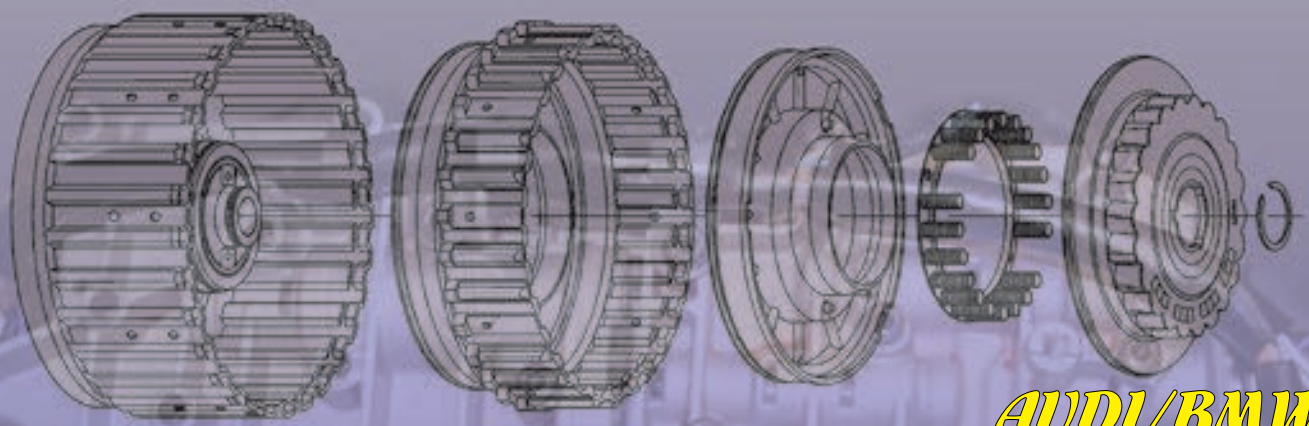
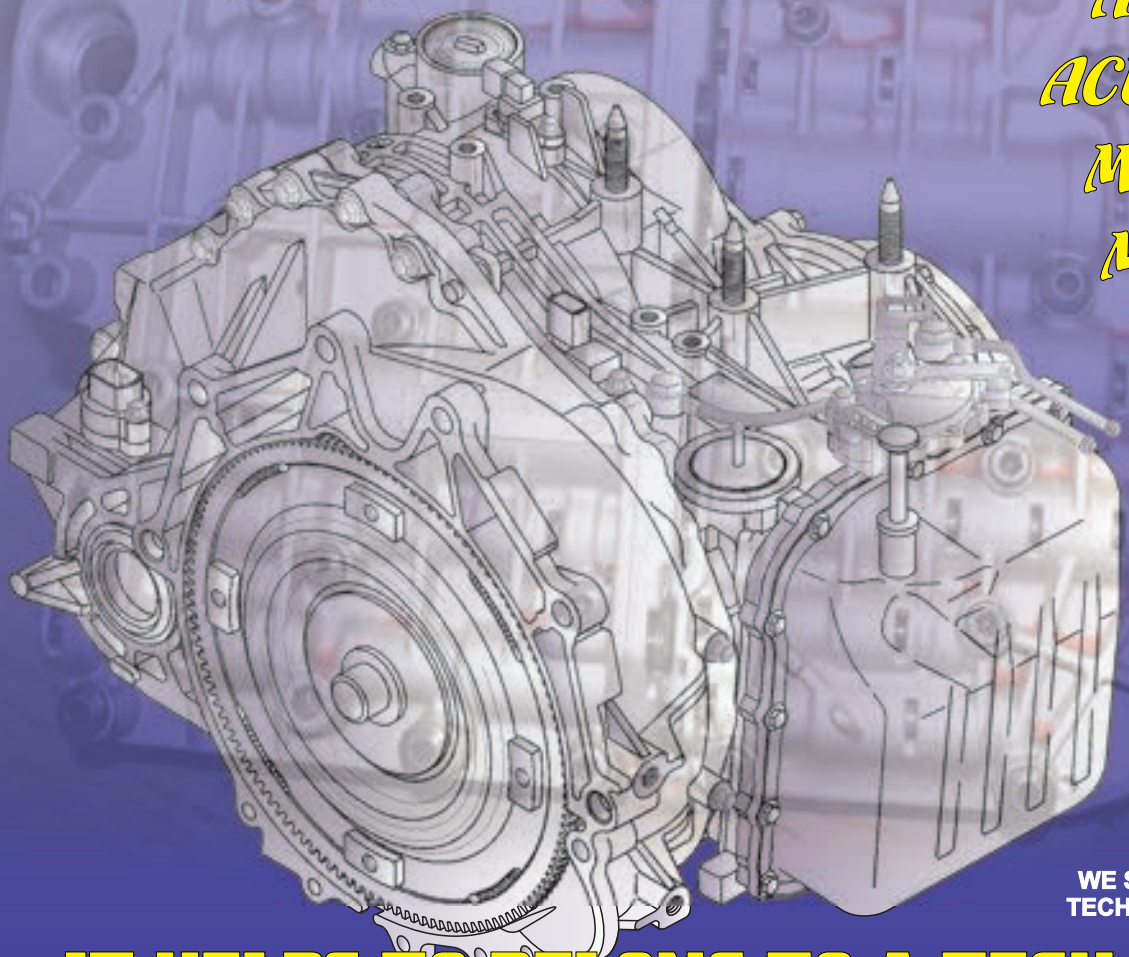
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AUTOMATIC TRANSMISSION SERVICE GROUP

2012 TRANSMISSION SEMINAR

TECHNICAL SERVICE INFORMATION





AUDI/BMW
ACURA/HONDA
MITSUBISHI
MERCEDES
NISSAN
SUBARU
TOYOTA
VW

ASE CERTIFIED

WE SUPPORT VOLUNTARY TECHNICIAN CERTIFICATION

IT HELPS TO BELONG TO A TECH SERVICE...

BUT BELONG TO A TECH SERVICE THAT HELPS

Borg Warner - IFC

"ATSG's 2012 Technical Training Seminar"

Introduction

This final manual of the day contains much needed technical information for the diagnostic and repair of transmissions in "so called" import manufacturers. With the world getting smaller everyday, the once "Big 3" that we use to know is now North America, Asia and Europe. So to call certain makes an import is true in one sense but in another, with the cross over of transmissions in manufacturers increasing yearly combined with many of these cars being assembled here in the US is becoming quite a stretch. But nonetheless, we still need information and one of the qualities ATSG is known for is producing material that the manufacturers do not. This manual is just one example of that.

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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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Lubegard - 2

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BMW/AUDI/VW ZF5HP19 FAMILY
SLIPS IN REVERSE OR FLARED 2-3 UPSHIFT HOT

COMPLAINT: Before or after overhaul, BMW and/or AUDI/VW vehicles equipped with the ZF5HP19 family transmission may exhibit a complaint of a slipping condition while backing up or a flared 2-3 upshift typically when hot.

CAUSE: The cause may be, leakage in the "D" Clutch circuit causing the slip in Reverse or leakage in the " F" Clutch circuit causing the flare on the 2-3 upshift. (See Figure 1 for component application chart).This leakage may be attributed to a blown out o-ring on the accumulator cap for either the D or F accumulator. ***Note:*** This area can be easily overlooked during overhaul.

CORRECTION: Refer to Figure 2 for the location of the D and F clutch accumulator line-ups and replace the o-ring seals on both accumulator caps.

Special thanks to
Steve Peluso
Lee Myles, MA

ZF-5HP-19 CLUTCH APPLICATION CHART

RANGE	"A" CLUT	"B" CLUT	"C" CLUT	"D" CLUT	"LOW" SPRAG	"E" CLUT	"F" CLUT	"G" CLUT	GEAR RATIO	CONV CLUT
Park								ON		
Reverse		ON		ON				ON	4.08	
Neutral								ON		
"D"-1st	ON				HOLD			ON	3.66	
"D"-2nd	ON		ON					ON	1.99	
"D"-3rd	ON		ON				ON		1.40	*
"D"-4th	ON					ON	ON		1.00	*
"D"-5th			ON			ON	ON		0.74	*
"4"	*Same as above, Automatic Shift 1st thru 4th, 5th gear is inhibited.*									*
"3"	*Same as above, Automatic Shift 1st thru 3rd, 4th and 5th gear are inhibited.*									*
"2"	*Same as above, Automatic Shift 1st thru 2nd, 3rd, 4th and 5th gear are inhibited.*									

***Converter Clutch may be ON or OFF depending on vehicle speed and throttle position.**

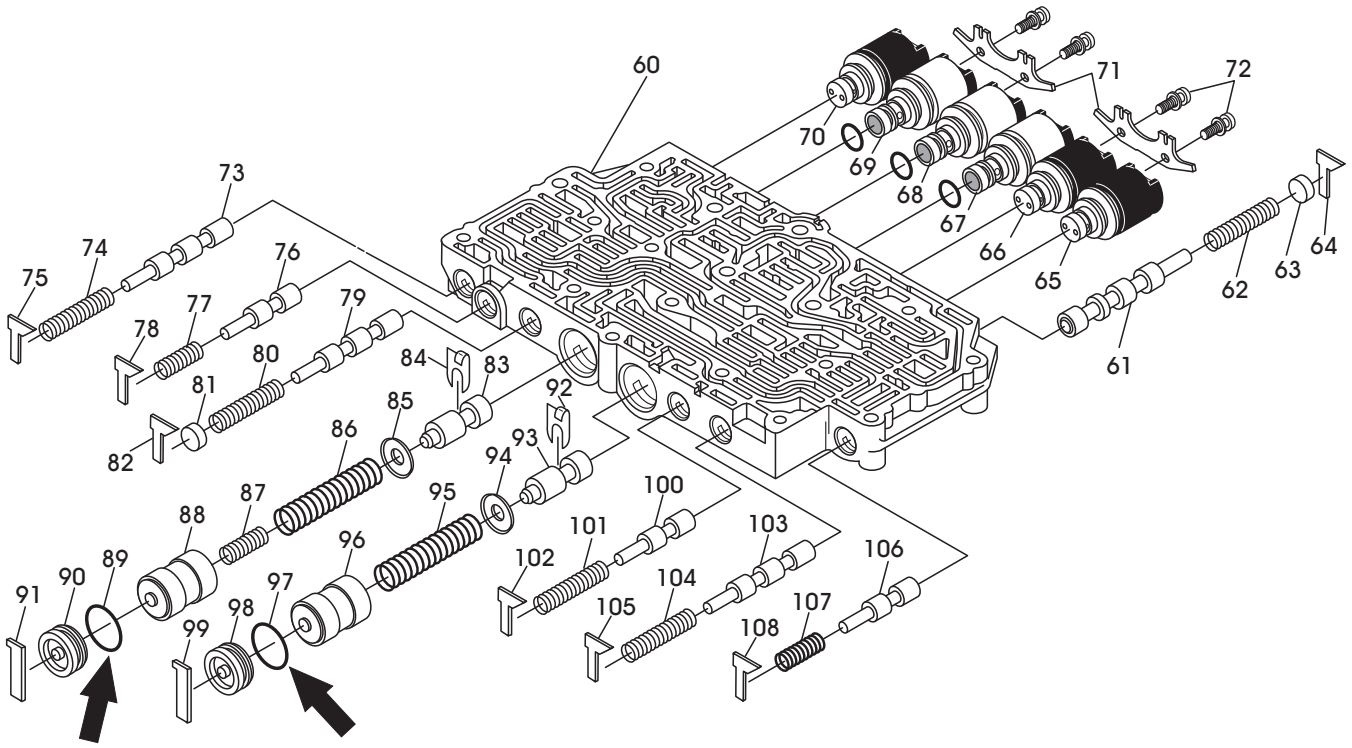
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Figure 1

SAP - 6

Transgo - 7

ZF-5HP-19FL
LOWER REAR VALVE BODY



60. Lower Rear Valve Body
61. Number 1Shift Valve
62. Number 1Shift Valve Spring
63. Number 1Shift Valve Bore Plug
64. Number 1Shift Valve Retainer
65. MV-3 Solenoid (On-Off)
66. MV-2 Solenoid (On-Off)
67. EDS-3 Solenoid and "O" Ring (Pressure Regulating)
68. EDS-4 Solenoid and "O" Ring (Pressure Regulating)
69. EDS-2 Solenoid and "O" Ring (Pressure Regulating)
70. MV-1 Solenoid (On-Off)
71. Solenoid Retaining Brackets (2 Required)
72. Solenoid Retaining Bracket Screws (4 Required)
73. Traction Coast Valve
74. Traction Coast Valve Spring
75. Traction Coast Valve Train Retainer
76. TCC Release Regulator Valve
77. TCC Release Regulator Valve Spring
78. TCC Release Regulator Valve Train Retainer
79. Number 3 Shift Valve
80. Number 3 Shift Valve Spring
81. Number 3 Shift Valve Train Bore Plug
82. Number 3 Shift Valve Train Retainer
83. "D" Clutch Accumulator Regulator Valve
84. "D" Clutch Accumulator Regulator Valve Retainer
85. "D" Clutch Damper Valve Spring Seat
86. "D" Clutch Damper Valve Outer Spring
87. "D" Clutch Damper Valve Inner Spring
88. "D" Clutch Damper Valve
89. "D" Clutch Valve Train Bore Plug "O" Ring
90. "D" Clutch Valve Train Bore Plug
91. "D" Clutch Valve Train Bore Plug Retainer
92. "F" Clutch Accumulator Regulator Valve Retainer
93. "F" Clutch Accumulator Regulator Valve
94. "F" Clutch Damper Valve Spring Seat
95. "F" Clutch Damper Valve Spring
96. "F" Clutch Damper Valve
97. "F" Clutch Valve Train Bore Plug "O" Ring
98. "F" Clutch Valve Train Bore Plug
99. "F" Clutch Valve Train Bore Plug Retainer
100. Reverse Gear Valve
101. Reverse Gear Valve Spring
102. Reverse Gear Valve Train Retainer
103. Number 2 Shift Valve
104. Number 2 Shift Valve Spring
105. Number 2 Shift Valve Train Retainer
106. Pressure Reduction Valve
107. Pressure Reduction Valve Spring
108. Pressure Reduction Valve Train Retainer

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Figure 2

5 SPEED HONDA/ACURA

THIRD CLUTCH FAILURE

COMPLAINT: Before or after overhaul the transmission slips badly in third gear. Upon disassembly of the transmission the third clutch friction and steel plates are severely damaged. The clutch piston, return spring and return spring retainer are also badly damaged.

CAUSE One cause may be the counter shaft support bearing has worn the mid-case, Figure 1, causing the counter shaft to acquire an off center rotation. This off center rotation results in the third clutch feed tube and/or bushing to wear causing a loss of third clutch pressure (Figures 2 & 3). This loss of pressure results in the third clutch assembly destruction, Figure 4.

NOTE: *Jesse Zacarias of Elec-Tran has brought to our attention another possible cause for 3rd clutch failure. Based on his research he has noticed an interesting computer strategy where during a 4-2 forced downshift 3rd clutch oil pressure became momentarily present. The pressure was enough to close the 3rd clutch pressure switch. This quick apply and release of the 3rd clutches during a 4th clutch release and 2nd clutch apply overheats the clutch pack (For more details read the Shift Pointers article in the November 2011 Issue of Transmission Digest). According to Jesse, unless or until Honda changes this shift strategy eliminating this concern, he has been using Raybestos GPX® friction plates in the 3rd clutch pack due to its unique friction material and special grooved pattern. As a result the clutch pack tends to maintain a cooler operating temperature.*

CORRECTION: There should be no side to side movement in any direction of the counter shaft or any other shaft in the mid-case. The mid-case will have to be sleeved in order to have the bearing(s) supported properly and the feed tubes may require replacement as well.

Replace the feed tube bushing in the counter shaft.

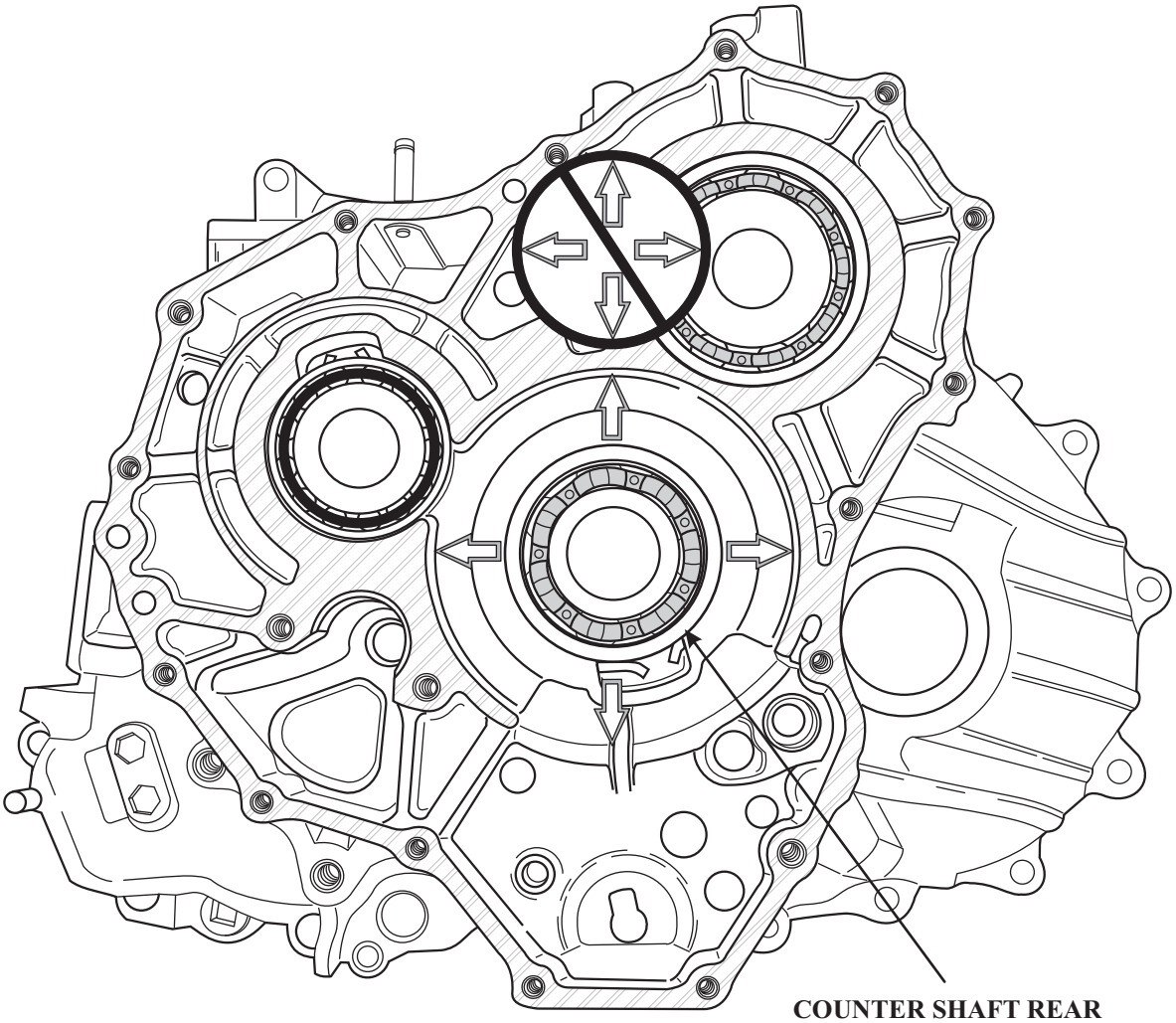
SERVICE INFORMATION:

Check with your parts distributor for availability of mid-case repairs, feed tube bushings and the necessary tools to remove and install them as well as any other parts required to repair these transmissions.

Rostra - 10

Filtran - 11

MID CASE



Note: This ball bearing should be very snug in the case and there should be no side to side or up and down movement of the ball bearing in the case. If there is movement, the mid case will have to be repaired.

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Figure 1

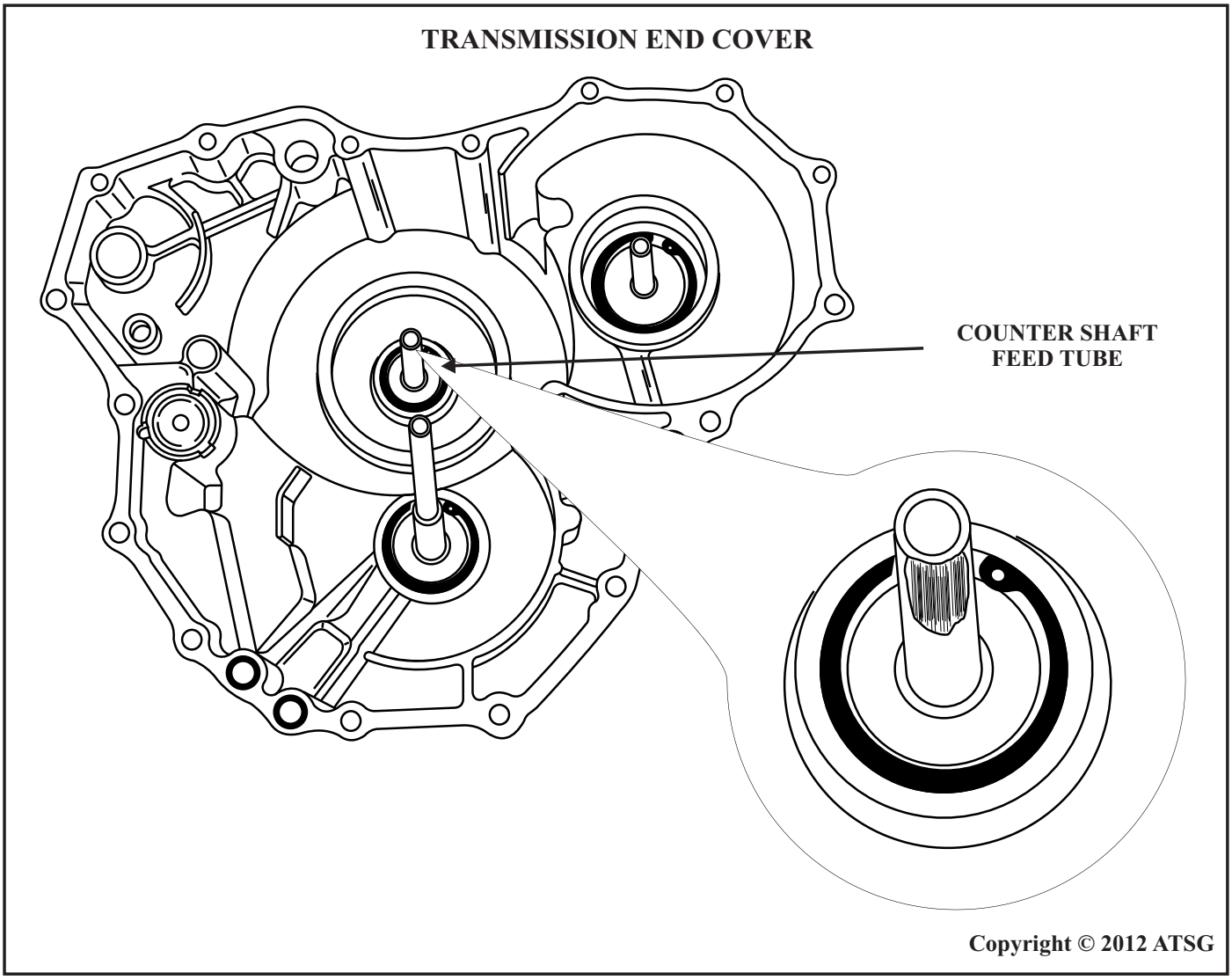


Figure 2

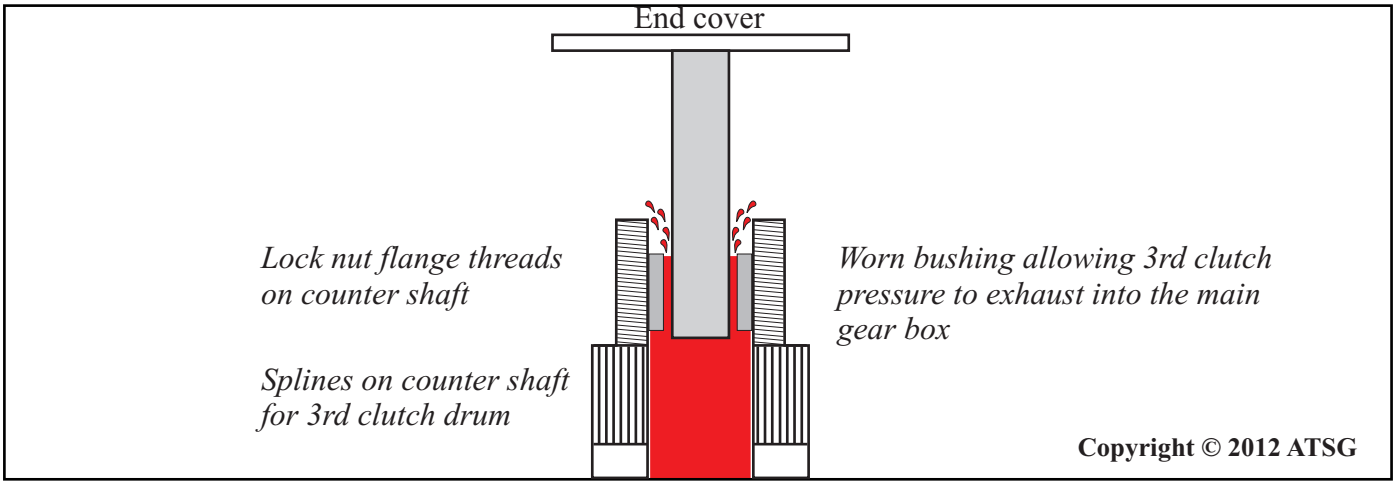
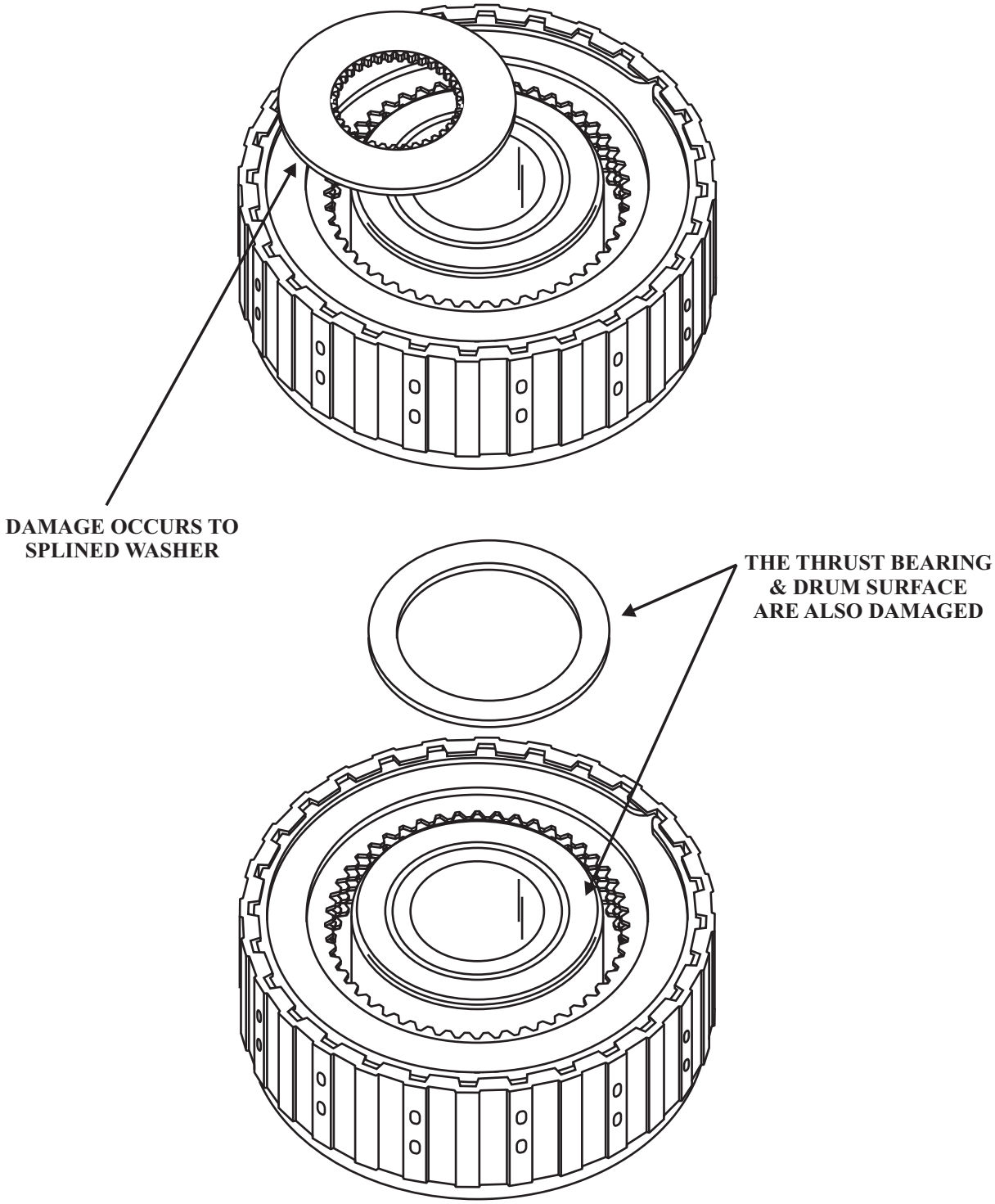


Figure 3

THIRD CLUTCH DRUM ASSEMBLY



NOTE: Due to the counter shaft support bearing case wear the counter shaft will rotate in an off center rotation causing third clutch feed tube and bushing damage. This will cause the third clutch to burn which will increase clutch clearance considerably. This will cause the clutch piston return spring to begin rotating which will destroy all related parts contained in the drum.

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Figure 4

Raybestos - 15

HONDA/ACURA

OVERHEATED TORQUE CONVERTER

COMPLAINT: A Honda or Acura comes in with the torque converter discolored due to severe overheating, see Figure 1.
The vehicle may come back after transmission repairs with the same complaint. In both instances Diagnostic Trouble Code P0740 for converter clutch slippage may also be stored.

CAUSE: The lack of oil flow which allows the converter clutch to drag when in the released position. The pressure regulator valve must remain in a regulating position that will allow the flow to have adequate converter charge and TCC release oil. When the oil warms and becomes thinner and engine rpm is low, the pressure regulator valve restricts or cuts off the oil flow to the TCC release circuit. The small volume pump that these transmissions use does not help the situation either.

The following is a list of causes for the blue converter syndrome as well as DTC P0740 that will need to be addressed:
1. Pressure Regulator Valve issues, Figure 2.
2. Leaking bore plugs on the Lock-Up Shift and Lock-Up Control Valves.
3. A leaking TC Check Valve which is usually located between the front case half and the main valve body.
4. A restricted fluid warmer for those units that have them mounted on top of the transaxle.
5. A restricted factory inline filter.
6. Warped valve body sections.
7. Wear in the pump gear area.
8. A poor fit between the converter neck o-ring and the inner pump gear.
9. The use of poor quality transmission fluid.

CORRECTION: The following is a list of corrective measures that will cure the blue converter syndrome and the storing of DTC P0740:
1. The use of the Sonnax® Converter Charge Regulated Pressure Regulator Valve, Figure 3.
2. The use of the Sonnax® o-ringed interference fit bore plugs, Figure 4, or using a tubing cutter to expand the bore plug so it fits tightly into the valve bore.
3. The use of the Sonnax® TC Check Valve, Figure 5.
4. Replace the fluid warmer or install an auxiliary cooler.
5. Replace the inline filter.
6. Flat sand all valve body sections
7. Replace the pump if necessary.
8. Use the green o-ring on the converter neck, it is a tighter fit.
9. Use the O.E. or equivalent transmission fluid.

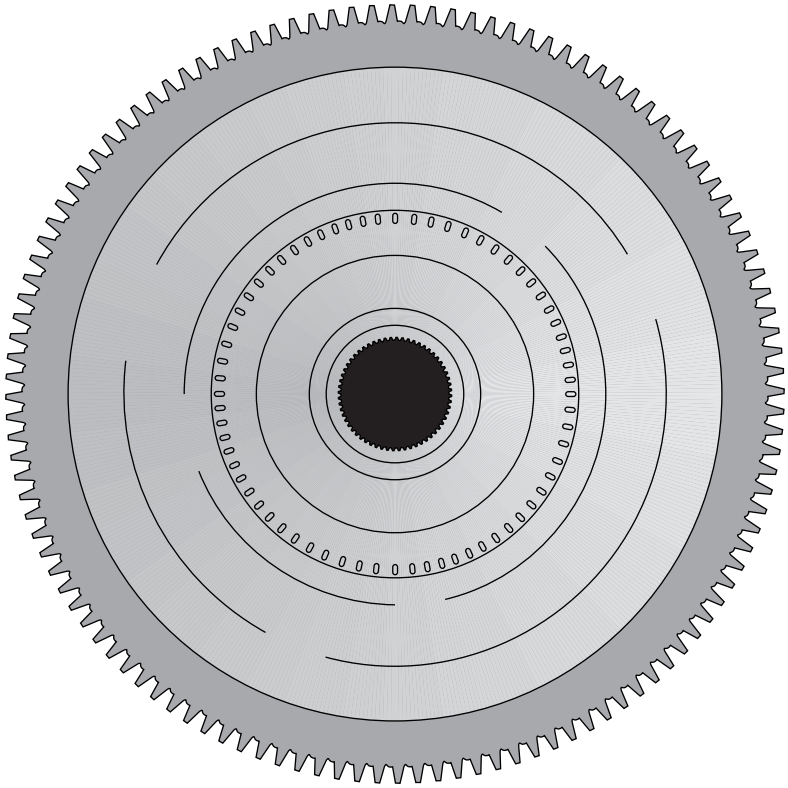
SERVICE INFORMATION:

Sonnax® Converter Charge Regulated Pressure Regulator Valve.....98892-04K
Sonnax® TC Check Valve Kit.....98892-06K
Sonnax® Bore Plug Kit.....98892-01K

Many thanks to Ed Lee and Greg Nader from Sonnax® for their assistance in compiling the above information.

HONDA/ACURA OVERHEATED TORQUE CONVERTER

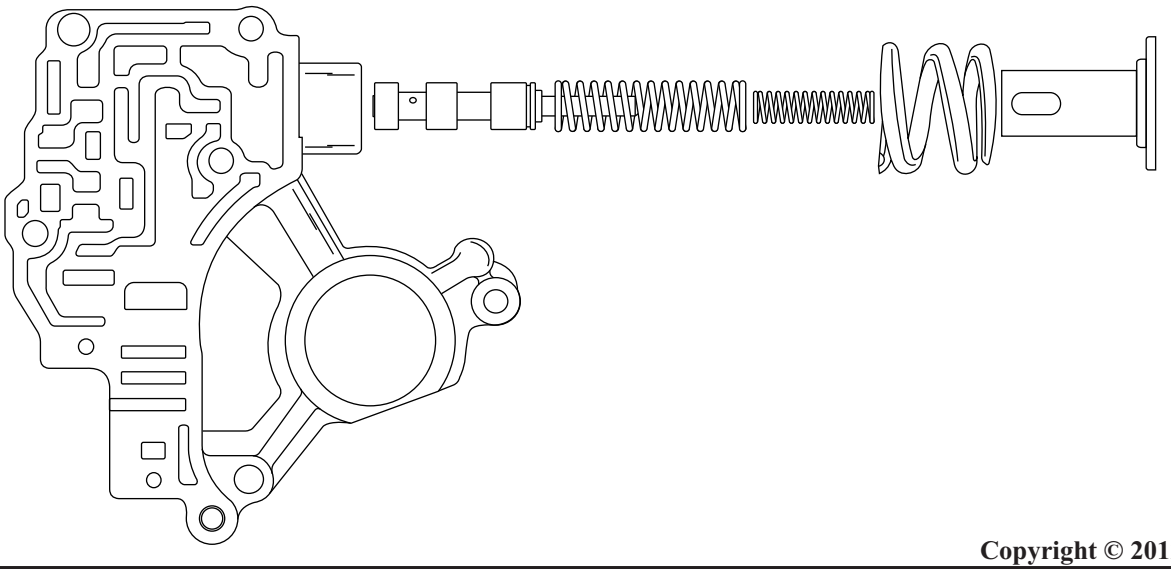
OVERHEATED TORQUE CONVERTER



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Figure 1

PRESSURE REGULATOR VALVE ASSEMBLY

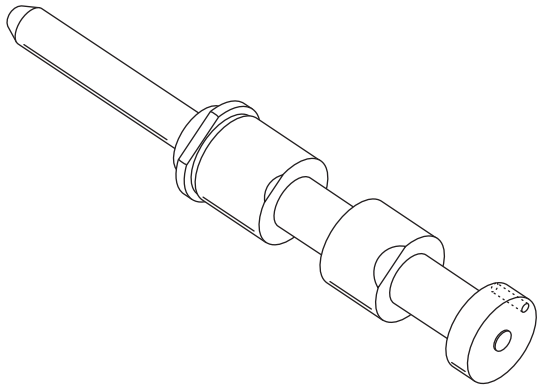


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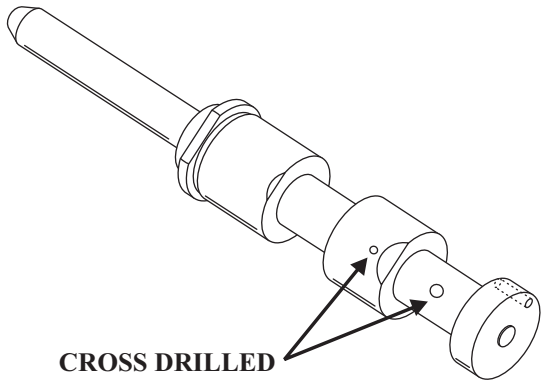
Figure 2

HONDA/ACURA OVERHEATED TORQUE CONVERTER

O.E. PRESSURE REGULATOR VALVE



***SONNAX® PRESSURE REGULATOR VALVE**

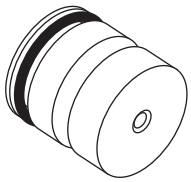


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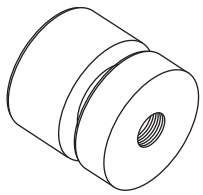
***The Sonnax® Converter Charge Regulated Pressure Regulator Valve fits all Honda/Acura transaxles EXCEPT the following: A6VA, AOYA, BOYA, MPOA, MPJA, APX4, MPXA, MP1A, PX4B, MPRA, RO, MPZA, M5HA, M1WA, M5DA, MPWA & MPYA.**

Figure 3

SONNAX® O-RINGED 14MM END PLUG



SONNAX® INTERFERENCE 15MM END PLUG



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Figure 4

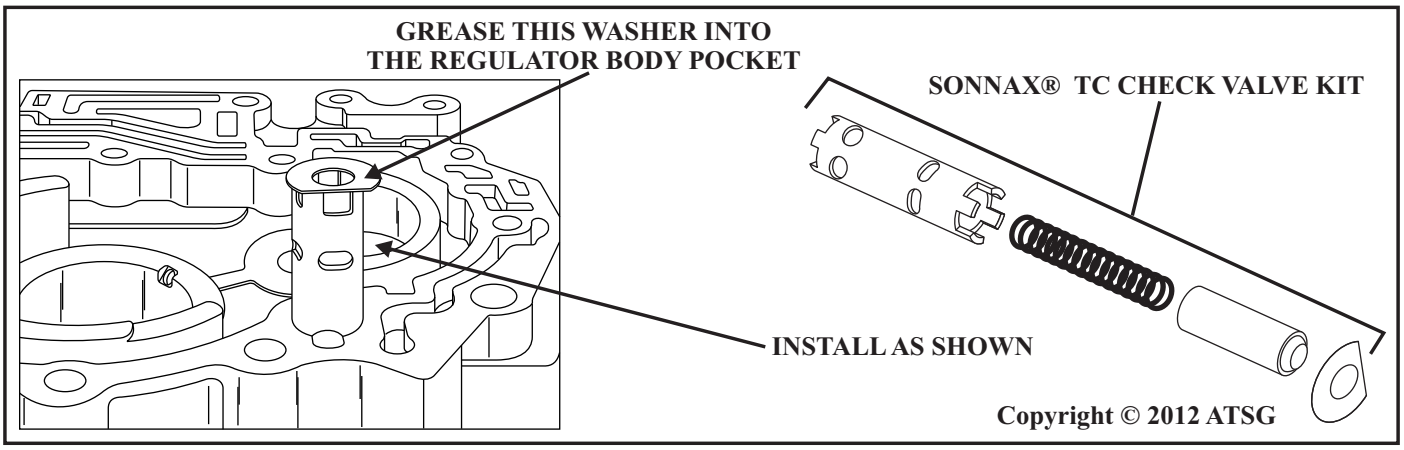


Figure 5

MITSUBISHI F4A50 SERIES
HARSH OR FLARED 2-3/3-2 AND OR GEAR RATIO ERRORS

COMPLAINT: After overhaul or transmission replacement, Mitsubishi vehicles equipped with the F4A50 series transmission may exhibit a complaint of a harsh or flared 2-3 upshift and harsh 3-2 downshift which may be accompanied with or without gear ratio errors, P0732 (42) for second gear, P0734 (44) for 4th gear, and P0736 (46) for reverse.

CAUSE: The cause may be, that the transmission was replaced with a incompatible planetary ratio, or that during overhaul the overdrive planetary gear set and reverse/second sun gear and shell were replaced with the incorrect tooth counts/ratio. Beginning in the 2004 model year the overdrive planetary gear set and reverse/second sungear changed tooth counts which changes the ratio for 2nd, 4th and Reverse. The ratio difference between the two is very small and that is the reason that there are sometimes no gear ratio error codes set. ***Note: to verify, place selector in Manual 2nd and hold the range, this will typically cause the P0732 code to show up quickly.*** Refer to Figure 1 for a model I.D.

CORRECTION: To correct this condition, refer to Figure 2 for the locations of the overdrive planetary and reverse/second sun gear and shell assembly, and Figure 3 for the tooth counts to verify that the correct ratio is installed into the transmission.

MITSUBISHI F4A51RATIO AND MODEL I.D.

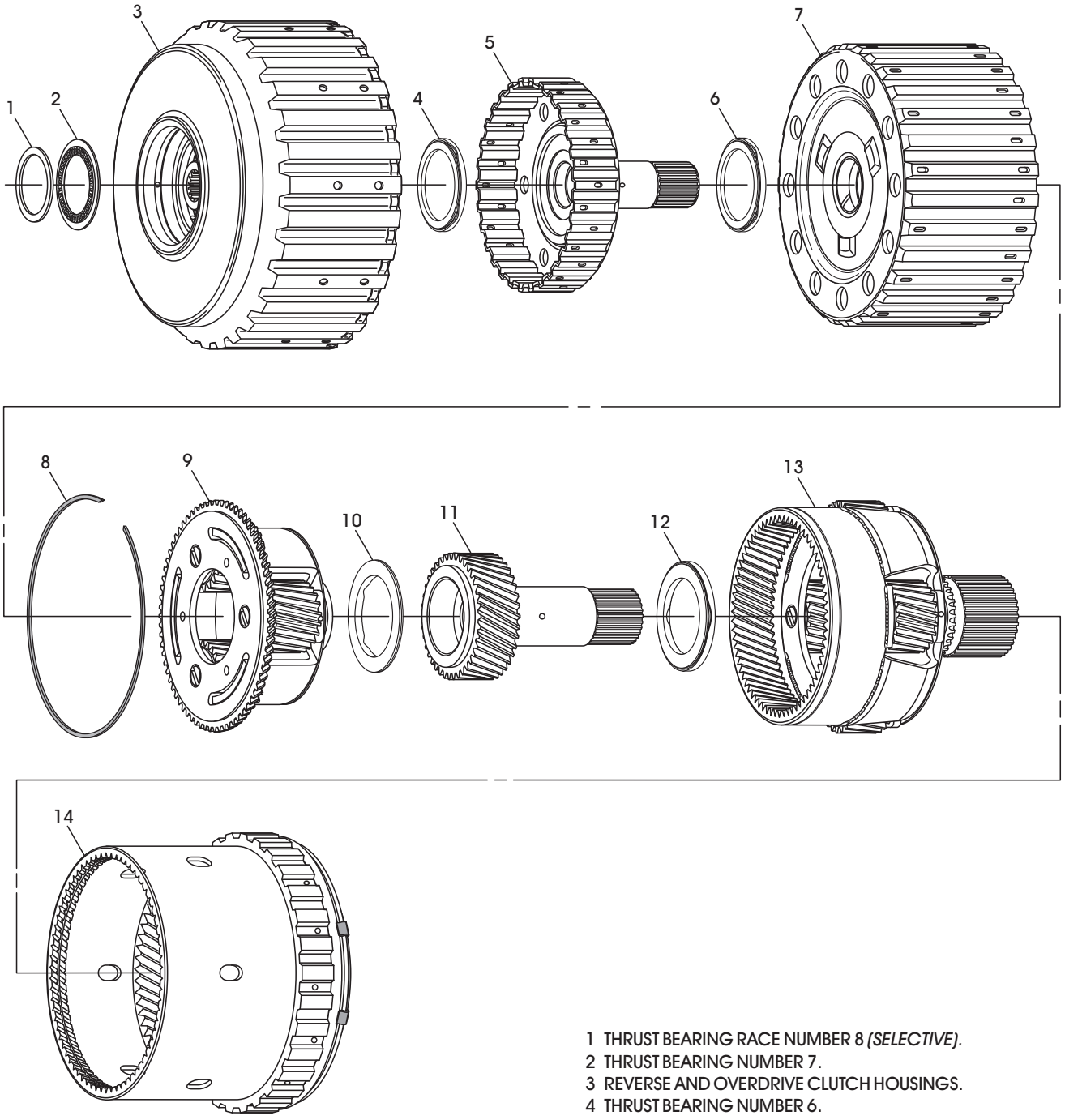
RATIO CHART "A"	VEHICLE APPLICATIONS
1st Gear 2.842	**04 & EARLIER DIAMANTE**
2nd Gear 1.495	**03 & EARLIER ECLIPSE**
3rd Gear 1.000	**03 & EARLIER GALANT**
4th Gear .731	
Reverse 2.720	

RATIO CHART "B"	VEHICLE APPLICATIONS
1st Gear 2.842	**04 & UP ENDEAVOR**
2nd Gear 1.529	**04 & UP ECLIPSE**
3rd Gear 1.000	**04 & UP GALANT**
4th Gear .686	
Reverse 2.193	

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Figure 1

GEAR TRAIN EXPLODED VIEW



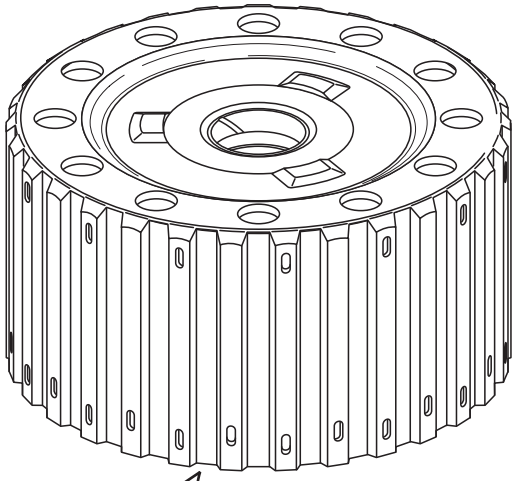
1 THRUST BEARING RACE NUMBER 8 *(SELECTIVE)*.
2 THRUST BEARING NUMBER 7.
3 REVERSE AND OVERDRIVE CLUTCH HOUSINGS.
4 THRUST BEARING NUMBER 6.
5 OVERDRIVE CLUTCH HUB.
6 THRUST BEARING NUMBER 5.
7 REVERSE/2nd SUN GEAR AND SHELL ASSEMBLY.
8 PLANETARY RETAINING SNAP RING.
9 OVERDRIVE PLANETARY CARRIER.
10 THRUST BEARING NUMBER 4.
11 UNDERDRIVE SUN GEAR.
12 THRUST BEARING NUMBER 3.
13 OUTPUT PLANETARY CARRIER ASSEMBLY.
14 OUTPUT INTERNAL RING GEAR.

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Figure 2

TOOTH COUNTS

REVERSE/2nd SUN GEAR AND SHELL



SUN GEAR TOOTH COUNTS

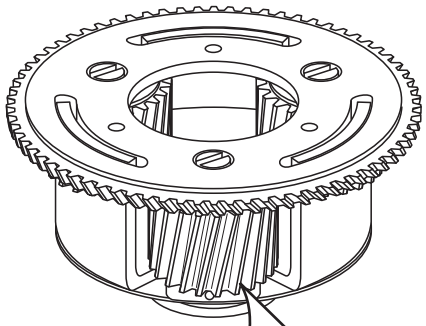
RATIO CHART "A"



RATIO CHART "B"



OVERDRIVE PLANETARY



PINION TOOTH COUNTS

RATIO CHART "A"



RATIO CHART "B"



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Figure 3

MITSUBISHI/HYUNDAI/KIA F4A40-50/F5A50
SHUDDER DURING DRIVE ENGAGEMENT

COMPLAINT: Mitsubishi, Hyundai and/or Kia vehicles equipped with the F4A40/50 or F5A50 series transmissions may exhibit a complaint of shudder during the engagement into the Drive position. This complaint may also increase as trans fluid temperature increases.

CAUSE: The cause may be, that during the overhaul process the accumulator pistons were installed backwards with the pistons first then the springs, or the plastic accumulator piston sealing ring is not expanding quick enough, as the piston is sometimes loose in the bore in the case, causing a shudder during the Underdrive Clutch application when Drive is selected.

CORRECTION: To correct this condition, refer to Figures 2 and 3 and ensure that the accumulator pistons are installed the correct way, springs first then piston. If the accumulators are installed correctly, refer to Figure 1 for an updated accumulator piston that fits into the bore a little more snug and has a "D"- ring which will help seal this circuit better, and replace the previous version with the new design. The new design piston can be used in all locations shown in Figures 2 and 3, and there is also spring identification for most models available.

SERVICE INFORMATION:

F4A40/50-F5A50 ACCUMULATOR PISTON(SONNAX PART NUMBER).....41954-02K

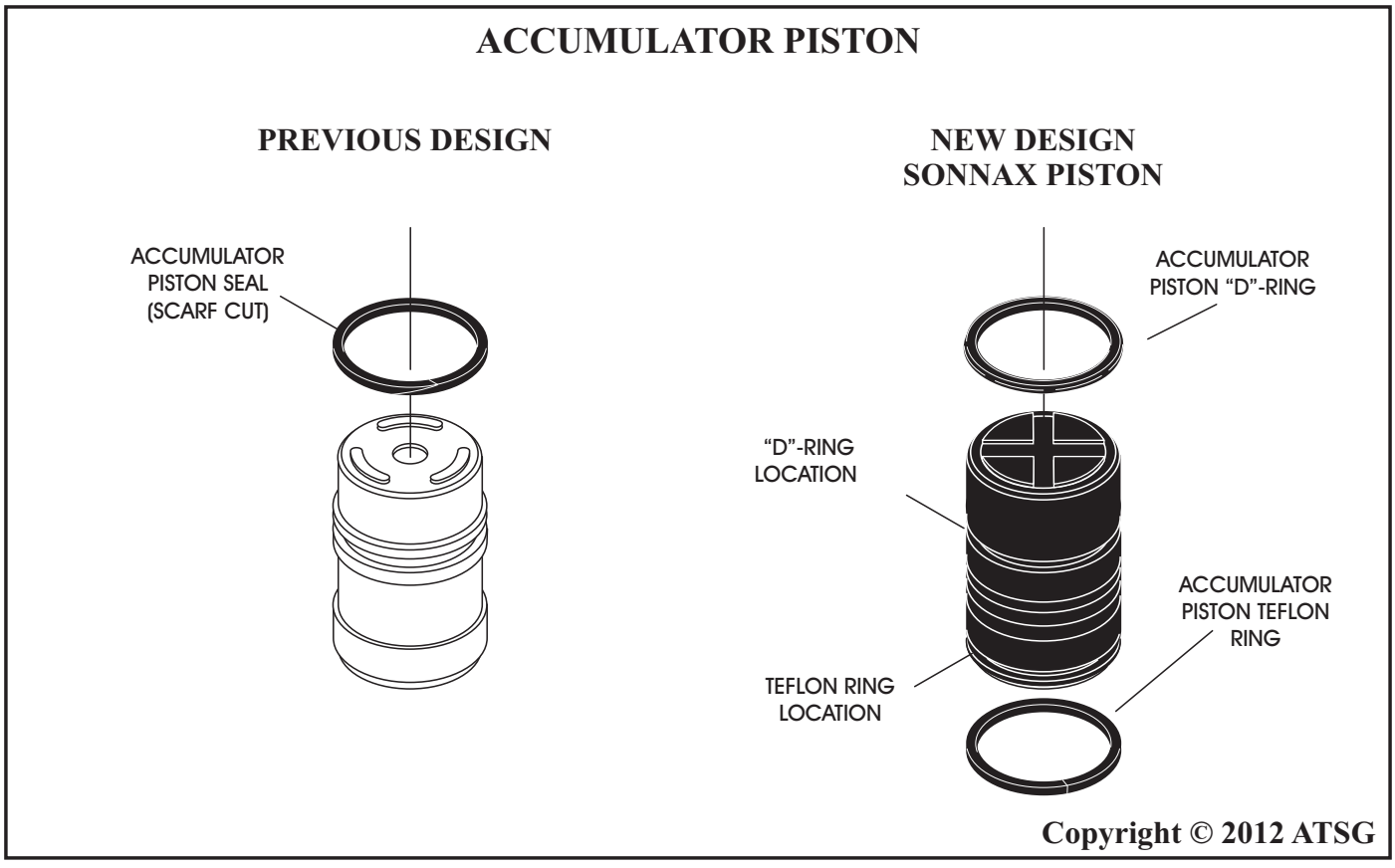
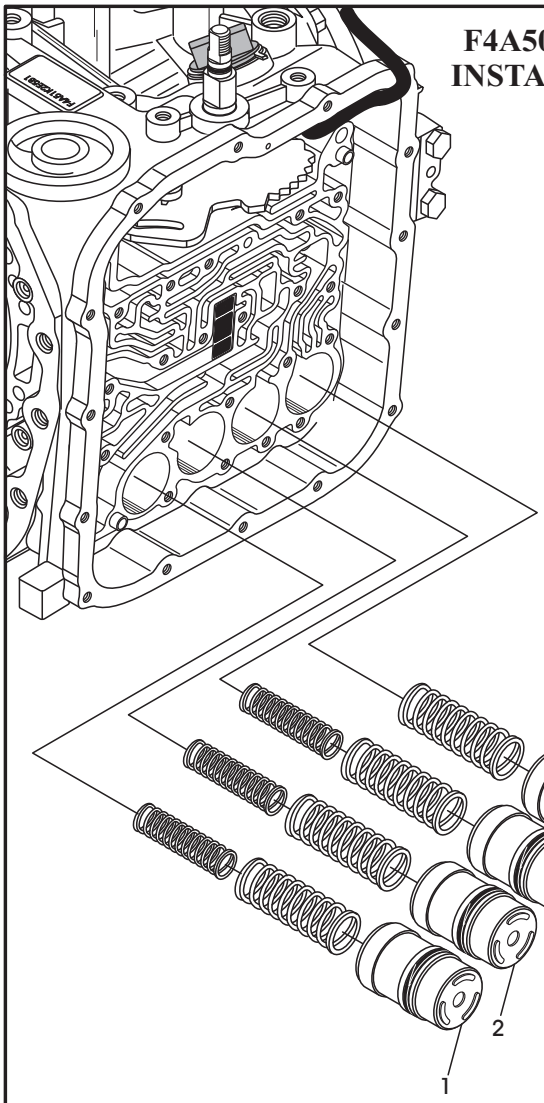


Figure 1

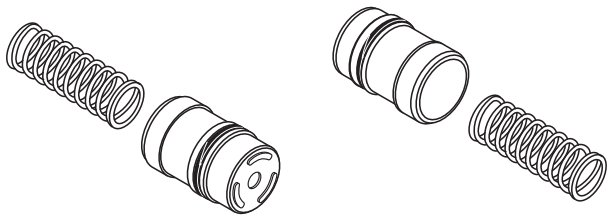
F4A50 ACCUMULATOR PISTON INSTALLATION AND SPRING I.D.



1 LOW/REVERSE CLUTCH ACCUMULATOR PISTON AND SPRINGS.
2 UNDERDRIVE CLUTCH ACCUMULATOR PISTON AND SPRINGS.
3 SECOND CLUTCH ACCUMULATOR PISTON AND SPRINGS.
4 OVERDRIVE CLUTCH ACCUMULATOR PISTON AND SPRING.

ACCUMULATOR PISTON INSTALLATION

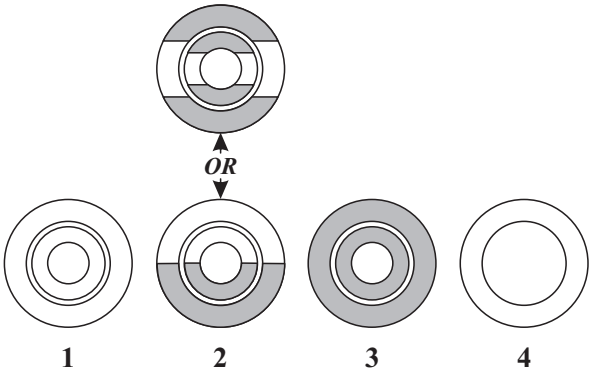
RIGHT WRONG



Install Springs first

ACCUMULATOR SPRING IDENTIFICATION

NOTE: The shaded areas are the identification "Bluing".

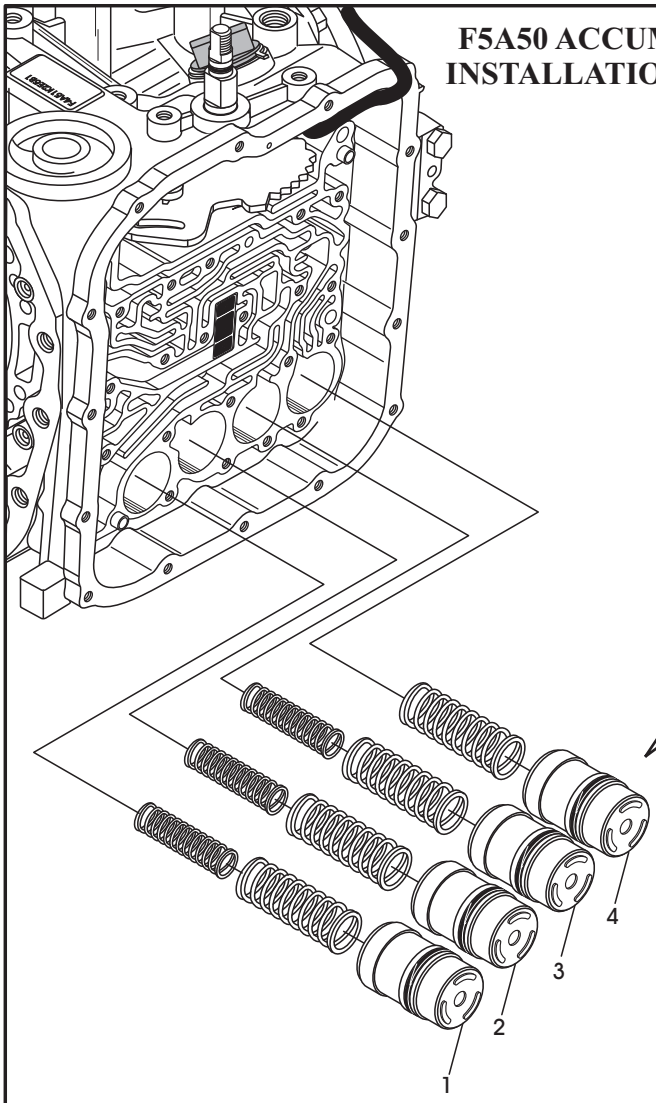


NO.	ACCUMULATOR	I.D. "Bluing"
1	*Low/Reverse Clutch*	*None*
2	*Underdrive Clutch*	*Half or 2/3rds*
3	*Second Clutch*	*Full Surface*
4	*Overdrive Clutch*	*None*

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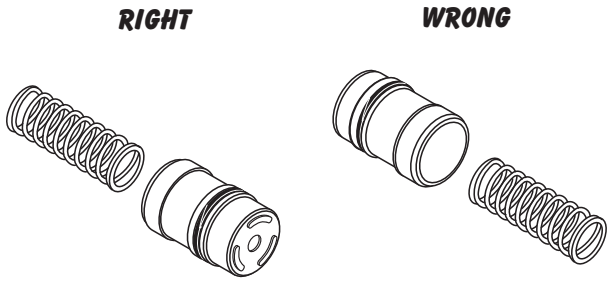
Figure 2

F5A50 ACCUMULATOR PISTON INSTALLATION AND SPRING I.D.



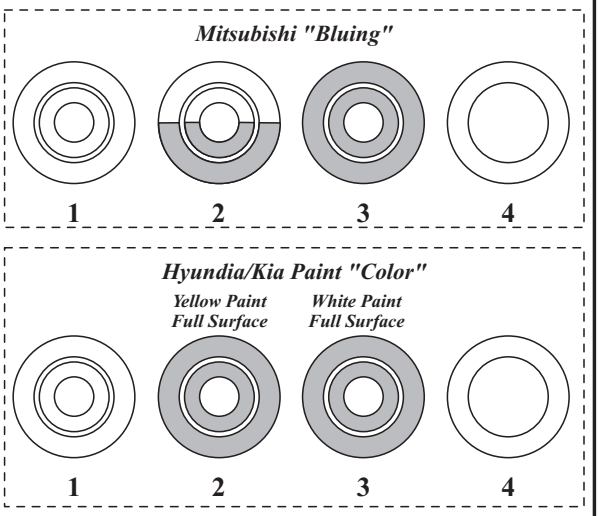
1 LOW/REVERSE CLUTCH ACCUMULATOR PISTON AND SPRINGS.
2 UNDERDRIVE CLUTCH ACCUMULATOR PISTON AND SPRINGS.
3 SECOND CLUTCH ACCUMULATOR PISTON AND SPRINGS.
4 OVERDRIVE CLUTCH ACCUMULATOR PISTON AND SPRING.

ACCUMULATOR PISTON INSTALLATION



Install Springs first

ACCUMULATOR SPRING IDENTIFICATION



NO.	ACCUMULATOR	Mitsubishi "Bluing"	Hyun/Kia "Color"
1	*Low/Reverse Clutch*	*None*	*None*
2	*Underdrive Clutch*	*One Half*	*Yellow Paint Full Surface*
3	*Second Clutch*	*Full Surface*	*White Paint Full Surface*
4	*Overdrive Clutch*	*None*	*None*

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Figure 3

MITSUBISHI F5A50/HYUNDAI-KIA A5G-HF1
CONTROL DIFFERENCES

- ***Refer to Figure 1 for a Component and Solenoid application chart for Mitsubishi, Pre-2007 Hyundai and Pre-2006 Kia vehicles.***
- ***Refer to Figure 2 for a Component and Solenoid application chart for 2007 Up Hyundai and 2006 Up Kia vehicles. Note the different component and solenoid applications in 4th and 5th.***
- ***Refer to Figure 3 for Solenoid identification for Mitsubishi, Pre-2007 Hyundai and Pre-2006 Kia vehicles.***
- ***Refer to Figure 4 and 5 for Case connector terminal identification, ohm values for the Mitsubishi, Pre-2007 Hyundai and Pre-2006 Kia, for the 6 solenoids, and an internal wire schematic for a Mitsubishi Eclipse.***
- ***Refer to Figure 6 for Solenoid identification for 2007 Up Hyundai and 2006 Up Kia. Note the added Line Pressure Control Solenoid.***
- ***Refer to Figure 7 for Case connector terminal identification for 2007 Up Hyundai and 2006 Up Kia vehicles, ohm values for the 7 solenoids and an internal wire schematic for a Hyundai Azera, as shown in Figure 8 and an internal wire schematic for a Kia Sedona in Figure 9.***
- ***Refer to Figures 10-15 for Valve Body Exploded views for Mitsubishi, Pre-2007 Hyundai and Pre-2006 Kia vehicles.***
- ***Refer to Figures 16-21 for Valve Body Exploded views for 2007 Up Hyundai and 2006 Up Kia vehicles.***

"MITSUBISHI, PRE-2007 HYUNDAI, PRE-2006 KIA ONLY" INTERNAL COMPONENT APPLICATION CHART

Gear Range	Reverse Clutch	Underdrive Clutch	2nd Clutch	Overdrive Clutch	Low/Rev Clutch	Direct Clutch	Reduct Band	Low (OWC-1) Sprag	Reduct (OWC-2) Sprag	TCC	Gear Ratio Mitsubishi
Park					ON		ON				
Reverse	ON				ON		ON				3.117
Neutral					ON		ON				
Dr-1st		ON			ON*		ON	HOLD	HOLD		3.789
Dr-2nd		ON	ON				ON		HOLD		2.162
Dr-3rd		ON		ON			ON		HOLD		1.421
Dr-4th		ON		ON		ON				ON**	1.000
Dr-5th			ON	ON		ON				ON**	0.686

Final Drive Ratio 3.325

* Low/Reverse clutch is applied below 6 mph, released above 6 mph.
** TCC dependant on throttle position, temperature and vehicle speed.
Note: Reverse Clutch is applied with fluid pressure from the manual valve.
Note: (OWC = One Way Clutch)..

FLUID REQUIREMENTS
Mitsubishi Diamond SP III

"MITSUBISHI, PRE-2007 HYUNDAI, PRE-2006 KIA ONLY" SOLENOID APPLICATION CHART

Gear Range	U.D. Sol	2nd Sol	O.D. Sol	TCC Sol	L/R-Dir. Sol***	RED. Sol
Park	ON	ON	ON	OFF	OFF	OFF
Reverse	ON	ON	ON	OFF	OFF	OFF
Neutral	ON	ON	ON	OFF	OFF	OFF
Dr-1st	OFF	ON	ON	OFF	OFF*	OFF
Dr-2nd	OFF	OFF	ON	OFF	ON	OFF
Dr-3rd	OFF	ON	OFF	OFF	ON	OFF
Dr-4th	OFF	ON	OFF	ON**	OFF	ON
Dr-5th	ON	OFF	OFF	ON**	OFF	ON

* Low/Reverse clutch is applied below 6 mph, and released above 6 mph.
** Torque Converter Clutch (TCC) dependant on throttle position, temperature and vehicle speed.
*** Low/Reverse Clutch or Direct Clutch depending on switch valve position.

Solenoid ON = Energized
Solenoid OFF = De-Energized

Failsafe: Two failsafe strategies are available, 2nd gear and 3rd gear.
Should all solenoids be turned Off (i.e. electrical failure), 3rd gear will be the result.
2nd gear failsafe "may" be commanded by the TCM, energizing the appropriate solenoids. Reverse always available.

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Figure 1

"2007-UP HYUNDAI, 2006-UP KIA ONLY" INTERNAL COMPONENT APPLICATION CHART

Gear Range	Reverse Clutch	Underdrive Clutch	2nd Clutch	Overdrive Clutch	Low/Rev Clutch	Direct Clutch	Reduct Band	Low (OWC-1) Sprag	Reduct (OWC-2) Sprag	DCC	Gear Ratio	
											Hyundai	Kia
Park					ON		ON					
Reverse	ON				ON		ON				3.859	4.586
Neutral					ON		ON					
Dr-1st		ON			ON*		ON	HOLD	HOLD		3.840	4.457
Dr-2nd		ON	ON				ON		HOLD		2.092	2.442
Dr-3rd		ON		ON			ON		HOLD		1.440	1.686
Dr-4th		ON	ON	ON			ON		HOLD	ON**	1.048	1.233
Dr-5th			ON	ON		ON				ON**	0.728	0.868

Final Drive Ratio 3.333

* Low/Reverse clutch is applied below 6 mph, released above 6 mph.

** Damper Converter Clutch (DCC) dependant on throttle position, temperature and vehicle speed.

Note: Reverse Clutch is applied with fluid pressure from the manual valve.

Note: (OWC = One Way Clutch)..

FLUID REQUIREMENTS
Hyundai/Kia Diamond SP III

"2007-UP HYUNDAI, 2006-UP KIA ONLY" SOLENOID APPLICATION CHART

Gear Range	U.D. Sol	2nd Sol	O.D. Sol	DCC Sol	L/R-Dir. Sol***	RED. Sol	Line VFS Sol
Park	ON	ON	ON	OFF	OFF	OFF	****
Reverse	ON	ON	ON	OFF	OFF	OFF	****
Neutral	ON	ON	ON	OFF	OFF	OFF	****
Dr-1st	OFF	ON	ON	OFF	OFF*	OFF	****
Dr-2nd	OFF	OFF	ON	OFF	ON	OFF	****
Dr-3rd	OFF	ON	OFF	OFF	ON	OFF	****
Dr-4th	OFF	OFF	OFF	ON**	ON	OFF	****
Dr-5th	ON	OFF	OFF	ON**	OFF	ON	****

* Low/Reverse clutch is applied below 6 mph, and released above 6 mph.

** Damper Converter Clutch (DCC) dependant on throttle position, temperature and vehicle speed.

*** Low/Reverse Clutch or Direct Clutch depending on switch valve position.

**** VFS is constantly modulating to control Line Pressure depending on throttle opening, engine load and vehicle speed.

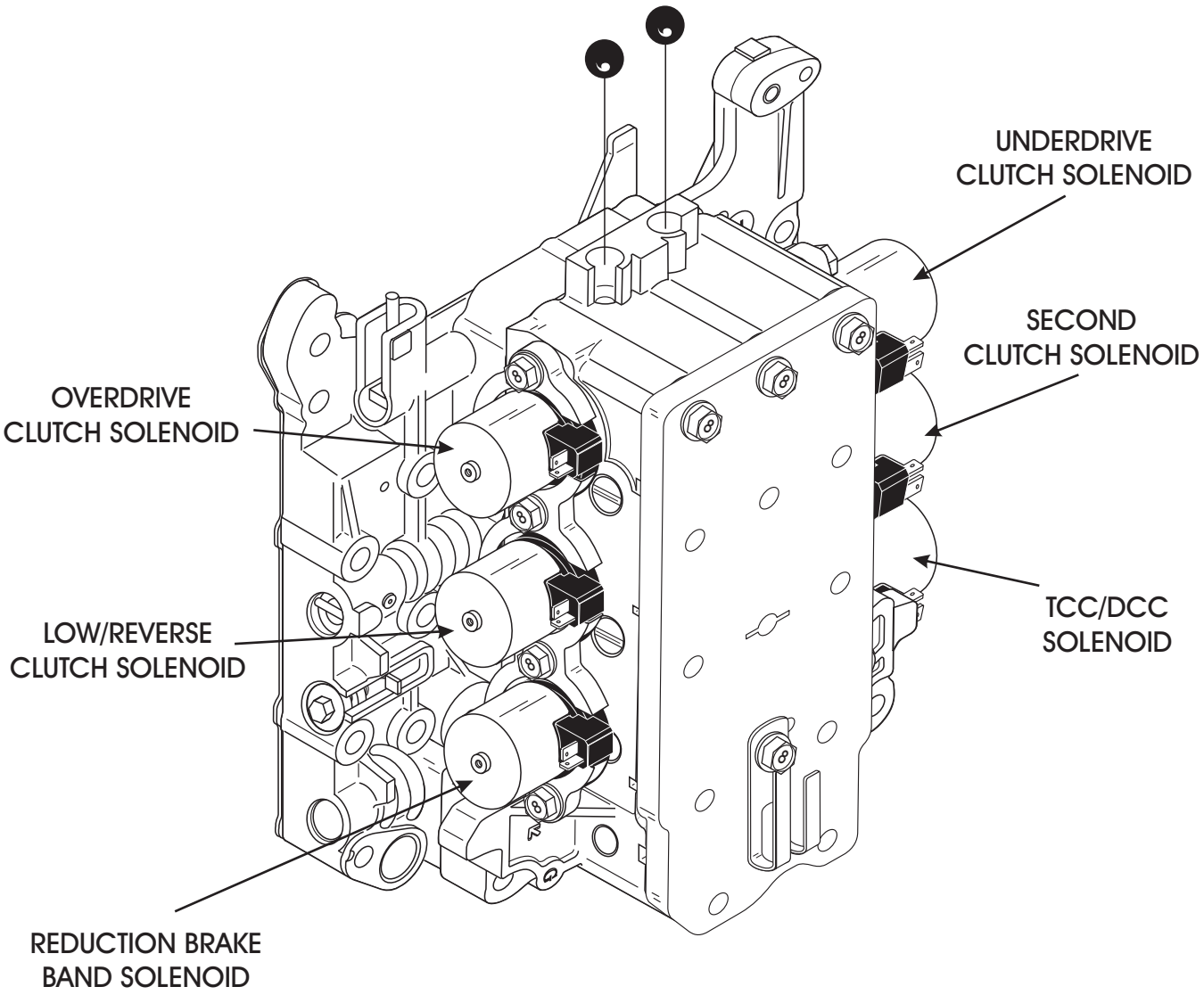
Solenoid ON = Energized
Solenoid OFF = De-Energized

Failsafe: Two failsafe strategies are available, 2nd gear and 3rd gear.
Should all solenoids be turned Off (i.e. electrical failure), 3rd gear will be the result.
2nd gear failsafe "may" be commanded by the TCM, energizing the appropriate solenoids. Reverse always available.

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Figure 2

"Mitsubishi", "Pre-06 Kia" & "Pre-07 Hyundai"
All Have 6 Shift Solenoids



SOLENOID RESISTANCE SHOULD BE
2.7 - 3.4 OHMS @ 20° C (68° F)

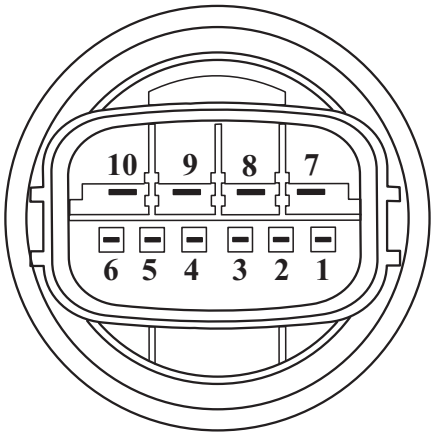
OEM Solenoid Part Numbers (At time of printing)
Mitsubishi Shift Solenoid- MD758981

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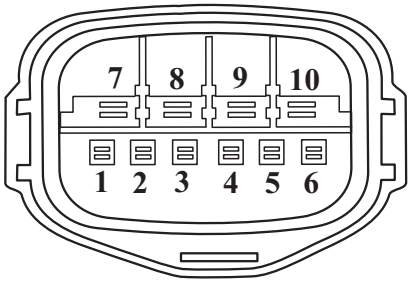
Figure 3

CASE CONNECTOR TERMINAL IDENTIFICATION AND INTERNAL COMPONENT RESISTANCE CHART

"Mitsubishi"
"Pre-2007 Hyundai" &
"Pre-2006 Kia" Only
(10-Way Connector)



View Looking Into Transaxle Case Connector



View Looking Into Transaxle Harness Connector

INTERNAL COMPONENT RESISTANCE CHART

COMPONENT	TERMINALS	RESISTANCE
Underdrive Solenoid	Terminals 9 and 3	2.7 - 3.4 Ohms @ 20°C (68°F)
2nd Solenoid	Terminals 9 and 4	2.7 - 3.4 Ohms @ 20°C (68°F)
Overdrive Solenoid	Terminals 9 and 5	2.7 - 3.4 Ohms @ 20°C (68°F)
Low/Rev Solenoid	Terminals 10 and 6	2.7 - 3.4 Ohms @ 20°C (68°F)
TCC Solenoid	Terminals 10 and 7	2.7 - 3.4 Ohms @ 20°C (68°F)
Reduction Solenoid	Terminals 10 and 8	2.7 - 3.4 Ohms @ 20°C (68°F)
TFT Sensor	Terminals 1 and 2	(Varies) 0°C (32°F) - 16.7K-20.5K (low temp) 100°C (212°F) - 0.57K-0.69K (high temp)

TERMINAL NUMBER	INTERNAL WIRE COLOR	CIRCUIT DESCRIPTION
1	Red	5 Volt Power to TFT Sensor
2	Black	Ground to TFT Sensor
3	White	Ground for Underdrive Solenoid control
4	Green	Ground for Second Clutch Solenoid control
5	Orange	Ground for Overdrive Solenoid control
6	Brown	Ground for Low/Reverse Solenoid control
7	Blue	Ground for TCC Solenoid control
8	Green	Ground for Reduction Solenoid control
9	Red	Power to Underdrive, Second, and Overdrive Solenoids
10	Yellow	Power to TCC, Low/Reverse, and Reduction Solenoids

NOTE: Wire colors may vary.

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Figure 4

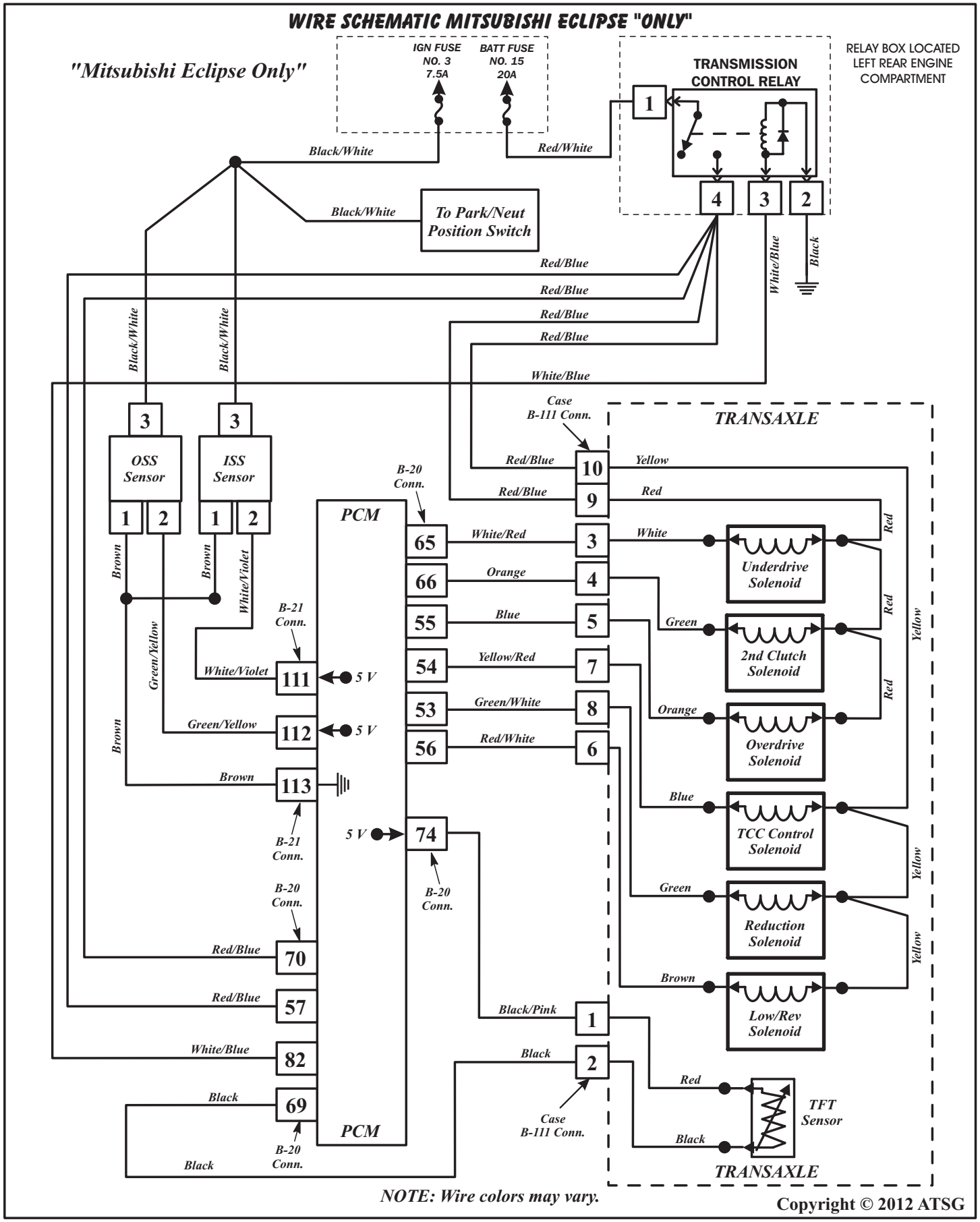
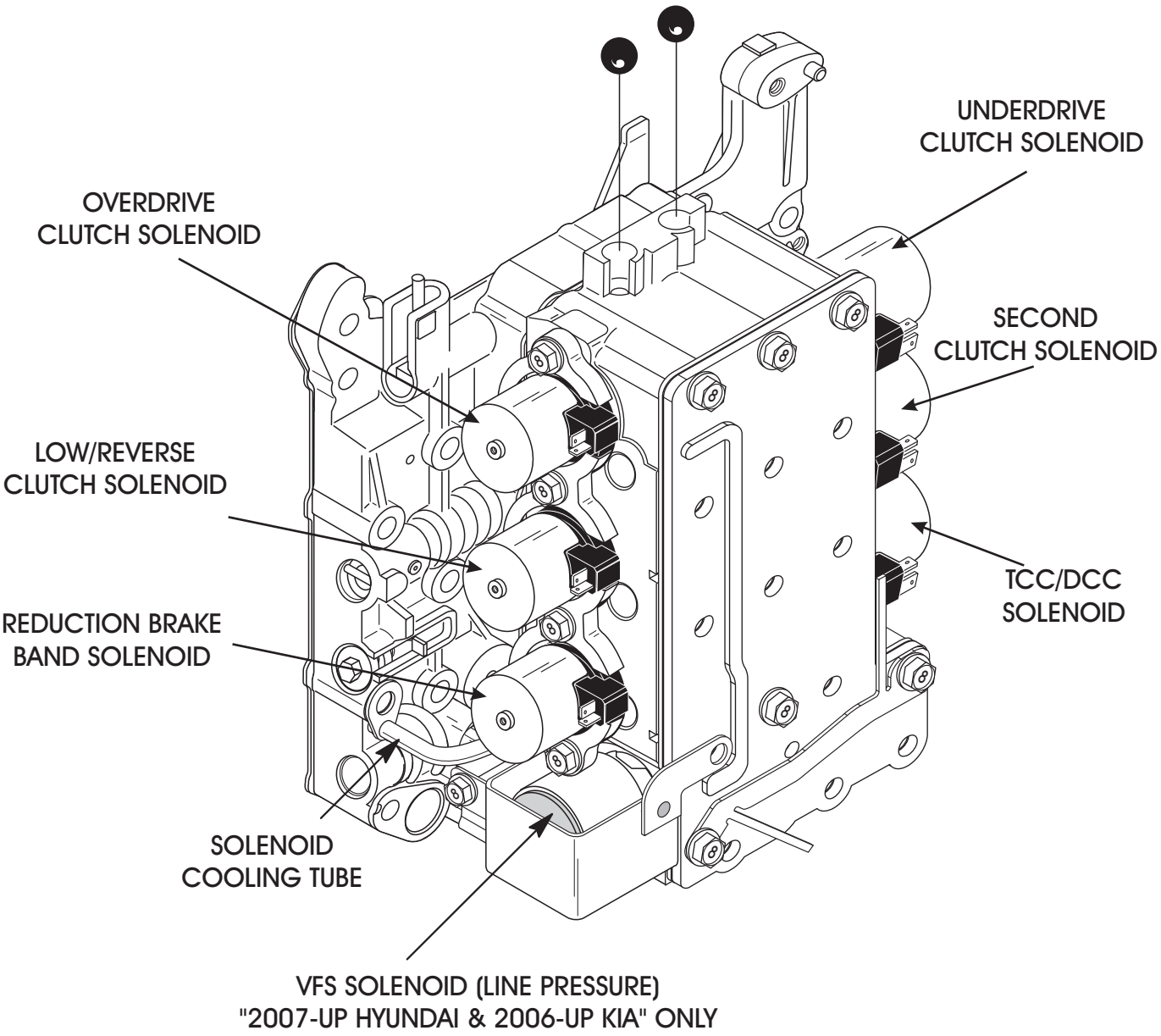

WIRE SCHEMATIC MITSUBISHI ECLIPSE "ONLY"
"Mitsubishi Eclipse Only"
IGN FUSE NO. 3 7.5A
BATT FUSE NO. 15 20A
TRANSMISSION CONTROL RELAY
RELAY BOX LOCATED LEFT REAR ENGINE COMPARTMENT
Black/White
Red/White
To Park/Neut Position Switch
Red/Blue
White/Blue
Black
OSS Sensor
ISS Sensor
Brown
White/Violet
Green/Yellow
PCM
B-20 Conn.
B-21 Conn.
5 V
Case B-111 Conn.
TRANSAXLE
Yellow
Red
White
Orange
Blue
Green
Underdrive Solenoid
2nd Clutch Solenoid
Overdrive Solenoid
TCC Control Solenoid
Reduction Solenoid
Low/Rev Solenoid
Black/Pink
TFT Sensor
NOTE: Wire colors may vary.
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Figure 5

"2006-Up Kia" & "2007-Up Hyundai"
All Have 6 Shift Solenoids
Plus 1 Line Pressure Solenoid



SOLENOID RESISTANCE SHOULD BE
2.7 - 3.4 OHMS @ 20° C (68° F)

VFS-SOLENOID RESISTANCE SHOULD BE
4.0 - 5.0 OHMS @ 20° C (68° F)

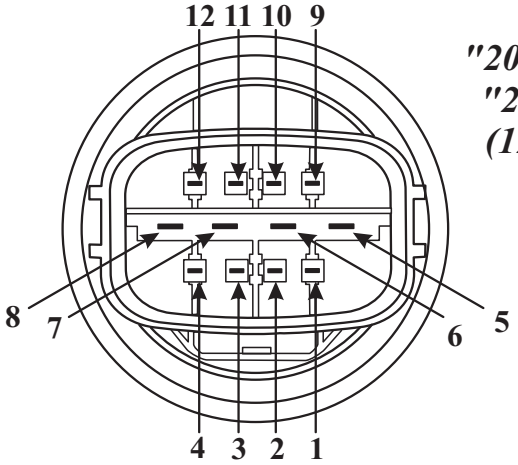
OEM Solenoid Part Numbers (At time of printing)

Hyundai & Kia Shift Solenoid - 46313-39051
Hyundai & Kia VFS Solenoid- 46313-3A060

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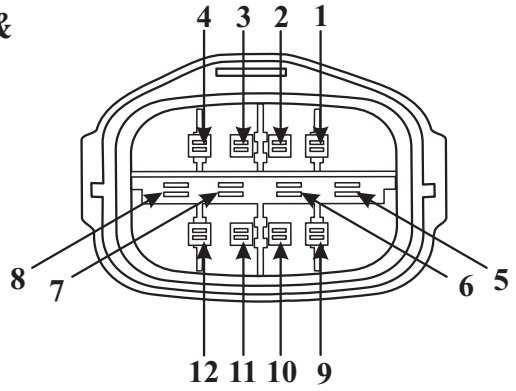
Figure 6

CASE CONNECTOR TERMINAL IDENTIFICATION AND INTERNAL COMPONENT RESISTANCE CHART



View Looking Into Transaxle
Pass-Thru Case Connector

"2007-Up Hyundai" & "2006-Up Kia" Only (12-Way Connector)



View Looking Into Transaxle
C-110 Harness Connector (Hyundai)
C-03 Harness Connector (Kia)

INTERNAL COMPONENT RESISTANCE CHART		
COMPONENT	***TERMINALS***	***RESISTANCE***
Underdrive Solenoid	*Terminals 5 and 3*	*2.7 - 3.4 Ohms @ 20°C (68°F)*
2nd Solenoid	*Terminals 5 and 4*	*2.7 - 3.4 Ohms @ 20°C (68°F)*
Overdrive Solenoid	*Terminals 5 and 12*	*2.7 - 3.4 Ohms @ 20°C (68°F)*
Low/Rev Solenoid	*Terminals 6 and 11*	*2.7 - 3.4 Ohms @ 20°C (68°F)*
DCC Solenoid	*Terminals 6 and 9*	*2.7 - 3.4 Ohms @ 20°C (68°F)*
Reduction Solenoid	*Terminals 6 and 10*	*2.7 - 3.4 Ohms @ 20°C (68°F)*
VFS Solenoid	*Terminals 7 and 8*	*4.0 - 5.0 Ohms @ 20°C (68°F)*
TFT Sensor	*Terminals 1 and 2*	*See Figure 4*

TERMINAL NUMBER	INTERNAL WIRE COLOR	CIRCUIT DESCRIPTION
1	*Red*	*5 Volt Power to TFT Sensor*
2	*Black*	*Ground to TFT Sensor*
3	*Yellow*	*Ground for Underdrive Solenoid control*
4	*Green*	*Ground for 2nd Clutch Solenoid control*
5	*Red*	*Power to Underdrive, Second, and Overdrive Solenoids*
6	*Yellow*	*Power to DCC, Low/Reverse, and Reduction Solenoids*
7	*Orange*	*Power to VFS (Line Pressure) Solenoid*
8	*Brown*	*Ground for VFS (Line Pressure) Solenoid control*
9	*Blue*	*Ground for DCC Solenoid control*
10	*Green*	*Ground for Reduction Solenoid control*
11	*Brown*	*Ground for Low/Reverse Solenoid control*
12	*Orange*	*Ground for Overdrive Solenoid control*

NOTE: Wire colors may vary.

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Figure 7

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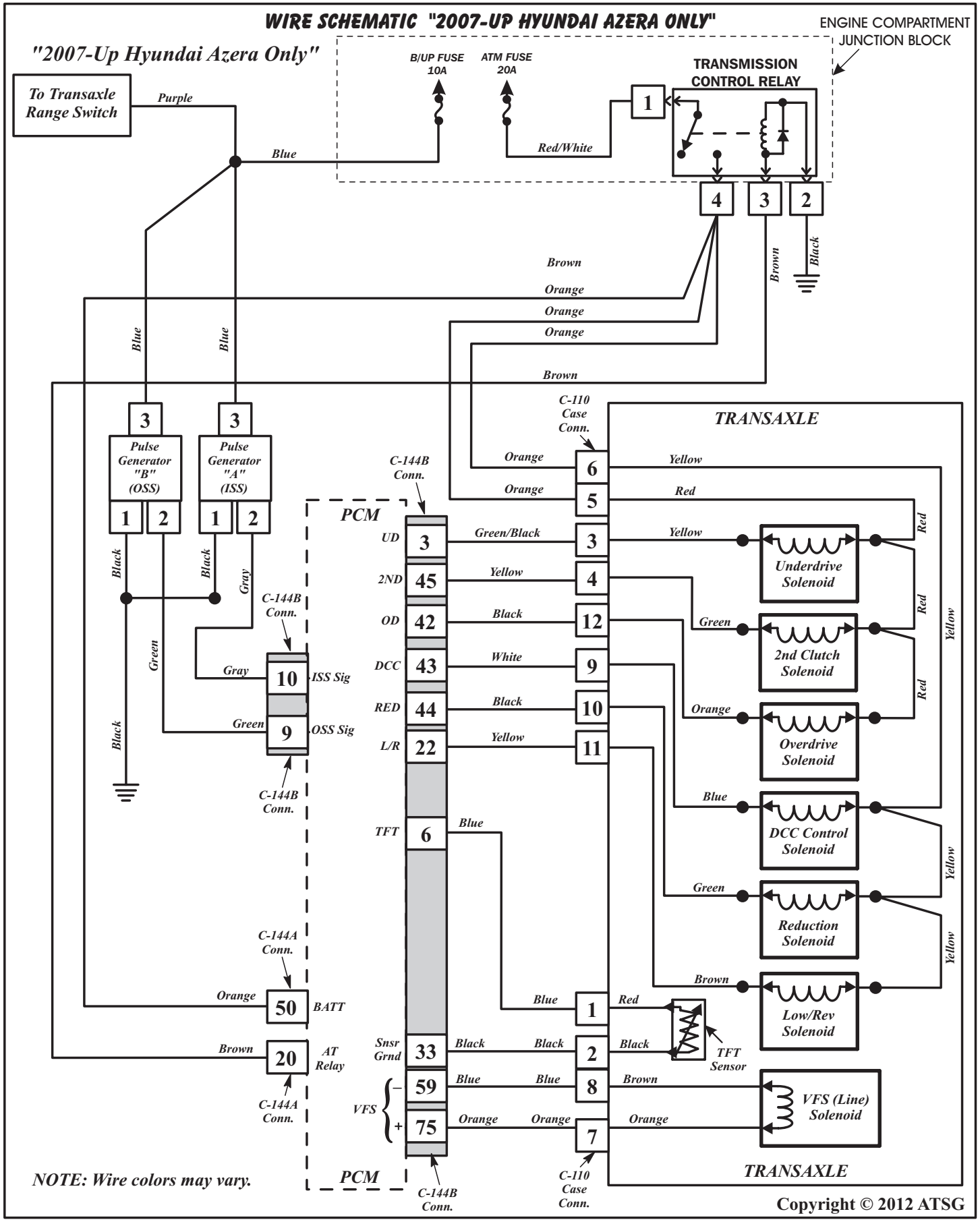


Figure 8

Automatic Transmission Service Group

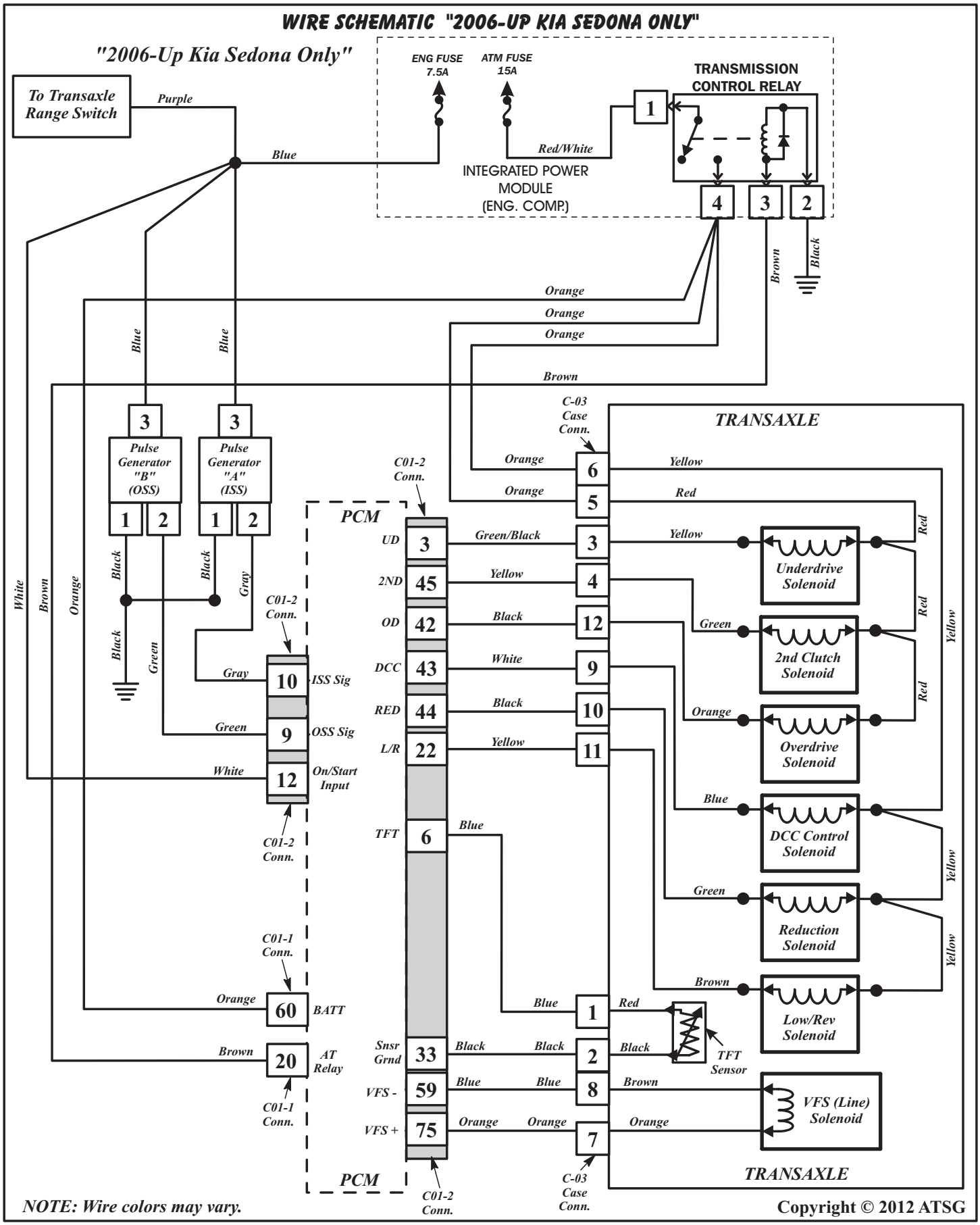
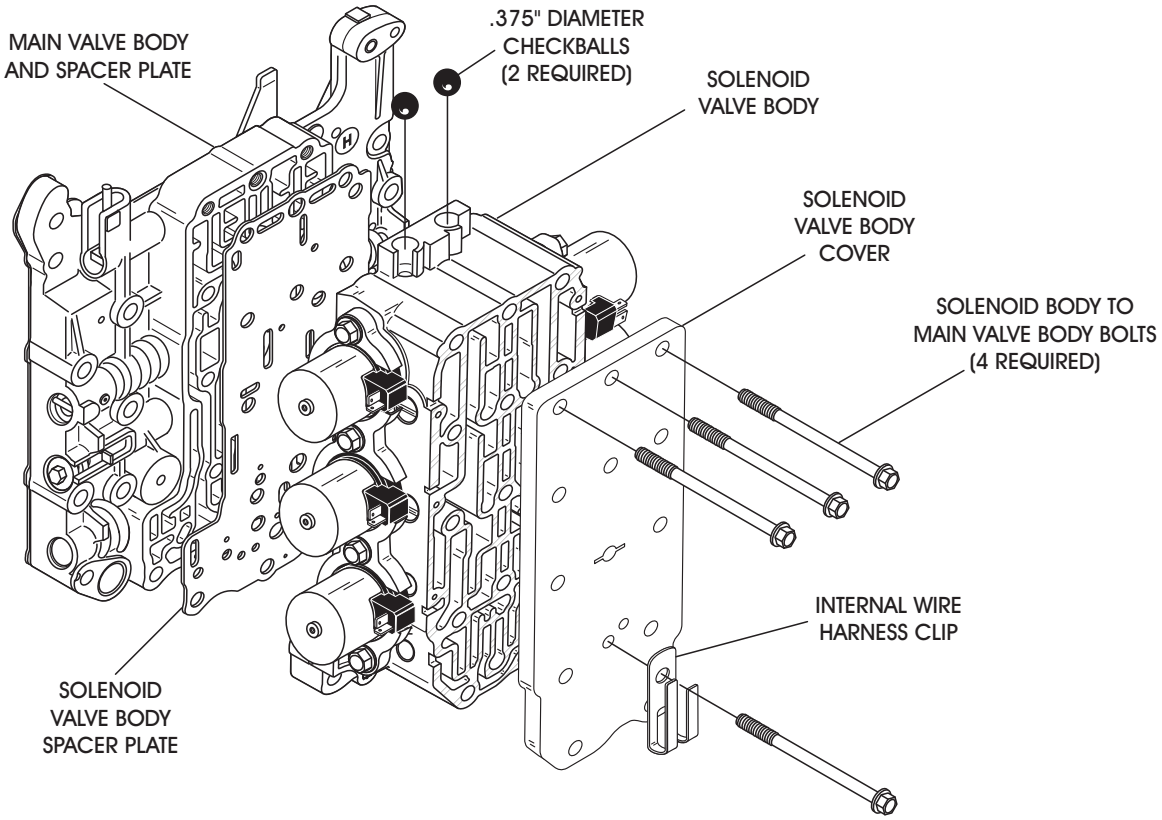


Figure 9
Automatic Transmission Service Group

"MITSUBISHI", "PRE-2006 KIA" & "PRE-2007 HYUNDIA" VALVE BODY EXPLODED VIEWS

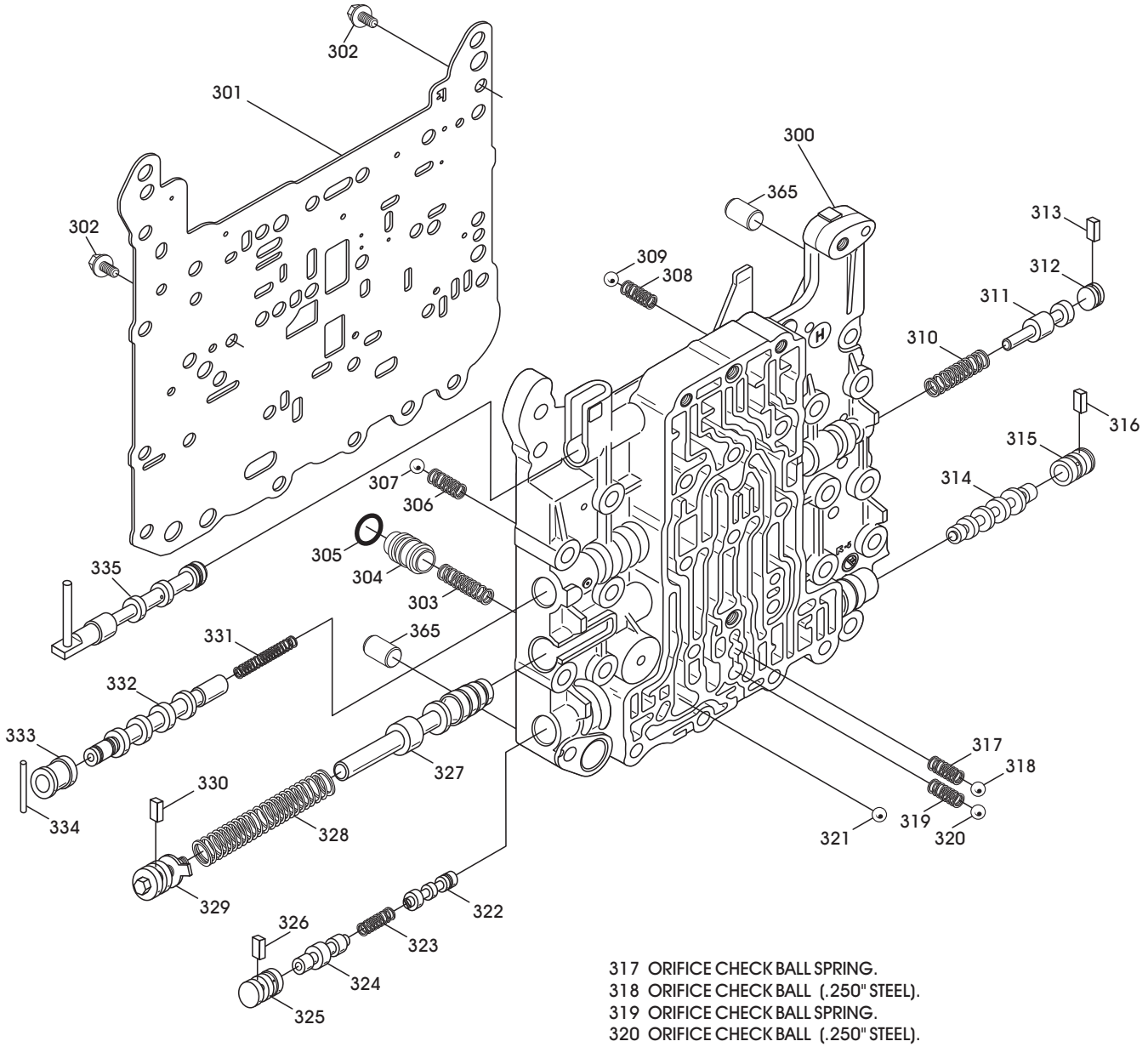


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Figure 10

SONNAX - 37

"MITSUBISHI", "PRE-2006 KIA" & "PRE-2007 HYUNDIA"
MAIN VALVE BODY EXPLODED VIEW

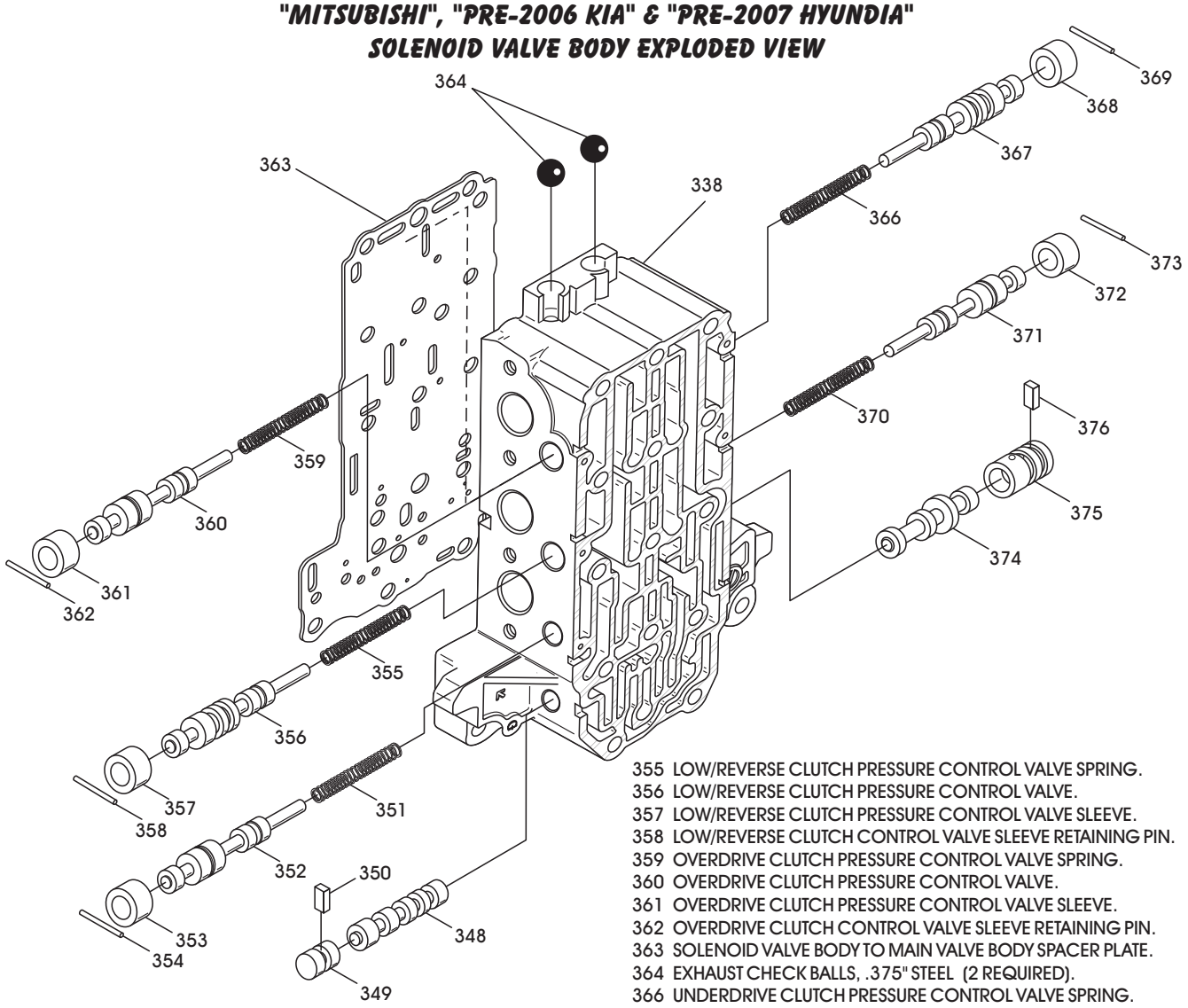


300 MAIN VALVE BODY CASTING.
301 MAIN VALVE BODY TO CASE SPACER PLATE.
302 MAIN VALVE BODY SPACER PLATE BOLTS (2 REQUIRED).
303 DAMPING VALVE SPRING.
304 DAMPING VALVE.
305 DAMPING VALVE "O" RING SEAL.
306 LINE RELIEF CHECK BALL SPRING.
307 LINE RELIEF CHECK BALL (.250" STEEL).
308 ORIFICE CHECK BALL SPRING.
309 ORIFICE CHECK BALL (.250" STEEL).
310 TORQUE CONVERTER PRESSURE CONTROL VALVE SPRING.
311 TORQUE CONVERTER PRESSURE CONTROL VALVE.
312 TORQUE CONVERTER PRESSURE CONTROL VALVE BORE PLUG.
313 TCC PRESSURE CONTROL VALVE BORE PLUG RETAINER.
314 FAIL-SAFE VALVE "B".
315 FAIL-SAFE VALVE "B" SLEEVE.
316 FAIL-SAFE VALVE "B" SLEEVE RETAINER.
317 ORIFICE CHECK BALL SPRING.
318 ORIFICE CHECK BALL (.250" STEEL).
319 ORIFICE CHECK BALL SPRING.
320 ORIFICE CHECK BALL (.250" STEEL).
321 BATHTUB CHECK BALL (.250" STEEL).
322 FAIL-SAFE VALVE "A1".
323 FAIL-SAFE VALVE "A" SPRING.
324 FAIL-SAFE VALVE "A2".
325 FAIL-SAFE VALVE "A" BORE PLUG.
326 FAIL-SAFE VALVE "A" BORE PLUG RETAINER.
327 MAIN PRESSURE REGULATOR VALVE.
328 MAIN PRESSURE REGULATOR VALVE SPRING.
329 MAIN PRESSURE REGULATOR ADJUSTMENT CONTROL.
330 MAIN PRESSURE ADJUSTMENT CONTROL RETAINER.
331 TORQUE CONVERTER CLUTCH CONTROL VALVE SPRING.
332 TORQUE CONVERTER CLUTCH CONTROL VALVE.
333 TORQUE CONVERTER CLUTCH CONTROL VALVE SLEEVE.
334 TCC CONTROL VALVE SLEEVE RETAINING PIN.
335 MANUAL SHIFT VALVE.
365 VALVE BODY TO CASE HOLLOW DOWELS.

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Figure 11

"MITSUBISHI", "PRE-2006 KIA" & "PRE-2007 HYUNDIA" SOLENOID VALVE BODY EXPLODED VIEW



338 SOLENOID VALVE BODY CASTING.
348 SWITCHING VALVE.
349 SWITCHING VALVE BORE PLUG.
350 SWITCHING VALVE BORE PLUG RETAINER.
351 REDUCTION BRAKE BAND PRESSURE CONTROL VALVE SPRING.
352 REDUCTION BRAKE BAND PRESSURE CONTROL VALVE.
353 REDUCTION BRAKE BAND PRESSURE CONTROL VALVE SLEEVE.
354 REDUCTION BAND CONTROL VALVE SLEEVE RETAINING PIN.

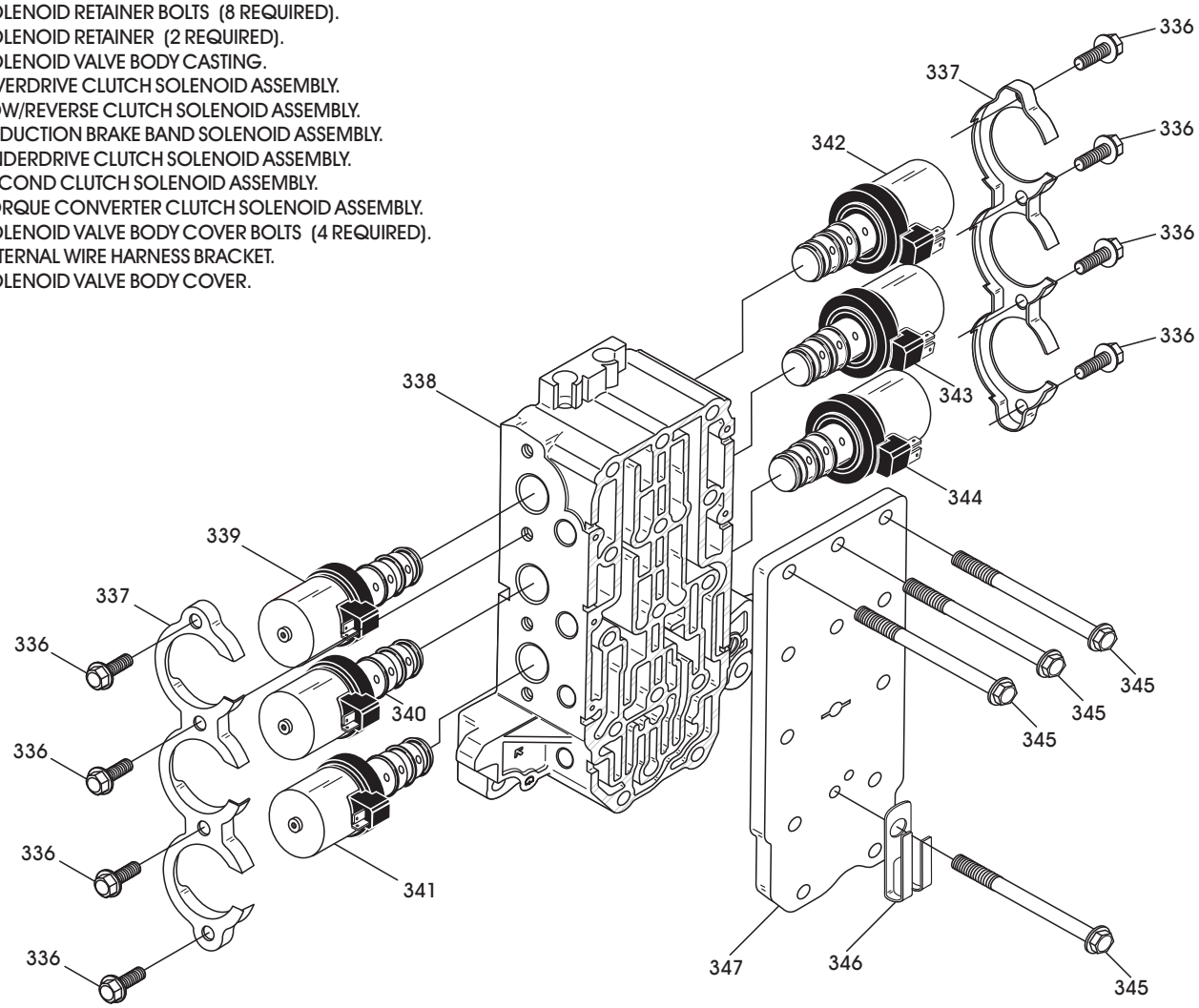
355 LOW/REVERSE CLUTCH PRESSURE CONTROL VALVE SPRING.
356 LOW/REVERSE CLUTCH PRESSURE CONTROL VALVE.
357 LOW/REVERSE CLUTCH PRESSURE CONTROL VALVE SLEEVE.
358 LOW/REVERSE CLUTCH CONTROL VALVE SLEEVE RETAINING PIN.
359 OVERDRIVE CLUTCH PRESSURE CONTROL VALVE SPRING.
360 OVERDRIVE CLUTCH PRESSURE CONTROL VALVE.
361 OVERDRIVE CLUTCH PRESSURE CONTROL VALVE SLEEVE.
362 OVERDRIVE CLUTCH CONTROL VALVE SLEEVE RETAINING PIN.
363 SOLENOID VALVE BODY TO MAIN VALVE BODY SPACER PLATE.
364 EXHAUST CHECK BALLS, .375" STEEL (2 REQUIRED).
366 UNDERDRIVE CLUTCH PRESSURE CONTROL VALVE SPRING.
367 UNDERDRIVE CLUTCH PRESSURE CONTROL VALVE.
368 UNDERDRIVE CLUTCH PRESSURE CONTROL VALVE SLEEVE.
369 UNDERDRIVE CLUTCH CONTROL VALVE SLEEVE RETAINING PIN.
370 SECOND CLUTCH PRESSURE CONTROL VALVE SPRING.
371 SECOND CLUTCH PRESSURE CONTROL VALVE.
372 SECOND CLUTCH PRESSURE CONTROL VALVE SLEEVE.
373 SECOND CLUTCH CONTROL VALVE SLEEVE RETAINING PIN.
374 FAIL-SAFE VALVE "C".
375 FAIL-SAFE VALVE "C" SLEEVE.
376 FAIL-SAFE VALVE "C" SLEEVE RETAINER.

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Figure 12

"MITSUBISHI", "PRE-2006 KIA" & "PRE-2007 HYUNDIA"
SOLENOID VALVE BODY EXPLODED VIEW

336 SOLENOID RETAINER BOLTS (8 REQUIRED).
337 SOLENOID RETAINER (2 REQUIRED).
338 SOLENOID VALVE BODY CASTING.
339 OVERDRIVE CLUTCH SOLENOID ASSEMBLY.
340 LOW/REVERSE CLUTCH SOLENOID ASSEMBLY.
341 REDUCTION BRAKE BAND SOLENOID ASSEMBLY.
342 UNDERDRIVE CLUTCH SOLENOID ASSEMBLY.
343 SECOND CLUTCH SOLENOID ASSEMBLY.
344 TORQUE CONVERTER CLUTCH SOLENOID ASSEMBLY.
345 SOLENOID VALVE BODY COVER BOLTS (4 REQUIRED).
346 INTERNAL WIRE HARNESS BRACKET.
347 SOLENOID VALVE BODY COVER.

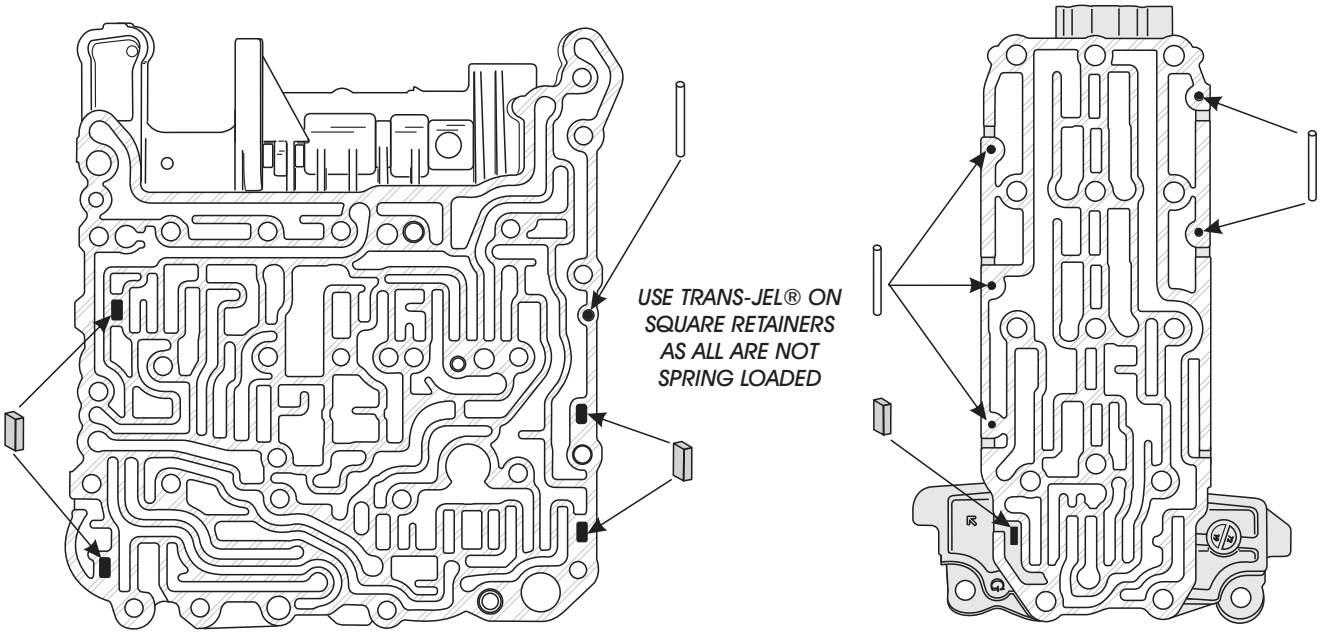


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Figure 13

SLAUSON - 41

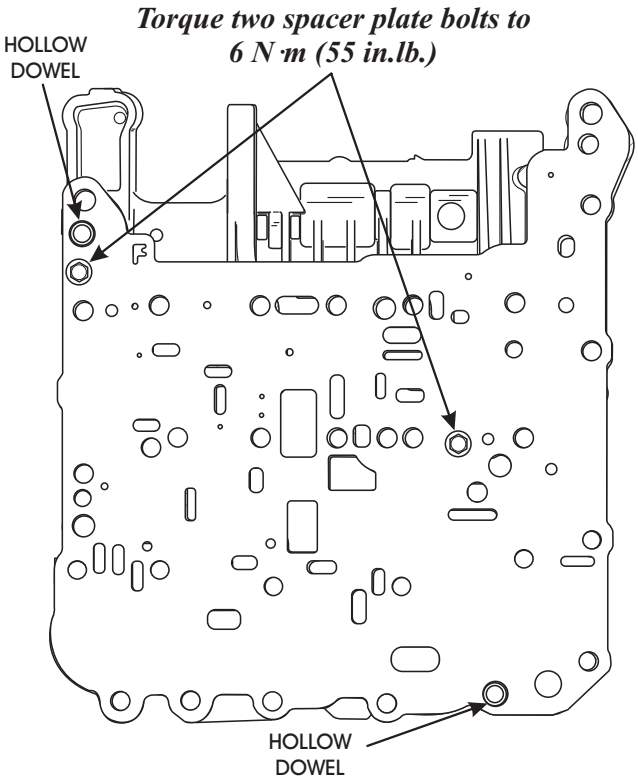
"MITSUBISHI", "PRE-2006 KIA" & "PRE-2007 HYUNDIA" VALVE BODY RETAINER LOCATIONS

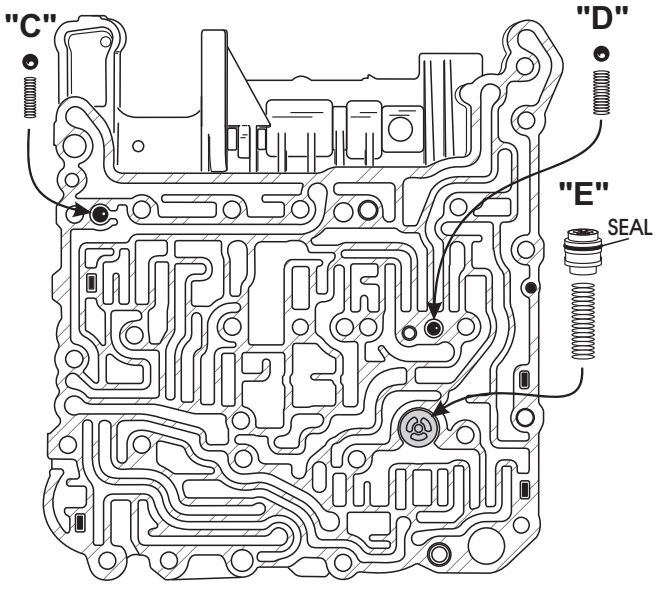


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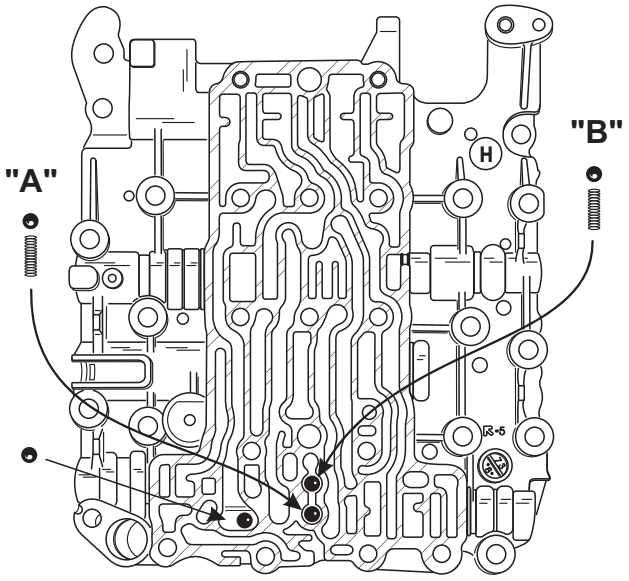
Figure 14

"MITSUBISHI", "PRE-2006 KIA" & "PRE-2007 HYUNDIA" SMALL PARTS LOCATIONS





CHECKBALL AND SPRING DIMENSIONS		
SPRING	LENGTH	DIAMETER
"C"	.665"	.177"
"D"	.677"	.277"
"E"	1.398"	.300"
CHECKBALLS ARE .250" DIAMETER STEEL		



CHECKBALL AND SPRING DIMENSIONS		
SPRING	LENGTH	DIAMETER
"A"	.665"	.177"
"B"	.665"	.177"
CHECKBALLS ARE .250" DIAMETER STEEL		

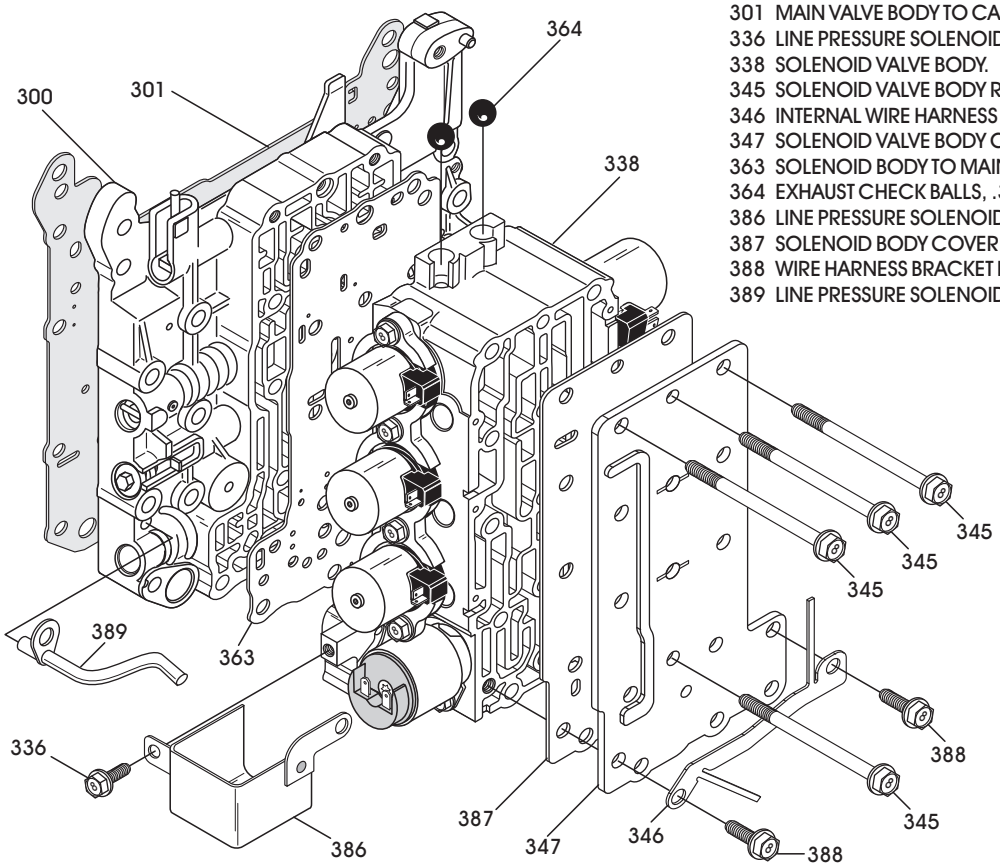
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Figure 15

TD - 44

EZ-DRIVER - 45

"2006-UP KIA" & "2007-UP HYUNDAI" VALVE BODY EXPLODED VIEWS

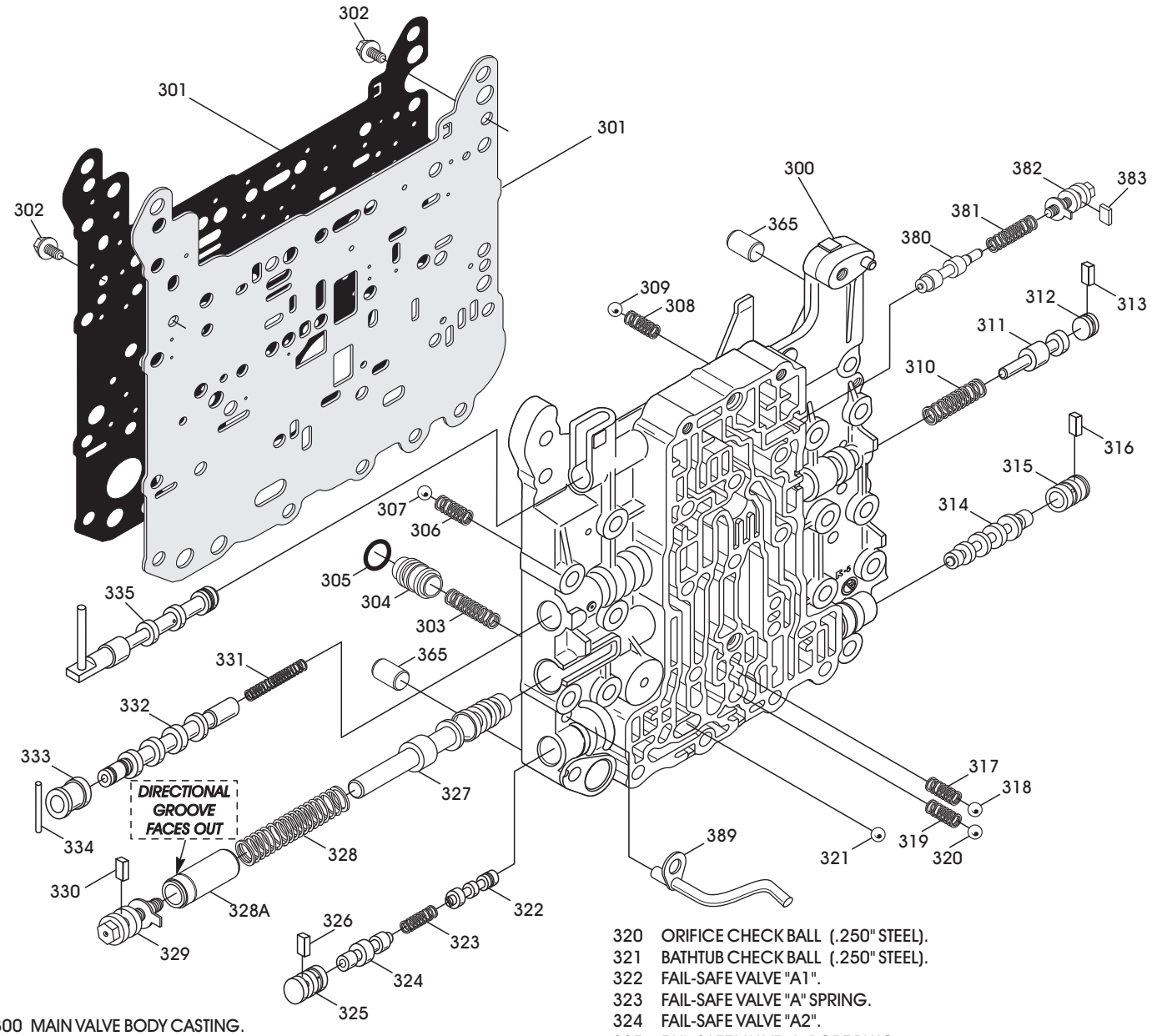


300 MAIN VALVE BODY.
301 MAIN VALVE BODY TO CASE SPACER PLATE AND GASKET.
336 LINE PRESSURE SOLENOID OIL SHIELD RETAINING BOLT.
338 SOLENOID VALVE BODY.
345 SOLENOID VALVE BODY RETAINING BOLTS (4 REQUIRED).
346 INTERNAL WIRE HARNESS BRACKET.
347 SOLENOID VALVE BODY COVER.
363 SOLENOID BODY TO MAIN VALVE BODY SPACER PLATE.
364 EXHAUST CHECK BALLS, .375" STEEL (2 REQUIRED).
386 LINE PRESSURE SOLENOID OIL SHIELD.
387 SOLENOID BODY COVER TO SOLENOID BODY SPACER PLATE.
388 WIRE HARNESS BRACKET RETAINING BOLTS (2 REQUIRED).
389 LINE PRESSURE SOLENOID COOLING TUBE.

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Figure 16

"2006-UP KIA" & "2007-UP HYUNDAI" MAIN VALVE BODY EXPLODED VIEW

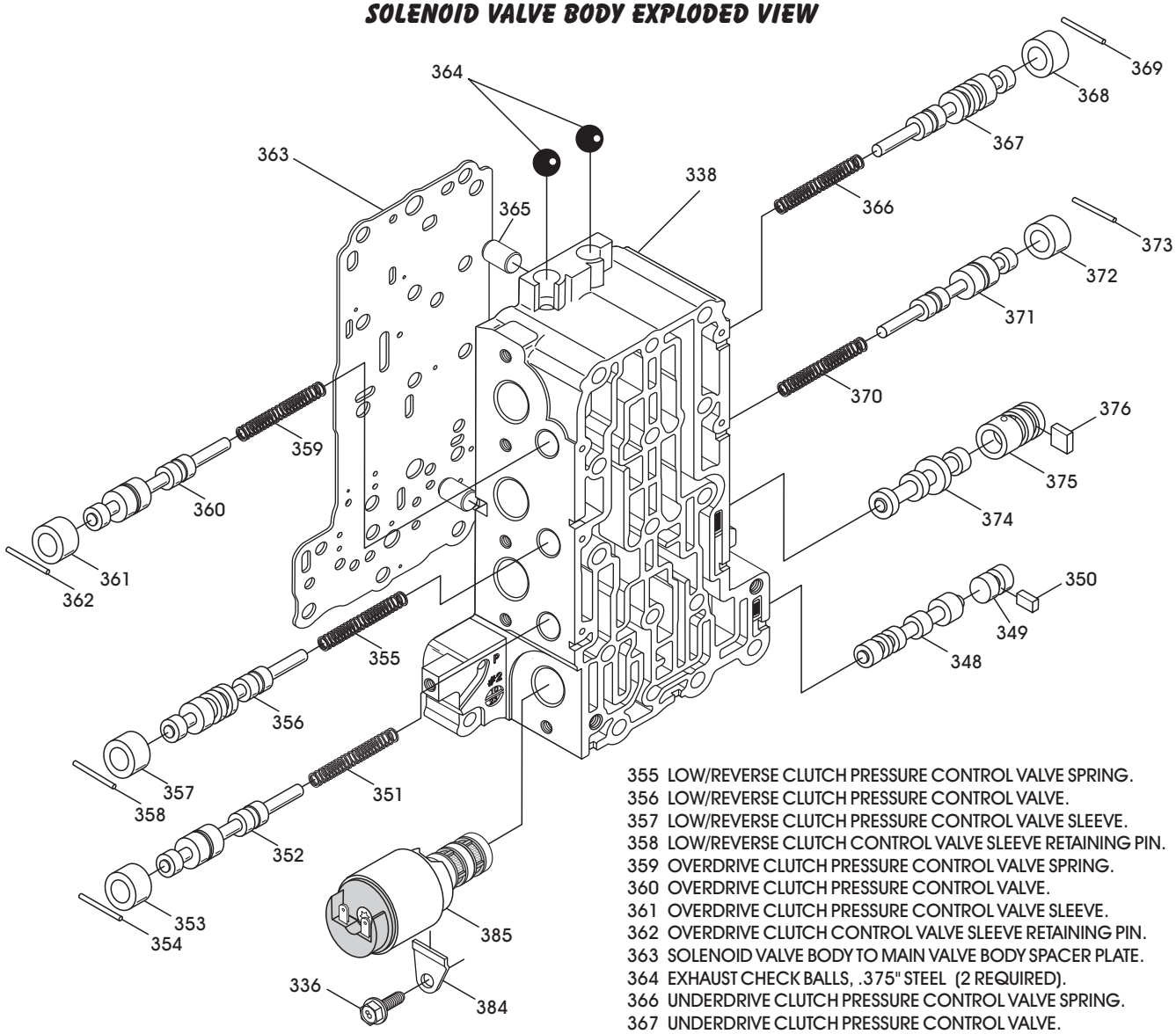


300 MAIN VALVE BODY CASTING.
301 MAIN VALVE BODY TO CASE SPACER PLATE AND GASKET.
302 MAIN VALVE BODY SPACER PLATE BOLTS (2 REQUIRED).
303 DAMPING VALVE SPRING.
304 DAMPING VALVE.
305 DAMPING VALVE "O" RING SEAL.
306 LINE RELIEF CHECK BALL SPRING.
307 LINE RELIEF CHECK BALL (.250" STEEL).
308 ORIFICE CHECK BALL SPRING.
309 ORIFICE CHECK BALL (.250" STEEL).
310 TORQUE CONVERTER PRESSURE CONTROL VALVE SPRING.
311 TORQUE CONVERTER PRESSURE CONTROL VALVE.
312 TORQUE CONVERTER PRESSURE CONTROL VALVE BORE PLUG.
313 TC PRESSURE CONTROL VALVE BORE PLUG RETAINER.
314 FAIL-SAFE VALVE "B".
315 FAIL-SAFE VALVE "B" SLEEVE.
316 FAIL-SAFE VALVE "B" SLEEVE RETAINER.
317 ORIFICE CHECK BALL SPRING.
318 ORIFICE CHECK BALL (.250" STEEL).
319 ORIFICE CHECK BALL SPRING.
320 ORIFICE CHECK BALL (.250" STEEL).
321 BATHTUB CHECK BALL (.250" STEEL).
322 FAIL-SAFE VALVE "A1".
323 FAIL-SAFE VALVE "A" SPRING.
324 FAIL-SAFE VALVE "A2".
325 FAIL-SAFE VALVE "A" BORE PLUG.
326 FAIL-SAFE VALVE "A" BORE PLUG RETAINER.
327 MAIN PRESSURE REGULATOR VALVE.
328 MAIN PRESSURE REGULATOR VALVE SPRING.
328A MAIN PRESSURE REGULATOR SLEEVE
329 MAIN PRESSURE REGULATOR ADJUSTMENT CONTROL.
330 MAIN PRESSURE ADJUSTMENT CONTROL RETAINER.
331 TORQUE CONVERTER CLUTCH CONTROL VALVE SPRING.
332 TORQUE CONVERTER CLUTCH CONTROL VALVE.
333 TORQUE CONVERTER CLUTCH CONTROL VALVE SLEEVE.
334 TCC CONTROL VALVE SLEEVE RETAINING PIN.
335 MANUAL SHIFT VALVE.
365 VALVE BODY TO CASE HOLLOW DOWELS.
380 SOLENOID REDUCING VALVE.
381 SOLENOID REDUCING VALVE SPRING.
382 SOLENOID REDUCING VALVE PLUG & ADJUSTMENT CONTROL.
383 SOLENOID REDUCING VALVE BORE PLUG RETAINER.
389 (VFS) LINE PRESSURE SOLENOID COOLING TUBE.

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Figure 17

"2006-UP KIA" & "2007-UP HYUNDAI" SOLENOID VALVE BODY EXPLODED VIEW



336 SOLENOID RETAINING BOLT.
338 SOLENOID VALVE BODY CASTING.
348 SWITCHING VALVE.
349 SWITCHING VALVE BORE PLUG.
350 SWITCHING VALVE BORE PLUG RETAINER.
351 REDUCTION BRAKE BAND PRESSURE CONTROL VALVE SPRING.
352 REDUCTION BRAKE BAND PRESSURE CONTROL VALVE.
353 REDUCTION BRAKE BAND PRESSURE CONTROL VALVE SLEEVE.
354 REDUCTION BAND CONTROL VALVE SLEEVE RETAINING PIN.

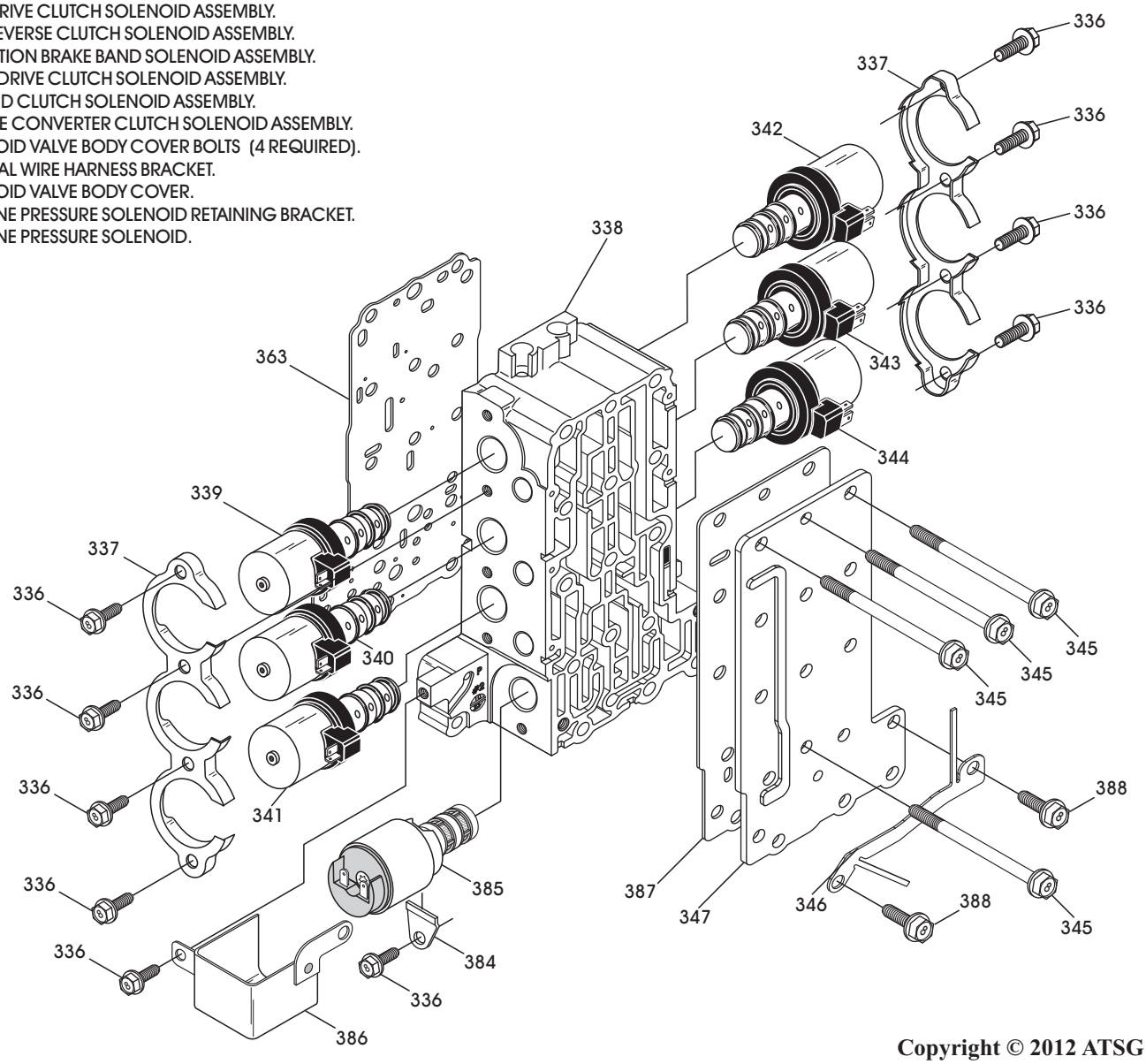
355 LOW/REVERSE CLUTCH PRESSURE CONTROL VALVE SPRING.
356 LOW/REVERSE CLUTCH PRESSURE CONTROL VALVE.
357 LOW/REVERSE CLUTCH PRESSURE CONTROL VALVE SLEEVE.
358 LOW/REVERSE CLUTCH CONTROL VALVE SLEEVE RETAINING PIN.
359 OVERDRIVE CLUTCH PRESSURE CONTROL VALVE SPRING.
360 OVERDRIVE CLUTCH PRESSURE CONTROL VALVE.
361 OVERDRIVE CLUTCH PRESSURE CONTROL VALVE SLEEVE.
362 OVERDRIVE CLUTCH CONTROL VALVE SLEEVE RETAINING PIN.
363 SOLENOID VALVE BODY TO MAIN VALVE BODY SPACER PLATE.
364 EXHAUST CHECK BALLS, .375" STEEL (2 REQUIRED).
366 UNDERDRIVE CLUTCH PRESSURE CONTROL VALVE SPRING.
367 UNDERDRIVE CLUTCH PRESSURE CONTROL VALVE.
368 UNDERDRIVE CLUTCH PRESSURE CONTROL VALVE SLEEVE.
369 UNDERDRIVE CLUTCH CONTROL VALVE SLEEVE RETAINING PIN.
370 SECOND CLUTCH PRESSURE CONTROL VALVE SPRING.
371 SECOND CLUTCH PRESSURE CONTROL VALVE.
372 SECOND CLUTCH PRESSURE CONTROL VALVE SLEEVE.
373 SECOND CLUTCH CONTROL VALVE SLEEVE RETAINING PIN.
374 FAIL-SAFE VALVE "C".
375 FAIL-SAFE VALVE "C" SLEEVE.
376 FAIL-SAFE VALVE "C" SLEEVE RETAINER.
384 (VFS) LINE PRESSURE SOLENOID RETAINING BRACKET.
385 (VFS) LINE PRESSURE SOLENOID.

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Figure 18

"2006-UP KIA" & "2007-UP HYUNDAI" SOLENOID I.D.

336 SOLENOID RETAINER BOLTS (10 REQUIRED).
337 SOLENOID RETAINER (2 REQUIRED).
338 SOLENOID VALVE BODY CASTING.
339 OVERDRIVE CLUTCH SOLENOID ASSEMBLY.
340 LOW/REVERSE CLUTCH SOLENOID ASSEMBLY.
341 REDUCTION BRAKE BAND SOLENOID ASSEMBLY.
342 UNDERDRIVE CLUTCH SOLENOID ASSEMBLY.
343 SECOND CLUTCH SOLENOID ASSEMBLY.
344 TORQUE CONVERTER CLUTCH SOLENOID ASSEMBLY.
345 SOLENOID VALVE BODY COVER BOLTS (4 REQUIRED).
346 INTERNAL WIRE HARNESS BRACKET.
347 SOLENOID VALVE BODY COVER.
384 (VFS) LINE PRESSURE SOLENOID RETAINING BRACKET.
385 (VFS) LINE PRESSURE SOLENOID.
386 (VFS) LINE PRESSURE SOLENOID OIL SHIELD.
387 SOLENOID BODY COVER TO SOLENOID BODY SPACER PLATE.
388 WIRE HARNESS BRACKET RETAINING BOLTS (2 REQUIRED).



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Figure 19

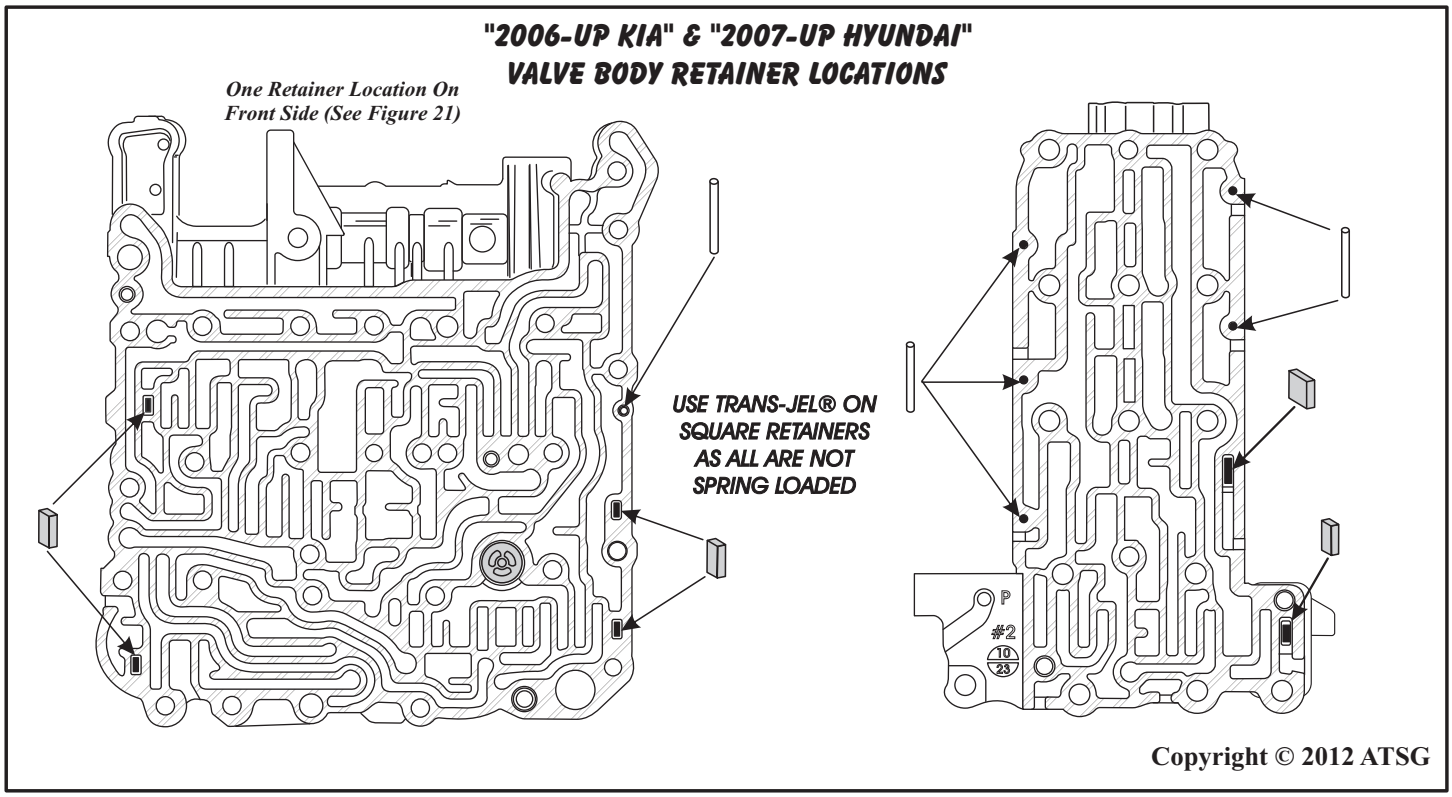
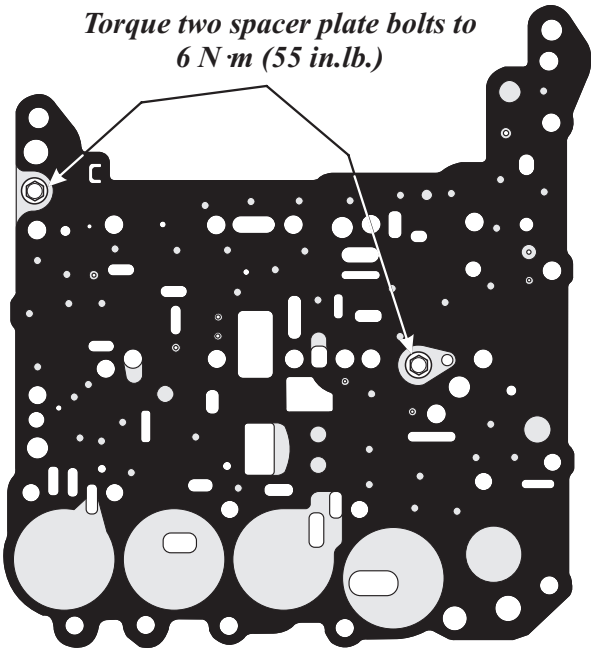
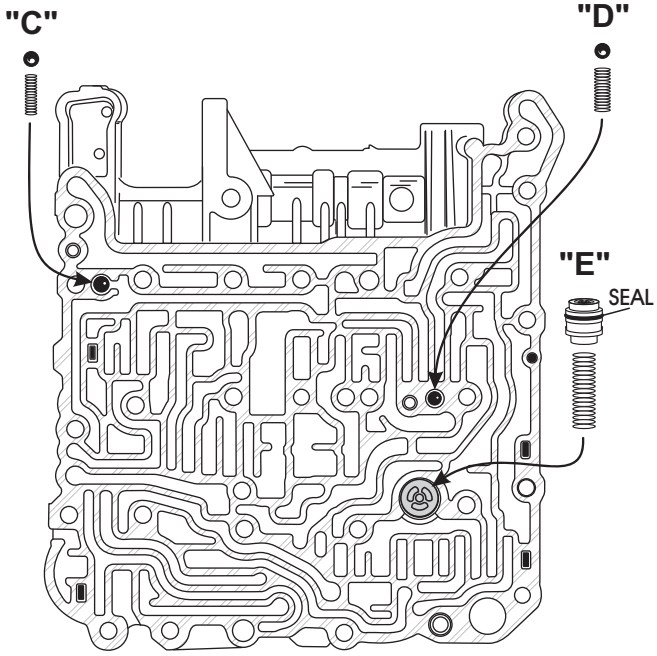

"2006-UP KIA" & "2007-UP HYUNDAI"
VALVE BODY RETAINER LOCATIONS
One Retainer Location On
Front Side (See Figure 21)
USE TRANS-JEL® ON
SQUARE RETAINERS
AS ALL ARE NOT
SPRING LOADED
P
#2
10
23
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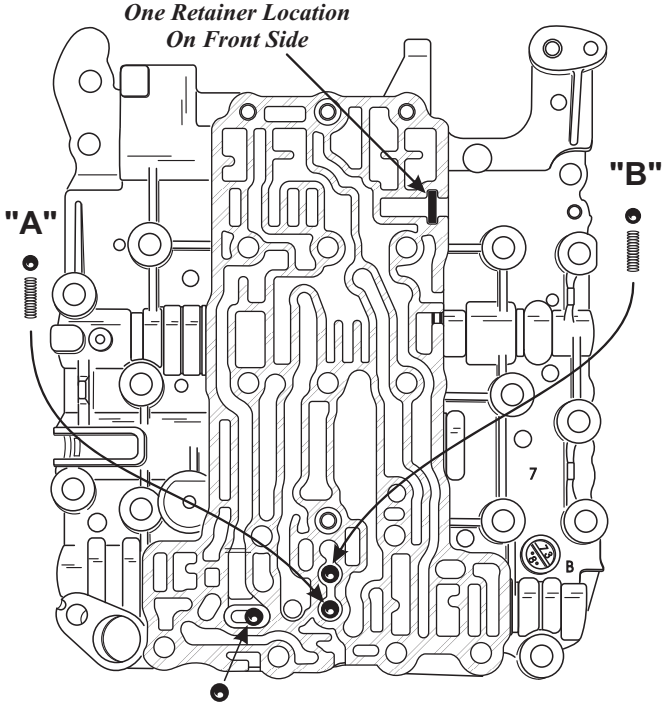
Figure 20

"2006-UP KIA" & "2007-UP HYUNDAI" SMALL PARTS LOCATIONS





CHECKBALL AND SPRING DIMENSIONS		
SPRING	LENGTH	DIAMETER
"C"	.322"	.200"
"D"	.681"	.277"
"E"	1.398"	.300"
CHECKBALLS ARE .250" DIAMETER STEEL		



CHECKBALL AND SPRING DIMENSIONS		
SPRING	LENGTH	DIAMETER
"A"	.665"	.177"
"B"	.665"	.177"
CHECKBALLS ARE .250" DIAMETER STEEL		

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Figure 21

MERCEDES 722.9
INTERMITTENT NO FIRST OR REVERSE

COMPLAINT: ***Reverse:***
A complaint of a no reverse condition occurs in the Comfort mode but has reverse in Sport Mode.

Drive 1st gear:
In Comfort Mode the transmission starts in 2nd gear but a neutralizing occurs when a kick-down into 1st gear takes place. In Sport mode the transmission does not have 1st gear.

These complaints usually occur after rebuild.

CAUSE: B3 oil guide pipe missing or not sealing.

Reverse:
There are two different reverse gear ratios available with the 722.9 via the Comfort and Sport Mode Button as explained in figure 1.

The B3 clutch is applied to provide reverse in the Comfort Mode while in the Sport Mode the B1 clutches are used. With a loss of pressure due to a missing or cracked B3 feed pipe the B3 clutches do not apply causing a no reverse condition in the Comfort Mode.

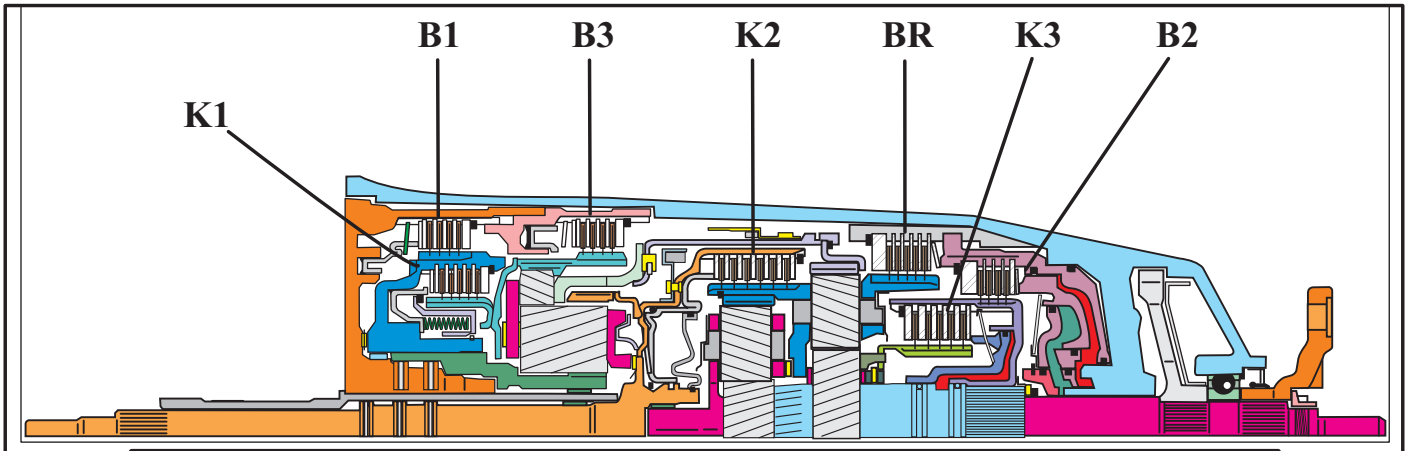
Drive 1st gear:
In the Comfort Mode, the vehicle has 2nd gear starts bypassing the need for the B3 clutches to be applied for a first gear take off. But if a kick-down into first gear is performed the transmission will neutralize with a loss of pressure due to a missing or cracked B3 feed pipe. This will also cause a no 1st gear complaint in the Sport Mode.

CORRECTION: If missing, locate and install the B3 pipe between the valve body and case (see Figures 2 and 3).

If it is broken and new one will need to be purchased.

SERVICE INFORMATION:

B3 Oil Guide Pipe.....A 220 277 00 47



Gear	Gear Ratio W7A 700	B1	B2	B3	BR	K1	K2	K3
1	4.377		X	X				X
2	2.859	X	X					X
3	1.921		X			X		X
4	1.368		X			X	X	
5	1.000					X	X	X
6	0.820	X					X	X
7	0.728			X			X	X
N (1)				X				X
R (1)	-3.416	X			X			X
R (2)	-2.231			X	X			X

(1) S Mode (2) C Mode (X) Applied

Variable Shift Programing

Two basic shift programs can be varied by customer using the S/C button on the Electronic Shifter Module.

"S"(Sport)

1st gear starts
Normal shift points
Reverse gear 1 (3.416:1)

"C" (Comfort)

2nd gear starts
Earlier up-shifts and later downshifts
Reverse gear 2 (2.231:1)

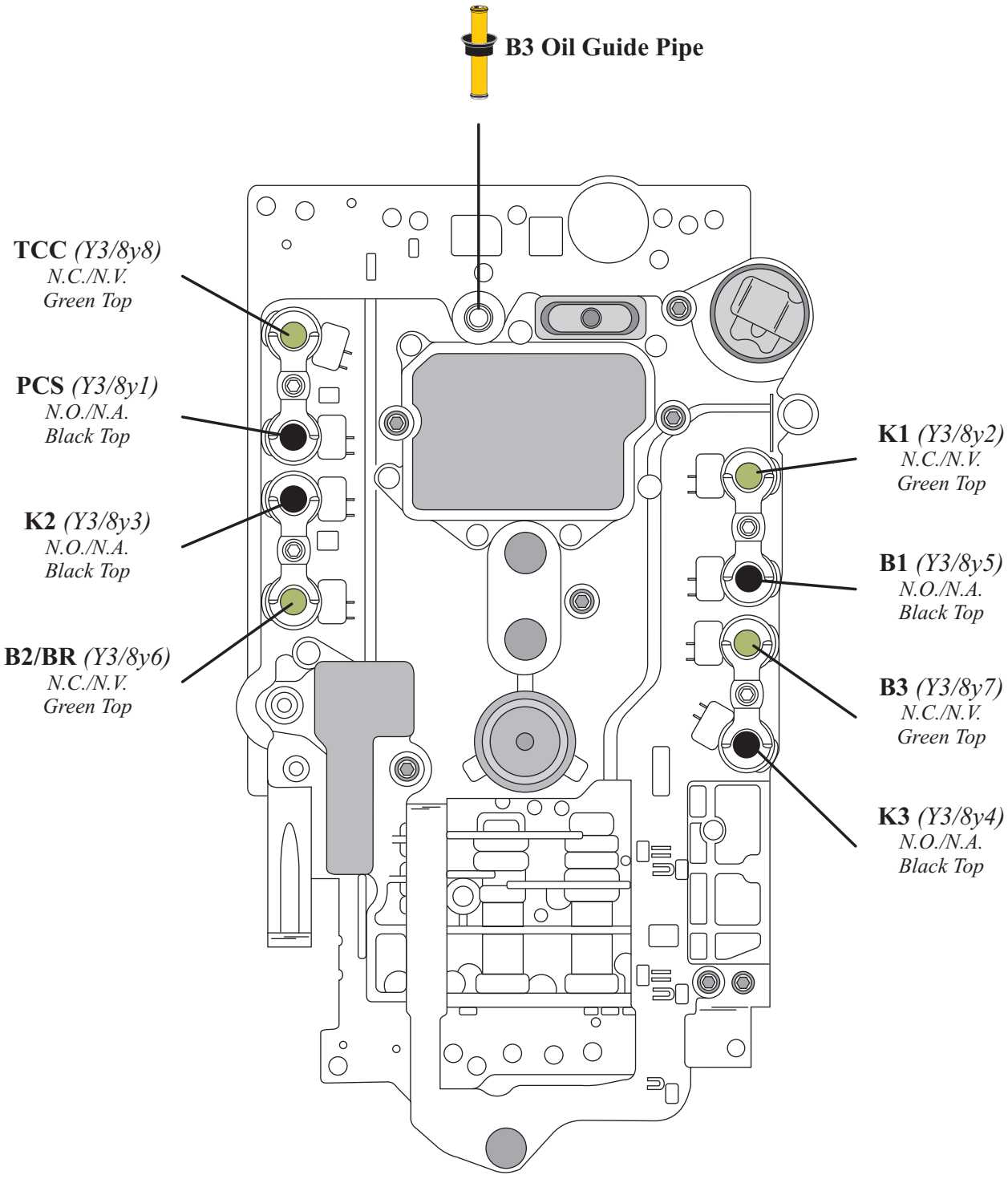
Note: Transmission will start in first gear if any of the following conditions apply:

1st gear is manually selected
3/4 to full throttle acceleration from start
Cold engine temp (pre catalytic warm up)

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Figure 1

MERCEDES 722.9
INTERMITTENT NO FIRST OR REVERSE



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Figure 2

MERCEDES 722.9
CHECK BALL FUNCTION AND LOCATION

COMPLAINT: After valve body inspection and cleaning the vehicle now produces various complaints not previously present such as severe clutch slip producing codes for gear ratio error. Or indescribable shift complaints with solenoid performance codes or TCC issues.

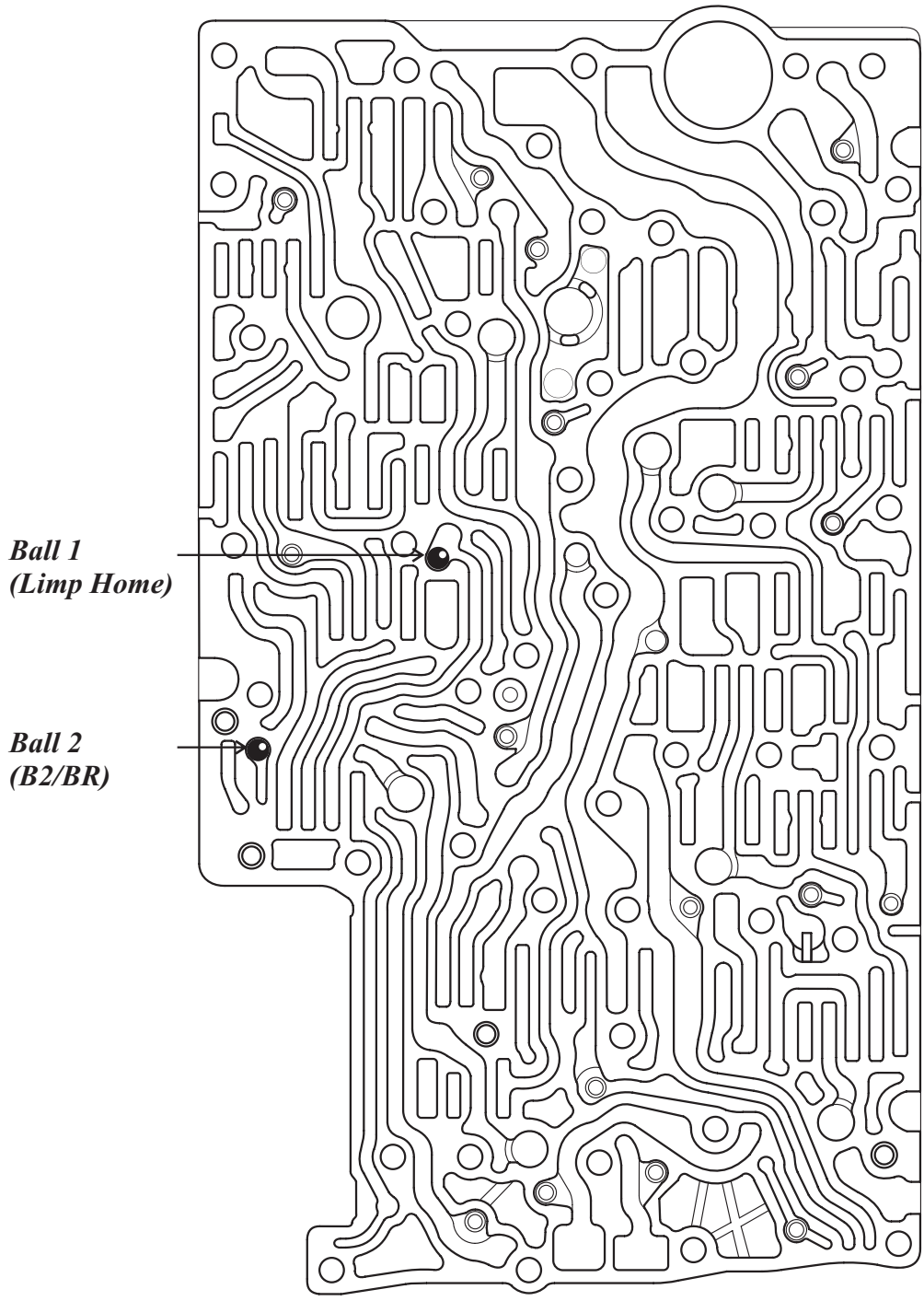
CAUSE: There are only two black Teflon style check balls in the 722.9 valve body that are used in the hydraulic activity of the transmission (Figures 1 and 4). The other 14 steel check balls are not (Figures 2 and 4). By gravity, these check balls seal off test ports used during the assembly process in the factory. Should any one of these balls be left out or misplaced a leak in a clutch circuit or a solenoid's signal oil circuit will occur causing some of the above mentioned complaints depending upon which ball or balls is missing or not sealing.

CORRECTION: Inspect each check ball for proper location and that each of the steel balls are in place and sealing off the test port so that their respective circuits are no longer dumping to exhaust.

Figures 1 through 3 provide the proper location of all 16 check balls and check valve as well as their function.

In addition to the steel check balls being specifically identified in figure 2 and the check valves in figure 3, a lower case letter has been assigned to show its location in the hydraulic schematic provided in figure 4.

2 Black Check Ball Identification and Location

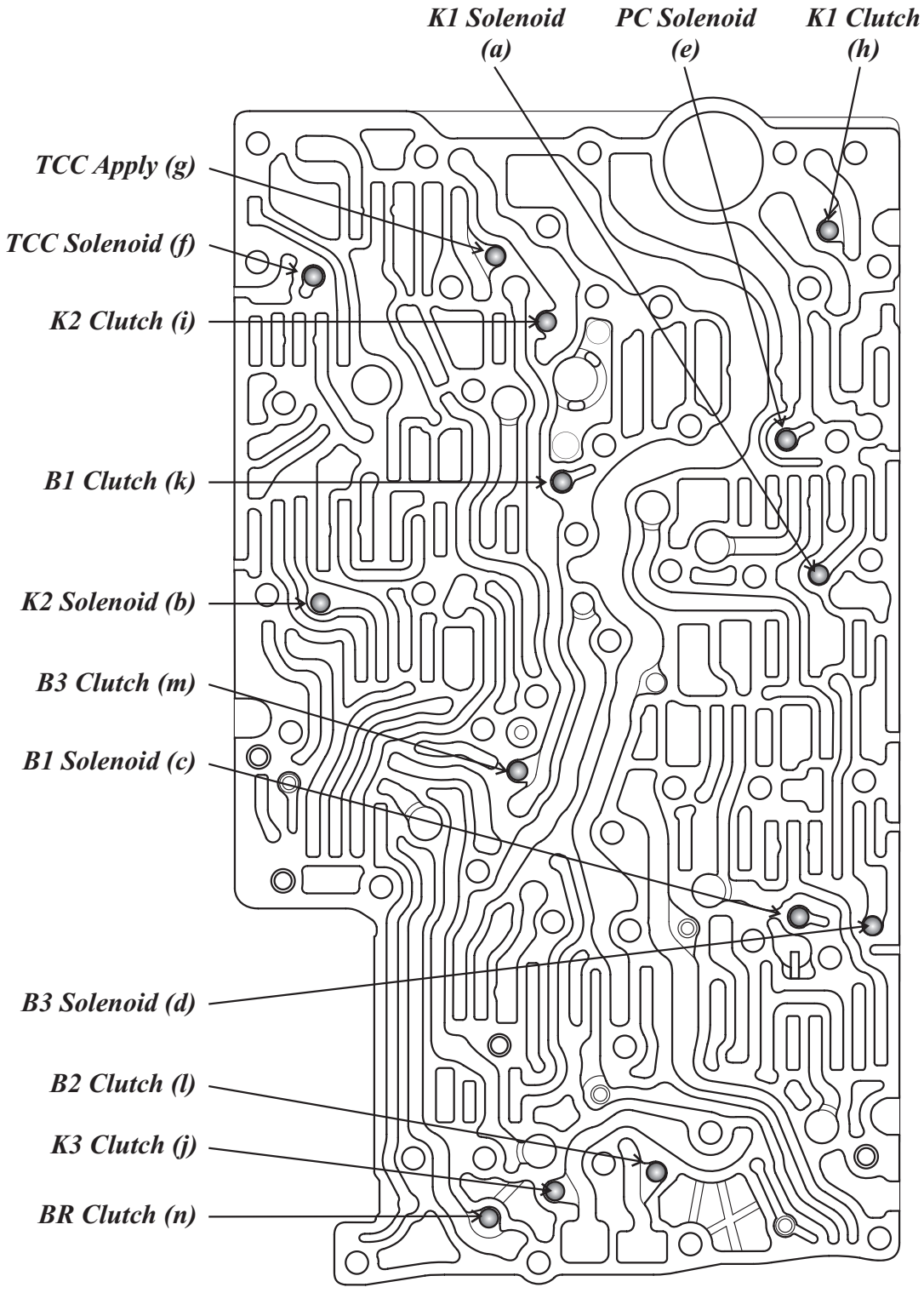


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Figure 1

TRANSTAR - 57

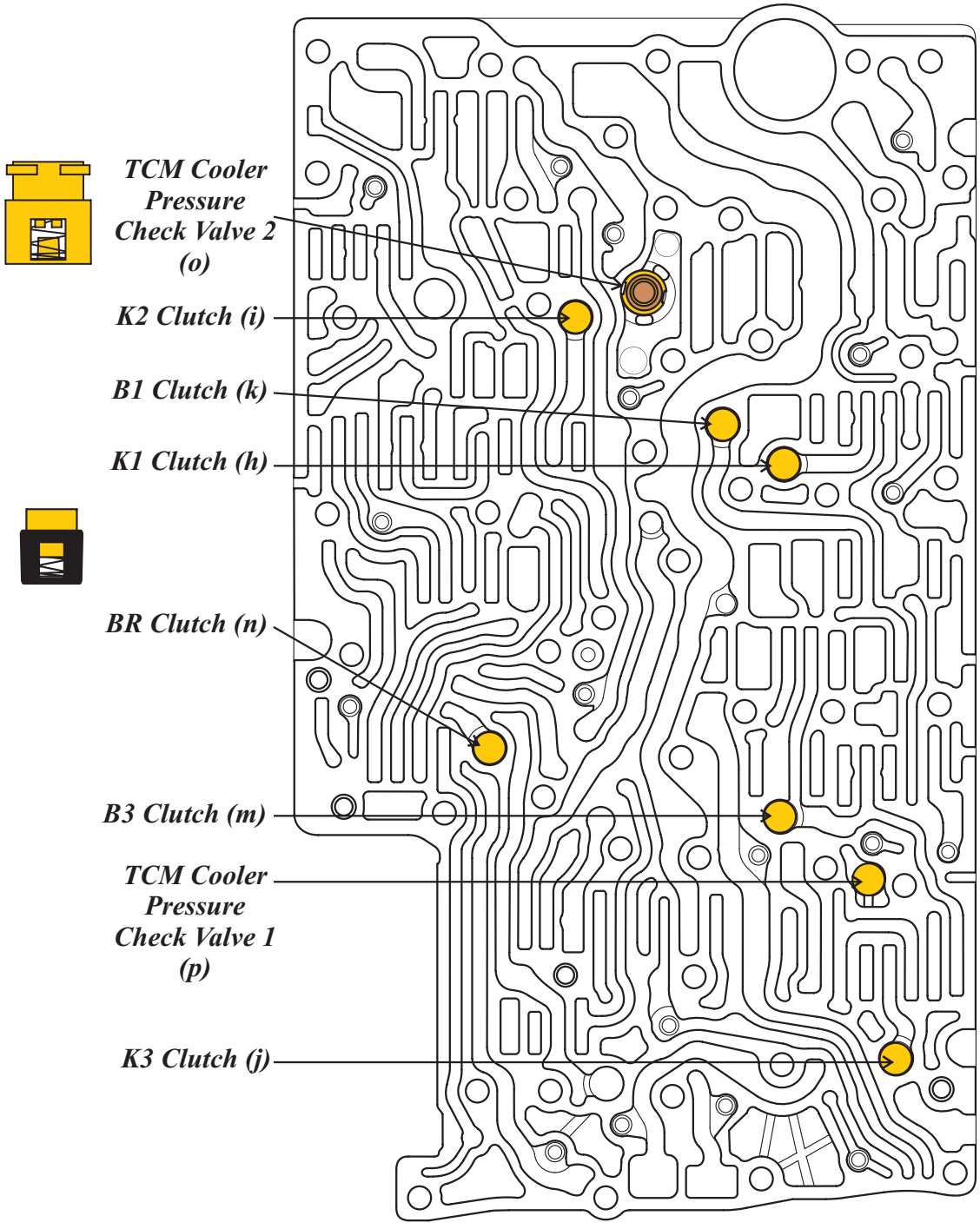
14 Steel Check Ball Identification and Locations
Sealing Off Factory Measuring Points



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Figure 2

8 Check Valve Identification and Location



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Figure 3

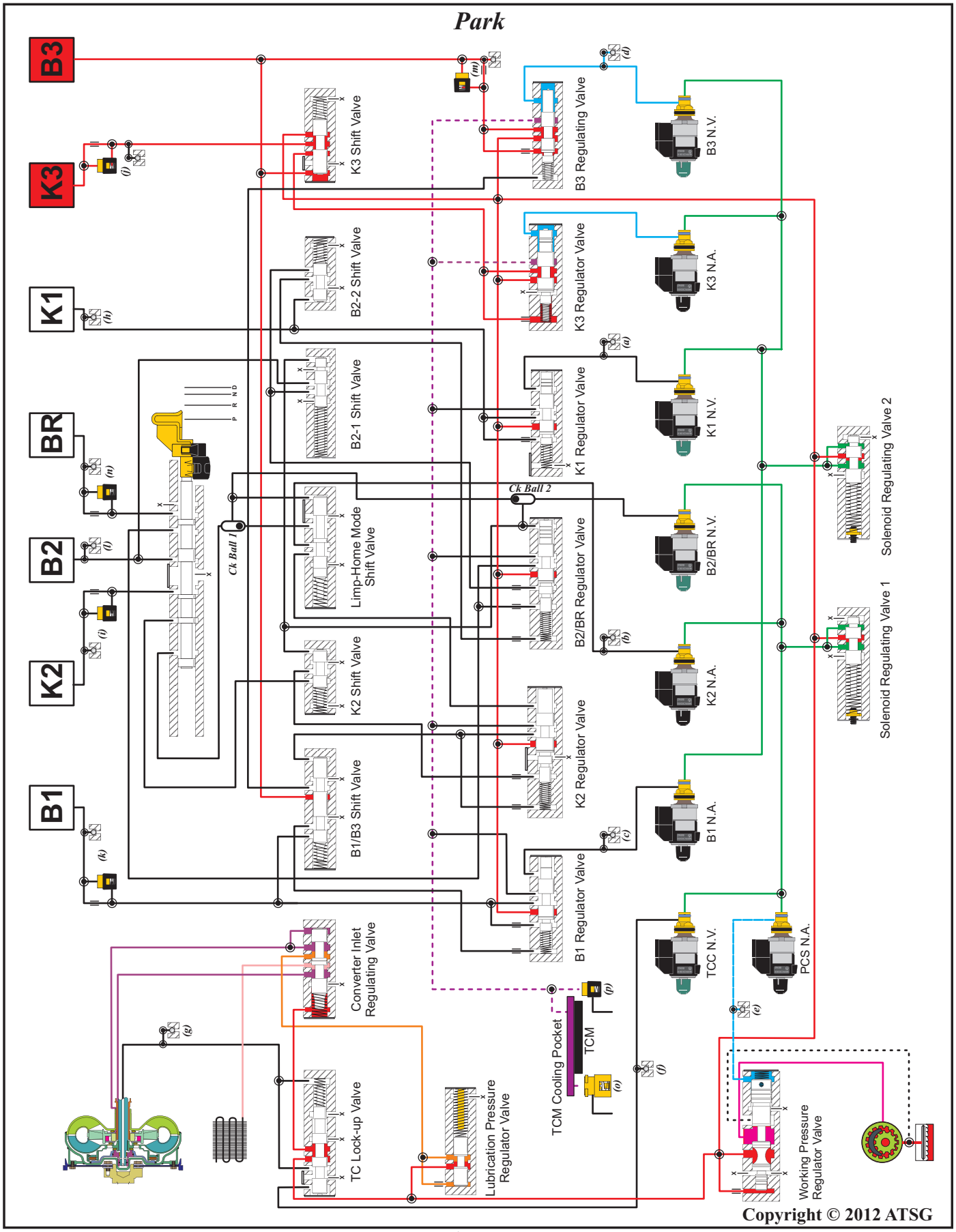

Park
B3
K3
K1
BR
B2
K2
B1
K3 Shift Valve
B2-2 Shift Valve
B2-1 Shift Valve
Limp-Home Mode Shift Valve
K2 Shift Valve
B1/B3 Shift Valve
Converter Inlet Regulating Valve
TC Lock-up Valve
Lubrication Pressure Regulator Valve
B3 Regulating Valve
K3 Regulator Valve
K1 Regulator Valve
B2/BR Regulator Valve
K2 Regulator Valve
B1 Regulator Valve
TCM Cooling Pocket
TCM
B3 N.V.
K3 N.A.
K1 N.V.
B2/BR N.V.
K2 N.A.
B1 N.A.
TCC N.V.
PCS N.A.
Working Pressure Regulator Valve
Solenoid Regulating Valve 2
Solenoid Regulating Valve 1
Ck Ball 1
Ck Ball 2
P R N D
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Figure 4

NISSAN RE5R05A

STUCK IN 1st GEAR

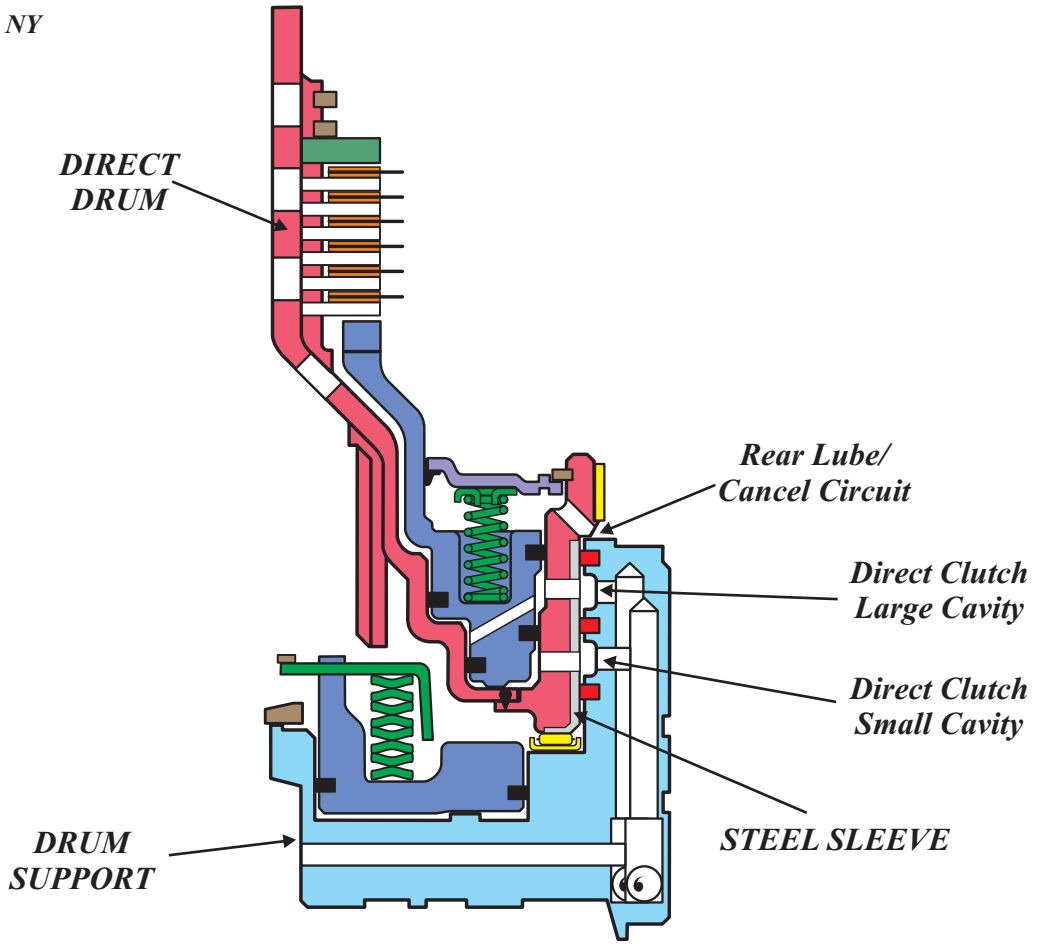
COMPLAINT: Before or after overhaul, vehicles equipped with the RE5R05A may exhibit a stuck in 1st gear condition.

CAUSE: The cause may be, the steel sleeve that is pressed into the Direct Clutch drum, as shown in the cut-away in Figure 1, has turned and is blocking off the feed holes to the Direct Clutch piston.

CORRECTION: To correct this condition, inspect the sleeve area of the Direct Clutch drum, as shown in Figure 2, and ensure that the feed holes in the sleeve are aligned with the feed holes in the drum, and replace the drum as necessary.

Special Thanks to Nick at Diamond Transmission NY

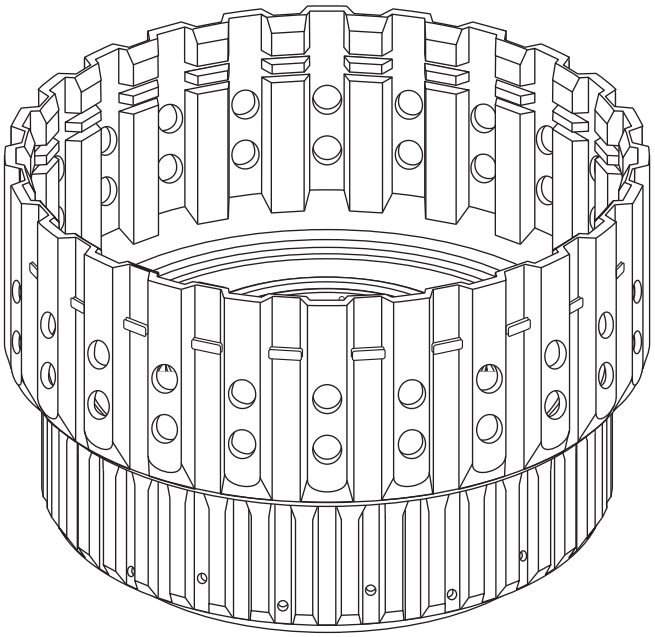
DIRECT CLUTCH DRUM AND SUPPORT



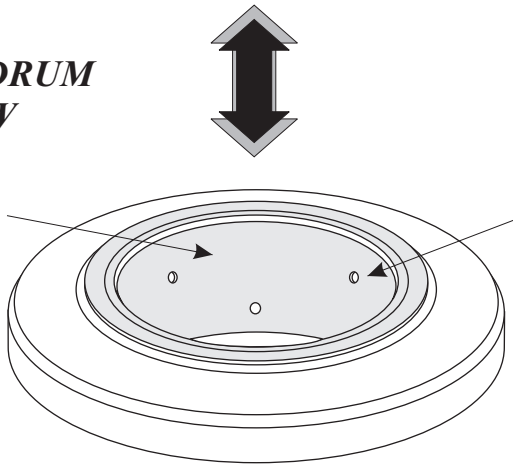
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Figure 1

DIRECT CLUTCH DRUM



DIRECT CLUTCH DRUM BOTTOM VIEW



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Figure 2

NISSAN RE5R05A
1-2 SHIFT SHUDDER

COMPLAINT: Before or after overhaul, vehicles equipped with the RE5R05A may exhibit a 1-2 shift shudder. It also may be noted that the direct clutch during inspection revealed slightly discolored friction plates, but the clutch is not destroyed.

CAUSE: The cause may be, the upper sealing ring on the drum support, as shown in Figure 1, has excessive clearance in the ring land, causing a leak into the lube circuit, which can create a slow application of the Direct Clutch. ***Explanation:*** There are two chambers in the Direct Clutch, a large and small. Notice in the application chart, in Figure 2, that during the 1-2 upshift both the large and small chambers are filled, and the large chamber is released when an upshift to 4th occurs, thru the Direct Clutch Piston Switch Valve, as shown in the theory of operation partial circuit diagrams in Figures 3 and 4. Refer to Figure 5 and note that the top sealing ring separates the Direct Clutch Large chamber from the lube circuit which is part of the Cancel circuit on the spring side of the Direct Clutch Piston. A leak in the top sealing ring may allow Direct Clutch Large chamber pressure to enter the lube circuit/cancel circuit slowing down the piston apply and causing a shudder during the 1-2 upshift.

CORRECTION: To correct this condition, inspect the sealing ring to ring land clearance as shown in Figure 1 after a new set of rings have been installed. If the clearance exceeds .005" replace the drum support. Note: Measure all three rings in their ring lands and compare the readings, as they should be the same. Refer to Figure 6 and ensure the piston seals are new and the Direct Drum is assembled correctly.

Special Thanks to
Steve Peluso
Lee Myles MA

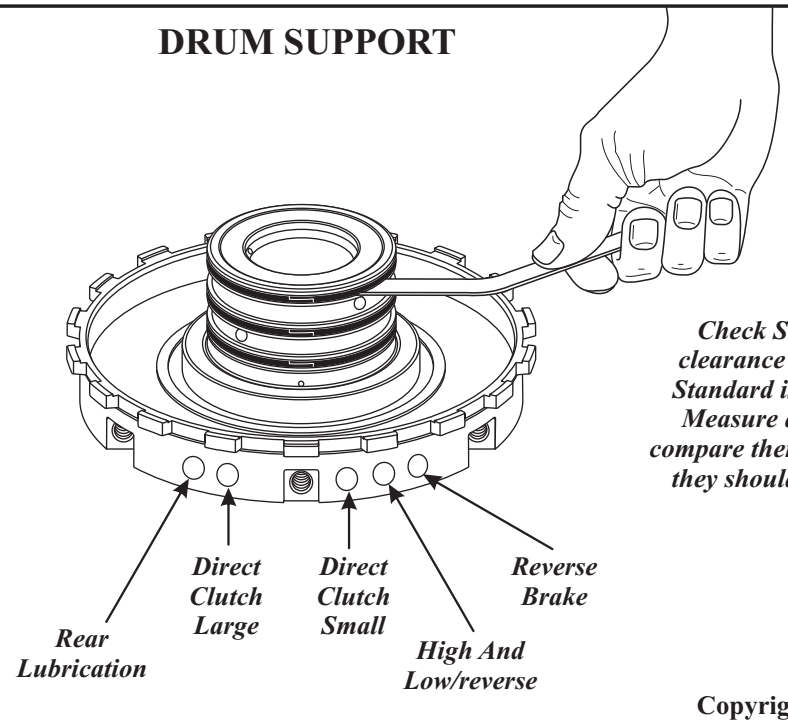


Figure 1

COMPONENT APPLICATION CHART

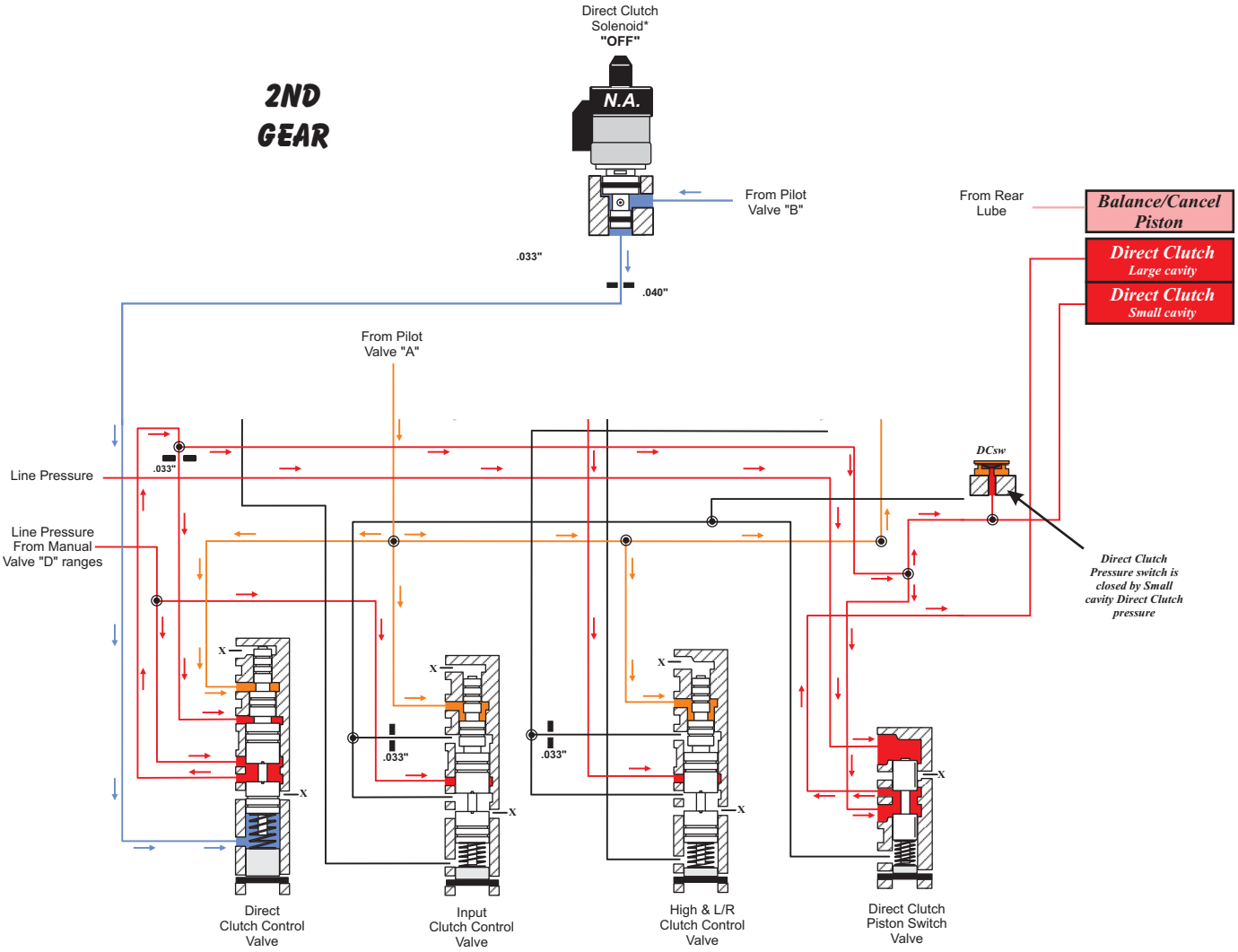
Range	High/Low Reverse Clutch	Direct Clutch		Input Clutch	Reverse Brake Clutch	Front Brake Band	Forward Brake Clutch	Low Coast Brake Clutch	1st Sprag	Forward Sprag	3rd Sprag	Gear Ratio
		Large	Small									
P	**ON					**ON						
R	ON				ON	ON			Hold		Hold	2.613
N	**ON					**ON						
"D"-1st	ON					**ON	ON	*ON	Hold	Hold	Hold	3.827
"D"-2nd		ON	ON			**ON	ON			Hold	Hold	2.368
"D"-3rd	ON	ON	ON			ON	**ON		*Hold		Hold	1.520
"D"-4th	ON		ON	ON			**ON		*Hold			1.000
"D"-5th	ON			ON		ON	**ON		*Hold		*Hold	0.834
"4"-1st	ON					**ON	ON	*ON	Hold	Hold	Hold	3.827
"4"-2nd		ON	ON			**ON	ON			Hold	Hold	2.368
"4"-3rd	ON	ON	ON			ON	**ON		*Hold		Hold	1.520
"4"-4th	ON		ON	ON			**ON		*Hold			1.000
"3"-1st	ON					**ON	ON	*ON	Hold	Hold	Hold	3.827
"3"-2nd		ON	ON			**ON	ON			Hold	Hold	2.368
"3"-3rd	ON	ON	ON			ON	**ON		*Hold		Hold	1.520
"2"-1st	ON					**ON	ON	*ON	Hold	Hold	Hold	3.827
"2"-2nd		ON	ON			ON	ON	ON		Hold	Hold	2.368
"1"-1st	ON					ON	ON	ON	Hold	Hold	Hold	3.827

** Effective, only when coasting.*
*** ON, but not effective.*

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Figure 2

DIRECT CLUTCH SOLENOID THEORY OF OPERATION

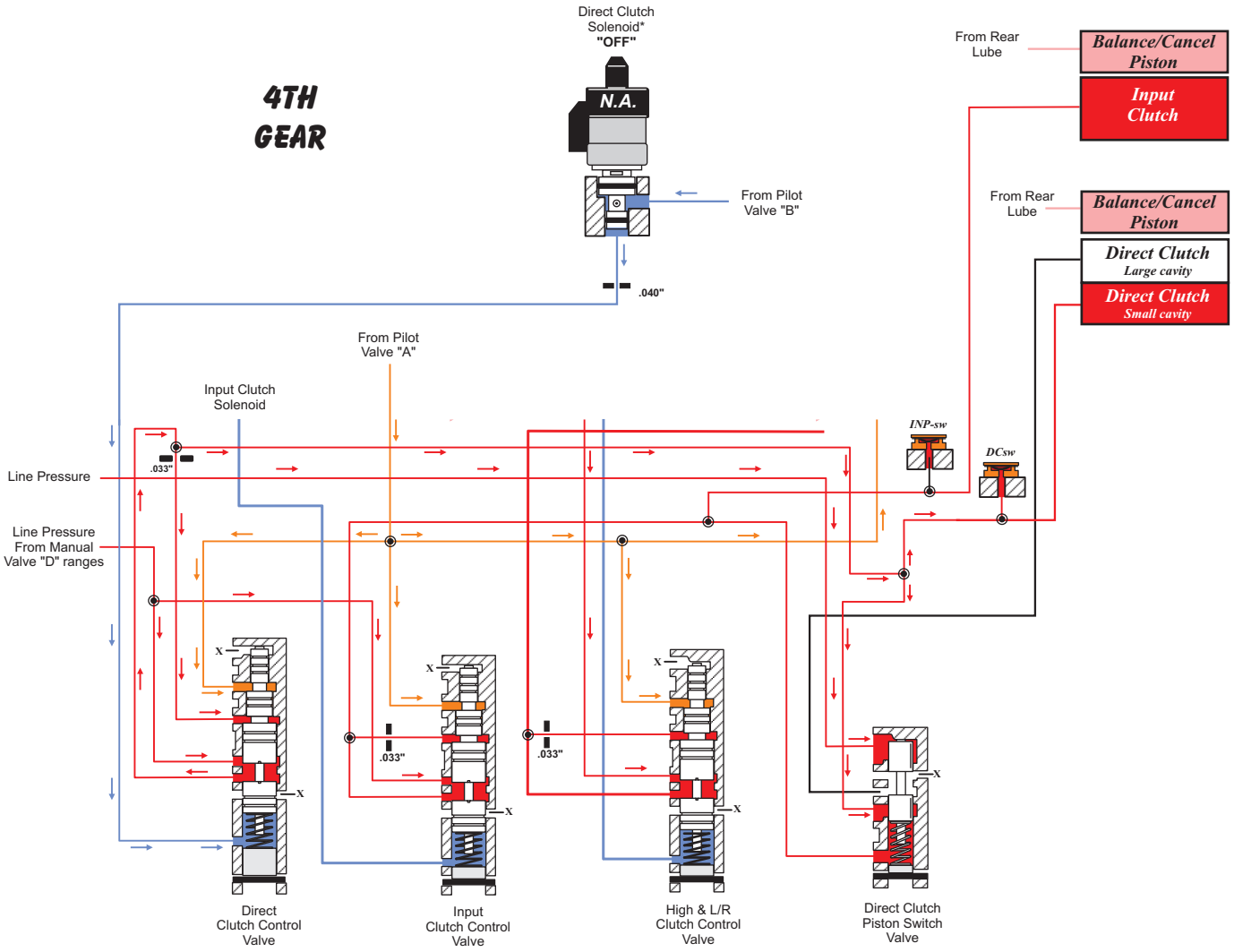


The Direct Clutch solenoid is a Normally Applied solenoid. The Solenoid is fed solenoid pressure from Pilot Valve "B." When the solenoid is "ON" it blocks solenoid pressure from entering the spring side of the Direct Clutch Control Valve, keeping the Direct Clutch from applying. When the solenoid is "OFF," it allows solenoid pressure to enter the spring side of the Direct Clutch Control Valve which strokes the valve against Pilot "A" pressure allowing Line pressure from the Manual valve Drive ranges to enter the Direct Clutch Small cavity and the Direct Clutch Piston Switch Valve. The Direct Clutch Piston Switch Valve is controlled by regulated line pressure on the first land and by Input Clutch Pressure on the spring side. Both large and small cavity of the Direct Clutch are filled in 2nd and 3rd gears, because of the position of the Direct Clutch Piston Switch Valve. The Direct Clutch Pressure switch is Closed by the presence of Small Cavity Direct Clutch Pressure.

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Figure 3

DIRECT CLUTCH SOLENOID THEORY OF OPERATION

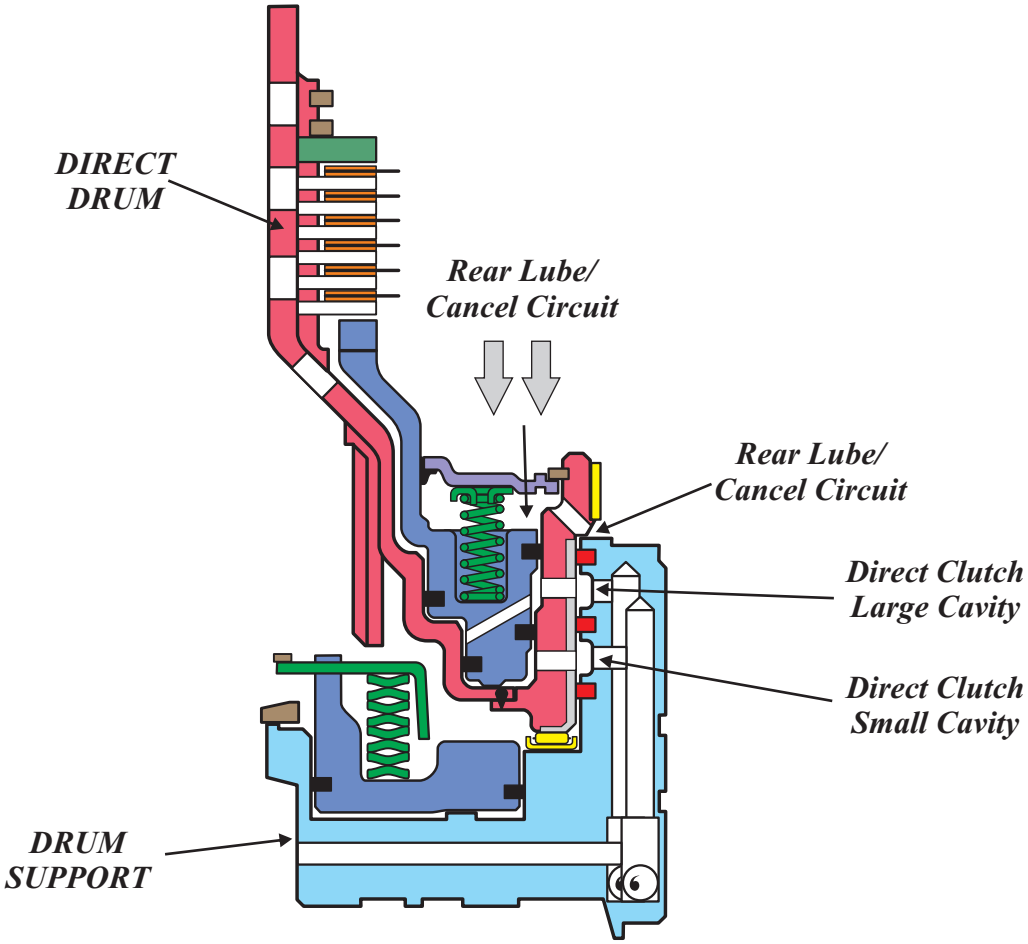


The Direct Clutch solenoid is a Normally Applied solenoid. The Solenoid is fed solenoid pressure from Pilot Valve "B." When the solenoid is "ON" it blocks solenoid pressure from entering the spring side of the Direct Clutch Control Valve, keeping the Direct Clutch from applying. When the solenoid is "OFF," it allows solenoid pressure to enter the spring side of the Direct Clutch Control Valve which strokes the valve against Pilot "A" pressure allowing Line pressure from the Manual valve (Drive ranges) to enter the Direct Clutch Small cavity and the Direct Clutch Piston Switch Valve. The Direct Clutch Piston Switch Valve is controlled by regulated line pressure on the first land and by Input Clutch Pressure on the spring side. The Small Cavity of the Direct Clutch piston is filled in 4th gear as the Input Clutch is ON. Input Clutch Pressure is fed to the spring side of the Direct Clutch Piston Switch Valve, stroking the valve, which releases the Large Cavity of the Direct Clutch.

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Figure 4

DIRECT CLUTCH PASSAGE IDENTIFICATION



Rear Lube/Cancel Circuit is fed between the balance piston and the spring retainer. This can provide a quick release of the piston as it will basically add to the release spring tension.

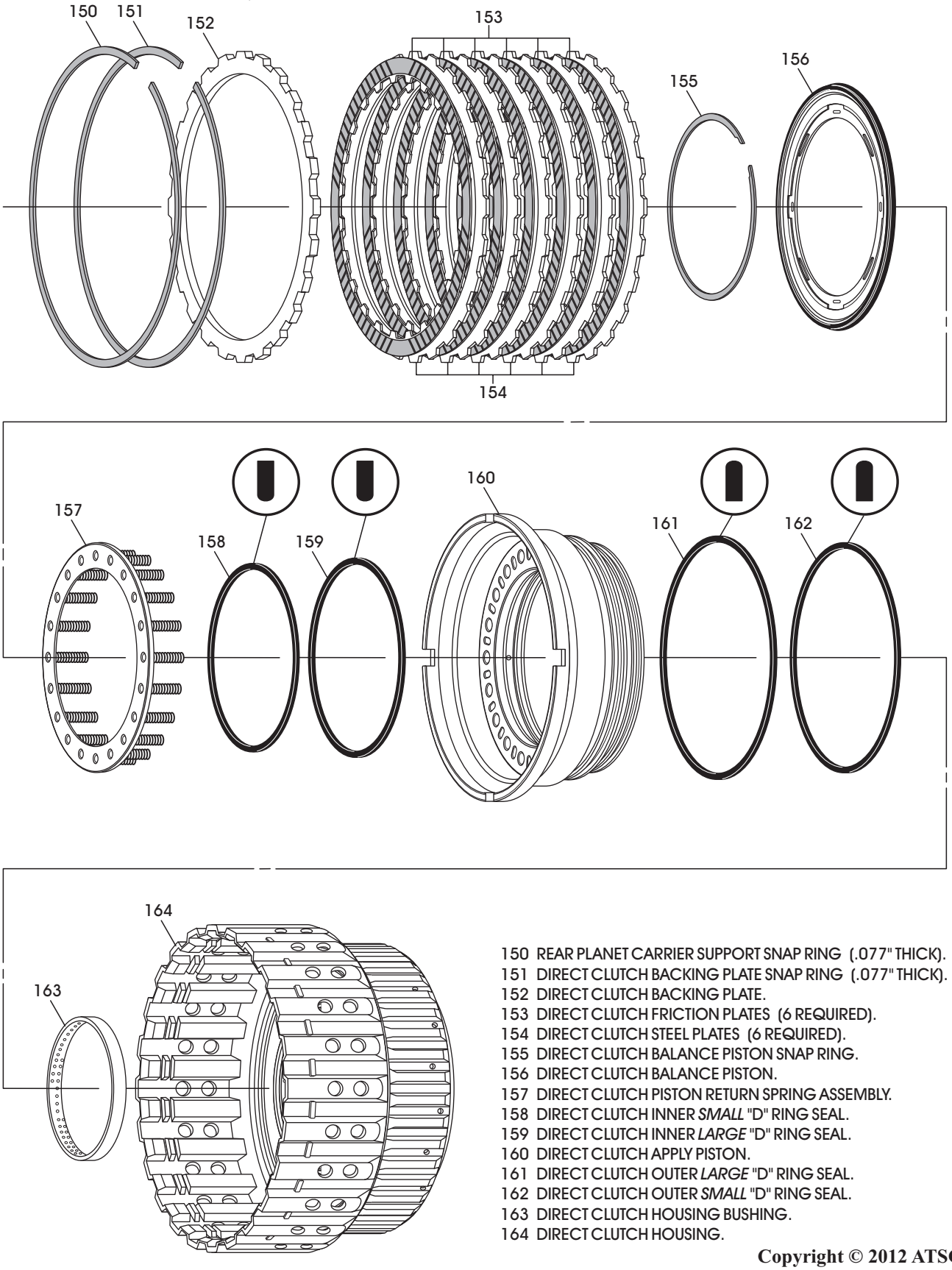
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Figure 5

EUROPEAN - 68

EUROPEAN - 69

DIRECT CLUTCH HOUSING ASSEMBLY EXPLODED VIEW



150 REAR PLANET CARRIER SUPPORT SNAP RING (.077" THICK).
151 DIRECT CLUTCH BACKING PLATE SNAP RING (.077" THICK).
152 DIRECT CLUTCH BACKING PLATE.
153 DIRECT CLUTCH FRICTION PLATES (6 REQUIRED).
154 DIRECT CLUTCH STEEL PLATES (6 REQUIRED).
155 DIRECT CLUTCH BALANCE PISTON SNAP RING.
156 DIRECT CLUTCH BALANCE PISTON.
157 DIRECT CLUTCH PISTON RETURN SPRING ASSEMBLY.
158 DIRECT CLUTCH INNER *SMALL* "D" RING SEAL.
159 DIRECT CLUTCH INNER *LARGE* "D" RING SEAL.
160 DIRECT CLUTCH APPLY PISTON.
161 DIRECT CLUTCH OUTER *LARGE* "D" RING SEAL.
162 DIRECT CLUTCH OUTER *SMALL* "D" RING SEAL.
163 DIRECT CLUTCH HOUSING BUSHING.
164 DIRECT CLUTCH HOUSING.

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Figure 6

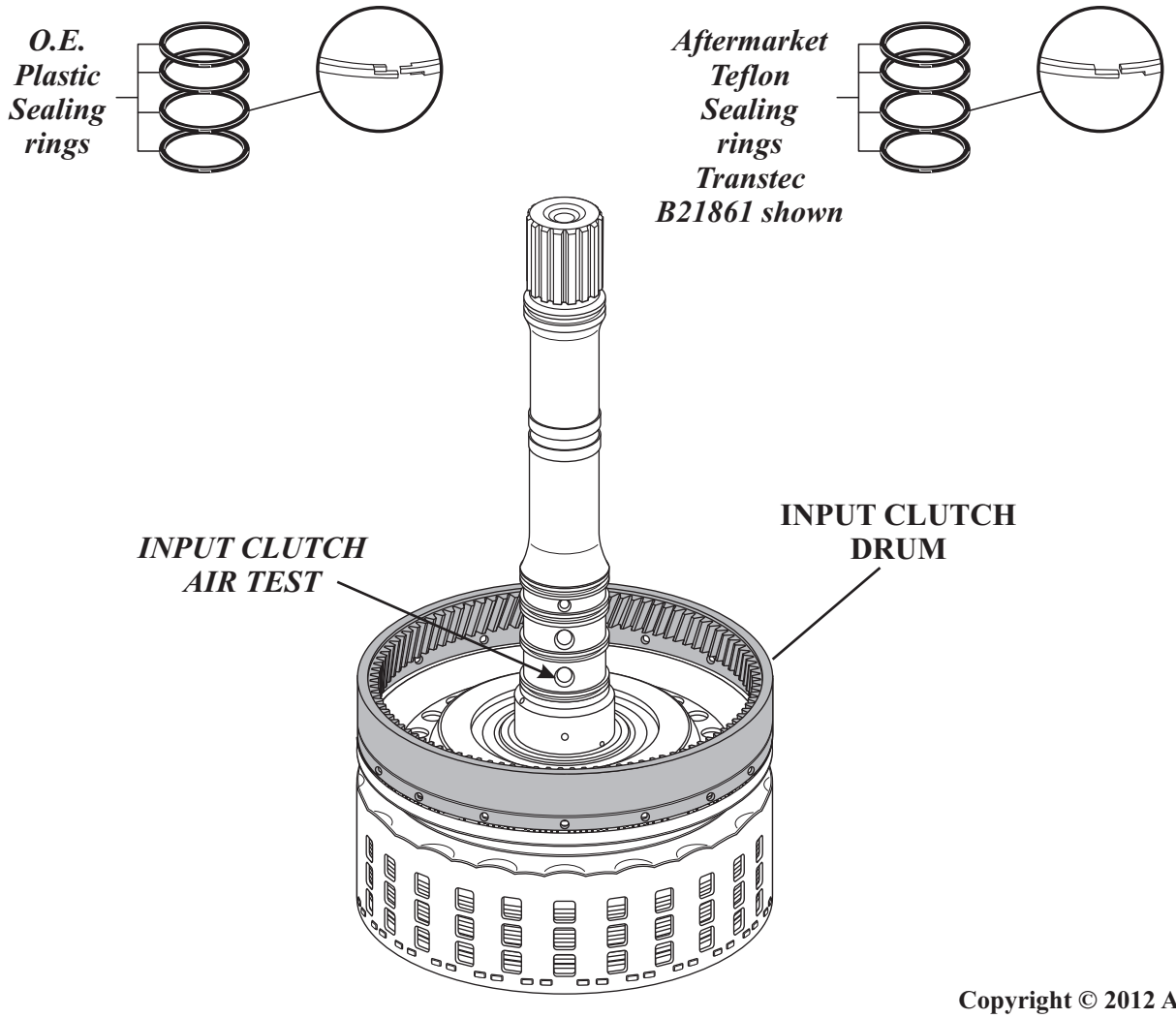
NISSAN RE5R05A
FLARE 3-4 NO 5th GEAR

COMPLAINT: After overhaul, vehicles equipped with the RE5R05A may exhibit a slight flare on the 3-4 upshift and a neutral or slipping condition in 5th gear, along with a possible P0734 and P0735 diagnostic trouble code.

CAUSE: The cause may be, the Input Clutch/Turbine shaft sealing rings, as shown in Figure 1, were stretched too far when they were installed causing a slight bend in the ring or the plastic rings are not conforming to the inside of the pump stator, creating a leak in the Input Clutch circuit .

CORRECTION: To correct this condition, inspect the sleeve area of the back of the pump, shown in Figure 2, and ensure that it is not grooved and the support bearing is in good shape, replace as necessary. Air test the Input Clutch and make sure that it is solid as shown in Figure 1, if the air test does not pass, refer to Figure 3 and renew piston seals and re-check. Contact your aftermarket supplier and locate Input Clutch rings made out of a teflon material, as it may conform to the inside of the pump stator easier than the plastic type.

INPUT CLUTCH/TURBINE SHAFT SEALING RINGS



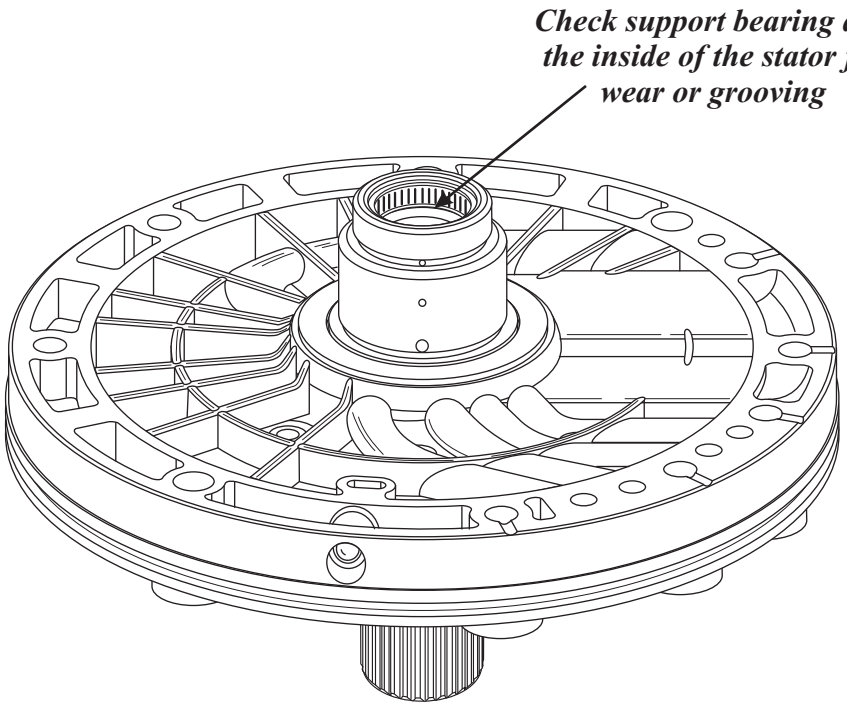
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Figure 1

Carlyn - 72

TRANSTEC 73

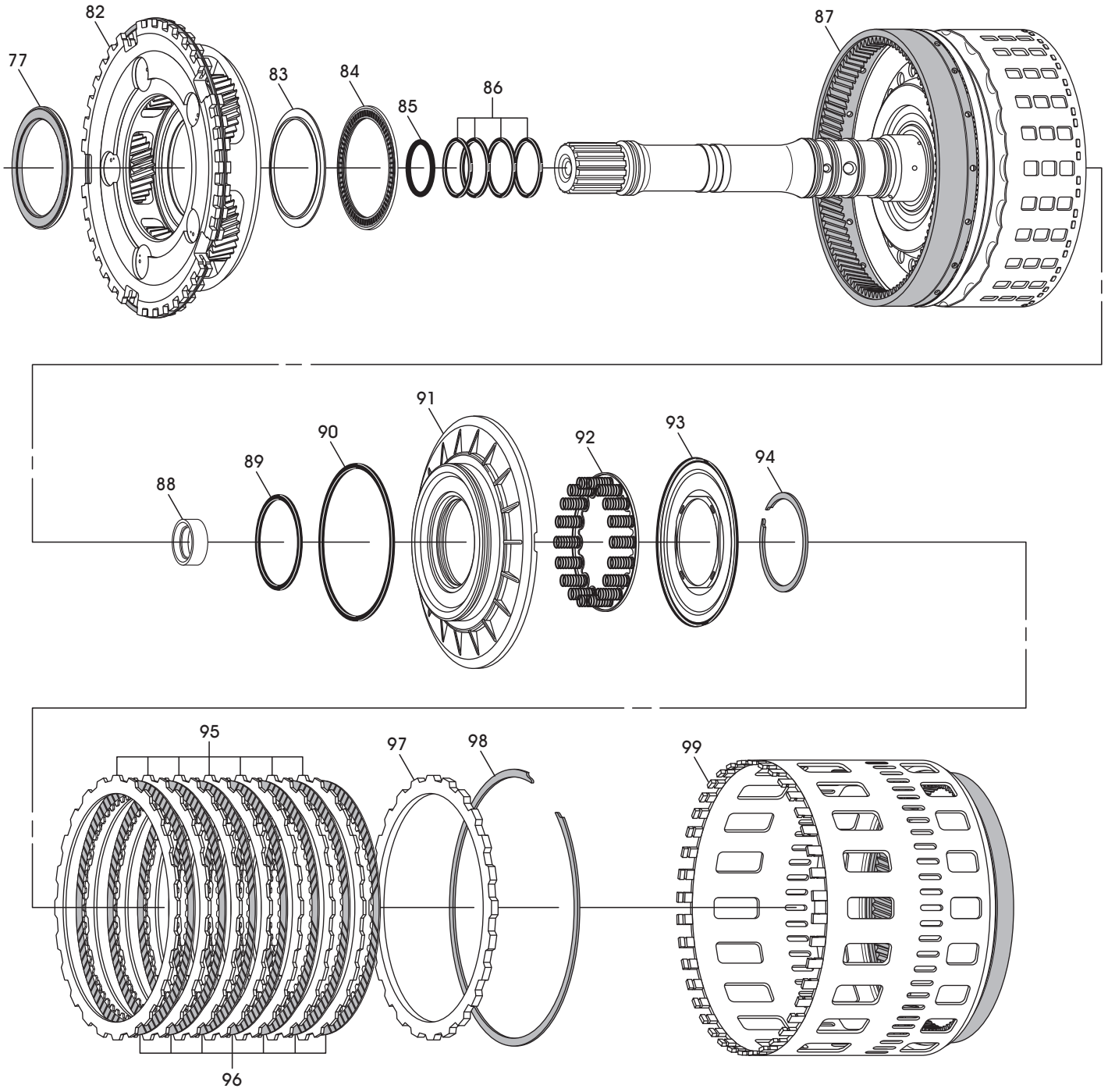
STATOR SHAFT



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Figure 2

INPUT HOUSING ASSEMBLY EXPLODED VIEW



77 NUMBER 3 THRUST BEARING.
82 FRONT PLANETARY CARRIER ASSEMBLY, WITH SNAP RING.
83 NUMBER 4, THRUST BEARING RACE.
84 NUMBER 5 THRUST BEARING.
85 TURBINE SHAFT "O" RING SEAL.
86 TURBINE SHAFT SEAL RINGS (4 REQUIRED).
87 INPUT CLUTCH HOUSING ASSEMBLY.
88 INPUT HOUSING BUSHING.
89 INPUT CLUTCH APPLY PISTON INNER "D" RING SEAL.
90 INPUT CLUTCH APPLY PISTON OUTER "D" RING SEAL.
91 INPUT CLUTCH APPLY PISTON.
92 INPUT CLUTCH APPLY PISTON RETURN SPRING ASSEMBLY.
93 INPUT CLUTCH BALANCE PISTON.
94 INPUT CLUTCH BALANCE PISTON RETAINING SNAP RING.
95 INPUT CLUTCH STEEL PLATES (7 REQUIRED).
96 INPUT CLUTCH FRICTION PLATES (7 REQUIRED).
97 INPUT CLUTCH BACKING PLATE.
98 INPUT CLUTCH BACKING PLATE SNAP RING.
99 REAR PLANETARY CARRIER RING GEAR AND SHELL ASSEMBLY.

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Figure 3

EXEDY LEFT 76

EXEDY RIGHT 77

SUBARU 4EAT PHASE II VERSION II
AWD BIND ON TURNS

COMPLAINT: 2004 and up All Wheel Drive Subaru vehicles equipped with the 4EAT Phase 2 Version 2 transmission may exhibit a binding condition when turning into a tight corner or a tight parking space. Refer to Figure 1 for model identification, that use this type of transmission.

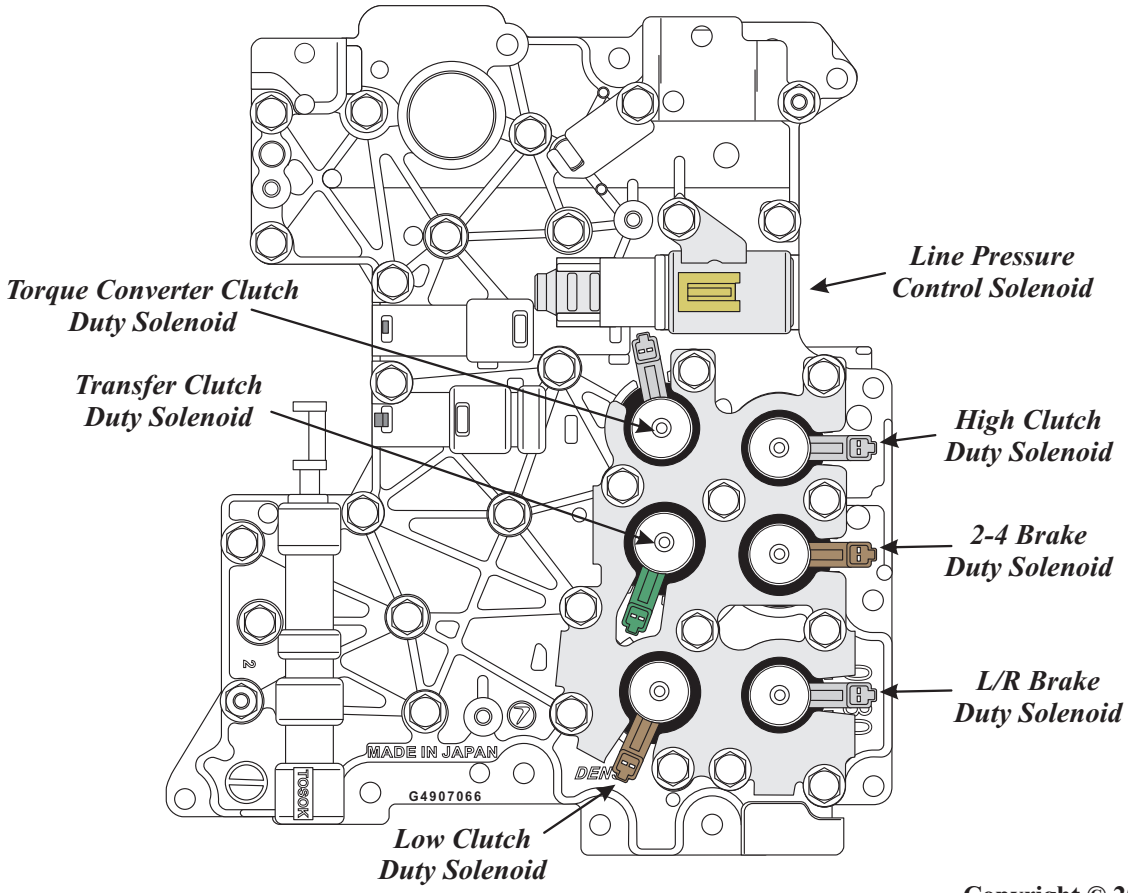
CAUSE: The cause may be that the Transfer Clutch solenoid is faulty, not allowing the Transfer Clutches which drive the rear drive shaft, to slip enough when in a tight corner or the Transfer Clutch Control Valve is stuck in the Valve body. ***Note:*** There is much confusion in the location of the Transfer Clutch Solenoid between the Phase 2 that started in 1998 and the Phase 2 Version 2 that started in select models in 2004. See Figure 2 for the location of the Phase 2 Version 2 Transfer Clutch Solenoid. ***Testing:*** The easiest way to verify that the solenoid is mechanically good is to simply disconnect the wiring harness for the transmission with the wheels free on a lift. This will cause a third gear start and there should be no power transmitted to the rear wheels if the solenoid is mechanically good and the Transfer Clutch Valve is free, as the Transfer Clutch Solenoid is Normally Vented, see Figures 3 and 4. If when the harness is disconnected, the rear wheels are being driven, this would indicate that the Transfer Clutch Control Valve is stuck or the Transfer Clutch solenoid is faulty.

CORRECTION: To correct this condition, refer to Figures 5-9 for valve identification and location of the Transfer Clutch Control Valve and verify that the valve is free. If the valve with spring removed falls on it's own weight, the only other reason for this problem would be that the solenoid mechanically is faulty. At the time of this printing, the only way to get this solenoid new is to purchase the complete valve body, as all the solenoids are included.

4AT PHASE II VERSION II MODEL I.D.
2004 and Later Subaru Forester Turbo
2005 and Later Subaru Forester Non-Turbo
2005 and Later Subaru Impreza Non-Turbo
2006 and Later Subaru Impreza Turbo
2005 and Later Subaru Legacy/Outback

Figure 1

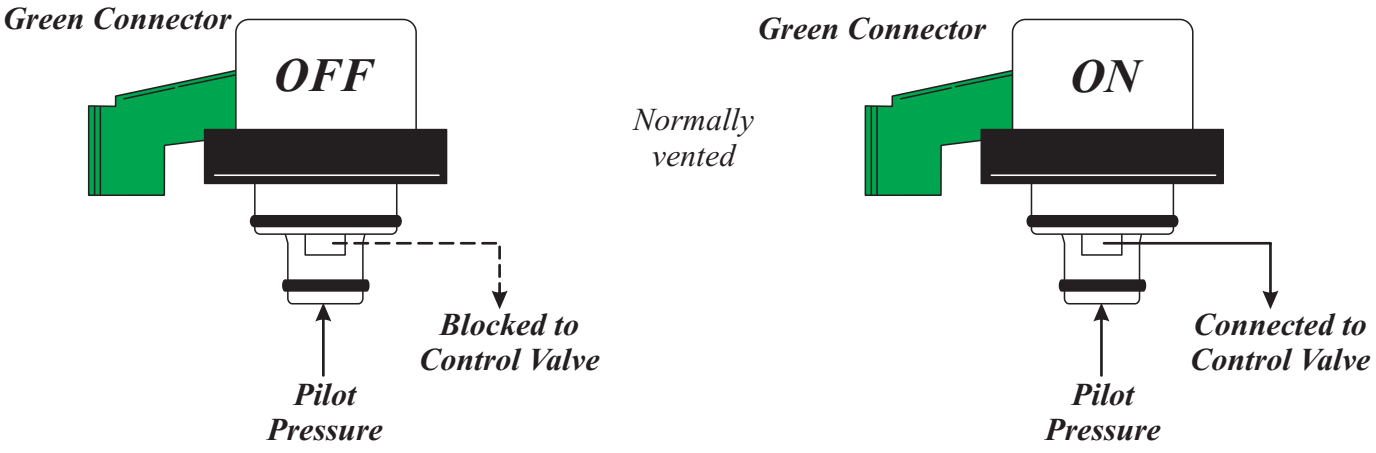
SOLENOID LOCATIONS



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Figure 2

TRANSFER CLUTCH DUTY SOLENOID
FUNCTIONAL CHECK



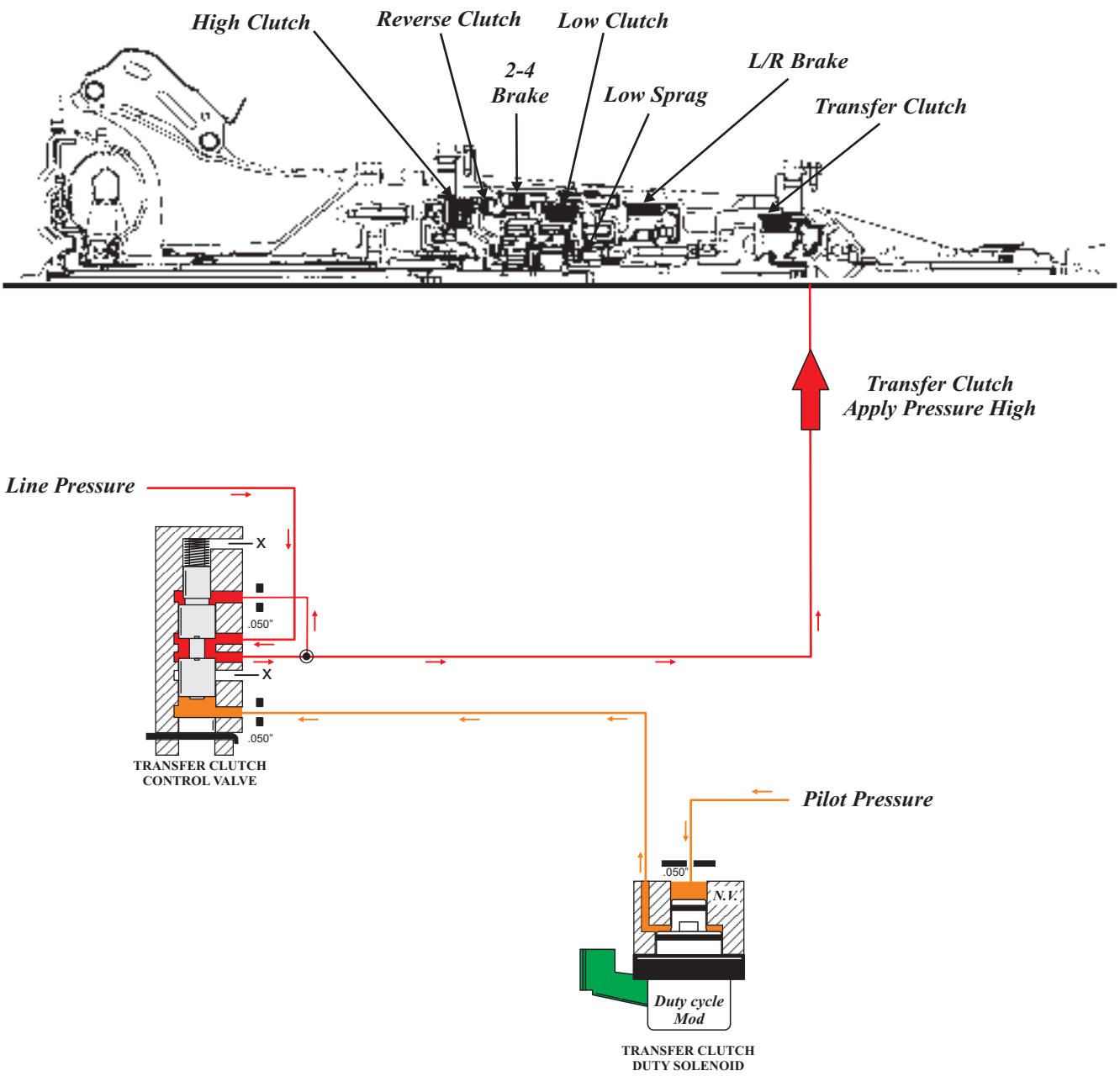
Summary: The Transfer Clutch Duty Solenoid is Normally Vented. When the Solenoid duty cycle is Low, Pilot pressure to the Control valve is blocked, closing the Transfer Clutch Control Valve. When the Solenoid duty cycle is High, Pilot pressure to the Control valve is High, opening the Transfer Clutch Control valve.

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Figure 3

SUBARU 4EAT PHASE II VERSION II

TRANSFER CLUTCH CONTROL



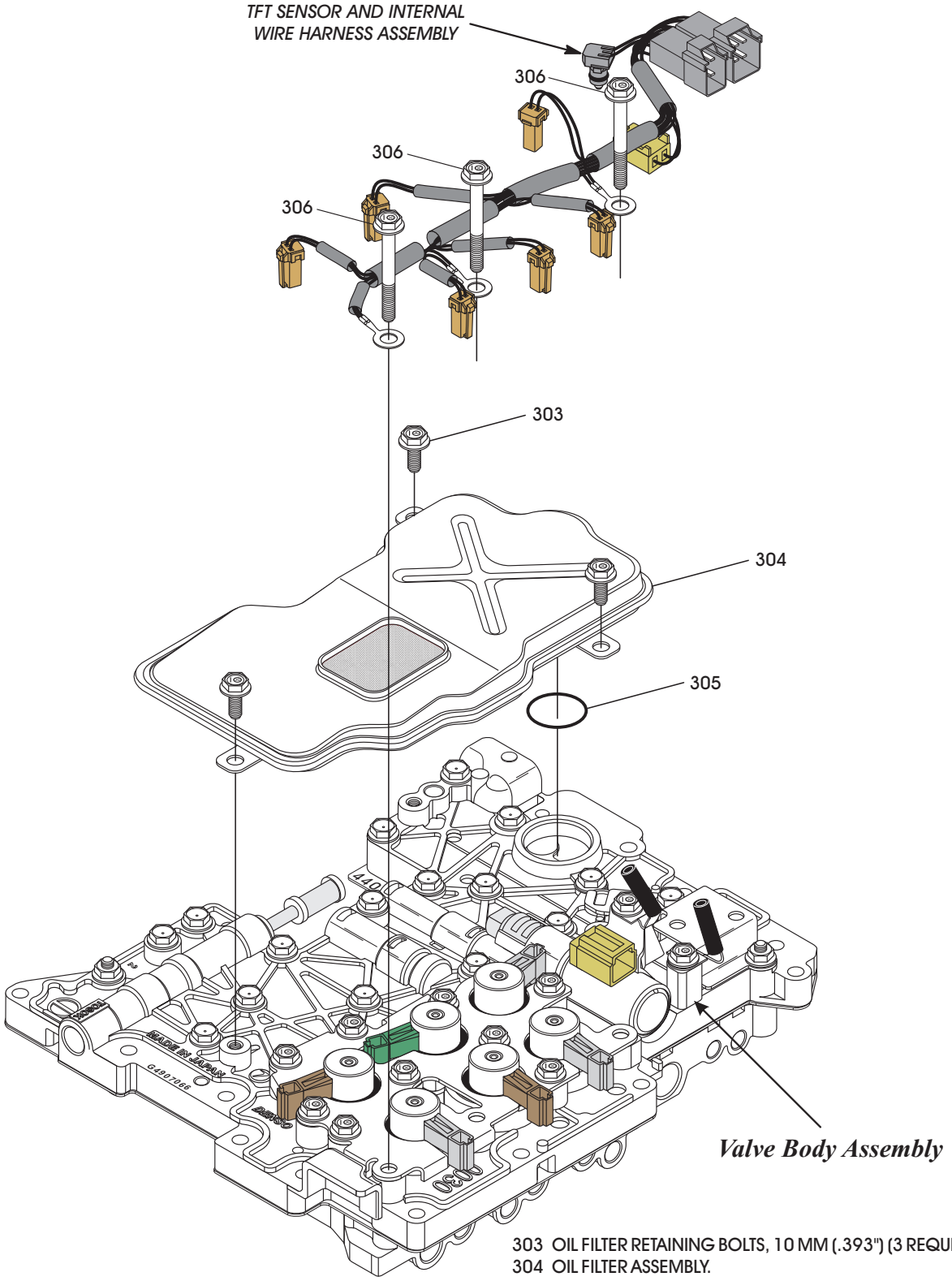
Summary

Transfer Clutch Duty solenoid control is based on Accelerator Pedal Position signal, a comparison of Front and Rear vehicle speed signal, ATF temp. signal, ABS Signal, Brake Switch and Range Signal. The Control unit looks at information from all of these circuits to control Transfer Clutch pressure which in turn transmits power to the rear drive shaft for All Wheel Drive. When the duty cycle is low or "O" transfer clutch pressure will be low with little to no power transmitted to the rear wheels.

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Figure 4

SUMP FILTER AND INTERNAL WIRING HARNESS LOCATION

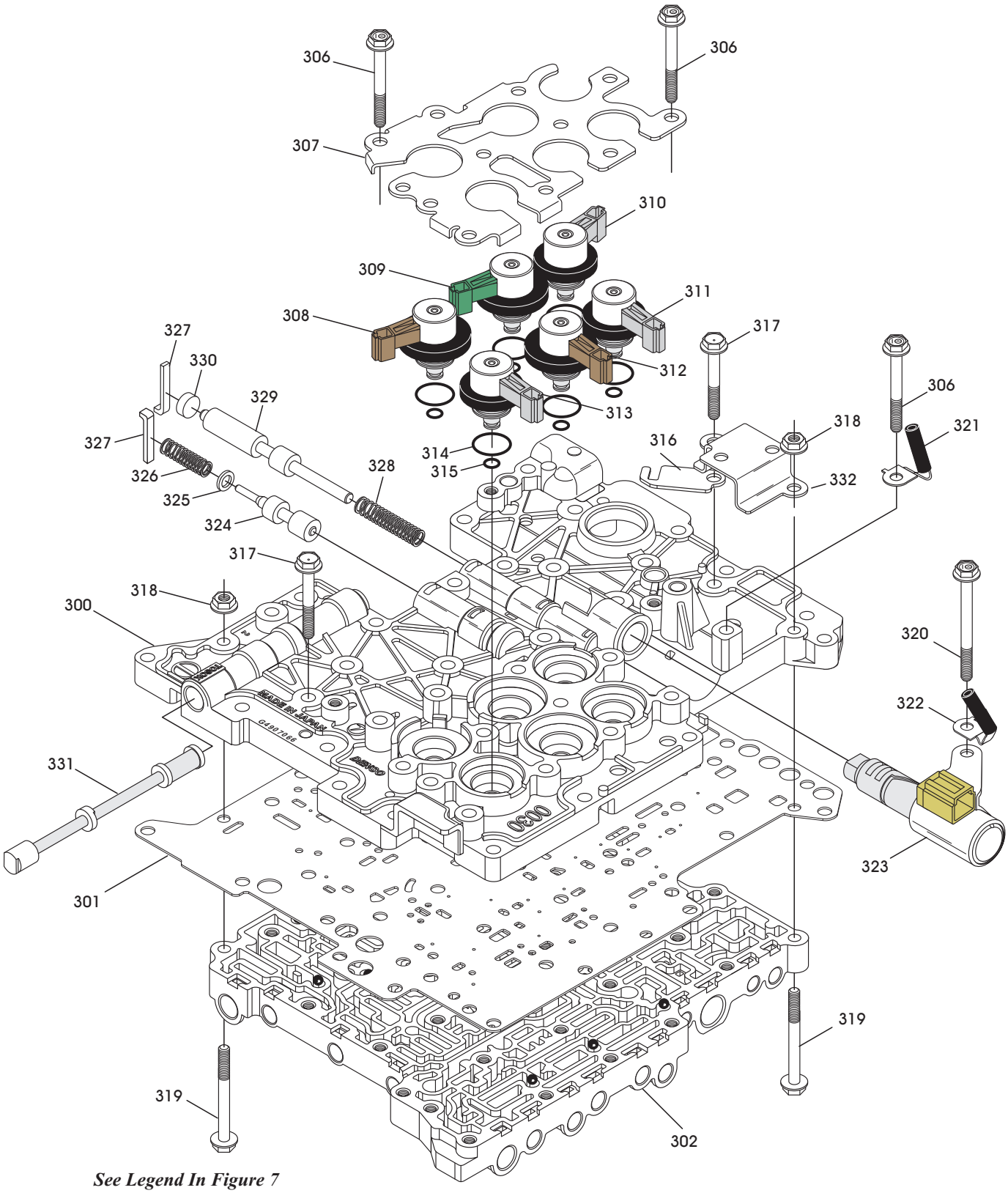


303 OIL FILTER RETAINING BOLTS, 10 MM (.393") (3 REQUIRED).
304 OIL FILTER ASSEMBLY.
305 OIL FILTER TO LOWER VALVE BODY "O" RING SEAL.
306 VALVE BODY BOLT, 45 MM (1.771") (13 REQUIRED).

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Figure 5

LOWER VALVE BODY EXPLODED VIEW



See Legend In Figure 7

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Figure 6

FIGURE 6 LEGEND

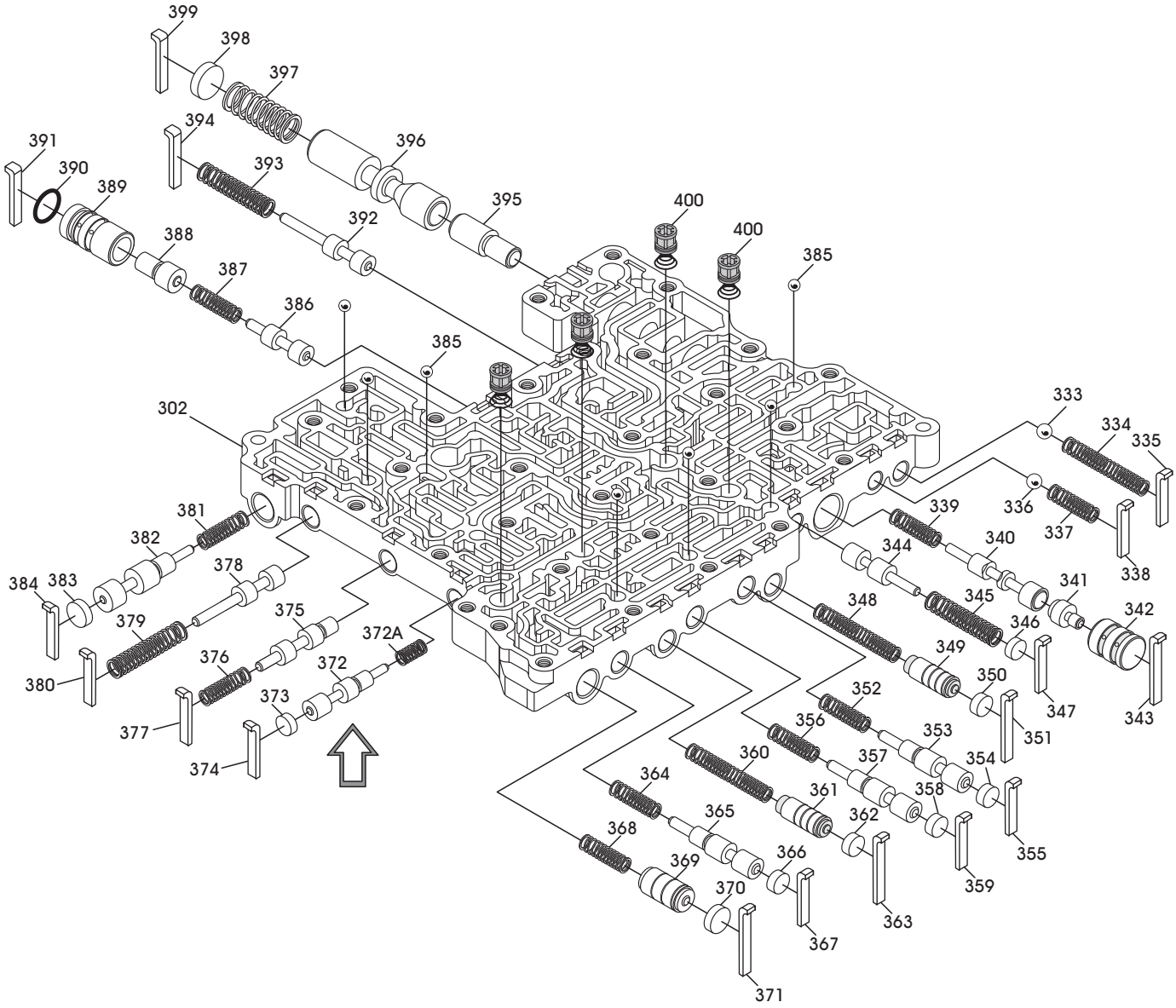
300 LOWER VALVE BODY CASTING.
301 VALVE BODY SPACER PLATE.
302 UPPER VALVE BODY CASTING.
306 VALVE BODY BOLT, 45 MM (1.771") (13 REQUIRED).
307 SOLENOID RETAINING BRACKET.
308 LOW CLUTCH DUTY SOLENOID.
309 TRANSFER CLUTCH DUTY SOLENOID.
310 TORQUE CONVERTER CLUTCH DUTY SOLENOID.
311 HIGH CLUTCH DUTY SOLENOID.
312 2-4 BRAKE DUTY SOLENOID.
313 LOW REVERSE BRAKE DUTY SOLENOID.
314 SOLENOID LARGE "O" RING SEAL (6 REQUIRED).
315 SOLENOID SMALL "O" RING SEAL (6 REQUIRED).
316 TRANS TEMP SENSOR RETAINING BRACKET.
317 VALVE BODY BOLT, 40 MM (1.575") (16 REQUIRED).
318 NUT FOR 52 MM VALVE BODY BOLT.
319 VALVE BODY BOLT, 52 MM (2.047") (2 REQUIRED).
320 VALVE BODY BOLT, 60 MM (2.362") (1 REQUIRED).
321 INTERNAL WIRE HARNESS RETAINER.
322 INTERNAL WIRE HARNESS RETAINER.
323 LINE PRESSURE CONTROL SOLENOID.
324 PILOT VALVE.
325 SPRING SHIM, 1.41 MM (.055") THICK.
326 SPRING.
327 RETAINER.
328 SPRING.
329 REVERSE BOOST VALVE.
330 BORE PLUG.
331 MANUAL VALVE.
332 INTERNAL HARNESS CONNECTOR RETAINER BRACKET.

Note: The Valve names are provided by ATSG and are based on valve function.

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Figure 7

UPPER VALVE BODY EXPLODED VIEW



See Legend In Figure 9

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Figure 8

FIGURE 8 LEGEND

302 UPPER VALVE BODY CASTING.
333 LINE PRESSURE BLOW-OFF BALL, 8.72 MM (.343") DIAMETER.
334 LINE PRESSURE BLOW-OFF BALL SPRING.
335 BLOW-OFF BALL SPRING RETAINER.
336 REAR LUBE CHECK BALL, 8.72 MM (.343") DIAMETER.
337 REAR LUBE SPRING.
338 REAR LUBE SPRING RETAINER.
339 LOCK-UP CONTROL VALVE SPRING.
340 LOCK-UP CONTROL VALVE.
341 LOCK-UP CONTROL BOOST VALVE.
342 LOCK-UP CONTROL BOOST VALVE SLEEVE.
343 LOCK-UP CONTROL BOOST VALVE SLEEVE RETAINER.
344 TCC REGULATOR VALVE 2. (APPLY)
345 TCC REGULATOR VALVE 2 SPRING.
346 TCC REGULATOR VALVE 2 BORE PLUG.
347 TCC REGULATOR VALVE 2 BORE PLUG RETAINER.
348 HIGH CLUTCH DUTY SOLENOID ACCUMULATOR SPRING.
349 HIGH CLUTCH DUTY SOLENOID ACCUMULATOR VALVE.
350 HIGH CLUTCH DUTY SOLENOID ACCUMULATOR BORE PLUG.
351 HIGH CLUTCH DUTY SOLENOID ACCUMULATOR RETAINER.
352 HIGH CLUTCH CONTROL VALVE SPRING.
353 HIGH CLUTCH CONTROL VALVE.
354 HIGH CLUTCH CONTROL BORE PLUG.
355 HIGH CLUTCH CONTROL BORE PLUG RETAINER.
356 2-4 BRAKE CONTROL VALVE SPRING.
357 2-4 BRAKE CONTROL VALVE.
358 2-4 BRAKE CONTROL BORE PLUG.
359 2-4 BRAKE CONTROL BORE PLUG RETAINER.
360 2-4 BRAKE DUTY SOLENOID ACCUMULATOR SPRING.
361 2-4 BRAKE DUTY SOLENOID ACCUMULATOR VALVE.
362 2-4 BRAKE DUTY SOLENOID ACCUMULATOR BORE PLUG.
363 2-4 BRAKE DUTY SOLENOID ACCUMULATOR RETAINER.
364 LOW CLUTCH CONTROL VALVE SPRING.
365 LOW CLUTCH CONTROL VALVE.
366 LOW CLUTCH CONTROL VALVE BORE PLUG.
367 LOW CLUTCH CONTROL VALVE RETAINER.
368 LOW CLUTCH DUTY SOLENOID ACCUMULATOR SPRING.
369 LOW CLUTCH DUTY SOLENOID ACCUMULATOR VALVE.
370 LOW CLUTCH DUTY SOLENOID ACCUMULATOR.
371 LOW CLUTCH DUTY SOLENOID ACCUMULATOR RETAINER.
372A TRANSFER CLUTCH CONTROL VALVE SPRING
372 TRANSFER CLUTCH CONTROL VALVE.
373 TRANSFER CLUTCH CONTROL VALVE BORE PLUG.
374 TRANSFER CLUTCH CONTROL VALVE BORE PLUG RETAINER.
375 LOW/REVERSE BRAKE SEQUENCE VALVE.
376 LOW/REVERSE BRAKE SEQUENCE SPRING.
377 LOW/REVERSE BRAKE SEQUENCE SPRING RETAINER.
378 LOW/2-4 RELAY VALVE.
379 LOW/2-4 RELAY VALVE SPRING.
380 LOW/2-4 RELAY VALVE SPRING RETAINER.
381 LOW/REVERSE BRAKE CONTROL VALVE SPRING.
382 LOW/REVERSE BRAKE CONTROL VALVE.
383 LOW/REVERSE BRAKE CONTROL VALVE BORE PLUG.
384 LOW/REVERSE BRAKE CONTROL VALVE BORE PLUG RETAINER.
385 STEEL CHECK BALLS, 5.53 MM (.217") DIAMETER (7 REQUIRED).
386 2-4 BRAKE SEQUENCE VALVE.
387 2-4 BRAKE SEQUENCE VALVE SPRING.
388 2-4 BRAKE SEQUENCE BOOST VALVE.
389 2-4 BRAKE SEQUENCE BOOST VALVE SLEEVE.
390 2-4 BRAKE SEQUENCE BOOST VALE SLEEVE "O" RING SEAL.
391 2-4 BRAKE SEQUENCE BOOST VALVE SLEEVE RETAINER.
392 TORQUE CONVERTER/LUBE REGULATOR VALVE 1.
393 TORQUE CONVERTER/LUBE REGULATOR VALVE 1 SPRING.
394 TORQUE CONVERTER/LUBE REG. VALVE 1 SPRING RETAINER.
395 LINE PRESSURE REGULATOR INNER VALVE.
396 LINE PRESSURE REGULATOR VALVE.
397 LINE PRESSURE REGULATOR VALVE SPRING.
398 LINE PRESSURE REGULATOR VALVE BORE PLUG.
399 LINE PRESSURE REGULATOR VALVE BORE PLUG RETAINER.
400 PLASTIC SCREENS (4 REQUIRED).

Note: The Valve names are provided by ATSG and are based on valve function.

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Figure 9

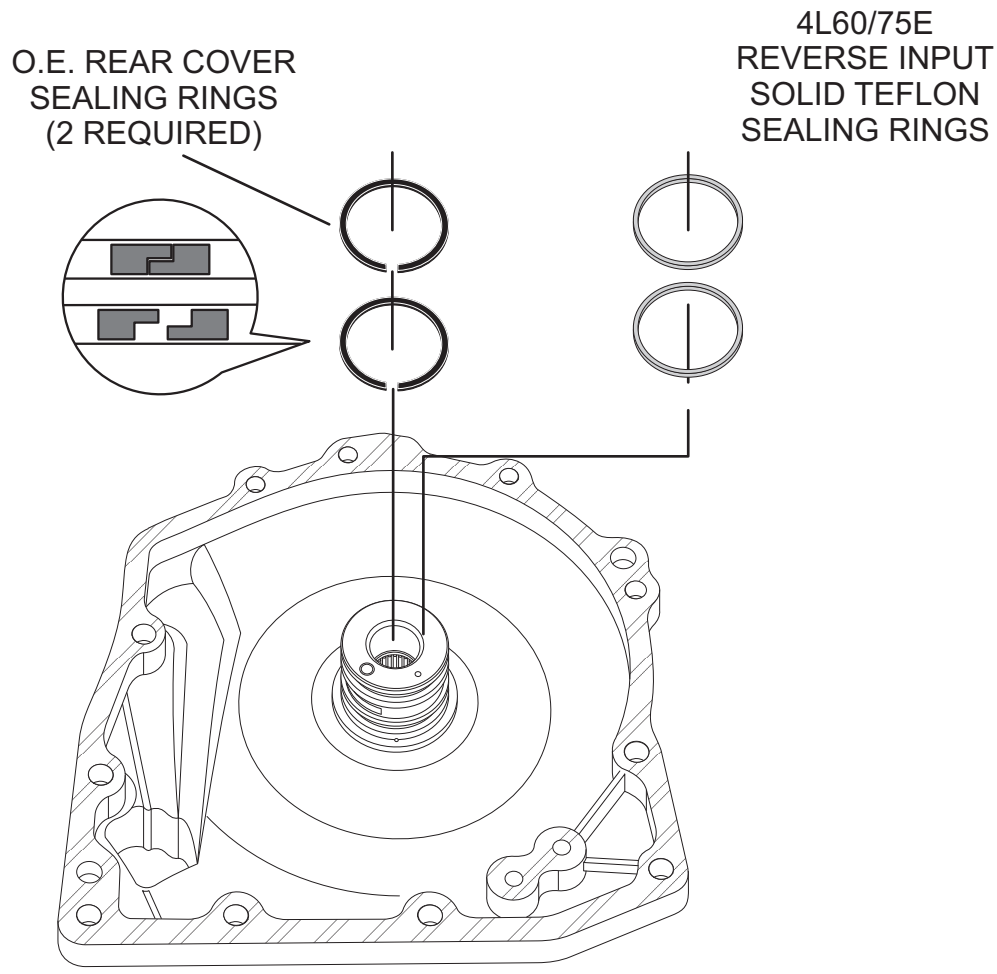
TOYOTA/LEXUS U140/U150
FLAIRED 2-3 UPSHIFT- DELAYED REVERSE
SLIGHT BIND IN REVERSE

COMPLAINT: Before or after overhaul, vehicles equipped with the U140/U150 transaxle, may exhibit a flair on the 2-3 upshift or a delayed engagement into Reverse or even a partial bind up in Reverse, especially when the vehicle is hot.

CAUSE: The cause may be, the sealing ring groove in the rear cover has a small amount of wear causing a problem with the O.E. sealing ring not to expand and seal off its fluid passage, which can cause a loss of pressure , on the U140, or a connection from the C2 to the C0 circuit which may cause a slight bind up, on the U150.

CORRECTION: To correct this condition, replace the sealing rings with the Reverse Input solid teflon sealing rings from a GM 4L60/75E. To install, gently slide the solid rings over the ring lands one at a time. Use the C2 drum on the U140 to size the ring, or the C2/C0 drum on the U150.

U140 REAR COVER "C2" SEALING RINGS

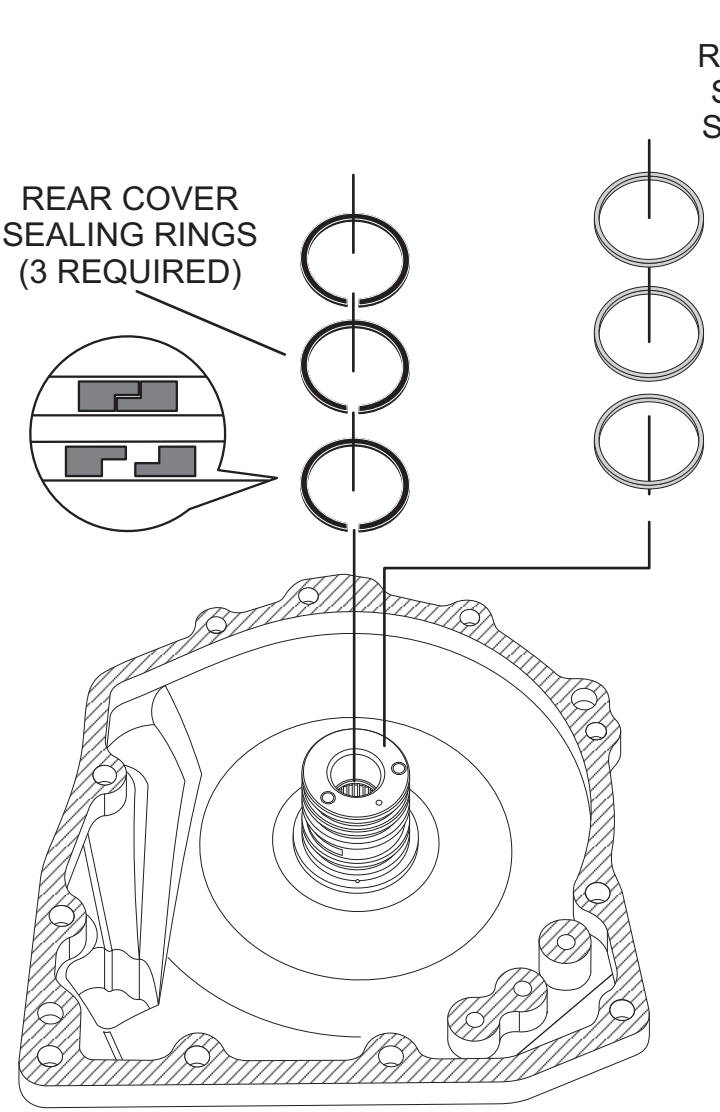


Note: walk the solid teflon rings over the ring lands and size them with the drum

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Figure 1

U150 REAR COVER "C2/C0" SEALING RINGS



Note: walk the solid teflon rings over the ring lands and size them with the drum

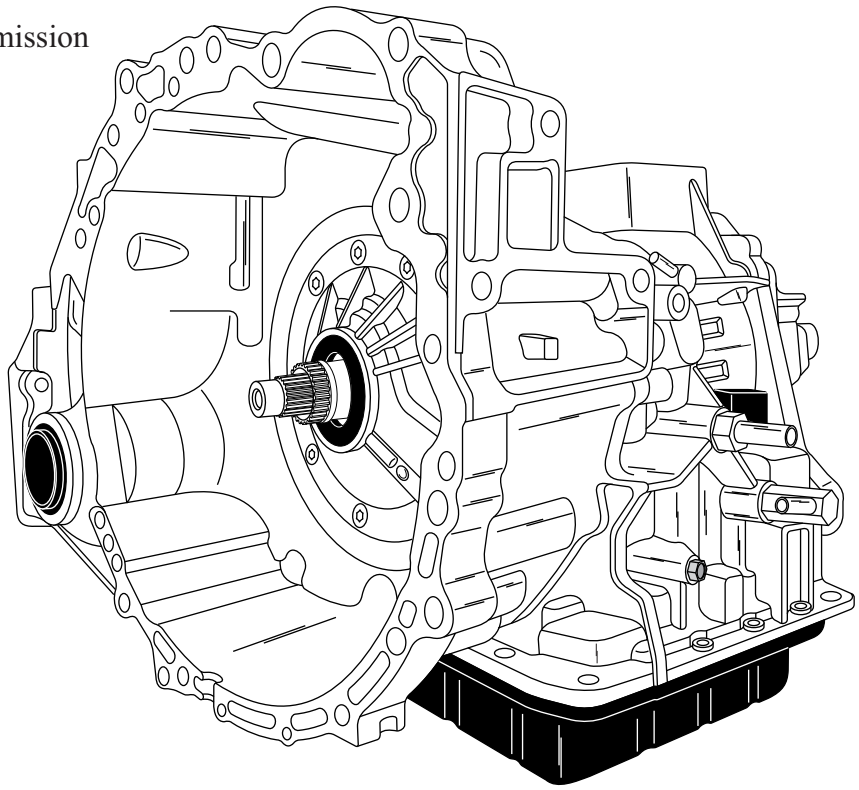
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Figure 2

TOYOTA U660E

Model Application

Taken from the 2011 Automatic Transmission Guide Global Edition by TRANStec®:



Toyota

Alphard	2008-2011
Aurion	2006-2011
Avalon	**2008-2011**
Avensis	2008-2011
Blade	2008-2011
Camry	**2006-2011**
Estima	2006-2011
Highlander	**2009-2011**
Mark X Z10	2007-2011
RAV 4	**2008-2011**
Sienna	**2009-2011**
Vanguard	2011
Venza	2008-2011
Verso	2009-2011

Lexus

ES350	**2006-2011**
RX350	**2008-2011**

Specifications

Gear Ratios for a 2007 Camry:

1st	3.300
2nd	1.900
3rd	1.420
4th	1.000
5th	0.713
6th	0.608
Reverse	4.148
Differential Gear Ratio	3.685

(Counter gear included)

Fluid Capacity - Liters (US qts, Imp. qts)

6.57 (6.94, 5.78) Includes Differential

Fluid Type: Toyota Genuine ATF WS

Weight: 94.4kg - 208.1lbs - Includes fluid filled to maximum level

Two Driving Clutches : C1 & C2
Three Brake Clutches : B1, B2 & B3
One 1-way Clutch: F1

1 Ravigneaux Planetary Gear Set
- Front Sun Gear: 30 teeth
- Rear Sun Gear: 27 teeth
- Long Pinion Gear: 20 teeth
- Short Pinion Gear: 22 teeth
- Ring Gear: 69 teeth

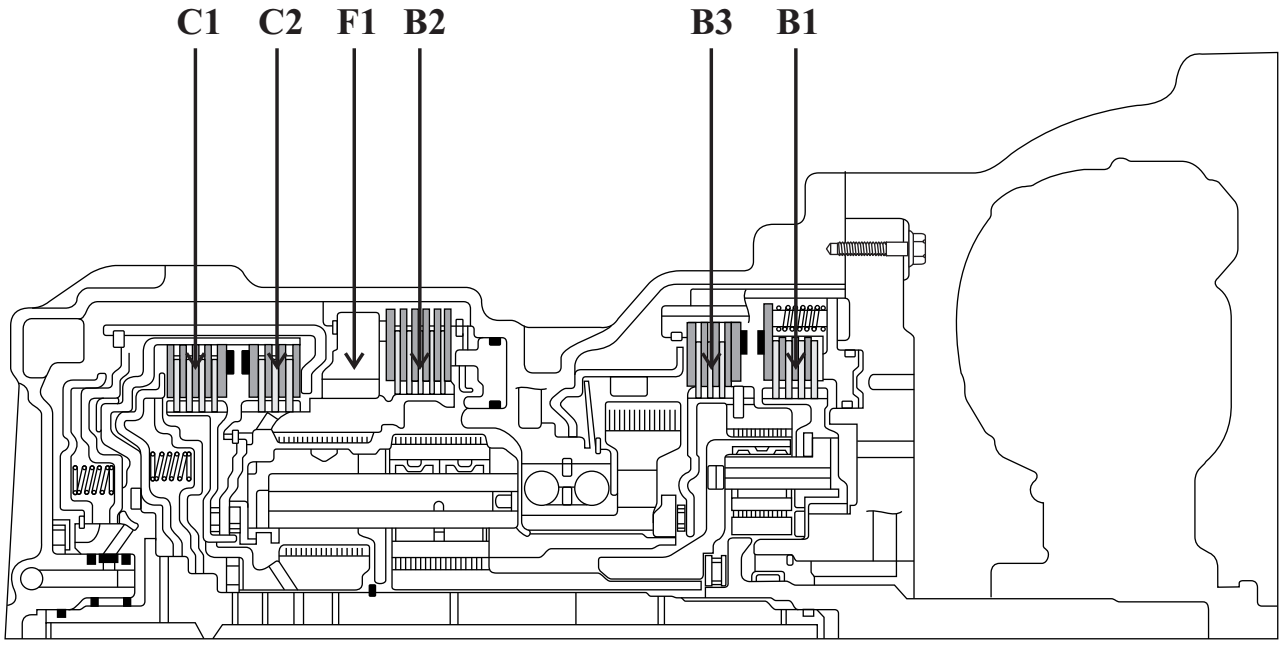
U/D Planetary Gear Set
- Sun Gear: 66 teeth
- Pinion Gear: 21 teeth
- Ring Gear: 110 teeth

Counter Gear
- Drive gear: 44 teeth
- Driven Gear: 47 teeth

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Figure 1

TOYOTA U660E
COMPONENT APPLICATION CHART



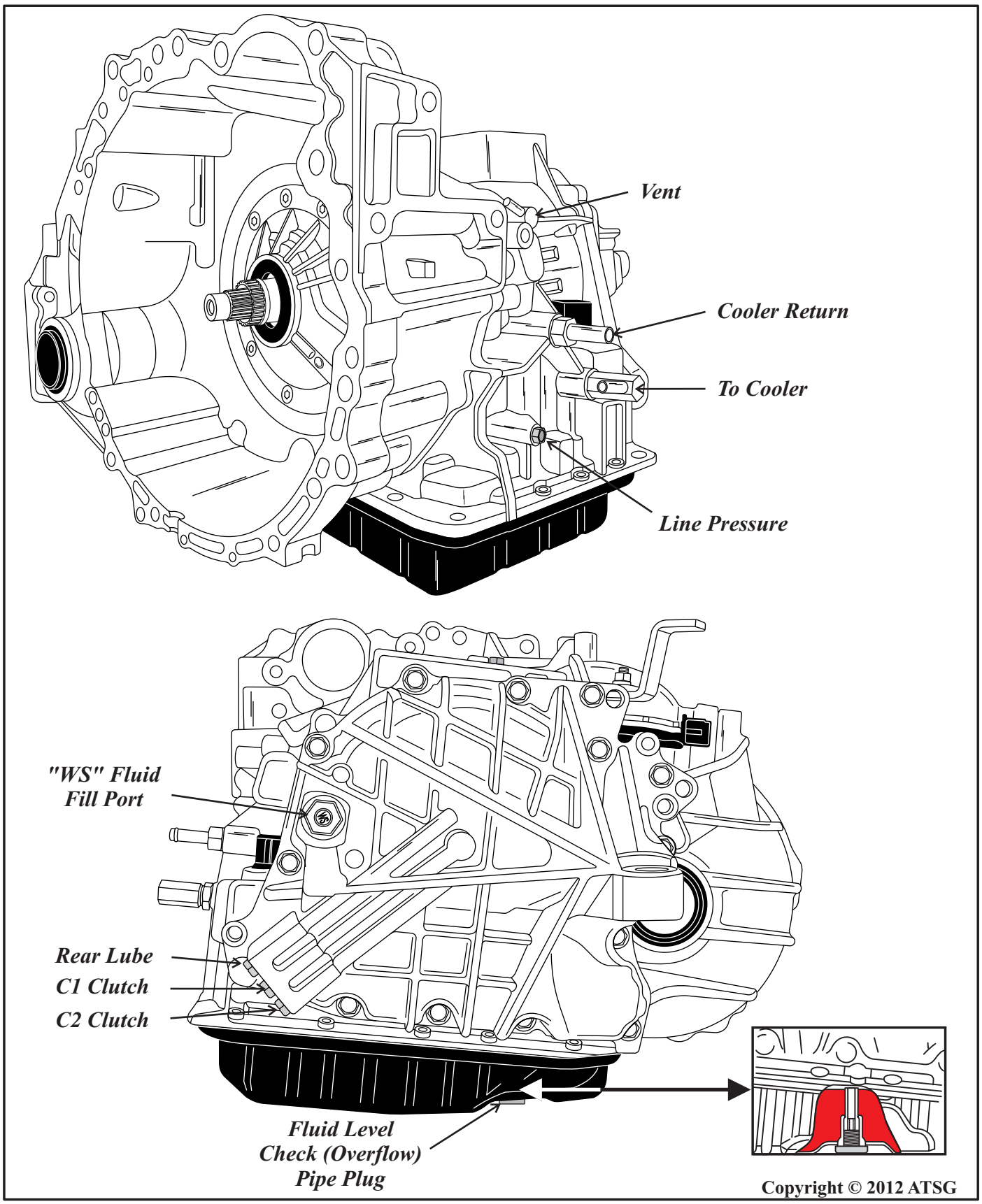
Shift Lever	Gear	C1	C2	B1	B2	B3	F1
P	Park						
R	Reverse				X	X*	
N	Neutral						
D, S6	1st	X					X
	2nd	X		X			
	3rd	X				X	
	4th	X	X				
	5th		X			X	
	6th		X	X			
S1	1st/Manual	X			X		X

**** - For safety reasons, the computer can inhibit a reverse engagement by energizing the SL solenoid which will release the B3 clutch.***

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Figure 2

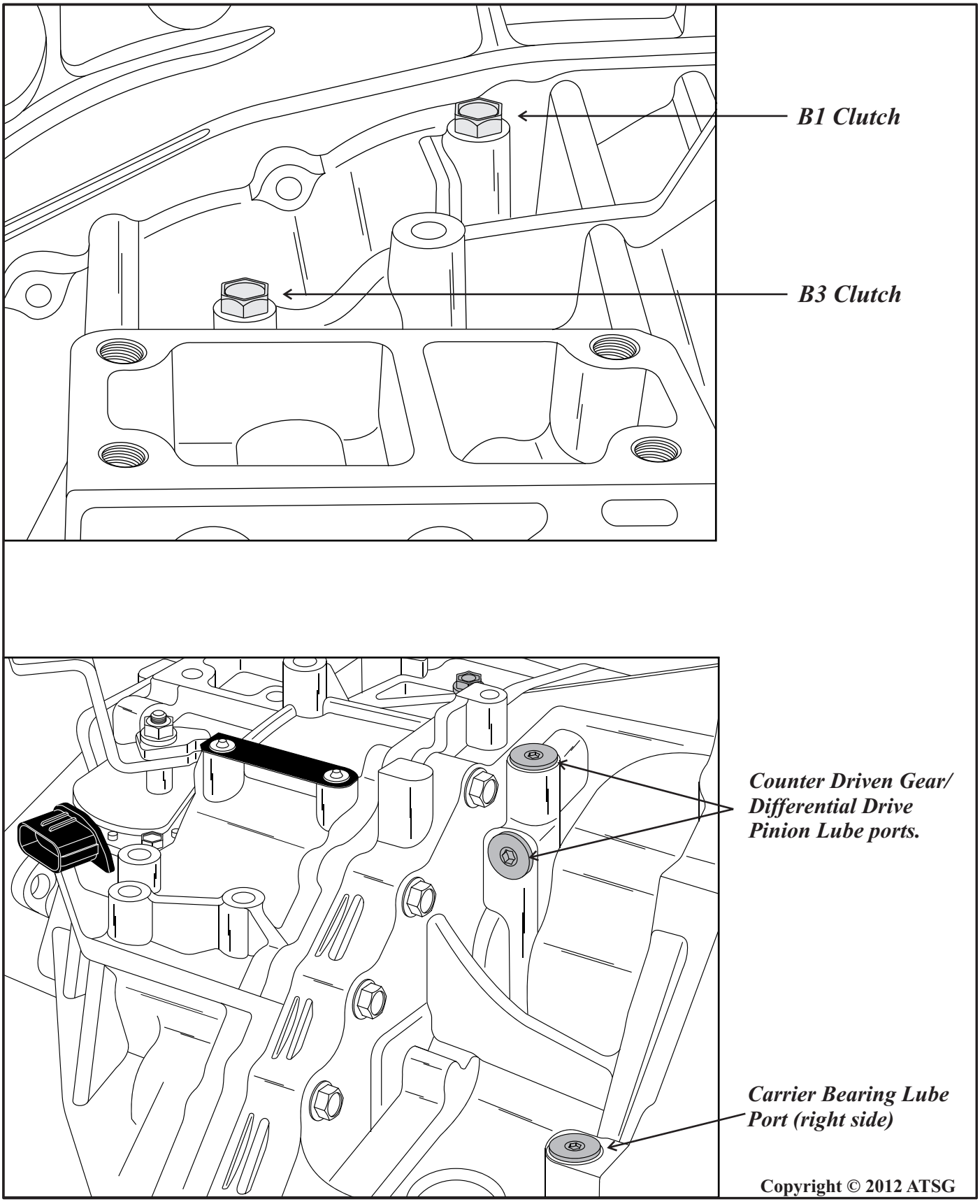
TOYOTA U660E
PRESSURE TAP IDENTIFICATION



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Figure 3

TOYOTA U660E
PRESSURE TAP IDENTIFICATION



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Figure 4

TOYOTA U660E
FLUID FILL PROCEDURE

ATF FILLING PROCEDURES WITHOUT SCAN TOOL (From factory manual):
The ATF filling procedure is changed in order to improve the accuracy of the ATF level when the transaxle is being repaired or replaced. As a result, the oil filler tube and the oil level gauge used for a conventional automatic transaxle are discontinued, eliminating the need to inspect the fluid level as a part of routine maintenance.

This filling procedure employs a refill plug, overflow plug, ATF temperature sensor, and shift indicator light "D". After the transaxle is refilled with ATF, remove the overflow plug and drain the extra ATF at the proper ATF temperature. Thus, the appropriate ATF level can be obtained.

Service Tip
ATF filling procedure through the DLC3 Connector (Special Service Tool part # 09843-18040 is optional)

Recommended fluid temperature is: 104°F (40°C) or less (Observed with scan tool or flashing D light without scan tool).

When a large amount of ATF needs to be filled (i.e. after removal and installation of oil pan or torque converter), perform the procedure from step 1.

When a small amount of ATF is required (i.e. removal and installation of oil cooler tube, repair of a minor oil leak), perform the procedure from step 7.

1) Raise the vehicle while keeping it level.
2) Remove the refill plug and overflow plug (Figure 3).
3) Fill the transaxle with WS type ATF through the refill plug hole until it overflows from the overflow plug hole (Figure 3).
4) Reinstall the overflow plug.
5) Add the specified amount of ATF (specified amount is determined by the procedure that was performed) and reinstall the refill plug.

Procedure Liters (US qts, Imp.qts)
Removal and installation of transaxle oil pan (including oil drainage) - 2.9 (3.1, 2.6)
Removal and installation of transaxle valve body - 3.3 (3.5, 2.9)
Replacement of torque converter - 4.9 (5.2, 4.3)

Lower the vehicle:

7) Use the SST (09843-18040) or jumper to short between the TC and CG terminals of the DLC3 connector:

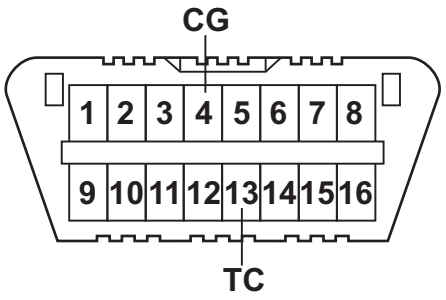


Figure 5

TOYOTA U660E
FLUID FILL PROCEDURE

8) Start the engine and allow it to idle. A/C switch must be turned off.
9) Move the shift lever from the P position to the S mode position and slowly select each gear S1 - S6. Then move the shift lever back to the P position.
10) Move the shift lever to the D position, and then quickly move it back and forth between N and D (at least once every 1.5 seconds) for at least 6 seconds. This will activate oil temperature detection mode.

Standard: The shift position indicator light "D" remains illuminated for 2 seconds and then goes off.

11) Return the shift lever to the P position and disconnect the TC terminal.
12) Idle the engine to raise the ATF temperature.
13) Immediately after the shift position indicator "D" light turns on, lift the vehicle up. The shift position indicator light "D" will indicate the ATF temperature according to the following table:

ATF Temp.	Optimal Temp.	Higher than Optimal Temp.	Lower than Optimal Temp.
Shift Position Indicator Light "D"	OFF	ON	Blinking

14) Remove the overflow plug and adjust the oil quantity. If the ATF overflows, go to step 17, and if the ATF does not overflow, go to step 15.
15) Remove the refill plug.
16) Add ATF through the refill plug hole until it flows out from the overflow plug hole.
17) When the ATF flow slows to a trickle, install the overflow plug and a new gasket.
18) Reinstall the refill plug (if the refill plug was removed).
19) Lower the vehicle.
20) Turn the ignition switch (engine switch) OFF to stop the engine.

LINE PRESSURE TESTING PROCEDURE

Perform the test at normal operating ATF temperature of: 50 to 80°C (122 to 176°F)
Perform the test with the A/C OFF.
When conducting stall test, do not continue more than 5 seconds.

Attach pressure gauge to the line pressure tap as seen in figure 3.

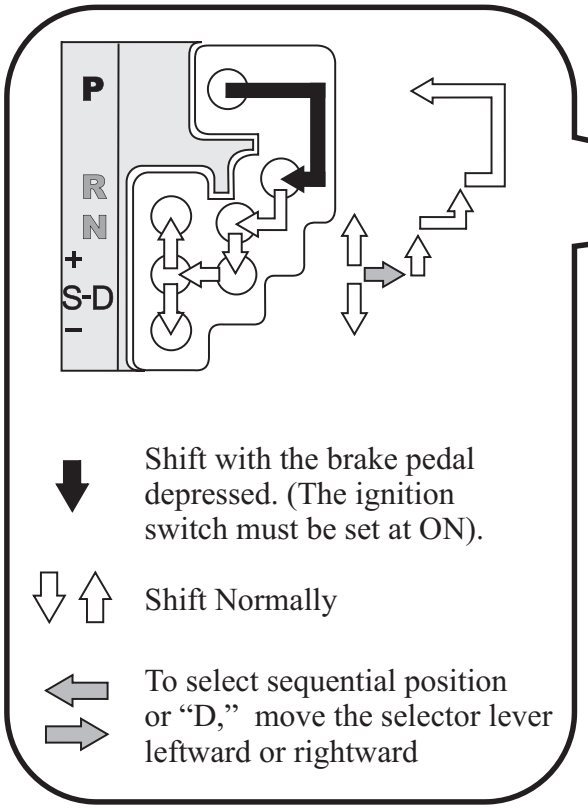
Lift vehicle off the ground with a hoist.

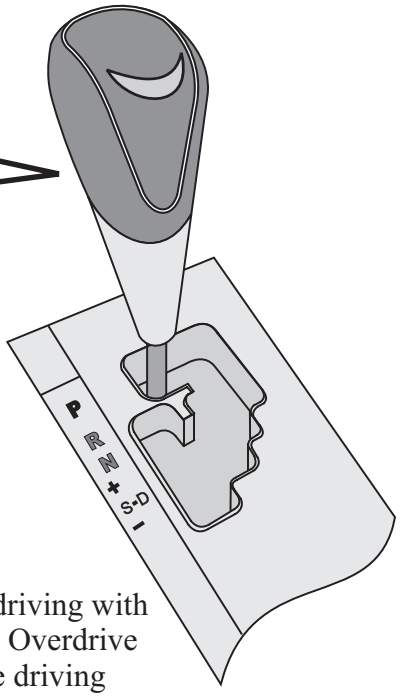
Start vehicle and warm the fluid to operating temperature.

In Drive at idle: 52-60 psi
In Drive at stall: 168-196 psi
In Reverse at idle: 117-133 psi
In Reverse at stall: 274-290 psi

Once proper line pressure is established, clutch pressure can be compared to line pressure. When the clutch is fully applied it should equal line pressure within 10 psi or less.

TOYOTA U660E
SELECTOR LEVER





P: Park
R: Reverse
N: Neutral
D: Normal driving with shift into Overdrive
S: "S" mode driving
+: Up-shift range
–: Downshift range

In the "D" position, a program called Artificial Intelligence shifting control (AI) will automatically select the most suitable shift range according to the driver's operation and driving condition. Once the lever is moved to the "S" position, this function will be cancelled.

Shifting control on the slope:
On inclines, you can drive smoothly with reduced shifting quantity. On declines, the vehicle will shift down automatically to obtain optimum engine braking and reduce the driver's foot braking load.

Automatic shifting point change control:
The most suitable shift range is selected depending on the driver's accelerator pedal operation and vehicle condition.

Driving in the "S" mode:
Once the selector lever has been positioned into the S mode, the shifter can be tapped forward "+" for manual up-shift control and rearward "–" for manual downshift control.

Once a particular gear range is selected, i.e. 5th gear range, if the driver no longer taps the lever for another up-shift or downshift, the transmission will automatically shift between 1st and 5th gear.

When the selector lever is initially shifted from the "D" to the "S" position, the transmission will be in 4th or 5th gear range depending on the vehicle speed.

However, if the selector lever is shifted to the "S" position when AI shifting control is being performed, the initial shift range position may be "3" (third range). This is because the suitable shift range is selected depending on the driving condition.

The "S" mode indicator light and the current shift range position are shown on the instrument cluster.

Shift range positions: *Following page*

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TOYOTA U660E
SELECTOR LEVER

"6" (Sixth range):
The most suitable gear is selected automatically between first and overdrive (sixth) gears according to the vehicle speed or driving conditions.

"5" (fifth range): The most suitable gear is selected automatically between first and fifth gears according to vehicle speed or driving conditions. This range is suitable for acceleration such as when passing a vehicle ahead of you during high speed driving.

"4" (Fourth range): The most suitable gear is selected automatically between first and fourth gears according to the vehicle speed or driving conditions. Slight engine braking will be obtained on a downhill road. Smooth running with less shifting will be obtained on an uphill road.

"3" (Third range): The most suitable gear is selected automatically between first and third gears according to the vehicle speed or driving conditions. This range is to be used when stronger engine braking is necessary.

"2" (Second range): First or second gear will be selected automatically according to the vehicle speed or driving conditions. This range is to be used when engine braking stronger than that of the "3" range position is necessary.

"1" (First range): The gear is fixed in first regardless of vehicle speed or driving conditions. This range is to be used when maximum engine braking is necessary.

If you attempt to downshift the transmission when it is not possible to downshift due to high vehicle speed, a warning tone sounds twice.

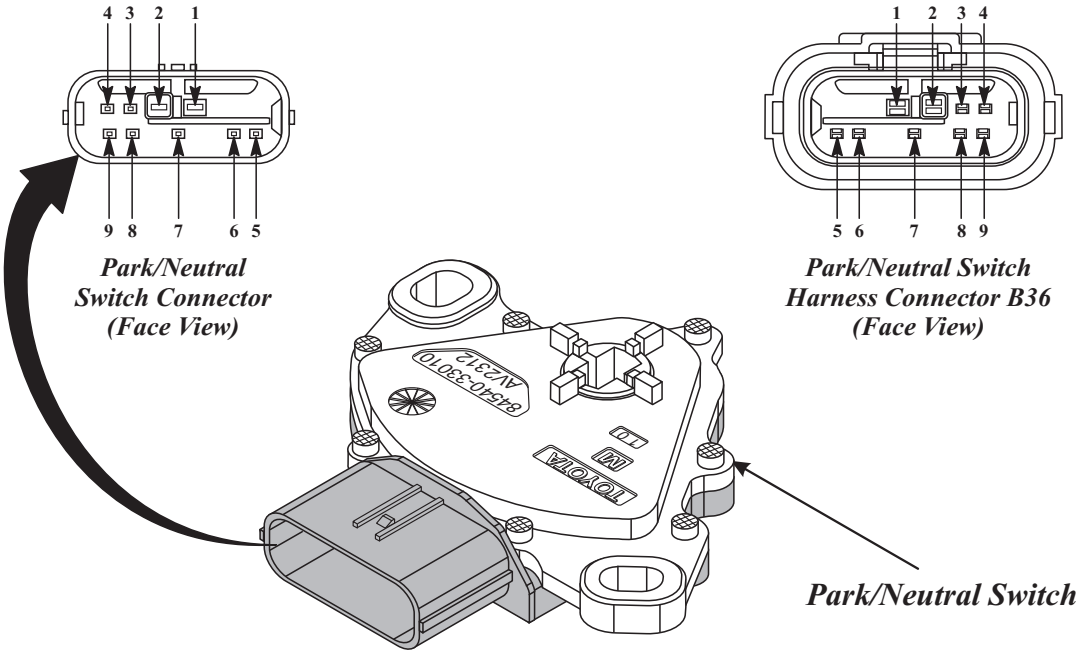
Speeds for a highway entrance or to pass slower traffic, maximum acceleration may be necessary. The following maximum allowable speeds should be observed in each of the following gear range:

Range	km/h	(mph)
1	60	(37)
2	104	(65)
3	139	(86)
4	198	(123)

TOYOTA U660E
PARK NEUTRAL SWITCH

Terminal	Function
1	Ignition Voltage In
2	Reverse Signal to TCM
3	Park Signal to ECM
4	From Main Body Control Module
5	Not Used
6	Not Used
7	Drive Signal to TCM
8	Neutral Signal to ECM
9	Park/Neutral Switch - Start Signal to TCM

Park/Neutral Switch Connector Terminal Identification



Park/Neutral Switch Connector (Face View)

Park/Neutral Switch Harness Connector B36 (Face View)

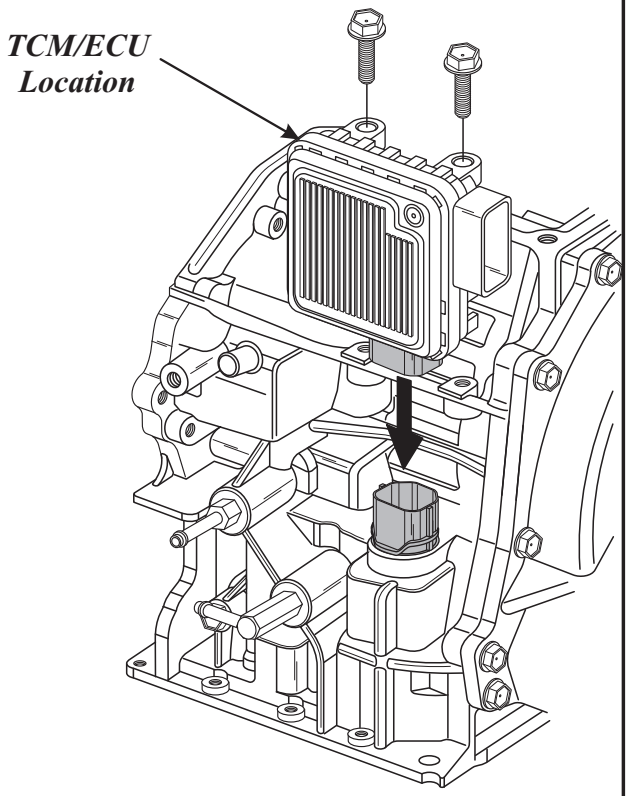
Park/Neutral Switch

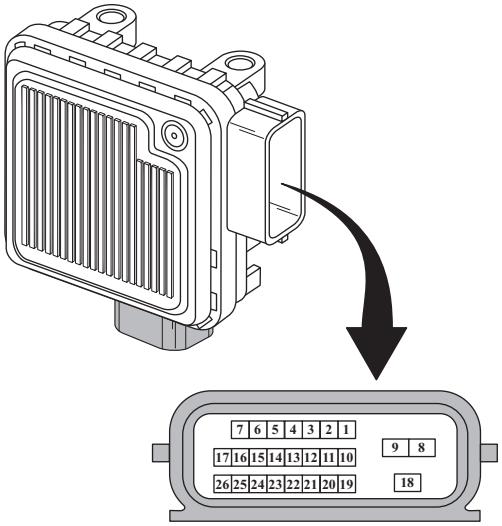
Terminals	Shifter Position	Resistance
1 - 3 & 4 - 9	"P"	Less Than 1 Ohm
	Except "P"	10k Ohms or Higher
1 - 2	"R"	Less Than 1 Ohm
	Except "R"	10k Ohms or Higher
1 - 8 & 4 - 9	"N"	Less Than 1 Ohm
	Except "N"	10k Ohms or Higher
1 - 7	"D", "S", "+" & "-"	Less Than 1 Ohm
	Except "D", "S", "+" & "-"	10k Ohms or Higher

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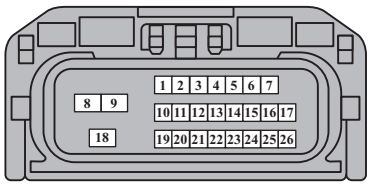
Figure 6

TOYOTA U660E
TRANSMISSION CONTROL MODULE





TCM/ECU Connector
Vehicle Harness Side
(Face View)



Vehicle Harness Connector
"B40" To TCM/ECU
(Face View)

TCM "B40" CONNECTOR VEHICLE HARNESS SIDE

Terminal	Color	Function
1	White/Blue	Battery Voltage for TCM memory (Always Hot).
3	Black/Red	Speed Signal from combination meter.
6	Black	CAN + Communication.
7	Yellow	CAN - Communication.
8	Black/White	Ground (E1).
10	Yellow	Starter signal.
11	Blue	Park/Neutral switch signal.
12	Black	Stop light switch signal.
13	Blue/Black	Ignition switch ON signal.
15	White	Reverse (R) shift position switch signal.
16	Red	Drive (D) shift position switch signal.
18	White	B+ Ignition, Power source for TCM.

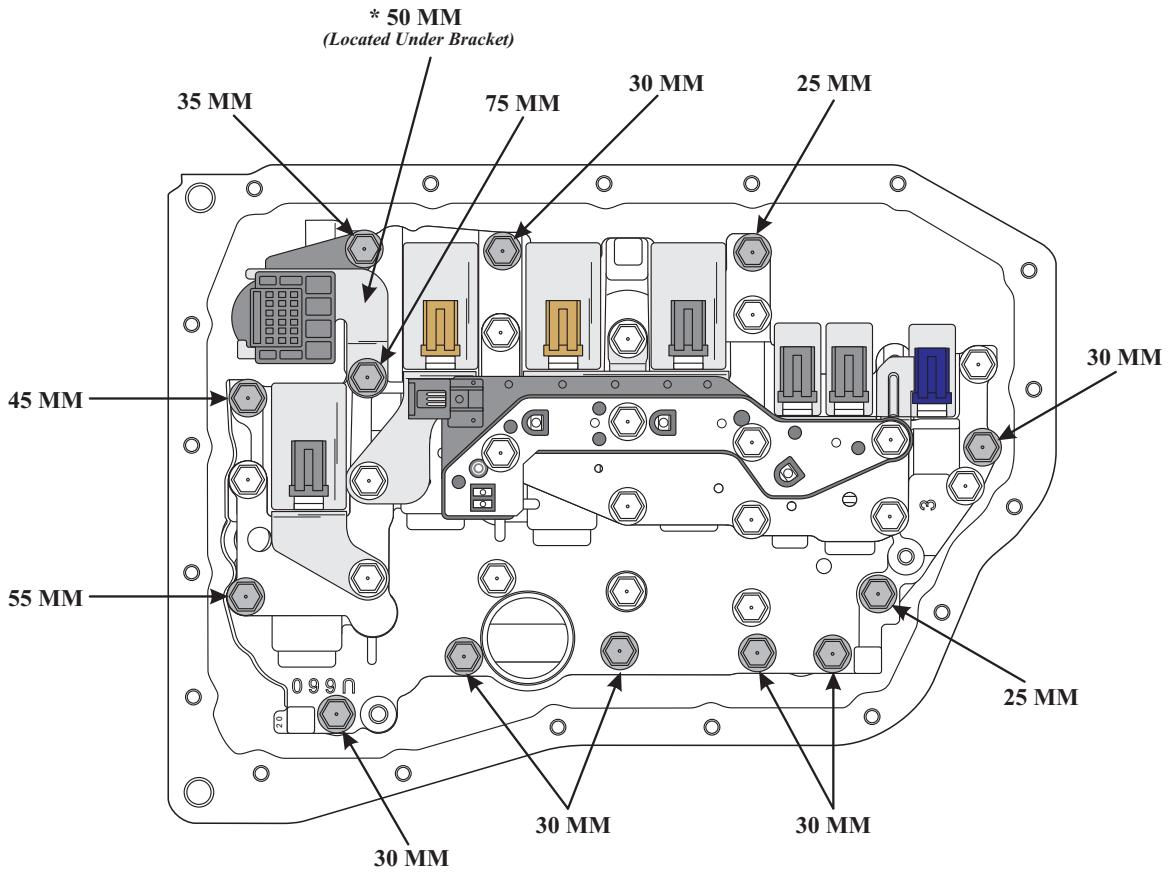
Note: Wire colors may vary.

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Figure 7

TOYOTA U660E
VALVE BODY TO CASE RETAINING BOLTS

Valve Body To Case Retaining Bolts Identification and Location (Total 14)

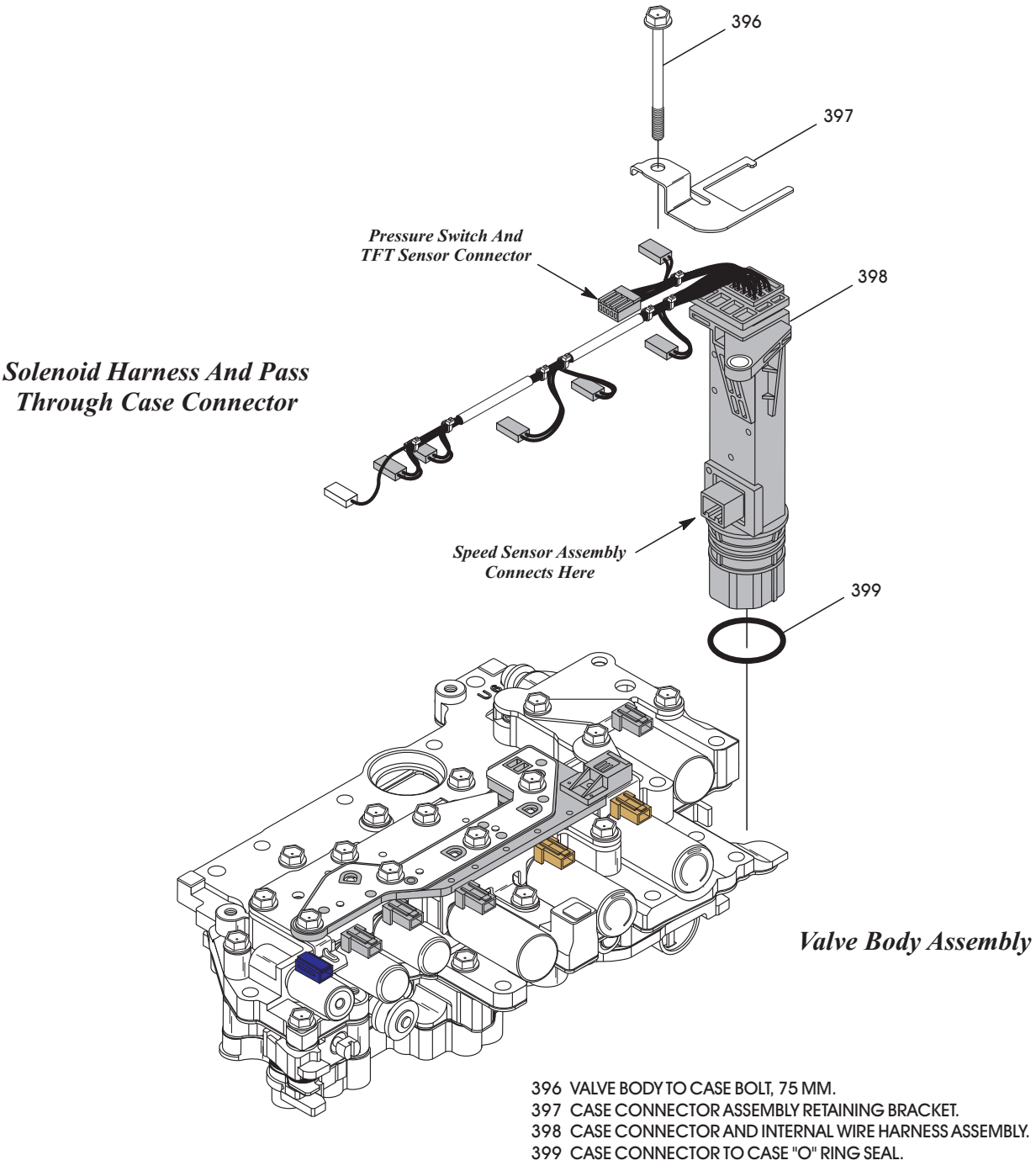


The Internal Wire Harness and Case Connector retaining bracket must be removed first. Then remove the remaining valve body to case retaining bolts as shown above to remove the valve body. CAUTION, the internal wire harness and case connector assembly "must" be removed with the valve body as an assembly, as the speed sensor assembly is bolted to the upper valve body and plugs into the case connector and internal harness assembly. If you try to remove it before removing the valve body, you will break the case connector assembly.

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Figure 8

TOYOTA U660E
VALVE BODY ASSEMBLY VIEW



396 VALVE BODY TO CASE BOLT, 75 MM.
397 CASE CONNECTOR ASSEMBLY RETAINING BRACKET.
398 CASE CONNECTOR AND INTERNAL WIRE HARNESS ASSEMBLY.
399 CASE CONNECTOR TO CASE "O" RING SEAL.

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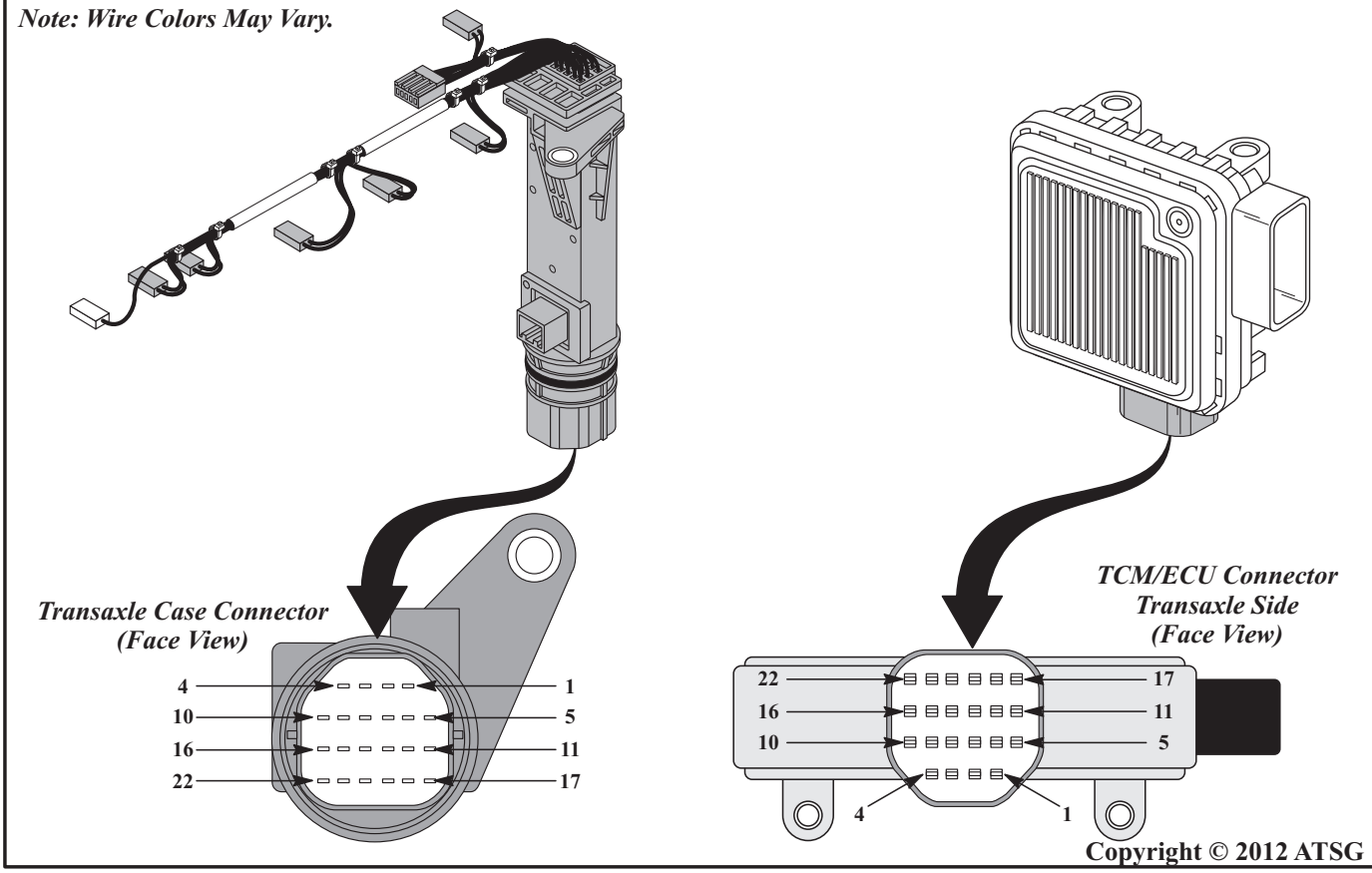
Figure 9

TOYOTA U660E

CASE CONNECTOR AND INTERNAL WIRE HARNESS TERMINAL ID

Terminal	Color	Function
1	Concealed	Turbine Speed Sensor Ground (NTB).
2	Concealed	Turbine Speed Sensor Signal (NTO).
3	Concealed	Counter Gear Speed Sensor Ground (NCB).
4	Concealed	Counter Gear Speed Sensor Signal (NCO).
5	Black	Linear Solenoid "SLU" Ground (TCC and B2 Brake Pressure Control).
6	Dk Blue	ON-OFF 3-Way Solenoid "SL" Positive (This Solenoid is internally grounded).
7	Black	Linear Solenoid "SLT" Ground (Line Pressure Control).
8	Black	Linear Solenoid "SL2" Ground (C2 Clutch Pressure Control).
9	Orange	Linear Solenoid "SL2" Positive (C2 Clutch Pressure Control).
10	White	Pressure Switch Number 1 (PS1).
11	White	Linear Solenoid "SLU" Positive (TCC and B2 Brake Pressure Control).
12	Grey	Linear Solenoid "SLT" Positive (Line Pressure Control).
13	Black	Linear Solenoid "SL1" Ground (C1 Clutch Pressure Control).
14	Red	Linear Solenoid "SL1" Positive (C1 Clutch Pressure Control).
15	Black	Linear Solenoid "SL3" Ground (B1 Brake Pressure Control).
16	Dk Blue	Linear Solenoid "SL3" Positive (B1 Brake Pressure Control).
17	Orange	Transaxle Fluid Temperature Ground (E2).
18	Grey	Transaxle Fluid Temperature Signal (THO1).
19	Tan	Pressure Switch Number 3 (PS3).
20	Yellow	Pressure Switch Number 2 (PS2).
21	Black	Linear Solenoid "SL4" Ground (B3 Brake Clutch Pressure Control).
22	Green	Linear Solenoid "SL4" Positive (B3 Brake Clutch Pressure Control).

Note: Wire Colors May Vary.

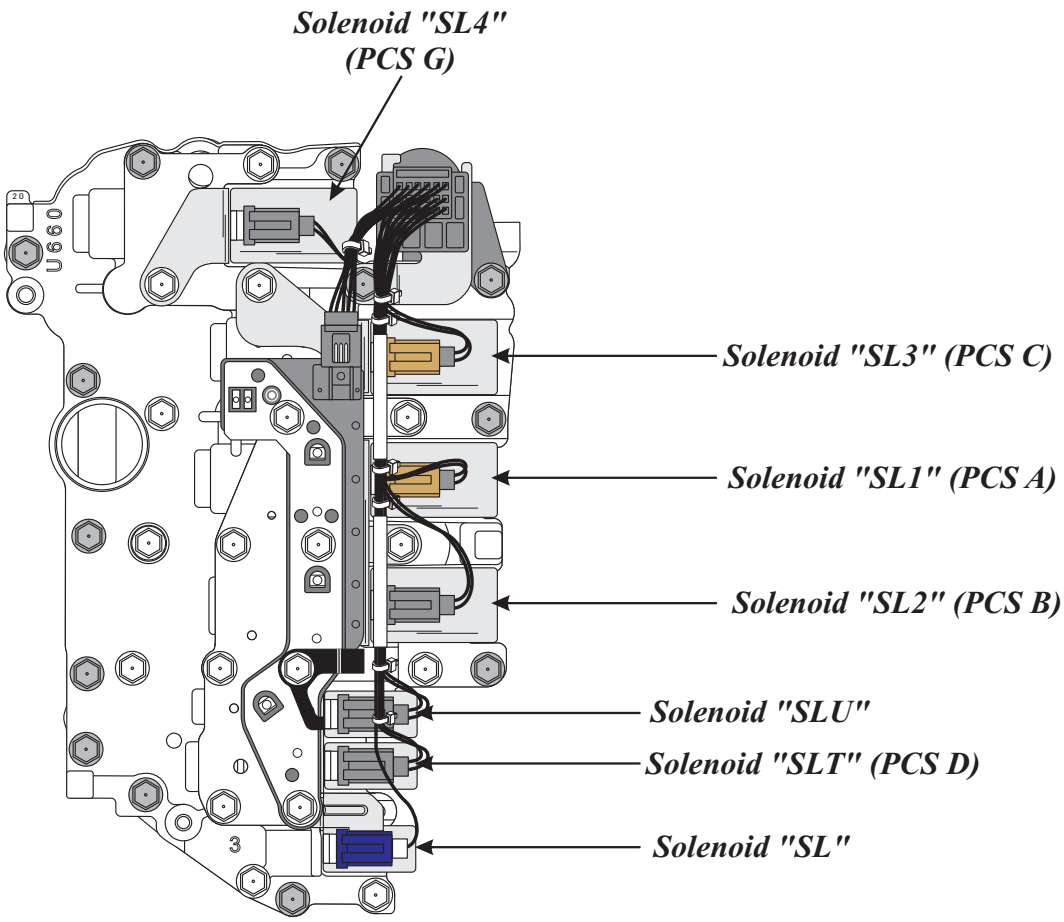


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Figure 10

TOYOTA U660E

SOLENOID IDENTIFICATION, LOCATIONS AND FUNCTION



Solenoid	Type	Function	Ohms Resistance
SL1	Linear	C1 Clutch Pressure Control	5.0-5.6 @ 20°C (68°F)
SL2	Linear	C2 Clutch Pressure Control	5.0-5.6 @ 20°C (68°F)
SL3	Linear	B1 Brake Clutch Pressure Control	5.0-5.6 @ 20°C (68°F)
SL4	Linear	B3 Brake Clutch Pressure Control	5.0-5.6 @ 20°C (68°F)
SLT	Linear	Line Pressure Control	5.0-5.6 @ 20°C (68°F)
SLU	Linear	Torque Converter Clutch Pressure Control B2 Brake Clutch Pressure Control	5.0-5.6 @ 20°C (68°F)
SL	On-Off 3-Way	Switches the Lock-Up relay valve Switches the B2 Brake Clutch Apply Control Valve Switches the Reverse Sequence Valve	11-15 @ 20°C (68°F)

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Figure 11

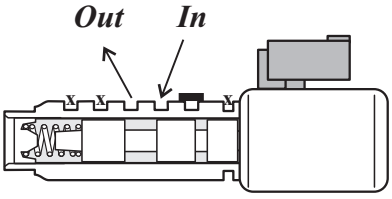
TOYOTA U660E
SOLENOID FUNCTION

The SL1, SL2, SL3, SL4 and SLU linear solenoids provide hydraulic pressure proportional to the current flow. When the solenoid is off (no current), their respective apply circuits are open to exhaust otherwise referred to as being Normally Vented (N.V.). Pressure in their respective apply circuits increases as current to the solenoid increases.

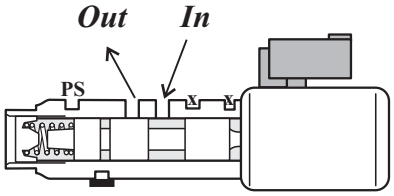
The SLT operates inversely in that when no current is applied, maximum pressure is applied to its respective circuit. This is a Normally Applied (N.A.) linear solenoid.

The SLT, SLU and SL solenoids are supplied with a pressure less than line pressure from a solenoid modulating valve in the valve body. These solenoids then operate their respective valves with this pressure.

The SL1, SL2, SL3 and SL4 are large flow linear solenoids supplied with line pressure to the regulating valve built into the snout of each of these solenoids. They then regulate the pressure to apply and release their respective clutch element.



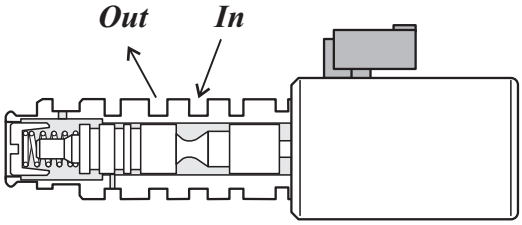
N.A. "SLT" Solenoid
(Line Pressure Control)



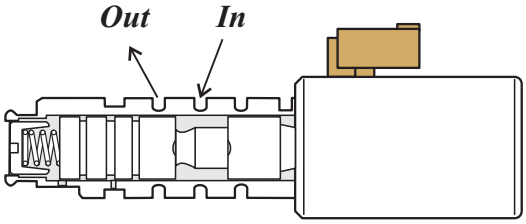
N.V. "SLU" Solenoid
(Lock-Up & B2 Brake Control)

The SLT Solenoid is supplied with Solenoid Modulating Valve Pressure. The SLT Solenoid regulates this pressure to both the Primary and Secondary Pressure Regulator Valves as well as the Sequence Valve.

The SLU Solenoid is supplied with Solenoid Modulating Valve Pressure. The SLU Solenoid regulates this pressure to both the Lock-Up Control Valve for Converter Clutch Flex Control and B2 Apply Control Valve for a manual S1 low gear.



N.V."SL2" (C2 Clutch Control)
N.V."SL4" (B3 Brake Control)
Black Connector Solenoids



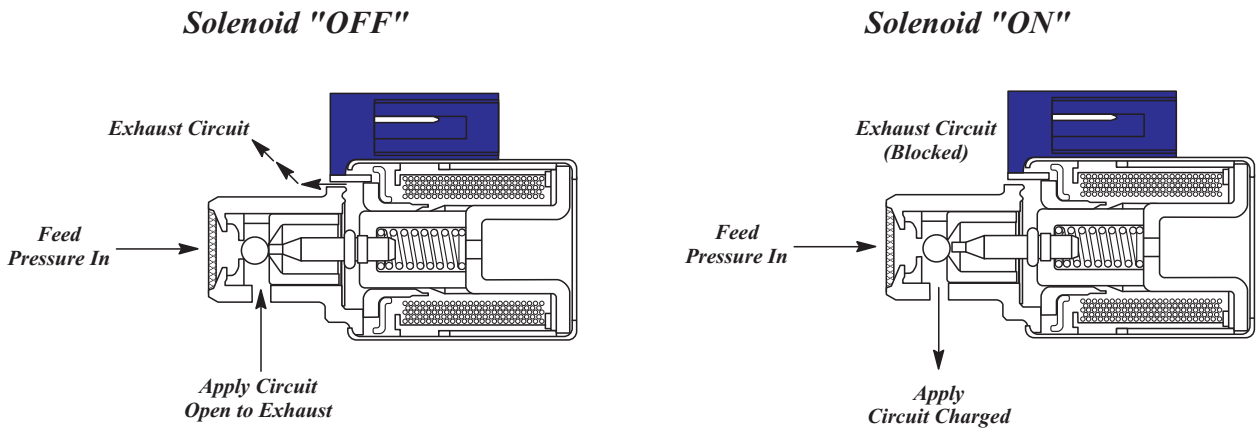
N.V. "SL1" (C1 Clutch Control)
N.V. "SL3" (B1 Brake Control)
Brown Connector Solenoids

As mentioned above the SL1, SL2, SL3 and SL4 solenoids are supplied with main line pressure regulated by the SLT Solenoid. These solenoids then control the apply and release of their respective clutch element. The SL1 controls the C1 Clutch, the SL2 controls the C2 Clutch, the SL3 controls the B1 Brake and the SL4 controls the B3 Brake.

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Figure 12

TOYOTA U660E
SOLENOID FUNCTION



The SL Solenoid is supplied with pressure from the Solenoid Modulating Valve in the valve body. When the solenoid is off this feed pressure is blocked. Simultaneously the apply circuit is open or connected to exhaust. When the solenoid is turned on the feed circuit becomes connected to the apply circuit and the exhaust circuit is blocked.

The SL apply circuit connects to the Reverse Sequence Valve, the B2 Apply Control Valve and the Lock-up Relay Valve enabling it to apply the converter clutch in conjunction with the SLU solenoid and provide a Reverse Inhibit feature for safety purposes.

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Figure 13

Solenoid Application Chart

		Gear (ON = Modulated)					
		1st	**2nd**	**3rd**	**4th**	**5th**	**6th**
Solenoid	**SL1**	**ON**	**ON**	**ON**	**ON**	**Off**	**Off**
	SL2	**Off**	**Off**	**Off**	**ON**	**ON**	**ON**
	SL3	**Off**	**ON**	**Off**	**Off**	**Off**	**ON**
	SL4	**Off**	**Off**	**ON**	**Off**	**ON**	**Off**

The SLT solenoid continuously modulates adjusting main line pressure according to temperature, engine load and monitored gear ratio and shift time

The SL and SLU solenoids can be active as early as 2nd gear due to the Converter Clutch Apply FLEX Strategy.

If forward motion is detected at the time when Reverse is selected, the SL solenoid will turn to on switch the Reverse Sequence Valve. This will shut off pressure to the B3 clutch enabling the "No Reverse" safety strategy.

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Figure 14

TOYOTA U660E
FAILSAFE STRATEGY

Malfunction Part	Failsafe Strategy
Input Turbine Speed Sensor	1st or 3rd only
Counter Gear Speed Sensor	1st to 4th only *Counter Gear Speed is based on signals from the skid control ECU speed sensor signal.
ATF Temp. Sensor	1st to 4th only
ECT ECU Power Supply Low Voltage	If malfunction occurred in 6th the transmission will remain in 6th. If malfunction occurred in any lower gear the transmission will default to 5th
CAN communication	1st or 3rd only
Knock Sensor	1st to 4th only
SL1, SL2, SL3 or SL4	Current to the failed solenoid is turned off. The remaining solenoids operate normally which is referred to as "Shift Control." Thus various irregular shift patterns and failsafe strategies will be observed.
SL1 "On" Malfunction	No 5th or 6th
SL1 "Off" Malfunction	1st = N, 2nd = N, 3rd = N, 4th = N, 5th to 6th
SL1 "Off" Malfunction (*With Failsafe strategy*)	3rd or 5th only
SL1 "Off" Malfunction (*With Failsafe strategy and PS 1 & 2 Malfunction*)	3rd or 5th only
SL2 "On" Malfunction	4th to 6th only
SL2 "Off" Malfunction	1st to 3rd, 4th = 1st, 5th = N, 6th = N
SL2 "Off" Malfunction (*With Failsafe strategy*)	1st to 3rd only
SL2 "Off" Malfunction (*With Failsafe strategy and PS 1 & 2 Malfunction*)	2nd or 3rd only

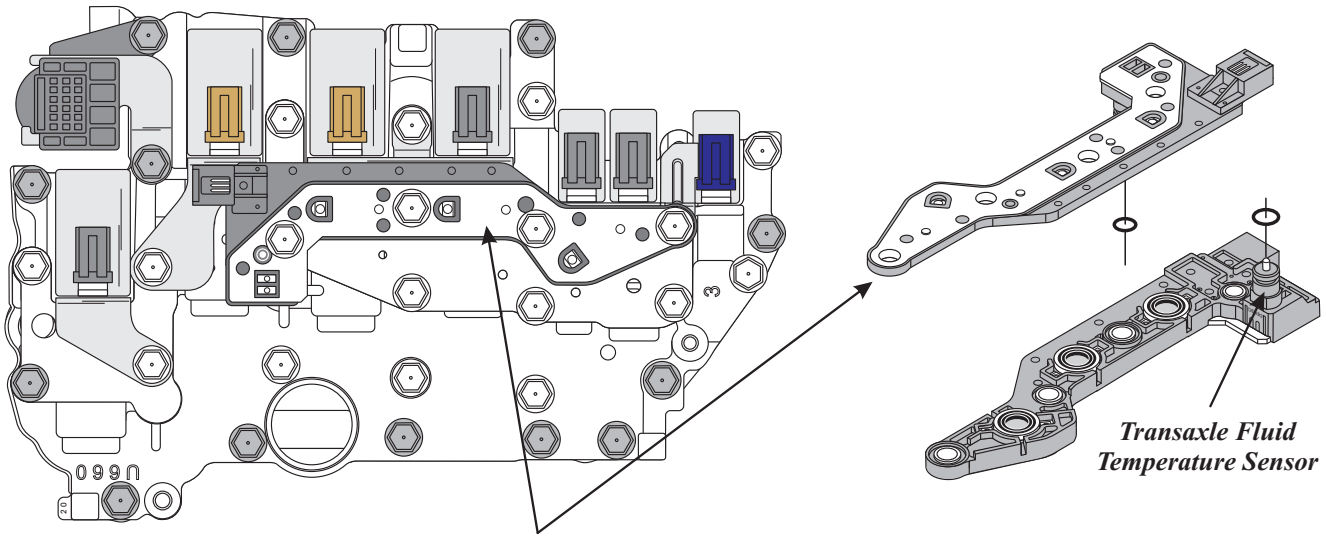
Figure 15

TOYOTA U660E
FAILSAFE STRATEGY

Malfunction Part	Failsafe Strategy
SL3 "On" Malfunction	2nd - 6th only
SL3 "Off" Malfunction	1st, 3rd to 5th, 6th = N
SL3 "Off" Malfunction (*With Failsafe strategy*)	1st and 3rd to 5th
SL3 "Off" Malfunction (*With Failsafe strategy and PS 1 & 2 Malfunction*)	3rd only
SL4 "On" Malfunction	3rd to 5th only
SL4 "Off" Malfunction	1st to 2nd, 3rd = 1st, 4th, 5th = N, 6th
SL4 "Off" Malfunction (*With Failsafe strategy*)	1st to 2nd, 4th
SL4 "Off" Malfunction (*With Failsafe strategy and PS 1 & 2 Malfunction*)	2nd only
No Power to TCM	3rd only

Figure 16

PRESSURE SWITCH AND TFT SENSOR ASSEMBLY



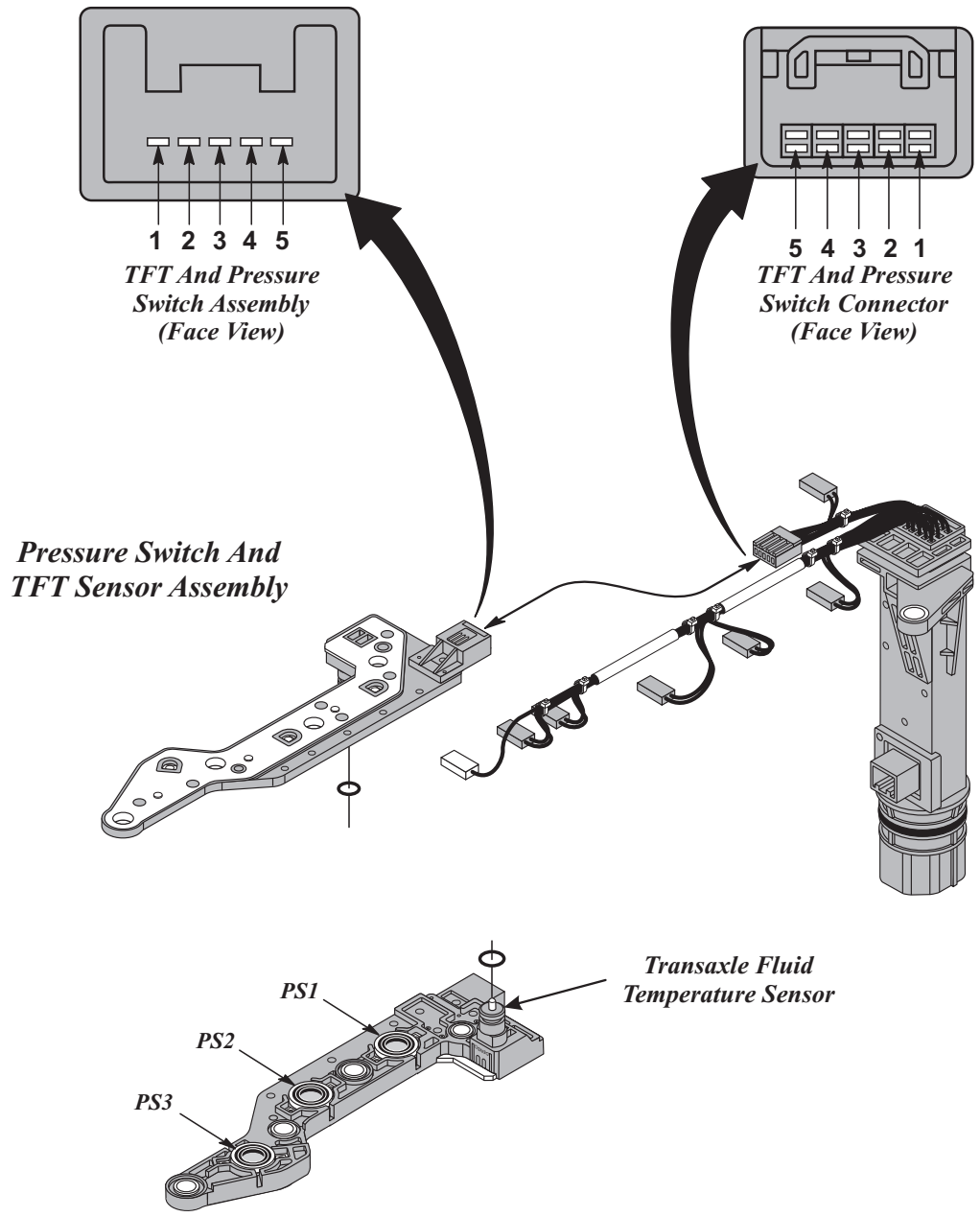
Pressure Switch And TFT Sensor Assembly

Transaxle Fluid Temperature Sensor

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Figure 17

TOYOTA U660E
PRESSURE SWITCH AND TFT SENSOR TERMINAL ID



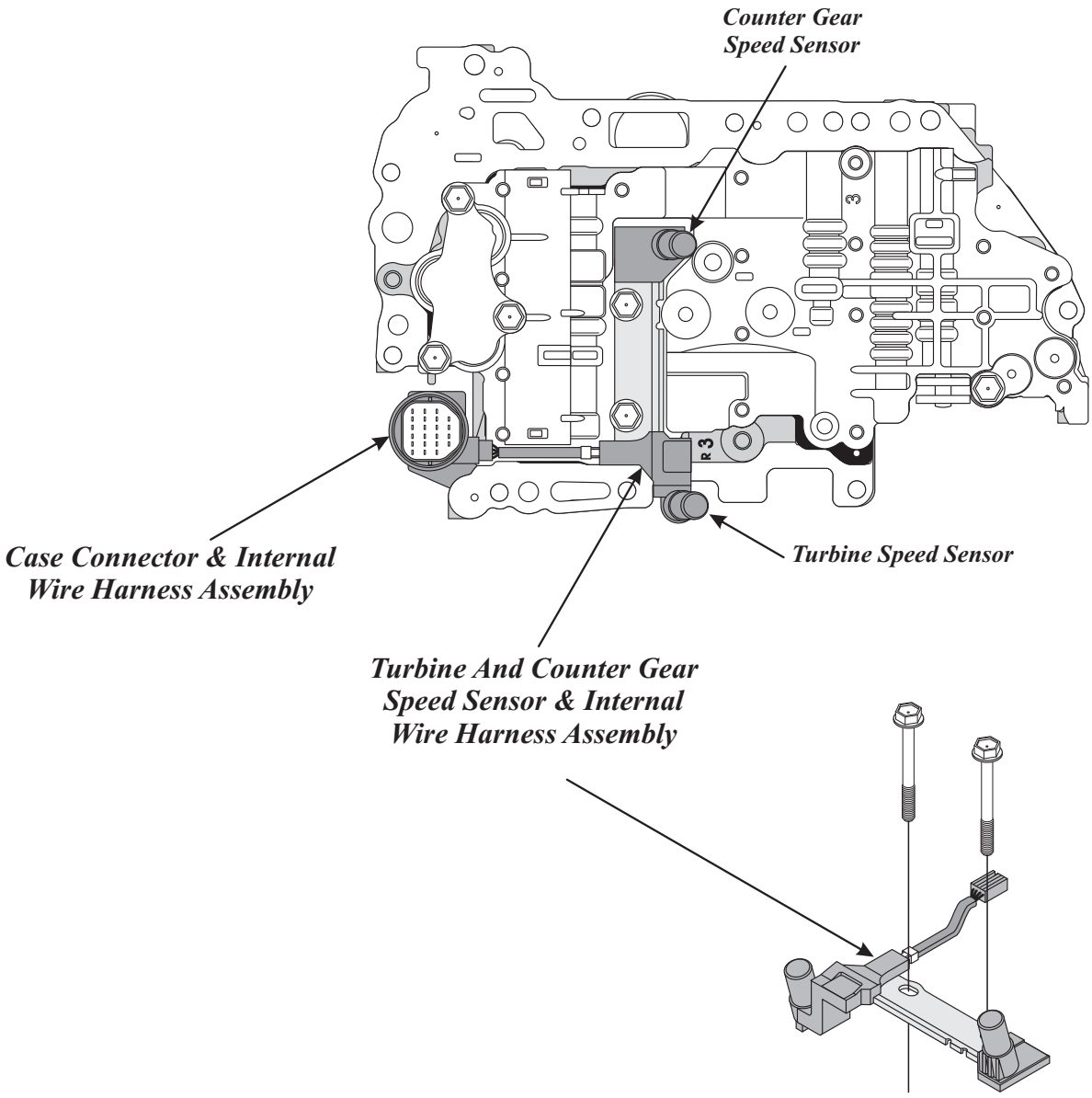
TFT SENSOR AND PRESSURE SWITCH ASSEMBLY

Terminal	Color	Function
1	Tan	Pressure Switch 3 (PS3) - Monitors the SLU Solenoid - TCC Flex and B2 apply in S1 (Manual 1st)
2	Yellow	Pressure Switch 2 (PS2) - Monitors the SL2 Solenoid - C2 Clutch Apply
3	White	Pressure Switch 1 (PS1) - Monitors the SL1 Solenoid - C1 Clutch Apply
4	Grey	Transaxle Fluid Temperature Signal
5	Orange	Transaxle Fluid Temperature Ground

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Figure 18

TOYOTA U660E
SPEED SENSOR ASSEMBLY

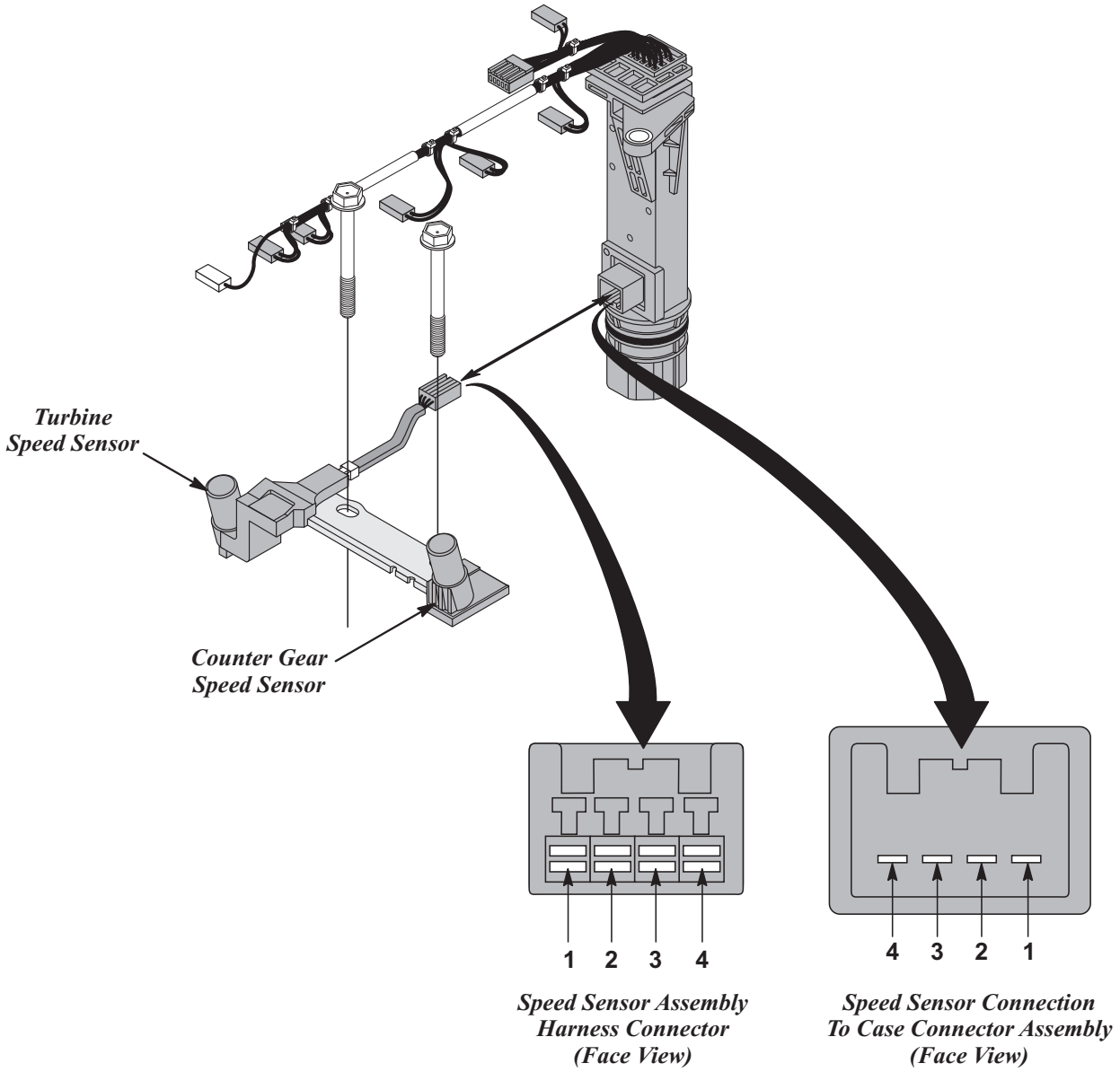


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Figure 19

TOYOTA U660E

SPEED SENSOR ASSEMBLY TERMINAL IDENTIFICATION



TRANSAXLE CASE CONNECTOR AND INTERNAL WIRE HARNESS

Terminal	Color	Function	Resistance
1	White	Turbine Speed Sensor Ground (NTB)	10k or Higher
2	Red	Turbine Speed Sensor Signal (NTO)	
3	Black	Counter Gear Speed Sensor Ground (NCB)	10k or Higher
4	Yellow	Counter Gear Speed Sensor Signal (NCO)	

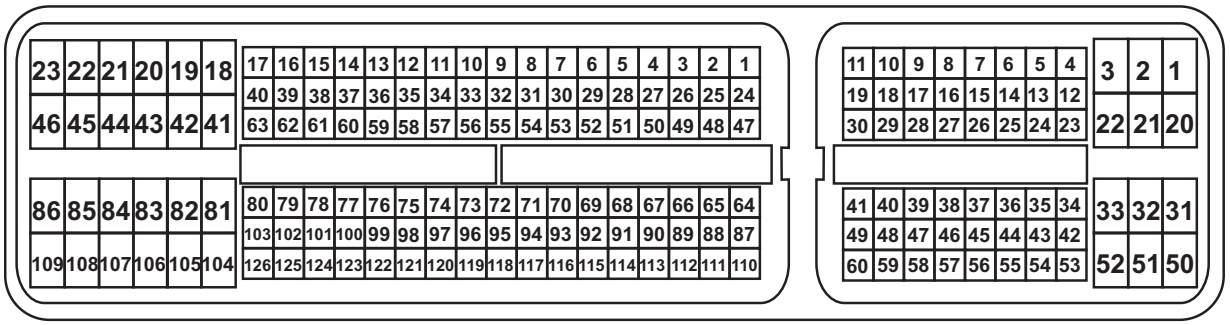
Note: Wire Colors May Vary.

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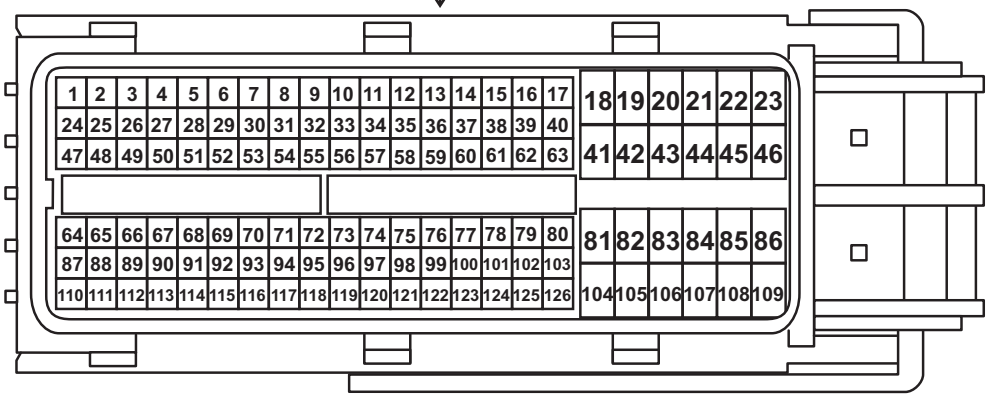
Figure 20

TOYOTA U660E

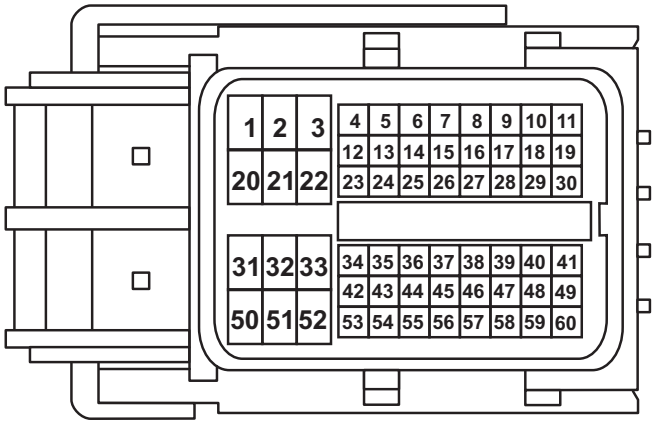
ECM CONNECTOR AND TERMINAL IDENTIFICATION



ECM Terminal Identification
(Face View)



ECM Connector B12
Terminal Identification
(Face View)

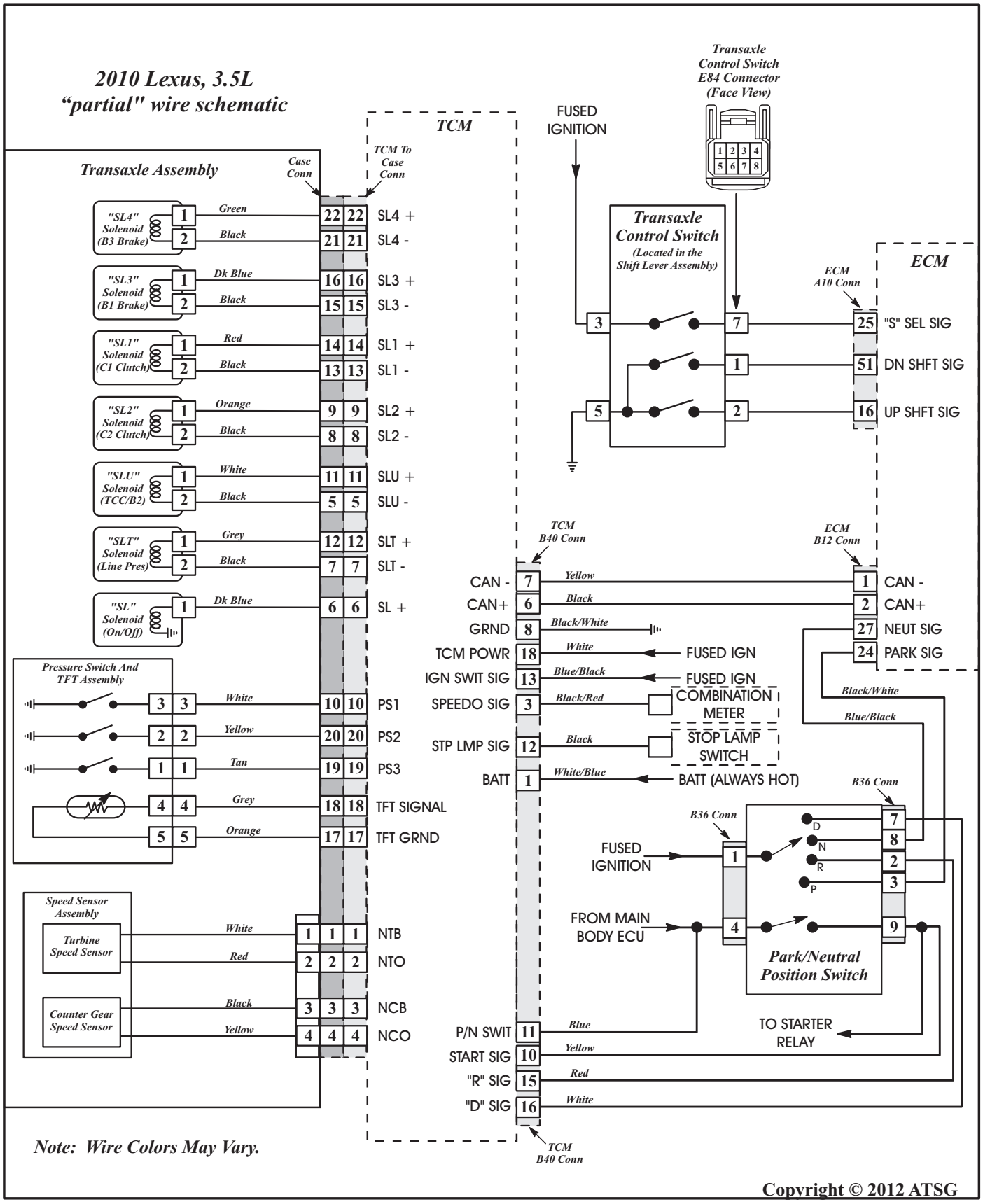


ECM Connector A10
Terminal Identification
(Face View)

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Figure 21

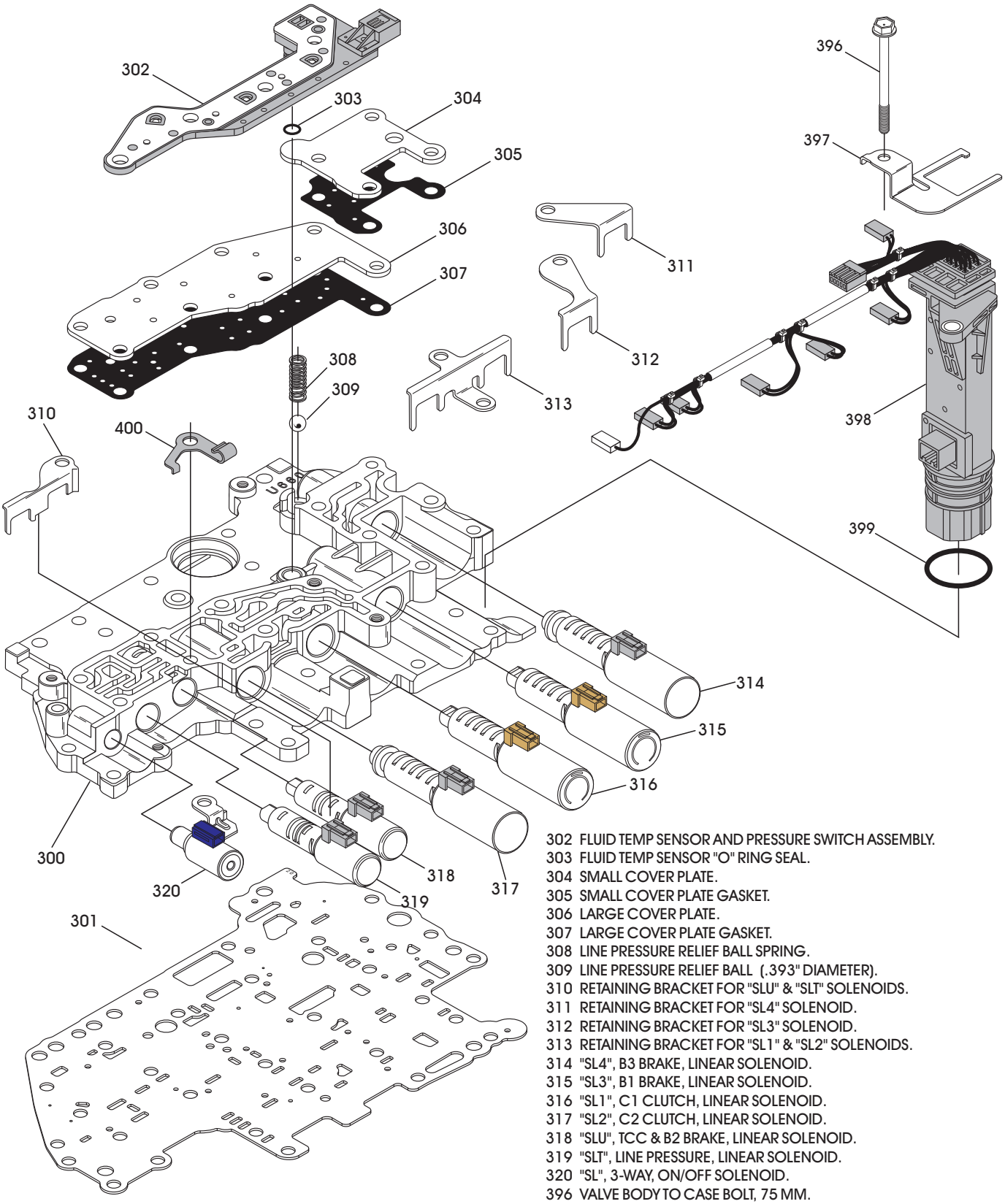
TOYOTA U660E
PARTIAL WIRING SCHEMATIC



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Figure 22

SOLENOID BODY EXPLODED VIEW



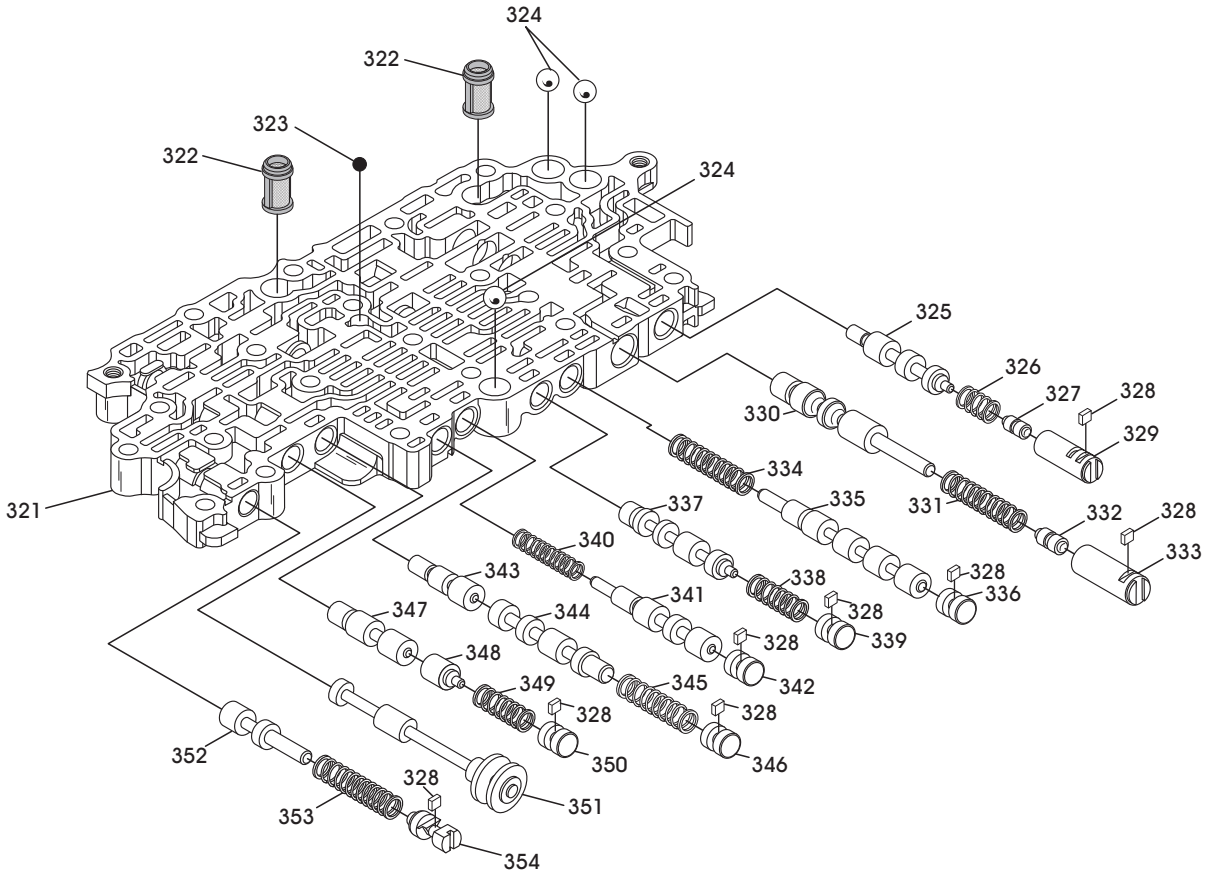
302 FLUID TEMP SENSOR AND PRESSURE SWITCH ASSEMBLY.
303 FLUID TEMP SENSOR "O" RING SEAL.
304 SMALL COVER PLATE.
305 SMALL COVER PLATE GASKET.
306 LARGE COVER PLATE.
307 LARGE COVER PLATE GASKET.
308 LINE PRESSURE RELIEF BALL SPRING.
309 LINE PRESSURE RELIEF BALL (.393" DIAMETER).
310 RETAINING BRACKET FOR "SLU" & "SLT" SOLENOIDS.
311 RETAINING BRACKET FOR "SL4" SOLENOID.
312 RETAINING BRACKET FOR "SL3" SOLENOID.
313 RETAINING BRACKET FOR "SL1" & "SL2" SOLENOIDS.
314 "SL4", B3 BRAKE, LINEAR SOLENOID.
315 "SL3", B1 BRAKE, LINEAR SOLENOID.
316 "SL1", C1 CLUTCH, LINEAR SOLENOID.
317 "SL2", C2 CLUTCH, LINEAR SOLENOID.
318 "SLU", TCC & B2 BRAKE, LINEAR SOLENOID.
319 "SLT", LINE PRESSURE, LINEAR SOLENOID.
320 "SL", 3-WAY, ON/OFF SOLENOID.
396 VALVE BODY TO CASE BOLT, 75 MM.
397 CASE CONNECTOR ASSEMBLY RETAINING BRACKET.
398 CASE CONNECTOR AND INTERNAL WIRE HARNESS ASSEMBLY.
399 CASE CONNECTOR TO CASE "O" RING SEAL.

300 SOLENOID BODY CASTING.
301 SOLENOID BODY TO CENTER VALVE BODY SPACER PLATE.

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Figure 23

TOYOTA U660E
MIDDLE VALVE BODY EXPLODED VIEW



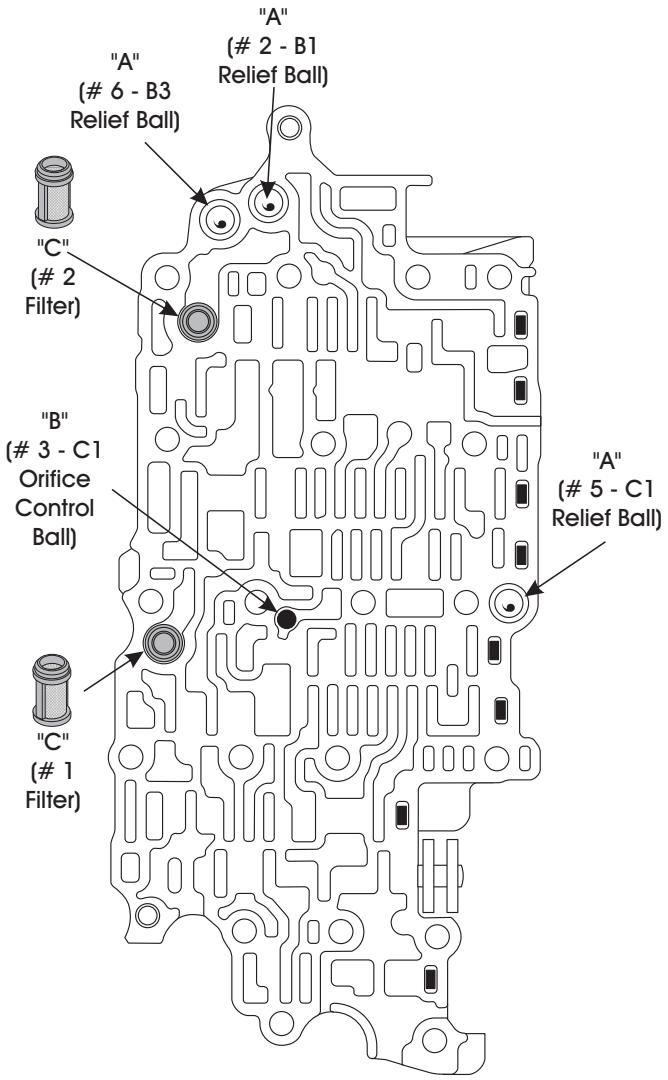
321 MIDDLE VALVE BODY CASTING.
322 FLUID SCREENS (2 REQUIRED).
323 VITON CHECK BALL, 218" DIAMETER (1 REQUIRED).
324 STEEL CHECK BALL, 393" DIAMETER (3 REQUIRED).
325 B1 APPLY CONTROL VALVE.
326 B1 APPLY CONTROL VALVE SPRING.
327 B1 APPLY BOOST VALVE.
328 VALVE RETAINER (8 REQUIRED).
329 B1 APPLY BOOST VALVE SLEEVE.
330 PRIMARY PRESSURE REGULATOR VALVE.
331 PRIMARY PRESSURE REGULATOR VALVE SPRING.
332 PRIMARY PRESSURE REGULATOR BOOST VALVE.
333 PRIMARY PRESSURE REGULATOR BOOST VALVE SLEEVE.
334 SEQUENCE VALVE SPRING.
335 SEQUENCE VALVE.
336 SEQUENCE VALVE BORE PLUG.
337 CLUTCH CONTROL VALVE.
338 CLUTCH CONTROL VALVE SPRING.
339 CLUTCH CONTROL VALVE BORE PLUG.
340 C2 CLUTCH APPLY CONTROL VALVE SPRING.
341 C2 CLUTCH APPLY CONTROL VALVE.
342 C2 CLUTCH APPLY CONTROL VALVE BORE PLUG.
343 B2 APPLY CONTROL RELAY VALVE.
344 B2 APPLY CONTROL VALVE.
345 B2 APPLY CONTROL VALVE SPRING.
346 B2 APPLY CONTROL VALVE BORE PLUG.
347 B2 CONTROL VALVE.
348 B2 CONTROL RELAY VALVE.
349 B2 CONTROL VALVE SPRING.
350 B2 CONTROL VALVE BORE PLUG.
351 MANUAL VALVE.
352 SOLENOID MODULATOR VALVE.
353 SOLENOID MODULATOR VALVE SPRING.
354 SOLENOID MODULATOR VALVE ADJUSTABLE BORE PLUG.

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Figure 24

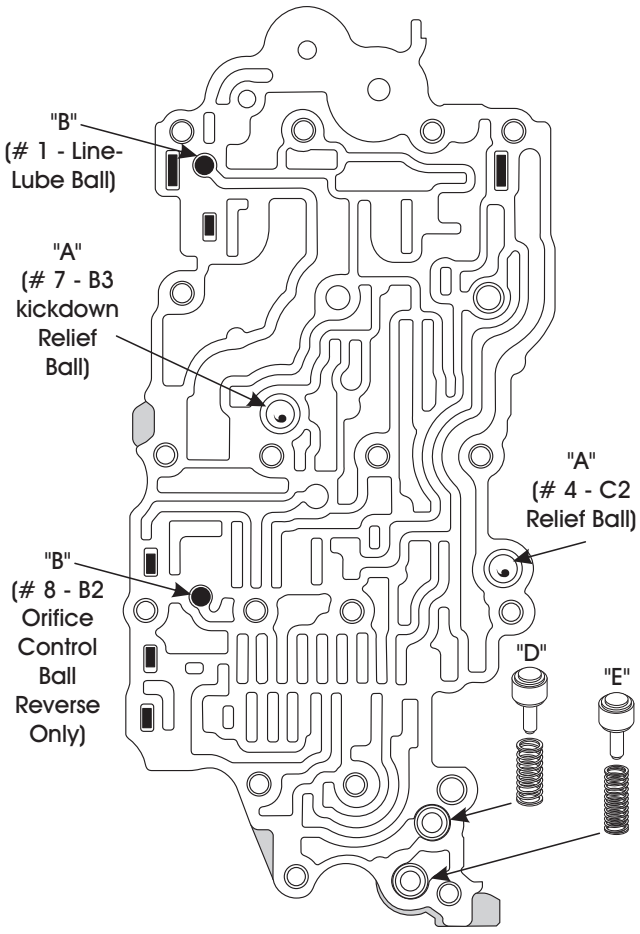
TOYOTA U660E
VALVE BODY SMALL PARTS LOCATION

MIDDLE VALVE BODY
SMALL PARTS AND RETAINER LOCATIONS



"A" STEEL CHECK BALL, 393" DIAMETER (3 REQUIRED).
"B" VITON CHECK BALL, 218" DIAMETER (1 REQUIRED).
"C" FLUID SCREENS (2 REQUIRED).

UPPER VALVE BODY
SMALL PARTS AND RETAINER LOCATIONS



"A" STEEL CHECK BALL, 393" DIAMETER (2 REQUIRED).
"B" VITON CHECK BALL, 218" DIAMETER (2 REQUIRED).
"D" LUBE RELIEF CHECK VALVE (SEE SPRING SPECS BELOW).
"E" CONVERTER RELIEF CHECK VALVE (SEE SPRING SPECS BELOW).

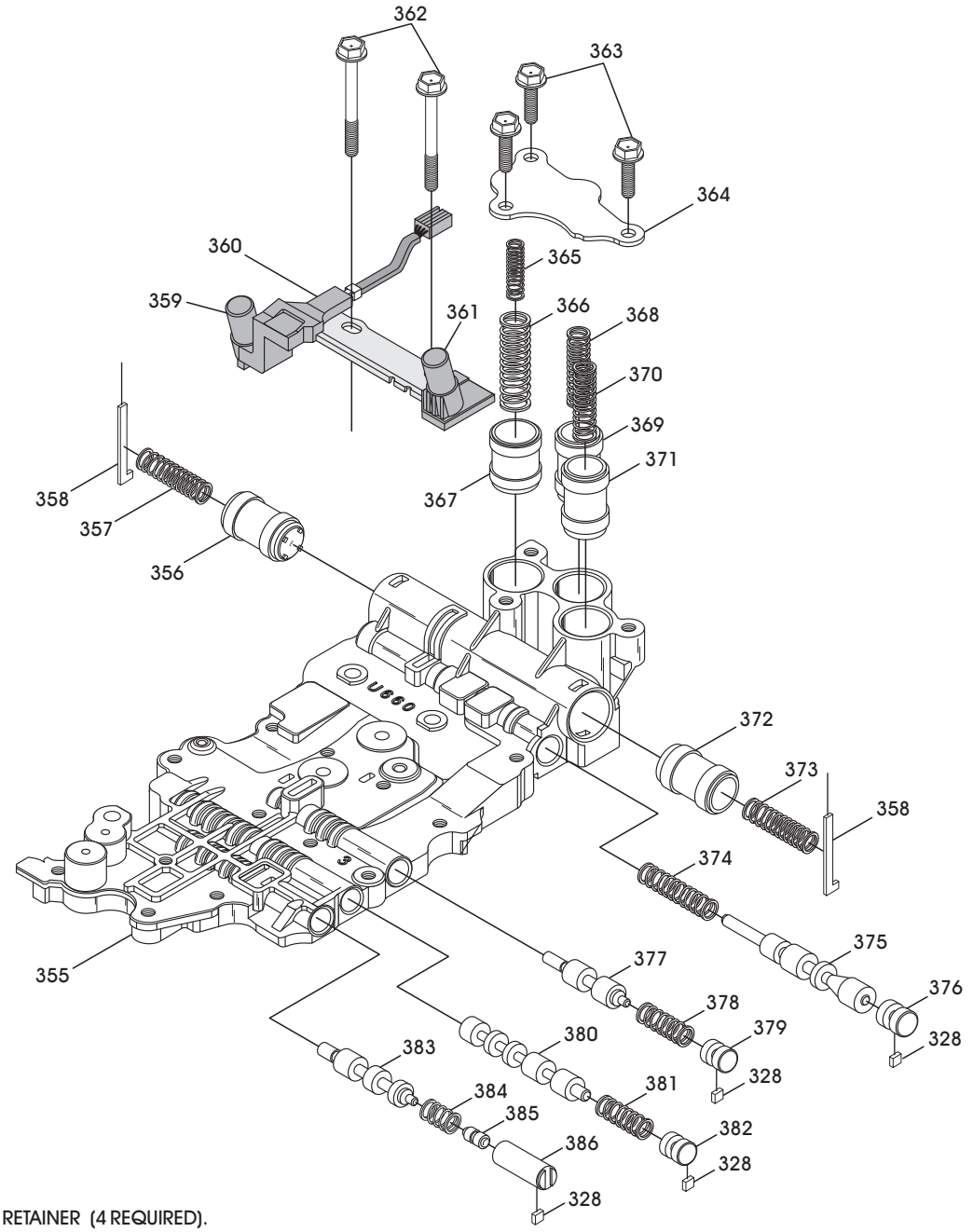
SPRING "D"
Free Length = .820"
Spring Diameter = .282"
Wire Diameter = .031"
Approx Coils = 9 (NONE)

SPRING "E"
Free Length = .852"
Spring Diameter = .275"
Wire Diameter = .019"
Approx Coils = 15 (NONE)

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Figure 25

UPPER VALVE BODY EXPLODED VIEW

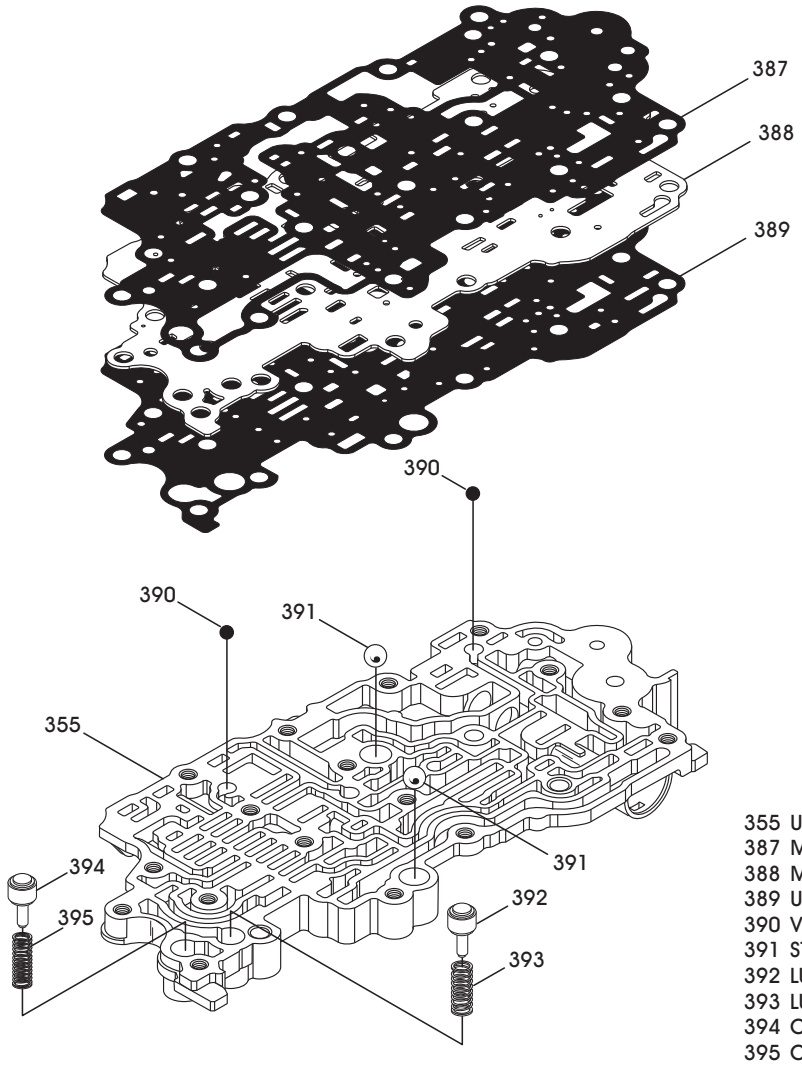


328 BORE PLUG RETAINER (4 REQUIRED).
355 UPPER VALVE BODY CASTING.
356 C2 ACCUMULATOR PISTON.
357 C2 ACCUMULATOR SPRING.
358 ACCUMULATOR RETAINER (2 REQUIRED).
359 INPUT SPEED SENSOR (PART OF ASSEMBLY).
360 SPEED SENSOR AND HARNESS ASSEMBLY.
361 COUNTER GEAR (OUTPUT) SPEED SENSOR (PART OF ASSEMBLY).
362 SPEED SENSOR ASSEMBLY RETAINING BOLTS.
363 ACCUMULATOR COVER RETAINING BOLTS (3 REQUIRED).
364 ACCUMULATOR COVER.
365 C1 ACCUMULATOR INNER SPRING.
366 C1 ACCUMULATOR OUTER SPRING.
367 C1 ACCUMULATOR PISTON (LARGER THAN THE OTHERS).
368 B2 ACCUMULATOR SPRING.
369 B2 ACCUMULATOR PISTON.
370 B1 ACCUMULATOR SPRING.
371 B1 ACCUMULATOR PISTON.
372 B3 ACCUMULATOR PISTON.
373 B3 ACCUMULATOR SPRING.
374 SECONDARY PRESSURE REGULATOR VALVE SPRING.
375 SECONDARY PRESSURE REGULATOR VALVE.
376 SECONDARY PRESSURE REGULATOR VALVE BORE PLUG.
377 REVERSE SEQUENCE VALVE.
378 REVERSE SEQUENCE VALVE SPRING.
379 REVERSE SEQUENCE VALVE BORE PLUG.
380 LOCK-UP RELAY VALVE.
381 LOCK-UP RELAY VALVE SPRING.
382 LOCK-UP RELAY VALVE BORE PLUG.
383 LOCK-UP CONTROL VALVE.
384 LOCK-UP CONTROL VALVE SPRING.
385 LOCK-UP CONTROL BOOST VALVE.
386 LOCK-UP CONTROL BOOST VALVE SLEEVE.

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Figure 26

TOYOTA U660E
UPPER VALVE BODY EXPLODED VIEW



355 UPPER VALVE BODY CASTING.
387 MIDDLE VALVE BODY TO UPPER SPACER PLATE GASKET.
388 MIDDLE VALVE BODY TO UPPER VALVE BODY SPACER PLATE.
389 UPPER VALVE BODY TO UPPER SPACER PLATE GASKET.
390 VITON CHECK BALLS, 218" DIAMETER (2 REQUIRED).
391 STEEL CHECK BALLS, 393" DIAMETER (2 REQUIRED).
392 LUBE RELIEF VALVE.
393 LUBE RELIEF VALVE SPRING.
394 CONVERTER RELIEF VALVE.
395 CONVERTER RELIEF VALVE SPRING.

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Figure 27

ACCUMULATOR SPRING SPECIFICATIONS

SPRING NO. 365 "INNER"
Free Length = 1.435"
Spring Diameter = .393"
Wire Diameter = .063"
Approx Coils = 13 (NONE)

SPRING NO. 366 "OUTER"
Free Length = 2.320"
Spring Diameter = .557"
Wire Diameter = .063"
Approx Coils = 13 (DK BLUE)

SPRING NO. 368
Free Length = 1.870"
Spring Diameter = .470"
Wire Diameter = .075"
Approx Coils = 14 (RED)

SPRING NO, 370
Free Length = 1.680"
Spring Diameter = .473"
Wire Diameter = .079"
Approx Coils = 12 (WHITE)

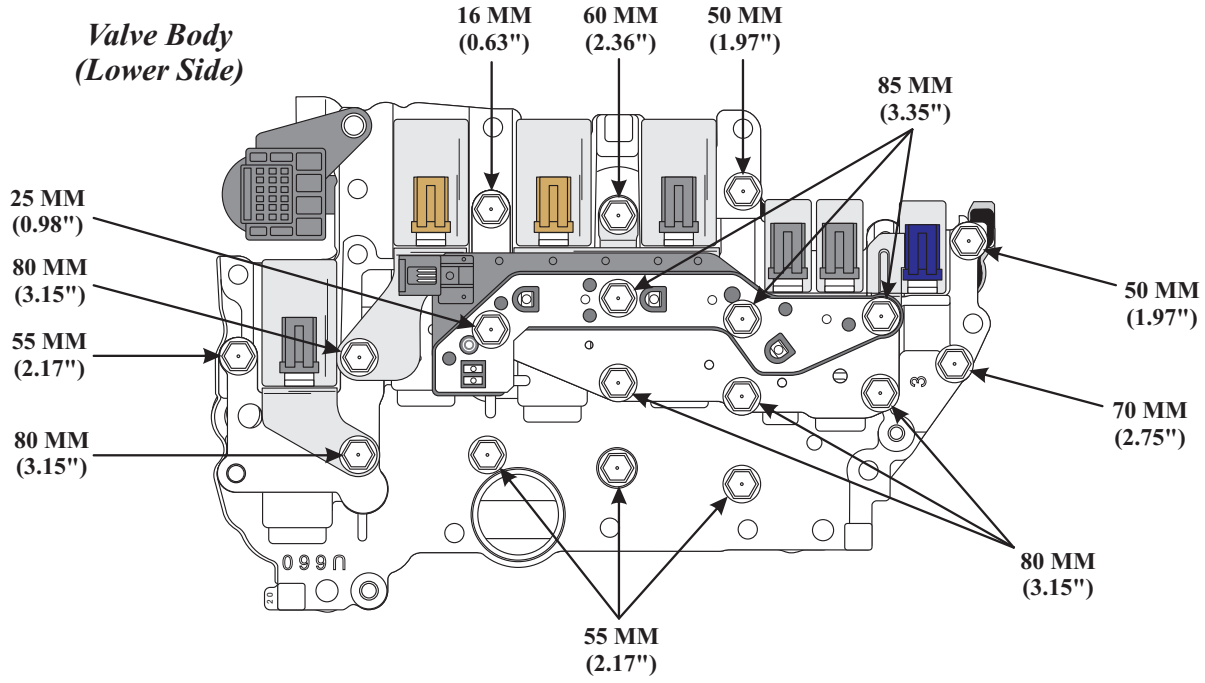
SPRING NO. 357
Free Length = 1.724"
Spring Diameter = .471"
Wire Diameter = .079"
Approx Coils = 12 (BLUE)

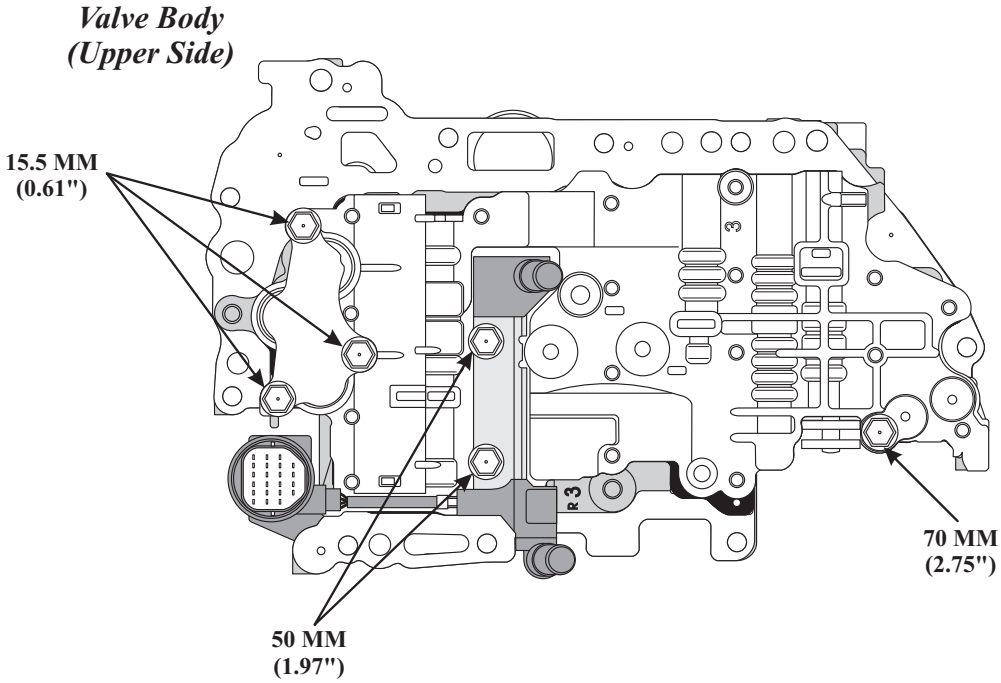
SPRING NO. 373
Free Length = 1.680"
Spring Diameter = .473"
Wire Diameter = .079"
Approx Coils = 12 (WHITE)

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Figure 28

TOYOTA U660E
VALVE BODY BOLT IDENTIFICATION AND LOCATION



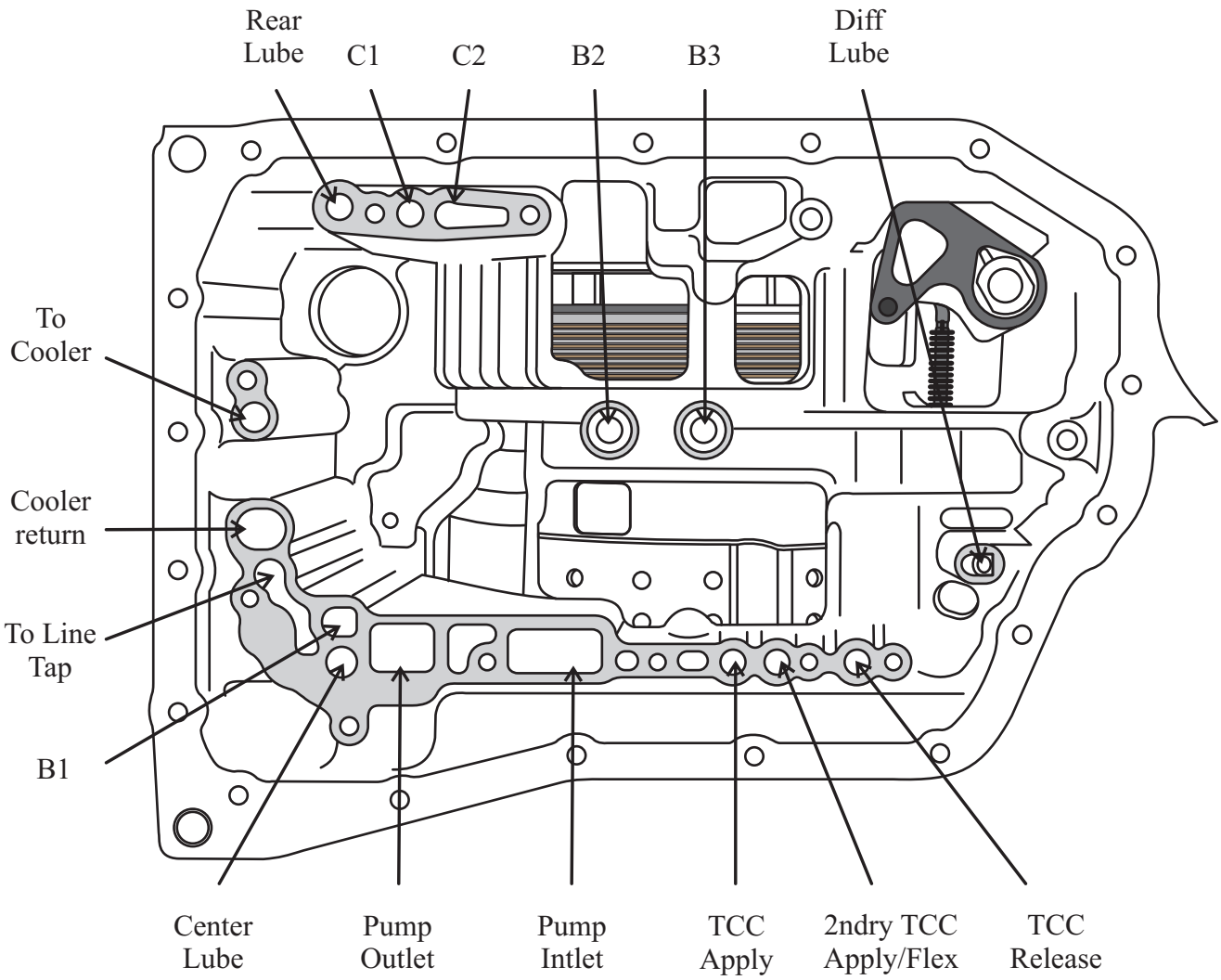


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Figure 29

TOYOTA U660E

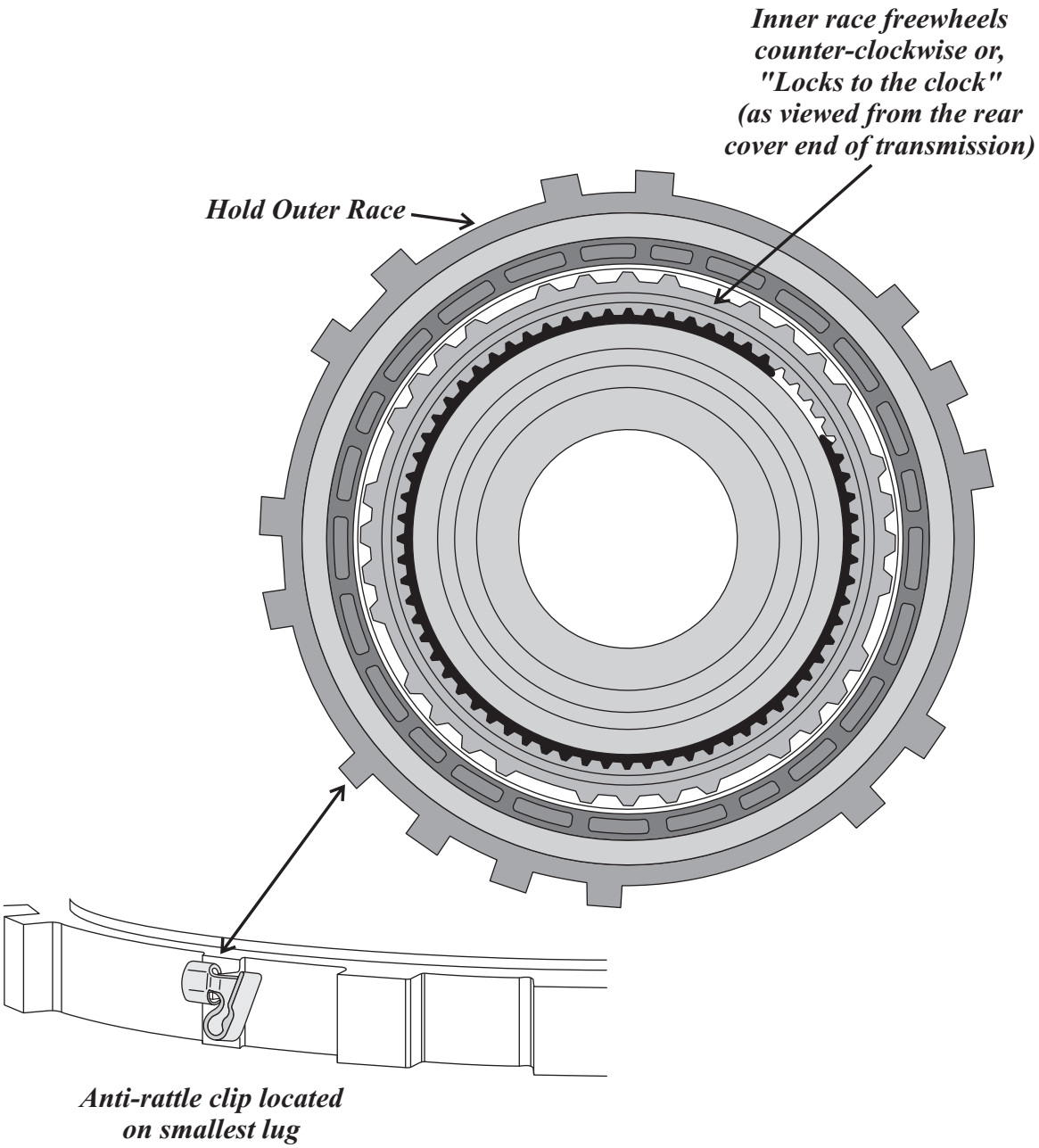
CASE PASSAGE IDENTIFICATION



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Figure 30

TOYOTA U660E
SPRAG ROTATION



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Figure 31

TOYOTA U660E
DIAGNOSTC CODES

TOYOTA U660E DIAGNOSTIC TROUBLE CODES	
DTC	*DESCRIPTION*
P0500	*Vehicle Speed Sensor "A"*
P0560	*System Voltage*
P0710	*TFT Sensor "A" Open or Shorted Circuit*
P0711	*TFT Sensor "A" Performance Fault*
P0712	*TFT Sensor "A" Circuit Low Input*
P0713	*TFT Sensor "A" Circuit High Input*
P0715	*Input/Turbine Speed Sensor Circuit Malfunction*
P0717	*Input/Turbine Speed Sensor Circuit No Signal*
P0724	*Brake Switch "B" Circuit High*
P0741	*SL TCC Solenoid Performance Fault (Stuck Closed)*
P0746	*Pressure Control Solenoid A (SL1) Performance Fault*
P0748	*Pressure Control Solenoid A (SL1) Shorted or Open Circuit*
P0776	*Pressure Control Solenoid B (SL2) Performance Fault*
P0778	*Pressure Control Solenoid B (SL2) Shorted or Open Circuit*
P0791	*Intermediate Shaft Speed Sensor "A" Circuit*
P0793	*Intermediate Shaft Speed Sensor "A" Circuit*
P0796	*Pressure Control Solenoid C (SL3) Performance Fault*
P0798	*Pressure Control Solenoid C (SL3) Shorted or Open Circuit*
P0872	*Transmission Fluid Pressure Switch 1 Circuit Low*
P0873	*Transmission Fluid Pressure Switch 1 Circuit High*
P0877	*Transmission Fluid Pressure Switch 2 Circuit Low*
P0878	*Transmission Fluid Pressure Switch 2 Circuit High*
P0989	*Transmission Fluid Pressure Switch 3 Circuit Low*
P0990	*Transmission Fluid Pressure Switch 1 Circuit High*
P2714	*Pressure Control Solenoid D (SLT) Performance Fault*
P2716	*Pressure Control Solenoid D (SLT) Shorted or Open Circuit*
P2757	*TCC Solenoid (SLU) Performance Fault*
P2759	*TCC Solenoid (SLU) Shorted or Open Circuit*
P2769	*TCC Solenoid (SL) Shorted Circuit*
P2770	*TCC Solenoid (SL) Open Circuit*
P2808	*Pressure Control Solenoid G (SL4) Performance Fault*
P2810	*Pressure Control Solenoid G (SL4) Shorted or Open Circuit*
U0100	*TCM Lost Communication with ECM/PCM "A"*

Figure 32

TOYOTA A750E/F
ATF TEMPERATURE SENSOR CODE P2742

COMPLAINT: A 2004-2005 Toyota 4Runner, Land Cruiser, Sequoia, Tacoma or Tundra equipped with a V8 engine and the A750E/F transmission may come in with the "MIL" Lamp illuminated and a P2742 DTC stored for Transmission Fluid Temperature Sensor "B" Circuit Low" which may occur intermittently.

CAUSE: Transmission Temperature Sensor "B"/internal wire harness is faulty, Figure 1. When the short occurs, Transmission Temperature Sensor "B" will display a temperature of 302º F (150ºC).

CORRECTION: Because Transmission Temperature Sensor "B" is part of the internal wire harness, the internal wire harness will require replacement.

SERVICE INFORMATION:

Internal Wire Harness -2004 4Runner & Land Cruiser.....82125-35130
Internal Wire Harness-2005 Land Cruiser, Sequoia, Tacoma & Tundra.....82125-35150

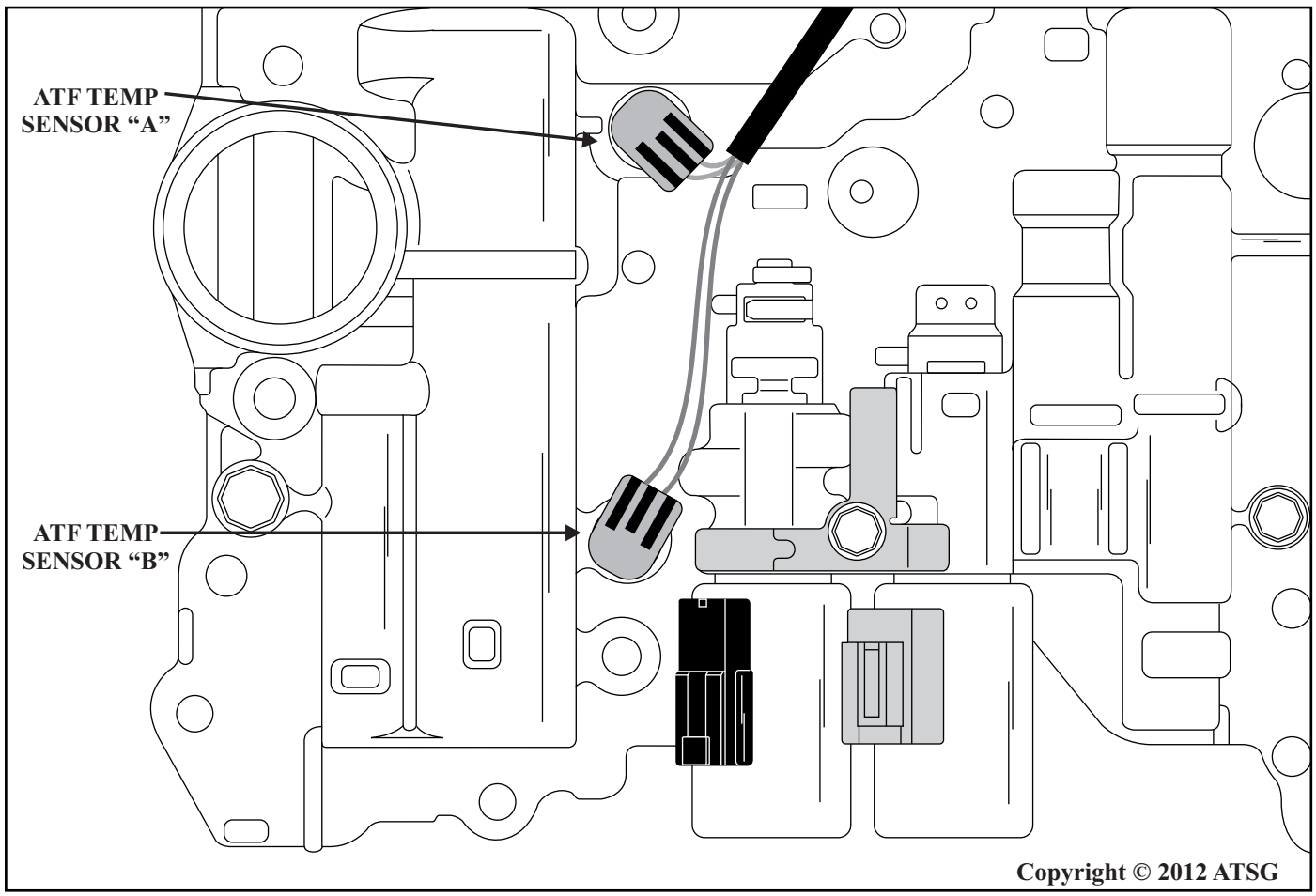


Figure 1

VOLKSWAGEN
09A/JF506E
NO REVERSE

COMPLAINT: Volkswagen vehicles equipped with the 09A/JF506E transaxle may exhibit a complaint of no Reverse, or an intermittent no Reverse condition before or after overhaul. ***Note: This complaint may be also be related to cold weather.***

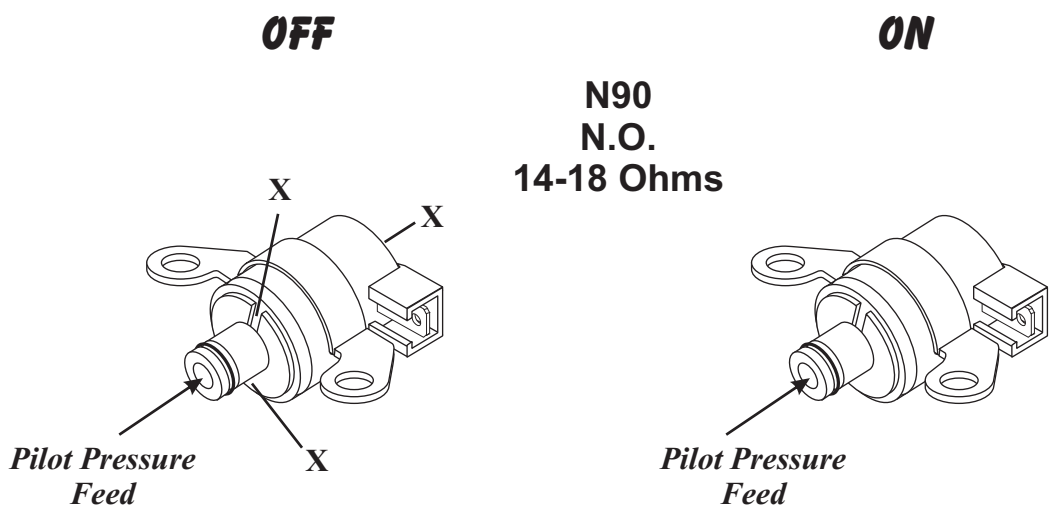
CAUSE: The cause may be, the Low Timing Solenoid (N90-SV3) is mechanically stuck closed or the Reverse Inhibit Valve is hung in the valve body, blocking the passage to the Low Reverse Brake. Refer to Figures 3 and 4 for a partial hydraulic diagram of the operation of the Low Timing Solenoid and how it functions when Reverse is engaged and when Reverse is inhibited. ***Note: The N90 solenoid is energized if the vehicle is going Forward and Reverse is selected to inhibit Reverse.***

CORRECTION: See Figure 2 for the location of the Low Timing Solenoid and Figure 1 for the mechanical function of the solenoid and replace as necessary. ***Note: If it is a cold condition, you may want to put the solenoid in the freezer for a while before testing.*** If the solenoid tests good it will be necessary to dis-assemble the valve body and check the Reverse Inhibit Valve. Refer to Figures 5-8 for the exploded view of the valve body and location of the Reverse Inhibit Valve. Clean and ensure that the valve is free before re-assembling the valve body.

SERVICE INFORMATION:

The Low Timing Solenoid (N90-SV3) can be purchased from most aftermarket suppliers.

LOW TIMING SOLENOID N90-SV3

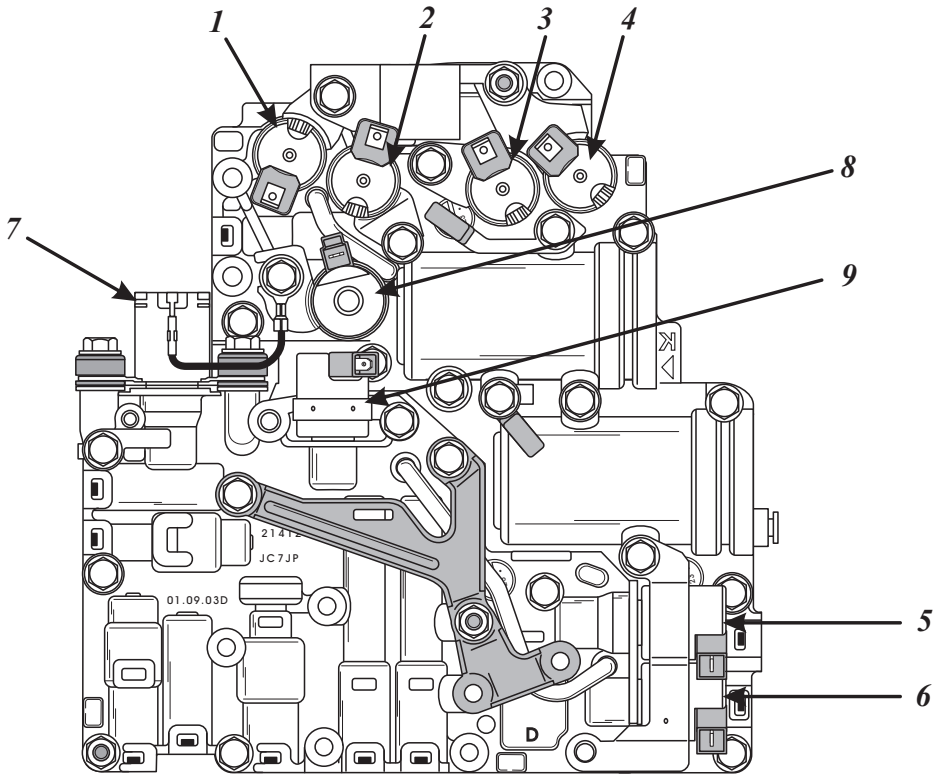


Summary: The Low Timing N90 Solenoid is a Normally Open On-Off Solenoid. When the Solenoid is OFF Pilot Pressure is exhausted thru the areas shown above. When the Solenoid is ON, the exhaust ports are closed.

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Figure 1

VOLKSWAGEN SOLENOID IDENTIFICATION AND LOCATIONS

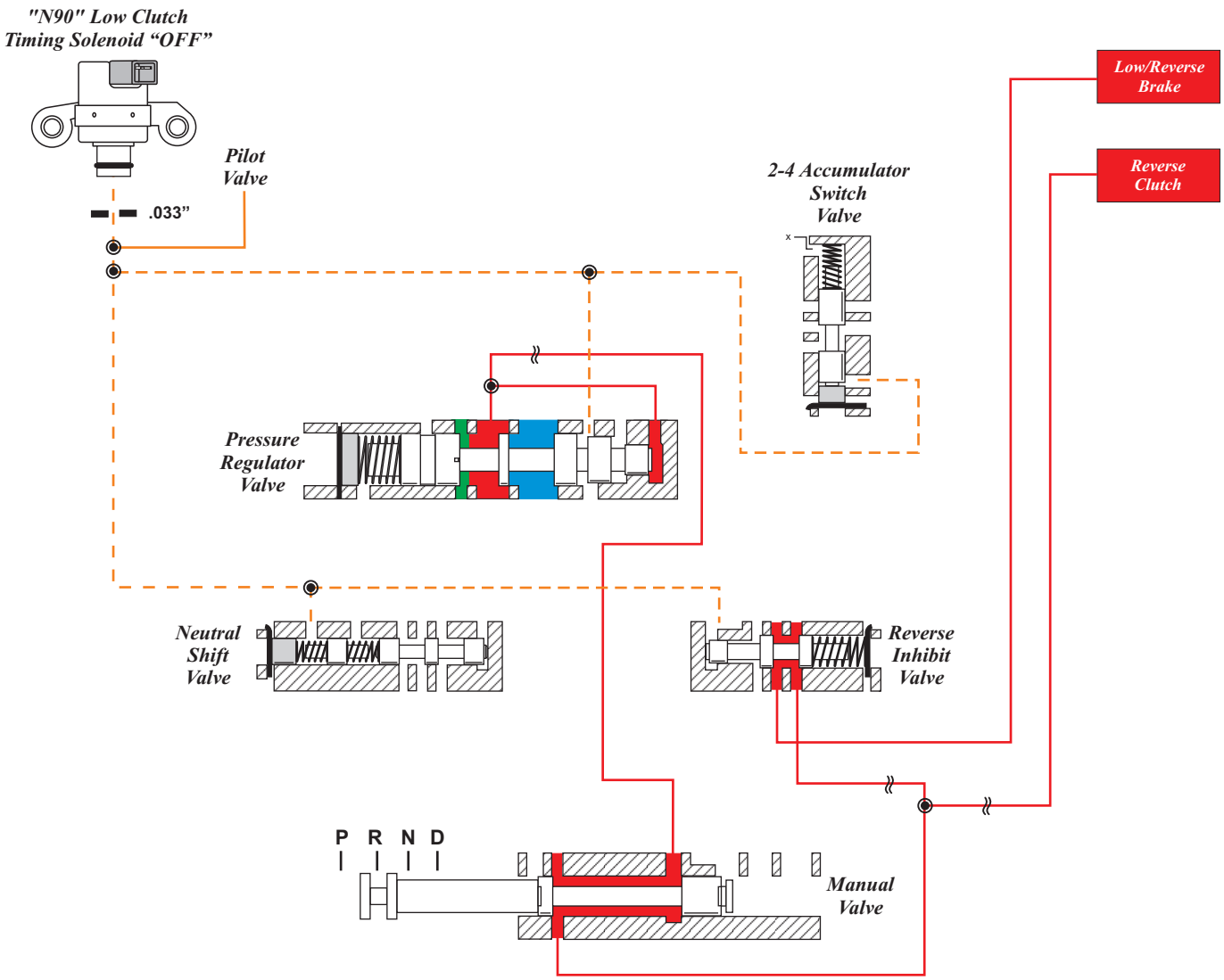


Manufacturer	Volkswagen Solenoid Identification And Location								
	1	2	3	4	5	6	7	8	9
VW Golf, GTI and Jetta	N88 - SV1	N281-SV8	N89-SV2	N92-SV5	N283-SV10	N282-SV9	N93-SV6	N91-SV4	N90-SV3
Description	Shift Solenoid "A"	Reduction Timing Solenoid	Shift Solenoid "B"	Shift Solenoid "C"	2-4 Brake Solenoid	2-4 Brake Timing Solenoid	Line Pressure Solenoid	TCC Solenoid	Low Clutch Timing Solenoid

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Figure 2

Reverse

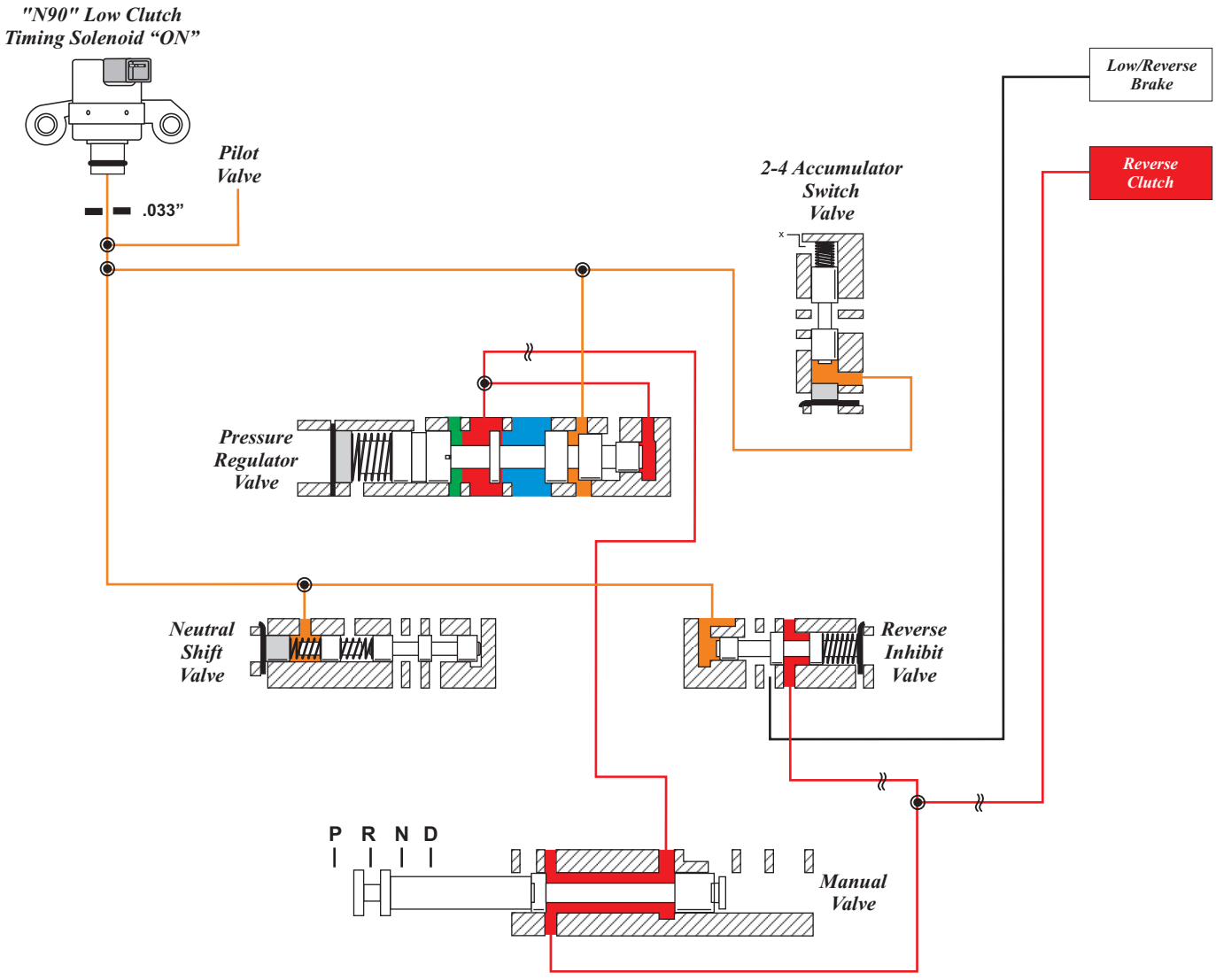


Summary: The Low Timing N90 Solenoid is pulsed on for Low Clutch engagements, the 2-4 Clutch application and for Line Pressure Cut-back, and for a Reverse Inhibit feature. When the solenoid is OFF the solenoid provides an exhaust for the Pilot pressure it is fed and none of the valves that it controls are stroked.

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Figure 3

Reverse Inhibit



Summary: The Low Timing N90 Solenoid is pulsed on for Low Clutch engagements, the 2-4 Clutch application and for Line Pressure Cut-back, and for a Reverse Inhibit feature. When the solenoid is ON the solenoid closes the exhaust ports and Pilot pressure strokes the Pressure Regulator Valve allowing a pressure cut-back, it also strokes the 2-4 Accumulator Switch Valve in preparation of a 2-4 clutch application, it provides pressure on the spring side of the Neutral Shift Valve in preparation of a Low Clutch application and strokes the Reverse Inhibit Valve which prevents the Low/Reverse Brake from applying.

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Figure 4

VOLKSWAGEN JF506E VALVE BODY EXPLODED VIEW

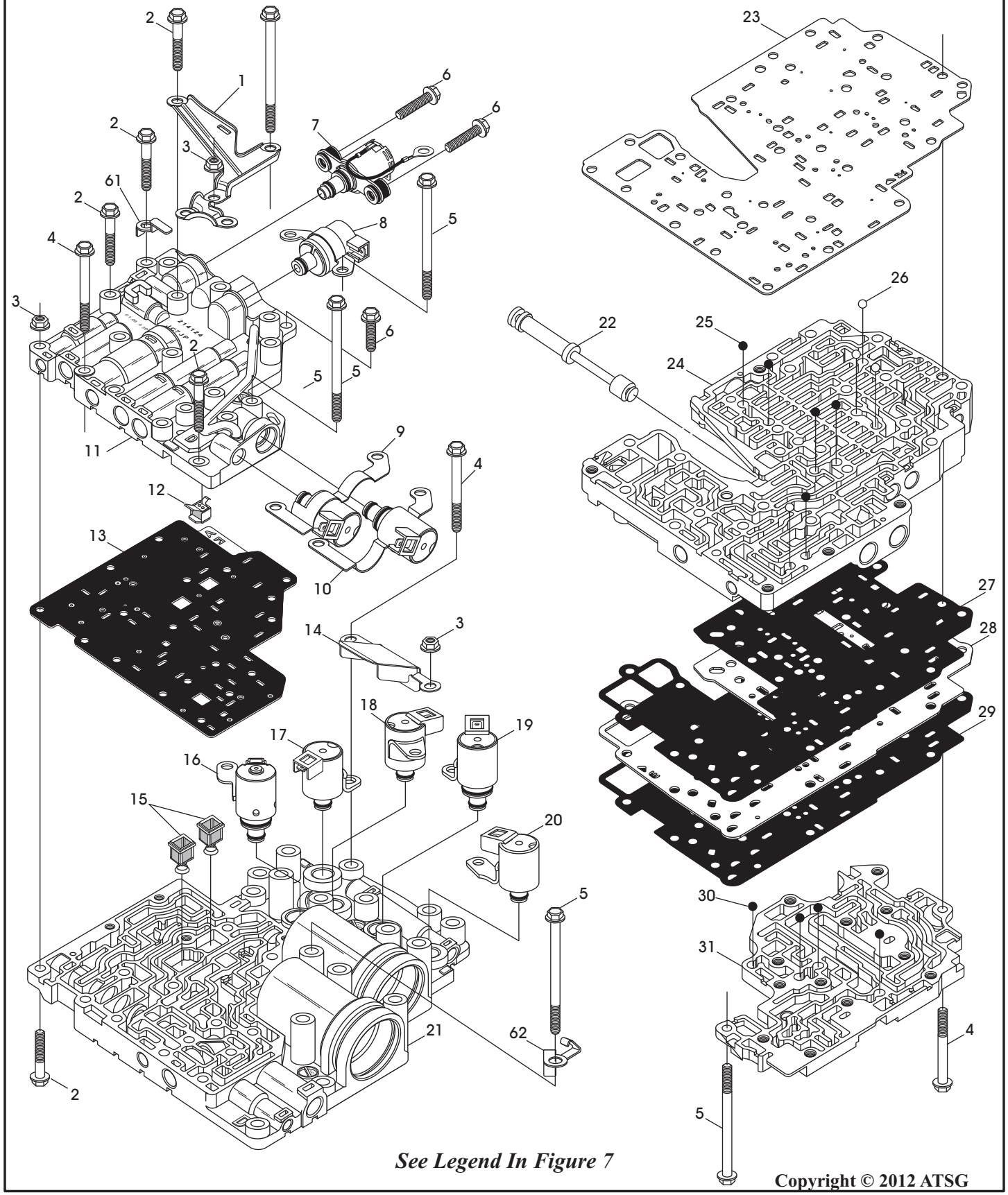
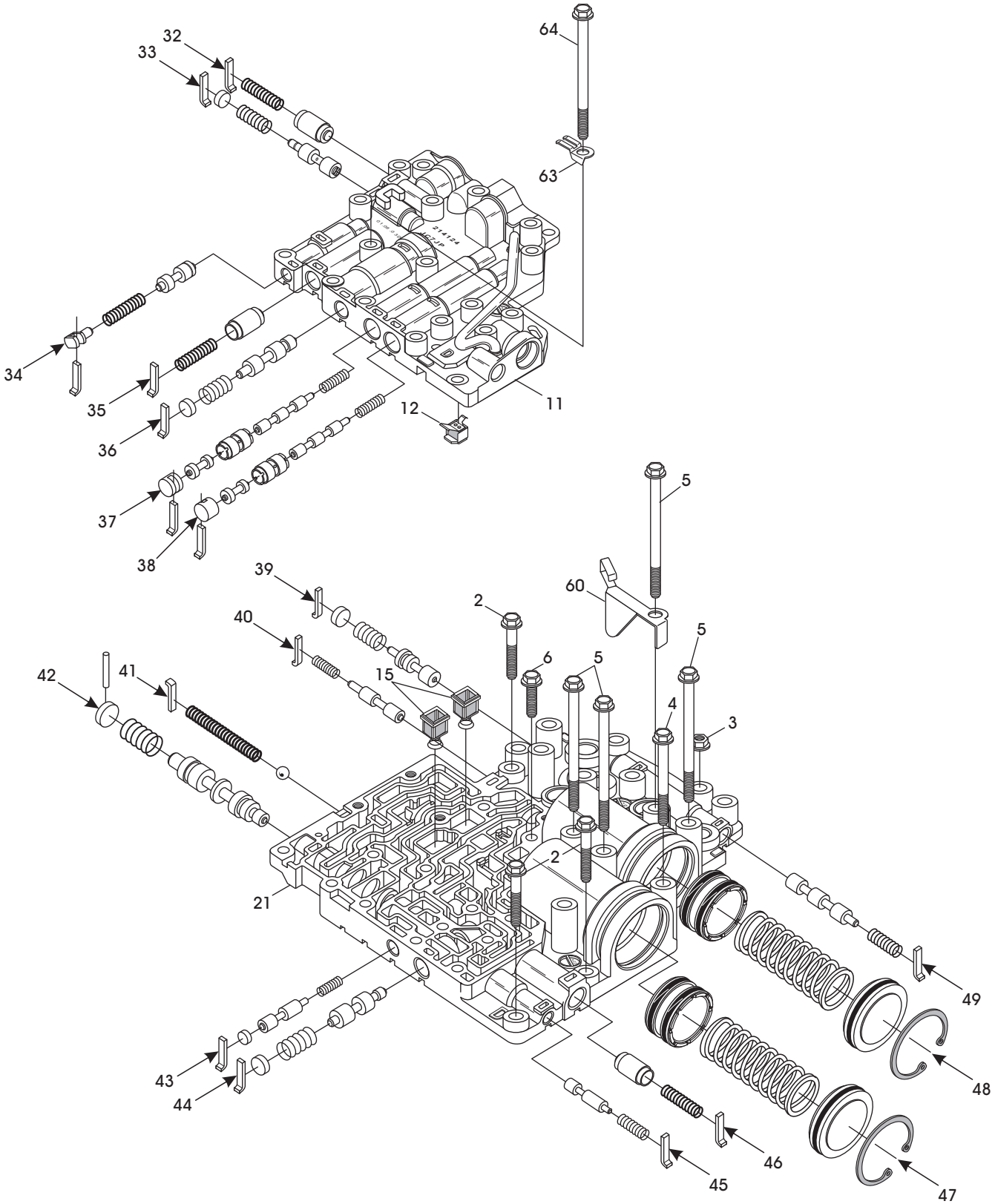


Figure 5

VOLKSWAGEN JF506E VALVE BODY EXPLODED VIEW

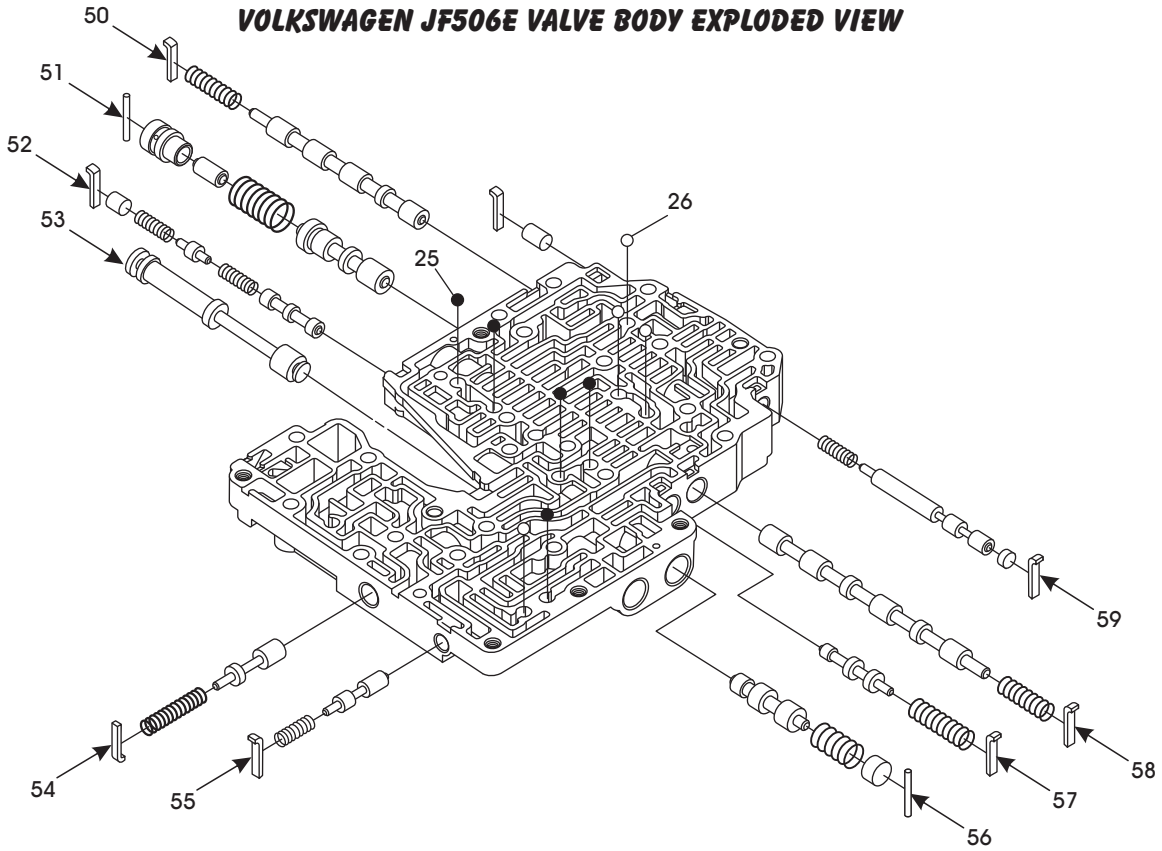


See Legend In Figure 7

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Figure 6

VOLKSWAGEN JF506E VALVE BODY EXPLODED VIEW



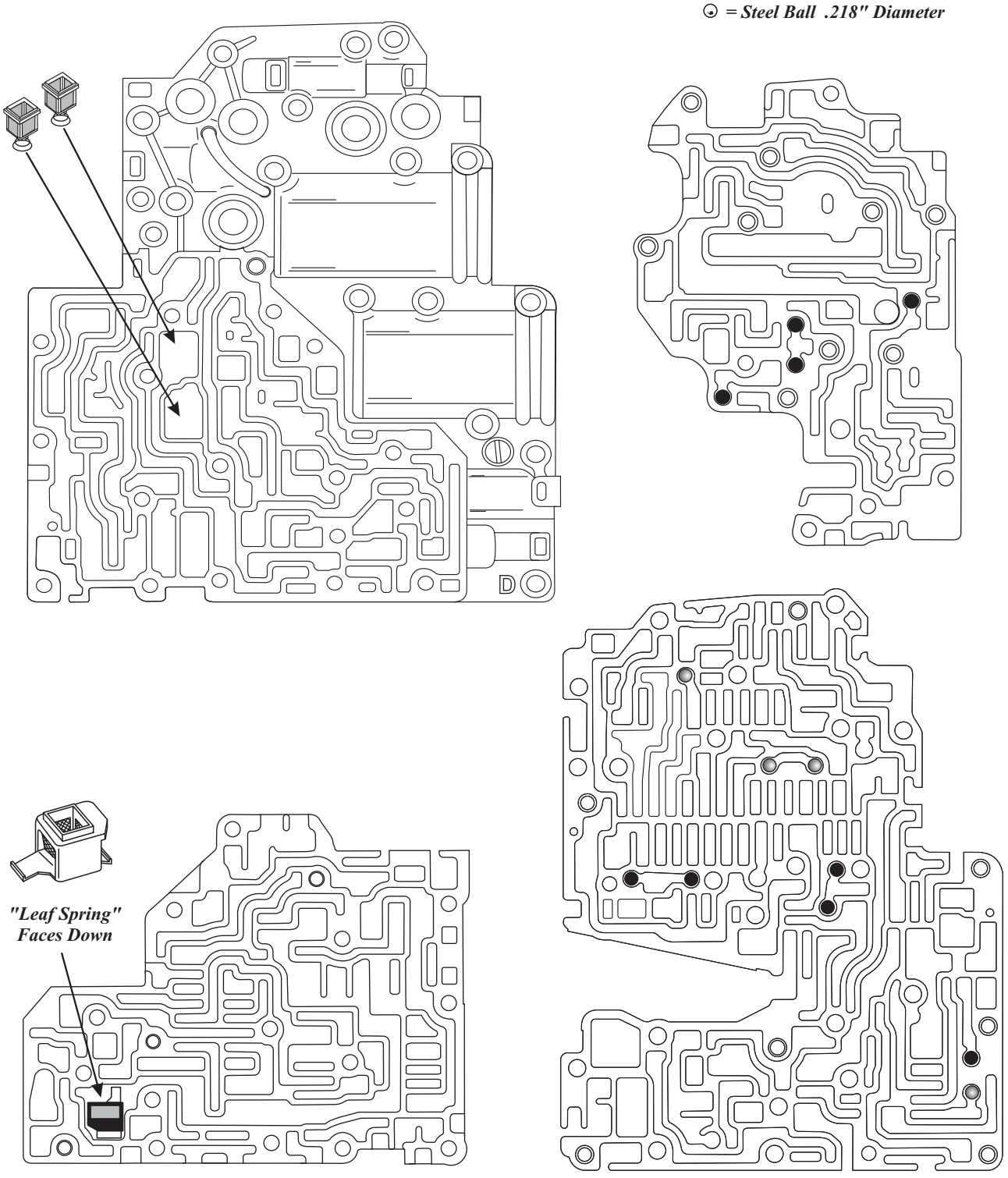
1 VALVE BODY BRACKET
2 VALVE BODY BOLT, 37MM LENGTH
3 NUT FOR VALVE BODY BOLT FROM BOTTOM
4 VALVE BODY BOLT, 67MM LENGTH
5 VALVE BODY BOLT, 90MM LENGTH
6 VALVE BODY BOLT, 22MM LENGTH
7 LINE PRESSURE SOLENOID (N93-SV6)
8 LOW CLUTCH TIMING SOLENOID (N90-SV3)
9 2-4 BRAKE TIMING SOLENOID (N282-SV9)
10 2-4 BRAKE DUTY SOLENOID (N283-SV10)
11 SUB LOWER VALVE BODY CASTING
12 PILOT FILTER WITH "LEAF" SPRING
13 SPACER PLATE "A" WITH GASKETS
14 OIL BAFFLE
15 COIL SPRING LOADED FILTERS (2 REQUIRED)
16 TCC SOLENOID (N91-SV4)
17 SHIFT SOLENOID "A" (N88-SV1)
18 REDUCTION TIMING SOLENOID (N281-SV8)
19 SHIFT SOLENOID "B" (N89-SV2)
20 SHIFT SOLENOID "C" (N92-SV5)
21 LOWER VALVE BODY CASTING
22 MANUAL SHIFT VALVE
23 SPACER PLATE "B" (NO GASKETS)
24 INTERNAL VALVE BODY CASTING
25 PLASTIC CHECK BALL (.218" DIAMETER, 5 REQUIRED)
26 STEEL CHECK BALL (.218" DIAMETER, 4 REQUIRED)
27 SPACER PLATE "C" UPPER GASKET (MAY BE BONDED)
28 SPACER PLATE "C"
29 SPACER PLATE "C" LOWER GASKET (MAY BE BONDED)
30 PLASTIC CHECK BALL (.218" DIAMETER, 4 REQUIRED)
31 UPPER VALVE BODY CASTING
32 MODIFIER ACCUMULATOR VALVE TRAIN
33 PRESSURE MODIFIER VALVE TRAIN
34 TORQUE CONVERTER PRESSURE REGULATOR VALVE TRAIN
35 THROTTLE ACCUMULATOR VALVE "A" VALVE TRAIN
36 ACCUMULATOR CONTROL VALVE "A" VALVE TRAIN
37 HIGH CLUTCH ACCUMULATOR REGULATOR VALVE TRAIN
38 2-4 BRAKE CLUTCH ACCUMULATOR REGULATOR VALVE TRAIN
39 REDUCTION REDUCING VALVE TRAIN
40 REDUCTION TIMING VALVE TRAIN
41 LINE PRESSURE RELIEF BALL AND SPRING
42 PRESSURE REGULATOR VALVE TRAIN
43 2-4 CLUTCH ACCUMULATOR REGULATOR SWITCH VALVE TRAIN
44 ACCUMULATOR CONTROL VALVE "B" VALVE TRAIN
45 HIGH CLUTCH ACCUMULATOR REGULATOR SWITCH VALVE
46 THROTTLE ACCUMULATOR "B" VALVE TRAIN
47 HIGH CLUTCH ACCUMULATOR PISTON AND SPRING
48 LOW CLUTCH ACCUMULATOR PISTON AND SPRING
49 SHIFT VALVE "C" VALVE TRAIN
50 SHIFT VALVE "A" VALVE TRAIN
51 TCC CONTROL VALVE TRAIN
52 NEUTRAL SHIFT VALVE TRAIN
53 MANUAL SHIFT VALVE
54 PILOT VALVE TRAIN
55 ACCUMULATOR SWITCH VALVE TRAIN
56 NEUTRAL CONTROL VALVE TRAIN
57 REVERSE INHIBIT VALVE TRAIN
58 SHIFT VALVE "B" VALVE TRAIN
59 FAILSAFE VALVE TRAIN
60 INTERNAL SOLENOID WIRE HARNESS CLIP
61 INTERNAL SOLENOID WIRE HARNESS CLIP
62 INTERNAL SPEED SENSOR WIRE HARNESS CLIP
63 INTERNAL SPEED SENSOR WIRE HARNESS CLIP
64 VALVE BODY TO CASE BOLT, 90MM LONG *(SILVER IN COLOR)*

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Figure 7

VOLKSWAGEN SMALL PARTS AND CHECKBALL LOCATIONS

● = Plastic Ball .218" Diameter
⊙ = Steel Ball .218" Diameter



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Figure 8

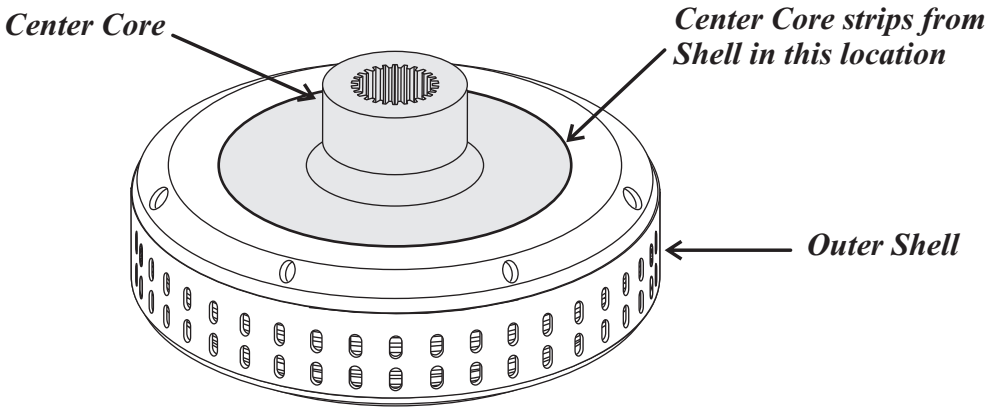
AUDI/BMW/VW TF60-SN/09G
SLIPS IN FIRST NEUTRALIZES IN SECOND

COMPLAINT: A complaint of slipping on take off and then neutralizes going into second may occur before and sometimes after rebuild. This complaint may be accompanied with gear ratio code P0731 and/or P0732.

CAUSE: The K1/C1 clutch drum is manufactured in such a way that its center core is splined pressed to the outer shell containing the friction elements. The spline between these two pieces are shallow and become insufficient to hold against the input torque causing them to strip out (Figure 1). When this occurs the center core spins independently from the shell containing the friction components. The transmission slips on take off as there is enough tension from the piston and return spring to hold the center core just enough to be able to partially drive the shell containing the friction elements (Figure 2). But when a shift into second takes place there is not enough holding strength causing the center core of the drum to spin free from the shell and the transmission neutralizes.

CORRECTION: The drum is best inspected with it completely empty of the friction pack, return spring and piston. While holding the outer shell with one hand, you should not be able to turn the center core with the other. If it spins the drum will need to be replaced.

Many thanks to Bill Anthony from Seal Aftermarket Products - SAP

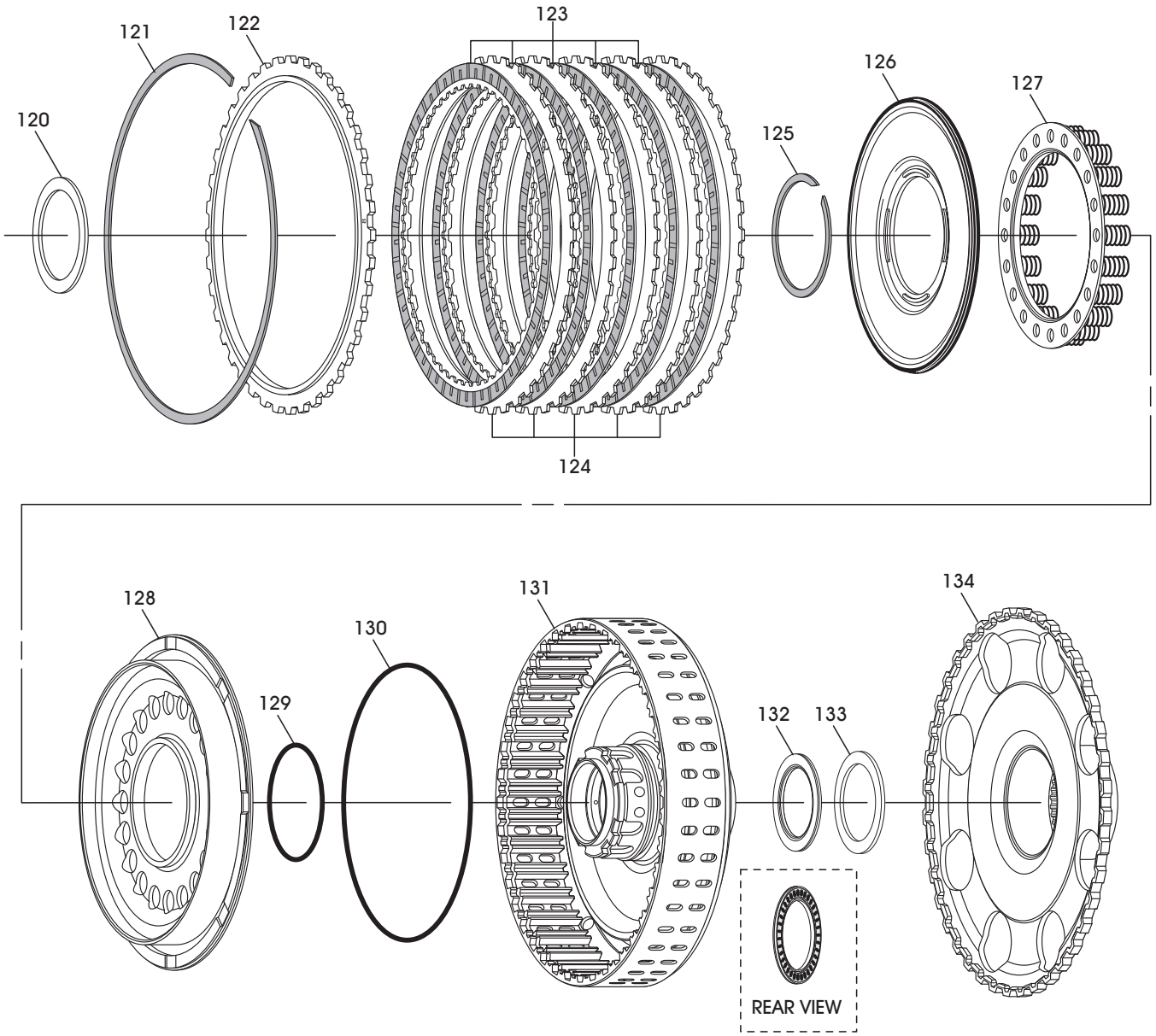


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Figure 1

AUDI/BMW/VW TF60-SN/09G
SLIPS IN FIRST NEUTRALIZES IN SECOND

K1 CLUTCH HOUSING AND RELATED PARTS, EXPLODED VIEW



120 NUMBER 5 THRUST BEARING RACE.
121 K1 CLUTCH BACKING PLATE SNAP RING, 1.62MM (.064") THICK.
122 K1 CLUTCH BACKING PLATE.
123 K1 CLUTCH FRICTION PLATES (QUANTITY WILL VARY).
124 K1 CLUTCH STEEL PLATES (QUANTITY WILL VARY).
125 K1 CLUTCH BALANCE PISTON SNAP RING.
126 K1 CLUTCH BALANCE PISTON.
127 K1 CLUTCH APPLY PISTON RETURN SPRING ASSEMBLY.
128 K1 CLUTCH APPLY PISTON.
129 K1 CLUTCH INNER "O" RING SEAL.
130 K1 CLUTCH OUTER "O" RING SEAL.
131 K1 CLUTCH HOUSING ASSEMBLY.
132 NUMBER 6 THRUST BEARING.
133 NUMBER 6 THRUST BEARING RACE.
134 K3 CLUTCH HOUSING DRIVE HUB.

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Figure 2

VW 09G - 09D
RELEARN PROCEDURE

COMPLAINT: Various complaints related to garage shifts, harsh and/or flared up-shifts and/or coast downshift bumps.

CAUSE: The TCM has inaccurate learned values and basic settings causing incorrect shift overlap via the solenoids producing the harsh or flared shift complaints.

CORRECTION: After repairs, rebuild, TCM replacement or TCM software updates, initialization of the learned values and basic settings will need to be performed. Below is a relearn procedure for 2006 and later VW vehicles equipped with and 09D or an 09G transmission.

1. Bring the vehicle up to operating temperature by letting it idle or by driving it. Do not break torque the engine to raise the temperature. Monitor the transmission fluid temperature with the use of a scan tool or a temperature gun. The manual relearn test must be performed between 150° F (66° C) and 230°F (110° C). Do not attempt to perform the test outside of this range.

2. With the brake applied **at all times**:
   a) Shift the lever to N and hold for 3 seconds.
   b) Shift the lever to D and hold for 3 seconds and return the lever to N (repeat this 5 times).
   c) Repeat this same procedure 5 times from N to R.

3. In D drive the vehicle with a throttle opening between 25 and 30% until 6th gear is reached at approximately 60 mph (80km/h). Release the accelerator and coast bringing the vehicle to a stop in 60 seconds minimum. Repeat this procedure until the original shift complaints are resolved. This may take repeating this procedure up to 10 times.

Bulletin adapted from a Shift Pointers article in the December 2011 issue of Transmission Digest written by Jesse Zacarias from Elec-Tran Diagnostics.

VW DSG 02E (DQ250)
SOLENOID ELECTRICAL CODES

COMPLAINT: A Volkswagen vehicle equipped with a 6 speed Direct Shift Gearbox may experience a solenoid electrical code or codes before and/or after repairs. The solenoids are a part of the Mechatronic assembly with the solenoids being mounted to the valve body and controlled by the internal TCM through a hard frame conductor plate. As a result, the conductor plate or solenoids are not sold separately but as a complete assembly.

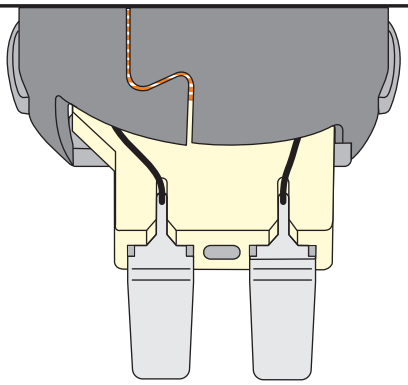
CAUSE: One cause can be a loose fitting solenoid coil wire where it pinch fits the blades that make contact with the conductor plate (Figure 1).

Another cause can be a poor contact between the conductor plate and the solenoid where the conductor plate pinch fits the coil blades of the solenoid (Figure 2).

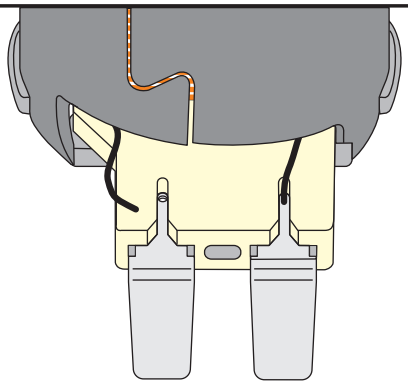
CORRECTION: Carefully inspect the solenoid for a loose coil wire where it passes through the blade of the solenoid. If the wire is loose, repair as necessary (Figure 1).

Ensure that there is enough tension on the conductor plate tabs to pinch the solenoid blades firmly preventing poor contact (Figure 2).

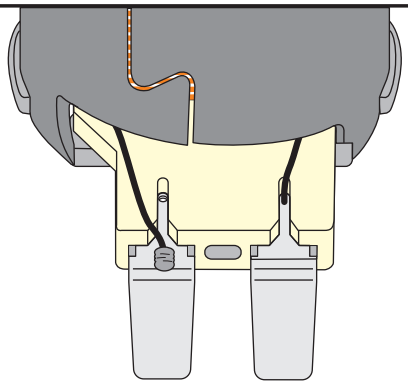
Many thanks to Juan Carlos Molina from Taller Molina in Argentina



Coil wires connected to the solenoid blades through holes with an interference fit.



Coil wires may break or become loose from the solenoid blades.



In some cases it can be possible to solder wire to the blade

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Figure 1

VW DSG 02E (DQ250)
SOLENOID ELECTRICAL CODES

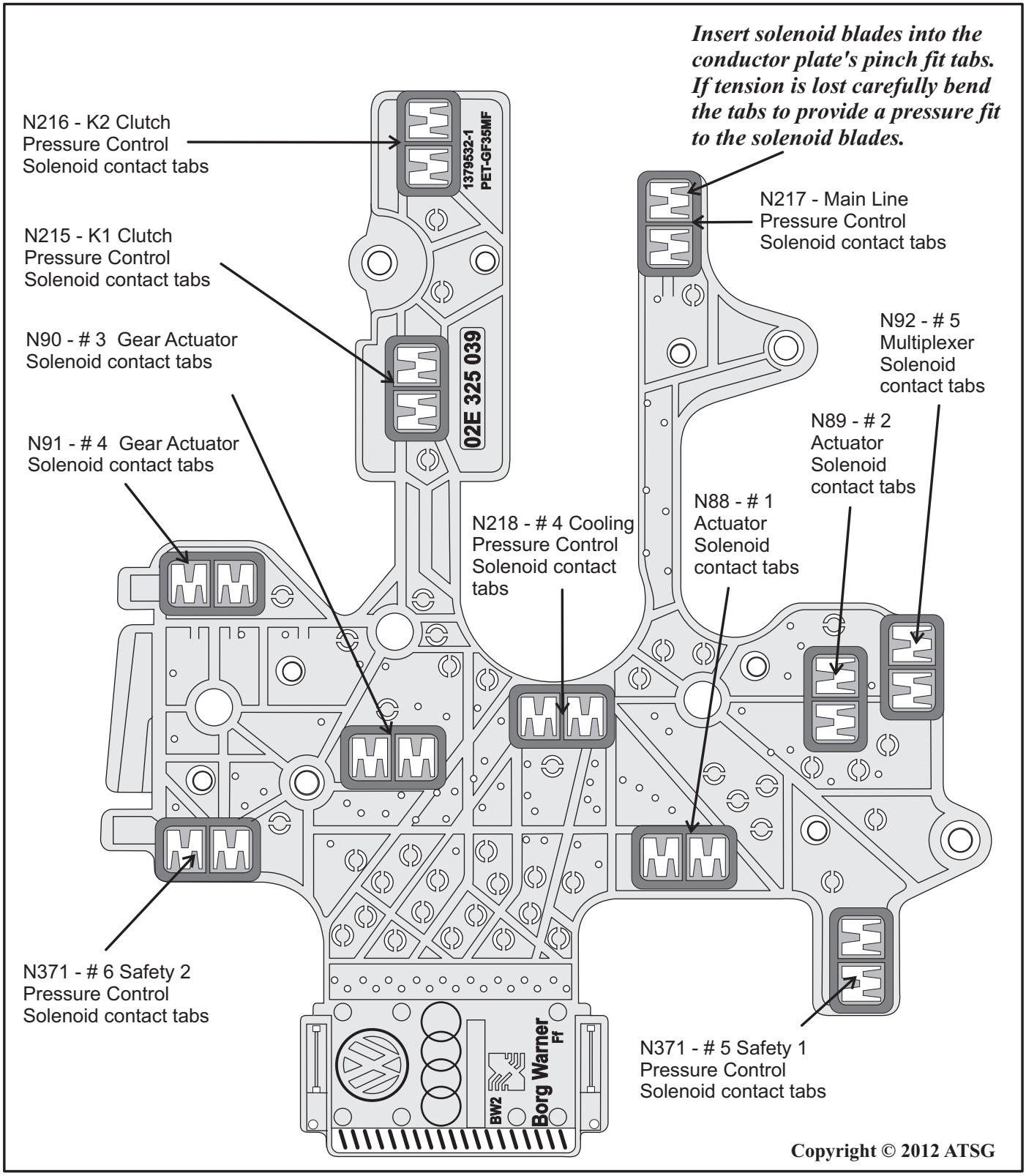


Figure 2

VOLKSWAGEN 02E DSG

FLUID SERVICE

COMPLAINT: How or where to check or fill the transmission to the correct oil level.

CAUSE: A lack of detailed service information regarding the filling, topping off and checking the 02E oil level makes it difficult to determine if the transmission has the correct oil level.

CORRECTION #1:

02E transmissions built up to a production date of September 20, 2004 had two service plugs in the bottom of the transmission, Figure 1. Service plug "A" is used to check the oil level. Service plug "B" is the ATF drain plug.
With service plug "A" removed and the transmission temperature at 35° to 112°F (35°C to 45°C), oil should trickle out of the "A" plug hole. This would indicate that the transmission has the correct oil level.

NOTE: #1: It is important to not switch these plugs. Behind plug "A" is an overflow pipe that determines when the transmission has the correct oil level. Installing plug "B" in this hole could damage the overflow pipe.

CORRECTION #2:

02E transmissions with a production date from September 21, 2004 have only service plug "A". This is both the drain and check plug, once the plug is removed, the 8mm hex black plastic overflow pipe is removed to drain the transmission and then replaced to check the fluid level. Tighten the overflow pipe to 27 lb. in. (3Nm).
With service plug "A" removed and the transmission temperature at 35° to 112°F (35°C to 45°C), hold the foot brake and shift into each selector lever position for approximately 3 seconds each. Place the selector lever in park and verify the transmission temperature with a scan tool. Let any excess fluid run out until it seeks its own level. At this time oil should trickle out of the "A" plug hole. This would indicate that the transmission has the correct oil level, Figures 2 and 3.

NOTE #2: It is best to fill the transmission through the vent cap as shown in Figure 4.

SERVICE INFORMATION:

Dry Fill Capacity.....7.6 Quarts (7.2 Liters)
Service Fill Capacity.....5.5 Quarts 5.2 Liters)
Volkswagen DSG Fluid Part #.....G052182A2

(For proper clutch overlap it is highly recommended to use OE specified fluid)

VW 02E DSG FLUID SERVICE

TRANSMISSIONS WITH PRODUCTION DATE UP TO 9/20/04

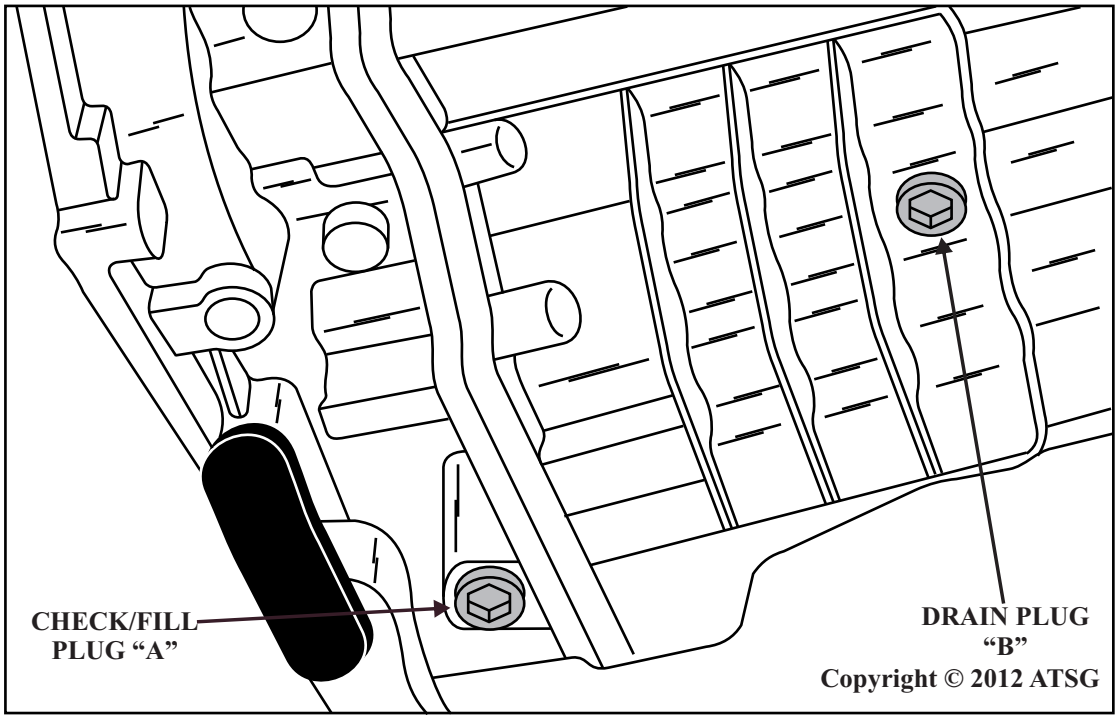


Figure 1

TRANSMISSIONS WITH PRODUCTION DATE FROM 9/21/04

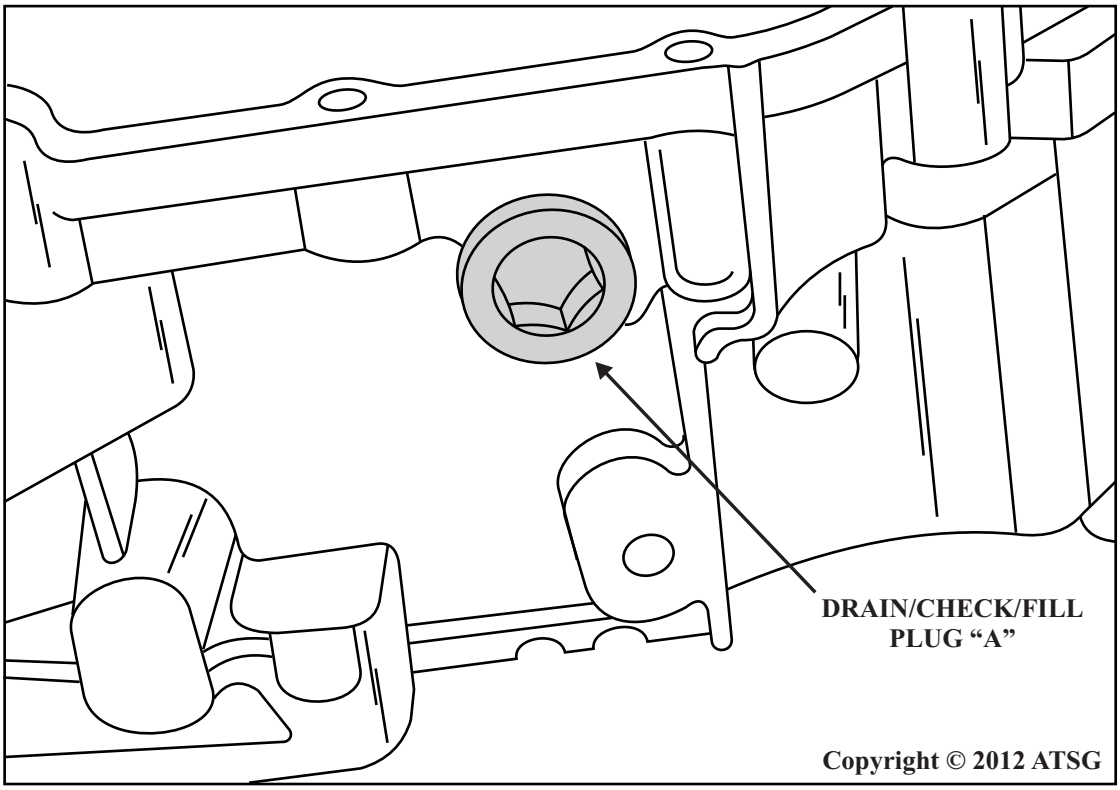
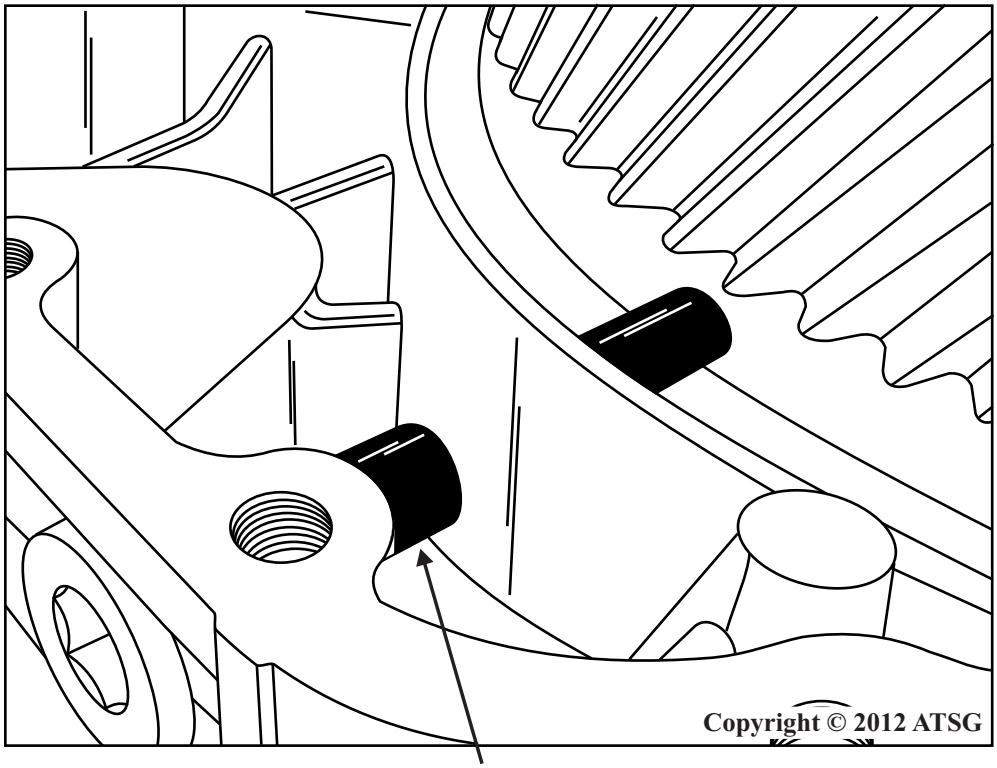


Figure 2

VW 02E DSG FLUID SERVICE

TRANSMISSIONS WITH PRODUCTION DATE FROM 9/21/04



REMOVE PLASTIC OVERFLOW TUBE TO DRAIN FLUID
INSTALL PLASTIC OVERFLOW TUBE TO CHECK FLUID LEVEL

Figure 3

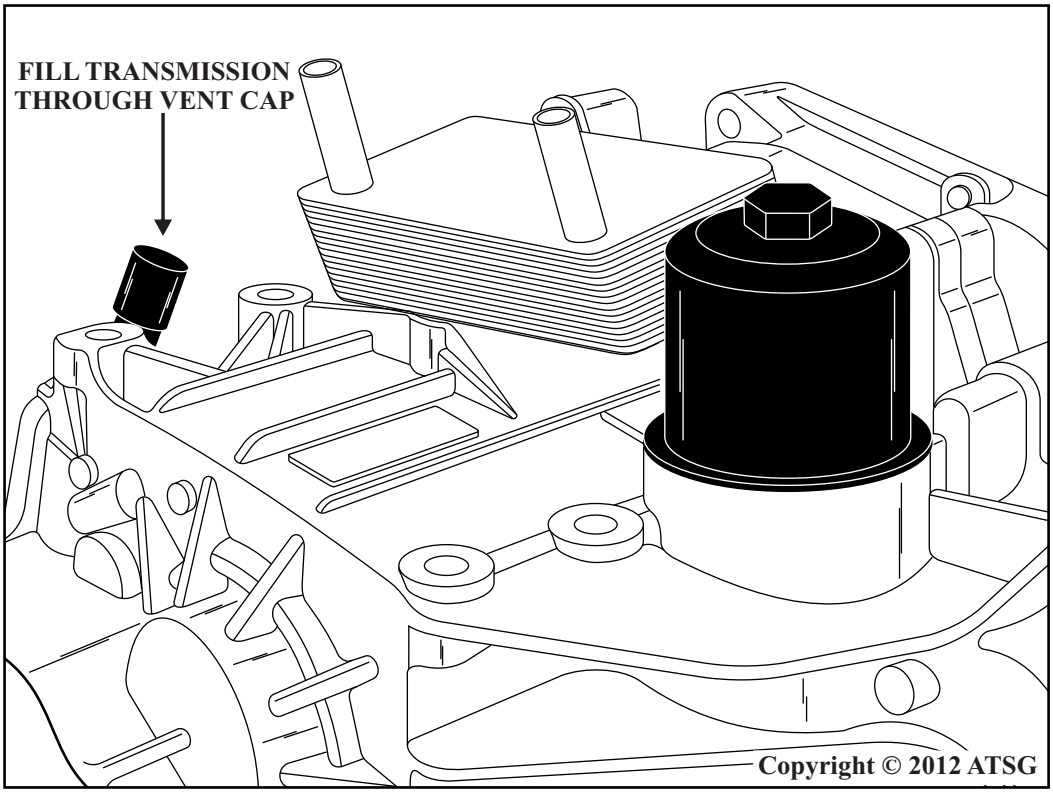


Figure 4

SAP - IBC

Teckpak/Fitzall - BC