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2013

TRANSMISSION SEMINAR

TECHNICAL SERVICE INFORMATION



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Introduction

So far the day has been full of great usable tech for transmissions that are presently coming into the shop and preparation for those that will be. And we are not letting up now that we are near the end of the day. This last presentation continues with the same intensity presenting information needed to handle both European and Asian manufacturers. Much of the information provided in all three of these manuals are not offered by the manufacturers. In most cases they do not illustrate valve body breakdowns so the information you have in these manuals will serve you well for many years to come. In closing, all of us here at ATSG would like to thank you for attending this years seminar and we look forward to seeing you again next year.

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AUDI 01J

DTC 17114 GEAR RATIO MONITORING: INCORRECT GEAR RATIO

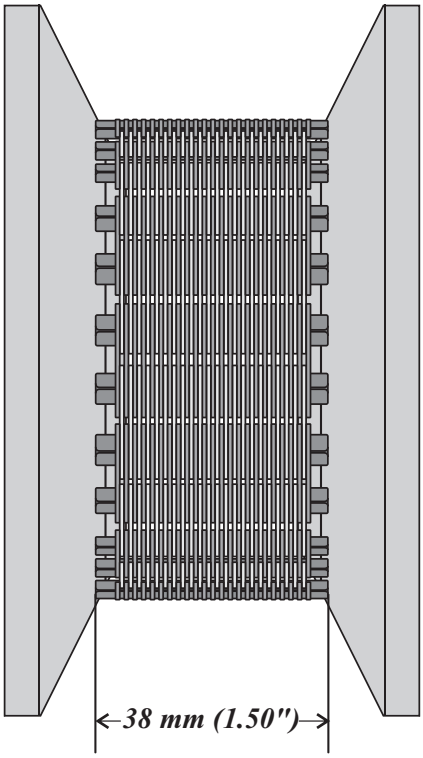
COMPLAINT: After a rebuild, an Audi 01J CVT exhibits a gear ratio error code 17114 only after the transmission has reached and held its highest ratio while cruising. If driven around town in stop and go traffic the transmission operates correctly. Even if its highest ratio is reached for a short period of time.

CAUSE: During the rebuild process an incorrect width chain was installed.

Note: There are various input and final drive ratios available with these 01J transmissions which if the incorrect transmission was used could cause a similar complaint. As with many transmissions today, swapping one for another for a quick turnaround requires ensuring the identical overall gear ratio transmission is being used. When it comes to the 01J transmission there is no exception to this rule.

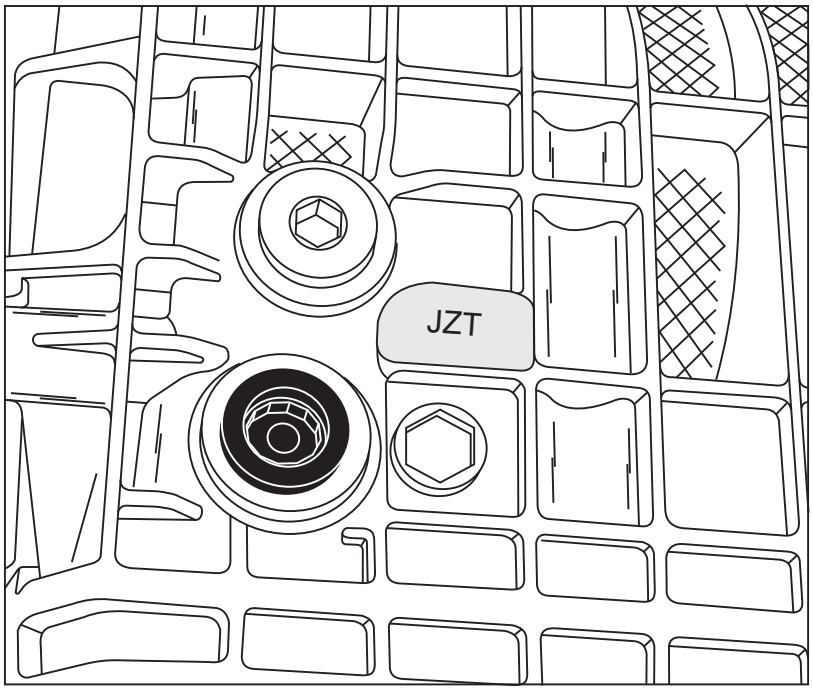
CORRECTION: 34 mm (1.34") and a 38 mm (1.50") are the two different width chains available depending on the model (figure 1). There are no charts that indicate which CVT models takes the 34mm or 38mm chain. So if you are to replace the chain, you should measure the original and order a new one according to the year, make, engine size and transmission code. The 3 digit transmission code such as a JZT or a GYJ can be located on the bottom side of the case as seen in figure 2.

MEASURING CHAIN WIDTH



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Figure 1



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Figure 2

NEW FROM TRANSGO®

Honda-LK

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Corrects/Prevents/Reduces:

Repeated Hot Trip Converter Blues. (Severe Converter Overheating)

Fits: The following Transmissions Only:

-Acura:

CL V6 Only: 98-03 M7ZA, BGFA, MGFA
3.2TL & TL: 99-09 B7VA, M7WA, B7WA, BDGA, BDHA
MDX: 01-09 MGHA, BGHA, MDKA, BDKA, BYFA.
RL: 05-08 MJBA

-Honda:

Accord V6 Only: 99-09 B7XA, BAYA, MAYA, B97A
Odyssey V6 Only: 99-09 B7TA, B7YA, BYBA, BGRA, PGRA, P36A B36A
Pilot: 03-09 BVGA, PVLA, PVGA, P35A, P34A
Ridgeline: 06-09 BJFA, MJFA, PSFA

-Saturn: **Vue:** 04-07-MDRA, MDPA



Honda-LK2

Lube Correction Kit-Fixes up to 6 transmissions.

Corrects/Prevents/Reduces:

Repeated Hot Trip Converter Blues. (Severe Converter Overheating)

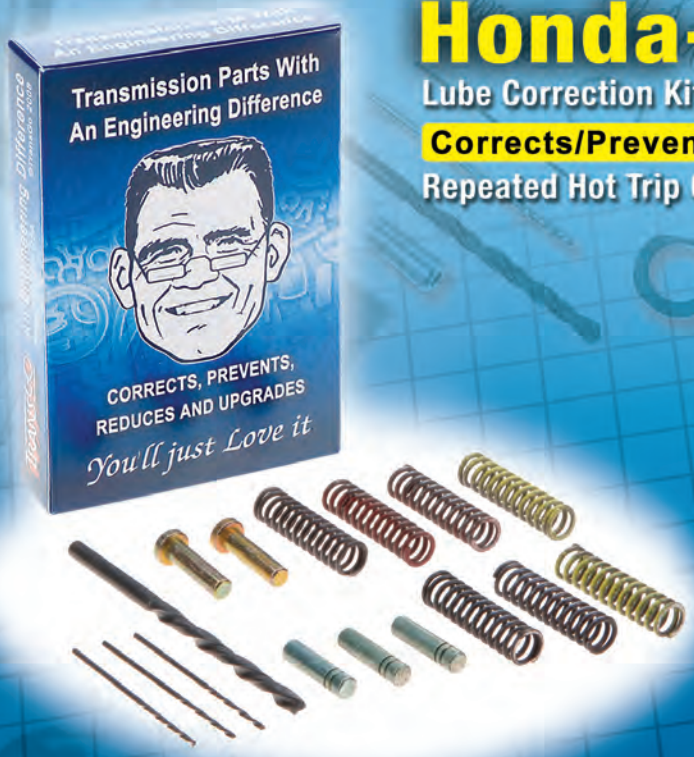
Fits: The following Transmissions Only:

-Acura:

CL 4Cyl: 97-99 A6VA, B6VA
RSX 4Cyl: 02-06 MRMA
TSX 4Cyl: 04-09 MCTA, MM7A

-Honda:

Accord V6: 95-97 MPZA
Accord 4 Cyl: 94-09 MPOA, AOYA, BOYA, BAXA, MCLA, BCLA, M91A, B90A, MAXA
Odyssey 4 Cyl: 95-98 MPJA, MDWA
CRV: 97-09 M4TA, MDLA, MDMA, MRVA, MCVA, MKZA, MKYA, GPPA, GPLA, MZHA, MCJA, BZHA, BZJA
Civic: 96-09 A4RA, B4RA, B46A, M4RA, BDRA, S4RA, BMXA, SLXA, SPCA
Element: 03-09 BZNA, BZKA, MZKA, MNZA



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ZF5HP-19/FL/FLA
LOSS OF 3RD/4TH AND DTC 46 WHEN HOT

COMPLAINT: 1998 and up, Audi or BMW vehicles, equipped with the ZF5HP-19/ FL/FLA may exhibit a condition of a 2-3 upshift flair, or a loss of 3rd and/or 4th gear as well as a two digit diagnostic trouble code of 46 ***Gear Monitoring (BMW DTC)***. Note: extreme cases have also caused a complaint of a no move forward when the code 46 sets, as limp home mode is 4th gear.

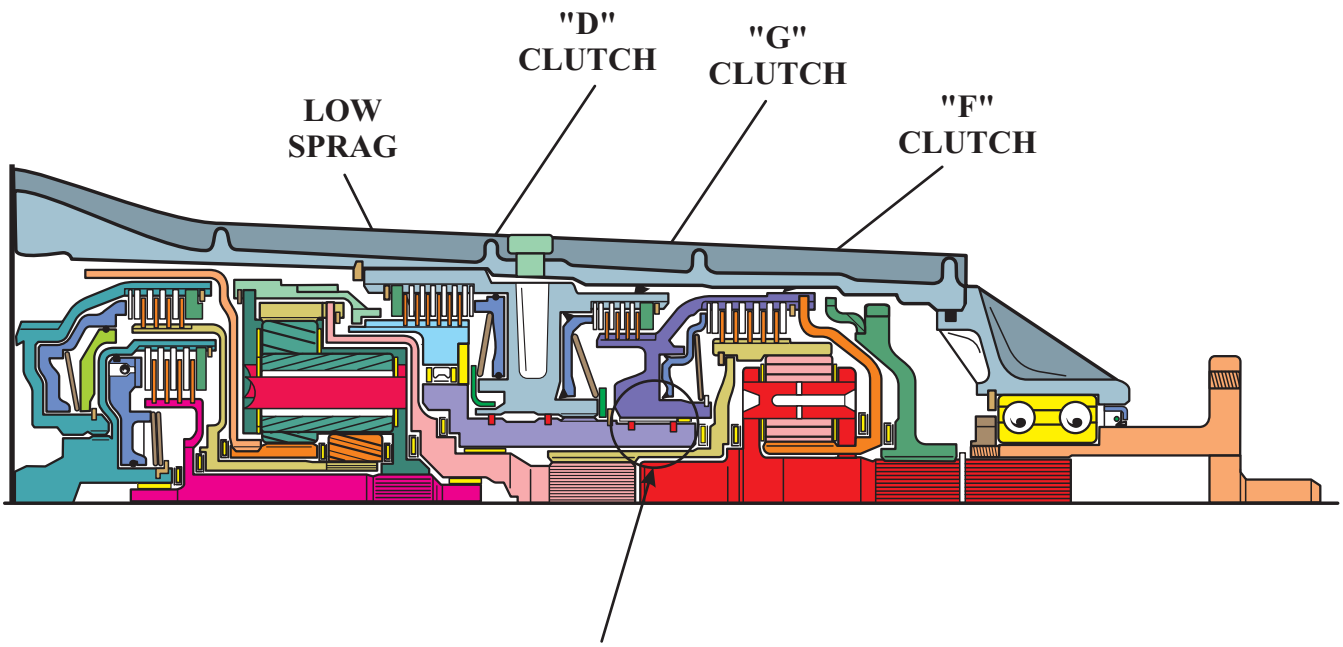
CAUSE: The cause may be, a loss of apply pressure to the F Clutch, as the sleeve in the drum is mis-positioned allowing the sealing ring closest to the bearing to leak, as shown in Figure 1. Refer to Figure 3 for a drawing of the F Clutch drum and the sleeve to verify if the sleeve is in the right place. A small amount of movement of the sleeve can cause a leak in the "F" Clutch. Refer to Figure 2 and note that the F clutch is applied in 3rd, 4th and 5th gear . ***Note: 4th gear is limp mode and the application chart shows that if the F clutch is not functional, this could cause it to stop moving***.

CORRECTION: Replace the F Clutch drum with the part number listed below in Service information.

SERVICE INFORMATION:

F DRUM ASSEMBLY (ZF part no. ALL).....1060277010
Erikson Industries- 800-388-4418

ZF5HP-19 CROSS-SECTIONAL VIEW



The F Clutch Drum with Needle Bearing has a steel sleeve in it that can move causing a leak in the F clutch. Note the sealing ring on the right, is at the end of the sleeve, any movement away from the bearing will allow the sealing ring to leak

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Figure 1

ZF-5HP-19 CLUTCH APPLICATION CHART

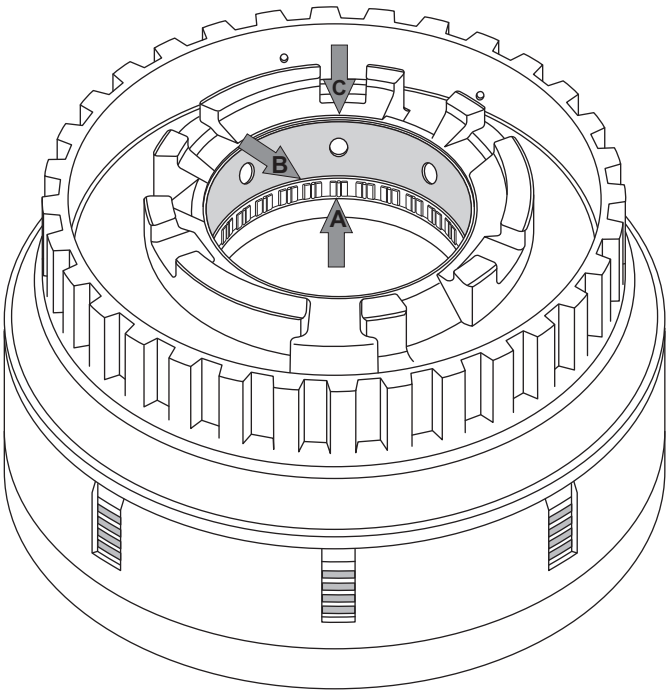
RANGE	"A" CLUT	"B" CLUT	"C" CLUT	"D" CLUT	"LOW" SPRAG	"E" CLUT	"F" CLUT	"G" CLUT	GEAR RATIO	CONV CLUT
Park								ON		
Reverse		ON		ON				ON	4.08	
Neutral								ON		
"D"-1st	ON				HOLD			ON	3.66	
"D"-2nd	ON		ON				ON	ON	1.99	
"D"-3rd	ON		ON				ON		1.40	*
"D"-4th	ON					ON	ON		1.00	*
"D"-5th			ON			ON	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 2

VERIFY SLEEVE IS IN THE RIGHT POSITION IN THE F CLUTCH DRUM



Arrow "A"- Make sure that the Bearing is against the staked area in the drum
Arrow "B"- Make sure that the Sleeve is up against the Bearing
Arrow "C"- Make sure that the Sleeve is approximately .020" above the drum surface

Note: The sealing ring closest to the bearing is extremely close to the edge of the sleeve. Any movement of the sleeve will cause a leak in the "F" Clutch.

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Figure 3

Special thanks to Reno @ Continental and Ralph Abraham from Alonzo's Transmissions for providing to is a drum.

ZF5HP-19/FL/FLA

FIRM ENGAGEMENT INTO D HARSH COAST-DOWNSHIFTS

COMPLAINT: Audi or BMW vehicles, equipped with the ZF5HP-19/ FL/FLA may exhibit a condition of a firm engagement in the Drive position accompanied with a harsh coast-downshift. This condition will typically get more pronounced when hot. This condition seems to be more prevalent in vehicles 2003 and newer.

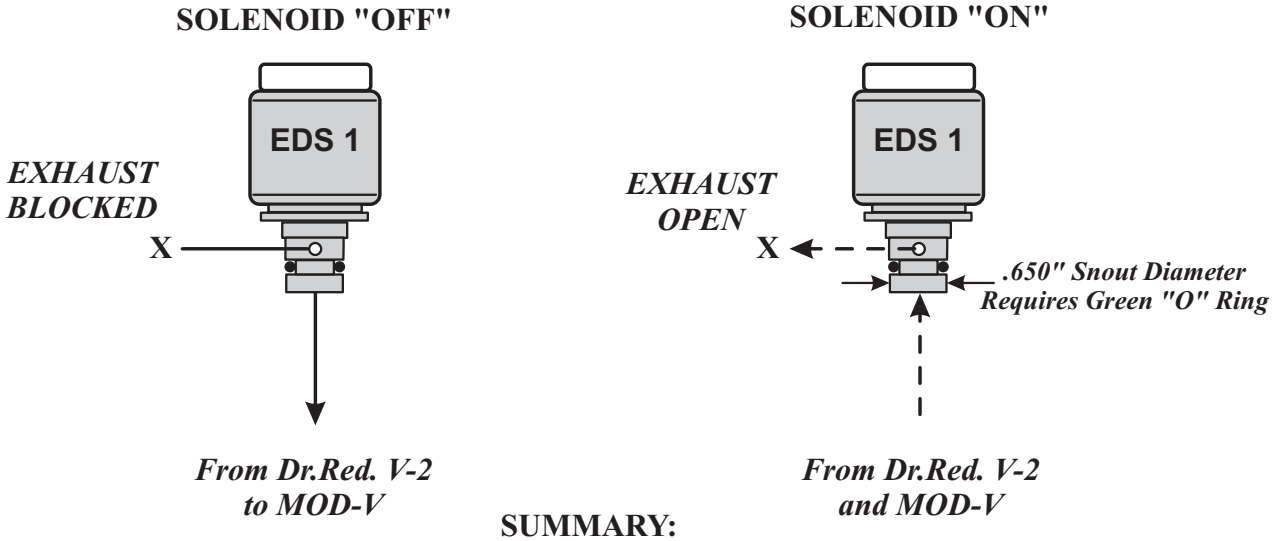
CAUSE: The cause may be a mechanically malfunctioning EDS 1 Solenoid. Refer to Figure 1 for a description on mechanical function. Figure 2 shows a partial hydraulic schematic of the EDS 1 Solenoid and how it controls the Modulating Pressure Valve. If the EDS 1 is malfunctioning it will cause high modulating valve pressure, which can cause high line pressure as well as high accumulator back pressure. This typically causes the firm engagement in Drive and the harsh coast-downshifts.

CORRECTION: To correct this condition, refer to Figure 3 for the location of EDS 1 Solenoid and replace it. Refer to Figure 4 for the location of the Modulating Pressure Valve, as it would be a good idea to make sure that the valve moves free in its bore, while replacing EDS 1.

SERVICE INFORMATION:

EDS 1 SOLENOID (Fits Pulse generator TSS types to 2000- ZF part no.).....0501 209 875
EDS 1 SOLENOID (Fits Hall effect TSS types and 2003 up- ZF part no.).....0501 210 725
Verify part number for your application with a ZF distributer.
Erikson Industries- 800-388-4418

EDS-1 OPERATION
(Line Pressure Solenoid)



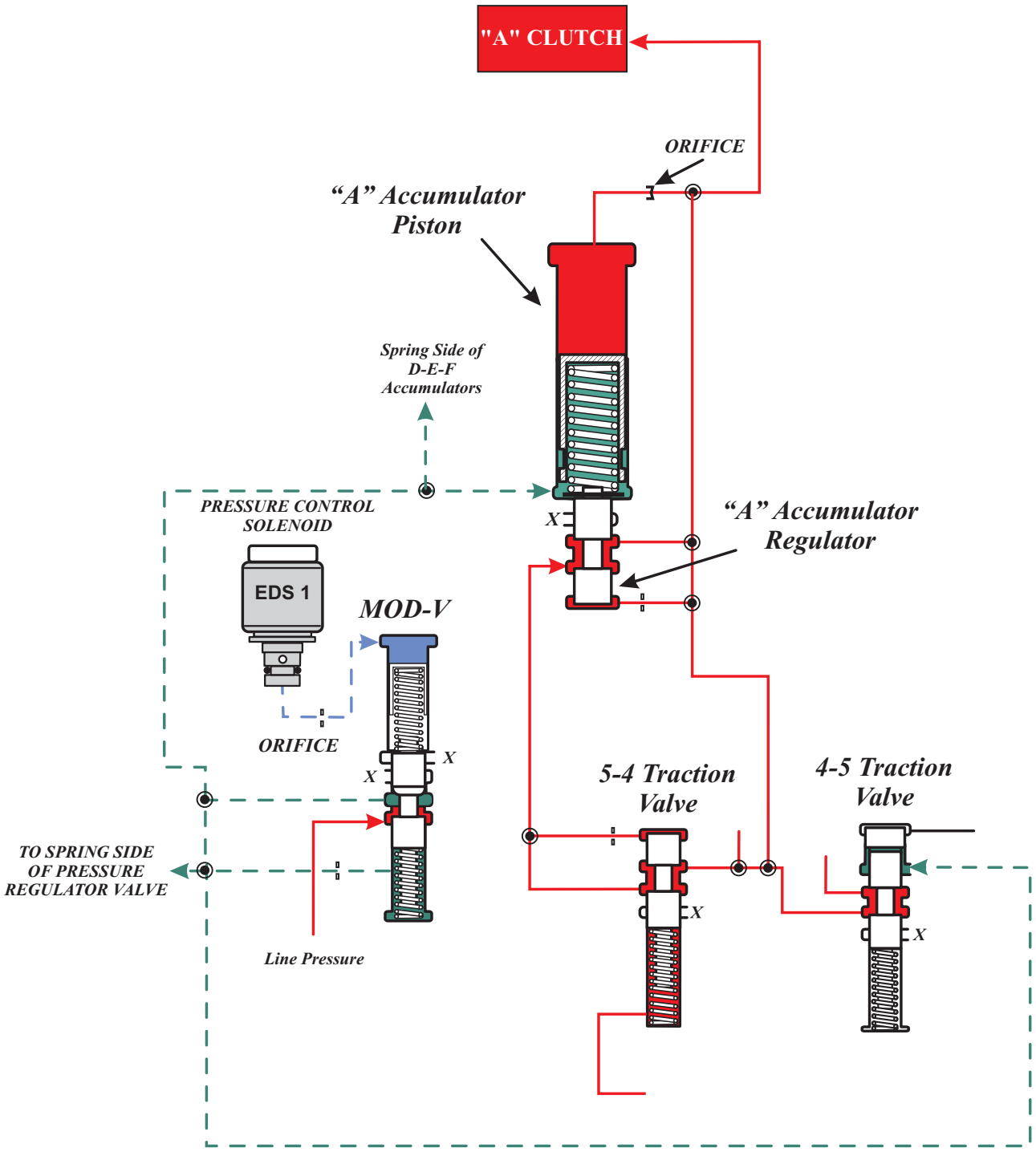
SUMMARY:

When EDS 1 solenoid is "OFF," solenoid reducing pressure, from Dr. Red. V-2, is high to MOD-V valve which creates high line pressure.
When EDS 1 solenoid is "ON," solenoid reducing pressure, from Dr. Red. V-2, is low to MOD-V valve which creates low line pressure.

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Figure 1

EDS-1 SOLENOID OPERATION

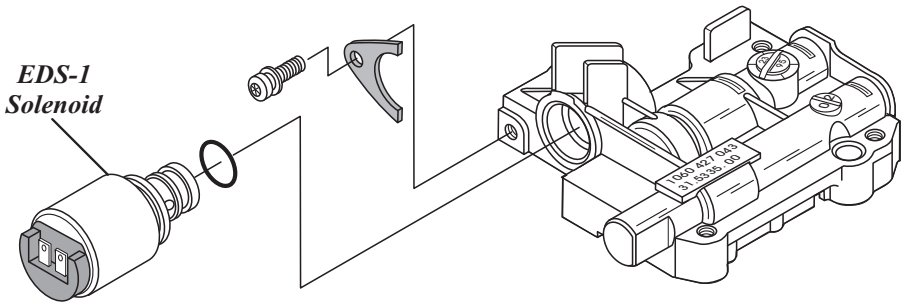


EDS 1 is a pressure control solenoid that acts on the Modulating Pressure Valve (MOD-V). Mod-V pressure is fed to the spring side of the accumulator pistons and the Pressure Regulator valve, which controls pressure rise and shift feel.

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Figure 2

ZF-5HP-19 SOLENOID IDENTIFICATION AND LOCATIONS



SPECIAL NOTE:

EDS-1 Solenoid
.650" Snout Diameter
Requires Green "O" Ring

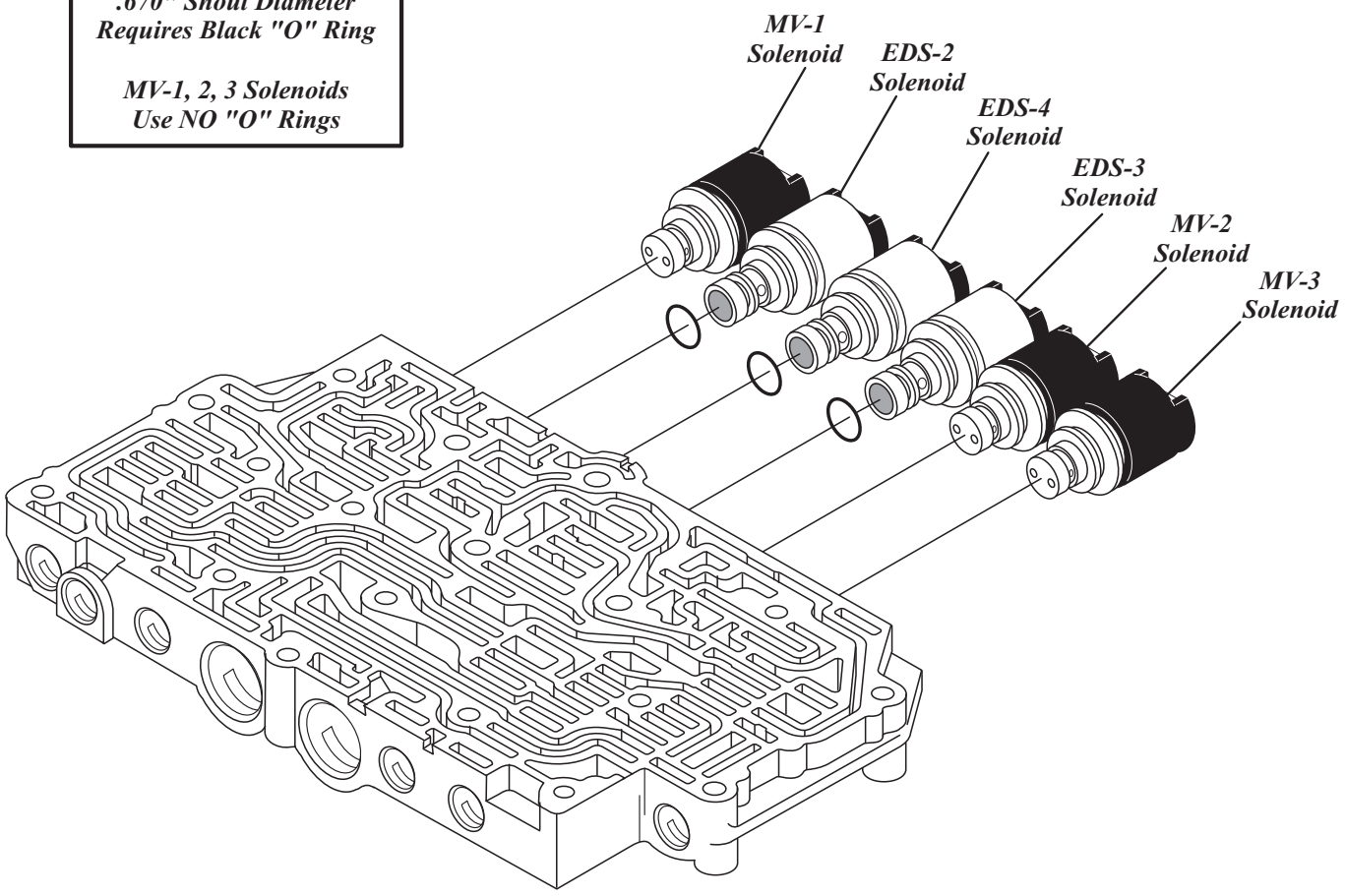
EDS-2, 3, 4 Solenoids
.670" Snout Diameter
Requires Black "O" Ring

MV-1, 2, 3 Solenoids
Use NO "O" Rings

Common ZF Part Numbers

EDS-1 Solenoid	0501 209 875
(Fits Pulse generator TSS to 2000)	
EDS-1 Solenoid	0501 210 725
(Fits Hall effect TSS and 03 up)	

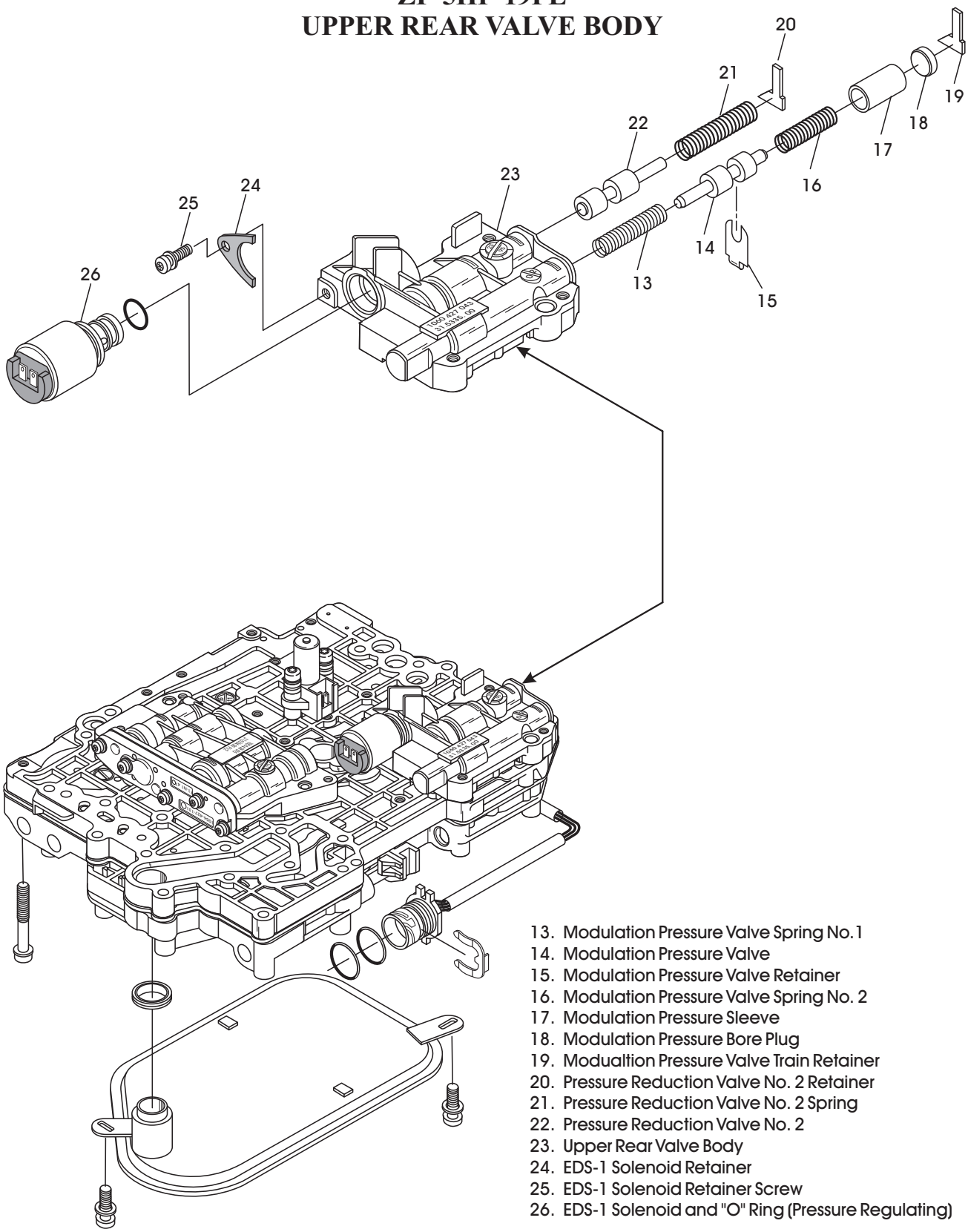
Note: Verify part number with ZF distributer for your application



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Figure 3

ZF-5HP-19FL
UPPER REAR VALVE BODY



13. Modulation Pressure Valve Spring No.1
14. Modulation Pressure Valve
15. Modulation Pressure Valve Retainer
16. Modulation Pressure Valve Spring No. 2
17. Modulation Pressure Sleeve
18. Modulation Pressure Bore Plug
19. Modualtion Pressure Valve Train Retainer
20. Pressure Reduction Valve No. 2 Retainer
21. Pressure Reduction Valve No. 2 Spring
22. Pressure Reduction Valve No. 2
23. Upper Rear Valve Body
24. EDS-1 Solenoid Retainer
25. EDS-1 Solenoid Retainer Screw
26. EDS-1 Solenoid and "O" Ring (Pressure Regulating)

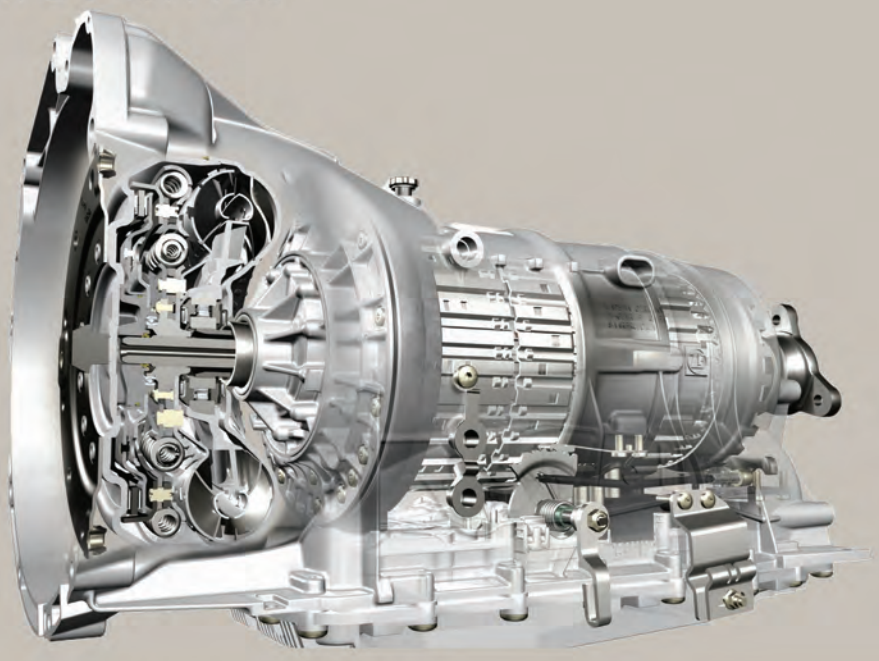
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Figure 4



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AUDI/VW ZF5HP19 FL/FLA (01V)
PORSCHE ZF5HP19 HL/HLA
VALVE BODY SMALL PARTS ID

The ZF5HP19 or 01V as Audi/VW calls it was first used in the 1994 Audi A8 with continued use thru the 2005 model year in either front wheel or all wheel drive configurations. Volkswagen started using the 01V in the 1998 VW Passat and continued its use in that model through the 2004 model year.
In approximately 2003, the valve body channel casting design was changed as well as the small part locations and function into what is referred to as Version 2 which significantly differs from the previous Version 1 design. Figures 1 through 3 will illustrate the differences between the Version 1 and 2 design levels.

Porsche used a version of the ZF5HP19 with designations of HL for rear wheel drive or HLA for all wheel drive from 2000 to the 2008 model year in the 911, Boxster and Cayman models. The channel casting will have the Version 1 design level.

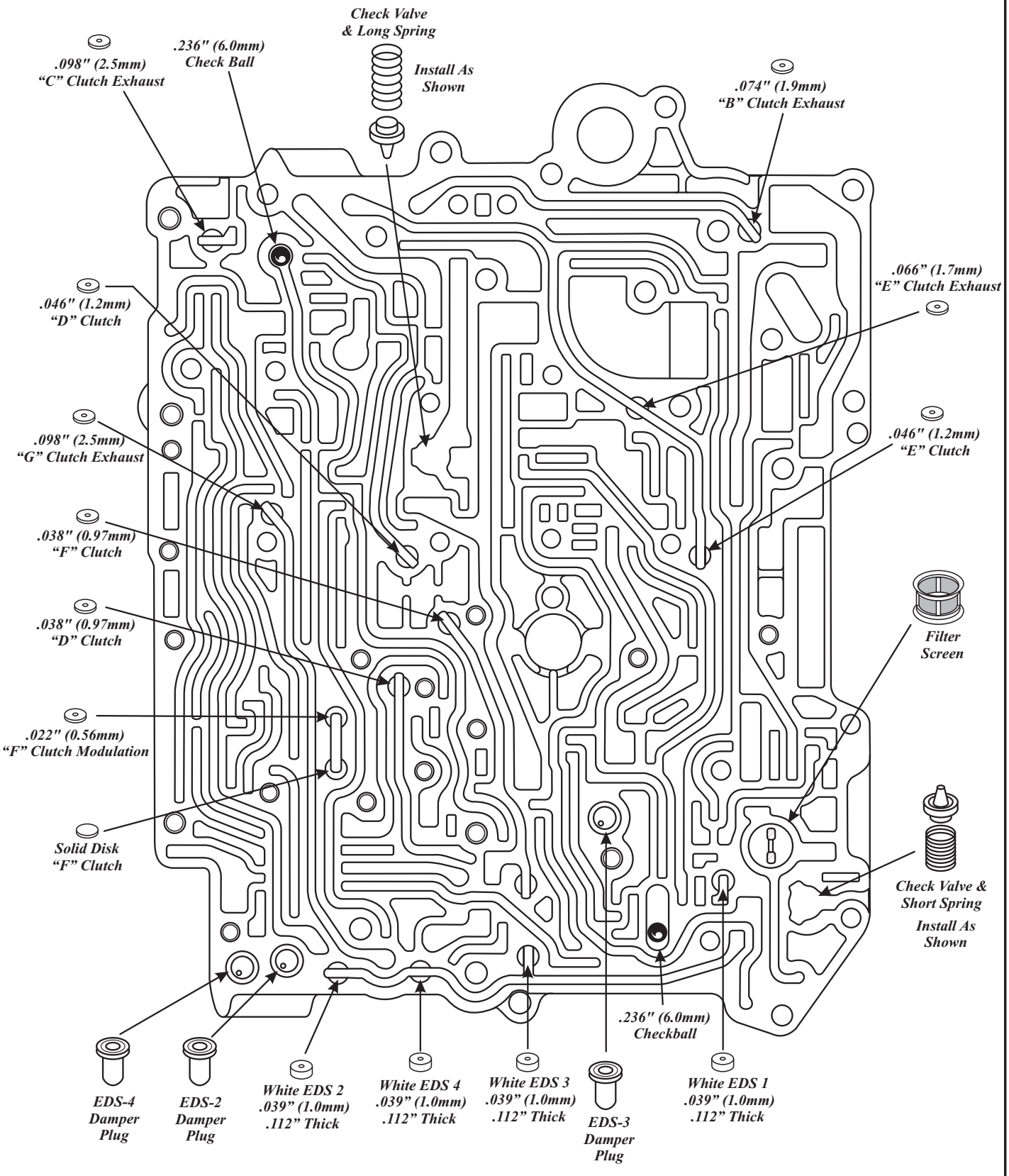
Refer to Figure 1 for the Audi, VW & Porsche Version 1 Channel Casting Small Parts ID.

Refer to Figure 2 for the Audi & VW Version 2 Channel Casting Small Parts ID.

Refer to Figure 3 for Audi, VW & Porsche Versions 1 & 2 Modulation Housing Small Parts ID.

ZF-5HP-19FL/FLA/HL/HLA (01V) CHANNEL PLATE PART LOCATIONS

AUDI/VW/PORSCHE VERSION 1



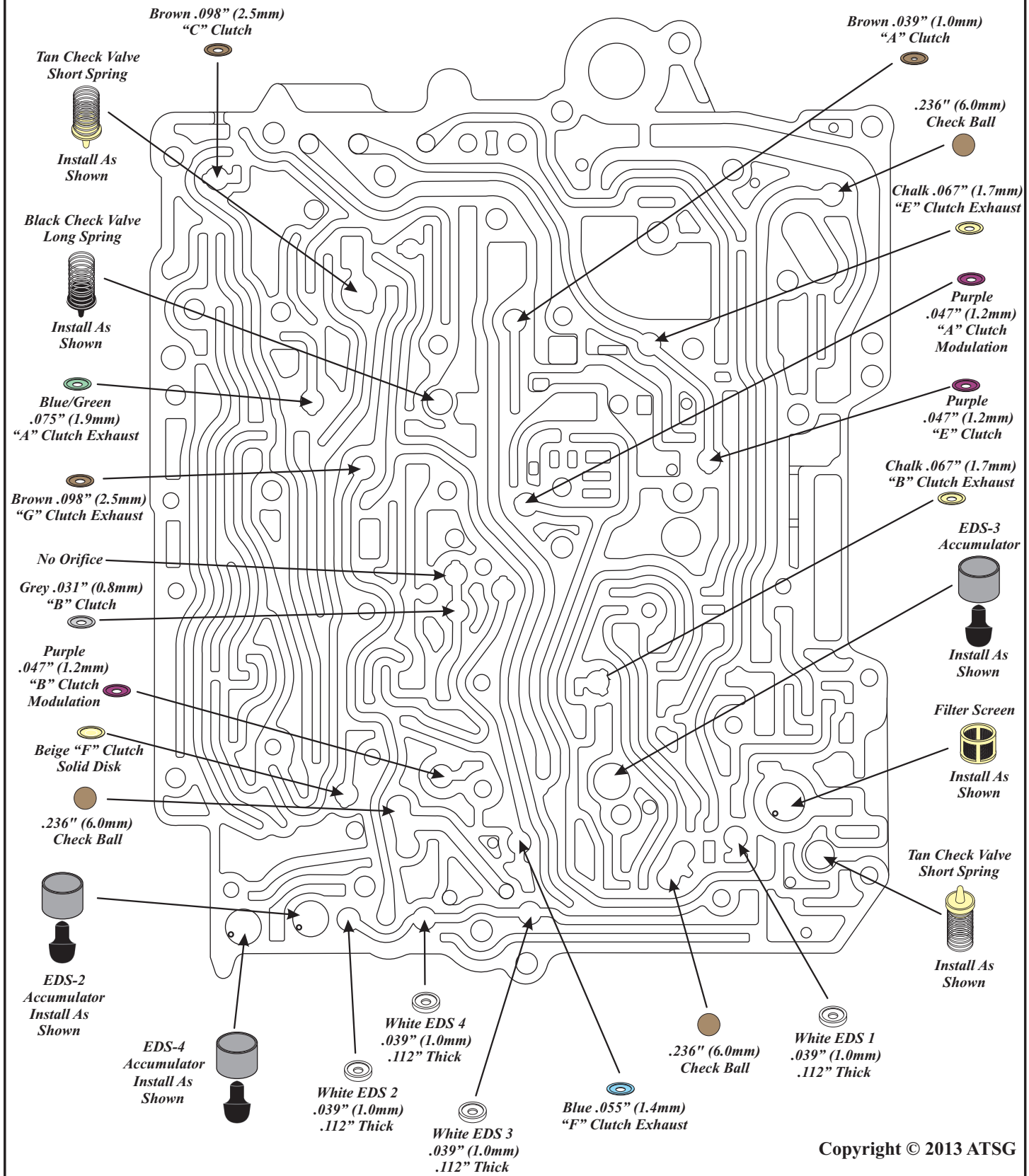
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Figure 1

ZF-5HP-19FL/FLA (01V) CHANNEL PLATE PART LOCATIONS

AUDI/VW VERSION 2

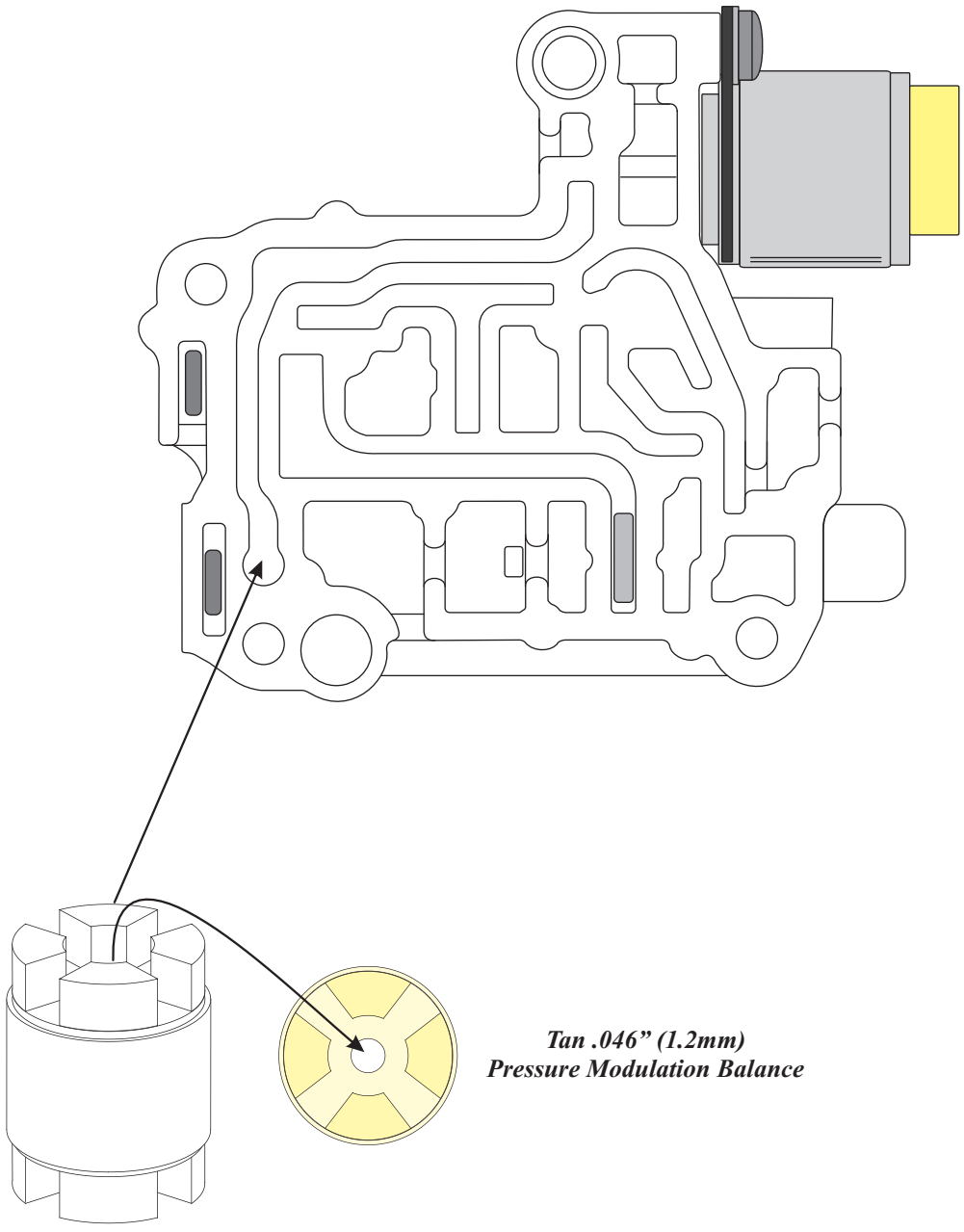


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ZF-5HP-19FL/FLA/HL/HLA (01V) MODULATION HOUSING PART LOCATIONS

AUDI/VW/PORSCHE VERSIONS 1 & 2



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Figure 3

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ZF5HP24
DELAY/SLIPS IN REVERSE

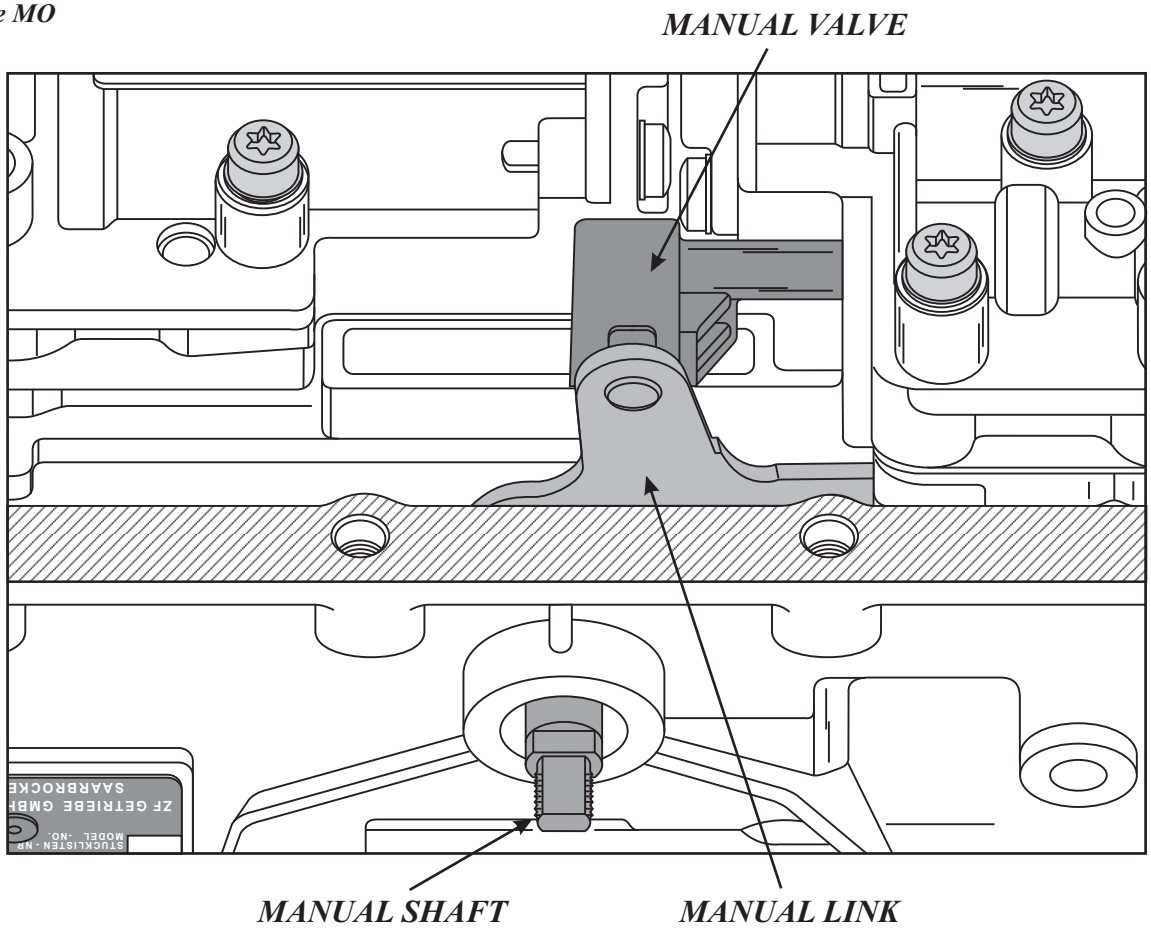
COMPLAINT: After overhaul, vehicles equipped with the ZF5HP24 transmission may exhibit a delayed engagement in Reverse or when Reverse is engaged it slips backing up. ***Note: It may be noticed that when the selector is pushed a little closer to the Park or Drive Position, Reverse engages good.***

CAUSE: The cause may be, that the Manual Valve, as shown in Figure 1, is mis-aligned to the valve body casting causing a loss of pressure to the Reverse apply circuit. This happens when the Tamper-proof bolts are removed from the detent spring (see Figure 2). Note: There is no alignment when reassembling the detent spring to the case.

CORRECTION: To correct this condition, Refer to Figure 2 and place the Manual shaft in Reverse range. Measure from the edge of the valve body casting to the edge of the Manual Valve and verify that the reading is approximately .830"-.835." It may be necessary to remove the valve body and loosen the tamper proof bolts to adjust the detent spring to get the right reading.

Special thanks to David Transmission Exchange MO

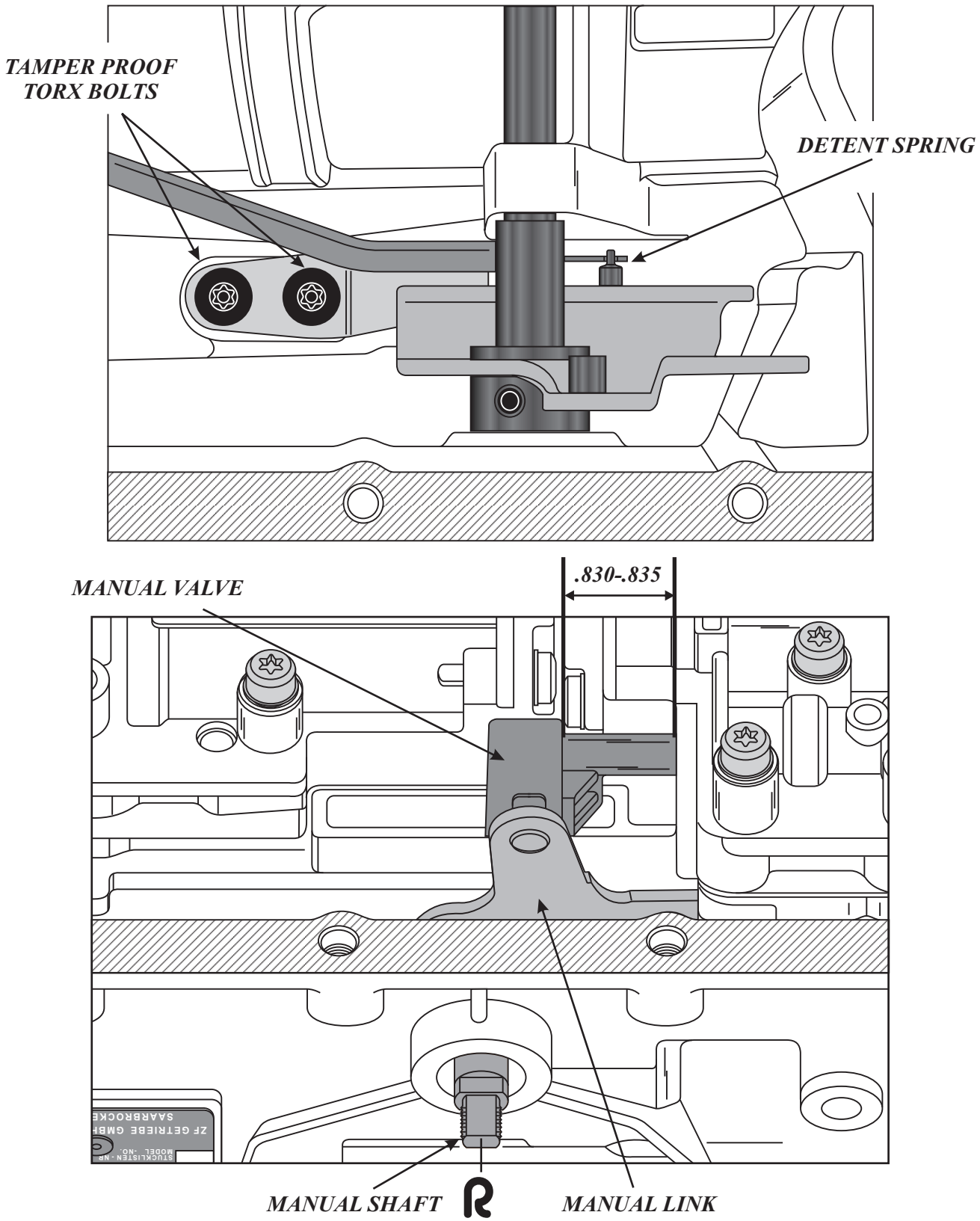
MANUAL LINK



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Figure 1

DETENT SPRING AND MANUAL VALVE ALIGNMENT



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Figure 2

JAGUAR XJ8 ZF5HP24

POOR 3-4 SHIFT- ERRATIC OPERATION - POSSIBLE P1722

COMPLAINT: An XJ8 Jaguar equipped with a ZF5HP24 may develop a consistently poor 3-4 up-shift during an initial drive cycle. All 3-4 shifts afterward was fine. Intermittently it will failsafe with no codes set. Occasionally it may set P1722 while at other times it could have 2nd gear starts and/or sudden neutralizing.

CAUSE: Jaguar defines code P1722 as being a "Transmission Stall Speed Failure" sighting the following possibilities in causing this code to occur:

1. Output speed sensor signal faulty
2. Harness fault
3. Connector pin(s) bent, loose or corroded
4. Transmission Control Module failure
5. Transmission mechanical fault

In many cases this list can be very helpful in discovering the root cause to the erratic transmission operation. However, there is another possible cause that could be easily overlooked and undiscovered since this problem usually manifests itself with an intermittent no start complaint rather than the erratic transmission operation.

If you look at the partial wiring diagram provided in Figure 1, you will notice that the battery is in the trunk. The positive lead of the battery goes to a High Power Protection Module which is also in the trunk. This module then supplies power to the two rear Heel Board fuse boxes, the Engine Management and Engine Compartment fuse boxes. It also supplies power to the Starter Motor and Generator after it passes through a stud called the “False Bulkhead Stud Connector.”

This stud is located by the ECM/TCM box in the right rear corner of the engine compartment as seen in Figures 2 and 3. The nuts that hold down the cables to this stud loosens compromising the connection. A careful look at the stud reveals evidence of arcing due to the loose connection. This bad connection allows for a voltage drop to occur during ignition cycle as well as intermittent voltage supply affecting TCM operation.

CORRECTION: If the stud is badly damaged due to severe arcing, it may be necessary to replace it or recondition the threads by chasing it with a die and ensure a secure connection of the cables.

Additional information:
There are a few obvious reasons why this compromised connection through the False Bulkhead Stud Connector can be elusive. As first mentioned, this problem usually causes an intermittent no start complaint which apparently does not always occur. Secondly, why did the TCM produce code P1722 and not the codes which relate to its ignition supply voltage? Maybe the answer to this is that it was not bad enough long enough to set the code.

According to Jaguar, the TCM monitors battery and ignition switched supply voltages at terminals 54 and 55. A permanent supply is used to maintain a battery backed 'memory' at terminal 26. Should this supply be cut, due to battery disconnection, the 'adaptive shift’

JAGUAR XJ8 ZF5HP24

POOR 3-4 SHIFT- ERRATIC OPERATION - POSSIBLE P1722

CORRECTION: values will be lost. This will result in a small reduction in shift quality for a period until the adaptions are 're-learned'. Should the ignition switched supply fall outside prescribed limits, the TCM will adopt a 'limp home' mode resulting in inconsistent solenoid control.

DTC P1793 will be logged should the TCM adopt 'limp home' as a result of the supply voltage being greater than 16V or less than 7V with an engine speed greater than 1600 rpm. Should the ignition supply be greater than 7V but less than 9V the TCM will hold the gear that it has currently selected. If after 2.5 seconds, with the engine speed greater than 1600 rpm, the voltage remains at this level DTC P1789 will be logged and 'limp home' mode adopted. The 2.5 second delay is built in to prevent reaction to a momentary voltage fluctuation.

Should the battery become disconnected, XK8 models will require having the window position memory reset. But to expedite the adaptive learning process for some functions of the ECM, Jaguar suggests that you perform the following procedure:

Warning: Perform this procedure with the vehicle on a firm surface (not on a lift) after ensuring that no danger exists to surrounding personnel or property.

Caution: Do not exceed the engine speeds and time durations listed.

1. Engage P and allow the engine to reach normal operating temperature.
2. Press the A/C button to turn the climate control off.
3. Apply the service and parking brakes, and move the transmission selector lever to D.
4. Allow the engine to idle for an additional 2 minutes.
5. Gradually raise the engine speed to 950 RPM. Hold this speed for 45 seconds.
6. Raise the engine speed to 1200 RPM. Hold this speed for 45 seconds.
7. Raise the engine speed to 1500 RPM. Hold this speed for 30 seconds.
8. Allow the engine to return to idle. Move the selector lever to P and switch off the engine.

COMPREHENSIVE COMPONENT MONITOR TRANSMISSION DRIVE CYCLE

The Comprehensive Component Monitor transmission drive cycle will check all transmission system components:

1. Engine and transmission at normal operating temperature. Ignition OFF; ensure that SPORT mode is NOT selected.

2. With gear selector in P and the ignition ON. Check gearshift interlock by attempting to move selector without pressing the brake pedal. Verify P state illumination.

3. Press and hold the brake pedal. Move the gear selector to R. Verify R state illumination.

JAGUAR XJ8 ZF5HP24

POOR 3-4 SHIFT- ERRATIC OPERATION - POSSIBLE P1722

CORRECTION:

4. Set the parking brake. Press and hold the brake pedal. Attempt to start the engine. The engine should not start.

6. With the hand brake set and the brake pedal pressed, move the gear selector to the remaining positions in the J-Gate (D, 4, 3, 2) for five (5) seconds each. Verify the state illumination in each position.

7. Move the gear selector back to 4. Verify 4 state illumination.

8. Move the gear selector to D. Verify D state illumination.

9. Move the gear selector to N. Verify N state illumination.

10. Select R, release the brakes and drive the vehicle in Reverse for a short distance.

11. Stop the vehicle.

12. Select 2 and drive the vehicle up to 65 km/h (40 mph) . Hold 65 km/h (40 mph) for a minimum of five (5) seconds .

13. Select 3 and hold 65 km/h (40 mph) for a minimum of five (5) seconds.

14. Select 4 and hold 65 km/h (40 mph) for a minimum of five (5) seconds.

15. Select D and accelerate to a minimum speed of 80 km/h (50 mph). Hold 80 - 129 km/h (50 - 80 mph) for a minimum of 1.7 kilometers (1 mile).

16. Stop the vehicle; do not switch OFF the engine.

17. Use WDS Datalogger (or capable scan tool) to check TOTAL NUMBER OF DTC SET to ensure that transmission DTC monitoring is complete.

JAGUAR XJ8 ZF5HP24

POOR 3-4 SHIFT- ERRATIC OPERATION - POSSIBLE P1722

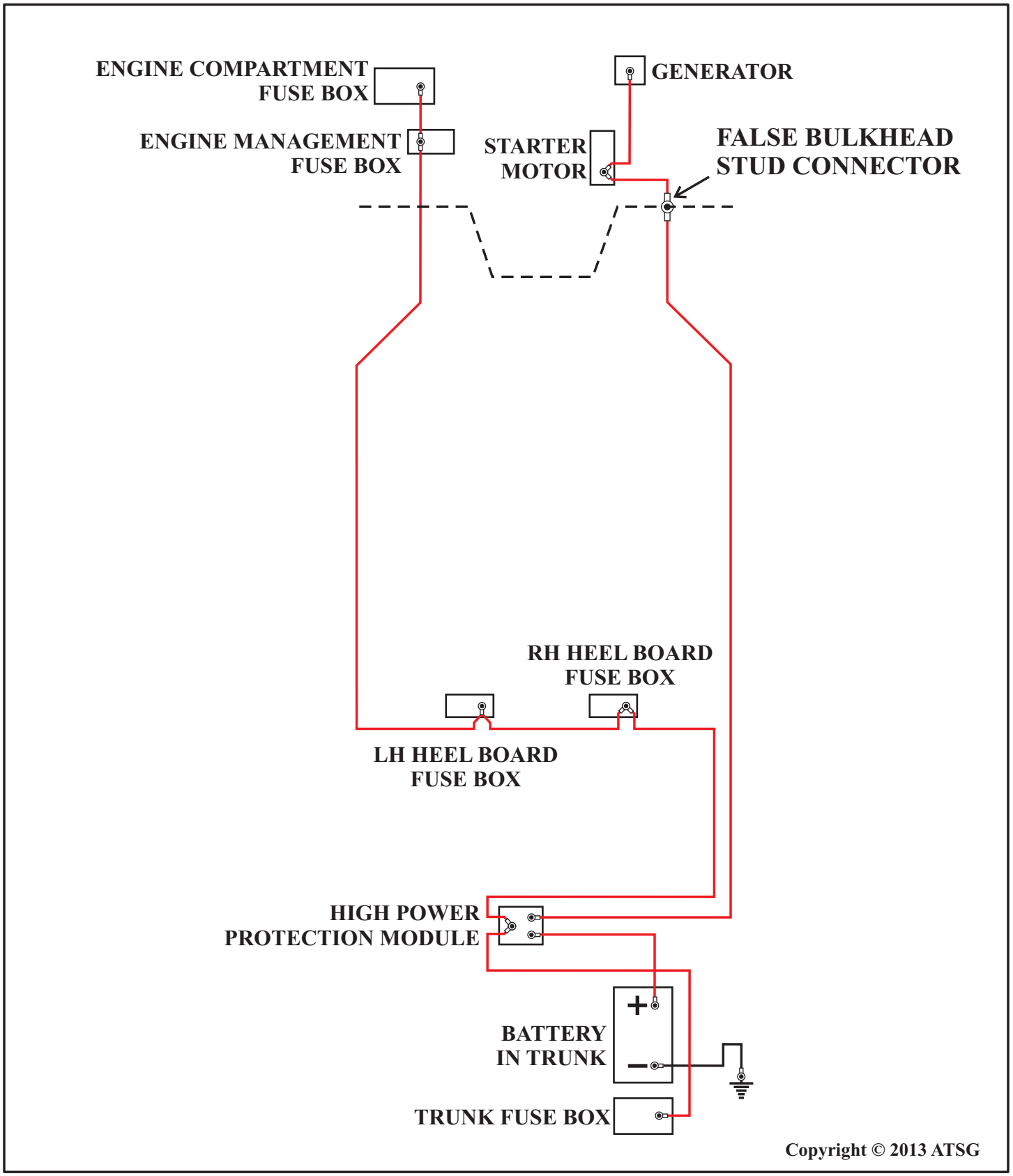
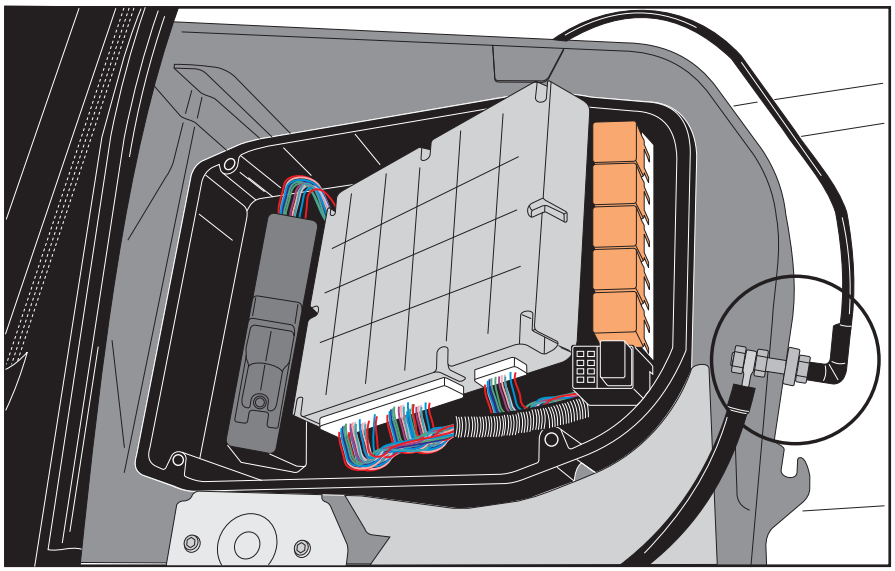


Figure 1

JAGUAR XJ8 ZF5HP24

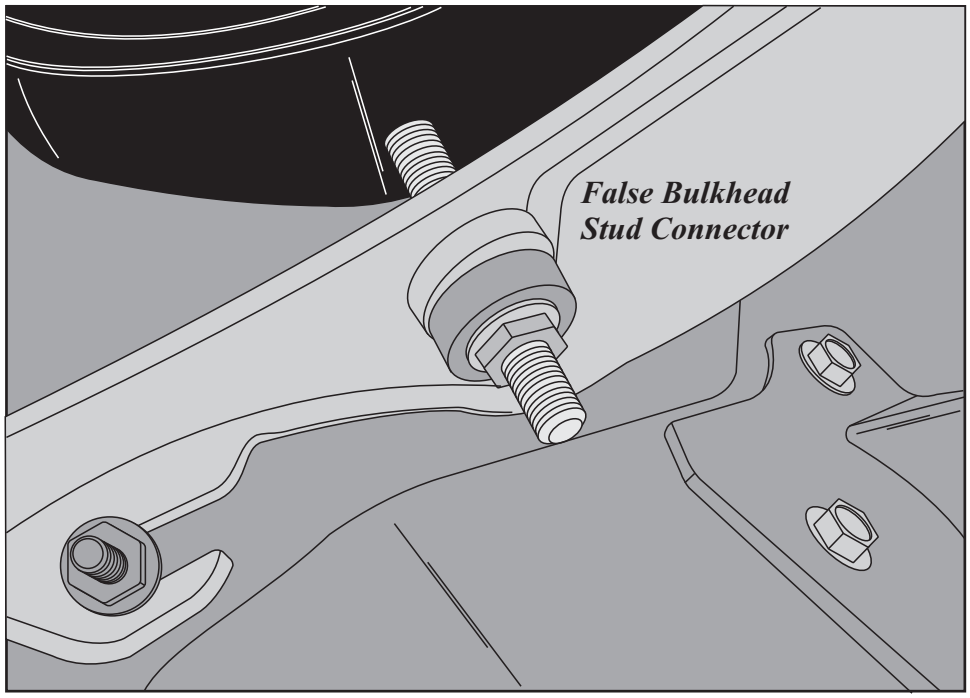
POOR 3-4 SHIFT- ERRATIC OPERATION - POSSIBLE P1722



False Bulkhead Stud Connector

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Figure 2



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Figure 3

BMW ZF6HP19- AUDI 09L
PRELIMINARY INFORMATION

The BMW ZF6HP19 and AUDI 09L AWD (2004&up) transmission is based on the ZF6HP26 that has been in existence since 2002. These transmissions were designed to be light weight and also have a lower torque capacity.

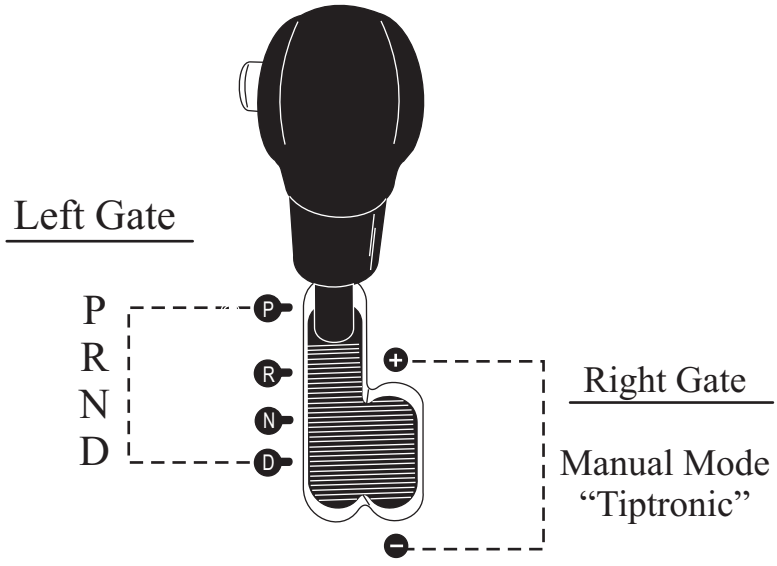
This Transmission features a Torque Converter with Lock-up Clutch, 3 driving clutches referred to as clutch A, B and E, 2 brake clutches referred to as clutch C and D, a Lepelletier Planetary Gear Train, and an internal Transmission Control module referred to as a Mechatronic Module.

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

Electrically and Hydraulically, this gear box is controlled by what is known as "The Mechatronic Module." This is a combination of a transmission control module and valve body configured as one unit. In other words, the computer for the transmission is mounted onto the valve body and is submerged in transmission fluid. As a result of this Mechatronic Module technology, the pass through case connector from the module to the vehicle harness will basically contain power, ground and CAN Bus network wiring, as well as inputs from the "Tiptronic" Shifter. The Mechatronic Module controls shift timing and shift feel based on inputs from the Engine Control Module, ABS, and the Driver Information Module via the CAN. Shift strategy is controlled by the Mechatronic Module based on shifter input. Figure 1 shows a typical shifter for an AUDI that provides information to the Mechatronic Module related to range selection. There are two gates on this shifter. The Left side provides Park, Reverse, Neutral and Drive selections. In the Drive position the Mechatronic Module incorporates "ASIS" Adaptive Shift Strategy for shift scheduling, shift feel and timing. On the Right side provides "Manual Mode Tiptronic" shifting, where gears will have to be manually selected.

The following pages provide information including a cross sectional view and component application chart, solenoid identification for BMW and AUDI models as well as valve body breakdowns and illustrations. Check ball and small parts function are also included as well as passage identification of the case oil circuits. ***Note:*** the following information is based on an AUDI valve body that has a manual valve. Some BMW have a "E" shift which does not incorporate a manual valve, which changes the valve body configuration.

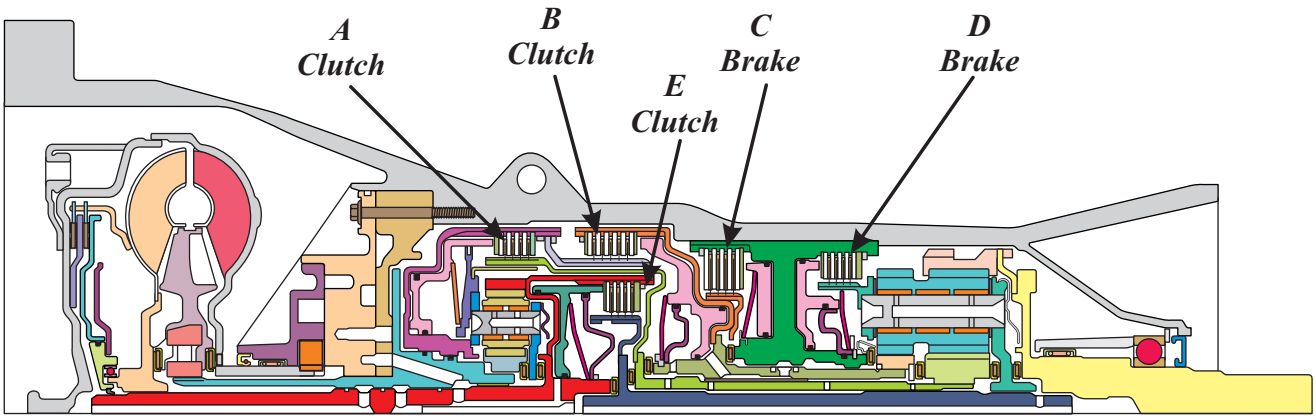
TYPICAL AUDI SHIFTER



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Figure 1

ZF6HP19
INTERNAL COMPONENT IDENTIFICATION AND LOCATION



COMPONENT APPLICATION CHART

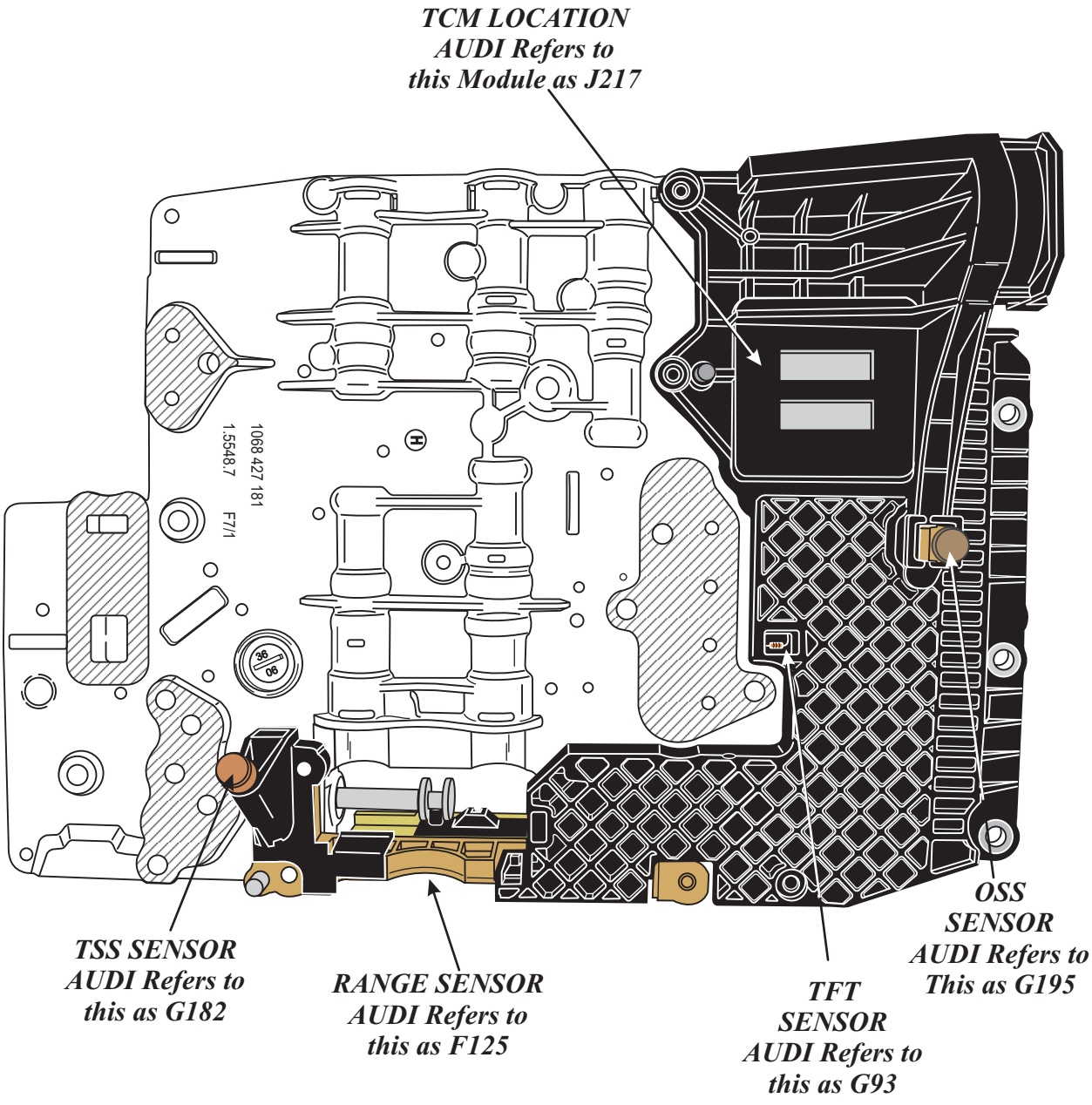
RANGE	A Clutch	B Clutch	E Clutch	C Brake	D Brake	Torq Conv Clutch	GEAR RATIO
Park					Applied		
Reverse		Applied			Applied		3.40
Neutral					Applied		
"D"-1st	Applied				Applied		4.17
"D"-2nd	Applied			Applied		Applied*	2.34
"D"-3rd	Applied	Applied				Applied*	1.52
"D"-4th	Applied		Applied			Applied*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

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

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Figure 2

TCM/MECHATRONIC MODULE LOCATED ON TOP OF VALVE BODY



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Figure 3

EXEDY





QUALITY APPRECIATION BY WORLD LEADING CAR MANUFACTURERS

FORD
Year 2002



FORD Certificate of Appreciation

GM
For the years 2000, 2002 & 2003



GM Best Supplier Award

HONDA
Year 2002



HONDA Quality & Delivery Performance Award

DAIMLER
Year 2009



DAIMLER (MERCEDES BENZ) Best Supplier Powertrain

TOYOTA
2 years consecutively



TOYOTA Safety Prize

NISSAN
Year 2002



NISSAN Quality Master Award

DAIHATSU
9 years consecutively



DAIHATSU Special Quality Awards

SUZUKI
Year 2002



SUZUKI Best Supplier Award

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NO.1 FOR POWERTRAIN PRODUCTS

DAIKIN CLUTCH

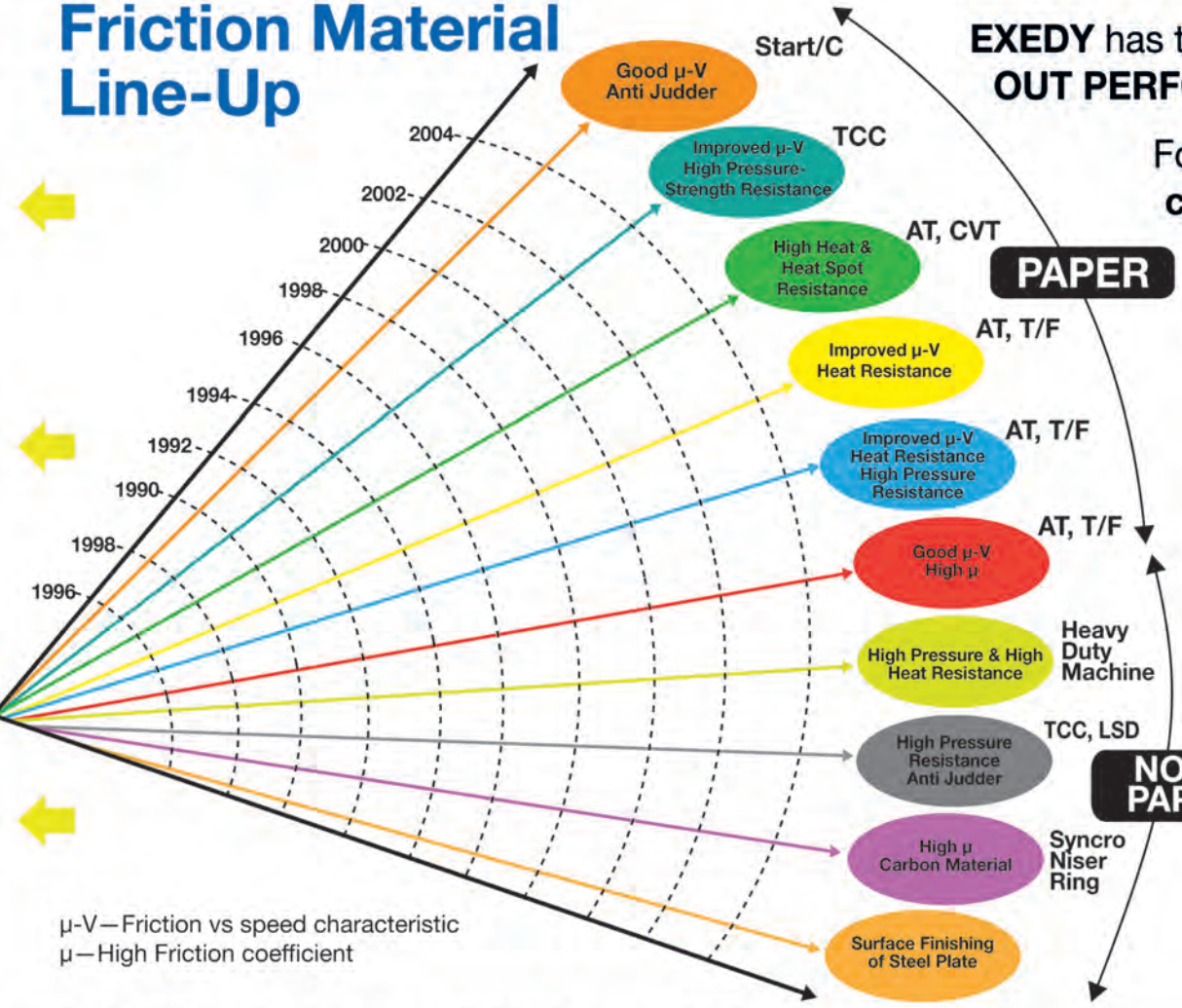
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Friction Material Line-Up



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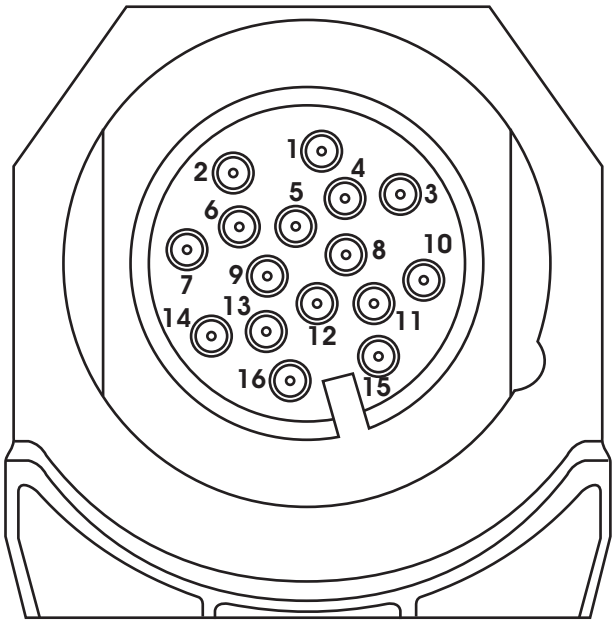
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CASE CONNECTOR TERMINAL FUNCTION



PIN #	DESCRIPTION AND FUNCTION
1	M-SHIFT INPUT (MANUAL SHIFT PROGRAM)
2	CAN LOW
3	K-LINE
4	(-) DOWNSHIFT INPUT
5	(+) DOWNSHIFT INPUT
6	CAN HIGH
7	CAN SCREEN (MODEL DEPENDENT)
8	OPTIONAL OUTPUT
9	IGNITION VOLTAGE
10	PARK NEUTRAL SIGNAL-PN
11	SHIFT LOCK
12	BRAKE LIGHT
13	GROUND
14	BATTERY VOLTAGE (KEEP ALIVE)
15	PARK NEUTRAL SIGNAL-PN (OPTIONAL)
16	GROUND

Note: Terminal I.D. is model dependent refer to a wiring diagram for the specific vehicle being repaired.

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Figure 4

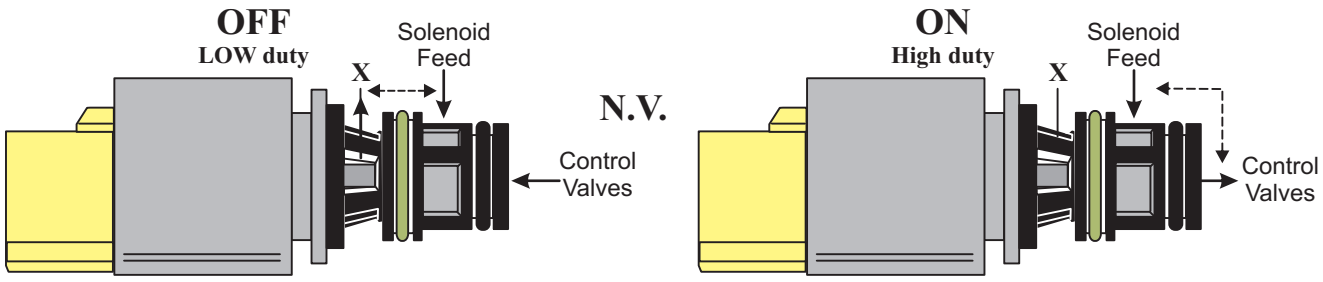
ZF6HP19 M-SHIFT SOLENOID CHECKS

MV-1 ON-OFF SOLENOID



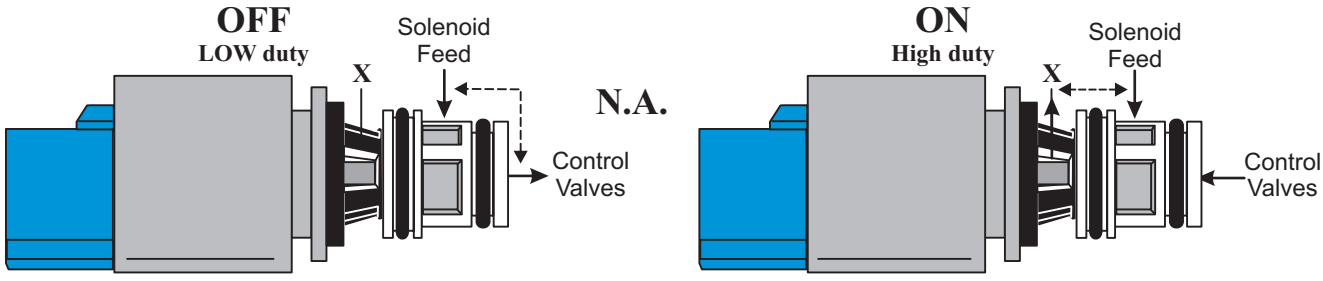
The MV-1 Solenoid is Normally closed. When the solenoid is OFF, pressure from the valves it is in control of are connected to the exhaust. When the Solenoid is ON, Solenoid Feed is connected thru the Solenoid to the valves it is in control of.

EDS 1, EDS 3, EDS 6 PRESSURE CONTROL SOLENOIDS



EDS 1, EDS3, EDS6 is are Normally Vented variable Pressure Control Solenoids. When the solenoids are OFF, or at Low Duty cycle, pressure from the valves they are in control of is connected to the exhaust. When the Solenoids are ON, or at High Duty cycle, Solenoid Feed is connected thru the Solenoid to the valves they are in control of.

EDS 2, EDS 4, EDS 5 PRESSURE CONTROL SOLENOIDS



EDS 2, EDS 4, EDS 5 is are Normally Applied variable Pressure Control Solenoids. When the Solenoids are OFF, or at Low Duty cycle, Solenoid Feed is connected thru the Solenoid to the valves they are in control of. When the solenoids are ON, or at High Duty cycle, pressure from the valves they are in control of are connected to the exhaust.

Figure 5

ZF6HP19 M-SHIFT SOLENOID SPECS

MV-1 ON-OFF SOLENOID

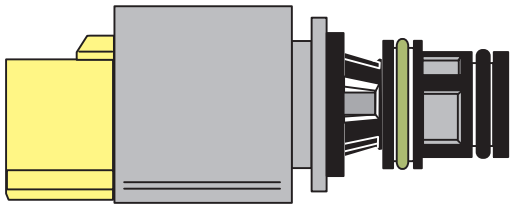
Resistance
Value 11-12 Ohms



Solenoid Output
Pressure Specs.
Off- 0psi
On- up to 87psi
(based on solenoid psi.)

EDS 1, EDS 3, EDS 6 PRESSURE CONTROL SOLENOIDS

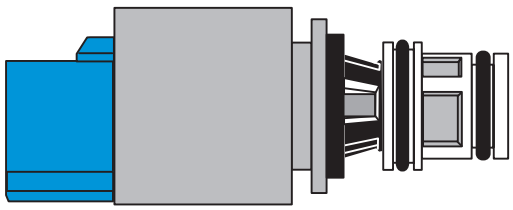
Resistance
Value 5-6 Ohms



Solenoid Output
Pressure Specs.
Off- 0psi
On- 66.71psi

EDS 2, EDS 4, EDS 5 PRESSURE CONTROL SOLENOIDS

Resistance
Value 5-6 Ohms



Solenoid Output
Pressure Specs.
Off- 66.71psi
On- 0psi

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Figure 6

SOLENOID APPLICATION CHART

RANGE (Component) *Solenoid type*	MV1 N88	EDS-1 N215 (A) *N.V.*	EDS-2 N216 (B) *N.A.*	EDS-3 N217 (C) *N.V.*	EDS-4 N218 (D/E) *N.A.*	EDS-5 N233 (LPS) *N.A.*	EDS-6 N371 (TCC) *N.V.*
Park					X	X*	
Reverse						X*	
Neutral					X	X*	
D 1st gear		X	X			X*	X**
D 2nd gear		X	X	X	X	X*	X**
D 3rd gear		X			X	X*	X**
D 4th gear	ON	X	X			X*	X**
D 5th gear	ON					X*	X**
D 6th gear	ON		X	X		X*	X**

Solenoid type = N.V. = Normally Vented N.A. = Normally applied

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

X* = Modulated by the TCM based on engine load and driving conditions for Line pressure control.

X = TCC Modulated by the TCM based on engine load and driving conditions.**
TCC On- Solenoid at high duty cycle app. 600-700mA
TCC Off- Solenoid at Low duty cycle app. 100 mA
Note: TCC can also be partially on between upshifts duty cycle is approximately 300-400mA in these conditions

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Figure 7

UPPER VALVE BODY RETAINER AND SMALL PART LOCATIONS

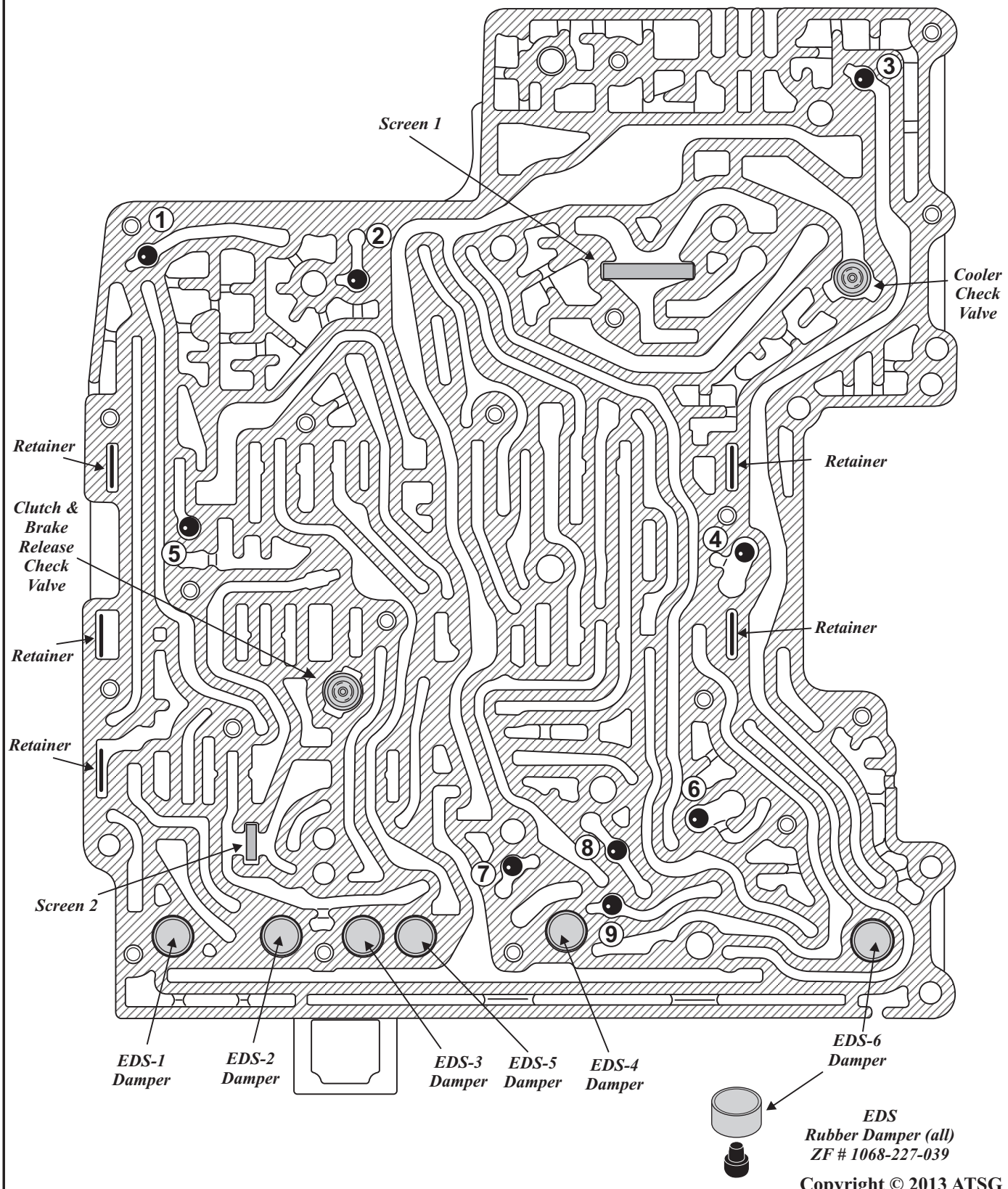


Figure 8

CHECK BALL, SCREEN, AND CHECK VALVE FUNCTION

Check Ball ① In the "A" Clutch Apply/Release Circuit
Check Ball ② In the "E" Clutch Apply/Release Circuit
Check Ball ③ Orifice Ball Line from Manual Valve to KV-B (Reverse)
Check Ball ④ Forward-Reverse Shuttle Ball
Check Ball ⑤ Orifice Ball Line from Manual Valve to KV-A (Forward)
Check Ball ⑥ SV1-SV2 Shuttle Ball
Check Ball ⑦ In the "B" Clutch Apply/Release Circuit
Check Ball ⑧ In the "D1" Brake Apply/Release Circuit
Check Ball ⑨ In the "C" Brake Apply/Release Circuit

Screen 1 - Filters Line pressure from the Pressure Regulator Valve to the Converter Pressure Valve and the Lubrication Valve

Screen 2 - Filters pressure fed to the B Clutch

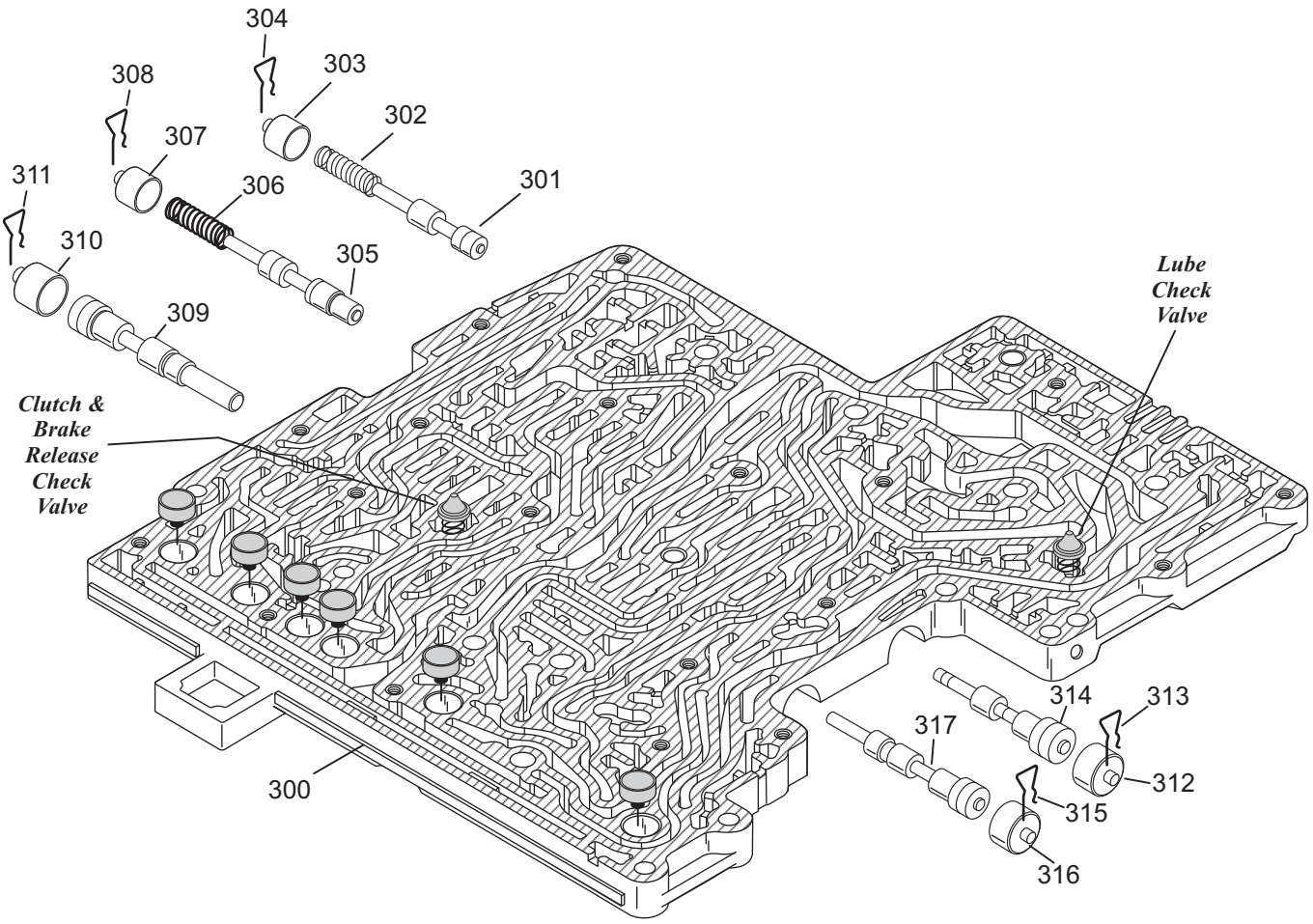
Cooler Check Valve- Connected to the TCC Release and Cooler circuit

Clutch Release Check Valve- Meters Clutch and Brake release

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Figure 9

UPPER VALVE BODY



LEGEND FOR UPPER VALVE BODY

300 UPPER VALVE BODY CASTING.
301 HOLDING VALVE D2
302 HOLDING VALVE D2 SPRING
303 BORE PLUG
304 RETAINER
305 CLUTCH VALVE- BRAKE D2
306 CLUTCH VALVE- BRAKE D2 SPRING
307 BORE PLUG
308 RETAINER
309 CLUTCH VALVE- CLUTCH B
310 BORE PLUG
311 RETAINER
312 BORE PLUG
313 RETAINER
314 CLUTCH VALVE- BRAKE D1
315 RETAINER
316 BORE PLUG
317 CLUTCH VALVE- BRAKE C

NOTE: Some valve bodies may or may not have springs behind some of the valve line-ups shown above

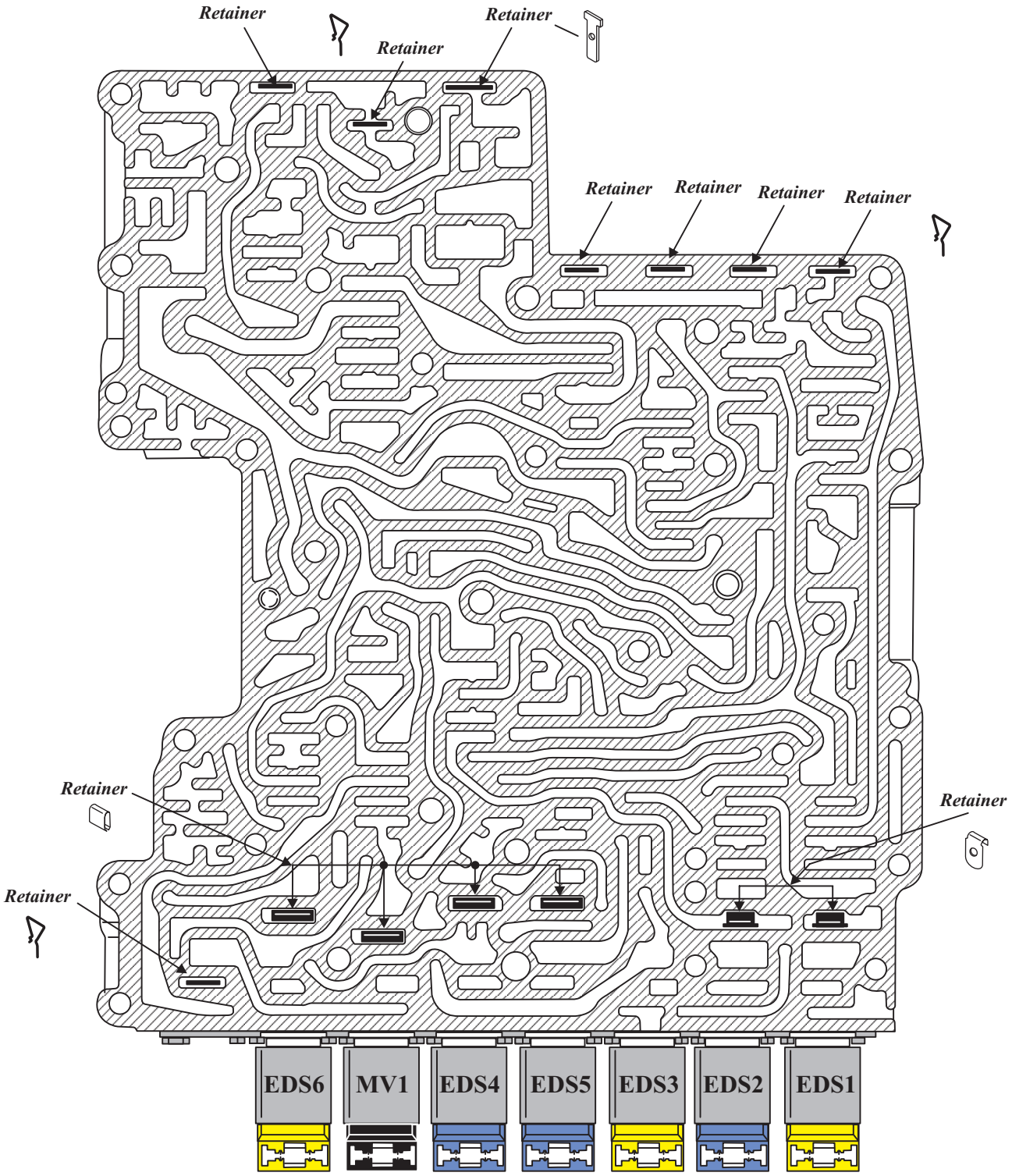
UPPER VALVE BODY SPRING SPECIFICATIONS

SPRING NUMBER 302	SPRING NUMBER 306
Free Length = 1.535"	Free Length = 1.550"
Spring Diameter = .352"	Spring Diameter = .403"
Wire Diameter = .022"	Wire Diameter = .042"
Approx Coils = 13	Approx Coils = 15
Color = (NONE)	Color = (NONE)

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Figure 10

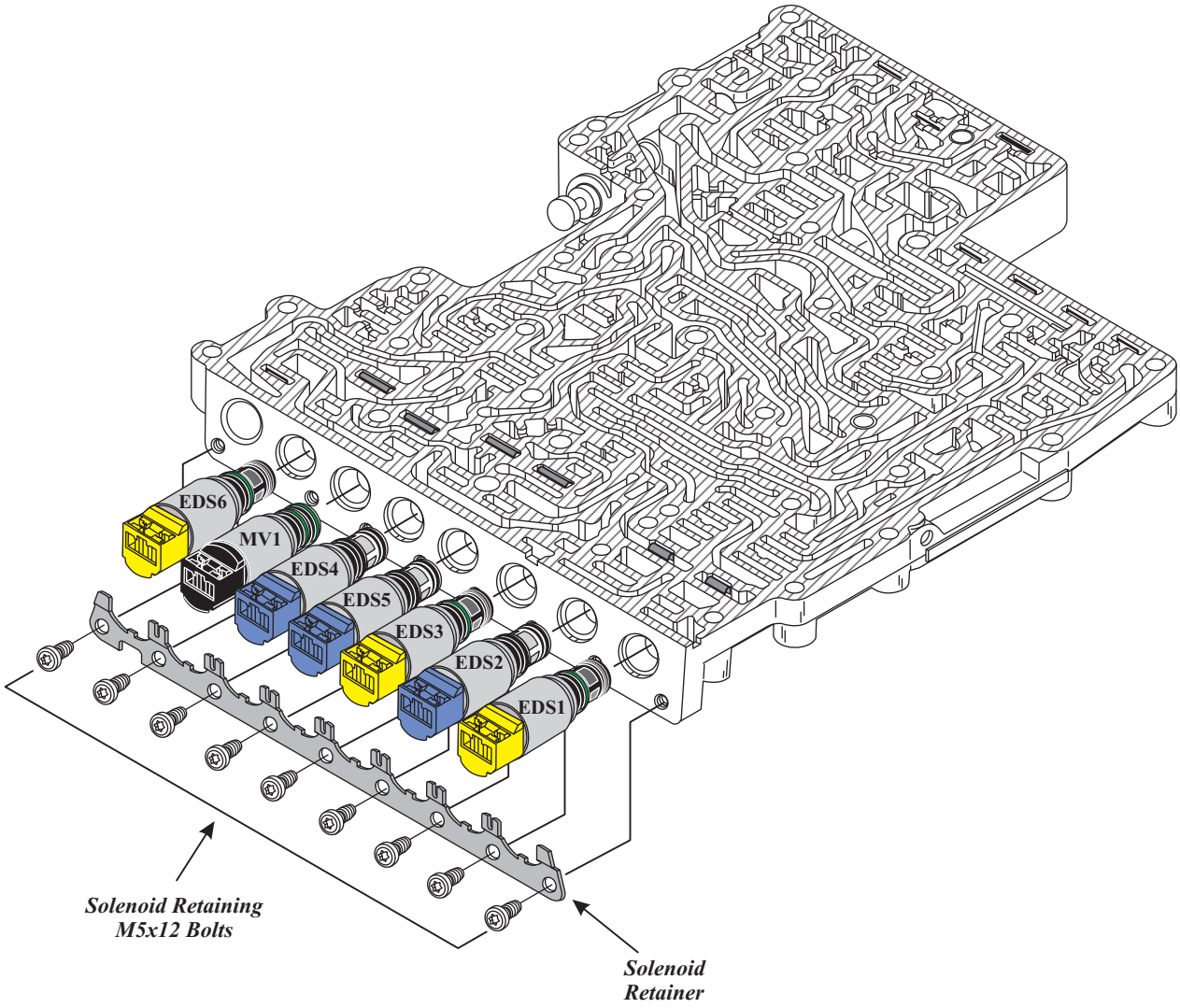
LOWER VALVE BODY RETAINER LOCATIONS



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Figure 11

SOLENOID I.D. AND RETAINER LOCATION



SOLENOID I.D. NOMENCLATURE

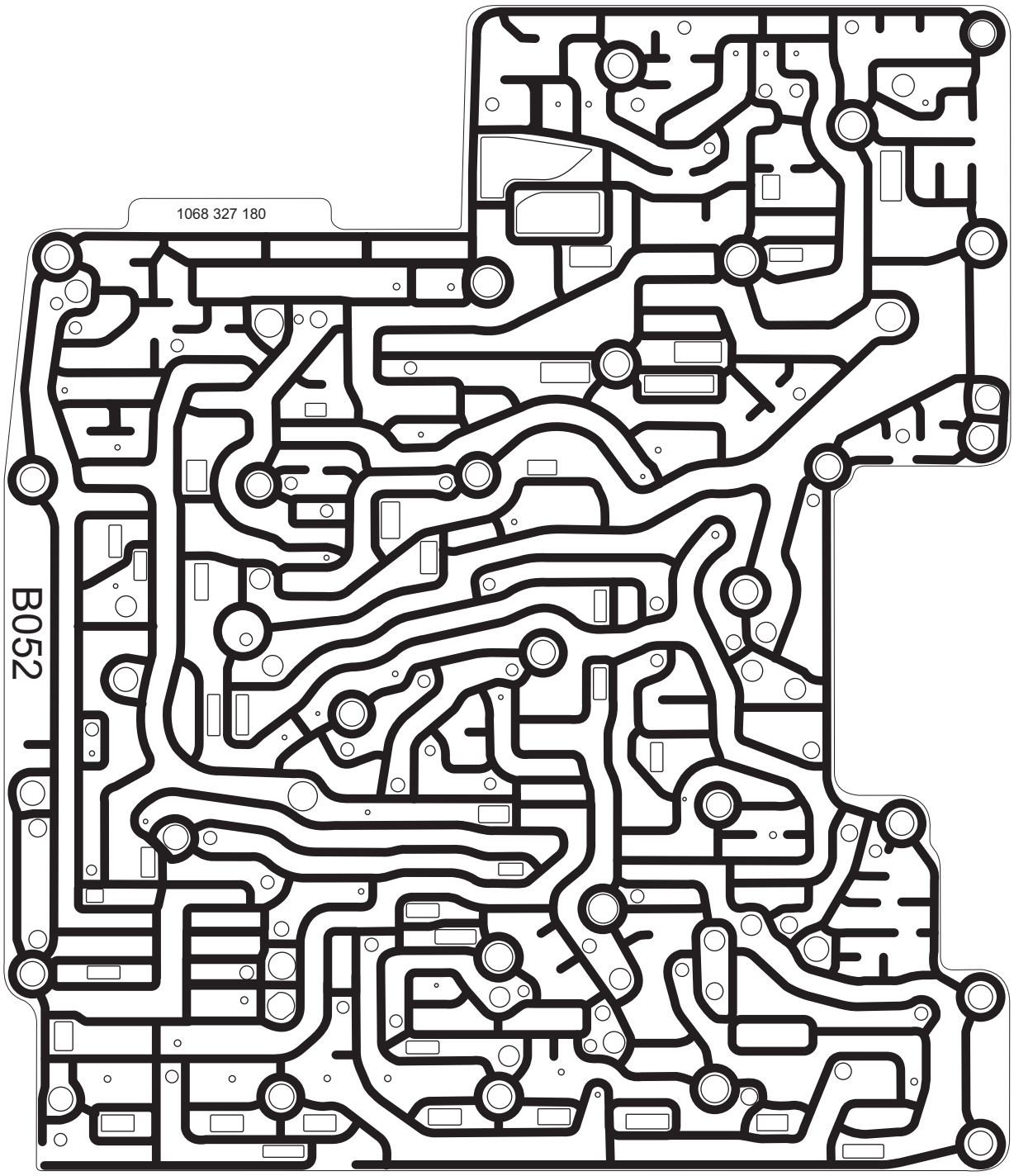
BMW	AUDI
EDS-1	N215
EDS-2	N216
EDS-3	N217
EDS-4	N218
EDS-5	N233
EDS-6	N371
MV1	N88

Note: Valve Body Shown above is for Manual Valve type.
"E" Shift models have a solenoid configuration that is not the same.

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Figure 12

SPACER PLATE

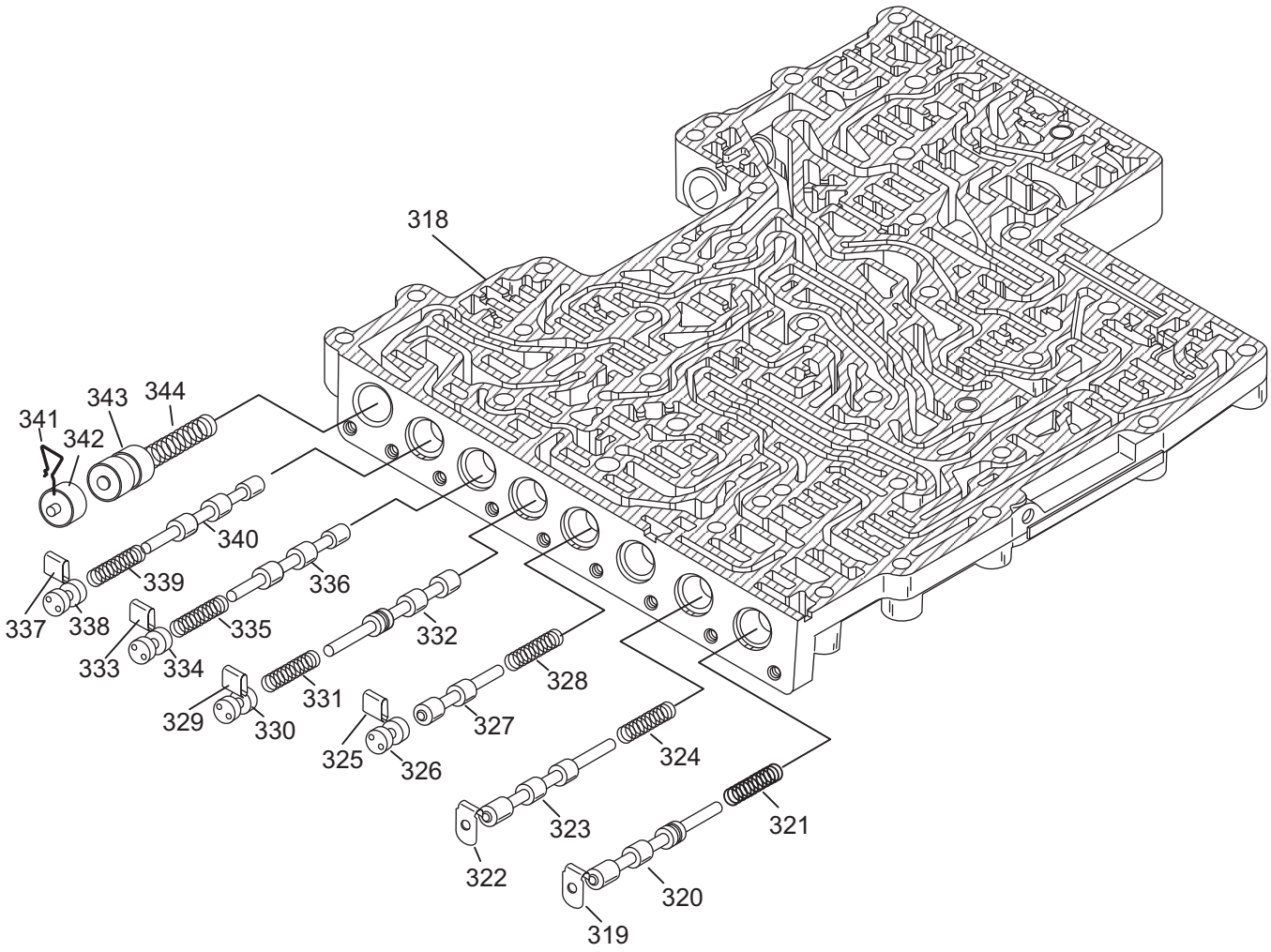


Note: the Spacer Plate is aluminum with a rubber beaded coating which acts as a gasket. This plate is commonly replaced as the coating will come off of the aluminum plate.

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Figure 13

LOWER VALVE BODY REAR SIDE



LEGEND FOR LOWER VALVE BODY REAR SIDE

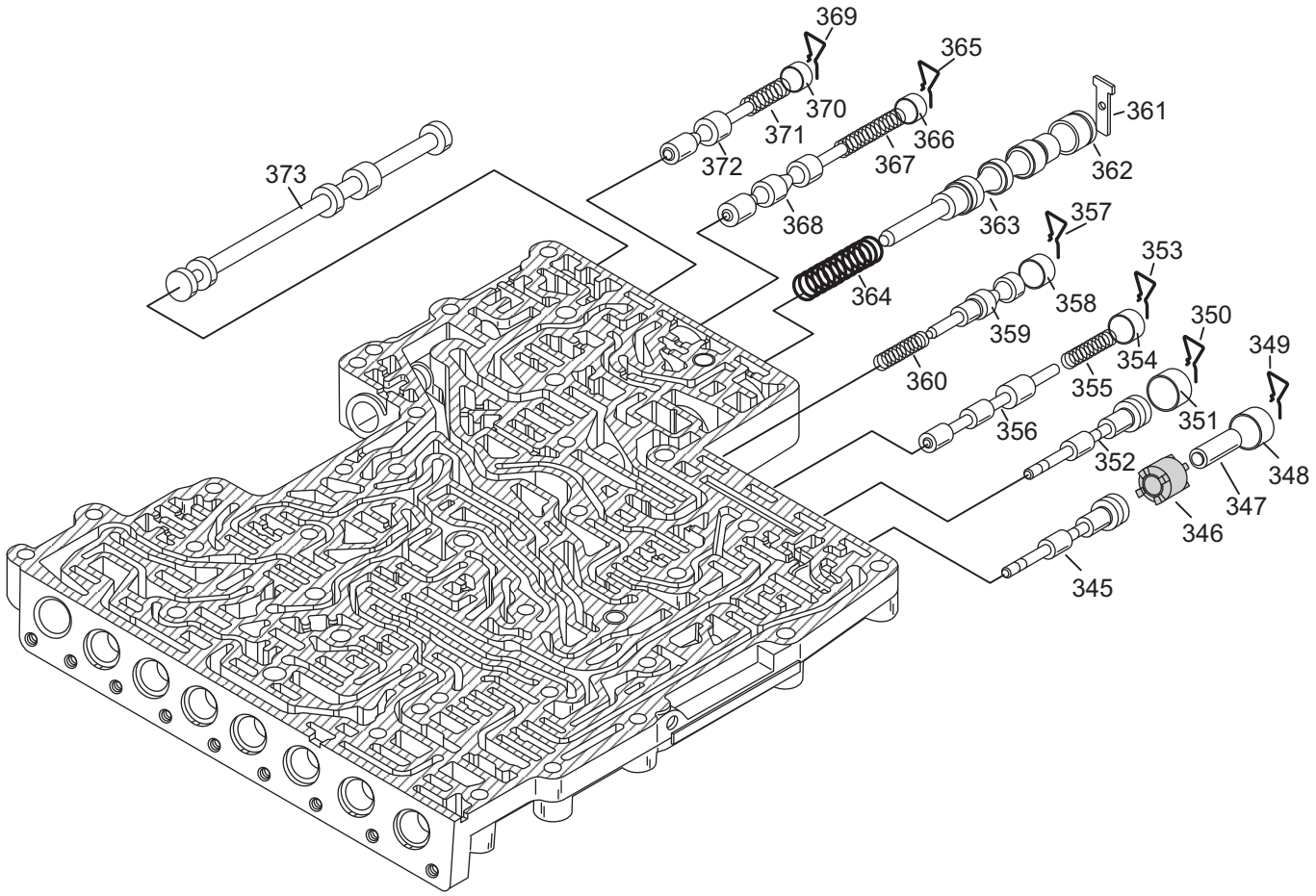
318 LOWER VALVE BODY CASTING.
319 RETAINER
320 CLUTCH "A" RETAINING VALVE (HV-A)
321 CLUTCH "A" RETAINING VALVE (HV-A) SPRING
322 RETAINER
323 CLUTCH "B" RETAINING VALVE (HV-B)
324 CLUTCH "B" RETAINING VALVE (HV-B) SPRING
325 RETAINER
326 BORE PLUG
327 PRESSURE REDUCING VALVE (Dr.Red-V)
328 PRESSURE REDUCING VALVE (Dr.Red-V) SPRING
329 RETAINER
330 BORE PLUG
331 BRAKE "D" RETAINING VALVE (HV-D) SPRING
332 BRAKE "D" RETAINING VALVE (HV-D)
333 RETAINER
334 BORE PLUG
335 SHIFT VALVE 1 SPRING
336 SHIFT VALVE 1
337 RETAINER
338 BORE PLUG
339 SHIFT VALVE 2 SPRING
340 SHIFT VALVE 2
341 RETAINER
342 BORE PLUG
343 MV1 ACCUMULATOR PISTON
344 MV1 ACCUMULATOR PISTON SPRING

See Figure 16 for Spring Specifications

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Figure 14

LOWER VALVE BODY FRONT SIDE



LEGEND FOR LOWER VALVE BODY FRONT SIDE

345 CLUTCH VALVE "A" (KV-A)
346 CLUTCH VALVE "A" SLEEVE (KV-A)
347 CLUTCH VALVE "A" PLUG (KV-A)
348 BORE PLUG
349 RETAINER
350 RETAINER
351 BORE PLUG
352 CLUTCH VALVE "E" (KV-E)
353 RETAINER
354 BORE PLUG
355 CLUTCH "E" RETAINING VALVE SPRING (HV-E)
356 CLUTCH "E" RETAINING VALVE (HV-E)
357 RETAINER
358 BORE PLUG
359 CONVERTER CLUTCH VALVE (WK-V)
360 CONVERTER CLUTCH VALVE SPRING (WK-V)
361 RETAINER
362 MAIN PRESSURE REGULATOR SLEEVE (SYS.DR.-V)
363 MAIN PRESSURE REGULATOR VALVE (SYS.DR.-V)
364 MAIN PRESSURE REGULATOR SPRING (SYS.DR.-V)
365 RETAINER
366 BORE PLUG
367 CONVERTER PRESSURE VALVE SPRING (WD-V)
368 CONVERTER PRESSURE VALVE (WD-V)
369 RETAINER
370 BORE PLUG
371 LUBRICATING VALVE SPRING (SCHM.-V)
372 LUBRICATION VALVE (SCHM.-V)
373 MANUAL VALVE

NOTE: Some valve bodies may or may not have springs behind some of the valve line-ups shown above

See Figure 16 for Spring Specifications

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Figure 15

LOWER VALVE BODY REAR SIDE SPRING SPECIFICATIONS

SPRING NUMBER 321
Free Length = 1.475"
Spring Diameter = .382"
Wire Diameter = .043"
Approx Coils = 13
Color = (NONE)

SPRING NUMBER 324
Free Length = 1.485"
Spring Diameter = .382"
Wire Diameter = .043"
Approx Coils = 13
Color = (NONE)

SPRING NUMBER 328
Free Length = 1.675"
Spring Diameter = .358"
Wire Diameter = .043"
Approx Coils = 15
Color = (NONE)

SPRING NUMBER 331
Free Length = 1.480"
Spring Diameter = .382"
Wire Diameter = .043"
Approx Coils = 13
Color = (NONE)

SPRING NUMBER 335
Free Length = 1.290"
Spring Diameter = .400"
Wire Diameter = .027"
Approx Coils = 10
Color = (NONE)

SPRING NUMBER 339
Free Length = 1.290"
Spring Diameter = .400"
Wire Diameter = .027"
Approx Coils = 10
Color = (NONE)

SPRING NUMBER 339
Free Length = 2.920"
Spring Diameter = .445"
Wire Diameter = .049"
Approx Coils = 23.5
Color = (NONE)

LOWER VALVE BODY FRONT SIDE SPRING SPECIFICATIONS

SPRING NUMBER 355
Free Length = 1.570"
Spring Diameter = .406"
Wire Diameter = .043"
Approx Coils = 15
Color = (NONE)

SPRING NUMBER 360
Free Length = 1.310"
Spring Diameter = .340"
Wire Diameter = .033"
Approx Coils = 12.5
Color = (NONE)

SPRING NUMBER 364
Free Length = 2.235"
Spring Diameter = .515"
Wire Diameter = .055"
Approx Coils = 12
Color = (NONE)

SPRING NUMBER 367
Free Length = 1.660"
Spring Diameter = .454"
Wire Diameter = .035"
Approx Coils = 15
Color = (NONE)

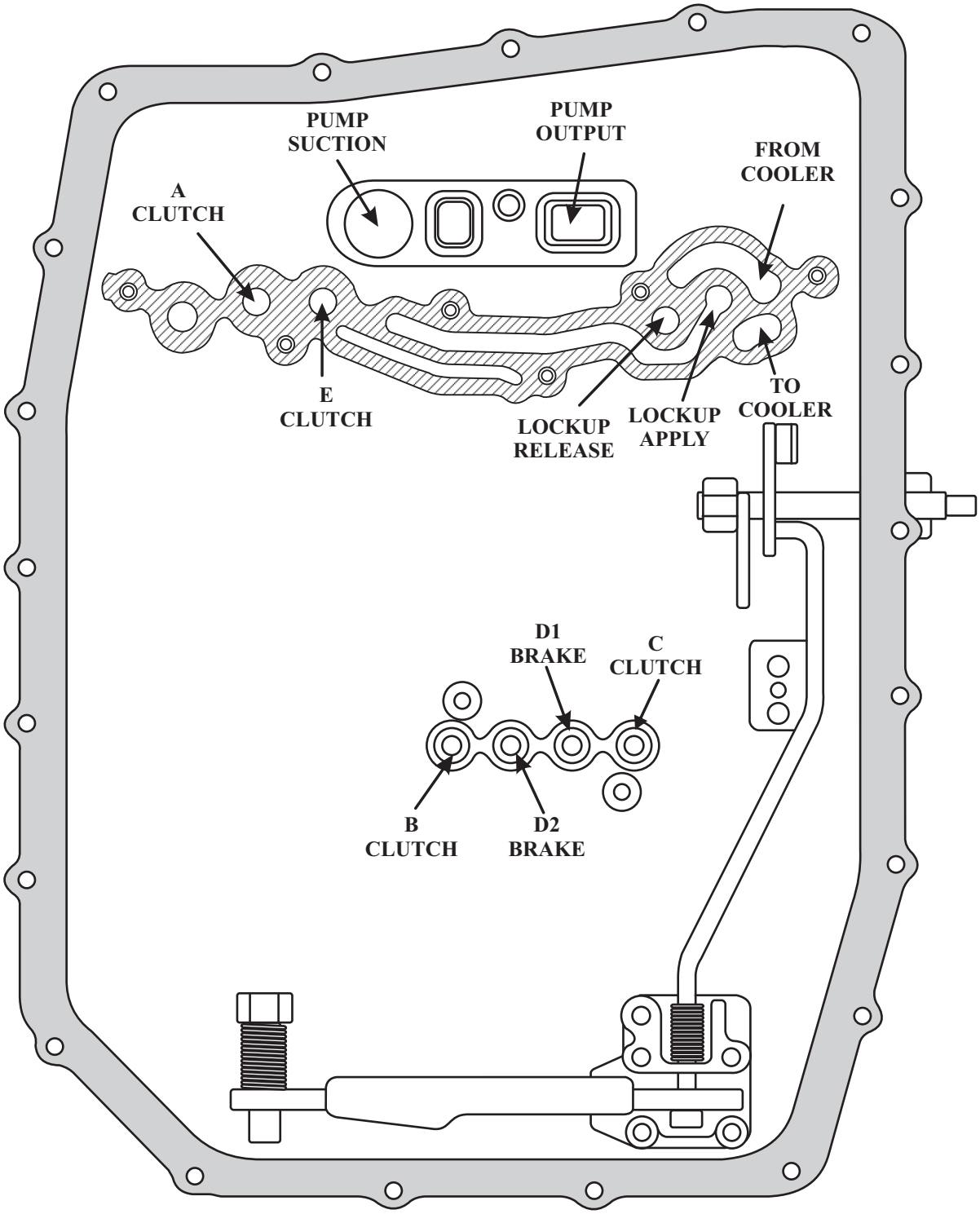
SPRING NUMBER 371
Free Length = 1.143"
Spring Diameter = .486"
Wire Diameter = .046"
Approx Coils = 9
Color = (NONE)

Note: Spring specifications are model dependant and are not all the same

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Figure 16

6HP AIR CHECK AND CASE PASSAGE IDENTIFICATION



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Figure 17

BMW ZF6HP19
NEUTRAL IDLE CONTROL FAILURE

COMPLAINT: Several BMW models such as the 335i, 528i, 535i and X5 vehicles with the ZF6HP19 transmission may experience a delayed engagement and/or a harsh take off from a stop during the engine warm-up phase (cold engine), and cannot be reproduced in the Sport Mode.

CAUSE: There is an unfavorable Neutral Idle Control (NIC) calibration issue in the EGS software controlling the A clutch apply and release.

CORRECTION: To verify the vehicle in question qualifies for a reprogram and recode check the vehicles integration level.

Integration levels for E90, E92 and E93 models (335i), anything E89x-09-03-520 or lower will require reprogramming and recoding.

Integration levels for E60 N52K models (528i), anything E060-09-03-530 or lower will require reprogramming and recoding.

Integration levels for E60/61 N54 models (535i), anything E060-09-03-530 or lower will require reprogramming and recoding.

Integration levels for E70 N54 models (X5), anything E070-09-03-530 or lower will require reprogramming and recoding.

SERVICE INFORMATION:

BMW issued a defect code 24 00 33 98 00 for vehicles that were covered under a New Vehicle Limited Warranty or the Certified Pre-Owned Program.

AUDI ZF6HP19FLA
VIBRATIONS ON TURNS

COMPLAINT: Vehicles equipped with a ZF6HP19 (09L) transmission may experience complaints from the vehicle owner of vibrations, humming noise or rubbing noise from the drivetrain when driving slowly around tight turns. Especially so when the steering wheel is at a full lock turn. Note: Light vibrations at full steering wheel lock is normal.

CAUSE: The ability for the additives in the differential fluid that allow the friction to slip reduces with wear. This scenario provides an environment that can cause the friction plates and worm wheel teeth in the center differential to be subject to wear. This then changes the friction and locking values in the center differential causing the vibration noise complaints from the drivetrain.

CORRECTION: First make an inspection of the fluid level and condition. If the fluid level is low and/or has metal shavings or any other sign of damage the center differential will need to be inspected for excessive wear. Repair as necessary and restore fluid retention. .

If the fluid level is correct and the condition does not indicate internal damage, changing the fluid may be all that is needed to resolve the concern. Since the center differential does not have a drain plug, the cover will need to be removed just far enough to drain the oil. Reassemble and fill with new oil.

Drive the vehicle making many turns until the gearbox has reached 80º C at which time renew your assessment of any vibrations. If the vibrations have been reduced to normal the problem is resolved. Otherwise the center differential and/or friction plates may require servicing.

SERVICE INFORMATION:

New Center Differential Fluid Part #.....G 055 145 A2

AUDI 09L -ZF6HP19A
GEAR NOISE-TRANSFER CASE GEARTRAIN FAILURE

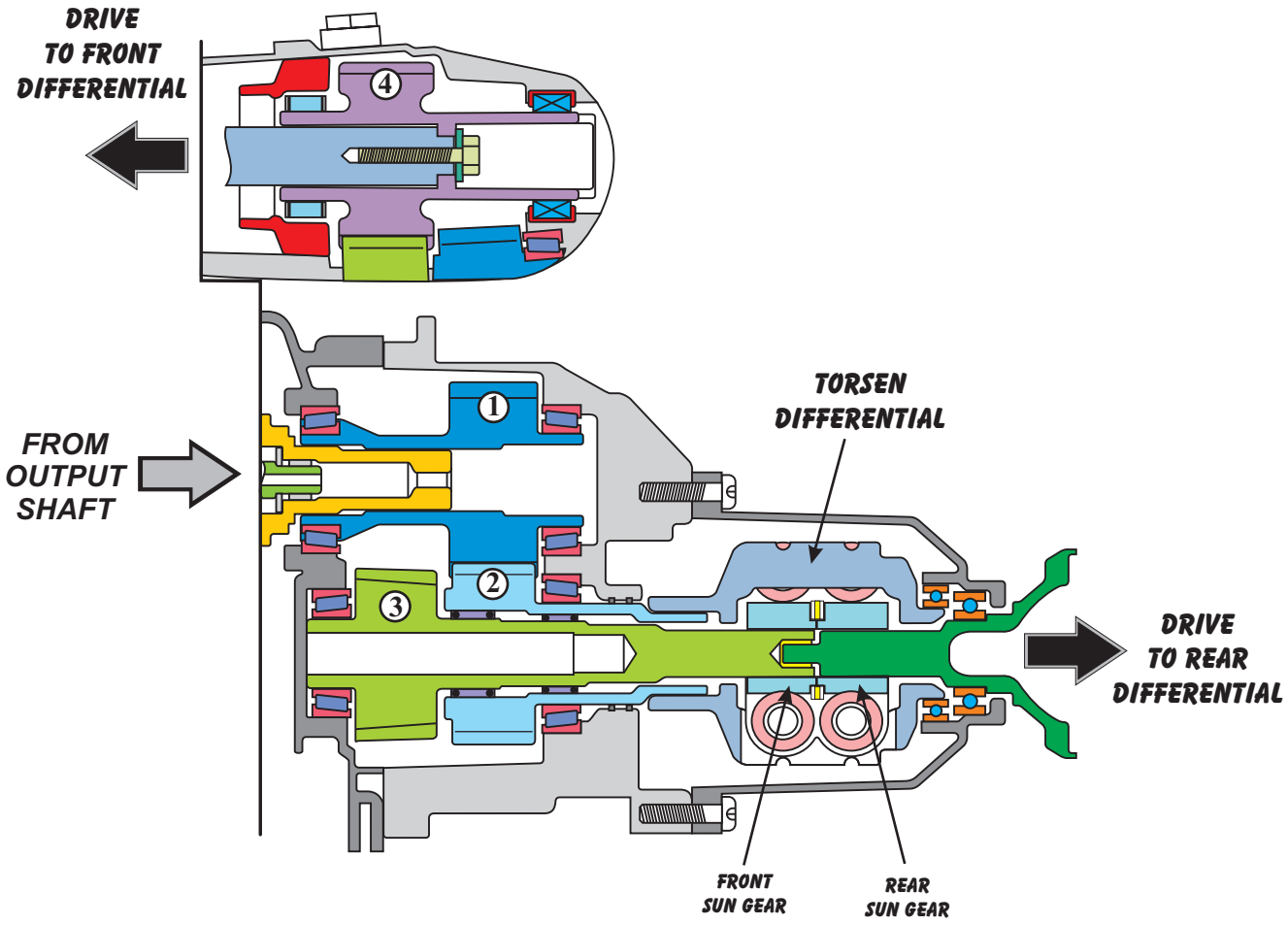
COMPLAINT: 2004 and up Audi vehicles equipped with the 09L All Wheel Drive transmission may exhibit a complaint of a gear mesh noise after overhaul. This noise if not caught quick enough will lead to transfer case geartrain failure.

CAUSE: The cause may be, that during transmission overhaul, the Drive transfer gear, connected to the output shaft of the transmission was installed backwards, meshing with the Driven transfer gear, connected to the Torsen Differential, leading to the Front Drive Shaft drive gear. When this gear is installed backwards, the gear mesh is off significantly causing the gear noise. Notice in Figure 1 in the cross-sectional view that gear 3 has a smaller diameter than gear 2, which creates the gear mesh problem and gear train destruction. Figure 1 also shows the gear train of the transfer case assembly including the Torsen Differential. Refer to Figures 2 and 3 for a description of power-flow and illustrations of the correct and in-correct assembly.

CORRECTION: To correct this condition, refer to Figure 2 for an illustration of the correct placement of the Drive transfer gear. Repair or replace gear train as necessary.

Special Thanks to:
Erikson Industries
800-388-4418

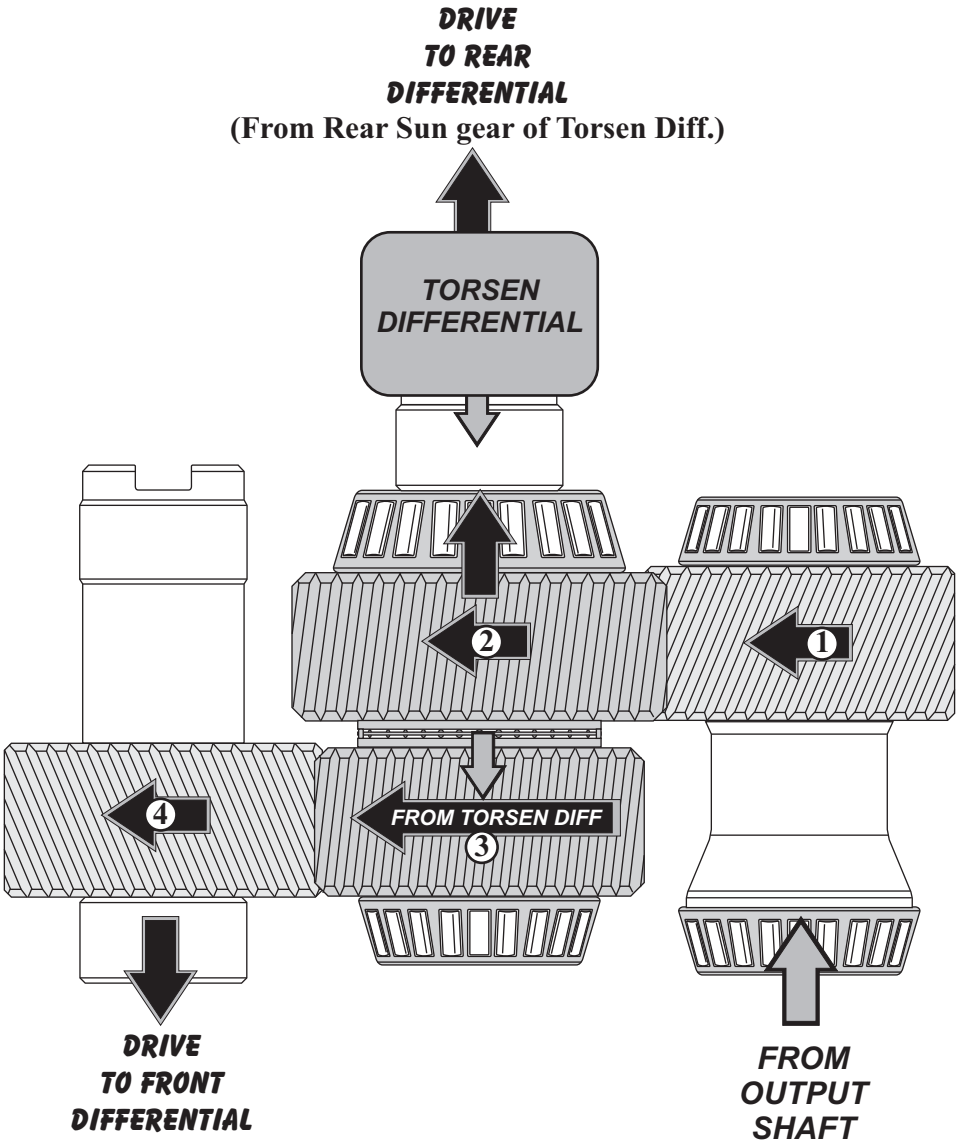
09L TRANSFER CASE CROSS-SECTIONAL VIEW



Drive Gear ① is connected to the Output shaft of the Transmission
Driven Gear ② is connected to the Outer Spline - Carrier of the Torsen Differential
Driven Gear ③ is connected to the Inner Spline- Front sun gear of the Torsen Differential
Driven Gear ④ is connected to the Front Drive shaft

Figure 1

09L TRANSFER CASE- "CORRECT ASSEMBLY"

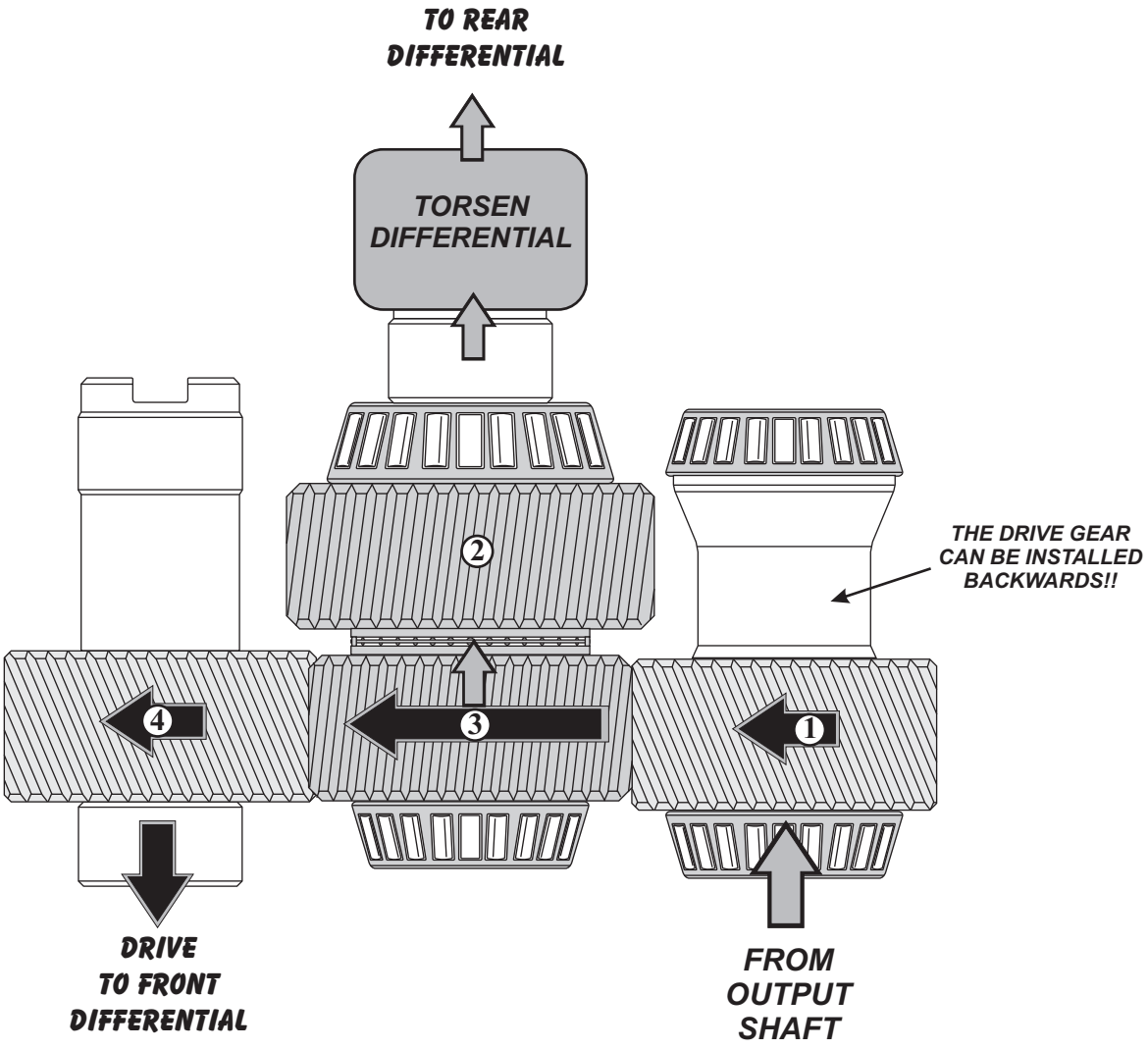


Drive Gear ① is connected to the Output shaft of the Transmission
Driven Gear ② is connected to the Outer Spline - Carrier of the Torsen Differential
Driven Gear ③ is connected to the Inner Spline- Front sun gear of the Torsen Differential
Driven Gear ④ is connected to the Front Drive shaft

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Figure 2

09L TRANSFER CASE- "IN-CORRECT ASSEMBLY"



Drive Gear ① is connected to the Output shaft of the Transmission

Driven Gear ③ is connected to the Inner Spline of the Torsen Differential

Driven Gear ④ is connected to the Front Drive shaft

Driven Gear ② is connected to the Outer Spline of the Torsen Differential but is not driven by the correct geartrain.

NOTE: Drive Gear 1 can be installed backwards, as the tapered bearing is the same on both ends. Notice that Gear 2 and 3 have different diameters, this is what causes the gear noise, and will quickly destroy the gear set.

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Figure 3

BMW ZF6HP26/19 "E" SHIFT
DTC 507B STAYS IN PARK

COMPLAINT: 2002 and up BMW vehicles equipped with the ZF6HP26 and or the ZF6HP19, equipped with the "E" Shift, may have a complaint of a Diagnostic Trouble Code of 507B Parking gear sensor implausible, typically after overhaul. The technician observed the gear shift position indicator lamps go from park to neutral to drive and then it immediately returned to park as shown in Figure 1.

CAUSE: The cause may be that the linkage arm that houses the emergency park release cable is bent not allowing the linkage to fully move towards the rear of the case to release the park rod, which causes the DTC 507B and the shifter to go directly back into Park.

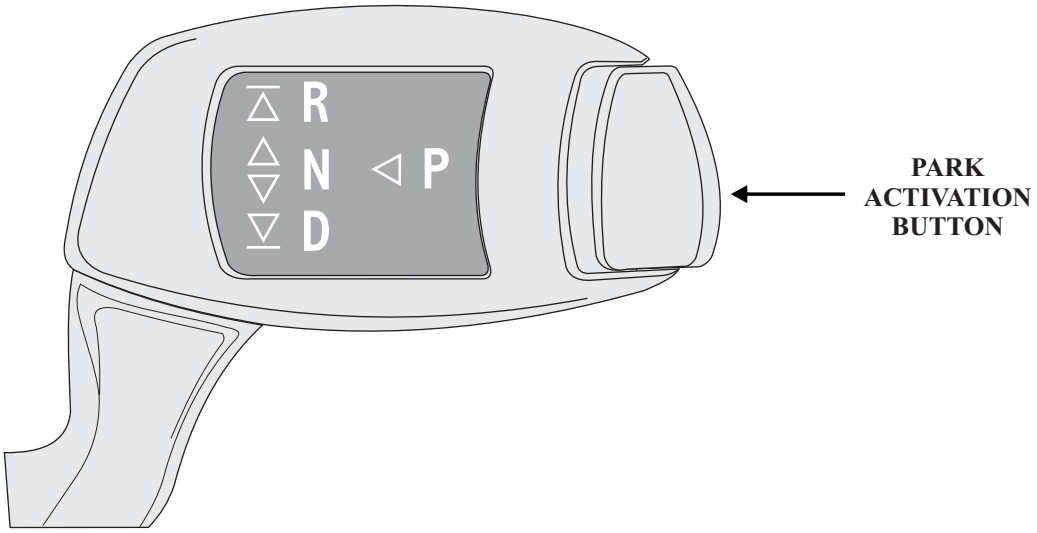
Description of operation: The "E" Shift does not have a manual valve, it has a rod that is actuated by solenoids which moves the internal linkage to engage and disengage park as well as other gear selection. There is a pre-loaded barrel spring mounted on a rotating lever that operates the park rod with the tension of the spring pushing the lever and rod into the park position. To release park, the MV3 and MV2 solenoids are energized.

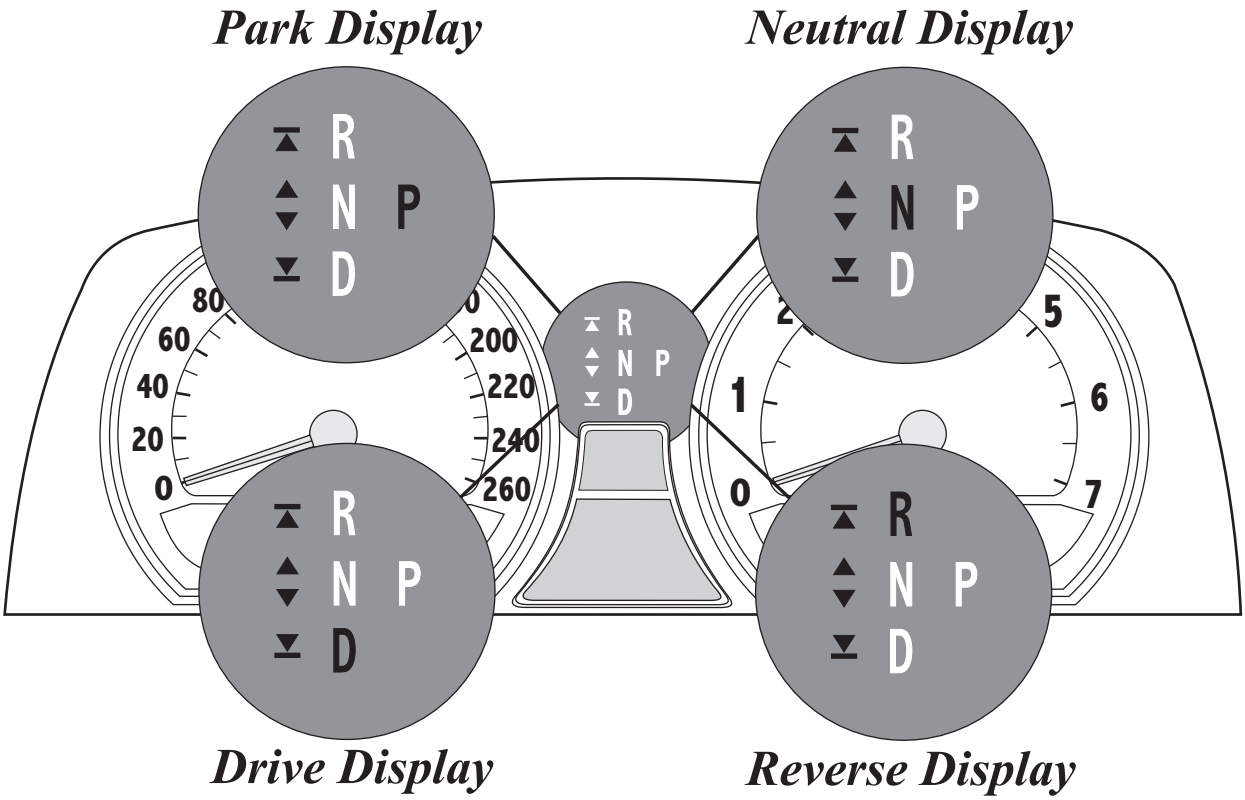
The MV3 Solenoid is mounted on the back side of the park lock cylinder which is on the valve body, as shown in Figure 2. Inside the cylinder there is a piston which connects to the rotating lever. When the MV3 Solenoid is OFF, a shaft extends out from the solenoid, pushing the rear of the piston and lever into the park position. When a command is requested to release park, the MV3 Solenoid is energized and the shaft retracts. At this time the MV2 Solenoid is also energized and it supplies fluid pressure to a chamber inside the front area of the cylinder which pushes the piston, rotating lever and park rod into the released position, as shown in Figure 3.

CORRECTION: To correct this condition, remove the protective cover that houses the emergency park release cable and on a suitable lift, select Drive or Reverse, watching to ensure the free movement of the linkage arm. ***Note:*** the cable should not impede the movement of the linkage arm, if it does, repair or replace the linkage arm so that it travels freely over the stationary cable, as shown in Figure 4.

Special Thanks to Dino Lee Myles NY

SELECTOR LEVER



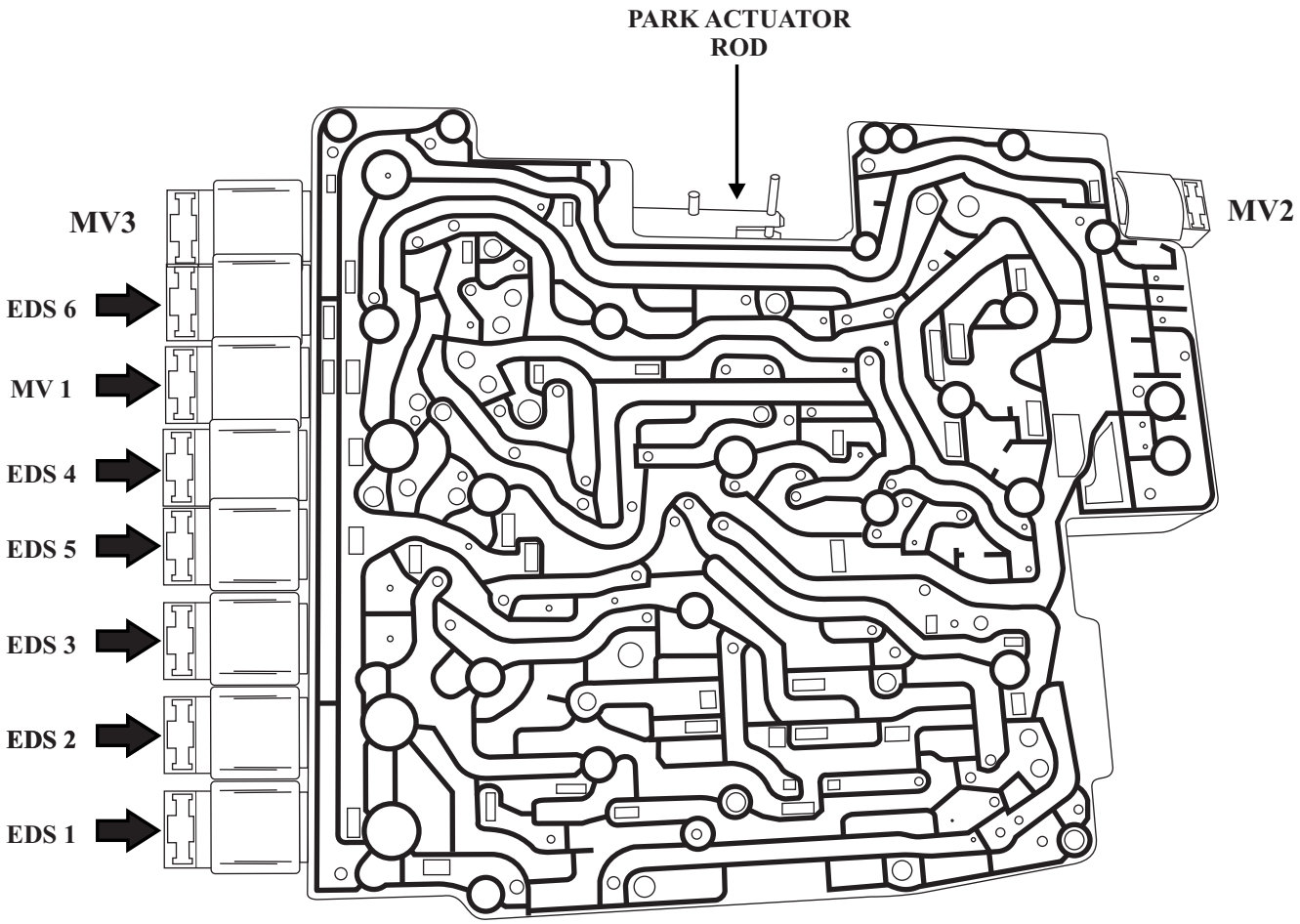


When Reverse or Drive is selected, the D or R lamp will light for a second then go right back into Park

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Figure 1

SOLENOID LOCATION

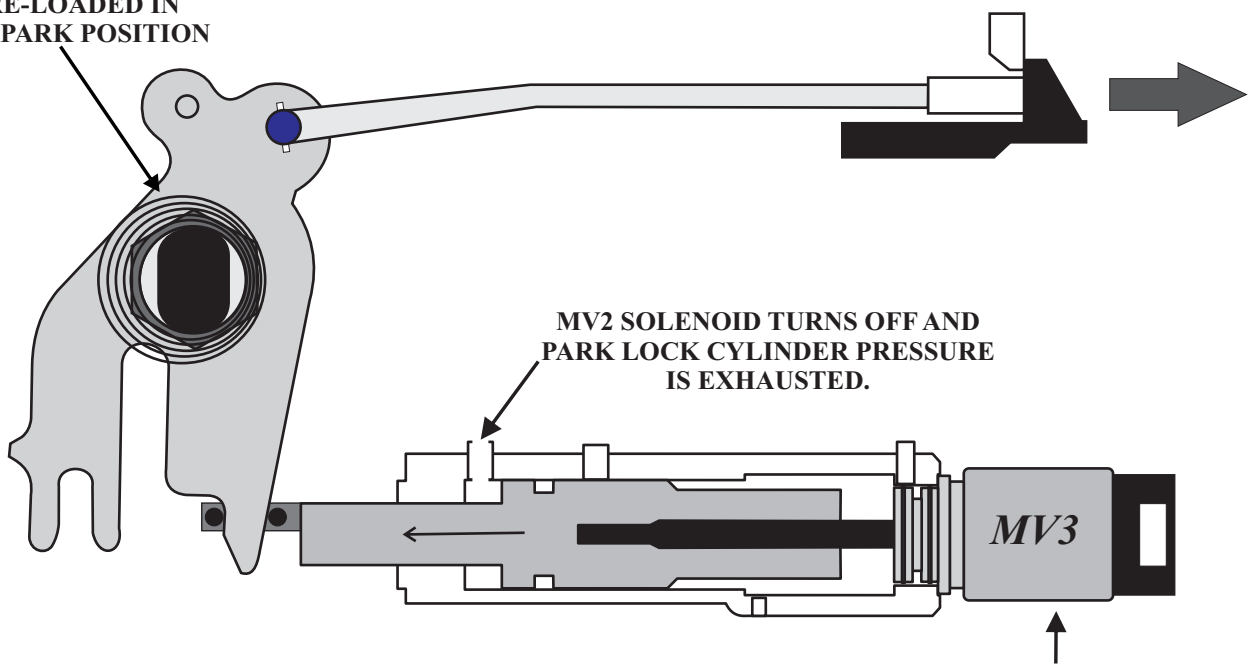


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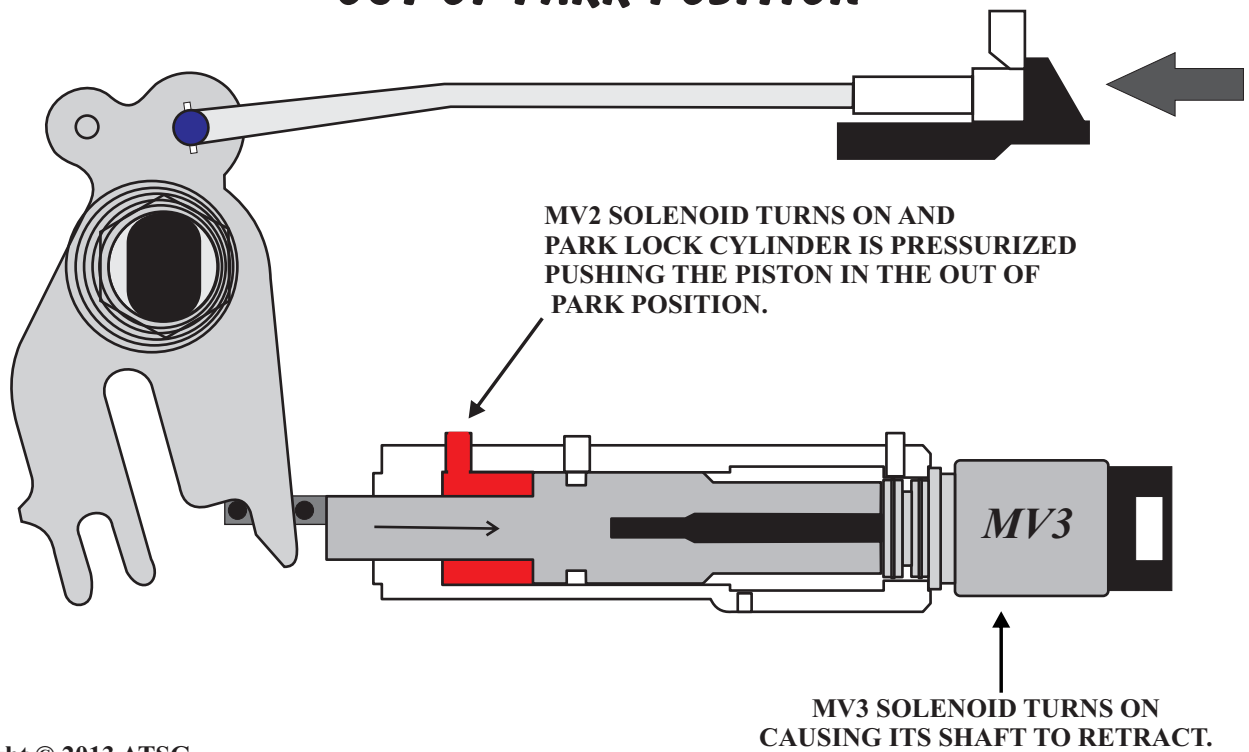
Figure 2

DESCRIPTION OF OPERATION

PARK POSITION



OUT OF PARK POSITION

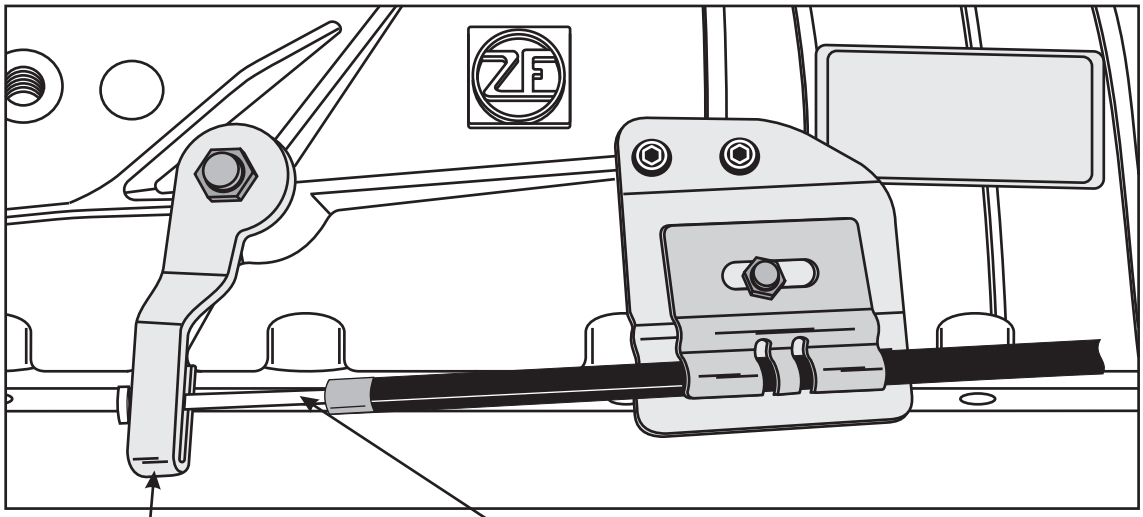


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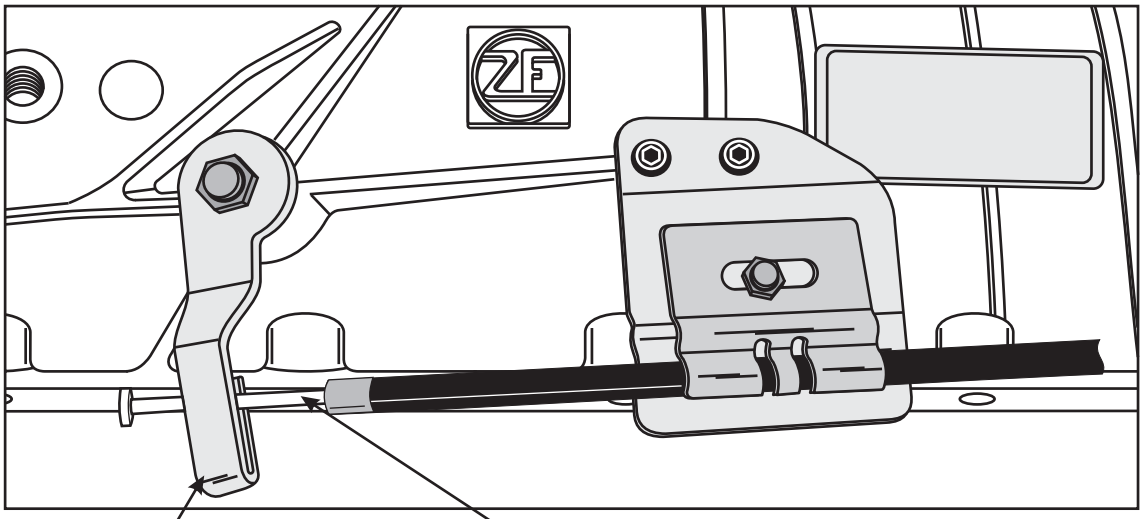
Figure 3

LINKAGE OPERATION

PARK POSITION



OUT OF PARK POSITION



The Linkage arm must move freely over the stationary Emergency Park Release Cable or it will cause it to set the DTC 507B

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Figure 4

AUDI ZF6HP19/26
DELAYED ENGAGEMENT WHEN COLD OR NO DRIVE ON FIRST ENGAGEMENT

COMPLAINT: Some 6HP19, 6HP26 and 6HP28 (09L, 09E and 0B6) transmissions may exhibit a delayed engagement when cold or no drive on first engagement. When hot a suction noise may be heard. In some instances the transmission will default to 3rd gear with the possibility of the following DTCs being stored in the transmission control unit:

DTC P0730 (Transmission monitoring incorrect gear ratio)
DTC P2700 (Clutch A implausible)
DTC P2701 (Clutch B implausible)
DTC P2702 (Clutch C implausible)
DTC P2703 (Clutch D implausible)

CAUSE: Due to a design change, the filter neck may not fit tightly into the seal allowing the pump to suck air. This cavitation foams the fluid and prevents the clutches from applying completely. This also makes checking the fluid level difficult as it will "raise" the fluid level higher than its actual capacity.

CORRECTION: When the filter/pan assembly is removed the seal may remain in the pump which may be your indicator that this is the concern. Check the seal on both the filter neck and pump. It should have a snug fit on both. If not, replace the filter assembly.

After service it may be necessary to perform a “Guided Functions Adaptation Drive” (GFF) to reset the adapts.

OE instructions with their test equipment:
The GFF Adaptation Drive test plan is located in Function / Component Selection >> Powertrain >> Automatic transmission 09E >> 01-On Board Diagnostics >> 02- Transmission Electronics 09E >> J217- TCM functions >> J217- TCM adaptation drive.

SERVICE INFORMATION:

0B6 Gearbox
Filter.....0B6 325 429
1 Set Of Hexagon Socket Flat Head Bolts.....0B6 398 747
Pan Gasket.....09E 321 371 A

09L Gearbox
Filter.....09L 325 429
Pan Gasket.....09L 321 371 A

09E Gearbox
Filter.....09E 325 429
Pan Gasket.....09E 321 371

Check whether the new filter is the improved version with the numbers 22222 and 33333 printed on the top of the filter. If numbers are not printed on the filter, do not install it. Return the part and obtain another filter.

BMW ZF6HP19/26
REVERSE AND/OR DRIVE ENGAGEMENT COMPLAINTS

COMPLAINT: The customer may complain that after the initial start-up when cold, or during park maneuvers Drive and/or Reverse cannot be engaged using the Gear Selecting Switch (GWS) especially at low ambient temperatures. In some cases, fault codes A838, A830 and/or A82A may be stored in the GWS and 51AB in the EGS transmission control modules. When the vehicle arrives to the shop the complaint may not be duplicated.

CAUSE: In most cases the vehicle owner may not be familiar with the proper operation of the GWS shifter. In certain other cases the GWS shifter assembly may be faulty.

CORRECTION: BMW has offered up the following fault code descriptions to provide helpful diagnostic hints when dealing with GWS related complaints.

Code A838 - "Play protection blocking active": This fault is set when a lock button is pressed and released numerous times (more than 20 times during a 40 second time period with KL15 on). After the fault is set, the locking function does not work - the shifter can be moved forwards and backwards without pressing the unlock button. D or R is not engaged. The transmission stays in Park.

Code A830 - "Resetting system faulty": This fault is set if the GWS shifter cannot return from the steptronic gate (left position) to the middle position when P is selected. The main reason for this fault is a mechanical blockage. If the shifter is being manually held to the left while the P button is pressed, after five return attempts the A830 fault will be set with the P indicator flashing. Also, this fault may occur under extreme environmental conditions: extremely high or low ambient temperatures; under voltage conditions; or due to incorrect installation (excessive pressure from the shift gate bezel on the shifter disc).

Code A82A - "Parking button faulty": This fault is set when the P button is pressed very slowly, and/or the button is not fully depressed.

Code 51AB - "EGS incorrect signal from GWS: P button": This fault is stored in the EGS module when the GWS fault code A82A becomes present (see above).

If all four faults are stored, then there is a strong indication that the customer is not fully familiar with the GWS operation strategy. For example, when performing a "three point turn" parking maneuver, the customer needs to move the GWS shifter from the steptronic gate (if driving in the sport or manual mode) to the center position prior to engaging the R or D gears. In such a situation, the customer needs to be advised on the proper operation of the GWS shifter.

BMW ZF6HP19/26
REVERSE AND/OR DRIVE ENGAGEMENT COMPLAINTS

CORRECTION: ***Important Note:***

Please remind the customer that the drive position D or R gear request from the GWS shifter will be ignored (the transmission will stay in Park) if the driver's door is not fully closed and the driver's seat belt is not latched. Also, if the driver were to leave the vehicle with the engine running with drive position D or R selected, the automatic transmission would automatically shift into the park position P upon opening of the door.

This is a built-in safety feature of the EGS/GWS, not a system malfunction.

Should the GWS assembly need to be replaced, the vehicle will need to be reprogrammed and recoded.

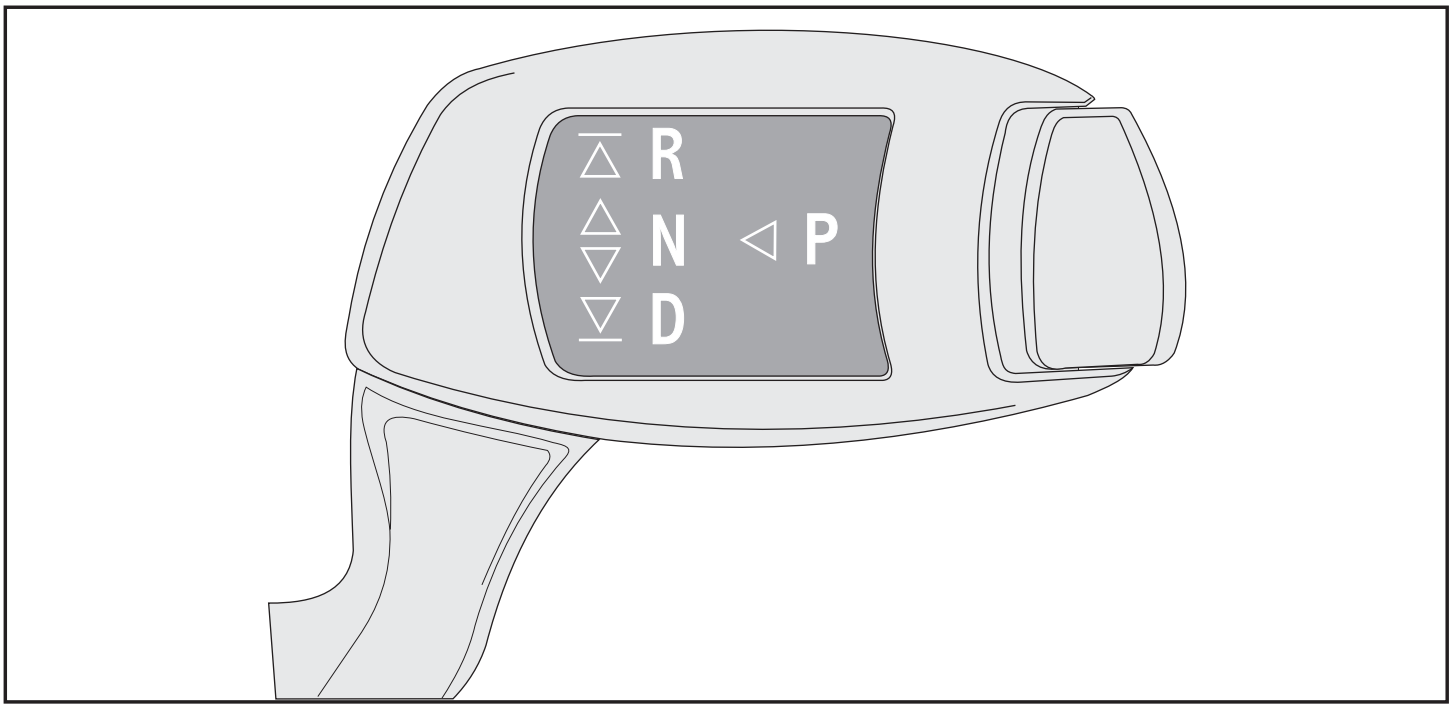


Figure 1

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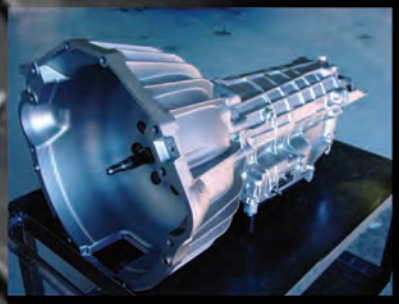
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AUDI ZF6HP26
6-3 DOWNSHIFT GRUNT

COMPLAINT: A 6HP26 (09E) transmission may exhibit a grunting noise during a hard acceleration shift from 6th to 3rd. In some instances this same noise can be heard on a 5 to 4 downshift. The noise may not be consistent as it occurs under specific conditions related to temperature, engine speed, vehicle speed and load.

CAUSE # 1: One possibility is due to incorrect tolerances in Clutch A and B.

CAUSE # 2: Another is the incorrect use of fluid.

CORRECTION #1: The production solution for incorrect clutch tolerances was "Optimized software to improve gear change." In other words, a programmed shift strategy change to compensate for the incorrect tolerances.

Compare the Transmission Control Unit software part number and software version to the chart below (figure 1). If the software version is lower than the new version listed in the chart, perform the software update.

CORRECTION #2: Use the correct fluid for the transmission according to the code letters on the ID plate on the transmission.

When completed, perform an adaptation drive to ensure shift quality. The adaptation drive is necessary because the software update deletes all the adaptation values of the shift elements in the transmission control unit. The adaptation drive must be performed in GFF or Guided Functions.

OE instructions with their test equipment:
The GFF Adaptation Drive test plan is located in Function / Component Selection >> Powertrain >> Automatic transmission 09E >> 01-On Board Diagnostics >> 02-Transmission Electronics 09E >> J217- TCM functions >> J217- TCM adaptation drive.

SERVICE INFORMATION:

Model	Engine/ Transmission	Old software part number	Old software version (*or lower*)	New software part number	New software version (*or higher*)	SVM Action Code *(Software Version Management)*
S6	5.2L/09E	4F2.910.156.M	0060	4F2.910.156.M	0070	4F02A017
S6	5.2L/09E	4F5.910.156.F	0020	4F5.910.156.F	0030	4F02A017
S8	5.2L/09E	4E1.910.156.K	0060	4E1.910.156.K	0070	4E02A007
S8	5.2L/09E	4E2.910.156.C	0030	4E2.910.156.C	0040	4E02A007

Figure 1

BMW ZF6HP
JUMPS INTO NEUTRAL AFTER SELECTING DRIVE/REVERSE

COMPLAINT: Various BMW vehicles using the ZF6HP type transmission may have vehicle owners complain that intermittently the transmission will jump into neutral after drive or reverse engagement is selected. The Kombi (center digital dash display) and the GWS (Gear select display) displays in the vehicle indicate that neutral is commanded from D or R simultaneously. No fault codes in the EGS transmission control module or in the GWS shifter is reported.

CAUSE: The vehicle has a GWS module software error issue.

CORRECTION: To verify the vehicle in question qualifies for a reprogram and recode, check the vehicles integration level.

Integration levels for E60 and E61 vehicles E060-08-03-550 or lower will require reprogramming and recoding.

Integration levels for E70 vehicles E070-08-03-525 or lower will require reprogramming and recoding.

SERVICE INFORMATION:

BMW issued a defect code 61 31 71 14 00 for vehicles that were covered under a New Vehicle Limited Warranty or the Certified Pre-Owned Program.

BMW ZF6HP
STEERING WHEEL SHIFT PADDLES INOPERATIVE

COMPLAINT: The customer may complain that the steering wheel paddle shifters are inoperative. Additionally, the Gear Selecting Switch (GWS) gear shifter will not stay in the manual/sport gate (left side), but moves back immediately to the D center position automatically. BMW fault code 5087 "Hardware, inputs one touch function" is found to be stored in the EGS transmission control module.

CAUSE: The direct communication input line between the paddle shifters and the EGS transmission control module is interrupted. To make matters a bit more difficult, wiring schematics direct from BMW have been incorrect.

CORRECTION: Upshift and downshift requests from both paddle shifters are transferred directly to the EGS transmission control module via a single wire connection. This signal wire begins at the Steering Column Shift Cluster (SZL-A27). It has a 16 pin connector plugging into it called the X1880 connector just below the steering wheel bottom side. Terminal 13 in this connector is the signal wire and is usually a blue/grey wire which runs to a connector in the under the hood electrical box called the X6031 connector. This is a black 12 pin connector and is located on the front wall next to the ground harness (figure 1). The signal wire passes through this connector at terminal 11 and runs directly to the EGS in the transmission's Mechatronic assembly at terminal 12 in the X8500 connector (figure 2).

A quick test point would be to:

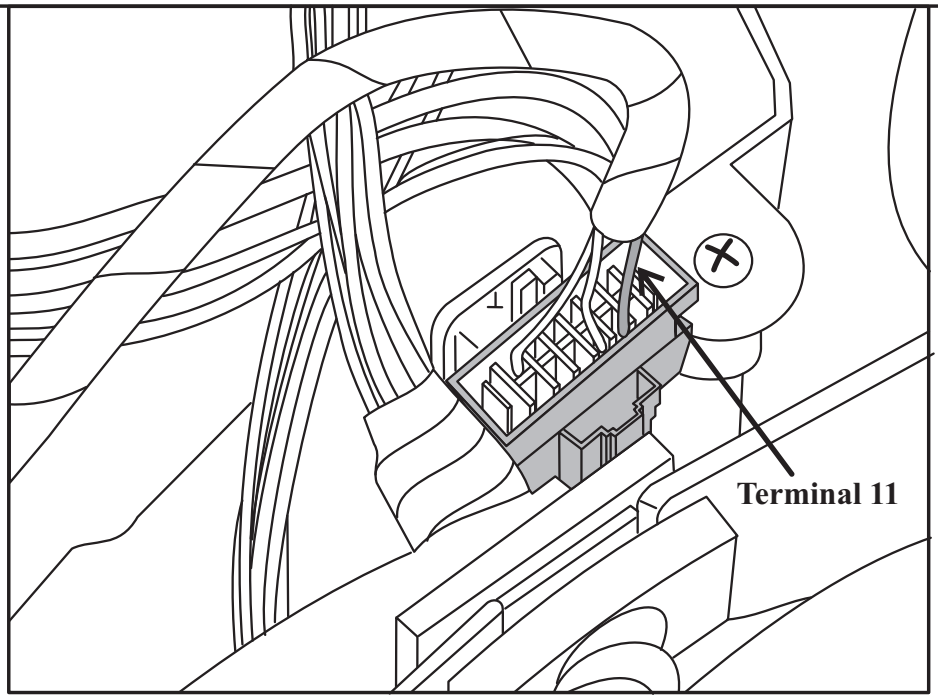
1. Place car on rack with wheels slightly of the ground and the emergency brake applied.
2. Locate the E-box and find the signal wire at terminal 11 in the X6031 connector.
3. Using a volt meter, monitor the voltage seen when operating the steering wheel paddle shifter with the engine running and the transmission in the Drive position. The correct voltage values should be as follows:

D position-	3.7V - 3.8V
Upshift	2.4V - 2.5V
Downshift	1.2V - 1.25V

If no voltage is observed check the wiring from the X6031 connector to the X1880 connector. Look for a broken or shorted wire or a backed out pin in one of the connectors and repair as necessary.

If the correct voltage values are observed on both sides of the X6031 connector but is missing at the EGS X8500 connector down at the transmission, look for a broken or shorted wire and repair as necessary.

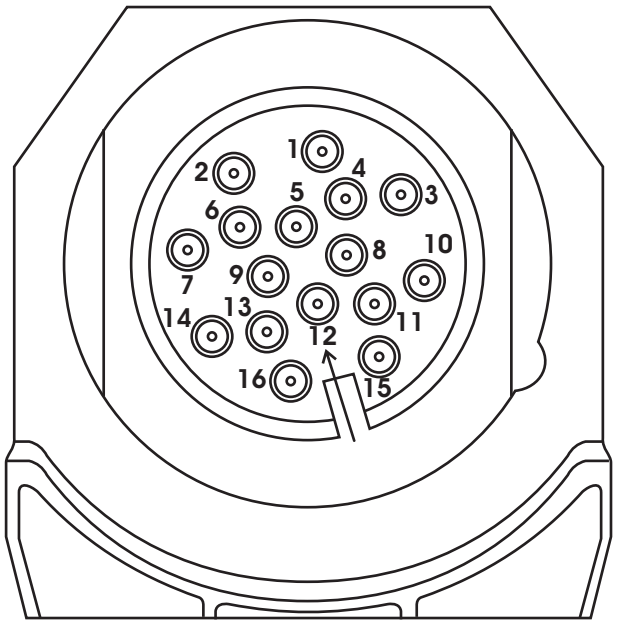
- E60, E61 with 6HP19TU, 6HP26TU sport automatic transmissions
- E63, E64 with 6HP26TU sport automatic transmission
- E60 = 2004–2009 5 Series Sedan
- E61 = 2004–2009 5 Series Touring/Sports Wagon
- E63 = 2004–2010 6 Series Coupé
- E64 = 2004–2010 6 Series Convertible



The X6031 connector is located in the E-Box where the ECM is located. This is a 12 terminal black connector located on the front wall of the box next to the ground harness. Terminal 11 is the paddle shift signal wire (blue/grey) in the connector.

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Figure 1



The paddle shift signal wire enters the EGS in the transmission's Mechatronic assembly at terminal 12 in the X8500 connector

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Figure 2

LAND ROVER LR3
GEAR SELECTOR DIFFICULT TO OPERATE

COMPLAINT: A 2006 LR3 equipped with a ZF6HP26 transmission may come into the shop with the customer complaining that the gear selector lever has become hard to move. The transmission malfunction indicator lamp is illuminated and code retrieval indicates a code P0850 "Park/Neutral Switch Input Circuit Fault" stored in the TCM memory. The technician also notices that the "D" Indicator Lamp is flickering.

CAUSE: The selector lever cable pivot bushing is binding due to wear (Refer to Figure 1).

CORRECTION: Replace gear selector assembly.

NOTE: Other related gear selector codes can be stored due to corrosion of the electrical connector that plugs into the gearshift module, (Refer to Figure 2).

SERVICE INFORMATION:

Gear Selector Assembly.....UCD500030

A special thanks to Ralph at Alonso Transmission in Miami for supplying the vehicle that made this bulletin possible.

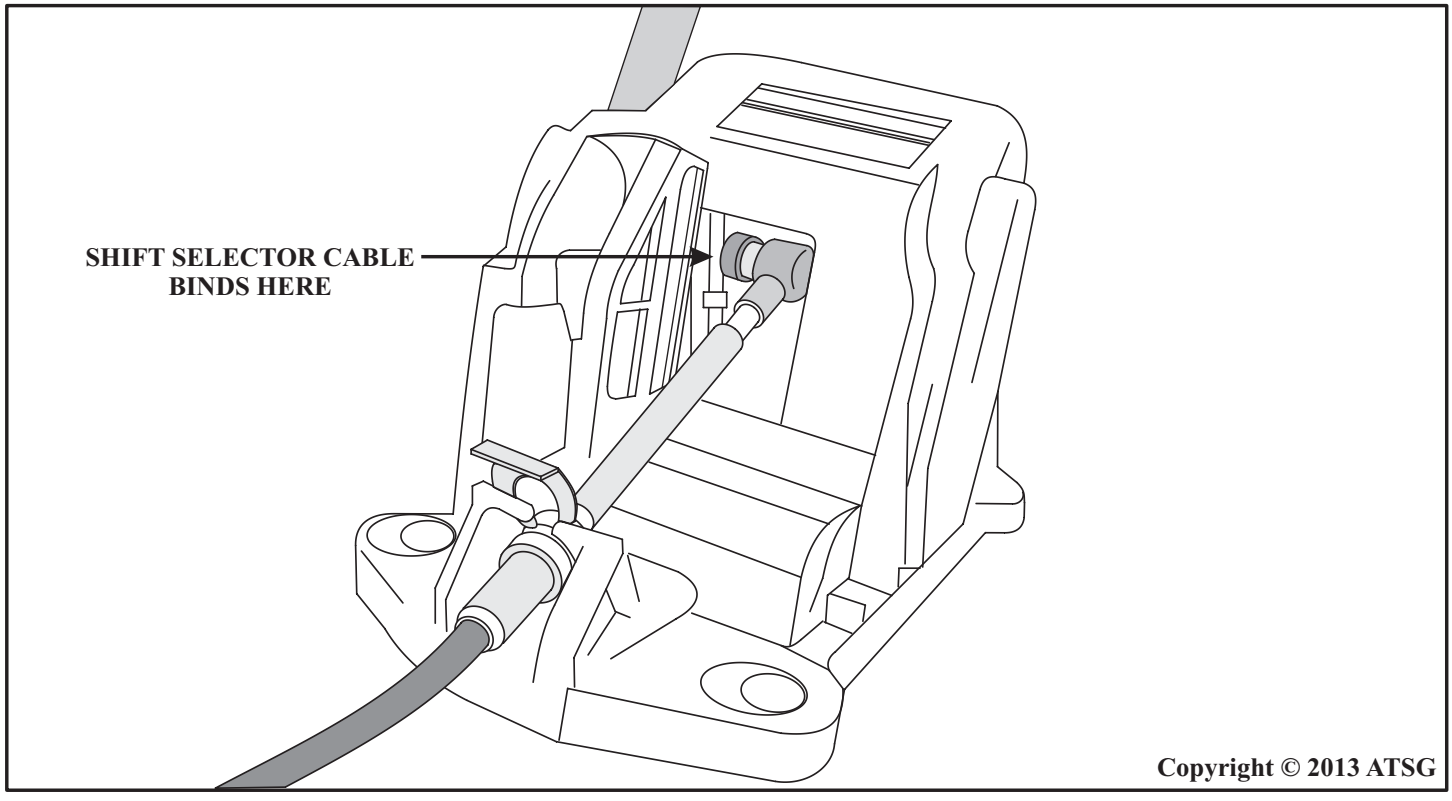
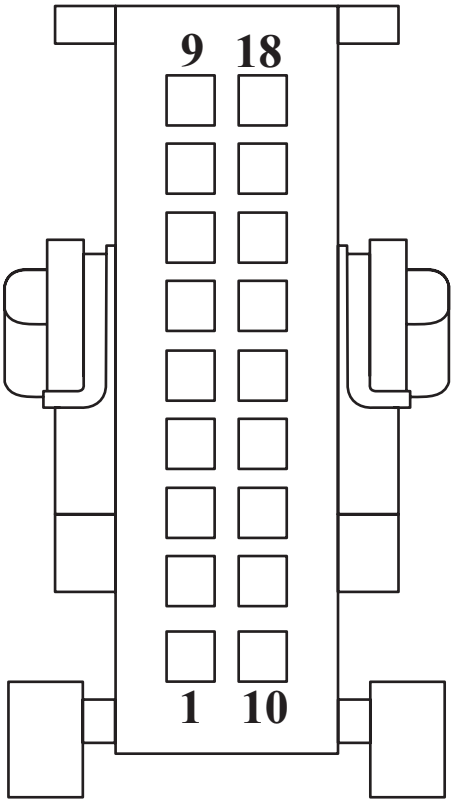


Figure 1

LAND ROVER LR3
GEAR SELECTOR DIFFICULT TO OPERATE

SHIFT CONTROL MODULE CONNECTOR IDENTIFICATION



TERMINAL NUMBER	WIRE COLOR	CIRCUIT FUNCTION
1	Black	Ground
2	Green	Park Lock Signal
3	Red/Brown	Back Light
4	Black/Green	Sport/Manual Mode Signal
5	Yellow	Manual Upshift Signal
6	Brown	Manual Downshift Signal
7	Green/Pink	12V Ignition Power
8	Purple/Blue	12V Battery Power
9	Red	Shift Lock Solenoid (+)
10	Yellow	Shift Lock Solenoid (-)
11	Red	Park Indicator Lamp
12	Red/Green	Reverse Indicator Lamp
13	Red/White	Neutral Indicator Lamp
14	Red/Blue	Drive Indicator Lamp
15	Red/Yellow	Sport/Manual Indicator Lamp
16	Red/Black	Quadrant Illumination

Terminals 17 and 18 are not used. Wire colors may vary.

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Figure 2

BMW 6L45
NO ENGAGEMENT

COMPLAINT: 2006 and up BMW 1,3,5 and X3 Series produced to 3/31/2009, equipped with the 6L45 transmission (GA6L45R), may exhibit a condition of no engagement when selecting Forward or Reverse ranges. Note: The transmission warning lamp may be on accompanied by DTC's 56B8- R ratio fault, 56B8-3,5,R ratio fault, 56BB, 1,4,5,6 and R Neutral test, 56BD 2 and 6 Neutral test and or 56BF 1,2,3 and 4 Neutral test.

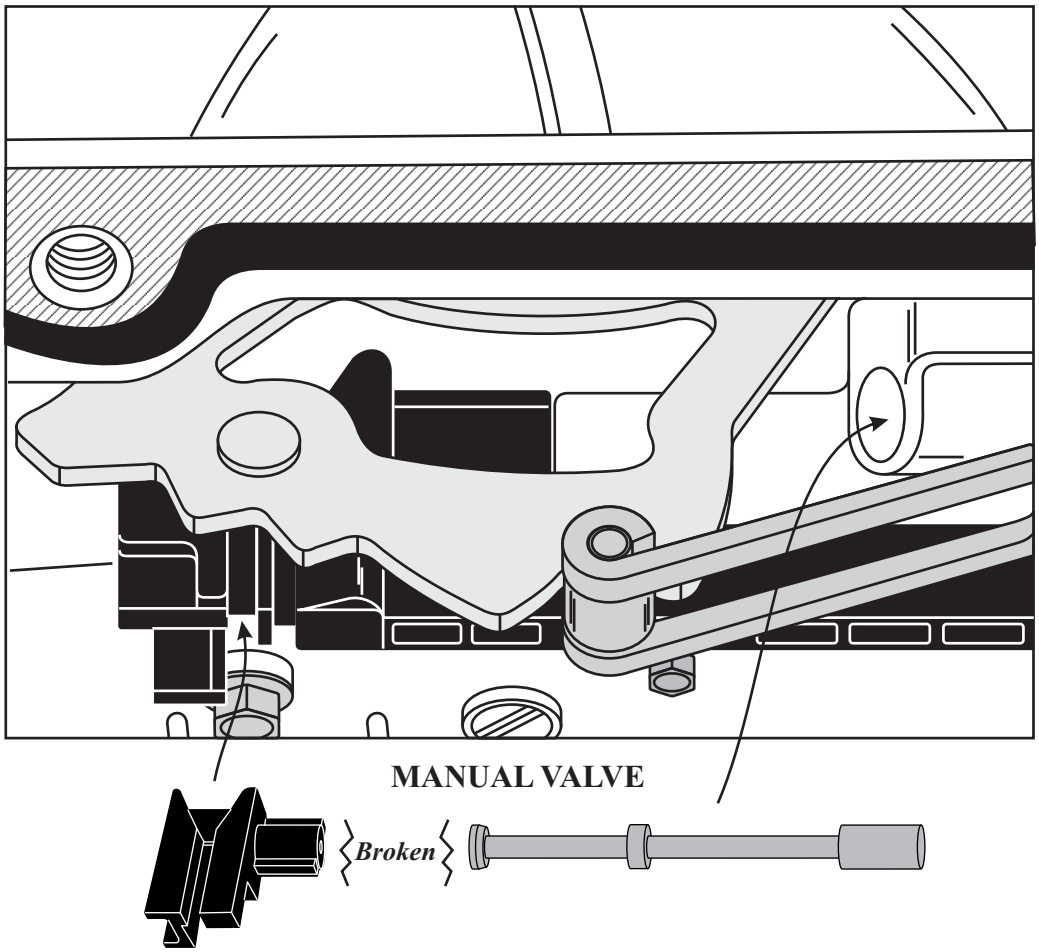
CAUSE: The cause may be, the Manual Valve may have broken where it connects to the Manual link, allowing the valve to put the transmission into a neutral position. See Figures 1 and 2 for a view of the Manual link and a close up of the Manual Valve.

CORRECTION: To correct this condition, R&R the valve body assembly and replace the broken Manual Valve with the *New* valve listed in Service information

SERVICE INFORMATION:

MANUAL VALVE (BMW part number).....24-33-7- 617-803

Special thanks to Wayne at Habbys NY



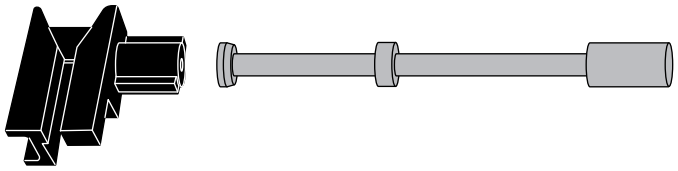
The Manual Valve breaks where it connects to the Manual Link

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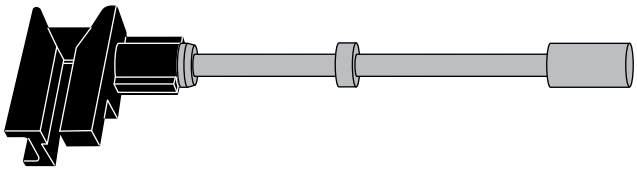
Figure 1

MANUAL VALVE

Broken



New- 24-33-7-617-803



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Figure 2

BMW ZF6HP
COMMON HEX DECIMAL CODE DEFINITIONS

The following information provides common Hex Decimal Diagnostic Trouble Codes (in Bold) and their definitions. This information is specific to ZF6HP family of transmissions.

4E20 -Electronic pressure control valve 1 (EDS 1)
4E21 -Electronic pressure control valve 2 (EDS 2)
4E22 -Electronic pressure control valve 3 (EDS 3)
4E23 -Electronic pressure control valve 4 (EDS 4)
4E24 -Electronic pressure control valve 5 (EDS 5)
4E25 -Electronic pressure control valve 6 (Torque Converter Clutch)
4E26 -Current fault, electronic pressure actuator in P/R/N
4E84 -Solenoid valve 1
4E85 -Solenoid valve 2
4E86 -Solenoid valve 3 (interlock)
4E87 -Solenoid valve 4 (shift lock)
4E89 -Solenoid valve 1 or Solenoid valve 2 mechanically jammed
4EE8 -Turbine speed sensor
4EE9 -Output speed sensor
4EEB -Output speed sensor - gradient too high
4EF2 -Gear-oil temperature sensor
4EF3 -Control module temperature sensor
4EFB -Transmission over-temperature
4F53 -Fault in disengagement of converter lockup clutch
4F70 -Engine over speed
4F71 -No message from instrument cluster during emergency release parking lock activated
4F81 -Ratio monitoring, clutch A
4F82 -Ratio monitoring, clutch B
4F83 -Ratio monitoring, clutch C
4F84 -Ratio monitoring, clutch D
4F85 -Ratio monitoring, clutch E
4F87 -Ratio monitoring, gearshift 1 - 2
4F88 -Ratio monitoring, gearshift 2 - 3
4F89 -Ratio monitoring, gearshift 3 - 4
4F8A -Ratio monitoring, gearshift 4 - 5
4F8B -Ratio monitoring, gearshift 5 - 6
4F8C -Ratio monitoring, gearshift 6 - 5
4F8D -Ratio monitoring, gearshift 5 - 4
4F8E -Ratio monitoring, gearshift 4 - 3
4F8F -Ratio monitoring, gearshift 3 - 2
4F90 -Ratio monitoring, gearshift 2 - 1
4F91 -Ratio monitoring, clutches A - D
4F92 -Ratio monitoring, clutches A - C
4F93 -Ratio monitoring, clutches A - B
4F94 -Ratio monitoring, clutches A - E
4F95 -Ratio monitoring, clutches B - E
4F96 -Ratio monitoring, clutches C - E
4F97 -Ratio monitoring, clutches B - D
Note: Monitoring codes are mechanically generated as in gear ratio errors

BMW ZF6HP
COMMON HEX DECIMAL CODE DESCRIPTIONS

4FB0 -Transmission control: Internal fault (EPROM/FLASH)
4FB1 -Transmission control: Internal fault (EEPROM)
4FB2 -Transmission control: Internal fault (watchdog)
4FB7 -Transmission control: Internal fault (EEPROM writing)
4FB8 -Transmission control: Internal fault (monitoring level 2)
4FB9 -Transmission control: Internal fault (TPU/QADC)
4FBA -Actuator activation and selector-lever position implausible, speed above threshold value
4FBB -Actuator activation and selector-lever position implausible, speed below threshold value
5014 -Supply voltage, transmission control
507B -Parking gear sensors implausible
507C -Parking gear incorrectly engaged
507D -Parking gear incorrectly disengaged
5087 -One-touch or M gate switch
5088 -Transmission-selector-switch sensor faulty
5089 -P/N line does not match transmission position
50DC -Transmission position sensor
50DD -Activation of two substitute functions of same priority
51A8 -No message (throttle valve/accelerator pedal) from engine management
51AE -No message (brake-light switch) from engine management
51B0 -Message from DSC (brake-light switch/brake pressure) implausible
A158 -Battery Disconnection

ACURA

DTC P0740 AND TCS 31-2

COMPLAINT: Before and after a rebuild, an Acura vehicle such as a 3.2TL with the 5 speed B7WA transmission may store both a P0740 TCC performance code along with a Traction Control code 31-2 Engine Retard Command (PFINH) signal. During a rebuild the converter was replaced yet the two codes remain. This causes the tech to focus on resolving the TCS 31-2 code and after much time no resolution is realized.

CAUSE: In most cases code P0740 causes the traction control system to produce code 31-2 for an engine retard command problem.

Engine torque reduction is a strategy being utilized on several fronts. It is used for fuel economy as well as in various shift strategies eliminating tail end shift bumps. Another area where torque reduction is used is in traction control/vehicle stability assist systems. As individual wheels are being braked for anti-skid control, a signal is also being sent to reduce engine torque. With code P0740 stored, the PCM/TCM is telling the TCS is will not perform this torque reduction function. In return the ABS/TCS system sets code 31-2.

CORRECTION: There are many reasons that causes the converter clutch to not perform correctly causing the P0740 code. Besides a compromised torque converter, there can be performance issues with the following and should be checked and repaired as needed:

1. Line pressure control (filter, pump, PR system)
2. TCC solenoid mechanical malfunction
3. Linear solenoid C mechanical malfunction
4. Lock-up Timing Valve
5. Lock-up Shift Valve
6. Lock-up Control Valve
7. Leaking bore plugs with TCC valves
8. Torque converter check valve
9. Cooler check valve
10. Stator arm to regulator body wear
11. Heat exchanger

HONDA MKZA/MCLA/MZKA FAMILY
WHINING/BUZZING NOISE TORQUE CONVERTER FAILURE

COMPLAINT: Before or after overhaul, 2002-2006 Honda CRV- 4 and 5 speed, 2003-2006 Honda Accord 5speed, 2003-2006 Honda Element 4 and 5 speed equipped with the 2.4L 4 cylinder engine, may have a complaint of a whine or buzzing noise, as in valve resonance, and/or a complaint of Torque Converter overheat, which leads to premature transmission failure.

CAUSE: The cause may be that the lubrication pipe leading to the bellhousing is cracked causing a pressure loss in the converter/lube circuit. See figure 1 for the location of the pipe.

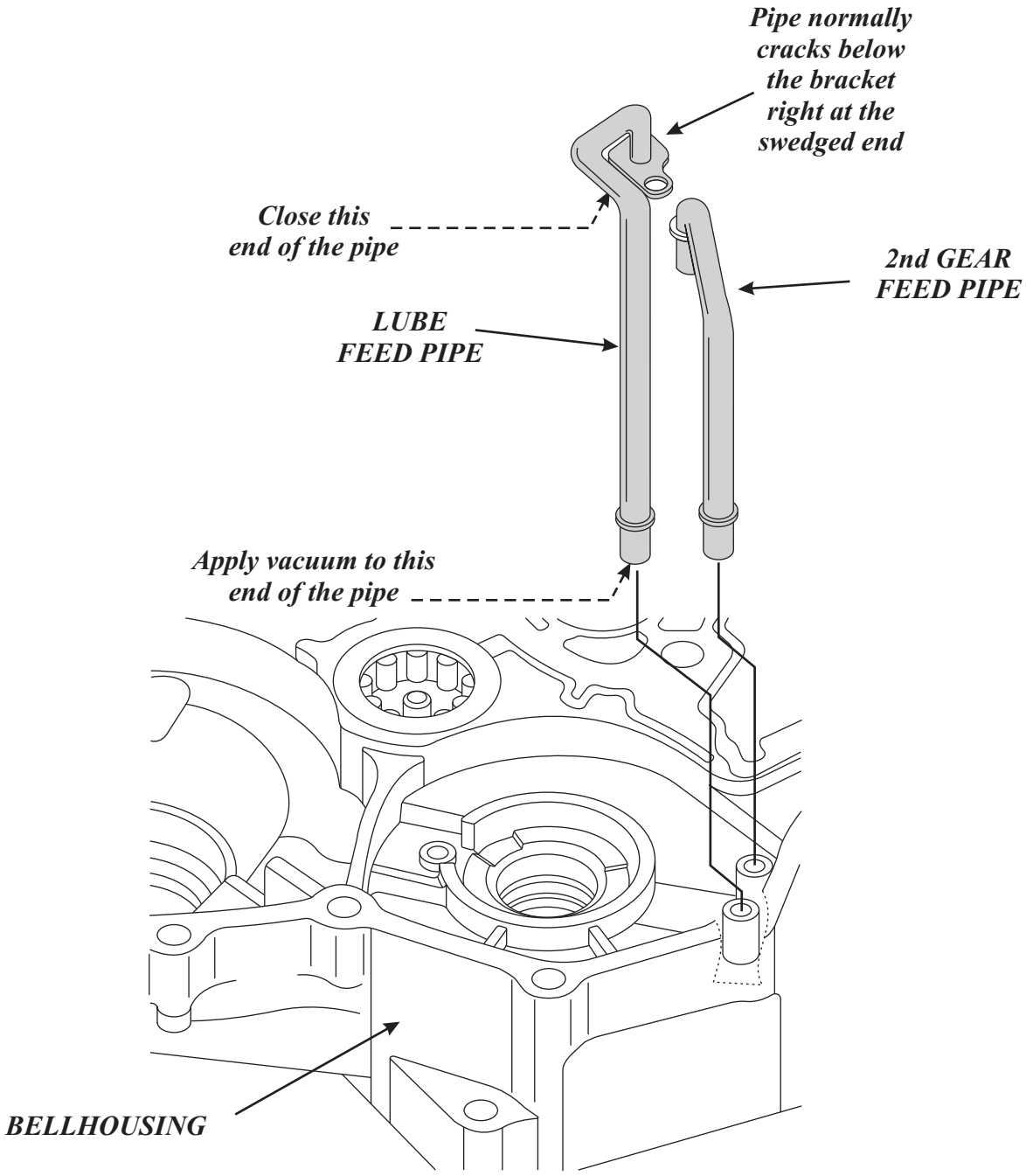
CORRECTION: Replace the tube with the part number shown in service information. ***Note:*** the tube comes in combination with the other tube shown in Figure 1. To verify the tube is cracked, use a vacuum pump on one end of the tube and close off the tube on the opposite end. It must hold vacuum or it has a hairline crack in it. See Figure 1 for the area in which the crack occurs.

SERVICE INFORMATION:

PIPE SET (Both pipes Honda part #).....22770-RCL-305

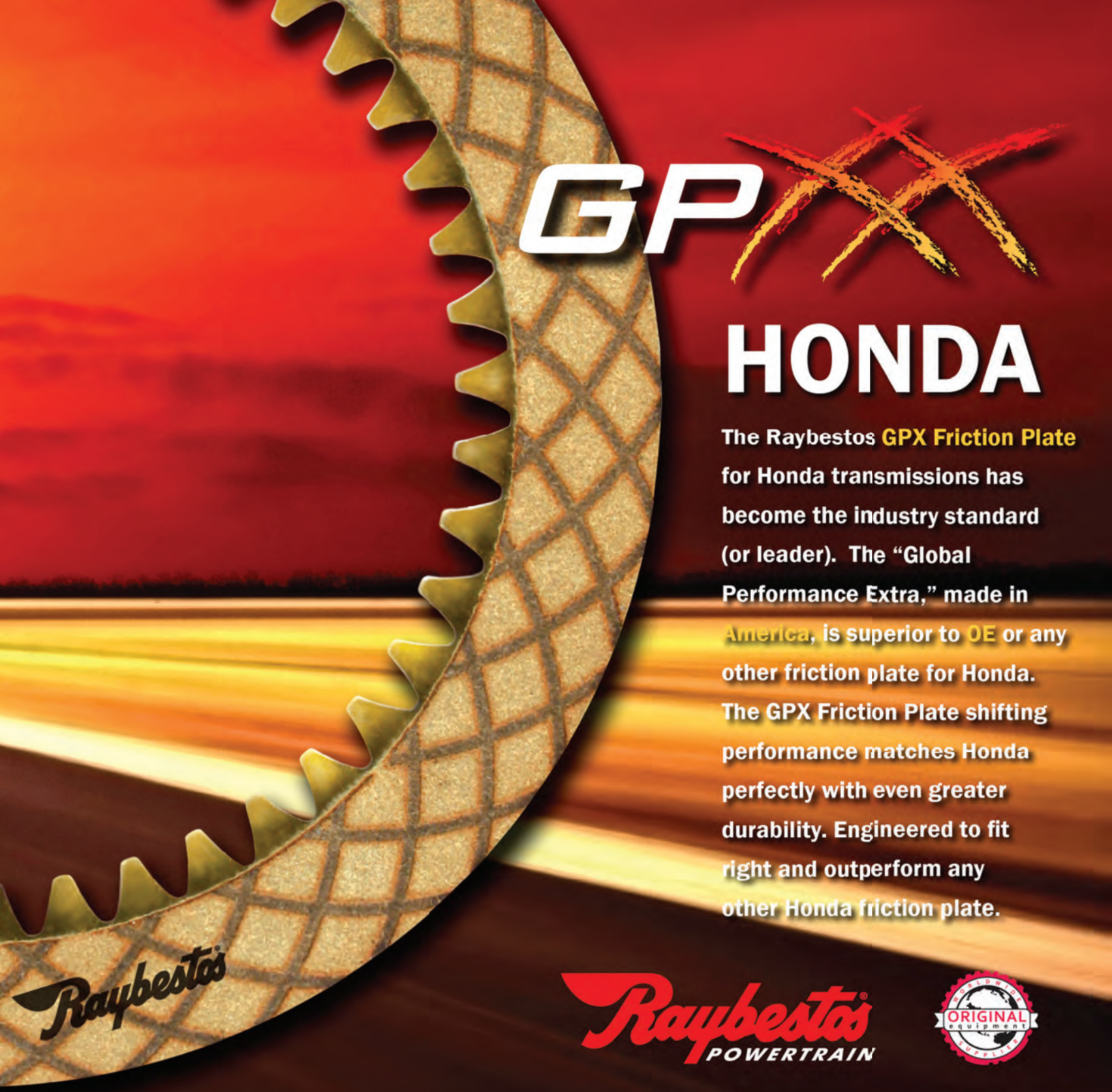
Special Thanks to
Gino @ AAMCO
Jim @ Budget trans
Bob @ Riz trans

LUBE PIPE LOCATION



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Figure 1



HONDA

The Raybestos **GPX Friction Plate** for Honda transmissions has become the industry standard (or leader). The "Global Performance Extra," made in America, is superior to OE or any other friction plate for Honda. The GPX Friction Plate shifting performance matches Honda perfectly with even greater durability. Engineered to fit right and outperform any other Honda friction plate.

Raybestos® POWERTRAIN

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Features and Benefits

- Proprietary Raybestos engineered friction material and unique groove design provide smooth shifts and greater durability
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- Withstands higher temperatures than the OE
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HONDA/ACURA -VARIOUS 4 AND 5 SPEED MODELS
SLIPS IN 2ND GEAR

COMPLAINT: Before or after overhaul, Honda and Acura vehicles, See Figure 1 for vehicle application chart, equipped with 4 and 5 speed transmissions may exhibit a slipping condition in 2nd gear, or a slide bump in 2nd gear. This complaint will typically get worse as temperature increases.

CAUSE: The cause may be, that the Sleeve in the bellhousing that is the collar for the sealing rings for the 2nd clutch is ring grooved or may be leaking around the "O"-rings in the case. This sleeve is commonly left alone and not resealed during the overhaul process.

CORRECTION: To correct this condition, refer to Figure 2 and remove the retaining bolt bearing and sleeve, to replace the "O"-rings. If the sleeve is ring grooved, replace the sleeve with the part number listed in service information. Refer to Figure 1 to verify vehicle application, and/or consult your local dealer to verify part number based on the vin code of the vehicle.

SERVICE INFORMATION:

A.COLLAR/OIL GUIDE (Honda-Acura part #).....23235-PRP-000
B.COLLAR/OIL GUIDE (Honda-Acura part #).....23237-RDK-010
See Chart below for common vehicle application to part number.

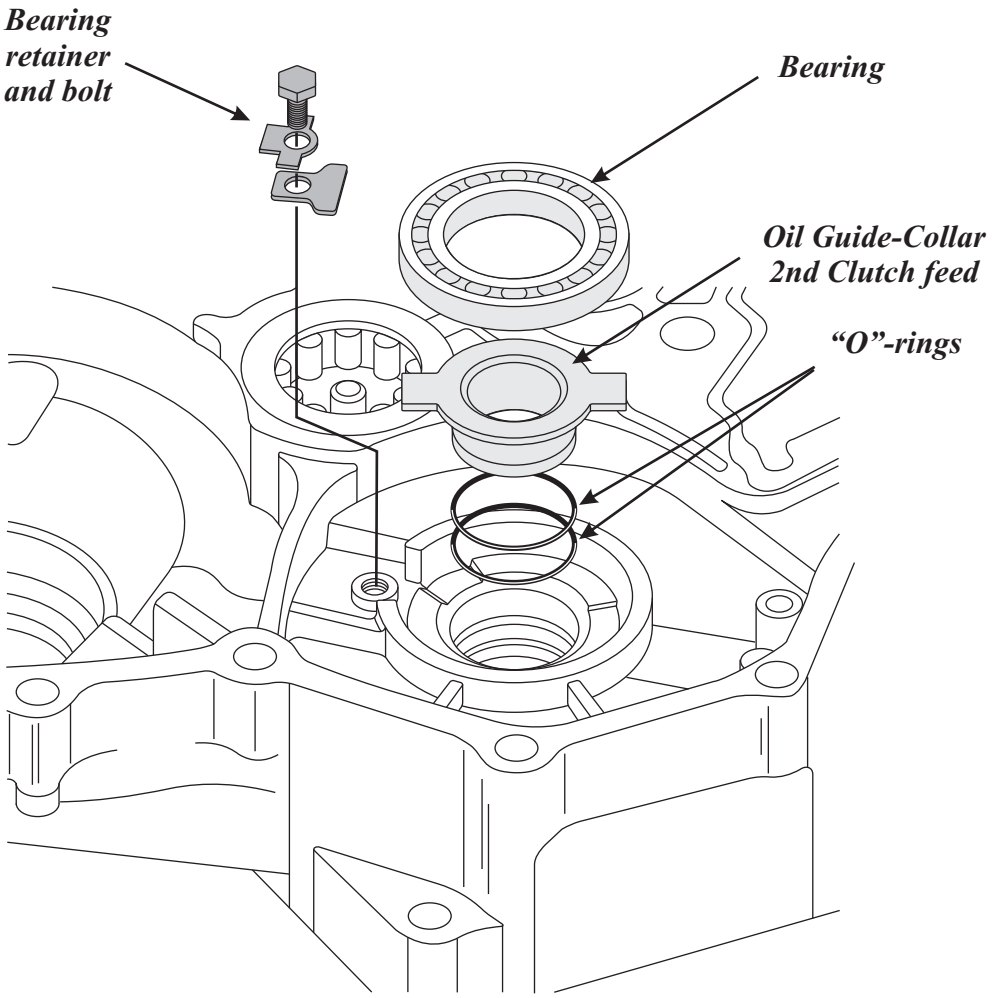
VEHICLE APPLICATION TO PART NUMBER

PART NO. "A" 23235-PRP-000	*PART NO. "B" 23237-RDK-010*
2003-12 Honda Accord (4cyl) 5 speed	*2008-12 Honda Accord (6cyl) 5 speed*
2002-12 Honda CRV (4cyl) 4&5 speed	*2010-12 Honda Crosstour (6cyl) 5 speed*
2003-11 Honda Element (4cyl) 4&5 speed	*2005-07 Honda Accord Hybrid (6cyl) 5 speed*
2005-12 Acura TSX/RSX (4cyl) 5 speed	*2007-12 Honda Odyseey (6cyl) 5 speed*
	2006-12 Honda Pilot (6cyl) 5 speed
	2006-12 Honda Ridgeline (6cyl) 5 speed
	2003-09 Acura MDX (6cyl) 5 speed
	2007-12 Acura RDX (6cyl) 5 speed
	2007-10 Acura RL (6cyl) 5 speed
	2007-11 Acura TL (6cyl) 5 speed

Verify part number and vehicle application, with vin, at your local dealer

Figure 1

OIL GUIDE/COLLAR LOCATION



Note: The bearing can be difficult to remove from the case. Using a heat gun from the inside of the case or place the bellhousing in the parts washer to warm it up may help.

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Figure 2

HONDA ODYSSEY 2007 - 2010
TORQUE CONVERTER CLUTCH VIBRATION

COMPLAINT: Some 2007 - 2010 Honda Odyssey vehicles, equipped with the PGRA-P36A transaxle, may come in to your shop with a complaint of a Torque Converter Clutch Vibration while driving the vehicle between 20 and 45 mph.

CAUSE: According to Honda Factory TSB 09-053 dated July 27, 2011 (which supersedes TSB 09-053 dated October 7, 2010) Product Update: PCM Update for Lock-Up Clutch Function.

Background:

A vibration from the torque converter lock-up clutch may be felt while driving between 20 and 45 mph. To minimize the possibility of this vibration, a software update for the transmission is available.

If the vibration returns again in the future, after the transmission software is updated, the torque converter will need to be replaced.

NOTE: The first software update did not address all the transmission concerns. Customers whose vehicles were updated need to be notified to have their vehicles updated with Database Update 08 - APR - 2010 or later.

Refer to the chart in Figure 1 for vehicles affected by this condition.

CORRECTION: Update the PCM A/T software.

SOFTWARE INFORMATION

HDS Software Version:2.023.007 (September 2010) (gray) or later.

Control Module (CM) Update: Database Update 09-SEP-2010 or later.

YEAR/MODEL	*PROGRAM ID*	*PROGRAM P/N*
2007 Odyssey LX, EX	GLA870 *(or later)*	37806-RGL-A87 *(or later)*
2007 Odyssey EX-L, Touring	GMA890 *(or later)*	37806-RGM-A89 *(or later)*
2008 Odyssey LX, EX	GLA940 *(or later)*	37806-RGL-A94 *(or later)*
2008 Odyssey EX-L, Touring	GLA960 *(or later)*	37806-RGW-A96 *(or later)*
2009-2010 Odyssey LX, EX	GLA3150, or GLA040 *(or later)*	37806-RGL-315 or 37806-RGL-A04 *(or later)*
2009-2010 Odyssey EX-L, EX-L w/RES Touring	GLA3150, or GWA040 *(or later)*	37806-RGW-315 or 37806-RGW-A04 *(or later)*

Figure 1

HYUNDAI F5A51/A5GF1
SLIPS IN 3rd, 4th, 5th

COMPLAINT: Before or after overhaul, Hyundai vehicles equipped with the F5A51/A5GF1, may exhibit a complaint of a flared 2-3 shift or slips in 3rd, 4th, 5th gear. This condition will get worse the hotter it gets. It may also include P0733-735 Diagnostic Trouble Codes related to gear ratio errors in 3rd, 4th, 5th gear. ***Note: this problem has shown up in 2007 Hyundai Sonata with as little as 35k miles on it.***

CAUSE: The cause may be, that the Reverse Piston, which houses the Overdrive Piston is cracked, allowing Overdrive clutch pressure to leak causing the slipping condition in 3rd, 4th , 5th. Refer to Figure 1 and note that the Overdrive clutch is applied in those ranges. See Figure 2 for the location of the Reverse/Overdrive Housing in the cross- sectional view. It may be noticed when removing the Overdrive outer piston seal that the seal is damaged where it rides against the inside of Reverse piston. ***This is caused by the crack***. Refer to Figure 3 for a cross-section of the Reverse and Overdrive piston showing the apply chamber of the Overdrive clutch and where the crack typically is.

CORRECTION: To correct this condition, dis-assemble the Overdrive/Reverse drum as shown in Figure 4 and replace the Reverse piston and Overdrive clutch piston seals.

SERVICE INFORMATION:

REVERSE CLUTCH PISTON (Hyundai part number).....45441-39501

Special thanks to:
Norm @ Mikes Transmission Ontario
Joe @ New Star IL

2007-UP HYUNDAI
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
Park					ON		ON				
Reverse	ON				ON		ON				3.859
Neutral					ON		ON				
Dr-1st		ON			ON*		ON	HOLD	HOLD		3.840
Dr-2nd		ON	ON				ON		HOLD		2.092
Dr-3rd		ON		ON			ON		HOLD		1.440
Dr-4th		ON	ON	ON			ON		HOLD	ON**	1.048
Dr-5th			ON	ON		ON				ON**	0.728

** 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)..

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Figure 1

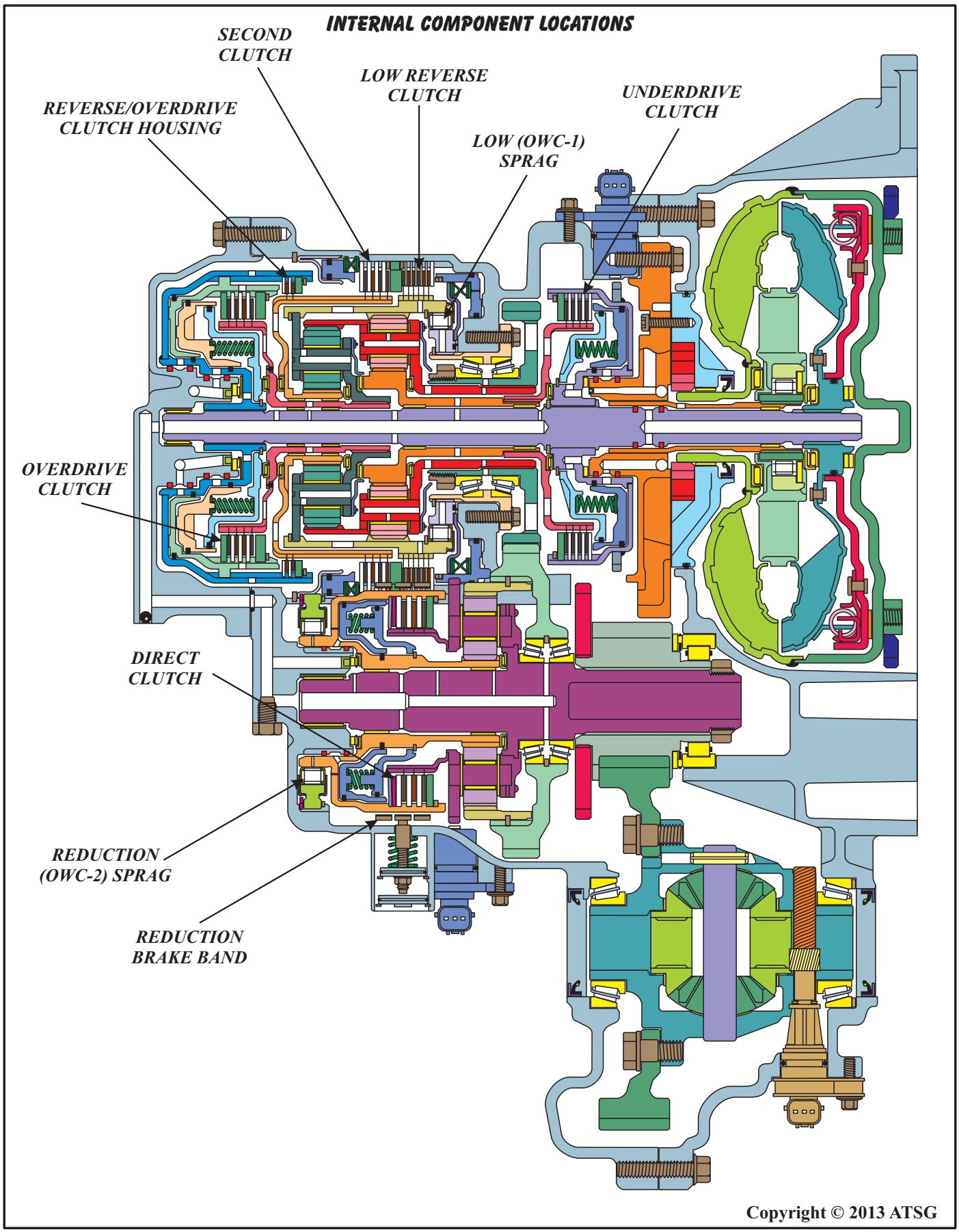
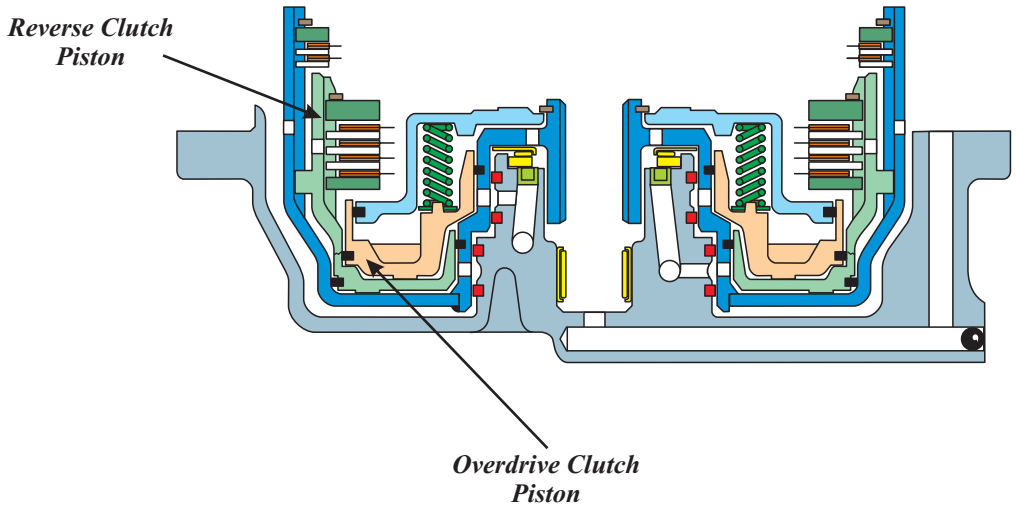

INTERNAL COMPONENT LOCATIONS
SECOND CLUTCH
LOW REVERSE CLUTCH
UNDERDRIVE CLUTCH
REVERSE/OVERDRIVE CLUTCH HOUSING
LOW (OWC-1) SPRAG
OVERDRIVE CLUTCH
DIRECT CLUTCH
REDUCTION (OWC-2) SPRAG
REDUCTION BRAKE BAND
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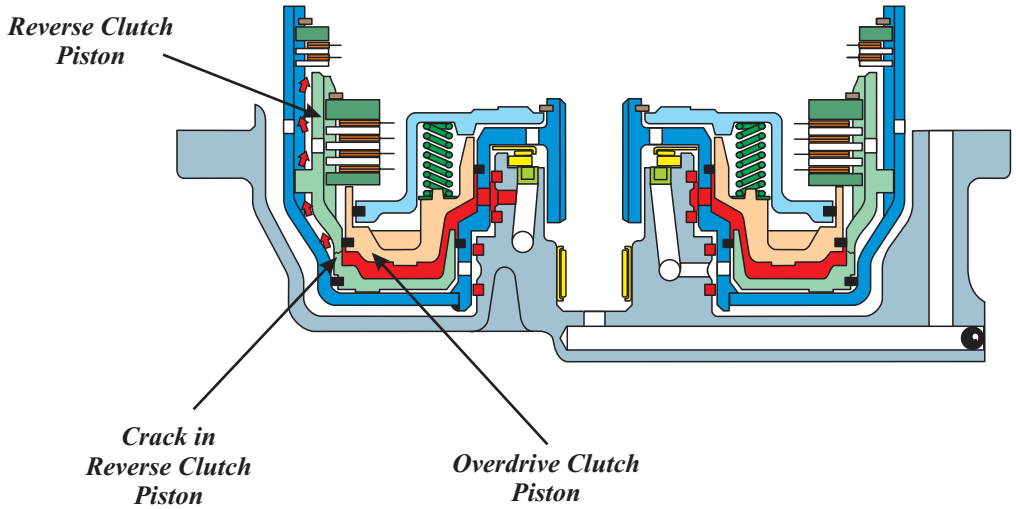
Figure 2

REVERSE/OVERDRIVE CLUTCH HOUSING CROSS-SECTION

OVERDRIVE CLUTCH RELEASED



OVERDRIVE CLUTCH APPLIED

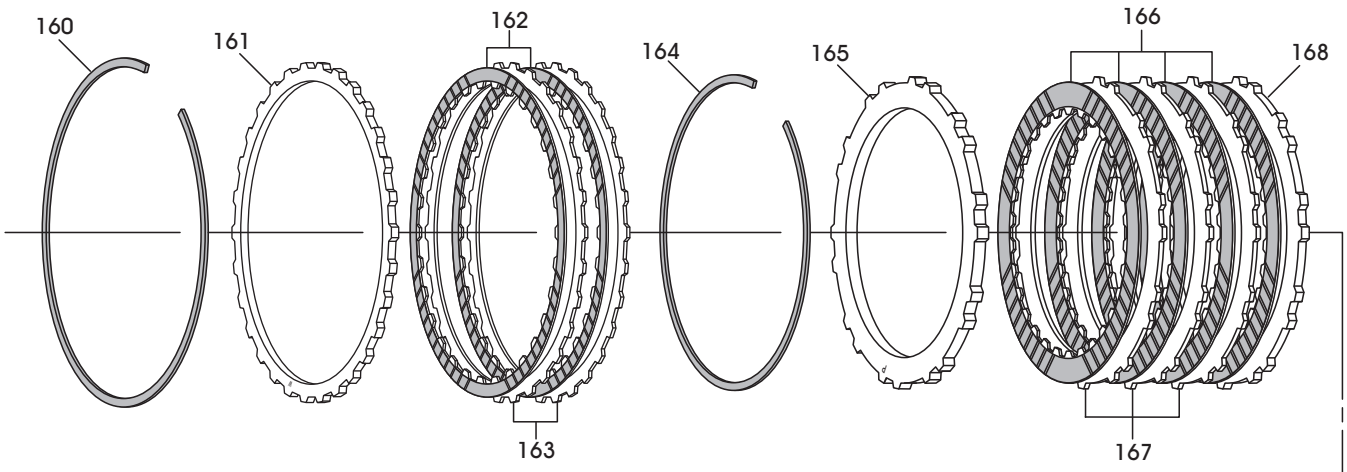


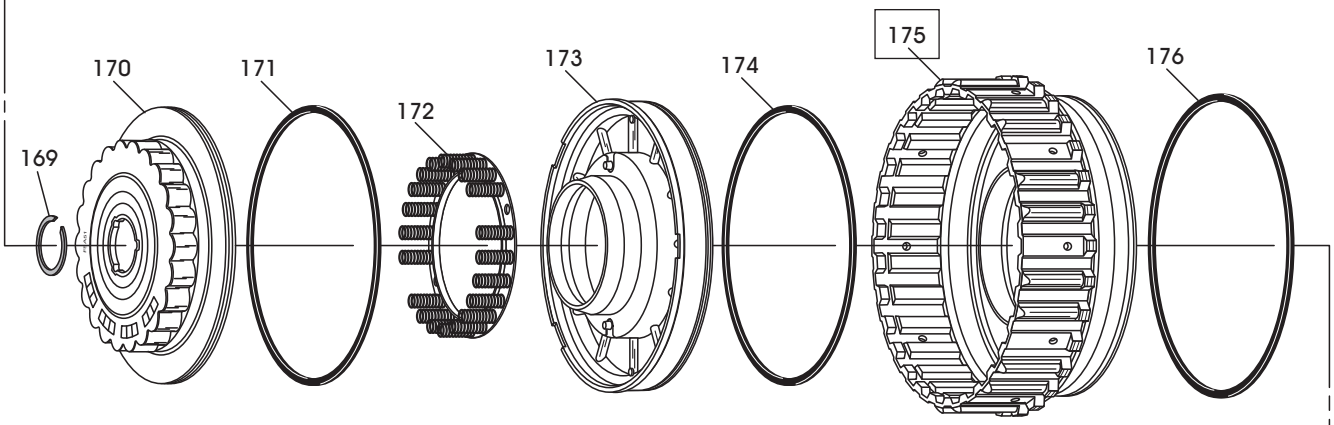
The outer piston seal will commonly be damaged as it passes over the crack

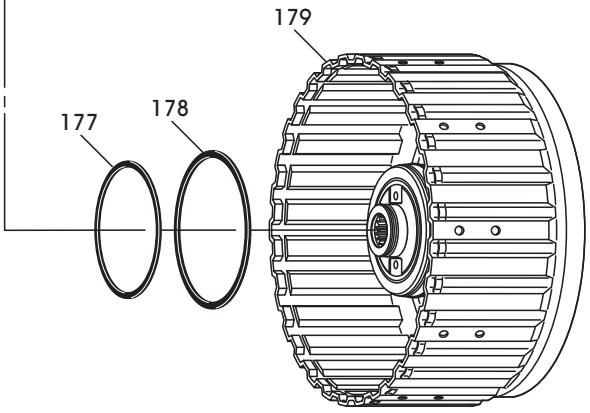
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Figure 3

REVERSE/OVERDRIVE CLUTCH HOUSING EXPLODED VIEW







160 REVERSE CLUTCH BACKING PLATE SNAP RING *(SELECTIVE).*
161 REVERSE CLUTCH BACKING PLATE (.160" THICK).
162 REVERSE CLUTCH FRICTION PLATES (.070" THK) (QTY VARIES).
163 REVERSE CLUTCH STEEL PLATES (.070" THICK) (QTY VARIES).
164 OD CLUTCH BACKING PLATE SNAP RING *(SELECTIVE).*
165 OD CLUTCH BACKING PLATE (.158" THICK).
166 OD CLUTCH FRICTION PLATES (.072" THK) (QTY VARIES).
167 OD CLUTCH STEEL PLATES (.119" THICK) (QTY VARIES).
168 OD CLUTCH APPLY PLATE (.158" THICK).
169 OD BALANCE PISTON RETAINING SNAP RING.
170 OD CLUTCH BALANCE PISTON.
171 OD CLUTCH BALANCE PISTON "D" RING SEAL.
172 OD CLUTCH APPLY PISTON RETURN SPRING.
173 OD CLUTCH APPLY PISTON.
174 OD CLUTCH APPLY PISTON OUTER "D" RING SEAL.
175 REVERSE CLUTCH APPLY PISTON.
176 REVERSE CLUTCH APPLY PISTON OUTER "D" RING SEAL.
177 OVERDRIVE CLUTCH PISTON INNER "D" RING SEAL.
178 REVERSE CLUTCH APPLY PISTON INNER "D" RING SEAL.
179 REVERSE/OVERDRIVE CLUTCH RETAINER ASSEMBLY.

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Figure 4

MAZDA RC4A-EL
CLIP AND TENSION SPRING LOCATIONS

COMPLAINT: During the rebuilding process of an RC4A-EL transmission there arises questions as to the proper placement of 1 clip and 3 tension style springs that are not seen in any other transmission.

CAUSE: The RC4A-EL transmission also known as the JR405E is a transmission used here in the States in the Mazda RX8 vehicle. It has a much broader use overseas. Since this is not a transmission that frequents the bench on a regular basis here, when it does, ATSG's technical hotline usually receives a call for help on placing these three unusual type tension springs. This question is also accompanied with "While I have you on the phone, there is a S shape clip as well that I am not sure about. Can you tell me where that goes also?"

CORRECTION: Figure 1 shows this S style clip as being the anti-rattle clip for the Low/Reverse Clutch stack up and its basic location. Figure 2 explains and illustrates how this Low/Reverse anti-rattle clip is placed into case after the clutch assembly and selective backing plate is installed. Once the clip is in place, the retaining snap ring is installed covering the clip to keep it securely in place (Figure 3).

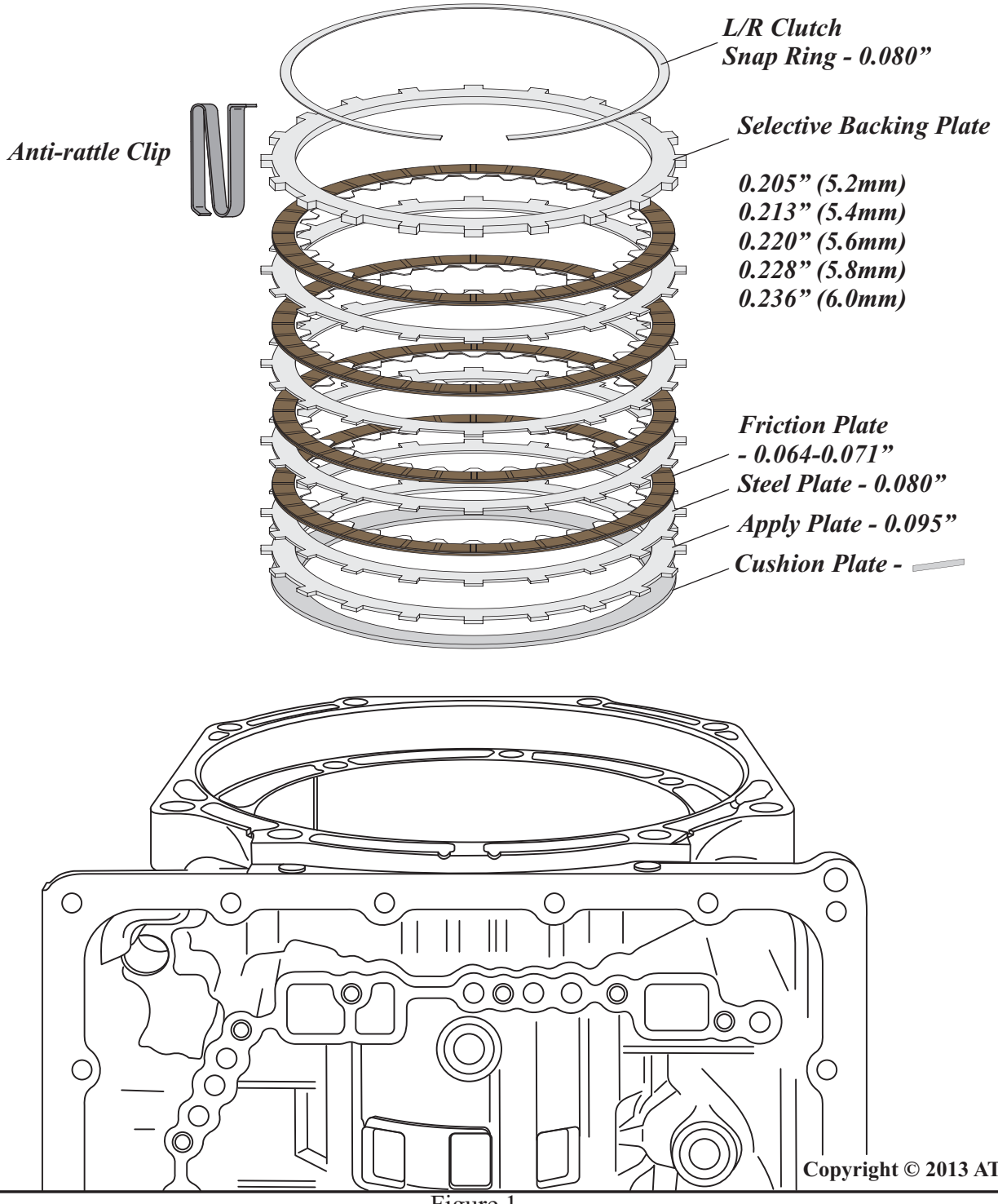
The 3 tension type springs are located in the case to center the 2-4 steel plate stack up to insulate them from making noise through the case (figure 4).

They are placed into the case at the 1, 4 and 9 o'clock positions in the grooves where the steel plates align (Figure 5). These positions can be easily located as the basic spring design is embossed into the case identifying their location as seen in Figure 5.

It is easiest to first place the assembly into the case then slide these 3 tension springs into place with the open side against the case. Then install the last friction plate, selective backing plate and cushion plate (Figure 6).

MAZDA RC4A-EL
CLIP AND TENSION SPRING LOCATIONS

Low/Reverse Brake Assembly
Clutch Clearance Specification
0.028" - 0.043"(0.7 - 1.1 mm)



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Figure 1

MAZDA RC4A-EL
CLIP AND TENSION SPRING LOCATIONS

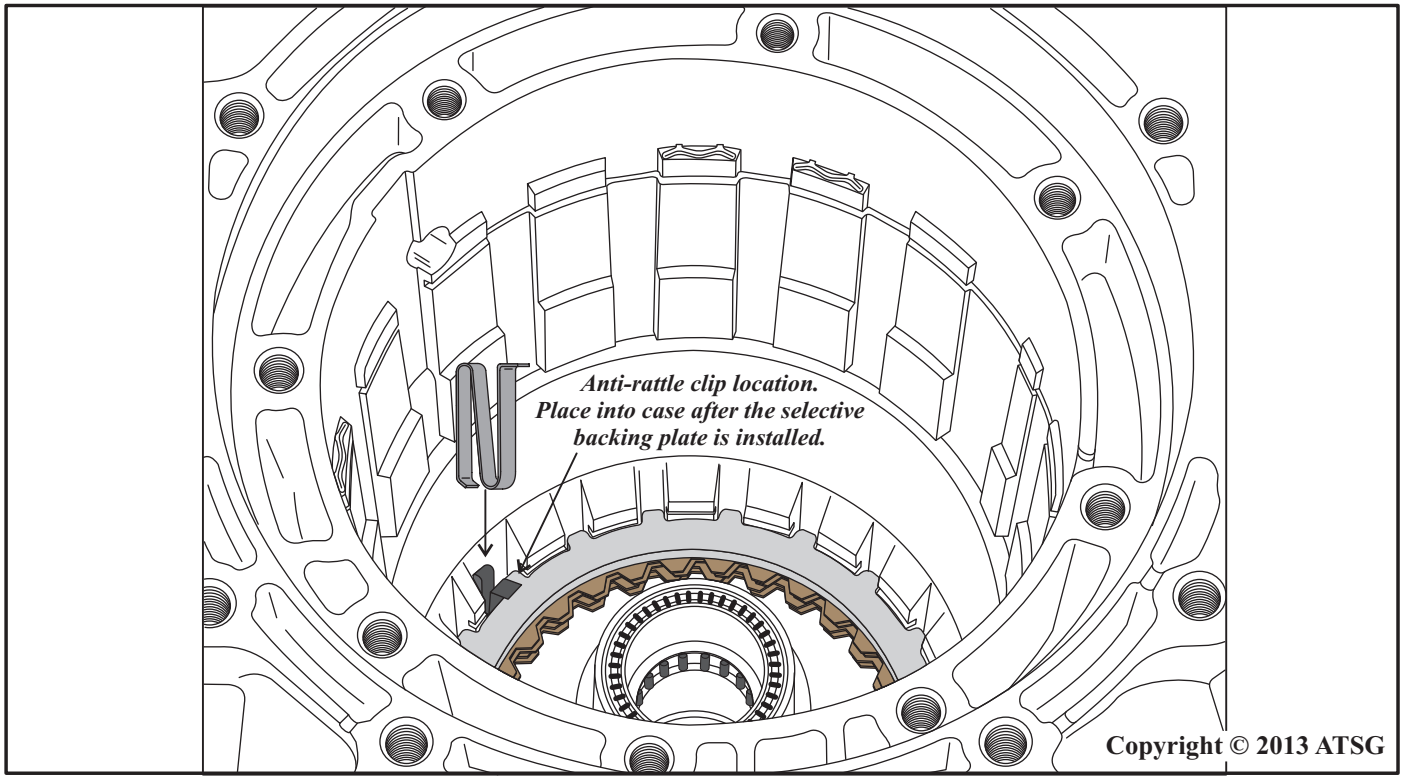


Figure 2

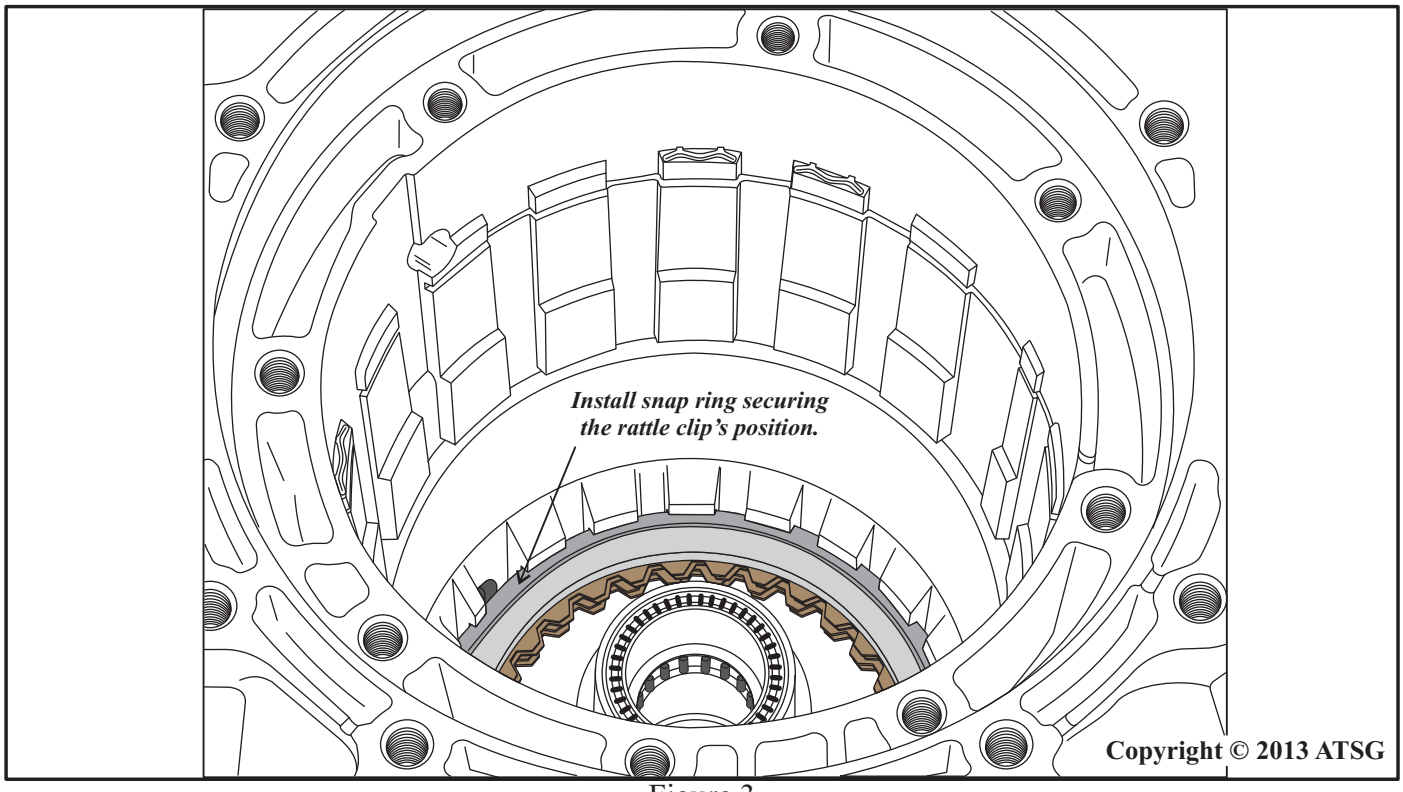


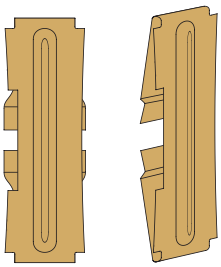
Figure 3

MAZDA RC4A-EL

CLIP AND TENSION SPRING LOCATIONS

2-4 Brake Assembly
Clutch Clearance Specification
0.040" - 0.055"(1.0 - 1.4 mm)

There are 3 steel plate centering springs to be installed into the case



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Figure 4

MAZDA RC4A-EL

CLIP AND TENSION SPRING LOCATIONS

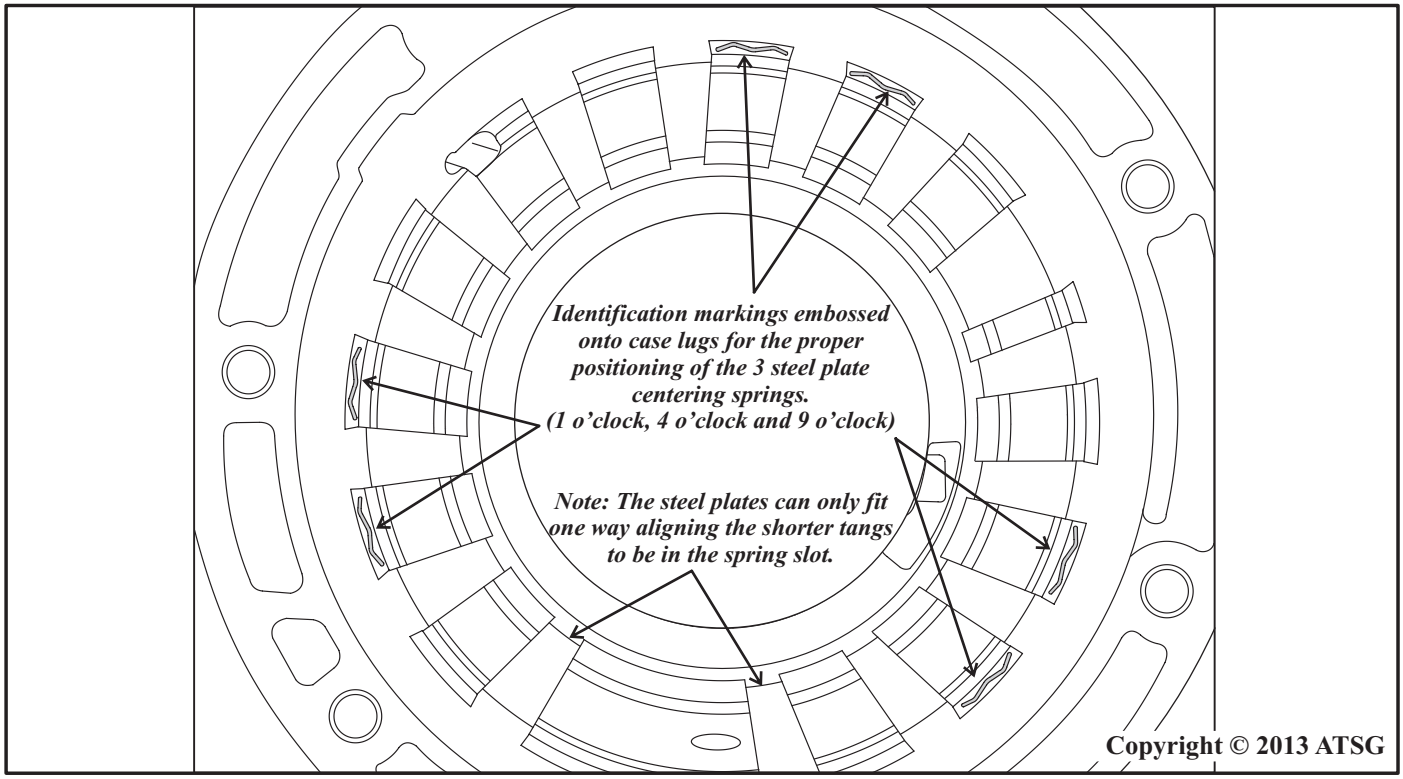


Figure 5

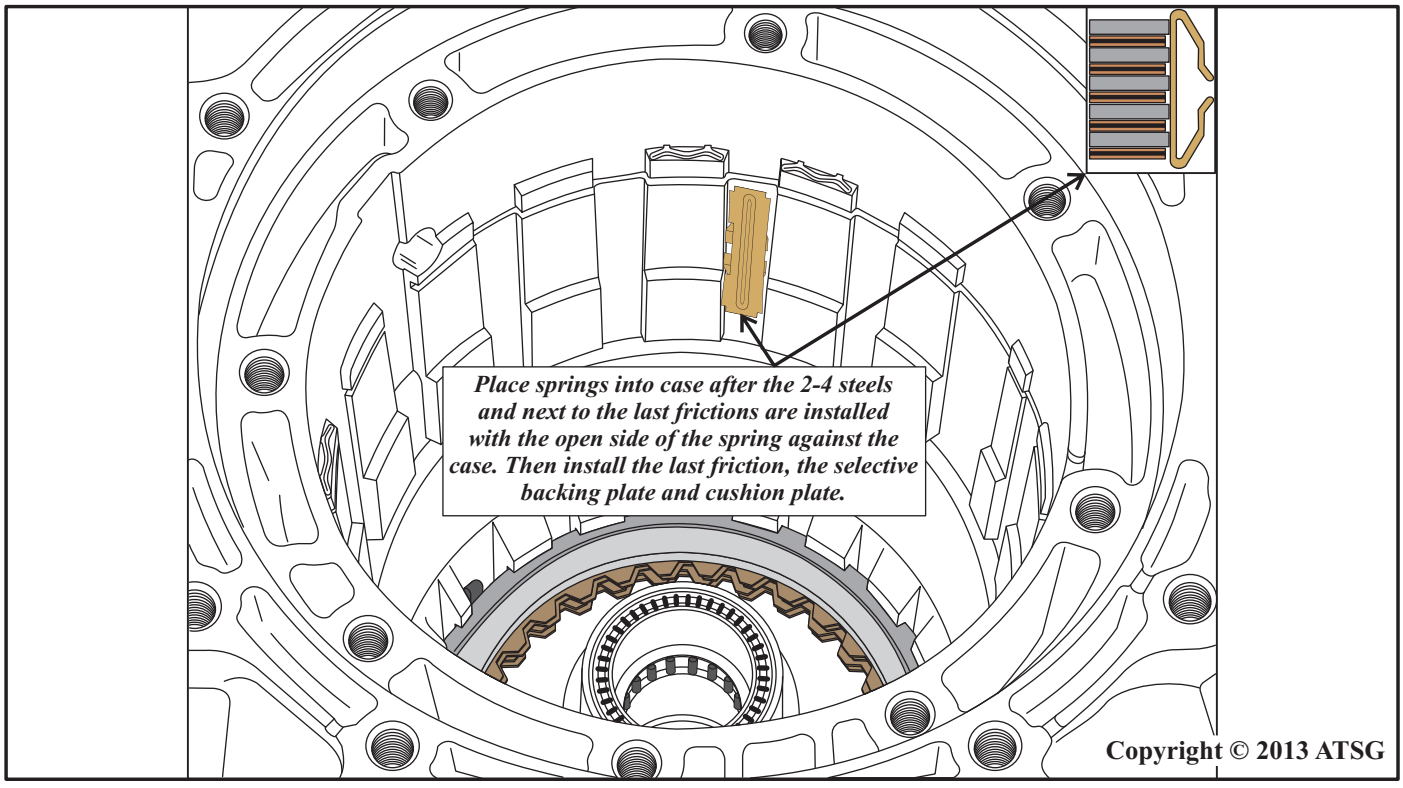
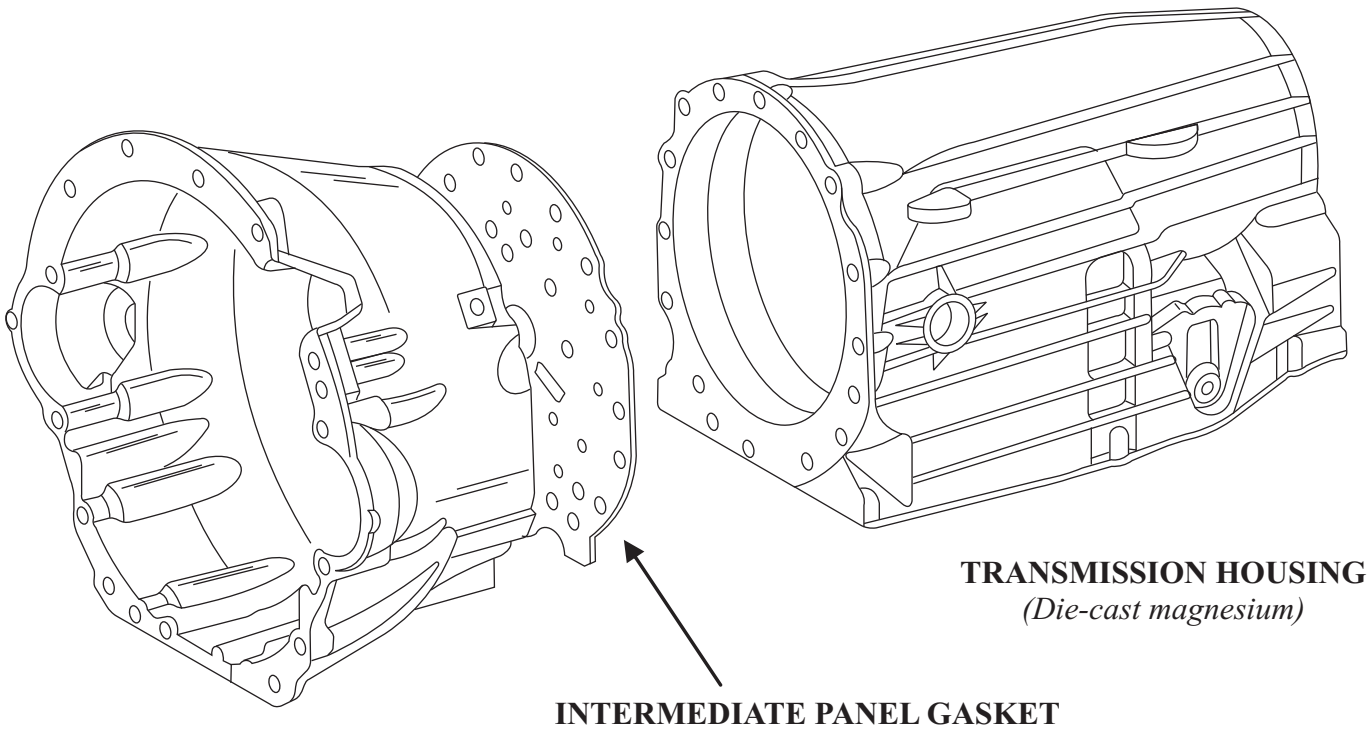


Figure 6

MERCEDES BENZ 722.9
TORQUE SPECS

NEW BOLTS AND INTERMEDIATE PLATE
PACKAGE KIT PART NUMBER - 600 0000 64 10



TRANSMISSION HOUSING
(Die-cast magnesium)

INTERMEDIATE PANEL GASKET
(Aluminum sheet coated with elastomer - 220 277 16 14)

CONVERTER HOUSING
(Die-cast aluminum)

Converter housing is die-cast aluminum. The transmission housing is die-cast magnesium (reduced weight compared to aluminum 2.5kg/5.5lb). As a result this requires aluminum bolts since steel bolts have a different expansion rate and corrosion concerns. Part number for a package of bolts 140 990 46 01 (*B2 Housing Bolts 004 990 23 12 - 2 required*).

All aluminum bolts must be replaced if removed. The intermediate panel or gasket is made from an aluminum sheet with an elastomer coating and can be reused if there are no signs of damage to the elastomer coating. This gasket extends out beyond the sealing surfaces of the converter and transmission housing to prevent water from settling on the transmission housing. Standing water (especially salt water) can corrode magnesium in as little as eight weeks.

Many thanks to Eddie Rose from Mansfield, UK for providing the following Converter Housing to Case Torque Specifications:

Stage 1 - Tighten to 10 Nm (*88.51 in-lbs*)
Stage 2 - Turn an additional 90 degrees

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TOYOTA A750E/F
MULTIPLE SOLENOID CIRCUIT FAULTS

COMPLAINT: Toyota Tundra, 4Runner, Tacoma, Sequoia and FJ Cruiser equipped with the A750 transmission may exhibit a complaint of multiple transmission solenoid electrical circuit faults set. Refer to Figure 2 for a list of common circuit faults affected by this issue.

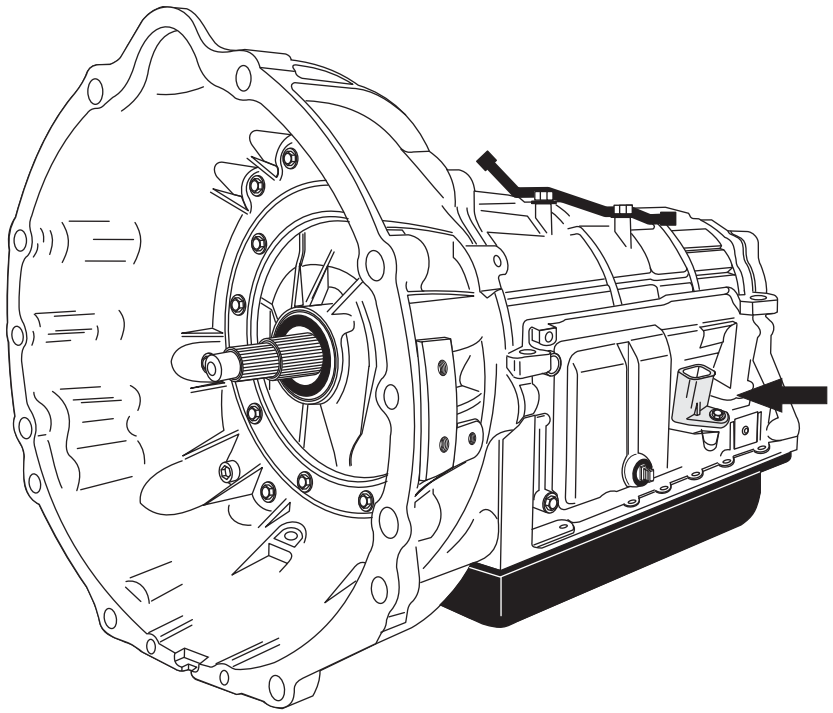
CAUSE: The cause may be, a bad weather pack seal on the harness side connector of the transmission case connector allowing moisture to corrode the male terminals and or deteriorating them. It is not uncommon to remove the external harness connector (female) and see the male terminals from the case connector, as shown in Figure 1, still stuck in the harness connector when this happens.

CORRECTION: To correct this condition, replace the transmission case connector, which is part of the internal harness, and clean the terminals in the female external harness connector. Install a small amount of dielectric grease into the connector and a small amount of silicone sealant on the weather pack seal to prevent moisture. If the connector is not corroded, use the following information to verify circuit integrity for the transmission solenoids. Refer to Figure 3 for a typical wiring diagram for A750. Refer to Figure 4 for terminal identification and ohm values for internal components. Refer to Figure 5 for solenoid location and ohm values on the valve body. Replace solenoids or harness as necessary.

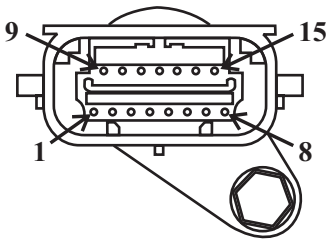
SERVICE INFORMATION:

INTERNAL HARNESS (04-4Runner, Land Cruiser Toyota part number).....82125-35130
INTERNAL HARNESS (05-Sequoia, Land Cruiser , Tundra, Tacoma).....82125-35150
Note: Contact your local dealer for vehicles other than shown above.

TRANSMISSION CASE CONNECTOR



Transmission Case Connector Pin ID (male)



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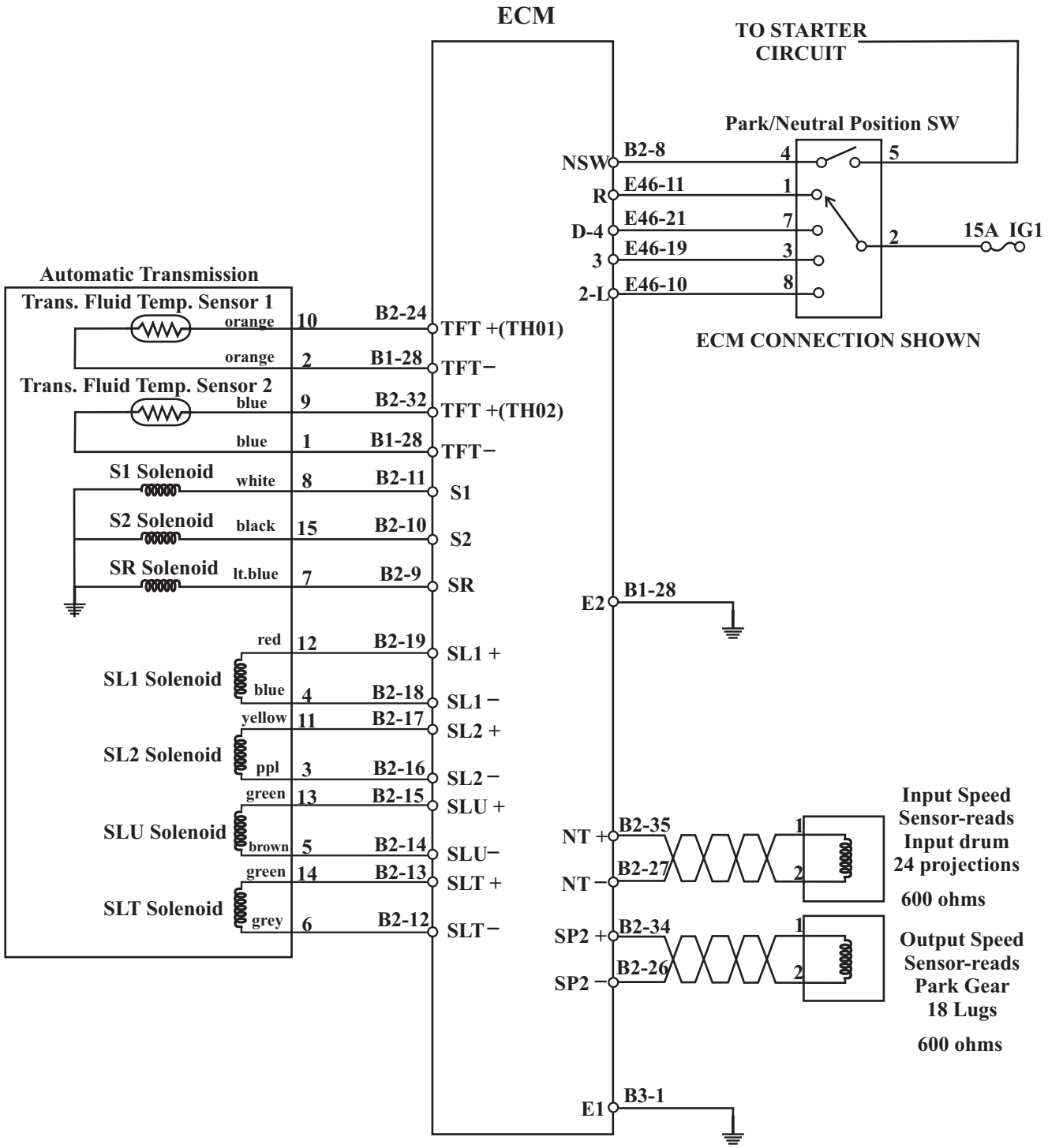
Figure 1

DIAGNOSTIC TROUBLE CODE DESCRIPTIONS

DTC	DESCRIPTION	TROUBLE AREAS	ELECTRICAL FAULT	MIL-1	MIL-2
P0710 P0712 P0713	Transmission Fluid Temp. Sensor "A" Circuit	Open or short in No.1 Temp sensor circuit	YES	ON	DTC Stored
P0748	Pressure Control Solenoid "A" Circuit Fault (SL1)	Open or short in SL1 circuit	YES	ON	DTC Stored
P0778	Pressure Control Solenoid "B" electrical Fault (SL2)	Open or short in SL2 electrical circuit	YES	ON	DTC Stored
P0973	Shift Solenoid "A" control circuit Low (S1)	Short in S1 electrical circuit	YES	ON	DTC Stored
P0974	Shift Solenoid "A" control circuit High (S1)	Open in S1 electrical circuit	YES	ON	DTC Stored
P0976	Shift Solenoid "B" control circuit Low (S2)	Short in S2 electrical circuit	YES	ON	DTC Stored
P0977	Shift Solenoid "B" control circuit High (S2)	Open in S2 electrical circuit	YES	ON	DTC Stored
P0985	Shift Solenoid "E" control circuit Low (SR)	Short in SR electrical circuit	YES	ON	DTC Stored
P0986	Shift Solenoid "E" control circuit High (SR)	Open in SR electrical circuit	YES	ON	DTC Stored
P2716	Pressure Control Solenoid "D" electrical Fault (SLT)	Open or short in SLT electrical circuit	YES	ON	DTC Stored
P2740 P2742 P2743	Transmission Fluid Temp. Sensor "B" Circuit	Open or Short in No.2 Temp sensor circuit	YES	ON	DTC Stored
P2759	TCC Control Solenoid Electrical Fault (SLU)	Open or short in SLU electrical circuit	YES	ON	DTC Stored

Figure 2

TRANSMISSION TO ECM PARTIAL WIRING SCHEMATIC

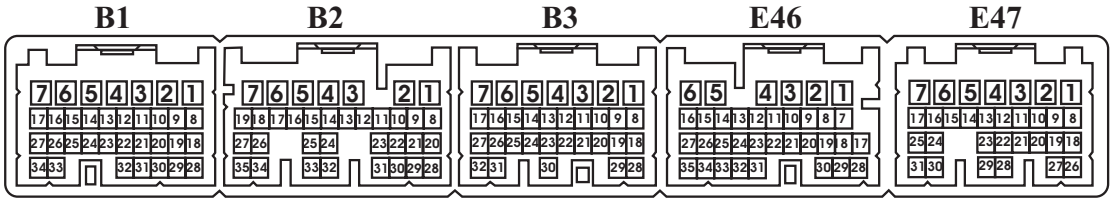


TERMINAL ID SHOWN IS BASED ON A 07 FJ CRUISER
CONSULT A WIRING DIAGRAM FOR TERMINAL I.D.
FOR OTHER VEHICLE APPLICATIONS

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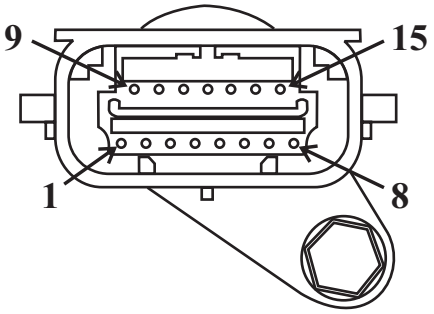
Figure 3

SOLENOID RESISTANCE CHECK CHART AT THE TRANS OR ECM



ECM Connector and Pin ID

Transmission Case Connector Pin ID



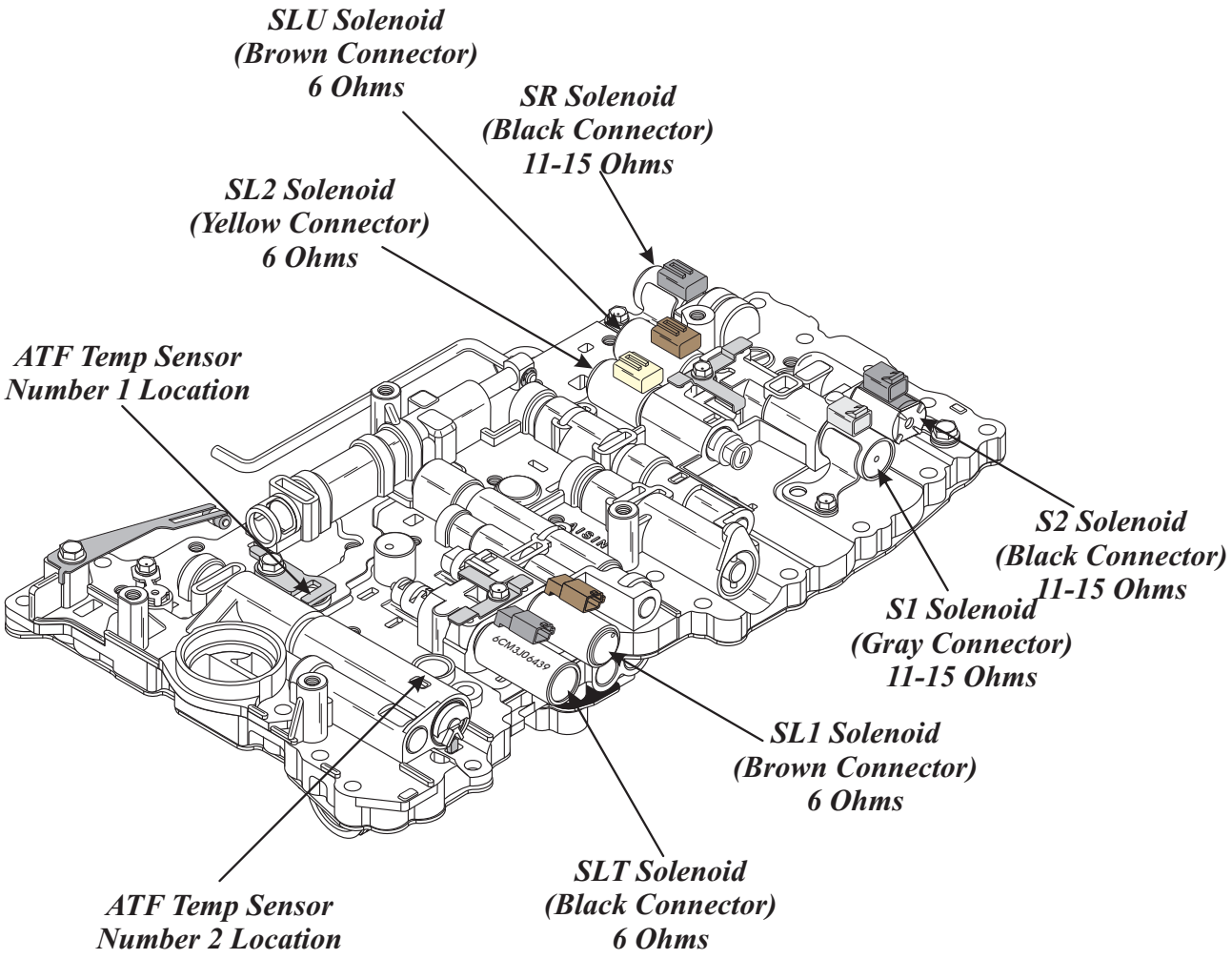
Solenoid Resistance Check at the Transmission Case Connector OR from the ECM Connector "B2"

Description	*Transmission Case Connector*		*ECM "B2" Connector*		*Value*
Solenoid	**Positive**	**Negative**	**Positive**	**Negative**	**Approximate Ohm Value**
S1	**8**	**Case Ground**	**B2-11**	**B3-1 or Body**	**11 - 15**
S2	**15**	**Case Ground**	**B2-10**	**B3-1 or Body**	**11 - 15**
SR	**7**	**Case Ground**	**B2-9**	**B3-1 or Body**	**11 - 15**
SL1	**12**	**4**	**B2-19**	**B2-18**	**6**
SL2	**11**	**3**	**B2-17**	**B2-16**	**6**
SLU	**13**	**5**	**B2-15**	**B2-14**	**6**
SLT	**14**	**6**	**B2-13**	**B2-12**	**6**
TFT-1 (THO)	**10**	**2**	**B2-24**	**B1-28**	**3.5k @ 68° F .22k @ 230° F**
TFT-2 (THO)	**9**	**1**	**B2-32**	**B1-28**	**3.5k @ 68° F .22k @ 230° F**

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Figure 4

TOYOTA A750E/F SOLENOID IDENTIFICATION AND LOCATION



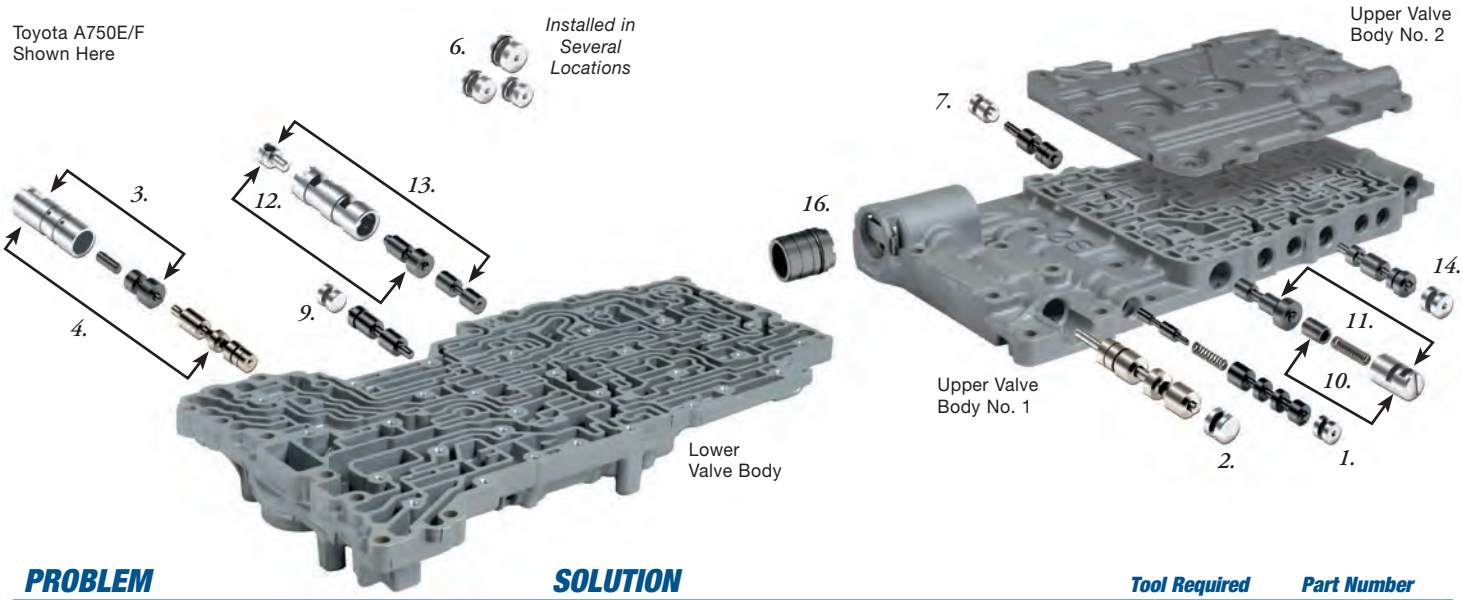
Note: To ohm test SLT, SL1, SLU, SL2, connect ohm meter across the two terminals in the connector

Note: To ohm test S1, S2, SR, connect ohm meter from the terminal in the connector and ground the meter to the hold down bracket of the solenoid

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Figure 5

16 Sonnax Solutions for the Toyota A750E/F, A760E/H & A761E Unit Series!



PROBLEM	SOLUTION	Tool Required	Part Number
• Converter apply/release complaints & codes • Burnt converters • Harsh lockup	**1.** Lockup Relay Valve Kit	F-147741-TL7 & VB-FIX	147741-07K
	2. Secondary Pressure Regulator Kit	F-147741-TL4 & VB-FIX	147741-10K
• Insufficient line rise in drive ranges • Higher-than-normal reverse pressures	**3.** Boost Valve Assembly		147741-01K
• Low/High line pressure • Soft and/or harsh shifts	**4.** Oversized Main Pressure Regulator & Boost Valve Assembly Kit	F-147741-TL4 & VB-FIX	147741-04K
• Various complaints of leaking end plug • Complaints relating to pressure loss	*5. O-Ringed End Plug Kit *A760E/H & A761E Only*		147741-30K
	6. O-Ringed End Plug Kit *A750E/F Only*		147741-31K
• Solenoid codes • Shift complaints	**7.** Solenoid Modulator Valve Kit	F-147741-TL5 & VB-FIX	147741-05K
• Harsh up/downshifts • Flare upshifts • Gear ratio/solenoid mechanical codes	*8. Clutch Control Valve Kit *A760E/H & A761E Only*	F-147741-TL14 & VB-FIX	147741-14K
	9. Clutch Control Valve Kit *A750E/F Only*	F-147741-TL22 & VB-FIX	147741-22K
• Harsh downshifts • RPM surge on coast • Overheated fluid • Converter apply/release complaints	**10.** Lockup Control Plunger Valve & Sleeve Kit		147741-37K
	11. Oversized Lockup Control Valve, Plunger Valve & Sleeve Kit	F-147741-TL16 & VB-FIX	147741-16K
• Shift complaints & codes • Harsh shifts • Burnt bands • Flares	**12.** Accumulator Control Plunger Valve & Sleeve Kit		147741-35K
	13. Oversized Accumulator Control Valve, Plunger Valve & Sleeve Kit	147741-TL24	147741-24K
	14. Brake Control Valve Kit	F-147741-TL28 & VB-FIX	147741-28K
• Harsh or slipping 5-6 shifts • Harsh 3-2 downshifts	*15. B2 Accumulator Pistons *A760E/H & A761E Only*	F-147741-TL13 & VB-FIX	147741-13
• Delayed engagements • Slips/Flares in forward gears	**16.** Accumulator Piston Kit *Fits U140E/F, U240E, U241E, U150E, U151E/F, U250E, A750E/F, A760E/F/H & A761E*		57917E-19K

***Note:** These items fit only A760E/H & A761E units and are not shown in illustration.

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TOYOTA A750
TCC SHUDDER

COMPLAINT: Toyota Tundra, 4Runner, Tacoma, Sequoia and FJ Cruiser equipped with the A750 transmission may exhibit a complaint of Torque Converter Clutch Shudder at speeds between 32 and 42 mph. At speeds above 42 mph in 4th and 5th gear the shudder is not present. It is also noticed that when moving the selector into the "S" or "4" position and or driving the vehicle under a harder acceleration, this shudder disappears.

CAUSE: The cause may be that the WS automatic transmission fluid has broken down, at mileage near 40k, which causes the Torque Converter Clutch to shudder during "Flex Lockup." ***Description***: Flex Lockup is a Low duty cycle (approximately 32%) High Torque Converter Clutch Slip , only available in AI mode. Artificial Intelligence (AI) shift control strategy. AI shifting control selects the most suitable shift range automatically according to the driver's operation and driving condition. This mode is available in the "D" range. See Figure 1 for driving mode explanation. ***Note: The duty % is not available on the scan tool and must be viewed on a scope or graphing multi-meter.*** Torque Converter shudder and or Torque Converter Clutch failure can also be caused by driving the vehicle, with the TCC shudder, for too long of a period of time and not dealing with the fluid issue. It has also been noticed that the TCC Control Valve Sleeve and Secondary Regulator Valve bores are showing wear at relatively low mileage. Refer to the partial oil circuit diagrams in Figures 2 and 3, which will point out the valve trains in the oil circuit diagram.

CORRECTION: To correct this condition, evacuate and re-install new WS ATF. See Figure 4 for filling information. ***Note:*** *This does not always fix this issue*, it can, *if* the customer brings the vehicle in when the shudder first appears. If the problem still persists, it will need to have the Torque Converter Clutch replaced and the valve body will need to be opened to verify the integrity of the vale bores previously mentioned. Refer to Figure 5 for an exploded view of the upper valve body.

SERVICE INFORMATION:

TCC CONTROL VALVE SLEEVE (Sonnax part number).....147741-37K
SECONDARY REGULATOR VALVE (Sonnax part number).....147741-10K

Shifter Assemblies

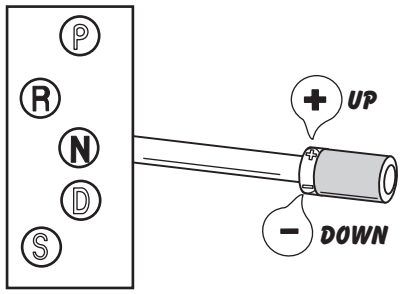
There are different types of Shifter assemblies, one located on the column and one located in the center floor console. They consist of a Park, Reverse, Neutral, Drive and Select Mode Driving position. A shift lock system is used to minimize the possibility of incorrect operation. This means that you can only shift out of Park when the brake pedal is depressed with the ignition switch in the ON position.

Once the selector lever is placed into the Drive position , the Engine Control Module provides an Artificial Intelligence (AI) shift control strategy.

AI shifting control selects the most suitable shift range automatically according to the driver's operation and driving condition. It judges whether the road is downslope or up-slope by detecting the throttle opening degree or the vehicle speed. It can also detect turns by monitoring wheel speed and will prevent unnecessary up-shifting and down shifting. AI can also read the driver's intention by monitoring acceleration and tailor shift time and feel ideal for each driver. ***AI shift control operates automatically with the selector lever in the "D" position. When it is moved to the "S" or "4" position, this function will be cancelled***.

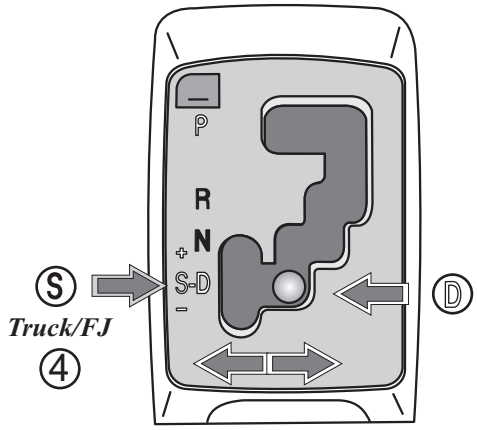
If the selector lever is placed into the "S" or "4" range from the "D" range on the fly (while driving in the AI shift control strategy), the AI strategy will select the proper shift range based upon the driving condition at the time the selector lever was moved. Once selected, ***AI strategy will be cancelled.***

COLUMN SHIFTER



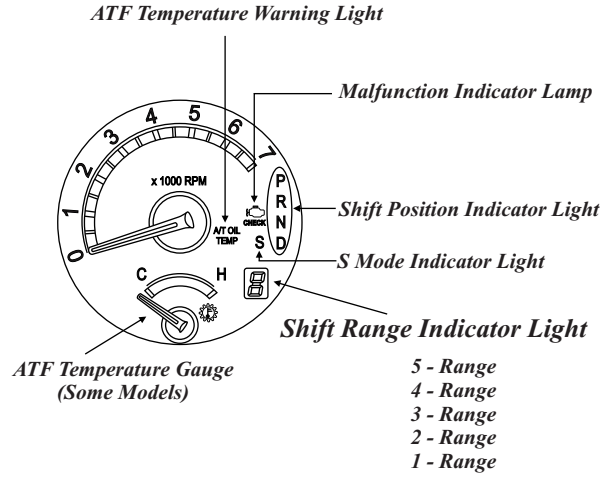
Transmission Control Switch

FLOOR SHIFTER



Truck/FJ Cruiser have a "4" selection to the left of "D"

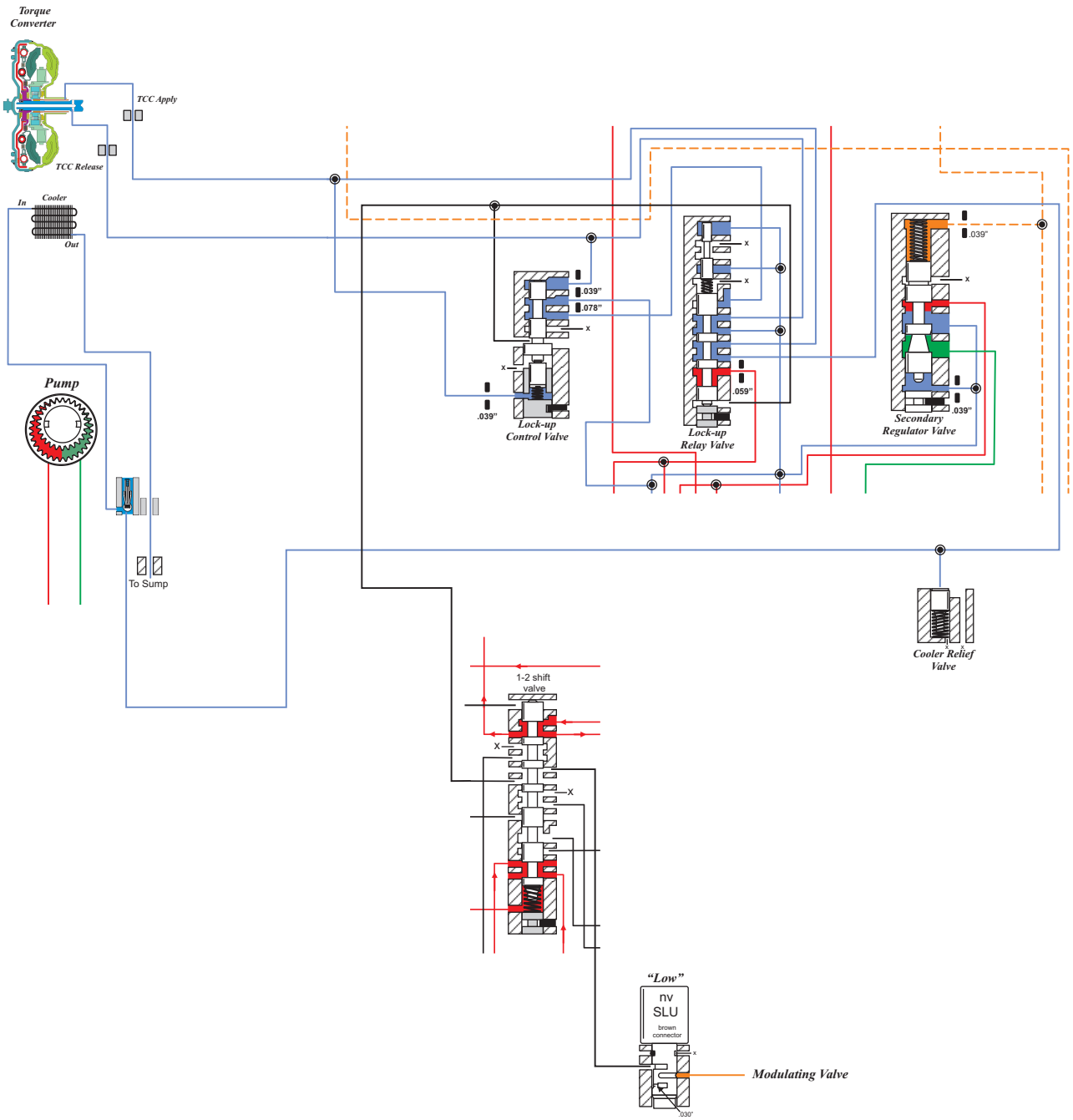
Combination Meter Display



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Figure 1

SLU SOLENOID THEORY OF OPERATION
TCC OFF

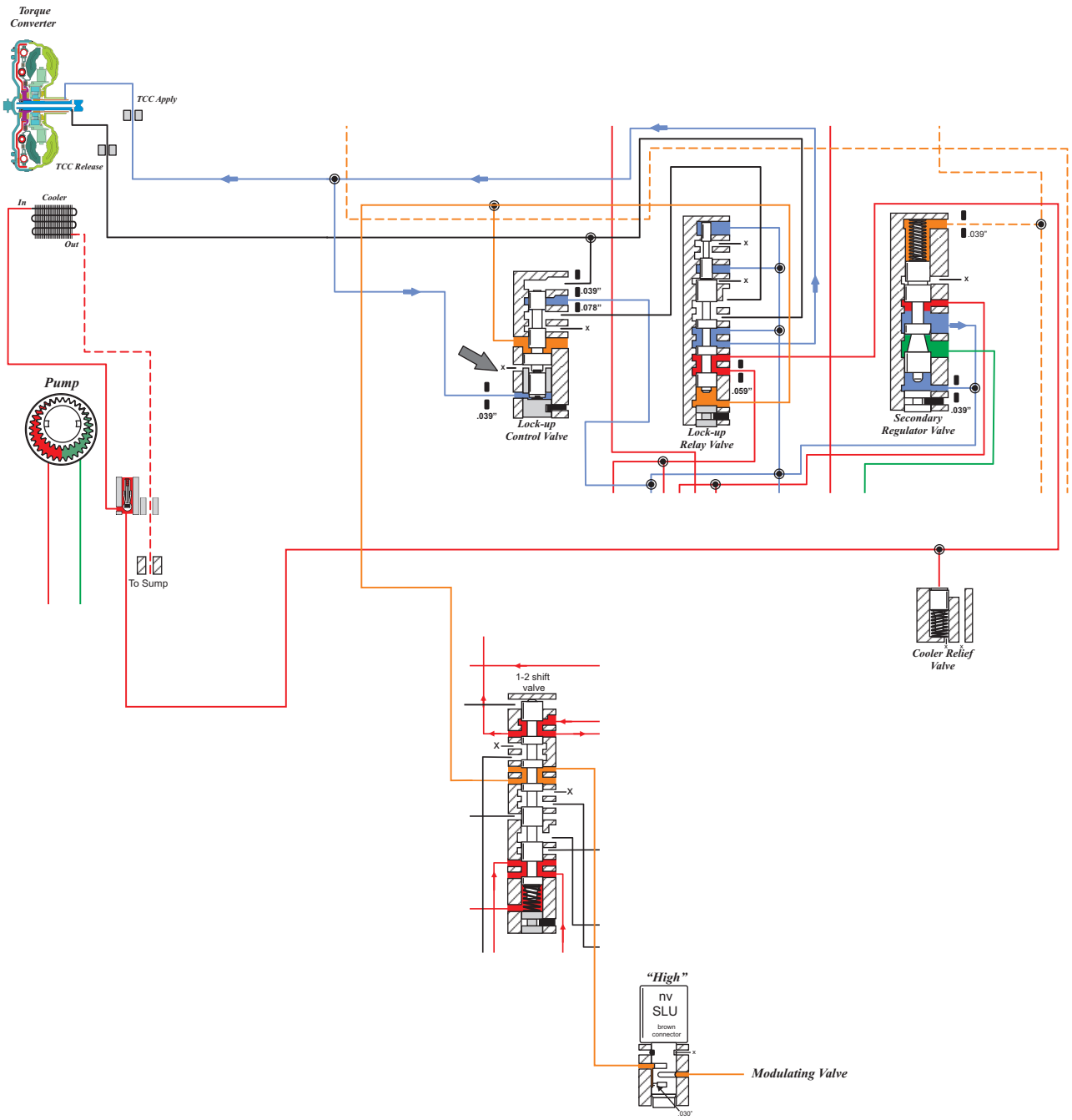


The SLU solenoid is a Normally Vented Solenoid, when the solenoid is at Low duty cycle the Torque Converter Clutch is not applied. The SLU circuit is connected to the 1-2 Shift valve which prevents TCC application in Reverse or 1st gear.

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Figure 2

SLU SOLENOID THEORY OF OPERATION
TCC ON



The SLU solenoid is a Normally Vented Solenoid, when the solenoid is at High duty cycle and the 1-2 Shift valve is not stroked, the Torque Converter Clutch is Applied, thru the Lock-up relay and Lock-up Control Valve. The cooler is also fed orificed line pressure when these valves switch. This ECM is also capable of partially applying the TCC after third gear, which is referred to as Flex Lock-up. Duty Cycle for the SLU will be approximately 32%. The SLU is also used for garage shift feel.

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Figure 3

TRANSMISSION FLUID CHECK AND CAPACITY

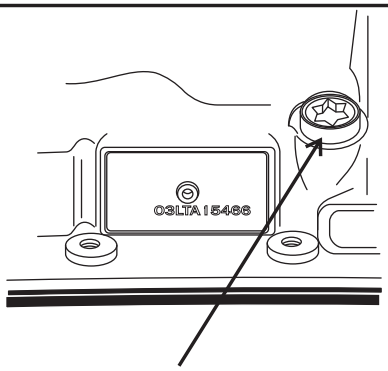
The 2005 and later A750E/F transmission does not utilize a conventional filler tube and dip stick for checking the fluid level. Looking at the bottom of the pan you will find two plugs one of which is marked as "check" . The other is a drain plug.

Looking inside the pan, you can see that on the other side of this check plug is a check pipe. Fluid is to be filled until the level is high enough to run over and out of the check pipe.

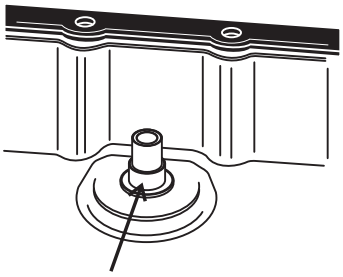
To fill the transmission, there are two options. Remove the 24mm fill plug on the passenger side rear of the case, marked with a “WS” and fill the trans or, there is also a 55 torx head bolt at the rear of the case on the drivers side of the vehicle which can also be used to fill the transmission as well.

This transmission utilizes a "WS" designated fluid and on a dry fill it will require 11 quarts (10.9L). 3.2 quarts (3.0L) on a drain and refill.

Note: The transmission fluid must be up to operating temperature when topping off. Oil overflow should be the thickness of a strand of spaghetti, when the level is correct.

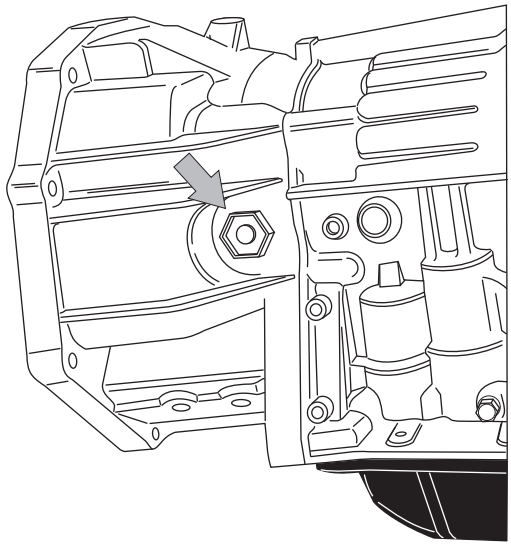


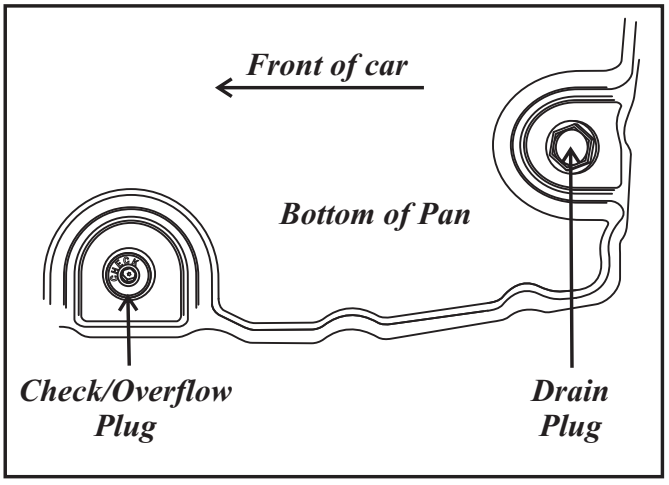
Optional Fill Plug



Check/Overflow Tube inside pan

Fill Plug

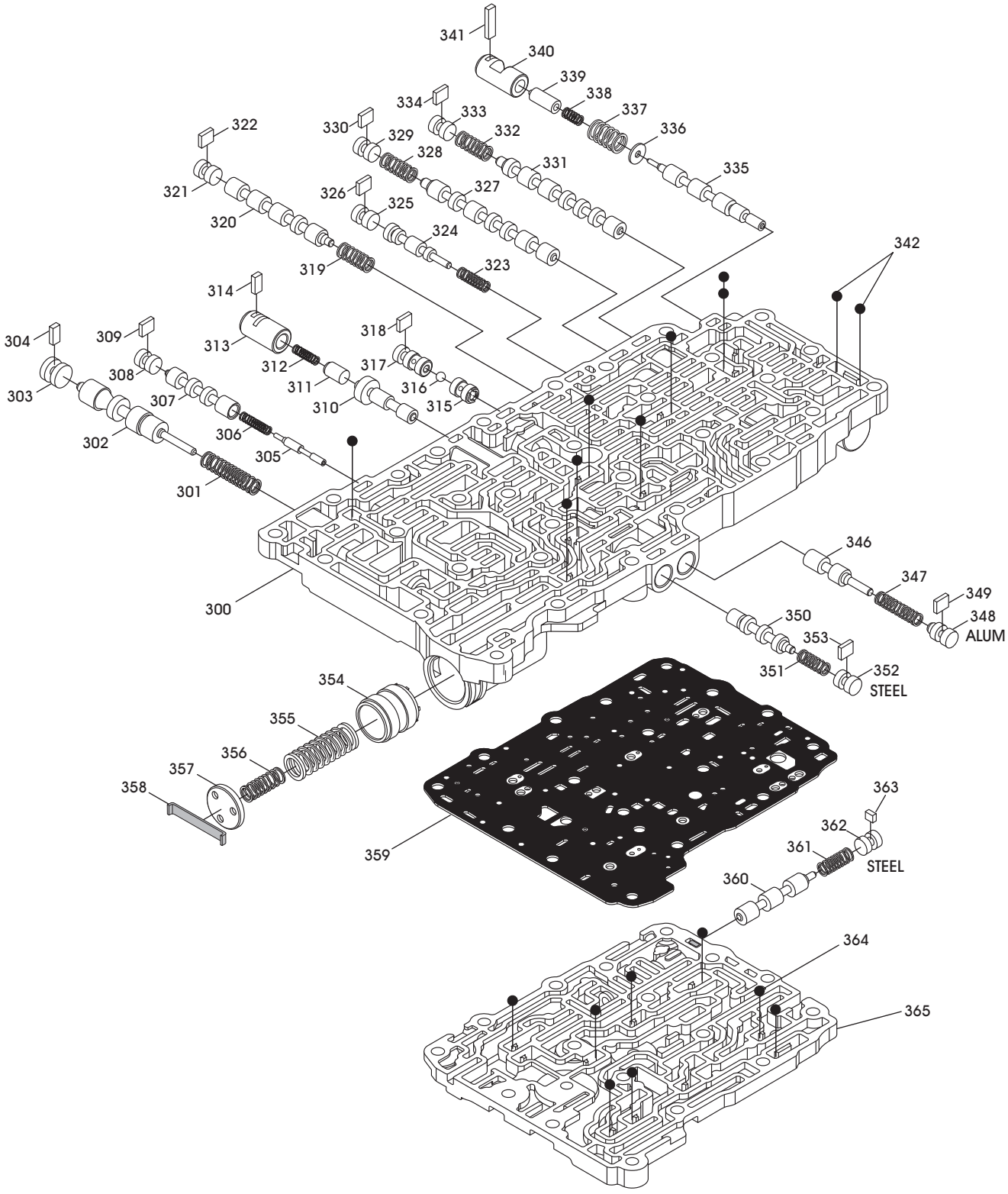




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Figure 4

UPPER VALVE BODY AND COVER EXPLODED VIEW



See Figure 6 For Legend

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Figure 5

FIGURE 5 LEGEND

300 UPPER VALVE BODY CASTING.
301 SECONDARY PRESSURE REGULATOR VALVE SPRING.
302 SECONDARY PRESSURE REGULATOR VALVE.
303 ALUMINUM BORE PLUG.
304 SHORT BORE PLUG RETAINER.
305 LOCK-UP RELAY "INNER" VALVE.
306 LOCK-UP RELAY VALVE SPRING.
307 LOCK-UP RELAY VALVE.
308 STEEL BORE PLUG.
309 BORE PLUG RETAINER.
310 LOCK-UP CONTROL VALVE.
311 LOCK-UP CONTROL BOOST VALVE.
312 LOCK-UP CONTROL BOOST VALVE SPRING.
313 LOCK-UP CONTROL BOOST VALVE SLEEVE.
314 LOCK-UP CONTROL BOOST SLEEVE RETAINER
315 INNER CHECK BALL SEAT (C3).
316 STEEL SHUTTLE BALL (.250" DIAMETER).
317 OUTER CHECK BALL SEAT.
318 OUTER CHECK BALL SEAT RETAINER.
319 3-4 SHIFT VALVE SPRING.
320 3-4 SHIFT VALVE.
321 3-4 SHIFT VALVE BORE PLUG.
322 3-4 SHIFT VALVE BORE PLUG RETAINER.
323 BRAKE CONTROL VALVE SPRING.
324 BRAKE CONTROL VALVE.
325 BRAKE CONTROL VALVE BORE PLUG.
326 BRAKE CONTROL VALVE BORE PLUG RETAINER.
327 2-3 SHIFT VALVE.
328 2-3 SHIFT VALVE SPRING.
329 2-3 SHIFT VALVE BORE PLUG.
330 2-3 SHIFT VALVE BORE PLUG RETAINER.
331 1-2 SHIFT VALVE.
332 1-2 SHIFT VALVE SPRING.
333 1-2 SHIFT VALVE BORE PLUG.
334 1-2 SHIFT VALVE BORE PLUG RETAINER.
335 B1 APPLY CONTROL VALVE.
336 B1 APPLY CONTROL VALVE SPRING SEAT.
337 B1 APPLY CONTROL VALVE SPRING.
338 B1 APPLY CONTROL BOOST VALVE SPRING.
339 B1 APPLY CONTROL BOOST VALVE.
340 B1 APPLY CONTROL BOOST VALVE SLEEVE.
341 B1 APPLY CONTROL BOOST VALVE SLEEVE RETAINER.
342 5.5 MM (.216") DIA. VITON CHECK BALLS (10 REQ. IN V.B.)
346 SOLENOID MODULATOR VALVE.
347 SOLENOID MODULATOR VALVE SPRING.
348 SOLENOID MODULATOR VALVE ALUMINUM BORE PLUG.
349 SOLENOID MODULATOR VALVE BORE PLUG RETAINER.
350 CLUTCH LOCK VALVE.
351 CLUTCH LOCK VALVE SPRING.
352 CLUTCH LOCK VALVE STEEL BORE PLUG.
353 CLUTCH LOCK VALVE BORE PLUG RETAINER.
354 B1 ACCUMULATOR PISTON.
355 B1 ACCUMULATOR PISTON OUTER SPRING.
356 B1 ACCUMULATOR PISTON INNER SPRING.
357 B1 ACCUMULATOR VENTED BORE PLUG.
358 B1 ACCUMULATOR BORE PLUG RETAINER.
359 UPPER V.B. COVER TO UPPER V. B. SPACER PLATE (ID "T01").
360 COAST BRAKE RELAY VALVE.
361 COAST BRAKE RELAY VALVE SPRING.
362 COAST BRAKE RELAY VALVE STEEL BORE PLUG.
363 COAST BRAKE RELAY VALVE BORE PLUG RETAINER.
364 5.5 MM (.216") DIAMETER CHECK BALLS (8 REQ. IN COVER).

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Figure 6

TOYOTA U660-E
HARSH TCC APPLY

COMPLAINT: The vehicle exhibits a harsh TCC apply accompanied by an illuminated Malfunctioning Indicator Light (MIL). Upon code retrieval, P2757 is obtained which is a Torque Converter Clutch Pressure Control Solenoid (SLU) Performance fault code.

CAUSE: Toyota's 6 speed U660E utilizes a Flex Lock-Up Control converter clutch apply strategy which under specific driving conditions will allow a partial apply of the converter clutch as early as 2nd gear all the way to 6th gear. This flex control is accomplished through the use of a uniquely designed 3 port passage to the converter (Figure 1), an SL and an SLU solenoid (Figure 2), a Lock-Up Relay Valve and a Lock-Up Control Valve (Figure 3). TCC off, flex and full apply hydraulics can be seen in Figures 4, 5 and 6.

When the TCM request the apply of the clutch, it monitors the percentage of apply by comparing engine RPM to the Turbine RPM. Should the desired apply exceed the minimum or maximum range of the command given, P2757 sets causing the MIL to illuminate.

The two most common possibilities that can compromise the apply performance of the converter clutch causing P2757 to set is a mechanically failed SLU solenoid and/or Lock-Up Control Valve bore wear as the valve is steel and the housing is aluminum. When the SL solenoid has a performance problem it usually produces a P0741 code.

CORRECTION: Inspect the performance of the SLU solenoid and replace as necessary.
Inspect the Lock-Up Control Valve bore for wear, repair or replace as necessary.

Special note 1: The SLU and SLT solenoids are next to each other in the valve body. These two solenoids are dimensionally the same and can be inserted into the valve body in the wrong location. This will cause both line pressure and TCC apply issues as these two solenoids function differently. The SLT solenoid can be easily identified by 5 slotted passages to the valve in the snout of the solenoid while the SLU has 4 (Figure 7). Use Figure 8 for their proper location.

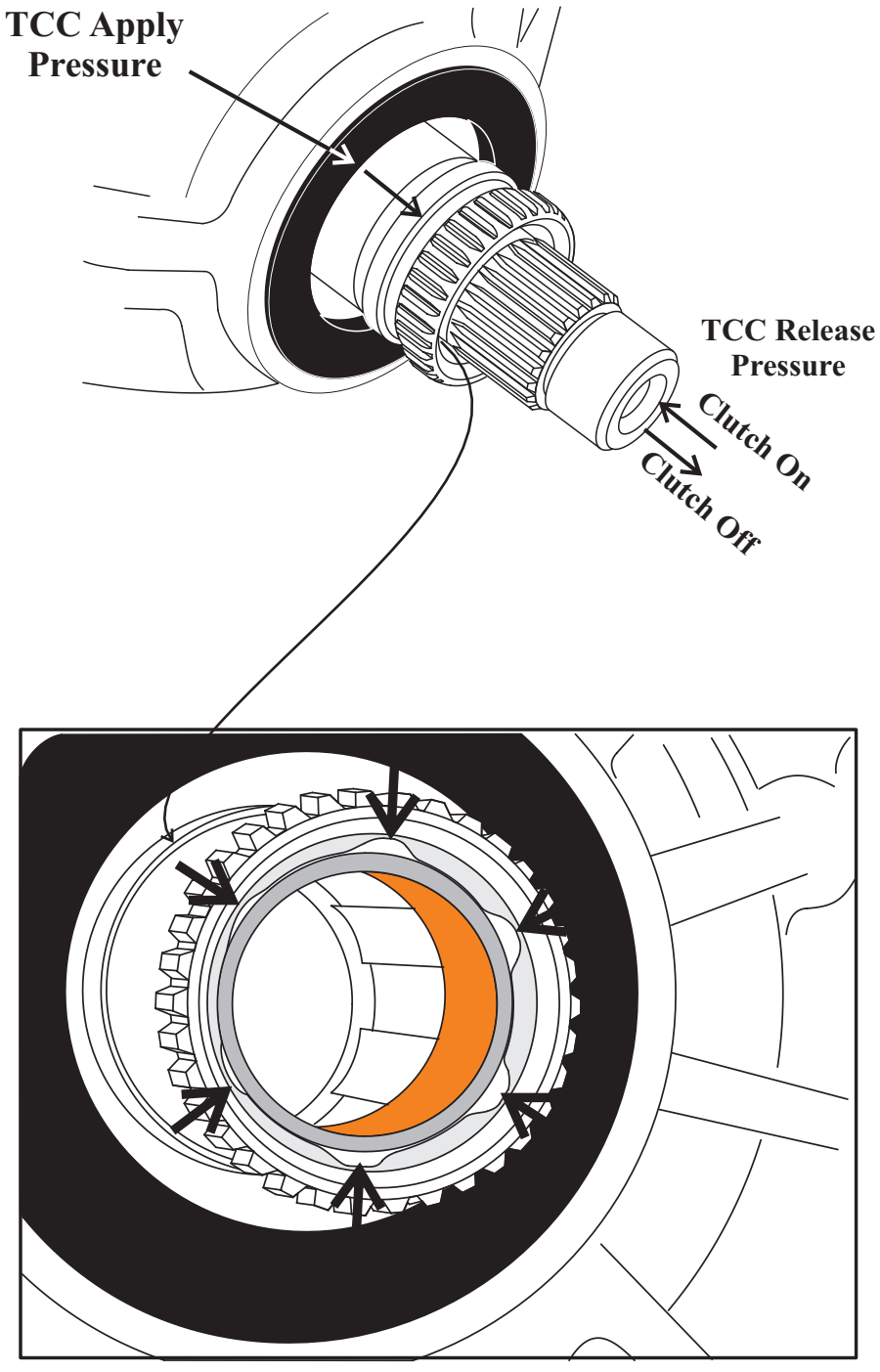
Special note 2: The SL, SLU and SLT solenoids are supplied with pressure from the Solenoid Modulating Valve (Figure 9). This too is a steel valve in an aluminum housing and is prone to wearing the bore. This will affect both line pressure control and TCC control making this an important bore to inspect at all times.

Special note 3: Toyota Bulletin T-SB-0061-08 dated May 13, 2008 stipulates that 2007-2008 Camry and 2008 Avalon may experience a TCC Shudder on light acceleration between speeds of 26 mph (42 km/h) (4th) and 36 mph (58 km/h) (5th) and/or 44 mph (71 km/h) (6th).

Production changes were made to the Torque Converter to improve this condition and is covered under the 60 month/60,000 mile warranty whichever comes first from the vehicle's in-service date. This TSB applies to vehicles produced BEFORE the Production Change Effective VINs shown below:

From TMMK plant - 4T1BK36B#8U299716
4T1BK46B#9U076421
4T1BK46B#9U579648
From Tsutsumi plant - JTNBK46K#83035861

TOYOTA U660-E
HARSH TCC APPLY

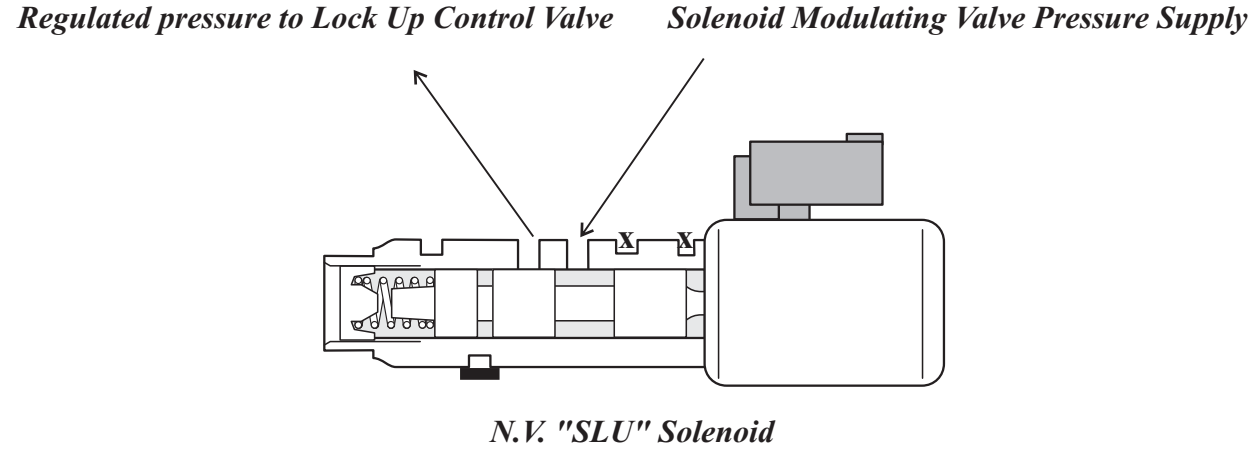


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Figure 1

TOYOTA U660-E
HARSH TCC APPLY

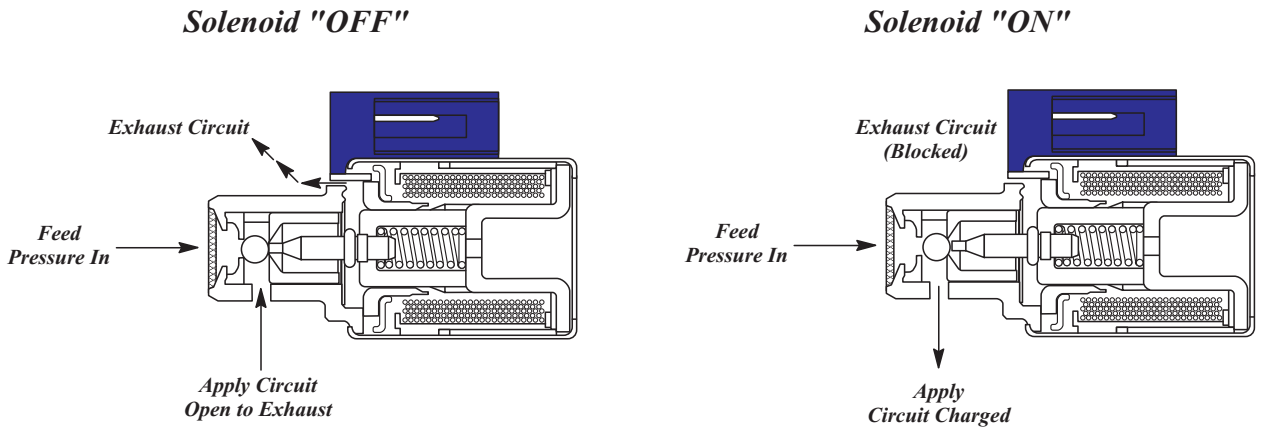
Torque Converter Clutch Pressure Control Solenoid (SLU)



N.V. "SLU" Solenoid

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.

Solenoid Lock-Up (SL) Torque Converter Clutch On/Off Control



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 2

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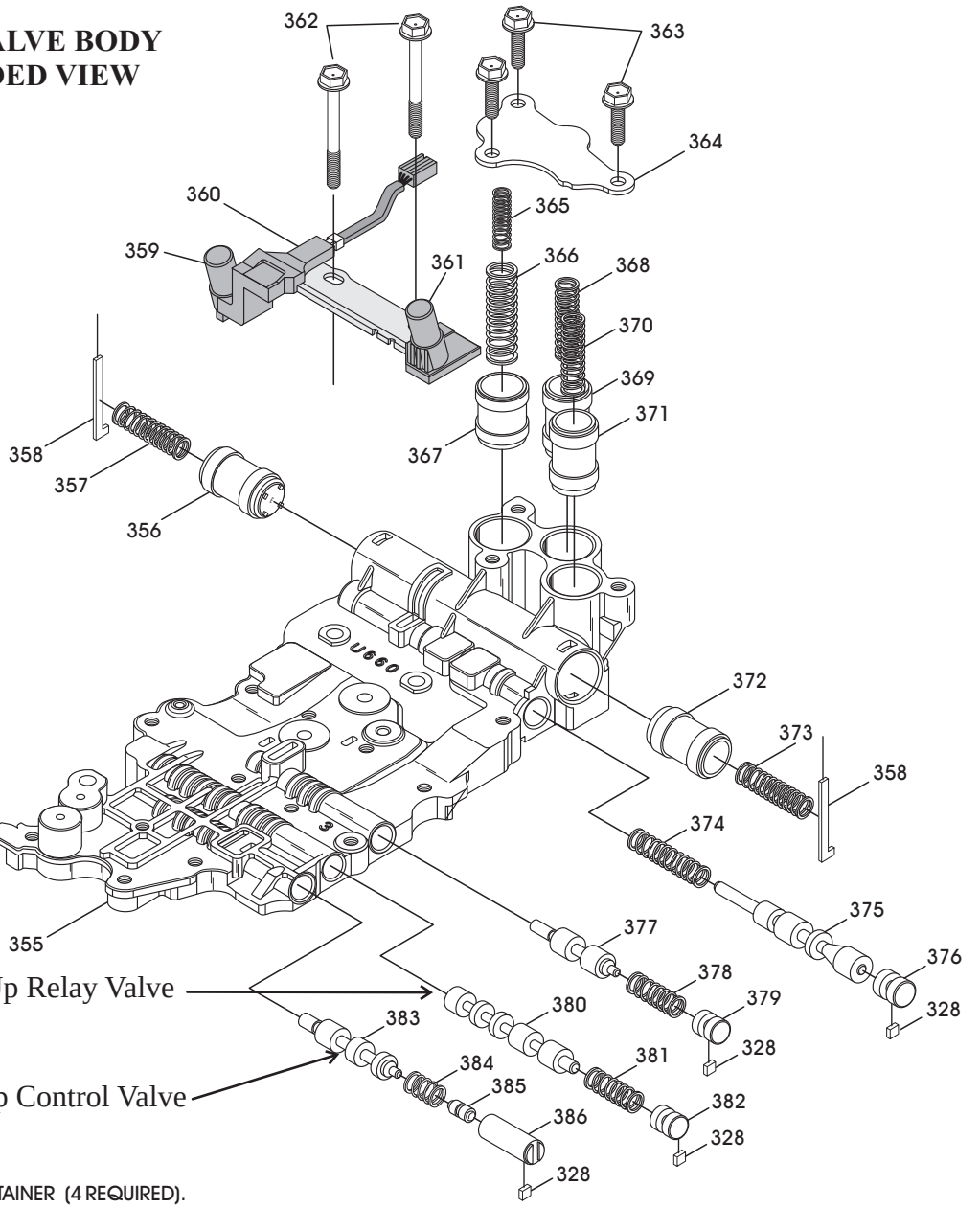
Rostra

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TOYOTA U660-E
HARSH TCC APPLY

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 C2 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 3

TOYOTA U660-E
HARSH TCC APPLY

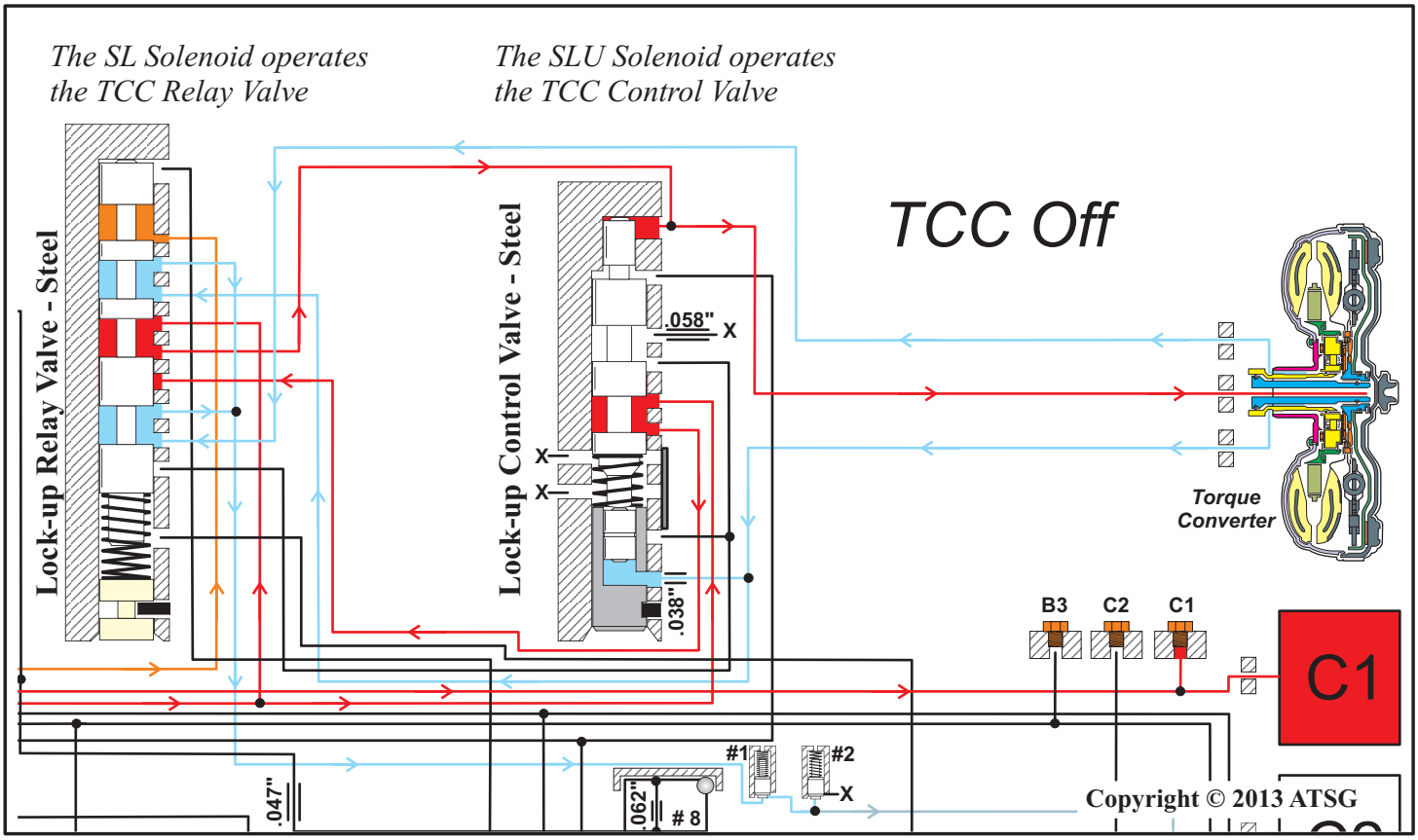


Figure 4

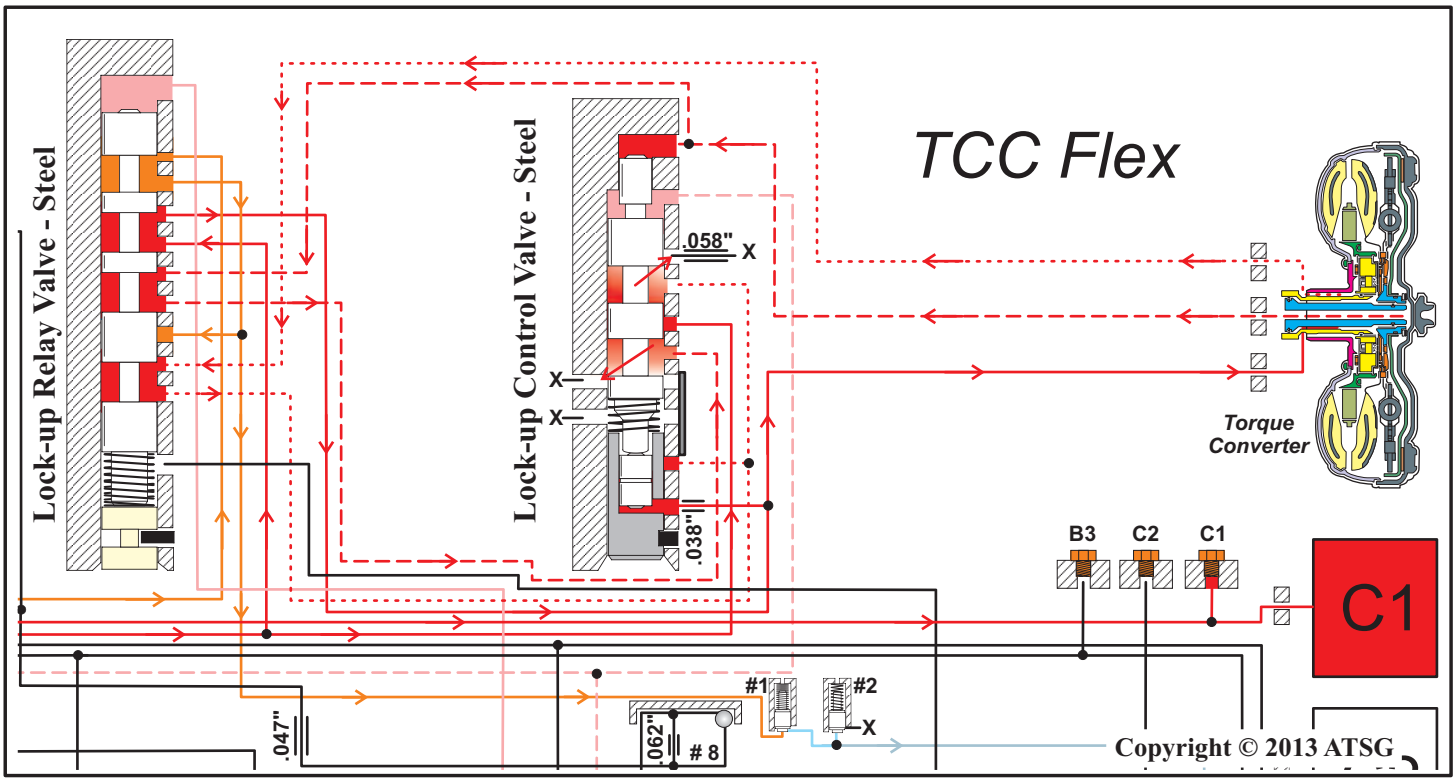


Figure 5

TOYOTA U660-E
HARSH TCC APPLY

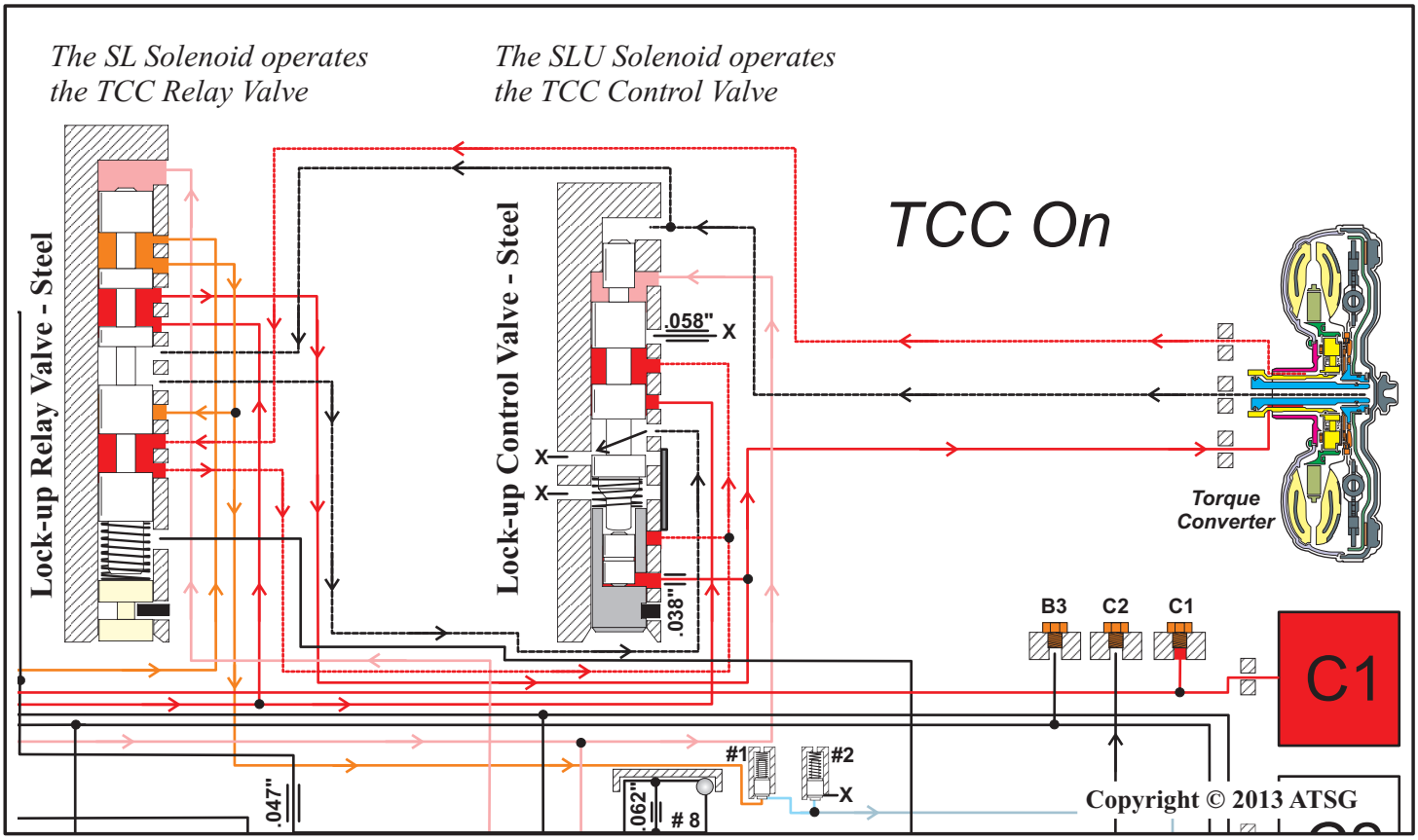


Figure 6

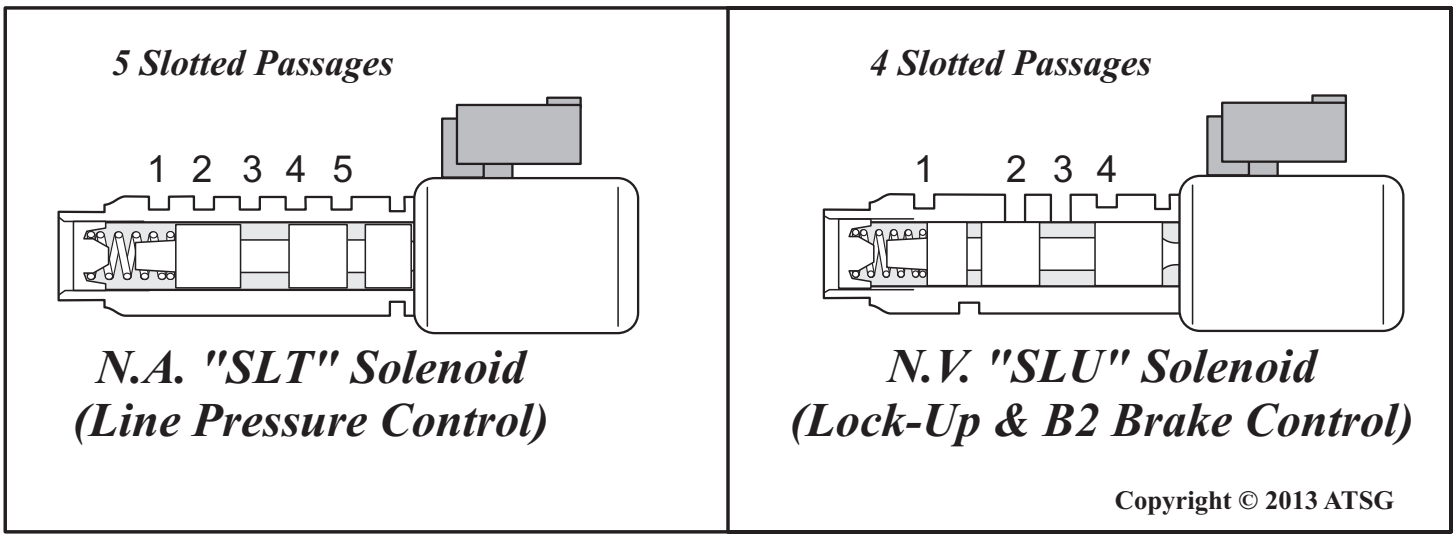


Figure 7

Social Media Impulse

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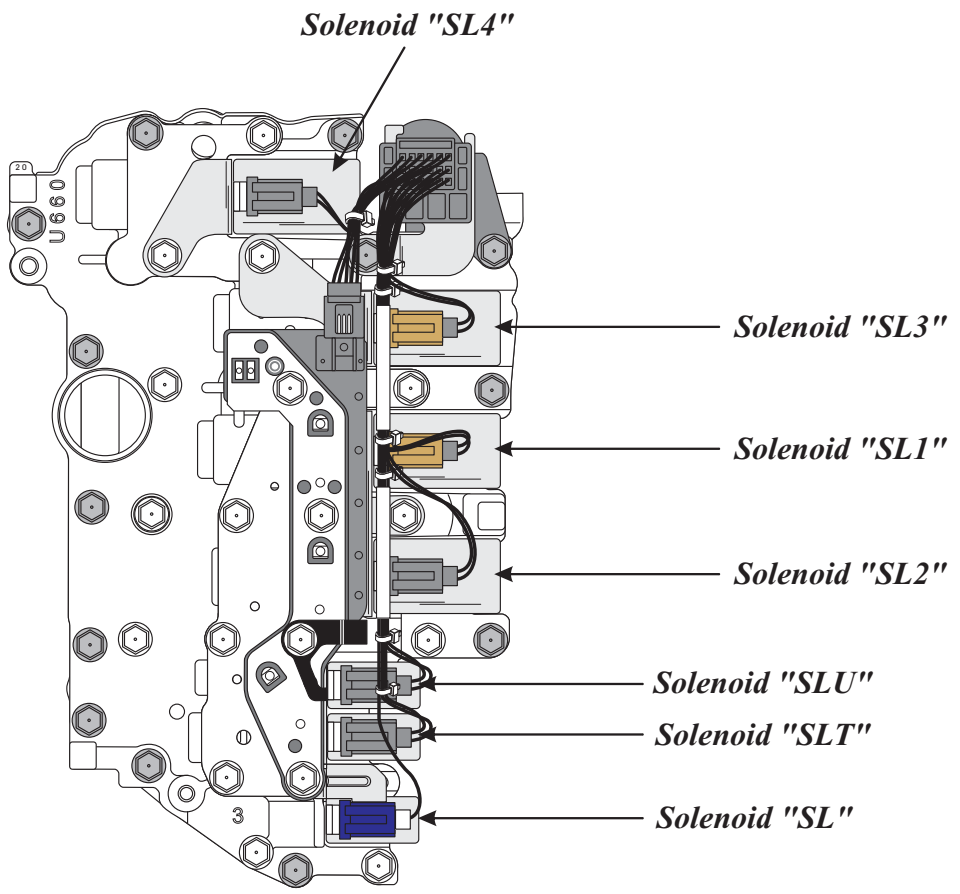
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TOYOTA U660-E
HARSH TCC APPLY



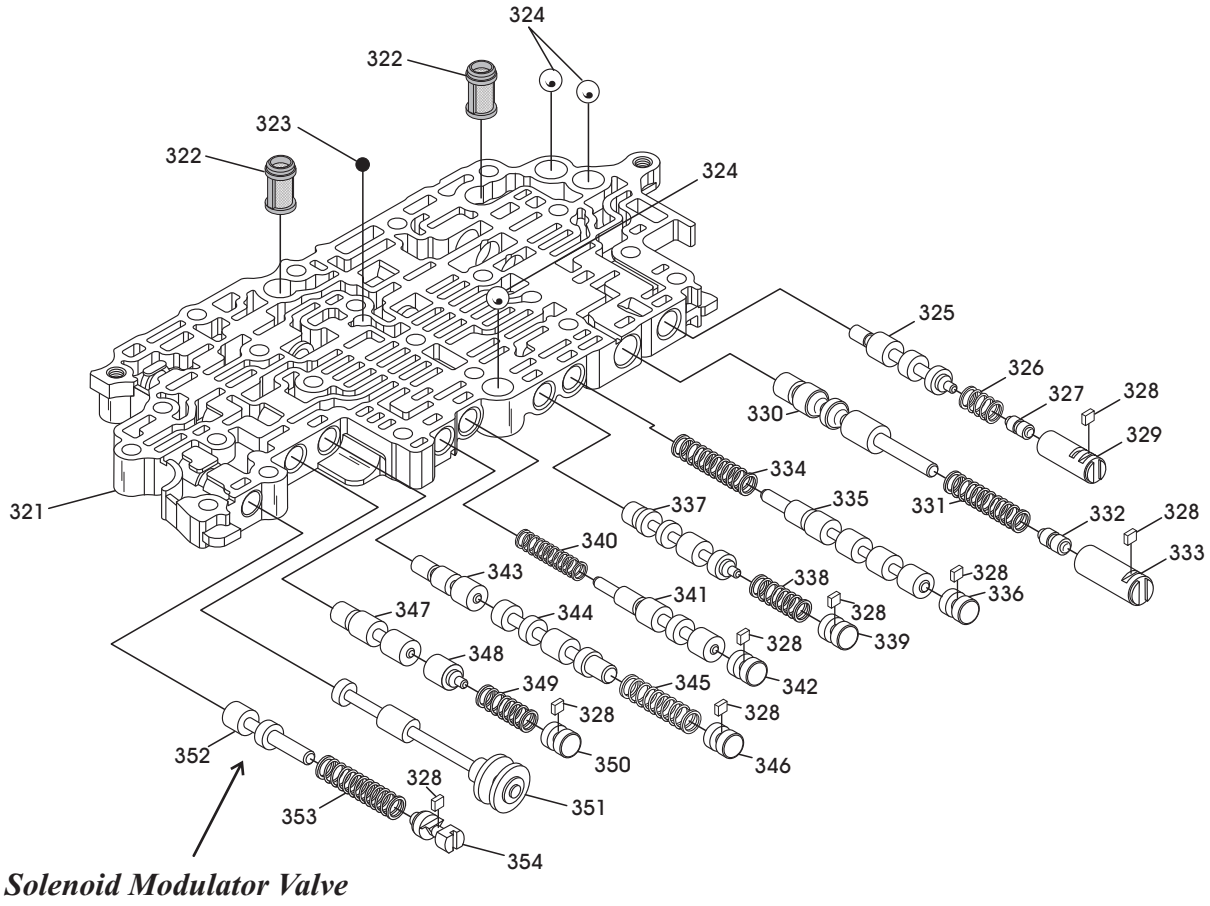
Solenoid	Type	Function	Ohms Resistance
SL1	Linear	C1 Clutch Pressure Control	5.0-5.6 @ 20°C (68°F)
SL2	Linear	C2 Clutch Pressure Control	5.0-5.6 @ 20°C (68°F)
SL3	Linear	B1 Brake Clutch Pressure Control	5.0-5.6 @ 20°C (68°F)
SL4	Linear	B3 Brake Clutch Pressure Control	5.0-5.6 @ 20°C (68°F)
SLT	Linear	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 8

TOYOTA U660-E
HARSH TCC APPLY

LOWER 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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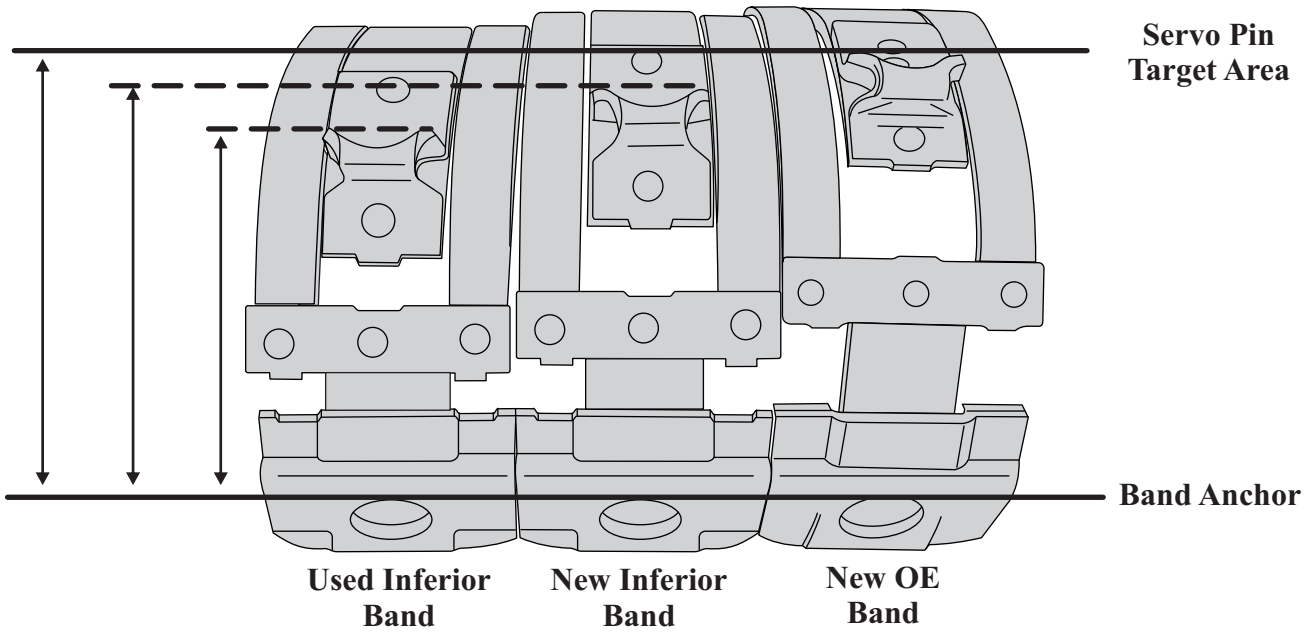
Figure 9

AW55-50SN/AF33-5/RE5F22A
2-3 AND/OR 4-3 FLARE

COMPLAINT: After rebuild the transmission exhibits a 2-3 and/or 4-3 flare. The transmission received a new valve body with solenoids, the adapts have been reset and the band has been adjusted as best as possible yet the 2-3 and/or 4-3 flare problem continues.

CAUSE: One cause can be the use of an inferior quality band (Figure 1). The dimensions of the band are very inconsistent with Original Equipment (O.E.) making it difficult to obtain the right band adjustment causing the 1-2/Reverse Clutch (B5) to release before the band (B4) applies. There needs to be an overlap of when the clutch releases and the band applies. If the overlap is to0 little, the transmission will flare. If the overlap is too much, the shift will be harsh.

CORRECTION: Install an OE quality band and adjust the band via the apply pin. There should be 0.125" (3.17mm) to 0.187" (4.76mm) travel. Refer to Figure 2 for the different length pins that are available with which to set the proper servo travel to apply the band.



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Figure 1

New Transmission-by-Vehicle App for smart phones



New, Global Edition Transmission App Simplifies Identifying Transmissions by Vehicle

You can now use your mobile phone to identify automatic transmissions in virtually any vehicle in the world.

Developed to eliminate confusion over look-alike transmissions, this mobile app identifies transmissions by vehicle make, model, year and engine for import and domestic applications through the 2012 model year and is updated continuously with new vehicle listings.

You can select Honda, for example, to learn that a 2002 Honda Accord with V6 3.0L engine has a 4-speed, front wheel drive transmission (model B7XA).

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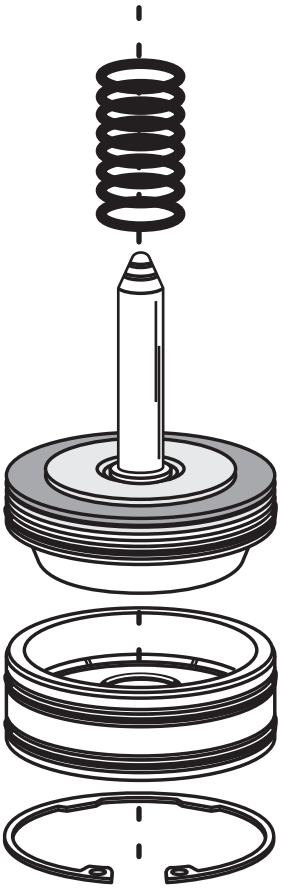
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AW55-50SN/AF33-5/RE5F22A
2-3 AND/OR 4-3 FLARE

SERVO APPLY PINS

VOLVO/SAAB/GM



0 grooves - 76.20 mm - 24220756

1 groove - 76.68 mm - 24220757

2 grooves - 77.19 mm - 24220758

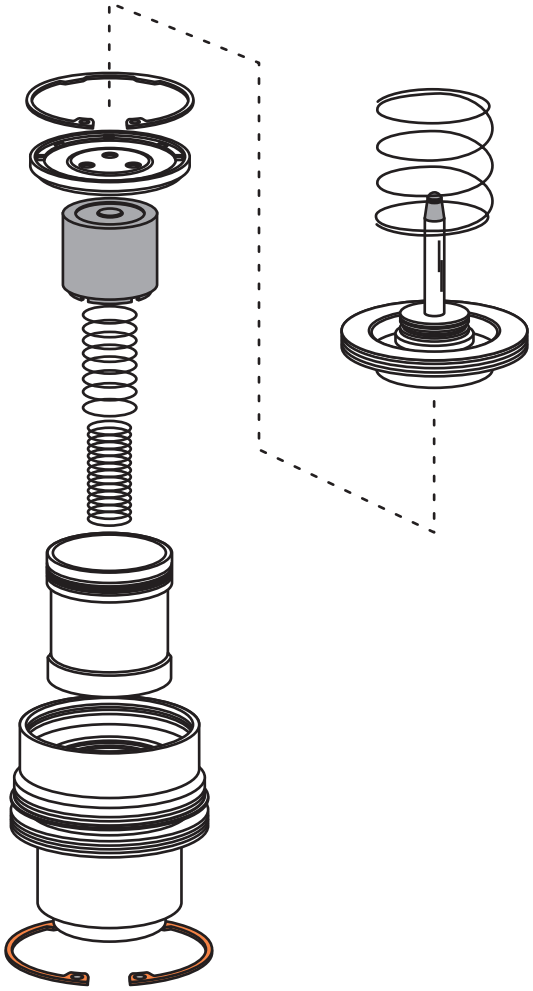
3 grooves - 77.70 mm - 24220759

4 grooves - 78.18 mm - 24220760

Servo Travel = 3.17 mm - 4.76 mm

0.125" - 0.1875" = 1/8" - 3/16"

NISSAN



0 grooves - 63.70 mm - 31615-8Y005

1 groove - 64.21 mm - 31615-8Y004

2 grooves - 64.70 mm - 31615-8Y003

3 grooves - 65.20 mm - 31615-8Y002

4 grooves - 65.71 mm - 31615-8Y001

Servo Travel = 3.17 mm - 4.76 mm

0.125" - 0.1875" = 1/8" - 3/16"

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Figure 2

AW55-50/51SN

HARSH REVERSE ENGAGEMENT

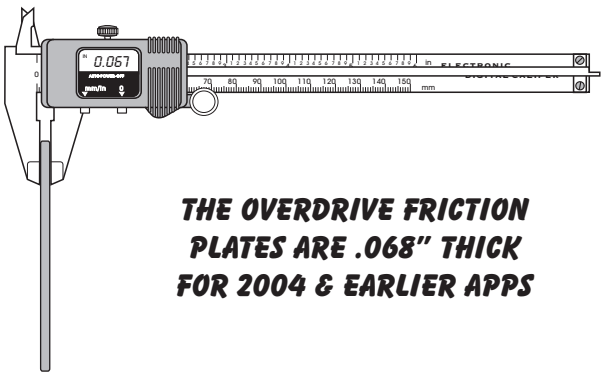
COMPLAINT: A harsh reverse engagement is felt, an exchange valve body had been installed, all pressures were within specification and all shift adapts have been performed yet the harsh reverse engagement remains.

CAUSE: Direct (C2) friction plates were installed that were the incorrect thickness which made this clutch pack too tight. If the clutch clearance is too tight the geartrain is already engaged when the selector lever is moved from park to reverse. This can cause reverse engagement to apply too quickly and can also be firm.
This can be caused by friction plates that have too much inconsistency in the thickness of the friction plates.

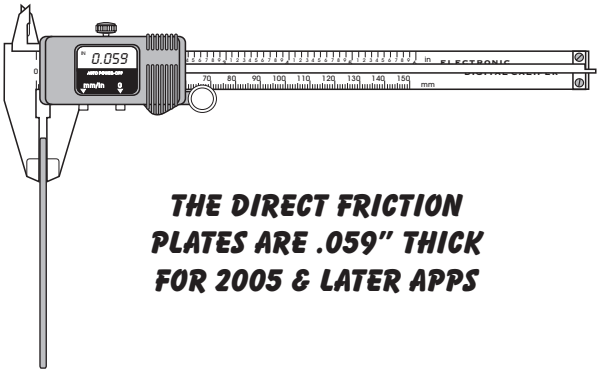
CORRECTION: The Direct Clutch frictions come in two (2) thicknesses, (Refer to Figure 1), for 2004 and earlier applications the friction plate thickness should be .068". 2005 and Later applications Direct friction plate thickness should be .059". Some friction plates can be upwards of .002" to .003" which can cause clearance problems. Direct clutch steel plates are .071" for all applications.
The Direct clutch pressure plate is selective but with incorrect friction plate thickness a proper thickness pressure plate cannot be found. Direct clutch components, clutch clearance specifications and air checks can be seen in Figures 2 and 3.

AW55-50/51SN

HARSH REVERSE ENGAGEMENT



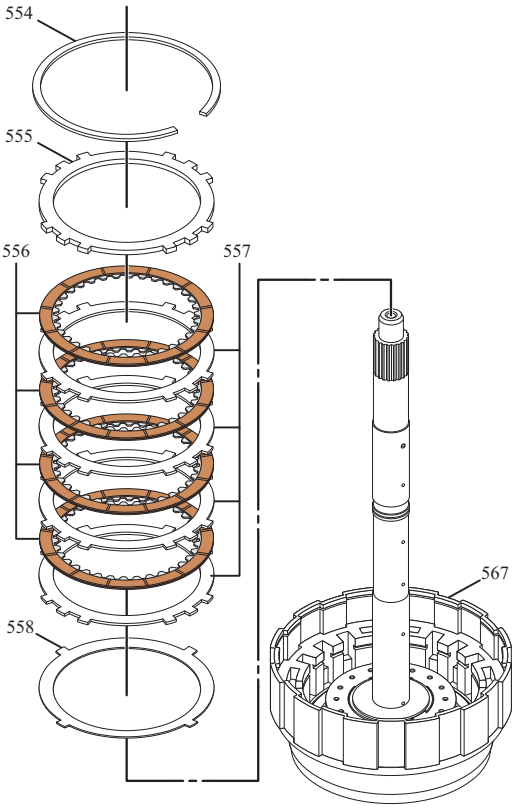
THE OVERDRIVE FRICTION PLATES ARE .068" THICK FOR 2004 & EARLIER APPS



THE DIRECT FRICTION PLATES ARE .059" THICK FOR 2005 & LATER APPS

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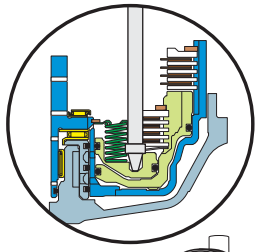
Figure 1



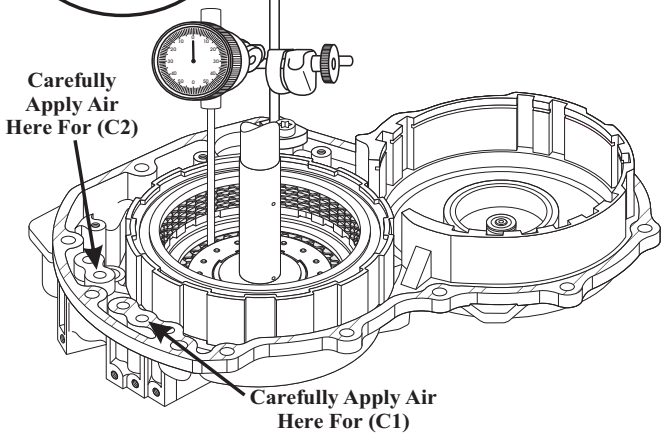
554. DIRECT CLUTCH (C2) BACKING PLATE RETAINING SNAP RING
555. DIRECT CLUTCH (C2) BACKING PLATE (SELECTIVE)
556. DIRECT CLUTCH (C2) LINED PLATE (4 REQUIRED)
557. DIRECT CLUTCH (C2) STEEL PLATE (4 REQUIRED)
558. DIRECT CLUTCH (C2) APPLY CUSHION PLATE
567. FORWARD (C1) AND DIRECT (C2) CLUTCH DRUM HOUSING ASSEMBLY

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Figure 2



CHECKING FORWARD (C1) AND DIRECT (C2) CLUTCH CLEARANCE



Clutch Assembly Specifications

Forward Clutch (C1)	*Specification Metric (English)*
Forward Clutch (C1) Clearance	*0.74 - 1.06 mm (0.029 - 0.042 in.)*
Direct Clutch (C2)	*Specification Metric (English)*
Direct Clutch (C2) Clearance	*0.76 - 1.24 mm (0.030 - 0.049 in.)*
Available Forward (C1) and Direct (C2) Backing Plate Thicknesses	*3.6 mm (0.142 in.)*
	3.8 mm (0.150 in)
	4.0 mm (0.157 in)

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Figure 3

Motor Age INTRODUCING...

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COLUMNIST POWERTRAIN PRO

BY WAYNE COLONNA

Email: wayne@atsg.biz

POWERTRAIN PRO:

COLLABORATION, EDUCATION, DIVERSIFICATION

Welcome to Powertrain Pro. I'm Wayne Colonna, president of employee-owned Automatic Transmission Service Group (ATSG) and publisher of the new Powertrain Pro. We are here to bridge general repair and transmission work through collaboration, education and diversification.

In the last 10 years, many automotive repair facilities, particularly specialty shops, have experienced a need to broaden their services to remain profitable. Diversifying the type of repairs offered to the public is no exception to transmission specialty shops. One of the largest automatic transmission franchise chains (representing approximately one-tenth of all transmission specialty shops in existence today) broadened its services to total car care.

Additionally, we are seeing increased use of remanufactured transmissions as an alternative to rebuilding them in-house. Combining these factors, a specialty shop could output more automatic transmission repair work in a week than if it did not have the option of completing other repairs.

Because of this, specialty shops need increased training beyond their specialties. Diagnostic assistance also is needed, should a remanufactured transmission be installed and does not operate correctly. Is it the transmission or is it malfunctioning because of some other failure in the vehicle?

Powertrain Pro not only will provide helpful information regarding automatic transmission diagnostics and repair, it also will point to digital training beyond for other areas of the vehicle. Besides our featured transmission related subjects, companies that desire to help you grow your business will sponsor free webinars regarding a wide range of vehicle maintenance and repair.

Motor Age already has a great deal of content related to engine management, brakes, air conditioning, exhausts, tune-ups, maintenance, radiators and cooling systems, just to name a few. All of these resources, as well as previous transmission-related content, will be harnessed, catalogued and listed in the Powertrain Pro section of MotorAge.com as a free, one-stop, bumper-to-bumper information outlet accessible 24/7.

With computers now controlling all aspects of the vehicle and interacting with one another for fuel economy, emission control and safety (skid control, etc.), what part of the car can you afford to not work on? Specialty shops need the training on how to diagnose and work on other aspects of the vehicle, as well as knowing the correct tools needed to perform these repairs. Powertrain Pro aims to bring awareness to these other areas of the vehicle to aid shops in diversifying their services effectively.

Over the past 10 years, we all have seen this Powertrain concept develop. Along the way, I am sure many of us have experienced odd effects of Powertrain strategy, including reasons one would never think of putting in a diagnostic flow chart. An example is over-inflated, underinflated tires or three worn tires and a spare with increased tread as the fourth wheel causing a curve recognition program to be initiated while driving straight. This causes problems like a no up-shift condition with medium to heavy throttle or very late erratic up shifts and kick-down shifts. High-end vehicles like BMWs use this curve recognition program to prevent shift business while in turns. As a result, different tire sizes cause the wheel speed sensors to send a signal to its module, which then interprets it as a vehicle in a turn. This is just one example of what we will bring to light in Powertrain Pro.

We also will share some insights regarding problems with transfer cases, manual shift transmissions, CVTs and powershift transmissions. While all of this transmission information is being added to the Powertrain Pro content, _Motor Age_ will continue to provide training content beyond transmission diagnostics and repair.

All of this is designed to help your shop grow through collaboration, education and diversification.

JUST SCAN IT

Scan this QR Code to listen to the interview on your smartphone. Or visit MotorAge.com/Automatic

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Wayne Colonna is President of the Automatic Transmission Service Group in Cutler Bay, FL, and a frequent speaker/instructor for transmission training around the globe.

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Motor Age POWERTRAIN PRO

DEEP AUTOMOTIVE TRANSMISSION-CENTERED CONTENT, SPEARHEADED BY **WAYNE COLONNA** – PRESIDENT OF ATSG!

THE ATSG TRAINING COMMITMENT

THE TOP TECHS IN AUTOMOTIVE TRANSMISSION – THE LEADERS IN THE FIELD! HERE ARE JUST SOME OF THE RESOURCES:

- A team of diagnostic experts at the shops' disposal
- Support remanufactured installations
- Reduce comebacks
- Troubleshoot R & R and Transability issues quickly
- Webinar training

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A *Measurable* Difference in Transmission Filter Performance



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GENERAL PURPOSE POWERLINE NOISE FILTERS
A TOOL,A REPAIR PART, OR PREVENTATIVE MAINTENANCE

COMPLAINT: A variety of odd behaviors and/or codes

CAUSE: Noise on the Powerline caused by bad connections, failing alternator or battery, faulty ignition circuitry, or even sunspots.

CORRECTION: Install a General Purpose powerline noise filter on the power circuit to the affected part.

When you first apply the filter it is a diagnostic tool. If it fixes the problem then you may choose to make the filter a repair part by leaving it in place. If it does not fix the problem, you may consider leaving it in place to prevent future problems.

Electronically there are as many different designs for filters as there are data busses. For simple powerline filters two are most popular. A simple capacitor placed between the power wire and the ground is one, and the other is a full Pi filter.

Powerliine noise is simply a bit of AC power "riding" on top of a DC signal. Since a capacitor will allow AC to pass through it, but will not allow DC to pass through it, placing one across the power input shunts the AC component to ground. It is very quick and easy to install, but does not get all of the noise out. Simple capacitor filters are available already made up with a nice sleeve around the capacitor, a ring terminal for the ground side, and either a fuse tap pin that fits in next to the devices fuse, or an IDC crimp on type wire tap. These are typically referred to as "wire tap" or "fuse tap" filters

A Pi filter (it is called a Pi filter because the schematic diagram looks like the mathematical symbol for Pi, p) add an inductive element. An inductor, or coil, will allow DC to pass through easily and wants to prevent AC from passing through. The opposite of a capacitor. So placing a coil in line with the power lead, along with a capacitor to ground on either side of it will give you a very powerful filter. Unfortunately, the coil must be capable of carrying the load of the power wire so the current rating of the filter must be large enough for the device being protected. Installation is a bit more difficult as the power wire must be cut and the filter placed in series with the device.

A good selection of both types of powerline filers may be found at http://electronicnoisefilters.com

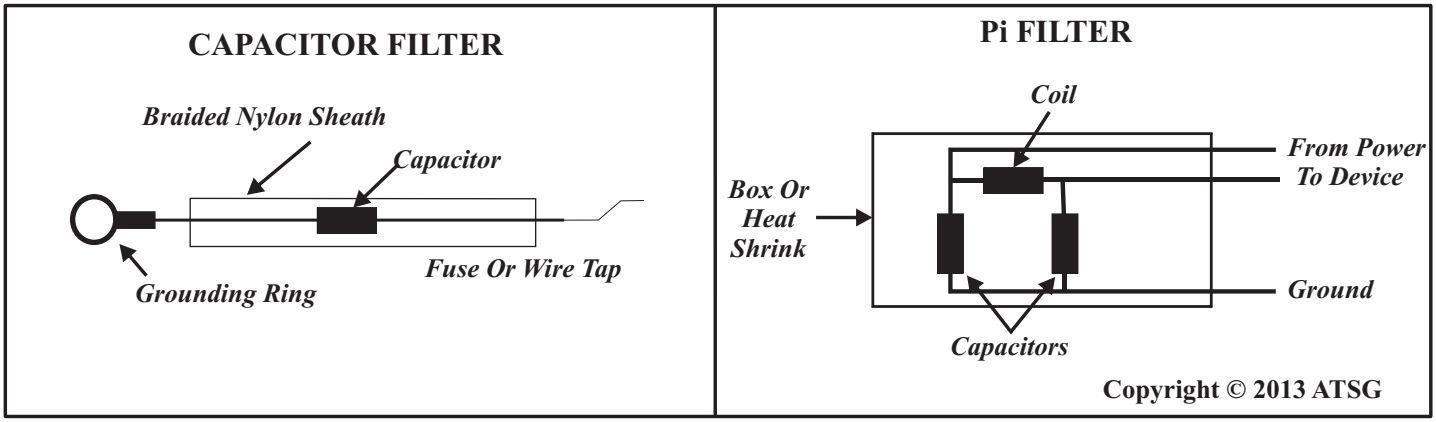


Figure 1

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35199


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