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INTRODUCTION

MITSUBISHI F5A5A (F5A51) & HYUNDIA/KIA A5GF1, A5HF1 (F5A51)

This is a five speed, Front Wheel Drive transaxle, with fully electronic controls for the upshifts and downshifts, with 5th gear being overdrive. The individual gear ratios are achieved through three planetary gear sets. The components of the planetary gear sets are driven or held by means of four multi-plate drive clutch packs, two multi-plate brake clutch packs, one reduction brake band and two one way clutches.

To minimize fuel consumption, the torque converter clutch is applied by the PCM, depending on throttle position and vehicle speed. These units are currently found in several Mitsubishi models, some Hyundai models and some Kia models, as shown in Figure 1 and 2. The 2007 and later Hyundai models and the 2006 and later Kia models have an added line pressure control solenoid, along with a revised shift solenoid application.

We wish to thank Mitsubishi Motor Company for the information and illustrations that have made this booklet possible. A special thanks also to Bob Nuttall for information and suggestions that have made this a very accurate booklet.

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INDEX

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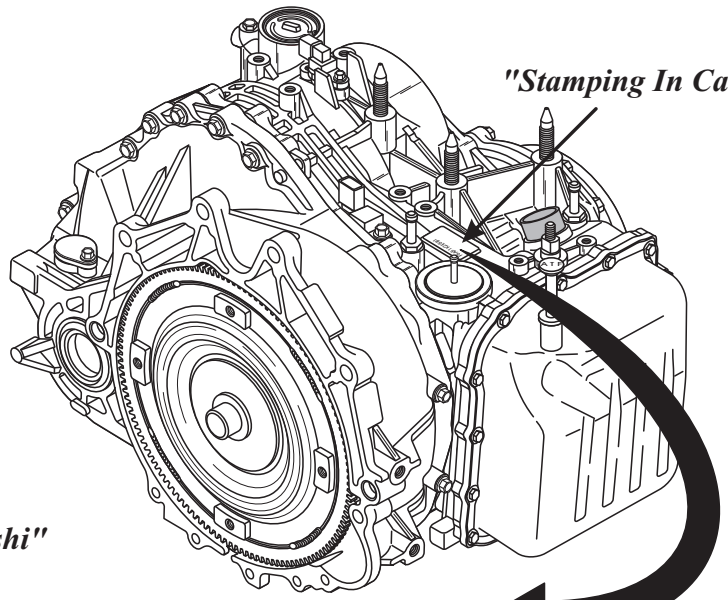
IDENTIFICATION CODE STAMPING LOCATION



"Mitsubishi"

F 5 A 51 K 2 E 5 B 1

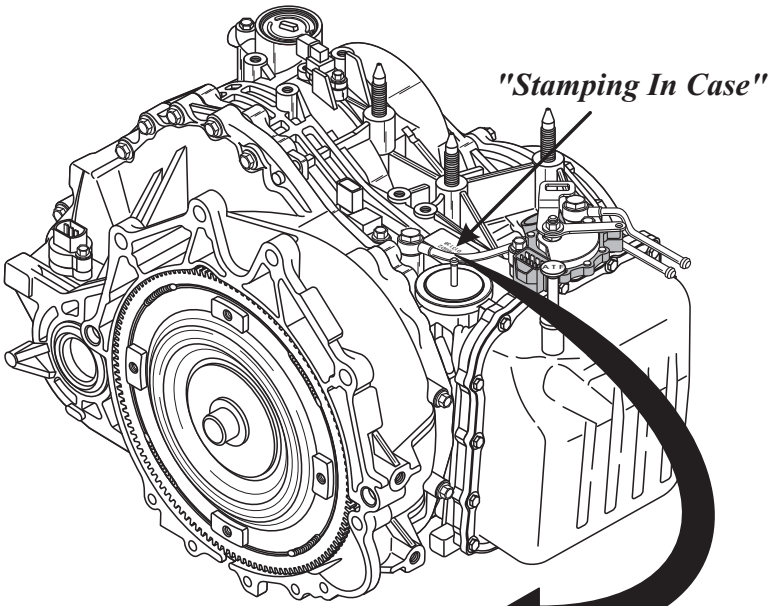
Drive Axle
F = Front Wheel Drive
R = Rear Wheel Drive

Forward Speeds
4 = Four Speeds
5 = Five Speeds

Transmission Type
A = Automatic
M = Manual

Trans Capacity
42 = Standard Duty
51 = Heavy Duty

Manufacturing Plant
K = Kyoto Works (Not always stamped)



"Hyundai/Kia"

U 5 K BD □ 0 0 0 0 0 1

1 2 3 4 5 6

1 Model, U = A5HF1, Q = A5GF1
2 Production Year, 5 = 2005, 6 = 2006
3 FD Ratio, K = 3.333
4 Classification,
5 Spare,
6 Serial Number, 000001 - 999999

A5HF1 = 7 Solenoid Valve Body (Line Pressure Solenoid)
A5GF1 = 6 Solenoid Valve Body (No Line Pressure Solenoid)

Figure 1

GENERAL DESCRIPTION

This is a five speed, Front Wheel Drive transaxle, with fully electronic controls for the upshifts and downshifts, and is a re-designed F4A51 with an added planetary, reduction sprag, direct clutch pack, and reduction brake band.

The individual gear ratios are now achieved through three planetary gear sets, and there are three different planetary gear ratios. Refer to the individual component application charts (Figure 4 and 5) for the gear ratios. The components of the planetary gear sets are driven or held by means of four multi-plate drive clutch packs, two multi-plate brake clutch packs, one reduction brake band and two one way clutches (sprags). Refer to Figure 3 for the internal component locations.

To minimize fuel consumption, the torque converter clutch is applied by the Powertrain Control Module (PCM), depending on throttle position, transaxle temperature, and vehicle speed. These units are currently found in several Mitsubishi models, and referred to as the "F5A5A" in Mitsubishi.

It is also found in some Hyundai and Kia models, and they both refer to it as the "A5HF1", and this version operates much differently than the Mitsubishi models.

Refer to Figure 1 for identification tag information and Figure 2 for vehicle application chart.

GENERAL OPERATION

Mitsubishi, Pre-07 Hyundai, Pre-2006 Kia Operation

The Mitsubishi version uses the basic 4 speed valve body with an added solenoid to control the reduction band, so it now has six solenoids instead of five. The Low/Reverse solenoid is now a double duty solenoid and is used to also apply the added direct clutch pack, based on position of the switch valve in valve body.

The valve body has an added control valve for the reduction band and an added Fail-safe "C" valve.

The component and the solenoid application charts for Mitsubishi, Pre-07 Hyundai and Pre-06 Kia models are found in Figure 4.

2007-Up Hyundia, 2006-Up Kia Operation

The later Hyundai and Kia version uses the same six solenoid valve body as the earlier models ***except,*** it has an additional solenoid, (Total of 7), used strictly to control line pressure. The Low/Reverse solenoid is still a double duty solenoid and is used to apply the added direct clutch pack, based on the position of the switch valve in the valve body.

However, the 2007-Up Hyundai and 2006-Up Kia internal component and solenoid applications are different than the earlier version. The component and solenoid application charts for the 2007-Up Hyundai and 2006-Up Kia are found in Figure 5.

MITSUBISHI VEHICLE APPLICATION CHART			
YEAR	***MODEL***	***ENGINE***	***TRANSAXLE***
2000-2001	*Diamante*	*V6-2.5L*	*F5A5A (F5A51)*
2006-2008	*Eclipse*	*V6-3.8L*	*F5A5A (F5A51)*
2006-2009	*Galant*	*V6-3.8L*	*F5A5A (F5A51)*
HYUNDAI VEHICLE APPLICATION CHART			
2007-2010	*Sonata*	*V6-3.3L,*	*A5HF1 (F5A51)*
2007-2010	*Santa Fe*	*V6-3.3L, 3.5L*	*A5HF1 (F5A51)*
2007-2011	*Azera*	*V6-3.3L, 3.5L*	*A5HF1 (F5A51)*
2007-2011	*Entourage*	*V6-3.3L, 3.5L*	*A5HF1 (F5A51)*
KIA VEHICLE APPLICATION CHART			
2006-2009	*Amanti*	*V6-3.5L, 3.8L*	*A5HF1 (F5A51)*
2006-2011	*Sedona*	*V6-3.5L, 3.8L*	*A5HF1 (F5A51)*
2009-2011	*Sorento*	*L4-2.2L*	*A5HF1 (F5A51)*

Figure 2

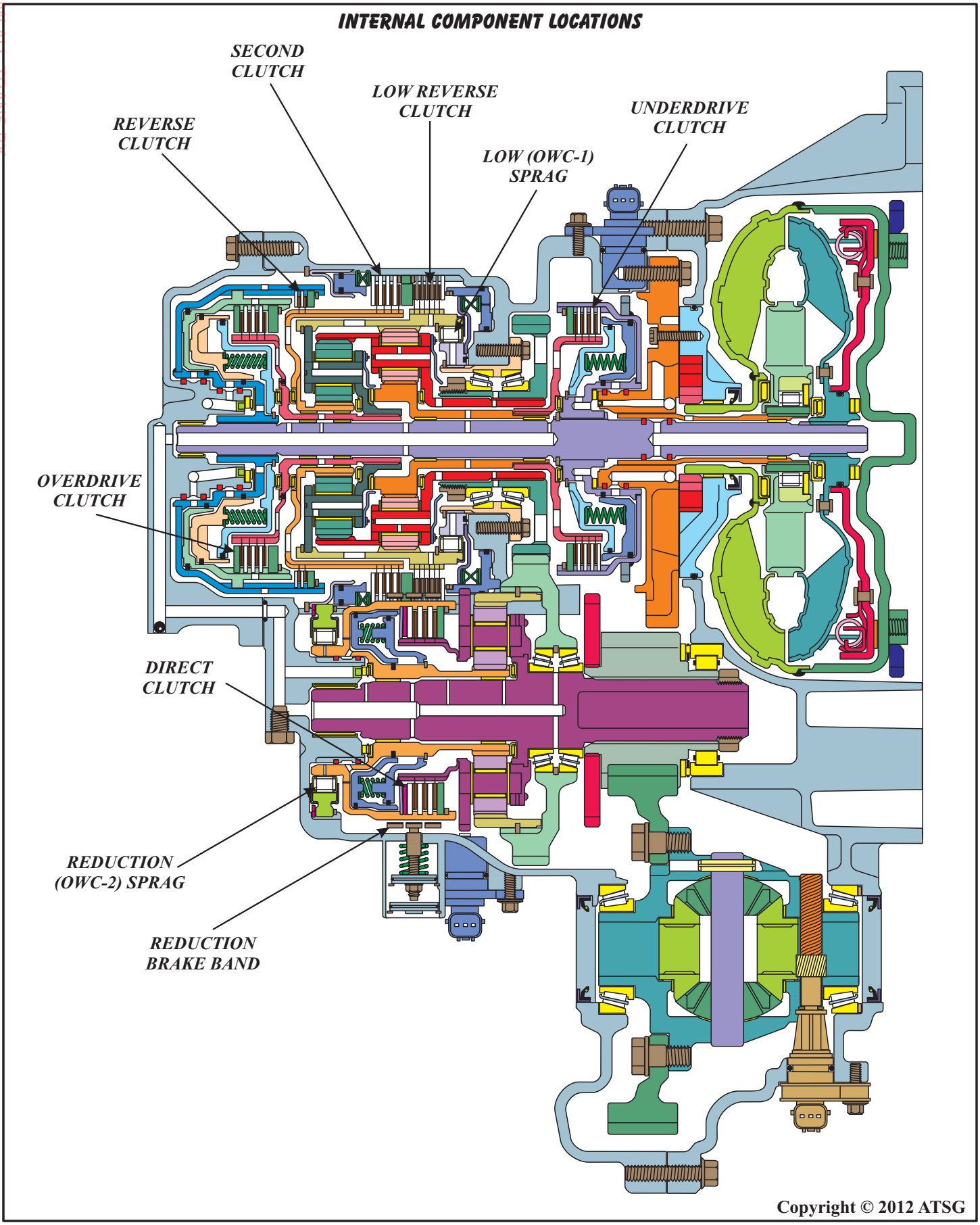


Figure 3

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

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

Final Drive Ratio 3.325

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

** TCC dependant on throttle position, temperature and vehicle speed.

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

Note: (OWC = One Way Clutch)..

FLUID REQUIREMENTS
Mitsubishi Diamond SP III

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

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

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

** Torque Converter Clutch (TCC) dependant on throttle position, temperature and vehicle speed.

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

Solenoid ON = Energized
Solenoid OFF = De-Energized

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

Figure 4

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

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

Final Drive Ratio 3.333

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

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

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

Note: (OWC = One Way Clutch)..

FLUID REQUIREMENTS
Hyundai/Kia Diamond SP III

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

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

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

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

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

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

Solenoid ON = Energized
Solenoid OFF = De-Energized

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

Figure 5

ELECTRONIC COMPONENTS

Shift Solenoid Application

The Mitsubishi, Hyundai and Kia all use 6 solenoids mounted on the valve body, to upshift and downshift the transaxle, as well as the apply and release of the TCC/DCC.

However, two different shift solenoid application patterns are used, as shown on Page 6 and 7.

Refer to Page 6 for internal component and solenoid application charts for "Mitsubishi" and the earlier "Hyundai/Kia" models.

Refer to Page 7 for internal component and solenoid application charts for later "Hyundai/Kia" models.

The individual shift solenoid locations are the same between the two and are shown in Figure 6. Function of each solenoid is described in detail on Page 9.

Line Pressure Control

The 2007-Up Hyundai and 2006-Up Kia vehicles ***only,*** use an added VFS Solenoid to control line pressure on all of their models that use the A5HF1 transaxle, and the location on valve body is shown in Figure 7.

All of the Mitsubishi and pre-2006 Hyundai/Kia vehicles use only the pressure regulator valve in the valve body for line pressure control. Both versions have the capability of adjusting line pressure mechanically.

OEM Solenoid Part Numbers (At time of printing)

Mitsubishi Shift Solenoid MD758981
Hyundai & Kia Shift Solenoid 46313-39051
Hyundai & Kia VFS Solenoid 46313-3A060

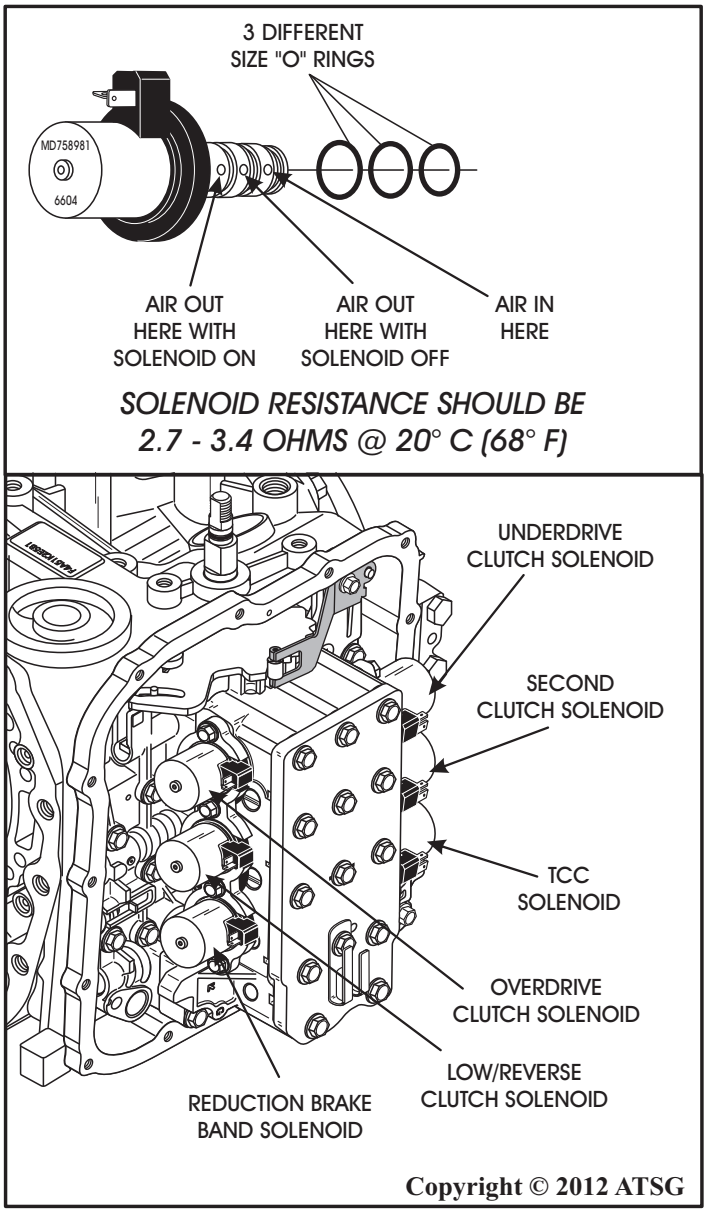


Figure 6

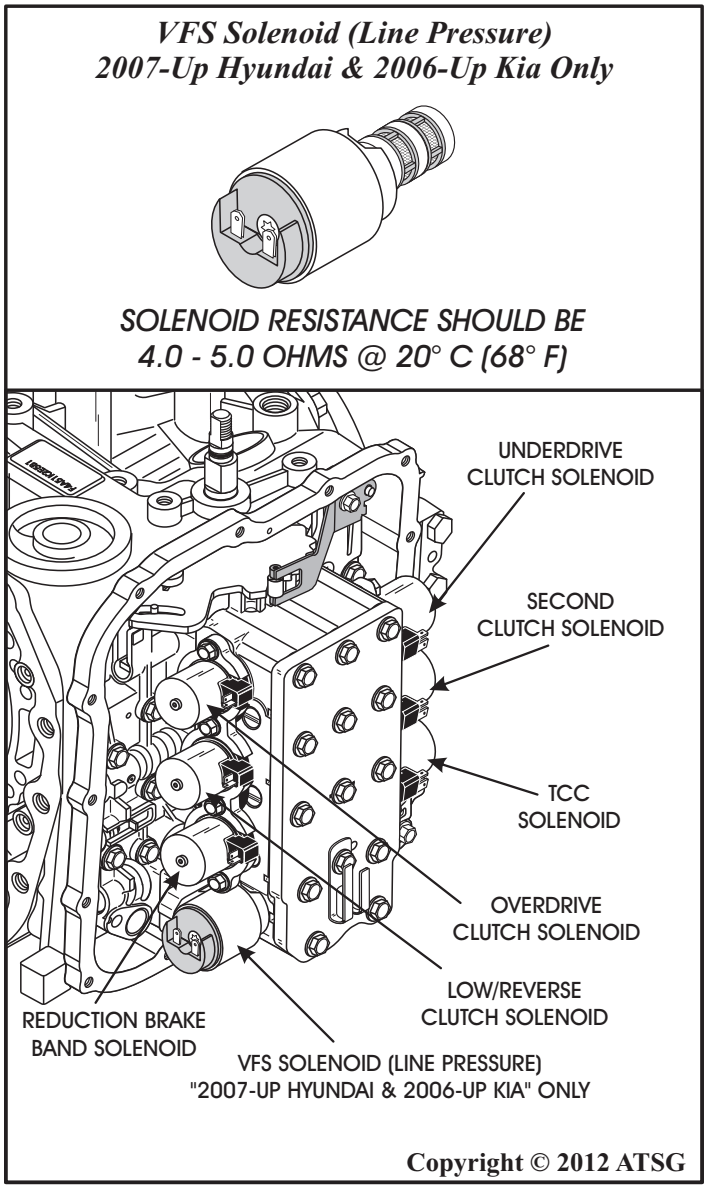


Figure 7

ELECTRONIC COMPONENTS (CONT'D)

Solenoid Operation

The F5A51 transaxle uses six solenoids for all of the upshifts, downshifts and apply & release of the TCC/DCC. All six of the shift solenoids are "Normally Applied" Pulse Width Modulated style and will interchange in any of their positions.

The Low/Reverse solenoid is a double duty solenoid and will apply the Low/Reverse Clutch or will apply the Direct Clutch, depending on the position of the switch valve in the valve body.

All shift solenoids can be air checked using the procedure shown in Figure 6, and solenoid resistance is checked across the 2 terminals. Solenoid locations on the valve body are also shown in Figure 6 and 7.

Solenoid Function

The Underdrive Clutch Solenoid, is used to apply and release the underdrive clutch. When solenoid is de-energized (OFF), the underdrive clutch is ON. When solenoid is energized (ON), the underdrive clutch is OFF.

The Overdrive Clutch Solenoid, is used to apply and release the overdrive clutch. When solenoid is de-energized (OFF), the overdrive clutch is ON. When solenoid is energized (ON), the overdrive clutch is OFF.

The Second Clutch Solenoid, is used to apply and release the second brake clutch. When solenoid is de-energized (OFF), the second brake clutch is ON. When solenoid is energized (ON), the second brake clutch is OFF.

The Reduction Solenoid, is used to apply and release the reduction brake band. When solenoid is de-energized (OFF), the reduction brake band is ON. When solenoid is energized (ON), the reduction brake band is OFF.

The TCC/DCC Solenoid, is used to apply and release the Torque Converter Clutch. When the solenoid is de-energized (OFF), the converter clutch is OFF, as it routes fluid to the spring side of the converter clutch control valve in the valve body. When solenoid is energized (ON), the converter clutch is ON, as it now exhausts fluid from the spring side of control valve, allowing it to stroke.

The Low/Reverse Solenoid, is used to apply and release the low/reverse clutch. When solenoid is de-energized (OFF), the low/reverse clutch is ON. When solenoid is energized (ON), low/reverse clutch is OFF. This function occurs with the switch valve in the valve body in the *downshifted* position.

When the switch valve is *upshifted,* by overdrive clutch fluid, a different sequence of events occur still using the same solenoid. In this configuration, ***The Low/Reverse Solenoid***, is used to apply and release the Direct Clutch. When the solenoid is de-energized (OFF), the direct clutch is ON. When the solenoid is energized (ON), the direct clutch is OFF.

The VFS Solenoid, (7th solenoid) used on the 2007-Up Hyundai and 2006-Up Kia models only, to more precisely control line pressure according to current vehicle driving conditions. It is a Variable Force Solenoid with duty control that uses a higher frequency of (600 Hz), instead of the existing PWM style that uses a lower frequency (60 Hz) to control all other solenoids.

In PWM control, amount of oil flow is determined by the duration of ON signal with repeated ON/OFF pulses.

In VFS control, amount of oil flow is determined by the width of the oil passage opening.

2007-Up Hyundai and 2006-Up Kia models are also equipped with an orificed tube that provides a constant stream of cooler fluid spraying on the VFS Solenoid for cooling the solenoid, which provides increased durability.

Electronic Components
Continued on Page 10

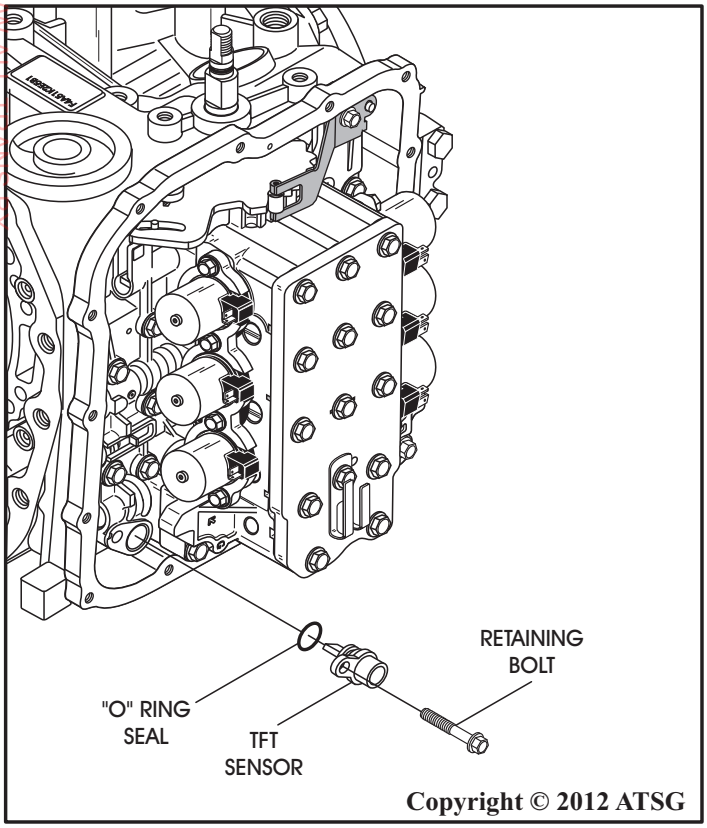


Figure 8

Transaxle Fluid Temperature (TFT) Sensor

The Transaxle Fluid Temperature (TFT) sensor is located in the valve body, mounted into a fluid passage with a valve body to case bolt and requires an "O" ring seal, as shown in Figure 8.

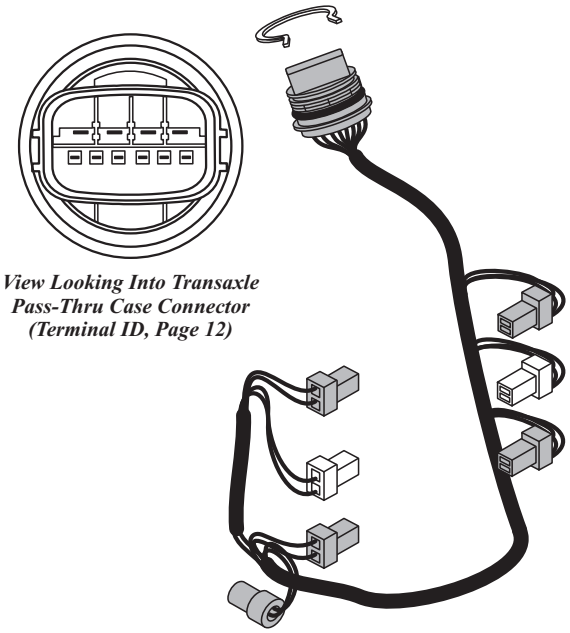
The TFT is a negative temperature coefficient sensor, which means that as temperature increases the resistance decreases, as shown in Figure 9.

Electronic Components
Continued on Page 11

TFT SENSOR RESISTANCE CHART	
Fluid Temp C° (F°)	*Resistance*
0° C (32° F)	*16.7k - 20.5k*
20° C (68° F)	*7.3k - 8.9k*
40° C (104° F)	*3.4k - 4.2k*
60° C (140° F)	*1.9k - 2.2k*
80° C (176° F)	*1.0k - 1.2k*
100° C (212° F)	*0.57k - 0.69k*

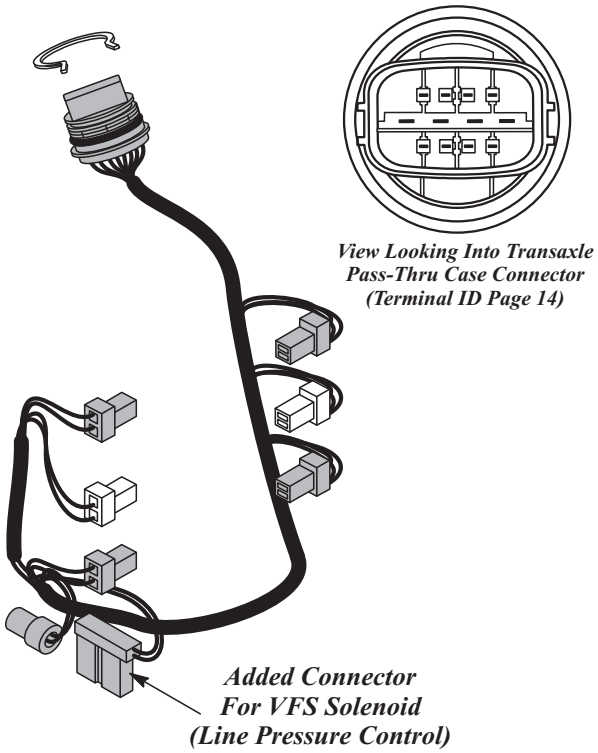
Figure 9

MITSUBISHI F5A51 AND
EARLY HYUNDAI/KIA A5GF1
Internal Wire Harness And
10-Way Case Connector



View Looking Into Transaxle
Pass-Thru Case Connector
(Terminal ID, Page 12)

2007-UP HYUNDAI AND 2006-UP KIA A5HF1
Internal Wire Harness And
12-Way Case Connector



View Looking Into Transaxle
Pass-Thru Case Connector
(Terminal ID Page 14)

Added Connector
For VFS Solenoid
(Line Pressure Control)

Figure 10

ELECTRONIC COMPONENTS (CONT'D)

Internal Wire Harness (10-Way Mitsubishi) And (10-Way Early Hyundai/Kia)

The 10-way pass-thru case connector and internal wire harness assembly carries feed voltage to all solenoids and the switched ground signals from the Powertrain Control Module (PCM) to the appropriate solenoid to control all of the upshifts and downshifts, as well as the TCC apply and release (See Figure 10 and 11).

The Internal wire harness is also used to feed 5 volts from the PCM to the TFT sensor and carries the fluid temperature signal back to the PCM.

The 10-way pass-thru case connector and internal wire harness assembly, connector colors, and wire colors are shown in Figure 11.

The pass-thru case connector terminal identification and terminal function along with a resistance chart are shown in Figure 13.

Wire schematic for the Mitsubishi Eclipse is shown in Figure 14.

Note: This manual does not include "All" of the wire schematics for every model.

Internal Wire Harness (12-Way 2007-Up Hyundai) And (12-Way 2006-Up Kia)

The 12-way pass-thru case connector and internal wire harness assembly carries feed voltage to all solenoids and the switched ground signals from the Powertrain Control Module (PCM) to the appropriate solenoid to control all of the upshifts and downshifts, as well as the DCC apply and release (See Figure 10 and 12).

The Internal wire harness is also used to feed 5 volts from the PCM to the TFT sensor and carries the fluid temperature signal back to the PCM.

The 12-way pass-thru case connector and internal wire harness assembly, connector colors, and wire colors are shown in Figure 12.

The pass-thru case connector terminal identification and terminal function along with a resistance chart are shown in Figure 15.

Wire schematic for the 2007 Hyundai Azera is shown in Figure 16 and wire schematic for the 2006 Kia Sedona is shown in Figure 17.

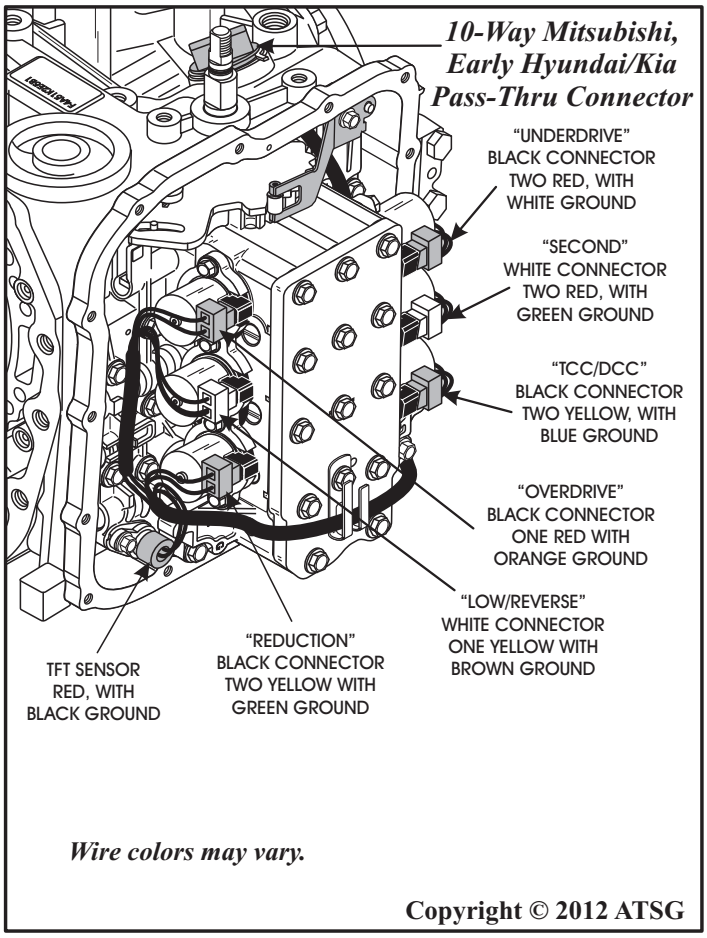


Figure 11

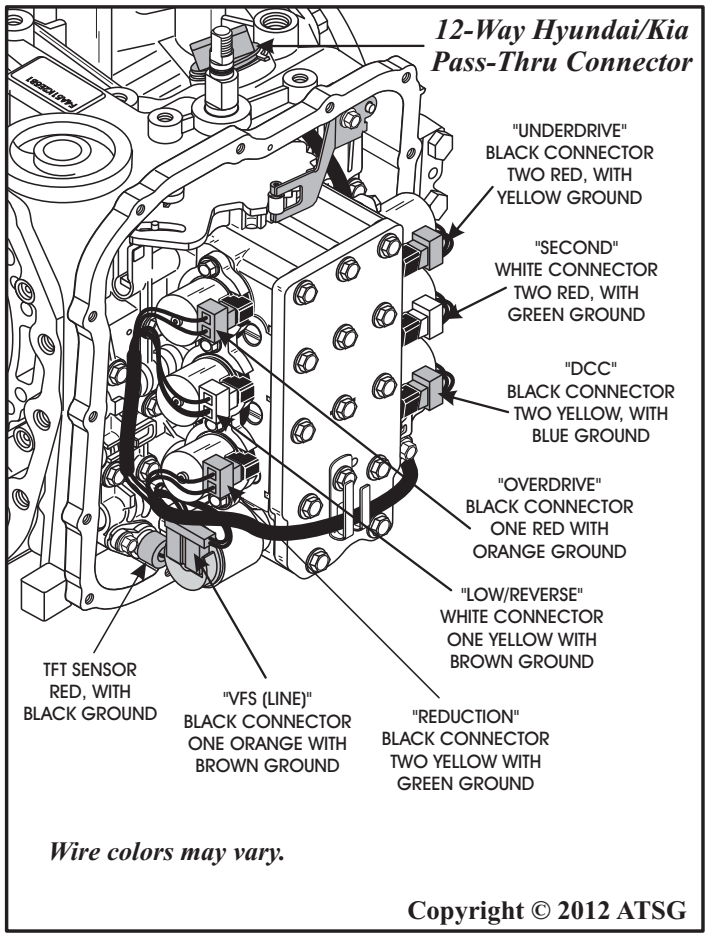
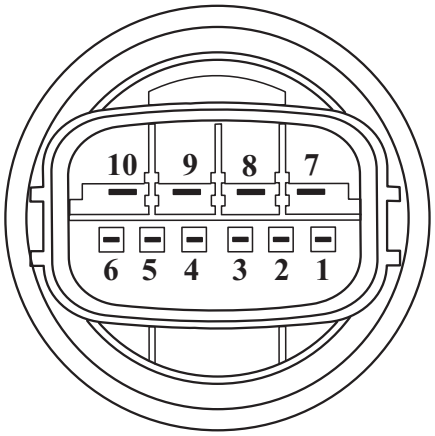


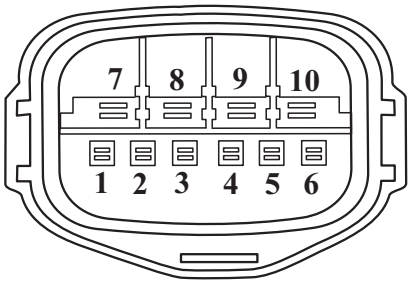
Figure 12

CASE CONNECTOR TERMINAL IDENTIFICATION AND INTERNAL COMPONENT RESISTANCE CHART

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



View Looking Into Transaxle Case Connector



View Looking Into Transaxle Harness Connector

INTERNAL COMPONENT RESISTANCE CHART

COMPONENT	*TERMINALS*	*RESISTANCE*
Underdrive Solenoid	*Terminals 9 and 3*	*2.7 - 3.4 Ohms @ 20°C (68°F)*
2nd Solenoid	*Terminals 9 and 4*	*2.7 - 3.4 Ohms @ 20°C (68°F)*
Overdrive Solenoid	*Terminals 9 and 5*	*2.7 - 3.4 Ohms @ 20°C (68°F)*
Low/Rev Solenoid	*Terminals 10 and 6*	*2.7 - 3.4 Ohms @ 20°C (68°F)*
TCC Solenoid	*Terminals 10 and 7*	*2.7 - 3.4 Ohms @ 20°C (68°F)*
Reduction Solenoid	*Terminals 10 and 8*	*2.7 - 3.4 Ohms @ 20°C (68°F)*
TFT Sensor	*Terminals 1 and 2*	*See Chart in Figure 9*

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

NOTE: Wire colors may vary.

Figure 13

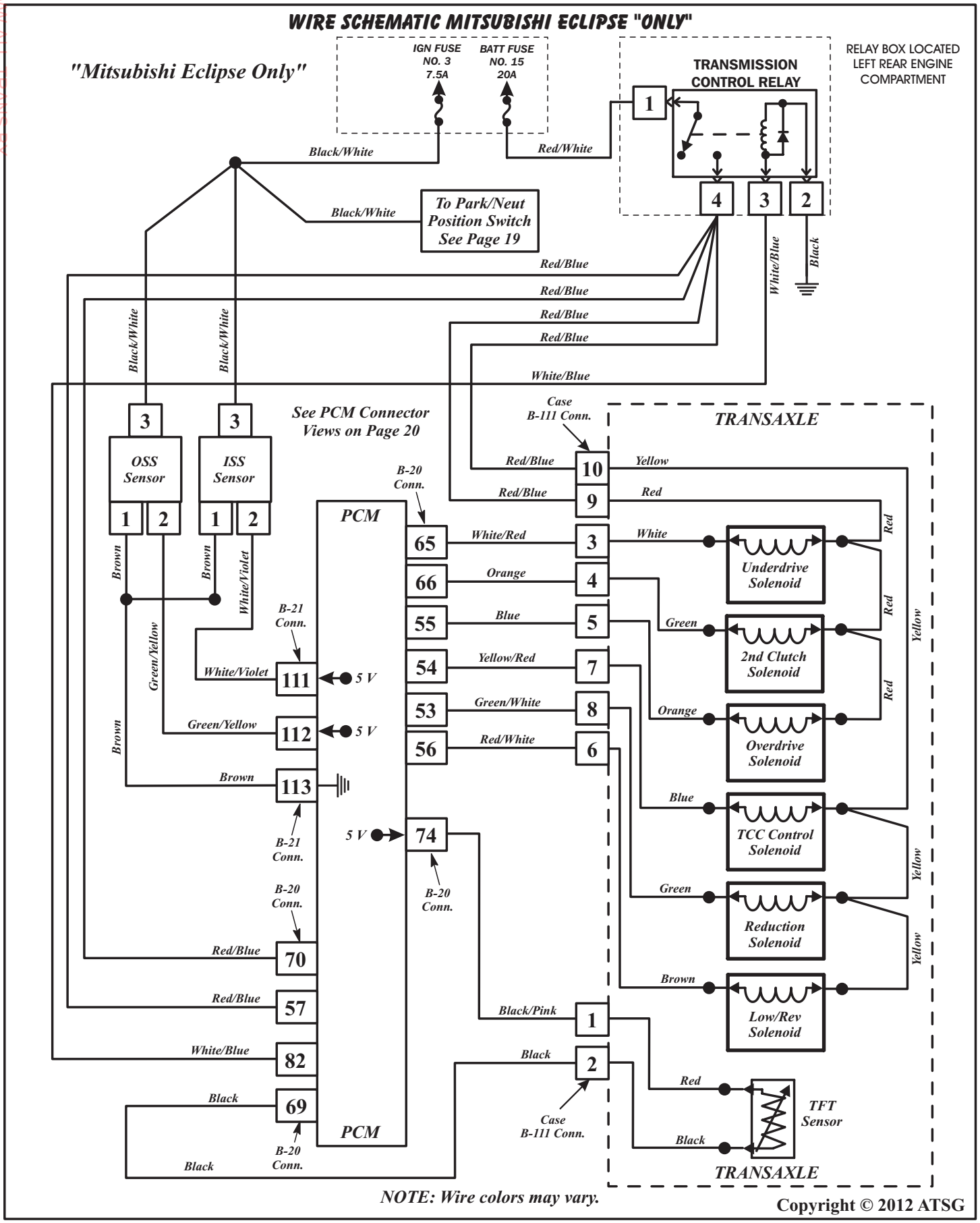
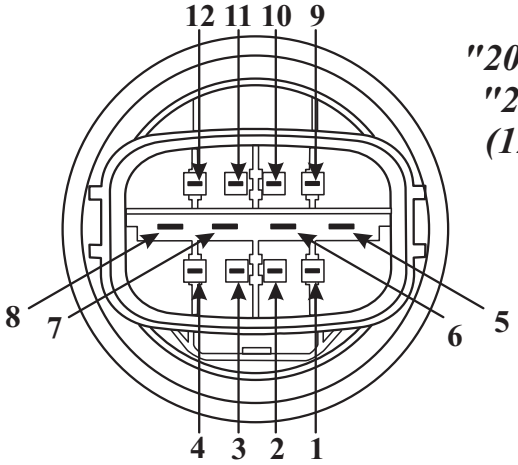


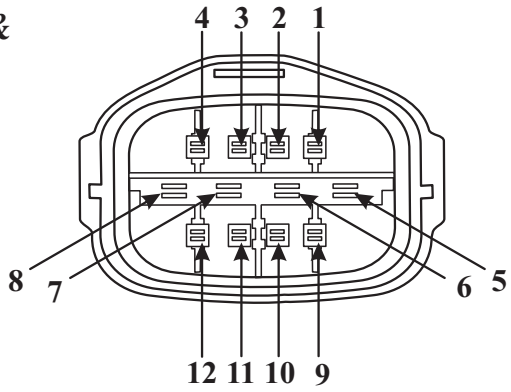
Figure 14

CASE CONNECTOR TERMINAL IDENTIFICATION AND INTERNAL COMPONENT RESISTANCE CHART



View Looking Into Transaxle
Pass-Thru Case Connector

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



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

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

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

NOTE: Wire colors may vary.

Figure 15

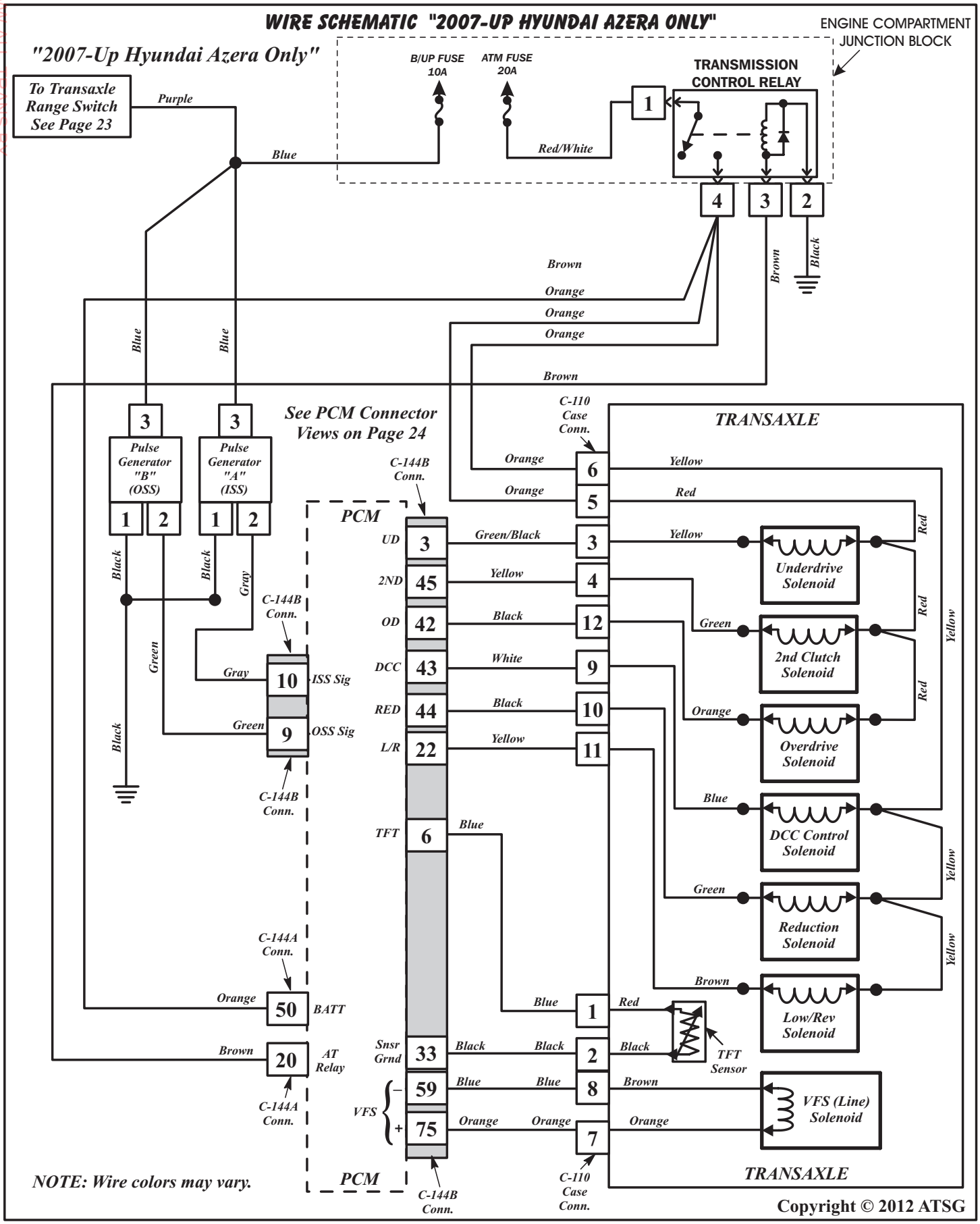


Figure 16

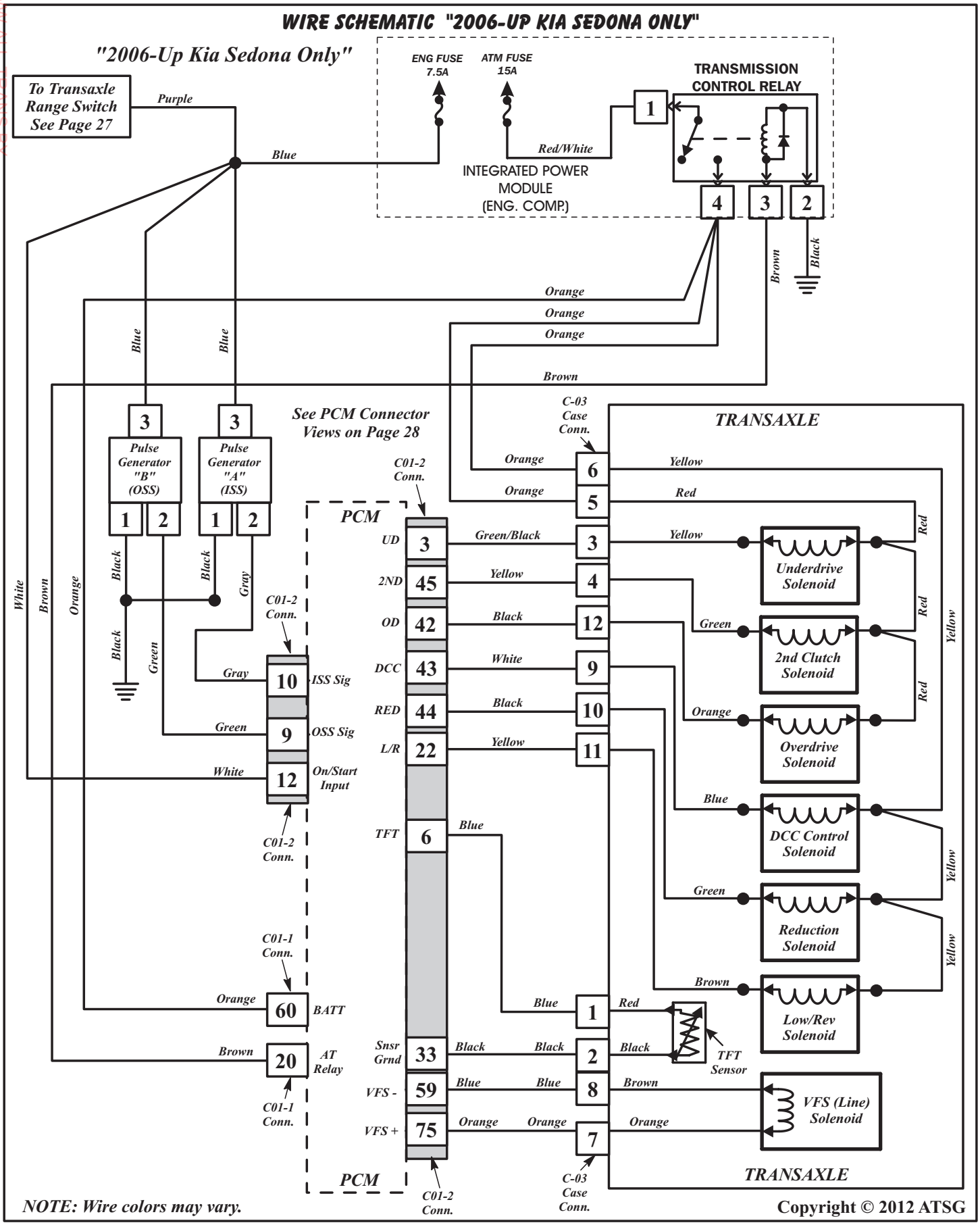


Figure 17

ELECTRONIC COMPONENTS (CONT'D)

Mitsubishi Transaxle Range Switch (TRS)

The Transaxle Range Switch (TRS) is located on top of the transaxle, as shown in Figure 18. The TRS is a mechanical multi-position switch with four selector positions, one reverse switch and one switch for positions P/N, for starting control. Refer to the TRS wire schematic in Figure 22.

The appearance of the selector lever, as shown in Figure 19, will vary between the different vehicle applications. However, they all have four detent positions and the operation and function remains the same.

Selector Lever Positions

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

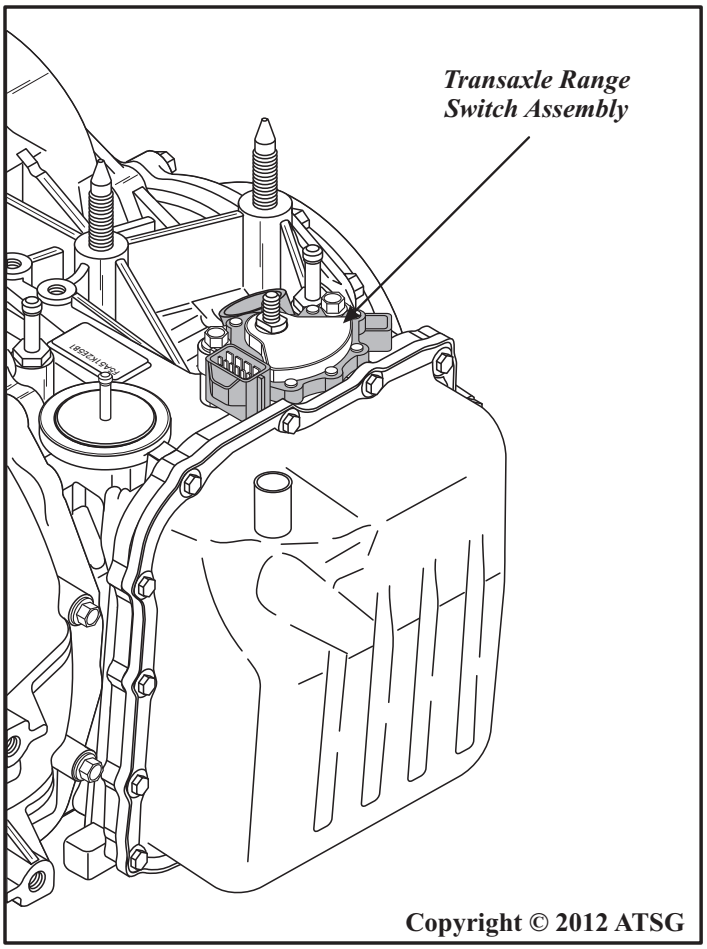


Figure 18

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

N When the "Neutral" position is selected, there is no powerflow through the transmission. The output shaft is not held and is free to rotate and the engine can be started. This position can also be selected while the vehicle is moving, to restart the engine if that becomes necessary.

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

With the shift lever in the "D" position and moved into the right hand selector gate, it enables the driver to select the range of gears by tapping the selector lever towards the "-" or "+" to cause the transaxle to downshift or upshift.

Continued on Page 18

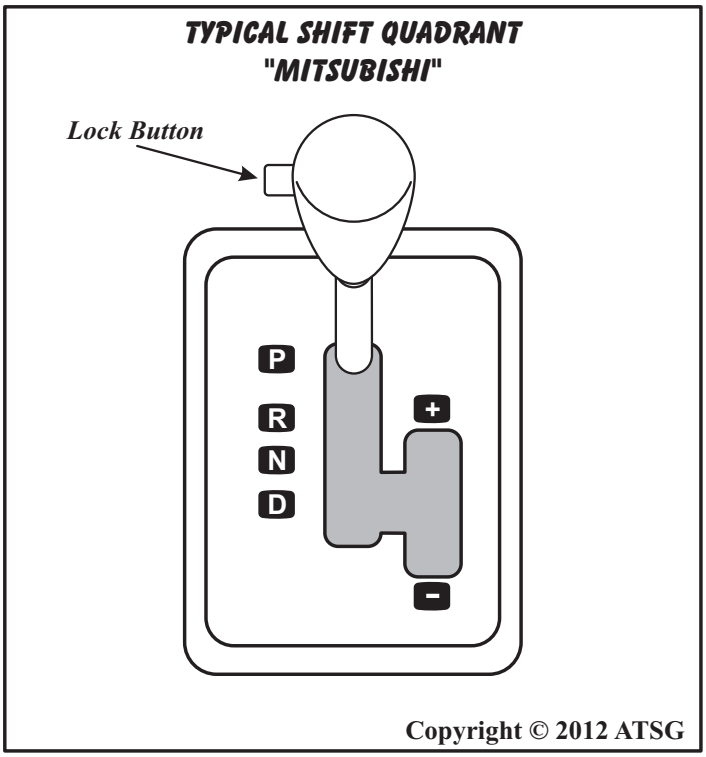


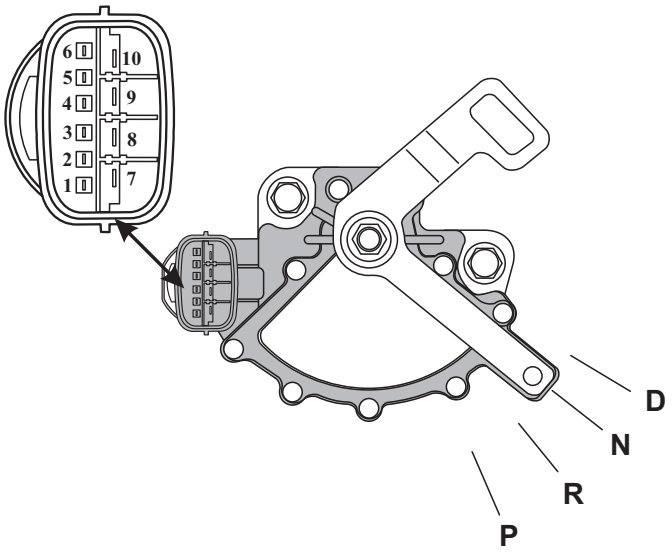
Figure 19

ELECTRONIC COMPONENTS (CONT'D)

Mitsubishi Transaxle Range Switch Check

The only voltage sent to the TRS goes in at terminal 8 and 10 as shown in Figure 22. In Reverse, voltage exits through terminal 7 to the reverse lamps and to the PCM. Ignition start voltage is sent to terminal 10 and out thru terminal 9 to the starter relay. Diagnosis here is easily done using the DVOM set to DC volts.

The TRS can also be checked with the connector removed and your DVOM set to Ohms. You should have continuity across the terminals shown in the chart in Figure 20 (Less than 2 ohms), related to the position of the gear selector lever. If these do not check properly, replace the transaxle range switch.



"Mitsubishi Only" Continuity Test

Terminal	P	R	N	D			
1				●			
*							
3	●						
4			●				
*							
*							
7		●					
8	●	●	●	●			
9	●		●				
10	●		●				

Figure 20

Transaxle Range Switch Adjustment (In Vehicle "All Models")

1. Place the shift selector lever in the "N" position.
2. Loosen the control cable to the manual control lever on transaxle.
3. Place the manual control lever on transaxle in neutral position.
4. Loosen transaxle range switch mounting bolts and turn the TRS body so the hole in the end of the manual control lever and the hole in flange of the TRS body are aligned.
   Note: The TRS body can be aligned by inserting a 5-mm diameter steel bar (3/16" bit) into the end hole of the manual control lever and the flange hole in TRS switch body, as shown in Figure 21.
5. Torque transaxle range switch mounting bolts to 11 N·m (97 in.lb.).
   Note: Ensure that the switch body does not move during the torquing process.
6. Remove the alignment tool.

Electronic Components Continued on Page 21

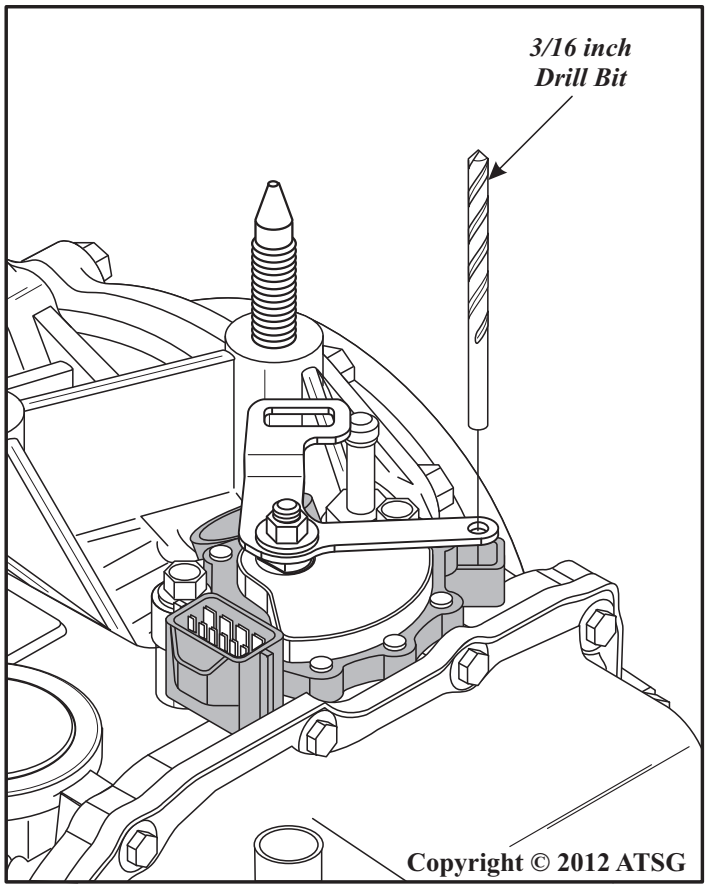
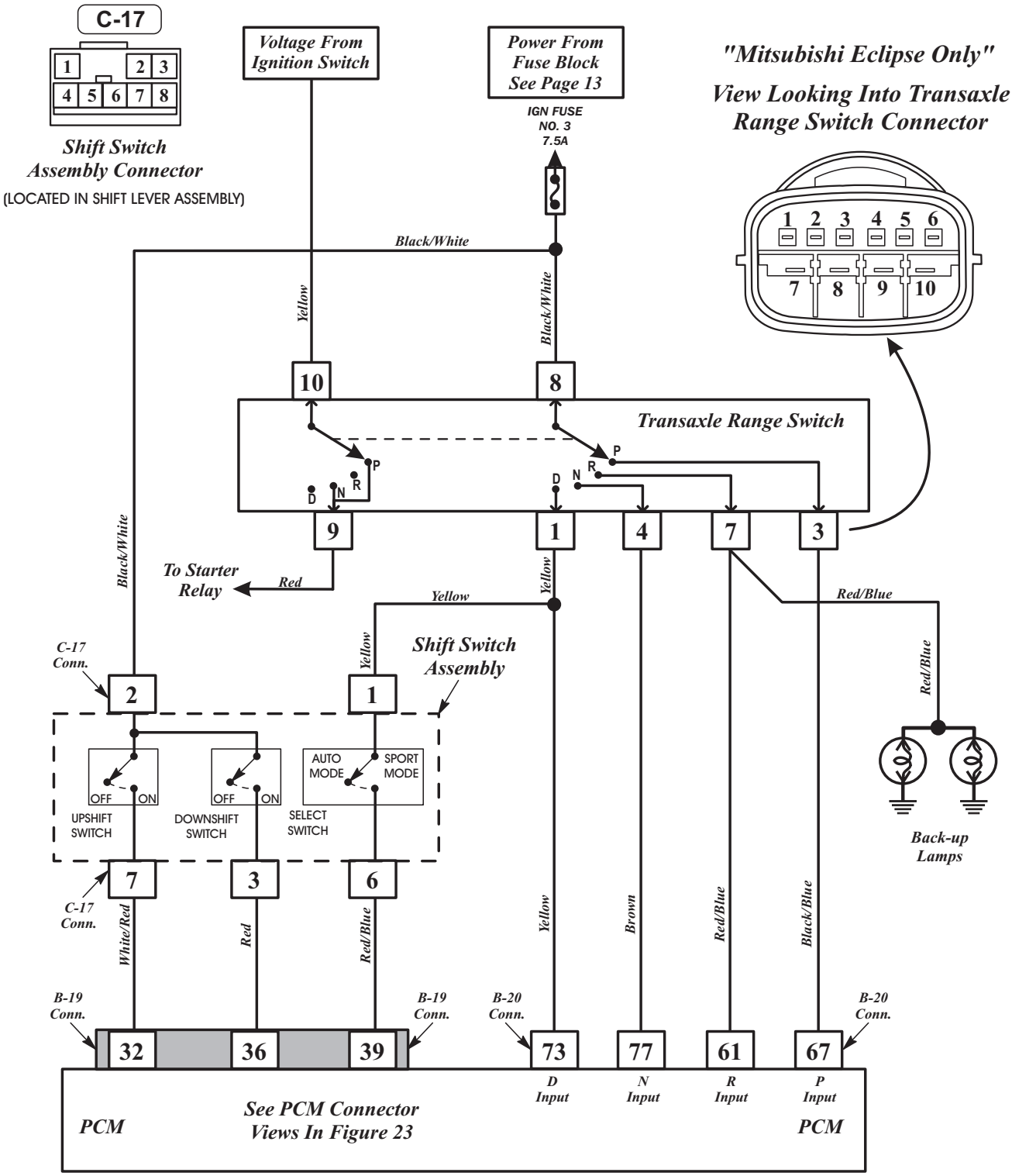


Figure 21

MITSUBISHI TRANSAXLE RANGE SWITCH CONNECTOR AND TERMINAL IDENTIFICATION

"Mitsubishi Only"

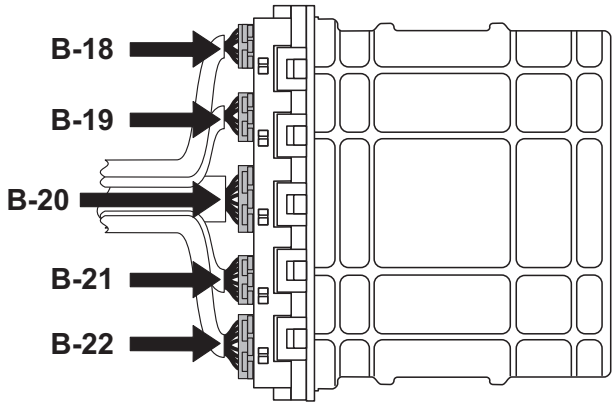


NOTE: Wire colors may vary.

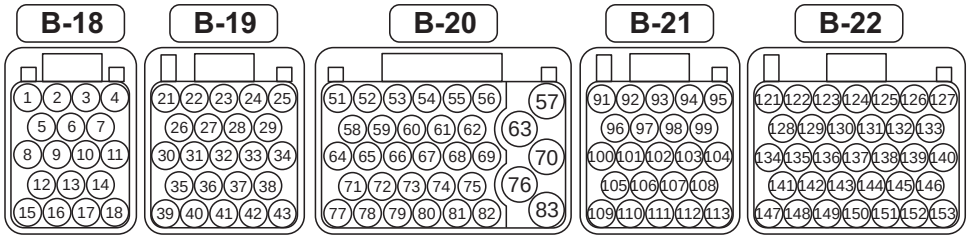
Figure 22

"MITSUBISHI ONLY" CONNECTOR VIEWS

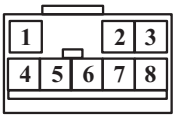
Powertrain Control Module (PCM)



The PCM is located in the engine compartment on the left fender panel just below the relay box.

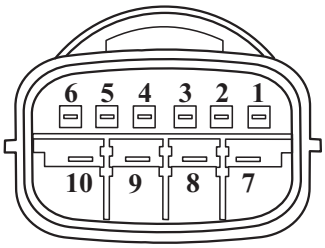


Powertrain Control Module (PCM) Connectors

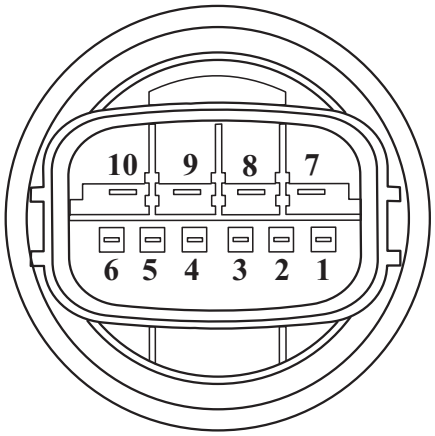


Shift Switch Assembly
C-17 Connector
(LOCATED IN SHIFT LEVER ASSEMBLY)

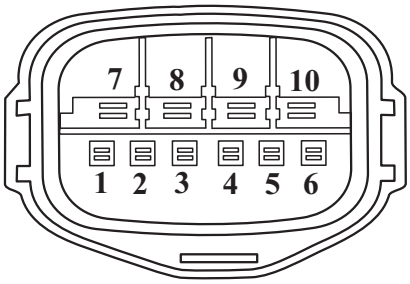
See Page 29 For Inout and Output Speed Sensor Connector Views



View Looking Into Transaxle Range Switch Harness B-113 Connector



View Looking Into Transaxle Case Connector



View Looking Into Transaxle Harness B-111 Connector

Figure 23

ELECTRONIC COMPONENTS (CONT'D)

"Hyundai Only" Transaxle Range Switch (TRS)

The Transaxle Range Switch (TRS) is located on top of the transaxle, as shown in Figure 24. The TRS is a mechanical multi-position switch with four selector positions on the "Tiptronic" version, seven selector positions on "Non-Tiptronic" versions, one reverse switch and one switch for positions P/N, for starting control. Refer to Figure 25 for the two versions of the Shift Lever assembly and the TRS wire schematic is shown in Figure 26.

"Hyundai Only" Selector Lever Positions

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

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

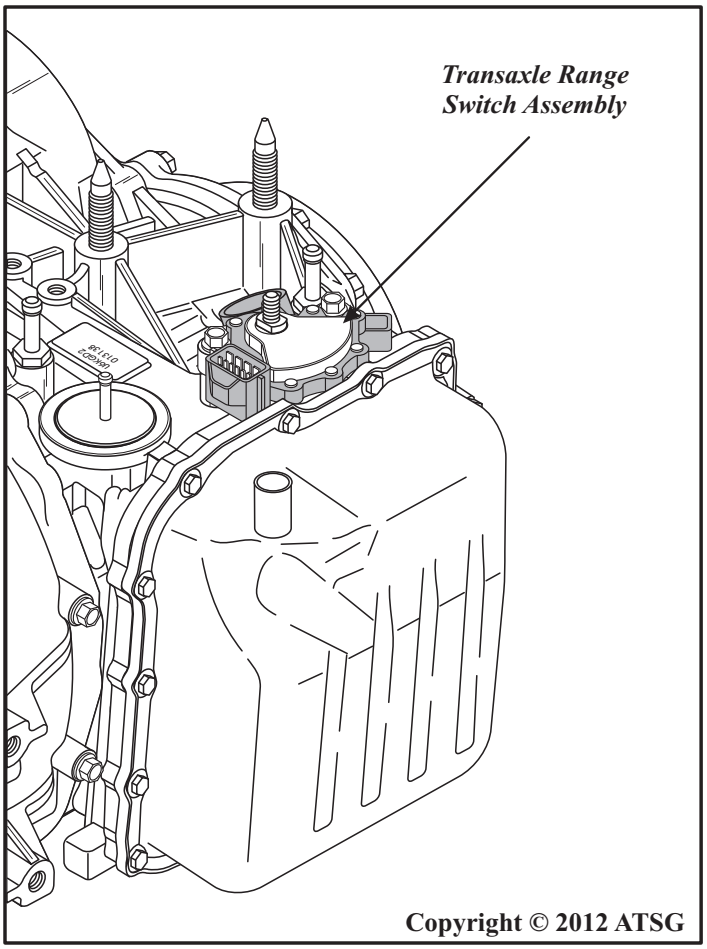


Figure 24

N When the "Neutral" position is selected, there is no powerflow through the transmission. The output shaft is not held and is free to rotate and the engine can be started. This position can also be selected while the vehicle is moving, to restart the engine if that becomes necessary.

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

On "Tiptronic" models with the shift lever in "D" position and moved into the right hand selector gate, it enables the driver to select the range of gears by tapping the selector lever towards the "-" or "+" to cause the transaxle to downshift or upshift. Refer to Figure 25.

3 When the "Third" position is selected, the transaxle will take off in first gear and not allow any shifts above third gear. This position can also be used for engine braking as necessary.

2 When the "Second" position is selected, the transaxle will take off in first gear and not allow any shifts above second gear. This position can also be used for engine braking as necessary.

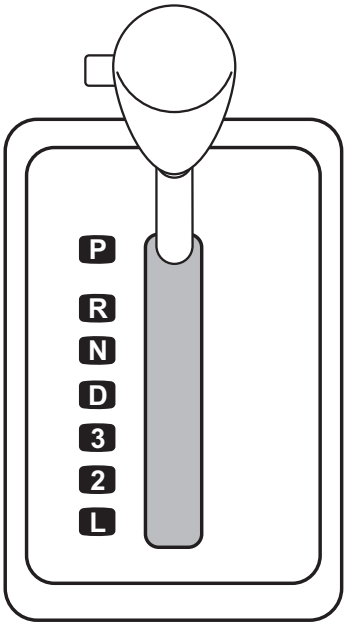
L When the "Low" position is selected, the transaxle will take off in first gear and not allow any shifts above first gear. This position can also be used for engine braking as necessary.

"Hyundai Only" Transaxle Range Switch Check

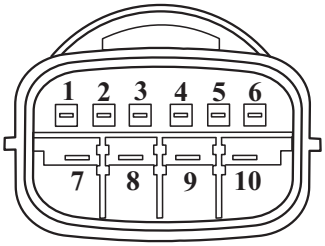
The only voltage sent to the TRS goes in at terminal 8 and 10 as shown in Figure 26. In Reverse, voltage exits through terminal 7 with a signal to the BCM & PCM. The BCM illuminates the Reverse lamps.. Ignition start voltage is sent to terminal 10 and out thru terminal 9 to the starter relay. Diagnosis here is easily done using the DVOM set to DC volts.

The TRS can also be checked with the connector removed and your DVOM set to Ohms. You should have continuity across the terminals shown in the charts in Figure 25 (Less than 2 ohms), related to the position of the gear selector lever. If these do not check properly, replace the transaxle range switch.

HYUNDAI "NON-TIPTRONIC" MODELS

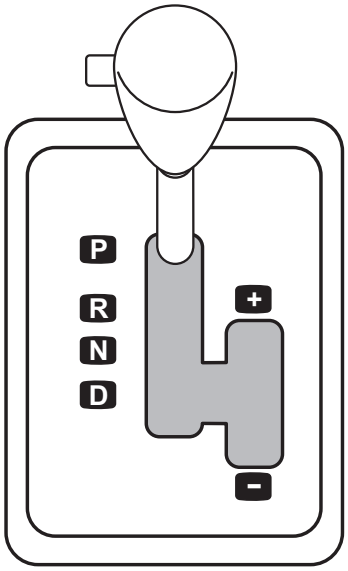


Transaxle Range Switch
"Non-Tiptronic Models"
(Face View)

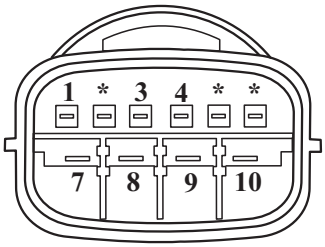


"Non-Tiptronic" Continuity Test							
Terminal	P	R	N	D	3	2	L
1				●			
2						●	
3	●						
4			●				
5					●		
6							●
7		●					
8	●	●	●	●	●	●	●
9	●		●				
10	●		●				

HYUNDAI "TIPTRONIC" MODELS



Transaxle Range Switch
"Tiptronic Models
(Face View)



Terminals not used are marked with an asterisk (*)

"Tiptronic" Continuity Test							
Terminal	P	R	N	D			
1				●			
*							
3	●						
4			●				
*							
*							
7		●					
8	●	●	●	●			
9	●		●				
10	●		●				

Figure 25

TRANSAXLE RANGE SWITCH CONNECTOR AND TERMINAL IDENTIFICATION

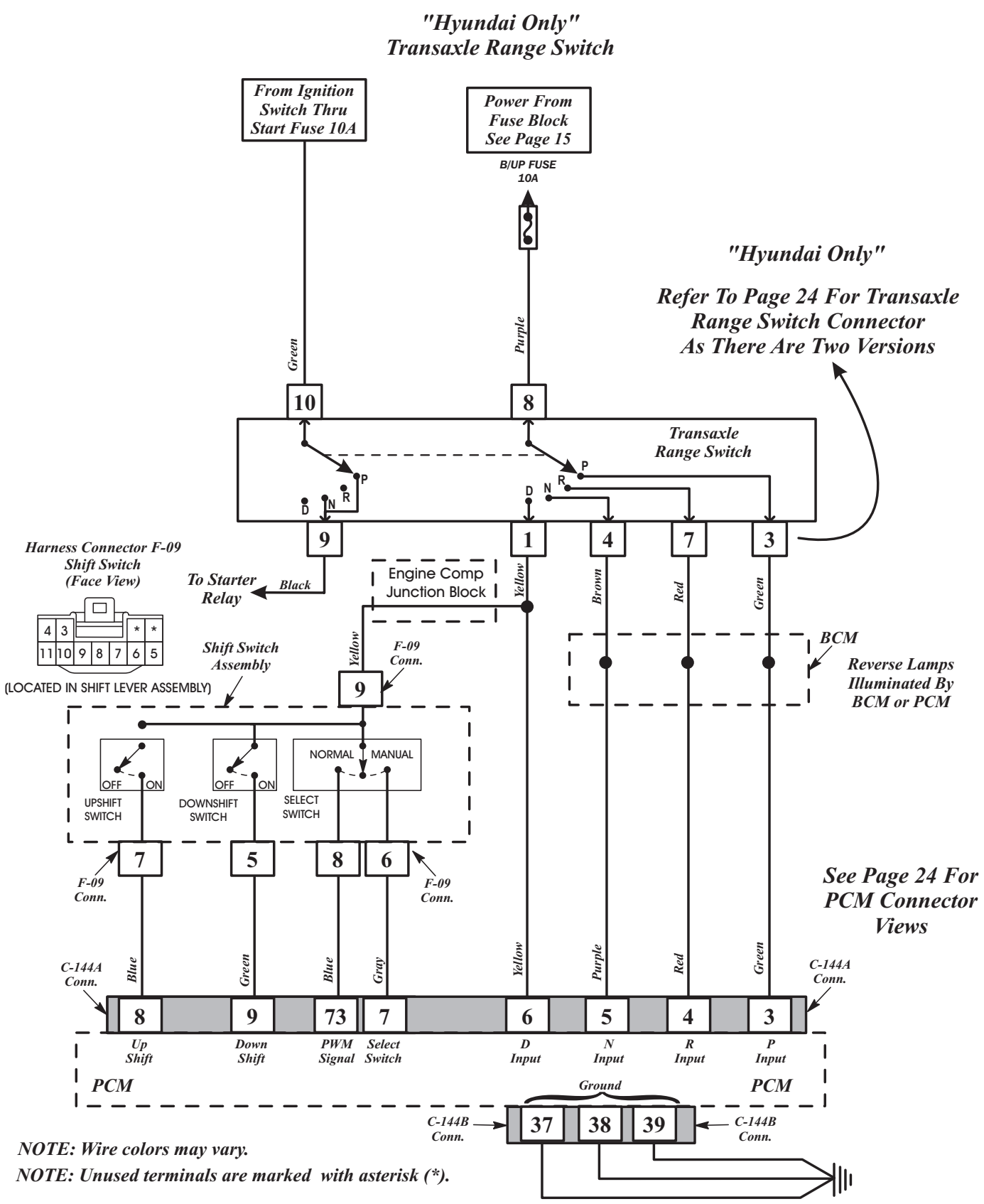
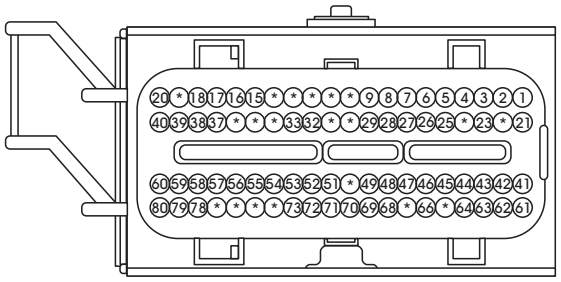


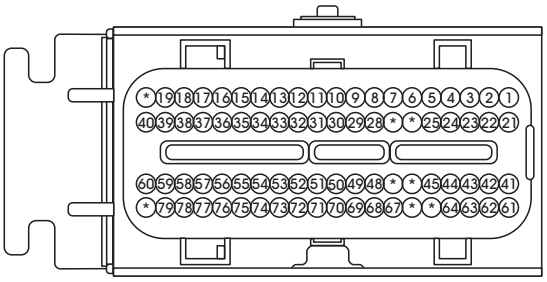
Figure 26

CONNECTOR VIEWS AND TERMINAL IDENTIFICATION
"HYUNDAI ONLY"

PCM Connector C-144A
(Face View)

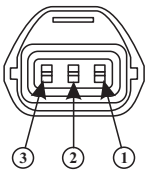


PCM Connector C-144B
(Face View)

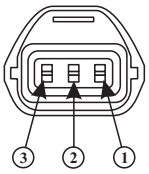


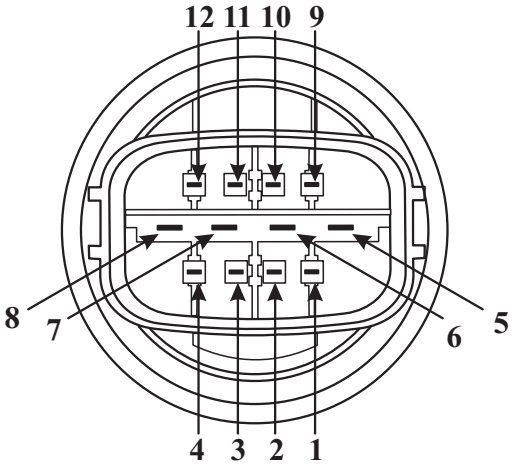
PCM located left rear of engine compartment.

Harness Connector C-108
Pulse Generator "A"
(Input Speed)
(Face View)



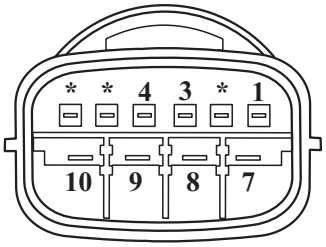
Harness Connector C-115
Pulse Generator "B"
(Output Speed)
(Face View)



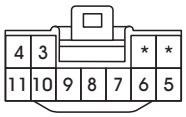


View Looking Into Transaxle
Pass-Thru Case Connector

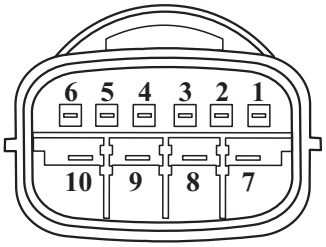
Harness Connector C-109
Transaxle Range Switch
"Tiptronic Models"
(Face View)



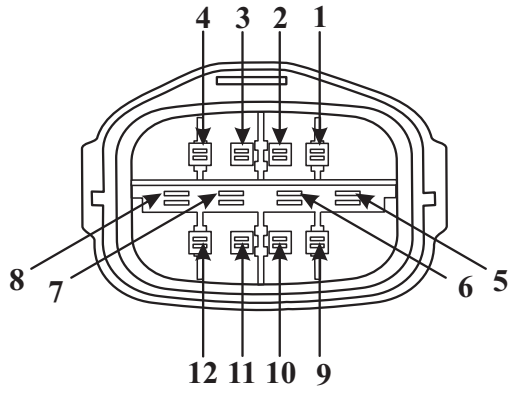
Harness Connector F-09
Shift Switch
(Face View)
(LOCATED IN SHIFT LEVER ASSEMBLY)



Harness Connector C-109
Transaxle Range Switch
"Non-Tiptronic Models"
(Face View)



See Page 22



View Looking Into Transaxle
C-110 Harness Connector

NOTE: Unused terminals are marked with asterisk (*).

Figure 27

ELECTRONIC COMPONENTS (CONT'D)

Kia Transaxle Range Switch (TRS)

The Transaxle Range Switch (TRS) is located on top of the transaxle, as shown in Figure 28. The TRS is a mechanical multi-position switch with four selector positions, one reverse switch and one switch for positions P/N, for starting control. Refer to the TRS wire schematic in Figure 32.

The appearance of the selector lever, as shown in Figure 29, will vary between the different vehicle applications. However, they all have four detent positions and the operation and function remains the same.

Selector Lever Positions

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

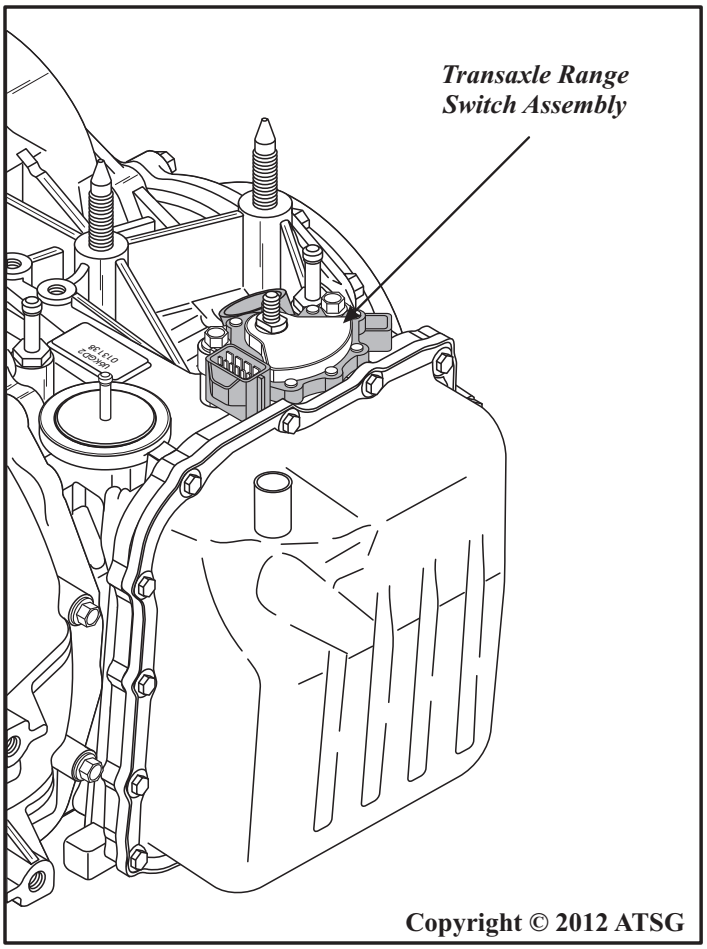


Figure 28

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

N When the "Neutral" position is selected, there is no powerflow through the transmission. The output shaft is not held and is free to rotate and the engine can be started. This position can also be selected while the vehicle is moving, to restart the engine if that becomes necessary.

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

With the shift lever in the “D" position and moved into the right hand selector gate, it enables the driver to select the range of gears by tapping the selector lever towards the "-" or "+" to cause the transaxle to downshift or upshift.

Continued on Page 26

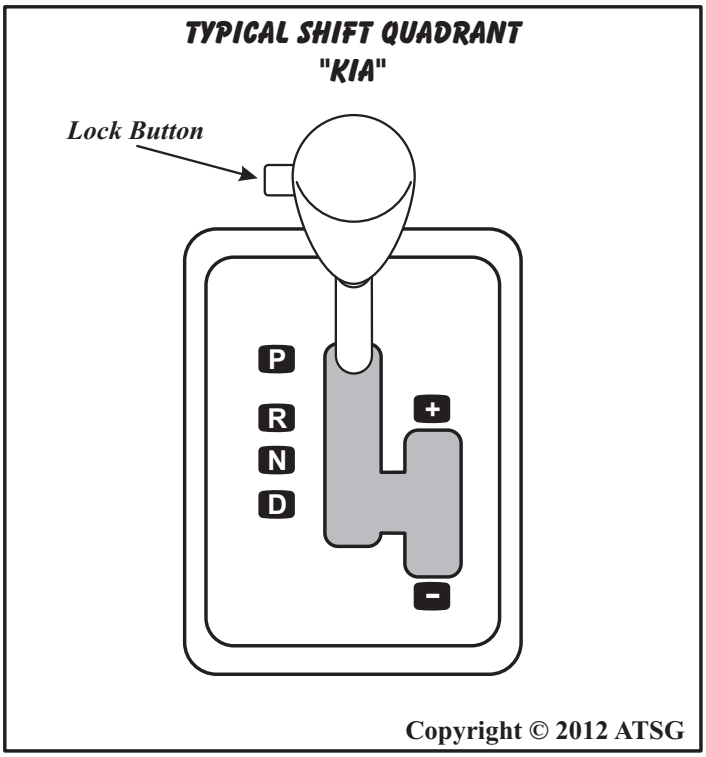


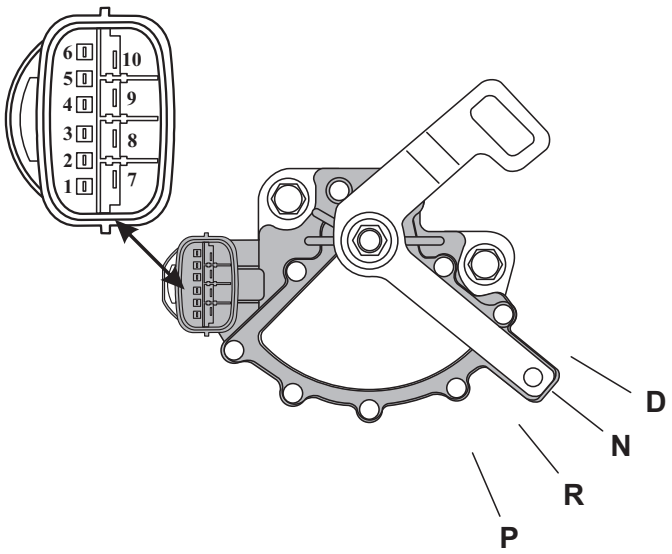
Figure 29

ELECTRONIC COMPONENTS (CONT'D)

Kia Transaxle Range Switch Check

The only voltage sent to the TRS goes in at terminal 8 and 10 as shown in Figure 32. In Reverse, voltage exits through terminal 7 to the BCM & PCM. The BCM/PCM illuminates the reverse lamps. Ignition start voltage is sent to terminal 10 and out thru terminal 9 to the starter relay. Diagnosis here is easily done using the DVOM set to DC volts.

The TRS can also be checked with the connector removed and your DVOM set to Ohms. You should have continuity across the terminals shown in the chart in Figure 30 (Less than 2 ohms), related to the position of the gear selector lever. If these do not check properly, replace the transaxle range switch.



"Kia Only" Continuity Test

Terminal	P	R	N	D			
1				●			
*							
3	●						
4			●				
*							
*							
7		●					
8	●	●	●	●			
9	●		●				
10	●		●				

Figure 30

Transaxle Range Switch Adjustment (In Vehicle "All Models")

1. Place the shift selector lever in the "N" position.
2. Loosen the control cable to the manual control lever on transaxle.
3. Place the manual control lever on transaxle in neutral position.
4. Loosen transaxle range switch mounting bolts and turn the TRS body so the hole in the end of the manual control lever and the hole in flange of the TRS body are aligned.
   Note: The TRS body can be aligned by inserting a 5-mm diameter steel bar (3/16" bit) into the end hole of the manual control lever and the flange hole in TRS switch body, as shown in Figure 31.
5. Torque transaxle range switch mounting bolts to 11 N·m (97 in.lb.).
   Note: Ensure that the switch body does not move during the torquing process.
6. Remove the alignment tool.

Electronic Components Continued on Page 29

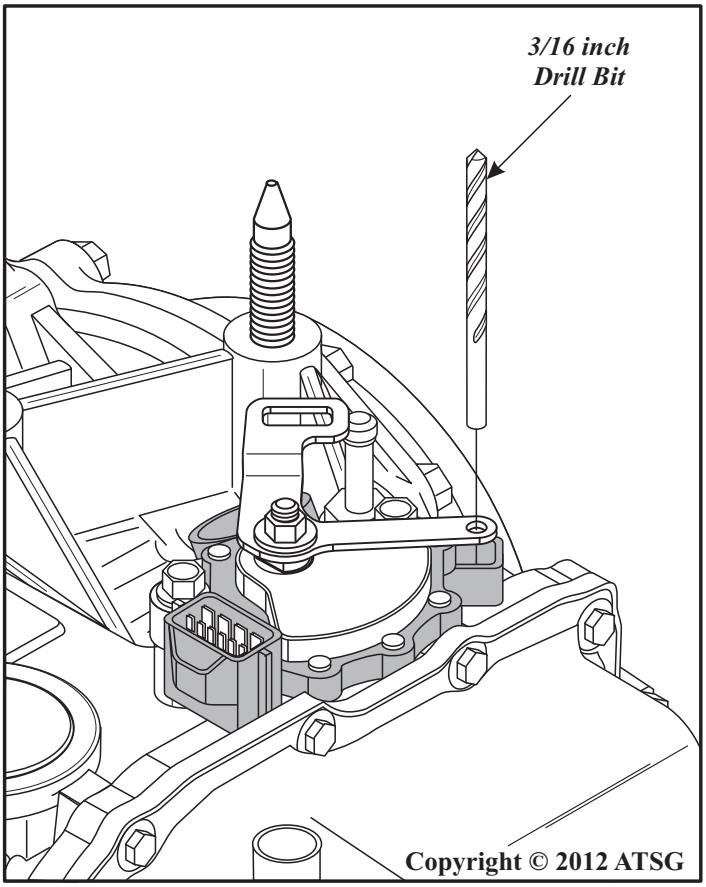
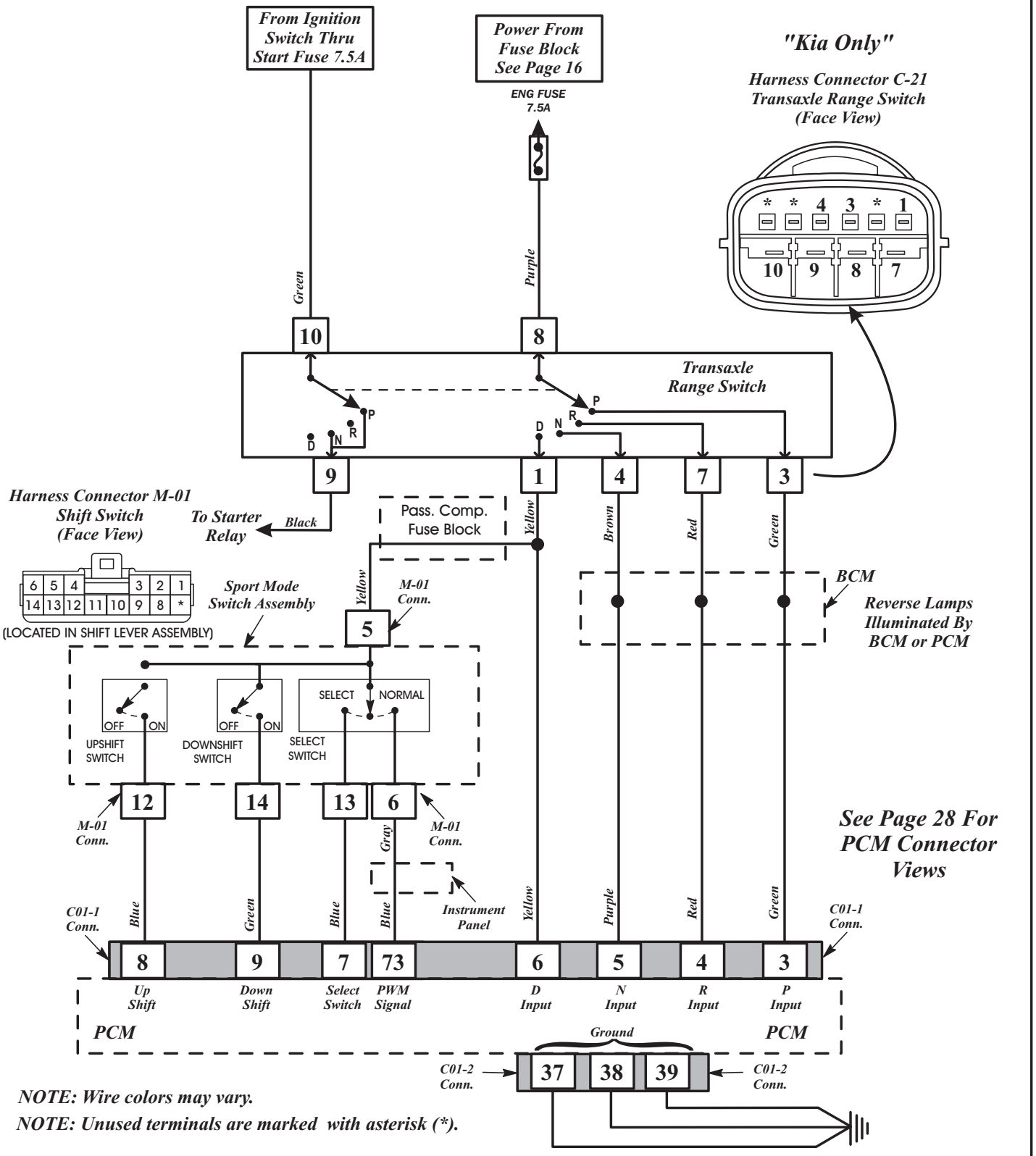


Figure 31

TRANSAXLE RANGE SWITCH CONNECTOR AND TERMINAL IDENTIFICATION

"Kia Only"
Transaxle Range Switch



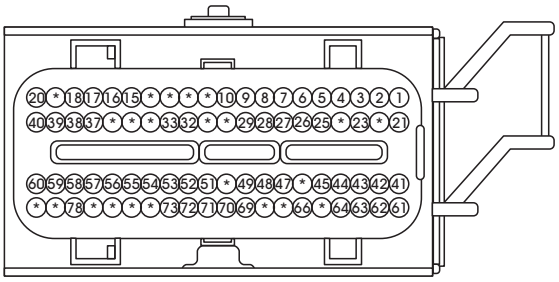
NOTE: Wire colors may vary.

NOTE: Unused terminals are marked with asterisk (*).

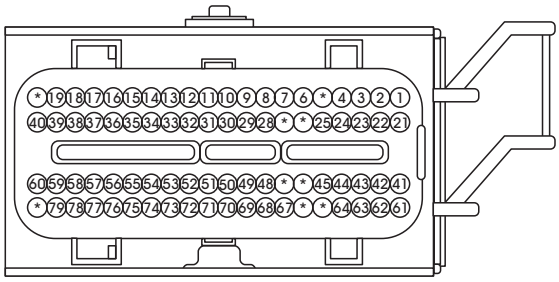
Figure 32

CONNECTOR VIEWS AND TERMINAL IDENTIFICATION
"KIA ONLY"

PCM Connector C01-1
(Face View)

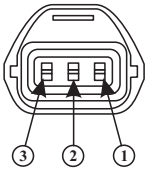


PCM Connector C01-2
(Face View)

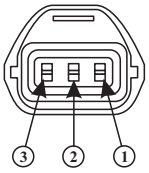


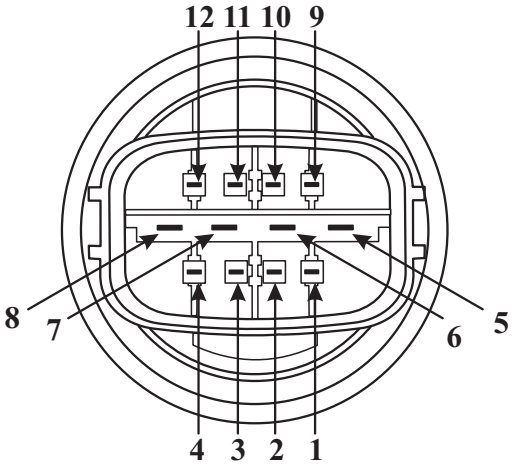
PCM located on firewall, left rear of engine compartment, behind relay box.

Harness Connector C-13
Pulse Generator "A"
(Input Speed)
(Face View)



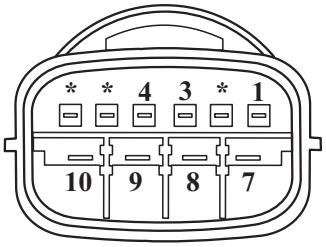
Harness Connector C-15
Pulse Generator "B"
(Output Speed)
(Face View)



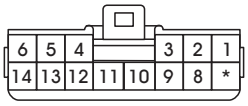


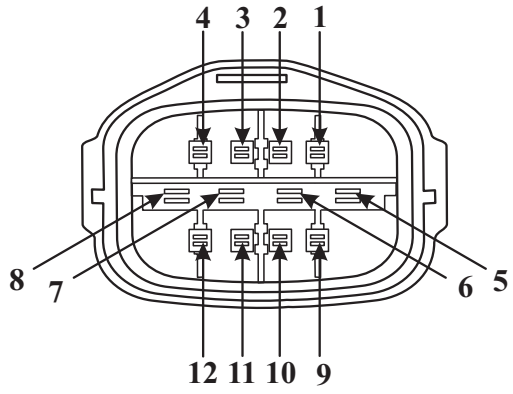
View Looking Into Transaxle
Pass-Thru Case Connector

Harness Connector C-21
Transaxle Range Switch
(Face View)



Harness Connector M-01
Shift Switch
(Face View)
(LOCATED IN SHIFT LEVER ASSEMBLY)





View Looking Into Transaxle
C-03 Harness Connector

NOTE: Unused terminals are marked with asterisk (*).

Figure 33

ELECTRONIC COMPONENTS (CONT'D)

Input and Output Speed Sensors

The Input and Output Speed Sensors are located on top of the transaxle case, as shown in Figure 34, and retained with a bolt. Both speed sensors are equipped with an "O" ring seal to seal the case bore, as shown in Figure 35 and 36.

Refer to Page 30 for speed sensor operation and diagnosis.

Continued on Page 30

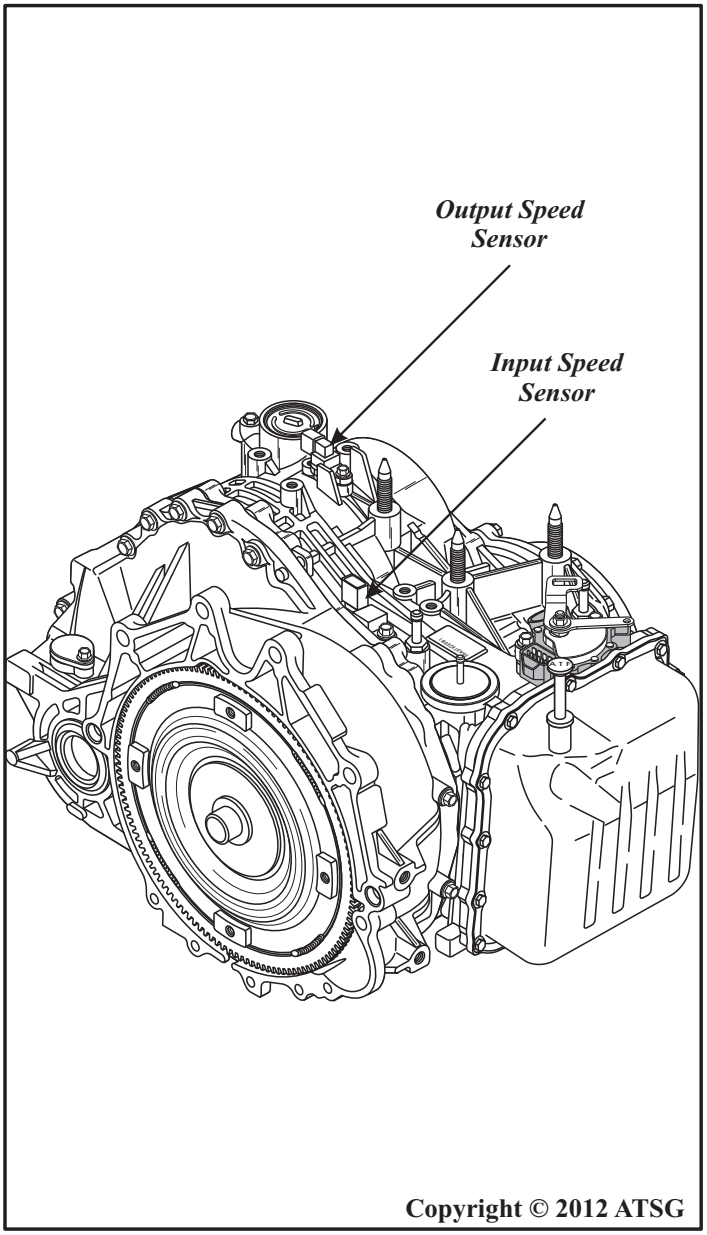


Figure 34

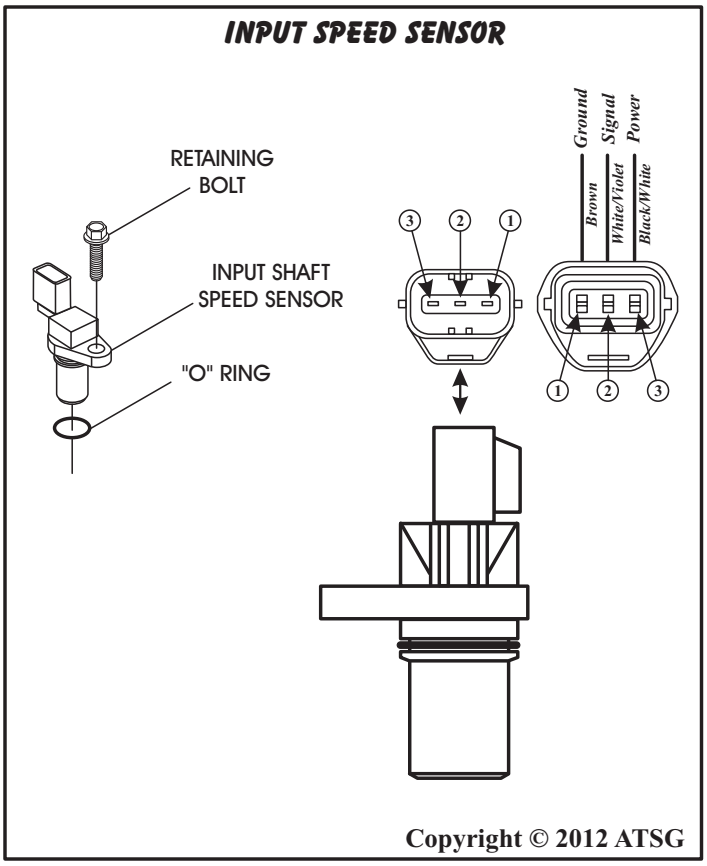


Figure 35

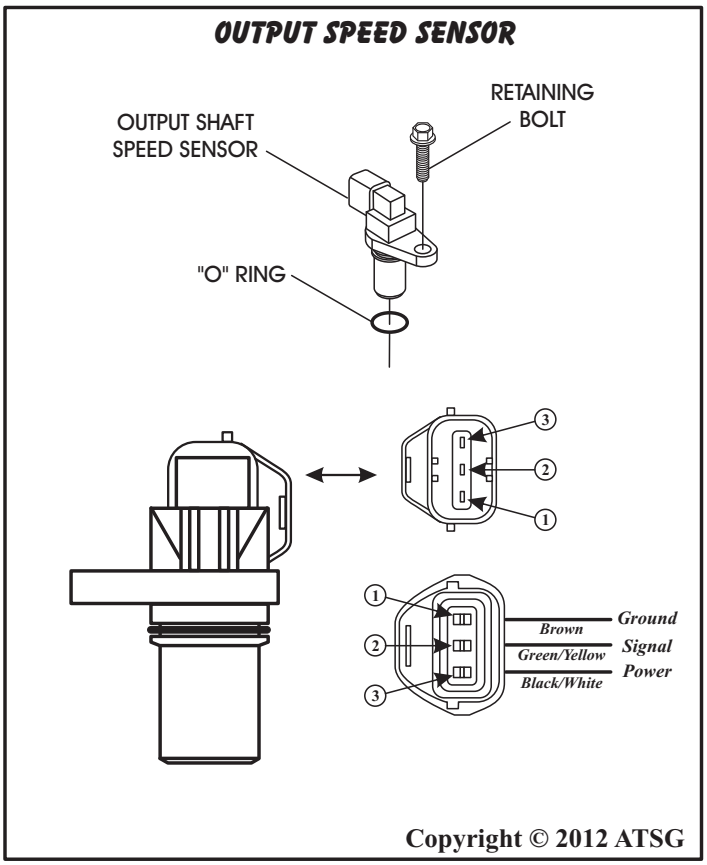


Figure 36

ELECTRONIC COMPONENTS (CONT'D)

Input Speed Sensor

When the key is turned on, you should see battery voltage at input speed sensor terminal 3. A coil built into the input shaft speed sensor generates a 0 - 5 volt pulse signal when the input shaft rotates. The pulse signal frequency increases with a rise in input shaft speed. The PCM interprets this pulse signal as input shaft speed. The input shaft speed sensor generates the pulse signal as the teeth on the underdrive clutch housing pass the magnetic tip of the sensor.

The input speed sensors all operate in the same manner but all of the PCM terminals are different. You must refer to the wiring schematic for the model you are working on.

Mitsubishi wire schematic - See Page 13.
Hyundai wire schematic - See Page 15.
Kia wire schematic - See Page 16.

Conditions To Set DTC

If no output pulse is detected from the input shaft speed sensor for one second or more, while driving in 3rd or 4th gear at a speed of 30 km/h (19 mph) or more, there is an open or short in the input shaft speed sensor circuit, and a DTC is set. When a DTC is output four times, the transaxle is locked into 3rd gear as a failsafe measure.

Output Speed Sensor

When the key is turned on, you should see battery voltage at output speed sensor terminal 3. A coil built into the output shaft speed sensor generates a 0 - 5 volt pulse signal when the output shaft rotates. The pulse signal frequency increases with a rise in output shaft speed. The PCM interprets this pulse signal as output shaft speed. The output shaft speed sensor generates the pulse signal as the teeth on the direct planetary carrier pass the magnetic tip of the sensor.

The output speed sensors all operate in the same manner but all of the PCM terminals are different. You must refer to the wiring schematic for the model you are working on.

Mitsubishi wire schematic - See Page 13.
Hyundai wire schematic - See Page 15.
Kia wire schematic - See Page 16.

Conditions To Set DTC

If the output from the output speed sensor is continuously 50% lower than vehicle speed for one second or more, while driving in 3rd or 4th gear at a speed of 30 km/h (19 mph) or more, there is an open or short in the output speed sensor circuit, and a DTC is set. When a DTC is output four times, the transaxle is locked into 3rd as a failsafe measure.

Electronic Components
Continued on Page 31

ELECTRONIC COMPONENTS (CONT'D)

Powertrain Control Module (PCM)

The main function of the PCM is to electronically control a multitude of components including the transaxle upshifts and downshifts, and the torque converter clutch apply or release. The PCM learns the driving habits and the preferences of each individual driver by processing driving data on engine output, engine load, foot brake operation, etc. The PCM then uses this data to adjust shift timing to best suit the drivers style.

Reading And Erasing DTC's

The PCM monitors its input and output signals, some signals at all times and others only under specified conditions. When an irregular signal is initially monitored, the PCM decides that a malfunction has occured and records this as a diagnostic trouble code. The diagnostic results can be read with scan tool. Diagnostic trouble codes are kept in memory by direct battery feed. The codes are retained in memory even if the ignition switch is in the Off position. The DTC's are not erased even after the battery terminals and the PCM connector are disconnected. ***A compatable scan tool is required to read and erase diagnostic trouble codes.***
Diagnostic Trouble Codes are described as follows:
Mitsubishi Codes, Figure 38.
Hyundai & Kia Codes, Figure 39 and 40.

Powertrain Control Module (PCM) Locations

Mitsubishi - The PCM is located in the engine compartment on the left inner fender panel, just below the relay box. PCM connector views Page 20.

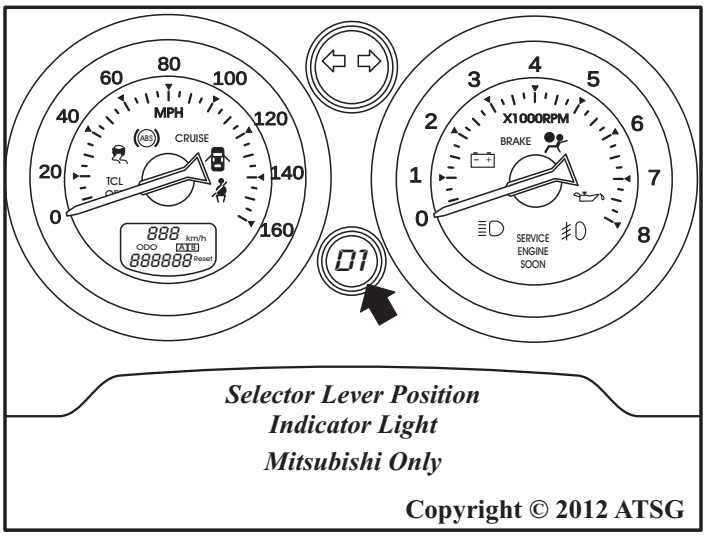
Hyundai - The PCM is located in the left rear of the engine compartment. PCM connector views Page 24.

Kia - The PCM is located on firewall, at the left rear of the engine compartment, behind the relay box. PCM connector views Page 28.

Selector Lever Position Indicator Light (Mitsubishi Only)

The selector lever position indicator light located in the instrument cluster, as shown in Figure 37, will flash once per second (D1 thru D5) if there are any diagnostic trouble codes stored related to the transaxle system. Check for diagnostic trouble codes if the selector lever position indicator (D1 thru D5) is flashing once per second (Requires Scanner). This applies to Mitsubishi Only. Hyundai and Kia models use a Malfunction Indicator Lamp (MIL) that illuminates when there is a trouble code stored.

Note: If the selector lever position indicator light (D1 thru D5) is flashing "twice" per second, the transaxle fluid temperature is high. It flashes when the fluid temp is approximately 257°F or more, and quits flashing when fluid temp drops to approximately 239°F or less.



Selector Lever Position Indicator Light
Mitsubishi Only

Figure 37

"MITSUBISHI" DIAGNOSTIC TROUBLE CODE DESCRIPTION	
Code	*Description*
P0500	*Vehicle Speed Sensor Malfunction*
P0603	*EEPROM Malfunction*
P0606	*PCM Malfunction*
P0630	*VIN Not Programmed or Incompatable PCM*
P0642	*Throttle Position Sensor, Power Supply*
P0705	*Transaxle Range Switch, Open Circuit*
P0712	*Transaxle Fluid Temperature Sensor, Short Circuit*
P0713	*Transaxle Fluid Temperature Sensor, Open Circuit*
P0715	*Input Speed Sensor, Open Circuit/Short Circuit*
P0720	*Output Speed Sensor, Open Circuit/Short Circuit*
P0731	*1st Gear Ratio Error*
P0732	*2nd Gear Ratio Error*
P0733	*3rd Gear Ratio Error*
P0734	*4th Gear Ratio Error*
P0735	*5th Gear Ratio Error*
P0736	*Reverse Gear Ratio Error*
P0741	*Torque Converter Clutch, Performance or Stuck Off*
P0742	*Torque Converter Clutch, Performance or Stuck On*
P0743	*Torque Converter Clutch Solenoid, Open Circuit/Short Circuit*
P0753	*Low/Reverse Solenoid, Open Circuit/Short Circuit*
P0758	*Underdrive Solenoid, Open Circuit/Short Circuit*
P0763	*Second Clutch Solenoid, Open Circuit/Short Circuit*
P0768	*Overdrive Solenoid, Open Circuit/Short Circuit*
P0773	*Reduction Brake Band Solenoid, Open Circuit/Short Circuit*
P1751	*Transaxle Control Relay, Open Circuit/Short To Ground*
P1771	*Transaxle Range Switch, Short Circuit*

CODE RETRIEVAL REQUIRES CAPABLE SCANNER

Figure 38

"HYUNDAI & KIA" DIAGNOSTIC TROUBLE CODE DESCRIPTION	
Code	*Description*
P0500	*Vehicle Speed Sensor, Circuit Malfunction*
P0501	*Vehicle Speed Sensor, Range/Performance*
P0560	*System Voltage*
P0600	*CAN Communication Bus*
P0601	*EEPROM, Check Sum Error*
P0602	*EEPROM, Programming Error*
P0604	*Internal Control Module, RAM Error*
P0605	*EEPROM, Abnormal*
P0630	*VIN Not Programmed or Incompatable PCM*
P0700	*PCM Request For MIL On*
P0703	*Stop Lamp Switch, Short Circuit/Open Circuit*
P0705	*Transaxle Range Switch, Malfunction*
P0707	*Transaxle Range Switch, Open Circuit*
P0708	*Transaxle Range Switch, Short Circuit*
P0712	*Transaxle Fluid Temperature Sensor, Short Circuit*
P0713	*Transaxle Fluid Temperature Sensor, Open Circuit*
P0715	*Input Speed Sensor, Open Circuit/Short Circuit*
P0717	*Input Speed Sensor Circuit, No Signal*
P0720	*Output Speed Sensor, Open Circuit/Short Circuit*
P0722	*Output Speed Sensor Circuit, No Signal*
P0725	*Crank Position Sensor, Open Circuit*
P0731	*1st Gear Ratio Error*
P0732	*2nd Gear Ratio Error*
P0733	*3rd Gear Ratio Error*
P0734	*4th Gear Ratio Error*
P0735	*5th Gear Ratio Error*
P0736	*Reverse Gear Ratio Error*
P0740	*Torque Converter Clutch, Defective System*
P0741	*Torque Converter Clutch, Stuck Off*
P0742	*Torque Converter Clutch, Stuck On*
P0743	*Torque Converter Clutch Solenoid, Open Circuit/Short Circuit*
P0746	*VFS Solenoid (Line Pressure), Performance*
P0748	*VFS Solenoid (Line Pressure), Electrical*
P0750	*Low/Reverse Solenoid, Open Circuit/Short Circuit*

Continued on Page 34

Figure 39

"HYUNDAI & KIA" DIAGNOSTIC TROUBLE CODE DESCRIPTION	
Code	*Description*
P0755	*Underdrive Solenoid, Open Circuit/Short Circuit*
P0760	*Second Clutch Solenoid, Open Circuit/Short Circuit*
P0765	*Overdrive Solenoid, Open Circuit/Short Circuit*
P0770	*Reduction Brake Band Solenoid, Open Circuit/Short Circuit*
P0885	*A/T Relay Circuit, Circuit Malfunction*
P0890	*A/T Relay Circuit, Low Circuit*
P0891	*A/T Relay Circuit, Open Circuit*
P1500	*Vehicle Speed Sensor, Open Circuit/Short Circuit*
P1529	*Vehicle Speed Sensor, Open/Short*
P1602	*Serial Communication Line Problem With PCM*
P1603	*CAN Communication Bus, OFF*
P1604	*No ID From PCM to CAN*
P1630	*CAN-BUS OFF, TCM Failure Open/Short*
P1631	*CAN-TIME OUT ECU, ECM Failure Open/Short*
P1701	*Throttle Position Sensor, Malfunction*
P1702	*Throttle Position Sensor, Misadjusted*
P1703	*Throttle Position Sensor, Open Circuit*
P1704	*Throttle Position Sensor, Short Circuit*
P1707	*Cruise Control Brake Switch Malfunction*
P1723	*Transaxle Control Relay, Open Circuit/Short To Ground*
P1726	*Accelerator Pedal Position Sensor Signal*
P1749	*Serial Communication Error, ECM, TCM*
P1764	*CAN Controller Circuit Malfunction*
P1766	*CAN Communication BUS, OFF*

CODE RETRIEVAL REQUIRES CAPABLE SCANNER

Figure 40

VALVE BODY TO CASE PASSAGE IDENTIFICATION

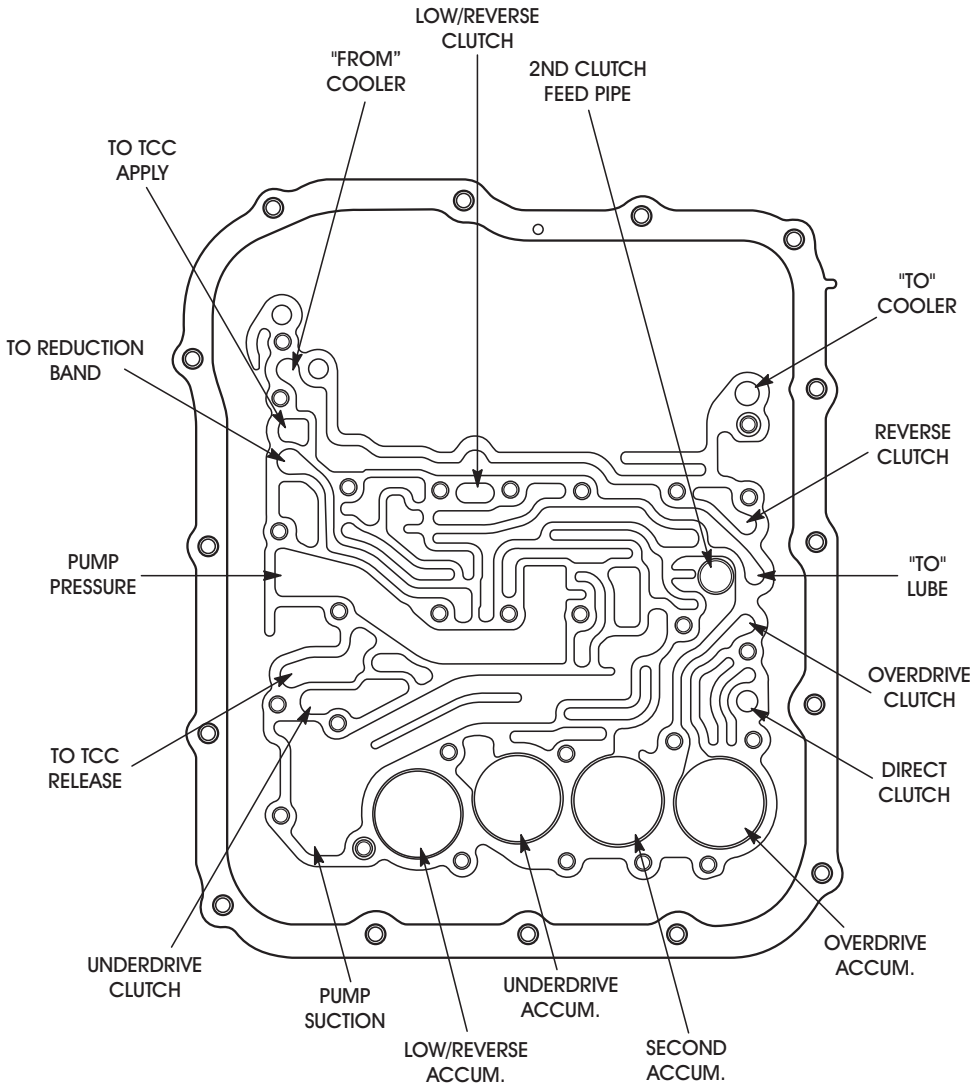
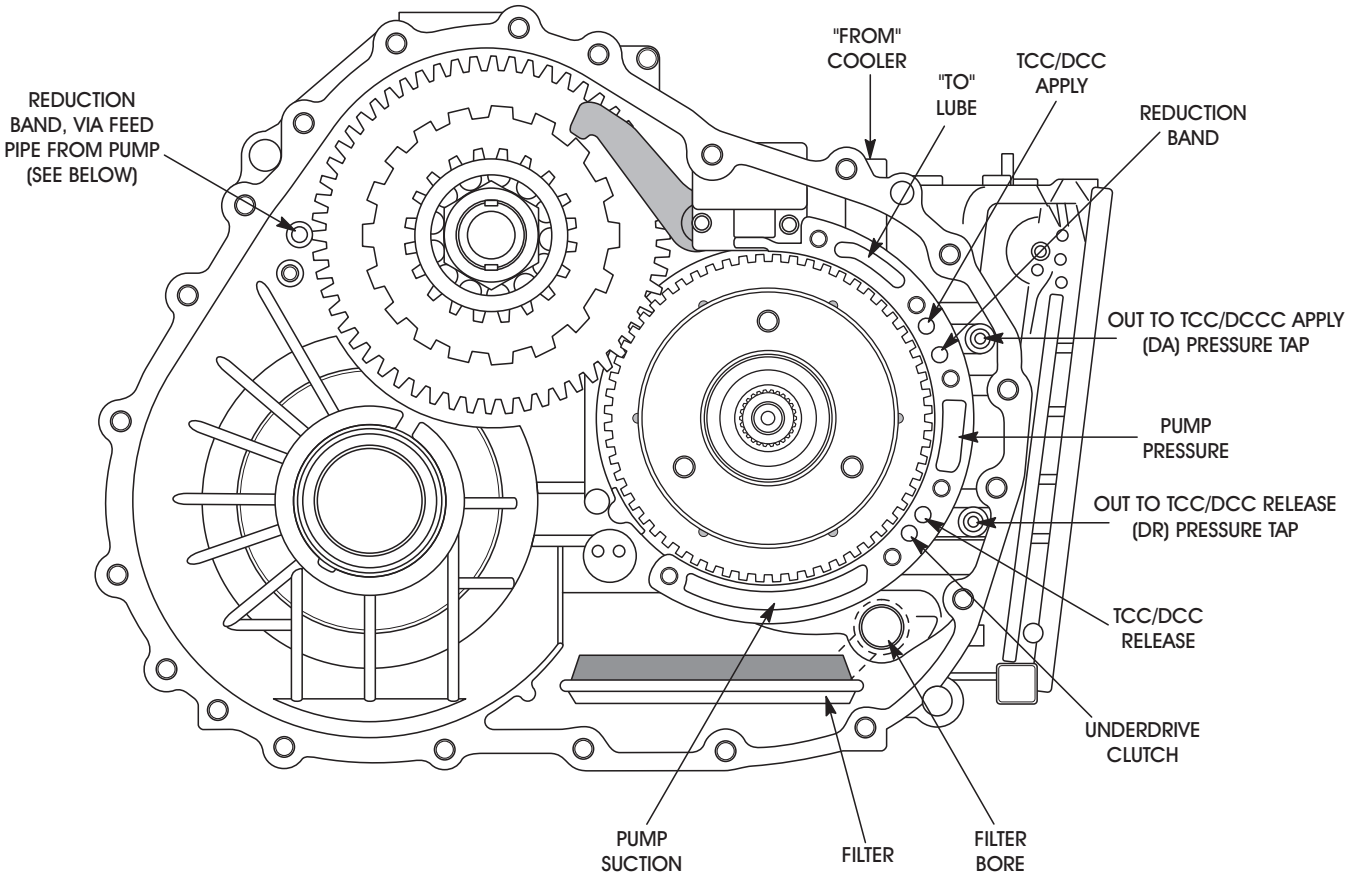


Figure 41

FRONT CASE PASSAGE IDENTIFICATION



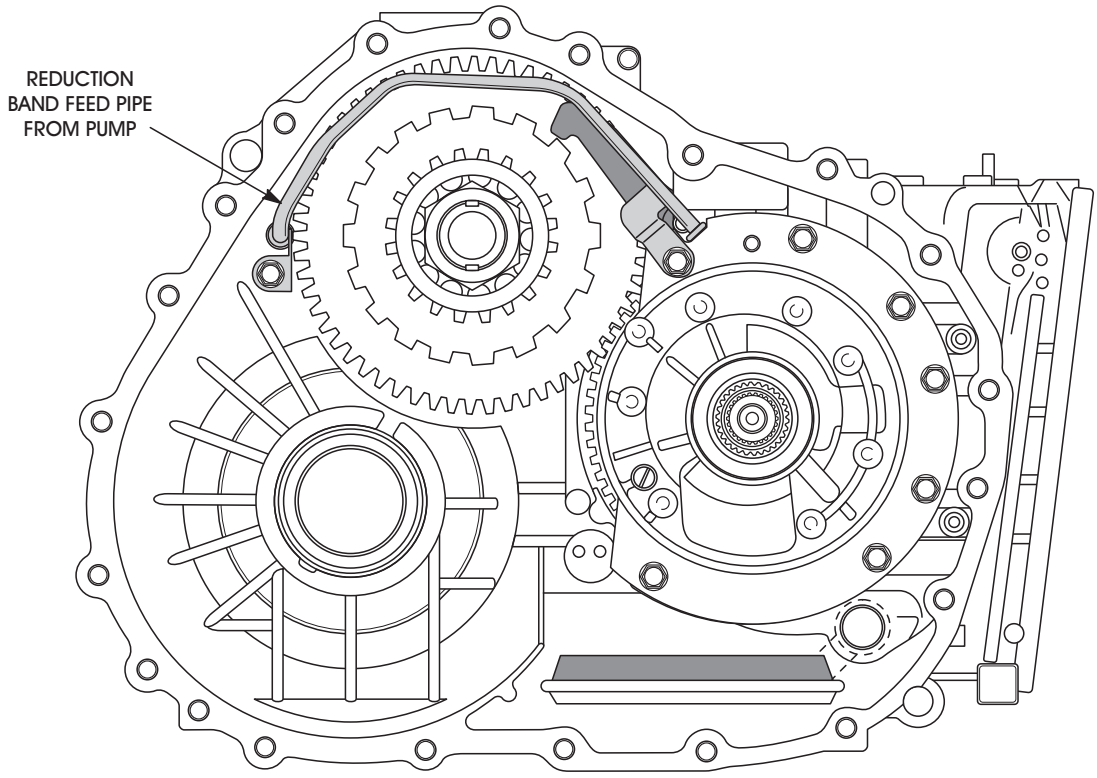
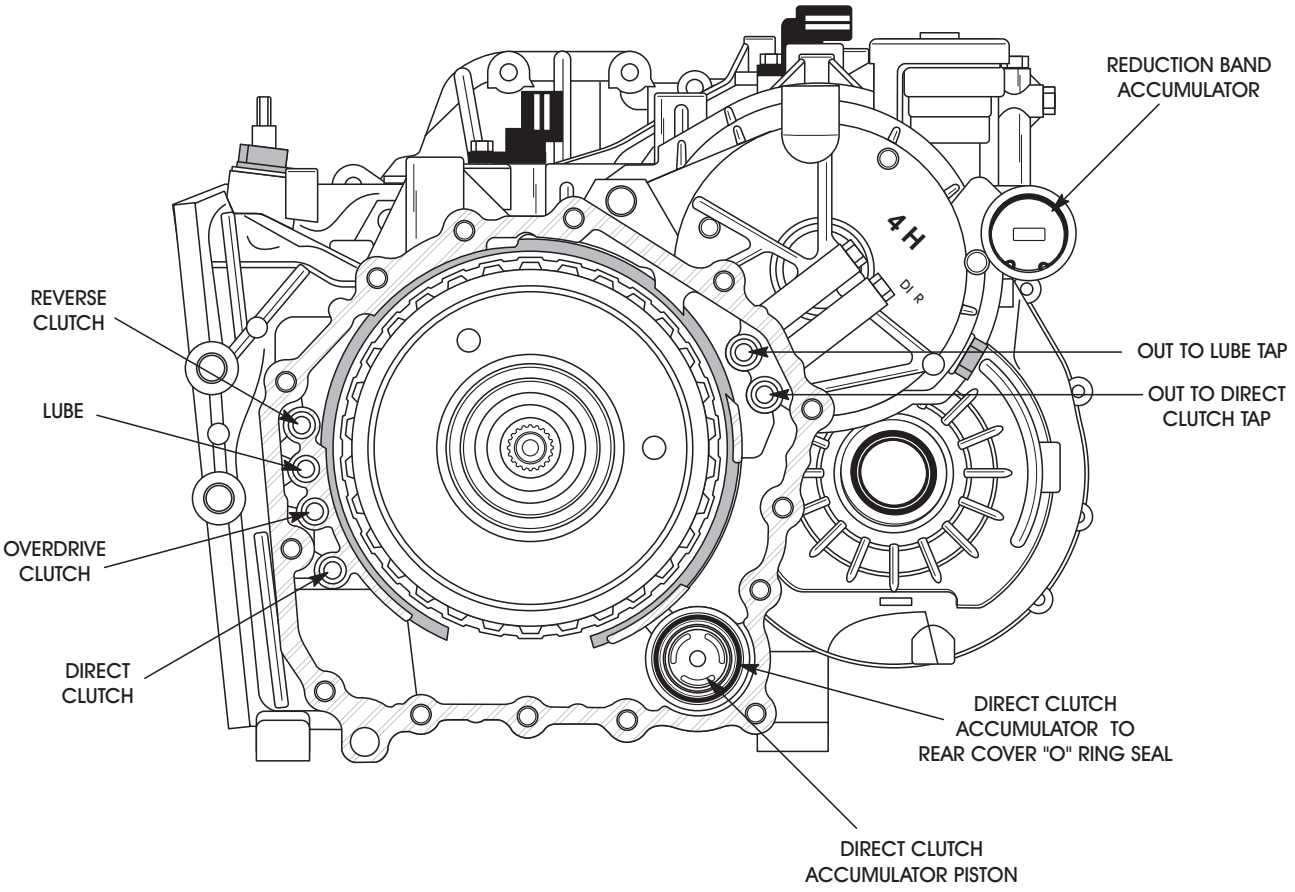


Figure 42

REAR CASE PASSAGE IDENTIFICATION



REAR COVER PASSAGE IDENTIFICATION

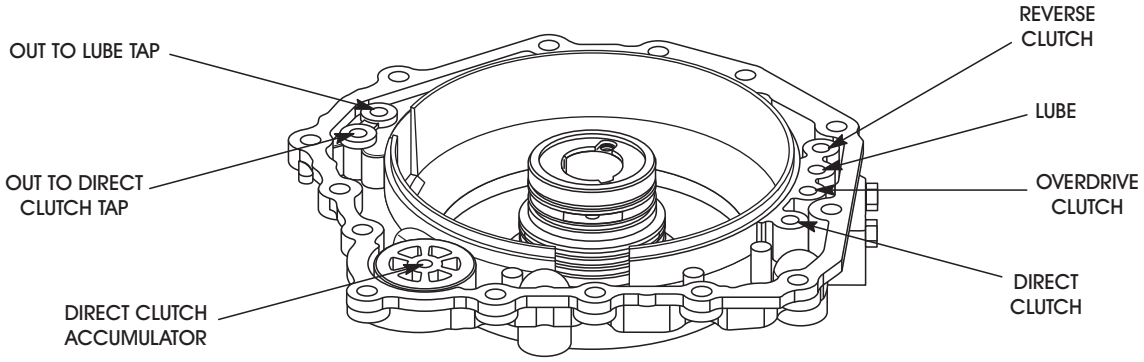


Figure 43

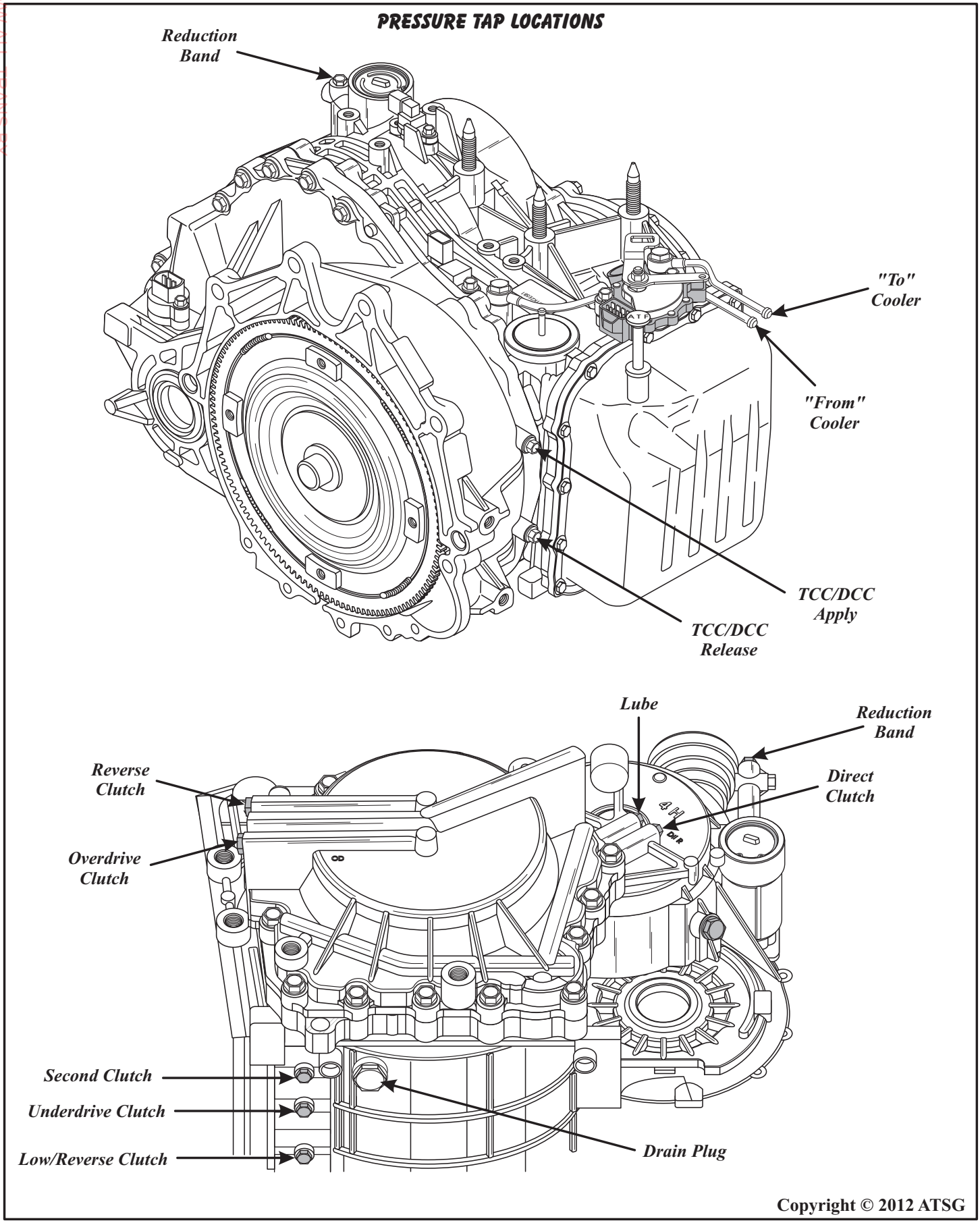
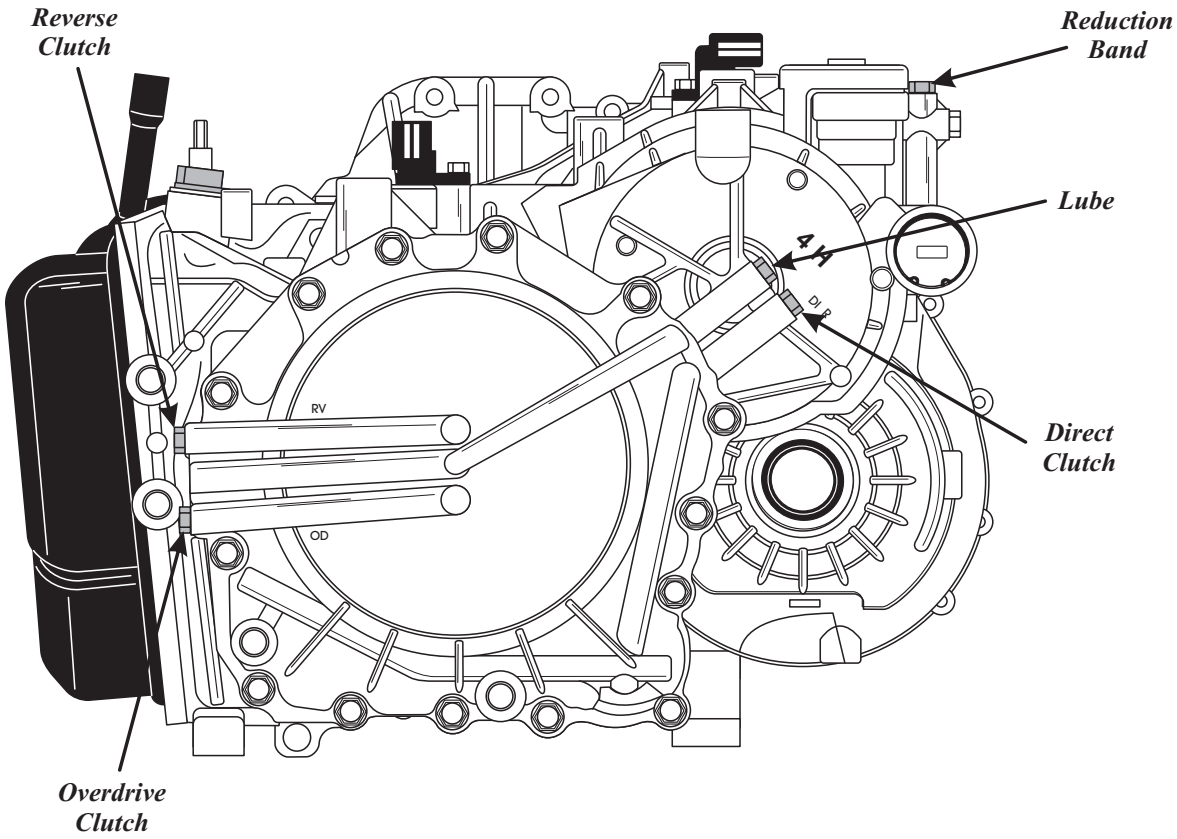
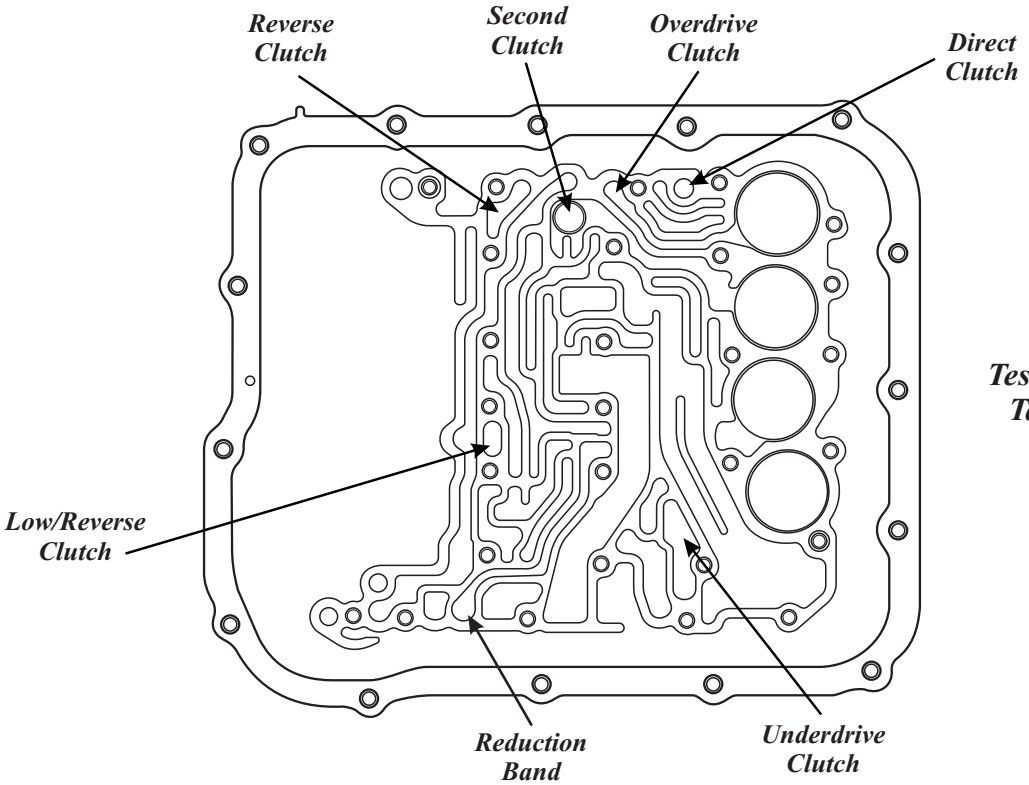


Figure 44

PRESSURE TAP LOCATIONS



AIR CHECK LOCATIONS



Test Plate Makes This Task Much Easier.

Figure 45

"MITSUBISHI, PRE-2007 HYUNDAI, AND PRE-2006 KIA"
LINE PRESSURE TEST SPECIFICATIONS

PRESSURES (PSI) MEASURED AT 2500 RPM

Gear	Underdrive Clutch	Second Clutch	Overdrive Clutch	Low/Rev Clutch	Reverse Clutch	Reduction Band	Direct Clutch	T.C.C. Apply	T.C.C. Release
Park				44-56		44-56			* 32-52
Reverse				185-256	185-256	185-256			* 73-106
Neutral				44-56		44-56			* 32-52
"D"-1st	137-153			137-153		137-153			* 73-106
"D"-2nd	137-153	137-153				137-153			* 73-106
"D"-3rd	113-131		113-131			113-128			* 65-104
"D"-4th	113-131		113-131				113-128	**	0
"D"-5th		113-127	113-131				113-128	**	0

** TCC Release (DR) pressures measured at 1500 RPM.*

*** TCC Apply (DA) pressures may vary between 0 and 50 psi, when OFF, depending on throttle opening and vehicle speed. With TCC fully applied pressure should be approximately 100 psi.*

"2007-UPHYUNDAI & 2006-UP KIA"
LINE PRESSURE TEST SPECIFICATIONS

PRESSURES (PSI) MEASURED AT 2500 RPM

Gear	Underdrive Clutch	Second Clutch	Overdrive Clutch	Low/Rev Clutch	Reverse Clutch	Reduction Band	Direct Clutch	D.C.C. Apply	D.C.C. Release
Park				44-56		44-56			* 32-52
Reverse				185-256	185-256	185-256			* 73-106
Neutral				44-56		44-56			* 32-52
"D"-1st	137-153			137-153		137-153			* 73-106
"D"-2nd	137-153	137-153				137-153			* 73-106
"D"-3rd	113-131		113-131			113-128			* 65-104
"D"-4th	113-131	113-127	113-131			113-128		**	0
"D"-5th		113-127	113-131				113-128	**	0

** DCC Release (DR) pressures measured at 1500 RPM.*

*** DCC Apply (DA) pressures may vary between 0 and 50 psi, when OFF, depending on throttle opening and vehicle speed. With DCC fully applied pressure should be approximately 100 psi.*

Figure 46

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 in order to avoid improper service that may damage the vehicle, tools and/or equipment.

TRANSAXLE DISASSEMBLY

EXTERNAL COMPONENTS

1. The transaxle should be steam cleaned on the outside, to remove any dirt or grease before disassembly begins.
2. This transaxle can be disassembled very easily on a work bench without the benefit of any holding fixture for rotation.
3. Remove the torque converter from transaxle, as shown in Figure 47.
   Caution: Use care when removing the torque converter, to avoid personal injury and/or damage to converter, as it is heavy.

Continued on Page 42

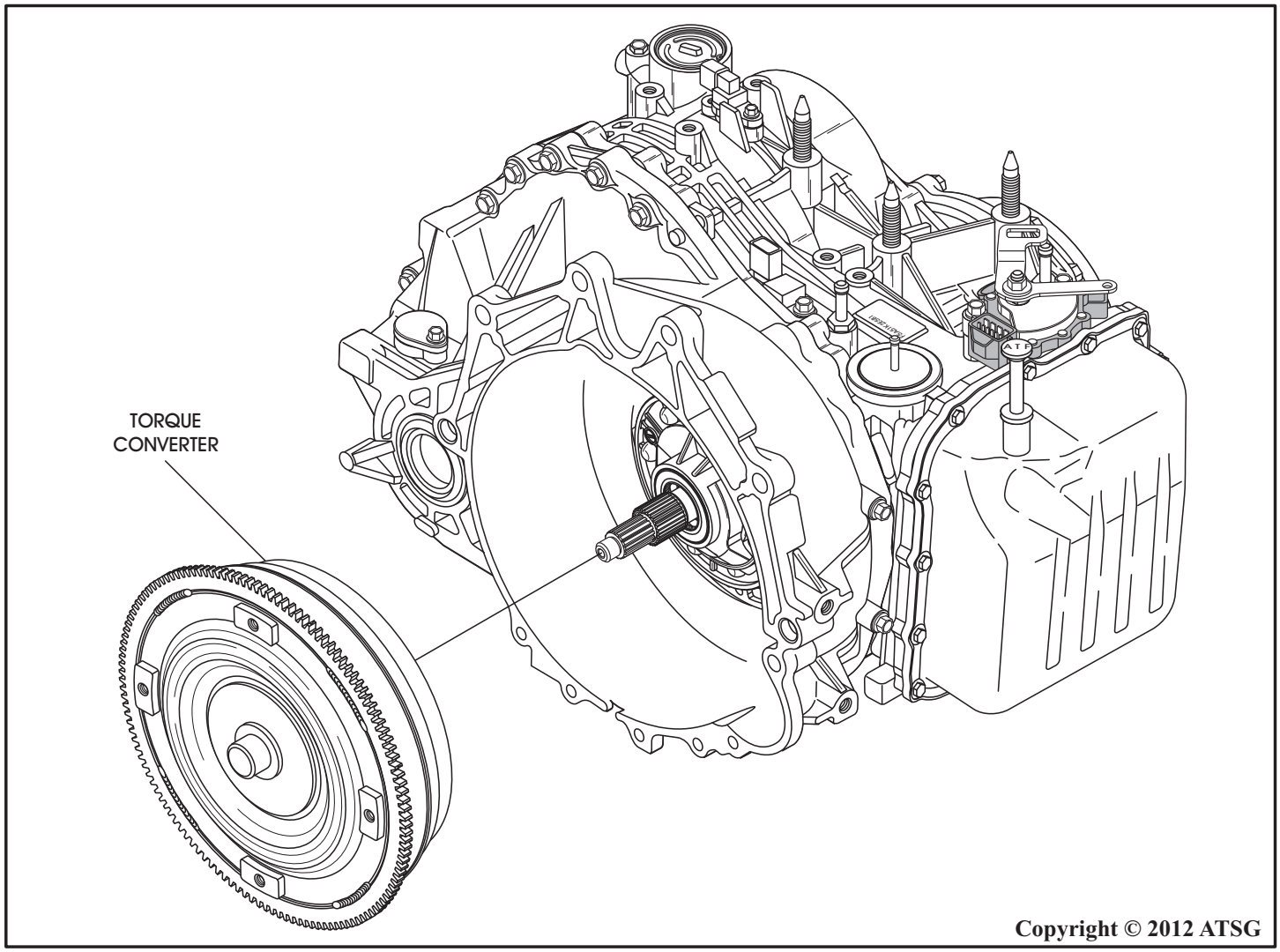


Figure 47

TRANSAXLE DISASSEMBLY

EXTERNAL COMPONENTS (CONT'D)

4. Remove the fluid level indicator from transaxle as shown in Figure 48.
5. Remove air breather assembly from transaxle, as shown in Figure 48.
6. Remove the input shaft speed sensor retaining bolt and the input shaft speed sensor, as shown in Figure 48.
7. Remove and discard the "O" ring.
8. Remove the output shaft speed sensor retaining bolt and the output shaft speed sensor, as shown in Figure 48.
9. Remove and discard the "O" ring.
10. Remove the manual lever nut, washer, and the manual lever, as shown in Figure 48.
11. Remove the transaxle range switch retaining bolts and transaxle range switch, as shown in Figure 48.

Continued on Page 43

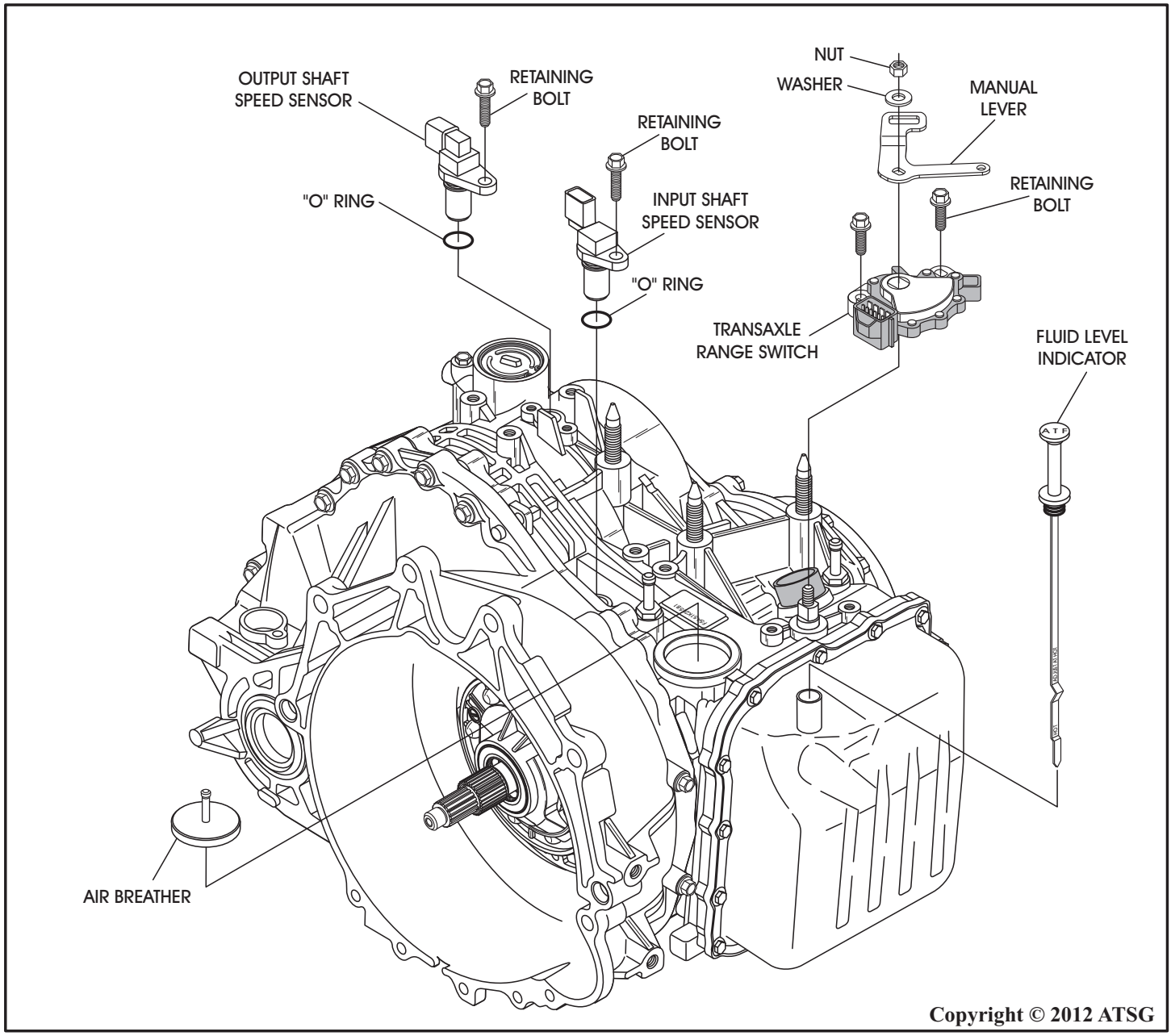


Figure 48

TRANSAXLE DISASSEMBLY

EXTERNAL COMPONENTS (CONT'D)

12. Remove the speedometer adapter, the vehicle speed sensor, or the sealing cap, depending on which the transaxle is equipped with. Refer to Figure 50.
13. As a diagnostic aid, install dial indicator, as shown in Figure 49, measure and record the input shaft end play.

Continued on Page 44

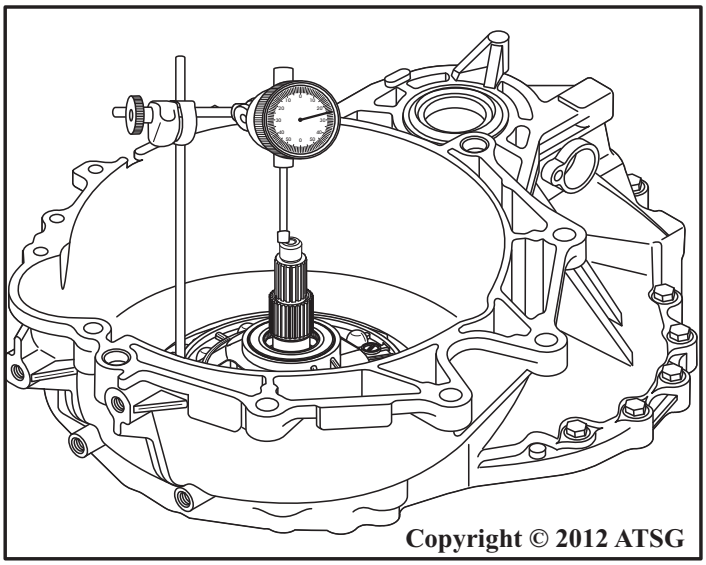


Figure 49

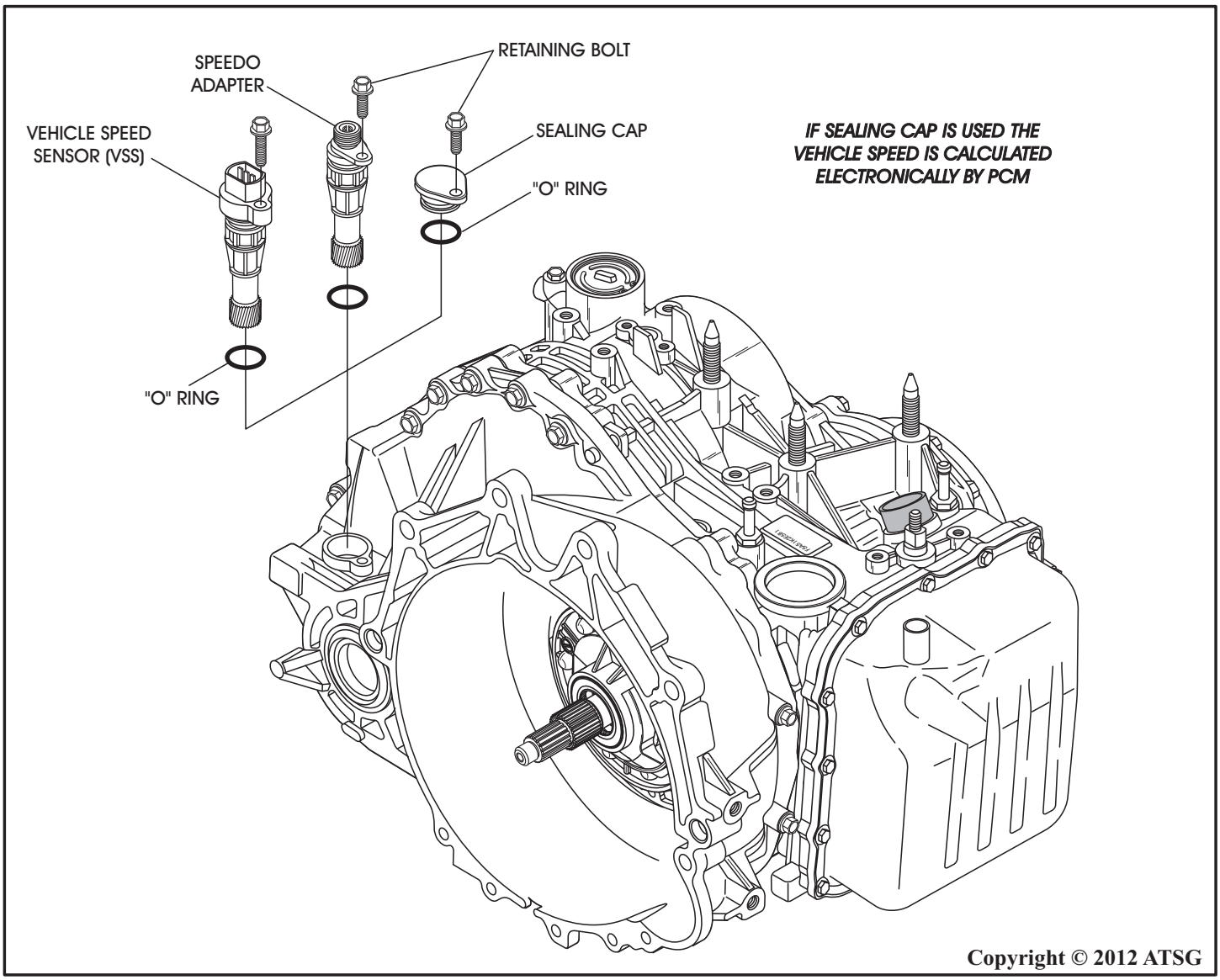


Figure 50

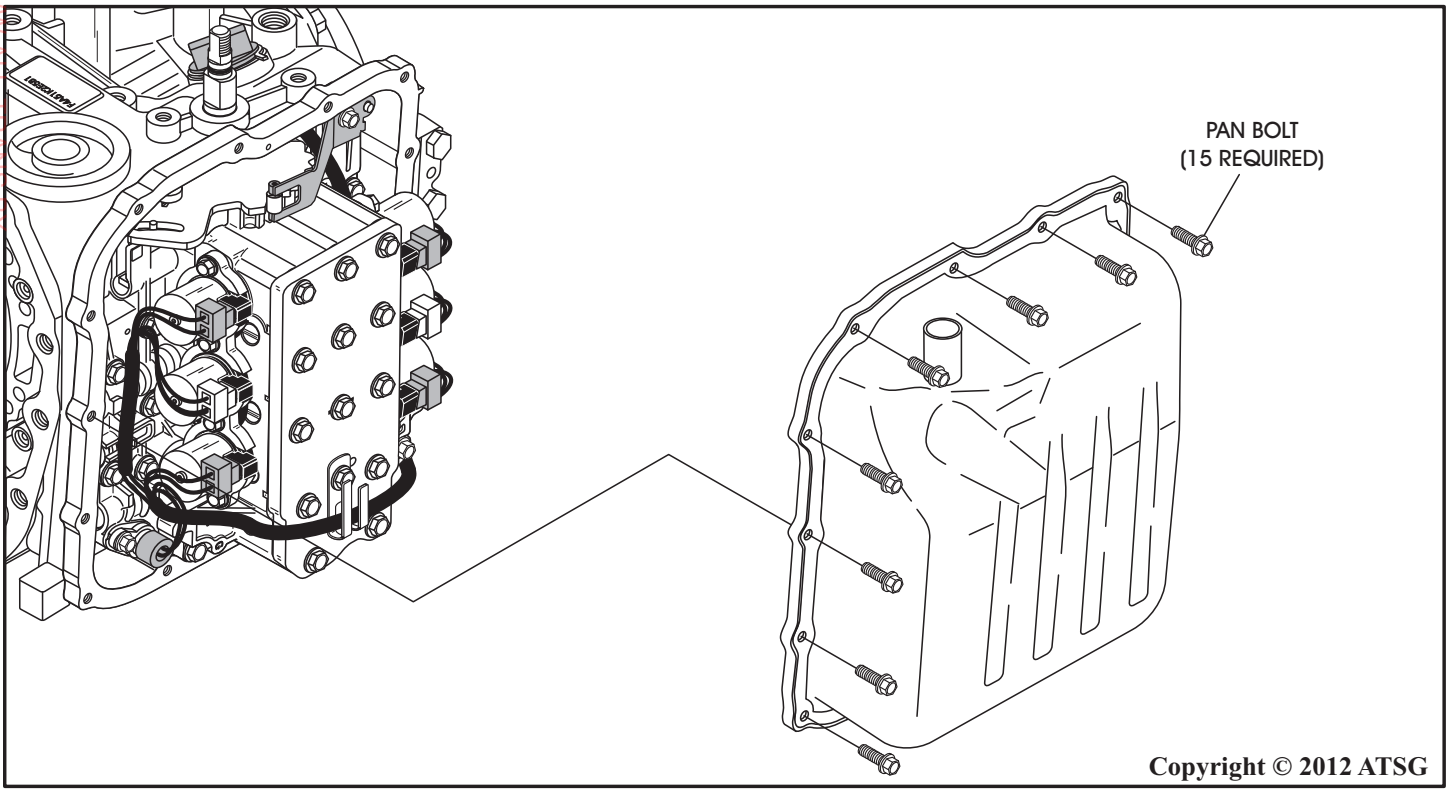


Figure 51

TRANSAXLE DISASSEMBLY

INTERNAL COMPONENTS

1. Remove the 15 pan bolts and remove the oil pan, as shown in Figure 51.
2. Disconnect the shift solenoid connectors and the fluid temperature sensor connector, as shown in Figure 52.
   Note: Some of the shift solenoids can be cross-connected. We have provided you with color of the wires that we observed. If yours are different, label them now to prevent you from cross-connecting on re- assembly.
3. Remove the connectors and drape the wire harness up and over the top of pan rail.
   Note: The Mitsubishi and early Hyundai/Kia version is illustrated in Figure 52. 2007-Up Hyundai and 2006-Up Kia versions have one extra line pressure solenoid and are illustrated in Figure 53.

Continued on Page 45

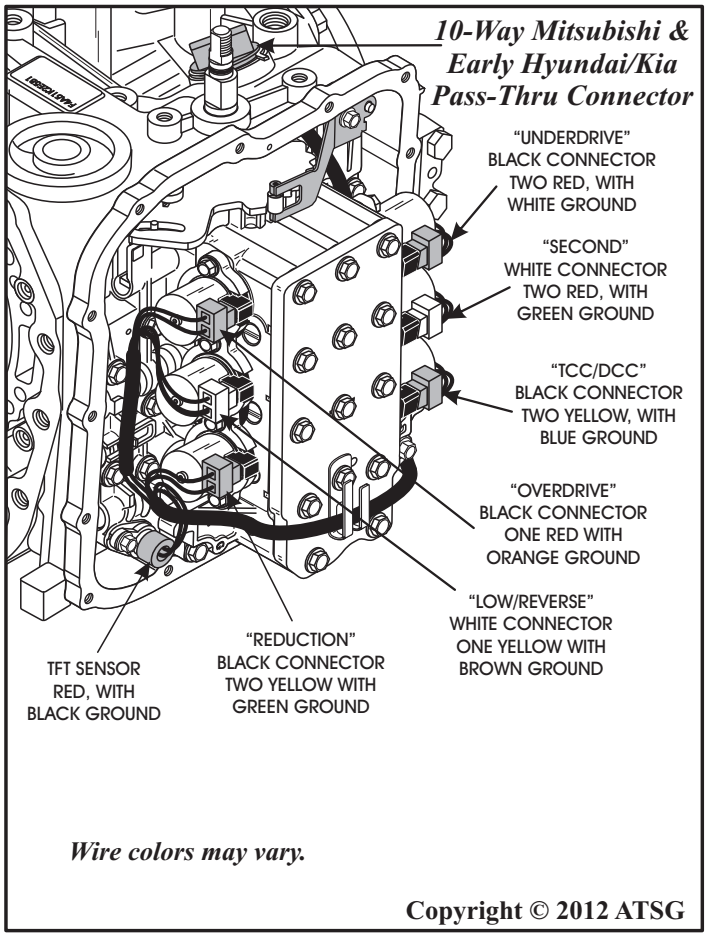


Figure 52

TRANSAXLE DISASSEMBLY
INTERNAL COMPONENTS (CONT'D)

4. If you have 2007-Up Hyundai or 2006-Up Kia version, remove the connectors, as shown in Figure 53, and drape the wire harness up and over the top of pan rail.
   Note: We have provided you with color of the wires that we observed. If yours are different, label them now to prevent cross-connecting on re-assembly (See Figure 53).
5. Remove the internal detent spring, as shown in Figure 54.
6. Remove the TFT sensor, as shown in Figure 54, remove and discard the "o" ring seal.
7. Remove the valve body to case mounting bolts as shown in Figure 55.
   Note: Remove all valve body bolts "Except" the bolts that we labeled with "E", as shown in Figure 55. The bolts labeled with "E" are solenoid body to main valve body bolts.

Continued on Page 46

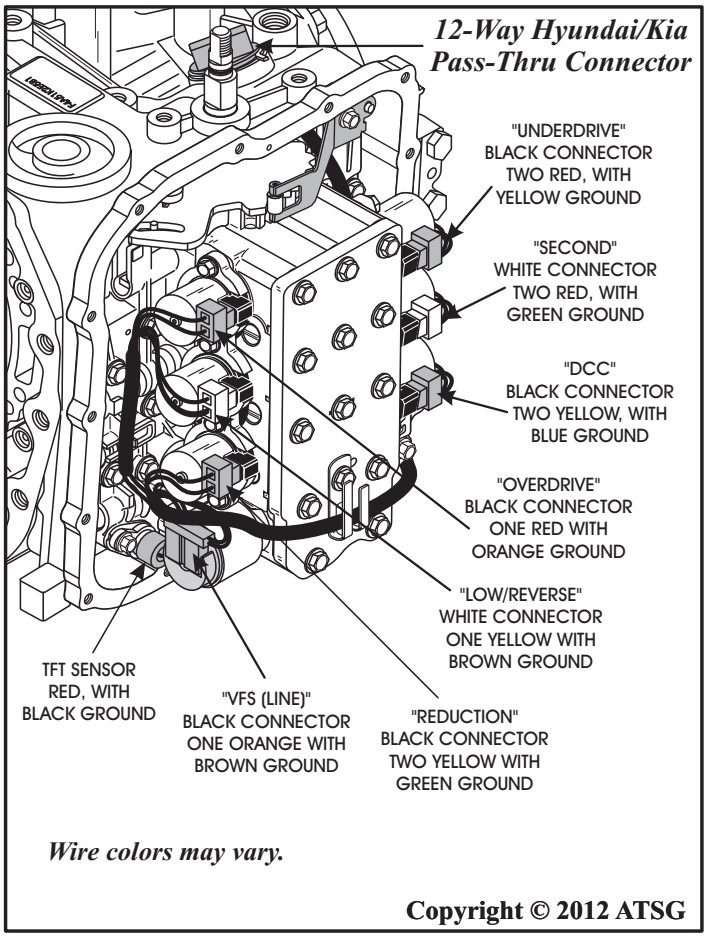


Figure 53

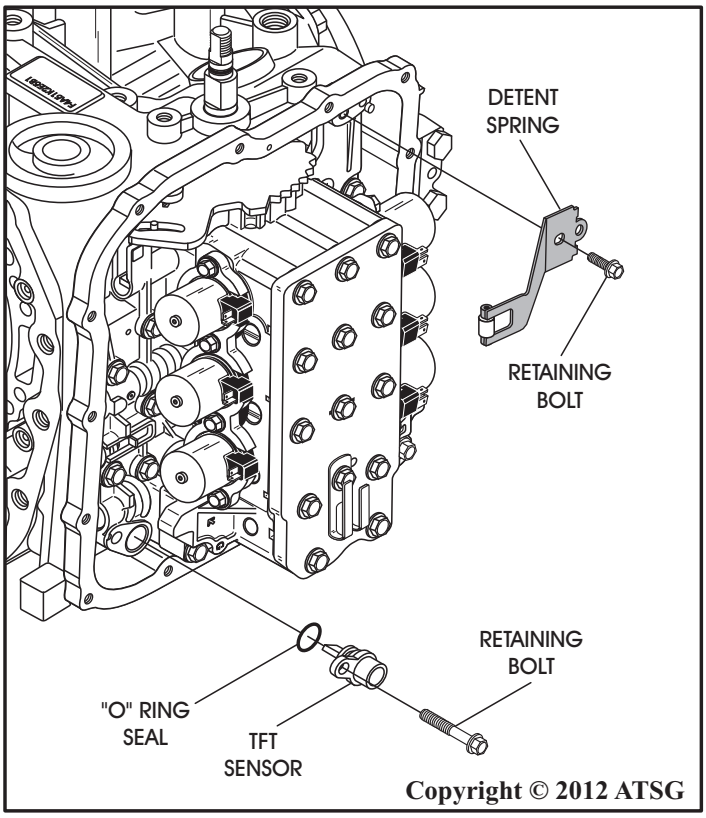


Figure 54

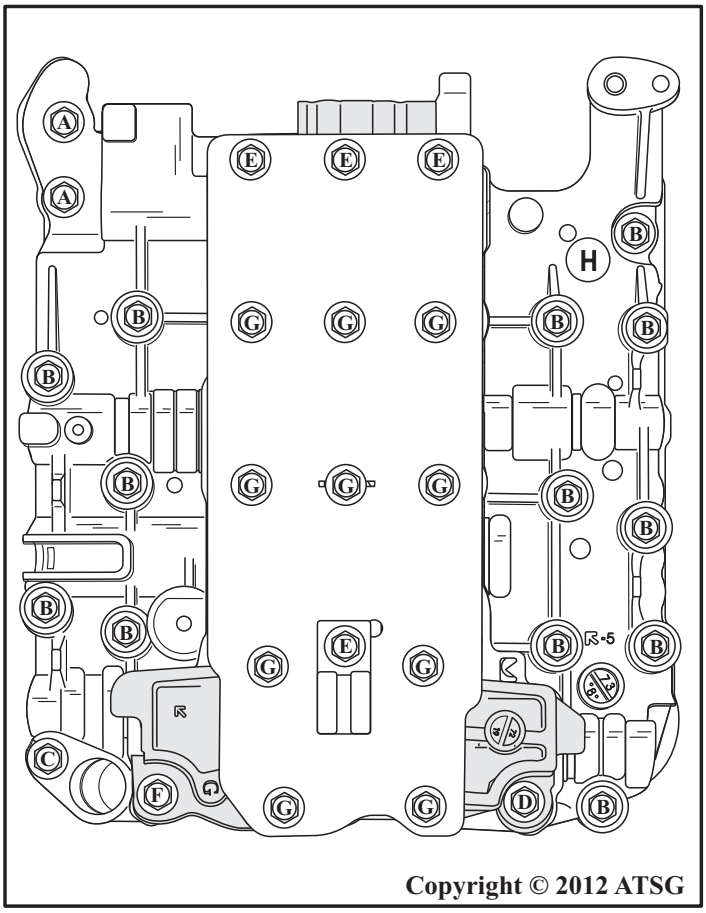


Figure 55

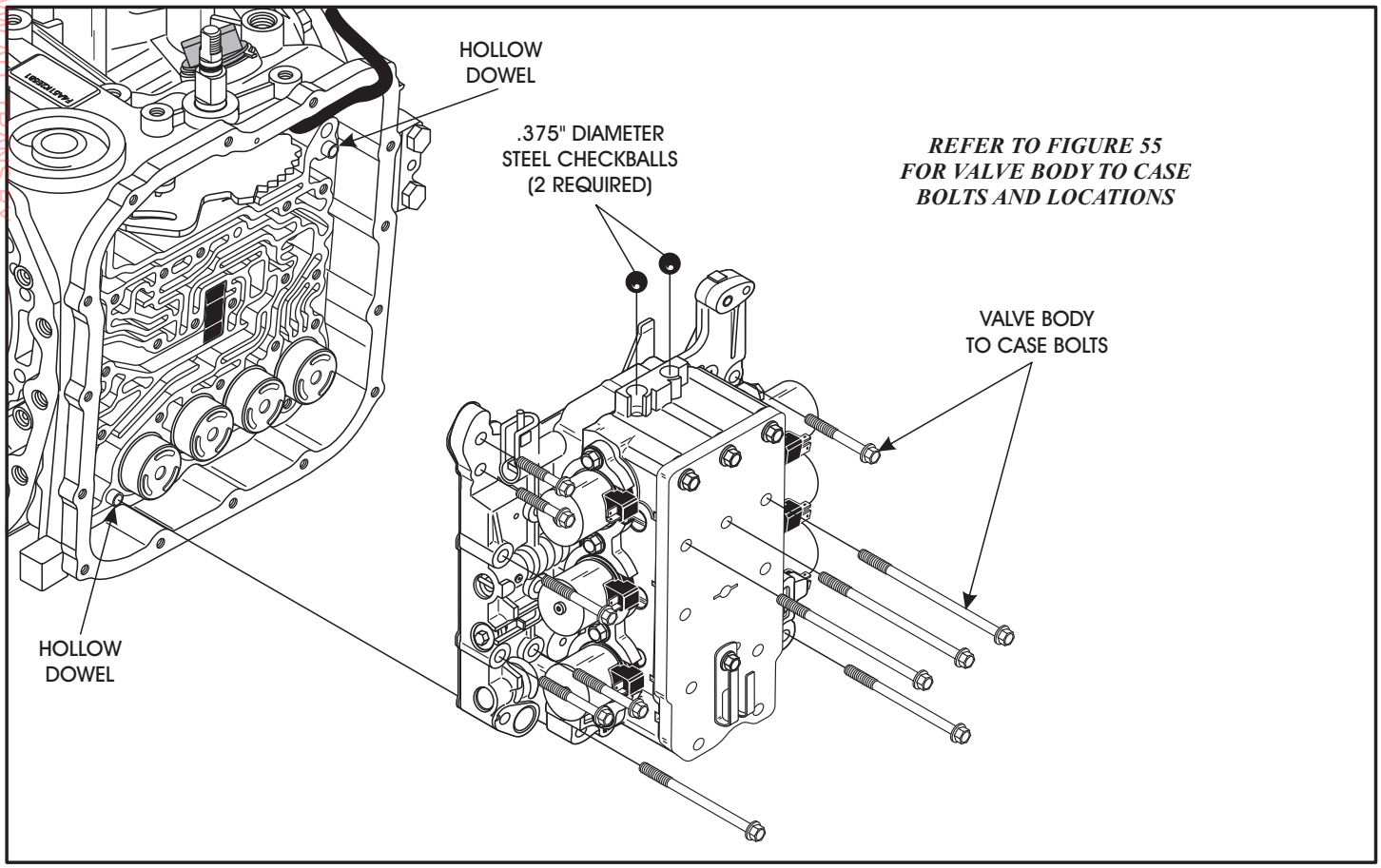


Figure 56

TRANSAXLE DISASSEMBLY

INTERNAL COMPONENTS (CONT'D)

8. Remove 28 valve body to case bolts and the valve body assembly, as shown in Figure 56.
9. Notice the two steel balls in the top of valve body, as shown in Figure 56.
   Note: Place steel balls and hollow dowels in a safe location for reassembly.
10. Set the valve body assembly aside for the component rebuild section.
11. Remove the manual shaft retaining pin from pan rail, as shown in Figure 57.
12. Remove and discard the 2nd clutch case seal, as shown in Figure 57.
13. Remove the case worm track oil screen, as shown in Figure 57.
    Note: Replace case screen as necessary.

Continued on Page 47

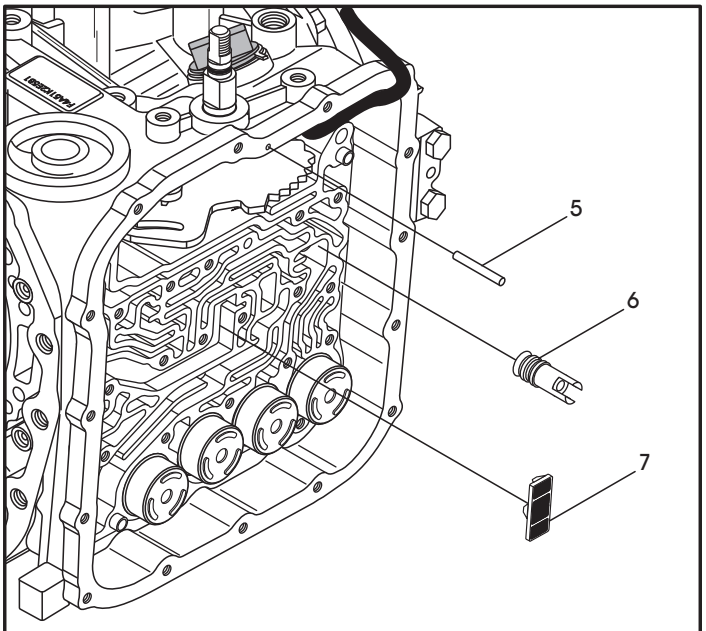


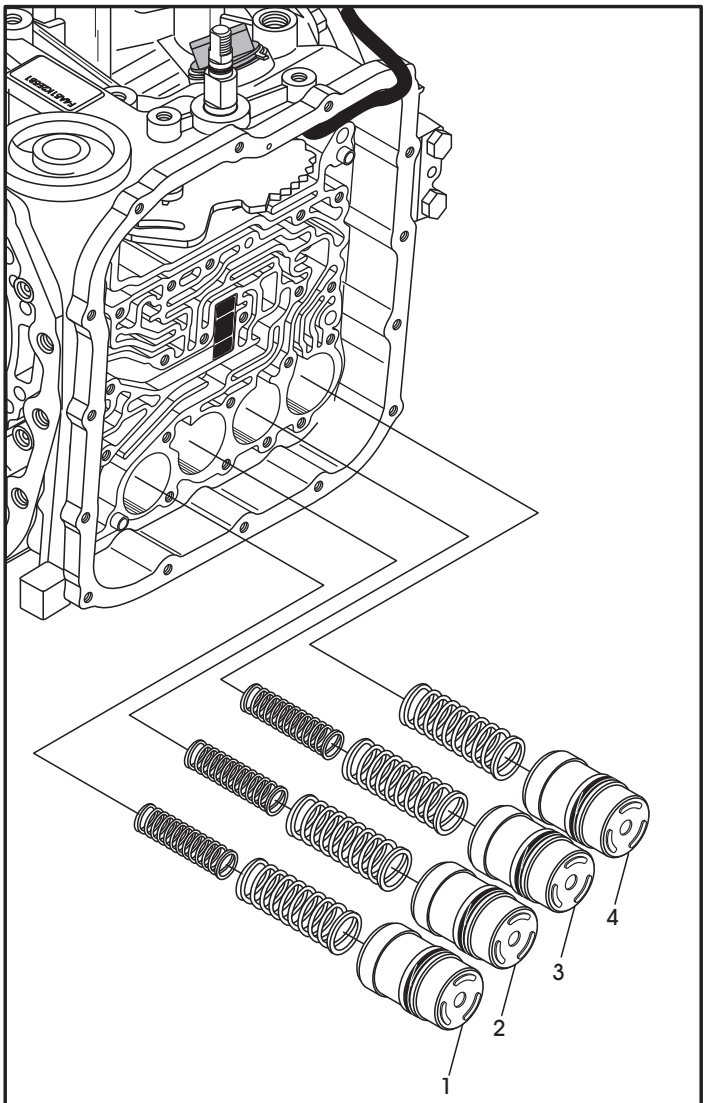
Figure 57

TRANSAXLE DISASSEMBLY

INTERNAL COMPONENTS (CONT'D)

14. Remove each accumulator piston and springs, as shown in Figure 58.
    Note: The Mitsubishi accumulator springs are identified with blue dye, as shown in Figure 60, and Hyundai/Kia accumulator springs are identified with White and Yellow paint, also shown in Figure 60. If your springs are not identified, label them now as you remove them, for re-assembly ID.
15. Remove and discard all accumulator piston seal rings, as shown in Figure 59.

Continued on Page 48



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

Figure 58

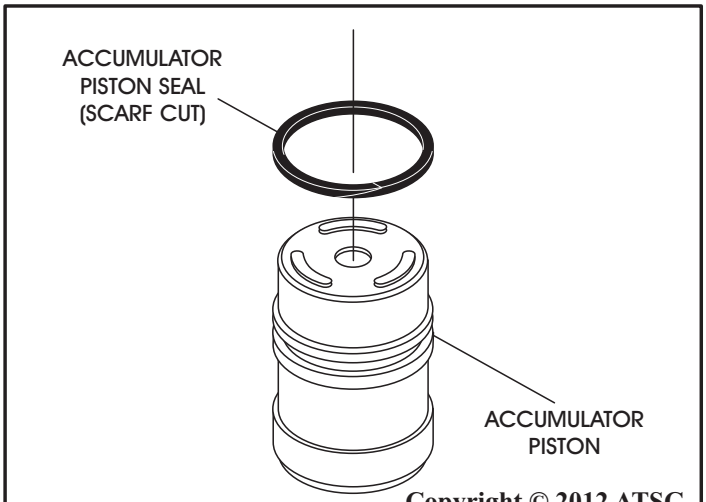
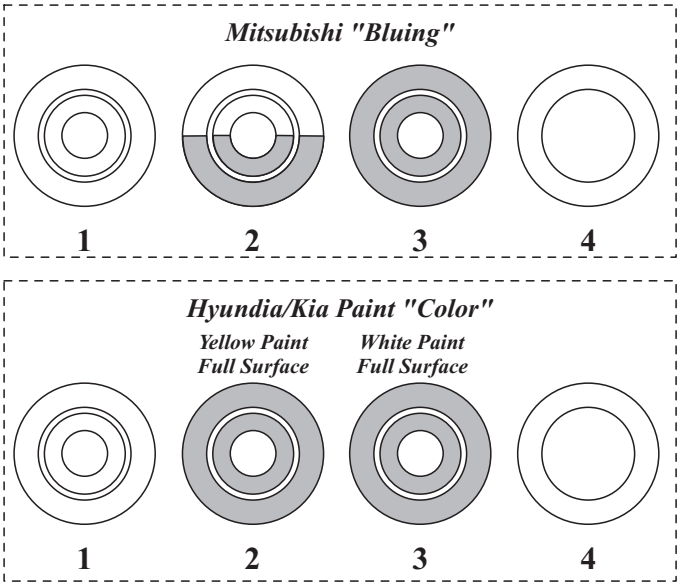


Figure 59

ACCUMULATOR SPRING IDENTIFICATION



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

Figure 60

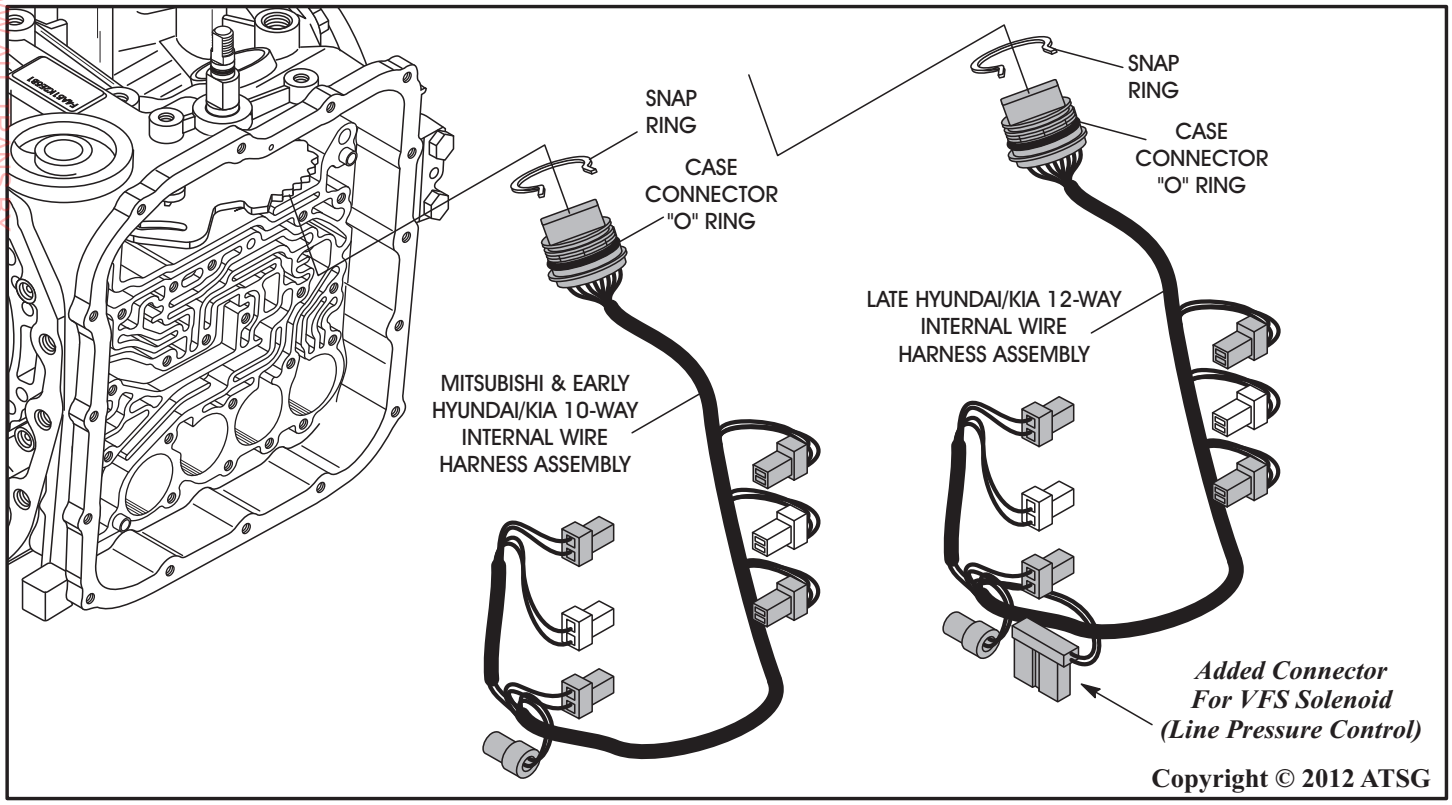


Figure 61

TRANSAXLE DISASSEMBLY

INTERNAL COMPONENTS (CONT'D)

16. Remove the case connector snap ring and remove the internal wire harness through the inside of the case, as shown in Figure 61. ***Note: Both the 10-way Mitsubishi and early Hyundai/Kia, and the 12-way late Hyundai/Kia internal harness are shown in Figure 61.***
17. Remove and discard the case connector "O" ring, as shown in Figure 61.
18. With the manual shaft retaining pin removed, rotate back and forth and remove the inside detent lever and parking rod through the inside of the case, as shown in Figure 62.
19. Remove and discard the two "O"ring seals on the manual shaft, as shown in Figure 62.

Continued on Page 49

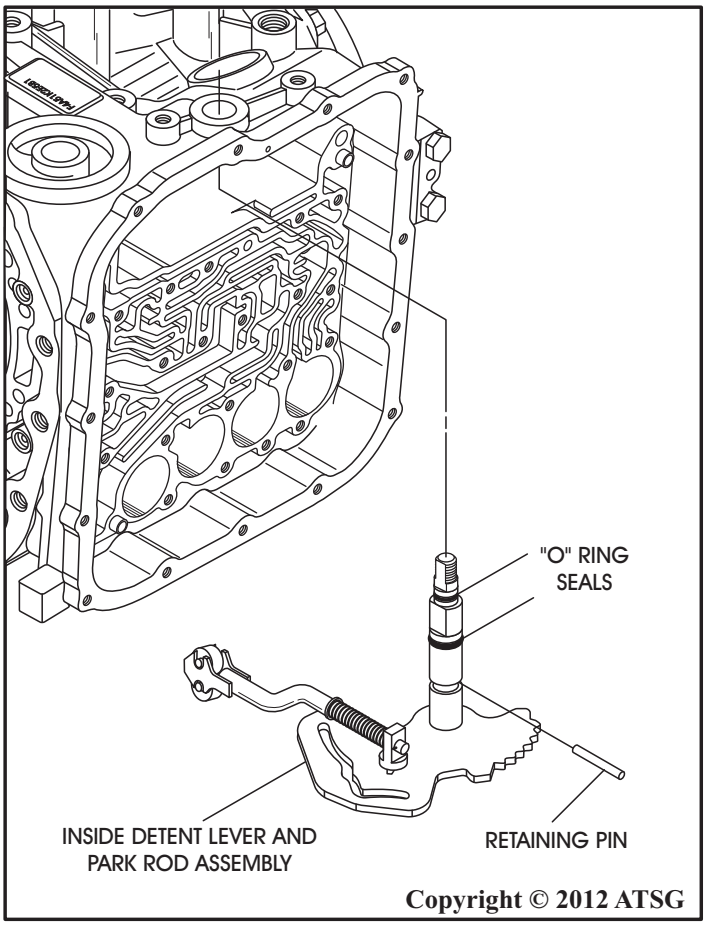


Figure 62

TRANSAXLE DISASSEMBLY

INTERNAL COMPONENTS (CONT'D)

20. Rotate the case on the work bench so that the converter housing is facing up, as shown in Figure 64.
21. Remove the 20 torque converter housing bolts, as shown in Figure 63 and 64.
    Note: Six of these bolts are inside of the converter housing, as shown in Figure 63.
22. Remove and discard the two small "O" rings between the converter housing and the case, as shown in Figure 64.
    Note: The "O" rings may be stuck to the torque converter housing.

Continued on Page 50

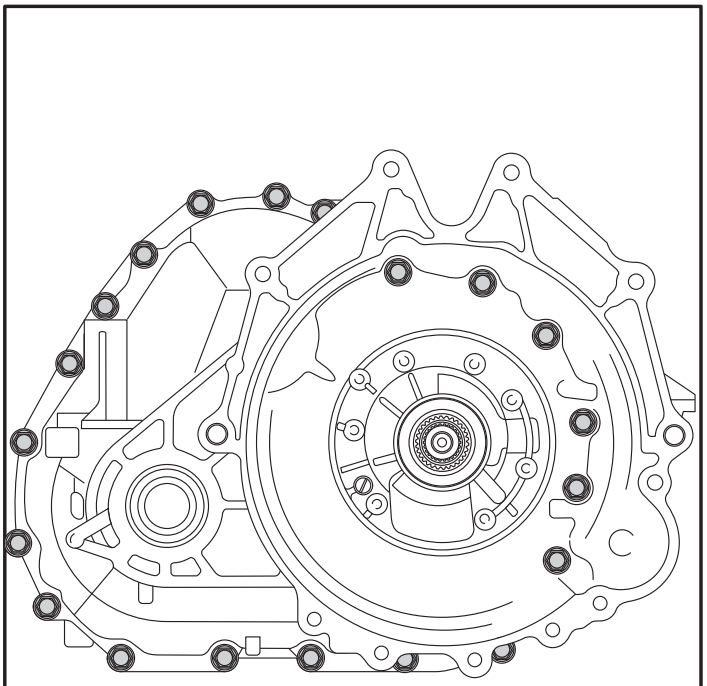
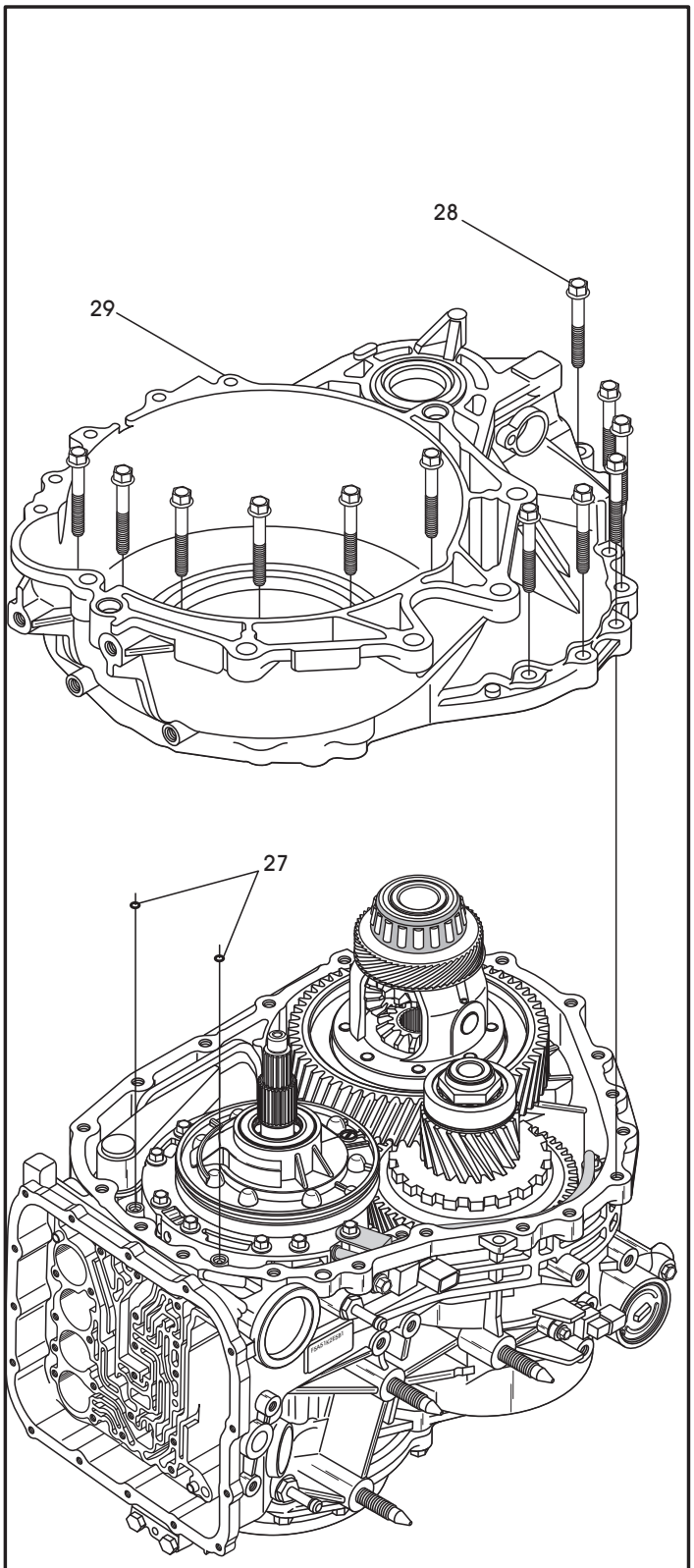


Figure 63



27 CONVERTER COVER TO CASE "O" RINGS (2 REQUIRED).
28 CONVERTER COVER TO CASE RETAINING BOLTS (20 REQ.).
29 TORQUE CONVERTER HOUSING.

Figure 64

TRANSAXLE DISASSEMBLY

INTERNAL COMPONENTS (CONT'D)

23. Remove and discard the oil filter and "O" ring, as shown in Figure 65.
24. Remove the differential assembly from case, as shown in Figure 65.
25. Set complete differential assembly aside for the component rebuild section.
26. Remove the two reduction band feed pipe retaining bolts, as shown in Figure 66, and remove feed pipe with brackets.

Continued on Page 51

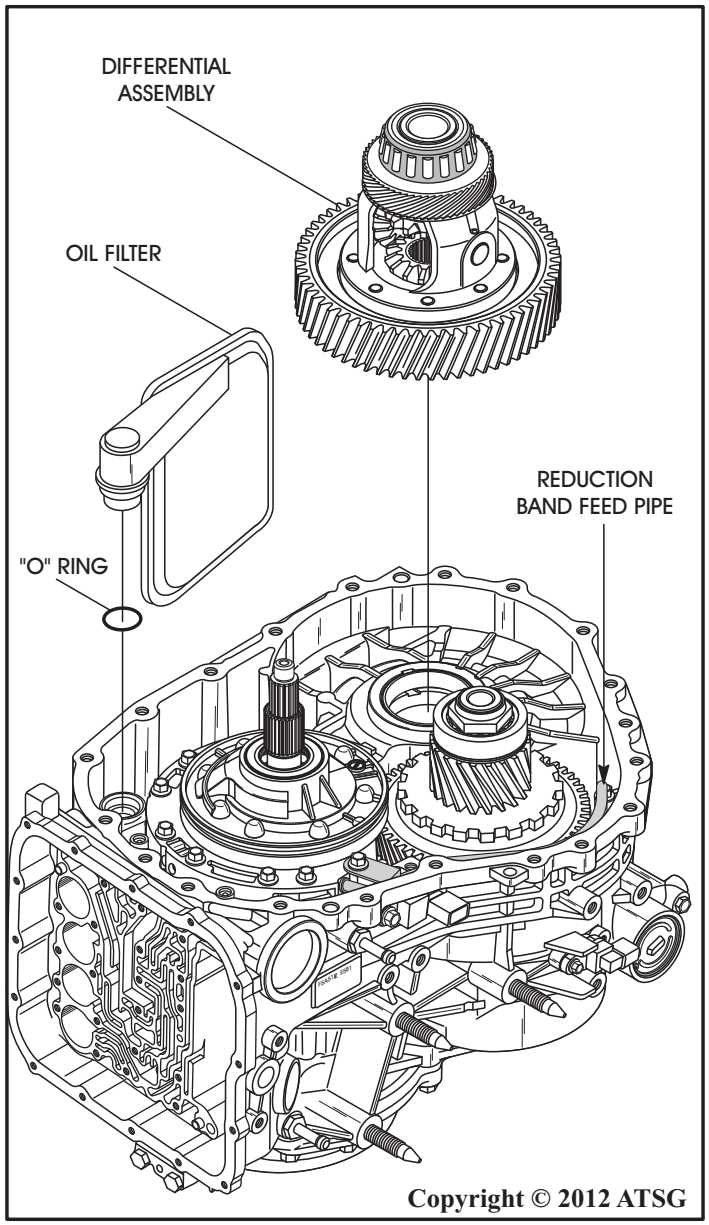


Figure 65

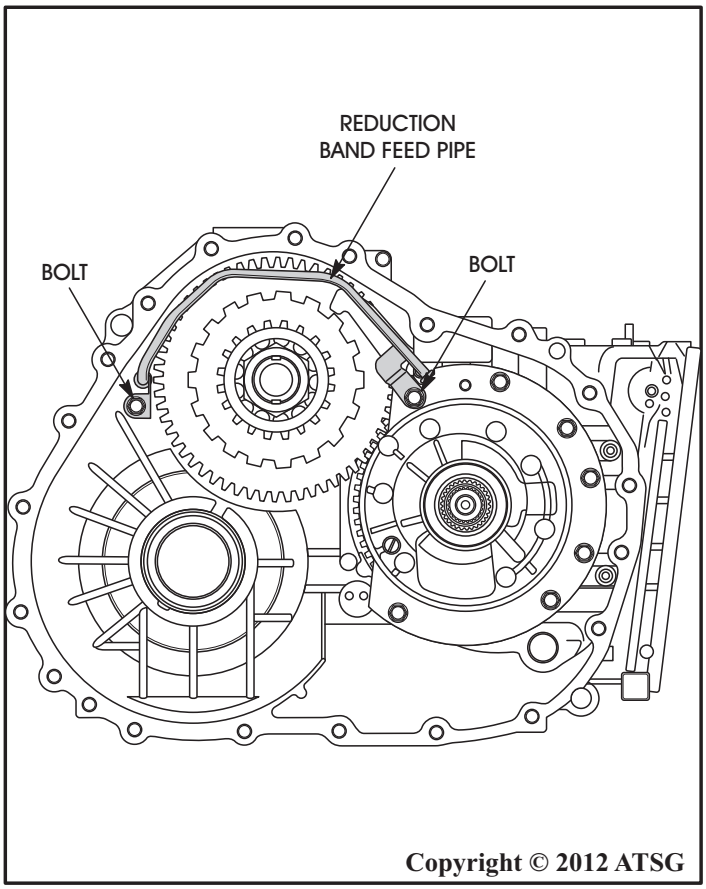


Figure 66

TRANSAXLE DISASSEMBLY
INTERNAL COMPONENTS (CONT'D)

27. Remove the six oil pump retaining bolts, as shown in Figure 67, and remove the oil pump assembly.
28. Set complete oil pump assembly aside for the component rebuild section.

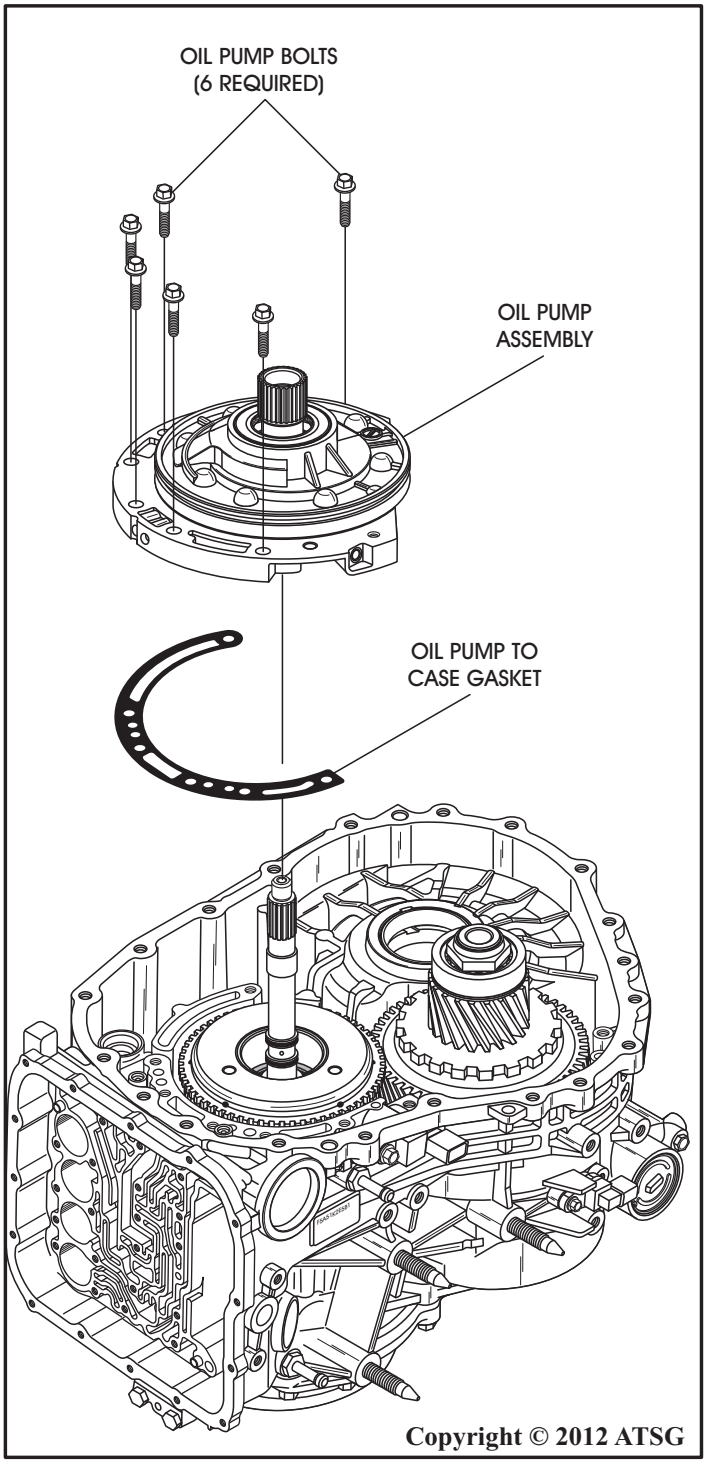


Figure 67

28. Remove and discard the oil pump to case gasket, as shown in Figure 67.
Note: Gasket may be stuck to oil pump.
29. Remove the underdrive clutch housing by lifting straight up, as shown in Figure 68.
30. Remove the number 1 selective thrust washer, as shown in Figure 68.
Note: Number 1 selective thrust washer may be stuck to oil pump.
31. Set the complete underdrive clutch housing aside for the component rebuild section.

Continued on Page 52

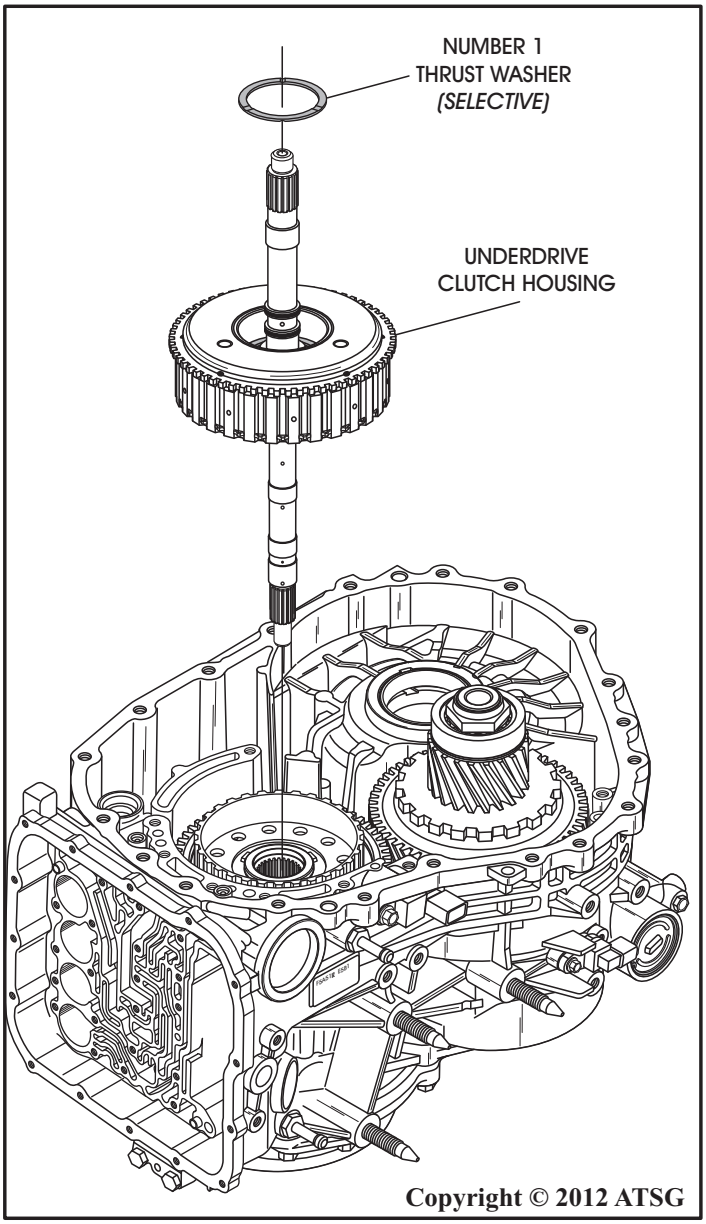


Figure 68

TRANSAXLE DISASSEMBLY

INTERNAL COMPONENTS (CONT'D)

32. Remove underdrive clutch hub and number 2 thrust bearing, as shown in Figure 69.
33. Remove the reduction band servo cover snap ring and cover, as shown in Figure 70.
34. Remove and discard the servo cover "O" ring seal, as shown in Figure 70.
35. Remove reduction band servo piston snap ring and piston assembly, as shown in Figure 70.
36. Remove and discard the servo piston seal, as shown in Figure 70.
37. Remove the reduction band servo piston return spring, as shown in Figure 70.

Continued on Page 53

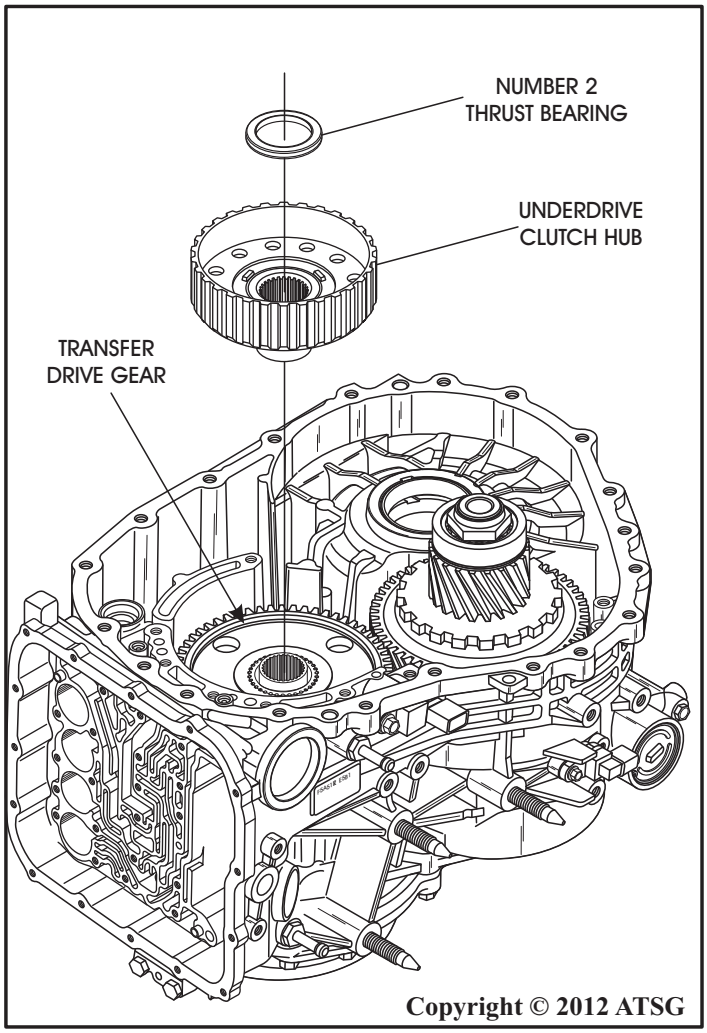
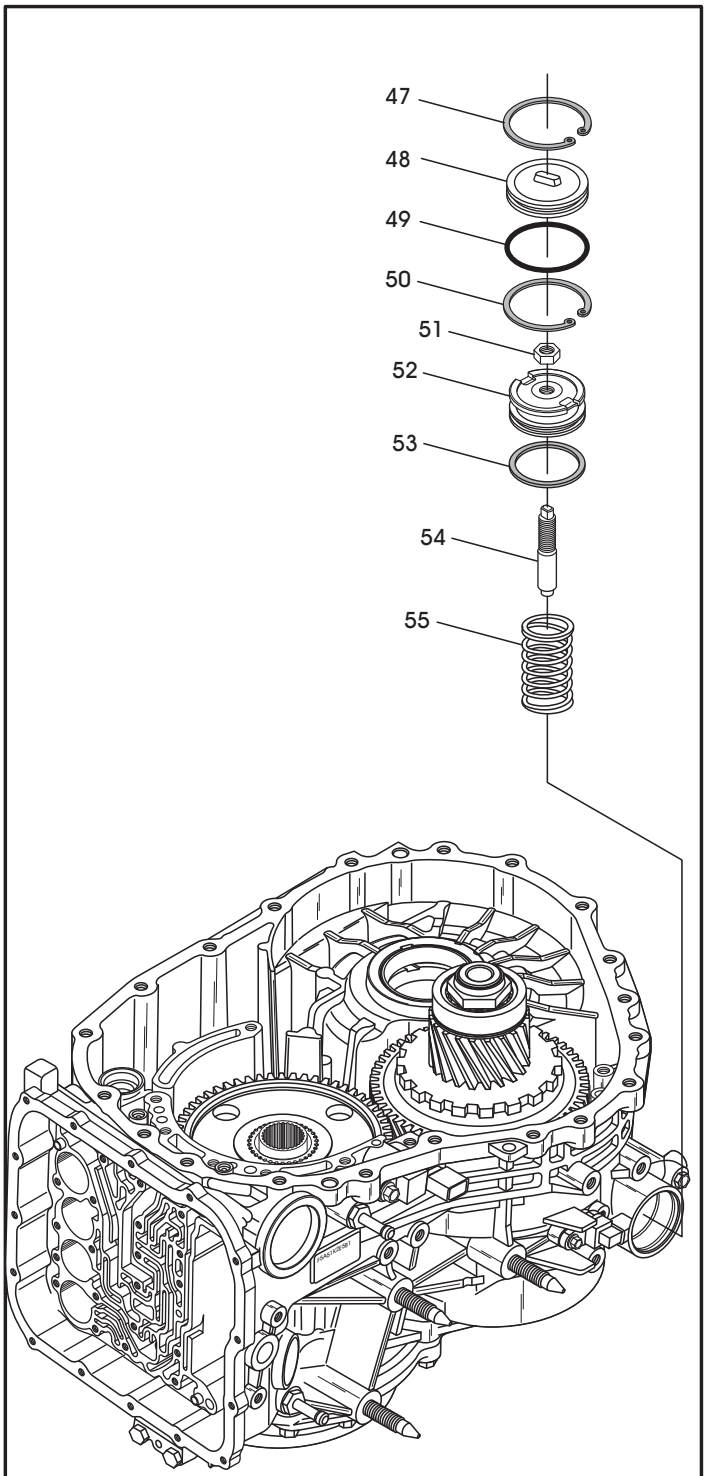


Figure 69



47 REDUCTION BAND SERVO COVER SNAP RING.
48 REDUCTION BAND SERVO COVER.
49 REDUCTION BAND SERVO COVER "O" RING SEAL.
50 REDUCTION BAND SERVO PISTON SNAP RING.
51 REDUCTION BAND SERVO ADJUSTING NUT.
52 REDUCTION BAND SERVO PISTON.
53 REDUCTION BAND SERVO PISTON SEAL RING.
54 REDUCTION BAND SERVO APPLY PIN.
55 REDUCTION BAND SERVO PISTON RETURN SPRING.

Figure 70

TRANSAXLE DISASSEMBLY

INTERNAL COMPONENTS (CONT'D)

38. Remove the two parking rod roller support pins, as shown in Figure 71, using needle nose pliers.
39. Remove the parking rod roller support from the inside of case, as shown in Figure 71.
40. Remove the parking pawl pivot pin, as shown in Figure 72.
41. Remove the parking pawl, and return spring as an assembly, as shown in Figure 72.
42. Before removing the direct planetary carrier and transfer driven gear assembly, measure the depth of the transfer gear below the case surface, as shown in Figure 73, and record measurement for final assembly process.

Continued on Page 54

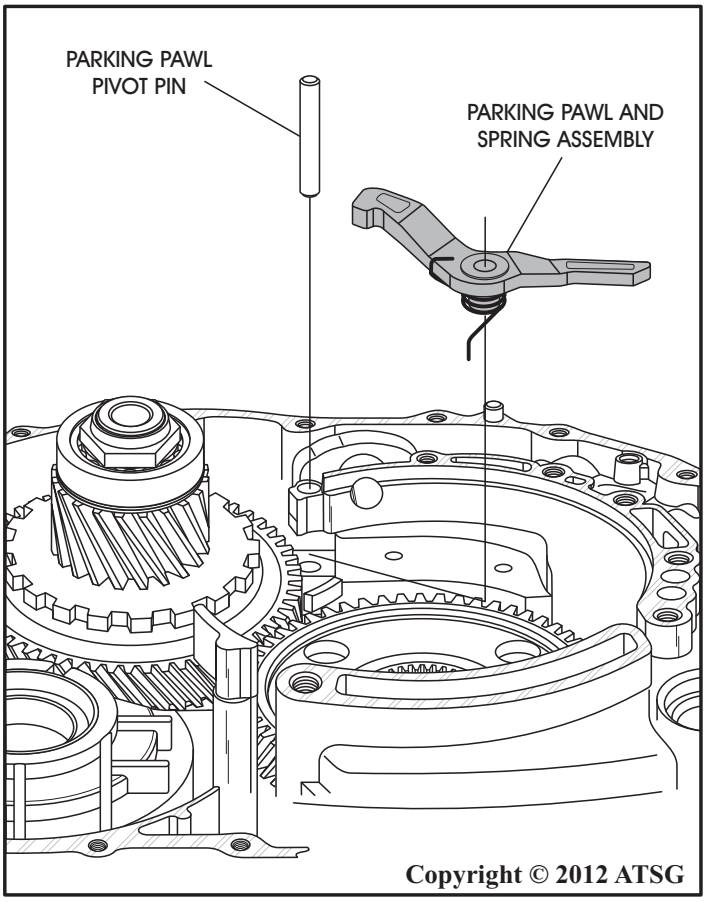


Figure 72

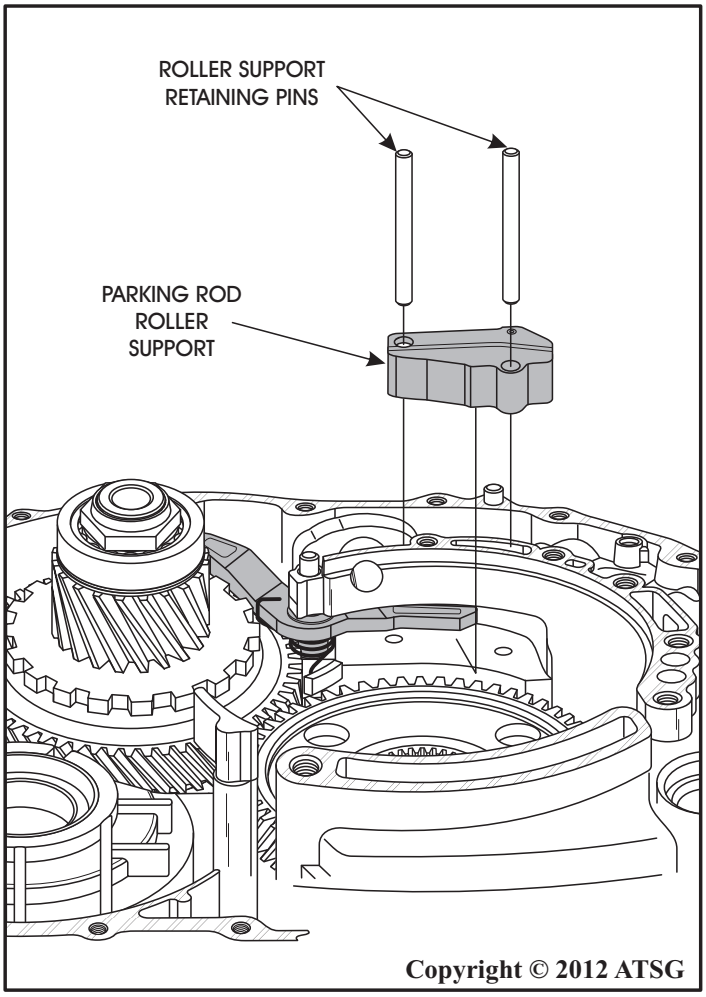


Figure 71

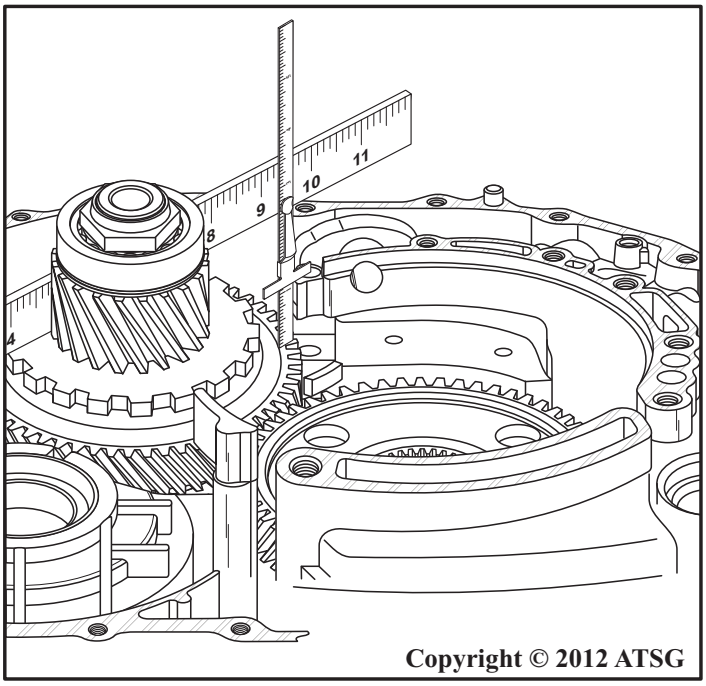


Figure 73

TRANSAXLE DISASSEMBLY

INTERNAL COMPONENTS (CONT'D)

43. Now you can remove the direct planetary carrier and driven transfer gear assembly, as shown in Figure 74, and set aside for component rebuild section.
44. Remove the direct clutch housing from case, as shown in Figure 75, and set aside for component rebuild section.
45. Remove the reduction band from the case, as shown in Figure 75.
    Note: May be necessary to remove the band anchor plug and "O" ring to remove band, as shown in Figure 76.

Continued on Page 55

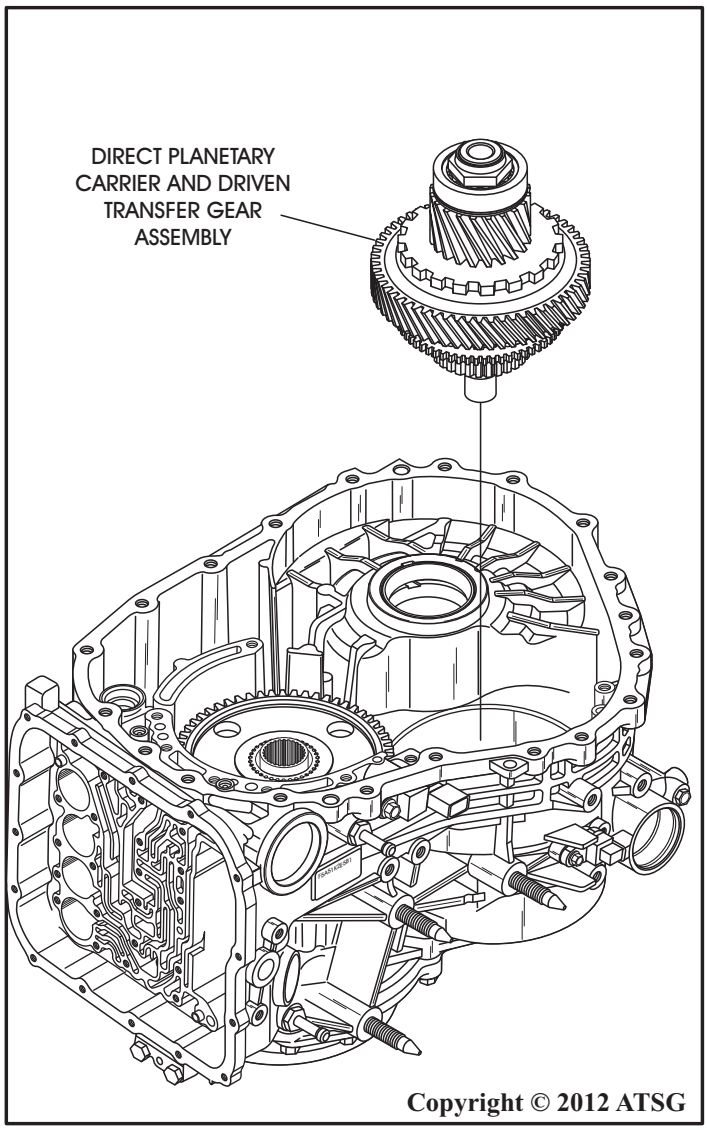


Figure 74

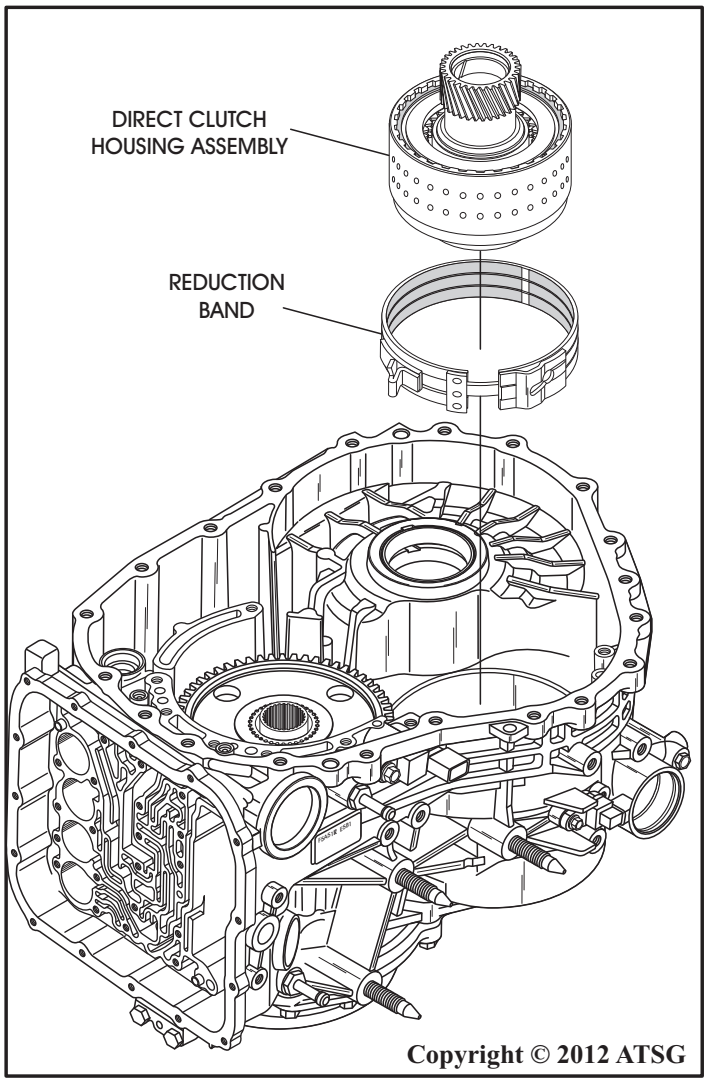


Figure 75

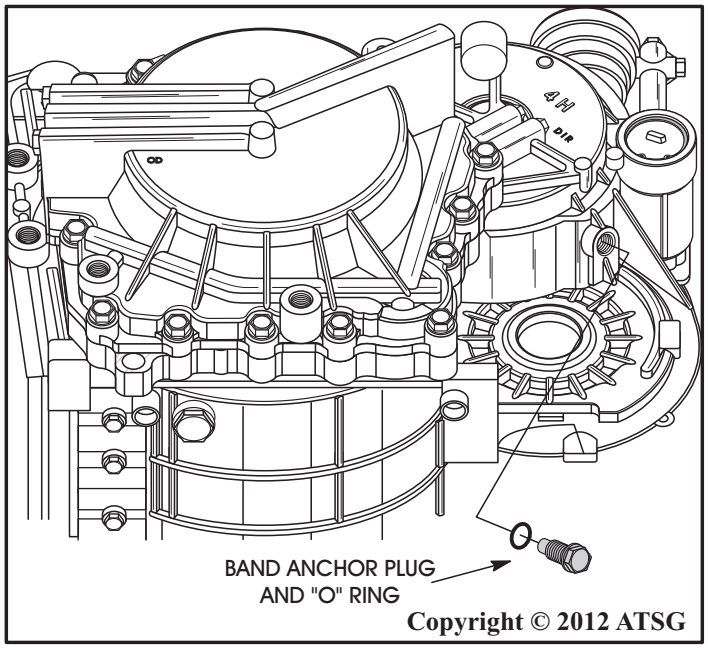


Figure 76

TRANSAXLE DISASSEMBLY

INTERNAL COMPONENTS (CONT'D)

46. Remove the number 11 thrust bearing, as shown in Figure 77.
    Note: Number 11 thrust bearing may be stuck to back side of direct clutch housing.
47. Remove the number 12 thrust bearing race, as shown in Figure 77.
48. Remove the reduction sprag retaining snap ring from the case, as shown in Figure 77.
49. Remove the reduction (OWC-2) sprag assembly from case, as shown in Figure 77, and set aside for the component rebuild section.
50. Remove the reduction sprag race cushion spring, as shown in Figure 77.
    Note: Reduction sprag race cushion spring is found in Hyundai and Kia models only.
51. Remove and discard the two direct clutch seal rings from the case, as shown in Figure 77.
52. Rotate transaxle case on bench so that rear cover is facing up, as shown in Figure 78.
53. Remove the reduction accumulator snap ring, cover, return spring and accumulator piston, as shown in Figure 78.
54. Remove and discard the cover "O" ring seal and the accumulator piston seal ring.

Continued on Page 56

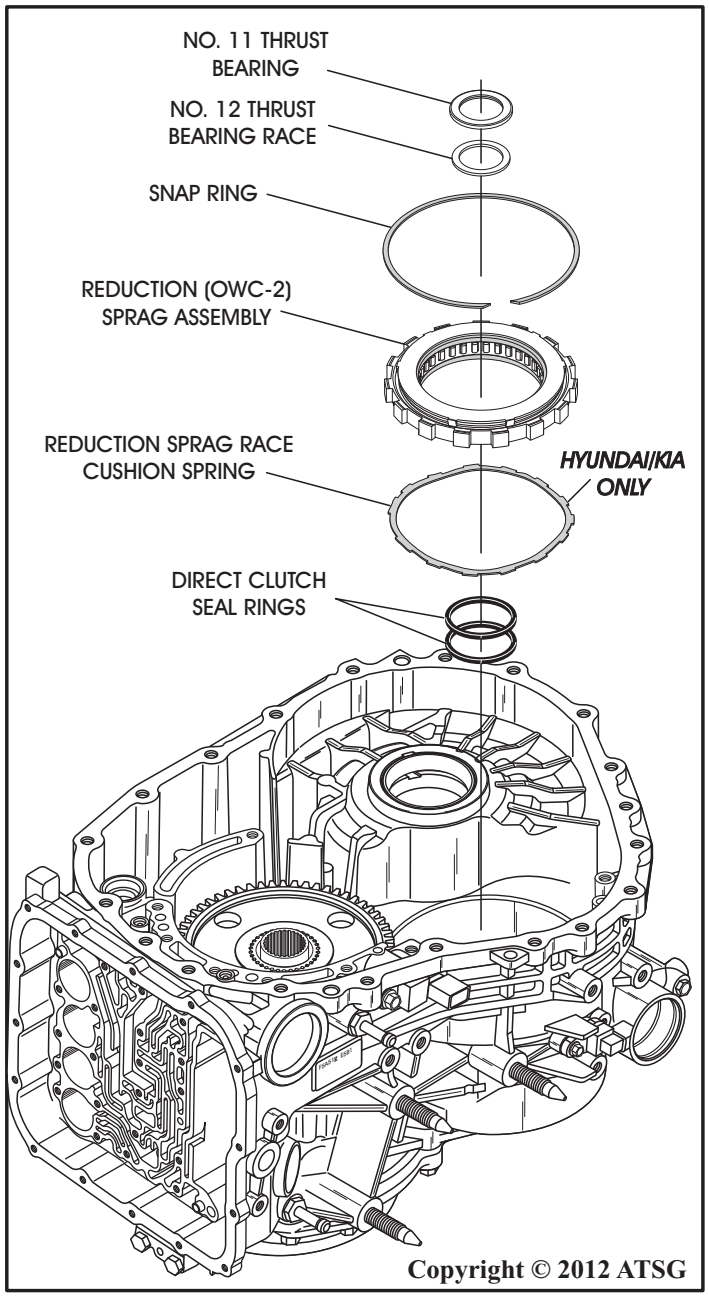


Figure 77

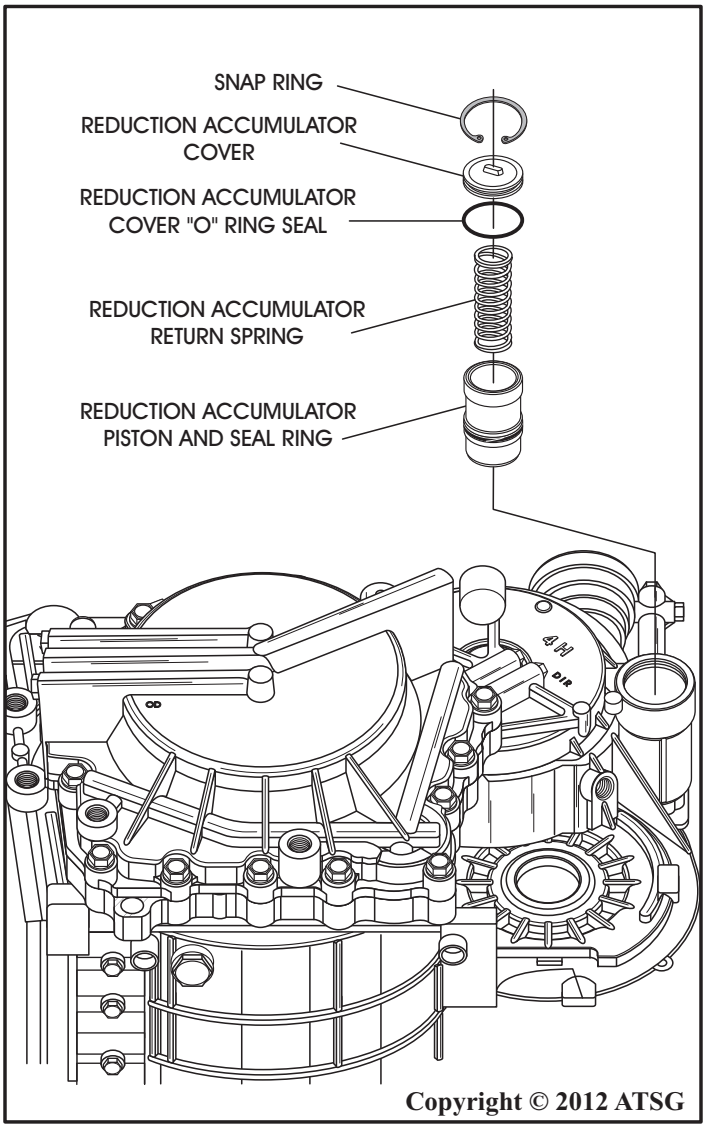


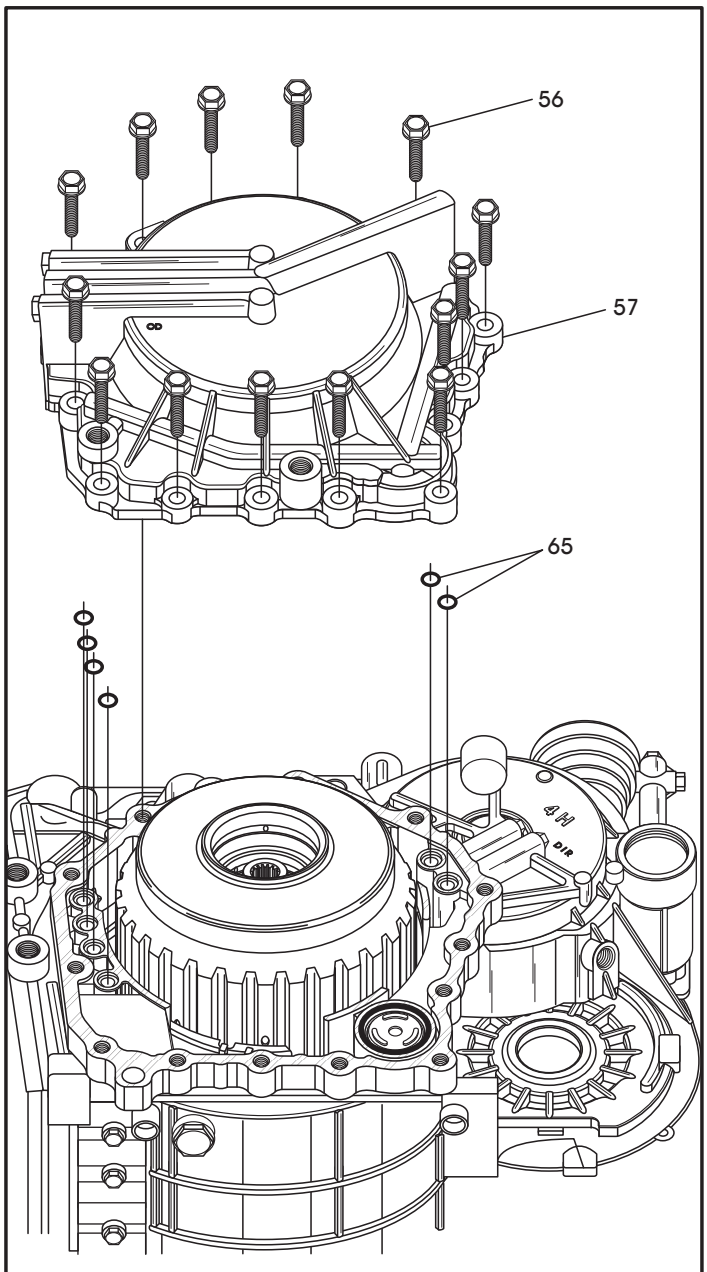
Figure 78

TRANSAXLE DISASSEMBLY

INTERNAL COMPONENTS (CONT'D)

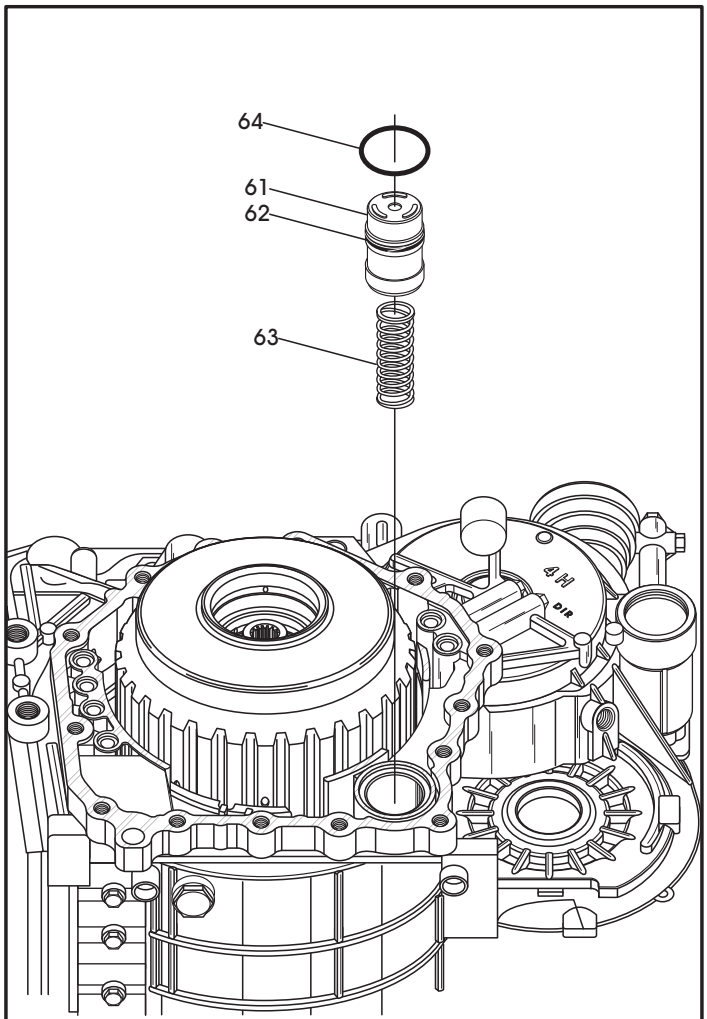
55. Remove the fourteen rear cover retaining bolts, as shown in Figure 79.
56. Remove the transaxle rear cover, as shown in Figure 79, and set aside for component rebuild section.
57. Remove and discard the six rear cover to case "O" ring seals, as shown in Figure 79.
58. Remove and discard the case cover to the direct clutch accumulator "O" ring seal, as shown in Figure 80.
59. Remove the direct clutch accumulator piston and return spring, as shown in Figure 80.
60. Remove and discard direct clutch accumulator piston seal ring (See Figure 80).

Continued on Page 57



56 REAR COVER RETAINING BOLTS (14 REQUIRED).
57 REAR COVER.
65 REAR COVER TO CASE "O" RING SEALS (6 REQUIRED).

Figure 79



61 DIRECT CLUTCH ACCUMULATOR PISTON.
62 DIRECT CLUTCH ACCUMULATOR PISTON SEAL RING.
63 DIRECT CLUTCH ACCUMULATOR PISTON RETURN SPRING.
64 DIRECT CLUTCH ACCUM. TO CASE COVER "O" RING SEAL.

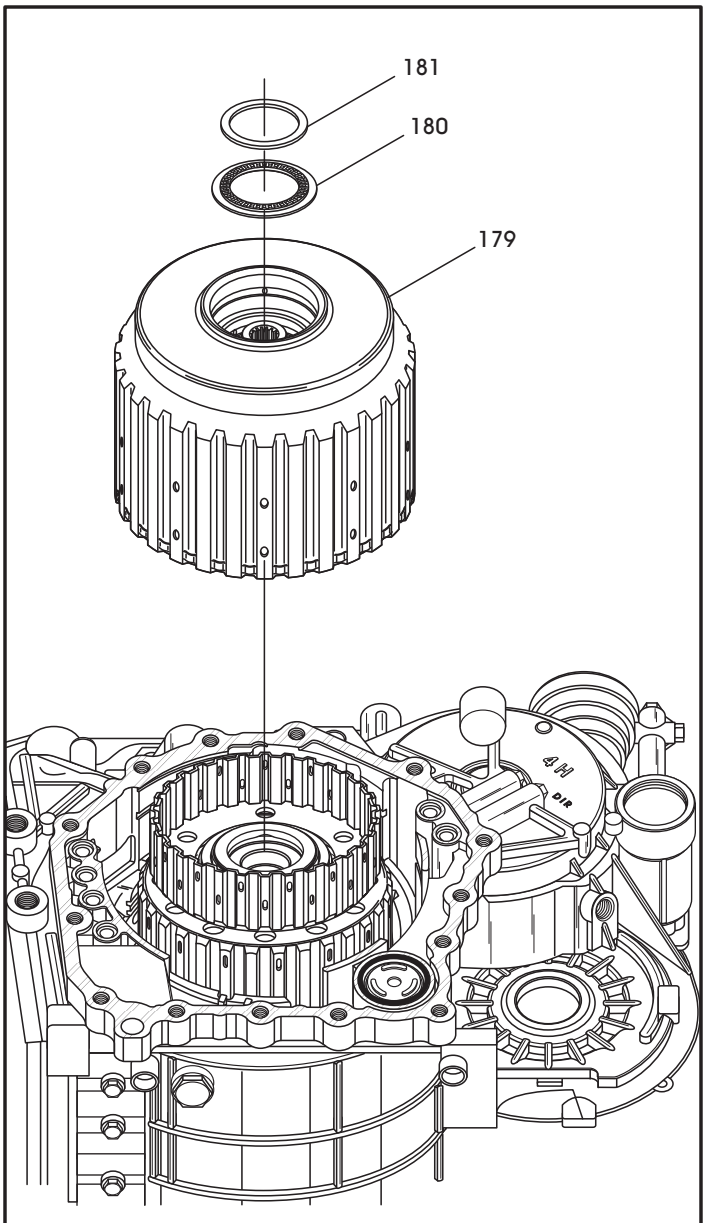
Figure 80

TRANSAXLE DISASSEMBLY

INTERNAL COMPONENTS (CONT'D)

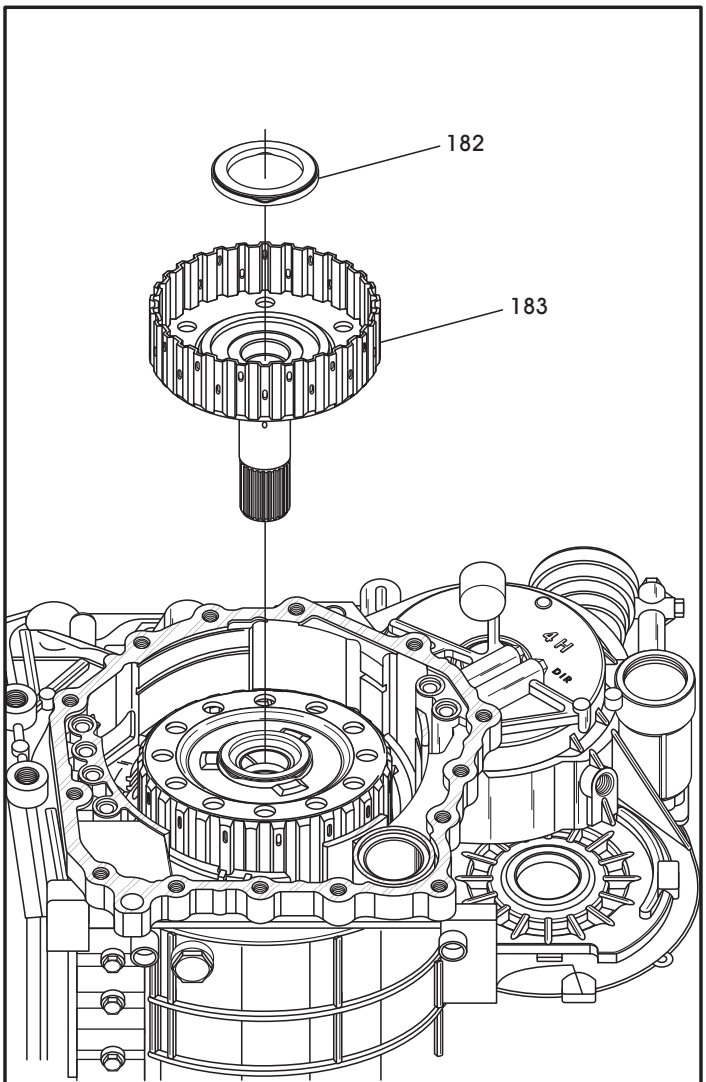
61. Remove number 8 ***selective*** thrust race and the number 7 thrust bearing assembly, as shown in Figure 81.
    Note: Number 8 selective thrust race may be stuck to rear cover.
62. Remove the reverse/overdrive clutch housing assembly, as shown in Figure 81.
63. Set the reverse/overdrive clutch housing aside for the component rebuild section.
64. Remove the number 6 thrust bearing and the overdrive clutch hub, as shown in Figure 82.
65. Set the overdrive clutch hub and the number 6 bearing aside for component rebuild section.
66. Remove the number 5 thrust bearing and the sun gear and shell assembly, as shown in Figure 83.
67. Set the number 5 thrust bearing and the sun gear and shell assembly aside for component rebuild section.

Continued on Page 58



179 REVERSE/OVERDRIVE CLUTCH RETAINER ASSEMBLY.
180 NUMBER 7 THRUST BEARING.
181 NUMBER 8 THRUST BEARING RACE *(SELECTIVE)*.

Figure 81



182 NUMBER 6 THRUST BEARING.
183 OVERDRIVE CLUTCH HUB.

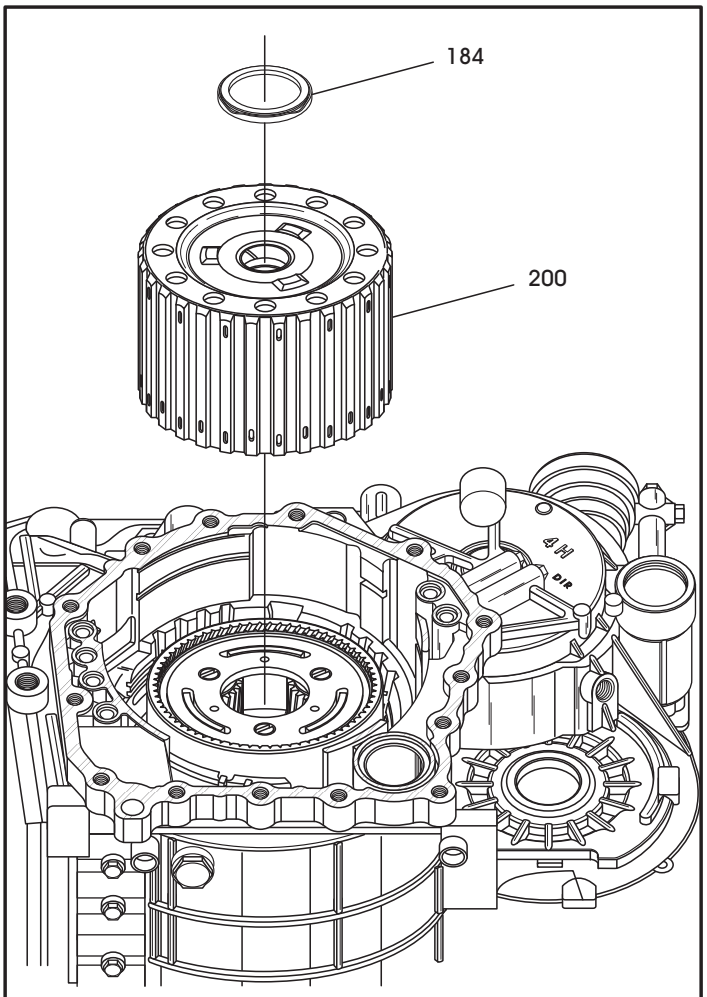
Figure 82

TRANSAXLE DISASSEMBLY

INTERNAL COMPONENTS (CONT'D)

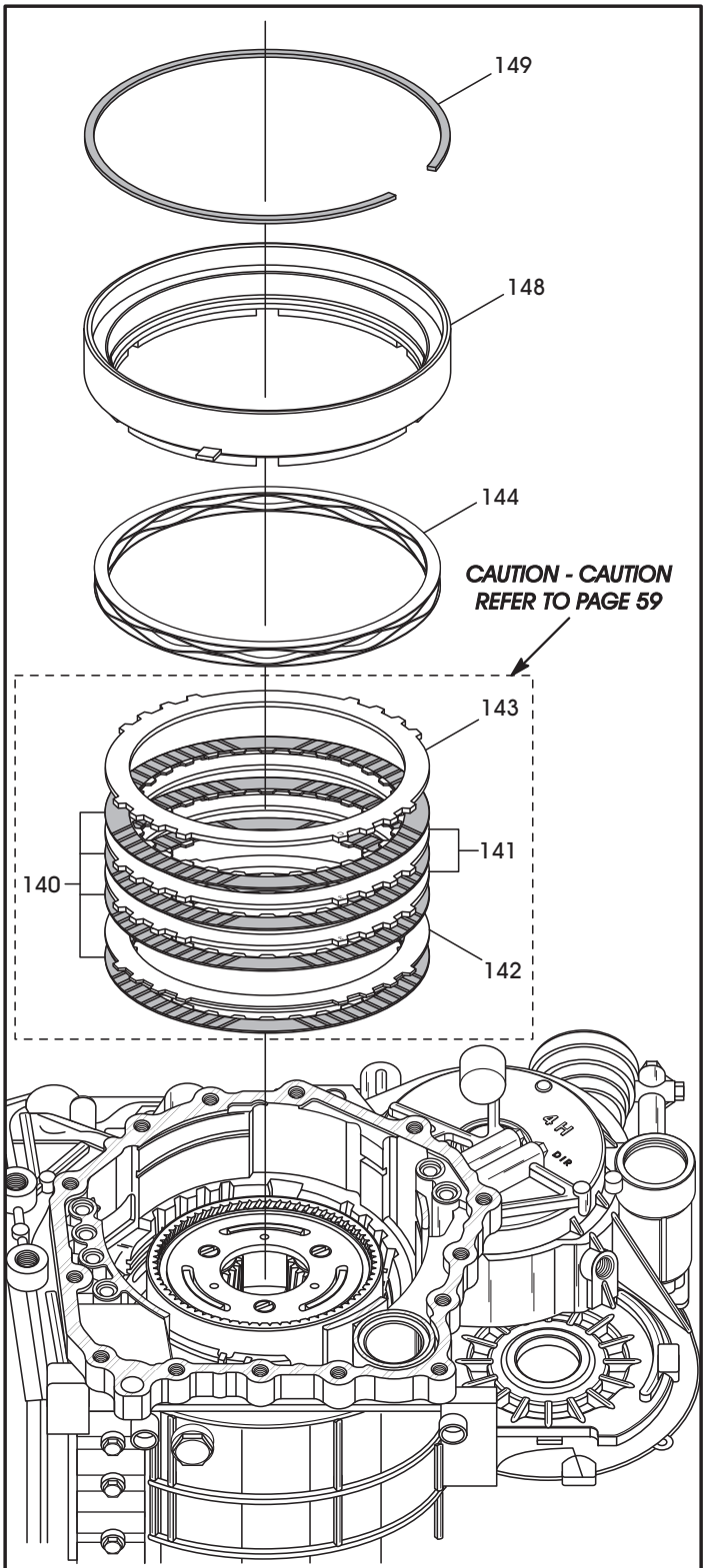
68. Remove 2nd clutch retainer snap ring, as shown in Figure 84.
69. Remove the 2nd clutch retainer/piston assembly and the return spring, as shown in Figure 84, and set aside for component rebuild section.
    CAUTION: Various 2nd clutch stack-ups in the Hyundai and Kia models are in service. If you're working on Hyundai/Kia, remove 2nd clutch pack very carefully and tag the components for identification including which direction the stepped plates are installed. Refer to Page 59 for the various stack-ups observed, and there may be more than shown at this time.
70. If your working on Mitsubishi, remove the 2nd clutch plates as shown in Figure 84.

Continued on Page 60



184 NUMBER 5 THRUST BEARING.
200 REVERSE SUN GEAR AND SHELL ASSEMBLY.

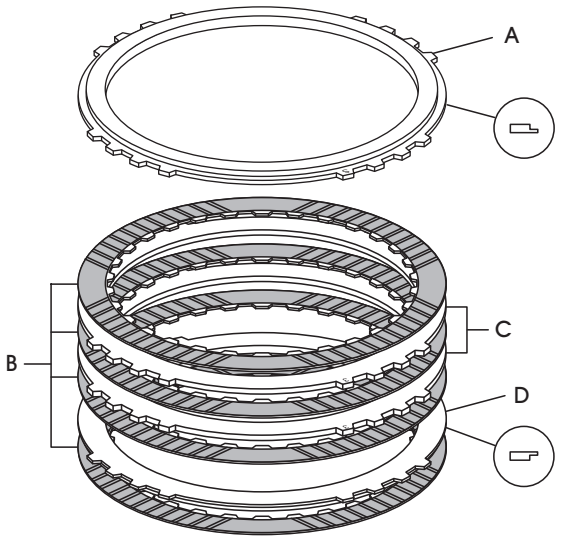
Figure 83



140 2ND CLUTCH DOUBLE SIDED FRICTION PLATES (4 REQUIRED).
141 2ND CLUTCH STEEL PLATES, .119" THICK (2 REQUIRED).
142 2ND CLUTCH STEPPED PLATE.
143 2ND CLUTCH FLAT APPLY PLATE *(SELECTIVE).*
144 2ND CLUTCH APPLY PISTON RETURN SPRING.
148 2ND CLUTCH PISTON RETAINER.
149 2ND CLUTCH RETAINER RETAINING SNAP RING, .090" THICK.

Figure 84

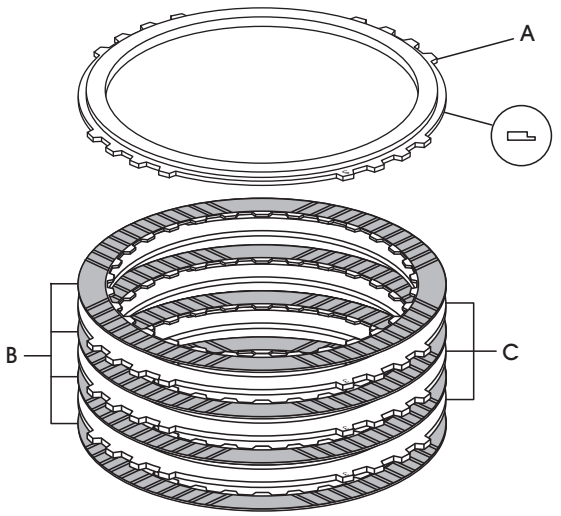
A5HF1 2ND CLUTCH, PRE-2007 HYUNDAI
A5HF1 2ND CLUTCH, PRE-2006 KIA



A STEPPED APPLY PLATE, ID "J", = .059"/.118" THICK.
B DOUBLE-SIDED FRICTIONS = .070" THICK (4 REQUIRED).
C STEEL PLATES, ID "4", = .119" THICK (2 REQUIRED).
D STEPPED PLATE, ID "S", = .039"/.118" THICK (1 REQUIRED).

Figure 85

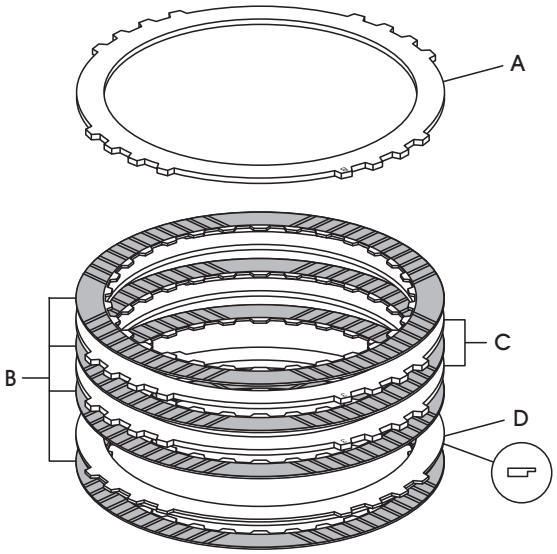
A5GF1 2ND CLUTCH, PRE-2007 HYUNDAI
A5GF1 2ND CLUTCH, PRE-2006 KIA



A STEPPED APPLY PLATE, ID (NONE), = .041"/.098" THICK.
B DOUBLE-SIDED FRICTIONS = .070" THICK (4 REQUIRED).
C STEEL PLATES, ID "3", = .098" THICK (3 REQUIRED).

Figure 86

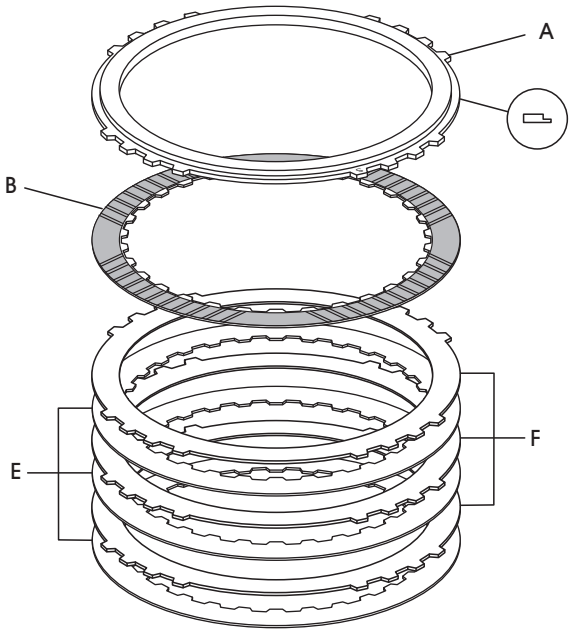
F5A51 MITSUBISHI (ALL MODELS)



A FLAT APPLY PLATE, ID "B", = (SELECTIVE).
B DOUBLE-SIDED FRICTIONS = .070" THICK (4 REQUIRED).
C STEEL PLATES, ID "3", = .098" THICK (2 REQUIRED).
D STEPPED PLATE, ID "NONE", = .059"/.098" THICK (1 REQUIRED).

Figure 87

A5GF1 2ND CLUTCH, 2007-UP HYUNDAI
A5GF1 2ND CLUTCH, 2006-UP KIA



A STEPPED APPLY PLATE, ID (NONE), = .039"/.119" THICK.
B *DOUBLE-SIDED* FRICTION = .070" THICK (1 REQUIRED).
E *SINGLE-SIDED*, INT SPLINE FRICTION = .091" THICK (3 REQUIRED).
F *SINGLE-SIDED*, EXT SPLINE FRICTION = .091" THICK (3 REQUIRED).

Figure 88

TRANSAXLE DISASSEMBLY

INTERNAL COMPONENTS (CONT'D)

Note: Keep the 2nd clutches in the order you removed them and set aside for reference during reassembly.

71. Remove the planetary gear set and low sprag assembly (OWC-1), as shown in Figure 89, and set aside for the component rebuild section.
72. Remove the L/R & 2nd clutch pressure plate ***selective*** snap ring (139) and the L/R & 2nd clutch pressure plate, as shown in Figure 90.
73. Remove the next snap ring (137) from the groove in the case, as shown in Figure 90.
74. Remove the low/reverse clutch friction and steel plates, as shown in Figure 90.
75. Remove the low/reverse clutch ***selective*** apply plate, as shown in Figure 90.
76. Remove the low/reverse clutch "Waved" plate, as shown in Figure 90.

Continued on Page 61

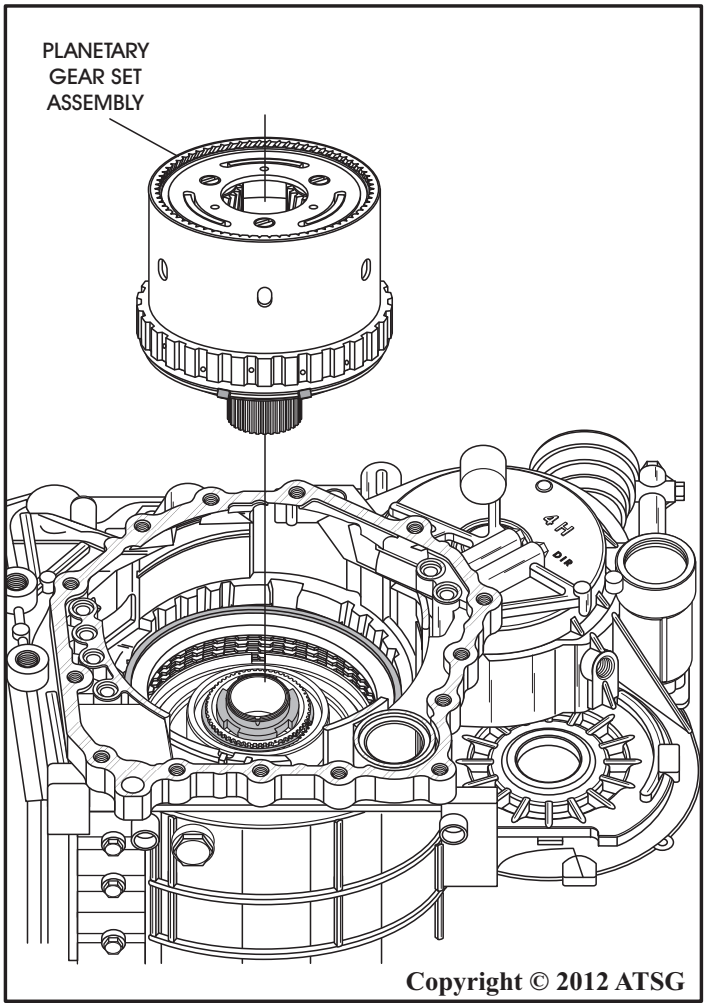
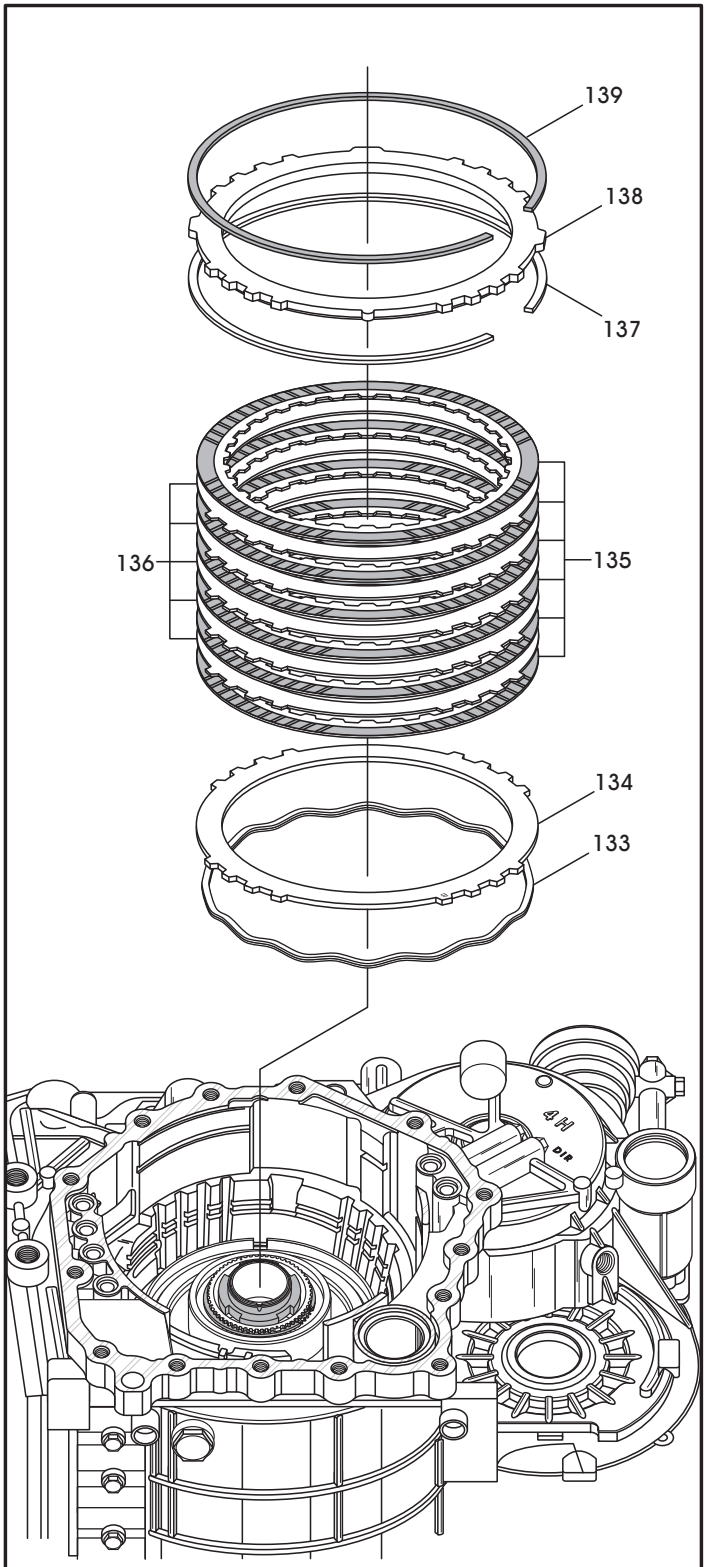


Figure 89



133 LOW/REVERSE CLUTCH "*WAVED*" CUSHION PLATE.
134 LOW/REVERSE CLUTCH APPLY PLATE *(SELECTIVE).*
135 LOW/REVERSE CLUTCH FRICTION PLATES (6 REQUIRED).
136 LOW/REVERSE CLUTCH STEEL PLATES, .040" THICK (5 REQ).
137 L/R & 2ND CLUTCH PRESSURE PLATE SNAP RING (.078" THICK).
138 L/R & 2ND CLUTCH STEPPED PRESSURE PLATE.
139 L/R & 2ND CLUTCH PRESSURE PLATE SNAP RING *(SELECTIVE).*

Figure 90

TRANSAXLE DISASSEMBLY

INTERNAL COMPONENTS (CONT'D)

77. Using the special tools shown in Figure 91, or a suitable substitute, compress low/reverse clutch piston return spring.
78. Remove the low sprag (OWC-1) inner race snap ring (132), as shown in Figure 92.
79. Slowly release compression tool and remove the tool from the case.
80. Remove the low sprag inner race (OWC-1), as shown in Figure 92, remove and discard the "Lip Type" seal on the back side of inner race.
81. Remove the low/reverse clutch return spring retainer, as shown in Figure 92.
82. Remove the low/reverse clutch piston return spring, as shown in Figure 92.
83. Remove the low/reverse clutch piston, as shown in Figure 92.
84. Remove and discard the low/reverse clutch piston "D" ring seals.

Continued on Page 62

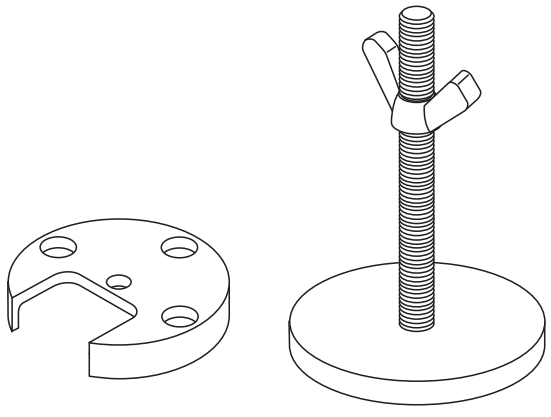
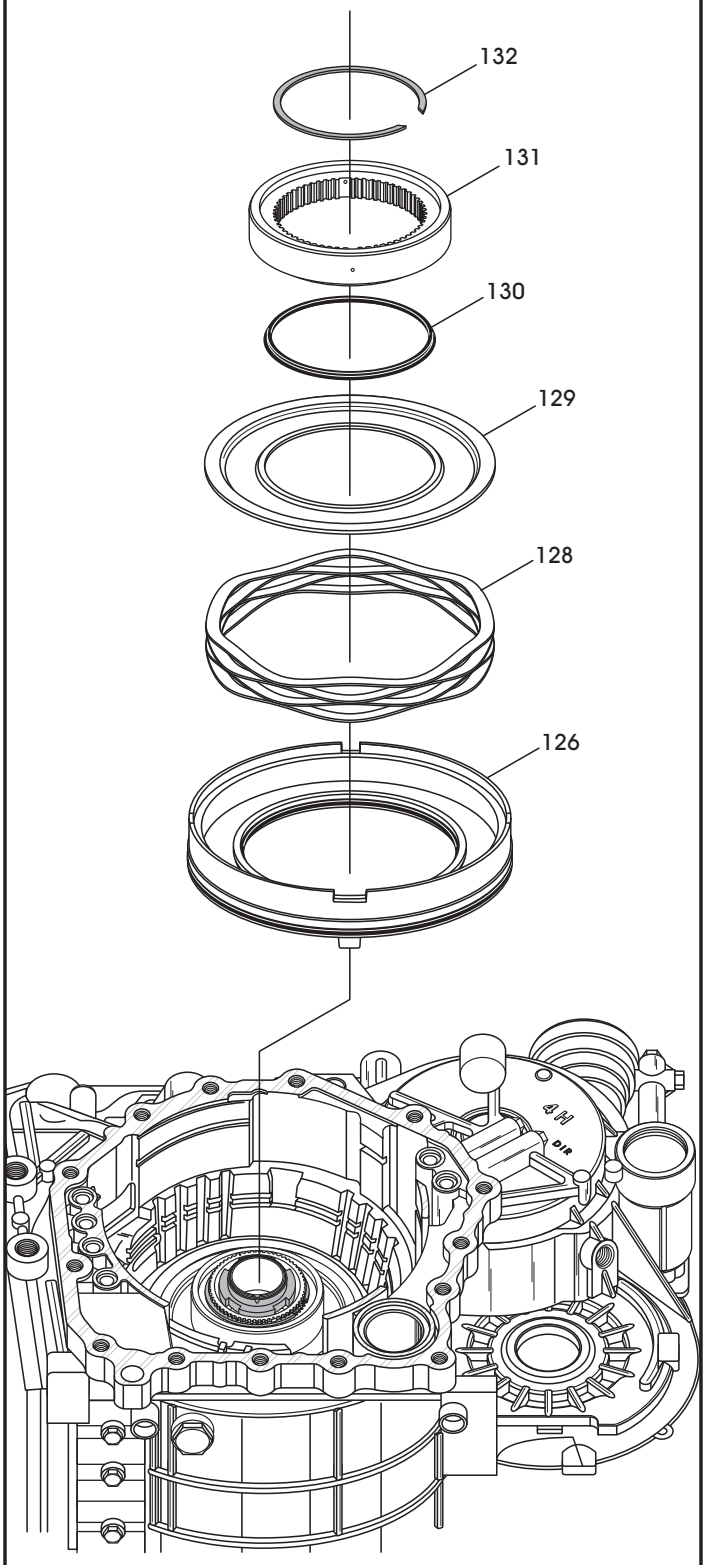


Figure 91



126 LOW/REVERSE CLUTCH APPLY PISTON AND "D" RING SEALS.
128 LOW/REVERSE CLUTCH PISTON RETURN SPRING.
129 LOW/REVERSE CLUTCH RETURN SPRING RETAINER.
130 LOW SPRAG (OWC-1) INNER RACE "*LIP TYPE*" LUBE SEAL.
131 LOW SPRAG (OWC-1) INNER RACE.
132 LOW SPRAG (OWC-1) INNER RACE RETAINING SNAP RING.

Figure 92

TRANSAXLE DISASSEMBLY

INTERNAL COMPONENTS (CONT'D)

85. Remove the transfer drive gear by accessing the retaining bolts through the access holes provided in gear, as shown in Figure 93.
Note: Reference marks must be placed on case and bearing housing (See Figure 93), as the housing bolts in case in 1 direction only. If bearing service is not necessary, the transfer drive gear does not need to be removed.
86. Rotate the transfer gear as necessary so the access holes are over the bolts for removal and remove four bolts.
87. Rotate the transfer gear 45 degrees and remove the remaining four bolts (Total of 8).
88. Remove the transfer drive gear assembly, as shown in Figure 94.

SPECIAL NOTE:

The transfer drive gear and bearings are serviced only as a complete assembly. The exploded views provided in this manual of the transfer drive gear and bearings, as shown in Figure 95, are for reference only.

Continued on Page 63

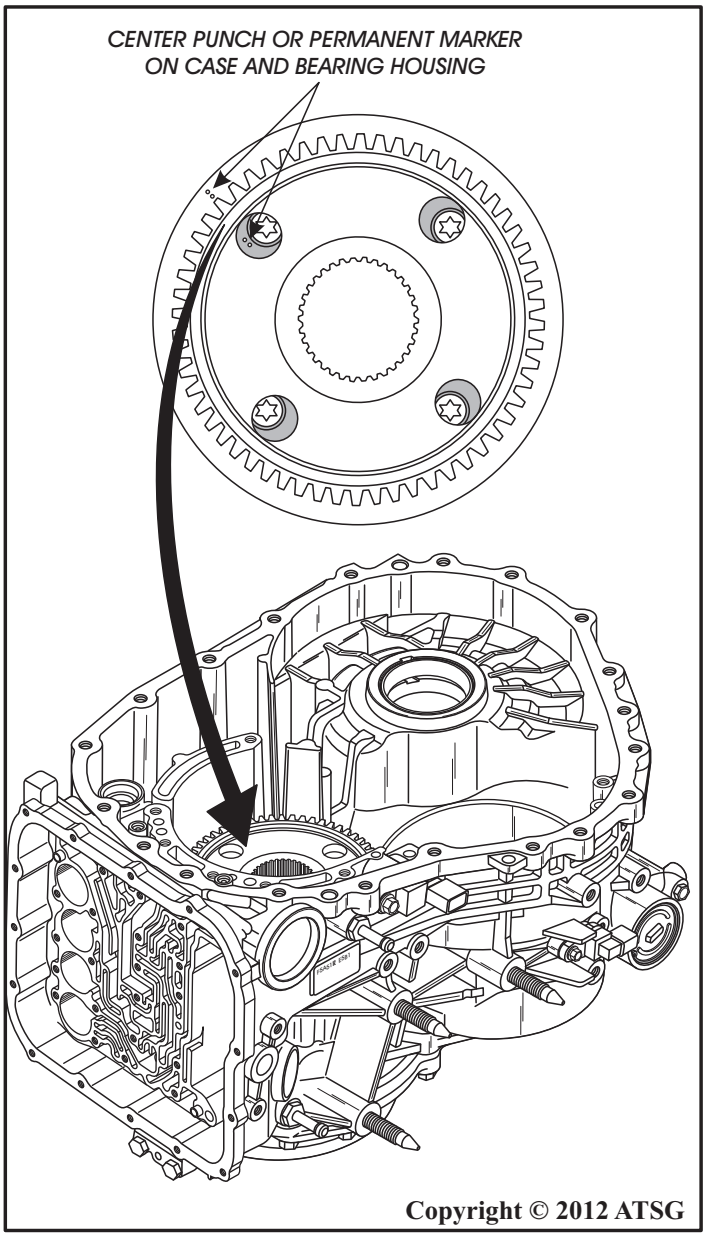


Figure 93

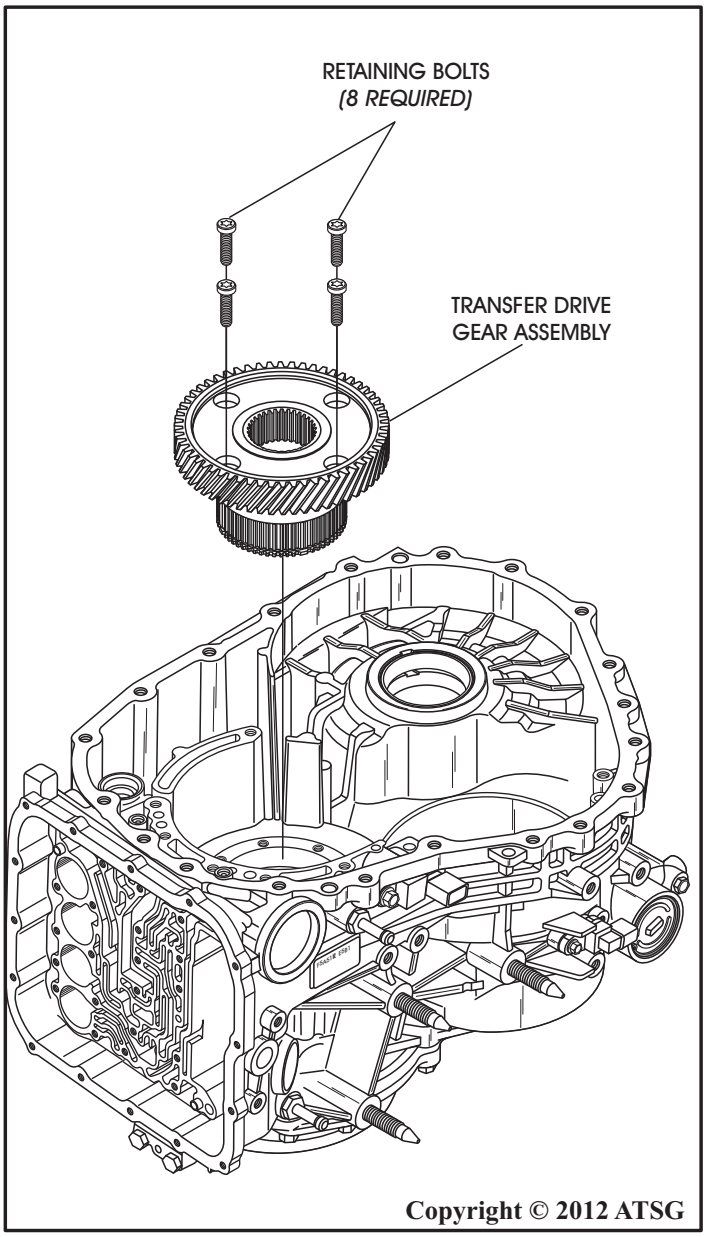
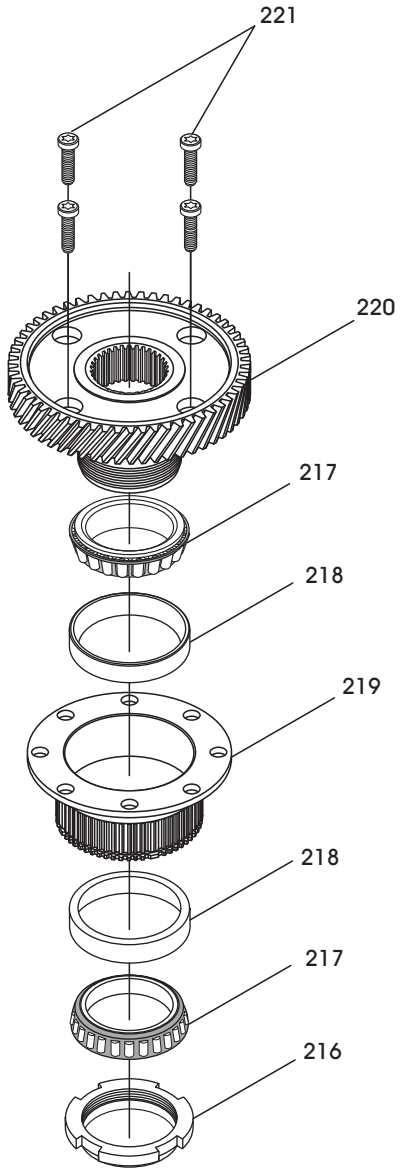


Figure 94

TRANSFER DRIVE GEAR AND TAPERED ROLLER BEARING ASSEMBLY



216 TRANSFER DRIVE GEAR BEARING NUT.
217 TRANSFER DRIVE GEAR "TAPERED ROLLER" BEARING (2 REQ.).
218 TRANSFER DRIVE GEAR BEARING CUP (2 REQUIRED).
219 TRANSFER DRIVE GEAR BEARING HOUSING.
220 TRANSFER DRIVE GEAR.
221 TRANSFER DRIVE GEAR RETAINING BOLTS (8 REQUIRED).

Illustration For Reference Only
Serviced Only As Assembly

Figure 95

COMPONENT REBUILD

Transaxle Case Assembly

1. Clean the transaxle case thoroughly and dry with compressed air.
2. Install alignment dowel MD998412, as shown in Figure 96, as a guide for proper alignment.
3. Align your reference marks from disassembly process and install transfer drive gear assembly, as shown in Figure 96.
4. Install three retaining bolts, remove alignment tool and install the fourth bolt.
5. Rotate the transfer drive gear 45 degrees and install the remaining four bolts.
6. Torque all transfer drive gear retaining bolts to 34 N·m (25 ft.lb.).

Continued on Page 64

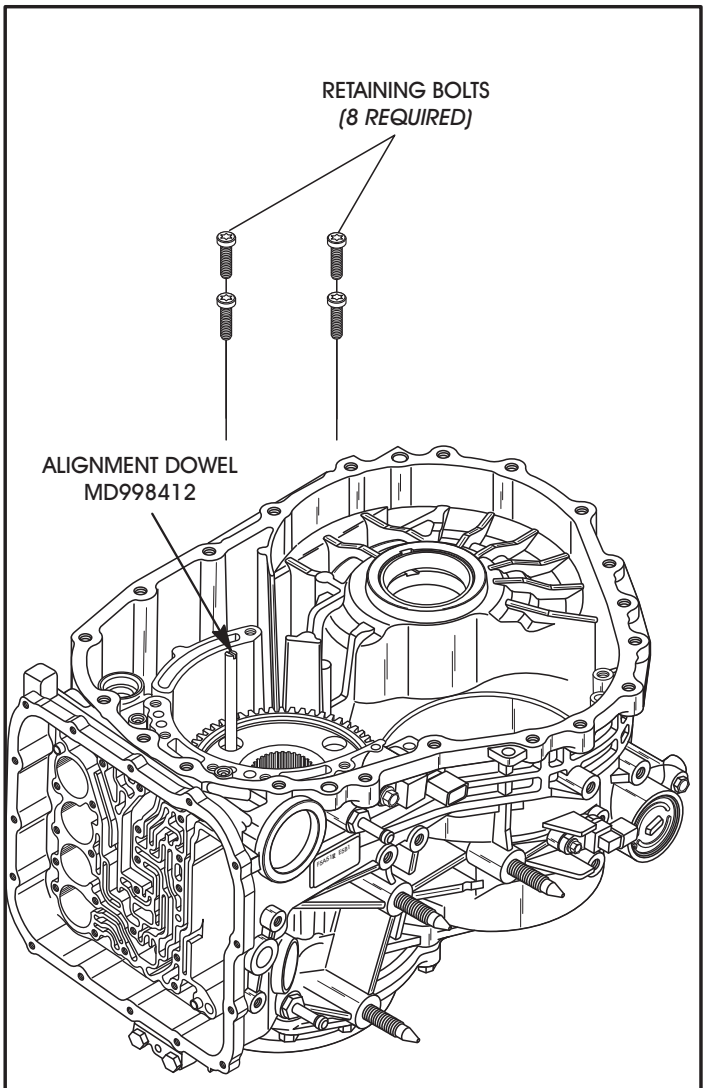


Figure 96

COMPONENT REBUILD

Transaxle Case Assembly (Cont'd)

7. Install new differential bearing cup as necessary using the proper driver, as shown in Figure 97.
   Note: We will cover the differential pre-load adjustment during the final assembly process.
8. Install new caged needle bearing, as necessary, into case, as shown in Figure 98 using proper driver and adapter.
   Note: Caged needle bearing must be installed 0.5 - 1.5 mm (.020" - .059") below number 12 thrust bearing race case surface, as shown in Figure 99.
9. Install new direct clutch seal rings into the case grooves, as shown in Figure 98, and lube with small amount of Trans-Jel®.

Continued on Page 65

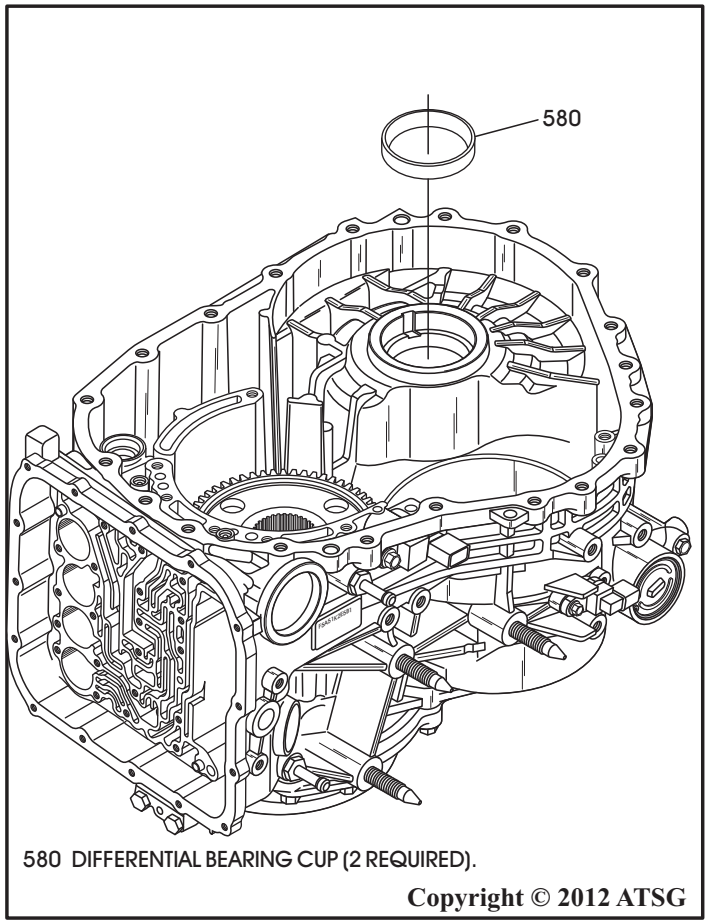


Figure 97

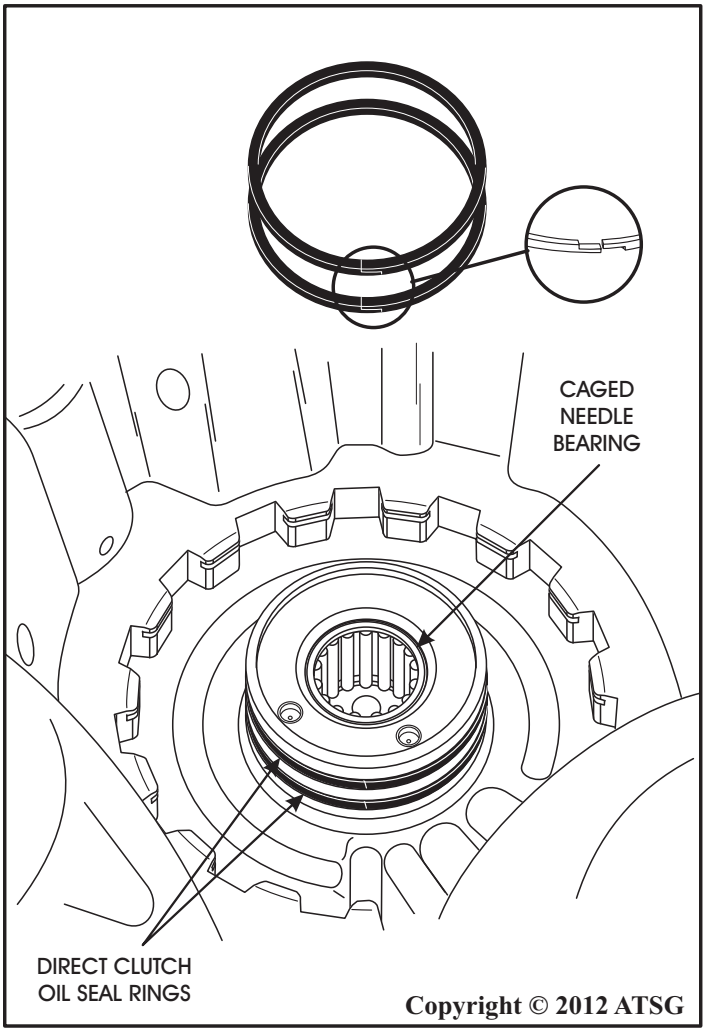


Figure 98

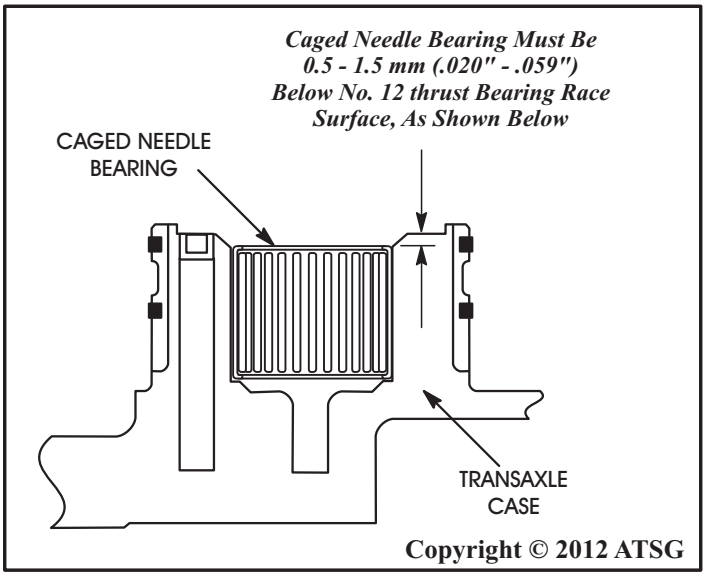
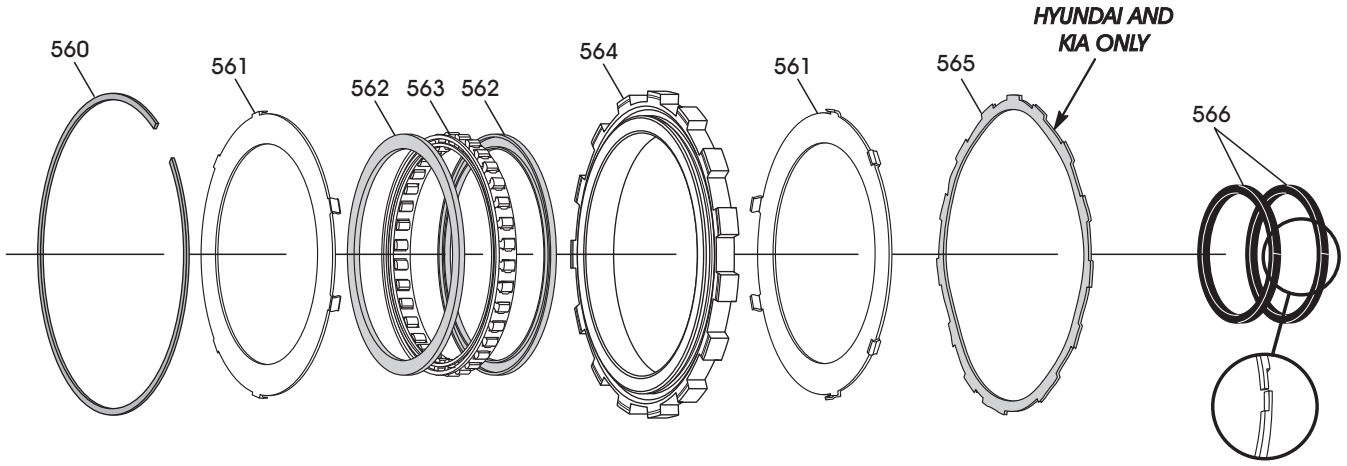


Figure 99

REDUCTION SPRAG (OWC-2) EXPLODED VIEW



560 REDUCTION SPRAG (OWC-2) ASSEMBLY RETAINING SNAP RING.
561 REDUCTION SPRAG (OWC-2) RETAINERS (2 REQUIRED).
562 REDUCTION SPRAG (OWC-2) END BEARINGS (2 REQUIRED).
563 REDUCTION SPRAG (OWC-2) ASSEMBLY.
564 REDUCTION SPRAG (OWC-2) OUTER RACE.
565 REDUCTION SPRAG RACE CUSHION PLATE *(HYUNDAI & KIA ONLY).*
566 DIRECT CLUTCH "STEP-CUT" SEALING RINGS.

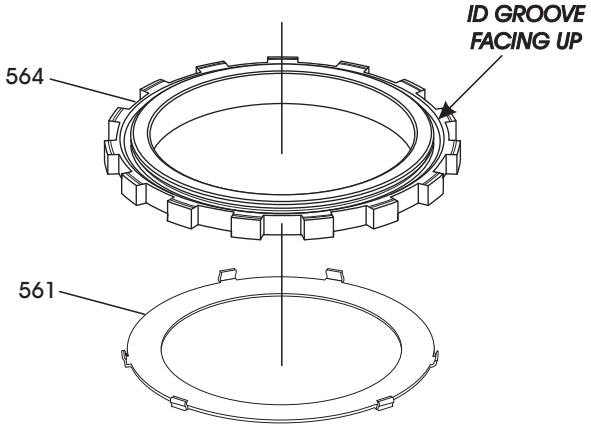
Figure 100

COMPONENT REBUILD

Transaxle Case Assembly (Cont'd)
Reduction Sprag (OWC-2) Assembly

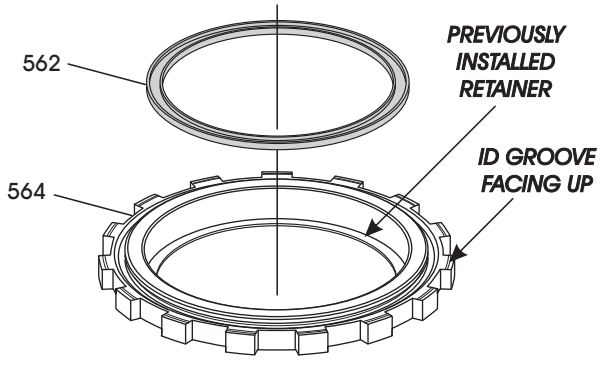
10. Disassemble reduction sprag (OWC-2) assembly using Figure 100 as a guide.
11. Clean and inspect reduction sprag parts thoroughly and dry with compressed air.
12. Install one reduction sprag retainer on bottom of reduction sprag outer race, as shown in Figure 101. ***Note: ID groove on outer race must face up.***
13. Install one reduction sprag end bearing, as shown in Figure 102, into the reduction sprag outer race. ***Note: ID groove on outer race must face up.***

Continued on Page 66



561 REDUCTION SPRAG RETAINERS (2 REQUIRED).
564 REDUCTION SPRAG OUTER RACE.

Figure 101



562 REDUCTION SPRAG END BEARINGS (2 REQUIRED).
564 REDUCTION SPRAG OUTER RACE.

Figure 102

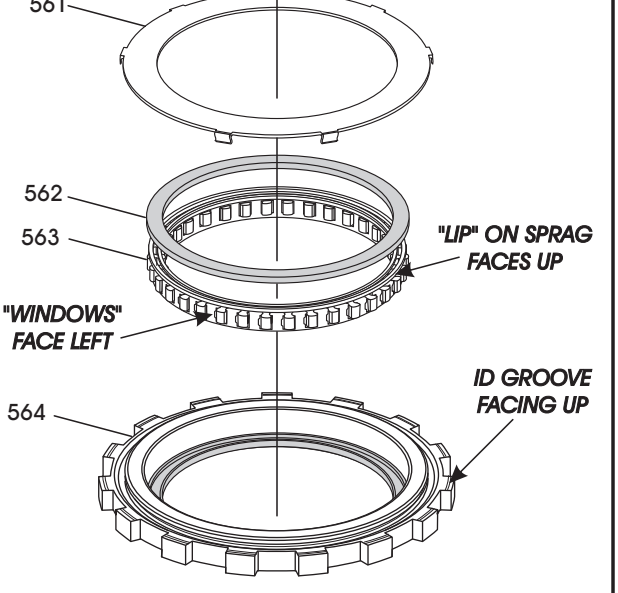
COMPONENT REBUILD

Transaxle Case Assembly (Cont'd)

Reduction Sprag (OWC-2) Assembly (Cont'd)

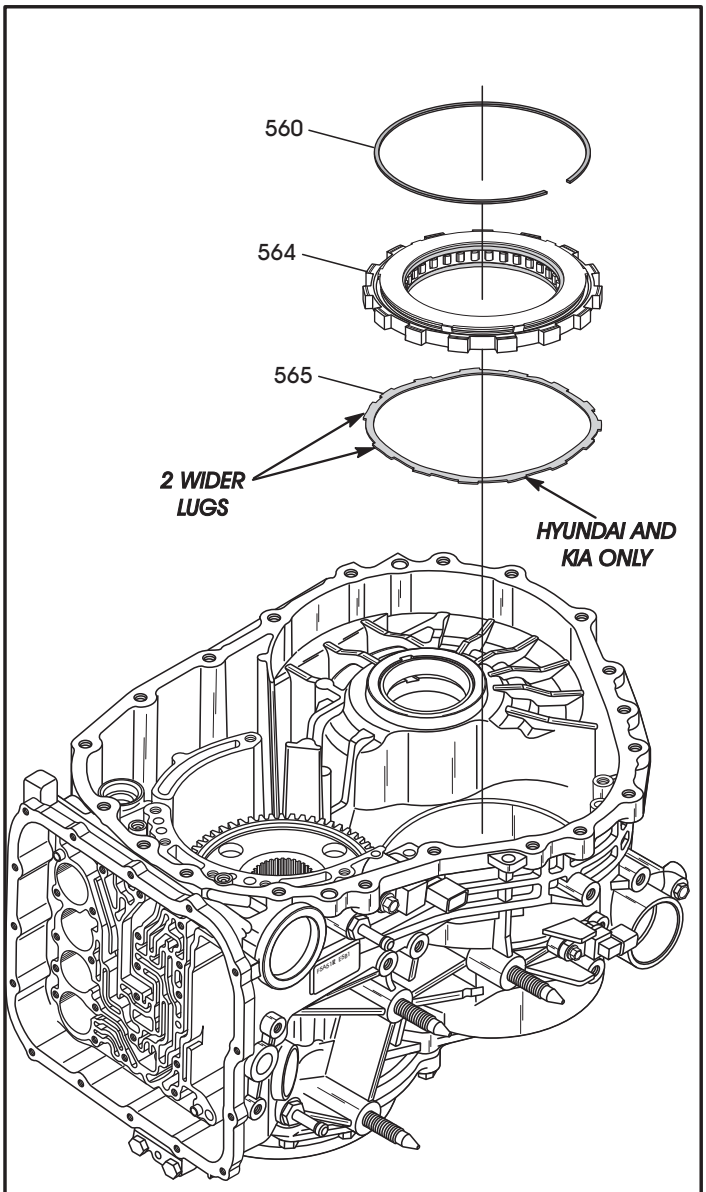
14. Install the reduction sprag assembly into the outer race, as shown in Figure 103, with the "lip" on sprag cage facing up.
    Note: The reduction sprag cage has no arrows on it to help with direction of installation. The "lip" must face up and the "windows" to the left, with the ID groove on the outer race also facing up, as shown in Figure 103.
15. Install the second reduction sprag end bearing, as shown in Figure 103, with the smooth side facing up.
16. Install the second reduction sprag retainer by snapping it over the lip on the outer race, as shown in Figure 103.
17. Install reduction sprag race cushion plate into the case, as shown in Figure 104.
    Note: Cushion plate is used on Hyundai & Kia only and 2 wider lugs go toward area of case with no lug cavities.
18. Install the completed reduction sprag (OWC-2) assembly, as shown in Figure 104, into transaxle case with the ID groove facing up.
19. Install the reduction sprag assembly retaining snap ring, as shown in Figure 104, and ensure that it is fully seated (See Figure 105).

Continued on Page 67



561 REDUCTION SPRAG RETAINERS (2 REQUIRED).
562 REDUCTION SPRAG END BEARINGS (2 REQUIRED).
563 REDUCTION SPRAG (OWC-2) ASSEMBLY.
564 REDUCTION SPRAG OUTER RACE.

Figure 103



560 REDUCTION SPRAG ASSEMBLY RETAINING SNAP RING.
564 COMPLETED REDUCTION SPRAG (OWC-2) ASSEMBLY.
565 REDUCTION SPRAG RACE CUSHION PLATE *(HYUNDAI & KIA ONLY)*.

Figure 104

COMPONENT REBUILD

Transaxle Case Assembly (Cont'd)

Reduction Sprag (OWC-2) Assembly

20. Ensure that reduction sprag retaining snap ring is fully seated in groove, as shown in Figure 105.
21. Temporarily install the direct clutch housing, as shown in Figure 106, to check proper operation of the reduction sprag (OWC-2).
    Note: Direct clutch housing should freewheel counter-clockwise and lock in the clockwise direction, as shown in Figure 106.
22. Remove the direct clutch housing and set the completed case aside for final assembly.

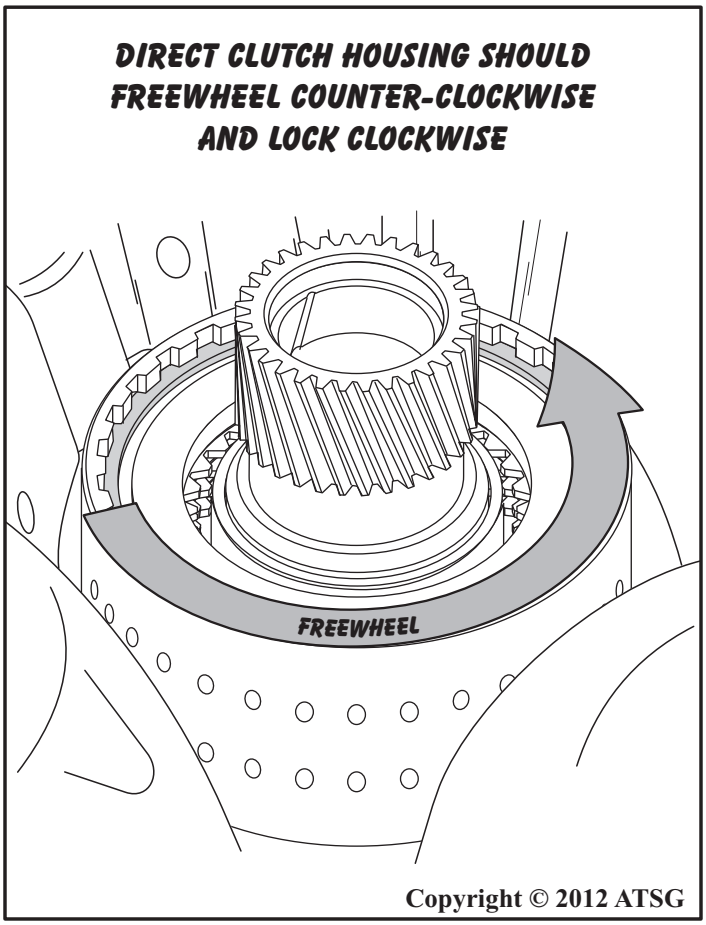


Figure 106

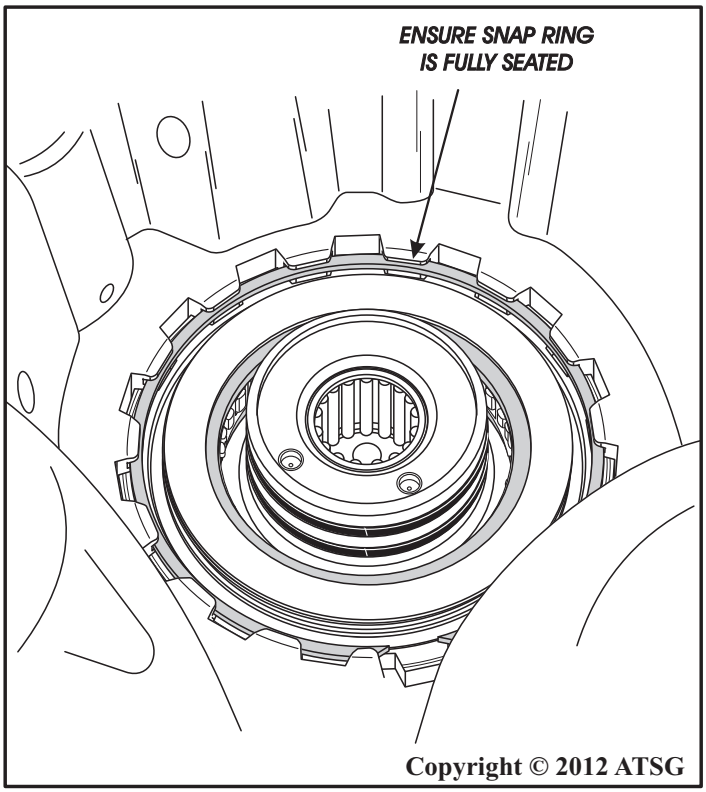


Figure 105

COMPONENT REBUILD SECTION

Rear Cover Assembly

1. Remove and discard the overdrive clutch seal rings and the reverse clutch seal rings.
2. Inspect end cover journal and sealing ring area for any wear and/or damage and check seal ring groove clearance with a feeler gage, as described in Figure 107.
3. Install new input shaft caged needle bearing, as necessary, using the proper driver, as shown in Figure 108.
4. Install new reverse clutch seal rings into their grooves, as shown in Figure 109, and ensure they are properly hooked and seated.
5. Install new overdrive clutch seal rings into their grooves, as shown in Figure 109, and ensure they are properly hooked and seated.
6. Install ***selective*** number 8 thrust bearing race, as shown in Figure 109, and retain with a small amount of Trans-Jel®.
7. Set the completed rear cover assembly aside for the final assembly process (See Figure 110)

Continued on Page 69

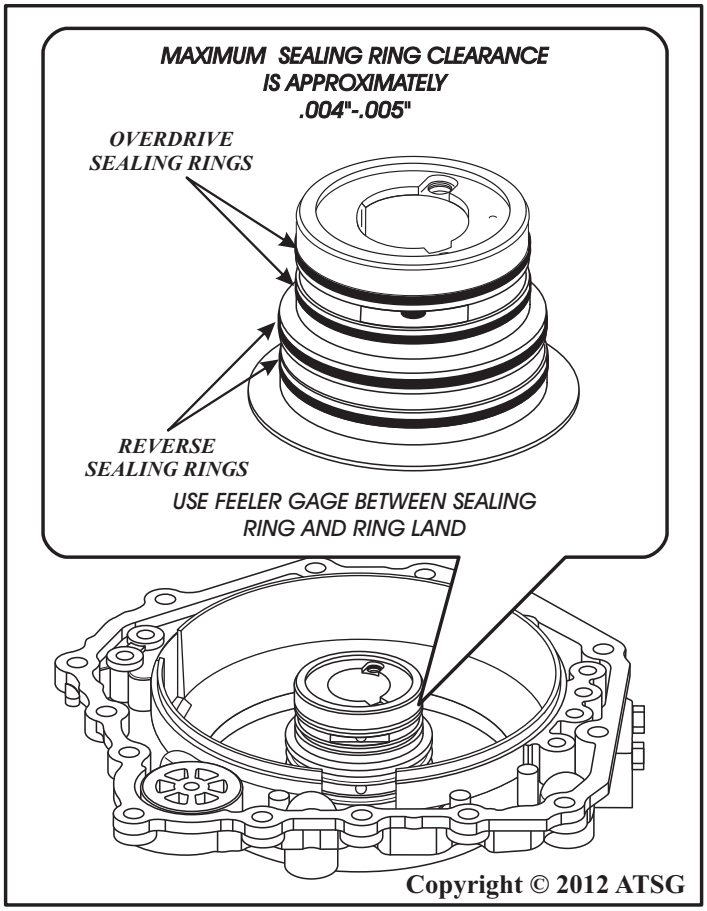


Figure 107

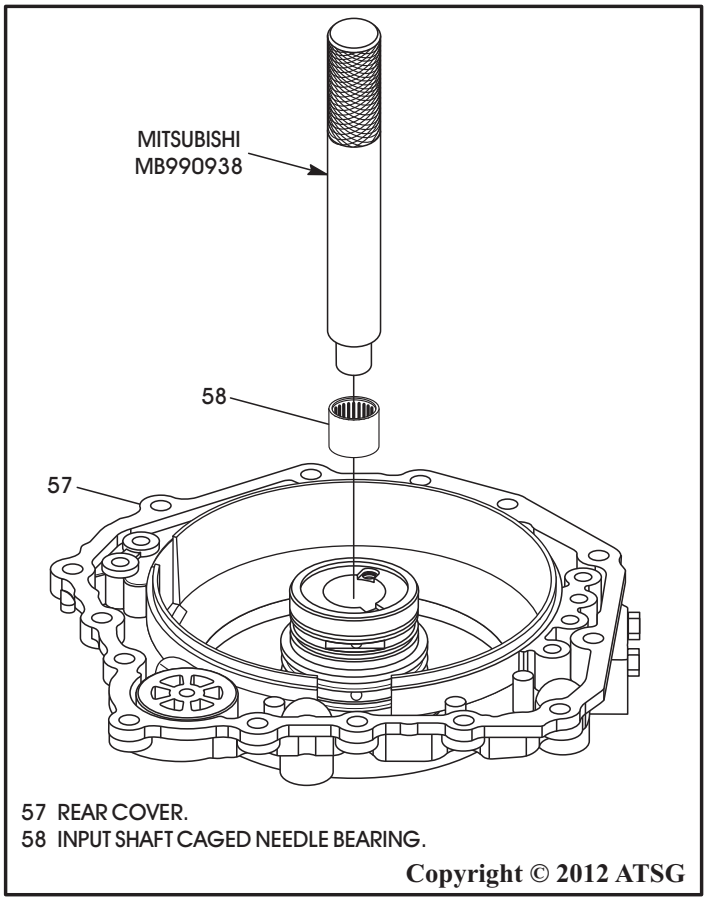


Figure 108

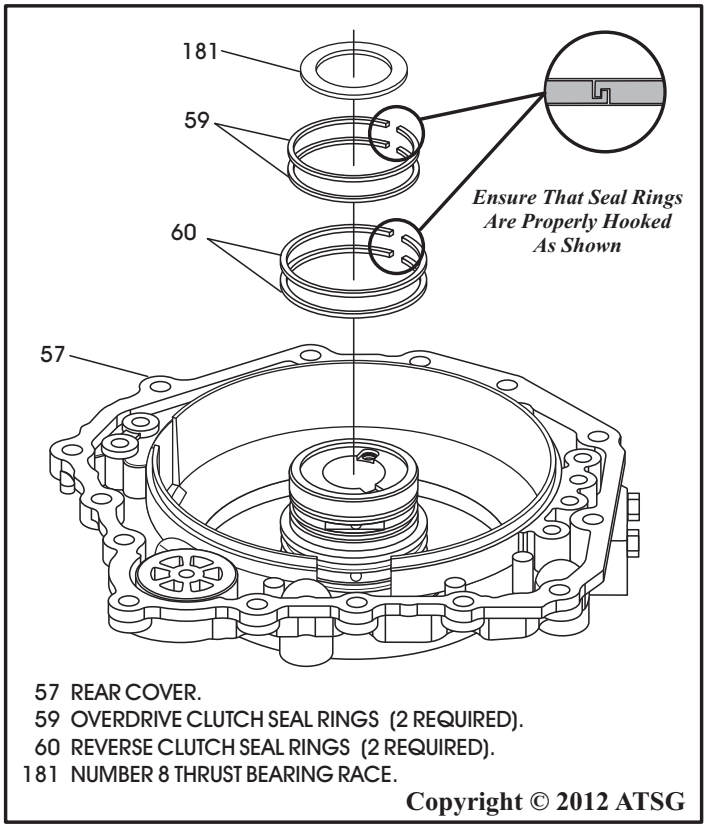


Figure 109

COMPLETED REAR COVER ASSEMBLY

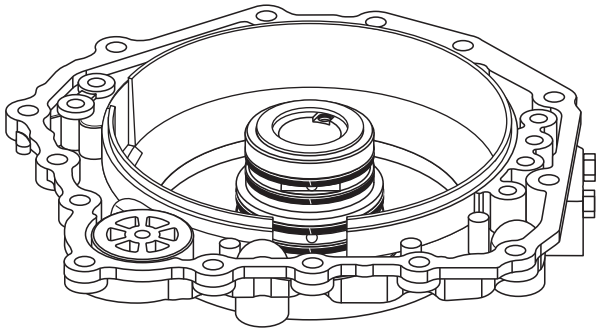


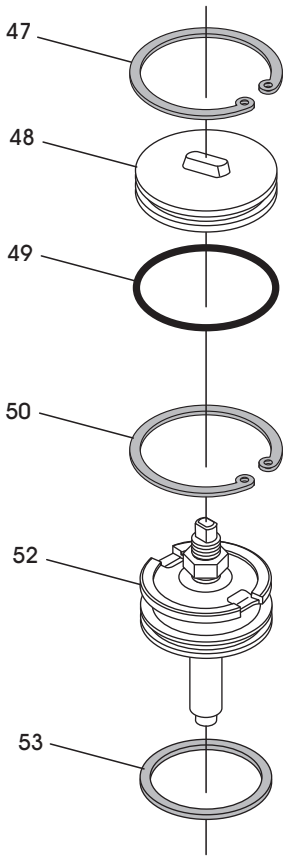
Figure 110

COMPONENT REBUILD SECTION

Reduction Servo Assembly

1. Install new "O" ring seal into the groove on the reduction servo cover, as shown in Figure 111, and lube with a small amount of Trans-Jel®.
2. Install new scarf-cut sealing ring into the groove on the reduction servo piston, as shown in Figure 111.
3. Set the completed reduction servo piston and cover aside for the final assembly process, as shown in Figure 112.

Component Rebuild
Continued on Page 70



47 REDUCTION BAND SERVO COVER SNAP RING.
48 REDUCTION BAND SERVO COVER.
49 REDUCTION BAND SERVO COVER "O" RING SEAL.
50 REDUCTION BAND SERVO PISTON SNAP RING.
52 REDUCTION BAND SERVO PISTON ASSEMBLY.
53 REDUCTION BAND SERVO PISTON SEAL RING.

Figure 111

COMPLETED REDUCTION SERVO COVER AND PISTON ASSEMBLY

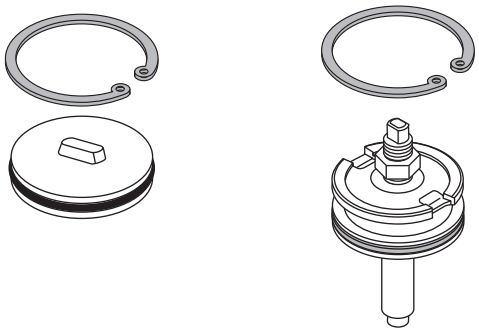
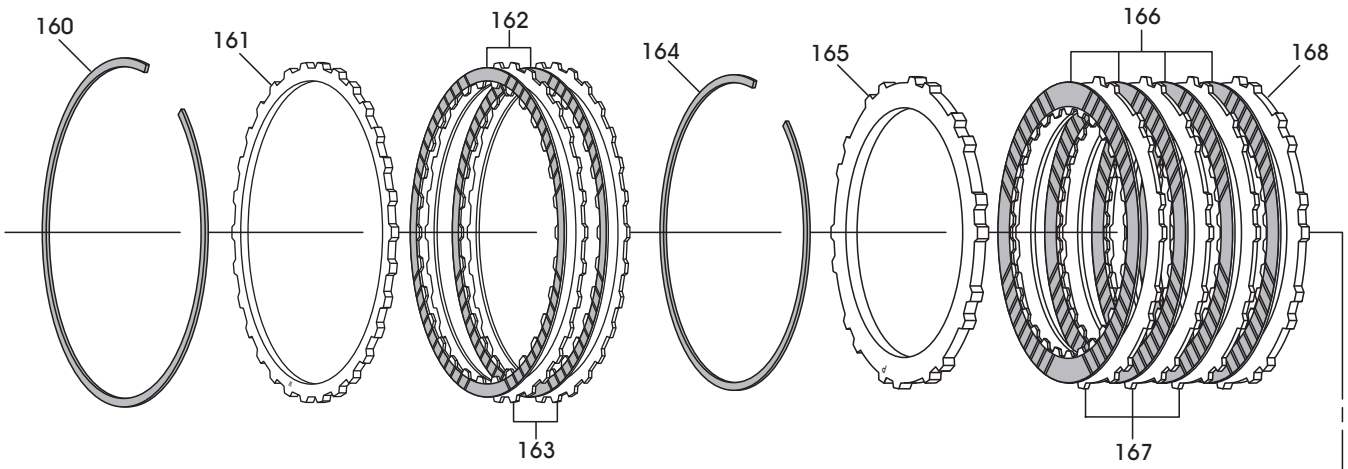
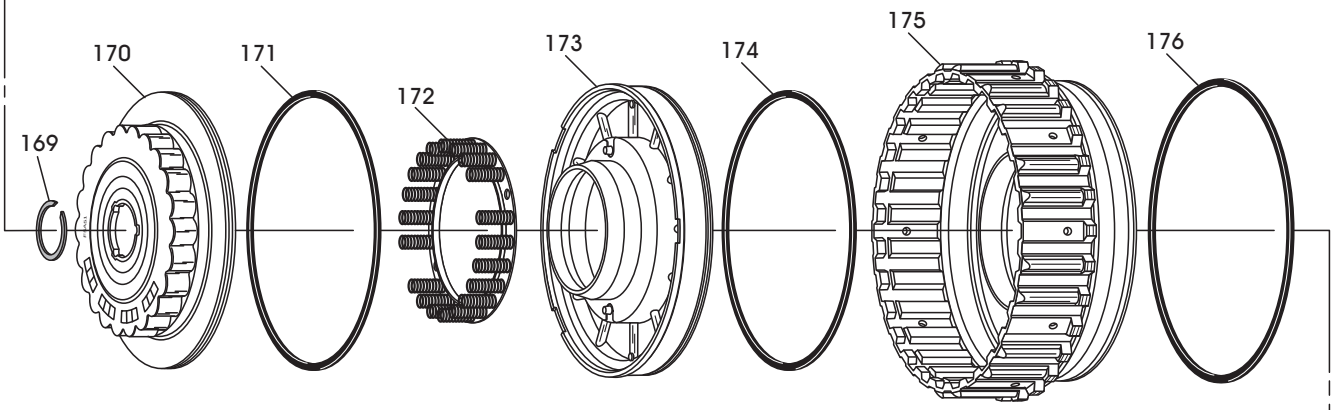
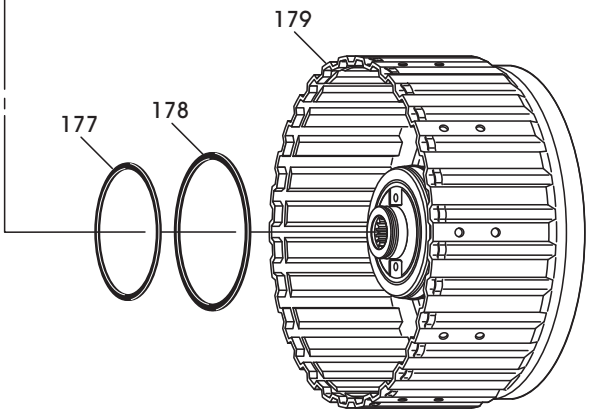


Figure 112

REVERSE/OVERDRIVE CLUTCH HOUSING EXPLODED VIEW, "MITSUBISHI" MODELS ONLY







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

Figure 113

COMPONENT REBUILD SECTION

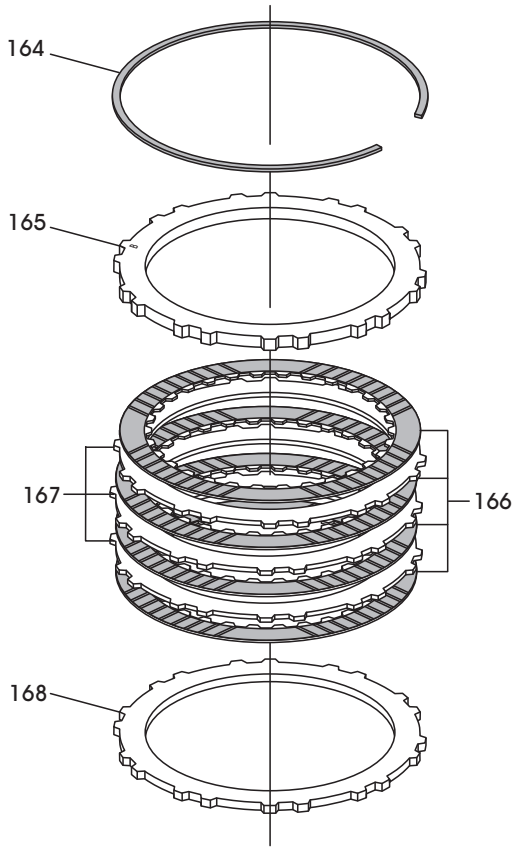
Reverse/Overdrive Clutch Housing

1. Disassemble reverse/overdrive clutch housing using Figure 113 as a guide.
   Note: It is "Mandatory" that you check the clutch pack as it is removed. The amount and thickness of plates will vary, as well as the diameter. The bottom apply plate is not used in all models.
   Note: Beginning in 2006 for Kia and 2007 for Hyundai, the overdrive clutch pack changed to a "partial"single-sided friction stack-up. Refer to Figure 114 and 115 for the different versions of the overdrive clutch pack.
2. Clean all reverse/overdrive parts thoroughly with a good cleaning solution and dry with compressed air.
3. Inspect all reverse/overdrive parts thoroughly for any wear and/or damage.

Continued on Page 72

OVERDRIVE CLUTCH PACK WITH DOUBLE-SIDED FRICTION PLATES

All Mitsubishi
Pre-2007 Hyundai
Pre-2006 Kia

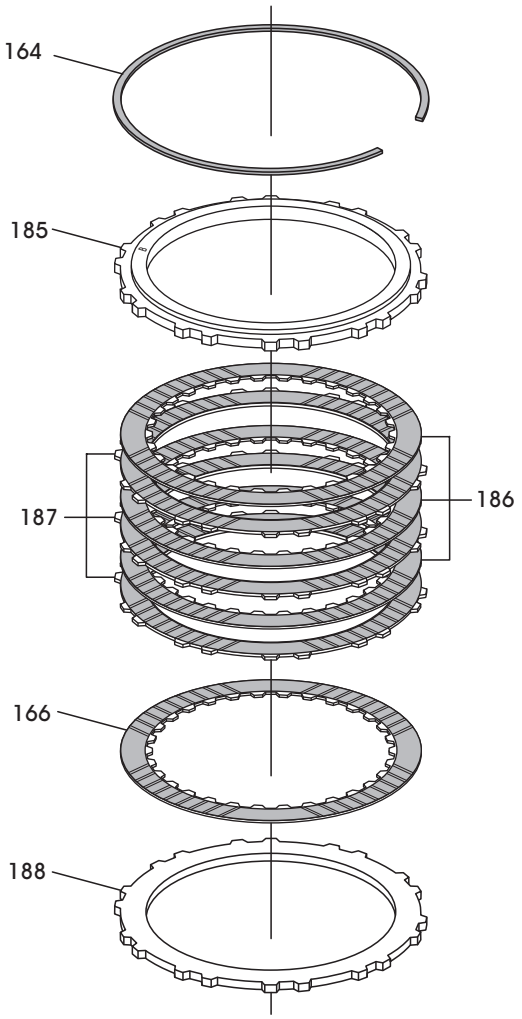


164 OVERDRIVE CLUTCH BACKING PLATE SNAP RING *(SELECTIVE).*
165 OVERDRIVE CLUTCH BACKING PLATE (.158" THICK).
166 OVERDRIVE CLUTCH FRICTION PLATES (.072" THICK).
167 OVERDRIVE CLUTCH STEEL PLATES (.119" THICK).
168 OVERDRIVE CLUTCH APPLY PLATE (.158" THICK).

Figure 114

OVERDRIVE CLUTCH PACK WITH SINGLE-SIDED FRICTION PLATES

2007-Up Hyundai
2006-Up Kia



164 OVERDRIVE CLUTCH BACKING PLATE SNAP RING *(SELECTIVE).*
166 OD *DOUBLE-SIDED* FRICTION PLATE (.072" THICK) (1 REQ.).
185 OD CLUTCH "STEPPED" BACKING PLATE (.159"/.238" THICK).
186 OD CLUTCH *SINGLE-SIDED*, INT SPLINE PLATES (.099" THICK).
187 OD CLUTCH *SINGLE-SIDED*, EXT SPLINE PLATES (.099" THICK).
188 OD CLUTCH APPLY PLATE (.158" THICK).

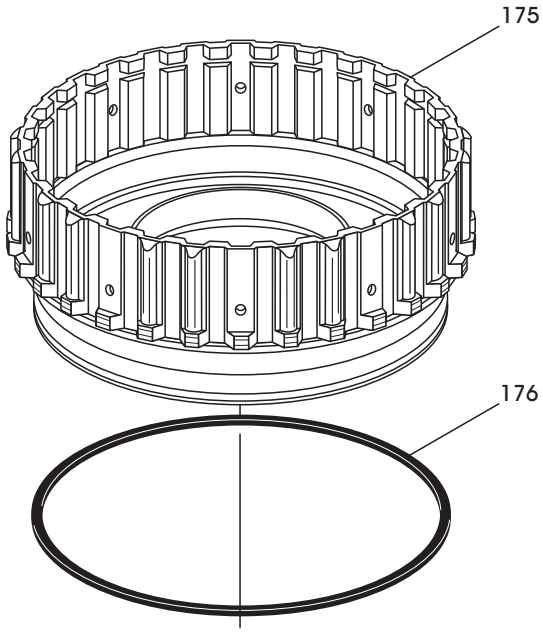
Figure 115

COMPONENT REBUILD SECTION

Reverse/Overdrive clutch Housing (Cont'd)

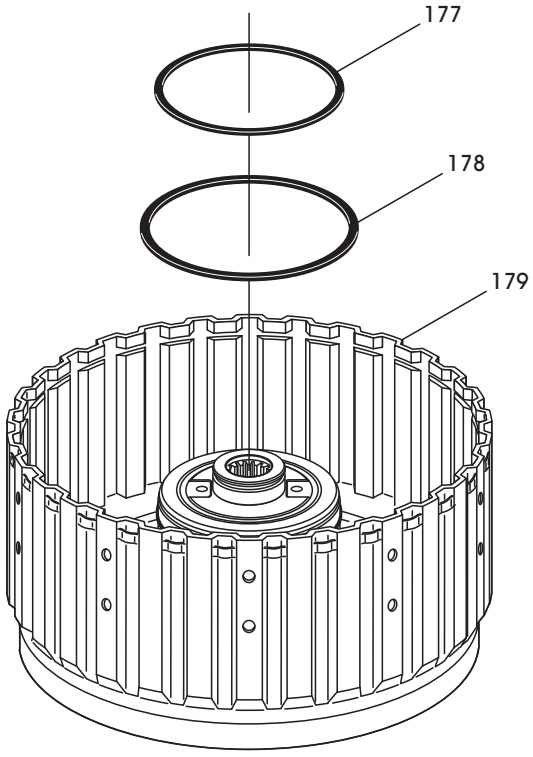
4. Install new inner piston "D" ring seal into lower groove in reverse/overdrive clutch retainer, as shown in Figure 116, and lube with small amount of Trans-Jel®.
5. Install new inner piston "D" ring seal into upper groove in reverse/overdrive clutch retainer, as shown in Figure 116, and lube with small amount of Trans-Jel®.
6. Install new outer "D" ring seal onto the reverse clutch apply piston, as shown in Figure 117, and lube with a small amount of Trans-Jel®.
7. Install new outer "D" ring seal onto overdrive clutch apply piston, as shown in Figure 118, and lube with a small amount of Trans-Jel®.

Continued on Page 73



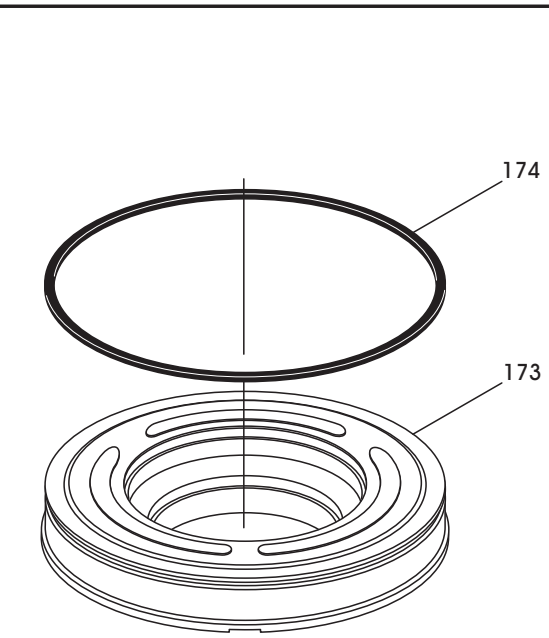
175 REVERSE CLUTCH APPLY PISTON/OVERDRIVE CLUTCH RETAINER.
176 REVERSE CLUTCH APPLY PISTON OUTER "D" RING SEAL.

Figure 117



177 OVERDRIVE CLUTCH PISTON INNER "D" RING SEAL.
178 REVERSE CLUTCH APPLY PISTON INNER "D" RING SEAL.
179 REVERSE/OVERDRIVE CLUTCH RETAINER ASSEMBLY.

Figure 116



173 OVERDRIVE CLUTCH APPLY PISTON.
174 OVERDRIVE CLUTCH APPLY PISTON OUTER "D" RING SEAL.

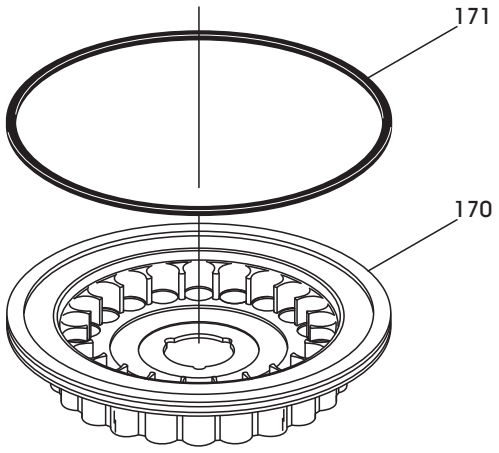
Figure 118

COMPONENT REBUILD SECTION

Reverse/Overdrive clutch Housing (Cont'd)

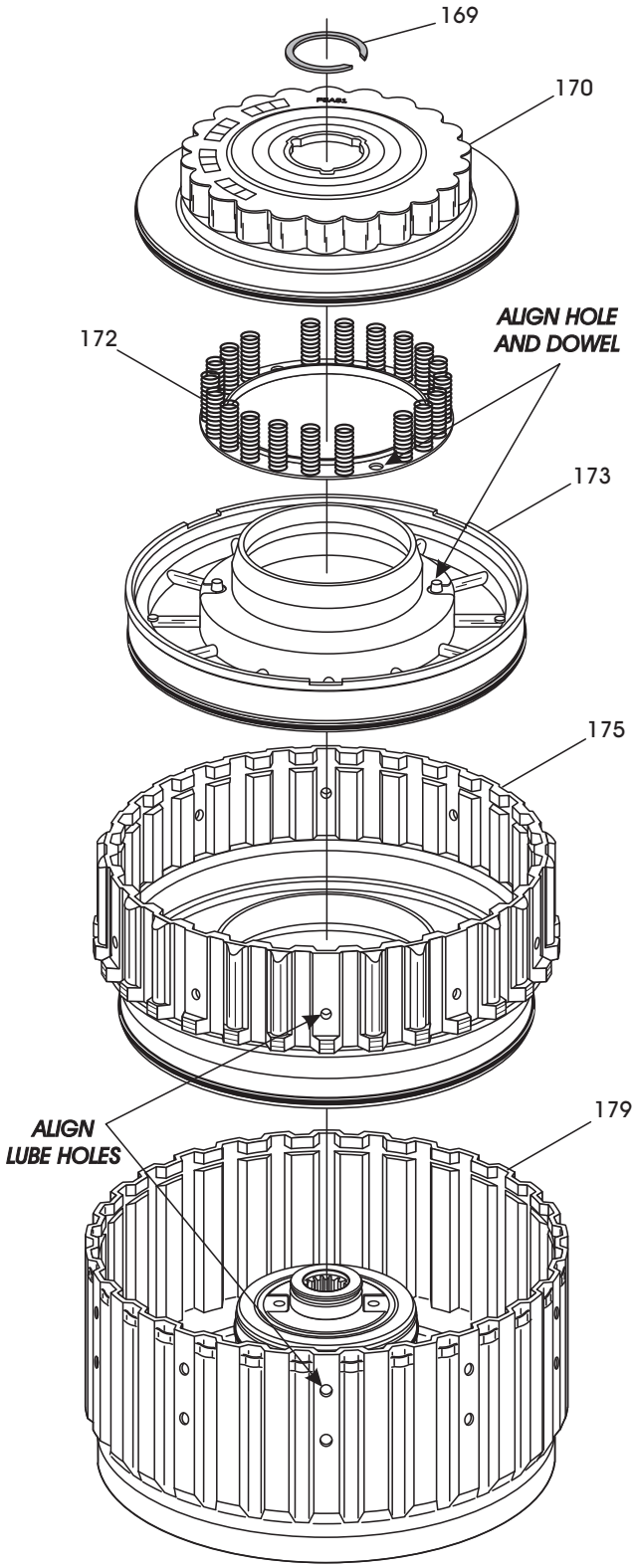
8. Install new "D" ring seal onto overdrive clutch balance piston, as shown in Figure 119, and lube with a small amount of Trans-Jel®.
9. Install the completed reverse apply piston into the retainer, aligning the lube holes, as shown in Figure 120, and ensure that it is fully seated.
10. Install the completed overdrive apply piston into the reverse apply piston, as shown in Figure 120, and ensure that it is fully seated.
11. Install the overdrive clutch piston return spring as shown in Figure 120.
    Note: Ensure alignment holes are seated over the dowels on piston (See Figure 120).
12. Install the overdrive clutch balance piston over return spring assembly, as shown in Figure 120, and lay snap ring on top of piston.
13. Compress the return spring assembly with a spring compressor, install the snap ring into groove with snap ring pliers, and remove the spring compressor.

Continued on Page 74



170 OVERDRIVE CLUTCH BALANCE PISTON.
171 OVERDRIVE CLUTCH BALANCE PISTON "D" RING SEAL.

Figure 119

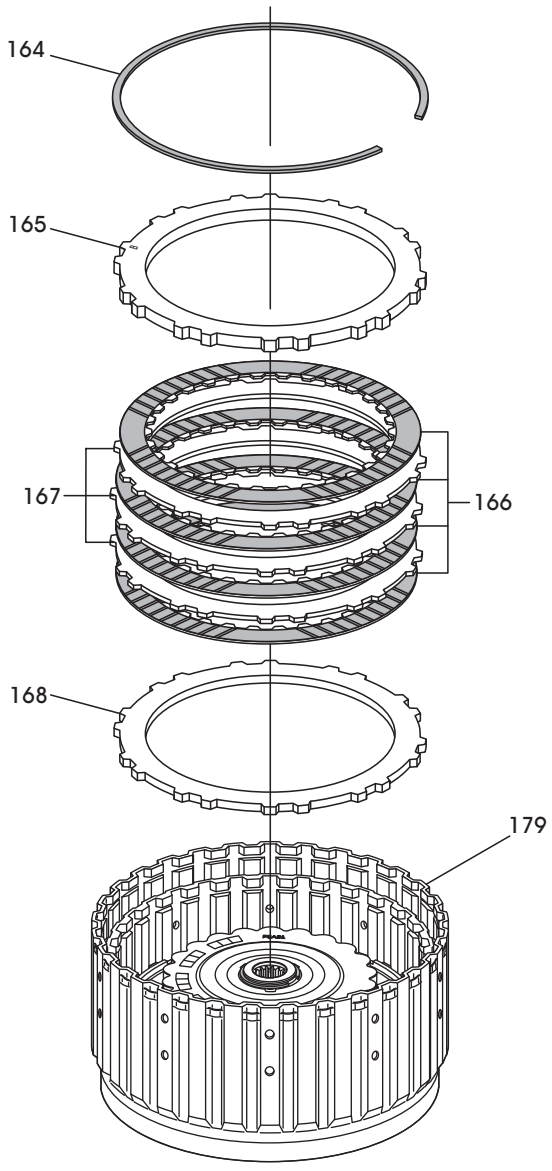


169 OVERDRIVE BALANCE PISTON RETAINING SNAP RING.
170 OVERDRIVE CLUTCH BALANCE PISTON AND SEAL ASSEMBLY.
172 OVERDRIVE CLUTCH APPLY PISTON RETURN SPRING.
173 OVERDRIVE CLUTCH APPLY PISTON AND SEAL ASSEMBLY.
175 REVERSE CLUTCH APPLY PISTON AND SEAL ASSEMBLY.
179 REVERSE/OVERDRIVE CLUTCH RETAINER ASSEMBLY.

Figure 120

OVERDRIVE CLUTCH PACK WITH DOUBLE-SIDED FRICTION PLATES

All Mitsubishi
Pre-2007 Hyundai
Pre-2006 Kia



164 OD CLUTCH BACKING PLATE SNAP RING *(SELECTIVE)*.
165 OD CLUTCH BACKING PLATE (.158" THICK).
166 OD CLUTCH FRICTION PLATES (.072" THK) (QTY VARIES).
167 OD CLUTCH STEEL PLATES (.119" THICK) (QTY VARIES).
168 OD CLUTCH APPLY PLATE (.158" THICK).
179 REVERSE/OVERDRIVE CLUTCH RETAINER ASSEMBLY.

Figure 121

COMPONENT REBUILD SECTION

Reverse/Overdrive clutch Housing (Cont'd)
"Double-Sided" Overdrive Clutch

14. Install the overdrive apply plate inside reverse apply piston, as shown in Figure 121.
Note: Install apply plate with the rounded edge facing up and the area with no teeth must be aligned with the lube holes in the retainer, as shown in Figure 122.
15. Alternate with double-sided frictions and steel plates, as shown in Figure 121, until you have installed 4 frictions and 3 steel plates.
Note: Align steel plates so the area with no teeth are aligned with the lube holes in the retainer, as shown in Figure 122. Friction plates should be soaked in proper ATF for 1 hour before assembly.
16. Install the overdrive clutch backing plate, as shown in Figure 121.
Note: Install backing plate with the rounded edge facing the friction and the area with no teeth must be aligned with the lube holes in the retainer, as shown in Figure 122.
17. Install the ***selective*** overdrive clutch backing plate snap ring, as shown in Figure 121.

Continued on Page 75

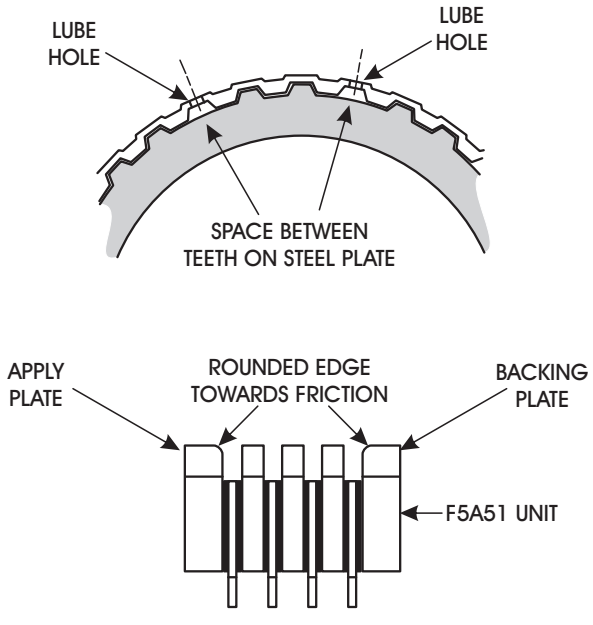


Figure 122

COMPONENT REBUILD SECTION

Reverse/Overdrive clutch Housing (Cont'd)
Partial "Single-Sided" Overdrive Clutch

18. Install the overdrive apply plate inside reverse apply piston, as shown in Figure 124.
    Note: Install apply plate with the rounded edge facing up and the area with no teeth must be aligned with the lube holes in the retainer, as shown in Figure 123.
19. Next, install a normal "double-sided" friction plate, as shown in Figure 124.
    Note: All friction plates should be soaked in proper ATF for 1 hour before assembly.
20. Next, install the "single-sided" plates beginning with an external spline plate with lining facing up and alternate with internal spline plates until you have installed three of each, as shown in Figure 124.
    Note: The area on the external-spline plates with no teeth must be aligned with lube holes in the retainer, as shown in Figure 123.
21. Install the overdrive clutch backing plate, as shown in Figure 124, with the step facing up.
    Note: The area on backing plate with no teeth must be aligned with the lube holes in retainer, as shown in Figure 123.
22. Install the ***selective*** overdrive clutch backing plate snap ring, as shown in Figure 124.

Continued on Page 76

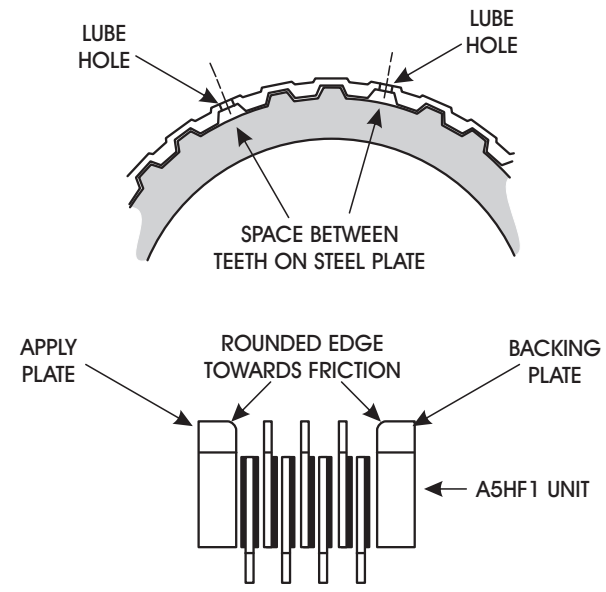
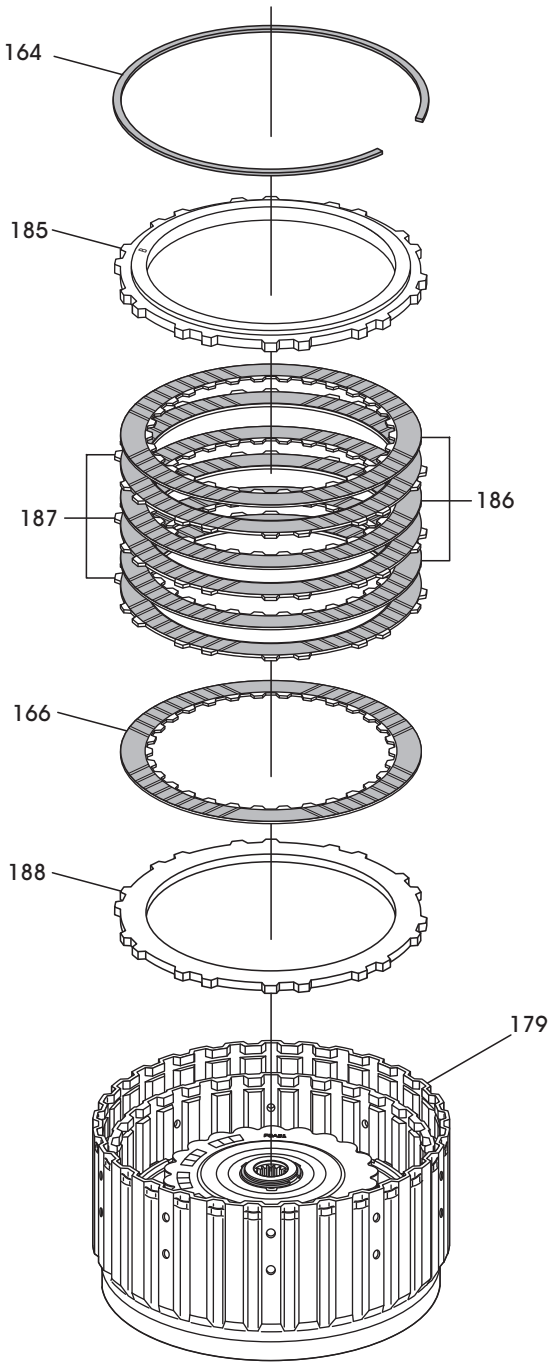


Figure 123

OVERDRIVE CLUTCH PACK WITH SINGLE-SIDED FRICTION PLATES

2007-Up Hyundai
2006-Up Kia



164 OVERDRIVE CLUTCH BACKING PLATE SNAP RING *(SELECTIVE)*.
166 OD CLUTCH *DOUBLE-SIDED* FRICTION (.072" THICK) (1 REQ.).
179 REVERSE/OVERDRIVE CLUTCH RETAINER ASSEMBLY.
185 OD CLUTCH "STEPPED" BACKING PLATE (.159"/.238" THICK).
186 OD CLUTCH *SINGLE-SIDED*, INT SPLINE PLATE (.099" THICK) (3).
187 OD CLUTCH *SINGLE-SIDED*, EXT SPLINE PLATE (.099" THICK) (3).
188 OD CLUTCH APPLY PLATE (.158" THICK).

Figure 124

COMPONENT REBUILD SECTION

Reverse/Overdrive clutch Housing (Cont'd)

23. Install the clutch compressing tools as shown in Figure125 and 127.
Note: The overdrive lined plates are "Waved" and must be compressed as shown to achieve the proper clutch clearance reading.
24. Compress the plates and measure with feeler gage between snap ring and backing plate, as shown in Figure 127.
25. With the plates compressed clutch clearance should be 1.5-1.7 mm (.059"-.066").
26. Change the selective snap ring as necessary, using the chart in Figure 126, to obtain proper overdrive clutch clearance.

Continued on Page 77

UNDERDRIVE AND OVERDRIVE SELECTIVE SNAP RING CHART

F5A51 SERIES

Thickness	I.D. Color	Part Number
1.6 mm (.063")	Brown	MD759960
1.7 mm (.067")	None	MD759961
1.8 mm (.071")	Blue	MD759962
1.9 mm (.075")	Brown	MD759963
2.0 mm (.079")	None	MD750841
2.1 mm (.083")	Blue	MD750842
2.2 mm (.087")	Brown	MD750843
2.3 mm (.091")	None	MD750844
2.4 mm (.094")	Blue	MD750845
2.5 mm (.098")	Brown	MD750846
2.6 mm (.102")	None	MD750847
2.7 mm (.106")	Blue	MD750848
2.8 mm (.110")	Brown	MD750849
2.9 mm (.114")	None	MD750850
3.0 mm (.118")	Blue	MD750851

Figure 126

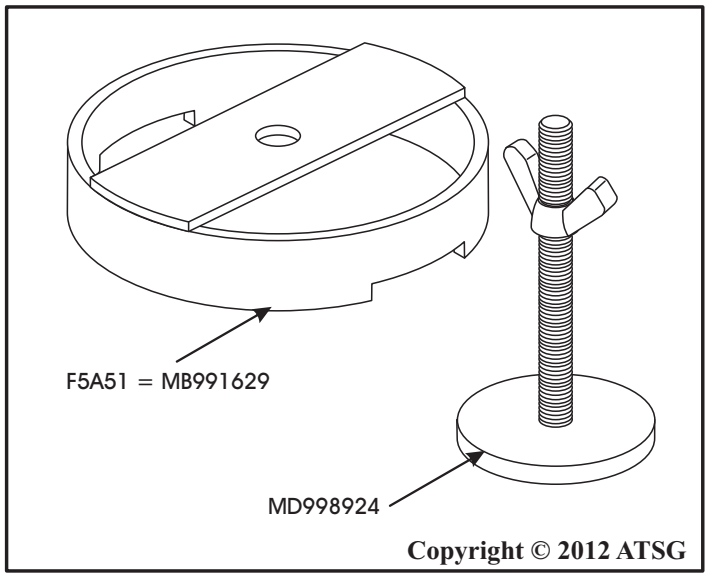


Figure 125

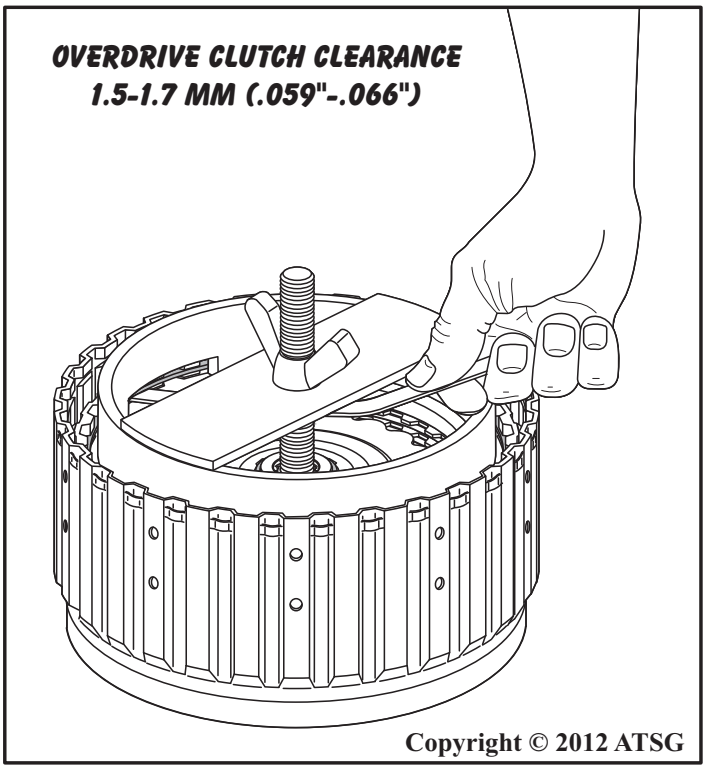


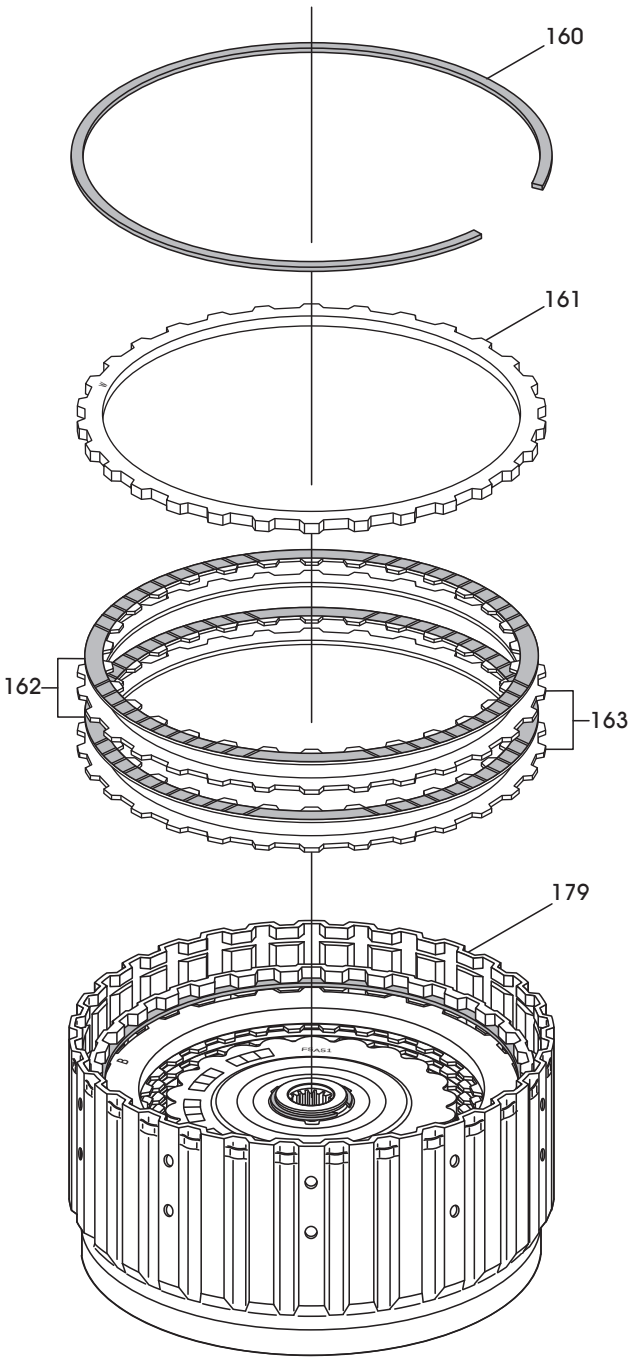
Figure 127

COMPONENT REBUILD SECTION

Reverse/Overdrive clutch Housing (Cont'd)

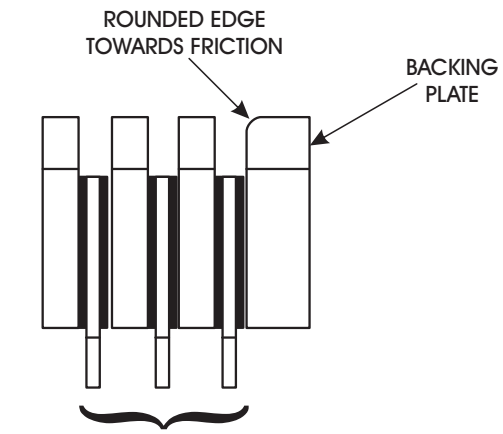
27. Install the reverse clutch plates beginning with a steel plate and alternating with friction plates until you have installed two of each, as shown in Figure 128.
    Note: Quantity of friction & steels will vary by model. Friction plates should be soaked in ATF for 1 hour, prior to installation.
28. Install the reverse clutch backing plate with the rounded edge towards friction plate, as shown in Figure 128 and 129.
29. Install the reverse clutch backing plate snap ring, as shown in Figure 128.

Continued on Page 78



160 REVERSE CLUTCH BACKING PLATE SNAP RING *(SELECTIVE)*.
161 REVERSE CLUTCH BACKING PLATE (.160" THICK).
162 REVERSE CLUTCH FRICTION PLATES (.070" THK) (QTY VARIES).
163 REVERSE CLUTCH STEEL PLATES (.070" THICK) (QTY VARIES).
179 REVERSE/OVERDRIVE CLUTCH RETAINER ASSEMBLY.

Figure 128



Most Use 2 Frictions & 2 Steels
(Some Use 3 of Each)

Figure 129

COMPONENT REBUILD SECTION

Reverse/Overdrive clutch Housing (Cont'd)

30. Install the clutch compressing tools that are shown in Figure 132.
    Note: The reverse lined plates are "Waved" and must be compressed as shown to check for the proper clutch clearance reading.
31. Compress the plates and measure with feeler gage between snap ring and backing plate, as shown in Figure 130.
    Note: Proper compression can at times be achieved by hand, as shown in Figure 130, as most have only 2 friction plates.
32. With the plates compressed clutch clearance should be 1.6-1.8 mm (.063"-.070").
33. Change the selective snap ring as necessary using the chart in Figure 131, to obtain proper reverse clutch clearance.

Continued on Page 79

REVERSE CLUTCH SELECTIVE SNAP RING CHART

F5A51 SERIES

Thickness	I.D. Color	Part Number
1.6 mm (.063")	None	MD761088
1.7 mm (.067")	Blue	MD761089
1.8 mm (.071")	Brown	MD761090
1.9 mm (.075")	None	MD758947
2.0 mm (.079")	Blue	MD756690
2.1 mm (.083")	Brown	MD756691
2.2 mm (.087")	None	MD756692
2.3 mm (.091")	Blue	MD756693
2.4 mm (.094")	Brown	MD756694
2.5 mm (.098")	None	MD756695
2.6 mm (.102")	Blue	MD756696
2.7 mm (.106")	Brown	MD756697
2.8 mm (.110")	None	MD756698

Figure 131

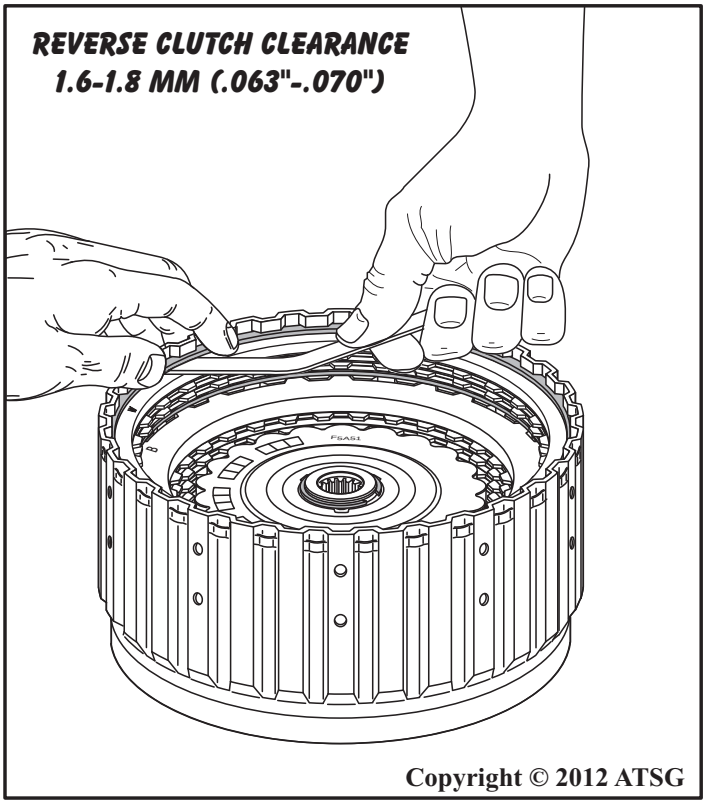


Figure 130

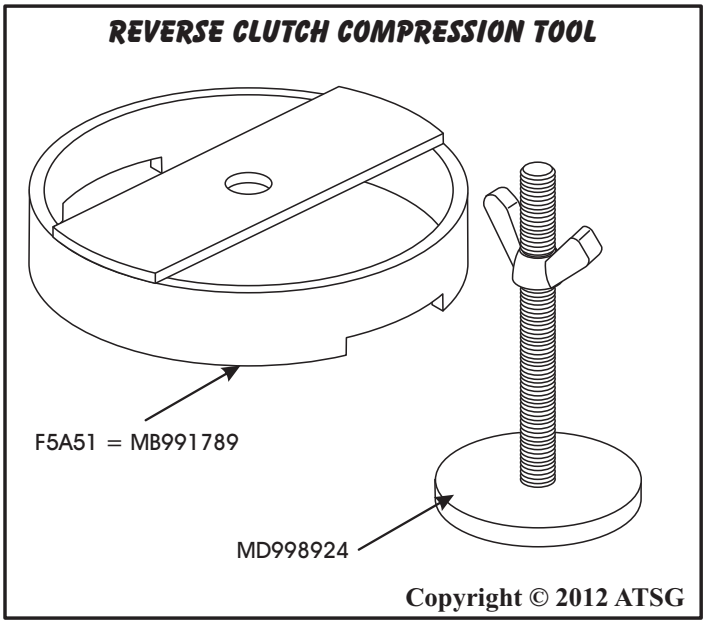


Figure 132

COMPONENT REBUILD SECTION

Reverse/Overdrive clutch Housing (Cont'd)

34. Turn the reverse/overdrive clutch housing over as shown in Figure 133.
35. Install the number 7 thrust bearing in direction shown in Figure 133, and retain with a small amount of Trans-Jel®.
36. Set the completed overdrive/reverse clutch housing aside for the final assembly process.

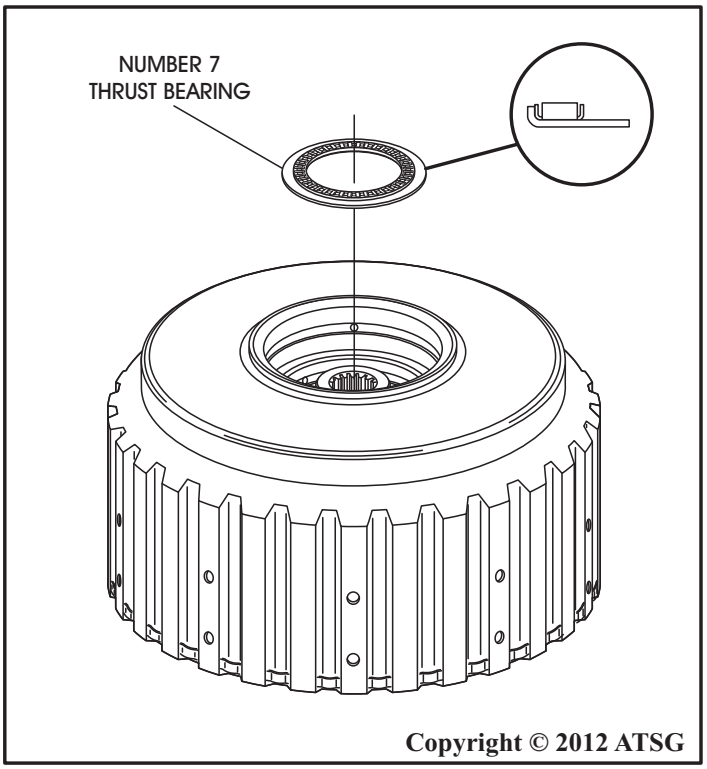


Figure 133

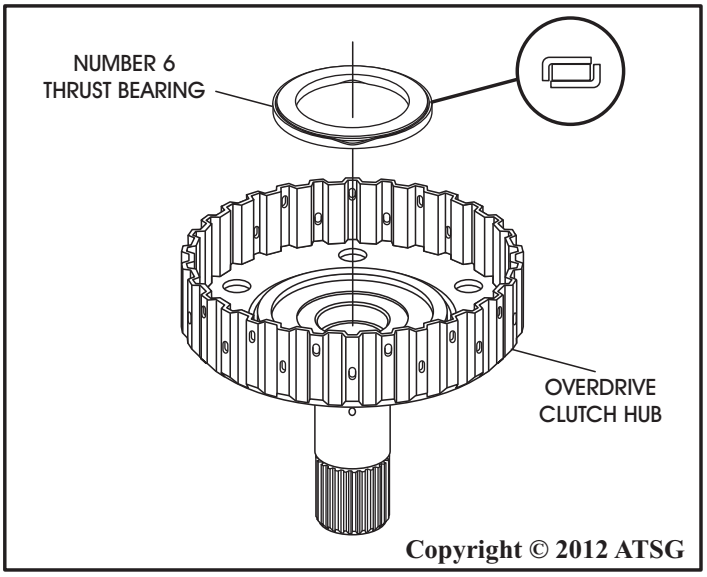


Figure 134

Overdrive Clutch Hub

1. Clean the overdrive clutch hub thoroughly in cleaning solution and dry with compressed air.
2. Inspect the overdrive clutch hub thoroughly for any wear and/or damage.
3. Install the number 6 thrust bearing in direction shown in Figure 134, and retain with a small amount of Trans-Jel®.
4. Set the completed overdrive clutch hub aside for final assembly process (See Figure 135).

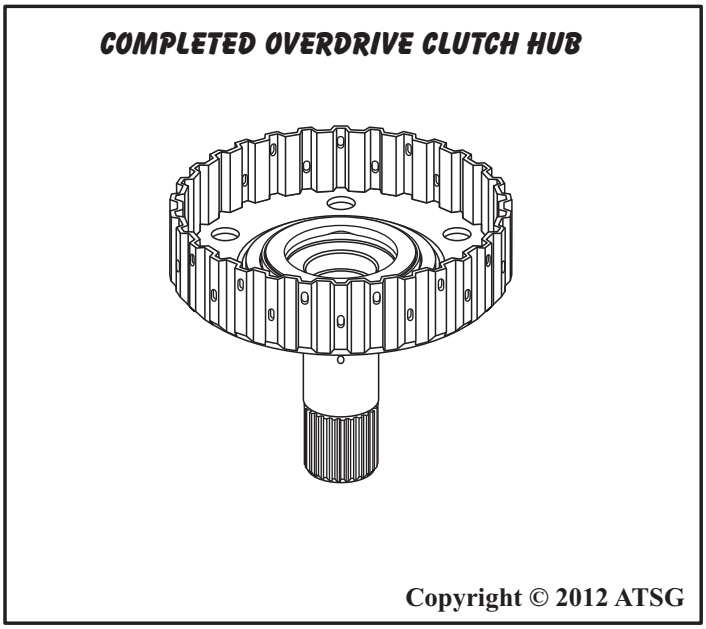


Figure 135

Component Rebuild
Continued on Page 80

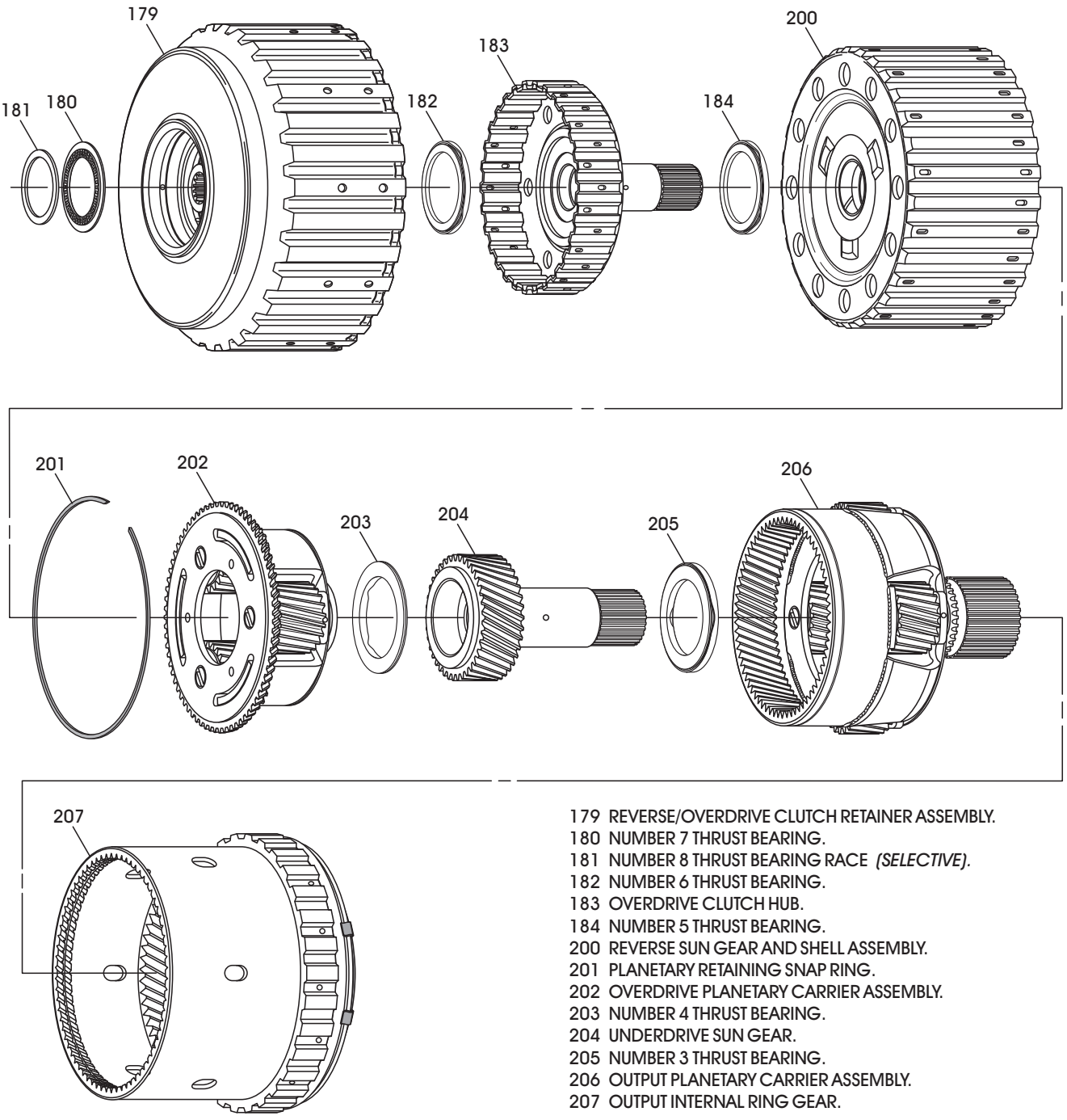
COMPONENT REBUILD SECTION

Planetary Gear Train Assembly

1. Disassemble the planetary gear train by first removing the snap ring, and using Figure 136 and 137 as a guide.
2. Clean all of the planetary gear train parts using a suitable cleaning solution and dry with compressed air.
3. Inspect all planetary gear train parts for any wear and/or damage, replace as necessary. ***Note: Mitsubishi, Hyundai, and Kia all have different planetary gear ratios and will not interchange. Inspect any replacement parts very carefully.***

Continued on Page 81

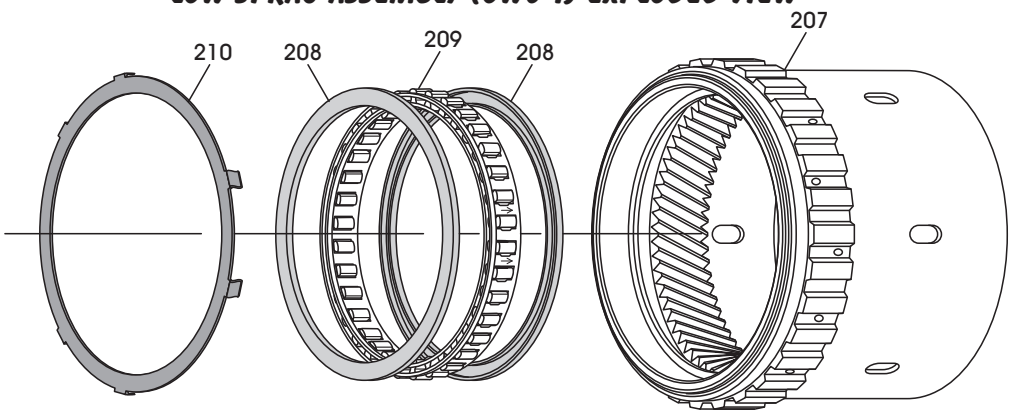
GEAR TRAIN EXPLODED VIEW



179 REVERSE/OVERDRIVE CLUTCH RETAINER ASSEMBLY.
180 NUMBER 7 THRUST BEARING.
181 NUMBER 8 THRUST BEARING RACE *(SELECTIVE).*
182 NUMBER 6 THRUST BEARING.
183 OVERDRIVE CLUTCH HUB.
184 NUMBER 5 THRUST BEARING.
200 REVERSE SUN GEAR AND SHELL ASSEMBLY.
201 PLANETARY RETAINING SNAP RING.
202 OVERDRIVE PLANETARY CARRIER ASSEMBLY.
203 NUMBER 4 THRUST BEARING.
204 UNDERDRIVE SUN GEAR.
205 NUMBER 3 THRUST BEARING.
206 OUTPUT PLANETARY CARRIER ASSEMBLY.
207 OUTPUT INTERNAL RING GEAR.

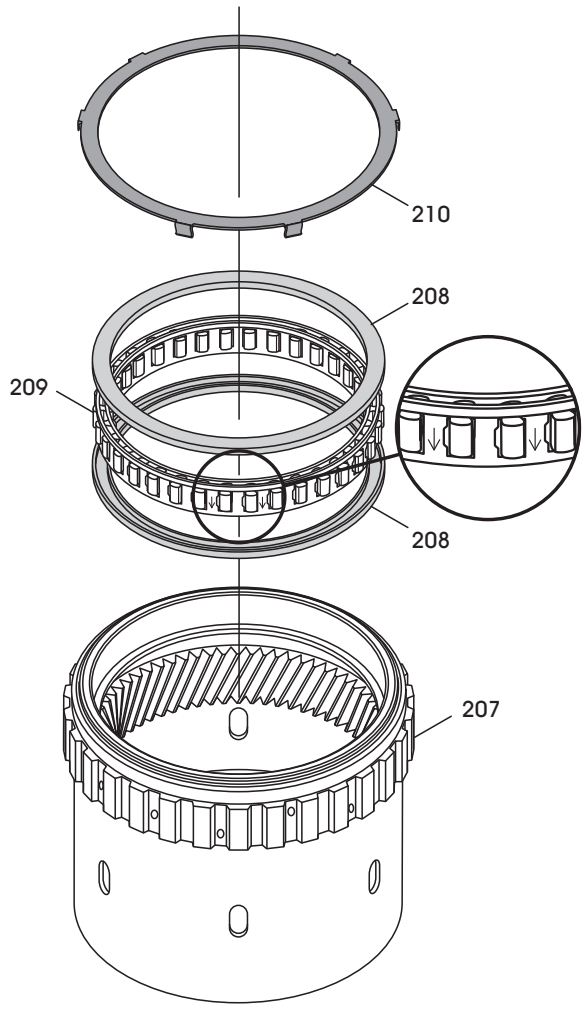
Figure 136

LOW SPRAG ASSEMBLY (OWC-1) EXPLODED VIEW



207 OUTPUT INTERNAL RING GEAR.
208 LOW SPRAG END BEARINGS (2 REQUIRED).
209 LOW SPRAG AND CAGE ASSEMBLY (OWC-1).
210 LOW SPRAG ASSEMBLY RETAINER PLATE.

Figure 137



207 OUTPUT INTERNAL RING GEAR.
208 LOW SPRAG END BEARINGS (2 REQUIRED).
209 LOW SPRAG AND CAGE ASSEMBLY (OWC-1).
210 LOW SPRAG ASSEMBLY RETAINER PLATE.

Figure 138

COMPONENT REBUILD SECTION

Planetary Gear Train Assembly (Cont'd)

4. Place output internal ring gear on a flat work surface, as shown in Figure 138.
5. Install one low sprag end bearing in direction shown in Figure 138, until fully seated.
6. Install the low sprag assembly (OWC-1) into the ring gear so that the arrows are pointing down, as shown in Figure 138.
7. Install the second low sprag end bearing in the direction shown in Figure 138, until fully seated.
8. Install the low sprag assembly retainer by snapping it over the lip on the ring gear, as shown in Figure 138.

Continued on Page 82

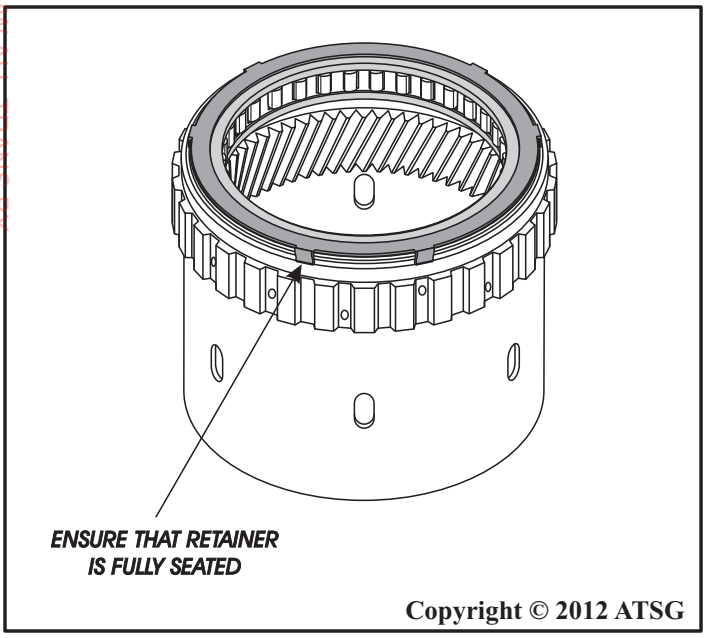


Figure 139

COMPONENT REBUILD SECTION

Planetary Gear Train Assembly (Cont'd)

9. Ensure that low sprag retainer is fully seated, as shown in Figure 139, and check it the full 360 degrees.
10. Turn the ring gear assembly over and set on blocks or similar device to raise it off of the work surface, as shown in Figure 140.
11. Install the output planetary carrier into output ring gear, as shown in Figure 140, and rotate to engage planetary gears.
12. Install the number 4 thrust bearing onto the overdrive carrier, as shown in Figure 141, with needles facing up and retain with Trans-Jel®.

Continued on Page 83

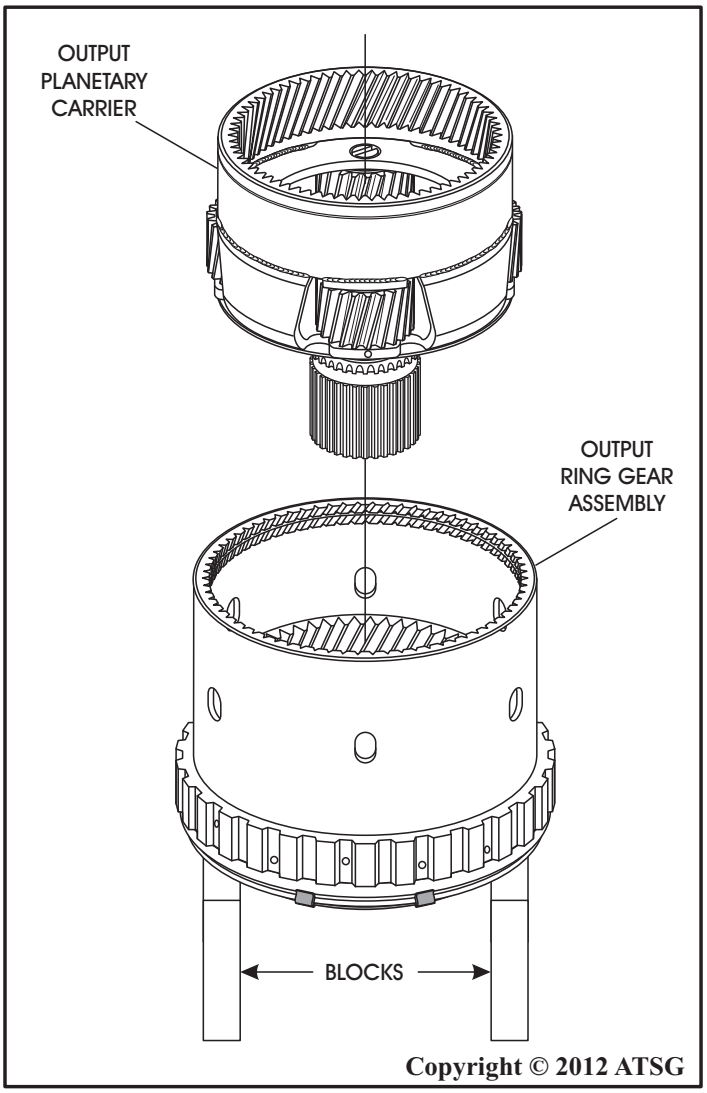


Figure 140

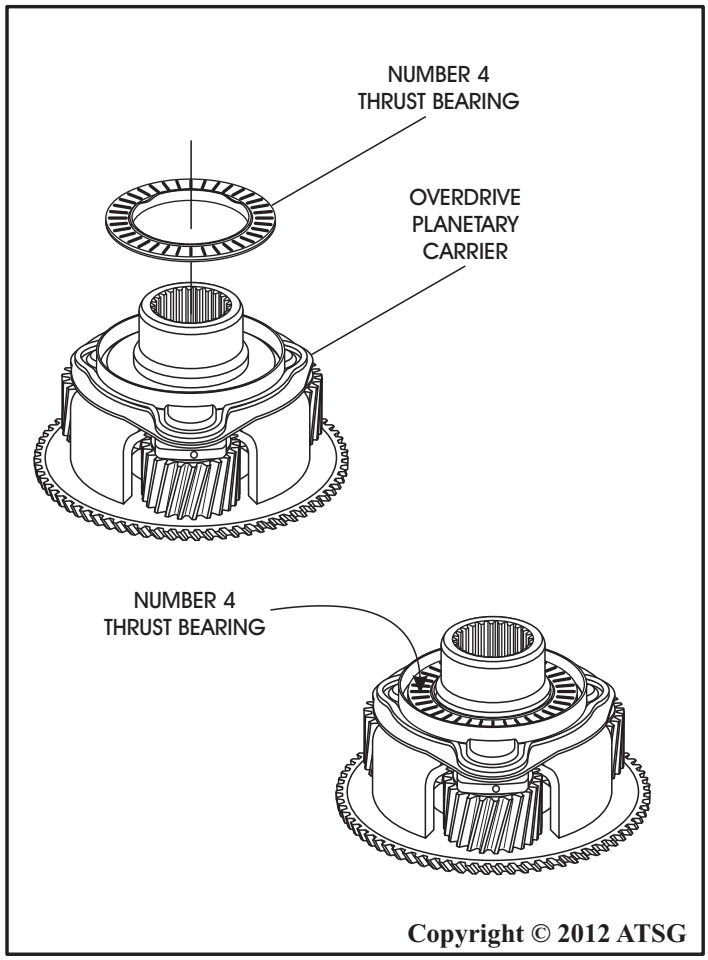
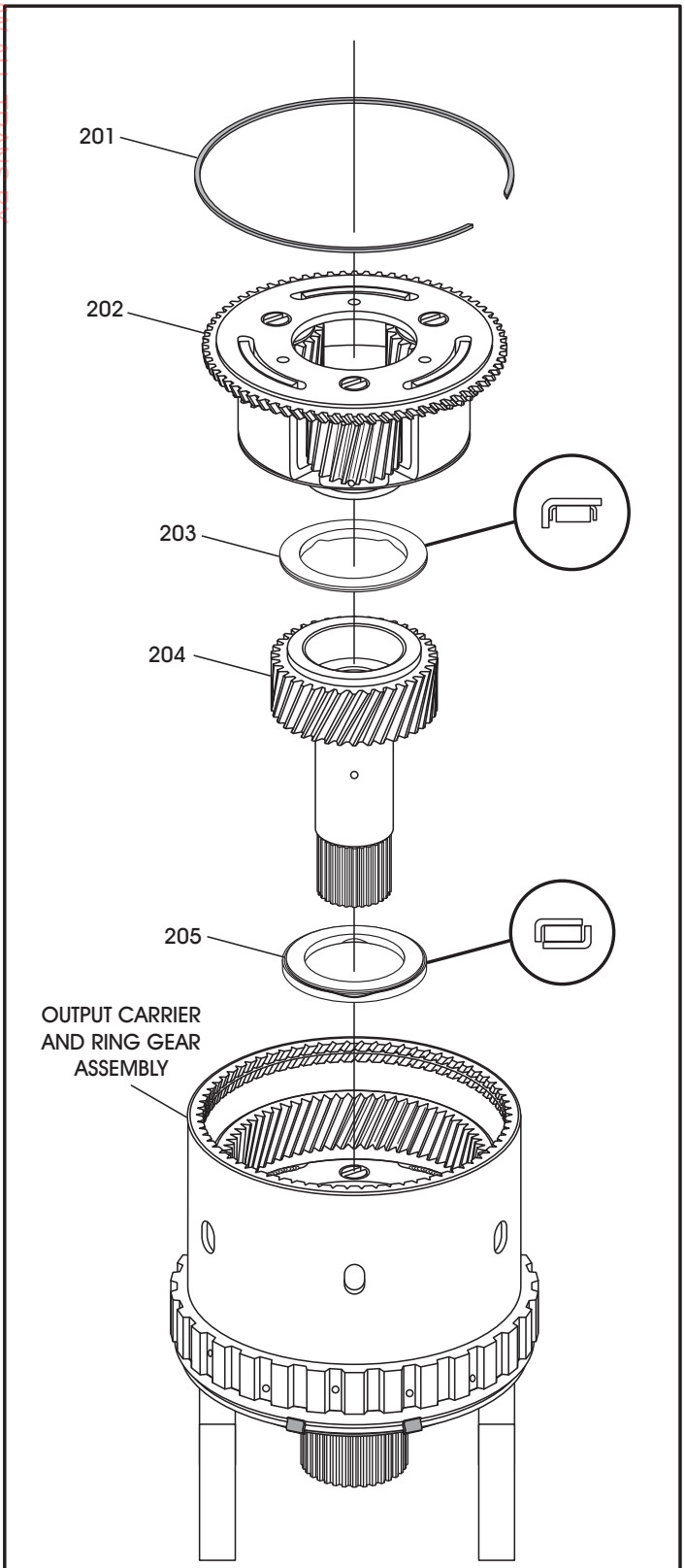


Figure 141



201 PLANETARY RETAINING SNAP RING.
202 OVERDRIVE PLANETARY CARRIER ASSEMBLY.
203 NUMBER 4 THRUST BEARING.
204 UNDERDRIVE SUN GEAR.
205 NUMBER 3 THRUST BEARING.

Figure 142

COMPONENT REBUILD SECTION

Planetary Gear Train Assembly (Cont'd)

13. Install the number 3 thrust bearing into the output planetary carrier in the direction shown in Figure 142.
14. Install the underdrive sun gear into the output planetary carrier in the direction shown in Figure 142, and rotate into position to engage into planetary gears.
15. Ensure the number 4 thrust bearing (203) is still in place in the overdrive carrier (202). Refer to Figure 142.
16. Install the overdrive carrier and the number 4 thrust bearing as an assembly, by rotating into position, as shown in Figure 142.
17. Install the overdrive carrier retaining snap ring, as shown in Figure 142, and ensure that it is fully seated.
18. Set completed planetary gear train assembly aside for the final assembly process, as shown in Figure 143.

Component Rebuild
Continued on Page 84

COMPLETED PLANETARY GEAR TRAIN ASSEMBLY

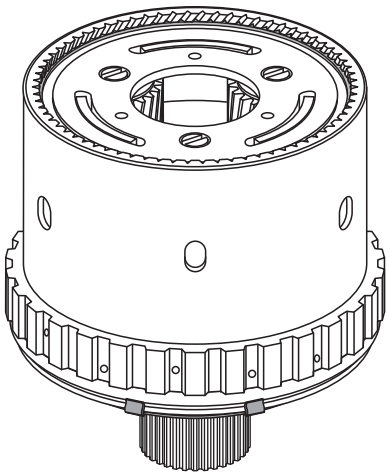
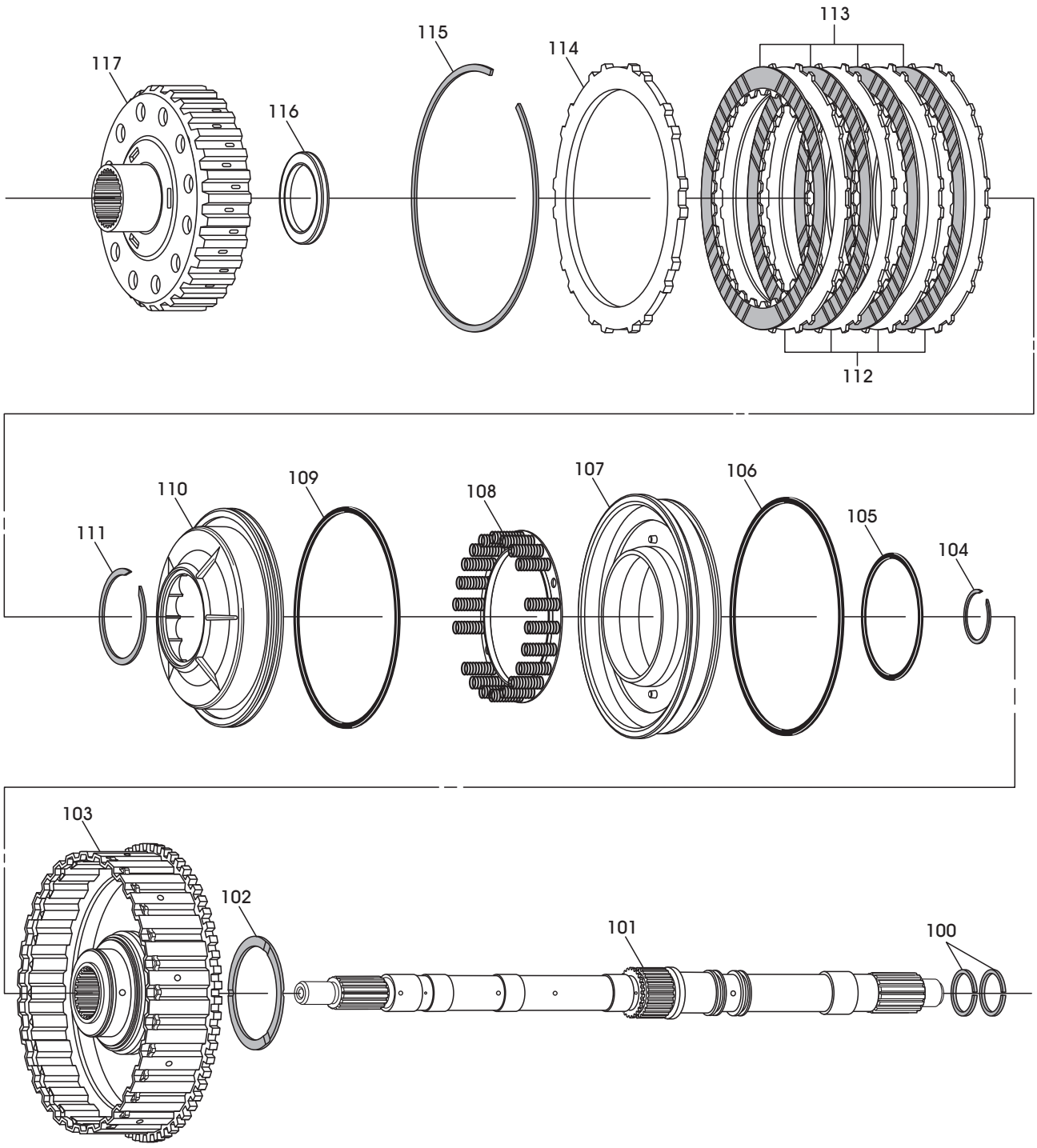


Figure 143

UNDERDRIVE CLUTCH HOUSING EXPLODED VIEW



100 TURBINE SHAFT SEALING RINGS.
101 TURBINE SHAFT.
102 NUMBER 1 *SELECTIVE* THRUST WASHER.
103 UNDERDRIVE CLUTCH HOUSING.
104 TURBINE SHAFT RETAINING SNAP RING.
105 UNDERDRIVE CLUTCH HOUSING INNER "D" RING SEAL.
106 UNDERDRIVE CLUTCH PISTON OUTER "D" RING SEAL.
107 UNDERDRIVE CLUTCH APPLY PISTON.
108 UNDERDRIVE CLUTCH PISTON RETURN SPRING ASSEMBLY.
109 UNDERDRIVE CLUTCH BALANCE PISTON "D" RING SEAL.
110 UNDERDRIVE CLUTCH BALANCE PISTON.
111 UNDERDRIVE CLUTCH BALANCE PISTON SNAP RING.
112 UNDERDRIVE CLUTCH STEEL PLATES.
113 UNDERDRIVE CLUTCH FRICTION PLATES.
114 UNDERDRIVE CLUTCH BACKING PLATE.
115 UNDERDRIVE CLUTCH BACKING PLATE *SELECTIVE* SNAP RING.
116 NUMBER 2 THRUST BEARING.
117 UNDERDRIVE CLUTCH HUB.

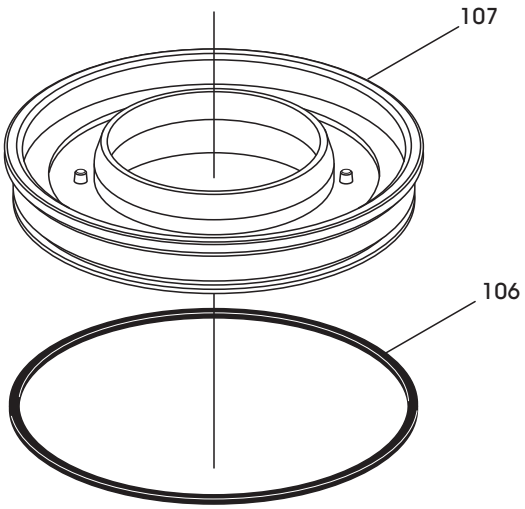
Figure 144

COMPONENT REBUILD SECTION

Underdrive Clutch Housing

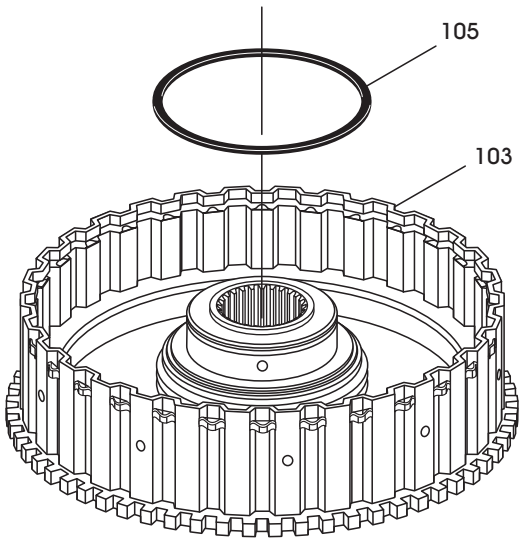
1. Disassemble the underdrive clutch housing using Figure 144 as a guide.
   Note: It is "Mandatory" that you check the clutch pack as it is removed. The amount and thickness of plates will vary, as well as the diameter. The bottom apply plate is not used in all models.
2. Clean all underdrive clutch housing parts with cleaning solution and dry with compressed air.
3. Inspect all underdrive clutch housing parts for any wear and/or damage. Replace as necessary.
4. Install new underdrive clutch inner "D" ring seal in underdrive clutch housing, as shown in Figure 145, and lube with a small amount of Trans-Jel®.
5. Install new underdrive clutch outer "D" ring seal onto underdrive clutch apply piston, as shown in Figure 146, and lube with a small amount of Trans-Jel®.
6. Install new "D" ring seal onto the underdrive clutch balance piston, as shown in Figure 147, and lube with a small amount of Trans-Jel®.

Continued on Page 86



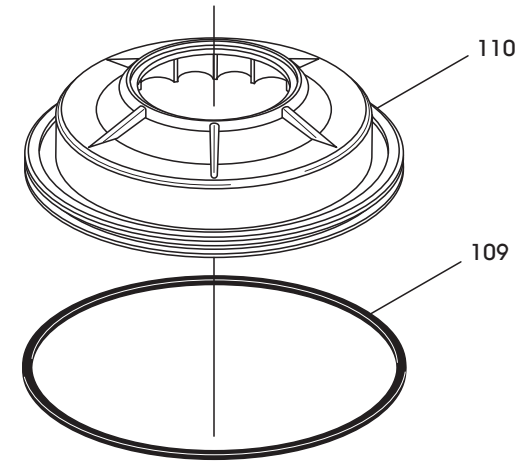
106 UNDERDRIVE CLUTCH PISTON OUTER "D" RING SEAL.
107 UNDERDRIVE CLUTCH APPLY PISTON.

Figure 146



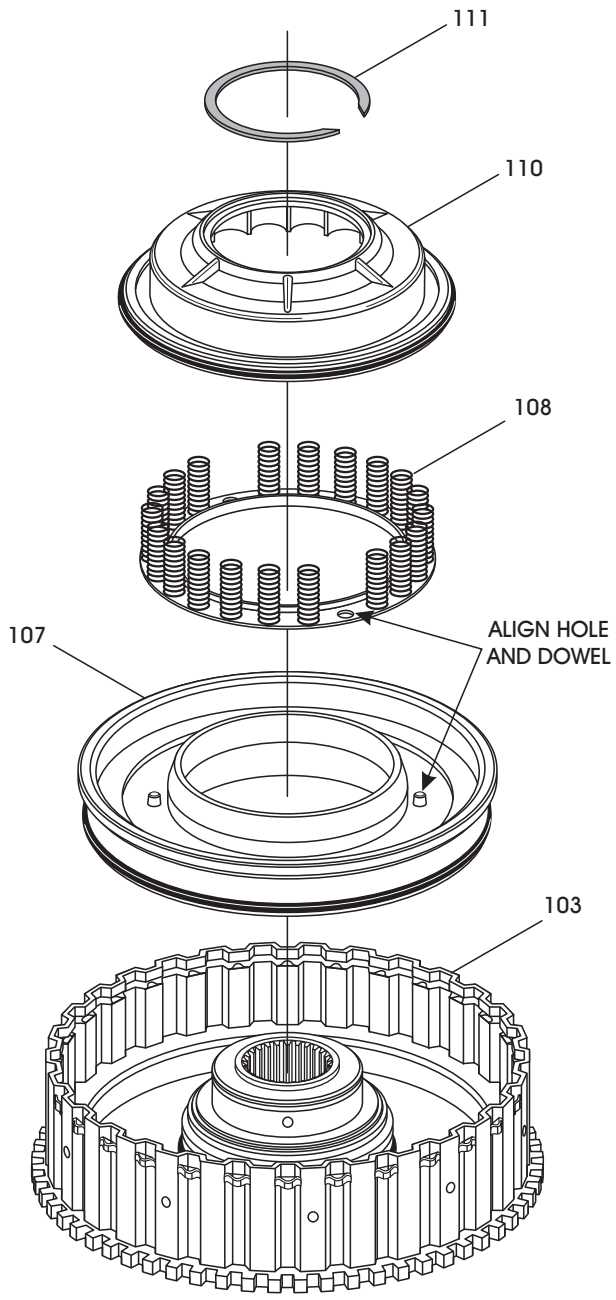
103 UNDERDRIVE CLUTCH HOUSING.
105 UNDERDRIVE CLUTCH HOUSING INNER "D" RING SEAL.

Figure 145



109 UNDERDRIVE CLUTCH BALANCE PISTON "D" RING SEAL.
110 UNDERDRIVE CLUTCH BALANCE PISTON.

Figure 147



103 UNDERDRIVE CLUTCH HOUSING.
107 UNDERDRIVE CLUTCH APPLY PISTON.
108 UNDERDRIVE CLUTCH PISTON RETURN SPRING ASSEMBLY.
110 UNDERDRIVE CLUTCH BALANCE PISTON ASSEMBLY.
111 UNDERDRIVE CLUTCH BALANCE PISTON SNAP RING.

Figure 148

COMPONENT REBUILD SECTION

Underdrive Clutch Housing (Cont'd)

7. Install the underdrive clutch piston assembly into the underdrive housing with a twisting motion, as shown in Figure 148.
8. Install the return spring assembly in direction shown in Figure 148, and ensure that holes in retainer are engaged over dowels on piston.
9. Install the underdrive clutch balance piston over the return spring assembly, as shown in Figure 148.
10. Compress the balance piston and return spring using the proper adapters and compressor.
11. Install the snap ring, as shown in Figure 148, and slowly remove the compression tool.

Continued on Page 87

COMPONENT REBUILD SECTION

Underdrive Clutch Housing (Cont'd)

12. Install the underdrive clutch plates beginning with a steel plate and alternating with friction plates, as shown in Figure 150, until you have installed four of each (Quantity Varies).
    Note: When installing the steel plates, align them so that the places with no teeth will be aligned with the lube holes in the housing, as shown in Figure 149.
    Note: Friction plates should be soaked in ATF for 1 hour before installation.
13. Install the underdrive clutch backing plate, as shown in Figure 149 and 150, with the rounded edge towards the friction.
14. Install the underdrive backing plate selective snap ring, as shown in Figure 150.

Continued on Page 88

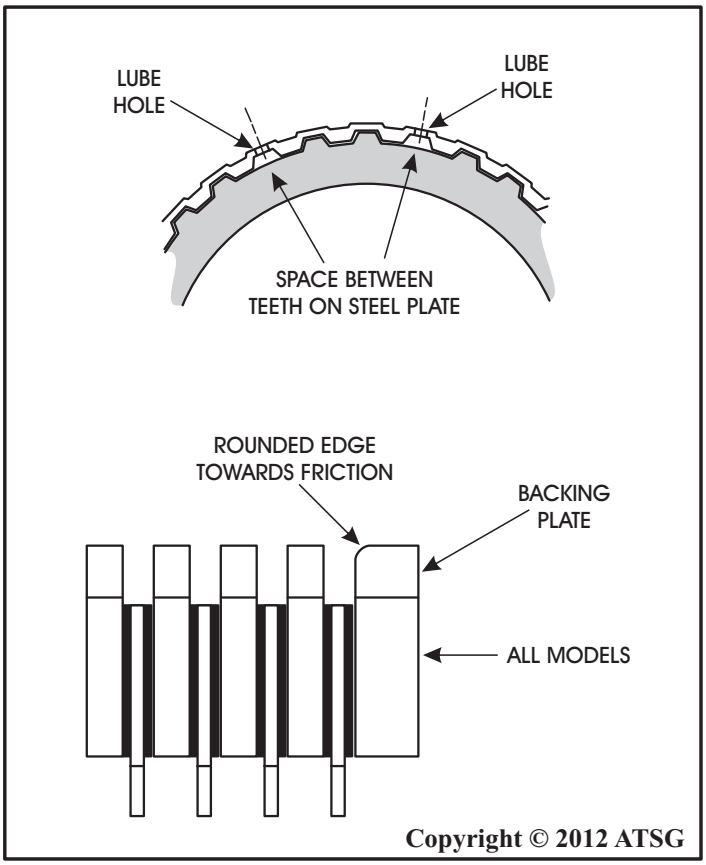


Figure 149

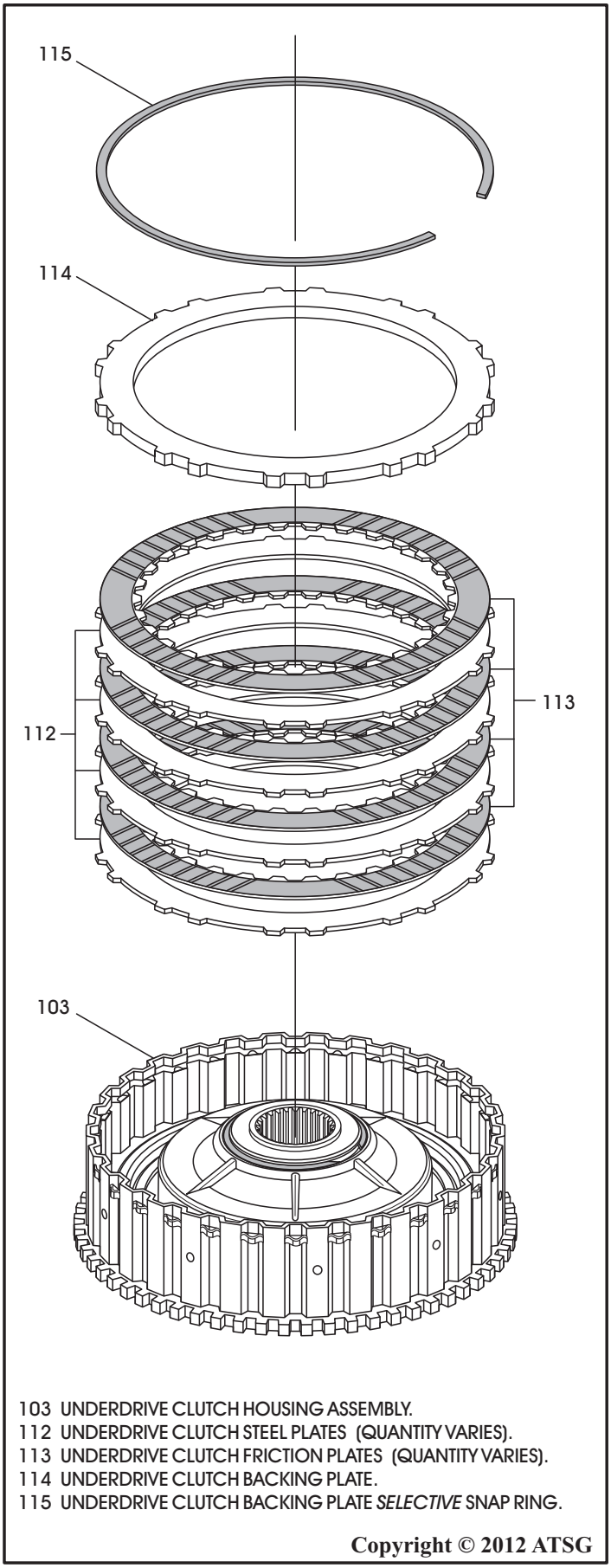


Figure 150

COMPONENT REBUILD SECTION

Underdrive Clutch Housing (Cont'd)

15. Install the clutch compressing tools, as shown in Figure 151 and 153.
Note: Underdrive lined plates are "Waved" on all models and must be compressed as shown in Figure 153 to achieve the proper clutch clearance reading. The underdrive friction plates were changed in May, 2000 to a friction with a less perceptable wave, but must still be compressed.
16. Compress the plates and measure with feeler gage between snap ring and backing plate, as shown in Figure 153.
17. With the plates compressed clutch clearance should be 1.6-1.8 mm (.063"-.071").
18. Change the selective snap ring as necessary, using the chart in Figure 152, to obtain proper underdrive clutch clearance.

Continued on Page 89

UNDERDRIVE AND OVERDRIVE SELECTIVE SNAP RING CHART

F5A51 SERIES

Thickness	I.D. Color	Part Number
1.6 mm (.063")	Brown	MD759960
1.7 mm (.067")	None	MD759961
1.8 mm (.071")	Blue	MD759962
1.9 mm (.075")	Brown	MD759963
2.0 mm (.079")	None	MD750841
2.1 mm (.083")	Blue	MD750842
2.2 mm (.087")	Brown	MD750843
2.3 mm (.091")	None	MD750844
2.4 mm (.094")	Blue	MD750845
2.5 mm (.098")	Brown	MD750846
2.6 mm (.102")	None	MD750847
2.7 mm (.106")	Blue	MD750848
2.8 mm (.110")	Brown	MD750849
2.9 mm (.114")	None	MD750850
3.0 mm (.118")	Blue	MD750851

Figure 152

UNDERDRIVE CLUTCH COMPRESSION TOOL

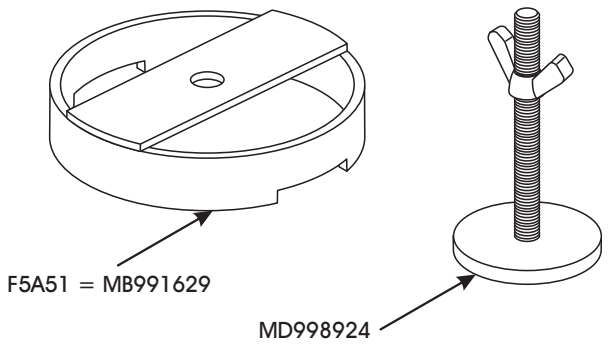


Figure 151

UNDERDRIVE CLUTCH CLEARANCE 1.6 - 1.8 MM (.063" - .071")

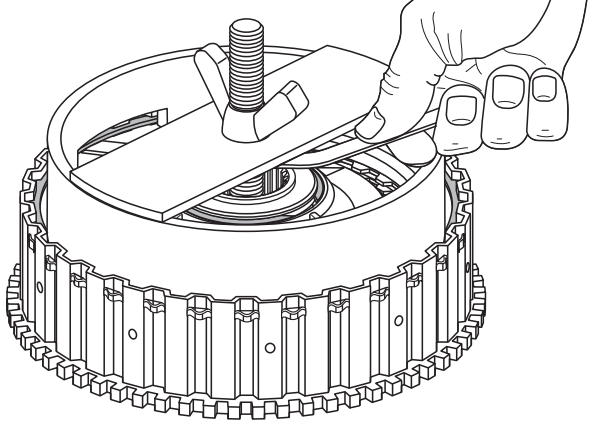


Figure 153

COMPONENT REBUILD SECTION

Underdrive Clutch Housing (Cont'd)

19. Install the turbine shaft through the underdrive clutch housing, as shown in Figure 154, install snap ring and ensure that it is fully seated.
20. Install the number 1 thrust washer, as shown in Figure 155, and retain with Trans-Jel®.
21. Install two new turbine shaft "butt-cut" sealing rings, as shown in Figure 155, and ensure rotation.
22. Set the completed underdrive clutch housing aside for the final assembly process.

Component Rebuild
Continued on Page 90

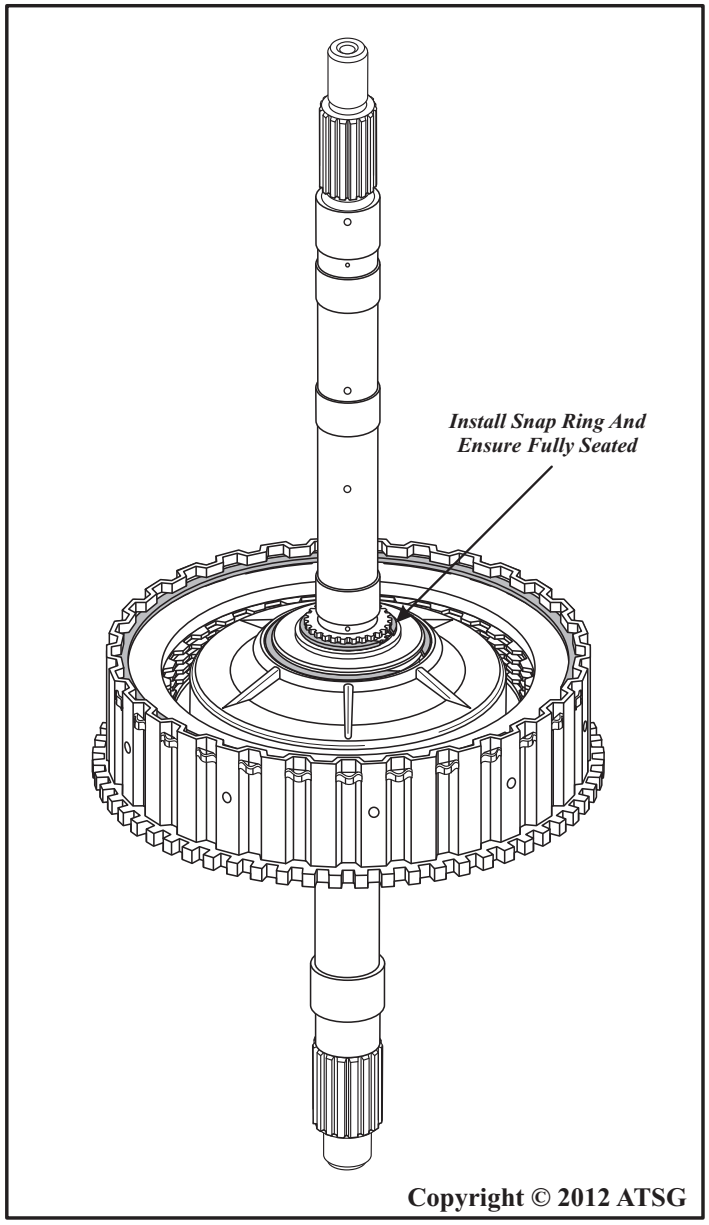
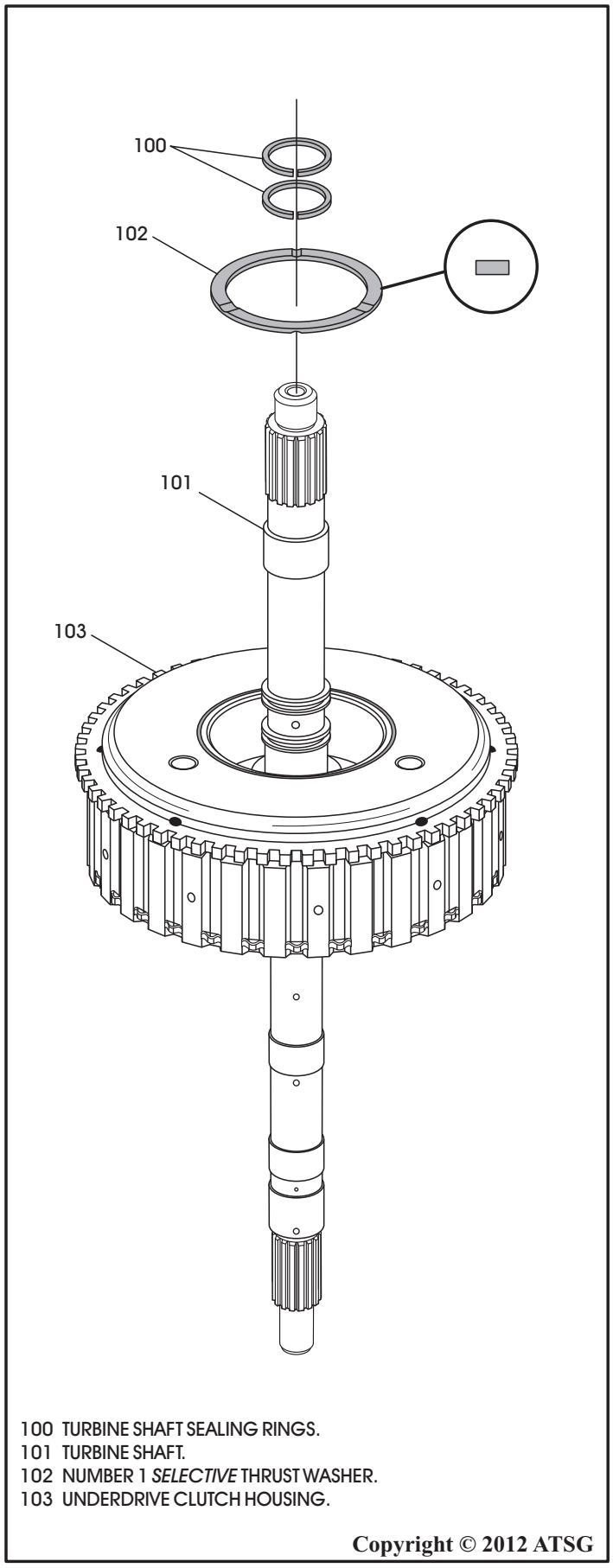


Figure 154



100 TURBINE SHAFT SEALING RINGS.
101 TURBINE SHAFT.
102 NUMBER 1 *SELECTIVE* THRUST WASHER.
103 UNDERDRIVE CLUTCH HOUSING.

Figure 155

COMPONENT REBUILD SECTION

Underdrive Clutch Hub

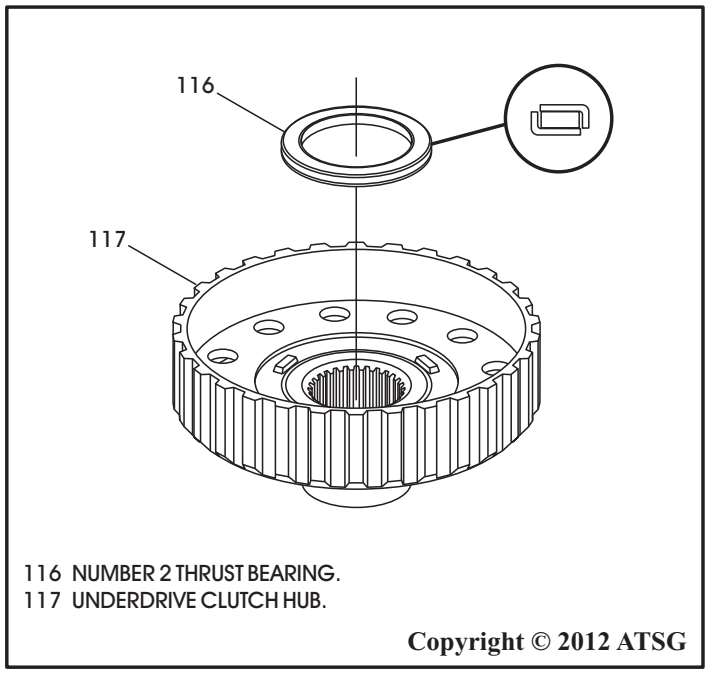
1. Clean and inspect the underdrive clutch hub thoroughly.
2. Install the number 2 thrust bearing onto the underdrive clutch hub, in the direction shown in Figure 156, and retain with a small amount of Trans-Jel®.
3. Set the completed underdrive clutch hub aside for the final assembly process, as shown in Figure 157.

COMPONENT REBUILD SECTION

Differential Assembly

1. Disassemble the differential assembly using Figure 159 as a guide.
2. Clean and inspect all of the differential parts thoroughly. Replace as necessary.
3. If bearing service is required, the tools shown in Figure 158, or their equivalant, and suitable hydraulic shop press will be necessary.

Continued on Page 91



116 NUMBER 2 THRUST BEARING.
117 UNDERDRIVE CLUTCH HUB.

Figure 156

COMPLETED UNDERDRIVE CLUTCH HUB

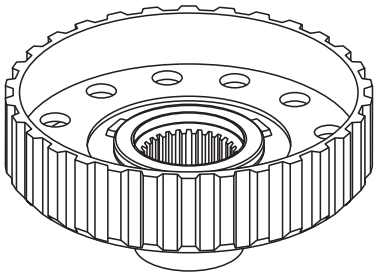


Figure 157

DIFFERENTIAL REQUIRED SPECIAL TOOLS FOR BEARING SERVICE

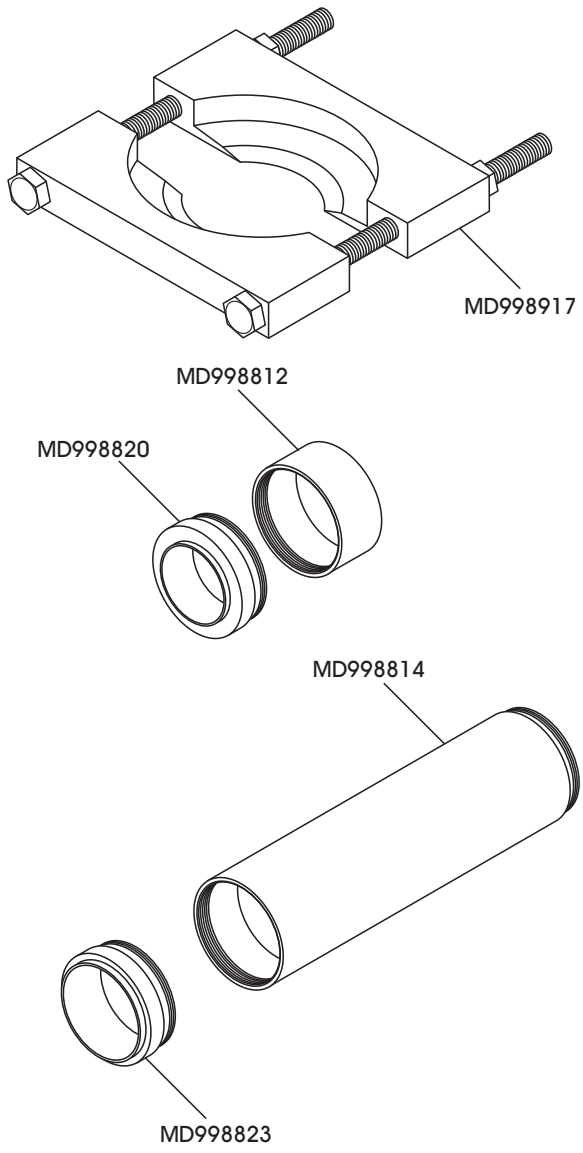
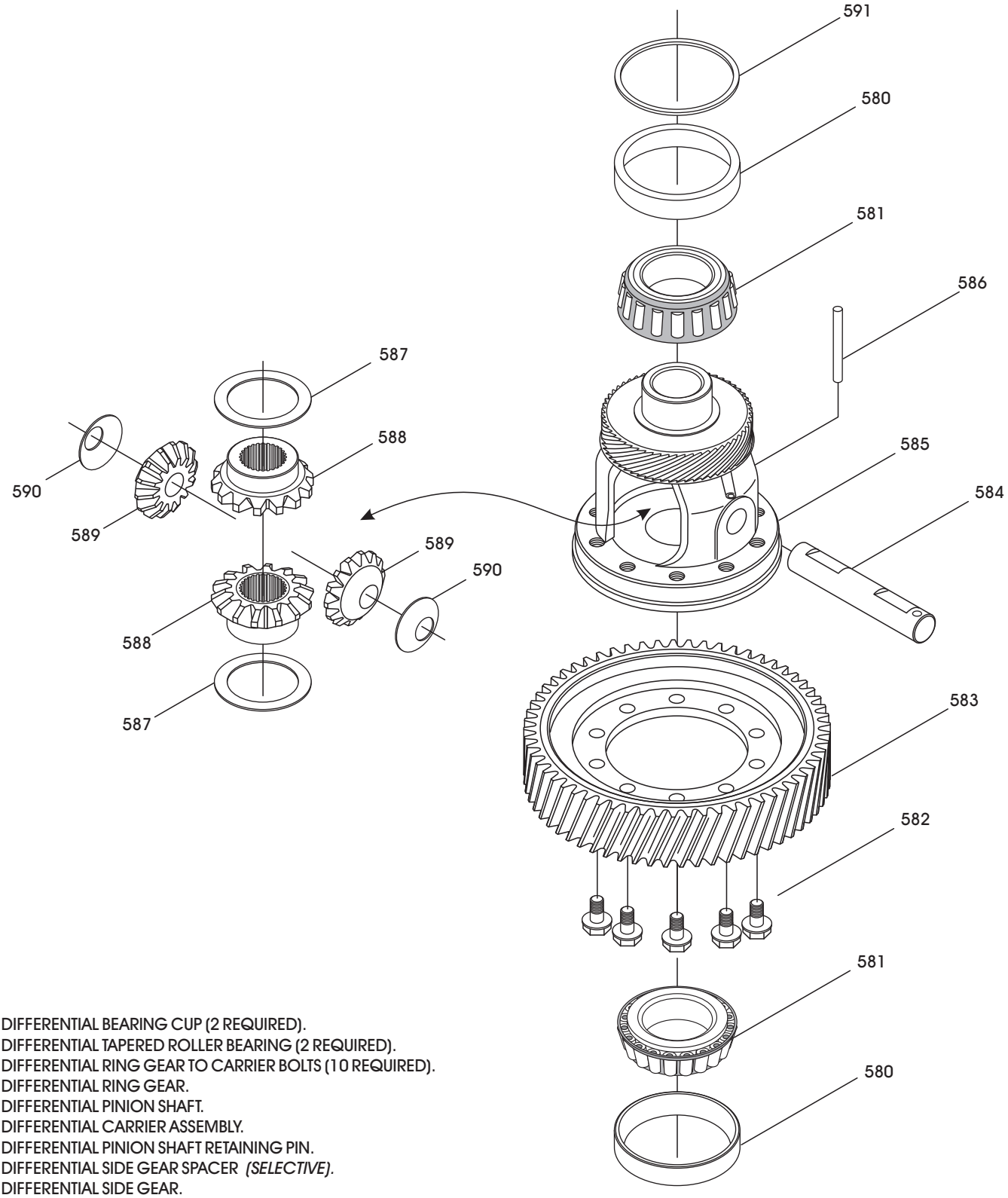


Figure 158

DIFFERENTIAL EXPLODED VIEW



580 DIFFERENTIAL BEARING CUP (2 REQUIRED).
581 DIFFERENTIAL TAPERED ROLLER BEARING (2 REQUIRED).
582 DIFFERENTIAL RING GEAR TO CARRIER BOLTS (10 REQUIRED).
583 DIFFERENTIAL RING GEAR.
584 DIFFERENTIAL PINION SHAFT.
585 DIFFERENTIAL CARRIER ASSEMBLY.
586 DIFFERENTIAL PINION SHAFT RETAINING PIN.
587 DIFFERENTIAL SIDE GEAR SPACER *(SELECTIVE).*
588 DIFFERENTIAL SIDE GEAR.
589 DIFFERENTIAL PINION GEAR.
590 DIFFERENTIAL PINION GEAR WASHER.
591 SELECTIVE SPACER TO SET PRE-LOAD (CONV HOUSING SIDE)

Figure 159

COMPONENT REBUILD SECTION

Differential Assembly

4. Remove the bearings using the split puller and the appropriate size general service gear puller as shown in Figure 160.
5. Install the tapered roller bearings using the special tools, shown in Figure 161, and using a suitable hydraulic shop press.
6. Assemble the differential side gears and pinion gears, as shown in Figure 159.

Continued on Page 93

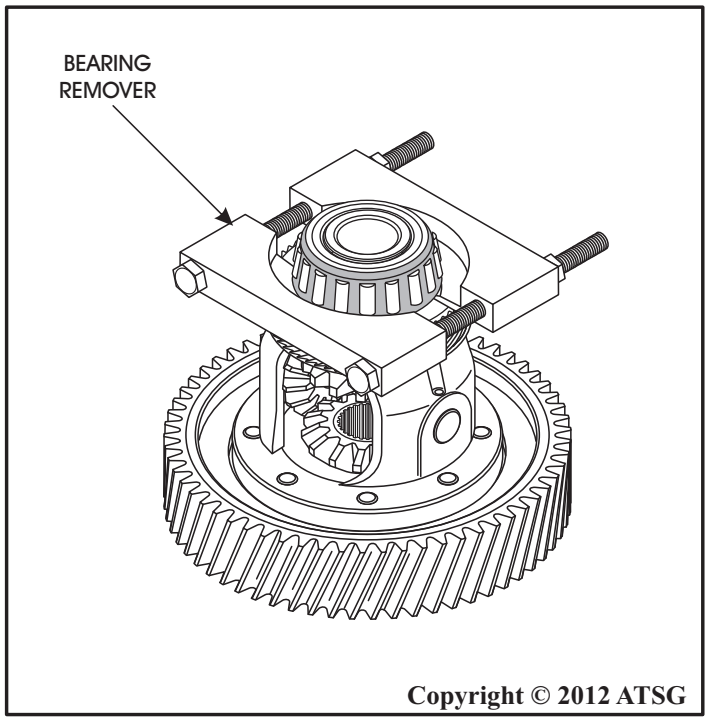


Figure 160

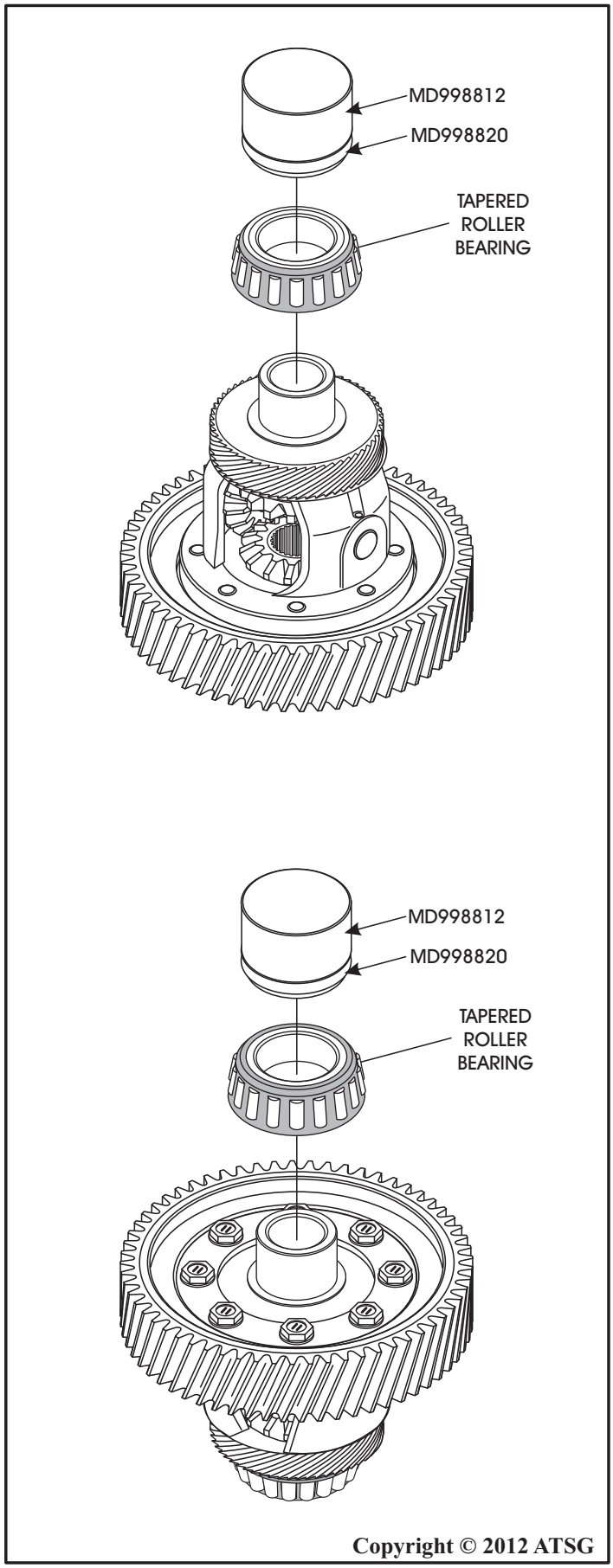


Figure 161

COMPONENT REBUILD SECTION

DIFFERENTIAL ASSEMBLY (CONT'D)

7. Measure the backlash between the side gears and pinion gears, as shown in Figure 162.
8. If backlash is out of specification, as shown in Figure 162, select a spacer from the chart and re-measure the backlash.
   Note: Adjust until the backlash is equal at both side gears.
9. If gear service was necessary, torque the ring gear bolts to 135 N·m (100 ft.lb.), as shown in Figure 163, using a criss-cross pattern.
10. Set completed differential assembly aside for the final assembly process (See Figure 164).

Component Rebuild
Continued on Page 94

DIFFERENTIAL SIDE GEAR SPACERS	
Thickness	***Part No.***
.75-.82 mm (.029"-.032")	*MD722986*
.83-.92 mm (.033"-.036")	*MD722985*
.93-1.00 mm (.037"-.040")	*MD722984*
1.01-1.08 mm (.040"-.043")	*MD722982*
1.09-1.16 mm (.043"-.046")	*MD722983*

SIDE GEAR BACKLASH
.025-.150 MM (.001"-.006")

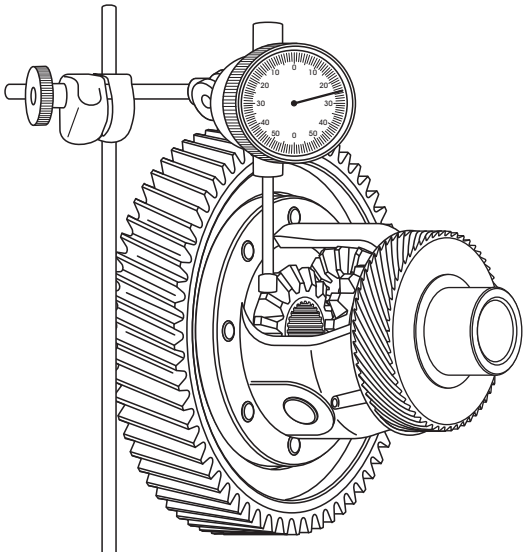


Figure 162

TORQUE TO
135 NM (100 FT.LB.)

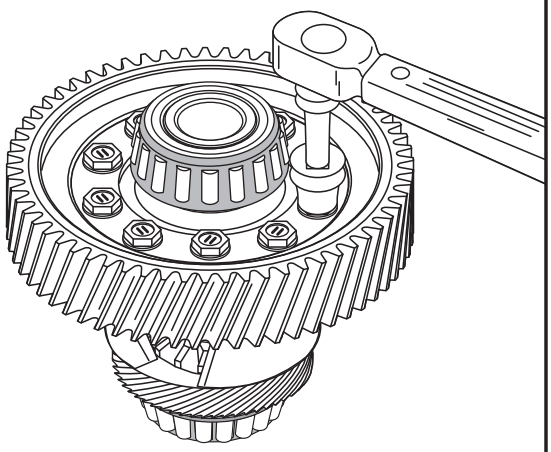


Figure 163

COMPLETED DIFFERENTIAL ASSEMBLY

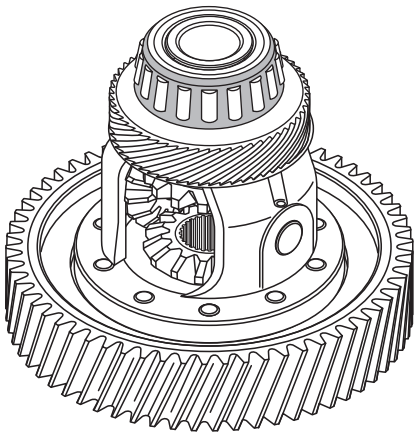
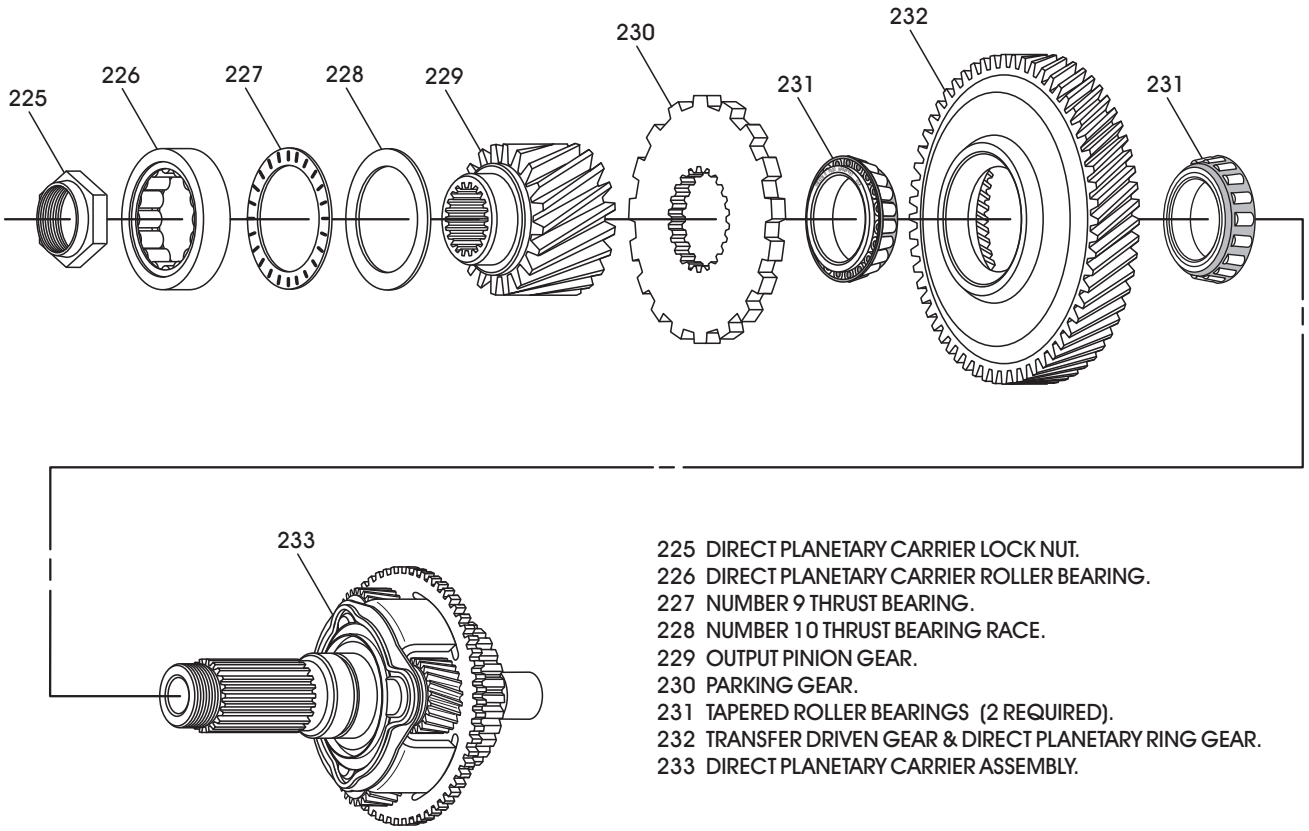


Figure 164

DIRECT PLANETARY CARRIER EXPLODED VIEW



225 DIRECT PLANETARY CARRIER LOCK NUT.
226 DIRECT PLANETARY CARRIER ROLLER BEARING.
227 NUMBER 9 THRUST BEARING.
228 NUMBER 10 THRUST BEARING RACE.
229 OUTPUT PINION GEAR.
230 PARKING GEAR.
231 TAPERED ROLLER BEARINGS (2 REQUIRED).
232 TRANSFER DRIVEN GEAR & DIRECT PLANETARY RING GEAR.
233 DIRECT PLANETARY CARRIER ASSEMBLY.

Figure 165

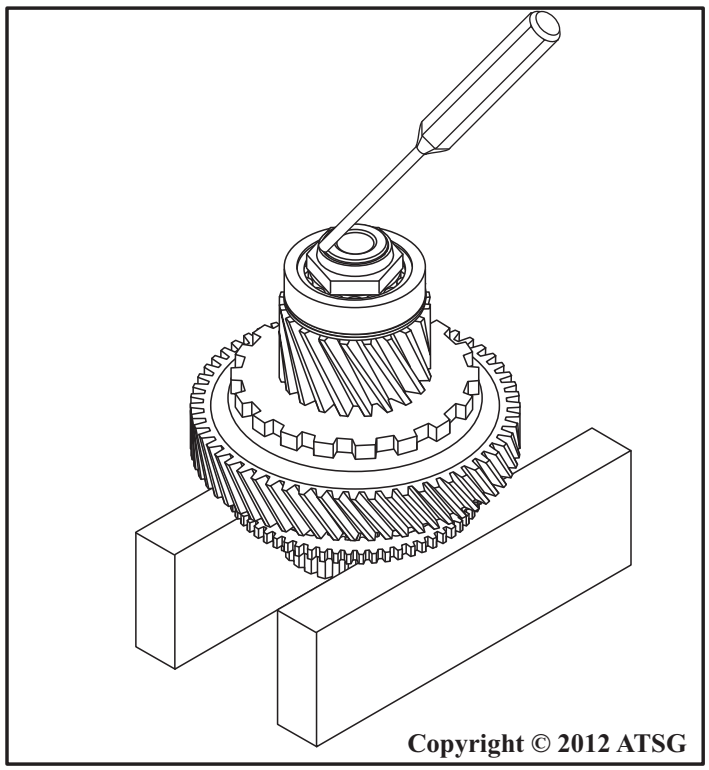


Figure 166

COMPONENT REBUILD SECTION

Direct Planetary Gearset

1. Unstake the locking nut with a punch, as shown in Figure 166.
2. Using the special spanner wrench, remove the locking nut, as shown in Figure 167.

Continued on Page 95

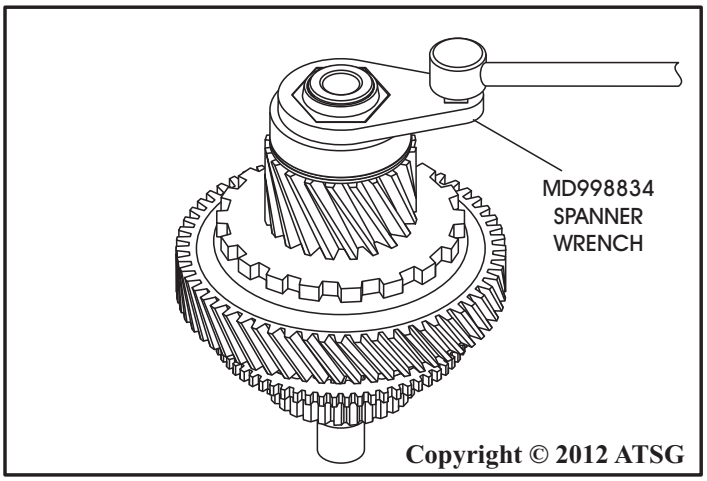


Figure 167

COMPONENT REBUILD SECTION

Direct Planetary Gearset (Cont'd)

3. Remove the lock nut and direct planetary carrier roller bearing, as shown in Figure 168.
4. Remove the number 9 thrust bearing and the number 10 thrust bearing race (See Figure 168).
5. Install universal bearing remover under parking gear, as shown in Figure 169, with the assembly in hydraulic press.
6. Remove the parking gear and output pinion gear by pressing out the planetary carrier shaft, as shown in Figure 170.

Continued on Page 96

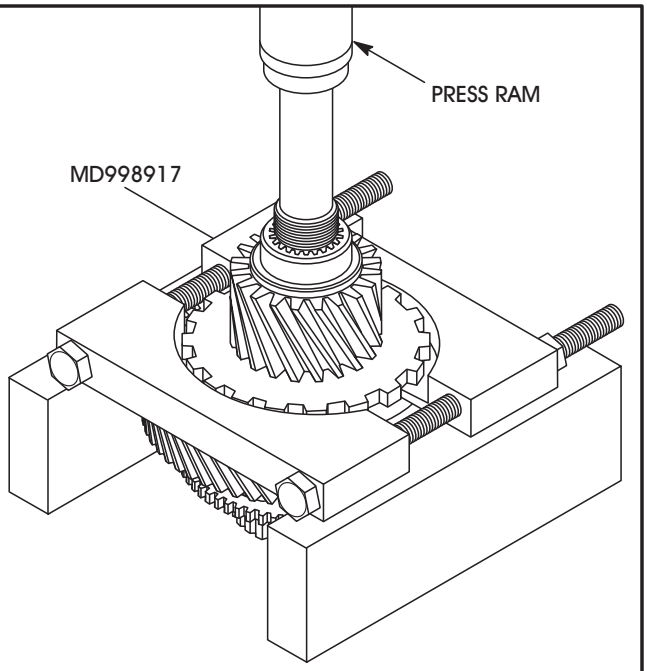
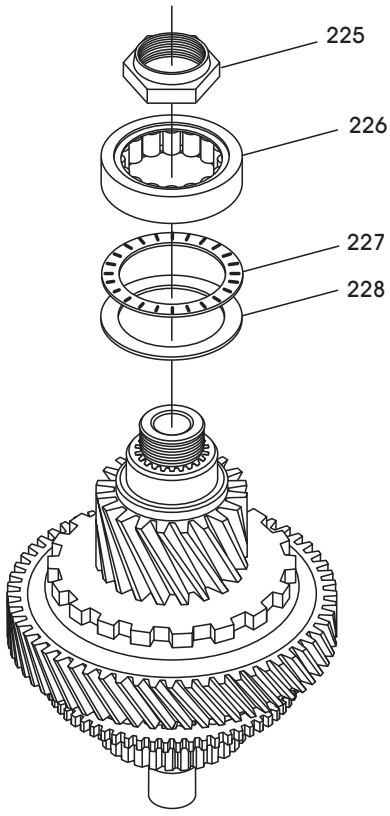
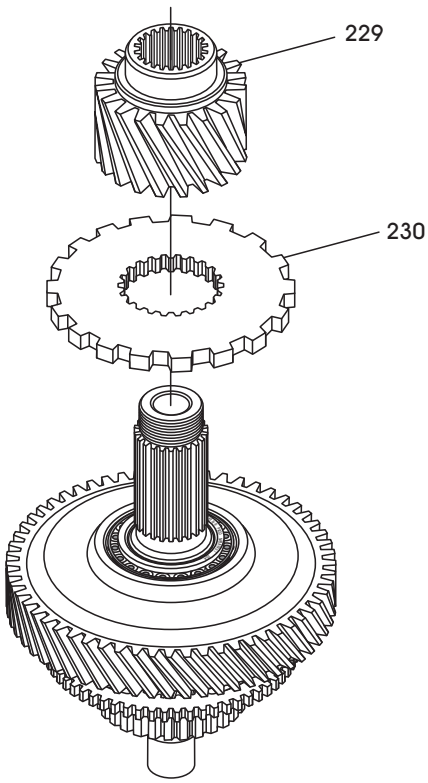


Figure 169



225 DIRECT PLANETARY CARRIER LOCK NUT.
226 DIRECT PLANETARY CARRIER ROLLER BEARING.
227 NUMBER 9 THRUST BEARING.
228 NUMBER 10 THRUST BEARING RACE.

Figure 168



229 OUTPUT PINION GEAR.
230 PARKING GEAR.

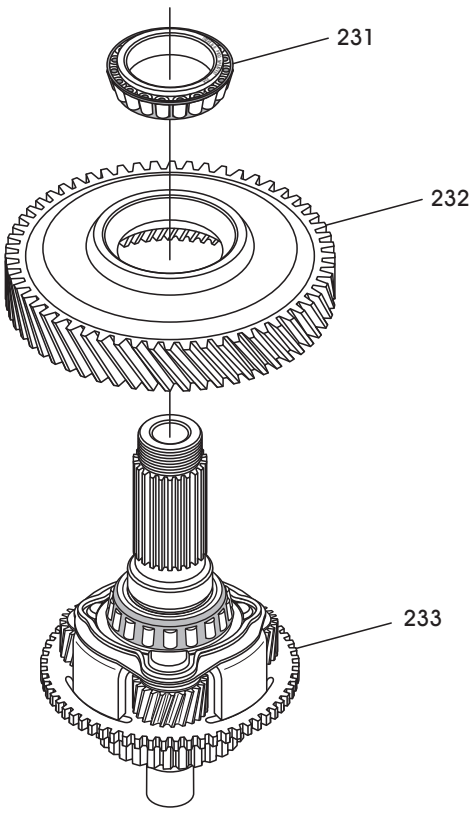
Figure 170

COMPONENT REBUILD SECTION

Direct Planetary Gearset (Cont'd)

7. With the assembly still in the press, place suitable supports under the driven transfer gear, as shown in Figure 171.
8. Again press the direct planetary carrier shaft out and remove the tapered roller bearing and driven transfer gear, as shown in Figure 172.
9. Now install the universal split puller under the remaining tapered roller bearing, as shown in Figure 173, and press it off of the shaft.

Continued on Page 97



231 TAPERED ROLLER BEARINGS (2 REQUIRED).
232 TRANSFER DRIVEN GEAR & DIRECT PLANETARY RING GEAR.
233 DIRECT PLANETARY CARRIER ASSEMBLY.

Figure 172

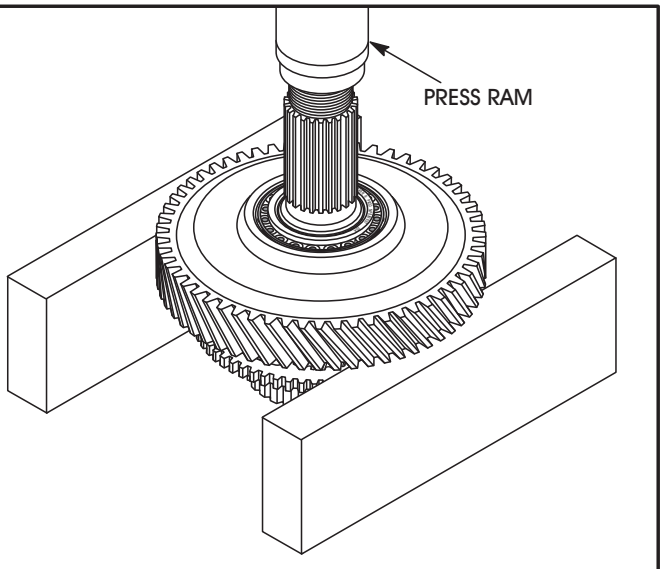


Figure 171

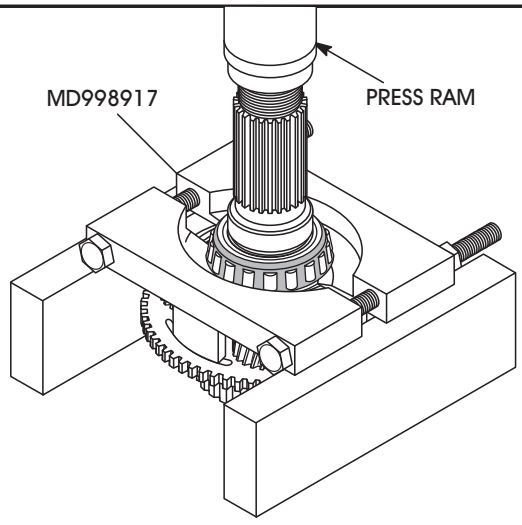


Figure 173

COMPONENT REBUILD SECTION

Direct Planetary Gearset (Cont'd)

10. Press a new tapered roller bearing onto direct planetary carrier, as shown in Figure 174, using the proper adapters.
11. Install new bearing cups into the driven transfer gear, as shown in Figure 175, using the proper adapters.
12. Install the transfer driven gear/direct ring gear onto the direct planetary carrier, as shown in Figure 176, and rotate into position to engage planetary pinions.
13. Install the second tapered roller bearing onto the direct planetary carrier, as shown in Figure 176.

Continued on Page 98

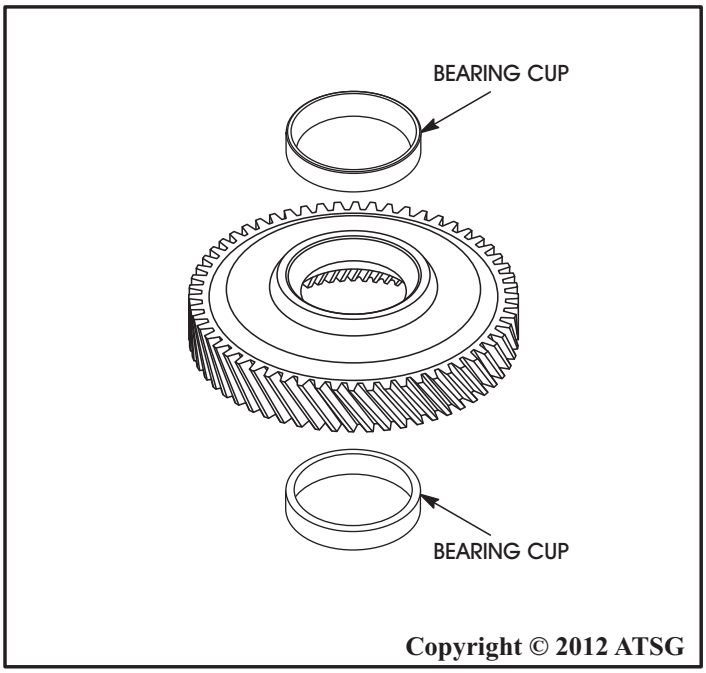


Figure 175

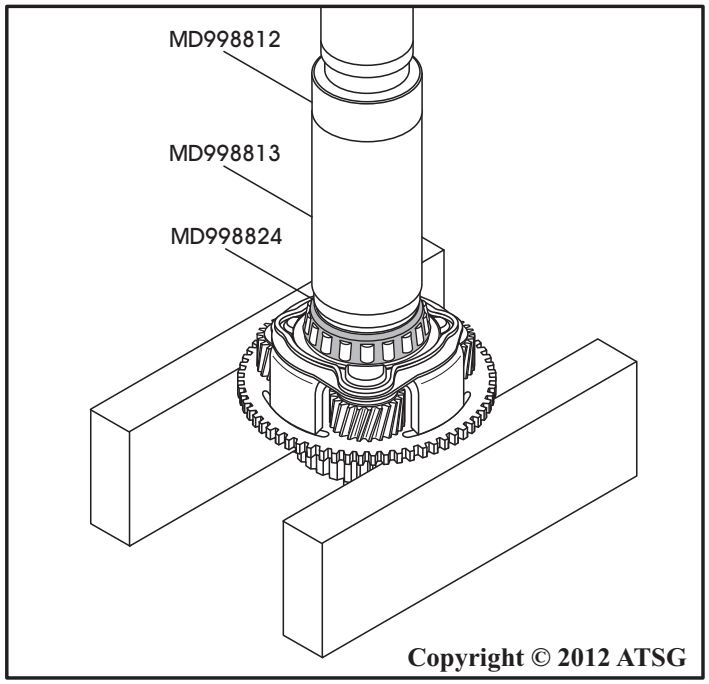
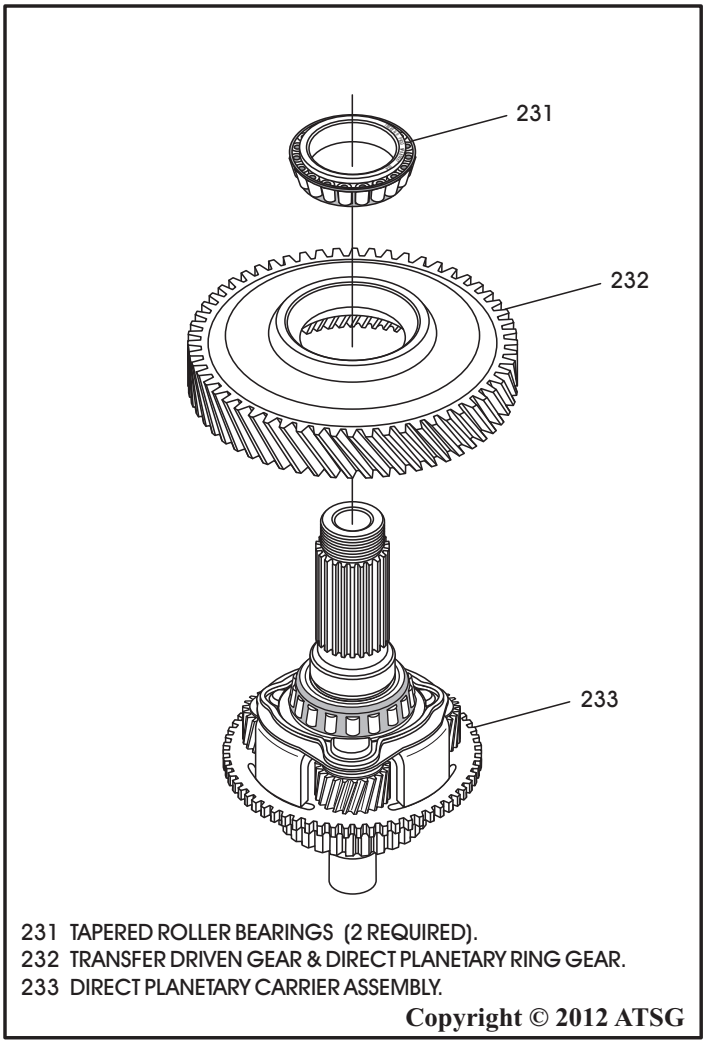


Figure 174



231 TAPERED ROLLER BEARINGS (2 REQUIRED).
232 TRANSFER DRIVEN GEAR & DIRECT PLANETARY RING GEAR.
233 DIRECT PLANETARY CARRIER ASSEMBLY.

Figure 176

COMPONENT REBUILD SECTION

Direct Planetary Gearset (Cont'd)

14. Press the tapered roller bearing into position, as shown in Figure 177.
15. Install the parking gear and output pinion gear onto direct planetary carrier shaft, as shown in Figure 178.
16. Press the output pinion gear into position, as shown in Figure 179.

Continued on Page 99

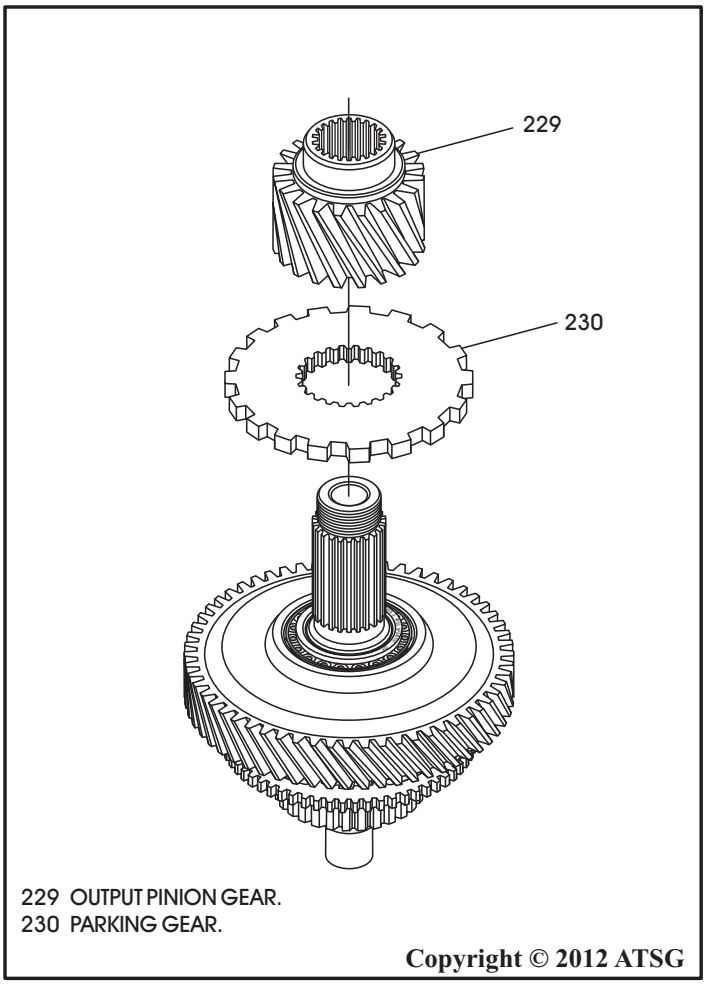


Figure 178

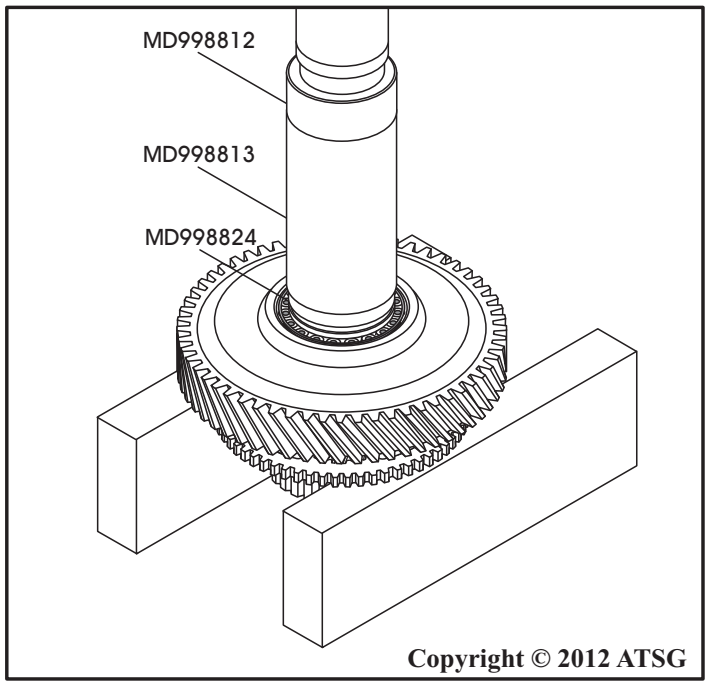


Figure 177

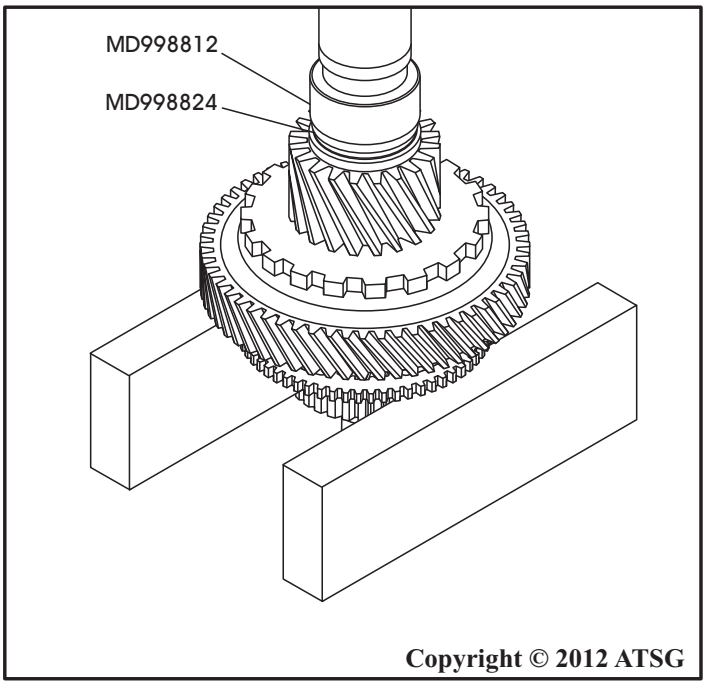


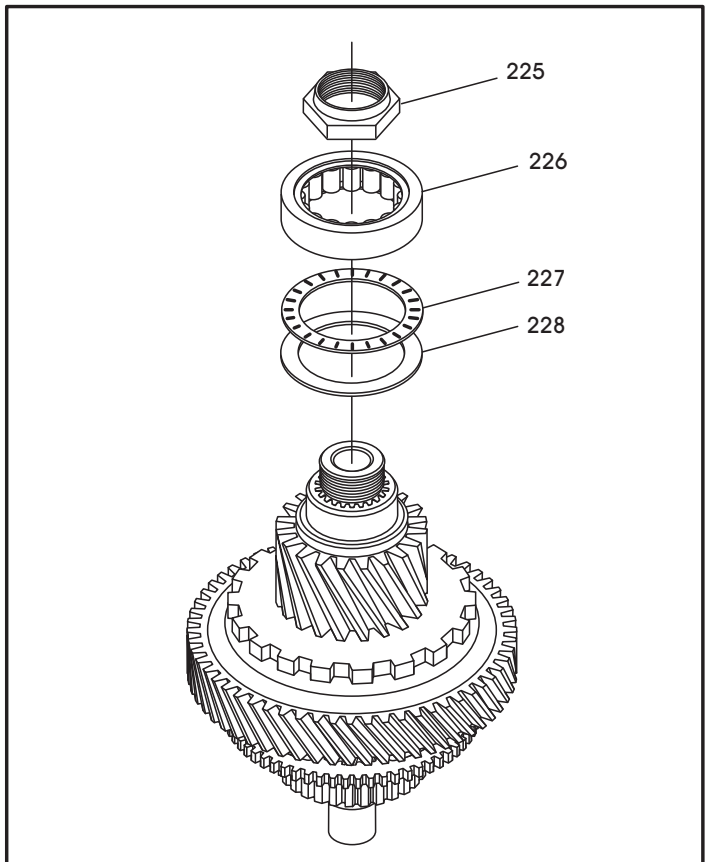
Figure 179

COMPONENT REBUILD SECTION

Direct Planetary Gearset (Cont'd)

17. Install the number 10 thrust bearing race and the number 9 thrust bearing, as shown in Figure 180.
18. Install the direct planetary carrier roller bearing, as shown in Figure 180.
19. Install the locking nut as shown in Figure 180.
20. Tighten the locking nut to the specified torque using the special spanner wrench, as shown in Figure 181. Loosen the locking nut 1 complete turn and once again torque the locking nut to 170 N·m (125 ft.lb.).
21. Stake the locking nut in place and set completed direct planetary gearset aside for final assembly, as shown in Figure 182.

Component Rebuild
Continued on Page 100



225 DIRECT PLANETARY CARRIER LOCK NUT.
226 DIRECT PLANETARY CARRIER ROLLER BEARING.
227 NUMBER 9 THRUST BEARING.
228 NUMBER 10 THRUST BEARING RACE.

Figure 180

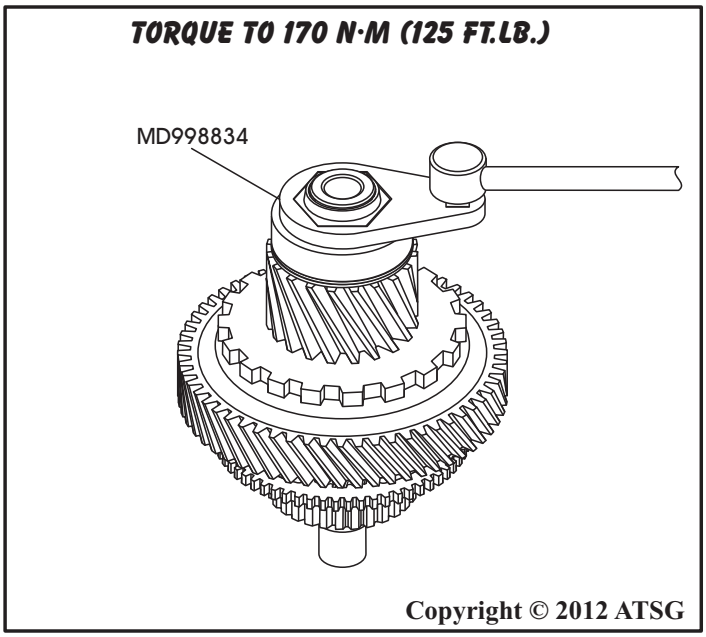


Figure 181

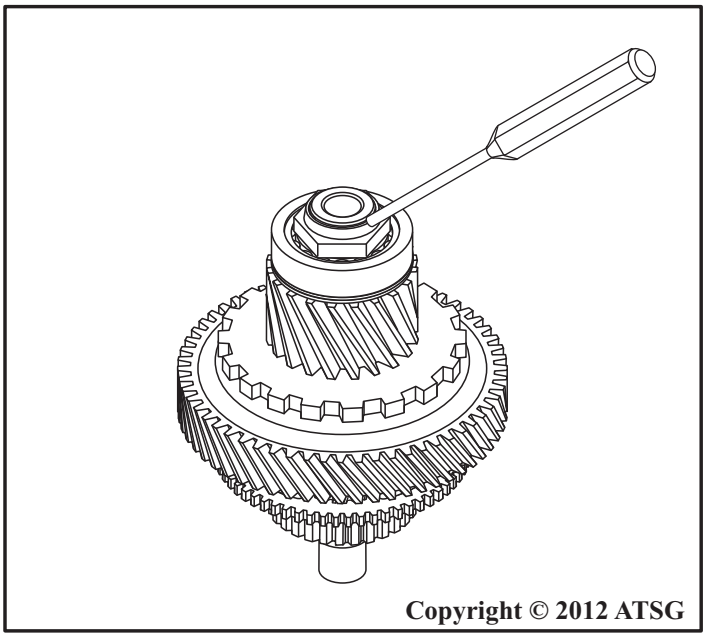


Figure 182

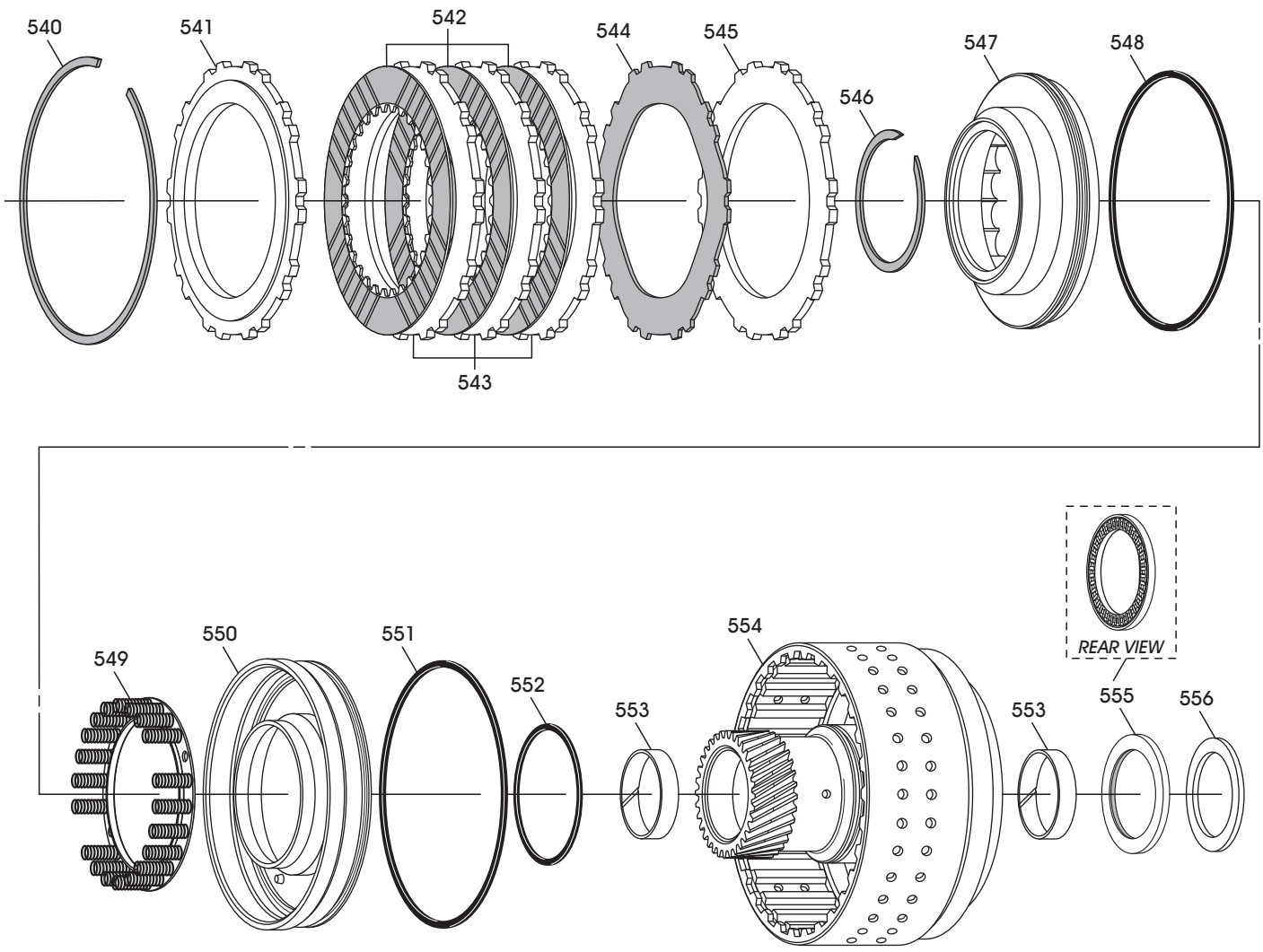
COMPONENT REBUILD SECTION

Direct Clutch Housing Assembly

1. Disassemble the direct clutch housing using Figure 183 as a guide.
   Note: It is "Mandatory" that you check the clutch pack as it is removed. The amount and thickness of plates will vary, as well as the diameter. The bottom apply plate is not used in all models. Refer to Page 103.
2. Clean all direct clutch parts thoroughly and dry with compressed air.
3. Inspect all direct clutch parts thoroughly for any wear and/or damage. Install new bushings as necessary using the proper driver.

Continued on Page 101

DIRECT CLUTCH HOUSING EXPLODED VIEW



540 DIRECT CLUTCH BACKING PLATE *SELECTIVE* SNAP RING.
541 DIRECT CLUTCH BACKING PLATE.
542 DIRECT CLUTCH FRICTION PLATES (QTY VARIES).
543 DIRECT CLUTCH STEEL PLATES (QTY. VARIES).
544 DIRECT CLUTCH *WAVE* PLATE.
545 DIRECT CLUTCH APPLY PLATE *(NOT USED ALL MODELS).*
546 DIRECT CLUTCH RETURN SPRING RETAINER SNAP RING.
547 DIRECT CLUTCH RETURN SPRING RETAINER.
548 DIRECT CLUTCH RETURN SPRING RETAINER "D" RING SEAL.
549 DIRECT CLUTCH APPLY PISTON RETURN SPRING.
550 DIRECT CLUTCH APPLY PISTON.
551 DIRECT CLUTCH APPLY PISTON OUTER "D" RING SEAL.
552 DIRECT CLUTCH HOUSING INNER "D" RING SEAL..
553 DIRECT CLUTCH HOUSING BUSHINGS (2 REQUIRED).
554 DIRECT CLUTCH HOUSING.
555 NUMBER 11 THRUST BEARING.
556 NUMBER 12 THRUST BEARING RACE.

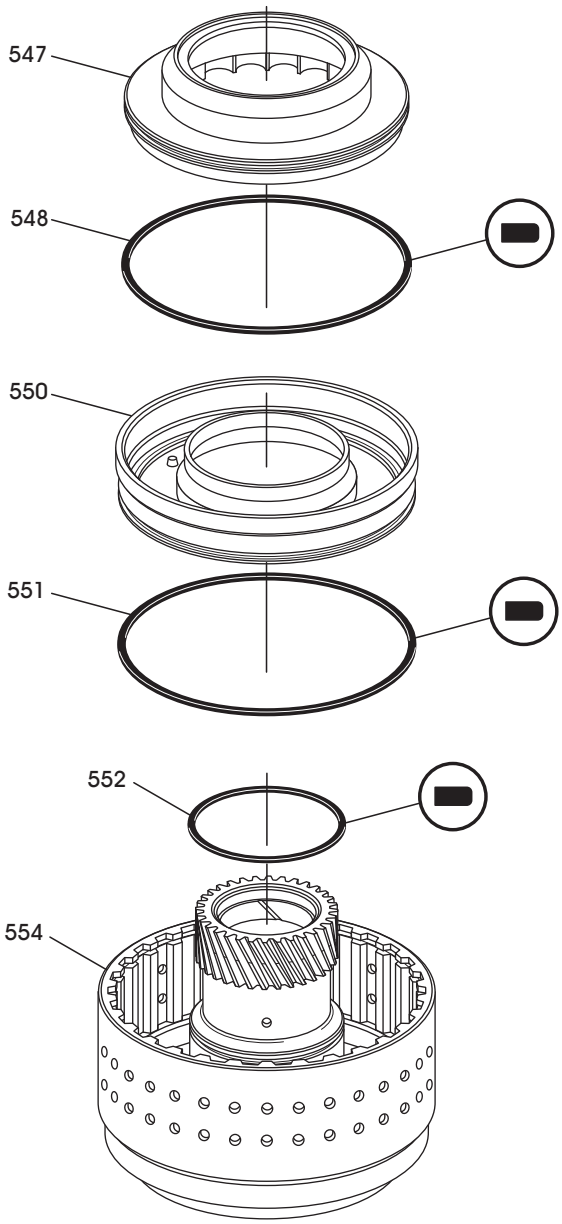
Figure 183

COMPONENT REBUILD SECTION

Direct Clutch Housing Assembly (Cont'd)

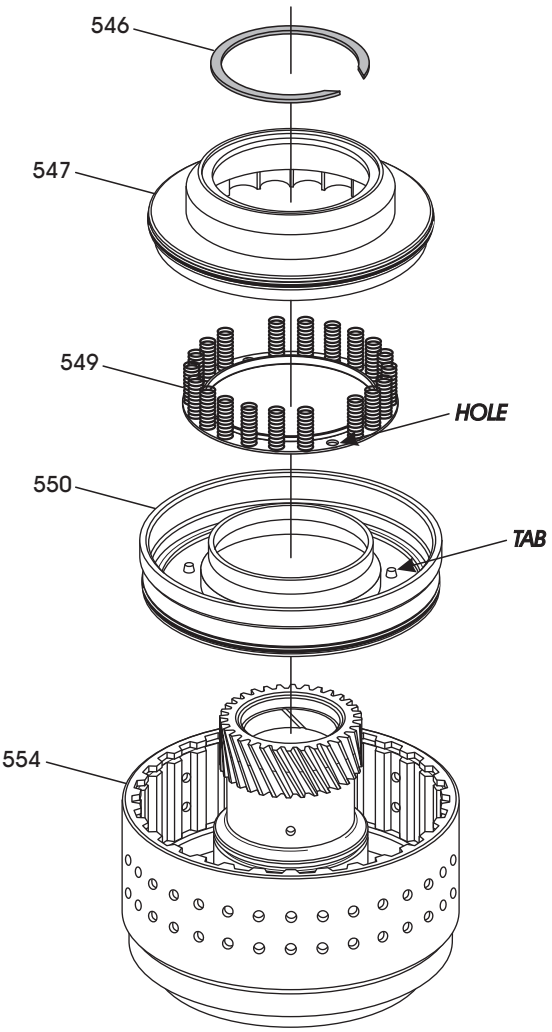
4. Install new "D" ring seals on both pistons and in the direct clutch housing (See Figure 184).
5. Lube seals and install the direct clutch piston in direct clutch housing, as shown in Figure 185.
6. Install the direct clutch piston return spring, as shown in Figure 185, and ensure that holes in return spring align with tabs on piston.
7. Install direct return spring retainer, as shown in Figure 185.
8. Compress the assembly and install the snap ring, as shown in Figure 185.

Continued on Page 102



547 DIRECT CLUTCH RETURN SPRING RETAINER.
548 DIRECT CLUTCH RETURN SPRING RETAINER "D" RING SEAL.
550 DIRECT CLUTCH APPLY PISTON.
551 DIRECT CLUTCH APPLY PISTON OUTER "D" RING SEAL.
552 DIRECT CLUTCH HOUSING INNER "D" RING SEAL..
554 DIRECT CLUTCH HOUSING.

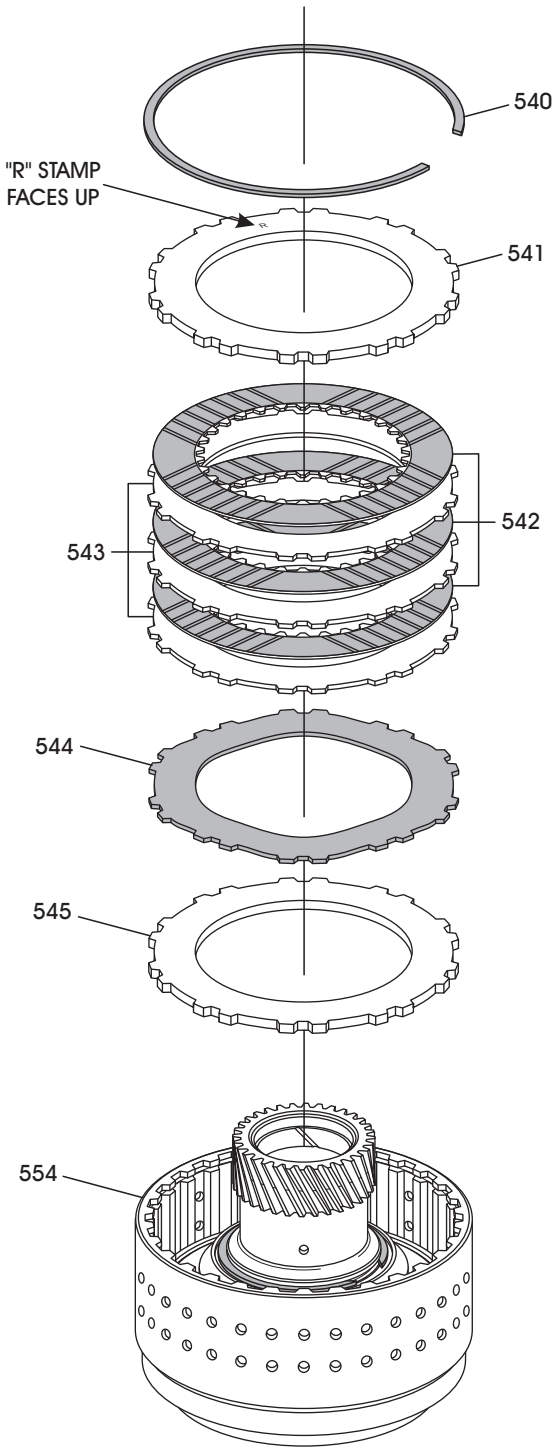
Figure 184



546 DIRECT CLUTCH RETURN SPRING RETAINER SNAP RING.
547 DIRECT CLUTCH RETURN SPRING RETAINER AND SEAL.
549 DIRECT CLUTCH APPLY PISTON RETURN SPRING.
550 DIRECT CLUTCH APPLY PISTON AND SEAL.
554 DIRECT CLUTCH HOUSING.

Figure 185

MITSUBISHI (ALL MODELS)



540 DIRECT CLUTCH BACKING PLATE *SELECTIVE* SNAP RING.
541 DIRECT CLUTCH BACKING PLATE.
542 DIRECT CLUTCH FRICTION PLATES (QTY VARIES).
543 DIRECT CLUTCH STEEL PLATES (QTY. VARIES).
544 DIRECT CLUTCH *WAVE* PLATE.
545 DIRECT CLUTCH APPLY PLATE *(NOT USED ALL MODELS).*
554 DIRECT CLUTCH HOUSING.

Figure 186

COMPONENT REBUILD SECTION

Direct Clutch Housing Assembly (Cont'd)

9. If working on Mitsubishi, install the apply plate, then the wave plate, as shown in Figure 186.
   Note: For the Hyundai and Kia models, refer to Page 103 for the various clutch stacks.
10. Install the direct clutch plates beginning with a steel plate and alternating with friction plates, as shown in Figure 186.
    Note: Quantity of friction and steel plates will vary from model to model.
    Note: Steel plates must be installed so that no teeth are blocking lube holes, as shown in Figure 187. All clutch plates should be soaked for 1 hour in proper ATF before assembly.
11. Install the direct clutch backing plate, as shown in Figure 186, with the "R" stamp facing up, and oriented same as steel plates.
12. Install the backing plate selective snap ring, as shown in Figure 186.

Continued on Page 104

DIRECT CLUTCH STACK-UP

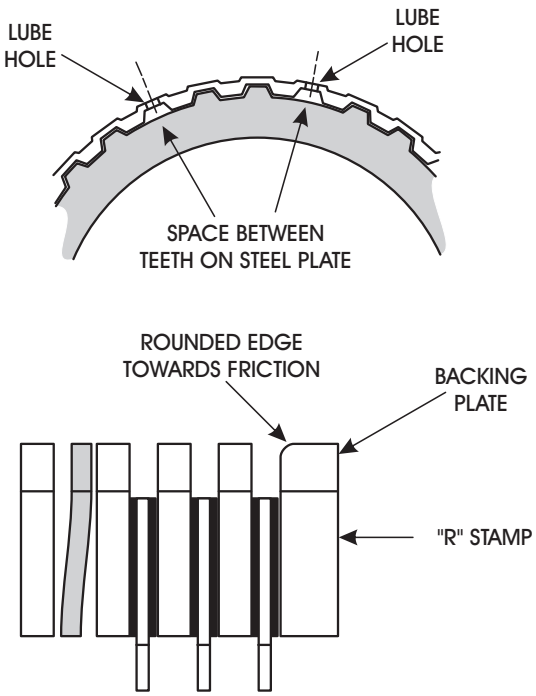


Figure 187

A5HF1 DIRECT CLUTCH, PRE-2007 HYUNDAI
A5HF1 DIRECT CLUTCH, PRE-2006 KIA

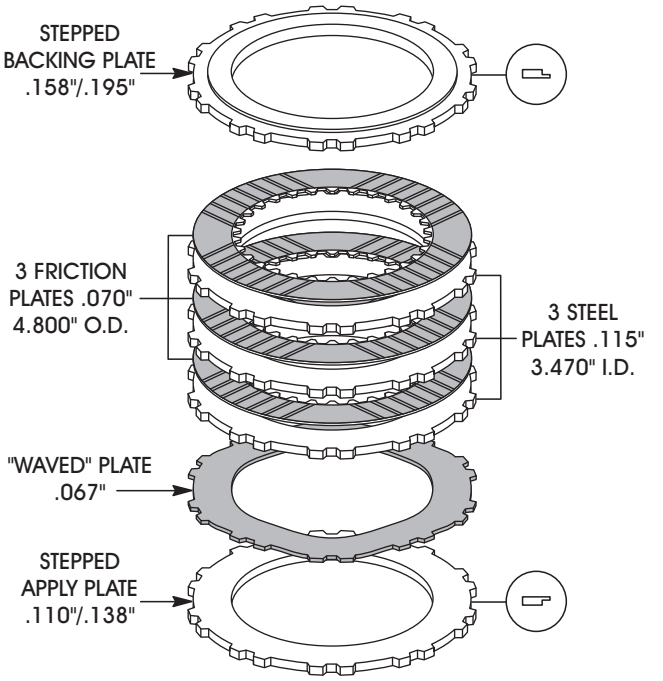


Figure 188

A5GF1 DIRECT CLUTCH, PRE-2007 HYUNDAI
A5GF1 DIRECT CLUTCH, PRE-2006 KIA

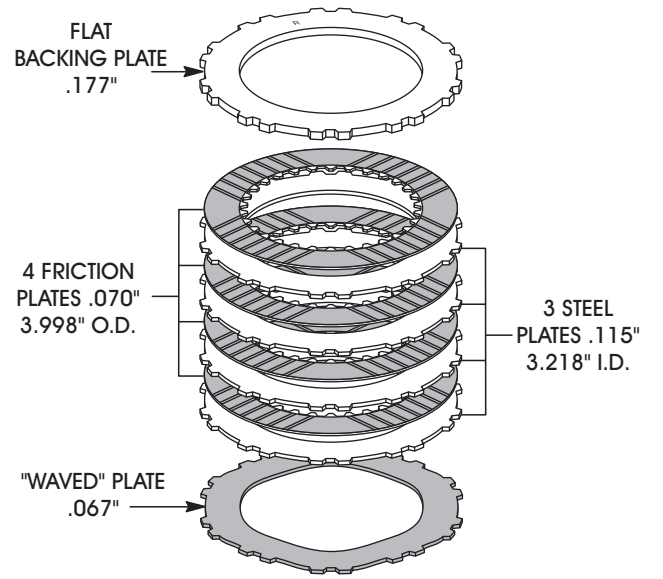


Figure 189

F5A51 DIRECT CLUTCH MITSUBISHI
(ALL MODELS)

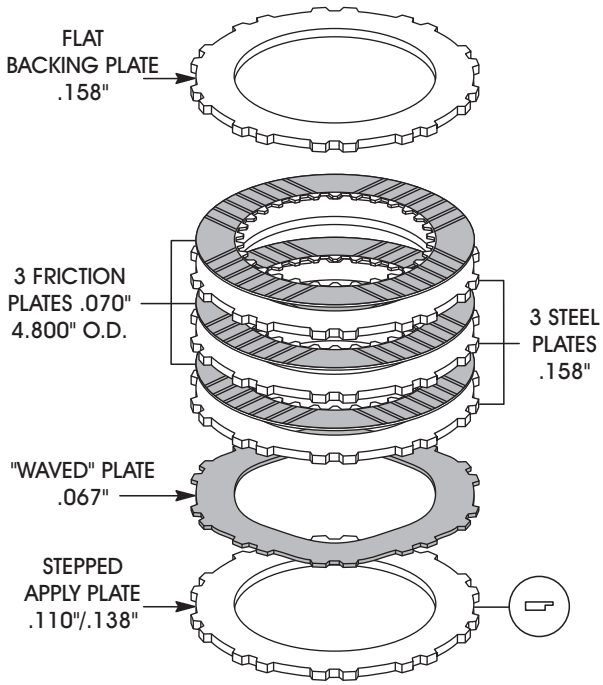


Figure 190

A5GF1 DIRECT CLUTCH, 2007-UP HYUNDAI
A5GF1 DIRECT CLUTCH, 2006-UP KIA

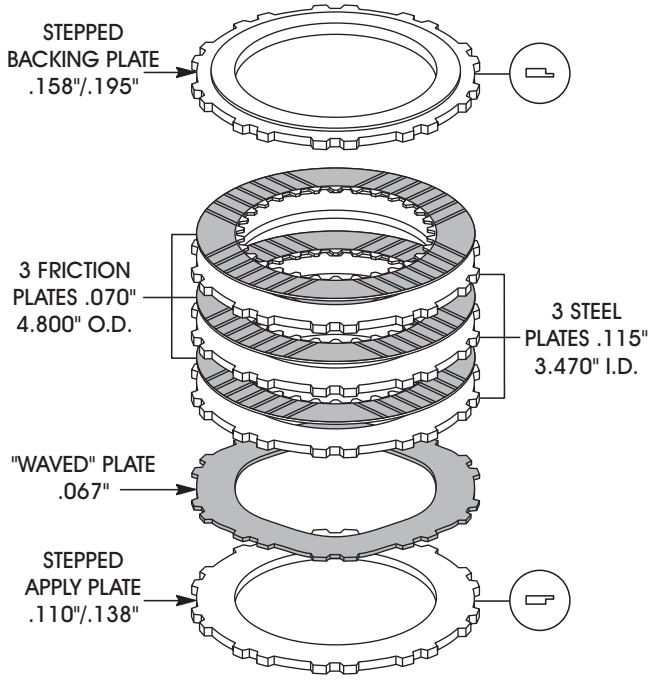


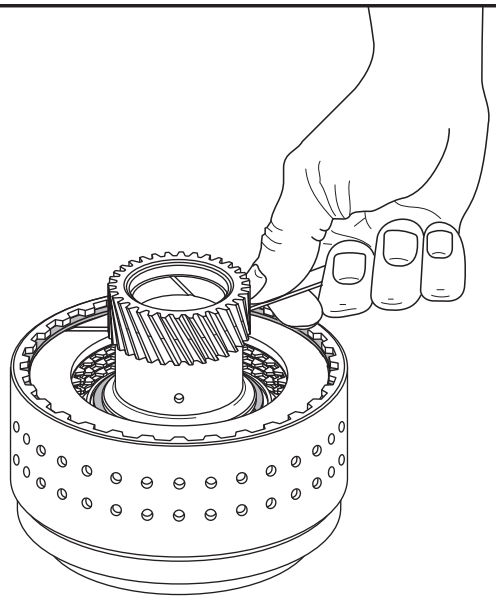
Figure 191

COMPONENT REBUILD SECTION

Direct Clutch Housing Assembly (Cont'd)

13. Compress the plates by hand with a force of 49N (11 lb.) and measure with feeler gauge between the snap ring and the backing plate, as shown in Figure 192.
14. With plates compressed direct clutch clearance should be 0.6-0.8 mm (.024" - .032").
15. Change the selective snap ring as necessary, using the chart in Figure 192, to obtain proper direct clutch clearance.
16. Install the number 11 thrust bearing, as shown in Figure 193, with the needles facing up and retain with Trans-Jel®.
17. Set the completed direct clutch housing aside for the final assembly process, as shown in Figure 194.

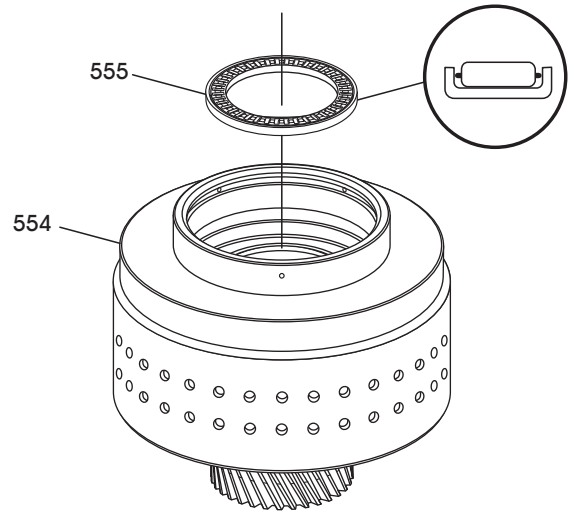
Component Rebuild
Continued on Page 105



DIRECT CLUTCH CLEARANCE SHOULD BE 0.6-0.8 MM (.024" - .032")

DIRECT CLUTCH SELECTIVE SNAP RING		
THICKNESS	I.D. SYMBOL	PART NUMBER
1.9 MM (.075")	BROWN	MD758946
2.0 MM (.079")	NONE	MD753397
2.1 MM (.083")	BLUE	MD753398
2.2 MM (.087")	BROWN	MD753399
2.3 MM (.091")	NONE	MD753400
2.4 MM (.094")	BLUE	MD753401
2.5 MM (.098")	BROWN	MD753402
2.6 MM (.102")	NONE	MD753403
2.7 MM (.106")	BLUE	MD753404
2.8 MM (.110")	BROWN	MD753405
2.9 MM (.114")	NONE	MD753406
3.0 MM (.118")	BLUE	MD753407

Figure 192



554 DIRECT CLUTCH HOUSING.
555 NUMBER 11 THRUST BEARING.

Figure 193

COMPLETED DIRECT CLUTCH HOUSING

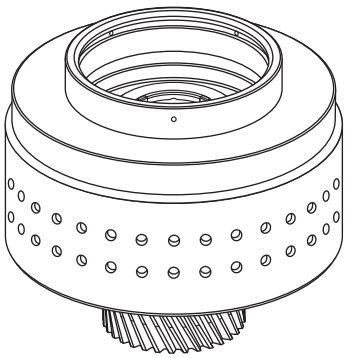
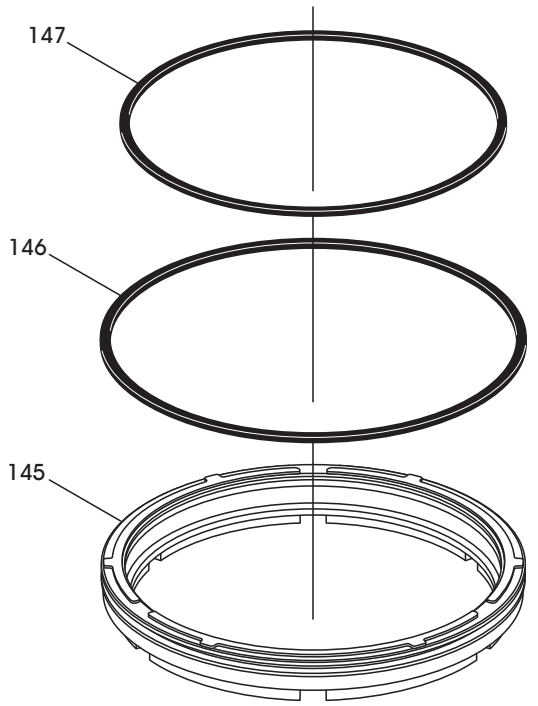
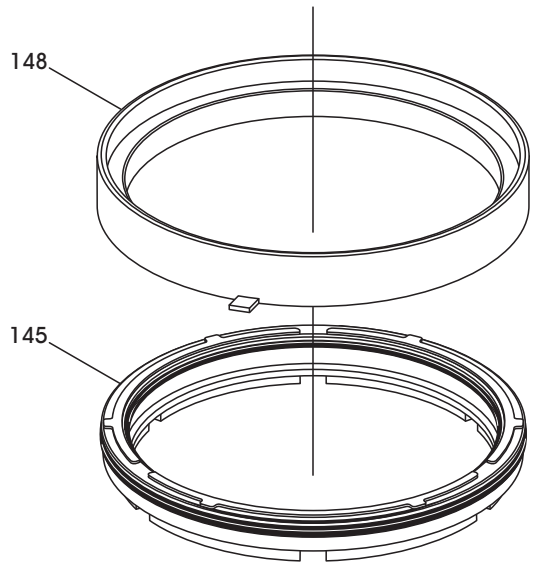


Figure 194



145 2ND CLUTCH APPLY PISTON.
146 2ND CLUTCH PISTON OUTER "D" RING SEAL.
147 2ND CLUTCH PISTON INNER "D" RING SEAL.

Figure 195



145 2ND CLUTCH APPLY PISTON AND SEALS ASSEMBLY.
148 2ND CLUTCH PISTON RETAINER.

Figure 196

COMPONENT REBUILD SECTION

Second Clutch Piston And Retainer

1. Install new inner and outer "D" ring seals onto the 2nd clutch piston, as shown in Figure 195, and lube with a small amount of Trans-Jel®.
2. Lube the inside seal surfaces of the retainer with a small amount of Trans-Jel® and install the piston assembly into the retainer, as shown in Figure 196.
3. Use care so as not to cut the "D" ring seals during installation.
4. Set completed 2nd clutch piston and retainer assembly aside for the final assembly process, as shown in Figure 197.

COMPLETED 2ND CLUTCH PISTON AND RETAINER ASSEMBLY

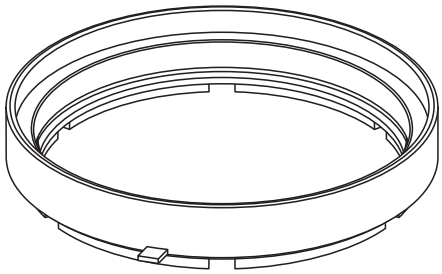
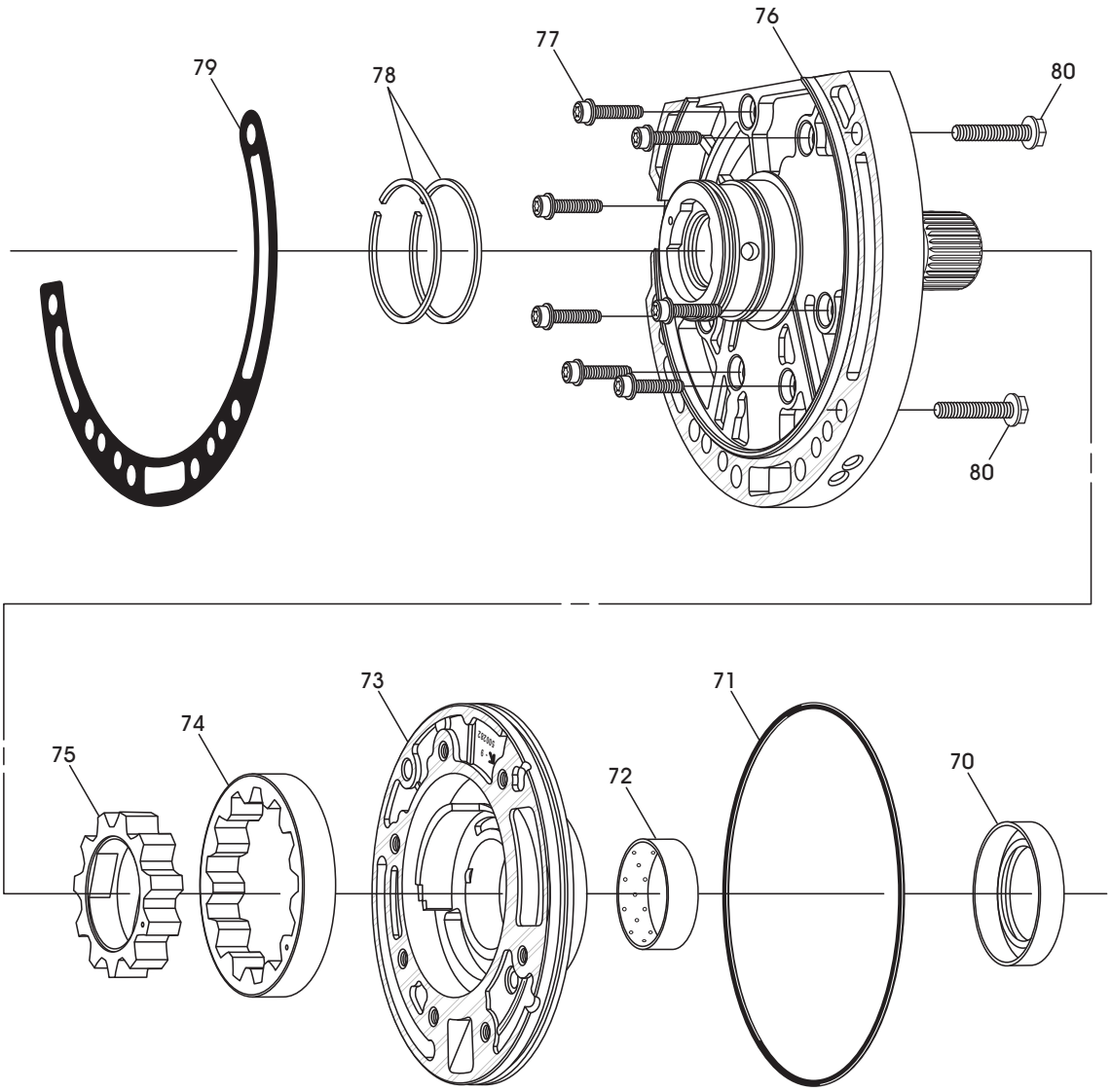
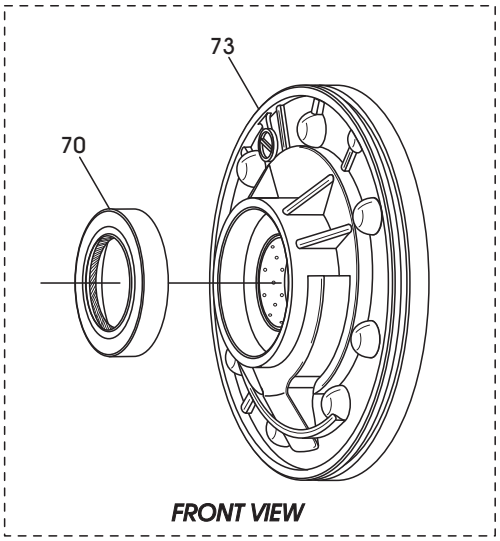


Figure 197

Component Rebuild
Continued on Page 106

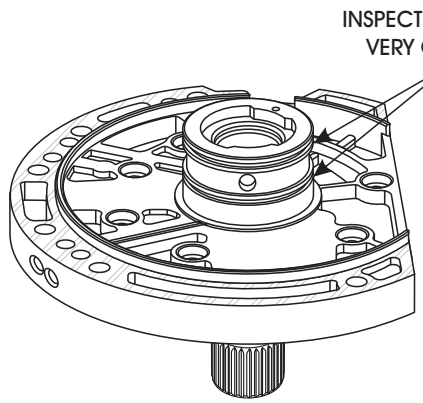
OIL PUMP ASSEMBLY, EXPLODED VIEW

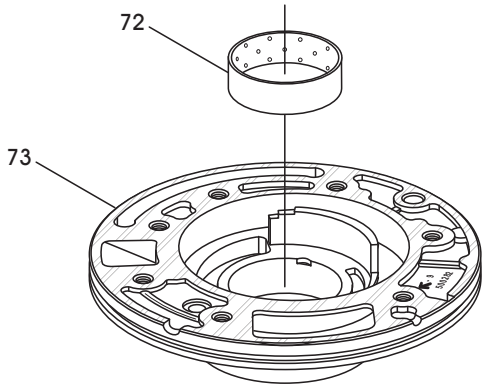




70 OIL PUMP CONVERTER HUB SEAL.
71 OIL PUMP BODY "O" RING SEAL.
72 OIL PUMP BODY BUSHING.
73 OIL PUMP BODY.
74 OIL PUMP BODY OUTER GEAR.
75 OIL PUMP BODY INNER GEAR.
76 OIL PUMP COVER/STATOR SHAFT ASSEMBLY.
77 PUMP COVER TO PUMP BODY RETAINING BOLTS (7 REQUIRED).
78 OIL PUMP STEEL SEALING RINGS.
79 OIL PUMP ASSEMBLY TO CASE GASKET.
80 OIL PUMP TO CASE RETAINING BOLTS (6 REQUIRED).

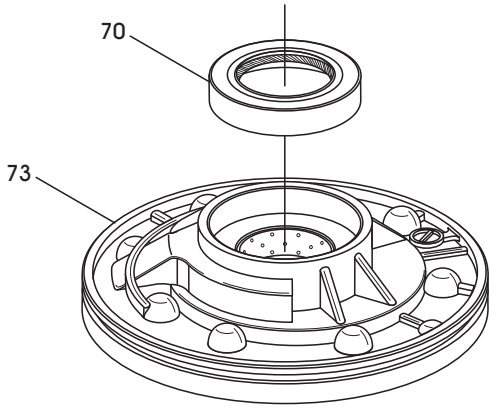
Figure 198





72 OIL PUMP BODY BUSHING.
73 OIL PUMP BODY.

Figure 199



70 OIL PUMP CONVERTER HUB SEAL.
73 OIL PUMP BODY.

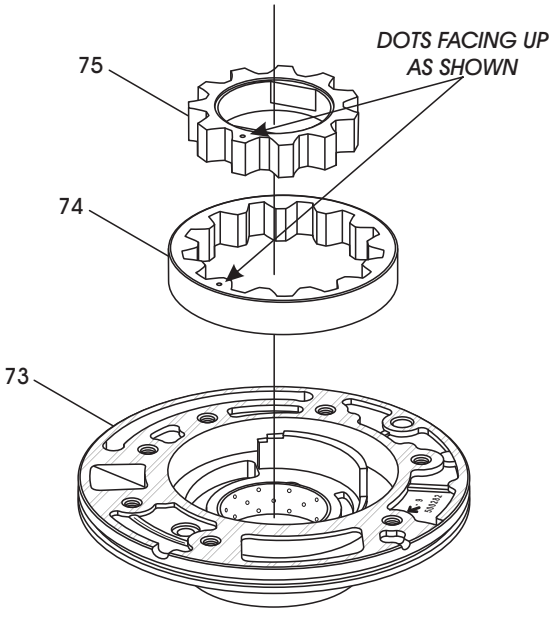
Figure 200

COMPONENT REBUILD SECTION

Oil Pump Assembly

1. Disassemble the oil pump assembly using Figure 198 as a guide.
2. Remove and discard oil pump gasket, "O" ring seal and converter seal (See Figure 198).
3. Clean all oil pump parts thoroughly with good cleaning solution and dry with compressed air.
4. Inspect all oil pump parts thoroughly for any wear and/or damage.
   Note: Inspect ring lands on the pump cover very carefully, as shown in Figure 199. It is very common to see wear here.
5. Install new oil pump bushing if necessary, as shown in Figure 199, using the proper bushing driver.
6. Turn oil pump over and install new converter seal, as shown in Figure 200, using the proper seal installer.
7. Turn the oil pump over and install pump gears into the pump pocket, as shown in Figure 201, with the "Dots" facing UP, as shown.
   Note: Lubricate pump gears and pocket with liberal amount of ATF.

Continued on Page 108



73 OIL PUMP BODY.
74 OIL PUMP BODY OUTER GEAR.
75 OIL PUMP BODY INNER GEAR.

Figure 201

SONNAX® PUMP ALIGNMENT TOOL

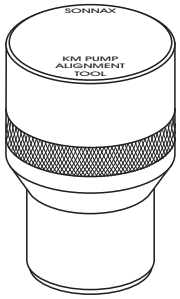
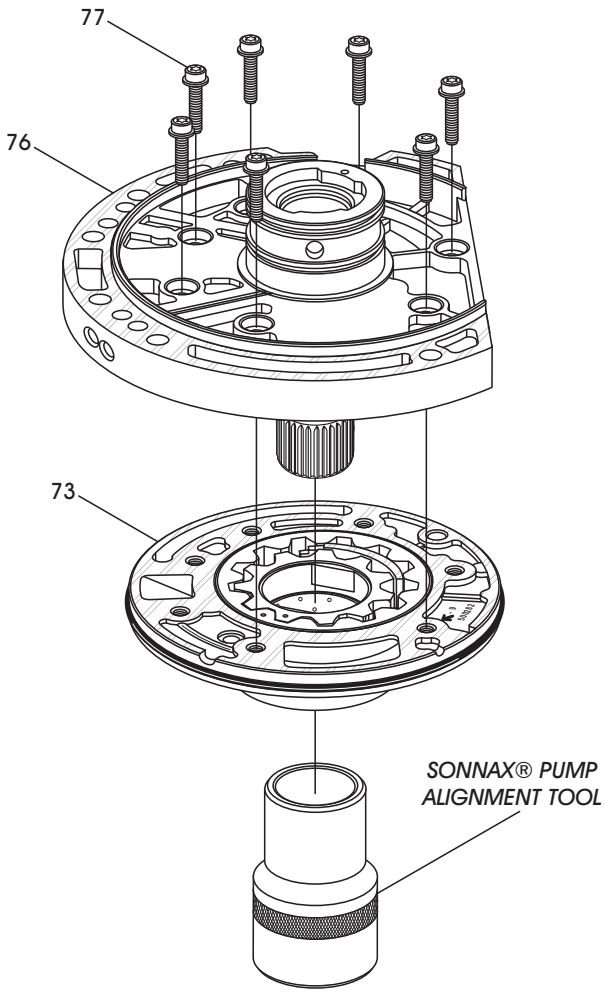


Figure 202



73 COMPLETED OIL PUMP BODY.
76 OIL PUMP COVER/STATOR SHAFT ASSEMBLY.
77 PUMP COVER TO PUMP BODY RETAINING BOLTS (7 REQUIRED).

Figure 203

COMPONENT REBUILD SECTION

Oil Pump Assembly (Cont'd)

8. There is available from Sonnax®, an oil pump alignment tool, that is ***mandatory*** for proper oil pump to cover alignment (See Figure 202).
9. Install the pump alignment tool through the bushing, as shown in Figure 203, and set the completed oil pump body assembly on flat surface.
10. Install the oil pump cover through and into the pump alignment tool, as shown in Figure 203.
11. Install the oil pump to pump cover retaining bolts, as shown in Figure 203.
12. Torque oil pump to pump cover retaining bolts to 10 N·m (88 in.lb.), as shown in Figure 204, using a criss-cross pattern.
    Note: The oil pump alignment tool "Must" remain in place until the torque process is completed.

Continued on Page 109

TORQUE COVER TO BODY BOLTS TO 10 NM (88 IN.LB.) WITH THE ALIGNMENT TOOL IN PLACE

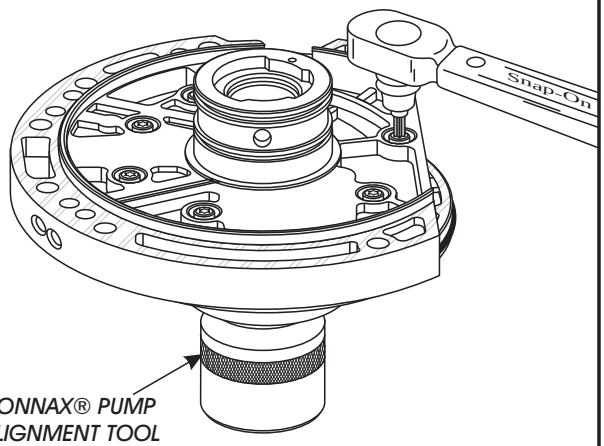


Figure 204

COMPONENT REBUILD SECTION

Oil Pump Assembly (Cont'd)

13. Install the underdrive clutch sealing rings, as shown in Figure 205, and ensure that they are properly hooked and have free rotation.
14. Turn the completed assembly over and remove the pump alignment tool.
15. Install the oil pump to case "O" ring seal, as shown in Figure 206, and lubricate with small amount of Trans-Jel®.
16. Set the completed oil pump assembly aside for the final assembly process (See Figure 207).

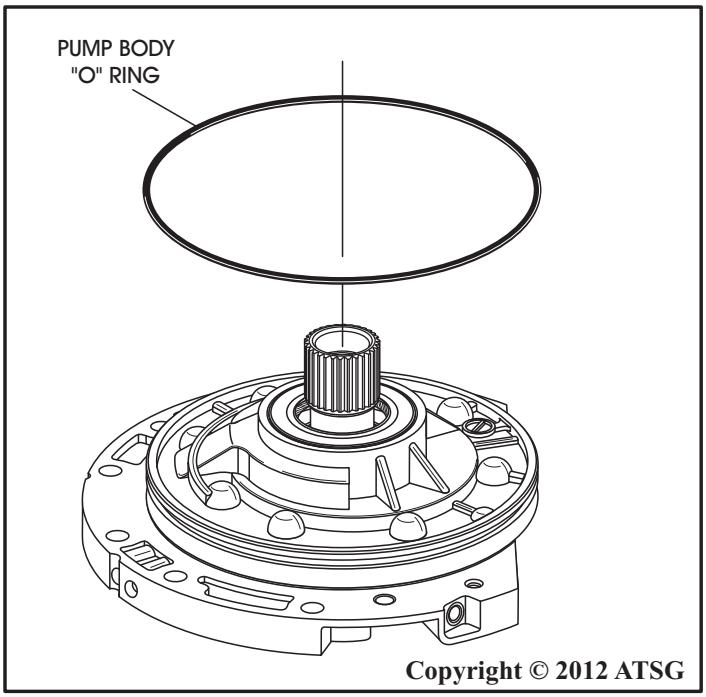


Figure 206

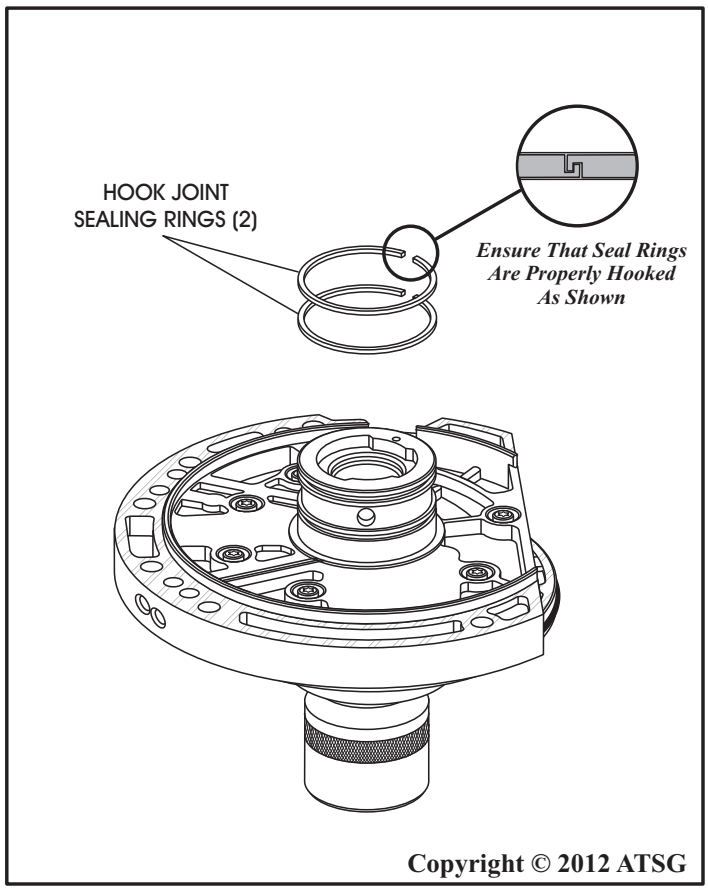


Figure 205

Component Rebuild
Continued on Page 110

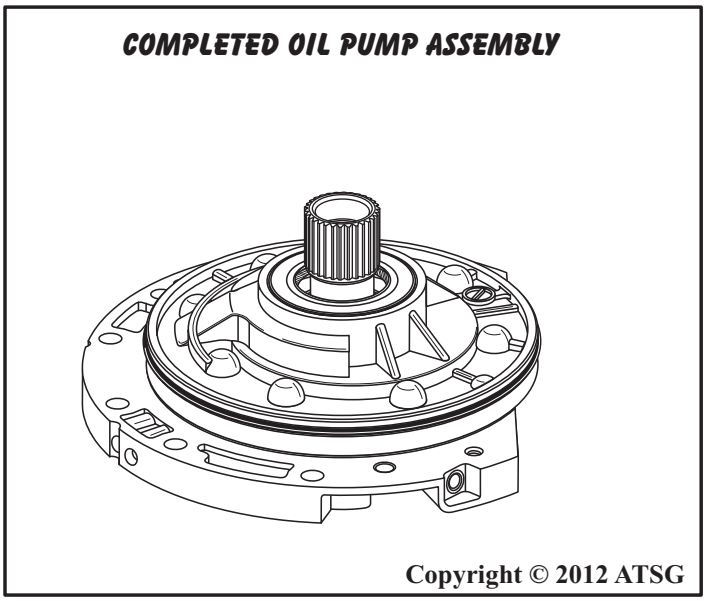


Figure 207

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

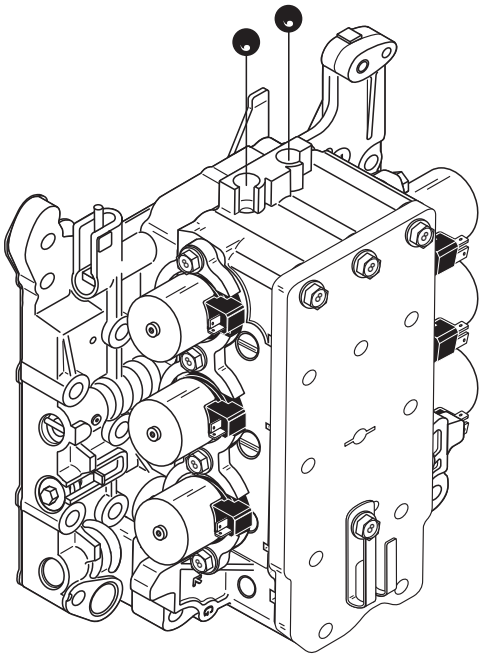


Figure 208

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

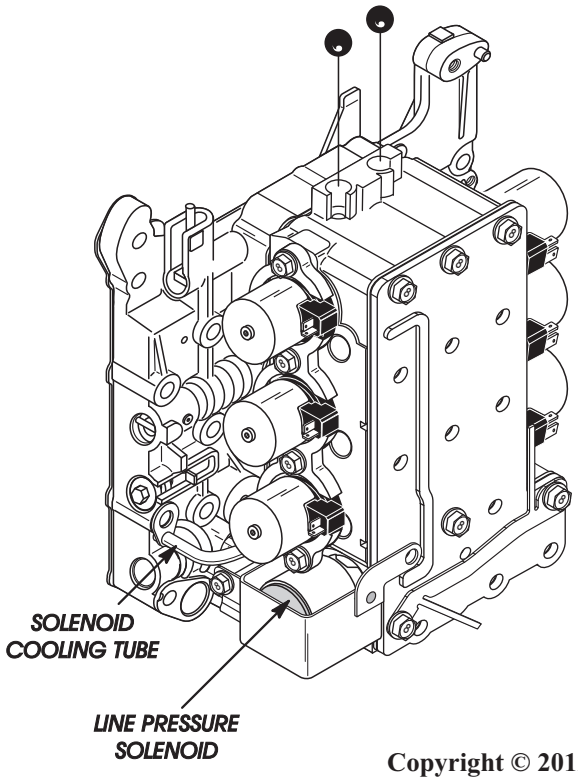


Figure 209

COMPONENT REBUILD SECTION

CAUTION - CAUTION - CAUTION

Component rebuild of the valve body is in two different sections because of the two different valve bodies. "Section One" will cover only the "Mitsubishi", "Pre-06 Kia" & "Pre-07 Hyundai" and is found on Page 111 thru 118.

"Section Two" will cover only the valve body assembly for the "06-Up Kia" & "07-Up Hyundai" models and begins on Page 119.

The valve body for Mitsubishi, Pre-2006 Kia and the Pre-2007 Hyundai, is shown in Figure 208, and is equipped with 6 shift solenoids.

The valve body for 2006-Up Kia and 2007-Up Hyundai, is shown in Figure 209, and is equipped with an additional Line Pressure Solenoid and a cooling tube for the solenoid.

These two valve bodies are totally different and will not interchange, nor will any of the components. All of the worm tracks, spacer plates and cover plates are different.

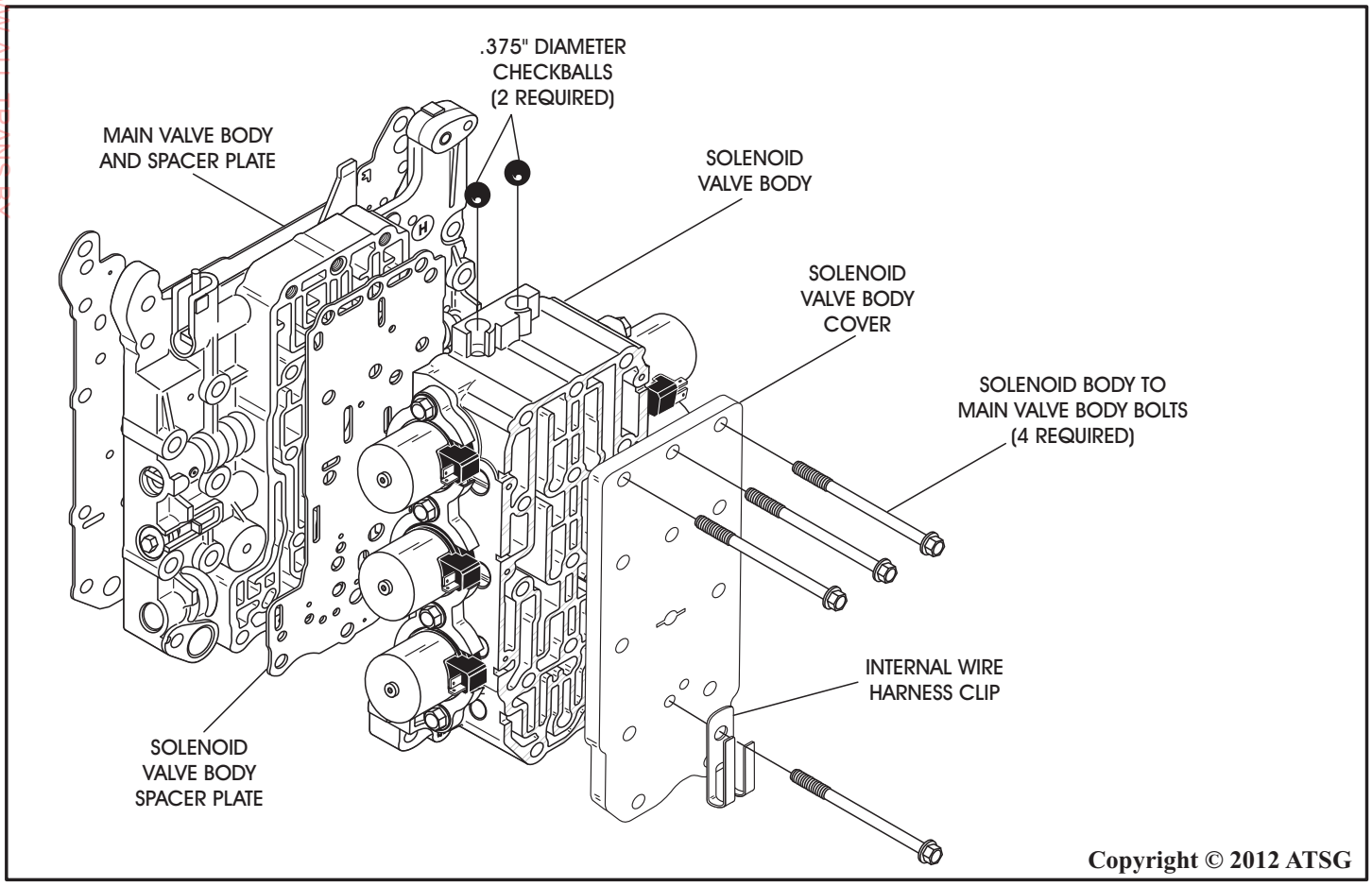


Figure 210

COMPONENT REBUILD SECTION
VALVE BODY "SECTION ONE"
"MITSUBISHI", "PRE-06 KIA" & "PRE-07 HYUNDAI"

"Section One" Valve Body Assembly

1. Remove the two exhaust check balls from the top of the solenoid body and place in a safe location, as shown in Figure 210.
2. Remove the four solenoid body to main valve body retaining bolts, as shown in Figure 210.
3. Remove the solenoid body cover, the solenoid valve body, and solenoid body spacer plate, as shown in Figure 210.
4. Remove the two check balls and springs, and the check ball from the bath tub location from the front side of main valve body, as shown in Figure 212, and place in a safe location.

Continued on Page 112

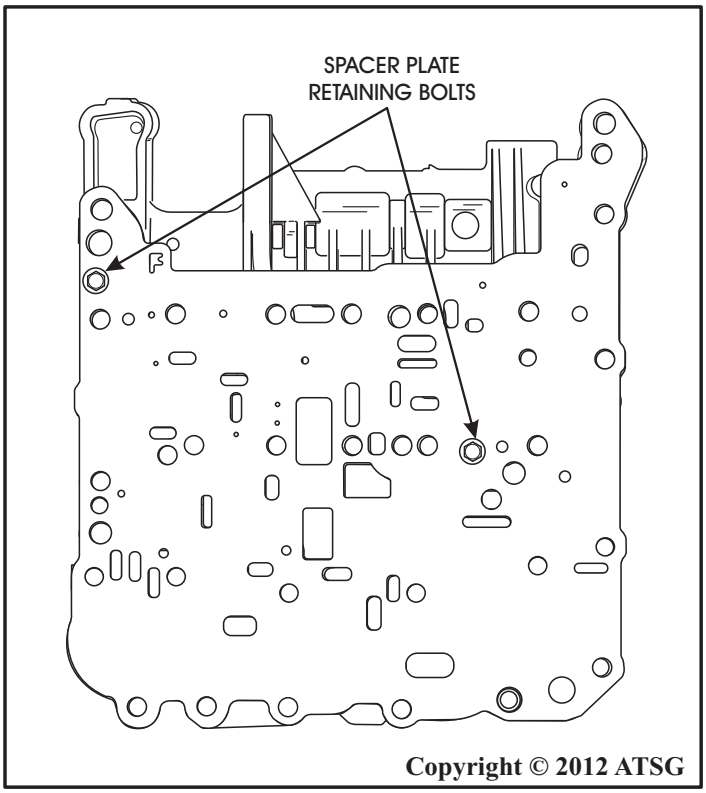


Figure 211

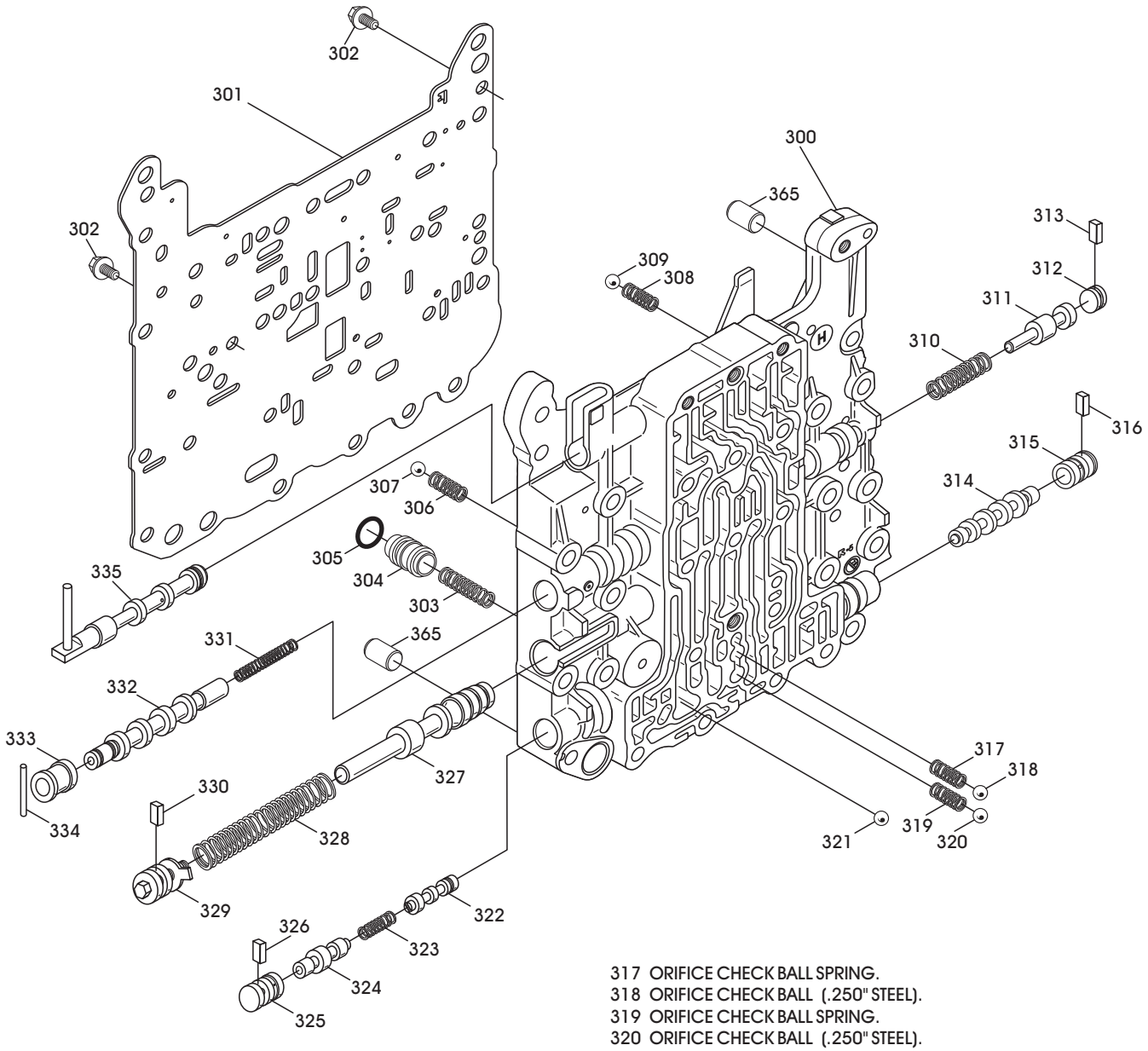
COMPONENT REBUILD SECTION
VALVE BODY "SECTION ONE"
"MITSUBISHI", "PRE-06 KIA" & "PRE-07 HYUNDAI"

"Section One" Valve Body Assembly (Cont'd)

5. Turn the main valve body over and remove the two main spacer plate retaining bolts, as shown in Figure 211.
6. Remove the two check balls and springs, and the check valve and spring from this side of the valve body and place in a safe location.
7. Disassemble the complete main valve body using Figure 212 as a guide.
   Note: Place the valves, springs, bore plugs and retainers on appropriate trays exactly as they were removed, as shown in Figure 212.
8. Clean all main valve body parts thoroughly and dry with compressed air.
9. Inspect all main valve body parts thoroughly for any wear and/or damage.
10. Assemble the main valve body parts ***exactly***, as shown in Figure 212, and lube with the proper ATF as they are installed.

Continued on Page 114

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



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

Figure 212

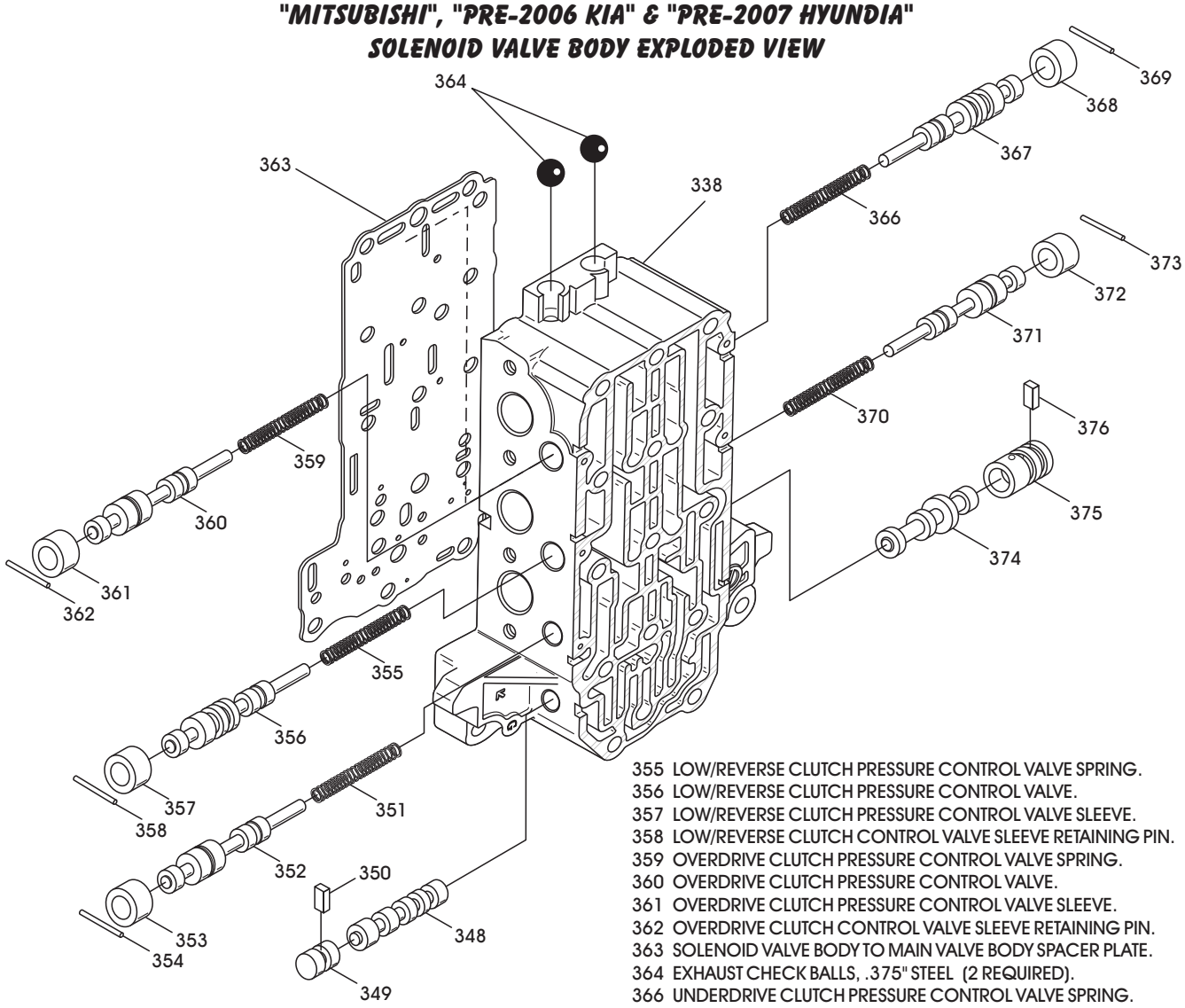
COMPONENT REBUILD SECTION
VALVE BODY "SECTION ONE"
"MITSUBISHI", "PRE-06 KIA" & "PRE-07 HYUNDAI"

"Section One" Valve Body Assembly (Cont'd)

11. Disassemble solenoid valve body and place the valves, springs, retainers in appropriate trays exactly as they were removed (See Figure 213).
12. Clean all solenoid valve body parts thoroughly and dry with compressed air.
13. Assemble solenoid valve body parts ***exactly,*** as shown in Figure 213, and lube with ATF as they are installed.

Continued on Page 115

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



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

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

Figure 213

COMPONENT REBUILD SECTION
VALVE BODY "SECTION ONE"
"MITSUBISHI", "PRE-06 KIA" & "PRE-07 HYUNDAI"

"Section One" Valve Body Assembly (Cont'd)

14. The overdrive, low/reverse, reduction band, 2nd clutch, underdrive and the TCC solenoids are all the same, and will interchange in any of their positions (See Figure 214).
15. The OEM part number for all solenoids, at time of this printing, is MD758981, and are also available from several aftermarket sources.
16. All solenoids can be air checked using the procedure shown in Figure 215.
17. Install new solenoid to solenoid body casting seal, as shown in Figure 215, on all solenoids. ***Note: These solenoid seals are included in most gasket and seal packages.***
18. Install new "O" rings onto the solenoids, as shown in Figure 215, and lubricate with small amount of Trans-Jel®.
19. Install all of the solenoid assemblies into the locations shown in Figure 214.
20. Install both solenoid retainers and bolts, and torque the bolts to 6 N·m (55 in.lb.).

Continued on Page 116

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

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

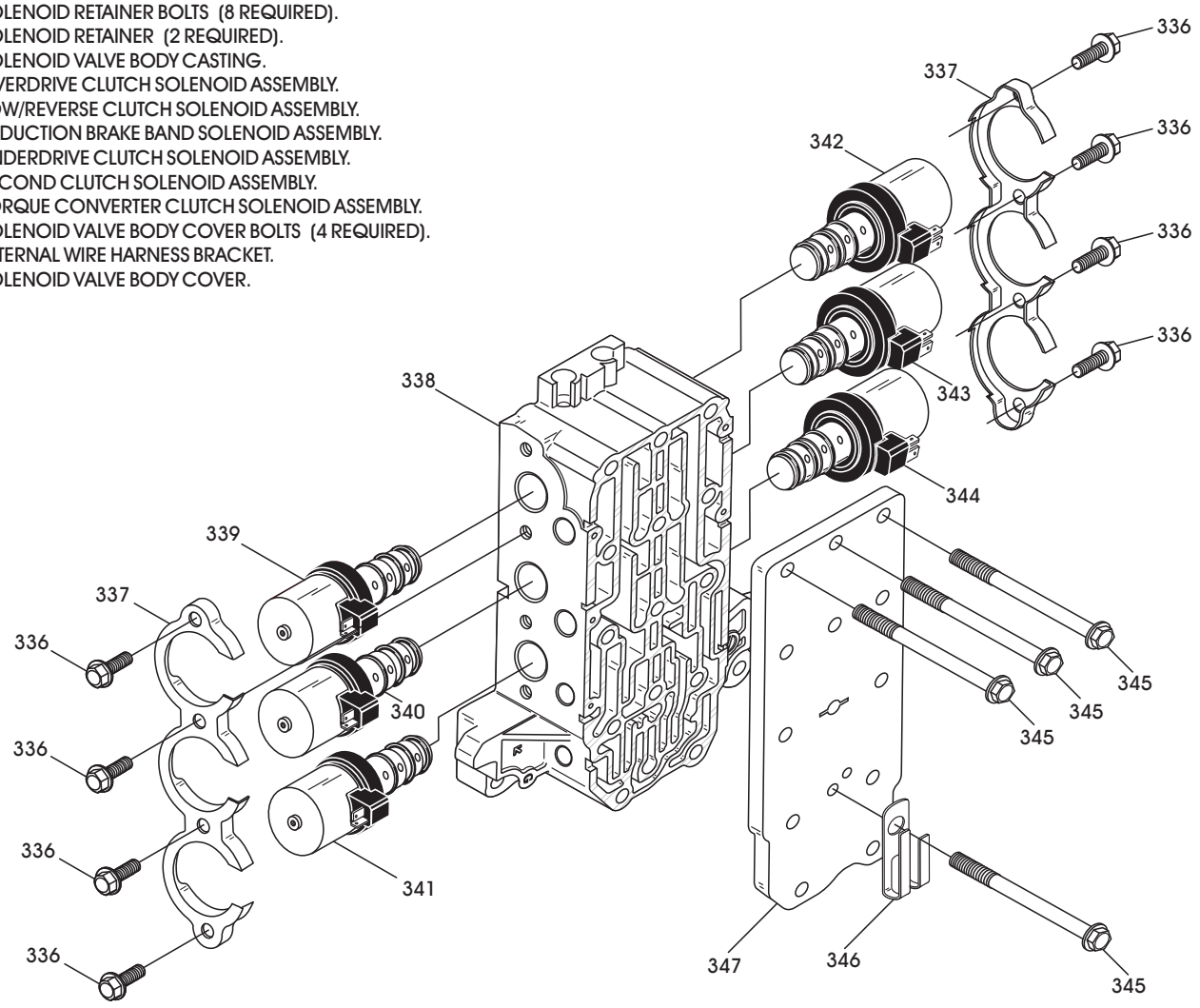


Figure 214

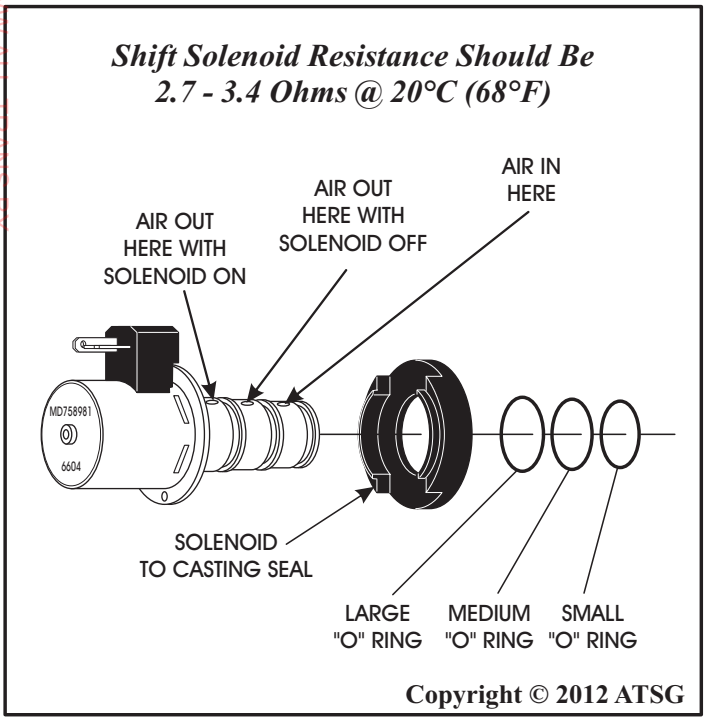


Figure 215

COMPONENT REBUILD SECTION
VALVE BODY "SECTION ONE"
"MITSUBISHI", "PRE-06 KIA" & "PRE-07 HYUNDAI"

"Section One" Valve Body Assembly (Cont'd)

21. The main valve body and solenoid valve body retainer locations have been provided for you in Figure 216.
22. Lay the assembled main valve body on a flat work surface, as shown in Figure 217.
23. Install the "C" check ball and spring with the spring going in first, as shown in Figure 217.
24. Install the "D" check ball and spring with the spring going in first, as shown in Figure 217.
25. Install new seal on the damping valve "E" and install assembly with the spring going in first, as shown in Figure 217.
    Note: Spring and check ball dimensions are shown in Figure 217.

Continued on Page 117

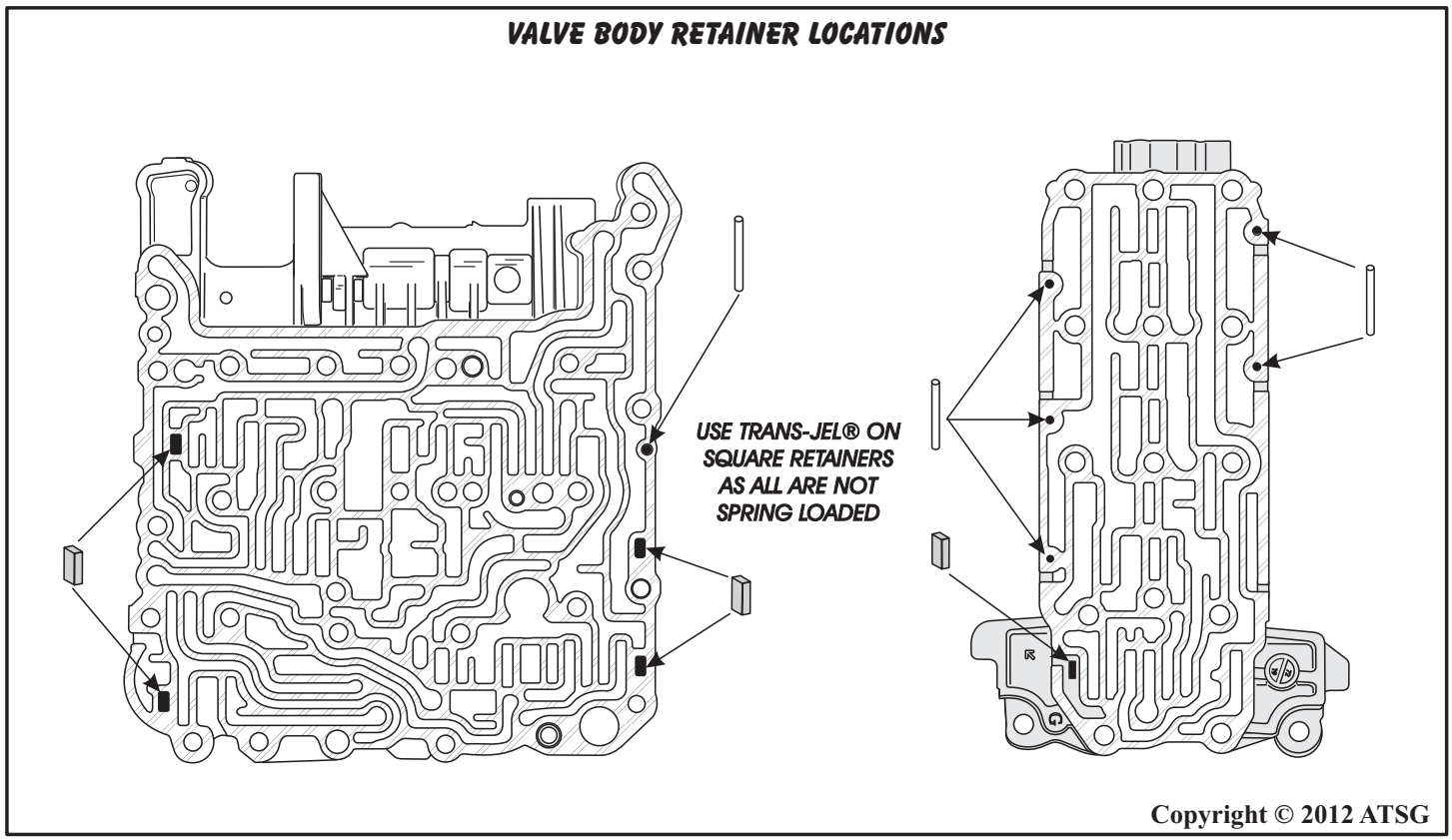


Figure 216

COMPONENT REBUILD SECTION
VALVE BODY "SECTION ONE"
"MITSUBISHI", "PRE-06 KIA" & "PRE-07 HYUNDAI"

"Section One" Valve Body Assembly (Cont'd)

26. Install the hollow dowels into the valve body in positions shown in Figure 218.
    Note: May still be stuck in case.
27. Install the main valve body spacer plate and bolts, as shown in Figure 218. Torque spacer plate bolts to 6 N·m (55 in.lb.).
28. Turn the valve body over with the spacer plate facing down, as shown in Figure 219.
29. Install the "A" check ball and spring with the spring going in first, as shown in Figure 219.
30. Install the "B" check ball and spring with the spring going in first, as shown in Figure 219.
31. Install the last check ball into the bath tub, as shown in Figure 219.
    Note: Spring and check ball dimensions are shown in Figure 219.

Continued on Page 118

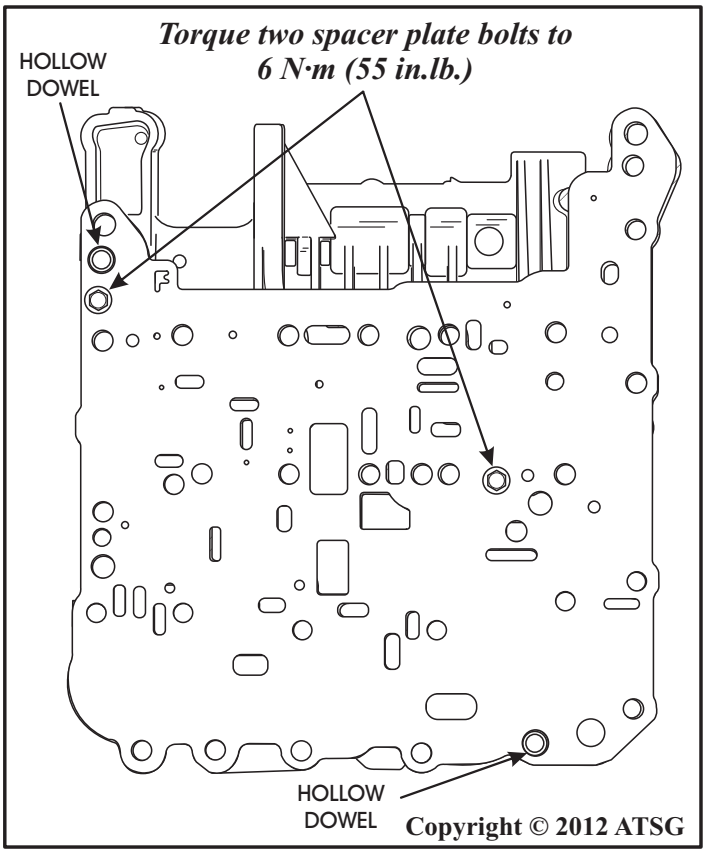
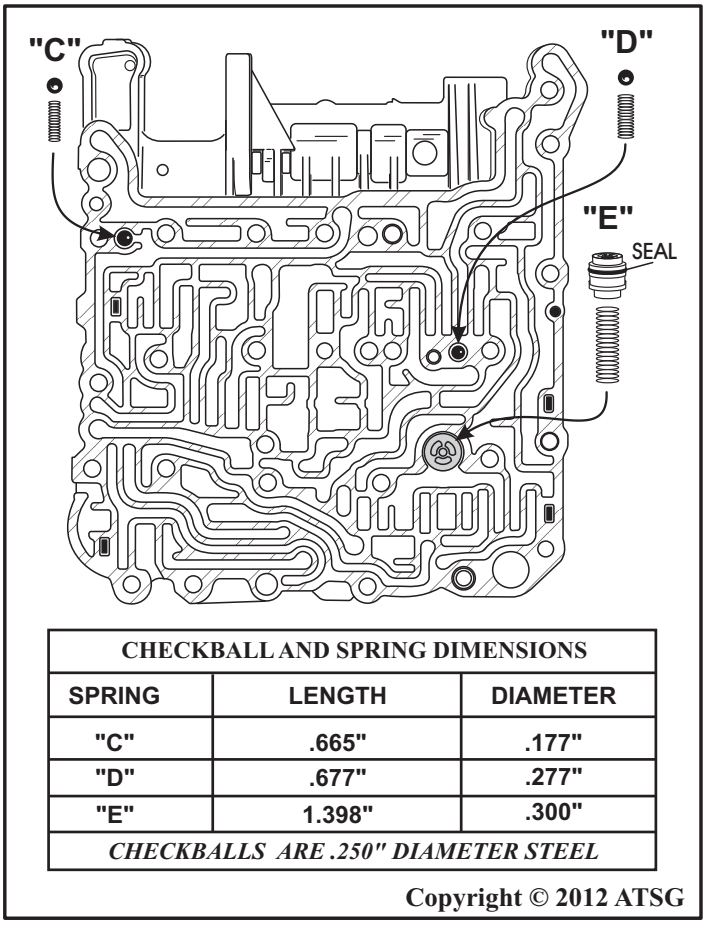
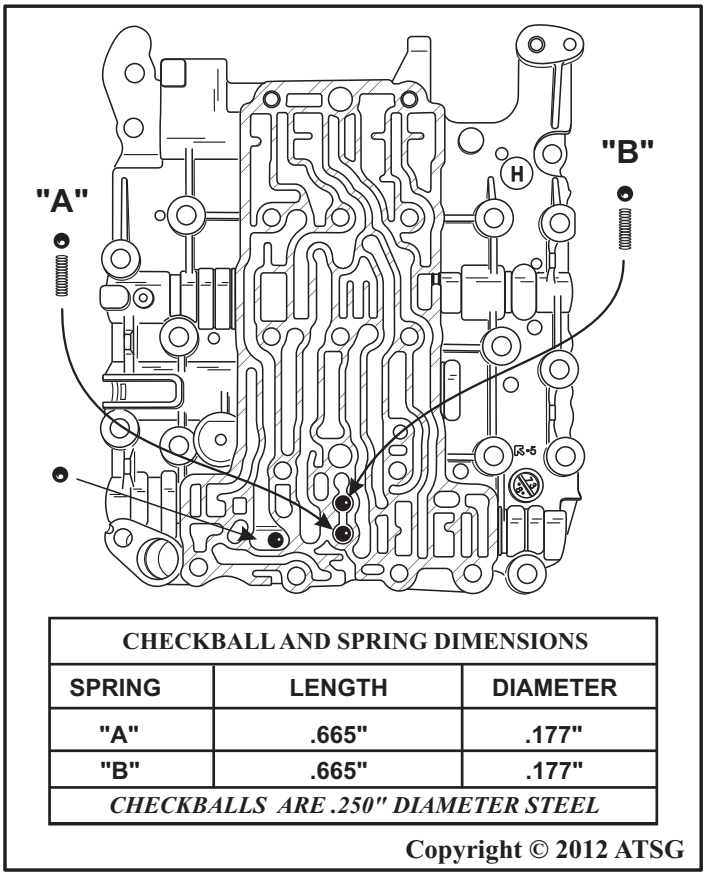


Figure 218



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

Figure 217



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

Figure 219

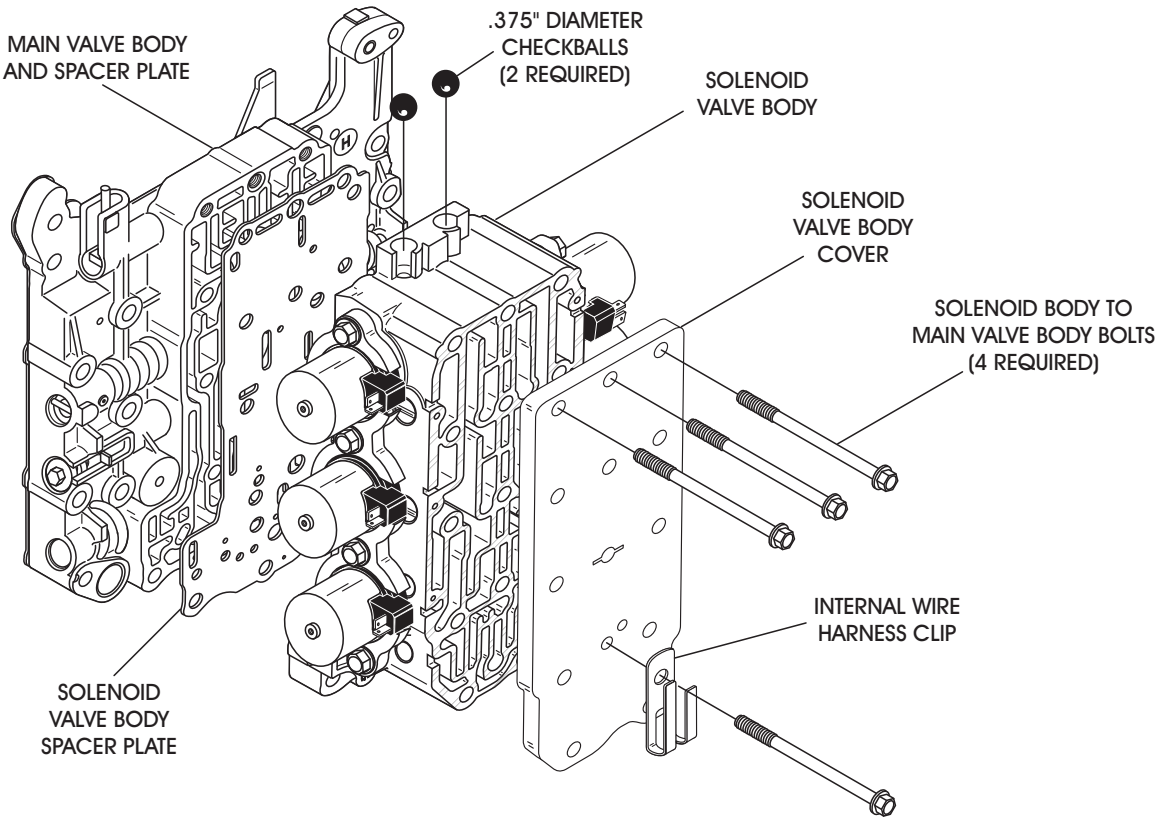


Figure 220

COMPONENT REBUILD SECTION
VALVE BODY "SECTION ONE"
"MITSUBISHI", "PRE-06 KIA" & "PRE-07 HYUNDAI"

"Section One" Valve Body Assembly (Cont'd)

32. Install the solenoid body spacer plate, solenoid body and the solenoid body cover, as shown in Figure 220.
33. Install the four solenoid body to main valve body bolts in locations shown in Figure 220. ***Note: Hand tighten the bolts as the torque process will follow in final assembly.***
34. Set the completed valve body assembly aside for final assembly process (See Figure 221).

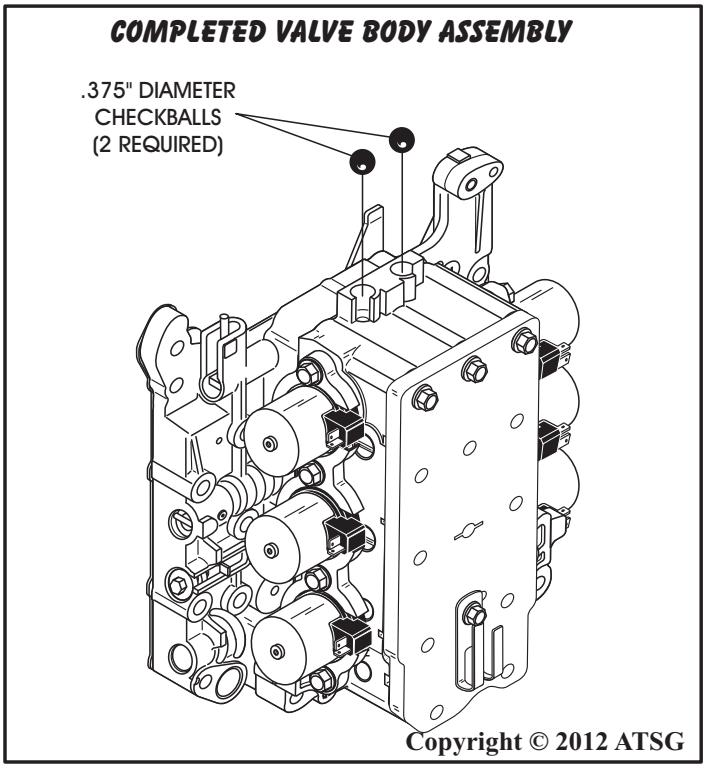


Figure 221

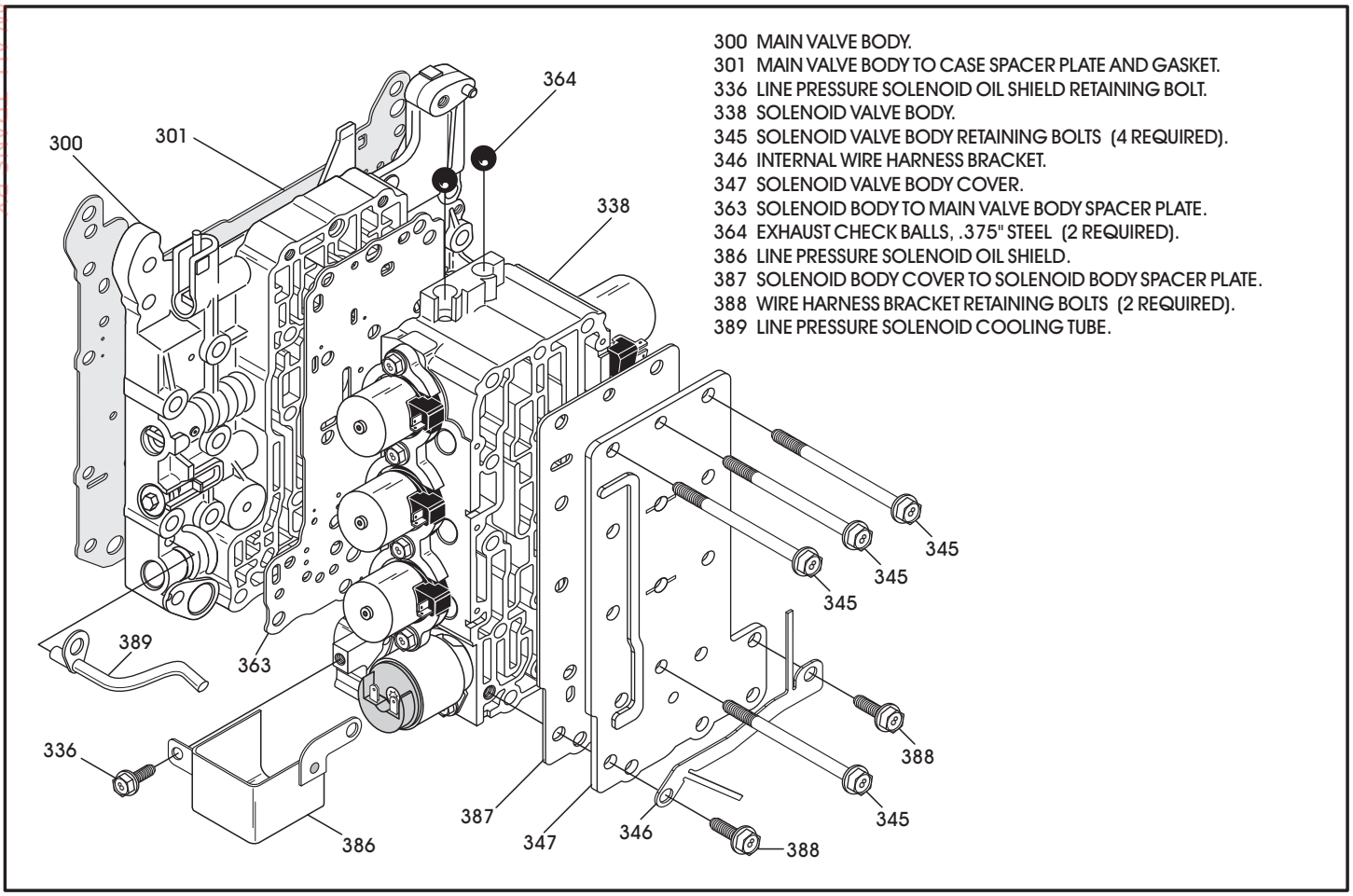


Figure 222

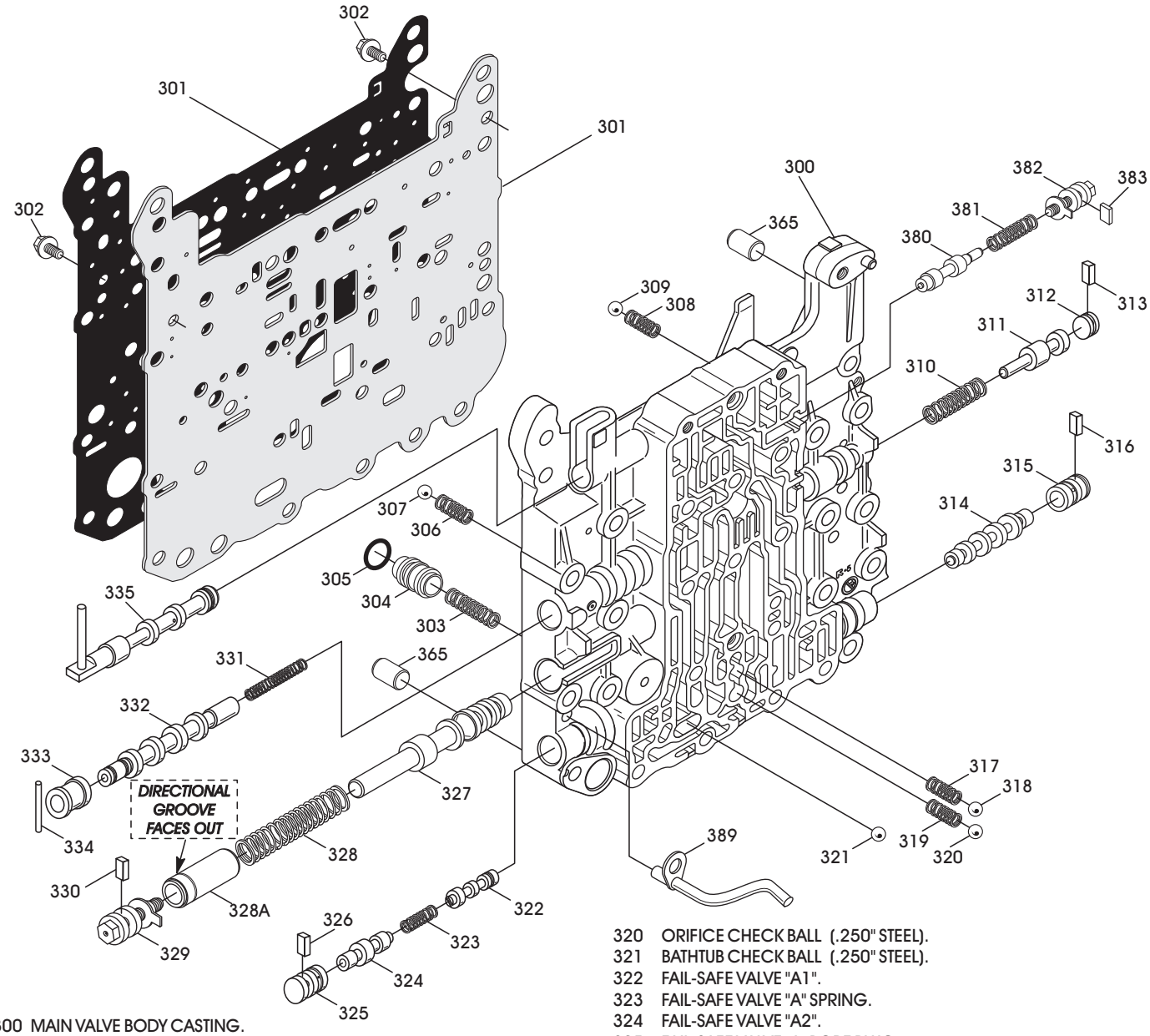
COMPONENT REBUILD SECTION
VALVE BODY "SECTION TWO"
"2006-UP KIA" & "2007-UP HYUNDAI"

"Section Two" Valve Body Assembly

1. Remove the two exhaust check balls from the top of the solenoid body and place in a safe location, as shown in Figure 222.
2. Remove the line pressure solenoid cooling tube, as shown in Figure 222, which is held in place by a valve body to case bolt and place it in safe location.
3. Remove line pressure solenoid oil shield (386), as shown in Figure 222, place in safe location.
4. Remove the 2 solenoid body cover bolts (388), as shown in Figure 222, which also retains the internal wire harness bracket, and place in safe location.
5. Remove the four solenoid body to main valve body retaining bolts, as shown in Figure 222.
6. Remove the solenoid body cover, the solenoid body cover spacer plate, solenoid valve body, and solenoid body spacer plate, as shown in Figure 222.
7. Remove the two check balls and springs, and the check ball from the bath tub location, as shown in Figure 223, and place in safe location.

Continued on Page 121

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



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

Figure 223

COMPONENT REBUILD SECTION
VALVE BODY "SECTION TWO"
"2006-UP KIA" & "2007-UP HYUNDAI"

"Section Two" Valve Body Assembly (Cont'd)

8. Turn the main valve body over and remove the two main spacer plate retaining bolts, as shown in Figure 224.
9. Remove the two check balls and springs, and the check valve and spring from this side of the valve body and place in a safe location.
10. Disassemble the complete main valve body using Figure 223 as a guide.
    Note: Place the valves, springs, bore plugs and retainers on appropriate trays exactly as they were removed, as shown in Figure 223.
11. Clean all main valve body parts thoroughly and dry with compressed air.
12. Inspect all main valve body parts thoroughly for any wear and/or damage.
13. Assemble the main valve body parts ***exactly***, as shown in Figure 223, and lube with the proper ATF as they are installed.
    Note: Notice that sleeve 328A in Figure 223 is directional, and groove on sleeve or the step faces out as shown.

    Note: Use small amount of Trans-Jel® to keep the square retainers in place as the bore plugs are not all spring loaded.

    Note: Notice that this valve body has two bore plugs that are adjustable. Line Pressure and Solenoid Reducing Pressure. Do not alter either adjustment.

Continued on Page 122

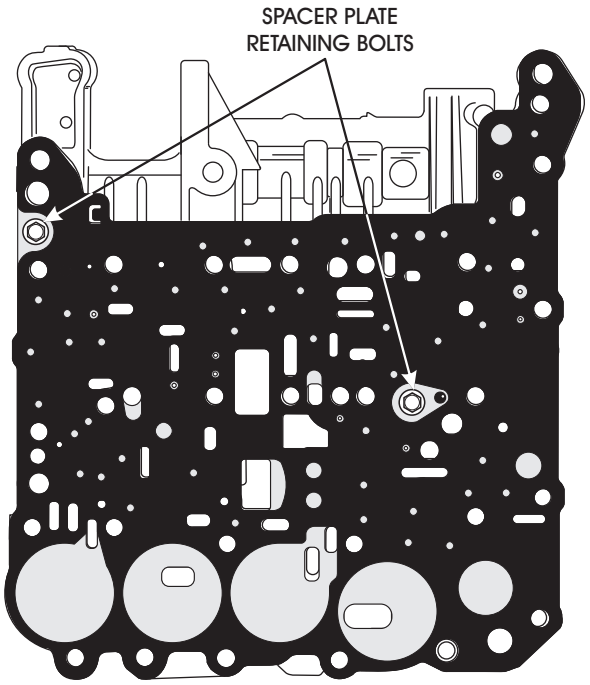
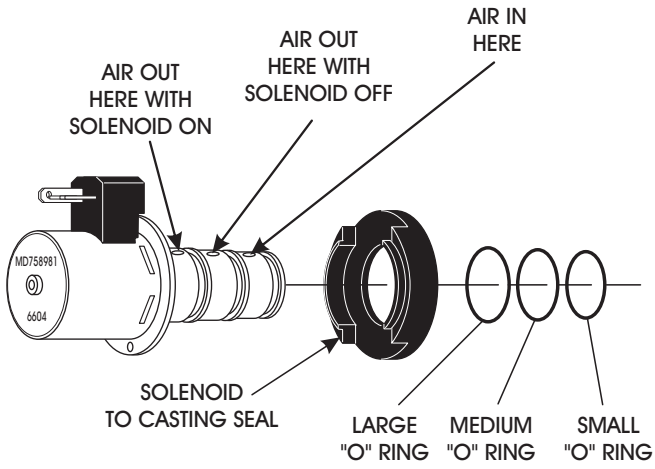


Figure 224

Shift Solenoid Resistance Should Be
2.7 - 3.4 Ohms @ 20°C (68°F)



(VFS) Line Pressure Solenoid Resistance Should Be
4.0 - 5.0 Ohms @ 20°C (68°F)

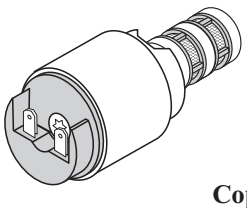


Figure 225

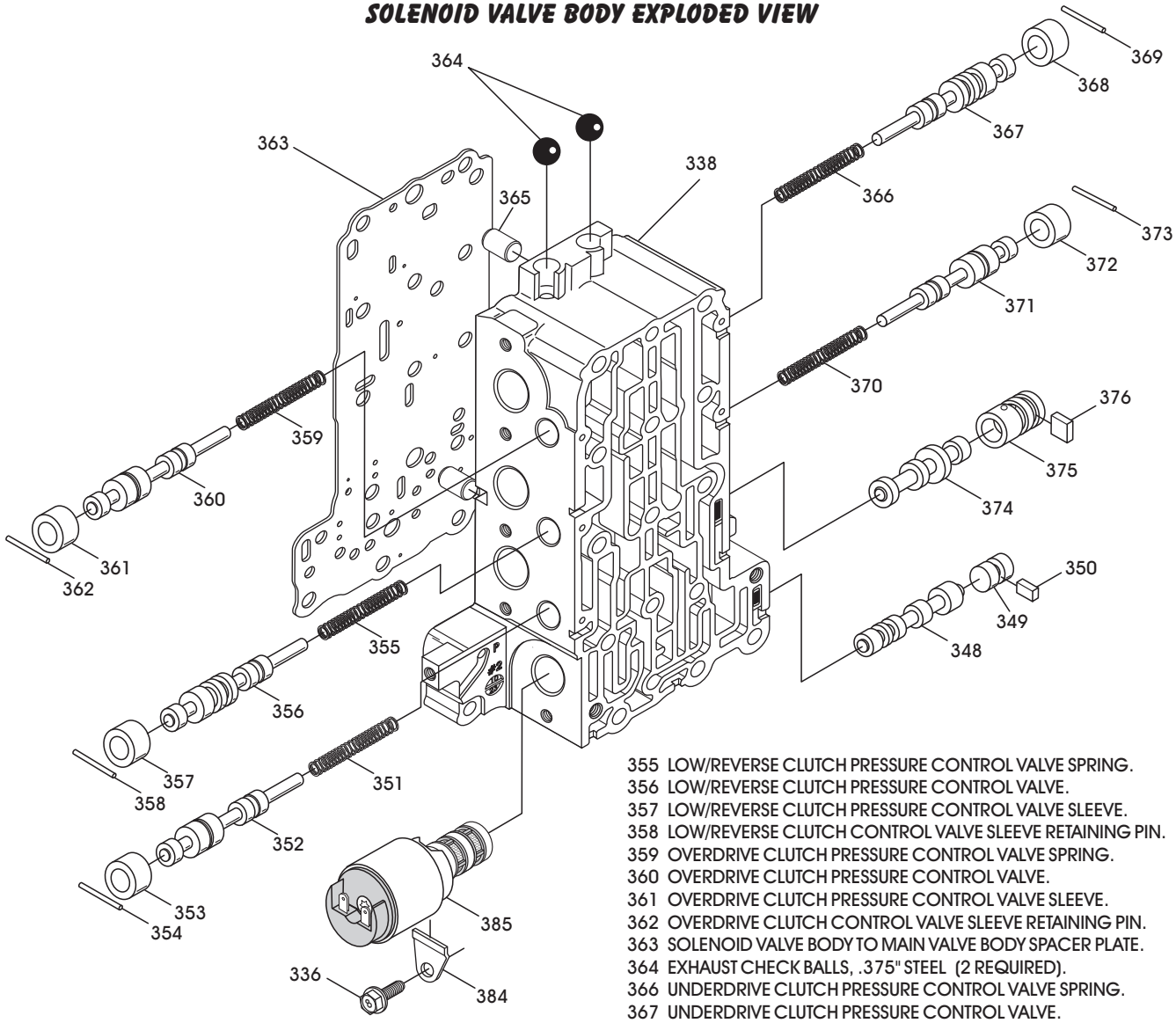
VALVE BODY "SECTION TWO"
"2006-UP KIA" & "2007-UP HYUNDAI"

"Section Two" Valve Body Assembly (Cont'd)

14. Disassemble solenoid valve body and place the valves, springs, retainers in appropriate trays exactly as they were removed (See Figure 226).
15. Clean all solenoid valve body parts thoroughly and dry with compressed air.
16. Assemble solenoid valve body parts ***exactly,*** as shown in Figure 226, and lube with ATF as they are installed.
Note: Use Trans-Jel® to keep square retainers in place as all are not spring loaded.

Continued on Page 123

SOLENOID VALVE BODY EXPLODED VIEW



336 SOLENOID RETAINING BOLT.
338 SOLENOID VALVE BODY CASTING.
348 SWITCHING VALVE.
349 SWITCHING VALVE BORE PLUG.
350 SWITCHING VALVE BORE PLUG RETAINER.
351 REDUCTION BRAKE BAND PRESSURE CONTROL VALVE SPRING.
352 REDUCTION BRAKE BAND PRESSURE CONTROL VALVE.
353 REDUCTION BRAKE BAND PRESSURE CONTROL VALVE SLEEVE.
354 REDUCTION BAND CONTROL VALVE SLEEVE RETAINING PIN.
355 LOW/REVERSE CLUTCH PRESSURE CONTROL VALVE SPRING.
356 LOW/REVERSE CLUTCH PRESSURE CONTROL VALVE.
357 LOW/REVERSE CLUTCH PRESSURE CONTROL VALVE SLEEVE.
358 LOW/REVERSE CLUTCH CONTROL VALVE SLEEVE RETAINING PIN.
359 OVERDRIVE CLUTCH PRESSURE CONTROL VALVE SPRING.
360 OVERDRIVE CLUTCH PRESSURE CONTROL VALVE.
361 OVERDRIVE CLUTCH PRESSURE CONTROL VALVE SLEEVE.
362 OVERDRIVE CLUTCH CONTROL VALVE SLEEVE RETAINING PIN.
363 SOLENOID VALVE BODY TO MAIN VALVE BODY SPACER PLATE.
364 EXHAUST CHECK BALLS, .375" STEEL (2 REQUIRED).
366 UNDERDRIVE CLUTCH PRESSURE CONTROL VALVE SPRING.
367 UNDERDRIVE CLUTCH PRESSURE CONTROL VALVE.
368 UNDERDRIVE CLUTCH PRESSURE CONTROL VALVE SLEEVE.
369 UNDERDRIVE CLUTCH CONTROL VALVE SLEEVE RETAINING PIN.
370 SECOND CLUTCH PRESSURE CONTROL VALVE SPRING.
371 SECOND CLUTCH PRESSURE CONTROL VALVE.
372 SECOND CLUTCH PRESSURE CONTROL VALVE SLEEVE.
373 SECOND CLUTCH CONTROL VALVE SLEEVE RETAINING PIN.
374 FAIL-SAFE VALVE "C".
375 FAIL-SAFE VALVE "C" SLEEVE.
376 FAIL-SAFE VALVE "C" SLEEVE RETAINER.
384 (VFS) LINE PRESSURE SOLENOID RETAINING BRACKET.
385 (VFS) LINE PRESSURE SOLENOID.

Figure 226

COMPONENT REBUILD SECTION
VALVE BODY "SECTION TWO"
"2006-UP KIA" & "2007-UP HYUNDAI"

"Section Two" Valve Body Assembly (Cont'd)

17. The overdrive, low/reverse, reduction band, 2nd clutch, underdrive and the TCC solenoids are all the same, and will interchange in any of their positions (See Figure 227).
18. The OEM part number for all shift solenoids is 46313-39051, & VFS solenoid is 46313-3A060. ***Note: Current numbers at time of this printing.***
19. All shift solenoids can be air checked using the procedure shown in Figure 225.
20. Install new solenoid to solenoid body casting seal, as shown in Figure 225, on shift solenoids. ***Note: These solenoid seals are included in most gasket and seal packages.***
21. Install new "O" rings onto shift solenoids, as shown in Figure 225, and lubricate with small amount of Trans-Jel®.
22. Install all shift solenoid assemblies into their locations, as shown in Figure 227.
23. Install both shift solenoid retainers and bolts, and torque the bolts to 6 N·m (55 in.lb.).

Continued on Page 124

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

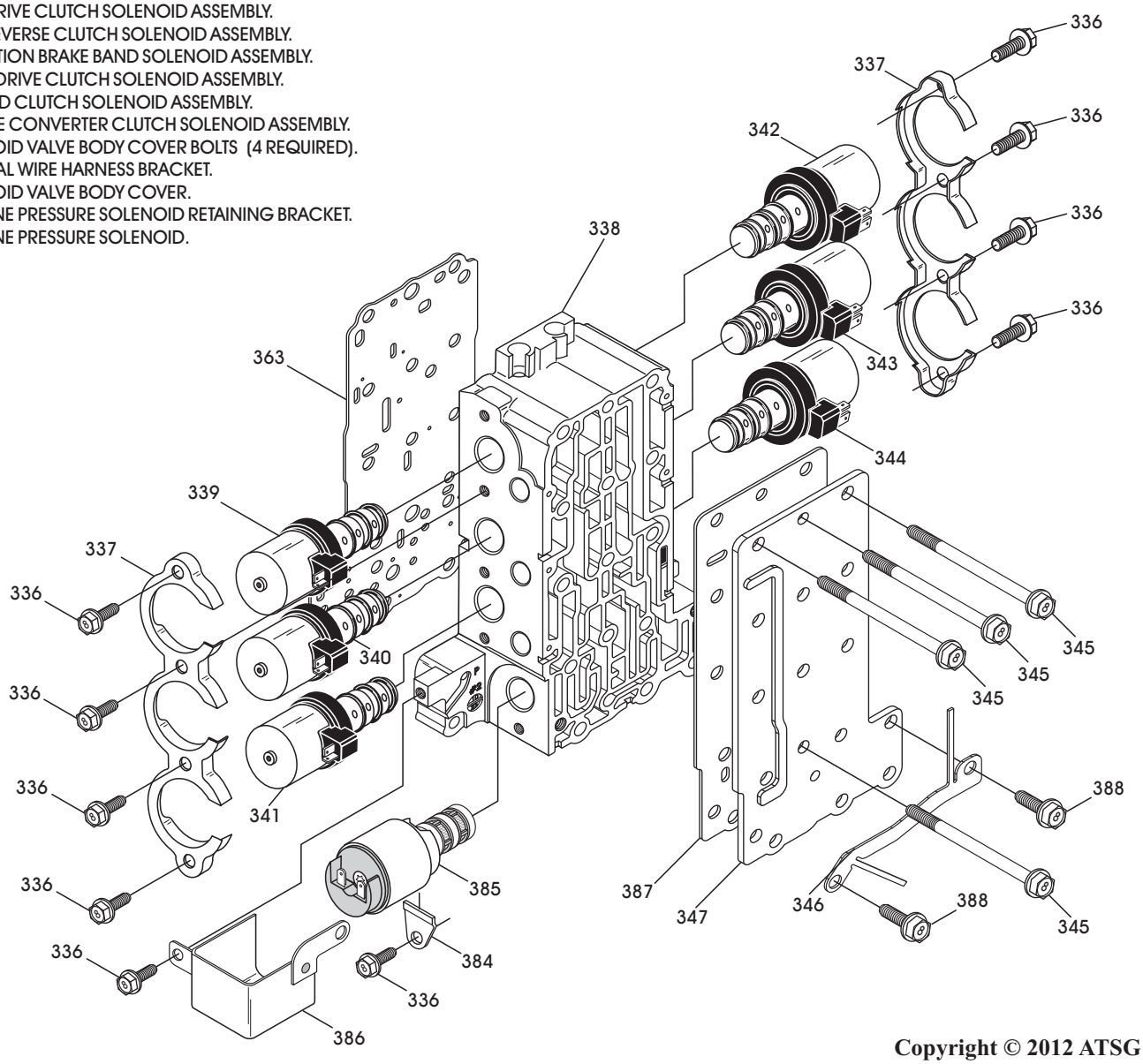


Figure 227

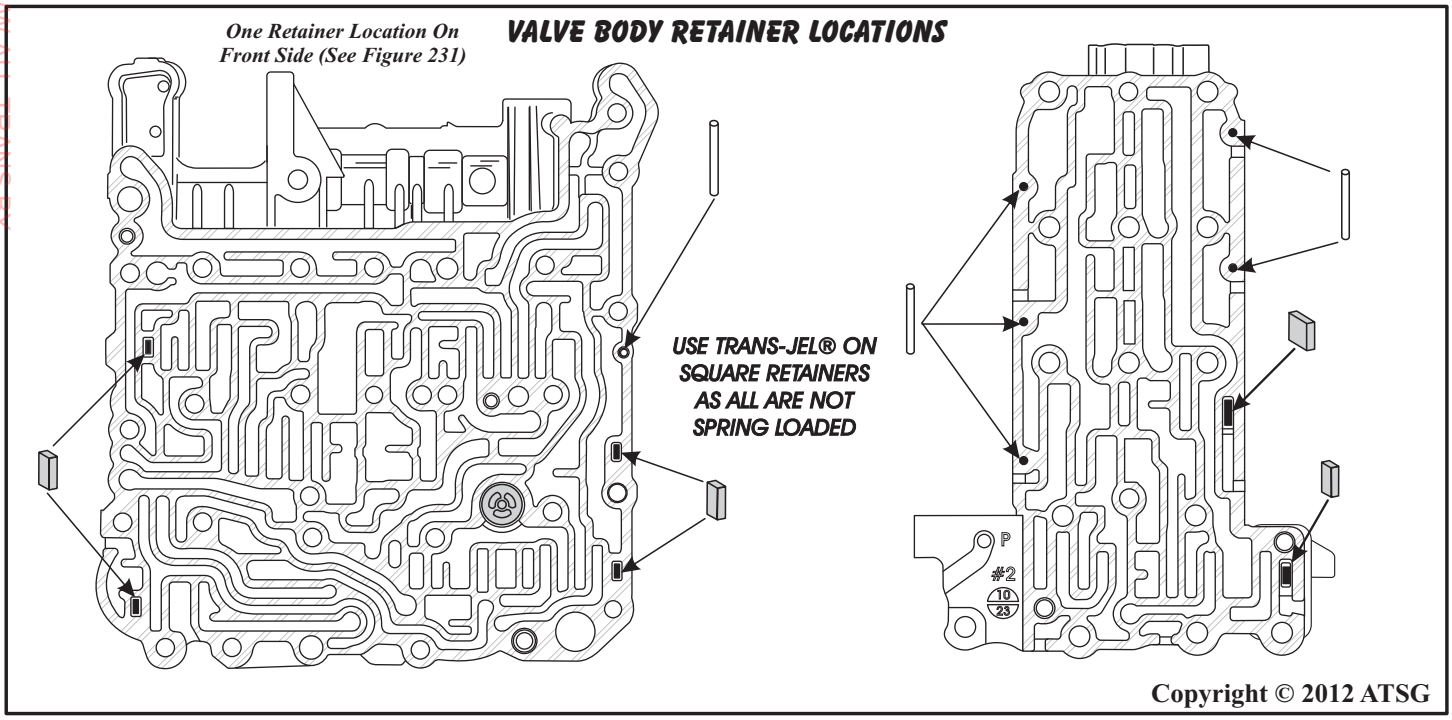


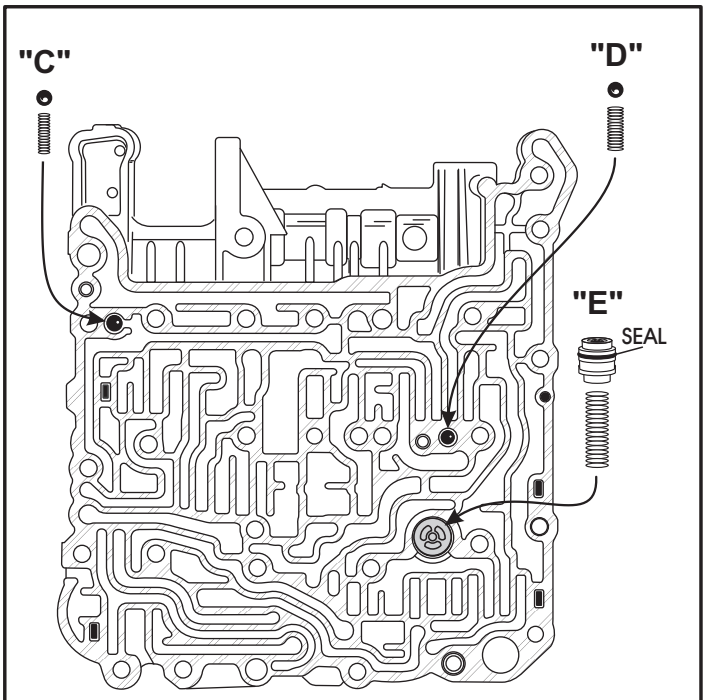
Figure 228

COMPONENT REBUILD SECTION
VALVE BODY "SECTION TWO"
"2006-UP KIA" & "2007-UP HYUNDAI"

"Section Two" Valve Body Assembly (Cont'd)

24. Install (VFS) line pressure solenoid, as shown in Figure 227, install retainer and torque the bolt to 6 N·m (55 in.lb.).
25. The main valve body and solenoid valve body retainer locations have been provided for you in Figure 228.
    Note: One retainer location is shown in Figure 231, as it is on front side.
26. Lay the assembled main valve body on a flat work surface, as shown in Figure 229.
27. Install the "C" check ball and spring with the spring going in first, as shown in Figure 229.
28. Install the "D" check ball and spring with the spring going in first, as shown in Figure 229.
29. Install new seal on the damping valve "E" and install assembly with the spring going in first, as shown in Figure 229.
    Note: Spring and check ball dimensions are shown in Figure 229.

Continued on Page 125



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

Figure 229

COMPONENT REBUILD SECTION
VALVE BODY "SECTION TWO"
"2006-UP KIA" & "2007-UP HYUNDAI"

"Section Two" Valve Body Assembly (Cont'd)

30. Install the hollow dowels into the valve body in positions shown in Figure 230.
    Note: Hollow dowels may still be in case.
31. Install the main valve body spacer plate and bolts, as shown in Figure 230. Torque spacer plate bolts to 6 N·m (55 in.lb.).
32. Turn the valve body over with the spacer plate facing down, as shown in Figure 231.
33. Install the "A" check ball and spring with the spring going in first, as shown in Figure 231.
34. Install the "B" check ball and spring with the spring going in first, as shown in Figure 231.
35. Install the last check ball into the bath tub, as shown in Figure 231.
    Note: Spring and check ball dimensions are shown in Figure 231.

Continued on Page 126

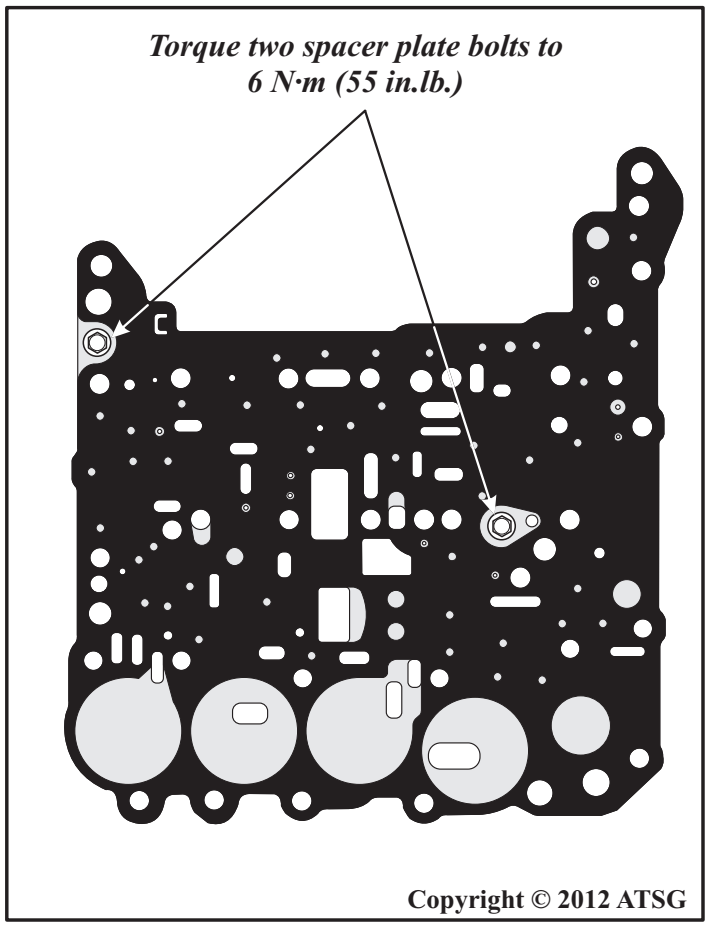
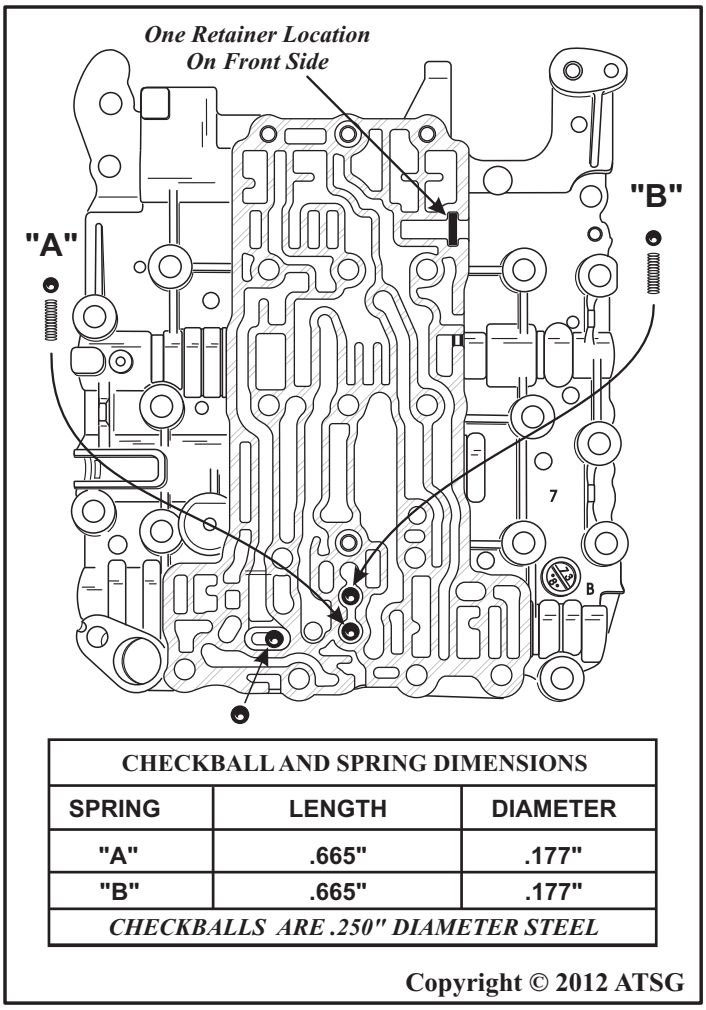


Figure 230



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

Figure 231

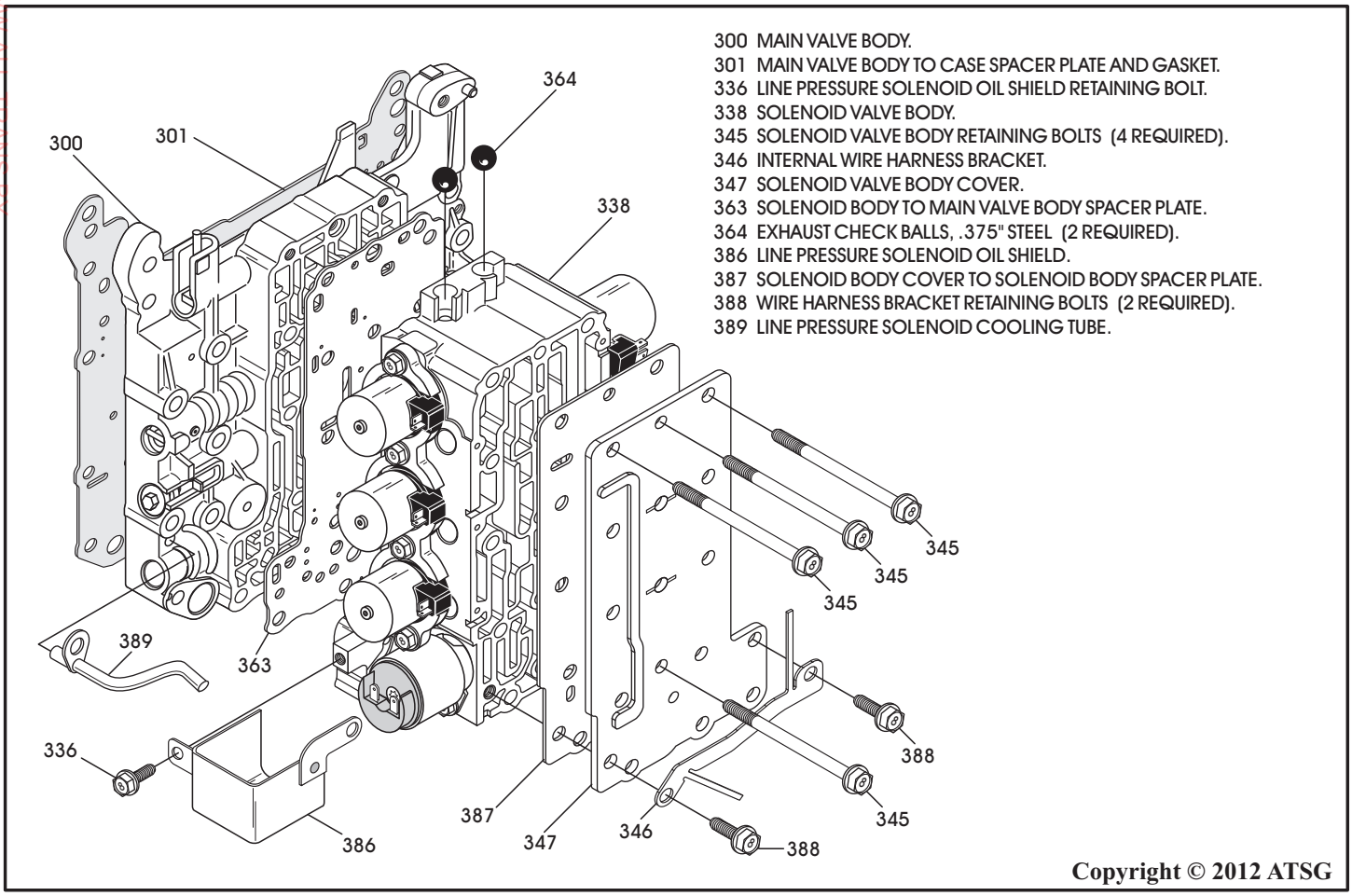


Figure 232

COMPONENT REBUILD SECTION
VALVE BODY "SECTION TWO"
"2006-UP KIA" & "2007-UP HYUNDAI"

"Section Two" Valve Body Assembly (Cont'd)

36. Install the solenoid body spacer plate, solenoid valve body, solenoid body cover spacer plate, and the solenoid valve body cover, as shown in Figure 232.
37. Install the four solenoid body to main valve body bolts in locations shown in Figure 232.
38. Install the internal wire harness bracket and two retaining bolts, as shown in Figure 232.
    Note: Hand tighten the bolts as the torque process will follow in final assembly.
39. Install the (VFS) line pressure solenoid cooling tube, as shown in Figure 232.
40. Install (VFS) line pressure solenoid oil shield and retaining bolt, as shown in Figure 232.
41. Set the completed valve body assembly aside for final assembly process (See Figure 233).

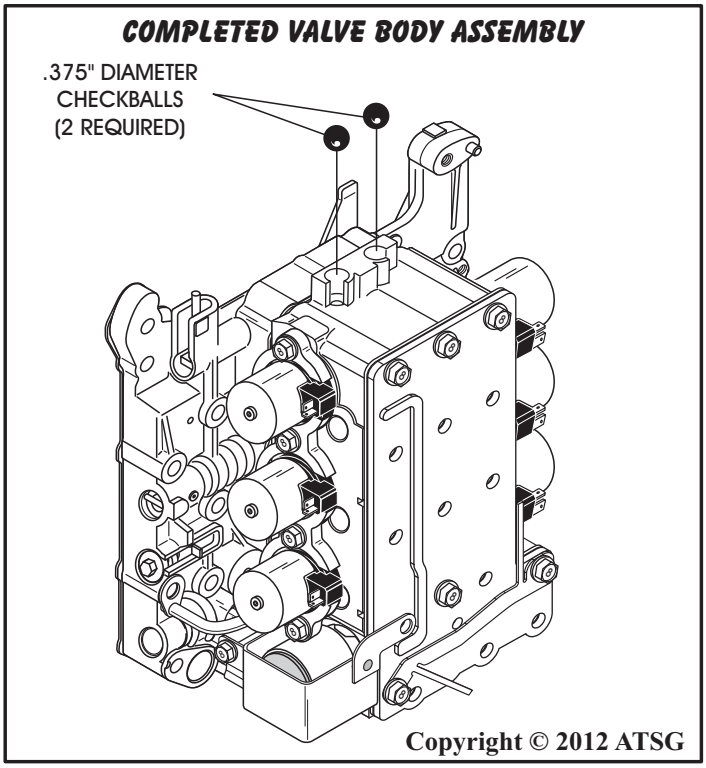


Figure 233

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

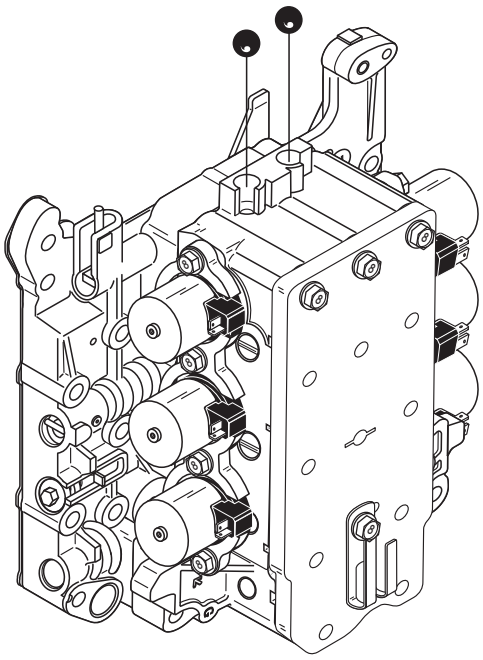


Figure 234

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

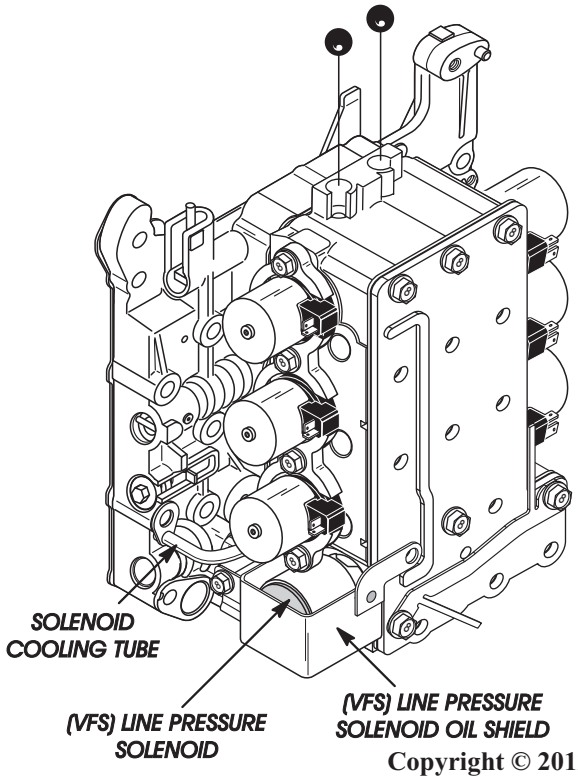


Figure 235

COMPONENT REBUILD SECTION

CAUTION - CAUTION - CAUTION

Component rebuild of the valve body is in two different sections because of the two different valve bodies. "Section One" will cover only the "Mitsubishi", "Pre-06 Kia" & "Pre-07 Hyundai" and is found on Page 111 thru 118.

"Section Two" will cover only the valve body assembly for the "06-Up Kia" & "07-Up Hyundai" models and begins on Page 119.

The valve body for Mitsubishi, Pre-2006 Kia and the Pre-2007 Hyundai, is shown in Figure 234, and is equipped with 6 shift solenoids.

The valve body for 2006-Up Kia and 2007-Up Hyundai, is shown in Figure 235, and is equipped with an additional (VFS) Line Pressure Solenoid and a cooling tube for the solenoid. This version is also equipped with an oil shield that retains the fluid from cooling tube for the solenoid.

These two valve bodies are totally different and will not interchange, nor will any of the components. All of the worm tracks, spacer plates and cover plates are different.

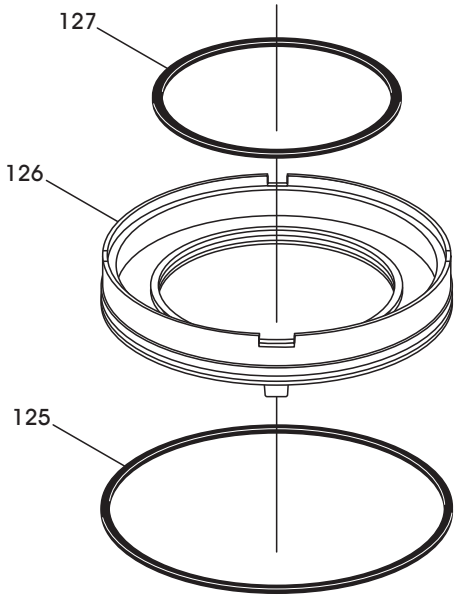
Final Assembly
Begins on Page 128

FINAL ASSEMBLY

INTERNAL COMPONENTS

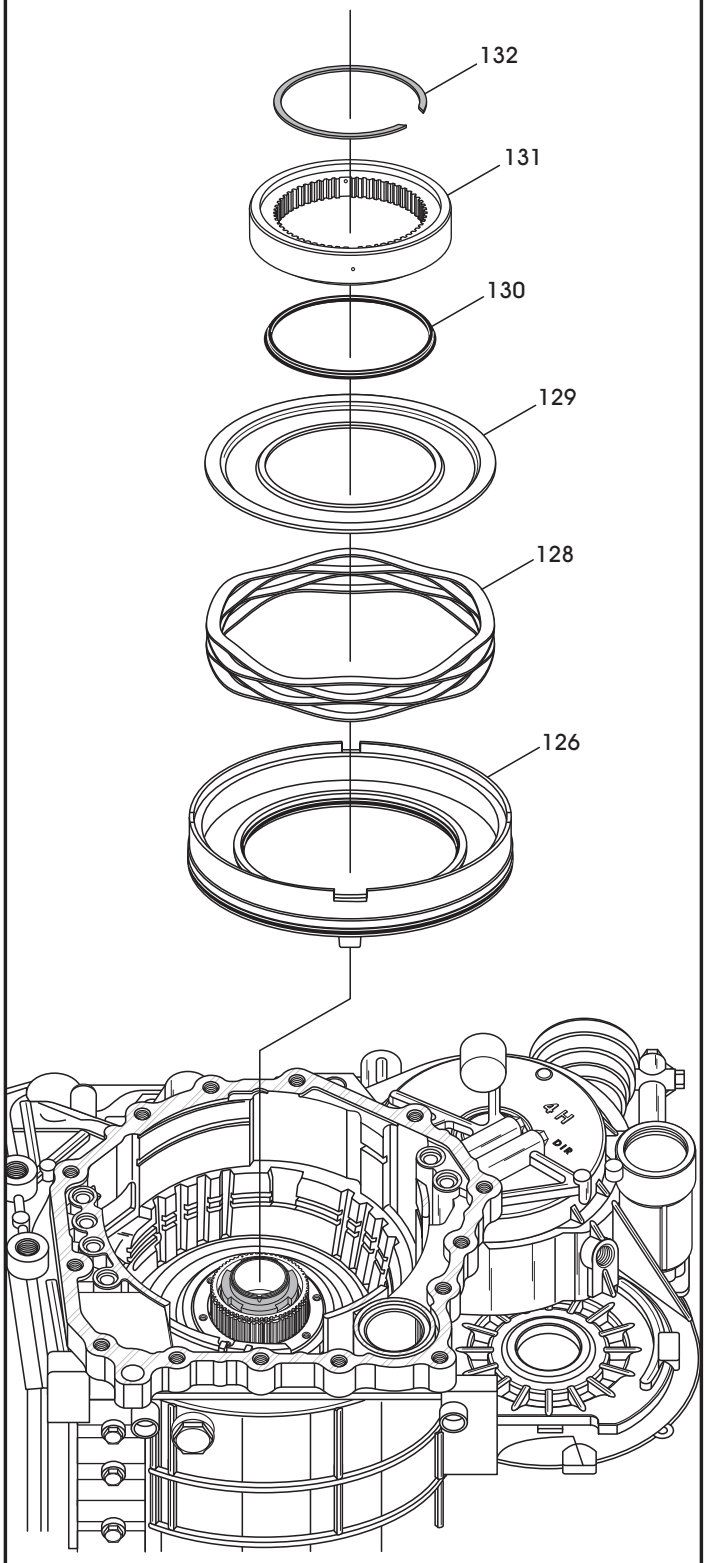
1. Install new inner and outer "D" ring seals onto the low/reverse piston, as shown in Figure 236, and lube with a small amount of Trans-Jel®.
2. Install the low/reverse piston assembly into the case, as shown in Figure 237.
3. Install the low/reverse piston return spring into the case, as shown in Figure 237.
4. Install low/reverse clutch return spring retainer into the case, as shown in Figure 237.

Continued on Page 129



125 LOW/REVERSE CLUTCH PISTON OUTER "D" RING SEAL.
126 LOW/REVERSE CLUTCH APPLY PISTON.
127 LOW/REVERSE CLUTCH PISTON INNER "D" RING SEAL.

Figure 236



126 LOW/REVERSE CLUTCH APPLY PISTON AND "D" RING SEALS.
128 LOW/REVERSE CLUTCH PISTON RETURN SPRING.
129 LOW/REVERSE CLUTCH RETURN SPRING RETAINER.
130 LOW SPRAG (OWC-1) INNER RACE "*LIP TYPE*" LUBE SEAL.
131 LOW SPRAG (OWC-1) INNER RACE.
132 LOW SPRAG (OWC-1) INNER RACE RETAINING SNAP RING.

Figure 237

FINAL ASSEMBLY
INTERNAL COMPONENTS (CONT'D)

5. Install a new "Lip" type seal into the groove on back side of the sprag inner race, as shown in Figure 238 and 240, with the lip facing down, and retain with small amount of Trans-Jel®. ***Note: This is a lube seal and must be installed in sprag race with lip facing down as shown.***
6. Install the sprag inner race, with the seal side facing down, as shown in Figure 240.
7. Check the placement of the I.D. notches in the sprag inner race, as shown in Figure 238. The sprag inner race ***must*** be installed with the I.D. notches along the 6 and 12-O-Clock line, as shown in Figure 238.

Continued on Page 130

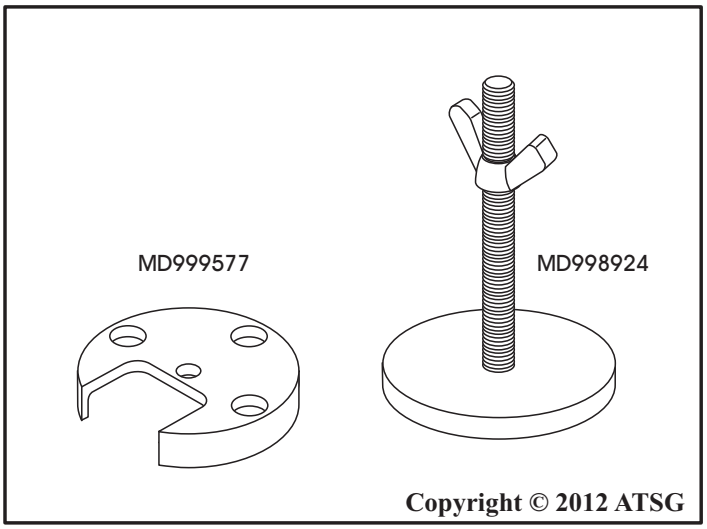


Figure 239

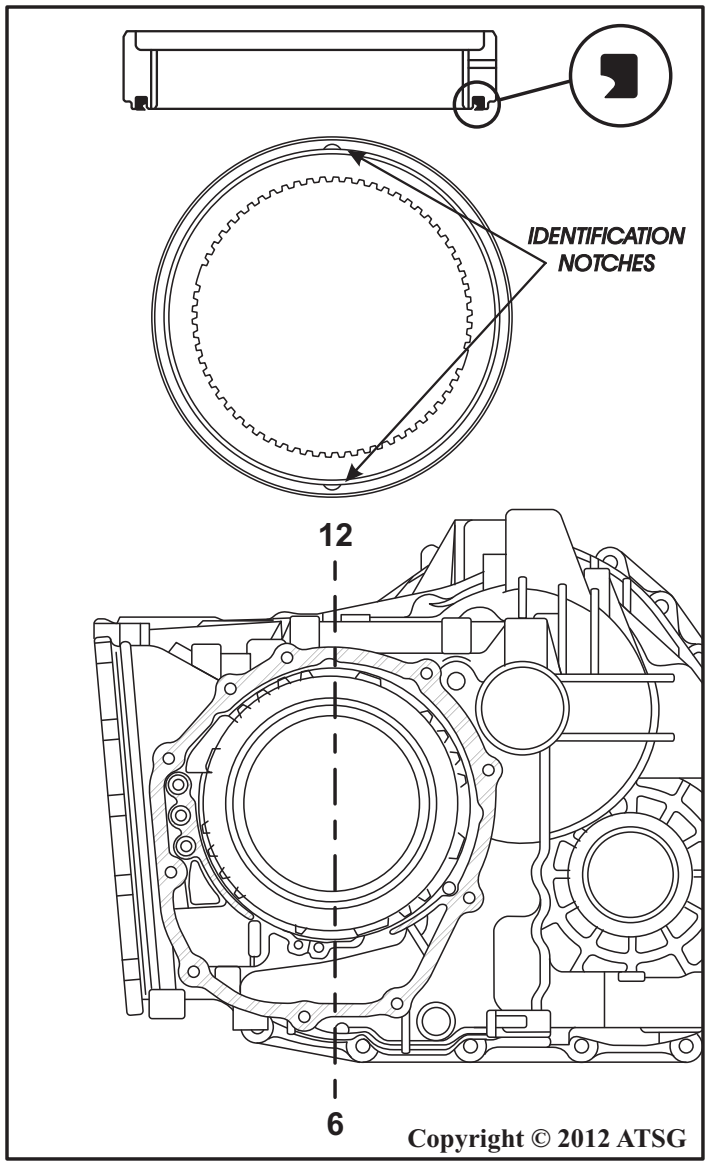


Figure 238

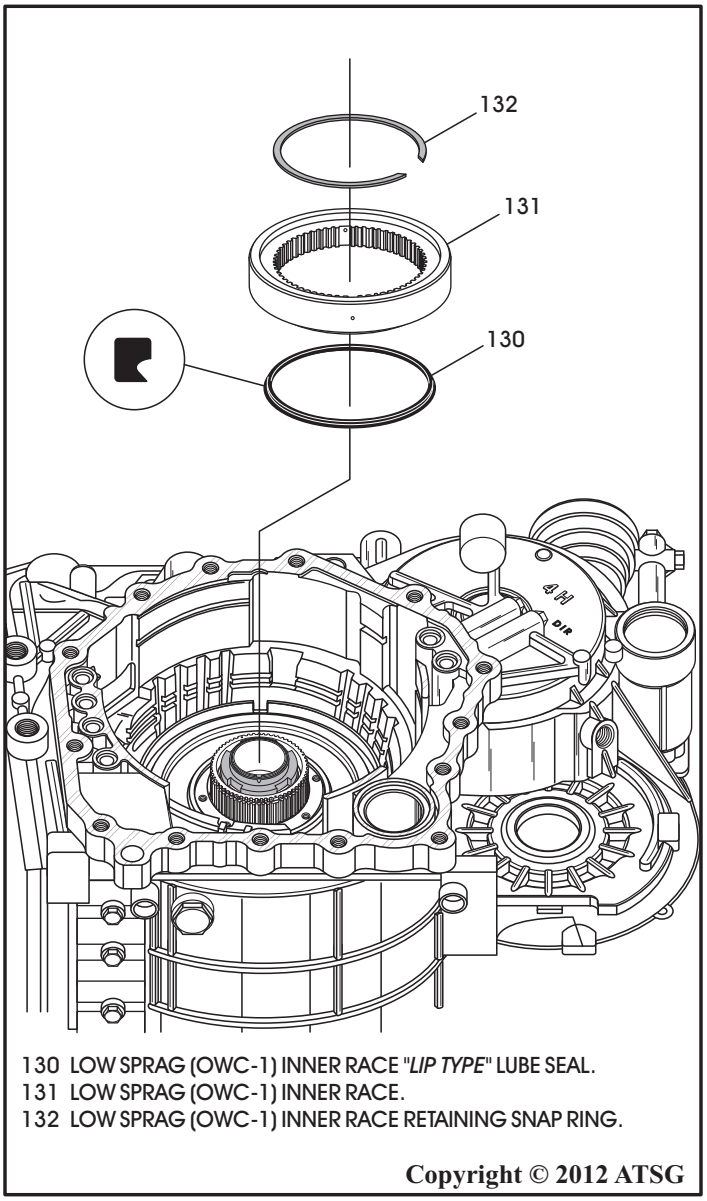


Figure 240

FINAL ASSEMBLY
INTERNAL COMPONENTS (CONT'D)

8. Compress the sprag race, retainer and return spring using special tools shown in Figure 239, and install snap ring.
9. Remove the compression tools and ***do not*** yet install any clutches.
10. Now is the time to install the planetary gear set, as shown in Figure 241, to check for the proper operation of the low sprag (OWC-1). ***Note: Planetary gear set should Freewheel counter-clockwise and Lock in a clockwise direction, as shown in Figure 242.***
11. Verify proper operation and then remove the planetary gear-set.
12. Install the .078" snap ring, the pressure plate with step facing ***down*** and the selective snap ring, as shown in Figure 243.
    Note: Do not install any clutches at this time.

Continued on Page 131

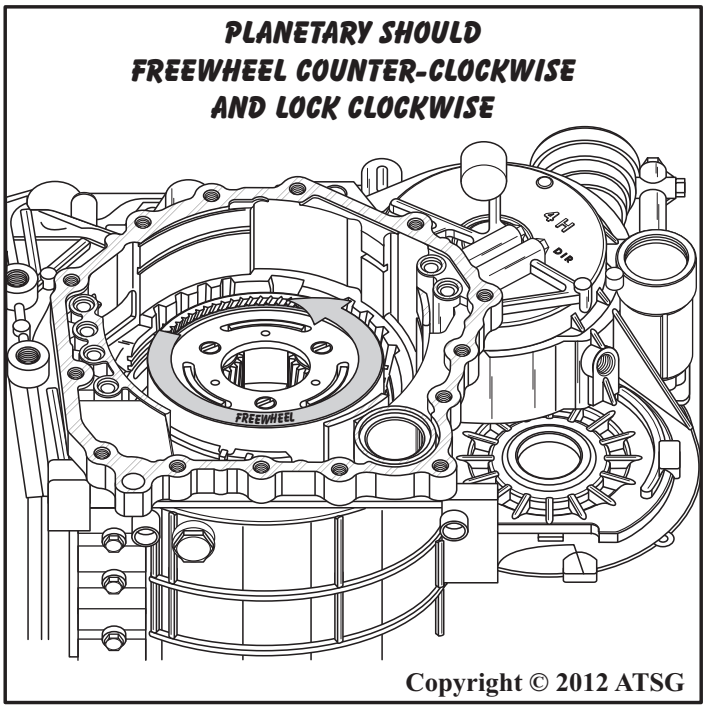


Figure 242

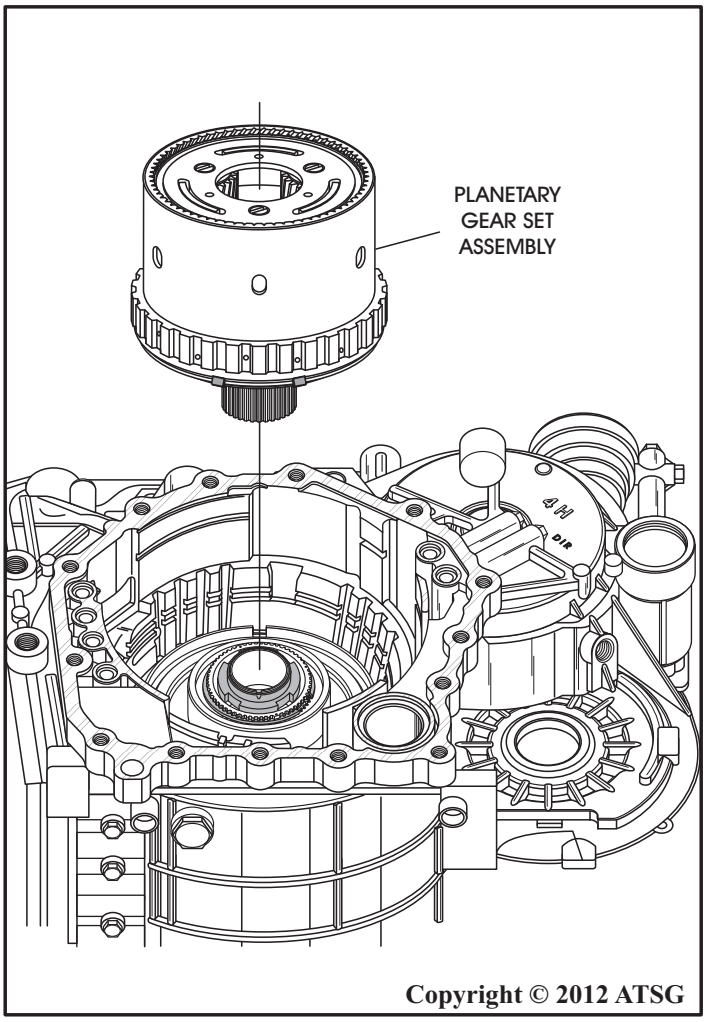


Figure 241

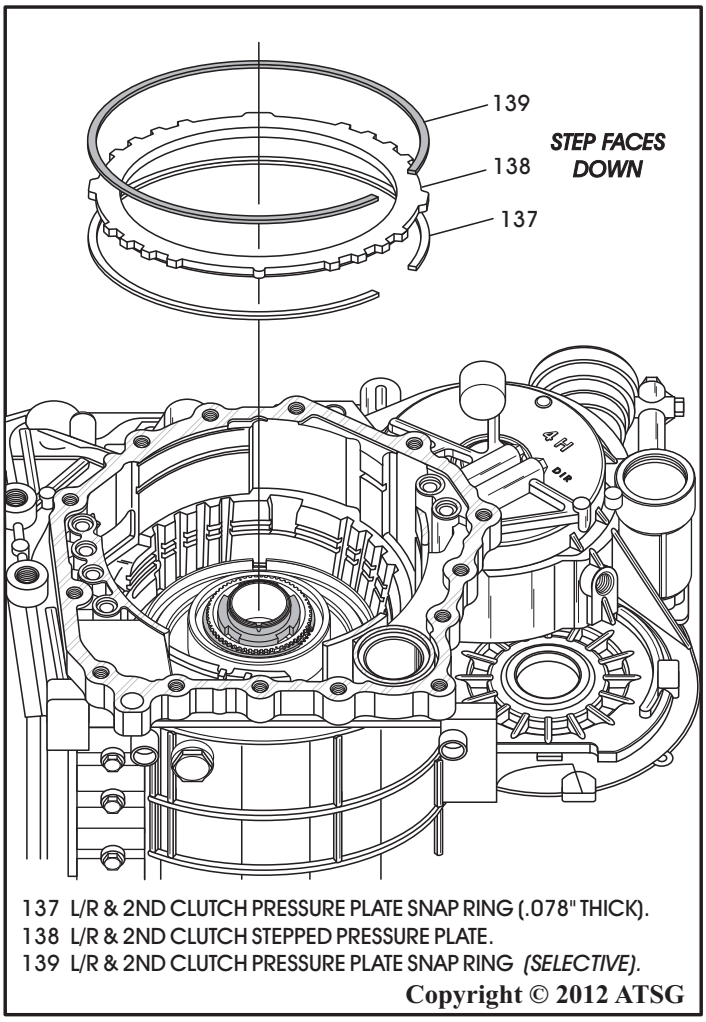


Figure 243

FINAL ASSEMBLY
INTERNAL COMPONENTS (CONT'D)

13. Measure with a feeler gage between pressure plate and the selective snap ring, as shown in Figure 244.
14. Mitsubishi wants maximum of .006" at this location. Specification is 0" - .006".
15. Select a snap ring from the chart in Figure 245 to achieve the desired specification.
16. Now remove the pressure plate and snap rings from the transaxle case.

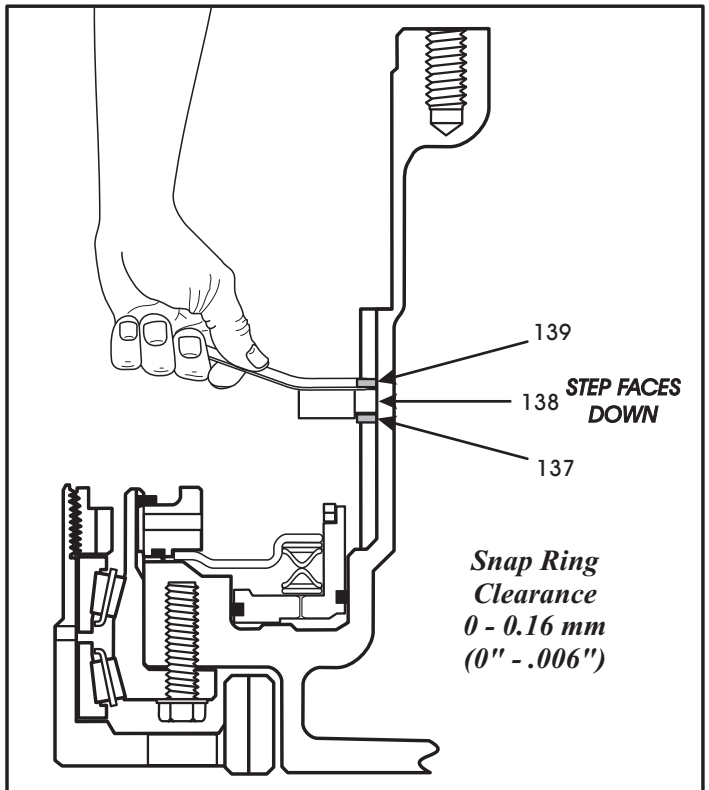
Continued on Page 132

LOW/REVERSE & SECOND PRESSURE PLATE SELECTIVE SNAP RING CHART

F5A51 MODELS

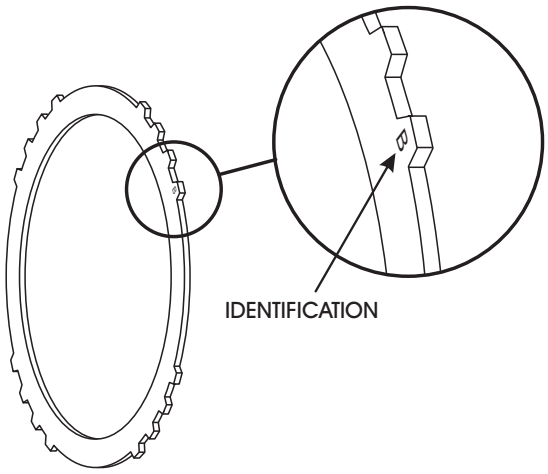
Thickness	I.D. Color	Part Number
2.2 mm (.087")	None	MD756784
2.3 mm (.091")	Blue	MD756785
2.4 mm (.094")	Brown	MD758552
2.5 mm (.098")	None	MD758553

Figure 245



137 L/R & 2ND CLUTCH PRESSURE PLATE SNAP RING (.078" THICK).
138 L/R & 2ND CLUTCH STEPPED PRESSURE PLATE.
139 L/R & 2ND CLUTCH PRESSURE PLATE SNAP RING *(SELECTIVE)*.

Figure 244

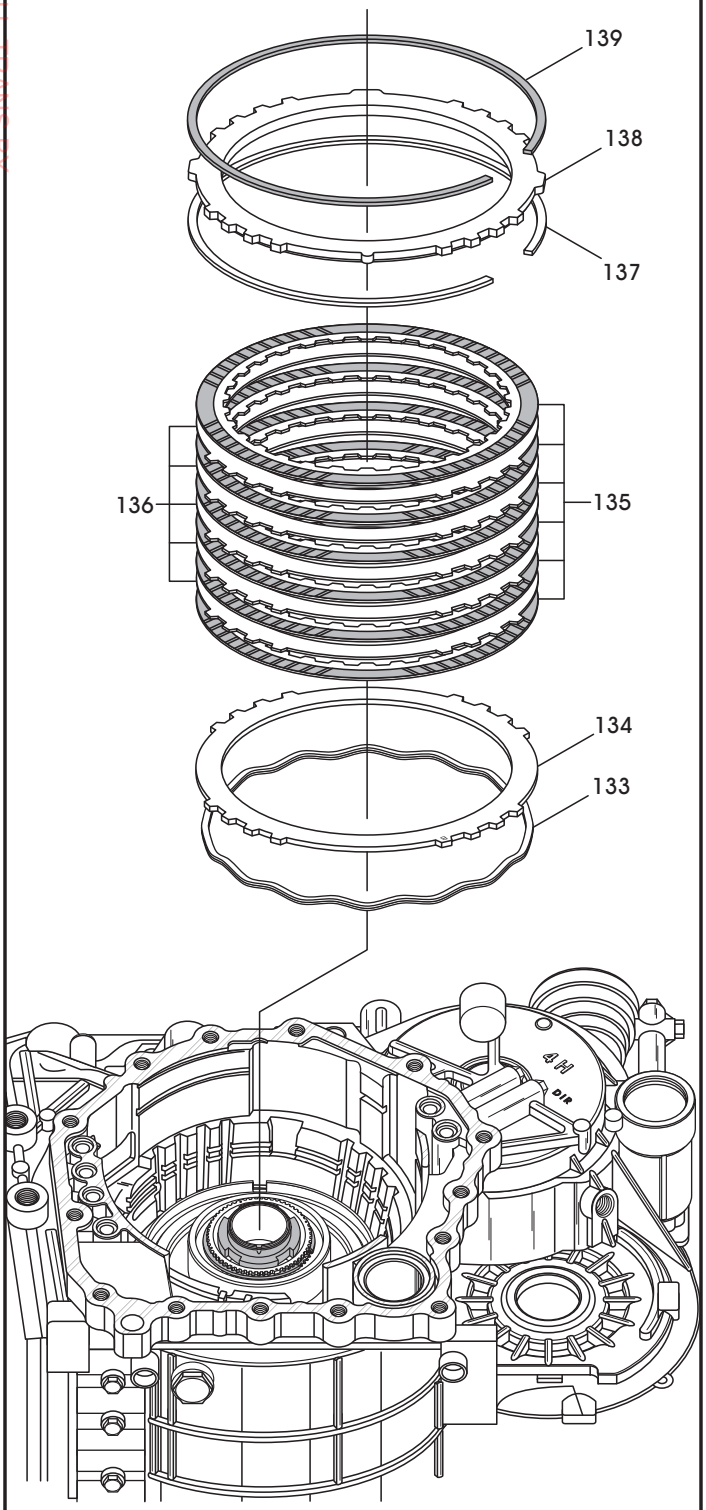


LOW/REVERSE CLUTCH & SECOND CUTCH SELECTIVE APPLY PLATE CHART

F5A51 MODELS

Thickness	I.D. Symbol	Part Number
1.6 mm (.063")	F	MD759568
1.8 mm (.071")	E	MD759425
2.0 mm (.079")	D	MD759426
2.2 mm (.087")	C	MD759427
2.4 mm (.094")	B	MD759428
2.6 mm (.102")	A	MD759429
2.8 mm (.110")	0	MD759430
3.0 mm (.118")	1	MD759431

Figure 246



133 LOW/REVERSE CLUTCH "*WAVED*" CUSHION PLATE.
134 LOW/REVERSE CLUTCH APPLY PLATE *(SELECTIVE).*
135 LOW/REVERSE CLUTCH FRICTION PLATES (QTY VARIES).
136 LOW/REVERSE CLUTCH STEEL PLATES, .040" THK. (QTY. VARIES).
137 L/R & 2ND CLUTCH PRESSURE PLATE SNAP RING (.078" THICK).
138 L/R & 2ND CLUTCH STEPPED PRESSURE PLATE.
139 L/R & 2ND CLUTCH PRESSURE PLATE SNAP RING *(SELECTIVE).*

Figure 247

FINAL ASSEMBLY

INTERNAL COMPONENTS (CONT'D)

17. Install the low/reverse "Waved" cushion plate, as shown in Figure 247, on top of piston.
18. Install the low/reverse clutch selective apply plate, as shown in Figure 247.
19. Install the low/reverse clutch plates beginning with a friction and alternating with steel plates, as shown in Figure 247 (Quantity will vary). ***Note: "Do Not" yet install the last friction.***
20. Install the .078" snap ring into the case groove, as shown in Figure 247.
21. Now, install the last friction, the pressure plate with step ***down*** and the selective snap ring, as shown in Figure 247.
22. Check the low/reverse clutch clearance using a feeler gage ***carefully,*** between the top friction and pressure plate, as shown in Figure 248.
23. The low/reverse clutch clearance should be, 1.65-2.11 mm (.065"-.083").
24. Change the selective apply plate using chart in Figure 246, to obtain specified clearance.

Continued on Page 133

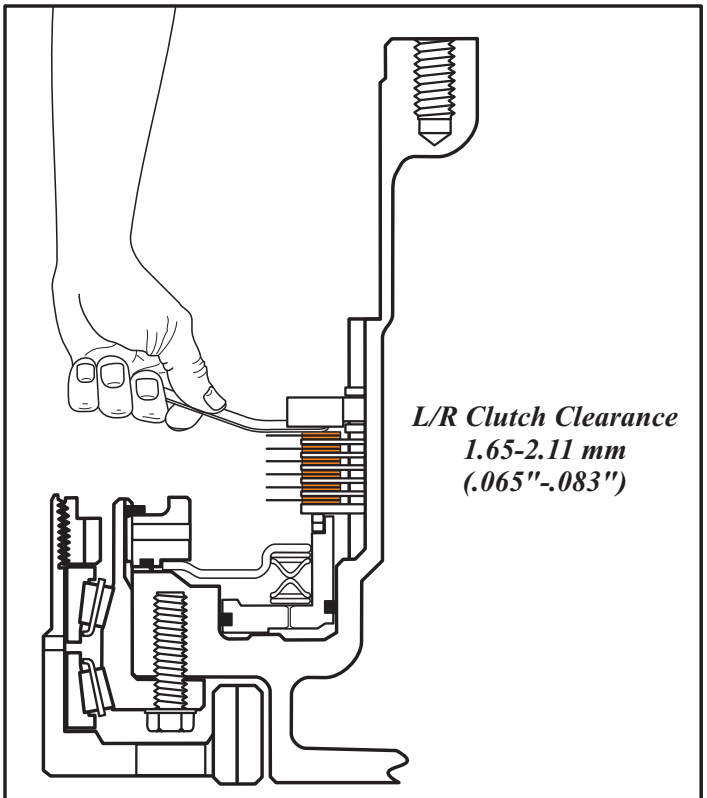
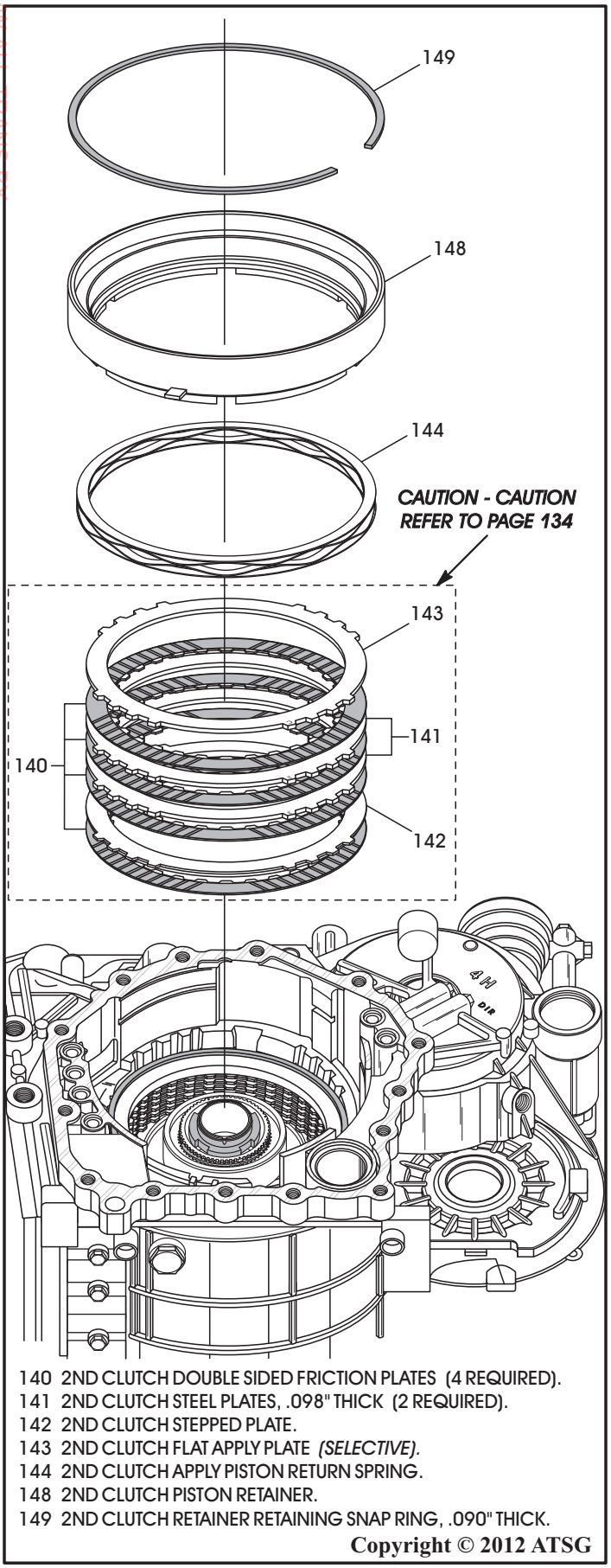


Figure 248



140 2ND CLUTCH DOUBLE SIDED FRICTION PLATES (4 REQUIRED).
141 2ND CLUTCH STEEL PLATES, .098" THICK (2 REQUIRED).
142 2ND CLUTCH STEPPED PLATE.
143 2ND CLUTCH FLAT APPLY PLATE *(SELECTIVE)*.
144 2ND CLUTCH APPLY PISTON RETURN SPRING.
148 2ND CLUTCH PISTON RETAINER.
149 2ND CLUTCH RETAINER RETAINING SNAP RING, .090" THICK.

Figure 249

FINAL ASSEMBLY

INTERNAL COMPONENTS (CONT'D)

25. Install second clutch plates, beginning with a friction, followed by the stepped plate with the step facing down, followed by frictions and steels, and finally the selective plate, piston retainer and snap ring. (See Figure 249).
Note: Figure 249 shows the Mitsubishi second clutch stack. Hyundai and Kia have a variety of different second clutch stacks, including a "partial" single-sided clutch stack and all of them are illustrated on Page 134.
26. Check the 2nd clutch clearance with a feeler gage, between the selective apply plate and the 2nd clutch piston, as shown in Figure 250.
27. The 2nd clutch clearance should be: 1.09-1.55 mm (.043"-.061"), and is also shown in Figure 250.
28. Change selective apply plate as necessary to obtain correct 2nd clearance, using the chart in Figure 246.
29. Now, remove the complete 2nd clutch pack using Figure 249, as a guide.

Continued on Page 134

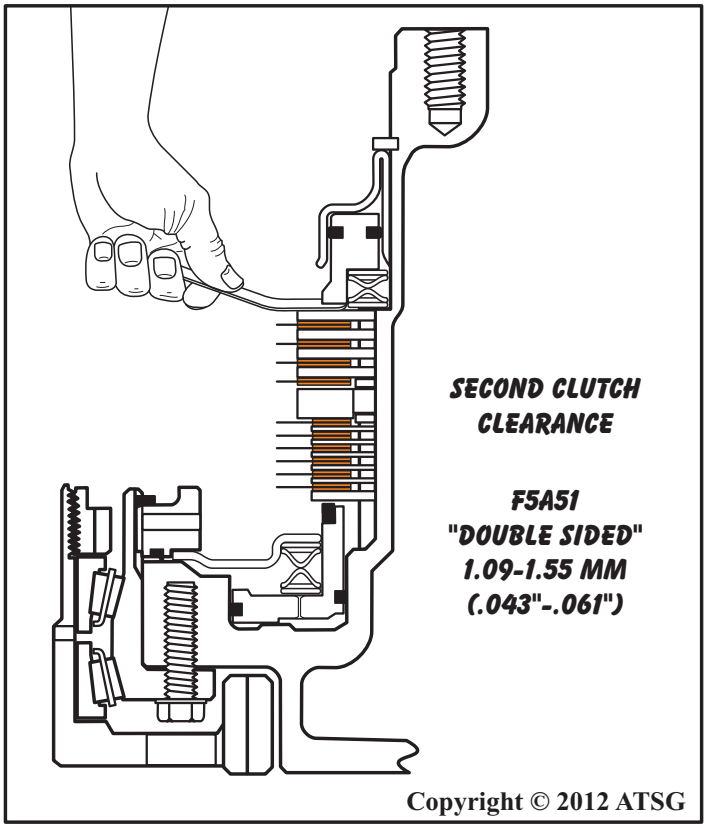
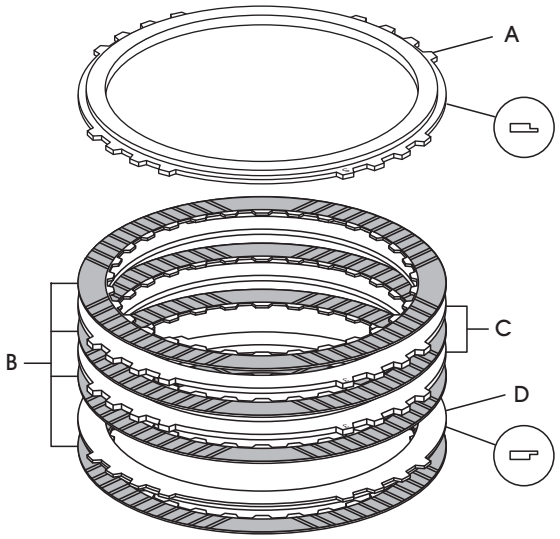


Figure 250

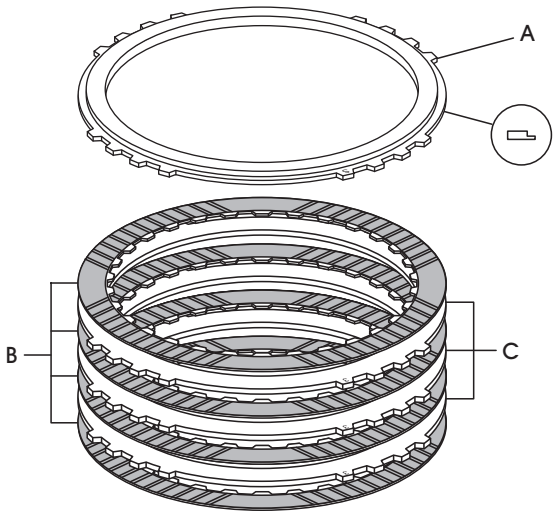
A5HF1 2ND CLUTCH, PRE-2007 HYUNDAI
A5HF1 2ND CLUTCH, PRE-2006 KIA



A STEPPED APPLY PLATE, ID "J", = .059"/.118" THICK.
B DOUBLE-SIDED FRICTIONS = .070" THICK (4 REQUIRED).
C STEEL PLATES, ID "4", = .119" THICK (2 REQUIRED).
D STEPPED PLATE, ID "S", = .039"/.118" THICK (1 REQUIRED).

Figure 251

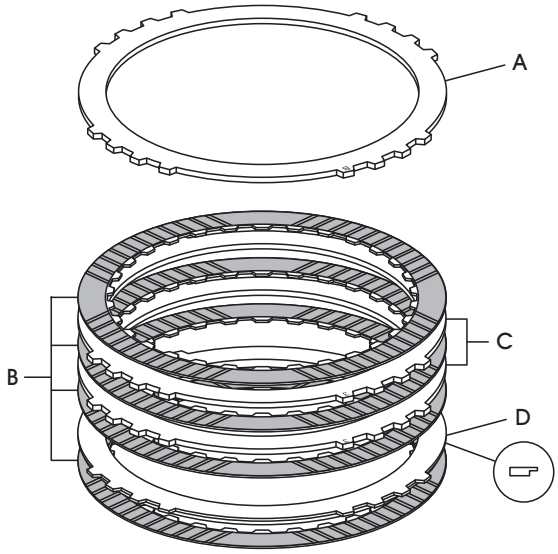
A5GF1 2ND CLUTCH, PRE-2007 HYUNDAI
A5GF1 2ND CLUTCH, PRE-2006 KIA



A STEPPED APPLY PLATE, ID (NONE), = .041"/.098" THICK.
B DOUBLE-SIDED FRICTIONS = .070" THICK (4 REQUIRED).
C STEEL PLATES, ID "3", = .098" THICK (3 REQUIRED).

Figure 252

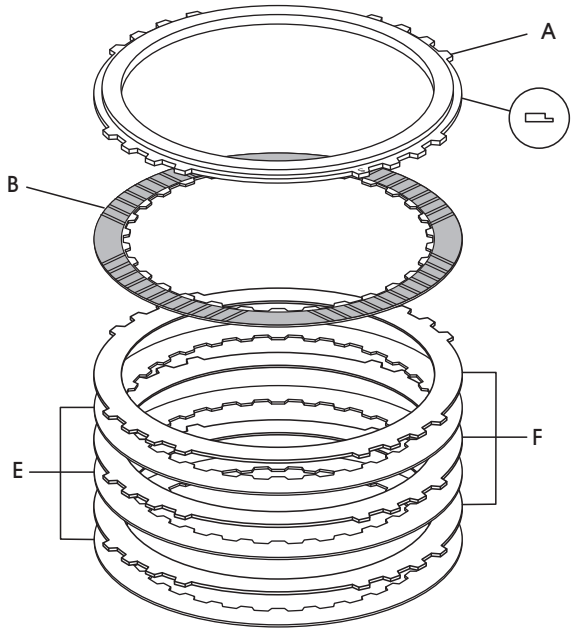
F5A51 MITSUBISHI (ALL MODELS)



A FLAT APPLY PLATE, ID "B", = (SELECTIVE).
B DOUBLE-SIDED FRICTIONS = .070" THICK (4 REQUIRED).
C STEEL PLATES, ID "3", = .098" THICK (2 REQUIRED).
D STEPPED PLATE, ID "NONE", = .059"/.098" THICK (1 REQUIRED).

Figure 253

A5GF1 2ND CLUTCH, 2007-UP HYUNDAI
A5GF1 2ND CLUTCH, 2006-UP KIA



A STEPPED APPLY PLATE, ID (NONE), = .039"/.119" THICK.
B *DOUBLE-SIDED* FRICTION = .070" THICK (1 REQUIRED).
E *SINGLE-SIDED,* INT SPLINE FRICTION = .091" THICK (3 REQUIRED).
F *SINGLE-SIDED,* EXT SPLINE FRICTION = .091" THICK (3 REQUIRED).

Figure 254

FINAL ASSEMBLY
INTERNAL COMPONENTS (CONT'D)

30. With 2nd clutch pack removed, install completed planetary gear set and low sprag (OWC-1) assembly into the case, as shown in Figure 255, by rotating to engage the low/reverse frictions and the sprag onto the inner race.
    Note: Planetary gear set should Freewheel counter-clockwise and Lock in clockwise direction, as shown in Figure 256.
31. Install the reverse sun gear and shell assembly, as shown in Figure 257.
32. Install the number 5 thrust bearing in direction shown in Figure 257, and retain with a small amount of Trans-Jel®.

Continued on Page 136

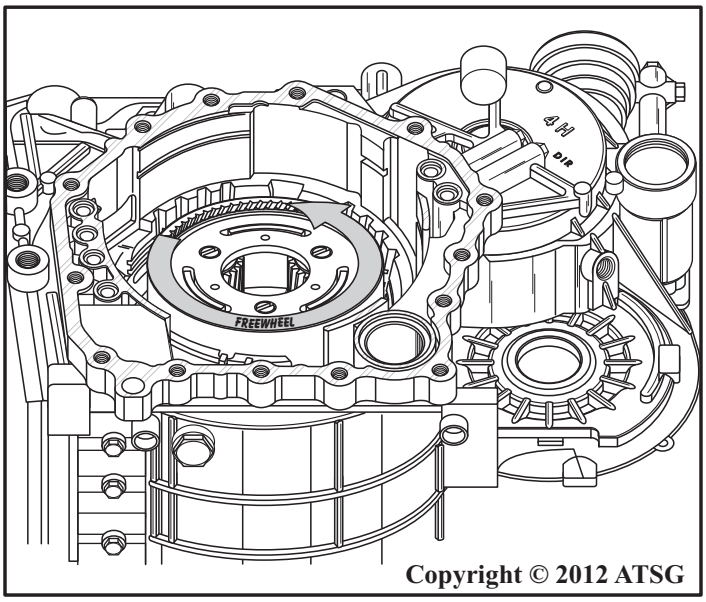


Figure 256

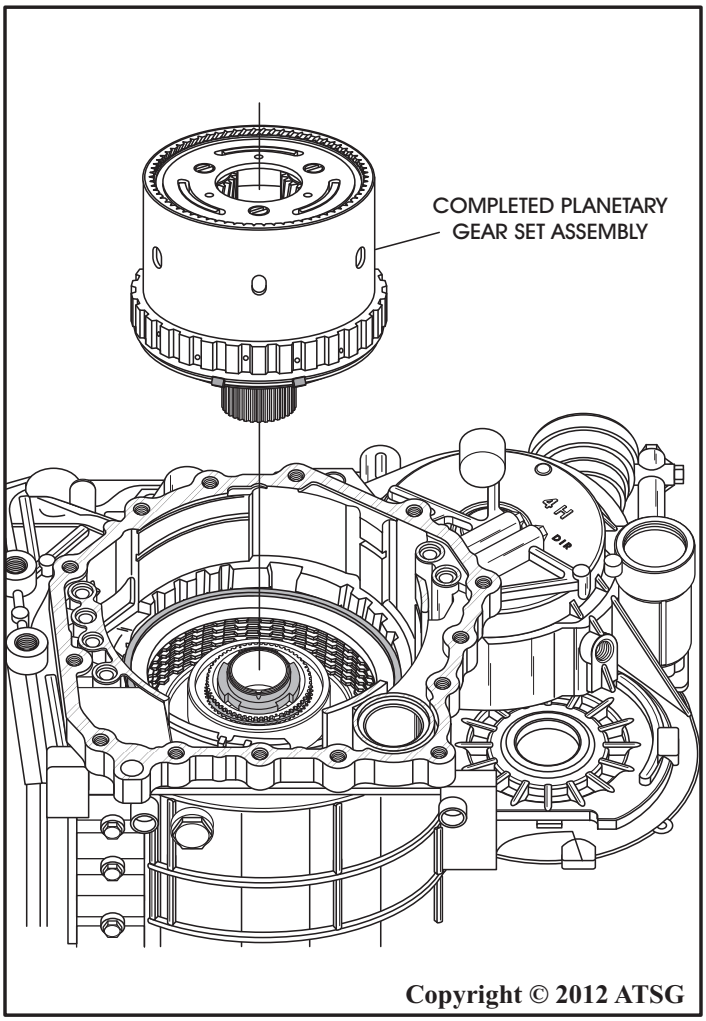
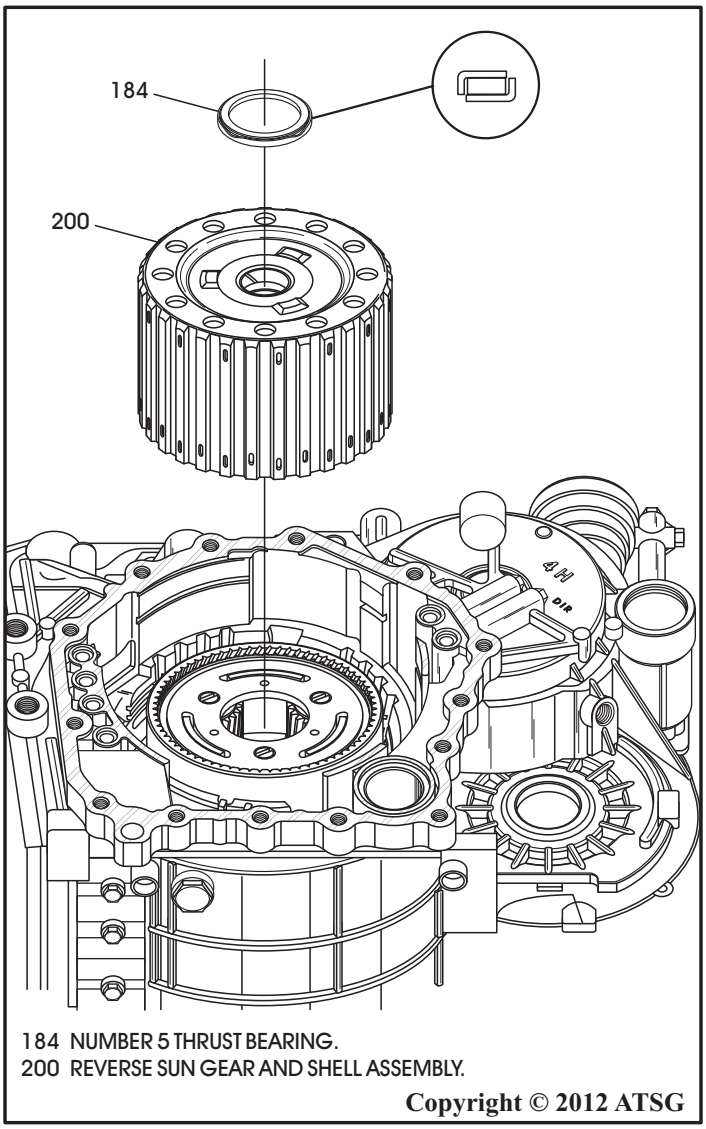
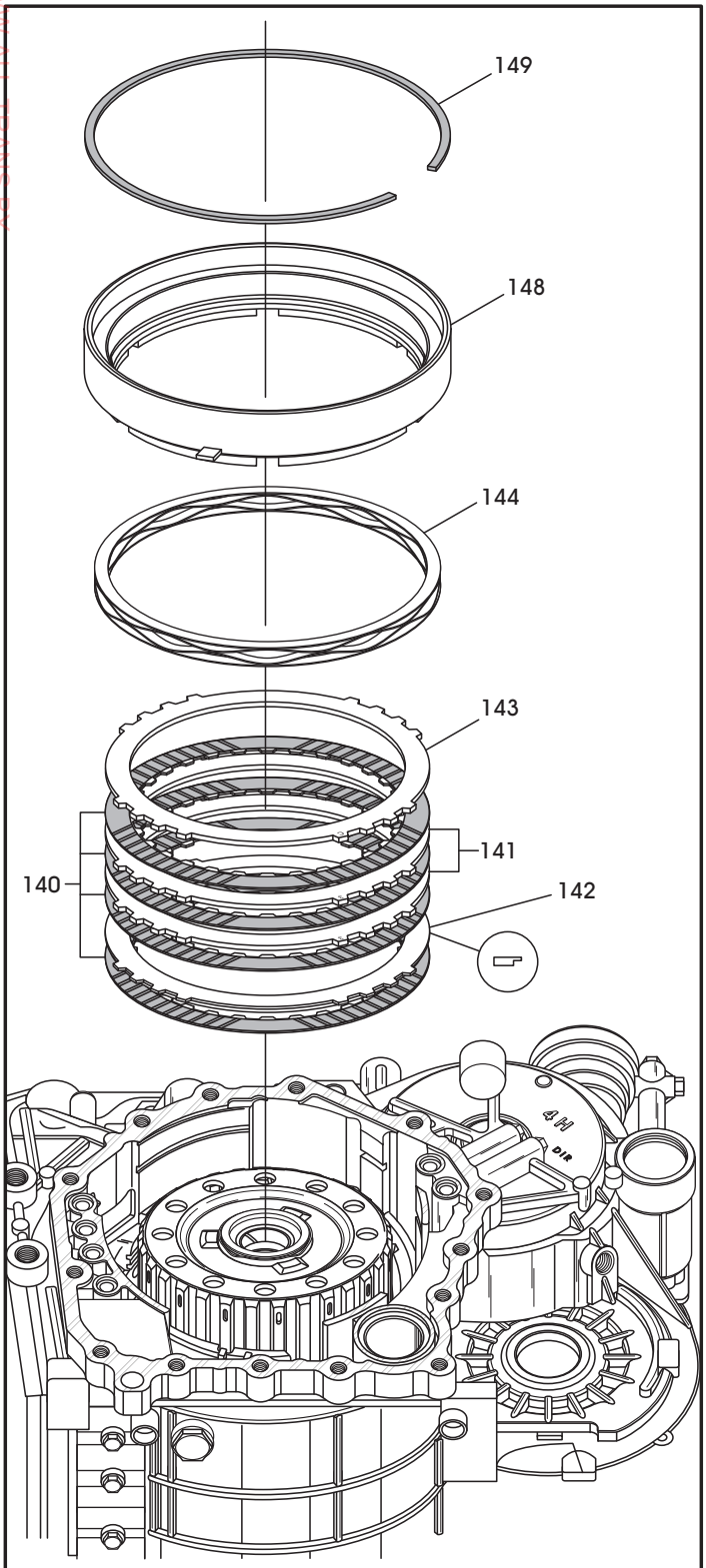


Figure 255



184 NUMBER 5 THRUST BEARING.
200 REVERSE SUN GEAR AND SHELL ASSEMBLY.

Figure 257



140 2ND CLUTCH DOUBLE SIDED FRICTION PLATES (4 REQUIRED).
141 2ND CLUTCH STEEL PLATES, .098" THICK (2 REQUIIRED).
142 2ND CLUTCH STEPPED PLATE.
143 2ND CLUTCH APPLY PLATE *(SELECTIVE)*.
144 2ND CLUTCH APPLY PISTON RETURN SPRING.
148 2ND CLUTCH PISTON RETAINER.
149 2ND CLUTCH RETAINER RETAINING SNAP RING, .090" THICK.

Figure 258

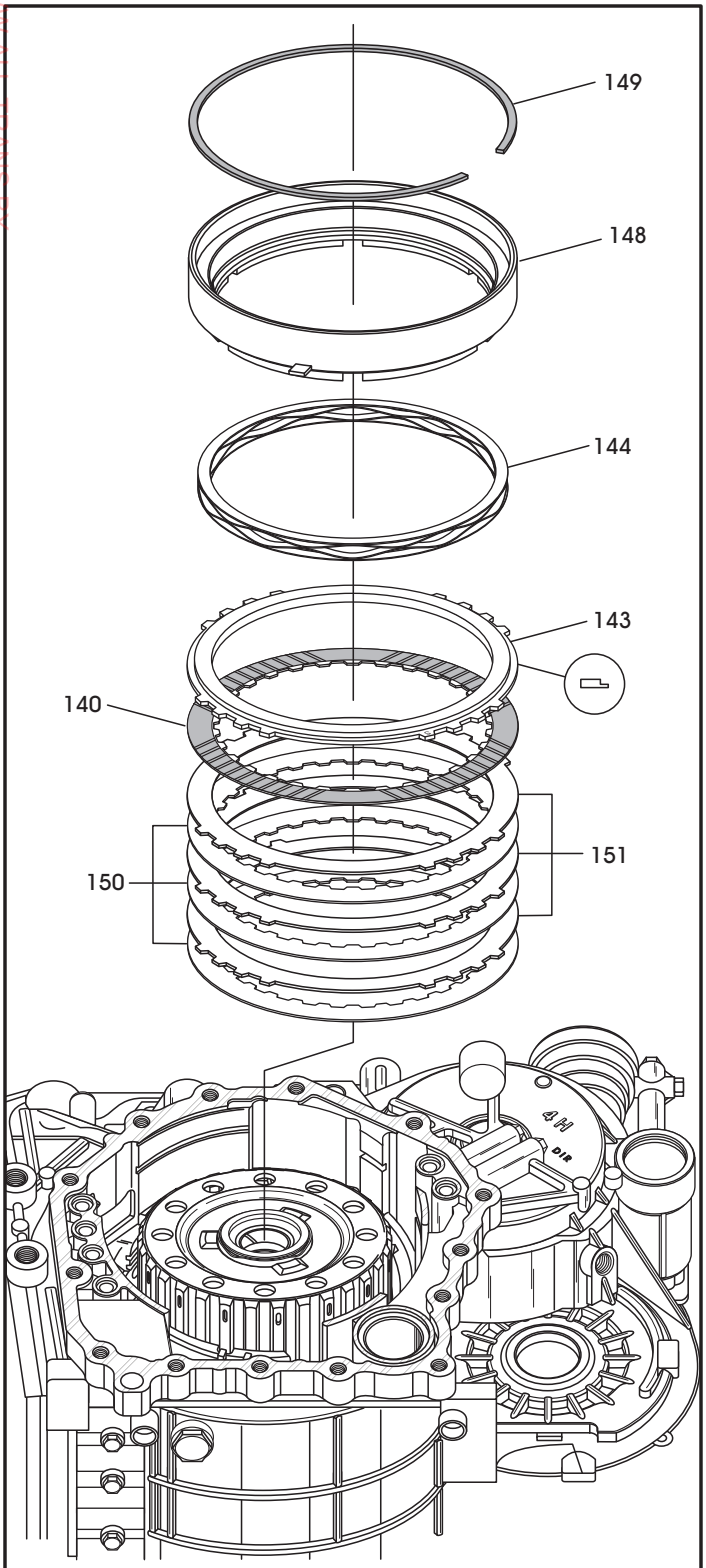
FINAL ASSEMBLY

INTERNAL COMPONENTS (CONT'D)

33. Install the second clutch pack as follows:
Mitsubishi "Double-Sided" Frictions
34. Install one second clutch friction on top of the pre-installed pressure plate (See Figure 258).
35. Install the stepped steel plate with step facing the friction, as shown in Figure 258.
36. Install second clutch friction plates alternating with steel plates (3 friction, 2 steel), as shown in Figure 258.
37. Install the selective second clutch apply plate that was selected in step 28 on Page 133, as shown in Figure 258.
38. Install the second clutch piston return spring, as shown in Figure 258.
39. Install the completed second clutch retainer, as shown in Figure 258.
40. Compress the retainer against the return spring and install the retaining snap ring, as shown in Figure 258.

Note: For Hyundai and Kia "Single-sided" second clutch assembly, see Page 137.

Continued on Page 137



140 2ND CLUTCH DOUBLE SIDED FRICTION PLATES (1 REQUIRED).
143 2ND CLUTCH *SELECTIVE* STEPPED APPLY PLATE, (.039"/.119").
144 2ND CLUTCH APPLY PISTON RETURN SPRING.
148 COMPLETED 2ND CLUTCH PISTON RETAINER ASSEMBLY.
149 2ND CLUTCH RETAINER RETAINING SNAP RING, .090" THICK.
150 2ND CLUTCH SINGLE-SIDED, INT SPLINE, .091" THICK (3 REQ.).
151 2ND CLUTCH SINGLE-SIDED, EXT SPLINE, .091" THICK (3 REQ).

Figure 259

FINAL ASSEMBLY

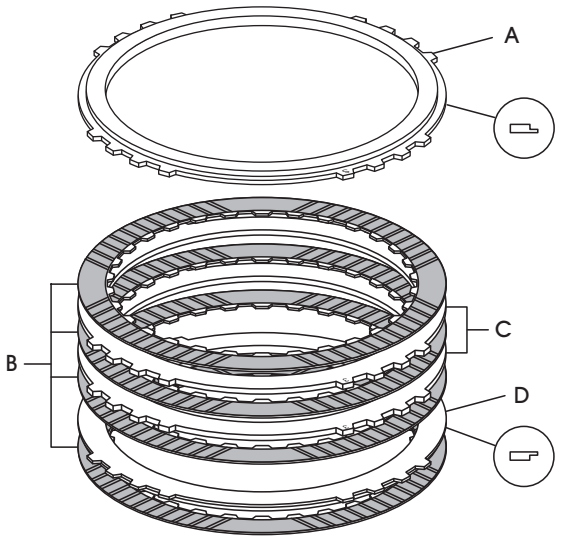
INTERNAL COMPONENTS (CONT'D)

41. Install the second clutch pack as follows:
Hyundai and Kia "Single-Sided" Friction
42. Install the "Single-Sided" second clutch plates beginning with an internal-spline plate and alternating with external-spline plates until you have installed three of each, as shown in Figure 259.
Note: "Single-Sided" plates are all installed with lining facing down (See Figure 259).
43. Install ***one "Double-Sided"*** friction on the last "Single-Sided" plate, as shown in Figure 259.
44. Install the selective second clutch apply plate that was selected in step 26 on Page 133, with the step facing up, as shown in Figure 259.
Note: Hyundai and Kia have no part numbers listed for this selective plate at time of printing and may not be available.
45. Install the second clutch piston return spring, as shown in Figure 259.
46. Install the completed second clutch retainer, as shown in Figure 259.
47. Compress the retainer against the return spring and install the retaining snap ring, as shown in Figure 259.

Note: For additional versions of the Hyundai and Kia second clutch assembly, see Page 138.

Continued on Page 138

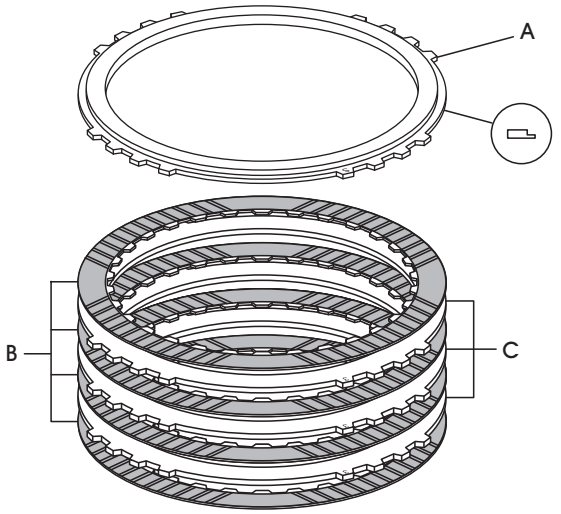
A5HF1 2ND CLUTCH, PRE-2007 HYUNDAI
A5HF1 2ND CLUTCH, PRE-2006 KIA



A STEPPED APPLY PLATE, ID "J", = .059"/.118" THICK.
B DOUBLE-SIDED FRICTIONS = .070" THICK (4 REQUIRED).
C STEEL PLATES, ID "4", = .119" THICK (2 REQUIRED).
D STEPPED PLATE, ID "S", = .039"/.118" THICK (1 REQUIRED).

Figure 260

A5GF1 2ND CLUTCH, PRE-2007 HYUNDAI
A5GF1 2ND CLUTCH, PRE-2006 KIA



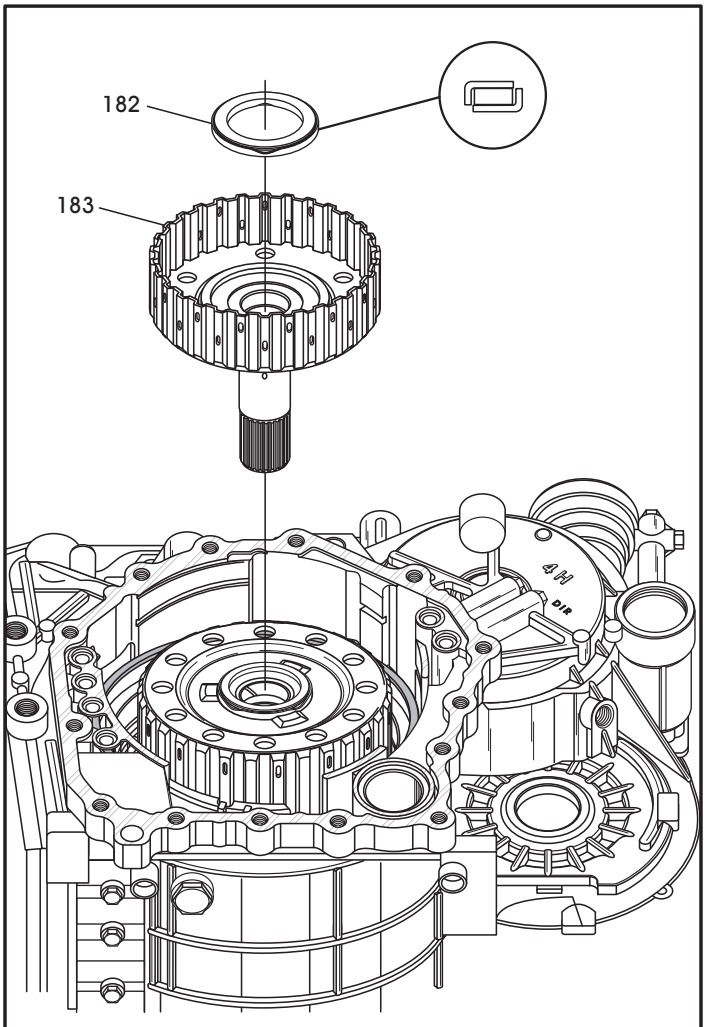
A STEPPED APPLY PLATE, ID (NONE), = .041"/.098" THICK.
B DOUBLE-SIDED FRICTIONS = .070" THICK (4 REQUIRED).
C STEEL PLATES, ID "3", = .098" THICK (3 REQUIRED).

Figure 261

FINAL ASSEMBLY
INTERNAL COMPONENTS (CONT'D)

48. Install the overdrive clutch hub, as shown in Figure 262.
49. Install number 6 thrust bearing in the direction shown in Figure 262, and retain with a small amount of Trans-Jel®.

Continued on Page 139



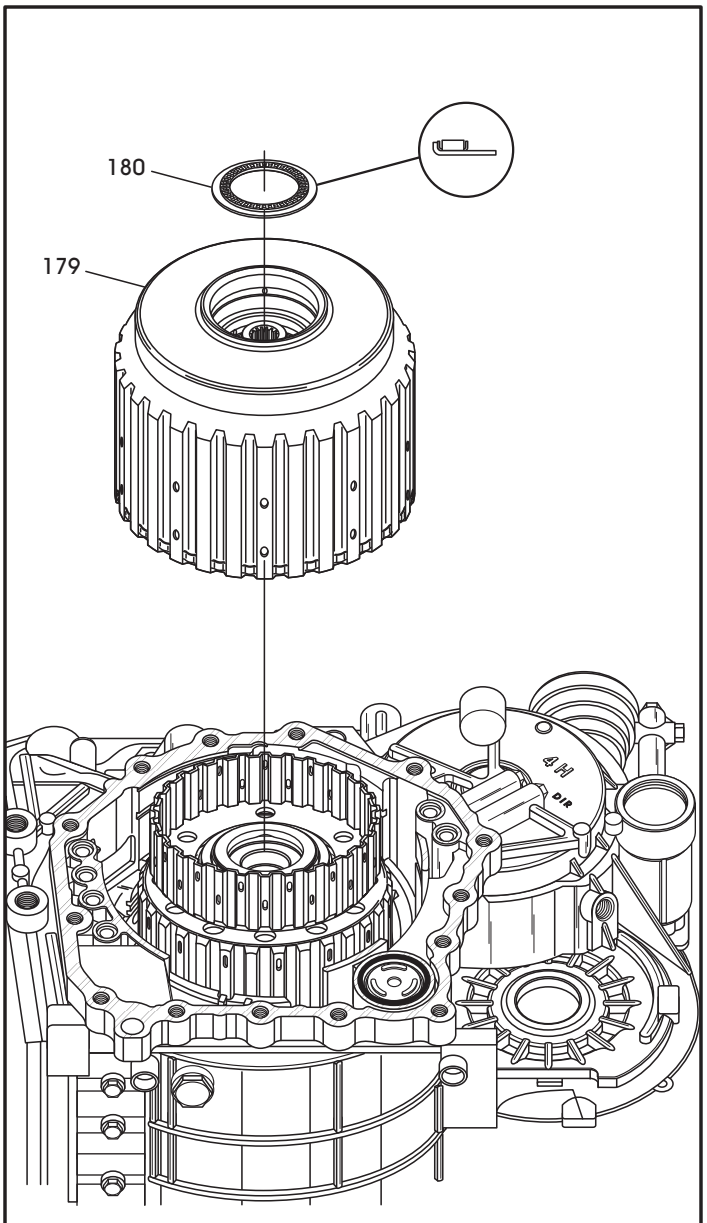
182 NUMBER 6 THRUST BEARING.
183 OVERDRIVE CLUTCH HUB.

Figure 262

FINAL ASSEMBLY
INTERNAL COMPONENTS (CONT'D)

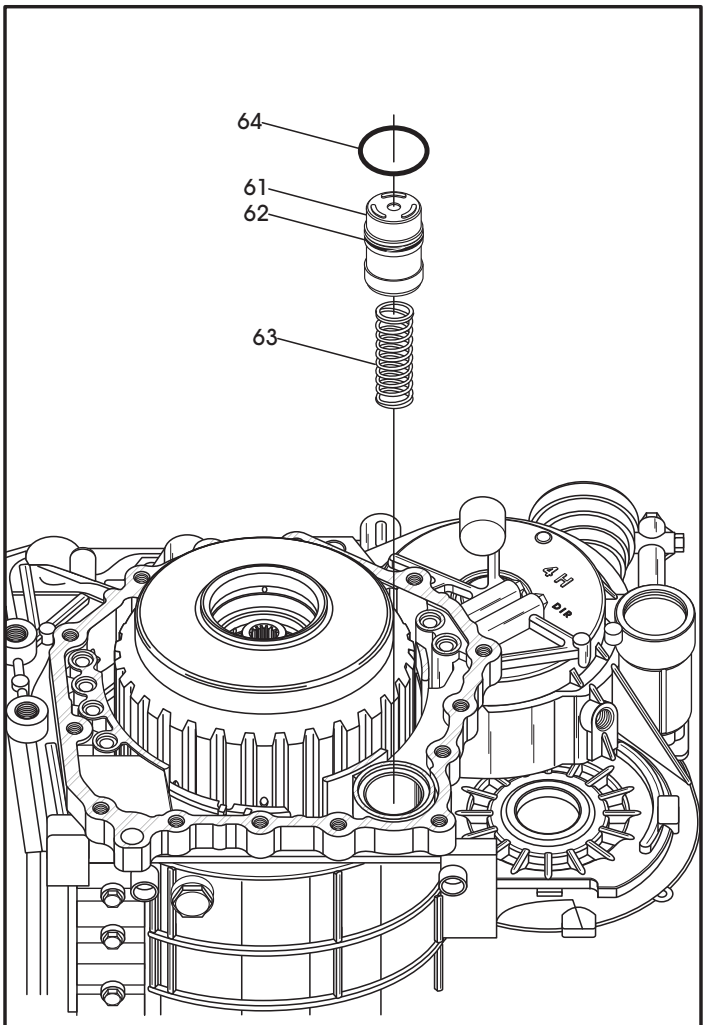
50. Install the reverse/overdrive clutch housing, as shown in Figure 263, by rotating back and forth until all overdrive clutches are engaged on the hub and all reverse clutches are engaged on the sun shell, and the housing is fully seated.
51. Install number 7 thrust bearing in the direction shown in Figure 263.
52. Install the direct clutch accumulator spring into the case, as shown in Figure 264.
53. Install new scarf-cut seal ring onto direct clutch accumulator piston and install the assembly into the case, as shown in Figure 264.
54. Do not yet install the direct clutch accumulator to rear cover "O" ring seal.

Continued on Page 140



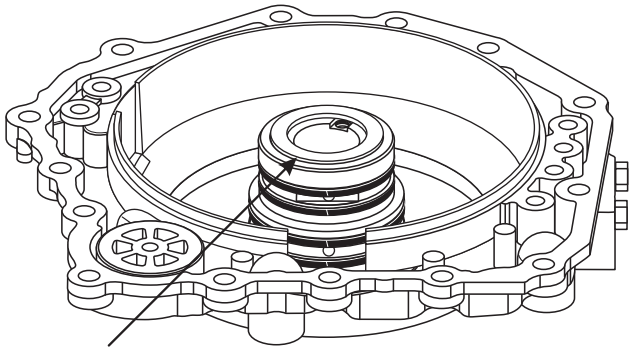
179 REVERSE/OVERDRIVE CLUTCH RETAINER ASSEMBLY.
180 NUMBER 7 THRUST BEARING.

Figure 263



61 DIRECT CLUTCH ACCUMULATOR PISTON.
62 DIRECT CLUTCH ACCUMULATOR PISTON SEAL RING.
63 DIRECT CLUTCH ACCUMULATOR PISTON RETURN SPRING.
64 DIRECT CLUTCH ACCUM. TO CASE COVER "O" RING SEAL.

Figure 264



Number 8 Thrust Bearing Race In Place

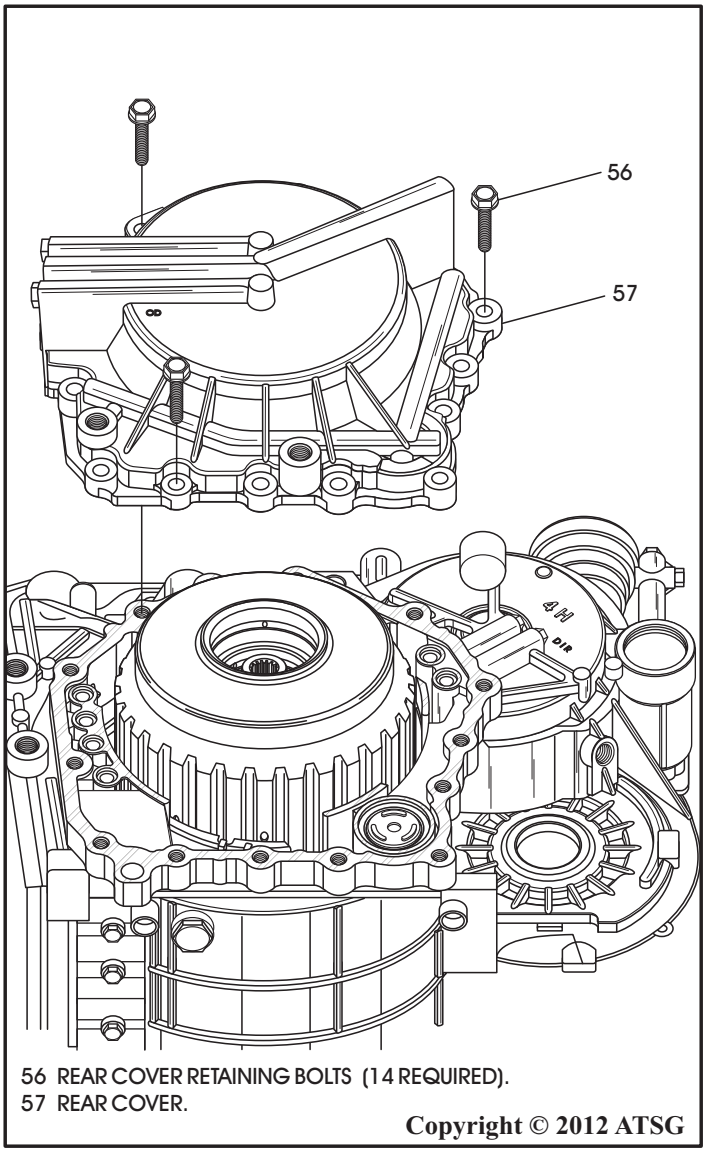
Figure 265

FINAL ASSEMBLY

INTERNAL COMPONENTS (CONT'D)

55. Install number 8 selective thrust race onto the rear cover, as shown in Figure 265, and retain with small amount of Trans-Jel®.
56. Install the rear cover dry (No sealant) onto the case, as shown in Figure 266, and torque bolts to 23 N·m (17 ft.lb.).
57. Now turn the transaxle over so the converter housing side is facing up, as shown in Figure 267.
58. Install the underdrive clutch hub, as shown in Figure 267.

Continued on Page 141



56 REAR COVER RETAINING BOLTS (14 REQUIRED).
57 REAR COVER.

Figure 266

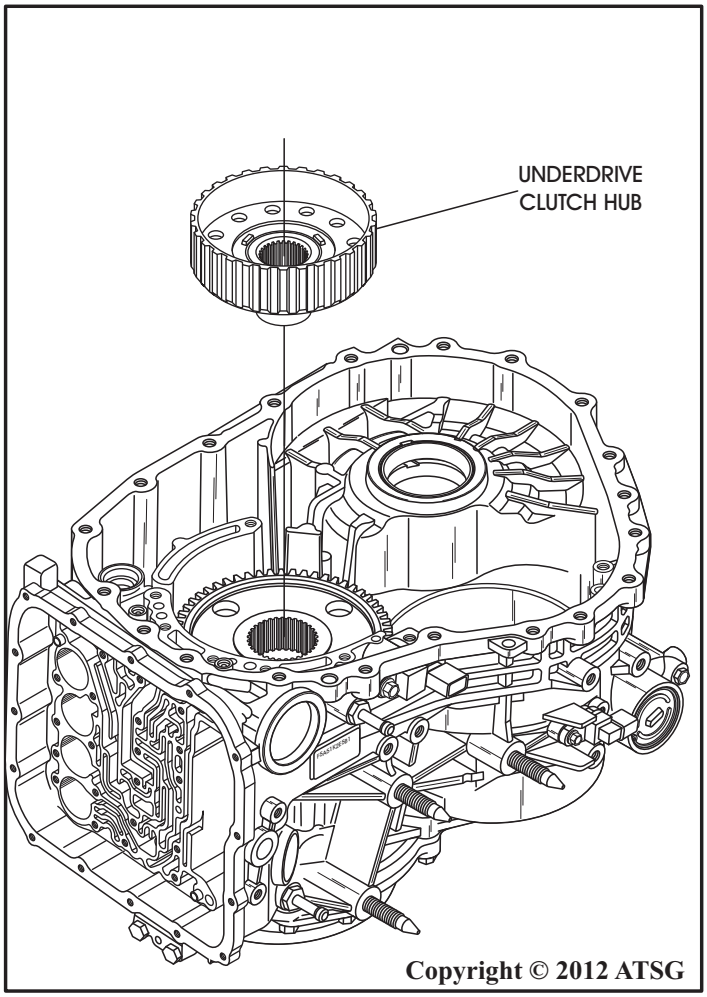


Figure 267

FINAL ASSEMBLY
INTERNAL COMPONENTS (CONT'D)

59. Install dial indicator as shown in Figure 268 and measure rear end-play by moving geartrain up and down.
60. Rear end clearance should be as follows: 0.25 mm - 0.45 mm (.010" - .018").
61. Remove the dial indicator and the underdrive clutch hub.
62. Turn the transaxle over again and remove the rear cover.
63. Change the number 8 thrust bearing race as necessary to obtain the proper rear end-play specification, using the chart in Figure 269.
64. Install 6 new small "O" ring seals into their pressure feed pockets, as shown in Figure 270, and retain with small amount of Trans-Jel®.
65. Install new large "O" ring seal into direct clutch accumulator pocket, as shown in Figure 270, and retain with small amount of Trans-Jel®.

Continued on Page 142

NUMBER 8 THRUST PLATE CHART	
THICKNESS	PART NUMBER
1.6 mm (.063")	MD707267
1.7 mm (.067")	MD759681
1.8 mm (.071")	MD723064
1.9 mm (.075")	MD754794
2.0 mm (.079")	MD707268
2.1 mm (.083")	MD754795
2.2 mm (.087")	MD723065
2.3 mm (.091")	MD754796
2.4 mm (.094")	MD724358
2.5 mm (.098")	MD754797
2.6 mm (.102")	MD754798

Figure 269

Rear Transaxle End-Play Should Be
0.25 mm - 0.45 mm (.010" - .018")

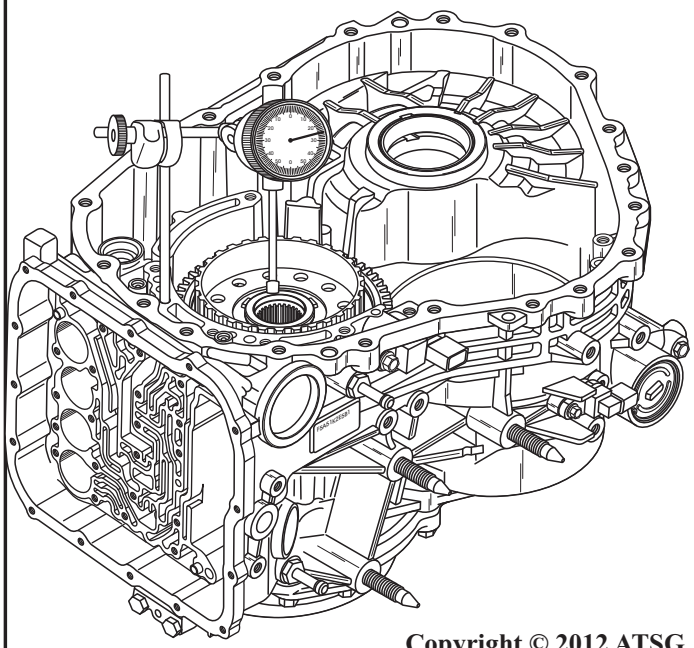
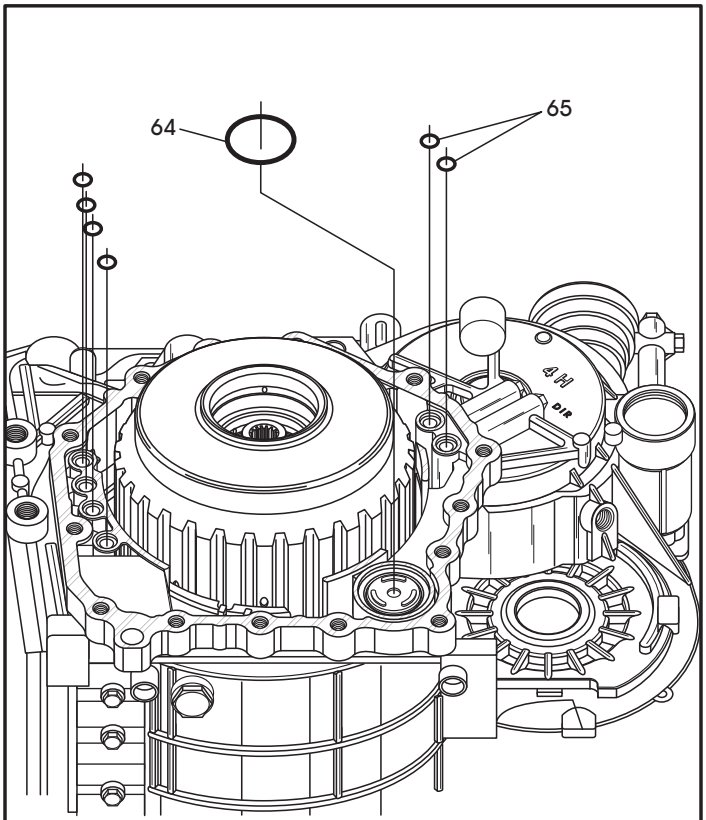


Figure 268



64 DIRECT CLUTCH ACCUM. TO CASE COVER "O" RING SEAL.
65 REAR COVER TO CASE "O" RING SEALS (6 REQUIRED).

Figure 270

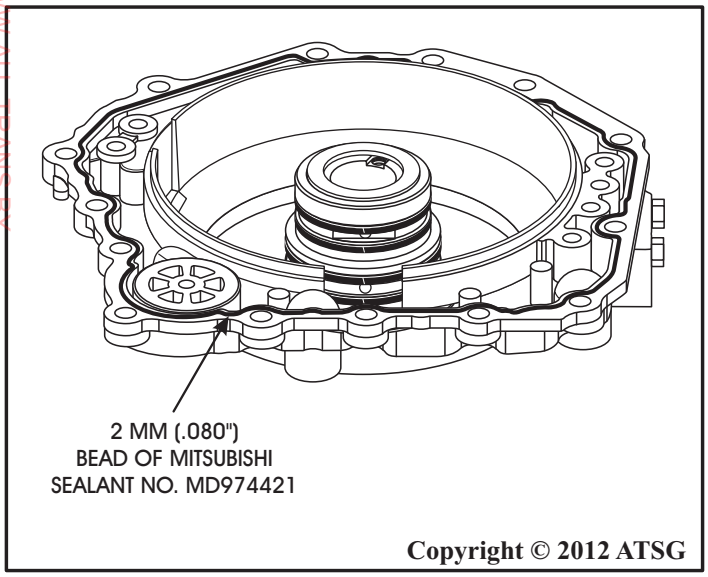


Figure 271

FINAL ASSEMBLY
INTERNAL COMPONENTS (CONT'D)

66. Apply a 2 mm (.080") bead of the Mitsubishi sealant, part number MD974421, or equivalent, to the rear cover, as shown in Figure 271.
67. Ensure that all 7 "O" ring seals are in place in their pockets in case, as shown in Figure 272, and install the rear cover.
    Note: Install the rear cover within 15 minutes while the sealant is still wet.
68. Install the 14 rear cover to case retaining bolts, as shown in Figure 272.
69. Torque the 14 rear cover retaining bolts to 23 N·m (17 ft.lb.), as shown in Figure 273.
    Note: After installation, keep the sealed area away from ATF for approximately one hour.

Continued on Page 143

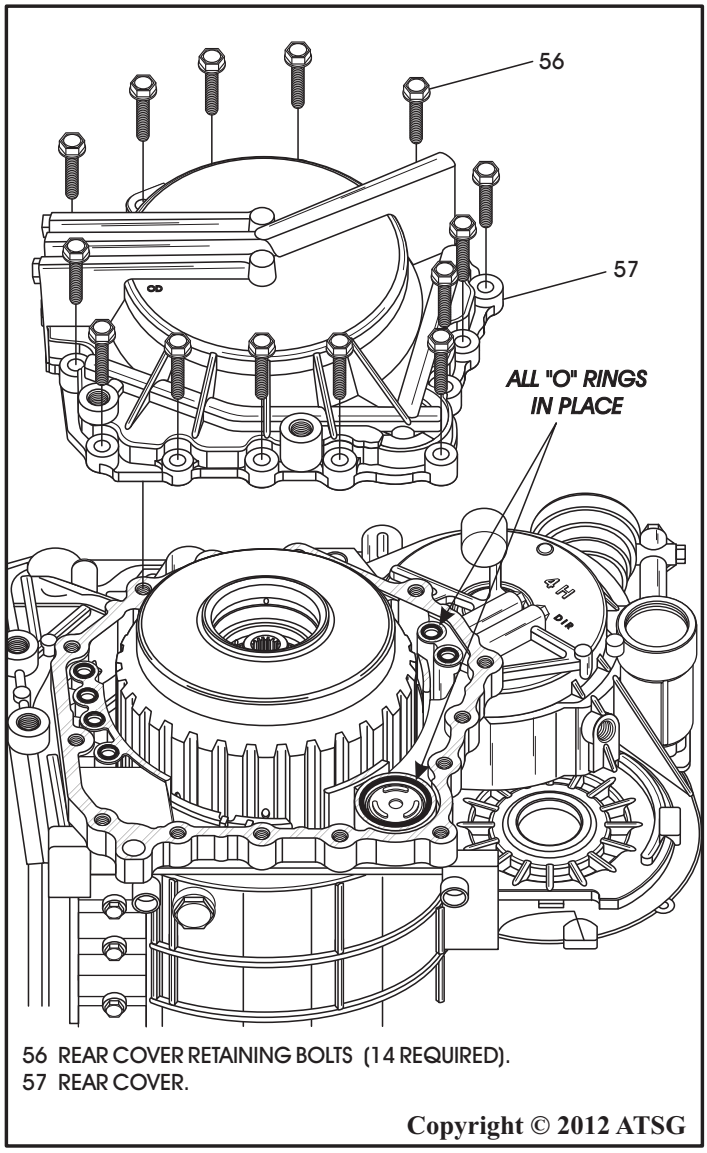


Figure 272

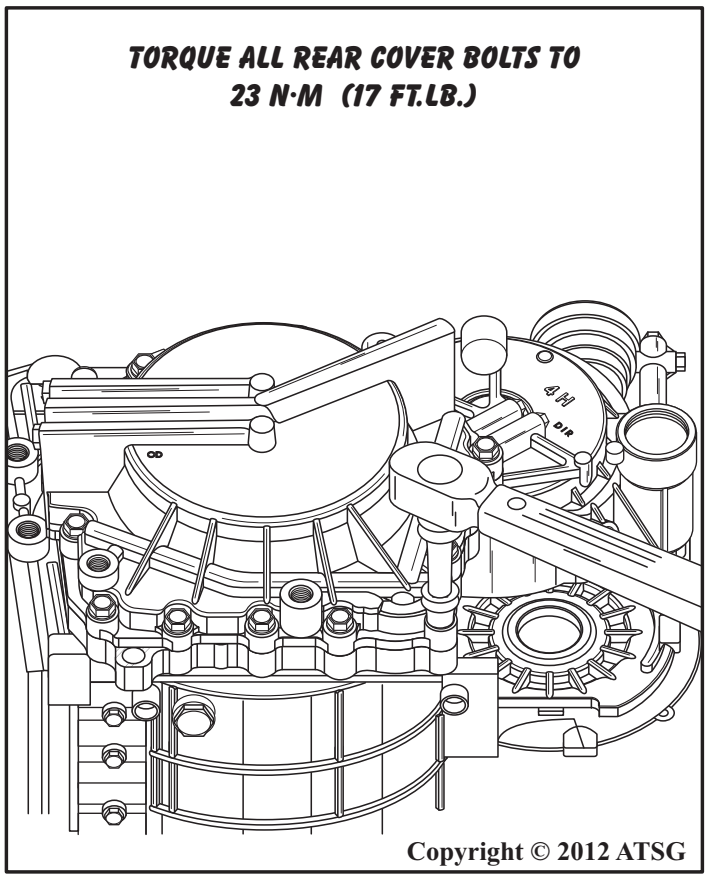


Figure 273

FINAL ASSEMBLY
INTERNAL COMPONENTS (CONT'D)

70. Install new scarf-cut seal on the reduction accumulator piston and install the assembly into case bore, seal down, as shown in Figure 274.
71. Install the reduction accumulator return spring into the piston, as shown in Figure 274.
72. Install new "O" ring seal onto the reduction accumulator cover and install the assembly into case bore, as shown in Figure 274.
73. Compress the cover against spring pressure and install the snap ring, as shown in Figure 274.
74. Again turn the transaxle case over so that torque converter housing side is facing up.
75. Install the number 12 thrust bearing race on top of seal ring tower in direct planetary case bore, as shown in Figure 275, and retain with a small amount of Trans-Jel®.
76. Ensure that direct clutch seal rings are still properly seated, as shown in Figure 275.
77. Ensure that the number 11 thrust bearing is still seated properly in the direct clutch housing, as shown in Figure 276 (Needles facing up).

Continued on Page 144

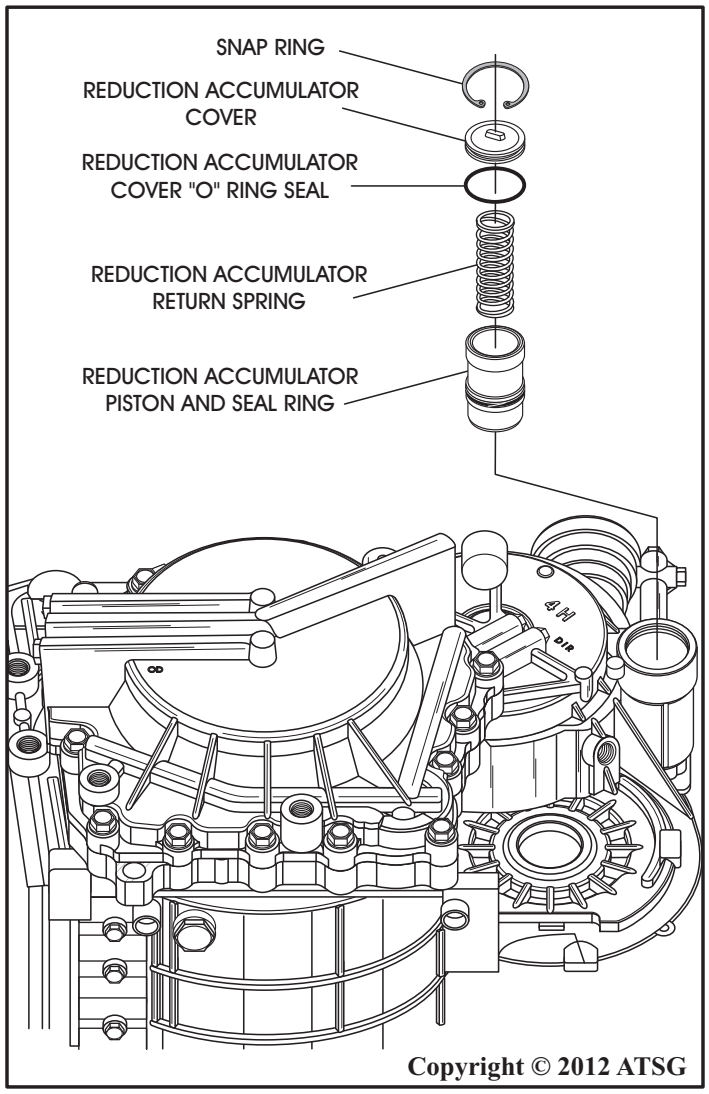


Figure 274

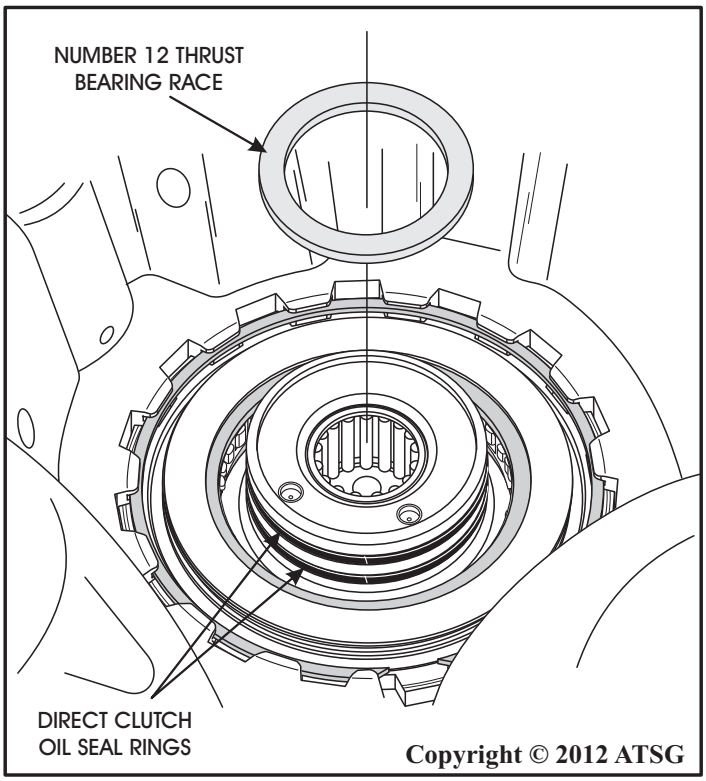


Figure 275

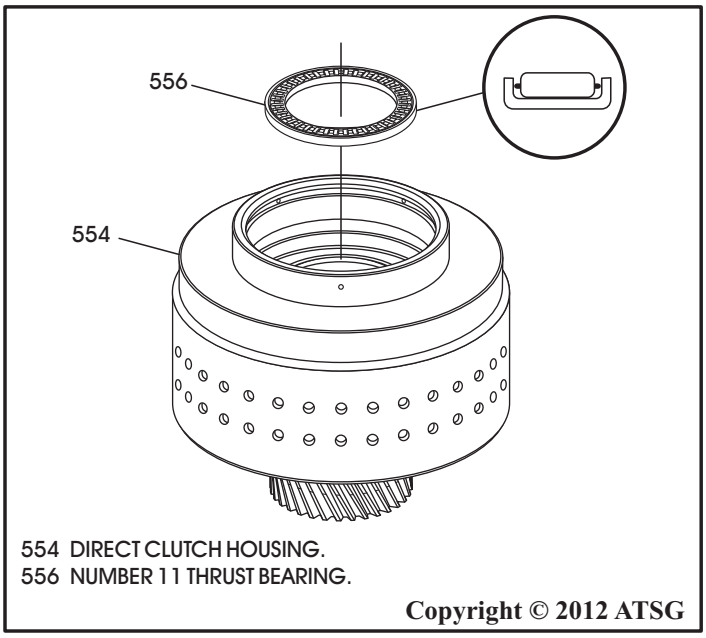


Figure 276

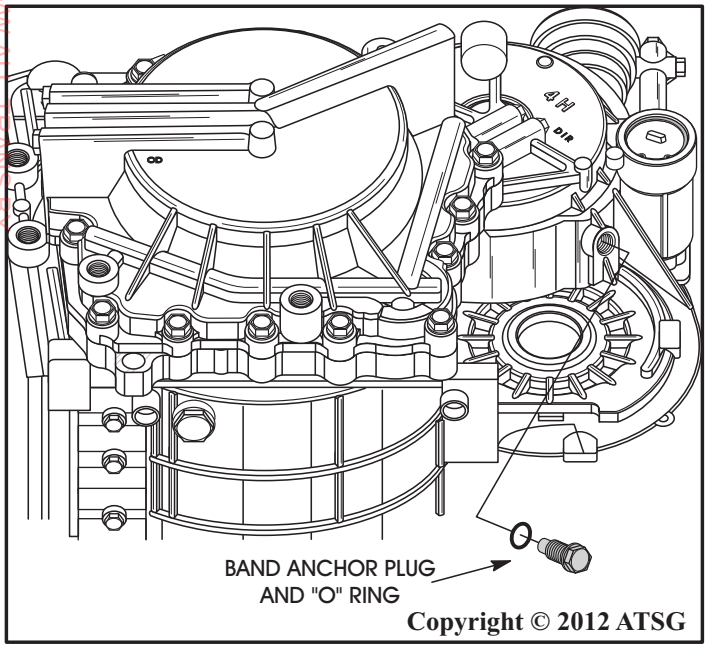


Figure 277

FINAL ASSEMBLY

INTERNAL COMPONENTS (CONT'D)

78. Install new "O" ring seal on the reduction band anchor plug and install band anchor plug into the case, as shown in Figure 277.
79. Install the reduction band into the case, as shown in Figure 278, and ensure it is seated on the band anchor plug properly.
80. Install the completed direct clutch housing into the case, as shown in Figure 278, by rotating counter-clockwise until fully seated.
    Note: Lifting of the band on opposite side of anchor plug may be required to fully seat the direct clutch housing. A 90 degree pick tool works well here.
81. After installation and fully seated, direct clutch housing should freewheel counter-clockwise and lock in a clockwise direction (See Figure 279).
82. After the direct clutch housing is fully seated torque the reduction band anchor plug to 98 N·m (72 ft.lb.).

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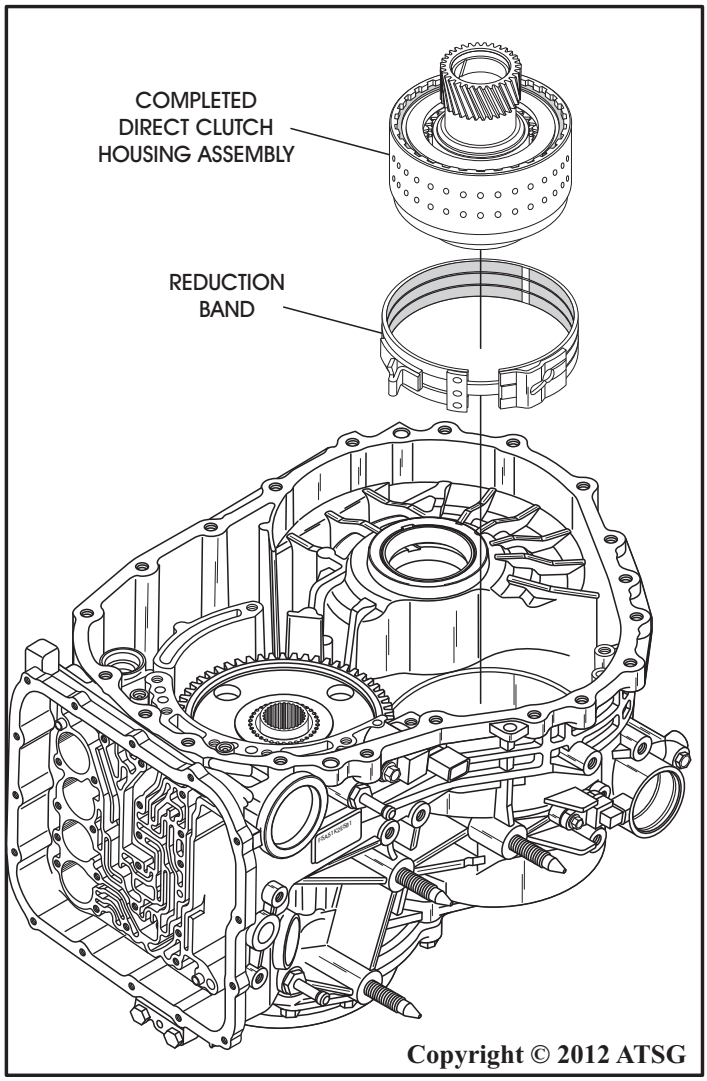


Figure 278

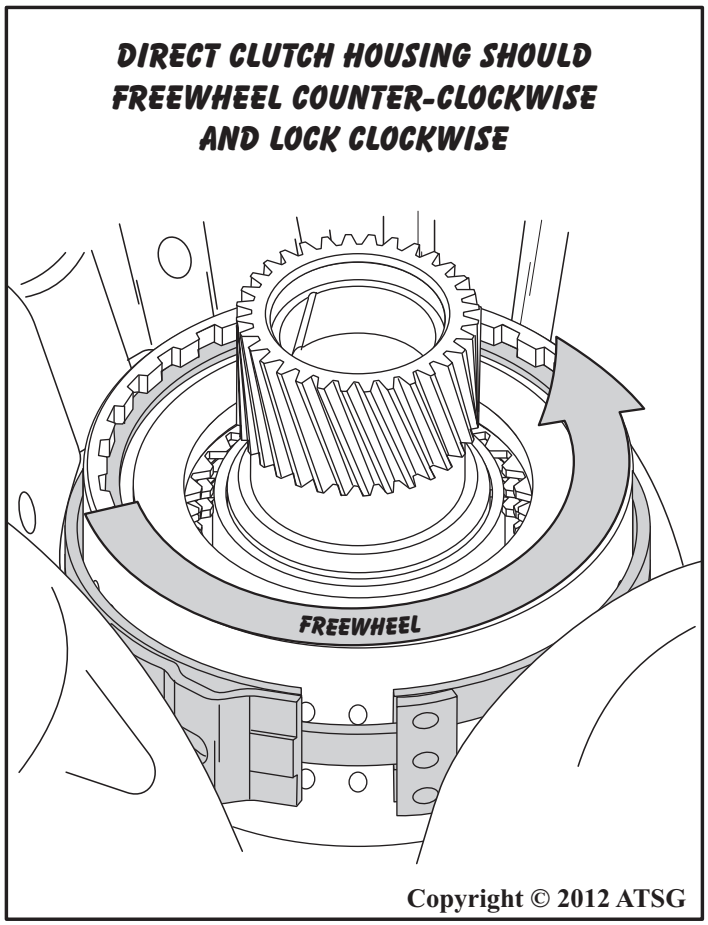


Figure 279

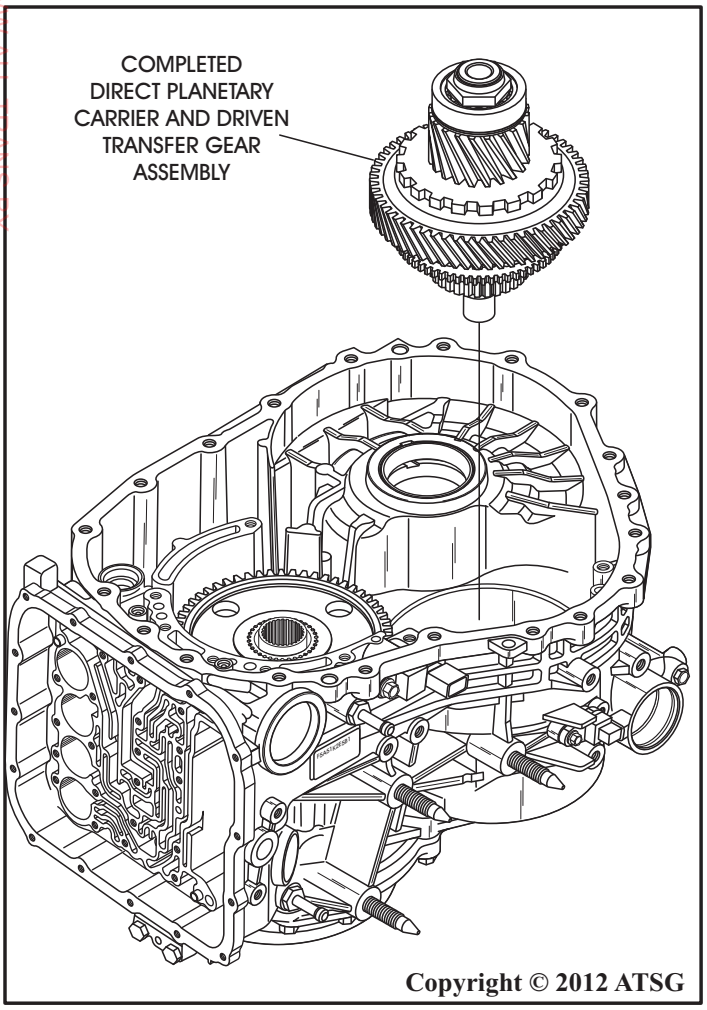


Figure 280

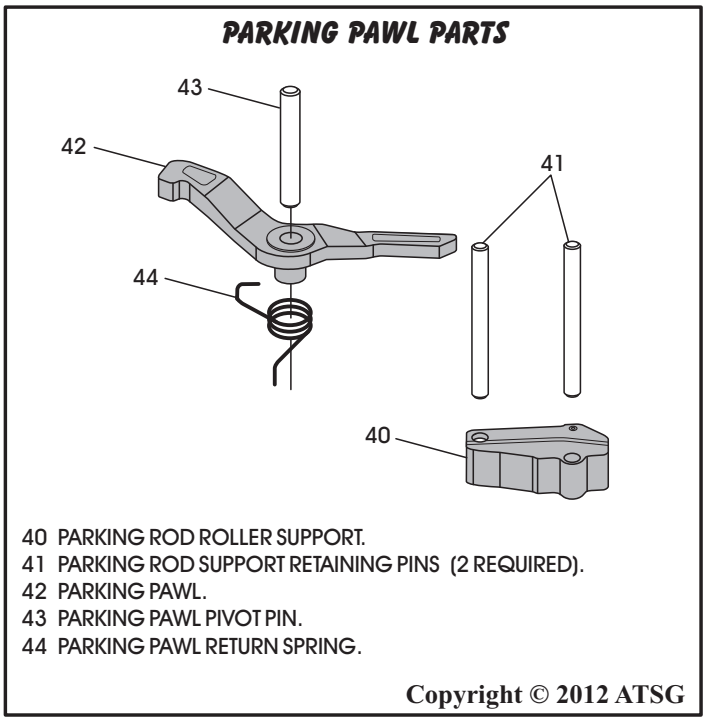


Figure 281

FINAL ASSEMBLY

INTERNAL COMPONENTS (CONT'D)

83. Install the completed direct planetary carrier and driven transfer gear assembly, as shown in Figure 280, by rotating back and forth to engage all direct frictions and planetary pinions until it is fully seated.
Note: Use measurement you recorded during the disassembly procedure to ensure assembly is fully seated.
84. Assemble the parking pawl return spring to the parking pawl, as shown in Figure 281 and 282.
85. Install the parking pawl and spring assembly into the case, as shown in Figure 282, and install the parking pawl pivot pin.

Continued on Page 146

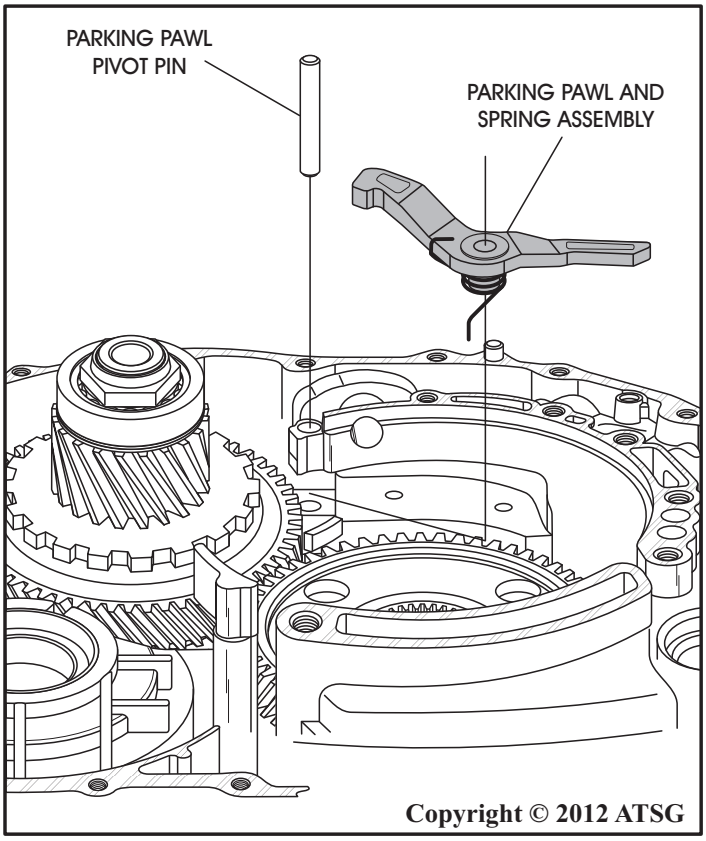


Figure 282

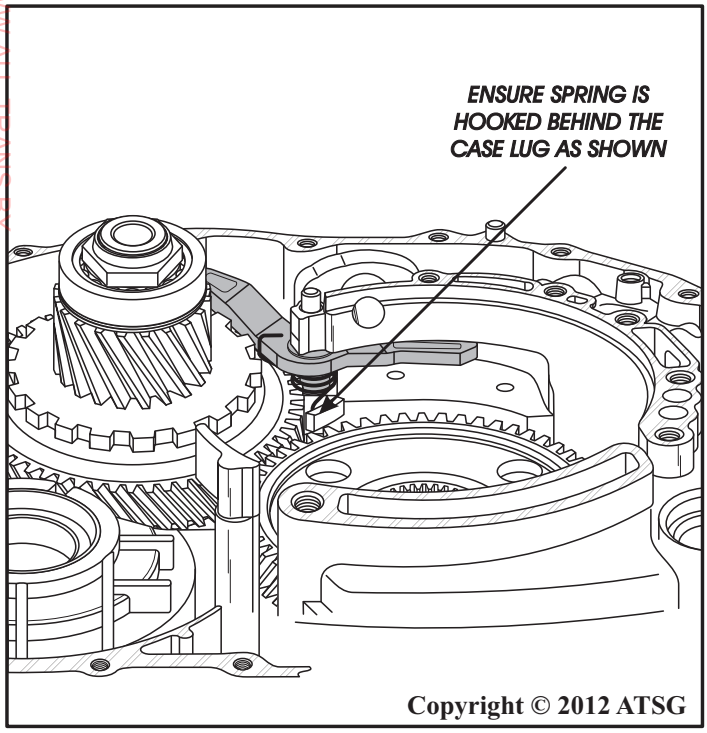


Figure 283

FINAL ASSEMBLY

INTERNAL COMPONENTS (CONT'D)

86. Ensure that parking pawl return spring is hooked properly behind the internal case lug, as shown in Figure 283.
87. Install the parking rod roller support into the case, as shown in Figure 284.
88. Install both parking rod roller support retaining pins, as shown in Figure 284.
89. Push the retaining pins down until fully seated by ***hand only,*** as shown in Figure 285.

Continued on Page 147

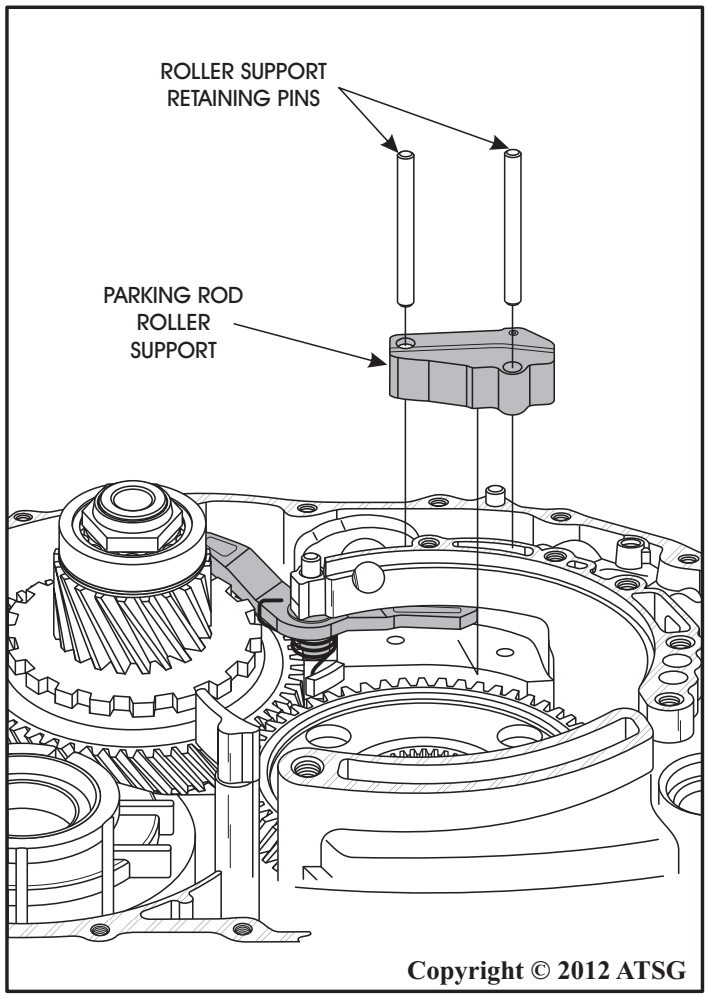


Figure 284

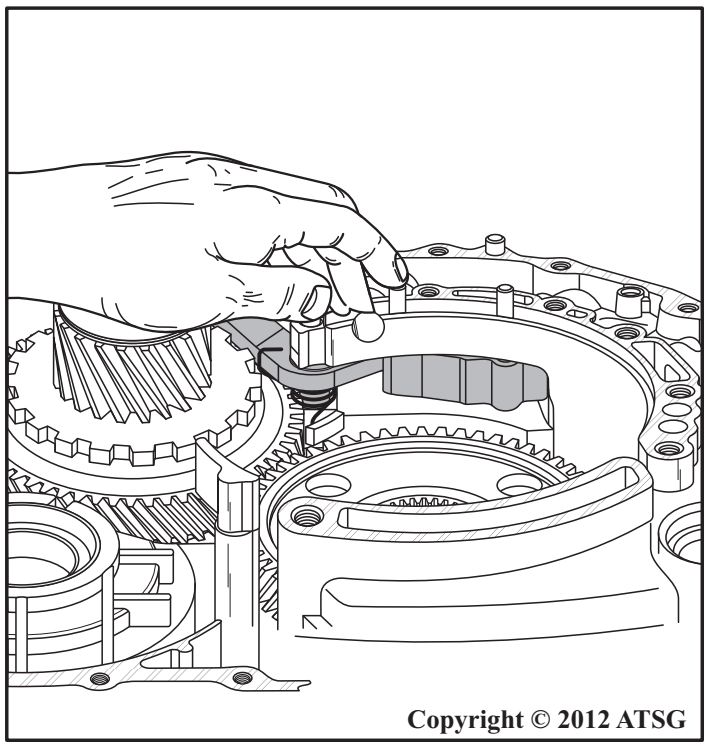


Figure 285

FINAL ASSEMBLY
INTERNAL COMPONENTS (CONT'D)

90. Install the reduction servo piston return spring into case, as shown in Figure 286.
91. Install pre-assembled reduction servo piston and seal assembly, as shown in Figure 286 and 287, compress the spring and install snap ring, with flat side facing down.
    Note: Place the cavity in the piston and the opening in the snap ring, to opening in case as shown in Figure 287.
92. Turn adjusting screw (apply pin) in completely with a substantial amount of torque to ensure band is fully seated on anchor plug and servo pin and then back it off.
93. Torque the adjustment screw (apply pin) to 44 in.lb. and back off 5-1/2 to 5-3/4 turns, and torque the lock nut to 18 N·m (13 ft.lb.).
    Note: Mitsubishi supplies a special tool to hold the piston from turning during the adjustment process, as shown in Figure 287.
94. Install the pre-assembled reduction servo cover and snap ring, flat side facing down, as shown in Figure 288.

Continued on Page 148

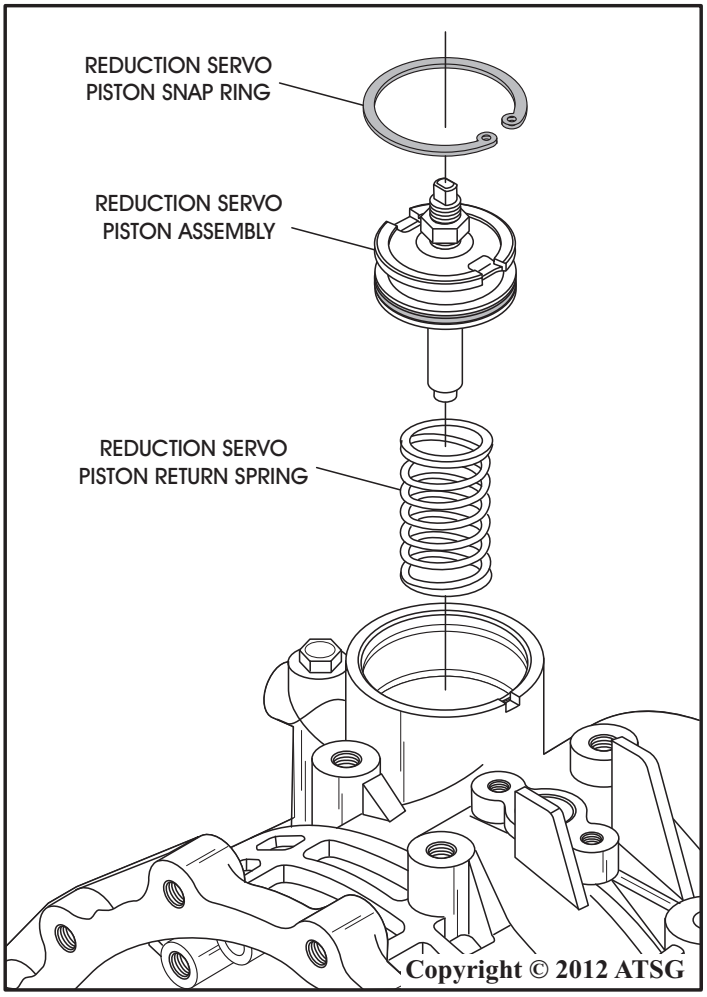


Figure 286

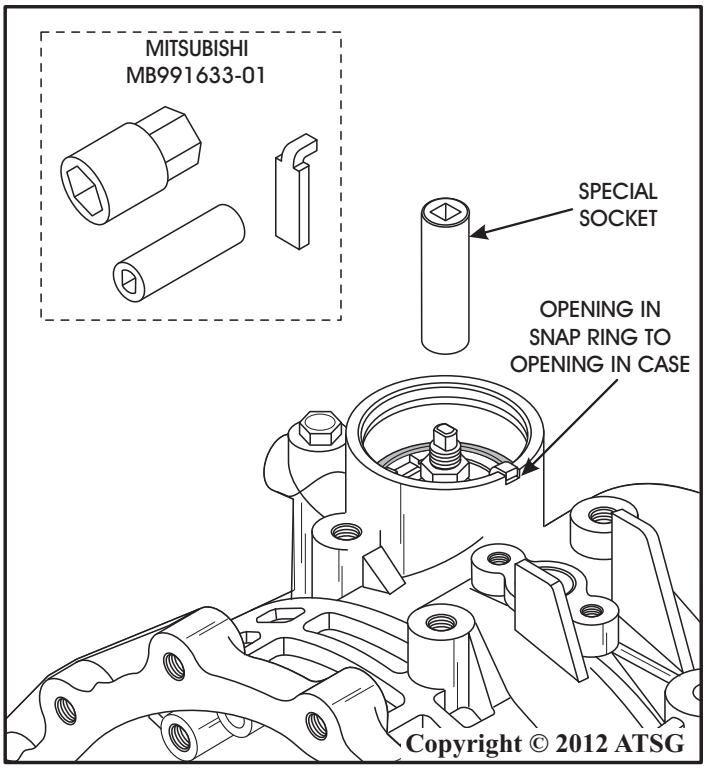


Figure 287

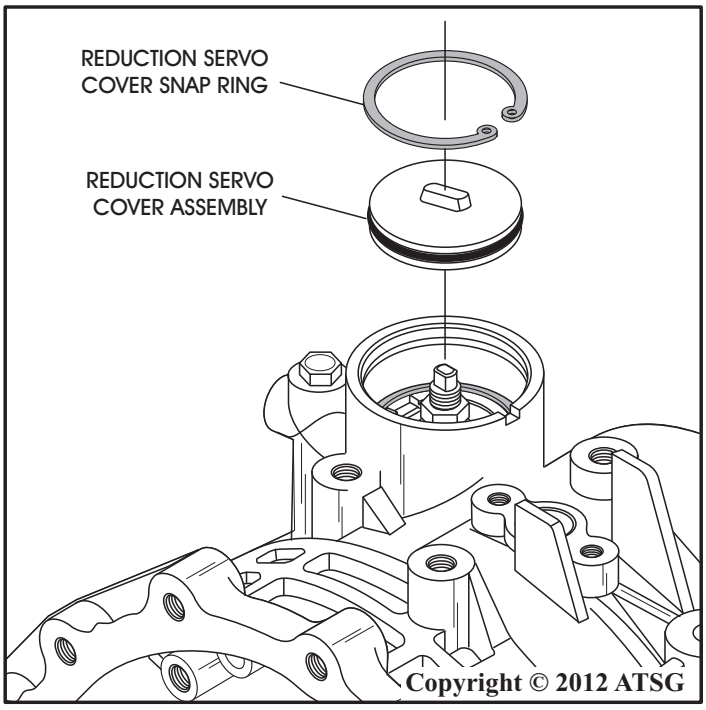


Figure 288

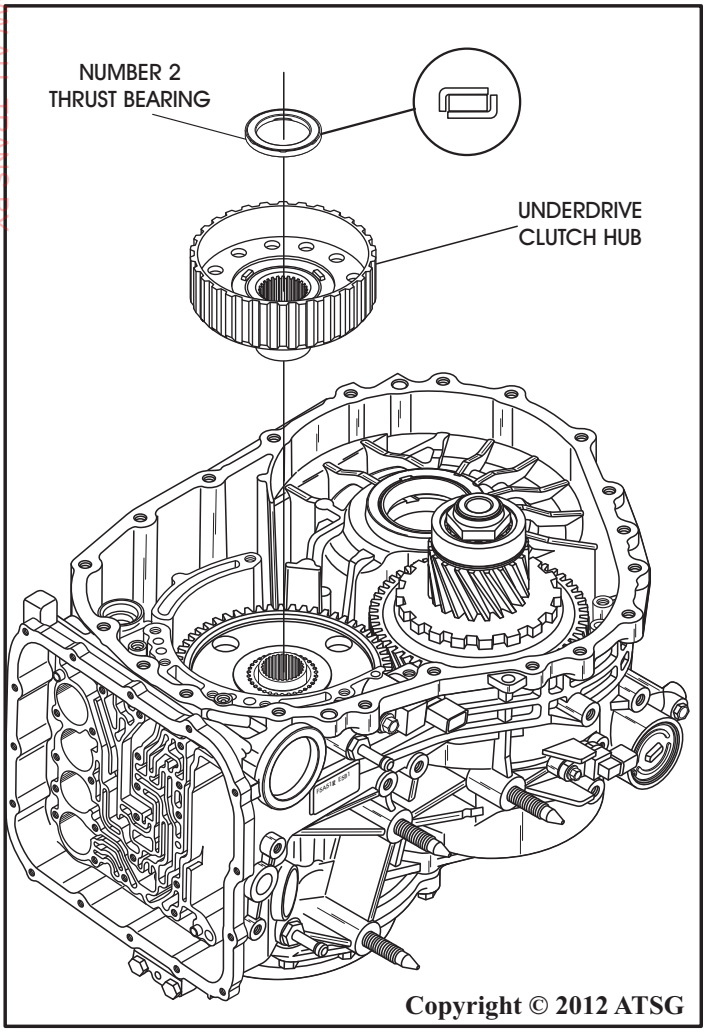


Figure 289

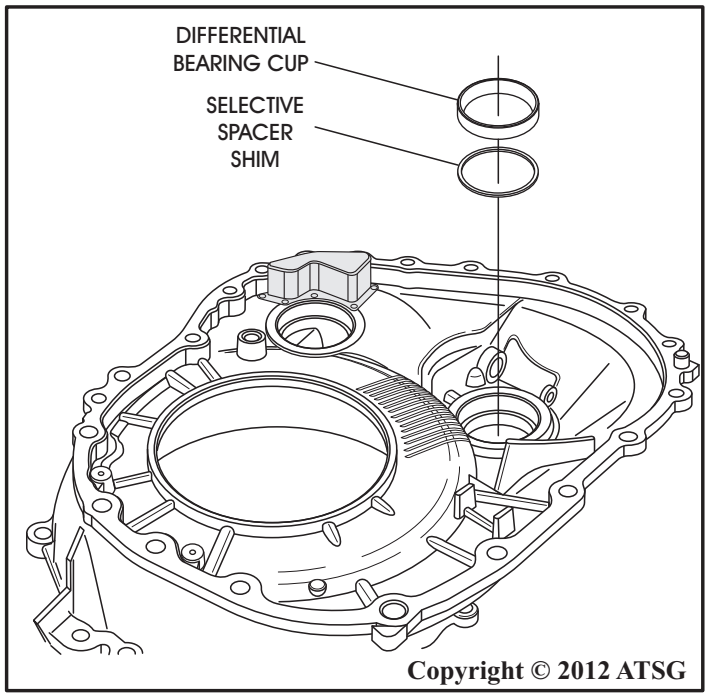


Figure 290

FINAL ASSEMBLY

INTERNAL COMPONENTS (CONT'D)

95. Install the underdrive clutch hub and number 2 thrust bearing, as shown in Figure 289.
96. Install the original selective spacer shim and bearing cup,as shown in Figure 290, into the converter housing using proper drivers. ***Note: If for any reason you do not know what spacer goes here, you must install the bearing cup without the spacer.***
97. Install the differential into case, install the converter housing, as shown in Figure 291, and torque the converter housing bolts to 48 N·m (35 ft.lb.).

Continued on Page 149

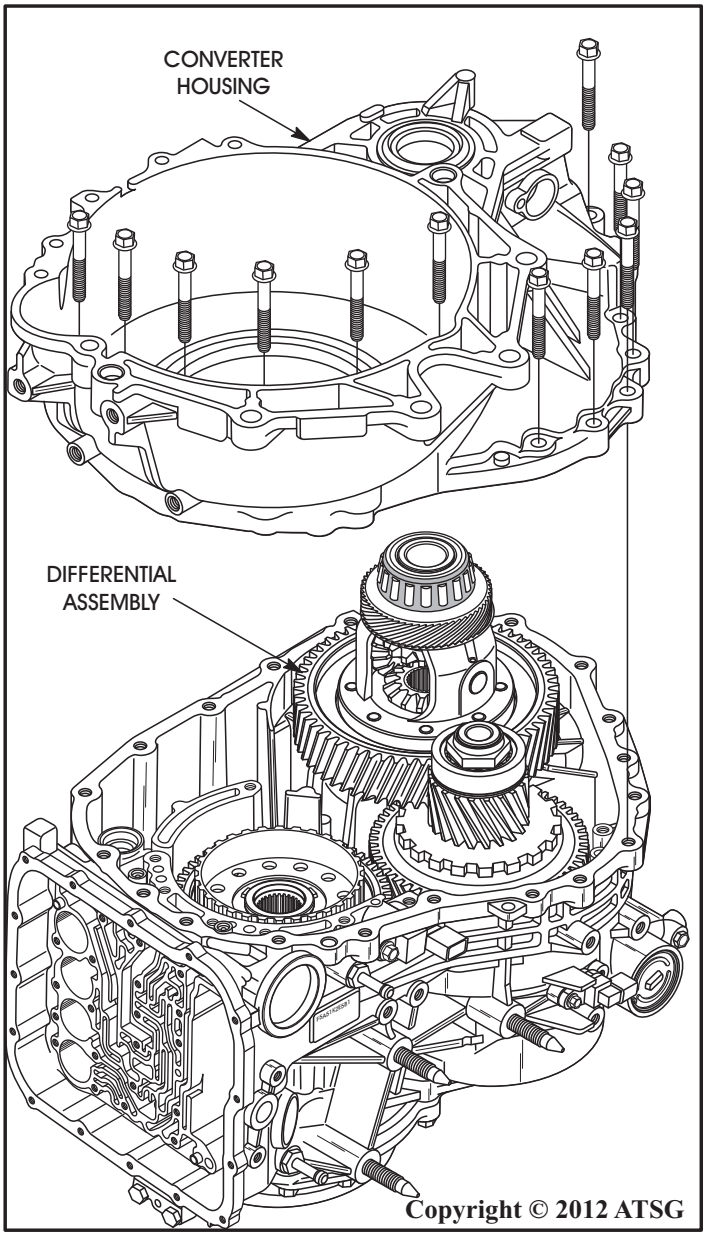


Figure 291

DIFFERENTIAL CASE SELECTIVE SPACER CHART		
Thickness	*I.D. Symbol*	*Part Number*
0.71 mm (.0280")	*71*	*MD754475*
0.74 mm (.0291")	*74*	*MD727660*
0.77 mm (.0303")	*77*	*MD754476*
0.80 mm (.0315")	*80*	*MD727661*
0.83 mm (.0327")	*83*	*MD720937*
0.86 mm (.0339")	*86*	*MD720938*
0.89 mm (.0350")	*89*	*MD720939*
0.92 mm (.0362")	*92*	*MD720940*
0.95 mm (.0374")	*95*	*MD720941*
0.98 mm (.0386")	*98*	*MD720942*
1.01 mm (.0398")	*01*	*MD720943*
1.04 mm (.0409")	*04*	*MD720944*
1.07 mm (.0421")	*07*	*MD720945*
1.10 mm (.0433")	*J*	*MD710454*
1.13 mm (.0445")	*D*	*MD700270*
1.16 mm (.0457")	*K*	*MD710455*
1.19 mm (.0469")	*L*	*MD710456*
1.22 mm (.0480")	*G*	*MD700271*
1.25 mm (.0492")	*M*	*MD710457*
1.28 mm (.0504")	*N*	*MD710458*
1.31 mm (.0516")	*E*	*MD706574*
1.34 mm (.0528")	*O*	*MD710459*
1.37 mm (.0539")	*P*	*MD710460*

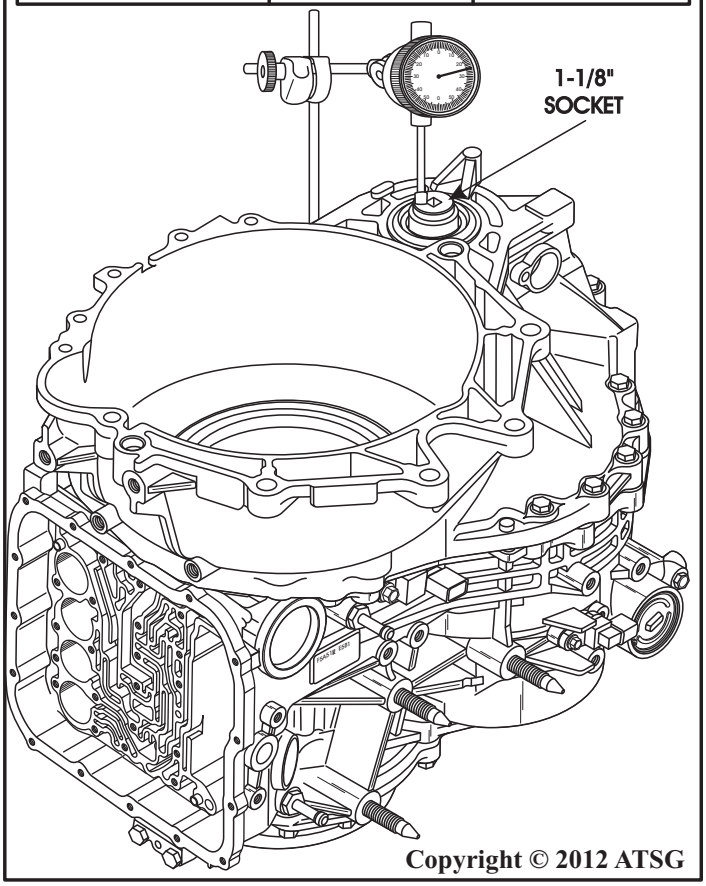


Figure 292

FINAL ASSEMBLY

INTERNAL COMPONENTS (CONT'D)

98. Install 1-1/8", 1/2" drive socket through the axle seal, as shown in Figure 292.
99. Install a dial indicator with the stem resting on the socket, as shown in Figure 292, and zero the dial indicator.
100. With a large screwdriver coming through the axle seal on the opposite side and against the differential cross shaft, move the differential up and down to determine end play.
101. Choose a spacer from the chart in Figure 292 that is .002"- .004" thicker than your end play reading.
102. Remove the converter housing and the bearing cup, install the selected spacer and re-install the bearing cup, as shown in Figure 290.
103. Install the underdrive clutch housing and the number 1 selective thrust washer, as shown in Figure 293.

Continued on Page 150

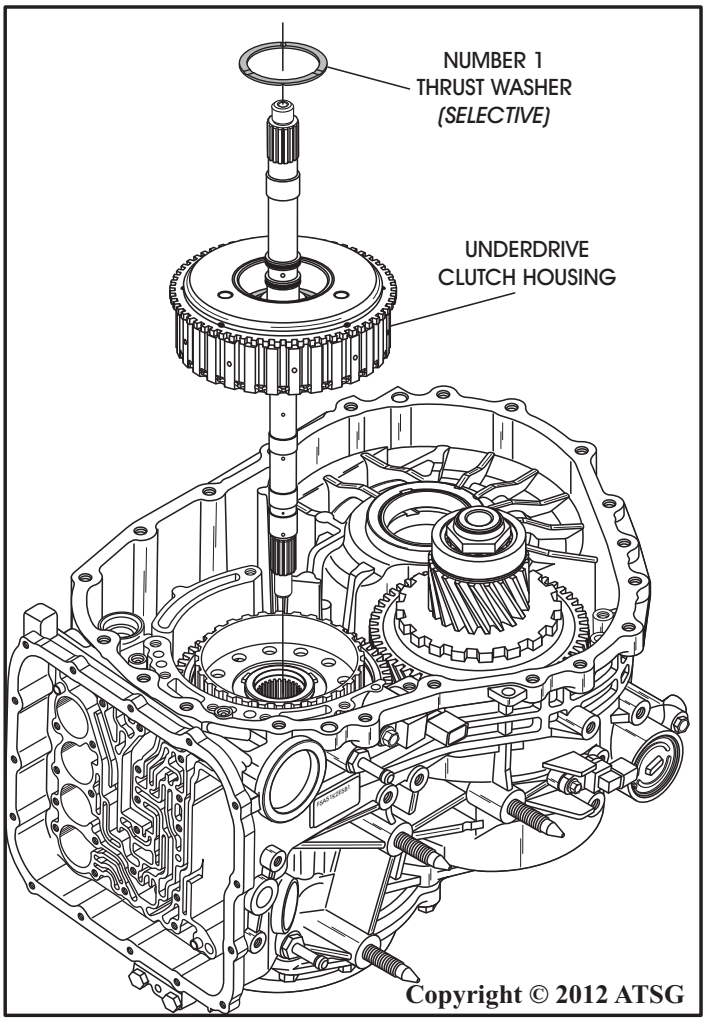


Figure 293

FINAL ASSEMBLY
INTERNAL COMPONENTS (CONT'D)

104. Install the "H" gage on transaxle pump surface, as shown in Figure 294, and let the adjustment leg down to rest on the selective thrust washer and tighten the adustment knob.
105. Turn the "H" gage over and set it on oil pump assembly, ***with*** the oil pump gasket in place, as shown in Figure 295.
106. Measure with a feeler gage between the pump surface and "H" gage adjustment leg, as shown in Figure 295, for proper front end play.
107. Proper front end play should be as follows; .045 - .105 mm (.028" - .057").
108. Change selective thrust washer as necessary using the chart in Figure 295, to obtain proper input shaft end play.

Continued on Page 151

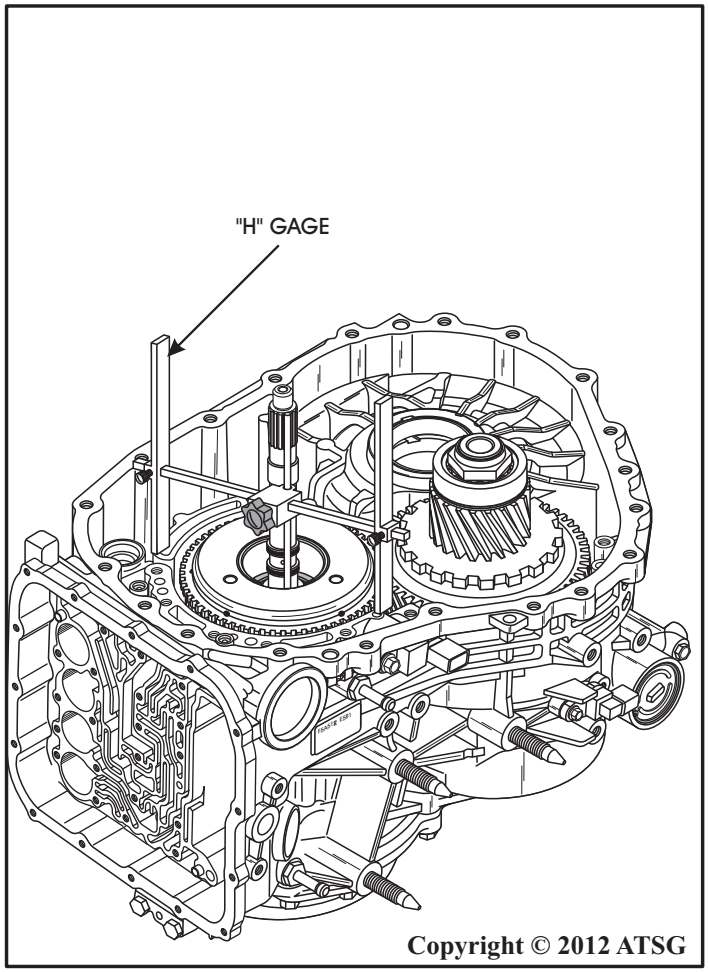


Figure 294

INPUT SHAFT SELECTIVE WASHER CHART		
Thickness	*I.D. Symbol*	*Part Number*
1.8 mm (.071")	*18*	*MD754509*
2.0 mm (.079")	*20*	*MD754508*
2.2 mm (.087")	*22*	*MD754507*
2.4 mm (.094")	*24*	*MD753793*
2.6 mm (.102")	*26*	*MD753794*
2.8 mm (.110")	*28*	*MD753795*

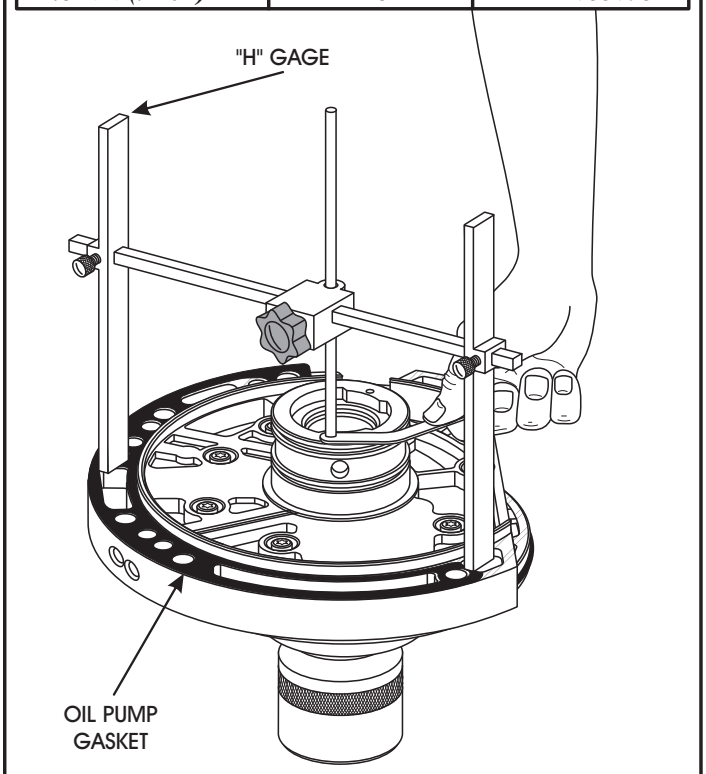


Figure 295

FINAL ASSEMBLY

INTERNAL COMPONENTS (CONT'D)

109. Install the oil pump gasket on transaxle case, as shown in Figure 296.
110. Install the pre-assembled oil pump assembly, as shown in Figure 296.
111. Install and torque the 6 oil pump to case bolts to 23 N·m (17 ft.lb.) (See Figure 296).
112. Install dial indicator, as shown in Figure 297, to ensure that front transaxle end-play is; .045-.105 mm (.028" - .057").
113. Install reduction band feed pipe into oil pump and rotate down into the case, as shown in Figure 298.
114. Install reduction band feed pipe retaining bolts and torque to 11 N·m (97 in.lb.), as shown in Figure 298.

Continued on Page 152

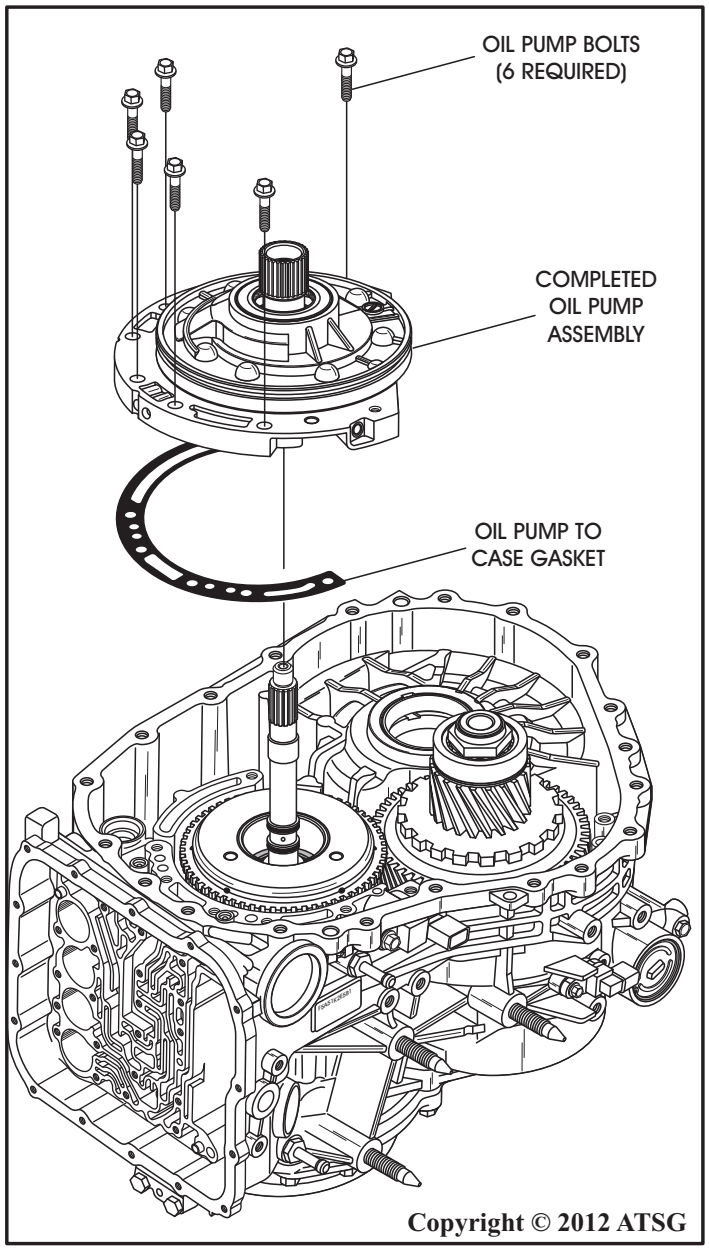


Figure 296

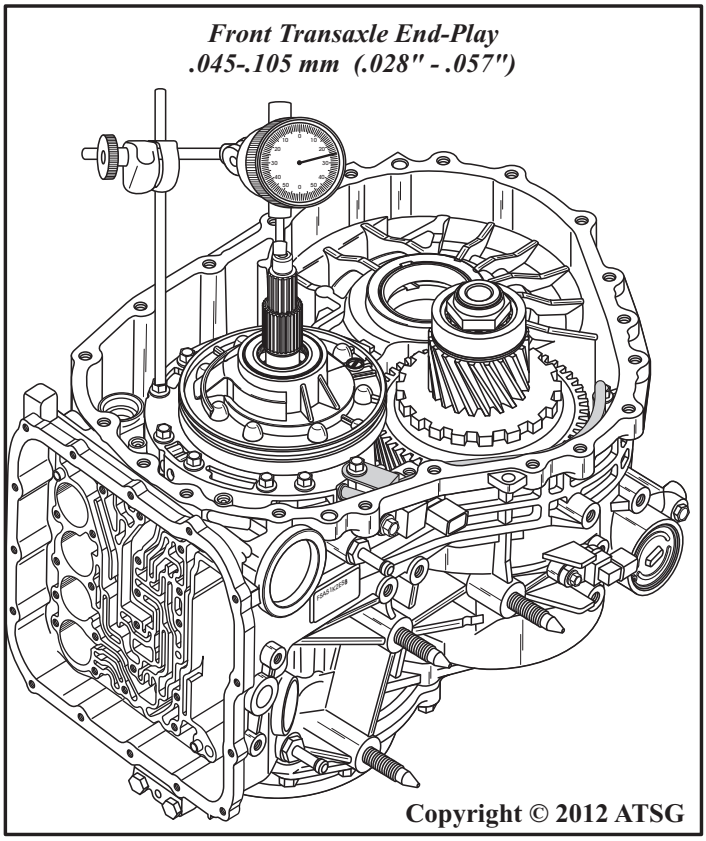


Figure 297

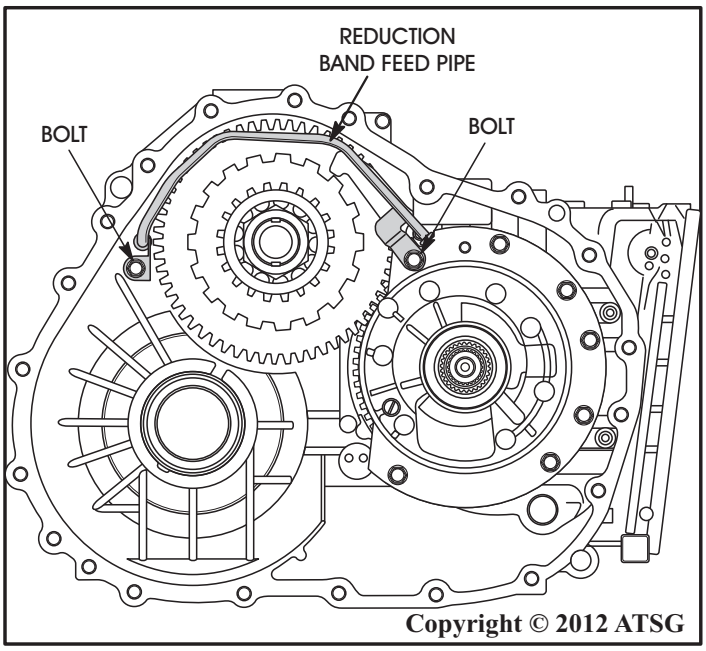


Figure 298

FINAL ASSEMBLY
INTERNAL COMPONENTS (CONT'D)

115. Install a new "O" ring on the neck of new filter and lube "O" ring with with a small amount of Trans-Jel® (See Figure 299).
116. Install the filter assembly into the transaxle case bore, as shown in Figure 299.
117. Install the completed differential assembly into the case, as shown in Figure 299.
118. Install two new "O" rings into the pockets in transaxle case, as shown in Figure 300, and retain with small amount of Trans-Jel®.
119. Apply a 2 mm (.080") bead of the Mitsubishi sealant, part number MD974421, or equivalent to converter housing, as shown in Figure 301.

Continued on Page 153

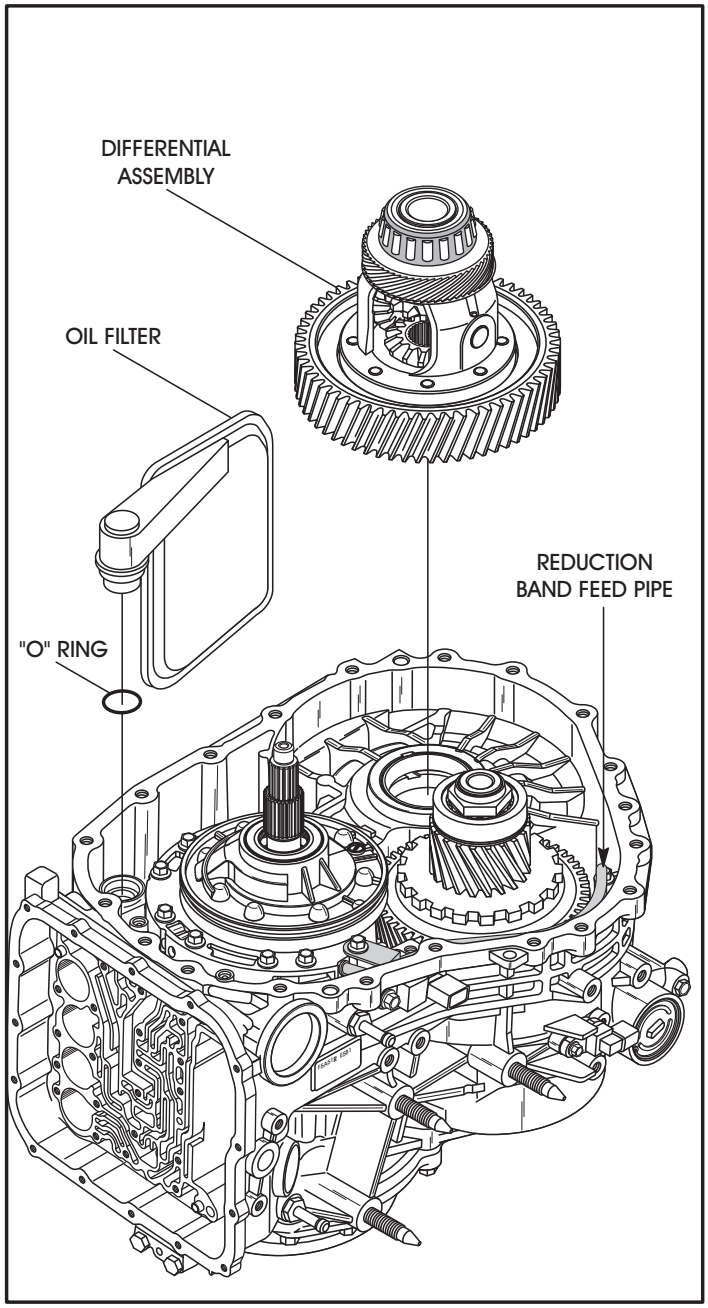


Figure 299

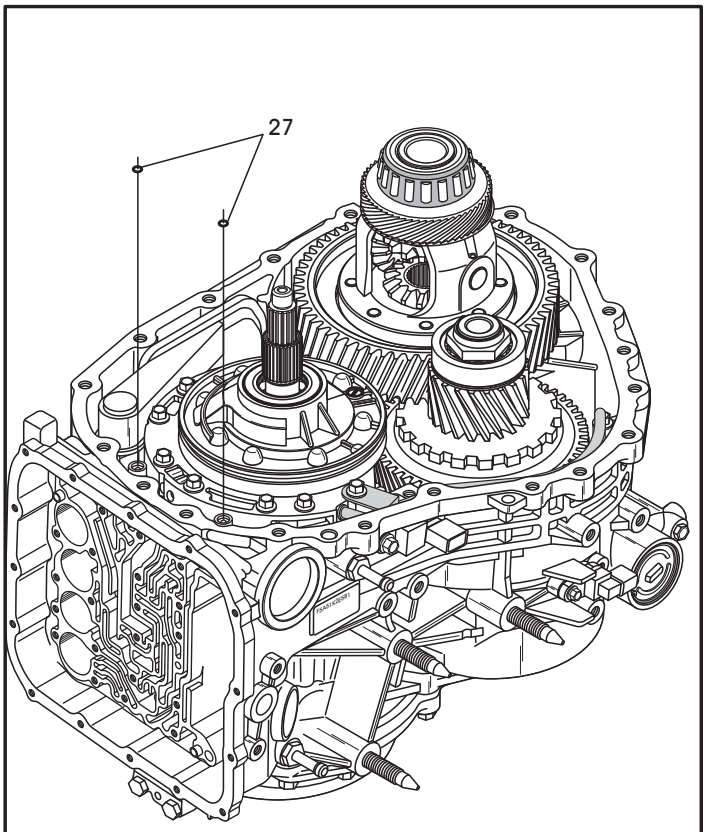


Figure 300

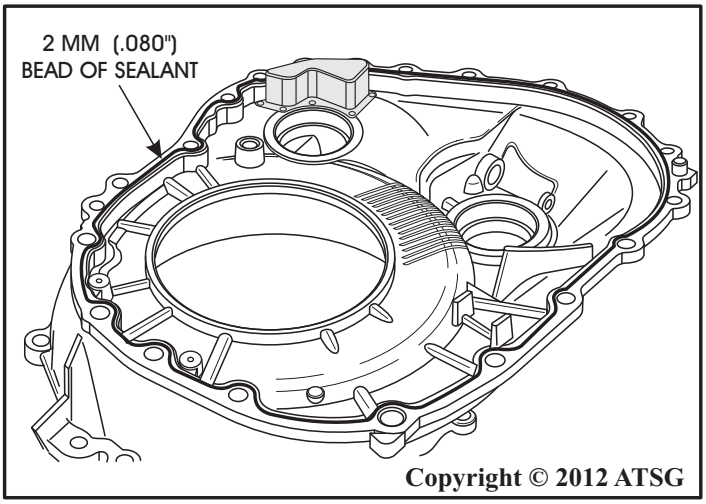


Figure 301

FINAL ASSEMBLY
INTERNAL COMPONENTS (CONT'D)

120. Ensure the two small "O" rings are still in place and install the completed converter housing, as shown in Figure 303.
Note: install converter housing within fifteen minutes while the sealant is still wet.
121. Install the twenty converter housing bolts, as shown in Figure 303, and torque all the bolts to 48 N·m (35 ft.lb.).
Note: After installation, keep the sealed area away from ATF for approximately one hour.

Continued on Page 154

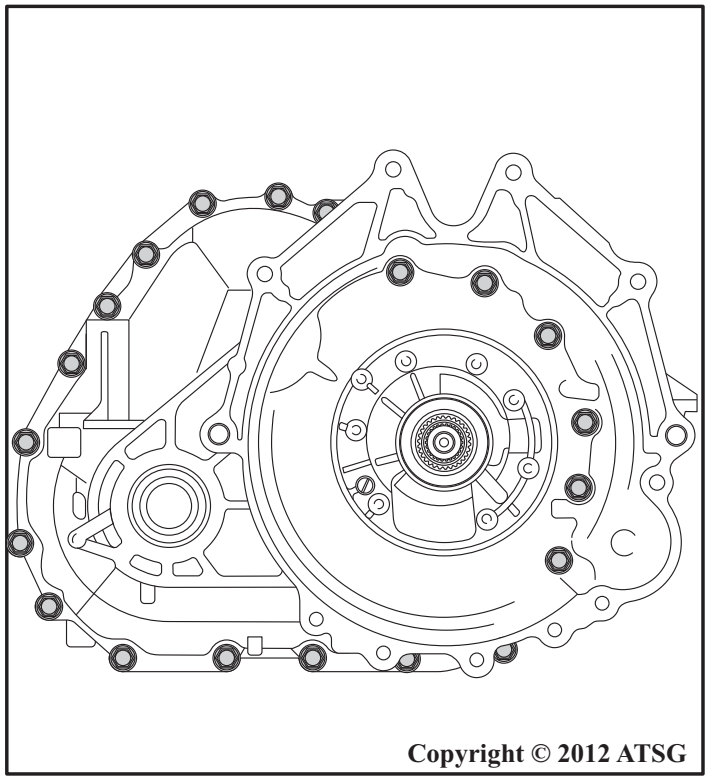
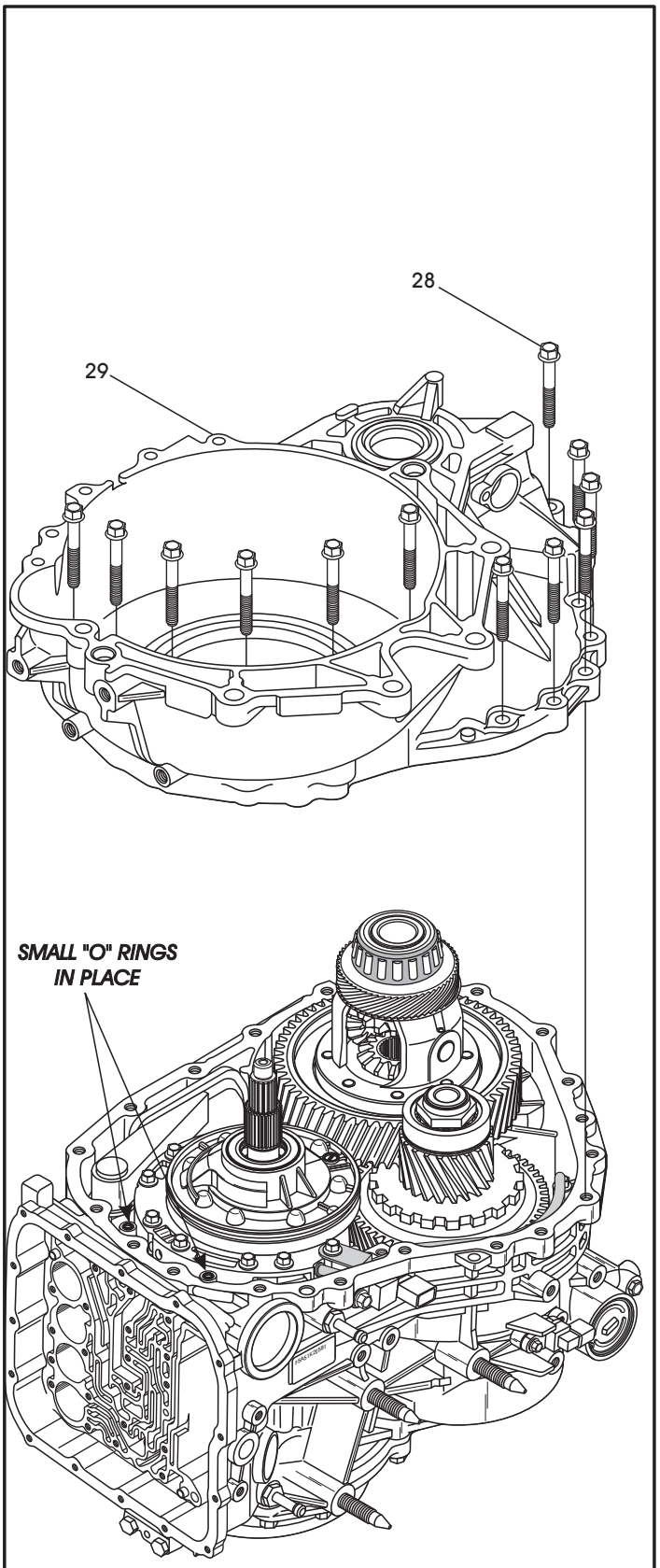


Figure 302



28 CONVERTER HOUSING TO CASE RETAINING BOLTS (20 REQ.).
29 TORQUE CONVERTER HOUSING.

Figure 303

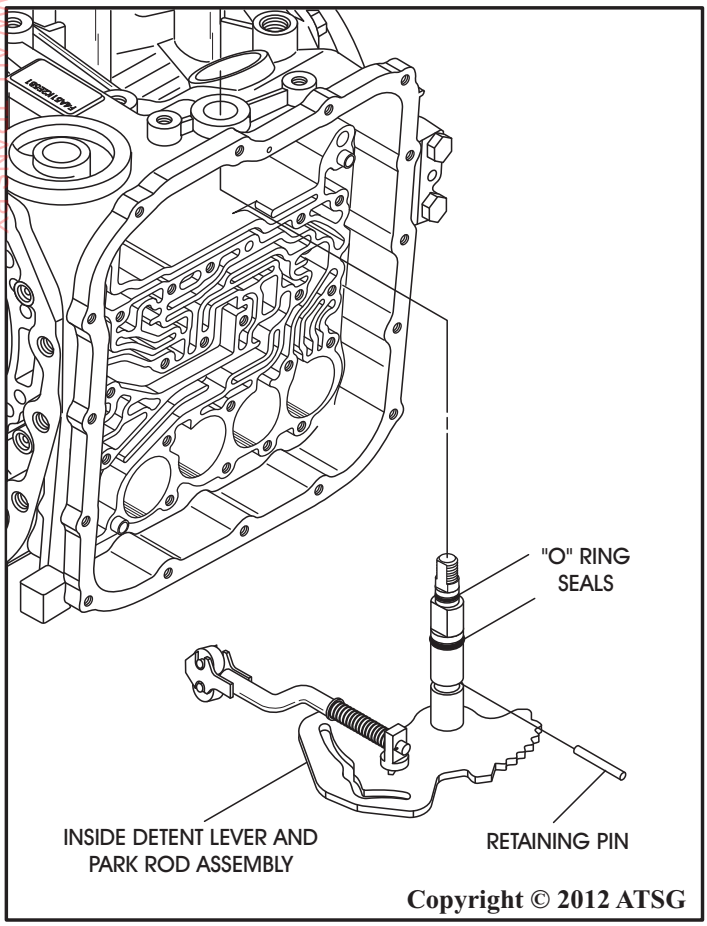


Figure 304

FINAL ASSEMBLY

INTERNAL COMPONENTS (CONT'D)

122. Install two new "O" rings onto manual shaft, as shown in Figure 304, and lube with small amount of Trans-Jel®.
123. Assemble the park actuating rod to the inside detent lever, as shown in Figure 304.
124. Install the inside detent lever assembly into the case, as shown in Figure 304, and install the retaining pin through the pan rail and shaft.
125. Install new "O" ring on case connector, as shown in Figure 305, and lube with a small amount of Trans-Jel.
126. Install the internal wire harness from inside the case and through the case bore, as shown in Figure 305, and install snap ring.
Note: Both the 10-Way Mitsubishi and early Hyundai/Kia, & the 12-Way late Hyundai/Kia internal harness' are shown in Figure 305.

Continued on Page 155

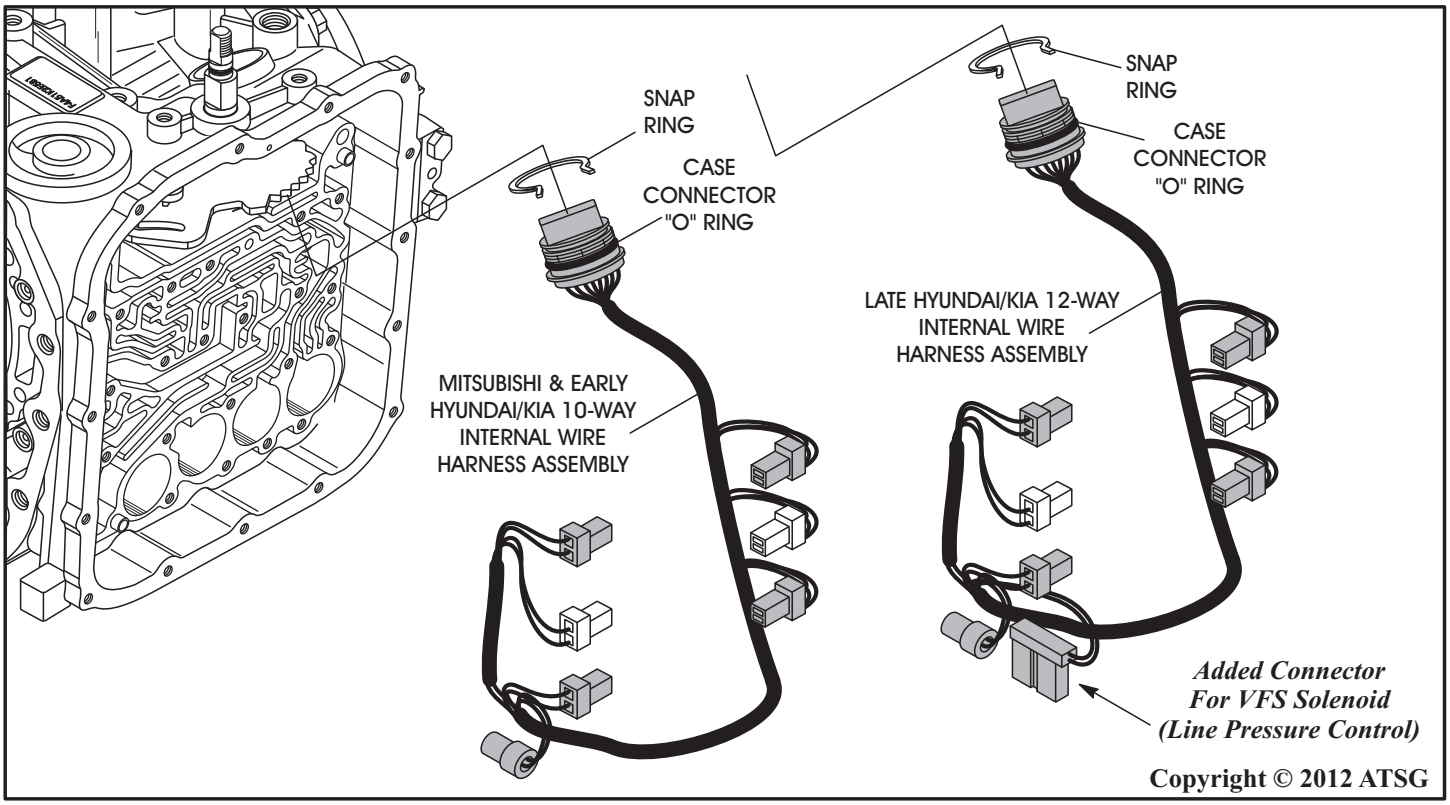
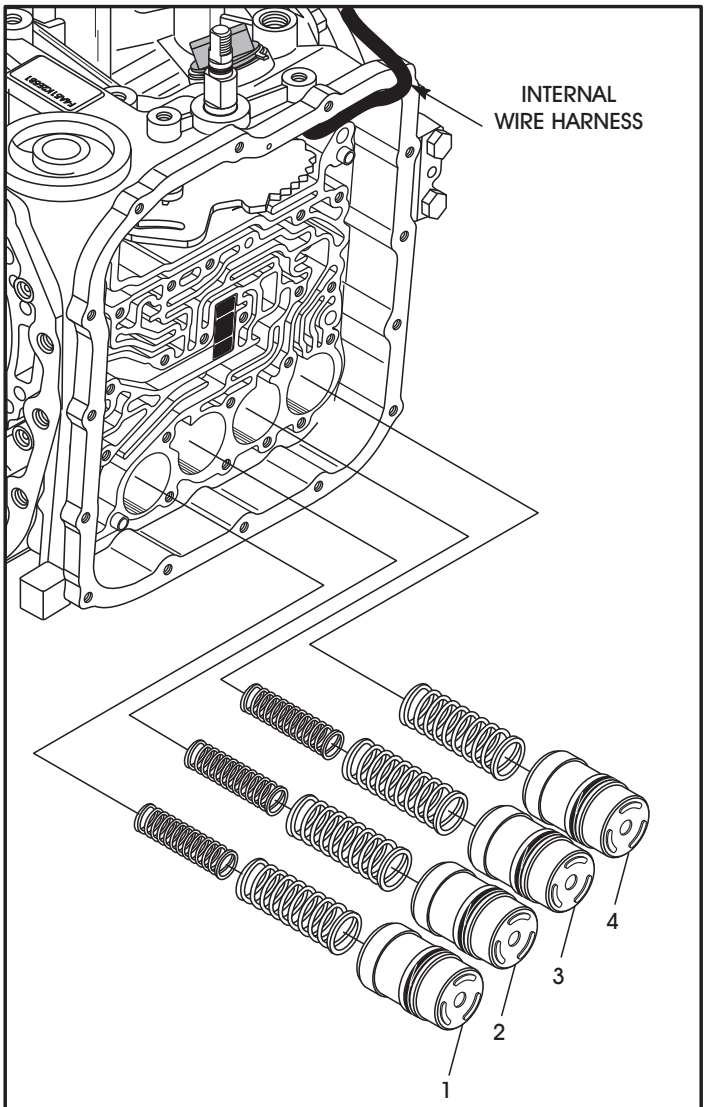


Figure 305

FINAL ASSEMBLY
INTERNAL COMPONENTS (CONT'D)

127. Lay internal harness back over the pan rail, as shown in Figure 306, so that it is out of the way for accumulator piston and valve body installation.
128. Install new scarf-cut accumulator piston seals on each of the four accumulator pistons, as shown in Figure 307.
129. Install each accumulator piston assembly with the proper spring configuration, as shown in Figure 306, using your disassembly notes for identification.



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

Figure 306

Note: The Mitsubishi accumulator springs are identified with blue dye, as shown in Figure 308. The Hyundai and Kia accumulator springs are identified with White and Yellow paint, also shown in Figure 308.

Continued on Page 156

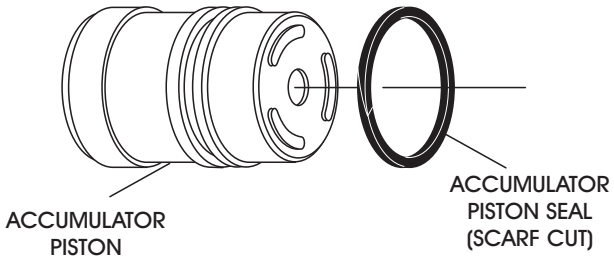
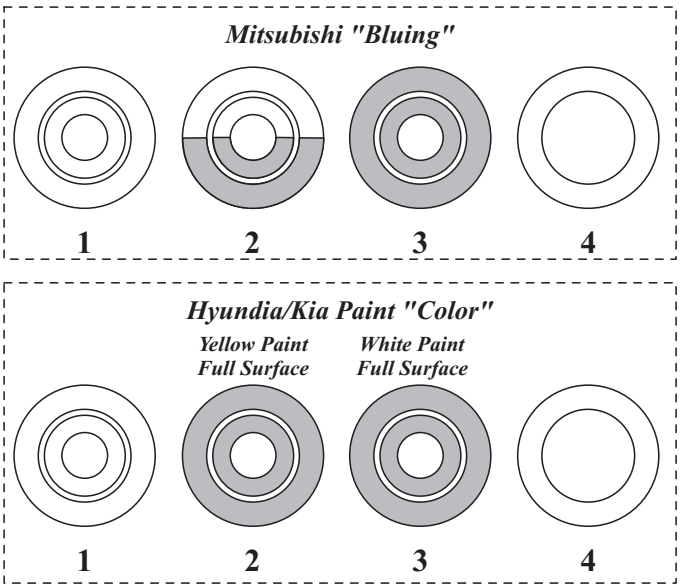


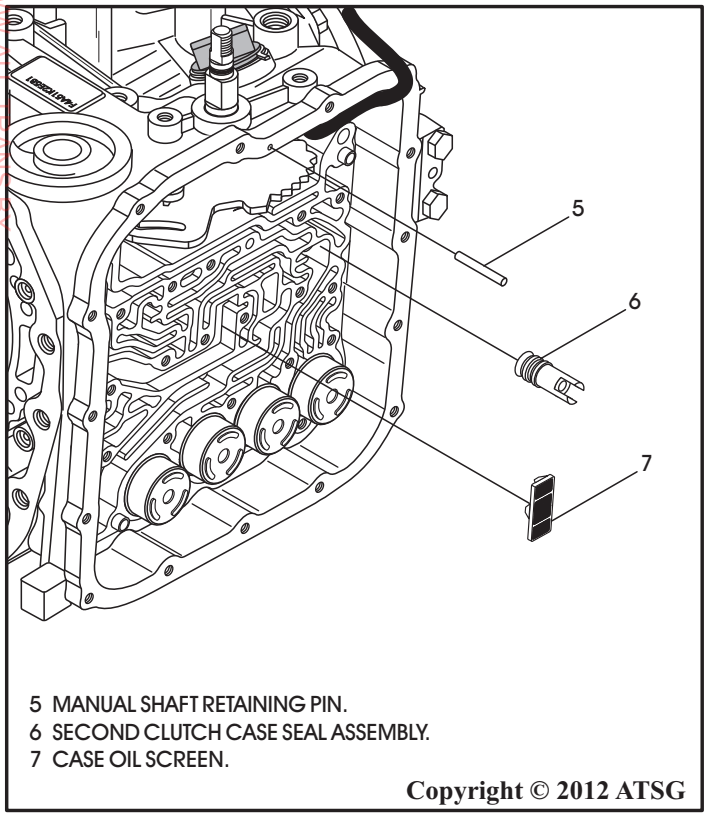
Figure 307

ACCUMULATOR SPRING IDENTIFICATION



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

Figure 308



5 MANUAL SHAFT RETAINING PIN.
6 SECOND CLUTCH CASE SEAL ASSEMBLY.
7 CASE OIL SCREEN.

Figure 309

FINAL ASSEMBLY

INTERNAL COMPONENTS (CONT'D)

130. Ensure that manual lever shaft retaining pin is in place, as shown in Figure 309.
131. Install the case oil screen into the worm track as shown in Figure 309.
132. Install a new 2nd clutch case seal assembly, as shown in Figure 309.
133. If installing new valve body gasket, ensure you have proper gasket and install over the hollow dowels on case, as shown in Figure 310.
Note: Original gasket is bonded to spacer plate.
134. Ensure that the two steel exhaust balls are in place in top of valve body (See Figure 310).
135. Install the pre-assembled valve body assembly over the hollow dowels in the case, as shown in Figure 310.
Note: Ensure that manual valve is engaged into the slot in the inside detent lever as you install the valve body, and if late Hyundai or Kia, ensure cooling tube is in place, as shown in Figure 310

Continued on Page 157

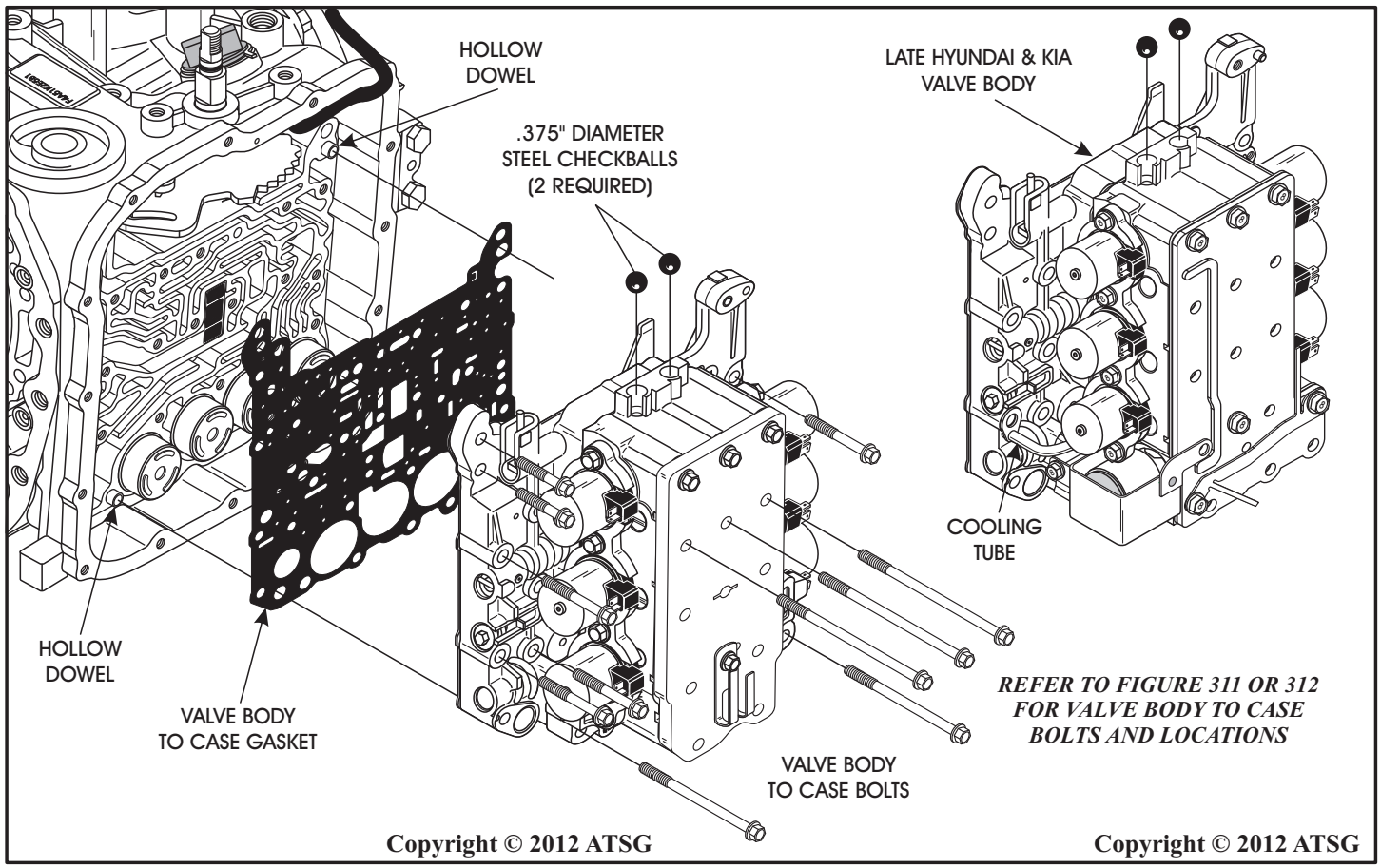


Figure 310

FINAL ASSEMBLY
INTERNAL COMPONENTS (CONT'D)

136. Install all valve body bolts in their proper locations, as shown in Figure 310.

Note: Refer to Figure 311 or 312 for proper bolt location, length and identification.

137. Hand tighten only at this time.

Continued on Page 159

"MITSUBISHI", "PRE-06 KIA" & "PRE-07 HYUNDAI"
VALVE BODY BOLT CHART AND LOCATIONS

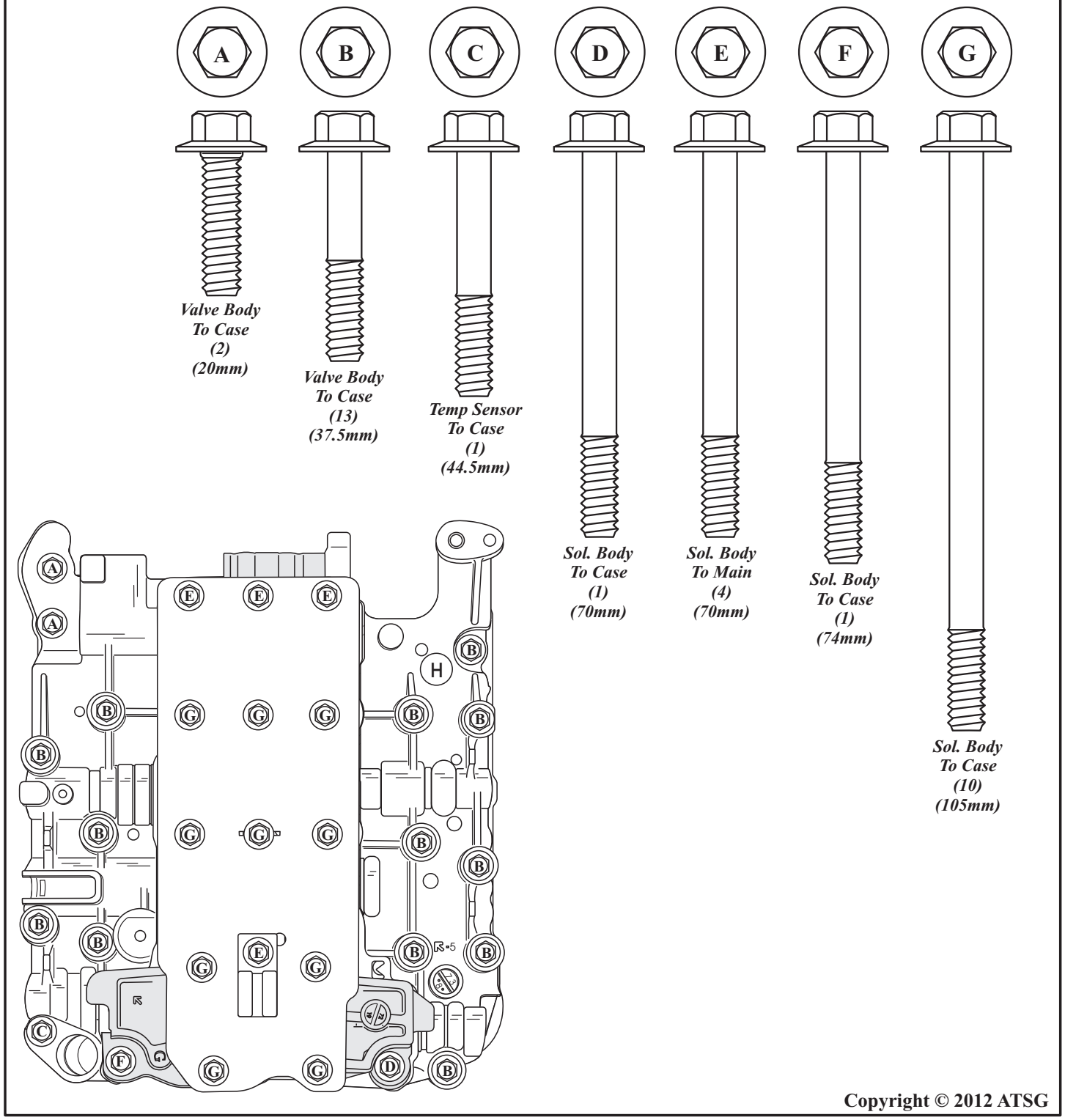
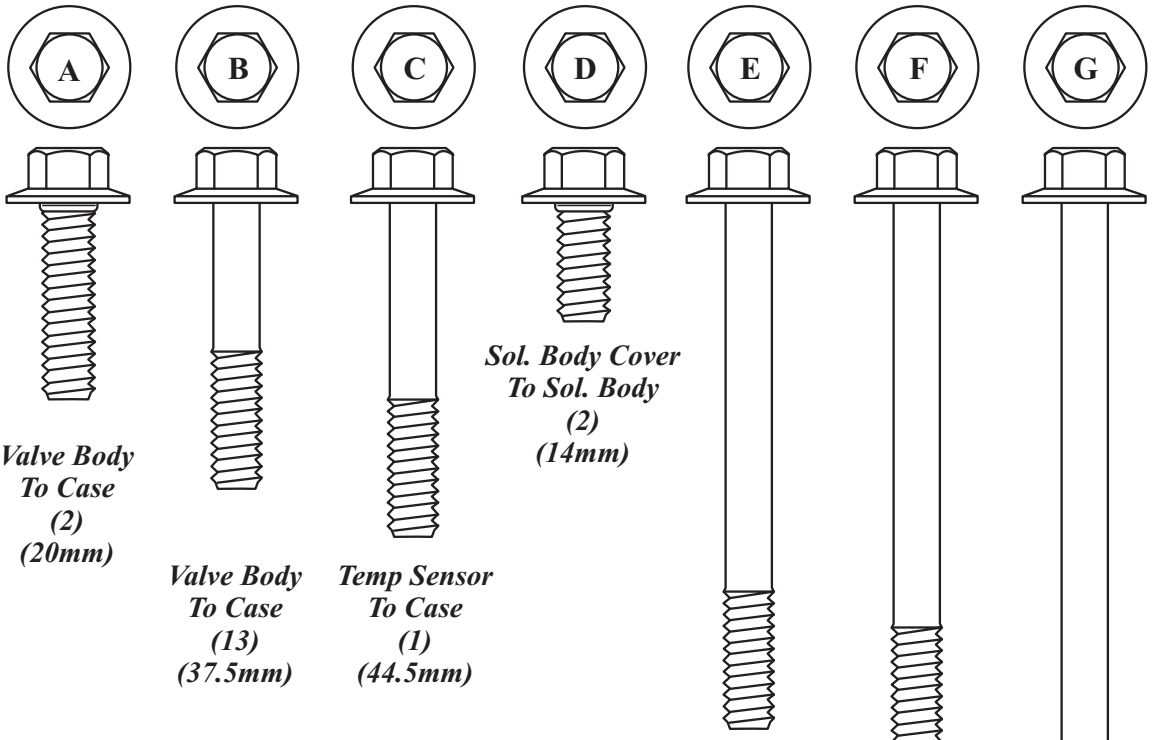


Figure 311

"2006-UP KIA" & "2007-UP HYUNDAI"
VALVE BODY BOLT CHART AND LOCATIONS



Valve Body To Case (2) (20mm)

Valve Body To Case (13) (37.5mm)

Temp Sensor To Case (1) (44.5mm)

Sol. Body Cover To Sol. Body (2) (14mm)

Sol. Body To Main VB (4) (70mm)

Sol. Body To Case (1) (74mm)

Sol. Body To Case (11) (105mm)

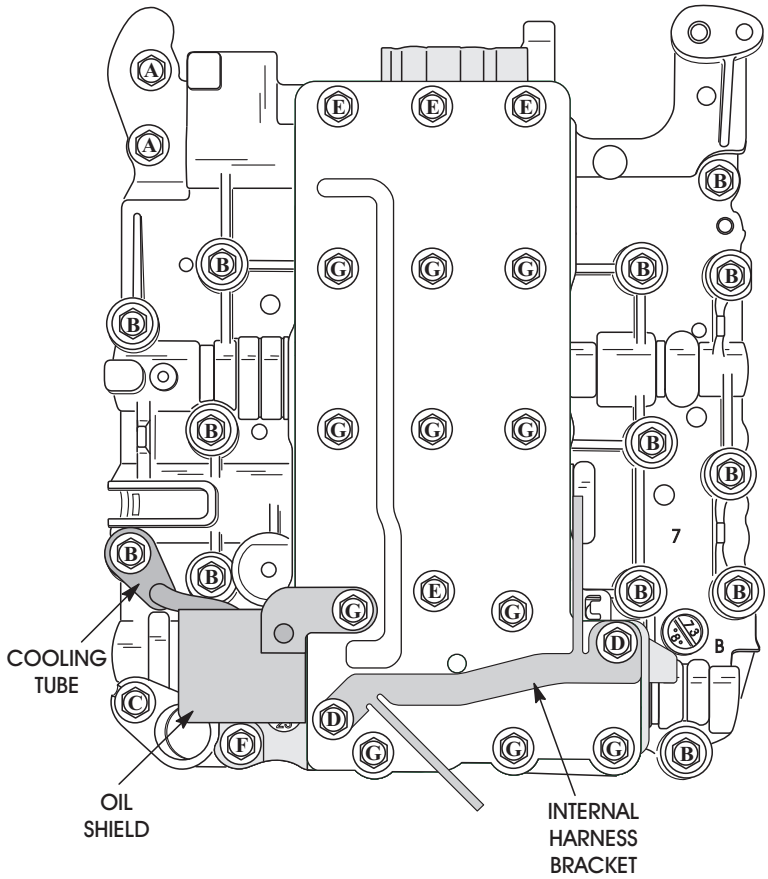


Figure 312

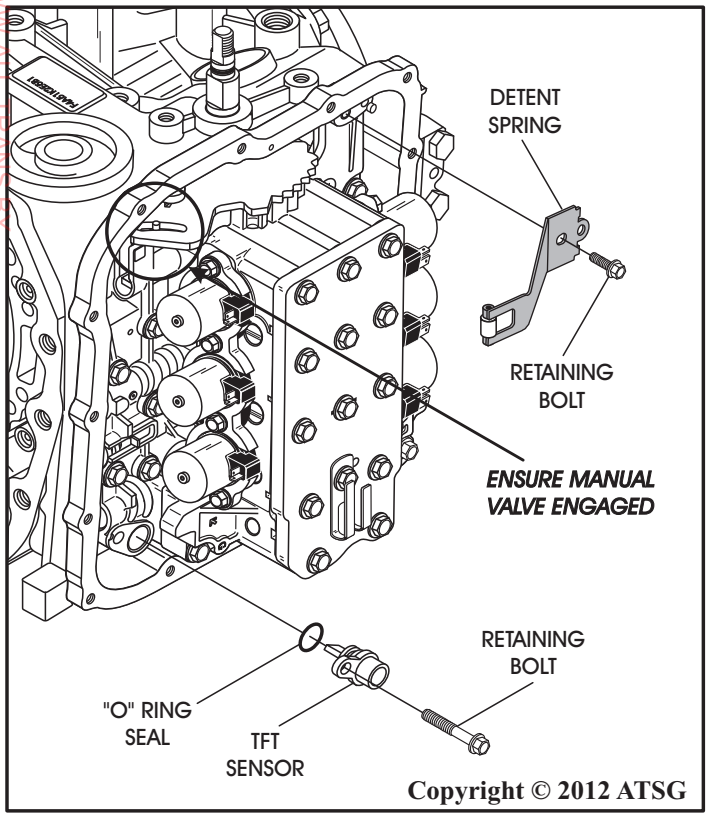


Figure 313

FINAL ASSEMBLY

INTERNAL COMPONENTS (CONT'D)

138. Install a new "O" ring on the transaxle fluid temp sensor, as shown in Figure 313.
139. Install the temperature sensor and retaining bolt, as shown in Figure 313.
140. Now, torque ***all*** valve body bolts to 11 N·m (97 in.lb.), beginning in the center and work in a circular pattern.
141. Check once again to ensure that manual valve is connected to inside detent lever, and install the detent spring, as shown in Figure 313.
142. Torque the bolt to 6 N·m (55 in.lb.).
143. Connect the internal harness connectors to the individual solenoids, and connect the temp sensor, as shown in Figure 314 and 315.
Note: The colors shown in Figure 314 were observed colors on Mitsubishi models.
The colors shown in Figure 315 were observed colors on late style Hyundai and Kia models.

Continued on Page 160

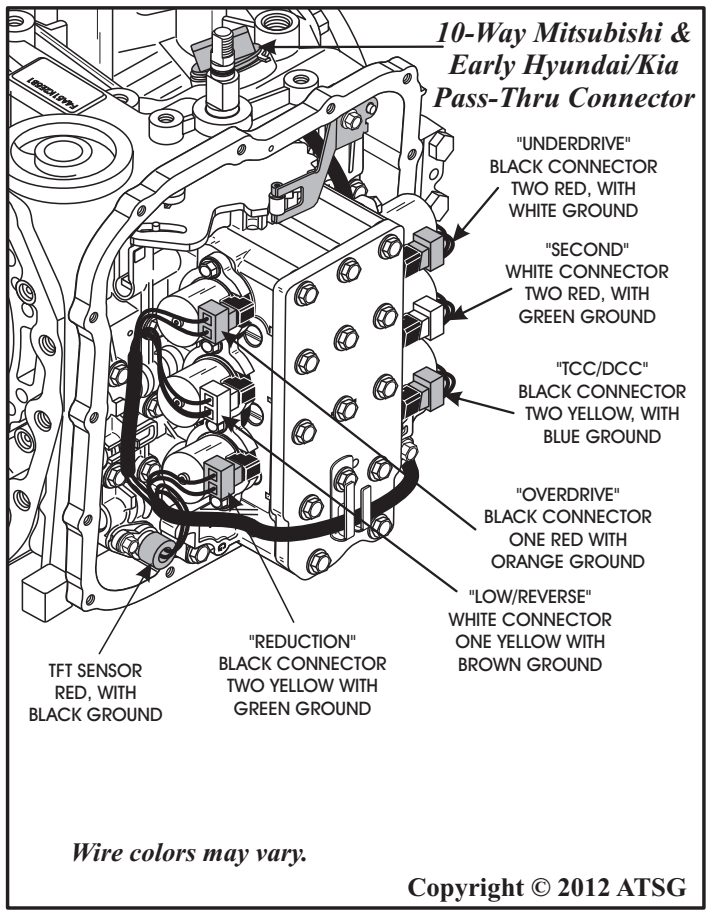


Figure 314

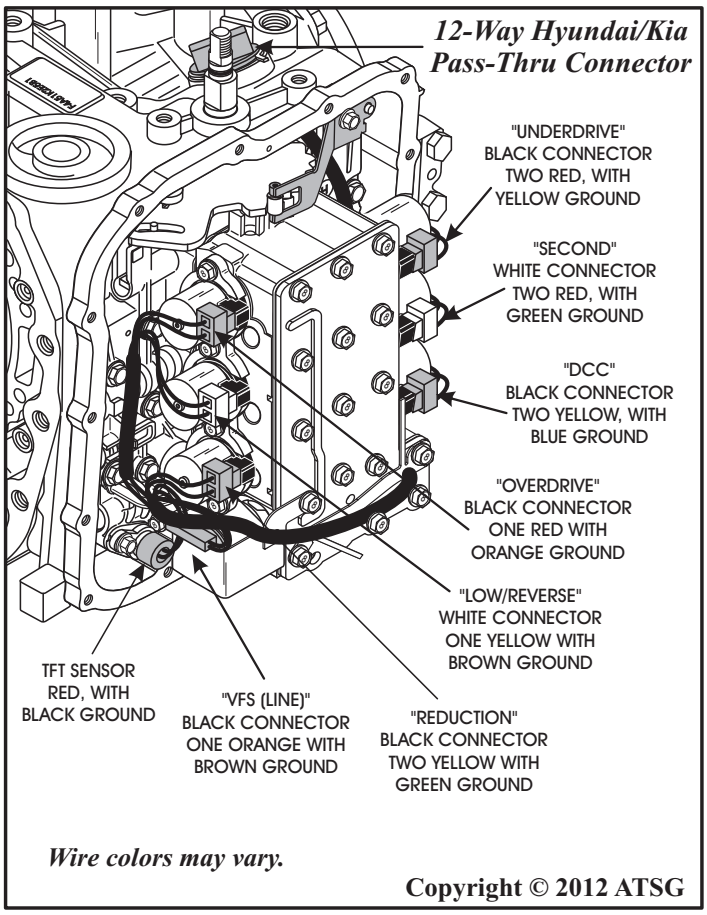


Figure 315

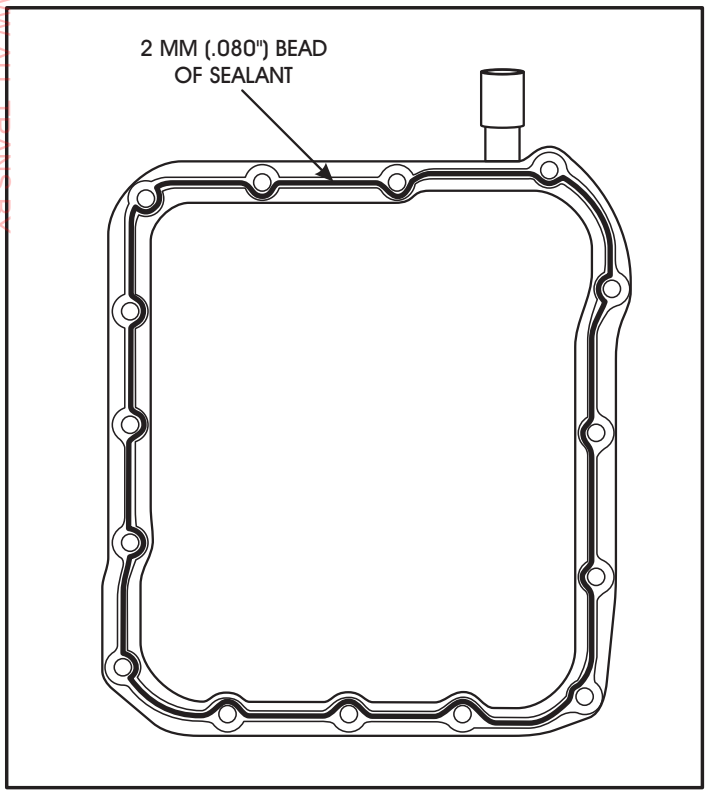


Figure 316

FINAL ASSEMBLY
INTERNAL COMPONENTS (CONT'D)

144. Apply a 2 mm (.080") bead of sealant around the oil pan, as shown in Figure 316.
Note: Install oil pan while sealant is still wet.
145. This would be a good time to ensure that the manual valve is properly hooked, all solenoid connectors and temp sensor are connected.
146. Install the oil pan onto transaxle, as shown in Figure 317, and torque all pan bolts to; 11 N·m (97 in.lb.).
Note: None of the sealant surfaces or fresh sealant can be exposed to ATF for 1 hour, to give sealant time to set properly.

Continued on Page 161

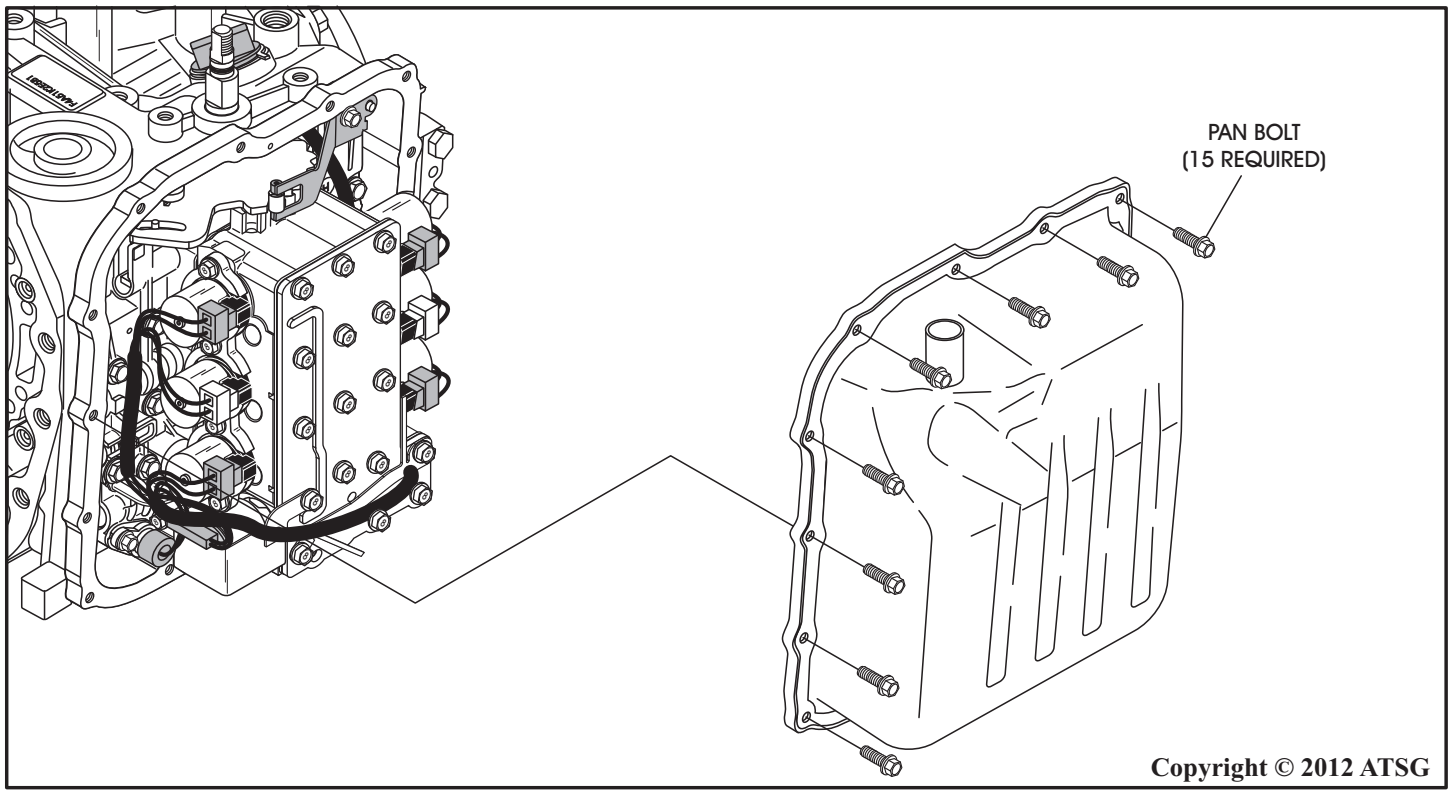


Figure 317

FINAL ASSEMBLY

EXTERNAL COMPONENTS

147. Install a new "O" ring on output shaft speed sensor, lube with small amount of Trans-Jel®, and install the assembly into case, as shown in Figure 318.
148. Torque the output shaft speed sensor bolt to; 11 N·m (97 in.lb.).
149. Install a new "O" ring on input shaft speed sensor, lube with small amount of Trans-Jel®, and install the assembly into case, as shown in Figure 318.
150. Torque the input shaft speed sensor bolt to; 11 N·m (97 in.lb.).
151. Install the fluid level indicator into tube, as shown in Figure 318.
152. Install the transaxle range switch, and external manual lever, as shown in Figure 318.
Note: The transaxle range switch adjustment and testing procedure is found on Page 162.
153. Install the air breather so that flat surface of the breather is even with the flat machined surface of the case (See Figure 318).

Continued on Page 162

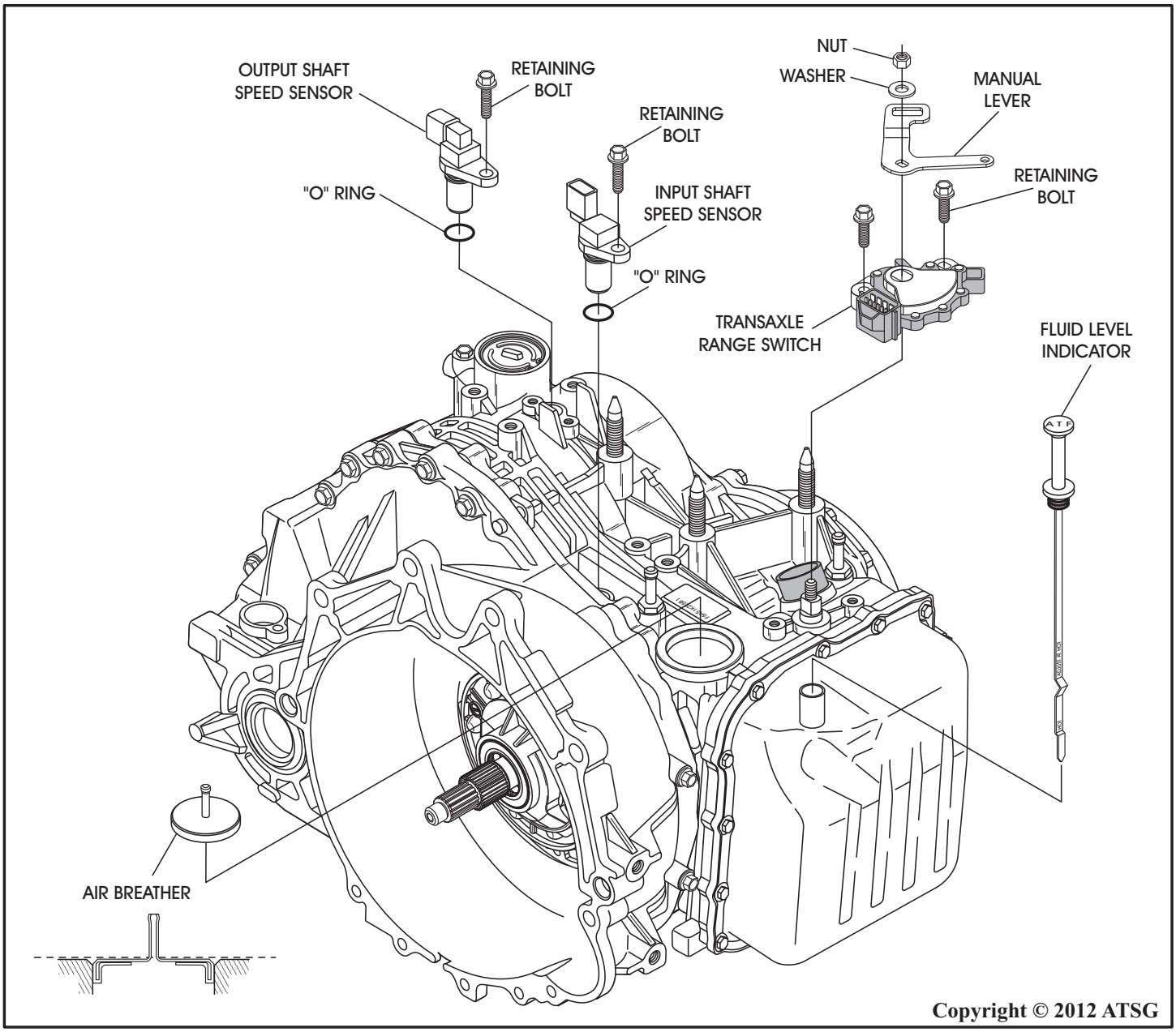


Figure 318

FINAL ASSEMBLY

EXTERNAL COMPONENTS (CONT'D)

Transaxle Range Switch Adjustment (On Bench "All Models")

154. Place the manual control lever on transaxle in neutral position.
155. Loosen transaxle range switch mounting bolts and turn the TRS body so the hole in the end of the manual control lever and the hole in flange of the TRS body are aligned.
Note: The TRS body can be aligned by inserting a 5-mm diameter steel bar (3/16" drill bit) into the end hole of the manual control lever and the flange hole in TRS body, as shown in Figure 319.
156. Torque transaxle range switch mounting bolts to 11 N·m (97 in.lb.).
Torque the manual control lever nut to 22 N·m (16 ft.lb.).
Note: Ensure that the switch body does not move during the torquing process.
157. Remove the alignment tool.

Continued on Page 163

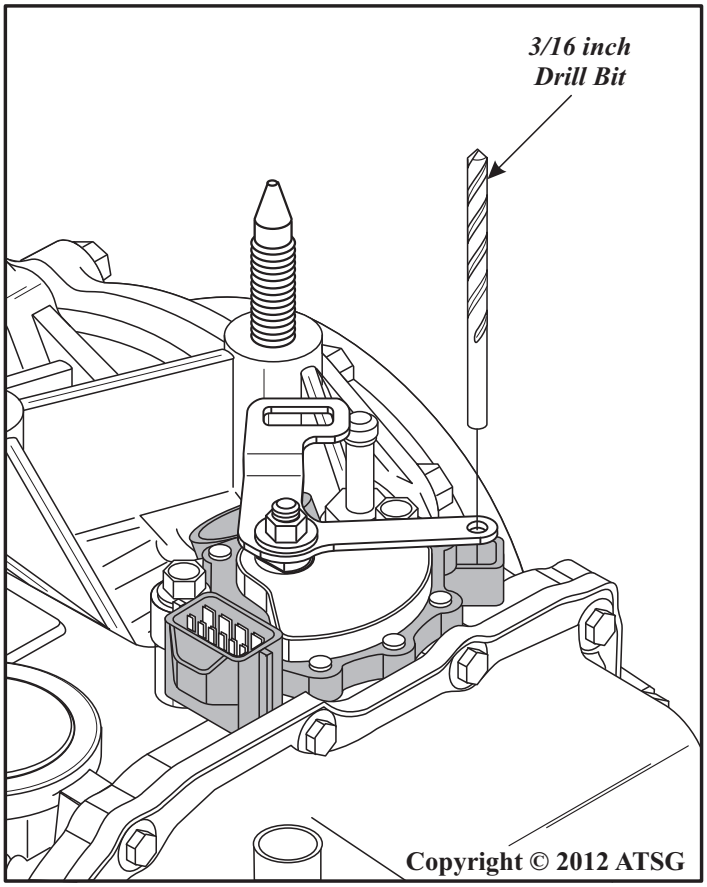
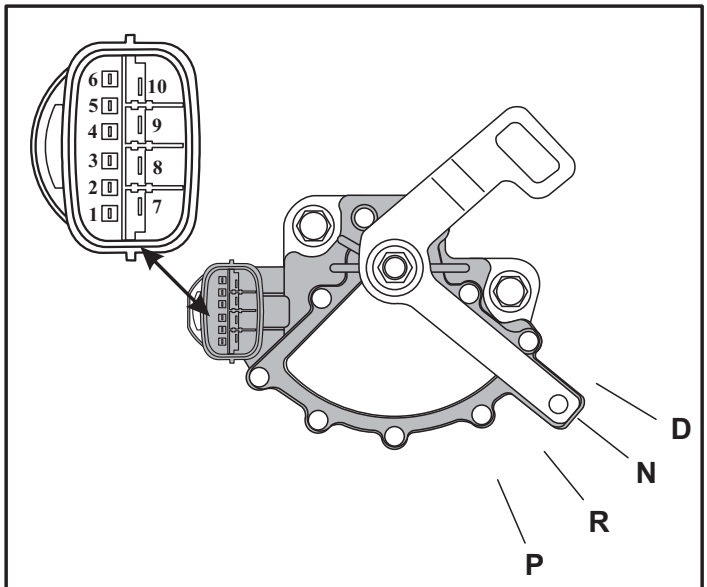


Figure 319

Mitsubishi Transaxle Range Switch Check (For Hyundai and Kia, See Page 22

The only voltage sent to the TRS goes in at terminal 8 and 10 as shown in Figure 22. In Reverse, voltage exits through terminal 7 to the reverse lamps and to the PCM. Ignition start voltage is sent to terminal 10 and out thru terminal 9 to the starter relay. Diagnosis here is easily done using the DVOM set to DC volts.

The TRS can also be checked with the connector removed and your DVOM set to Ohms. You should have continuity across the terminals shown in the chart in Figure 320 (Less than 2 ohms), related to the position of the gear selector lever. If these do not check properly, replace the transaxle range switch.



"Mitsubishi Only" Continuity Test

Terminal	P	R	N	D			
1				●			
*							
3	●						
4			●				
*							
*							
7		●					
8	●	●	●	●			
9	●		●				
10	●		●				

Figure 320

FINAL ASSEMBLY
EXTERNAL COMPONENTS (CONT'D)

158. Install a new "O" ring on vehicle speed sensor, speedo adapter, or the sealing cap, depending on how the transaxle is equipped, as shown in Figure 322.
159. Install new speedometer driven gear shaft seal with lip facing gear, as shown in Figure 321, install retaining clip and speedo driven gear. ***Note: Lube seal and gear with Trans-Jel®.***
160. Install the vehicle speed sensor, speedo adapter, or sealing cap, depending on how the transaxle is equipped, as shown in Figure 322, and torque bolt as follows:
Sealing Cap = 5 N·m (9 in.lb.).
Speedometer Adapter = 11 N·m (97 in.lb.).
Vehicle Speed Sensor = 11 N·m (97 in.lb.).
161. Install the two banjo fitting cooler lines with four new washers, as shown in Figure 322, and torque retaining bolts to 24 N·m (18 ft.lb.).

Continued on Page 164

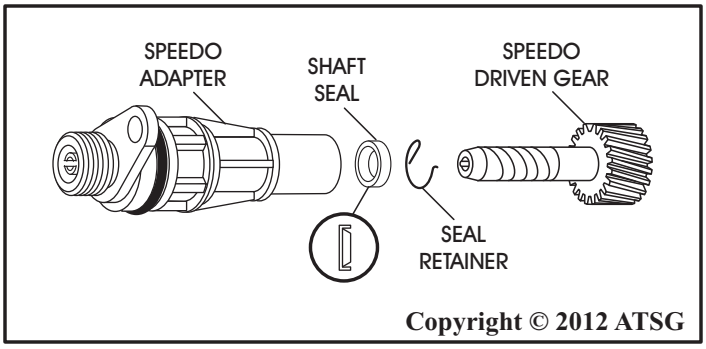


Figure 321

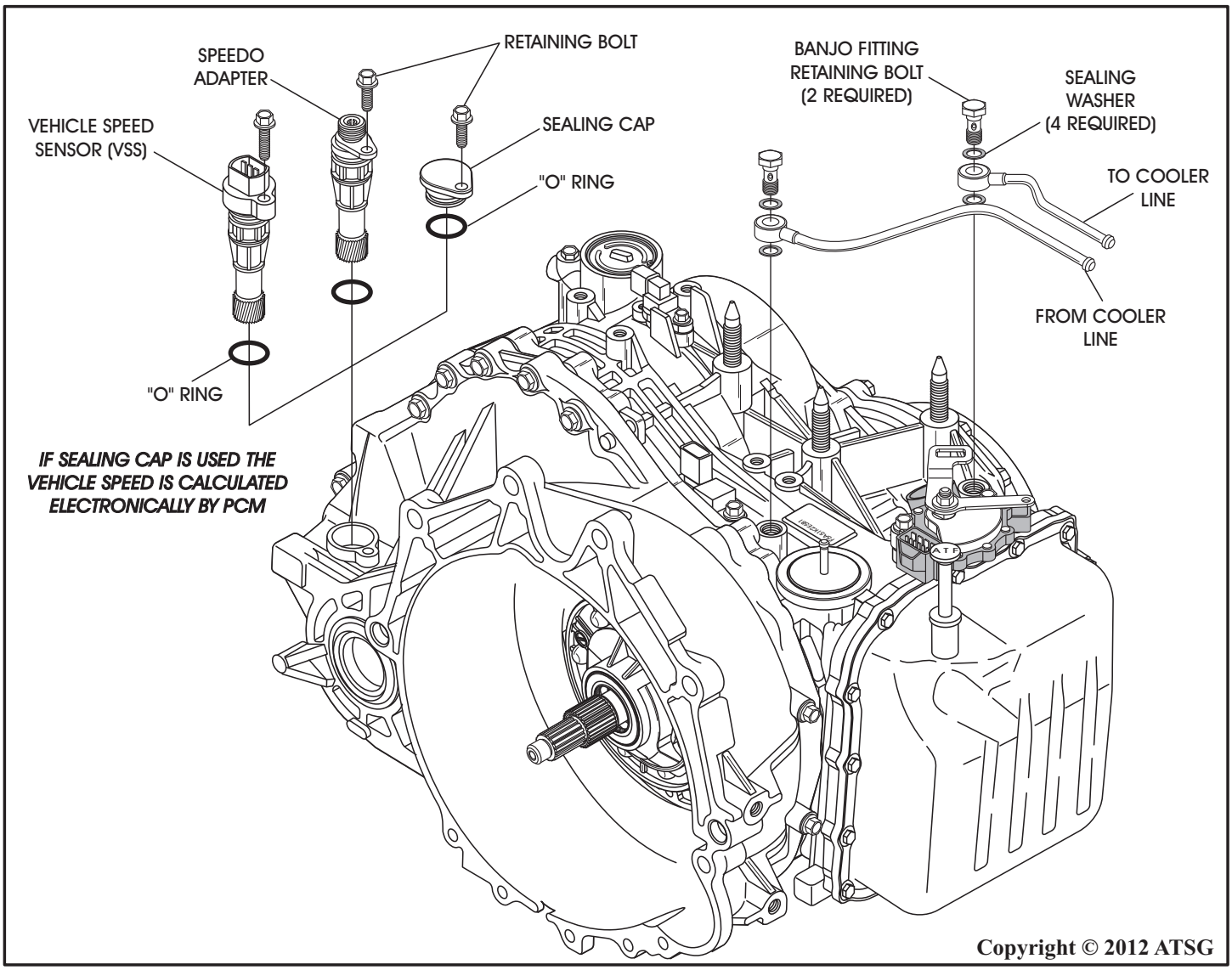


Figure 322

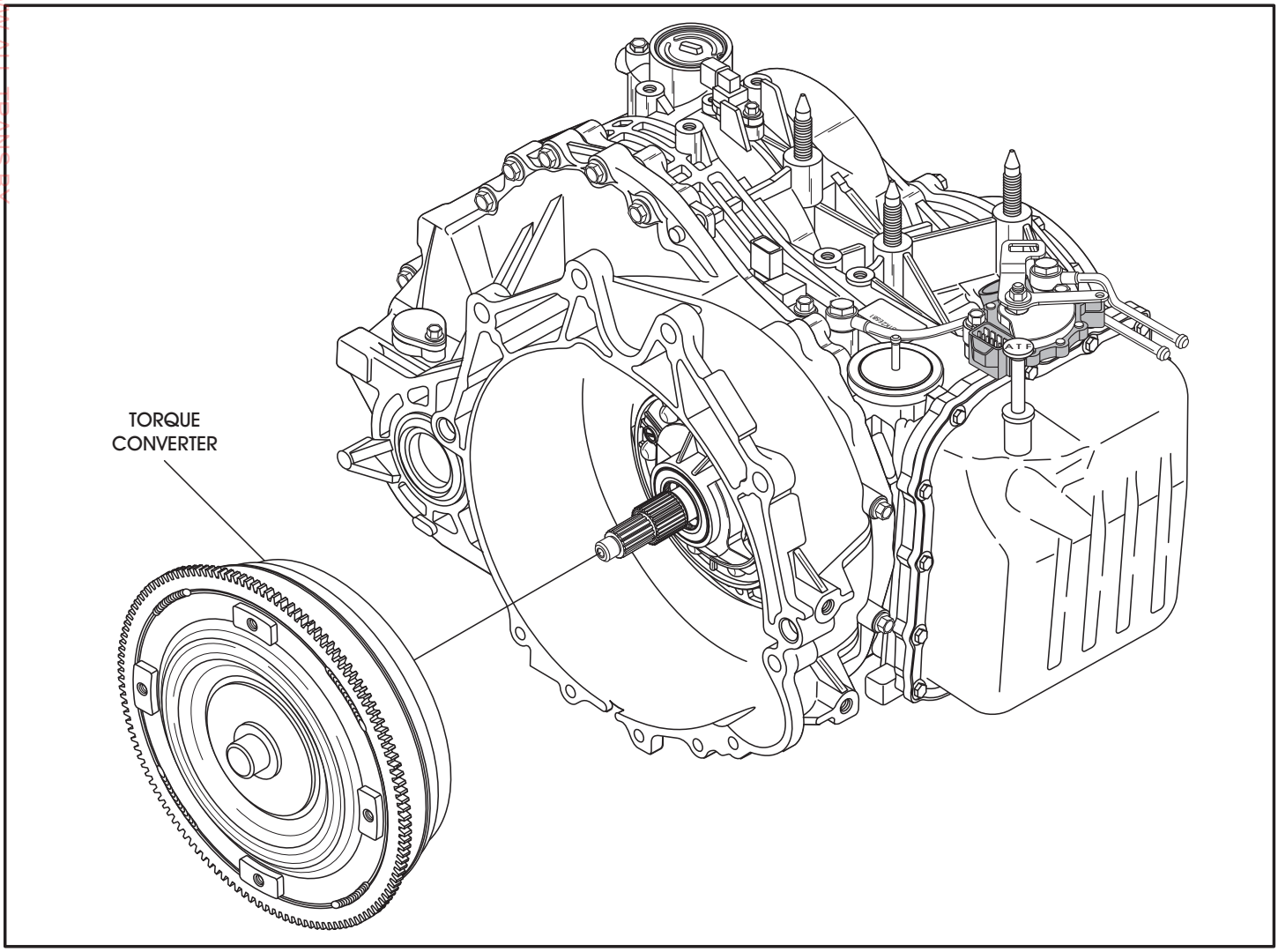


Figure 323

FINAL ASSEMBLY

EXTERNAL COMPONENTS (CONT'D)

162. Install the torque converter into the transaxle, as shown in Figure 323, and ensure that hub is engaged properly in pump gear.
Note: Apply ATF to converter hub and also prime converter to soak the converter clutch before installing, and use care not to damage converter seal during installation.
163. Ensure that converter is engaged into pump gear by measuring from face of bell housing to converter pad surface (See Figure 324). This dimension should be as follows: Dimension "A" = 9.4 mm (.370").

CONGRATULATIONS,
YOU ARE FINISHED.

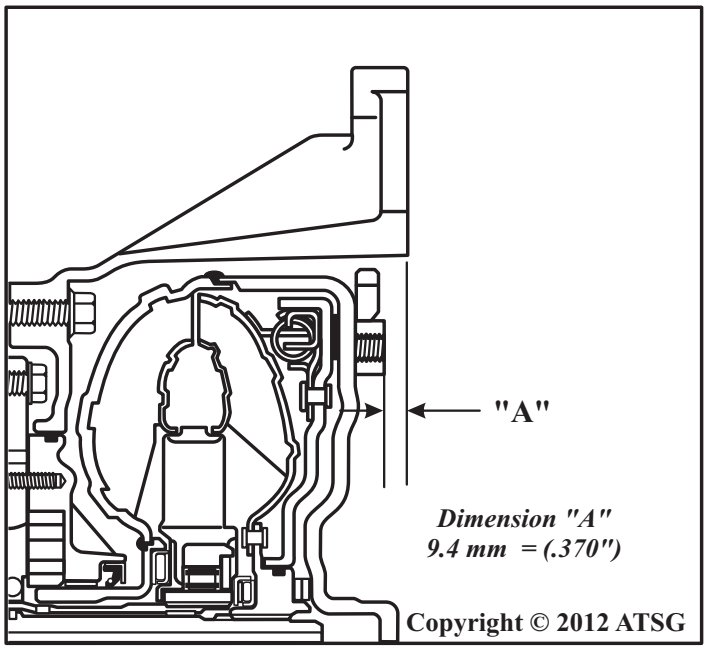
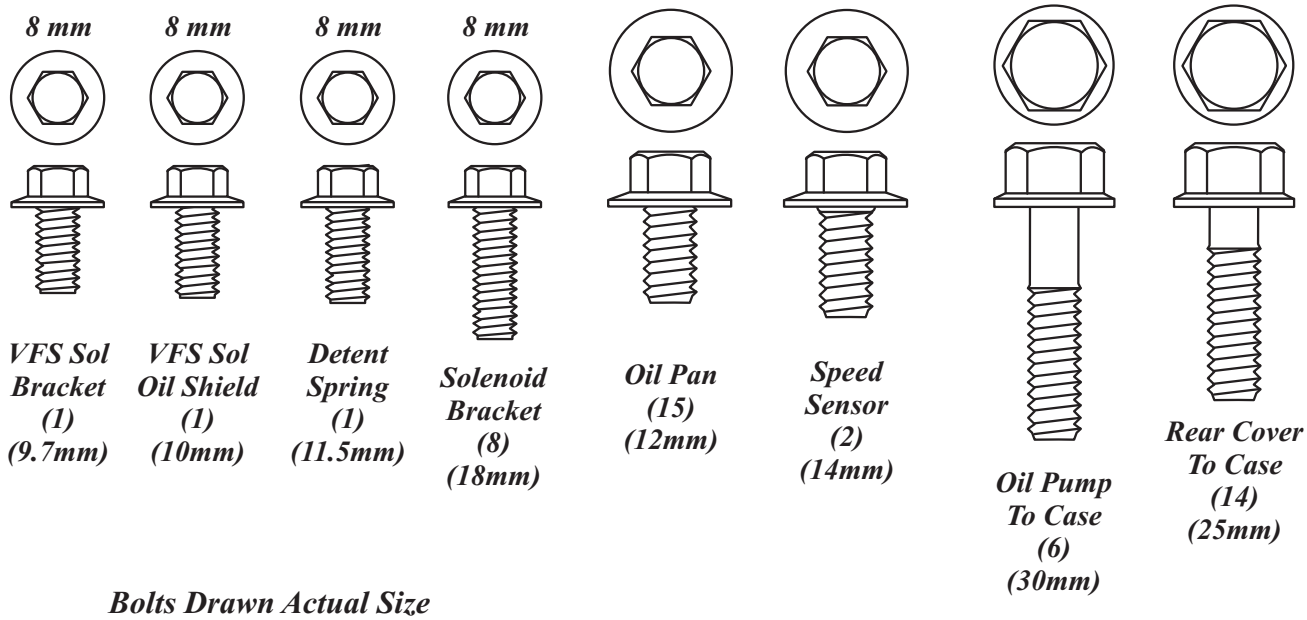


Figure 324

BOLT CHART FOR ALL MODELS EXCEPT THE VALVE BODY



VFS Sol Bracket (1) (9.7mm)

VFS Sol Oil Shield (1) (10mm)

Detent Spring (1) (11.5mm)

Solenoid Bracket (8) (18mm)

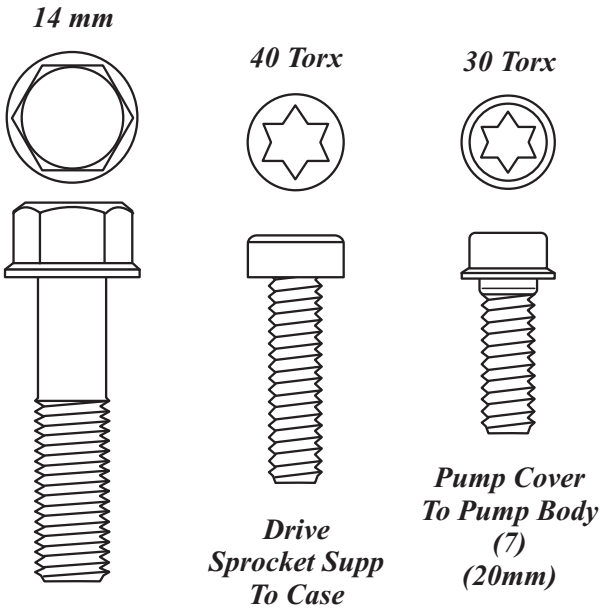
Oil Pan (15) (12mm)

Speed Sensor (2) (14mm)

Oil Pump To Case (6) (30mm)

Rear Cover To Case (14) (25mm)

Bolts Drawn Actual Size



Converter Housing To Case (22) (40mm)

Drive Sprocket Supp To Case (8) (27mm)

Pump Cover To Pump Body (7) (20mm)

VALVE BODY BOLT CHART

Mitsubishi, Pre-06 Kia & Pre-07 Hyundai = Page 157

2006-Up Kia & 2007-Up Hyundai = Page 158

Figure 325

SPECIAL TOOLS

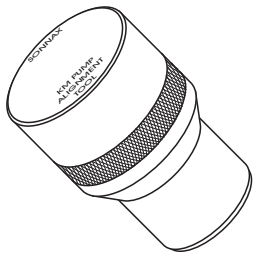
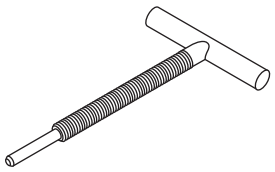
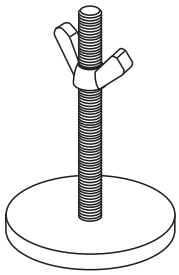
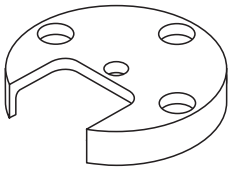
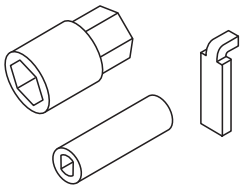
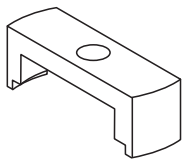
	FUNCTION	PART NUMBER	SUPERSESSION
	OIL PUMP ALIGNMENT	SONNAX® 41005-TL	SONNAX® 41005-TL
	OIL PUMP REMOVAL	MITSUBISHI MD998333	MITSUBISHI MD998333-01
	UNIVERSAL SPRING COMPRESSOR	MITSUBISHI MD998924	MITSUBISHI MD998924-01
	REMOVE AND INSTALL ONE-WAY CLUTCH INNER RACE SNAP RING	MITSUBISHI MD999577	MITSUBISHI MD999577
	ADJUSTMENT OF REDUCTION BRAKE BAND SERVO PISTON	MITSUBISHI MB991633	MITSUBISHI MB991633-01
	REMOVE AND INSTALL OVERDRIVE CLUTCH SNAP RING	MITSUBISHI MD999590	MITSUBISHI MIT305039

Figure 326

SPECIAL TOOLS

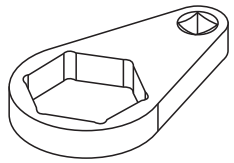
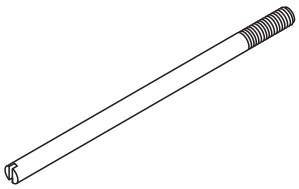
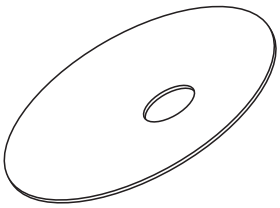
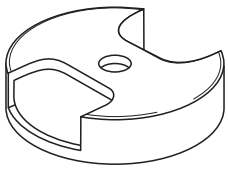
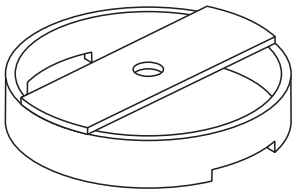
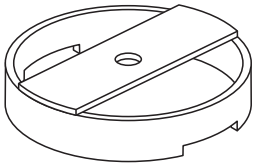
	FUNCTION	PART NUMBER	SUPERSESSION
	REMOVE AND INSTALL DIRECT PLANETARY CARRIER LOCK NUT	MITSUBISHI MD998834	
	ALIGNMENT DOWEL FOR OIL PUMP AND TRANSFER DRIVE GEAR	MITSUBISHI MD998412	MITSUBISHI MD998412
	CLEARANCE DUMMY PLATE FOR LOW/REVERSE AND 2ND CLUTCH CLEARANCE	MITSUBISHI MD991632	MITSUBISHI MD991632-01
	REMOVE AND INSTALL UNDERDRIVE CLUTCH SNAP RING	MITSUBISHI MD998907	MITSUBISHI MD998907-01
	MEASUREMENT OF REVERSE CLUTCH END PLAY	MITSUBISHI MB991789	MITSUBISHI MB991789-01
	MEASUREMENT OF OVERDRIVE CLUTCH AND UNDERDRIVE CLUTCH END PLAY	MITSUBISHI MB991629	MITSUBISHI MB991629-01

Figure 327

SPECIAL TOOLS

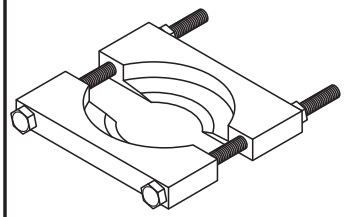
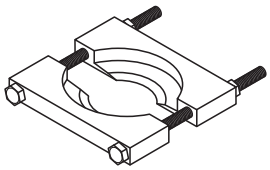
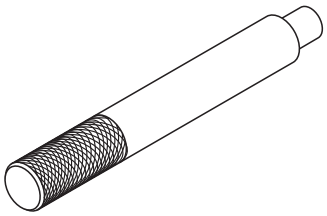
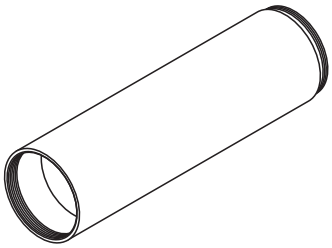
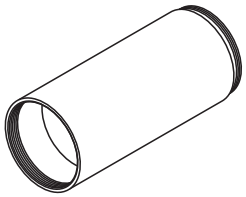
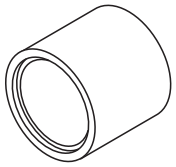
	FUNCTION	PART NUMBER	SUPERSESSION
	BEARING REMOVER	UNIVERSAL OR MITSUBISHI MD998917	UNIVERSAL OR MITSUBISHI MD998917
	BEARING REMOVER	UNIVERSAL OR MITSUBISHI MD998801	UNIVERSAL OR MITSUBISHI MD998801
	INSTALLER CAP	UNIVERSAL OR MITSUBISHI MD998812	UNIVERSAL OR MITSUBISHI MD998812
	INSTALLER ADAPTER FOR INSTALLATION OF DIFFERENTIAL TAPERED ROLLER BEARINGS	MITSUBISHI MD998820	MITSUBISHI MD998820-01
	INSTALLER ADAPTER FOR INSTALLATION OF PINION LARGE TAPERED BEARING AND THE TRANSFER DRIVEN GEAR	MITSUBISHI MD998824	MITSUBISHI MD998824-01
	INSTALLER ADAPTER FOR INSTALLATION OF PINION LARGE TAPERED BEARING		MITSUBISHI MD998827

Figure 328

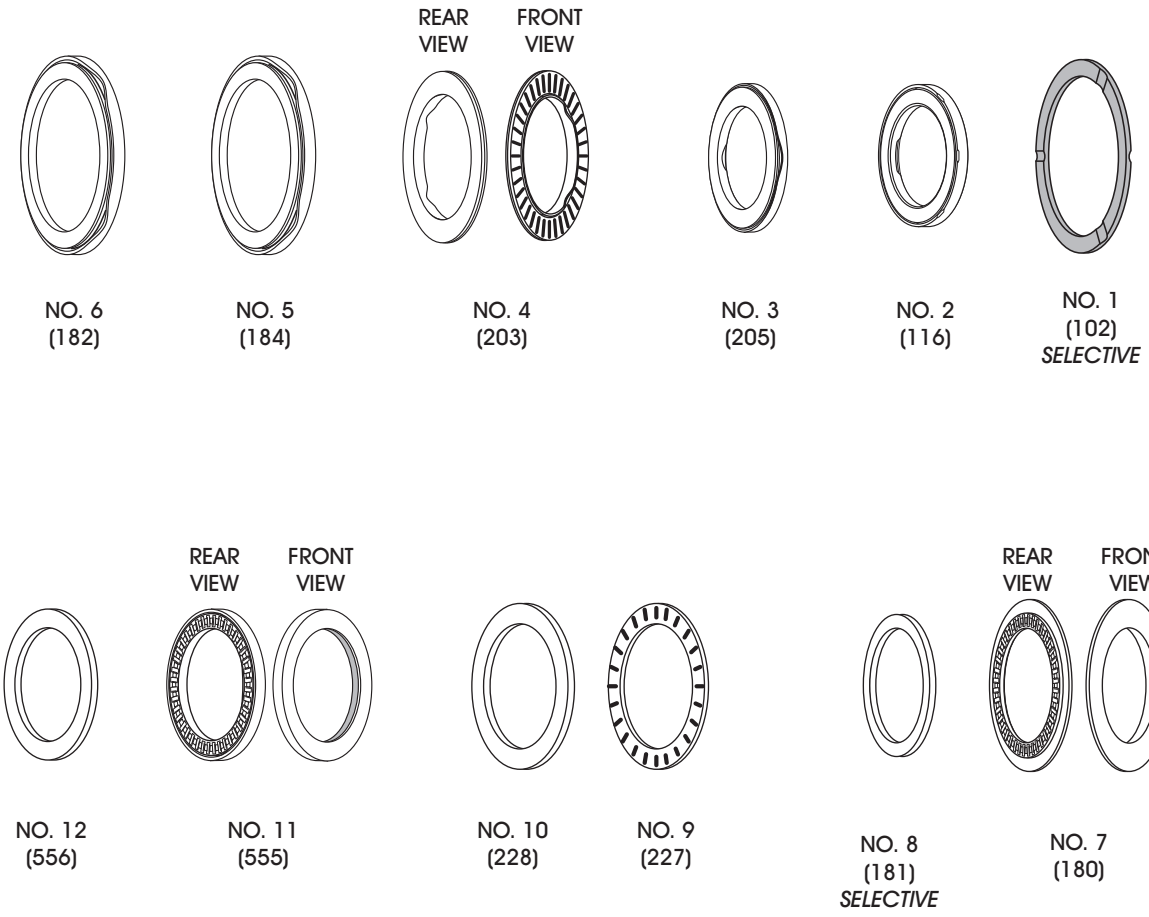
SPECIAL TOOLS

	FUNCTION	PART NUMBER	SUPERSESSION
	INSTALLATION OF INPUT SHAFT CAGED NEEDLE BEARING IN REAR COVER	MITSUBISHI MB990938	MITSUBISHI MB990938
	INSTALLER ADAPTER LONG EXTENSION FOR USE WITH CAP AND ADAPTERS ON PINION SHAFT	MITSUBISHI MD998814	MITSUBISHI MD998814
	INSTALLER ADAPTER SHORT EXTENSION FOR USE WITH CAP AND ADAPTERS	MITSUBISHI MD998813	MITSUBISHI MD998813
	INSTALLATION OF DIFFERENTIAL TAPERED ROLLER BEARING CUPS	MITSUBISHI MB991445	MITSUBISHI MB991445
	INSTALLATION OF DIFFERENTIAL TAPERED ROLLER BEARING	MITSUBISHI MD998823	MITSUBISHI MD998823

In addition to the tools listed above, you will need standard bushing and seal drivers, "H" gage for end play measurements, and suitable hydraulic shop press.

Figure 329

THRUST BEARING AND WASHER IDENTIFICATION



NO. 1 "*SELECTIVE*" THRUST WASHER, UNDERDRIVE CLUTCH HOUSING TO OIL PUMP (ILLUSTRATION NO. 102).
NO. 2 THRUST BEARING, UNDERDRIVE CLUTCH HOUSING TO UNDERDRIVE CLUTCH HUB (ILLUSTRATION NO. 116).
NO. 3 THRUST BEARING, OUTPUT PLANETARY CARRIER TO UNDERDRIVE SUN GEAR (ILLUSTRATION NO. 205).
NO. 4 THRUST BEARING, UNDERDRIVE SUN GEAR TO OVERDRIVE PLANETARY CARRIER (ILLUSTRATION NO. 203).
OVERDRIVE CARRIER TO REVERSE SUN GEAR IS A CAPTURED BEARING IN OVERDRIVE CARRIER AND NOT SERVICED.
NO. 5 THRUST BEARING, REVERSE SUN GEAR AND SHELL TO OVERDRIVE CLUTCH HUB (ILLUSTRATION NO. 184).
NO. 6 THRUST BEARING, OVERDRIVE CLUTCH HUB TO OVERDRIVE BALANCE PISTON (ILLUSTRATION NO. 182).
NO. 7 THRUST BEARING, OVERDRIVE CLUTCH HOUSING TO NUMBER 8 SELECTIVE THRUST BEARING RACE (ILLUSTRATION NO. 180).
NO. 8 "*SELECTIVE*" THRUST BEARING RACE, NUMBER 7 THRUST BEARING TO REAR COVER (ILLUSTRATION NO. 181).
NO. 9 THRUST BEARING, DIRECT PLANETARY CARRIER ROLLER BEARING TO NUMBER 10 BEARING RACE (ILLUSTRATION NO. 227).
NO. 10 THRUST BEARING RACE, NUMBER 9 THRUST BEARING TO OUTPUT PINION GEAR (ILLUSTRATION NO. 228).
NO. 11 THRUST BEARING, DIRECT CLUTCH HOUSING TO NUMBER 12 THRUST BEARING RACE (ILLUSTRATION NO. 555).
NO. 12 THRUST BEARING RACE, NUMBER 11 THRUST BEARING TO TRANSAXLE CASE (ILLUSTRATION NO. 556).

Figure 330

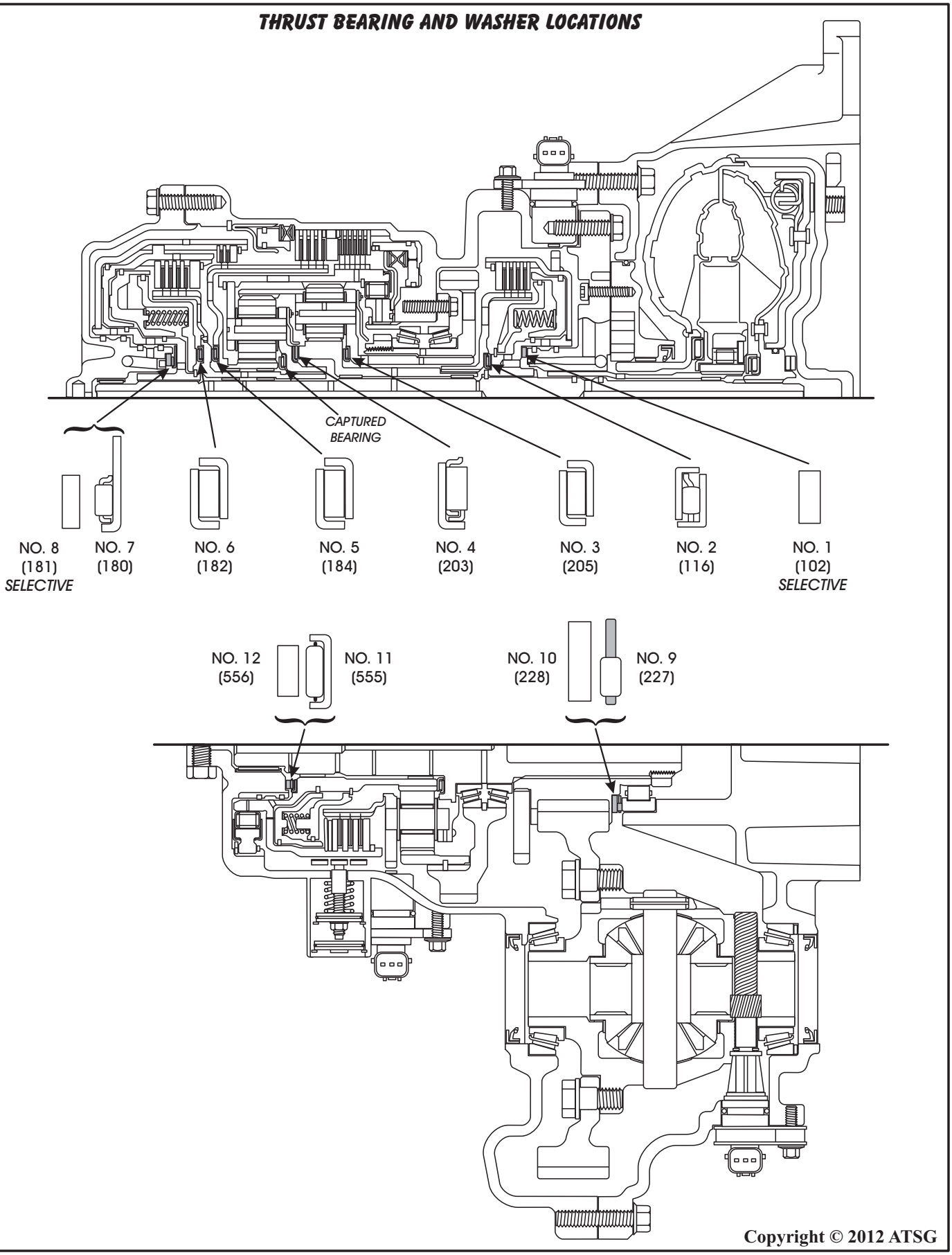


Figure 331

TORQUE SPECIFICATIONS			
Description	N•m	lb.ft.	lb.in.
Oil Pump Stator to Oil Pump Body	10		88
Oil Pump to Case	23	17	
Valve Body to Case (All)	11		97
Detent Spring to Valve Body	6		55
Spacer Plate to Valve Body	6		55
Solenoid Retainer Plates to Valve Body	6		55
VFS Line Pressure Solenoid Bracket	6		55
VFS Solenoid Oil Shield to Solenoid Body	6		55
Direct Planetary Lock Nut	170	125	
Reduction Band Feed Pipe	11		97
Reduction Band Anchor Plug	98	72	
Differential Ring Gear Bolts	135	100	
Converter Housing to Case	48	35	
Rear Cover to Case	23	17	
Oil Pan to Case	11		97
Input And Output Shaft Speed Sensor	11		97
Transaxle Range Sensor to Case	11		97
External Manual Lever to Shaft Nut	22	16	
Speedometer Adapter to Case	11		97
Vehicle Speed Sensor to Case	11		97
Sealing Cap to Case	5		9
Cooler Line Banjo Fitting Bolts to Case	24	18	
Transfer Drive Gear to Case	34	25	
Reduction Servo Apply Pin Lock Nut	18	13	
FLUID REQUIREMENTS = Mitsubishi Diamond SP III			

END-PLAY, CLUTCH CLEARANCE, AND BAND SPECIFICATIONS	
COMPONENT	SPECIFICATION
Transaxle Front End-Play (Number 1 thrust washer)	.70 - 1.45 MM (.028" - .057")
Transaxle Rear End-Play (Number 8 selective thrust bearing race)	.25 - .45 MM (.010" - .018")
Differential Side Gear Backlash	.025 - .15 MM (.001" - .006")
Underdrive Clutch Clearance	1.60 - 1.80 MM (.063" - .071")
Low/Reverse Brake Clutch Clearance	1.65 - 2.11 MM (.065" - .083")
Second Brake Clutch Clearance	1.09 - 1.55 MM (.043" - .061")
Reduction Brake Band Adjustment	44 in.lb. - Back Off 5 1/2 - 5 3/4 Turns
Overdrive Clutch Clearance	1.5 - 1.7 MM (.059" - .067")
Direct Clutch Clearance	.6 - .8 MM (.024" - .032")
Reverse Clutch Clearance	1.60 - 1.80 MM (.063" - .071")

Figure 332