



INTRODUCTION

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GENERAL MOTORS 6T30/6T40/6T45/6T50 TRANSMISSION

The Hydra-matic 6T30/40/45/50 (6 Speed) is a fully automatic, six speed, front wheel drive, electronically controlled transmission that features clutch to clutch shifting. It is also all-wheel drive capable. It was first introduced in the 2007 Chevy Captiva followed by the Malibu in 2008 and quickly spread to the compact, mid-size, small crossover vehicle line, as shown in Figure 1. The 6T40 is also found in hybrid applications. At the start of production for the 2012 model year Generation 2 was introduced which is currently used in all platforms using the 6T family of transmissions. This series of transmissions is also known as the GF6.

It consists primarily of a four element torque converter, three planetary gear sets, five clutch packs, one mechanical one-way clutch and a hydraulic pressurization and control system. Three planetary gear sets provide the six forward gear ratios and reverse. Changing gear ratios is fully automatic and is accomplished through the use of a Transmission Control Module (TCM), that is *located within the transmission*. The TCM receives and monitors various electronic sensor inputs, and uses this information to shift the transmission at the optimum time. The TCM commands shift solenoids and Clutch Pressure Control (CPC) solenoids within the transmission to control shift timing. The TCM controls shift feel through the CPC solenoids. The TCM also controls the apply and release of the torque converter clutch which allows the engine to deliver the maximum fuel efficiency without sacrificing vehicle performance. This manual contains the procedures necessary to diagnose, overhaul and/or repair the 6T30/40/45/50 (6 Speed) GEN 1 and GEN 2 transmissions from General Motors and is for use by professional technicians.

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GENERAL MOTORS 6T30/40/45/50 TRANSMISSION

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Technical Service Information

GENERAL DESCRIPTION

There are five variants of the transmission (6T30, 6T40, 6T45, 6T45 eAssist Hybrid and 6T50), based on the torque carrying capacity. Structure is common between the variants, and component differences are primarily related to size.

The 4-element torque converter contains a pump, a turbine, a pressure plate splined to the turbine, and a stator assembly. The torque converter acts as a fluid coupling to smoothly transmit power from the engine to the transmission. It also hydraulically provides additional torque multiplication when required. The pressure plate, when applied, provides a mechanical direct drive coupling of the engine to the input shaft of the transmission.

The three compound planetary gear sets provide the six forward gear ratios and reverse. Changing gear ratios is fully automatic and is accomplished through the use of a transmission control module (TCM) located inside the transmission and bolted to the valve body. The TCM receives and monitors various electronic sensor inputs and uses this information to shift the transmission at the optimum time. The TCM commands 1 On/Off shift solenoid and six variable (PWM) solenoids to control shift timing and shift feel.

The TCM also controls the apply and release of the torque converter clutch which allows the engine to deliver the maximum fuel efficiency without sacrificing vehicle performance. All of the solenoids and the TCM are contained within the transmission. The hydraulic system primarily consists of an on-axis engine driven gear-type pump, upper and lower valve body assemblies, transfer drive gear support assembly and the transmission case. The pump maintains the working pressures needed to stroke the clutch pistons that apply or release the friction components. These friction components, when applied or released, support the automatic shifting qualities of the transmission. The hybrid version is equipped with an electric auxiliary pump to maintain minimal line pressure when the engine is in Auto-Stop Mode.

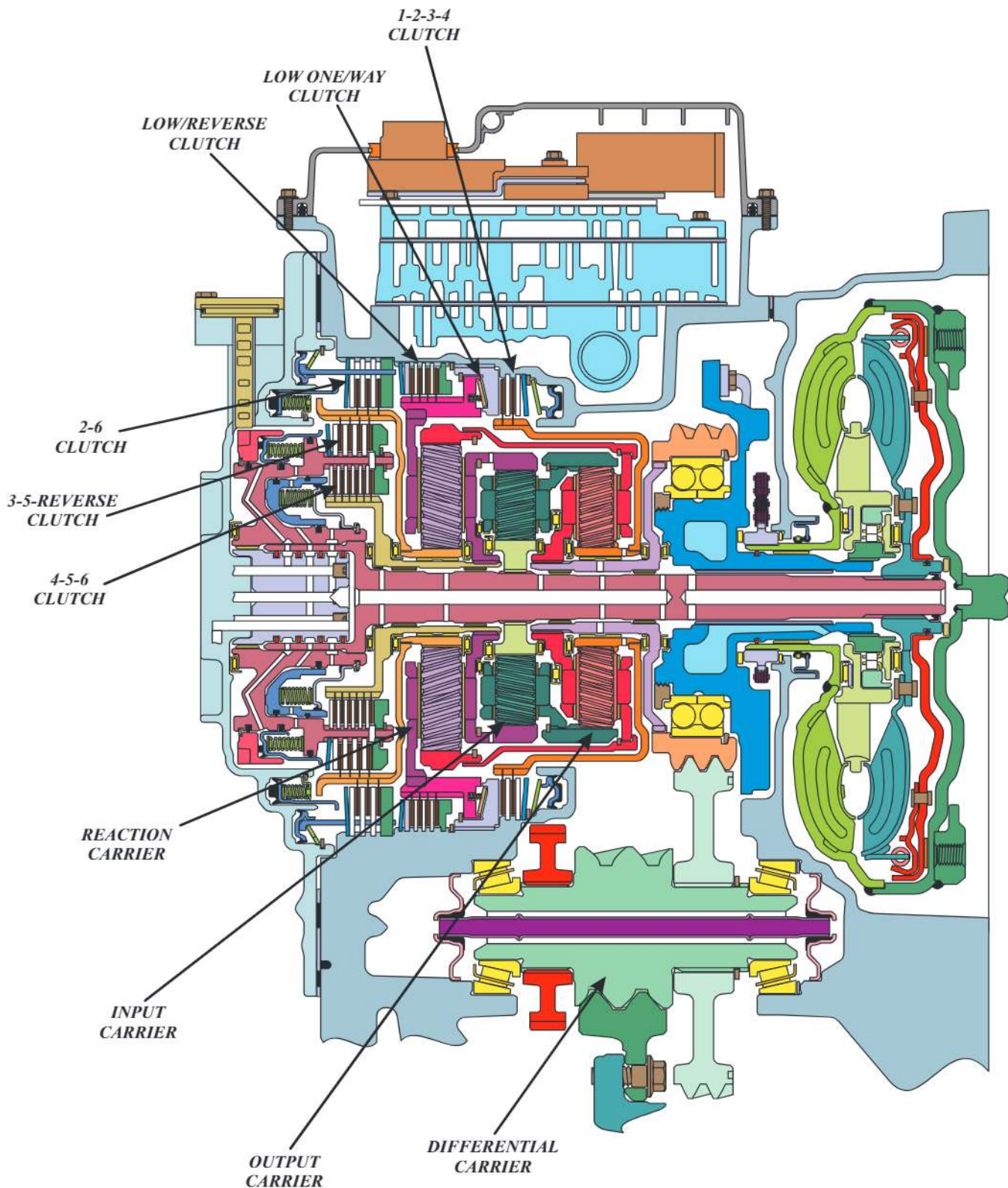
The friction components used in this transmission consist of 5 multiple disc clutches. The multiple disc clutches combine with a one-way clutch to deliver the seven different ratios, six forward and one reverse, through the compound planetary gear sets. The gear sets then transfer torque through the transfer drive, transfer driven gear and differential assembly.

Component location chart is found in the cut-away view in Figure 2.

U.S. VEHICLE APPLICATION CHART				Copyright © 2016 ATSG
VEHICLE	YEAR	ENGINE	TRANSMISSION RPO	TRANSAXLE
BUICK LACROSSE	2010-2016	2.4L Ecotec (I4)	MH7	6T45
BUICK LACROSSE	2012-2016	2.4L Ecotec (I4) w/eAssist	MHH	6T40
BUICK ENCORE	2013-2016	1.4L Turbo (I4)	MH8	6T40
BUICK VERANO	2012-2016	2.4L Ecotec (I4)	MH8 (MHB AWD)	6T40
BUICK VERANO	2013-2016	2.0L Ecotec Turbo(I4)	MHK	6T50
BUICK REGAL & GS	2012-2016	2.4L Ecotec (I4)	MH8/M7W (M7U AWD)	6T40
BUICK REGAL	2012-2016	2.4L Ecotec (I4) w/eAssist	MHH	6T40
BUICK REGAL CXL	2012-2016	2.0L Ecotec Turbo(I4)	MHK	6T50
BUICK CASCADA	2016	1.6L Turbo Ecotec (I4)	MHK	6T40
BUICK ENVISION	2016	2.0L DOHC Turbo(I4)	MHK	6T50
CHEVROLET CRUZE	2011-16	1.8L DOHC (L4)	MH9	6T30
CHEVROLET CRUZE	2011-16	1.4L Turbo (I4)	MH8	6T40
CHEVROLET MALIBU	2008-16	2.4L Ecotec (I4)	MH8	6T40
CHEVROLET MALIBU ECO	2013-16	2.4L Ecotec (I4) w/eAssist	MHH	6T40
CHEVROLET MALIBU (ECO)	2013-16	2.5L Ecotec (I4) (w/ eAssist)	MH8 (MNH)	6T40
CHEVROLET IMPALA	2014-16	2.5L Ecotec (I4)	MH7/MHG	6T45
CHEVROLET IMPALA	2014	2.4L Ecotec (I4) w/eAssist	MHH	6T40
CHEVROLET SONIC	2012-2016	1.8L DOHC (L4)	MH9	6T30
CHEVROLET SONIC	2012-2016	2.0L Ecotec Turbo(I4)	MH8	6T40
CHEVROLET EQUINOX/GMC TERRAIN	2010-16	2.4L Ecotec (I4)	MH7 (MHC AWD)	6T45
CHEVROLET CAPTIVA SPORT	2012-16	2.4L Ecotec (I4)	MH7	6T45
CHEVROLET CAPTIVA SPORT	2012-16	3.0L (V6)	MHK (MHJ AWD)	6T50
CHEVROLET TRAX	2015-2016	1.4L Turbo (I4)	MH8 (MHB AWD)	6T40
PONTIAC G6	2009	2.4L Ecotec (I4)	MH8	6T40
SATURN AURA	2009	2.4L Ecotec (I4)	MH8	6T40

Figure 1

COMPONENT LOCATION AND IDENTIFICATION



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Figure 2

DESCRIPTION OF OPERATION AND POWERFLOW

The Hydra-matic 6T30/40/45/50 (6 Speed) is a fully automatic, six speed, front wheel drive, electronically controlled transmission (See Figure 3), that features clutch to clutch shifting. It consists primarily of a four element torque converter, three planetary gear sets, five clutch packs, one mechanical one-way clutch and a hydraulic pressurization and control system.

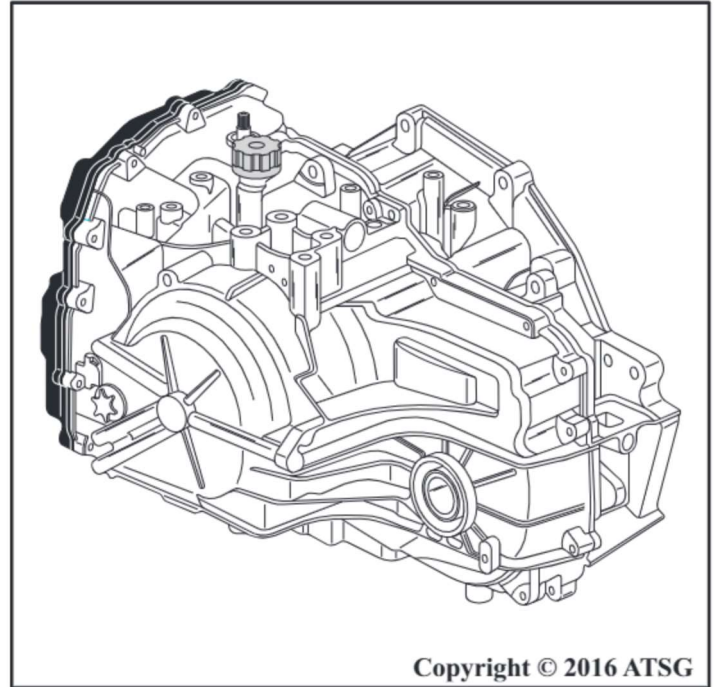
The three planetary gear sets provide the six forward gear ratios and reverse. Changing gear ratios is fully automatic and is accomplished through the use of a Transmission Control Module (TCM) located within the transmission. The TCM receives and monitors various electronic sensor inputs, and uses this information to shift the transmission at the optimum time.

The TCM commands shift solenoids and variable bleed Clutch Pressure Control (CPC) solenoids (GEN1) or variable feed (GEN2) within the transmission to control shift timing. The TCM controls shift feel through the CPC solenoids. The TCM also controls the apply and release of the torque converter clutch which allows the engine to deliver the maximum fuel efficiency without sacrificing vehicle performance.

The hydraulic system primarily consists of a gear type pump, a control valve body, converter housing and case. The pump maintains the working pressures needed to apply the clutch pistons that apply or release the friction components. These friction components, when applied or released, support the shifting qualities of the transmission.

The friction components used in this transmission consist of five multiple disc clutches. The multiple disc clutches combine with one mechanical sprag clutch, to deliver seven different gear ratios through the gear sets that then transfer torque through the output shaft.

Refer to Figure 4 for the component application chart for this transmission.



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Figure 3

RANGE	GEAR	RATIO	SHIFT SOL (On/Off)	1-2-3-4CL PC SOL 5 N.L.	2-6 CL PC SOL 4 N.L.	3-5 REV CL PC SOL 2 N.H.	LO/REV 4-5-6 CL PC SOL 3 N.H.	4-5-6 CLUTCH	3-5 REV CLUTCH	2-6 CLUTCH	LOW ONE-WAY CLUTCH	LO/REV CLUTCH	1-2-3-4 CLUTCH
PARK	P		ON	OFF	OFF	ON	OFF					APPLIED*	
REV	R	2.940	ON	OFF	OFF	OFF	OFF		APPLIED			APPLIED	
NEUT	N		ON	OFF	OFF	ON	OFF					APPLIED*	
D R I V E	IST BRAKING	4.584	OFF	ON	OFF	ON	OFF					APPLIED	APPLIED
	IST	4.584	OFF	ON	OFF	ON	ON				HOLD		APPLIED
	2ND	2.964	OFF	ON	ON	ON	ON			APPLIED			APPLIED
	3RD	1.912	OFF	ON	OFF	OFF	ON		APPLIED				APPLIED
	4TH	1.446	OFF	ON	OFF	ON	OFF	APPLIED					APPLIED
	5TH	1.000	OFF	OFF	OFF	OFF	OFF	APPLIED	APPLIED				
	6TH	0.746	OFF	OFF	ON	ON	OFF	APPLIED		APPLIED			

* APPLIED WITH NO LOAD

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Figure 4

SHIFT QUADRANTS

There are two different styles of shift quadrants for this transmission; Standard Shift Quadrant and Driver Shift Control (DSC) Quadrant.

The transmission shift quadrants vary by model. There may be four to seven different positions shown on the shift quadrant. Refer to Figure 5, 6, and 7. The following are a couple of examples.

Standard Shift Quadrant

P - Park position enables the engine to be started while preventing the vehicle from moving. For safety reasons, the vehicle's parking brake should always be used in addition to the "Park" position. Park position should not be selected until the vehicle has come to a complete stop.

R - Reverse enables the vehicle to be operated in a rearward direction.

N - Neutral position enables the engine to start and operate without driving the vehicle. If necessary, this position should be selected to restart the engine while the vehicle is moving.

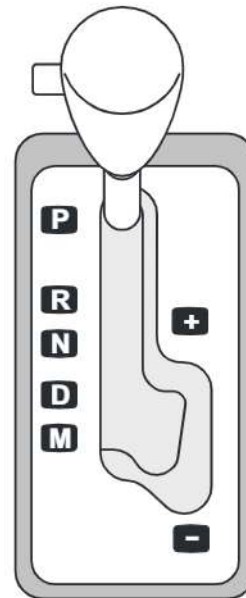
D - Drive range should be used for all normal driving conditions for maximum efficiency and fuel economy. Drive range allows the transmission to upshift and downshift in each of the six forward gear ratios automatically, according to the normal shift pattern that is programmed into the TCM.

Driver Shift Control (DSC) Quadrant

Some vehicles are equipped with Driver Shift Control (DSC) version of the selector system, as shown in Figure 5. This configuration allows the driver to manually shift between forward gears.

M - In the M (Manual) position, the driver may manually select the range of gears by tapping the selector lever towards "+" or "-" to cause an upshift or downshift, as shown in Figure 5. The transmission will shift up or down depending on the request that is made by tapping the selector lever. Refer to the appropriate owners manual for specific instructions.

DRIVER SHIFT CONTROL (DSC) QUADRANT



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Figure 5

SHIFT QUADRANTS (CONT'D)

Standard Shift Quadrant (Cont'd)

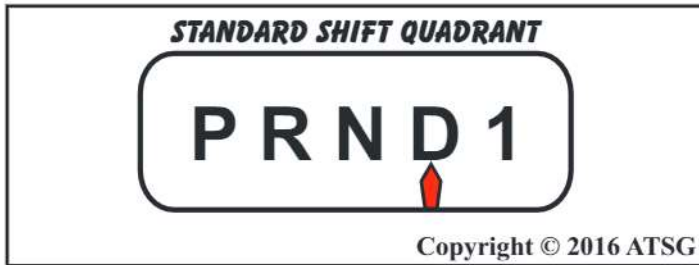


Figure 6

P - Park position enables the engine to be started while preventing the vehicle from moving. For safety reasons, the vehicle's parking brake should always be used in addition to the "Park" position. Park position should not be selected until the vehicle has come to a complete stop.

R - Reverse enables the vehicle to be operated in a rearward direction.

N - Neutral position enables the engine to start and operate without driving the vehicle. If necessary, this position should be selected to restart the engine while the vehicle is moving.

D - Drive range should be used for all normal driving conditions for maximum efficiency and fuel economy. Drive range allows the transmission to upshift and downshift in each of the six forward gear ratios automatically, according to the normal shift pattern that is programmed into the TCM.

1 - Manual 1st has the same starting ratio as Drive range but prevents the transmission from shifting above 1st gear. Manual 1st can be used for heavy towing and engine braking as desired. Manual 1st can be selected at any vehicle speed but will downshift into 1st gear, only if vehicle speed is low enough not to over-rev the engine. This speed is calibrated in the TCM.

Driver Shift Control (DSC) Quadrant

Some vehicles are equipped with a shift quadrant that allows manual range selection. For example, "M" manual range as shown in Figure 7. These ranges can be used for conditions where it may be desirable to control the selection of gear ratios. These conditions include trailer towing, driving on hilly terrain, and are also helpful for engine braking when descending slight grades.

M - When manual mode is selected, the current gear range will be the highest attainable range, with all of the lower gears available. Plus/Minus buttons on the steering wheel, as shown in Figure 7, may be used to select the desired range of gears for the current driving conditions. Refer to the appropriate owners manual for specific instructions.

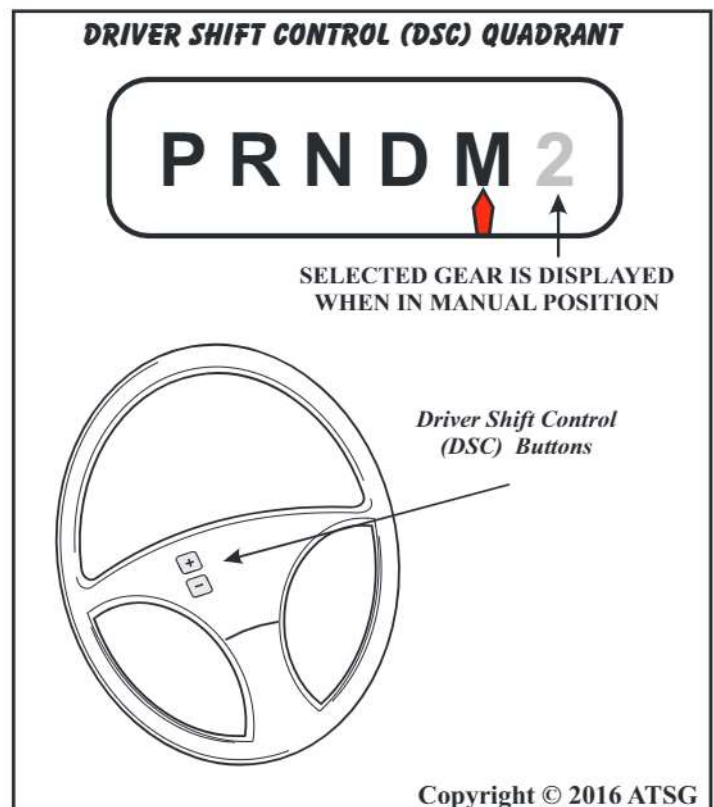
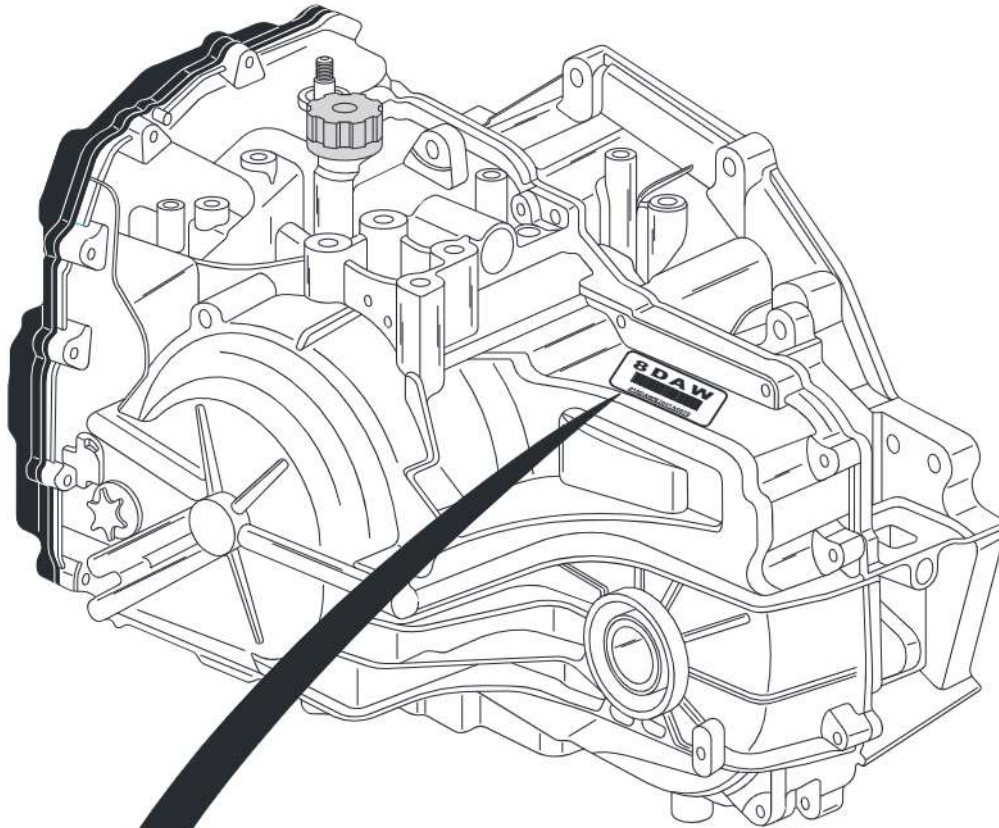


Figure 7

IDENTIFICATION TAG INFORMATION

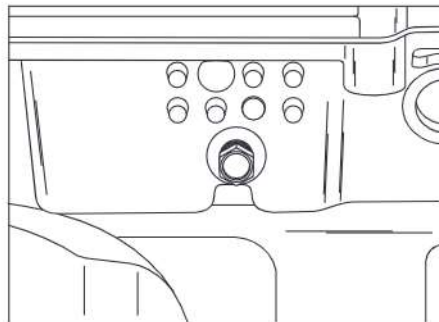
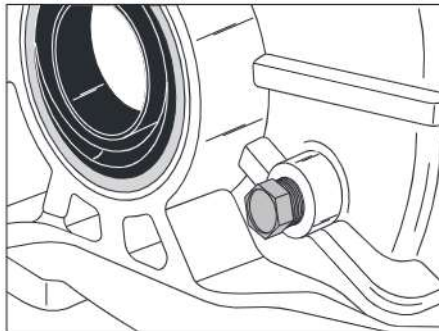
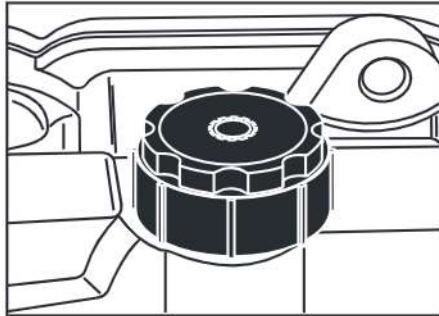


Identification Tag Information Chart	
Callout	Description
1	Code for Automatic Transmission
2	Model Year
3	Model for Transmission
4	Transmission Family (W = 6T40)
5	Source Code for Plant
6	Calendar Year
7	Julian Date
8	Shift/Build Line (A/B)
9	Sequence No. starting at 0001 @ 12:01 AM each day
Source Code for Plant: 4 = Ramos Arizpe, Mexico H = Ypsilanti, Michigan J = Windsor, Ontario S = Strashbourg, France W = Warren, Michigan Y = Toledo, Ohio R = Boryeong, Korea M = Yan Tai, Shan Dong, China P = San Luis Potosi, Mexico	

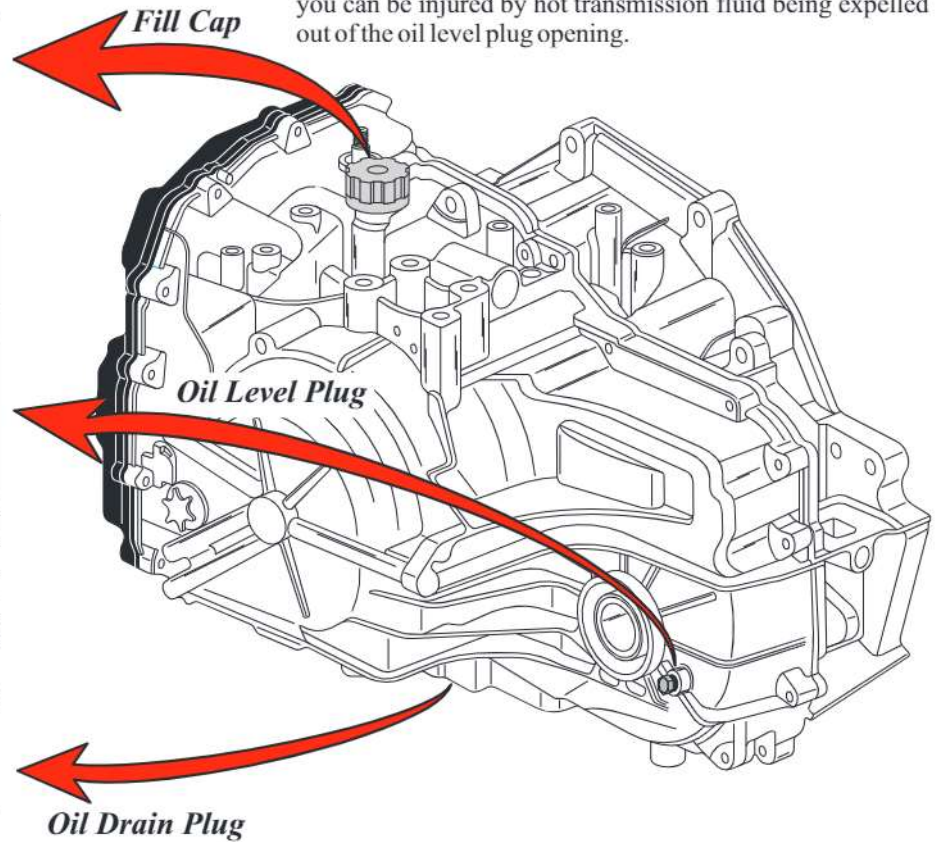
Figure 8

TRANSMISSION FLUID DRAIN, FILL & CHECK PROCEDURE

6T30/40/45/50



Warning - The engine must be running when the transmission fluid level plug is removed, or excessive fluid loss will occur. Transmission fluid may be hot. Since the actual fluid level is unknown, stand clear when removing the level plug. Have a container ready to capture any lost fluid. Do not turn the engine off with the level plug removed, as you can be injured by hot transmission fluid being expelled out of the oil level plug opening.



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TRANSMISSION FLUID CAPACITY SPECIFICATIONS

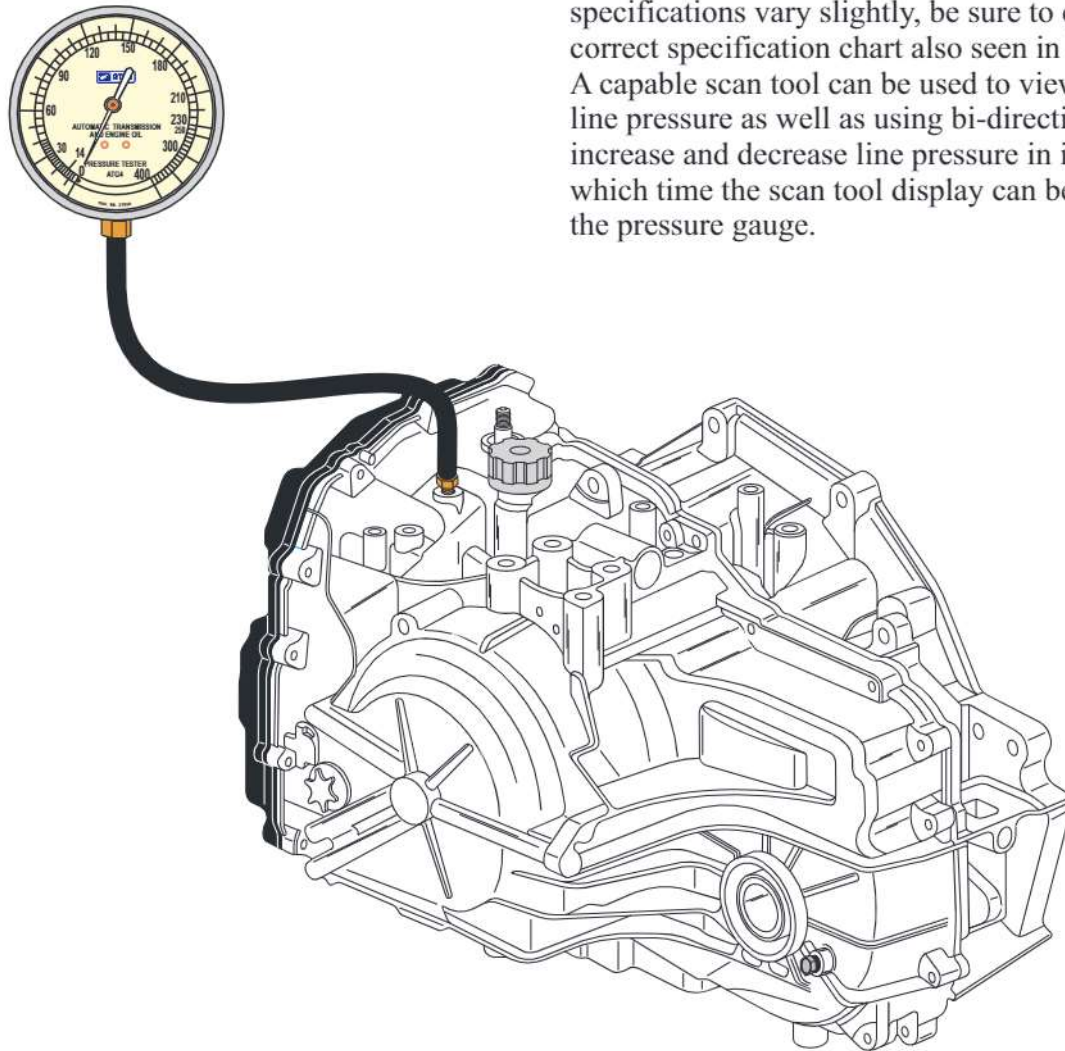
<i>DEXRON-VI</i> <i>Automatic Transmission Fluid</i>	SPECIFICATION	
	QUARTS	LITERS
Fluid Change - Approximate Capacity	4.2 - 6.3	4.0 - 6.0
Valve Body Cover Removal - Approximate Capacity	5.3 - 7.4	5.0 - 7.0
Overhaul - Approximate Capacity	8.5 - 9.0	8.0 - 8.5

When draining fluid, the fluid temperature must be below 140° F (60° C) due to internal thermal element. The transmission fluid level must be checked when the transmission fluid reaches a temperature of 185 - 203° F (85 - 95° C). Adjusting the fluid level outside these temperatures will result in internal damage (underfilled) or fluid discharge out of the vent (overfilled) or possible overheating of the transmission.

Figure 9

TRANSMISSION LINE PRESSURE SPECIFICATIONS

The line pressure tap is conveniently located on top of the transmission along side the transmission's fill cap as seen in Figure 10. Gen 1 and 2 line pressure specifications vary slightly, be sure to consult the correct specification chart also seen in Figure 10. A capable scan tool can be used to view commanded line pressure as well as using bi-directional control to increase and decrease line pressure in increments at which time the scan tool display can be compared to the pressure gauge.



GEN 1 LINE PRESSURE SPECIFICATION

REQUESTED		ACTUAL
Pressure (kPa)	English	Metric
None.....	50-80 psi.....	345-550 kPa
200.....	100-130 psi.....	690-900 kPa
400.....	160-190 psi.....	1100-1310 kPa
600.....	220-250 psi.....	1520-1725 kPa
800-2000.....	270-330 psi.....	1860-2275 kPa

GEN 2 LINE PRESSURE SPECIFICATION

REQUESTED		ACTUAL
Pressure (kPa)	English	Metric
None.....	25-55 psi.....	172-379 kPa
200.....	96-126 psi.....	662-869 kPa
400.....	166-196 psi.....	1145-1351 kPa
600.....	237-267 psi.....	1634-1841 kPa
800-2000.....	307-337 psi.....	2117-2324 kPa

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Figure 10

ELECTRONIC COMPONENTS

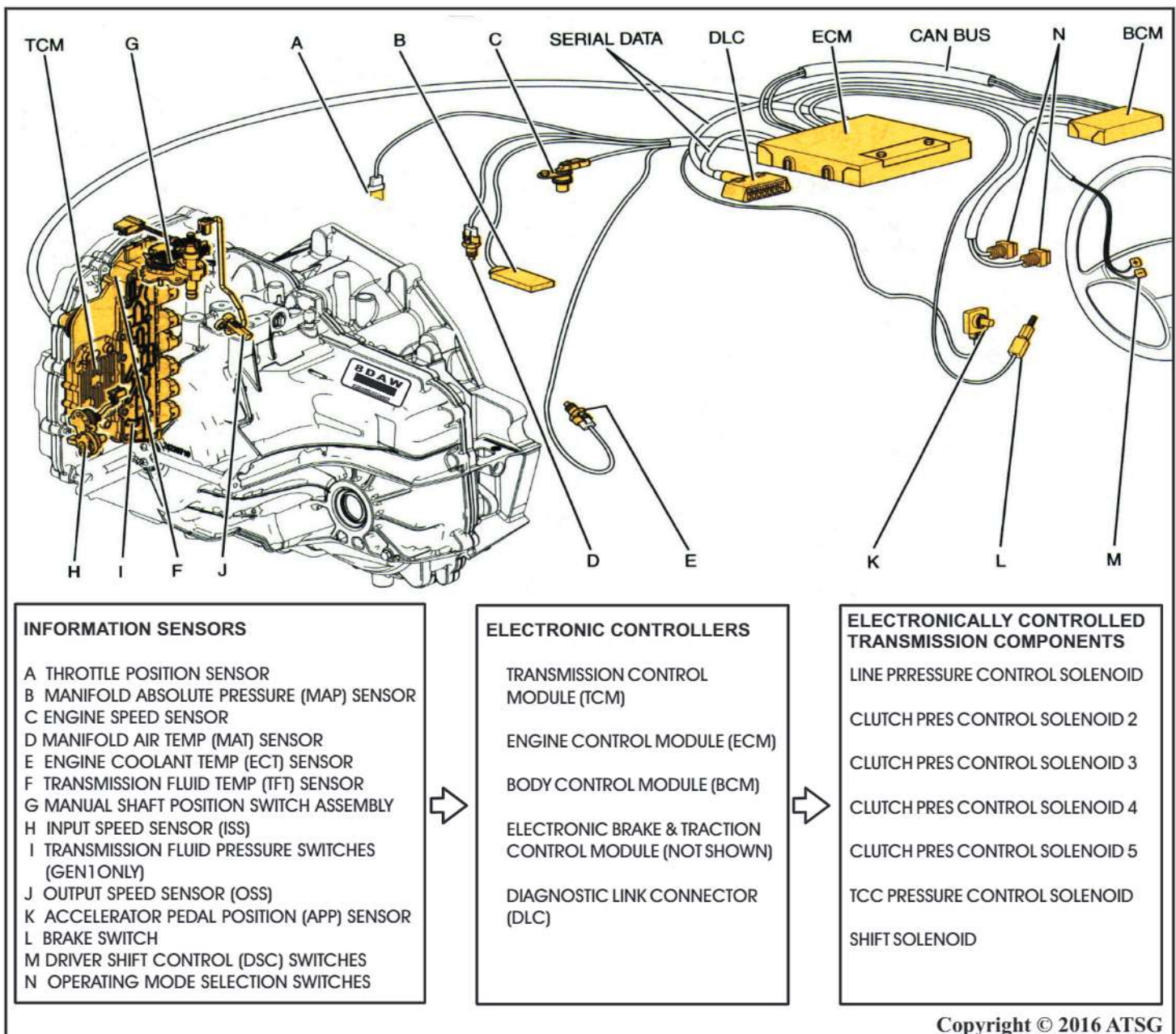
In the 6T30/40/45/50 transmission, the TCM, both shift solenoids, all 6 of the pressure control solenoids, the TFT sensor and fluid pressure switches (GEN1 Only) are contained in one unit, the Control Solenoid Body and TCM Assembly, which is behind the side cover pan, and bolted to the valve body, as shown in Figure 11.

Electrical signals from various sensors provide information to the TCM about vehicle speed, throttle position, engine coolant temp, fluid temp, range selector position, engine speed, turbine speed and operating mode. The TCM uses this information to determine the precise moment to upshift or downshift, apply or release the converter clutch, and what

pressure is needed to apply the clutches. This type of control provides consistent and precise shift points and shift quality based on the actual operating conditions of the vehicle.

Adaptive shift control technology enables the TCM to continually monitor and compare shift performance to the optimum shift, and make adjustments to the factory settings to continually deliver excellent shift quality.

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Figure 11

ELECTRONIC COMPONENTS (CONT'D)

Control Solenoid Body And TCM Assembly

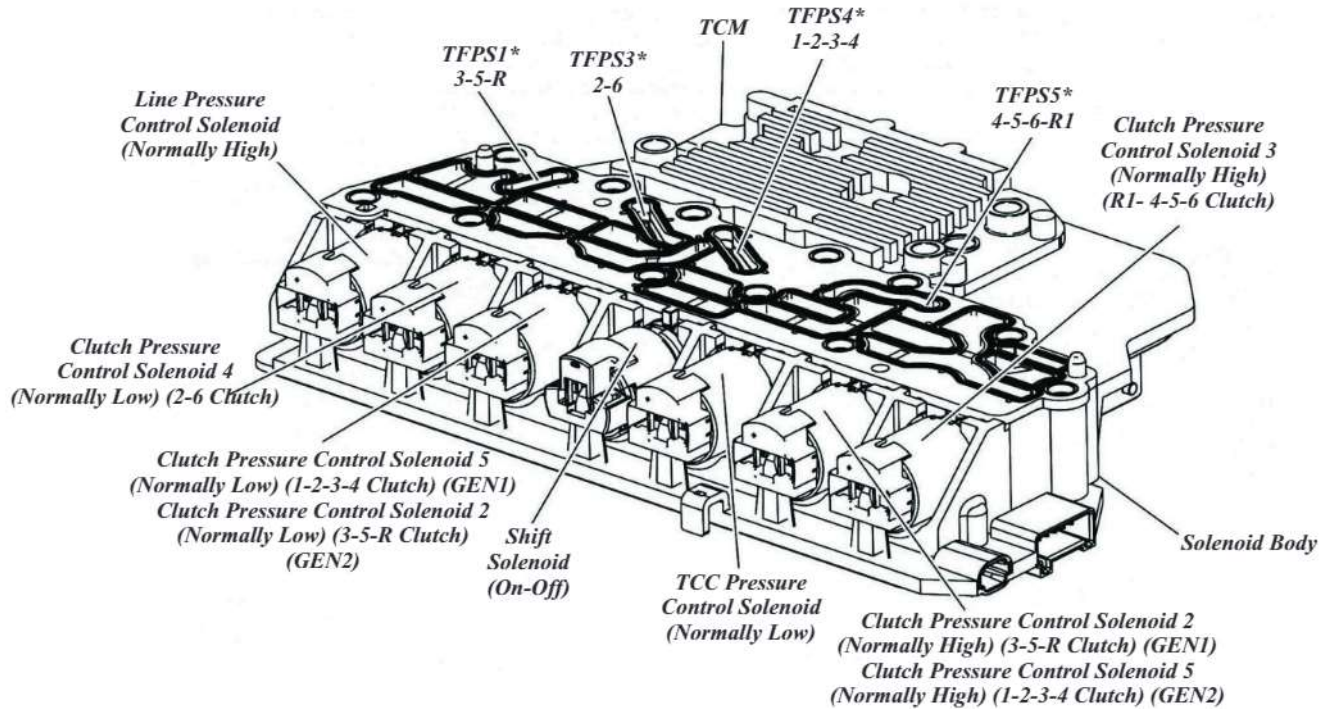
The Solenoid Body & TCM Assembly utilizes a lead frame system to connect the components to the TCM, as shown in Figure 12. There are no wires used for these components. The Control Solenoid Body and TCM Assembly connect to the external harness 14 way connector using a pass-thru sleeve.

All fluid passages to the switches and solenoids are protected from debris by a serviceable filter plate assembly, as shown in Figure 12.

Continued on Page 13

SOLENOID LOCATIONS AND IDENTIFICATION (GEN 1 & 2)

*ONLY GEN1 HAS PRESSURE SWITCHES



RANGE	GEAR	SHIFT SOL (On/Off)	1-2-3-4CL PC SOL 5 N.L. (GEN1)	1-2-3-4CL PC SOL 5 N.H. (GEN2)	2-6 CL PC SOL 4 N.L.	3-5 REV CL PC SOL 2 N.H. (GEN1)	3-5 REV CL PC SOL 2 N.L. (GEN2)	LO/REV 4-5-6 CL PC SOL 3 N.H.	4-5-6 CLUTCH	3-5 REV CLUTCH	2-6 CLUTCH	LOW ONE-WAY CLUTCH	LO/REV CLUTCH	1-2-3-4 CLUTCH
PARK	P	ON	OFF	OFF	OFF	ON	OFF	OFF					APPLIED*	
REV	R	ON	OFF	OFF	OFF	OFF	ON	OFF		APPLIED			APPLIED	
NEUT	N	ON	OFF	OFF	OFF	ON	OFF	OFF					APPLIED*	
D R I V E NEUTRAL IDLE CTRL CAPABLE	1ST	OFF	ON	ON	OFF	ON	OFF	OFF					APPLIED	APPLIED
	2ND	OFF	ON	ON	ON	ON	OFF	ON			APPLIED			APPLIED
	3RD	OFF	ON	ON	OFF	OFF	ON	ON		APPLIED				APPLIED
	4TH	OFF	ON	ON	OFF	ON	OFF	OFF	APPLIED					APPLIED
	5TH	OFF	OFF	OFF	OFF	OFF	ON	OFF	APPLIED	APPLIED				
	6TH	OFF	OFF	OFF	ON	ON	OFF	OFF	APPLIED		APPLIED			

* APPLIED WITH NO LOAD

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Figure 12

ELECTRONIC COMPONENTS (CONT'D)

Shift Solenoid - GEN 1 & 2

The 6T30/40/45/50 transmission uses one shift solenoid to control the clutch select valve.

The Shift Solenoid is normally closed, 3 port, ON/OFF type solenoid controlled by the TCM. The shift solenoid works in combination with the clutch pressure control solenoids to control the various shift and clutch regulator valves in the valve body.

When the TCM provides a path to ground for the electrical circuit to energize (Turn ON) the solenoid, current flows through the coil assembly in the solenoid and creates a magnetic field. The magnetic field moves the plunger and metering ball assembly to the right, as shown in Figure 13, against the exhaust seat, thereby blocking the exhaust passage and creating solenoid control pressure.

The Shift Solenoid is de-energized (Turned OFF) when the TCM opens the path to ground for the solenoid's electrical circuit. With the solenoid OFF, solenoid spring force moves the plunger and metering ball assembly to the left, as shown in Figure 13, away from the exhaust seat and against the feed seat. This blocks actuator feed limit fluid from entering the solenoid and allows any existing solenoid control pressure to exhaust through the solenoid.

The Shift Solenoid resistance is approximately 18 Ohms @ room temperature.

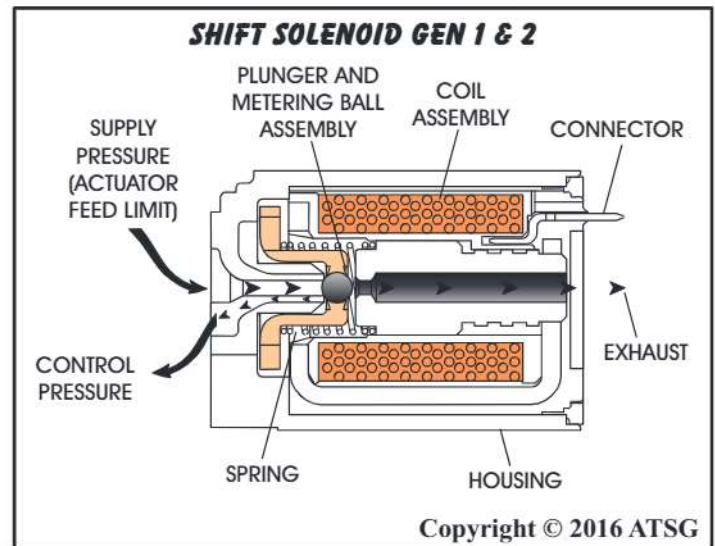


Figure 13

Shift Solenoid

Actuator feed limit fluid feeds the shift solenoid fluid circuit to control the clutch select valve. When the shift solenoid is energized (ON), actuator feed limit fluid is allowed to pass through the solenoid, thereby creating solenoid control pressure, as shown in Figure 13. Solenoid control pressure acts against clutch select valve spring force, to move the valve to the apply position.

When the shift solenoid is de-energized (OFF), actuator feed limit fluid is blocked from feeding the shift solenoid circuit, and any existing solenoid control pressure exhausts through the solenoid, as shown in Figure 13.

Fail Safe or Protection Mode

If for any reason, the entire electronic control system of the transmission, or any one of the electrical components within the Control Solenoid Body and TCM Assembly becomes disabled, the transmission will default to fail-safe mode and all solenoids will default to their normal state.

The transmission will default to 3rd gear in some applications and 5th gear in other applications. If the torque converter clutch is applied, it will be released. Reverse will also be available.

Continued on Page 14

ELECTRONIC COMPONENTS (CONT'D)

Line Pressure Control Solenoid - GEN 1 - Variable Bleed

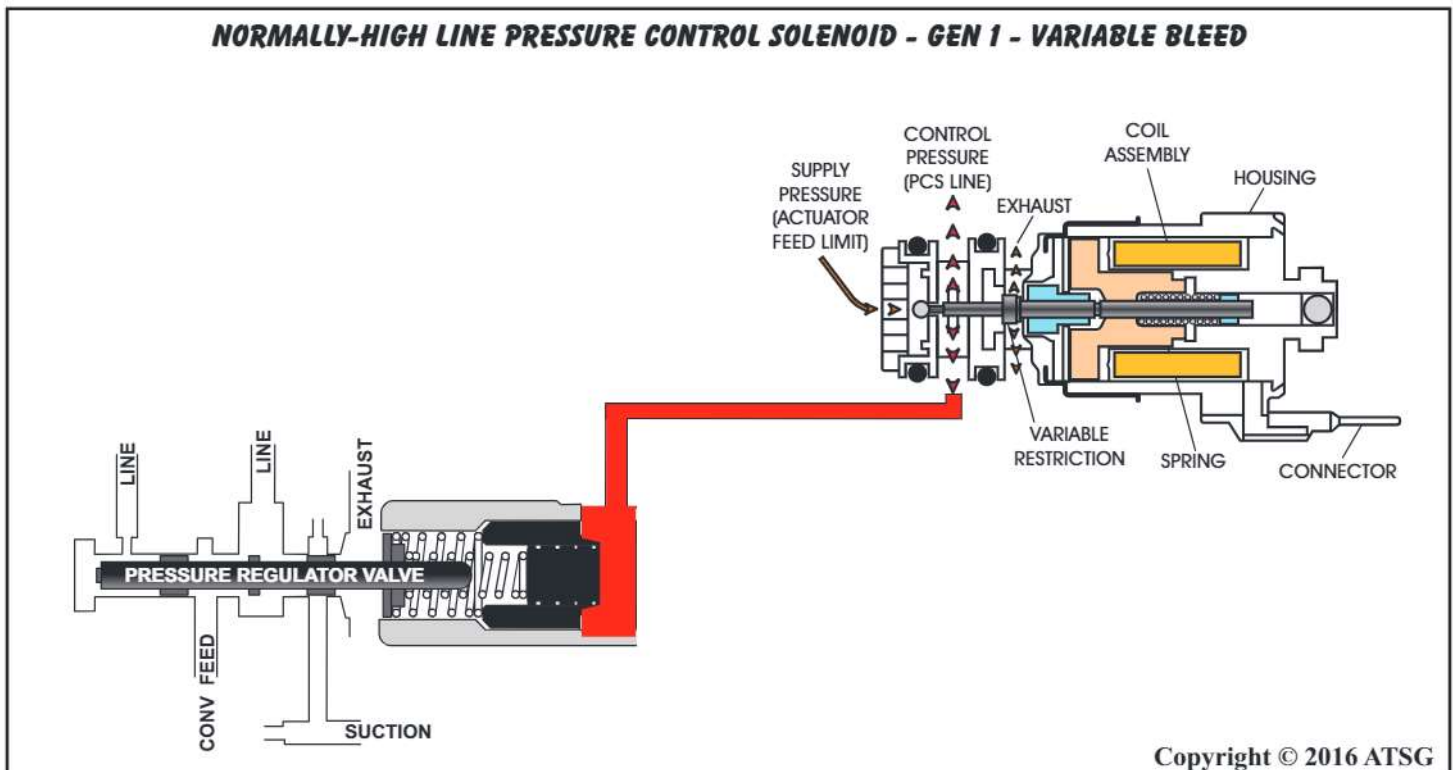
The Line Pressure Solenoid is a precision electronic pressure regulator that controls line pressure based on current flow through its coil windings. The TCM varies current to the **"normally-high"** line pressure control solenoid from approximately 0.1 amp (maximum line pressure), to 1.0 amps (minimum line pressure). As current flow is increased, the magnetic field produced by the coil moves the solenoid's variable restriction (GEN1 Variable Bleed) further away from the exhaust port, as shown in Figure 14. Opening the exhaust port decreases control pressure, as shown in Figure 14, which ultimately decreases line pressure. As the current flow is decreased, the reduced magnetic field allows the spring force to move the variable restriction (GEN1 Variable Bleed) to the left, as shown in Figure 14, closer to the exhaust port, increasing control pressure from the solenoid, which ultimately increases line pressure.

As the throttle position (engine torque) increases, the current flow is decreased by the TCM, which increases the pressure output of the line pressure solenoid. If the TCM detects a line pressure control solenoid electrical malfunction, a DTC will be activated.

If for any reason, the entire electronic control system of the transmission fails, the line pressure control solenoid will be OFF, and maximum line pressure will be the result. This will create harsh engagements and/or failsafe operation.

The Line Pressure Control Solenoid is part of the Control Solenoid Body Assembly and can be serviced separately however, care must be taken to install a replacement solenoid with the same rate of flow as the original solenoid or shift feel issues will occur.

Continued on Page 15



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Figure 14

ELECTRONIC COMPONENTS (CONT'D)

Line Pressure Control Solenoid - GEN 2 - Variable Flow

The Line Pressure Solenoid is a precision electronic pressure regulator that controls line pressure based on current flow through its coil windings. The TCM varies current to the **"normally-high"** line pressure control solenoid from approximately 0.1 amp (maximum line pressure), to 1.0 amps (minimum line pressure). As current flow is increased, the magnetic field produced by the coil moves the solenoid's variable restriction (GEN2 Variable Flow) further away from the exhaust port, as shown in Figure 15. Opening the exhaust port decreases control pressure, as shown in Figure 15, which ultimately decreases line pressure. As the current flow is decreased, the reduced magnetic field allows the spring force to move the variable restriction to the left, as shown in Figure 16, increasing control pressure from the solenoid, which ultimately increases line pressure.

As the throttle position (engine torque) increases, the current flow is decreased by the TCM, which increases the pressure output of the line pressure solenoid. If the TCM detects a line pressure control solenoid electrical malfunction, a DTC will be activated.

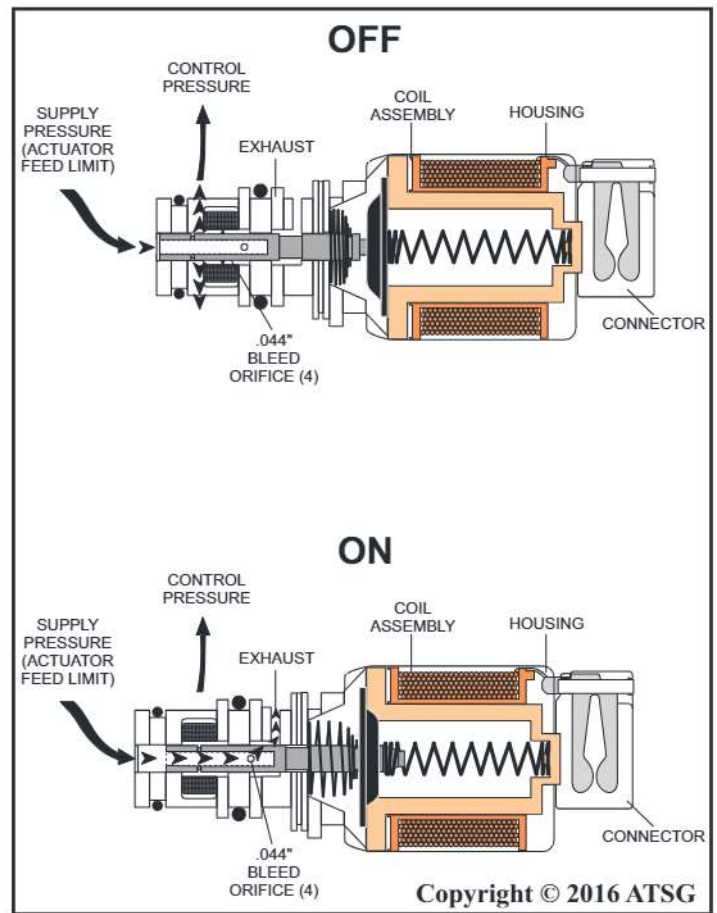


Figure 15

Continued on Page 16

The Line Pressure Control Solenoid is part of the Control Solenoid Body Assembly and can be serviced separately however, care must be taken to install a replacement solenoid with the same rate of flow as the original solenoid or shift feel issues will occur.

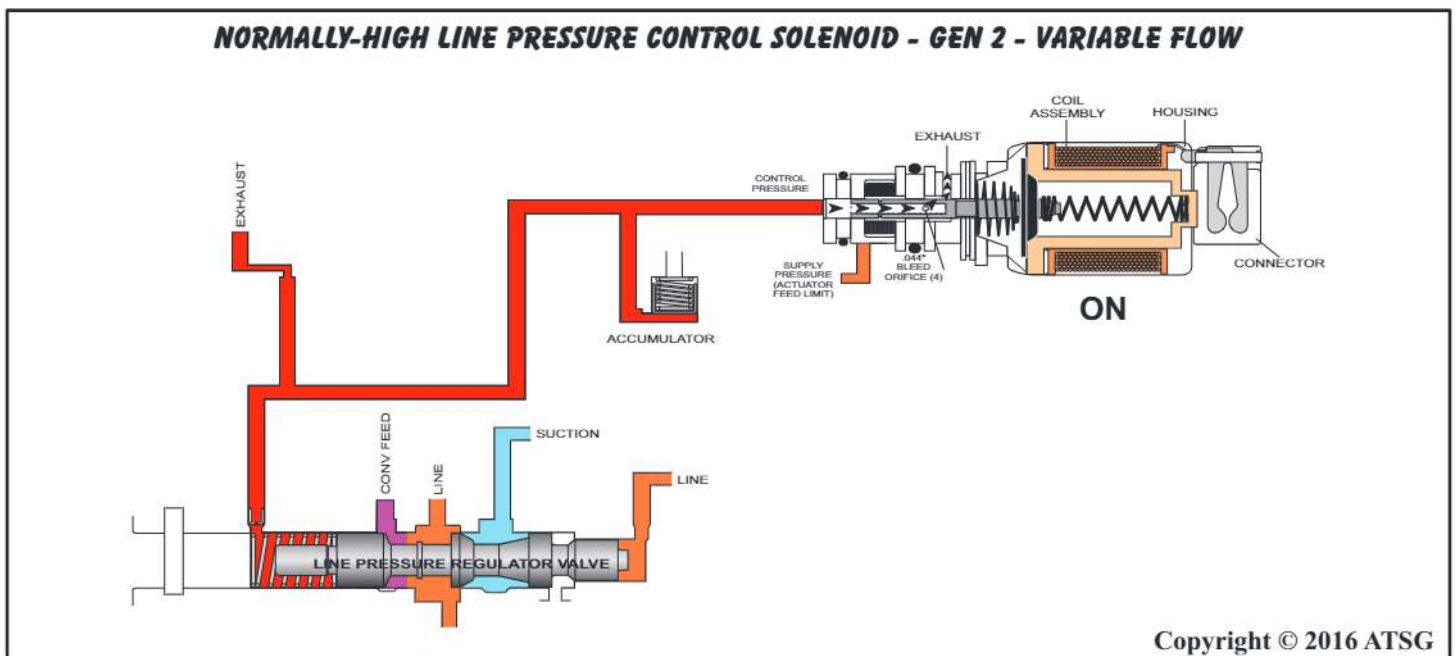


Figure 16

ELECTRONIC COMPONENTS (CONT'D)

Torque Converter Clutch (TCC) Solenoid - GEN 1 - Variable Bleed

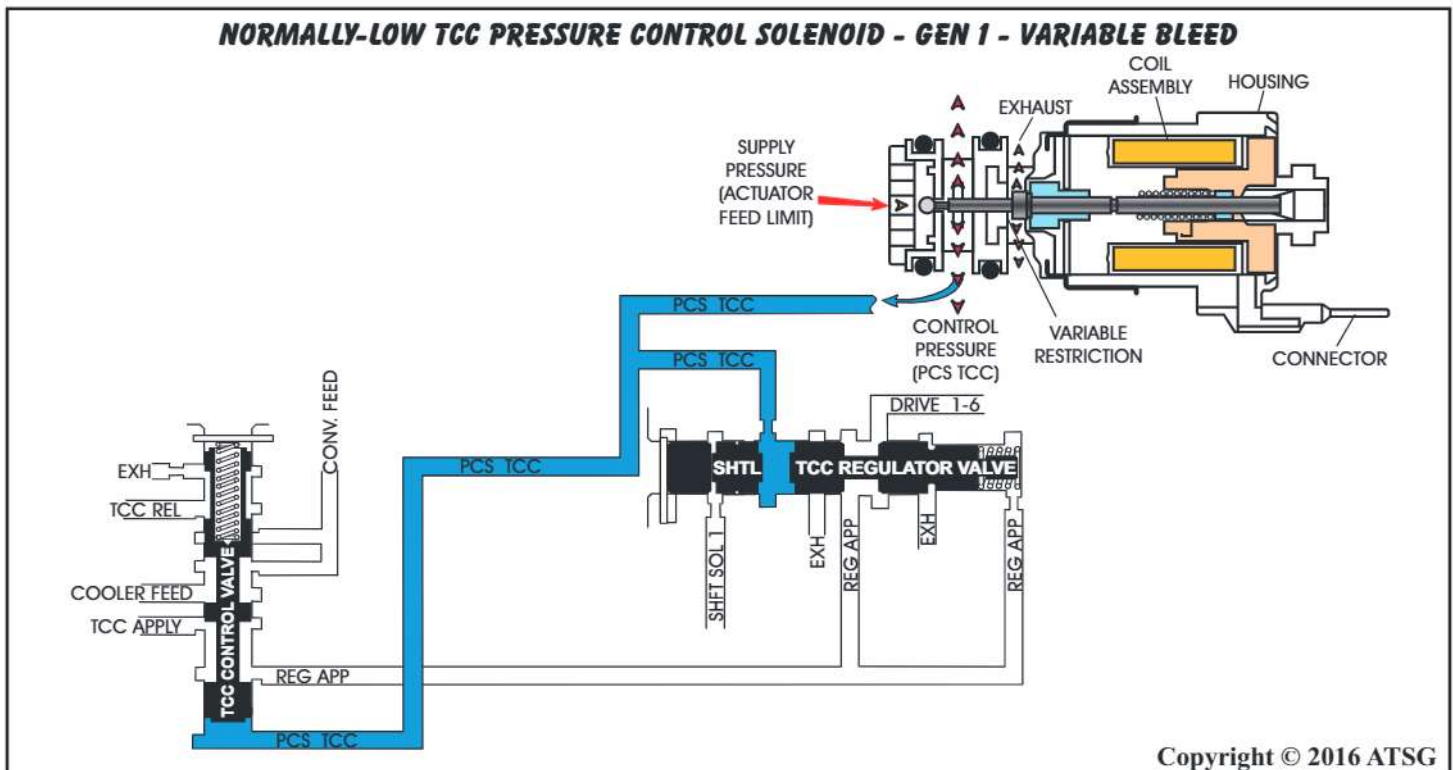
The Torque Converter Clutch (TCC) Solenoid is a "normally-low", electronic pressure regulator used to control the apply and release of the torque converter clutch based on current flow through its coil windings. The TCC solenoid regulates actuator feed limit fluid pressure to the TCC regulator valve, located in the upper valve body, and provides a signal pressure to shift the TCC control valve, located in the upper valve body, to the apply position, as shown in Figure 17. When the TCM determines to apply the TCC, the TCC solenoid is commanded to specific pressures, dependent on vehicle operating conditions, resulting in a smooth apply or release of the TCC. The solenoid's ability to "Ramp" the TCC apply and release pressures results in a smoother TCC operation.

When vehicle operating conditions are appropriate to apply the TCC, the TCM increases current flow to allow the TCC solenoid to increase PCS TCC fluid pressure, to move the TCC control valve to the apply position, as shown in Figure 17, and move the TCC regulator valve to the regulating position to regulate fluid pressure proportional to solenoid pressure. Release pressure is directed to exhaust, and regulated apply pressure is directed to the apply side of the converter clutch plate

and damper assembly. The TCM then increases the pressure to control a slippage of 20-80 RPM between the clutch plate and converter cover. This "Ramping" procedure for improved dampening of engine vibrations and allows the TCC to apply at low engine speeds in 2nd, 3rd, 4th, 5th and 6th gear. Release of the TCC is achieved by decreasing TCC solenoid pressure to a level low enough to allow spring force to move the TCC control valve and TCC regulating valve to the release position.

The Torque Converter Clutch Pressure Control Solenoid is part of the Control Solenoid Body Assembly and can be serviced separately however, care must be taken to install a replacement solenoid with the same rate of flow as the original solenoid or converter clutch apply issues will occur.

Continued on Page 17



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Figure 17

ELECTRONIC COMPONENTS (CONT'D)

Torque Converter Clutch (TCC) Solenoid - GEN 2 - Variable Flow

The Torque Converter Clutch (TCC) Solenoid is a "normally-low", electronic pressure regulator used to control the apply and release of the torque converter clutch based on current flow through its coil windings. The TCC solenoid regulates actuator feed limit fluid pressure to the TCC regulator valve, located in the upper valve body, and provides a signal pressure to shift the TCC control valve, located in the upper valve body, to the apply position, as shown in Figure 18. When the TCM determines to apply the TCC, the TCC solenoid is commanded to specific pressures, dependent on vehicle operating conditions, resulting in a smooth apply or release of the TCC. The solenoid's ability to "Ramp" the TCC apply and release pressures results in a smoother TCC operation.

When vehicle operating conditions are appropriate to apply the TCC, the TCM increases current flow to allow the TCC solenoid to increase PCS TCC fluid pressure, to move the TCC control valve to the apply position, as shown in Figure 19, and move the TCC regulator valve to the regulating position to regulate fluid pressure proportional to solenoid pressure. Release pressure is directed to exhaust, and regulated apply pressure is directed to the apply side of the converter clutch plate and damper assembly. The TCM then increases the pressure to control a slippage of 20-80 RPM between the clutch plate and converter cover. This "Ramping" procedure for improved dampening of engine vibrations and allows the TCC to apply at low engine speeds in 2nd, 3rd, 4th, 5th and 6th gear. Release of the TCC is achieved by decreasing TCC solenoid pressure to a level low enough to allow spring force to move the TCC control valve and TCC regulating valve to the release position.

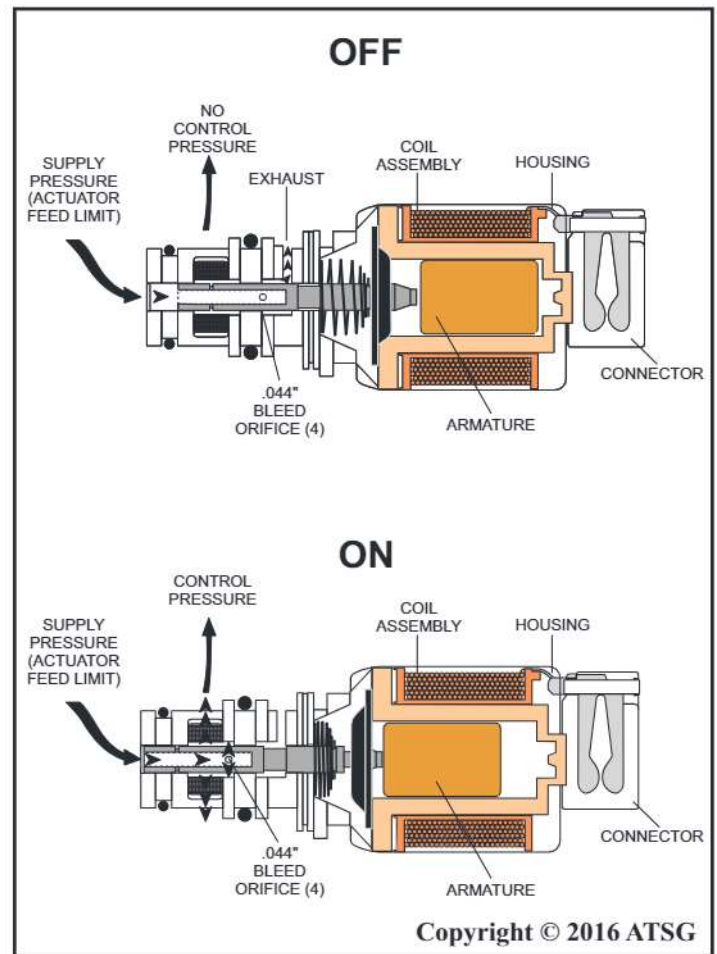


Figure 18

The Torque Converter Clutch Pressure Control Solenoid is part of the Control Solenoid Body Assembly and can be serviced separately however, care must be taken to install a replacement solenoid with the same rate of flow as the original solenoid or converter clutch apply issues will occur.

Continued on Page 18

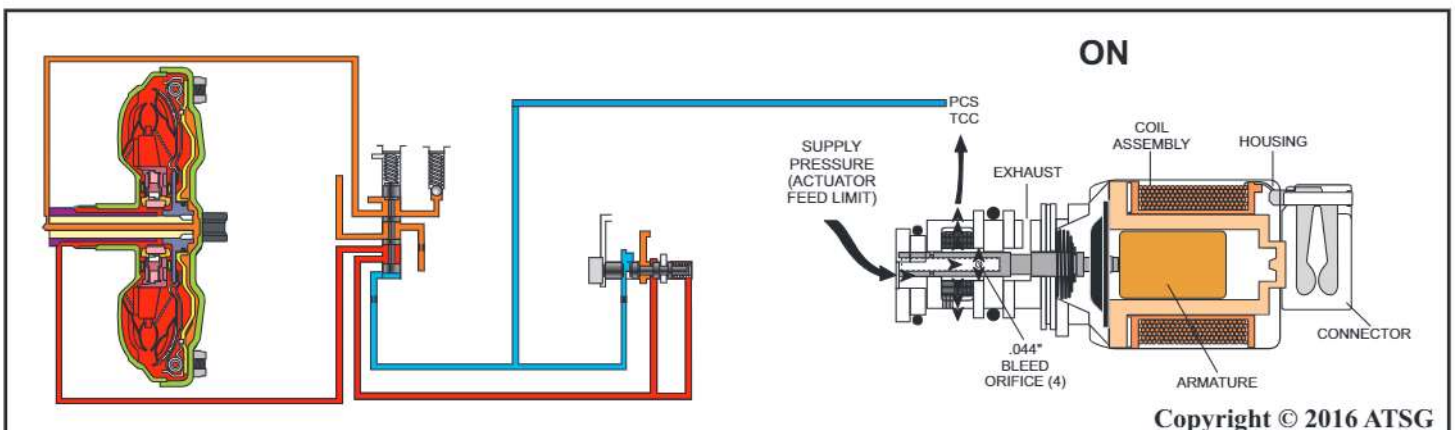


Figure 19

ELECTRONIC COMPONENTS (CONT'D)

Clutch Pressure Control (CPC)

Solenoids 2,3,4 And 5 - Gen 1 - Variable Bleed

There are two different types of clutch pressure control solenoids. Clutch Pressure Control solenoids 4 and 5 are "**normally-low**" pressure control solenoids, as shown in Figure 20, and are identical to the TCC PC solenoid.

Clutch Pressure Control solenoids 2 and 3 are "**normally-high**" pressure control solenoids, as shown in Figure 21, and are identical to the line pressure control solenoid.

The Clutch Pressure Control Solenoids are part of the Control Solenoid Body Assembly and can be serviced separately however, care must be taken to install a replacement solenoid with the same rate of flow as the original solenoid or shift feel issues will occur.

Clutch Pressure Control Solenoid 2

Clutch Pressure Control Solenoid 2 controls fluid flow to the 3-5-Reverse clutch regulator valve and the 3-5-Reverse boost valve. When commanded the solenoid controls the flow of exhaust fluid out of the solenoid to maintain a specific commanded control pressure. This allows the TCM to control the apply and release of the 3-5 and reverse clutch.

Clutch Pressure Control Solenoid 3

Clutch Pressure Control Solenoid 3 controls fluid flow to the 4-5-6 clutch regulator valve and the 4-5-6 boost valve. When commanded the solenoid controls the flow of exhaust fluid out of the solenoid to maintain a specific commanded control pressure. This allows the TCM to control the apply and release of the 4-5-6 clutch.

Clutch Pressure Control Solenoid 4

Clutch Pressure Control Solenoid 4 controls fluid flow to the 2-6 clutch regulator valve. When commanded the solenoid controls the flow of exhaust fluid out of the solenoid to maintain a specific commanded control pressure. This allows the TCM to control the apply and release of the 2-6 clutch.

Clutch Pressure Control Solenoid 5

Clutch Pressure Control Solenoid 5 controls fluid flow to the 1-2-3-4 clutch regulator valve and the 1-2-3-4 boost valve. When commanded the solenoid controls the flow of exhaust fluid out of the solenoid to maintain a specific commanded control pressure. This allows the TCM to control the apply and release of the 1-2-3-4 clutch.

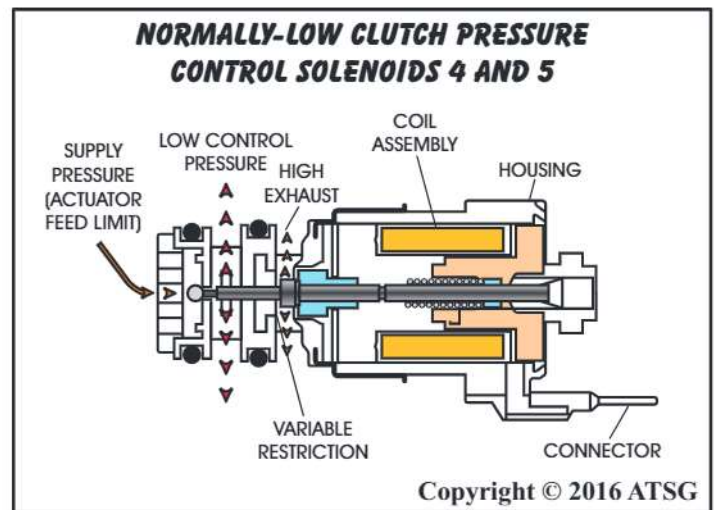


Figure 20

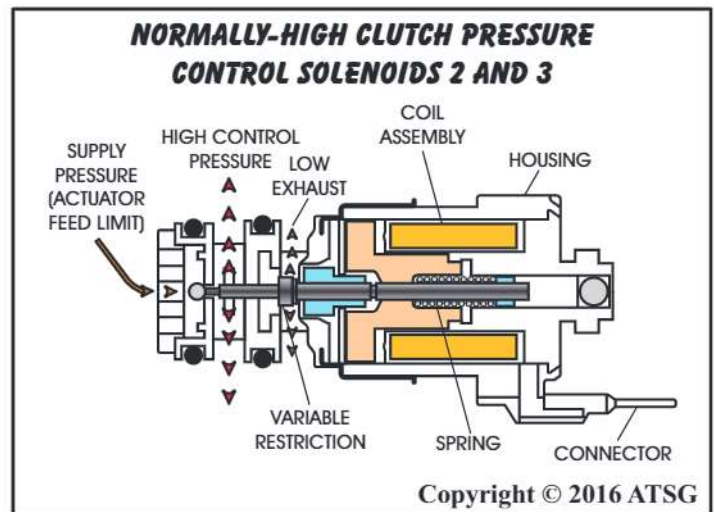


Figure 21

Transmission Adapt Function

Programming within the TCM also allows for automatic adjustments in shift pressure that are based on the changing characteristics of the transmission components. As the apply components within the transmission wear or change over time, the time required to apply a clutch increases or decreases. In order to compensate for these changes, the TCM adjusts the pressure commands to the various pressure control solenoids, to maintain the original calibrations. The automatic adjusting process is referred to as "Adaptive Learning" and is used to ensure consistent shift feel and increase the transmission's durability.

Continued on Page 19

ELECTRONIC COMPONENTS (CONT'D)

Clutch Pressure Control (CPC)

Solenoids 2,3,4 And 5 - Gen 2 - Variable Flow

There are two different types of clutch pressure control solenoids. Clutch Pressure Control solenoids 2 and 4 are **"normally-low"** pressure control solenoids, as shown in Figure 22, and are identical to the TCC PC solenoid.

Clutch Pressure Control solenoids 3 and 5 are **"normally-high"** pressure control solenoids, as shown in Figure 23, and are identical to the line pressure control solenoid.

The Clutch Pressure Control Solenoids are part of the Control Solenoid Body Assembly and can be serviced separately however, care must be taken to install a replacement solenoid with the same rate of flow as the original solenoid or shift feel issues will occur.

Clutch Pressure Control Solenoid 2 controls fluid flow to the 3-5-Reverse clutch regulator valve and the 3-5-Reverse boost valve. When commanded the solenoid controls the flow of exhaust fluid out of the solenoid to maintain a specific commanded control pressure. This allows the TCM to control the apply and release of the 3-5 and reverse clutch.

Clutch Pressure Control Solenoid 3 controls fluid flow to the 4-5-6 clutch regulator valve and the 4-5-6 boost valve. When commanded the solenoid controls the flow of exhaust fluid out of the solenoid to maintain a specific commanded control pressure. This allows the TCM to control the apply and release of the 4-5-6 clutch.

Clutch Pressure Control Solenoid 4 controls fluid flow to the 2-6 clutch regulator valve. When commanded the solenoid controls the flow of exhaust fluid out of the solenoid to maintain a specific commanded control pressure. This allows the TCM to control the apply and release of the 2-6 clutch.

Clutch Pressure Control Solenoid 5 controls fluid flow to the 1-2-3-4 clutch regulator valve and the 1-2-3-4 boost valve. When commanded the solenoid controls the flow of exhaust fluid out of the solenoid to maintain a specific commanded control pressure. This allows the TCM to control the apply and release of the 1-2-3-4 clutch.

Continued on Page 20

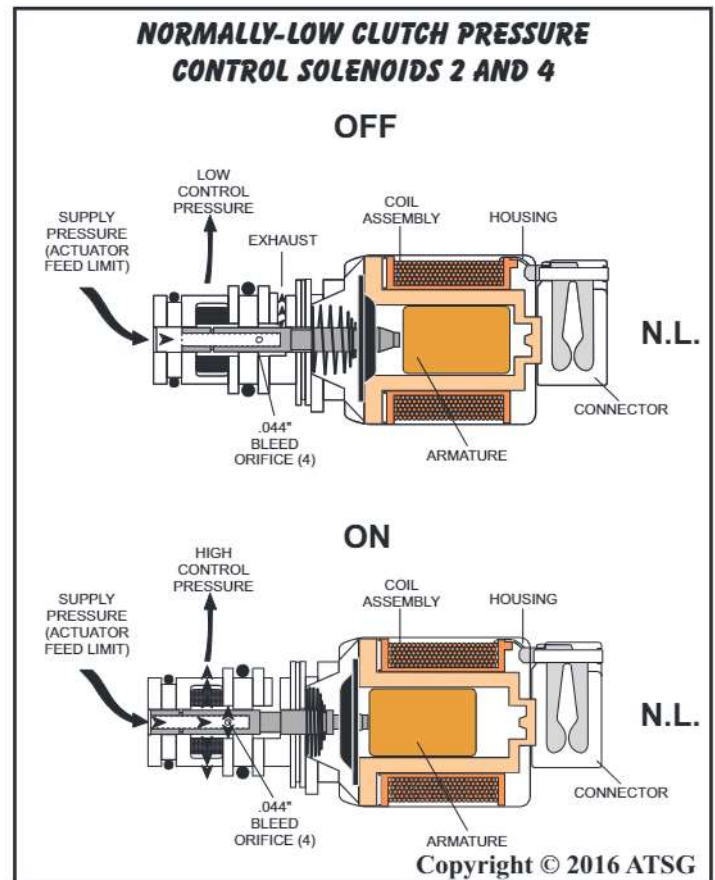


Figure 22

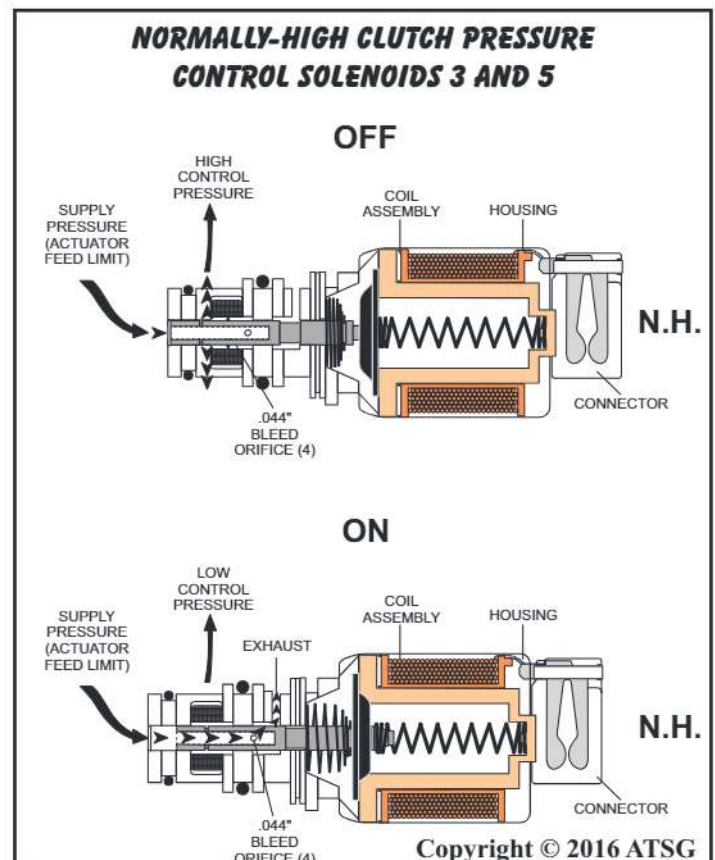


Figure 23

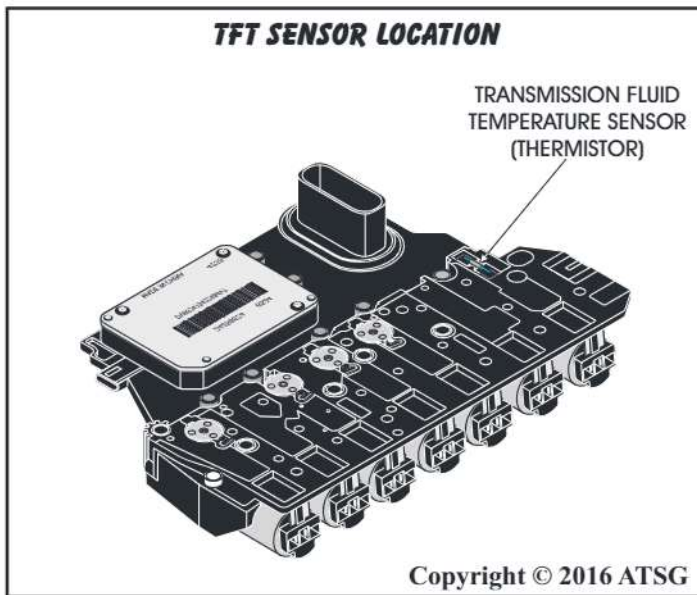


Figure 24

ELECTRONIC COMPONENTS (CONT'D)

Transmission Fluid Temperature (TFT) Sensor

The Transmission Fluid Temperature (TFT) sensor is an integral part of the solenoid body and TCM and located in the position shown in Figure 24, and is not serviced separately.

The TFT sensor is a thermistor, which changes value based on temperature. The sensor has a negative-temperature coefficient, which means as the temp increases, the resistance decreases, and as the temp decreases, the resistance increases. The TCM supplies a voltage reference signal to the sensor and measures the voltage drop in the circuit. The TCM uses this information to maintain shift quality and torque converter clutch apply quality over the entire operating temperature range. If the TCM detects an improper signal from the TFT sensor, a DTC will be activated.

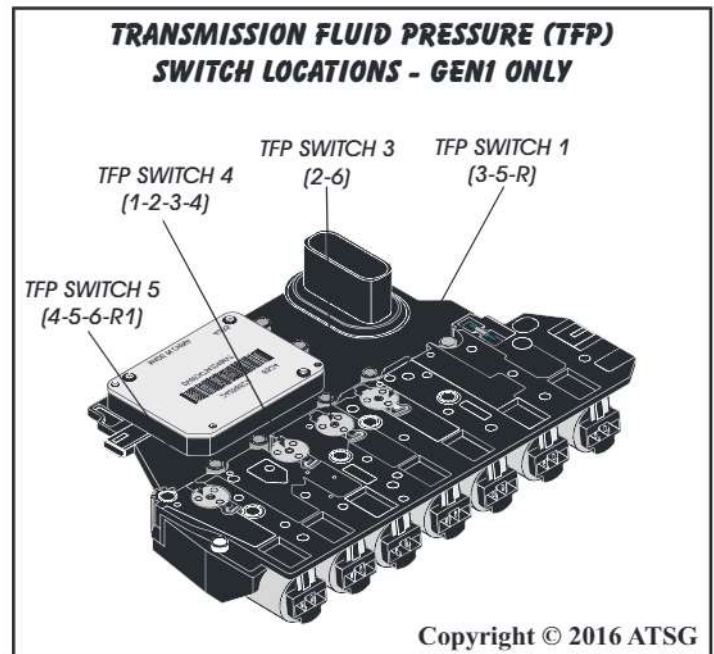


Figure 25

Fluid Pressure Switches - GEN1 ONLY

The transmission fluid pressure switches are located in the control solenoid body and TCM assembly, as shown in Figure 25, and are normally closed. When closed, these switches allow current flow through the switch. When fluid pressure is routed to the switch, pressure moves the diaphragm, piston and disk so that the circuit opens and there is no current flow. See Figure 26 for a cut-away view and a pressure switch logic chart.

TFP switch 1 sends a signal to the TCM to indicate the state of the 3-5-Reverse clutch regulator valve.

TFP switch 3 sends a signal to the TCM to indicate the state of the 2-6 clutch regulator valve.

TFP switch 4 sends a signal to the TCM to indicate the state of 1-2-3-4 clutch regulator valve.

TFP switch 5 sends a signal to the TCM to indicate the state of the 4-5-6/R1 clutch regulator valve.

Continued on Page 21

ELECTRONIC COMPONENTS (CONT'D)

Manual Shift Position Switch

The Transmission Manual Shift Position Switch Assembly, sometimes referred to as Internal Mode Switch (IMS), is a sliding contact switch that connects to the manual valve, with an electrical connector that plugs into the control solenoid body and TCM assembly, and is shown in Figure 27.

There are four inputs to the TCM from the position switch assembly, that indicate which transmission gear range has been selected. The state of each input is available for display on the scan tool. The four input parameters presented are Signal A, Signal B, Signal C, and Signal P (Parity). There is also a ground circuit and a P/N Start input which is sent to the ECM.

Continued on Page 22

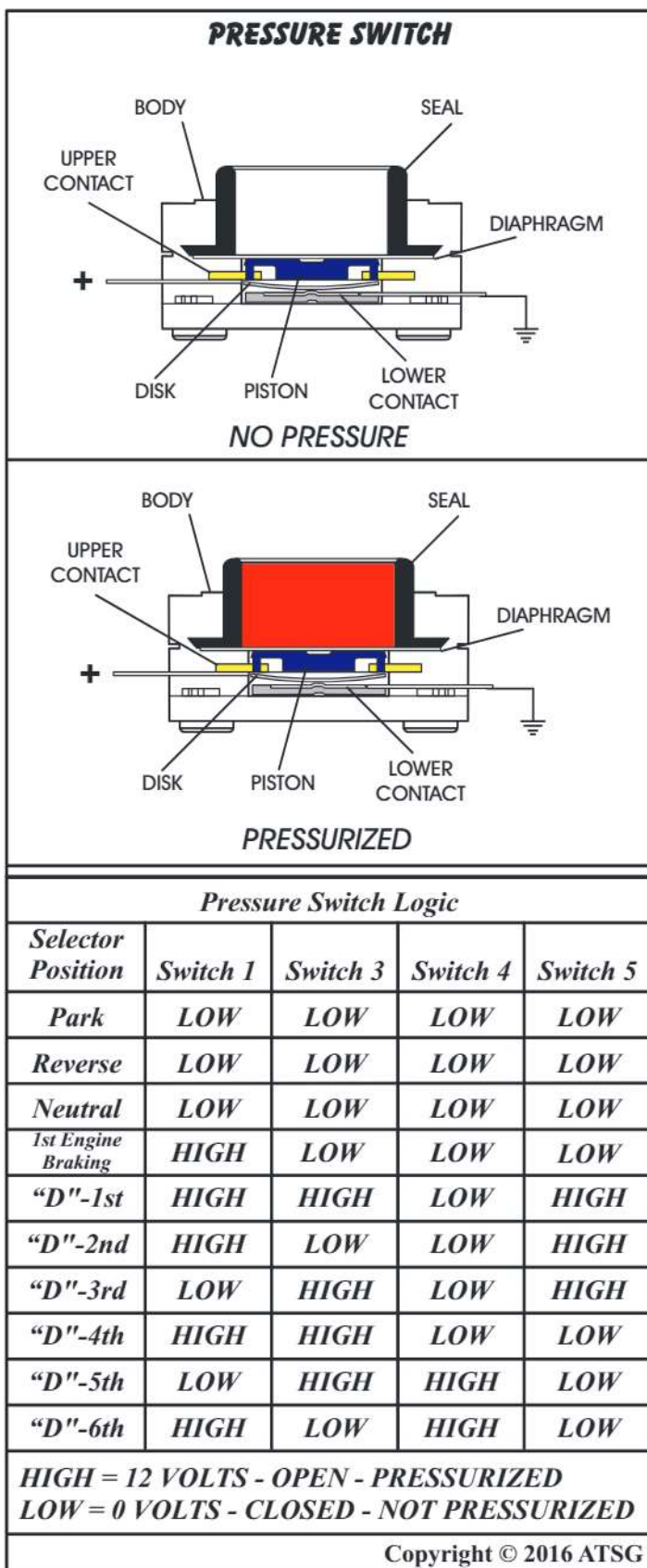
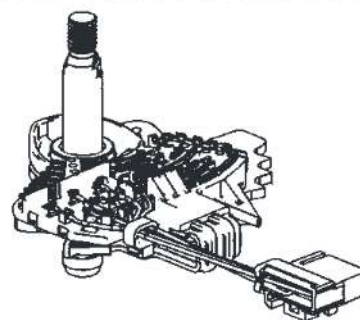


Figure 26

MANUAL SHAFT POSITION SWITCH



MANUAL SHAFT POSITION SWITCH LOGIC

Gear Selector Position	Signal A	Signal B	Signal C	Signal P
Park	LOW	HI	HI	LOW
Park/Reverse	LOW	LOW	HI	LOW
Reverse	LOW	LOW	HI	HI
Reverse/Neutral	HI	LOW	HI	HI
Neutral	HI	LOW	HI	LOW
Neutral/Drive 6	HI	LOW	LOW	LOW
Drive 6	HI	LOW	LOW	HI
Drive 6/Drive 4	LOW	LOW	LOW	HI
Drive 4	LOW	LOW	LOW	LOW
Drive 4/Drive 3	LOW	HI	LOW	LOW
Drive 3	LOW	HI	LOW	HI
Drive 3/Drive 2	HI	HI	LOW	HI
Drive 2	HI	HI	LOW	LOW
Open	HI	HI	HI	HI
Invalid	HI	HI	HI	LOW
Invalid	LOW	HI	HI	HI

HI = 12 Volts LOW = 0 Volts Copyright © 2016 ATSG

Figure 27

ELECTRONIC COMPONENTS (CONT'D)

Transmission Input Speed (ISS) Sensor

The Transmission Input Speed Sensor is a Hall Effect type sensor as shown in Figure 28. The ISS is mounted outside the transmission and is triggered by the 3-5-Reverse and 4-5-6 clutch housing by an attached reluctor wheel, Figure 29 and then goes through a pass-through connector outside the transmission after which it is routed back inside the transmission where it connects to the TECHM.

The sensor receives a 8.3 to 9.3 supply voltage on one circuit and produces a signal on the other circuit. The ground is built internal to the sensor making this a two wire Hall Effect Sensor.

This signal is sent to the TCM and is used to determine line pressure control, transmission shift timing, TCC slip speed and gear ratio information.

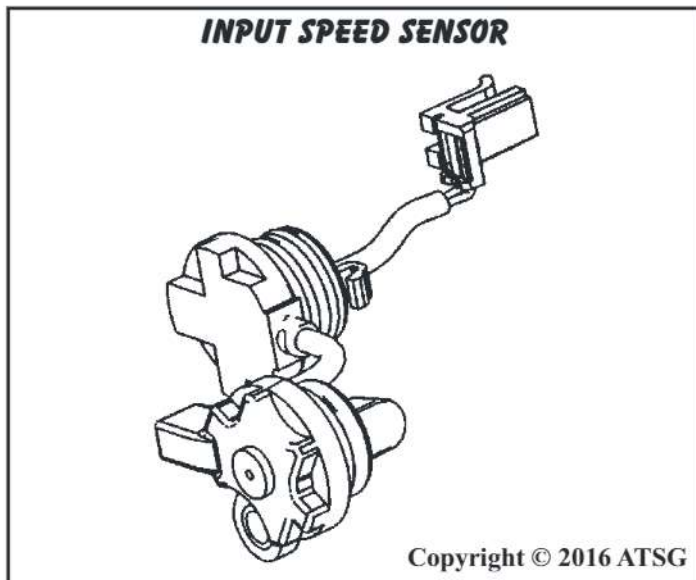


Figure 28

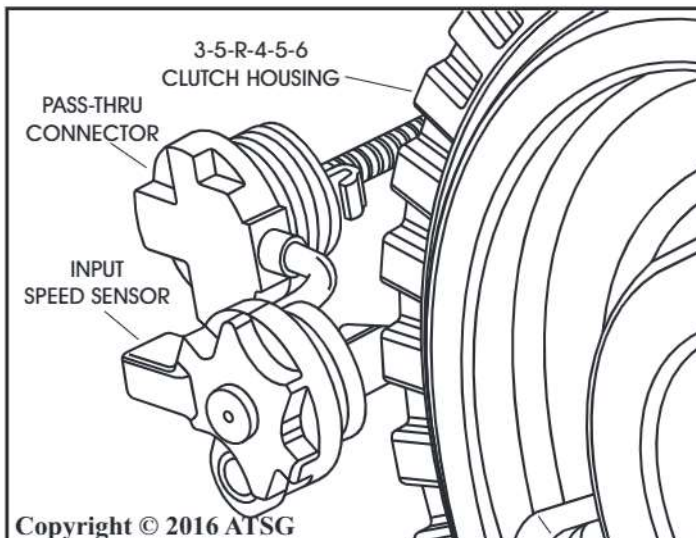


Figure 29

Transmission Output Speed (OSS) Sensor

The Transmission Output Speed Sensor is a Hall Effect type sensor as shown in Figure 30. The OSS is mounted inside the transmission and is triggered by the park gear teeth, Figure 31 where it connects to the TECHM.

The sensor receives a 8.3 to 9.3 supply voltage on one circuit and produces a signal on the other circuit. The ground is built internal to the sensor making this a two wire Hall Effect Sensor.

This signal is sent to the TCM and is used to determine transmission shift timing, vehicle speed and gear ratio information.

Continued on Page 23

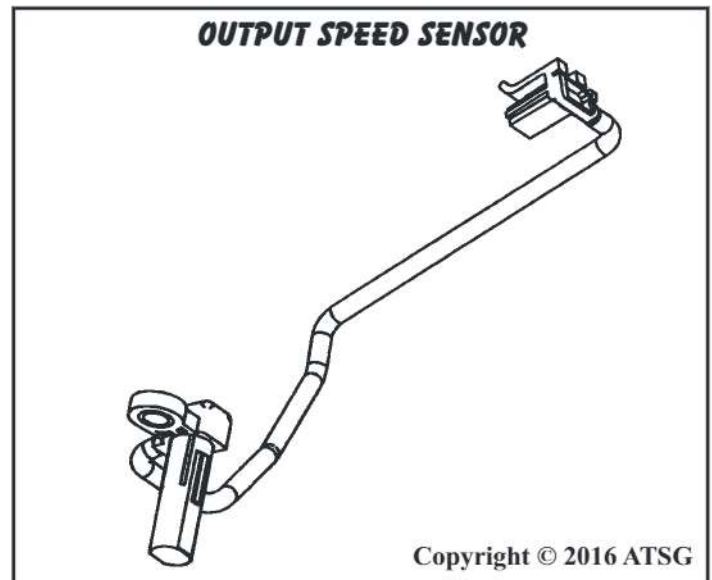


Figure 30

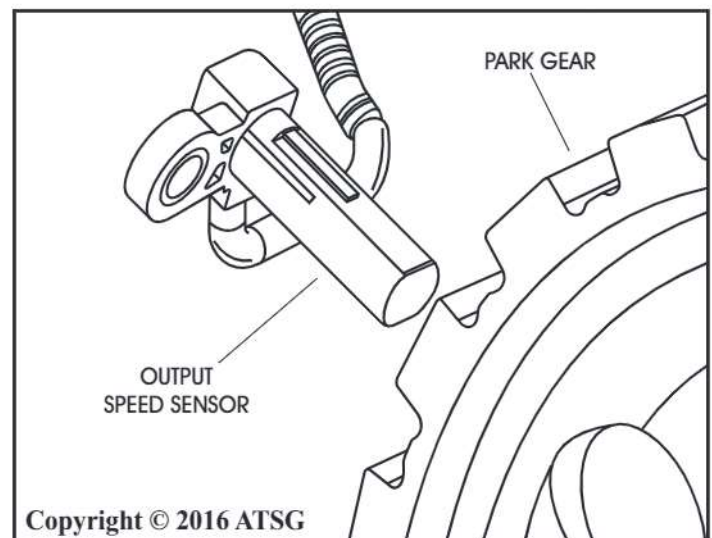


Figure 31

ELECTRONIC COMPONENTS (CONT'D)

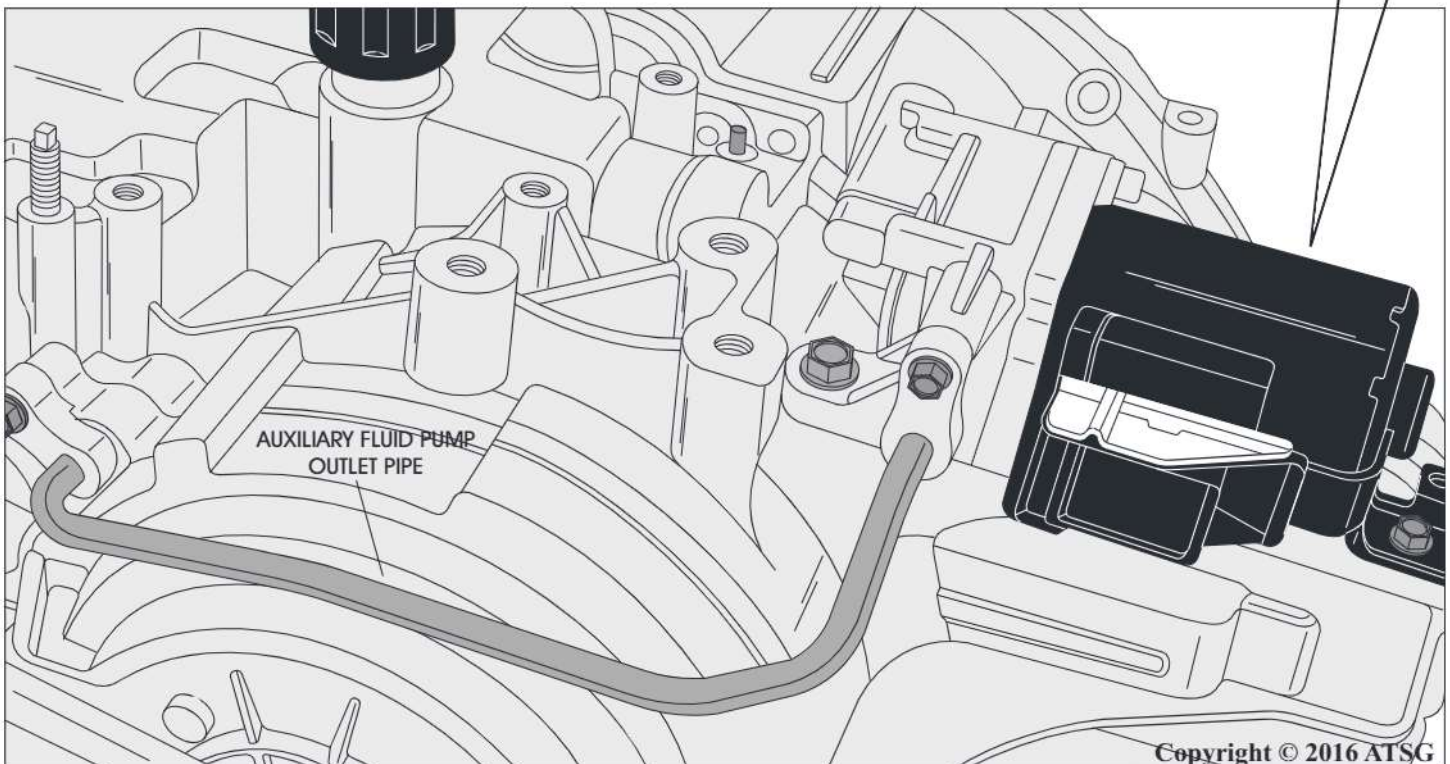
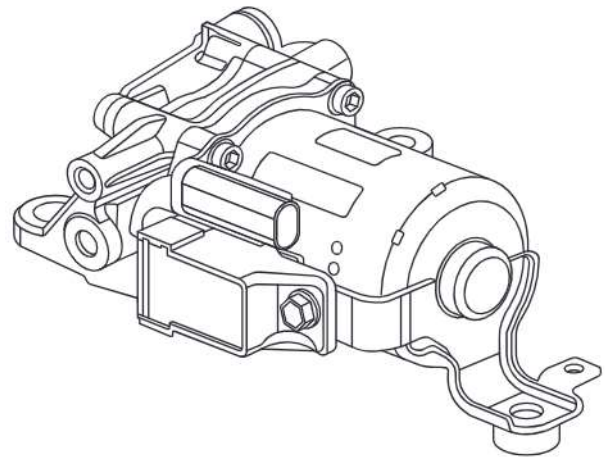
Auxiliary Fluid Pump Assembly (BAS Hybrid Only)

The auxiliary fluid pump assembly is attached to the outside of the transmission case and is a hydraulic pump driven by a 12 volt electric motor as shown in Figure 32. Control of the auxiliary pump is accomplished by the Hybrid Powertrain Control Module (HPCM) located in the engine compartment.

The purpose of the auxiliary pump is to provide hydraulic fluid pressure to the transmission for lubrication, cooling and clutch application when the engine is off and the main transmission pump is not operating when the vehicle is in Auto-Stop Mode.

Continued on Page 24

AUXILIARY FLUID PUMP ASSEMBLY (BAS HYBRID ONLY)



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Figure 32

ELECTRONIC COMPONENTS (CONT'D)

14-Way Case Connector

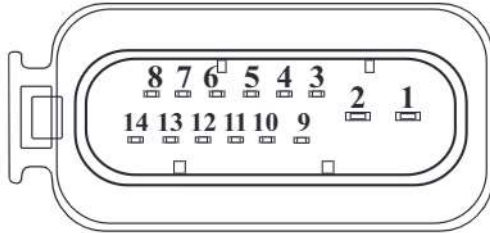
The 14-way transmission case connector is part of the solenoid body and TCM assembly, as shown in Figure 33, and **is not** serviced separately. The case connector and the terminal identification chart are both illustrated in Figure 33, for diagnostic purposes. We have provided a partial wiring schematic in Figure 35.

Since the case connector is part of the TCM and is located internally, there is an oval rubber seal required to seal the control unit 14-way connector to the plastic valve body cover which it passes through, as shown in Figure 34.

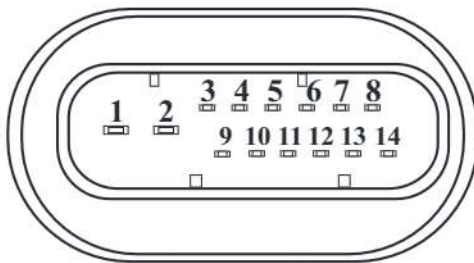
Continued on Page 25

CASE CONNECTOR TERMINAL I.D. AND FUNCTION

View Looking Into
14-Way Harness Connector



View Looking Into
14-Way Solenoid Body Connector



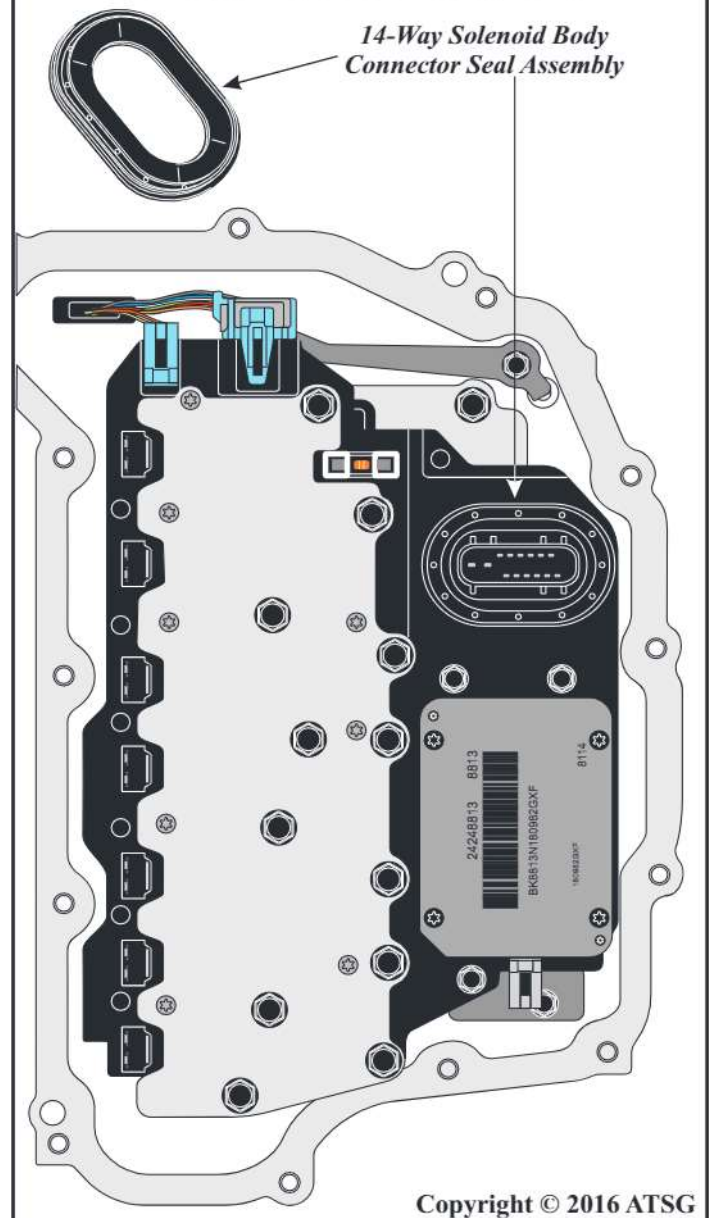
TERMINAL IDENTIFICATION AND FUNCTION

Pin No.	Function
1	Battery Voltage
2	Ground
3	Park/Neutral Signal
4	Not Used
5	Not Used
6	High Speed GMLAN Serial Data (+)
7	High Speed GMLAN Serial Data (+)
8	High Speed GMLAN Serial Data (-)
9	Not Used
10	Stop Lamp Switch Signal
11	Not Used
12	Ignition Voltage
13	Accessory Wakeup Voltage
14	High Speed GMLAN Serial Data (-)

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Figure 33

SOLENOID BODY CONNECTOR & SEAL



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Figure 34

PARTIAL WIRE SCHEMATIC (MODEL SENSITIVE)

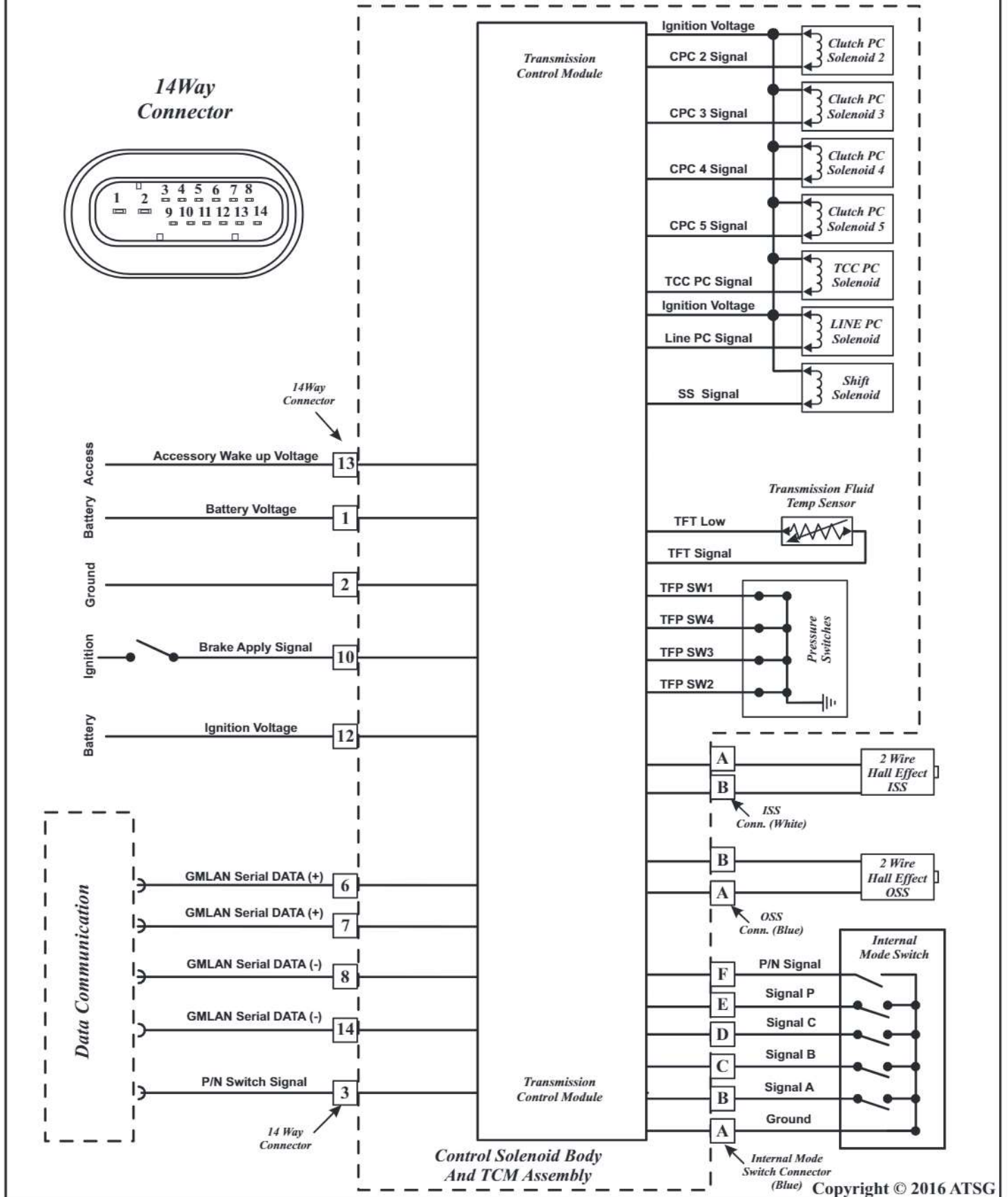


Figure 35

DIAGNOSTIC TROUBLE CODE (DTC) IDENTIFICATION		
DTC	DESCRIPTION	DTC TYPE*
P057B	<i>Brake Pedal Position Sensor Performance.</i>	A
P057C	<i>Brake Pedal Position Sensor Circuit Voltage Low.</i>	A
P057D	<i>Brake Pedal Position Sensor Circuit Voltage High.</i>	A
P0601	<i>TCM (Internal), Read Only Memory (ROM) Performance.</i>	A
P0603	<i>TCM (Internal), Long Term Memory Reset.</i>	A
P0604	<i>TCM (Internal), Random Access Memory (RAM) Performance.</i>	A
P062F	<i>TCM (Internal), Long Term Memory Performance.</i>	A
P0634	<i>TCM (Internal), Over Temperature.</i>	A
P0658	<i>Actuator High Control Circuit Group 1 Voltage Low.</i>	A
P0659	<i>Actuator High Control Circuit Group 1 Voltage High.</i>	C
P0667	<i>TCM (Internal), Temperature Sensor Performance.</i>	C
P0668	<i>TCM (Internal), Temperature Sensor Circuit Voltage Low.</i>	C
P0669	<i>TCM (Internal), Temperature Sensor Circuit Voltage High.</i>	C
P06AC	<i>Control Module (Internal) Power Up Temperature Sensor Performance.</i>	B
P06AD	<i>Control Module (Internal) Power Up Temperature Sensor Circuit Voltage Low.</i>	B
P06AE	<i>Control Module (Internal) Power Up Temperature Sensor Circuit Voltage High.</i>	B
P0711	<i>Transmission Fluid Temperature (TFT), Sensor Performance.</i>	B
P0712	<i>Transmission Fluid Temperature (TFT), Sensor Circuit Voltage Low.</i>	B
P0713	<i>Transmission Fluid Temperature (TFT), Sensor Circuit Voltage High.</i>	B
P0716	<i>Input Speed Sensor (ISS), Sensor Performance.</i>	A
P0717	<i>Input Speed Sensor (ISS), Sensor Circuit - No Signal.</i>	A
P07BF	<i>Input Speed Sensor (ISS), Sensor Circuit Voltage Low.</i>	A
P07C0	<i>Input Speed Sensor (ISS), Sensor Circuit Voltage High.</i>	A
P0722	<i>Output Speed Sensor (OSS), Sensor Circuit - No Signal.</i>	A
P0723	<i>Output Speed Sensor (OSS), Sensor Intermittent.</i>	A
P077C	<i>Output Speed Sensor (OSS), Sensor Circuit Voltage Low.</i>	A
P077D	<i>Output Speed Sensor (OSS), Sensor Circuit Voltage High.</i>	A
P0741	<i>Torque Converter Clutch (TCC), System Stuck OFF.</i>	B
P0742	<i>Torque Converter Clutch (TCC), System Stuck ON.</i>	A
P0751	<i>Shift Solenoid (SS) 1 Valve Performance, Stuck OFF.</i>	B
P0752	<i>Shift Solenoid (SS) 1 Valve Performance, Stuck ON.</i>	A
P0776	<i>Clutch Pressure Control (PC) Solenoid 2, Stuck OFF.</i>	A
*DTC TYPES A - Emission-related, turns the MIL "ON" immediately after the 1st failure. B - Emission-related, turns the MIL "ON" after two consecutive drive cycles with failure. C - Non-emission-related, no lamps and may display message on driver information center.		

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Figure 36

DIAGNOSTIC TROUBLE CODE (DTC) IDENTIFICATION		
DTC	DESCRIPTION	DTC TYPE*
P0777	Clutch Pressure Control (PC) Solenoid 2, Stuck ON.	A
P0796	Clutch Pressure Control (PC) Solenoid 3, Stuck OFF.	A
P0797	Clutch Pressure Control (PC) Solenoid 3, Stuck ON.	A
P0815	Upshift Switch Circuit Error.	C
P0816	Downshift Switch Circuit Error.	C
P0826	Upshift and Downshift Switch Circuit Error.	C
P0842	Transmission Fluid Pressure Switch 1, Circuit Voltage Low (GEN 1 Only).	C
P0843	Transmission Fluid Pressure Switch 1, Circuit Voltage High, (GEN 1 Only).	C
P0850	P/N Position (PNP) Switch, Circuit.	C
P0851	P/N Position (PNP) Switch, Circuit Voltage Low (Internal Mode Switch).	C
P0852	P/N Position (PNP) Switch, Circuit Voltage High (Internal Mode Switch).	C
P0872	Transmission Fluid Pressure Switch 3, Circuit Voltage Low, (GEN 1 Only).	C
P0873	Transmission Fluid Pressure Switch 3, Circuit Voltage High, (GEN 1 Only).	C
P0877	Transmission Fluid Pressure Switch 4, Circuit Voltage Low, GEN 1 Only).	C
P0878	Transmission Fluid Pressure Switch 4, Circuit Voltage High, GEN 1 Only).	C
P0961	Line Pressure Control (PC) Solenoid, System Performance.	B
P0962	Line Pressure Control (PC) Solenoid, Circuit Voltage Low.	A
P0963	Line Pressure Control (PC) Solenoid, Circuit Voltage High.	B
P0965	Clutch Pressure Control (PC) Solenoid 2, System Performance.	C
P0966	Clutch Pressure Control (PC) Solenoid 2, Circuit Voltage Low.	A
P0967	Clutch Pressure Control (PC) Solenoid 2, Circuit Voltage High.	A
P0969	Clutch Pressure Control (PC) Solenoid 3, System Performance.	C
P0970	Clutch Pressure Control (PC) Solenoid 3, Circuit Voltage Low.	A
P0971	Clutch Pressure Control (PC) Solenoid 3, Circuit Voltage High.	A
P0973	Shift Solenoid 1 (SS), Control Circuit Voltage Low.	A
P0974	Shift Solenoid 1 (SS), Control Circuit Voltage High.	B
P0989	Transmission Fluid Pressure Switch 5, Circuit Voltage Low, (GEN 1 Only).	C
P0990	Transmission Fluid Pressure Switch 5, Circuit Voltage High, (GEN 1 Only).	C
P1761	Up and Down Shift Switch Signal Message Counter Incorrect.	C
P182E	Internal Mode Switch, Invalid Range	A
P1915	Internal Mode Switch Does Not Indicate Park/Neutral During Start.	A
P1876	Up and Down Shift Enable Switch Circuit Voltage Low.	C
P2714	Clutch Pressure Control (PC) Solenoid 4, Stuck OFF.	A
*DTC TYPES A - Emission-related, turns the MIL "ON" immediately after the 1st failure. B - Emission-related, turns the MIL "ON" after two consecutive drive cycles with failure. C - Non-emission-related, no lamps and may display message on driver information center.		

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Figure 37

DIAGNOSTIC TROUBLE CODE (DTC) IDENTIFICATION		
DTC	DESCRIPTION	DTC TYPE*
P2715	Clutch Pressure Control (PC) Solenoid 4, Stuck ON.	A
P2719	Clutch Pressure Control (PC) Solenoid 4, System Performance.	C
P2720	Clutch Pressure Control (PC) Solenoid 4, Circuit Voltage Low.	A
P2721	Clutch Pressure Control (PC) Solenoid 4, Circuit Voltage High.	A
P2723	Clutch Pressure Control (PC) Solenoid 5, Stuck OFF.	A
P2724	Clutch Pressure Control (PC) Solenoid 5, Stuck ON.	A
P2728	Clutch Pressure Control (PC) Solenoid 5, System Performance.	C
P2729	Clutch Pressure Control (PC) Solenoid 5, Circuit Voltage Low.	A
P2730	Clutch Pressure Control (PC) Solenoid 5, Circuit Voltage High.	A
P2762	TCC Pressure Control (PC) Solenoid, System Performance.	C
P2763	TCC Pressure Control (PC) Solenoid, Circuit Voltage High.	B
P2764	TCC Pressure Control (PC) Solenoid, Circuit Voltage Low.	A
*DTC TYPES A - Emission-related, turns the MIL "ON" immediately after the 1st failure. B - Emission-related, turns the MIL "ON" after two consecutive drive cycles with failure. C - Non-emission-related, no lamps and may display message on driver information center.		

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Figure 38

FAIL-SAFE OR PROTECTION MODE

If for any reason, the entire electronic control system of the transmission, or any one of the electrical components within the Control Solenoid Body and TCM Assembly becomes disabled, the transmission will default to fail-safe mode. If the transmission is in 1st, 2nd or 3rd gear during an electrical failure, the transmission will default to 3rd gear. If the transmission is in 4th, 5th or 6th gear during an electrical failure, the transmission will default to 5th gear. The transmission will remain in 5th gear default range until the ignition has been turned off or the transmission has been shifted to Reverse. When the vehicle is restarted and shifted back into Drive, the transmission will then operate in the 3rd gear default range.

If for any reason, the entire electronic control system of the transmission fails, the line pressure control solenoid will be OFF, and maximum line pressure will be the result. This will create harsh engagements and garage shifts. The TCC PC solenoid would also be OFF, resulting in no torque converter clutch apply.

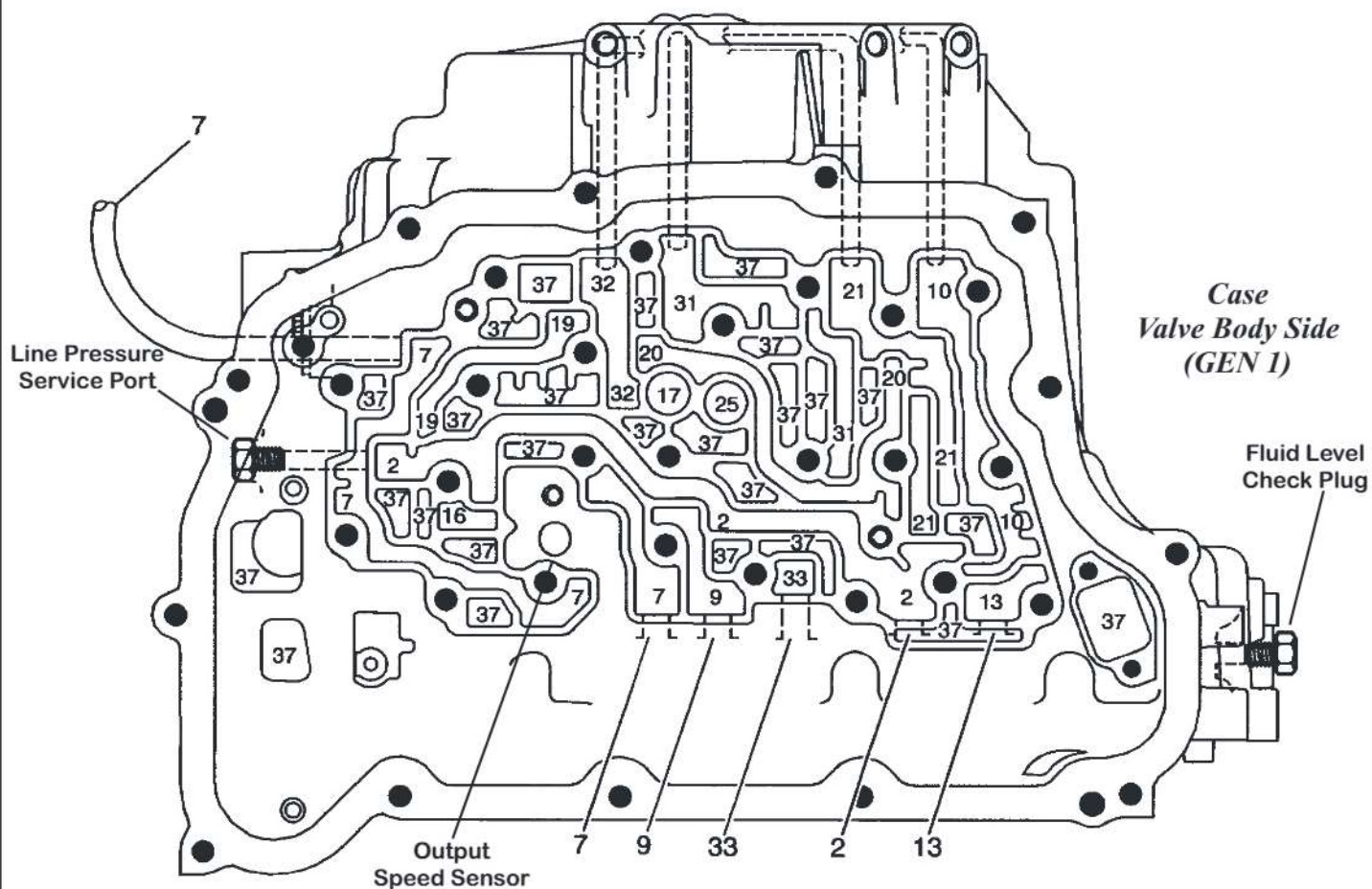
NON-SHIFTING CLUTCH FUNCTION VERIFICATION

The 6T30/40/45/50 transmission uses a pressure control system to apply and release clutches during shifts. The Transmission Control Module controls pressure commands to the pressure control solenoids. As normal wear of the transmission occur, the TCM performs a clutch verification. The TCM momentarily commands a clutch ON at a low pressure. The clutch function verification is conducted on smooth roads when the transmission is not shifting and engine torque is consistent. When a clutch function verification is occurring, a slight bump or drag may be felt momentarily. The clutch function verification will occur a few times over several minutes and will not repeat again for approximately 1000 miles. ***This is a normal condition and no repairs are required.***

NOTE: The clutch function verification will occur sooner for a particular clutch if the TCM detects it is producing frequent poor shift control.

Continued on Page 29

PASSAGE IDENTIFICATION



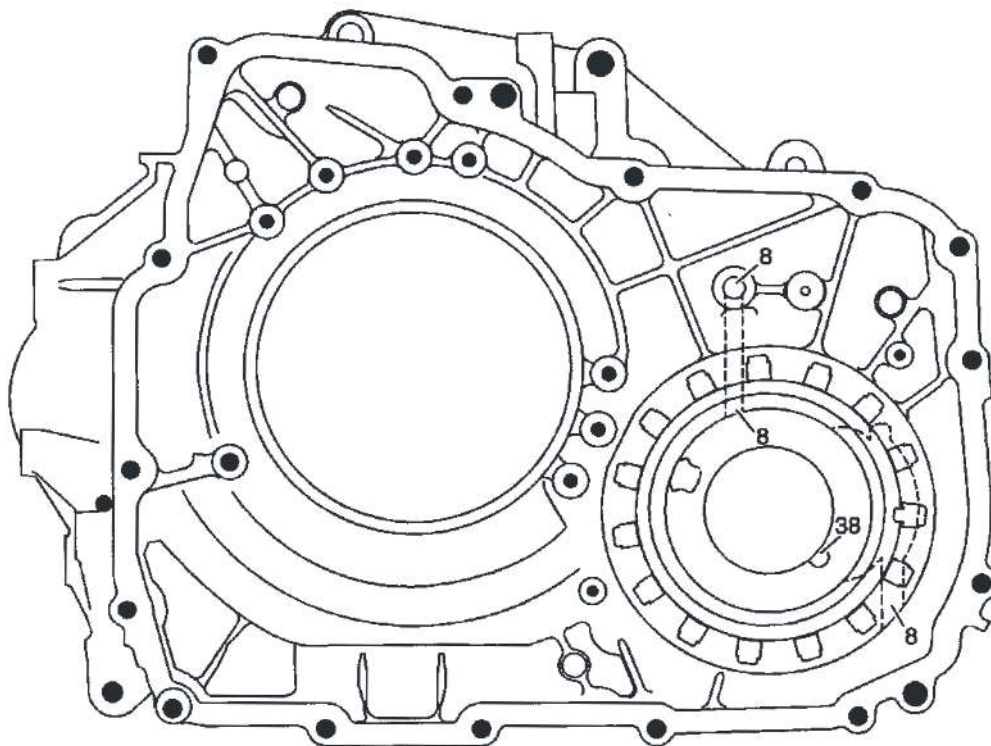
- 1 Suction
- 2 Line
- 4 Converter Feed
- 5 TCC Release
- 6 TCC Apply
- 7 Cooler Feed
- 8 Lube
- 9 Regulated Apply
- 10 Compensator Feed
- 11 Actuator Feed Limit
- 12 PS3
- 13 PCS Line
- 14 PCS R1/456 Clutch
- 15 Shift Solenoid
- 16 R1/456 Clutch Feed
- 17 R1
- 18 PCS 35Reverse Clutch
- 19 Reverse
- 20 35Reverse Clutch Feed

- 21 35Reverse Clutch
- 22 PCS 1234 Clutch
- 23 Drive
- 24 PS2
- 25 1234 Clutch
- 26 1234 Clutch Feedback
- 27 Drive 1-6
- 28 PS4
- 29 CSV2 Latch
- 30 PCS 26 Clutch
- 31 26 Clutch
- 32 456 Clutch
- 33 PCS TCC
- 34 PS1
- 36 Exhaust
- 37 Void
- 38 Seal Drainback
- 39 Vent

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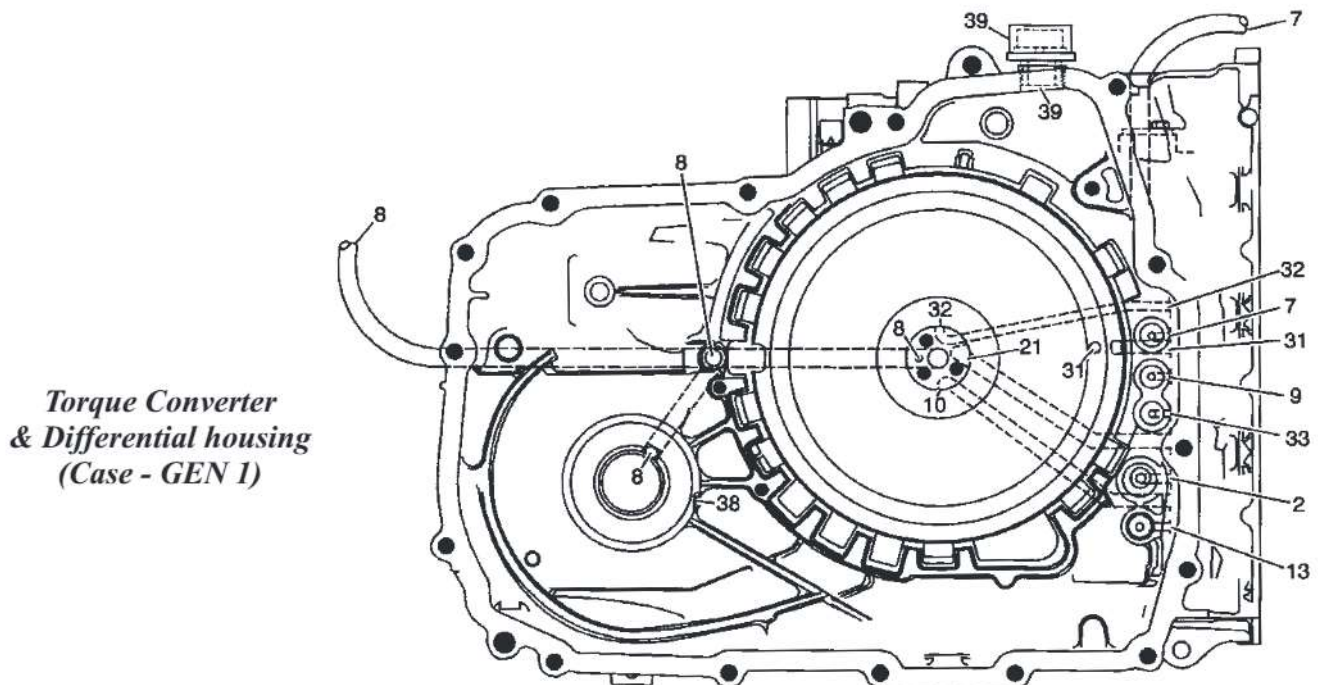
Figure 39

PASSAGE IDENTIFICATION



*Torque Converter
& Differential housing
(Case Side - GEN 1)*

See Page 29 For Legend

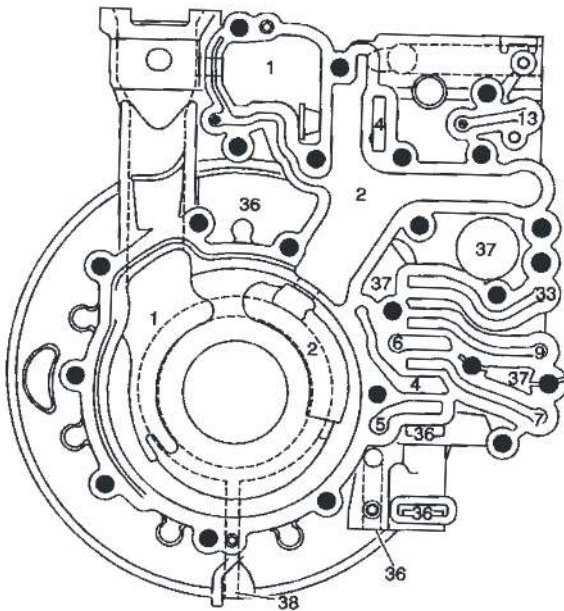


*Torque Converter
& Differential housing
(Case - GEN 1)*

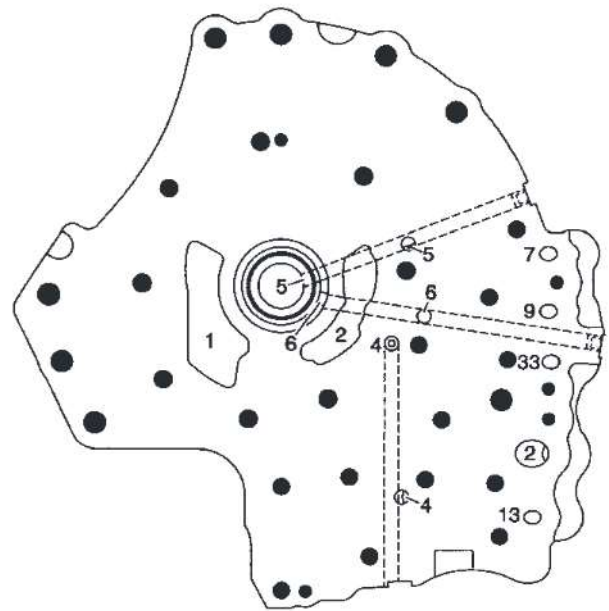
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Figure 40

PASSAGE IDENTIFICATION

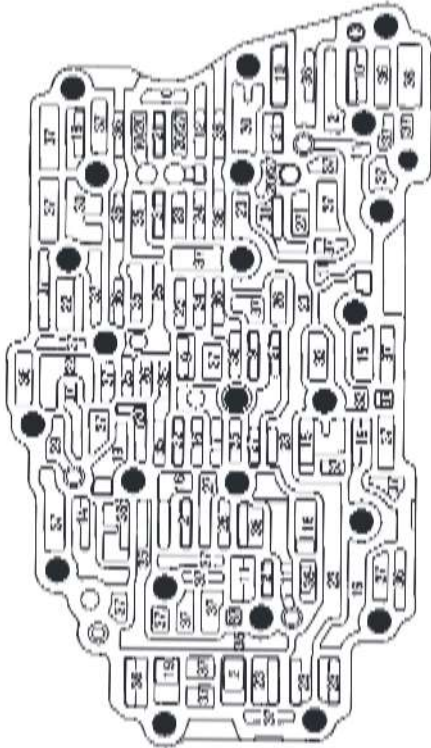


*Fluid Pump Body - Fluid Pump Cover Side
(GEN 1)*

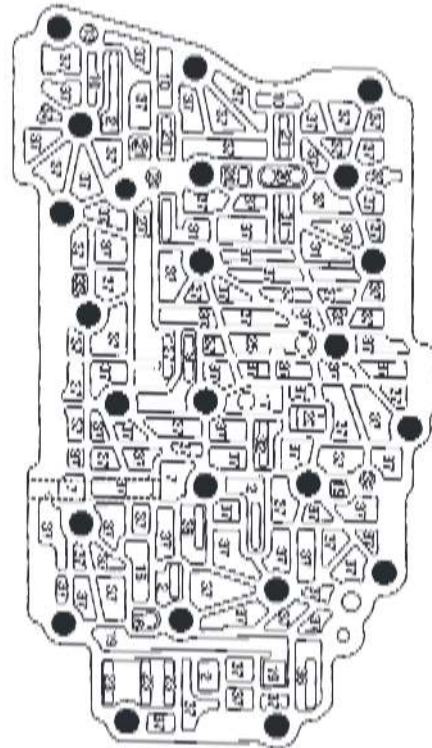


*Fluid Pump Cover - Fluid Pump Body Side
(GEN 1)*

See Page 29 For Legend



*Control Valve Body - Channel Plate Side
(GEN 1)*

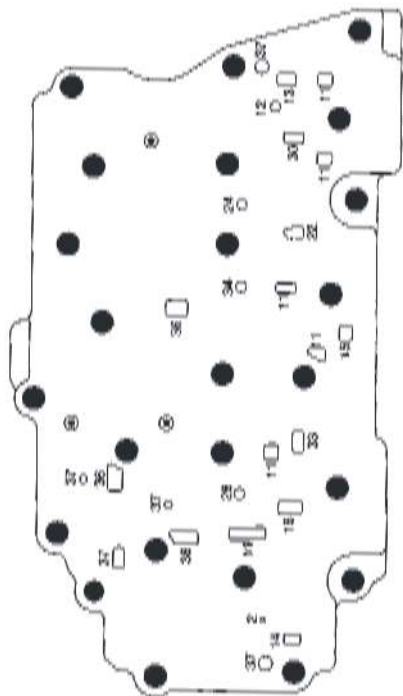


*Control Valve Body - Case Side
(GEN 1)*

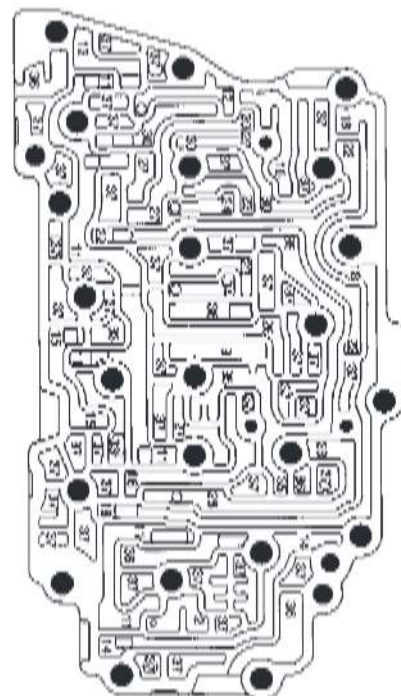
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Figure 41

PASSAGE IDENTIFICATION

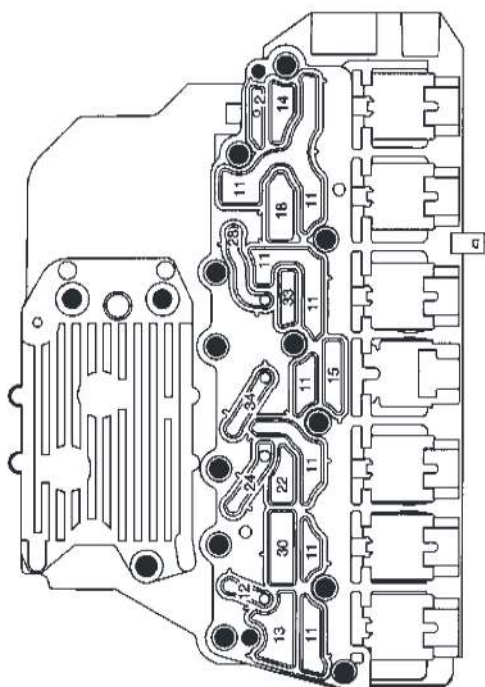


*Channel Plate - Control Solenoid Assembly Side
(GEN 1)*

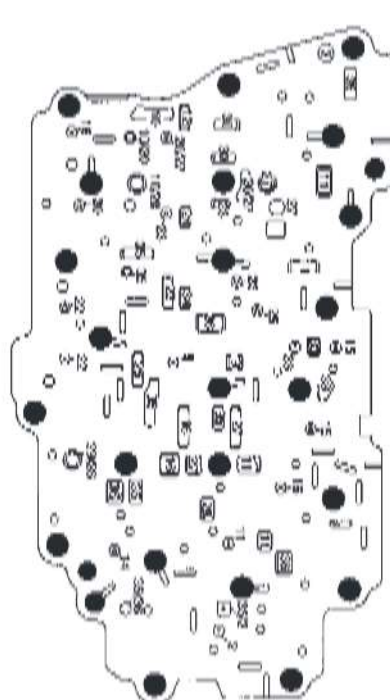


*Channel Plate - Control Valve Body Side
(GEN 1)*

See Page 29 For Legend



*Control Solenoid Assembly -
Channel Plate Side
(GEN 1)*



*Spacer Plate -
Channel Plate Side
(GEN 1)*

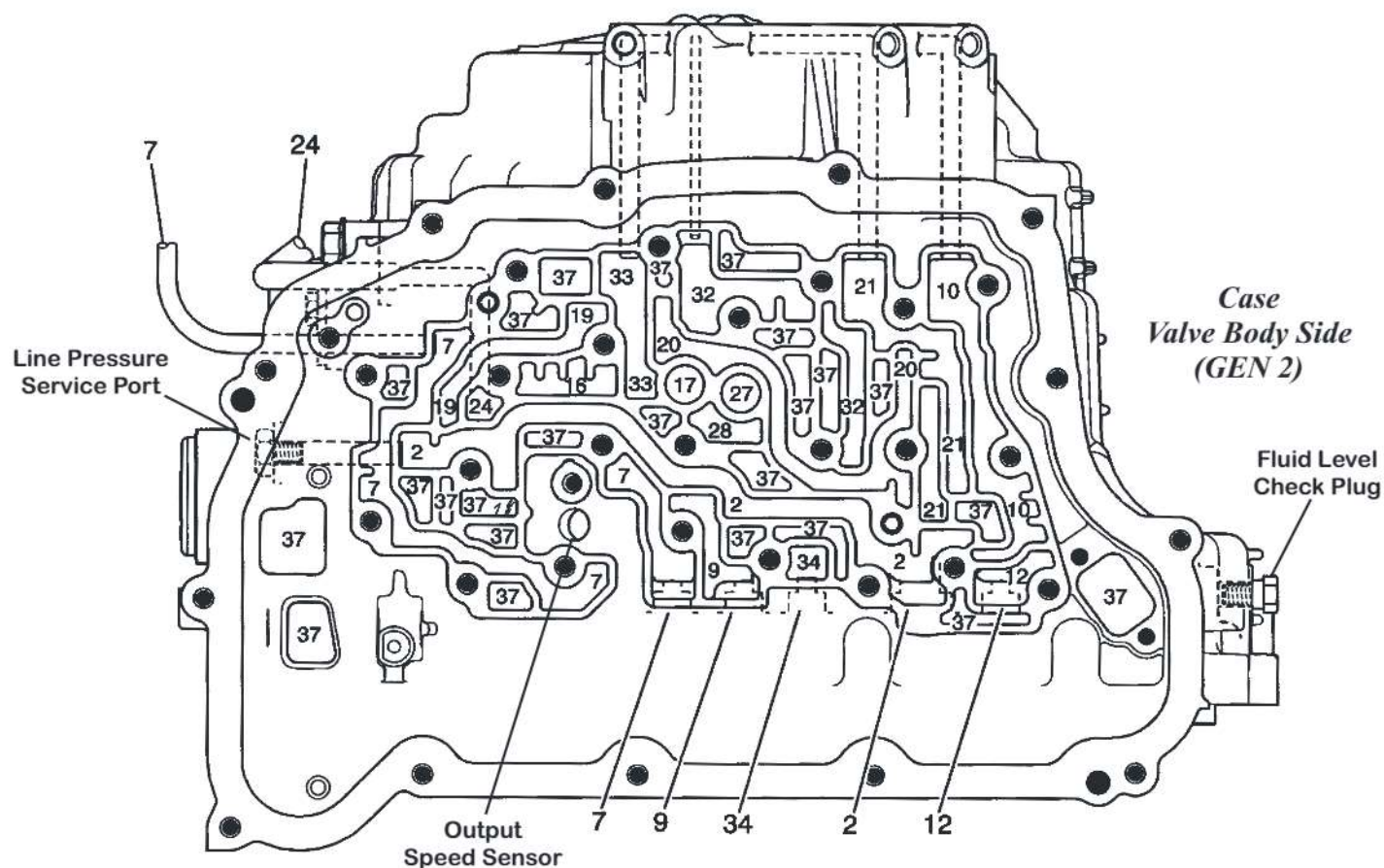


*Spacer Plate -
Case Side
(GEN 1)*

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Figure 42

PASSAGE IDENTIFICATION



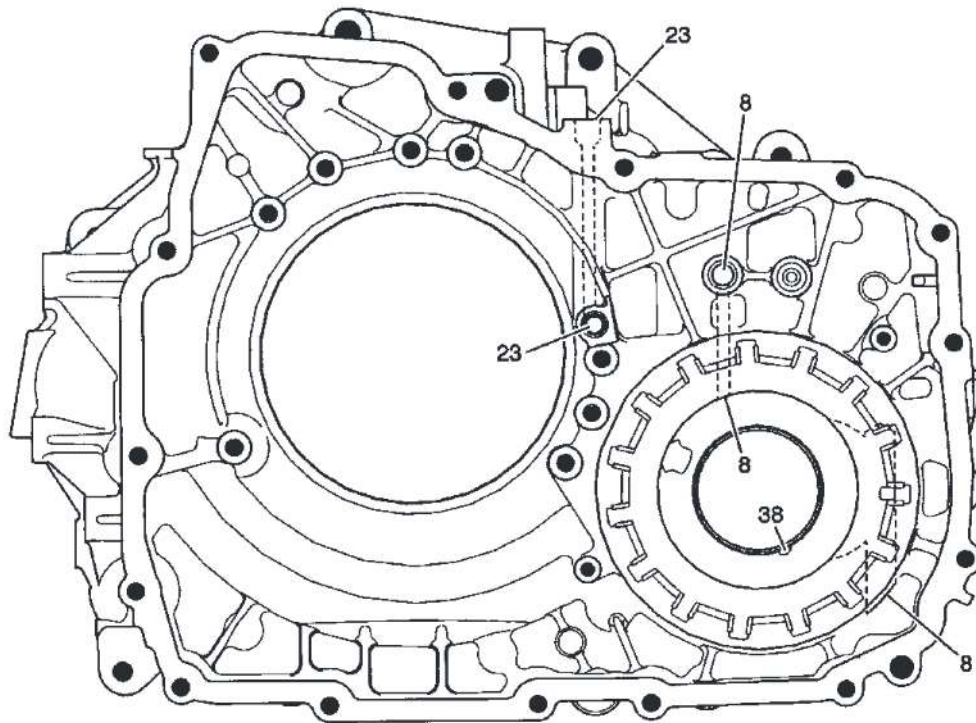
- 1 Suction
- 2 Line
- 4 Converter Feed
- 5 TCC Release
- 6 TCC Apply
- 7 Cooler Feed
- 8 Lube
- 9 Regulated Apply
- 10 Exhaust Backfill
- 11 Actuator Feed Limit
- 12 PCS Line
- 13 PCS R1/456 Clutch
- 14 Shift Solenoid
- 15 R1/456 Clutch Feed
- 16 R1/456 Clutch Feedback
- 17 R1
- 18 PCS 35Reverse Clutch
- 19 Reverse
- 20 35Reverse Clutch Feed

- 21 35Reverse Clutch
- 22 Default
- 23 Auxiliary Suction (BAS Hybrid Only)
- 24 Auxiliary Line (BAS Hybrid Only)
- 25 PCS 1234 Clutch
- 26 Drive
- 27 1234 Clutch
- 28 1234 Clutch Feedback
- 29 Drive 1-6
- 30 Latch
- 31 PCS 26 Clutch
- 32 26 Clutch
- 33 456 Clutch
- 34 PCS TCC
- 36 Exhaust
- 37 Void
- 38 Seal Drainback
- 39 Vent

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Figure 43

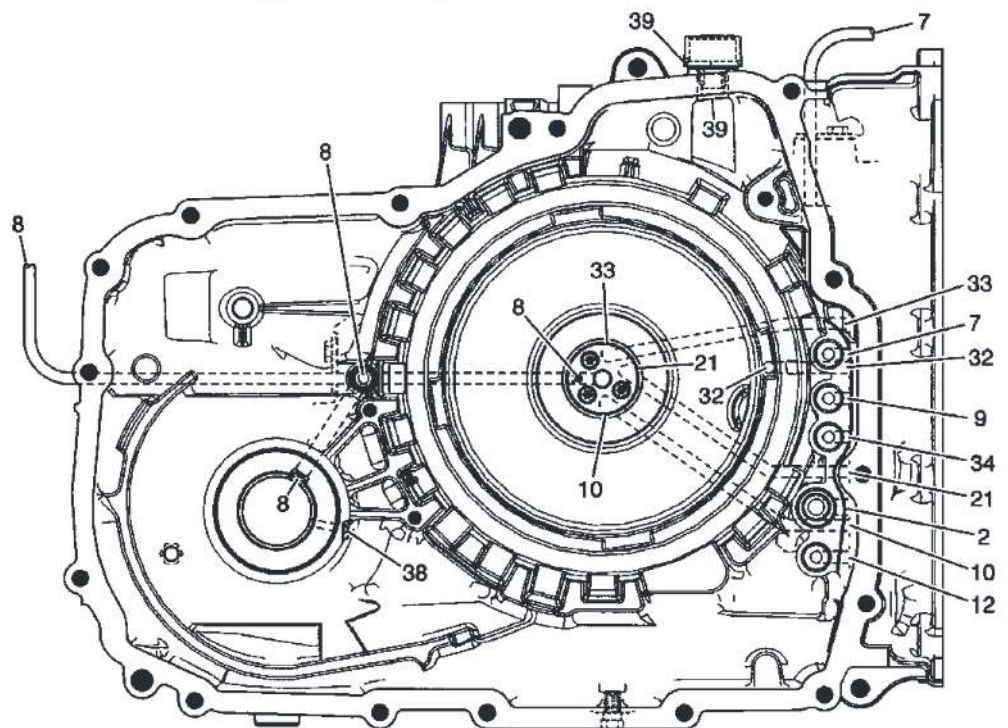
PASSAGE IDENTIFICATION



*Torque Converter
& Differential housing
(Case Side - GEN 2)*

See Page 33 For Legend

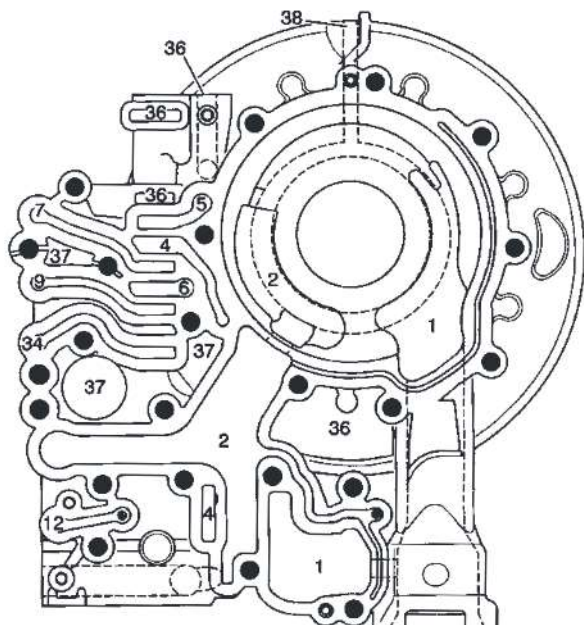
*Torque Converter
& Differential housing
(Case - GEN 2)*



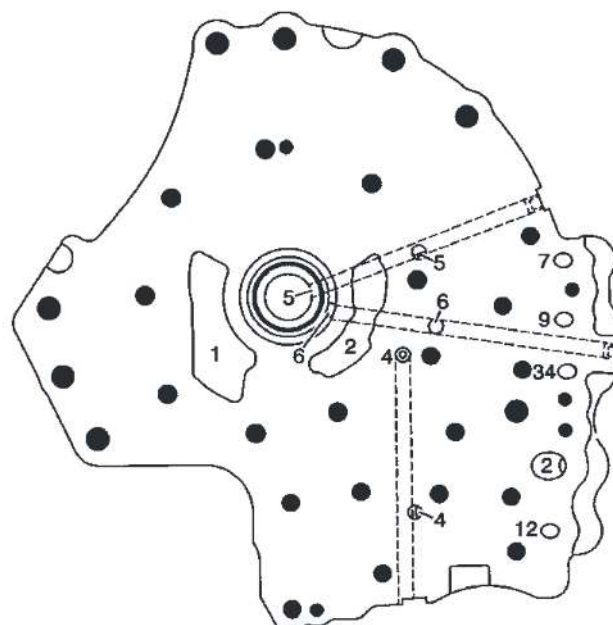
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Figure 44

PASSAGE IDENTIFICATION

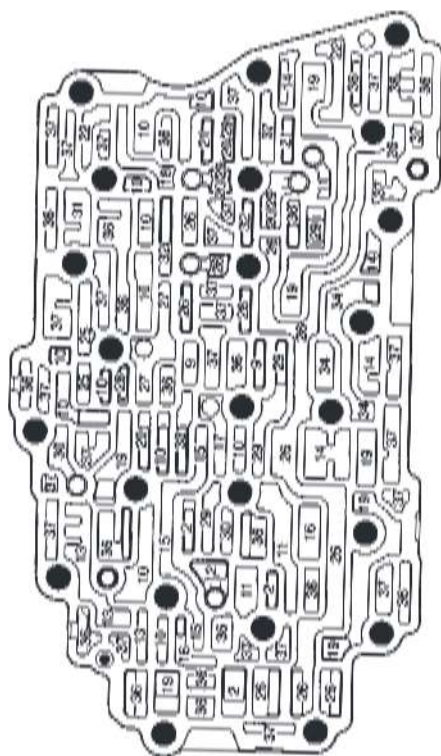


*Fluid Pump Body - Fluid Pump Cover Side
(GEN 2)*

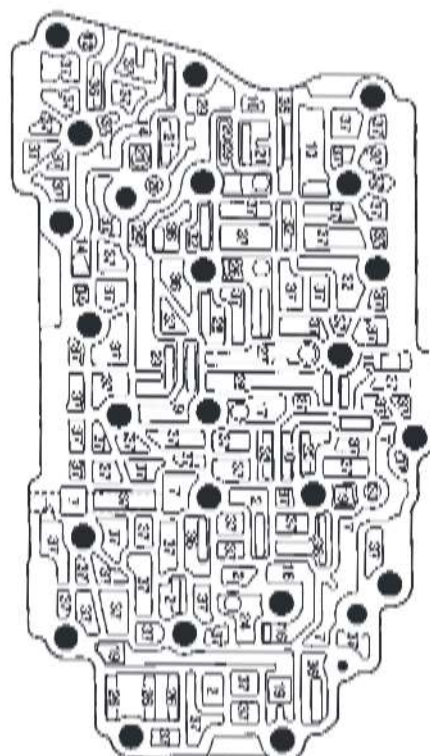


*Fluid Pump Cover - Fluid Pump Body Side
(GEN 2)*

See Page 33 For Legend



*Control Valve Body - Channel Plate Side
(GEN 2)*

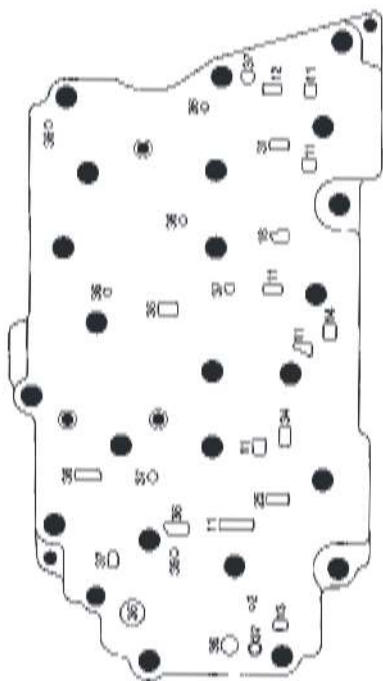


*Control Valve Body - Case Side
(GEN 2)*

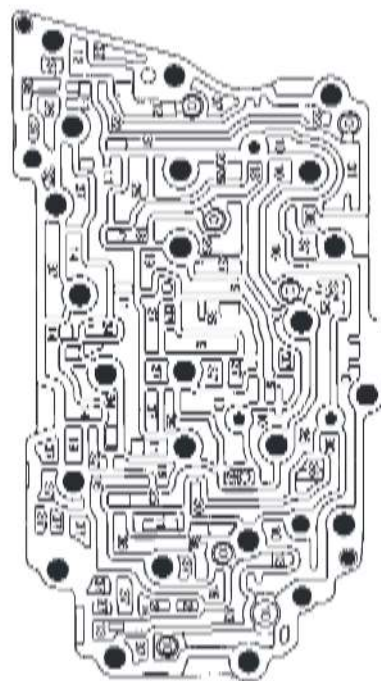
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Figure 45

PASSAGE IDENTIFICATION

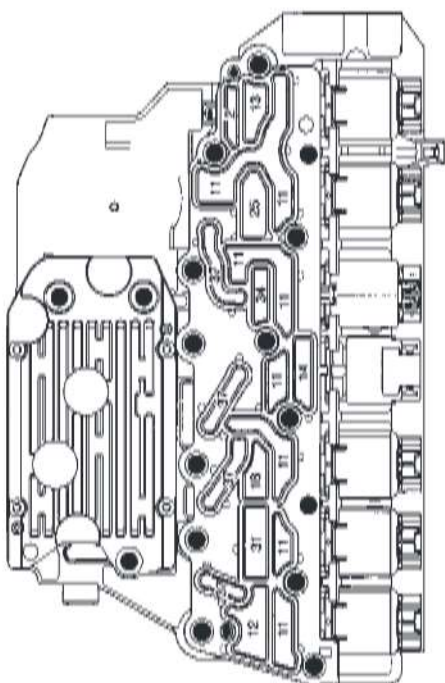


*Channel Plate - Control Solenoid Assembly Side
(GEN 2)*

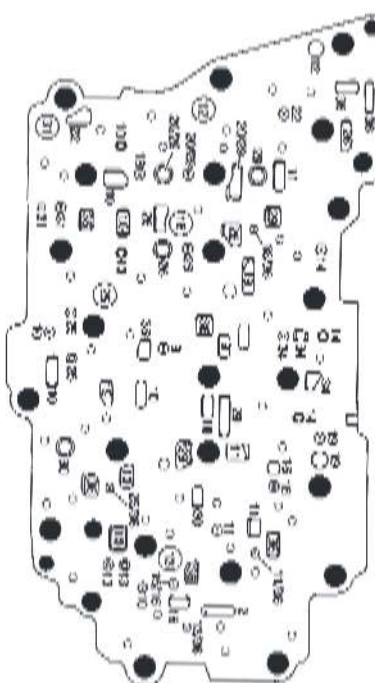


*Channel Plate - Control Valve Body Side
(GEN 2)*

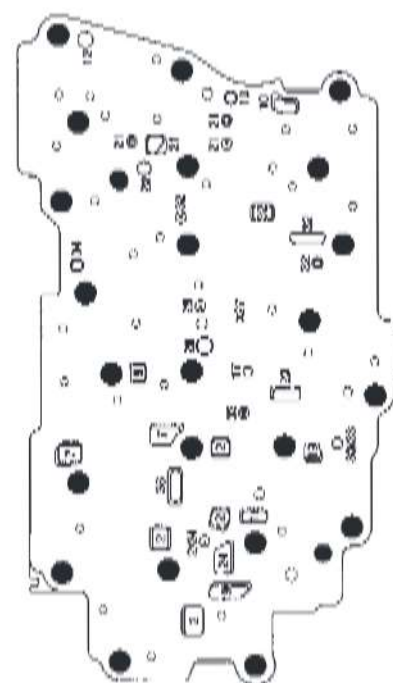
See Page 33 For Legend



*Control Solenoid Assembly -
Channel Plate Side
(GEN 2)*



*Spacer Plate -
Channel Plate Side
(GEN 2)*



*Spacer Plate -
Case Side
(GEN 2)*

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Figure 46



Technical Service Information

CHECK BALL LOCATION AND FUNCTION - GEN 1

#1 4-5-6 Clutch/CSV2 Latch

The number one check ball is located in the control valve body assembly, as shown in Figure 47. This “ball shuttle valve” type check ball is seated against the 4-5-6 clutch passage by PS4 fluid while the transmission is operating in Drive Range-First, Second and third gears. With the check ball in this position, PS4 fluid enters the CSV2 latch fluid circuit to hold the clutch select valve in the released position. When the transmission is operating in Drive Range-Fourth, Fifth or Sixth gears, 4-5-6 clutch fluid pressure seats the check ball against the PS4 fluid passage to allow 4-5-6 clutch fluid to enter the CSV2 latch fluid circuit to hold the clutch select valve in the released position.

#2 3-5-Reverse Clutch Feed/Drive 1-6

The number two check ball is located in the control valve body assembly, as shown in Figure 47. This “ball shuttle valve” type check ball is seated against the drive 1-6 fluid passage by 3-5-reverse clutch feed fluid while the transmission is operating in reverse. With the check ball in this position, 3-5-reverse clutch feed fluid enters the 3-5-reverse/drive 1-6 fluid circuit and is routed through the 3-5-reverse clutch regulator valve in order to apply the 3-5-reverse clutch. When the transmission is operating Drive Range-First, Second, Third, Fourth, Fifth or Sixth gear, the check ball seats against the 3-5-reverse clutch feed/drive 1-6 fluid circuit. 3-5-reverse clutch feed/drive 1-6 fluid passes through the 3-5-reverse clutch regulator valve and enters the PS2 fluid circuit. PS2 fluid is then routed to pressure switch 2 and opens the switch.

#3 3-5-Reverse Clutch Feed (Some Models Only)

The number three check ball is located in the control valve body assembly, as shown in Figure 47. This “one way orifice control” type check ball is seated against the 3-5-reverse clutch feed passage while the transmission is operating in Reverse gear. With the check ball in this position, 3-5-reverse clutch feed fluid is directed through an orifice to the 3-5-reverse clutch regulator valve.

Note: The #3 check ball is only functional on models that have a 4th gear default capability. The check ball is present for all applications, but is not functional in 5th gear default models.

#4 Compensator Feed/3-5-Reverse Clutch Feed

The number four check ball is located in the control valve body assembly, as shown in Figure 47. This “one way orifice control” type check ball is seated against the 3-5-Reverse clutch fluid passage by compensator feed fluid while the transmission is operating in all gears. With the check ball in this position, compensator feed pressure passes through the 3-5-Reverse clutch regulator valve and fills the 3-5-Reverse clutch circuit.

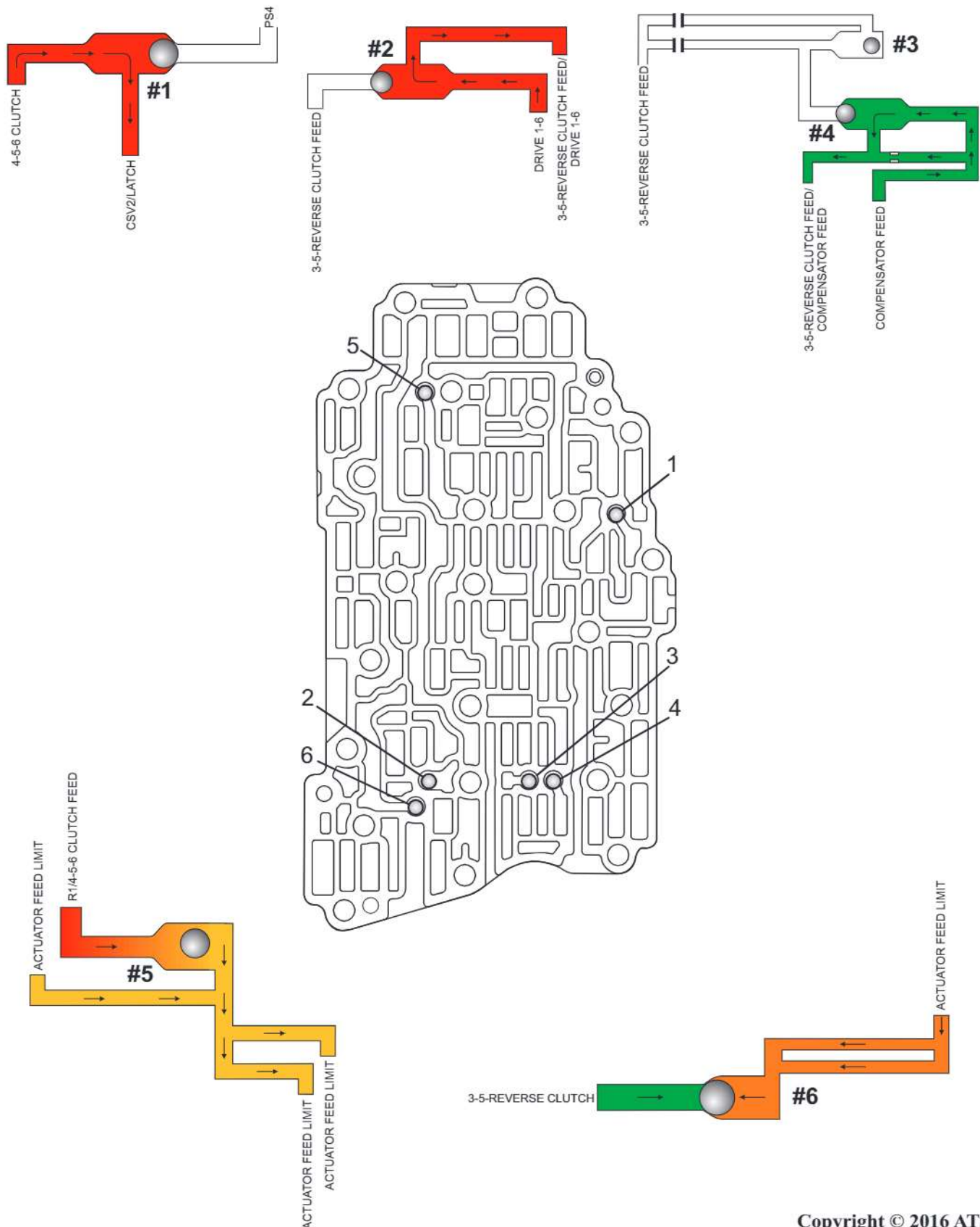
#5 R1/4-5-6 Clutch/Actuator Feed Limit

The number five check ball is located in the control valve body assembly, as shown in Figure 47. This check ball functions as an accumulator, absorbing excess R1/4-5-6 clutch feed fluid pressure in order to help control clutch feel. When the low and reverse clutch is applied in Park, Reverse, Neutral and Drive Range-First Gear (Engine Breaking), R1/4-5-6 clutch feed fluid unseats the check ball allowing excess clutch apply fluid pressure to enter the actuator feed limit fluid circuit. In Drive Range-Fourth, Fifth and Sixth gear, this check ball functions in the same way when the 4-5-6 clutch is applied.

#6 Reverse Clutch /Actuator Feed Limit

The number six check ball is located in the control valve body assembly, as shown in Figure 47. This check ball functions as an accumulator, absorbing excess 3-5-reverse clutch fluid pressure in order to help control clutch feel. When the 3-5-reverse clutch is applied in Reverse, Drive Range-Third and Fifth gear, 3-5-reverse clutch fluid unseats the check ball allowing excess clutch apply fluid pressure to enter the actuator feed limit fluid circuit.

CHECK BALL LOCATION AND FUNCTION - GEN 1



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Figure 47



Technical Service Information

CHECK BALL LOCATION AND FUNCTION - GEN 2

#1 4-5-6 Clutch Latch

The number one check ball is located in the control valve body assembly, as shown in Figure 48. This “ball shuttle valve” type check ball is seated against the 4-5-6 clutch passage by latch fluid while the transmission is operating in Drive Range-First, Second and Third gears. With this check ball in this position, latch fluid holds the clutch select valve in the released position. When the transmission is operating in Drive Range-Fourth, Fifth or Sixth gears, 4-5-6 clutch fluid pressure seats the check ball against the latch fluid passage to allow 4-5-6 clutch fluid to enter the latch fluid circuit to hold the clutch select valve in the released position.

#2 3-5-Reverse Clutch Feed/Drive 1-6

The number two check ball is located in the control valve body assembly, as shown in Figure 48. This “ball shuttle valve” type check ball is seated against the drive 1-6 fluid passage by 3-5-reverse clutch feed fluid while the transmission is operating in Reverse. With the check ball in this position, 3-5-reverse clutch feed fluid enters the 3-5-reverse clutch feed/drive 1-6 fluid circuit, seats the #3 check ball, and is routed through the 3-5-reverse clutch regulator valve in order to apply the 3-5-reverse clutch. When the transmission is operating in Drive Range-First, Second, Third, Fourth, Fifth or Sixth gear, the check ball seats against the 3-5-reverse clutch feed fluid passage to allow drive 1-6 fluid to enter the 3-5-reverse clutch feed/drive 1-6 fluid circuit. 3-5-reverse clutch feed/drive 1-6 fluid seats the #3 check ball and is routed to the 3-5-reverse clutch regulator valve.

#3 3-5-Reverse Clutch Feed/Drive 1-6

The number three check ball is located in the control valve body assembly, as shown in Figure 48. This “orifice control” type check ball is seated by 3-5-reverse clutch feed/drive 1-6 fluid, routed from the #2 check ball, while the transmission is operating in Reverse and all forward gears. With the check ball in this position, unrestricted 3-5-reverse clutch feed/drive 1-6 fluid pressure is routed to the 3-5-reverse clutch regulator valve in order to supply clutch apply pressure to the 3-5-reverse clutch when needed. When the 3-5-reverse clutch releases after a shift to Neutral from Reverse, exhausting 3-5-reverse clutch fluid pressure seats the #3 check ball against the channel plate to valve body spacer plate, forcing the exhausting fluid pressure to pass through orifice #5 in order to help control the release of the 3-5-reverse clutch.

#4 3-5-Reverse Clutch Boost

The number four check ball is located in the control valve body assembly, as shown in Figure 48. This check ball functions as a boost valve. When the 3-5-reverse clutch applies in Reverse, Drive Range-Third and Fifth gear, the 3-5-reverse clutch regulator valve regulates 3-5-reverse clutch feed/drive 1-6 pressure into the 3-5-reverse clutch fluid circuit with a force balance between PCS 3-5-reverse clutch fluid pressure at one end of the valve, and 3-5-reverse fluid and 3-5-reverse clutch valve spring pressure at the other end. The check ball remains seated until 3-5-reverse clutch fluid pressure exceeds actuator feed limit fluid pressure. When 3-5-reverse clutch pressure exceeds actuator feed limit pressure, the check ball unseats allowing 3-5-reverse clutch fluid, from the spring end of the 3-5-reverse clutch regulator valve, to enter the actuator feed limit circuit. PCS 3-5-reverse clutch fluid pressure is now able to move the 3-5-reverse clutch regulator valve to the full feed position, increasing 3-5-reverse clutch apply pressure to be the same as line pressure (boost).

#5 Drive 1-2-3-4 Clutch

The number five check ball is located in the control valve body assembly, as shown in Figure 48. This “one way orifice control” type check ball is seated by drive fluid, routed from the manual valve, while the transmission is operating in all forward gears. With the check ball in this position, unrestricted drive fluid pressure is routed to the 1-2-3-4 clutch regulator valve in order to supply clutch apply pressure to the 1-2-3-4 clutch when needed. When the 1-2-3-4 clutch releases after a shift to Neutral from Drive, exhausting 1-2-3-4 clutch fluid pressure seats the #5 check ball against the channel plate to valve body spacer plate, forcing the exhausting fluid pressure to pass through orifice #32 in order to help control the release of the 1-2-3-4 clutch.

#6 Line/Auxiliary Line (BAS Hybrid Only)

The number six check ball is located in the control valve body assembly, as shown in Figure 48. This check ball is seated against the auxiliary line passage when the engine is running. With the check ball in this position, line fluid from the fluid pump supplies fluid pressure to the various hydraulic circuits and apply components throughout the transmission. For BAS models only, when the engine is OFF and the auxiliary pump is ON, auxiliary line fluid pressure unseats the #6 check ball in order to replace line pressure from the fluid pump assembly.

Note: The #6 check ball is present on all applications, but is only functional on BAS models when the auxiliary fluid pump is ON.

Fluid Through Check Ball (BAS Hybrid Only)

The fluid through check ball is an encapsulated check ball that is located in the transmission case in line with the engine driven pump assembly in the PCS line pressure passage. This check ball is unseated by line fluid pressure from the fluid pump assembly when the engine is running. When the engine is OFF and the auxiliary fluid pump is ON, auxiliary line fluid pressure seats the fluid through checkball in order to prevent line pressure from exhausting through the fluid pump assembly.

Note: The fluid through check ball capsule is installed in all Generation 2 transmission cases but is functional only in the BAS Hybrid models.

5 - Actuator Feed Accumulator Pistons

Located in the valve body channel plate as shown in Figure 48, five actuator feed accumulator pistons are used to dampen any pressure irregularities occurring in the various clutch apply circuits during clutch apply.

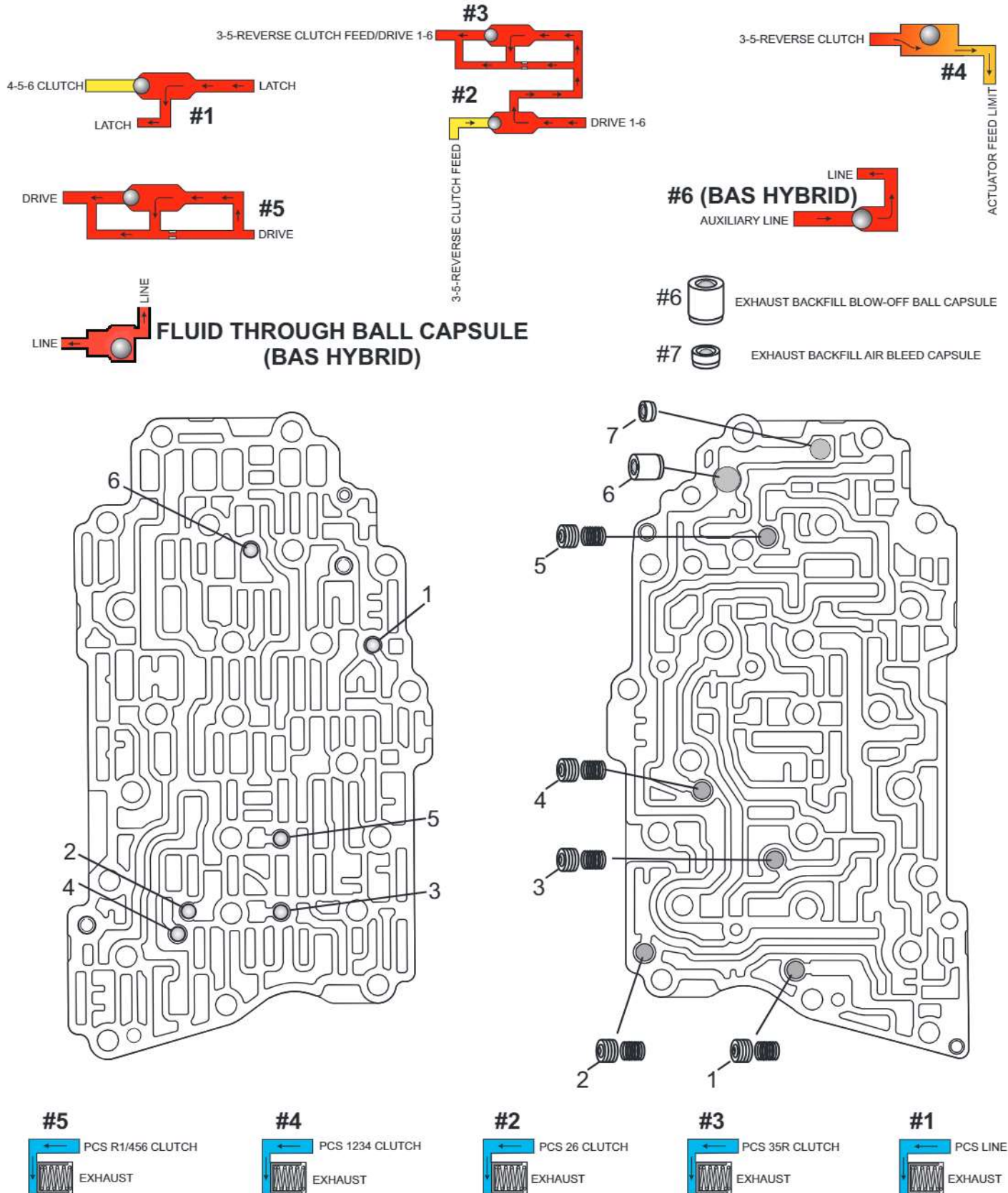
6 - Exhaust Backfill Blow-Off Ball

Located in the valve body channel plate as shown in Figure 48, this checkball and spring will exhaust clutch release back fill fluid if the pressure in the circuit gets too high.

7 - Exhaust Backfill Air Bleed

Located in the valve body channel plate as shown in Figure 48, this checkball will purge air that may become trapped in the exhaust backfill fluid circuit.

CHECK BALL LOCATION AND FUNCTION - GEN 2



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Figure 48

SAFETY PRECAUTIONS

Service information provided in this manual by ATSG is intended for use by professional, qualified technicians. Attempting repairs or service without the appropriate training, tools and equipment could cause injury to you or others.

The service procedures we recommend and describe in this manual are effective methods of performing service and repair on this unit. Some of the procedures require the use of special tools that are designed for specific purposes.

This manual contains CAUTIONS that you must observe carefully in order to reduce the risk of injury to yourself or others. This manual also contains NOTES that must be carefully followed.

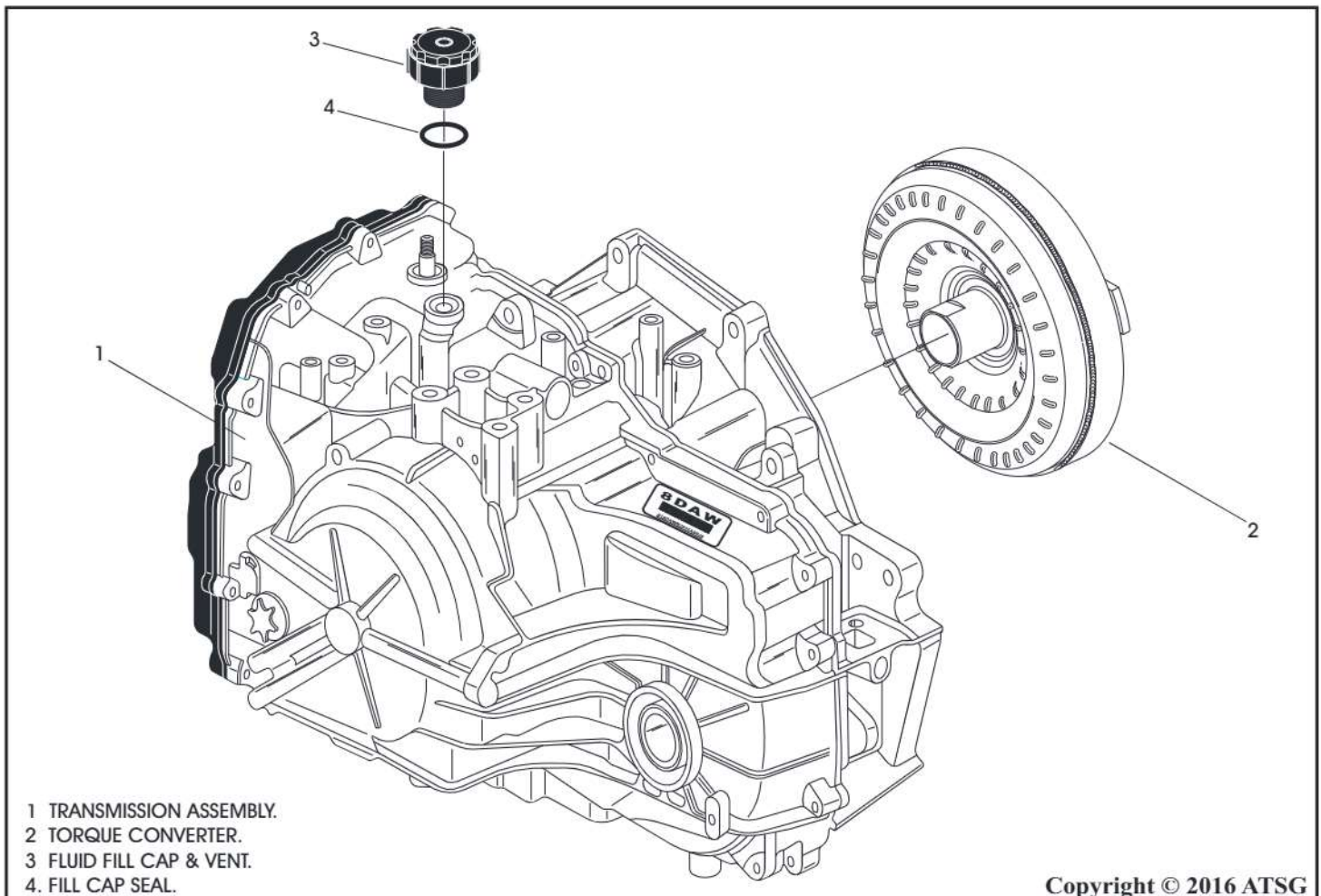
Technicians Note: GM does not publish clutch clearances, if the clutch packs are loaded correctly and quality parts are used, clutch clearance should not be a concern.

Continued on Page 42

TRANSMISSION DISASSEMBLY

1. The transmission should be steam cleaned on the outside, to remove any dirt and grease before the disassembly process begins.
2. This transmission can be disassembled very easily on a work bench without the benefit of a holding fixture for rotation, however there is one available from Kent-Moore under DT-47811 and DT-46625. Both part numbers are required. Or refer to aftermarket tool sources.
3. Remove the torque converter assembly from the transmission, as shown in Figure 49.
4. Record the converter code letters just in case replacement becomes necessary.
5. Remove the transmission fluid fill cap at this time and discard the fill cap seal as shown in Figure 49.

Note: *The fill cap is also the transmission vent. Although rare, some transmissions may be equipped with a filler tube and fluid indicator stick which can be removed at this time.*



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Figure 49

TRANSMISSION DISASSEMBLY (CONT'D)

BAS HYBRID ONLY

6. Remove the 5 bolts from the auxiliary pump motor and the auxiliary fluid pump outlet pipe as shown in Figure 50. Note the location of the longer bolt.
7. Remove the two pump outlet seals and put aside for future disposal.
8. Remove the auxiliary fluid pump seal and put aside for future disposal.
9. Remove the auxiliary fluid pump gasket and discard as it is not reusable.

ALL MODELS

Note: It should not be necessary to remove the fluid level indicator plug, Figure 50, unless it was leaking or damaged. On some models a "dip stick" tube will be in this location.

10. Remove the 13 bolts from the valve body side cover as shown in Figure 51.
11. Remove valve body cover as shown in Figure 51.
12. Remove gasket from valve body cover and discard as shown in Figure 51.
13. Remove valve body cover wiring connector seal and discard as shown in Figure 51.

Continued on Page 43

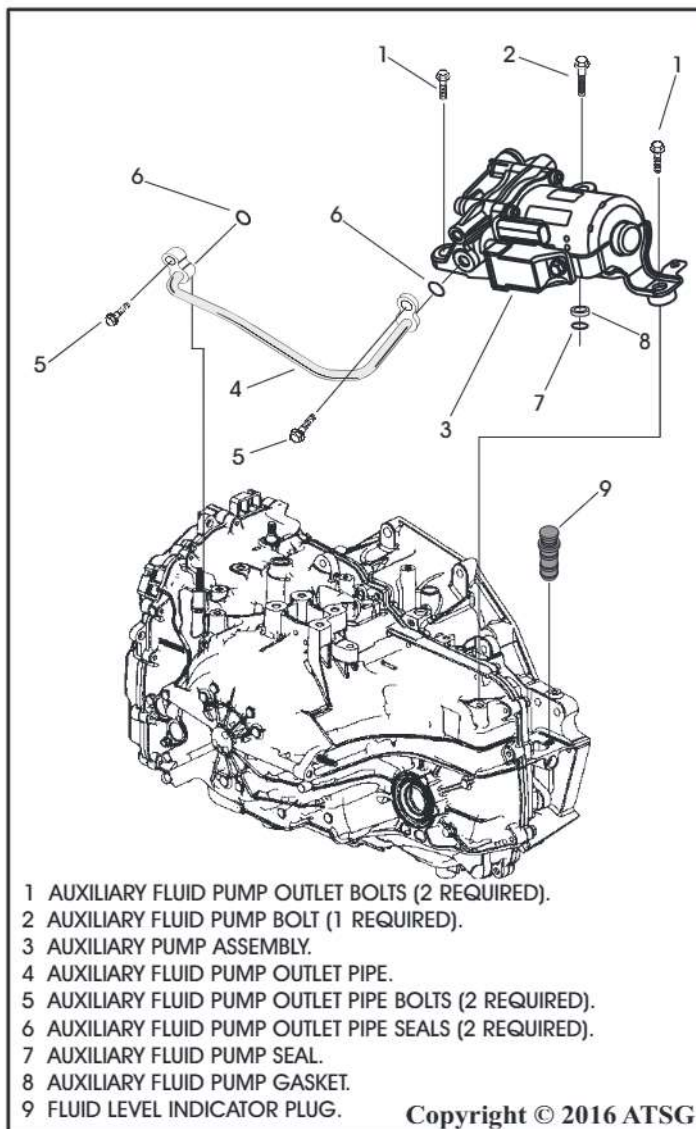


Figure 50

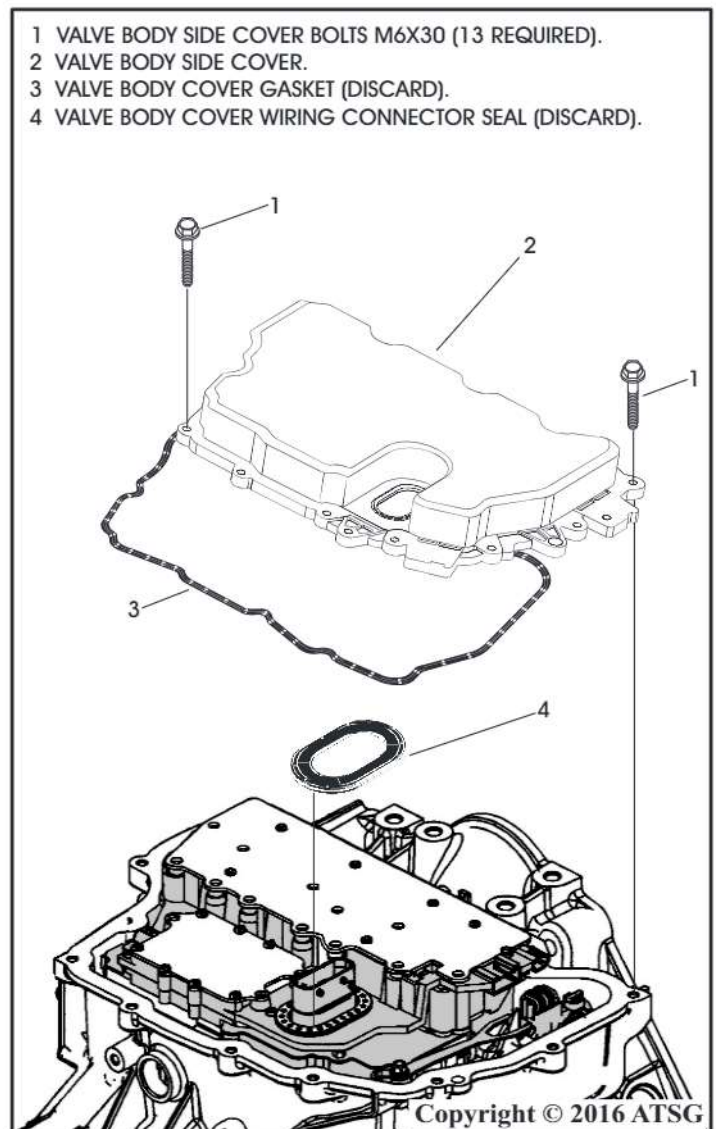


Figure 51

TRANSMISSION DISASSEMBLY (CONT'D)

14. Disconnect the Shaft Position Switch connector (1) as shown in Figure 52.
15. Disconnect the Output Speed Sensor connector (2) as shown in Figure 52.
16. Disconnect the Input Speed Sensor connector (3) as shown in Figure 52.
17. Carefully lay the internal harness over the pan rail.
18. Remove only the control unit assembly bolts shown in Figure 53.

Continued on Page 44

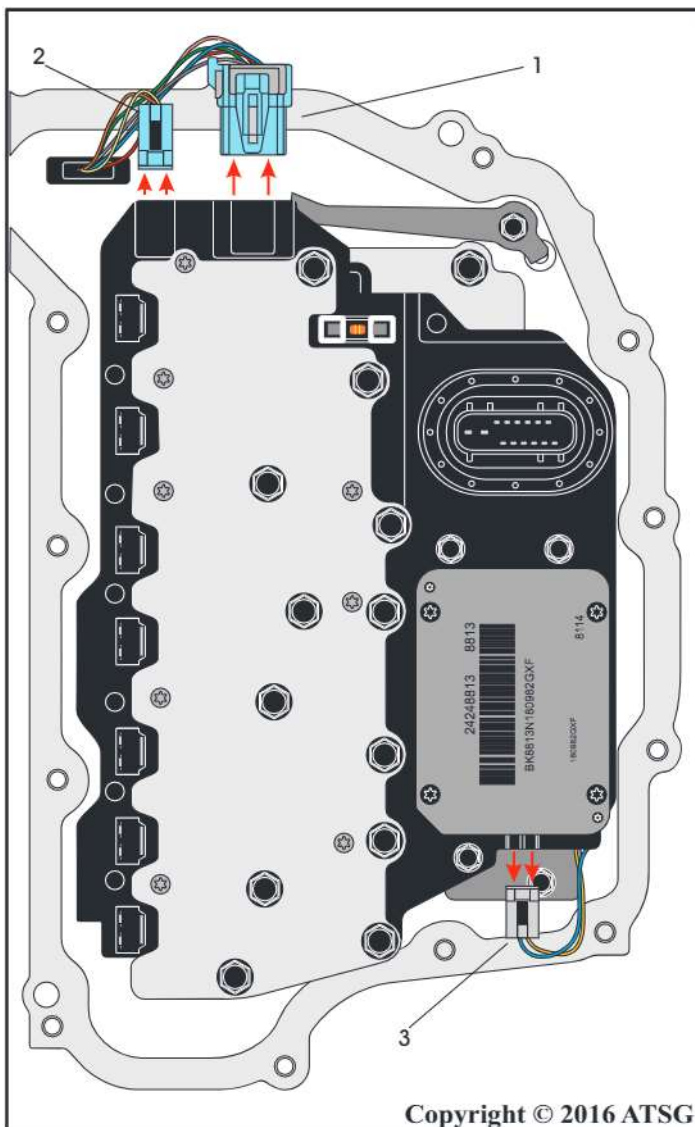


Figure 52

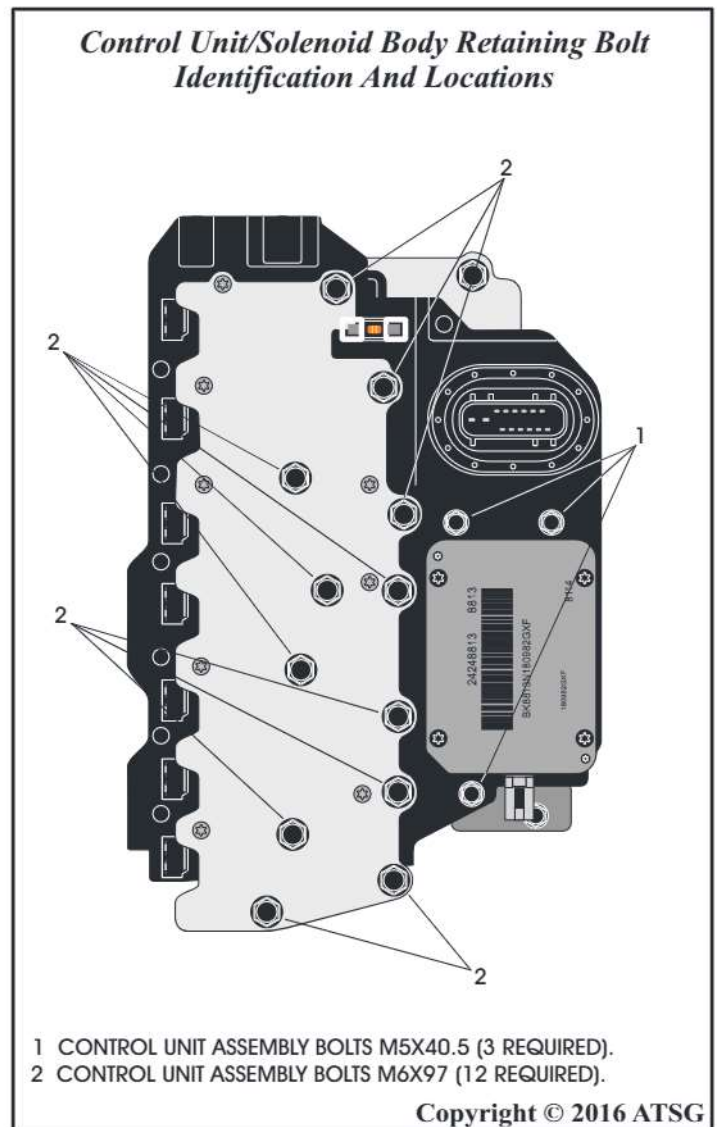


Figure 53

TRANSMISSION DISASSEMBLY (CONT'D)

19. With the control unit assembly bolts removed the control unit with solenoid body can now also be removed as shown in Figure 54.
20. Remove and discard the control unit assembly filter plate as shown in Figure 54.
21. Remove only the valve body bolts shown in Figure 55.

Continued on Page 45

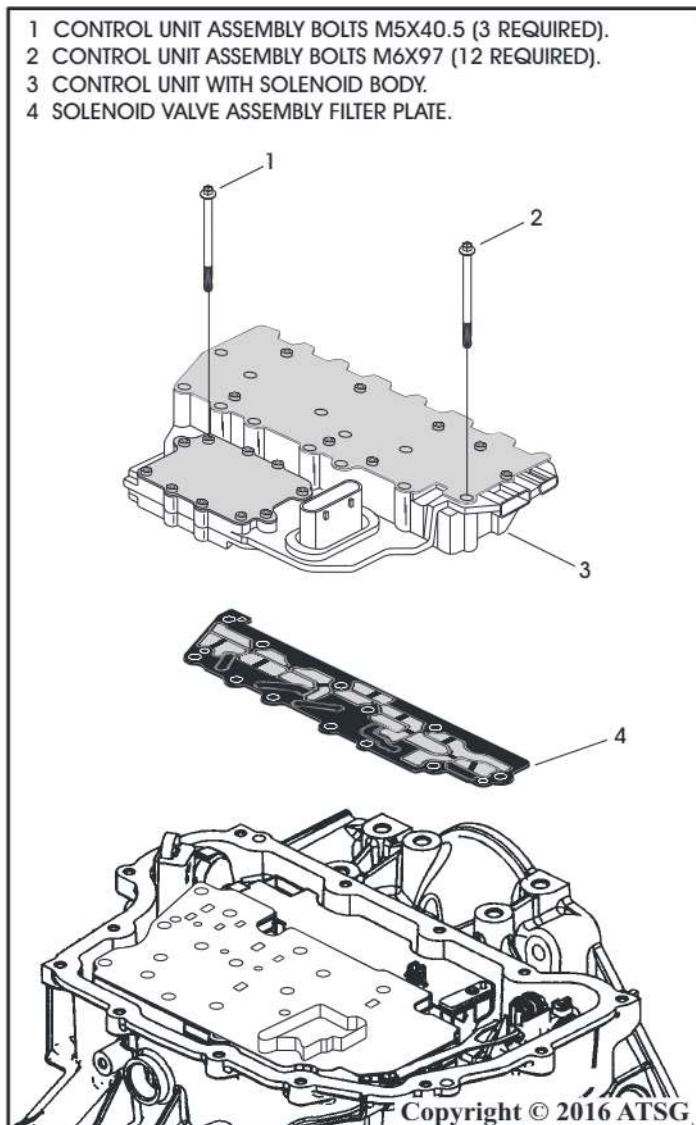


Figure 54

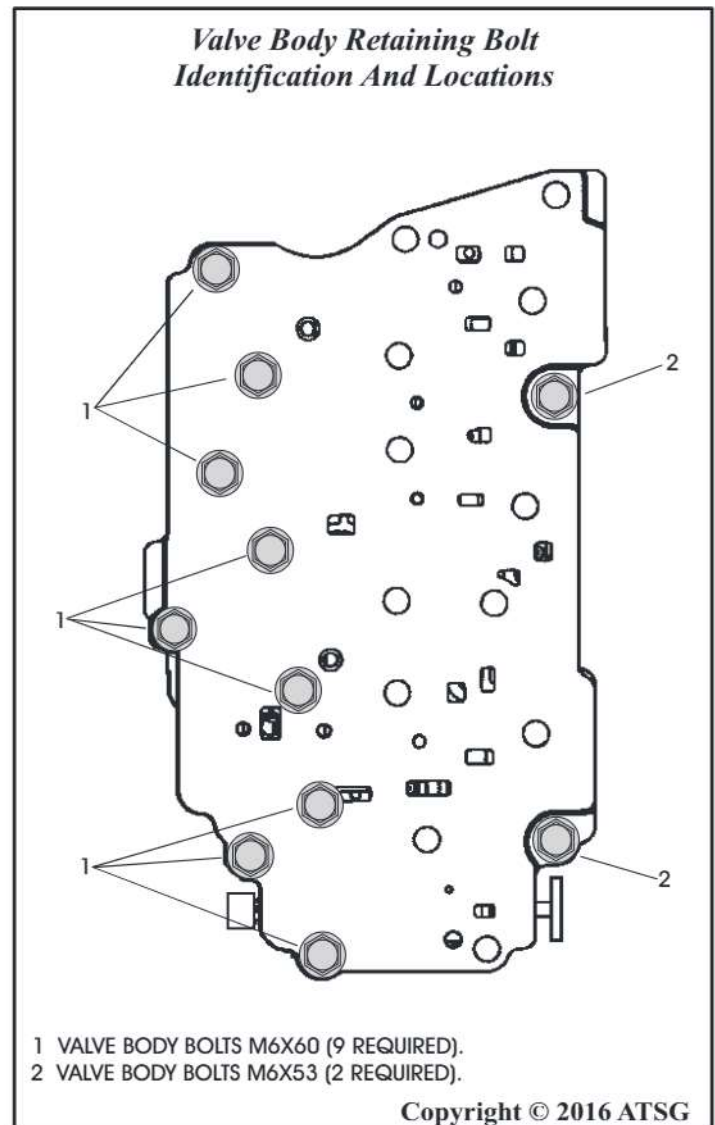


Figure 55

TRANSMISSION DISASSEMBLY (CONT'D)

22. With the control valve body assembly bolts removed, lift the control valve body assembly up off the transmission case as shown in Figure 56 (the valve body spacer plate may come off with the valve body assembly).
23. Remove the valve body spacer plate at this time providing it did not come off with the valve body assembly.

Note: The valve body spacer plate uses bonded gaskets which are difficult to remove. Separate valve body gaskets may be provided in the rebuild kit should the bonded gasket be damaged or a new spacer plate must be acquired.

24. Remove the fluid level control valve assembly and gasket as seen in Figure 56, discard the gasket.

25. Remove and discard the 1-2-3-4 and low/reverse clutch fluid passage seals shown in Figure 56.
26. Remove the manual shaft detent lever bolt and lever as seen in Figure 56.

Note: Remember how the detent lever roller is indexed into the manual shaft position switch for correct reassembly purposes.

27. Remove output speed sensor bolt and output speed sensor assembly as shown in Figure 57.

Note: Carefully compress the input speed sensor locking tabs for proper removal.

28. Remove input speed sensor bolt and input speed sensor assembly as shown in Figure 57.
29. Remove and discard the input speed sensor o-ring seals.

Continued on Page 46

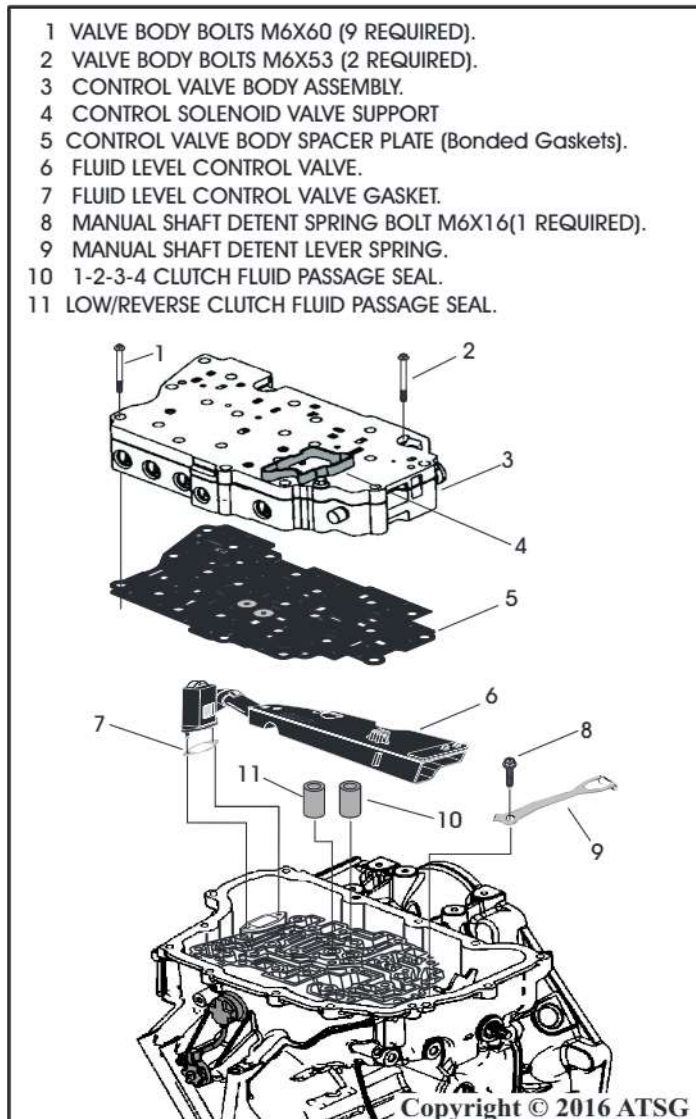


Figure 56

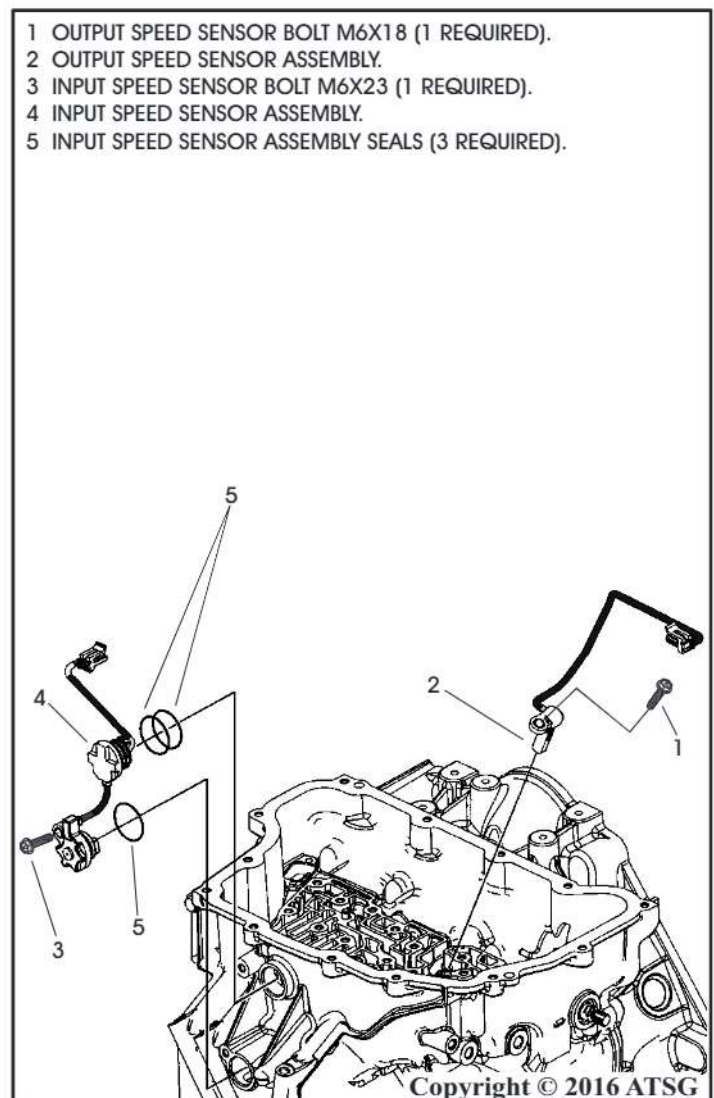


Figure 57

TRANSMISSION DISASSEMBLY (CONT'D)

30. Remove the 15 torque converter to transmission case bolts as shown in Figure 58.
31. Remove and discard the torque converter housing gasket shown in Figure 58.
32. Remove the torque converter housing which also contains the fluid pump assembly as seen in Figure 58.
33. Remove and discard the fluid pump seal assembly shown in Figure 58.
34. Inspect the transmission fluid through check ball capsule as shown in Figure 58 (BAS Hybrid Models Only).

35. Remove the front differential carrier bearing as shown in Figure 59 and inspect the bearing for smooth operation.
36. Remove the differential carrier assembly as shown in Figure 59 and inspect gears for excessive wear.
37. Remove final drive sun gear as shown in Figure 59 and inspect for excessive wear.

Note: *If replacement of the differential carrier or the final drive sun gear is required, be sure to count the gear teeth on both components as there are different tooth counts for different gear ratios.*

Failure to do so will result in transmission malfunctions and gear ratio issues.

Continued on Page 47

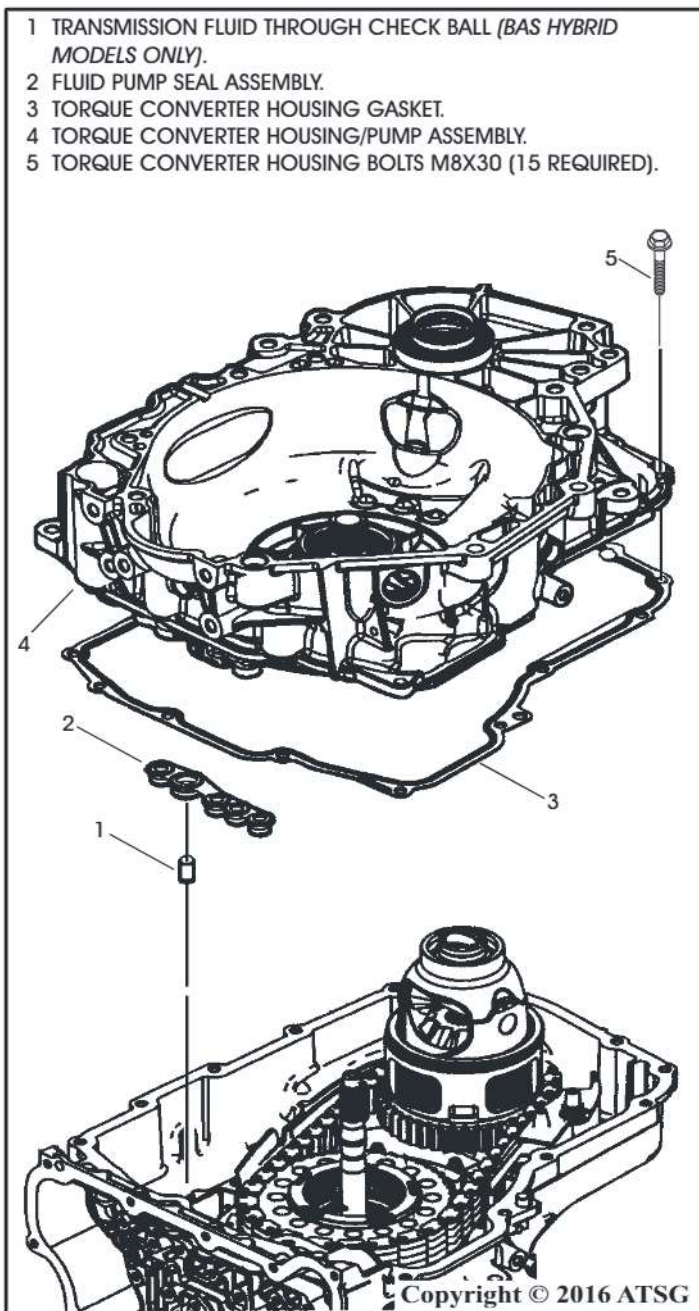


Figure 58

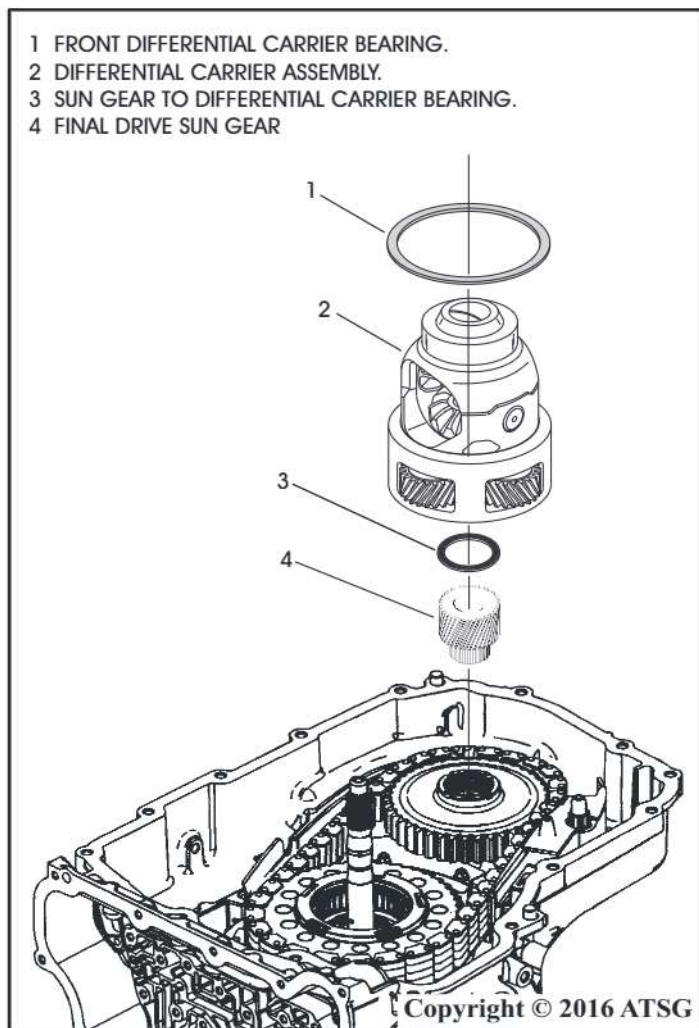


Figure 59

TRANSMISSION DISASSEMBLY (CONT'D)

38. Carefully remove the final drive pinion gear pin retainer as shown in Figure 60 and 61.
39. Carefully slide each pinion gear pin out while attempting to not disturb the needle bearing rollers as shown in Figure 60 and 61.
40. Grease the pinion gear rollers in place while carefully sliding each pinion gear out as shown in Figure 60 and 61.
41. Keep pinion gear thrust washers with the pinion gear they were matched to as shown in Figure 60 and 61.

Note: The pinion gear thrust washers are selective in order to maintain proper gear clearance.

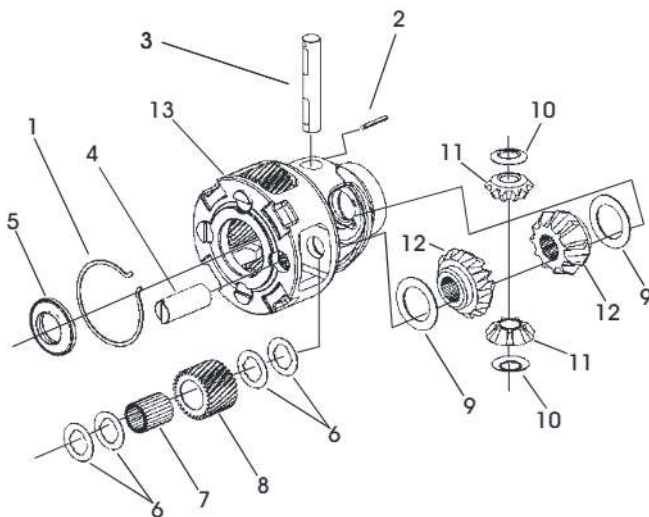
42. Remove the sun gear to differential housing bearing as shown in Figure 60 and 61 and the front differential carrier cover shown in Figure 61 only.

43. Clean and inspect the sun gear to differential housing bearing for smoothness of operation.
44. Clean and inspect all thrust washers for scoring, wear or damage.
45. Clean and inspect pinion pin, needle rollers and gear bearing surfaces for wear or scoring.
46. Replace parts as necessary, lubricate all moving parts and reassemble.

Note: GM only services the front differential as an assembly, individual parts would have to be acquired from another source.

Continued on Page 48

DIFFERENTIAL CARRIER ASSEMBLY 2 PINION GEAR

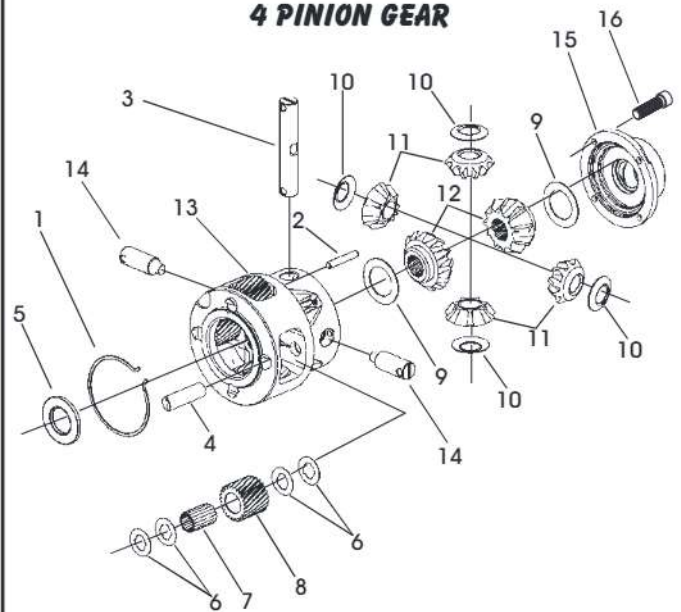


- 1 FINAL DRIVE PINION GEAR PIN RETAINER.
- 2 FRONT DIFFERENTIAL PINION GEAR PIN.
- 3 FRONT DIFFERENTIAL PINION GEAR SHAFT.
- 4 FINAL DRIVE PINION PIN.
- 5 DIFFERENTIAL SUN GEAR TO DIFFERENTIAL HOUSING BEARING.
- 6 FINAL DRIVE INNER & OUTER THRUST WASHER.
- 7 FINAL DRIVE NEEDLE BEARING.
- 8 FINAL DRIVE PINION GEAR.
- 9 FRONT DIFFERENTIAL SIDE GEAR THRUST WASHER.
- 10 FRONT DIFFERENTIAL PINION GEAR THRUST WASHER.
- 11 FRONT DIFFERENTIAL PINION GEAR.
- 12 FRONT DIFFERENTIAL SIDE GEAR.
- 13 DIFFERENTIAL CARRIER HOUSING.

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Figure 60

DIFFERENTIAL CARRIER ASSEMBLY 4 PINION GEAR



- 1 FINAL DRIVE PINION GEAR PIN RETAINER.
- 2 FRONT DIFFERENTIAL PINION GEAR PIN.
- 3 FRONT DIFFERENTIAL PINION GEAR SHAFT.
- 4 FINAL DRIVE PINION PIN.
- 5 DIFFERENTIAL SUN GEAR TO DIFFERENTIAL HOUSING BEARING.
- 6 FINAL DRIVE INNER & OUTER THRUST WASHER.
- 7 FINAL DRIVE NEEDLE BEARING.
- 8 FINAL DRIVE PINION GEAR.
- 9 FRONT DIFFERENTIAL SIDE GEAR THRUST WASHER.
- 10 FRONT DIFFERENTIAL PINION GEAR THRUST WASHER.
- 11 FRONT DIFFERENTIAL PINION GEAR.
- 12 FRONT DIFFERENTIAL SIDE GEAR.
- 13 DIFFERENTIAL CARRIER HOUSING.
- 14 FRONT DIFFERENTIAL PINION GEAR SHAFT.
- 15 FRONT DIFFERENTIAL CARRIER COVER.
- 16 FRONT DIFFERENTIAL CARRIER COVER BOLTS (4 REQUIRED).

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Figure 61

- 1 FRONT DIFFERENTIAL CARRIER BAFFLE (6T30).
- 1 FRONT DIFFERENTIAL CARRIER BAFFLE (6T40, 6T45, 6T50).
- 2 FRONT DIFFERENTIAL CARRIER BAFFLE BOLTS M6X16 (2 REQUIRED).
- 3 DRIVE LINK LUBE SCOOP SEAL.
- 4 DRIVE LINK SCOOP.
- 5 DRIVE LINK LUBE FLUID SEAL.
- 6 DRIVEN SPROCKET BEARING.
- 7 DRIVE SPROCKET BEARING.
- 8 DRIVEN, DRIVE SPROCKET & CHAIN ASSEMBLY (1.00" WIDE 6T30/40).
- 8 DRIVEN, DRIVE SPROCKET & CHAIN ASSEMBLY (1.25" WIDE 6T45/50).
- 9 PARK PAWL.
- 10 PARK PAWL SPRING.
- 11 PARK PAWL PIN.

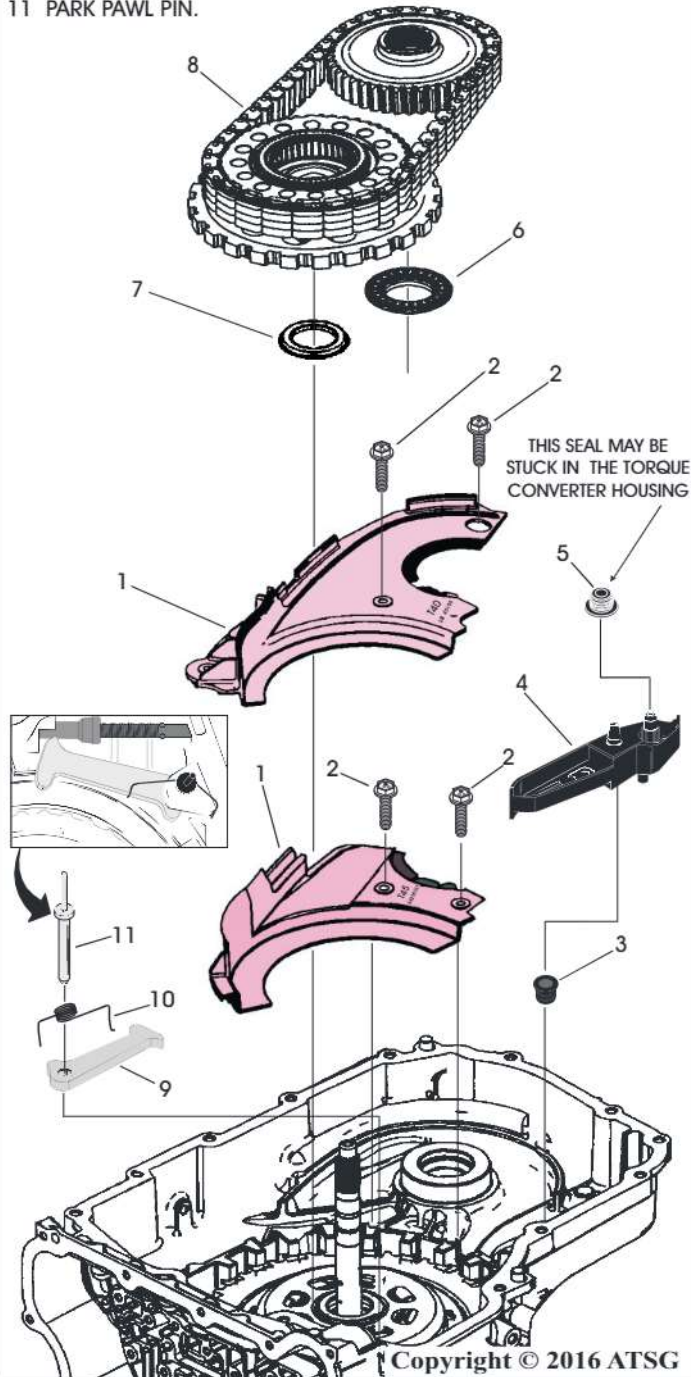


Figure 62

TRANSMISSION DISASSEMBLY (CONT'D)

47. Remove the sprockets and drive chain as one assembly as shown in Figure 62.

Note: The driven sprocket ball bearing inner race has a slight interference fit with the case. Pull the sprocket and drive chain up at the same time and inspect the bearing for smoothness of operation.

48. Remove the drive link lube scoop and discard the two drive link lube seals as shown in Figure 62.

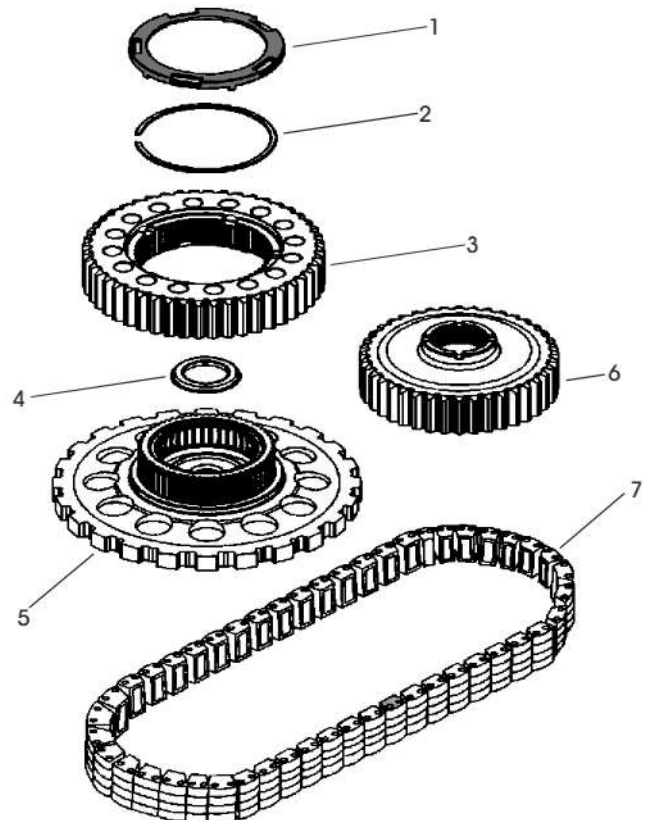
49. Unhook the park pawl spring and remove the park pawl shaft, spring and pawl assembly as seen in Figure 62.

50. Remove the two front differential carrier baffle bolts and the plastic baffle as shown in Figure 62.

51. Disassemble and inspect the driven and drive sprocket bearings for pitting or scoring. Refer to Figure 63. Discard the drive sprocket thrust washer shown in Figure 63.

Continued on Page 49

- 1 DRIVE SPROCKET THRUST WASHER.
- 2 DRIVE SPROCKET/PARK GEAR RETAINER RING.
- 3 DRIVE SPROCKET.
- 4 DRIVE SPROCKET BEARING.
- 5 PARK GEAR & DRIVE SPROCKET HUB.
- 6 DRIVEN SPROCKET.
- 7 DRIVE CHAIN.



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Figure 63

TRANSMISSION DISASSEMBLY (CONT'D)

52. Remove manual shaft detent lever hub pin , Refer to Figure 64, with side cutters and discard.
53. Remove manual shift shaft pin using a mini slide hammer with seal remover installed. Gently tap upwards until pin is out as seen in Figure 64 and discard if bent.
54. Remove manual selector shaft as shown in Figure 64.
55. Remove manual detent lever/shaft position switch with park pawl actuator assembly as shown in Figure 64.
56. Remove park pawl actuator guide pin from transmission case as seen in Figure 65.
57. Remove park pawl actuator guide from transmission case as seen in Figure 65.
58. Remove o-ring seal from park pawl actuator guide, Refer to Figure 65, and discard.
59. Using the DT-45201 seal removal tool or a similar tool as seen in Figure 65, remove the manual selector seal and discard.

Continued on Page 50

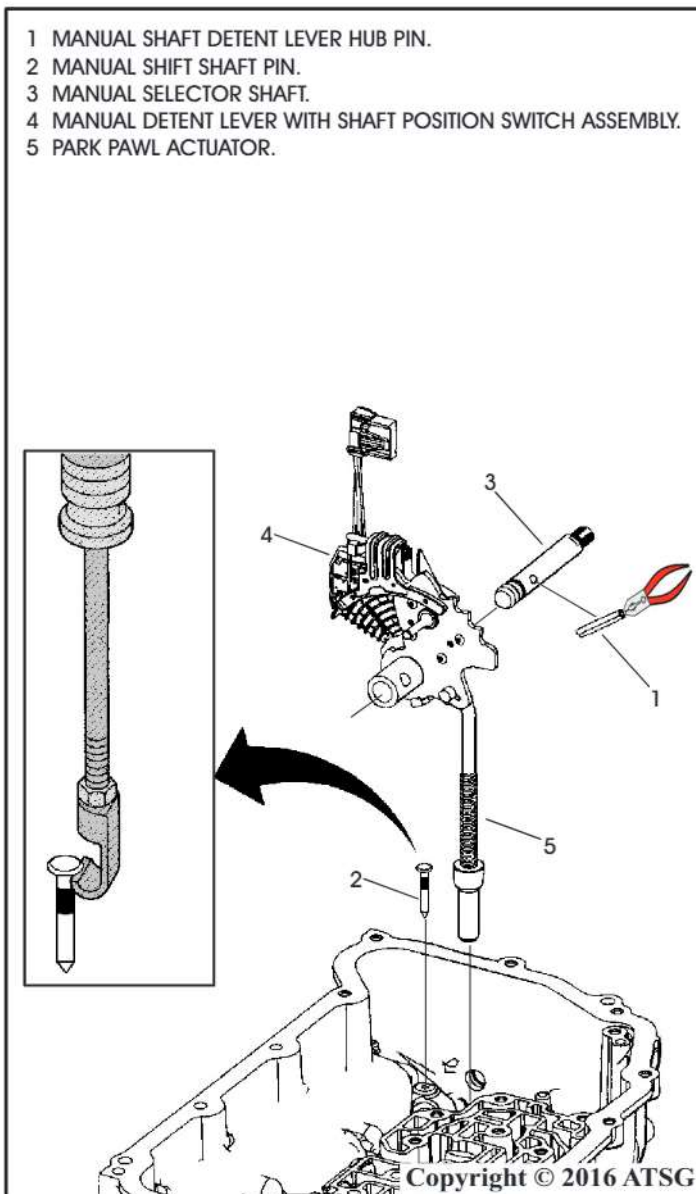


Figure 64

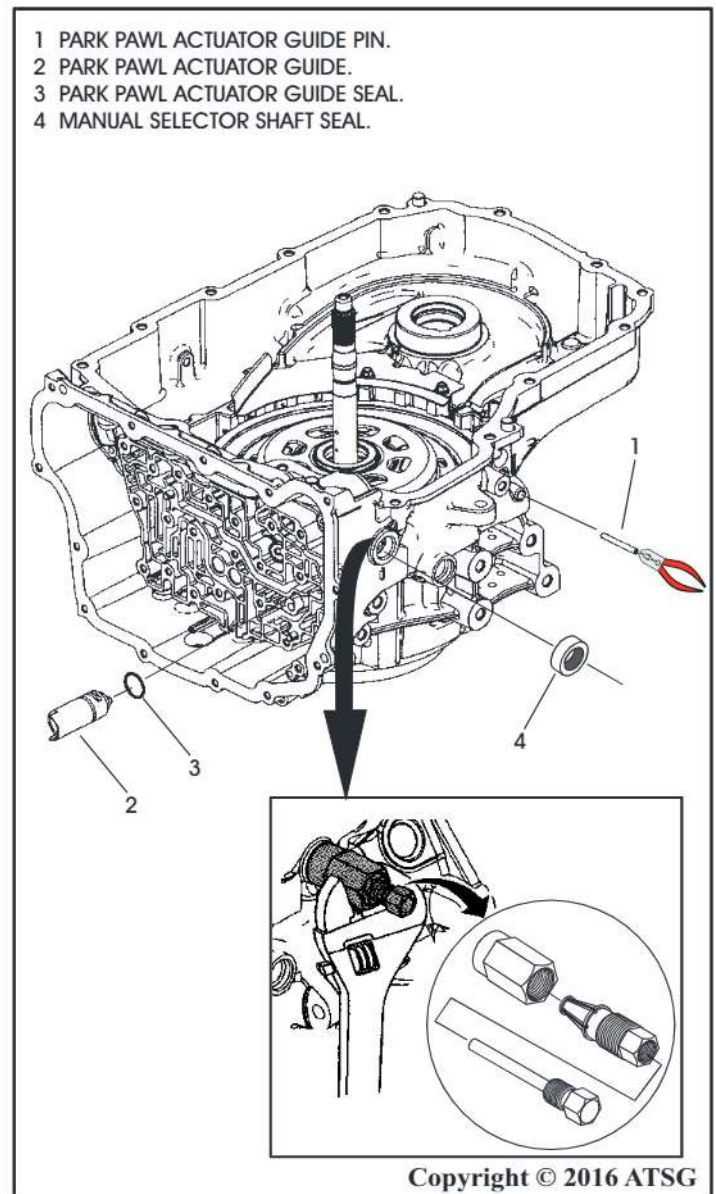


Figure 65

TRANSMISSION DISASSEMBLY (CONT'D)

60. Remove the 1-2-3-4 clutch backing plate retaining snap ring as shown in Figure 66 using a long flat bladed tool.

NOTE: Use caution when removing the 1-2-3-4 clutch backing plate retaining snap ring as it is under considerable tension.

61. Before removing the 1-2-3-4 clutch backing plate, observe the **BLUE** punch mark in the 1-2-3-4 clutch backing plate as seen in Figure 67.
62. The position of this mark should be noted for correct orientation of the backing plate into the case during the assembly process.

Note: If the 1-2-3-4 backing plate does not have the **Blue** punch mark, use the wide lug to wide opening in the case for orientation.

Continued on Page 51

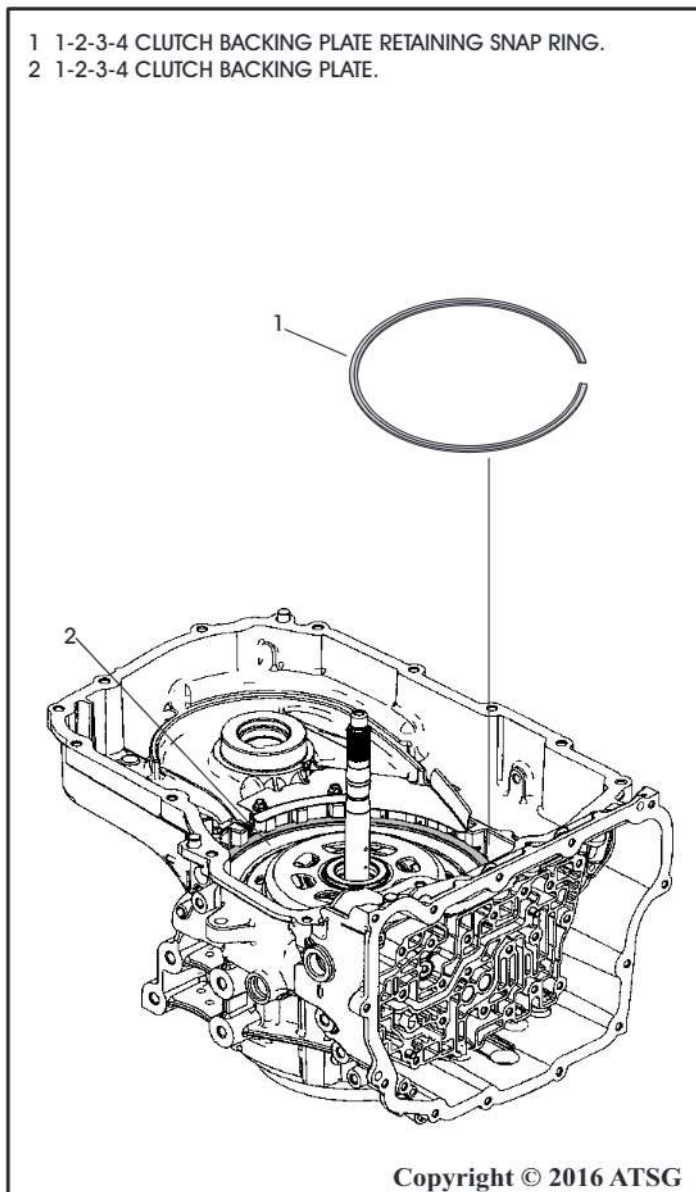


Figure 66

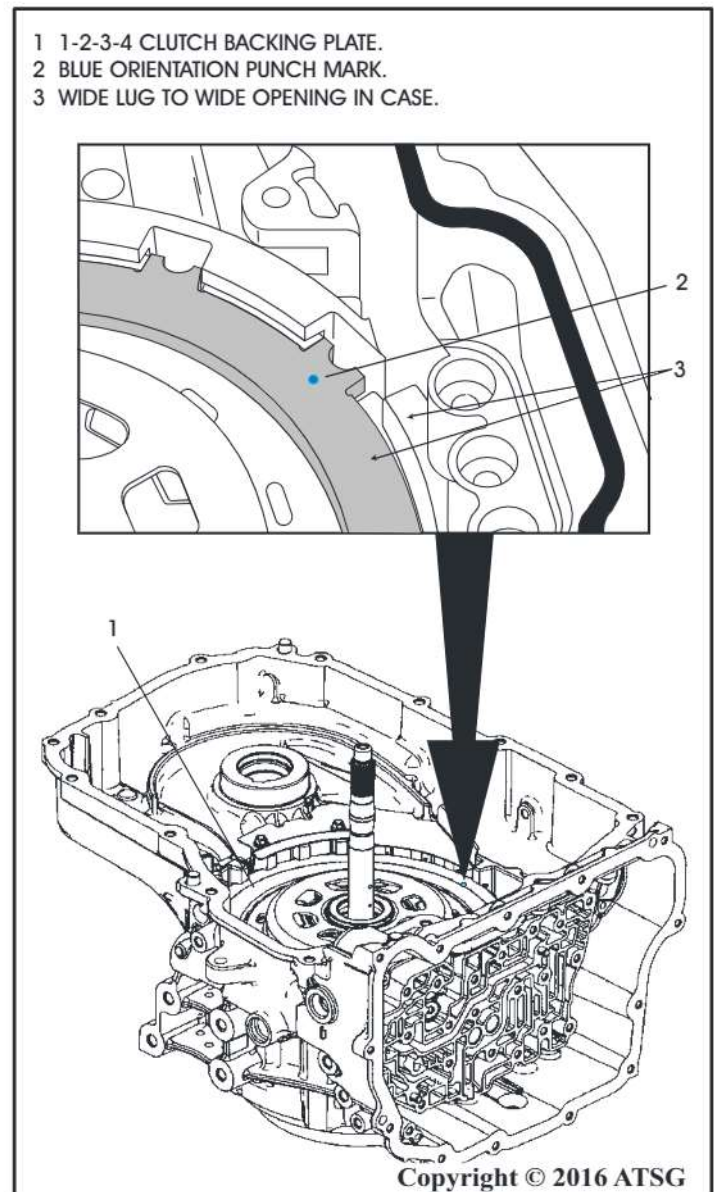
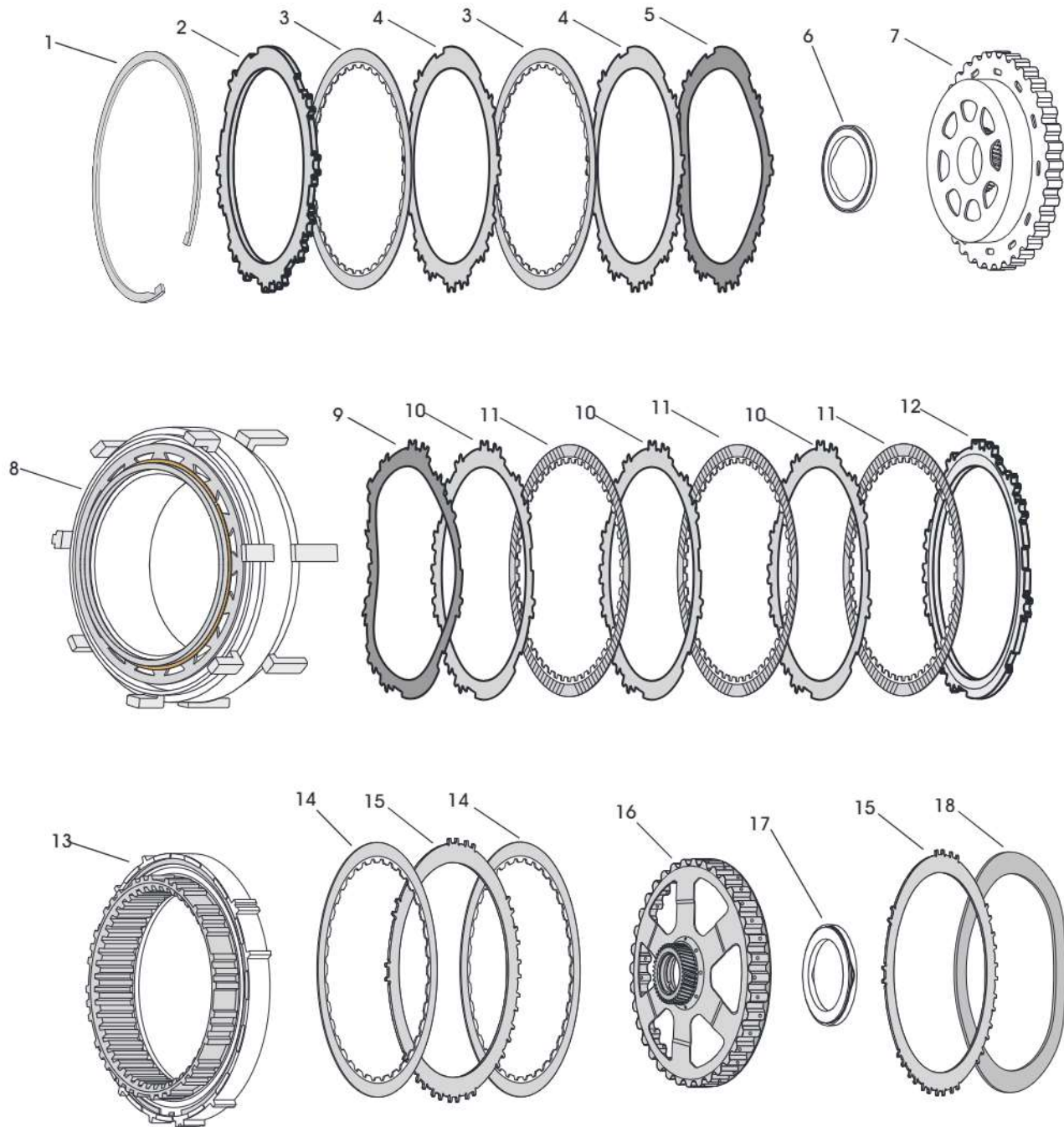


Figure 67

1-2-3-4 CLUTCH, LOW/REVERSE CLUTCH, 2-6 CLUTCH ASSEMBLIES & RELATED COMPONENTS



- 1 1-2-3-4 CLUTCH RETAINING SNAP RING.
- 2 1-2-3-4 CLUTCH BACKING PLATE.
- 3 1-2-3-4 FRICTION PLATES - GEN 1 (2 REQUIRED).
- 4 1-2-3-4 STEEL PLATES (2 REQUIRED).
- 5 1-2-3-4 WAVED PLATE.
- 6 OUTPUT SUN GEAR THRUST BEARING.
- 7 OUTPUT SUN GEAR ASSEMBLY.
- 8 LOW-REVERSE/1-2-3-4 CLUTCH HOUSING.
- 9 LOW-REVERSE WAVE PLATE.

- 10 LOW-REVERSE STEEL PLATE (3 REQUIRED).
- 11 LOW-REVERSE FRICTION PLATE (3 REQUIRED).
- 12 LOW-REVERSE STEPPED BACKING PLATE.
- 13 LOW ONE WAY DIODE.
- 14 2-6 FRICTION PLATE (2 REQUIRED).
- 15 2-6 STEEL PLATE (2 REQUIRED).
- 16 REACTION CARRIER SUN GEAR ASSEMBLY.
- 17 REACTION CARRIER SUN GEAR THRUST BEARING.
- 18 2-6 WAVE PLATE.

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Figure 68

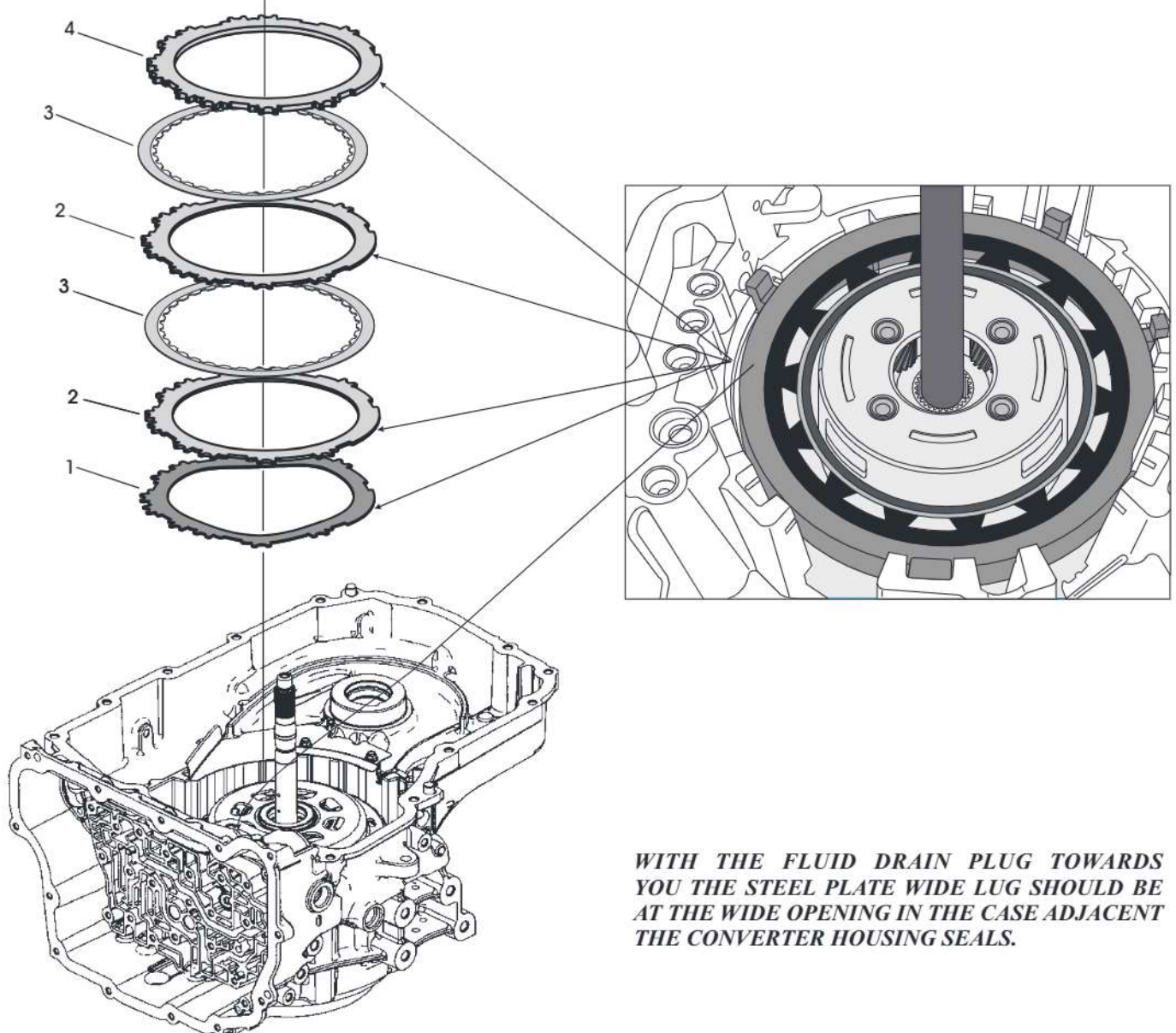
TRANSMISSION DISASSEMBLY (CONT'D)

63. Before removing the 1-2-3-4 clutch assembly from the case, provide a steel plate location indicator, such as a small grind mark and a matching location in the case, for orientation purposes during the reassembly process as shown in Figure 69.

64. Remove the 1-2-3-4 clutch backing plate, friction plates, steel plates and the waved plate seen in Figure 69 and set aside for future inspection.

Continued on Page 53

- 1 1-2-3-4 WAVED PLATE.
- 2 1-2-3-4 STEEL PLATES (2 REQUIRED).
- 3 1-2-3-4 FRICTION PLATES - GEN 1 (2 REQUIRED).
- 3 1-2-3-4 FRICTION PLATES - GEN 2 (2 REQUIRED).
- 4 1-2-3-4 CLUTCH BACKING PLATE.



WITH THE FLUID DRAIN PLUG TOWARDS YOU THE STEEL PLATE WIDE LUG SHOULD BE AT THE WIDE OPENING IN THE CASE ADJACENT THE CONVERTER HOUSING SEALS.

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Figure 69

TRANSMISSION DISASSEMBLY (CONT'D)

65. Remove the drive sprocket thrust bearing and check it for smooth operation as shown in Figure 70.
66. Remove the output sun gear assembly as shown in Figure 70 and check the output sun gear bushing for wear or galling.

67. Remove the 1-2-3-4/low-reverse clutch housing as shown in Figure 71.
68. Note the location of the narrow lug on the clutch housing as well as the location in the case as seen in Figure 71 where this narrow lug will be indexed for reassembly.

Continued on Page 54

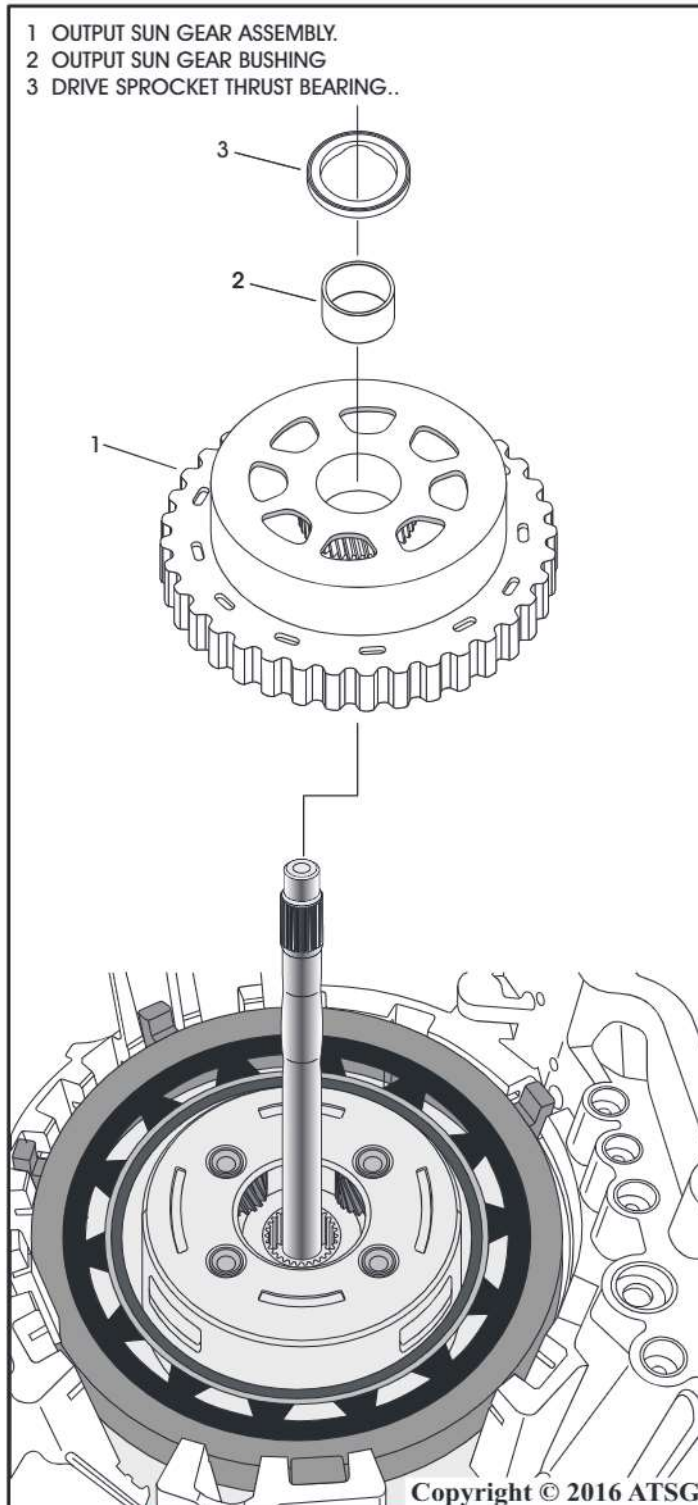


Figure 70

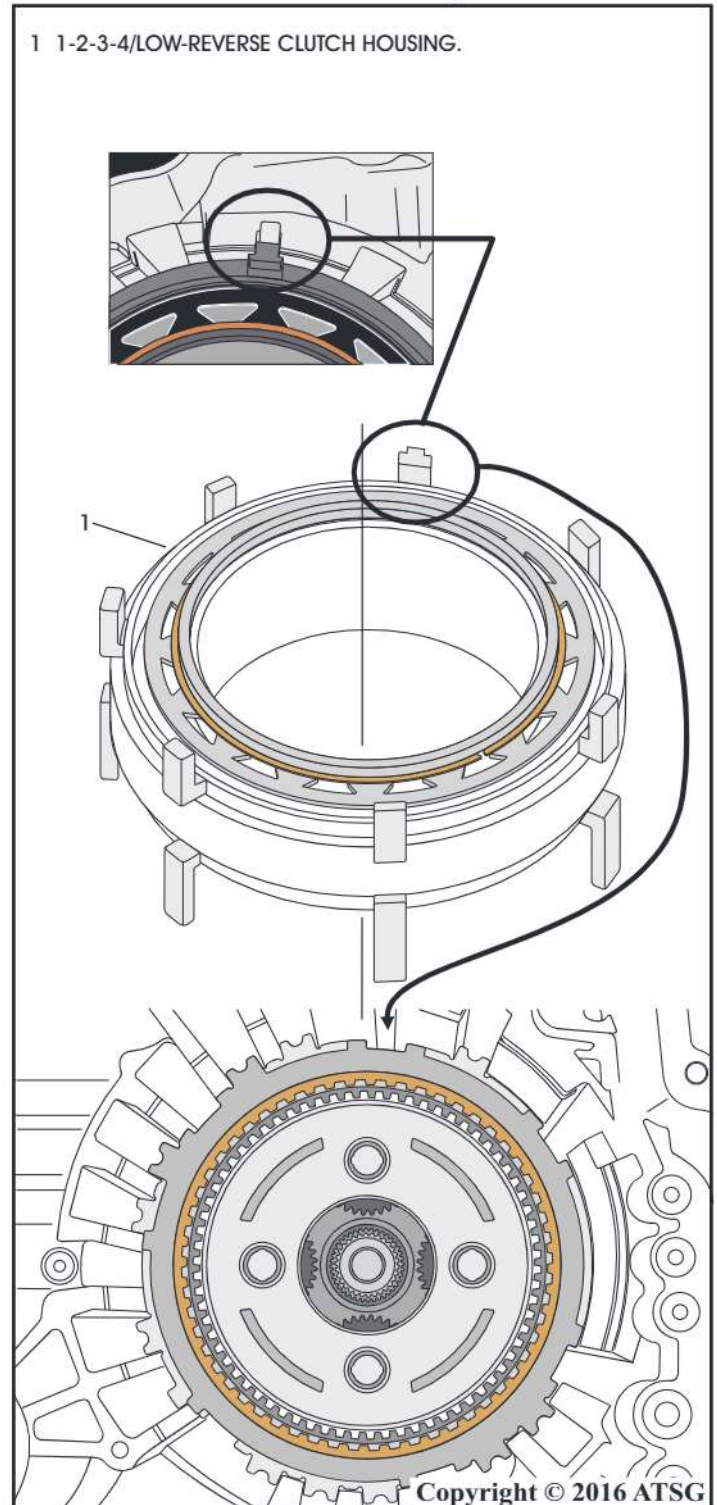


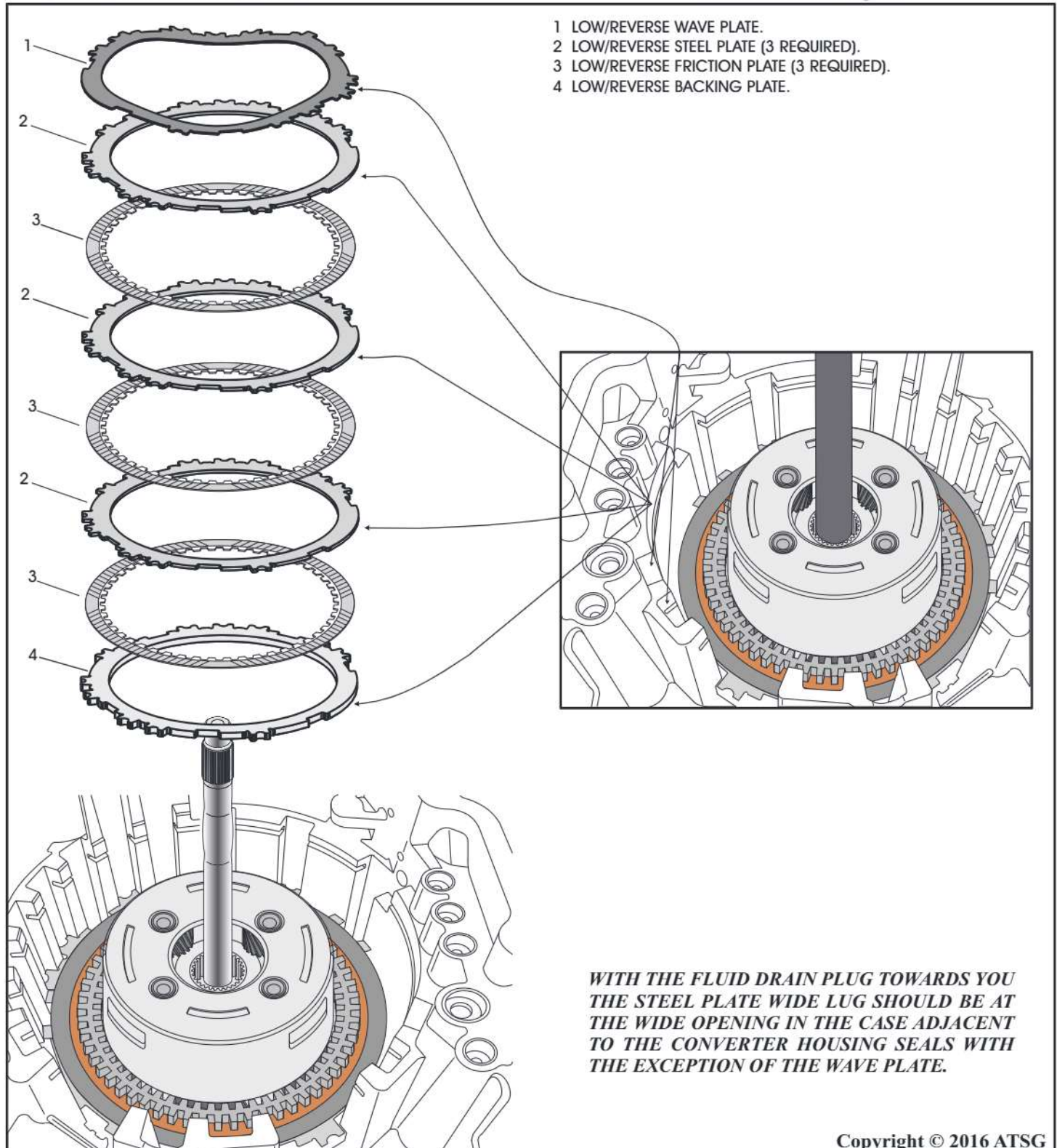
Figure 71

TRANSMISSION DISASSEMBLY (CONT'D)

69. Before removing the low/reverse wave plate, make a small grind mark on the plate and a matching location in the case for reassembly purposes, then remove friction plates and backing plate as shown in Figure 72.

70. Identify and record the low/reverse steel plate position by making a small grind mark on the steel plates and matching location in the case for reassembly purposes as seen in Figure 72.

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Figure 72

6T30/40 GEARTRAIN - 3 & 4 PINION CARRIERS

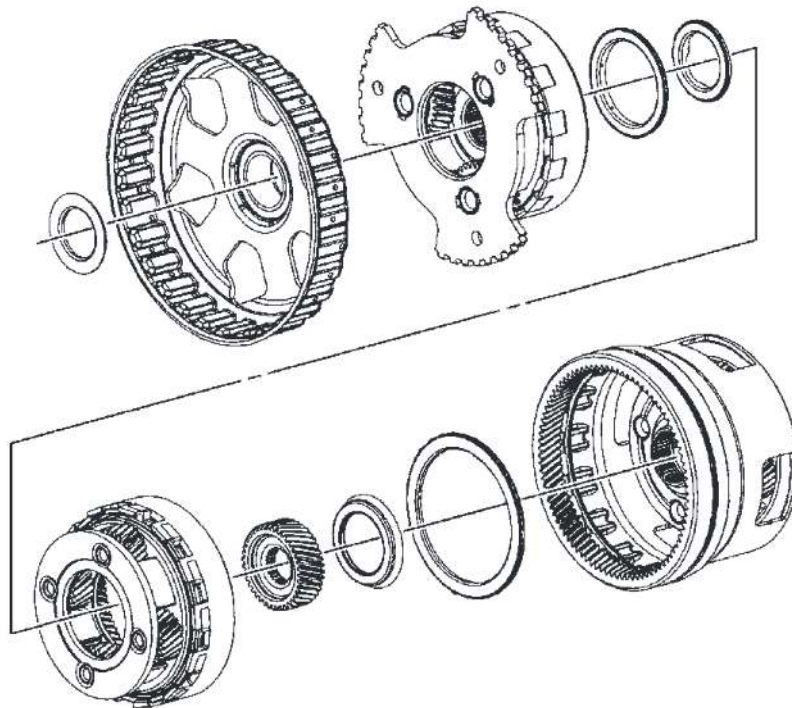


Figure 73

6T45/50 GEARTRAIN - 4 & 5 PINION CARRIERS

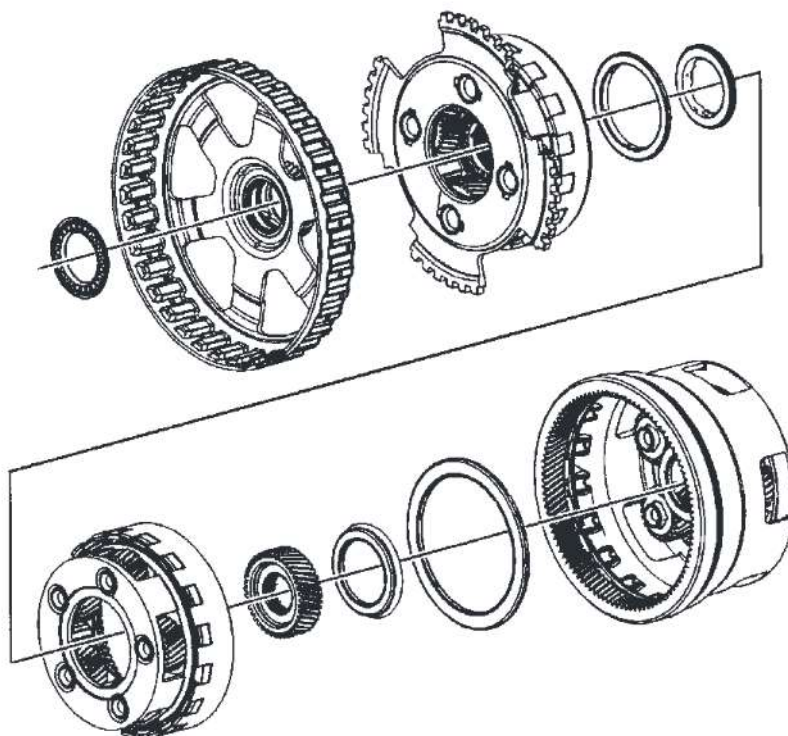


Figure 74

TRANSMISSION DISASSEMBLY (CONT'D)

71. Remove the output carrier assembly as well as the output carrier and input sun gear thrust bearings as seen in Figure 75.
72. Remove the input carrier assembly as well as the input sun gear as seen in Figure 75.

Continued on Page 57

73. Remove the input sun gear and input carrier bearings as seen in Figure 75.
74. Remove the reaction carrier assembly as seen in Figure 75.

NOTE: Check all thrust bearings for roughness and check all carrier pinions for roughness or "rocking". Replace as needed.

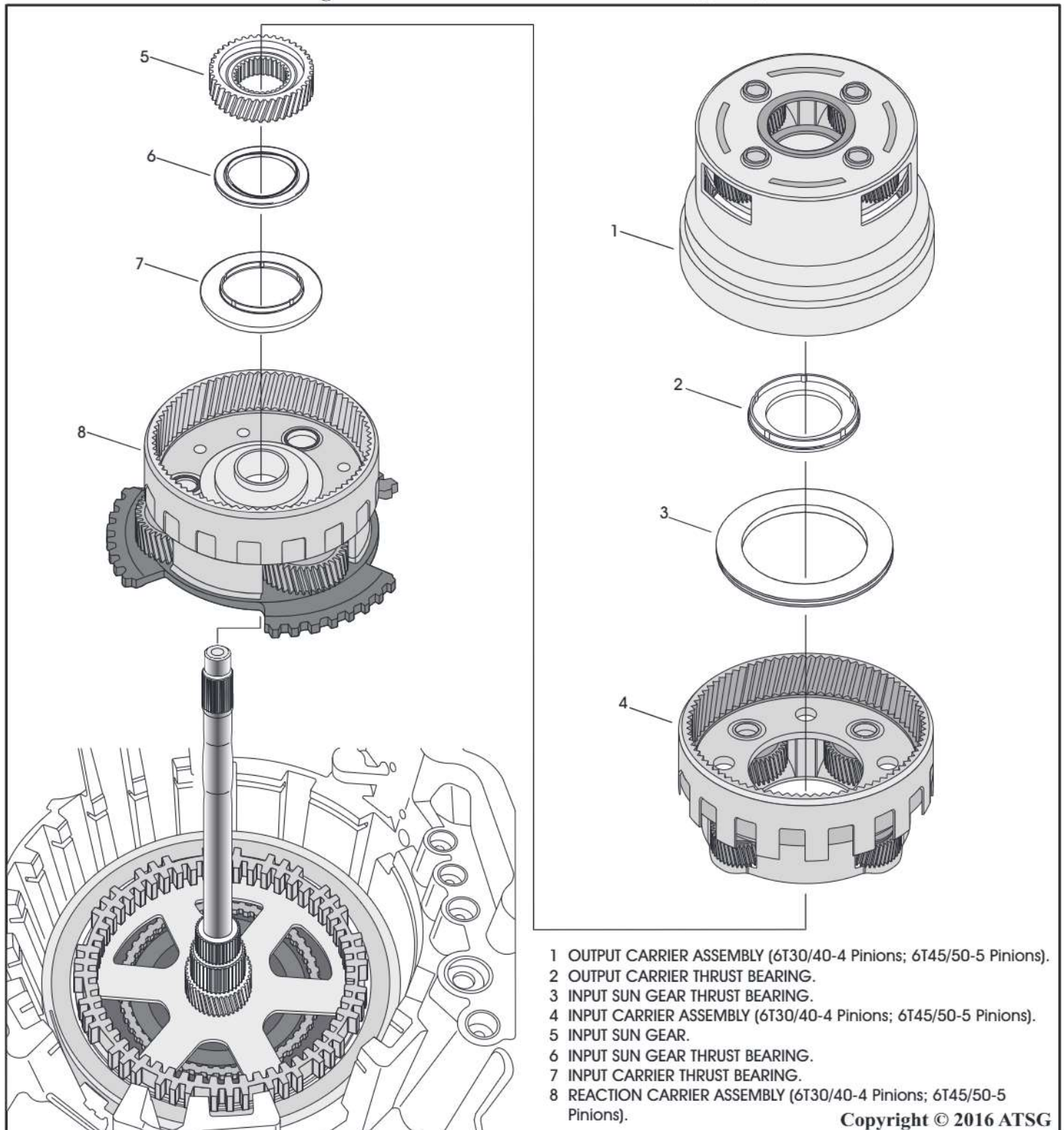


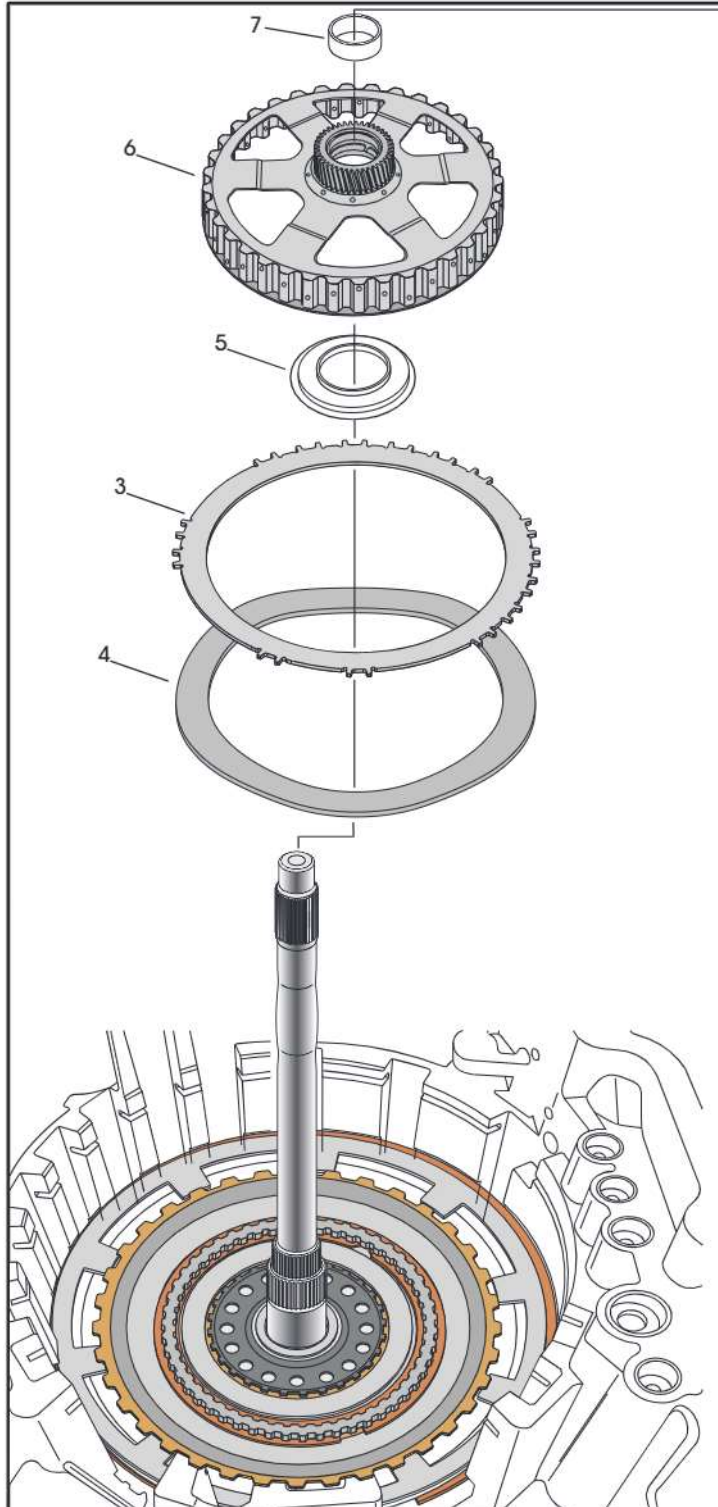
Figure 75

TRANSMISSION DISASSEMBLY (CONT'D)

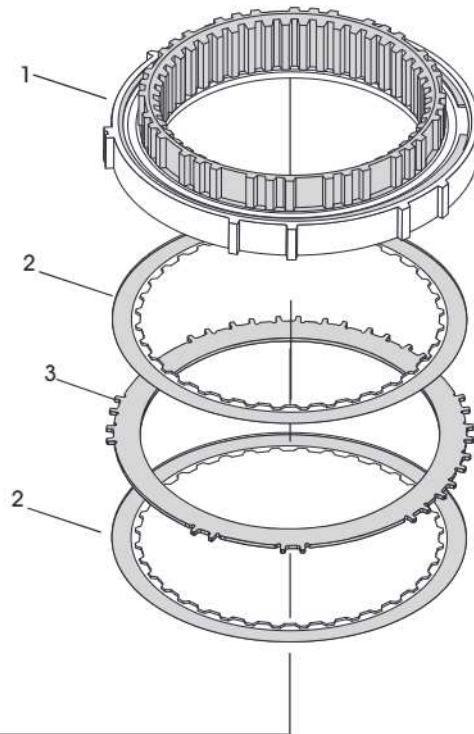
75. Remove the low one way clutch assembly from the case as shown in Figure 76.
76. Grasp the reaction carrier sun gear assembly by the sun gear and lift it out of the case as shown in Figure 76. The reaction carrier sun gear bearing may be stuck to the under side of the reaction carrier sun gear assembly.

77. Two 2-6 friction plates and one steel plate will come with it as seen in Figure 76.
78. Remove the bottom 2-6 steel plate as well as the 2-6 wave plate as shown in Figure 76.
79. Check the low one way clutch for proper operation as seen in Figure 76.

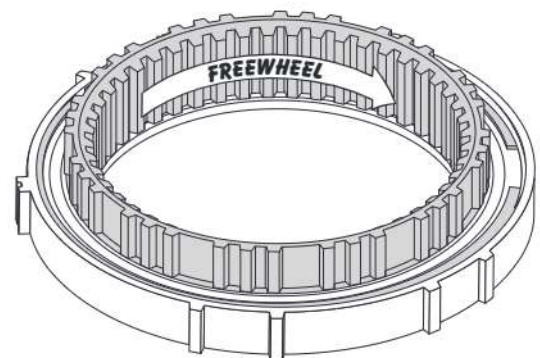
Note: Provide a grind mark on the 2-6 steel plates and case for reassembly orientation purposes.



Continued on Page 58



- 1 LOW ONE WAY CLUTCH (MECHANICAL DIODE).
- 2 2-6 FRICTION PLATE (2 REQUIRED).
- 3 2-6 STEEL PLATE (2 REQUIRED).
- 4 2-6 WAVE PLATE.
- 5 REACTION CARRIER SUN GEAR THRUST BEARING.
- 6 REACTION CARRIER SUN GEAR ASSEMBLY.
- 7 REACTION SUN GEAR BUSHING (CHECK FOR WEAR OR GALLING).



WITH THE OUTER RACE HELD, THE INNER RACE SHOULD FREEWHEEL CLOCKWISE

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Figure 76

TRANSMISSION DISASSEMBLY (CONT'D)

80. Remove the 3-5-R/4-5-6 clutch housing as an entire assembly as seen in Figure 77.
81. Remove and inspect the 3-5-R/4-5-6 Clutch housing to case thrust bearing shown in Figure 77.

Continued on Page 59

82. Remove the 2-6 clutch spring retaining snap ring as seen in Figure 78 using a long flat bladed tool.
83. Remove the 2-6 clutch piston return spring as seen in Figure 78.
84. Dislodge the 2-6 clutch piston by placing the tip of a blow gun into the 2-6 clutch feed hole and carefully applying air pressure until piston is free as shown in Figure 78.

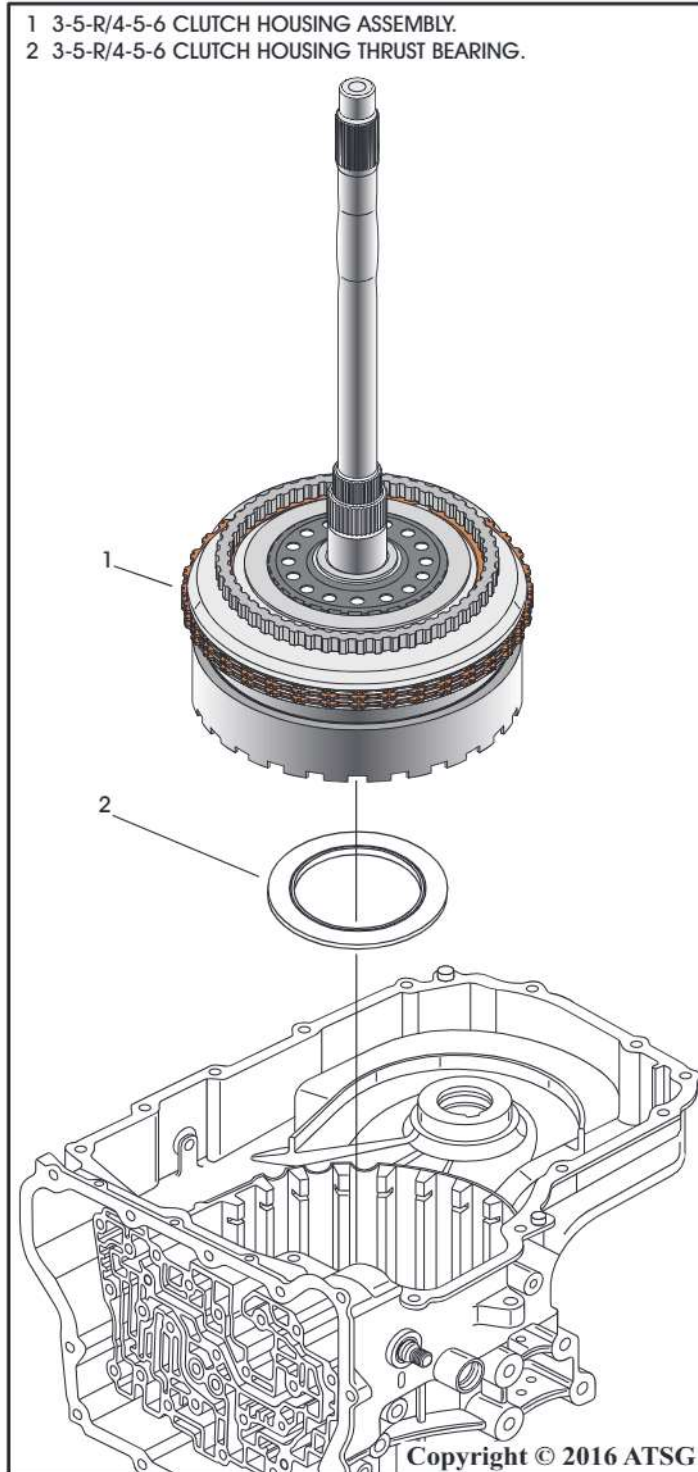


Figure 77

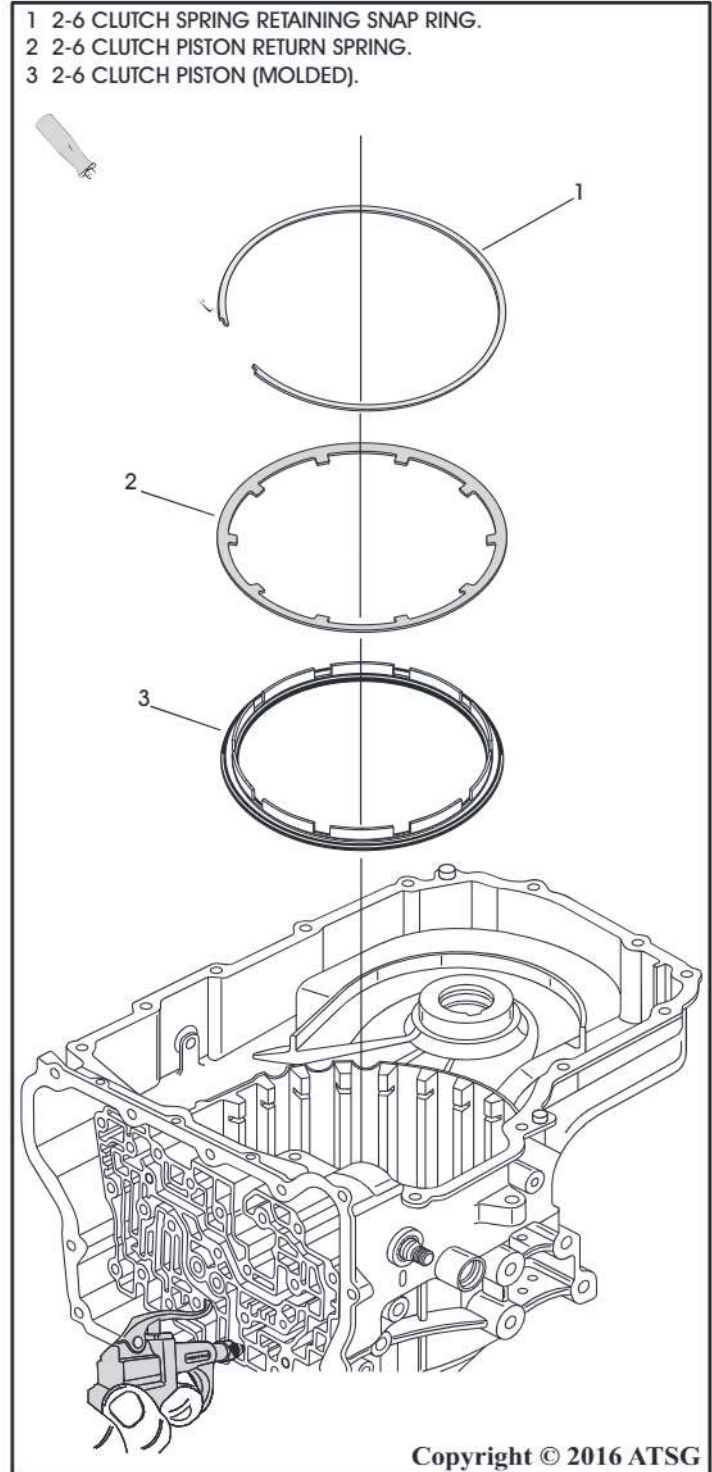


Figure 78

TRANSMISSION DISASSEMBLY (CONT'D)

85. Remove the three ring tower bolts and lift the ring tower out of the case as seen in Figure 79.
86. Remove and discard the sealing rings and inspect the ring lands for damage or wear as well as the support journals for galling.

Continued on Page 60

87. Make certain the torque converter housing locating dowel pins are not lost during the cleaning process as shown in Figure 80.
88. Make certain the valve body locating dowel pins are not lost during the cleaning process as shown in Figure 80.

- 1 RING TOWER BOLTS M6X50 (3 REQUIRED).
- 2 3-5-R/4-5-6 CLUTCH SEALING RINGS (4 REQUIRED 2008 - 2009).
- 2 3-5-R/4-5-6 CLUTCH SEALING RINGS (3 REQUIRED 2010 & UP).
- 3 4-5-6/3-5-REVERSE HOUSING SUPPORT - 4 RING (2.332" LONG).
- 3 4-5-6/3-5-REVERSE HOUSING SUPPORT - 3 RING (2.080" LONG).

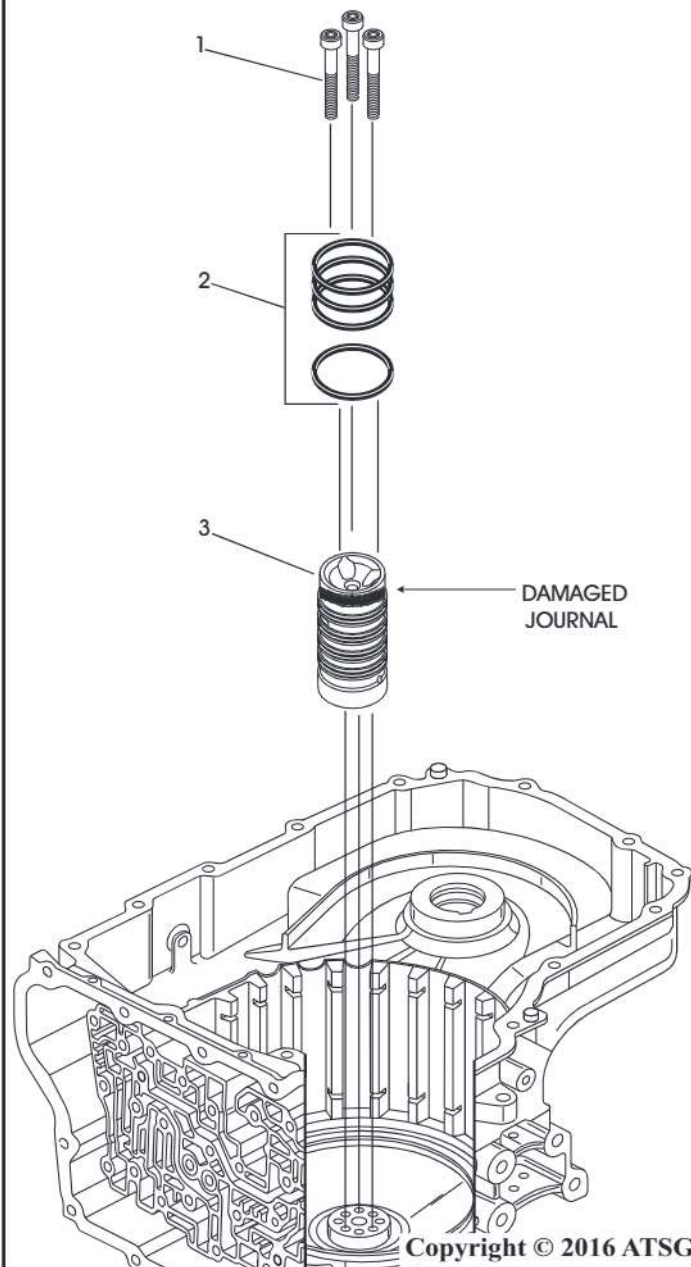


Figure 79

- 1 TORQUE CONVERTER HOUSING LOCATING DOWEL PINS.
- 2 VALVE BODY LOCATING DOWEL PINS.

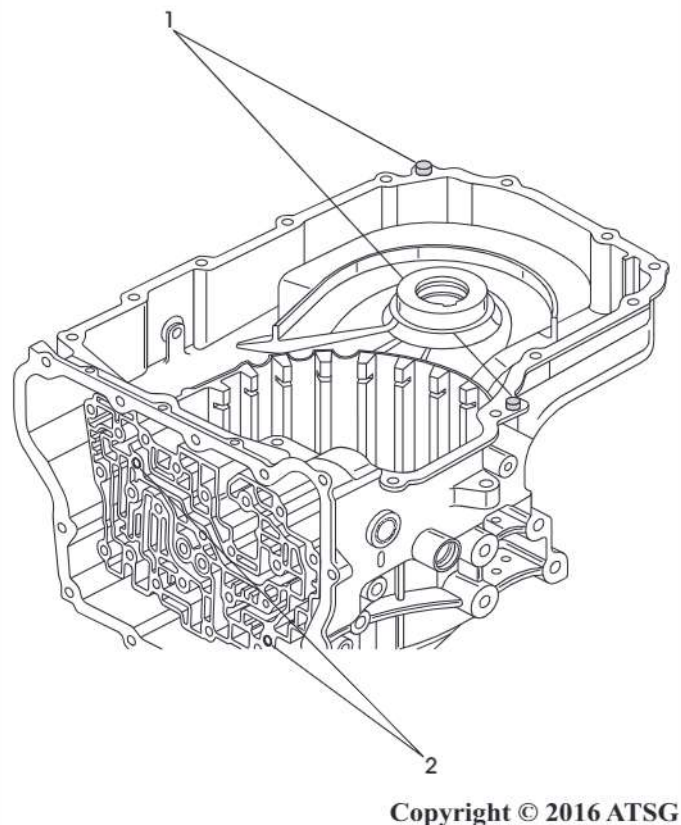


Figure 80

TRANSMISSION DISASSEMBLY (CONT'D)

89. Remove the transmission case axle seal using a slide hammer and universal seal puller attachment as shown in Figure 81.

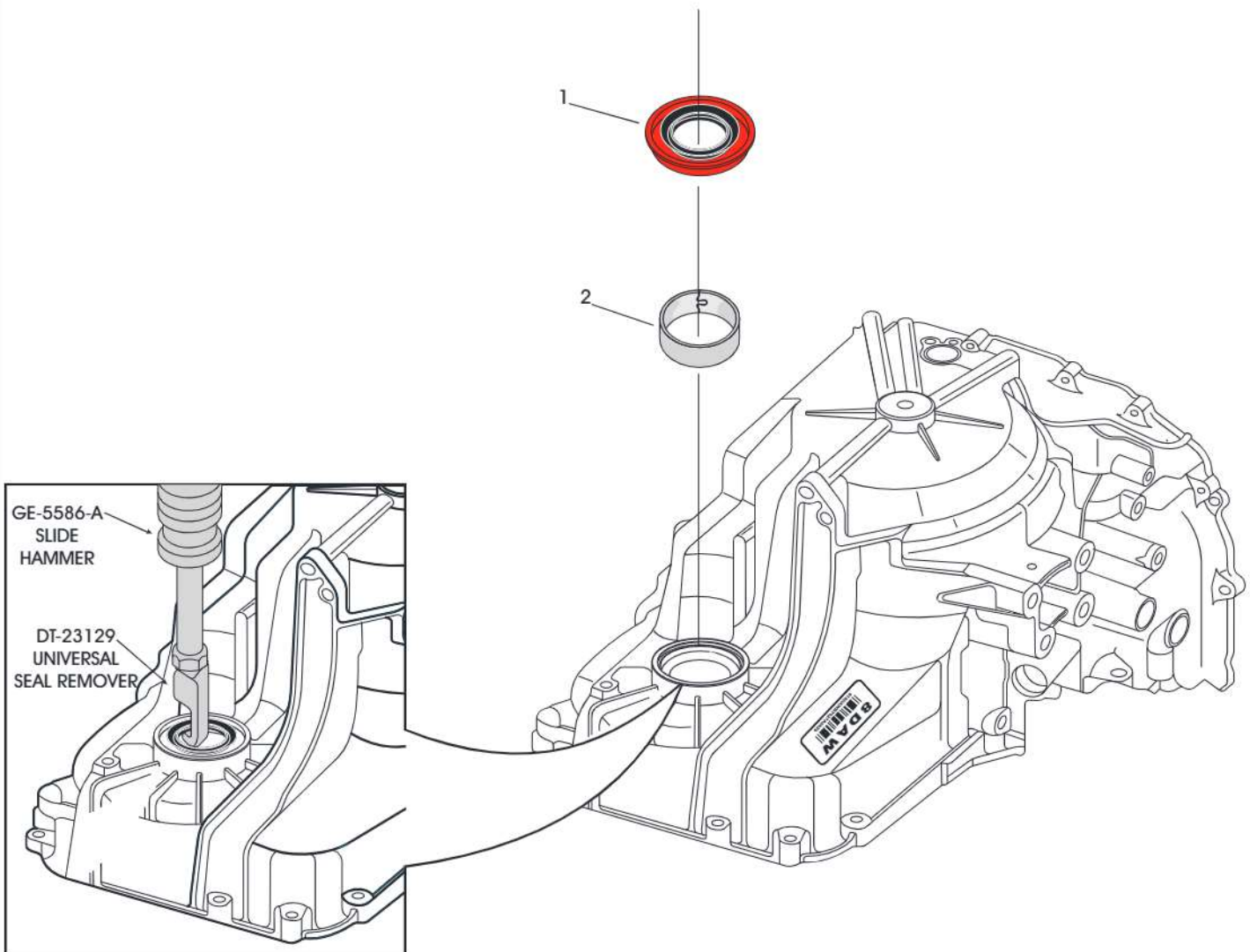
90. Inspect the transmission case axle support bushing for wear or scoring seen in Figure 81.

91. If the transmission case axle support bushing is found to be damaged, remove the bushing at this time by using a bushing driver and hydraulic press making certain to properly support the case in order to prevent damage.

Note: *The transmission case axle support bushing is a commonly known failure which can result in the axle seal badly leaking. Be sure to check the axle stub for damage as well.*

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- 1 AXLE SEAL - CASE SIDE.
- 2 AXLE SUPPORT BUSHING.



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Figure 81

TRANSMISSION DISASSEMBLY (CONT'D)

92. Remove and discard the torque converter housing axle seal using a slide hammer with a seal removal hook as shown in Figure 82.
93. If the torque converter housing axle support bushing is worn or galled, use a bushing cutter to remove it.
94. Be sure to check the condition of the axle stub to see if the galled bushing damaged it.
95. After cleaning the torque converter housing, clean gasket surfaces and inspect threaded holes for damage.
96. Do not use abrasive cleaning materials on gasket surfaces as they can remove enough metal to cause a leak between case halves.
97. Keep the torque converter housing free of lint from cloth or paper towels.

Continued on Page 62

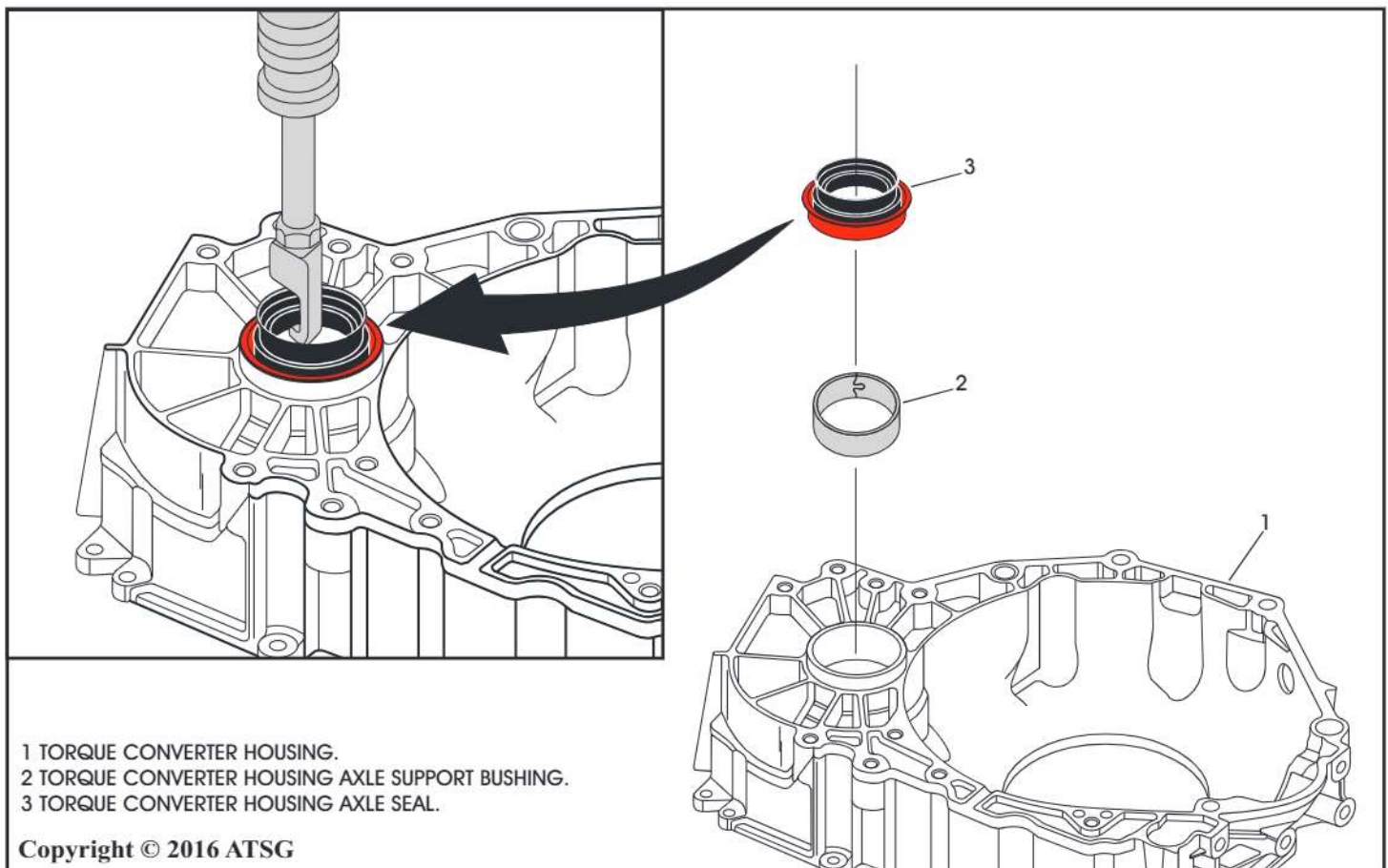


Figure 82

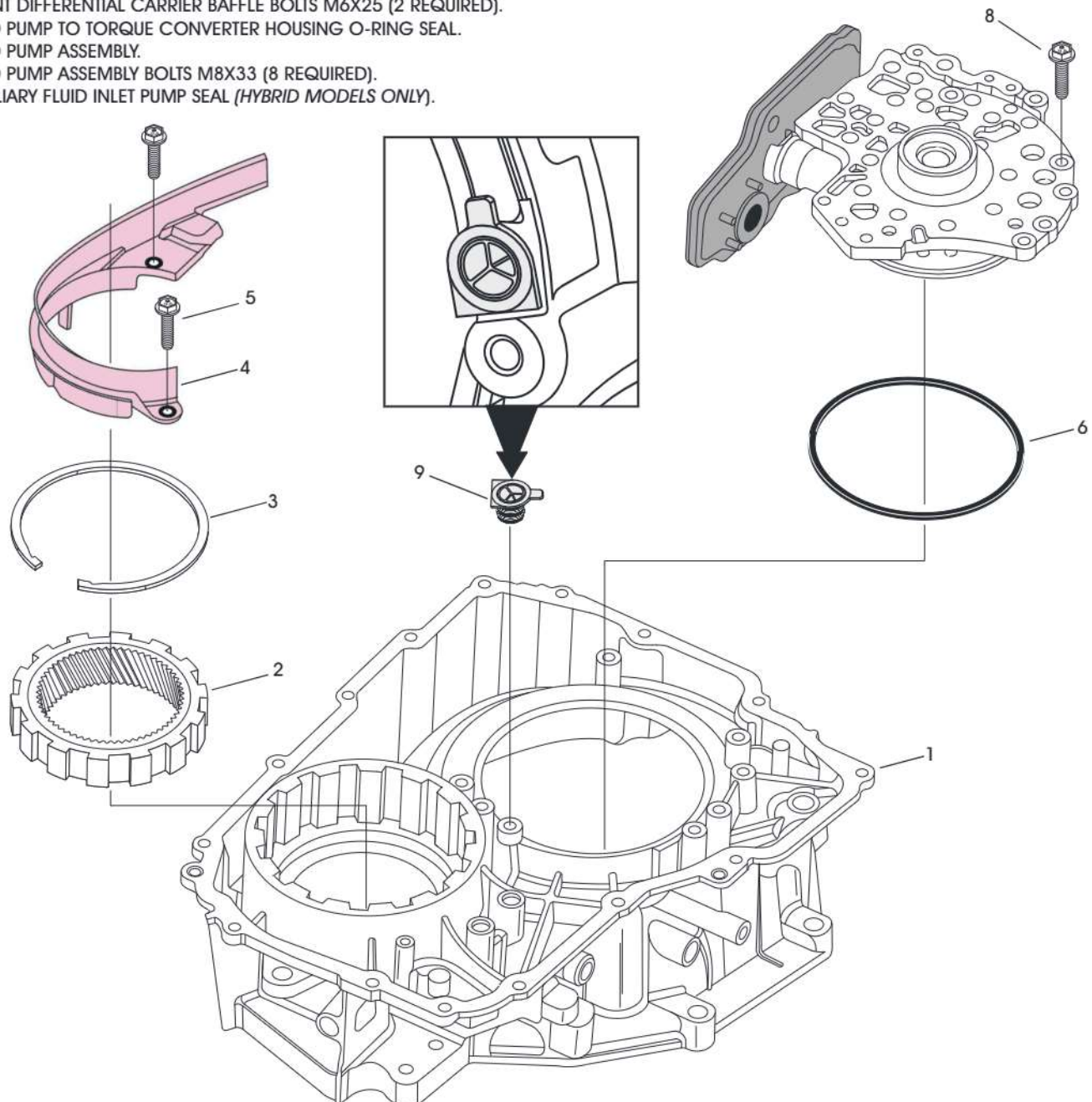
TRANSMISSION DISASSEMBLY (CONT'D)

98. Remove the two front differential carrier baffle bolts and the baffle as seen in Figure 83.
99. Remove the front differential ring gear retainer and the front differential ring gear as seen in Figure 83.
100. Remove the eight fluid pump bolts and lift the pump and filter assembly out of the torque converter housing as seen in Figure 83.

101. Remove the fluid pump to torque converter housing o-ring seal and discard as seen in Figure 83.
102. Remove the auxiliary fluid inlet pump seal and discard as seen in Figure 83.

NOTE: The auxiliary fluid inlet pump seal is used only on BAS Hybrid models.

- 1 TORQUE CONVERTER HOUSING.
- 2 FRONT DIFFERENTIAL RING GEAR.
- 3 FRONT DIFFERENTIAL RING GEAR RETAINER.
- 4 FRONT DIFFERENTIAL CARRIER BAFFLE.
- 5 FRONT DIFFERENTIAL CARRIER BAFFLE BOLTS M6X25 (2 REQUIRED).
- 6 FLUID PUMP TO TORQUE CONVERTER HOUSING O-RING SEAL.
- 7 FLUID PUMP ASSEMBLY.
- 8 FLUID PUMP ASSEMBLY BOLTS M8X33 (8 REQUIRED).
- 9 AUXILIARY FLUID INLET PUMP SEAL (HYBRID MODELS ONLY).



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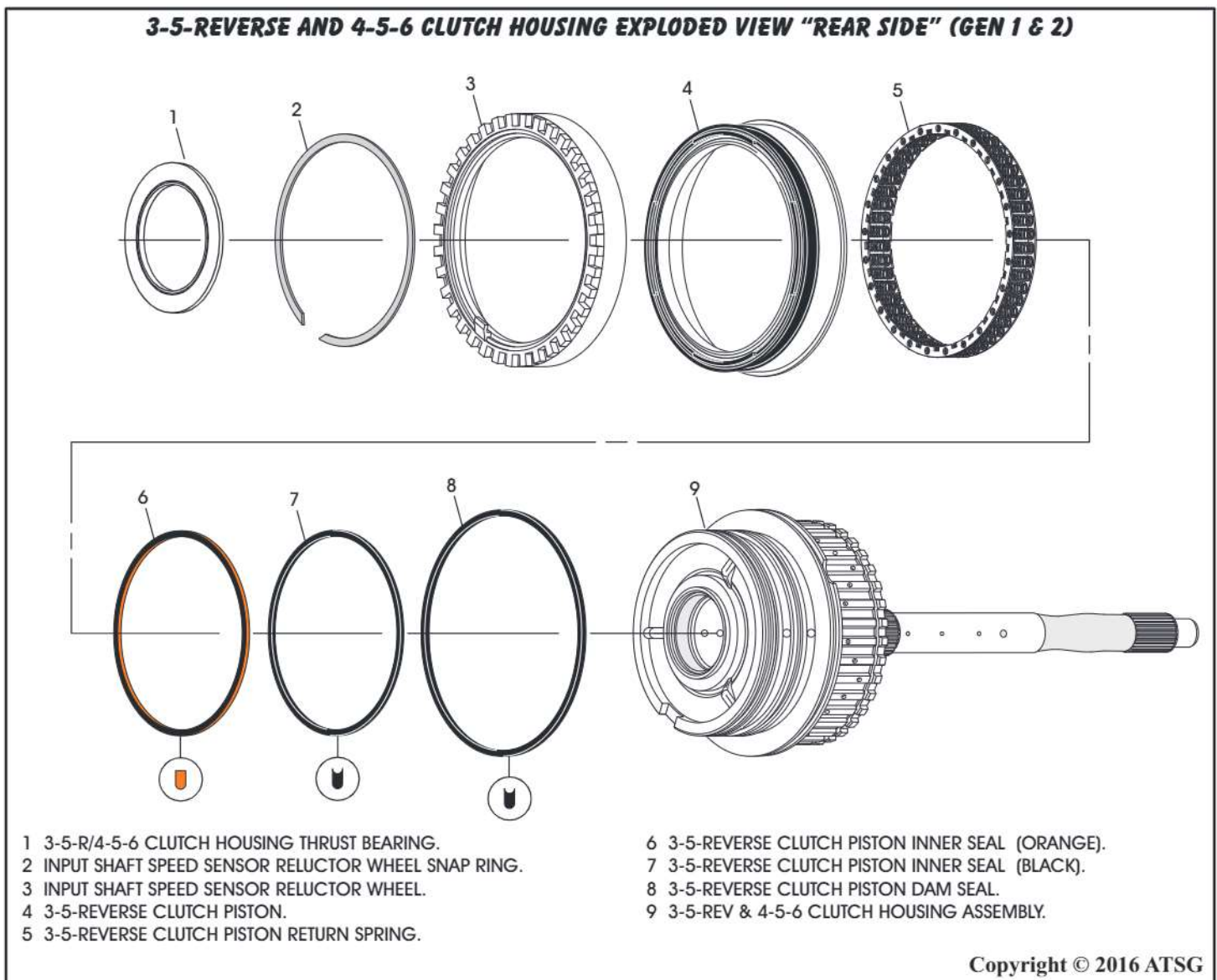
Figure 83

COMPONENT REBUILD

3-5-Rev & 4-5-6 Clutch Housing - Disassembly

1. The 3-5-Reverse/4-5-6 clutch housing is disassembled from both sides. The rear side of the housing contains the 3-5-R components as well as the turbine speed sensor reluctor ring. All components are the same for both generation 1 and 2.
2. An exploded view can be seen in Figure 84.
2. The front side of the drum contains the 4-5-6 clutch components. Certain internal components are different between early and late production as well as the differences between generation 1 and 2 components.
3. Generation 1 components for the 4-5-6/3-5-Reverse are shown in Figure 85. Generation 2 components are shown in Figure 86.
4. The clutch housing requires different style seals so care should be taken to insure each seal is installed in the correct location which will be explained in detail when assembly of the 3-5-R/4-5-6 clutch housing begins.

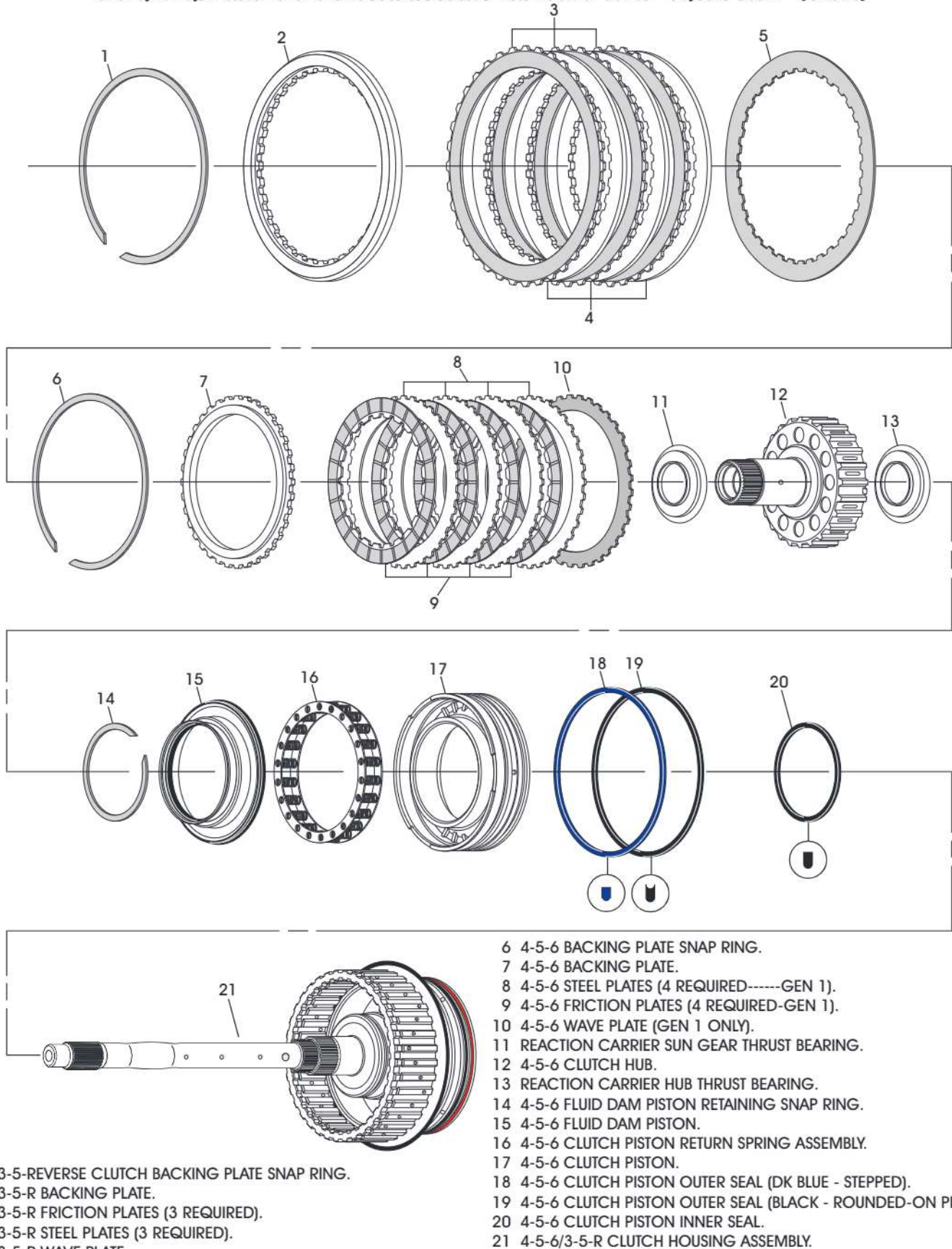
Continued on Page 64



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Figure 84

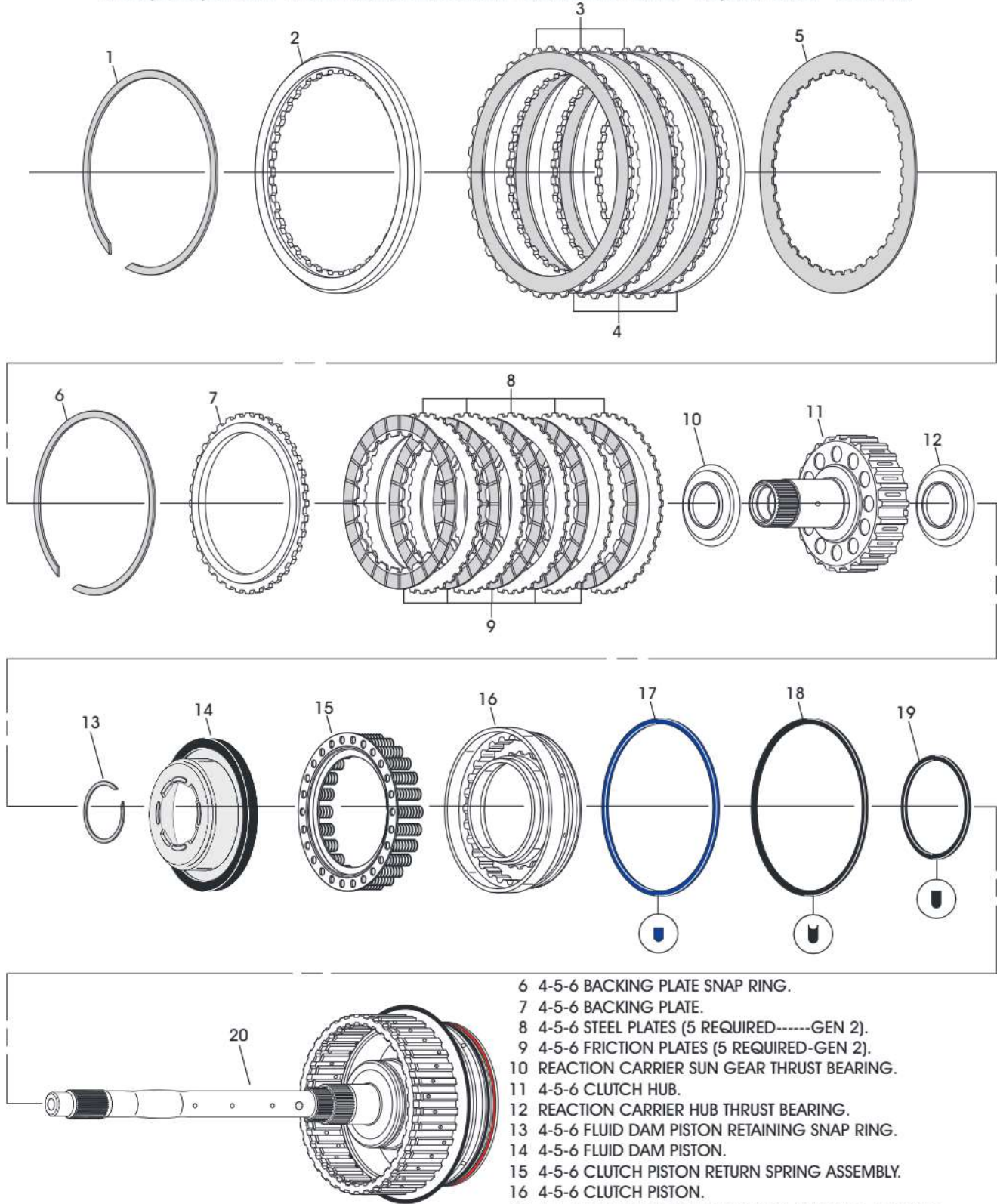
3-5-REVERSE AND 4-5-6 CLUTCH HOUSING EXPLODED VIEW "FRONT SIDE" (GEN 1)



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Figure 85

3-5-REVERSE AND 4-5-6 CLUTCH HOUSING EXPLODED VIEW "FRONT SIDE" (GEN 2)



- 1 3-5-REVERSE CLUTCH BACKING PLATE SNAP RING.
- 2 3-5-R BACKING PLATE.
- 3 3-5-R FRICTION PLATES (3 REQUIRED).
- 4 3-5-R STEEL PLATES (3 REQUIRED).
- 5 3-5-R WAVE PLATE.

- 6 4-5-6 BACKING PLATE SNAP RING.
- 7 4-5-6 BACKING PLATE.
- 8 4-5-6 STEEL PLATES (5 REQUIRED-----GEN 2).
- 9 4-5-6 FRICTION PLATES (5 REQUIRED-GEN 2).
- 10 REACTION CARRIER SUN GEAR THRUST BEARING.
- 11 4-5-6 CLUTCH HUB.
- 12 REACTION CARRIER HUB THRUST BEARING.
- 13 4-5-6 FLUID DAM PISTON RETAINING SNAP RING.
- 14 4-5-6 FLUID DAM PISTON.
- 15 4-5-6 CLUTCH PISTON RETURN SPRING ASSEMBLY.
- 16 4-5-6 CLUTCH PISTON.
- 17 4-5-6 CLUTCH PISTON OUTER SEAL (DK BLUE - STEPPED).
- 18 4-5-6 CLUTCH PISTON OUTER SEAL (BLACK - ROUNDED-IN DRUM).
- 19 4-5-6 CLUTCH PISTON INNER SEAL.
- 20 4-5-6/3-5-R CLUTCH HOUSING ASSEMBLY.

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Figure 86

COMPONENT REBUILD (CONT'D)

3-5-Rev & 4-5-6 Clutch Housing - Disassembly

5. An exploded view of all the 4-5-6 clutch components can be seen in Figure 87. Some components are either early design or are Generation 1 level.
6. The Generation 1 4-5-6 clutch pack uses three frictions and three steel plates with a wave plate at the bottom of the pack as seen in Figure 87.
7. The 4-5-6 clutch fluid dam piston and the fluid dam piston retaining snap ring are early design level used in 2007-2009 models. The snap ring and the center opening of the fluid dam piston is larger in diameter than the later design shown on Page 67. This means the snap ring will be positioned in the groove in the aluminum part of the 4-5-6 clutch housing.
8. The 4-5-6 clutch piston return spring assembly is the early design level used in 2007-2009 models. This a closed design return spring assembly using a retainer on both sides of the springs as seen in Figure 87.
9. The 4-5-6 clutch piston is also the early design which positions the two outer piston seals on the piston. This means that only the inner piston seal goes inside the drum.

Continued on Page 67

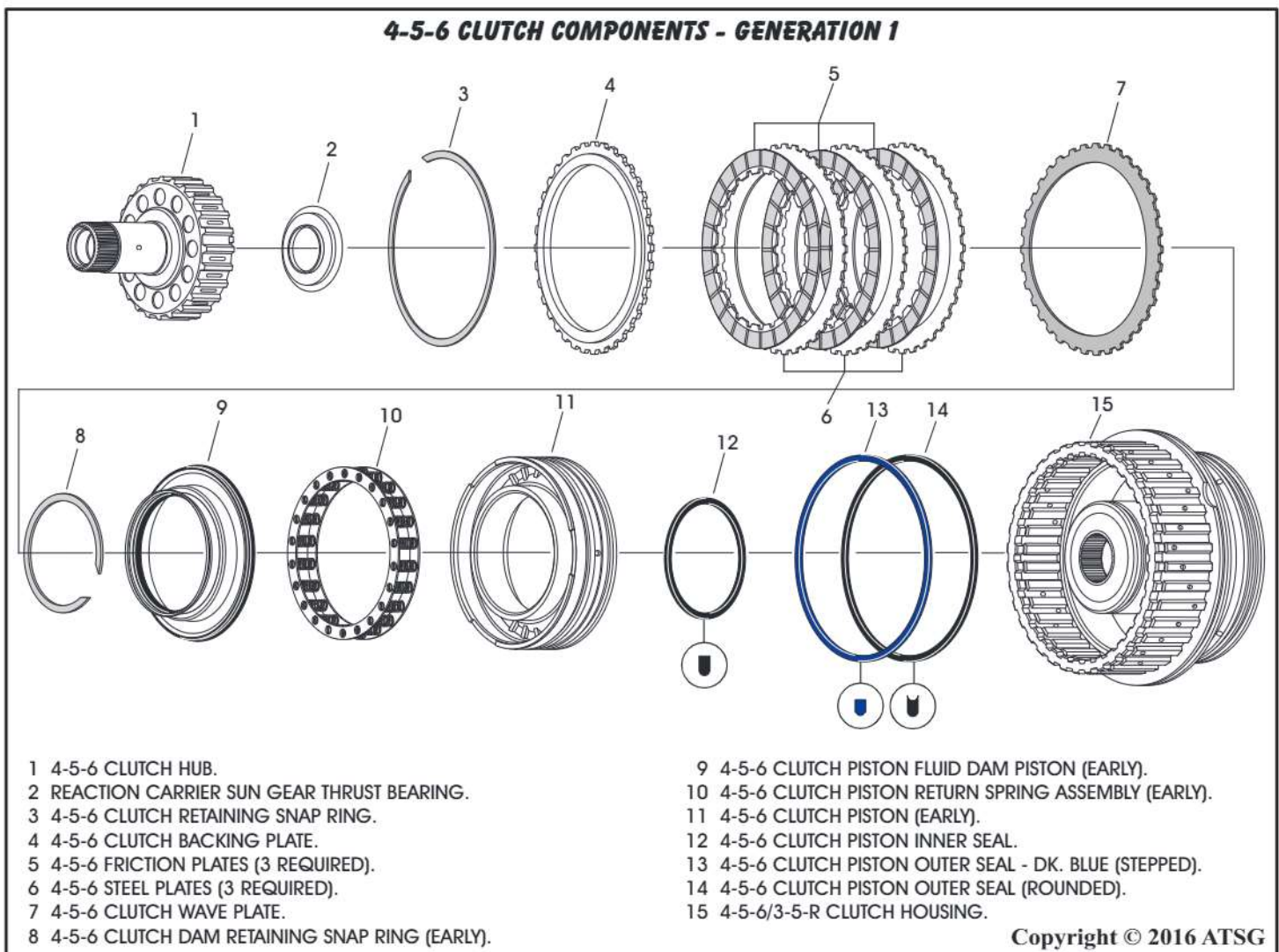


Figure 87

COMPONENT REBUILD (CONT'D)

3-5-Rev & 4-5-6 Clutch Housing - Disassembly

5. An exploded view of all the 4-5-6 clutch components can be seen in Figure 88. Some components are either late design or are Generation 2 level.
6. The Generation 2 4-5-6 clutch pack uses four frictions and four steel plates and has had the wave plate at the bottom of the pack eliminated as seen in Figure 88.
7. The 4-5-6 clutch fluid dam piston and the fluid dam piston "stepped" retaining snap ring are late design level used in 2010 and later models as shown in Figure 88.
The step faces the fluid dam piston and the snap ring and the center opening of the fluid dam piston is smaller in diameter than the earlier design shown on Page 66.

- This means the snap ring will be positioned in the groove in the steel part of the 4-5-6 clutch housing.
8. The 4-5-6 clutch piston return spring assembly is the late design level used in 2010 and later models. This is an open design return spring assembly using a retainer on only one side of the springs as seen in Figure 88.
9. The 4-5-6 clutch piston is also the late design which positions the outer "rounded" piston seal and the inner piston seal inside the 4-5-6 clutch housing. The outer dark blue "stepped" piston seal is the only seal that goes on the 4-5-6 clutch piston.

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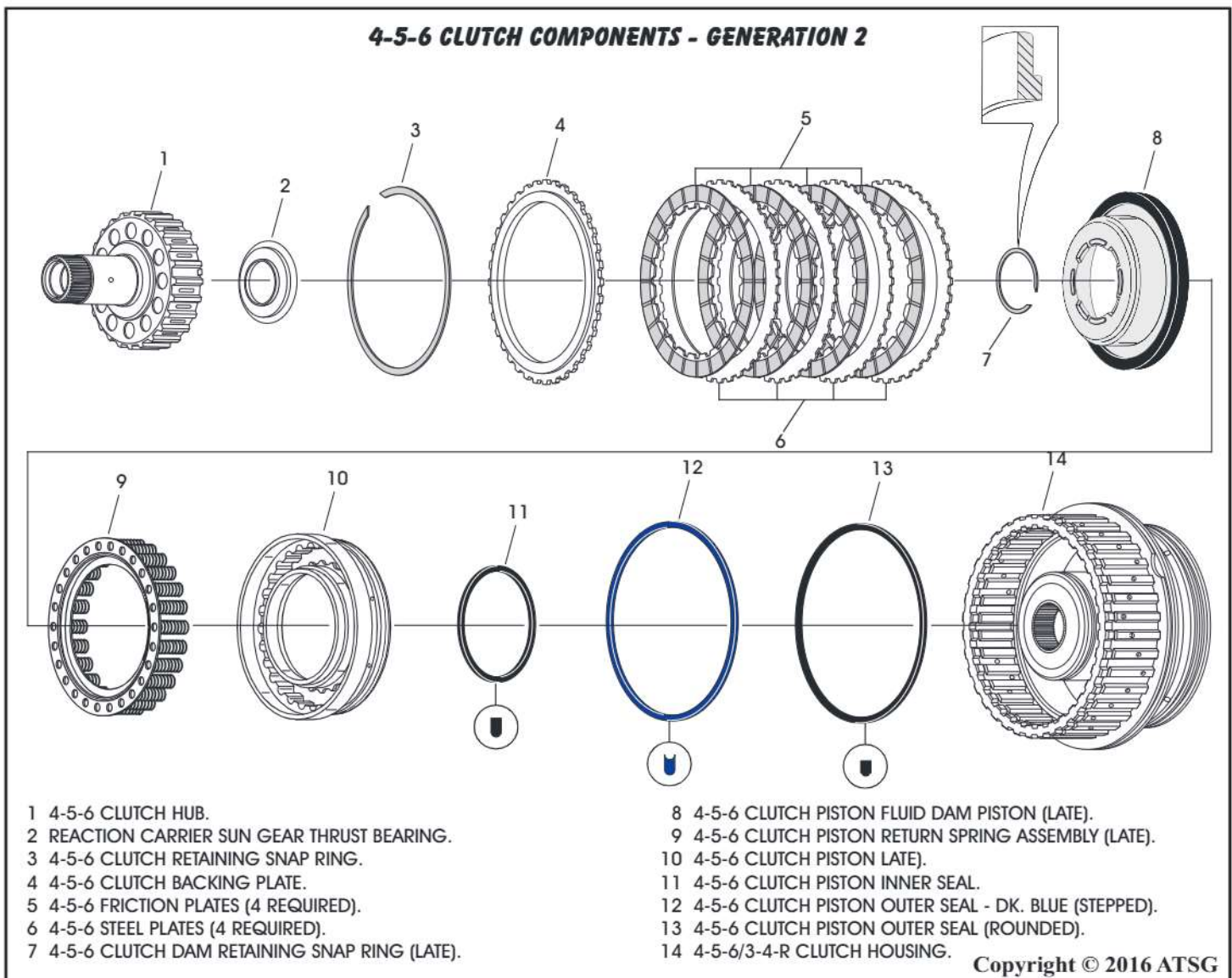


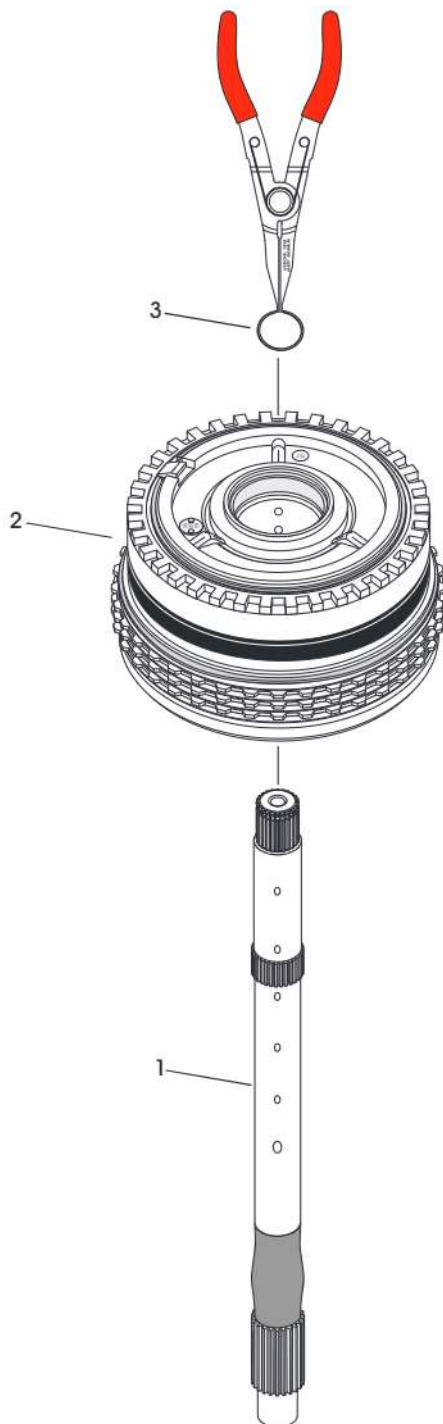
Figure 88

COMPONENT REBUILD (CONT'D)

3-5-Rev & 4-5-6 Clutch Housing - Disassembly

10. Remove the turbine shaft retaining snap ring using a curved tip snap ring plier as shown in Figure 89.
11. Remove the turbine shaft and inspect all mating splined areas for spline erosion.

1 TURBINE SHAFT.
2 3-5-R/4-5-6 CLUTCH HOUSING.
3 TURBINE SHAFT RETAINING SNAP RING.



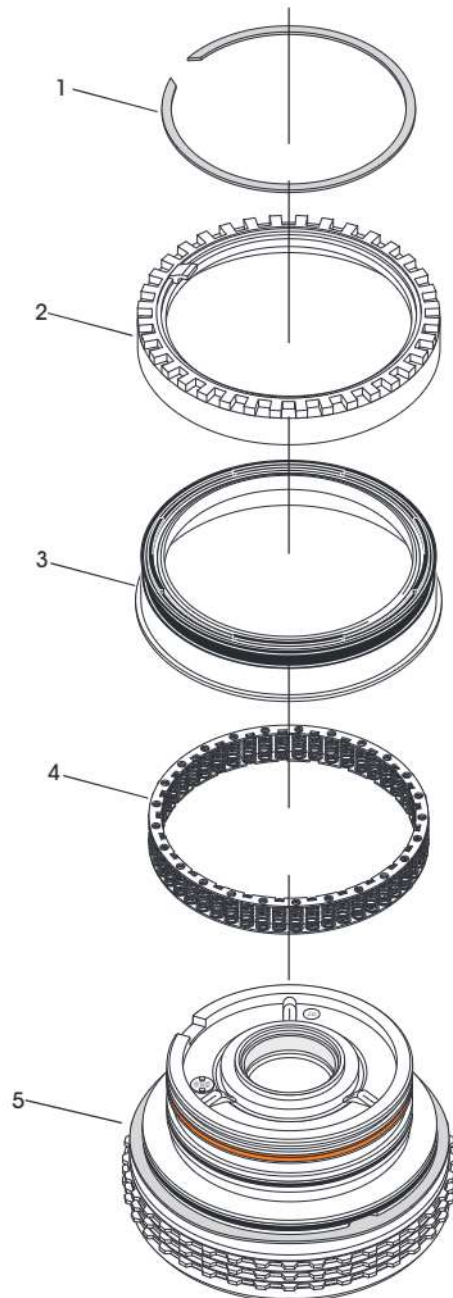
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Figure 89

12. The ISS retractor retaining snap ring and ISS retractor ring are shown in Figure 90.
13. The 3-5-Reverse molded clutch piston is seen in Figure 90.
14. The 3-5-Reverse piston return spring is seen in Figure 90. Refer to Page 69 for the complete disassembly procedure.

Continued on Page 69

1 INPUT SHAFT SPEED SENSOR RELUCTOR RING SNAP RING.
2 INPUT SHAFT SPEED SENSOR RELUCTOR RING.
3 3-5-REVERSE CLUTCH PISTON.
4 3-5-REVERSE CLUTCH PISTON RETURN SPRING.
5 3-5-REVERSE & 4-5-6 CLUTCH HOUSING ASSEMBLY.



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Figure 90

COMPONENT REBUILD (CONT'D)

3-5-Rev & 4-5-6 Clutch Housing - Disassembly

15. Compress the input speed sensor reluctor ring just enough to remove the snap ring using spring compressor tool, as shown in Figure 91.
- Note: Over compressing the reluctor wheel will break the alignment tab and clutch housing.**
16. Remove the input speed sensor reluctor wheel, as shown in Figure 92.
17. Remove 3-5-Rev clutch apply piston, as shown in Figure 92 and discard.
18. Remove the 3-5-Rev clutch piston return spring, as shown in Figure 92.

Continued on Page 70

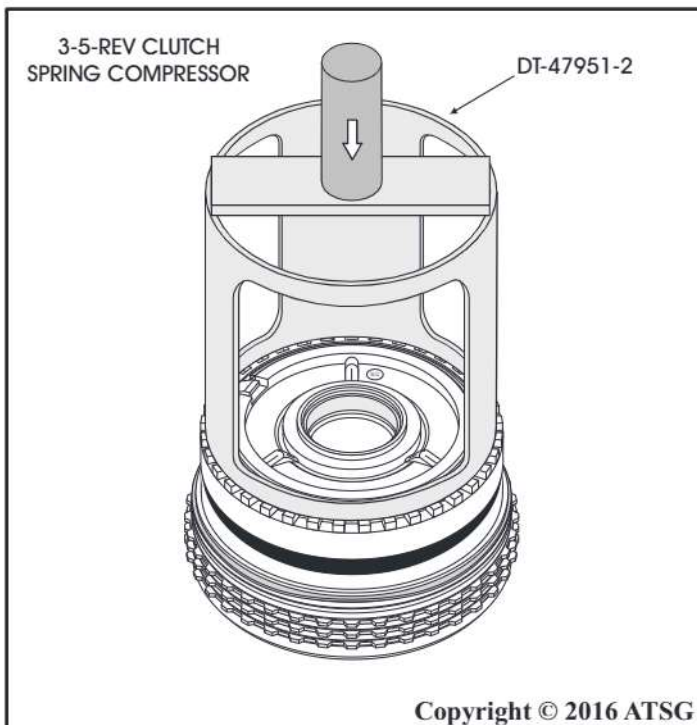


Figure 91

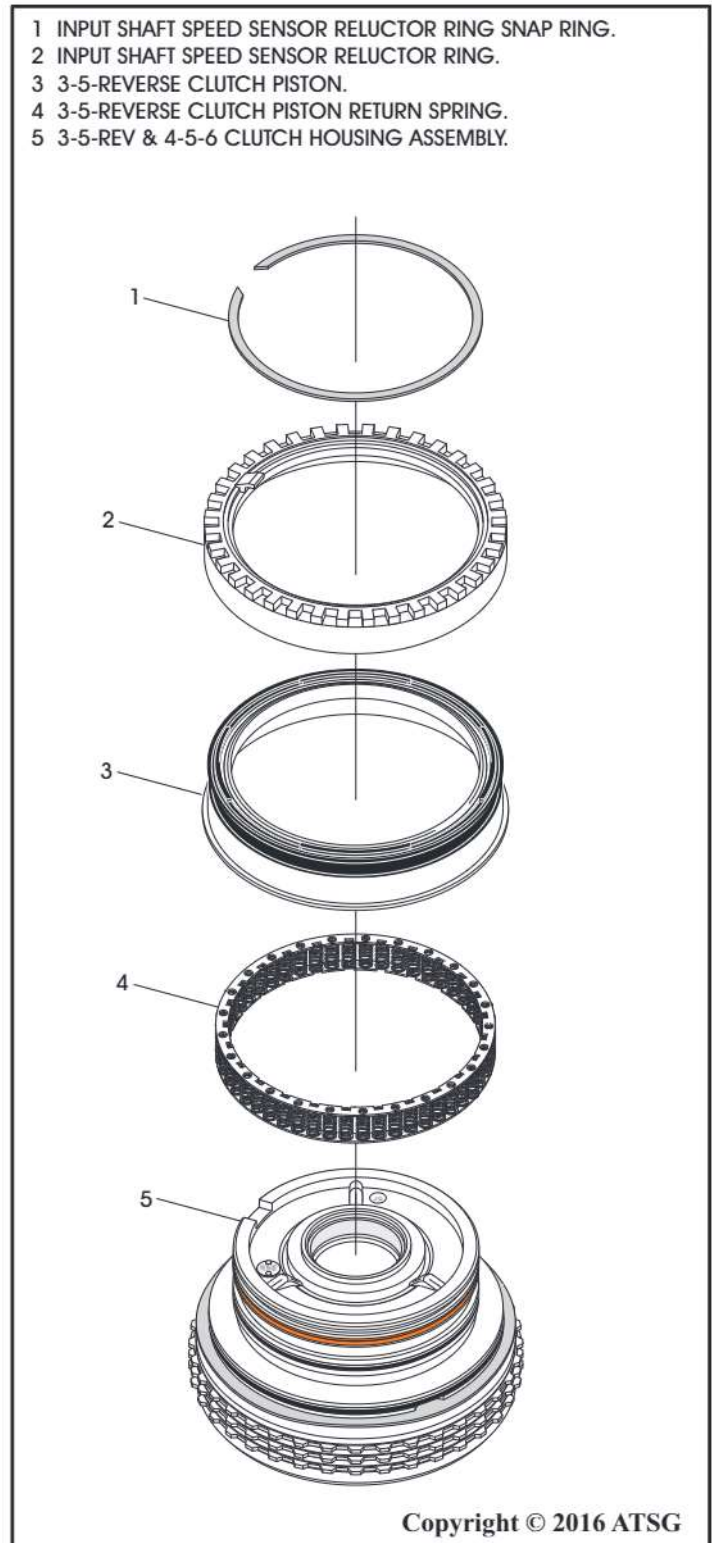


Figure 92

COMPONENT REBUILD (CONT'D)

3-5-Rev & 4-5-6 Clutch Housing - Disassembly

19. Remove and discard the 3-5-Reverse clutch piston inner seals making note of the position of the orange and black seals as shown in Figure 93.
20. Remove and discard the fluid dam seal shown in Figure 93.
21. Remove the 3-5-Reverse clutch backing plate retaining snap ring as seen in Figure 94.
22. Remove the 3-5-Reverse clutch backing plate as seen in Figure 94.
23. Remove the 3-5-Reverse friction and steel plates as seen in Figure 94.
24. Remove the 3-5-Reverse wave plate also seen in Figure 94.

Note: The 3-5-Reverse wave plate and clutch backing plate snap ring are prone to breakage.

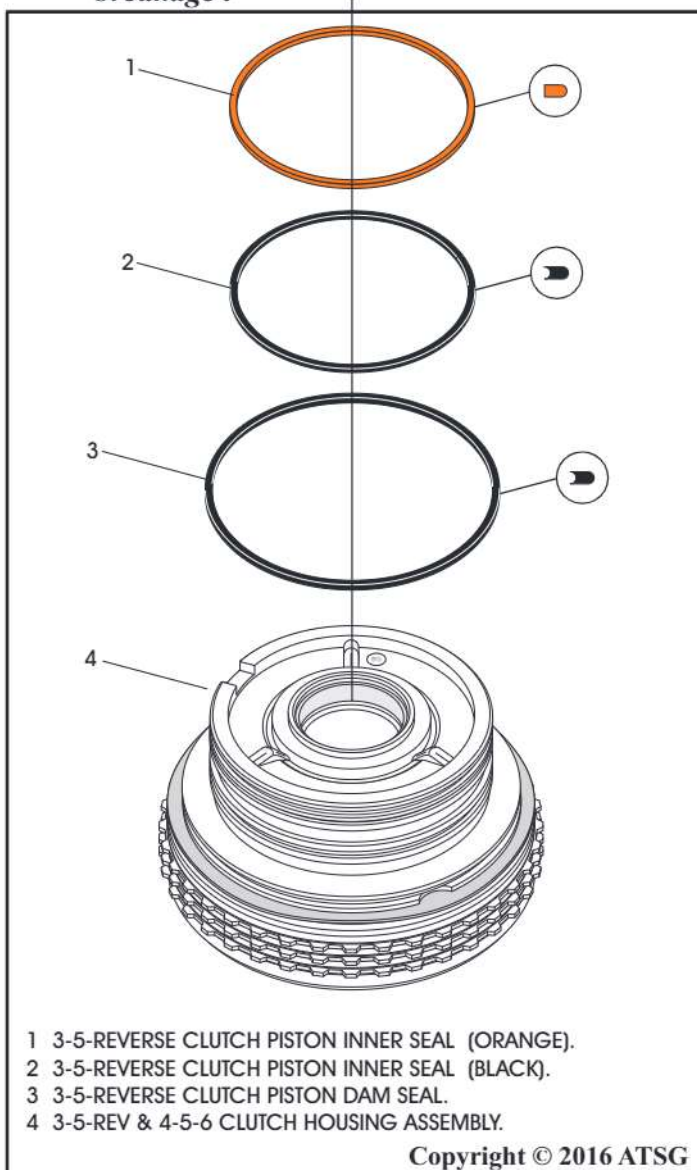


Figure 93

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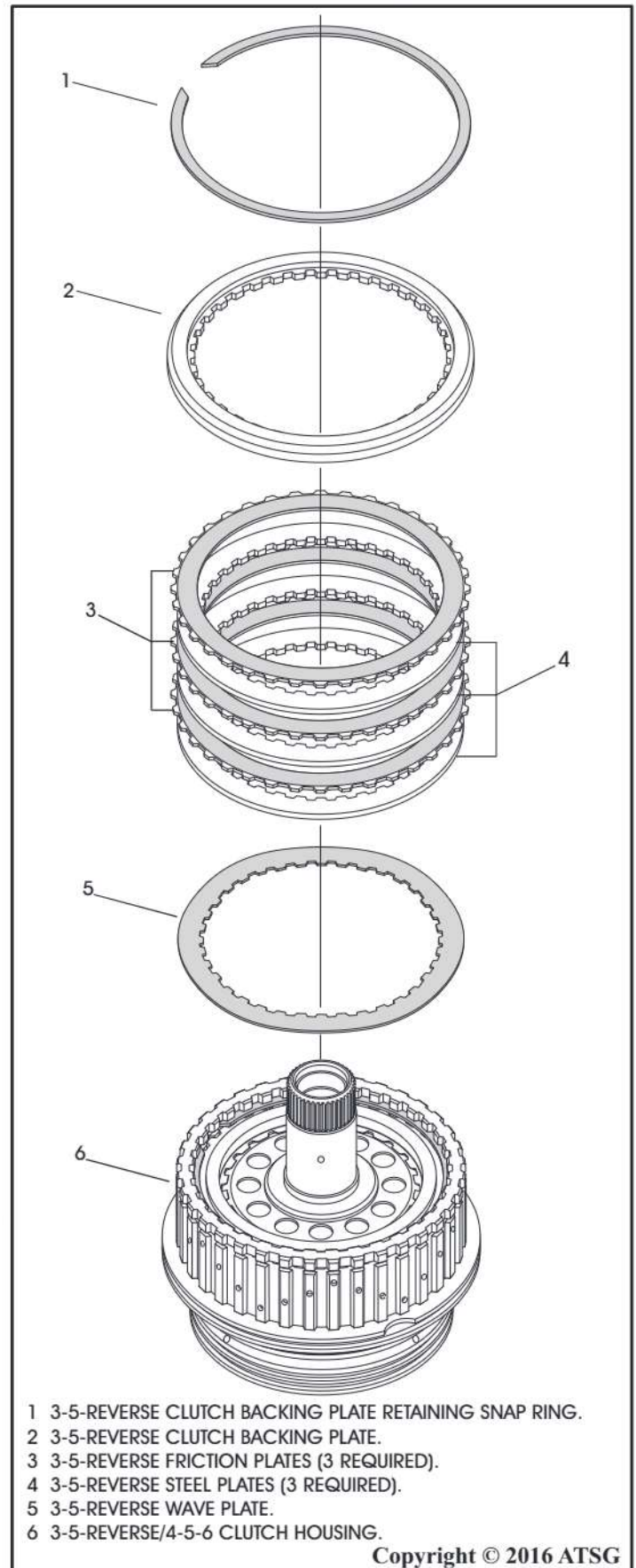


Figure 94

COMPONENT REBUILD (CONT'D)

3-5-Rev & 4-5-6 Clutch Housing - Disassembly

25. For Generation 1 remove 4-5-6 clutch backing plate retaining snap ring as seen in Figure 95.
 26. Remove the 4-5-6 clutch backing plate seen in Figure 95.
 27. Remove four 4-5-6 friction and steel plates as seen in Figure 95.
 28. Remove the 4-5-6 wave plate seen in Figure 95.
- Note: The 4-5-6 wave plate is extremely prone to breakage. Replacement is strongly recommended.**

29. For Generation 2 remove 4-5-6 clutch backing plate retaining snap ring as seen in Figure 96.
30. Remove the 4-5-6 clutch backing plate seen in Figure 96.
31. Remove five 4-5-6 friction and steel plates as seen in Figure 96.

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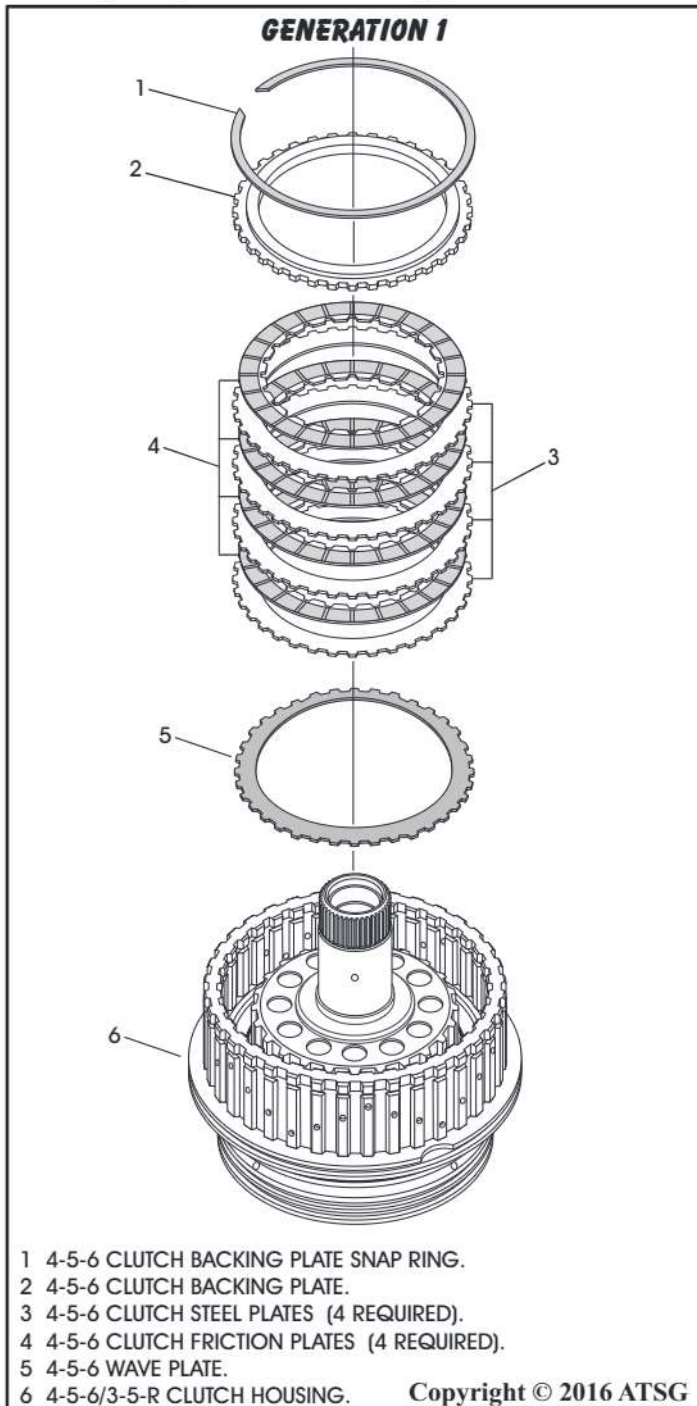


Figure 95

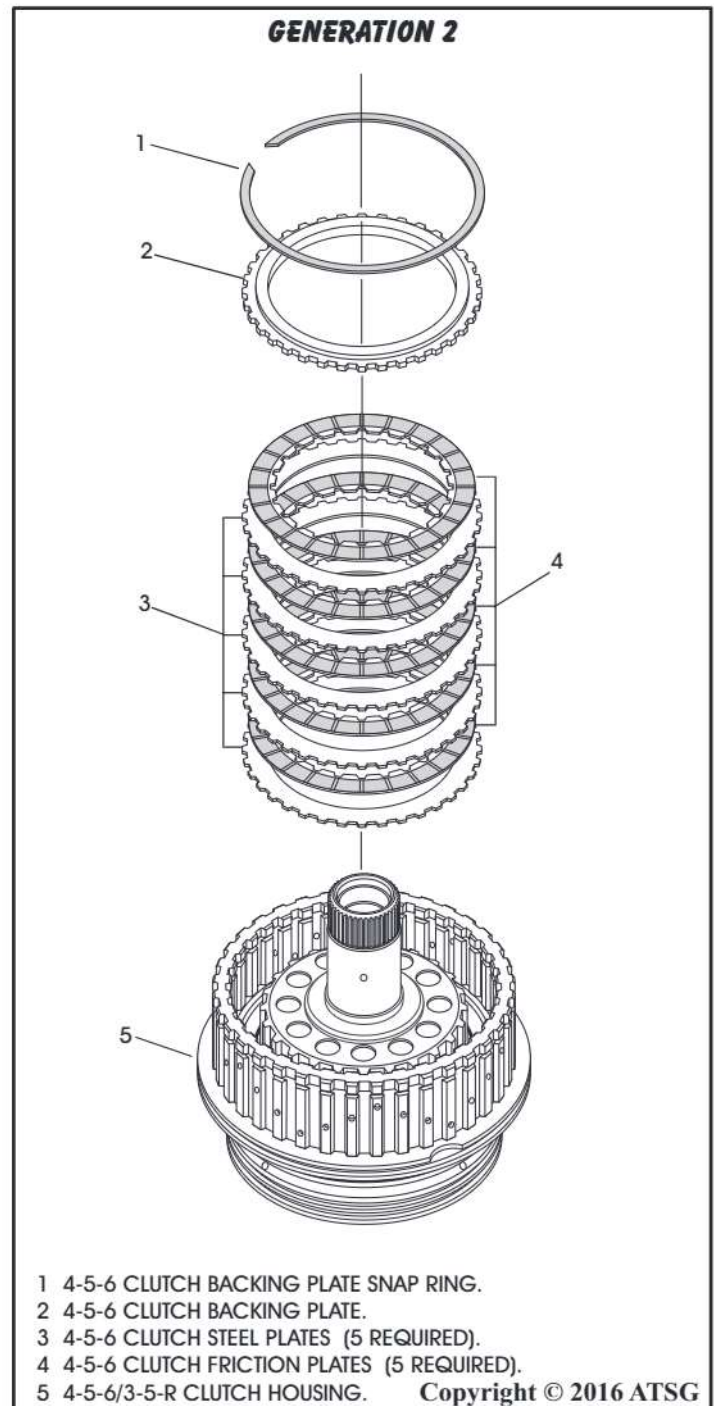
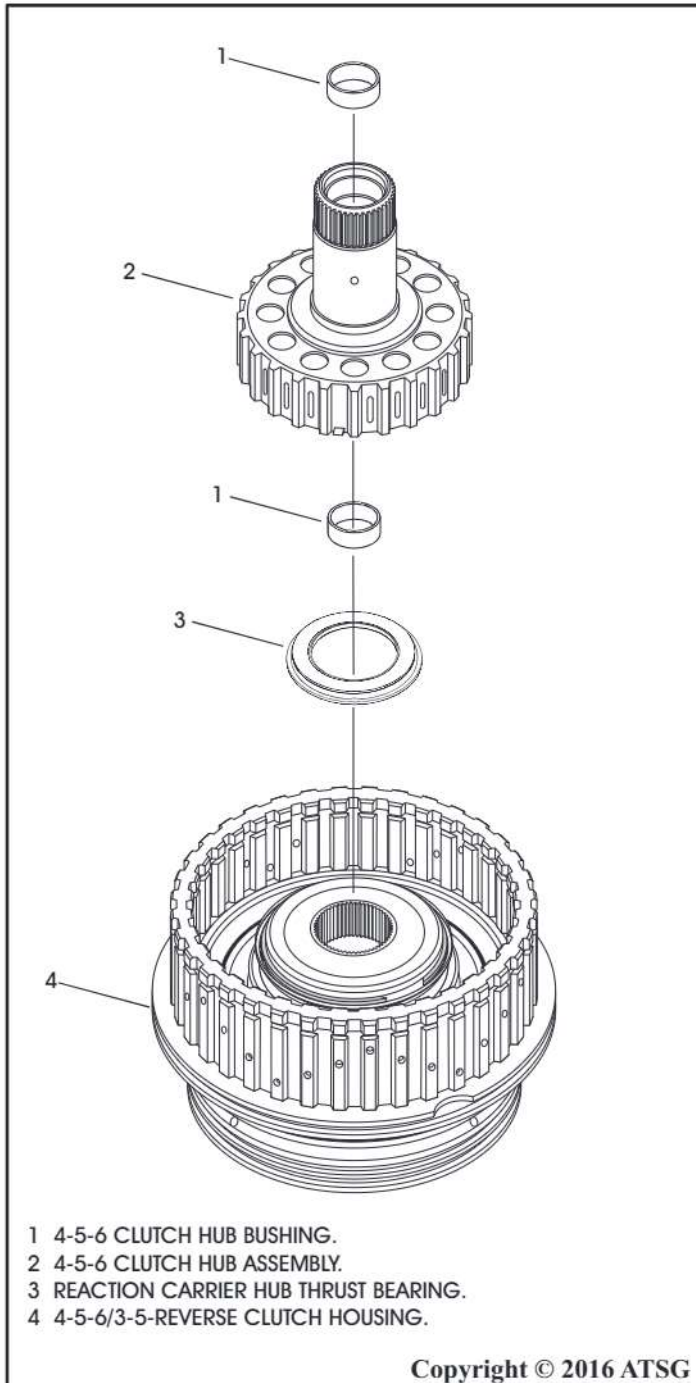


Figure 96

COMPONENT REBUILD (CONT'D)

3-5-Rev & 4-5-6 Clutch Housing - Disassembly

32. Remove the 4-5-6 clutch hub as seen in Figure 97 and check bushings for galling.
33. Remove and inspect the reaction carrier hub thrust bearing for smoothness of operation as seen in Figure 97.



Continued on Page 73

Figure 97

COMPONENT REBUILD (CONT'D)

3-5-Rev & 4-5-6 Clutch Housing - Disassembly

34. Utilizing the DT-47951-2 spring compressor or a similar aftermarket tool, remove the 4-5-6 clutch dam piston retaining snap ring as seen in Figure 98 (early models) and Figure 99 (late models).

35. Utilizing the DT-47951-2 spring compressor or a similar aftermarket tool, remove the 4-5-6 clutch dam piston as seen in Figure 98 (early models) and Figure 99 (late models).

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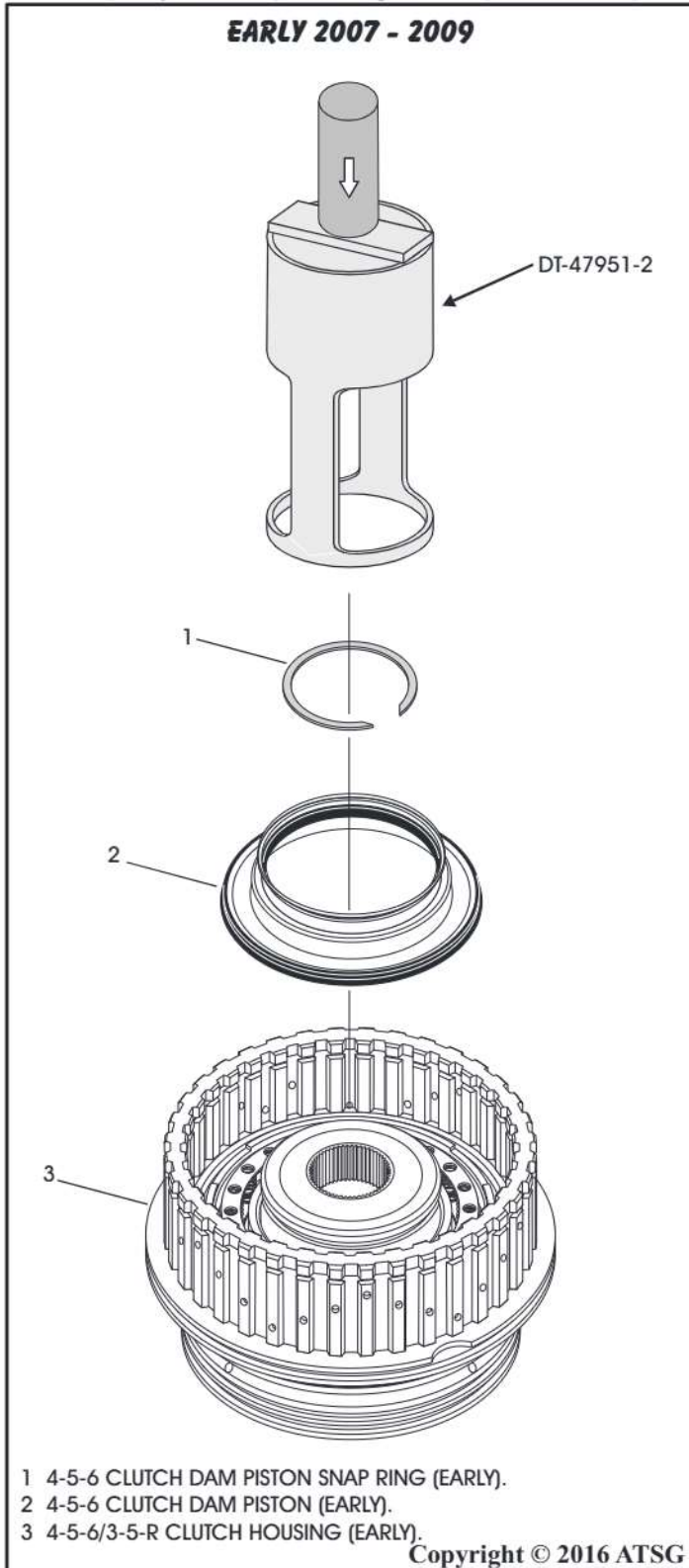


Figure 98

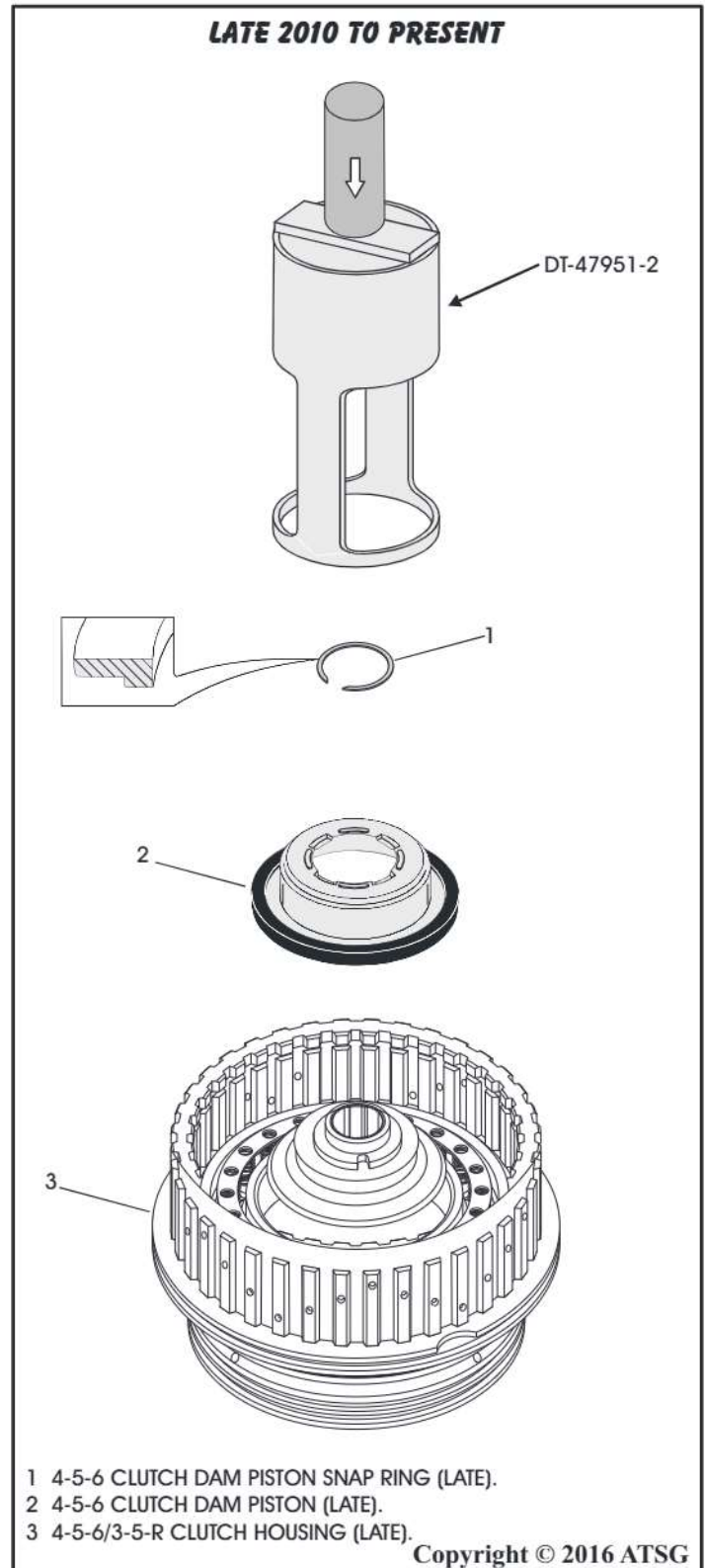


Figure 99

COMPONENT REBUILD (CONT'D)

3-5-Rev & 4-5-6 Clutch Housing - Disassembly

36. Remove the clutch piston return spring assembly shown in Figure 100 (early), Figure 101 (late).
37. Remove the 4-5-6 clutch piston shown in Figure 100 (early), Figure 101 (late).

38. Remove and discard all 4-5-6 clutch piston seals as seen in Figure 100 (early), Figure 101 (late).
39. The early 4-5-6 clutch piston will have two seals on it and one seal in the drum, while the late piston will only have one seal on the piston and two seals in the drum.

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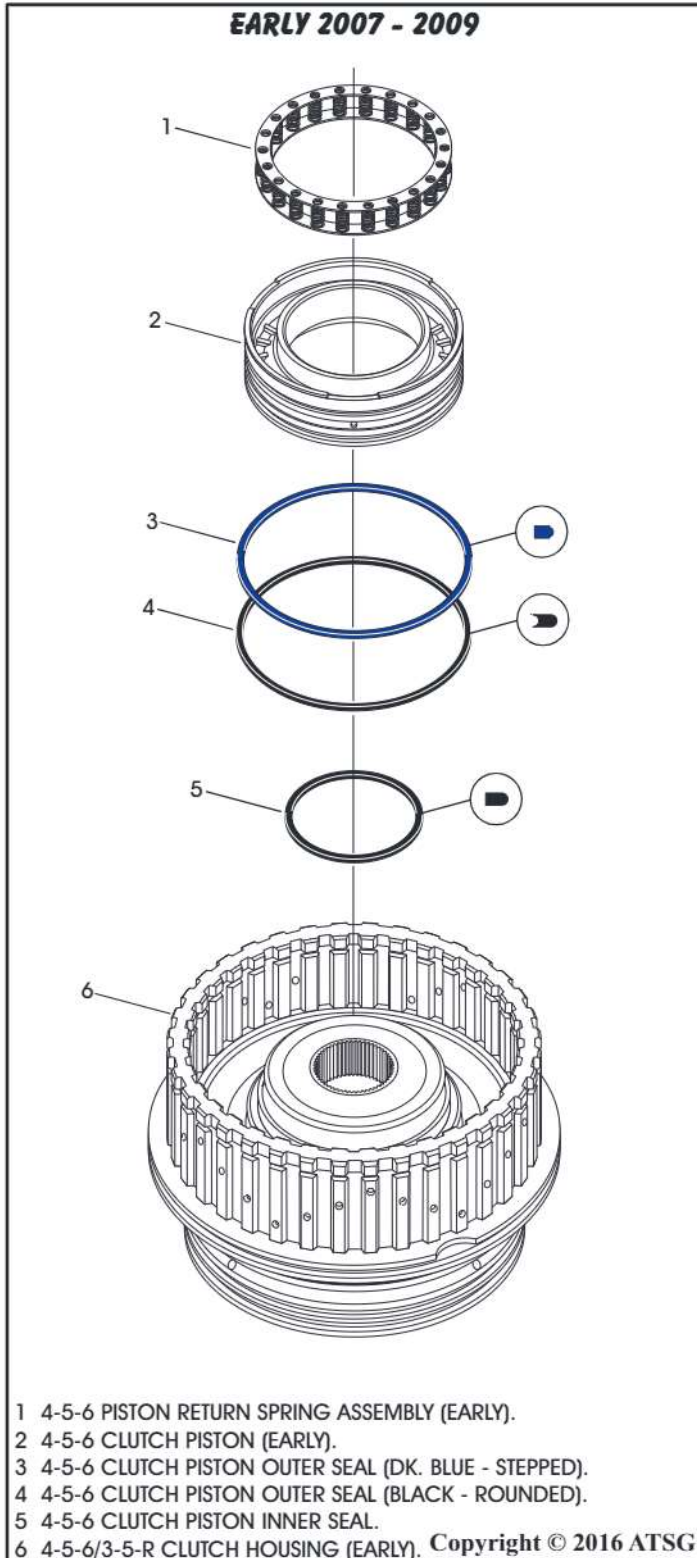


Figure 100

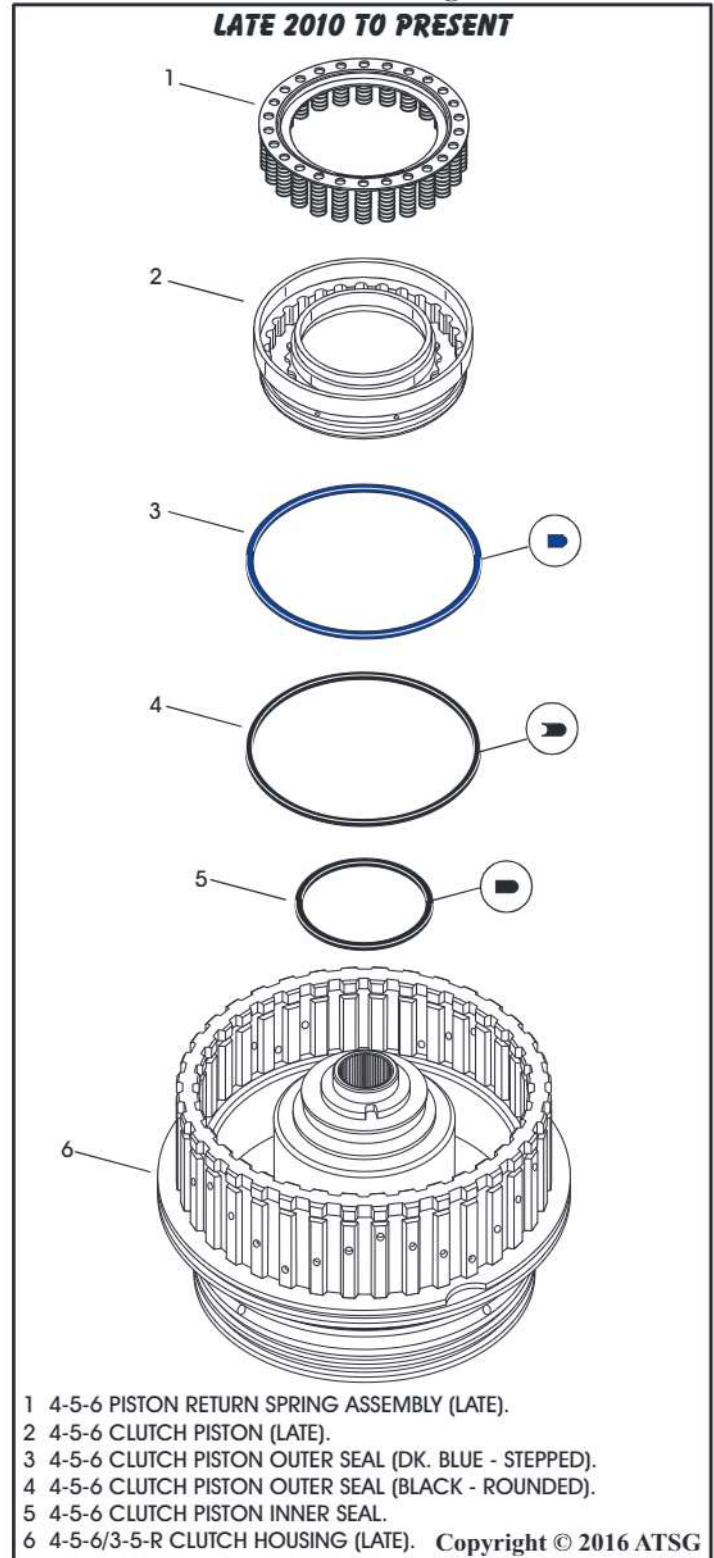


Figure 101

COMPONENT REBUILD (CONT'D)

3-5-Rev & 4-5-6 Clutch Housing - Assembly

40. After cleaning and inspecting all 4-5-6 components, install the piston seals in the order shown in Figures 102, 103, 104 and 105. Be certain to correctly identify the correct early or late 4-5-6 components as shown in the figures below.

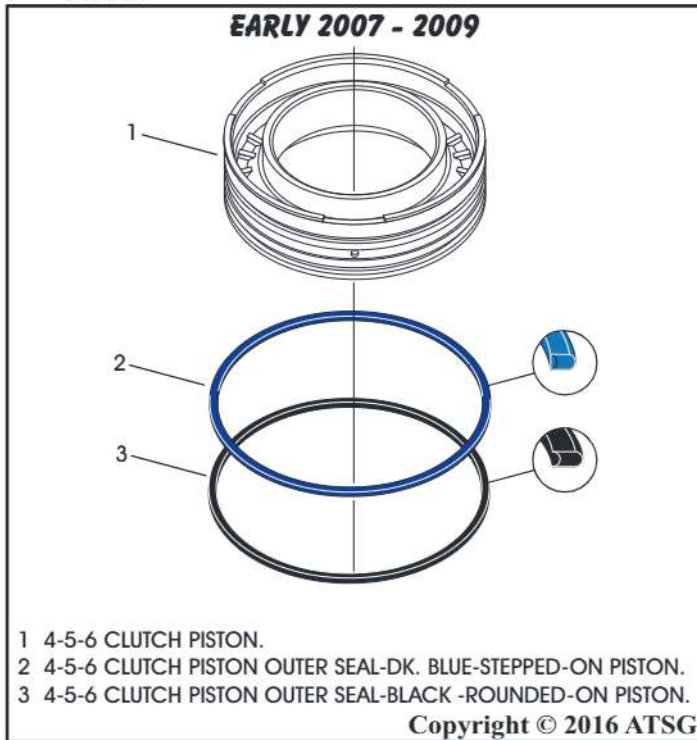


Figure 102

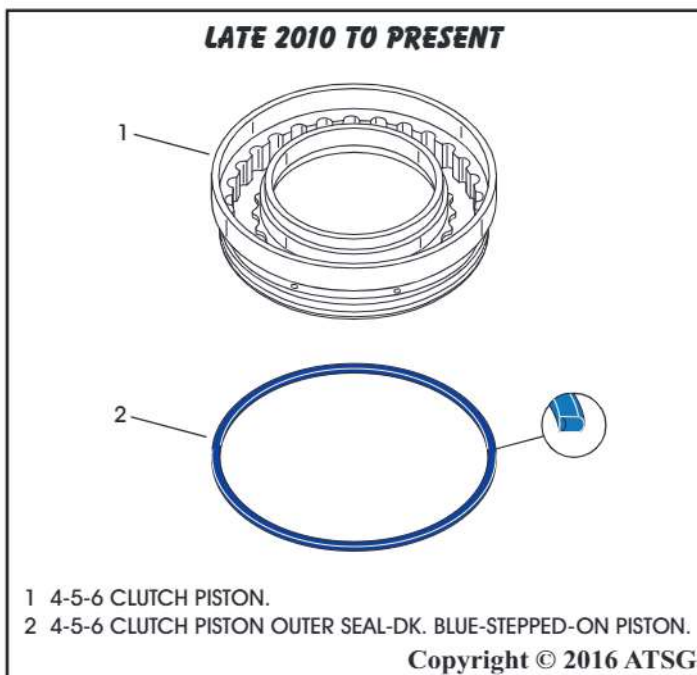


Figure 104

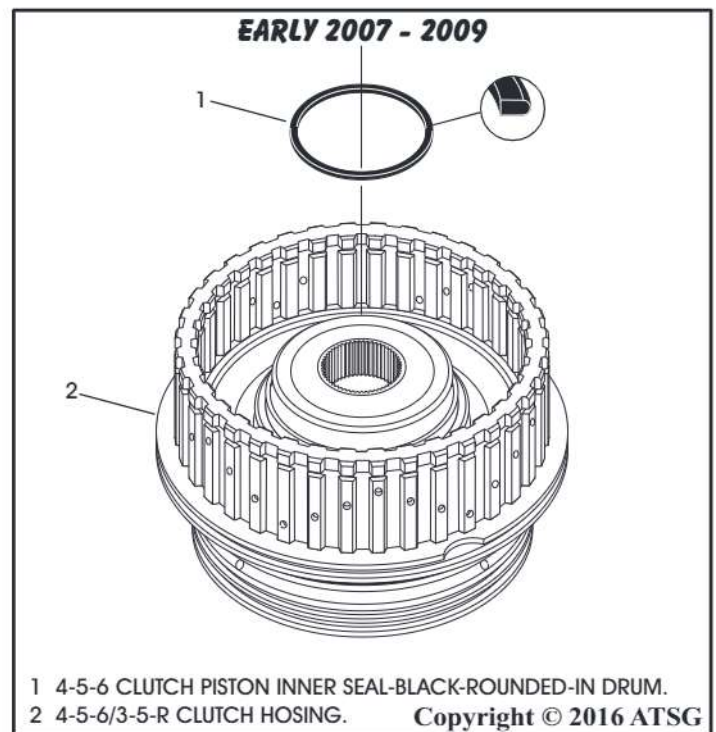


Figure 103

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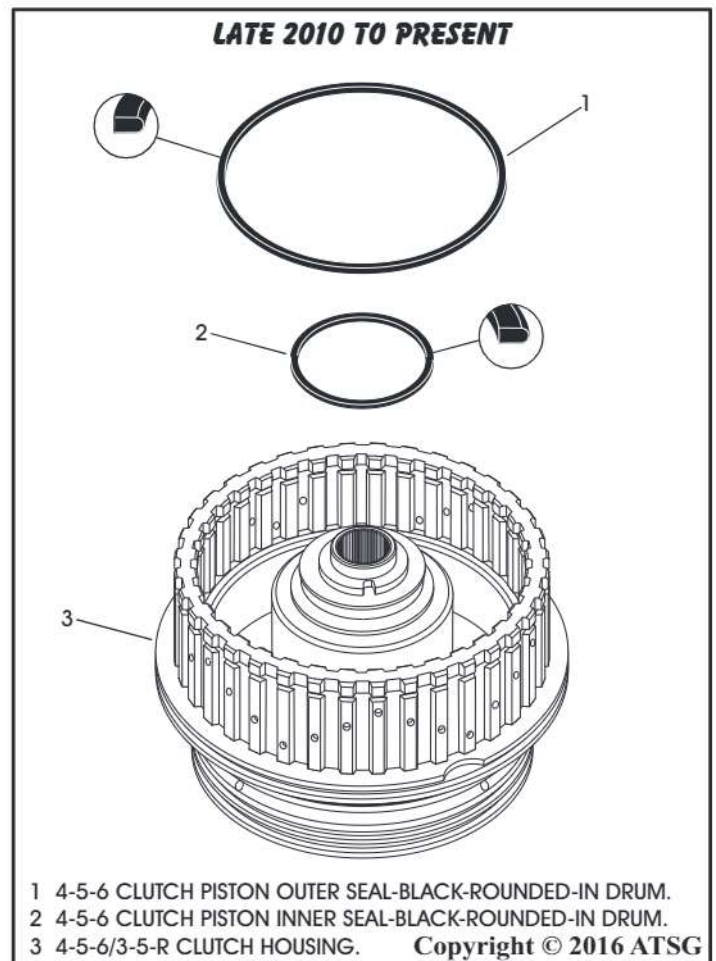


Figure 105

COMPONENT REBUILD (CONT'D)

3-5-Rev & 4-5-6 Clutch Housing - Assembly (Early)

41. Clean all 3-5-Rev & 4-5-6 clutch housing parts thoroughly and dry with compressed air.
42. Inspect all 3-5-Rev & 4-5-6 clutch housing parts thoroughly for any wear or damage and replace as necessary.
43. Install new 4-5-6 clutch piston **"Stepped", Blue** outer seal into the upper groove, as shown in Figure 106.
44. Install new 4-5-6 clutch piston **"Rounded", Black** outer seal into the lower groove, as shown in Figure 106.
45. Install new 4-5-6 clutch piston inner seal into the clutch housing, as shown in Figure 106, and lube with small amount of transmission fluid.
46. Install the DT-47805 seal protector as shown in Figure 106.
47. Lube the 4-5-6 clutch piston outer seals and the inside diameter of piston with small amount of transmission fluid, (See Figure 106).
48. Install 4-5-6 clutch piston assembly into housing, as shown in Figure 106, until fully seated.

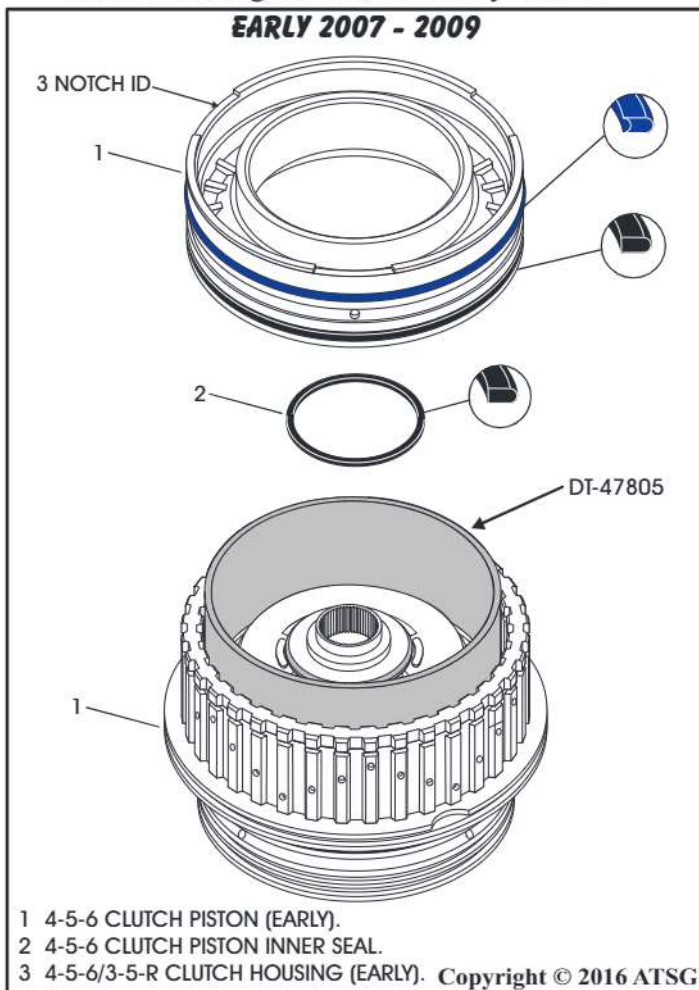


Figure 106

3-5-Rev & 4-5-6 Clutch Housing - Assembly (Late)

49. Clean all 3-5-Rev & 4-5-6 clutch housing parts thoroughly and dry with compressed air.
50. Inspect all 3-5-Rev & 4-5-6 clutch housing parts thoroughly for any wear or damage and replace as necessary.
51. Install new 4-5-6 clutch piston **"Stepped", Blue** outer seal into the groove in the piston, as shown in Figure 107.
52. Install new 4-5-6 clutch piston **"Rounded", Black** outer seal into the groove in the drum, as shown in Figure 107.
53. Install new 4-5-6 clutch piston inner seal into the clutch housing, as shown in Figure 107, and lube with small amount of transmission fluid.
54. Install the DT-47805 seal protector as shown in Figure 106.
55. Lube the 4-5-6 clutch piston outer seals and the inside diameter of piston with small amount of transmission fluid, (See Figure 107).
56. Install 4-5-6 clutch piston assembly into housing, as shown in Figure 107, until fully seated.

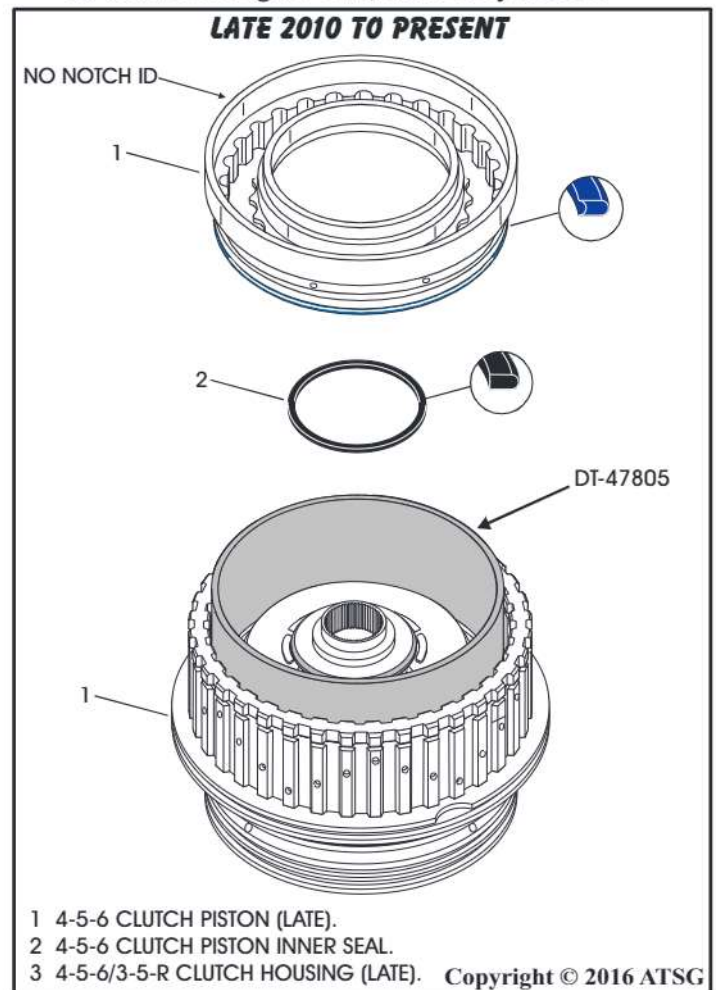


Figure 107

COMPONENT REBUILD (CONT'D)

3-5-Rev & 4-5-6 Clutch Housing - Assembly (Early)

57. Install 4-5-6 clutch piston return spring assembly as seen in Figure 108.
58. Install the 4-5-6 fluid dam piston using the DT-47951-1 seal protector as shown in Figure 108.
59. Install the 4-5-6 fluid dam piston retaining snap ring shown in Figure 108 using the DT-47951-2 spring compressor as shown in Figure 108.

Continued on Page 78

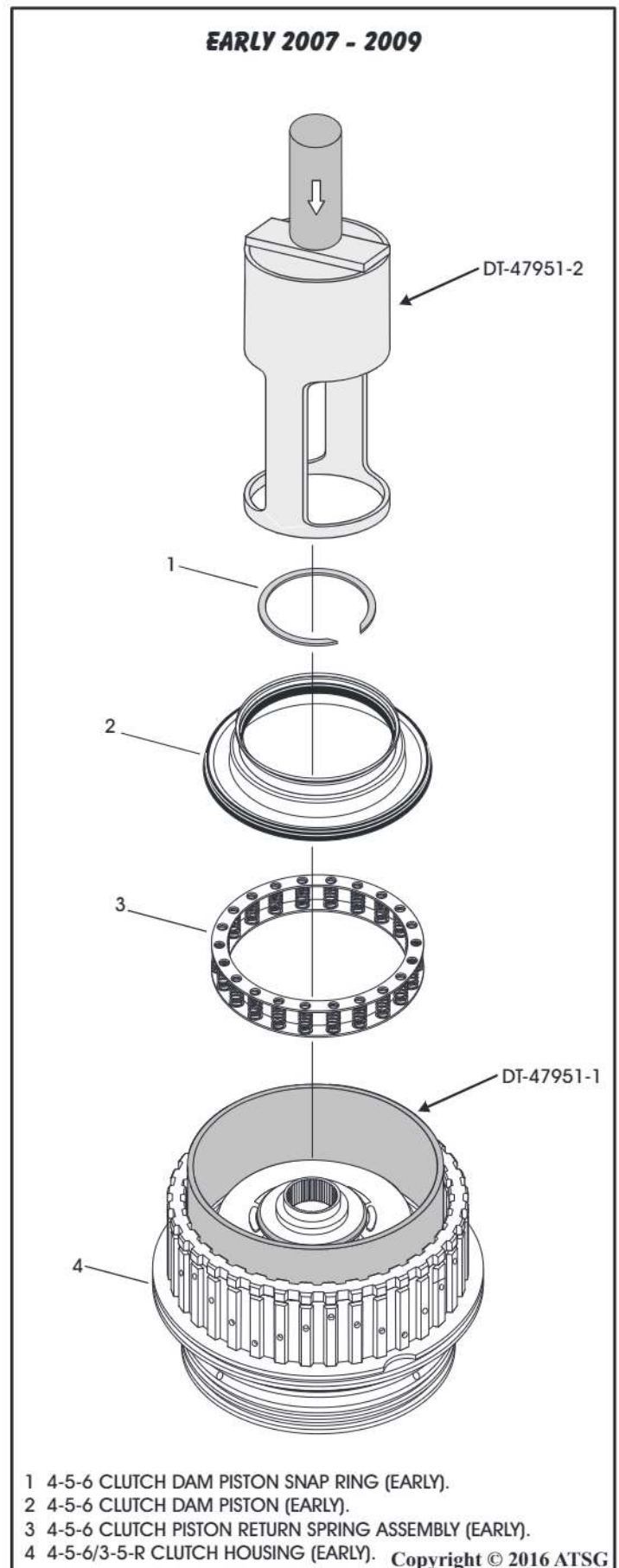


Figure 108

COMPONENT REBUILD (CONT'D)

3-5-Rev & 4-5-6 Clutch Housing - Assembly (Late)

60. Install the 4-5-6 piston return spring assembly as seen in Figure 109.
61. Install the fluid dam piston shown in Figure 109 using the DT-47951-1 outer seal protector and the DT-50117-2 seal protector retaining fingers as well as the DT-46620 inner seal protector.
62. Position the 4-5-6 fluid dam piston retaining snap ring for installation with the “stepped” side facing the 4-5-6 fluid dam piston.
63. Place the DT-47951-2 spring compressor onto the 4-5-6 fluid dam piston and compress the return spring as seen in Figure 109.
64. Install the 4-5-6 clutch dam piston snap ring using a suitable pair of snap ring pliers.

Continued on Page 79

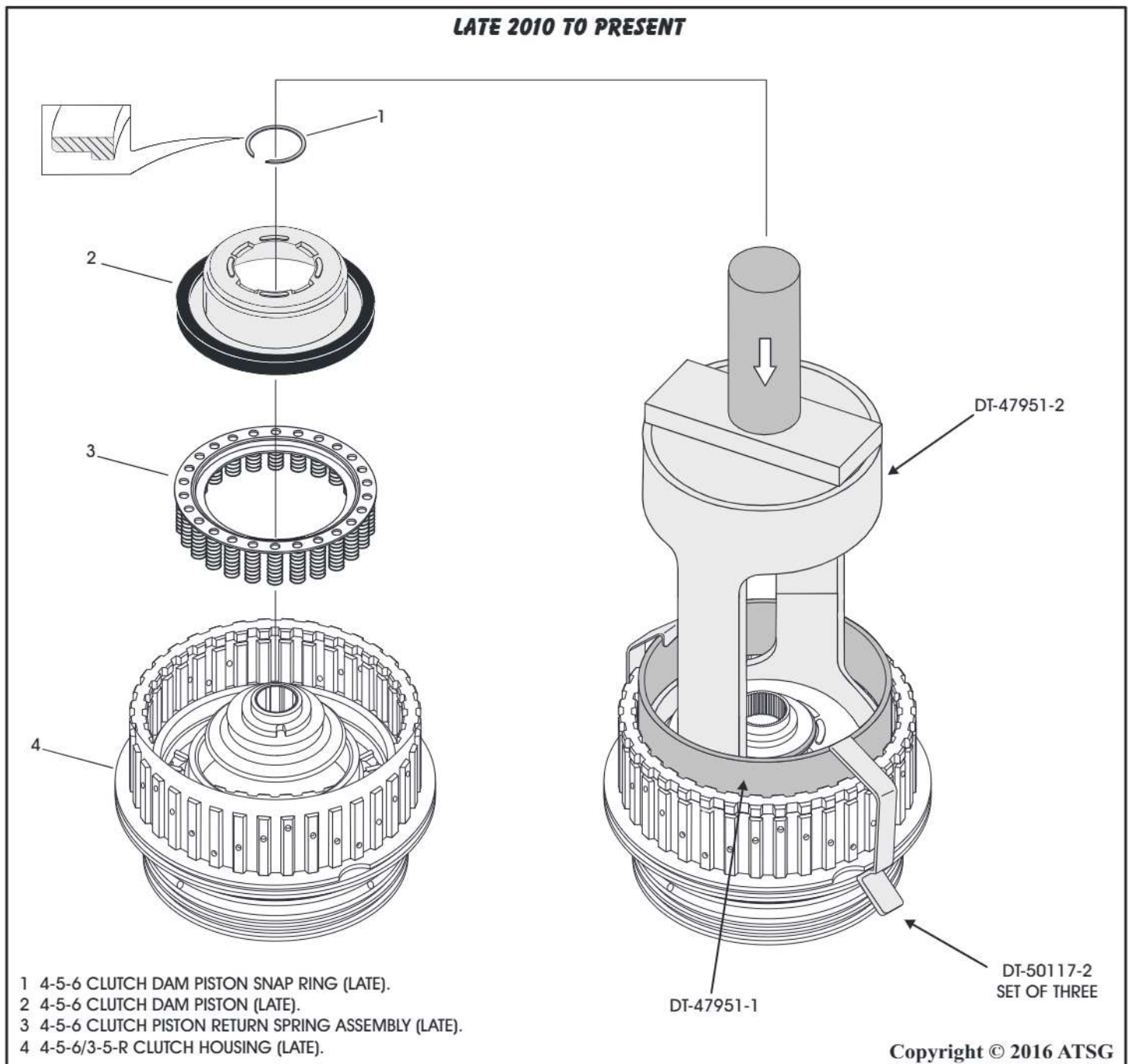


Figure 109

COMPONENT REBUILD (CONT'D) - 3-5-REVERSE CLUTCH UPDATED COMPONENTS - GENERATION 1 ONLY

65. It is highly recommended that the components shown in Figure 110 be replaced with the updated components shown in Figure 111.
66. These components apply to Generation 1 models only.

67. It is recommended that components 3 and 5 seen in Figure 111 be replaced as an assembly to avoid wave plate breakage.
68. Components 1, 2 and 4 seen in Figure 111 are replaced to prevent the snap ring from dislodging.

Continued on Page 80

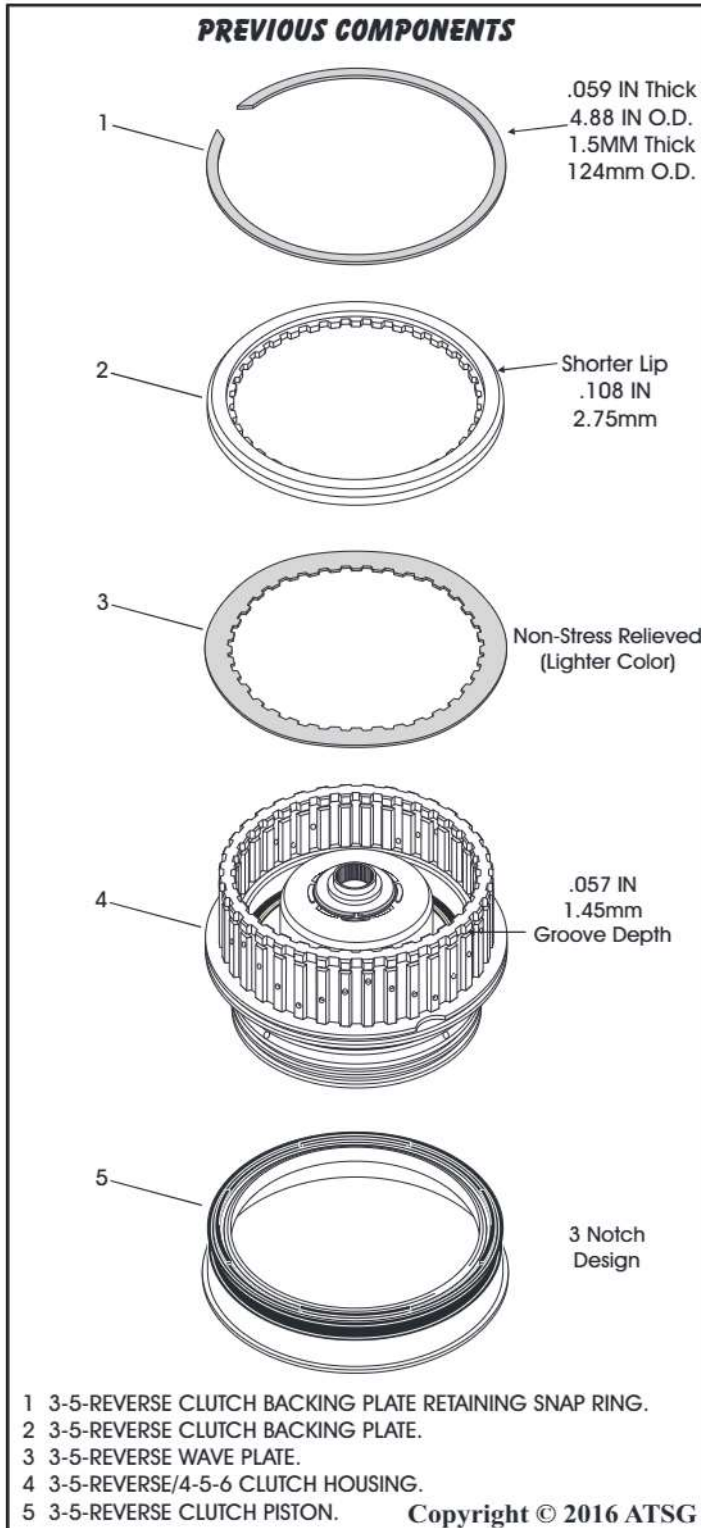


Figure 110

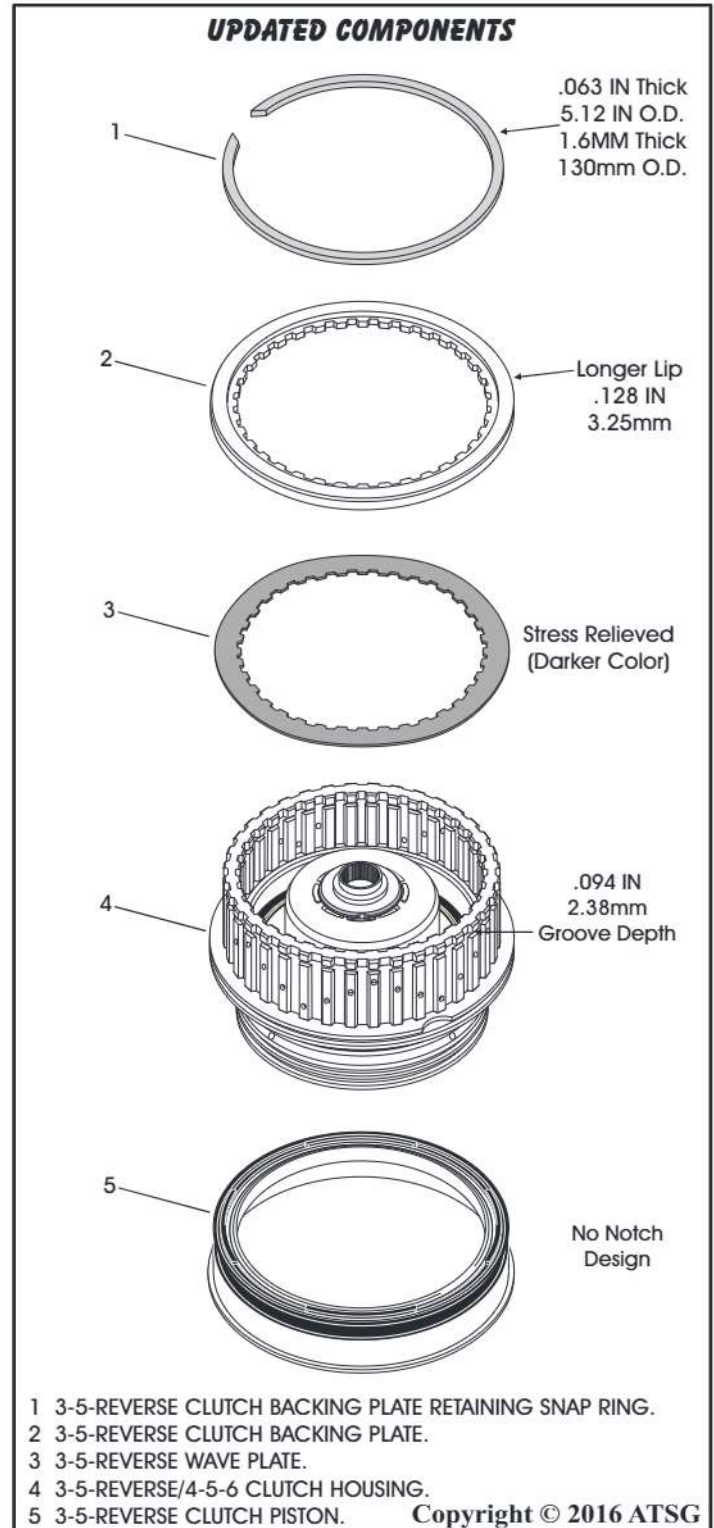


Figure 111

COMPONENT REBUILD (CONT'D)

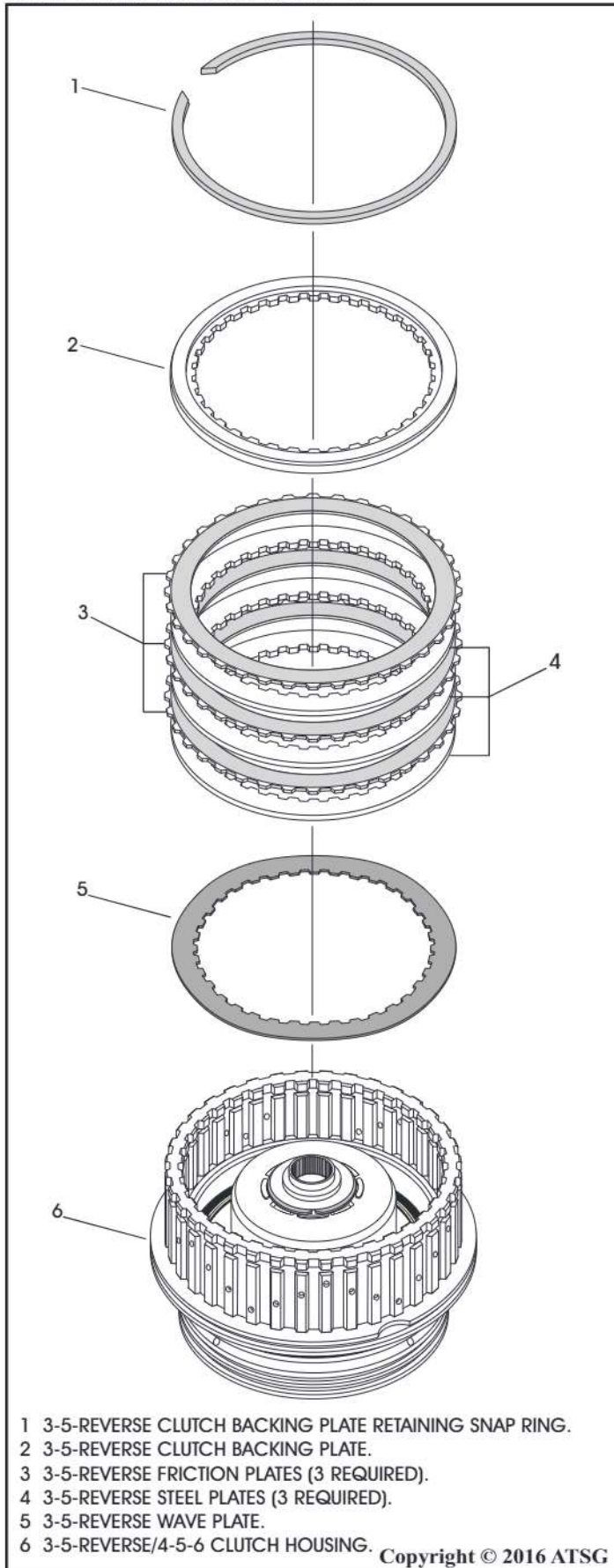


Figure 112

3-5-Rev & 4-5-6 Clutch Housing - Assembly

69. Install a new wave plate onto the 4-5-6/3-5-R clutch housing seen in Figure 112.

Note: Soak frictions plates in transmission fluid before installation.

70. Starting with a steel plate install three 3-5-R friction and three steel plates in an alternating fashion onto the 4-5-6/3-5-R clutch housing as seen in Figure 112.

71. Install the 3-5-R backing plate and then the retaining snap ring seen in Figure 112.

72. Install the 3-5-R clutch piston dam seal (Black), the 3-5-R clutch piston inner seal (Black) and the 3-5-R clutch piston reluctor inner seal (Orange) in the order shown in Figure 113.

Continued on Page 81

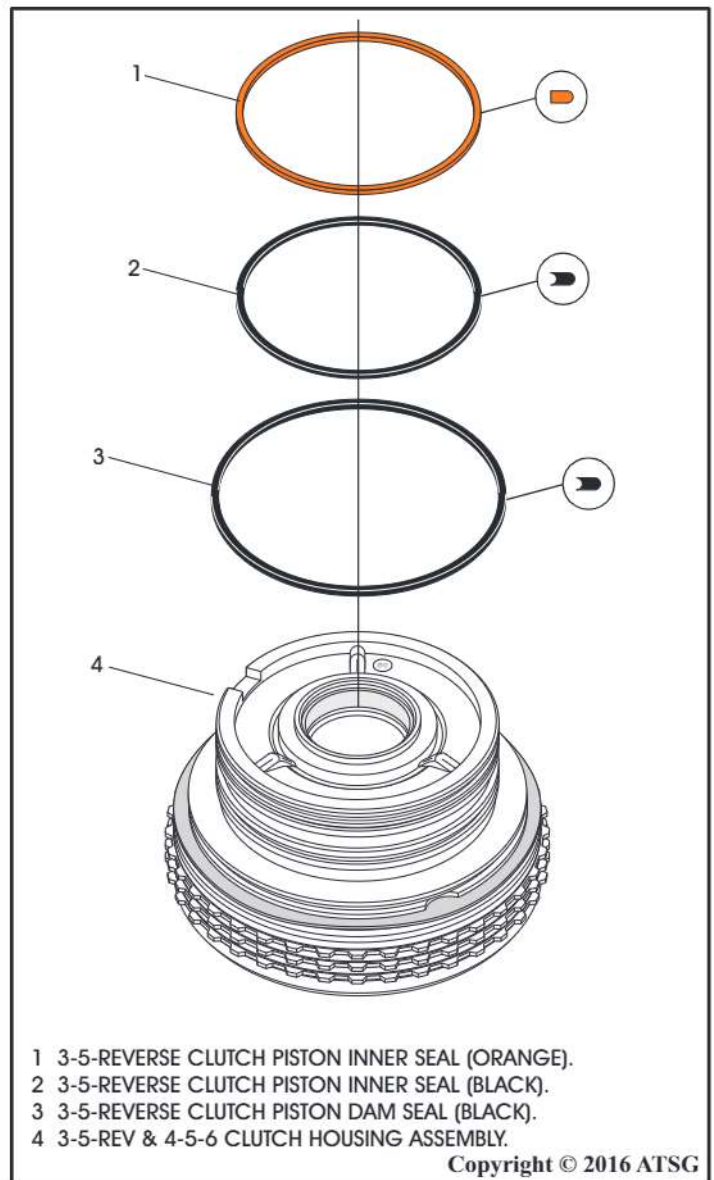


Figure 113

COMPONENT REBUILD (CONT'D)

3-5-Rev & 4-5-6 Clutch Housing - Assembly

73. Lubricate all three inner piston seals with a small amount of transmission fluid.
74. Install the 3-5-Rev clutch piston return spring, as shown in Figure 114.
75. Lubricate the lip seals of 3-5-Rev clutch piston and install into the speed sensor reductor ring, as shown in Figure 115.

Continued on Page 82

76. Lubricate both inside diameters of the piston and the inside diameter of reductor ring with a small amount of transmission fluid.
77. Install the reductor wheel and 3-5-Rev piston as an assembly, as shown in Figure 115.

Note: The reductor ring must be rotated so that alignment tab fits into the slot in the housing, as shown in Figure 115.

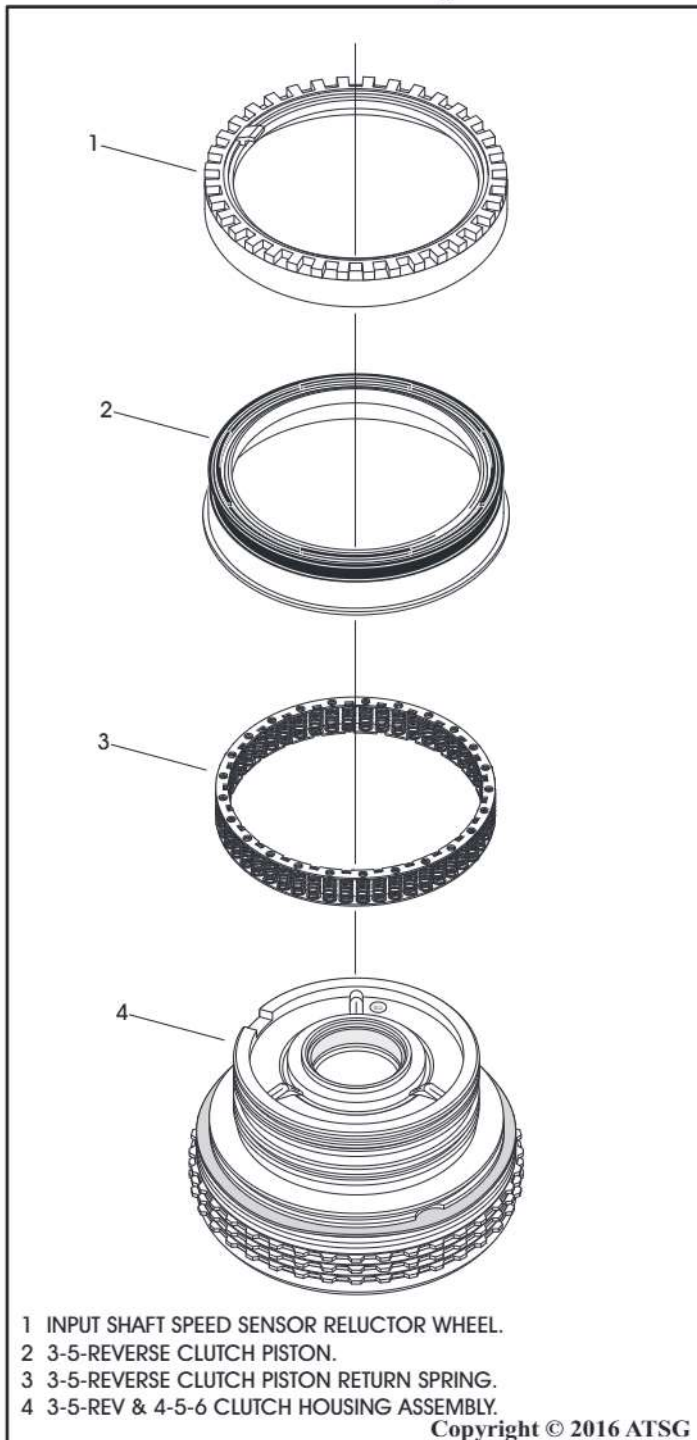


Figure 114

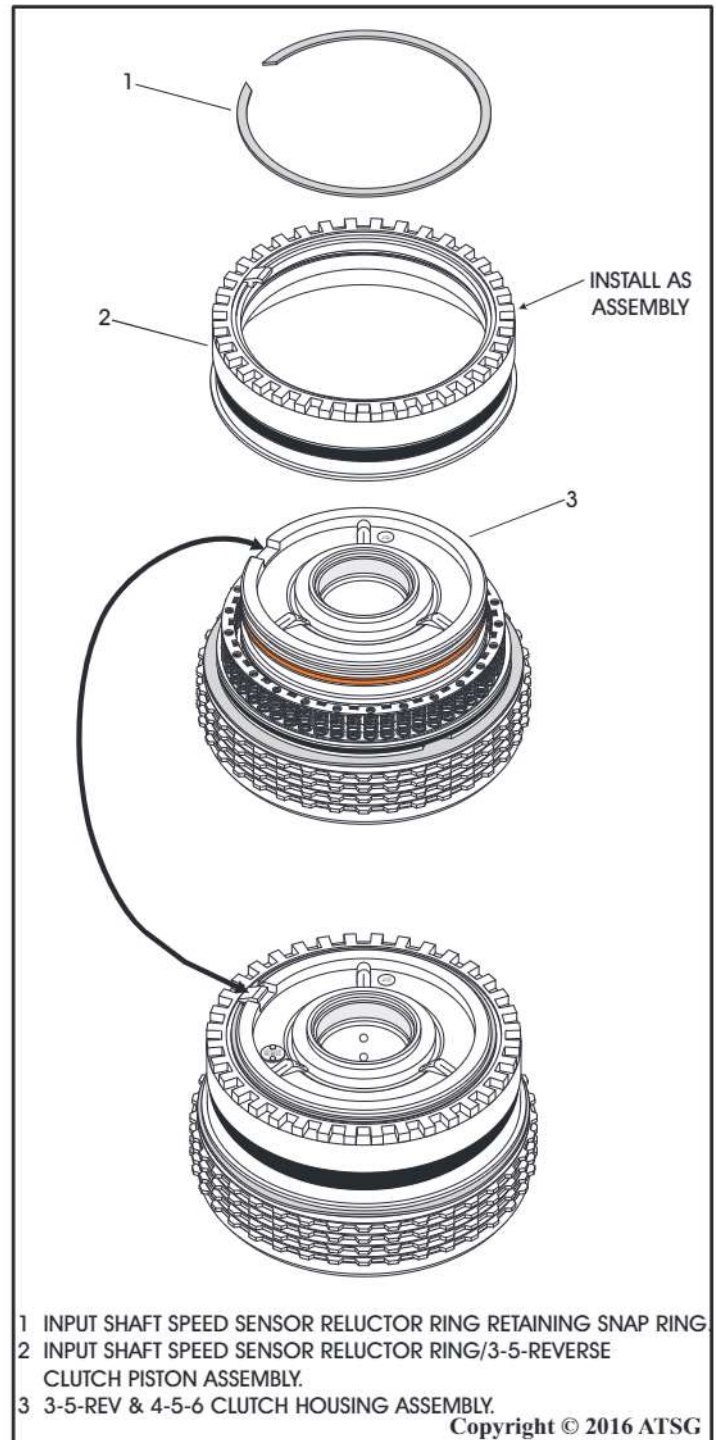


Figure 115

COMPONENT REBUILD (CONT'D)

3-5-Rev & 4-5-6 Clutch Housing - Assembly

78. Compress the input speed sensor reluctor ring just enough to install the snap ring using spring compressor tool, as shown in Figure 116.
Note: Over compressing the reluctor ring will break the alignment tab and clutch housing.
79. Install the snap ring with alignment tab centered in the snap ring opening (See Figure 116).

80. Lubricate the reaction carrier hub thrust bearing with transmission fluid and install it with the wide side down against the 4-5-6/3-5-Reverse housing as shown in Figure 117.
81. Install the 4-5-6 clutch hub as shown in Figure 117.

Continued on Page 83

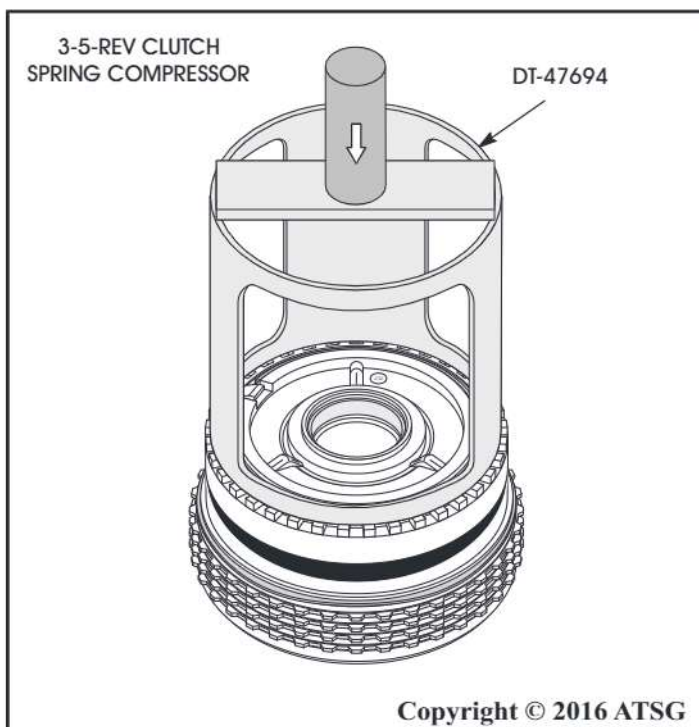


Figure 116

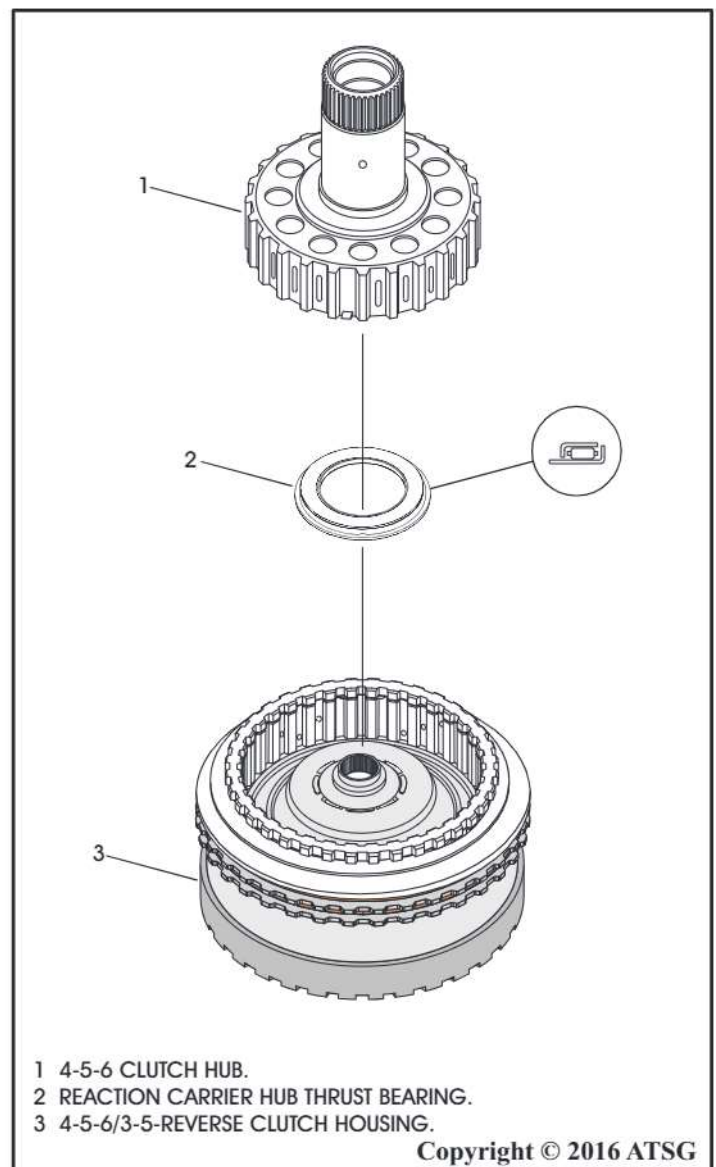


Figure 117

COMPONENT REBUILD (CONT'D)

3-5-Rev & 4-5-6 Clutch Housing - Assembly

82. For Generation 1 units, soak all frictions in transmission fluid before installation.
83. Install the 4-5-6 clutch wave plate into the clutch housing as seen in Figure 118.
84. Starting with a steel plate, install four friction and four steel plates in an alternating fashion as shown in Figure 118.
85. Install the 4-5-6 clutch backing plate and then the retaining snap ring as seen in Figure 118.

86. For Generation 2 units, soak all frictions in transmission fluid before installation.
87. Starting with a steel plate, install five friction and five steel plates in an alternating fashion as shown in Figure 119.
88. Install the 4-5-6 clutch backing plate and then the retaining snap ring as seen in Figure 119.

Continued on Page 84

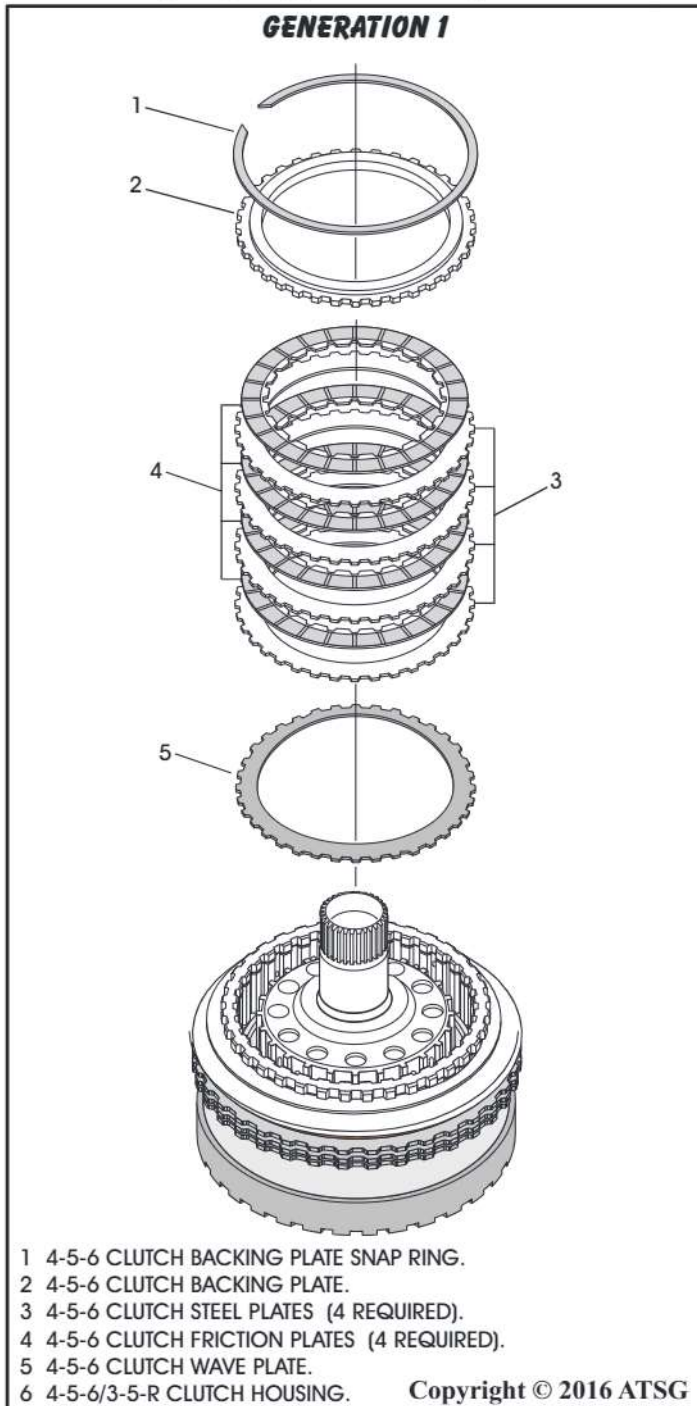


Figure 118

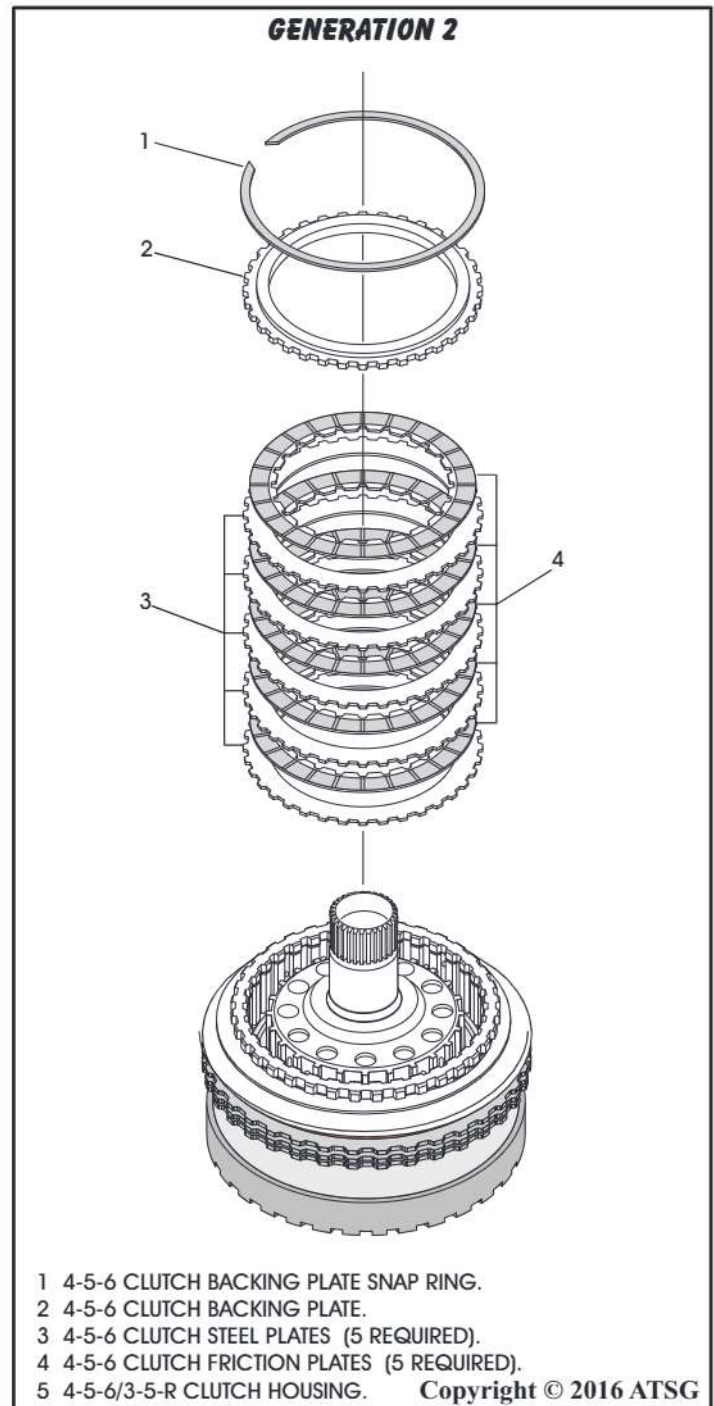


Figure 119

COMPONENT REBUILD (CONT'D)

3-5-Rev & 4-5-6 Clutch Housing - Assembly

89. Insert the turbine shaft into the 3-5-R/4-5-6 clutch housing from the clutch hub side as seen in Figure 120.

90. Using an appropriate pair of snap ring pliers, install the turbine shaft retaining snap ring as shown in Figure 120.

91. The rebuilding of the 3-5-R/4-5-6 clutch housing assembly has now been completed, See Figure 121, and is ready for air check and installation when the transmission reassembly process begins.

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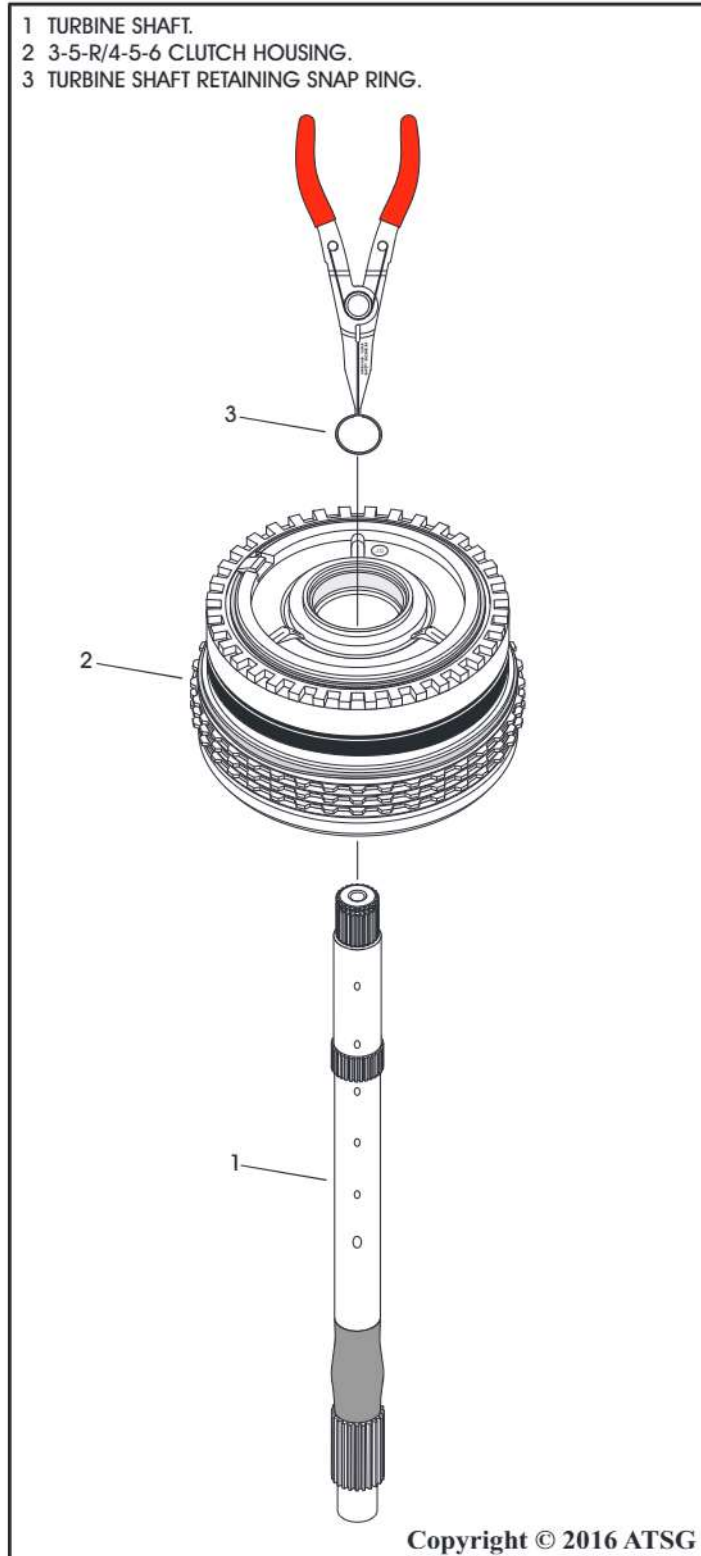


Figure 120



Figure 121

COMPONENT REBUILD (CONT'D)

1-2-3-4 & Low-Reverse Clutch Housing - Disassembly

1. Remove the low-reverse clutch spring retaining snap ring shown in Figure 122.
2. Remove the low-reverse clutch piston return spring shown in Figure 122.
3. Remove and discard the low-reverse piston shown in Figure 122.

Note: *Inspect the retaining snap ring groove. If signs of wear are seen replace the clutch housing, especially if found to be dislodged upon disassembly.*

4. Remove the 1-2-3-4 clutch spring retaining snap ring shown in Figure 123.
5. Remove the 1-2-3-4 clutch piston return spring shown in Figure 123.
6. Remove and discard the 1-2-3-4 piston shown in Figure 123.

Note: *Inspect the retaining snap ring groove. If signs of wear are seen replace the clutch housing, especially if found to be dislodged upon disassembly.*

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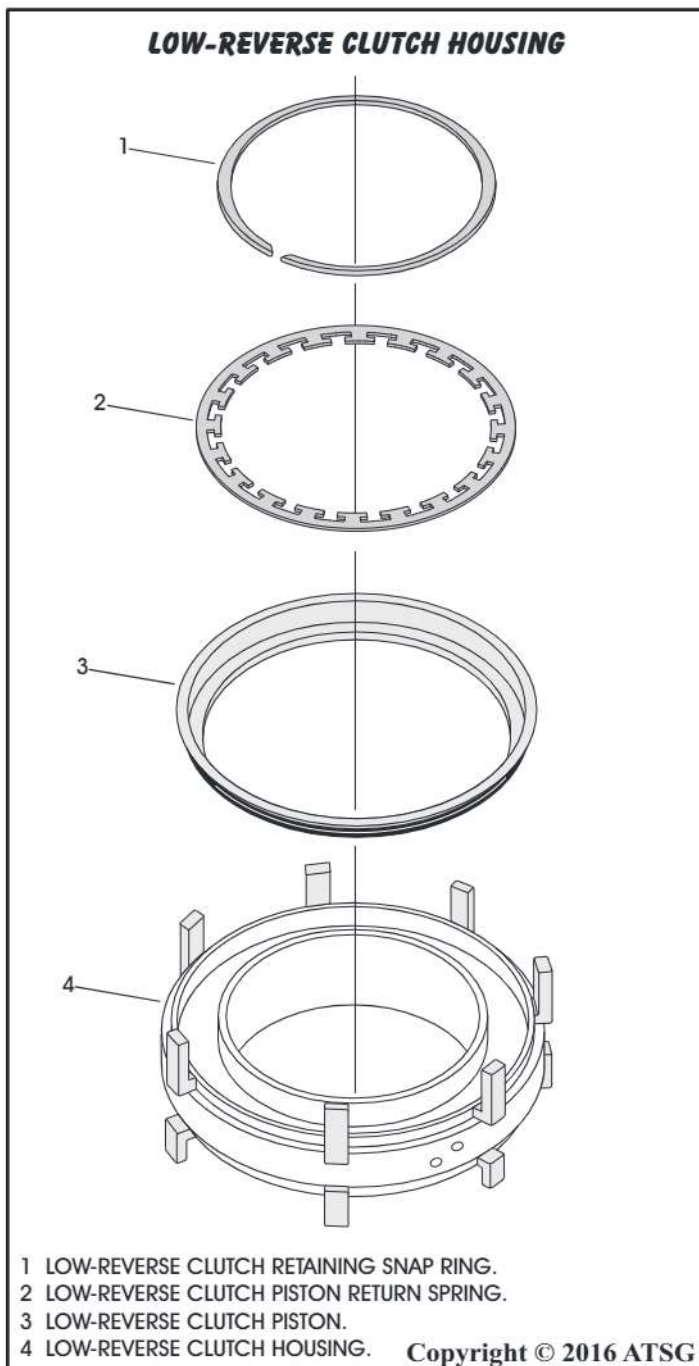


Figure 122

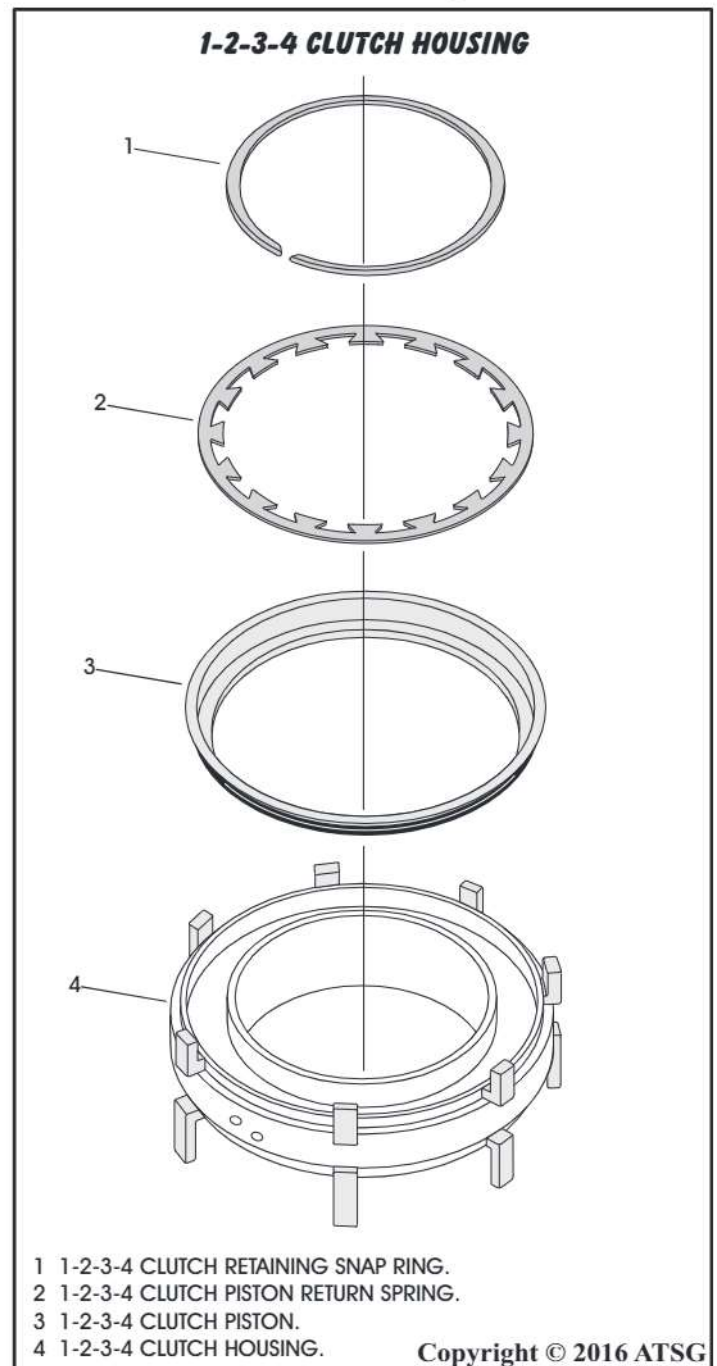


Figure 123

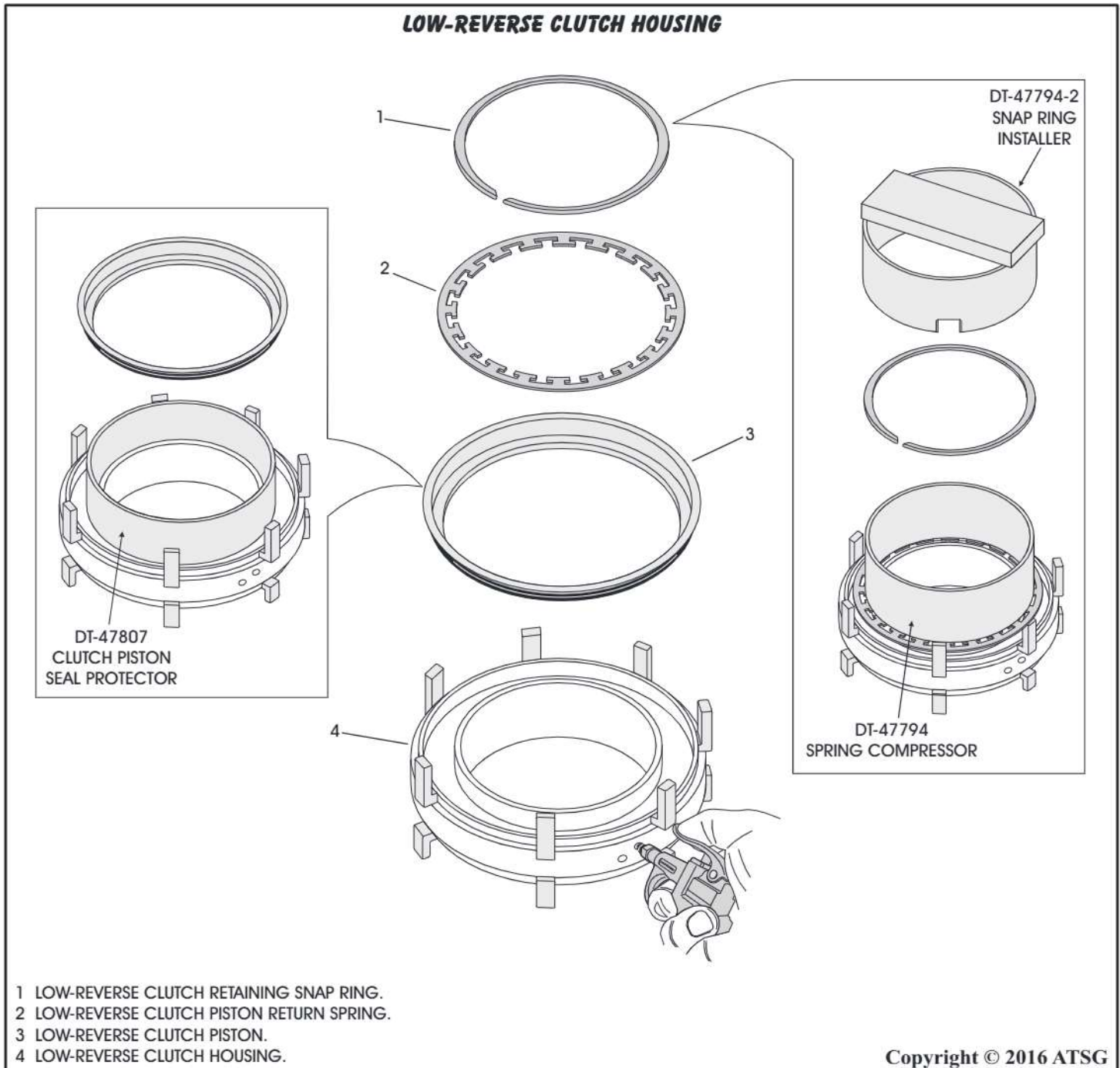
COMPONENT REBUILD (CONT'D)

1-2-3-4 & Low-Reverse Clutch Housing - Assembly

7. Lubricate the low-reverse clutch piston, See Figure 124, with transmission fluid.
8. Using the DT-47807 piston seal protector, install the low-reverse piston as shown in Figure 124.
9. Using the DT-47794 spring compressor apply pressure from a press and compress the low-reverse piston return spring.
10. Place the low-reverse retaining snap ring in position and push down on the DT-47794-2 snap ring installer to seat the retaining snap ring in place as seen in Figure 124.
11. Carefully air check the low-reverse piston assembly as shown in Figure 124.

Note: Limit air check pressure to no more than 40 psi (276 kPa) to prevent piston over travel.

Continued on Page 87



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Figure 124

COMPONENT REBUILD (CONT'D)

1-2-3-4 & Low-Reverse Clutch Housing - Assembly

12. Lubricate the 1-2-3-4 clutch piston, See Figure 125, with transmission fluid.
 13. Using the DT-47798 piston seal protector, install the 1-2-3-4 piston as shown in Figure 125.
 14. Using the DT-47799 spring compressor apply pressure from a press and compress the 1-2-3-4 piston return spring.
 15. Place the 1-2-3-4 retaining snap ring in position and push down on the DT-47799-1 snap ring installer to seat the retaining snap ring in place as seen in Figure 125.
 16. Carefully air check the 1-2-3-4 piston assembly as shown in Figure 125.
- Note:** Limit air check pressure to no more than 40 psi (276 kPa) to prevent piston over travel.

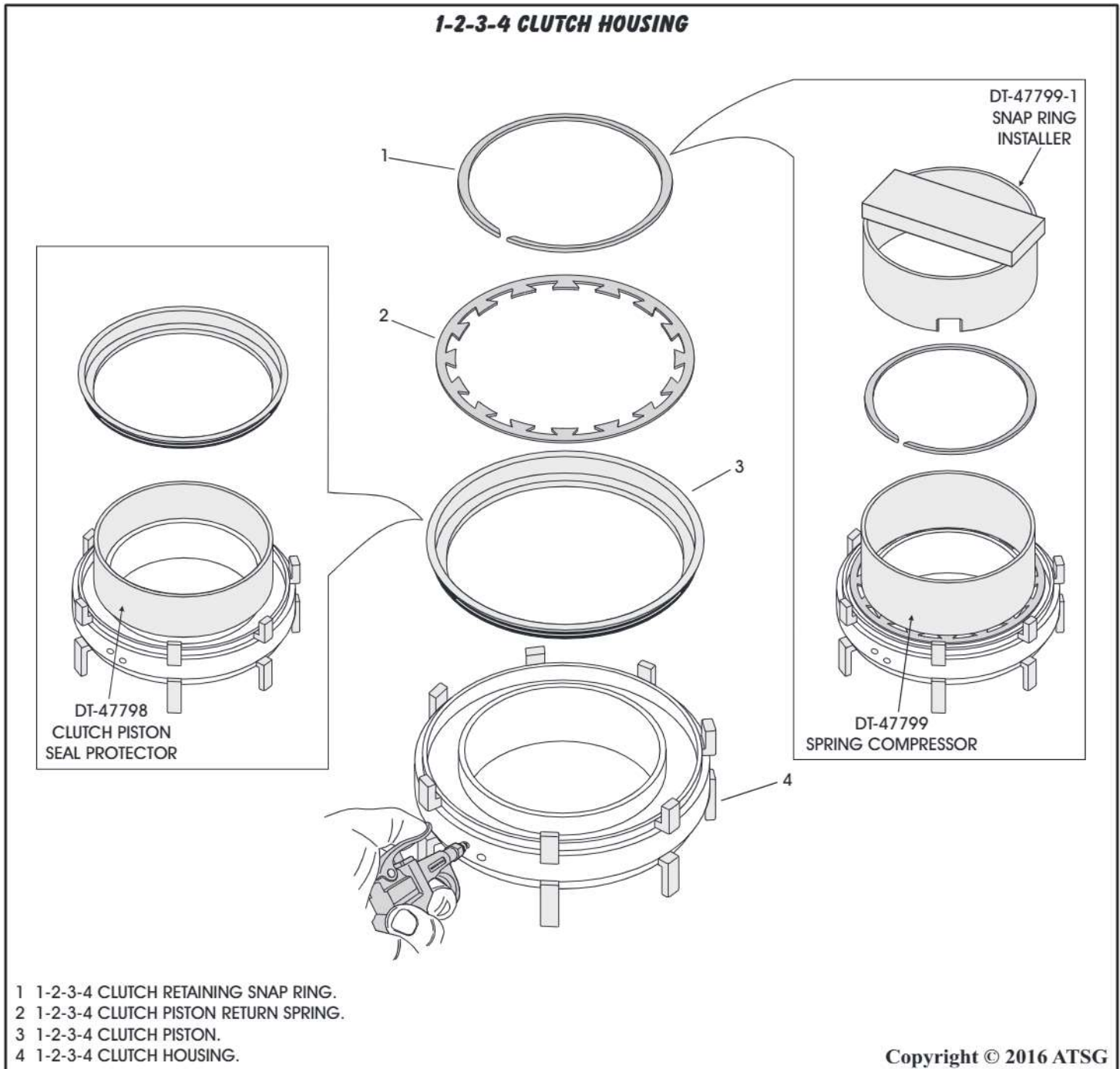


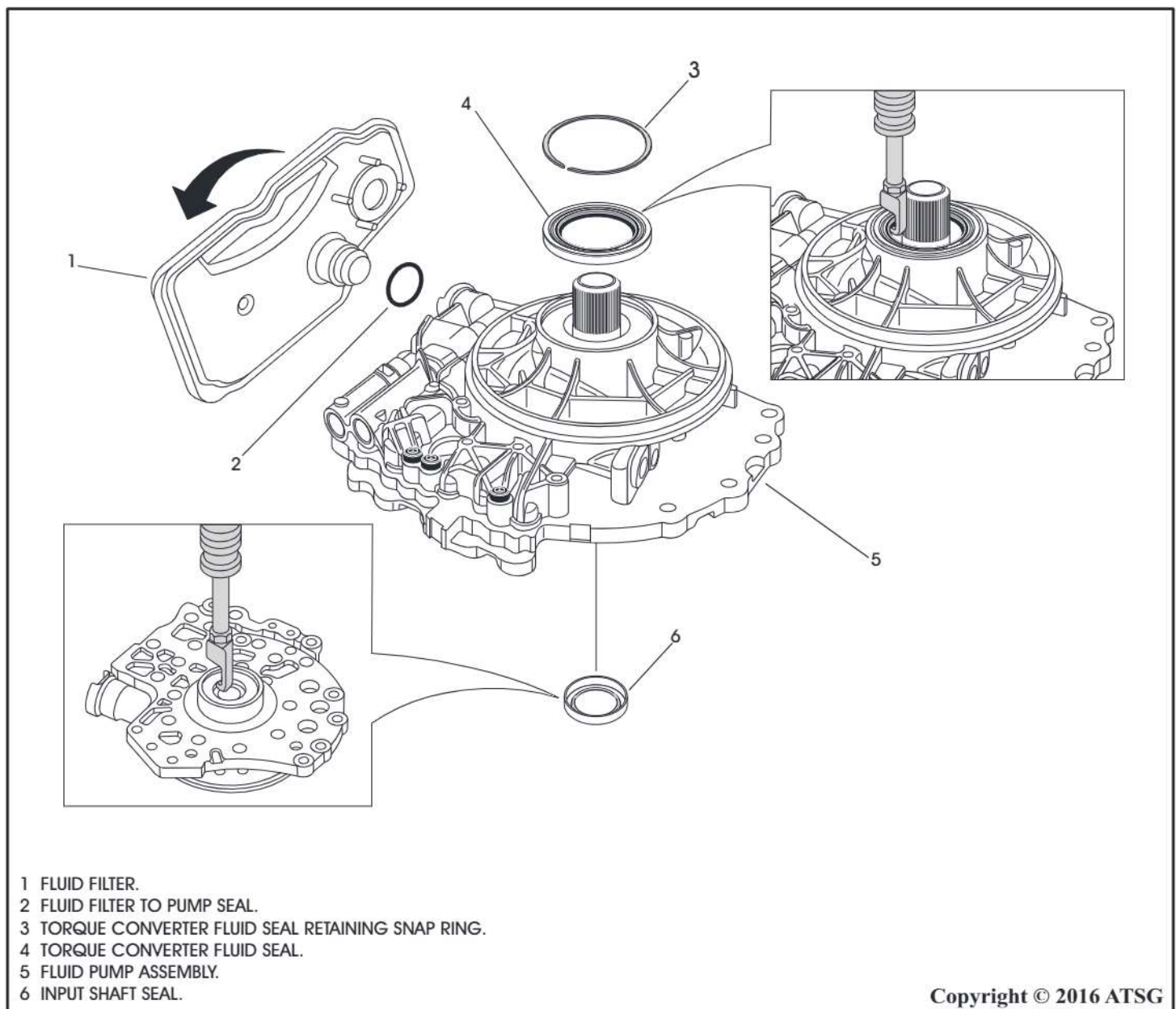
Figure 125

COMPONENT REBUILD (CONT'D)

Transmission Fluid Pump - Disassembly

1. Remove and discard the transmission fluid filter and o-ring seal by rotating it 90 degrees in the direction shown in Figure 126.
2. Remove the torque converter fluid seal retaining snap ring shown in Figure 126.
3. Using a slide hammer with a seal remover attachment, remove and discard the torque converter fluid seal shown in Figure 126.
4. With an appropriate puller, remove and discard the input shaft fluid seal seen in Figure 126.

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Figure 126

COMPONENT REBUILD (CONT'D)

Transmission Fluid Pump - Disassembly

5. Remove the three fluid pump bolts from the pump cover side and the twenty fluid pump bolts from the pump body side and separate the pump cover from the pump body as shown in Figure 127.
6. Remove the drive and driven pump gears and inspect them as well as the pump gear pocket and cover for any signs of wear as seen in Figure 127.
7. Inspect the front and rear stator bushings for excessive wear or galling as seen in Figure 127 and replace as necessary.

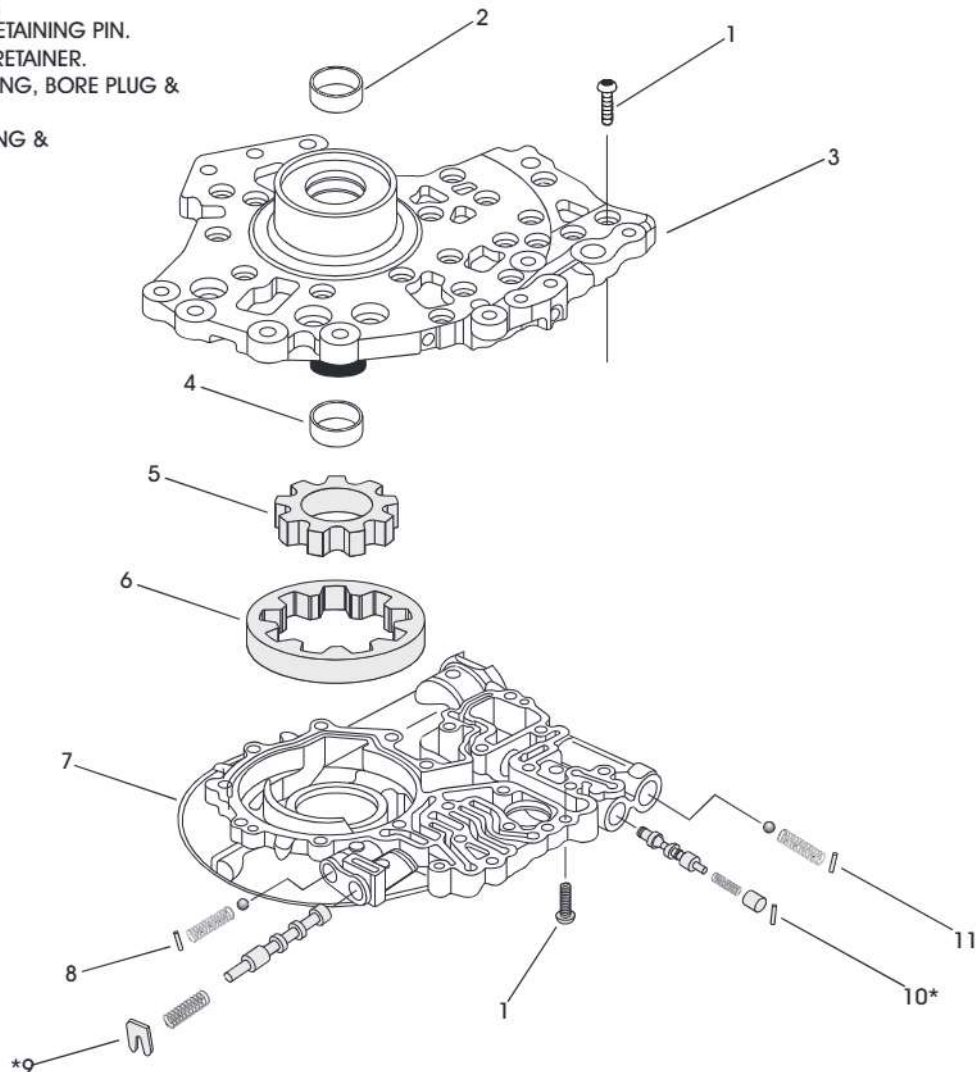
Continued on Page 90

8. Carefully remove each valve retainer and remove valve springs, bore plug, valves and ball valves for inspection as seen in Figure 127.

Note: Valve springs can be tightly compressed, use care when removing valve retainers.

9. Closely inspect the TCC Control and Pressure Regulator Valves and bores for wear, See Figure 127. An effective method of checking for excessive valve clearance is to perform a vacuum test. If wear is found, aftermarket repair kits are available.
10. Clean all parts thoroughly and air dry. Do not use cloth or paper towels that can deposit lint on valves.

- 1 FLUID PUMP COVER BOLTS M6X25 (23 REQUIRED).
- 2 REAR STATOR BUSHING (.755" WIDE).
- 3 FLUID PUMP COVER.
- 4 FRONT STATOR BUSHING (.700" WIDE).
- 5 FLUID PUMP DRIVE GEAR.
- 6 FLUID PUMP DRIVEN GEAR.
- 7 TRANSMISSION FLUID PUMP BODY.
- 8 TCC BLOW OFF BALL, SPRING & RETAINING PIN.
- 9 TCC CONTROL VALVE, SPRING & RETAINER.
- 10 PRESSURE REGULATOR VALVE, SPRING, BORE PLUG & RETAINING PIN.
- 11 FLUID PUMP BLOW OFF BALL, SPRING & RETAINING PIN.



*HIGH WEAR ITEM.

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Figure 127

COMPONENT REBUILD (CONT'D)

Transmission Fluid Pump - Assembly

11. In order to insure proper pump gear clearance, place a straight edge across the pump body gear pocket area as shown in Figure 128.
12. Measure from the bottom of the straight edge to the pump gear pocket surface as shown in Figure 128.
13. Measure the thickness of both the pump drive and driven gears as shown in Figure 128.

14. Refer to the chart in Figure 128 for correct gear clearance or for replacement gear selection based on the measurements that were taken.

Note: Failure to complete this process successfully could result in reduced pump oil volume which could cause the transmission to slip badly or create a "no move" condition.

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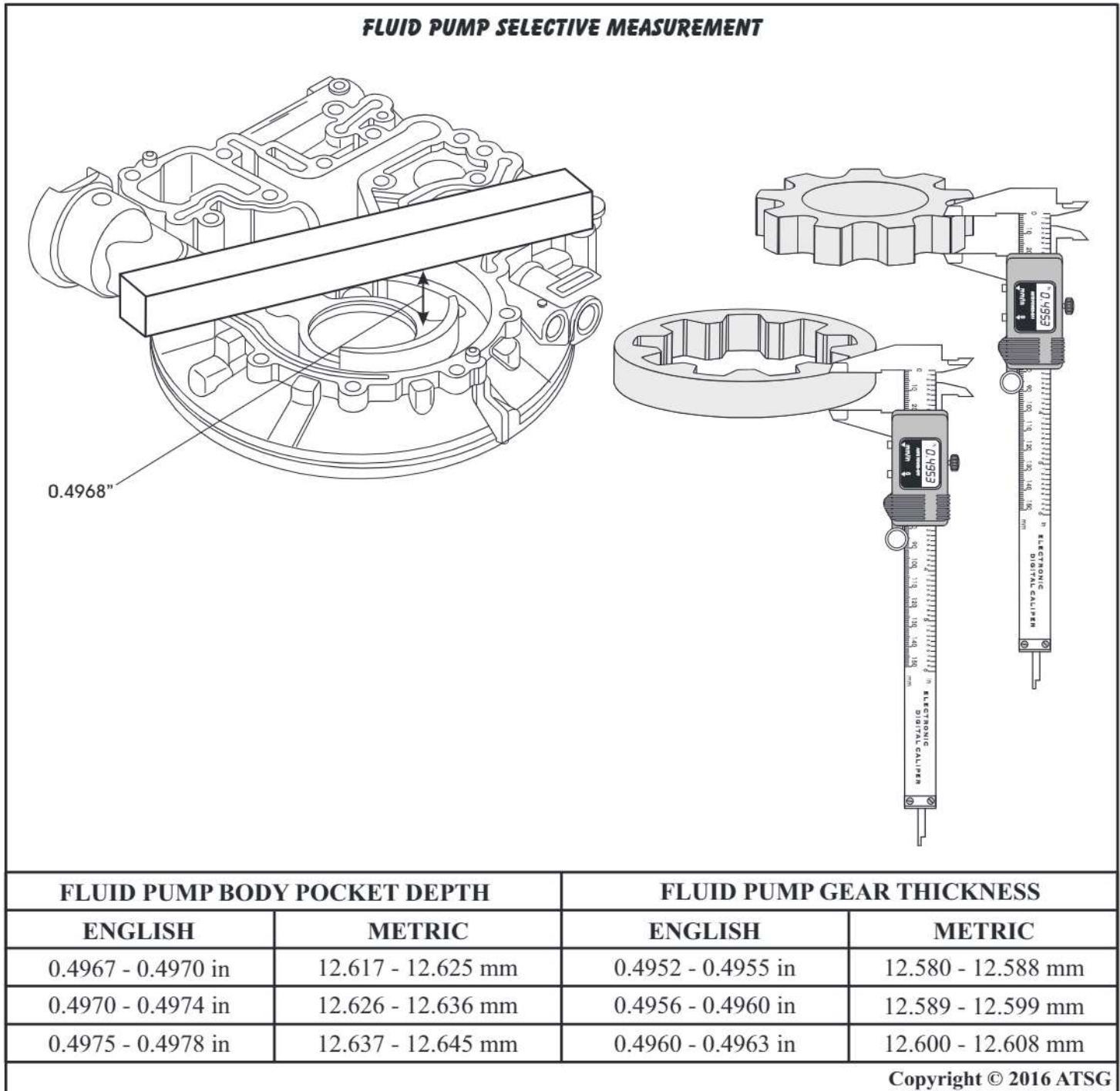


Figure 128

COMPONENT REBUILD (CONT'D)

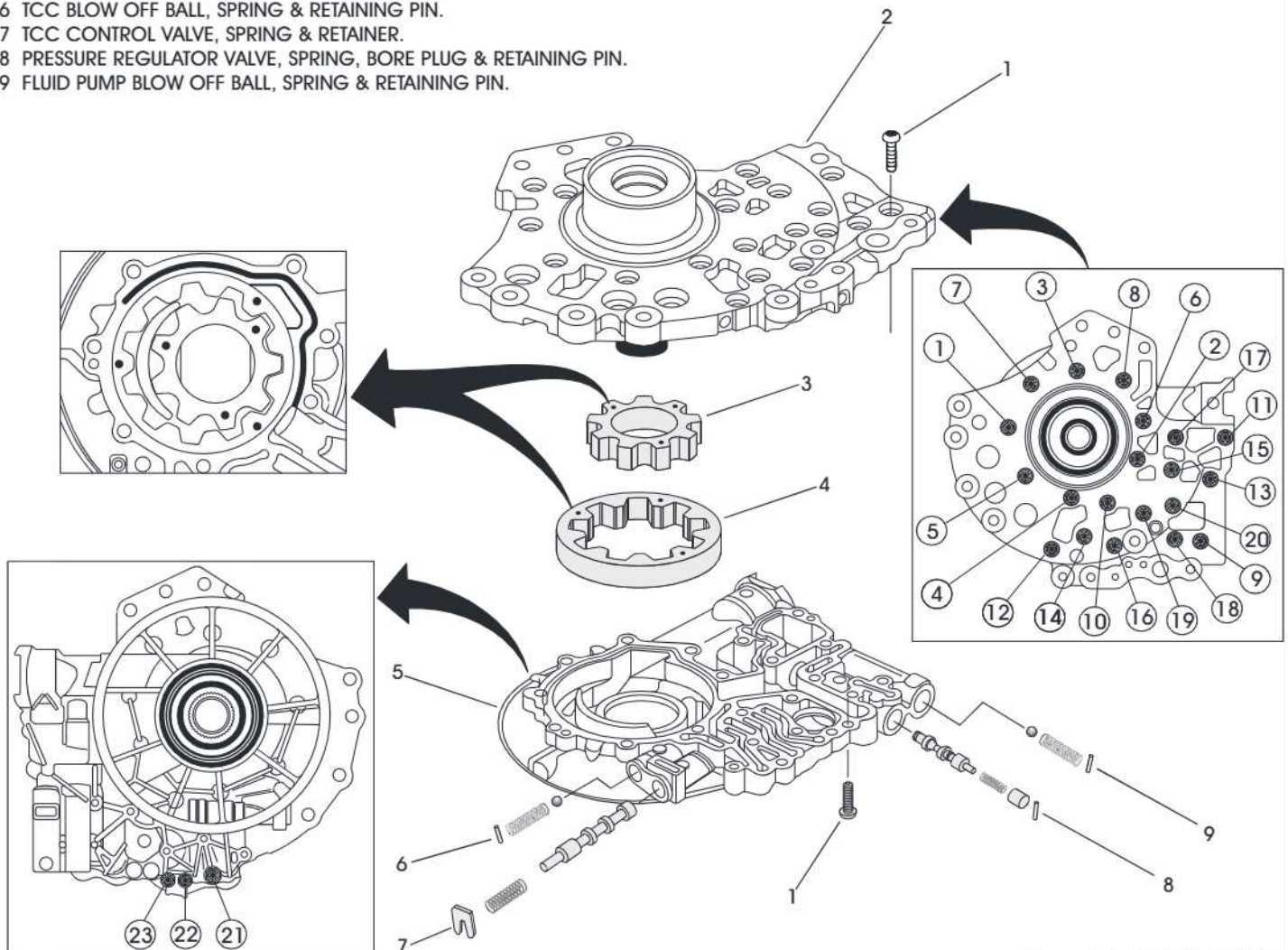
Transmission Fluid Pump - Assembly

15. Lubricate all valves with transmission fluid prior to assembly, install valves, balls, springs and retainers into the pump body as seen in Figure 129.
16. Make certain the pressure regulator valve bore plug seen in Figure 129 is not leaking, if it is use a mini tube cutter to cut a ridge in the center of the bore plug. This will expand the plug so it fits tightly into the bore without leakage.

17. Liberally lubricate with transmission fluid and install the drive and driven pump gears making certain that the **chamfer on the drive and driven gears face the pump body** and if they are present, align the dots on the pump gears as shown in Figure 129.
18. Install the three pump cover to pump body bolts from the pump cover side hand tight, then install the twenty pump body to pump cover bolts from the pump body side and tighten all bolts to 106 in. lbs. (12 N·m) using the tightening sequence shown in Figure 129.
19. Place the pump assembly on to the torque converter neck and rotate the pump assembly making certain the pump gears turn easily and smoothly.

Continued on Page 92

- 1 FLUID PUMP COVER BOLTS M6X25 (23 REQUIRED).
- 2 FLUID PUMP COVER.
- 3 FLUID PUMP DRIVE GEAR.
- 4 FLUID PUMP DRIVEN GEAR.
- 5 TRANSMISSION FLUID PUMP BODY.
- 6 TCC BLOW OFF BALL, SPRING & RETAINING PIN.
- 7 TCC CONTROL VALVE, SPRING & RETAINER.
- 8 PRESSURE REGULATOR VALVE, SPRING, BORE PLUG & RETAINING PIN.
- 9 FLUID PUMP BLOW OFF BALL, SPRING & RETAINING PIN.



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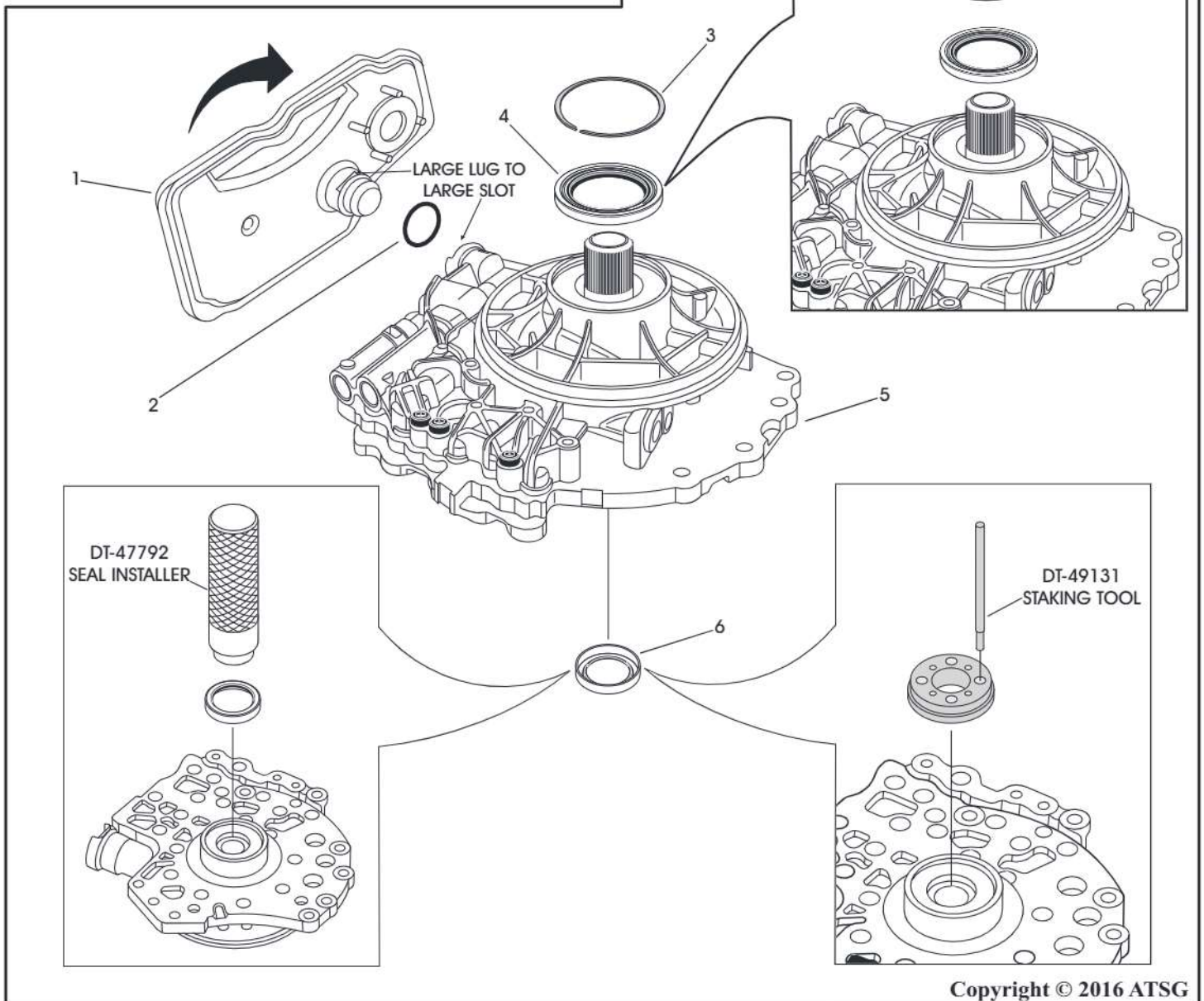
Figure 129

COMPONENT REBUILD (CONT'D)

Transmission Fluid Pump - Assembly

20. Install the fluid pump front seal using seal installer DT-47791-A or similar tool as shown in Figure 130.
21. Install front seal retaining snap ring as seen in Figure 130.
22. Turn pump assembly over and install the input shaft seal using seal installer DT-47792 as shown in Figure 130.
23. Using the DT-49131 staking tool shown in Figure 130 and stake the seal in place in two places 180° apart to insure proper seal retention.
24. Install a new o-ring seal on the fluid filter assembly if it does not have one and apply a small amount of assembly gel. Insert filter into pump suction port aligning the lugs on the filter pickup tube with the notches in the pump suction port and turn the filter 90° in the direction shown in Figure 130 to lock the filter in place. Fluid pump assembly has now been completed.

Continued on Page 93



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Figure 130

COMPONENT REBUILD (CONT'D)

Control Valve Body Assembly - Disassembly

1. Remove the control valve body bolt and the solenoid valve support from the Generation 1 valve body assembly as seen in Figure 131.
2. Remove the valve body channel plate and spacer plate from the main control valve body assembly as seen in Figure 131.
3. Take note of the six steel checkball locations before removal shown in Figure 131.
4. Remove the six steel check balls from the main control valve body assembly and set them aside for reassembly as shown in Figure 131.

Continued on Page 94

5. Remove the control valve body bolt and the solenoid valve support from the Generation 2 valve body assembly as seen in Figure 132.
6. Remove the valve body channel plate, See Figure 132, with the spacer plate held against the channel plate to prevent the small parts from falling out should the spacer plate retainer not hold.
7. Carefully remove all small parts from the valve body channel plate and set them aside for reassembly as shown in Figure 132.
8. Take note of the six steel checkball locations before removal shown in Figure 132.
9. Remove the six steel check balls from the main control valve body assembly and set them aside for reassembly as shown in Figure 132.

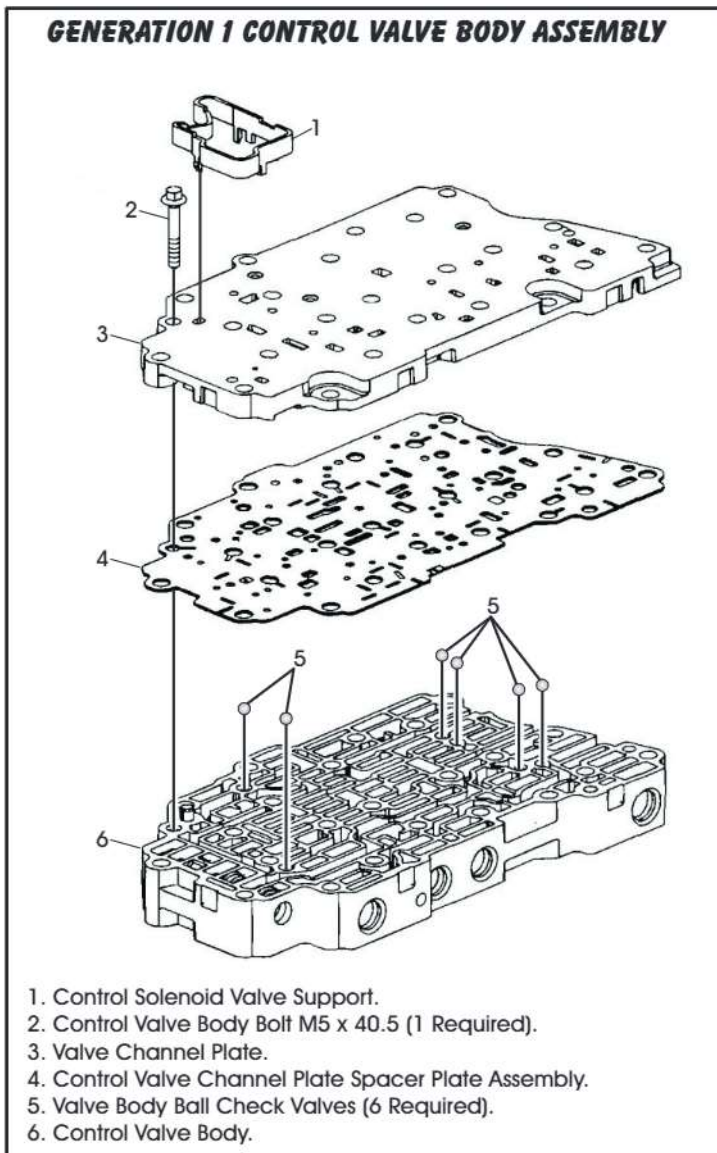


Figure 131

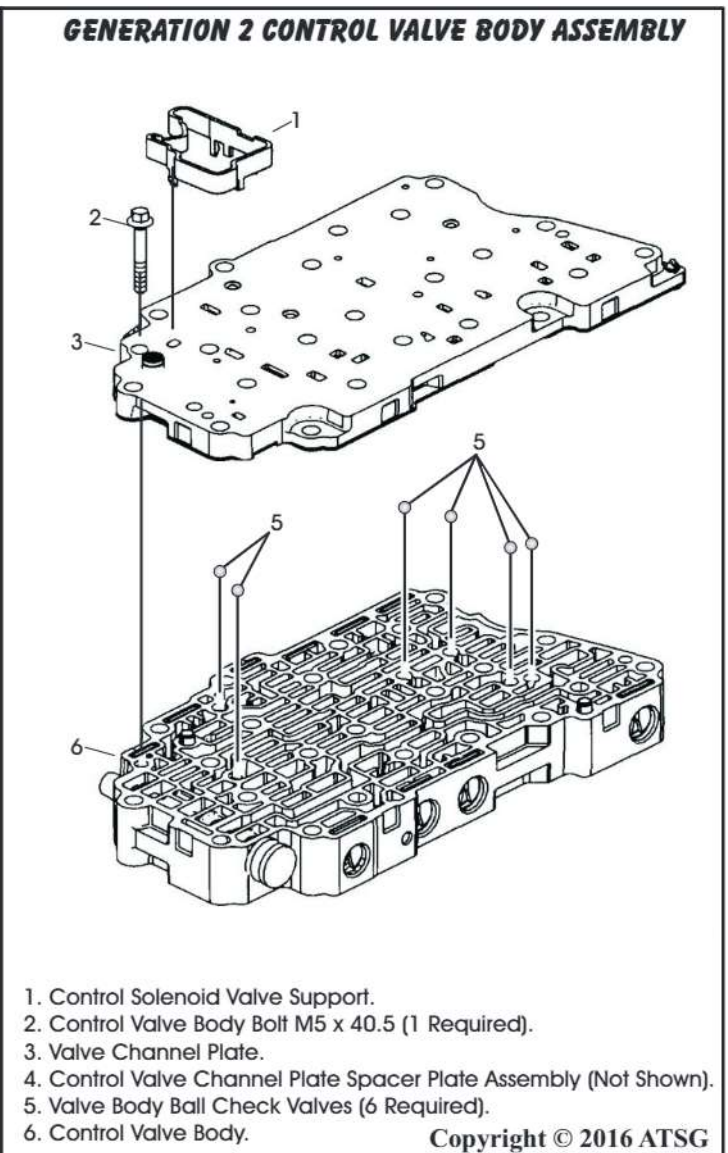


Figure 132

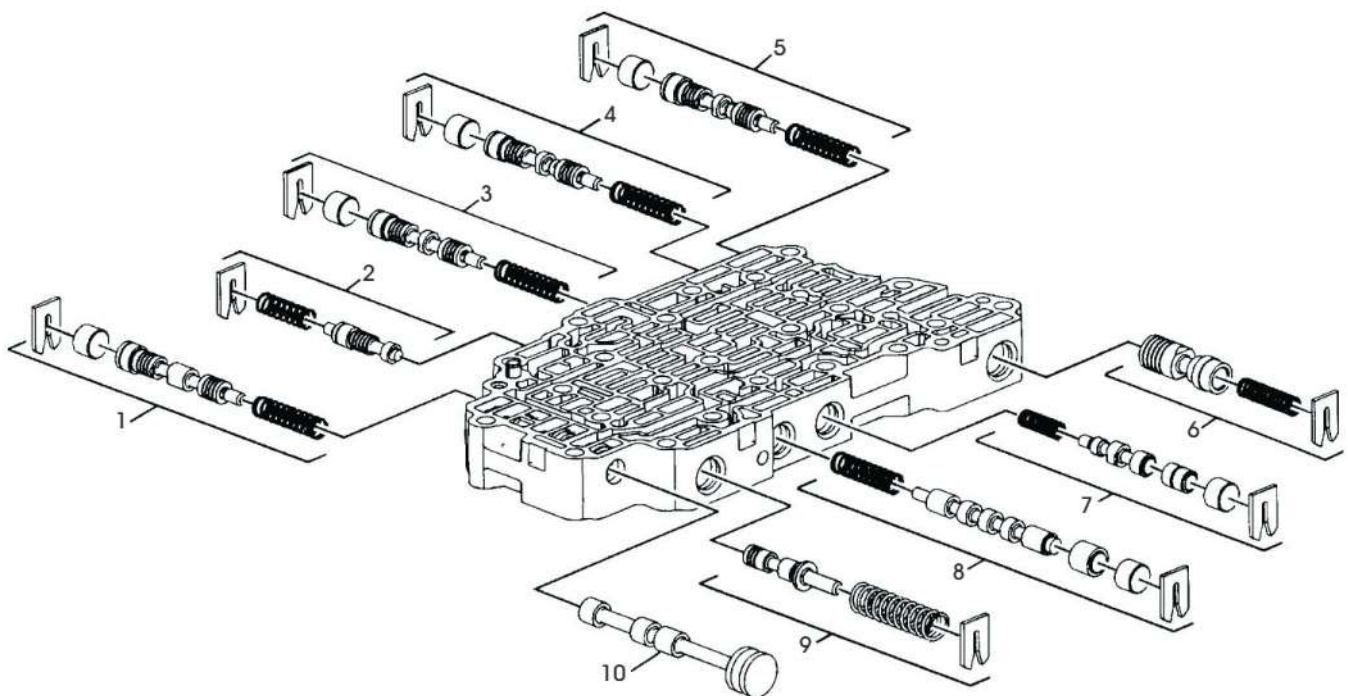
COMPONENT REBUILD (CONT'D)

Control Valve Body Assembly - Disassembly

10. It is strongly recommended that all valve bore areas be either wet air checked or vacuum tested before valve removal to expose excessive leakage in those areas.
12. Remove all valves from the Generation 1 main control valve body, Refer to Figure 133, and inspect the valves and their bores for signs of wear based on the above test results.
13. Insure that all valve body oil circuit areas are flat. Any uneven areas can be flat sanded.
14. Be sure to check for leaking bore plugs which could prevent proper stroking of the respective valve.
15. Replace or expand any bore plug, Refer to Figure 133, that may be leaking.
16. After market repair kits are available to address valve and bore wear conditions.
17. Check for broken or otherwise damaged springs and replace as necessary from a donor valve body.

Continued on Page 95

CONTROL VALVE BODY VALVE LOCATION AND IDENTIFICATION - GENERATION 1



1. First-Reverse and 4-5-6 Clutch Regulator Valve Train.
2. 1-2-3-4 Clutch Boost Valve Train.
3. 1-2-3-4 Clutch Regulator Valve Train.
4. 2-6 Clutch Regulator Valve Train.
5. 3-5 Reverse Clutch Regulator Valve Train.
6. Clutch Piston Dam Feed Regulator Valve Train (Compensator Feed Reg Valve).
7. TCC Regulator Apply Valve Train.
8. Clutch Select Valve Train.
9. Actuator Feed Limit Valve Train.
10. Manual Valve.

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Figure 133

COMPONENT REBUILD (CONT'D)

Control Valve Body Assembly - Disassembly

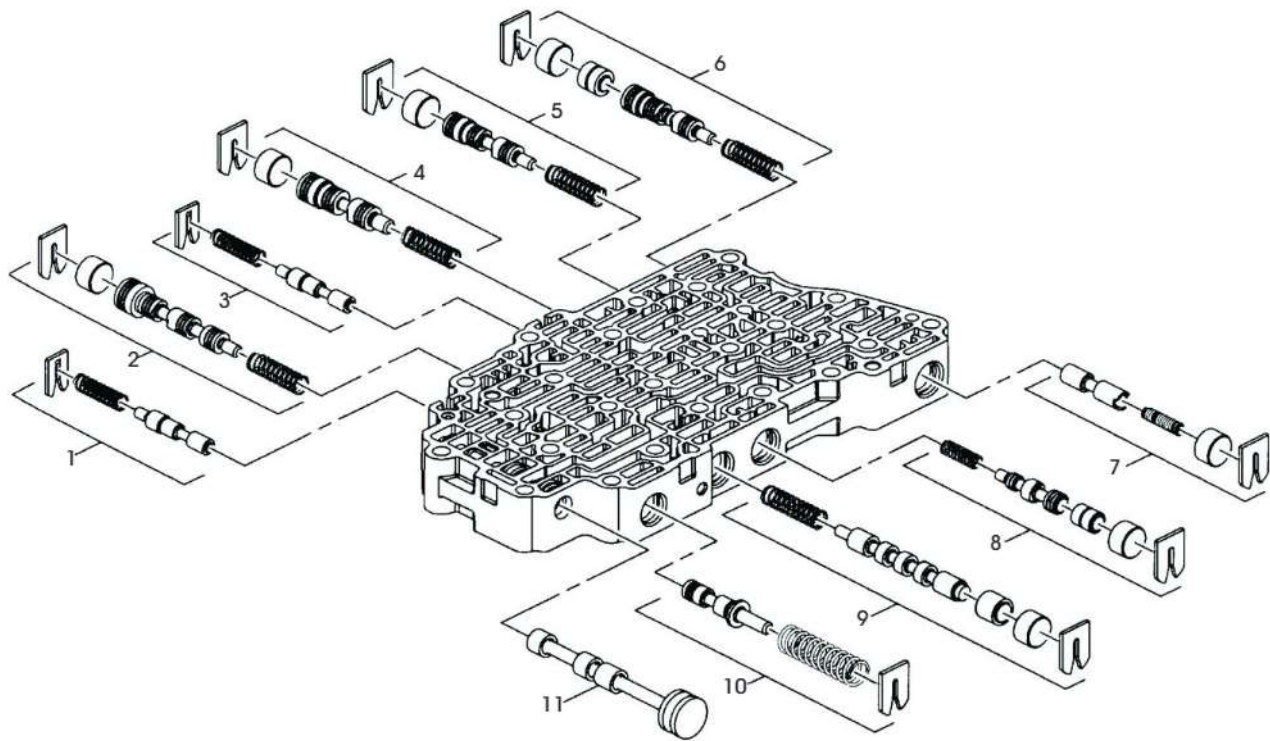
18. It is strongly recommended that all valve bore areas be either wet air checked or vacuum tested before valve removal to expose excessive leakage in those areas.
19. Remove all valves from the Generation 2 main control valve body, Refer to Figure 134, and inspect the valves and their bores for signs of wear based on the above test results.
20. Insure that all valve body oil circuit areas are flat. Any uneven areas can be flat sanded.
21. Be sure to check for leaking bore plugs which could prevent proper stroking of the respective valve.

22. Replace or expand any bore plug, Refer to Figure 134, that may be leaking.
23. After market repair kits are available to address valve and bore wear conditions.
24. Check for broken or otherwise damaged springs and replace as necessary from a donor valve body.
25. Thoroughly clean all valve body assembly components.

Note: *Generation 2 re-designed the clutch regulator valves so that the exhaust backfill circuits are now used in place of the compensator feed regulator valve which in Generation 1 had dumped through a metered exhaust. The added Default Override Valve ensures a Reverse engagement regardless of the state of the solenoids.*

Continued on Page 96

CONTROL VALVE BODY VALVE LOCATION AND IDENTIFICATION - GENERATION 2



1. Low-Reverse and 4-5-6 Clutch Boost Valve Train - Generation 2 Only.
2. Low-Reverse and 4-5-6 Clutch Regulator Valve Train.
3. 1-2-3-4 Clutch Boost Valve Train.
4. 1-2-3-4 Clutch Regulator Valve Train.
5. 2-6 Clutch Regulator Valve Train.
6. 3-5 Reverse Clutch Regulator Valve Train.
7. Default Override Valve Train - New valve line-up, Compensator Reg Feed Eliminated**.
8. TCC Regulator Apply Valve Train.
9. Clutch Select Valve Train.
10. Actuator Feed Limit Valve Train.
11. Manual Valve - * Some information states this valve is made shorter for GEN 2.

GEN 2 valve bodies obtained by ATSG did not have shorter manual valves.

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Figure 134

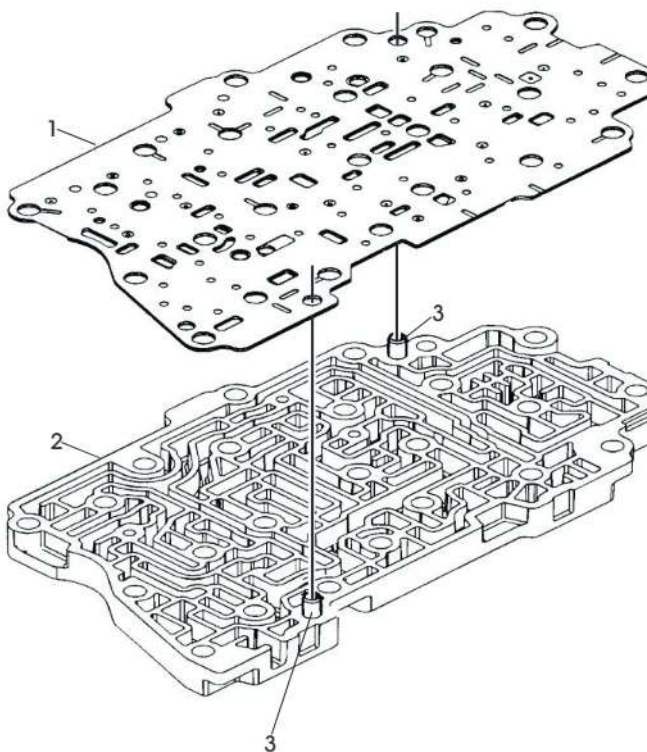
COMPONENT REBUILD (CONT'D)

Control Valve Body Assembly - Assembly

26. Ensure that the Generation 1 channel plate alignment dowel pins are in place as seen in Figure 135.
27. Place the spacer plate onto the channel plate using the alignment dowel pins for proper fit as seen in Figure 135.
28. Install all Generation 2 small parts into their proper location as shown in Figures 136 and 137 on Page 97.
29. Place the spacer plate onto the channel plate and align it with the spacer plate retainer holes seen in Figure 136.
30. Push the two spacer plate retainers into their respective holes as seen in Figure 136.

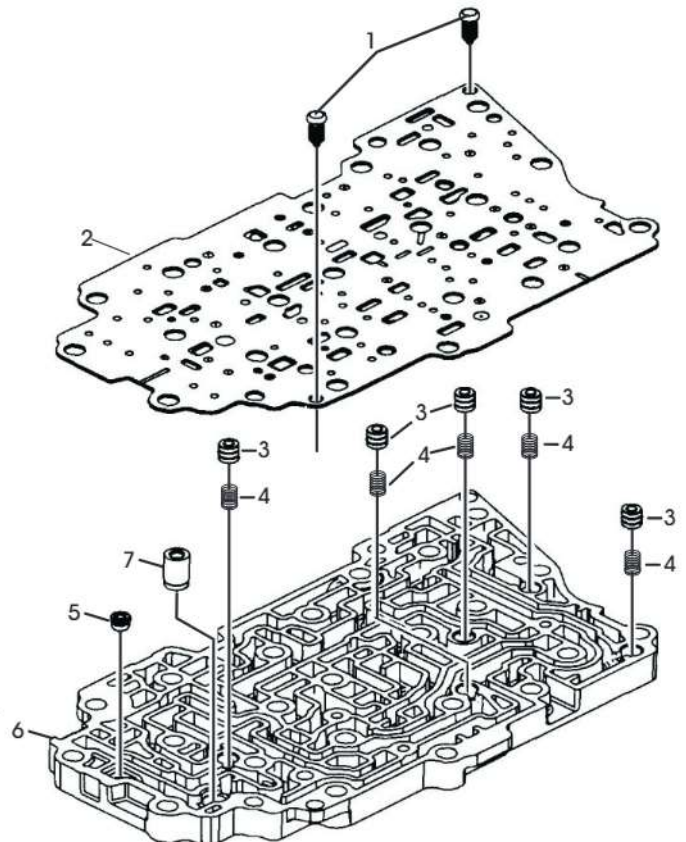
Continued on Page 97

GENERATION 1 CONTROL VALVE CHANNEL PLATE ASSEMBLY



1. Channel Plate to Valve Body Spacer Plate Assembly.
2. Valve Channel Plate.
3. Control Valve Body Guide Pins (2 Required).

GENERATION 2 CONTROL VALVE CHANNEL PLATE ASSEMBLY



1. Control Valve Body Spacer Plate Retainer (2 Required).
2. Channel Plate to Valve Body Spacer Plate Assembly.
3. Actuator Feed Accumulator Piston (Qty: 5 Required).
4. Actuator Feed Accumulator Spring (Qty: 5 Required).
5. Variable Hi and 2-3-4 Clutch Housing Valve Ball.
6. Valve Channel Plate.
7. Control Valve Channel Plate Ball Spring Assembly.

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Figure 135

Figure 136

COMPONENT REBUILD (CONT'D)

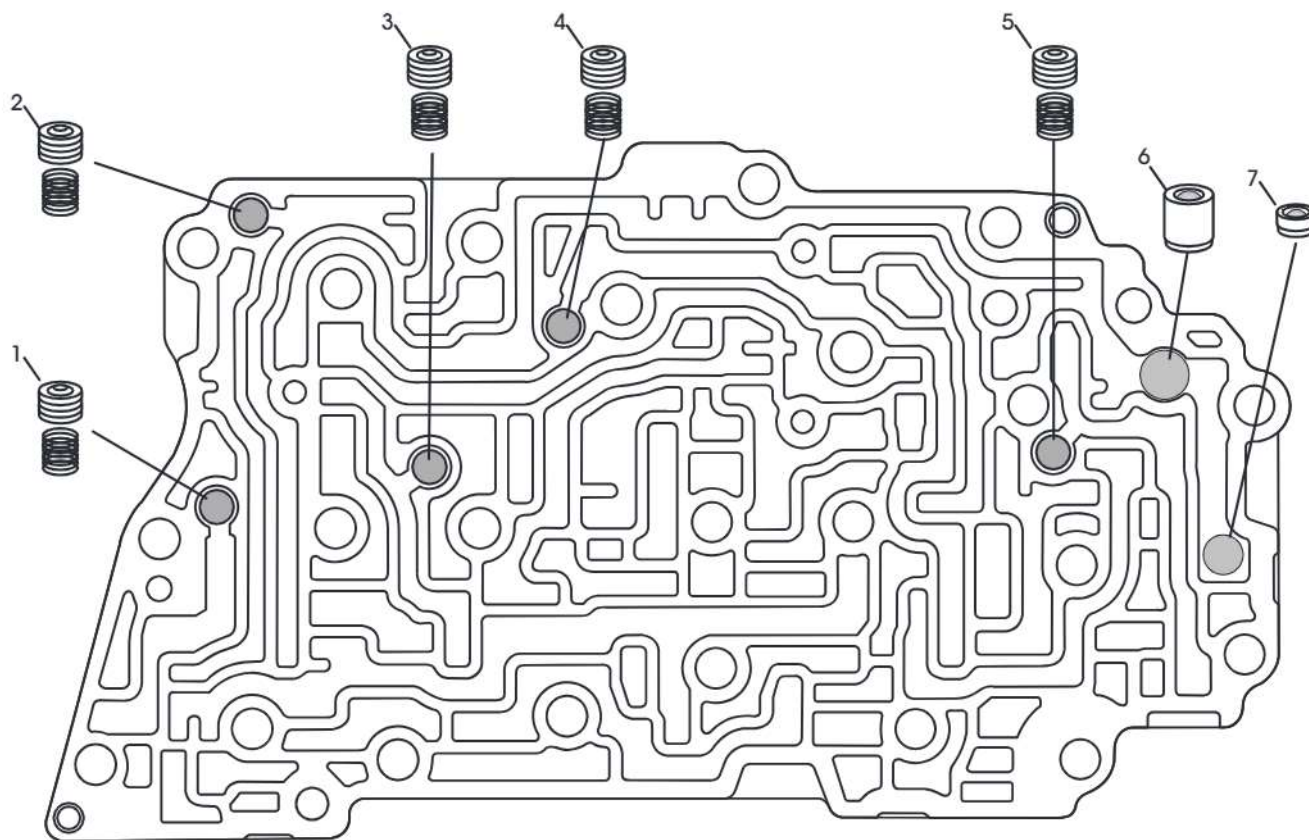
Control Valve Body Assembly - Assembly

31. When installing the actuator feed accumulators, it is not necessary to have concerns about spring placement as all springs are identical as shown in Figure 137.
32. The Variable Hi/2-3 Clutch Housing Valve Ball Capsule, See Figure 137, may be staked in place.
33. Make certain components 6 and 7 shown below in Figure 137 are clear of any foreign matter.

Continued on Page 98

CONTROL VALVE BODY VALVE CHANNEL PLATE IDENTIFICATION - GENERATION 2

GENERATION 2 CONTROL
CHANNEL PLATE ACCUMULATOR
AND CHECK VALVE LOCATION
AND IDENTIFICATION



1. PCS Accumulator.
2. 2-6 Clutch PCS Accumulator.
3. 3-5-R Clutch PCS Accumulator.
4. 1-2-3-4 Clutch PCS Accumulator.
5. R1/4-5-6 Clutch PCS Accumulator.
6. Exhaust Backfill Blow Off Ball Assembly.
7. Exhaust Backfill Air Bleed Capsule.

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Figure 137

COMPONENT REBUILD (CONT'D)

Control Valve Body Assembly - Assembly

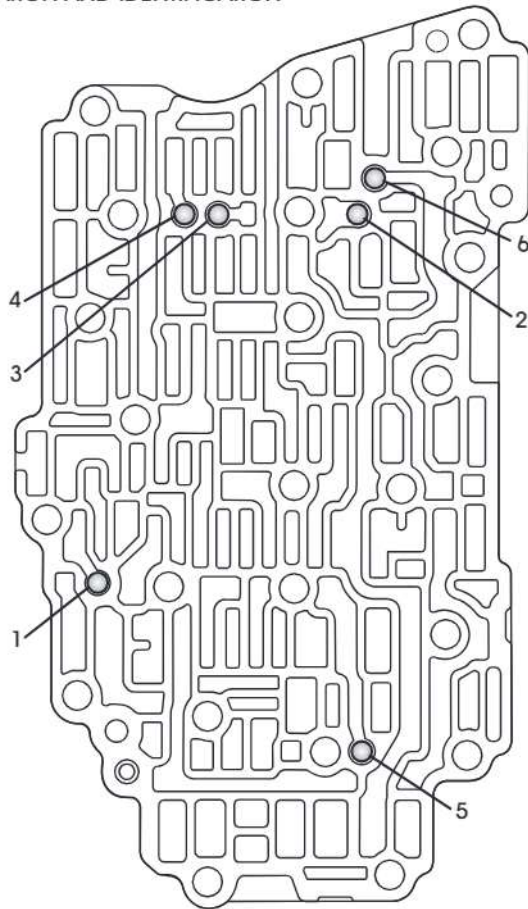
34. Install all six steel check balls in the locations shown in Figure 138 for Generation 1 applications.

35. Install all six steel check balls in the locations shown in Figure 139 for Generation 2 applications.

Continued on Page 99

GENERATION 1 CONTROL VALVE BODY ASSEMBLY

GENERATION 1 CONTROL VALVE BODY CHECK BALL LOCATION AND IDENTIFICATION

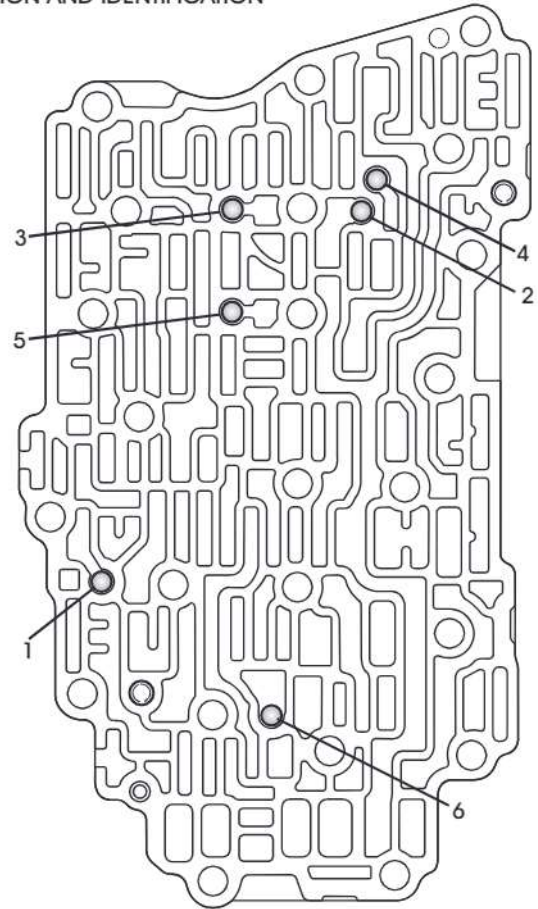


1. PS4.....Input-4-5-6 Clutch Feed...Output - CSV2 Latch.
2. 3-5-R/D1-6.....Input-D1-6.....Output - 3-5-R Feed.
3. 3-5-R Feed.....Output - 3-5-R Feed.
4. Compensator Feed...Input-3-5-R.....Output - 3-5-R Feed/Exh BF.
5. Actuator Feed Limit.....Output - R1/4-5-6 Feed.
6. Actuator Feed Limit.....Output - 3-5-R Clutch.

Figure 138

GENERATION 2 CONTROL VALVE BODY ASSEMBLY

GENERATION 2 CONTROL VALVE BODY CHECK BALL LOCATION AND IDENTIFICATION



1. Latch.....Input-4-5-6 Clutch Feed...Output - Latch.
2. 3-5-R Feed.....Input-D1-6.....Output - 3-5-R Feed/D1-6.
3. 3-5-R Feed/D1-6.....Output - 3-5-R Feed/D1-6.
4. Actuator Feed Limit.....Output - 3-5-R Clutch Feed.
5. Drive.....Output - Drive.
6. Line.....Auxiliary Line - Output - Line.

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Figure 139

COMPONENT REBUILD (CONT'D)

Control Valve Body Assembly - Assembly

36. Place the assembled Generation 1 channel plate and spacer plate assembly onto the main control valve body assembly as seen in Figure 140.
37. Install the control solenoid valve support as seen in Figure 140.
38. Insert the control valve body bolt into the location shown in Figure 140 and hand tighten the bolt.

Note: Final tightening of the valve body bolts will be completed during transmission assembly.

36. Place the assembled Generation 2 channel plate and spacer plate assembly onto the main control valve body assembly as seen in Figure 141.
37. Install the control solenoid valve support as seen in Figure 141.
38. Insert the control valve body bolt into the location shown in Figure 141 and hand tighten the bolt.

Note: Final tightening of the valve body bolts will be completed during transmission assembly.

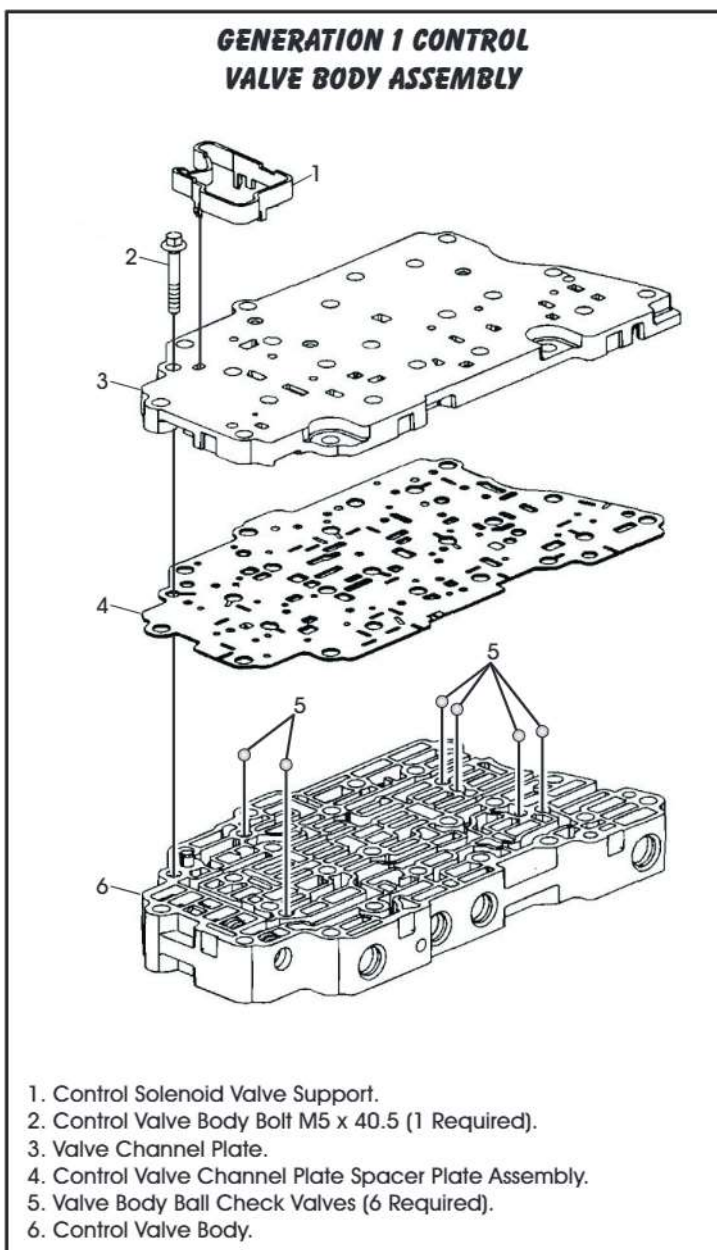


Figure 140

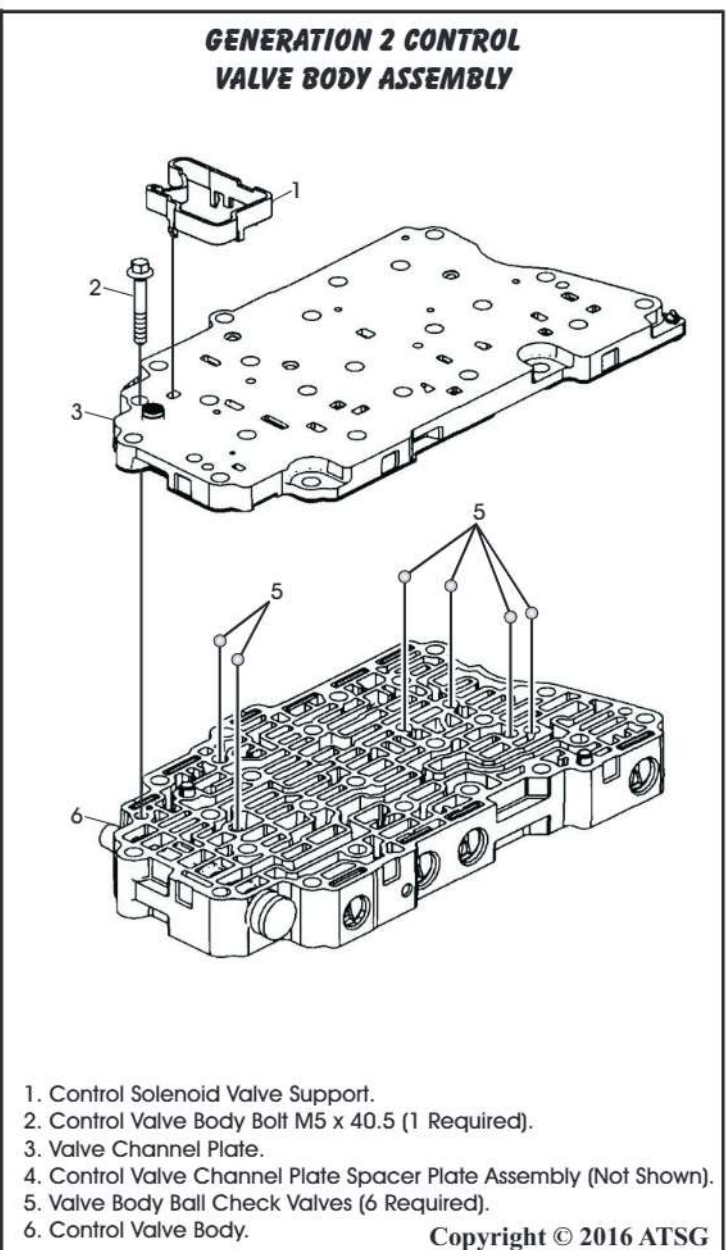


Figure 141

TRANSMISSION ASSEMBLE

1. Thoroughly clean and dry the transmission case seen in Figure 142.
2. Inspect all threaded holes for thread damage in need of repair utilizing a thread chaser, tap or Heli-Coil® repair kit.
3. Make certain the two torque converter alignment dowel pins are in place, Refer to Figure 142, and that they are set at a height of 0.29" (7.4 mm) as shown in Figure 142.

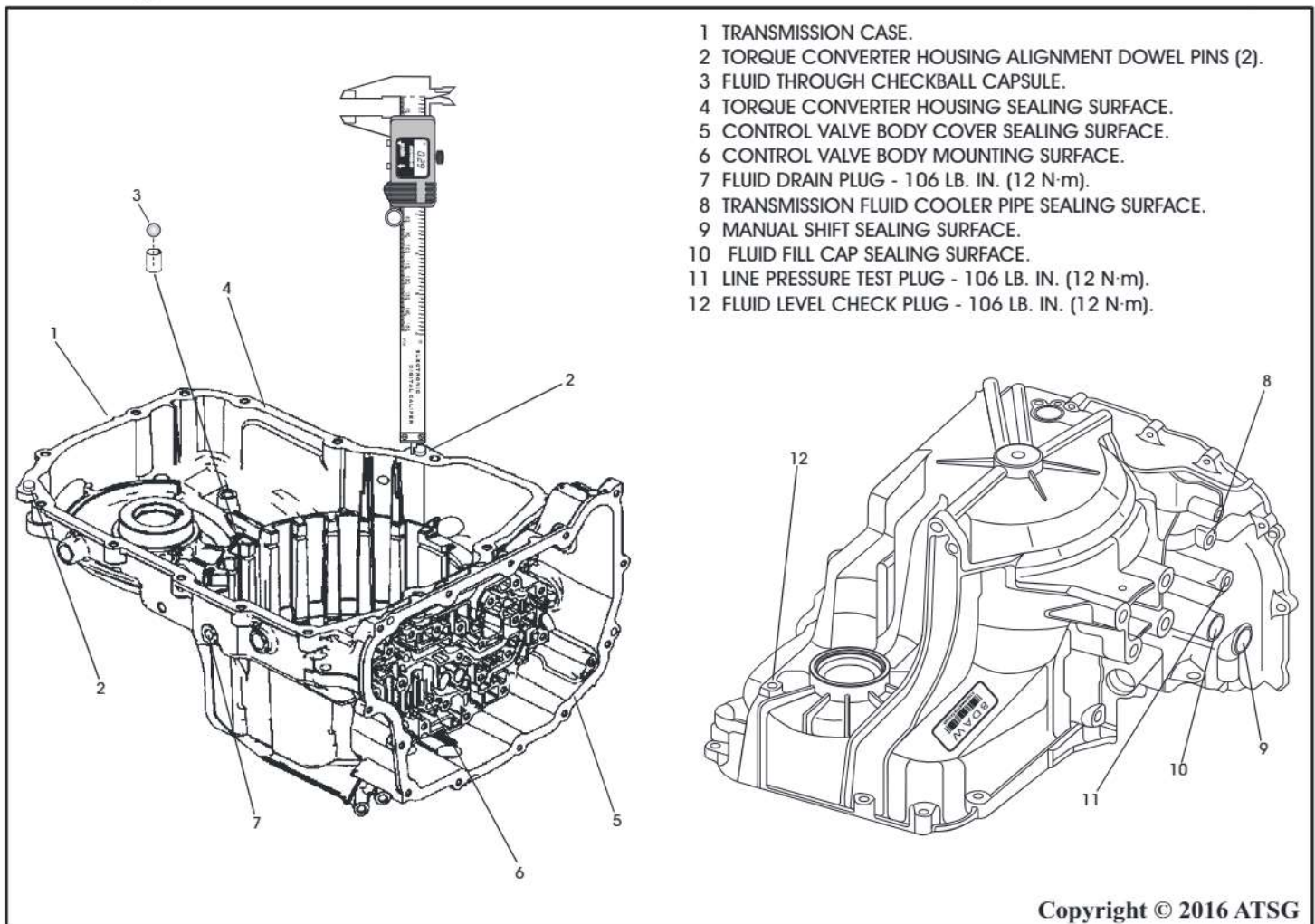
Note: Clean out the fluid through check ball capsule. The fluid through checkball capsule is set at of a depth of 0.43" (7.4mm).

4. Inspect the torque converter housing to transmission case gasket sealing surface, Figure 142, for any damage that might result in a leak.
5. Inspect the control valve body cover sealing surface, Figure 142, for any damage that might result in a leak.
6. Inspect the control valve body mounting surface, Figure 142, for damage and make certain the mounting surface is flat.

7. Make certain the transmission fluid drain plug is installed and is tightened to 106 lb. in. (12 N·m).
8. Inspect the transmission fluid cooler pipe sealing surface, Figure 142, for any damage that could result in a leak.
9. Inspect the manual shaft sealing surface, Figure 142, for any damage that could prevent the seal from sealing.
10. Inspect the transmission fluid fill cap sealing surface, Figure 142, for any damage could result in a leak.
11. Make certain the line pressure test plug is installed and tighten to 106 lb. in. (12 N·m) as seen in Figure 142.
12. Make certain the transmission fluid level check plug is installed, Figure 142, and is tightened to 106 lb. in. (12 N·m).

Note: The 6T45/50 transmission case is larger than the 6T30/40 case and has additional ribbed re-enforcement for greater strength.

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Figure 142

TRANSMISSION ASSEMBLY (CONT'D)

Note: The transmission case axle support bushing is a commonly known failure item which can result in the axle seal badly leaking. Be sure to check the axle stub for damage as well.

13. Utilizing an aftermarket bushing driver set, install a new aftermarket bushing as shown in Figure 143.

Note: Some aftermarket axle support bushings are wider than the original. This provides better support for the axle shaft. They may also be Teflon® coated which will provide for better durability.

14. It is highly recommended that a press be used to install the new bushing rather than a hammer. A hammer can damage the new bushing making it difficult to install the axle shaft.

15. Install a new axle seal into the transmission case using the DT-47790 seal installer with the GE-8092 driver handle as shown in Figure 144.

16. It is highly recommended that the axle seal be pressed into place rather than using a hammer.

Note: If a hammer must be used, after seal installation make certain the seals "Garter Spring" has not been dislodged.

Continued on Page 102

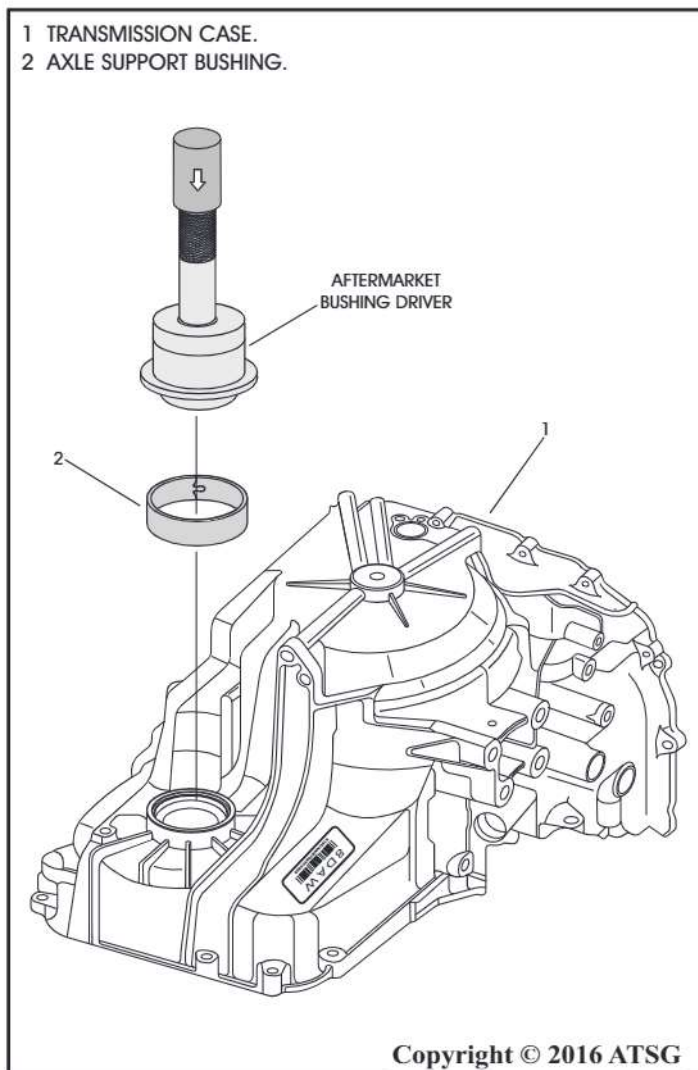


Figure 143

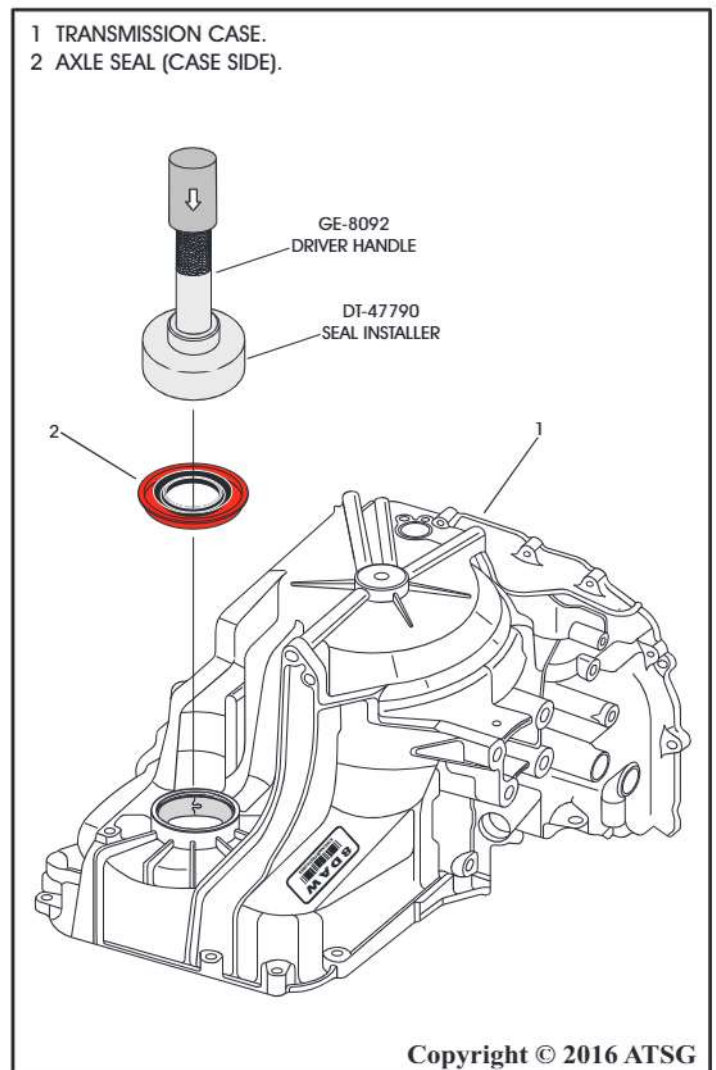


Figure 144

TRANSMISSION ASSEMBLY (CONT'D)

17. Place 4-5-6/3-5-R housing support into the bottom of the case as shown in Figure 145.
18. Install the three 4-5-6/3-5-R housing support bolts as shown in Figure 145.
19. Torque the 4-5-6/3-5-R housing support bolts to 106 lb. in. (12 N·m) as shown in Figure 146.

Continued on Page 103

- 1 4-5-6/3-5-R HOUSING SUPPORT BOLTS M6X50 (3 REQUIRED).
- 2 4-5-6/3-5-R HOUSING SUPPORT - 4 RING (2.332" LONG).
- 2 4-5-6/3-5-R HOUSING SUPPORT - 3 RING (2.080" LONG).

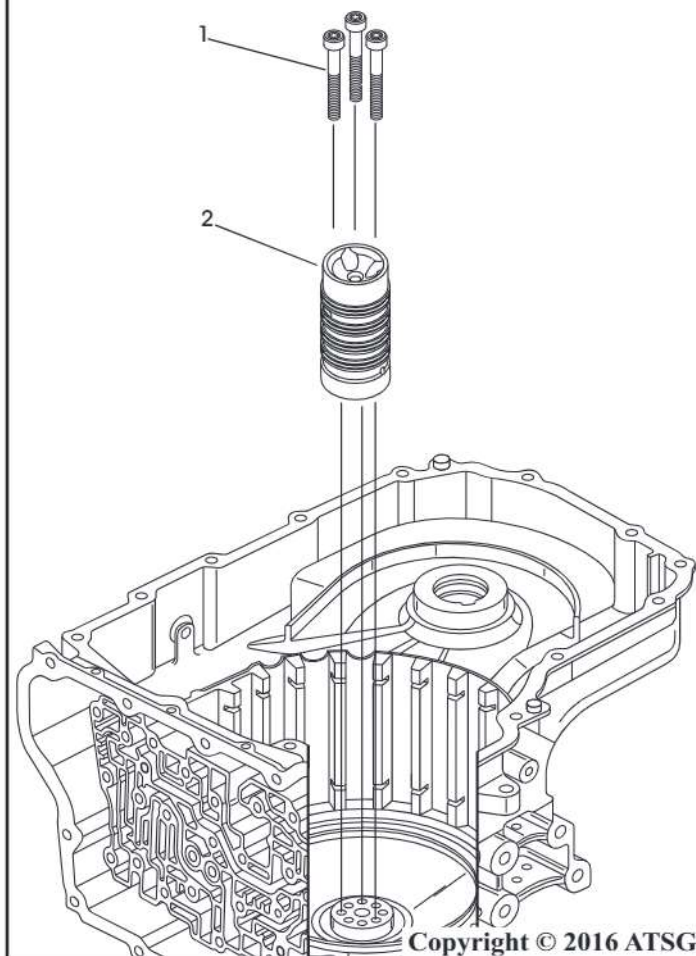


Figure 145

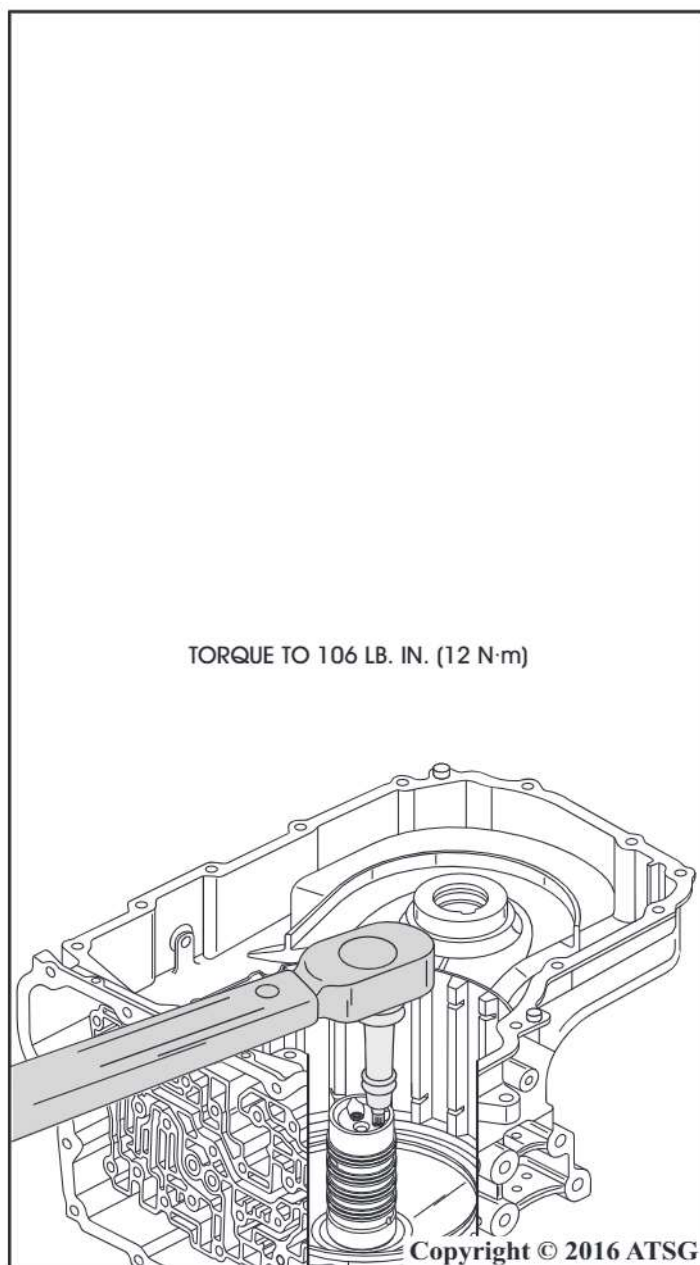


Figure 146

TRANSMISSION ASSEMBLE (CONT'D)

20. Place the DT-46620-3 sealing ring installer over the 4-5-6/3-5-R clutch housing support and adjust it so the bottom most ring land is exposed.
21. Slip one sealing ring over the DT-46620-3 seal installer as seen in Figure 147.
22. Slip the DT-46620-2 sealing ring installer over the DT-46620-3 and push down until the sealing ring is installed into the ring groove as seen in Figure 147.

Continued on Page 104

- 1 3-5-R/4-5-6 CLUTCH SEALING RINGS (4 REQUIRED 2008 - 2009).
- 1 3-5-R/4-5-6 CLUTCH SEALING RINGS (3 REQUIRED 2010 & UP).
- 2 3-5-REVERSE/4-5-6 HOUSING SUPPORT - 4 RING (2.332" LONG).
- 2 3-5-REVERSE/4-5-6 HOUSING SUPPORT - 3 RING (2.080" LONG).

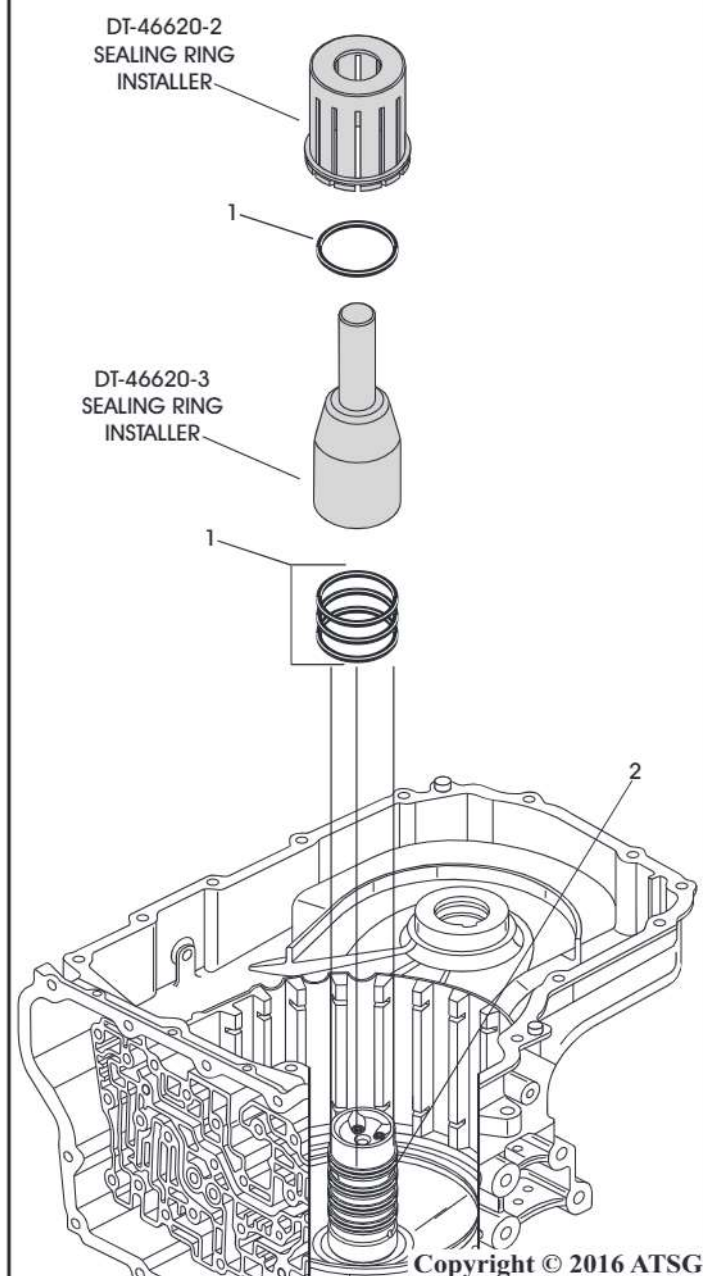


Figure 147

23. Repeat the previously described steps for each subsequent sealing ring until all sealing rings are installed onto the 4-5-6/3-5-R clutch housing support.
24. Now install the DT-46620-1 sealing ring sizer over all sealing rings with the **small chamfer facing up** and carefully assist the rings into the groove so the sizer slips smooth over all rings as shown in Figure 148.
26. Now remove the sizer and turn it over so the **large chamfer faces up** and reinstall the sizer over all rings until it moves up and down freely.

Caution: Use care not roll a ring out of position while sizing as this could damage the sealing ring.

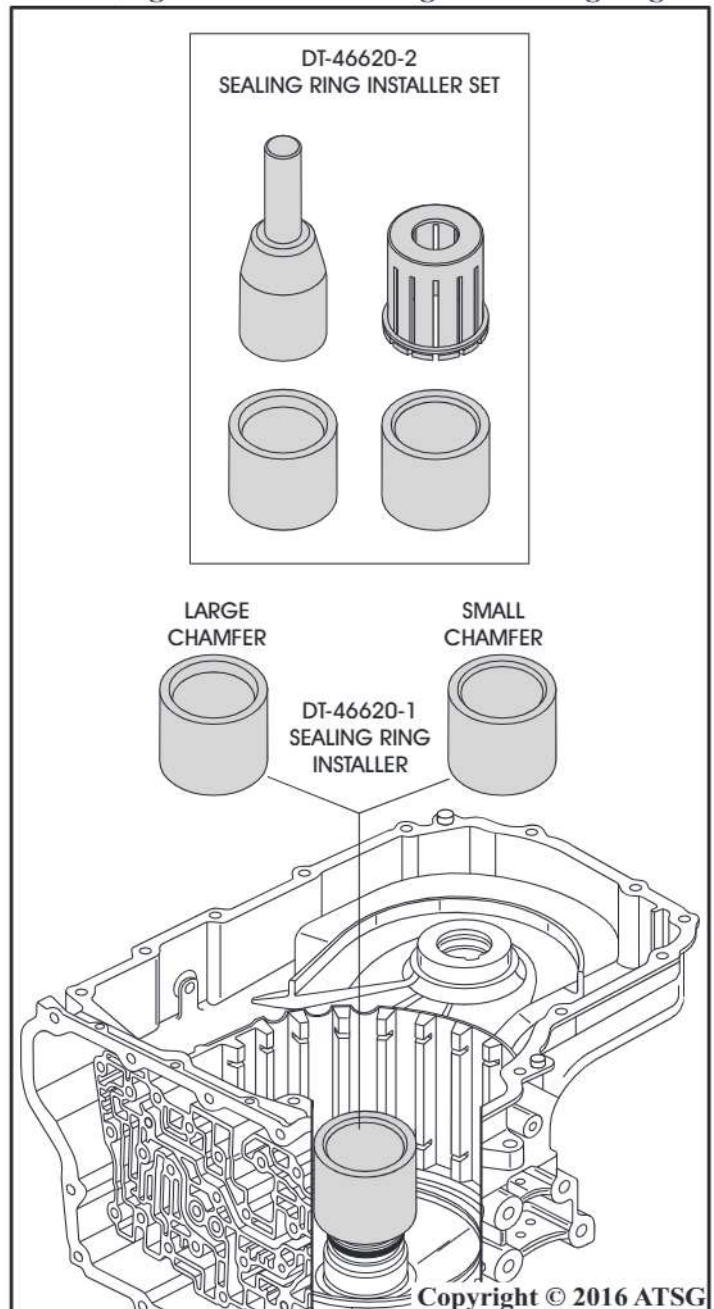


Figure 148

TRANSMISSION ASSEMBLE (CONT'D)

- 1 PARK PAWL ACTUATOR GUIDE PIN.
- 2 PARK PAWL ACTUATOR GUIDE.
- 3 PARK PAWL ACTUATOR GUIDE SEAL.
- 4 MANUAL SHAFT DETENT LEVER HUB PIN.
- 5 MANUAL SHIFT SHAFT PIN.
- 6 MANUAL SELECTOR SHAFT.
- 7 MANUAL DETENT LEVER WITH SHAFT POSITION SWITCH ASSEMBLY.
- 8 PARK PAWL ACTUATOR.

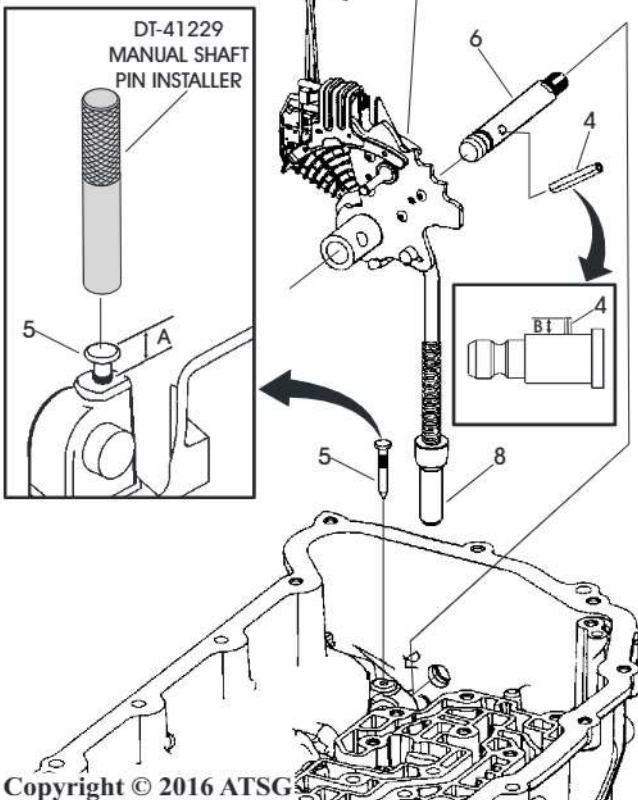
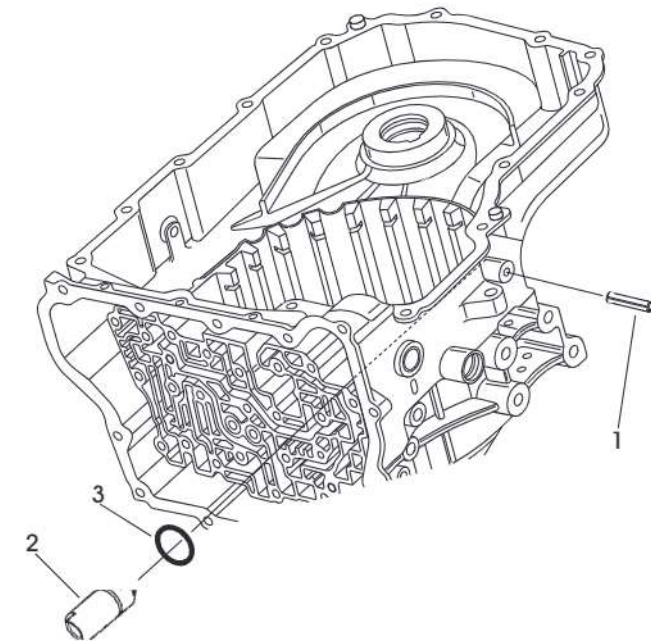
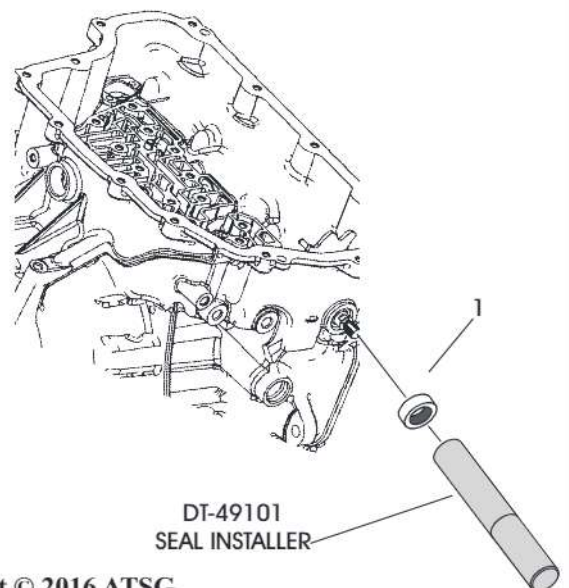


Figure 149

27. Install a new o-ring seal on the park pawl actuator guide as seen in Figure 149.
28. Lubricate the o-ring seal and guide and install it into the transmission case so that the roll pin groove in the guide lines up with the park pawl actuator guide pin hole in the case as seen in Figure 149.
29. Install the park pawl actuator guide pin into the hole in the transmission case as seen in Figure 149.
30. Place the manual detent/shaft position switch and park pawl assembly into position so that the manual shaft selector opening lines up with the detent assembly as seen in Figure 149.
31. Lubricate the manual selector shaft with assembly gel and insert it into the detent assembly so the roll pin hole lines up with the roll pin hole in the detent assembly as seen in Figure 149.
32. Install the manual selector shaft roll pin so that dimension "B" shown in Figure 149 measures 0.38" (7.9mm) as shown in Figure 149.
33. Install the manual shaft pin using the DT-41229 pin installer or a suitable punch to dimension "A" as shown in Figure 149 so that 0.28" - 0.32" (7.2 - 8.2mm) protrudes.
34. Lubricate the manual selector shaft seal with assembly gel and install the seal using the DT-49101 seal installer as seen in Figure 150.
35. Operate the park mechanism to insure it operates correctly.

Continued on Page 105

- 1 MANUAL SHAFT SEAL.



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Figure 150

TRANSMISSION ASSEMBLE (CONT'D)

36. Lubricate with transmission fluid the inside of the DT-47796 seal protector and place it into the bottom of the transmission case as seen in Figure 151.
37. Lubricate with transmission fluid the inner and outer lip seal areas of the 2-6 clutch piston and place it into the seal protector and push it all the way down until it bottoms out as seen in Figure 151 and remove the DT-47796 seal protector.
38. Install the 2-6 clutch piston return spring on top of the 2-6 clutch piston "dish up" as shown in Figure 151.

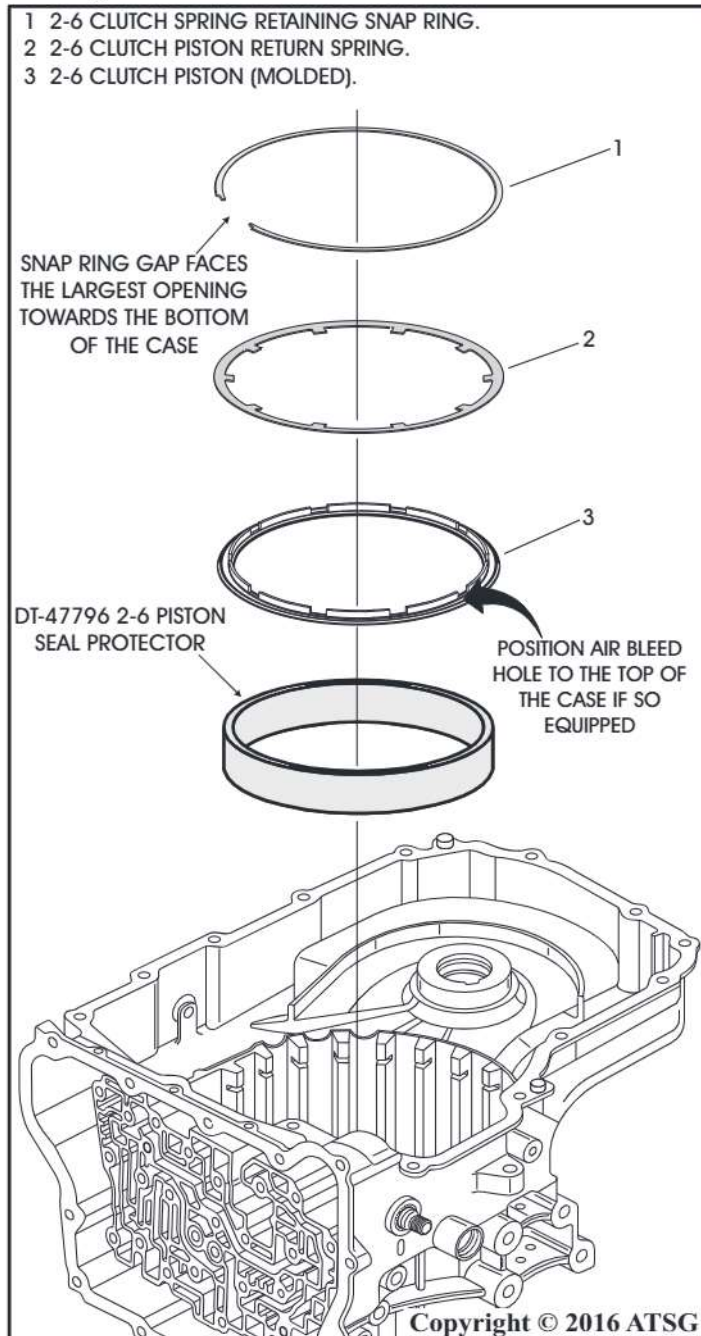


Figure 151

39. Install the 2-6 clutch spring retaining snap ring on top of the 2-6 clutch piston return spring with the snap ring gap facing the largest opening towards the bottom of the case and install the DT-47797 spring installer on top of the spring as shown in Figure 152.
40. Position the DT-48056 spring compressor bridge and bolt it to the transmission case so the screw is centered over the spring installer as shown in Figure 152.
41. Compress the 2-6 clutch piston return spring until the 2-6 clutch spring retaining snap ring groove is visible and securely seat the snap ring into the groove and then remove the spring compressor.
42. Carefully air check the 2-6 piston assembly as shown in Figure 152 to insure correct operation, **do not exceed 40 psi.**

Continued on Page 106

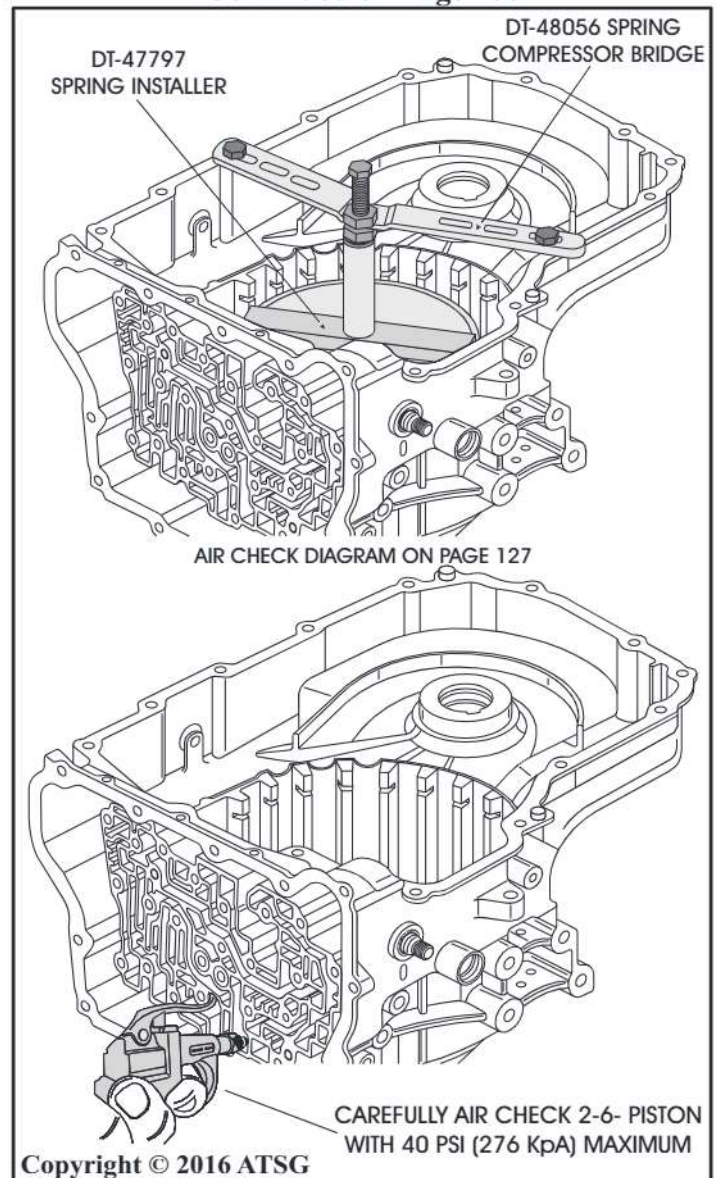


Figure 152

TRANSMISSION ASSEMBLY (CONT'D)

43. Attach the 3-5-R/4-5-6 clutch housing thrust bearing, See Figure 153, to the bottom of the 3-5-R/4-5-6 clutch drum housing with assembly gel.
44. Lubricate the 3-5-R/4-5-6 clutch housing support and sealing rings with transmission fluid.
45. Install the 3-5-R/4-5-6 clutch housing assembly into the transmission case as seen in Figure 153.

Continued on Page 107

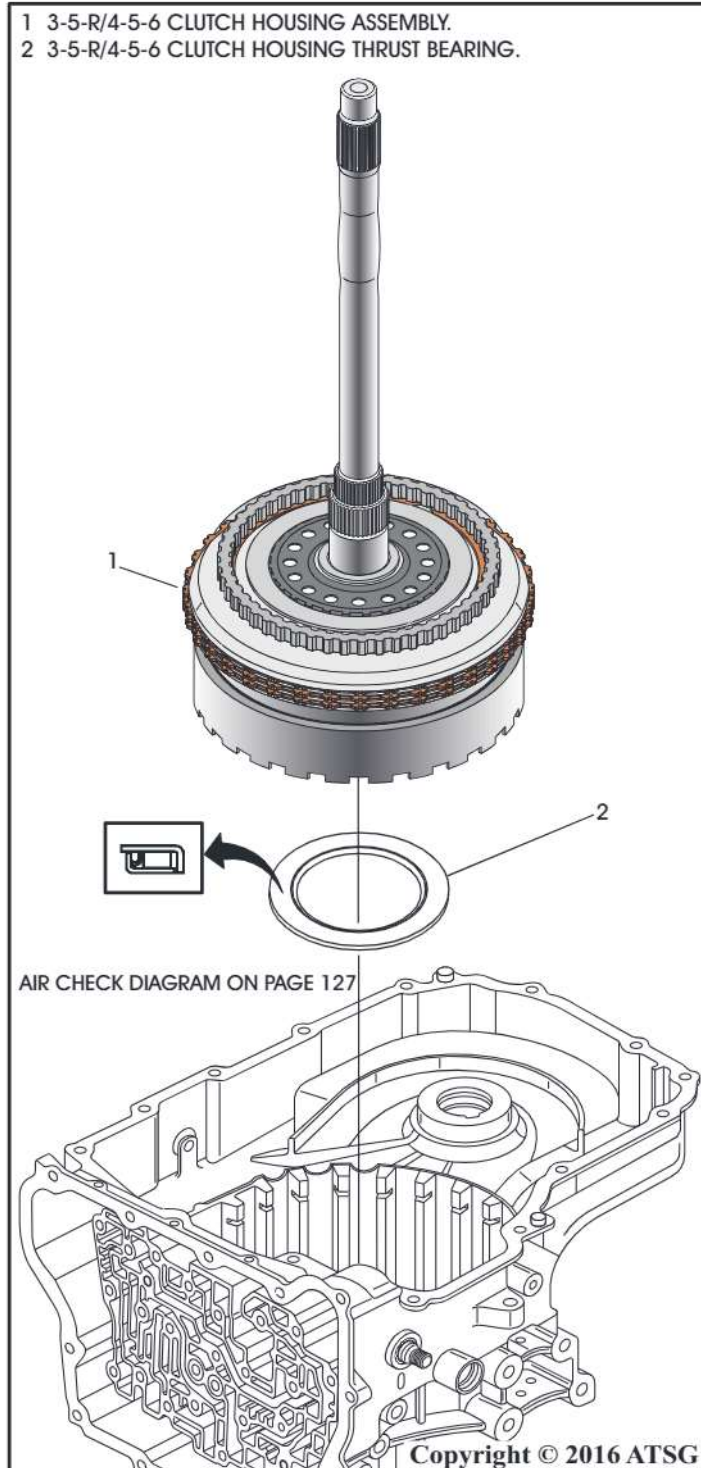


Figure 153

46. Install the 2-6 wave plate and one 2-6 steel plate as shown in Figure 154.
47. Install the reaction carrier sun gear thrust bearing on top of the 4-5-6 clutch hub as seen in Figure 154.
48. Install the reaction carrier sun gear assembly as seen in Figure 154.

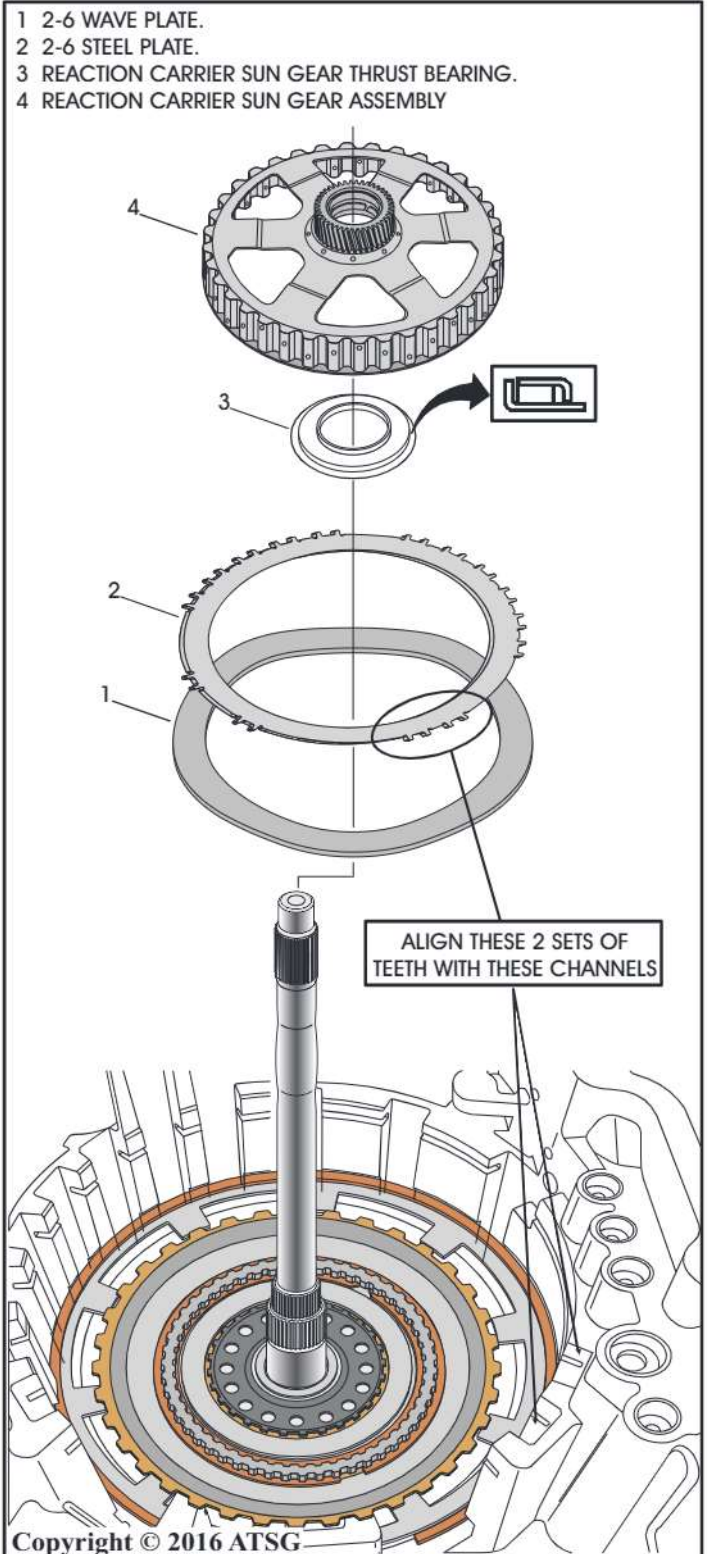


Figure 154

TRANSMISSION ASSEMBLE (CONT'D)

49. Check the operation of the low one-way clutch to be sure it freewheels in the direction shown in Figure 155 and locks in the other direction.

Continued on Page 108

50. Install the remainder of the 2-6 clutch pack by placing a 2-6 friction plate on top of the previously installed 2-6 steel plate, followed by a 2-6 steel plate, following the previous tooth orientation seen in Figure 154, and finally another 2-6 friction plate as shown in Figure 156.
51. Install the low one-way clutch assembly following the orientation shown in Figure 156. Make certain it goes all the way down against the 2-6 clutch pack.

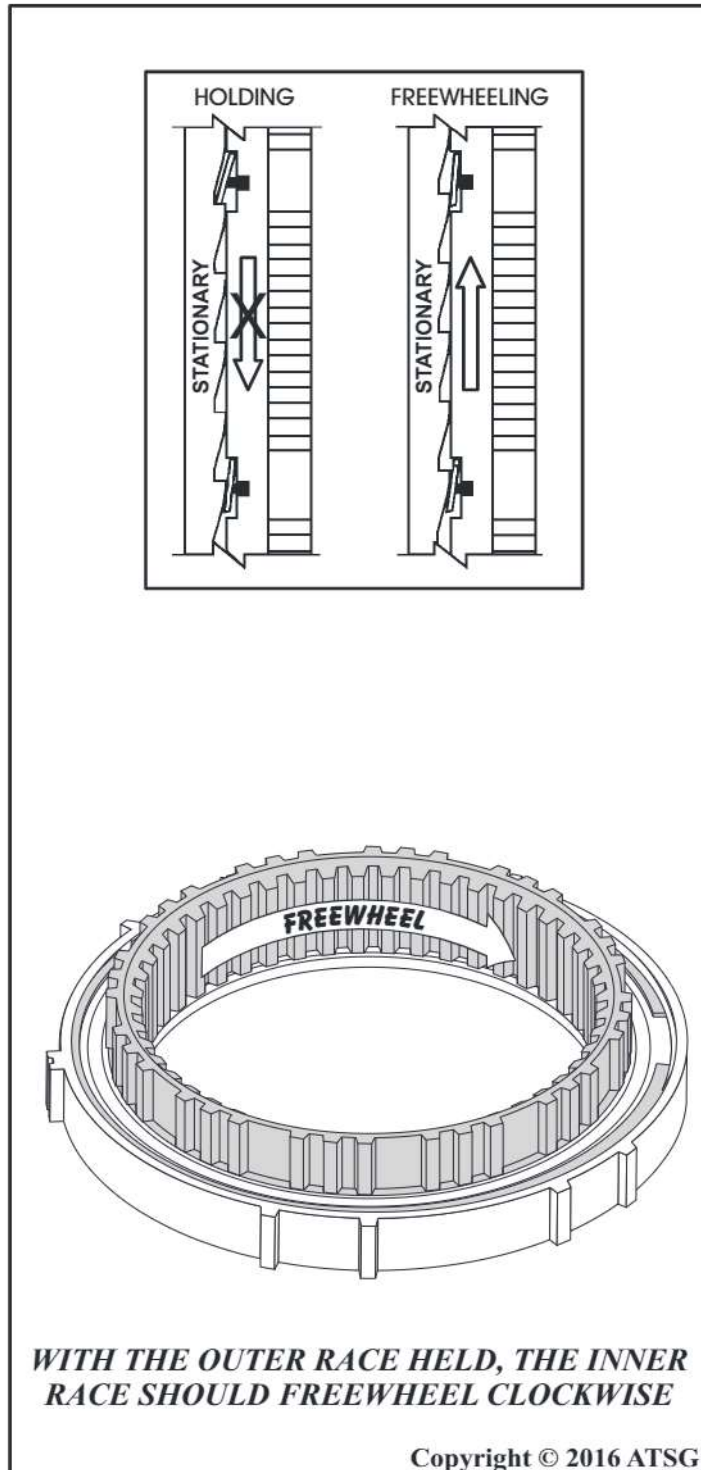


Figure 155

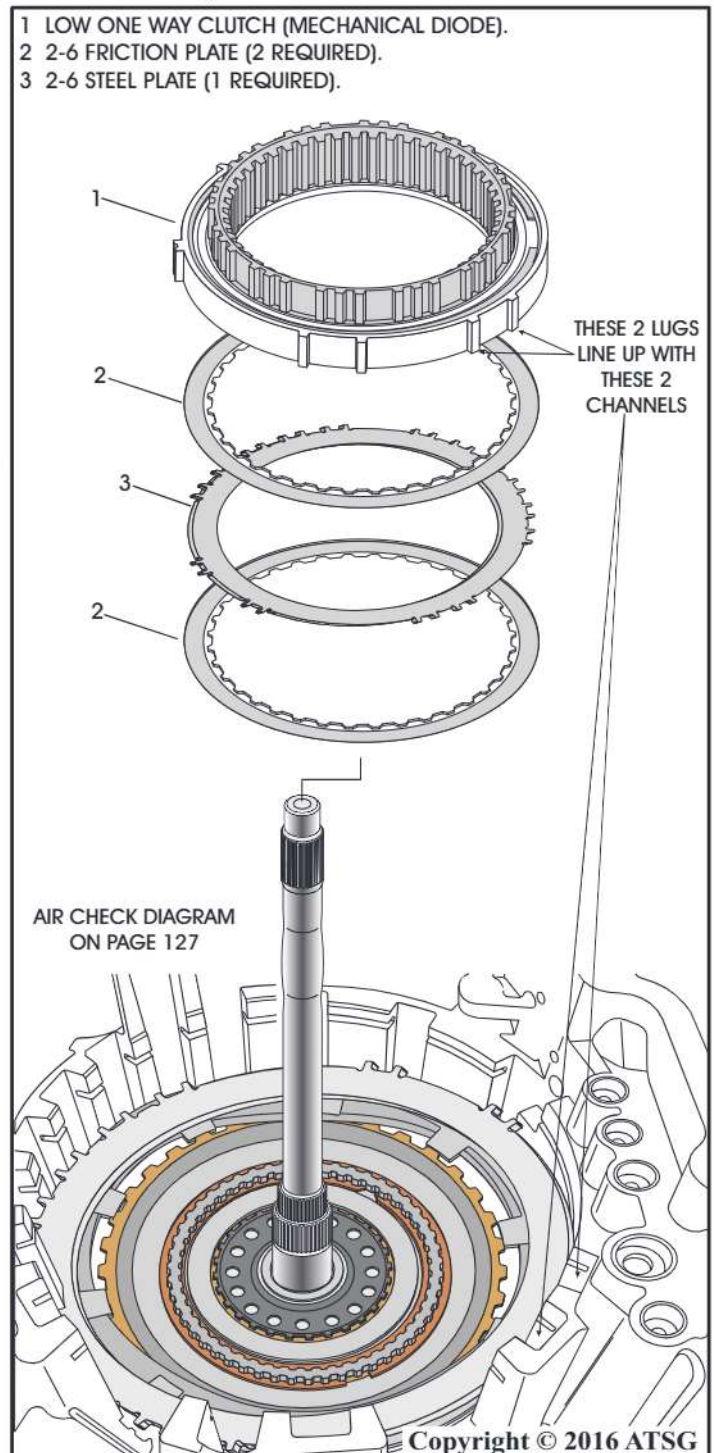


Figure 156

TRANSMISSION ASSEMBLY (CONT'D)

52. Install the reaction carrier into the low one-way clutch splines as seen in Figure 157.
53. Lubricate and install the input carrier thrust bearing and input sun gear thrust bearing as seen in Figure 157.

Continued on Page 109

54. Install the input carrier, and the input sun gear as seen in Figure 157.
55. Lubricate and install the input sun gear thrust bearing and the output carrier thrust bearing as seen in Figure 157.
56. Install the output carrier as shown in Figure 157.

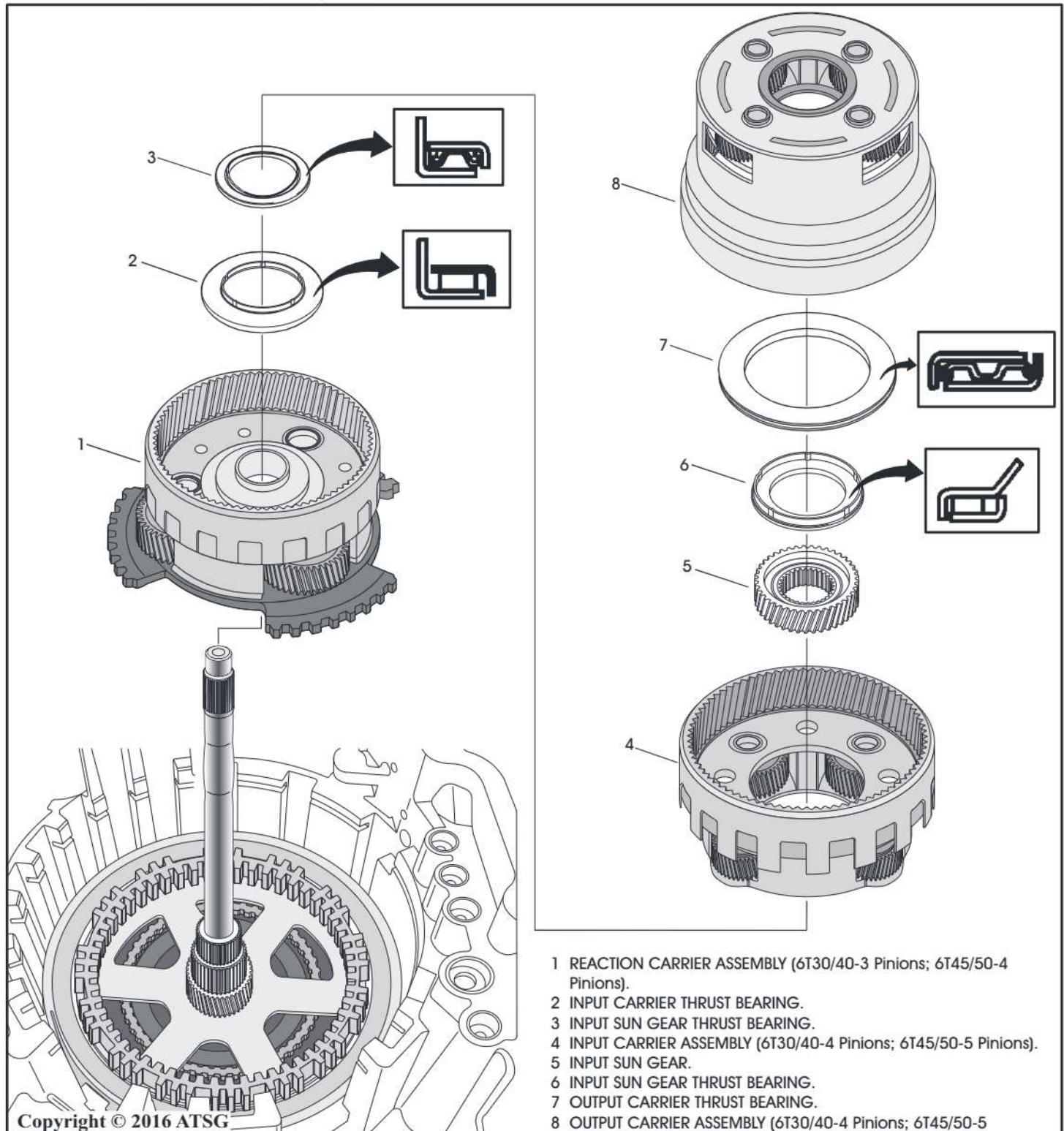


Figure 157

TRANSMISSION ASSEMBLY (CONT'D)

57. Install the low/reverse backing plate as shown in Figure 158.

NOTE: The low/reverse backing plate has a step which faces down.

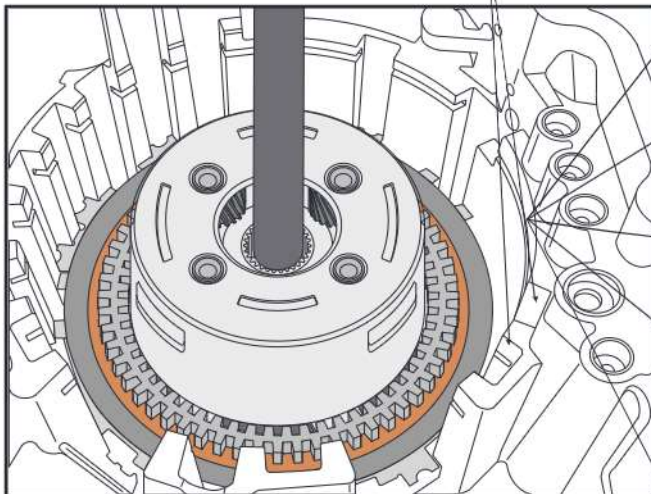
58. Starting with a low/reverse friction plate, alternate with a low/reverse steel plate until three friction and three steel plates have been installed. Finish by installing the low/reverse waved plate on top as shown in Figure 158.

Note: Be certain to install all low/reverse steel plates with the wide lug to the wide opening in the case which faces the valve body end EXCEPT the wave plate end as shown in Figure 158.

Continued on Page 110

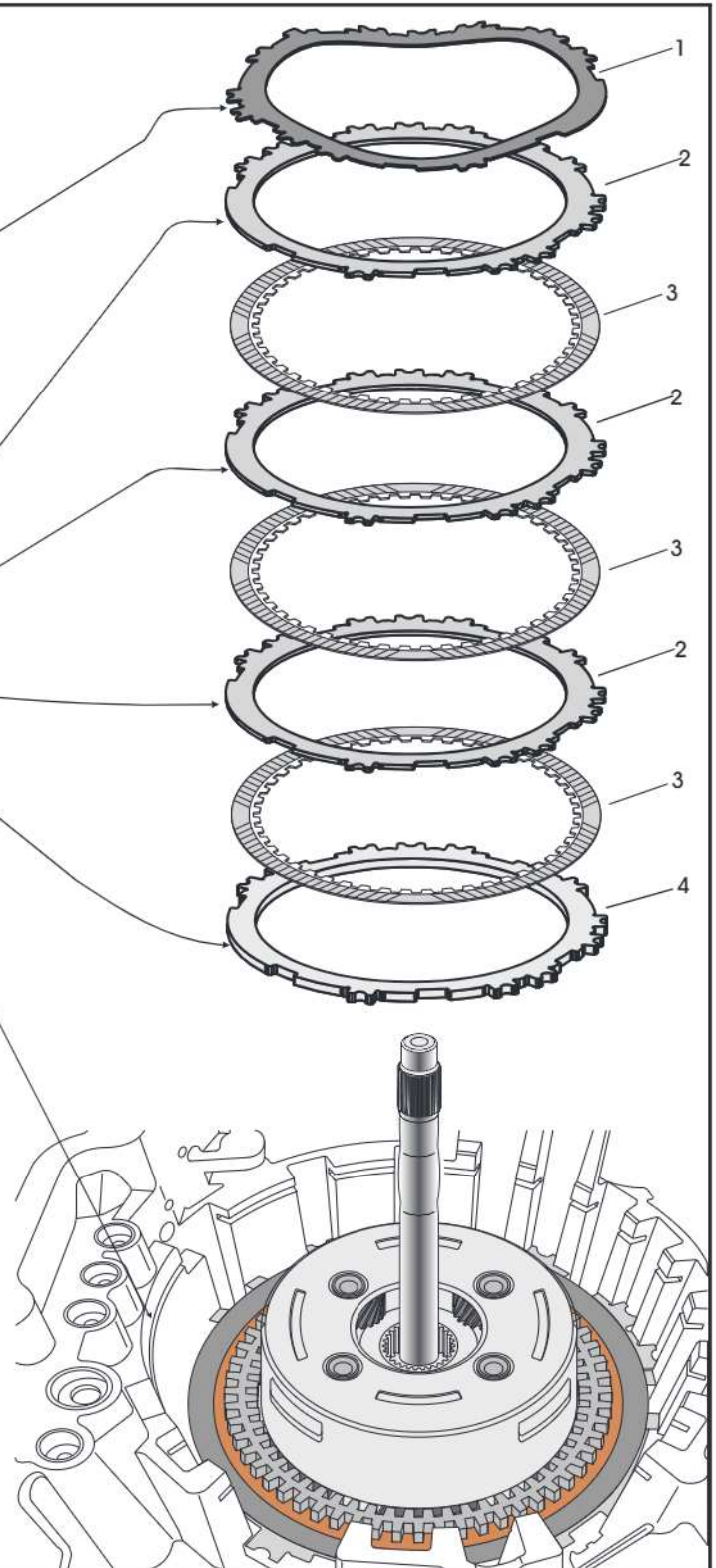
- 1 LOW/REVERSE WAVE PLATE.
- 2 LOW/REVERSE STEEL PLATE (3 REQUIRED).
- 3 LOW/REVERSE FRICTION PLATE (3 REQUIRED).
- 4 LOW/REVERSE BACKING PLATE.

ALIGN THESE 2 LUGS
WITH THESE CHANNELS



AIR CHECK DIAGRAM ON PAGE 127

WITH THE FLUID DRAIN PLUG TOWARDS YOU THE STEEL PLATE WIDE LUG SHOULD BE AT THE WIDE OPENING IN THE CASE ADJACENT THE CONVERTER HOUSING SEALS.



TRANSMISSION ASSEMBLY (CONT'D)

59. Install the 1-2-3-4/Low Reverse clutch housing with the narrow lug lined up with the narrow notch in the transmission case as shown in Figure 159.

60. Make certain that the output sun gear assembly support bushing is in good condition. replace if necessary with an aftermarket bushing kit.
61. Install the output sun gear assembly. Refer to Figure 160.

Continued on Page 111

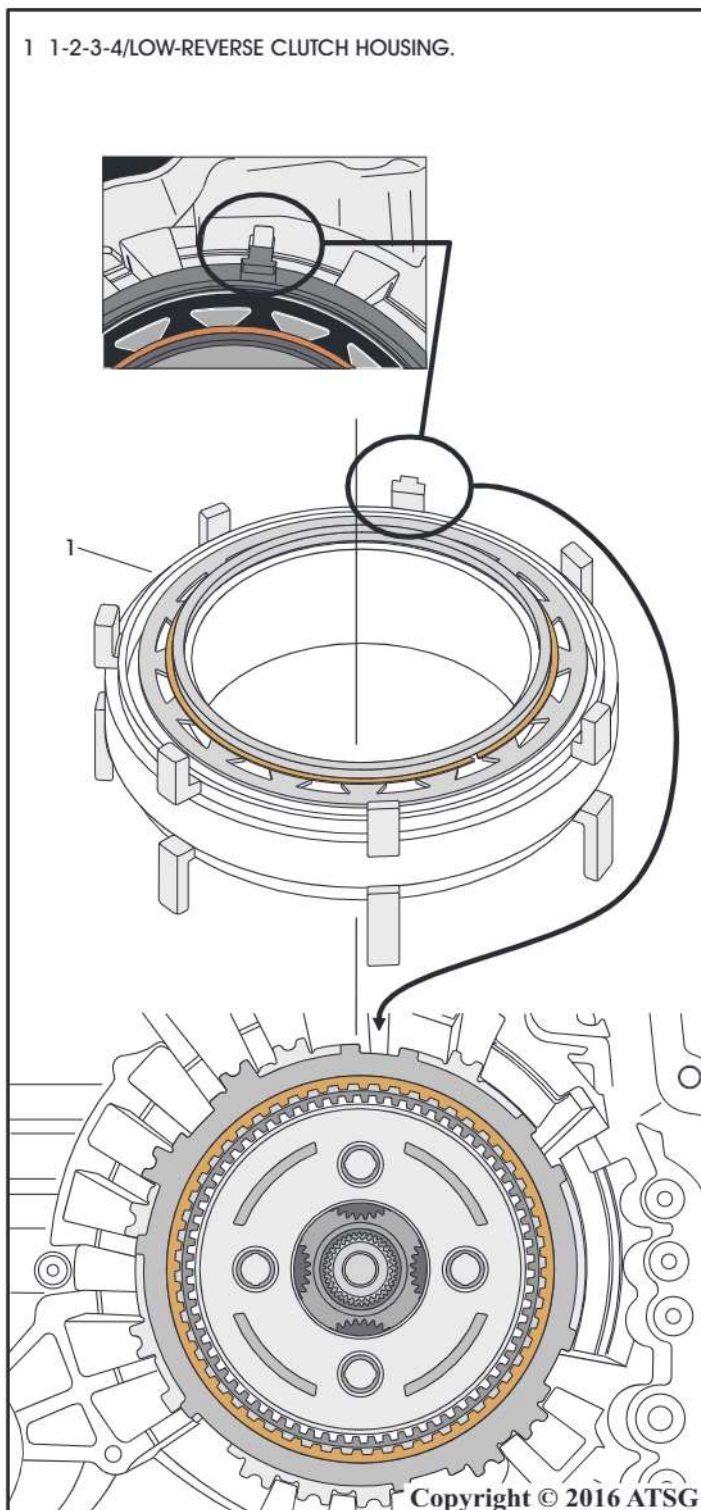


Figure 159

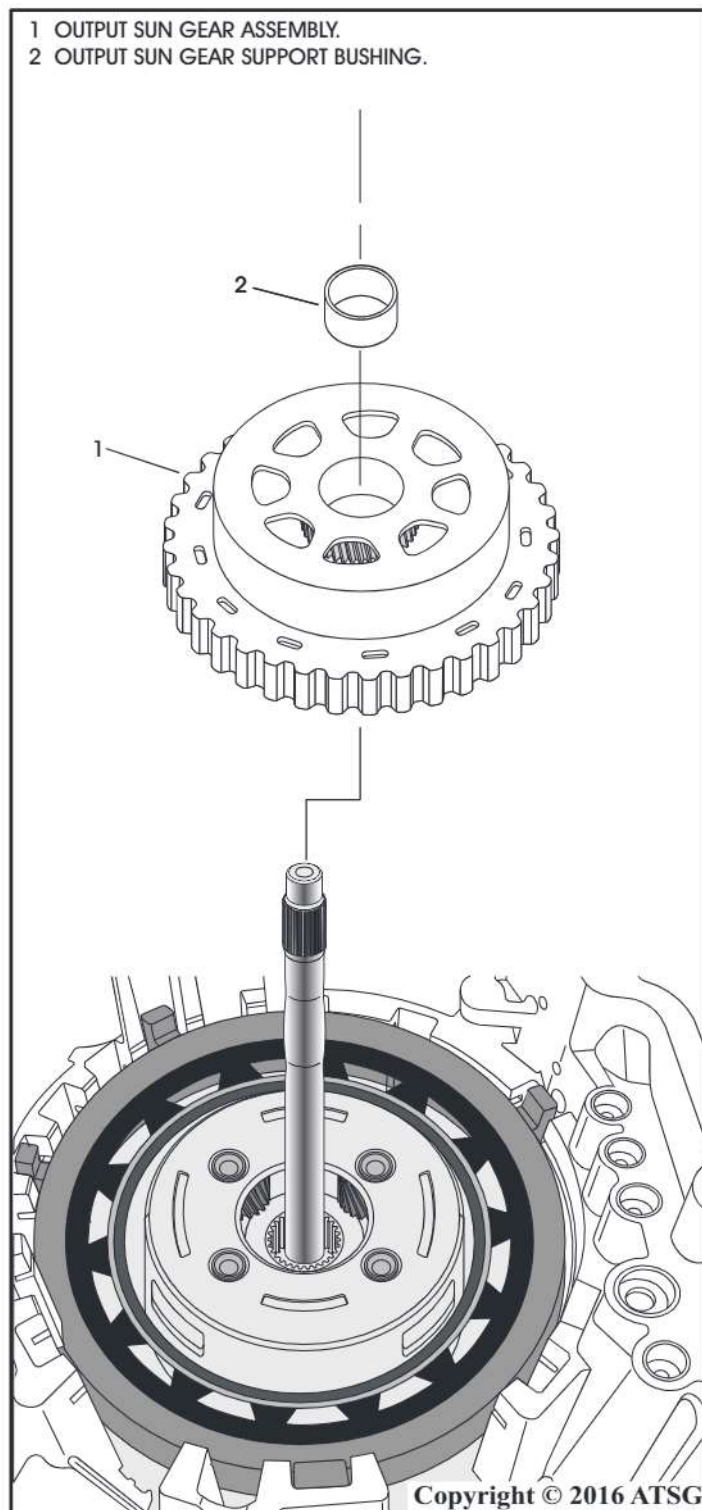


Figure 160

TRANSMISSION ASSEMBLY (CONT'D)

62. Install the 1-2-3-4 clutch wave plate as seen in Figure 161.
63. Load the 1-2-3-4 clutch pack by installing a steel plate followed by alternating friction and steel plates until two steel plates and two friction plates have been installed as seen in Figure 161.

Note: Be certain to install all 1-2-3-4 steel and friction plates with the wide lug to the wide opening in the case which faces the valve body end as shown in Figure 161.

Continued on Page 112

- 1 1-2-3-4 WAVED PLATE.
- 2 1-2-3-4 STEEL PLATES (2 REQUIRED).
- 3 1-2-3-4 FRICTION PLATES (2 REQUIRED).

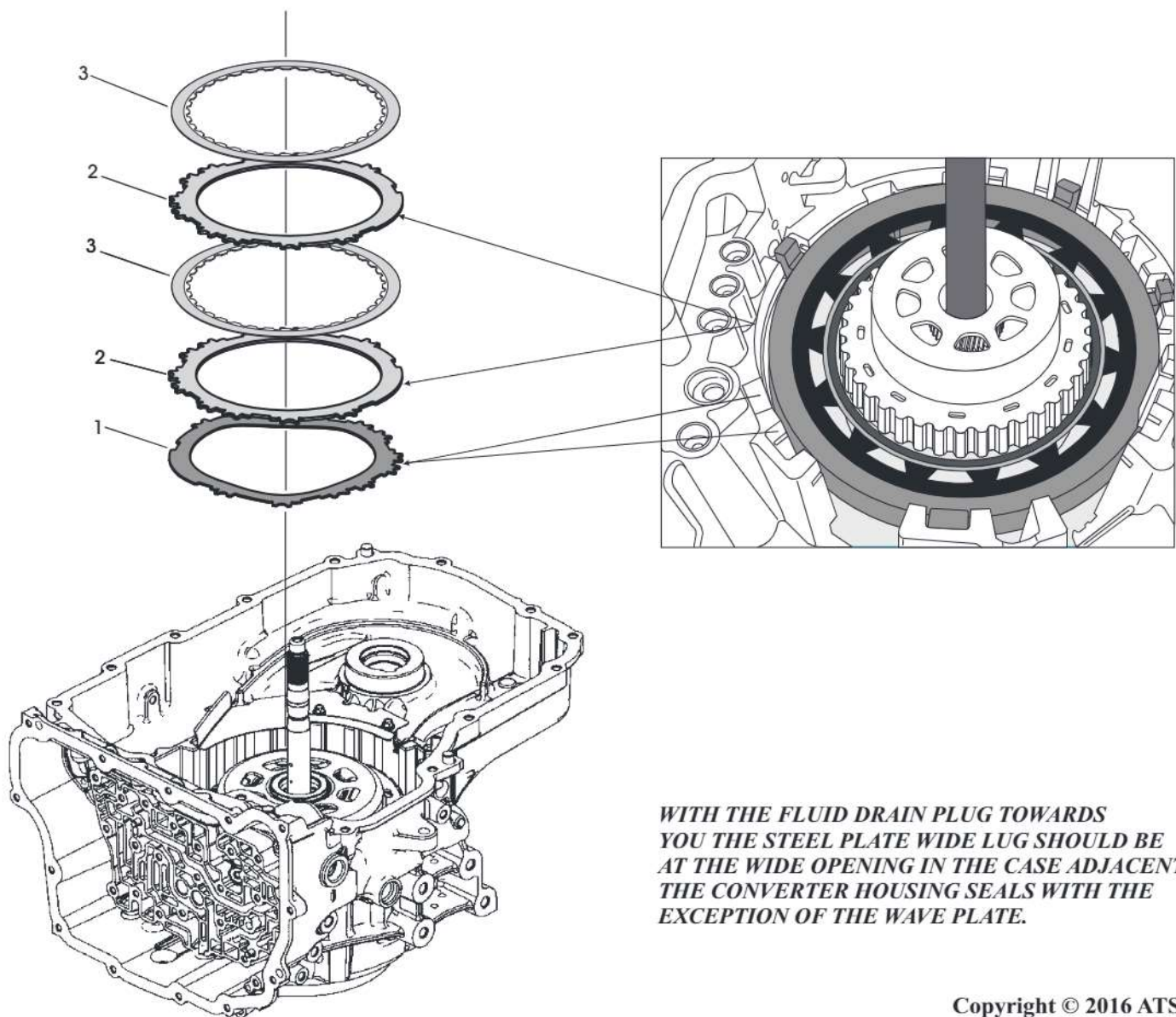


Figure 161

TRANSMISSION ASSEMBLE (CONT'D)

64. When installing the 1-2-3-4 clutch backing plate, be sure to align the **BLUE** punch mark with the opening in the case adjacent to the converter housing seal location shown in Figure 162.

*Note: If the 1-2-3-4 backing plate does not have the **Blue** punch mark, use the wide lug to wide opening in the case adjacent to the oil feed passages the same as the 1-2-3-4 steel plate installation.*

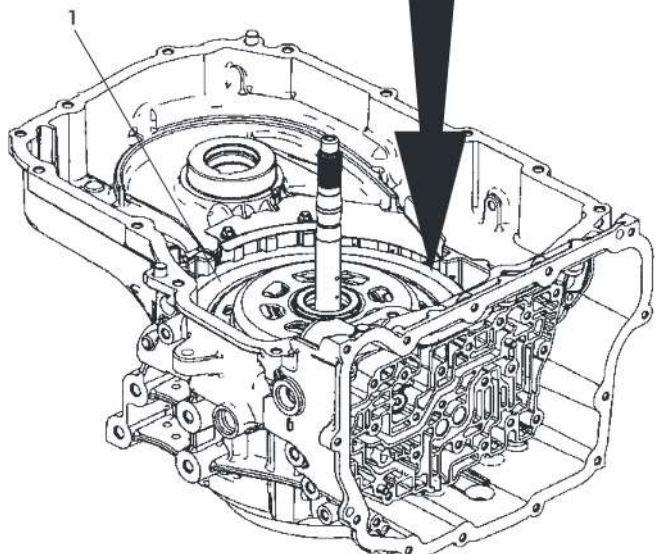
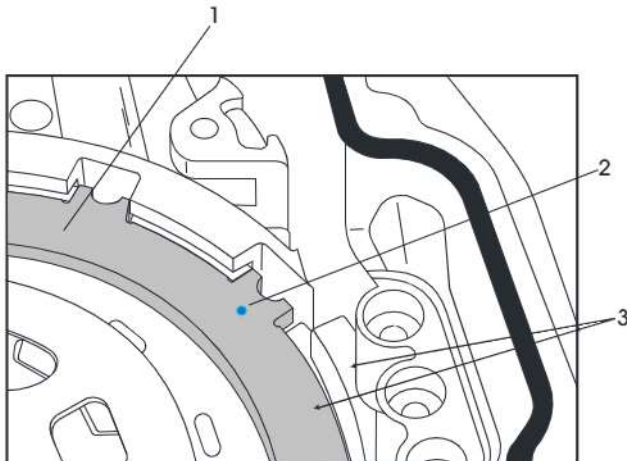
65. When installing the 1-2-3-4 clutch backing plate retaining snap ring, position the snap ring gap towards the wide opening which faces the bottom of the case as seen in Figure 163 using a long flat bladed tool taking care not to pry in the park pawl area of the case which could result in the park pawl to bind.

Note: The 1-2-3-4 clutch backing plate retaining snap ring is tapered, install the taper away from the backing plate as shown in Figure 163.

Exercise care when installing the snap ring as it has a great deal of tension.

Continued on Page 113

- 1 1-2-3-4 CLUTCH BACKING PLATE.
- 2 BLUE ORIENTATION PUNCH MARK.
- 3 1-2-3-4 CLUTCH BACKING PLATE SPACE TO CASE WIDE OPENING.

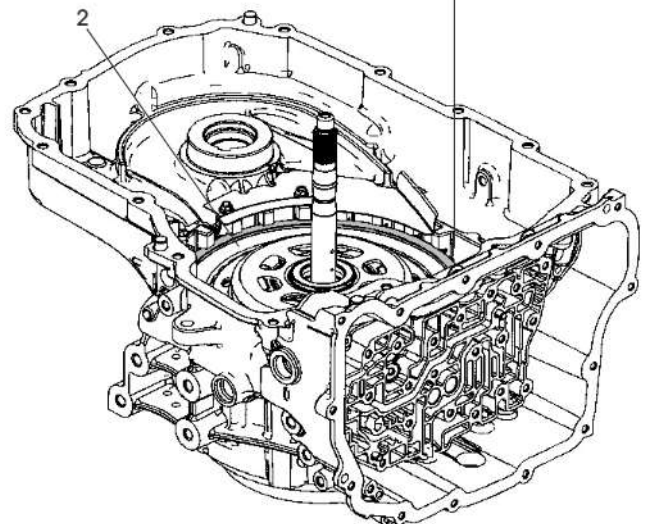
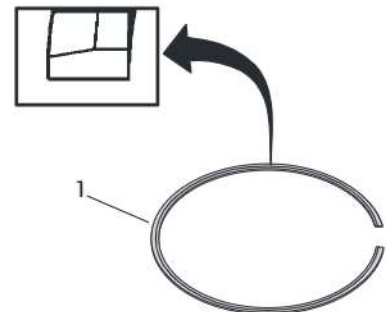


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Figure 162

- 1 1-2-3-4 CLUTCH BACKING PLATE RETAINING SNAP RING.
- 2 1-2-3-4 CLUTCH BACKING PLATE.

AIR CHECK DIAGRAM ON PAGE 127



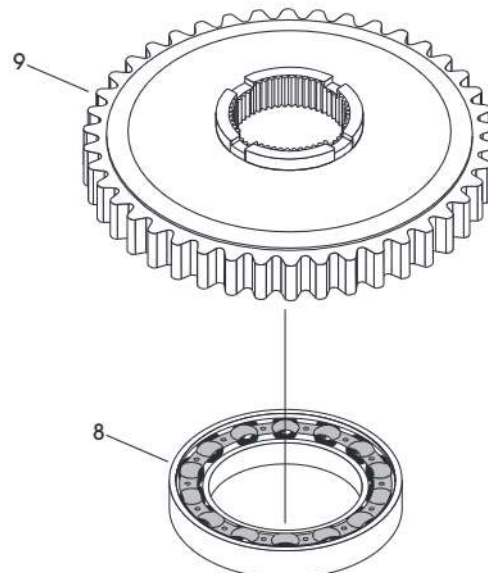
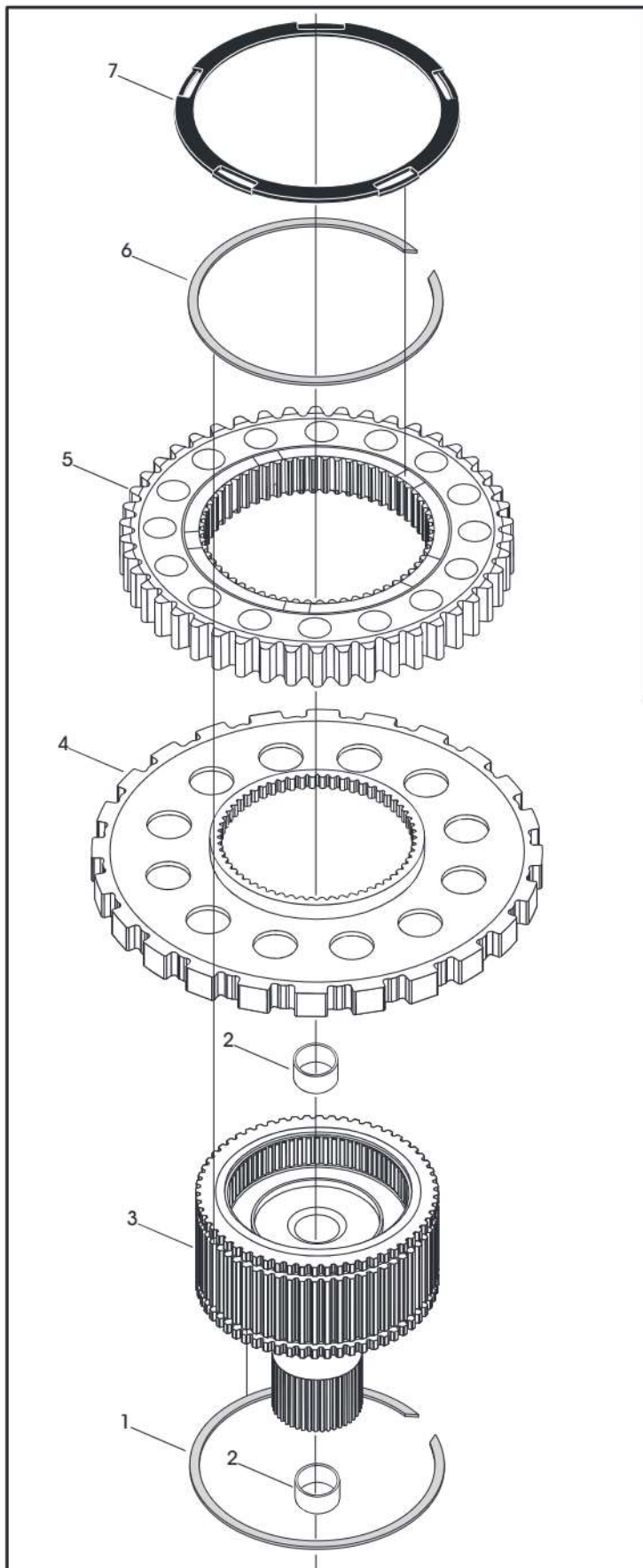
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Figure 163

TRANSMISSION ASSEMBLY (CONT'D)

66. Inspect the sprocket hub bushings shown in Figure 164 for wear or galling and replace as necessary.
67. Install the park gear support snap ring in the bottom snap ring groove on the sprocket hub as shown in Figure 164.
68. Install the park gear onto the sprocket hub splines with the raised center edge up as shown in Figure 164.
69. Install the drive sprocket on top of the park gear as seen in Figure 164.
70. Secure the assembly by installing the drive sprocket retaining snap ring into the sprocket hub upper snap ring groove as shown in Figure 164.
71. Install the drive sprocket thrust washer using a small amount of trans assembly gel into the notches in the drive sprocket as shown in Figure 164.
71. Check the condition of the driven sprocket ball bearing which is pressed into the bottom of the driven sprocket as seen in Figure 164, replace if necessary.

Continued on Page 114



- 1 PARK GEAR SUPPORT SNAP RING.
- 2 DRIVE SPROCKET HUB BUSHING.
- 3 DRIVE SPROCKET HUB.
- 4 PARK GEAR.
- 5 DRIVE SPROCKET.
- 6 DRIVE SPROCKET RETAINING SNAP RING.
- 7 DRIVE SPROCKET THRUST WASHER.
- 8 DRIVEN SPROCKET BALL BEARING.
- 9 DRIVEN SPROCKET.

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Figure 164

TRANSMISSION ASSEMBLY (CONT'D)

- 1 FRONT DIFFERENTIAL CARRIER BAFFLE (6T30).
- 1 FRONT DIFFERENTIAL CARRIER BAFFLE (6T40, 6T45, 6T50).
- 2 FRONT DIFFERENTIAL CARRIER BAFFLE BOLTS M6X16 (2 REQUIRED).
- 3 DRIVE LINK LUBE SCOOP SEAL.
- 4 DRIVE LINK SCOOP.
- 5 DRIVE LINK LUBE FLUID SEAL.
- 6 DRIVEN SPROCKET BEARING.
- 7 DRIVE SPROCKET BEARING.
- 8 DRIVEN, DRIVE SPROCKET & CHAIN ASSEMBLY (1.00" WIDE 6T30/40).
- 8 DRIVEN, DRIVE SPROCKET & CHAIN ASSEMBLY (1.25" WIDE 6T45/50).
- 9 PARK PAWL.
- 10 PARK PAWL SPRING.
- 11 PARK PAWL PIN.

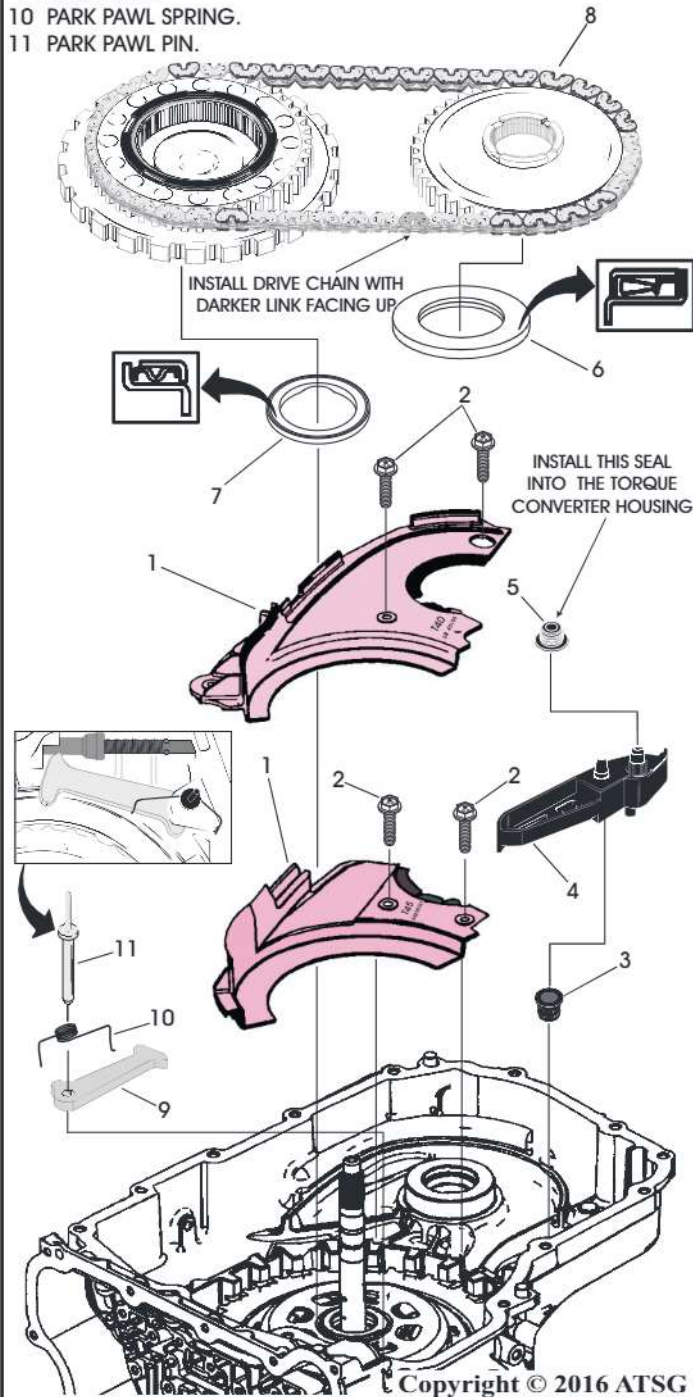


Figure 165

72. Install the front differential carrier baffle and torque the baffle bolts to 106 lb. in. (12 N·m) as seen in Figure 165.
73. Install the drive link lube scoop fluid seal into the transmission case as seen in Figure 165.
74. Install the drive link scoop. Install the drive link lube fluid seal into the torque converter housing as shown on Page 116, Figure 169. Install the park pawl, spring, (See Insert), and pin as seen in Figure 165.
75. Lubricate and install the driven sprocket bearing onto the transmission case and the driven sprocket bearing over the input shaft onto the output sun gear as shown in Figure 165.
76. Install the sprocket and drive chain as an assembly with the darker link facing up as shown in Figure 165.
77. Install the pump stator to drive sprocket hub thrust bearing as shown in Figure 166.
78. Install the final drive sun gear into the driven sprocket splines, the sun gear to differential carrier bearing, the assembled final drive carrier and the front differential carrier bearing as shown in Figure 166, lubricate all bearings.

Continued on Page 115

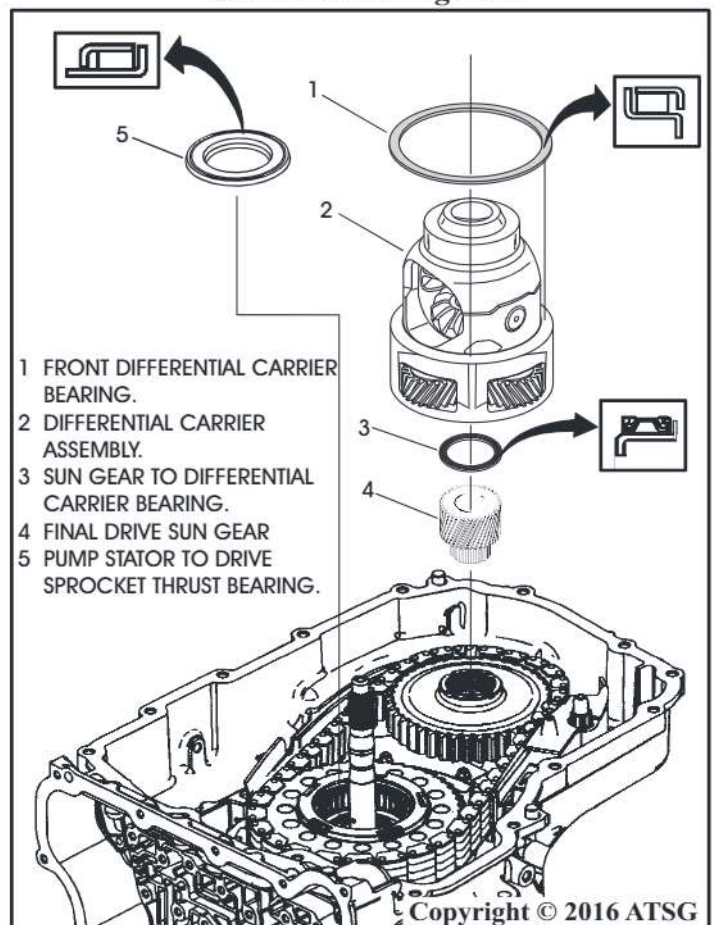


Figure 166

TRANSMISSION ASSEMBLE (CONT'D)

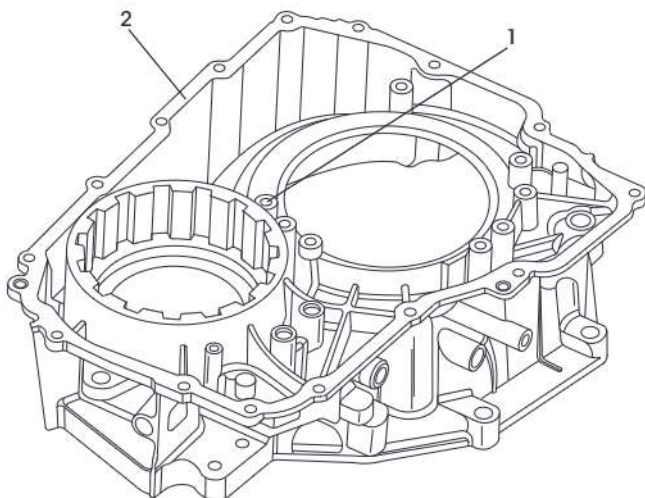
79. After the torque converter housing has been cleaned and dried, inspect all threaded holes, Refer to Figure 167, in the torque converter housing for stripped or otherwise damaged threads.
80. Repair any damaged threads with a thread repair kit.
81. Inspect the torque converter housing gasket sealing surface, Refer to Figure 167, for damage that could result in a leak.

Note: Do not use abrasive cleaning devices on the gasket sealing surface, they can remove enough metal to cause a leak.

82. Install a new axle support bushing into the torque converter housing as seen in Figure 168.
83. Install a new axle oil seal into the torque converter housing as seen in Figure 168.

Continued on Page 116

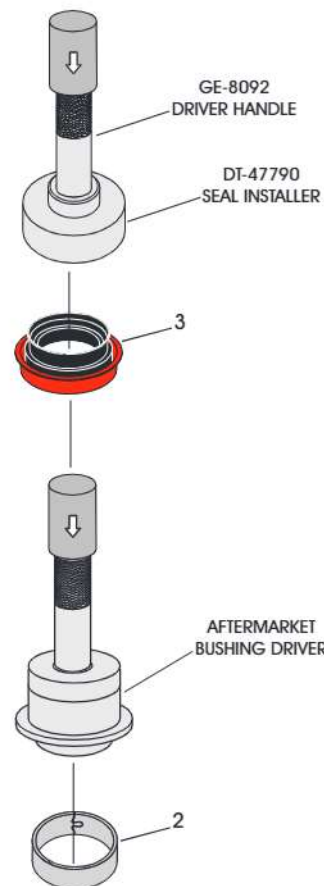
- 1 THREADED HOLES.
- 2 GASKET SEALING SURFACE.



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Figure 167

- 1 TORQUE CONVERTER HOUSING.
- 2 AXLE SUPPORT BUSHING.
- 3 AXLE OIL SEAL.



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Figure 168

TRANSMISSION ASSEMBLE (CONT'D)

84. Install a new fluid pump to torque converter housing seal onto the pump assembly seen in Figure 169.
85. Install the fluid pump and filter assembly into the torque converter housing as seen in figure 169.
86. Install the eight pump assembly bolts and torque them to 89 lb. in (10 N·m) plus an additional 45° turn on each bolt using the tightening sequence shown in Figure 169 and the EN-45059 Angle Meter.

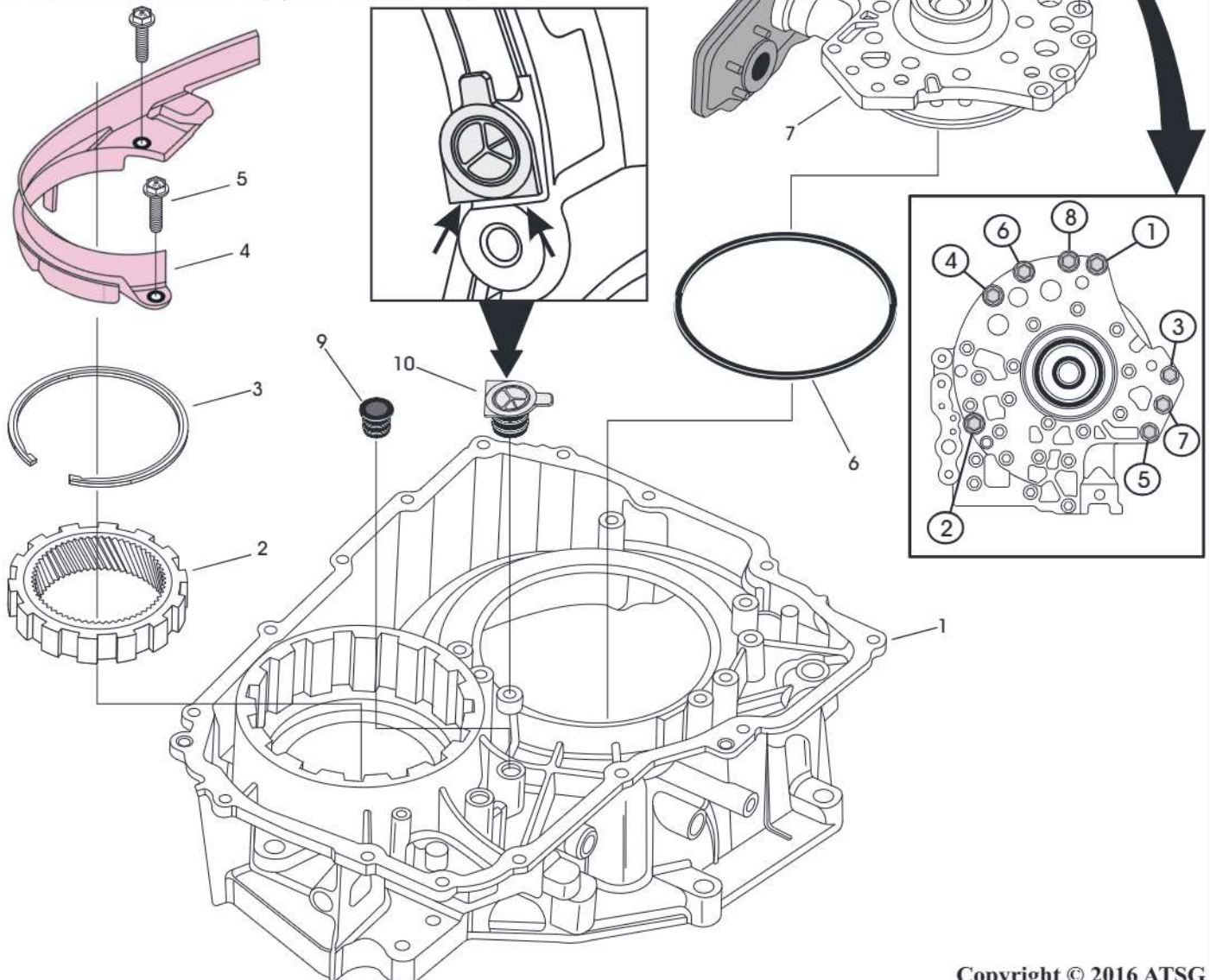
87. Install the auxiliary fluid inlet pump seal on BAS Hybrid models only as shown in Figure 169.
88. Install the front differential ring gear and front differential ring gear retaining snap ring as seen in Figure 169.

Note: *The front differential ring gear snap ring is tapered, install with the taper facing away from the ring gear.*

89. Install the front differential carrier baffle and bolts and torque to 106 lb. in (12 N·m) as seen in Figure 169.

Continued on Page 117

- 1 TORQUE CONVERTER HOUSING.
- 2 FRONT DIFFERENTIAL RING GEAR.
- 3 FRONT DIFFERENTIAL RING GEAR RETAINER.
- 4 FRONT DIFFERENTIAL CARRIER BAFFLE.
- 5 FRONT DIFFERENTIAL CARRIER BAFFLE BOLTS M6X25 (2 REQUIRED).
- 6 FLUID PUMP TO TORQUE CONVERTER HOUSING SEAL.
- 7 FLUID PUMP ASSEMBLY.
- 8 FLUID PUMP ASSEMBLY BOLTS M8X33 (8 REQUIRED).
- 9 DRIVE LINK LUBE SCOOP SEAL (Refer to Page 114, Figure 165).
- 10 AUXILIARY FLUID INLET PUMP SEAL (HYBRID MODELS ONLY).



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Figure 169

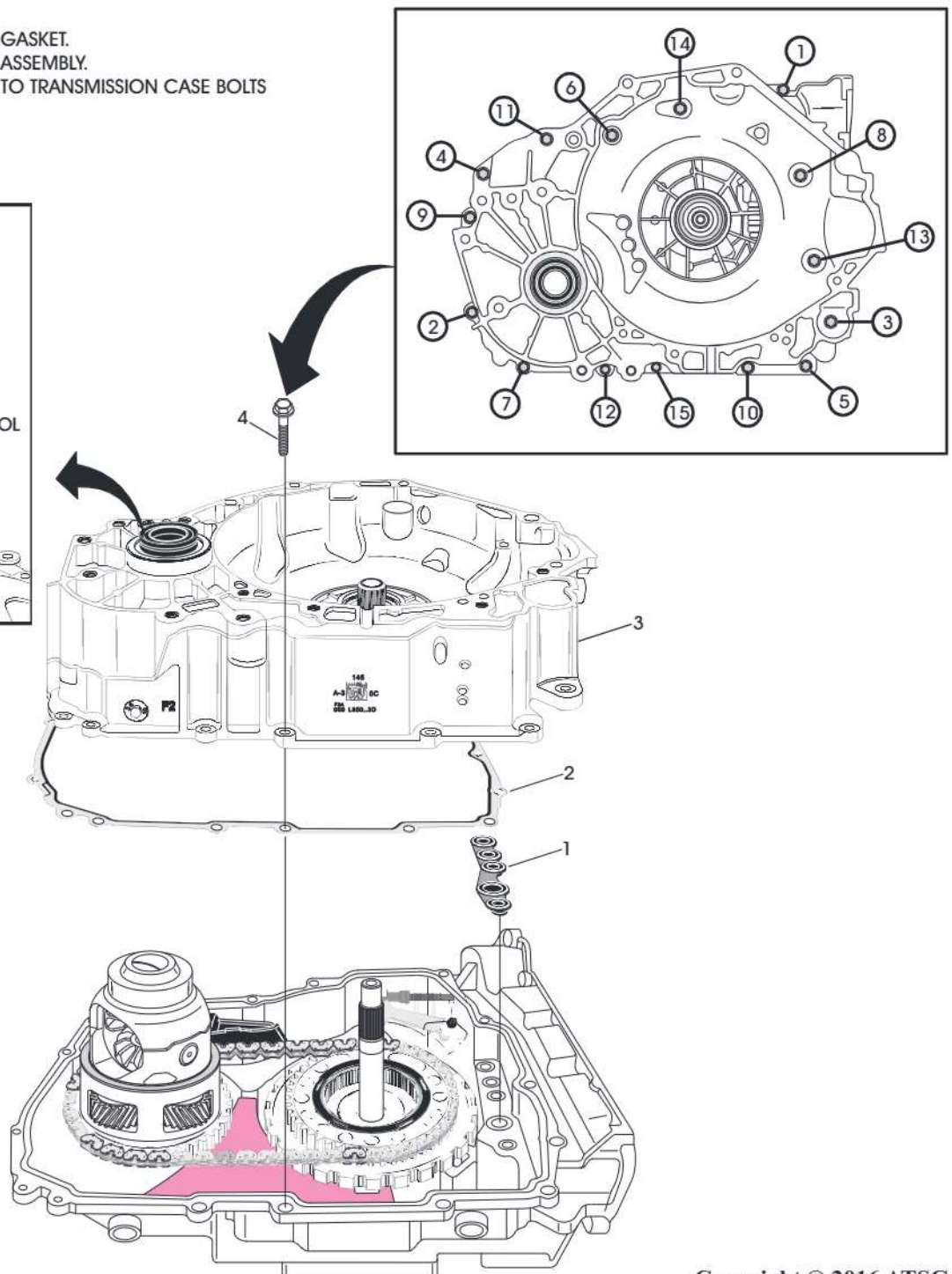
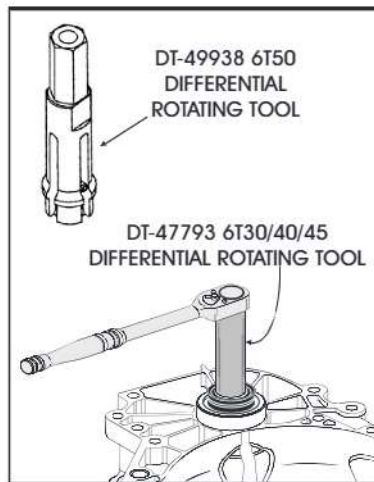
TRANSMISSION ASSEMBLY (CONT'D)

90. Install the fluid pump seal assembly into the transmission case as shown in Figure 170.
91. Install a new torque converter housing to transmission case gasket as seen in Figure 170.
92. Install the torque converter housing assembly onto the transmission case shown in Figure 170.

Continued on Page 118

93. If the torque converter housing will not drop all the way down to the transmission case, a differential turning tool may be needed as shown in Figure 170.
94. Install the fifteen torque converter housing bolts and torque to 89 lb. in. (10 N·m) in the sequence shown in Figure 170. Give each bolt an additional 50° turn.

- 1 FLUID PUMP SEAL ASSEMBLY.
- 2 TORQUE CONVERTER HOUSING GASKET.
- 3 TORQUE CONVERTER HOUSING ASSEMBLY.
- 4 TORQUE CONVERTER HOUSING TO TRANSMISSION CASE BOLTS M8X30 (15 REQUIRED).



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Figure 170

TRANSMISSION ASSEMBLE (CONT'D)

95. Install three new o-ring seals on the input speed sensor assembly as follows, two on the sensor end and one on the pass-through connector end as seen in Figure 171 and lubricate with transmission assembly gel.
 96. Install the input speed sensor assembly into the transmission case as seen in Figure 171, taking care to route the sensor wiring so it is in position to connect to the transmission control module once it is installed.
 97. Install the input speed sensor bolt and torque to 80 lb. in. (9 N·m).
 98. Install the output speed sensor assembly into the position shown in Figure 171.
- Note:** Be certain to route the output speed sensor wiring as shown in Figure 171 to avoid wire damage when the control valve body is installed.
99. Install the output speed sensor bolt and torque to 80 lb. in. (9 N·m).

Continued on Page 119

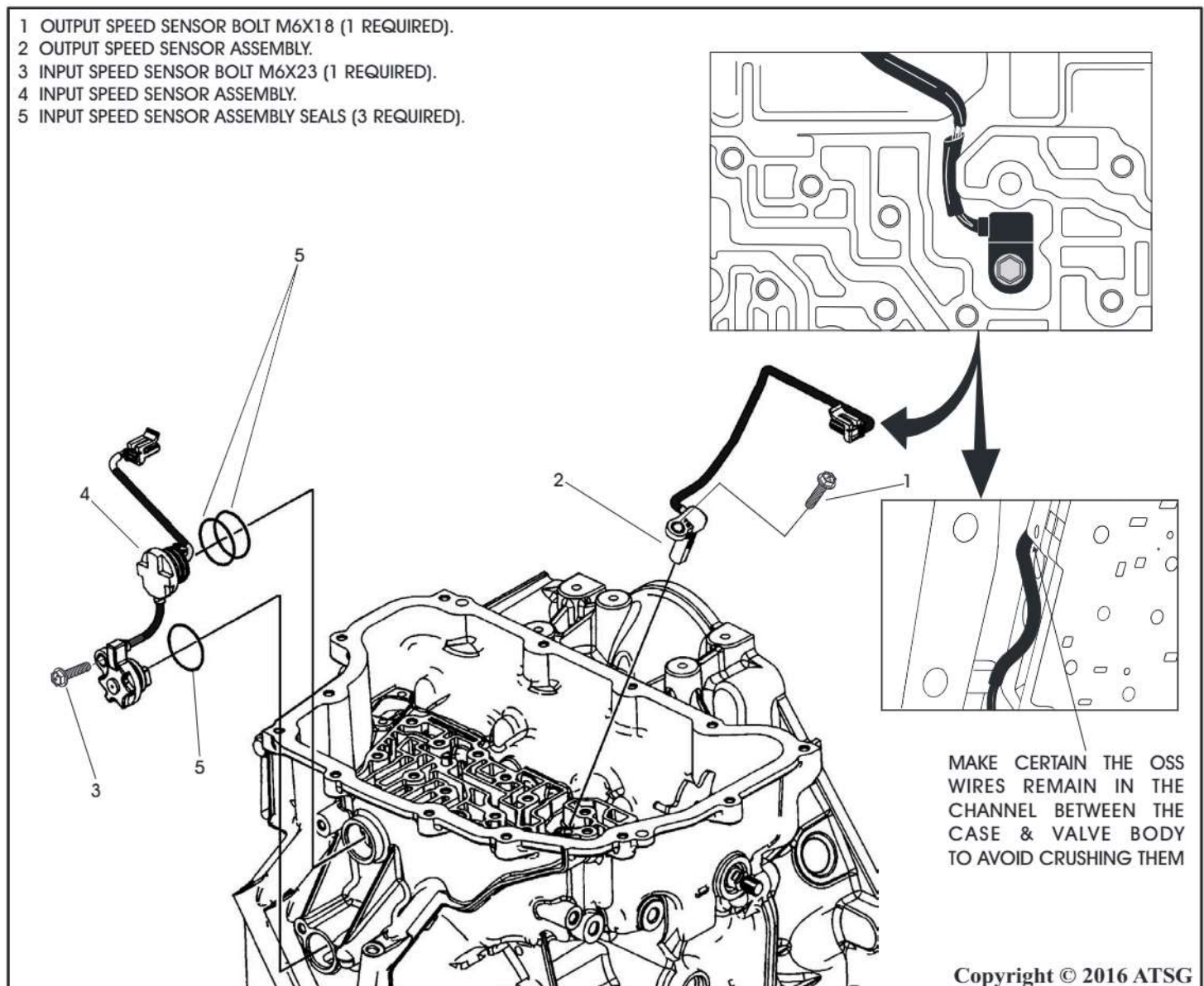


Figure 171

TRANSMISSION ASSEMBLE (CONT'D)

100. Install the manual shaft detent lever spring into the transmission case making certain that the detent roller indexes the detent lever as seen in Figure 172.
101. Install the low/reverse and 1-2-3-4 clutch fluid passage seals into their proper locations shown in Figure 172.
102. Install the fluid level control valve with a new gasket into the location shown in Figure 172.

Note: To insure proper operation of the fluid level control valve, the thermal valve should be closed when the control valve is below 140° F (60° C). When heated to at least 140° F (60° C) the thermal valve should open.

103. Install the control valve body spacer plate onto the transmission case as seen in Figure 172.

Note: Refer to bonded spacer plate reuse on Page 45.

104. Install the control valve body onto the spacer plate with the control solenoid valve support as seen in Figure 172 making certain that the manual valve has been correctly indexed to the detent lever pin.
105. Using the valve body bolt identification and tightening sequence shown in Figure 172 and torque all bolts to 97 lb. in (11 N·m).

Continued on Page 120

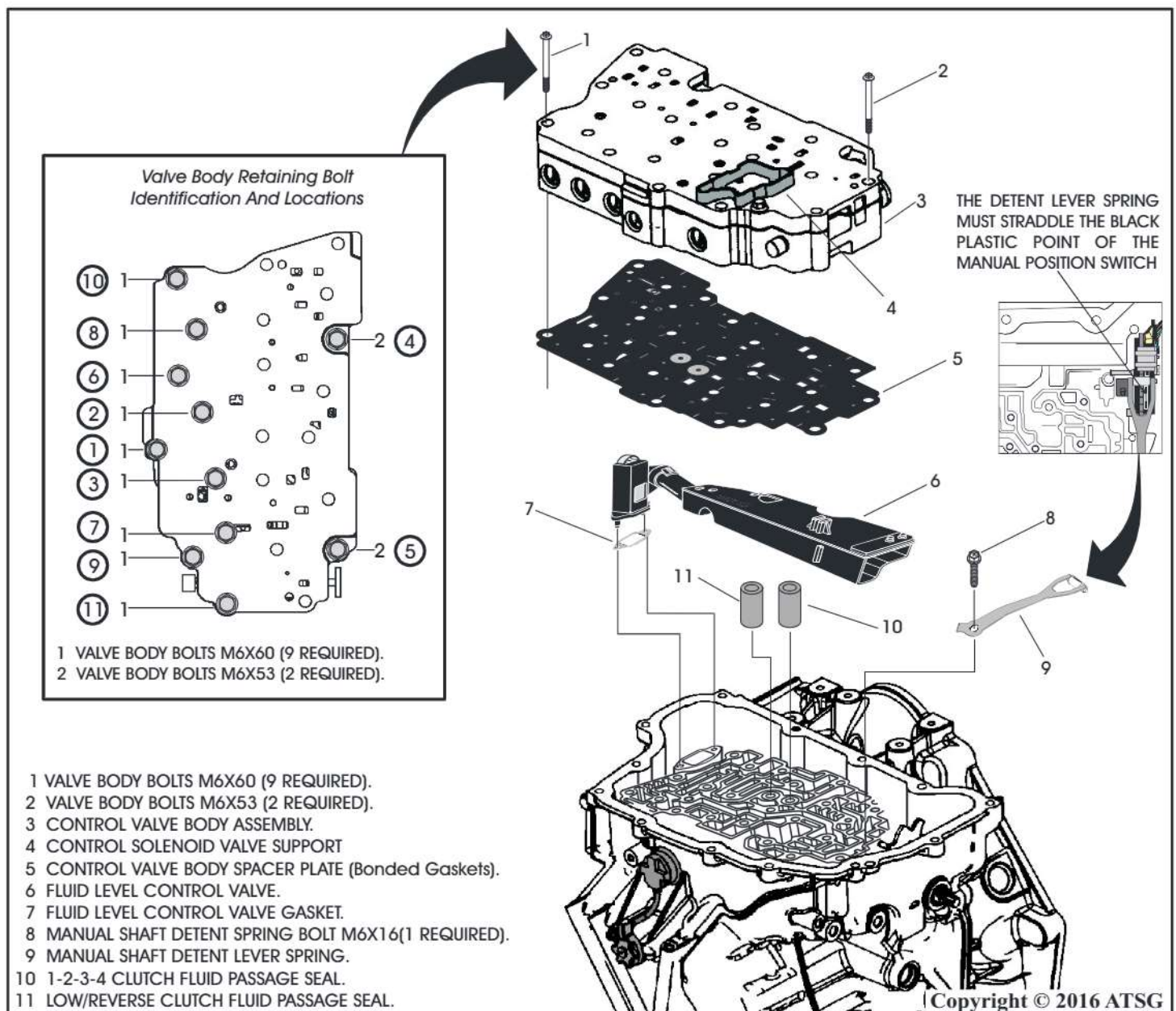


Figure 172

TRANSMISSION ELECTRONIC CONTROL HYDRAULIC MODULE (TECHM)

106. Remove the eight (8) Generation 1 Transmission Electronic Control Hydraulic Module (TECHM) cover screws and remove cover as seen in Figure 173.
107. The solenoid body can be removed at this time for solenoid testing as seen on Page 121.
108. Access to the fluid pressure switches is now possible for inspection and repairs as seen on Page 121.

109. Remove the eight (8) Generation 2 Transmission Electronic Control Hydraulic Module (TECHM) cover screws and remove cover as seen in Figure 174.

110. The solenoid body can be removed at this time for solenoid testing as seen on Page 121.

Note: *Generation 2 TECHM does not have pressure switches, the pressure switch pockets are present but are non-functional.*

Continued on Page 121

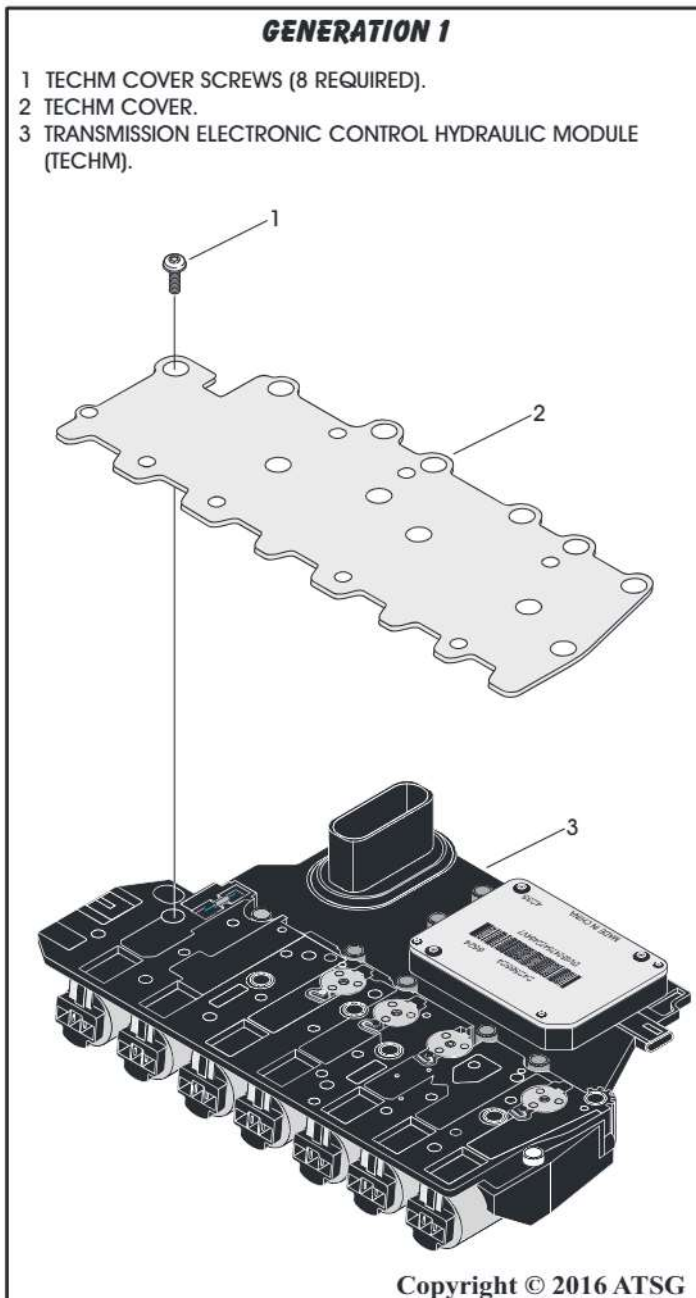


Figure 173

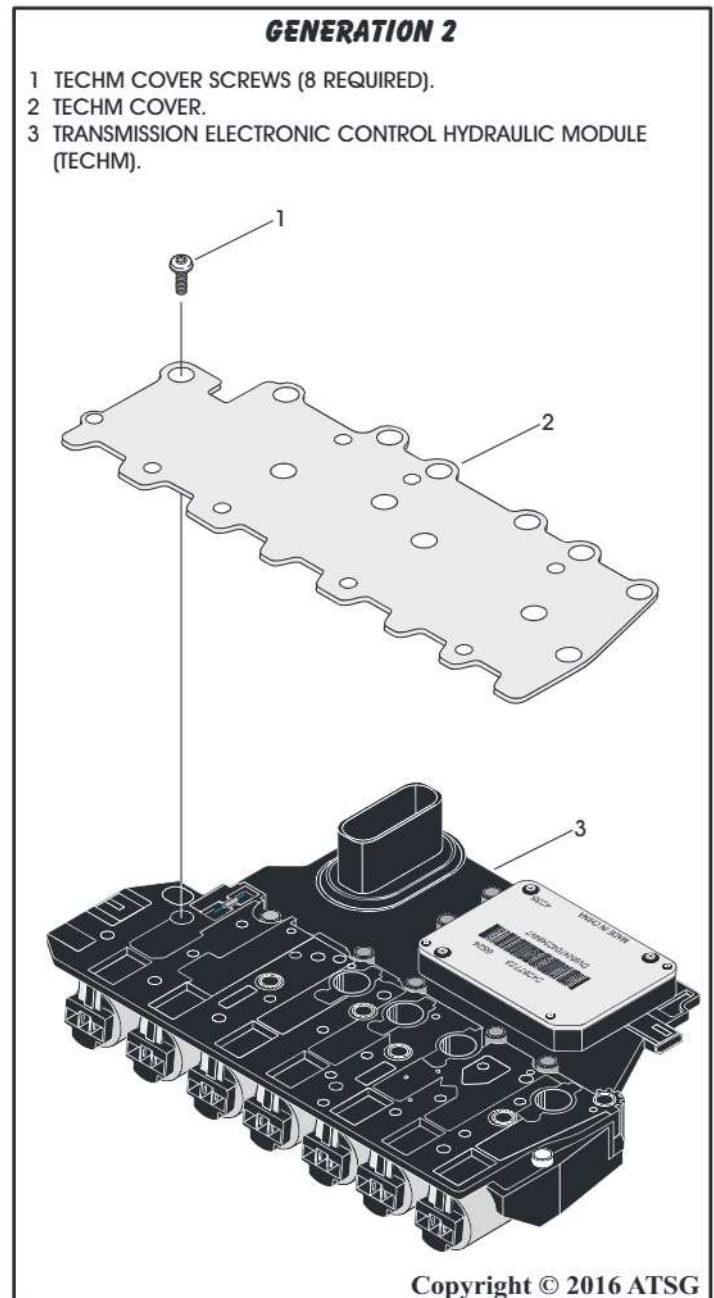


Figure 174

TRANSMISSION ELECTRONIC CONTROL HYDRAULIC MODULE (TECHM CONT'D)

Note: If it has been determined that a transmission malfunction has been caused by a faulty solenoid, individual new solenoids are available from the original equipment manufacturer.

111. Remove the solenoid retaining clip and pull the defective solenoid out of the solenoid body as shown in Figure 175.

Caution: When replacing a solenoid, it is most important to replace that solenoid with one that has the SAME FLOW RATE. The last two digits stamped on the solenoid body indicate the flow rate of that solenoid.

Notice in Figure 175 that there are two 3-5-Reverse solenoids, BUT, one has a 06 and the other has a 12 flow rate ID. Be sure to replace any solenoid with one that has the same flow rate identification number. Failure to do so may result in shift feel complaints that can not be remedied by any means other than to install a solenoid with the correct flow rate.

Continued on Page 122

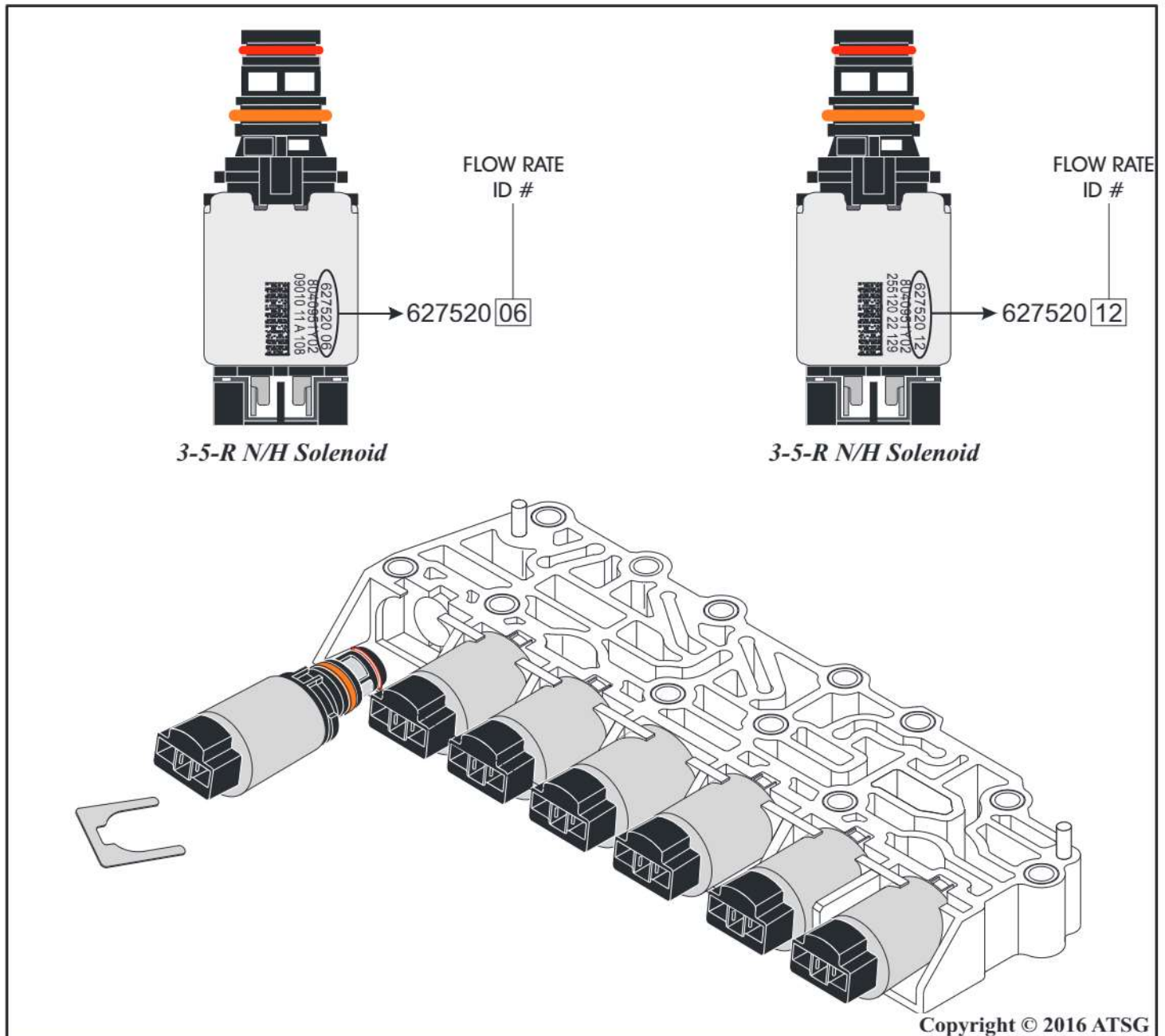


Figure 175

TRANSMISSION ELECTRONIC CONTROL HYDRAULIC MODULE (TECHM CONT'D)

112. With the Generation 1 solenoid body separated from the control unit, the pressure switches can now be serviced or repaired using an aftermarket repair kit.
113. Remove the each pressure switch body from each pressure switch diaphragm assembly and discard the o-ring seal as seen in Figure 176.
114. Using a pick tool remove the plastic "D" ring, then use the pick tool to remove each diaphragm and washer.
115. Clean each pressure switch pocket and air dry.
Technician's Note: *If this vehicle you are working on came into the shop with electrically generated pressure switch trouble codes, do not rebuild the pressure switches, replace the TECHM.*

116. Install all the new parts from the pressure switch repair kit, no special tools are needed.

Assembly Tips:

Push the pressure switch body o-ring seals into their respective groove in the control unit body and place each pressure switch body, stem down in each opening. This will make the assembly of the solenoid body to the control unit easier. Keep the solenoid body in the position seen in Figure 176. Carefully line up the control unit solenoid prongs with the solenoid receptacles in the solenoid body as seen in Figure 176 and gently push down until the control unit bottoms out, this will prevent the solenoid retaining clips from falling out during the assembly process.

117. Turn the entire control unit/solenoid body assembly over and install the control unit cover with its eight (8) screws as shown in Figure 177.

Continued on Page 123

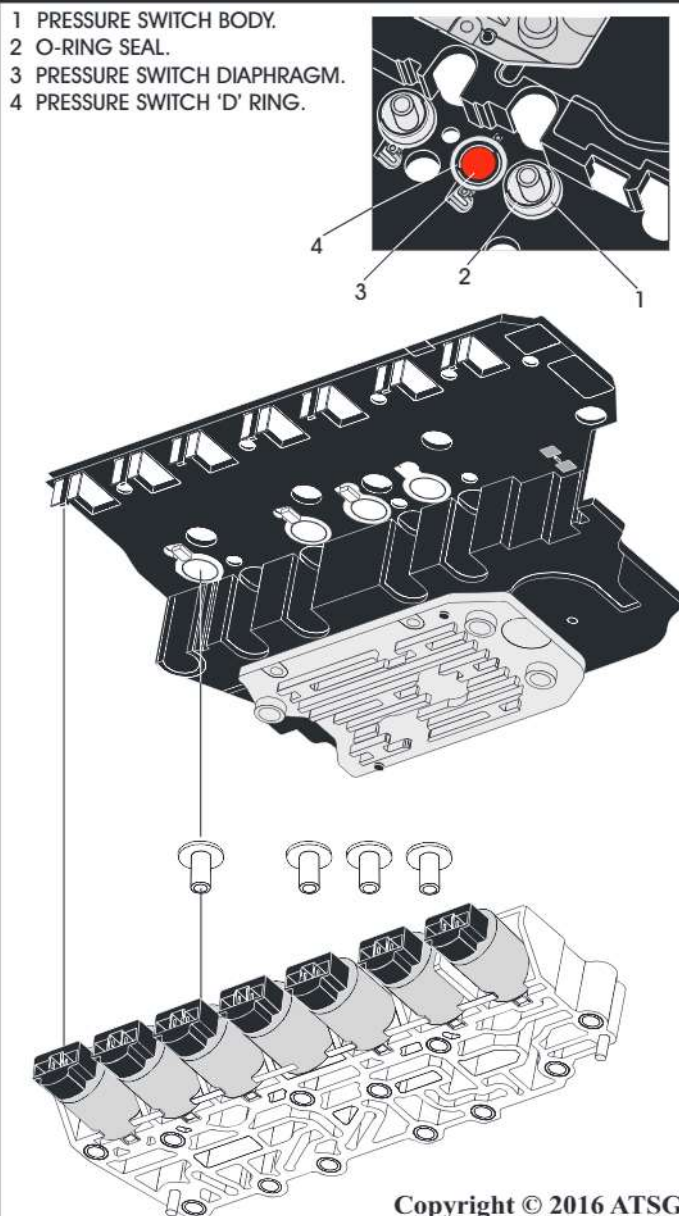


Figure 176

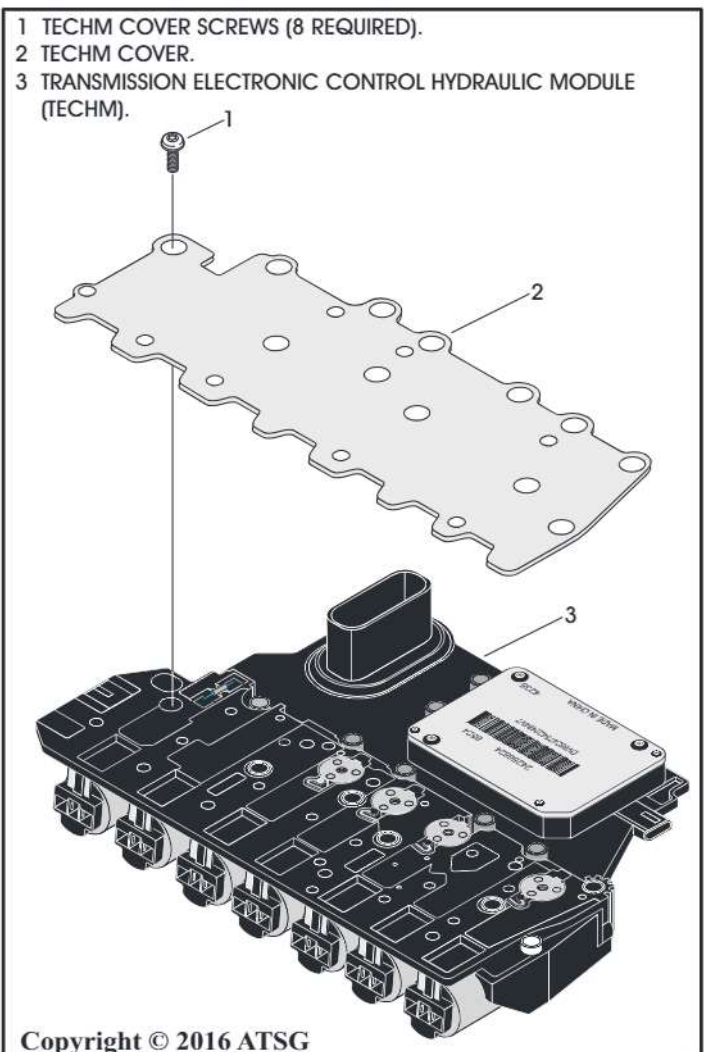


Figure 177

TRANSMISSION ASSEMBLE (CONT'D)

118. Install a new solenoid body filter plate as seen in Figure 178 onto the two plastic dowel pins in the solenoid body.
119. Install the transmission control unit/solenoid body assembly onto the control valve body as seen in Figure 178.
120. Insert the three (3) M5X40.5 and the twelve (12) M6X97 control unit assembly bolts using the bolt location identification seen in Figure 178.
121. Torque the three M5X40.5 control unit assembly bolts to 62 lb. in. (7 N·m). Torque the twelve (12) control unit assembly bolts to 89 lb. in. (10 N·m) using the bolt tightening sequence shown in Figure 178.

Continued on Page 124

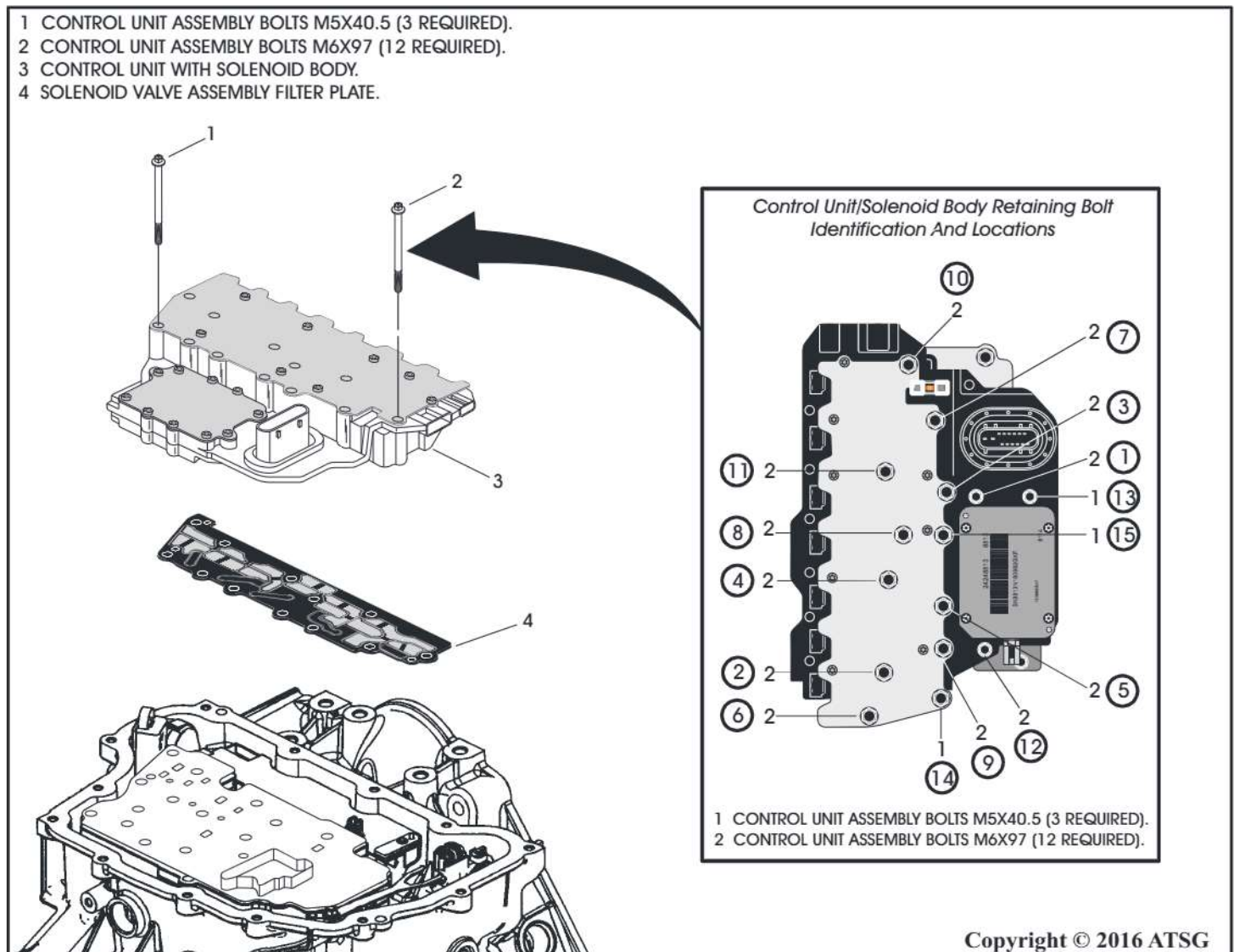


Figure 178

TRANSMISSION ASSEMBLE (CONT'D)

122. Connect the Shaft Position Switch connector (1) as shown in Figure 179.
 123. Connect the Output Speed Sensor connector (2) as shown in Figure 179.
- Note:** Care should be taken when connecting the output speed sensor to insure that the wire harness is secured to keep it from making contact with the internal manual shift linkage.
124. Connect the Input Speed Sensor connector (3) as shown in Figure 179.

125. Install a new valve body cover wiring connector seal as shown in Figure 180.
126. Install a new valve body cover gasket as shown in Figure 180 by pushing it into the groove in the cover.
127. Install the valve body cover and insert the thirteen (13) M6X30 valve body cover bolts as seen in Figure 180.
128. Torque the valve body cover bolts to 106 lb. in. (12 N·m) using the tightening sequence shown in Figure 180.

Continued on Page 125

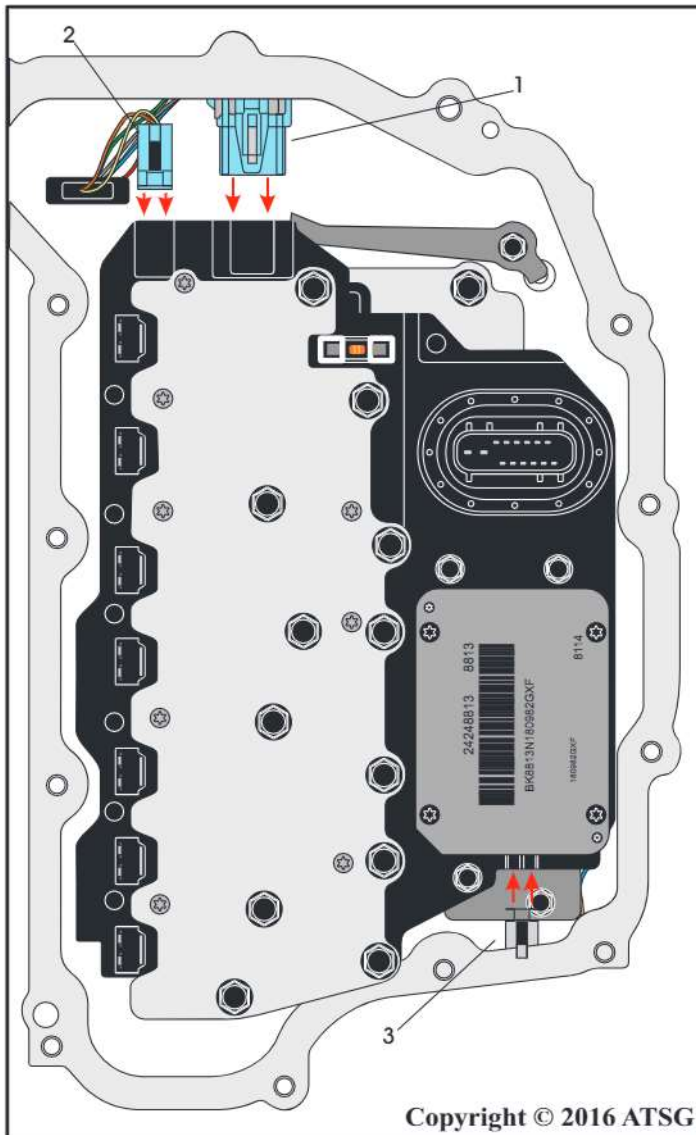


Figure 179

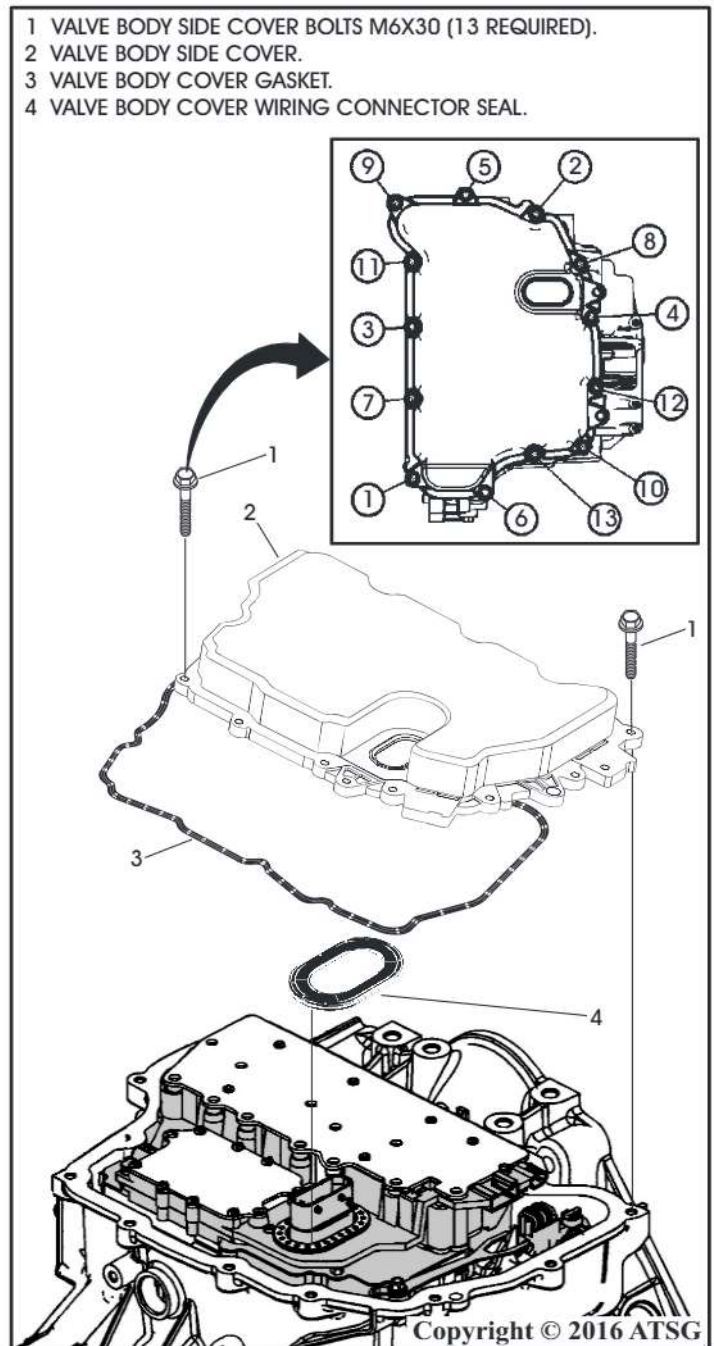


Figure 180

TRANSMISSION ASSEMBLY (CONT'D)

129. Install a new fluid level indicator plug as seen in Figure 181.

Note: *If the transmission has a dip stick tube then disregard step 129.*

130. Install the auxiliary pump assembly with a new auxiliary fluid pump gasket and seal as seen in Figure 181.

131. Insert the three (3) auxiliary fluid pump bolts seen in Figure 181 and torque them to 16 lb. ft. (22 N·m).

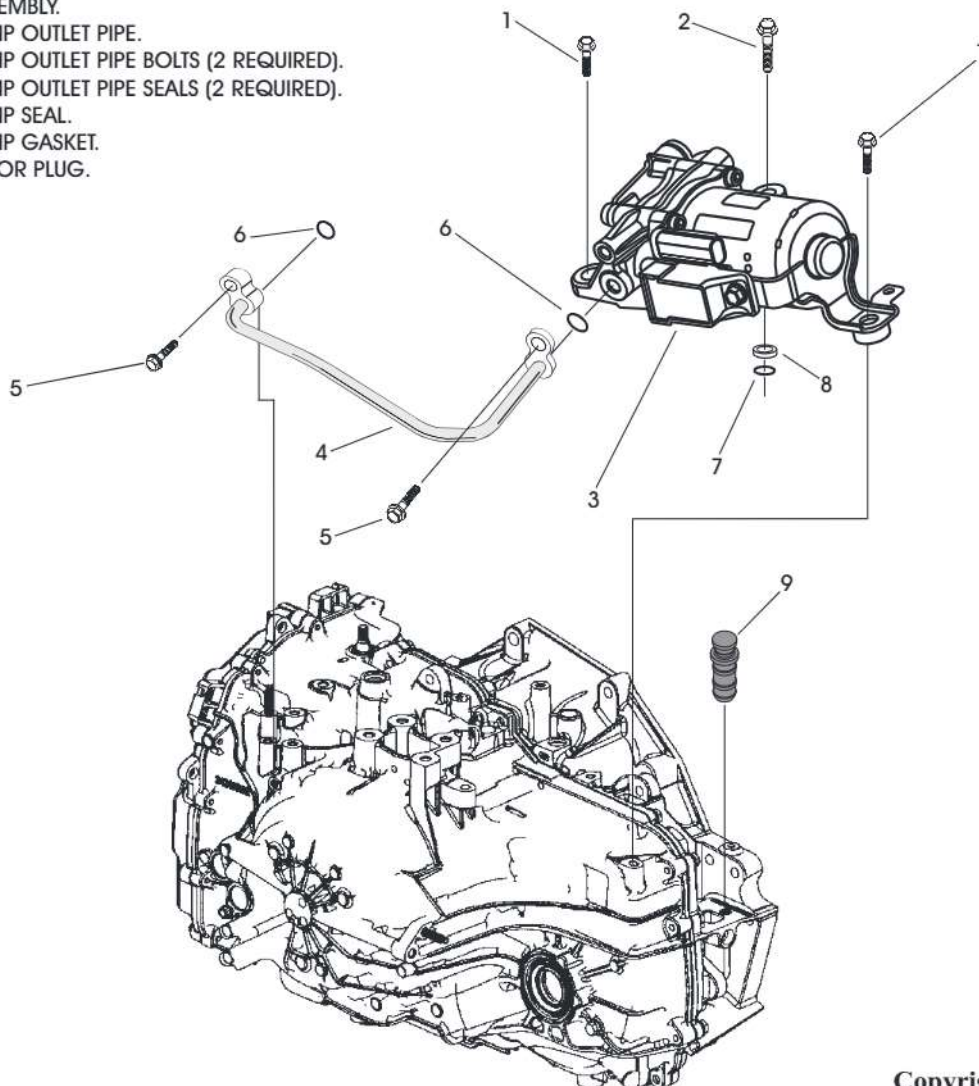
132. Install two (2) new o-ring seals on the auxiliary fluid pump outlet pipe shown in Figure 181.

133. Lubricate the o-ring seals and install the auxiliary fluid outlet pipe into the auxiliary fluid pump and the transmission case as seen in Figure 181.

134. Insert the two (2) auxiliary fluid outlet pipe bolts seen in Figure 181 and torque them to 16 lb. ft. (22 N·m).

Continued on Page 126

- 1 AUXILIARY FLUID PUMP OUTLET BOLTS (2 REQUIRED).
- 2 AUXILIARY FLUID PUMP BOLT (1 REQUIRED).
- 3 AUXILIARY PUMP ASSEMBLY.
- 4 AUXILIARY FLUID PUMP OUTLET PIPE.
- 5 AUXILIARY FLUID PUMP OUTLET PIPE BOLTS (2 REQUIRED).
- 6 AUXILIARY FLUID PUMP OUTLET PIPE SEALS (2 REQUIRED).
- 7 AUXILIARY FLUID PUMP SEAL.
- 8 AUXILIARY FLUID PUMP GASKET.
- 9 FLUID LEVEL INDICATOR PLUG.



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Figure 181

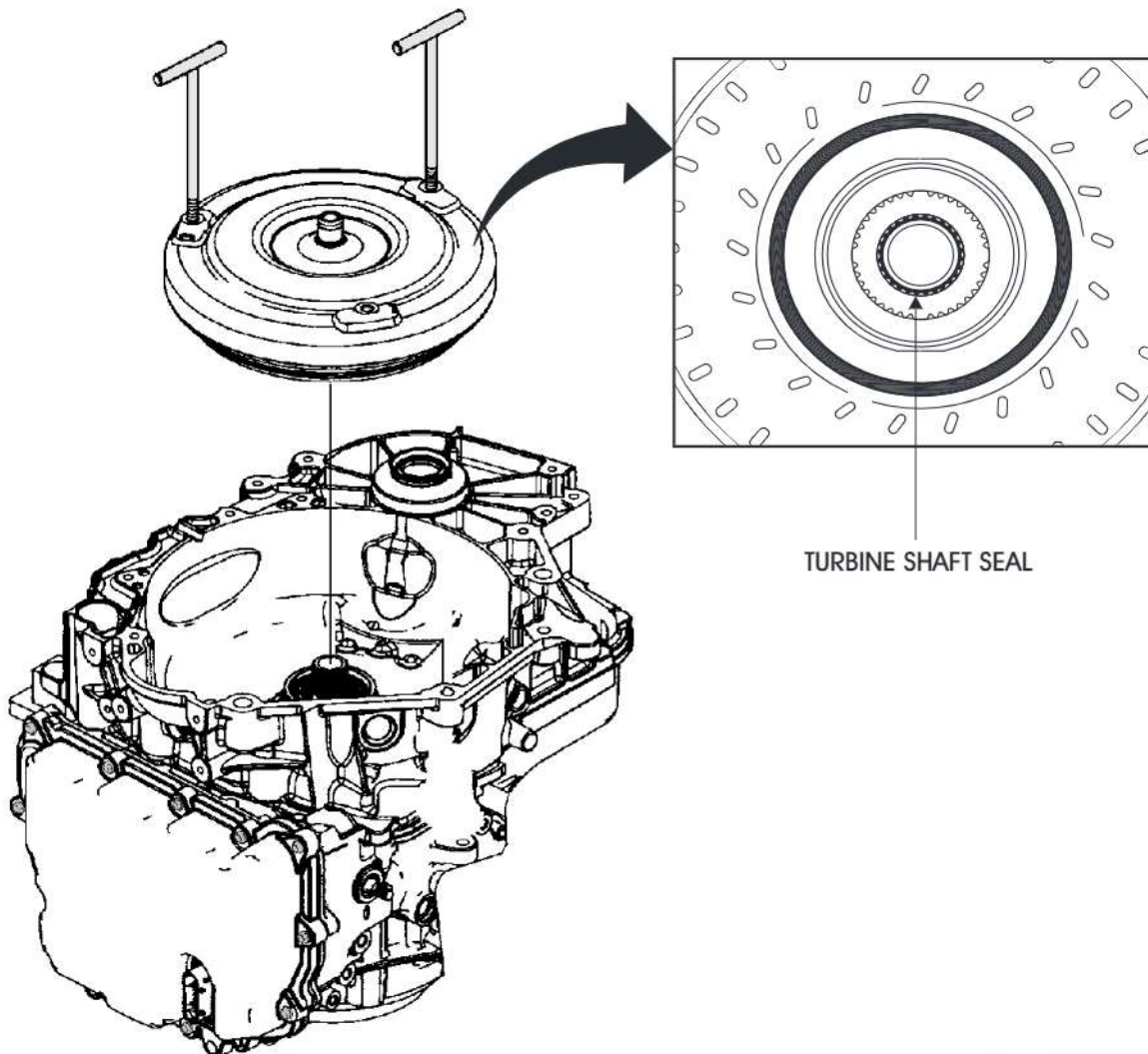
TRANSMISSION ASSEMBLY (CONT'D)

135. Position the transmission as shown in Figure 182.
136. Lubricate the transmission front seal, the tip of the turbine shaft and the turbine shaft seal inside the converter neck, shown in Figure 182. with transmission fluid.
137. Using the DT-46409 torque converter lifting handles install the torque converter straight down making certain all splines are indexed as seen in Figure 182.

Technicians Note: It is important to install the torque converter as shown in Figure 182 to avoid damaging the torque converter to turbine shaft seal. Attempting to install the torque converter with the transmission in an upright position could damage the torque converter to turbine shaft seal which could result in the torque converter clutch slipping and setting the corresponding code(s).

138. The transmission assembly is now ready for installation into the vehicle.

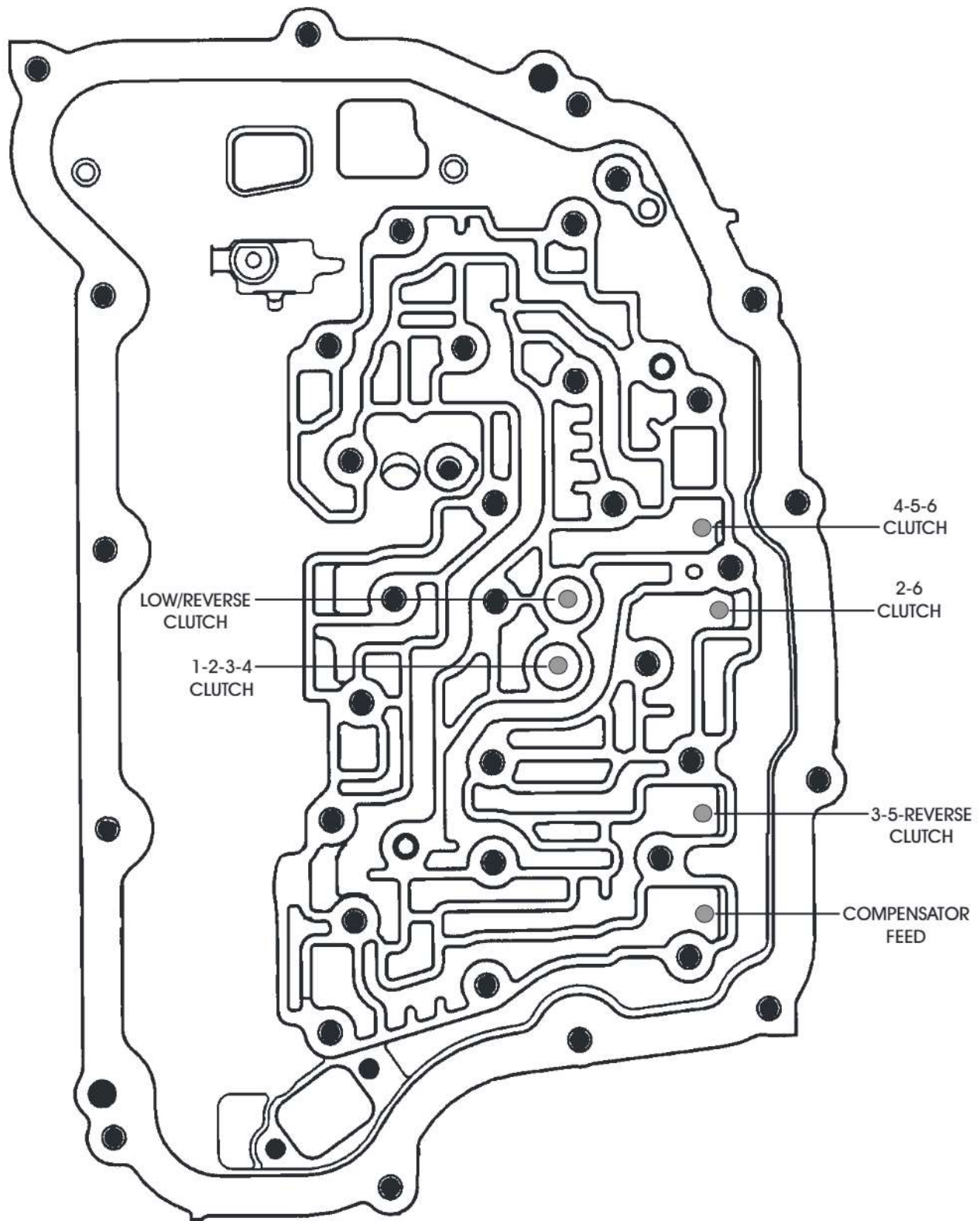
INSTALL CONVERTER WITH TRANSMISSION IN THE POSITION SHOWN



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Figure 182

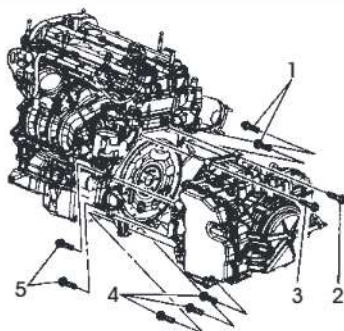
AIR CHECK LOCATIONS



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Figure 183

<i>Transmission Component</i>	N•m	Ft. Lb.	In. Lb.
Transmission Fluid Pump Bolts to Converter Housing			
First Pass	10		89
Second Pass	45° Additional Turn		
Transmission Fluid Pump Cover Bolts (M6x25)	12		106
Transmission Fluid Pump Cover Bolts (M6x21.5)	12		106
Control Solenoid Valve Assembly to Case Bolts (M6x97)	10		89
Control Solenoid Valve Assembly to Case Bolts (M5x40.5)	7		62
Control Valve Body Assembly (Complete) Bolt	7		62
Control Valve Body to Case Bolts (M6x53)	11		97
Control Valve Body to Case Bolts (M6x60)	11		97
Control Valve Body Cover Bolts	12		106
Drain Plug	12		106
Fluid Level Check Plug	12		106
Line Pressure Test Plug	12		106
Front Differential Carrier Baffle Bolts (Converter Housing)	12		106
Front Differential Carrier Baffle Bolts (Transmission Case)	12		106
4-5-6/3-5-R Clutch Housing Support Bolts	12		106
Input Speed Sensor Bolt	9		80
Manual Shaft Detent Spring Bolt	12		106
Output Speed Sensor Bolt	9		80
Torque Converter Housing to Transmission Case Bolts			
First Pass	10		89
Second Pass	50° Additional Turn		
Transmission Auxiliary Fluid Pump Outlet Bolts (Hybrid Models Only)	22	16	
Transmission Auxiliary Fluid Pump Bolts (Hybrid Models Only)	22	16	
Transmission Auxiliary Fluid Pump (Pump to Motor) Bolts (Hybrid Models Only)	10 - 12		89 - 106
<i>Vehicle Component</i>			
Transmission Control Bolts	9		80
Transmission to Engine Flywheel Bolts	60	45	
Rear Transmission Brace Bolt (Inboard)	50	37	
Rear Transmission Brace Bolt (Outboard)	100	74	
Torque Converter to Flywheel Bolts	60	45	
Transmission Mounting Bolts 1, 2 & 3 (6T30/6T40) See Illustration Below	75	55	
Transmission Mounting Bolts 4 & 5 (6T30/6T40) See Illustration Below	50	37	
Transmission Mounting Bolts 1, 2, 3, & 4 (6T45/6T50) See Illustration Below	75	55	
Transmission Mounting Bolts 5 (6T45/6T50) See Illustration Below	50	37	



CONTINUED 

Figure 184

TORQUE SPECIFICATIONS			
<i>Vehicle Component</i>	<i>N•m</i>	<i>Ft. Lb.</i>	<i>In. Lb.</i>
Transmission Fluid Cooler Outlet Pipe Nut	22	16	
Transmission Fluid Cooler Inlet Pipe Nut	22	16	
Transmission Front Mount Through Bolt	100	74	
Transmission Front Mount to Transmission Bolts	62	46	
Transmission Mount Bolt - Left Side to Frame Rail	22	16	
Transmission Mount Bolt - Left Side to Transmission			
First Pass	50	37	
Second Pass	50° - 75° Additional Turn		
Transmission Mount Nut - Left Side to Body	22	16	
Transmission Rear Mount Through Bolt	105	77	
Transmission Rear Mount to Cradle			
First Pass	100	74	
Second Pass	120° - 130° Additional Turn		
Transmission Rear Mount to Transmission	100	74	
Transmission Range Selector Cable Bracket Bolt	18	14	
Transmission Range Selector Cable Bracket Bolt	20	15	

Figure 185

ACKNOWLEDGMENTS

A very special thank you to Whatever It Takes Transmission Parts for the loan of the 6T40 transmission used for this manual.

Many thanks to Transtec® for their soft parts assistance that helped make this manual accurate.

A very large thank you to ATSG's Ed Kruse for his tireless artwork which made the illustrations in this manual possible.

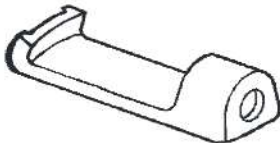
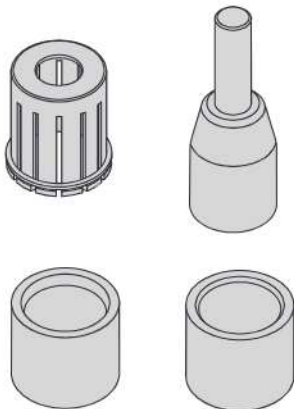
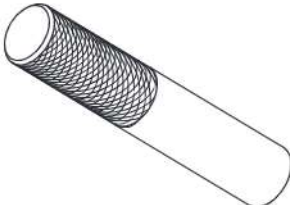
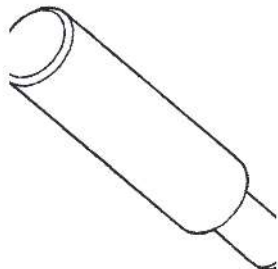
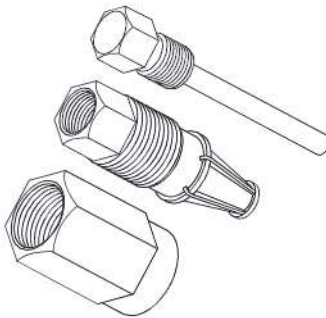
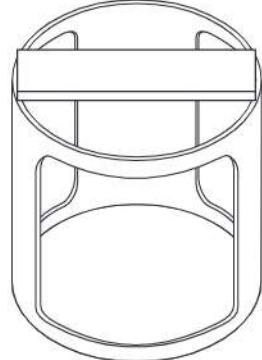
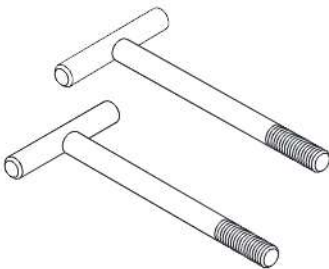
SPECIALTY TOOLS					
	DT-23129 Universal Seal Remover			DT-46620 Sealing Ring Sizer/Installer	
	DT-28585 Snap Ring Installer/Remover				
	DT-41229 Manual Shaft Pin Installer			DT-46626 Seal Installer	
	DT-45201 DT-48203 Manual Shift Shaft Seal Remover			DT-47694 3-5-Reverse Spring Compressor	
	DT-46409 Torque Converter Lifting Handles			DT-47790 Axle Seal Installer	

Figure 186

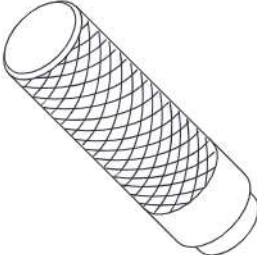
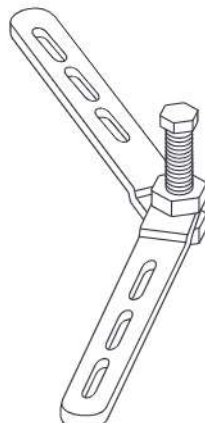
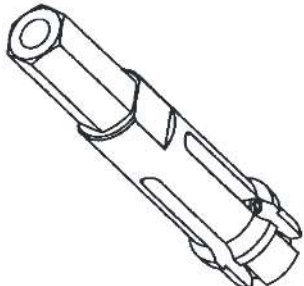
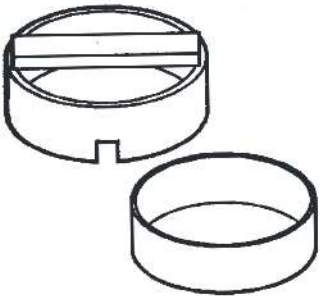
SPECIALTY TOOLS			
	DT-47791-A Front Seal Installer		DT-47796 2-6 Clutch Piston Seal Protector
	DT-47792 Rear Pump Seal Installer		DT-47797 2-6 Clutch Piston Spring Installer
	DT-47793 6T30/40/45 Differential Turning Tool		DT-48056 2-6 Clutch Spring Compressor Bridge
	DT-49938 6T50 Differential Turning Tool		DT-47798 1-2-3-4 Clutch Piston Seal Protector
	DT-47794 Low-Reverse Spring Compressor		

Figure 187

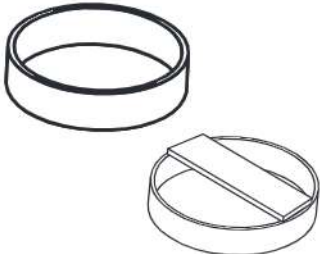
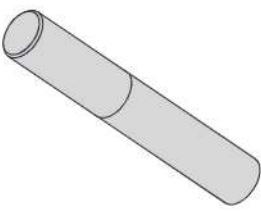
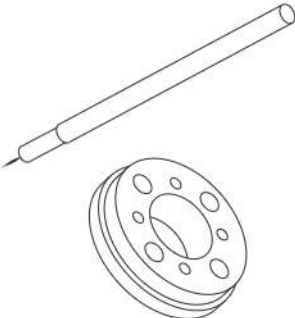
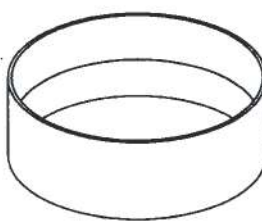
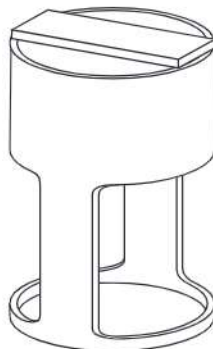
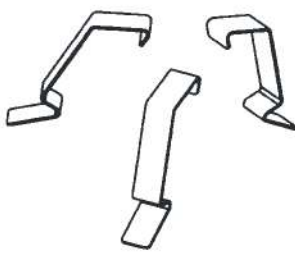
SPECIALTY TOOLS			
	DT-47799 1-2-3-4 Clutch Piston Spring Compressor		DT-49101 Manual Shaft Seal Installer
	DT-47805 4-5-6 Clutch Piston Seal Protector		DT-49131 Seal Staking Tool
	DT-47807 Low-Reverse Clutch Piston Seal Protector		DT-50117 6T50 4-5-6 Clutch Fluid Dam Seal Protector
	DT-47951-1 6T30/40/45 4-5-6 Clutch Fluid Dam Seal Protector		DT-50117-1 6T50 4-5-6 Clutch Piston Seal Protector
	DT-47951-2 4-5-6 Clutch Spring Compressor		DT-50117-2 4-5-6 Clutch Piston Seal Protector Retaining Clips

Figure 188

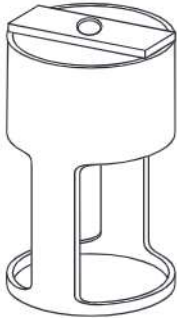
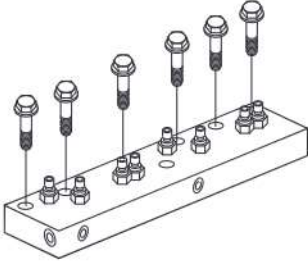
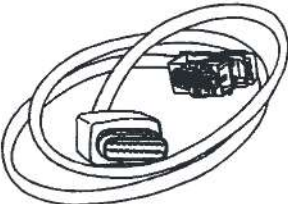
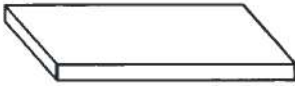
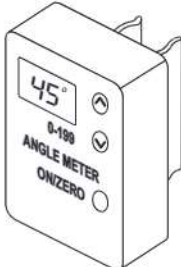
SPECIALTY TOOLS			
	DT-50573 4-5-6 Piston Retaining Ring Installer		DT-48550 Detent Lever Pin Remover
	GE-8092 Driver Handle		DT-48616 Solenoid Test Plate
	GE-6125-1B Slide Hammer		DT-48616-10 Adapter Harness
	GE-34673 Flat Gauge Bar		EN-45059 Angle Meter

Figure 189

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