns off, the inlet is blocked and the outlet is opened to exhaust (Figure 19).

The Variable Force Solenoids convert electrical current into a proportional hydraulic pressure. They are designed in two different ways:

SSA, SSC and the TCC (VFS 1, 3 and 6) are designed using a rising curve. In other words, at 0 mA it produces an output pressure of 0 psi (0 bars). At 850 mA output pressure rises as high as 67 psi (4.6 bar). See Figure 20.

At 68°F (20°C) they measure approximately 5 ohms. They are supplied with system voltage and are ground side controlled.

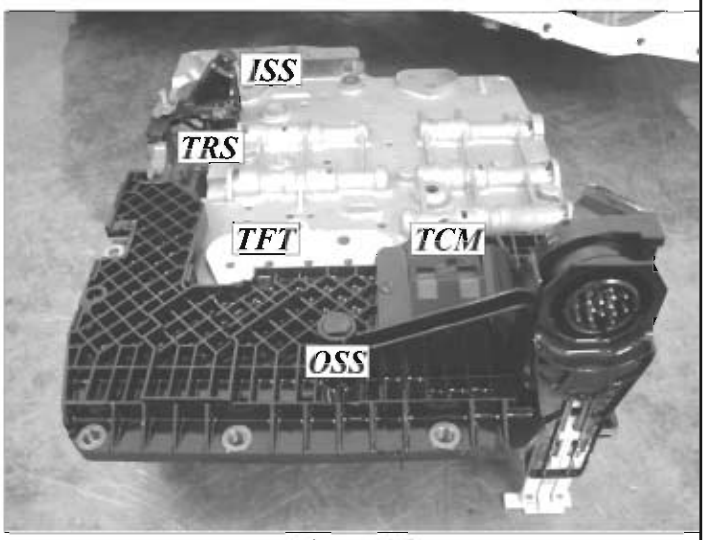


Figure 16

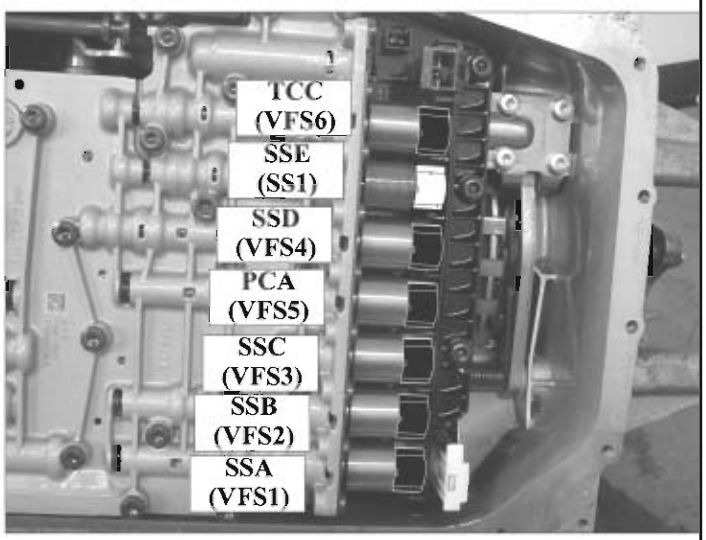
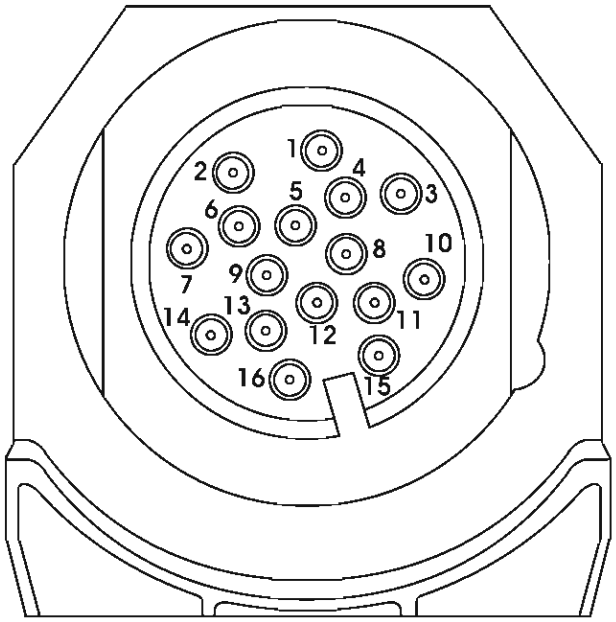


Figure 17

EDS solenoids 2, 4 and 5 are identified by a ***blue*** cap and are designed using a falling curve. In other words, at 0 mA it produces an output pressure of 67 psi (4.6 bars). At 850 mA output pressure rises as low as 0 psi (0 bars). See Figure 21.

At 68°F (20°C) they measure approximately 5 ohms. They are supplied with system voltage and are ground side controlled.

CASE CONNECTOR TERMINAL FUNCTION



PIN #	FUNCTION	NOTES
1	NOT IN USE	
2	CAN L	CAN LOW
3	NOT IN USE	
4	NOT IN USE	
5	NOT IN USE	
6	CAN H	CAN HIGH
7	NOT IN USE	
8	NOT IN USE	
9	TCM TERMINAL 15	IGNITION SWITCH
10	TERMINAL 19	P ARK NEUTRAL SIGNAL-PN
11	NOT IN USE	
12	NOT IN USE	
13	TCM TERMINAL 31	GROUND
14	TCM TERMINAL 30	PERMANENT POSITIVE (BATTERY VOLTAGE)
15	INTERLOCK	
16	TCM TERMINAL31	GROUND

Figure 18

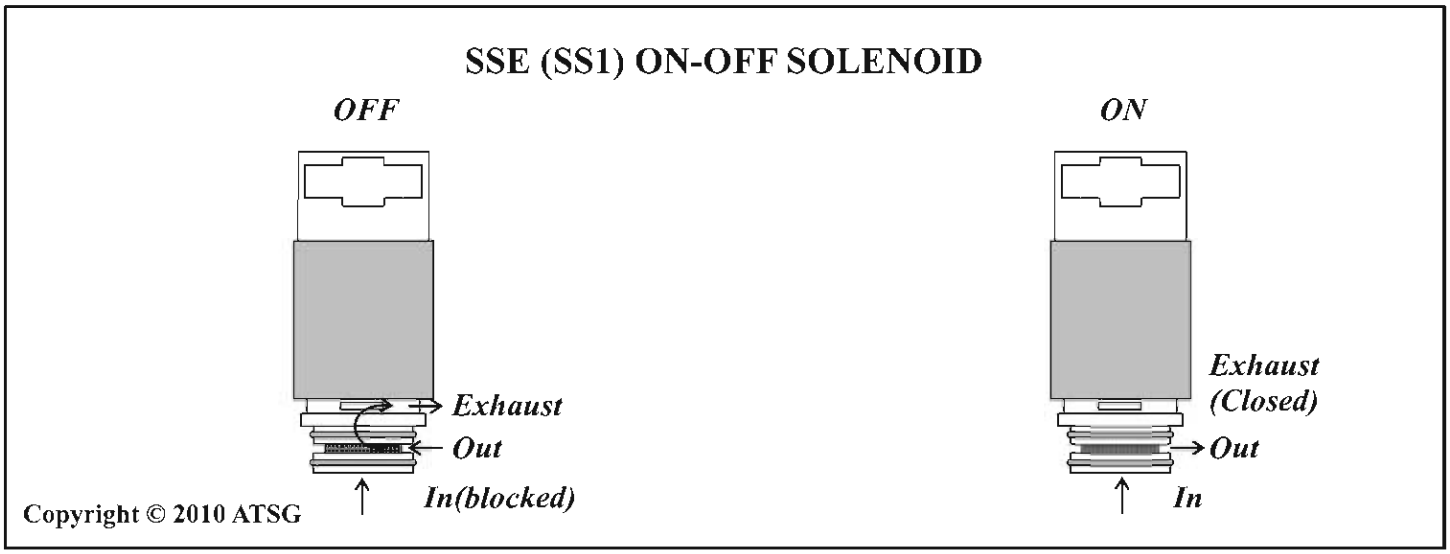


Figure 19

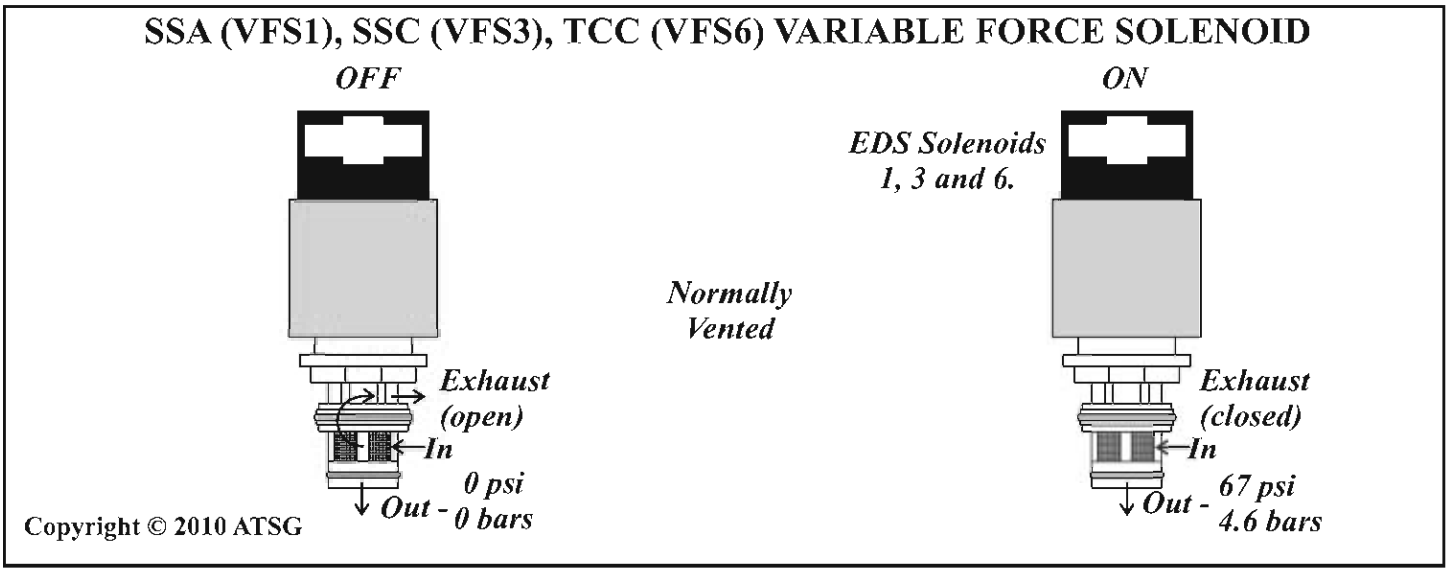


Figure 20

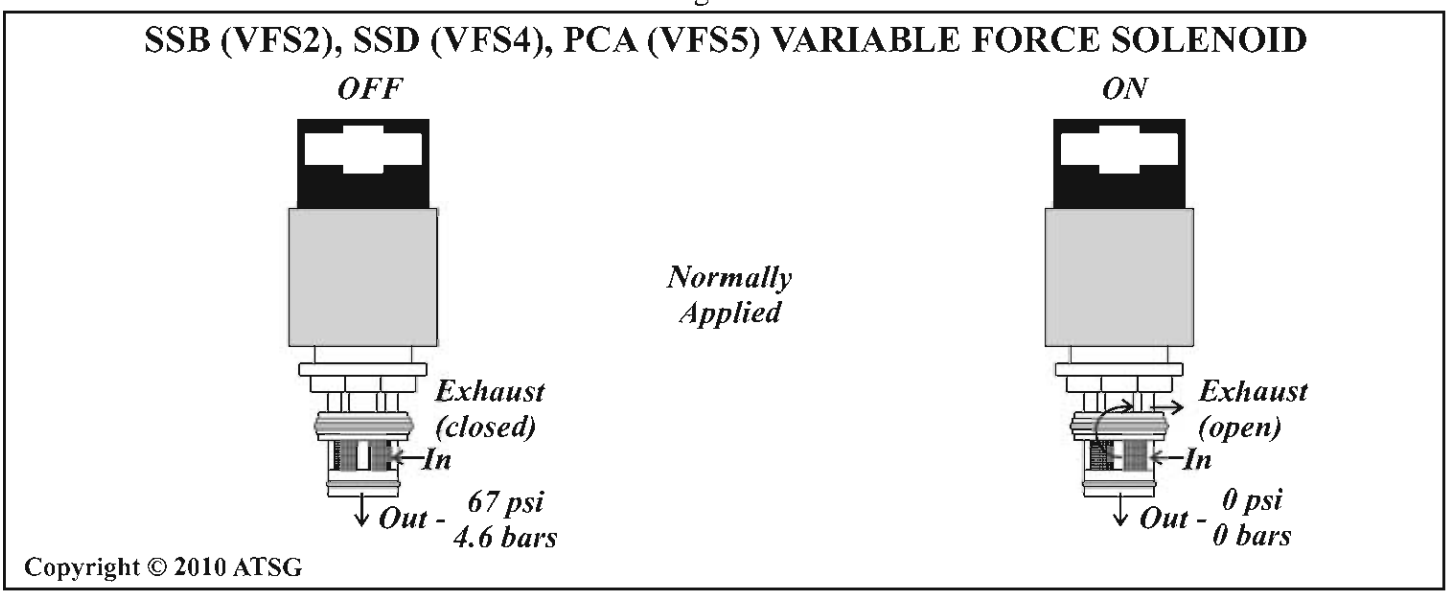


Figure 21

SOLENOID APPLICATION CHART

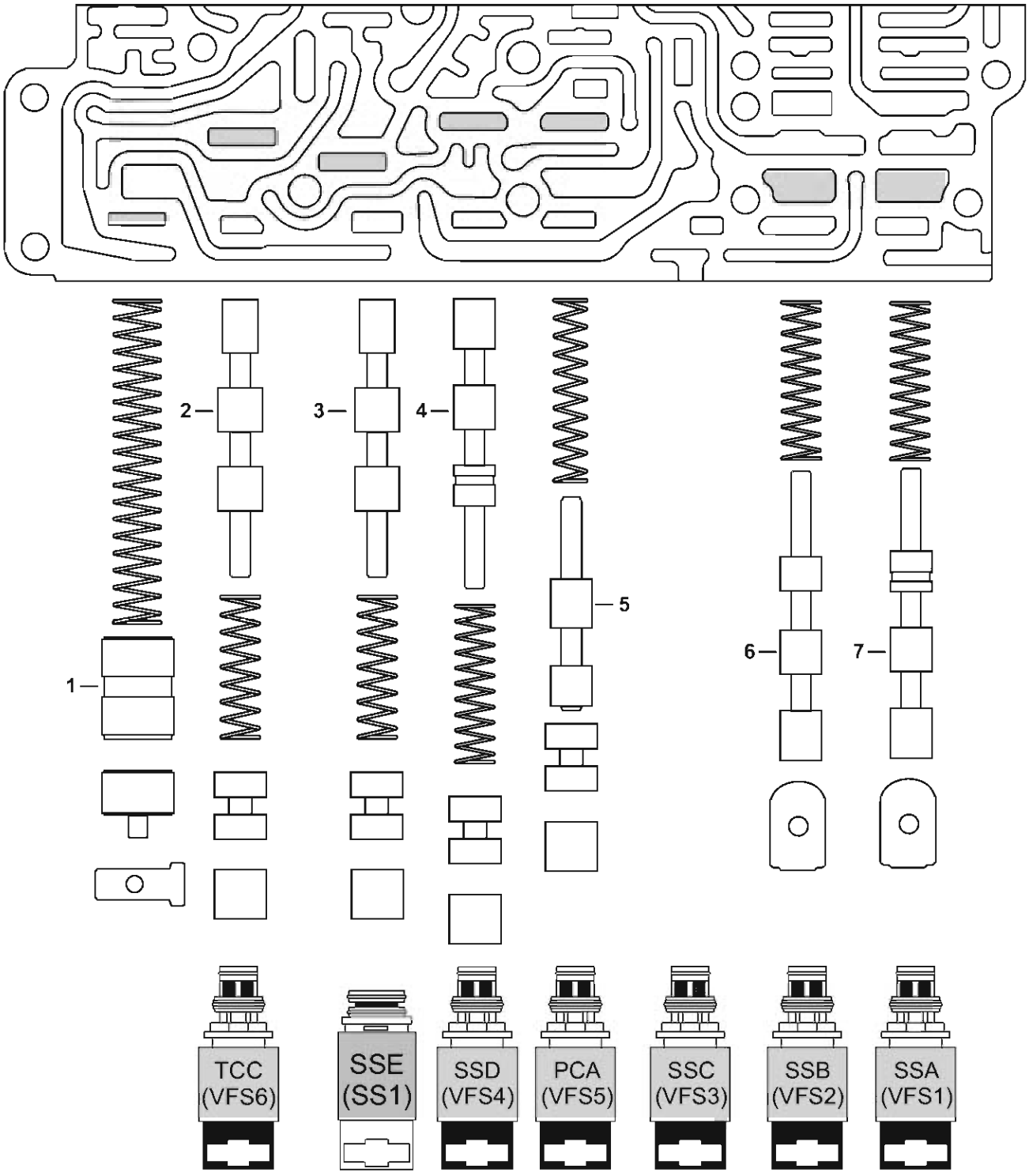
RANGE	SSE (SS1)	SSA (VFS1)	SSB (VFS2)	SSC (VFS3)	SSD (VFS4)	PCA (VFS5)	TCC (VFS6)
Park					X	X*	
Reverse						X*	
Neutral					X	X*	
D 1st gear		X	X			X*	X*
D 2nd gear		X	X	X	X	X*	X*
D 3rd gear		X			X	X*	X*
D 4th gear	ON	X	X			X*	X*
D 5th gear	ON					X*	X*
D 6th gear	ON		X	X		X*	X*

X = Solenoid at high duty cycle approximately 850 mA
No "X"= Solenoid at low duty cycle is approximately 50mA

X* = Modulated by the TCM based on engine load and driving conditions

Figure 22

6R60 LOWER VALVE BODY

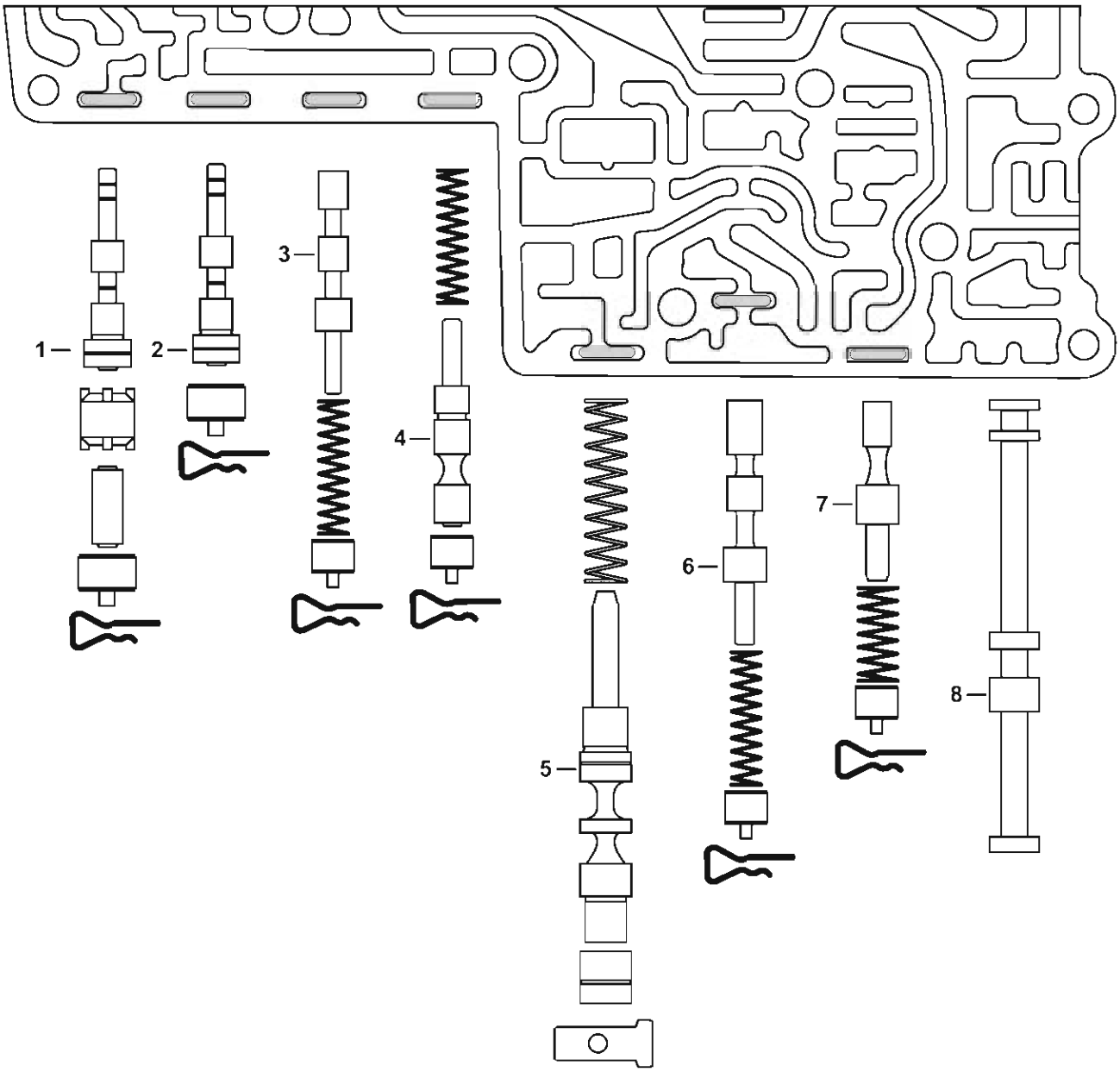


1. SSE Solenoid Damper
2. Solenoid Multiplex
3. Drive Enable
4. Clutch D1 Latch
5. Solenoid Pressure Regulator Valve
6. Clutch B Latch
7. Clutch A Latch

* Shaded area in the valve body indicate retainer location

Figure 23

6R60 LOWER VALVE BODY

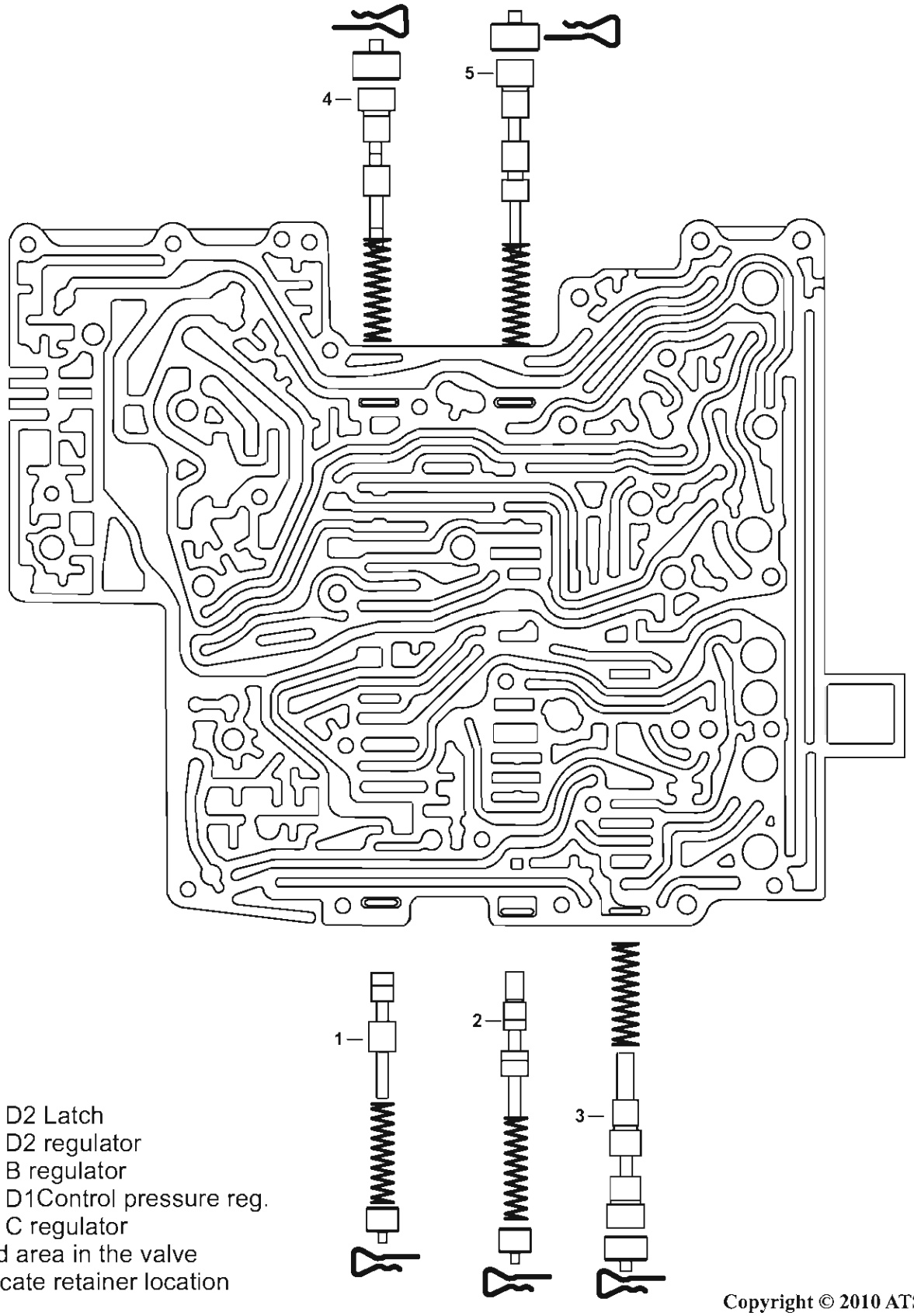


1. Clutch A Control Pressure Reg.
2. Clutch E Control Pressure Reg.
3. Clutch E Latch
4. Bypass Clutch Control Regulator Valve
5. Main Pressure Regulator Valve
6. Torque Converter Release Regulator Valve
7. Lubrication/Cooler Control Valve
8. Manual Valve

* Shaded area in the valve body indicate retainer location

Figure 24

6R60 UPPER (CHANNEL PLATE) VALVE BODY



1. Clutch D2 Latch
2. Clutch D2 regulator
3. Clutch B regulator
4. Clutch D1Control pressure reg.
5. Clutch C regulator

* Shaded area in the valve body indicate retainer location

Figure 25

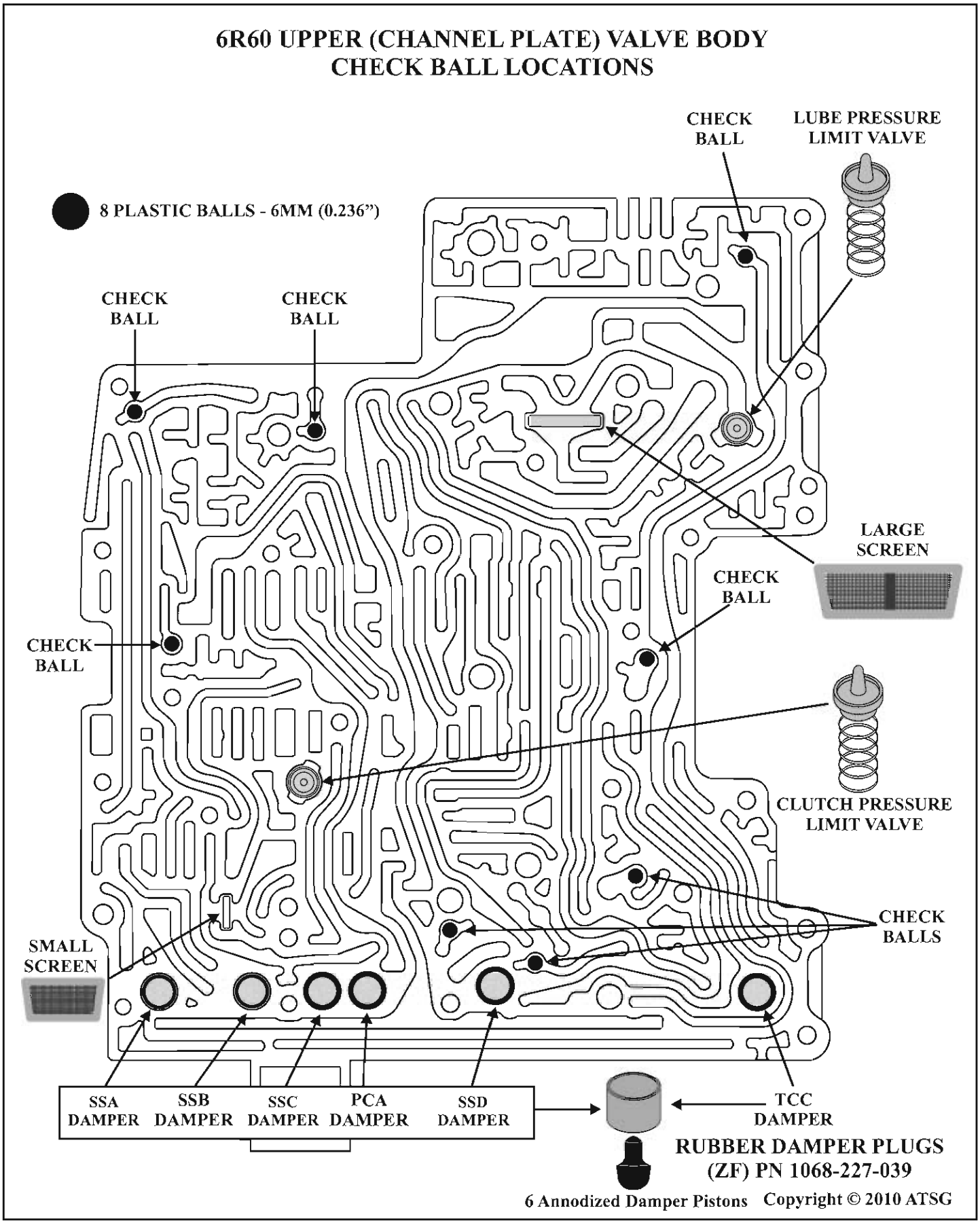

6R60 UPPER (CHANNEL PLATE) VALVE BODY
CHECK BALL LOCATIONS
CHECK BALL
LUBE PRESSURE LIMIT VALVE
8 PLASTIC BALLS - 6MM (0.236")
CHECK BALL
CHECK BALL
LARGE SCREEN
CHECK BALL
CHECK BALL
CLUTCH PRESSURE LIMIT VALVE
CHECK BALLS
SMALL SCREEN
SSA DAMPER
SSB DAMPER
SSC DAMPER
PCA DAMPER
SSD DAMPER
TCC DAMPER
RUBBER DAMPER PLUGS
(ZF) PN 1068-227-039
6 Annodized Damper Pistons
Copyright © 2010 ATSG

Figure 26

6R60 AIR CHECK AND CASE PASSAGE IDENTIFICATION

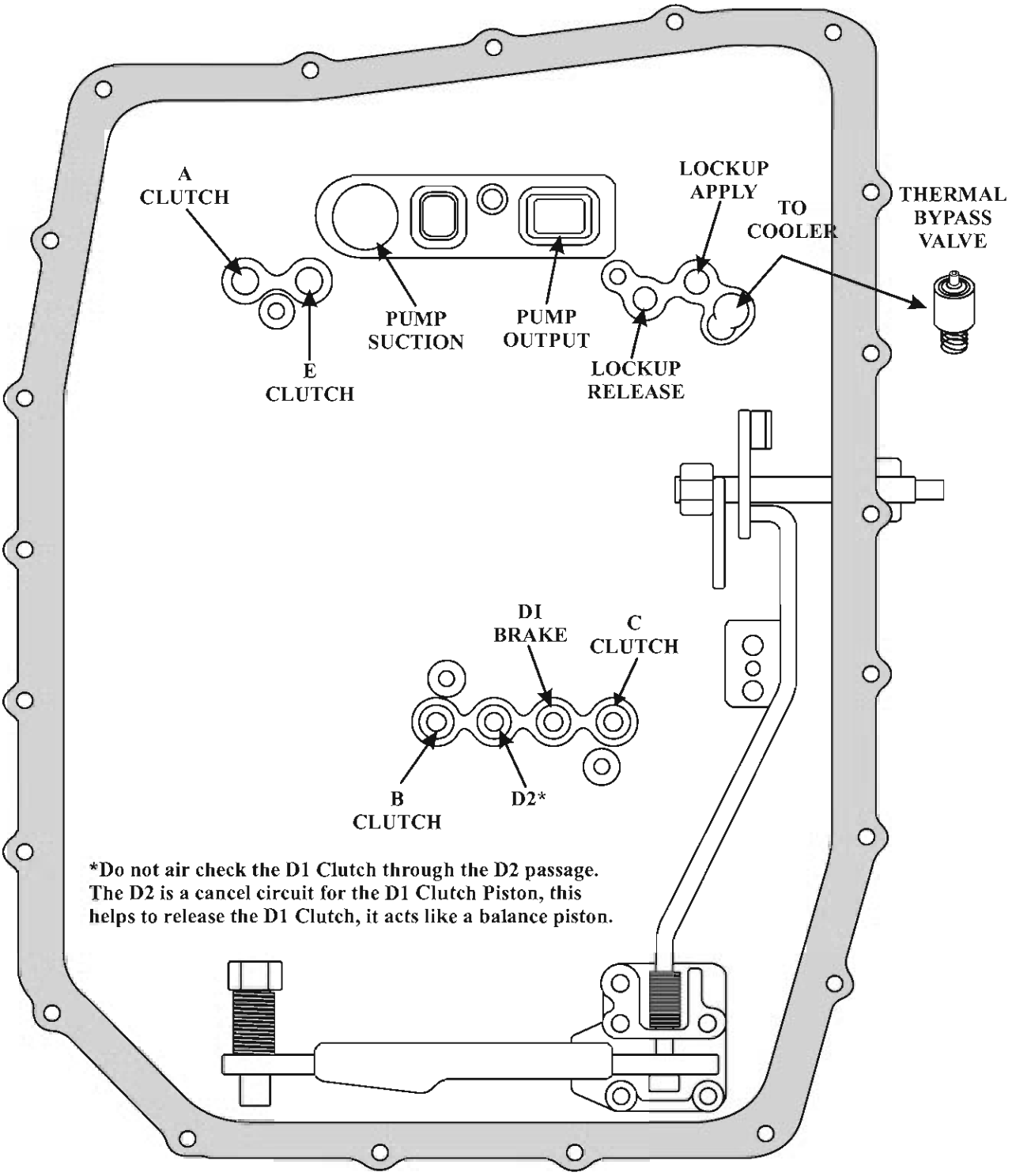


Figure 27

DTC	DTC DESCRIPTION	COMMENTS
P0218	Transmission Fluid Temperature "Overtemp"	Fluid overheat- agressive lock-up schedule
P0562	Battery- System Voltage Low (Below 9 volts)	May cause Limp mode 3rd or 5th gear
P0563	Battery- System Voltage High (Above 16 volts)	May cause Limp mode 3rd or 5th gear
P0605	TCM Read Only Memory corrupted	Reflash or replace Mechatronic unit (Limp mode)
P0613	TCM Internal Processor fault (software fault)	Reflash or replace Mechatronic unit (Limp mode)
P0634	TCM Module temperature too high	Verify Trans temp. Replace Mechatronic unit
P0641	TCM Module sensor voltage failed	Verify System voltage. Replace Mechatronic unit
P0657	Actuator Supply Voltage A open	Replace Mechatronic unit
P0658	Actuator Supply Voltage A low (short to ground)	Replace Mechatronic unit
P0659	Actuator Supply Voltage A high (short to power before ignition ON)	Replace Mechatronic unit
P0667	PCM,ECM,TCM internal temp range operation	
P0701	TCM control system range operation	May be caused by multiple DTC's- clear and see if it resets the code
P0705	Transmission Range Sensor	TCM has detected a TR signal that is out of Normal range. (Part of Mecatronic unit)
P0711	Transmission Fluid Temp Sensor	TCM has detected no change in the TFT during operation. (Part of Mecatronic unit)
P0712	Transmission Fluid Temp Sensor grounded	Part of Mecatronic unit
P0713	Transmission Fluid Temp Sensor (short to power)	Part of Mecatronic unit
P0714	Transmission Fluid Temp Sensor intermittent fault	Part of Mecatronic unit
P0715	Turbine Shaft Speed Sensor (short to power)	Part of Mecatronic unit
P0716	Turbine Shaft Speed Sensor (insufficient input)	Part of Mecatronic unit may be caused by material build up on the sensor
P0717	Turbine Shaft Speed Sensor (no input when OSS is operating)	Part of Mecatronic unit may be caused by material build up on the sensor
P0720	Output Shaft Speed Sensor (short to power)	Part of Mecatronic unit
P0721	Output Shaft Speed Sensor (insufficient Output)	Part of Mecatronic unit may be caused by material build up on the sensor
P0722	Output Shaft Speed Sensor (no Output when TSS is operating)	Part of Mecatronic unit may be caused by material build up on the sensor
P0723	Output Shaft Speed Sensor (intermittent signal)	Part of Mecatronic unit may be caused by material build up on the sensor
P0729	Sixth Gear ratio Error	Mechanical Fault
P0731	First Gear ratio Error	Mechanical Fault
P0781	1-2 or 2-1 Shift ratio Error	Mechanical Fault
P0782	2-3 or 3-2 Shift ratio Error	Mechanical Fault
P0783	3-4 or 4-3 Shift ratio Error	Mechanical Fault
P0784	4-5 or 5-4 Shift ratio Error	Mechanical Fault
P0732	Second Gear ratio Error	Mechanical Fault
P0733	Third Gear ratio Error	Mechanical Fault
P0734	Fourth Gear ratio Error	Mechanical Fault
P0735	Fifth Gear ratio Error	Mechanical Fault
P0736	Reverse Gear ratio Error	Mechanical Fault

Figure 28

DTC	DTC DESCRIPTION	COMMENTS
P0829	5-6 or 6-5 Shift ratio Error	Mechanical Fault
P0960	PCA (Variable Force Solenoid 5) failed or open ckt.	Check resistance and replace as necessary
P0962	PCA (Variable Force Solenoid 5) signal or ground open circuit.	Check resistance and replace as necessary
P0963	PCA (Variable Force Solenoid 5) short to power.	Check resistance and replace as necessary
P0972	SSA (VFS1) circuit shorted to ground or open	Check resistance and replace as necessary
P0973	SSA (VFS1) circuit shorted to ground or open (may he out of tolerance).	Check resistance and replace as necessary
P0974	SSA (VFS1) circuit shorted to power or open (may be out of tolerance).	Check resistance and replace as necessary
P0975	SSB (VFS2) circuit shorted to ground or open	Cbeck resistance and replace as necessary
P0976	SSB (VFS2) circuit shorted to ground or open (may be out of tolerance).	Check resistance and replace as necessary
P0977	SSB (VFS2) circuit shorted to power or open (may be out of tolerance).	Check resistance and replace as necessary
P0978	SSC (VFS3) circuit shorted to ground or open	Check resistance and replace as necessary
P0979	SSC (VFS3) circuit shorted to ground or open (may be out of tolerance).	Check resistance and replace as necessary
P0980	SSC (VFS3) circuit shorted to power or open (may be out of tolerance).	Cbeck resistance and replace as necessary
P0981	SSD (VFS4) circuit shorted to ground or open	Check resistance and replace as necessary
P0982	SSD (VFS4) circuit shorted to ground or open (may be out of tolerance).	Check resistance and replace as necessary
P0983	SSD (VFS4) circuit shorted to power or open (may be out of tolerance).	Check resistance and replace as necessary
P0770	SSE (SSI) circuit or solenoid failure	Check resistance and replace as necessary
P0985	SSE (SS1)circuit shorted to ground or open (may be out of tolerance).	Check resistance and replace as necessary
P0986	SSE (SS1)circuit shorted to power or open (may be out of tolerance).	Check resistance and replace as necessary
P1707	P/N switch circuit fault (no engine crank)	Part of Mecatronic unit
P1910	Reverse lamp circuit fault	Reverse solenoid ckt./ Lamps may be on at all times
P1911	Reverse lamp circuit fault (short to ground)	Reverse circuit or sensor fault
P1912	Reverse lamp circuit fault (short to power)	Reverse circuit or sensor fault
P0740	TCC (VFS6) circuit open	Check resistance and replace as necessary
P2763	TCC (VFS6) circuit fault (shorted to power)	Check resistance and replace as necessary
P2764	TCC (VFS6) circuit fault (shorted to ground)	Cbeck resistance and replace as necessary
P0741	TCC slip or TCC solenoid stuck open	Mechanical fault- Torque Converter mechanical slip
P0155	Control Area Network fault TCM and IP	Communication error
U0073	Control Area Network short from high to low	Communication error
U0100	Control Area Network between TCM and ECM	Communication error
U0121	CAN PCM/TCM error from ABS wheel speed.	Communication error
P062F	TCM EPROM error	TCM detects internal software concern with KAM

Figure 29

FORD MOTOR COMPANY

6R60 DOWNSHIFT BUMP WHILE BRAKING TO A STOP
4.6L ENGINE

COMPLAINT: Some Ford Motor Company vehicles 2006-2008 Explorer 4 door, Mountaineer, and the 2007-2008 Explorer Sport Trac vehicles equipped with 4.6L engine with the 6R60 Transmision and built before November 28 2007 may exhibit a downshift bump at approximately 10 MPH-16 Km/h, either coasting or under braking. Some 2006 Explorer, Mountaineer, and 2007 Explorer Sport Trac vehicles built prior to May 4 2006 may also exhibit symptoms of (1) delayed engagements into Drive from Park, Neutral, or Reverse. (2) There may be a hesitation upon tip in throttle after braking to a stop.

CAUSE: One cause for this symptom may be that there is a need to update the PCM/TCM Software Calibrations.

CORRECTION: There are updates available for the PCM/TCM Software from a Ford Dealer as per Ford Technical Service Bulletin **08-4-16**.
After the Software Revisions have been completed, and the TCM keep alive memory and adaptive tables have been reset, the vehicle will have to be driven to perform the Adaptive Shift Strategy Re-Learn. (See Figure 1)

1. Verify that Transmission Fluid Temperature is at 175 degress F-80 Degrees Celsius before proceeding.
2. Accelerate from a stop at light throttle to 15 MPH-24 Km/h, and remove foot from accelerator pedal.
3. Brake gently and come to a complete stop and remain stopped for at least 6 seconds.
4. Repeat steps 2-3 five times.
5. Accelerate from a stop at light throttle. The 1-2, 2-3, and 3-4 shifts must occur with engine speed in between 1300-1800 RPM.
6. Continue to accelerate gently to 50 MPH-80Km/h, or until the 5-6 upshift occurs.
7. Brake gently to a complete stop, and remain stopped for at least 10 seconds.
8. Repeat steps 5-7 a total of 3 times.

Figure 1

FORD 5R110W
REPEATED COAST CLUTCH HOUSING BREAKING

COMPLAINT: Ford vehicles equipped with the 5R110W transmission may exhibit a complaint of repeat Coast Clutch Housing breaking around the weld in the back of the drum. (See Figure 1).

CAUSE: The cause may be that the weld in the drum is not strong enough for the type of use the vehicle is under, or the pressure regulator valve is hung up causing low pressure, when pressure finally builds high enough for engagement it could be explained like a "neutral drop" which could snap the sun-gear section of the drum away from the stamped steel section of the drum.

CORRECTION: To correct this condition, refer to Figure 2 for an exploded view of the Coast Clutch Housing. Refer to Figure 3 and re-enforce the weld in the area shown. ***Note: A new drum may come back with the same issue, as this weld area has not changed.*** Also while the trans is out re-check the pressure regulator valve to make sure that it is not hanging, as shown in Figure 4.

BROKEN COAST CLUTCH HOUSING

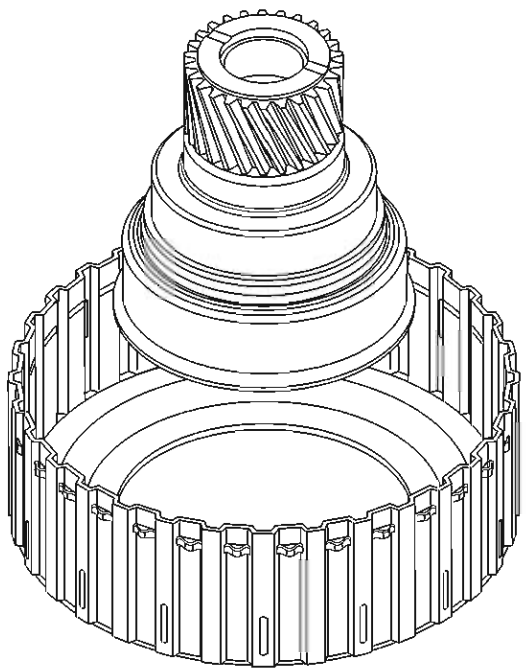
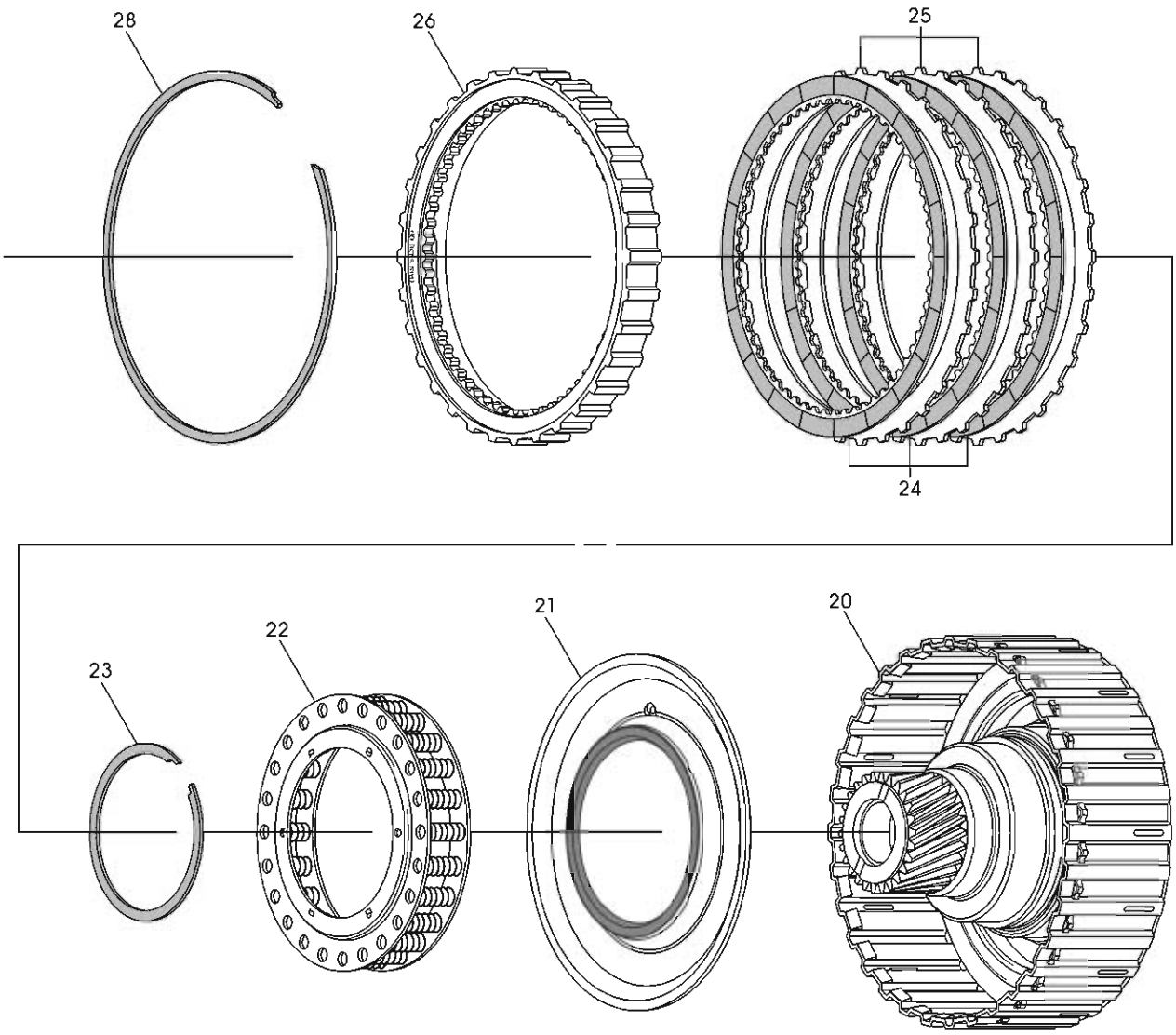


Figure 1

FORD 5R110W
REPEATED COAST CLUTCH HOUSING BREAKING

COAST CLUTCH HOUSING EXPLODED VIEW

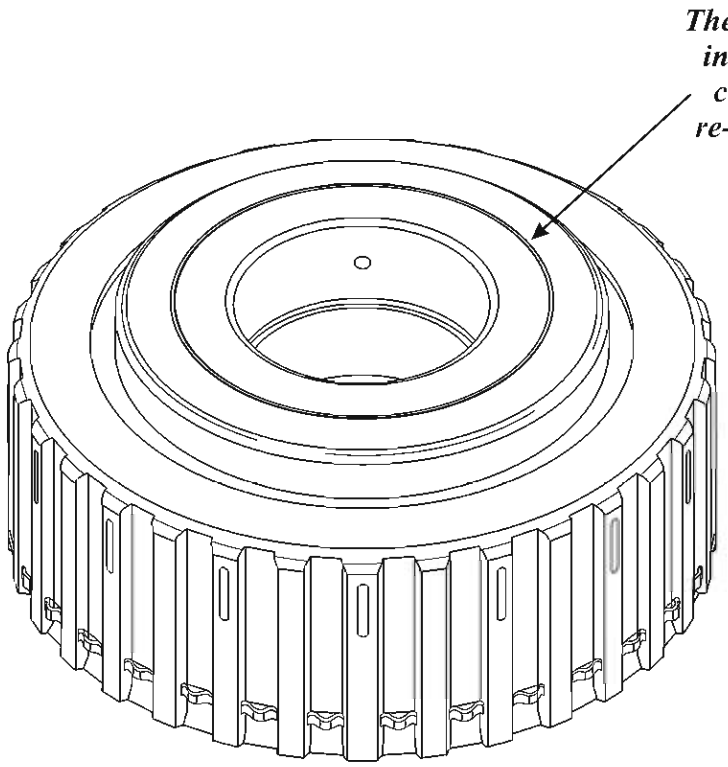


20 COAST CLUTCH HOUSING ASSEMBLY.
21 COAST CLUTCH MOLDED RUBBER, STAMPED STEEL PISTON ASSEMBLY.
22 COAST CLUTCH PISTON RETURN SPRING ASSEMBLY.
23 COAST CLUTCH RETURN SPRING ASSEMBLY SNAP RING.
24 COAST CLUTCH FRICTION PLATES (3 REQUIRED).
25 COAST CLUTCH STEEL PLATES (3 REQUIRED).
26 COAST CLUTCH BACKING PLATE/OVERDRIVE ONE-WAY DIODE ASSEMBLY.
28 COAST CLUTCH BACKING PLATE SNAP RING.

Figure 2

FORD 5R110W
REPEATED COAST CLUTCH HOUSING BREAKING

COAST CLUTCH HOUSING
REAR SIDE



Note: This re-enforced weld will not contact the Pump to Coast Drum washer surface.

Figure 3

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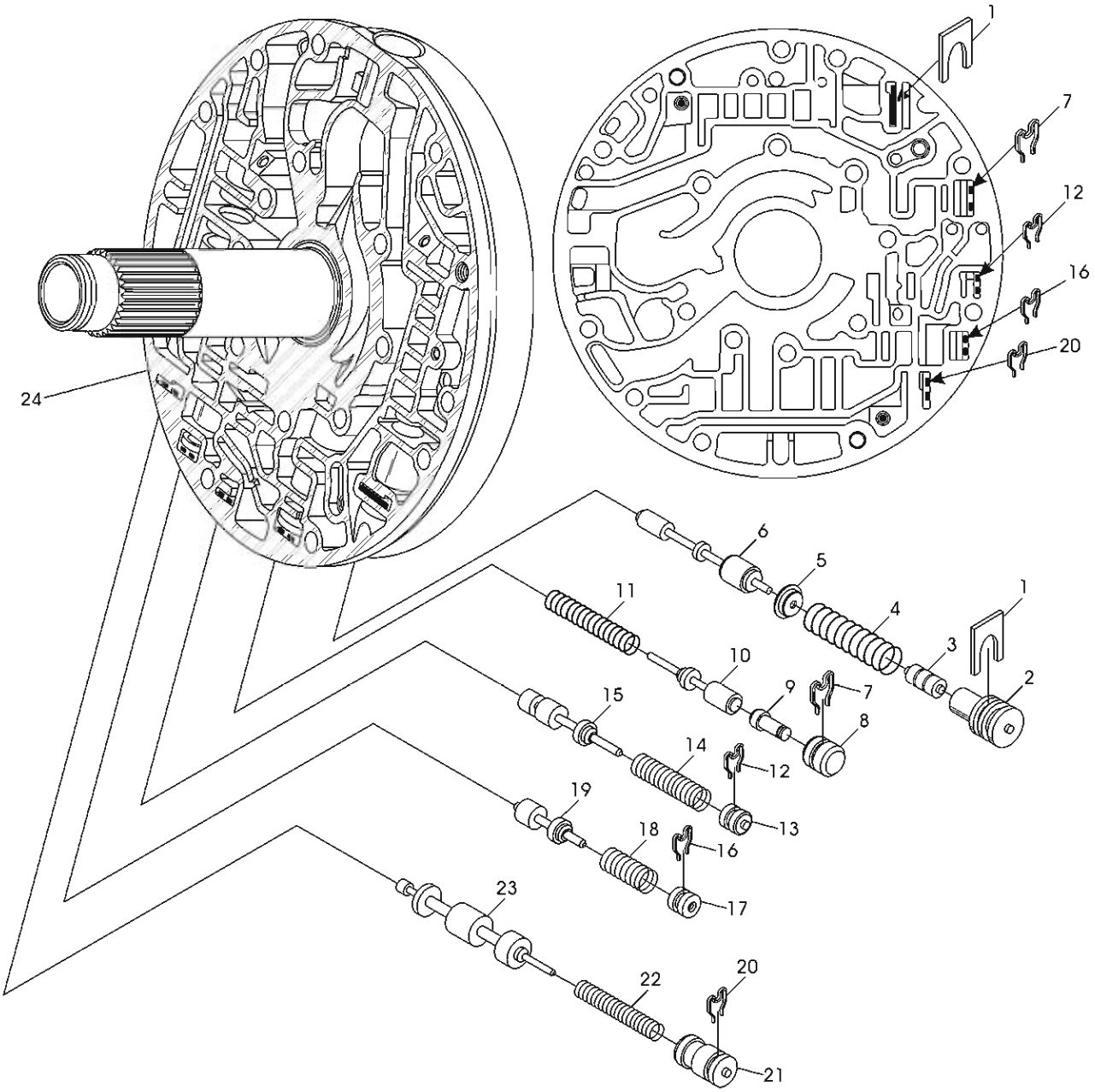
OIL PUMP COVER ASSEMBLY EXPLODED VIEW



1 CONVERTER CLUTCH CONTROL VALVE BORE PLUG RETAINER.
2 CONVERTER CLUTCH CONTROL VALVE SLEEVE.
3 CONVERTER CLUTCH CONTROL VALVE PLUG.
4 CONVERTER CLUTCH CONTROL VALVE SPRING.
5 CONVERTER CLUTCH CONTROL VALVE SPRING SEAT.
6 CONVERTER CLUTCH CONTROL VALVE.
7 COOLER BYPASS VALVE BORE PLUG RETAINER (ORANGE I.D.).
8 COOLER BYPASS VALVE BORE PLUG.
9 THERMOSTATIC VALVE ASSEMBLY.
10 COOLER BYPASS VALVE.
11 COOLER BYPASS VALVE SPRING.
12 CONVERTER PRESSURE LIMIT VALVE BORE PLUG RETAINER.
13 CONVERTER PRESSURE LIMIT VALVE BORE PLUG.
14 CONVERTER PRESSURE LIMIT VALVE SPRING.
15 CONVERTER PRESSURE LIMIT VALVE.
16 CONVERTER ANTI-DRAIN BACK VALVE BORE PLUG RETAINER.
17 CONVERTER ANTI-DRAIN BACK VALVE BORE PLUG.
18 CONVERTER ANTI-DRAIN BACK VALVE SPRING.
19 CONVERTER ANTI-DRAIN BACK VALVE.
20 MAIN REGULATOR VALVE BORE PLUG RETAINER.
21 MAIN REGULATOR VALVE BORE PLUG.
22 MAIN REGULATOR VALVE SPRING.
23 MAIN REGULATOR VALVE.
24 OIL PUMP COVER ASSEMBLY.

Figure 4

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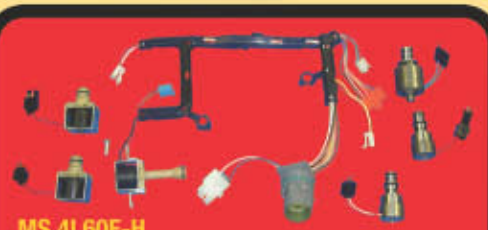
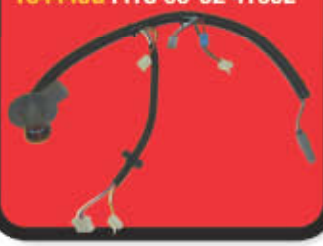
Fits 93-03 4L80E



MS 4L60E-H
Fits 93-95 4L60E
WARNING: This product will not work in 96 up vehicles.

4T65E INTERNAL WIRING HARNESS
T84446G FITS 96-02 4T65E



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