



TOYOTA/LEXUS U140E/F, U240E

INDEX

TRANSMISSION APPLICATION BY VEHICLE.....	3
IDENTIFICATION CODE STAMPING LOCATION.....	4
COMPONENT APPLICATION CHART.....	5
CONNECTOR AND INTERNAL HARNESS SCHEMATIC.....	6
WIRING DIAGRAM AND CONNECTORS.....	8
TRANSMISSION RANGE SENSOR.....	10
TURBINE AND OUTPUT SPEED SENSORS.....	12
VEHICLE SPEED SENSOR.....	13
DTC DESCRIPTIONS.....	14
TRANSAXLE DISASSEMBLY.....	15
COMPONENT REBUILD SECTION:	
TORQUE CONVERTER HOUSING.....	35
UNDERDRIVE PLANETARY ASSEMBLY.....	39
DIFFERENTIAL ASSEMBLY.....	45
OIL PUMP ASSEMBLY.....	48
DIRECT (C2) CLUTCH.....	52
FORWARD (C1) CLUTCH.....	55
UNDERDRIVE (C3) CLUTCH.....	59
2ND BRAKE (B1).....	62
NO. 1 ONE WAY CLUTCH (F1) FREEWHEEL OPERATION.....	67
NO. 2 ONE WAY CLUTCH (F2) FREEWHEEL OPERATION.....	68
VALVE BODY ASSEMBLY.....	69
UPPER VALVE BODY CHECK BAL LOCATIONS.....	71
LOWER VALVE BODY CHECK BAL LOCATIONS.....	72
SOLENOID OPERATION AND CHECK PROCEDURE.....	75
VALVE BODY RE-ASSEMBLY PROCEDURE.....	78
TRANSMISSION FINAL ASSEMBLY.....	82
TORQUE SPECIFICATIONS.....	113
CASE PASSAGE IDENTIFICATION FOR AIR TESTING.....	114
LINE PRESSURE TESTING, TAP LOCATIONS, FLUID CHECKING PROCEDURE.....	115
ECM MEMORY RESET PROCEDURE.....	116
SPECIAL SERVICE TOOLS (SST).....	117

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INTRODUCTION

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TOYOTA/LEXUS U140E/F AND U240E SERIES

Starting at the beginning of production for the 1998 model year for Lexus and 2000 for Toyota, a new transaxle, designated as the, U140/U240 series was introduced into service. This Transaxle's shift points, and shift feel are electronically controlled by a Powertrain Control Module. This is accomplished by the PCM monitoring engine load and adjusting solenoid duty cycle to match pressure rise and shift feel. The PCM also monitors the turbine and output speed sensors to calculate gear ratio and the Transmission Range Sensor for gear selection. This front wheel drive transaxle has four forward gears, and one reverse gear. The unit is comprised of three connecting clutches, three holding brakes, three planetary gear sets, and two one-way clutches. In addition, there is a clutch located in the torque converter which is applied via the ECM for increased fuel economy. The primary difference between the U140E/F and the U240E is clutch capacity. The U140 series being used primarily in the V6 applications, thus, containing a greater number of friction elements in the individual clutch packs, while the U240 series is utilized primarily in the smaller 4 cylinder engines.

*We wish to thank Toyota Motor Company
for the information and some illustrations.
We also wish to thank G-COR Automotive
Corp. for providing the transmissions that
made this booklet possible.*

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Technical Service Information

Toyota/Lexus U140/U240 Transmission Application by Vehicle

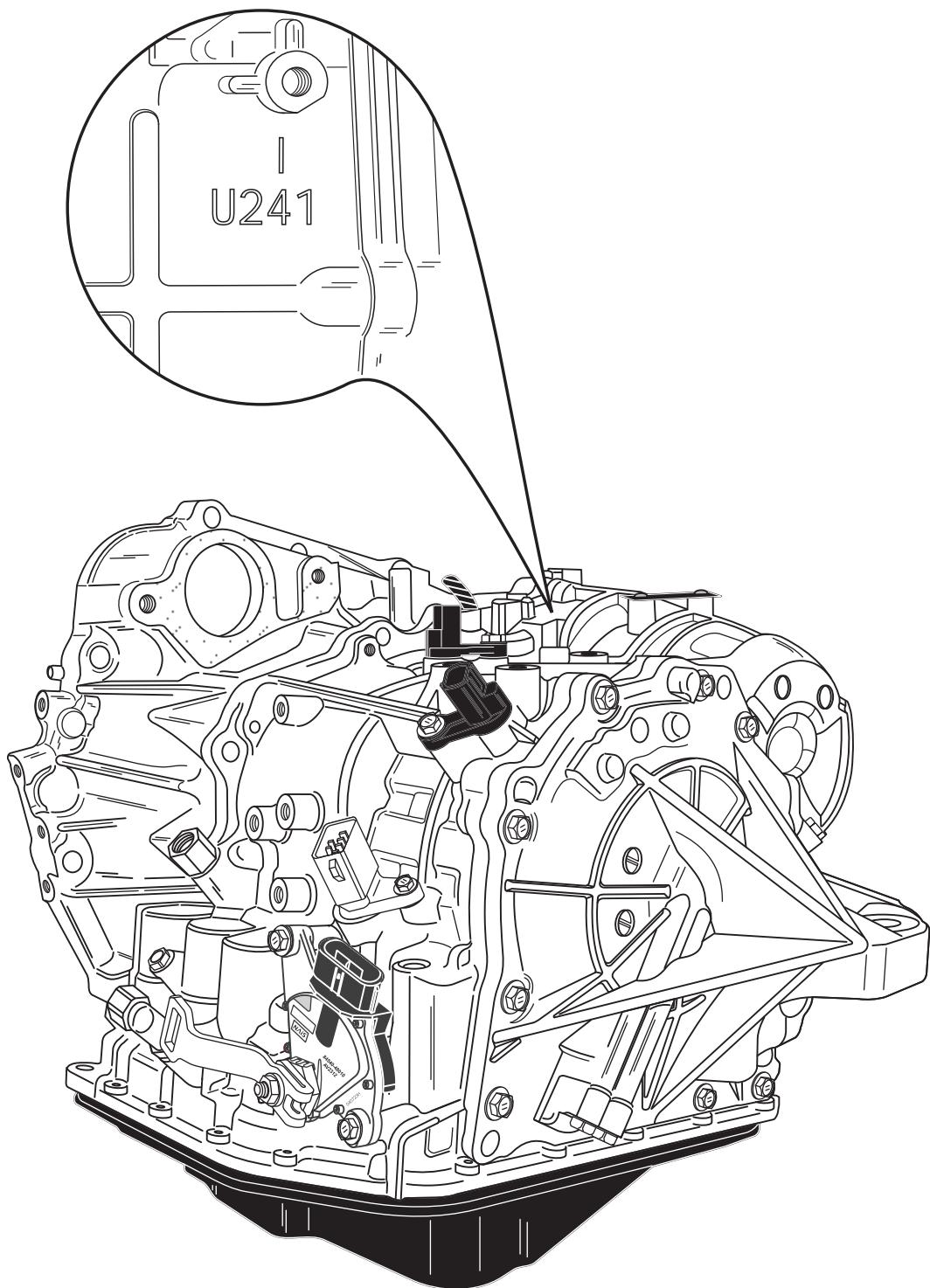
MAKE	MODEL	YEAR	ENGINE	TRANSMISSION
LEXUS	ES 300	1999 - 2001	V6 3.0L	U140E
LEXUS	RX 300	1998 - 2003	V6 3.0L	U140E
LEXUS	RX 300	1998 - 2003	V6 3.0L 4X4	U140F
TOYOTA	CAMRY	2002 - 2004	L4 2.0L	U240E
TOYOTA	CAMRY	2002 - 2003	V6 3.0L	U140E
TOYOTA	CELICA GTS	2000 - 2005	L4 1.8L	U240E
TOYOTA	HIGHLANDER	2001 - 2003	L4 2.4L - V6 3.0L 4X4	U140F
TOYOTA	HIGHLANDER	2001 - 2003	V6 3.0L	U140E
TOYOTA	HIGHLANDER	2004 - 2007	L4 2.4L	U240E
TOYOTA	HIGHLANDER	2004 - 2007	L4 2.4L - V6 3.0L 4X4	U140F
TOYOTA	MATRIX	2003 - 2006	L4 1.8L	U240E
TOYOTA	RAV4	2000 - 2007	L4 2.0L/2.4L 4X4	U140F
TOYOTA	RAV4	2000 - 2007	L4 2.0L/2.4L	U241E
TOYOTA	SCION tc	2004 - 2007	L4 2.4L	U241E
TOYOTA	SOLARA	2002 - 2005	L4 2.4L	U241E

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Figure 1

IDENTIFICATION CODE STAMPING LOCATION

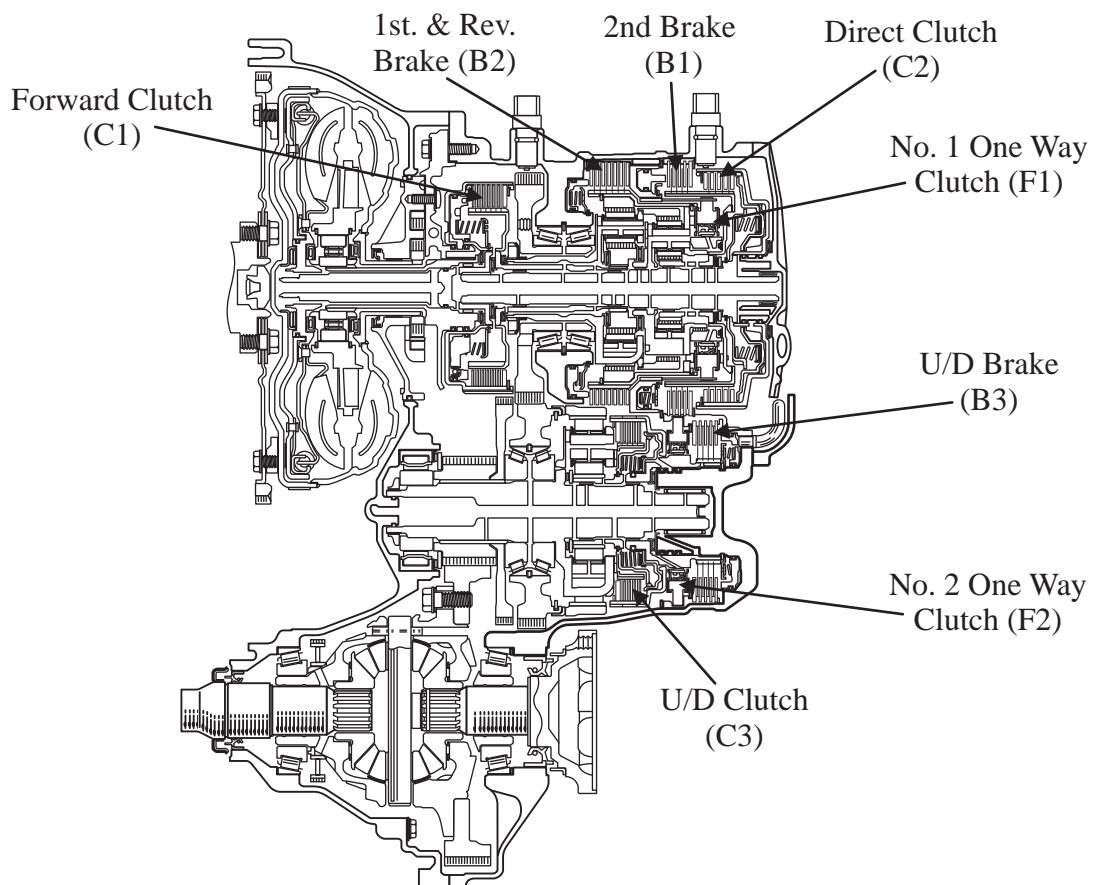
*Identification code is cast into the case
over the Underdrive Section.*



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Figure 2

TOYOTA/LEXUS U140/U240 COMPONENT APPLICATION CHART

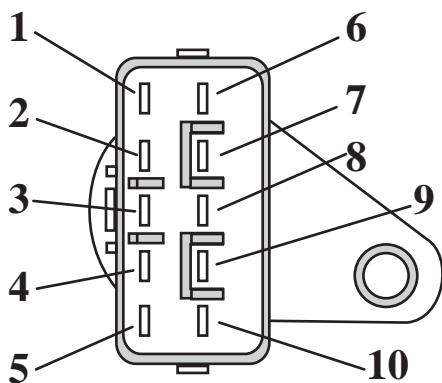


Gear Range	Fwd Clutch C1	Dir Clutch C2	U/D Clutch C3	2nd Brake B1	L/R Brake B2	U/D Brake B3	No. 1 One Way Clutch F1	No. 2 One Way Clutch F2
Park						ON		
Reverse		ON			ON	ON		
Neutral						ON		
D-1st Gear	ON					ON	ON	ON
D-2nd Gear	ON			ON		ON		ON
D-3rd Gear	ON	ON				ON		ON
D-4th Gear	ON	ON	ON					
2-1st Gear	ON					ON	ON	ON
2-2nd Gear	ON			ON		ON		ON
1-1st Gear	ON				ON	ON	ON	ON

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SOLENOID INTERNAL HARNESS AND CONNECTOR I.D. SOLENOID RESISTANCE VALUES

10 PIN CONNECTOR



CONNECTOR I.D.

Terminal	Function	Internal wire Color
1	THO (temp +)	Orange
2	SLT +	Orange
3	DSL +	Green
4	SL2 +	Yellow
5	SL1 +	White
6	E2 (temp -)	Orange
7	SLT -	Green
8	S4 +	Red
9	SL2 -	Brown
10	SL1 -	Black

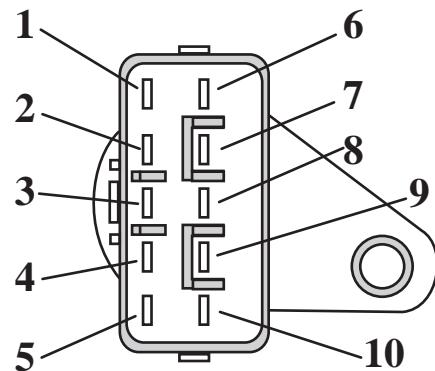
RESISTANCE VALUES

Test	Connect to terminals	Resistance
Temp Sensor	1 and 6	3.8k ohms @ 70°F
SLT	2 and 7	4.5 to 6.0
DSL	3 and Gnd to the case	11 to 15
SL2	4 and 9	4.5 to 6.0
SL1	5 and 10	4.5 to 6.0
S4	8 and Gnd to the case	11 to 15

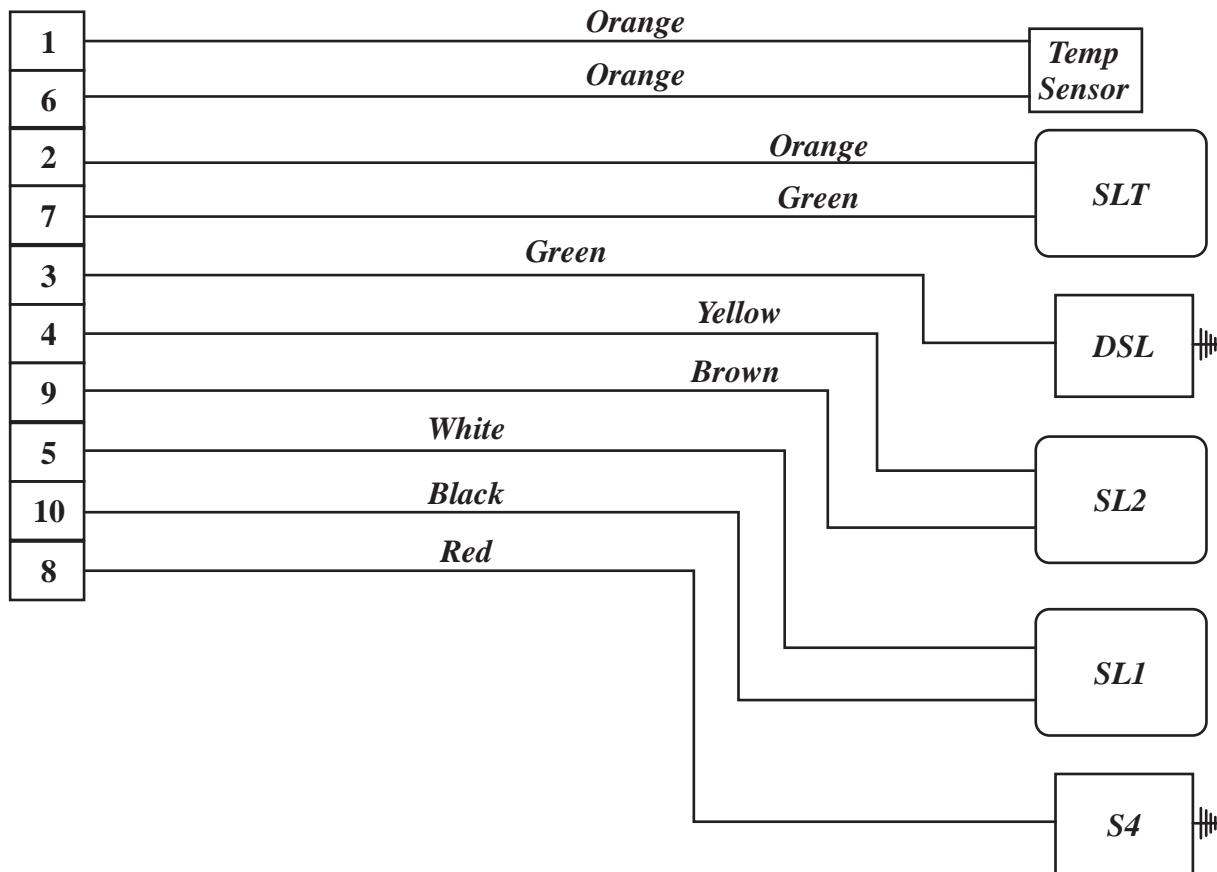
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Figure 4

10 PIN CONNECTOR INTERNAL HARNESS SCHEMATIC



Terminals



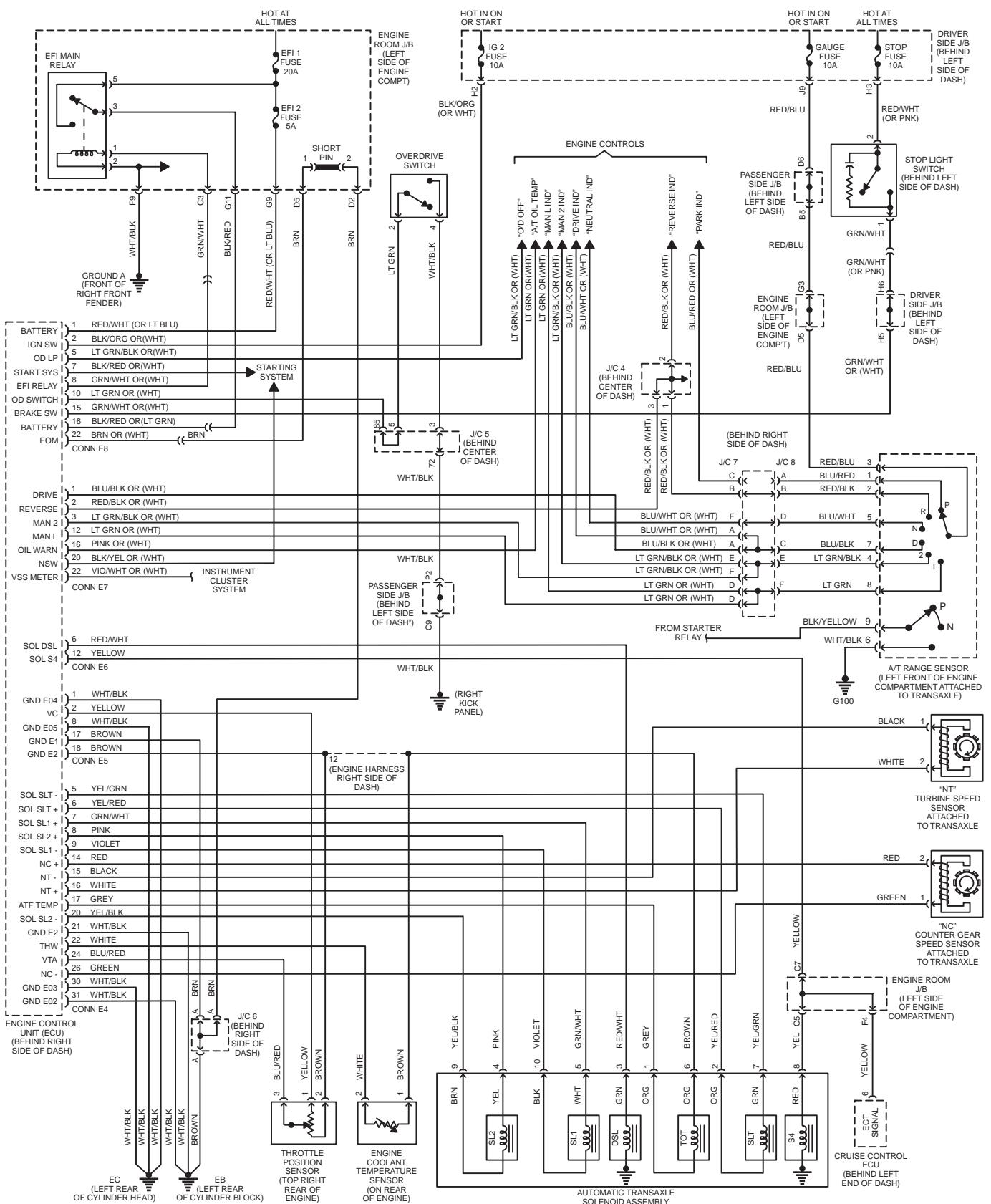
Note: The DSL and S4 Solenoid are grounded to the case

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Figure 5

TOYOTA U240 WIRING DIAGRAM

Example: 2001 RAV4 2.4L



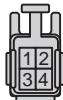
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Figure 6

ENGINE/TRANSMISSION CONTROLS CONNECTOR VIEWS

Example: 2001 RAV4 2.4L

CONNECTOR
O2
BLUE



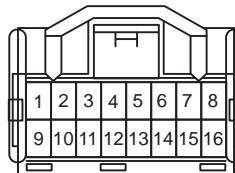
OVERDRIVE
SWITCH

CONNECTOR
P1
GREY



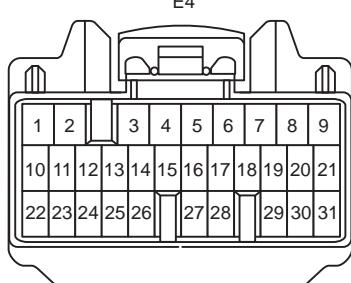
A/T
RANGE SENSOR

CONNECTOR
C20

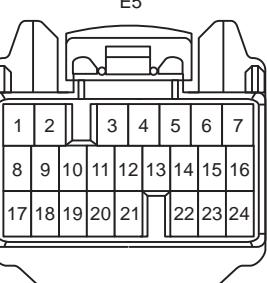


CRUISE CONTROL
ECU

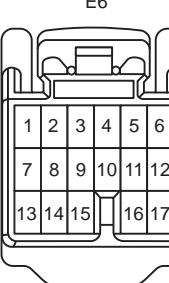
CONNECTOR
E4



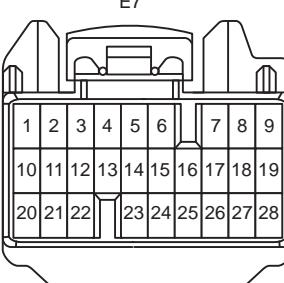
CONNECTOR
E5



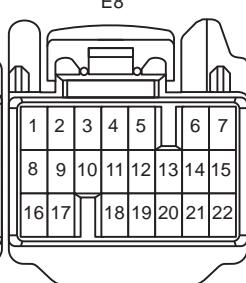
CONNECTOR
E6



CONNECTOR
E7



CONNECTOR
E8



ENGINE CONTROL
MODULE (ECM)

CONNECTOR
E2
GREEN



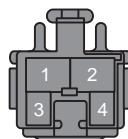
ENGINE COOLANT
TEMPERATURE
SENSOR (ECT)

CONNECTOR
T1
BLACK



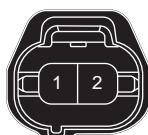
THROTTLE
POSITION SENSOR

CONNECTOR
S8
BROWN



A/T
BRAKE SWITCH

CONNECTOR
C3
BLACK



N/C
COUNTER GEAR
SPEED SENSOR

CONNECTOR
T2
BLACK



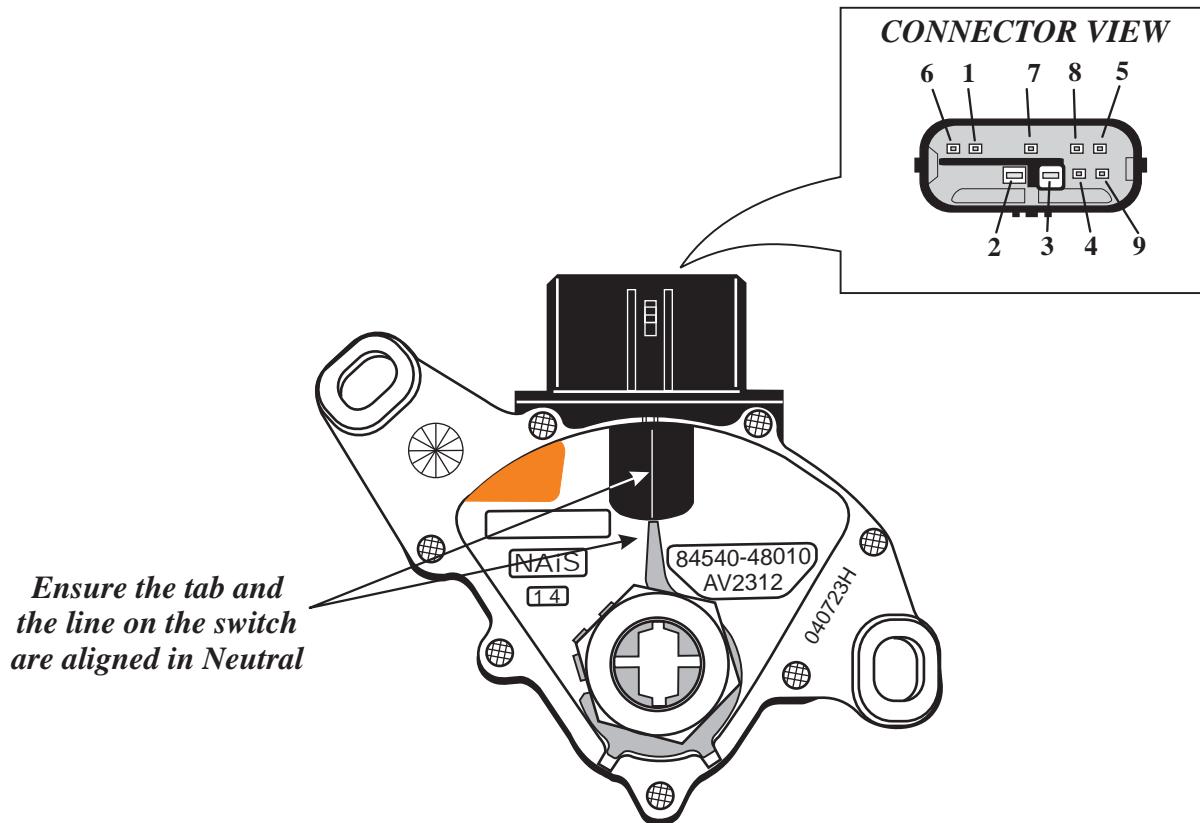
N/T
TURBINE SHAFT
SPEED SENSOR

CONNECTOR
V1
BLACK

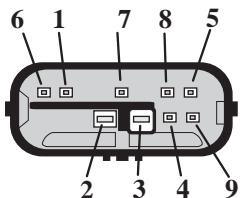


VEHICLE
SPEED SENSOR
(COMBINATION METER)

CHECKING PARK/NEUTRAL SWITCH TRANSMISSION RANGE SENSOR



CONNECTOR VIEW



NOTE: PIN CONFIGURATION MAY APPEAR INCORRECT, HOWEVER, IT AGREES WITH AVAILABLE WIRING DIAGRAMS. CONTINUITY TEST CHART WAS TAKEN FROM AN ACTUAL P/N SWITCH.

Disconnect the Park/Neutral switch connector and check for continuity between the terminals listed in the chart below

RANGE POSITION	TERMINALS	
P	3&1	9&6
R	3&2	
N	3&5	9&6
D	3&7	
2	3&4	
L	3&8	

Note: There should be continuity only on the terminals listed above

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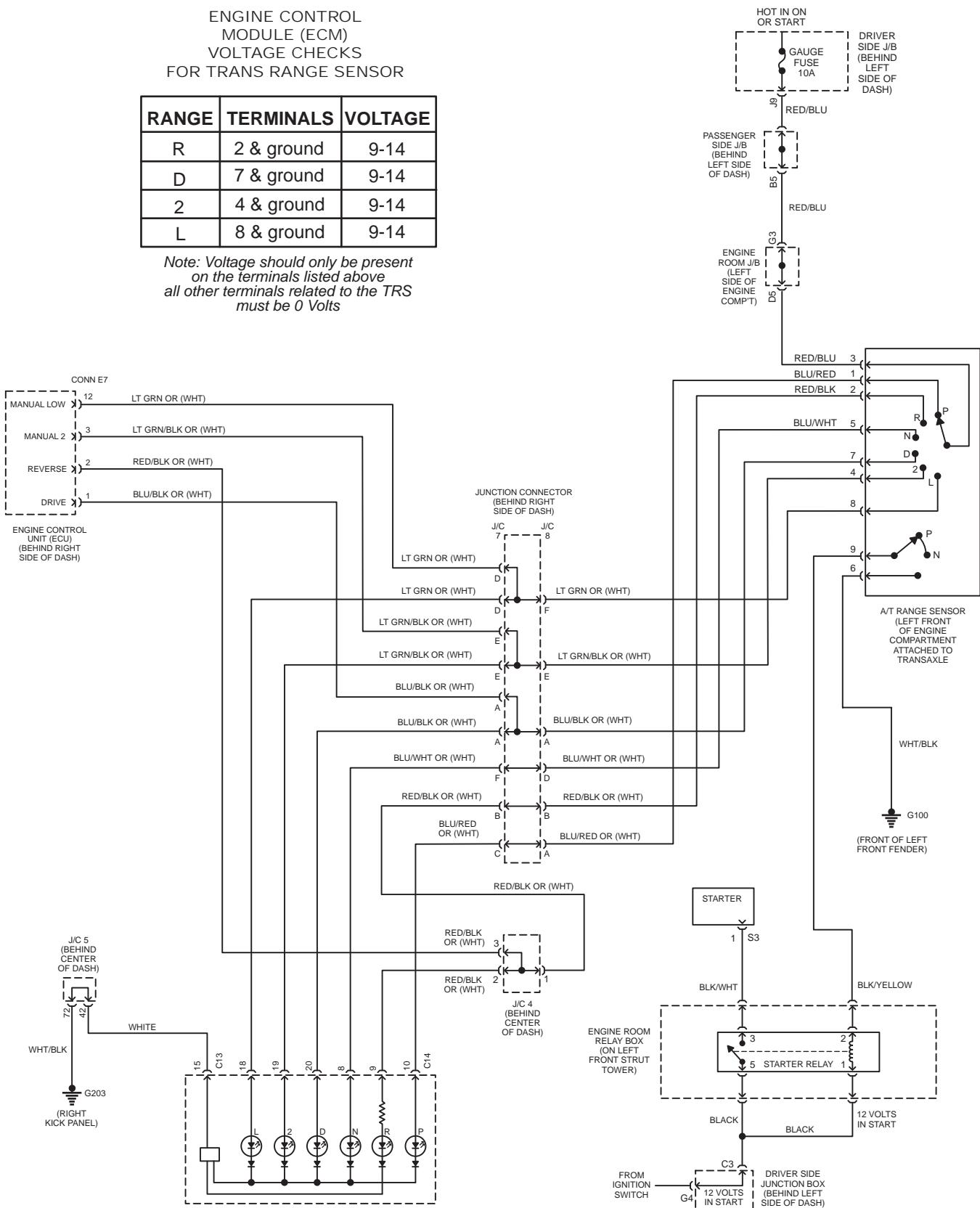
TOYOTA U240 WIRING DIAGRAM

Example: 2001 RAV4 2.4L

ENGINE CONTROL
MODULE (ECM)
VOLTAGE CHECKS
FOR TRANS RANGE SENSOR

RANGE	TERMINALS	VOLTAGE
R	2 & ground	9-14
D	7 & ground	9-14
2	4 & ground	9-14
L	8 & ground	9-14

Note: Voltage should only be present on the terminals listed above all other terminals related to the TRS must be 0 Volts

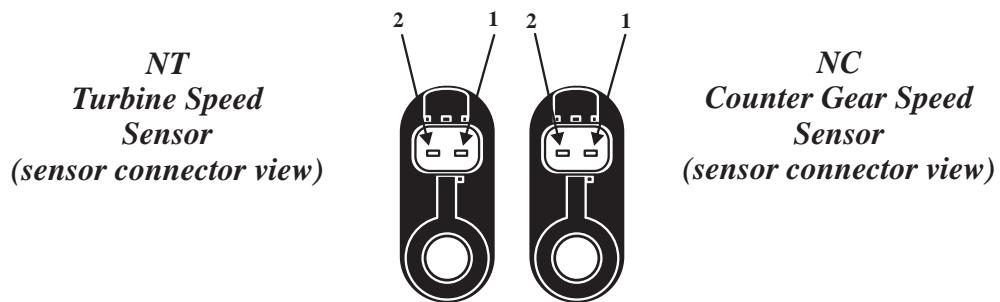
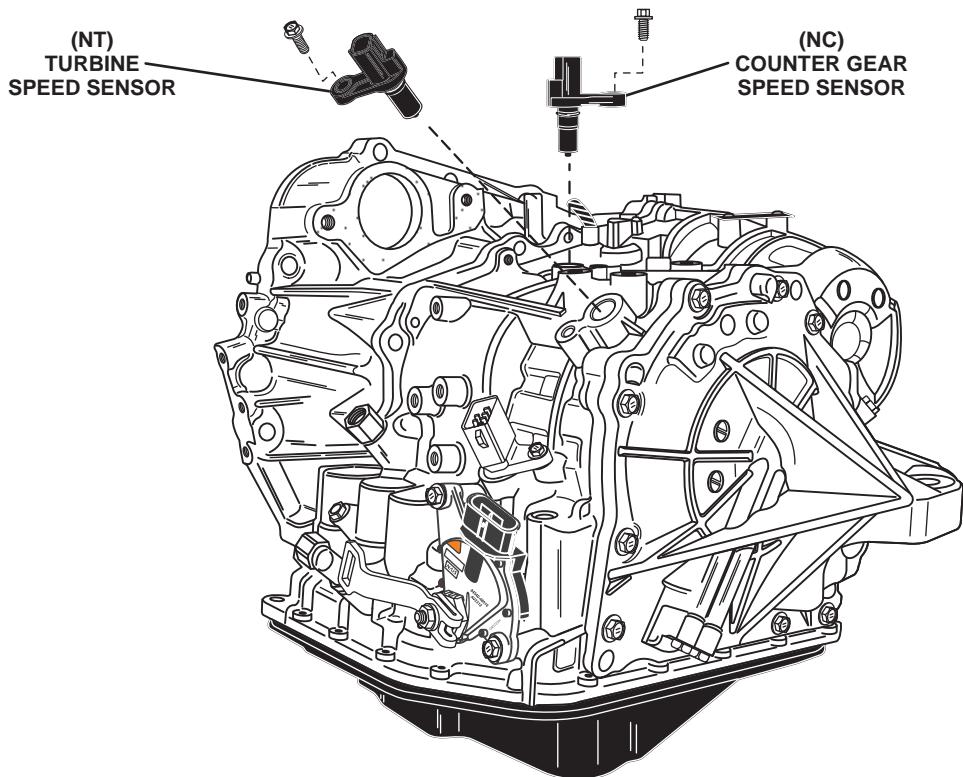


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Figure 9

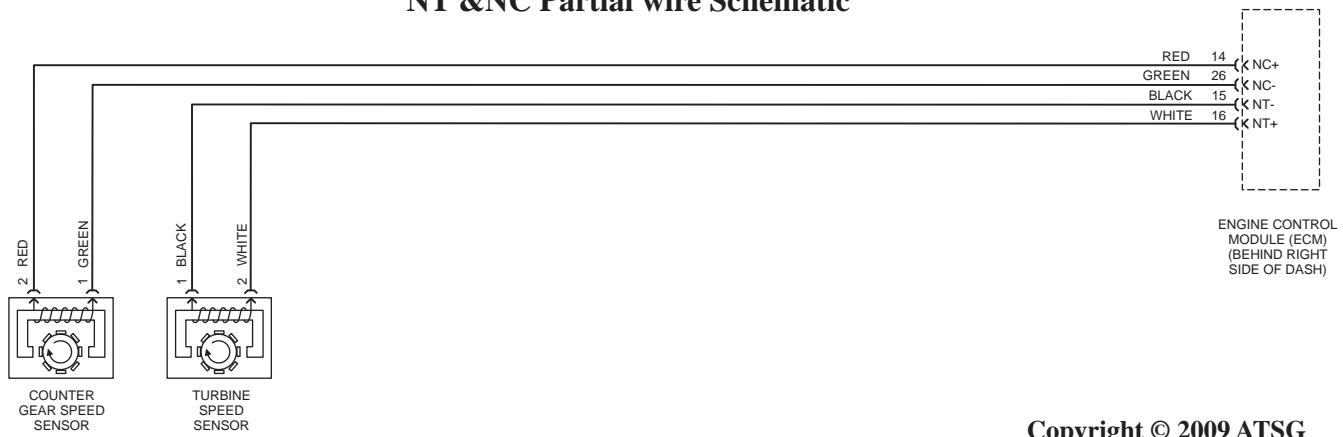
AUTOMATIC TRANSMISSION SERVICE GROUP

TOYOTA U240 NT AND NC SENSOR CHECK



Connect ohm meter between the terminals 1&2 on each sensor, the value should be 620 +/- 60

NT & NC Partial wire Schematic

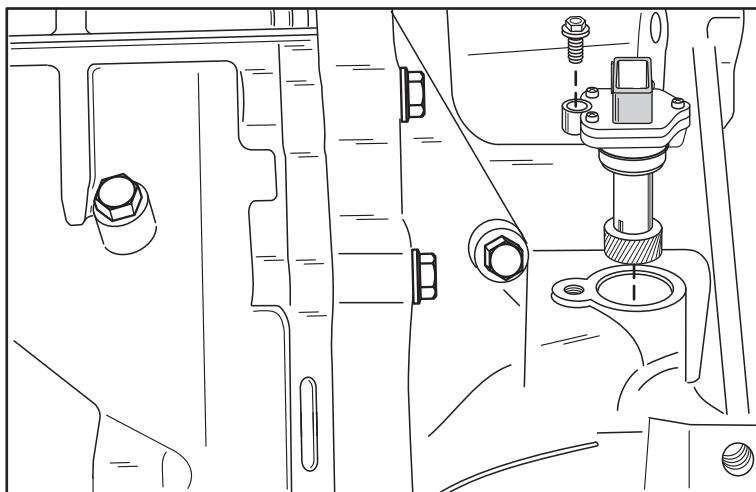


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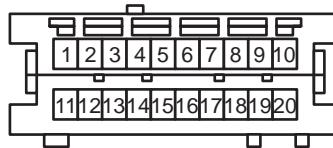
Figure 10

TOYOTA U240 VEHICLE SPEED SENSOR CHECK

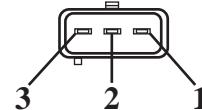
Rear View of Case



INSTRUMENT CLUSTER
CONNECTOR A C12 (VSS)



VSS SENSOR CONNECTOR
FACE VIEW

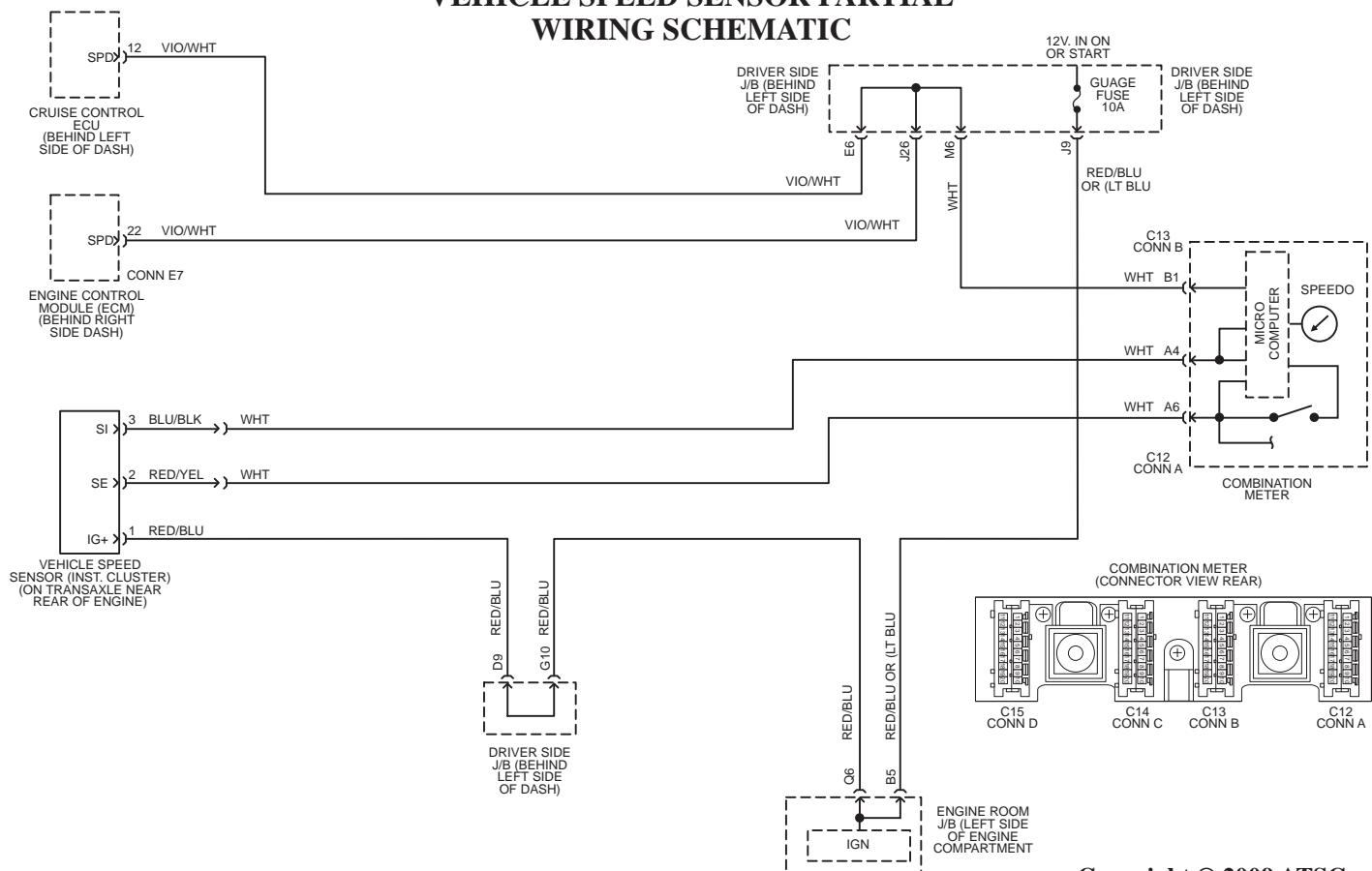


Terminal I.D.

1	Ignition voltage (from Fuse)
2	Ground
3	Signal out

Vehicle speed is sent to the Combination Meter then to the ECM. The VSS generates a Four Pulse per output rotation signal that is conditioned and converted to a digital signal by the Combination Meter.

VEHICLE SPEED SENSOR PARTIAL WIRING SCHEMATIC



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Figure 11

TOYOTA/LEXUS U140/U240
Diagnostic Trouble Code Descriptions

Code	Description
*P0130	<i>Heated Oxygen Sensor Circuit Malfunction (Bank 1 Sensor 1)(Except Calif.)</i>
*P0133	<i>Oxygen Sensor Circuit Slow Response (Bank 1 Sensor 1)</i>
*P0135	<i>Heated Oxygen Sensor Heater Circuit Malfunction (Bank 1 Sensor 1)</i>
*P0136	<i>Oxygen Sensor Heater Circuit Malfunction (Bank 1 Sensor 2)</i>
*P0141	<i>Heated Oxygen Sensor Heater Circuit Malfunction (Bank 1 Sensor 2)</i>
*P0325	<i>Knock Sensor 1 Circuit Malfunction</i>
*P0330	<i>Knock Sensor 1 Circuit Malfunction (LEXUS MODELS)</i>
P0500	<i>Vehicle Speed Sensor Malfunction</i>
P0710	<i>Transmission Fluid Temperature (TFT) Sensor Circuit Malfunction</i>
P0750	<i>Shift Solenoid A (Solenoid Valve SL1) Malfunction (Performance)</i>
P0753	<i>Shift Solenoid A (Solenoid Valve SL1) Circuit Malfunction (Electrical)</i>
P0755	<i>Shift Solenoid B (Solenoid Valve SL2) Malfunction (Performance)</i>
P0758	<i>Shift Solenoid B (Solenoid Valve SL2) Circuit Malfunction (Electrical)</i>
P0765	<i>Shift Solenoid D (Solenoid Valve S4) Malfunction (Performance)</i>
P0768	<i>Shift Solenoid D (Solenoid Valve S4) Circuit Malfunction (Electrical)</i>
P0770	<i>Shift Solenoid E (Solenoid Valve DSL/TCC) Malfunction (Performance)</i>
P0773	<i>Shift Solenoid E (Solenoid Valve DSL/TCC) Circuit Malfunction (Electrical)</i>
P1520	<i>Stop Light (Brake ON/OFF) Switch Circuit Malfunction</i>
P1725	<i>NT Revolution Sensor Circuit (Turbine Speed Sensor)</i>
P1730	<i>NC Revolution Sensor Circuit (Counter Gear Speed Sensor)</i>
P1760	<i>Linear Solenoid Pressure Control (Solenoid Valve SLT) Circuit Malfunction (Electrical)</i>
P1780	<i>Park/Neutral Position Switch Malfunction</i>

* Engine related codes that can result in no "Commanded" up-shift to 4th gear.

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 to others.

The service procedures we recommend and describe in this manual are effective methods of performing service and repair on this transmission. 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 to 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.

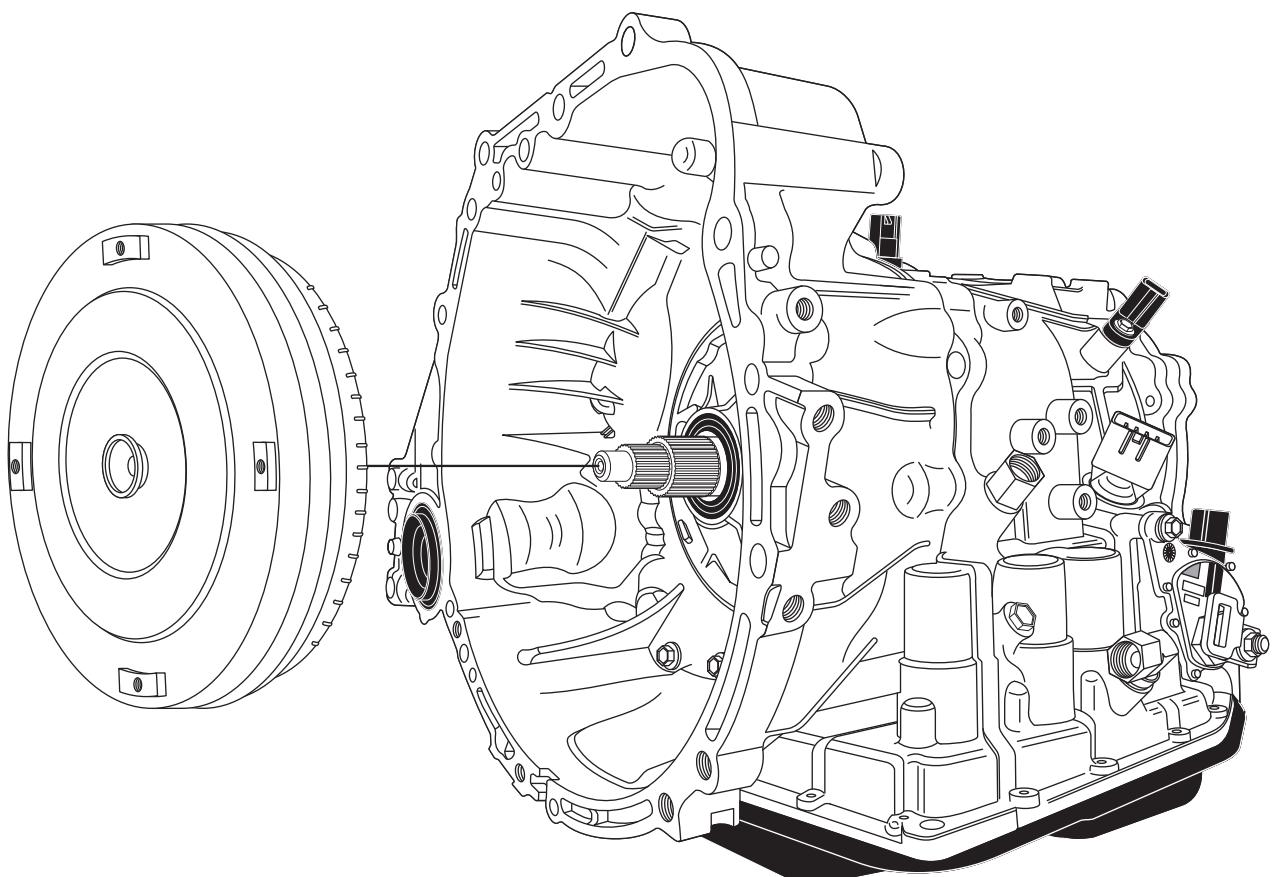
TRANSAXLE DISASSEMBLY

External components

1. The transaxle should be cleaned on the outside to remove dirt or grease prior to disassembly.
2. This transaxle can be disassembled quite easily on a suitable workbench without the aid of any holding fixture for rotation.
3. Remove the torque converter from transaxle as shown in Figure 13.

Caution: The torque converter is heavy, use caution when removing to avoid personal injury or damage to torque converter.

Continued on Page 16



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Figure 13

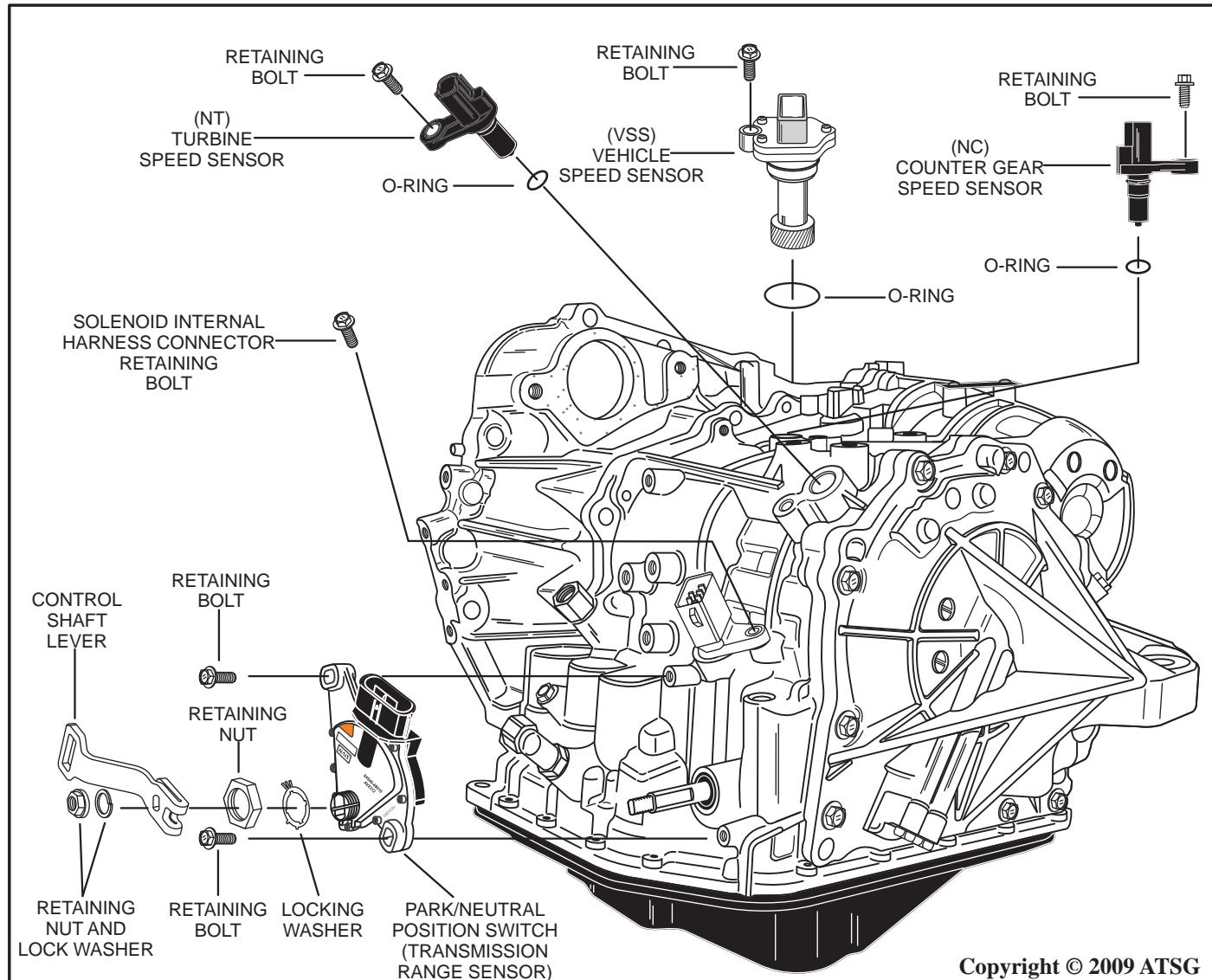
TRANSAXLE DISASSEMBLY

External components continued

4. Remove the retaining nut, lock washer and control shaft lever as shown in Figure 14.
5. Use a screwdriver to pry up tabs on locking washer, then remove the retaining nut and locking washer as shown in Figure 14.
6. Remove the two retaining bolts from the park/neutral position switch then gently pry and remove the switch away from the transmission as shown in Figure 14.
7. Remove the (NT) turbine shaft speed sensor retaining bolt and the turbine shaft speed sensor as shown in Figure 14.
8. Remove and discard the o-ring.

9. Remove the (NC) counter gear speed sensor retaining bolt and the counter gear speed sensor as shown in Figure 14.
 10. Remove and discard the o-ring.
 11. Remove the (VSS) vehicle speed sensor retaining bolt and the vehicle speed sensor as shown in Figure 14.
 12. Remove and discard the o-ring.
 13. Remove the solenoid internal harness connector retaining bolt as shown in Figure 14.
- Note:** *Only remove the retaining bolt, DO NOT attempt to remove the case connector at this time. Damage to internal harness wires will result.*

Continued on Page 17



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Figure 14

TRANSAXLE DISASSEMBLY

Internal components

1. Remove the eighteen pan bolts from the transmission as shown in Figure 15.
2. Remove the oil pan and oil pan gasket as shown in Figure 15.
3. Remove the oil pan gasket from the pan and discard.
4. Remove the three filter attaching bolts as shown in Figure 16.
5. Remove the oil filter and oil filter gasket as shown in Figure 16.
6. Discard both the oil filter and oil filter gasket.

Continued on Page 18

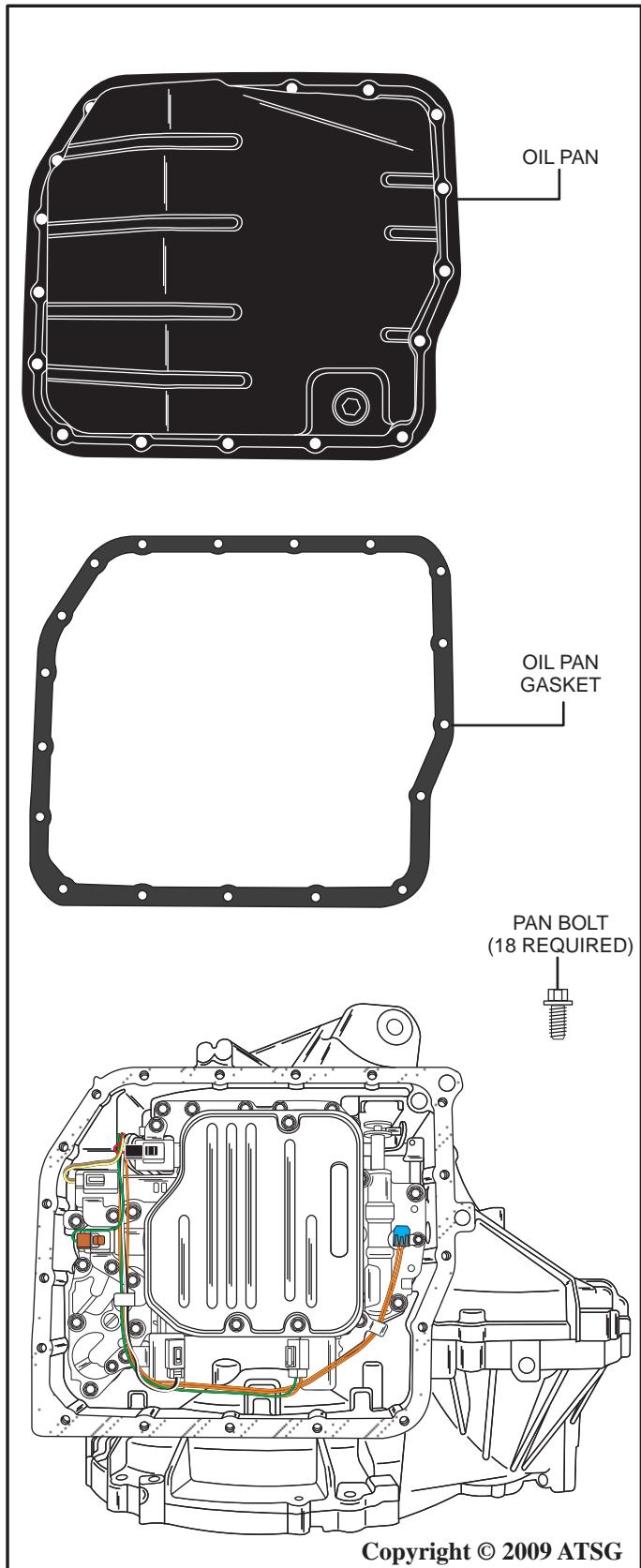


Figure 15

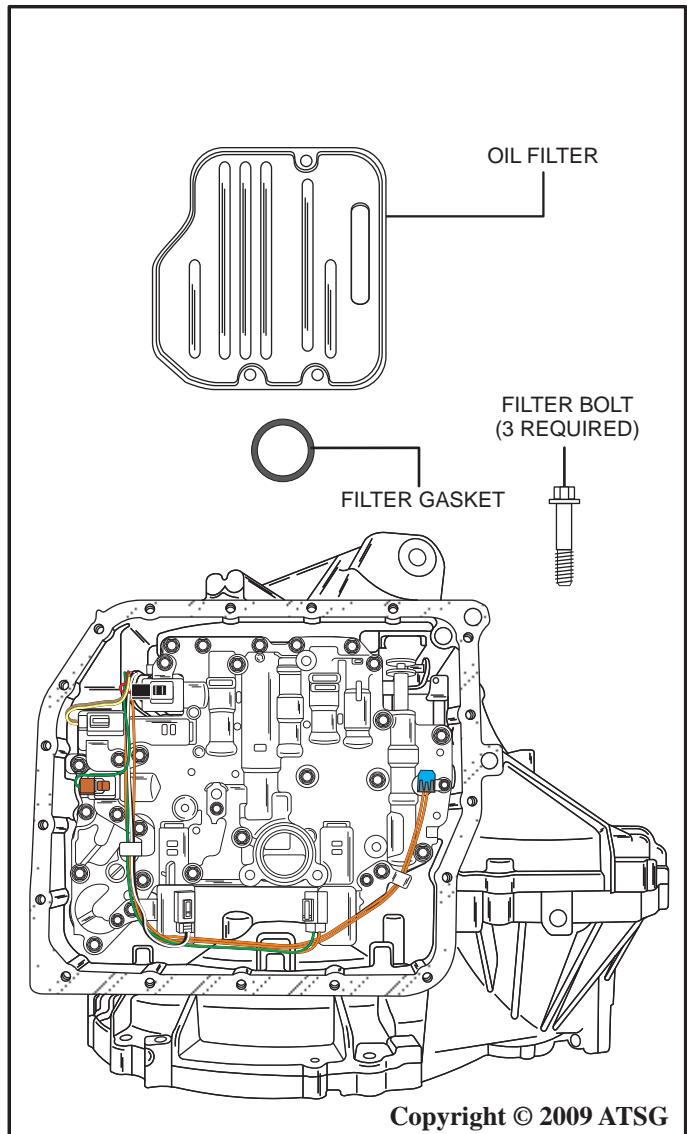


Figure 16

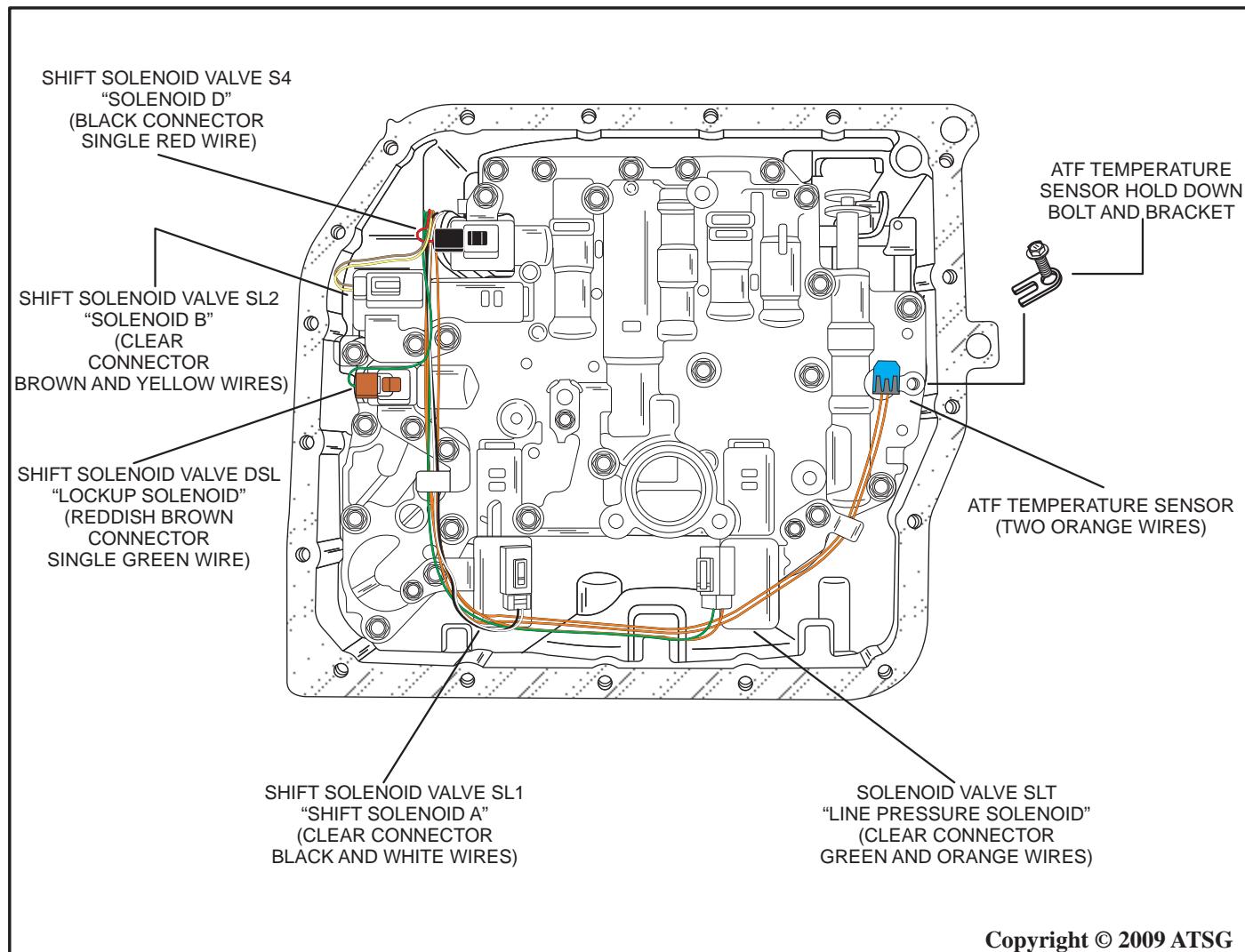
TRANSAXLE DISASSEMBLY

Internal components continued

7. Remove the ATF temperature sensor hold down bolt and bracket as shown in Figure 17.
8. Disconnect the connectors from the solenoids and remove the ATF temperature sensor from the valvebody as shown in Figure 17.
9. Remove the connectors and drape the internal wire harness up and over the pan rail.

Note: Internal wire harness and connector colors have been provided, however, the connector and wire colors in your transmission may be different. Should the colors be different, take the time to carefully label the wires and connectors to avoid cross-connecting during the assembly process.

Continued on Page 19



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Figure 17

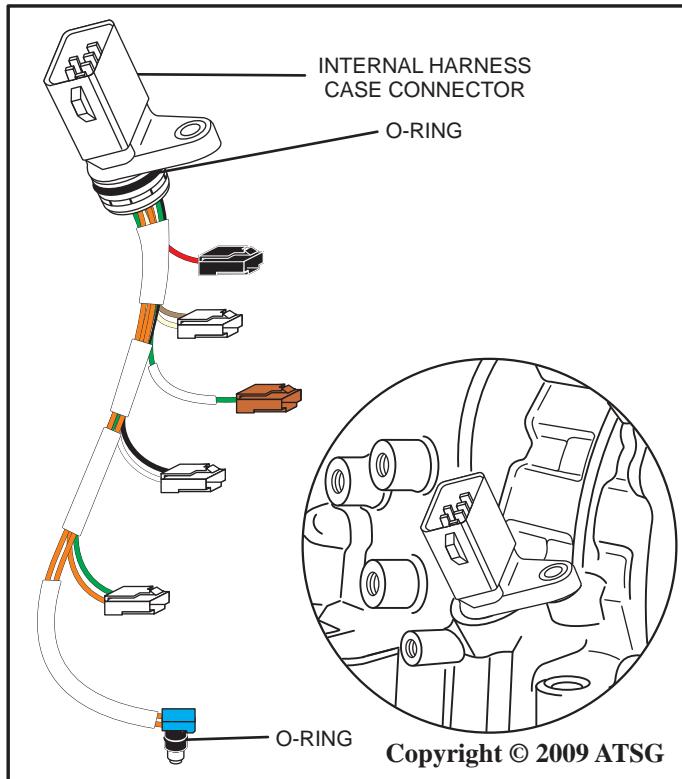


Figure 18

TRANSAXLE DISASSEMBLY

Internal components continued

10. Using a twisting motion, turn and remove the internal harness case connector and internal wire harness from the transmission case as shown in Figure 18. Be careful not to damage the wires in the harness.
11. Remove and discard the internal wiring harness o-ring and the o-ring for the ATF temperature sensor.
12. Remove the seventeen valve body to case attaching bolts from the valve body as shown in Figure 19.
13. Remove the valve body assembly from the case by lifting straight up and set aside for the component rebuild section.

Note: Valvebody to case attaching bolts are different lengths. Refer to chart below for proper installation in transaxle assembly

Continued on Page 20

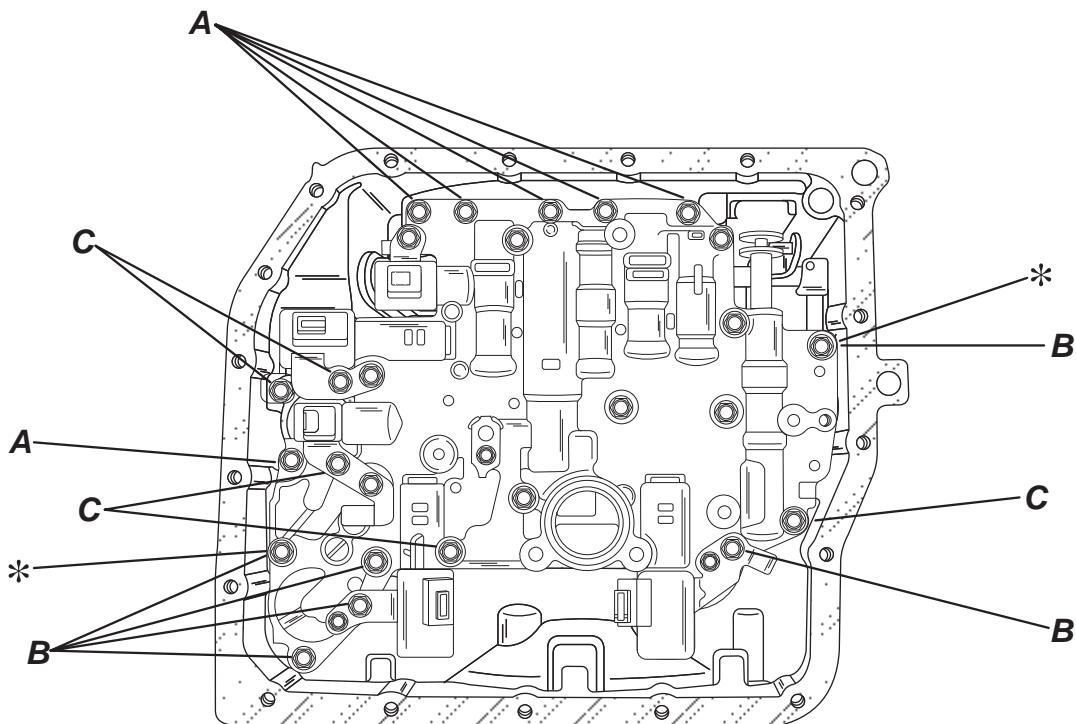
BOLT LENGTH

BOLT A: 25 mm (0.984" in.)

BOLT B: 41 mm (1.614" in.)

BOLT C: 45 mm (1.771" in.)

*INDICATES LOCATING BOLT



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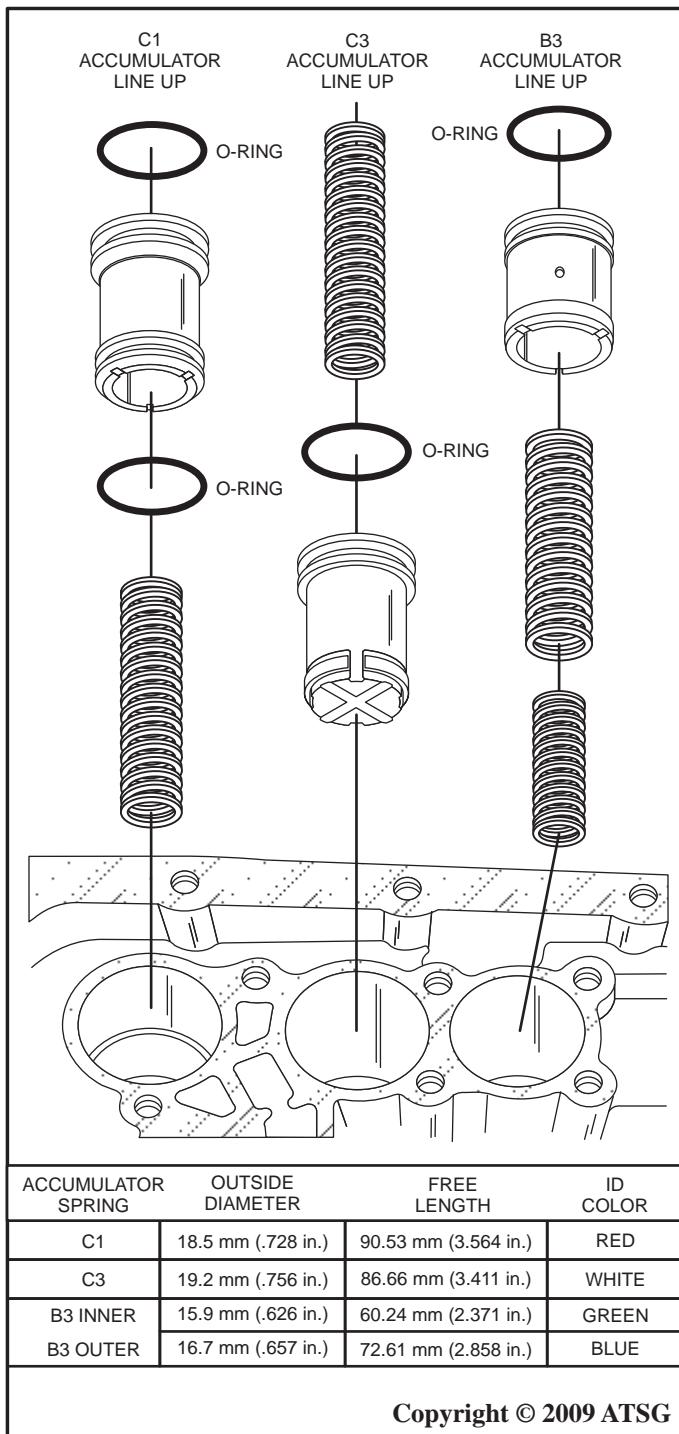
Figure 19

TRANSAXLE DISASSEMBLY (CONT'D)

14. Remove the C1, C3 and B3 accumulator pistons and springs as shown in Figure 20.

Note: Spring colors and dimensions have been provided in Figure 20, however, there may be variations from model to model..

15. Remove and discard the accumulator piston o-rings.



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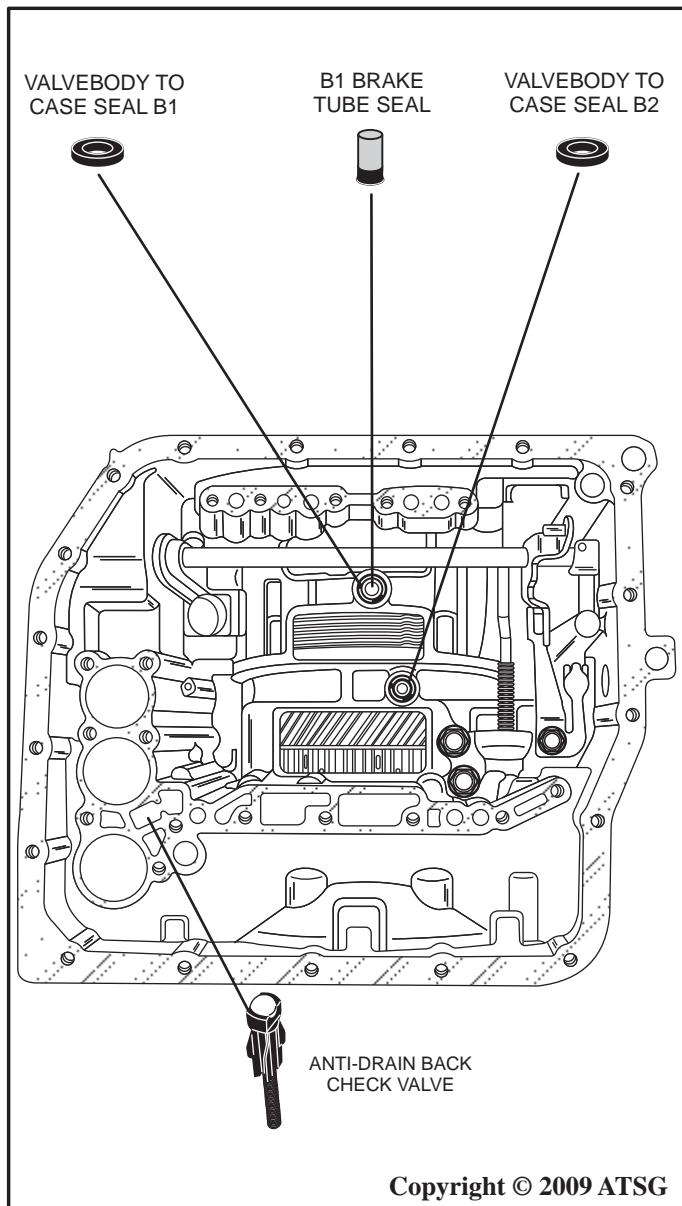
16. Remove the anti-drain back check valve as shown in Figure 21.

17. Remove the B1 and B2 valvebody to case seals as shown in Figure 21.

18. Remove the B1 tube seal as shown in Figure 21.

19. Discard the B1 and B2 valvebody to case seals, and the B1 tube seal.

Continued on Page 21



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Figure 20

Figure 21

TRANSAXLE DISASSEMBLY (CONT'D)

20. Remove the manual shaft locating pin using a pair of pliers as shown in Figure 22.
21. Remove the bolts from the manual lever detent spring and the manual lever detent spring tensioner plate and remove the detent spring and tensioner plate as shown in Figure 23.
22. Remove the bolts from the park pawl lock bracket and remove the park pawl lock bracket as shown in Figure 23.
23. Use a small screwdriver to move the spacer sleeve as shown in Figure 24.
24. Use a 1/8 in. diameter drift punch, to remove the roll pin from the manual selector shaft as shown in Figure 24.
25. Twist and remove the manual lever shaft from the case as shown in Figure 25.
26. Remove the manual valve detent lever and the park actuator rod as shown in Figure 25.
27. Remove the park actuator rod from the manual valve detent lever as shown in Figure 25.

Continued on Page 22.

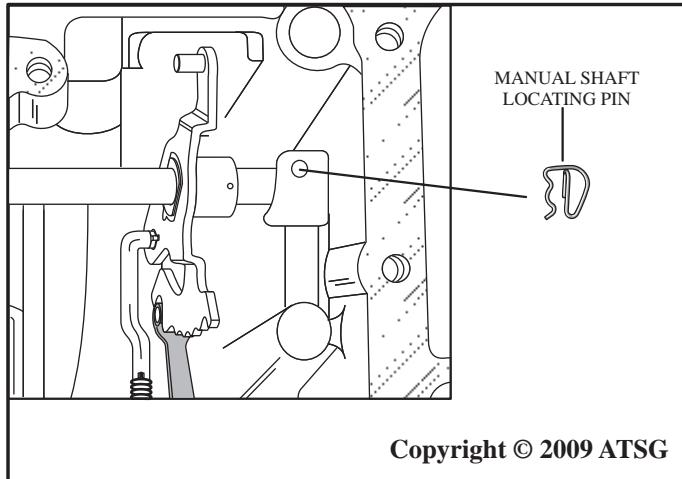


Figure 22

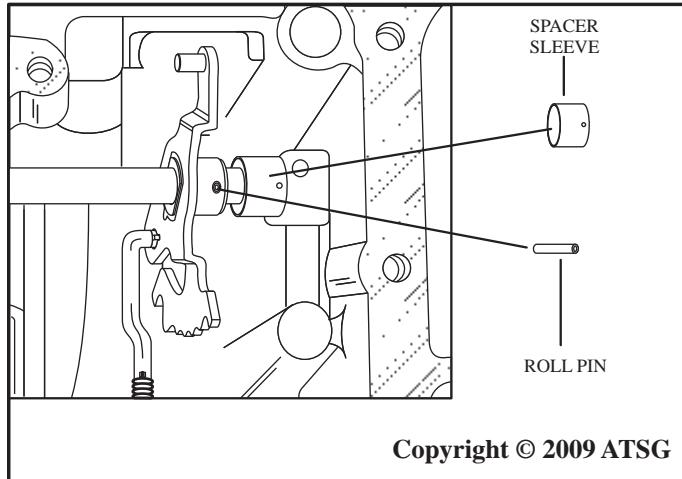


Figure 24

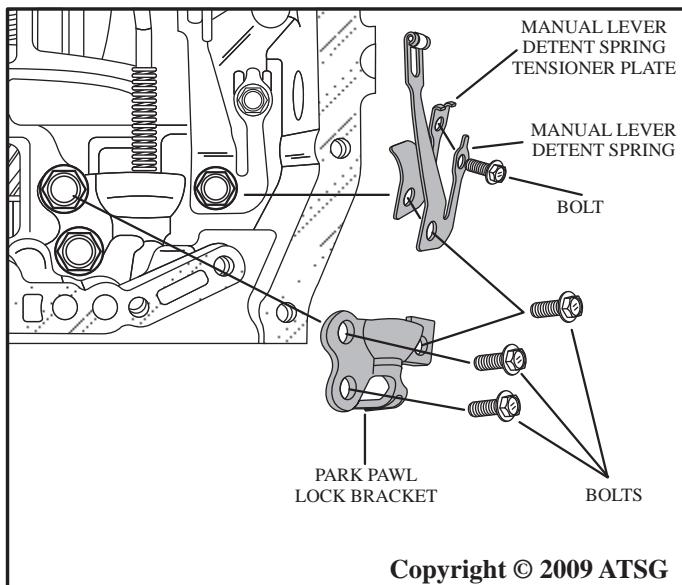


Figure 23

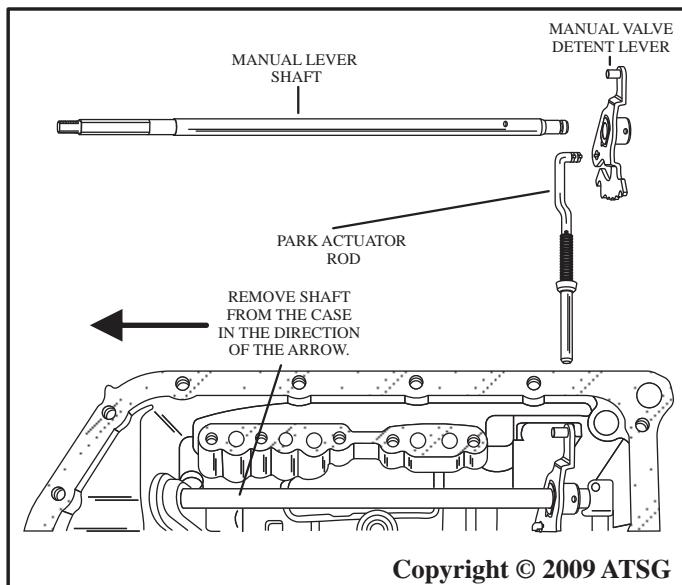
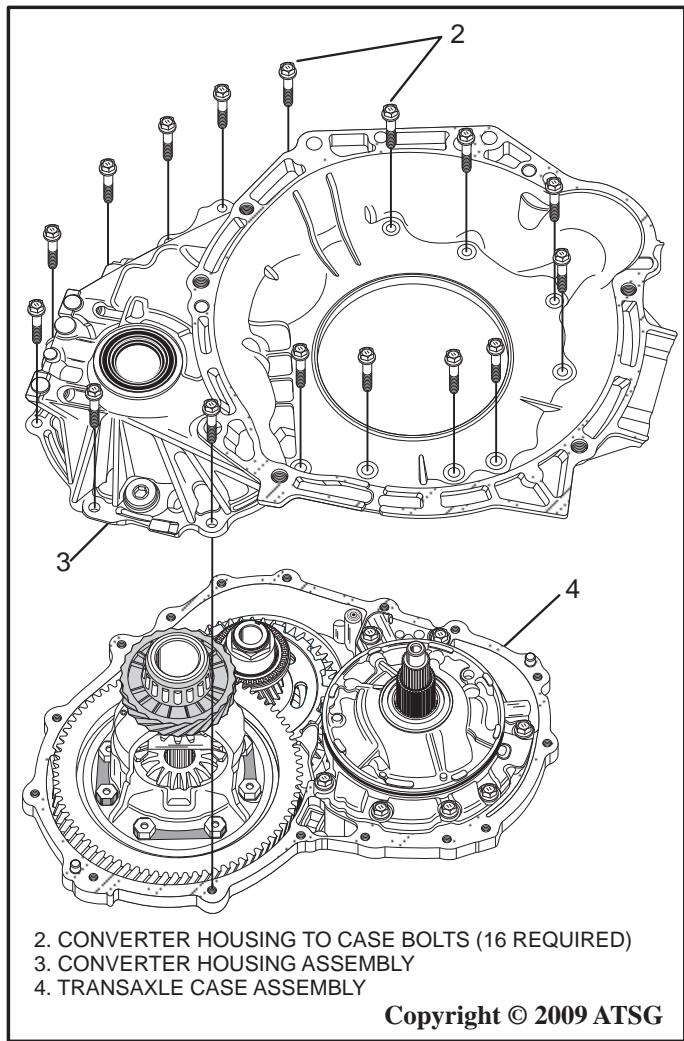


Figure 25

TRANSAXLE DISASSEMBLY (CONT'D)

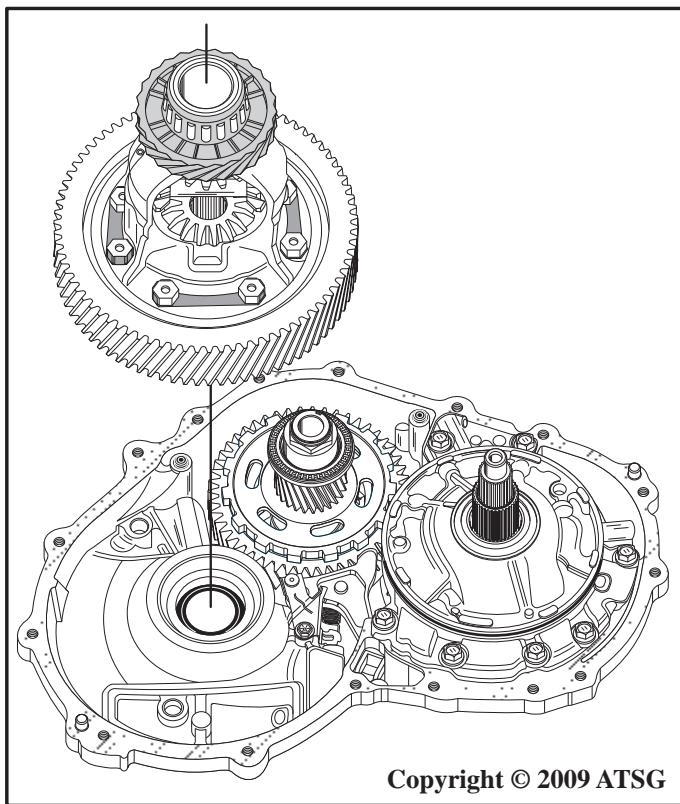
28. Remove the sixteen converter housing to case bolts as shown in Figure 26.
29. Once the bolts are removed, use a plastic hammer and gently tap the converter housing to loosen it from the transaxle case then remove the converter housing as shown in Figure 26.
30. Set the converter housing aside for component rebuild section.
31. Remove the final drive assembly by lifting straight up as shown in Figure 27.
32. Remove the seven oil pump retaining bolts as shown in Figure 28.
33. Remove the oil pump assembly by lifting straight up as shown in Figure 28.
34. Remove and discard the oil pump assembly o-ring as shown in Figure 28.

Continued on Page 23.



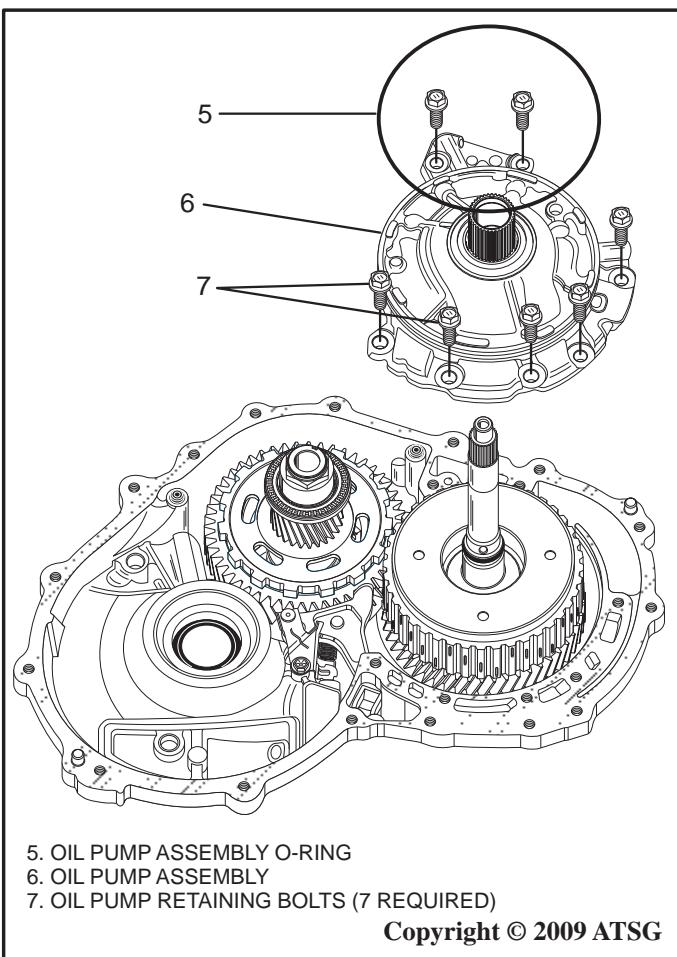
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Figure 26



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Figure 27



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Figure 28

TRANSAXLE DISASSEMBLY (CONT'D)

35. Using a pick or small screwdriver, remove and discard the two lube seals from the transaxle case assembly as shown in Figure 29.
36. Remove the thrust bearing and the bearing race from the underdrive planetary assembly as shown in Figure 29.
37. Remove and discard the forward (C1) clutch sealing ring as shown in Figure 30.
38. Remove the thrust bearing from the forward (C1) clutch drum as shown in Figure 30.
39. Remove the forward (C1) clutch drum assembly by lifting straight up as shown in Figure 30.
40. Remove the forward (C1) clutch thrust bearing assembly as shown in Figure 31.
41. Remove the forward (C1) clutch hub by lifting straight up as shown in Figure 31.
42. Remove the forward (C1) clutch hub thrust bearing and race as shown in Figure 31.

Continued on Page 24.

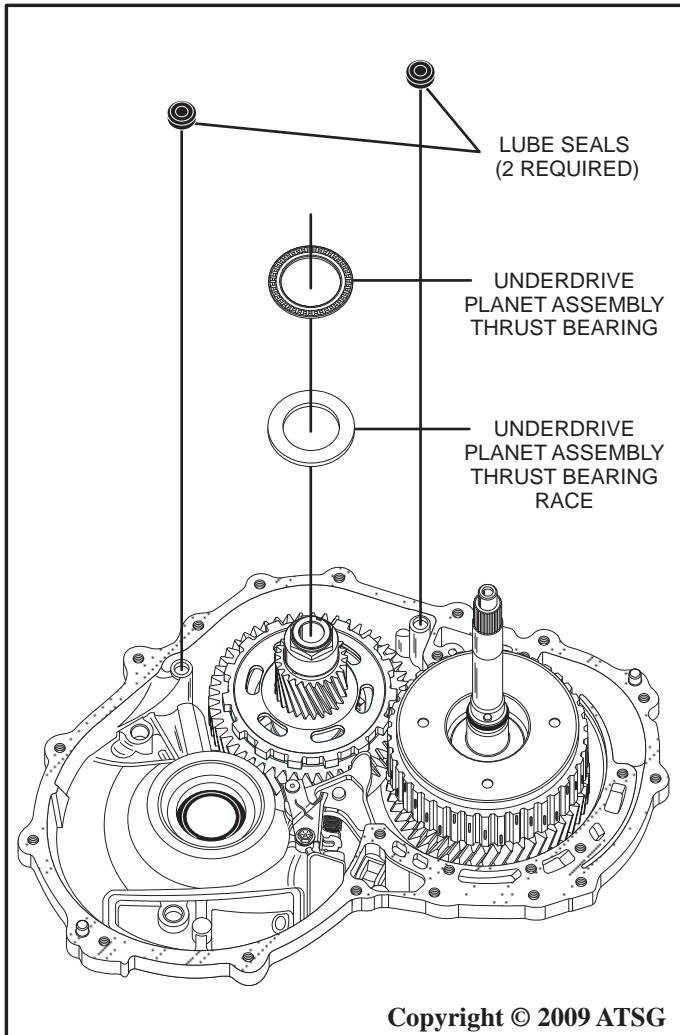


Figure 29

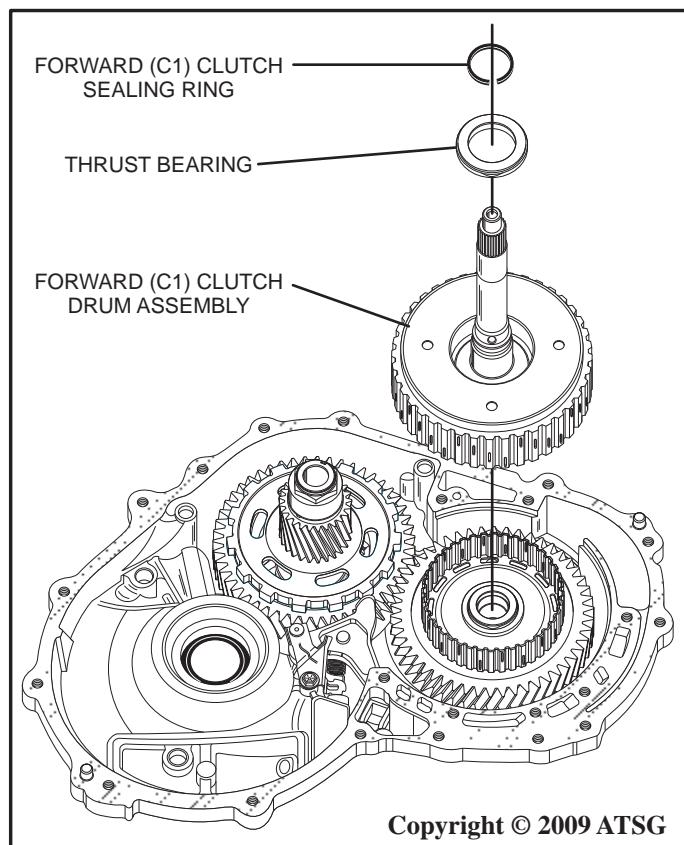


Figure 30

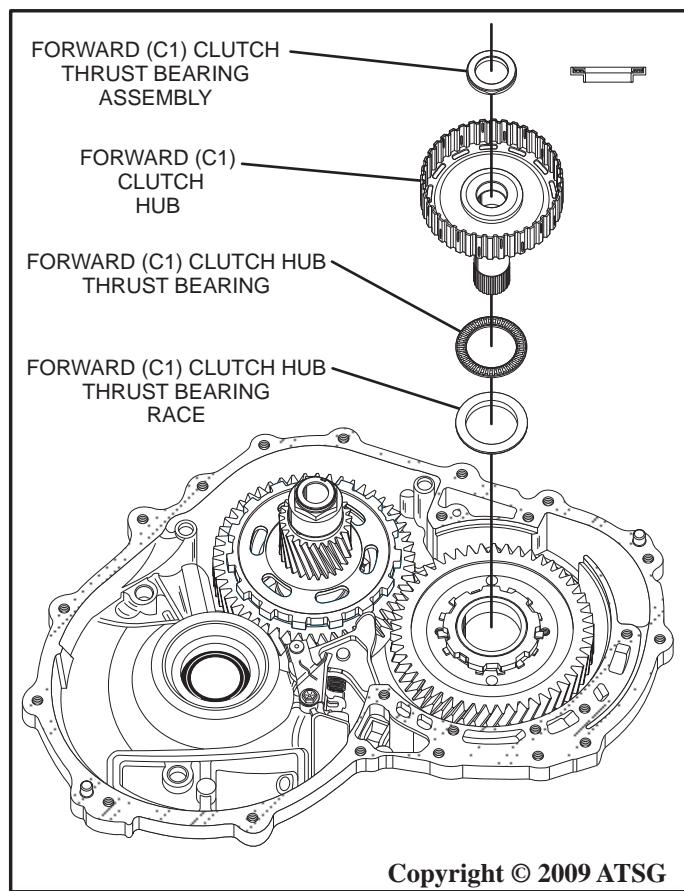


Figure 31

TRANSAXLE DISASSEMBLY (CONT'D)

43. Remove the park pawl shaft hold down bracket retaining bolt as shown in Figure 32.
44. Rotate the park pawl shaft hold down bracket and remove by sliding out and away from the park pawl shaft locating groove as shown in Figure 33.
45. Remove the park pawl shaft by lifting straight up as shown in Figure 33.
46. Slide the park pawl away from the park gear in the direction of the arrow as shown in Figure 34. Failure to do so will not allow removal of the underdrive planetary assembly.

Continued on Page 25.

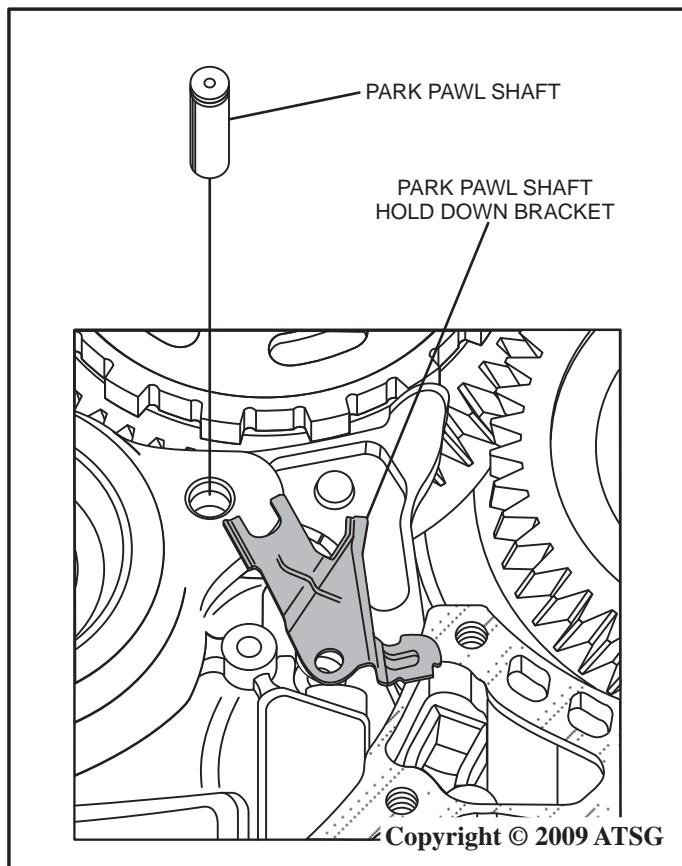


Figure 33

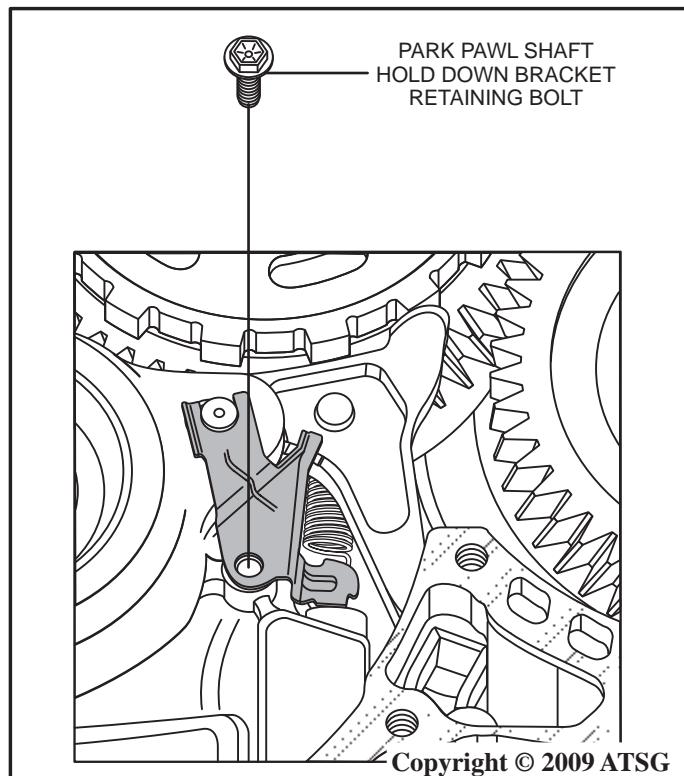


Figure 32

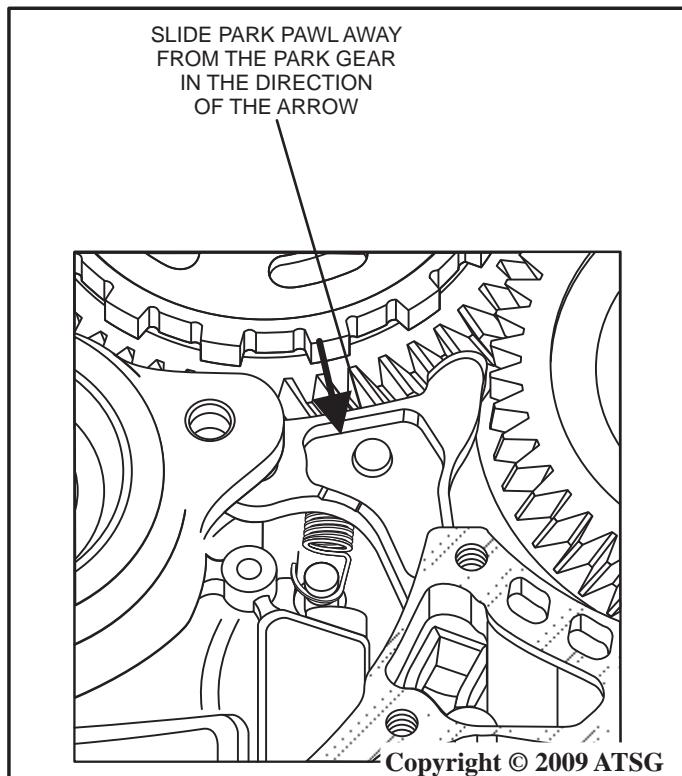


Figure 34

TRANSAXLE DISASSEMBLY (CONT'D)

47. Remove the underdrive planetary assembly by lifting straight up as shown in Figure 35. The planetary assembly is heavy, use care when lifting.
48. Remove the park pawl return spring retaining pin from the case as shown in Figure 36.
49. Remove the park pawl return spring from the park pawl and remove from the case as shown in Figure 37.
50. Remove the park pawl from the case as shown in Figure 37.

Continued on Page 26.

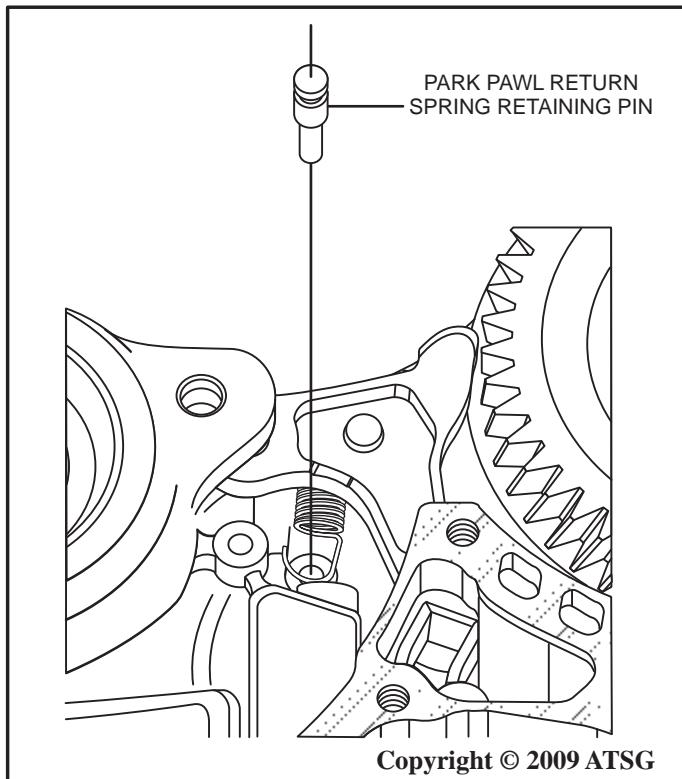


Figure 36

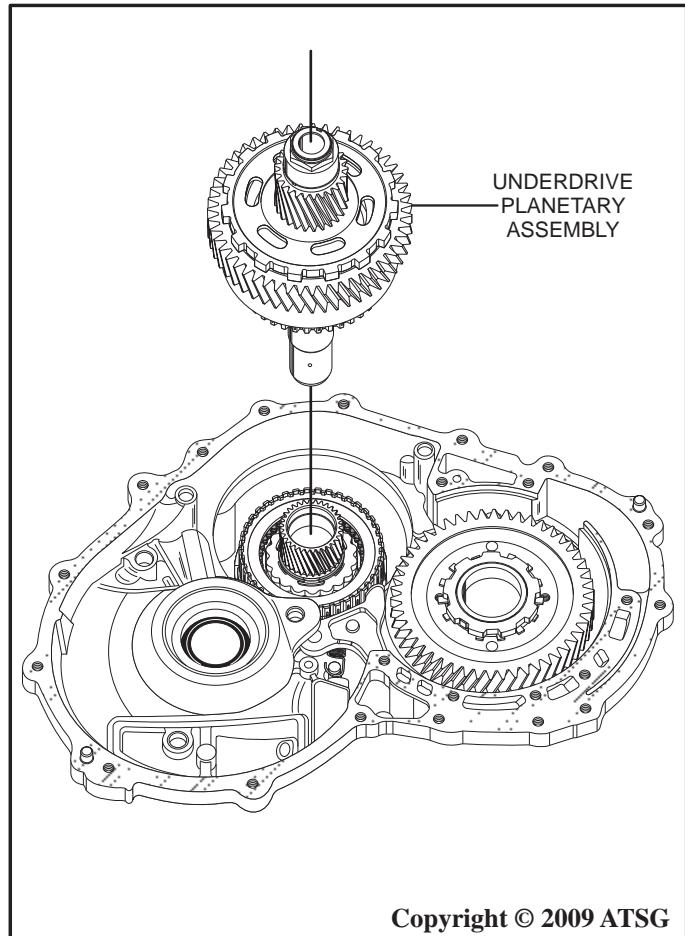


Figure 35

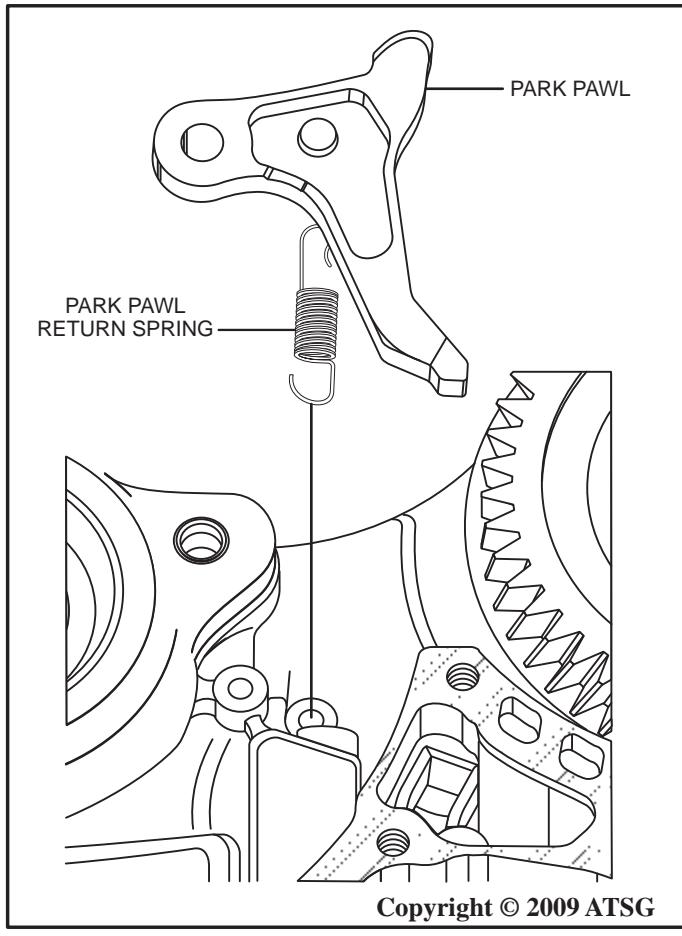


Figure 37

TRANSAXLE DISASSEMBLY (CONT'D)

51. Remove the underdrive clutch (C3) drum assembly from the case by lifting straight up as shown in Figure 38.
52. Remove the underdrive clutch (C3) thrust bearing and race assembly, and the underdrive clutch (C3) thrust bearing race as shown in Figure 38.
53. Using a screwdriver, remove the no. 2 one way clutch (F2) retaining snap ring as shown in Figure 39.
54. Remove the no. 2 one way clutch (F2) assembly from the case by lifting straight up as shown in Figure 39.
55. Remove the anti-rattle clip from the no. 2 one way clutch (F2) as shown in Figure 39.
56. Using a screwdriver, remove the underdrive brake retaining snap ring as shown in Figure 40.
57. Remove the underdrive brake (B3) pressure plate as shown in Figure 40.
58. Remove the underdrive brake (B3) friction and steel plates as shown in Figure 40.

Continued on Page 27.

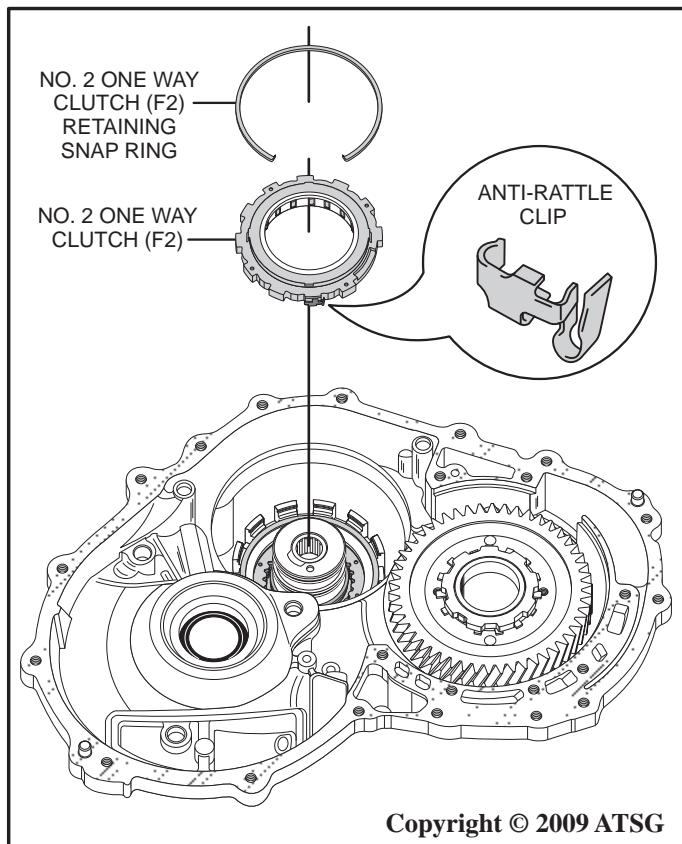
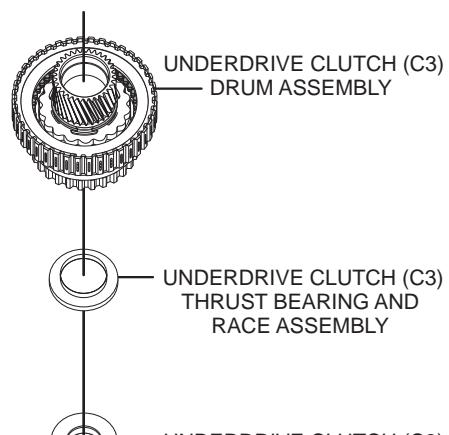
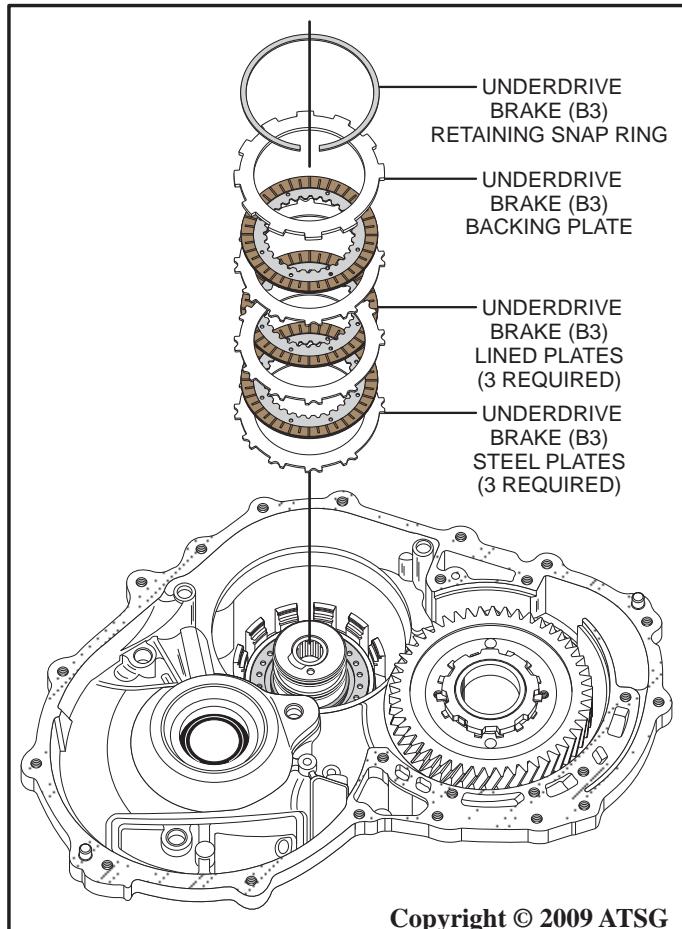


Figure 39



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Figure 38



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Figure 40

TRANSAXLE DISASSEMBLY (CONT'D)

59. Using SST 09387-00020 or a similar device and a suitable press, compress the underdrive brake (B3) piston return spring assembly, then using a pair of snap ring pliers remove the piston return spring retaining snap ring as shown in Figure 41.
60. Remove the underdrive brake (B3) piston return spring assembly as shown in Figure 41.
61. Remove the underdrive brake (B3) piston as shown in Figure 41.
62. Remove and discard the underdrive brake (B3) piston o-ring (*inner*) and (*outer*) as shown in Figure 41.
63. Remove and discard the underdrive clutch (C3) sealing rings as shown in Figure 42.
64. Turn transmission over so the transaxle rear cover is facing upward and remove the 11 12mm attaching bolts as shown in Figure 43.
65. Tap cover with a plastic hammer to loosen and remove the cover by lifting straight up as shown in Figure 43.

Continued on Page 28.

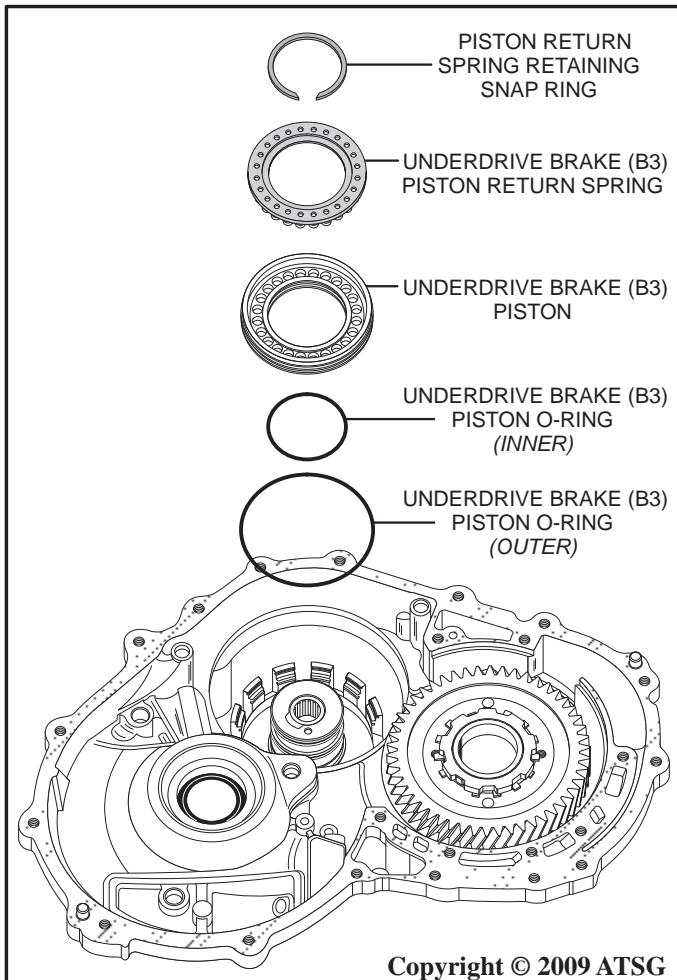
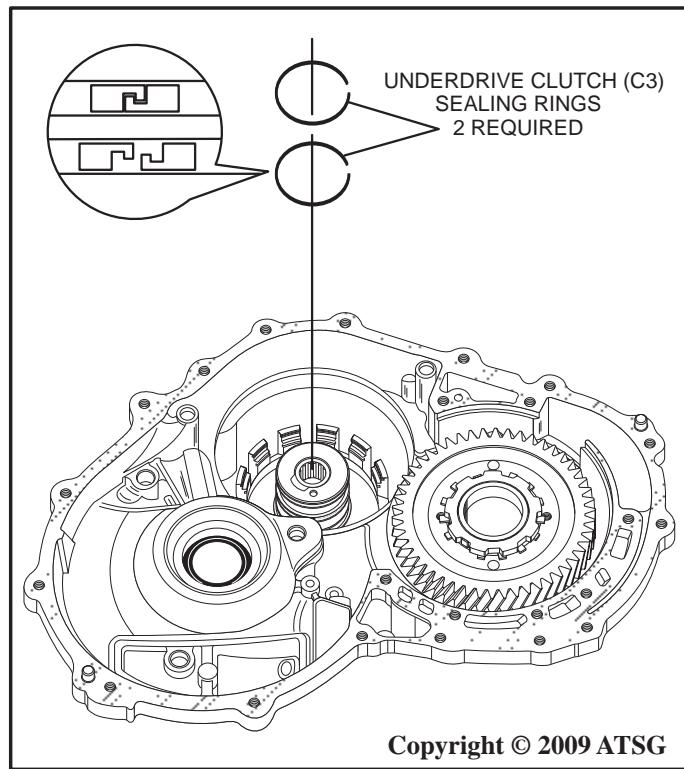


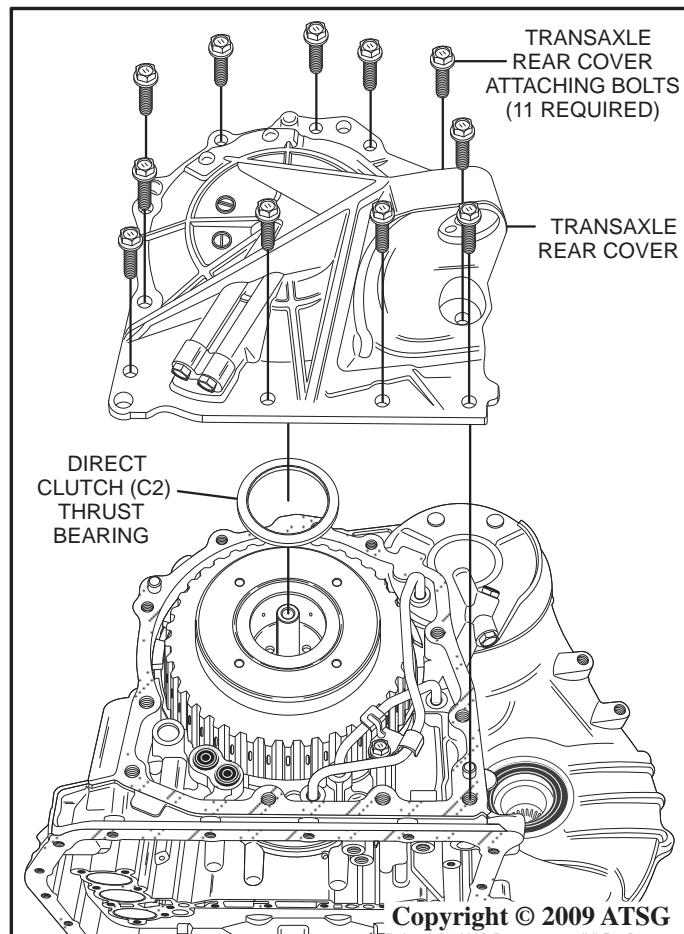
Figure 41

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Figure 42



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Figure 43

TRANSAXLE DISASSEMBLY (CONT'D)

66. Remove the direct clutch (C2) thrust bearing as shown in Figure 43 on Page 27. Remove the 2 case seals as shown in Figure 44.
67. Remove the 10mm hold down bracket attaching bolt as shown in Figure 44.
68. Remove the feed tube hold down bracket as shown in Figure 44.
69. Using a screwdriver, gently loosen and remove the longer underdrive brake (B3) oil feed tube by lifting straight up as shown in Figure 44.
70. Using a screwdriver, gently loosen and remove the shorter underdrive clutch (C3) oil feed tube by lifting straight up as shown in Figure 44.
71. Remove the direct clutch (C2) assembly by lifting straight up as shown in Figure 45.
72. Remove the rear planetary sun gear thrust bearing race and the rear planetary sun gear thrust bearing as shown in Figure 46.
73. Remove the rear planetary sun gear assembly by lifting straight up as shown in Figure 46.
74. Remove the rear planetary sun gear washer as shown in Figure 46.

Continued on Page 29.

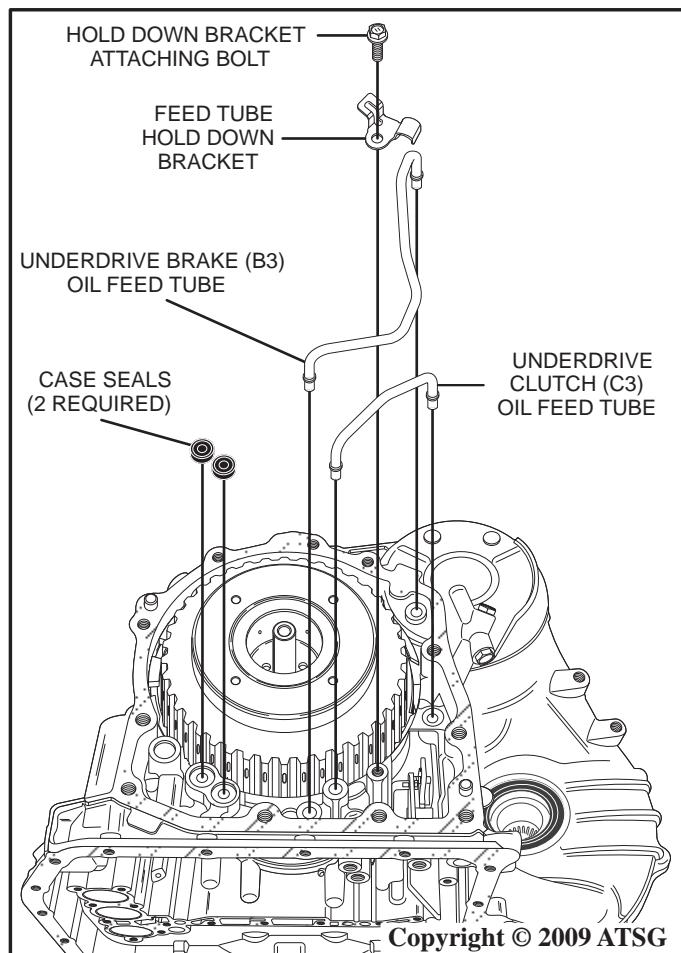


Figure 44

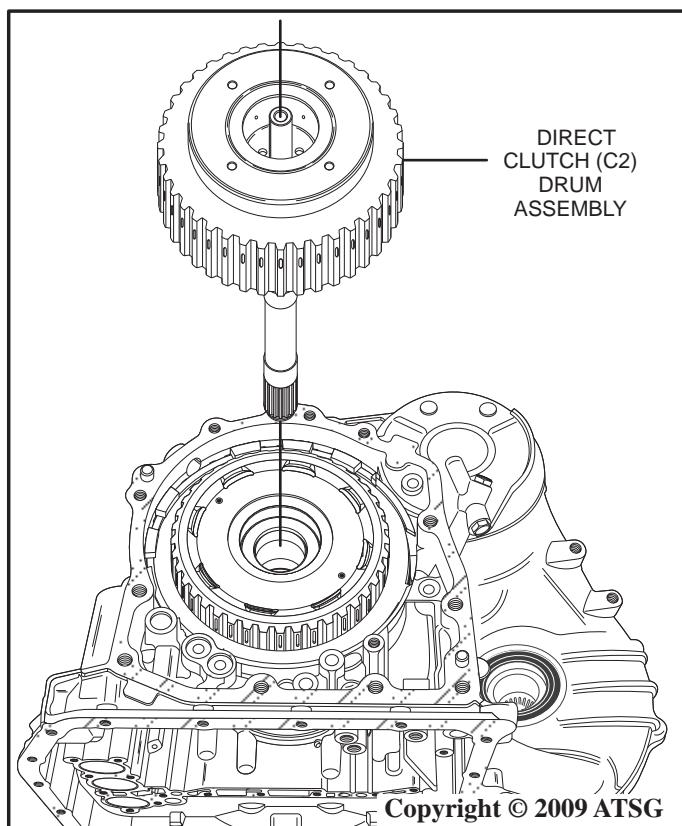


Figure 45

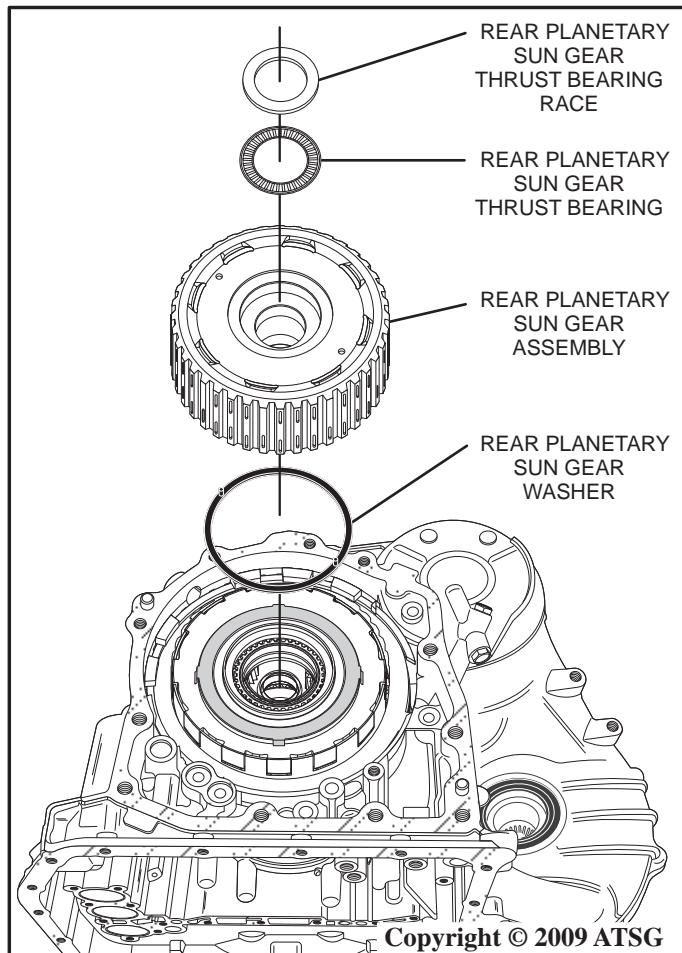


Figure 46

TRANSAXLE DISASSEMBLY (CONT'D)

75. Remove the No. 1 one way clutch (F1) thrust bearing as shown in Figure 47.
76. Remove the No. 1 one way clutch (F1) by lifting straight up as shown in Figure 47.
77. Remove the rear planetary thrust washer as shown in Figure 47.
78. Remove the No. 1 one way clutch (F1) outer sleeve by lifting the sleeve straight up as shown in Figure 48.
79. Using a screw driver, remove the 2nd brake (B1) retaining snap ring as shown in Figure 49.
80. Remove the 2nd brake (B1) steel and lined plates and the 2nd brake (B1) backing plate as shown in Figure 49.

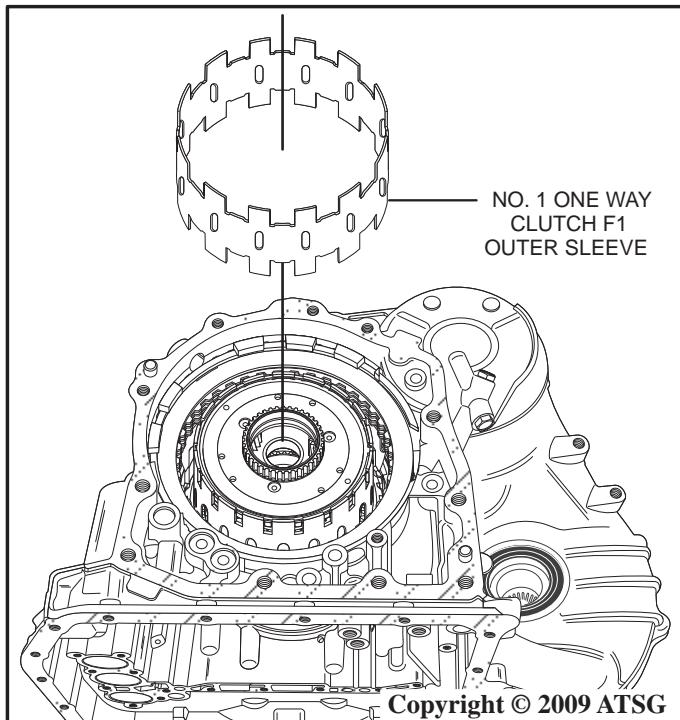


Figure 48

Continued on Page 30.

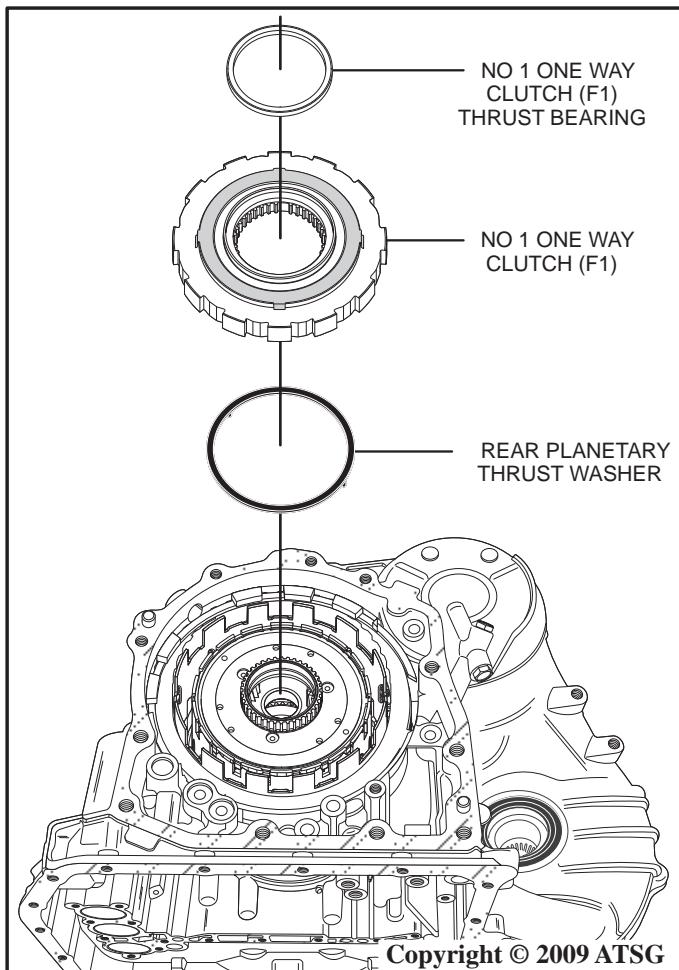


Figure 47

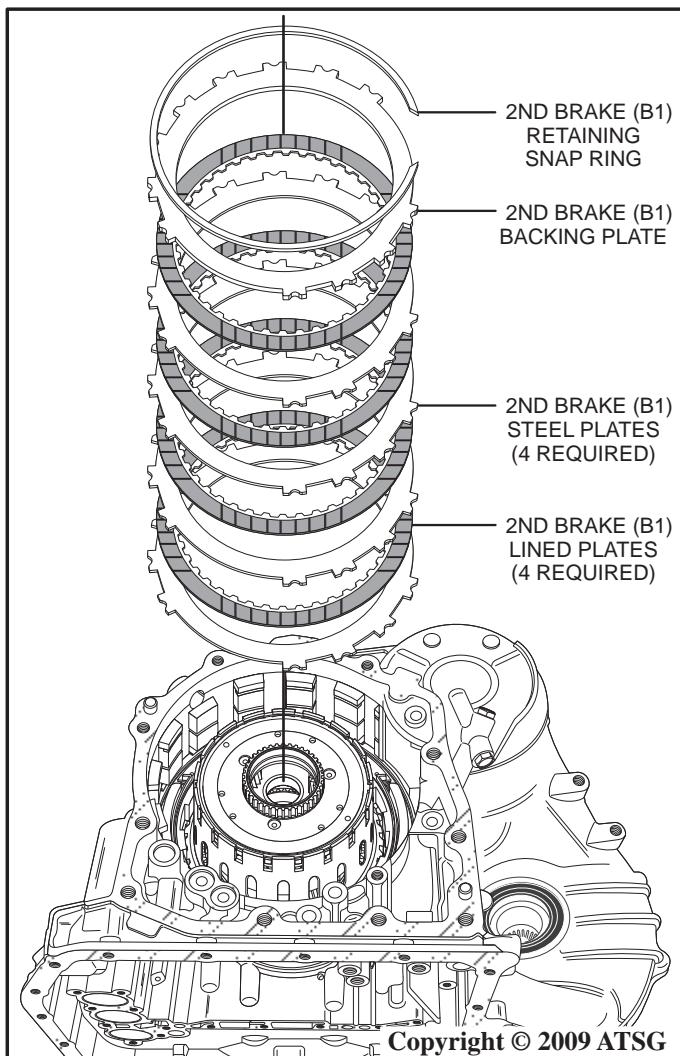
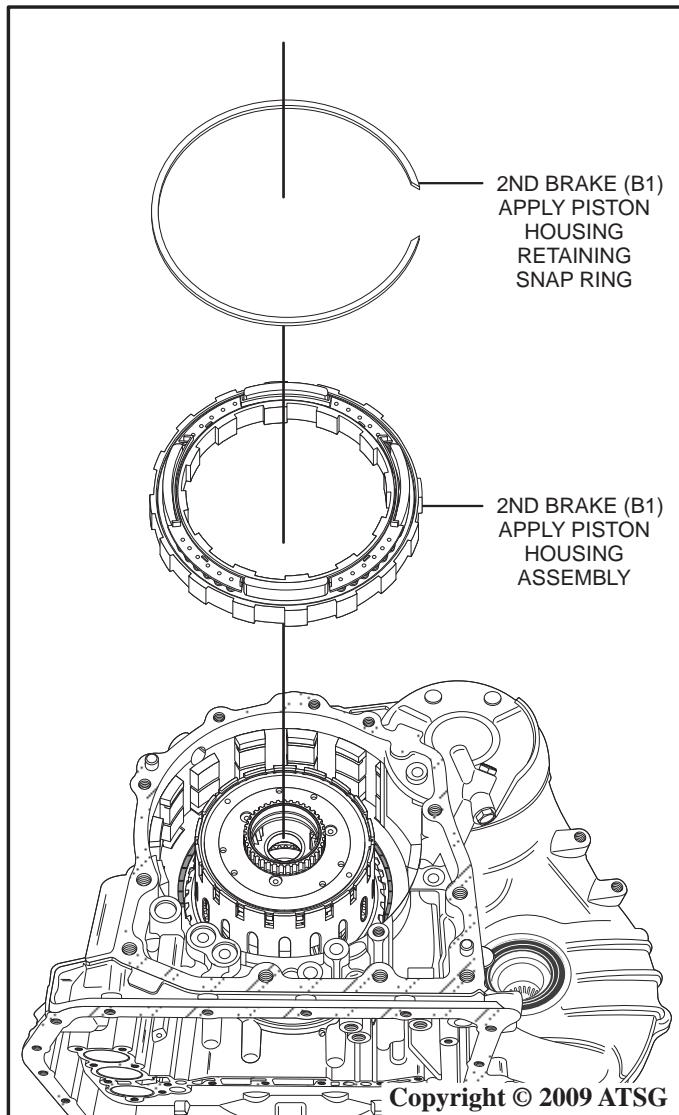


Figure 49

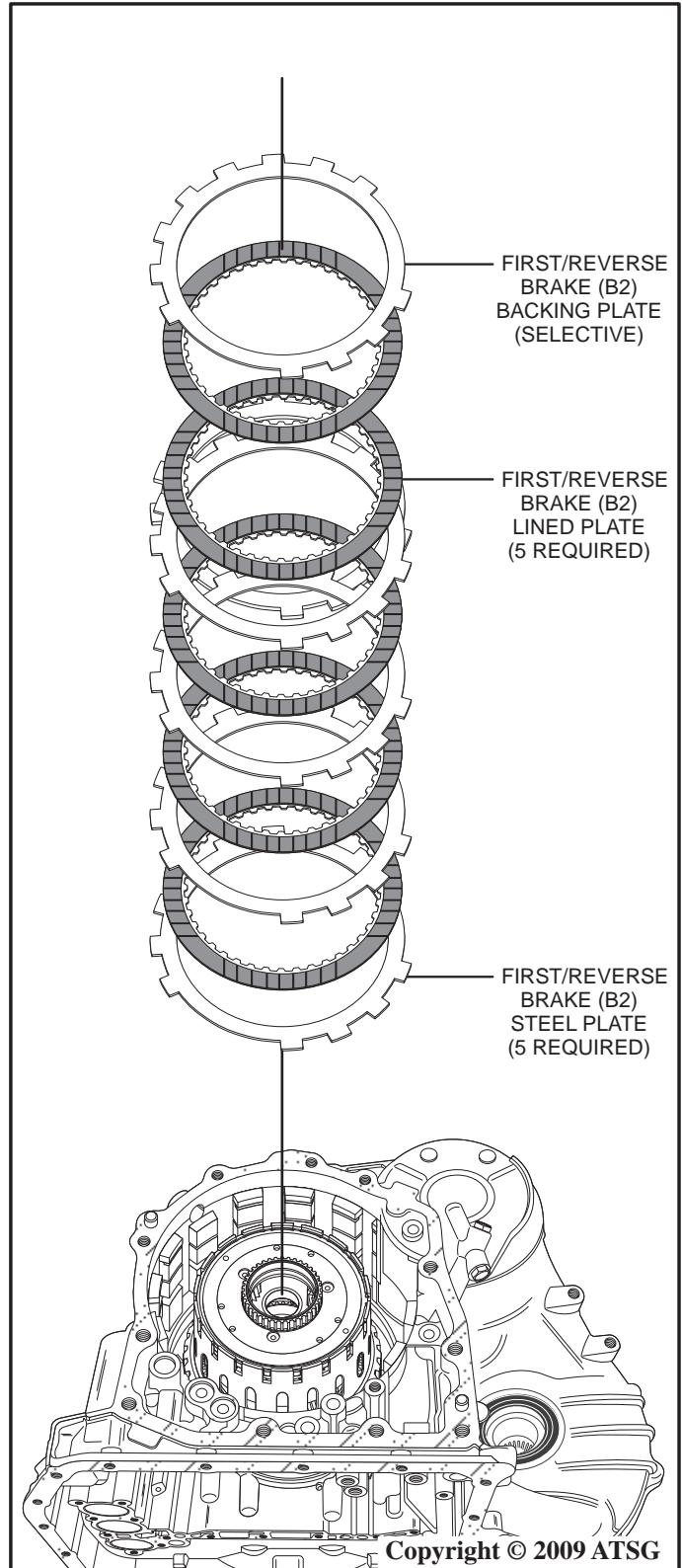
TRANSAXLE DISASSEMBLY (CONT'D)

81. Using a screwdriver, remove the 2nd brake (B1) apply piston housing retaining snap ring as shown in figure 50.
82. Remove the 2nd brake (B1) apply piston housing assembly by lifting straight up as shown in Figure 50.
83. Remove the first/reverse brake (B2) backing plate and the steel and lined plates as shown in Figure 51.

Continued on Page 31.



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Figure 50

Figure 51

TRANSAXLE DISASSEMBLY (CONT'D)

84. Using a screwdriver, remove the rear planetary retaining snap ring as shown in Figure 52.
85. Remove the rear planetary assembly by lifting straight up as shown in Figure 52.
86. Remove the front planetary sun gear thrust bearing upper race, the front planetary sun gear thrust bearing, and the front planetary sun gear lower race as shown in Figure 53.
87. Remove the front planetary sun gear by lifting straight up as shown in Figure 53.
88. Remove the front planetary thrust bearing assembly as shown in Figure 53.

Continued on Page 32.

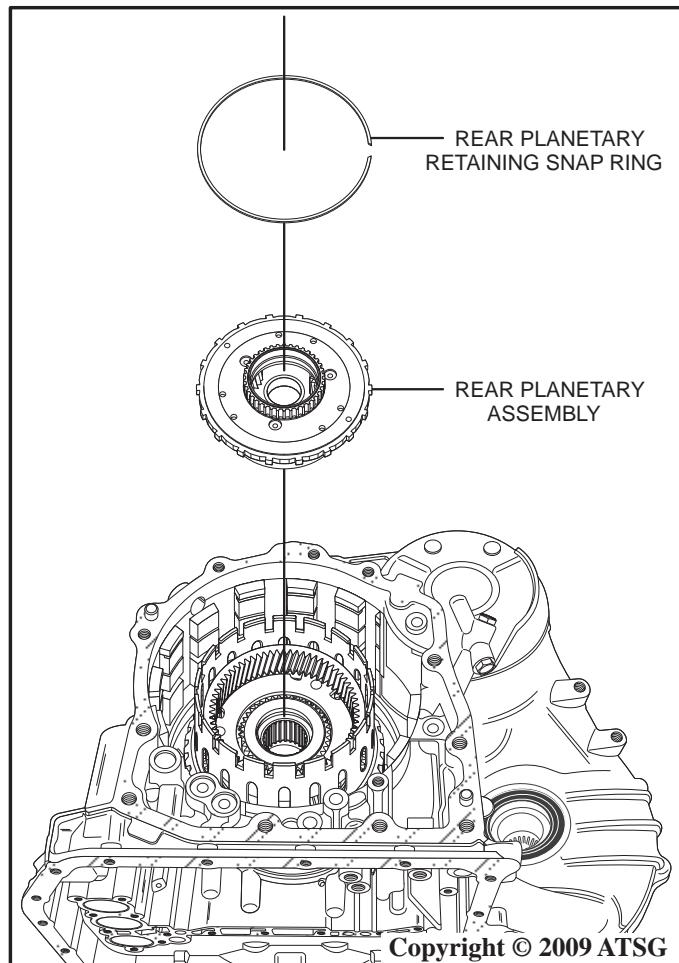


Figure 52

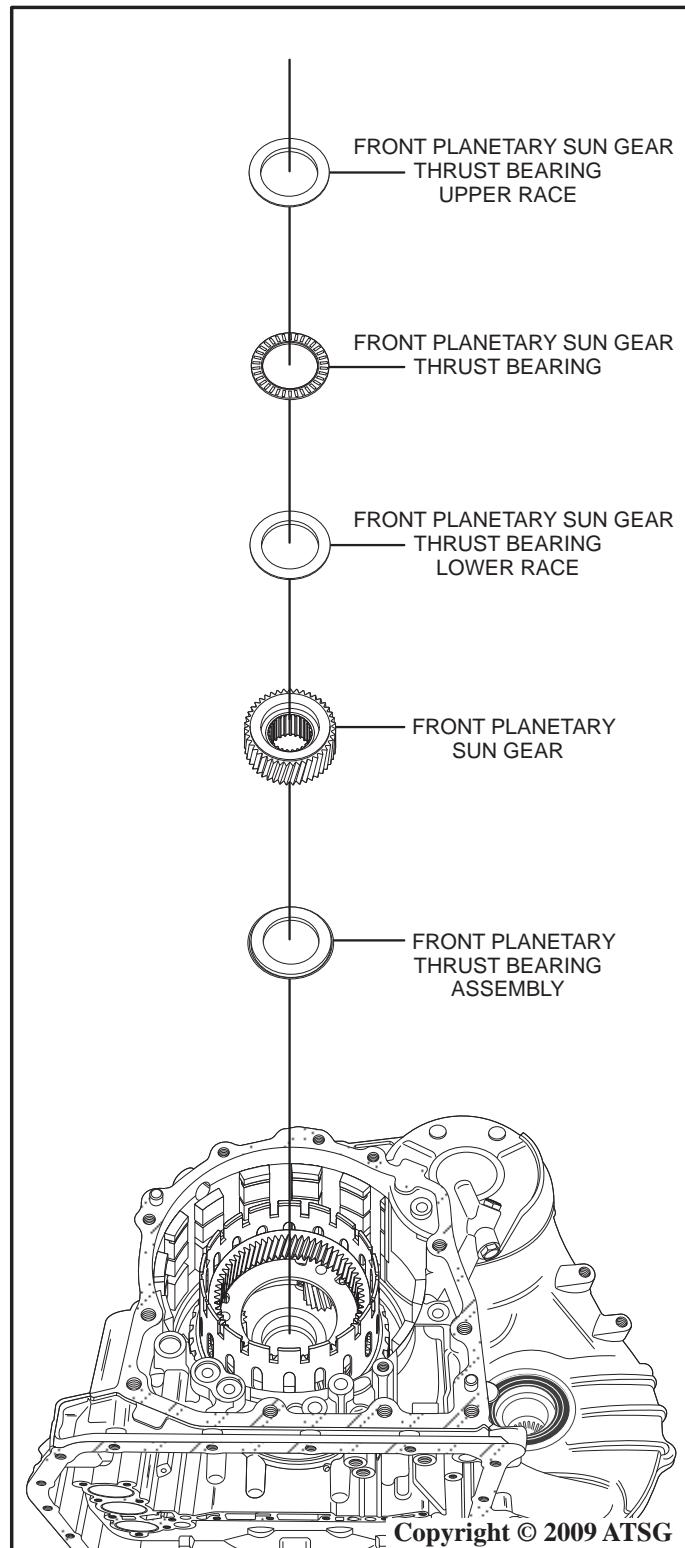


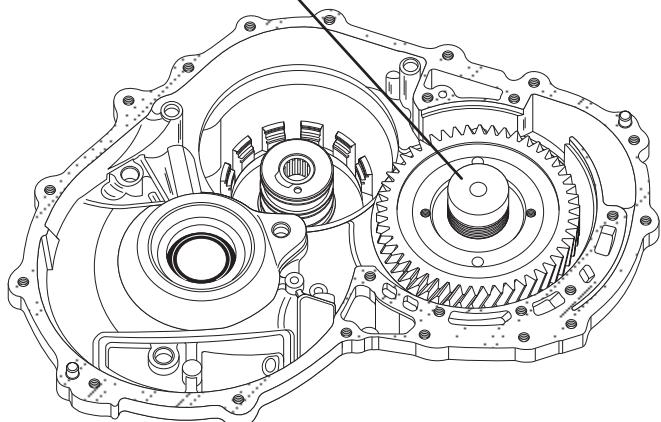
Figure 53

TRANSAXLE DISASSEMBLY (CONT'D)

92. Using a hammer and suitable chisel, carefully un-stake the folded tabs on the locking washer as shown in Figure 54.
93. Using SST 09387-00030, 09387-00080 or a suitable drift punch, loosen the retaining nut by turning counter-clockwise as shown in Figure 54.
94. Remove the retaining nut and the retaining nut lock washer as shown in Figure 54.
95. Place transaxle housing in a suitable press, then using SST 09950-60010 (09951-00450) or a suitable bushing driver, carefully press the front planetary assembly through the counter drive gear as shown in Figure 55.
96. Once the front planetary assembly splines are pressed down and through the counter drive gear, remove the counter drive gear by lifting straight up as shown in Figure 56.

Continued on Page 33.

SST (SPECIAL SERVICE TOOL)
09950-60010 (09951-00450)
OR SUITABLE
BUSHING DRIVER



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Figure 55

LOOSEN
COUNTER
CLOCKWISE

LOCKING TAB

RETAINING NUT

RETAINING NUT
LOCK WASHER

COUNTER DRIVE
GEAR

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Figure 54

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Figure 56

TRANSAXLE DISASSEMBLY (CONT'D)

97. Carefully remove the transaxle housing from the press and flip the transaxle housing over and remove the front planetary gear assembly by lifting straight up as shown in Figure 57.
98. Remove the front planetary ring gear and first/reverse brake (B2) hub assembly by lifting straight up as shown in Figure 57.
99. Remove the tapered roller bearing as shown in Figure 58.
100. Using a hammer and suitable drift punch, remove the two tapered roller bearing outer races from the case as shown in Figure 58.
101. Using a screwdriver, remove the snap ring from the case as shown in Figure 58.

Continued on Page 34.

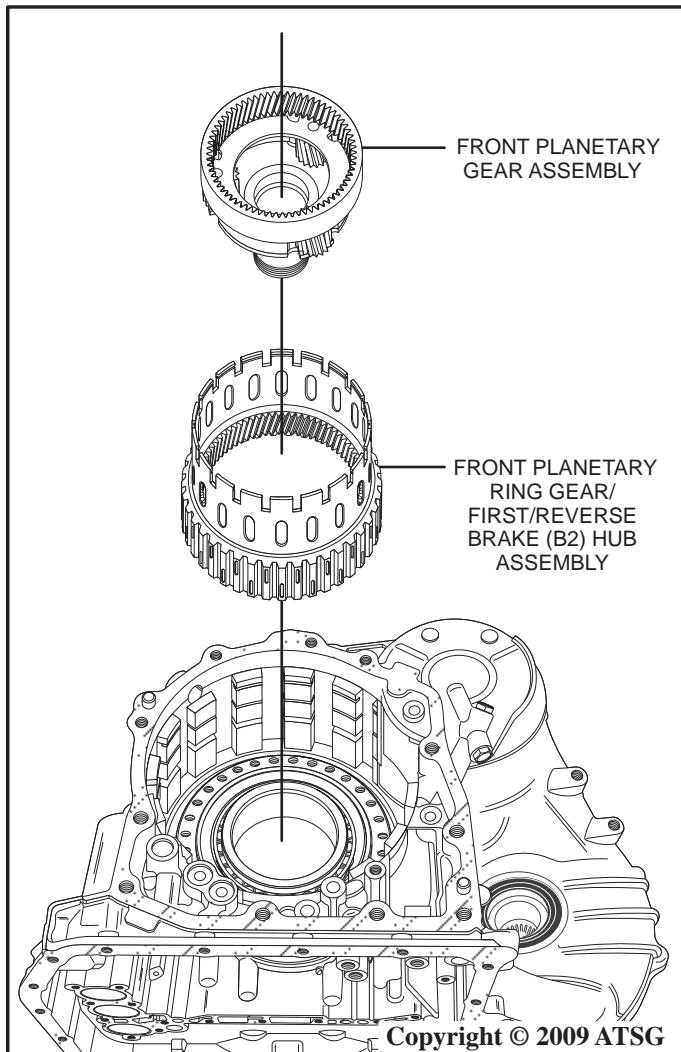


Figure 57

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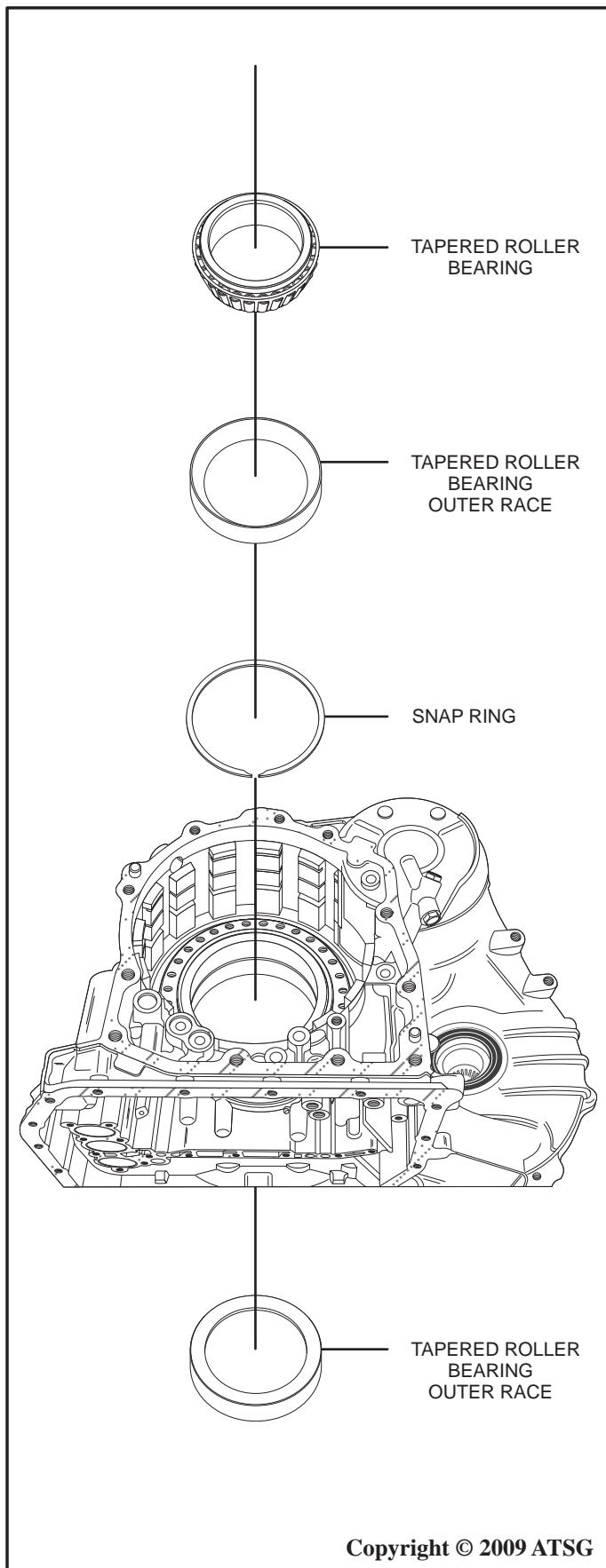


Figure 58

TRANSAXLE DISASSEMBLY (CONT'D)

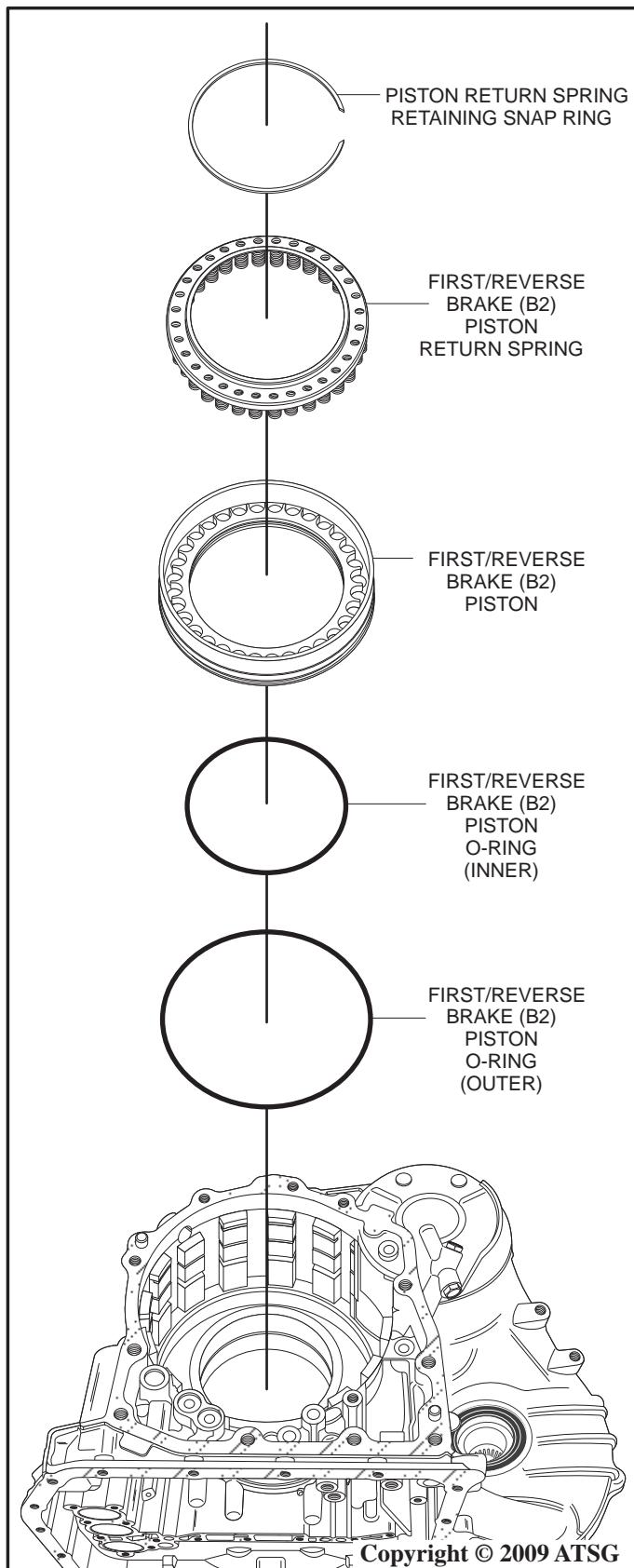


Figure 59

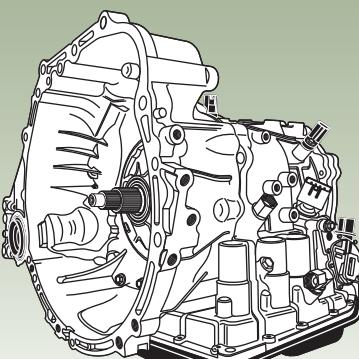
102. Using SST 09387-00070 or a similar device, and a suitable press, compress the first/reverse brake (B2) piston return spring and use a pair of snap ring pliers to remove the piston return spring retaining snap ring as shown in Figure 59.
103. Remove the first/reverse brake (B2) piston return spring as shown in Figure 59.
104. Remove the first/reverse brake (B2) apply piston as shown in Figure 59.
105. Remove and discard the first/reverse brake (B2) piston o-ring (*inner*) and (*outer*) as shown in Figure 59.

Continued on Page 35.

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Technical
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COMPONENT REBUILD

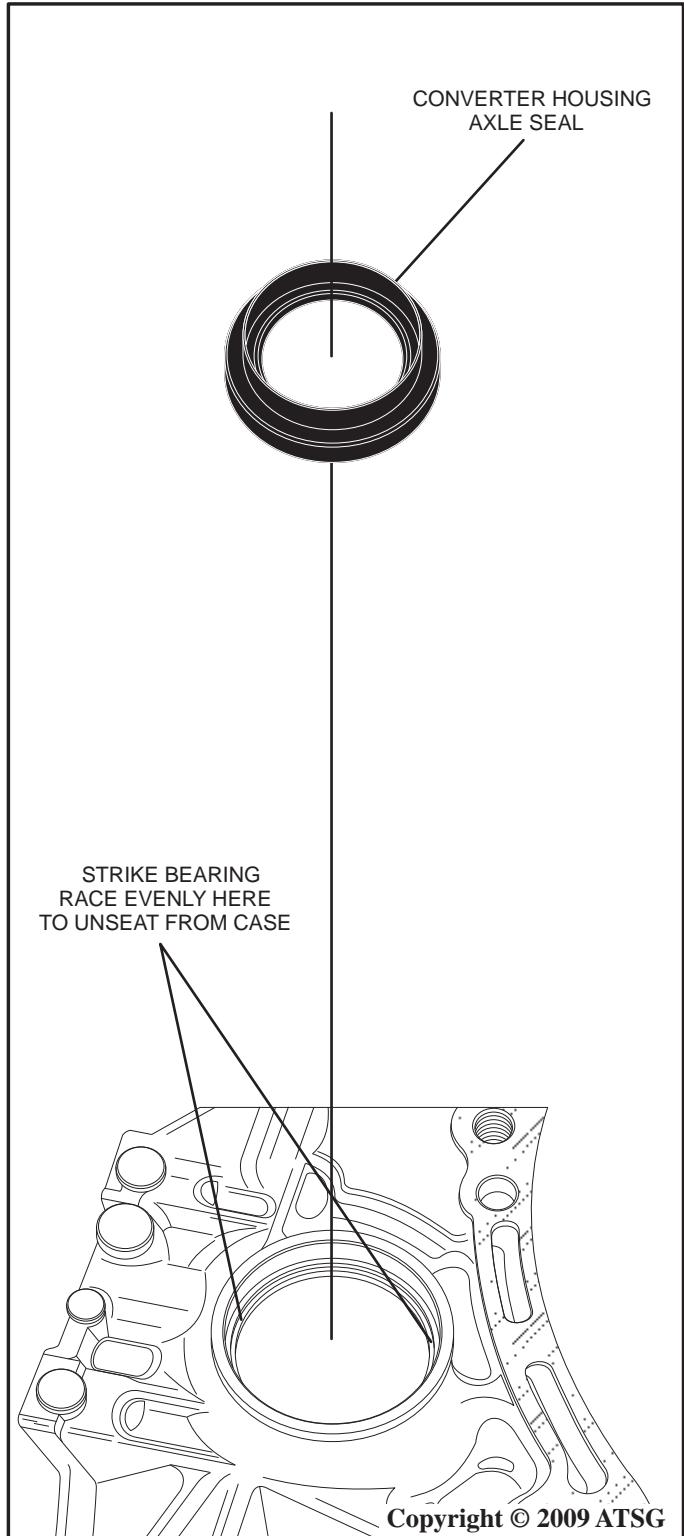
Torque Converter Housing.

Figure 60

1. Using a screwdriver, or seal removal tool, carefully pry and remove the axle seal from the converter housing as shown in Figure 60.
2. Using an appropriate drift punch and a hammer, strike the back of the differential carrier tapered roller bearing race to unseat it from the case as shown in Figure 60.
3. Remove the differential carrier tapered roller bearing outer race from the case as shown in Figure 61.

Continued on Page 36.

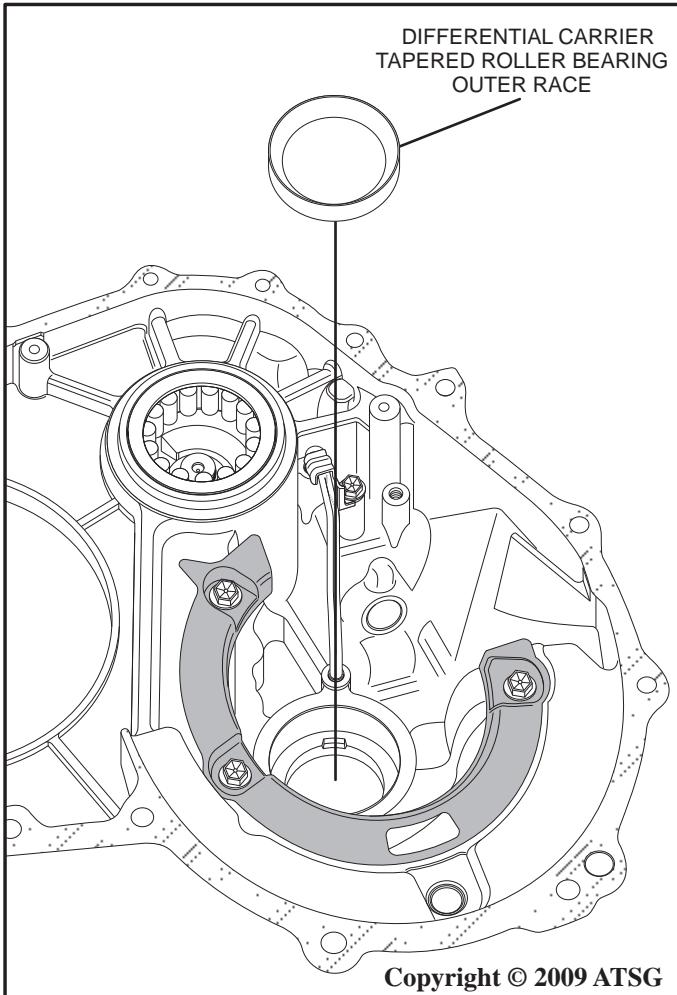


Figure 61

Technical Service Information

COMPONENT REBUILD (CONT'D)

Torque Converter Housing.

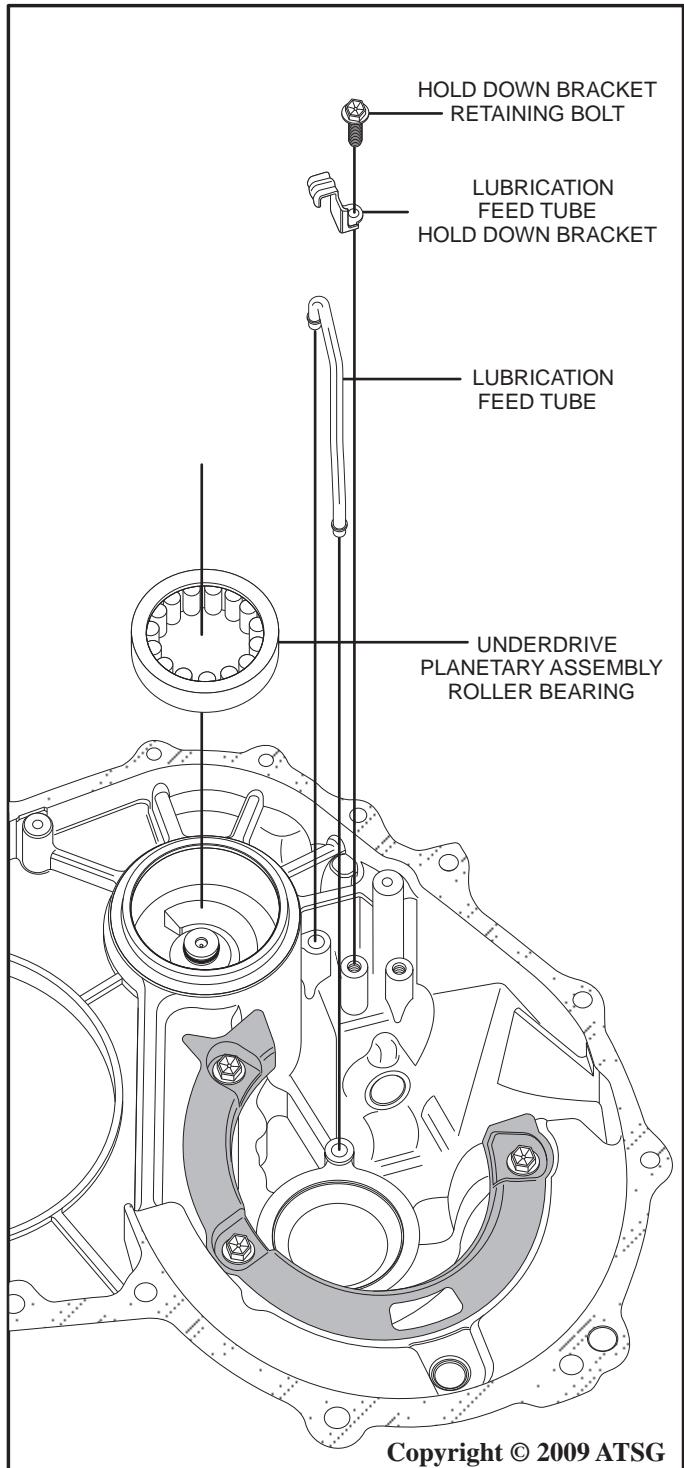


Figure 62

4. Using SST 09514-35011 or another suitable bearing removal tool such as a pilot bearing removal tool, remove the underdrive planetary assembly roller bearing as shown in Figure 62.
5. Remove the hold down bracket retaining bolt and the lubrication feed tube hold down bracket as shown in Figure 62.
6. Using a small screwdriver, carefully pry the lubrication feed tube from the case being careful not to bend or crack the feed tube as shown in Figure 62.
7. Remove the underdrive planetary gear assembly lube seal as shown in Figure 63.
8. Clean all converter housing parts thoroughly and dry with compressed air.
9. Check the lube orifice cup plug for debris, and the two lube holes in the case by blowing a small amount of compressed air into the case as shown in Figure 63.
10. Install a new underdrive planetary gear assembly lube seal and coat with a small amount of Trans-Jel® as shown in Figure 63.

Continued on Page 37.

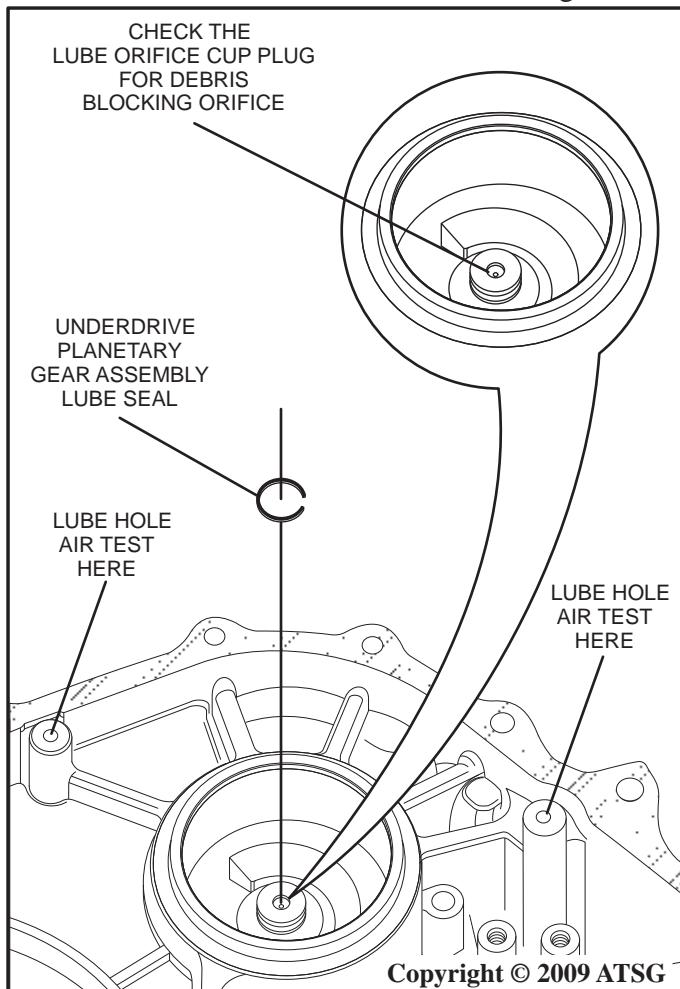
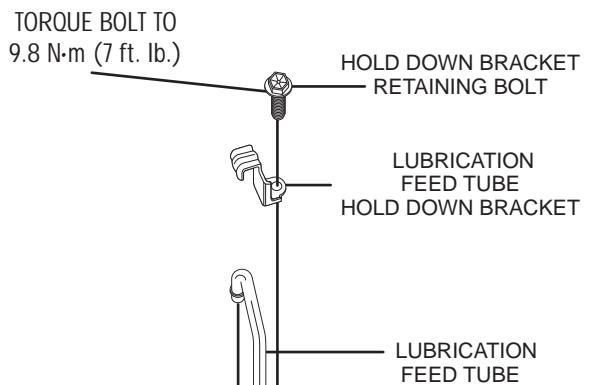


Figure 63

COMPONENT REBUILD (CONT'D)

Torque Converter Housing.



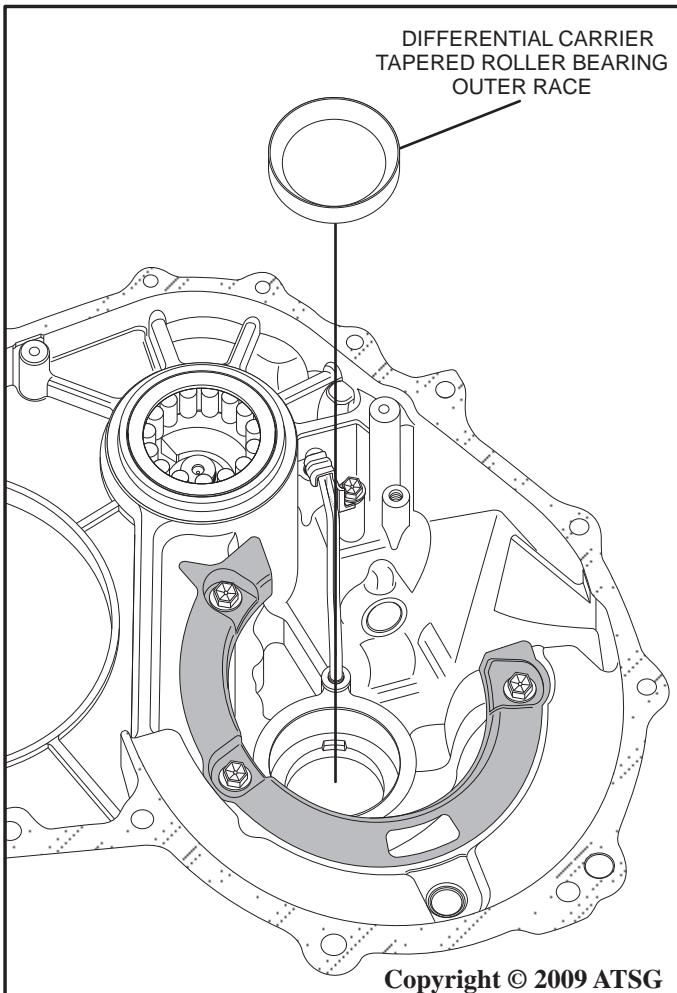
UNDERDRIVE PLANETARY ASSEMBLY ROLLER BEARING

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11. Carefully inspect the lubrication feed tube for defect, replace as necessary and install into the torque converter housing as shown in Figure 64.
12. Install the lubrication feed tube hold down bracket and the hold down bracket retaining bolt and torque the bolt to 9.8 N·m (7 ft. lb.) as shown in Figure 64.
13. Carefully inspect the underdrive planetary assembly roller bearing for defect, replace as necessary, and install roller bearing into the torque converter housing using SST 09950-60020, (09951-00810), 09950-70010, (09951-07100) or an appropriate bushing driver, then coat with a small amount of ATF as shown in Figure 64.
14. Inspect the differential carrier tapered roller bearing outer race for wear and replace as necessary, then install into the torque converter housing using SST 09951-00720, 09951-07150 or an appropriate bushing driver as shown in Figure 65.

Continued on Page 38.

DIFFERENTIAL CARRIER TAPERED ROLLER BEARING OUTER RACE



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Figure 64

AUTOMATIC TRANSMISSION SERVICE GROUP

COMPONENT REBUILD (CONT'D)

Torque Converter Housing.

15. Using a plastic hammer, with even taps, carefully install the torque converter housing axle seal into the case as shown in Figure 66.
16. Coat inside of axle seal with a small amount of Trans-Jel®.
17. Set aside the completed torque converter housing shown in Figure 67 for final assembly.

Continued on Page 39.

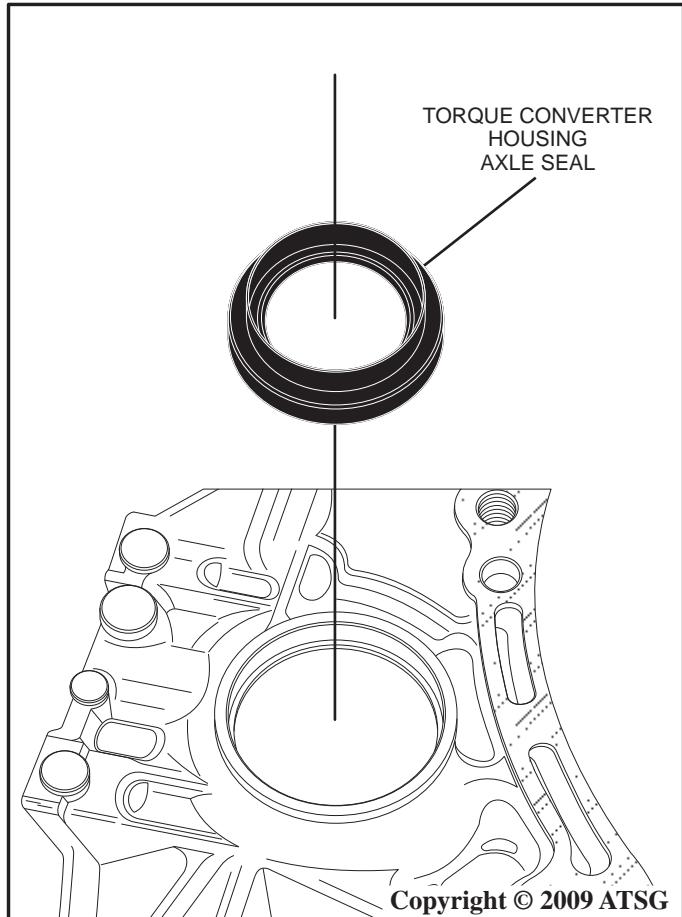


Figure 66

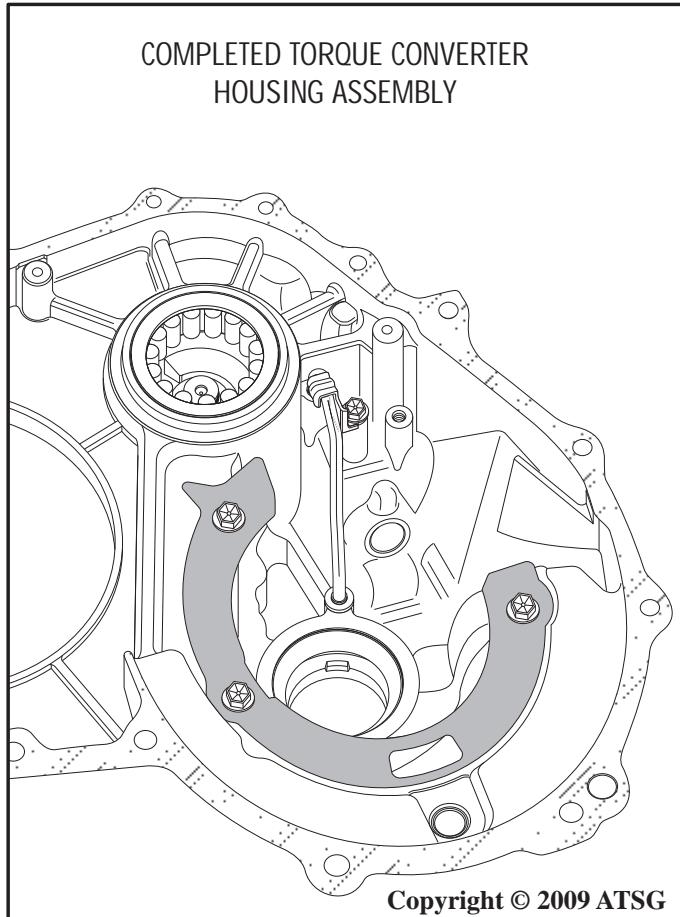
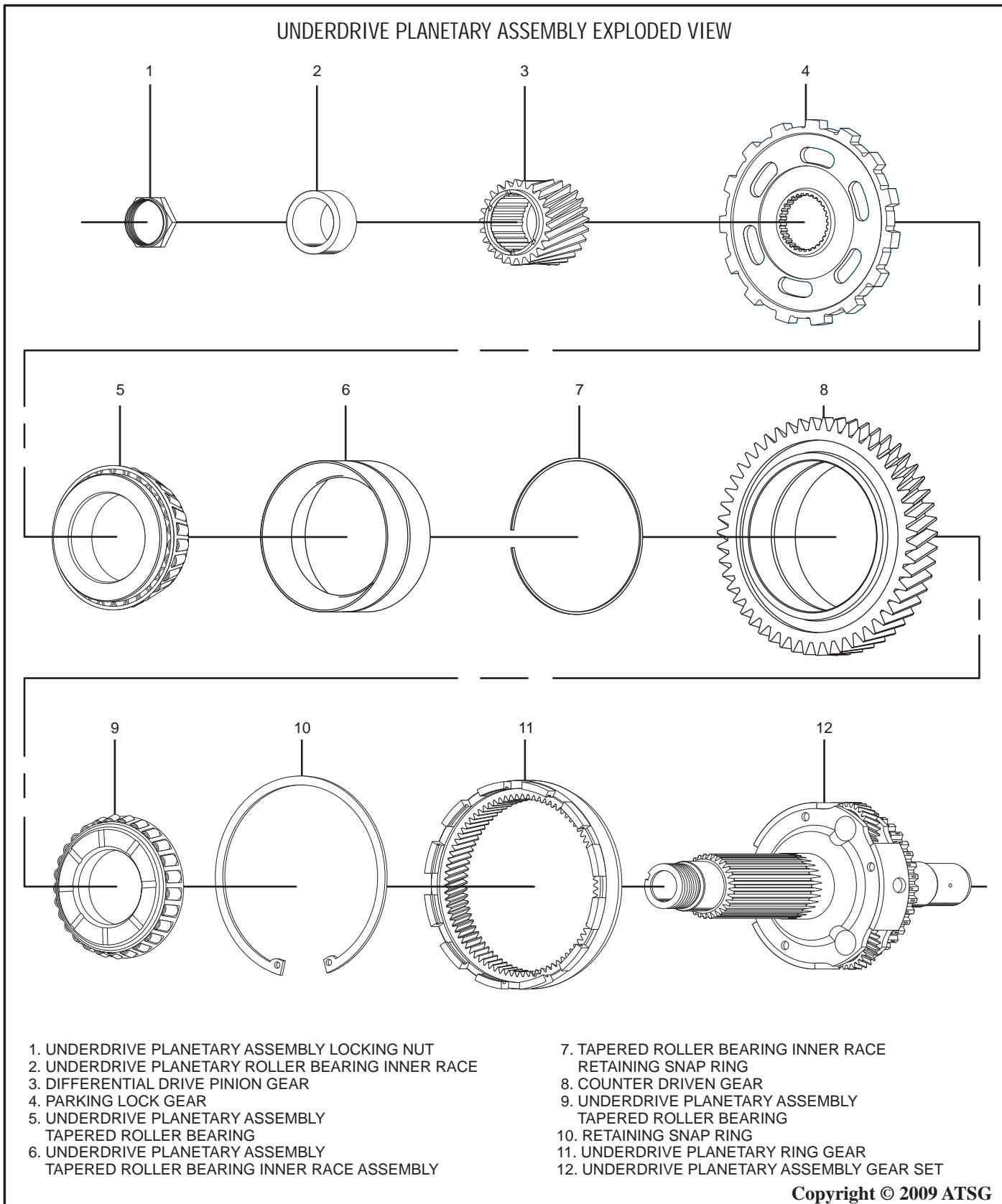


Figure 67

COMPONENT REBUILD (CONT'D)

Underdrive Planetary Assembly.



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Figure 68
AUTOMATIC TRANSMISSION SERVICE GROUP

COMPONENT REBUILD (CONT'D)

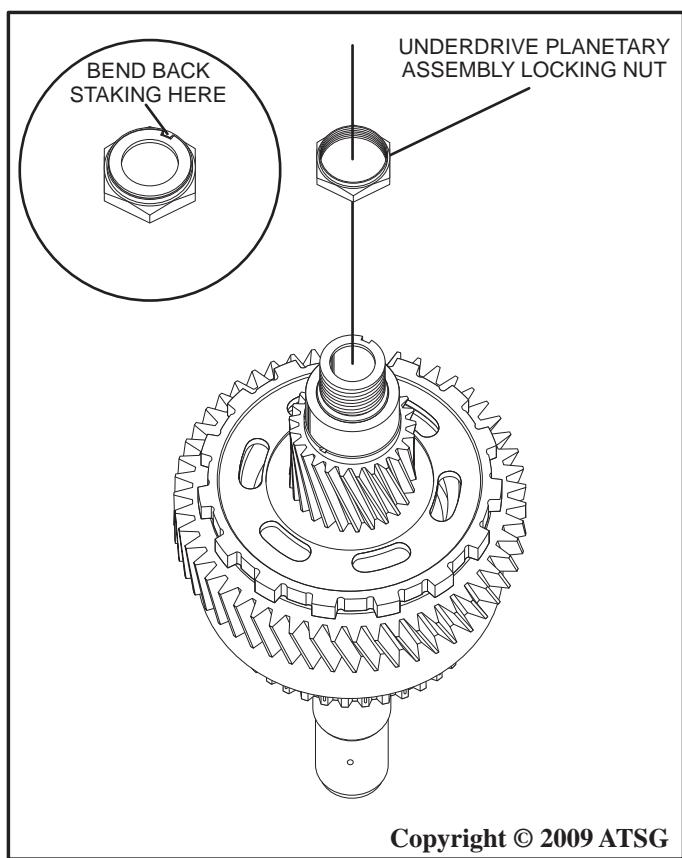


Figure 69

Underdrive Planetary Assembly

Note: The underdrive planetary roller bearing inner race (2) and the differential drive pinion gear (3) are pressed onto the planetary assembly gear set shaft (see Figure 68). It will be necessary to use a press for disassembly and reassembly.

1. Using SST 09930-00010 (09931-00010, 09931-00020) or an appropriate punch, bend back the staking on the underdrive planetary assembly locking nut as shown in Figure 69.
2. Set the underdrive planetary assembly into a soft jawed vice or similar holding device to avoid damage to the differential drive pinion gear, then using SST 09564-16020 or a suitable socket, remove the locking nut from the planetary assembly as shown in Figure 69.
3. Using SST 09950-00020, 09950-00030, 09950-60010 (09951-00340) or a suitable bearing removal tool, remove the underdrive planetary roller bearing inner race as shown in Figure 70.

Continued on Page 41.

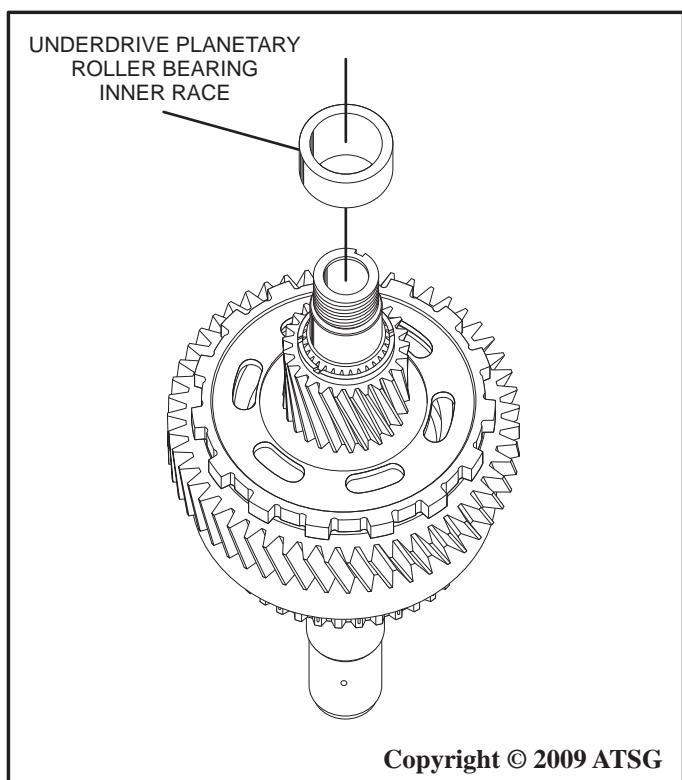
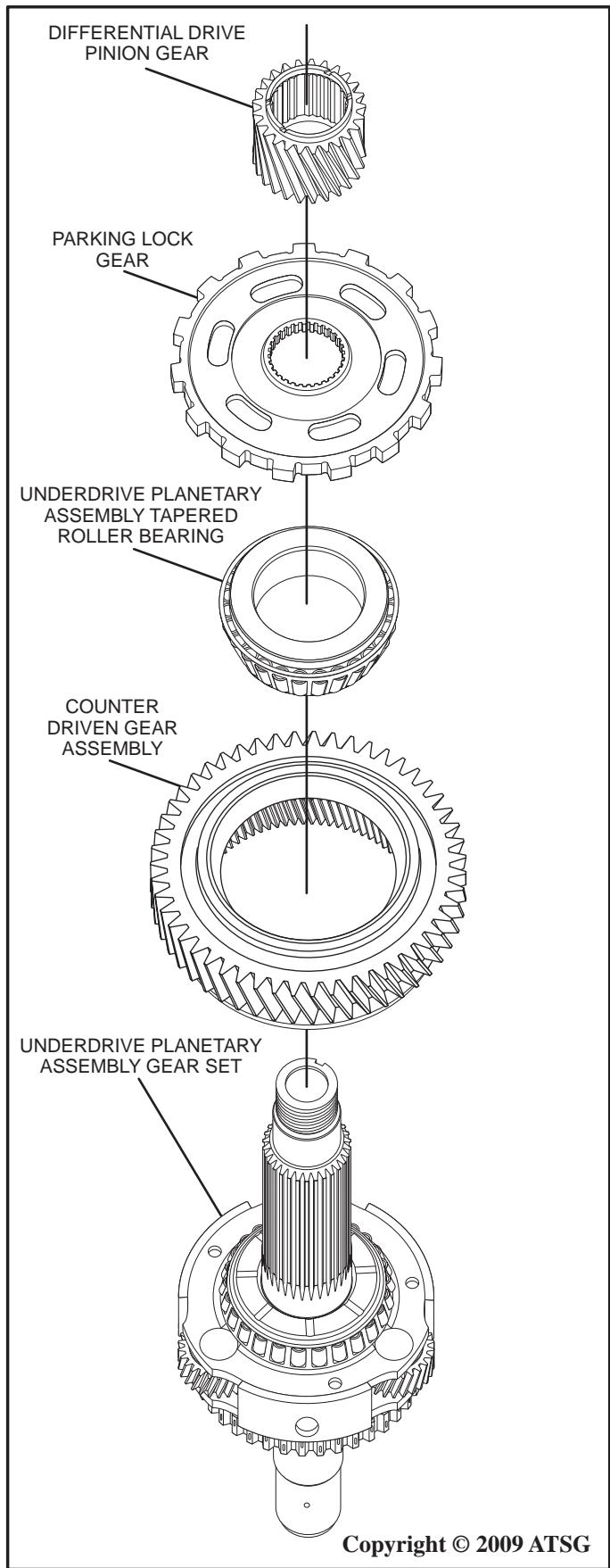


Figure 70

COMPONENT REBUILD (CONT'D)



Underdrive Planetary Assembly

4. Using SST 09387-00050 or an equivalent support for the counter driven gear assembly and a press, press the underdrive planetary assembly gear set down through the counter driven gear assembly, then remove the differential drive pinion gear, parking lock gear, underdrive planetary assembly tapered roller bearing, and the counter driven gear assembly from the underdrive planetary assembly gear set as shown in Figure 71.
5. Using SST 09950-00020, 09950-00030, 09950-60010 (09951-00340) or a suitable bearing removal tool, remove the underdrive planetary assembly tapered roller bearing as shown in Figure 72.

Continued on Page 42.

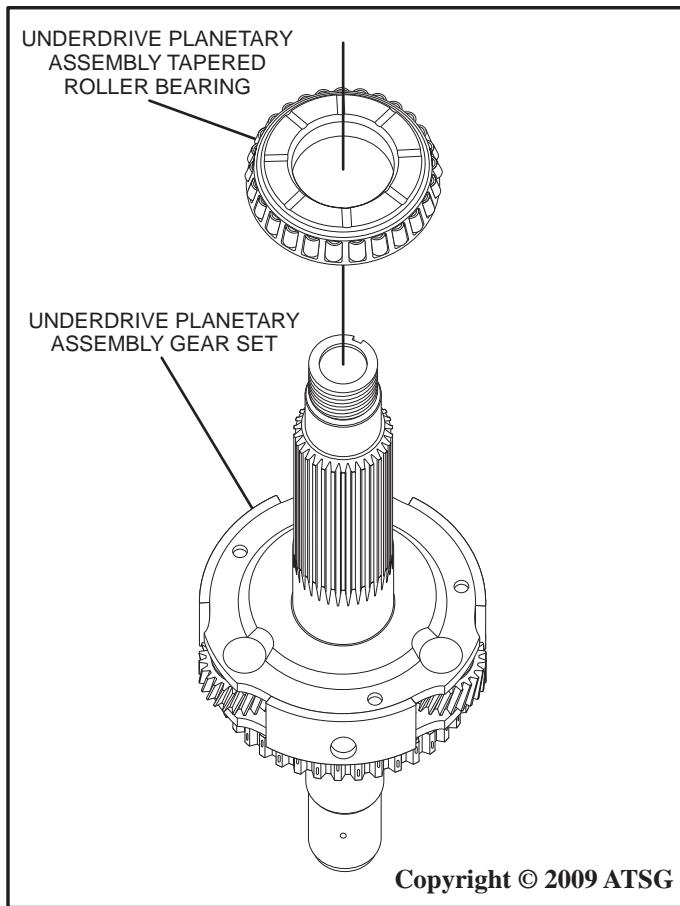


Figure 71

Figure 72

COMPONENT REBUILD (CONT'D)

Underdrive Planetary Assembly

6. The underdrive planetary ring gear can be removed from the counter drive gear by removing the snap ring as shown in Figure 73, however it is not necessary to remove unless there is damage to the underdrive planetary ring gear or counter drive gear.

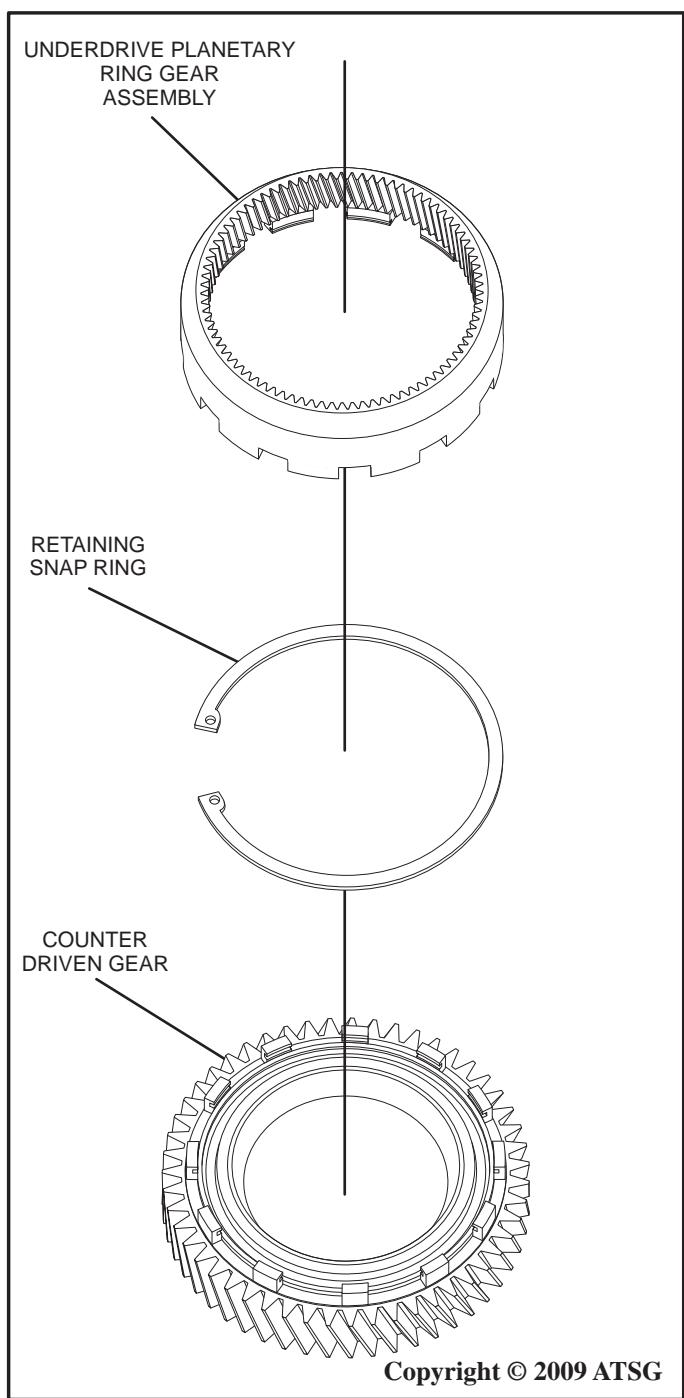


Figure 73

Note: Do not attempt to remove the tapered roller bearing inner race assembly from the counter drive gear as shown in the underdrive planetary assembly exploded view in Figure 68. It is not necessary during overhaul procedure and damage may occur to ring gear or inner race assembly. If the tapered roller bearing inner race assembly is worn or pitted, it will be necessary to replace the counter drive gear and inner race as an assembly.

7. Clean all underdrive planetary assembly parts thoroughly and dry with compressed air.
8. Inspect all underdrive planetary assembly parts carefully and replace each as necessary.
9. Place the underdrive planetary assembly gear set into a suitable press, then using SST 09316-00011 or equivalent, install new tapered roller bearing onto the underdrive planetary assembly gear set and press into place as shown in Figure 74.

Continued on Page 43.

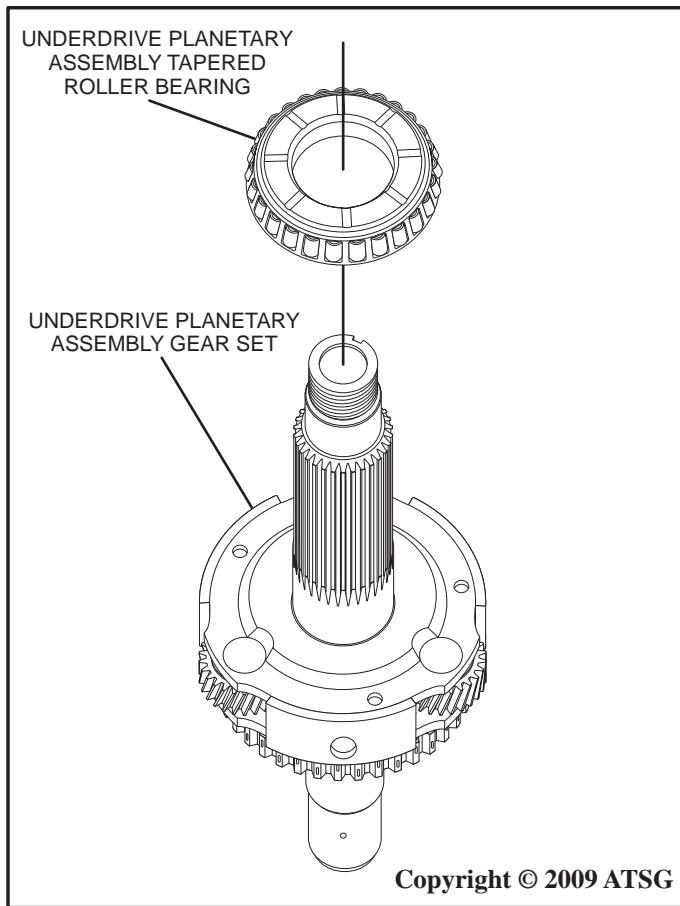


Figure 74

COMPONENT REBUILD (CONT'D)

Underdrive Planetary Assembly

10. With the underdrive planetary assembly gear set still in the suitable press, lubricate the tapered roller bearing inner race with a small amount of ATF and place the counter driven gear assembly on the underdrive planetary gear set as shown in Figure 75.

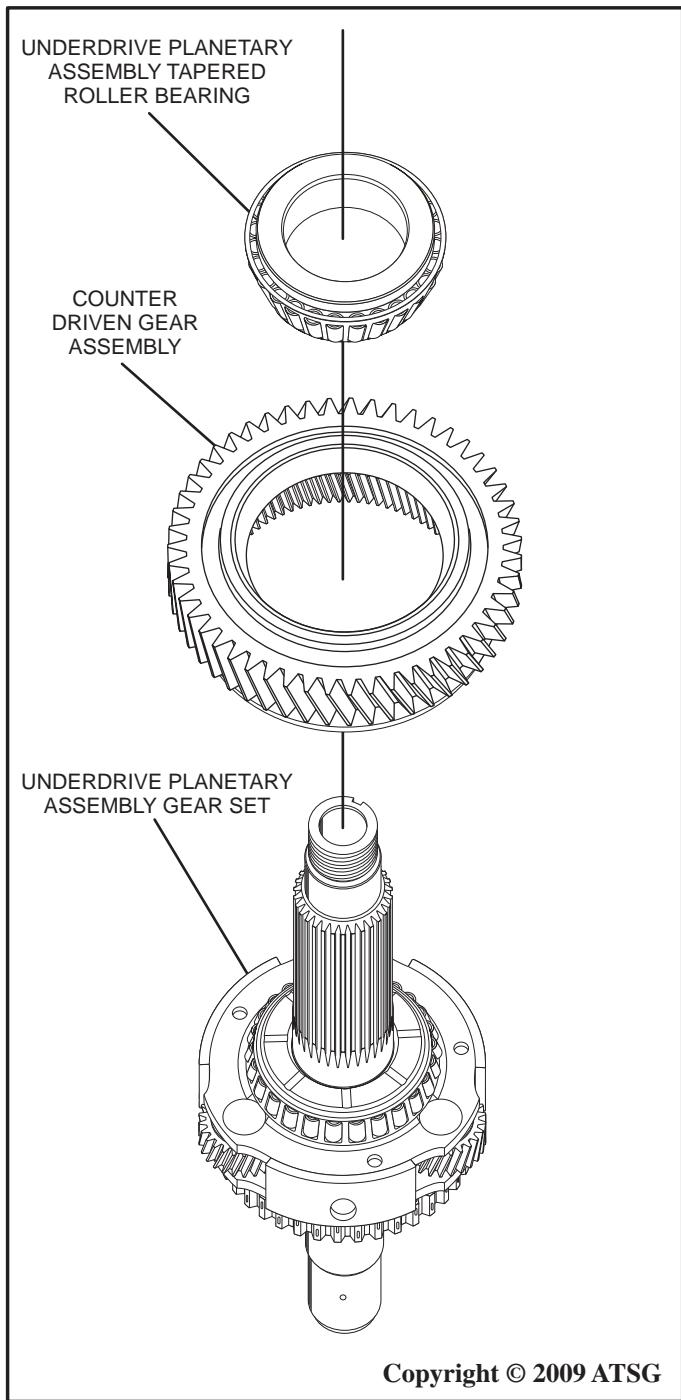


Figure 75

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11. Install a new tapered roller bearing onto the counter driven gear assembly, then using SST 09316-00011 or equivalent, press the tapered roller bearing onto the underdrive planetary assembly gear set splines **while at the same time slowly turning the counter driven gear** until the tapered roller bearing is fully seated.
12. Using SST 09506-35010, 09950-60010 (09951-00250) or equivalent, press the parking lock gear **while turning the counter driven gear** and seat it against the tapered roller bearing as shown in Figure 76.
13. Using SST 09506-35010, 09950-60010 (09951-00250) or equivalent, press, the differential drive pinion gear **while turning the counter driven gear** and seat it against the parking lock gear as shown in Figure 76.

Continued on Page 44.

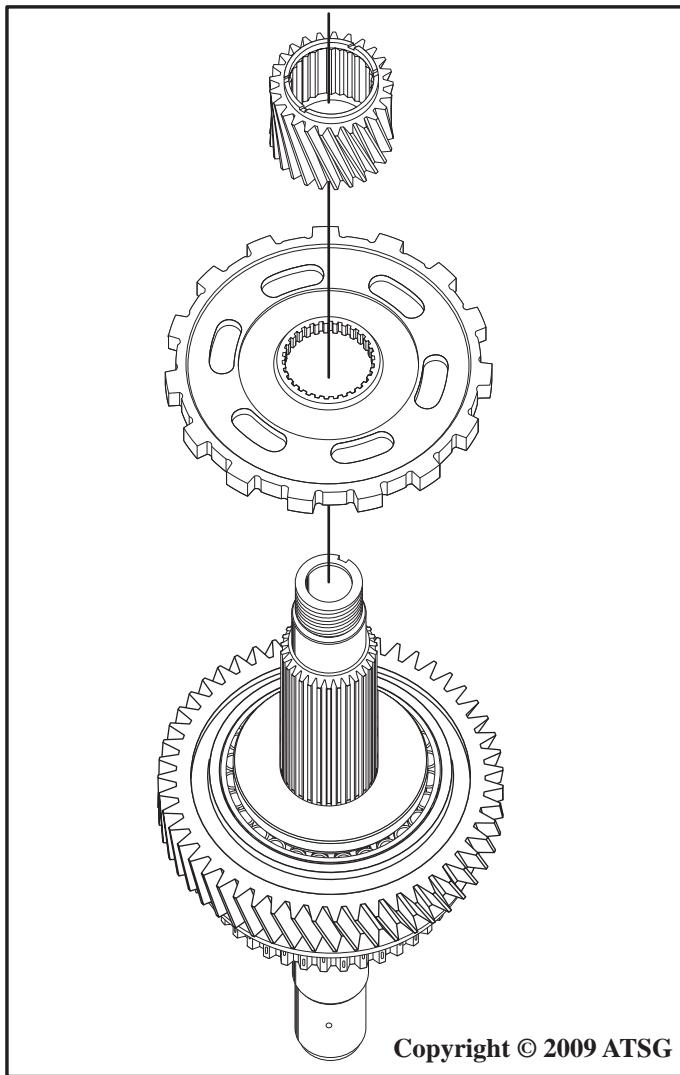


Figure 76

COMPONENT REBUILD (CONT'D)

Underdrive Planetary Assembly

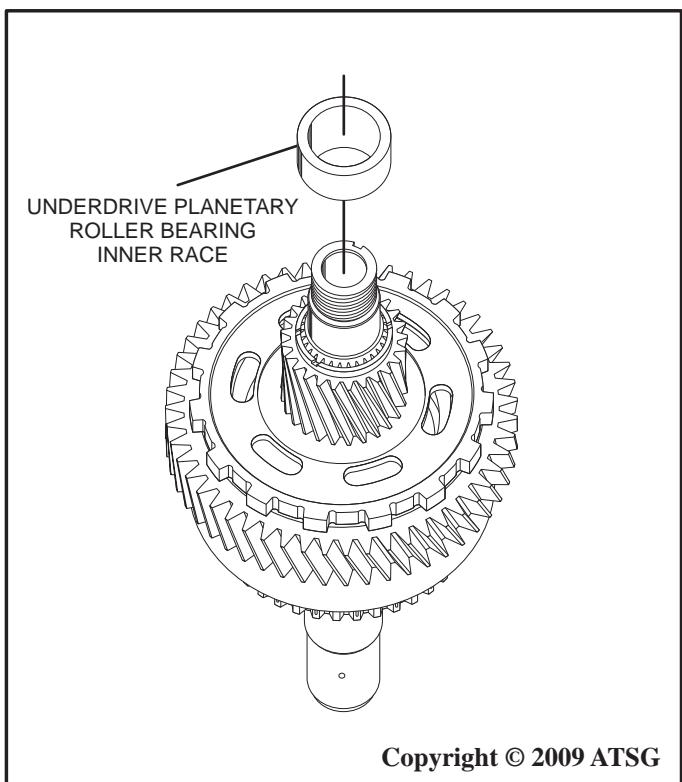


Figure 77

14. Using SST 09506-35010, 09950-60010 (09951-00250) or equivalent, press the underdrive planetary roller bearing inner race **while turning the counter driven gear** and seat it against the differential drive pinion gear as shown in Figure 77.
15. Set the underdrive planetary assembly into a soft jawed vice or similar holding device to avoid damage to the differential drive pinion gear then install a new locking nut using SST 09564-16020 or a suitable socket and torque the locking nut to 280 N m (207 ft. lb.) as shown in Figure 78.
16. Using SST 09387-0050 or a similar holding device and SST 09564-16020 or a suitable socket and a torque wrench check the bearing preload of the underdrive planetary assembly
Note: Bearing Preload refers to Turning Torque 0.7 - 4.4 N·m (6.2 - 38.9 in. lb.)
17. Once proper preload has been determined and correctly set, "stake" the nut into the shaft as shown in Figure 78.
18. Set the completed underdrive planetary assembly aside for final assembly. Refer to Figure 79.

Component Rebuild
Continued on Page 45.

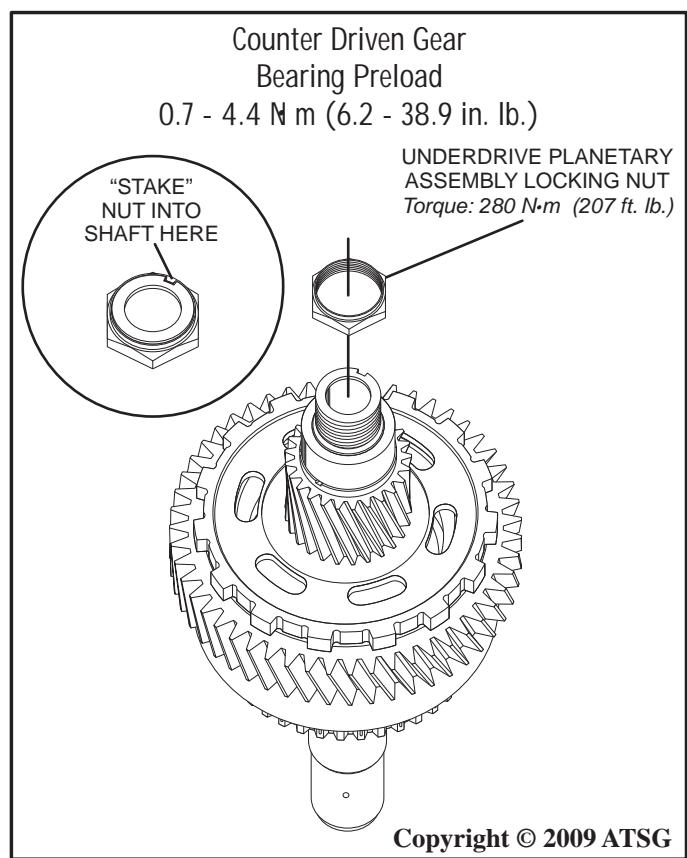


Figure 78

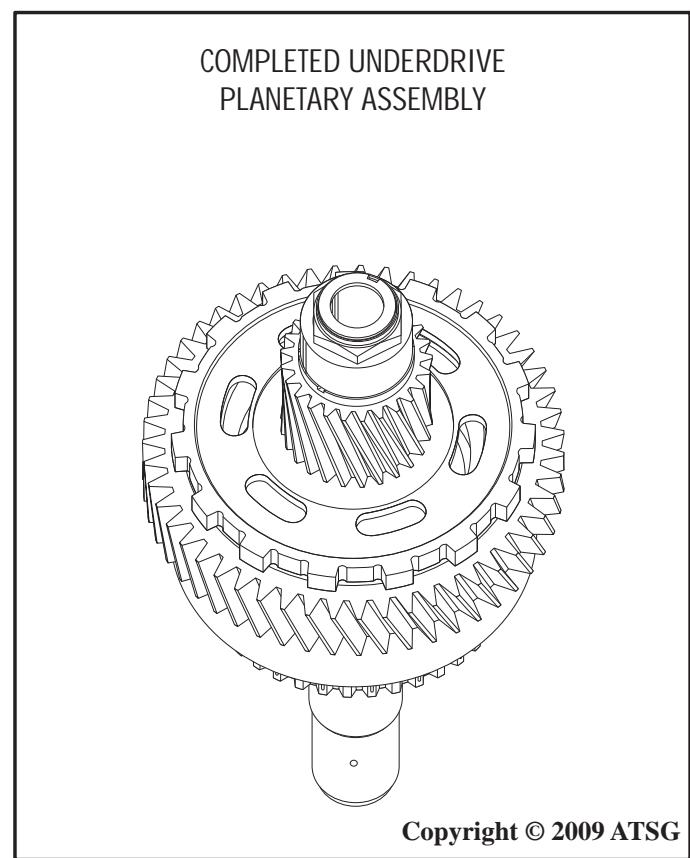
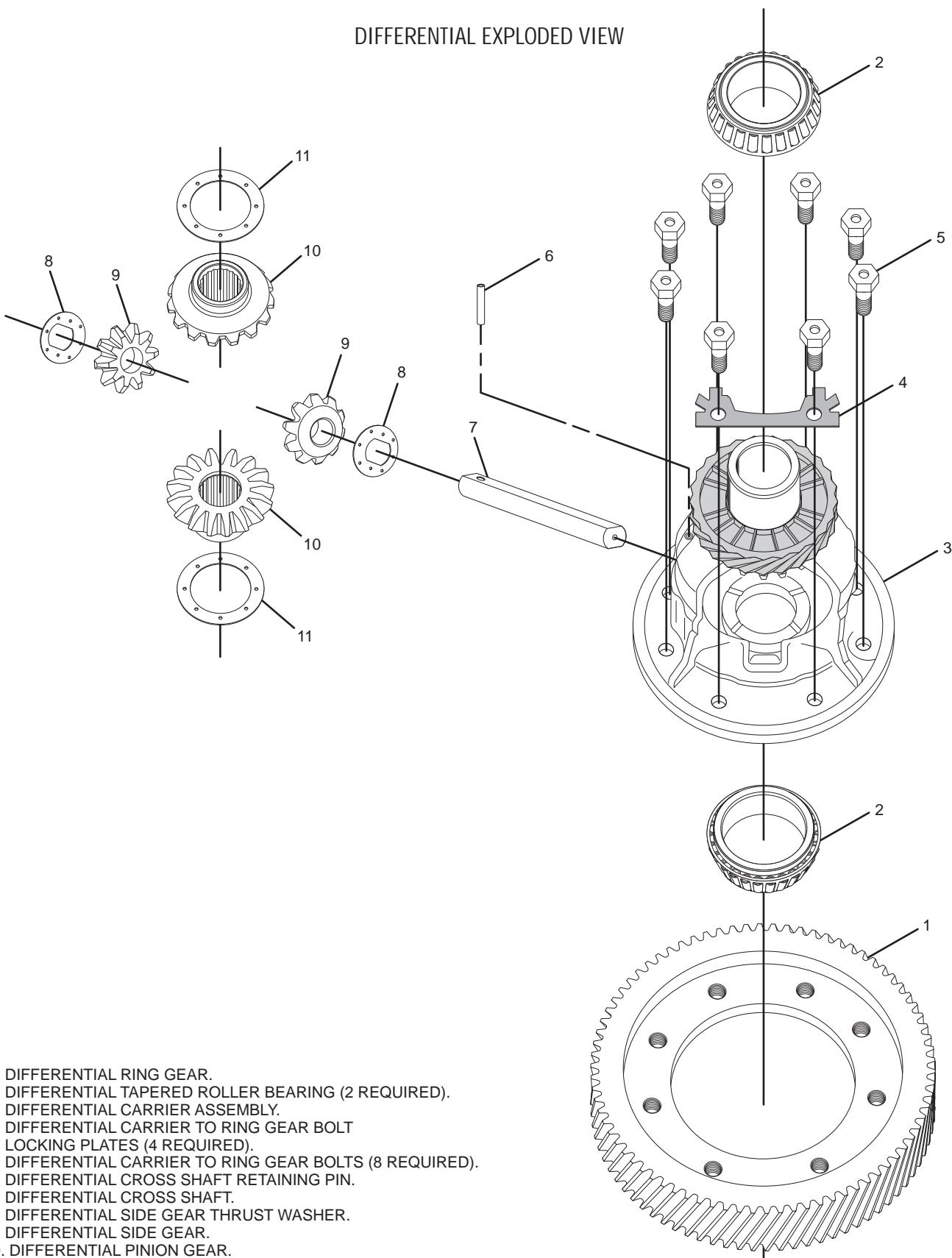


Figure 79

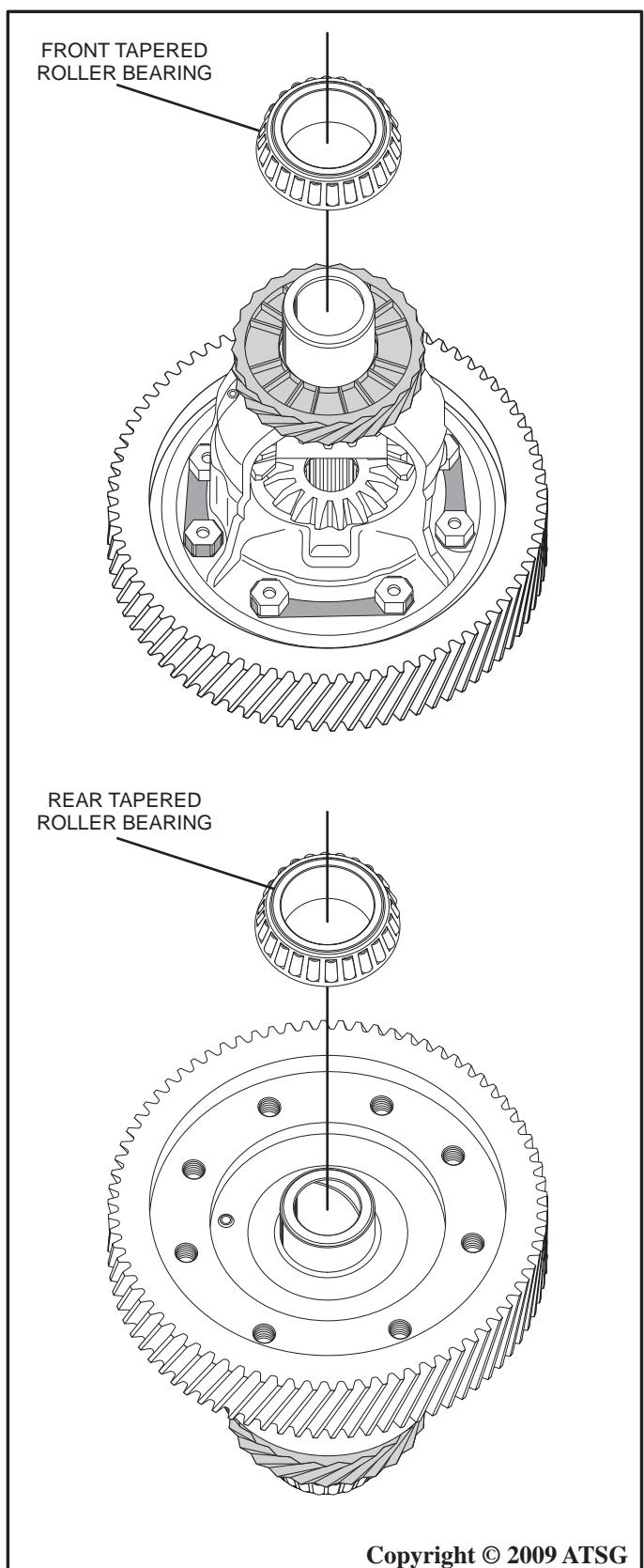
DIFFERENTIAL EXPLODED VIEW



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Figure 80
AUTOMATIC TRANSMISSION SERVICE GROUP

COMPONENT REBUILD (CONT'D)

Differential Assembly

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Figure 81

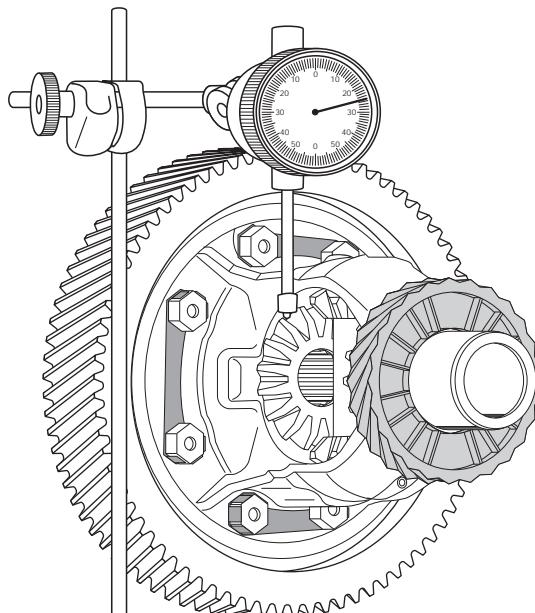
1. Remove the front and rear differential tapered roller bearings using SST 09950-04011 (09951-04010, 09952-04010, 09953-04030, 09954-04010, 09955-04061, 09957-04010, 09958-04011), 09950-60010 (09951-00440). Refer to Figure 81 for disassembly diagram.
2. Use a dial indicator and measure the backlash between the side gears and pinion gears as shown in Figure 82. (*Backlash is referred to as the amount of free-play between the gears*).
3. If backlash is not within specification, remove the cross shaft retaining pin and disassemble the differential carrier assembly using the diagram in Figure 80 as a reference, and refer to thrust washer thickness chart in Figure 82 and select an appropriate washer to bring backlash into proper tolerance. Adjust until backlash is equal at both side gears.

Note: If removing ring gear from carrier, both carrier and ring gear bolt holes must be marked and matched for proper alignment during reassembly.

Component Rebuild Continued on Page 47.

THRUST WASHER THICKNESS: mm. (in.)

0.95 (0.0373)	1.00 (0.0393)
1.05 (0.0413)	1.10 (0.0433)
1.15 (0.0453)	1.20 (0.0472)

NOMINAL SIDE GEAR BACKLASH
0.05 - 0.20 mm (0.002 - 0.0008 in.)

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Figure 82

COMPONENT REBUILD (CONT'D)

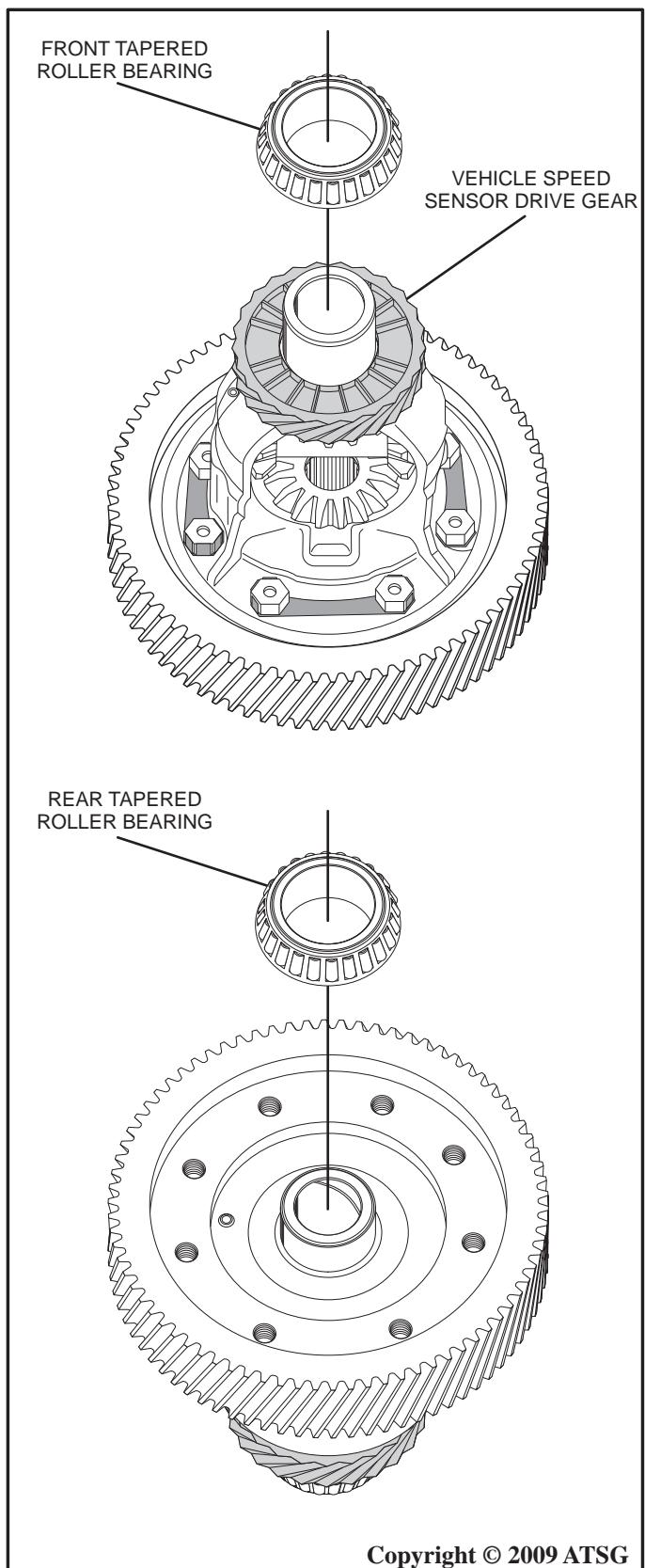
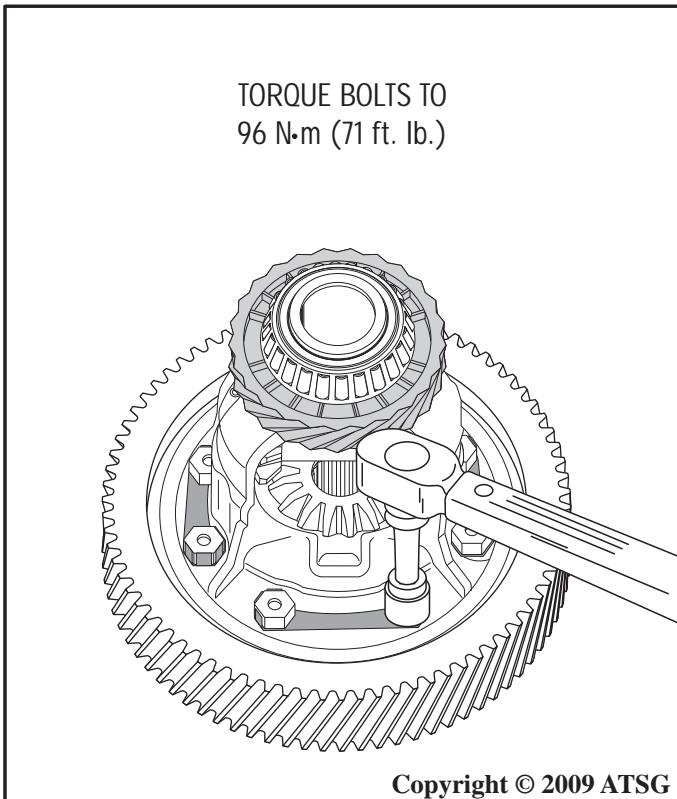
Differential Assembly

Figure 83

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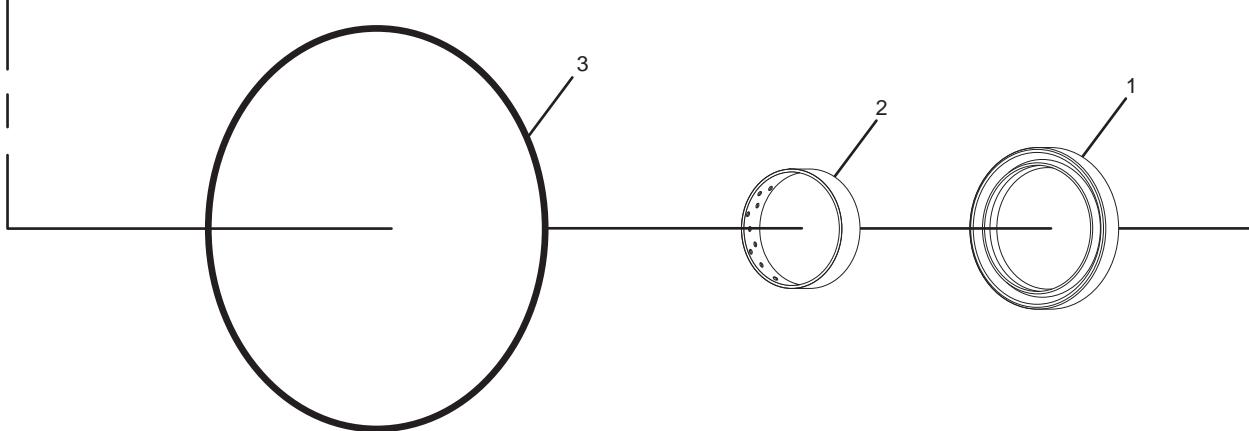
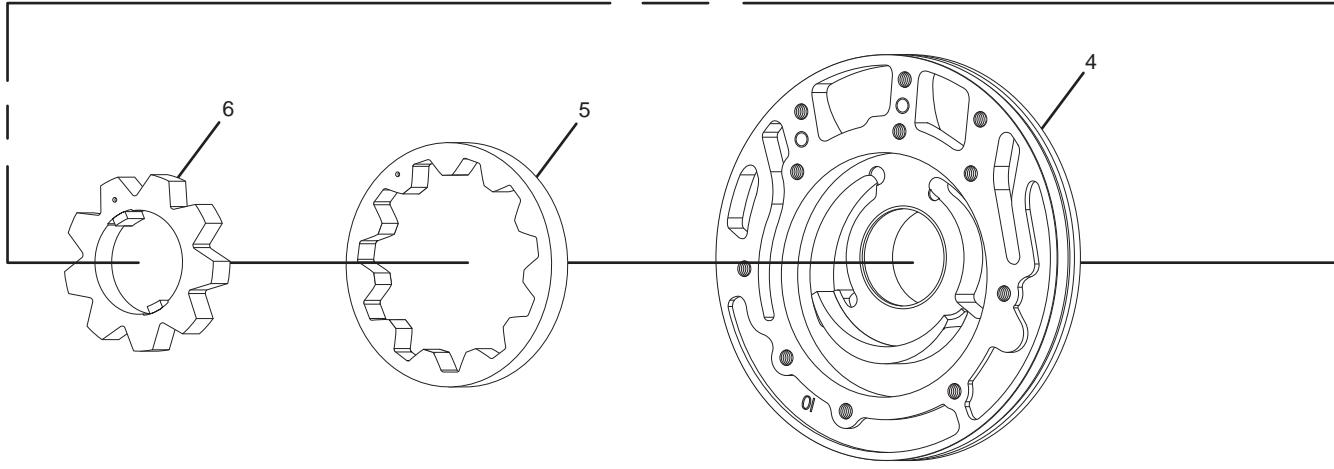
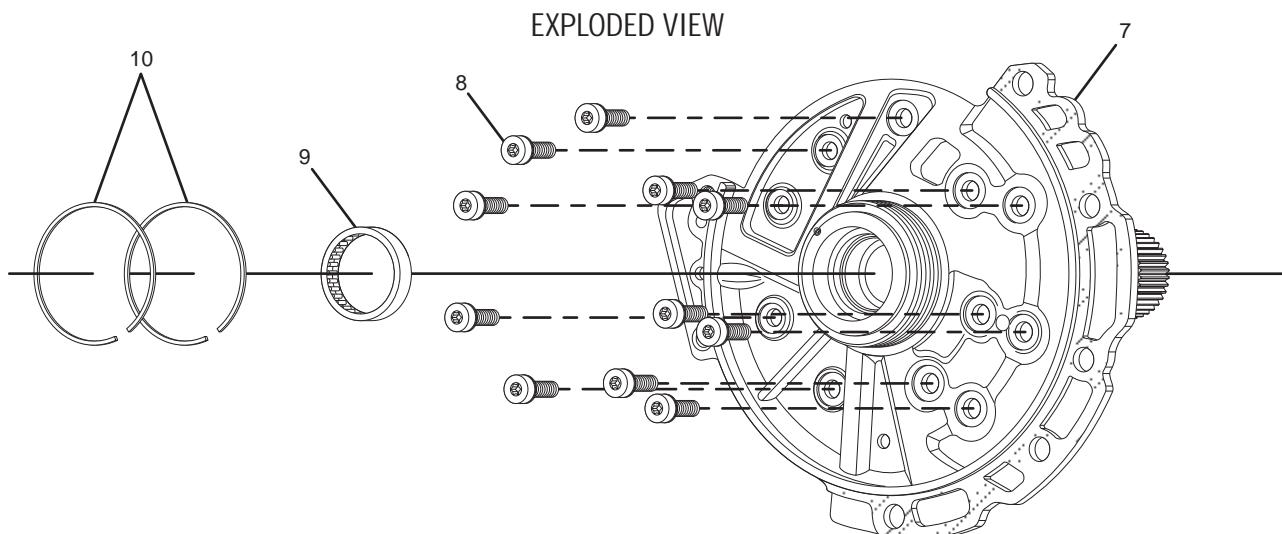
4. Inspect and replace if necessary, the vehicle speed sensor drive gear (*noting the direction of the gear*) and install it onto the differential carrier as shown in Figure 83.
5. Using SST 09350-32014 (09351-32150) or similar and a press, install the rear tapered roller bearing onto the differential carrier as shown in Figure 83.
6. Using SST 09350-32014 (09351-32090, 09351-32120) or similar and a press, install the front tapered roller bearing onto the differential carrier as shown in Figure 83.
7. If ring gear removal was necessary to replace a defective ring gear, it may be necessary to heat the ring gear in a tank of hot water or parts washer to a temperature of 200 degrees before assembly.
Note: If removing ring gear from carrier, both carrier and ring gear bolt holes must be marked and matched for proper alignment during reassembly.
8. Align the marks on the ring gear and carrier and quickly install the ring gear.
9. Install new locking plates and the 8 bolts and torque the bolts to 96 N·m (71 ft. lb.) then set the differential carrier aside for final assembly.

Component Rebuild Continued on Page 48.



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Figure 84



1. OIL PUMP CONVERTER SEAL
2. OIL PUMP CONVERTER HUB BUSHING
3. OIL PUMP BODY O-RING
4. OIL PUMP BODY
5. OIL PUMP BODY DRIVEN GEAR

6. OIL PUMP BODY DRIVE GEAR
7. OIL PUMP COVER/STATOR SHAFT ASSEMBLY
8. PUMP COVER TO PUMP BODY RETAINING BOLTS (11 REQUIRED)
9. OIL PUMP COVER/STATOR SHAFT ASSEMBLY ROLLER BEARING
10. OIL PUMP TEFLON SEALING RINGS (2 REQUIRED)

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Figure 85

COMPONENT REBUILD (CONT'D)

Oil Pump Assembly

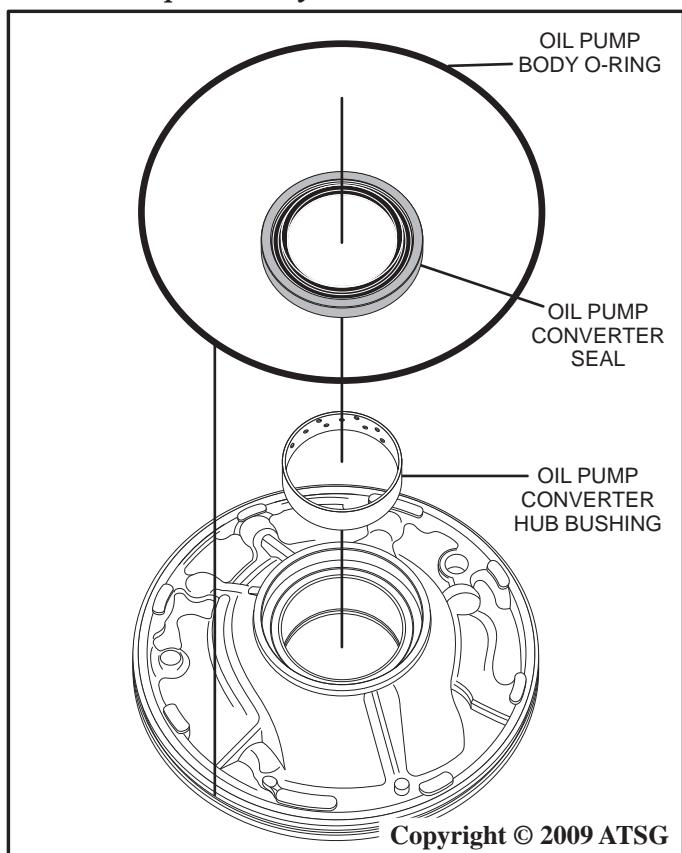


Figure 86

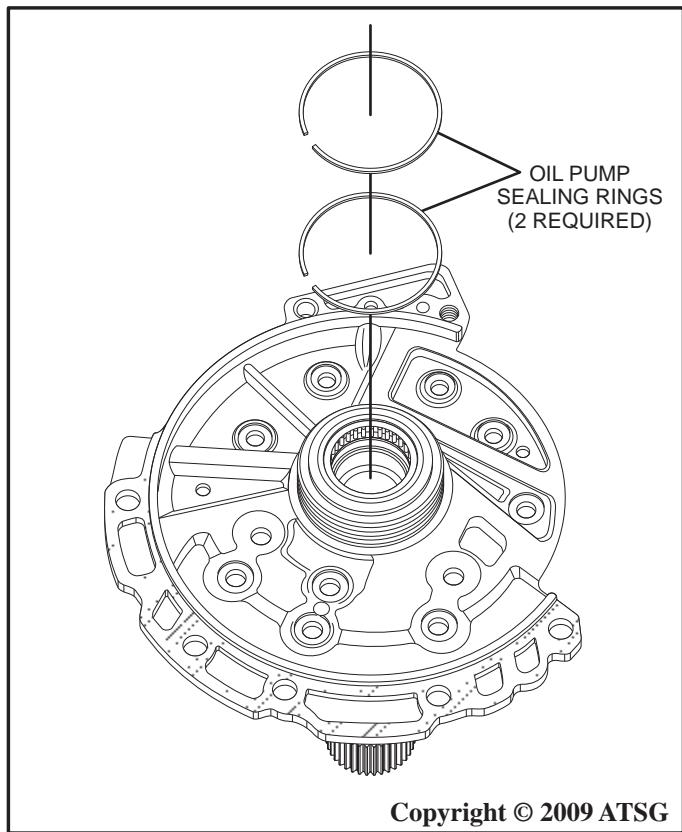


Figure 87

1. Disassemble the oil pump assembly using the diagram in Figure 85 as a guide.
2. Remove the oil pump body o-ring and oil pump converter seal as shown in Figure 86.
3. Remove the two pump body teflon sealing rings (*if not previously done*) as shown in Figure 87.
4. Clean all oil pump parts thoroughly with solvent and dry with compressed air.
5. Inspect all oil pump parts for wear or damage and replace as necessary.
6. Check the oil pump driven gear to pump body clearance by using a feeler gauge between the driven gear and oil pump body as shown in Figure 88.
7. Check the oil pump driven gear to pump body crescent clearance by using a feeler gauge between the driven gear and the oil pump body crescent as shown in Figure 88.
8. Check the oil pump drive and driven gear side clearance using a straight edge and a feeler gauge as shown in Figure 88.
9. If clearances are not within tolerance, replace oil pump assembly.

Component Rebuild Continued on Page 50.

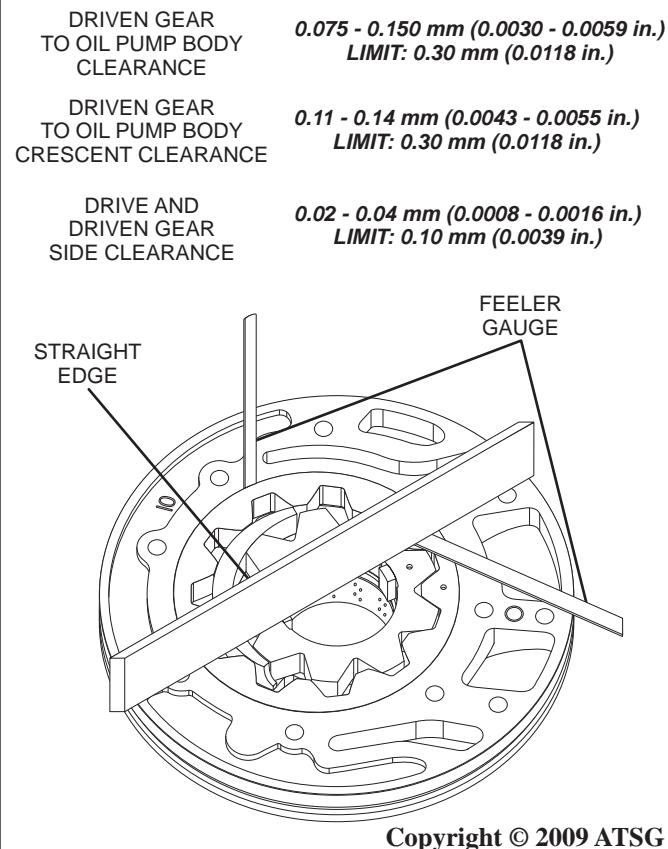


Figure 88

COMPONENT REBUILD (CONT'D)

Oil Pump Assembly

10. Using an appropriate bushing driver, install a new oil pump converter hub bushing as shown in Figure 89.
11. Using SST 09350-32014 (09351-32140) or other suitable seal installer, install a new oil pump converter seal as shown in Figure 89.
12. Install the oil pump body driven gear, the oil pump body drive gear and coat both gears with a small amount of ATF as shown in Figure 90.
13. Align the oil pump body with the oil pump cover and install the eleven pump cover to pump body retaining bolts as shown in Figure 91.
14. Using a torque wrench, torque the bolts to **9.8 N·m (7 ft. lb.)** as shown in Figure 91.
15. Install two new oil pump sealing rings onto the oil pump cover assembly and coat the rings with a small amount of Trans-Jel® as shown in Figure 91.

Component Rebuild Continued on Page 51.

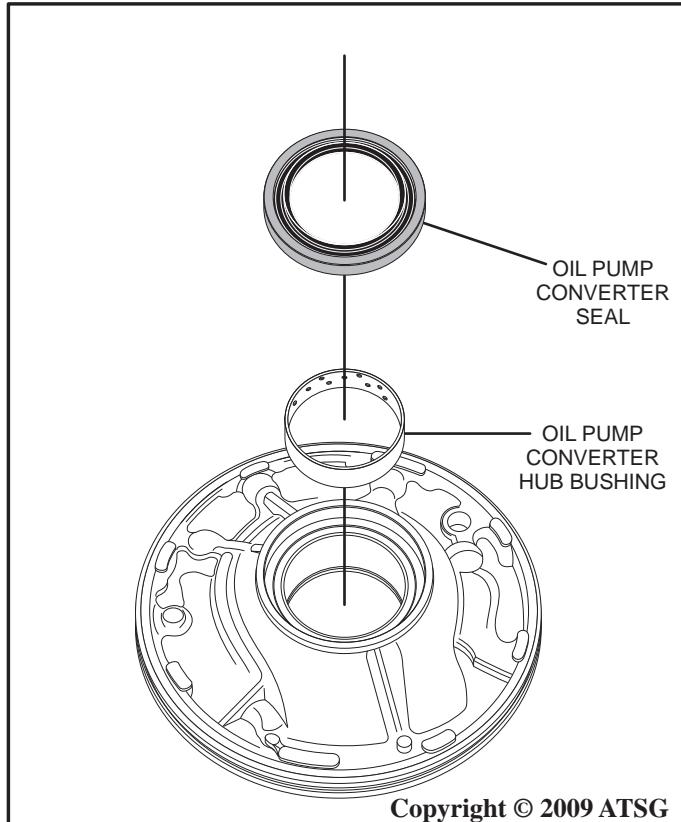


Figure 89

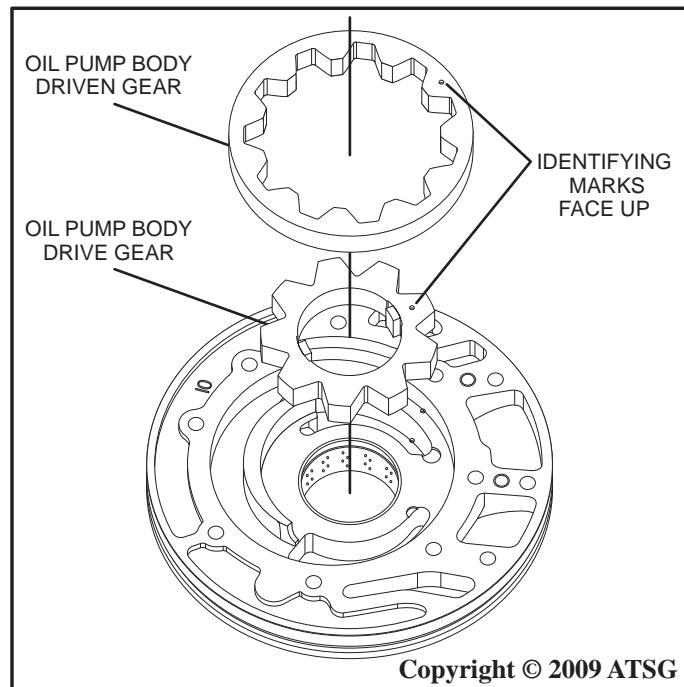


Figure 90

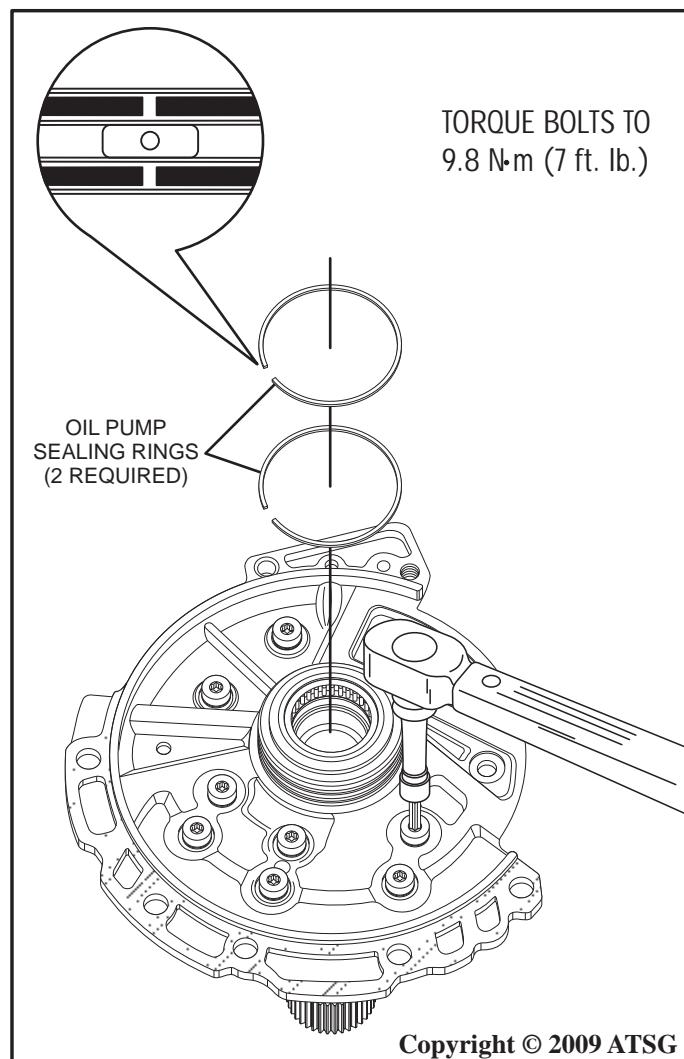


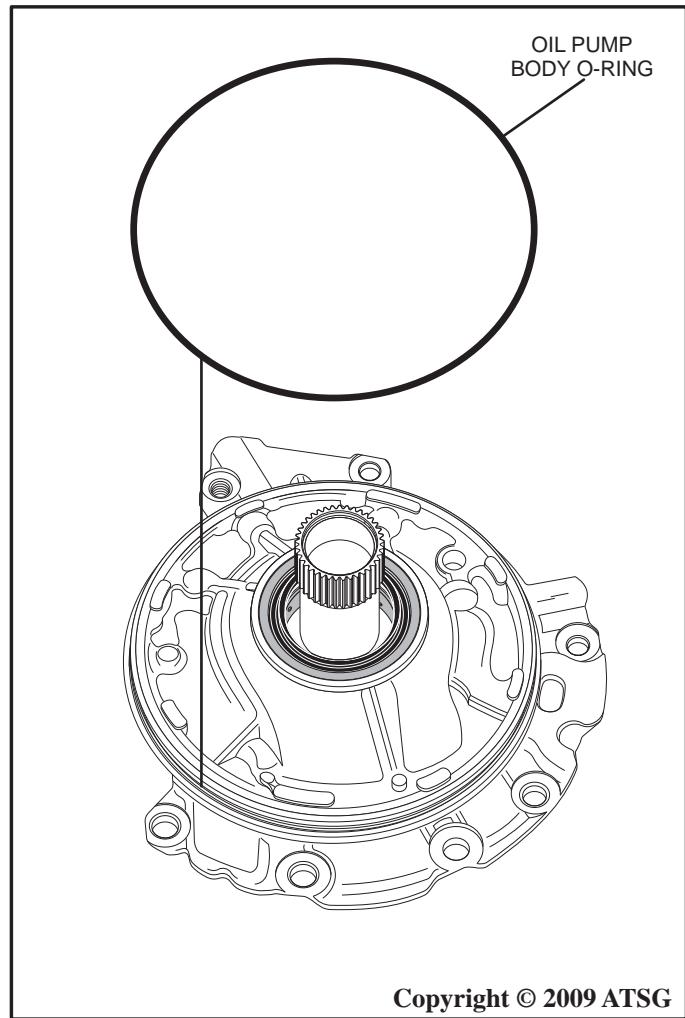
Figure 91

COMPONENT REBUILD (CONT'D)

Oil Pump Assembly

16. Install a new oil pump body o-ring onto the oil pump assembly and coat with a small amount of Trans-Jel® as shown in Figure 92.
17. Set the completed pump assembly aside for final assembly as shown in Figure 93.

Component Rebuild Continued on Page 52.

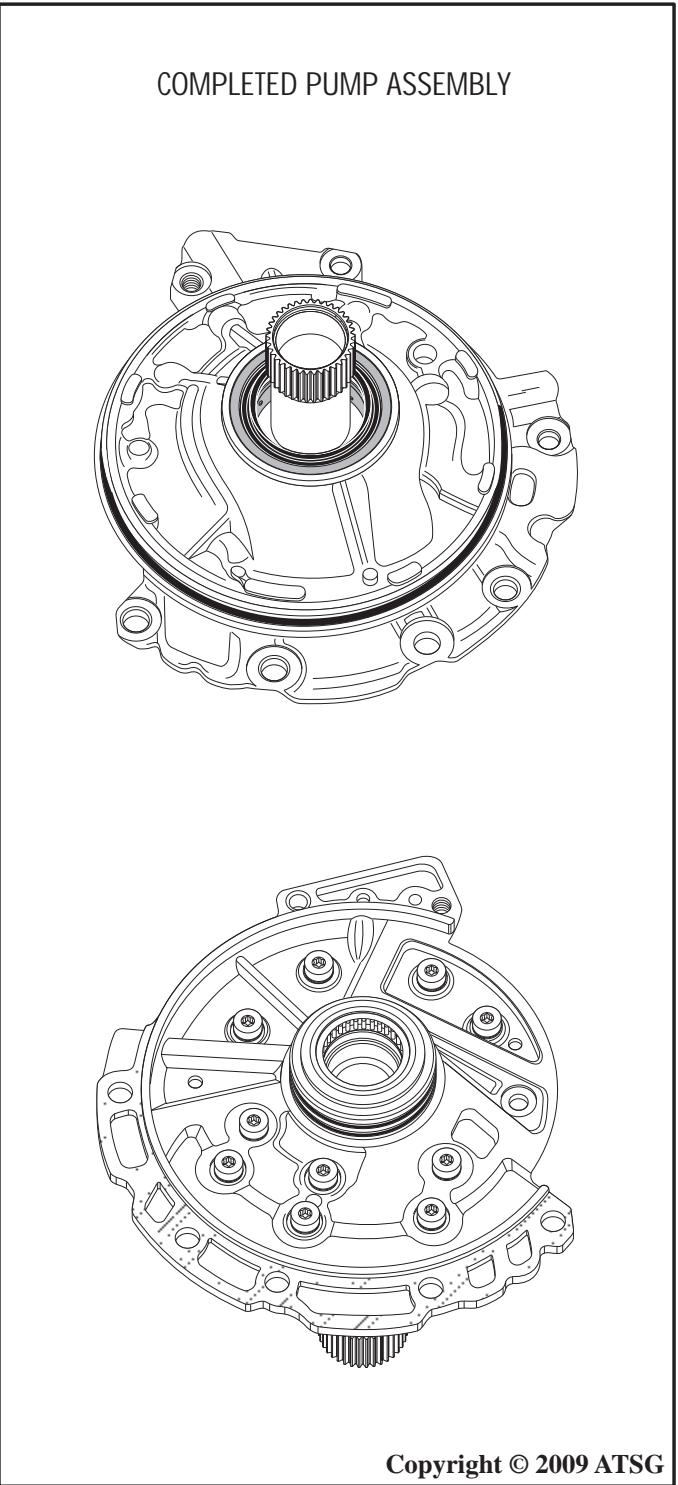


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Figure 92

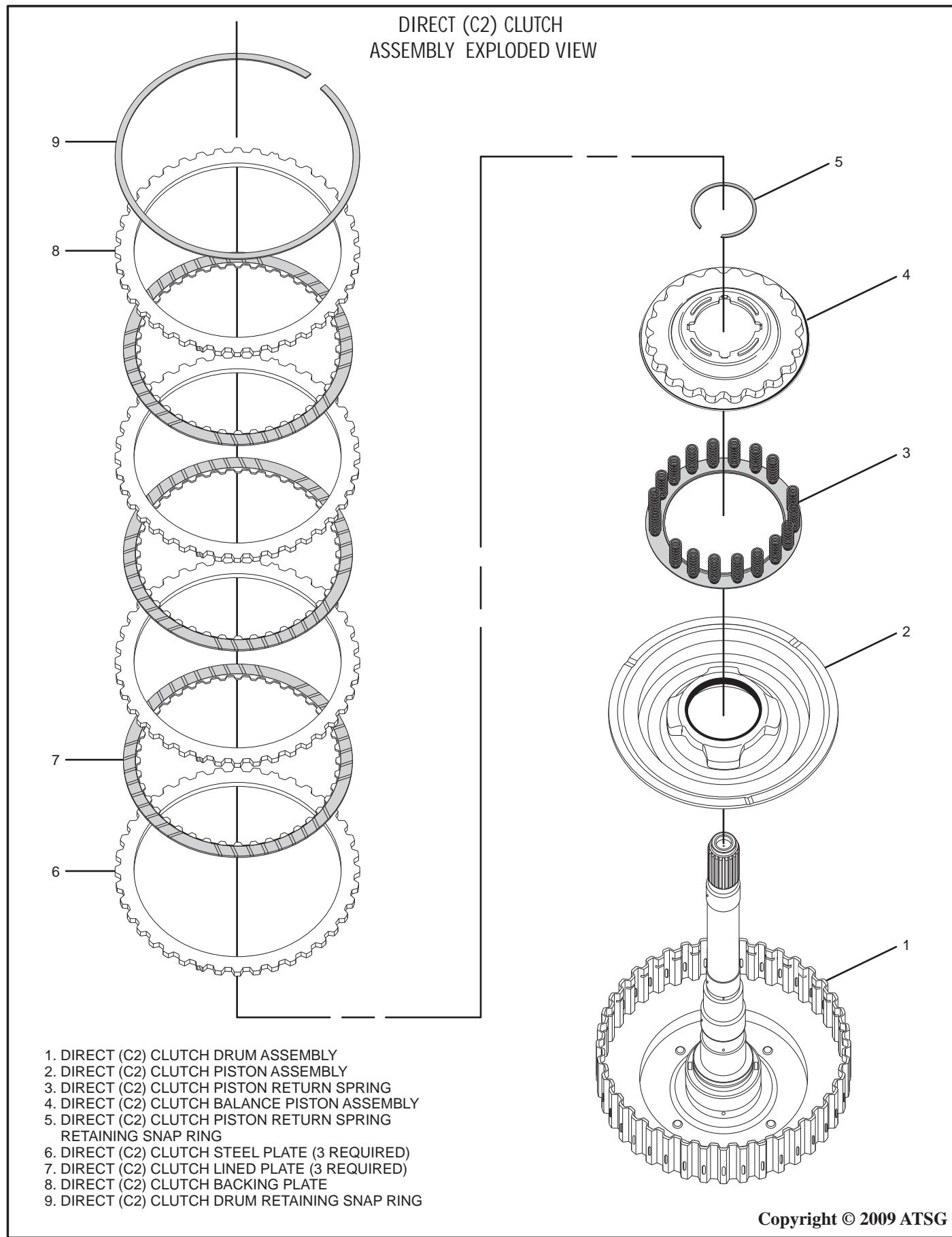
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COMPLETED PUMP ASSEMBLY



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Figure 93



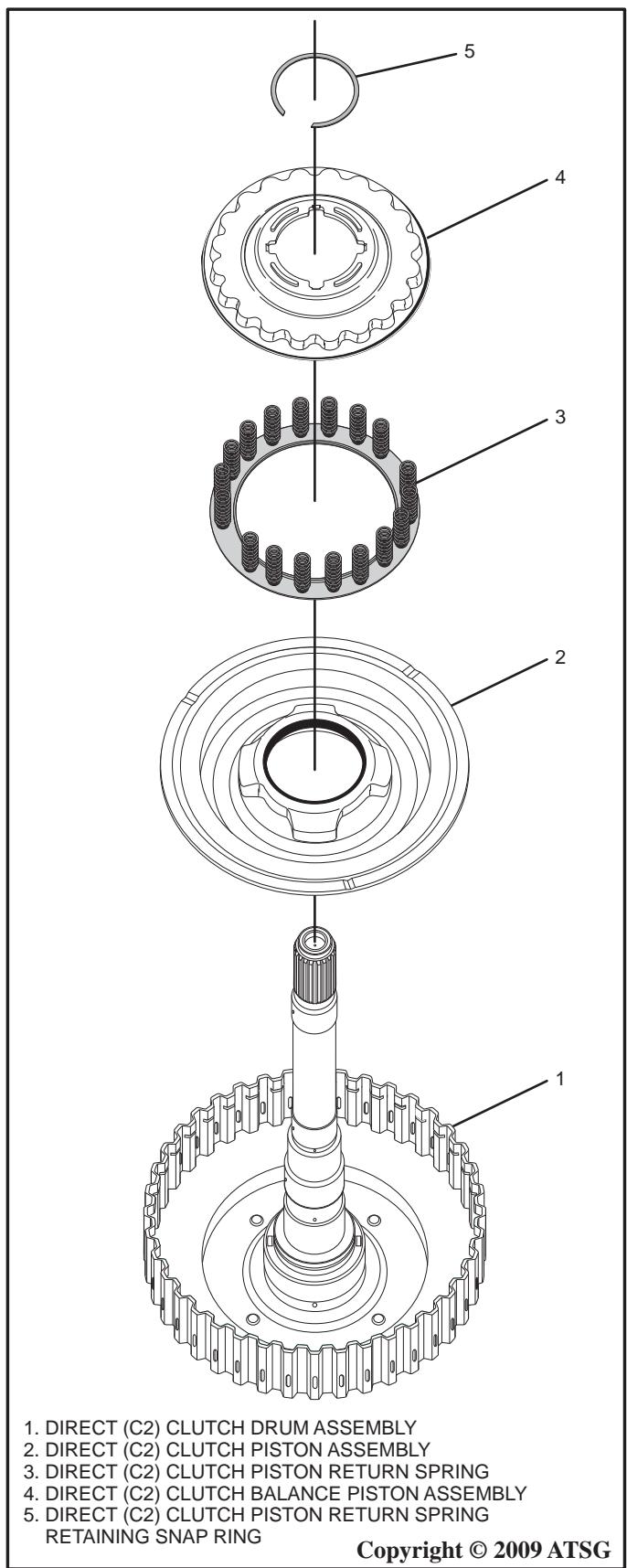
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Figure 94

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COMPONENT REBUILD (CONT'D)

Direct (C2) Clutch Drum Assembly



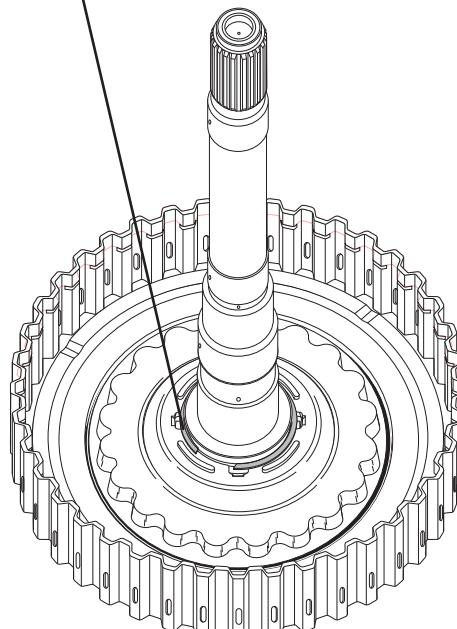
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Figure 95

1. Disassemble the direct (C2) clutch drum assembly using Figure 94 as a guide.
2. Clean all direct (C2) parts thoroughly with solvent and dry with compressed air.
3. Inspect all direct (C2) clutch parts for wear and/or damage and replace as necessary.
4. Coat the seal surface of the direct (C2) clutch piston with a small amount of Trans-Jel® and insert piston into the drum with a twisting motion as shown in Figure 95.
5. Install the direct (C2) clutch piston return spring on top of the piston as shown in Figure 95.
6. Coat the seal surface of the direct (C2) clutch balance piston with a small amount of Trans-Jel® and insert into the drum with a twisting motion as shown in Figure 95.
7. Using SST 09387-00020 or similar device on the balance piston, compress the return spring gently using a suitable press and install the retaining snap ring as shown in Figure 95.
8. Make sure the snap ring is fully seated in the snap ring groove and the balance piston as shown in Figure 96.

Component Rebuild Continued on Page 54.

MAKE SURE SNAP RING IS FULLY SEATED IN SNAP RING GROOVE AND THE BALANCE PISTON



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Figure 96

COMPONENT REBUILD (CONT'D)

Direct (C2) Clutch Drum Assembly

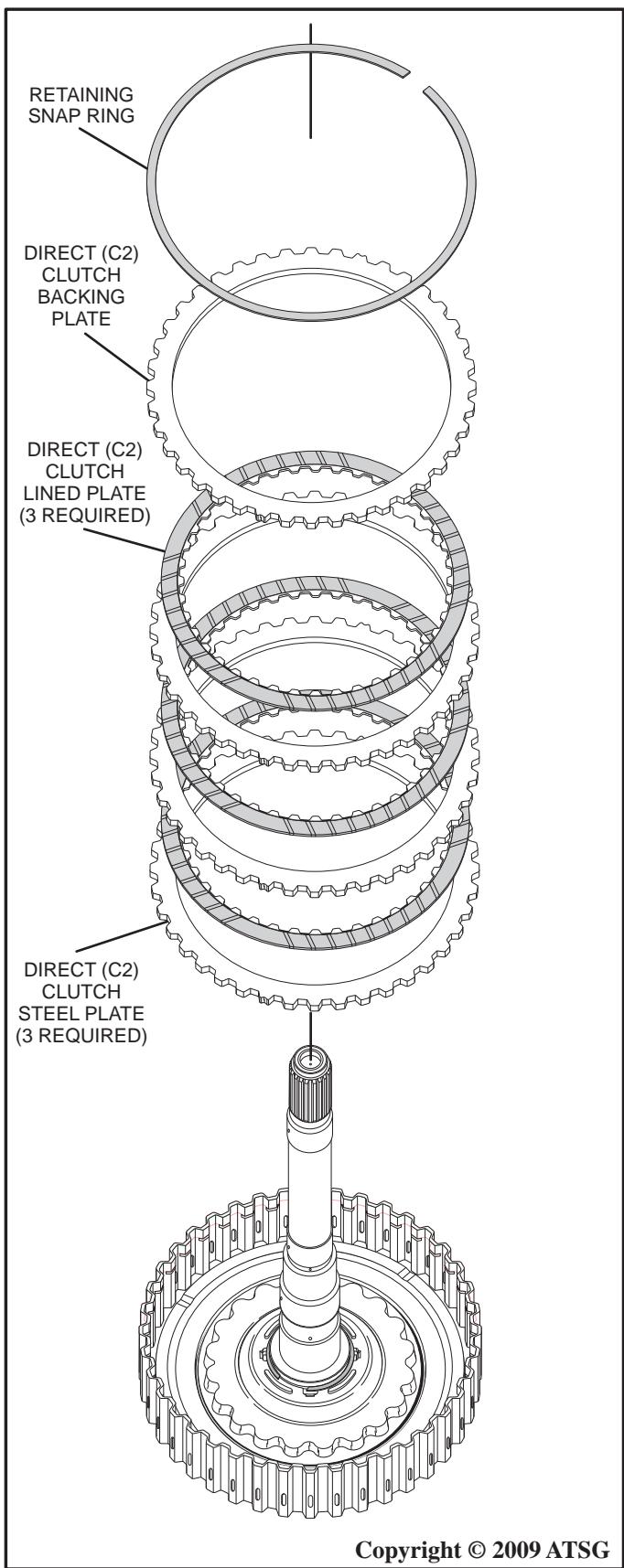


Figure 97

- Install the direct (C2) clutch plates beginning with a steel plate, then alternating frictions and steels until there are three steel and three lined plates installed into the drum housing as shown in Figure 97.

Note: All Friction Plates should be soaked in the appropriate ATF for the vehicle for 30 minutes prior to installation.

- Install the direct (C2) clutch backing plate into the drum housing as shown in Figure 97.
- Install the retaining snap ring into the drum housing as shown in Figure 97.
- Check the direct (C2) clutch clearance using a feeler gauge between the backing plate and snap ring as shown in Figure 98.
- Note:** Direct (C2) clutch clearance should be between 0.62mm - 0.74mm (.024" - .029")
- Change the "Selective" backing plate as necessary to attain proper clutch clearance using the chart in Figure 98.
- Set completed direct (C2) clutch aside for final assembly.

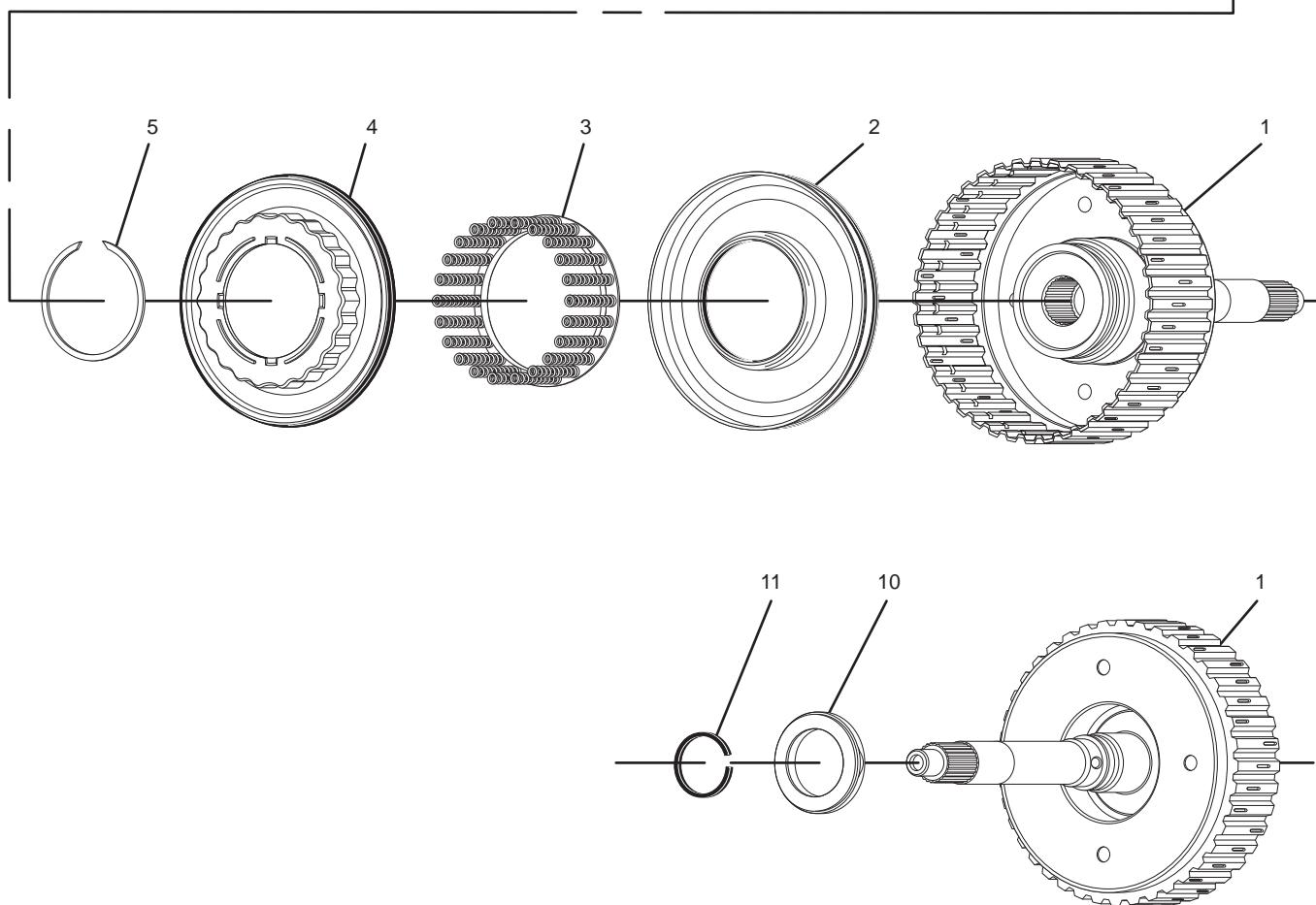
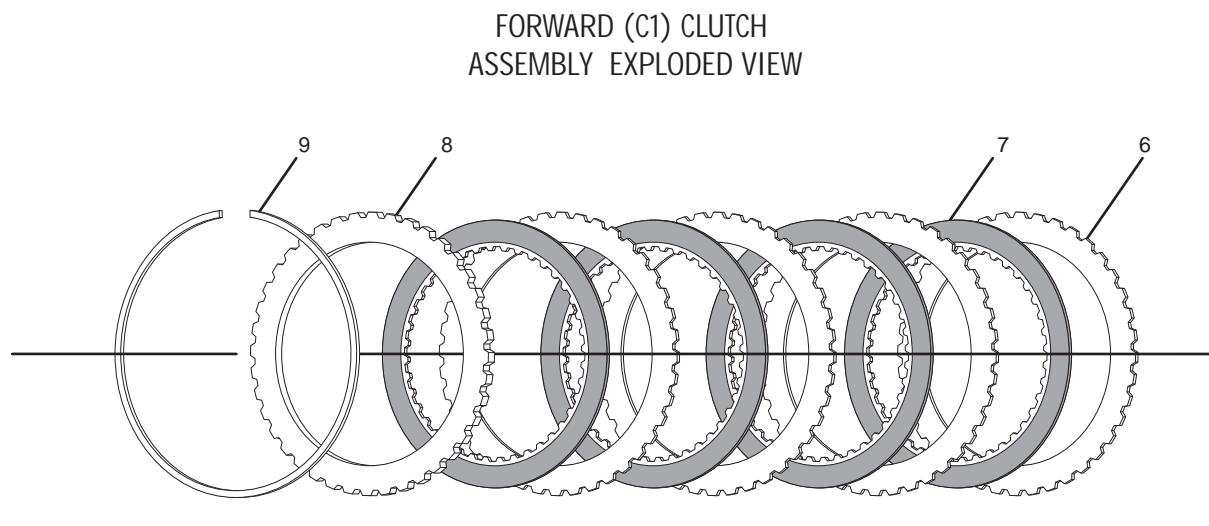
Component Rebuild Continued on Page 55.

SELECTIVE BACKING PLATES AVAILABLE FROM DEALER. ORDER BY THICKNESS.

3.0mm (.118")	3.3mm (.130")
3.1mm (.122")	3.4mm (.134")
3.2mm (.126")	3.5mm (.138")

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Figure 98

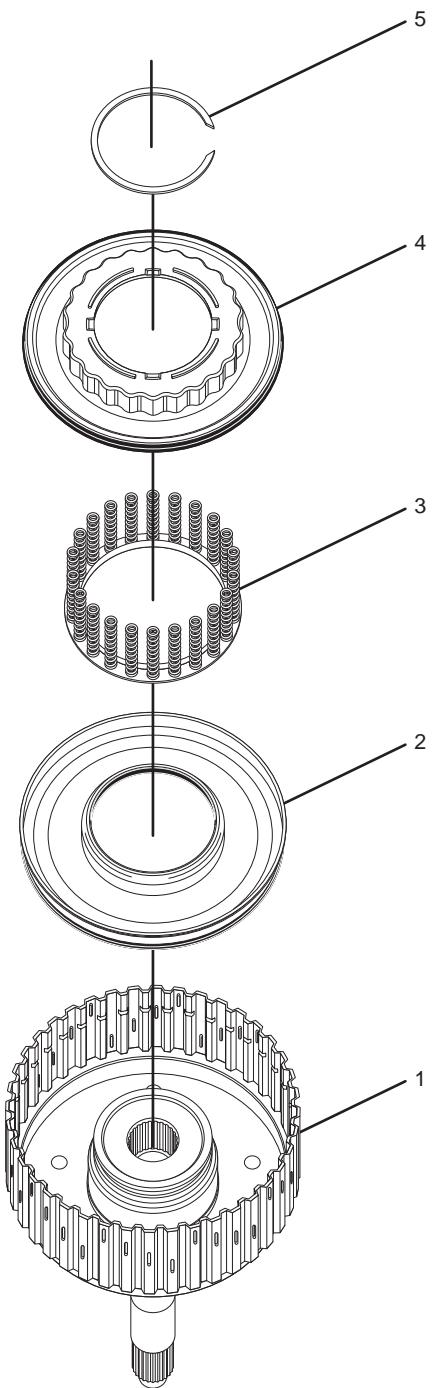


1. FORWARD (C1) CLUTCH DRUM ASSEMBLY
2. FORWARD (C1) CLUTCH PISTON
3. FORWARD (C1) CLUTCH PISTON RETURN SPRING
4. FORWARD (C1) CLUTCH BALANCE PISTON
5. FORWARD (C1) CLUTCH PISTON RETAINING SNAP RING
6. FORWARD (C1) CLUTCH STEEL PLATE (4 REQUIRED)

7. FORWARD (C1) CLUTCH LINED PLATE (4 REQUIRED)
8. FORWARD (C1) CLUTCH BACKING PLATE
9. FORWARD (C1) CLUTCH DRUM RETAINING SNAP RING
10. FORWARD (C1) CLUTCH THRUST BEARING
11. FORWARD (C1) CLUTCH SEALING RING

COMPONENT REBUILD (CONT'D)

Forward (C1) Clutch Drum Assembly



1. FORWARD (C1) CLUTCH DRUM ASSEMBLY
2. FORWARD (C1) CLUTCH PISTON ASSEMBLY
3. FORWARD (C1) CLUTCH PISTON RETURN SPRING
4. FORWARD (C1) CLUTCH BALANCE PISTON ASSEMBLY
5. FORWARD (C1) CLUTCH PISTON RETURN SPRING RETAINING SNAP RING

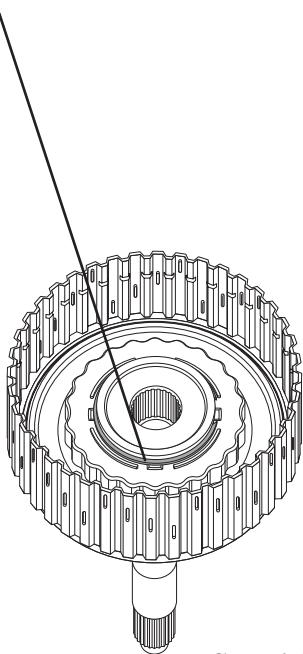
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Figure 100

1. Disassemble the forward (C1) clutch drum assembly using Figure 99 as a guide.
2. Clean all forward (C1) parts thoroughly with solvent and dry with compressed air.
3. Inspect all forward (C1) clutch parts for wear and/or damage and replace as necessary.
4. Coat the seal surface of the forward (C1) clutch piston with a small amount of Trans-Jel® and insert piston into the drum with a twisting motion as shown in Figure 100.
5. Install the forward (C1) clutch piston return spring on top of the piston as shown in Figure 100.
6. Coat the seal surface of the forward (C1) clutch balance piston with a small amount of Trans-Jel® and insert into the piston in the drum with a twisting motion as shown in Figure 100.
7. Using SST 09320-89010 or similar device on the balance piston, compress the return spring gently using a suitable press and install the retaining snap ring as shown in Figure 100.
8. Make sure the snap ring is fully seated in the snap ring groove and the balance piston as shown in Figure 101.

Component Rebuild Continued on Page 57.

MAKE SURE SNAP RING IS FULLY SEATED IN SNAP RING GROOVE AND THE BALANCE PISTON



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Figure 101

COMPONENT REBUILD (CONT'D)

Forward (C1) Clutch Drum Assembly

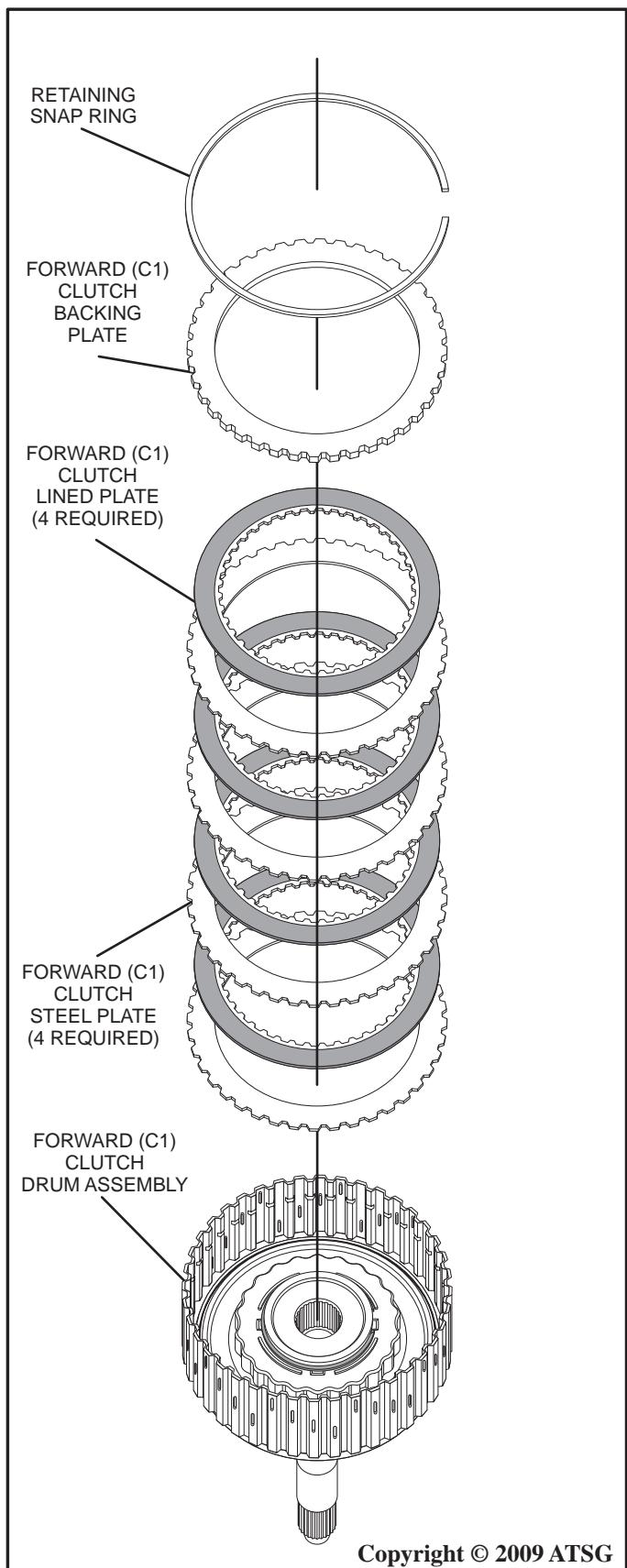


Figure 102

9. Install the forward (C1) clutch plates beginning with a steel plate, then alternating frictions and steels until there are four steel and four lined plates installed into the drum housing as shown in Figure 102.
- Note:** All Friction Plates should be soaked in the appropriate ATF for the vehicle for 30 minutes prior to installation.
10. Install the forward (C1) clutch backing plate into the drum housing as shown in Figure 102.
 11. Install the retaining snap ring into the drum housing as shown in Figure 102. Check the forward (C1) clutch clearance using a feeler gauge between the backing plate and snap ring as shown in Figure 103.
 12. **Note:** Forward (C1) clutch clearance should be between 0.61mm - 1.041mm (.024" - .041")
 13. Change the "Selective" backing plate as necessary to attain proper clutch clearance using the chart in Figure 103.

Component Rebuild Continued on Page 58.

**SELECTIVE BACKING PLATES
AVAILABLE FROM DEALER.
ORDER BY THICKNESS.**

**Forward (C1) Clutch Clearance Should Be
0.61mm - 1.041mm (.024" - .041")**

Selective Forward Clutch Backing Plates

3.0mm (.118")	3.45mm (.135")
3.15mm (.124")	3.6mm (.141")
3.3mm (.130")	Copyright © 2009 ATSG

Figure 103

COMPONENT REBUILD (CONT'D)

Forward (C1) Clutch Drum Assembly

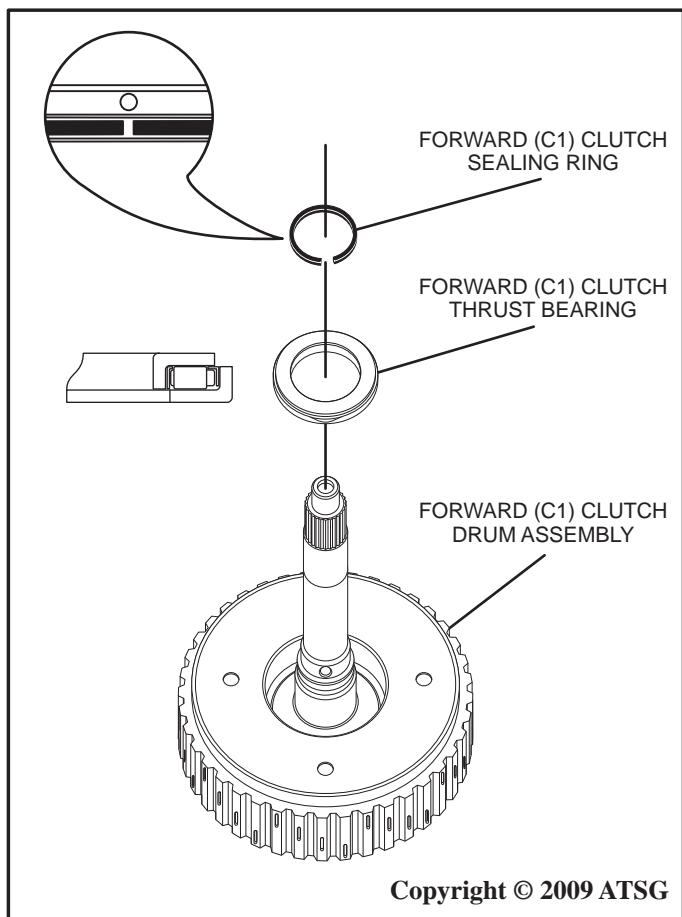


Figure 104

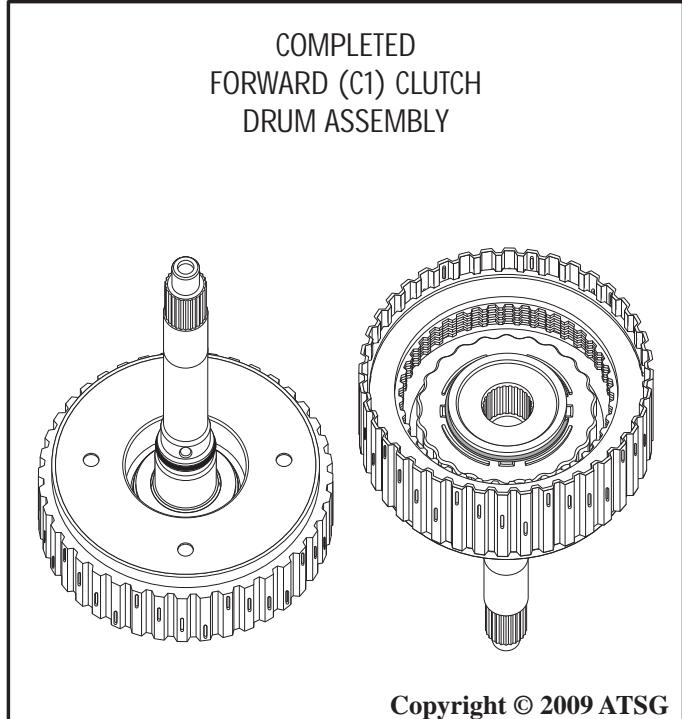


Figure 105

14. Coat the thrust bearing with a small amount of Trans-Jel® and install the bearing into the drum as shown in Figure 104.
15. Install a new sealing ring into the drum and coat with a small amount of Trans-Jel® as shown in Figure 104.
16. Set the forward (C1) clutch drum aside for final assembly as shown in Figure 105.

Component Rebuild
Continued on Page 59.

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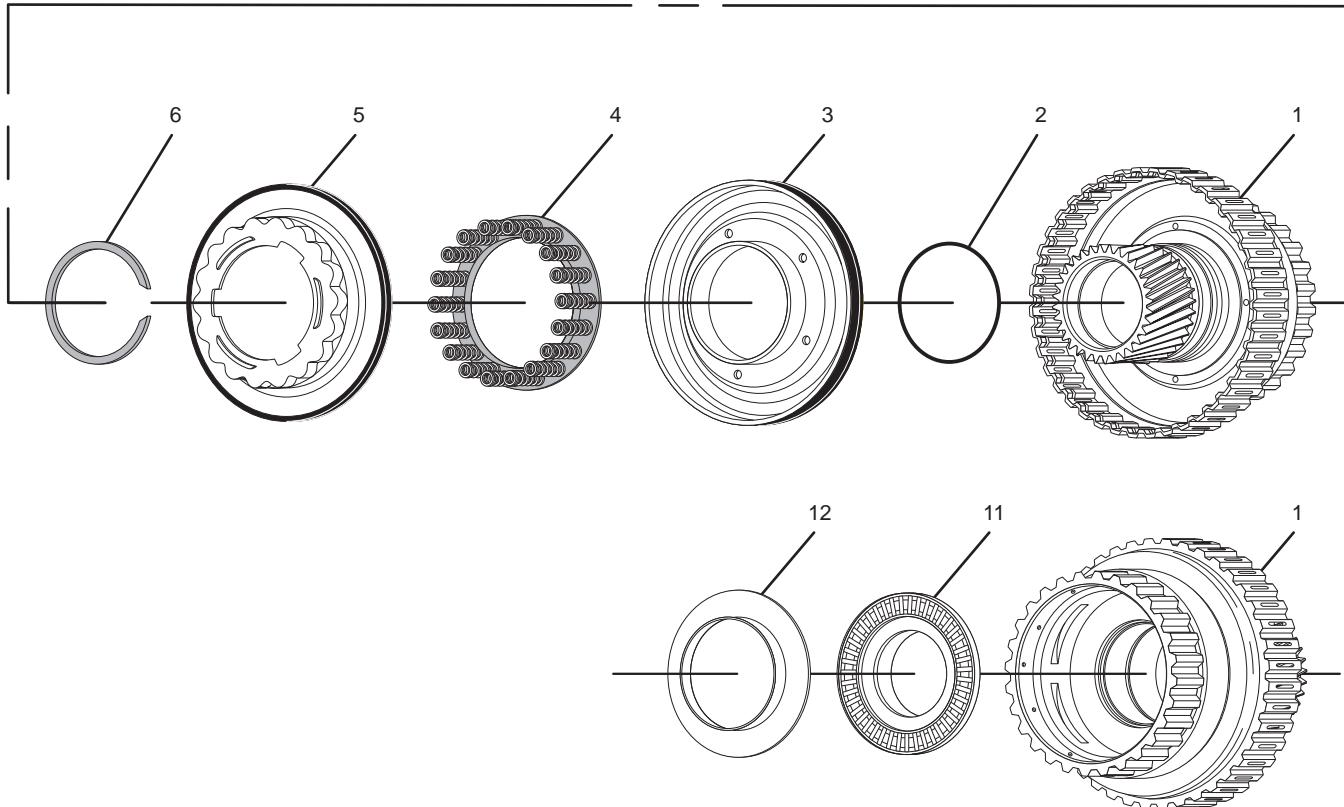
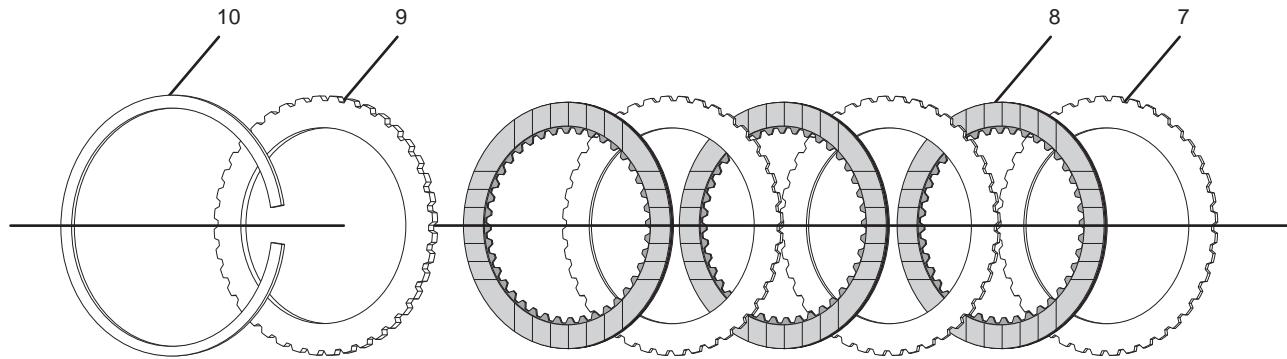
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GM.....6L80E

MAZDA.....JF506E

MITSUBISHI.....F4A41/51
MITSUBISHI.....R4A51/V5A51

VW, ROVER, JAGUAR.....JF506E
UPDATE HANDBOOK

UNDERDRIVE (C3) CLUTCH ASSEMBLY EXPLODED VIEW

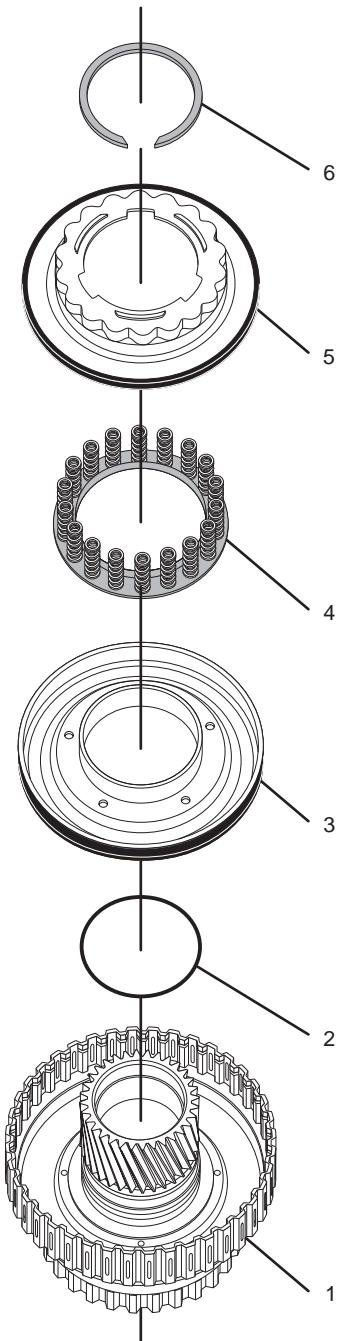


1. UNDERDRIVE (C3) CLUTCH DRUM ASSEMBLY
2. UNDERDRIVE (C3) CLUTCH DRUM O-RING SEAL
3. UNDERDRIVE (C3) CLUTCH PISTON ASSEMBLY
4. UNDERDRIVE (C3) CLUTCH PISTON RETURN SPRING
5. UNDERDRIVE (C3) CLUTCH BALANCE PISTON
6. UNDERDRIVE (C3) CLUTCH PISTON RETAINING SNAP RING

7. UNDERDRIVE (C3) CLUTCH STEEL PLATE (3 REQUIRED)
8. UNDERDRIVE (C3) CLUTCH LINED PLATE (3 REQUIRED)
9. UNDERDRIVE (C3) CLUTCH BACKING PLATE
10. UNDERDRIVE (C3) CLUTCH RETAINING SNAP RING
11. UNDERDRIVE (C3) CLUTCH THRUST BEARING AND RACE ASSEMBLY
12. UNDERDRIVE (C3) CLUTCH THRUST BEARING RACE

COMPONENT REBUILD (CONT'D)

Underdrive (C3) Clutch Drum Assembly



1. UNDERDRIVE (C3) CLUTCH DRUM ASSEMBLY
2. UNDERDRIVE (C3) CLUTCH DRUM O-RING SEAL
3. UNDERDRIVE (C3) CLUTCH PISTON ASSEMBLY
4. UNDERDRIVE (C3) CLUTCH PISTON RETURN SPRING
5. UNDERDRIVE (C3) CLUTCH BALANCE PISTON
6. UNDERDRIVE (C3) CLUTCH PISTON RETAINING SNAP RING

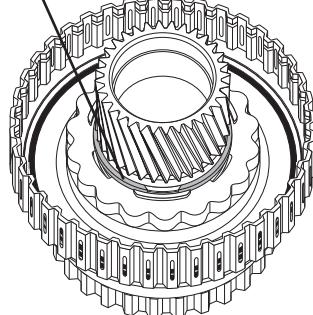
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Figure 107

1. Disassemble the underdrive (C3) clutch drum assembly using Figure 106 as a guide.
2. Clean all underdrive (C3) parts thoroughly with solvent and dry with compressed air.
3. Inspect all underdrive (C3) clutch parts for wear and/or damage and replace as necessary.
4. Install a new o-ring for the underdrive (C3) clutch piston and coat with a small amount of Trans-Jel® as shown in Figure 107.
5. Coat the seal surface of the underdrive (C3) clutch piston with a small amount of Trans-Jel® and insert piston into the drum with a twisting motion as shown in Figure 107.
6. Install the underdrive (C3) clutch piston return spring on top of the piston as shown in Figure 107.
7. Coat the seal surface of the underdrive (C3) clutch balance piston with a small amount of Trans-Jel® and insert into the piston in the drum with a twisting motion as shown in Figure 107.
8. Using SST 09350-32014 (09351-32070) or similar device on the balance piston, compress the return spring gently using a suitable press and install the retaining snap ring as shown in Figure 107.
9. Make sure the snap ring is fully seated in the snap ring groove and the balance piston as shown in Figure 108.

Component Rebuild Continued on Page 61.

MAKE SURE SNAP RING
IS FULLY SEATED IN SNAP
RING GROOVE AND THE
BALANCE PISTON



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Figure 108

COMPONENT REBUILD (CONT'D)

Underdrive (C3) Clutch Drum Assembly

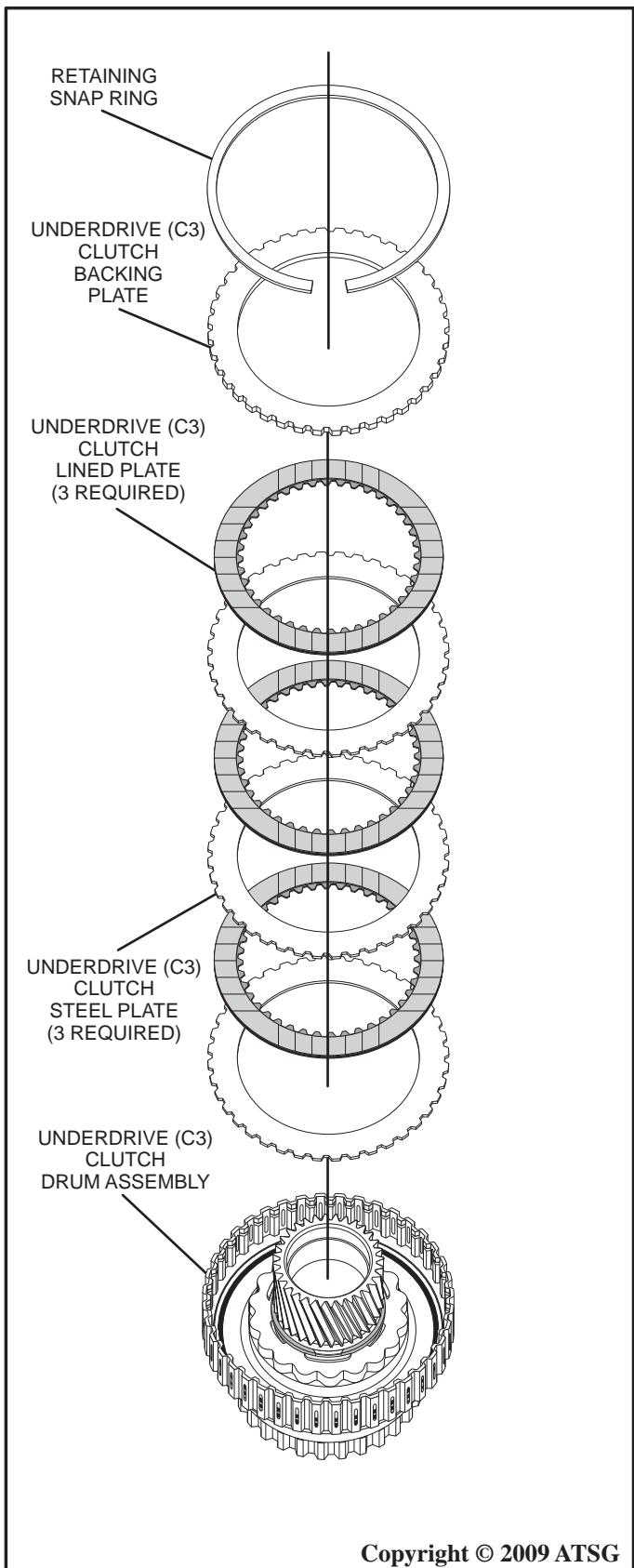


Figure 109

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10. Install the underdrive (C3) clutch plates beginning with a steel plate, then alternating frictions and steels until there are three steel and three lined plates installed into the drum housing as shown in Figure 109.
- Note: All Friction Plates should be soaked in the appropriate ATF for the vehicle for 30 minutes prior to installation.***
11. Install the underdrive (C3) clutch backing plate into the drum housing as shown in Figure 109.
 12. Install the retaining snap ring into the drum housing as shown in Figure 109. Check the underdrive (C3) clutch clearance using a feeler gauge between the backing plate and snap ring as shown in Figure 110.
 13. ***Note: Underdrive (C3) clutch clearance should be between 1.47mm - 1.69mm (.057" - .067")***
 14. Change the "Selective" backing plate as necessary to attain proper clutch clearance using the chart in Figure 110.
 15. Set the underdrive (C3) clutch drum aside for final assembly.

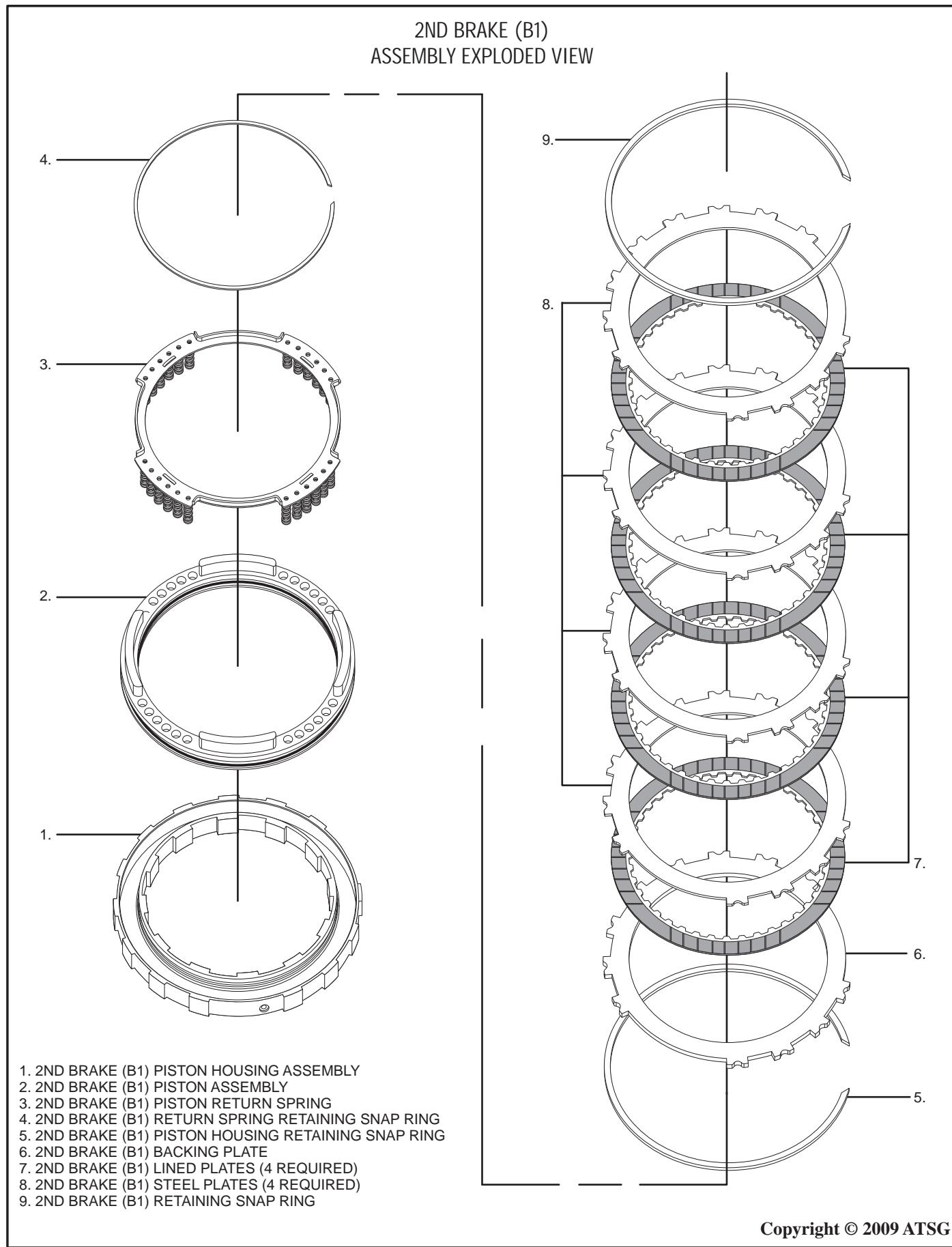
Component Rebuild Continued on Page 62.

**SELECTIVE BACKING PLATES
AVAILABLE FROM DEALER.
ORDER BY THICKNESS.**

***Underdrive (C3)Clutch Clearance Should Be
1.47mm - 1.69mm (.057" - .067")***

<i>Selective Underdrive (C3) Clutch Backing Plates</i>	
<i>3.0mm (.118")</i>	<i>3.4mm (.134")</i>
<i>3.2mm (.126")</i>	Copyright © 2009 ATSG

Figure 110



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Figure 111
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COMPONENT REBUILD (CONT'D)

2nd Brake (B1) Clutch Assembly

1. Disassemble the 2nd brake (B1) clutch piston assembly using the diagram in Figure 111 as a guide.
2. Clean all 2nd brake (B1) clutch parts thoroughly with solvent and dry with compressed air.
3. Inspect all 2nd brake (B1) clutch parts for wear and/or damage and replace as necessary.
4. Install a new inner and outer o-ring onto the 2nd brake (B1) piston assembly and coat the o-rings with a small amount of Trans-Jel® as shown in Figure 112.
5. Carefully install 2nd brake (B1) piston into the piston housing with a twisting motion as shown in Figure 113.
6. Install the 2nd brake (B1) piston return spring as shown in Figure 114.
7. Install the 2nd brake (B1) piston return spring retaining snap ring as shown in Figure 114.
8. Make sure snap ring is fully seated in the snap ring groove, and set 2nd brake (B1) piston assembly aside for final assembly.

Component Rebuild Continued on Page 64.

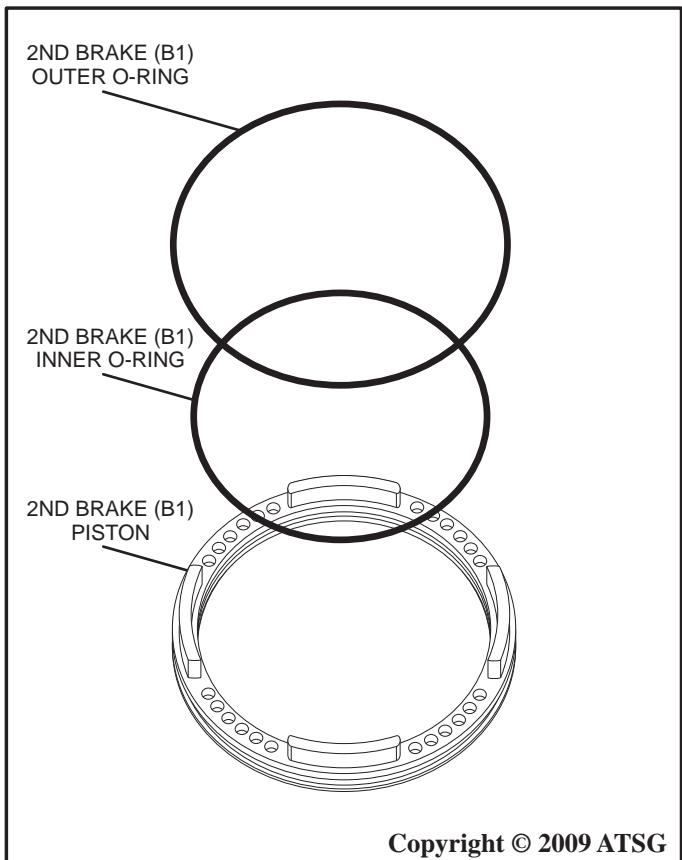


Figure 111

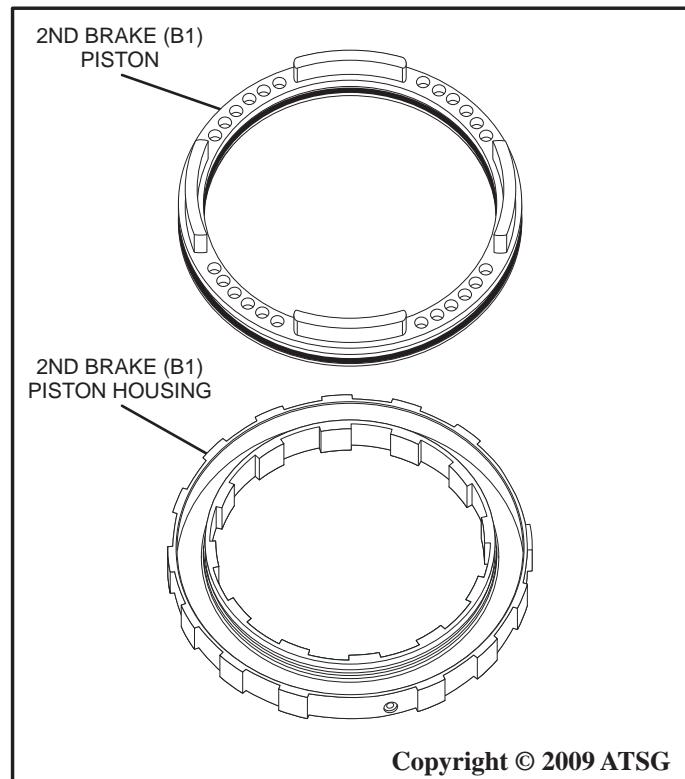


Figure 113

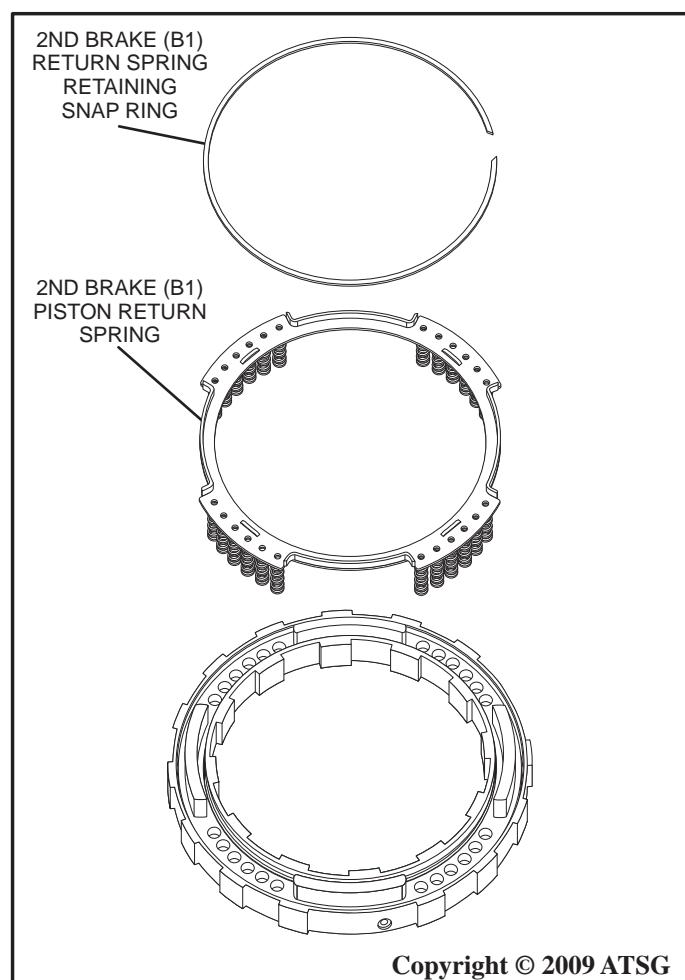
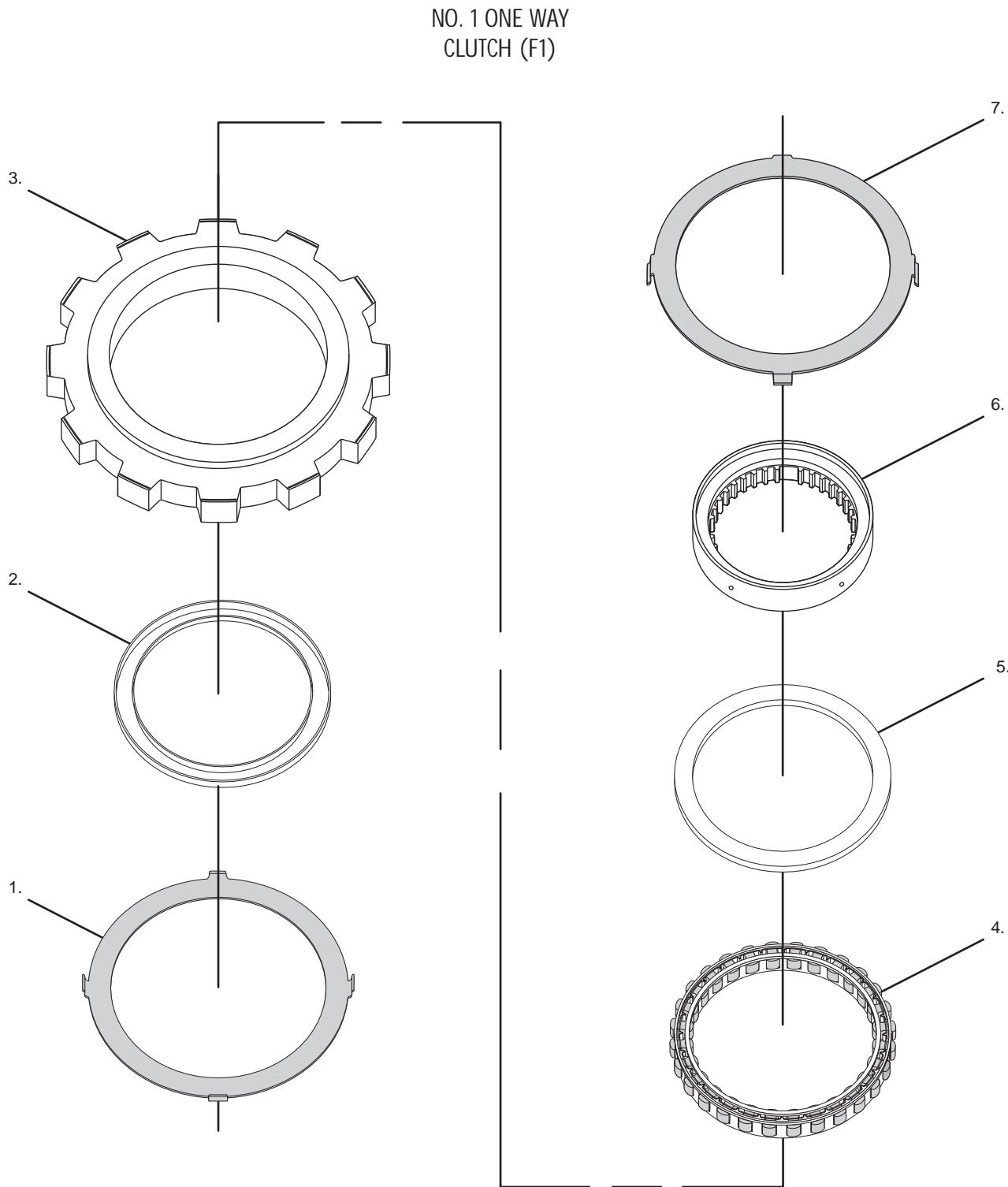


Figure 114

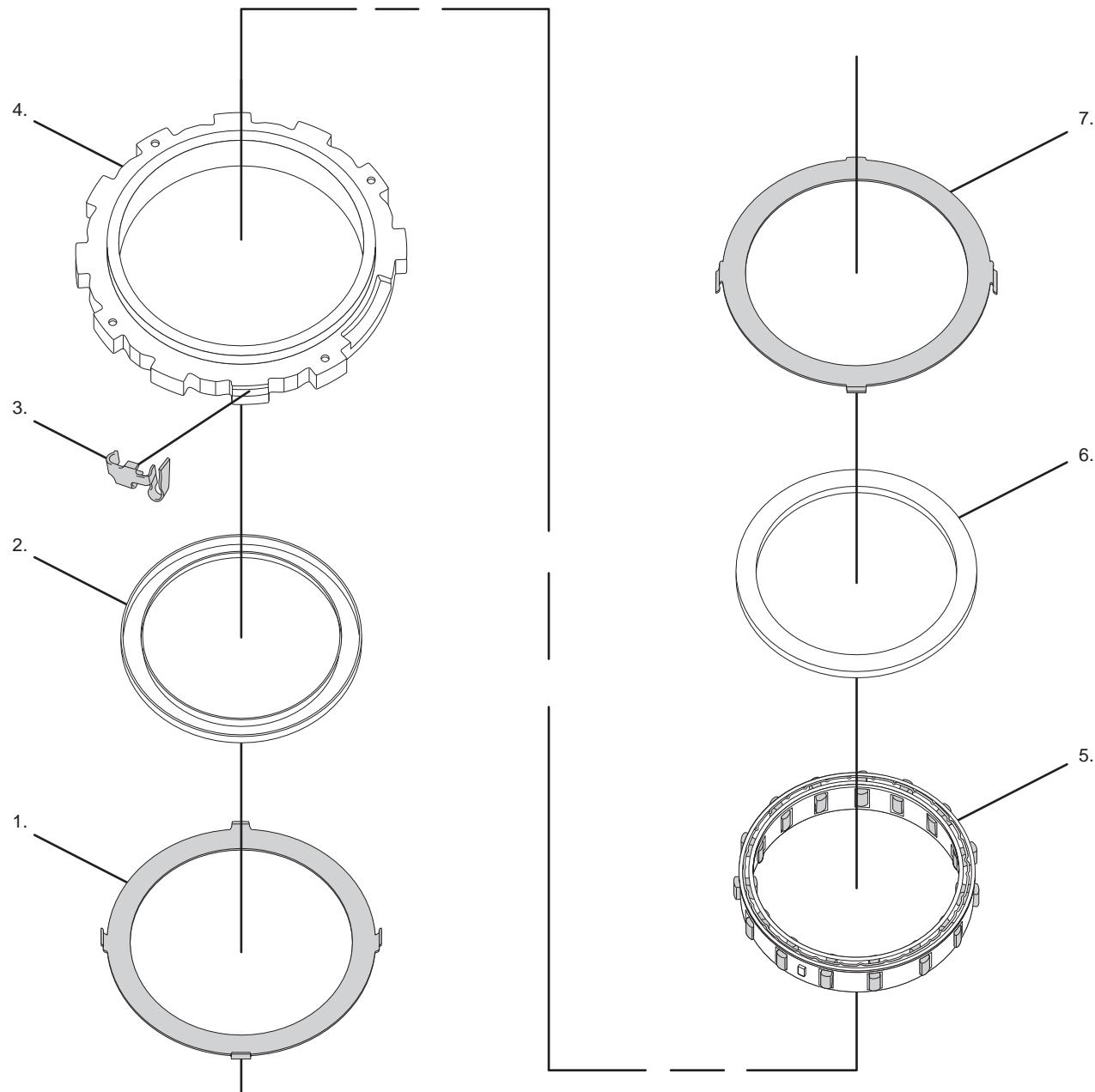


1. NO. 1 ONE-WAY CLUTCH (F1) RETAINING PLATE (LOWER)
2. NO. 1 ONE-WAY CLUTCH (F1) END BEARING (LOWER)
3. NO. 1 ONE-WAY CLUTCH (F1) ONE-WAY CLUTCH OUTER RACE
4. NO. 1 ONE-WAY CLUTCH (F1) ONE-WAY CLUTCH ASSEMBLY
5. NO. 1 ONE-WAY CLUTCH (F1) END BEARING (UPPER)
6. NO. 1 ONE-WAY CLUTCH (F1) ONE-WAY CLUTCH INNER RACE
7. NO. 1 ONE-WAY CLUTCH (F1) RETAINING PLATE (UPPER)

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Figure 115

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NO. 2 ONE WAY
CLUTCH (F2)

1. NO. 2 ONE-WAY CLUTCH (F2) RETAINING PLATE (LOWER)
2. NO. 2 ONE-WAY CLUTCH (F2) END BEARING (LOWER)
3. UNDERDRIVE BRAKE (B3) ANTI-CLUNK SPRING
4. NO. 2 ONE-WAY CLUTCH (F2) ONE-WAY CLUTCH OUTER RACE
5. NO. 2 ONE-WAY CLUTCH (F2) ONE-WAY CLUTCH ASSEMBLY
6. NO. 2 ONE-WAY CLUTCH (F2) END BEARING (LOWER)
7. NO. 2 ONE-WAY CLUTCH (F2) RETAINING PLATE (LOWER)

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Figure 116
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COMPONENT REBUILD (CONT'D)

No. 1 One-Way Clutch (F1) Assembly

1. Disassemble the No. 1 one-way clutch (F1) assembly using the diagram in Figure 115 as a guide.
2. Clean all No. 1 one-way clutch (F1) assembly parts thoroughly with solvent and dry with compressed air.
3. Inspect all No. 1 one-way clutch (F1) assembly parts for wear and/or damage and replace as necessary.
4. Install the retaining plate (lower) to the No. 1 one-way clutch (F1) outer race and snap into place as shown in Figure 117.
5. Install the end bearing (lower) into the No. 1 one-way clutch (F1) outer race as shown in Figure 117.

Component Rebuild Continued on Page 67.

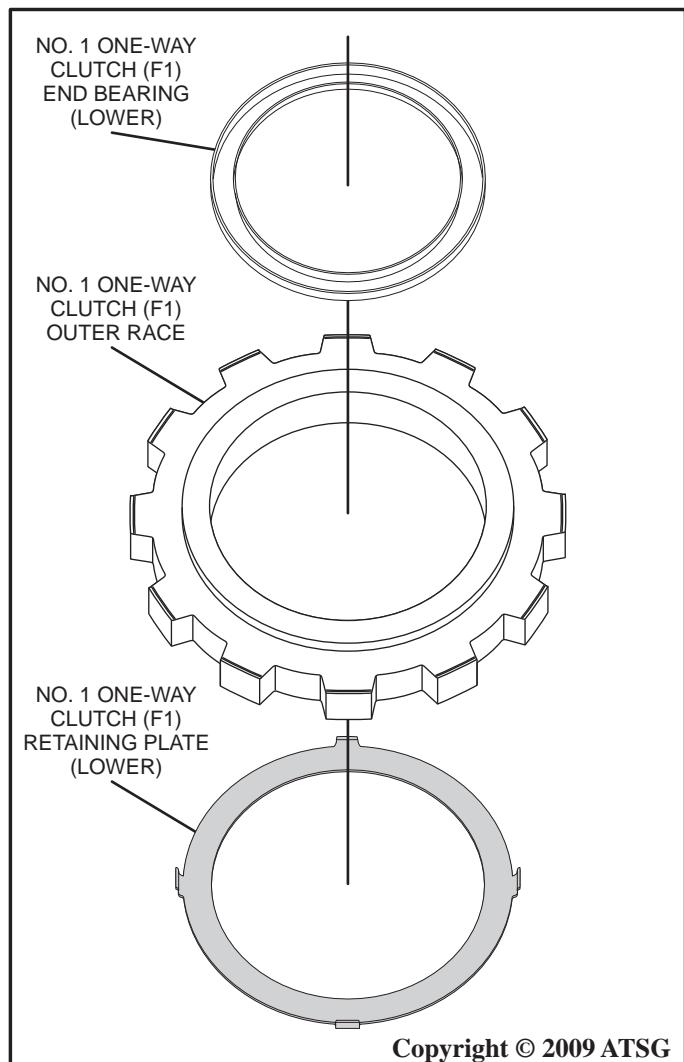
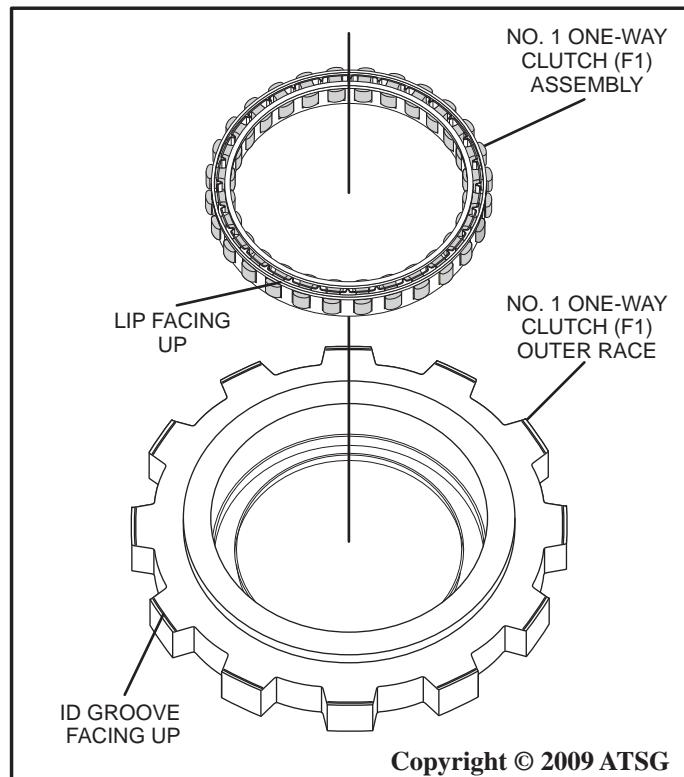


Figure 117

AUTOMATIC TRANSMISSION SERVICE GROUP



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Figure 118

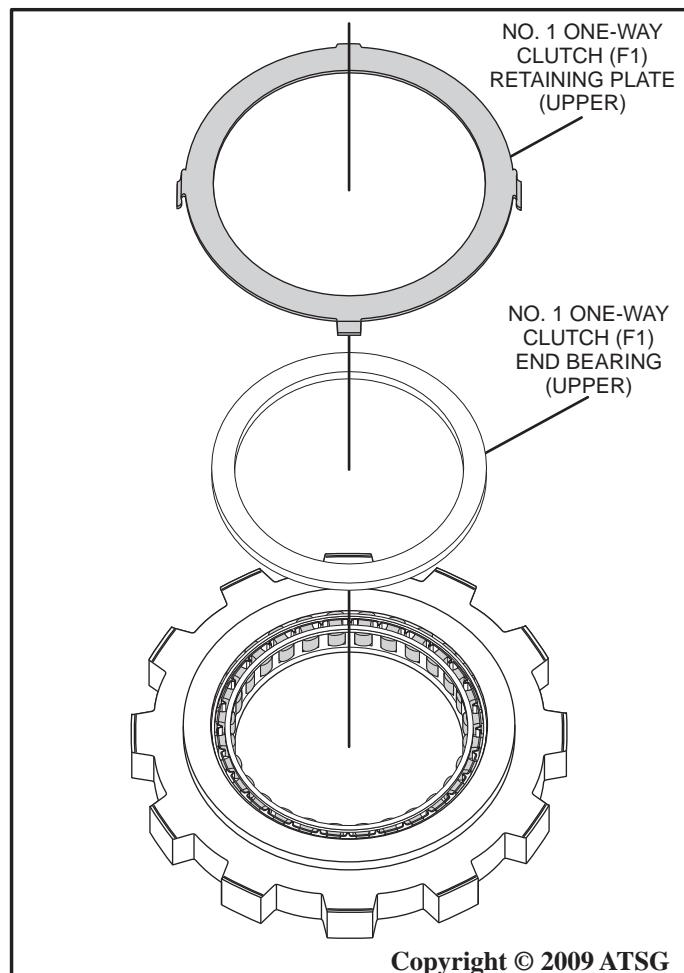


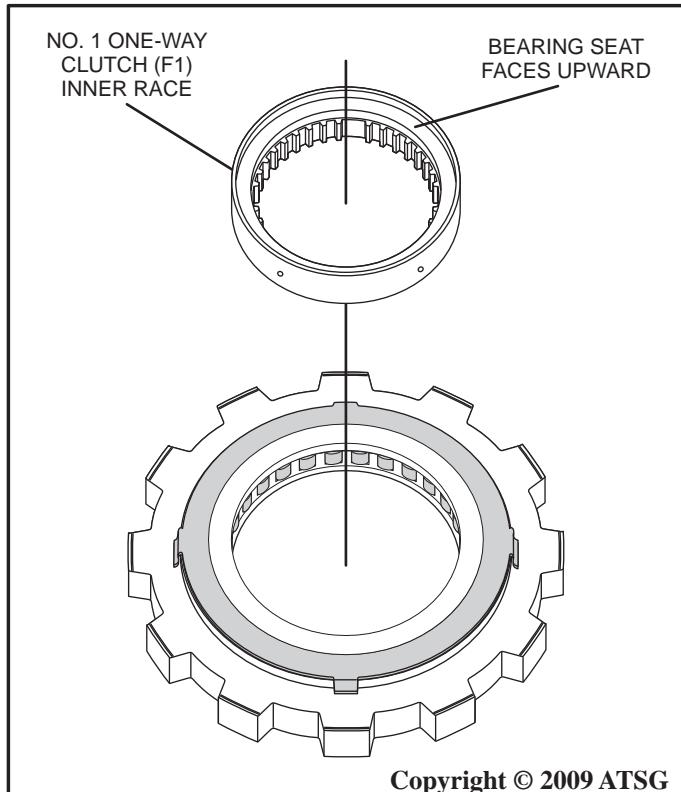
Figure 119

COMPONENT REBUILD (CONT'D)

No. 1 One-Way Clutch (F1) Assembly

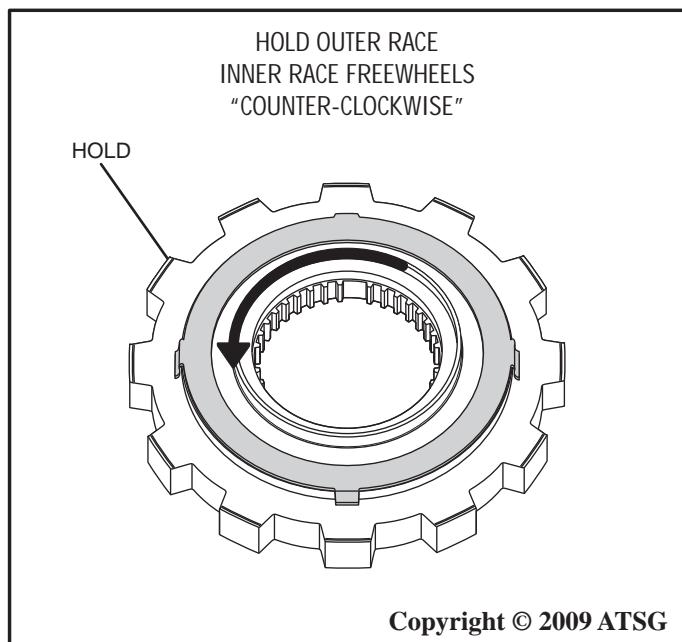
6. Coat the No. 1 one-way clutch (F1) assembly with a small amount of ATF, and install into the No. 1 one-way clutch (F1) outer race as shown in Figure 118.
NOTE: Make sure the LIP on the one way clutch and the ID GROOVE on the outer race are both facing the same upward direction as shown in Figure 118.
7. Install the No. 1 one-way clutch (F1) upper end bearing as shown in Figure 119.
8. Install the No. 1 one-way clutch (F1) retaining plate and then snap it into place as shown in Figure 119.
9. Install the No. 1 one-way clutch (F1) inner race by twisting in a "counter clockwise" direction with the bearing seat facing upward as shown in Figure 120.
10. Check freewheel operation of the No. 1 one-way clutch (F1) as shown in Figure 121.
(Hold the outer race, and the inner race should freewheel in a "counter-clockwise" direction).

Component Rebuild Continued on Page 68.



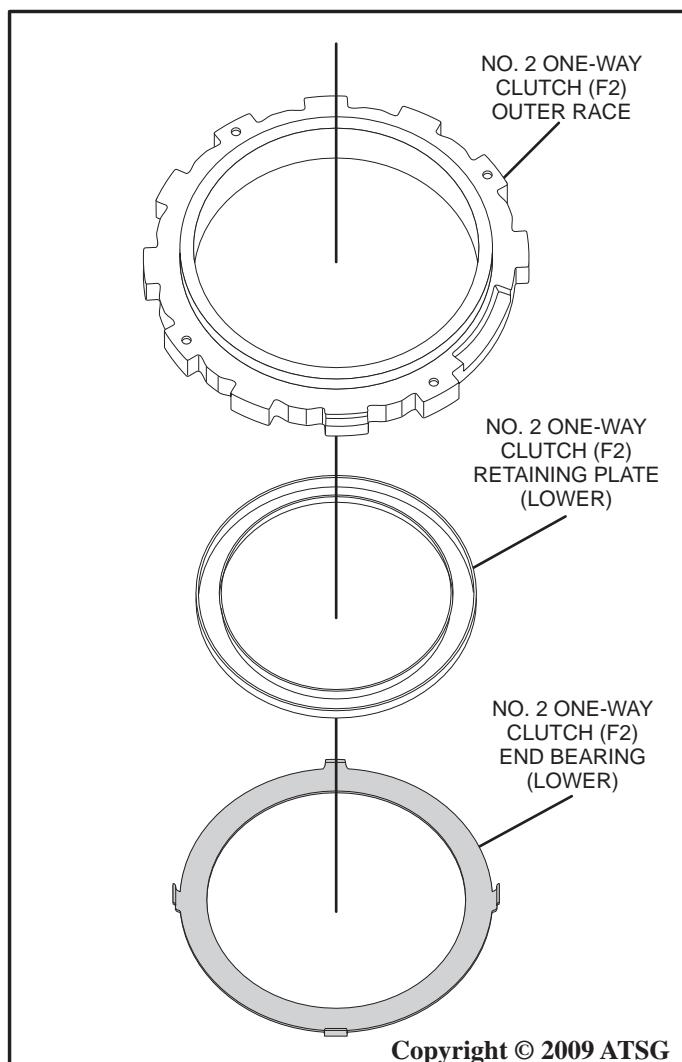
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Figure 120



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Figure 121



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Figure 122

COMPONENT REBUILD (CONT'D)

No. 2 One-Way Clutch (F2) Assembly

1. Disassemble the No. 2 one-way clutch (F2) assembly using the diagram in Figure 116 as a guide.
2. Clean all No. 2 one-way clutch (F2) assembly parts thoroughly with solvent and dry with compressed air.
3. Inspect all No. 2 one-way clutch (F2) assembly parts for wear and/or damage and replace as necessary.
4. Install the retaining plate (lower) to the No. 2 one-way clutch (F2) outer race and snap into place as shown in Figure 122.
5. Install the end bearing (lower) into the No. 2 one-way clutch (F2) outer race as shown in Figure 122.
6. Coat the No. 2 one-way clutch (F2) with a small amount of ATF and install into the No. 2 one-way clutch (F2) outer race (*making sure the lip on the one way clutch and the id mark on the inner race are facing upward*) as shown in Figure 123.
7. Install the No. 2 one-way clutch (F2) upper end

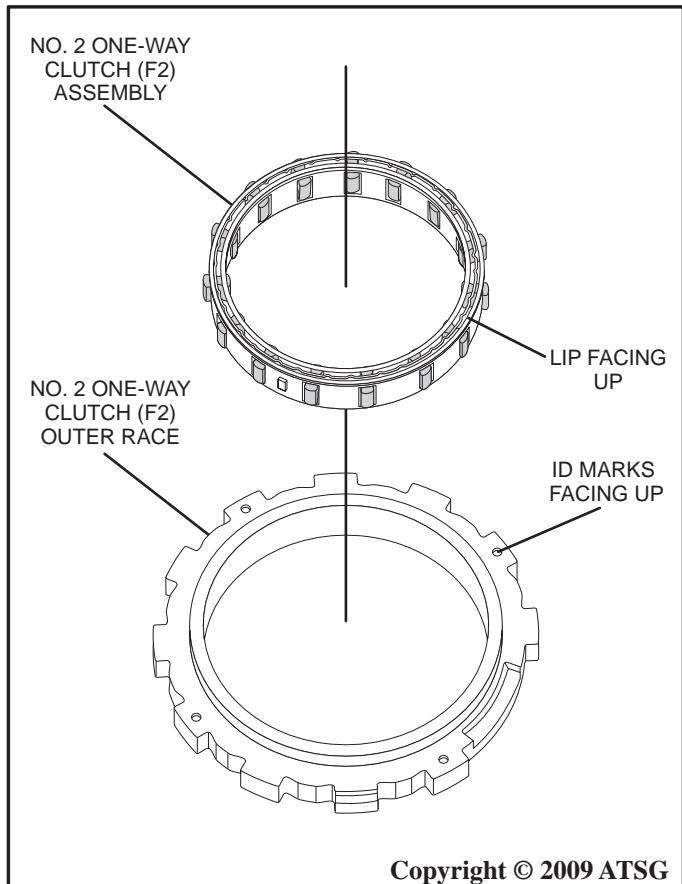


Figure 123

8. Install the No. 2 one-way clutch (F2) retaining plate and then snap it into place as shown in Figure 124.
9. Install the anti-clunk spring into place as shown in Figure 124.
10. Check freewheel operation of the No. 2 one-way clutch (F2) as shown in the transaxle final assembly section Figure 198.
(With the No. 2 one-way clutch (F2) installed in the case with the id marks facing upward, the underdrive clutch (C3) drum should freewheel in a "counter clockwise" direction.)

Continued on Page 69.

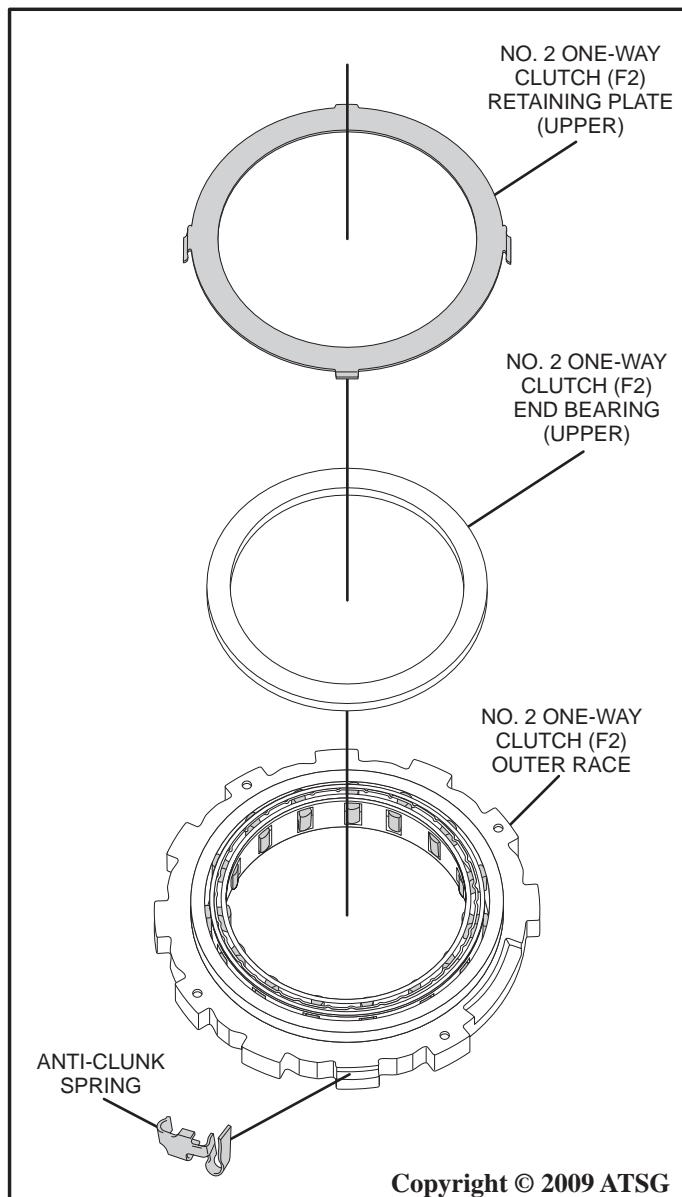
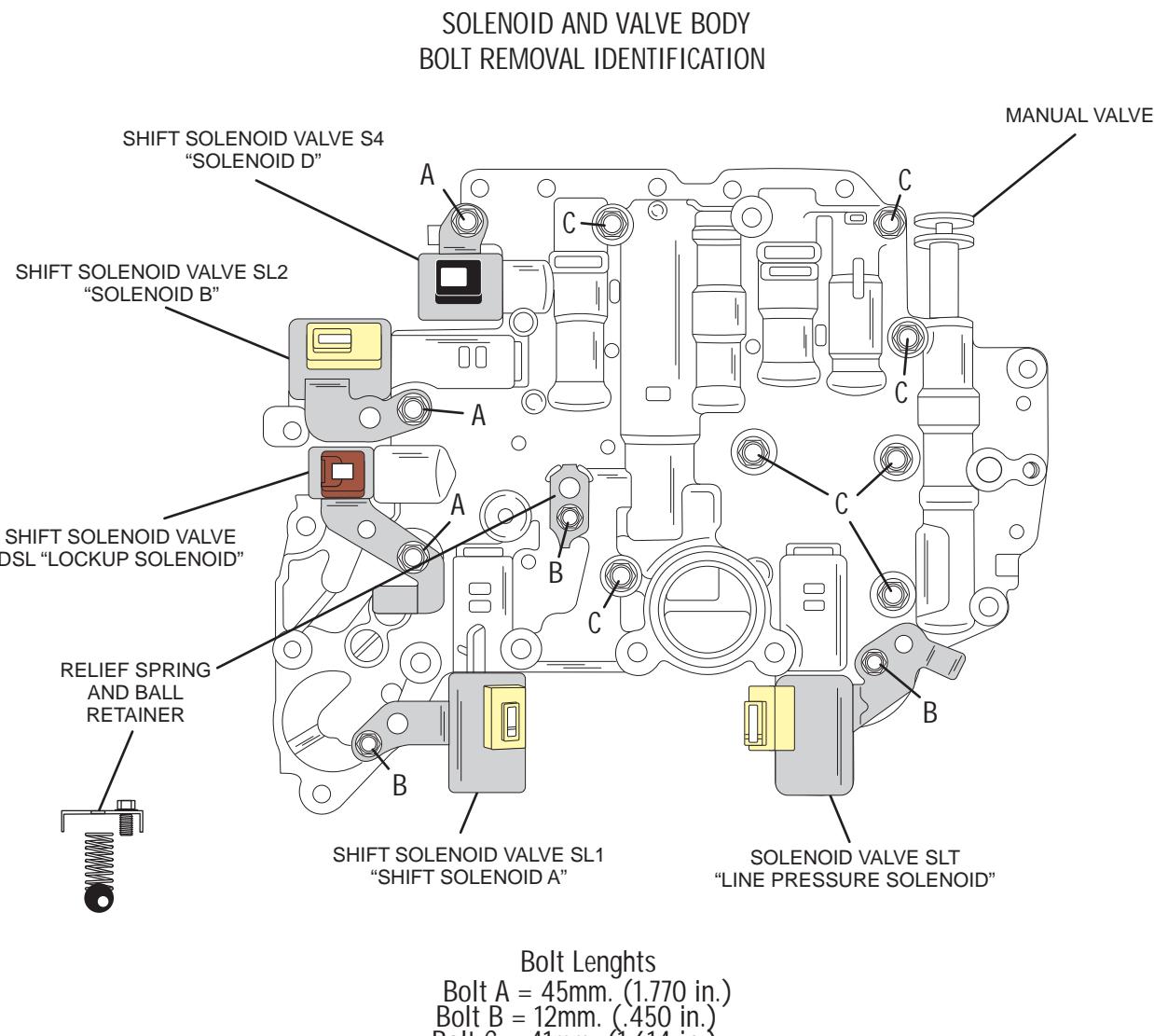


Figure 124

COMPONENT REBUILD SECTION VALVE BODY ASSEMBLY

1. Remove the three, 10 mm bolts identified with the letter "A," and remove the S4, SL2 and DSL solenoids from their bores, and lay aside for later inspection as shown in Figure 125.
 2. Remove the two, 8 mm bolts identified with the letter "B," and remove the SL1 and SLT solenoids from their bores, and lay aside for later inspection as shown in Figure 125.
 3. Remove the 8 mm bolt identified with the letter "B," and remove the relief spring and ball retainer as shown in Figure 125.
- Note: retainer is spring loaded.**
4. Remove relief spring and ball and lay aside for cleaning and assembly as shown in Figure 125.
Note: Ball diameter is 10mm.
 5. Remove the seven 10mm bolts identified with the letter "C" as shown in Figure 125.
 6. Remove the Manual Valve and lay aside for further cleaning and inspection.

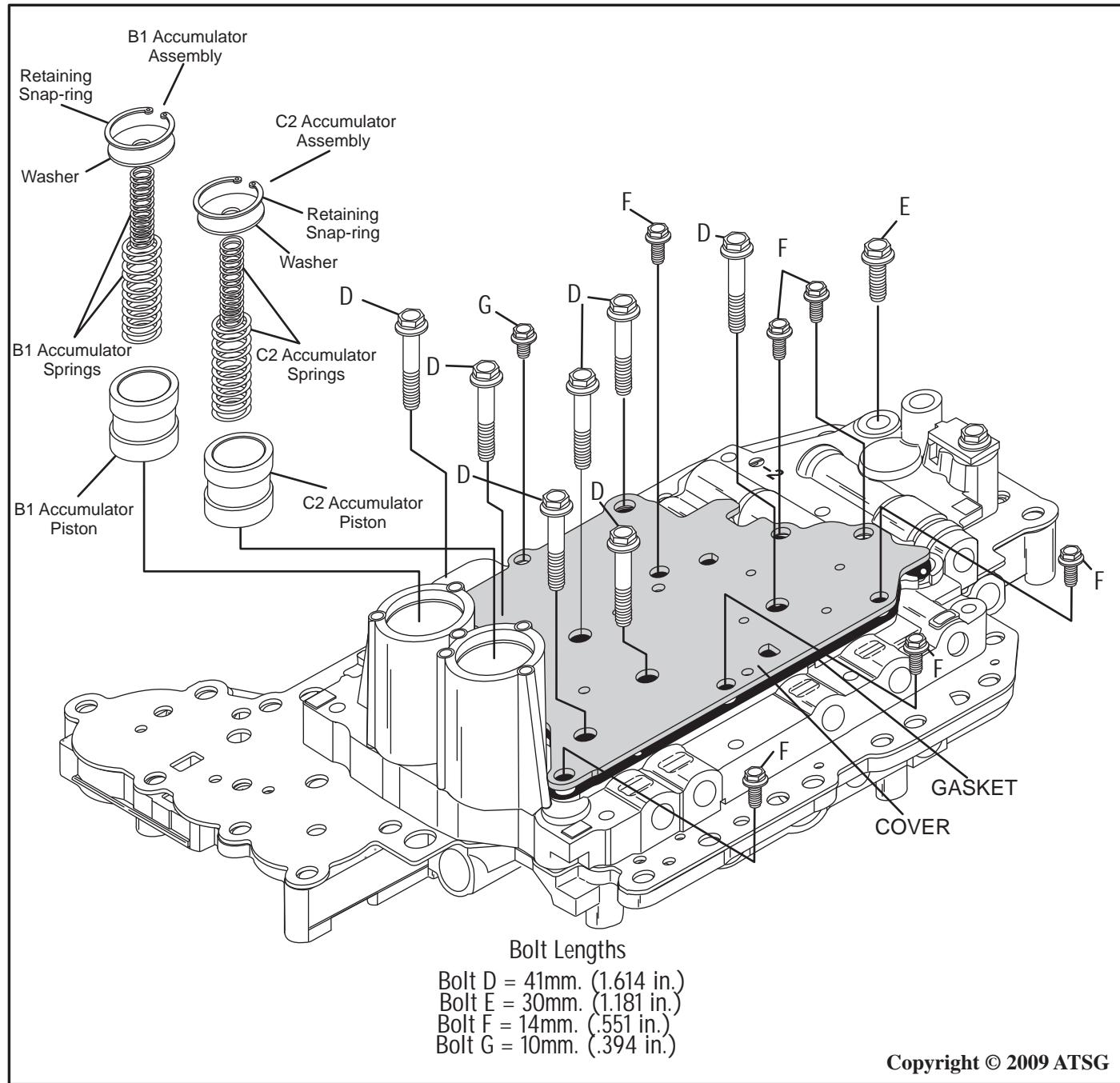
Valve body assembly continued on Page 70.



COMPONENT REBUILD SECTION VALVE BODY ASSEMBLY (CONT'D)

7. Remove the seven, 10 mm bolts identified with the letter "D" as shown in Figure 126.
8. Remove the 10 mm bolt identified with the letter "E" as shown in Figure 126
9. Remove the six, 8 mm bolts identified with the letter "F" as shown in Figure 126.
10. Remove the remaining 8 mm bolt identified with the letter "G" and remove the cover as shown in Figure 126.
11. Using snap-ring pliers, remove the snap rings retaining the B1 and C2 accumulator lineups as shown in Figure 126.
Caution: both assemblies are spring loaded.
12. Remove the B1 and C2 accumulator assembly retaining washers, springs and pistons, as shown in Figure 126 and lay aside for later inspection.

Valve body assembly continued on Page 71.



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Figure 126

COMPONENT REBUILD SECTION VALVE BODY ASSEMBLY (CONT'D)

13. Remove the 10 mm bolt identified with the letter "D" and remove the retainer and 10 mm relief ball as shown in Figure 127.
14. Remove the remaining 10 mm relief ball that is now exposed, after the removal of the cover.
15. Place fingers on the spacer plate, where the two grey arrows are indicated, and thumbs on the upper valve body, retaining them together, and flip the plate and valve body bottom side up as shown in Figure 127.
16. Remove the spacer plate from the upper valve body as shown in Figure 128.
17. Remove the two screens, and the five 5.5mm (.217") check balls as shown in Figure 128.
18. Set upper valve body aside for cleaning and further dis-assembly.

Valve body assembly continued on Page 72.

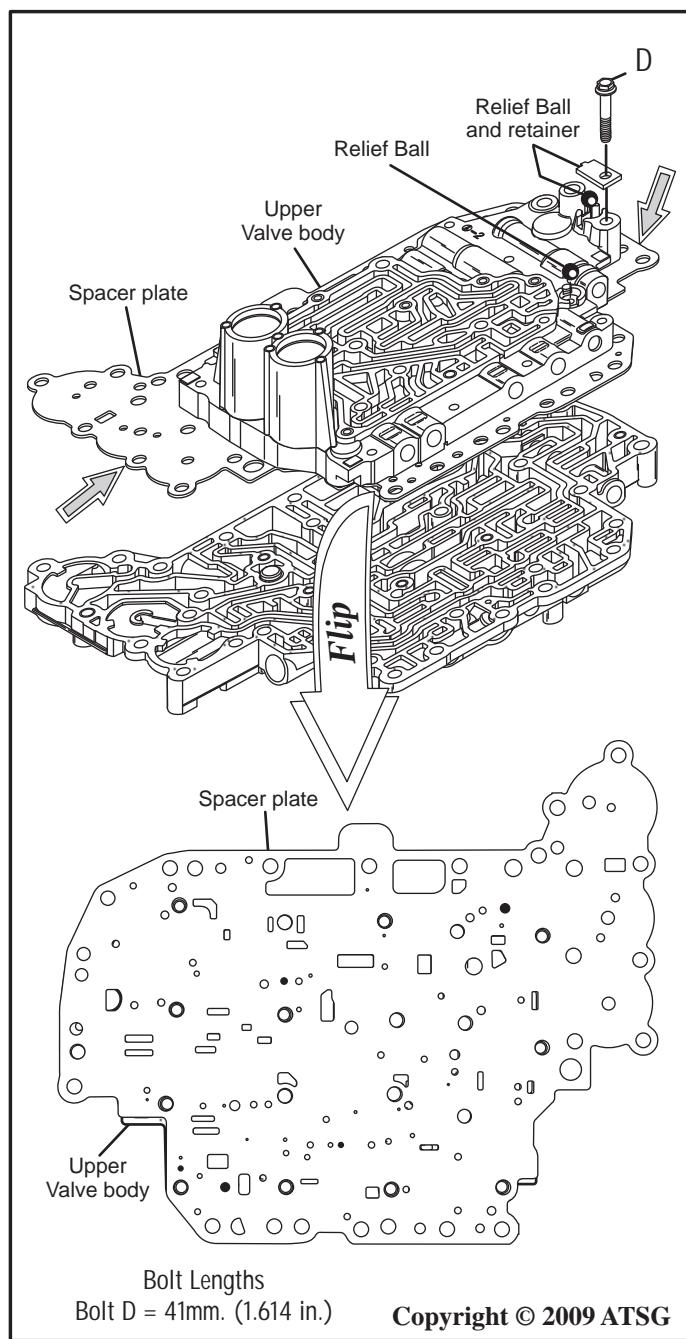


Figure 127

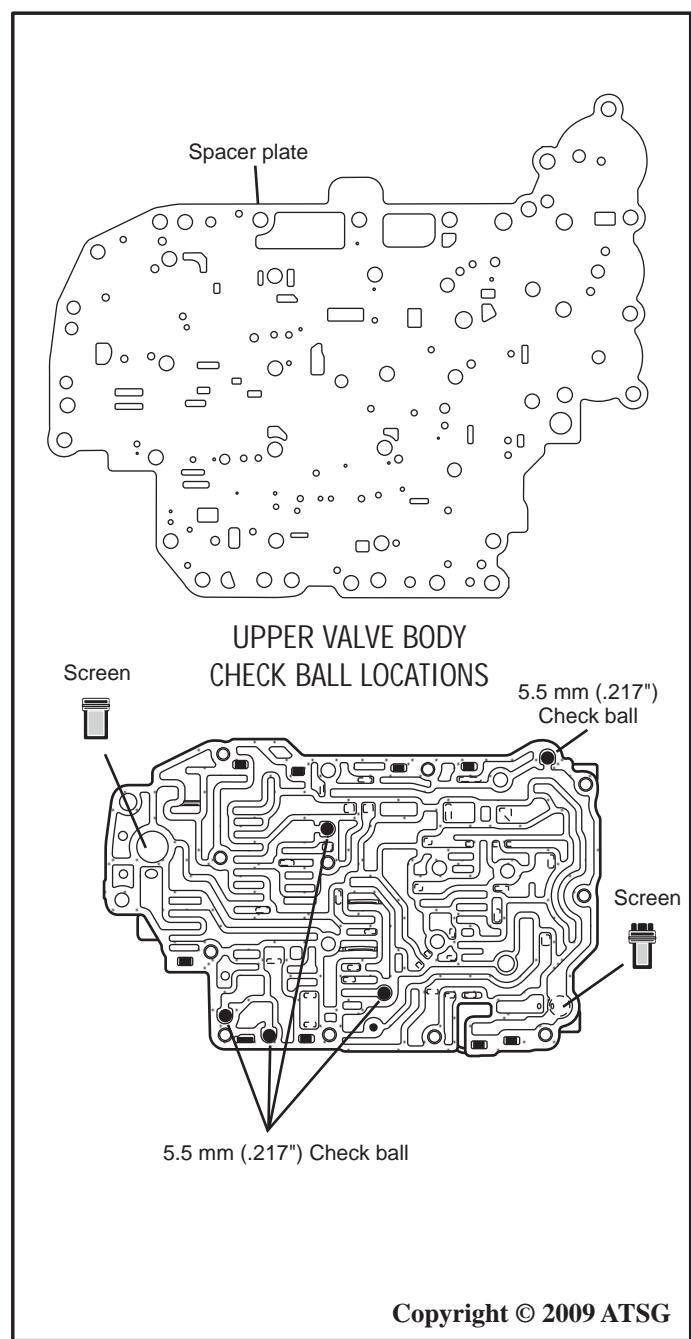
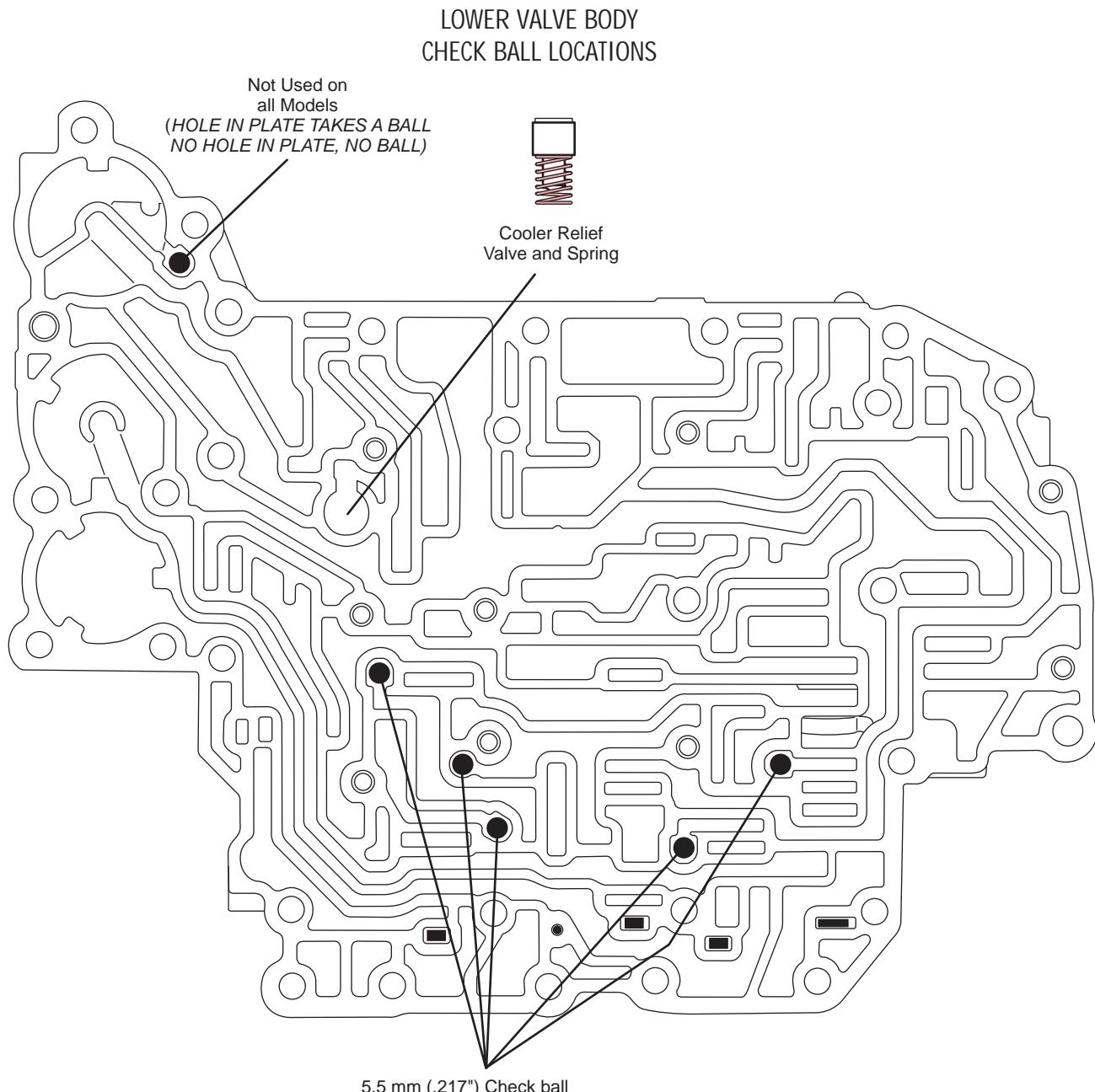


Figure 128

COMPONENT REBUILD SECTION
VALVE BODY ASSEMBLY (CONT'D)

19. Remove the Cooler relief valve and spring from the lower valve body as shown in Figure 129.
20. Remove the five 5.5 mm (.217") check balls as shown in Figure 129.
21. Remove the 5.5 mm (.217") check ball from the left corner of the lower valve body as shown in Figure 129 if required.
Note: will only use a ball in this location if there is a hole in the spacer plate above it.

Valve body assembly continued on Page 73.



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Figure 129

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Technical Service Information

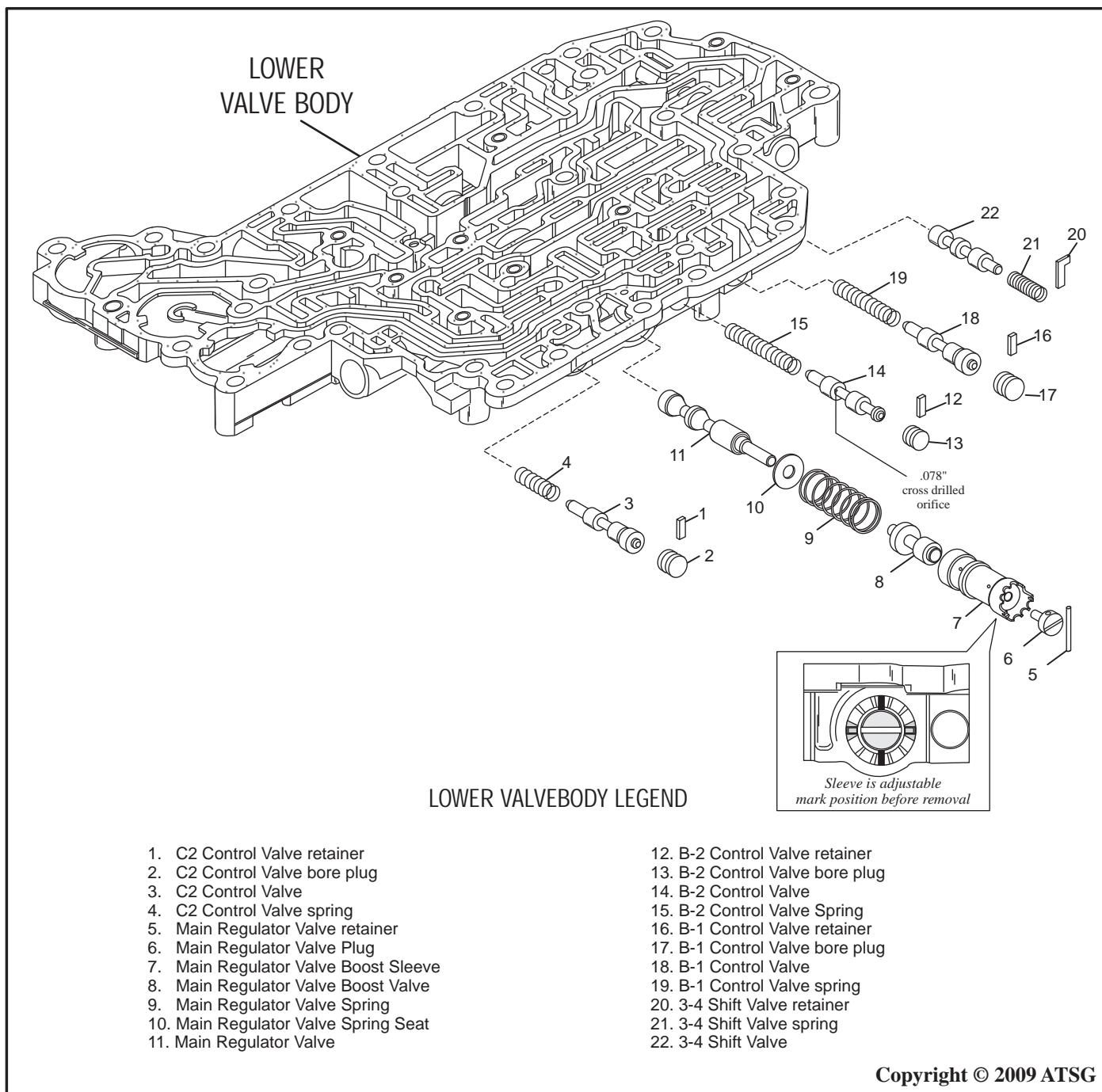
COMPONENT REBUILD SECTION VALVE BODY ASSEMBLY (CONT'D)

22. Disassemble lower valve body and place valves, springs and retainers in appropriate trays exactly as they were removed as shown in Figure 130.
23. Clean all valve body parts thoroughly with solvent and dry with compressed air.

24. Assemble the lower valve body parts as shown in Figure 130, and lube the valves with a small amount of ATF as they are installed.

Note: *the main regulator boost sleeve is adjustable and should be marked before removal to ensure that it is back at the factory adjustment. This will affect Line Pressure. Also, this sleeve is commonly worn and may require replacement.*

Valve body assembly continued on Page 74.



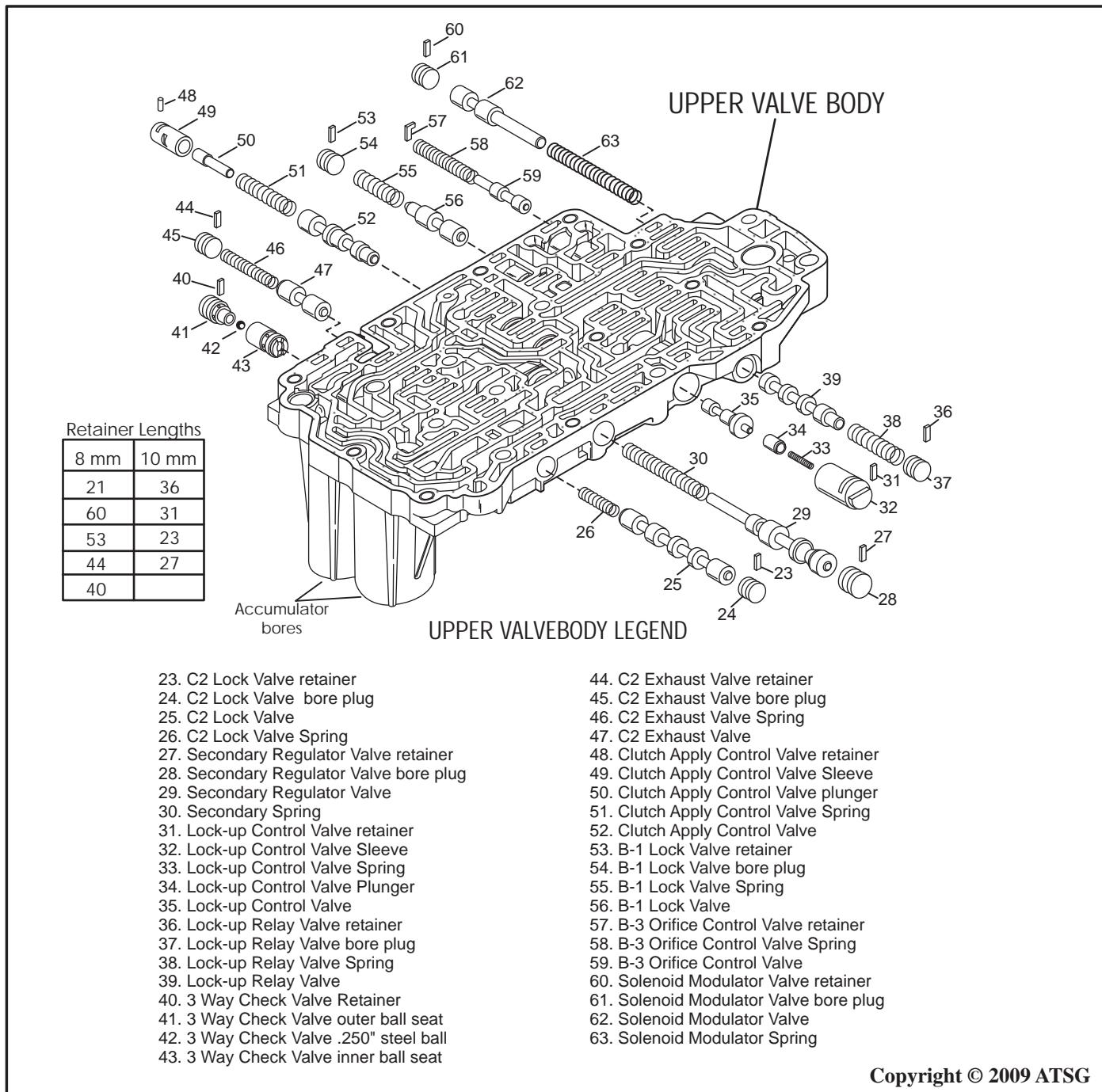
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Figure 130
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COMPONENT REBUILD SECTION VALVE BODY ASSEMBLY (CONT'D)

25. Disassemble upper valve body and place valves, springs and retainers in appropriate trays exactly as they were removed as shown in Figure 131.
 26. Clean all valve body parts thoroughly with solvent and dry with compressed air. Inspect the accumulator bores on top of the upper valve body for any wear and replace the valve body as necessary.
 27. Assemble the upper valve body parts as shown in Figure 131, and lube the valves with a small amount of ATF as they are installed.
- Note: Items 49 and 32 are commonly worn and may require replacement. Also note there are different lengths on some of the retainers listed below in Figure 131.**

Valve body assembly continued on Page 75.



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Figure 131

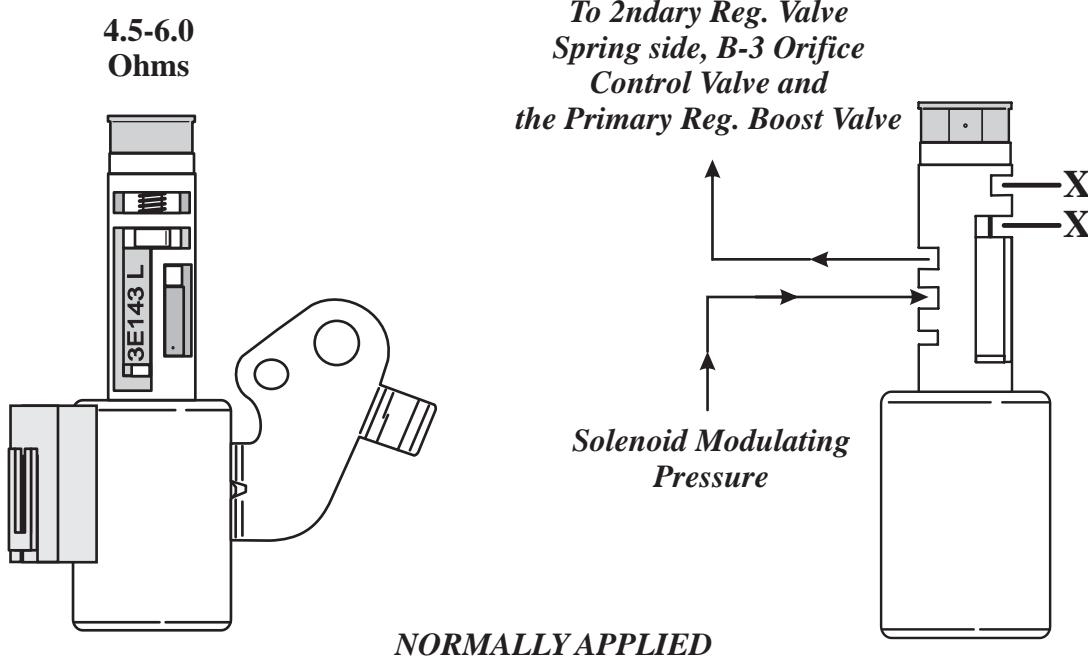
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COMPONENT REBUILD SECTION VALVE BODY ASSEMBLY (CONT'D)

28. Refer to Figure 132 below to check the SLT, line pressure control solenoid and its mechanical function. Figure 132 also will indicate the ohm value of the solenoid as well as a hydraulic description of the solenoids function.
29. Refer to Figure 133 to check the SL1 solenoid and its mechanical function. Figure 133 will also show the ohm value and its hydraulic function.
30. Refer to Figure 134 to check the SL2 solenoid and its mechanical function. Figure 134 will also show the ohm value and its hydraulic function.
31. Refer to Figure 135 to check the S4 solenoid and its mechanical function. Figure 135 will also show the ohm value and its hydraulic function.
32. Refer to Figure 136 to check the DSL solenoid and its mechanical function. Figure 136 will also show the ohm value and its hydraulic function.

Valve body assembly continued on Page 76.

SLT LINE PRESSURE CONTROL SOLENOID



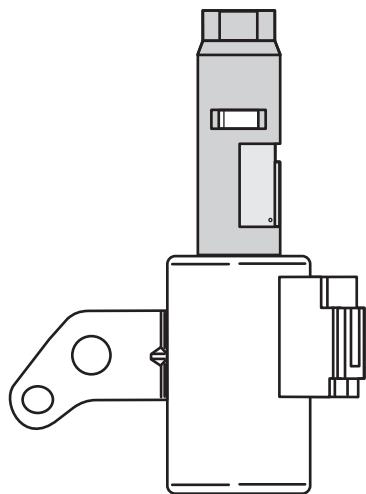
The SLT or Line Pressure Control Solenoid is a Normally Applied linear type Solenoid. When the Solenoid is OFF Solenoid Modulating Pressure will be connected to the port leading to the 2ndary Reg. Valve Spring side, B-3 Orifice Control Valve and the Primary Reg. Boost Valve causing Pressure to be high in those circuits, as well as Main Line Pressure. When the SLT Solenoid is ON pressure will be low leading to the valves listed above, as well as Line Pressure. This Solenoid is controlled by the PCM which calculates the duty cycle to match Line Pressure to engine load.

COMPONENT REBUILD SECTION VALVE BODY ASSEMBLY (CONT'D)

Valve body assembly continued on Page 77.

4.5-6.0
Ohms

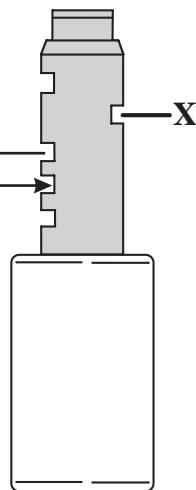
SL1 SOLENOID



*To Lockup Control valve
and the B-1 Lock Valve
Spring side in 2nd Gear*

*Solenoid Modulating
Pressure*

Normally Applied



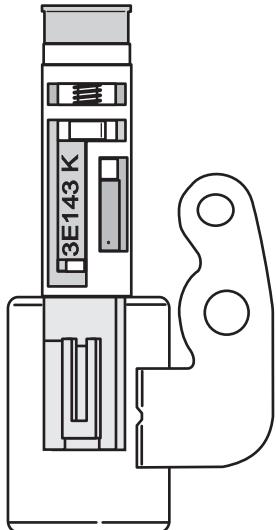
The SL1 Solenoid is a Normally Applied linear type Solenoid. When the Solenoid is OFF Modulating Pressure will be connected to the port leading to the Lockup Control valve and the spring side of the B-1 lock valve. When the Solenoid is ON Modulating pressure will be blocked.

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Figure 133

4.5-6.0
Ohms

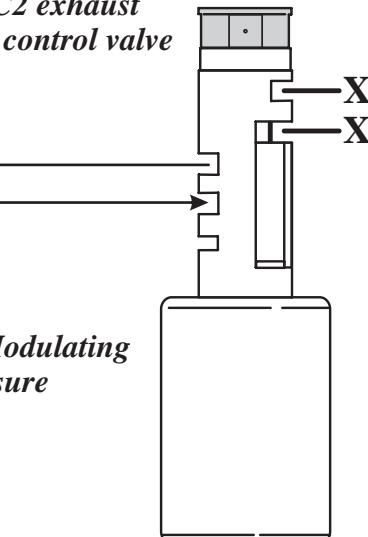
SL2 SOLENOID



*To the spring side of the
C2 lock valve, C2 exhaust
valve and the C-2 control valve*

*Solenoid Modulating
Pressure*

Normally Applied



The SL2 Solenoid is a Normally Applied linear type Solenoid. When the Solenoid is OFF Modulating Pressure will be connected to the port leading to the spring side of the C2 Lock Valve, the first land of the C2 exhaust valve and the first land of the C2 Control valve.

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Figure 134

COMPONENT REBUILD SECTION VALVE BODY ASSEMBLY (CONT'D)

Valve body assembly continued on Page 78.

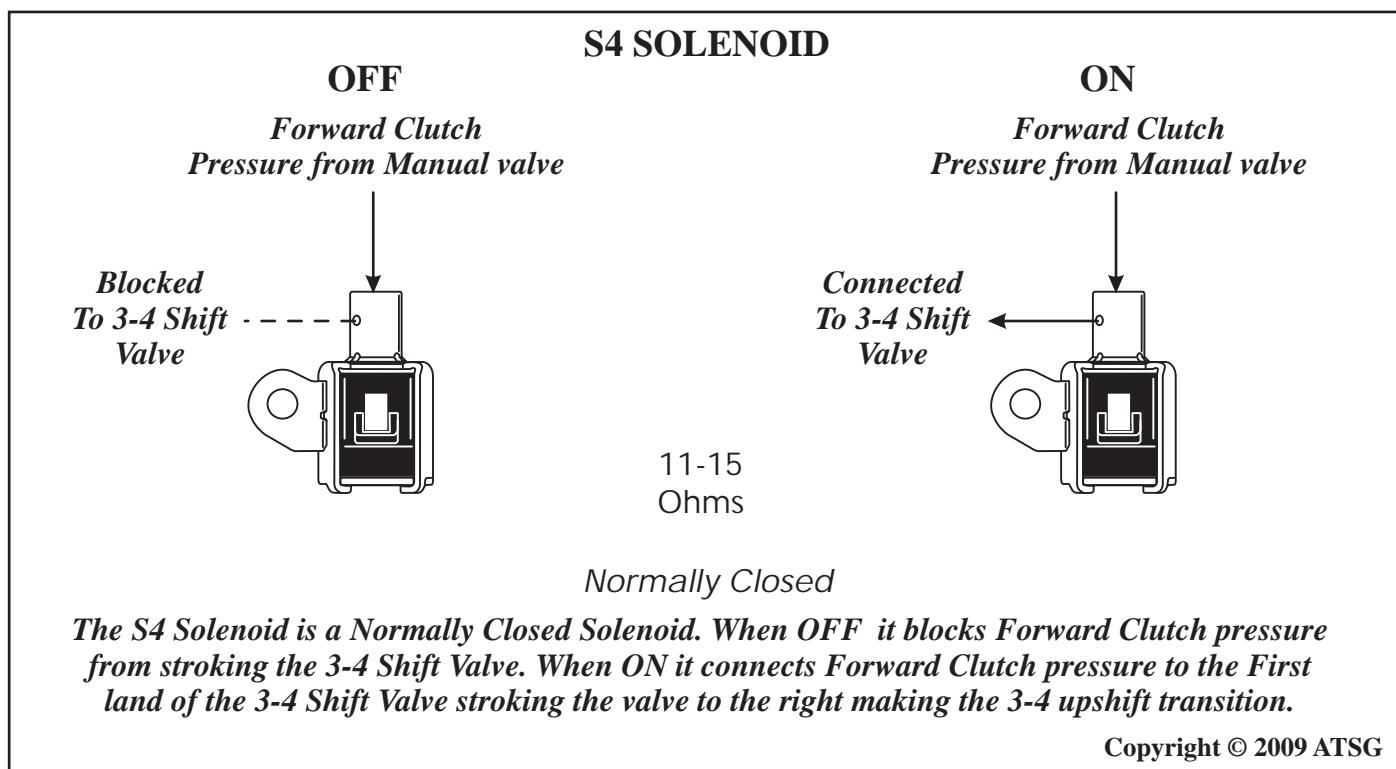


Figure 135

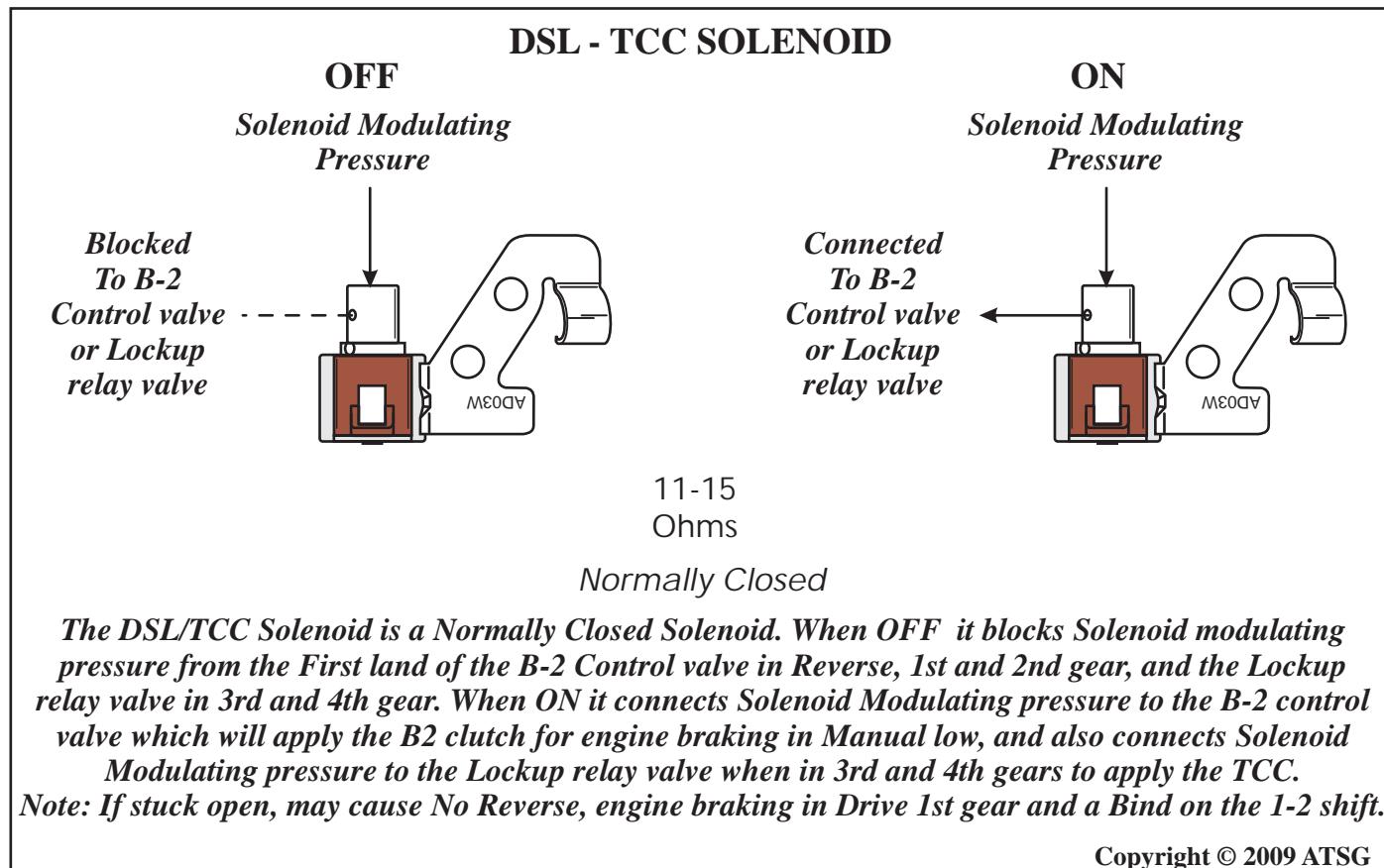


Figure 136

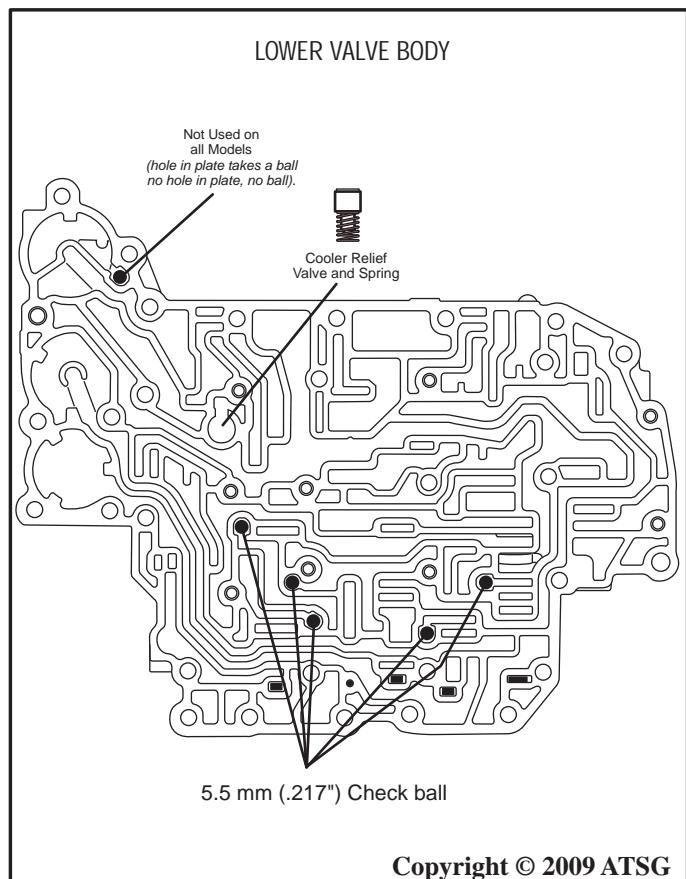
COMPONENT REBUILD SECTION VALVE BODY ASSEMBLY (CONT'D)

33. Install the five - 5.5mm (.217") check balls into the lower valve body casting as shown below in Figure 137.

Note: check the spacer plate over the check ball pocket in the top left corner to verify whether it requires the check ball.

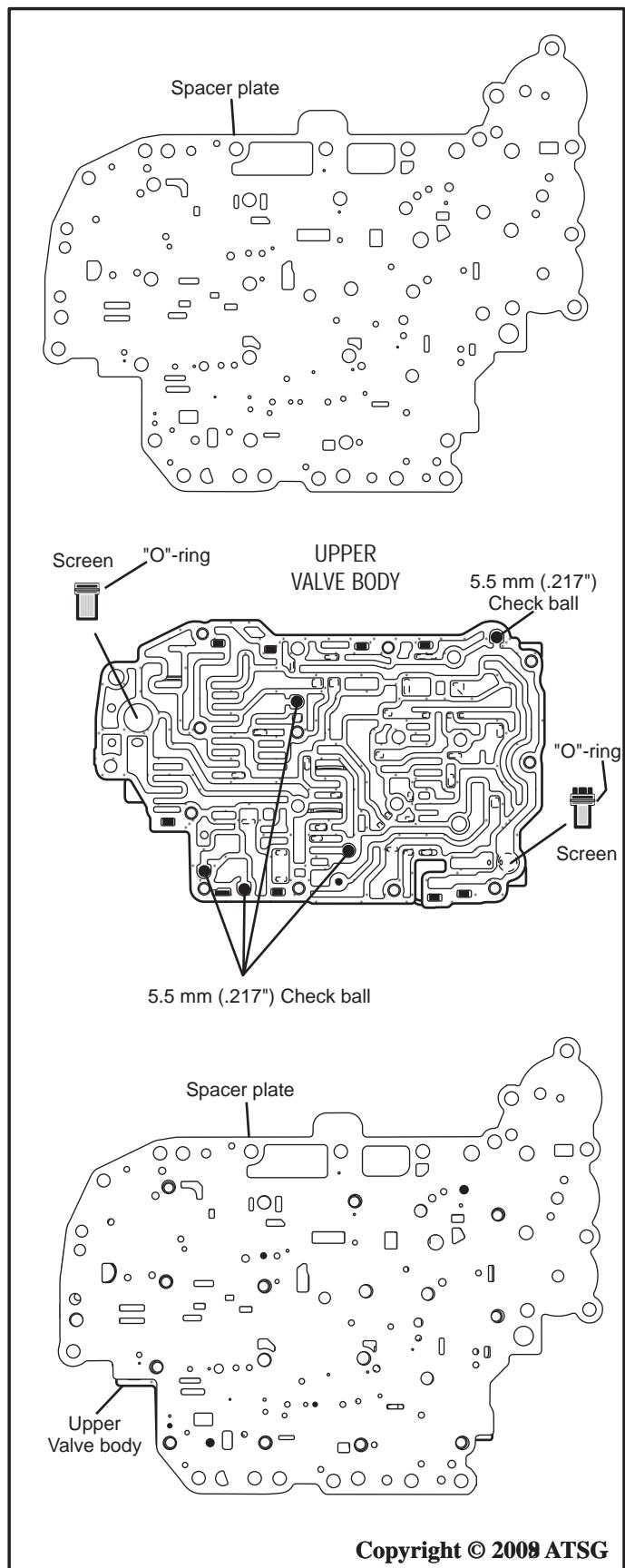
34. Install the cooler relief spring and valve into the lower valve body as shown in Figure 138.
35. Install the five - 5.5mm (.217") check balls into the upper valve body casting as shown below in Figure 138.
36. Install new o-rings onto the two screens and lubricate with a small amount of Trans-Jel® then install into the two holes in the upper valve body in the locations shown in Figure 138.
37. Assemble the spacer plate onto the upper valve body as shown in Figure 138, so it can be installed as an assembly onto the lower valve body.

Valve body assembly continued on Page 79.



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Figure 137



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Figure 138

COMPONENT REBUILD SECTION VALVE BODY ASSEMBLY (CONT'D)

38. Place fingers on the spacer plate, where the two grey arrows are indicated, and thumbs on the upper valve body, retaining them together, as shown in Figure 139.
39. Flip the plate and valve body over and assemble it onto the Lower Valve body, as shown in Figure 139.
40. Install the two 10 mm relief balls into the upper valve body as shown in Figure 139.
41. Install the retainer and the bolt identified with the letter "D" as shown in Figure 139, but do not torque at this time.
42. Install a new gasket on the Upper Valve body and assemble the cover over the new gasket as shown in Figure 140.

Valve body assembly continued on Page 80.

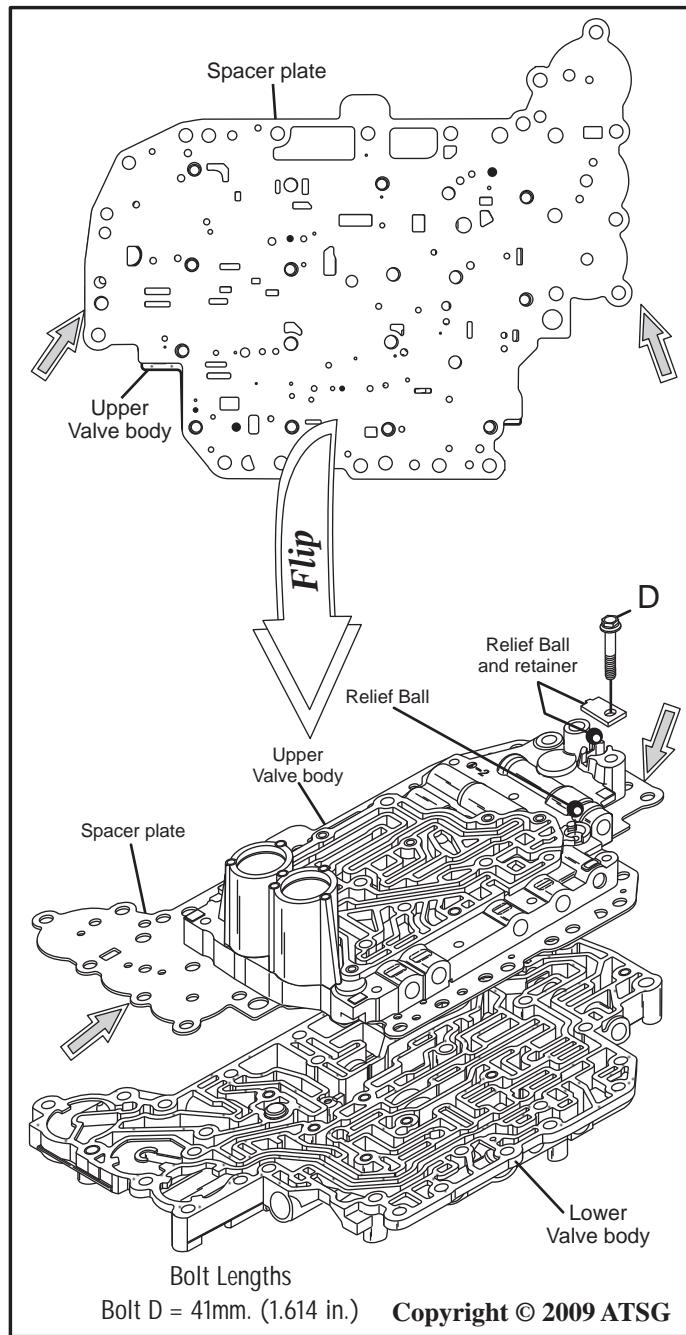


Figure 139

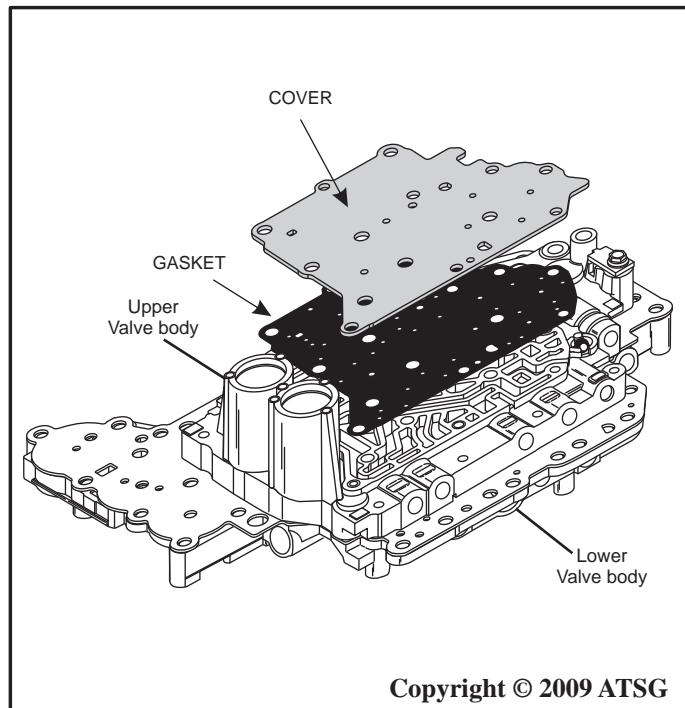


Figure 140

COMPONENT REBUILD SECTION VALVE BODY ASSEMBLY (CONT'D)

43. Install the seven, 10 mm bolts identified with the letter "D." Torque all bolts identified with the letter "D" to **11 Nm, 8ft.lb.** See Figure 141.
44. Install the 10 mm bolt identified with the letter "E." Torque the bolt identified with the letter "E" to **11Nm, 8ft.lb.** See Figure 141.
45. Install the six, 8 mm bolts identified with the letter "F," and the remaining 8 mm bolt identified with the letter "G" and torque to **6.6 Nm, 58in.lb.** See Figure 141.

46. Inspect the B1 and C2 accumulator pistons for wear or scoring, replace as necessary, and install them into the upper valve body as shown in Figure 141.
47. Install the accumulator springs into the pistons and verify the correct springs are in their locations, by using the spring specs provided in Figure 141.
48. Install the washer and retaining snap-ring as shown in Figure 141.

Valve body assembly continued on Page 81.

B1 Accumulator Outer Spring

No. Coils-10
Overall Length-1.765"
Outside Diameter-.632"
Coil Diameter-.082"
Color- White

B1 Accumulator Inner Spring

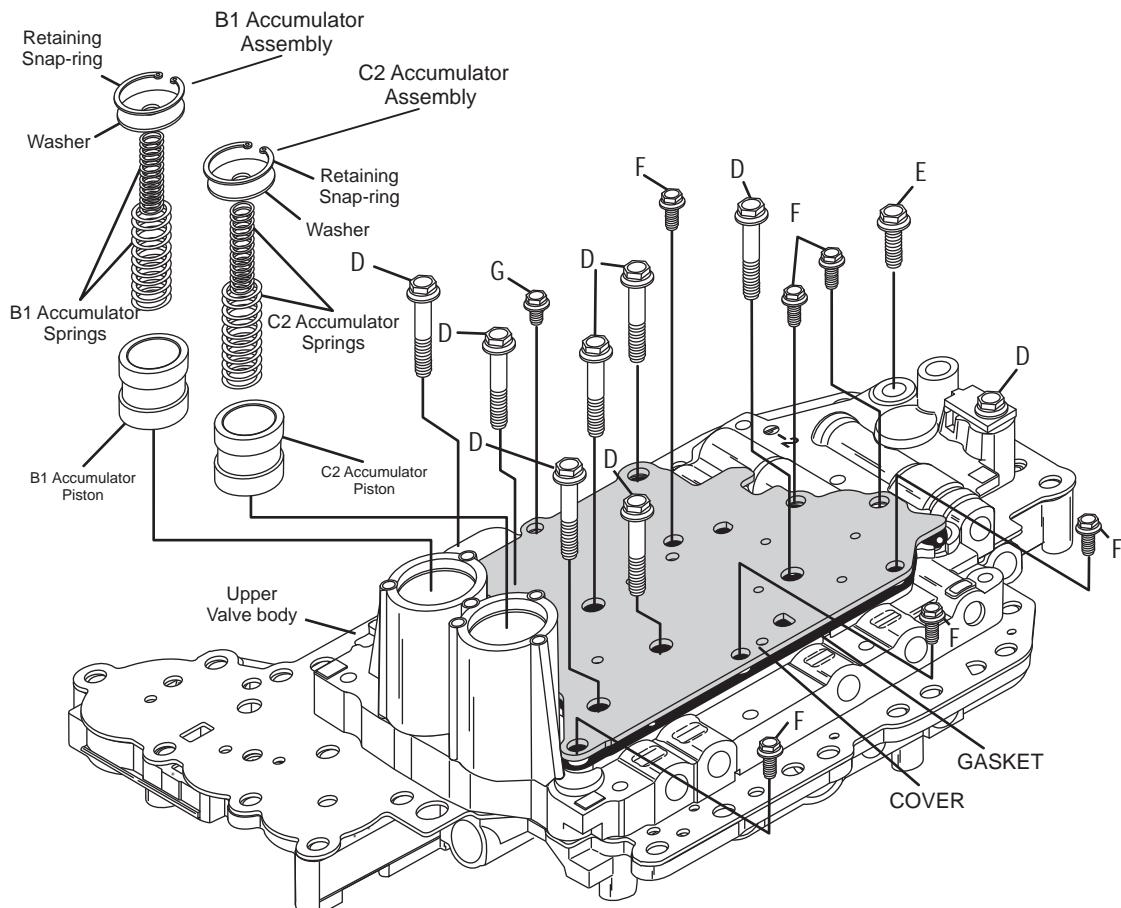
No. Coils-13.5
Overall Length-1.725"
Outside Diameter-.432"
Coil Diameter-.059"
Color- Purple

C2 Accumulator Outer Spring

No. Coils-9.5
Overall Length-1.845"
Outside Diameter-.633"
Coil Diameter-.078"
Color- Red-Brown

C2 Accumulator Inner Spring

No. Coils-11.5
Overall Length-1.860"
Outside Diameter-.438"
Coil Diameter-.050"
Color- Red-Brown



Bolt Lengths and Torque Specs

Bolt D = 41mm. (.1614 in.) Torque- 11 Nm, 8ft.lb
Bolt E = 30mm. (.1181 in.) Torque- 11 Nm, 8ft.lb
Bolt F = 14mm. (.551 in.) Torque- 6.6 Nm, 58in.lb
Bolt G = 10mm. (.394 in.) Torque- 6.6 Nm, 58in.lb

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Figure 141

COMPONENT REBUILD SECTION VALVE BODY ASSEMBLY (CONT'D)

49. Install the seven 10 mm bolts identified with the letter "C," and torque to **11Nm, 8ft.lb.** See Figure 142.
50. Install the S4, SL2 and DSL solenoids into their bores, and install the bolts identified with the letter "A," and torque to **11Nm, 8ft.lb.** as shown in Figure 142.
51. Install the SL1 and SLT solenoids into their bores, and the two, 8 mm bolts identified with the letter "B," and torque to **6.6 Nm, 58 in.lb.** as shown in Figure 142.
52. Install relief ball into the valve body then install the spring, retainer and bolt identified with the letter "B" and torque to **6.6 Nm, 8ft.lb.** as shown in Figure 142.
Note: Ball diameter is 10mm.
53. Install the Manual valve as shown in Figure 142.

Continued on Page 82.

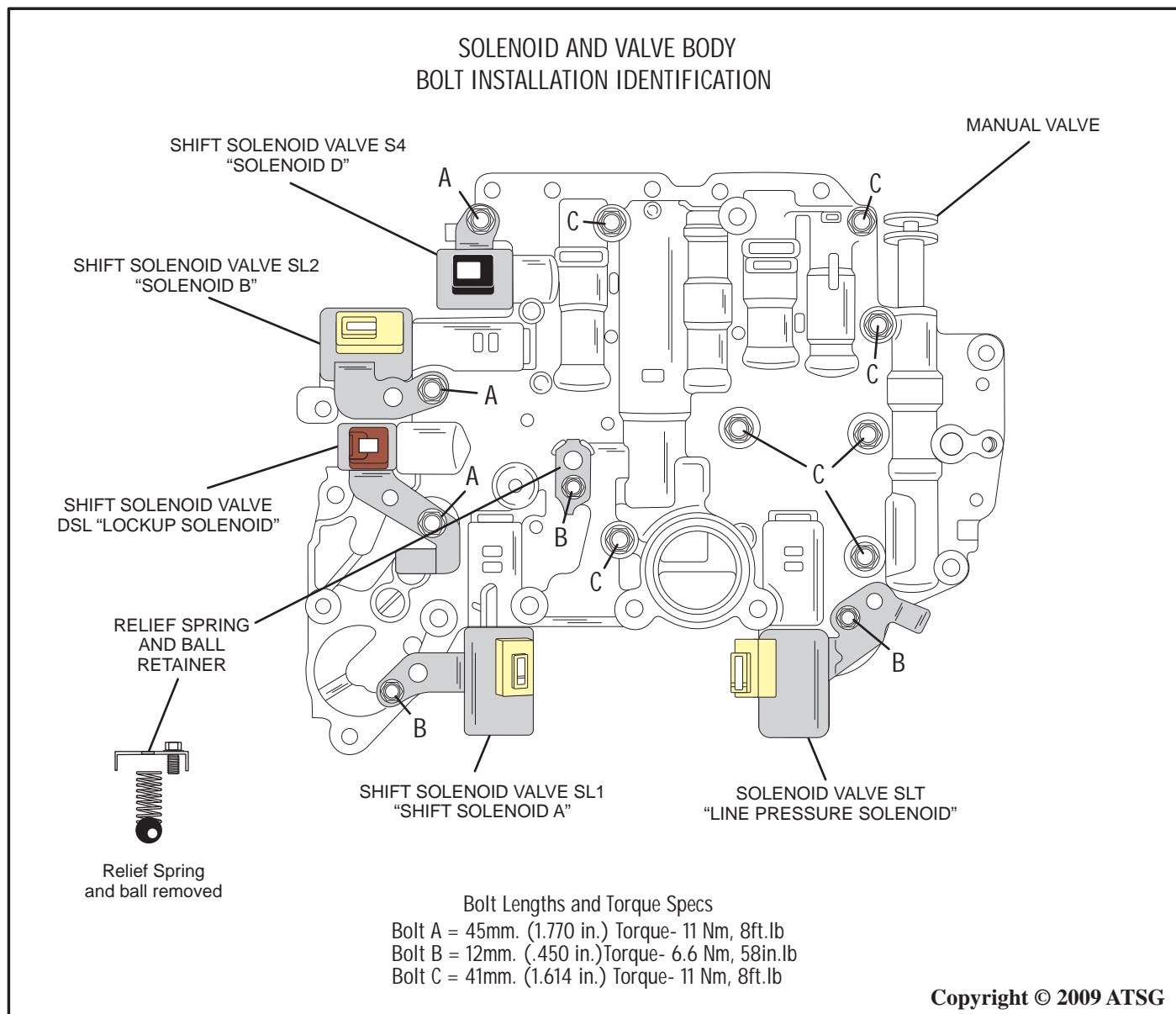


Figure 142
AUTOMATIC TRANSMISSION SERVICE GROUP

FINAL ASSEMBLY

Internal components

1. Clean the case thoroughly and dry with compressed air.
2. Install the snap ring into the snap ring groove in the case as shown in Figure 143.
3. Using SST 09950-60020 (09951-00890), 09950-70010 (09951-07150) or other suitable tool, press the tapered roller bearing outer races into the case until they both make contact with the snap ring as shown in Figure 143.
4. Coat the tapered roller bearing with a small amount of ATF, then using SST 09649-17010 or other suitable tool, press the tapered roller bearing onto the counter drive gear until it contacts the gear as shown in Figure 144.
5. Coat the tapered roller bearing with a small amount of ATF, then use SST 09950-60010 (09951-00890), 09950-70010 (09951-07150) or other suitable tool and a press to install the counter drive gear and the tapered roller bearing into the case, or set the case in a suitable press, and while supporting the counter drive gear press the tapered roller bearing over the counter drive gear as shown in Figure 145.

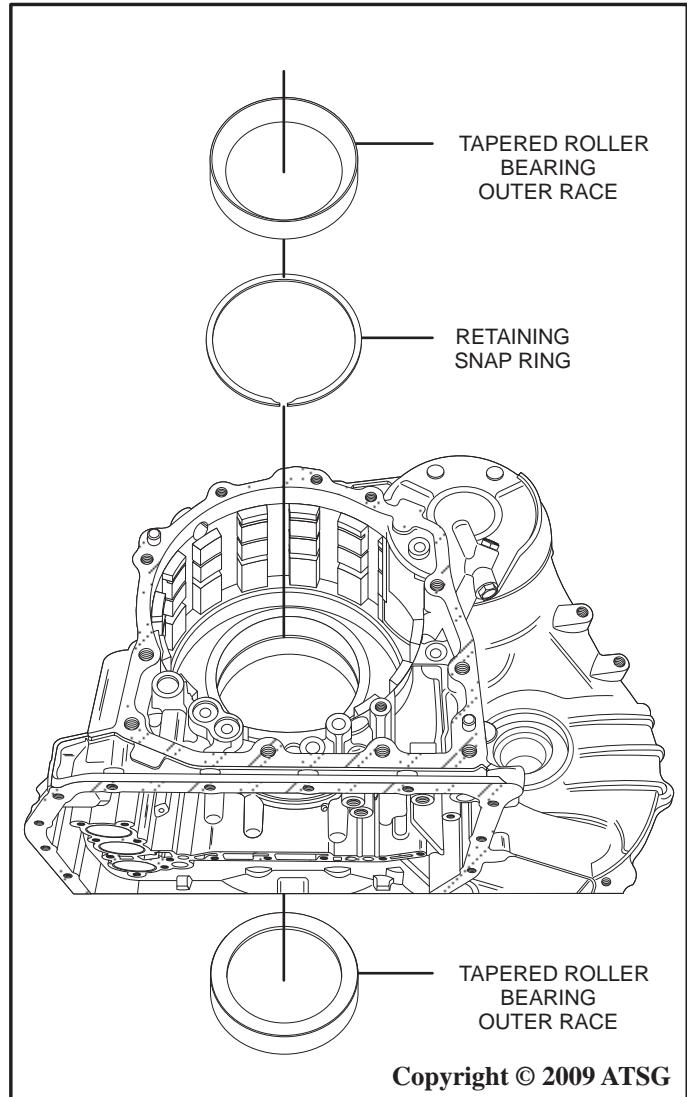


Figure 143

Final Assembly Continued on Page 83.

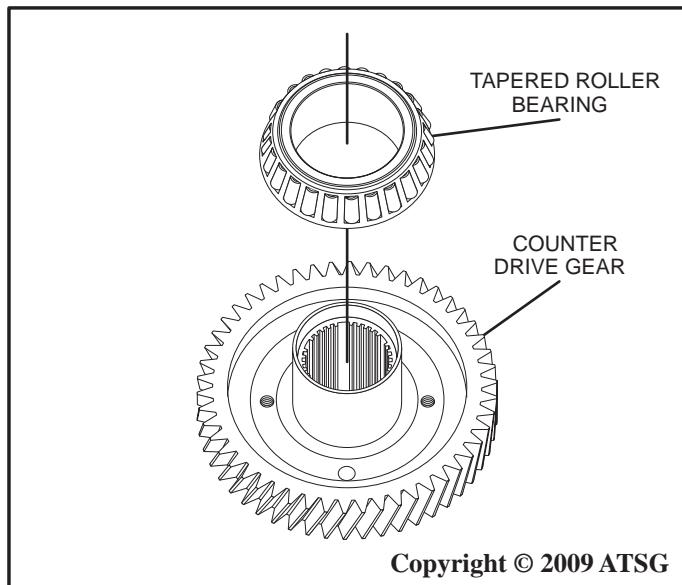


Figure 144

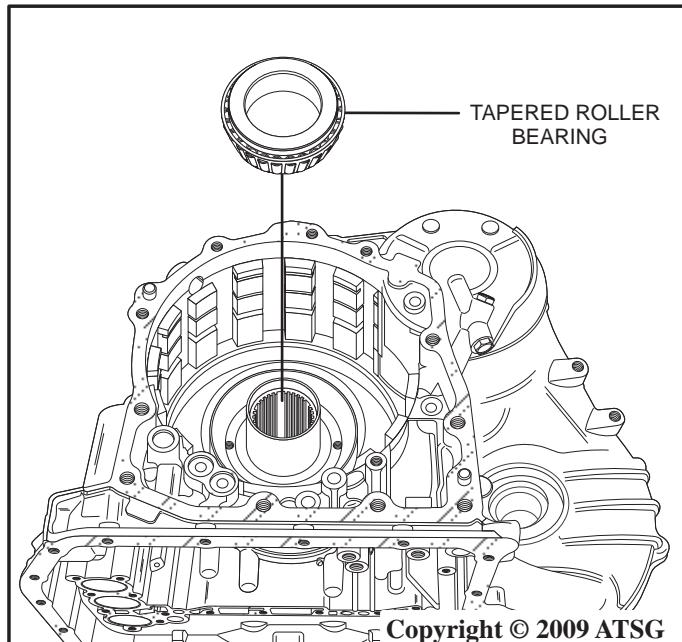


Figure 145

FINAL ASSEMBLY

Internal components

6. Install a new outer and inner o-ring onto the first/reverse brake (B2) piston as shown in Figure 146, and coat the o-rings with a small amount of Trans-Jel®.
7. Install the first/reverse brake (B2) piston into the case by twisting and pushing downward as shown in Figure 147.
8. Install the piston return spring into the piston as shown in Figure 148.

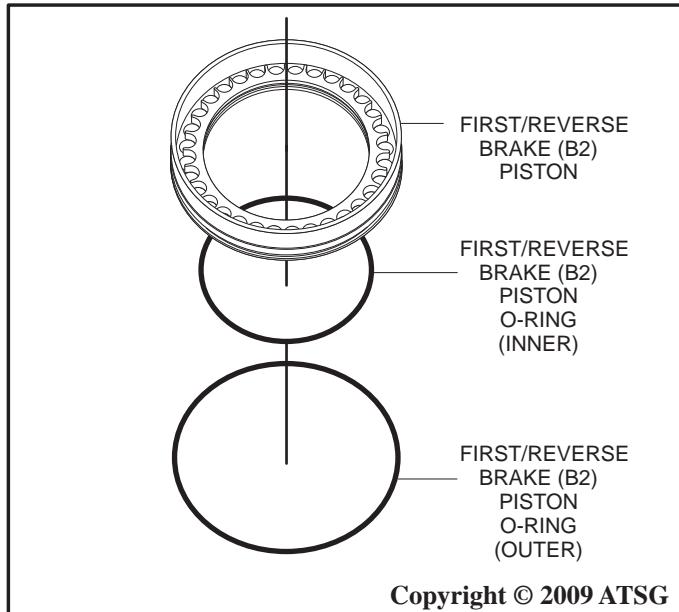


Figure 146

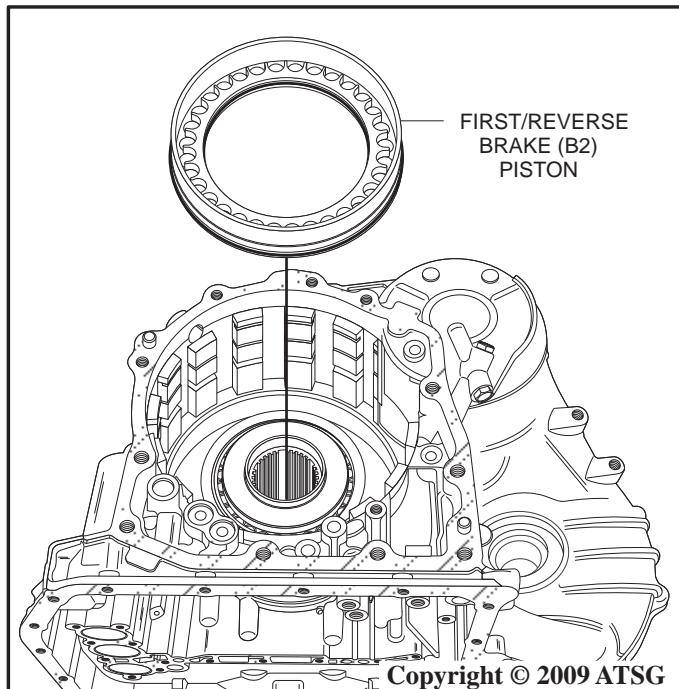


Figure 147

9. Using SST 09387-00070 or similar, and a press, compress the piston return spring and install the retaining snap ring as shown in Figure 148.
10. Make sure snap ring is fully seated into the groove as shown in Figure 149.

Final Assembly Continued on Page 84.

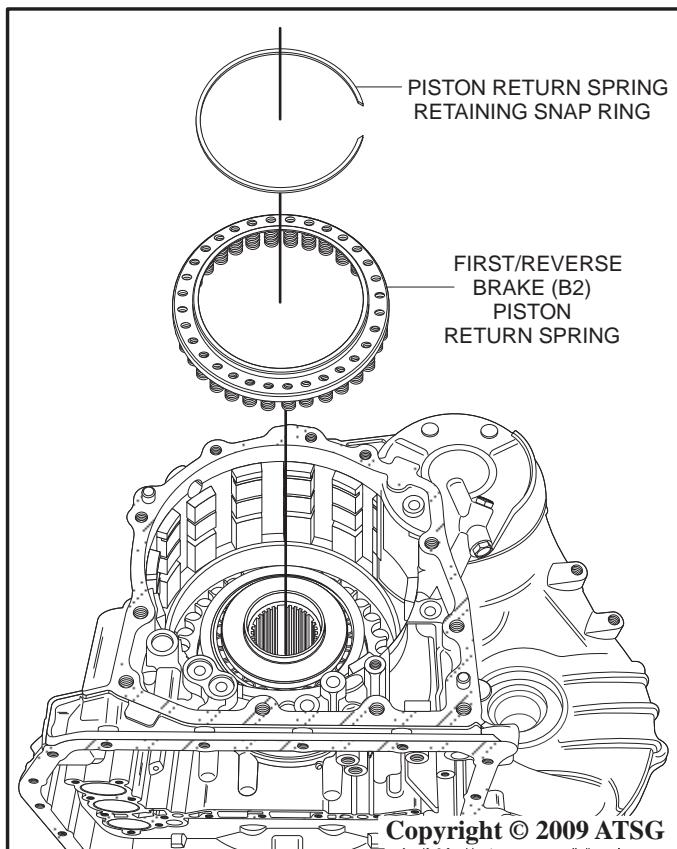


Figure 148

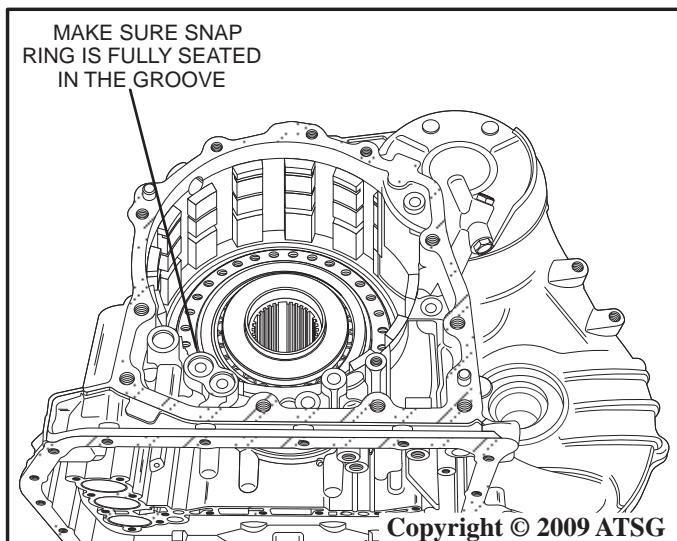


Figure 149

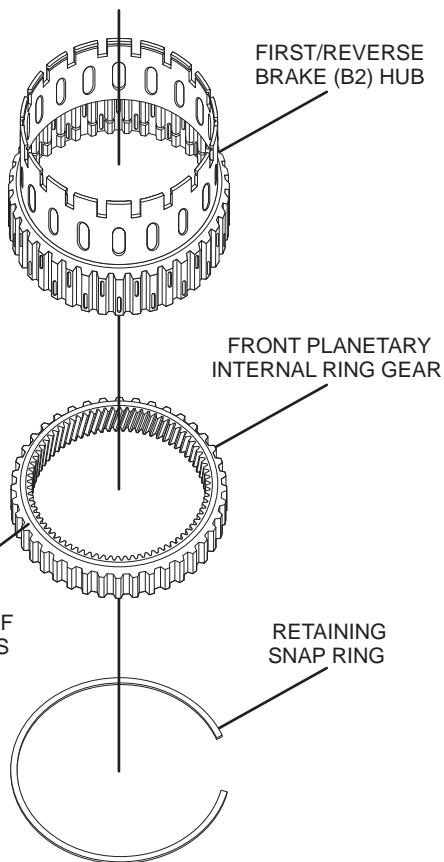
FINAL ASSEMBLY

Internal components

11. If the front planetary ring gear/first/reverse brake (B2) hub has been disassembled, inspect and clean all parts thoroughly with solvent, then dry with compressed air and reassemble using the diagram in Figure 150 as a guide.
12. Install the front planetary into the hub and install into the case as shown in Figure 151.
13. Using SST 09950-60010 (09951-00400) or other suitable tool and a press, align the splines of the front planet and the counter drive gear and press the front planet into the counter drive gear, or set the case into a suitable tool, and while supporting the counter drive gear, press the front planetary splines into the counter drive gear using a suitable driver as shown in Figure 152.
Note: Do not use excessive force when pressing the front planetary into the counter drive gear.

Final Assembly Continued on Page 85.

FRONT PLANETARY RING GEAR/
FIRST/REVERSE BRAKE (B2) HUB
ASSEMBLY EXPLODED VIEW

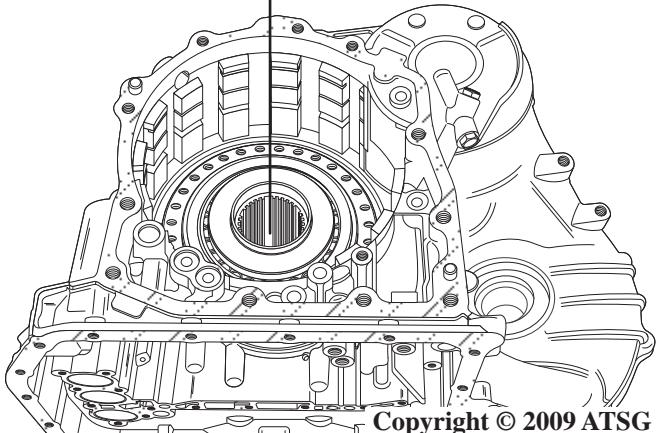


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Figure 150

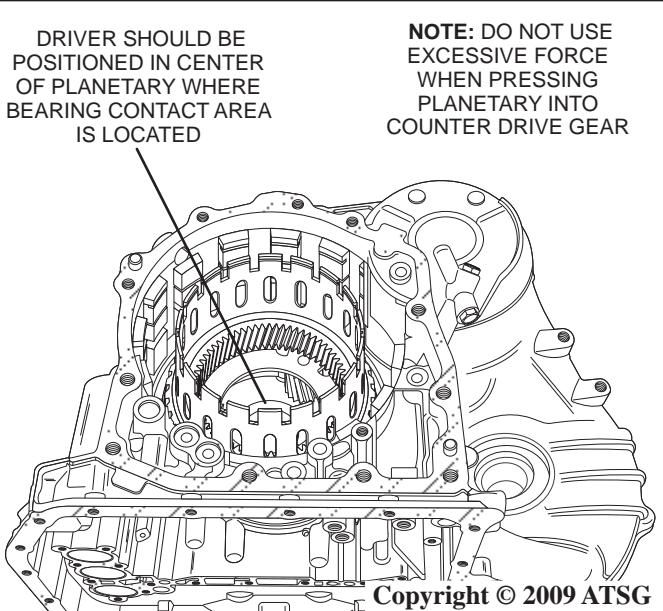
FRONT PLANETARY GEAR ASSEMBLY

FRONT PLANETARY RING GEAR/
FIRST/REVERSE BRAKE (B2) HUB
ASSEMBLY



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Figure 151



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Figure 152

Technical Service Information

FINAL ASSEMBLY

Internal components

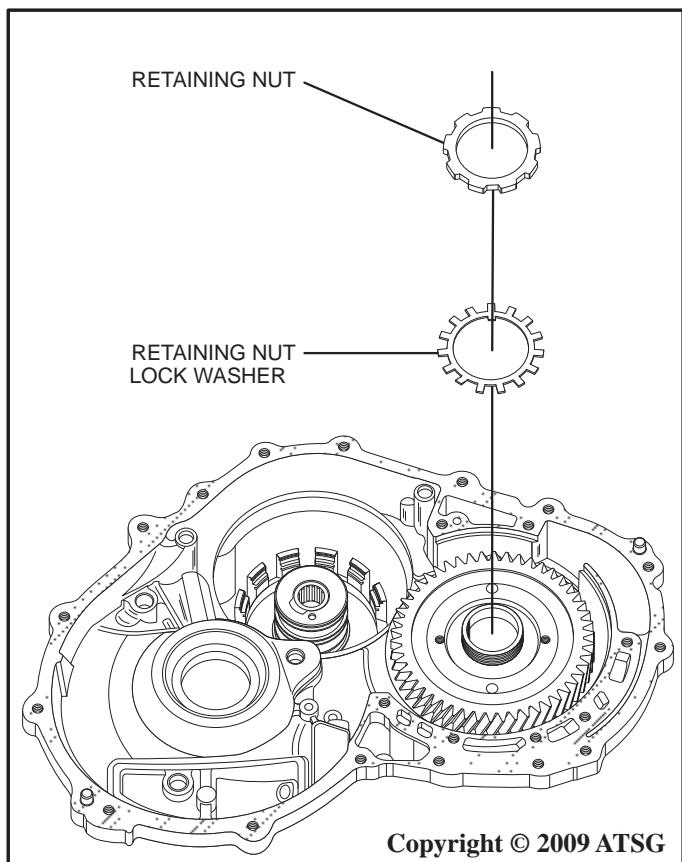


Figure 153

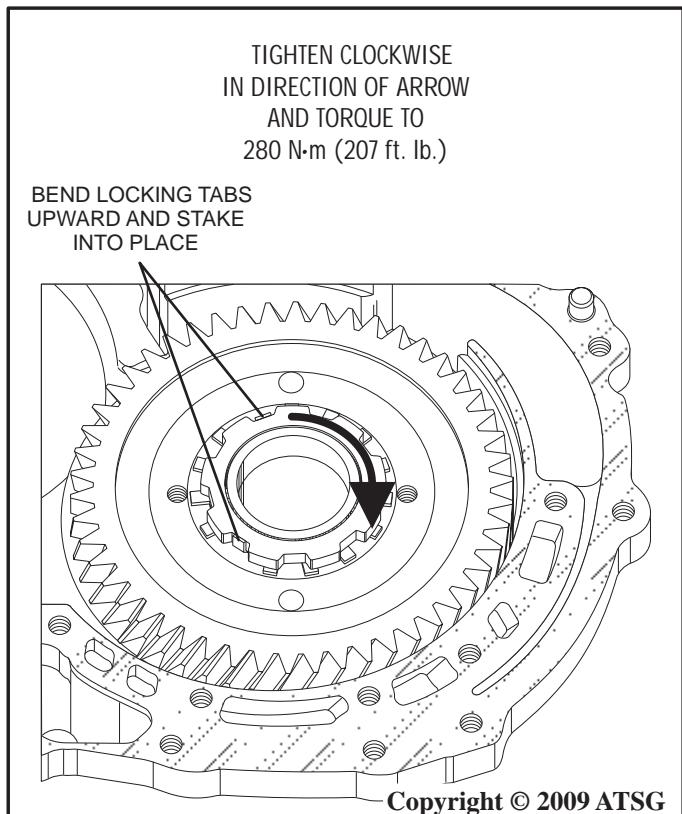


Figure 154

14. Flip the case housing over and install the counter drive gear retaining nut lock washer as shown in Figure 153.
15. Install the counter drive gear retaining nut as shown in Figure 153.
16. Use SST 09387-00030, 09387-00080 or other suitable socket and torque the retaining nut to 280 N m (207 ft. lb.) as shown in Figure 154.
17. Bend retaining nut locking tabs and stake them into place as shown in Figure 154.
18. Install the front planetary thrust bearing with the lip down as shown in Figure 155.
19. Install the front planetary sun gear as shown in Figure 155.
20. Install the thrust bearing lower race with the lip down and the bearing as shown in Figure 155.
21. Install the thrust bearing upper race as shown in Figure 155. If necessary, use a small amount of Trans-Jel® to hold the bearing in place.

Final Assembly Continued on Page 86.

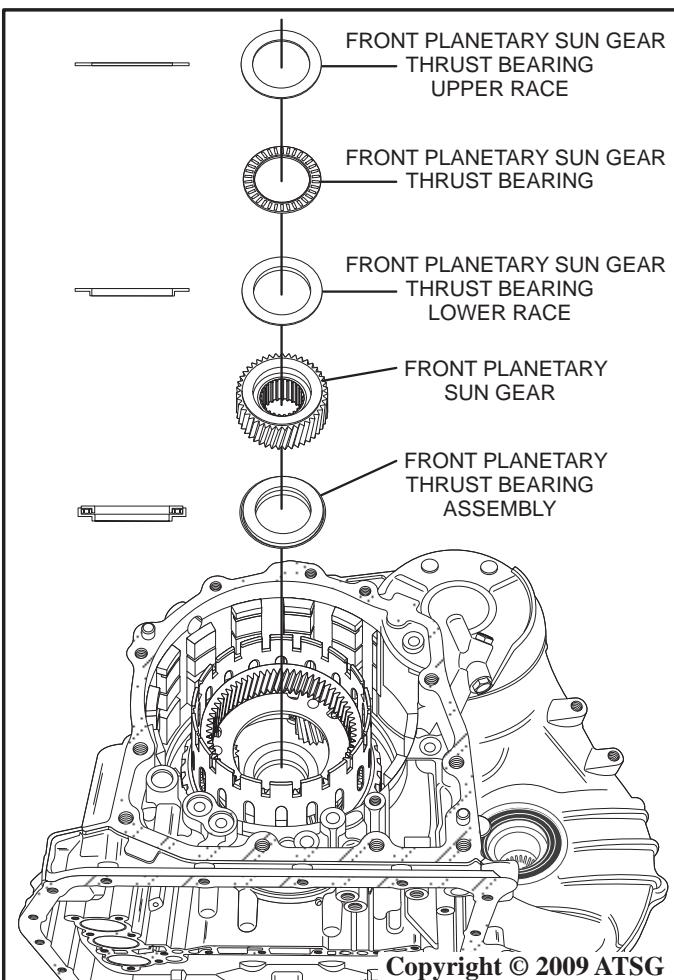


Figure 155

FINAL ASSEMBLY

Internal components

22. Install the rear planetary as shown in Figure 156.
 23. Install the rear planetary retaining snap ring using a screwdriver as shown in Figure 156.
 24. Make sure snap ring is fully seated into the snap ring groove as shown in Figure 157.
 25. Install the first/reverse brake (B2) clutch plates into the case beginning with a steel plate, then alternating frictions and steels until there are five steel plates and five lined plates in the case as shown in Figure 158.
 26. Install the first/reverse brake (B2) backing plate (selective) as shown in Figure 158.
- Note: friction plates should be soaked in the appropriate atf for the vehicle for 30 minutes prior to installation.**

Final Assembly Continued on Page 87.

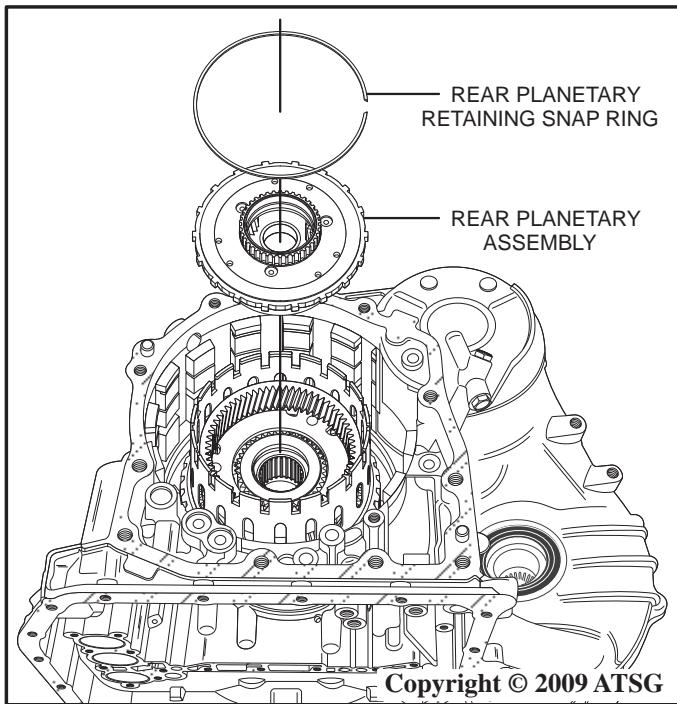


Figure 156

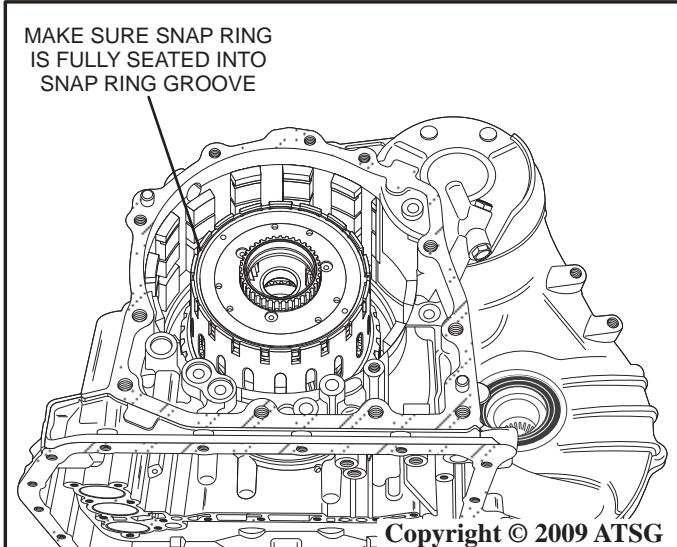


Figure 157

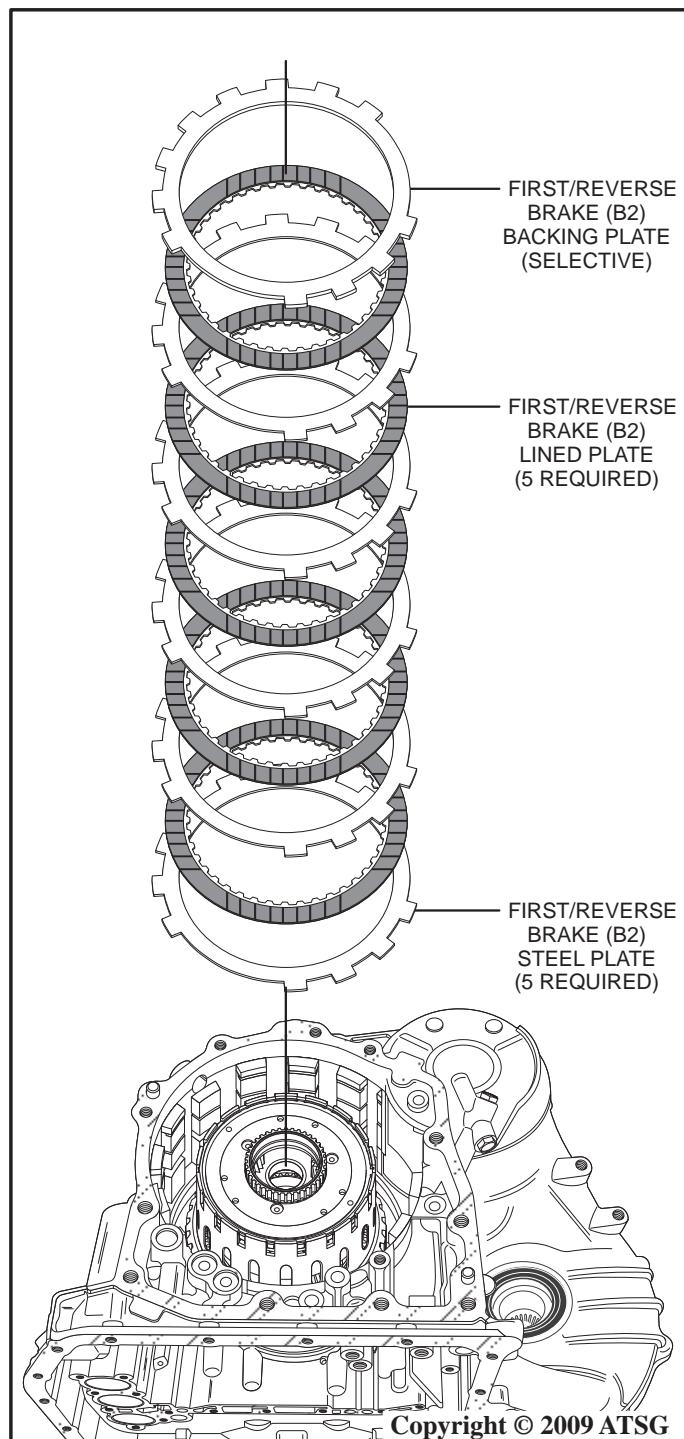


Figure 158

FINAL ASSEMBLY

Internal components

27. Check the first/reverse brake (B2) clutch clearance as shown in Figure 159.
28. Clutch clearance or piston travel should be **1.1 - 1.24 mm (.043 - .048 in.)** and is determined by using a vernier caliper and measuring the distance from the top friction plate to the seat in the case where the 2nd brake (B1) housing sits. Once the measurement is taken it can be referred to as "Dimension A". The thickness of the first/reverse brake (B2) backing plate is then measured and subtracted from "Dimension A". With this number, the proper selective backing plate can be determined and installed into the case according to the chart in Figure 159.
29. Install the 2nd brake (B1) piston housing assembly into the transmission aligning the lugs into the case with the feed hole toward the valve body area of the case as shown in Figure 160.
30. Install the 2nd brake (B1) piston housing retaining snap ring with the bevel side facing upward as shown in Figure 160.
31. Make sure retaining snap ring is fully seated into the snap ring groove in the case.

Final Assembly Continued on Page 88.

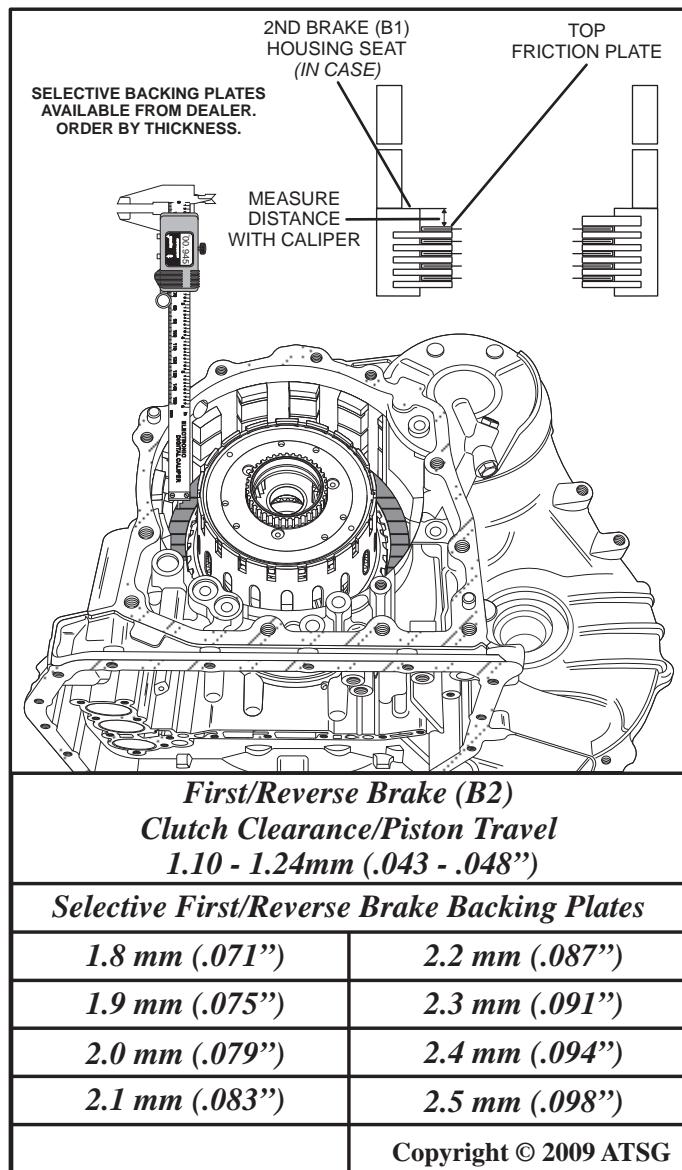


Figure 159

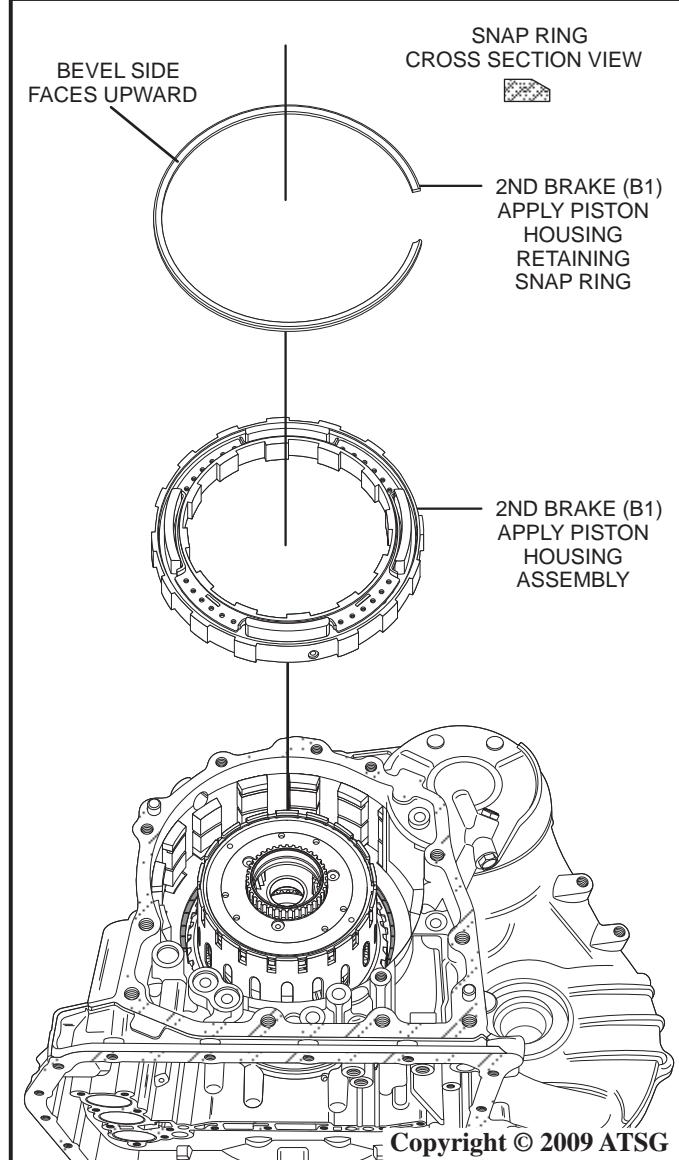


Figure 160

Technical Service Information

FINAL ASSEMBLY

Internal components

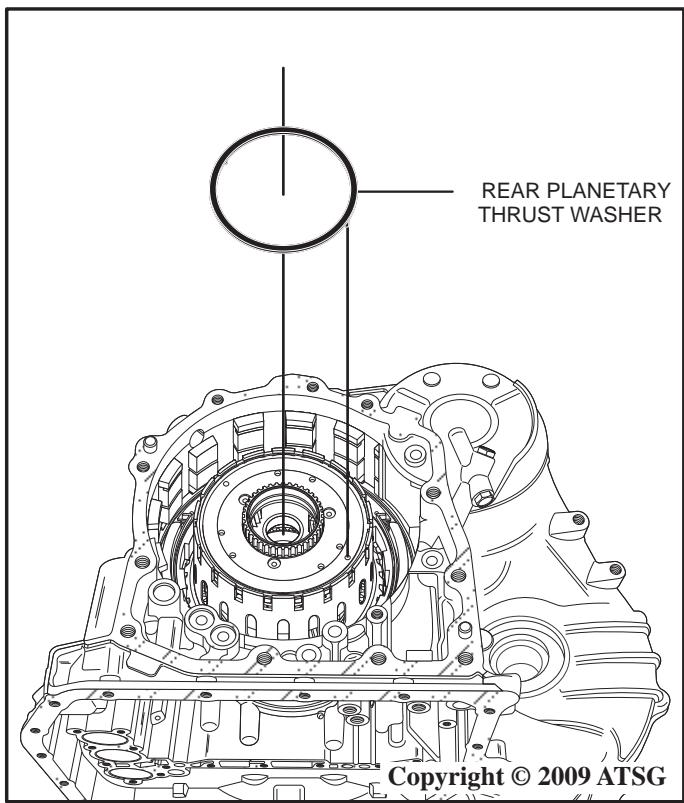


Figure 161

32. Coat the rear planetary thrust washer with a small amount of Trans-Jel® and install into the locating holes in the rear planetary as shown in Figure 161.
33. Install the No. 1 one way clutch (F1) outer sleeve so that the narrow lugs fit into the locating slots in the 2nd brake (B1) piston housing assembly as shown in Figure 162.
34. Install the No. 1 one way clutch (F1) assembly so it fits into the lugs in the outer shell as shown in Figure 163.
35. Make sure the id groove on the one way clutch assembly is facing up (*toward the back cover*) when installed as shown in Figure 163.

Final Assembly Continued on Page 89.

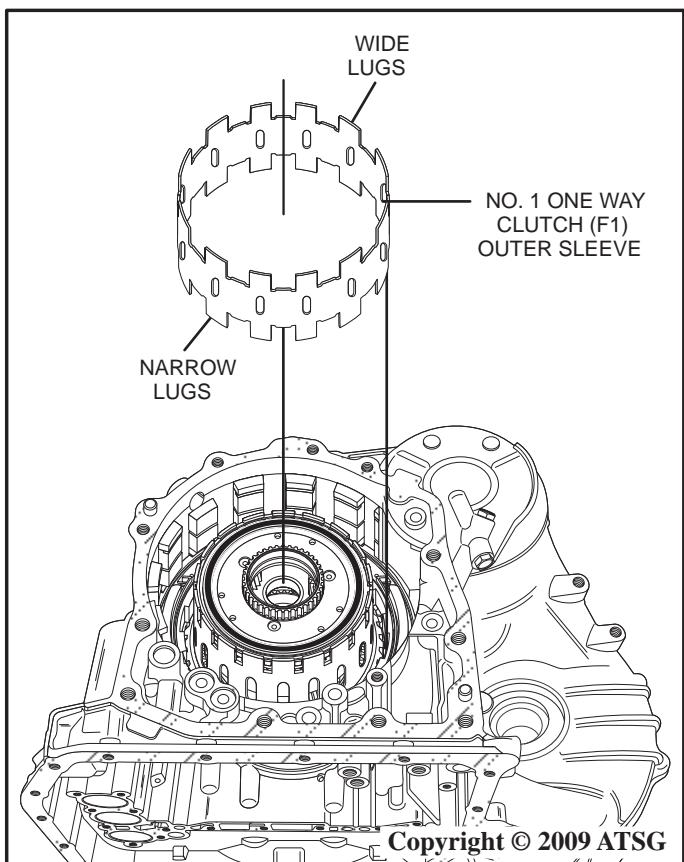


Figure 162

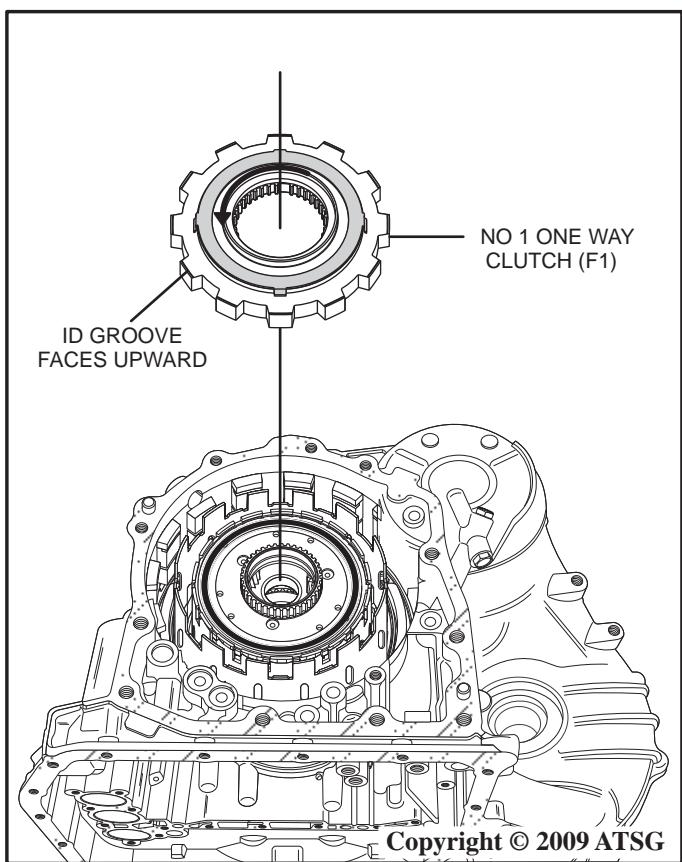


Figure 163

FINAL ASSEMBLY

Internal components

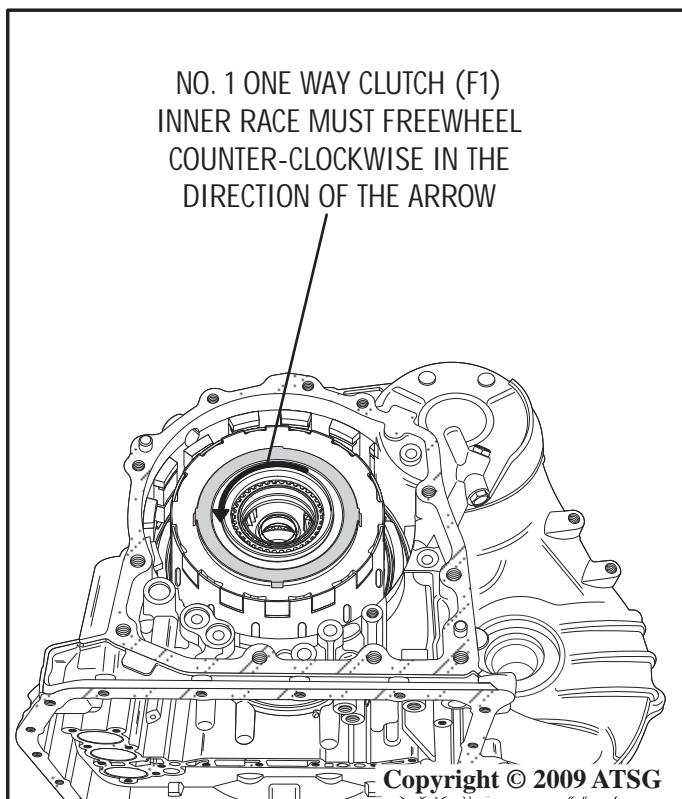


Figure 164

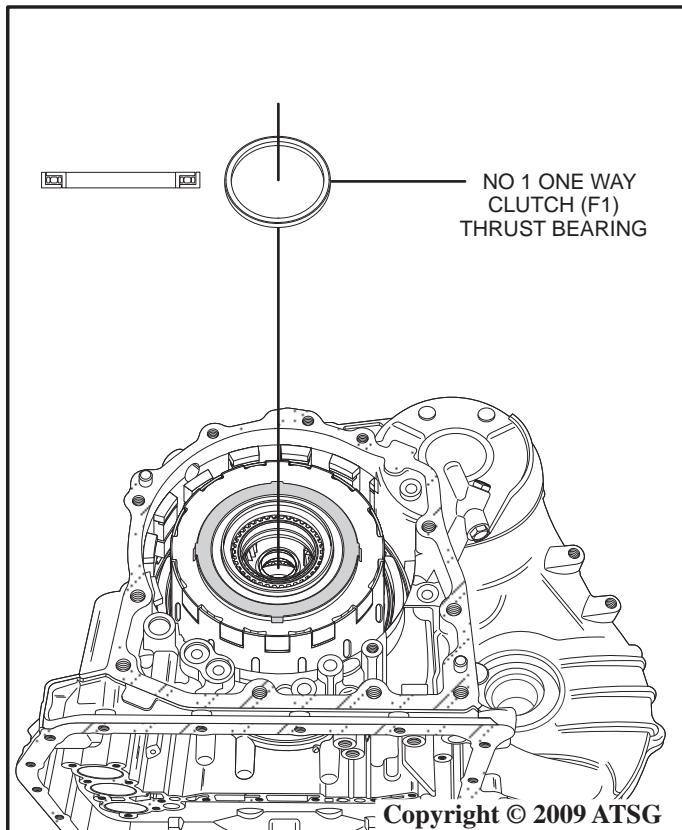


Figure 165

36. The one way clutch inner race must freewheel counter-clockwise as shown in Figure 164.
37. Coat the No. 1 one way clutch (F1) thrust bearing with a small amount of Trans-Jel® and install it in the direction shown in Figure 165.
38. Coat the rear planetary thrust washer with a small amount of Trans-Jel® and install it into the rear planetary sun gear assembly.
39. Install the rear planetary sun gear assembly using a twisting motion as shown in Figure 166.
40. Coat the rear planetary sun gear thrust bearing with a small amount of Trans-Jel® and install onto the rear planetary sun gear as shown in Figure 166.

Final Assembly Continued on Page 90.

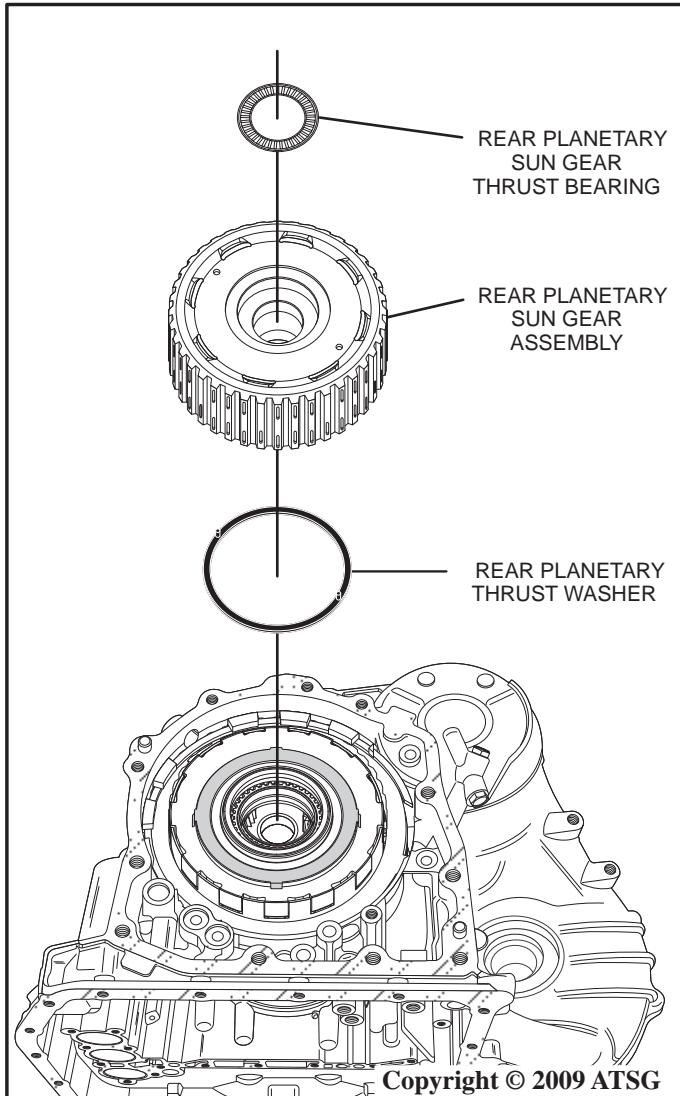


Figure 166

FINAL ASSEMBLY

Internal components

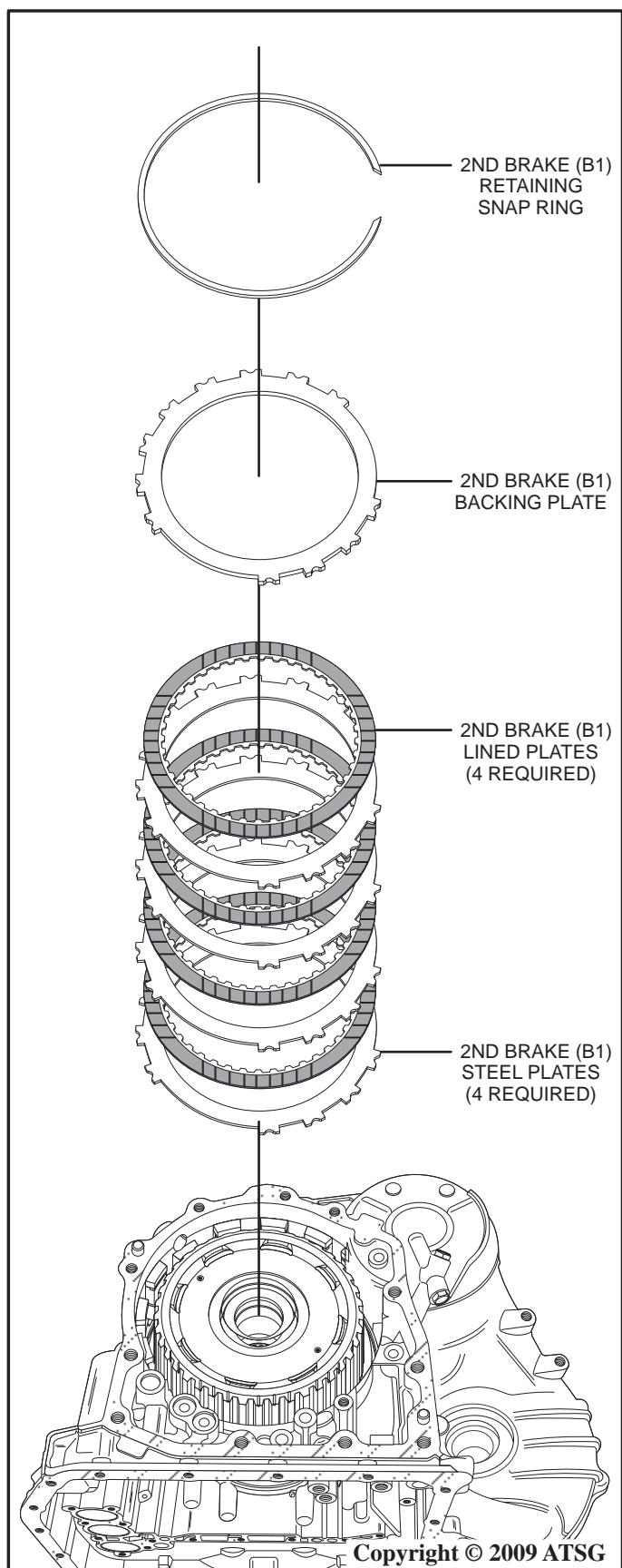


Figure 167

AUTOMATIC TRANSMISSION SERVICE GROUP

41. Install the 2nd brake (B1) clutch plates into the case beginning with a steel plate, then alternating frictions and steels until there are four steel plates and four lined plates in the case as shown in Figure 167.
Note: All Friction Plates should be soaked in the appropriate ATF for the vehicle for 30 minutes prior to installation.
42. Install the 2nd brake (B1) backing plate and the retaining snap ring as shown in Figure 167.
43. Make certain retaining snap ring is fully seated in the snap ring groove as shown in Figure 168.
44. Check clutch clearance to determine appropriate backing plate thickness as shown in Figure 168.
45. *Note: 2nd brake (B1) clutch clearance should be between .024 - .028" if not within specification, select appropriate backing plate from chart in Figure 168.*

Final Assembly Continued on Page 91.

SELECTIVE BACKING PLATES
AVAILABLE FROM DEALER.
ORDER BY THICKNESS.

MAKE SURE SNAP RING
IS FULLY SEATED IN
THE SNAP RING GROOVE

2nd Brake (B1)
Clutch Clearance/Piston Travel
.62 - .73mm (.024 - .028")

Selective 2nd Brake Backing Plates	
3.0 mm (.118")	3.4 mm (.134")
3.1 mm (.122")	3.5 mm (.138")
3.2 mm (.126")	3.6 mm (.142")
3.3 mm (.130")	
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Figure 168

FINAL ASSEMBLY

Internal components

46. Coat the rear planetary sun gear thrust bearing race with a small amount of Trans-Jel® and install it into the direct (C2) clutch drum assembly as shown in Figure 169.
47. Install the direct (C2) clutch drum assembly into the case with a twisting motion so the clutches in the drum spline onto the rear planetary sun gear assembly as shown in Figure 169.
48. Coat the direct (C2) clutch thrust bearing with a small amount of Trans-Jel® and install onto the drum as shown in Figure 169.
49. Lay a straight edge across the direct (C2) clutch drum on top of the bearing and measure the distance from the case to the top of the straight edge. Deduct the height of the straight edge from the overall height to obtain "Dimension A" as shown in Figure 170.
50. Measure the distance from the bearing seat in the rear cover to the top of the ring tower as shown in Figure 171. This is ("Dimension 1").

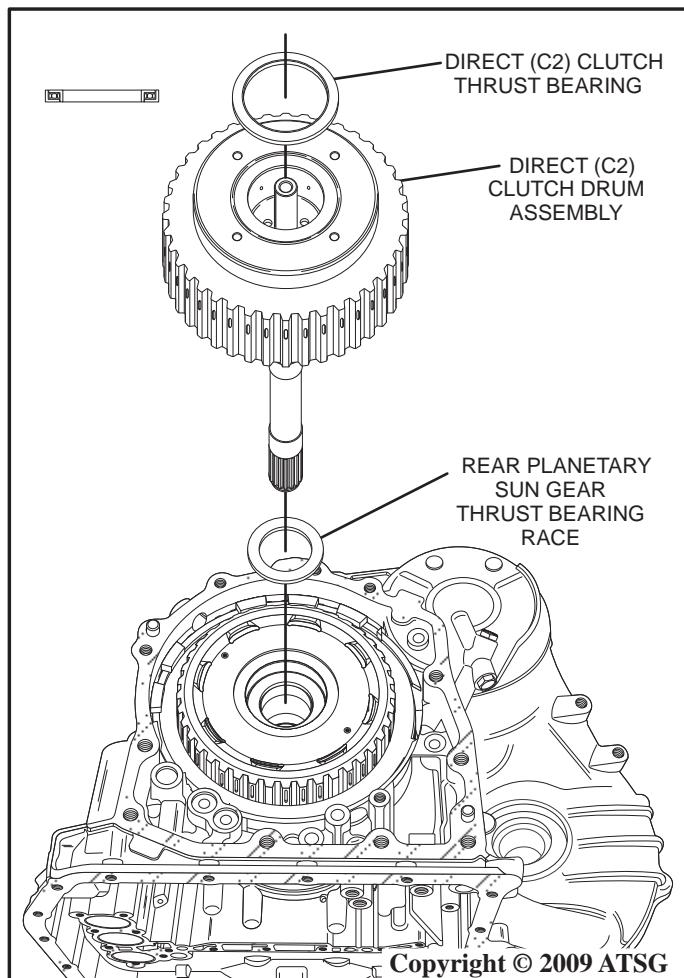


Figure 169

51. Measure from the top of the ring tower to the area where the rear cover contacts the transaxle case. This is "Dimension 2". Deduct ("Dimension 2") from ("Dimension 1") to determine "Dimension B". Next, deduct "Dimension A" from "Dimension B". Using this number, choose the appropriate thrust washer from the chart below to obtain proper end play as shown in Figure 171.

Final Assembly Continued on Page 92.

OBTAINING "DIMENSION A"

"Dimension A" is obtained by measuring from the top of the straight edge to the transmission case and deducting the height of the straight edge from the total measurement.

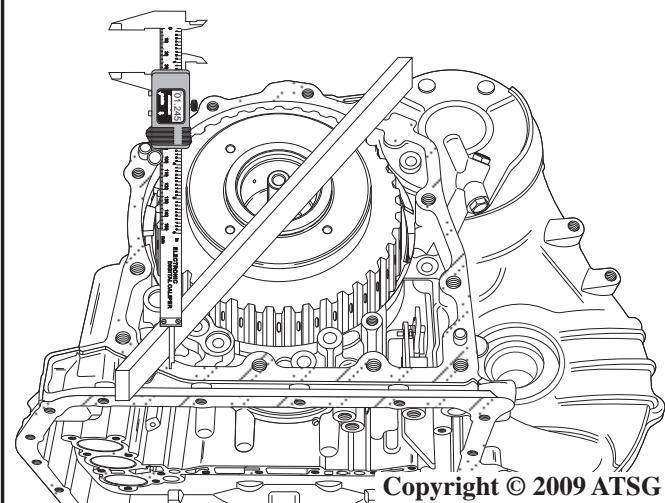
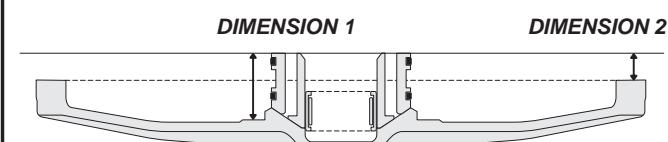


Figure 170

OBTAINING "DIMENSION B"

"Dimension B" is obtained by measuring from the bearing seat in the housing to the top of the ring tower ("Dimension 1") and then measuring from the top of the ring tower to the area where the cover contacts the transaxle case ("Dimension 2"). Deduct ("Dimension 2") from ("Dimension 1") to determine "Dimension B".



SELECTIVE BEARINGS AVAILABLE FROM DEALER.
ORDER BY THICKNESS.

END PLAY
0.2 - 0.9mm (.008 - .035 in.)

THICKNESS	INSIDE DIA.	OUTSIDE DIA.
3.55 mm (.139")	53.6 mm (2.11")	69.6 mm (2.74")
3.85 mm (.151")	53.6 mm (2.11")	69.6 mm (2.74")

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Figure 171

FINAL ASSEMBLY

Internal components

52. Inspect the rear cover needle bearing and if replacement is necessary, remove using SST 09387-00040 (09387-01010, 09387-01030, 09387-01040) or another similar bearing puller using Figure 172 as a reference.
53. Install new needle bearing (*if replacing*) using SST 09950-60010 (09951-00230, 09951-00350) or a similar driver and a press and install the new bearing to a depth of **12.05 - 12.75mm (.474 - .502 in.)** using Figure 172 as a reference.

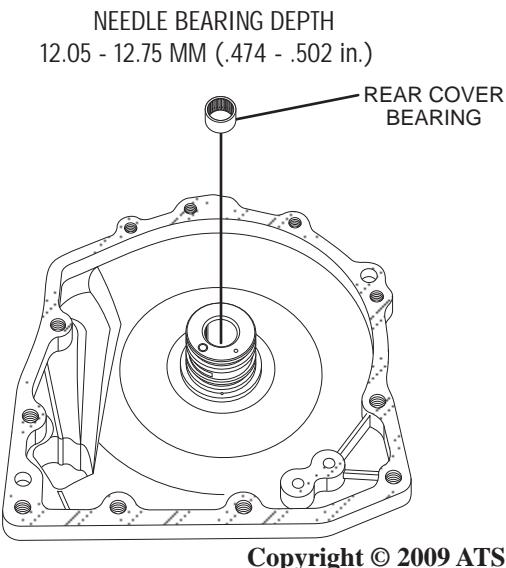


Figure 172

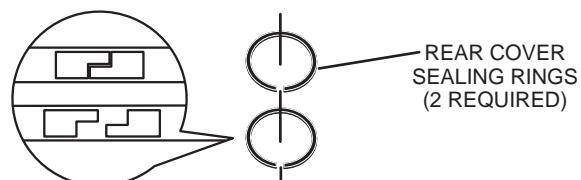


Figure 173

54. Install two new rings onto the back cover and coat the rings with a small amount of Trans-Jel® as shown in Figure 173.
55. Make certain the rings overlap correctly as shown in Figure 173.
56. Install the U/D clutch (C3) oil feed tube with a small plastic hammer as shown in Figure 174.
57. Install the U/D brake (B3) oil feed tube with a small plastic hammer as shown in Figure 174.
Note: Use care when installing tubes so they do not get bent or damaged in any way.
58. Install the two case seals using a small amount of Trans-Jel® to keep the seals in place as shown in Figure 174.
59. Install the feed tube hold down bracket as shown in Figure 174.
60. Install the feed tube hold down bracket attaching bolt as shown in Figure 174.

Final Assembly Continued on Page 93.

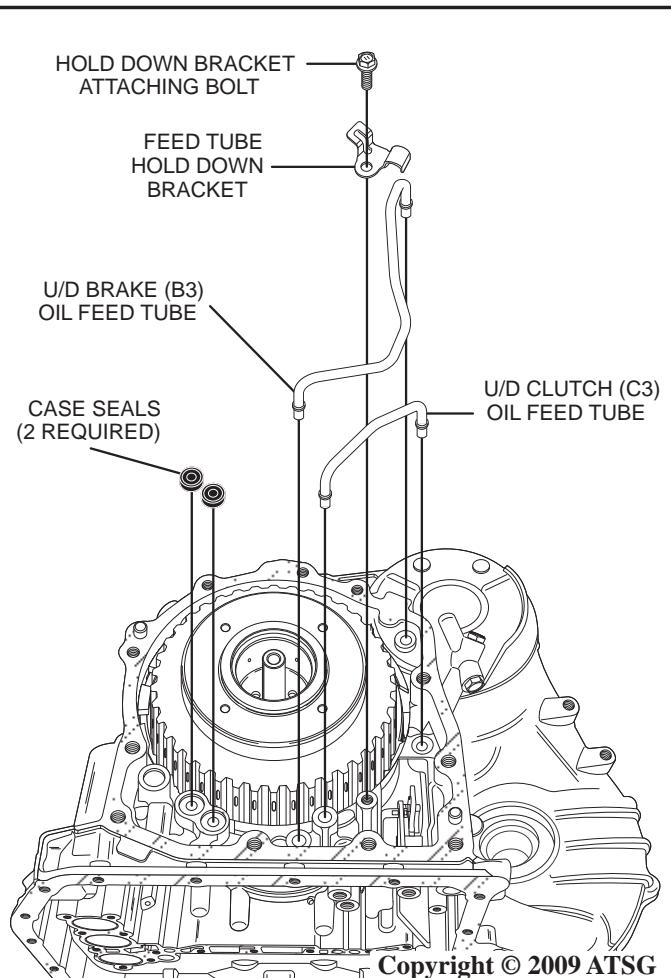


Figure 174

FINAL ASSEMBLY

Internal components

61. Using a torque wrench, torque the hold down bracket attaching bolt to **5.4 N m (48 in. lb.)** as shown in Figure 175.
62. Apply a thin bead of FIPG Part No. 08826-00090, THREE BOND 1281 or equivalent anaerobic sealant to the perimeter of the rear cover.
63. Coat the inside of the rear cover needle bearing with a small amount of ATF.
64. Install the transaxle rear cover onto the transaxle case as shown in Figure 176.
65. Apply a very small amount of liquid sealant Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent anaerobic sealant to the rear cover attaching bolt "A", then install the attaching bolts as shown in Figure 177.
66. Using a torque wrench, torque the rear cover attaching bolt "A" to **18.6 N m (14 ft. lb.)** and attaching bolts "B" to **24.5 N m (18 ft. lb.)** as shown in Figure 177.

Final Assembly Continued on Page 94.

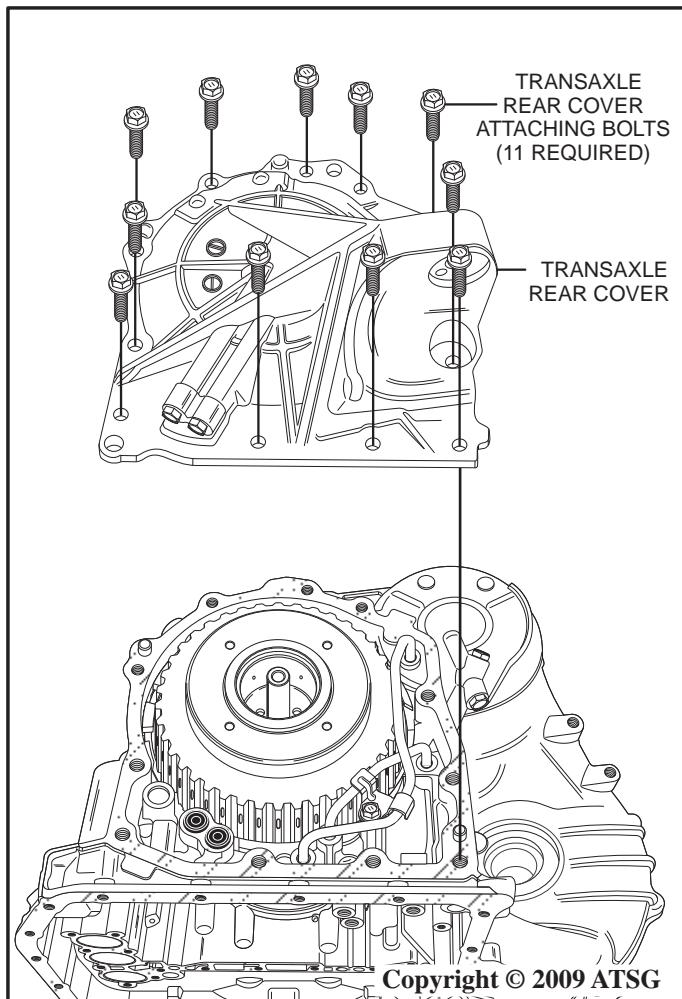


Figure 176

HOLD DOWN BRACKET
ATTACHING BOLT TORQUE
5.4 N·m (48 in. lb.)

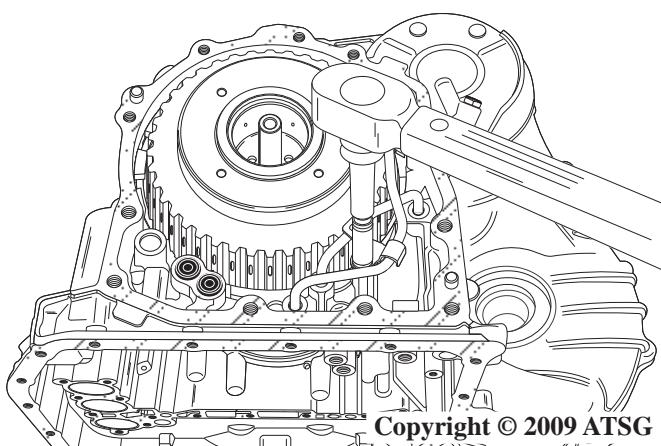


Figure 175

REAR COVER
ATTACHING BOLT B
(TEN REQUIRED)
TORQUE
24.5 N·m (18 ft. lb.)

REAR COVER
ATTACHING BOLT A
(ONE REQUIRED)
TORQUE
18.6 N·m (14 ft. lb.)

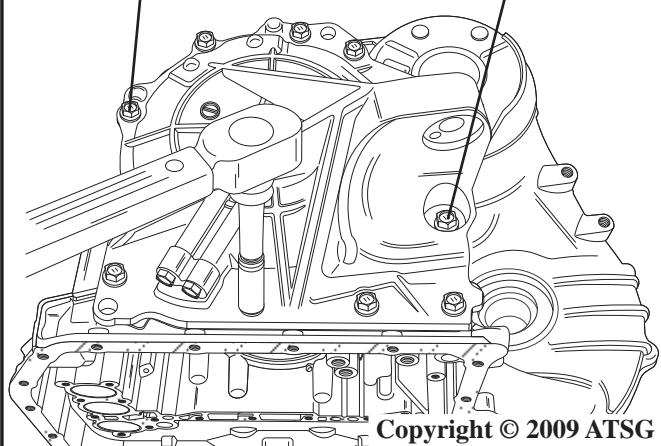


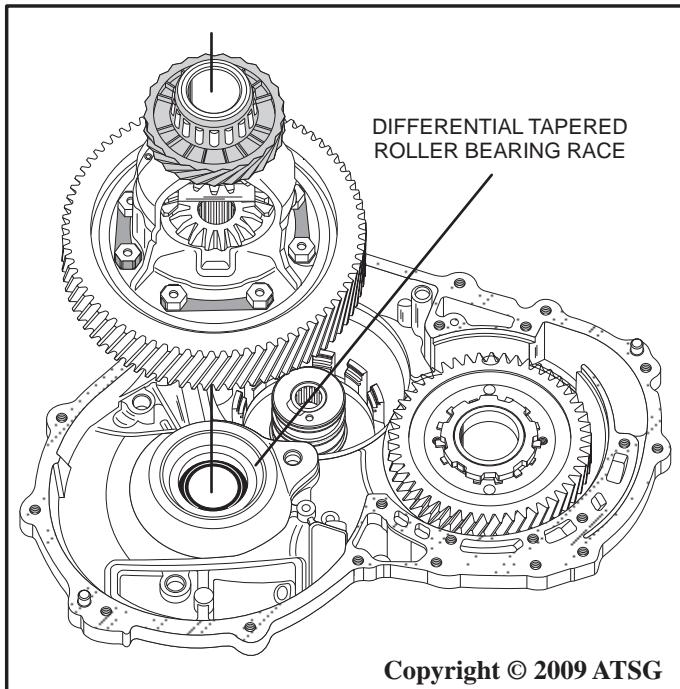
Figure 177

FINAL ASSEMBLY

Internal components

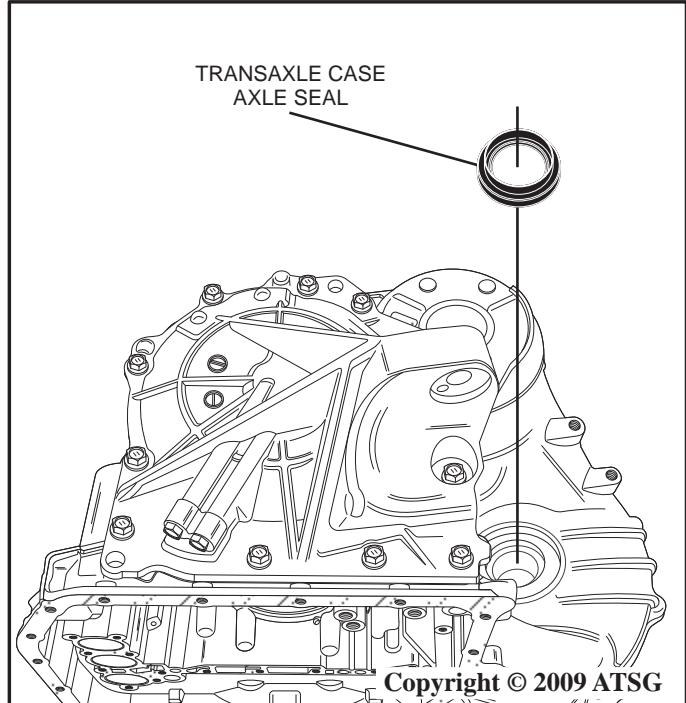
67. Using a plastic hammer, with even taps, carefully install the torque converter housing axle seal into the case as shown in Figure 178.
68. Coat inside of axle seal with a small amount of Trans-Jel®.
69. Flip the transaxle housing over then coat the differential tapered roller bearings with a small amount of ATF and place the differential carrier into the case as shown in Figure 179.
70. Install the sixteen differential housing to transaxle case attaching bolts and torque them as shown in Figure 180.

Final Assembly Continued on Page 95.



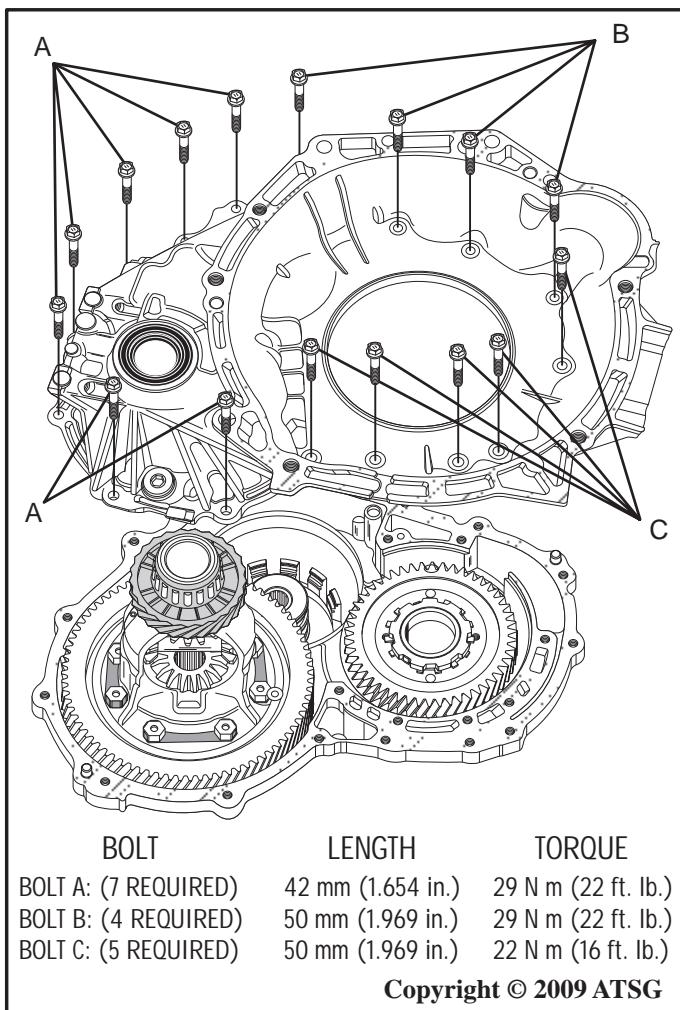
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Figure 179



94

Figure 178



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Figure 180

FINAL ASSEMBLY

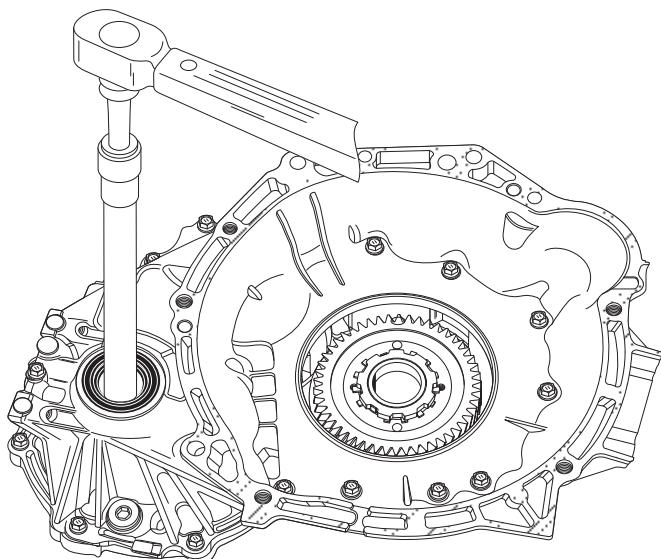
Internal components

71. Using SST 09564-32011 or similar device, turn the differential carrier in the case back and forth several times to allow the bearings to fully settle in the case as shown in Figure 181.
 72. Using SST 09564-32011 or similar device and a torque wrench, measure differential preload as shown in Figure 181.
 73. Compare the measured preload with the chart in Figure 182.
 74. If preload is not within specification, remove transaxle tapered roller bearing race (*refer to Figure 179*) and select a differential spacer from the chart in Figure 182 to obtain specified preload.
 75. Once preload is within specification, remove the differential housing attaching bolts and the housing as shown in Figure 183.
- NOTE:** *Selective spacers available from the dealer, order by thickness.*

Final Assembly Continued on Page 96.

CHECKING DIFFERENTIAL PRELOAD

USING SST 09564-32011 OR A SIMILAR DEVICE
ROTATE DIFFERENTIAL CARRIER
BACK AND FORTH SEVERAL TIMES
IN ORDER TO FULLY SEAT THE BEARINGS
THEN CHECK THE PRELOAD



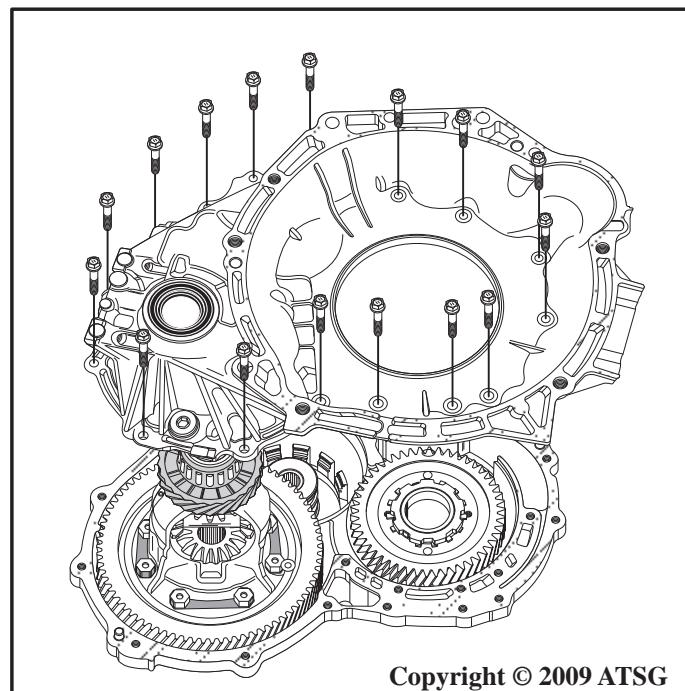
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Figure 181

DIFFERENTIAL PRELOAD	
New Bearing 1.0 - 1.6 N m (8.7 - 14.2 in. lb.)	Reused Bearing 0.5 - 0.8 N m (4.4 - 7.1 in. lb.)

DIFFERENTIAL SPACER THICKNESS	
2.90 mm (.1141 in.)	3.40 mm (.1339 in.)
2.95 mm (.1161 in.)	3.45 mm (.1358 in.)
3.00 mm (.1181 in.)	3.50 mm (.1378 in.)
3.05 mm (.1201 in.)	3.55 mm (.1398 in.)
3.10 mm (.1220 in.)	3.60 mm (.1417 in.)
3.15 mm (.1240 in.)	3.65 mm (.1437 in.)
3.20 mm (.1260 in.)	3.70 mm (.1457 in.)
3.25 mm (.1279 in.)	3.75 mm (.1476 in.)
3.30 mm (.1299 in.)	3.80 mm (.1496 in.)
3.35 mm (.1319 in.)	Copyright © 2009 ATSG

Figure 182



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Figure 183

FINAL ASSEMBLY

Internal components

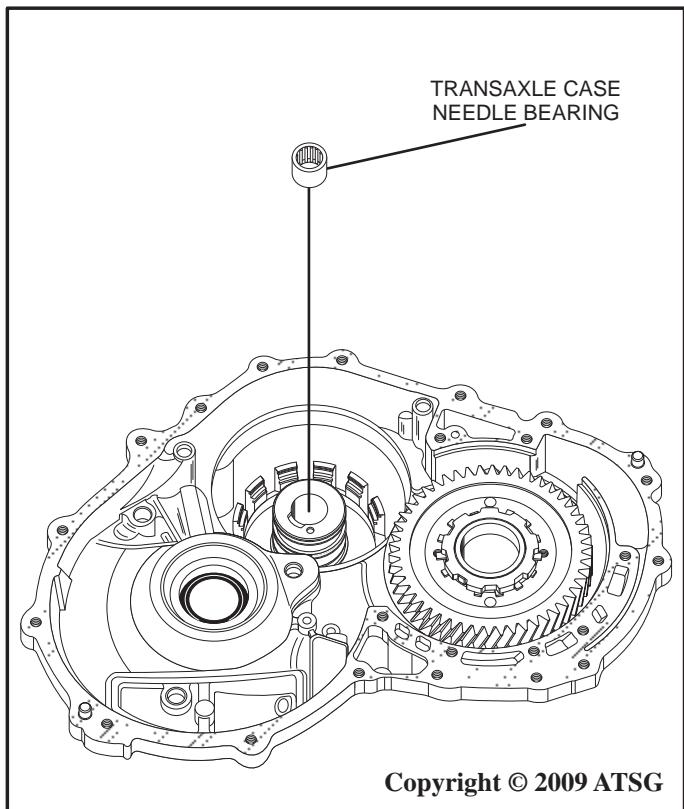


Figure 184

76. Inspect the needle bearing in the transaxle case and remove (if necessary) using SST 09387-00040, (09387-01020, 09387-01030, 09387-01040) or a similar bearing puller. Refer to Figure 184 for reference.
 77. Install new bearing (if necessary) using SST 09950-60010, (09951-00320), 09950-70010 (09951-07100) or a similar driver and install the needle bearing into the transaxle case as shown in Figure 185.
 78. Use a dial caliper to obtain proper bearing depth in the case. Refer to Figure 185 for reference.
 79. Coat the needle bearing with a small amount of ATF.
 80. Install two new underdrive clutch (C3) sealing rings onto the ring support in the transaxle case as shown in Figure 186.
 81. Make sure the rings lock together as shown in Figure 186.
- Note: Be careful not to open the rings too far, or damage to the rings may result.**
82. Coat the new rings with a small amount of Trans-Jel®.

Final Assembly Continued on Page 97.

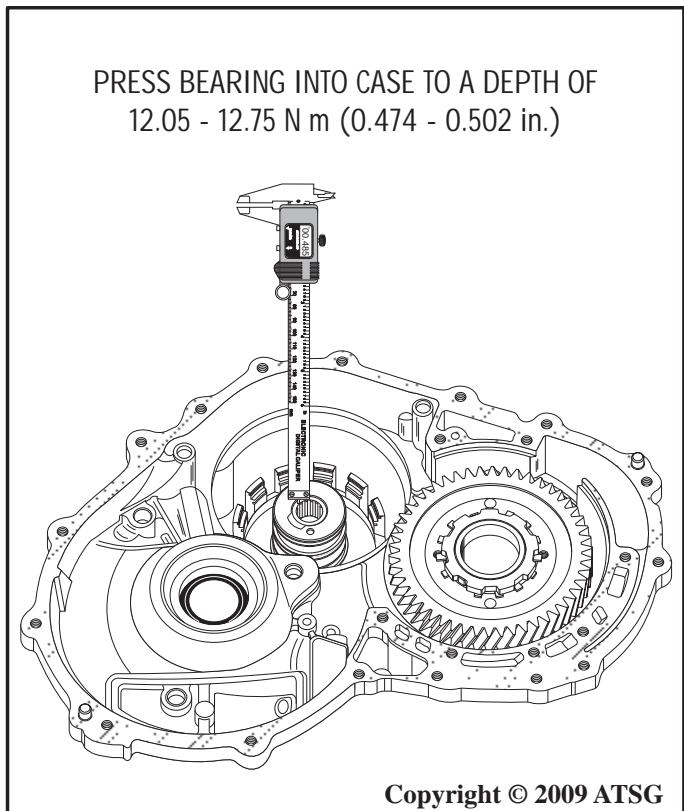


Figure 185

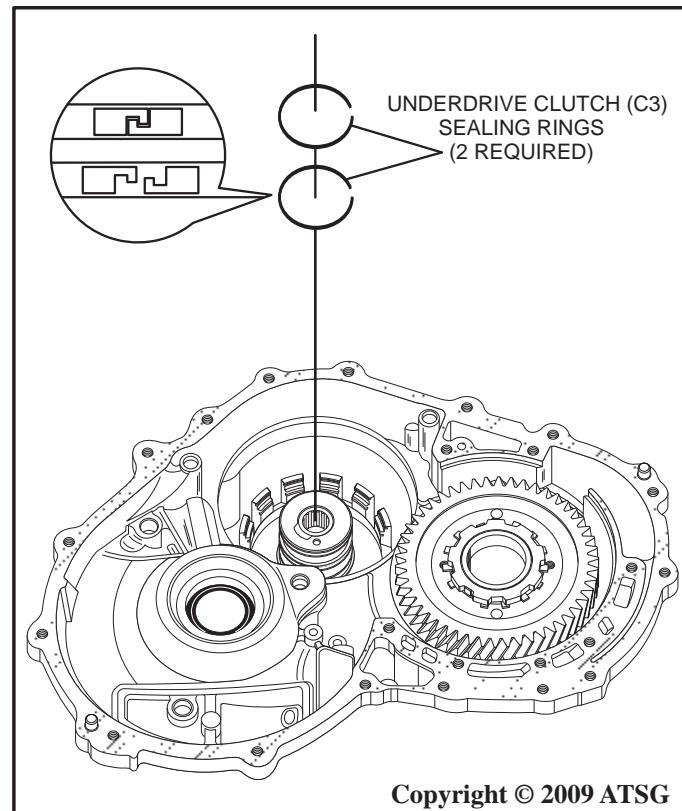


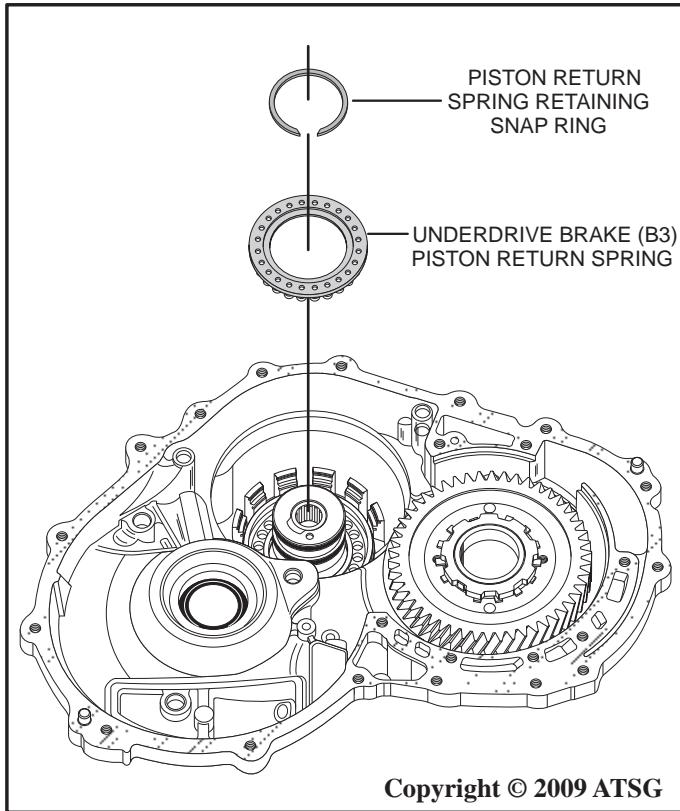
Figure 186

FINAL ASSEMBLY

Internal components

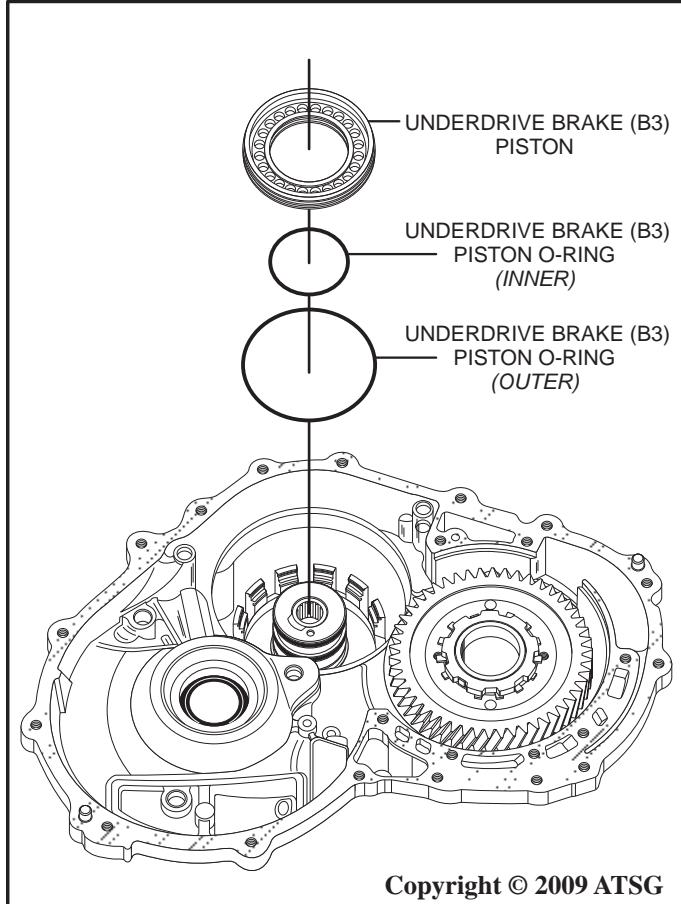
83. Install a new inner and outer o-ring onto the underdrive brake (B3) piston and coat both o-rings with a small amount of Trans-Jel® as shown in Figure 187.
84. Using a twisting motion, install the underdrive brake (B3) piston into the case as shown in Figure 187.
85. Make sure piston is fully seated into the case. Install the underdrive brake (B3) piston return spring into the piston as shown in Figure 188.
86. Using SST 09387-00020 or similar and a suitable press, compress the piston return spring as shown in Figure 188.
87. Using a pair of snap ring pliers, install the piston return spring retaining snap ring as shown in Figure 188.
88. Make certain the snap ring is fully seated into the snap ring groove as shown in Figure 189.

Final Assembly Continued on Page 98.



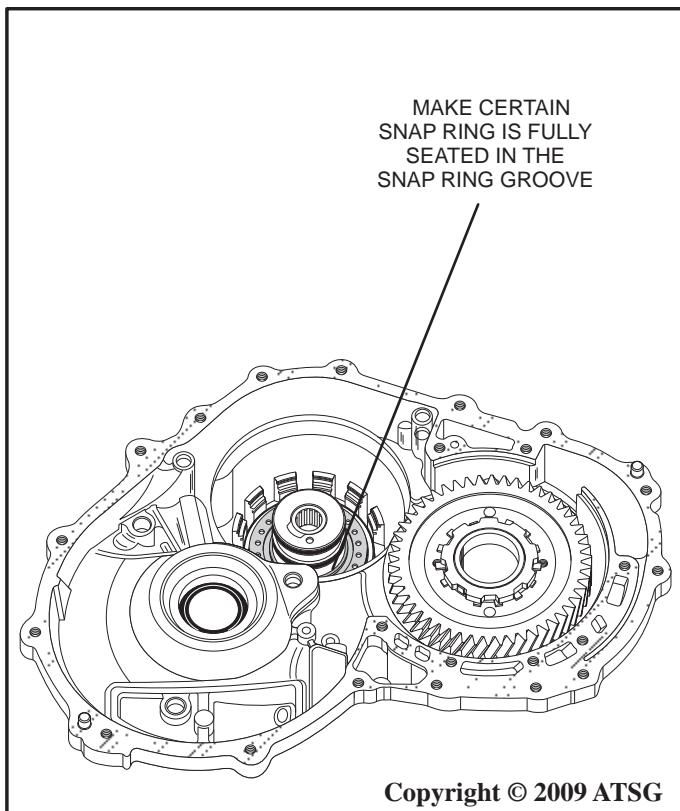
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Figure 188



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Figure 187



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Figure 189

FINAL ASSEMBLY

Internal components

89. Install the underdrive brake (B3) clutch plates into the case beginning with a steel plate, then alternating frictions and steels until there are three steel plates and three lined plates in the case as shown in Figure 190.
- Note:** All Friction Plates should be soaked in the appropriate ATF for the vehicle for 30 minutes prior to installation.
90. Install the underdrive brake (B3) backing plate into the case as shown in Figure 191.
 91. Install the underdrive brake (B3) retaining snap ring as shown in Figure 191.
 92. Make certain the retaining snap ring is fully seated in the snap ring groove as shown in Figure 192.
 93. Check clutch clearance/piston travel using a dial indicator while applying and releasing the underdrive brake (B3) piston with 60 psi of air pressure to determine appropriate backing plate thickness as shown in Figure 192.

Final Assembly Continued on Page 99.

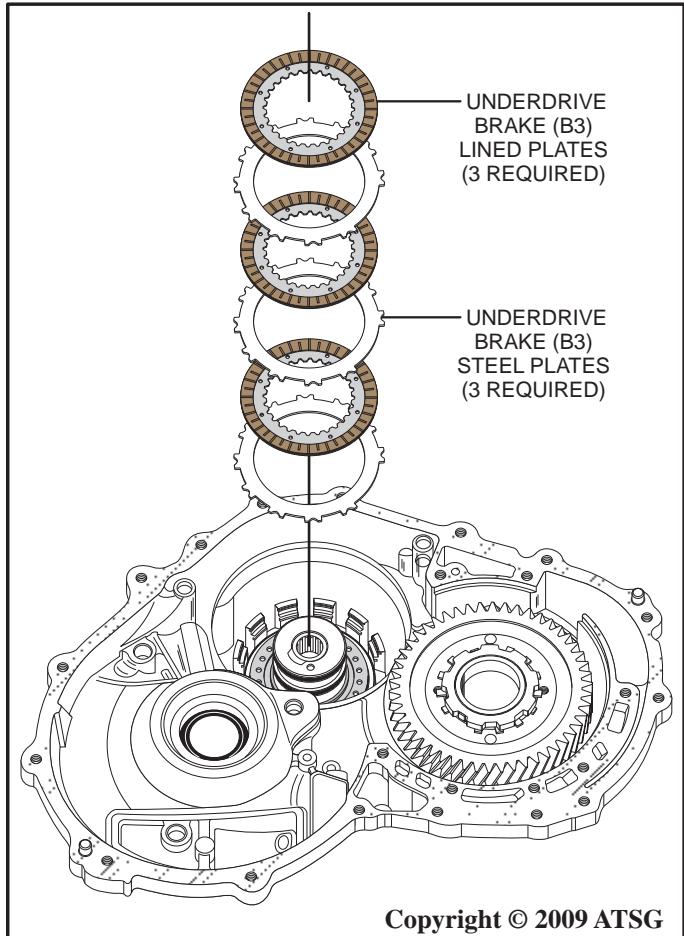


Figure 190

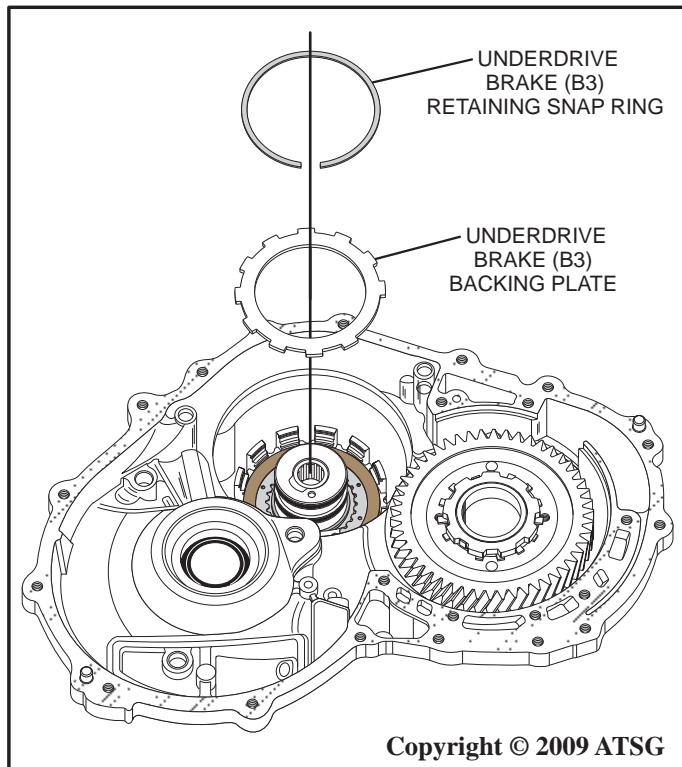


Figure 191

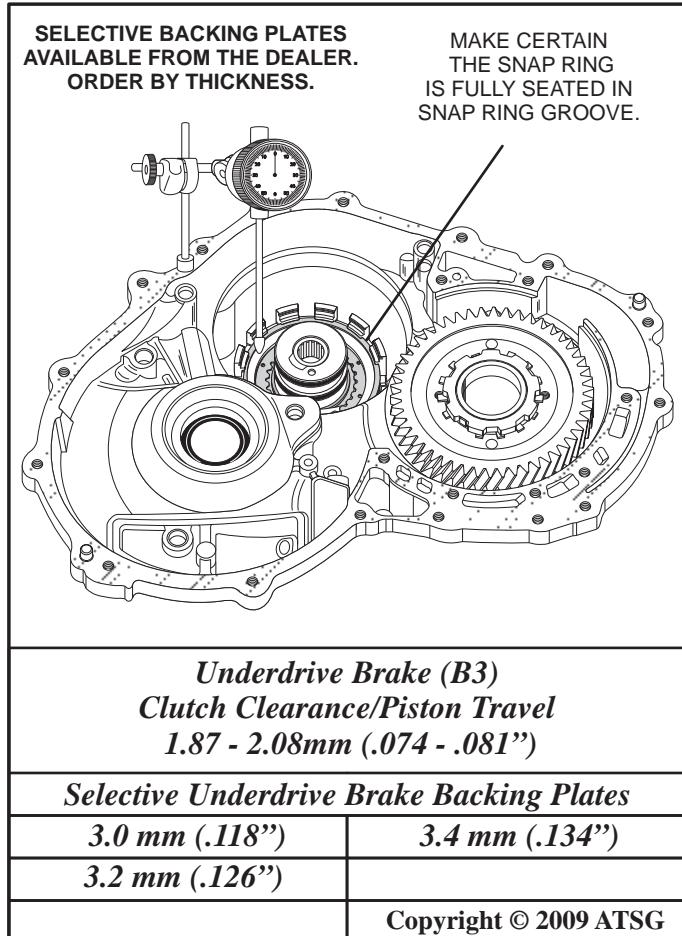


Figure 192

FINAL ASSEMBLY

Internal components

94. Attach the anti-rattle clip to the No. 2 one way clutch (F2) as shown in Figure 193.
95. Coat the rollers of the No. 2 one way clutch (F2) with a small amount of ATF, then install into the case with the anti-rattle clip in the 6 o-clock position in the case and the directional marks facing upward as shown in Figure 193.
96. Using a small screwdriver, install the no. 2 one way clutch (F2) retaining snap ring into the case as shown in Figure 193.
97. Make certain the retaining snap ring is fully seated in the snap ring groove in the case as shown in Figure 194.
98. Make certain the anti-rattle clip does not become detached upon installation.
99. Coat the underdrive clutch (C3) thrust bearing race with a small amount of Trans-Jel® and install it onto the ring tower in the case as shown in Figure 195.
100. Coat the underdrive clutch (C3) thrust bearing and race assembly with a small amount of Trans-Jel® and install into the underdrive clutch

Final Assembly Continued on Page 100.

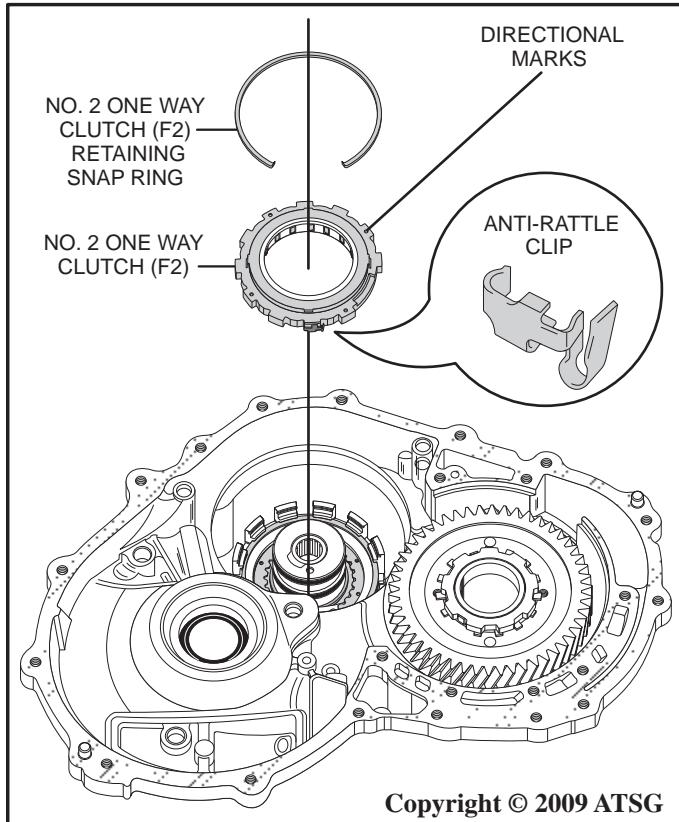
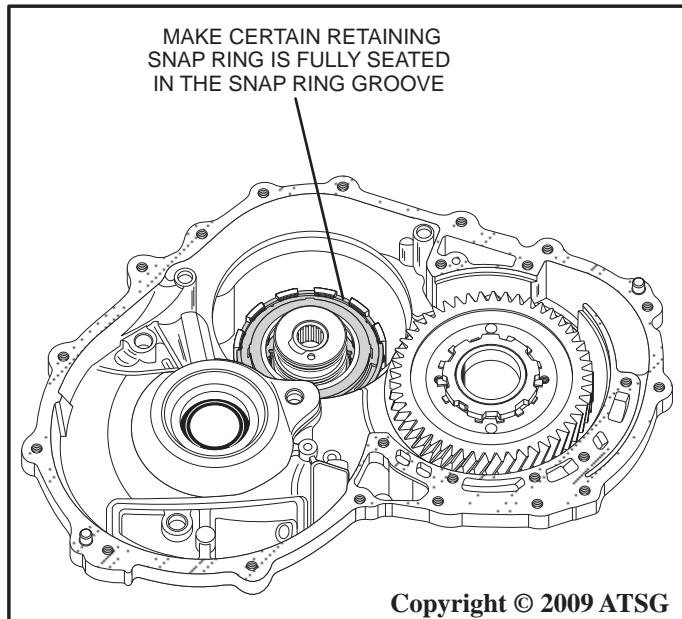
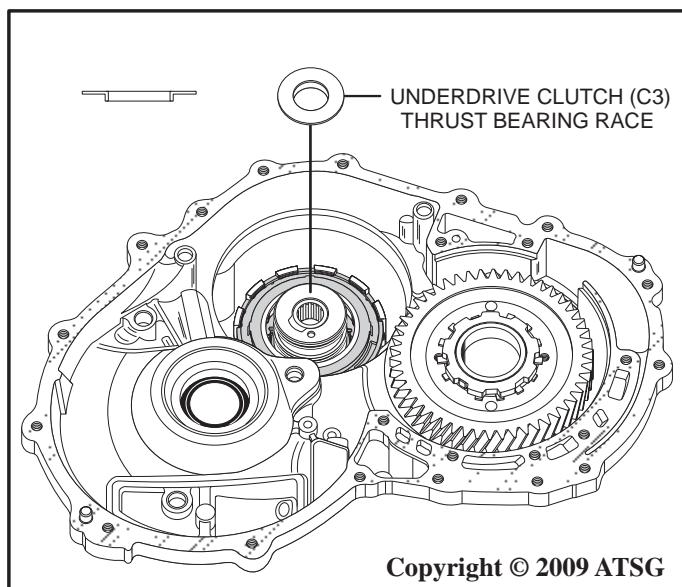


Figure 193



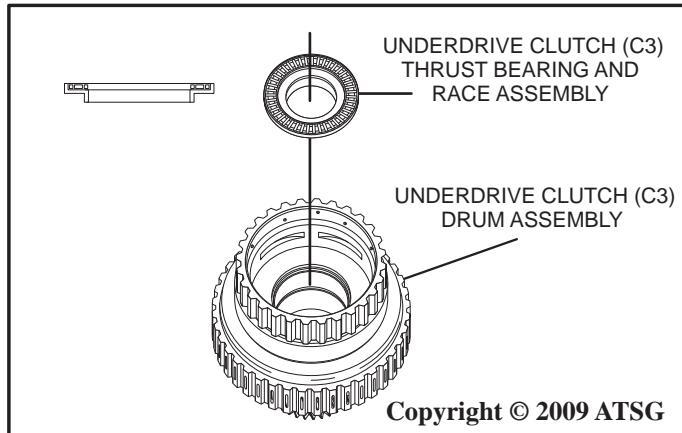
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Figure 194



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Figure 195



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Figure 196

FINAL ASSEMBLY

Internal components

101. Install the underdrive clutch (C3) drum into the case by turning in a counter-clockwise direction so that the hub on the drum fully splines into the underdrive brake (B3) lined plates in the case as shown in Figure 197.
102. Check for proper one way clutch operation. The underdrive clutch (C3) drum must rotate in a counter-clockwise direction and locks clockwise as shown in Figure 198.

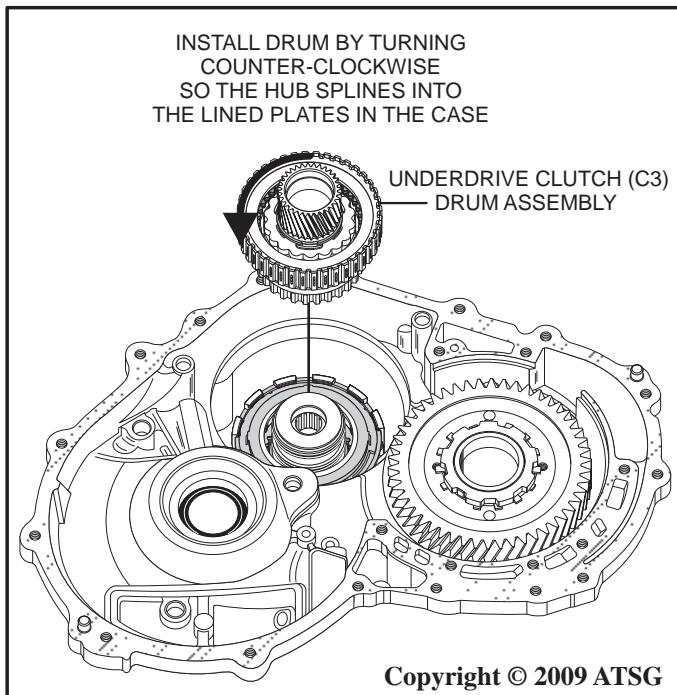


Figure 197

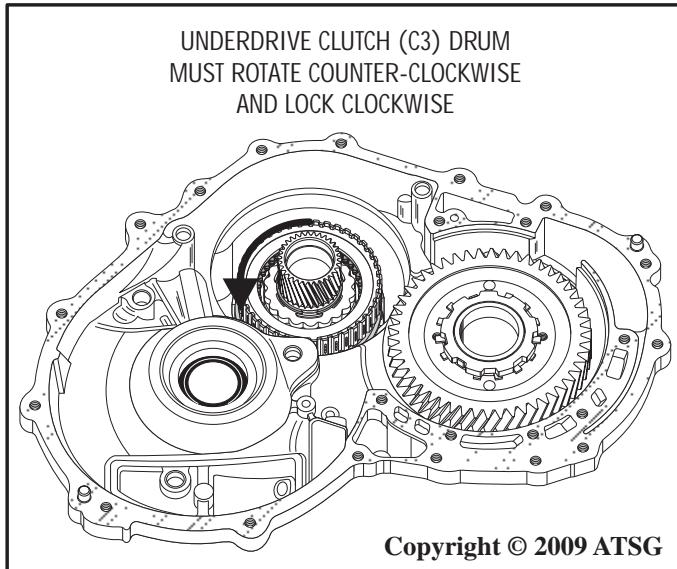


Figure 198

103. Clip the park pawl return spring onto the park pawl and slide the park pawl into the case as shown in Figure 199.
104. Install the park pawl return spring retaining pin as shown in Figure 200.

Final Assembly Continued on Page 101.

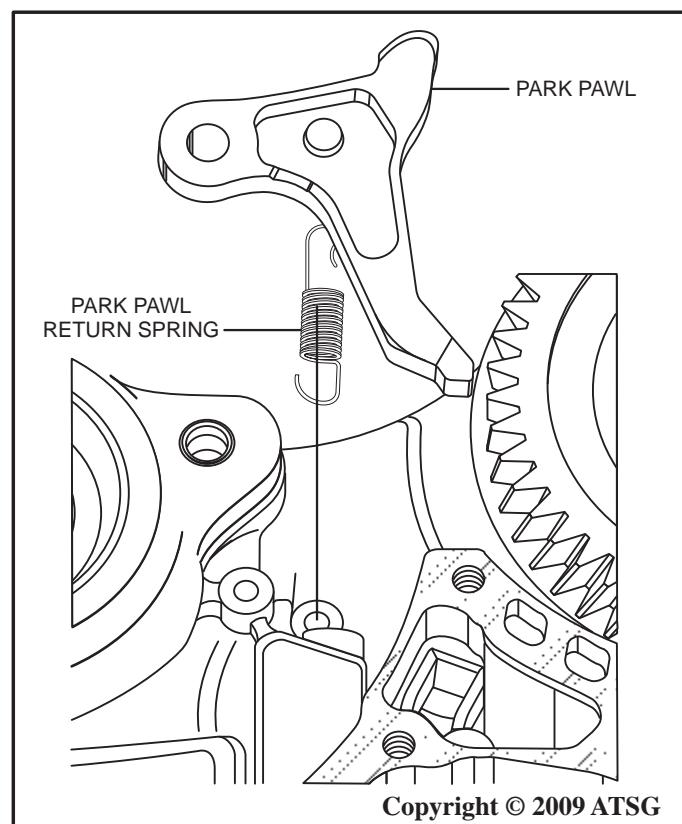


Figure 199

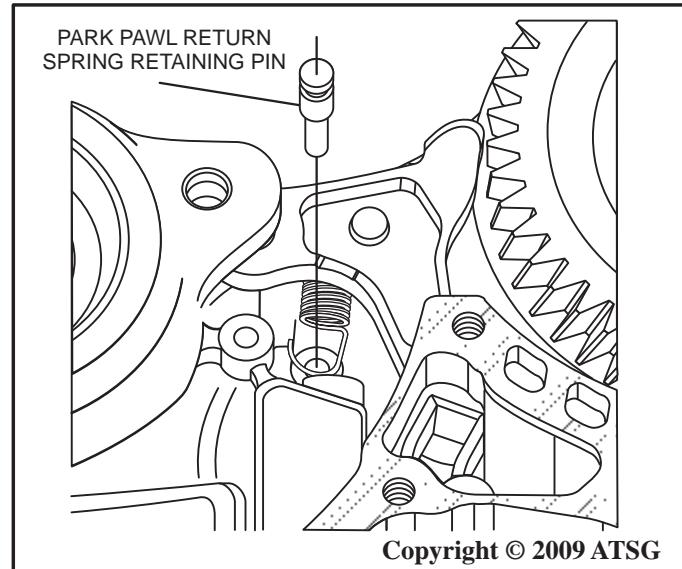


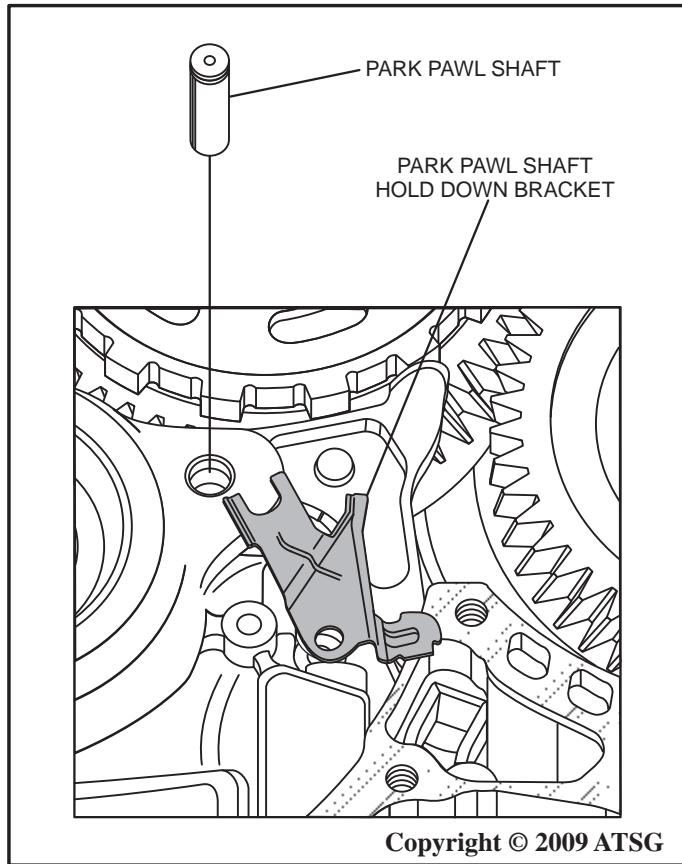
Figure 200

FINAL ASSEMBLY

Internal components

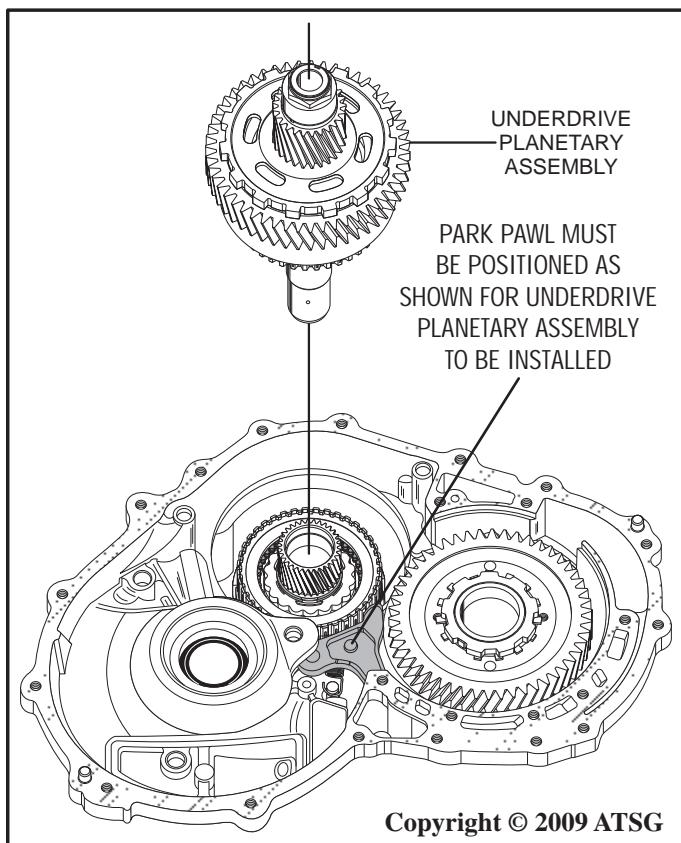
105. Position the park pawl in the case as shown in Figure 201 to provide for proper installation of the underdrive planetary assembly.
106. Install the underdrive planetary assembly into the case using a twisting motion so that the clutch hub splines into the underdrive lined plates and the planetary gears mesh with the sun gear on the underdrive clutch drum as shown in Figure 201.
107. Slide park pawl into position then install the park pawl shaft into the case and through the park pawl as shown in Figure 202.
108. Install the park pawl shaft hold down bracket into position in the case as shown in Figure 202.
109. Install the park pawl shaft hold down bracket retaining bolt and thread into the case as shown in Figure 203.
110. Torque the park pawl shaft hold down bracket retaining bolt to 9.8 N m (7 ft. lb.)

Final Assembly Continued on Page 102.



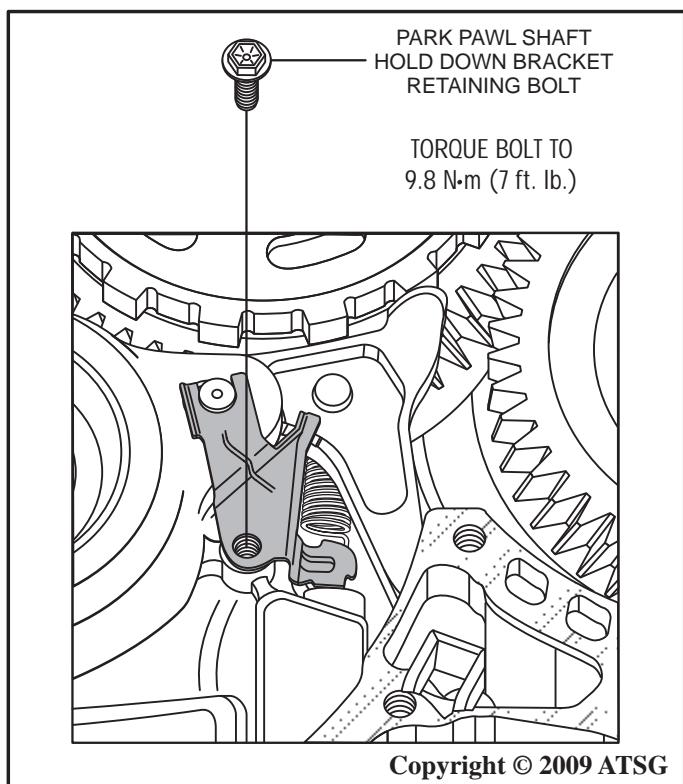
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Figure 202



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Figure 201



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Figure 203

FINAL ASSEMBLY

Internal components

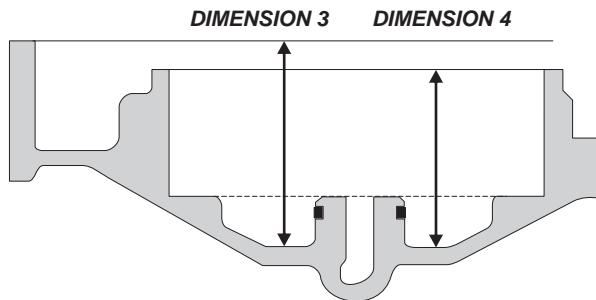
111. Using a straight edge across the top of the drive pinion gear, take a measurement from the top of the straight edge to the contact area of the torque converter housing. Deduct the height of the straight edge from the overall height to obtain ("Dimension C") as shown in Figure 204.
112. Next, measure the distance from the base of the torque converter housing to the area where the housing contacts the transaxle case as shown in Figure 205. This is ("Dimension 3").
113. Now, take a measurement from the base of the torque converter housing to the top of the bearing seat as shown in Figure 205. This is ("Dimension 4"). Deduct ("Dimension 4" from ("Dimension 3")) to determine "Dimension D". Next, deduct "Dimension D", the underdrive planetary thrust bearing thickness **3.28 mm (.129 in.)** and the thickness of the underdrive planetary thrust bearing race from "Dimension C" so the end play is **.198 - .693 mm (.0078 - .0273 in.)**.

114. Select the appropriate underdrive planetary thrust bearing race from the chart shown in Figure 206 to obtain proper end play measurement.

Final Assembly Continued on Page 103.

OBTAINING "DIMENSION D"

"Dimension D" is obtained by measuring from the base of the differential housing to the area where the torque converter housing contacts the transaxle case ("Dimension 3") and then measuring from the top of the bearing seat to the area where the torque converter housing contacts the transaxle case ("Dimension 4"). Deduct ("Dimension 4") from ("Dimension 3") to determine "Dimension B".

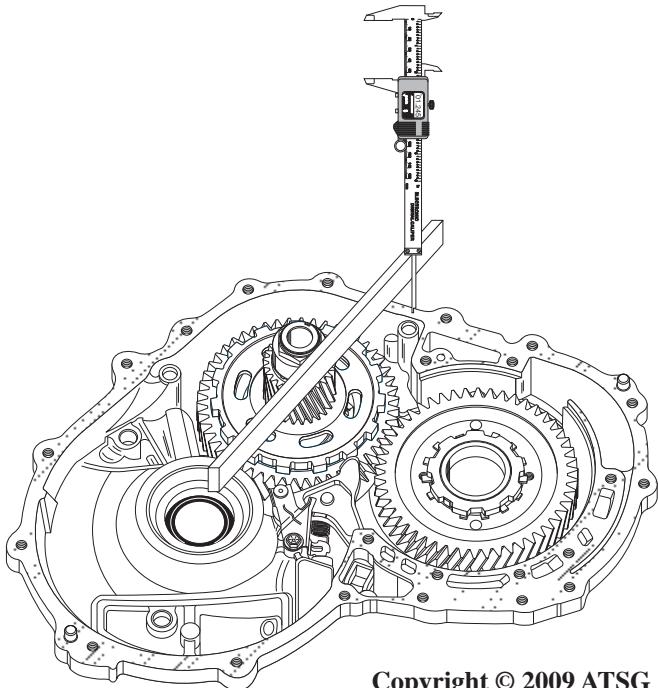


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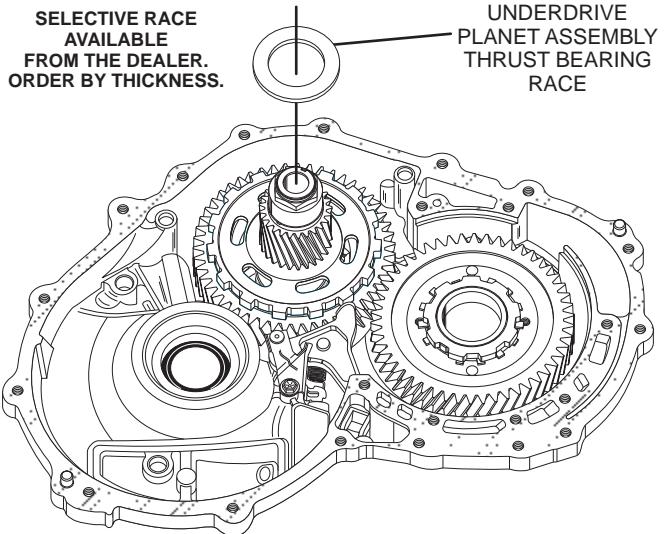
Figure 205

OBTAINING "DIMENSION C"

"Dimension C" is obtained by measuring from the top of the straight edge to the differential housing and deducting the height of the straight edge from the total measurement.



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END PLAY
0.198 - 0.693 mm (.0078 - .0273 in.)

THICKNESS	INSIDE DIA.	OUTSIDE DIA.
3.5 mm (.138")	57.2 mm (2.252")	84.96 mm (3.3449)
3.8 mm (.150")	57.2 mm (2.252")	84.96 mm (3.3449)

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Figure 204

Figure 206

FINAL ASSEMBLY

Internal components

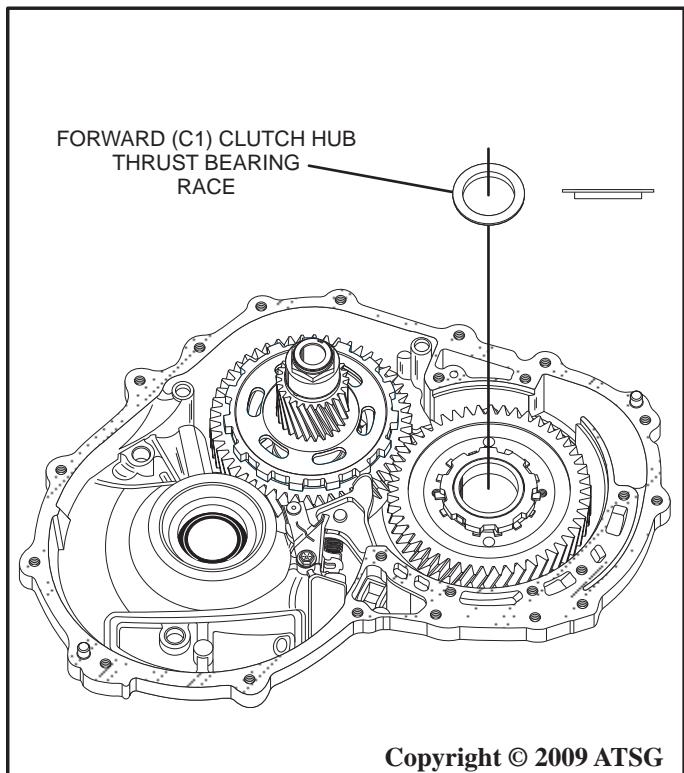


Figure 207

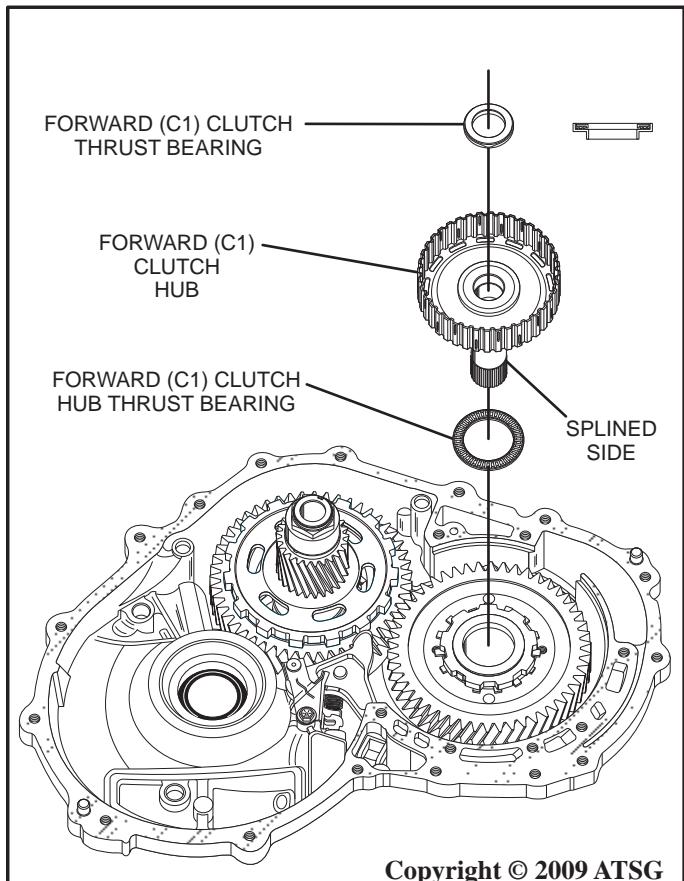


Figure 208

115. Coat the forward (C1) clutch hub thrust bearing race with a small amount of Trans-Jel® and install the race onto the transfer drive gear as shown Figure 207.
116. Coat the forward (C1) clutch hub thrust bearing with a small amount of Trans-Jel® and install the thrust bearing onto the splined side of the forward clutch hub as shown in Figure 208.
117. Install the forward (C1) clutch hub into the transmission while turning to engage the splines as shown in Figure 208.
118. Coat the forward (C1) clutch thrust bearing with a small amount of Trans-Jel® and install into the forward clutch hub with the lip facing down into the hub as shown in Figure 208.
119. Install the forward (C1) clutch drum assembly with a twisting motion so the lined plates spline with the hub as shown in Figure 209.

Final Assembly Continued on Page 104.

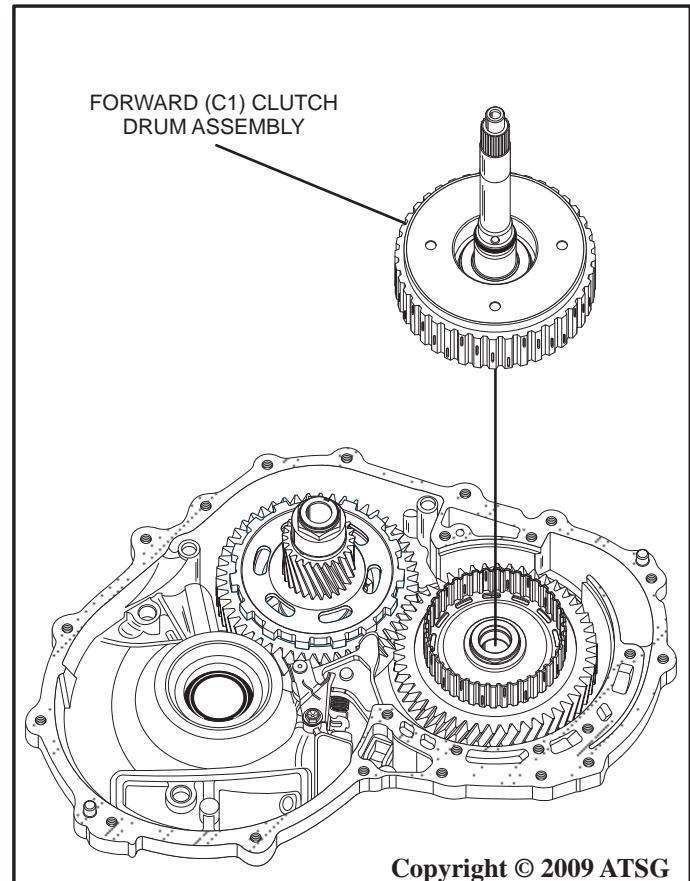


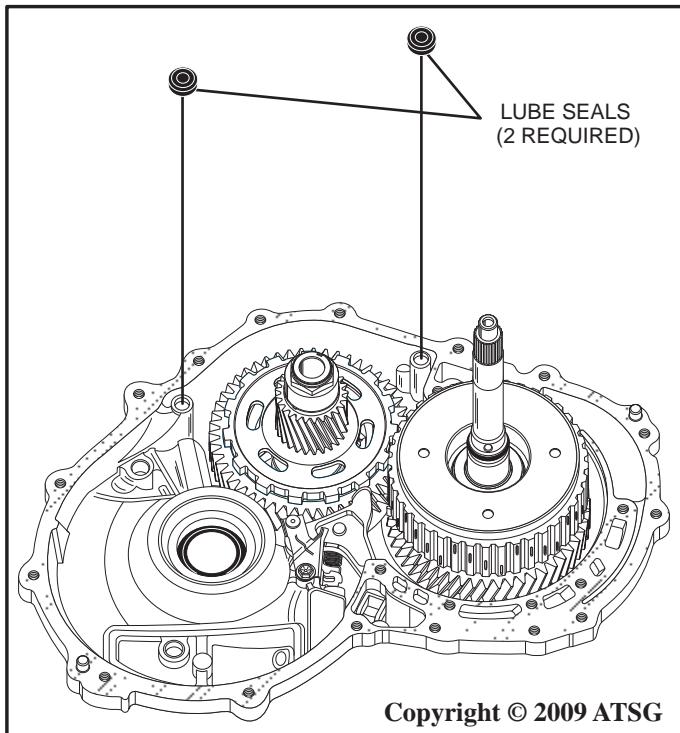
Figure 209

FINAL ASSEMBLY

Internal components

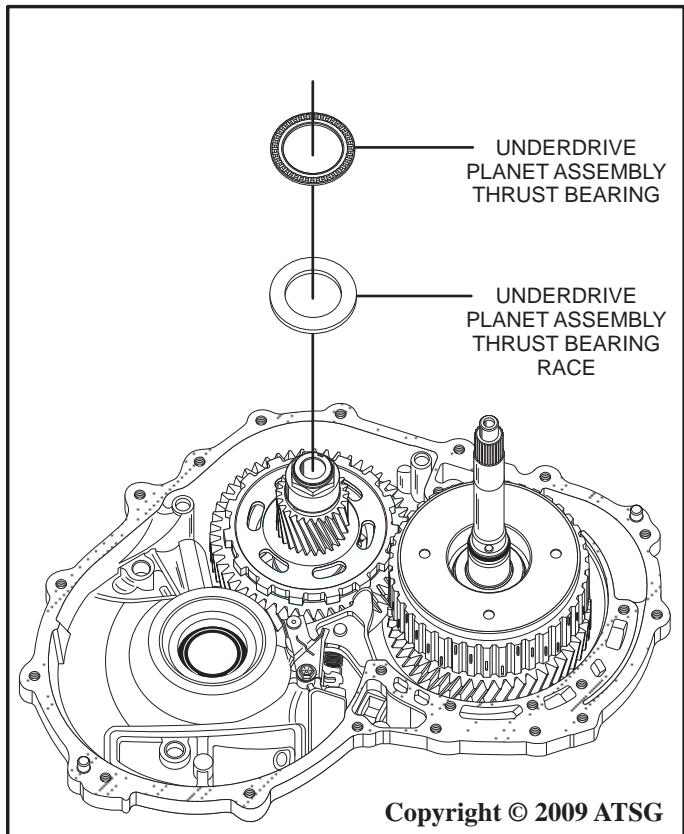
120. Coat the underdrive planetary thrust bearing race with a small amount of Trans-Jel® and install the race onto the underdrive planetary assembly drive pinion gear in the case as shown in Figure 210.
121. Coat the underdrive planetary assembly thrust bearing with a small amount of Trans-Jel® and install onto the race in the case as shown in Figure 210.
122. Coat the two lube seals with a small amount of Trans-Jel® and install them into the case in the locations shown in Figure 211.
123. Install the oil pump assembly onto the case and install the seven oil pump retaining bolts as shown in Figure 212.

Final Assembly Continued on Page 105.

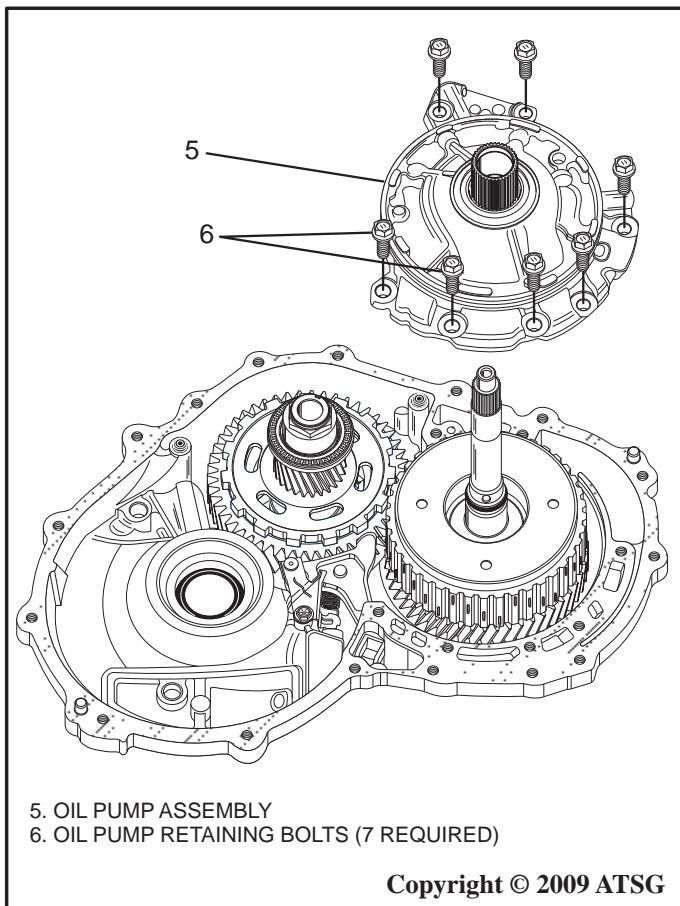


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Figure 211



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Figure 210

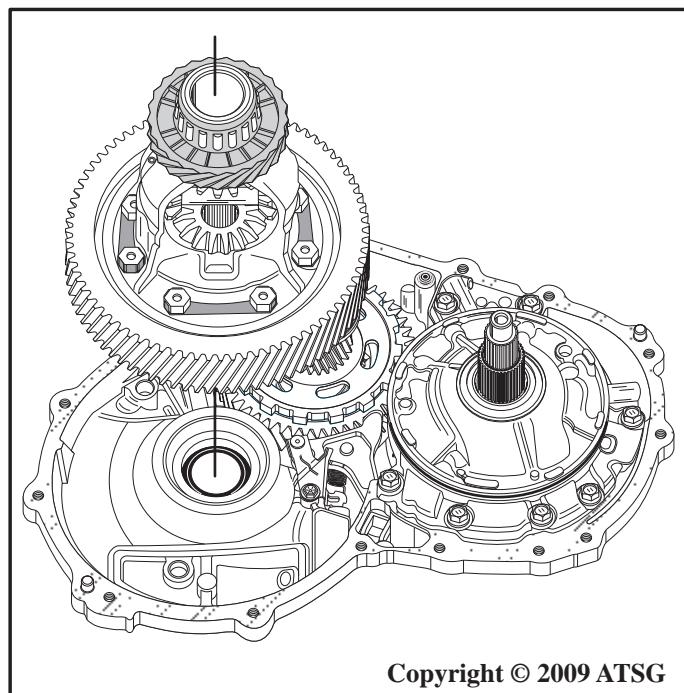
Figure 212

FINAL ASSEMBLY

Internal components

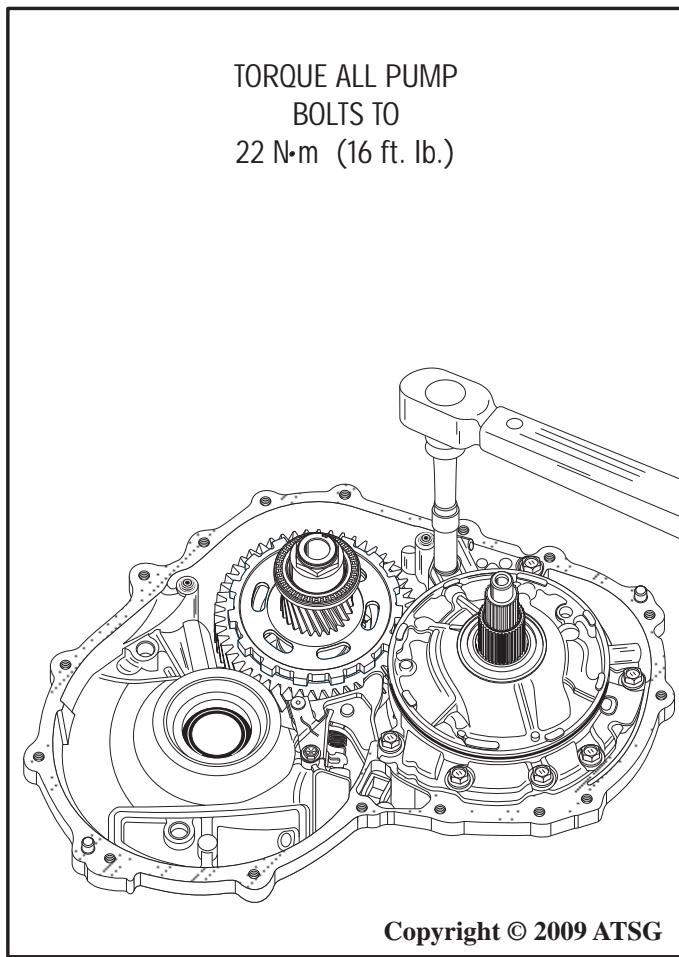
124. Tighten the seven pump retaining bolts and torque all pump bolts to **22 N·m (16 ft. lb.)**.
125. Re-coat the differential tapered roller bearings with a small amount of ATF if necessary and install the differential carrier into the case as shown in Figure 214.
126. Apply a thin bead of FIPG Part No. 08826-00090, THREE BOND 1281 or equivalent anaerobic sealant to the transaxle case.
127. Install the converter housing to the transaxle case as shown in Figure 215.
128. Apply a small amount of THREE BOND 2403 or equivalent anaerobic sealant to the bolts marked "C" shown in Figure 215.
129. Note the bolt lengths and torque specifications as shown in the chart in Figure 215 and torque all converter housing bolts as specified.

Final Assembly Continued on Page 106.



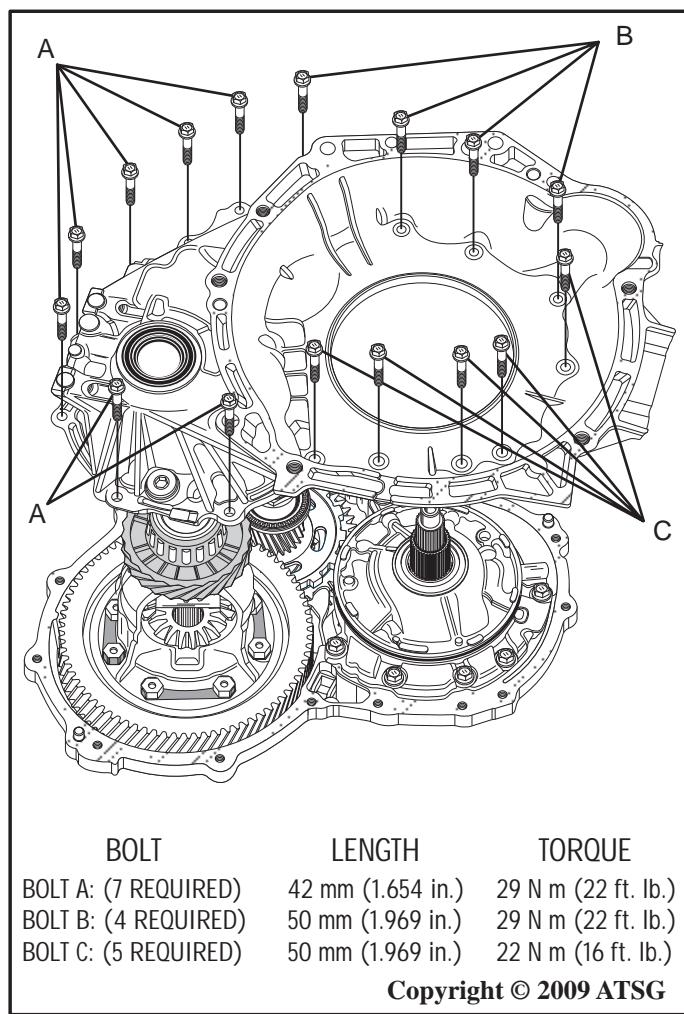
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Figure 214



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Figure 213



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Figure 215

FINAL ASSEMBLY

Internal components

130. Check the input shaft end play using a dial indicator and move the input shaft in an up/down manner as shown in Figure 213.
 131. Install new o-rings on the C1, C3, and B3 accumulator pistons as shown in Figure 214.
 132. Coat each of the o-rings with a small amount of ATF or Trans-Jel®.
- Note:** Spring colors and dimensions have been provided in Figure 214, however, there may be variations from model to model.
133. Install the C1 accumulator spring into the case using the identifier chart shown in Figure 214.
 134. Install the C1 accumulator piston into the case as shown in Figure 214.
 135. Install the C3 accumulator piston into the case as shown in Figure 214.
 136. Install the C3 accumulator spring into the case using the identifier chart shown in Figure 214.

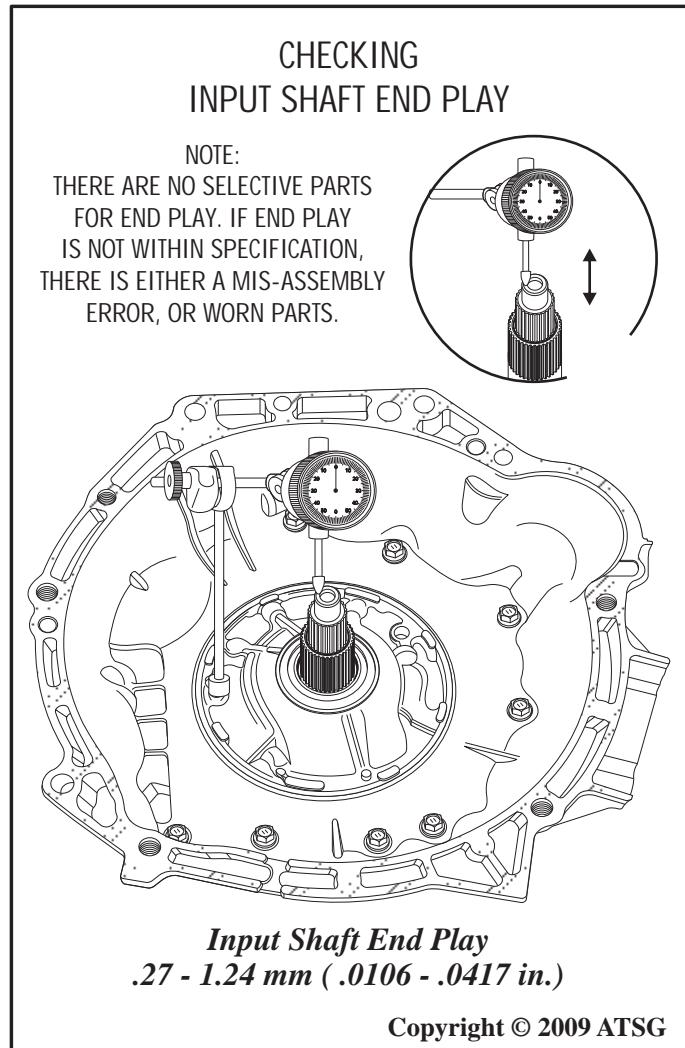


Figure 213

137. Install the B3 accumulator inner and outer springs into the case using the identifier chart shown in Figure 214.
138. Install the B3 accumulator piston into the case as shown in Figure 214.

Final Assembly Continued on Page 107.

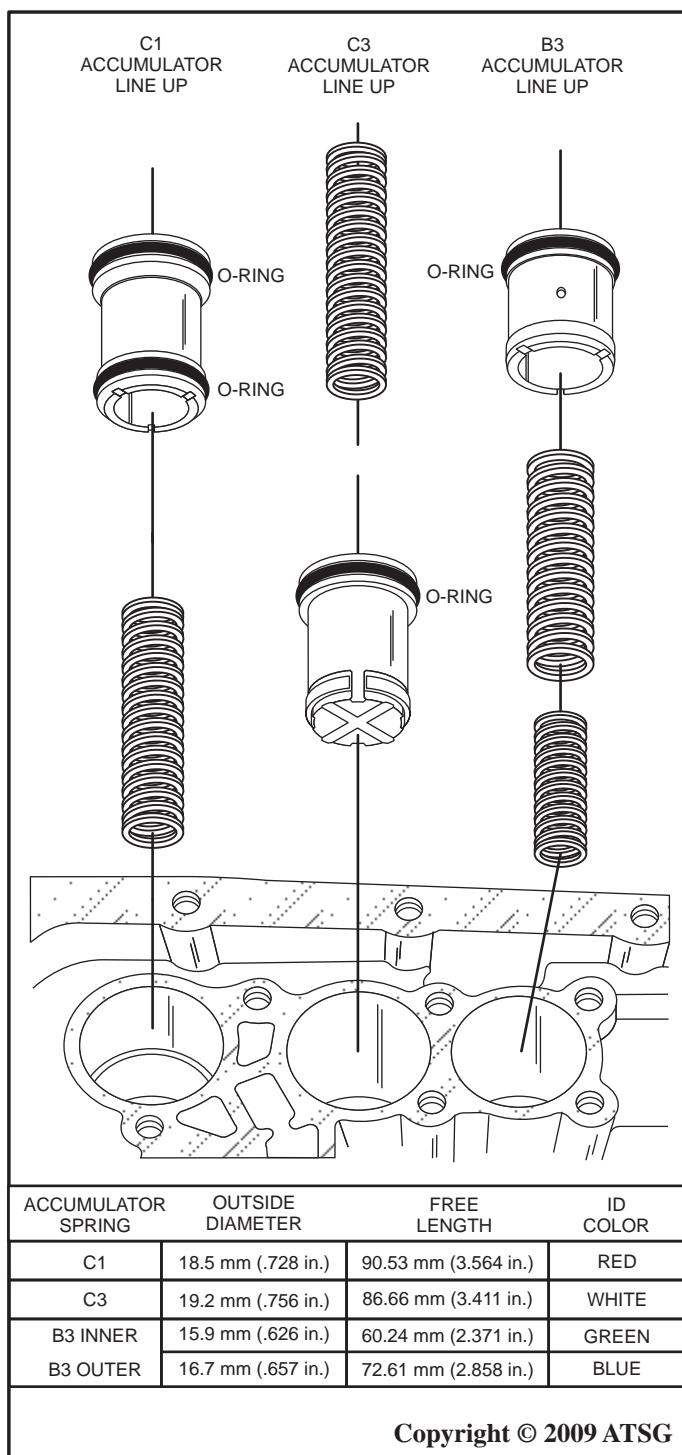


Figure 214

FINAL ASSEMBLY

Internal components

139. Coat the inside lip of the manual lever shaft seal with a small amount of ATF or Trans-Jel® and install into the case by lightly tapping with a small hammer as shown in Figure 215.
140. Install the park actuator rod into the manual valve detent lever as shown in Figure 216.
141. Install the manual lever shaft into the trans with a twisting motion, using care to not damage the seal and push it through the manual valve detent lever as shown in Figure 216.
142. Install the spacer sleeve into the case over the manual lever shaft as shown in Figure 217.
143. Align the hole in the manual valve detent lever with the hole in the manual lever shaft and install the roll pin into the detent lever using a small hammer as shown in Figure 217.
144. Slide the spacer sleeve over the detent lever so it covers the roll pin as shown in Figure 218.
145. Install the manual shaft locating pin as shown in Figure 218.

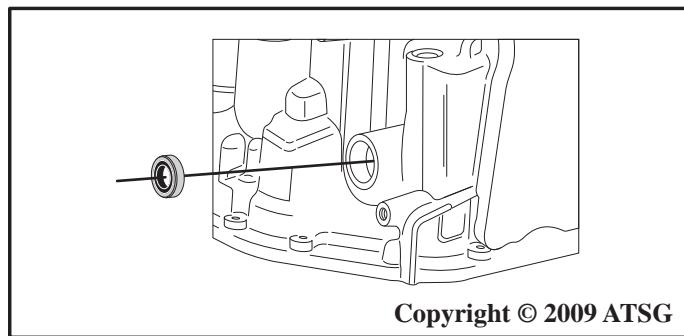


Figure 215

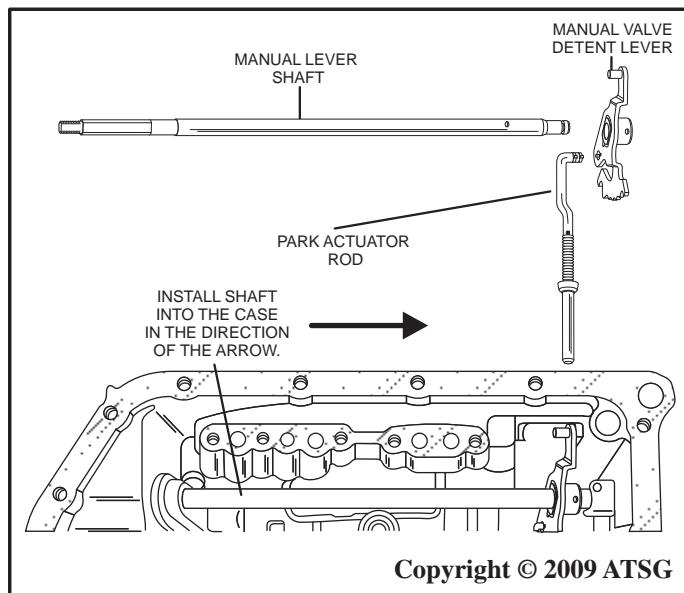


Figure 216

146. Install the manual lever detent spring tensioner plate and the manual lever detent spring as shown in Figure 219.
147. Install the retaining bolt into the detent spring and tensioner plate (*finger tight only*).
148. Install the park pawl lock bracket and the bolts finger tight only as shown in Figure 219.
149. Now torque all bolts as specified in Figure 219.

Final Assembly Continued on Page 108.

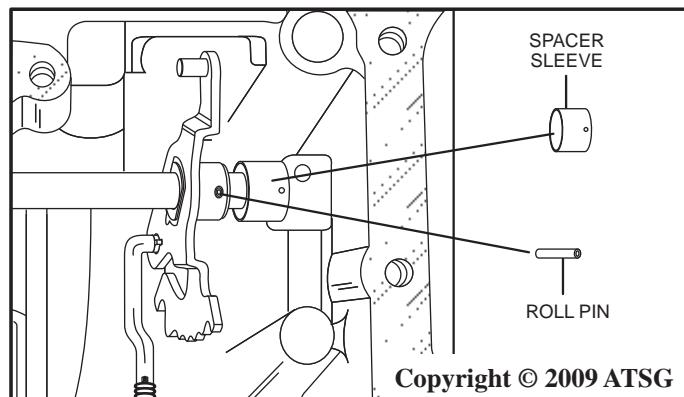


Figure 217

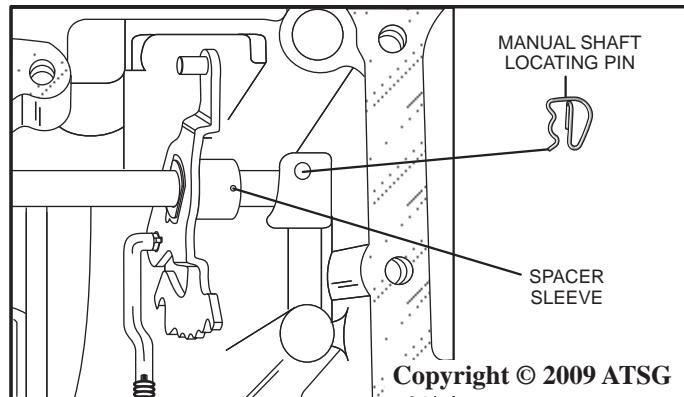


Figure 218

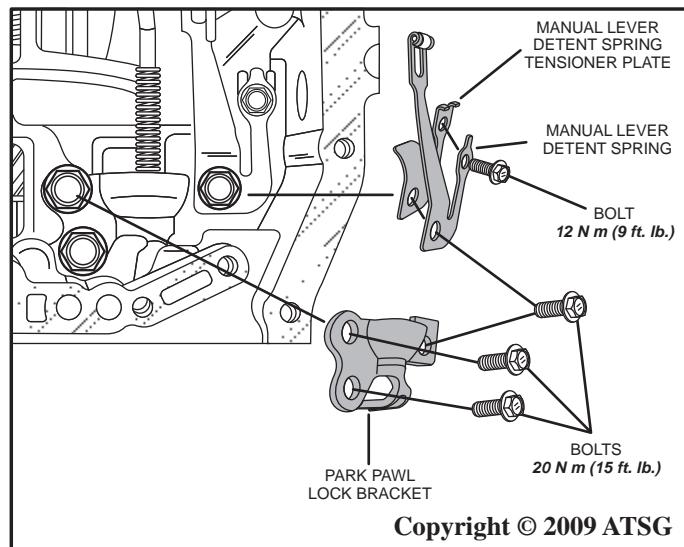


Figure 219

FINAL ASSEMBLY

Internal components

150. Install the B1 brake tube seal into the case as shown in Figure 220
151. Coat the valvebody to case seal B1 with a small amount of Trans-Jel® and install into the case as shown in Figure 220.
152. Coat the valvebody to case seal B2 with a small amount of Trans-Jel® and install into the case as shown in Figure 220.
153. Install the anti-drain back check valve into the case with the ball facing upward as shown in Figure 220.

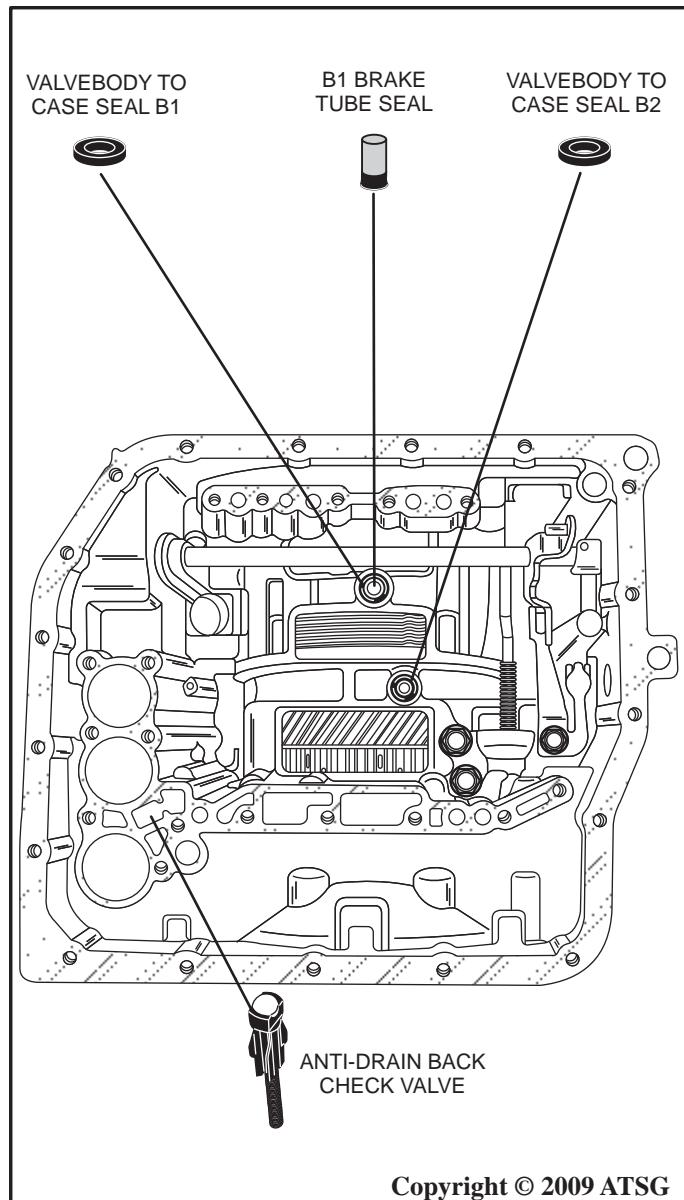


Figure 220

154. Install a new o-ring onto the internal harness case connector and coat the o-ring with a small amount of Trans-Jel® as shown in Figure 221.
155. Install a new o-ring onto the ATF temperature sensor as shown in Figure 221.
156. Install the internal harness case connector into the case with a twisting motion, then install and torque the retaining bolt as shown in Figure 221.
Torque bolt to 5.4 N·m (48 in. lb.)

Final Assembly Continued on Page 109.

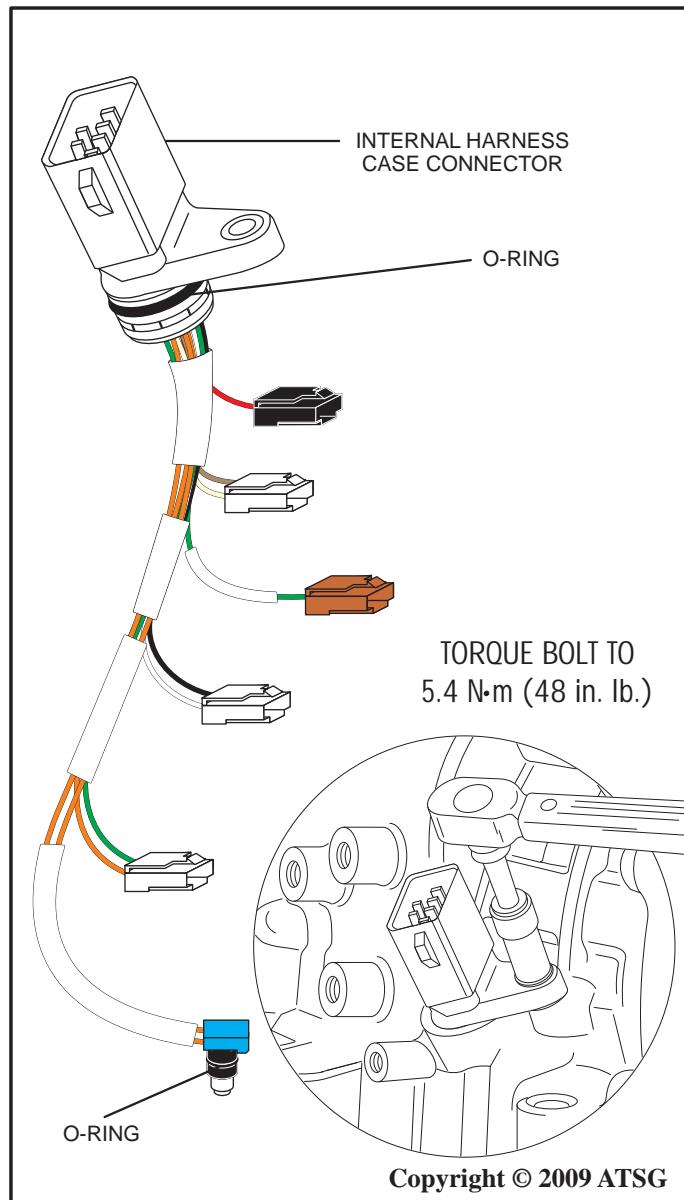


Figure 221

FINAL ASSEMBLY

Internal components

157. Install the valve body onto the case as shown in Figure 222 using care to not pinch the wires of the internal harness.
158. Make sure to align the manual valve so the pin on the detent lever is between the grooves at the end of the manual valve as shown in Figure 222.
159. Install the seventeen valve body to case attaching bolts according to proper length as shown in Figure 222.
160. Tighten the two locating bolts marked with the asterisk finger tight first, then the remaining ones.
161. **Torque the valve body attaching bolts to;
11 N m (8 ft. lb.)**

Final Assembly Continued on Page 110.

BOLT LENGTH

BOLT A: 25 mm (0.984" in.)

BOLT B: 41 mm (1.614" in.)

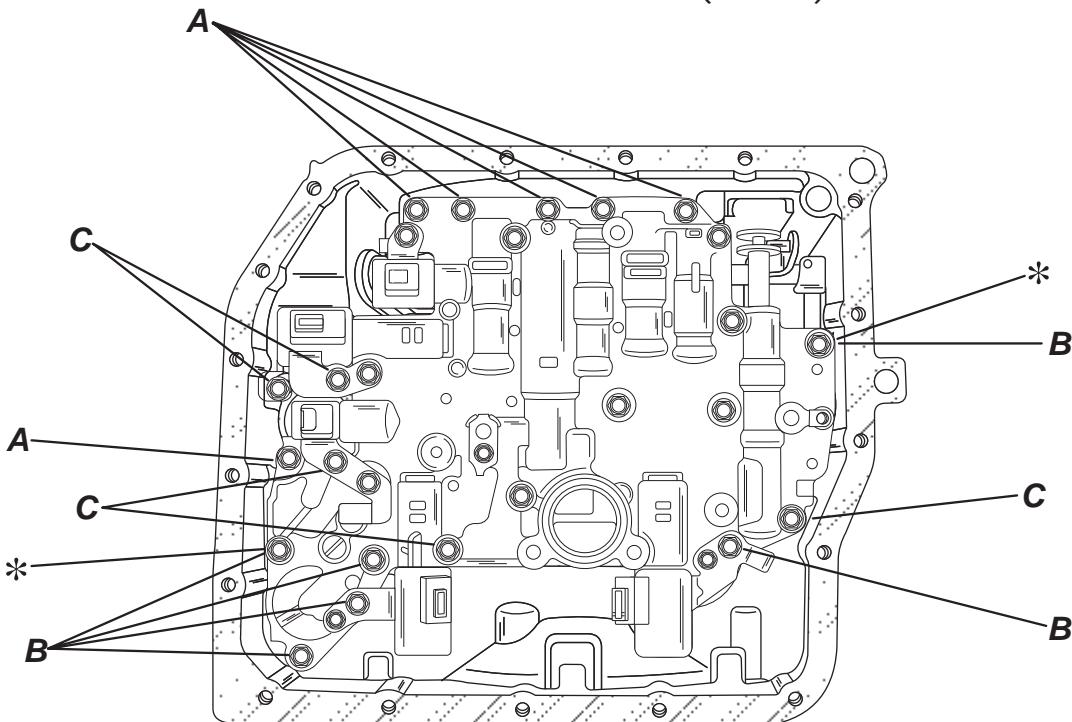
BOLT C: 45 mm (1.771" in.)

* INDICATES LOCATING BOLT

TORQUE ALL VALVE BODY

ATTACHING BOLTS TO

11 N·m (8 ft. lb.)



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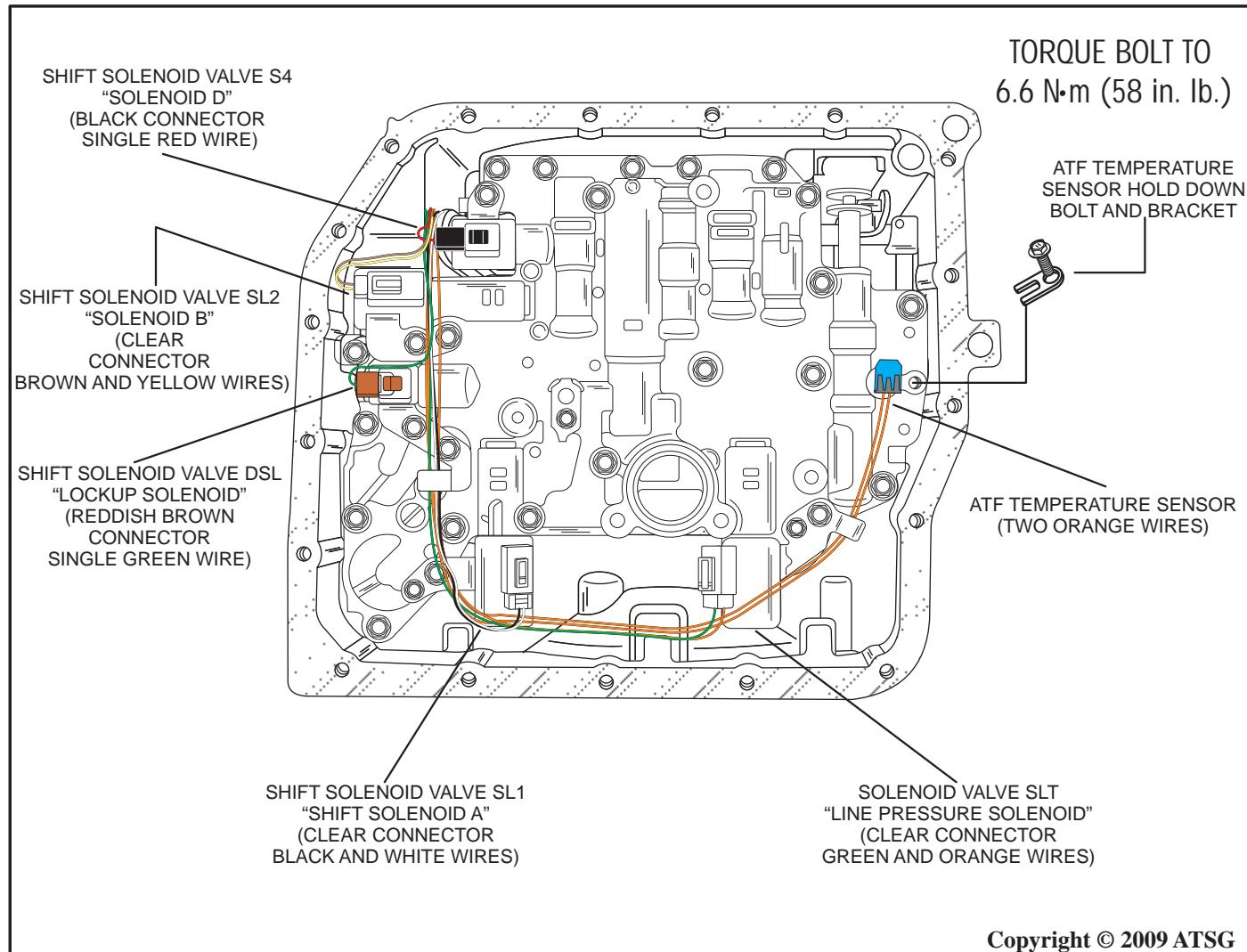
Figure 222

FINAL ASSEMBLY

Internal components

162. Connect all solenoid connectors according to the diagram in Figure 223.
163. Make certain the connectors are plugged in all the way until the locking tabs snap into place.
164. Coat the ATF temperature sensor o-ring with a small amount of Trans-Jel® then install into the locating hole in the valve body.
165. Install the ATF temperature sensor hold down bracket and the attaching bolt as shown in Figure 223.
166. **Torque the bolt to 6.6 N·m (58 in. lb.)**

Final Assembly Continued on Page 111.



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Figure 223

FINAL ASSEMBLY

Internal components

167. Install a new oil filter gasket onto the oil filter using a small amount of Trans-Jel® as shown in Figure 224.
168. Install the oil filter and gasket onto the valve body then install the three oil filter attaching bolts as shown in Figure 224.
169. **Torque the filter bolts to 11 N·m (8 ft. lb.)**
170. Install a new oil pan gasket onto the case as shown in Figure 225.
171. Coat the eighteen oil pan attaching bolts with a small amount of THREE BOND 2430 or equivalent anaerobic sealant and install them as shown in Figure 225.
172. **Torque all pan bolts to 7.8 N·m (69 in. lb.)**

Final Assembly Continued on Page 112.

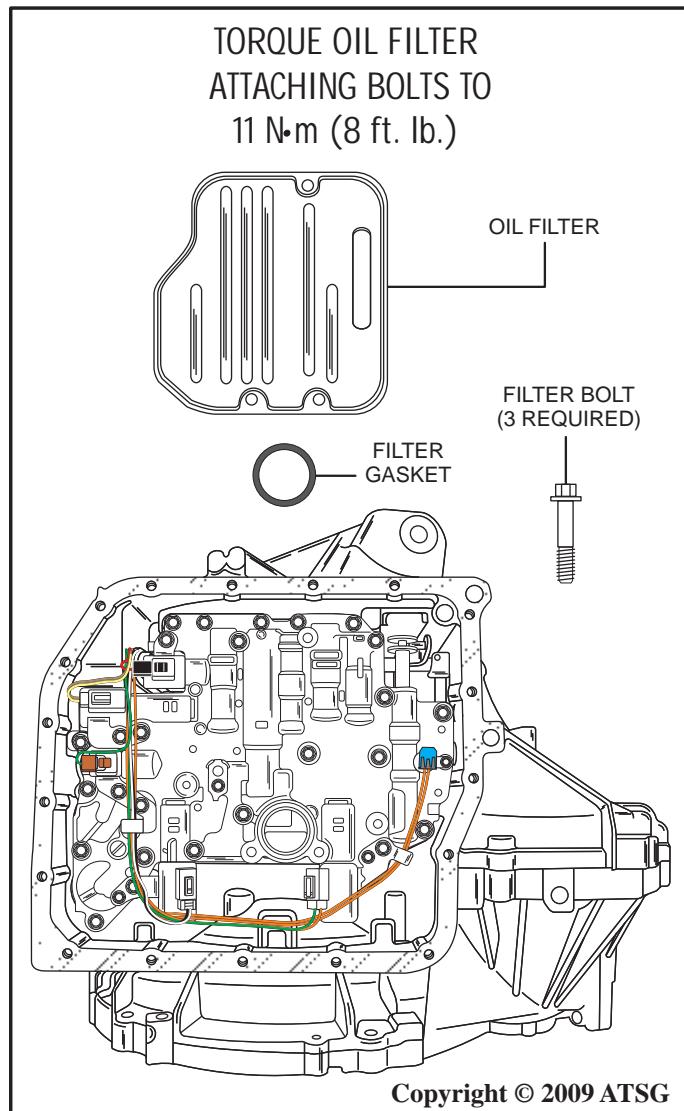


Figure 224

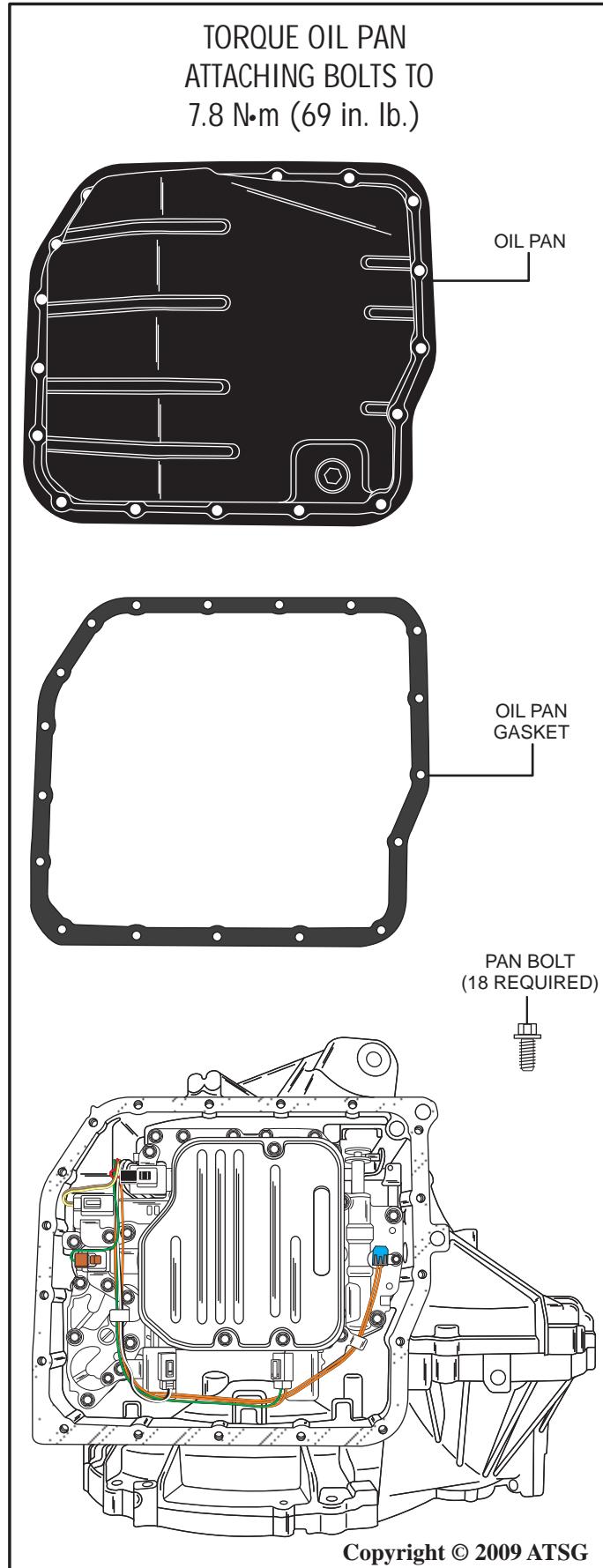


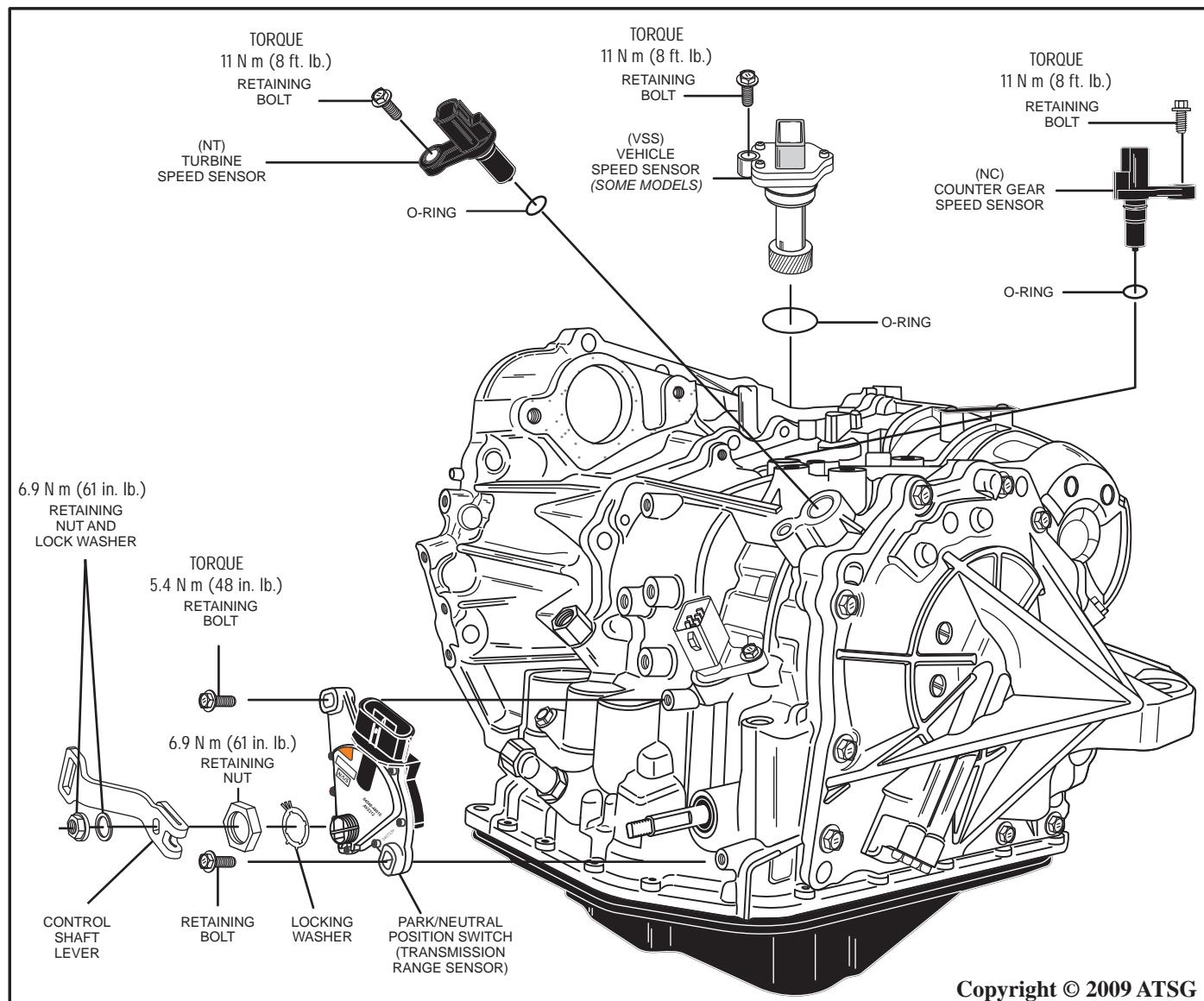
Figure 225

FINAL ASSEMBLY

Internal components

173. Install a new o-ring on the NT turbine speed sensor and coat the o-ring with a small amount of Trans-Jel®.
174. Install sensor into case and torque retaining bolt to **11 N m (8 ft. lb.)** as shown in Figure 226.
175. Install a new o-ring on the NC counter gear speed sensor and coat the o-ring with a small amount of Trans-Jel®.
176. Install sensor into case and torque retaining bolt to **11 N m (8 ft. lb)** as shown in Figure 226.
177. Install a new o-ring on the vehicle speed sensor (*if equipped*) and coat o-ring with a small amount of Trans-Jel®
178. Install sensor into case and torque retaining bolt to **11 N m (8ft. lb.)**
179. Install the park/neutral position switch onto the transaxle and align the holes in the switch with the threads in the case.
180. Align the park/neutral switch as shown back in Figure 8 and install the park/neutral switch retaining bolts and torque the retaining bolts to **5.4 N m (48 in. lb.)** as shown in Figure 226.
181. Install the locking washer and the retaining nut.
182. Torque the nut to **6.9 N m (61 in. lb.)** then bend the tabs on the locking washer into place over the retaining nut.
183. Install the control shaft lever, the lock washer and the retaining nut and torque the retaining nut to **6.9 N m (61 in. lb.)** as shown in Figure 226.

Final Assembly Continued on Page 113.



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Figure 226

FINAL ASSEMBLY

Internal components

184. Install the torque converter into the transaxle so it is fully engaged into the pump gears and splines as shown in Figure 227.

Final Assembly Complete.

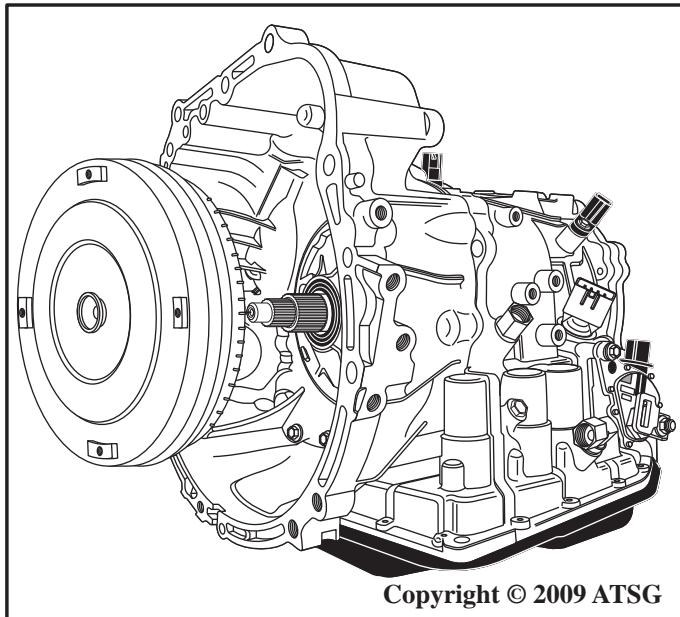


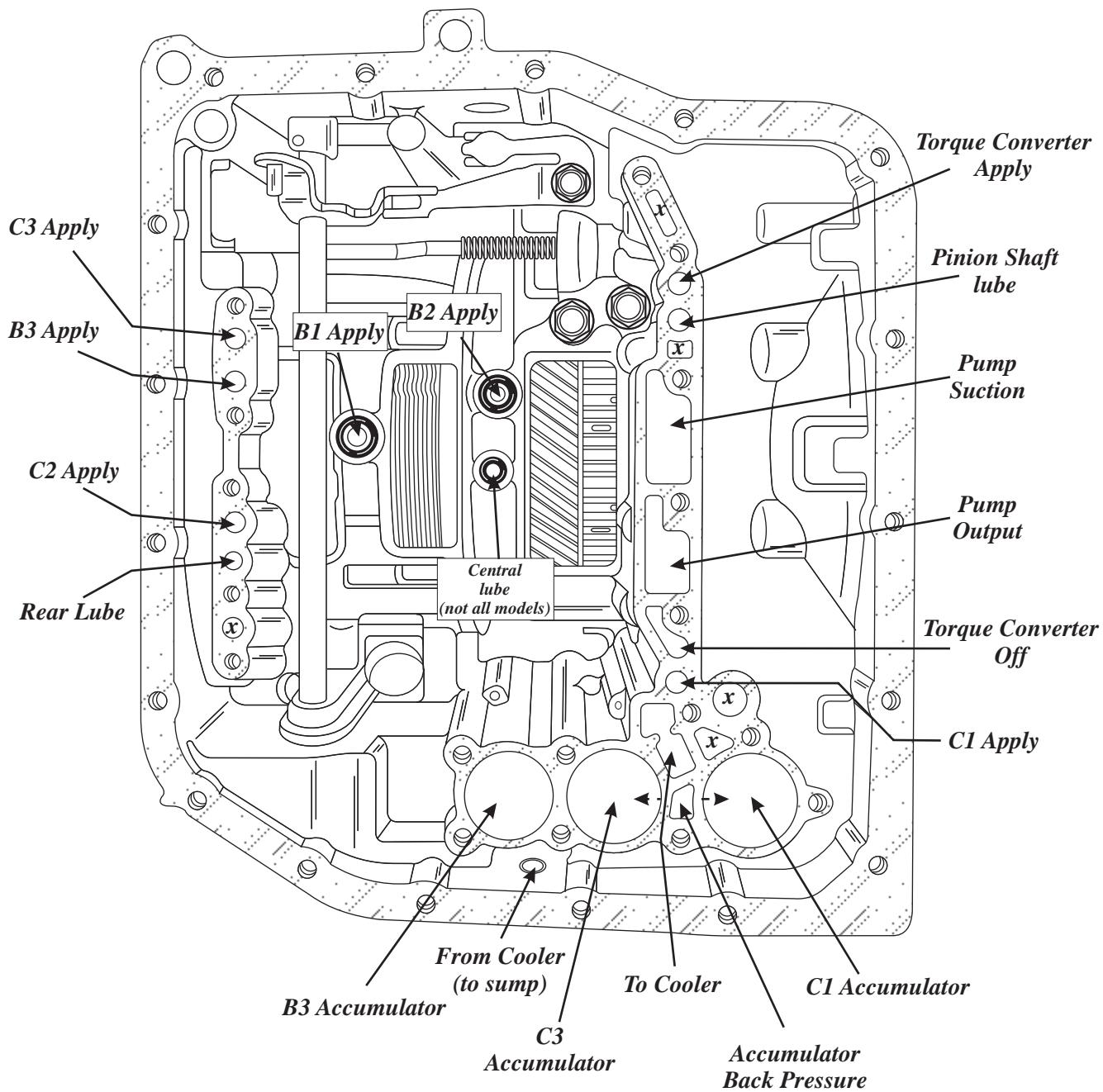
Figure 227

TORQUE SPECIFICATIONS

Internal harness connector to case.....	5.4 Nm (48 in. lb.)
ATF temp sensor hold down bracket.....	6.6 Nm (58 in. lb.)
NC counter gear speed sensor to case.....	11 Nm (8 ft. lb.)
NT turbine speed sensor to case.....	11 Nm (8 ft. lb.)
Park/neutral switch to case (2 required).....	5.4 Nm (48 in. lb.)
Park/neutral switch retaining nut.....	6.9 Nm (61 in. lb.)
Control shaft lever to control shaft.....	6.9 Nm (61 in. lb.)
Oil pan drain plug.....	17 Nm (13 ft. lb.)
Oil pan to case (18 required).....	7.8 Nm (69 in. lb.)
Oil filter to valvebody (3 required).....	11 Nm (8 ft. lb.)
Valvebody to case (17 required).....	11 Nm (8 ft. lb.)
Valvebody attaching A (3 required).....	11 Nm (8 ft. lb.)
Valvebody attaching B (3 required).....	6.6 Nm (58 in. lb.)
Valvebody attaching C (7 required).....	11 Nm (8 ft. lb.)
Valvebody attaching D (7 required).....	11 Nm (8 ft. lb.)
Valvebody attaching E (1 required).....	11 Nm (8 ft. lb.)
Valvebody attaching F (6 required).....	6.6 Nm (58 in. lb.)
Valvebody attaching G (1 required).....	6.6 Nm (58 in. lb.)
Park pawl bracket to case (3 required).....	20 Nm (15 ft. lb.)
Park pawl shaft clamp to case.....	9.8 Nm (87 in. lb.)
Manual lever detent spring to case.....	12 Nm (9 ft. lb.)
Transaxle rear cover to case A (1 required).....	18.6 Nm (14 ft. lb.)
Transaxle rear cover to case B (10 required)	24.5 Nm (18 ft. lb.)
Feed tube hold down bracket to case.....	5.4 Nm (48 in. lb.)
Converter housing to transaxle case A,B (11 required).....	29 Nm (21 ft. lb.)
Converter housing to transaxle case C (5 required).....	22 Nm (16 ft. lb.)
Oil pump to case (7 required).....	22 Nm (16 ft. lb.)
Pump cover to pump body (11 required).....	9.8 Nm (87 in. lb.)
UD planetary locking nut.....	280 Nm (207 ft. lb.)
Counter drive gear locking nut.....	280 Nm (207 ft. lb.)

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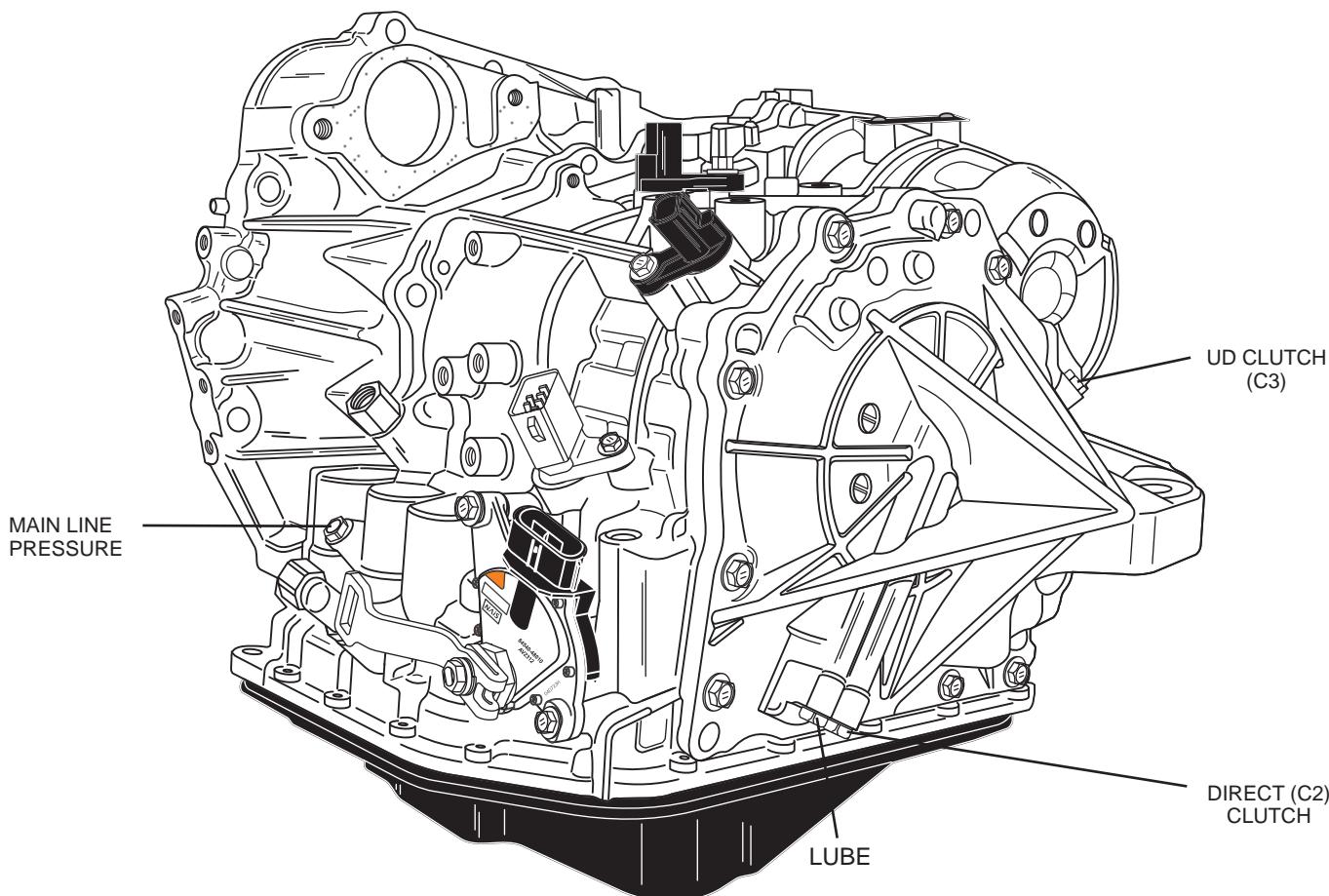
Figure 228

**CASE PASSAGE I.D.
AIR TEST PORTS**

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Figure 229

LINE PRESSURE TAP LOCATIONS AND SPECIFICATIONS



LINE PRESSURE SPECIFICATIONS

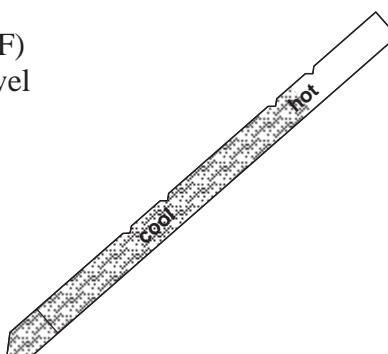
RANGE	IDLE	STALL
D	54-65psi.	131-160psi.
R	93-116psi.	251-294psi.

FLUID LEVEL CHECKING AND ATF CAPACITY/REQUIREMENT

Check fluid with temperature between 70 - 80 °C (158 - 176 °F) selector lever in park position with parking brake set. Fluid level should be between the hot marks on the stick.

Dry Fill.....8.6 liters
Drain and Re-fill.....3.3 liters

Fluid requirement: Toyota ATF Type T-IV
Part Number 08886-81015



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Figure 230
AUTOMATIC TRANSMISSION SERVICE GROUP

Technical Service Information

ECM MEMORY RESET PROCEDURE

ECM RESET MEMORY FUNCTION

Whenever the U-140E/F or U-240E automatic transmission is replaced, overhauled or individual components are replaced, use this procedure to clear Engine Control Module ECM/PCM "Learned Values" to minimize subsequent performance issues, or possible damage to transaxle. Use the memory reset procedure listed in Figure 231 below, using the required SSTs.

CAUTION:

Failure to follow the procedure below may lengthen the time to readjust the ECM/PCM "Learned Values" potentially resulting in performance concerns, or transaxle damage.

REQUIRED (SSTs)

SPECIAL SERVICE TOOLS (SSTs)	PART NUMBER	QUANTITY
Toyota Diagnostic Tester Kit*	01001271	1
CAN Interface Module Kit*	01002744	1
12 Megabyte Diagnostic Tester Program Card with version 12.01a (or later) Software*	01002593-005	1

* Essential SSTs.

NOTE:

Additional Diagnostic Tester Kits, CAN interface Modules, Program Cards or other SSTs may be ordered by calling SPX/OTC at 1-800-933-8335.

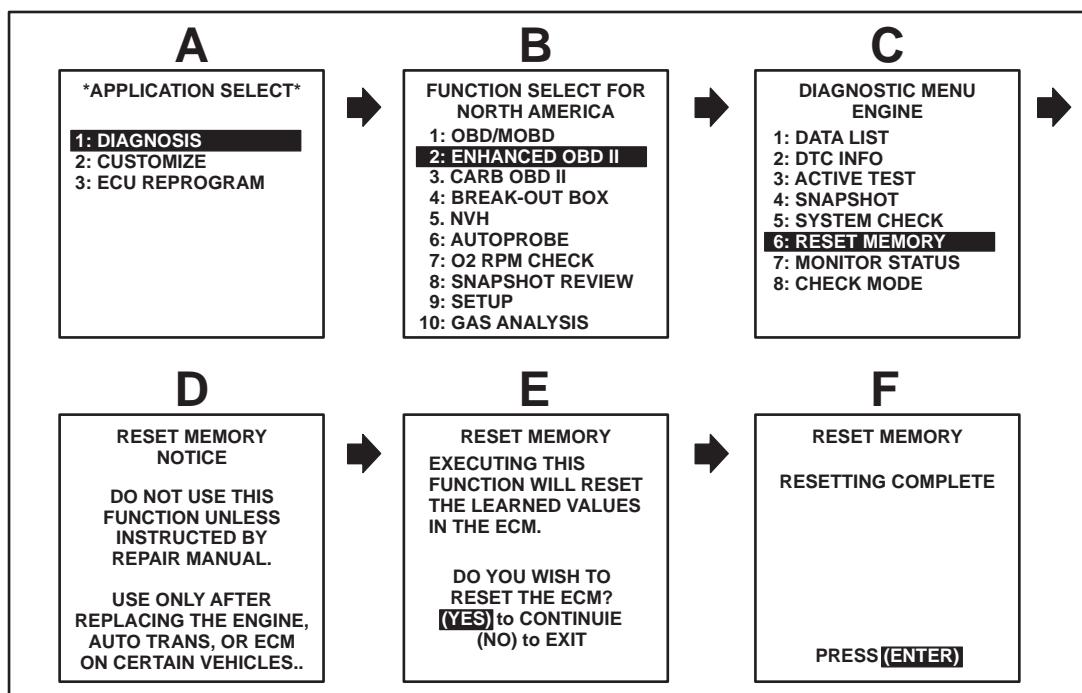
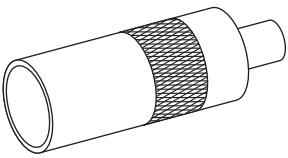
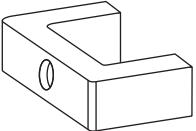
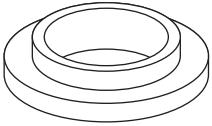
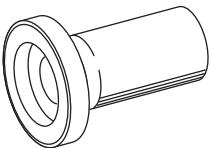
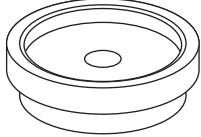
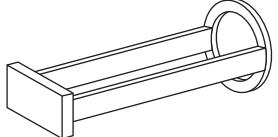
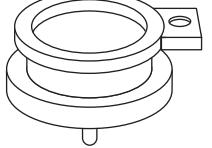
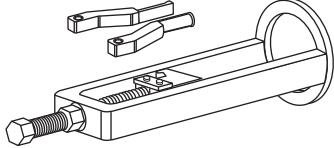
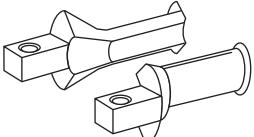
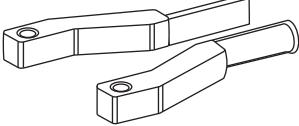
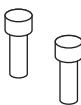
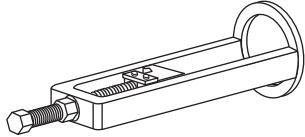
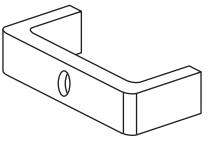


Figure 231

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Technical Service Information

(SST) SPECIAL SERVICE TOOLS

		
		
09351-32120 Bearing Driver	09351-32140 Seal Installer	09351-32150 Seal Installer
		
09387-00020 Spring Compressor	09387-00030 Counter Drive Gear Holding Tool	09387-00040 Bearing Puller Assembly
		
(09387-01010) Bearing Puller Adapter	(09387-01020) Bearing Puller Adapter	(09387-01030) Bearing Puller Adapter Pins
		
(09387-01040) Bearing Puller Body	09320-89010 Spring Compressor	

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Figure 232
AUTOMATIC TRANSMISSION SERVICE GROUP

Technical Service Information

(SST) SPECIAL SERVICE TOOLS

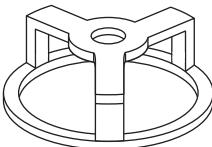
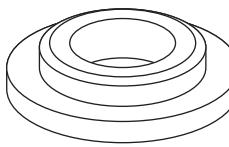
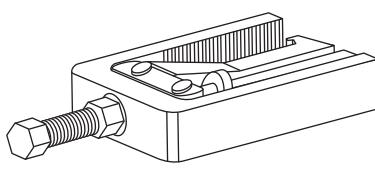
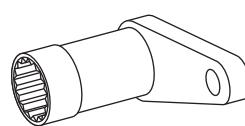
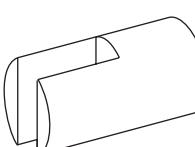
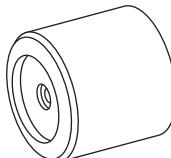
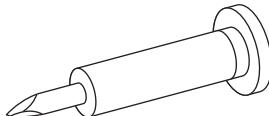
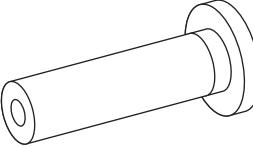
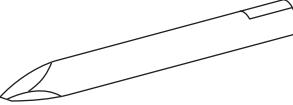
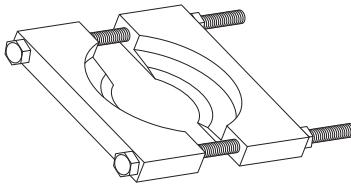
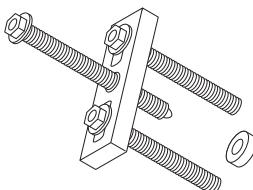
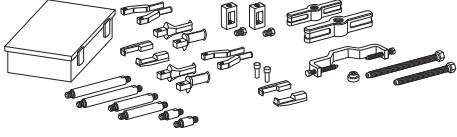
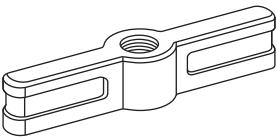
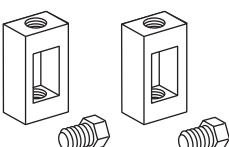
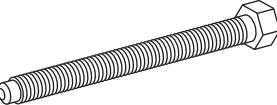
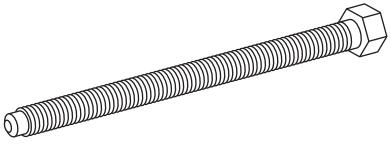
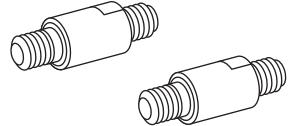
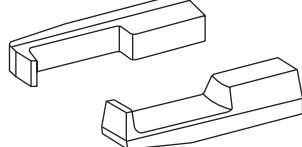
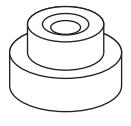
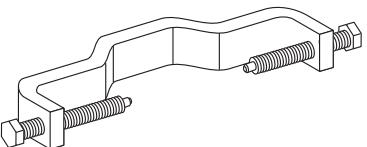
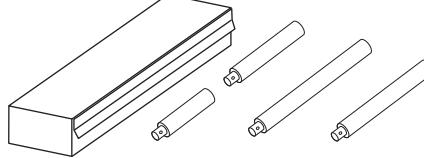
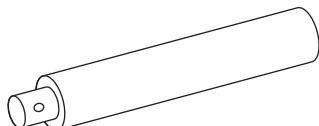
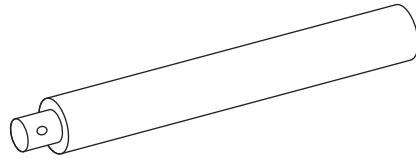
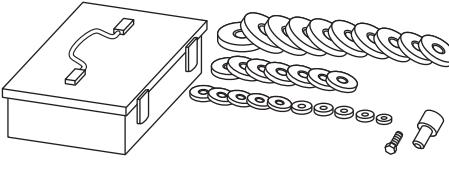
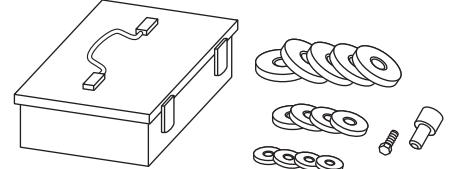
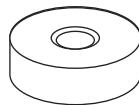
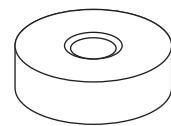
		
09387-00070 Spring Compressor	09387-00080 Counter Drive Gear Socket	09506-35010 Bearing Driver
		
09514-35011 Bearing Puller	09564-16020 Socket/Wrench	09564-32011 Differential Preload Adapter
		
09649-17010 Bearing Driver	09930-00010 Chisel	(09931-00010) Handle
		
(09931-00020) Chisel	09950-00020 Bearing Remover	09950-00030 Bearing Remover Attachment
		
09950-40011 Bearing Puller Set	(09951-04010) Sliding Arm Hanger	

Figure 233

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Technical Service Information

(SST) SPECIAL SERVICE TOOLS

 (09952-04010) Sliding Arm	 (09953-04020) Center Bolt	 (09953-04030) Center Bolt
 (09954-04010) Arm	 (09955-04061) Bearing Puller Adapter	 (09957-04010) Bearing Puller Adapter
 (09958-04011) Holding Fixture	 09950-70010 Handle Set	 09951-07100 Handle
 09951-07150 Handle	 09950-60010 Driver Set	 09950-60020 Driver Set
 (09951-00230) Driver	 (09951-00250) Driver	

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Figure 234

Technical Service Information

(SST) SPECIAL SERVICE TOOLS

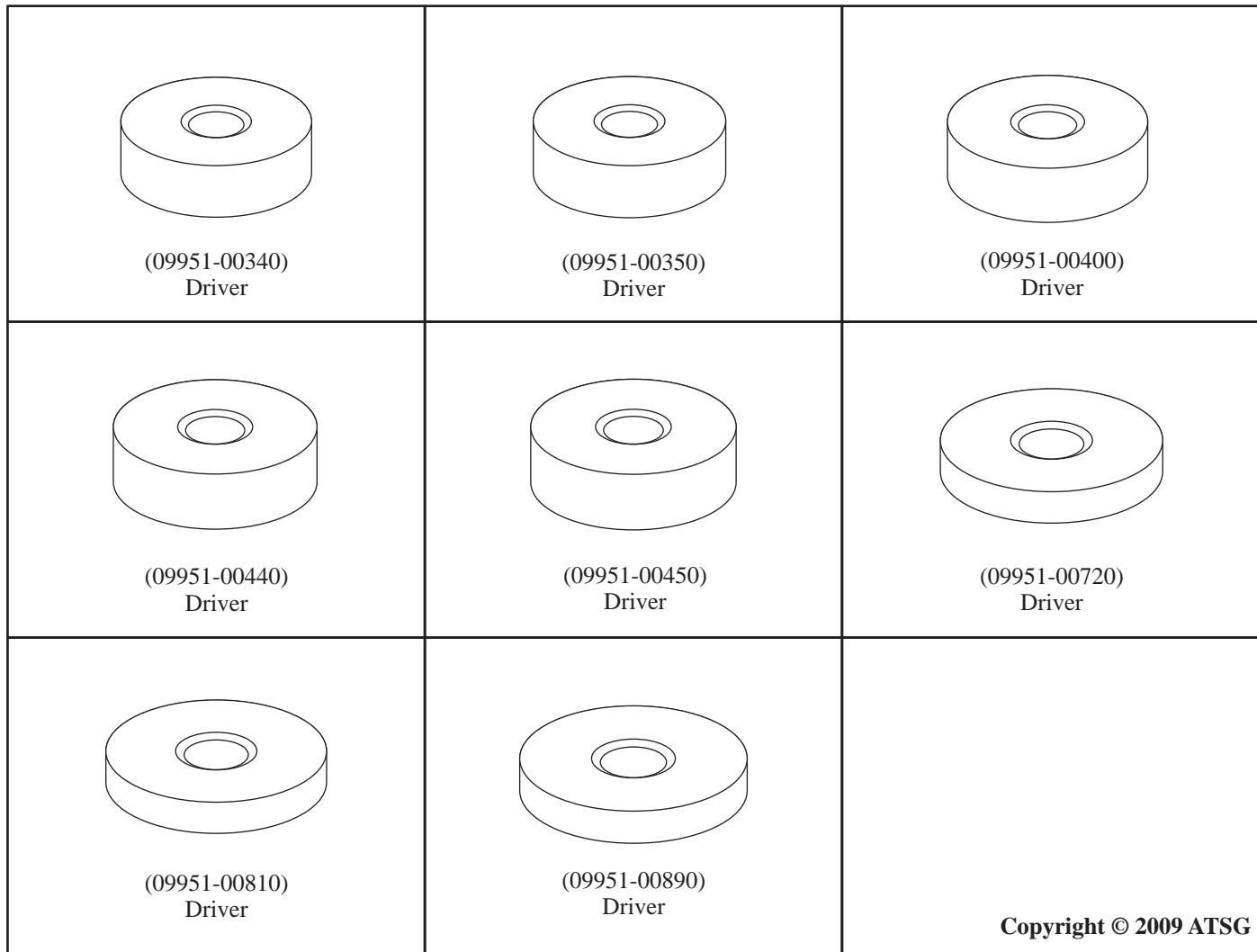


Figure 235