



## LEXUS A960E TRANSMISSION PRELIMINARY INFORMATION

- Refer to *Figure 1 for Transmission Specifications.*
- Refer to *Figure 2 for Component Identification.*
- Refer to *Figure 3 and 4 for Clutch Application and Solenoid Sequence.*
- Refer to *Figures 5 to 8 for ATF Check and Fill Procedures.*
- Refer to *Figure 9 for Line Pressure Specifications.*
- Refer to *Figure 10 for Solenoid Identification and Location.*
- Refer to *Figure 11 for Valve Body to Case Bolt Identification.*
- Refer to *Figure 12 for Valve Body Bolt Identification.*
- Refer to *Figure 13 for Upper Valve Body Checkball Locations & Spacer Plate ID (Casting #8870).*
- Refer to *Figure 14 for Upper Valve Body Cover Checkball Locations & Spacer Plate ID, (Casting #8870).*
- Refer to *Figure 15 for Upper Valve Body Checkball Locations & Spacer Plate ID (Casting #8840).*
- Refer to *Figure 16 for Upper Valve Body Cover Checkball Locations & Spacer Plate ID, (Casting #8840).*
- Refer to *Figure 17 for Valve Body Assembly Exploded View.*
- Refer to *Figure 18 for Upper Valve Body & Cover Exploded View.*
- Refer to *Figure 19 for Upper Valve Body & Cover Legend.*
- Refer to *Figure 20 for Transfer Plate Legend.*
- Refer to *Figure 21 for Transfer Plate Lower Side Exploded View.*
- Refer to *Figure 22 for Transfer Plate Upper Side Exploded View.*
- Refer to *Figure 23 for Lower Valve Body Exploded View.*
- Refer to *Figure 24 for In Case Accumulator & Spring ID.*
- Refer to *Figure 25 for F2 Sprag Rotation.*
- Refer to *Figure 26 for F4 Sprag Rotation.*
- Refer to *Figure 27 for F3 Sprag Rotation.*
- Refer to *Figure 28 for F1 Sprag Rotation.*

## LEXUS A960E TRANSMISSION

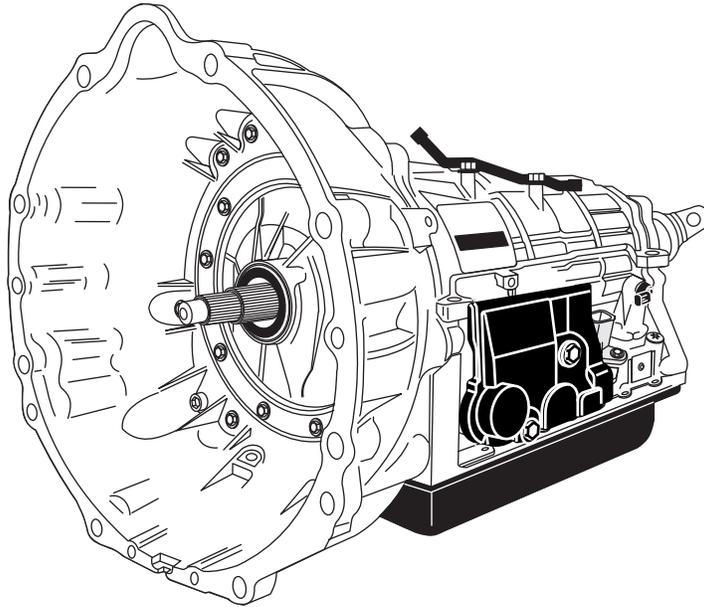
### PRELIMINARY INFORMATION

#### SPECIFICATIONS

The Lexus A960E Automatic Transmission is a 6 speed rear wheel drive electronically controlled transmission used on 2005 to 2012 Lexus GS300 with the 3.0 Liter engine and on 2005 to 2012 IS250 with the 2.5 Liter engine.

Fuel economy and driving performance have been improved with this Multi-Mode transmission which can be shifted with paddle switches.

It utilizes four rotating friction elements, four brake elements, four one-way clutches and three planetary gear sets as well as a lockup torque converter utilizing “Flex Lockup”.

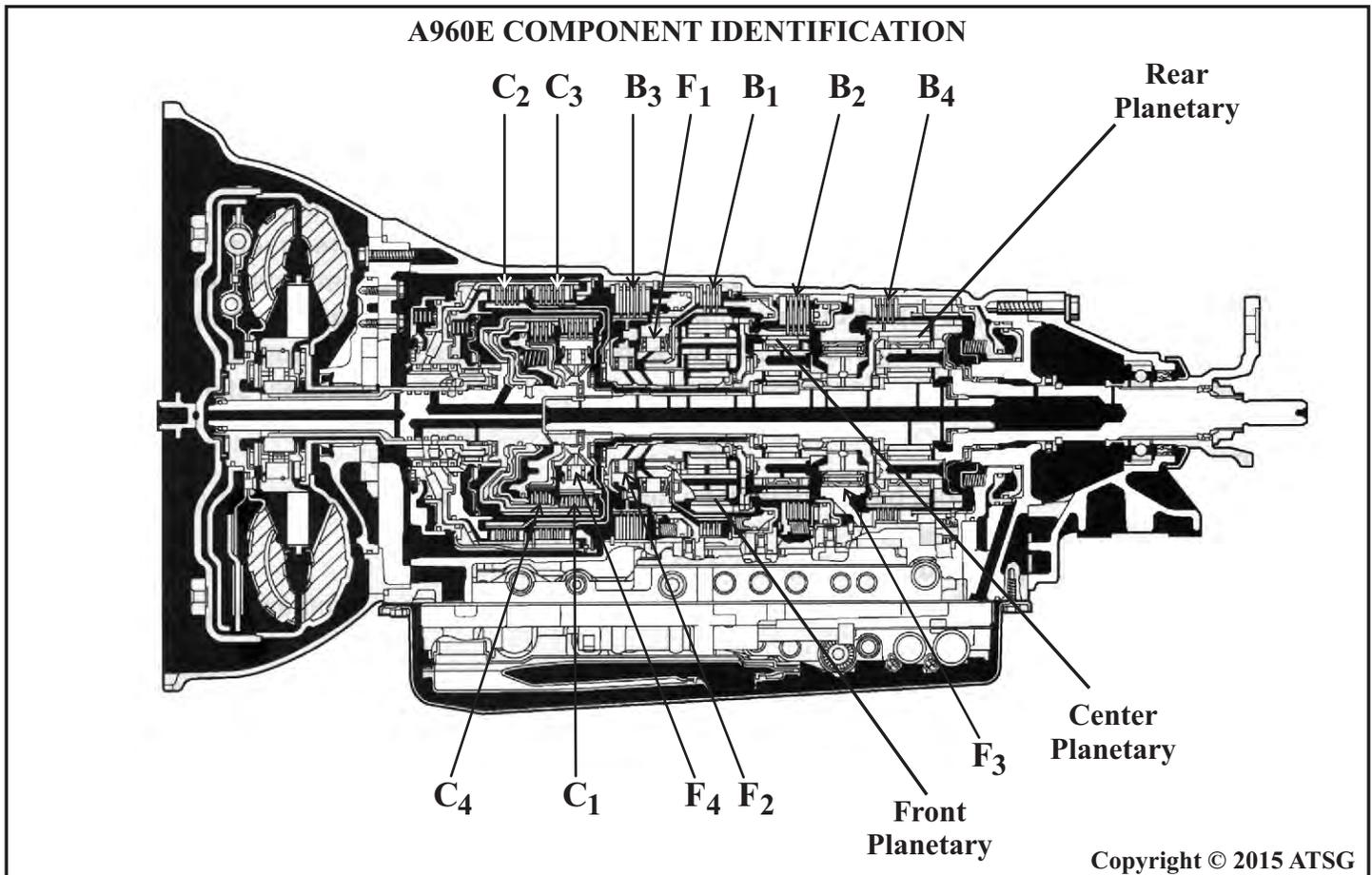


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A960E SPECIFICATIONS		
<b>GEAR RATIO</b>	1st	3.53
	2nd	2.06
	3rd	1.40
	4th	1.00
	5th	0.71
	6th	0.58
	Reverse	3.16
Fluid Capacity	Quarts (Liters)	7.6 (7.2)
Fluid Type	_____	WS
Weight (Wet)	Pounds (Kilograms)	164.7 (74.7)

Figure 1

## LEXUS A960E TRANSMISSION PRELIMINARY INFORMATION



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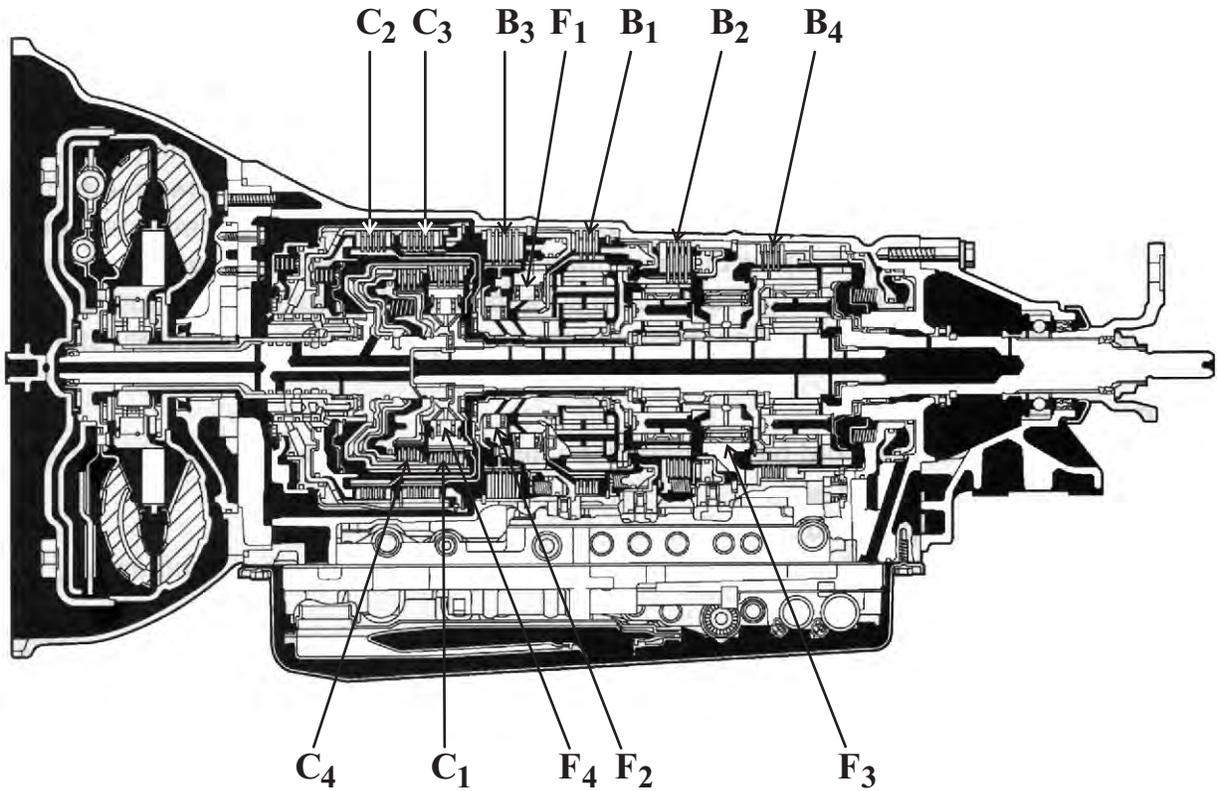
COMPONENT		FUNCTION
C1	No. 1 Clutch	Connects the input shaft,F4 and intermediate shaft
C2	No. 2 Clutch	Connects the input shaft and center planetary
C3	No. 3 Clutch	Connects the input shaft and sun gear
C4	No. 4 Clutch	Connects the input shaft and intermediate shaft
B1	No. 1 Brake	Prevents the front planetary from turning either CW or CCW
B2	No. 2 Brake	Prevents front & the center ring gear from turning either CW or CCW
B3	No. 3 Brake	Prevents outer race of F2 from turning both CW and CCW
B4	No. 4 Brake	Prevents center planetary carrier & rear ring gear from turning CW or CCW
F1	No. 1 One-Way Clutch	Prevents front planetary carrier from turning CCW
F2	No. 2 One-Way Clutch	When B3 is operating, F2 prevents the front sun gear from turning CCW
F3	No. 3 One-Way Clutch	Prevents the center planetary carrier & the rear ring gear from turning CCW
F4	No. 4 One-Way Clutch	Prevents the intermediate shaft from turning CCW

Figure 2

## LEXUS A960E TRANSMISSION

### PRELIMINARY INFORMATION

LEXUS A960E APPLICATION CHART



Shift Lever Position	Solenoids							Driving Clutches				Brake Clutches				One-Way Clutches				
	S1	S2	S3	S4	SR	SL1	SL2	SLU	C <sub>1</sub>	C <sub>2</sub>	C <sub>3</sub>	C <sub>4</sub>	B <sub>1</sub>	B <sub>2</sub>	B <sub>3</sub>	B <sub>4</sub>	F <sub>1</sub>	F <sub>2</sub>	F <sub>3</sub>	F <sub>4</sub>
Park		ON	ON		ON		ON													
Reverse*		ON	ON		ON		ON				○		○			○	○			
Neutral		ON	ON		ON		ON													
D S (6)	1st		ON	ON	ON		ON		○			○							○	○
	2nd	ON	ON	ON		ON		ON	ON	○		○			○		○	○		○
	3rd	ON		ON		ON		ON	ON	○		○	○		●		○			○
	4th*	ON				ON		ON	ON	○	○	●	○		●					○
	5th*	ON			ON		ON		ON	●	○	○		○	●					
	6th*	ON	ON		ON		ON		ON	●	○			●	○	●				

\*With Engine Braking ○Applied ●Applied But Ineffective (○)Applied During Engine Braking

Figure 3



# Technical Service Information

## LEXUS A960E TRANSMISSION

### PRELIMINARY INFORMATION

#### LEXUS A960E APPLICATION CHART

Shift Lever Position	Solenoids								Driving Clutches				Brake Clutches				One-Way Clutches				
	S1	S2	S3	S4	SR	SL1	SL2	SLU	C1	C2	C3	C4	B1	B2	B3	B4	F1	F2	F3	F4	
S (5)	1st		ON	ON		ON		ON		○			○							○	○
	2nd	ON	ON	ON		ON		ON	ON	○			○			○		○	○		○
	3rd	ON		ON		ON		ON	ON	○		○	○		●		○				○
	4th*	ON				ON		ON	ON	○	○	●	○		●						○
	5th*	ON				ON		ON		●	○	○		○	●						
S (4)	1st		ON	ON		ON		ON		○			○							○	○
	2nd	ON	ON	ON		ON		ON	ON	○			○			○		○	○		○
	3rd	ON		ON		ON		ON	ON	○		○	○		●		○				○
	4th*	ON				ON		ON	ON	○	○	●	○		●						○
S (3)	1st		ON	ON		ON		ON		○			○							○	○
	2nd	ON	ON	ON		ON		ON	ON	○			○			○		○	○		○
	3rd*	ON		ON		ON			ON	○		○	○	●	●		○				○
S (2)	1st		ON	ON		ON		ON		○			○							○	○
	2nd*	ON	ON	ON	ON	ON				○			○		○	○					○
S (1)	1st*		ON	ON		ON				○			○			●				○	○

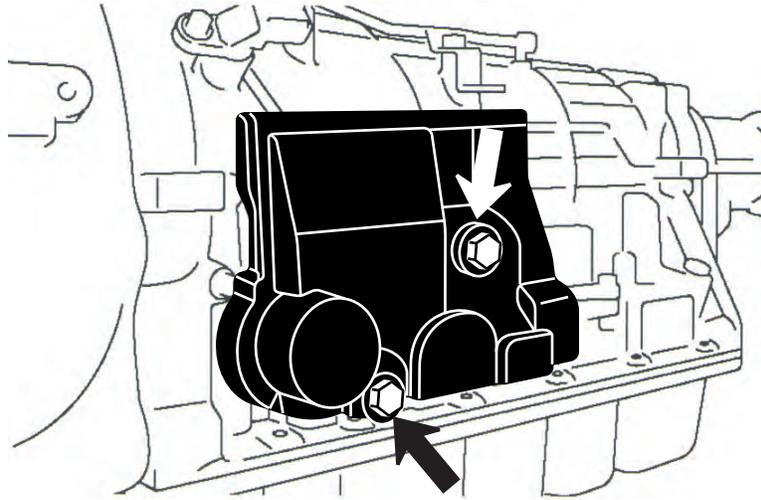
\*With Engine Braking ○Applied ●Applied But Ineffective (○)Applied During Engine Braking

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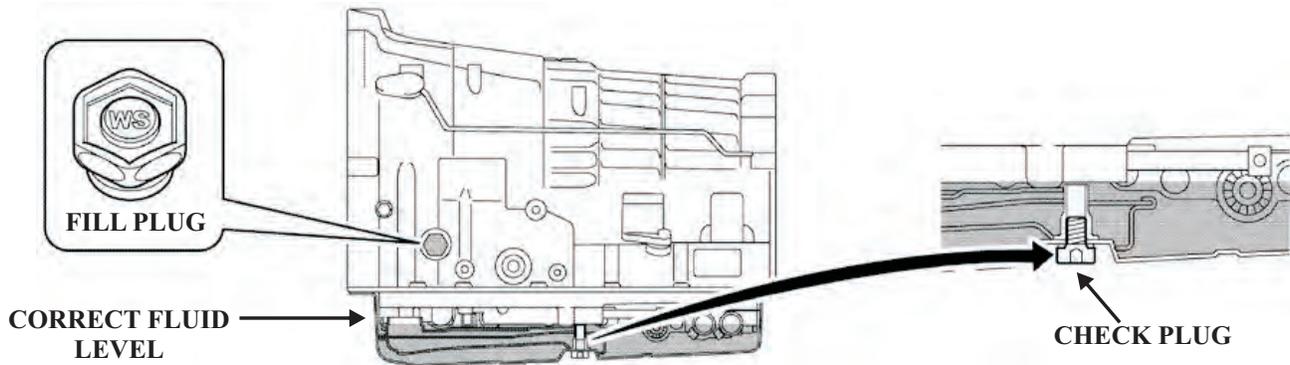
Figure 4

Technical Service Information  
**LEXUS A960E TRANSMISSION**  
PRELIMINARY INFORMATION

**LEXUS A960E ATF CHECK & FILL PROCEDURE**



Remove the 2 bolts indicated and then remove the fill plug cover



Remove fill plug and add the proper amount of WS ATF. Remove the check plug from the bottom of the pan. When the proper amount of fluid has been added, the fluid will trickle out of check plug hole indicating that the transmission has the correct fluid level. The oil fill procedure can be seen on the following page.

*Transmission Fluid Capacity: Dry Fill.....8.2 Qts. (7.8 Liters) WS Fluid*  
*Transmission Fluid Capacity: Service Fill.....1.6 Qts. (1.5 Liters) WS Fluid*



# Technical Service Information

## LEXUS A960E TRANSMISSION

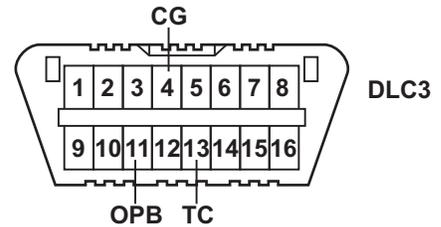
### PRELIMINARY INFORMATION

#### LEXUS A960E ATF CHECK & FILL PROCEDURE

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

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

- 1) Raise the vehicle while keeping it level.
- 2) Remove the fill plug and overflow plug.
- 3) Fill the transmission with WS type ATF only from the fill plug hole until it overflows from the overflow plug hole.
- 4) Install the overflow plug.
- 5) Add the specified amount of ATF (specified amount is determined by the procedure that was performed) and install the refill plug.



#### Example:

#### Procedure

	<b>Liters (US qts, Imp. qts)</b>
Removal and installation of the oil pan.....	1.0 (1.06, 0.88)
Removal and installation of the valve body.....	2.2 (2.33, 1.94)
Replacement of the torque converter.....	3.7 (3.91, 3.26)

- 6) Lower the vehicle
- 7) Use the SST (09843-18040) to short the TC, OPB, and CG terminals of the DLC3 connector
- 8) Start the engine and allow it to idle. The AC switch must be in the OFF position.
- 9) Move the shift lever from the P position to the S mode position and slowly select each gear from S1 to S6. Then move the shift lever back to Park.
- 10) Move the shift lever to the D position, and quickly move it back and forth between N and D (at least once every 1.5 seconds) for at least six seconds. This will activate the oil detection mode:  
**Standard: The shift position indicator light "D" will remain illuminated for 2 seconds and then go off.**
- 11) Return the shift lever to the P position and disconnect the TC terminal. Do not disconnect the SST from terminals OPB and CG of the DLC3 until the procedure is finished.
- 12) Idle the engine to raise the transmission fluid temperature.
- 13) Immediately after the shift position indicator "D" light turns on, lift the vehicle up. The shift position indicator "D" light will indicate the ATF temperature according to the following table.

ATF Temp	Too Cold	Optimum Temperature	Too Hot
"D" Light	Light is OFF	Light is ON	Light is BLINKING

Procedures continue on following page

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Figure 6

## LEXUS A960E TRANSMISSION

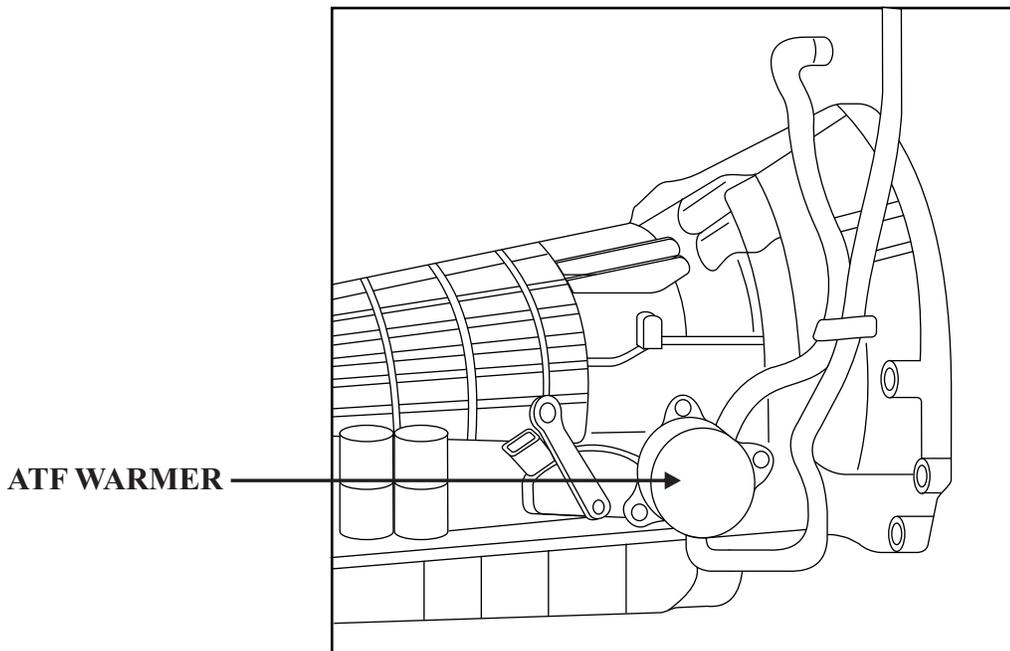
### PRELIMINARY INFORMATION

#### LEXUS A960E ATF CHECK & FILL PROCEDURE

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

Figure 7

#### ATF WARMER



**The ATF Warmer is used to warm the transmission fluid more quickly and to keep it warm. During the warm-up period engine coolant flows directly from the engine to the warmer to warm the fluid before the engine thermostat opens. After warm up engine coolant continues to flow to the warmer to keep the transmission at a normal operating temperature.**

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Figure 8



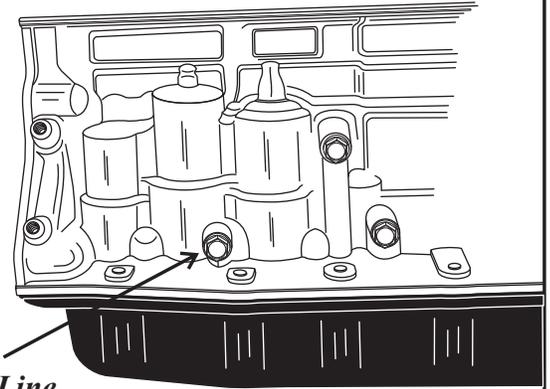
# Technical Service Information

## Lexus A960E TRANSMISSION

### PRELIMINARY INFORMATION

#### LINE PRESSURE TEST & SPECIFICATIONS

RPM	DRIVE	REVERSE
Idle	355 - 425 kPa (51-62 psi)	608 - 708 kPa (88-103 psi)
Stall	1213 - 1323 kPa (176-192 psi)	1340 - 1548 kPa (194-225 psi)

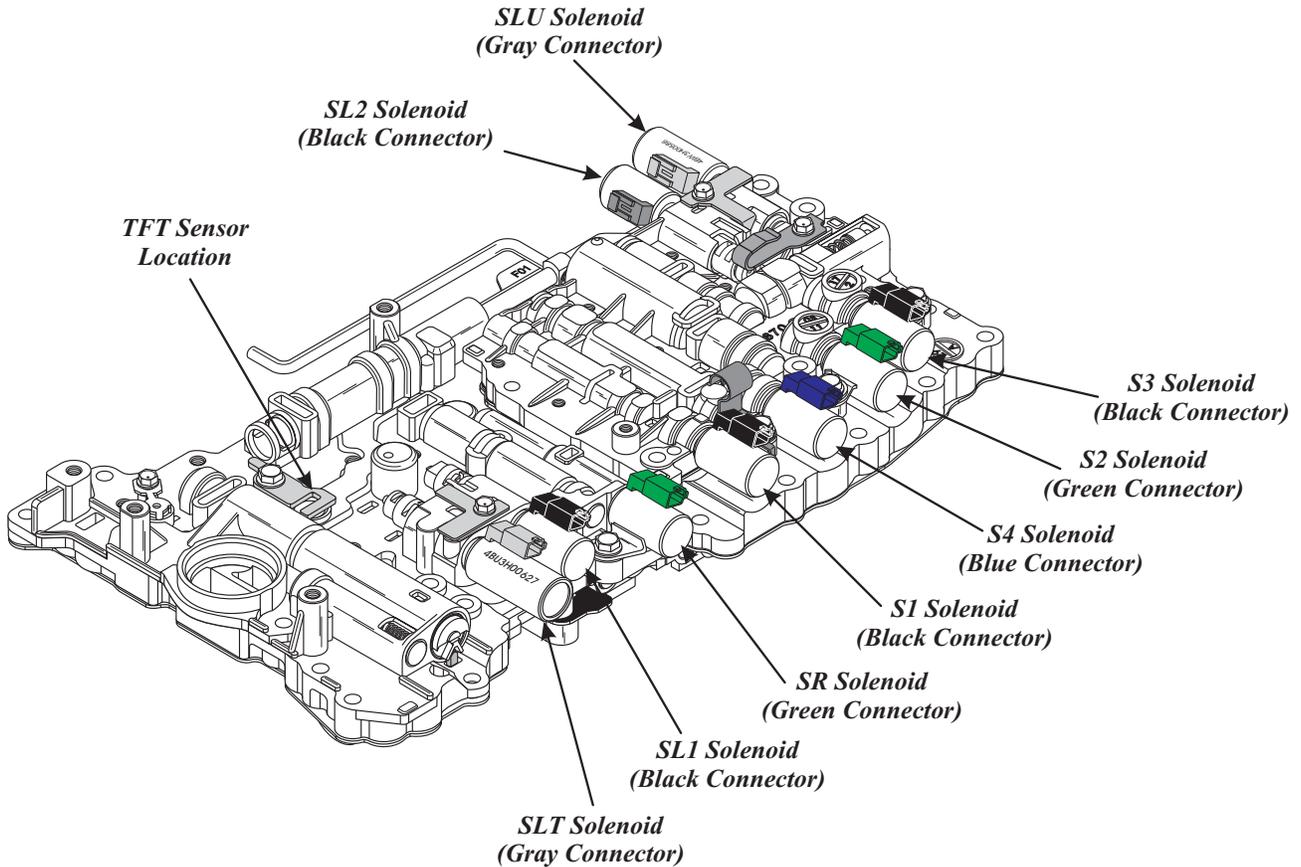


*Main Line  
Pressure Tap*

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Figure 9

#### SOLENOID IDENTIFICATION AND LOCATION

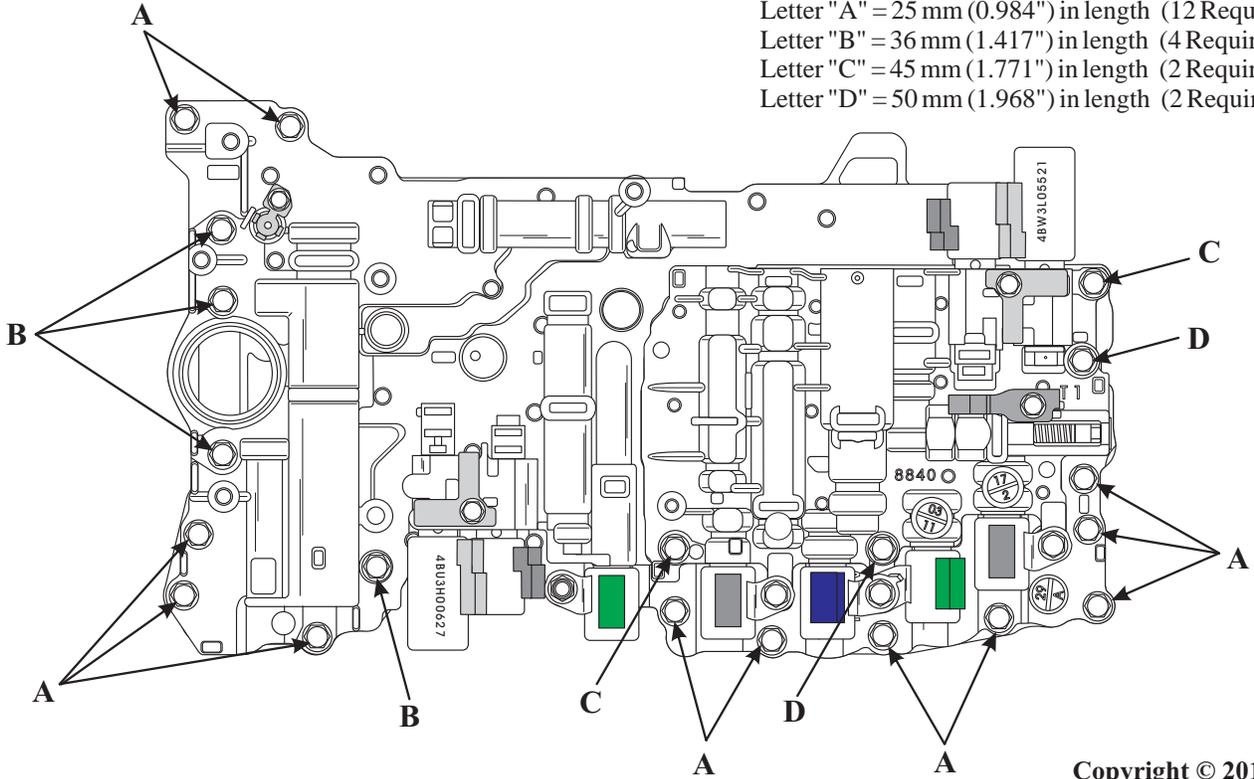


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Figure 10

## VALVE BODY TO CASE BOLT IDENTIFICATION AND LOCATION

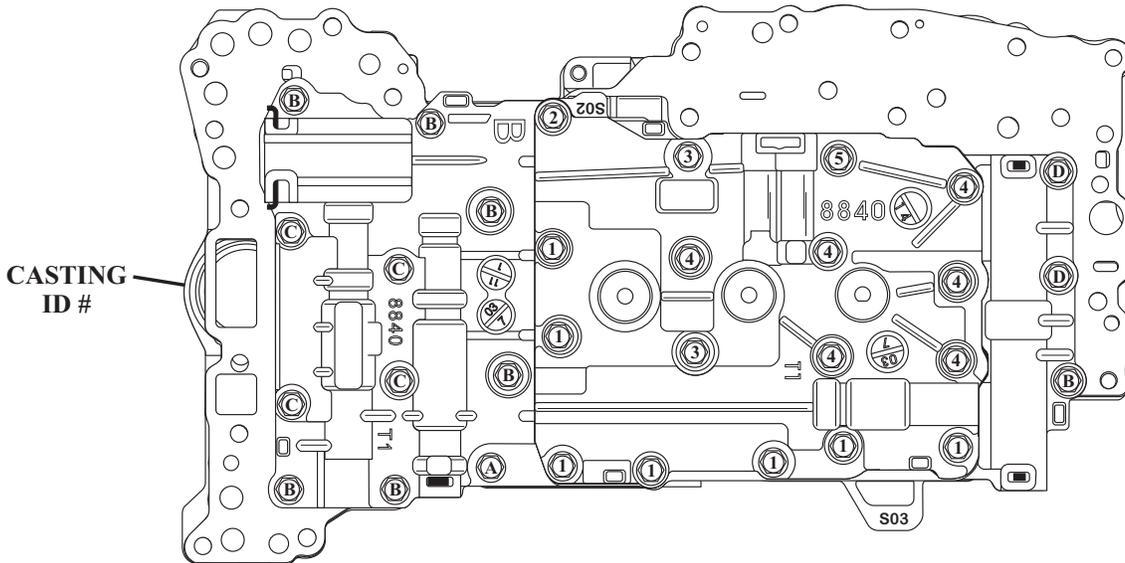
Letter "A" = 25 mm (0.984") in length (12 Required).  
 Letter "B" = 36 mm (1.417") in length (4 Required).  
 Letter "C" = 45 mm (1.771") in length (2 Required).  
 Letter "D" = 50 mm (1.968") in length (2 Required).



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Figure 11

## VALVE BODY BOLT LENGTH AND LOCATIONS



Number 1 = 39.5 mm (1.555") in length (7 Required).  
 Number 2 = 50 mm (1.968") in length (1 Required).  
 Number 3 = 59.5 mm (2.342") in length (2 Required).  
 Number 4 = 64 mm (2.519") in length (6 Required).  
 Number 5 = 76 mm (2.992") in length (1 Required).

Letter "A" = 20 mm (0.787") in length (1 Required).  
 Letter "B" = 25 mm (0.984") in length (7 Required).  
 Letter "C" = 32 mm (1.259") in length (4 Required).  
 Letter "D" = 50 mm (1.968") in length (2 Required).

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Figure 12

## UPPER VALVE BODY CHECK BALL LOCATIONS CASTING #8840

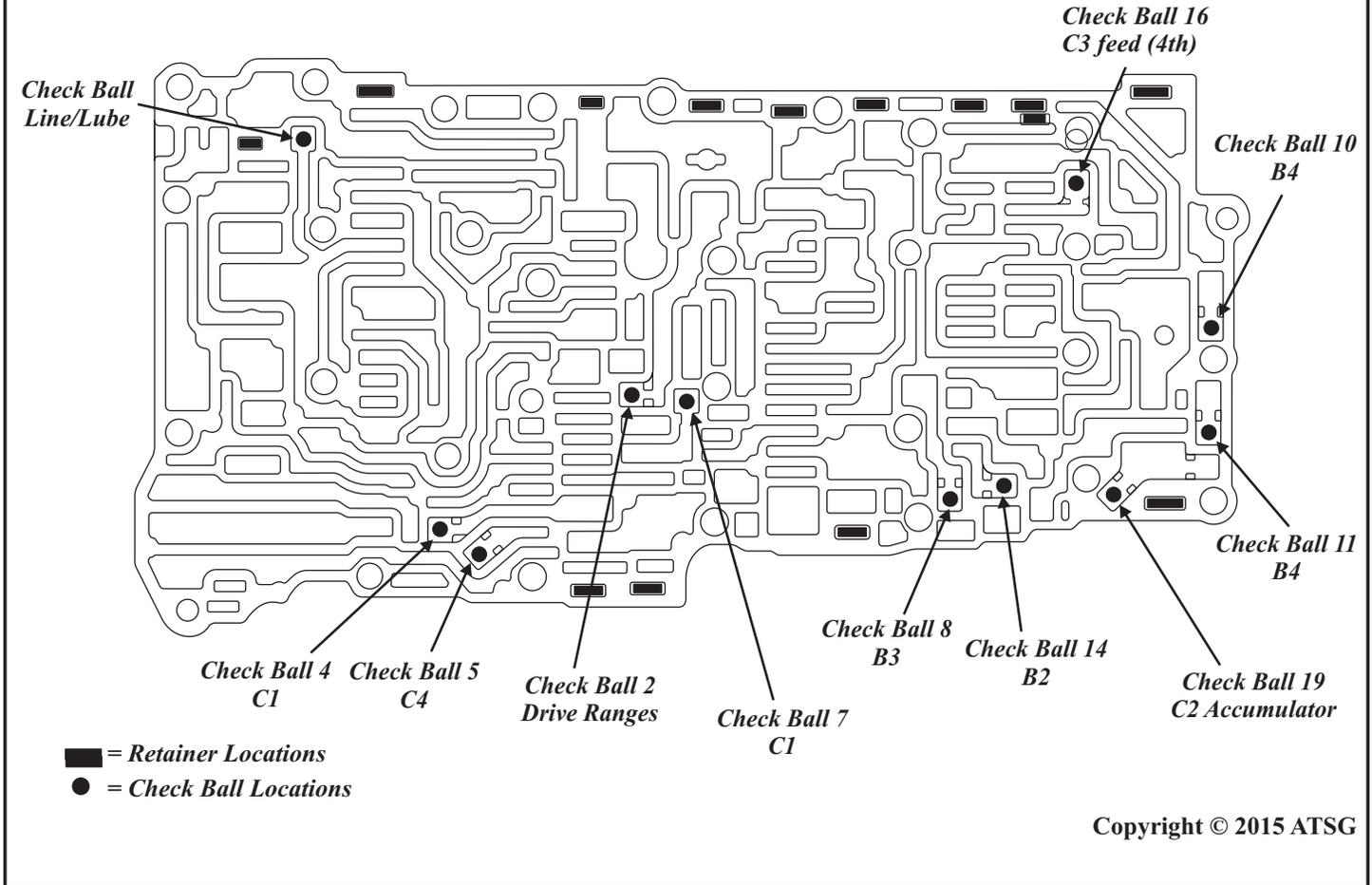
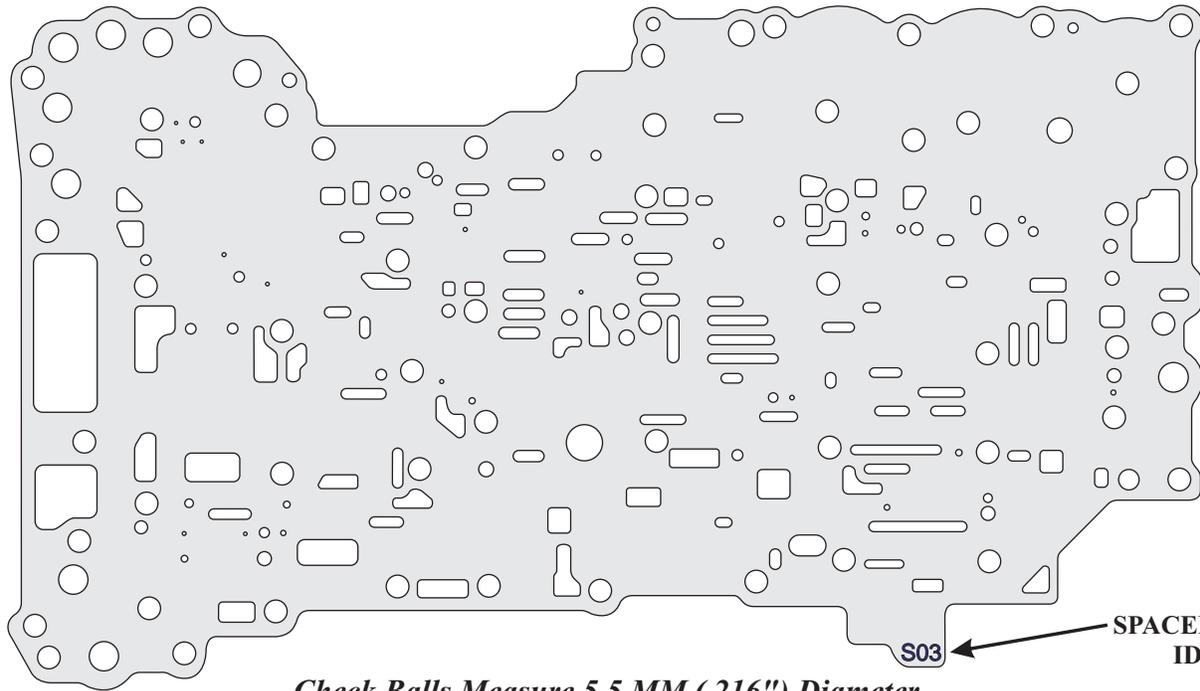


Figure 13

## UPPER VALVE BODY SPACER PLATE ID CASTING #8840



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Figure 14

UPPER VALVE BODY COVER CHECK BALL LOCATIONS  
CASTING #8840

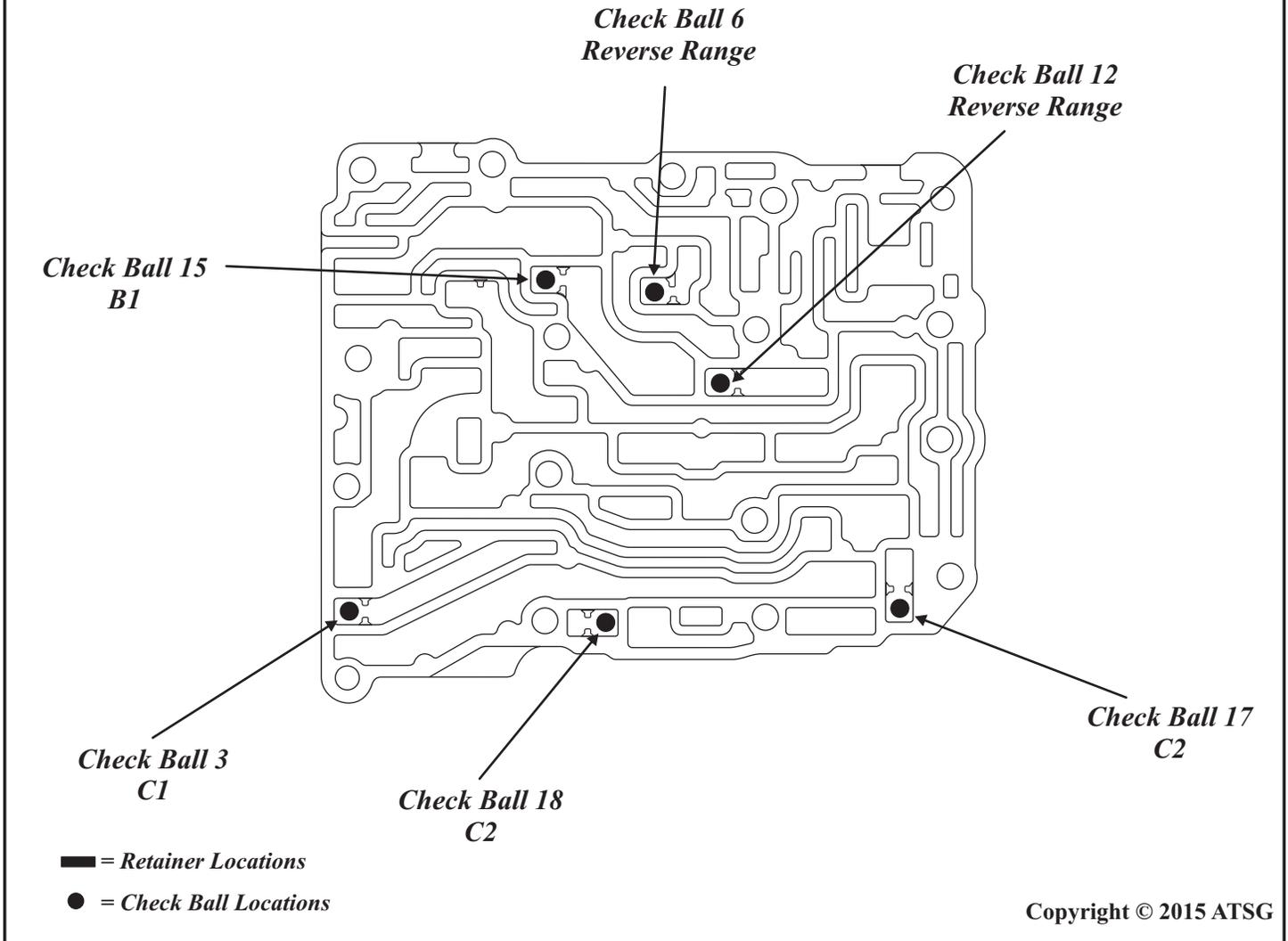
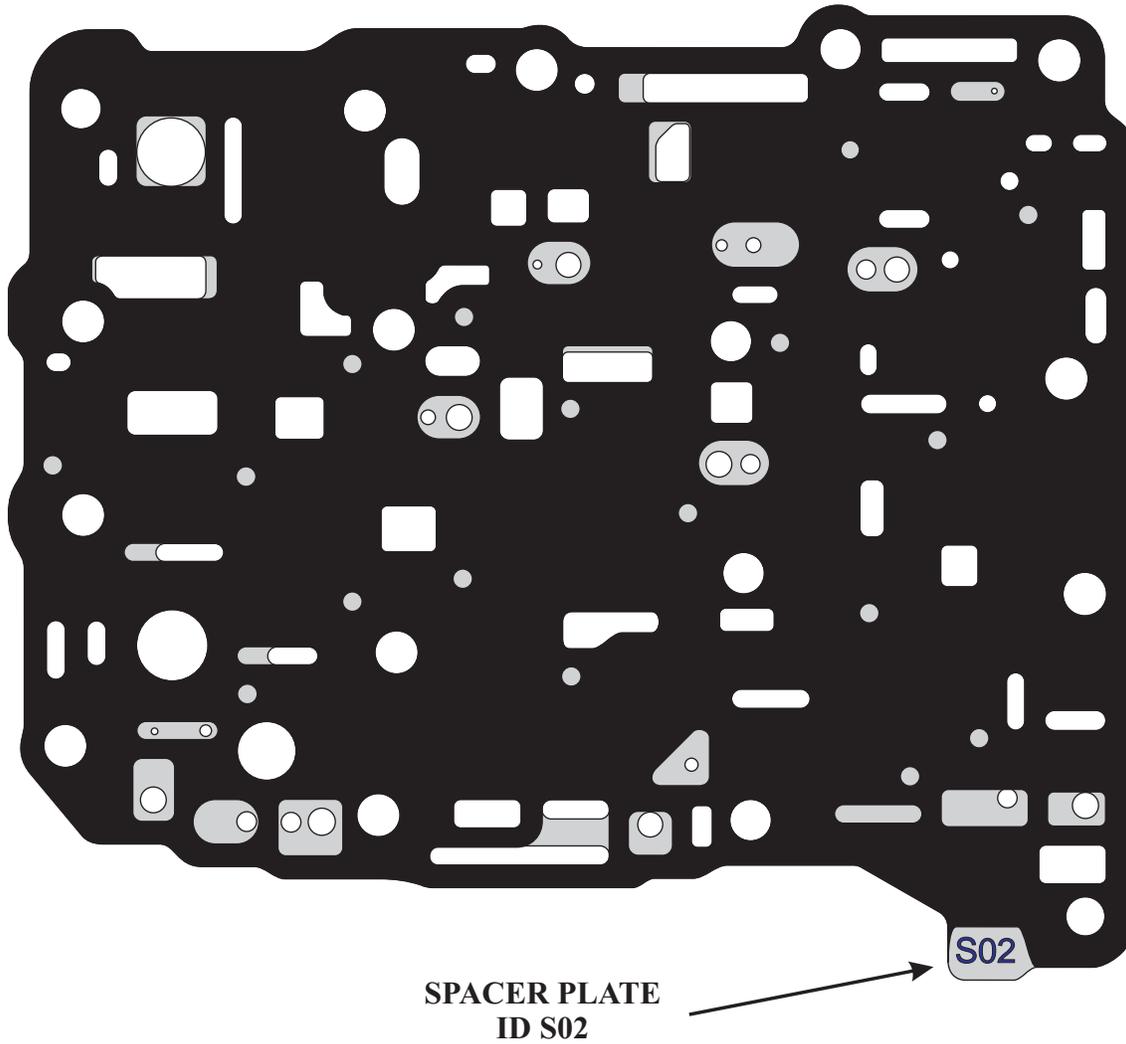


Figure 15

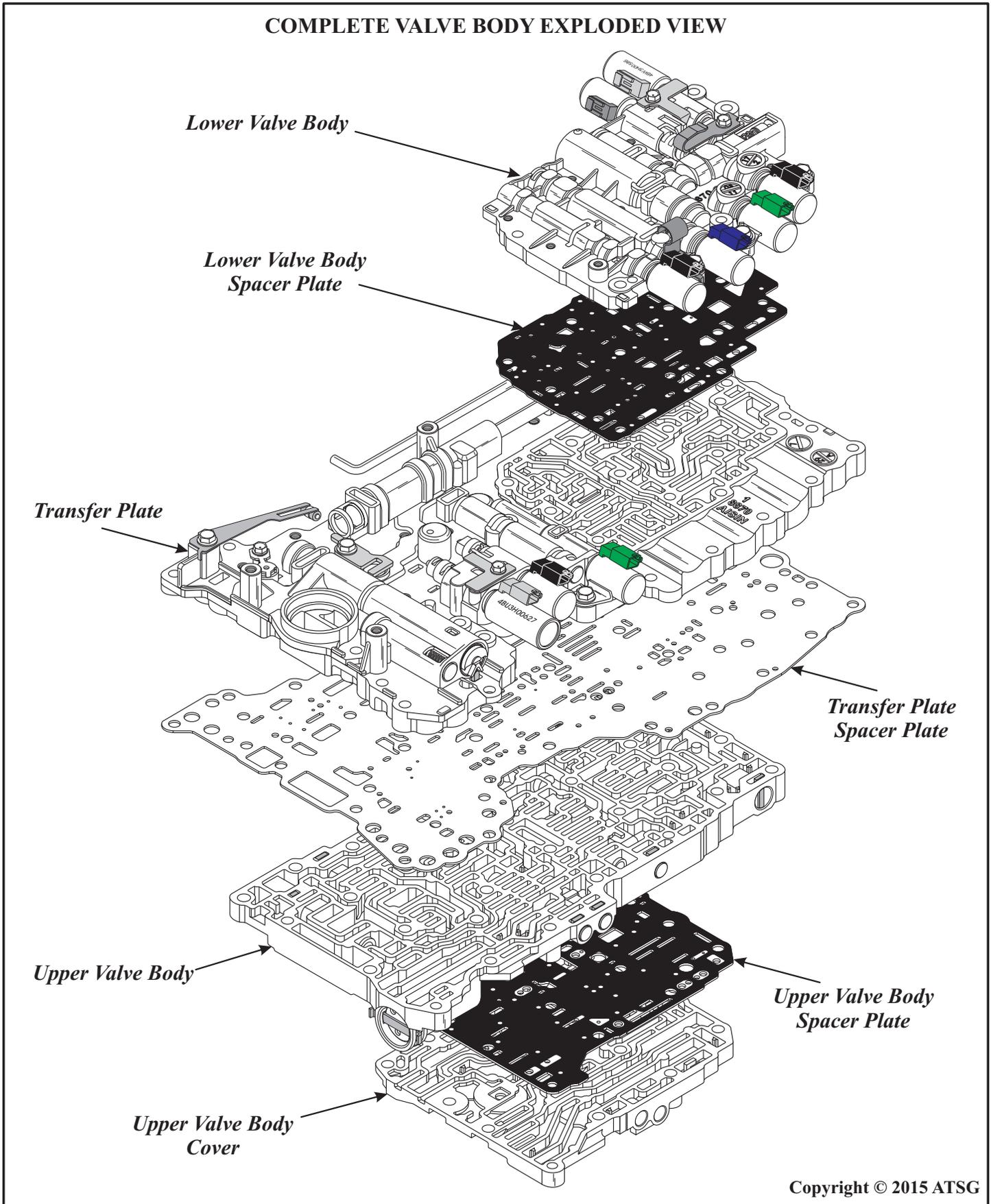
UPPER VALVE BODY COVER SPACER PLATE ID  
CASTING #8840



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Figure 16

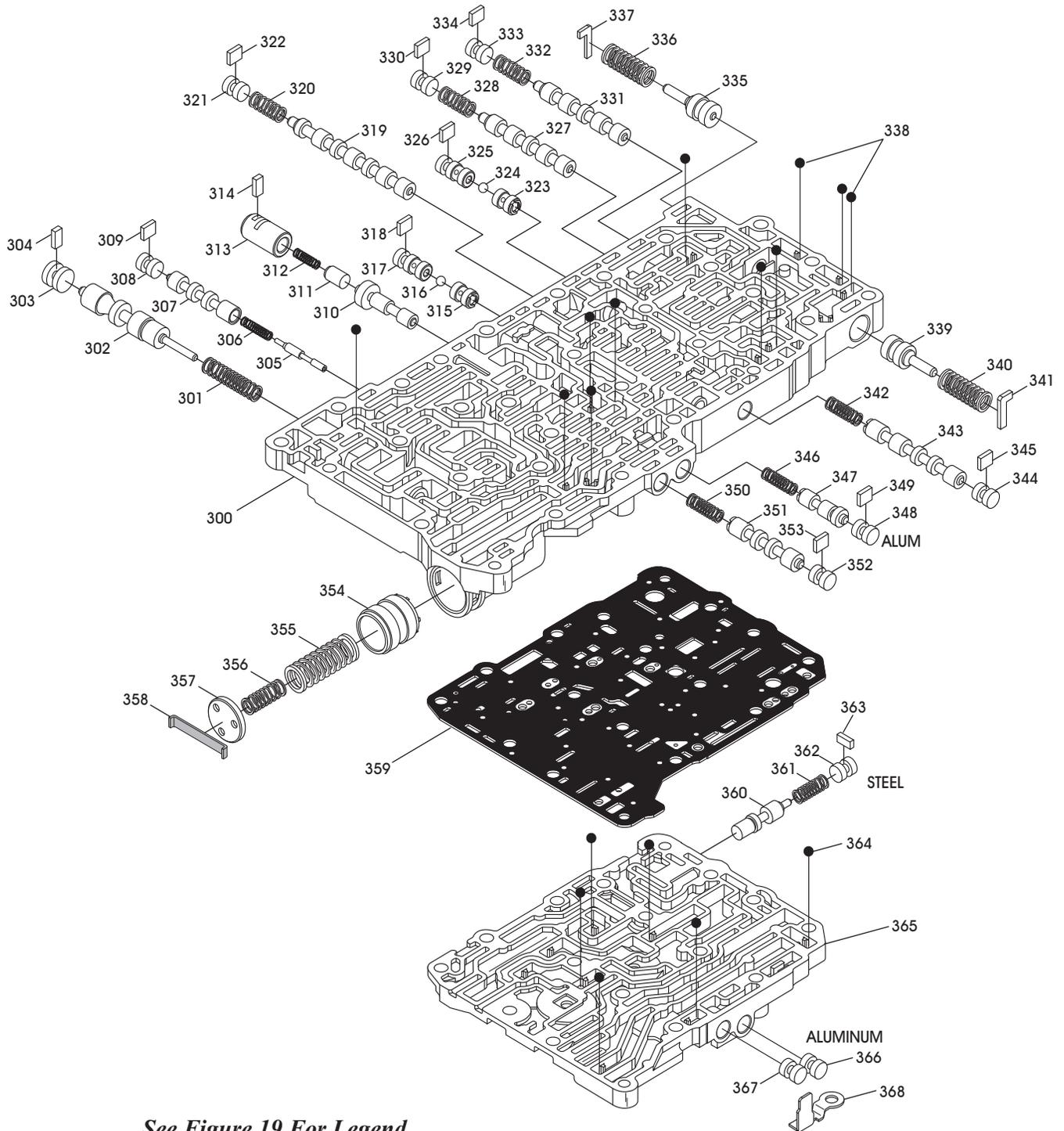
## COMPLETE VALVE BODY EXPLODED VIEW



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Figure 17

## UPPER VALVE BODY AND COVER EXPLODED VIEW



See Figure 19 For Legend

Figure 18



# Technical Service Information

## UPPER VALVE BODY AND COVER LEGEND

- |  |   |
|--|---|
| 300 UPPER VALVE BODY CASTING.                              | 336 B2 ACCUMULATOR VALVE SPRING.                            |
| 301 SECONDARY REGULATOR VALVE SPRING.                      | 337 RETAINER.   |
| 302 SECONDARY REGULATOR VALVE.                             | 338 5.5 MM (.216") DIAMETER CHECK BALLS (11 REQ. IN V. B.). |
| 303 ALUMINUM BORE PLUG.                                    | 339 B2 ACCUMULATOR VALVE.                                   |
| 304 BORE PLUG RETAINER.                                    | 340 B2 ACCUMULATOR VALVE SPRING.                            |
| 305 LOCK-UP RELAY INNER VALVE .                            | 341 RETAINER.   |
| 306 LOCK-UP RELAY VALVE SPRING.                            | 342 REVERSE SEQUENCE VALVE SPRING.                          |
| 307 LOCK-UP RELAY VALVE.                                   | 343 REVERSE SEQUENCE VALVE.                                 |
| 308 STEEL BORE PLUG.                                       | 344 STEEL BORE PLUG.  |
| 309 BORE PLUG RETAINER.                                    | 345 BORE PLUG RETAINER.                                     |
| 310 LOCK-UP CONTROL VALVE.                                 | 346 CLUTCH CONTROL VALVE SPRING.                            |
| 311 LOCK-UP CONTROL BOOST VALVE.                           | 347 CLUTCH CONTROL VALVE.                                   |
| 312 LOCK-UP CONTROL BOOST VALVE SPRING.                    | 348 ALUMINUM BORE PLUG.                                     |
| 313 LOCK-UP CONTROL BOOST VALVE SLEEVE.                    | 349 BORE PLUG RETAINER.                                     |
| 314 RETAINER   | 350 CLUTCH APPLY RELAY VALVE SPRING.                        |
| 315 C3 - 3-WAY CHECK BALL INNER SEAT.                      | 351 CLUTCH APPLY RELAY VALVE.                               |
| 316 SHUTTLE BALL (.250" DIAMETER).                         | 352 STEEL BORE PLUG.  |
| 317 C3 - 3-WAY CHECK BALL OUTER SEAT.                      | 353 BORE PLUG RETAINER.                                     |
| 318 RETAINER.  | 354 C1 ACCUMULATOR PISTON.                                  |
| 319 1-2 SHIFT VALVE.                                       | 355 C1 ACCUMULATOR PISTON OUTER SPRING.                     |
| 320 1-2 SHIFT VALVE SPRING.                                | 356 C1 ACCUMULATOR PISTON INNER SPRING.                     |
| 321 BORE PLUG.   | 357 C1 ACCUMULATOR VENTED BORE PLUG.                        |
| 322 BORE PLUG RETAINER.                                    | 358 C1 ACCUMULATOR BORE PLUG RETAINER.                      |
| 323 B4- 3-WAY CHECK BALL INNER SEAT.                       | 359 UPPER V.B. COVER TO UPPER V. B. SPACER PLATE.           |
| 324 SHUTTLE BALL (.250" DIAMETER).                         | 360 C3 APPLY RELAY VALVE.                                   |
| 325 B4- 3-WAY CHECK BALL OUTER SEAT.                       | 361 C3 APPLY RELAY VALVE SPRING.                            |
| 326 RETAINER.  | 362 STEEL BORE PLUG.  |
| 327 2-3 SHIFT VALVE. (ALSO FUNCTIONS AS A 5-6 SHIFT VALVE) | 363 BORE PLUG RETAINER.                                     |
| 328 2-3 SHIFT VALVE SPRING.                                | 364 5.5 MM (.216") DIAMETER CHECK BALLS (6 REQ. IN COVER).  |
| 329 BORE PLUG.   | 365 UPPER VALVE BODY COVER.                                 |
| 330 BORE PLUG RETAINER.                                    | 366 ALUMINUM BORE PLUG. (NOTE: EMPTY BORE-PASSAGE)          |
| 331 4-5 SHIFT VALVE.                                       | 367 ALUMINUM BORE PLUG. (NOTE: EMPTY BORE-PASSAGE)          |
| 332 4-5 SHIFT VALVE SPRING.                                | 368 BORE PLUG RETAINER (HELD WITH VB BOLT).                 |
| 333 BORE PLUG.   |   |
| 334 BORE PLUG RETAINER.                                    |   |
| 335 B2 ACCUMULATOR VALVE.                                  |   |

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Figure 19

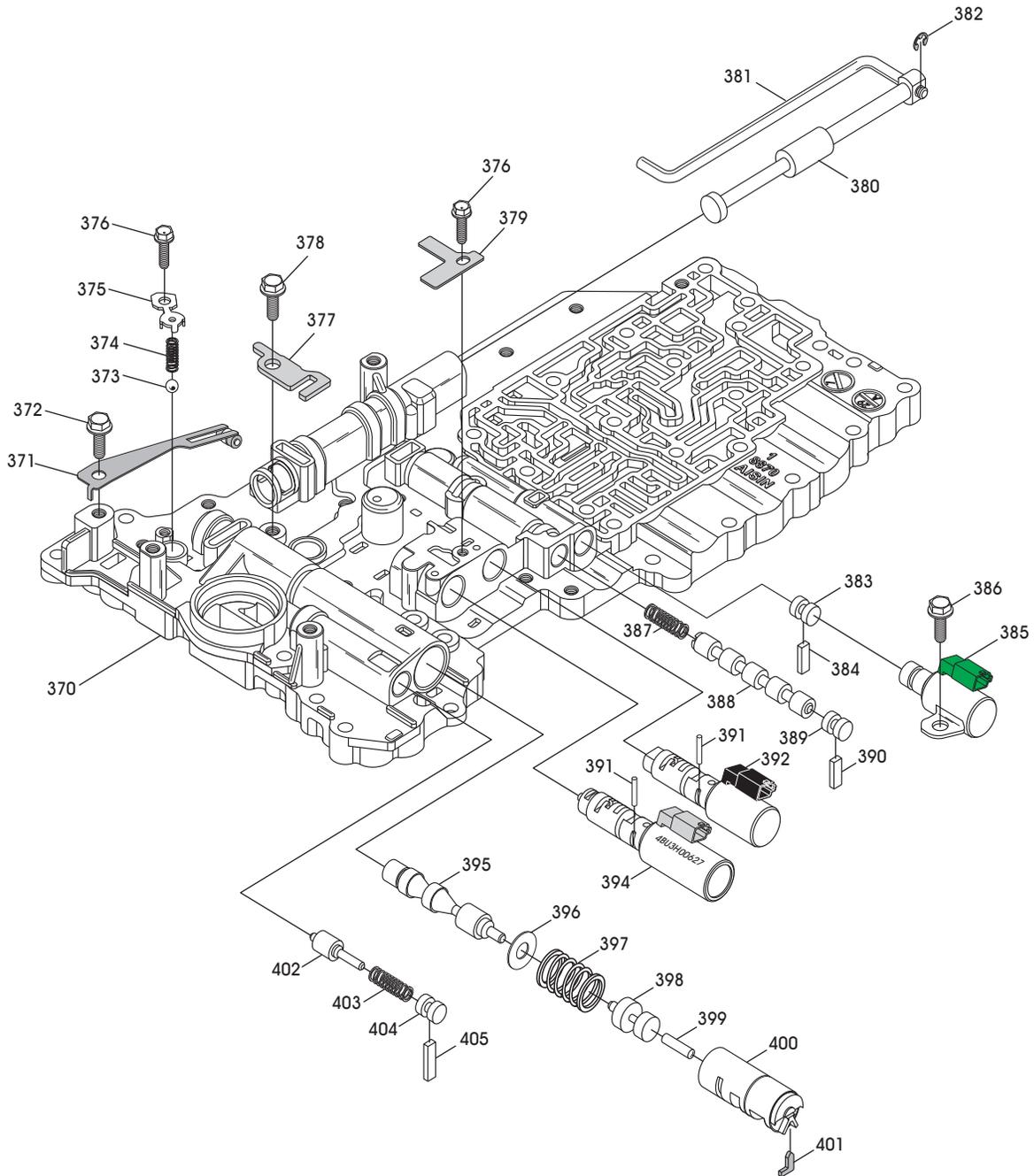
## TRANSFER PLATE LOWER SIDE LEGEND

- |  |   |
|--|---|
| 370 TRANSFER PLATE CASTING.                              | 390 BORE PLUG RETAINER.                         |
| 371 INSIDE DETENT SPRING.                                | 391 "SL1" & "SLT" SOLENOID RETAINING PINS.      |
| 372 DETENT SPRING RETAINING BOLT.                        | 392 "SL1" SOLENOID.                             |
| 373 LINE PRESSURE BLOW-OFF BALL, 8.0 MM (.315") DIAMETER | 394 "SLT" SOLENOID.                             |
| 374 LINE PRESSURE BLOW-OFF BALL SPRING.                  | 395 MAIN PRESSURE REGULATOR VALVE.              |
| 375 BLOW-OFF BALL SPRING RETAINER.                       | 396 MAIN PRESSURE REGULATOR VALVE SPRING SEAT.  |
| 376 BLOW-OFF BALL & SOLENOID BRACKET RETAINING BOLT.(2)  | 397 MAIN PRESSURE REGULATOR VALVE SPRING.       |
| 377 FLUID TEMPERATURE SENSOR RETAINER.                   | 398 MAIN PRESSURE REGULATOR BOOST VALVE.        |
| 378 FLUID TEMPERATURE SENSOR RETAINING BOLT.             | 399 MAIN PRESSURE REGULATOR BOOST VALVE PLUG.   |
| 379 SOLENOID PIN RETAINING BRACKET.                      | 400 MAIN PRESSURE REGULATOR BOOST VALVE SLEEVE. |
| 380 MANUAL VALVE.  | 401 BOOST VALVE SLEEVE RETAINER.                |
| 381 MANUAL VALVE LINK.                                   | 402 SLT ACCUMULATOR VALVE.                      |
| 382 MANUAL VALVE LINK RETAINING "E" CLIP.                | 403 SLT ACCUMULATOR SPRING.                     |
| 383 BORE PLUG.   | 404 BORE PLUG.                                  |
| 384 BORE PLUG RETAINER.                                  | 405 BORE PLUG RETAINER.                         |
| 385 "SR" SOLENOID (GREEN CONNECTOR).                     |   |
| 386 SOLENOID RETAINING BOLT.                             |   |
| 387 4-5 SHIFT VALVE SPRING.                              |   |
| 388 4-5 SHIFT VALVE.                                     |   |
| 389 BORE PLUG.   |   |

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Figure 20

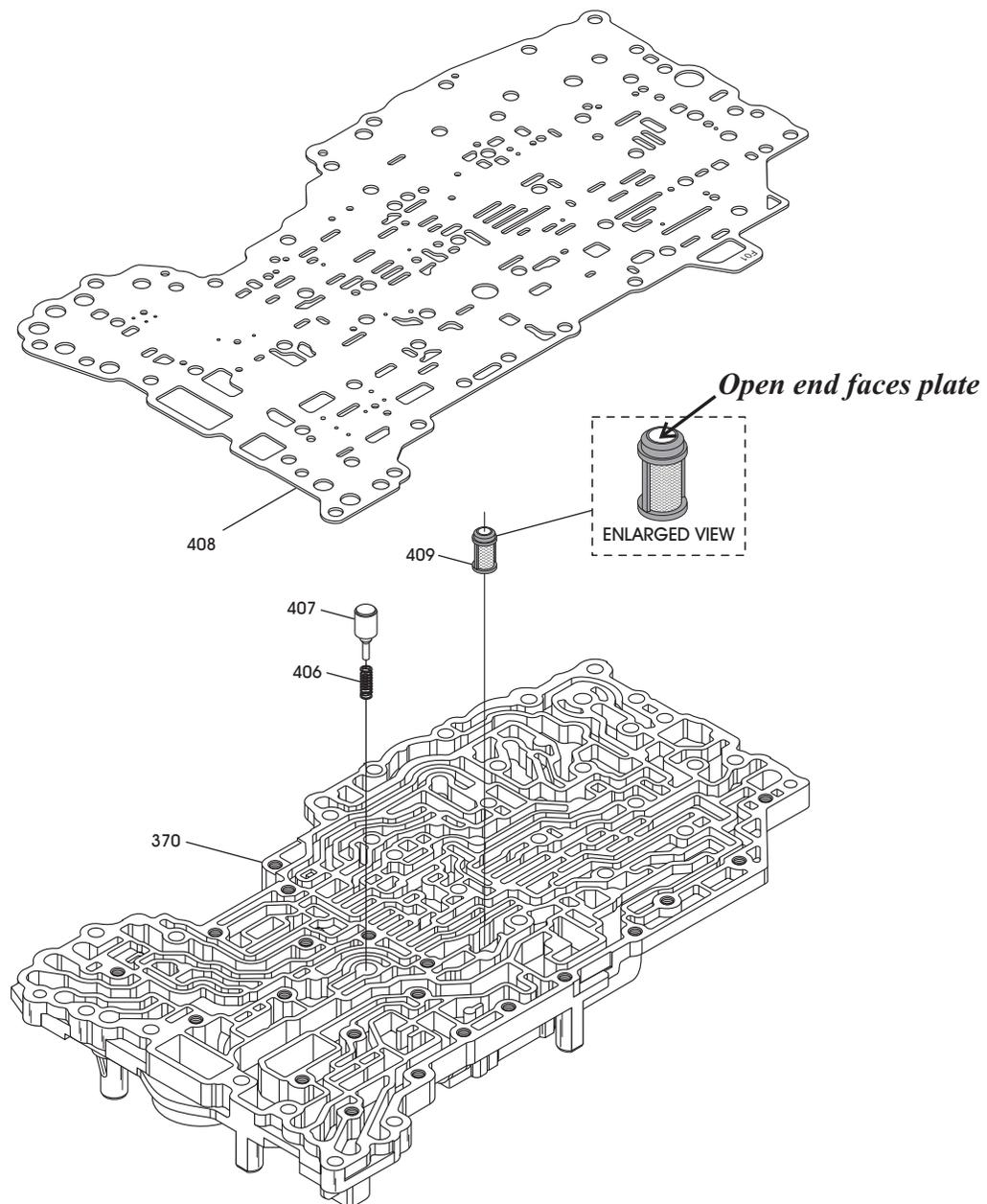
## TRANSFER PLATE LOWER SIDE EXPLODED VIEW



*See Figure 20 For Legend*

Figure 21

## TRANSFER PLATE UPPER SIDE EXPLODED VIEW

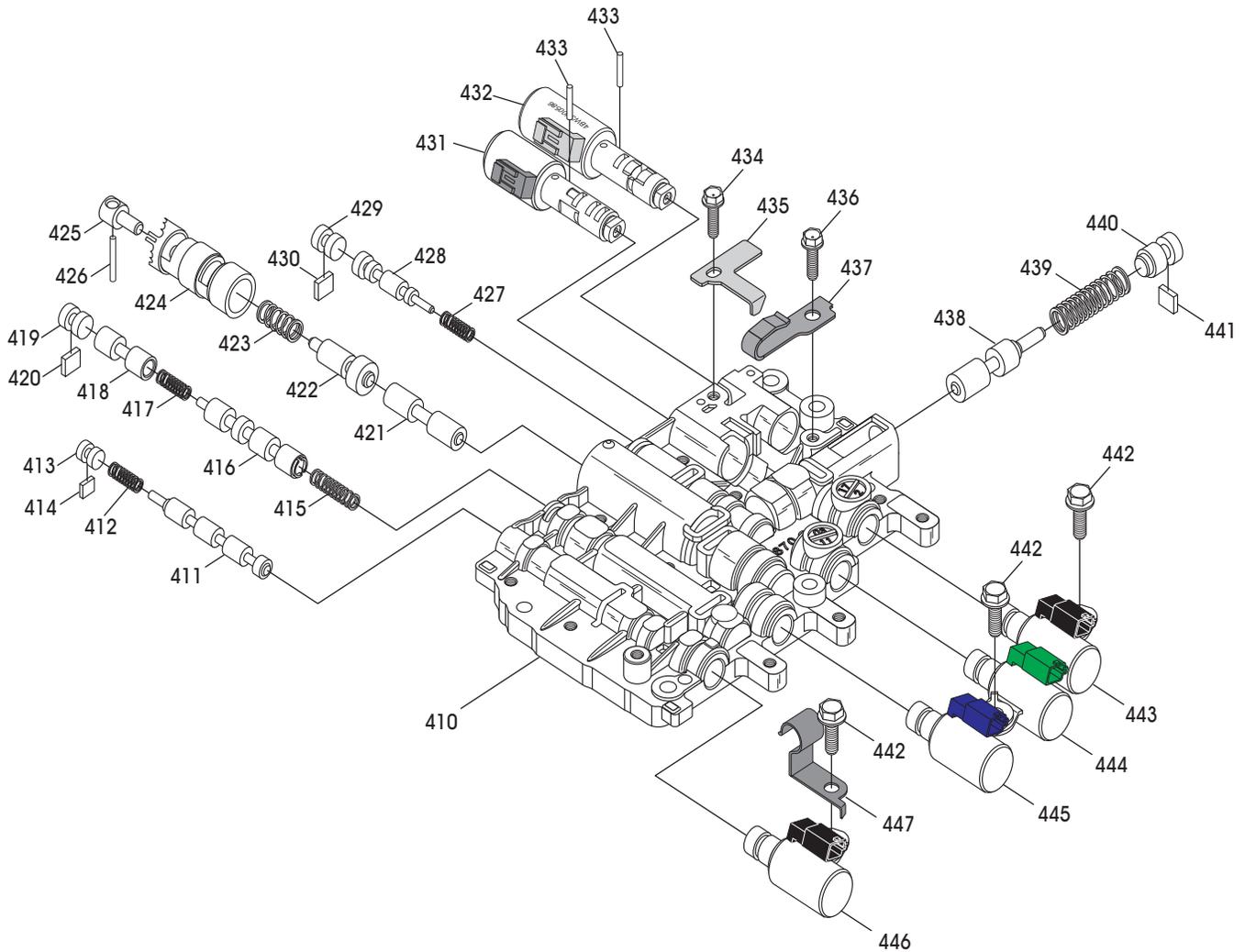


- 370 TRANSFER PLATE CASTING.
- 406 CHECK VALVE SPRING.
- 407 CHECK VALVE.
- 408 TRANSFER PLATE TO UPPER VALVE BODY SPACER PLATE.
- 409 SOLENOID FEED SCREEN.

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Figure 22

## LOWER VALVE BODY EXPLODED VIEW



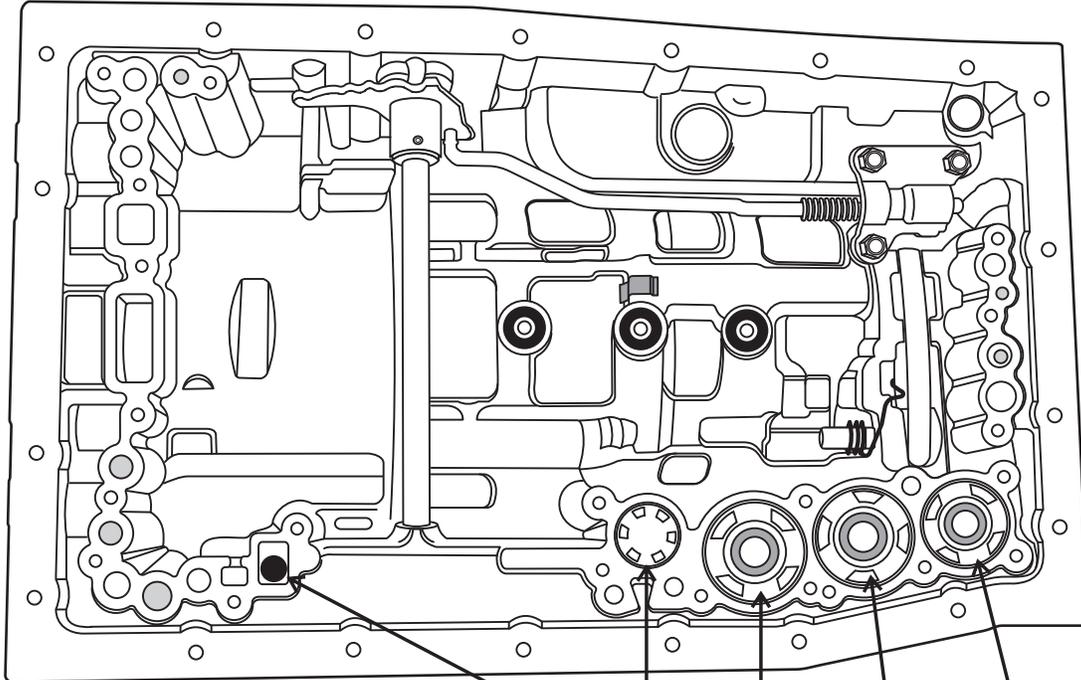
### LEGEND FOR LOWER VALVE BODY

- |  |  |
|--|--|
| 410 LOWER VALVE BODY CASTING.                  | 429 BORE PLUG.                             |
| 411 B1 APPLY RELAY VALVE.                      | 430 BORE PLUG RETAINER.                    |
| 412 B1 APPLY RELAY VALVE SPRING.               | 431 "SL2" SOLENOID.                        |
| 413 BORE PLUG.                                 | 432 "SLU" SOLENOID.                        |
| 414 BORE PLUG RETAINER.                        | 433 "SL2" & "SLU" SOLENOID RETAINING PINS. |
| 415 SL1 INNER RELAY VALVE SPRING.              | 434 RETAINING PIN BRACKET BOLT.            |
| 416 SL1 INNER RELAY VALVE.                     | 435 SOLENOID PIN RETAINING BRACKET.        |
| 417 SL1 OUTER RELAY VALVE SPRING.              | 436 WIRE HARNESS RETAINING CLIP BOLT.      |
| 418 SL1 OUTER RELAY VALVE.                     | 437 WIRE HARNESS RETAINING CLIP.           |
| 419 BORE PLUG.                                 | 438 SOLENOID MODULATING VALVE.             |
| 420 BORE PLUG RETAINER.                        | 439 SOLENOID MODULATING SPRING.            |
| 421 ACCUMULATOR CONTROL VALVE.                 | 440 BORE PLUG.                             |
| 422 ACCUMULATOR CONTROL BOOST VALVE.           | 441 BORE PLUG RETAINER.                    |
| 423 ACCUMULATOR CONTROL SPRING.                | 442 SOLENOID RETAINING BOLT.               |
| 424 ACCUMULATOR CONTROL ADJUSTABLE SLEEVE.     | 443 "S3" SOLENOID (BLACK CONNECTOR).       |
| 425 ADJUSTABLE SLEEVE PLUG. (MARK SETTING)     | 444 "S2" SOLENOID (GREEN CONNECTOR).       |
| 426 RETAINING PIN (LONGER THAN SOLENOID PINS). | 445 "S4" SOLENOID (BLUE CONNECTOR).        |
| 427 B1/B4 CONTROL VALVE SPRING.                | 446 "S1" SOLENOID (BLACK CONNECTOR).       |
| 428 B1/B4 CONTROL VALVE.                       | 447 WIRE HARNESS RETAINING CLIP.           |

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Figure 23

## ACCUMULATOR & SPRING ID



### *B1 Accumulator Spring*

#### Inner Spring

Free Length	Outer Diameter	Color
1.7099" (44.98 mm)	0.445" (11.30 mm)	Natural

#### Outer Spring

Free Length	Outer Diameter	Color
1.8252" (46.36 mm)	0.6732" (17.10 mm)	Natural

### *C3 Accumulator Spring*

#### Inner Spring

Free Length	Outer Diameter	Color
1.732" (44.0 mm)	0.551" (14.00 mm)	Yellow

#### Outer Spring

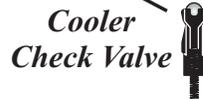
Free Length	Outer Diameter	Color
3.0178" (76.65 mm)	0.7913" (20.10 mm)	Natural

### *B3 Accumulator Spring*

Free Length	Outer Diameter	Color
2.539" (64.5 mm)	0.768" (19.5 mm)	Orange

### *C2 Accumulator Spring*

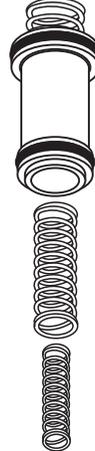
Free Length	Outer Diameter	Color
2.5618" (65.07 mm)	0.6378" (16.2 mm)	Pink



*B1*



*C3*



*B3*

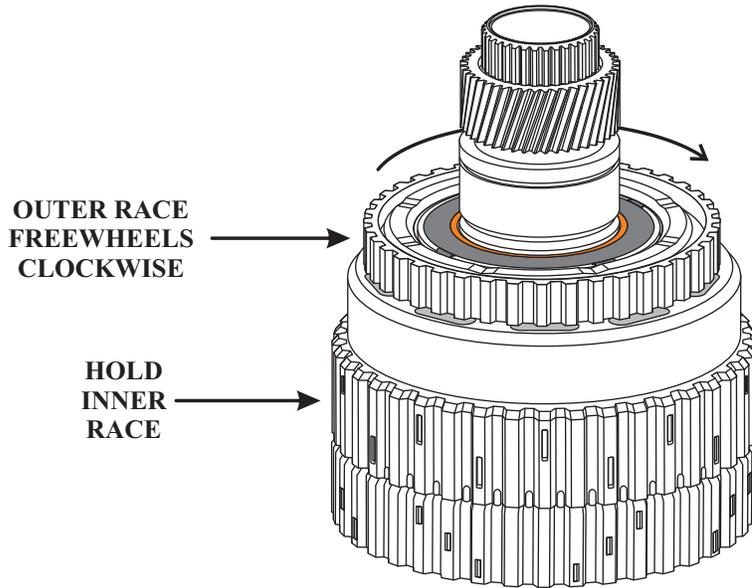


*C2*



Figure 24

**F2 SPRAG ROTATION**



**OUTER RACE  
FREEWHEELS  
CLOCKWISE**

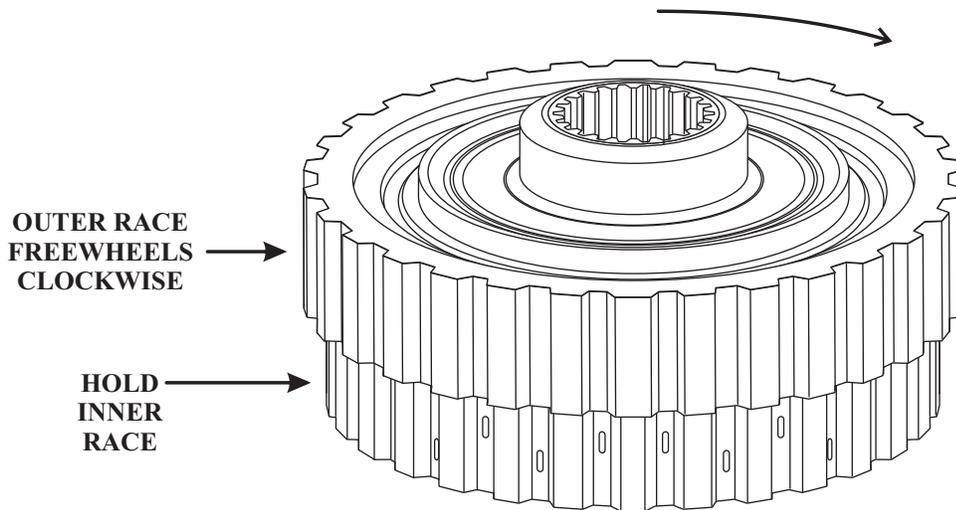
**HOLD  
INNER  
RACE**

**F2 SPRAG ASSEMBLY**

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Figure 25

**F4 SPRAG ROTATION**



**OUTER RACE  
FREEWHEELS  
CLOCKWISE**

**HOLD  
INNER  
RACE**

**F4 SPRAG ASSEMBLY**

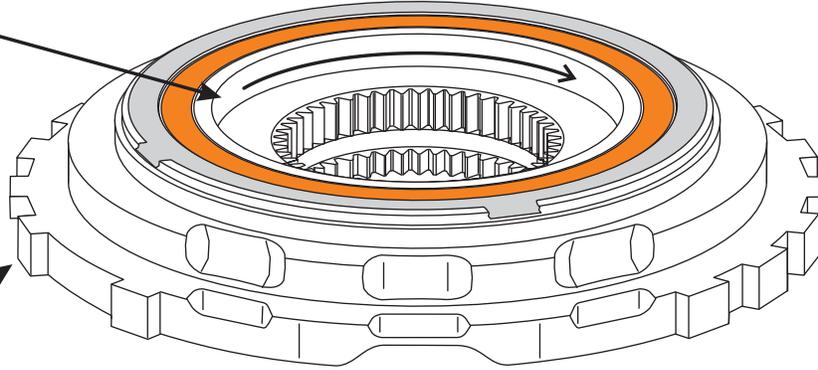
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Figure 26

F3 SPRAG ROTATION

INNER RACE  
FREEWHEELS  
CLOCK  
WISE

HOLD  
OUTER  
RACE



F3 SPRAG ASSEMBLY

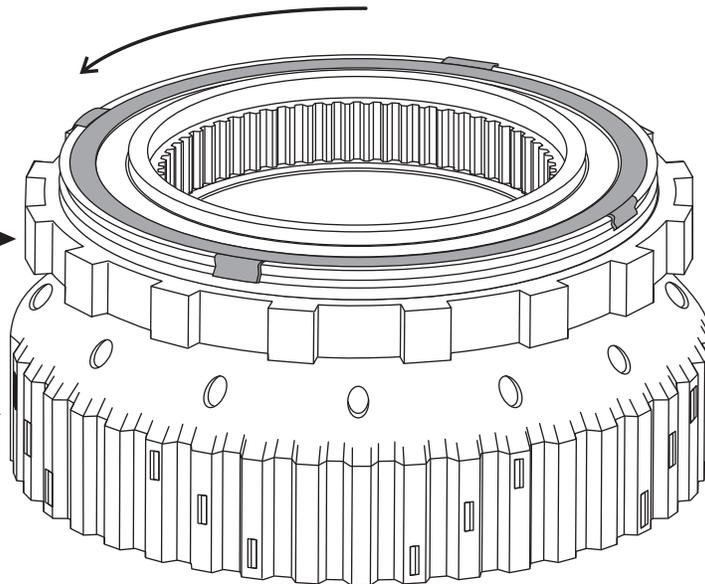
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Figure 27

F1 SPRAG ROTATION

OUTER RACE  
FREEWHEELS  
COUNTER  
CLOCKWISE

HOLD  
INNER  
RACE



F1 SPRAG ASSEMBLY

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Figure 28