

# CONTINUOUSLY VARIABLE TRANSMISSION

# CVT(TR690)

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# General Description

CONTINUOUSLY VARIABLE TRANSMISSION

## 1. General Description

### A: SPECIFICATION

#### 1. TORQUE CONVERTER

Model		3.6 L non-turbo
Type		Symmetric, 3-element, single stage, 2-phase torque converter
Stall torque ratio		1.80
Nominal	mm (in)	246 (9.69)
Stall speed (at sea level)	r/min	1,870 — 2,900 (D range) 1,750 — 2,750 (R range)
One-way clutch		Sprag type one-way clutch

#### 2. OIL PUMP

Type		Internal gear pump
Driving method		Driven by chain
Number of teeth	Inner rotor	8
	Outer rotor	9

#### 3. TRANSMISSION CONTROL ELEMENT

Type		Forward continuously variable speed change, 1 reverse, planetary gear
Multi-plate clutch		1 set
Multi-plate brake		1 set

#### 4. TRANSMISSION GEAR RATIO

Forward		3.105 — 0.482
Rev		3.018

#### 5. PLATE

Number of input clutch drive plates		5
Number of forward clutch drive plates		6
Number of reverse brake drive plates		5

## General Description

### CONTINUOUSLY VARIABLE TRANSMISSION

#### 6. SELECTOR POSITION

P (Park)	Transmission neutral, output shaft locked, engine start enabled
R (Reverse)	Rev
N (Neutral)	Transmission neutral, engine start enabled
D (Drive)	Forward continuously variable speed change
M (Manual mode) (paddle shift +side)	Manual gear change 1st → 2nd → 3rd → 4th → 5th → 6th
M (Manual mode) (paddle shift -side)	Manual gear change 1st ← 2nd ← 3rd ← 4th ← 5th ← 6th

#### 7. HYDRAULIC CONTROL AND LUBRICATION

Type	Electronic hydraulic control (speed changed by signals of vehicle speed and accelerator opening angle)
Fluid	Specified fluid: Subaru High Torque CVT Fluid <b>CAUTION:</b> <b>Always use specified CVTF. Using other fluid will cause malfunction.</b>
Fluid capacity L (US qt, Imp qt)	12.45 — 12.95 (13.2 — 13.7, 11.0 — 11.4)
Lubrication system	Forced feed lubrication with oil pump

#### 8. COOLING AND HARNESS

Model	Sedan	OUTBACK
Cooling system	Liquid-cooler incorporated in radiator	Liquid-cooler incorporated in radiator + CVTF cooler (air cool)
Inhibitor switch harness	12 poles	
Transmission harness	20 poles	

#### 9. TRANSFER

Transfer type	Multi-plate transfer (MP-T)
Number of transfer clutch drives & driven plates	6
Control method	Electronic hydraulic type
Reduction gear ratio	1.000 (37/37)

#### 10. REDUCTION GEAR RATIO

Front final reduction gear ratio	4.111
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#### 11. FRONT DIFFERENTIAL GEAR OIL

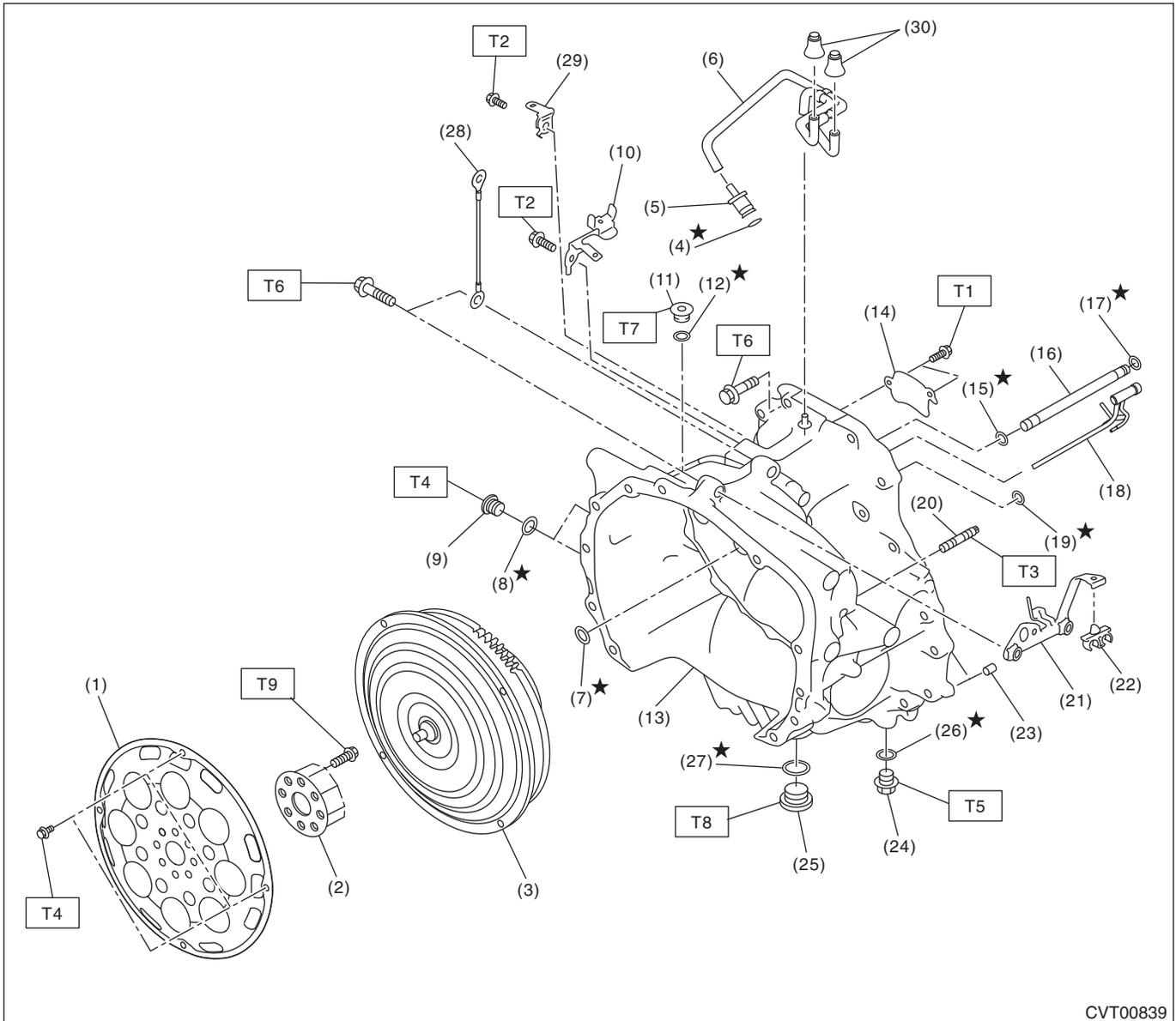
Fluid	Recommended fluid: SUBARU GEAR OIL EXTRA MT <b>CAUTION:</b> <b>If an alternative transmission oil is used, you may not have expected functionality and performance.</b> Alternative fluid: GL-5 (75W-90)
Fluid capacity L (US qt, Imp qt)	1.3 — 1.5 (1.4 — 1.6, 1.1 — 1.3)

# General Description

CONTINUOUSLY VARIABLE TRANSMISSION

## B: COMPONENT

### 1. TORQUE CONVERTER ASSEMBLY AND CONVERTER CASE



CVT00839

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# General Description

## CONTINUOUSLY VARIABLE TRANSMISSION

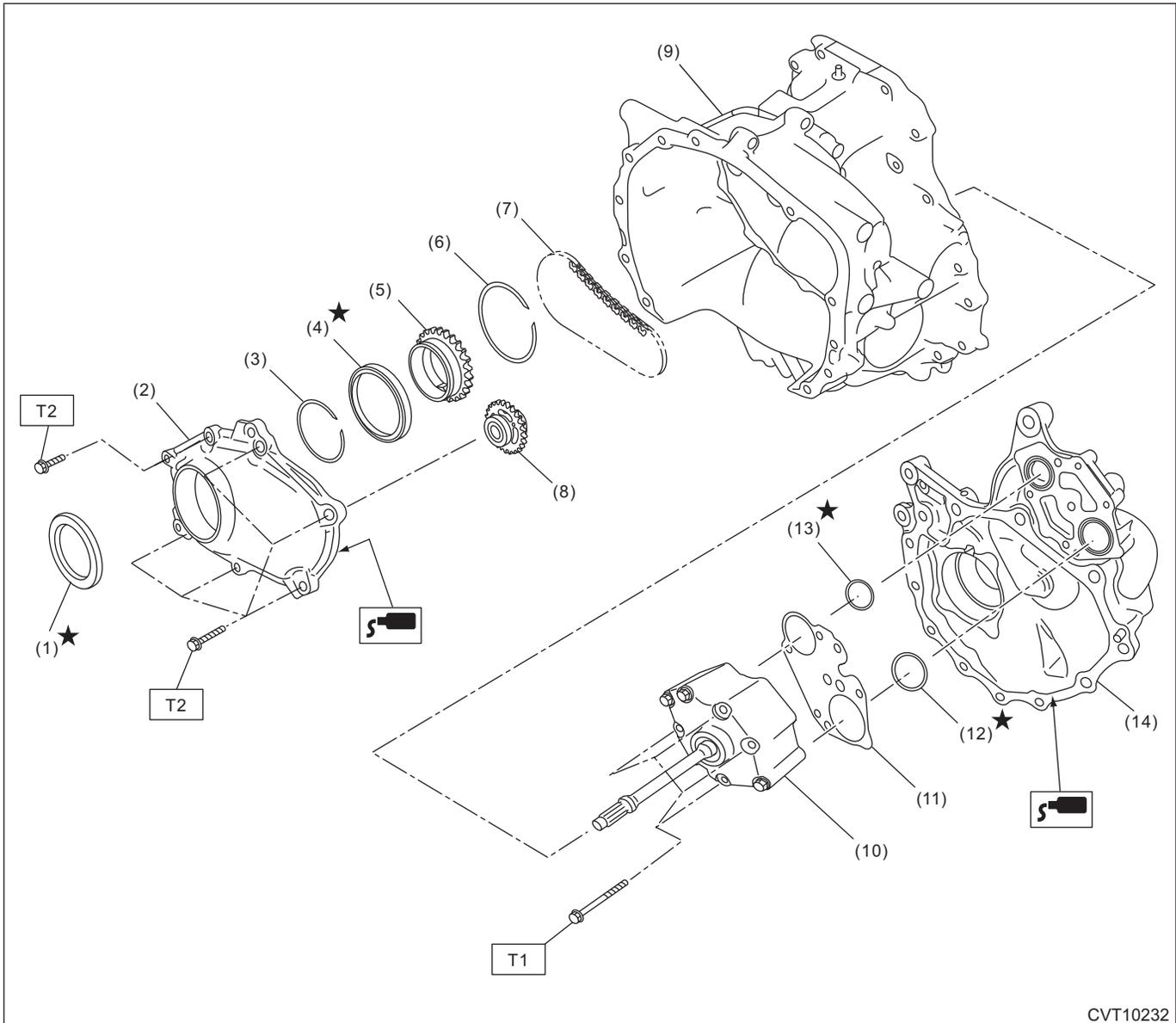
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(1) Drive plate	(15) O-ring	(29) Harness stay
(2) Reinforcement drive plate	(16) Lubrication pipe	(30) Air breather cap
(3) Torque converter ASSY	(17) O-ring	
(4) O-ring	(18) Lubrication pipe	<hr/> <b>Tightening torque: N-m (kgf-m, ft-lb)</b>
(5) Oil charge pipe cap	(19) O-ring	<b>T1: 9 (0.9, 6.6)</b>
(6) Air breather hose	(20) Stud bolt	<b>T2: 16 (1.6, 11.8)</b>
(7) O-ring	(21) Transmission hanger	<b>T3: 18 (1.8, 13.3)</b>
(8) O-ring	(22) Clip	<b>T4: 25 (2.5, 18.4)</b>
(9) Plug	(23) Straight pin	<b>T5: 35 (3.6, 25.8)</b>
(10) Transmission harness stay	(24) Overflow drain plug	<b>T6: 41 (4.2, 30.2)</b>
(11) Plug	(25) Front differential gear oil drain plug	<b>T7: 50 (5.1, 36.9)</b>
(12) O-ring	(26) Gasket	<b>T8: 70 (7.1, 51.6)</b>
(13) Converter case	(27) Gasket	<b>T9: &lt;Ref. to CVT(TR690)-159, INSTALLATION, Drive Plate.&gt;</b>
(14) Oil stopper plate	(28) Transmission radio ground cord	<hr/>

# General Description

CONTINUOUSLY VARIABLE TRANSMISSION

## 2. OIL PUMP ASSEMBLY



CVT10232

- |                          |                     |                            |
|--------------------------|---------------------|----------------------------|
| (1) Oil seal             | (7) Oil pump chain  | (13) O-ring (small)        |
| (2) Oil pump chain cover | (8) Driven sprocket | (14) Drive pinion retainer |
| (3) Snap ring            | (9) Converter case  |                            |
| (4) Ball bearing         | (10) Oil pump ASSY  |                            |
| (5) Drive sprocket       | (11) Plate          |                            |
| (6) Snap ring            | (12) O-ring (large) |                            |

**Tightening torque: N·m (kgf·m, ft·lb)**

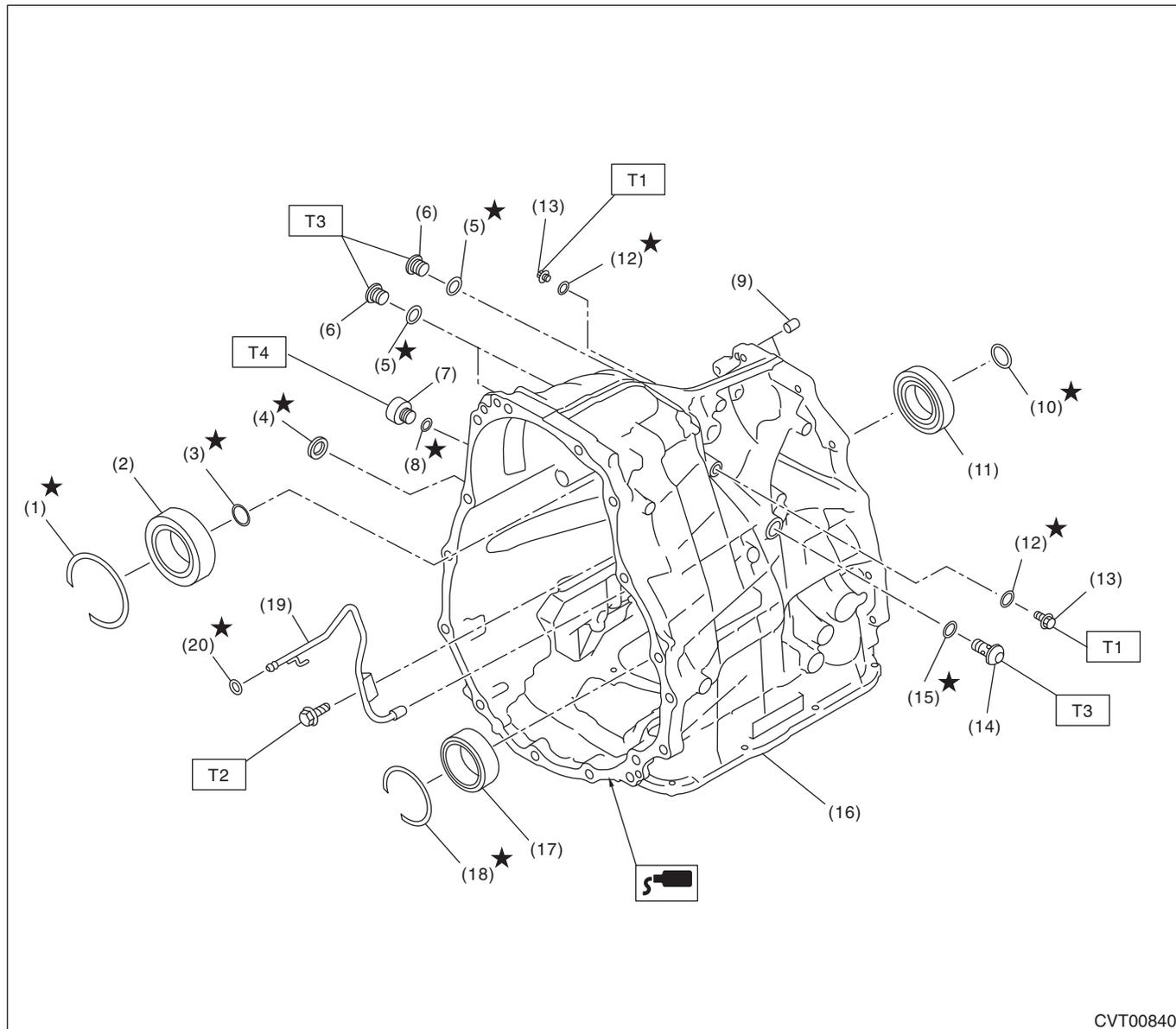
**T1: 8.5 (0.9, 6.3)**

**T2: 24 (2.4, 17.7)**

# General Description

## CONTINUOUSLY VARIABLE TRANSMISSION

### 3. TRANSMISSION CASE



- (1) Snap ring
- (2) Roller bearing
- (3) Seal ring
- (4) Oil seal
- (5) O-ring
- (6) Plug
- (7) Plug
- (8) Gasket
- (9) Straight pin

- (10) Seal ring
- (11) Ball bearing
- (12) O-ring
- (13) Plug
- (14) Plug
- (15) O-ring
- (16) Transmission case
- (17) Roller bearing
- (18) Snap ring

- (19) Lubrication pipe
- (20) O-ring

**Tightening torque: N·m (kgf·m, ft·lb)**

**T1: 13 (1.3, 9.6)**

**T2: 16 (1.6, 11.8)**

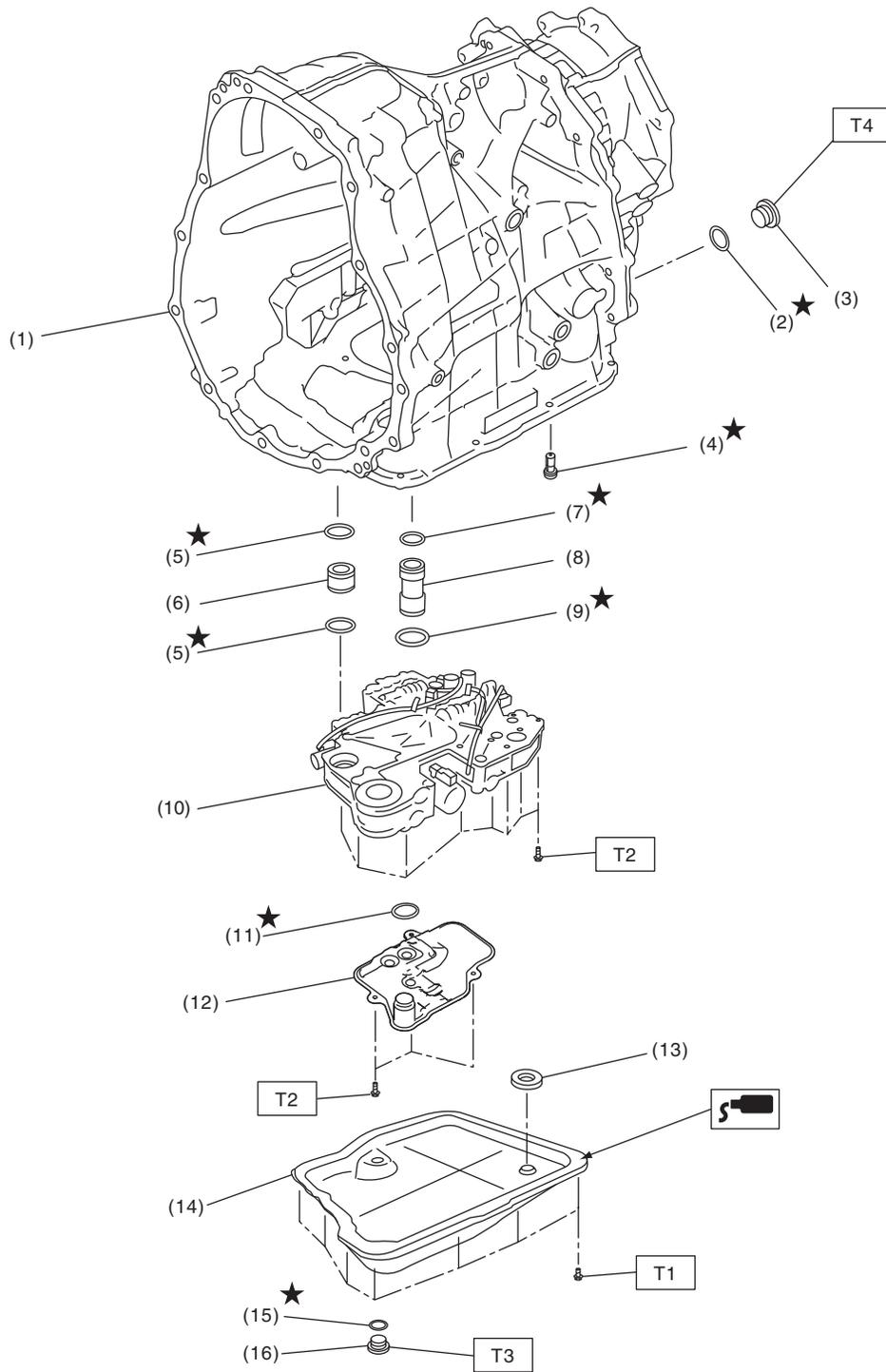
**T3: 25 (2.5, 18.4)**

**T4: 35 (3.6, 25.8)**

# General Description

CONTINUOUSLY VARIABLE TRANSMISSION

## 4. CONTROL VALVE BODY



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CVT00580

# General Description

## CONTINUOUSLY VARIABLE TRANSMISSION

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- |                       |                         |
|-----------------------|-------------------------|
| (1) Transmission case | (9) O-ring (large)      |
| (2) Gasket            | (10) Control valve body |
| (3) Filler plug       | (11) O-ring             |
| (4) CVTF filter       | (12) Oil strainer       |
| (5) O-ring            | (13) Magnet             |
| (6) Pressure pipe     | (14) Oil pan            |
| (7) O-ring (small)    | (15) Gasket             |
| (8) CVTF pipe         | (16) CVTF drain plug    |

---

**Tightening torque: N·m (kgf-m, ft-lb)**

**T1: 5 (0.5, 3.7)**

**T2: 9 (0.9, 6.6)**

**T3: 39.2 (4.0, 28.9)**

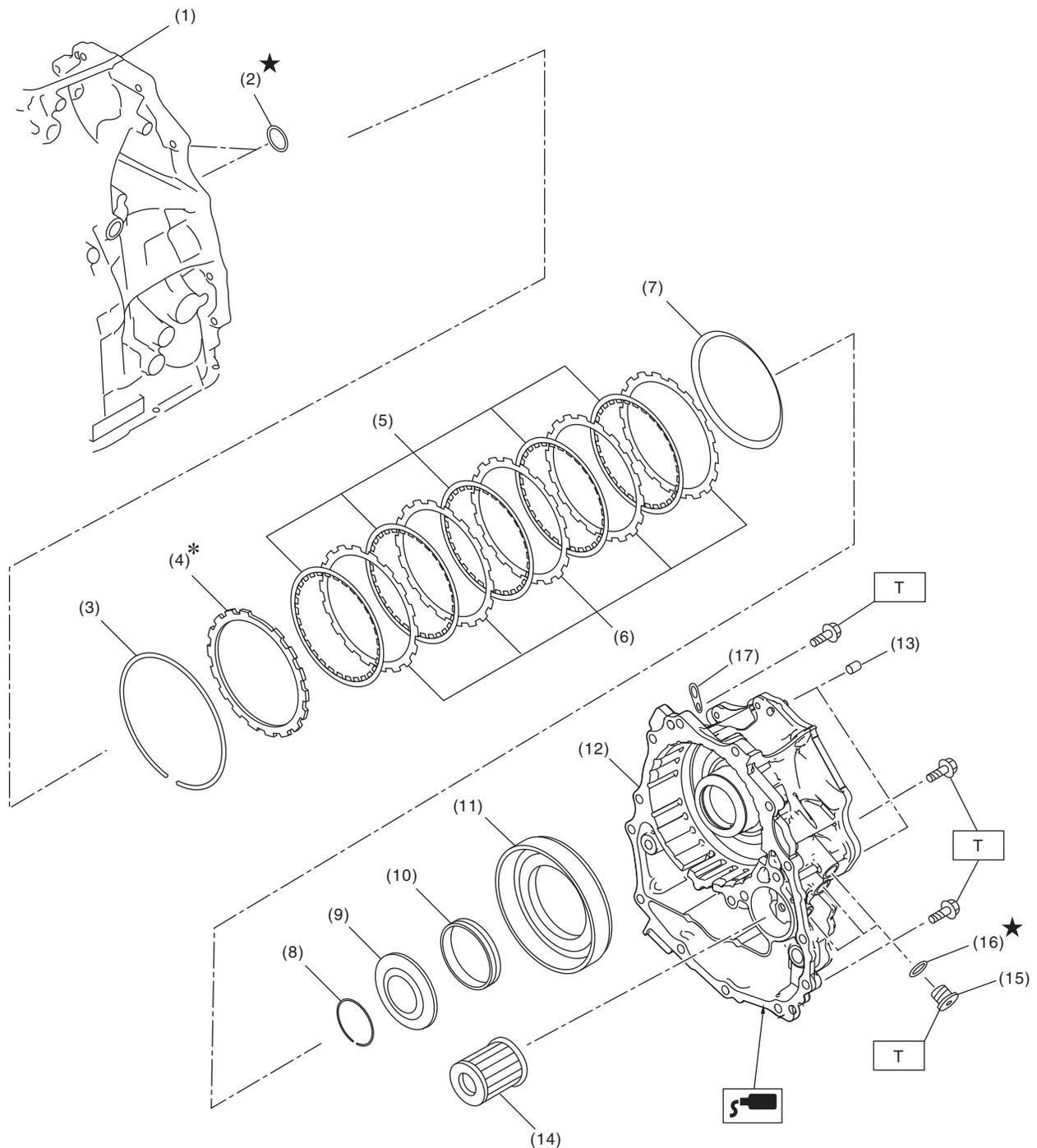
**T4: 50 (5.1, 36.9)**

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# General Description

CONTINUOUSLY VARIABLE TRANSMISSION

## 5. REVERSE BRAKE ASSEMBLY AND INTERMEDIATE CASE



AT-07299

- |                       |                           |                          |
|-----------------------|---------------------------|--------------------------|
| (1) Transmission case | (8) Snap ring             | (15) Plug                |
| (2) O-ring            | (9) Spring retainer       | (16) O-ring              |
| (3) Snap ring         | (10) Return spring        | (17) Transmission hanger |
| (4) Retaining plate   | (11) Reverse brake piston |                          |
| (5) Drive plate       | (12) Intermediate case    |                          |
| (6) Driven plate      | (13) Straight pin         |                          |
| (7) Dish plate        | (14) CVTF filter          |                          |

**Tightening torque: N-m (kgf-m, ft-lb)**

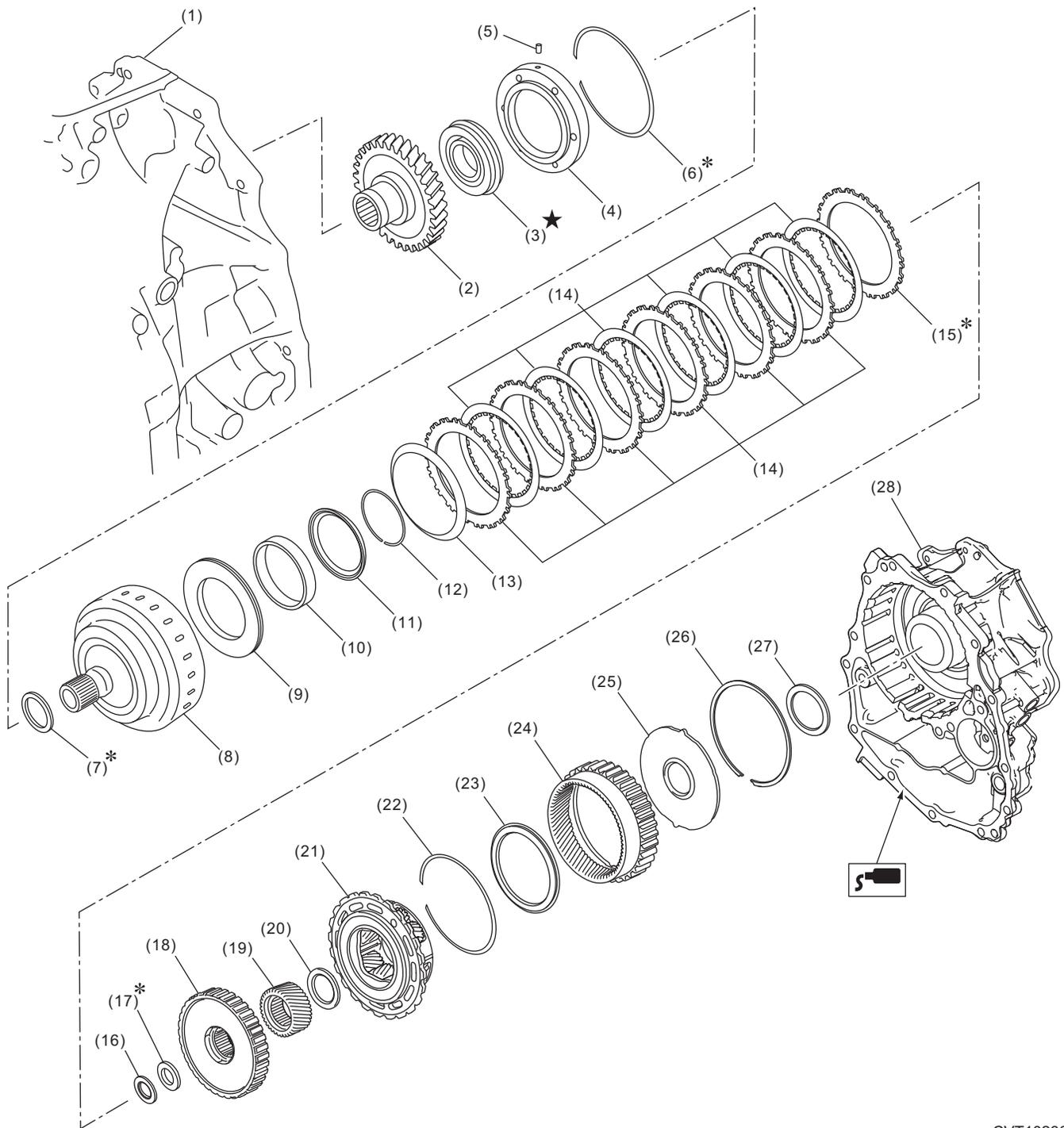
**T: 25 (2.5, 18.4)**

**CVT(TR690)-11**

# General Description

CONTINUOUSLY VARIABLE TRANSMISSION

## 6. FORWARD CLUTCH ASSEMBLY AND REDUCTION DRIVEN GEAR



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CVT10236

# General Description

## CONTINUOUSLY VARIABLE TRANSMISSION

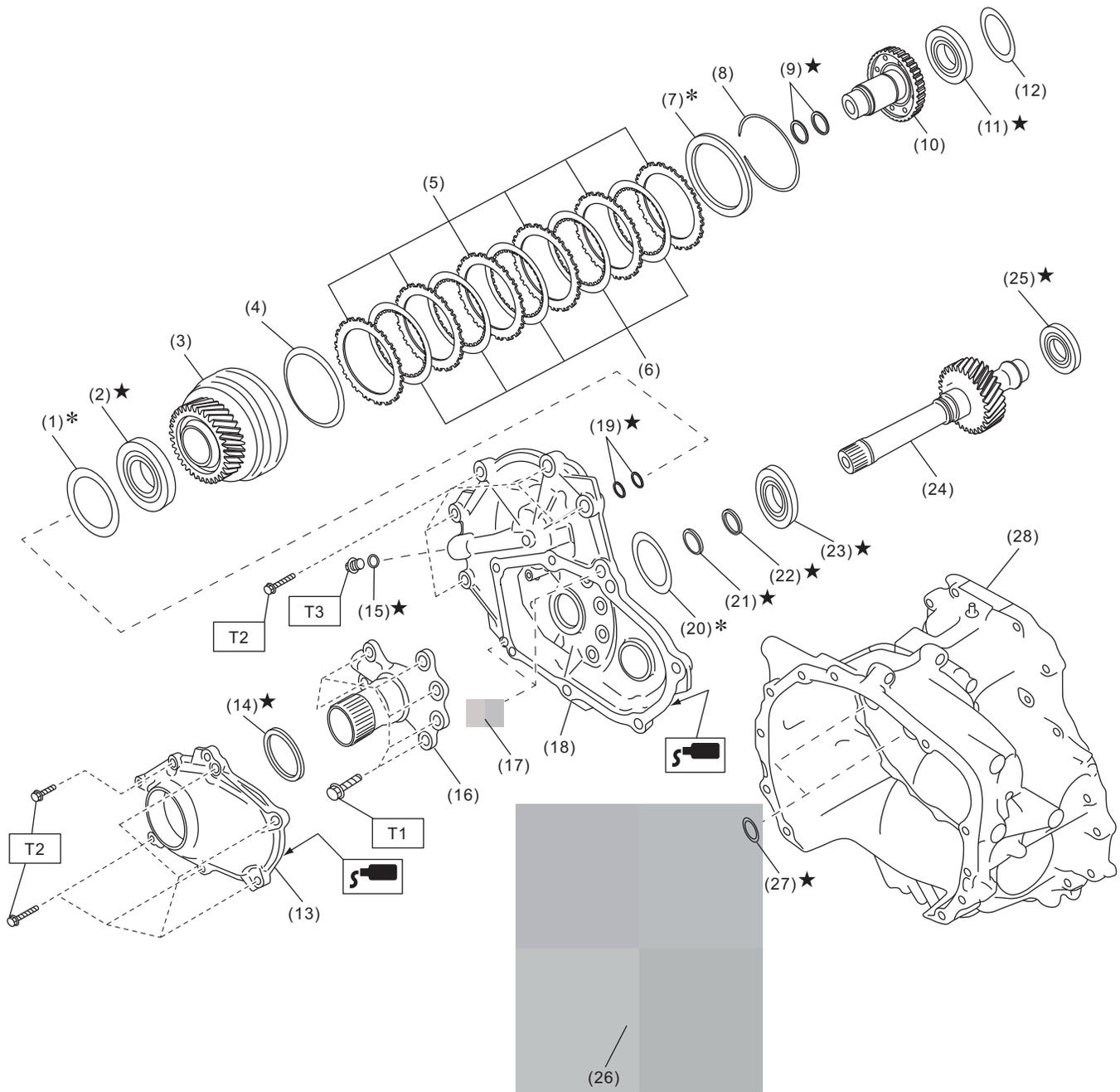
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- |                                    |                                     |                             |
|------------------------------------|-------------------------------------|-----------------------------|
| (1) Transmission case              | (11) Forward clutch piston retainer | (20) Thrust needle bearing  |
| (2) Reduction driven gear          | (12) Snap ring                      | (21) Planetary carrier ASSY |
| (3) Ball bearing                   | (13) Dish plate                     | (22) Snap ring              |
| (4) Reduction driven gear retainer | (14) Forward clutch plate           | (23) Thrust needle bearing  |
| (5) Straight pin                   | (15) Retaining plate                | (24) Internal gear          |
| (6) Snap ring                      | (16) Thrust needle bearing          | (25) Thrust gear plate      |
| (7) Washer                         | (17) Washer                         | (26) Snap ring              |
| (8) Forward clutch drum            | (18) Forward clutch hub             | (27) Thrust needle bearing  |
| (9) Forward clutch piston          | (19) Sun gear                       | (28) Intermediate case      |
| (10) Return spring                 |                                     |                             |

# General Description

CONTINUOUSLY VARIABLE TRANSMISSION

## 7. FRONT REDUCTION DRIVE GEAR AND FRONT REDUCTION DRIVEN GEAR



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CVT10518

# General Description

## CONTINUOUSLY VARIABLE TRANSMISSION

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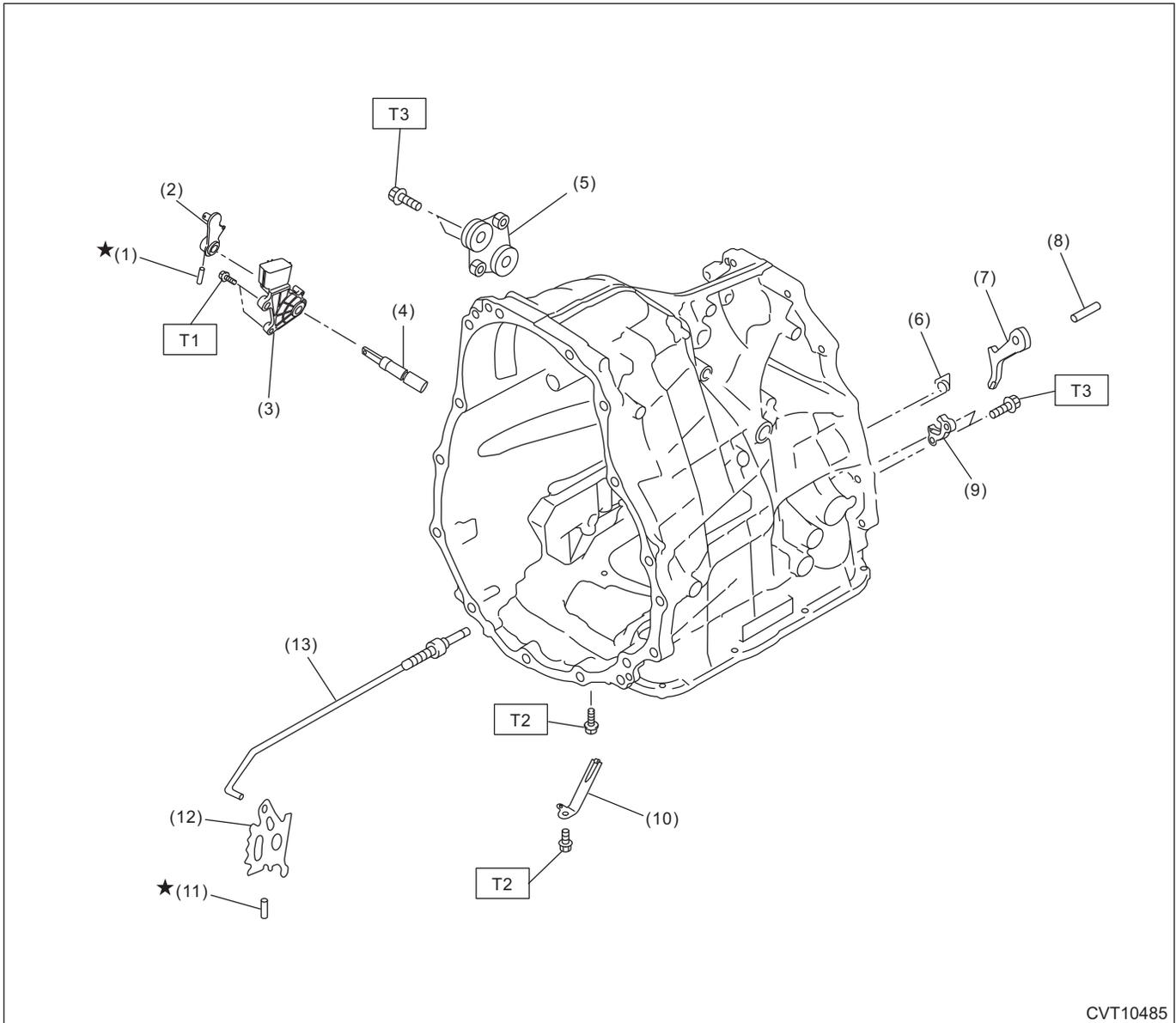
(1) Shim	(12) Shim	(23) Ball bearing
(2) Ball bearing	(13) Oil pump chain cover	(24) Front reduction drive gear
(3) Front reduction driven gear	(14) Seal ring	(25) Ball bearing
(4) Dish plate	(15) O-ring	(26) Converter case cover (stator shaft press-fitting type)
(5) Driven plate	(16) Center support COMPL (bolt fixing type)	(27) O-ring
(6) Drive plate	(17) Straight pin	(28) Converter case
(7) Retaining plate	(18) Converter case cover (bolt fixing type)	
(8) Snap ring	(19) Seal ring	<b><i>Tightening torque: N·m (kgf·m, ft·lb)</i></b>
(9) Seal ring	(20) Shim	<b><i>T1: 21.5 (2.2, 15.9)</i></b>
(10) Front reduction driven shaft	(21) O-ring	<b><i>T2: 24 (2.4, 17.7)</i></b>
(11) Ball bearing	(22) Seal ring	<b><i>T3: 25 (2.5, 18.4)</i></b>

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# General Description

## CONTINUOUSLY VARIABLE TRANSMISSION

### 8. TRANSMISSION CONTROL DEVICE



CVT10485

- |                       |                     |
|-----------------------|---------------------|
| (1) Spring pin        | (8) Shaft           |
| (2) Shifter arm       | (9) Parking support |
| (3) Inhibitor switch  | (10) Detent spring  |
| (4) Shifter arm shaft | (11) Spring pin     |
| (5) Cable plate ASSY  | (12) Manual plate   |
| (6) Return spring     | (13) Parking rod    |
| (7) Parking pawl      |                     |

**Tightening torque: N·m (kgf·m, ft·lb)**

**T1: 5 (0.5, 3.7)**

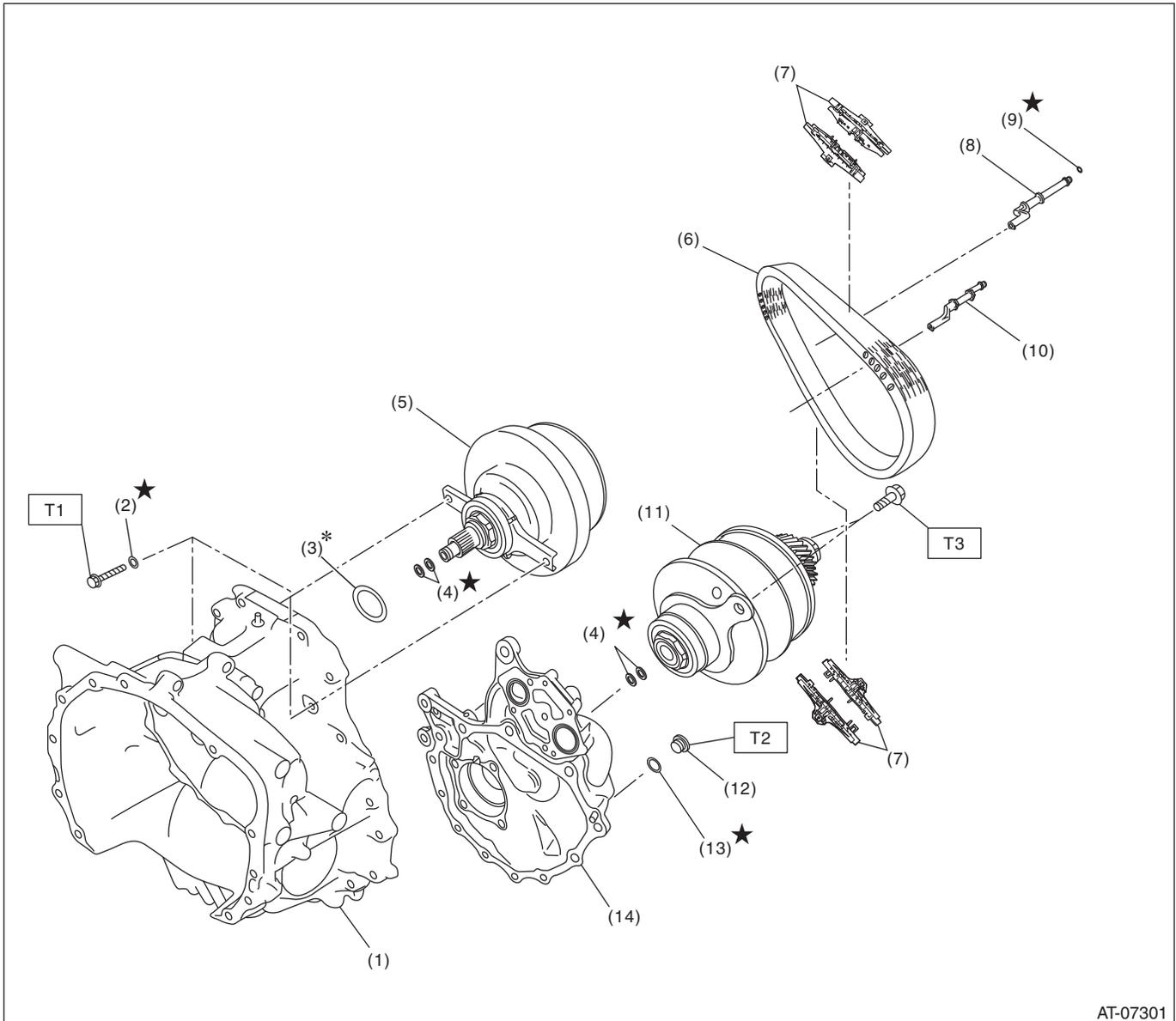
**T2: 7 (0.7, 5.2)**

**T3: 25 (2.5, 18.4)**

# General Description

CONTINUOUSLY VARIABLE TRANSMISSION

## 9. PRIMARY PULLEY, SECONDARY PULLEY AND VARIATOR CHAIN



AT-07301

- |                         |                            |
|-------------------------|----------------------------|
| (1) Converter case      | (8) Lubrication pipe       |
| (2) Seal washer         | (9) O-ring                 |
| (3) Shim                | (10) Support rod           |
| (4) Seal ring           | (11) Secondary pulley ASSY |
| (5) Primary pulley ASSY | (12) Plug                  |
| (6) Variator chain      | (13) O-ring                |
| (7) Chain guide         | (14) Drive pinion retainer |

**Tightening torque: N·m (kgf·m, ft·lb)**

**T1: 21 (2.1, 15.5)**

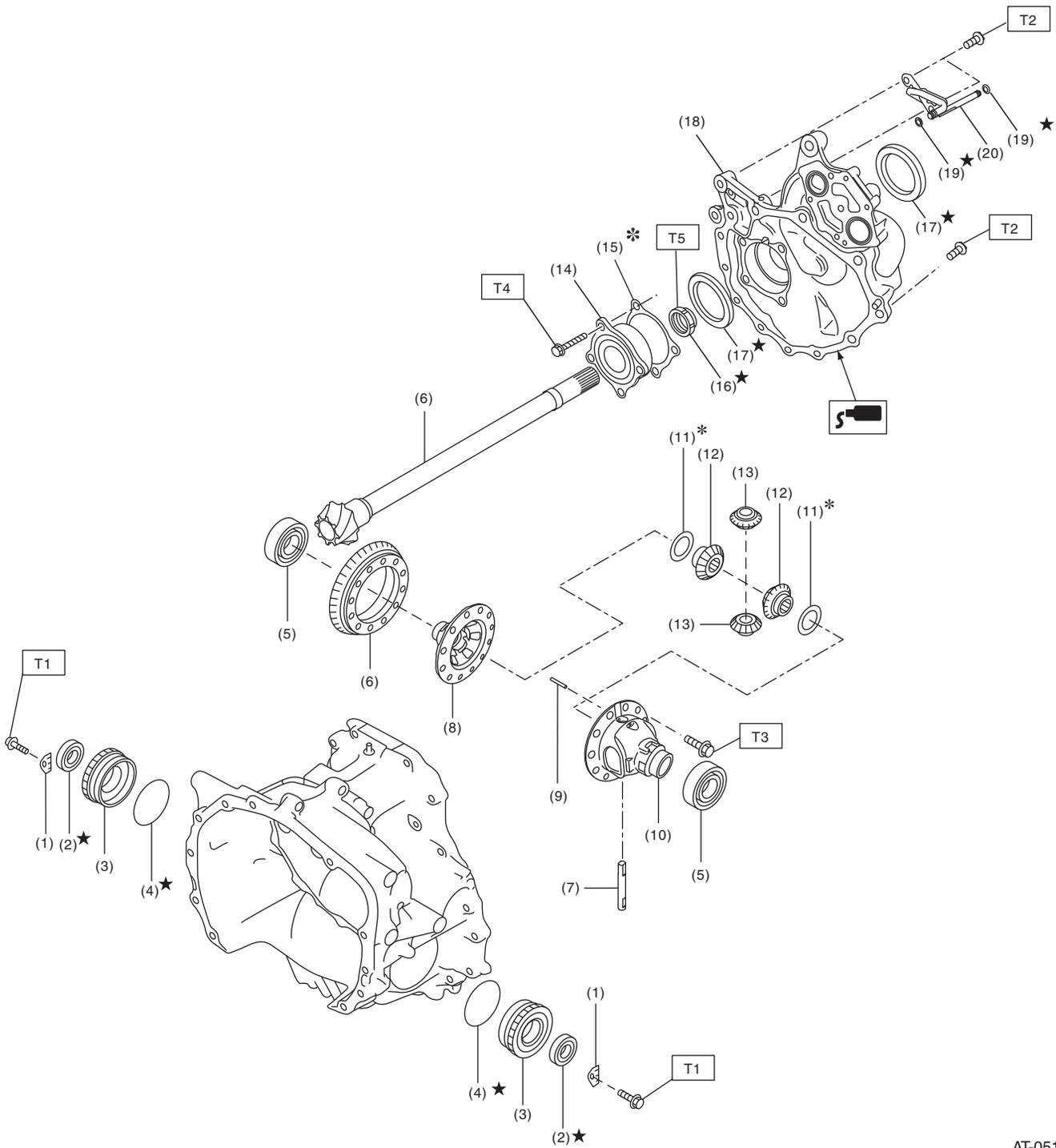
**T2: 25 (2.5, 18.4)**

**T3: 33 (3.4, 24.3)**

# General Description

CONTINUOUSLY VARIABLE TRANSMISSION

## 10.FRONT DIFFERENTIAL GEAR



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AT-05115

# General Description

CONTINUOUSLY VARIABLE TRANSMISSION

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(1) Lock plate	(10) Differential case LH	(19) O-ring
(2) Oil seal	(11) Washer	(20) Lubrication pipe
(3) Differential side retainer	(12) Differential bevel gear	
(4) O-ring	(13) Differential bevel pinion	<hr/>
(5) Taper roller bearing	(14) Taper roller bearing	<b>Tightening torque: N·m (kgf·m, ft·lb)</b>
(6) Drive pinion gear set	(15) Shim	<b>T1: 25 (2.5, 18.4)</b>
(7) Pinion shaft	(16) Lock nut	<b>T2: 43 (4.4, 31.7)</b>
		<b>T3: &lt;Ref. to CVT(TR690)-308, DIF- FERENTIAL CASE ASSEMBLY, ASSEMBLY, Front Differential Assembly.&gt;</b>
(8) Differential case RH	(17) Oil seal	<b>T4: 70 (7.1, 51.6)</b>
(9) Straight pin	(18) Drive pinion retainer	<b>T5: 130 (13.3, 95.9)</b>

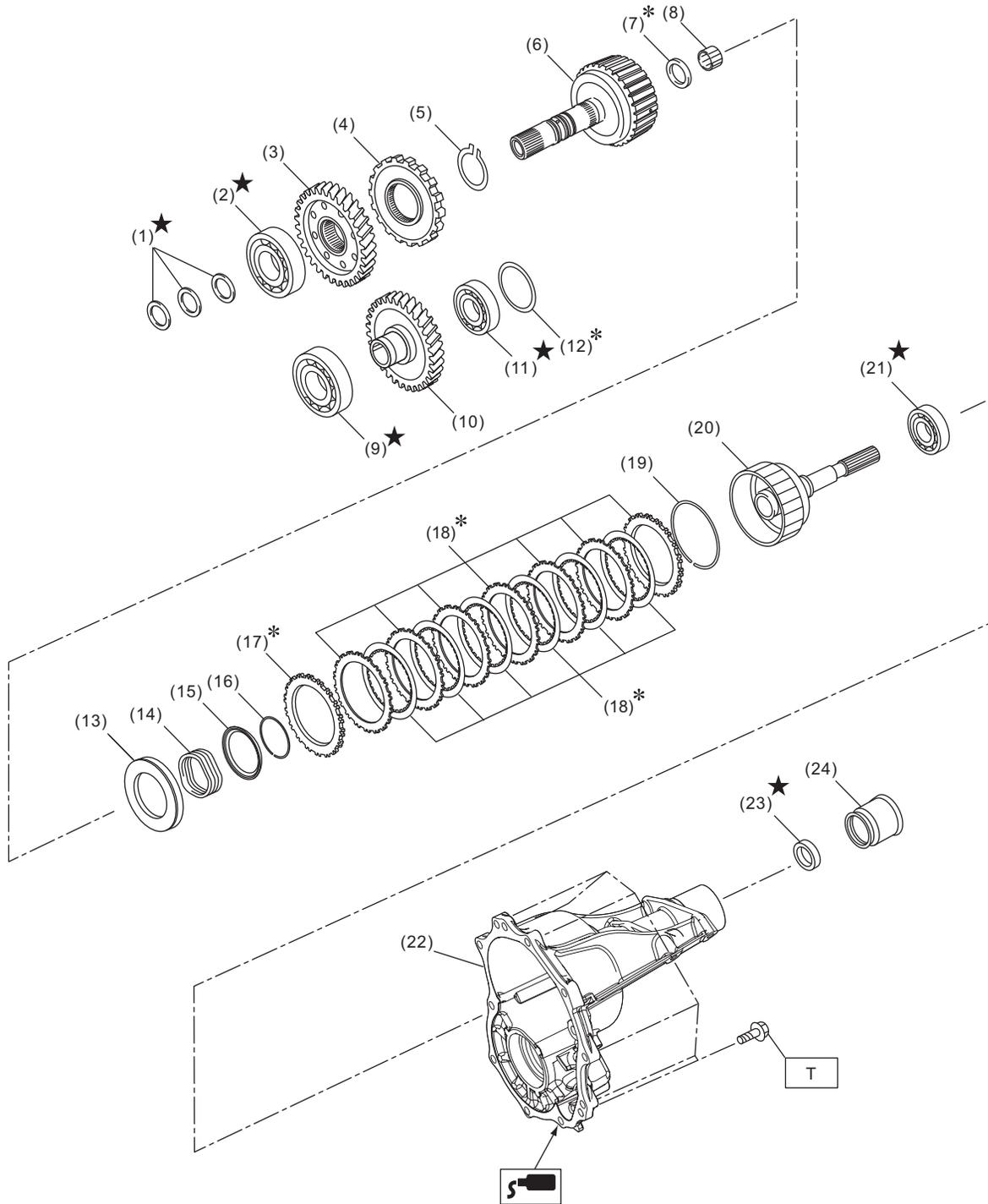
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# General Description

CONTINUOUSLY VARIABLE TRANSMISSION

## 11. TRANSFER AND EXTENSION CASE



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CVT10237

CVT(TR690)-20

# General Description

## CONTINUOUSLY VARIABLE TRANSMISSION

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- |                                |                                     |                       |
|--------------------------------|-------------------------------------|-----------------------|
| (1) Seal ring                  | (10) Transfer reduction driven gear | (19) Snap ring        |
| (2) Ball bearing               | (11) Ball bearing                   | (20) Rear drive shaft |
| (3) Transfer drive gear        | (12) Shim                           | (21) Ball bearing     |
| (4) Parking gear               | (13) Transfer piston                | (22) Extension case   |
| (5) Snap ring                  | (14) Return spring                  | (23) Oil seal         |
| (6) Reduction drive gear shaft | (15) Transfer piston seal           | (24) Dust cover       |
| (7) Thrust needle bearing      | (16) Snap ring                      |                       |
| (8) Needle bearing             | (17) Pressure plate                 |                       |
| (9) Ball bearing               | (18) Transfer clutch plate set      |                       |

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**Tightening torque: N·m (kgf·m, ft·lb)**

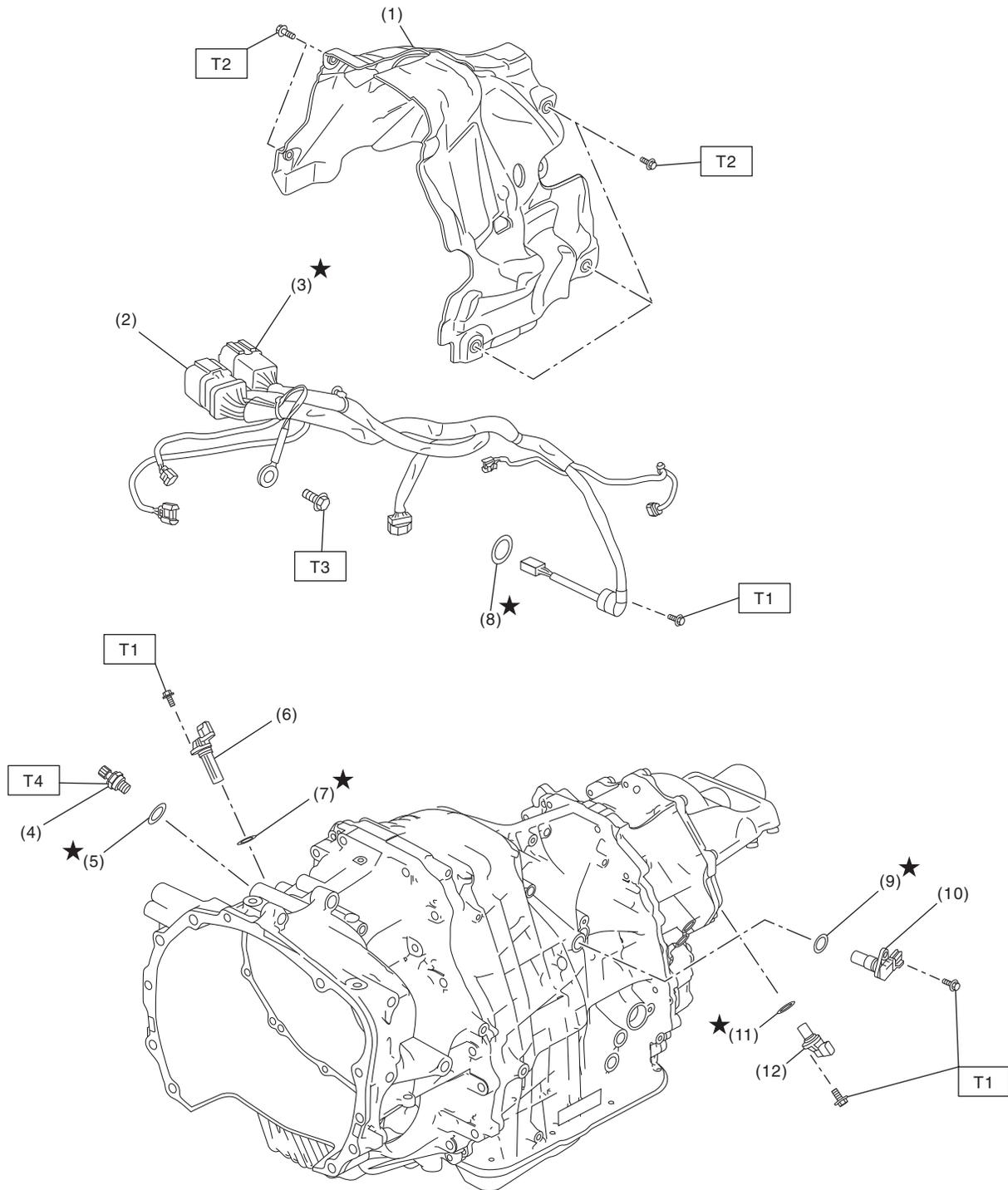
**T: 25 (2.5, 18.4)**

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# General Description

CONTINUOUSLY VARIABLE TRANSMISSION

## 12. TRANSMISSION HARNESS AND SENSOR



CVT00841

- |                               |                               |
|-------------------------------|-------------------------------|
| (1) Transmission cover        | (7) O-ring                    |
| (2) Transmission harness      | (8) O-ring                    |
| (3) Inhibitor harness         | (9) O-ring                    |
| (4) Secondary pressure sensor | (10) Secondary speed sensor   |
| (5) O-ring                    | (11) O-ring                   |
| (6) Primary speed sensor      | (12) Front wheel speed sensor |

**Tightening torque: N·m (kgf·m, ft·lb)**

**T1: 5 (0.5, 3.7)**

**T2: 8 (0.8, 5.9)**

**T3: 16 (1.6, 11.8)**

**T4: 39 (4.0, 28.8)**

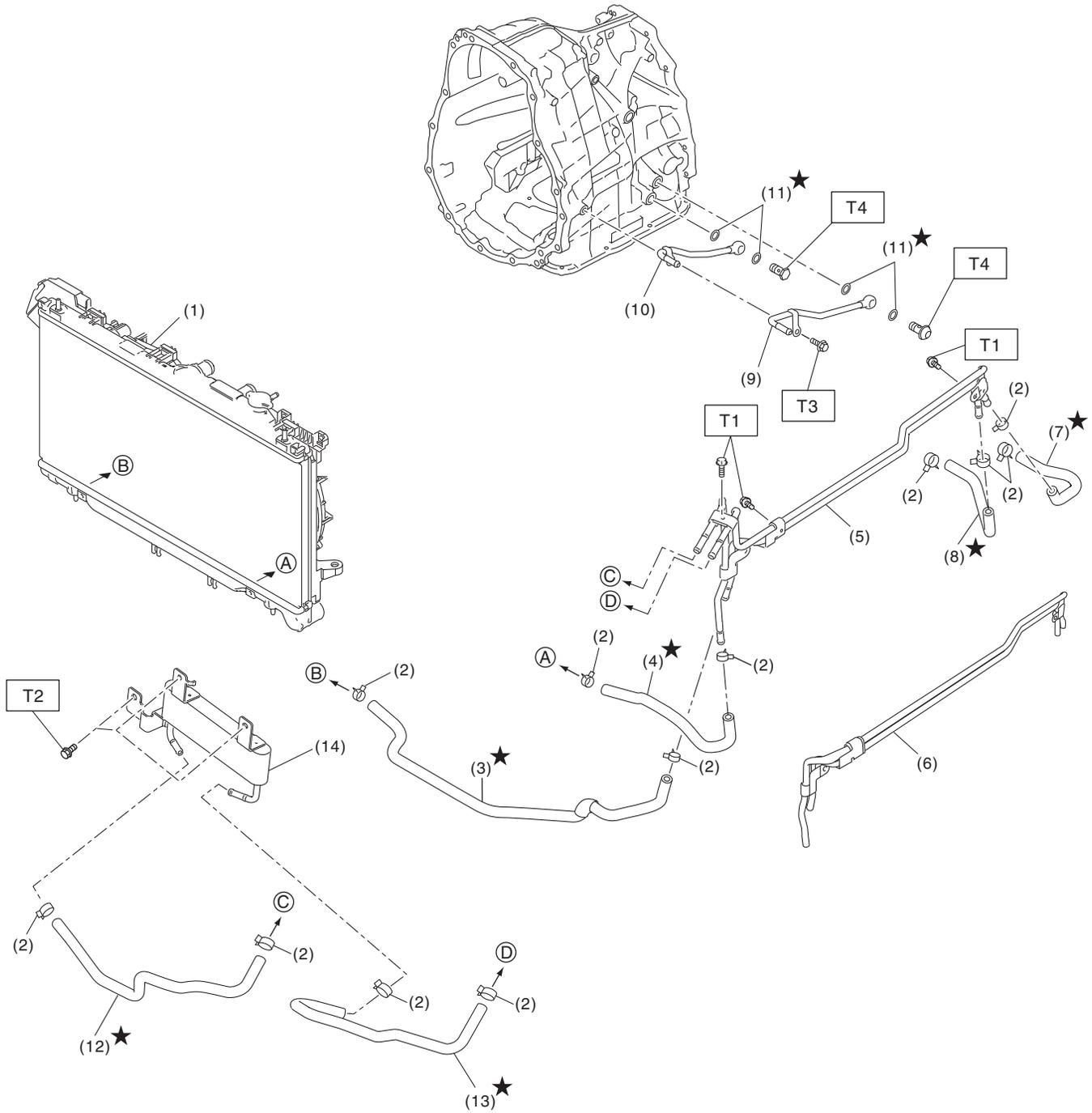
**CVT(TR690)-22**

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# General Description

CONTINUOUSLY VARIABLE TRANSMISSION

## 13. CVTF COOLER PIPE AND HOSE



CVT00969

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# General Description

## CONTINUOUSLY VARIABLE TRANSMISSION

- |   |   |
|---|---|
| (1) Radiator                              | (8) CVTF CVT outlet hose                                |
| (2) CVTF hose clip                        | (9) CVTF outlet pipe                                    |
| (3) CVTF radiator inlet hose              | (10) CVTF inlet pipe                                    |
| (4) CVTF radiator outlet hose             | (11) Gasket   |
| (5) CVTF cooler pipe ASSY (OUTBACK model) | (12) CVTF cooler (air cool) inlet hose (OUTBACK model)  |
| (6) CVTF cooler pipe ASSY (sedan model)   | (13) CVTF cooler (air cool) outlet hose (OUTBACK model) |
| (7) CVTF CVT inlet hose                   | (14) CVTF cooler (air cool) (OUTBACK model)             |

**Tightening torque: N·m (kgf-m, ft-lb)**

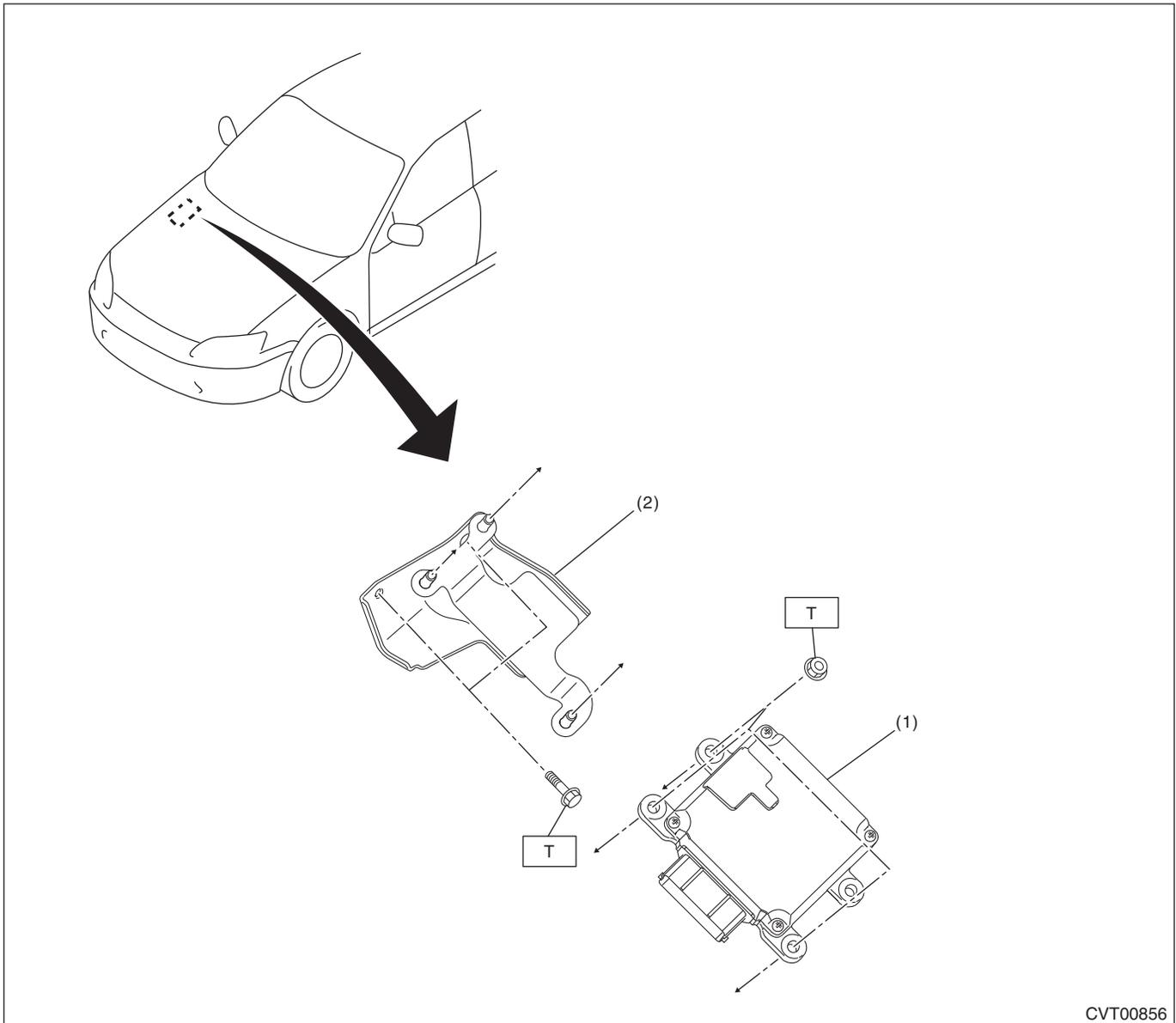
**T1: 7.5 (0.8, 5.5)**

**T2: 12 (1.2, 8.9)**

**T3: 16 (1.6, 11.8)**

**T4: 40 (4.1, 29.5)**

## 14. TRANSMISSION CONTROL MODULE



CVT00856

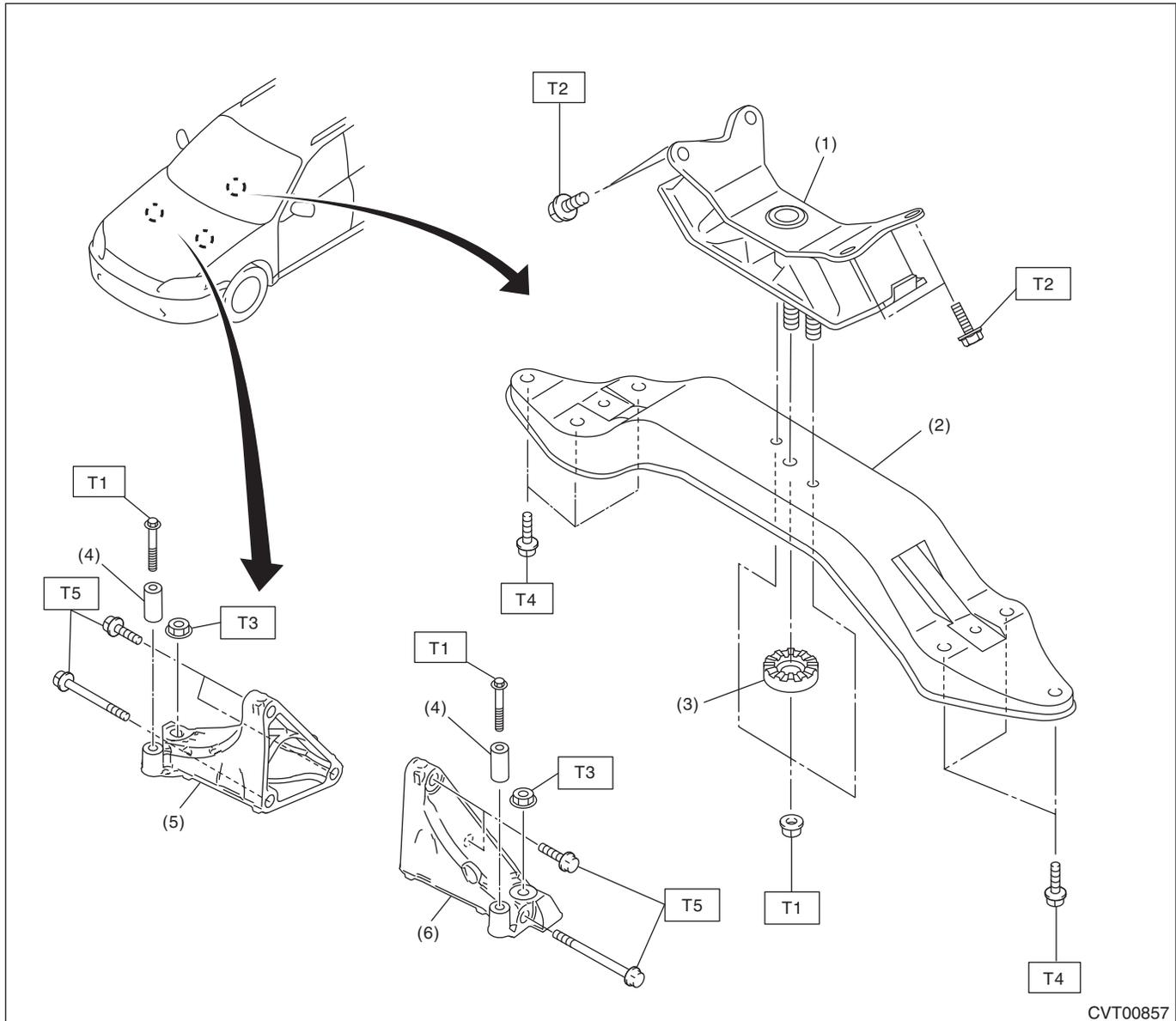
- (1) Transmission control module (TCM)

- (2) TCM bracket

**Tightening torque: N·m (kgf-m, ft-lb)**

**T: 7.5 (0.8, 5.5)**

### 15. TRANSMISSION MOUNTING



CVT00857

- |                                   |   |
|-----------------------------------|---|
| (1) Rear cushion rubber           | (4) Collar                                  |
| (2) Transmission rear crossmember | (5) Transmission main mounting bracket (RH) |
| (3) Stopper                       | (6) Transmission main mounting bracket (LH) |

**Tightening torque: N·m (kgf·m, ft·lb)**

**T1: 35 (3.6, 25.8)**

**T2: 40 (4.1, 29.5)**

**T3: 45 (4.6, 33.2)**

**T4: 75 (7.6, 55.3)**

**T5: 75 (7.6, 55.3)**

### C: CAUTION

- Wear appropriate work clothing, including a cap, protective goggles and protective shoes when performing any work.
- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust and dirt.
- Do not place the oil pan with its inner side facing up until it is installed, to prevent intrusion of foreign matter into the control valve body.

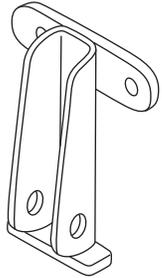
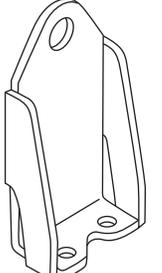
## General Description

### CONTINUOUSLY VARIABLE TRANSMISSION

- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
- When disassembling the case and other light alloy parts, use a plastic hammer to force it apart. Do not pry apart with screwdrivers or other tools.
- Vehicle components are extremely hot after driving. Be wary of receiving burns from heated parts.
- Use SUBARU genuine CVTF and recommended grease. Do not mix CVTF, grease etc. of different grades or manufacturers.
- Be sure to tighten bolts and nuts to the specified torque.
- Place lifts, shop jacks or rigid racks at specified locations.
- Apply CVTF onto sliding or revolving surfaces before installation.
- Apply CVTF onto the press-fitting surface of the part before press-fitting the part using a press.
- Replace deformed or damaged snap rings with new parts.
- Before installing O-rings or oil seals, apply sufficient amount of CVTF to avoid damage and deformation.
- Be careful not to incorrectly install or fail to install O-rings, snap rings and other such parts.
- Before securing a part on a vise, place cushioning material such as wood blocks, aluminum plate, or cloth between the part and the vise.
- Avoid damaging the mating surface of the case.
- Before applying liquid gasket, completely remove the old liquid gasket.
- After removing the sensors, breather hose and plugs, plug the holes to avoid foreign materials intruding as necessary.
- During disassembly or assembly, be sure to use nylon gloves or paper towels. Do not use cloth gloves or waste cloth.

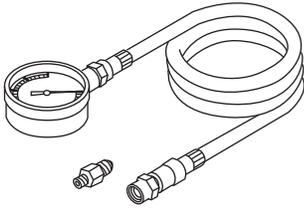
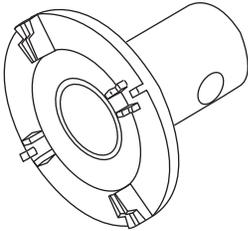
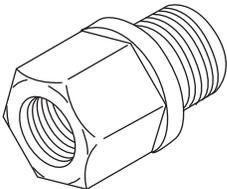
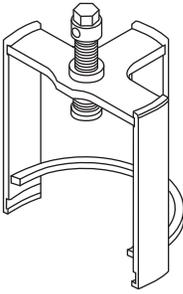
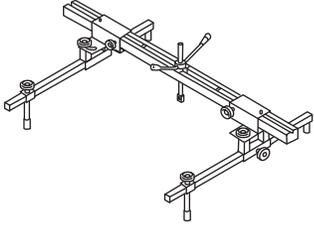
## D: PREPARATION TOOL

### 1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST41099AJ010	41099AJ010	SPECIAL TOOL H6	<ul style="list-style-type: none"> <li>• Used for removing and installing transmission.</li> <li>• For H6 engine.</li> </ul>
 ST18360AA020	18360AA020	HANGER	<ul style="list-style-type: none"> <li>• Used for removing and installing transmission.</li> <li>• For H6 engine.</li> </ul>

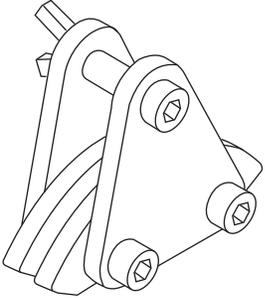
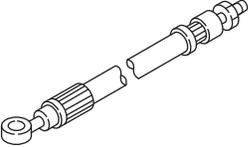
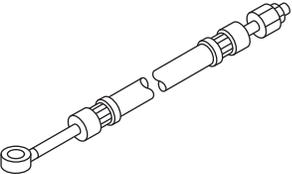
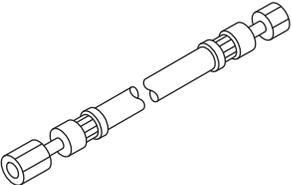
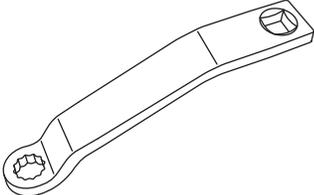
# General Description

## CONTINUOUSLY VARIABLE TRANSMISSION

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST18801AA000</p>	18801AA000	OIL PRESSURE GAUGE ASSY	Used for measuring the secondary pressure (line pressure).
 <p>ST18658AA020</p>	18658AA020	WRENCH COMPL RETAINER	Used for removing and installing the differential side retainer.
 <p>ST18681AA000</p>	18681AA000	PRESSURE GAUGE ADAPTER	Used for measuring the secondary pressure (line pressure) and transfer clutch hydraulic pressure. NOTE: Used together with the genuine O-ring (part No. 806911080).
 <p>ST18769AA000</p>	18769AA000	EXPANDER PULLEY	Used for removing and installing the secondary pulley assembly.
 <p>ST99099AJ000</p>	99099AJ000	ENGINE HANGER	<ul style="list-style-type: none"> <li>• Used for removing and installing the automatic transmission assembly.</li> <li>• Used together with CHAIN BALANCER (99099AJ010).</li> </ul>

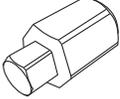
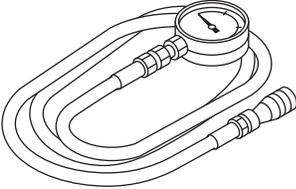
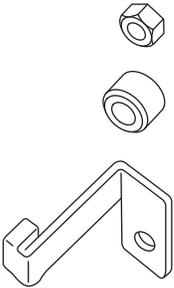
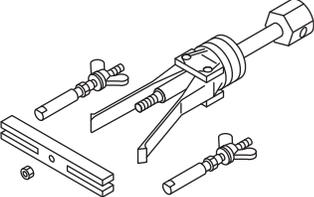
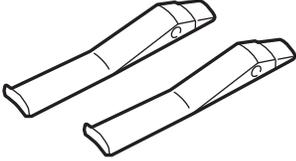
# General Description

## CONTINUOUSLY VARIABLE TRANSMISSION

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST99099AJ010</p>	99099AJ010	CHAIN BALANCER	<ul style="list-style-type: none"> <li>Used for removing and installing the automatic transmission assembly.</li> <li>Used together with ENGINE HANGER (99099AJ000).</li> </ul>
 <p>ST-498897700</p>	498897700	OIL PRESSURE ADAPTER SET	Used for measuring the secondary pressure (line pressure) hydraulic pressure.
 <p>ST34099AC020</p>	34099AC020	ADAPTER HOSE B	Used for measuring the transfer clutch hydraulic pressure. <b>NOTE:</b> Used with genuine union screw (Part No. 801914010) and gasket (Part No. 803914060).
 <p>ST34099AC010</p>	34099AC010	ADAPTER HOSE A	Used for measuring the transfer clutch hydraulic pressure.
 <p>ST73099SG000</p>	73099SG000	SPECIAL TOOL CONDENSER	Used for installing the transfer clutch pressure test plug.

# General Description

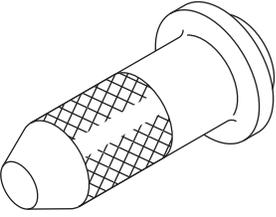
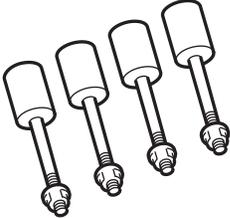
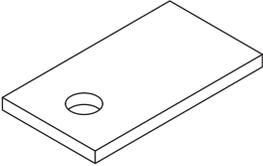
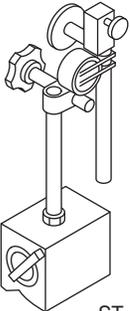
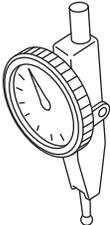
CONTINUOUSLY VARIABLE TRANSMISSION

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST18270AA040</p>	18270AA040	SOCKET	Used for installing the transfer clutch pressure test plug.
 <p>ST-498575400</p>	498575400	OIL PRESSURE GAUGE ASSY	Used for measuring the transfer clutch hydraulic pressure.
 <p>ST-498277200</p>	498277200	STOPPER SET	<ul style="list-style-type: none"> <li>• Used for removing and installing automatic transmission assembly to engine.</li> <li>• Used for preventing the torque converter from dropping off.</li> </ul>
 <p>ST-398527700</p>	398527700	PULLER ASSY	<ul style="list-style-type: none"> <li>• Used for removing the extension case oil seal.</li> <li>• Used for removing the roller bearing of the primary pulley and secondary pulley.</li> <li>• Used for removing the bearing of reduction driven gear.</li> <li>• Used for removing the differential side retainer bearing outer race.</li> </ul>
 <p>ST18760AA000</p>	18760AA000	CLAW	<ul style="list-style-type: none"> <li>• Used for removing ball bearing of front reduction driven gear.</li> <li>• Used together with PULLER ASSY (398527700).</li> </ul>

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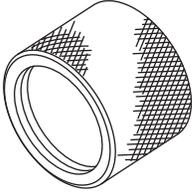
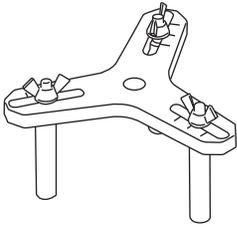
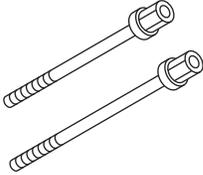
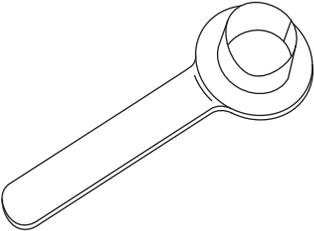
# General Description

## CONTINUOUSLY VARIABLE TRANSMISSION

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">ST-498057300</p>	498057300	INSTALLER	Used for installing the extension case oil seal.
 <p style="text-align: center;">ST18632AA000</p>	18632AA000	TRANSMISSION STAND	Used for disassembling and assembling the transmission.
 <p style="text-align: center;">ST-498255400</p>	498255400	PLATE	Used for measuring the backlash of hypoid gear.
 <p style="text-align: center;">ST-498247001</p>	498247001	MAGNET BASE	<ul style="list-style-type: none"> <li>• Used for measuring the backlash of differential bevel pinion gear.</li> <li>• Used for measuring the backlash of hypoid gear.</li> <li>• Used for measuring the clearance in forward clutch.</li> <li>• Used together with DIAL GAUGE (498247100).</li> </ul>
 <p style="text-align: center;">ST-498247100</p>	498247100	DIAL GAUGE	<ul style="list-style-type: none"> <li>• Used for measuring the backlash of differential bevel pinion gear.</li> <li>• Used for measuring the backlash of hypoid gear.</li> <li>• Used for measuring the clearance in forward clutch.</li> <li>• Used together with MAGNET BASE (498247001).</li> </ul>

# General Description

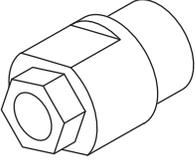
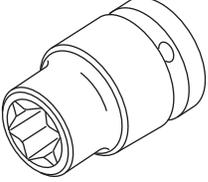
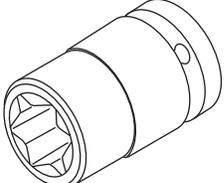
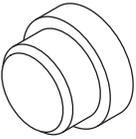
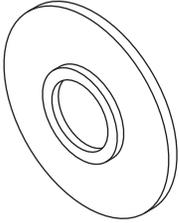
CONTINUOUSLY VARIABLE TRANSMISSION

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST18675AA000</p>	18675AA000	DIFFERENTIAL SIDE OIL SEAL INSTALLER	Used for installing the differential side retainer oil seal.
 <p>ST18762AA001</p>	18762AA001	COMPRESSOR SPECIAL TOOL	<ul style="list-style-type: none"> <li>• Used for disassembling and installing the multi-plate clutch piston for shifting.</li> <li>• COMPRESSOR SPECIAL TOOL (18762AA000) can also be used.</li> </ul>
 <p>ST18765AA000</p>	18765AA000	COMPRESSOR SUPPORT	Used for disassembling and installing the multi-plate clutch for shifting.
 <p>ST18763AA000</p>	18763AA000	COMPRESSOR SHAFT	Used for disassembling and installing the multi-plate clutch for shifting.
 <p>ST28399SA010</p>	28399SA010	OIL SEAL PROTECTOR	Used for protecting oil seal when installing front drive shaft.

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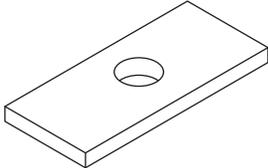
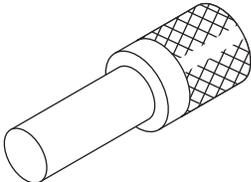
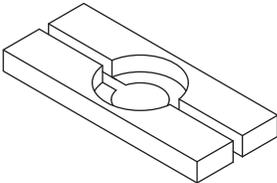
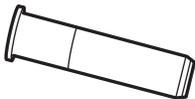
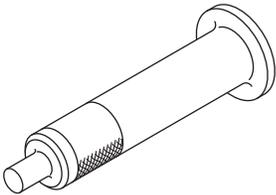
## General Description

### CONTINUOUSLY VARIABLE TRANSMISSION

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">ST18667AA010</p>	18667AA010	HOLDER	<ul style="list-style-type: none"> <li>• Used for removing and installing the drive pinion lock nut.</li> <li>• Used as a holder to rotate gear when checking tooth contact.</li> </ul>
 <p style="text-align: center;">ST18270KA010</p>	18270KA010	SOCKET (E16)	Used for removing and installing the center support COMPL.
 <p style="text-align: center;">ST18270KA020</p>	18270KA020	SOCKET (E20)	<ul style="list-style-type: none"> <li>• Used for removing and installing the hypoid driven gear.</li> <li>• Used for removing and installing the drive pinion shaft retainer.</li> </ul>
 <p style="text-align: center;">ST-398497701</p>	398497701	SEAT	Used for removing and installing the ball bearing.
 <p style="text-align: center;">ST-398177700</p>	398177700	INSTALLER	<ul style="list-style-type: none"> <li>• Used for removing and installing the ball bearing and tapered roller bearing.</li> <li>• Used for installing the parking gear.</li> </ul>

# General Description

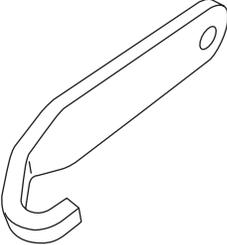
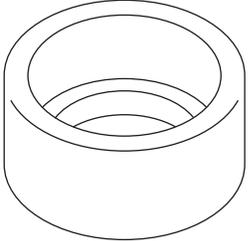
CONTINUOUSLY VARIABLE TRANSMISSION

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST-398643600</p>	398643600	GAUGE	Used for measuring the total end play, extension end play and drive pinion height.
 <p>ST-899864100</p>	899864100	REMOVER	Used for removing and installing the ball bearing.
 <p>ST-498077000</p>	498077000	REMOVER	<ul style="list-style-type: none"> <li>• Used for removing ball bearing of front reduction drive gear.</li> <li>• Used for removing the inner bearing inner race of the drive pinion shaft.</li> <li>• Used for removing the differential taper roller bearing.</li> </ul>
 <p>ST18657AA010</p>	18657AA010	INSTALLER	Used for installing the oil seal of inhibitor switch.
 <p>ST18657AA020</p>	18657AA020	OIL SEAL INSTALLER	Used for installing the oil seal.

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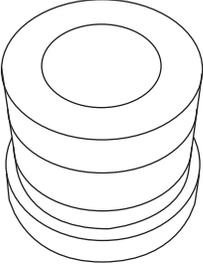
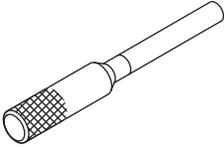
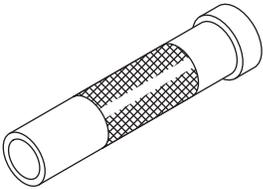
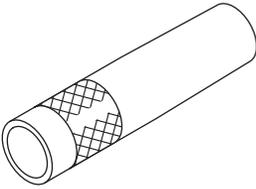
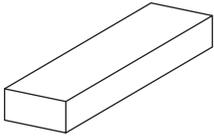
## General Description

### CONTINUOUSLY VARIABLE TRANSMISSION

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">ST18621AA000</p>	18621AA000	ADAPTER WRENCH	Used for removing and installing the drive pinion shaft lock nut.
 <p style="text-align: center;">ST18651AA000</p>	18651AA000	INSTALLER	Used for installing the bearing of front reduction drive gear.
 <p style="text-align: center;">ST18720AA000</p>	18720AA000	REMOVER	Used for removing ball bearing of reduction driven gear.
 <p style="text-align: center;">ST-498497300</p>	498497300	CRANKSHAFT STOPPER	Used for stopping the drive plate rotation when removing and installing the drive plate.
 <p style="text-align: center;">ST20299AG010</p>	20299AG010	BASE	Used for installing the bearing on primary pulley side.

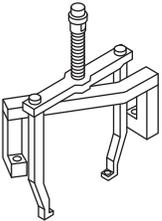
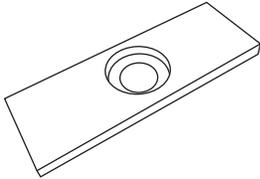
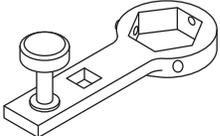
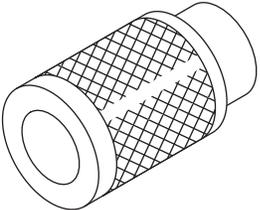
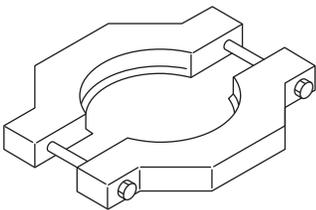
# General Description

## CONTINUOUSLY VARIABLE TRANSMISSION

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST-399513600</p>	399513600	INSTALLER	<ul style="list-style-type: none"> <li>• Used for removing the ball bearing of the rear drive shaft.</li> <li>• Used for removing the bearing of the oil pump chain sprocket.</li> </ul>
 <p>ST-499267300</p>	499267300	STOPPER PIN	Used for adjusting the inhibitor switch.
 <p>ST-499277100</p>	499277100	BUSHING 1-2 INSTALLER	<ul style="list-style-type: none"> <li>• Used for installing the front differential taper roller bearing.</li> <li>• Used for removing and installing the transfer reduction drive gear.</li> <li>• Used for installing the ball bearing of the transfer reduction drive gear.</li> <li>• Used for installing the oil seal.</li> <li>• Used for installing the ball bearing of the transfer reduction driven gear.</li> </ul>
 <p>ST-499277200</p>	499277200	INSTALLER	<ul style="list-style-type: none"> <li>• Used for installing the inner bearing inner race of drive pinion shaft.</li> <li>• Used for installing the reduction driven gear.</li> </ul>
 <p>ST-499575400</p>	499575400	GAUGE	Used for measuring height of end play.

# General Description

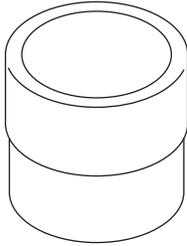
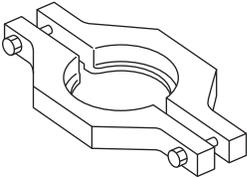
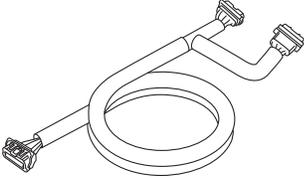
## CONTINUOUSLY VARIABLE TRANSMISSION

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST-499737100</p>	499737100	PULLER SET	<ul style="list-style-type: none"> <li>• Used for measuring height of forward clutch.</li> <li>• Used for measuring the transfer end play.</li> <li>• Use the rack only.</li> </ul>
 <p>ST-499575600</p>	499575600	GAUGE	<ul style="list-style-type: none"> <li>• Used for measuring height of forward clutch.</li> <li>• Used for measuring height of end play.</li> </ul>
 <p>ST-499787700</p>	499787700	WRENCH	Used for measuring the differential pinion shaft backlash.
 <p>ST-499757002</p>	499757002	INSTALLER	Used for installing the bearing of front reduction driven gear.
 <p>ST18767AA000</p>	18767AA000	BEARING REMOVER	<ul style="list-style-type: none"> <li>• Used for removing the transfer reduction drive gear.</li> <li>• Used for removing the reduction driven gear bearing retainer.</li> </ul>

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# General Description

CONTINUOUSLY VARIABLE TRANSMISSION

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST-499755602</p>	499755602	PRESS SNAP RING	<ul style="list-style-type: none"> <li>Used for installing the oil seal.</li> <li>Used for installing the ball bearing and roller bearing.</li> </ul>
 <p>ST-498077600</p>	498077600	REMOVER	<ul style="list-style-type: none"> <li>Used for removing the ball bearing of the rear drive shaft.</li> <li>Used for removing the ball bearing of transfer reduction driven gear.</li> <li>Used for removing ball bearing of reduction driven gear.</li> <li>Used for removing the ball bearing of drive sprocket.</li> </ul>
 <p>ST18460AA040</p>	18460AA040	CHECK BOARD	Used for measuring TCM terminal voltage and resistance.
 <p>STSSM4</p>	—	SUBARU SELECT MONITOR 4	Used for setting of each function and troubleshooting for electrical system. <b>NOTE:</b> For detailed operation procedures of Subaru Select Monitor 4, refer to “Application help”.

## 2. GENERAL TOOL

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance, voltage and current.
Thickness gauge	Used for the clearance in reverse brake, transfer clutch and input clutch.
Caliper	Used for measuring the clearance at the parts.
Spring scale	Used for measuring the starting torque of the drive pinion.
TORX® bit T70	Used for removing and installing differential gear oil drain plug.
Straight pin remover	Used for removing and installing the spring pin.

## General Description

### CONTINUOUSLY VARIABLE TRANSMISSION

TOOL NAME	REMARKS
Deep socket	Used for removing and installing the secondary pressure sensor. NOTE: Use Ko-ken 3/8 12-point 27 mm (manufacturer product No. 3305M-27).
Push/pull gauge	Used for measuring clutch clearance.
Angle gauge	<ul style="list-style-type: none"><li>• Used for installing the hypoid driven gear.</li><li>• Used for installing the drive plate.</li></ul>
Chain sling	Used for removing and installing transmission. <ul style="list-style-type: none"><li>• Length: 0.8 — 1 m (2.6 — 3.3 ft)</li><li>• Load capacity: 1.2 t (2646 lb) or more</li><li>• Diameter: 6 mm (0.24 in) or 6.3 mm (0.25 in)</li><li>• Chain external width: 23.5 mm (0.93 in) or less</li><li>• Chain internal width: 8.5 mm (0.33 in) or more</li></ul>
Screw shackle	Used for removing and installing transmission. <ul style="list-style-type: none"><li>• Load capacity: 250 kg (551 lb) or more</li><li>• Use two pieces.</li></ul>
DST-i	Used together with Subaru Select Monitor 4.

## 2. CVTF

### A: INSPECTION

Check for leakage of CVTF from transmission.

### B: ADJUSTMENT

#### CAUTION:

- CVTF level changes along with CVTF temperature. When inspecting CVTF level, observe the specified CVTF temperature.

- Always use specified CVTF. Using other fluid will cause malfunction.

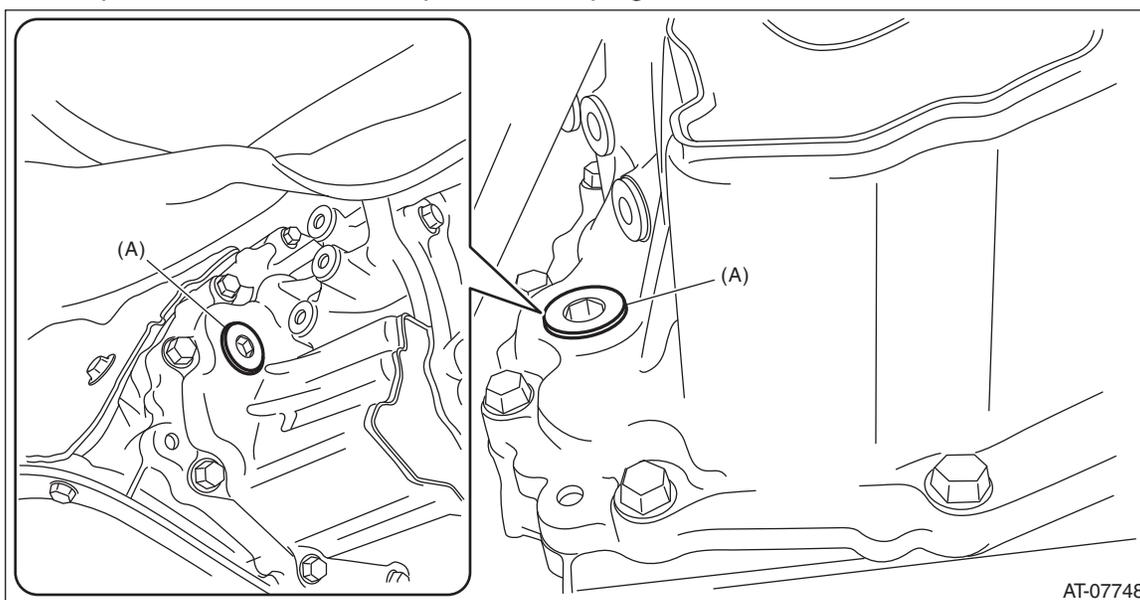
- 1) Idle the engine to raise CVTF temperature to 35 — 45°C (95 — 113°F) on Subaru Select Monitor.
- 2) Operate the select lever in P → R → N → D and D → N → R → P to circulate CVTF with the engine idling.
- 3) With the engine running, lift up the vehicle and remove the filler plug.

#### CAUTION:

Pay special attention to the following operations as the engine is at idle.

#### NOTE:

CVTF is at the specified level when it is up to the filler plug hole lower section.



(A) Filler plug

- 4) When there is no CVTF leakage from the transmission, add the specified fluid up to the filler plug hole lower section.

#### Specified fluid:

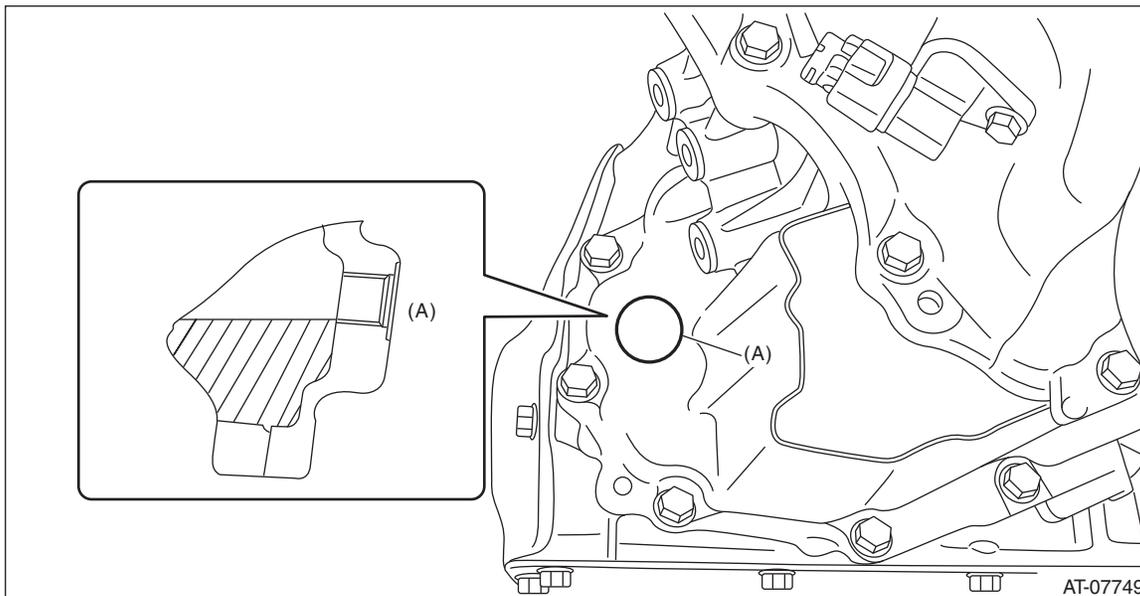
<Ref. to CVT(TR690)-4, HYDRAULIC CONTROL AND LUBRICATION, SPECIFICATION, General Description.>

# CVTF

## CONTINUOUSLY VARIABLE TRANSMISSION

### CAUTION:

Note that when CVTF is added up to the lower section of filler plug while the transmission is in cold condition, overfilling of CVTF occurs, causing the oil to spill out.



(A) Filler plug hole

5) Install the filler plug.

### NOTE:

Use a new gasket.

### *Tightening torque:*

*50 N·m (5.1 kgf-m, 36.9 ft-lb)*

## C: REPLACEMENT

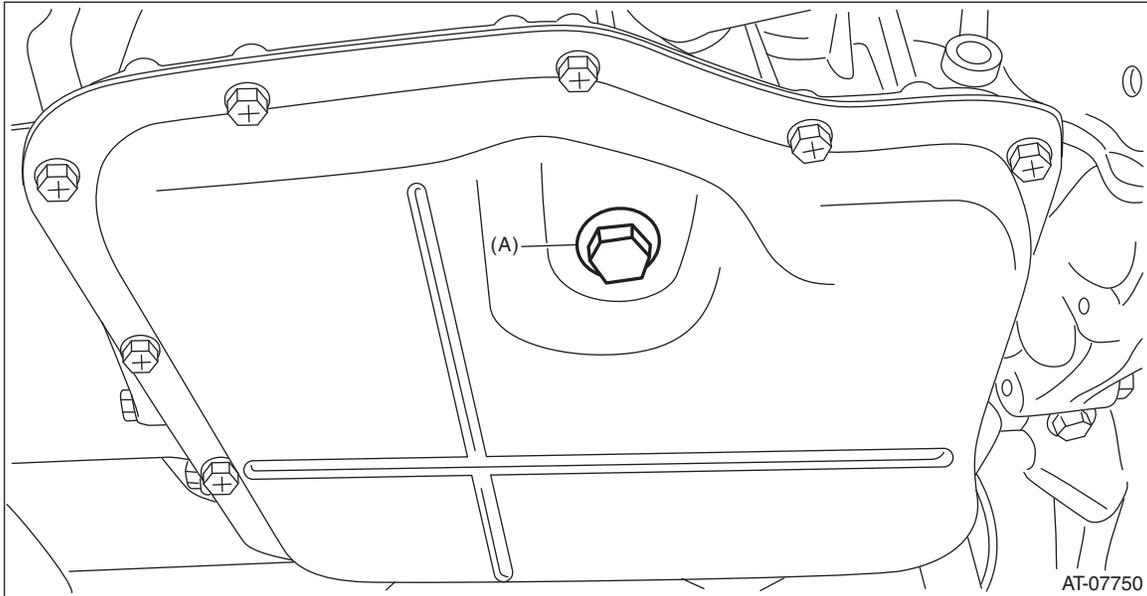
### CAUTION:

- Directly after the vehicle has been running or the engine has been idling for a long time, the CVTF is hot. Be careful not to burn yourself.
- Be careful not to spill the CVTF on exhaust pipe to prevent it from emitting smoke or causing fires. If CVTF adheres, wipe it off completely.
- Always use specified CVTF. Using other fluid will cause malfunction.

# CVTF

## CONTINUOUSLY VARIABLE TRANSMISSION

- 1) Lift up the vehicle, and remove the CVTF drain plug.



(A) CVTF drain plug

- 2) Check the CVTF condition. <Ref. to CVT(TR690)-42, CONDITION CHECK, CVTF.>
- 3) Install the CVTF drain plug and gasket.

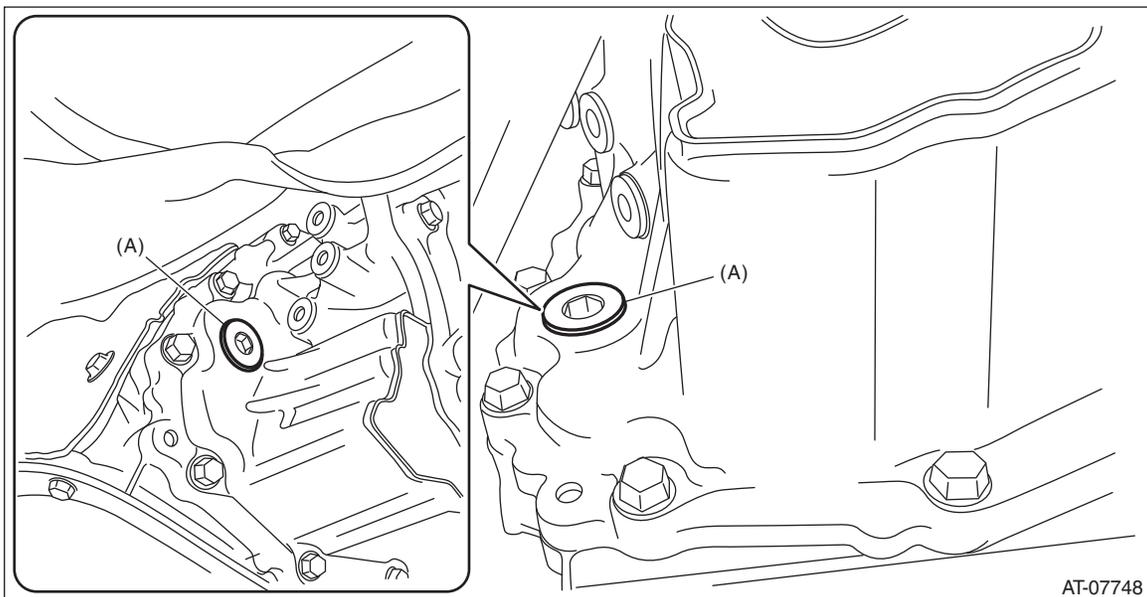
**NOTE:**

Use a new gasket.

**Tightening torque:**

**39.2 N·m (4.0 kgf·m, 28.9 ft·lb)**

- 4) Remove the filler plug.



(A) Filler plug

- 5) Add the specified fluid up to the filler plug hole lower section.

**Specified fluid:**

<Ref. to CVT(TR690)-4, HYDRAULIC CONTROL AND LUBRICATION, SPECIFICATION, General Description.>

# CVTF

## CONTINUOUSLY VARIABLE TRANSMISSION

- 6) Temporarily tighten the filler plug.
- 7) Idle the engine to raise CVTF temperature to 35 — 45°C (95 — 113°F) on Subaru Select Monitor.
- 8) Operate the select lever in P → R → N → D and D → N → R → P to circulate CVTF with the engine idling.

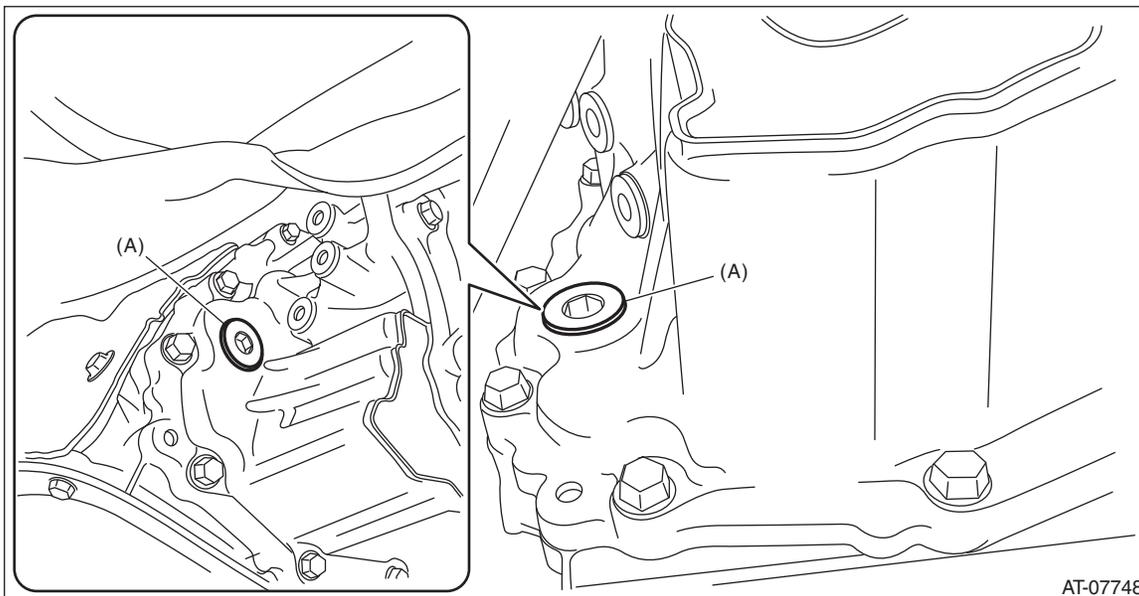
### CAUTION:

**Pay special attention to the following operations as the engine is at idle.**

- 9) Place the select lever in “P” range. Then lift up the vehicle with the engine at idle to adjust the CVTF level and check for leakage. <Ref. to CVT(TR690)-39, ADJUSTMENT, CVTF.>
- 10) Replace with a new gasket, and attach the filler plug.

### Tightening torque:

**50 N·m (5.1 kgf·m, 36.9 ft·lb)**



(A) Filler plug

## D: CONDITION CHECK

### NOTE:

When replacing CVTF, determine the condition inside the transmission body by inspecting the drained CVTF.

Fluid condition	Trouble and possible cause	Corrective action
Metal particles.	Excessive wear of the internal of the transmission body.	Replace CVTF and check if CVT operates correctly.
Thick and varnish-form fluid.	Burnt clutches	Replace CVTF and check the CVT body or vehicle for faulty.
Clouded CVTF or bubbles.	Water mixed in fluid.	Replace CVTF and check the water entering point.

## 3. Differential Gear Oil

### A: INSPECTION

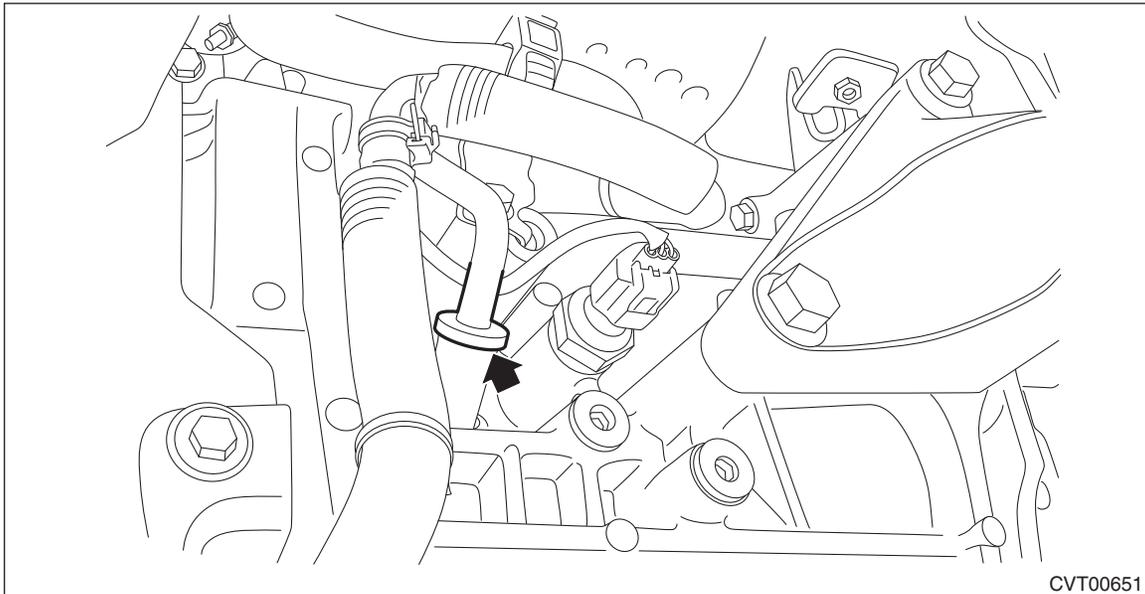
Check that there is no leakage of differential gear oil from the converter case.

### B: ADJUSTMENT

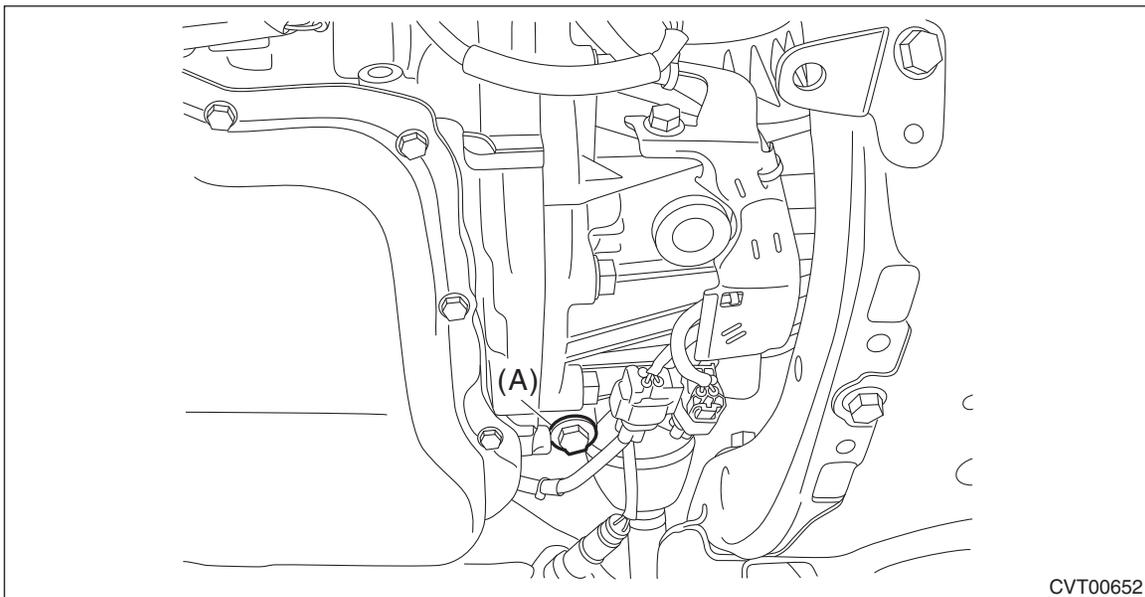
#### NOTE:

Immediately after removing the overflow drain plug, remaining gear oil (approx. 8 cc) may come out of the overflow pipe. This is not included in the specified amount. When removing the overflow drain plug, make sure the gear oil flows out of the overflow drain plug hole by filling with gear oil.

- 1) Lift up the vehicle.
- 2) Remove the front under cover. <Ref. to EI-27, REMOVAL, Front Under Cover.>
- 3) Remove the oil charge pipe cap.



- 4) Remove the overflow drain plug.



(A) Overflow drain plug

- 5) Fill in the differential gear oil through the charge pipe up to where the oil flows out of the overflow drain plug.

# Differential Gear Oil

CONTINUOUSLY VARIABLE TRANSMISSION

## **Recommended gear oil:**

<Ref. to CVT(TR690)-4, FRONT DIFFERENTIAL GEAR OIL, SPECIFICATION, General Description.>

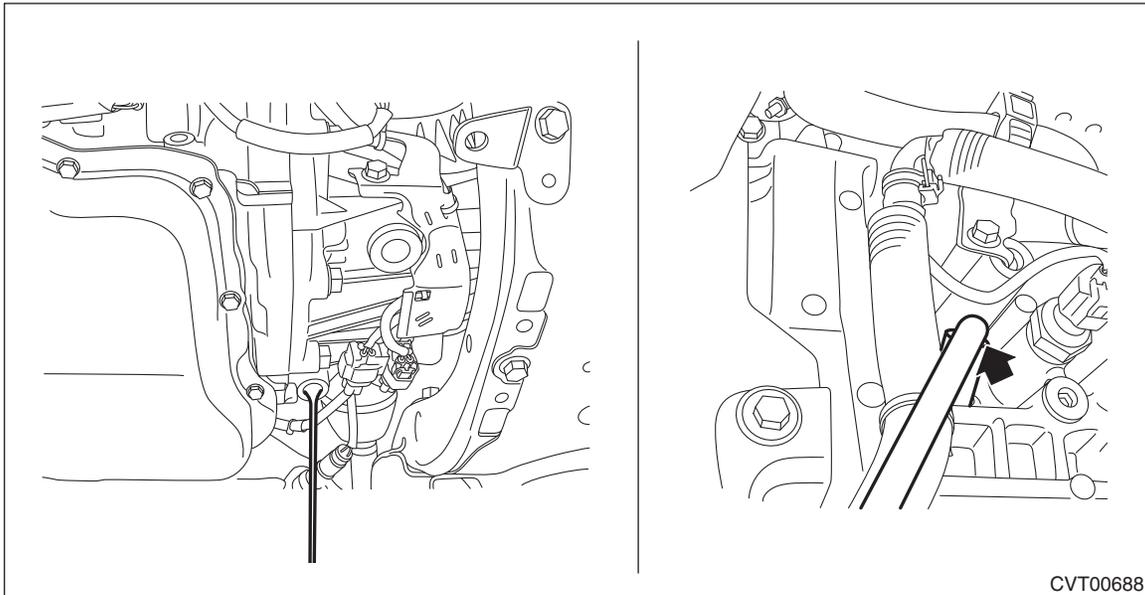
6) When the flow of the differential gear oil turns into a narrow stream, install the overflow drain plug.

## **NOTE:**

Use a new gasket.

## **Tightening torque:**

**35 N·m (3.6 kgf·m, 25.8 ft·lb)**



7) Install the oil charge pipe cap.

## **C: REPLACEMENT**

### **CAUTION:**

- Immediately after the vehicle has been running or after idling for a long time, the differential gear oil will be hot. Be careful not to burn yourself.
- Be careful not to spill differential gear oil on the exhaust pipe to prevent it from emitting smoke or causing a fire. If gear oil adheres, wipe it off completely.

- 1) Lift up the vehicle.
- 2) Remove the differential gear oil drain plug using TORX<sup>®</sup> bit T70. Drain differential gear oil.
- 3) Install the differential gear oil drain plug using TORX<sup>®</sup> bit T70.

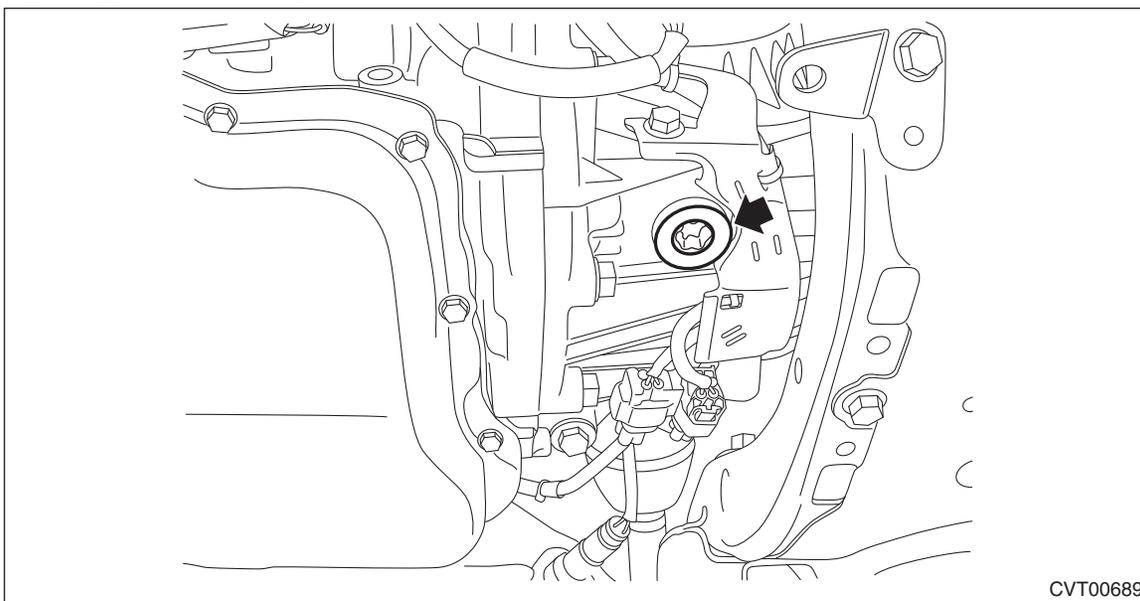
## **NOTE:**

Use a new gasket.

# Differential Gear Oil

CONTINUOUSLY VARIABLE TRANSMISSION

**Tightening torque:**  
**70 N·m (7.1 kgf·m, 51.6 ft·lb)**



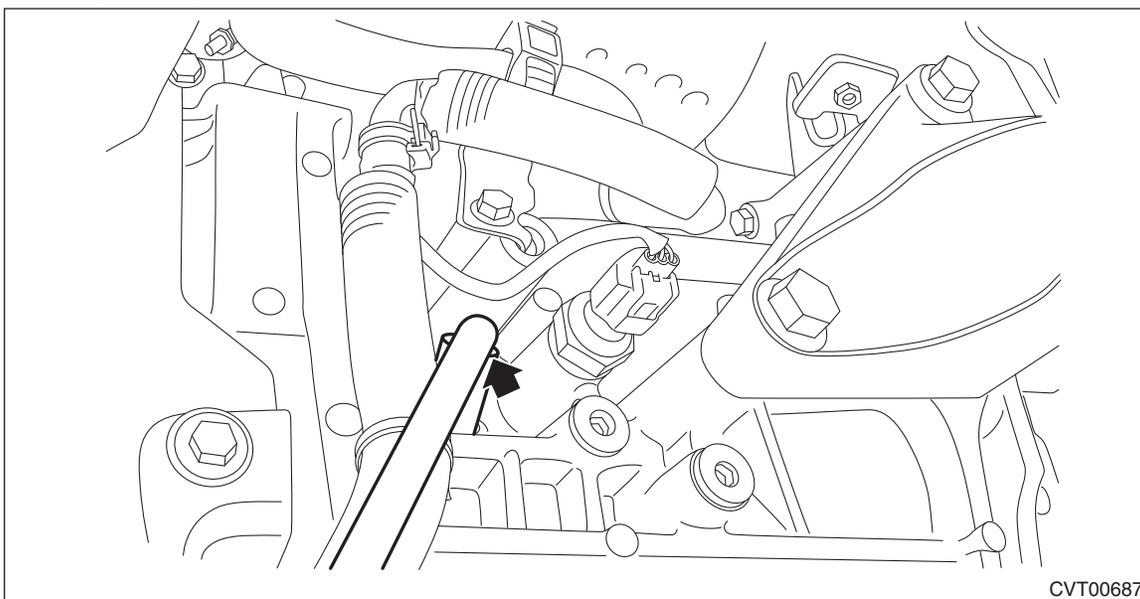
4) Pour gear oil from the charge pipe.

**Recommended gear oil:**

**<Ref. to CVT(TR690)-4, FRONT DIFFERENTIAL GEAR OIL, SPECIFICATION, General Description.>**

**Gear oil capacity:**

**<Ref. to CVT(TR690)-4, FRONT DIFFERENTIAL GEAR OIL, SPECIFICATION, General Description.>**



5) Adjust the level of differential gear oil. <Ref. to CVT(TR690)-43, ADJUSTMENT, Differential Gear Oil.>

# Variator Chain Break-in

CONTINUOUSLY VARIABLE TRANSMISSION

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## 4. Variator Chain Break-in

### A: GENERAL DESCRIPTION

Perform Variator Chain Break-in when the following work has been performed.

- Variator chain replacement
- Primary pulley and secondary pulley replacement

### B: PROCEDURE

NOTE:

- During variator chain break-in, VDC warning light illuminate because of the difference between the vehicle speed value and G sensor value. This is not a malfunction. If the warning light illuminates, clear the VDC memory after the variator chain break-in is finished. <Ref. to VDC(diag)-26, Clear Memory Mode.>
- If the above malfunction code is detected during variator chain break-in, the system enters into fail mode, and the vehicle shows symptom such as engine speed rapid increases even if the accelerator pedal is gradually depressed.

1) Lift up the vehicle.

**CAUTION:**

**Lift up the vehicle until the tire bottom is 0.3 m (0.98 ft) or more above the ground.**

2) Shift the select lever to “P” or “N” range.

3) Apply the electronic parking brake.

4) Connect the Subaru Select Monitor to data link connector.

5) Idle the engine to raise the CVTF temperature to 40 — 50°C (104 — 122°F) displayed on the Subaru Select Monitor.

NOTE:

When CVTF temperature does not rise easily or if you want to rise CVTF temperature faster, maintain the engine speed within 2,000 — 2,500 r/min at “P” or “N” range to raise the CVTF temperature.

6) With the select lever in “P” or “N” range, increase the engine speed to 3,000 — 3,500 r/min from the idling condition, and maintain the speed for approximately five seconds, then release the accelerator pedal.

7) Depress the accelerator pedal gradually again from idling condition to increase the engine speed to 3,000 — 3,500 r/min, maintain the speed for approximately five seconds, then release the accelerator pedal.

8) Release the electronic parking brake.

9) Shift the select lever into manual mode and set to 1st.

10) Depress the accelerator pedal gradually, and increase the engine speed to 5,300 r/min from engine idling condition.

NOTE:

Increase the engine speed while taking care that the engine speed does not become too high.

11) Release the accelerator pedal to fully closed position to lower the engine speed to 4,000 r/min.

12) Depress the accelerator pedal gradually again, and increase the engine speed to 5,300 r/min.

13) Repeat the steps 11) and 12) for 40 times.

14) Release the accelerator pedal to return the engine speed to idling.

15) Shift the select lever to “P” range, and then turn the engine to OFF.

## 5. AWD ON/OFF Switching Mode

### A: GENERAL DESCRIPTION

- Follow the messages displayed on the Subaru Select Monitor when working.
- Perform as necessary in FWD mode.
- When switched to FWD, AWD light illuminates.

### B: PROCEDURE

#### CAUTION:

- **Do not turn the power of the Subaru Select Monitor OFF during work, and do not disconnect the data link connector.**

- **On completing the work in FWD, switch back in AWD.**

- 1) Shift the select lever to “P” range.
- 2) Connect the Subaru Select Monitor to data link connector.
- 3) Turn the ignition switch to ON. (For model with push button start, press the push button ignition switch twice without depressing brake pedal.)
- 4) Turn off all switches causing an electrical load, such as headlights, A/C, seat heater and rear defogger.
- 5) Select «Diagnosis» in the «Start» screen of Subaru Select Monitor.
- 6) On «Vehicle selection» display, input the vehicle information and select «Confirmed».
- 7) On «Main Menu» display, select «Each System».
- 8) On «Select System» display, select «Transmission Control System».
- 9) On «Select Function» display, select «Work Support».
- 10) Select «AWD ON/OFF switching mode» in the «Work Support» screen.
- 11) Follow the messages displayed on the Subaru Select Monitor screen when working.

Switching completes successfully if any of the following messages is displayed.

- When switching from AWD to FWD: «Switched to FF. To return to AWD, perform basic mode again.»
- When switching from FWD to AWD: «Switched to AWD. To return to FF, perform basic mode again.»

#### NOTE:

- If communication error occurs during switching mode, start in the “AWD ON/OFF switching mode” again.
- If operation is interrupted before the successful end message is displayed, perform the «AWD ON/OFF switching mode» from the beginning until confirming the operation is successfully ended. If this mode fails to complete successfully, the cause is as follows.
  - Select lever is not in “P” range.
  - Engine is running.
- For detailed operation procedures, refer to “Application help”.

## 6. Road Test

### A: INSPECTION

NOTE:

Turn OFF the X mode switch and perform inspection.

#### 1. GENERAL PRECAUTION

Road tests should be conducted to properly diagnose the condition of CVT.

**CAUTION:**

**Always observe the local traffic laws when performing the test.**

#### 2. D RANGE SHIFT FUNCTION

Make sure that the engine speed is 1,100 — 1,300 r/min while driving on the level road at 50 km/h (31 MPH) after accelerating from halting to 1/4 of accelerator opening angle. Then stop the vehicle. Check normal gear change has occurred while the vehicle speed changes from a constant speed to zero.

#### 3. KICK-DOWN FUNCTION

Check if engine speed will rise by operating the accelerator opening angle to the full from a constant speed of 50 km/h (31 MPH) or more.

#### 4. ENGINE BRAKE OPERATION

Check down shifting operation, engine braking, and indicators inside the meters.

- Drive in “6th speed of manual mode” [70 — 80 km/h (43 — 50 MPH)], and shift down from 6th to 5th. Check if the indicator of combination meter switches “6” → “5”. At the same time, check the engine brake in 5th gear.
- Drive in “5th speed of manual mode” [60 — 70 km/h (37 — 43 MPH)], and shift down from 5th to 4th. Check if the indicator of combination meter switches “5” → “4”. At the same time, check the engine brake in 4th gear.
- Drive in “4th speed of manual mode” [50 — 60 km/h (31 — 37 MPH)], and shift down from 4th to 3rd. Check if the indicator of combination meter switches “4” → “3”. At the same time, check the engine brake in 3rd gear.
- Drive in “3rd speed of manual mode” [30 — 40 km/h (19 — 25 MPH)], and shift down from 3rd to 2nd. Check if the indicator of combination meter switches “3” → “2”. At the same time, check the engine brake in 2nd gear.
- Drive in “2nd speed of manual mode” [20 — 30 km/h (12 — 19 MPH)], and shift down from 2nd to 1st. Check if the indicator of combination meter switches “2” → “1”. At the same time, check the engine brake in 1st gear.

#### 5. LOCK-UP FUNCTION

When the accelerator is lightly depressed while driving on a flat road in “D” range, check that rpm does not change abruptly.

#### 6. P RANGE OPERATION

Stop the vehicle on an uphill grade of 5% or more and shift to the “P” range and apply the electronic parking brake. Check that the vehicle does not move when the parking brake is released.

#### 7. NOISE AND VIBRATION

Check for noise and vibration during driving at a constant speed, accelerating, decelerating and manual shift operation.

#### 8. OIL LEAKAGE

After the driving test, inspect for leakage of CVTF and differential gear oil from the transmission body.

## 7. Stall Test

### A: INSPECTION

#### CAUTION:

**Make sure no other person is around the vehicle during stall test measurement.**

#### NOTE:

Stall test is extremely important in diagnosing the condition of CVT and engine. The test is necessary to measure the engine stall speeds in “R” and “D” range.

Purposes of the stall test:

- Operational check of forward clutch and reverse brake
  - Operational check of the torque converter assembly
  - Engine performance check
- 1) Place wheel chocks at the front and rear of all wheels and engage the electronic parking brake.
  - 2) Turn the A/C OFF.
  - 3) Using the Subaru Select Monitor, check if the throttle valve operates when you depress the accelerator pedal. <Ref. to EN(H6DO)(diag)-53, OPERATION, Subaru Select Monitor.>
  - 4) Check the engine oil level. <Ref. to LU(H6DO)-10, INSPECTION, Engine Oil.>
  - 5) Check the coolant level. <Ref. to CO(H6DO)-13, INSPECTION, Engine Coolant.>
  - 6) Adjust the CVTF level. <Ref. to CVT(TR690)-39, ADJUSTMENT, CVTF.>
  - 7) Increase the CVTF temperature to 60 — 80°C (140 — 176°F) by idling the engine with the select lever shifted to “N” or “P” range.
  - 8) Hold down the pre-collision brake OFF switch to turn OFF the pre-collision brake. (With EyeSight)
  - 9) Shift the select lever to “D” range.
  - 10) Depress the accelerator pedal to the full while fully depressing the foot brake pedal with your left foot.
  - 11) When the engine speed stabilizes, quickly record the engine speed and release accelerator pedal. Shift the select lever to “N” range. Let the engine idle for one minute or more to cool it down.
  - 12) Shift to “R” range and perform the same stall test.

#### NOTE:

- Do not perform a stall test for over 5 seconds at a time. (From closed throttle, fully open throttle to stall speed reading.) Failure to follow this instruction will cause the engine oil and CVTF to deteriorate and the clutch and brake to be adversely affected.
- Be sure to cool down the engine for at least one minute after each stall test with the select lever set in the “P” or “N” range and with the idle speed of 1,200 r/min or less.
- If the stall speed is higher than the specified range, attempt to finish the stall test in as short a time as possible, in order to prevent the CVT from sustaining damage.

#### **Stall speed standard:**

**1,870 — 2,900 r/min (D range)**

**1,750 — 2,750 r/min (R range)**

# Stall Test

## CONTINUOUSLY VARIABLE TRANSMISSION

### Stall test judgment

Range	Range	Probable cause
Lower than standard value	D, R	<ul style="list-style-type: none"><li>• Throttle valve is not fully open.</li><li>• Insufficient engine output</li><li>• Torque converter malfunction</li></ul>
Higher than standard value	D	<ul style="list-style-type: none"><li>• Forward clutch slippage</li><li>• Secondary pressure (line pressure) is low.</li><li>• Variator chain malfunction</li><li>• Input clutch slippage</li></ul>
	R	<ul style="list-style-type: none"><li>• Reverse brake slippage</li><li>• Secondary pressure (line pressure) is low.</li><li>• Variator chain malfunction</li><li>• Input clutch slippage</li></ul>
	D, R	<ul style="list-style-type: none"><li>• Torque converter malfunction</li><li>• Control valve body malfunction</li><li>• TCM malfunction</li><li>• Damaged harness and harness connector</li></ul>

## 8. Time Lag Test

### A: INSPECTION

#### NOTE:

When the select lever is shifted while the engine is idling, there will be a certain time elapse or lag before shock is felt. This symptom helps to check the condition of forward clutch and reverse brake.

- Perform the test at normal operation CVTF temperature of 60 — 80°C (140 — 176°F).
- Be sure to allow one minute or more interval between tests.
- Make three measurements and take the average value.

1) Apply the electronic parking brake.

2) Start the engine. Check the idle speed. (A/C OFF)

3) Shift the select lever from “N” to “D” range. Using a stop watch, measure the time elapsed from shifting the lever until the shock is felt.

#### ***Time lag standard:***

##### ***1.2 seconds or less***

If “N” → “D” time lag is longer than specified:

- Secondary pressure (line pressure) is too low.
- Forward clutch worn
- Piston malfunction
- Control valve body malfunction
- Learning incomplete

4) In the same manner, measure the time lag when shifting from “N” range to “R” range.

#### ***Time lag standard:***

##### ***1.5 seconds or less***

If “N” → “R” time lag is longer than specified:

- Secondary pressure (line pressure) is too low.
- Reverse brake worn
- Piston malfunction
- Control valve body malfunction
- Learning incomplete

## Secondary Pressure (Line Pressure) Test

CONTINUOUSLY VARIABLE TRANSMISSION

### 9. Secondary Pressure (Line Pressure) Test

#### A: INSPECTION

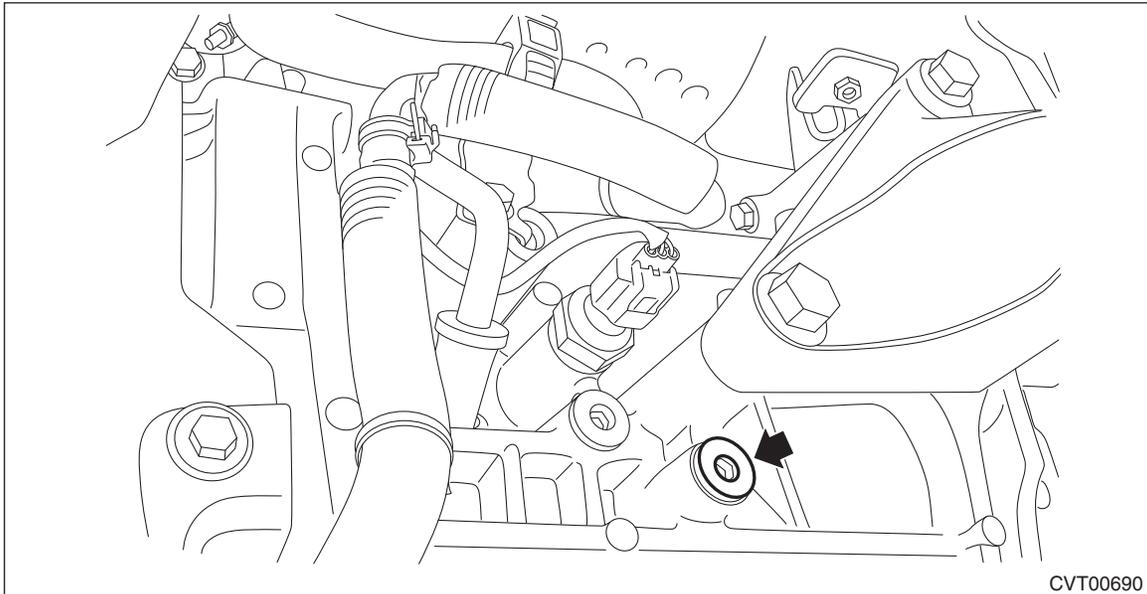
##### CAUTION:

- Directly after the vehicle has been running or the engine has been idling for a long time, the CVTF is hot. Be careful not to burn yourself.
- Make sure no other person is around the vehicle during secondary pressure (line pressure) test measurement.
- After performing the secondary pressure (line pressure) test measurement, adjust the CVTF level.

##### NOTE:

- If the pulley and variator chain, clutch or brake show signs of slipping or shift feel is not correct, check the secondary pressure (line pressure).
- Connect Subaru Select Monitor to vehicle so as to measure the engine speed and actual secondary pressure (secondary pressure (line pressure)).
- In many cases, slippage or inability to operate the vehicle may be due to insufficient oil pressure for the operation of clutch, brake or control valve.

- 1) Remove the front wheel RH. <Ref. to WT-6, REMOVAL, Tire and Wheel.>
- 2) Lift up the vehicle.
- 3) Remove the test plug for secondary pressure (line pressure).



- 4) Attach ST1, ST2 and ST3 to transmission.

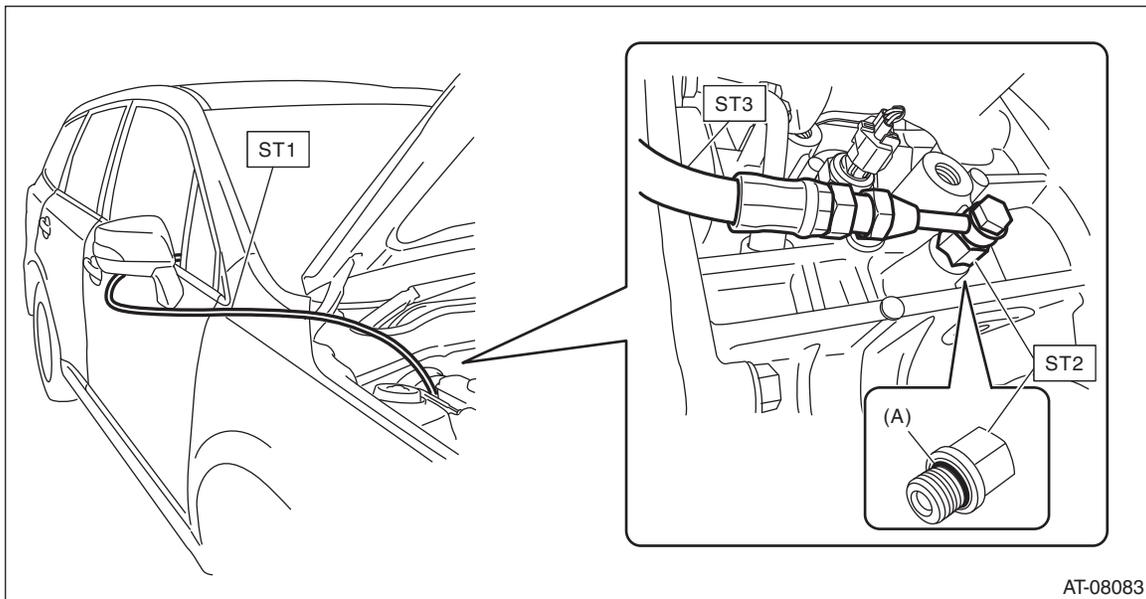
ST1 18801AA000 OIL PRESSURE GAUGE ASSY  
ST2 18681AA000 PRESSURE GAUGE ADAPTER  
ST3 498897700 OIL PRESSURE ADAPTER SET

## Secondary Pressure (Line Pressure) Test

CONTINUOUSLY VARIABLE TRANSMISSION

### NOTE:

Use ST2 PRESSURE GAUGE ADAPTER with genuine O-ring (Part No. 806911080) attached.



(A) O-ring (genuine part)

- 5) Lower the vehicle.
- 6) Set the gauge so that it can be seen from the driver's seat.
- 7) Install the front wheel RH. <Ref. to WT-6, INSTALLATION, Tire and Wheel.>
- 8) Using the Subaru Select Monitor, check if the throttle valve operates when you depress the accelerator pedal. <Ref. to EN(H6DO)(diag)-53, OPERATION, Subaru Select Monitor.>
- 9) Check the engine oil level. <Ref. to LU(H6DO)-10, INSPECTION, Engine Oil.>
- 10) Check the coolant level. <Ref. to CO(H6DO)-13, INSPECTION, Engine Coolant.>
- 11) Adjust the CVTF level. <Ref. to CVT(TR690)-39, ADJUSTMENT, CVTF.>
- 12) Increase the CVTF temperature to 60 — 80°C (140 — 176°F) by idling the engine with the select lever shifted to "N" or "P" range.
- 13) Hold down the pre-collision brake OFF switch to turn OFF the pre-collision brake. (With EyeSight)
- 14) Shift the select lever to "D" range.
- 15) Depress the accelerator pedal to the full while fully depressing the foot brake pedal with your left foot.
- 16) Immediately after the engine speed becomes steady, record the reading of the secondary pressure (line pressure), engine speed and actual secondary pressure on Subaru Select Monitor. And then release the accelerator pedal. Shift the select lever to "N" range. Let the engine idle for one minute or more to cool it down.

### NOTE:

- Do not continue the stall test for 5 seconds or more at a time (from fully closed throttle, fully open throttle to secondary pressure (line pressure) reading). Failure to follow this instruction will cause the engine oil and CVTF to deteriorate and the clutch and brake to be adversely affected.
- After performing the secondary pressure (line pressure) test, be sure to cool down the engine for at least one minute with the select lever set in "P" or "N" range and with the idle speed at 1,200 r/min or less.
- Under each condition, check that the measured pressure matches almost totally with actual secondary pressure.
- When both measured pressure and actual secondary pressure are out of specification, judge as control valve malfunction.
- The value at stall is for reference because the pressure changes under different conditions or circumstances.

## Secondary Pressure (Line Pressure) Test

### CONTINUOUSLY VARIABLE TRANSMISSION

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- The value at idling is steady because it is not affected by any condition or circumstance.

Secondary pressure (line pressure) standard				
	Range	Throttle	Brake	Secondary pressure (line pressure) (MPa (kgf/cm <sup>2</sup> , psi))
Stall	D, R	Full open	ON	4.5 — 6 (45.9 — 61.2, 652 — 870)
Idling	P, N	Full closed	OFF	0.5 — 1.5 (5.1 — 15.3, 72 — 218)

17) Remove the ST and install the plug after measurement.

#### NOTE:

- Use new O-rings.
- Apply CVTF to the O-rings.

#### **Tightening torque:**

**25 N·m (2.5 kgf·m, 18.4 ft·lb)**

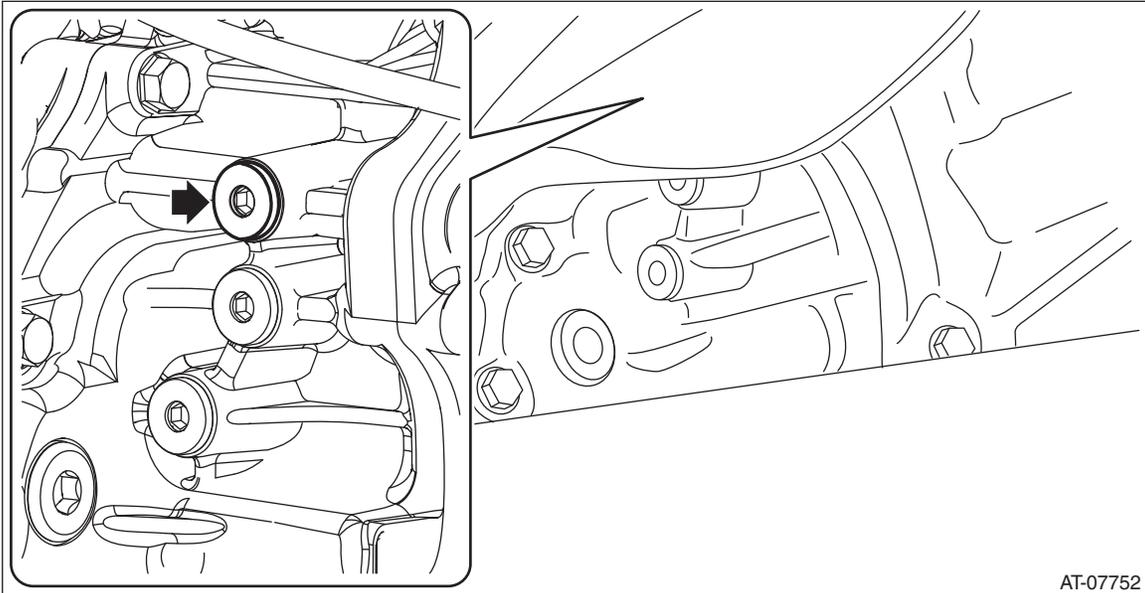
# Transfer Clutch Pressure Test

CONTINUOUSLY VARIABLE TRANSMISSION

## 10. Transfer Clutch Pressure Test

### A: INSPECTION

- 1) Lift up the vehicle.
- 2) Remove the test plug.



- 3) Set the ST1, ST2, ST3 and ST4 to the transmission.

#### **CAUTION:**

**Be careful when setting tools so that the hoses do not touch the exhaust pipes.**

#### **NOTE:**

- Use ST1 ADAPTER HOSE B with genuine union screw (Part No. 801914010) and gasket (Part No. 803914060) attached.

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# Transfer Clutch Pressure Test

## CONTINUOUSLY VARIABLE TRANSMISSION

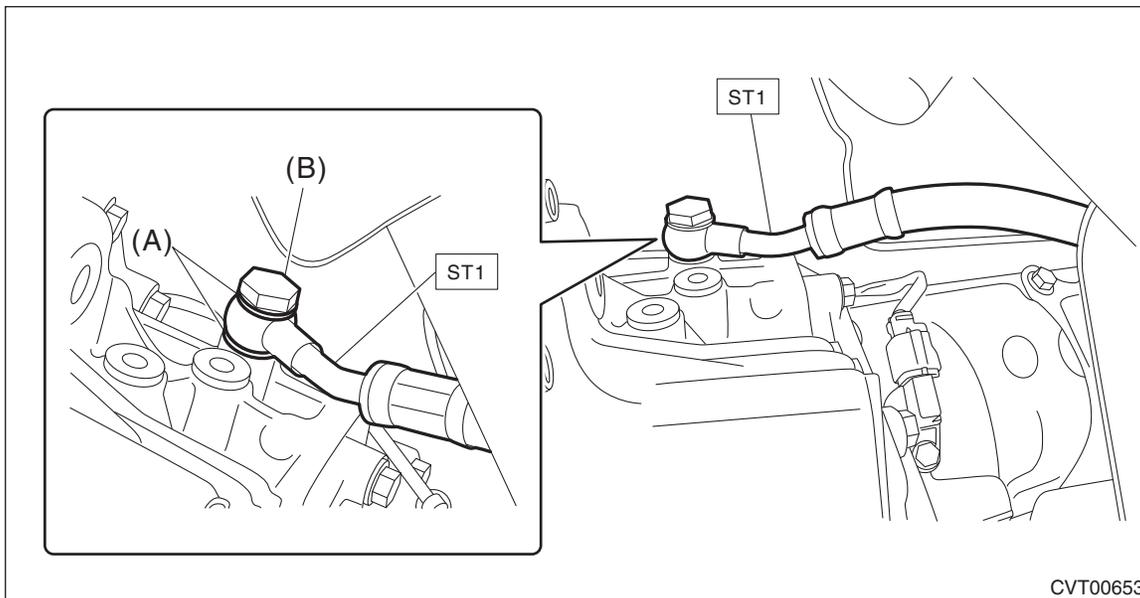
- Use ST3 PRESSURE GAUGE ADAPTER with genuine O-ring (Part No. 806911080) attached.

ST1 34099AC020 ADAPTER HOSE B

ST2 34099AC010 ADAPTER HOSE A

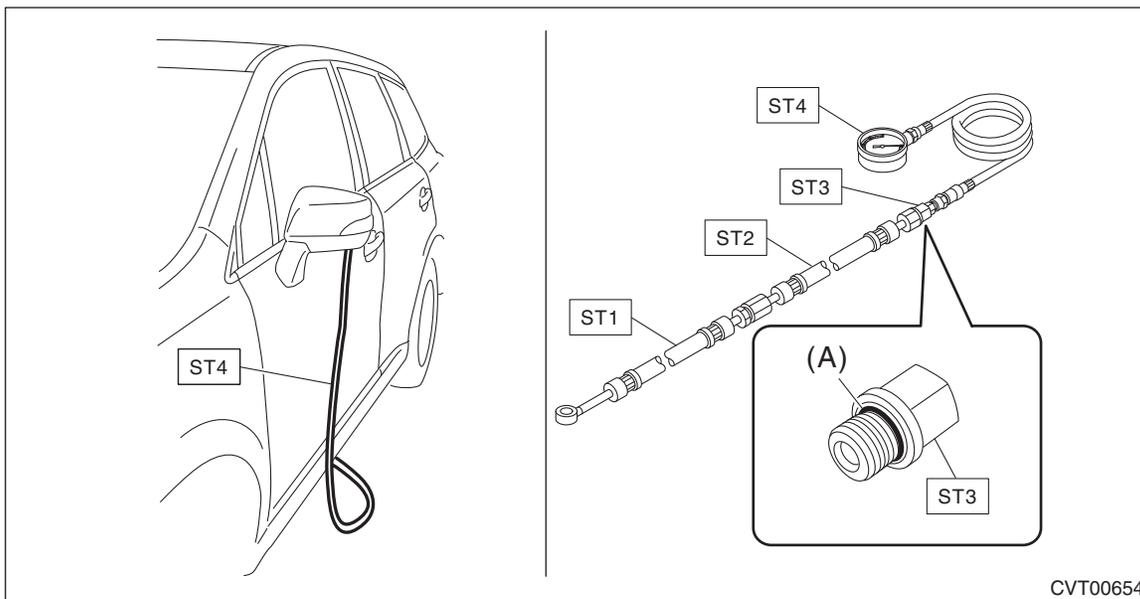
ST3 18681AA000 PRESSURE GAUGE ADAPTER

ST4 498575400 OIL PRESSURE GAUGE ASSY



(A) Gasket (genuine part)

(B) Union screw (genuine part)



(A) O-ring (genuine part)

4) Lower the vehicle.

5) Connect the Subaru Select Monitor to the data link connector and read the current data.

6) Check the transfer clutch pressure as in secondary pressure (line pressure) test. <Ref. to CVT(TR690)-52, Secondary Pressure (Line Pressure) Test.>

### NOTE:

- Turn OFF the X mode switch and perform inspection.

# Transfer Clutch Pressure Test

CONTINUOUSLY VARIABLE TRANSMISSION

- If oil pressure is not produced or it does not change, the control valve body may be malfunctioning.

Range position	ON Duty ratio (%)	Accelerator pedal opening angle (%)	Standard transfer clutch pressure kPa (kgf/cm <sup>2</sup> , psi)
D	95 — 100	Fully opened (100)	1,000 — 1,200 (10.2 — 12.2, 145 — 174)
	60	Adjust ON Duty ratio to 60%.	400 — 700 (4.1 — 7.1, 58 — 102)
	0	Fully closed (0)	—
N or P	0	Fully closed (0)	0

- 7) Lift up the vehicle.
- 8) Remove the ST.
- 9) Install the test plug using ST1 and ST2.

#### NOTE:

- Use new O-rings.
- Apply CVTF to the O-rings.
- Tighten the test plug while directly aligning ST2 and torque wrench.

ST1 18270AA040 SOCKET

ST2 73099SG000 SPECIAL TOOL CONDENSER

Using the following formula, calculate the tightening torque for a torque wrench.

$$T2 = L2 / (L1 + L2) \times T1$$

T1: 25 N·m (2.5 kgf-m, 18.4 ft-lb)

L1: ST2 length 0.1 m (3.94 in) (a)

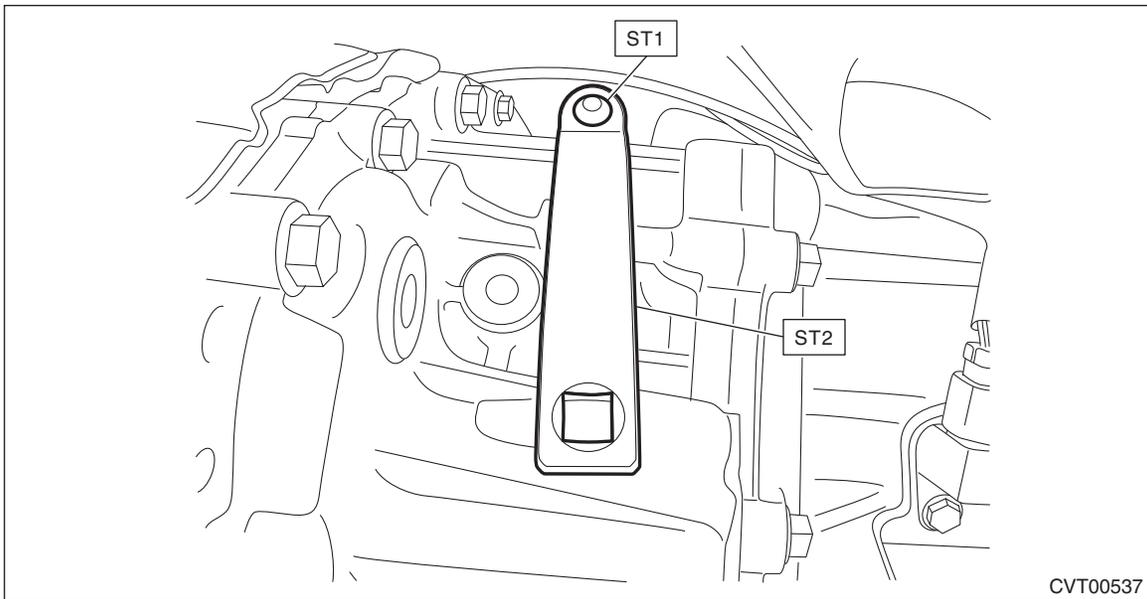
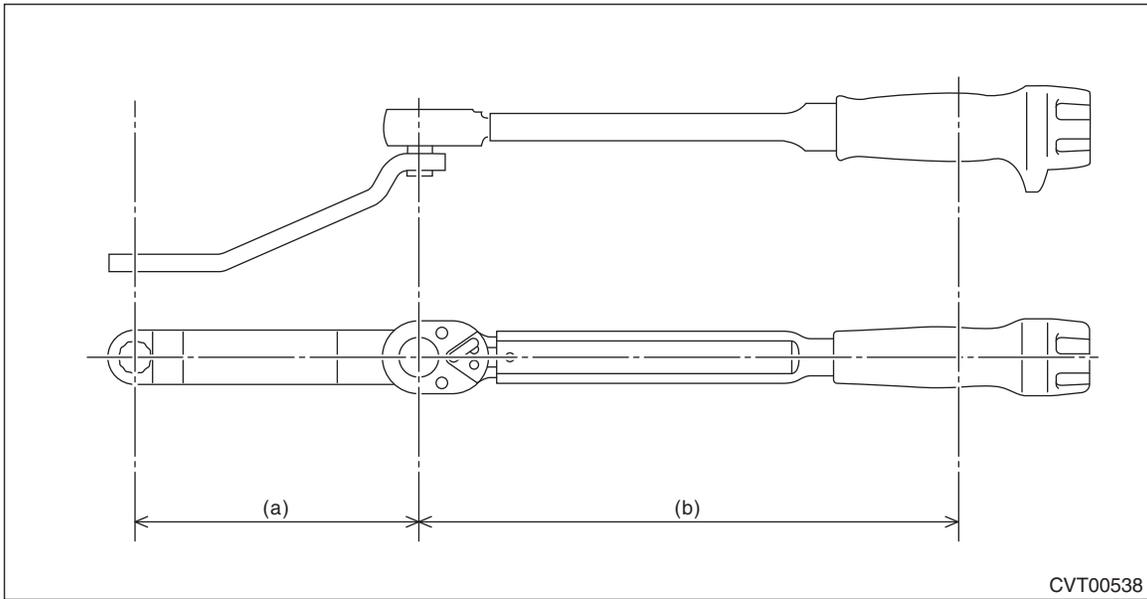
L2: Torque wrench length (b) m (in)

# Transfer Clutch Pressure Test

CONTINUOUSLY VARIABLE TRANSMISSION

[Required torque setting]

T2: Tightening torque: N·m (kgf·m, ft·lb)

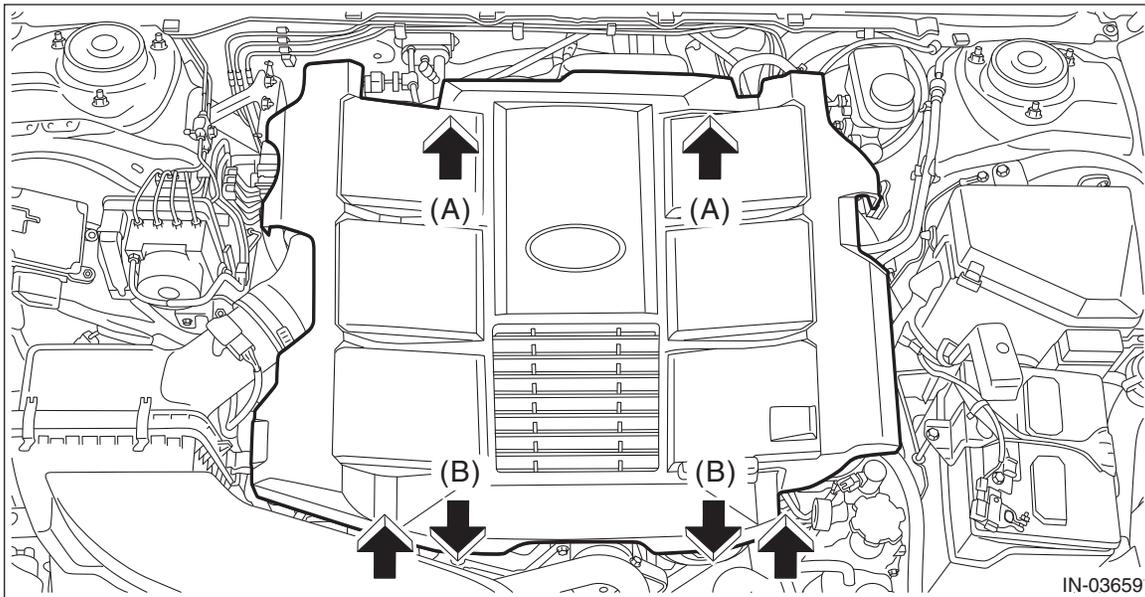


10) Lower the vehicle.

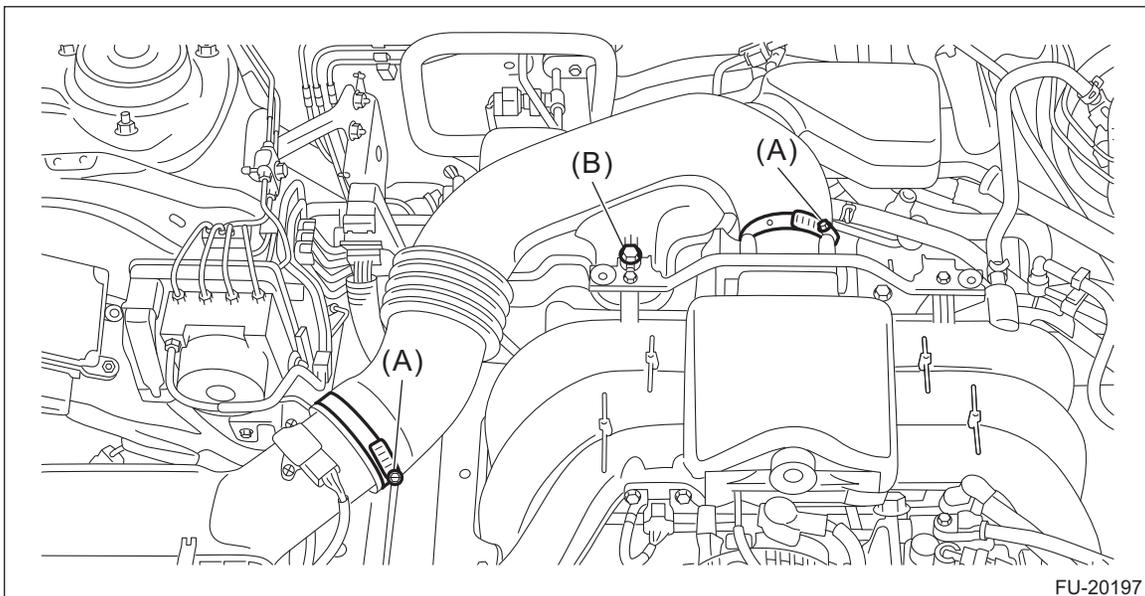
## 11. Automatic Transmission Assembly

### A: REMOVAL

- 1) Remove the front tires. <Ref. to WT-6, REMOVAL, Tire and Wheel.>
- 2) Remove the collector cover.
  - (1) Carefully pull up the rear of collector cover at two positions (A).
  - (2) Carefully pull up the front of collector cover at two positions (B) while moving it forward.



- 3) Disconnect the ground terminal from battery sensor. <Ref. to RC-3, BATTERY, NOTE, Repair Contents.>
- 4) Remove the air intake duct. <Ref. to IN(H6DO)-12, REMOVAL, Air Intake Duct.>
- 5) Loosen the clamp (A) which connects the air intake boot.
- 6) Loosen the bolt (B) securing the air intake boot to the collector cover bracket.



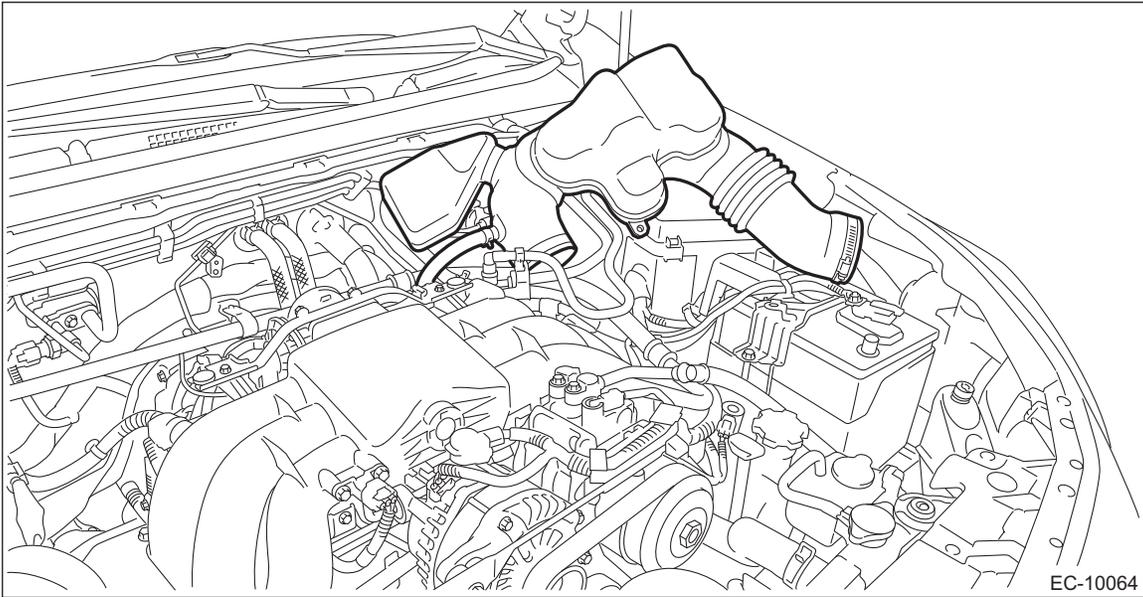
- 7) Remove the air intake boot from the throttle body and the air cleaner case (rear), and move it to the left side wheel apron.

# Automatic Transmission Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

## CAUTION:

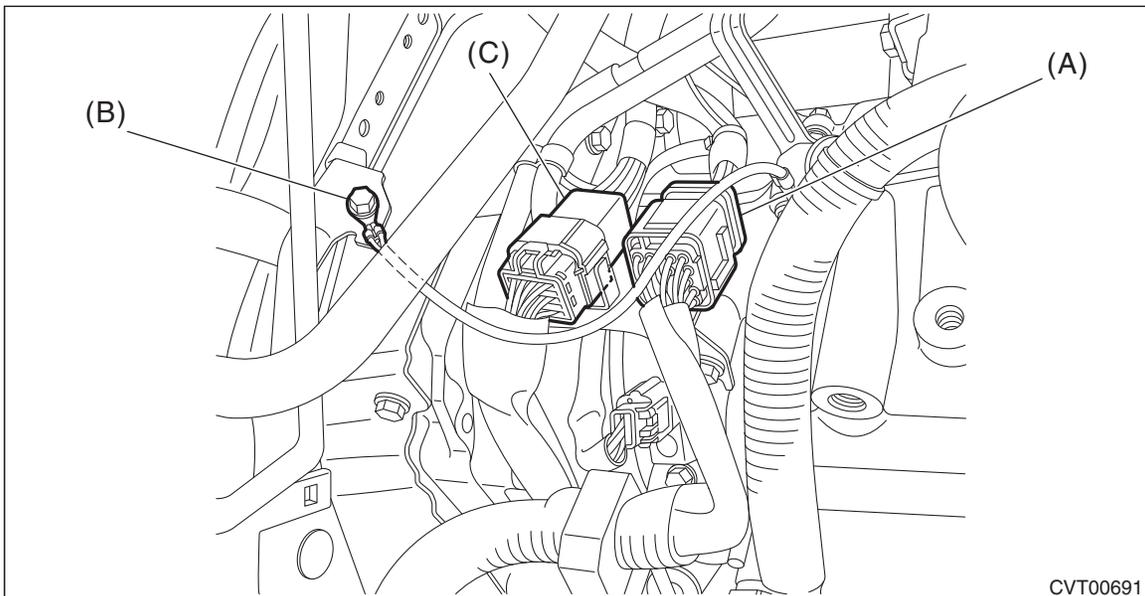
Be careful not to allow the air intake boot to contact the air conditioner pipe.



EC-10064

8) Disconnect the following connectors.

- Transmission harness connectors
- Transmission radio ground terminal
- Inhibitor harness connector



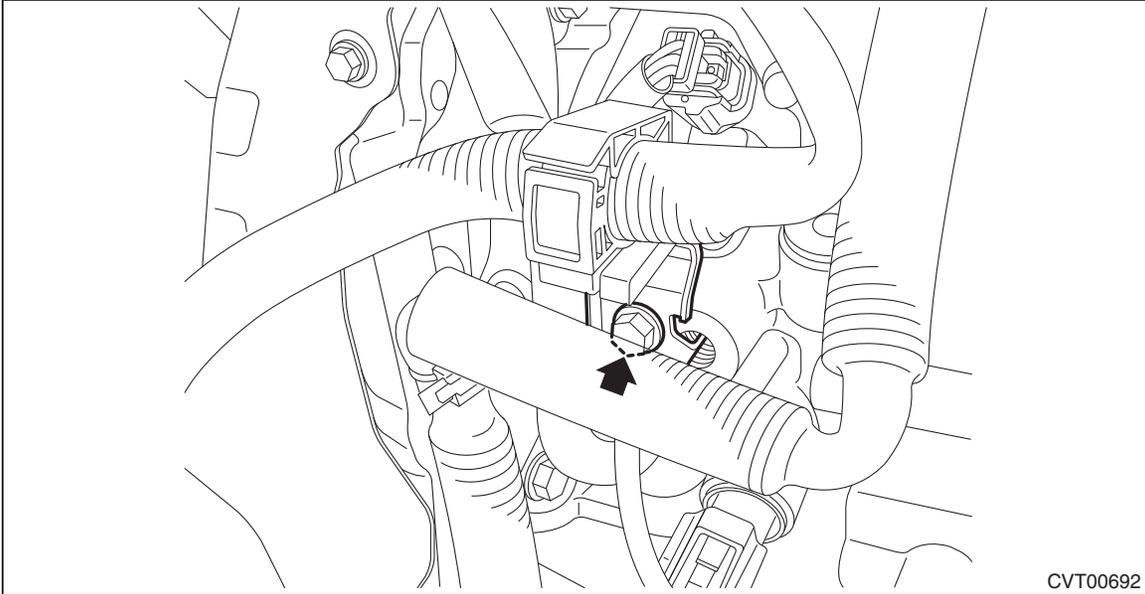
CVT00691

- (A) Transmission harness connectors
- (B) Transmission radio ground terminal
- (C) Inhibitor harness connector

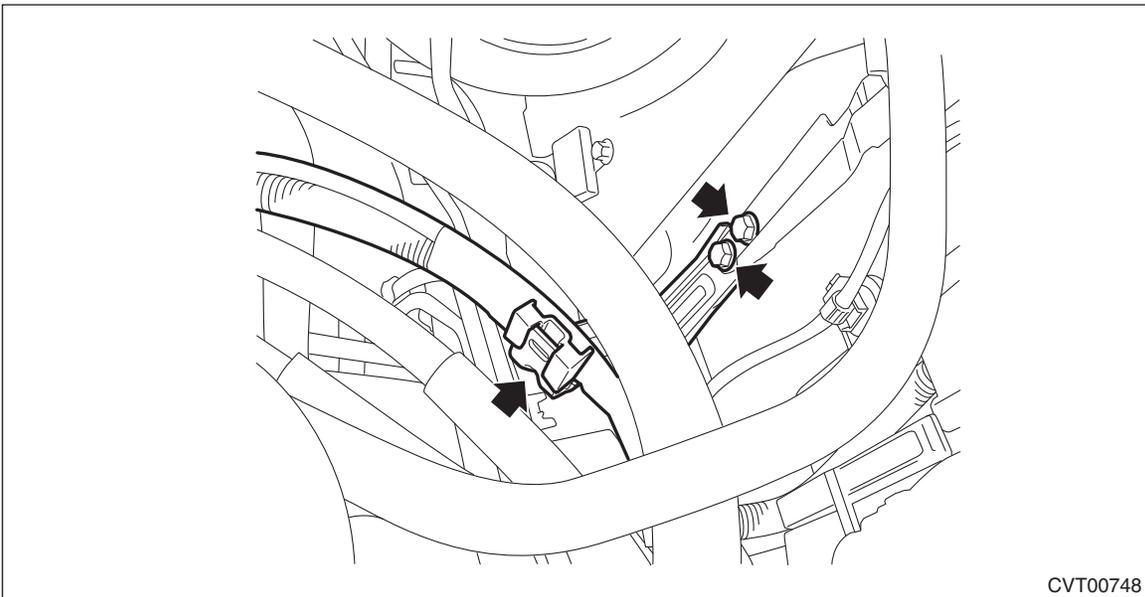
# Automatic Transmission Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

9) Disconnect the harness stay.



10) Separate the ground cable clip to remove the battery cable bracket.

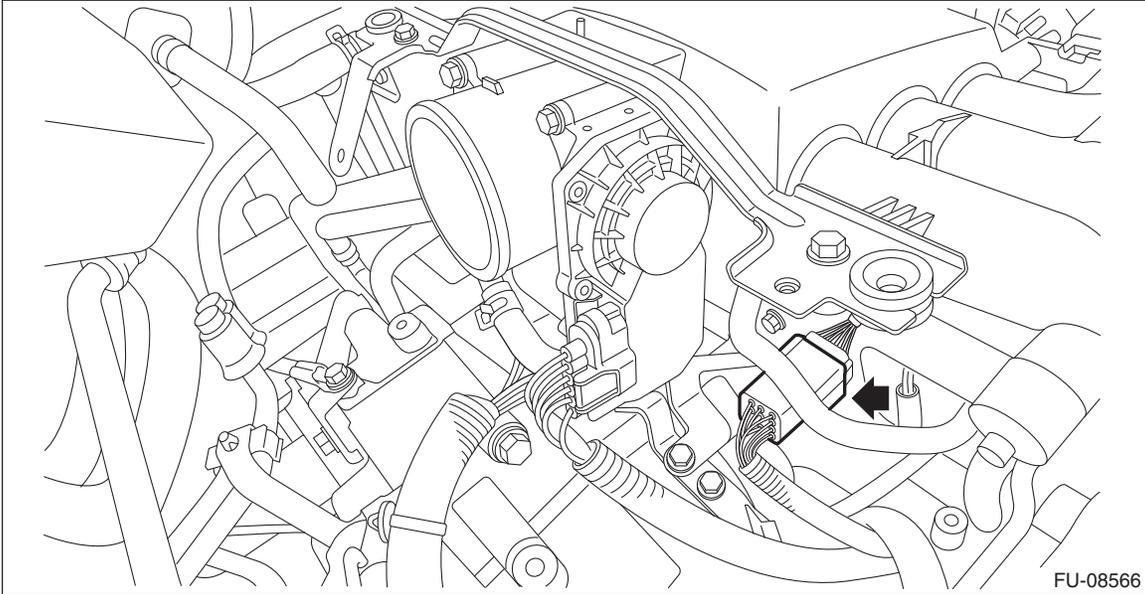


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# Automatic Transmission Assembly

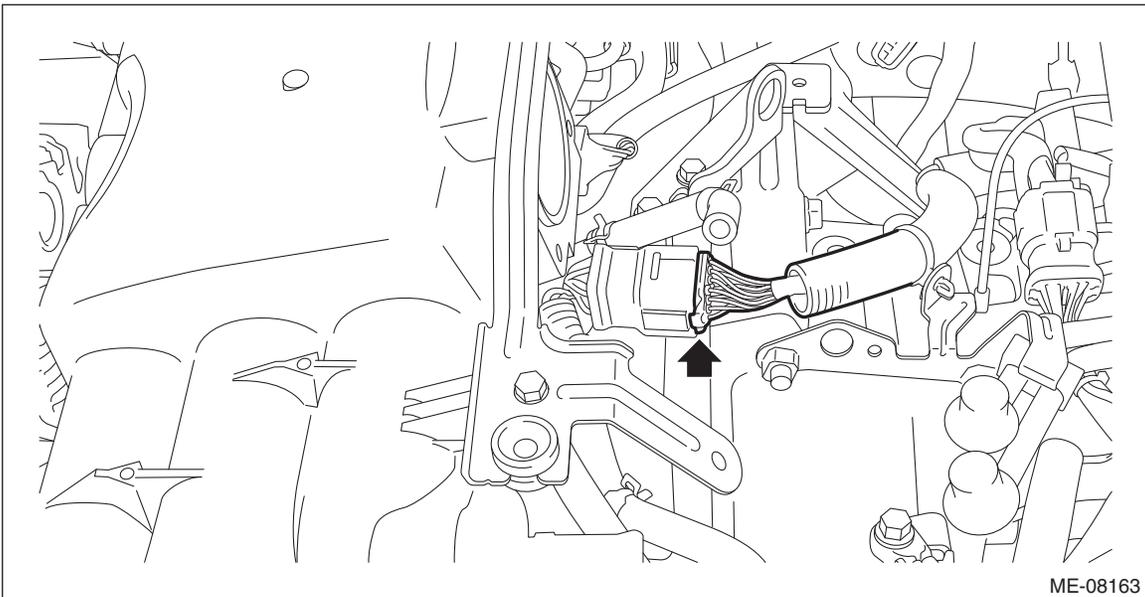
## CONTINUOUSLY VARIABLE TRANSMISSION

11) Disconnect the engine harness connector.



12) Remove the throttle body with the engine coolant hose connected. <Ref. to FU(H6DO)-19, REMOVAL, Throttle Body.>

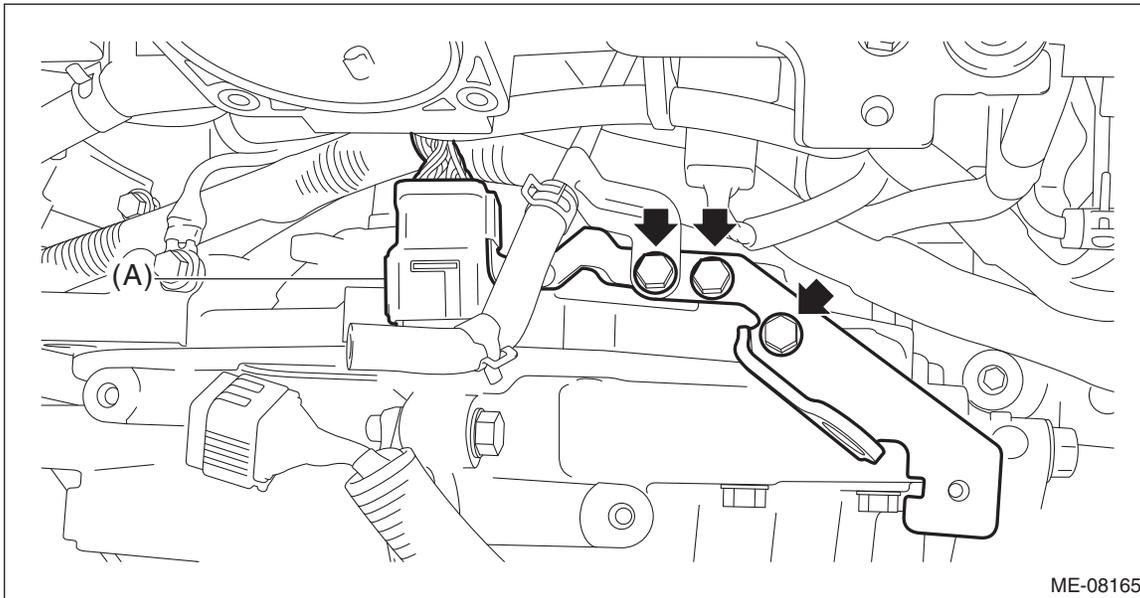
13) Disconnect the oxygen sensor harness connector.



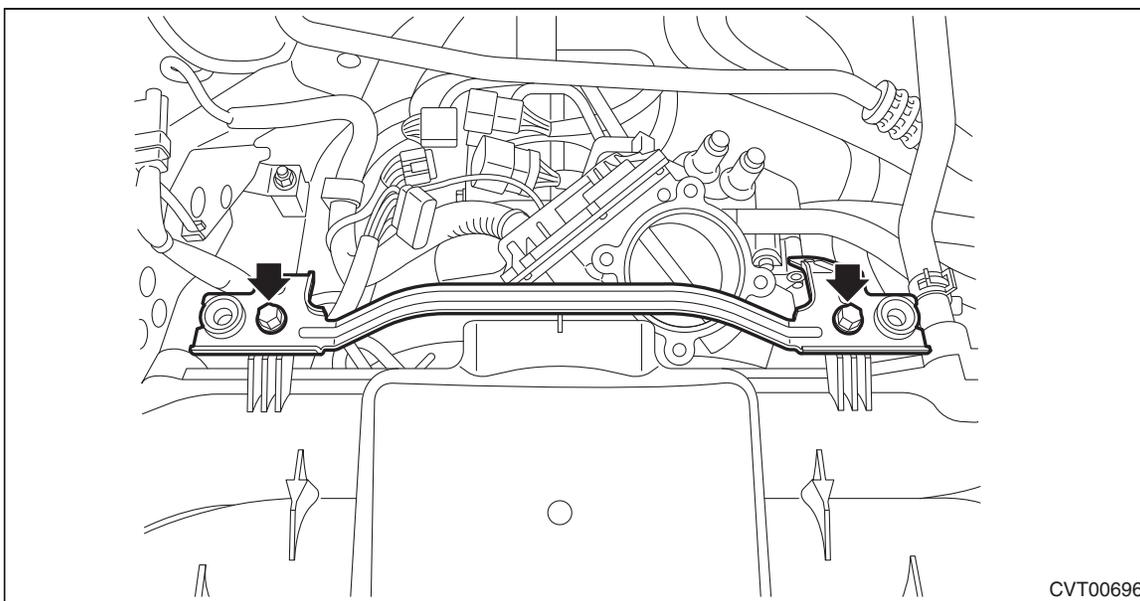
# Automatic Transmission Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

- 14) Disconnect the oxygen sensor harness connector (A), and then remove the engine hanger rear.



- 15) Remove the collector cover bracket.



- 16) Attach the ST to the engine.

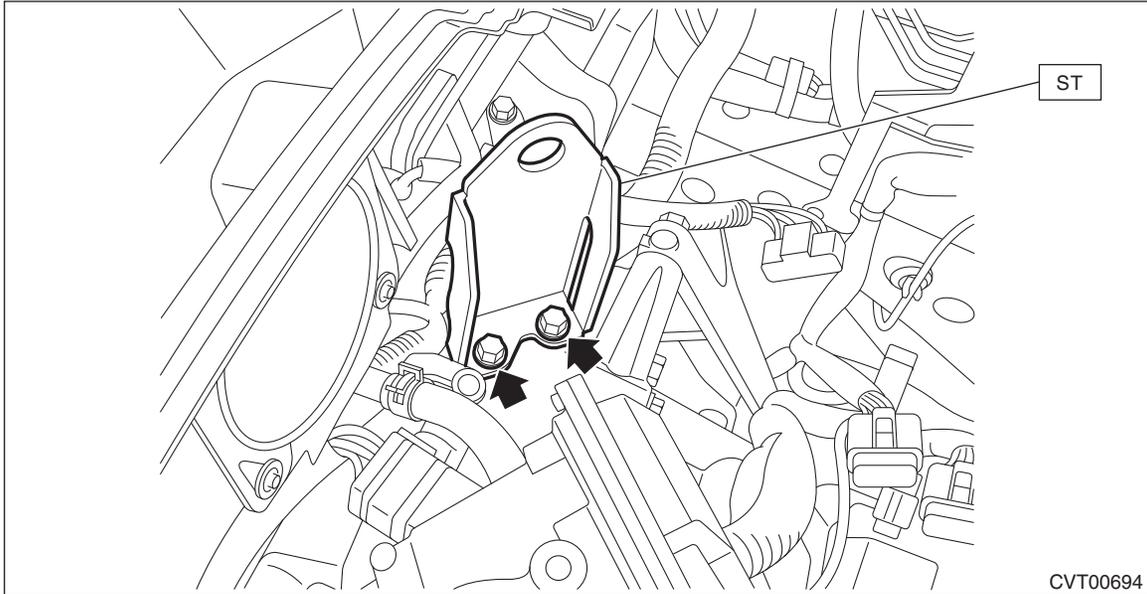
# Automatic Transmission Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

## Tightening torque:

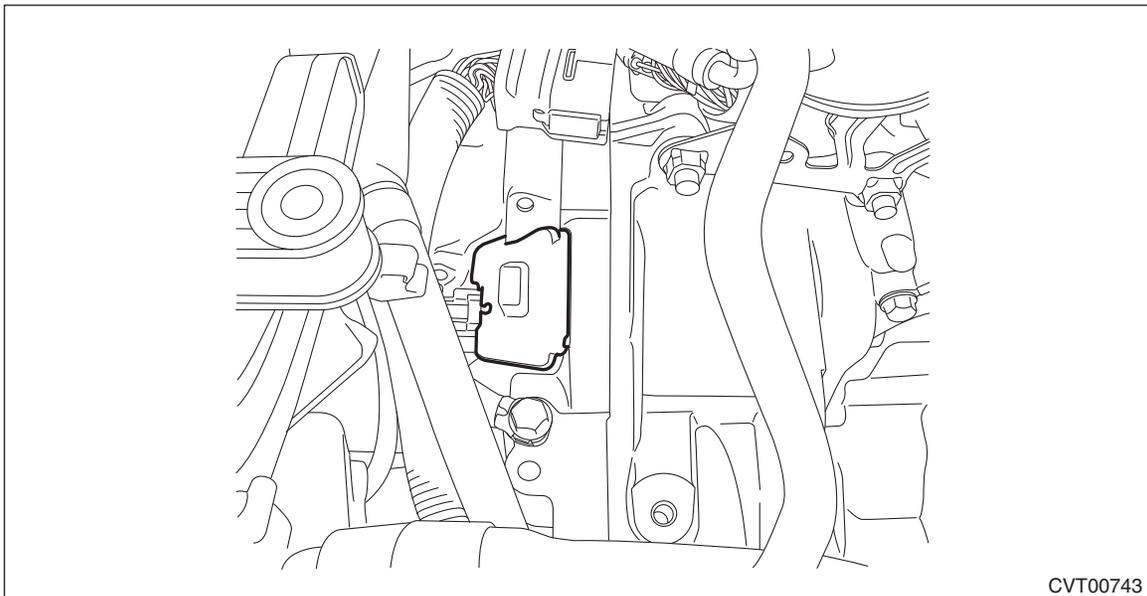
**19 N·m (1.9 kgf-m, 14.0 ft-lb)**

ST 18360AA020 HANGER



17) Remove the starter. <Ref. to SC(H6DO)-7, REMOVAL, Starter.>

18) Remove the service hole plug.



19) Remove the four bolts combining the torque converter and drive plate while rotating the crank pulley a little at a time in the same direction as engine revolution.

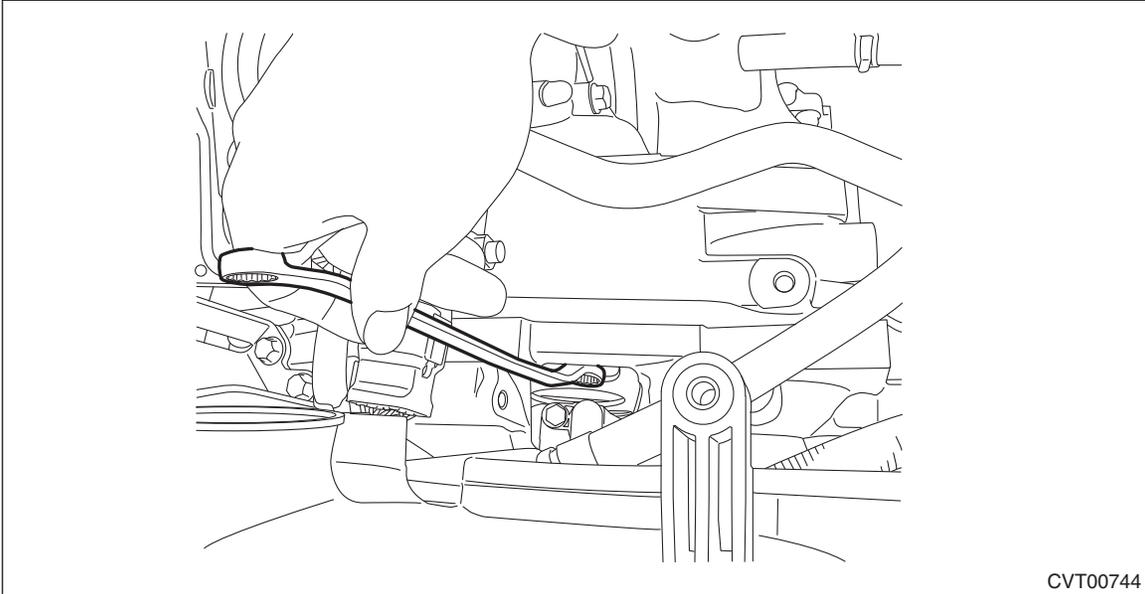
## CAUTION:

- Be careful not to drop bolts into converter housing.

# Automatic Transmission Assembly

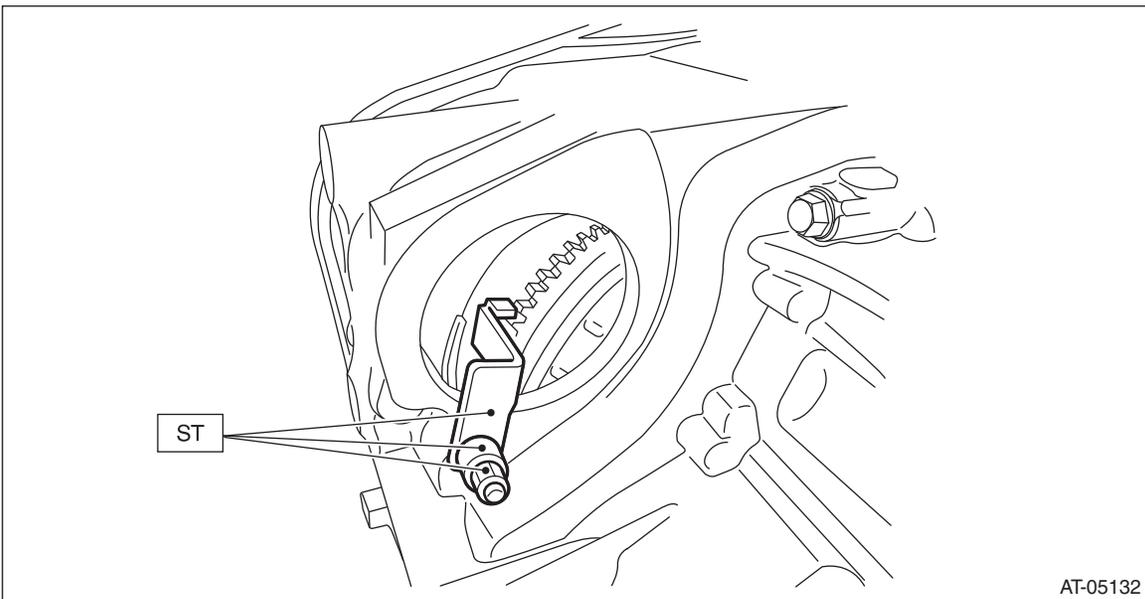
CONTINUOUSLY VARIABLE TRANSMISSION

- Be careful not to damage the mounting bolts.



CVT00744

- 20) Make sure the torque converter moves freely by rotating with finger through the starter installation hole.
- 21) Attach the ST to the converter case.  
ST 498277200 STOPPER SET



AT-05132

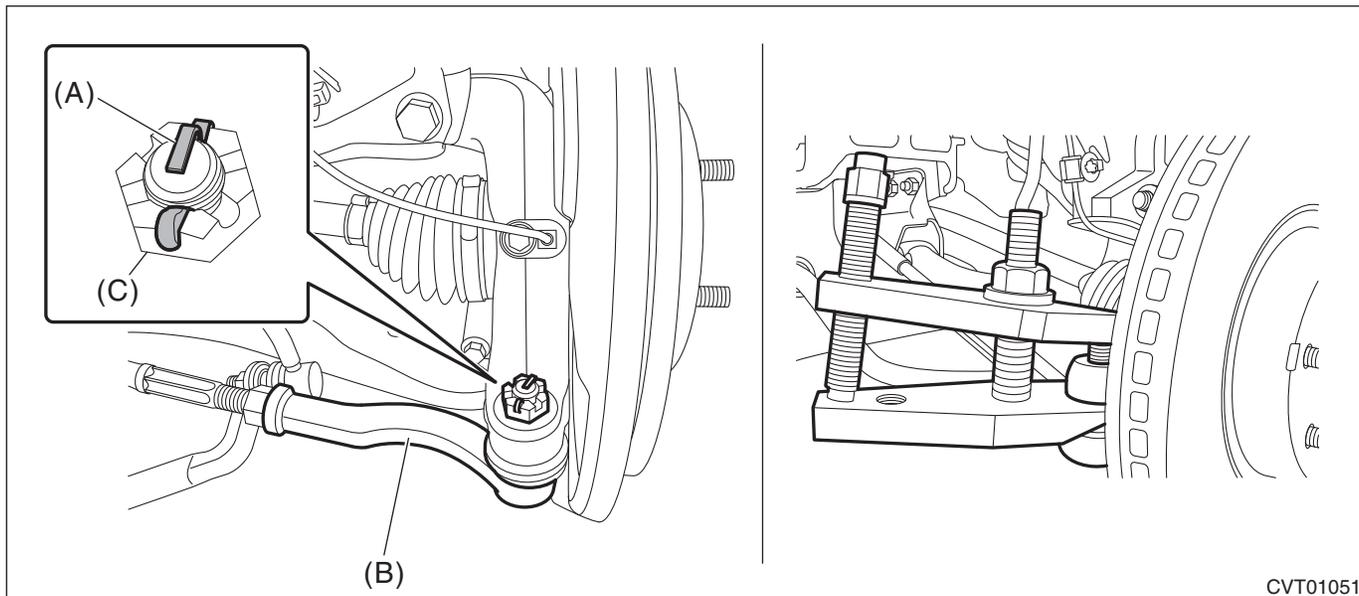
- 22) After pulling off the cotter pin and removing the castle nut, use a puller to remove the tie-rod end.

# Automatic Transmission Assembly

## CONTINUOUSLY VARIABLE TRANSMISSION

### NOTE:

Use a tool appropriate to the structure, and be careful not to damage the boot of the joint while removing. The boot may be damaged depending on the tool used.



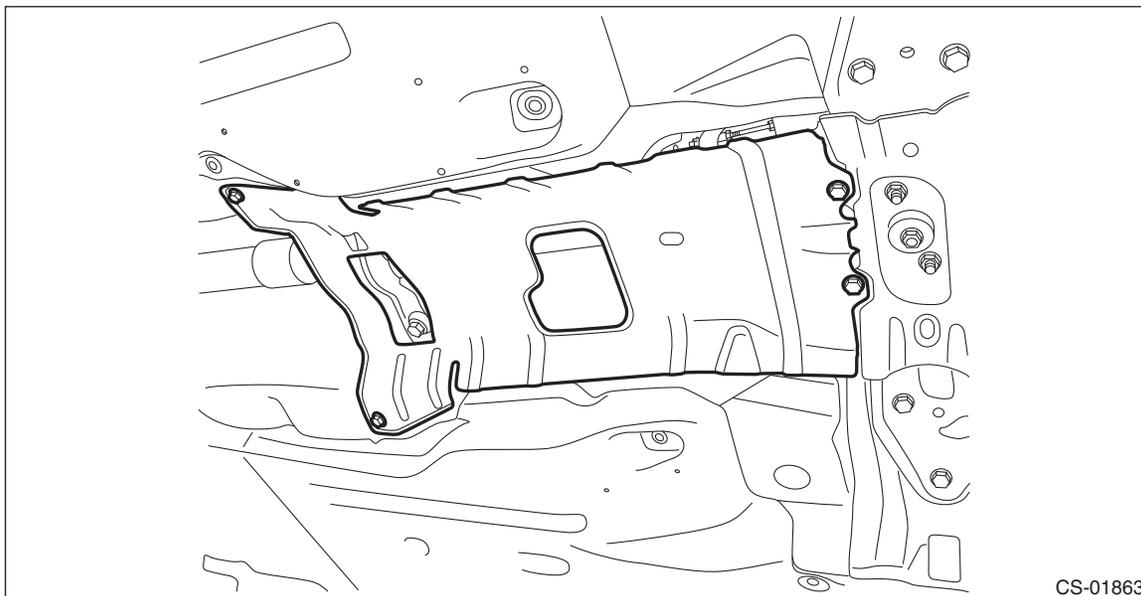
- (A) Cotter pin
- (B) Tie-rod end
- (C) Castle nut

23) Lift up the vehicle.

24) Remove the front under cover. <Ref. to EI-27, REMOVAL, Front Under Cover.>

25) Remove the front exhaust pipe. <Ref. to EX(H6DO)-6, REMOVAL, Front Exhaust Pipe.>

26) Remove the center exhaust cover.

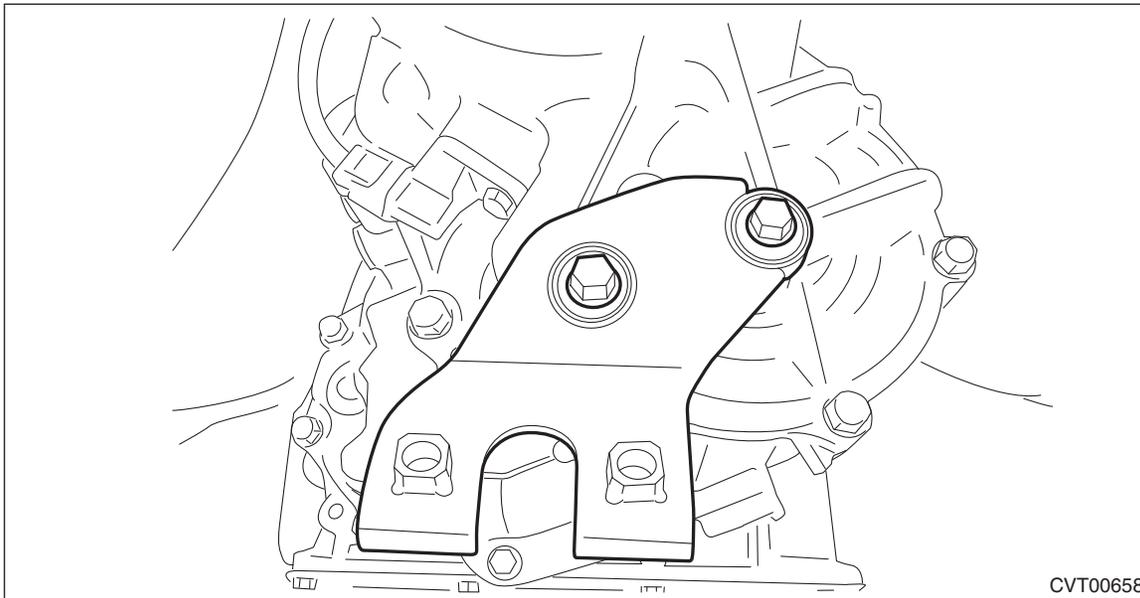


CS-01863

# Automatic Transmission Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

27) Remove the exhaust hanger bracket.



28) Remove the CVTF drain plug to drain CVTF. <Ref. to CVT(TR690)-40, REPLACEMENT, CVTF.>

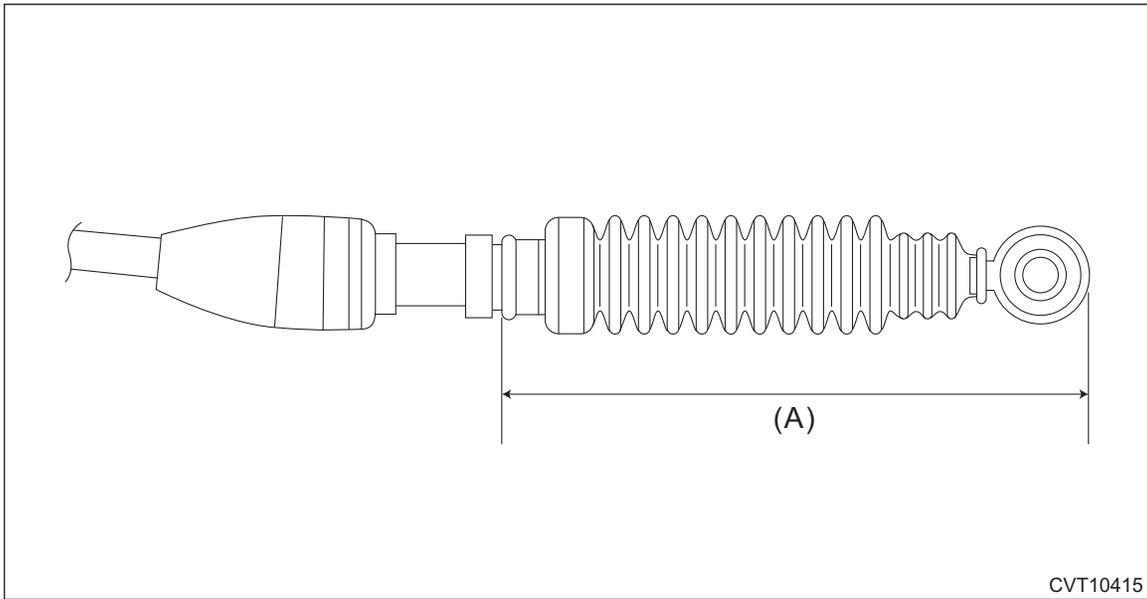
29) Remove the snap pin and washer, and disconnect the select cable.

# Automatic Transmission Assembly

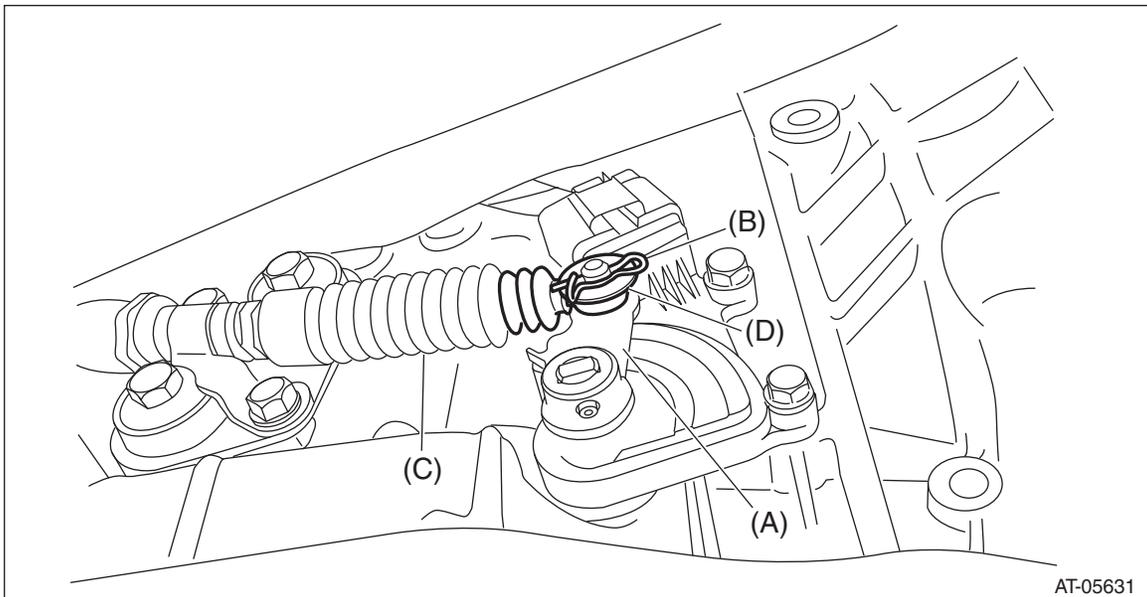
CONTINUOUSLY VARIABLE TRANSMISSION

## CAUTION:

Do not apply extra overload while holding the part (A).



CVT10415



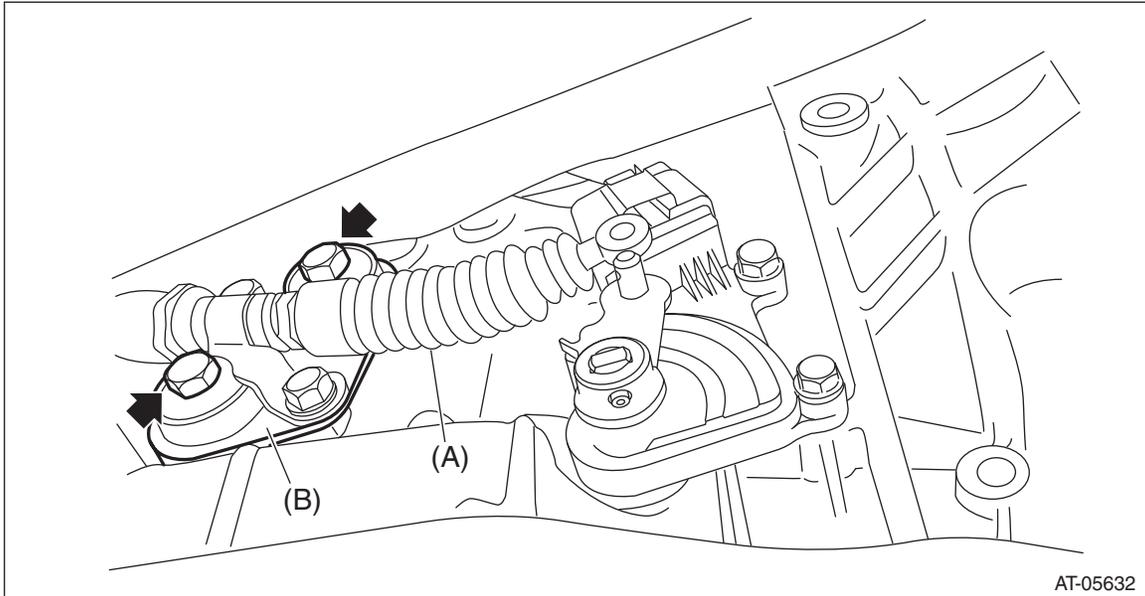
AT-05631

- (A) Shifter arm
- (B) Snap pin
- (C) Select cable
- (D) Washer

# Automatic Transmission Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

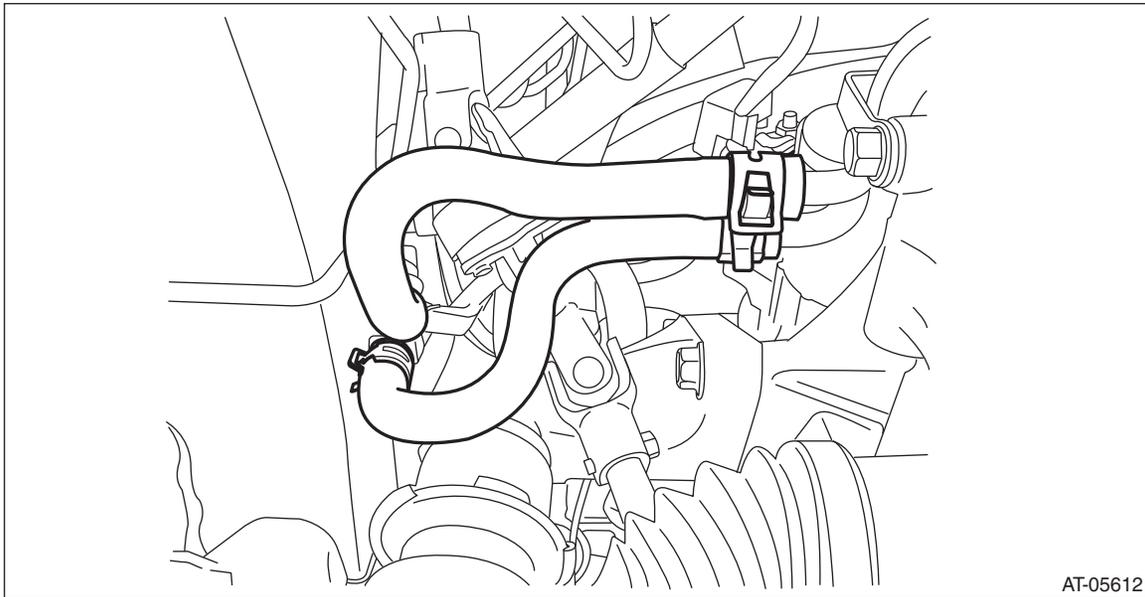
30) Remove the cable plate assembly.



- (A) Select cable
- (B) Cable plate ASSY

31) Drain differential gear oil. <Ref. to CVT(TR690)-44, REPLACEMENT, Differential Gear Oil.>

32) Remove the CVTF CVT inlet hose and CVTF CVT outlet hose.



33) Remove the universal joint. <Ref. to PS-21, REMOVAL, Universal Joint.>

34) Remove the propeller shaft. <Ref. to DS-10, REMOVAL, Propeller Shaft.>

35) Remove the stabilizer link.

36) Disconnect the lower arm ball joint and housing.

37) Pull out the front drive shaft from transmission using a crowbar.

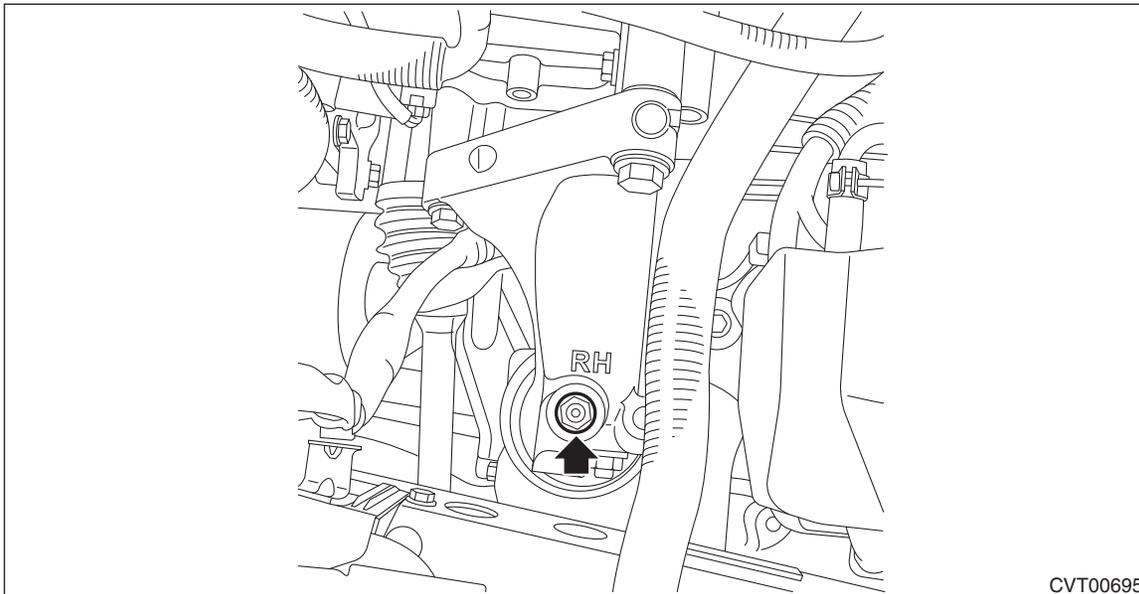
38) Holding the joint of front drive shaft from transmission side, pull out the drive shaft from transmission with care not to stretch the boot.

39) Lower the vehicle.

# Automatic Transmission Assembly

## CONTINUOUSLY VARIABLE TRANSMISSION

40) Remove the nuts from left and right transmission mounting brackets.



CVT00695

41) Set the ST1 and ST2 to vehicle.

ST1 99099AJ000 ENGINE HANGER

ST2 99099AJ010 CHAIN BALANCER

### CAUTION:

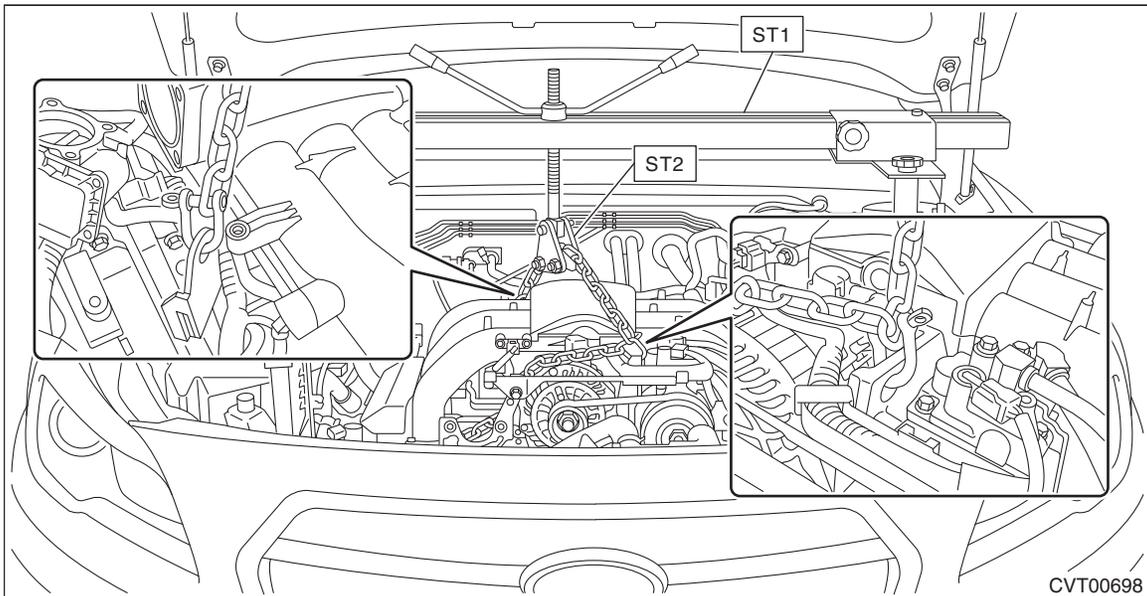
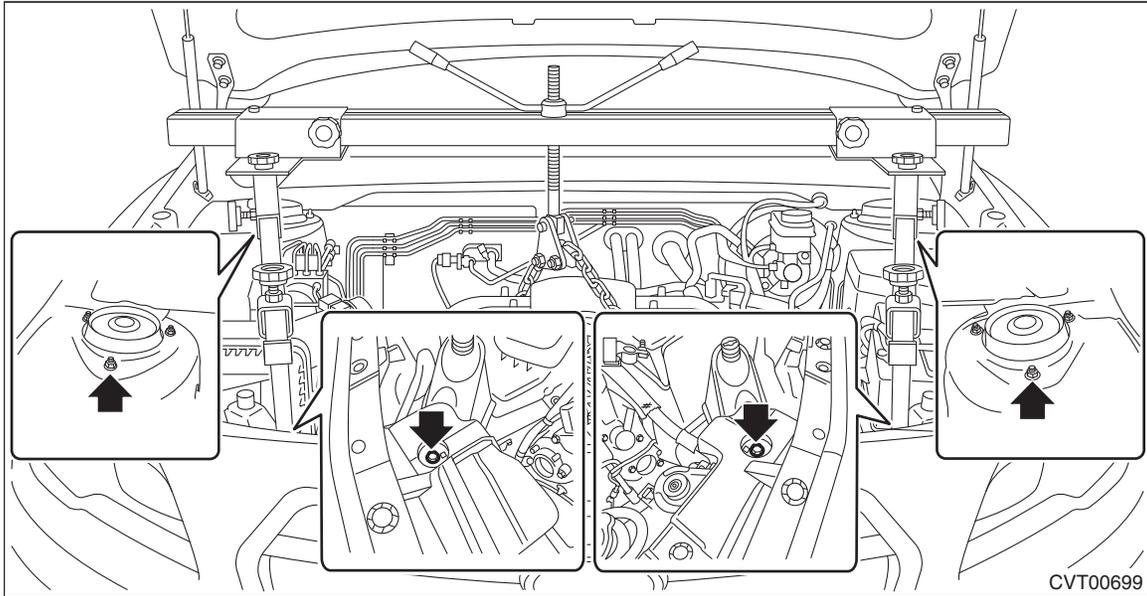
- Set so that the chain sling does not contact the engine parts.
- Install a bolt of  $\phi 8$  mm (0.3 in) at the locations shown in the figure, and place the front side arms of ST (ENGINE HANGER).

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# Automatic Transmission Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

- Set the rear arms of ST (ENGINE HANGER) at the locations shown in the figure.

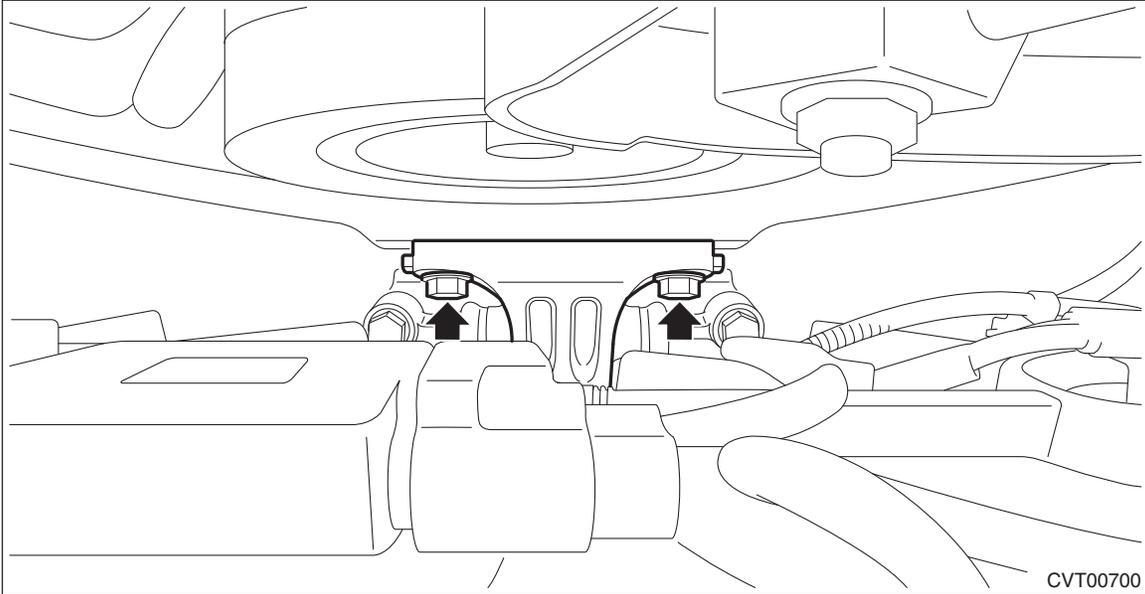


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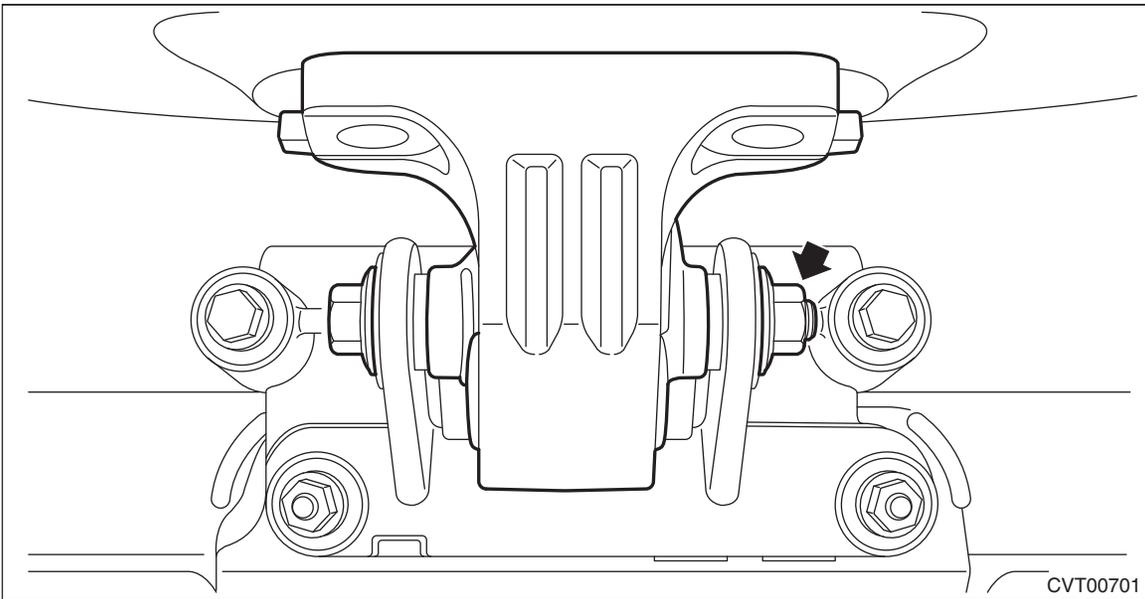
# Automatic Transmission Assembly

## CONTINUOUSLY VARIABLE TRANSMISSION

42) Lift the engine slightly and remove the bolts of front cushion rubber.



43) Remove the front cushion rubbers.

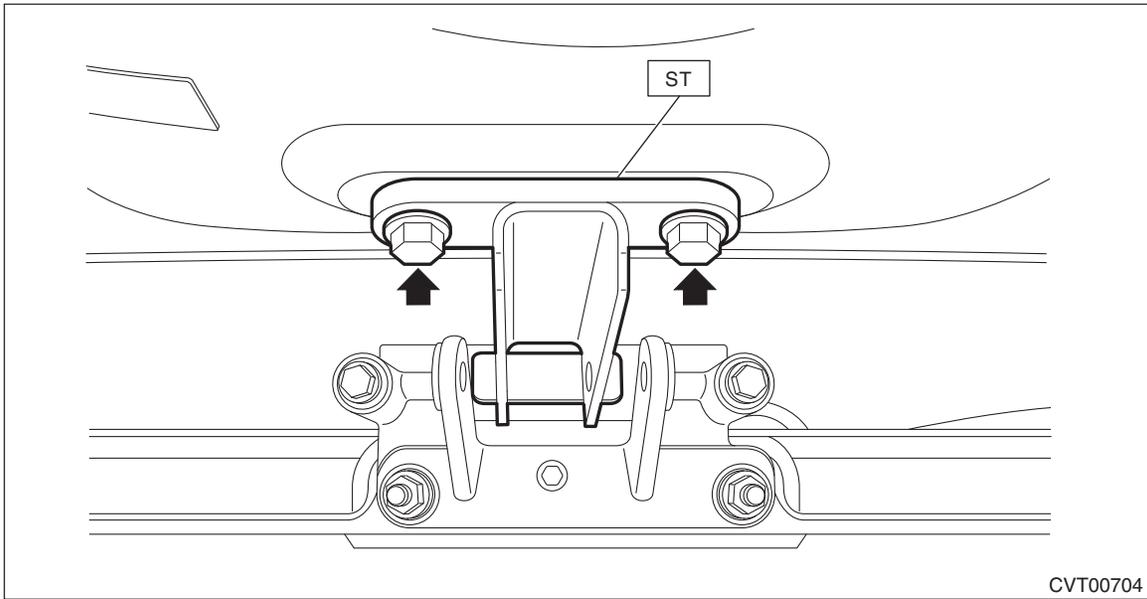


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# Automatic Transmission Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

- 44) Temporarily attach ST by using two bolts.  
ST 41099AJ010 SPECIAL TOOL H6



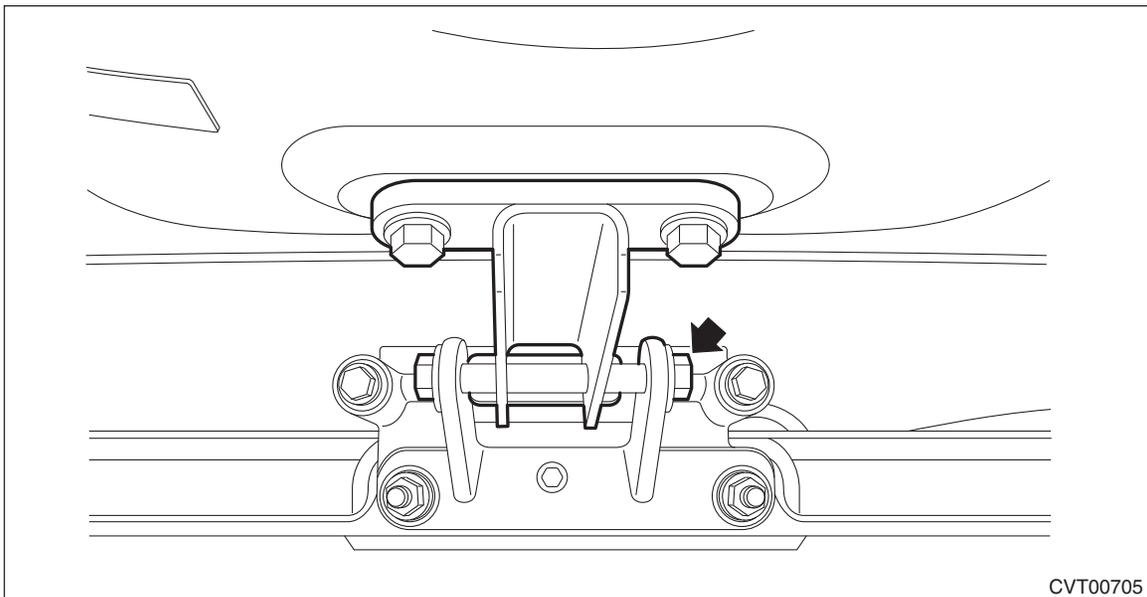
- 45) Lift up the engine unit high enough to install the bolt and nut to vehicle.

**CAUTION:**

**Do not lift up higher than enough level to install the ST to avoid damage to the hoses and pipes inside the engine room.**

**NOTE:**

If it is difficult to pull out the stud bolt from transmission mounting bracket, slightly shake the engine unit while lifting up.



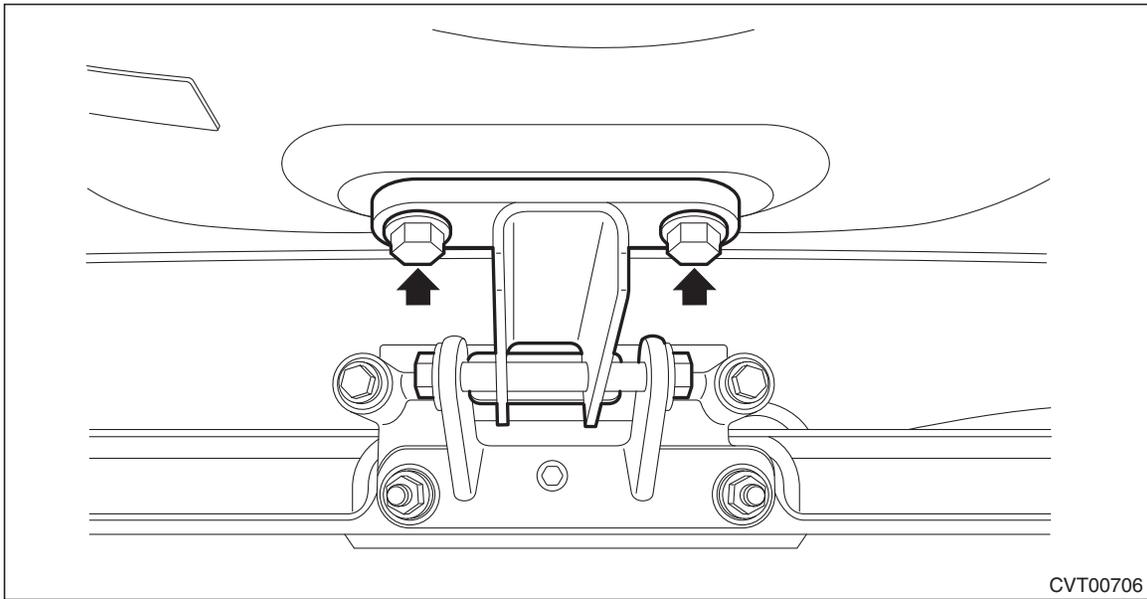
- 46) Tighten the mounting bolts on the engine side.

# Automatic Transmission Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

**Tightening torque:**

**25 N·m (2.5 kgf-m, 18.4 ft-lb)**



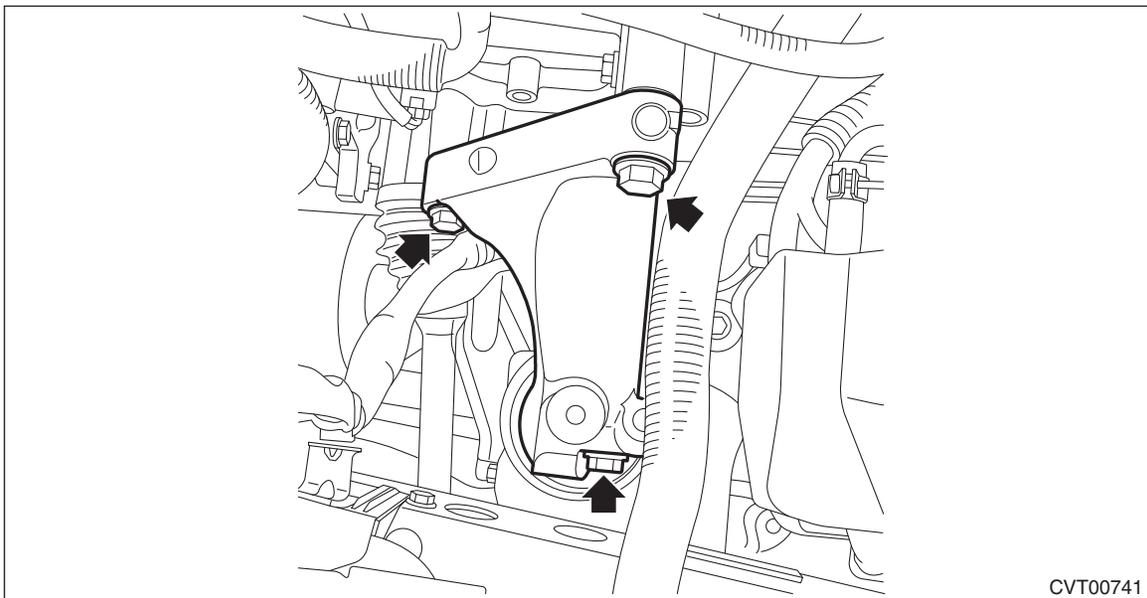
CVT00706

47) Remove the ST (ENGINE HANGER).

48) Remove the left and right transmission mounting brackets.

**NOTE:**

First, remove the transmission mounting bracket on the right side of vehicle, and then tilt the engine unit to remove the left transmission mounting bracket.

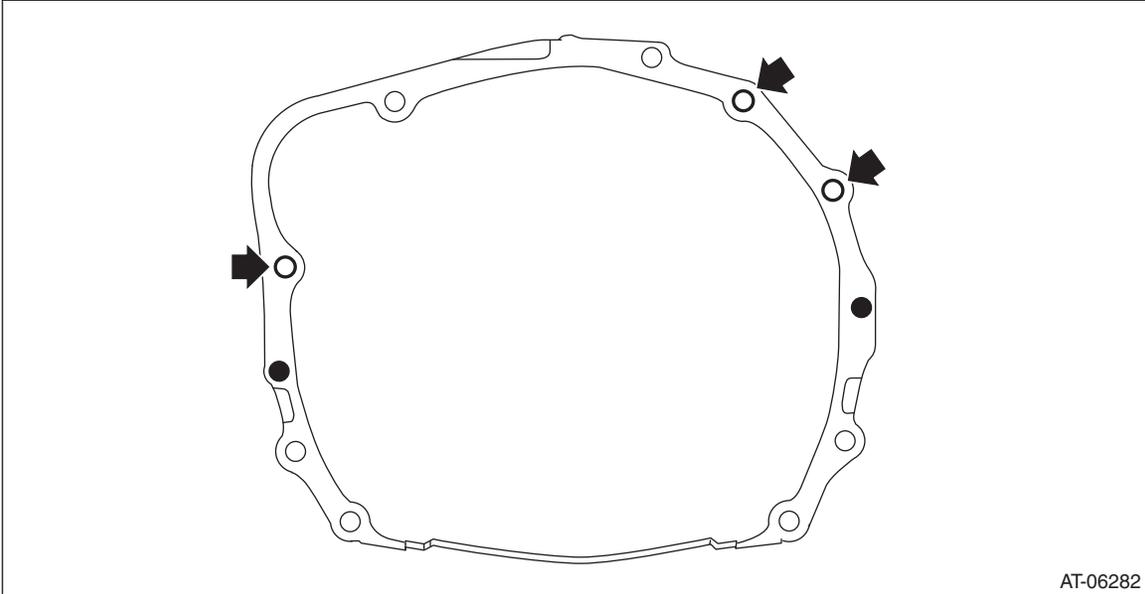


CVT00741

# Automatic Transmission Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

49) Remove the three transmission connecting bolts.

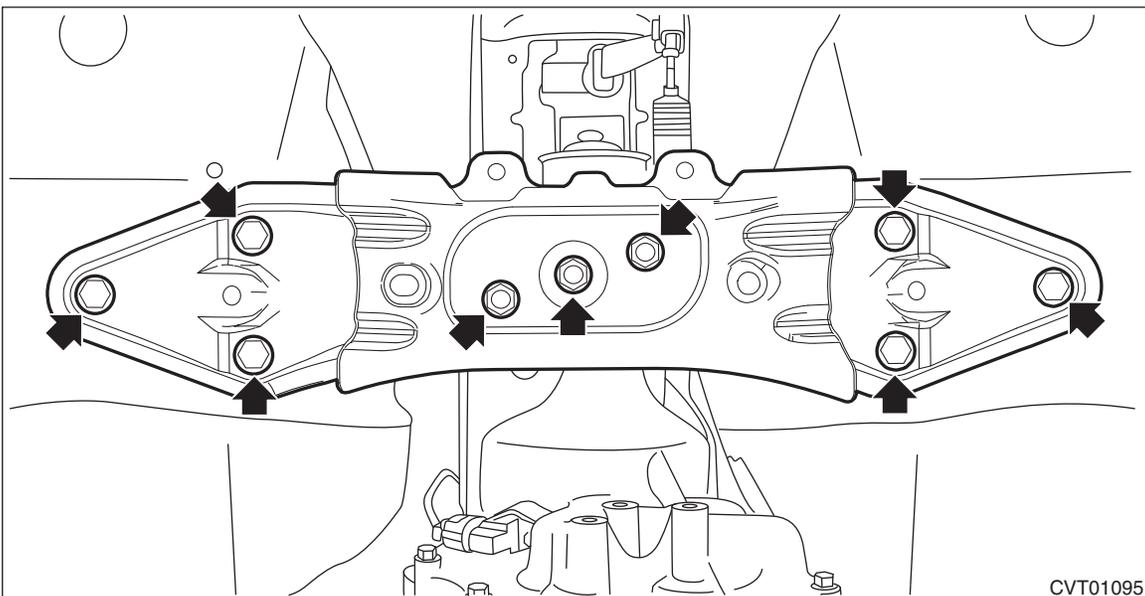


50) Set the ST (ENGINE HANGER) again to loosen the chain sling.

51) Lift up the vehicle.

52) Set the transmission jack under the transmission.

53) Remove the transmission rear crossmember.



54) Lower the transmission rear end (dust cover rear end).

**CAUTION:**

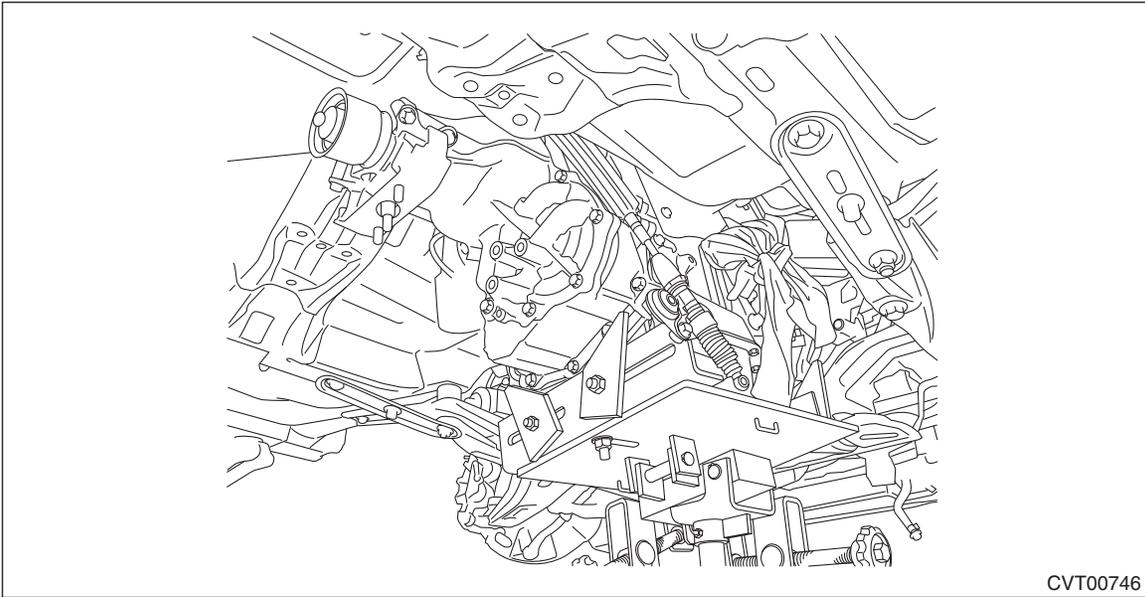
**When lowering the transmission rear end, be careful not to let the converter case and steering mechanical parts contact each other.**

# Automatic Transmission Assembly

## CONTINUOUSLY VARIABLE TRANSMISSION

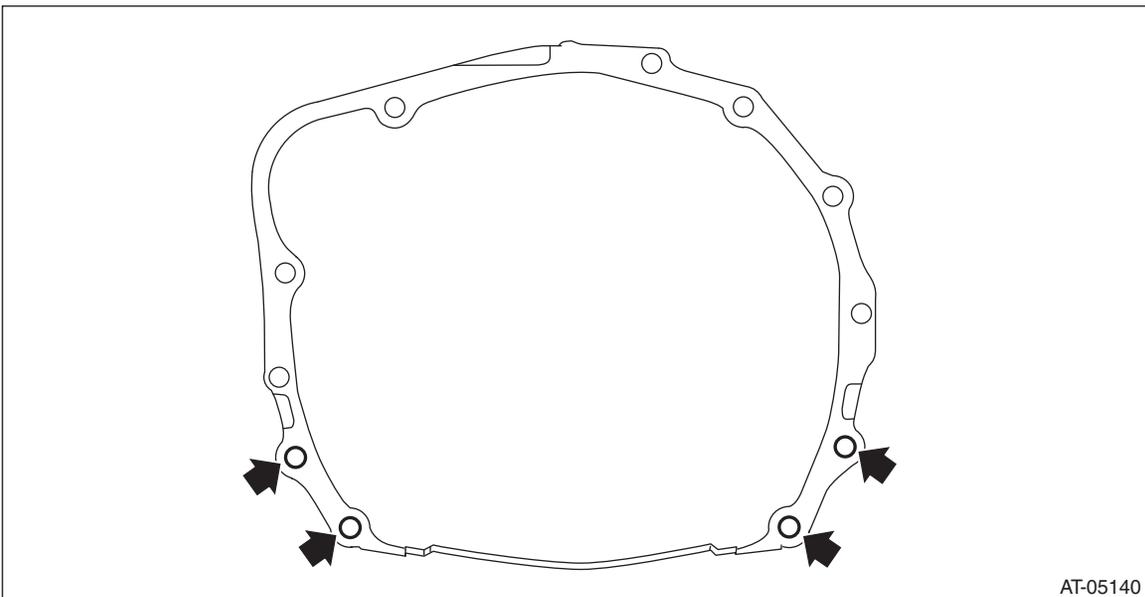
### NOTE:

Lower the transmission rear end by approx. 80 mm (3.1 in) (reference).



55) Rotate the handle of ST (ENGINE HANGER) to apply tension to the chain sling.

56) Remove the two transmission connecting bolts and two nuts (lower side).



57) Remove the transmission assembly.

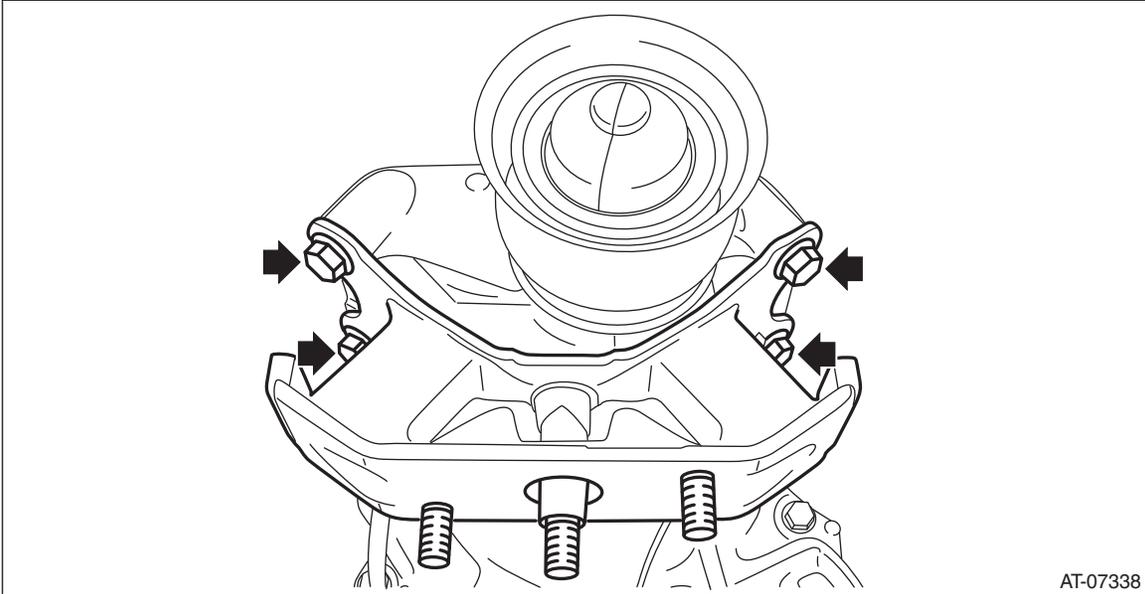
### NOTE:

Remove it while moving the transmission jack up and down so that the engine and transmission remain directly aligned.

# Automatic Transmission Assembly

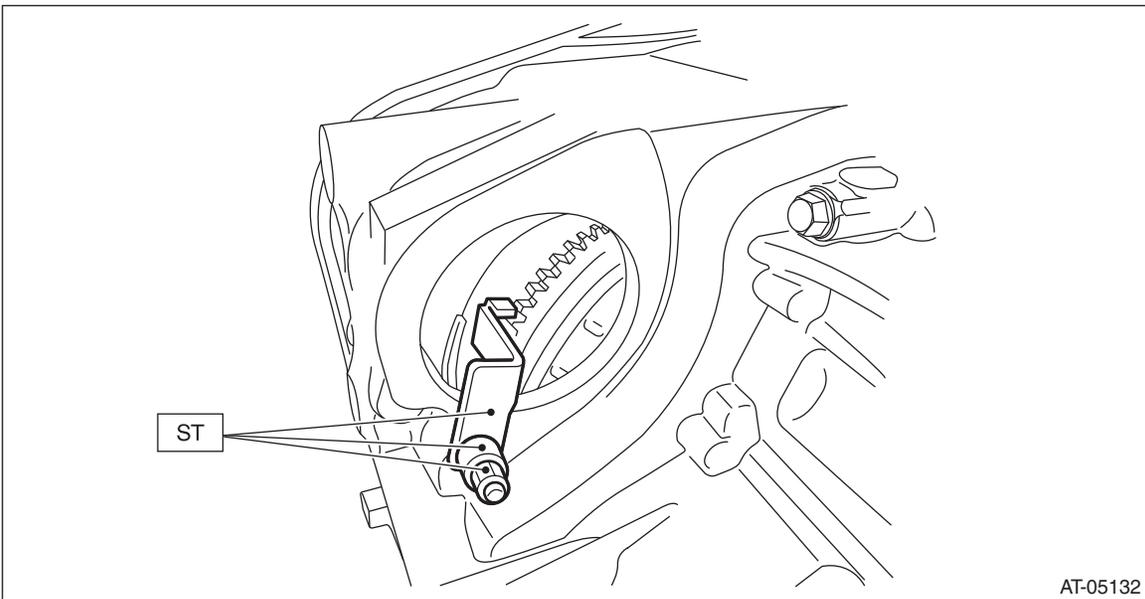
CONTINUOUSLY VARIABLE TRANSMISSION

58) Remove the rear cushion rubber.



## B: INSTALLATION

1) Attach the ST to converter case.  
ST 498277200 STOPPER SET



2) When completely overhauling the transmission, refill approx. 10 L (2.6 US qt, 8.8 Imp qt) of CVTF through the transmission right side plug, and install the plug.

### CAUTION:

**Always use specified CVTF. Using other fluid will cause malfunction. <Ref. to CVT(TR690)-4, HYDRAULIC CONTROL AND LUBRICATION, SPECIFICATION, General Description.>**

### NOTE:

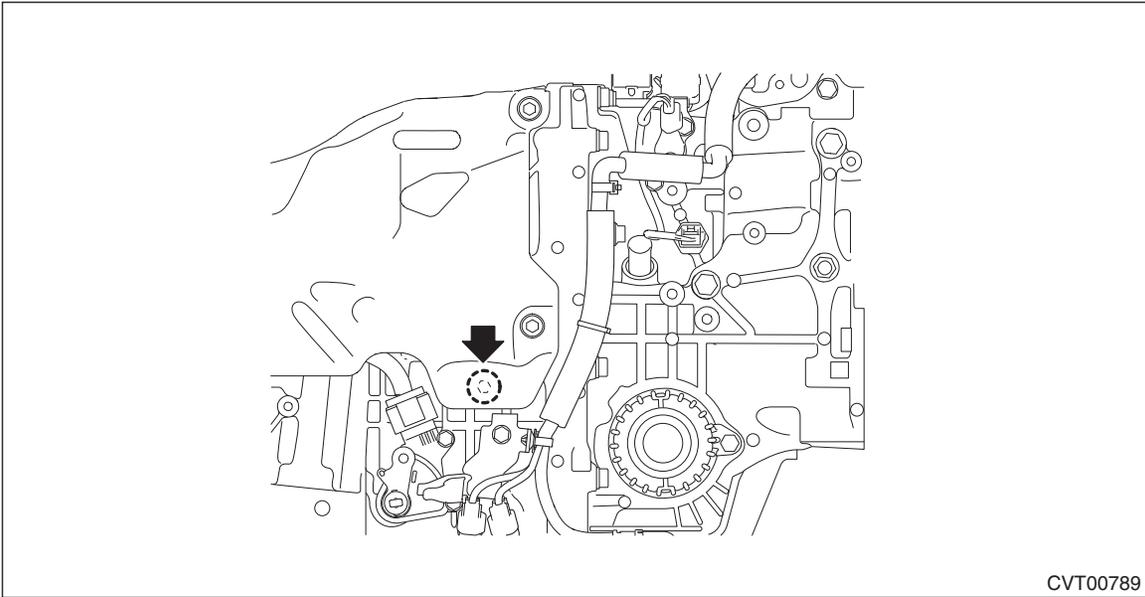
Use a new gasket.

# Automatic Transmission Assembly

## CONTINUOUSLY VARIABLE TRANSMISSION

### **Tightening torque:**

**35 N·m (3.6 kgf·m, 25.8 ft·lb)**



CVT00789

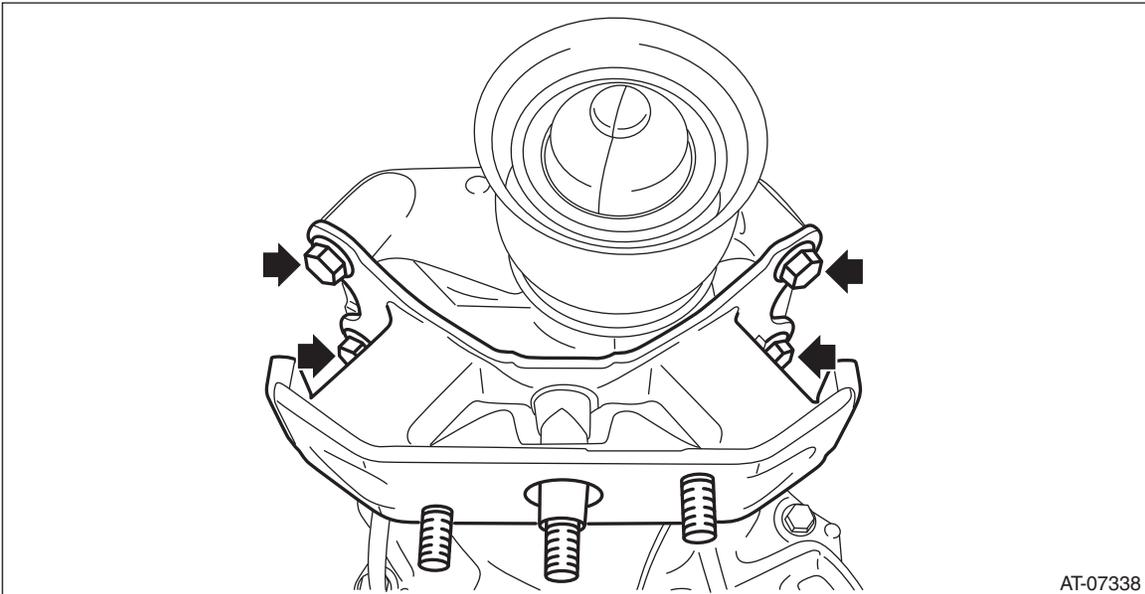
3) Replace the front differential side retainer oil seal. <Ref. to CVT(TR690)-101, REPLACEMENT, Differential Side Retainer Oil Seal.>

### **NOTE:**

- Be sure to replace the differential side retainer oil seal with a new part whenever the front drive shaft is removed from the transmission.
  - When a new differential side retainer oil seal has been installed, replacement is not required.
- 4) Install the rear cushion rubber.

### **Tightening torque:**

**40 N·m (4.1 kgf·m, 29.5 ft·lb)**



AT-07338

5) Mount the transmission onto the transmission jack.

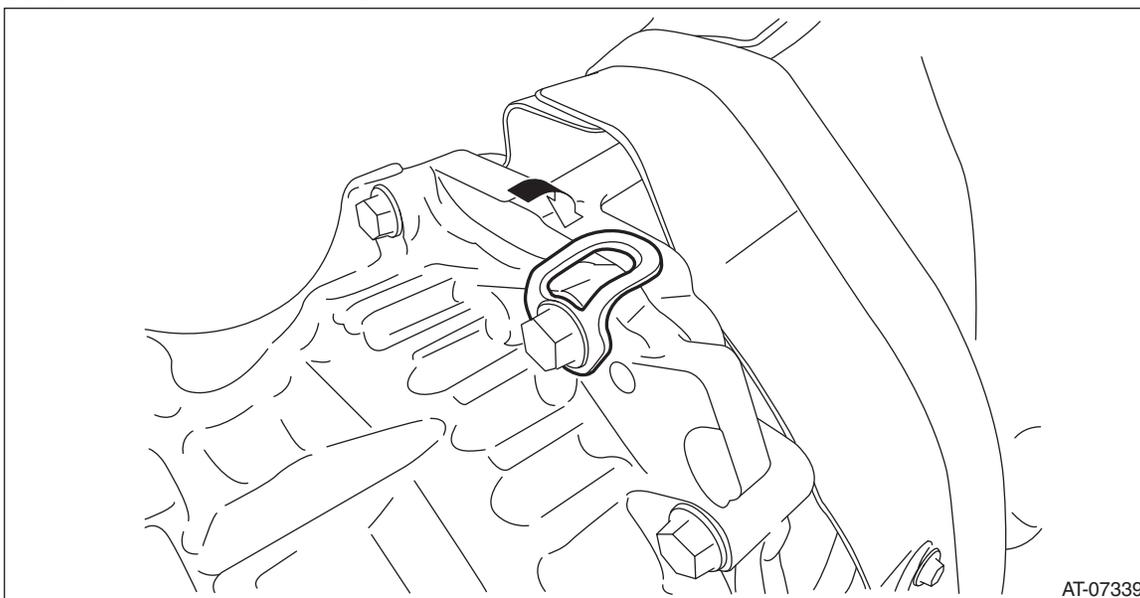
6) Strike and bend the transmission hanger of transmission rear with a soft rubber hammer etc. so that it gets in contact with the transmission case.

# Automatic Transmission Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

**CAUTION:**

**Do not apply excessive load or impact to the transmission case.**



7) While lifting up the transmission gradually, install the transmission to the engine.

**CAUTION:**

**This operation requires at least two persons.**

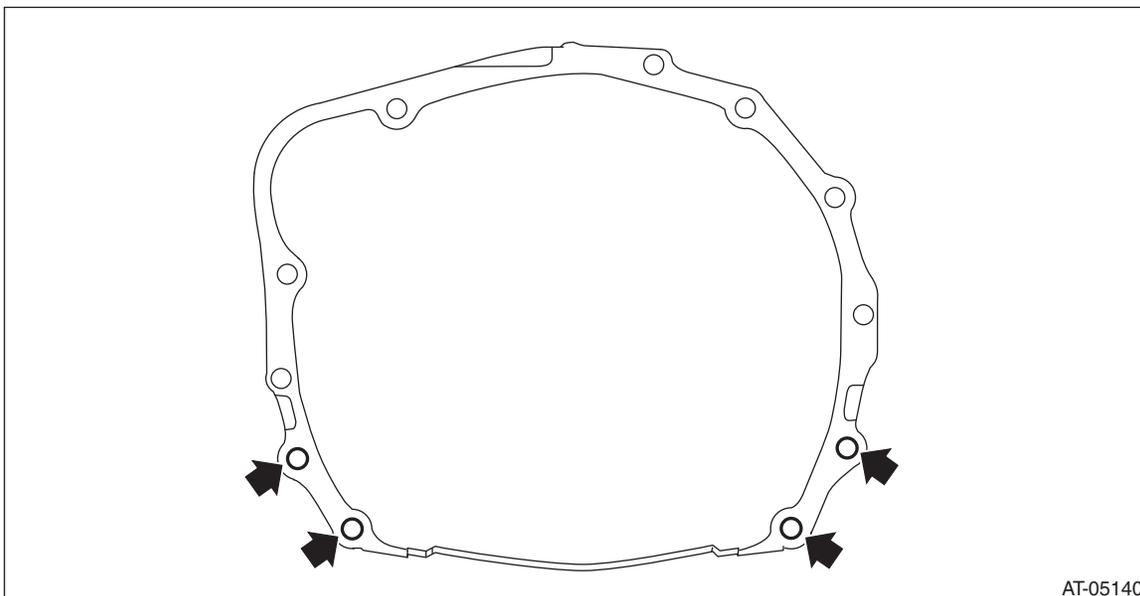
**NOTE:**

Keep the engine level.

8) Install the two engine connecting bolts and two nuts (lower side).

**Tightening torque:**

**50 N·m (5.1 kgf·m, 36.9 ft·lb)**



9) Secure the transmission rear crossmember to the vehicle body.

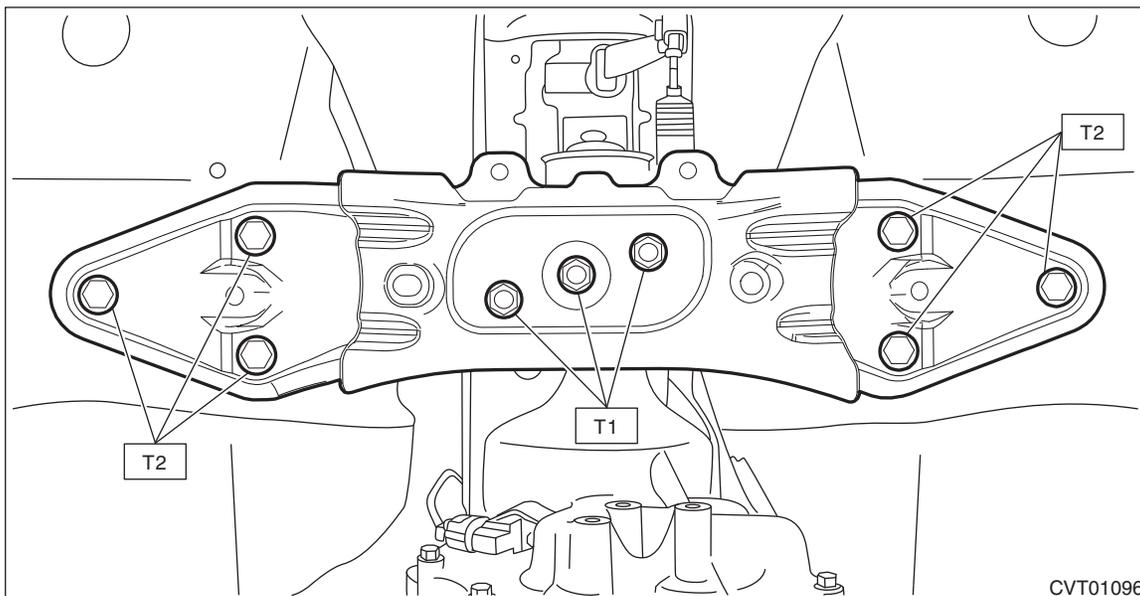
# Automatic Transmission Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

## Tightening torque:

**T1: 35 N·m (3.6 kgf-m, 25.8 ft-lb)**

**T2: 75 N·m (7.6 kgf-m, 55.3 ft-lb)**

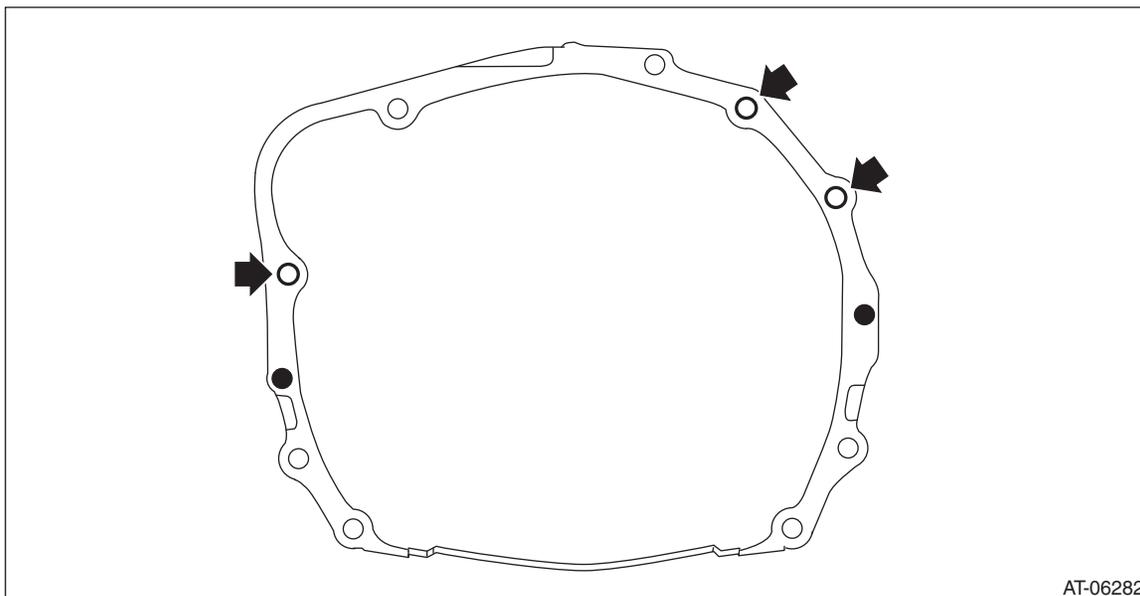


CVT01096

- 10) Remove the transmission jack.
- 11) Lower the vehicle.
- 12) Remove the ST (ENGINE HANGER).
- 13) Install the three engine mounting bolts (upper side).

## Tightening torque:

**50 N·m (5.1 kgf-m, 36.9 ft-lb)**



AT-06282

- 14) Install the left and right transmission mounting brackets.

## NOTE:

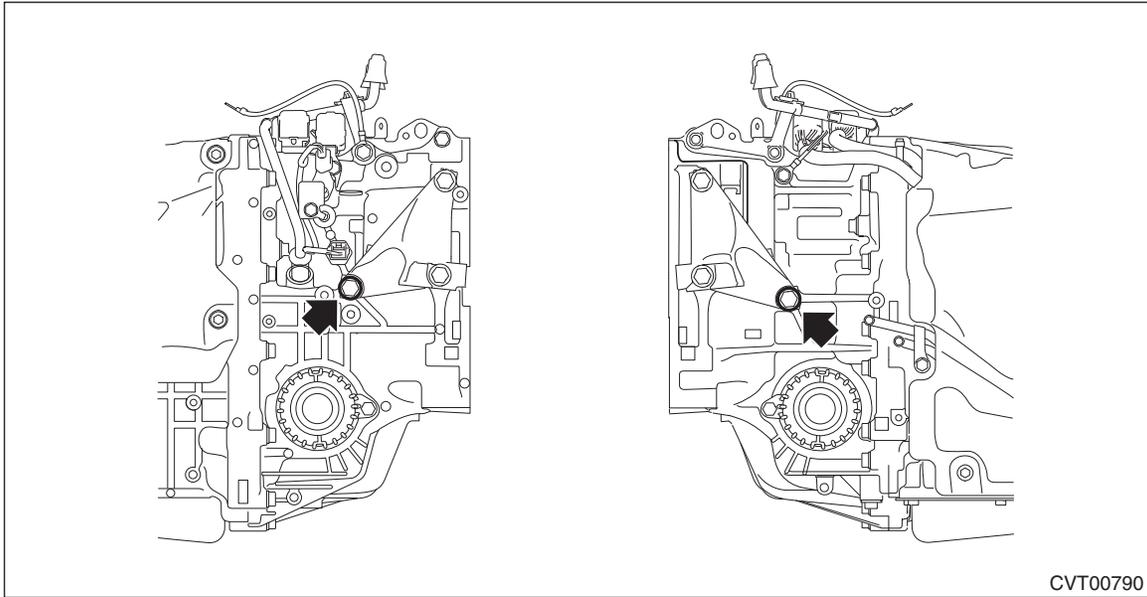
- Install to the left side of vehicle first because the engine inclines to the left.
- Temporarily tighten the bolt arrowed in the figure.

# Automatic Transmission Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

## Tightening torque:

75 N·m (7.6 kgf·m, 55.3 ft·lb)



CVT00790

15) Set the ST1 and ST2 to the vehicle body and lift up the engine unit slightly.

ST1 99099AJ000 ENGINE HANGER

ST2 99099AJ010 CHAIN BALANCER

### CAUTION:

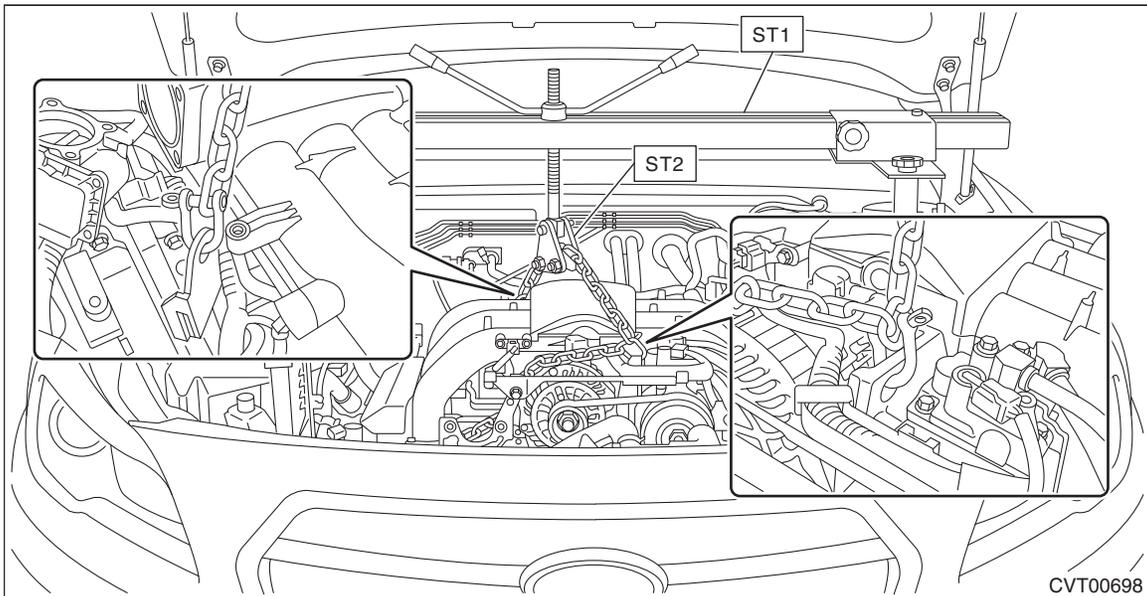
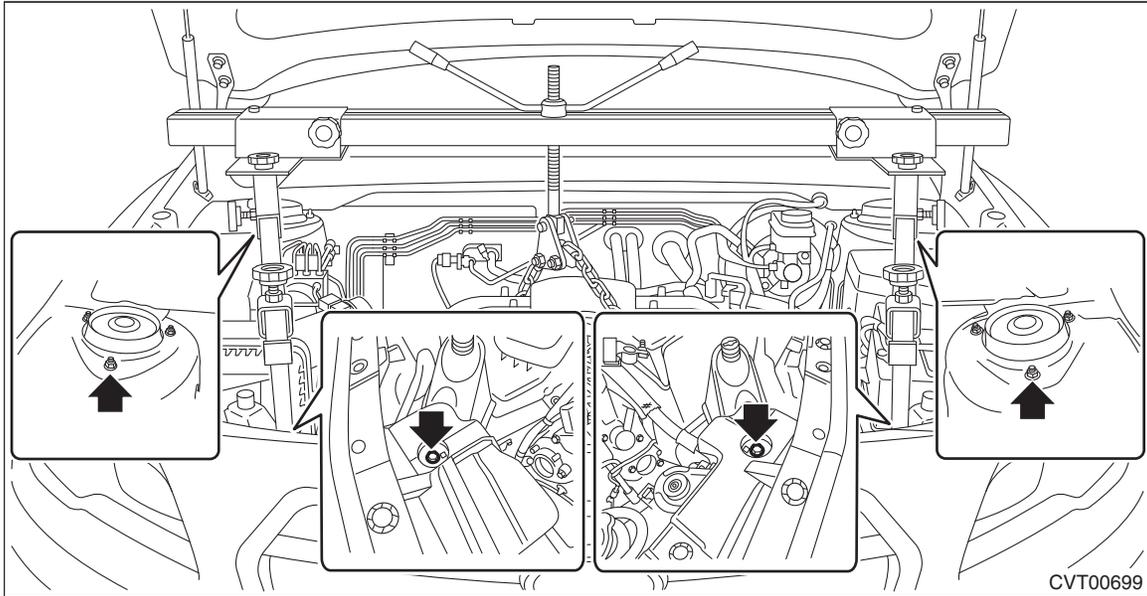
- Set so that the chain sling does not contact the engine parts.
- Install a bolt of  $\phi 8$  mm (0.3 in) at the locations shown in the figure, and place the front side arms of ST (ENGINE HANGER).

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# Automatic Transmission Assembly

## CONTINUOUSLY VARIABLE TRANSMISSION

- Set the rear arms of ST (ENGINE HANGER) at the locations shown in the figure.

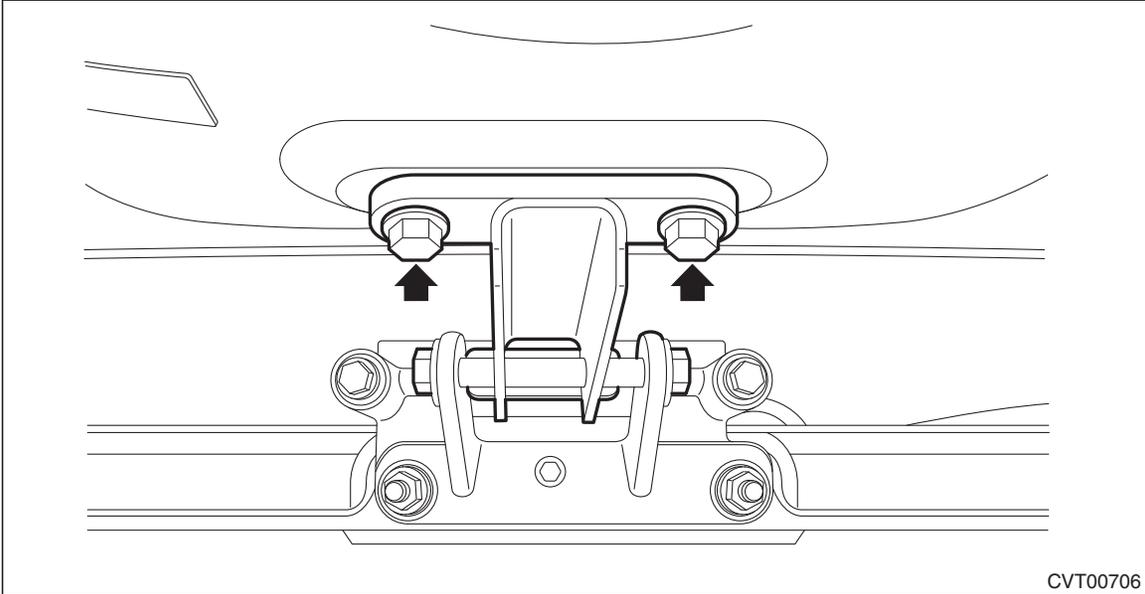


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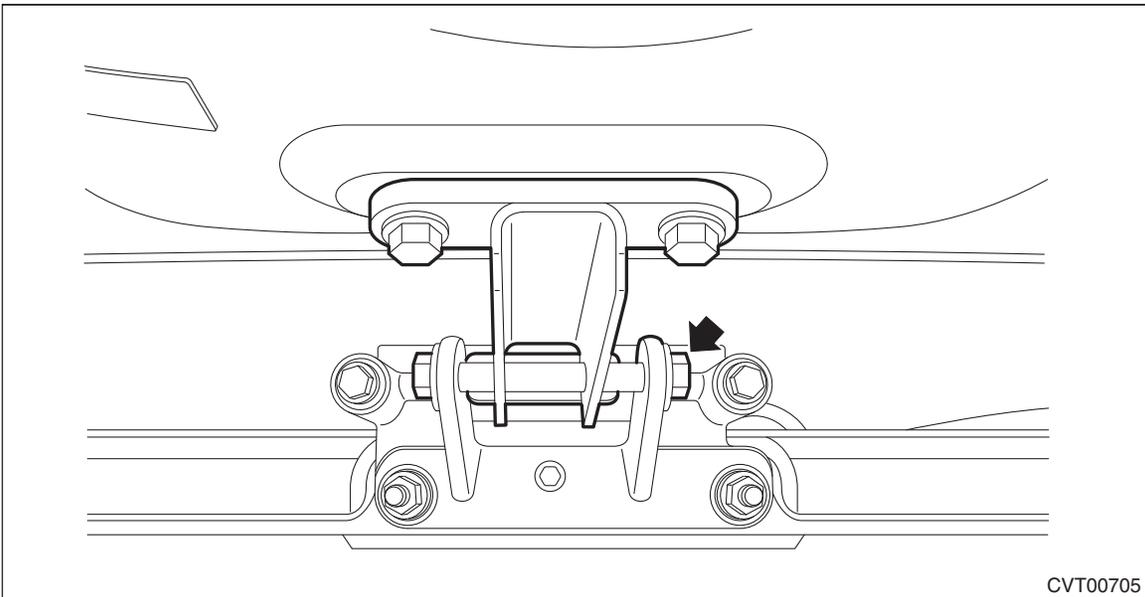
# Automatic Transmission Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

16) Remove the bolts from ST (SPECIAL TOOL H6).



17) Remove the bolt and nut to remove ST (SPECIAL TOOL H6).

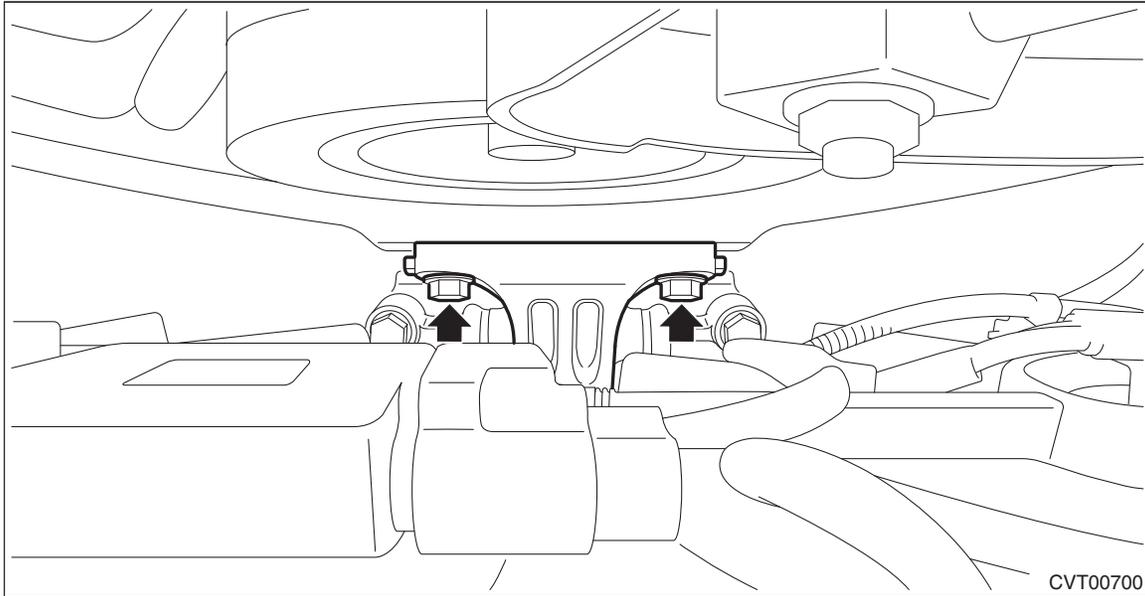


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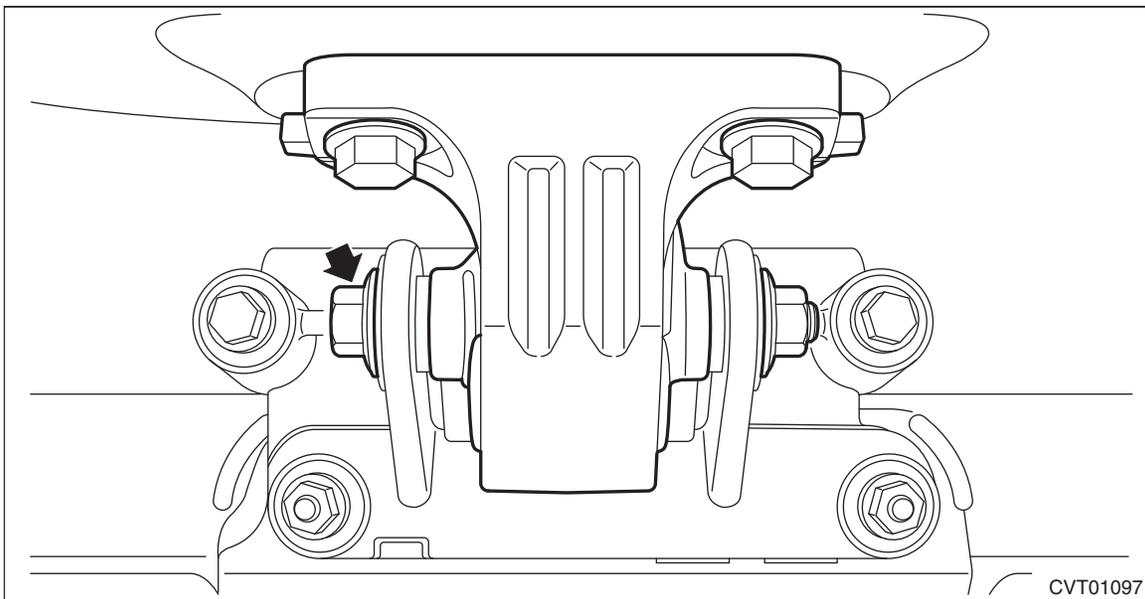
# Automatic Transmission Assembly

## CONTINUOUSLY VARIABLE TRANSMISSION

18) Temporarily attach the front cushion rubber with bolts.



19) Lift down the engine slightly and install the bolt and nut to the front cushion rubber.



20) Tighten the bolts and nuts of front cushion rubber.

NOTE:

Always start tightening from the bolts on the engine side.

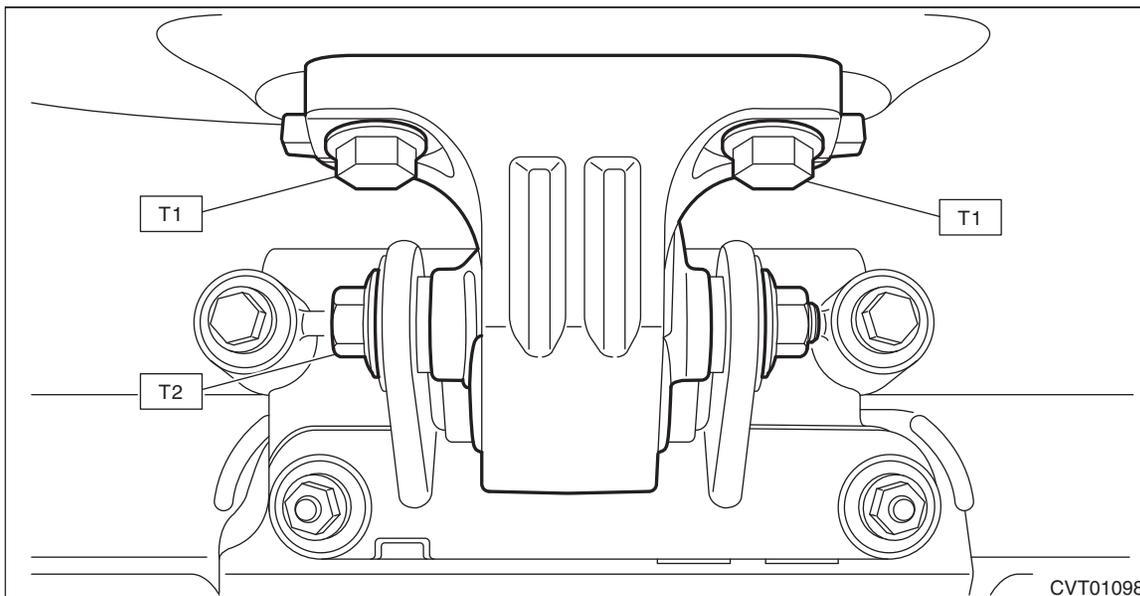
# Automatic Transmission Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

## Tightening torque:

**T1: 25 N·m (2.5 kgf-m, 18.4 ft-lb)**

**T2: 45 N·m (4.6 kgf-m, 33.2 ft-lb)**



21) Remove the ST (ENGINE HANGER and CHAIN SLING).

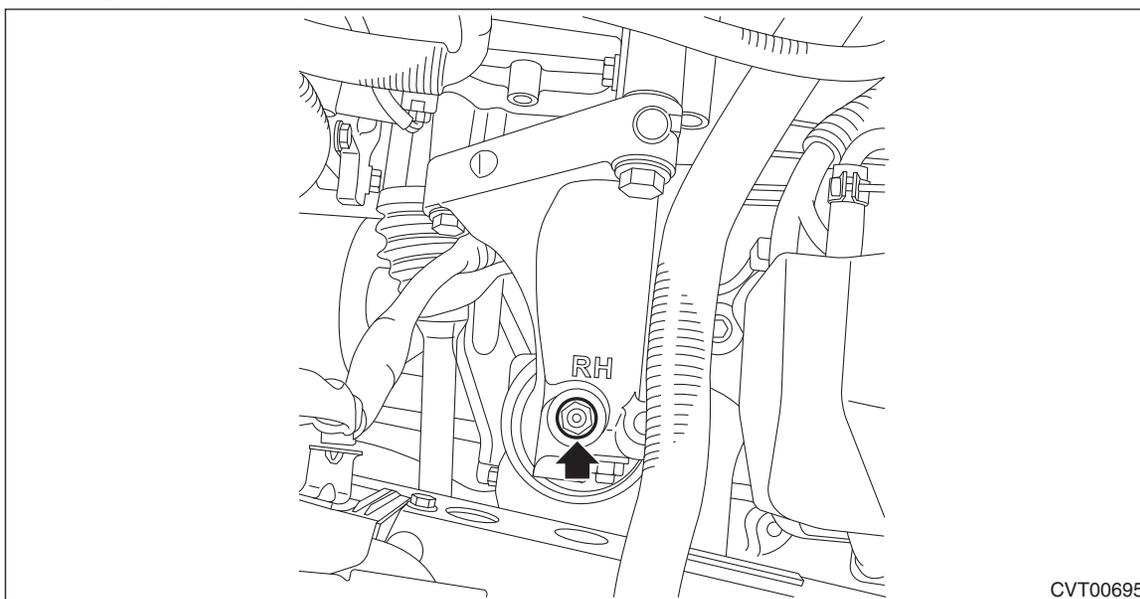
## CAUTION:

**Be sure to remove the  $\phi 8$  mm (0.3 in) bolt.**

22) Install the nut to the transmission mounting bracket.

## Tightening torque:

**45 N·m (4.6 kgf-m, 33.2 ft-lb)**



23) Remove the ST (STOPPER SET) from converter case.

24) Match the torque converter screw hole with drive plate hole to install the bolt.

## CAUTION:

- Do not drop the mounting bolt in the converter housing.
- Do not damage the mounting bolt.

## Tightening torque:

**25 N·m (2.5 kgf-m, 18.4 ft-lb)**

# Automatic Transmission Assembly

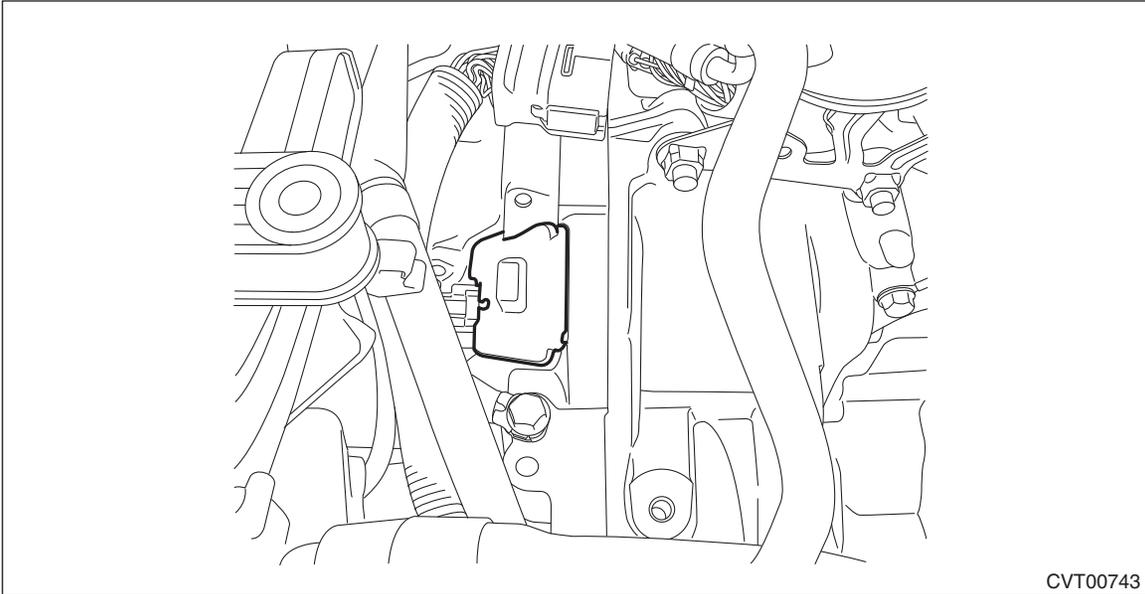
## CONTINUOUSLY VARIABLE TRANSMISSION

25) Install the remaining three bolts by rotating the crank pulley a little at a time in the same direction as engine revolution.

**Tightening torque:**

**25 N·m (2.5 kgf·m, 18.4 ft·lb)**

26) Install the service hole plug.



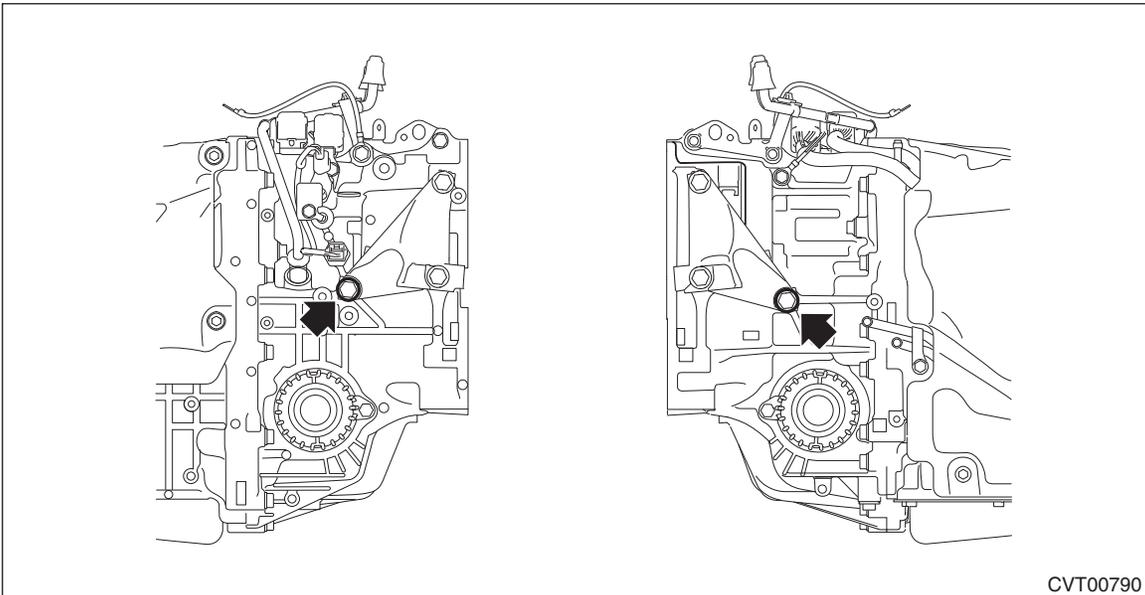
27) Install the starter. <Ref. to SC(H6DO)-9, INSTALLATION, Starter.>

28) Lift up the vehicle.

29) Tighten the single mounting bolt of transmission mounting bracket.

**Tightening torque:**

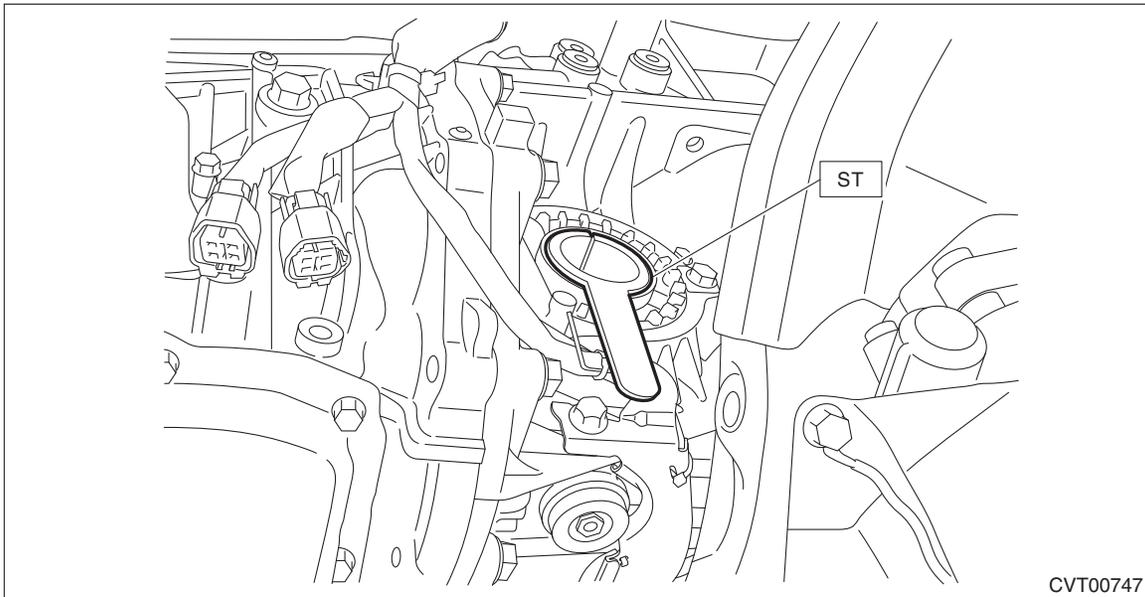
**75 N·m (7.6 kgf·m, 55.3 ft·lb)**



# Automatic Transmission Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

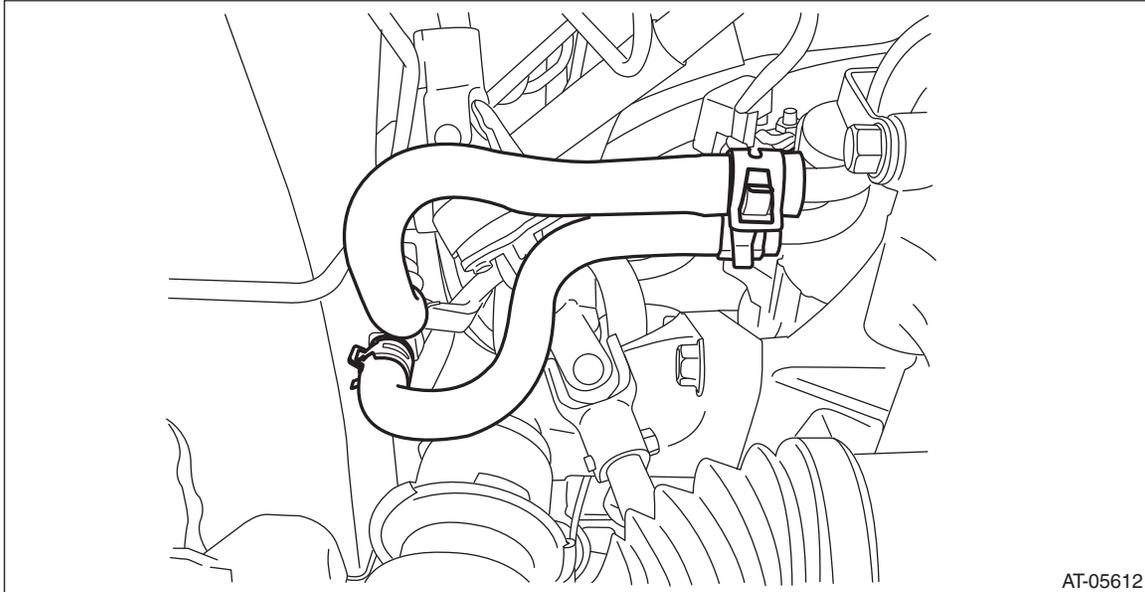
- 30) Set the ST to differential side retainer.  
ST 28399SA010 OIL SEAL PROTECTOR



- 31) Replace the circlip of the drive shaft with a new part.  
32) Insert the front drive shaft spline section into transmission and remove the ST (OIL SEAL PROTECTOR).  
33) Insert the drive shaft into the transmission securely by pressing the housing from outside of the vehicle.  
34) Install the CVTF CVT inlet hose and CVTF CVT outlet hose.

**NOTE:**

Use new CVTF CVT inlet hose and CVTF CVT outlet hose.



- 35) Insert the ball joint into housing and secure with bolt.

**CAUTION:**

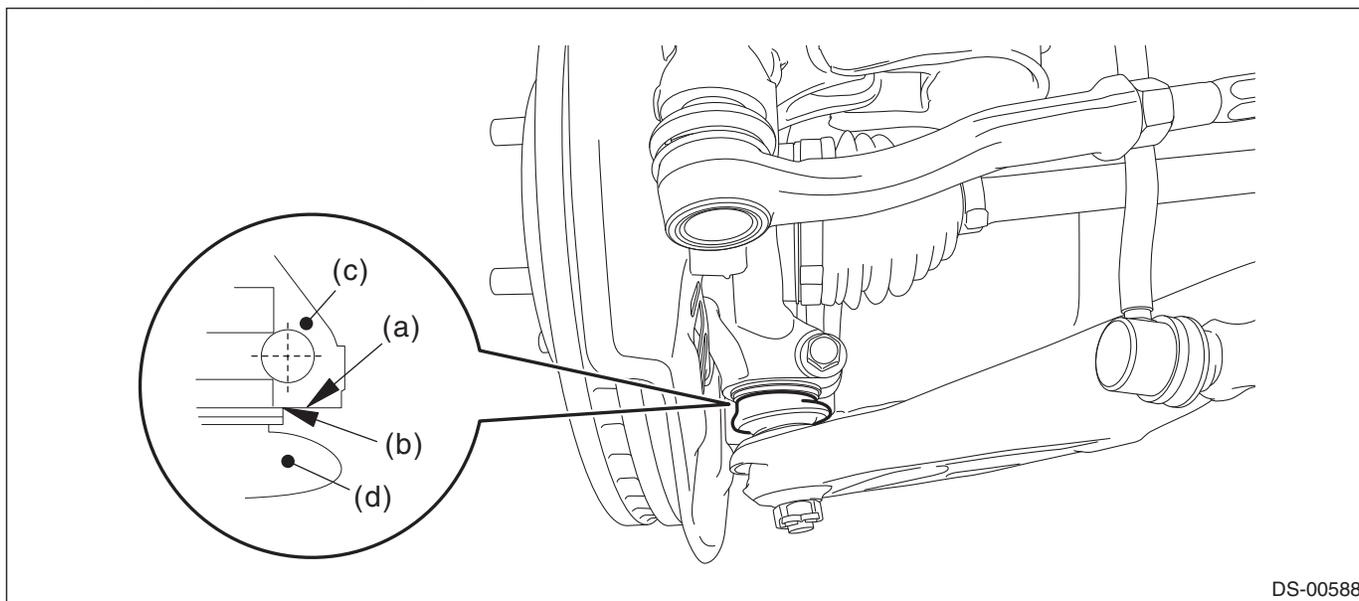
- Do not apply grease to the tapered portion of ball stud.
- Before tightening, make sure the bottom surface of the housing assembly - front axle and the stepped section of ball joint are in contact.
- Be careful not to damage the boot of the joint.

# Automatic Transmission Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

## **Tightening torque:**

**50 N·m (5.1 kgf·m, 36.9 ft-lb)**



DS-00588

- (a) Bottom surface of housing ASSY - front axle      (b) Raised section of ball joint      (c) Housing ASSY - front axle  
(d) Ball joint ASSY

36) Install the stabilizer link.

NOTE:

Use a new flange nut.

## **Tightening torque:**

**60 N·m (6.1 kgf·m, 44.3 ft-lb)**

37) Connect the tie-rod end and knuckle arm, and attach the castle nut.

## **Tightening torque:**

**27 N·m (2.75 kgf·m, 19.9 ft-lb)**

CAUTION:

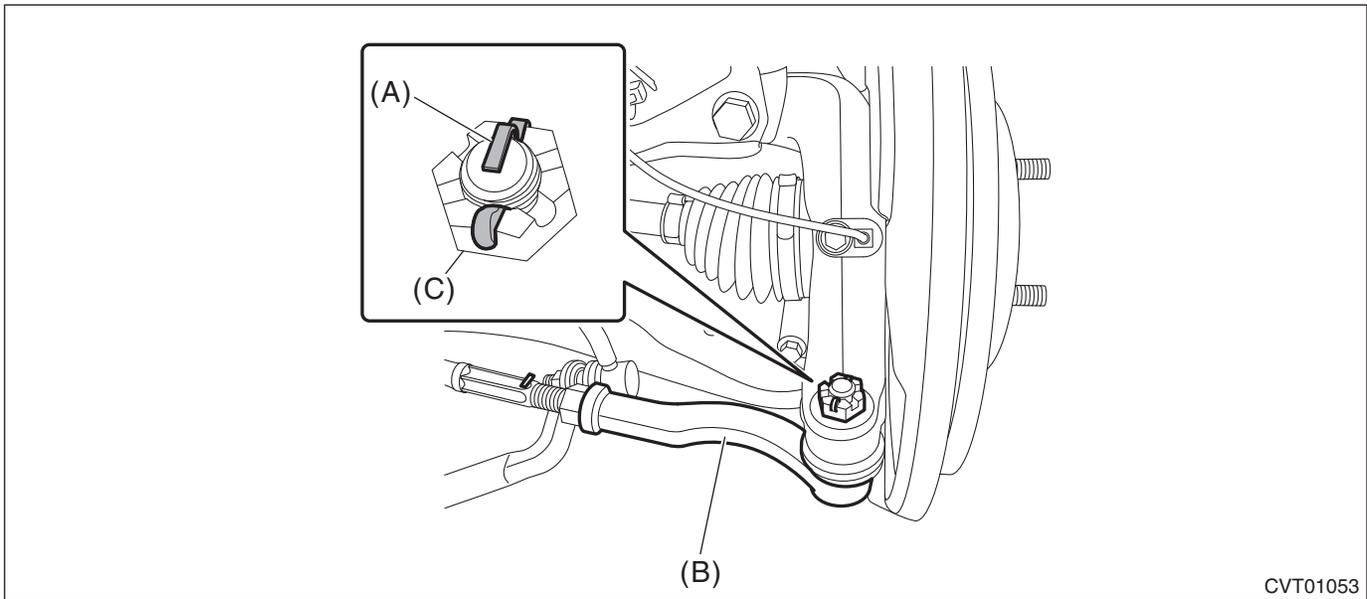
When connecting, do not hit the cap at the bottom of tie-rod end with hammer.

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# Automatic Transmission Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

38) After tightening the castle nut to the specified tightening torque, tighten it further within 60° until the cotter pin hole is aligned with slot in the nut. Fit the cotter pin into the nut, and then bend the pin to lock.



CVT01053

- (A) Cotter pin
- (B) Tie-rod end
- (C) Castle nut

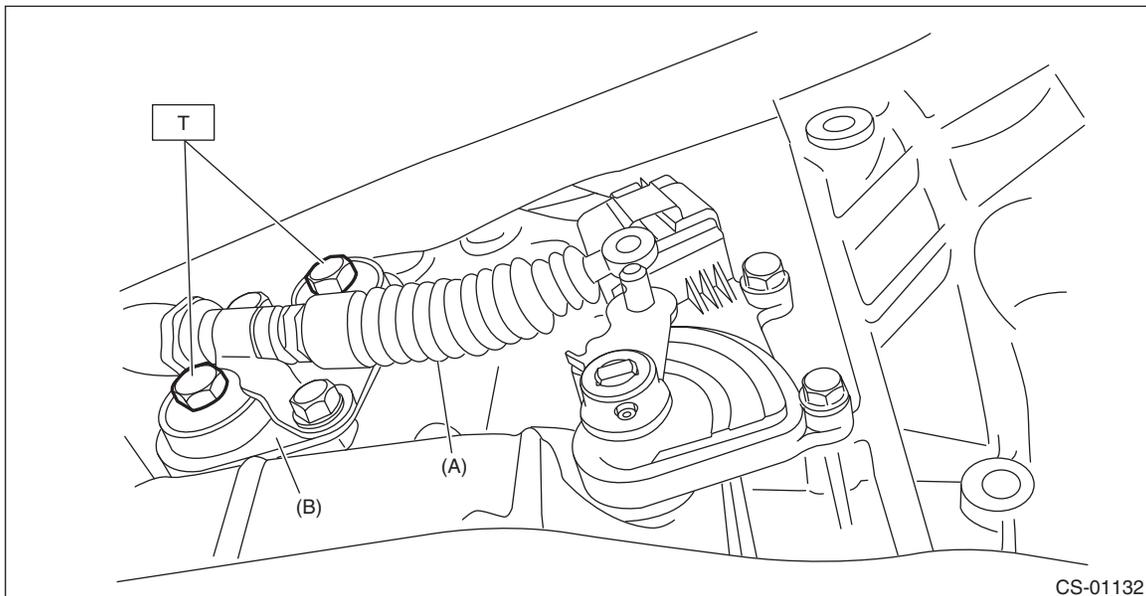
39) Install the propeller shaft. <Ref. to DS-12, INSTALLATION, Propeller Shaft.>

40) Install the universal joint. <Ref. to PS-21, INSTALLATION, Universal Joint.>

41) Install the cable plate assembly.

**Tightening torque:**

**T: 25 N·m (2.5 kgf-m, 18.4 ft-lb)**



CS-01132

- (A) Select cable
- (B) Cable plate ASSY

42) Connect the select cable and install the washer and snap pin.

**CVT(TR690)-89**

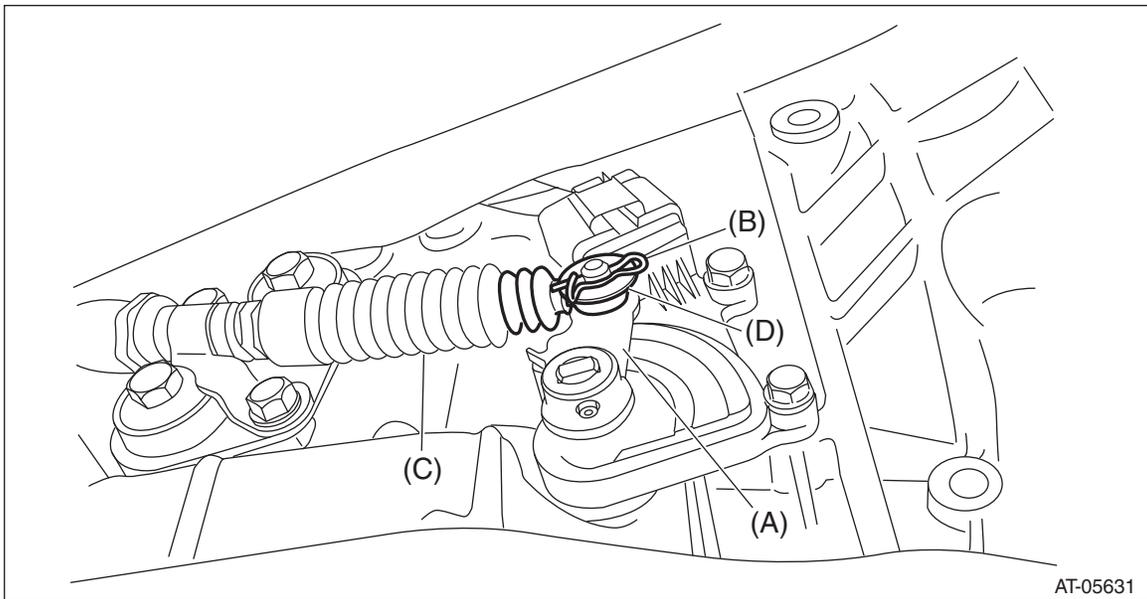
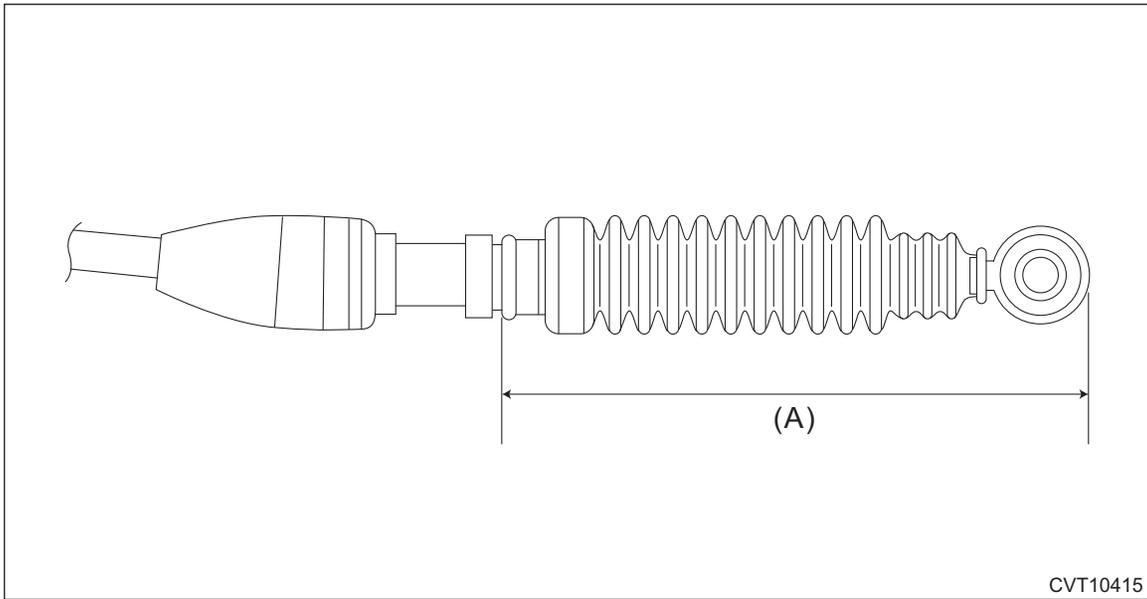
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# Automatic Transmission Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

## CAUTION:

Do not apply extra overload while holding the part (A).



- (A) Shifter arm
- (B) Snap pin
- (C) Select cable
- (D) Washer

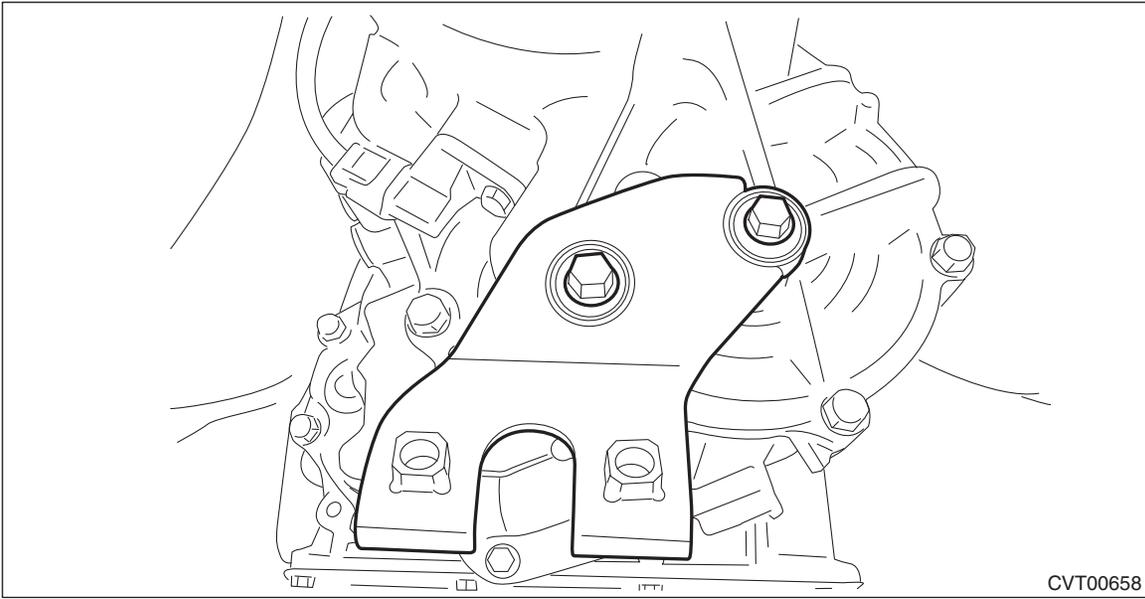
43) Install the exhaust hanger bracket.

# Automatic Transmission Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

**Tightening torque:**

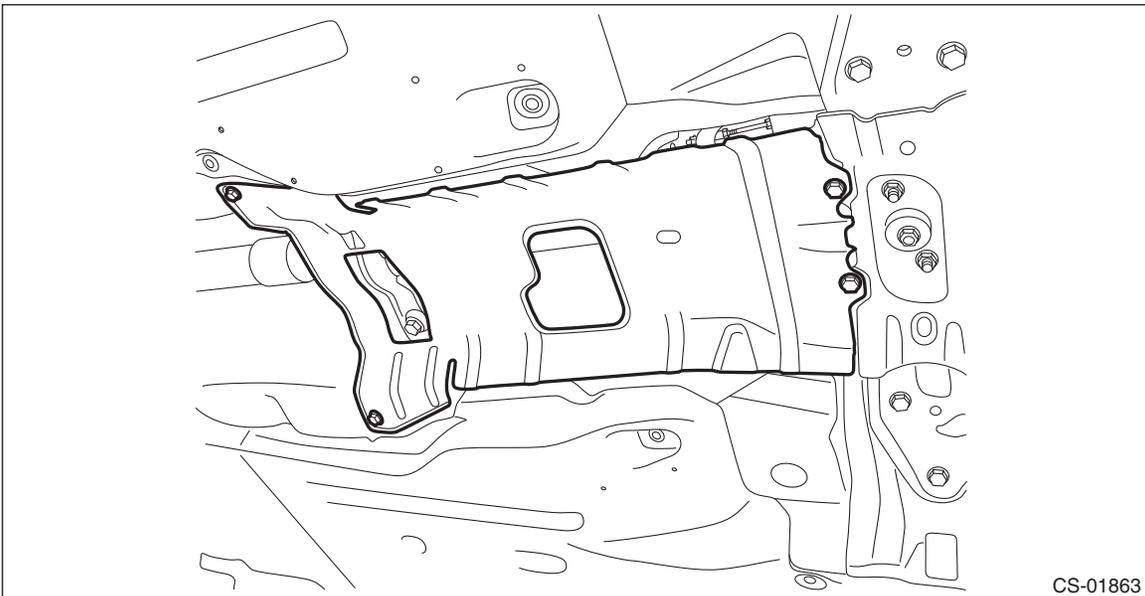
**30 N·m (3.1 kgf·m, 22.1 ft·lb)**



44) Install the center exhaust cover.

**Tightening torque:**

**18 N·m (1.8 kgf·m, 13.3 ft·lb)**



45) Install the front exhaust pipe. <Ref. to EX(H6DO)-7, INSTALLATION, Front Exhaust Pipe.>

46) Install the front under cover. <Ref. to EI-27, INSTALLATION, Front Under Cover.>

47) Lower the vehicle.

48) Remove the ST (HANGER).

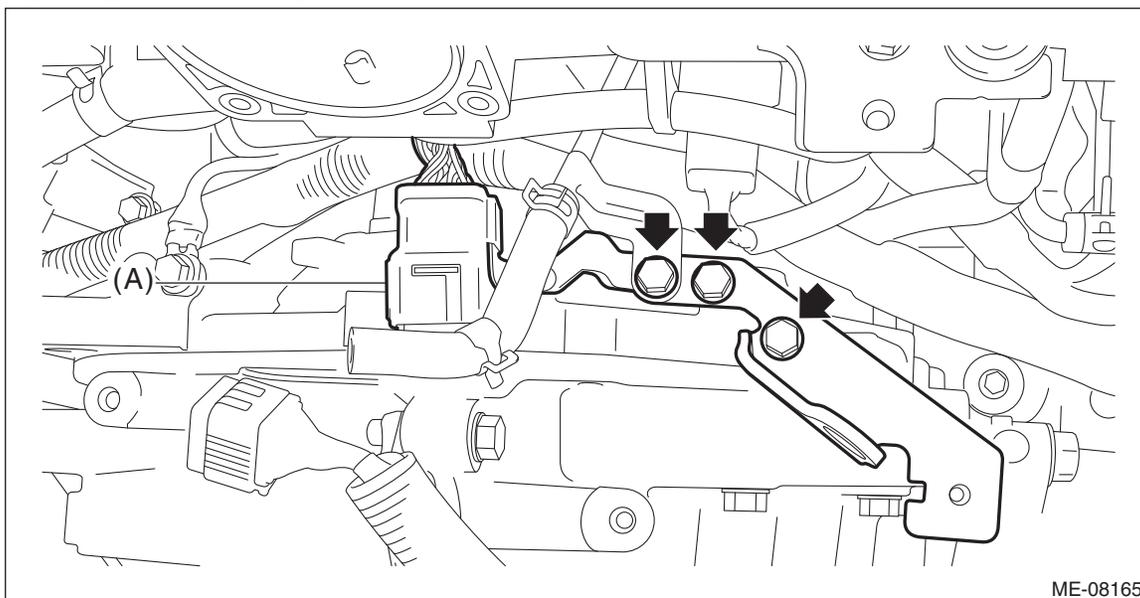
49) Install the engine hanger rear and the oxygen sensor harness connector (A).

# Automatic Transmission Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

**Tightening torque:**

**19 N·m (1.9 kgf·m, 14.0 ft·lb)**

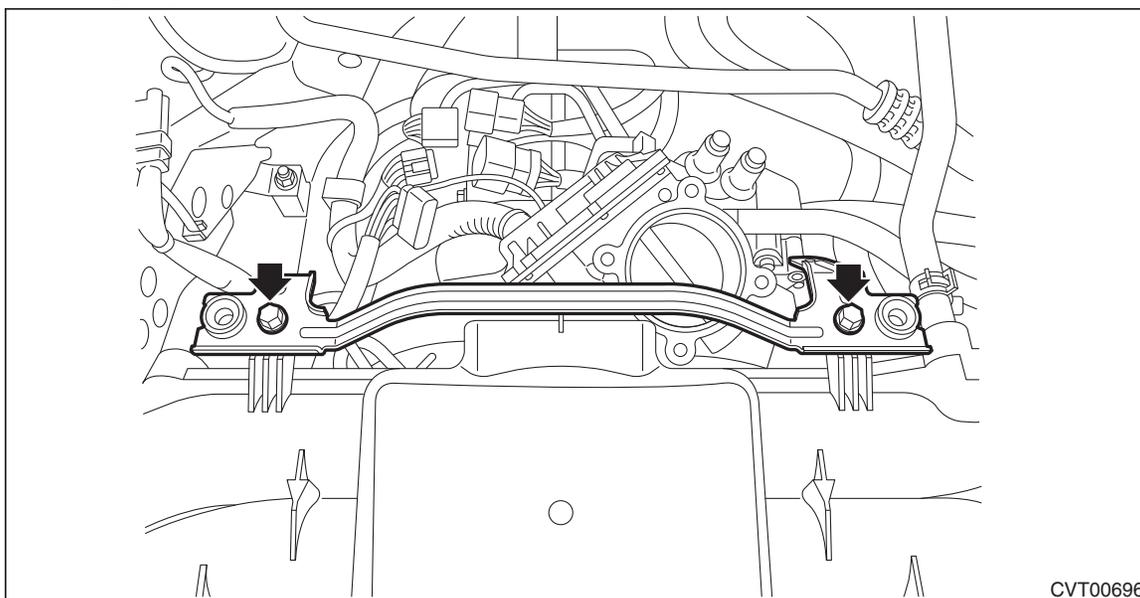


ME-08165

50) Install the collector cover bracket.

**Tightening torque:**

**6.5 N·m (0.7 kgf·m, 4.8 ft·lb)**



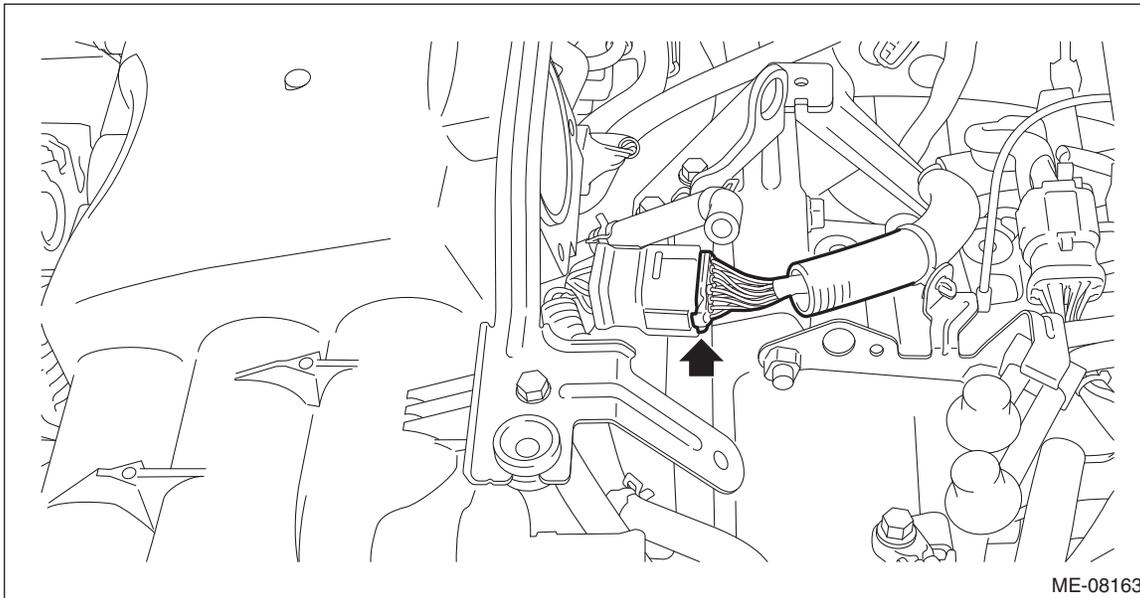
CVT00696

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# Automatic Transmission Assembly

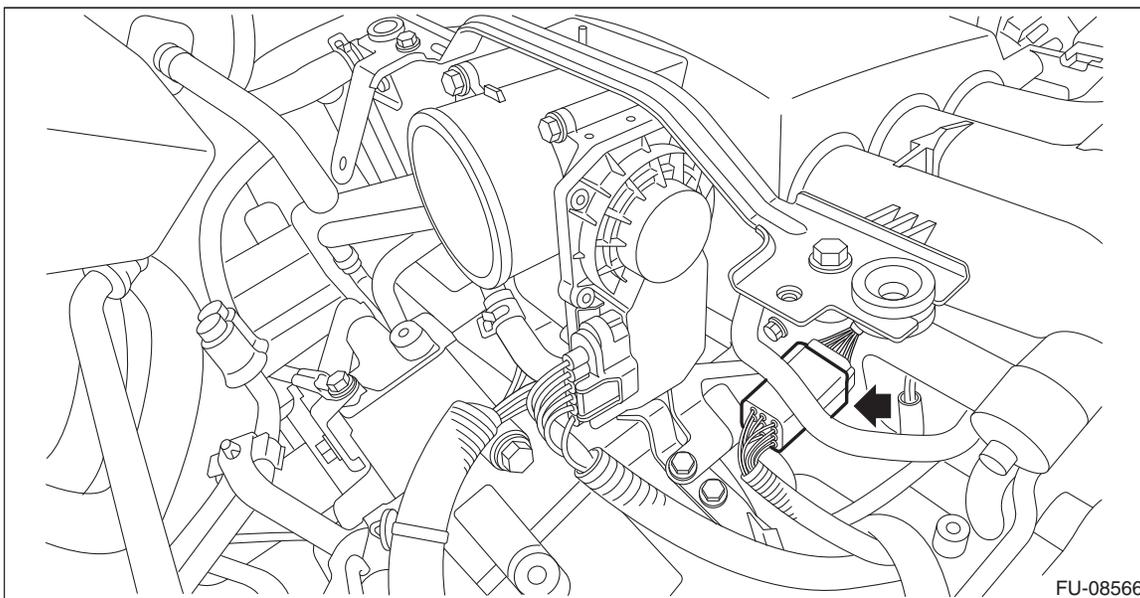
CONTINUOUSLY VARIABLE TRANSMISSION

51) Connect the oxygen sensor harness connector.



52) Install the throttle body. <Ref. to FU(H6DO)-20, INSTALLATION, Throttle Body.>

53) Connect the engine harness connector.



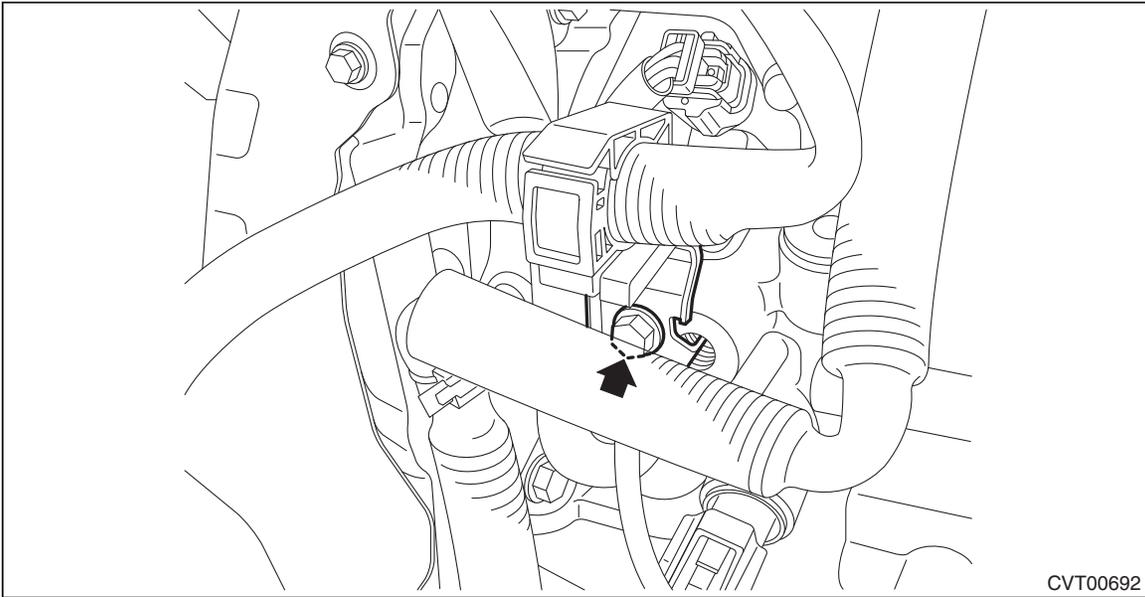
54) Install the harness stay.

# Automatic Transmission Assembly

## CONTINUOUSLY VARIABLE TRANSMISSION

### Tightening torque:

**16 N·m (1.6 kgf-m, 11.8 ft-lb)**

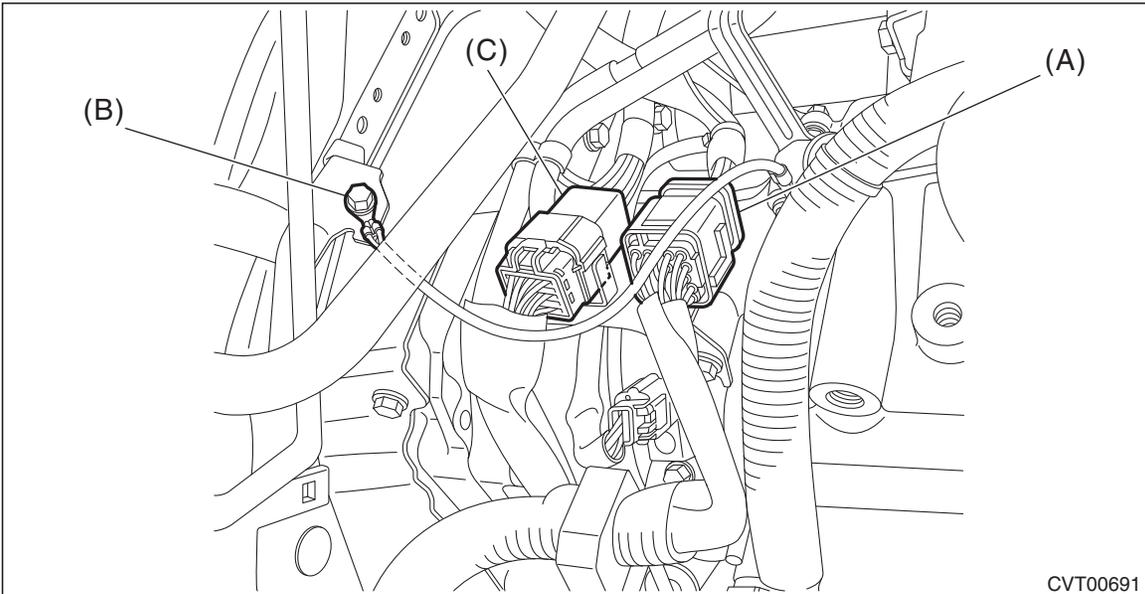


55) Connect the following harness connectors.

- Transmission harness connectors
- Transmission radio ground terminal
- Inhibitor harness connector

### Tightening torque:

**13 N·m (1.3 kgf-m, 9.6 ft-lb)**



- (A) Transmission harness connectors
- (B) Transmission radio ground terminal
- (C) Inhibitor harness connector

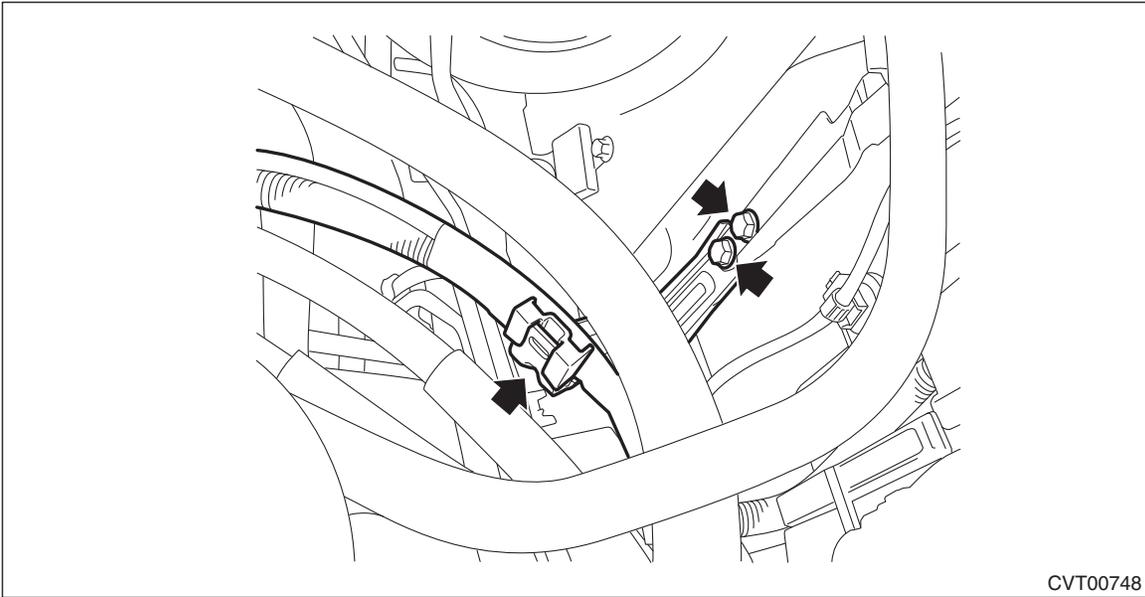
56) Install the battery cable bracket, and install the battery cable clip to the bracket.

# Automatic Transmission Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

## Tightening torque:

**7.5 N·m (0.8 kgf-m, 5.5 ft-lb)**



CVT00748

- 57) Install the air intake boot. <Ref. to IN(H6DO)-10, INSTALLATION, Air Intake Boot.>
- 58) Install the air intake duct. <Ref. to IN(H6DO)-12, INSTALLATION, Air Intake Duct.>
- 59) Install the front tires. <Ref. to WT-6, INSTALLATION, Tire and Wheel.>
- 60) Install the collector cover.
- 61) Connect the ground terminal to battery sensor. <Ref. to RC-3, BATTERY, NOTE, Repair Contents.>
- 62) Refill differential gear oil to adjust the differential gear oil amount. <Ref. to CVT(TR690)-43, ADJUSTMENT, Differential Gear Oil.>
- 63) Refill CVTF to adjust the CVTF amount. <Ref. to CVT(TR690)-39, ADJUSTMENT, CVTF.>
- 64) Perform the variator chain break-in. <Ref. to CVT(TR690)-46, Variator Chain Break-in.>

### CAUTION:

**Always execute the variator chain break-in after the replacement of the following.**

- Variator chain replacement
- Primary pulley and secondary pulley replacement

- 65) Perform the clear operation for AT learning. <Ref. to CVT(diag)-26, Clear Memory Mode.>
- 66) Perform the operation of AT learning mode. <Ref. to CVT(diag)-33, Learning Control.>
- 67) Execute the rear differential inspection mode. <Ref. to DI-63, Rear Differential Inspection Mode.>

### CAUTION:

**Always execute the rear differential inspection mode after the replacement of the following.**

- Replacement of transmission assembly
- Replacement of front differential hypoid gear set

- 68) Perform the road test to make sure there is no fault. <Ref. to CVT(TR690)-48, INSPECTION, Road Test.>

# Transmission Mounting System

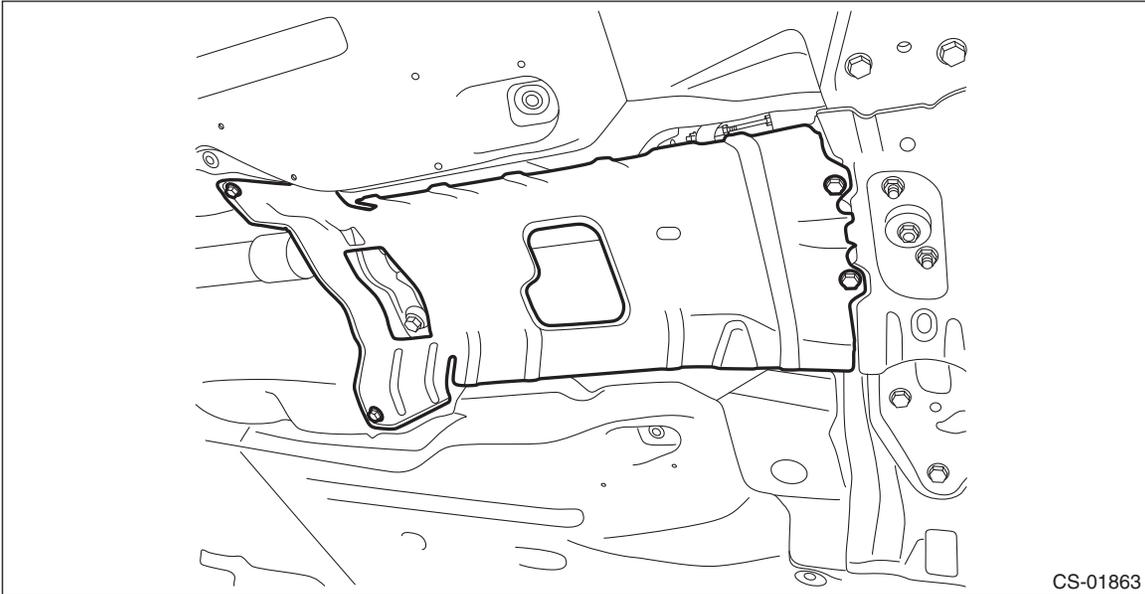
CONTINUOUSLY VARIABLE TRANSMISSION

## 12. Transmission Mounting System

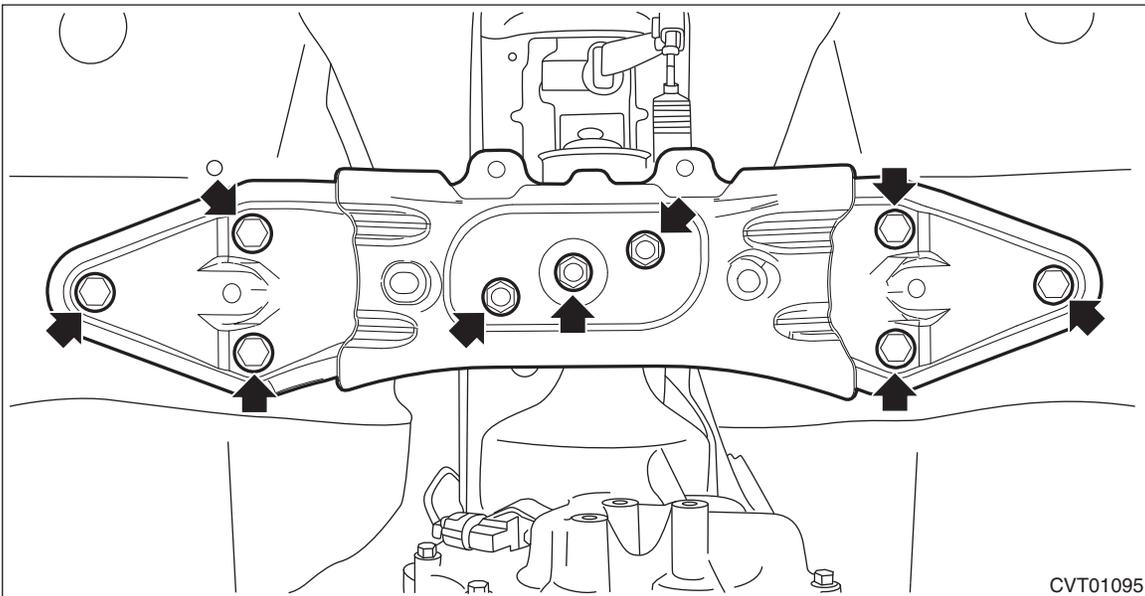
### A: REMOVAL

#### 1. TRANSMISSION REAR CROSSMEMBER AND REAR CUSHION RUBBER

- 1) Disconnect the ground terminal from battery sensor. <Ref. to RC-3, BATTERY, NOTE, Repair Contents.>
- 2) Lift up the vehicle.
- 3) Remove the front exhaust pipe. <Ref. to EX(H6DO)-6, REMOVAL, Front Exhaust Pipe.>
- 4) Remove the center exhaust cover.



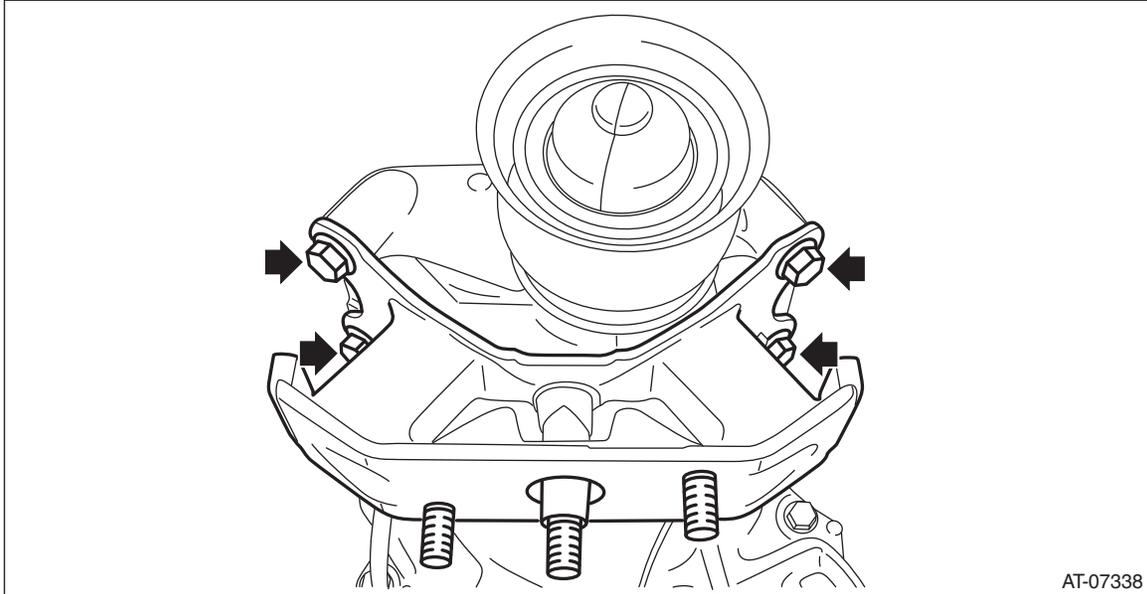
- 5) Set the transmission jack under the transmission. Make sure that the support plate of transmission jack does not touch the oil pan.
- 6) Remove the transmission rear crossmember.



# Transmission Mounting System

CONTINUOUSLY VARIABLE TRANSMISSION

7) Remove the rear cushion rubber.



## 2. MAIN MOUNTING BRACKET & MAIN CUSHION RUBBER

For removal, refer to the “ME (H6DO)” section. <Ref. to ME(H6DO)-76, MAIN MOUNTING BRACKET & MAIN CUSHION RUBBER, REMOVAL, Engine Mounting.>

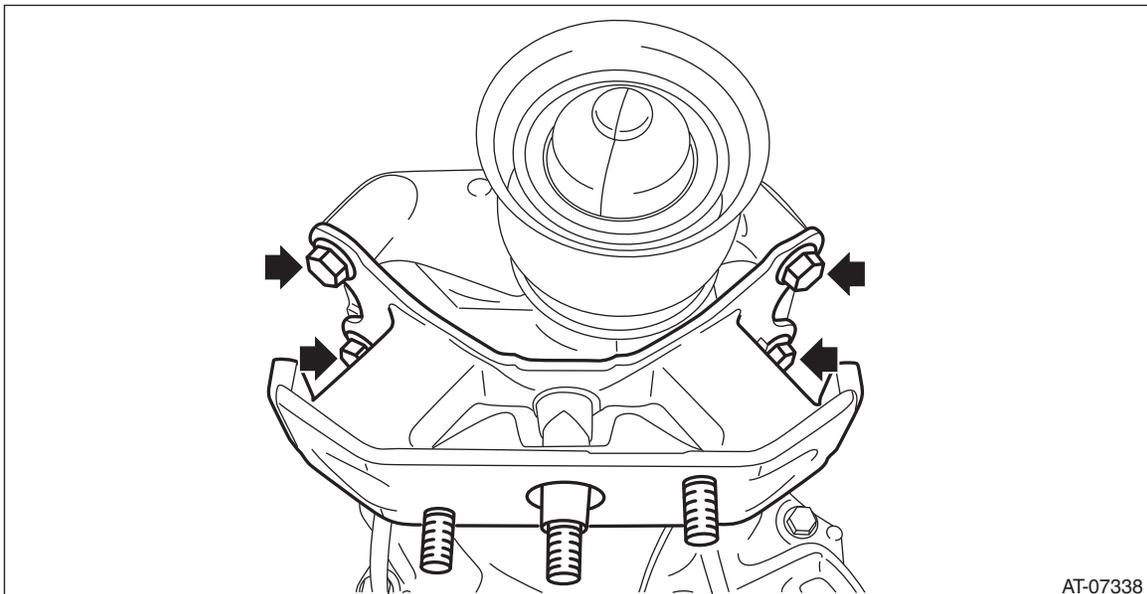
### B: INSTALLATION

#### 1. TRANSMISSION REAR CROSSMEMBER AND REAR CUSHION RUBBER

1) Install the rear cushion rubber.

**Tightening torque:**

**40 N·m (4.1 kgf·m, 29.5 ft·lb)**



2) Install the transmission rear crossmember.

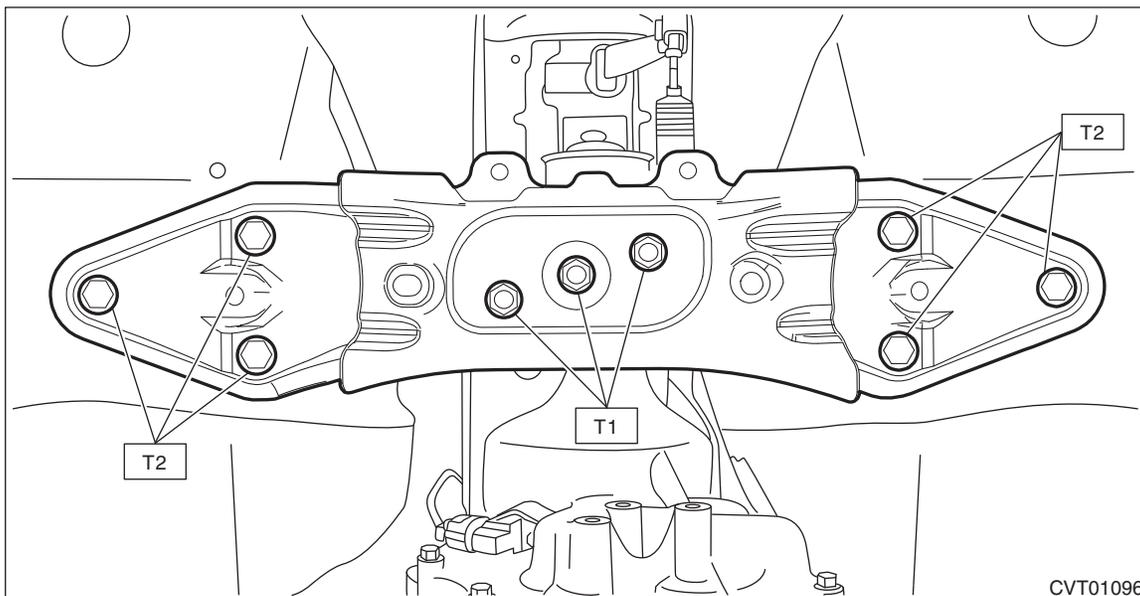
# Transmission Mounting System

CONTINUOUSLY VARIABLE TRANSMISSION

## Tightening torque:

**T1: 35 N·m (3.6 kgf-m, 25.8 ft-lb)**

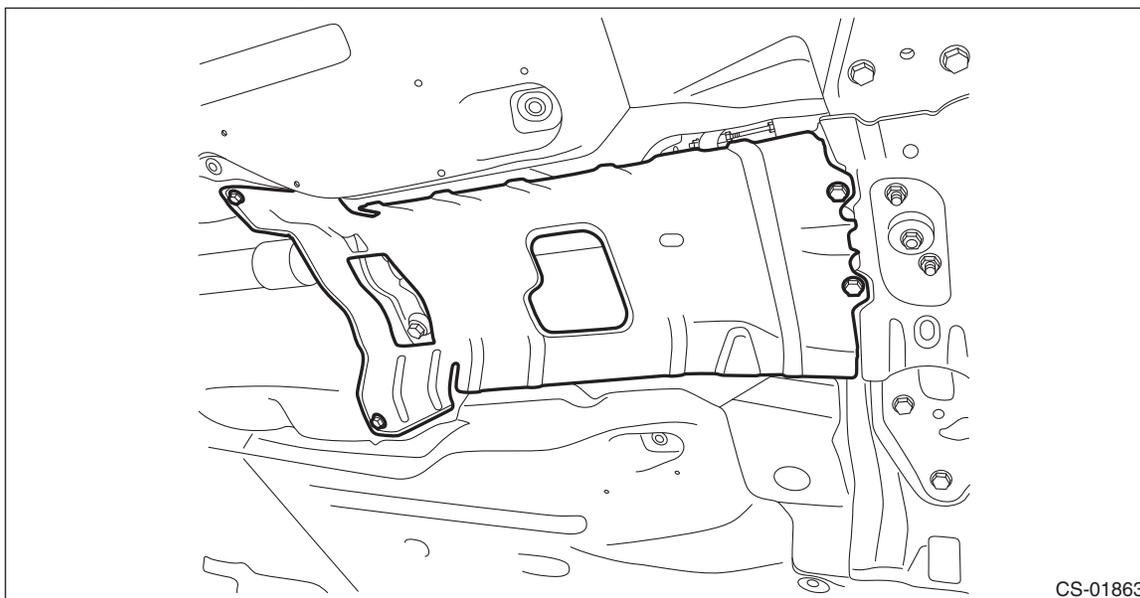
**T2: 75 N·m (7.6 kgf-m, 55.3 ft-lb)**



- 3) Remove the transmission jack.
- 4) Install the center exhaust cover.

## Tightening torque:

**18 N·m (1.8 kgf-m, 13.3 ft-lb)**



- 5) Install the front exhaust pipe. <Ref. to EX(H6DO)-7, INSTALLATION, Front Exhaust Pipe.>
- 6) Connect the ground terminal to battery sensor. <Ref. to RC-3, BATTERY, NOTE, Repair Contents.>

## 2. MAIN MOUNTING BRACKET & MAIN CUSHION RUBBER

For installation, refer to the “ME (H6DO)” section. <Ref. to ME(H6DO)-81, MAIN MOUNTING BRACKET & MAIN CUSHION RUBBER, INSTALLATION, Engine Mounting.>

### C: INSPECTION

- Check the crossmember for bends or damage.
- Check that the cushion rubber is not stiff, cracked or otherwise damaged.

## 13.Extension Case Oil Seal

### A: INSPECTION

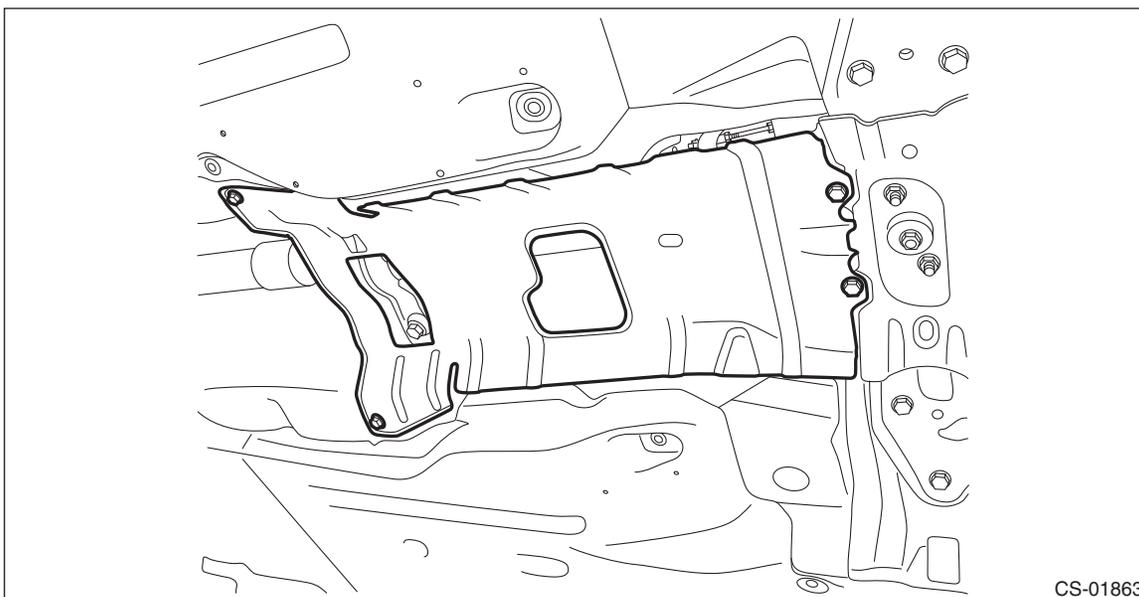
Check for leakage of CVTF from the joint section of transmission and propeller shaft. If a leak is found, inspect the propeller shaft and replace the oil seal.

### B: REPLACEMENT

#### CAUTION:

**Immediately after the vehicle has been running or after idling for a long time, the CVTF will be hot. Be careful not to burn yourself.**

- 1) Lift up the vehicle.
- 2) Remove the front exhaust pipe. <Ref. to EX(H6DO)-6, REMOVAL, Front Exhaust Pipe.>
- 3) Remove the center exhaust cover.



- 4) Clean the transmission exterior.
- 5) Remove the propeller shaft. <Ref. to DS-10, REMOVAL, Propeller Shaft.>
- 6) Using a screwdriver or ST, remove the oil seal trying not to damage the extension case.  
ST 398527700 PULLER ASSY
- 7) Using the ST, install the oil seal.

#### NOTE:

- Use a new oil seal.
- Apply CVTF to the oil seal lip and press-fitting surface.

ST 498057300 INSTALLER

- 8) Install the propeller shaft. <Ref. to DS-12, INSTALLATION, Propeller Shaft.>
- 9) Install the center exhaust cover.

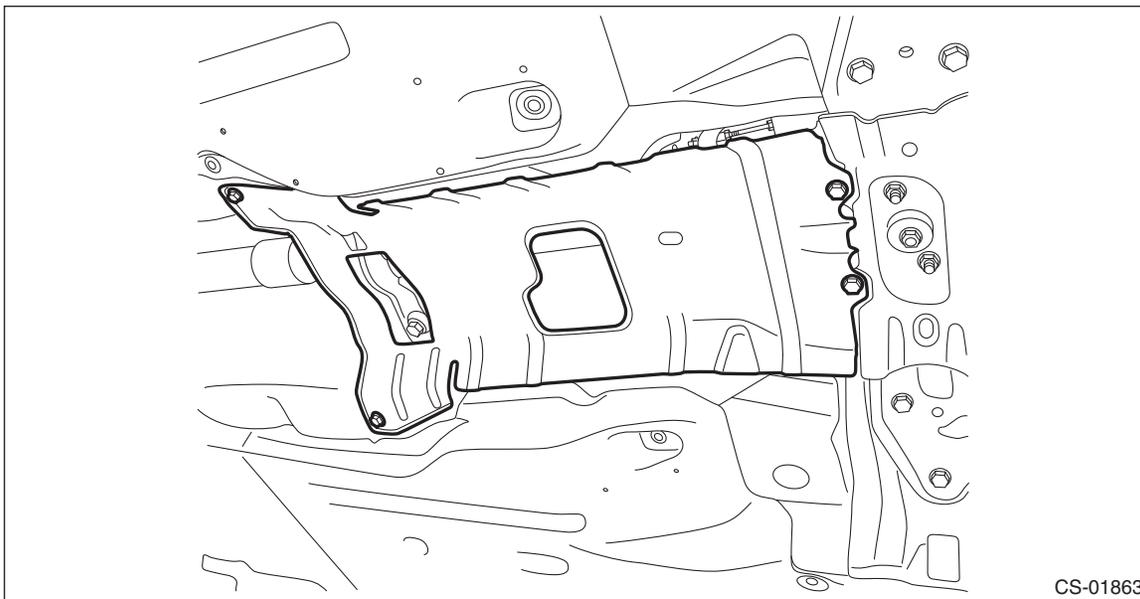
## Extension Case Oil Seal

CONTINUOUSLY VARIABLE TRANSMISSION

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**Tightening torque:**

**18 N·m (1.8 kgf-m, 13.3 ft-lb)**



10) Install the front exhaust pipe. <Ref. to EX(H6DO)-7, INSTALLATION, Front Exhaust Pipe.>

11) Adjust the CVTF level and check there is no leakage. <Ref. to CVT(TR690)-39, ADJUSTMENT, CVTF.>

## 14. Differential Side Retainer Oil Seal

### A: INSPECTION

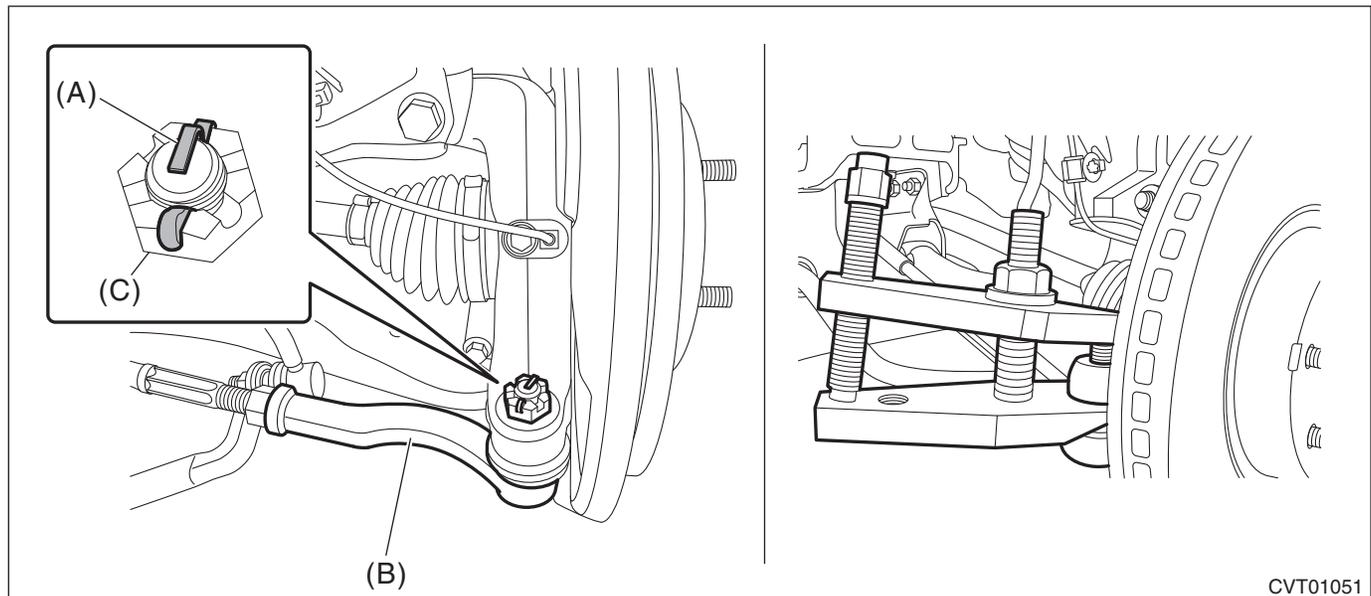
Check for leakage of gear oil from the oil seal. If there is an oil leak, inspect the front drive shaft and replace the oil seal.

### B: REPLACEMENT

#### CAUTION:

- Immediately after the vehicle has been running or after idling for a long time, the differential gear oil will be hot. Be careful not to burn yourself.
- Be careful not to spill the differential gear oil on exhaust pipe to prevent it from emitting smoke or fire. If differential gear oil is spilled on the exhaust pipe, wipe it off completely.

- 1) Lift up the vehicle, and remove the front wheels.
- 2) After pulling off the cotter pin and removing the castle nut, use a puller to remove the tie-rod end.



- (A) Cotter pin  
 (B) Tie-rod end  
 (C) Castle nut

- 3) Lift up the vehicle.
- 4) Remove the front under cover. <Ref. to EI-27, REMOVAL, Front Under Cover.>
- 5) Remove the front exhaust pipe. <Ref. to EX(H6DO)-6, REMOVAL, Front Exhaust Pipe.>
- 6) Drain differential gear oil. <Ref. to CVT(TR690)-44, REPLACEMENT, Differential Gear Oil.>
- 7) Tighten the differential gear oil drain plug.

#### NOTE:

Use a new gasket.

#### Tightening torque:

**70 N·m (7.1 kgf·m, 51.6 ft·lb)**

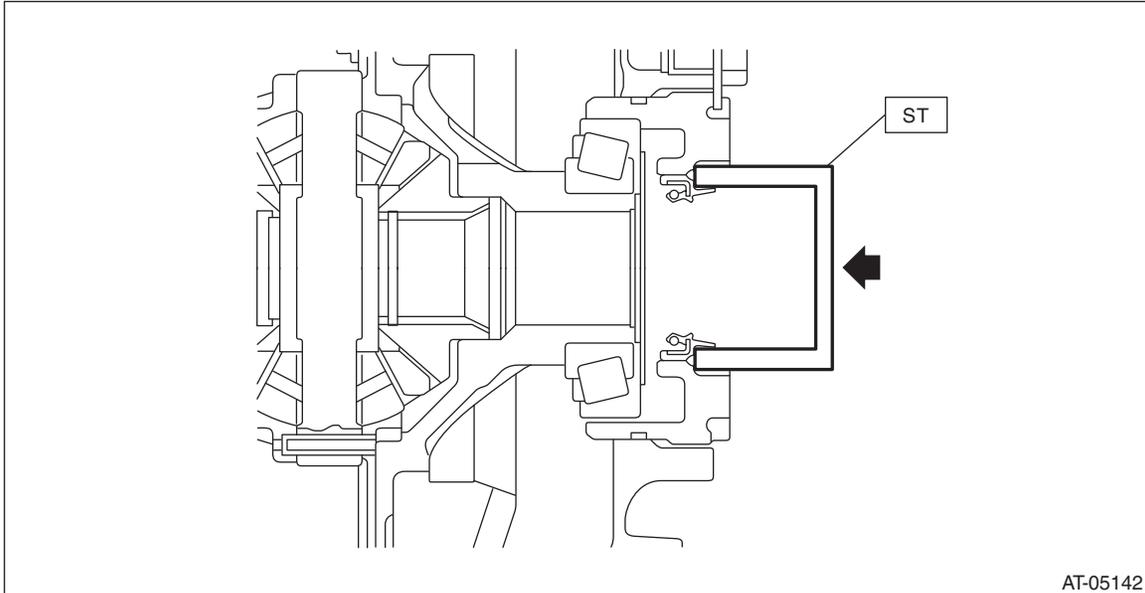
- 8) Remove the stabilizer link. <Ref. to FS-33, REMOVAL, Front Stabilizer.>
  - 9) Disconnect the lower arm ball joint and housing.
  - 10) Pull out the front drive shaft from transmission using a crowbar.
  - 11) Holding the joint of front drive shaft from transmission side, pull out the drive shaft from transmission with care not to stretch the boot.
  - 12) Remove the differential side retainer oil seal using driver wrapped with vinyl tape etc.
  - 13) Using the ST, install the differential side retainer oil seal by lightly tapping with a hammer.
- ST 18675AA000 DIFFERENTIAL SIDE OIL SEAL INSTALLER

# Differential Side Retainer Oil Seal

## CONTINUOUSLY VARIABLE TRANSMISSION

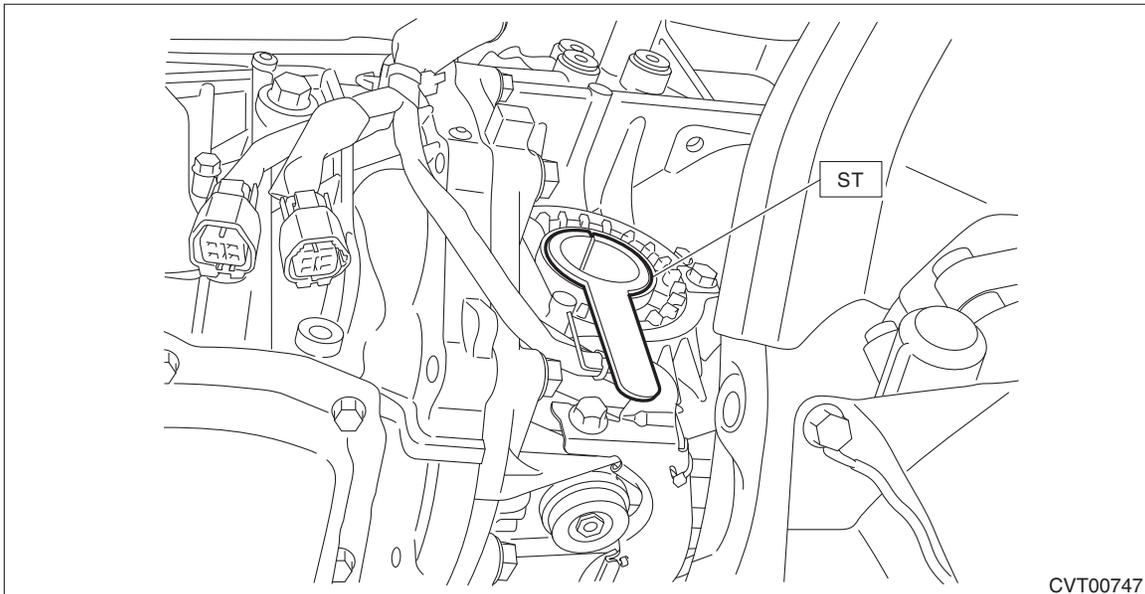
### NOTE:

- Apply differential gear oil to the lip surface, so that the oil seal lip is not deformed.
- Apply differential gear oil to the press-fitting surface of oil seal and the differential side retainer.
- Oil seal has an identification mark (R, L). When installing oil seals, do not confuse the left and right.



AT-05142

- 14) Set the ST to differential side retainer.  
ST 28399SA010 OIL SEAL PROTECTOR



CVT00747

- 15) Replace the circlip of the drive shaft with a new part.  
16) Insert the front drive shaft spline section into transmission and remove the ST (OIL SEAL PROTECTOR).  
17) Insert the drive shaft into the transmission securely by pressing the housing from outside of the vehicle.  
18) Insert the ball joint into housing and secure with bolt.

### CAUTION:

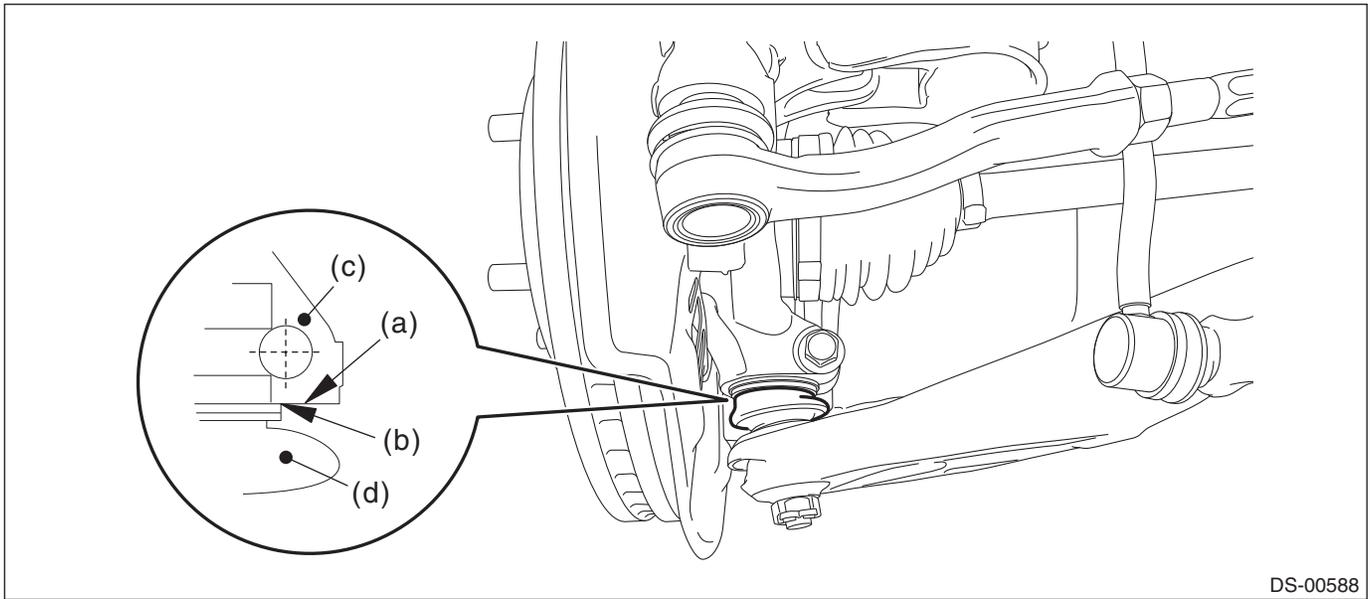
- Do not apply grease to the tapered portion of ball stud.
- Before tightening, make sure the bottom surface of the housing assembly - front axle and the stepped section of ball joint are in contact.
- Be careful not to damage the boot of the joint.

# Differential Side Retainer Oil Seal

CONTINUOUSLY VARIABLE TRANSMISSION

## **Tightening torque:**

**50 N·m (5.1 kgf·m, 36.9 ft-lb)**



- (a) Bottom surface of housing ASSY - front axle  
(d) Ball joint ASSY

(b) Raised section of ball joint

(c) Housing ASSY - front axle

19) Install the stabilizer link.

## **NOTE:**

Use a new flange nut.

## **Tightening torque:**

**60 N·m (6.1 kgf·m, 44.3 ft-lb)**

20) Install the front exhaust pipe. <Ref. to EX(H6DO)-7, INSTALLATION, Front Exhaust Pipe.>

21) Install the front under cover. <Ref. to EI-27, INSTALLATION, Front Under Cover.>

22) Lower the vehicle.

23) Connect the tie-rod end and knuckle arm, and attach the castle nut.

## **Tightening torque:**

**27 N·m (2.75 kgf·m, 19.9 ft-lb)**

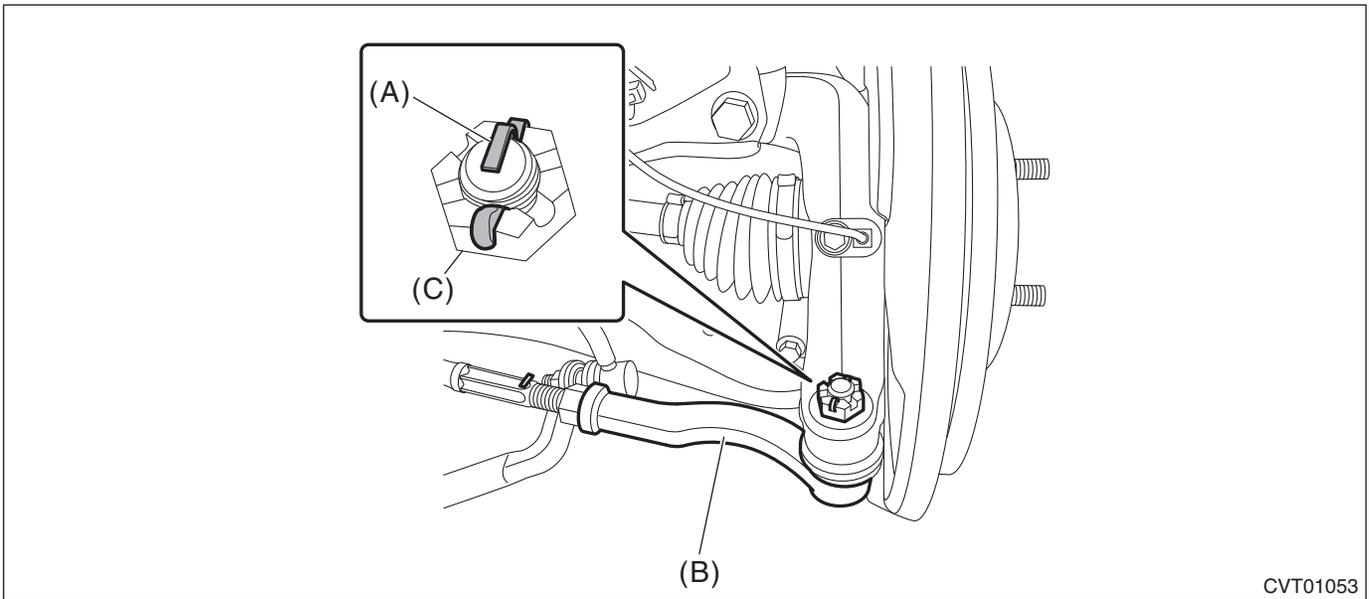
## **CAUTION:**

**When connecting, do not hit the cap at the bottom of tie-rod end with hammer.**

## Differential Side Retainer Oil Seal

### CONTINUOUSLY VARIABLE TRANSMISSION

24) After tightening the castle nut to the specified tightening torque, tighten it further within 60° until the cotter pin hole is aligned with slot in the nut. Fit the cotter pin into the nut, and then bend the pin to lock.



- (A) Cotter pin
- (B) Tie-rod end
- (C) Castle nut

25) Refill differential gear oil to adjust the differential gear oil amount. <Ref. to CVT(TR690)-43, ADJUSTMENT, Differential Gear Oil.>

26) Install the front tires.

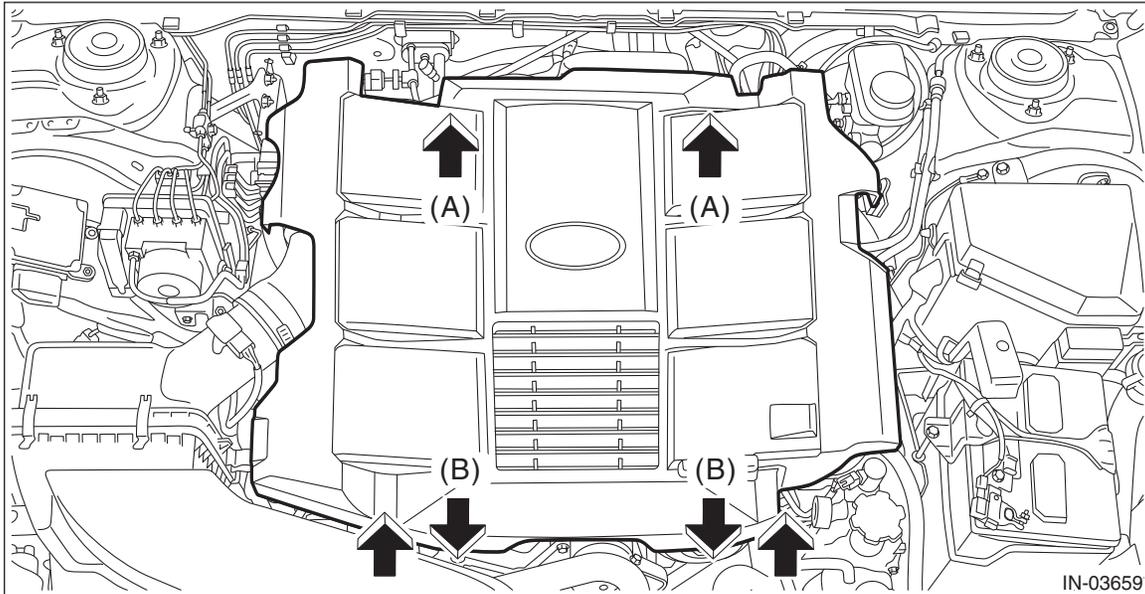
## 15. Inhibitor Switch

### A: INSPECTION

When the driving condition or starter motor operation is improper, first check the shift linkage for improper operation. If the shift linkage is functioning properly, check the inhibitor switch.

1) Remove the collector cover.

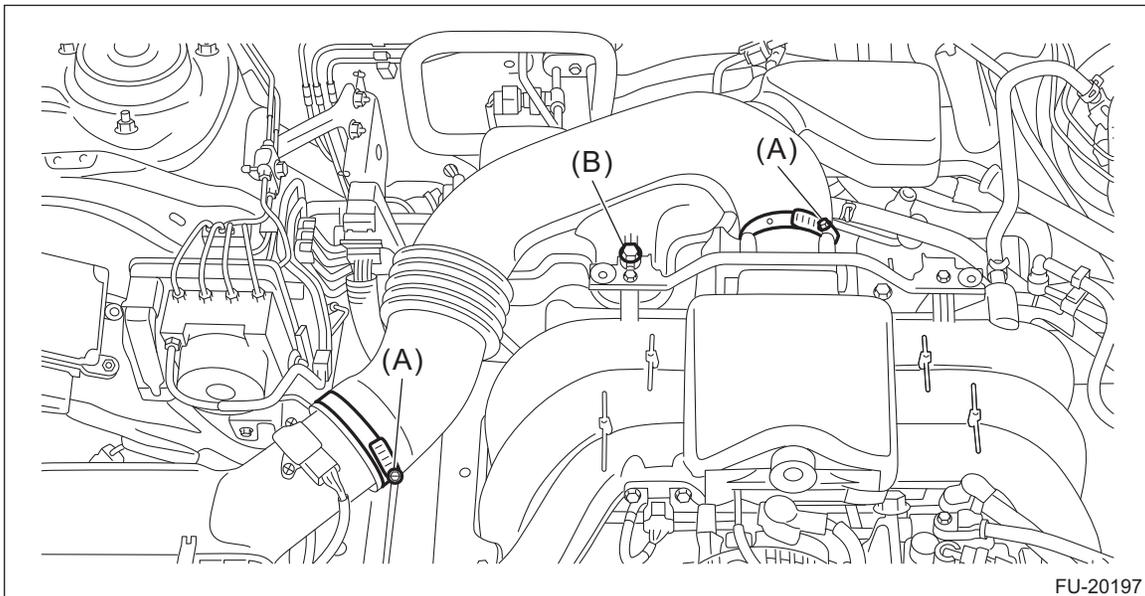
- (1) Carefully pull up the rear of collector cover at two positions (A).
- (2) Carefully pull up the front of collector cover at two positions (B) while moving it forward.



2) Disconnect the ground terminal from battery sensor. <Ref. to RC-3, BATTERY, NOTE, Repair Contents.>

3) Loosen the clamp (A) which connects the air intake boot.

4) Loosen the bolt (B) securing the air intake boot to the collector cover bracket.



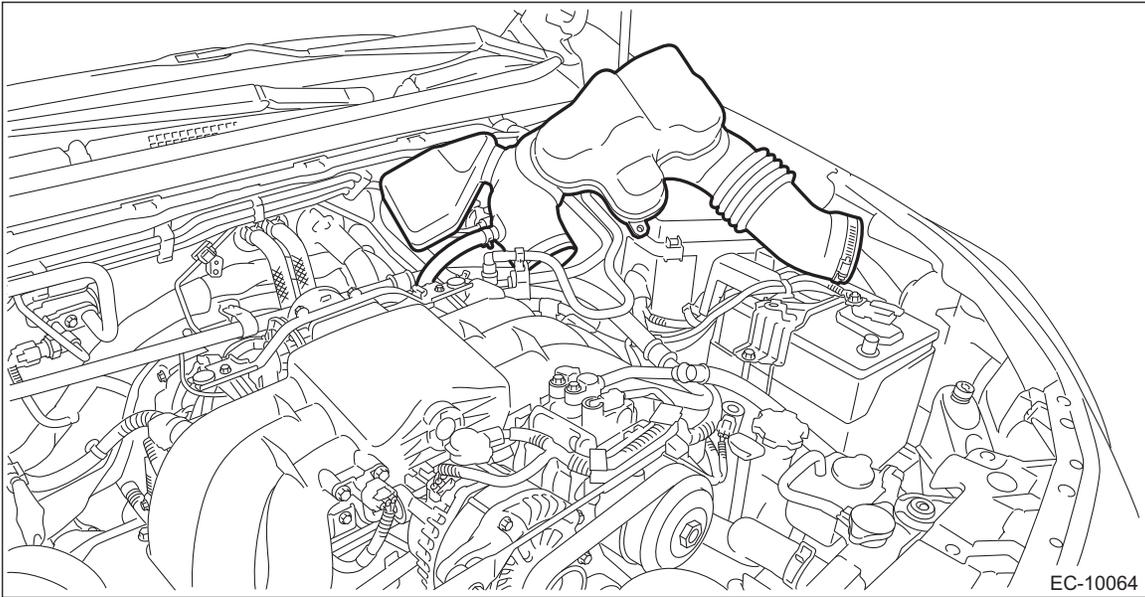
5) Remove the air intake boot from the throttle body and the air cleaner case (rear), and move it to the left side wheel apron.

# Inhibitor Switch

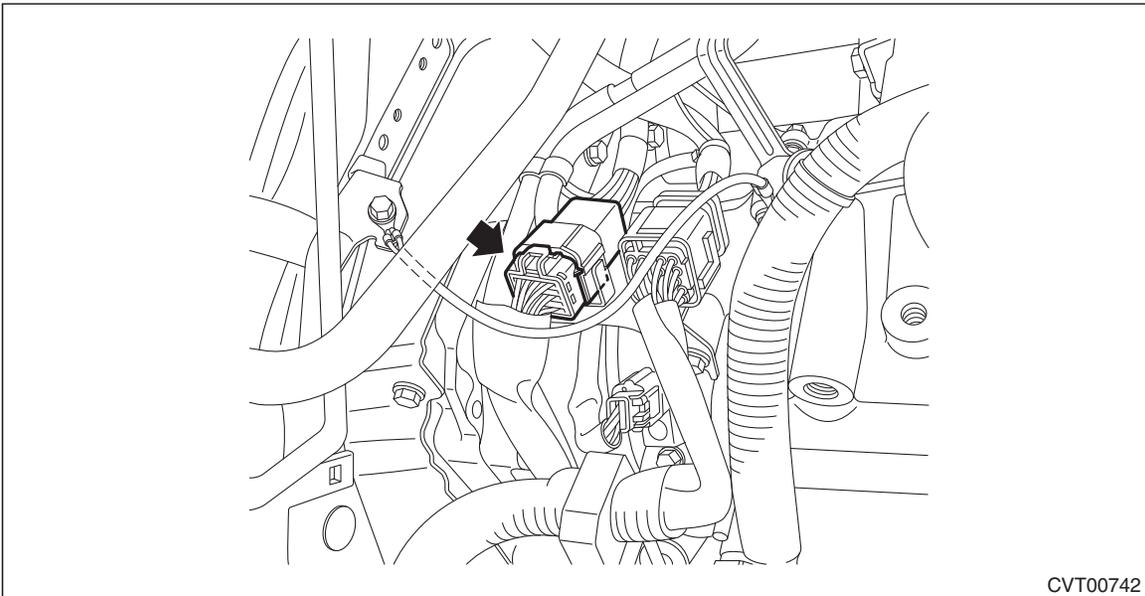
CONTINUOUSLY VARIABLE TRANSMISSION

## CAUTION:

Be careful not to allow the air intake boot to contact the air conditioner pipe.



6) Disconnect the inhibitor harness connector.



7) Check for continuity in inhibitor switch circuit by shifting the select lever in “P”, “R”, “N” and “D” respectively.

## NOTE:

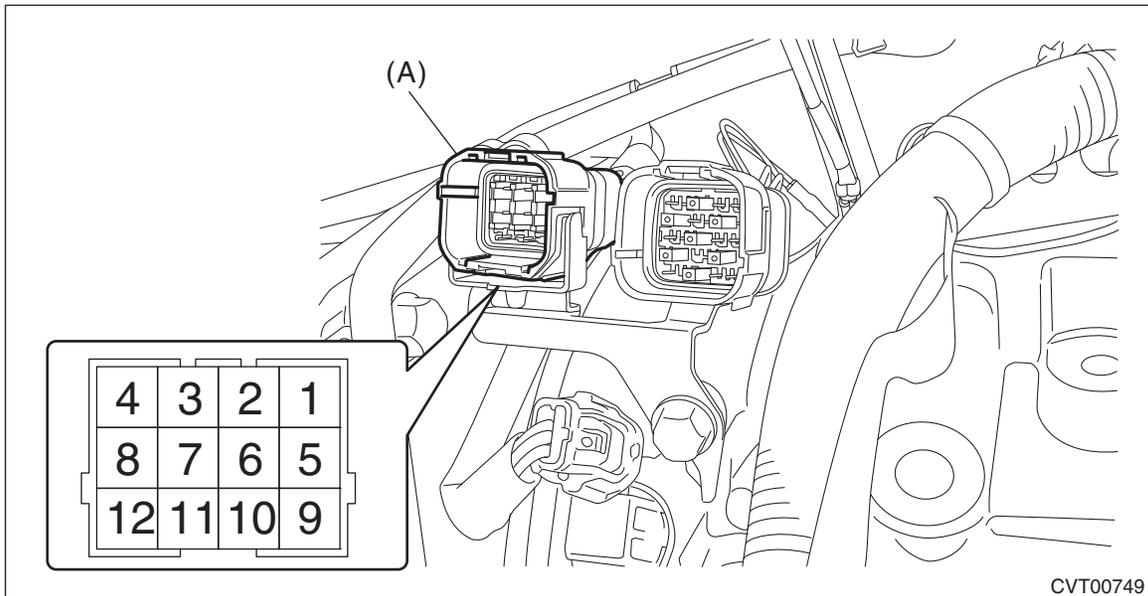
- Check that there is no continuity in the starter circuit when the select lever is in the “R” and “D” ranges.

# Inhibitor Switch

CONTINUOUSLY VARIABLE TRANSMISSION

- When inhibitor switch is normal, check there is no poor contact in vehicle side connector and no open circuit in harness.

	Range	Terminal No.
Signal sent to TCM	P	4 — 3
	R	4 — 2
	N	4 — 1
	D	4 — 8
Starter circuit	P/N	12 — 11
Back-up light circuit	R	10 — 9



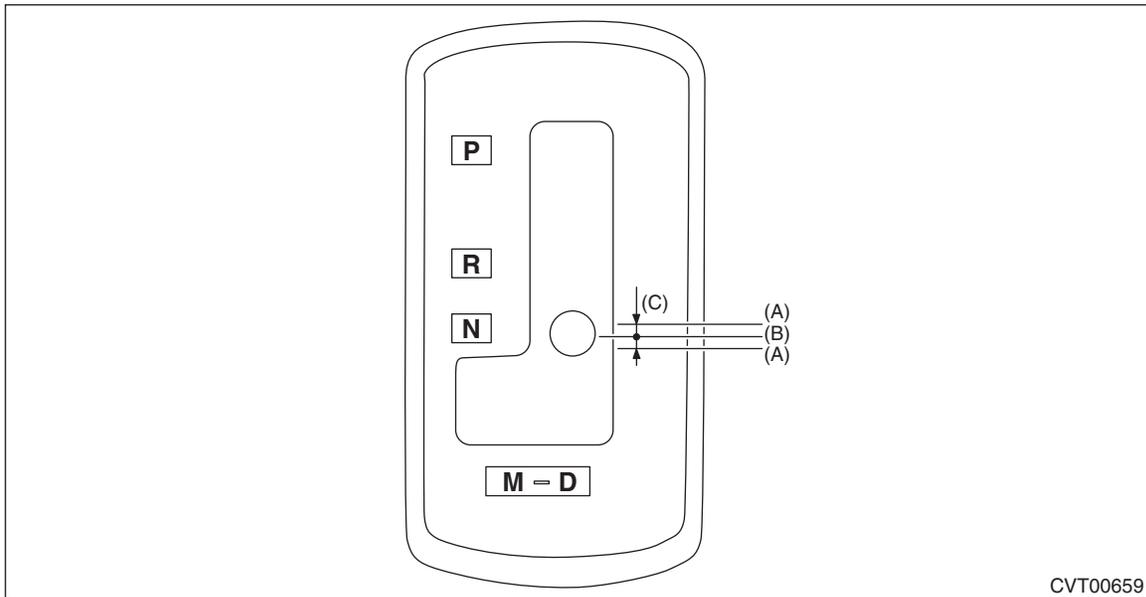
(A) Inhibitor harness connector

# Inhibitor Switch

## CONTINUOUSLY VARIABLE TRANSMISSION

8) Check that there is continuity at equal points when the select lever is moved  $1.5^\circ$  in both directions from the "N" range.

If there is continuity in only one direction or in other points, adjust the inhibitor switch. <Ref. to CVT(TR690)-108, ADJUSTMENT, Inhibitor Switch.>

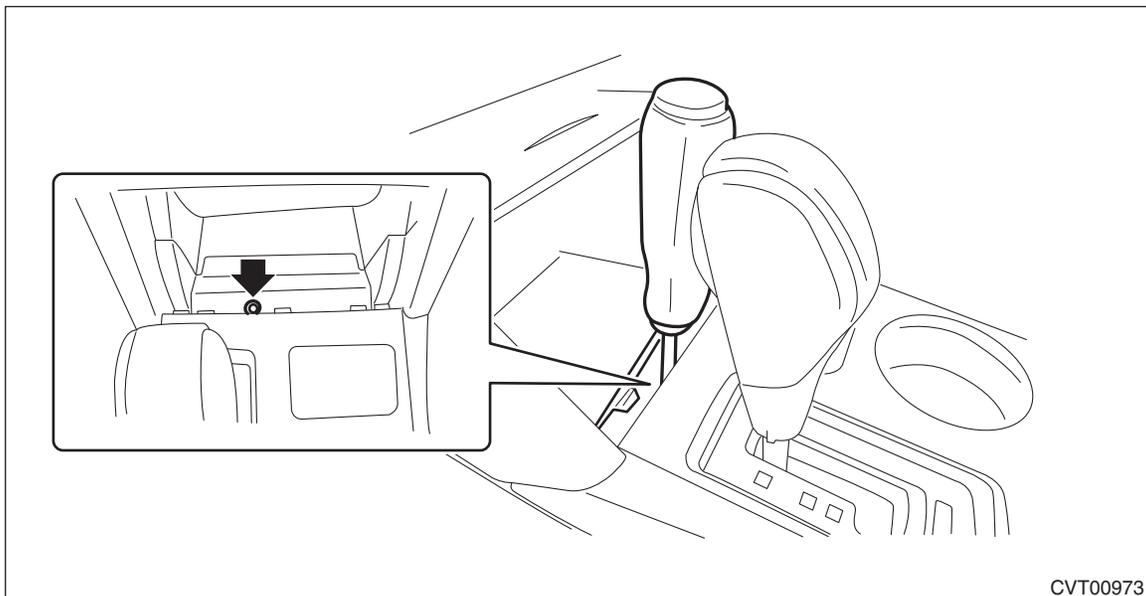


- (A) Continuity does not exist.
- (B) Continuity exists.
- (C)  $1.5^\circ$

9) Repeat the above inspection in other gear ranges. If there is fault, adjust the inhibitor switch and select cable. <Ref. to CVT(TR690)-108, ADJUSTMENT, Inhibitor Switch.> <Ref. to CS-48, ADJUSTMENT, Select Cable.>

## B: ADJUSTMENT

- 1) Disconnect the ground terminal from battery sensor. <Ref. to RC-3, BATTERY, NOTE, Repair Contents.>
- 2) Release the shift lock using a screwdriver to shift the select lever to the "N" range.

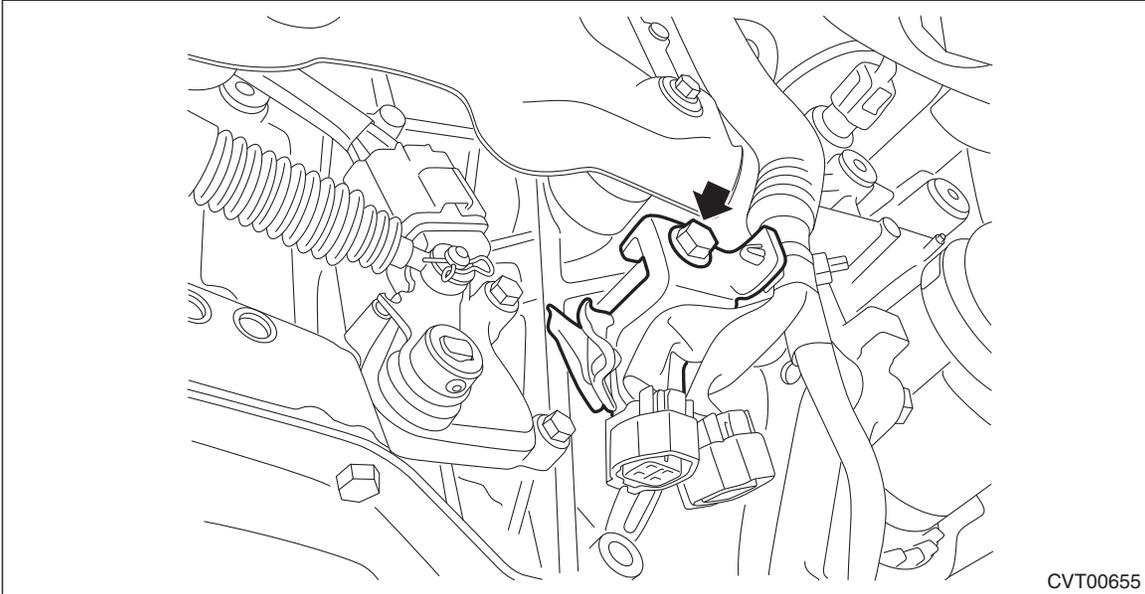


- 3) Remove the front exhaust pipe. <Ref. to EX(H6DO)-6, REMOVAL, Front Exhaust Pipe.>

# Inhibitor Switch

CONTINUOUSLY VARIABLE TRANSMISSION

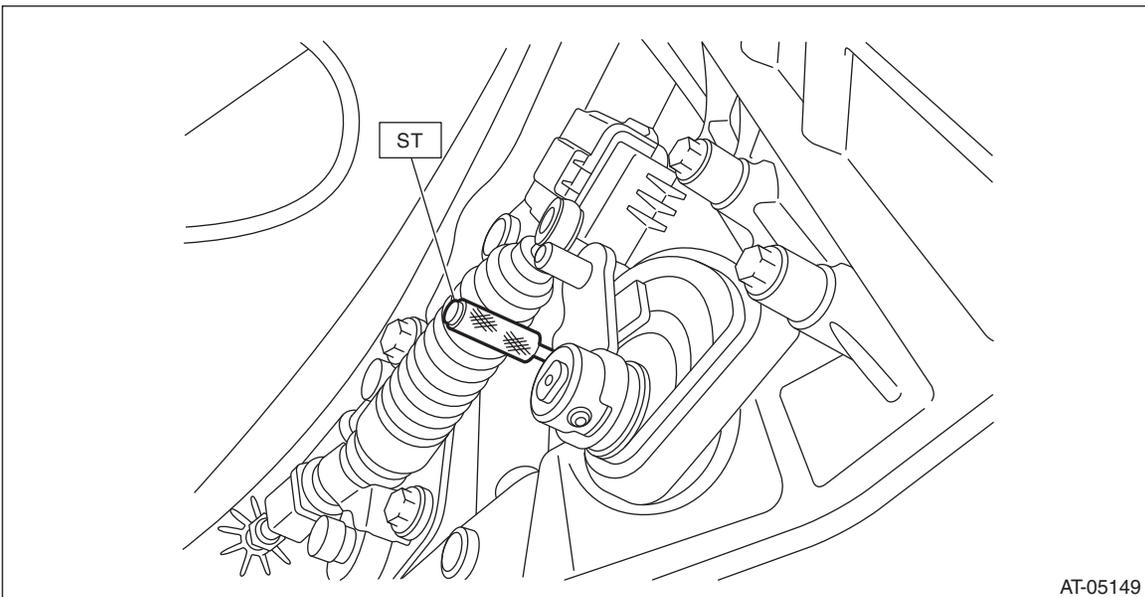
- 4) Remove the harness stay.



- 5) Loosen the two bolts holding the inhibitor switch.

- 6) Insert the ST vertically into the holes of the shifter arm and switch body.

ST 499267300 STOPPER PIN



- 7) Tighten the two bolts holding the inhibitor switch.

**Tightening torque:**

**5 N·m (0.5 kgf-m, 3.7 ft-lb)**

- 8) Repeat the inspection of the inhibitor switch. If the inhibitor switch is determined to be “faulty”, replace it.

## C: REMOVAL

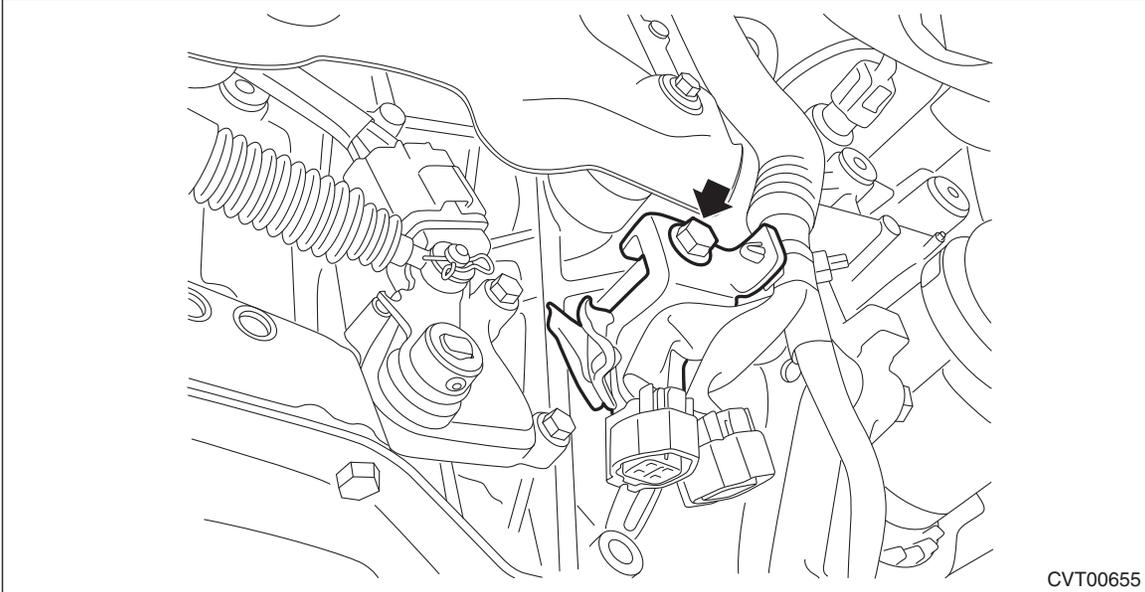
- 1) Disconnect the ground terminal from battery sensor. <Ref. to RC-3, BATTERY, NOTE, Repair Contents.>
- 2) While pressing the shift lock release button, shift the select lever to the “N” range.
- 3) Lift up the vehicle.
- 4) Remove the front exhaust pipe. <Ref. to EX(H6DO)-6, REMOVAL, Front Exhaust Pipe.>

## Inhibitor Switch

### CONTINUOUSLY VARIABLE TRANSMISSION

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5) Remove the harness stay.



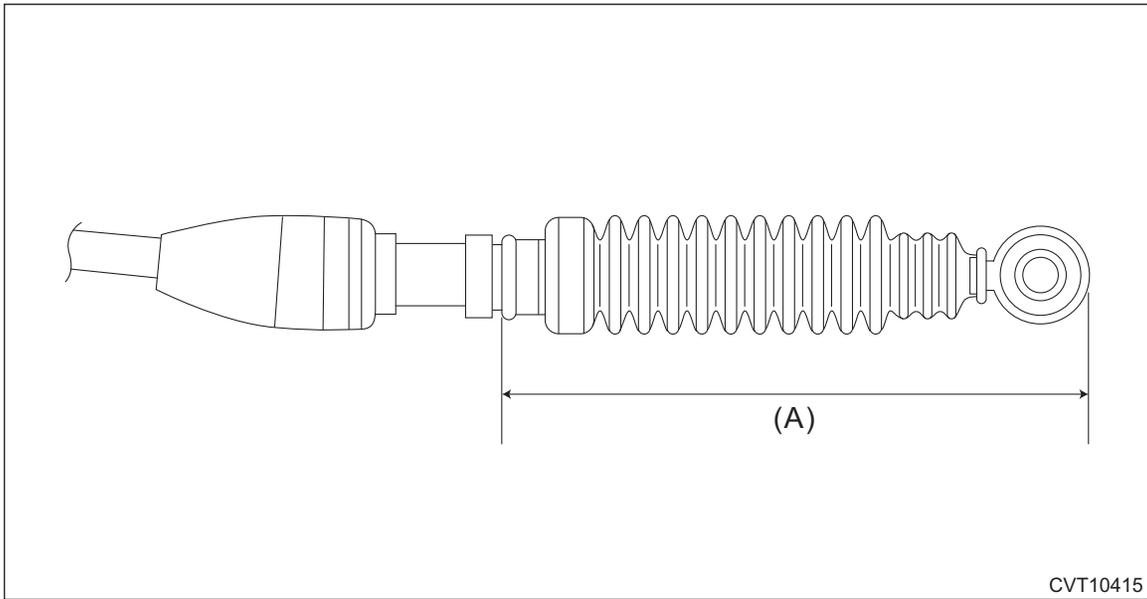
6) Remove the snap pin and washer, and disconnect the select cable.

# Inhibitor Switch

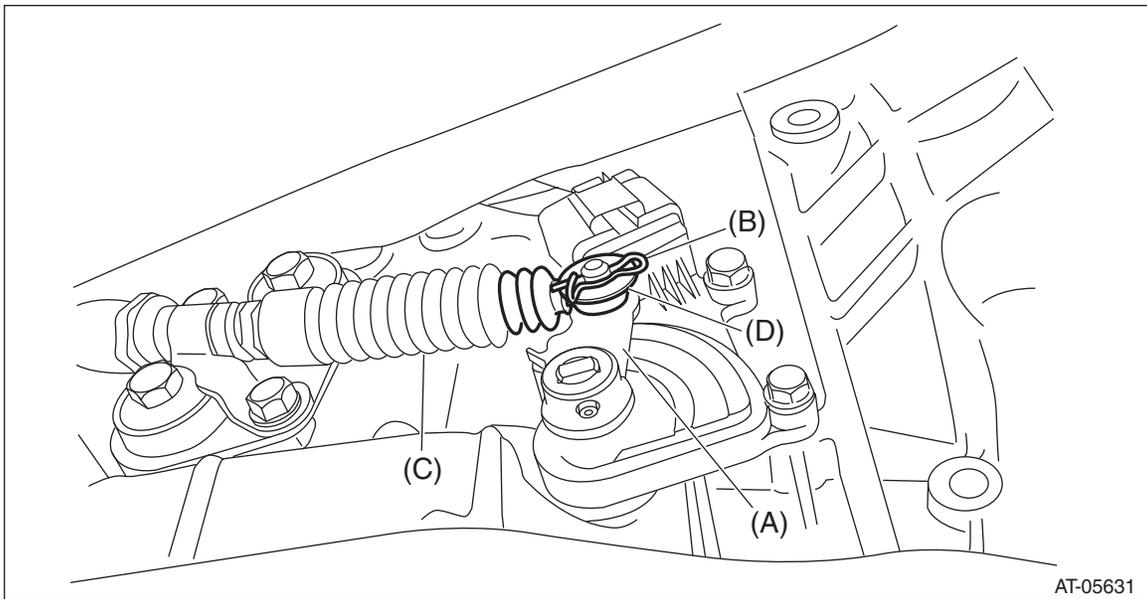
CONTINUOUSLY VARIABLE TRANSMISSION

**CAUTION:**

**Do not apply extra overload while holding the part (A).**



CVT10415



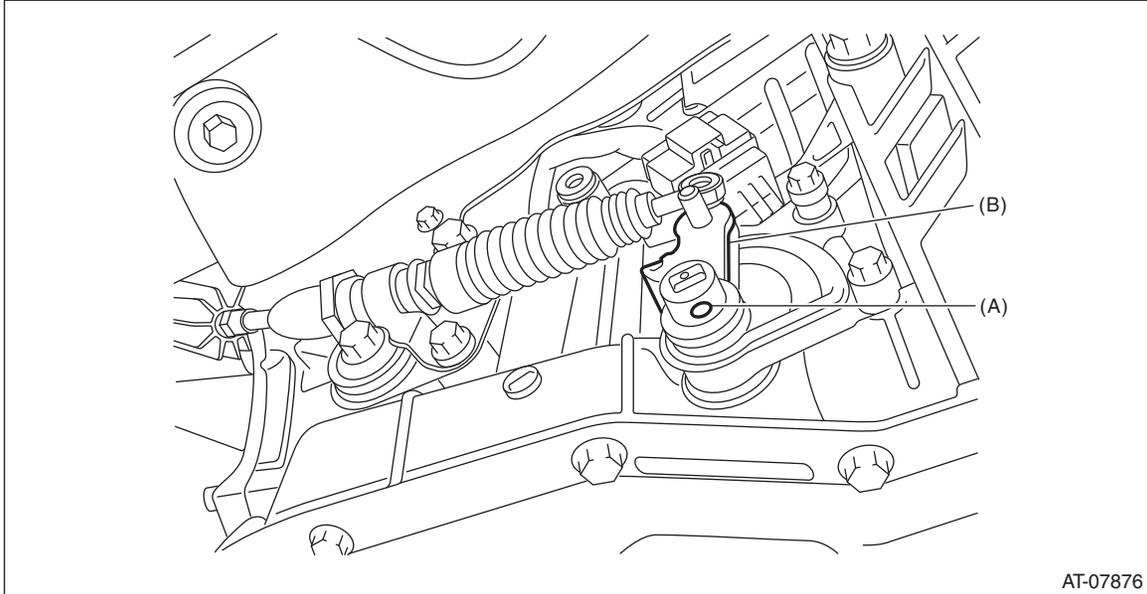
AT-05631

- (A) Shifter arm
- (B) Snap pin
- (C) Select cable
- (D) Washer

# Inhibitor Switch

## CONTINUOUSLY VARIABLE TRANSMISSION

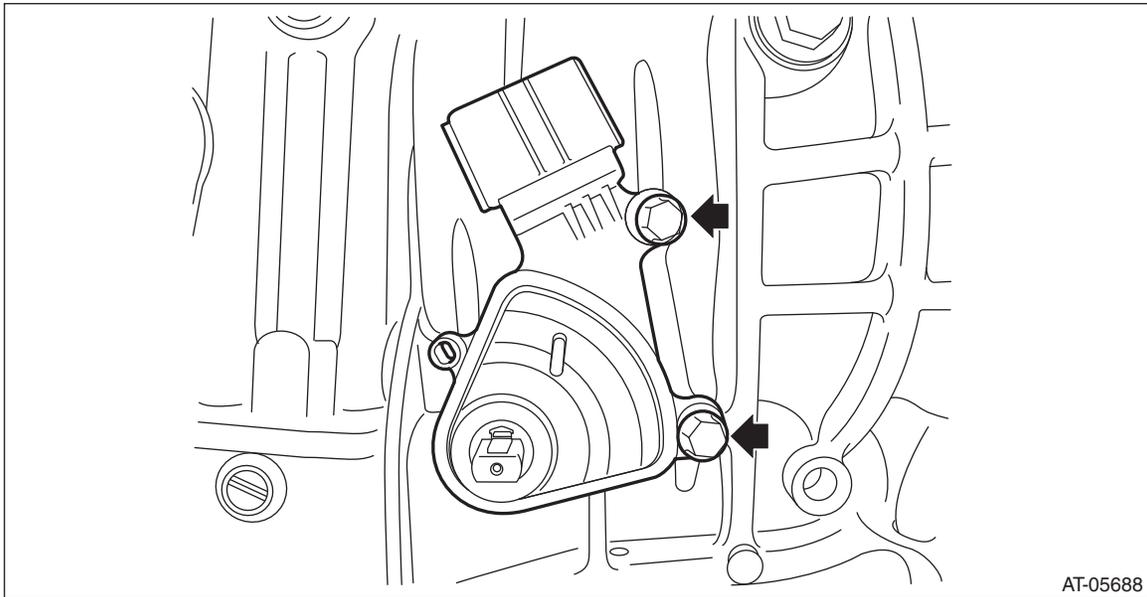
7) Remove the spring pin and shifter arm.



- (A) Spring pin
- (B) Shifter arm

8) Remove the inhibitor harness connector from inhibitor switch.

9) Remove the two inhibitor switch securing bolts.



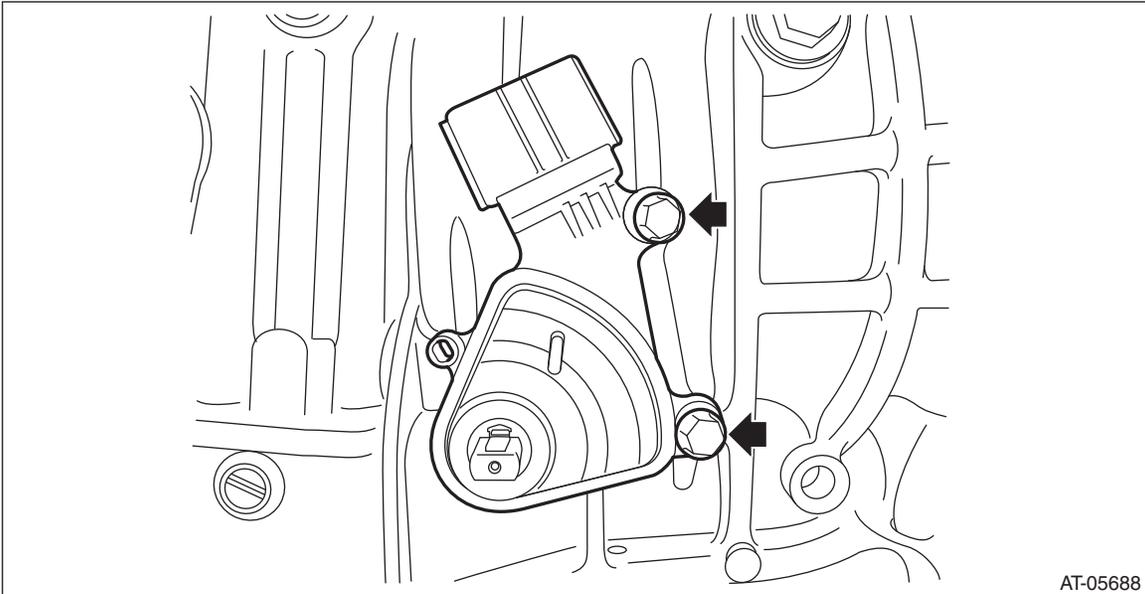
10) Remove the inhibitor switch.

# Inhibitor Switch

CONTINUOUSLY VARIABLE TRANSMISSION

## D: INSTALLATION

1) Temporarily install the inhibitor switch.

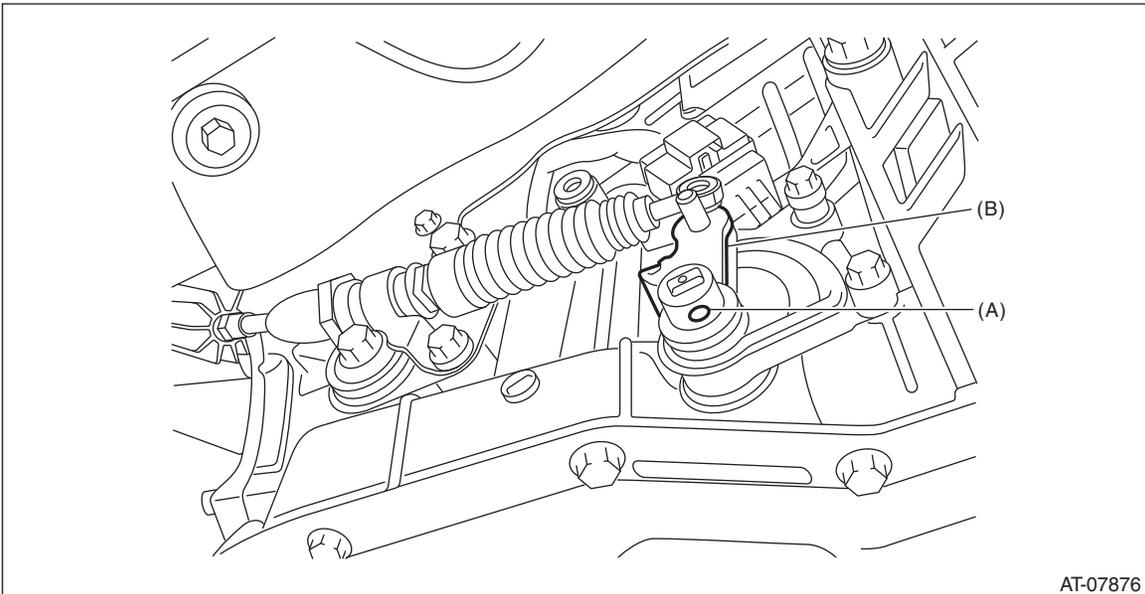


2) Connect the inhibitor harness connector to the inhibitor switch.

3) Install the shifter arm and fix with the spring pin.

NOTE:

Use new spring pin.



(A) Spring pin

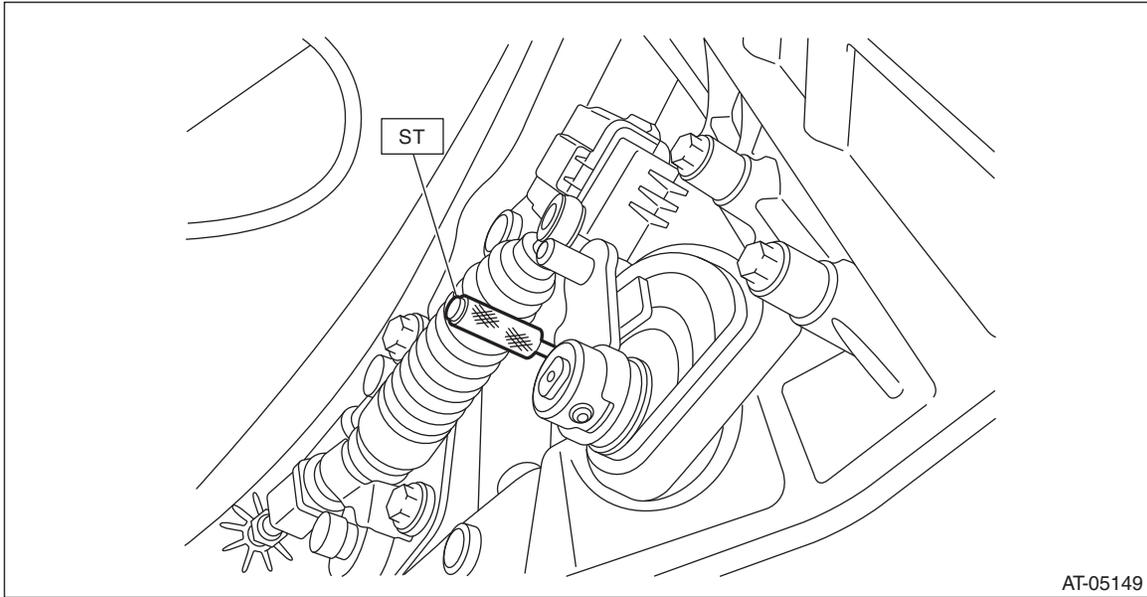
(B) Shifter arm

4) Shift the shifter arm to "N" range.

## Inhibitor Switch

CONTINUOUSLY VARIABLE TRANSMISSION

- 5) Install the ST vertically in the cutout of shifter arm and the hole of switch body.  
ST 499267300 STOPPER PIN



- 6) Tighten the two bolts holding the inhibitor switch.

**Tightening torque:**

**5 N·m (0.5 kgf·m, 3.7 ft·lb)**

- 7) Connect the select cable and install the washer and snap pin.

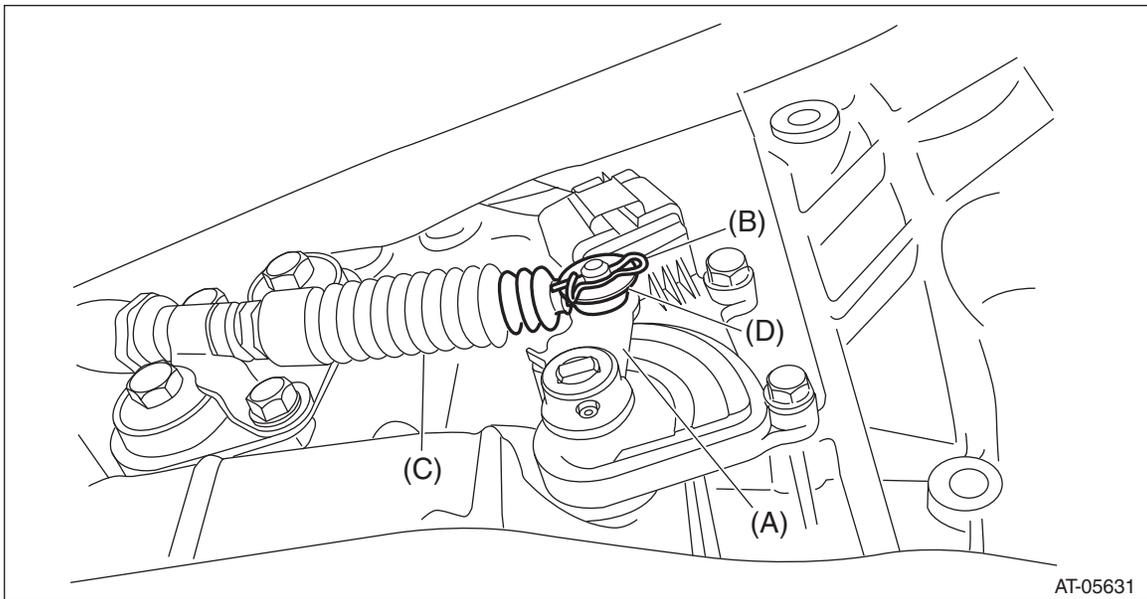
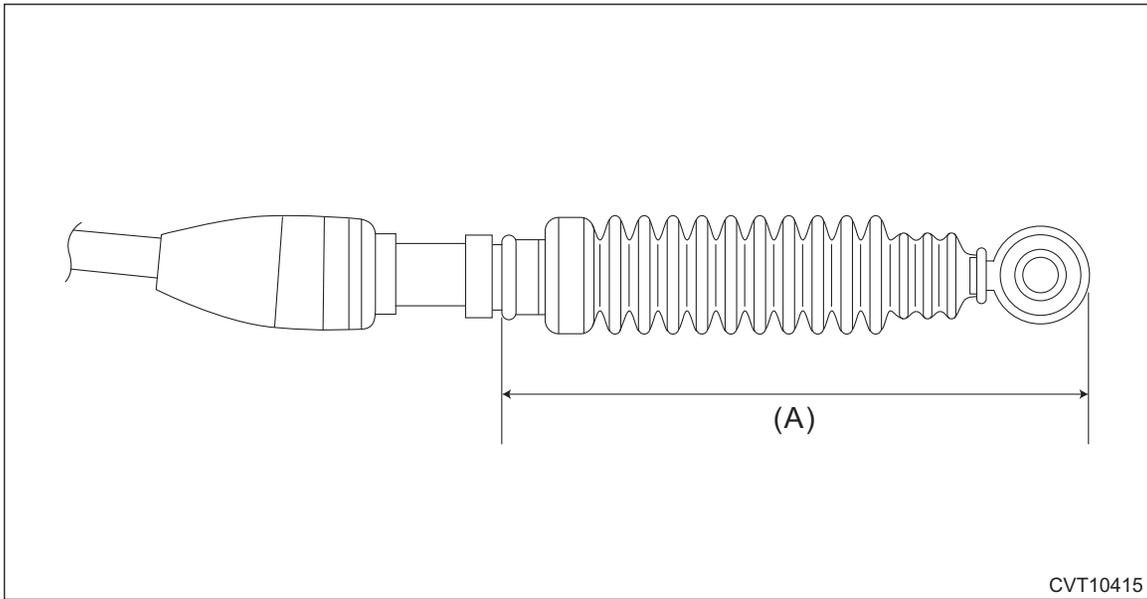
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# Inhibitor Switch

CONTINUOUSLY VARIABLE TRANSMISSION

**CAUTION:**

**Do not apply extra overload while holding the part (A).**



- (A) Shifter arm
- (B) Snap pin
- (C) Select cable
- (D) Washer

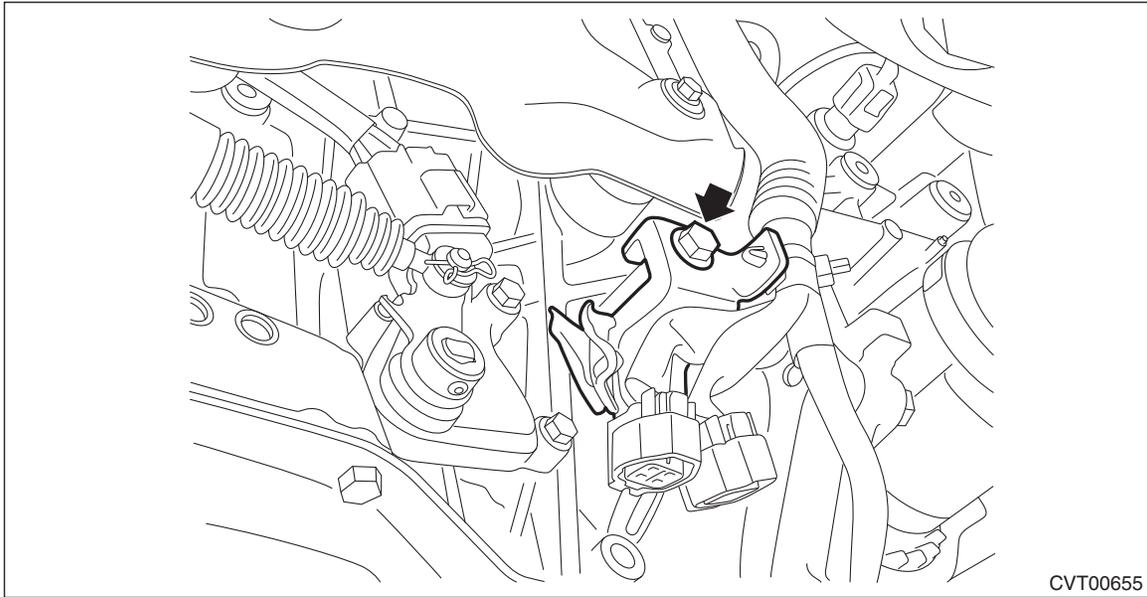
8) Install the harness stay.

## Inhibitor Switch

CONTINUOUSLY VARIABLE TRANSMISSION

**Tightening torque:**

**18 N·m (1.8 kgf-m, 13.3 ft-lb)**



- 9) Install the front exhaust pipe. <Ref. to EX(H6DO)-7, INSTALLATION, Front Exhaust Pipe.>
- 10) Lower the vehicle.
- 11) Connect the ground terminal to battery sensor. <Ref. to RC-3, BATTERY, NOTE, Repair Contents.>
- 12) Check the inhibitor switch. <Ref. to CVT(TR690)-105, INSPECTION, Inhibitor Switch.>

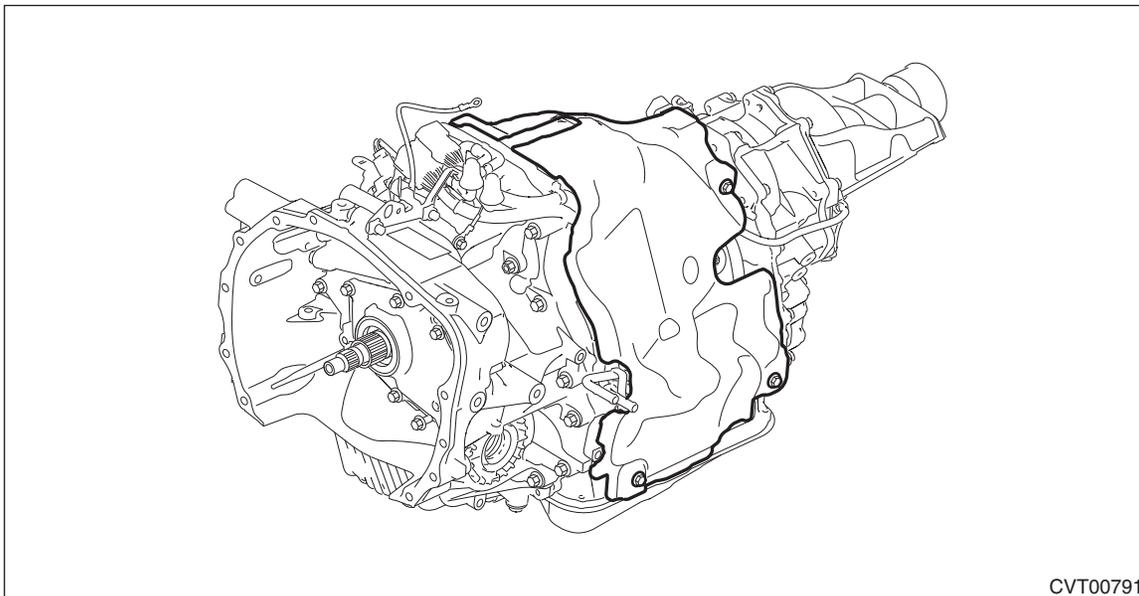
## 16.Secondary Speed Sensor

### A: REMOVAL

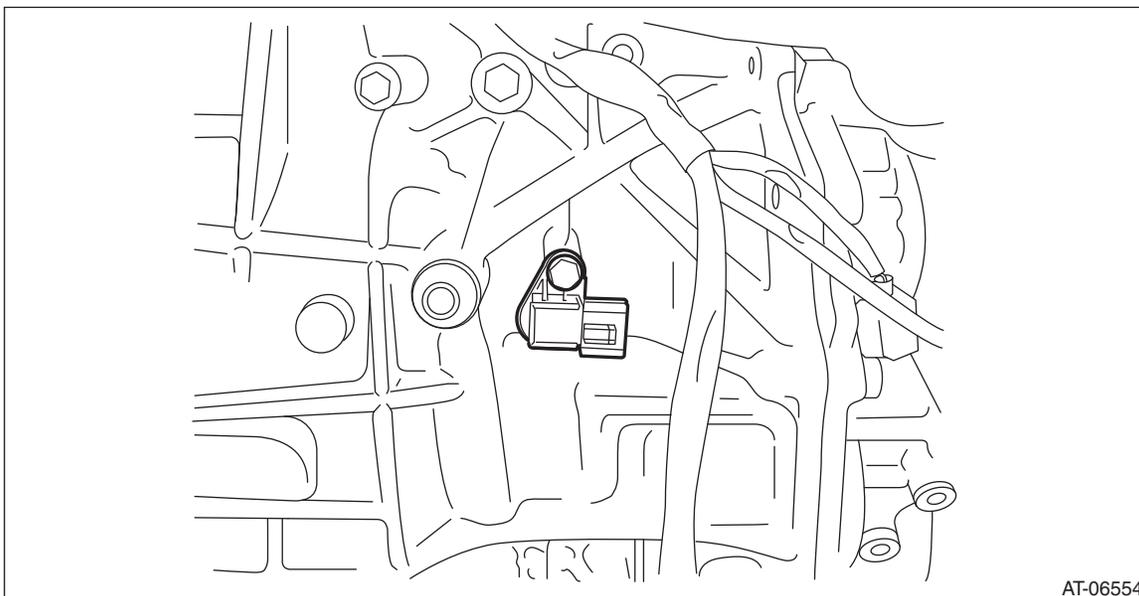
#### CAUTION:

Be sure to prevent water or oil from contacting the connector terminal of secondary speed sensor. If adhesion occurs, replace with a new part.

- 1) Remove the transmission from the vehicle. <Ref. to CVT(TR690)-59, REMOVAL, Automatic Transmission Assembly.>
- 2) Remove the transmission cover on the transmission upper side.



- 3) Remove the secondary speed sensor harness connector.
- 4) Remove the secondary speed sensor.



### B: INSTALLATION

#### CAUTION:

Be sure to prevent water or oil from contacting the connector terminal of secondary speed sensor. If adhesion occurs, replace with a new part.

- 1) Install the secondary speed sensor.

## Secondary Speed Sensor

### CONTINUOUSLY VARIABLE TRANSMISSION

#### NOTE:

- Use new O-rings.
- Apply CVTF to the O-rings.

#### **Tightening torque:**

**5 N·m (0.5 kgf·m, 3.7 ft·lb)**

- 2) Connect the harness connector.
- 3) Install the transmission cover.

#### **Tightening torque:**

**8 N·m (0.8 kgf·m, 5.9 ft·lb)**

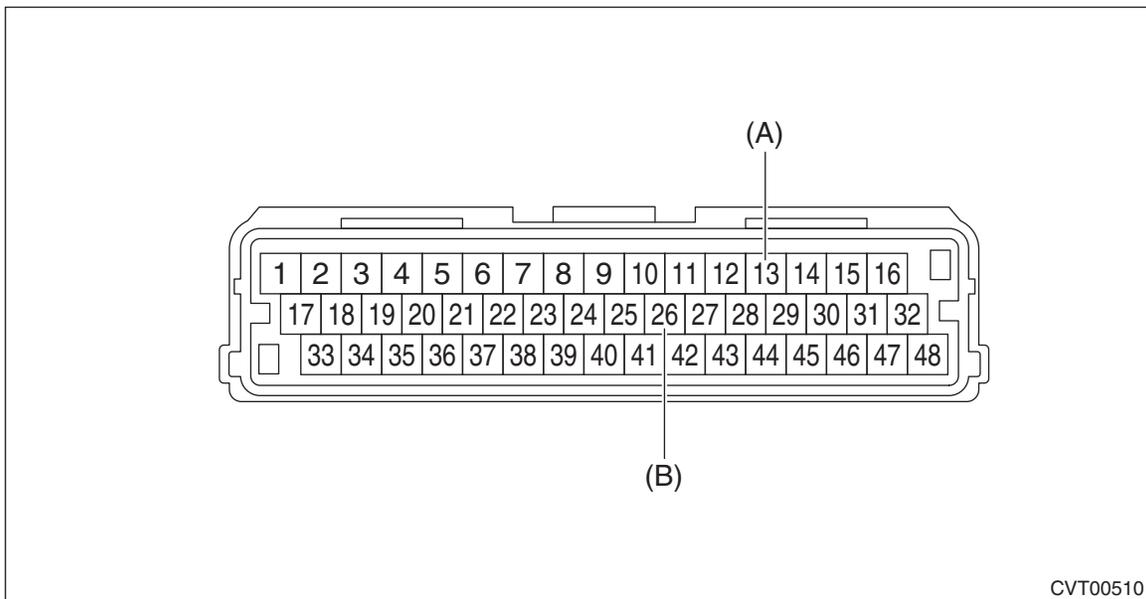
- 4) Install the transmission assembly. <Ref. to CVT(TR690)-77, INSTALLATION, Automatic Transmission Assembly.>

## C: INSPECTION

- 1) Remove the bulkhead harness connector from TCM. <Ref. to CVT(TR690)-146, REMOVAL, Transmission Control Module (TCM).>
- 2) Set the ST between the TCM and bulkhead harness.  
ST 18460AA040 CHECK BOARD
- 3) Set the probe of oscilloscope to the check board connector.

#### **Terminals:**

**No. 13 (+) — No. 26 (-)**



(A) + probe

(B) - probe

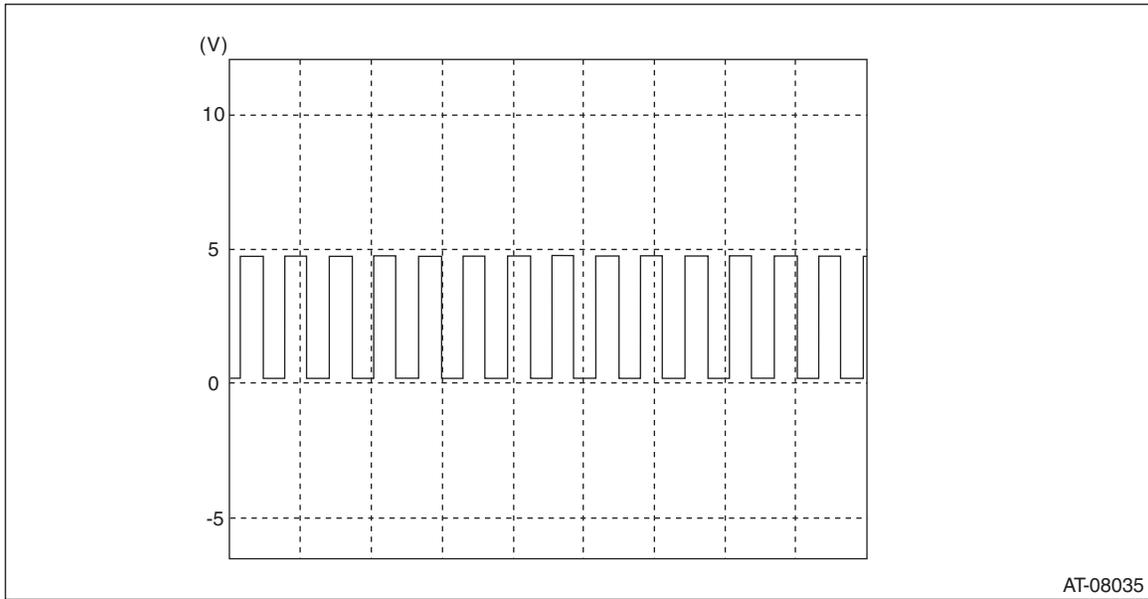
- 4) Start and warm up the engine.
- 5) Check the waveform of secondary speed sensor with engine idling.

# Secondary Speed Sensor

CONTINUOUSLY VARIABLE TRANSMISSION

NOTE:

The waveform cycle changes as the speed changes.



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# Primary Speed Sensor

CONTINUOUSLY VARIABLE TRANSMISSION

## 17.Primary Speed Sensor

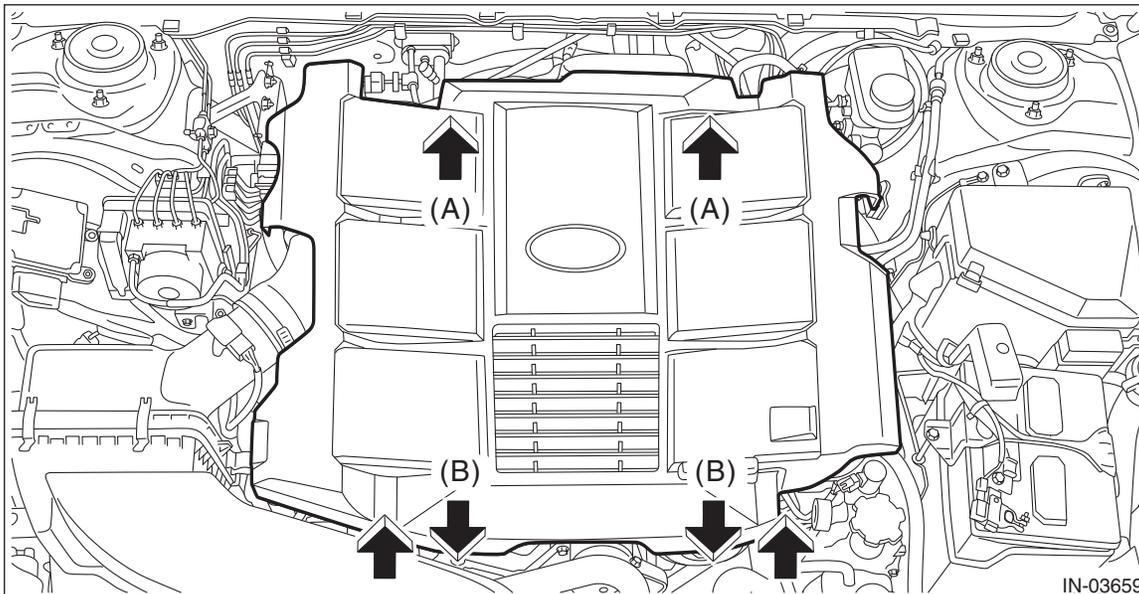
### A: REMOVAL

#### CAUTION:

Be sure to prevent water or oil from contacting the connector terminal of primary speed sensor. If adhesion occurs, replace with a new part.

1) Remove the collector cover.

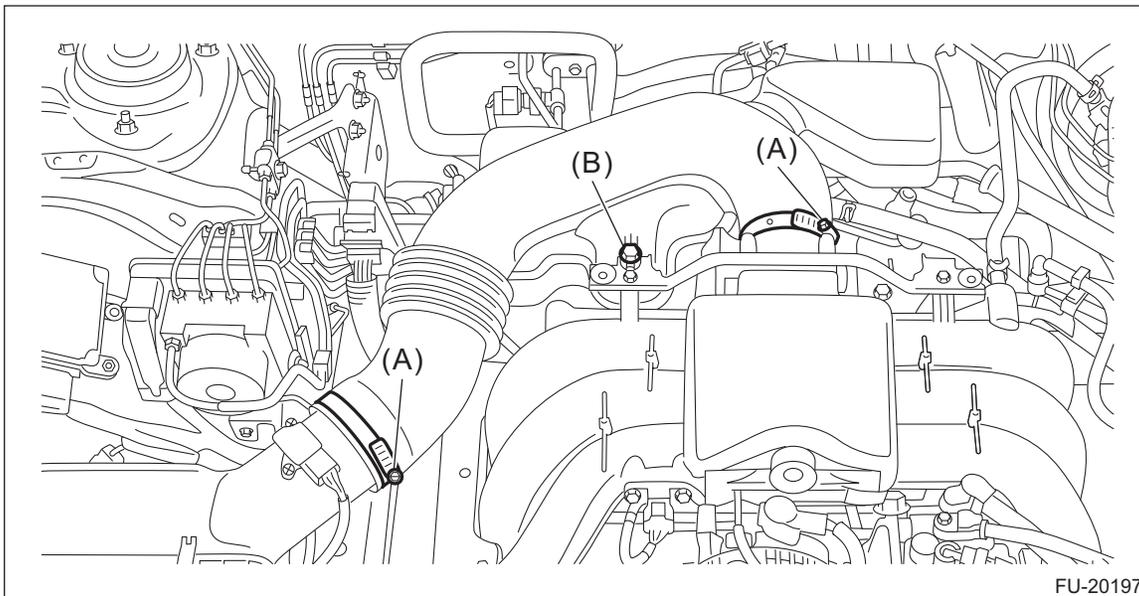
- (1) Carefully pull up the rear of collector cover at two positions (A).
- (2) Carefully pull up the front of collector cover at two positions (B) while moving it forward.



2) Disconnect the ground terminal from battery sensor. <Ref. to RC-3, BATTERY, NOTE, Repair Contents.>

3) Loosen the clamp (A) which connects the air intake boot.

4) Loosen the bolt (B) securing the air intake boot to the collector cover bracket.



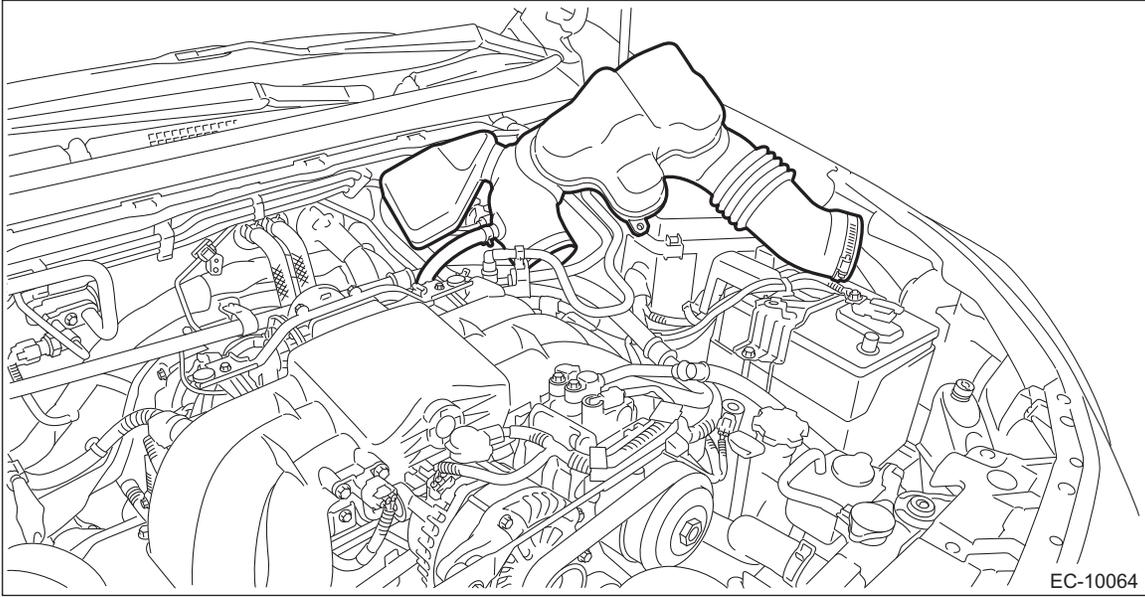
5) Remove the air intake boot from the throttle body and the air cleaner case (rear), and move it to the left side wheel apron.

# Primary Speed Sensor

CONTINUOUSLY VARIABLE TRANSMISSION

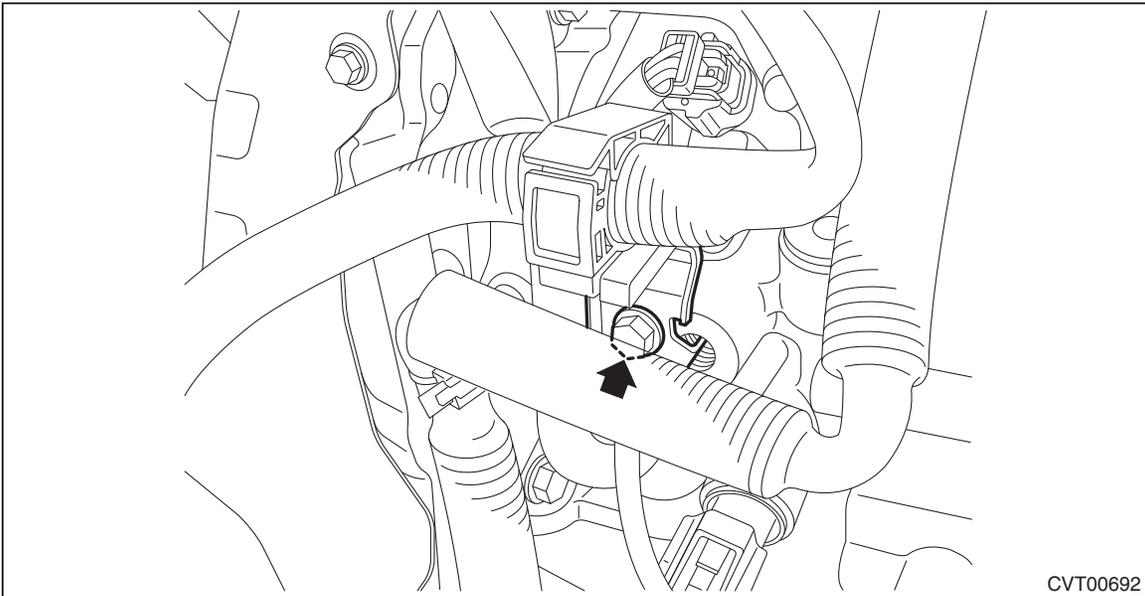
**CAUTION:**

Be careful not to allow the air intake boot to contact the air conditioner pipe.



6) Clean the transmission exterior.

7) Disconnect the harness stay.

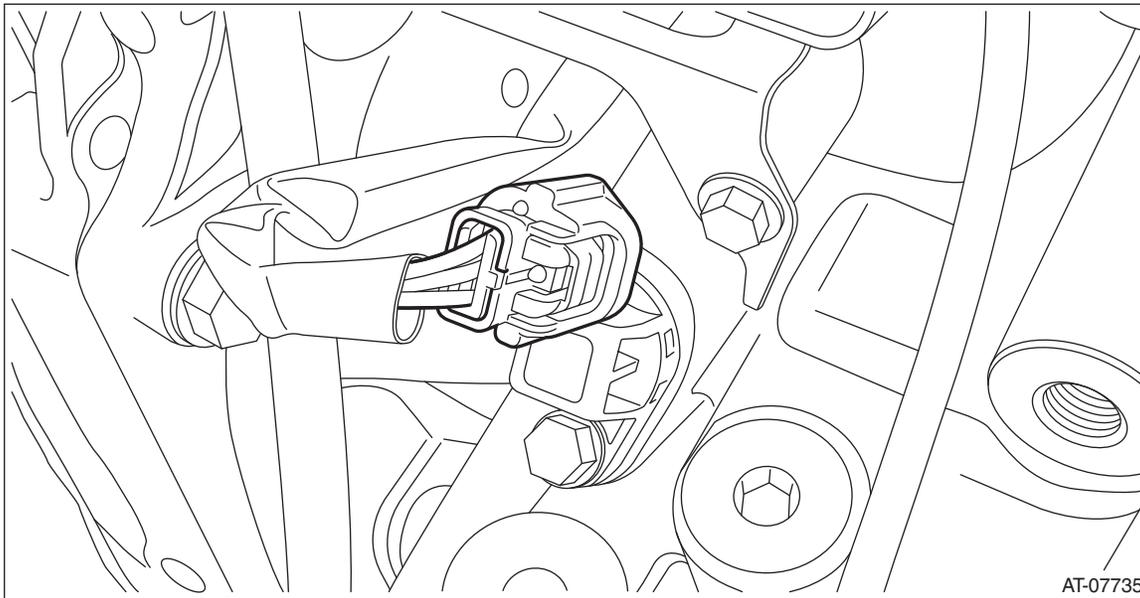


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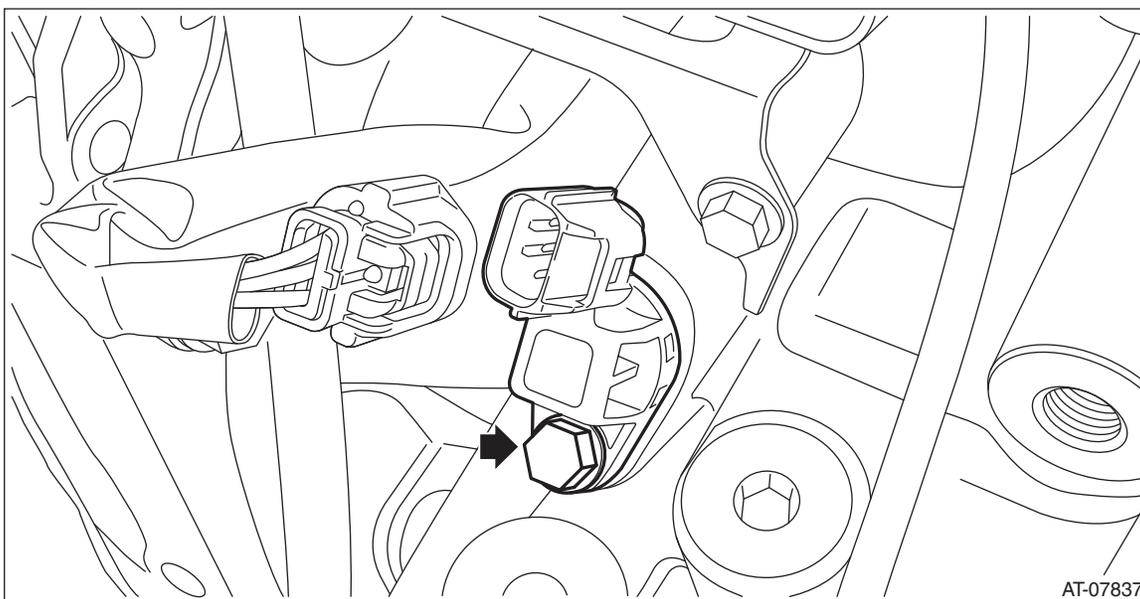
# Primary Speed Sensor

CONTINUOUSLY VARIABLE TRANSMISSION

8) Remove the primary speed sensor harness connector.



9) Remove the primary speed sensor.



## B: INSTALLATION

### CAUTION:

Be sure to prevent water or oil from contacting the connector terminal of primary speed sensor. If adhesion occurs, replace with a new part.

1) Install the primary speed sensor.

### NOTE:

- Use new O-rings.
- Apply CVTF to the O-rings.

### Tightening torque:

**5 N·m (0.5 kgf·m, 3.7 ft·lb)**

2) Connect the harness connector.

3) Install the harness stay.

### Tightening torque:

**16 N·m (1.6 kgf·m, 11.8 ft·lb)**

# Primary Speed Sensor

CONTINUOUSLY VARIABLE TRANSMISSION

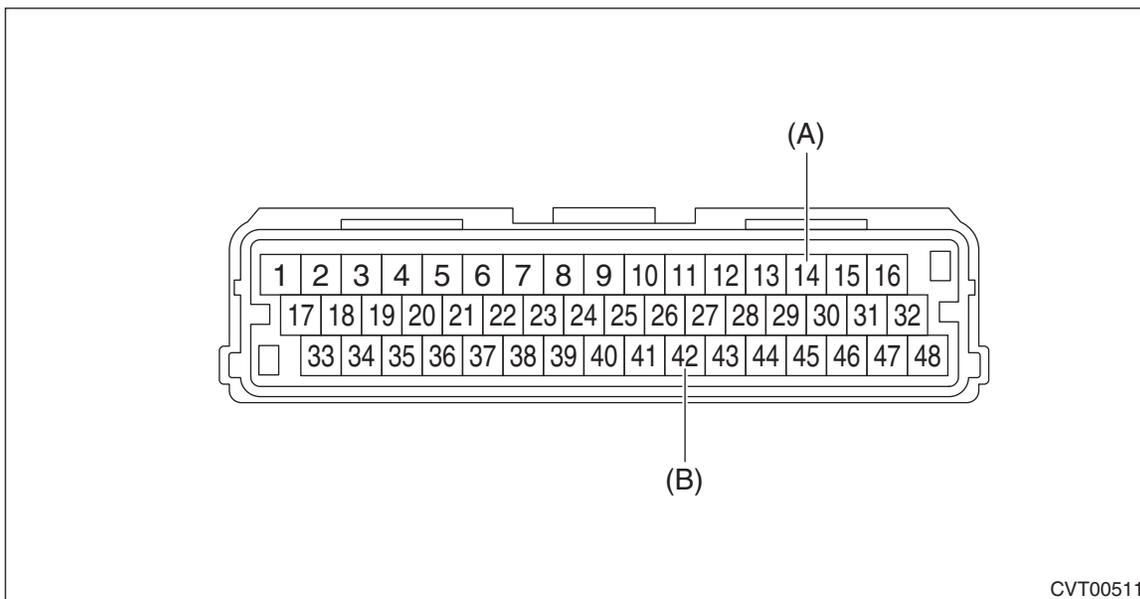
- 4) Install the air intake boot. <Ref. to IN(H6DO)-10, INSTALLATION, Air Intake Boot.>
- 5) Connect the ground terminal to battery sensor. <Ref. to RC-3, BATTERY, NOTE, Repair Contents.>
- 6) Install the collector cover.

## C: INSPECTION

- 1) Remove the bulkhead harness connector from TCM. <Ref. to CVT(TR690)-146, REMOVAL, Transmission Control Module (TCM).>
- 2) Set the ST between the TCM and bulkhead harness.  
ST 18460AA040 CHECK BOARD
- 3) Set the probe of oscilloscope to the check board connector.

### Terminals:

**No. 14 (+) — No. 42 (-)**



- (A) + probe
- (B) - probe

- 4) Start and warm up the engine.
- 5) Check the waveform of primary speed sensor with engine idling.

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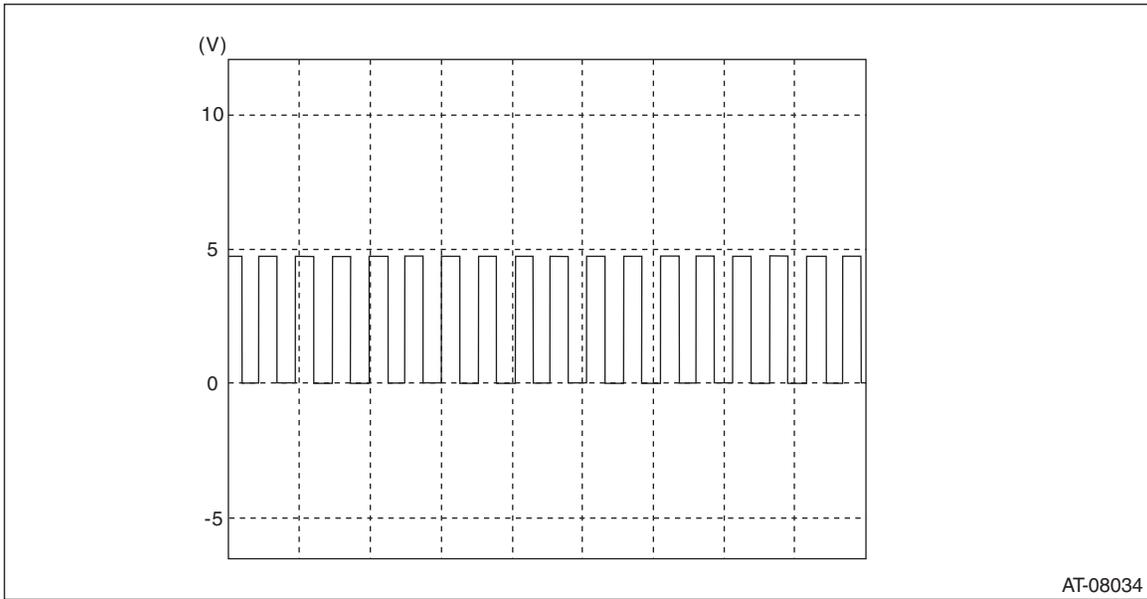
# Primary Speed Sensor

CONTINUOUSLY VARIABLE TRANSMISSION

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NOTE:

The waveform cycle changes as the speed changes.



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## 18. Front Wheel Speed Sensor

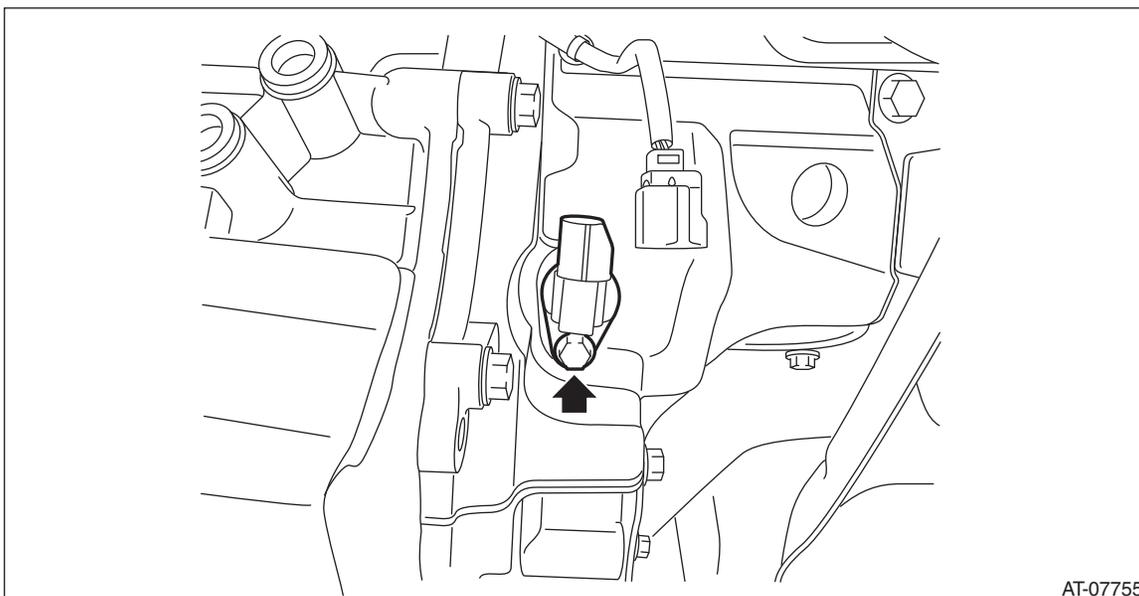
### A: REMOVAL

#### CAUTION:

• Be sure to prevent water or oil from contacting the connector terminal of front wheel speed sensor. If adhesion occurs, replace with a new part.

• When removing front wheel speed sensor, CVTF may let out. If CVTF has leaked, adjust the CVTF level after installing the front wheel speed sensor.

- 1) Disconnect the ground terminal from battery sensor. <Ref. to RC-3, BATTERY, NOTE, Repair Contents.>
- 2) Lift up the vehicle.
- 3) Clean the transmission exterior.
- 4) Remove the front wheel speed sensor harness connector.
- 5) Remove the front wheel speed sensor.



### B: INSTALLATION

#### CAUTION:

• Be sure to prevent water or oil from contacting the connector terminal of front wheel speed sensor. If adhesion occurs, replace with a new part.

• After installing the front wheel speed sensor, adjust the CVTF level.

- 1) Install the front wheel speed sensor.

#### NOTE:

- Use new O-rings.
- Apply CVTF to the O-rings.

#### *Tightening torque:*

**5 N·m (0.5 kgf·m, 3.7 ft·lb)**

- 2) Connect the harness connector.
- 3) Lower the vehicle.
- 4) Connect the ground terminal to battery sensor. <Ref. to RC-3, BATTERY, NOTE, Repair Contents.>

### C: INSPECTION

1) Remove the bulkhead harness connector from TCM. <Ref. to CVT(TR690)-146, REMOVAL, Transmission Control Module (TCM).>

2) Set the ST between the TCM and bulkhead harness.

ST 18460AA040 CHECK BOARD

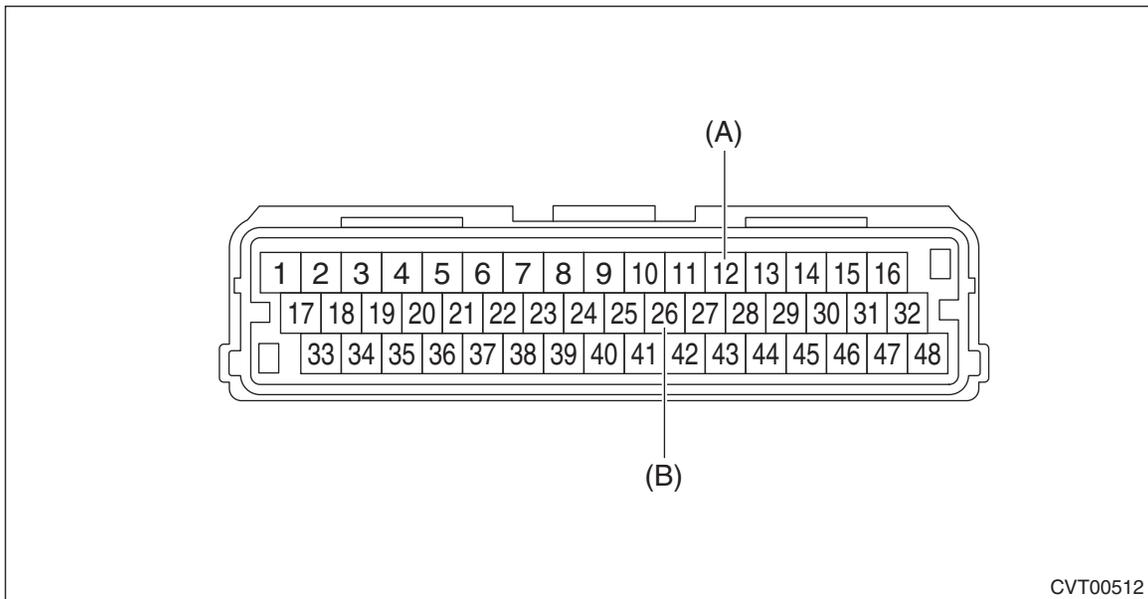
3) Set the probe of oscilloscope to the check board connector.

# Front Wheel Speed Sensor

CONTINUOUSLY VARIABLE TRANSMISSION

## Terminals:

No. 12 (+) — No. 26 (-)



CVT00512

(A) + probe

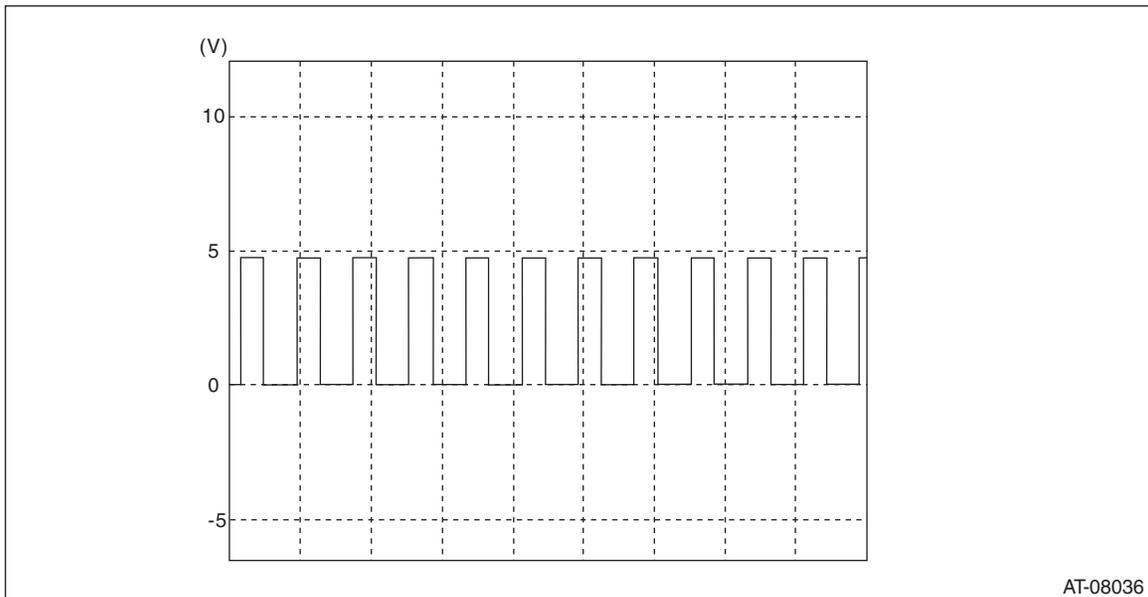
(B) - probe

4) Lift up the vehicle and raise the vehicle speed up to 20 km/h (12 MPH).

5) Check the waveform of front wheel speed sensor when vehicle speed is at 20 km/h (12 MPH).

## NOTE:

The waveform cycle changes as the speed changes.



AT-08036

## 19. Secondary Pressure Sensor

### A: REMOVAL

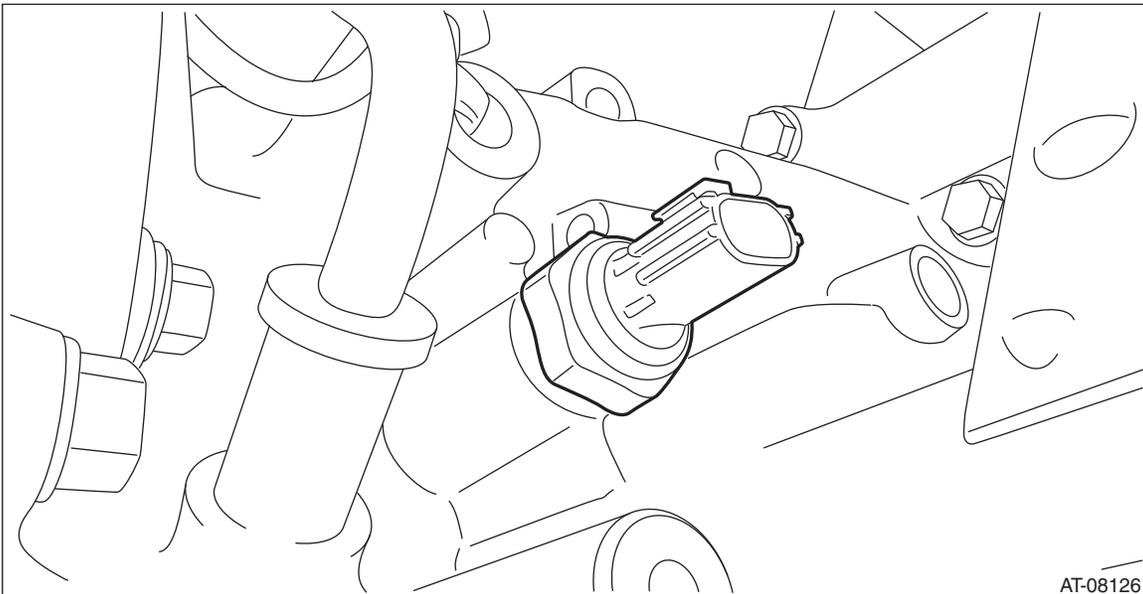
#### CAUTION:

- Be sure to prevent water or oil from contacting the connector terminal of secondary pressure sensor. If adhesion occurs, replace with a new part.
- When removing secondary pressure sensor, CVTF may let out. If CVTF has leaked, adjust the CVTF level after installing the secondary pressure sensor.

- 1) Disconnect the ground terminal from battery sensor. <Ref. to RC-3, BATTERY, NOTE, Repair Contents.>
- 2) Lift up the vehicle.
- 3) Clean the transmission exterior.
- 4) Remove the secondary pressure sensor harness connector.
- 5) Remove the secondary pressure sensor.

#### NOTE:

Use Ko-ken 3/8 12-point 27 mm (manufacturer product No. 3305M-27) deep socket.



### B: INSTALLATION

#### CAUTION:

- Be sure to prevent water or oil from contacting the connector terminal of secondary pressure sensor. If adhesion occurs, replace with a new part.
- After installing the secondary pressure sensor, adjust the CVTF level.

- 1) Install the secondary pressure sensor.

#### NOTE:

- Use new O-rings.
- Apply CVTF to the O-rings.

#### *Tightening torque:*

**39 N·m (4.0 kgf·m, 28.8 ft·lb)**

- 2) Connect the harness connector.
- 3) Lower the vehicle.
- 4) Connect the ground terminal to battery sensor. <Ref. to RC-3, BATTERY, NOTE, Repair Contents.>

### C: INSPECTION

- 1) Start and warm up the engine.
- 2) Shift the select lever to "P" or "N" range.
- 3) Depress the brake pedal and hold it.

## Secondary Pressure Sensor

CONTINUOUSLY VARIABLE TRANSMISSION

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4) Check "secondary pressure sensor voltage" by using Subaru Select Monitor while the engine is idling. <Ref. to CVT(diag)-18, OPERATION, Subaru Select Monitor.>

**Specification:**

**Approx. 0.8 V**

5) Check "secondary pressure sensor voltage" by using Subaru Select Monitor while the engine is stopped and the ignition switch is turned on. <Ref. to CVT(diag)-18, OPERATION, Subaru Select Monitor.>

**Specification:**

**Approx. 0.5 V**

## 20. Control Valve Body

### A: REMOVAL

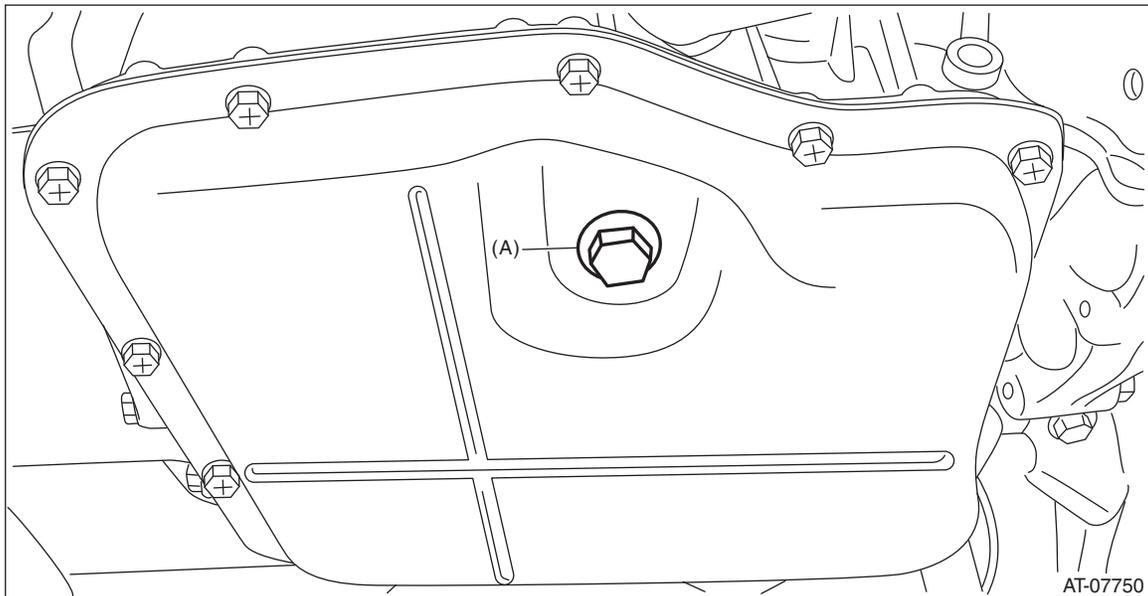
#### CAUTION:

- Directly after the vehicle has been running or the engine has been idling for a long time, the CVTF is hot. Be careful not to burn yourself.
- Be careful not to spill CVTF on the exhaust pipe to prevent it from emitting smoke or causing a fire. If the CVTF adheres, wipe it off completely.

#### NOTE:

The control valve body is replaced as an assembly only, because it is a non-disassembly part.

- 1) Disconnect the ground terminal from battery sensor. <Ref. to RC-3, BATTERY, NOTE, Repair Contents.>
- 2) Lift up the vehicle.
- 3) Clean the transmission exterior.
- 4) Remove the CVTF drain plug to drain CVTF.



(A) CVTF drain plug

- 5) Install the CVTF drain plug.

#### NOTE:

Use a new gasket.

#### **Tightening torque:**

**39.2 N·m (4.0 kgf-m, 28.9 ft-lb)**

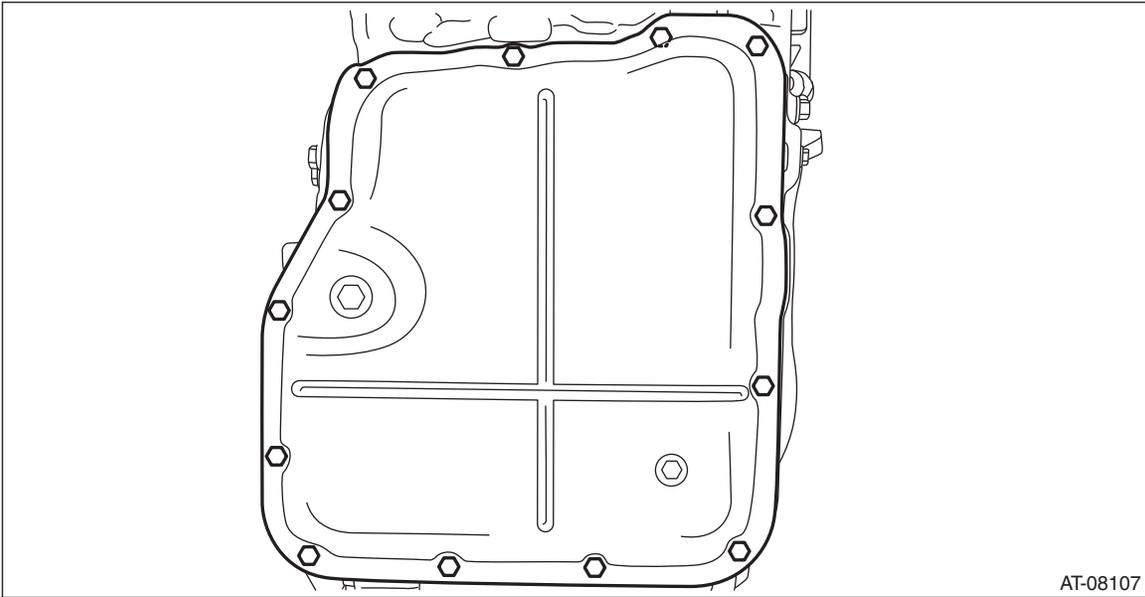
- 6) Remove the oil pan.

# Control Valve Body

CONTINUOUSLY VARIABLE TRANSMISSION

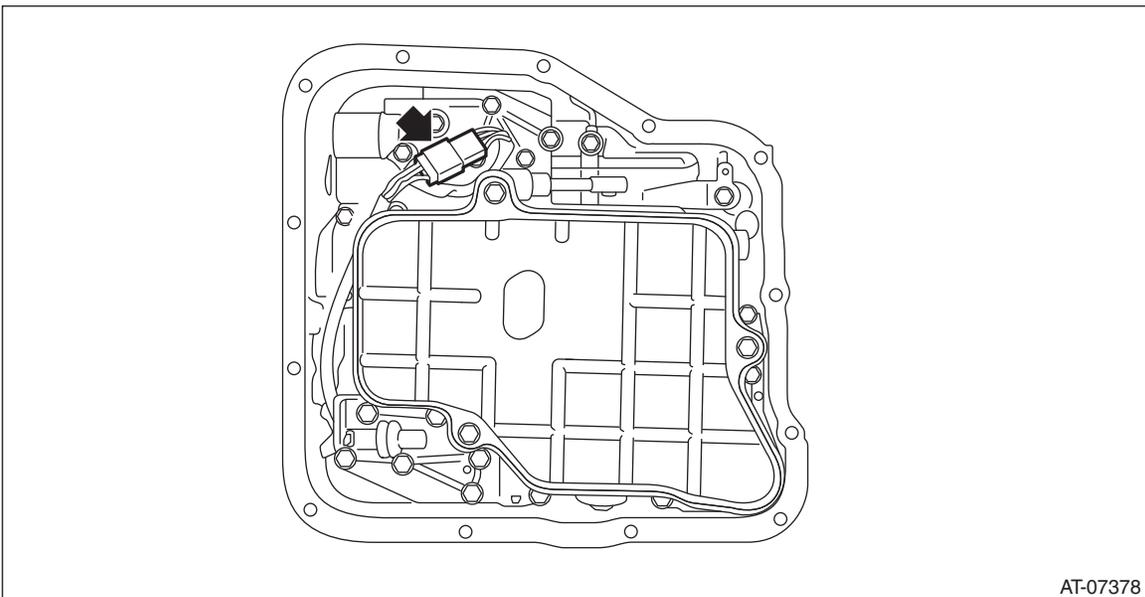
**CAUTION:**

**Be careful not to allow foreign matter such as dust or dirt to enter the oil pan.**



7) Remove the magnet.

8) Disconnect the control valve harness connector.

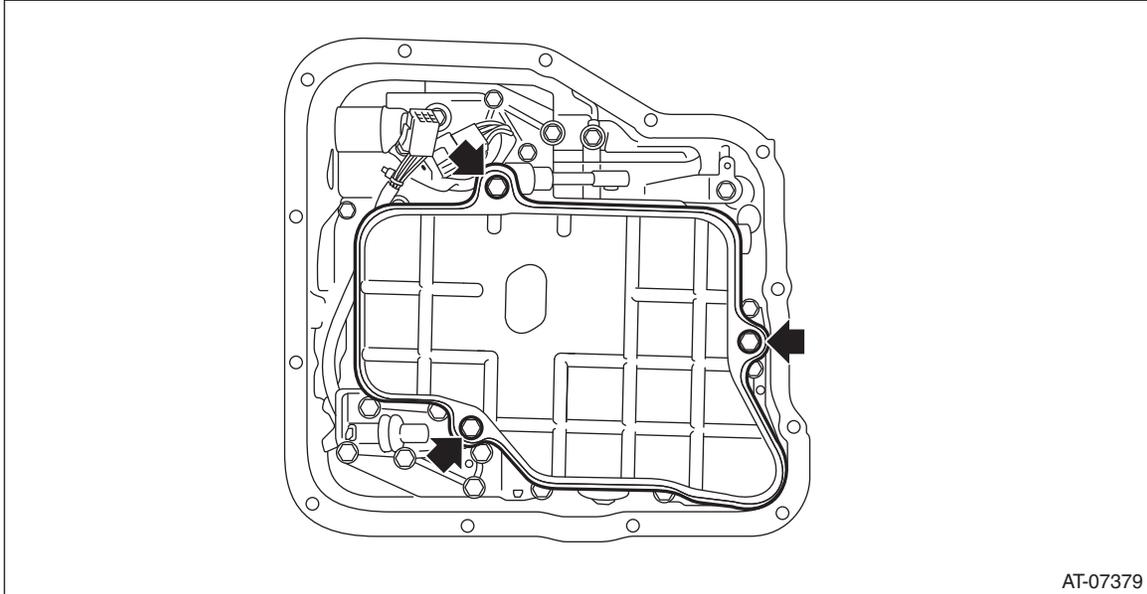


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# Control Valve Body

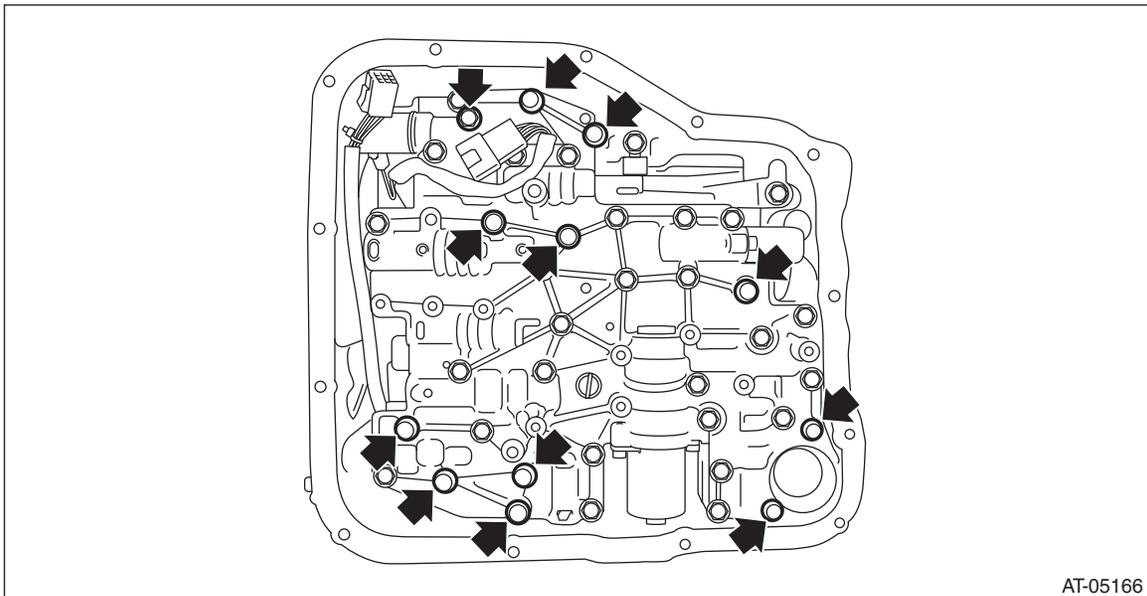
CONTINUOUSLY VARIABLE TRANSMISSION

9) Remove the oil strainer.



10) Remove the control valve body.

**CAUTION:**  
Do not let the manual valve drop off.



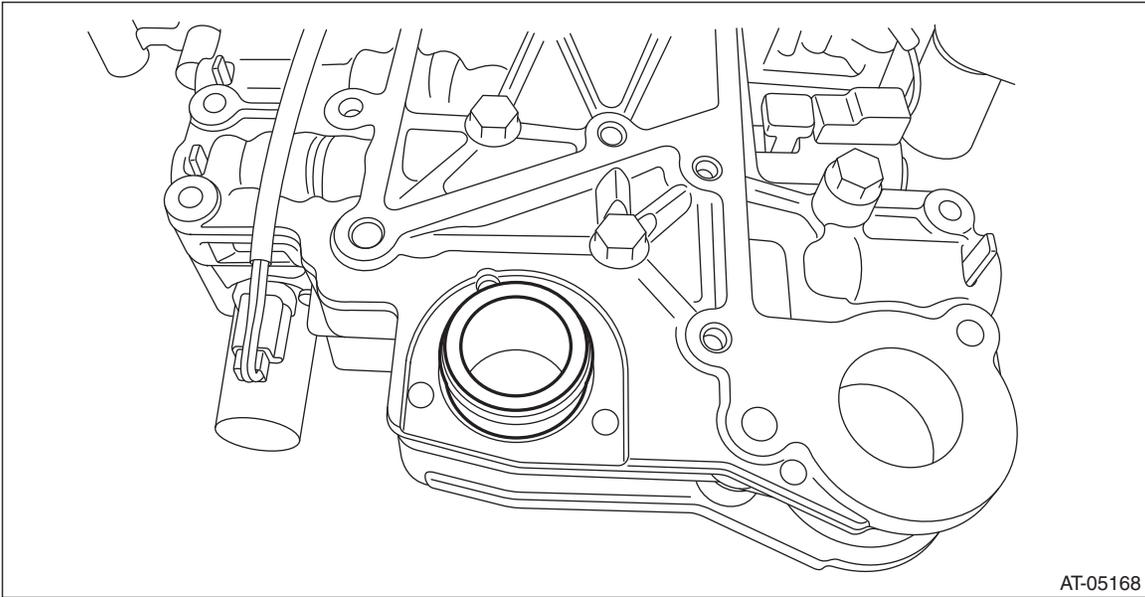
11) Remove the pressure pipe.

# Control Valve Body

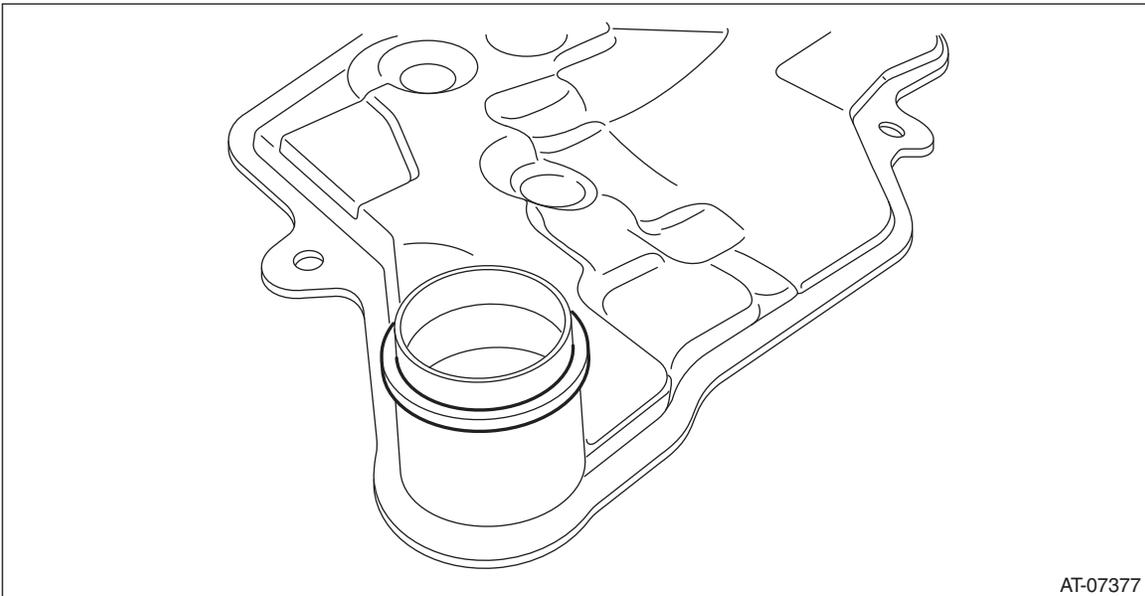
CONTINUOUSLY VARIABLE TRANSMISSION

NOTE:

It may be located in transmission case side.



12) Remove the O-ring from oil strainer.

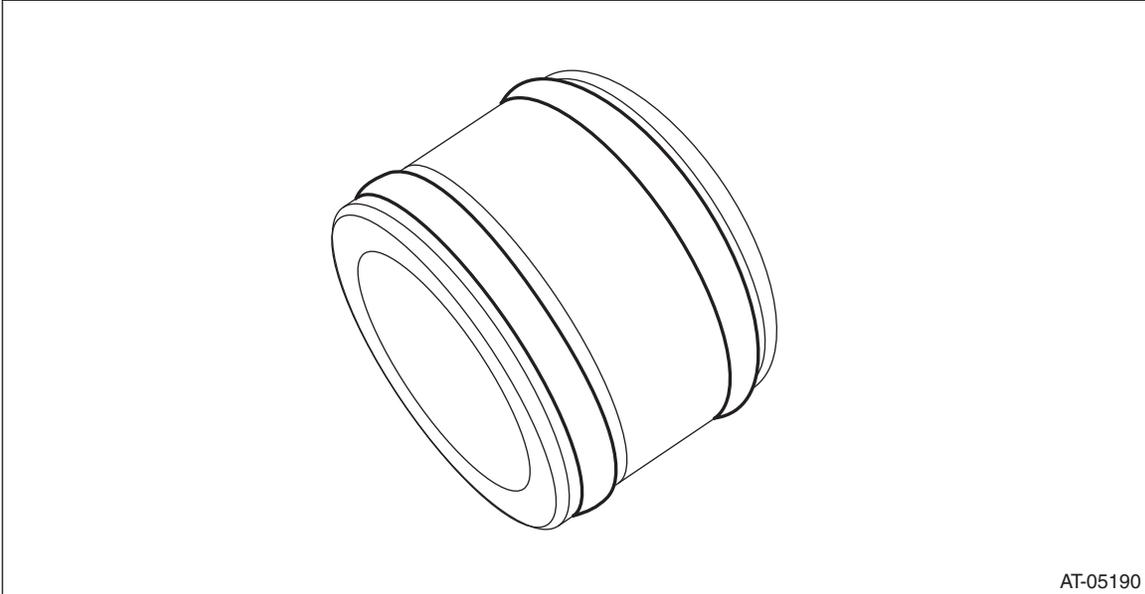


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# Control Valve Body

CONTINUOUSLY VARIABLE TRANSMISSION

13) Remove the O-ring from pressure pipe.



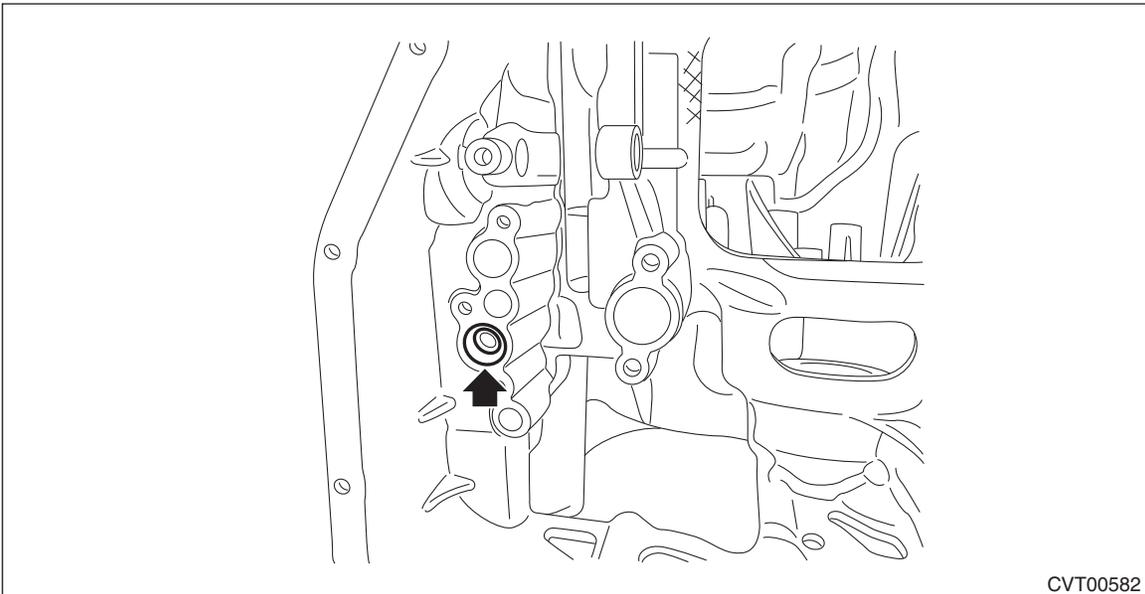
AT-05190

## B: INSTALLATION

- 1) Clean the mating surface of oil pan and transmission case.
- 2) Make sure that the CVTF filter is installed to the transmission case.

NOTE:

Make sure that the CVTF filter does not protrude from the transmission case.



CVT00582

- 3) Check the control valve body for dust and other foreign matter.
- 4) Install the O-ring to the pressure pipe.

NOTE:

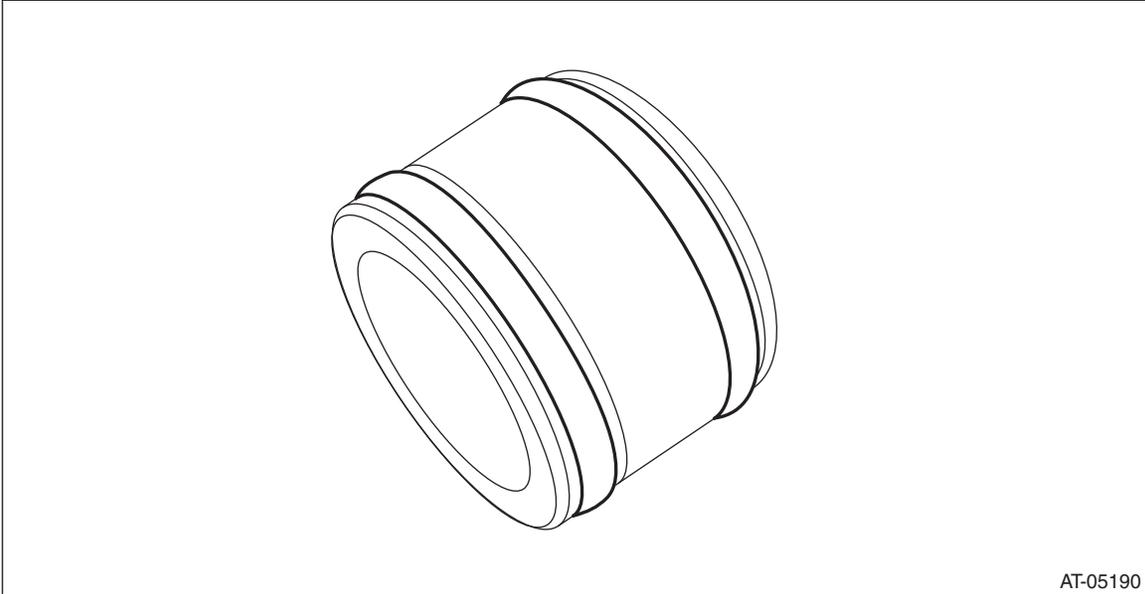
- Use new O-rings.

# Control Valve Body

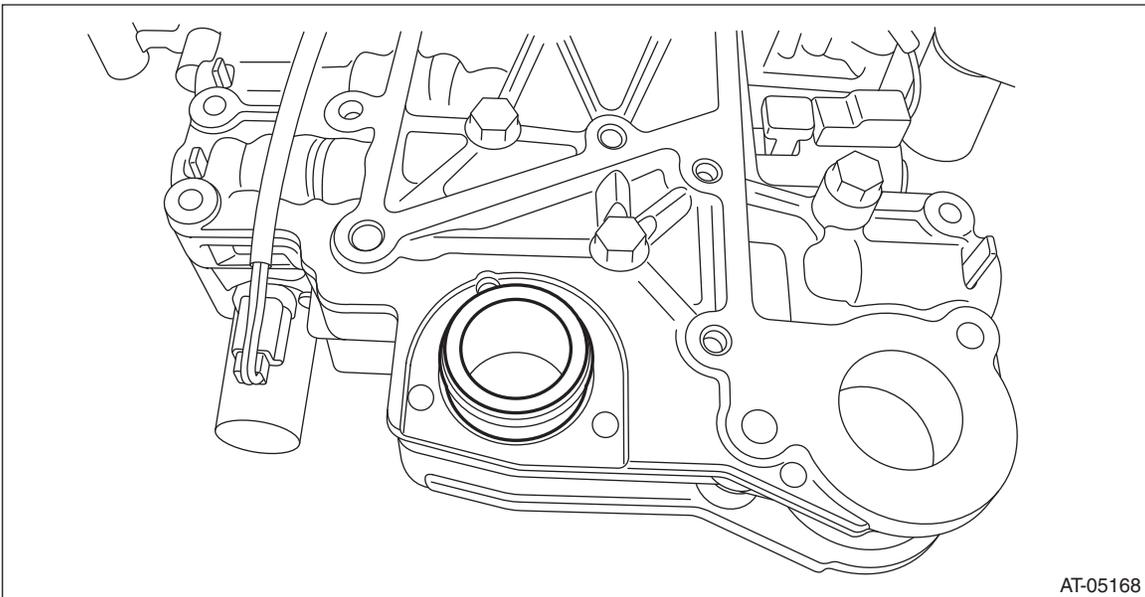
## CONTINUOUSLY VARIABLE TRANSMISSION

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- Apply CVTF to the O-rings.



- 5) Install the pressure pipe.



- 6) Install the control valve body.

**CAUTION:**

- Beware of the transmission harness getting caught in between.
- Do not impact or bend the transmission harness because it has the oil temperature sensor inside.

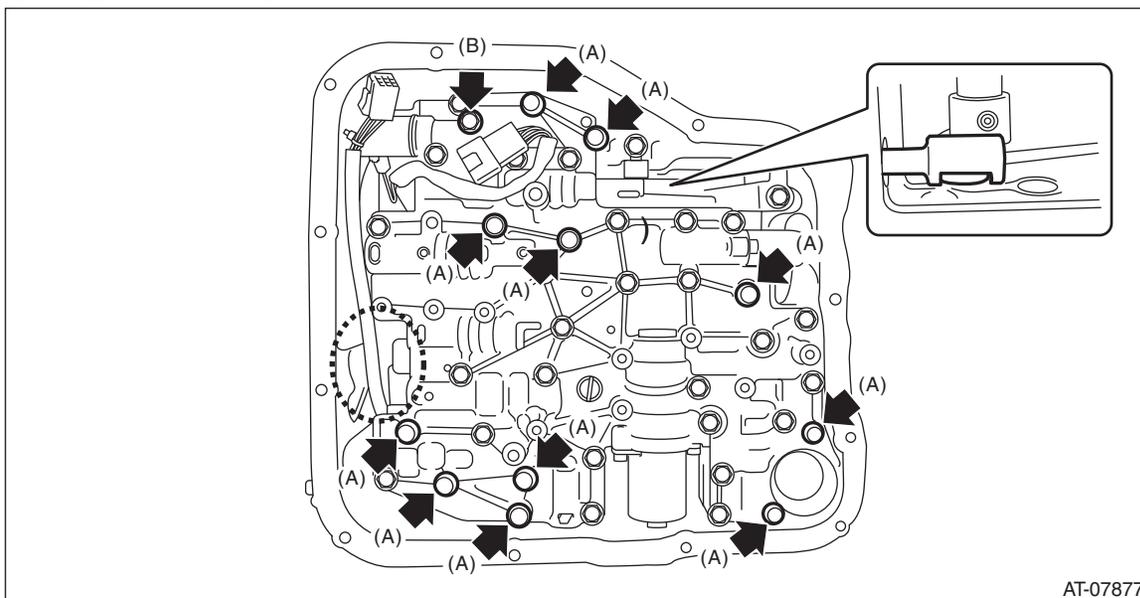
**NOTE:**

- Engage the manual valve to the manual plate.
- Lead the transmission harness through from the point indicated by dashed line in the figure.

# Control Valve Body

CONTINUOUSLY VARIABLE TRANSMISSION

**Tightening torque:**  
**9 N·m (0.9 kgf·m, 6.6 ft·lb)**



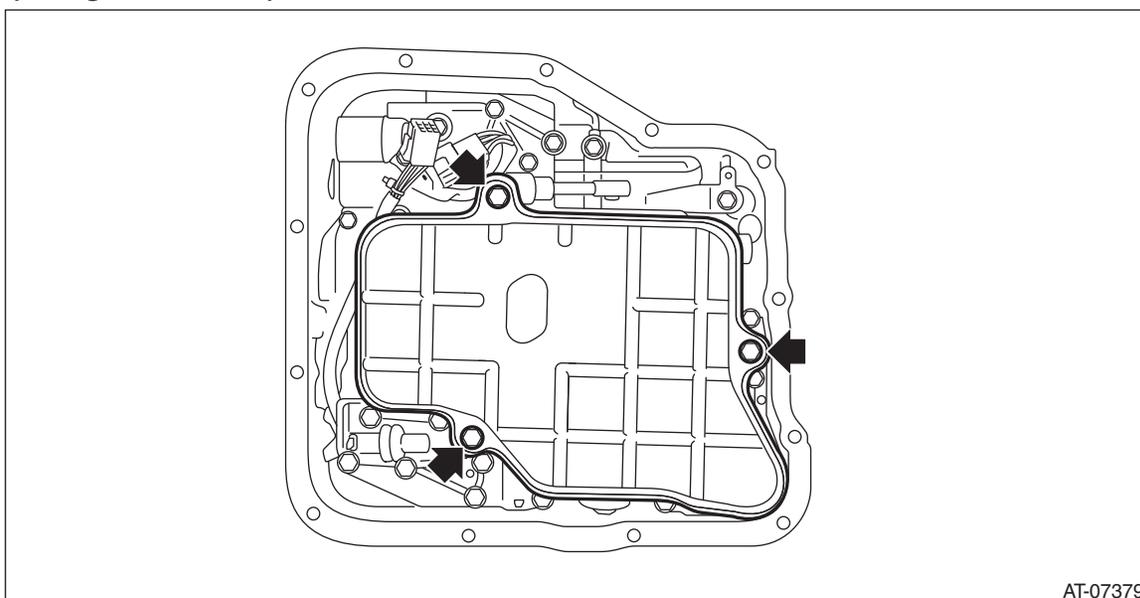
- (A) Short bolt (11 pcs)
- (B) Long bolt (1 pcs)

7) Install the O-ring to oil strainer and install the oil strainer.

NOTE:

- Use new O-rings.
- Apply CVTF to the O-rings.
- Let the transmission harness run between control valve body and oil strainer.

**Tightening torque:**  
**9 N·m (0.9 kgf·m, 6.6 ft·lb)**

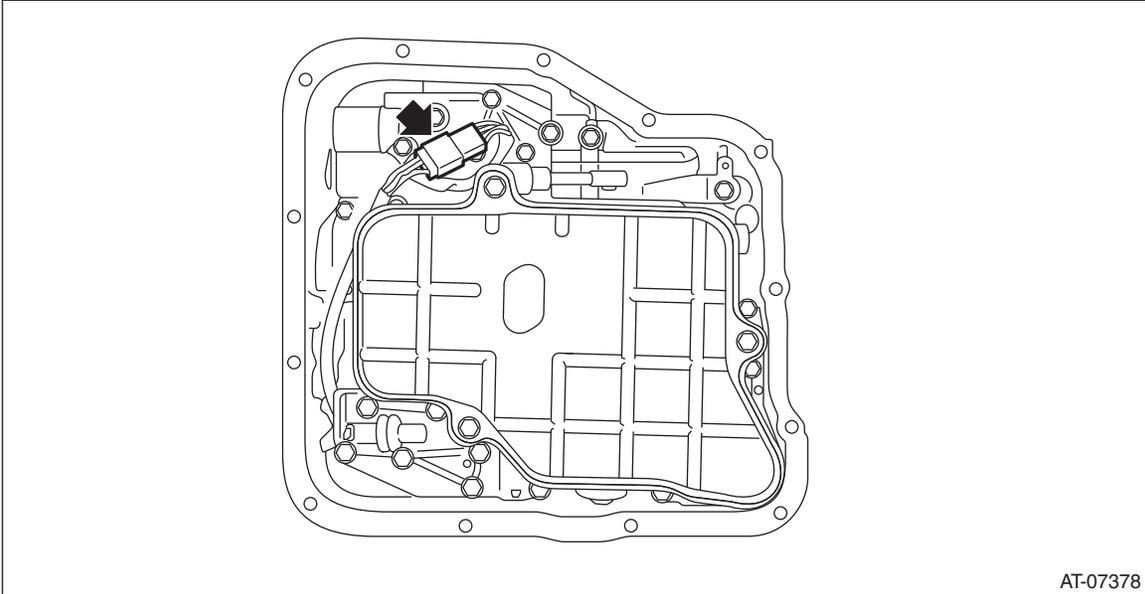


# Control Valve Body

## CONTINUOUSLY VARIABLE TRANSMISSION

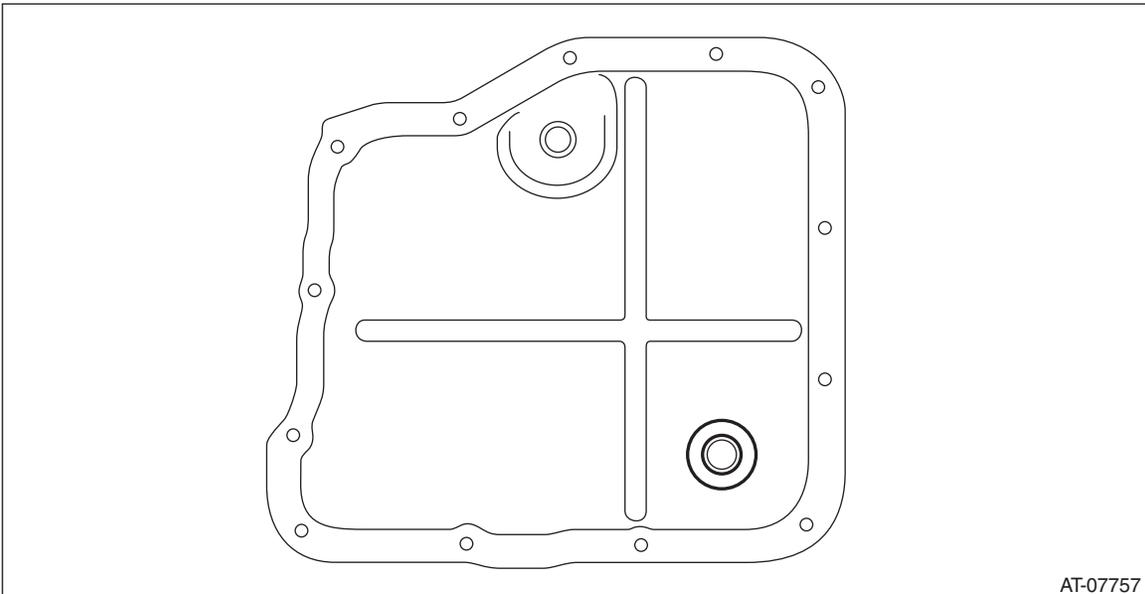
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8) Connect the control valve harness connector.



9) Clean the magnet.

10) Attach the magnet at the specified position of the oil pan.



11) Apply liquid gasket all around the oil pan mating surface seamlessly.

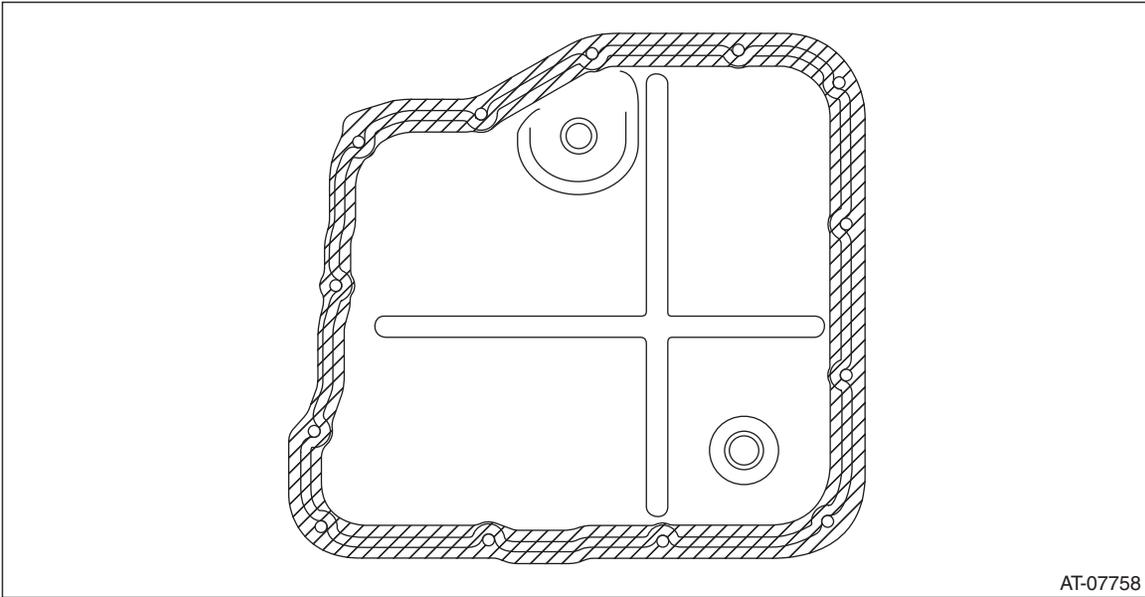
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# Control Valve Body

CONTINUOUSLY VARIABLE TRANSMISSION

## Liquid gasket:

**THREE BOND 1217B (Part No. K0877YA020) or equivalent**



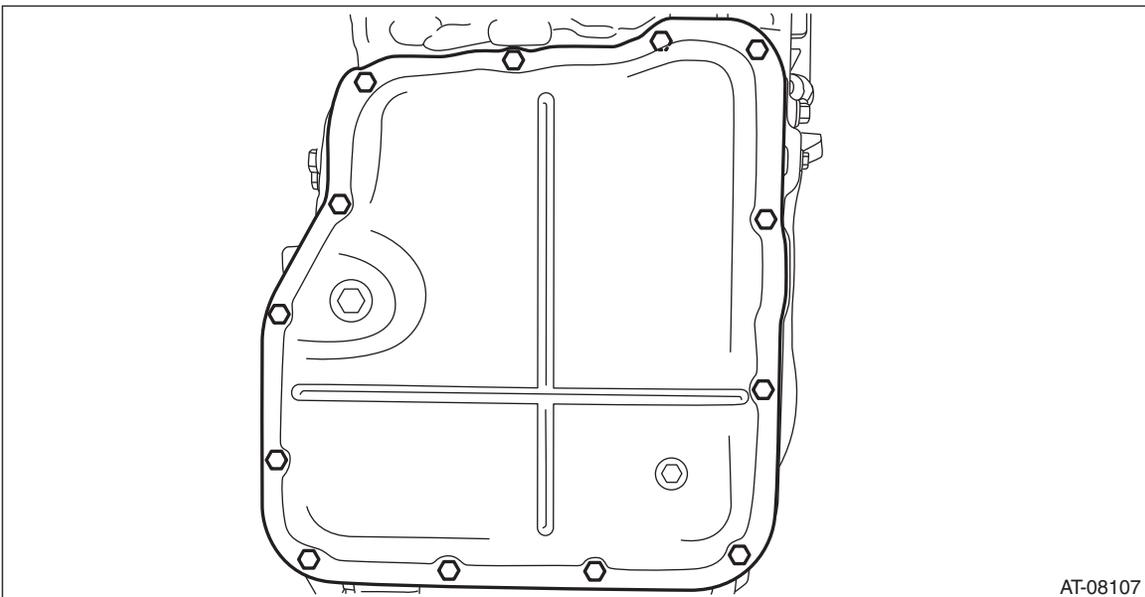
12) Install the oil pan by equally tightening the bolts.

## CAUTION:

**Beware of the transmission harness getting caught in between.**

## Tightening torque:

**5 N·m (0.5 kgf·m, 3.7 ft·lb)**



13) Connect the ground terminal to battery sensor. <Ref. to RC-3, BATTERY, NOTE, Repair Contents.>

14) Fill with CVTF. <Ref. to CVT(TR690)-40, REPLACEMENT, CVTF.>

15) Adjust the CVTF level. <Ref. to CVT(TR690)-39, ADJUSTMENT, CVTF.>

16) Perform the operation of AT learning mode. <Ref. to CVT(diag)-33, Learning Control.>

## C: INSPECTION

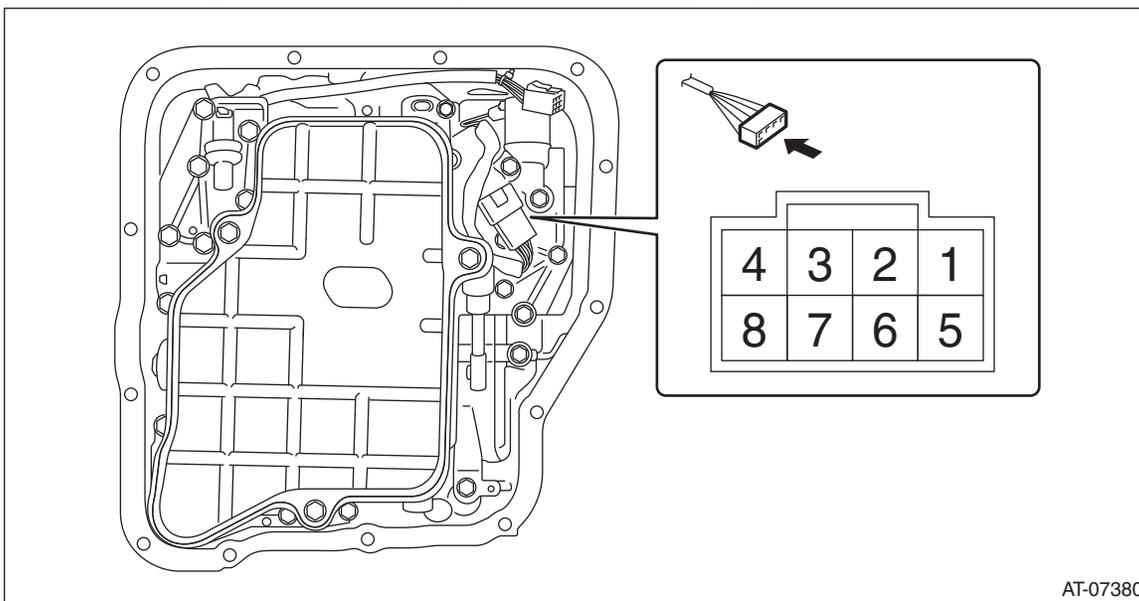
- Check each part for damage or dust.
- Check oil strainer for clogging.
- Measure the resistance of each solenoid.

# Control Valve Body

## CONTINUOUSLY VARIABLE TRANSMISSION

### NOTE:

Measurement should be performed at a temperature of 20°C (68°F).



AT-07380

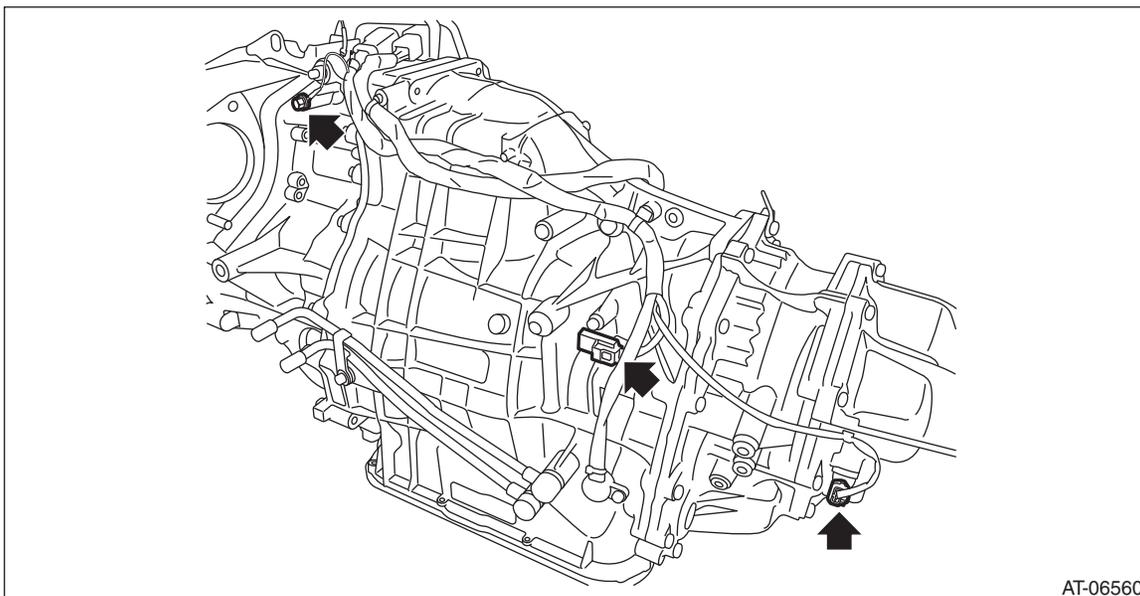
Solenoid	Terminal No.	Standard (Ω)
Secondary solenoid	No. 1 — control valve body	Approx. 6.6 Ω
Lock-up duty solenoid	No. 2 — control valve body	Approx. 12 Ω
F&R solenoid	No. 3 — control valve body	Approx. 5.3 Ω
Lock-up ON/OFF solenoid	No. 5 — control valve body	Approx. 16 Ω
Primary DOWN solenoid	No. 6 — control valve body	Approx. 12 Ω
Primary UP solenoid	No. 7 — control valve body	Approx. 12 Ω
AWD solenoid	No. 8 — control valve body	Approx. 3.2 Ω

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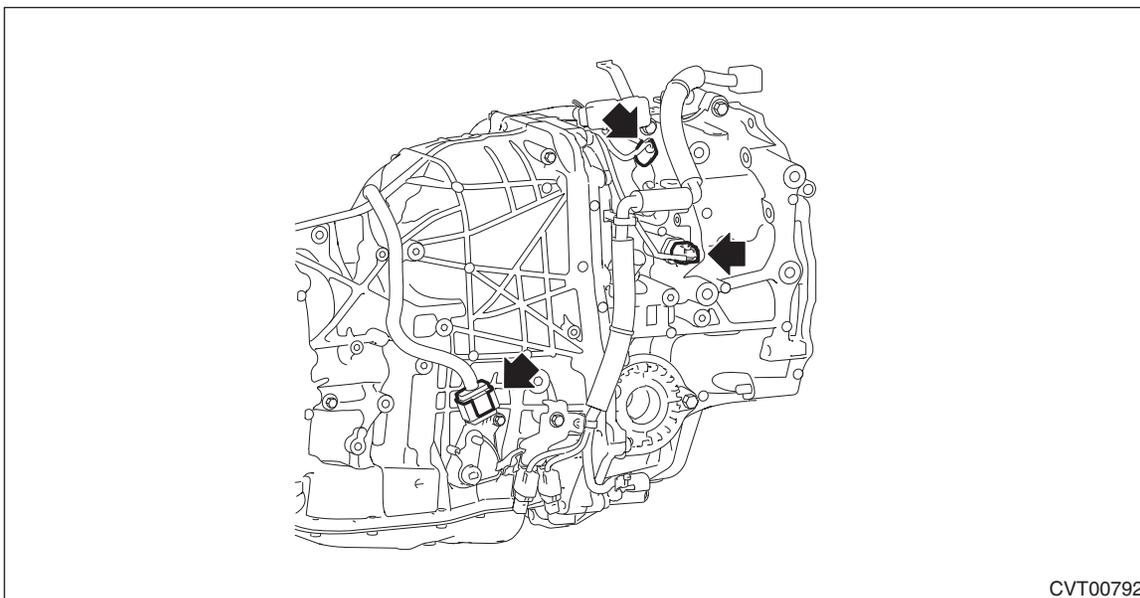
## 21. Transmission Harness

### A: REMOVAL

- 1) Remove the transmission from the vehicle. <Ref. to CVT(TR690)-59, REMOVAL, Automatic Transmission Assembly.>
- 2) Prepare for overhaul. <Ref. to CVT(TR690)-161, Preparation for Overhaul.>
- 3) Remove the transmission harness ground terminal and remove the harness connectors from front wheel speed sensor and secondary speed sensor.



- 4) Remove the harness connectors from inhibitor switch, primary speed sensor and secondary pressure sensor.

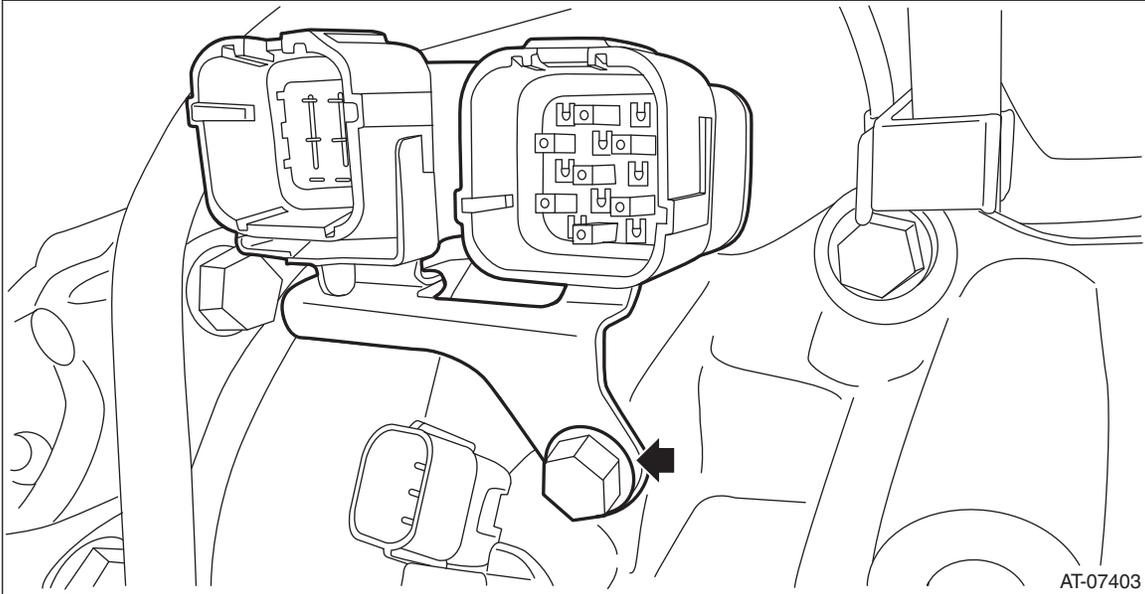


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# Transmission Harness

## CONTINUOUSLY VARIABLE TRANSMISSION

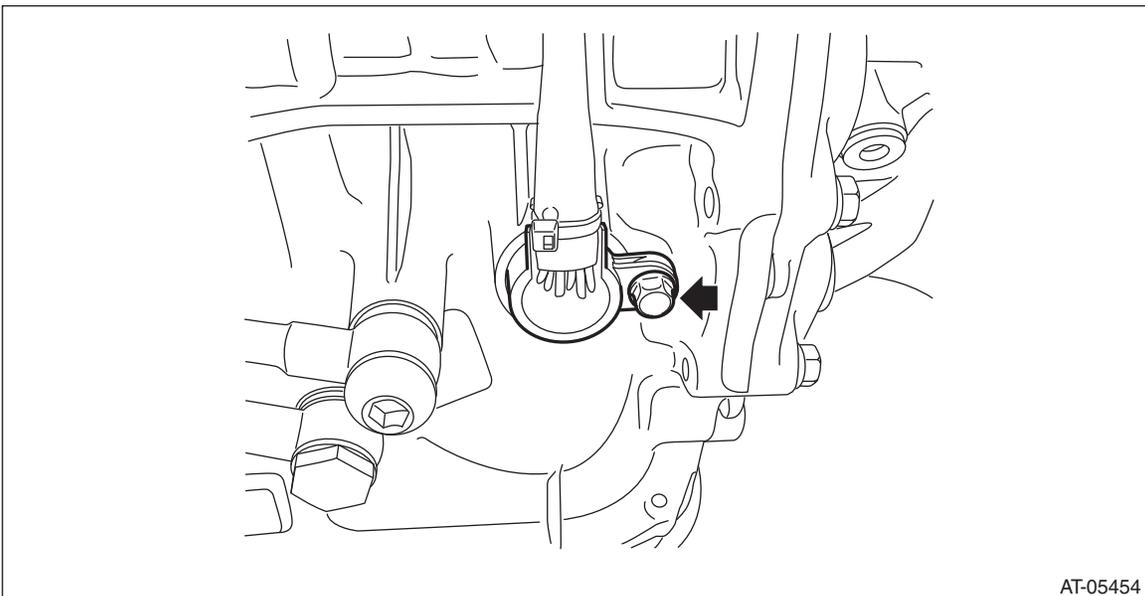
5) Remove the transmission harness stay.



6) Remove transmission harness connector and inhibitor harness connector from harness stay.

7) Remove the control valve body. <Ref. to CVT(TR690)-129, REMOVAL, Control Valve Body.>

8) Remove the mounting bolt to pull out the bushing of transmission harness from transmission case round hole.



9) Remove the harness clip from transmission assembly.

### **B: INSTALLATION**

1) Install the harness clip to the transmission assembly.

2) Insert the transmission harness bushing into the round hole on the transmission case and install the bolt.

#### NOTE:

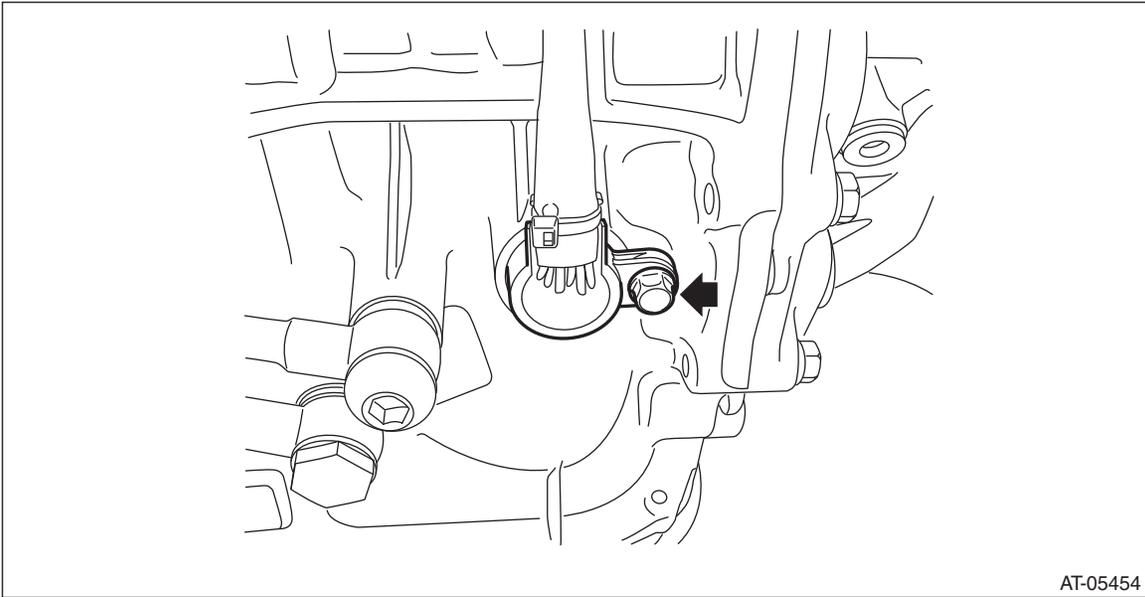
- Use new O-rings.
- Do not impact or bend the transmission harness because it has the oil temperature sensor inside.

# Transmission Harness

CONTINUOUSLY VARIABLE TRANSMISSION

**Tightening torque:**

**5 N·m (0.5 kgf·m, 3.7 ft·lb)**

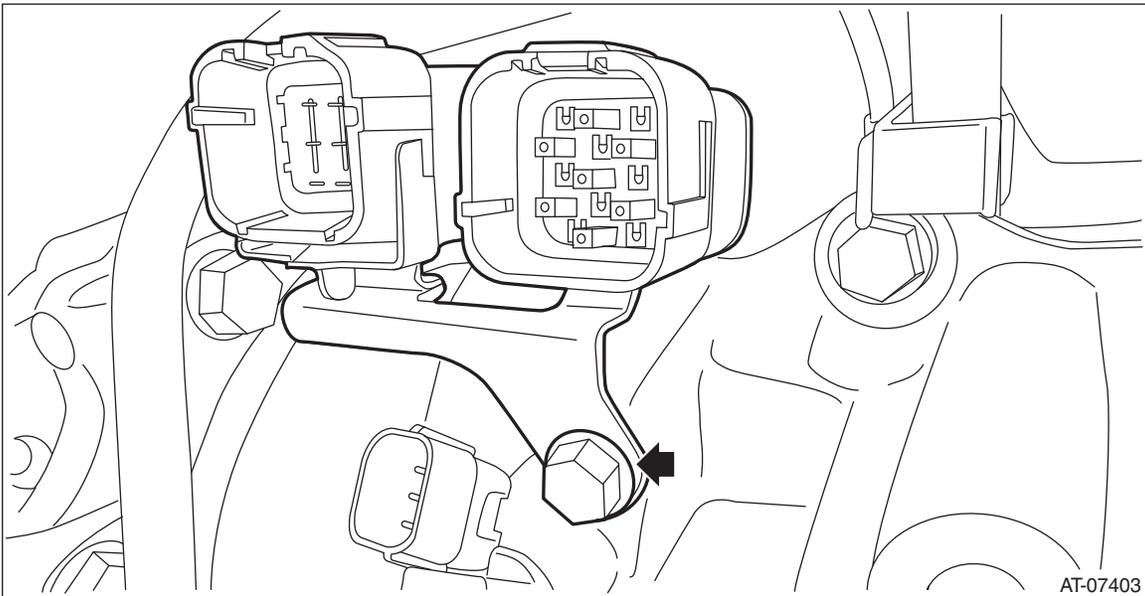


AT-05454

- 3) Install the control valve body. <Ref. to CVT(TR690)-133, INSTALLATION, Control Valve Body.>
- 4) Install the transmission harness connector and inhibitor harness connector to the harness stay.
- 5) Install the transmission harness stay.

**Tightening torque:**

**16 N·m (1.6 kgf·m, 11.8 ft·lb)**

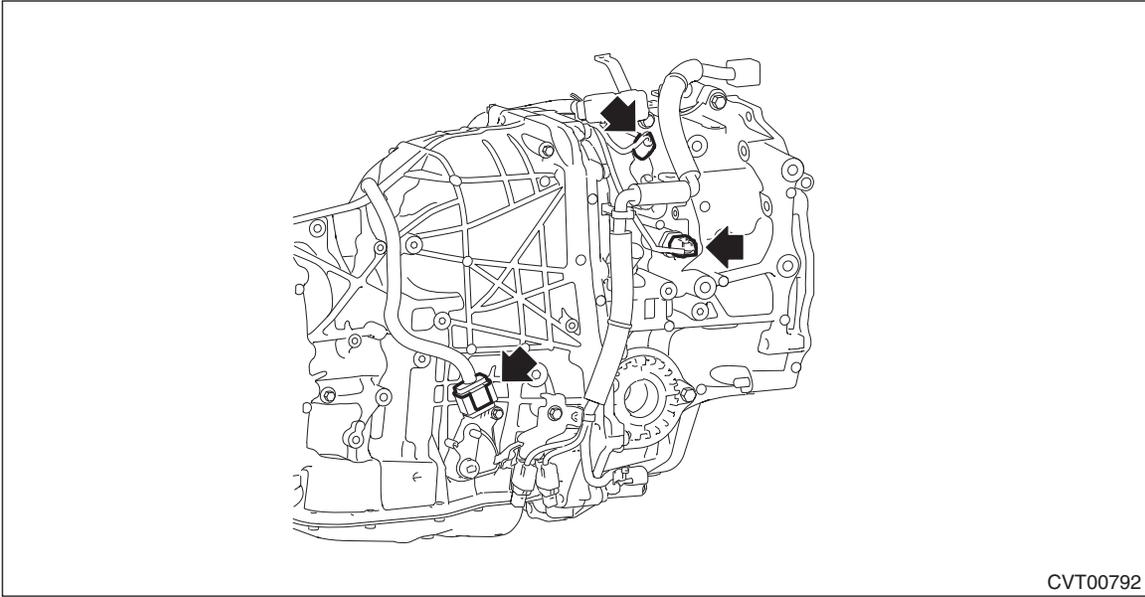


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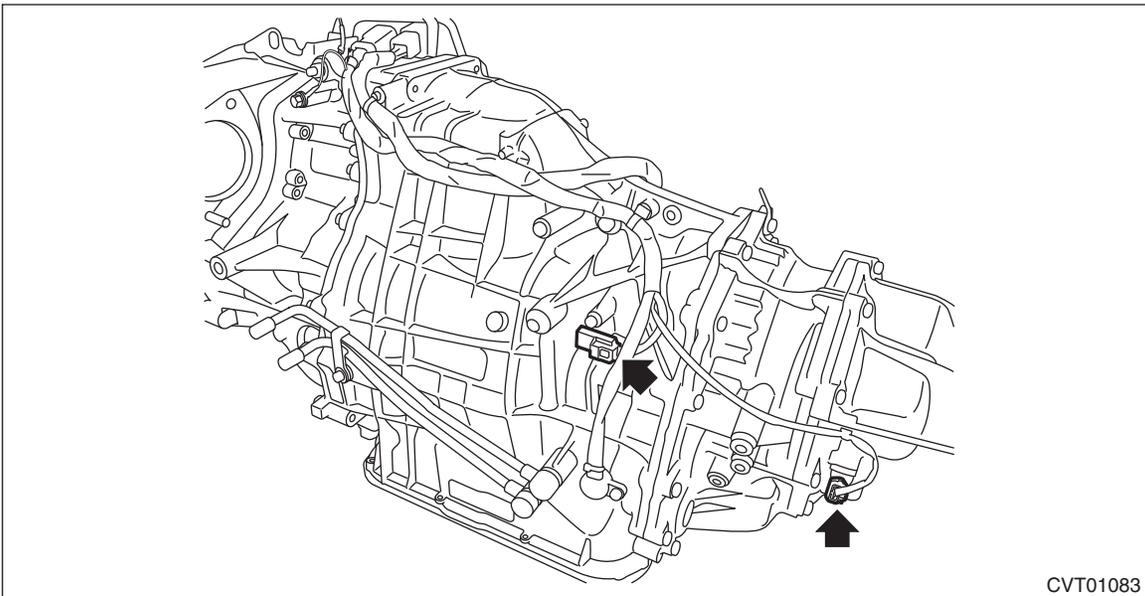
# Transmission Harness

## CONTINUOUSLY VARIABLE TRANSMISSION

6) Connect the harness connectors to the inhibitor switch, primary speed sensor and secondary pressure sensor.



7) Connect the harness connectors to the front wheel speed sensor and secondary speed sensor.



8) Install the transmission ground terminal.

NOTE:

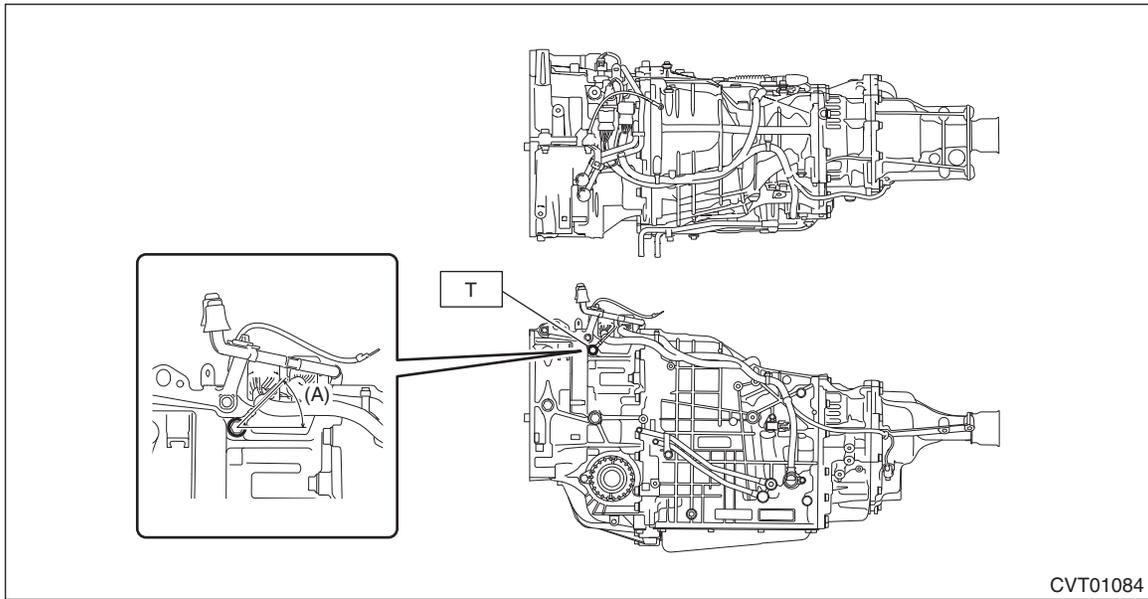
Install the transmission ground terminal at an approximately 45° angle (A).

# Transmission Harness

CONTINUOUSLY VARIABLE TRANSMISSION

## **Tightening torque:**

**16 N·m (1.6 kgf·m, 11.8 ft·lb)**



9) Install the transmission cover.

## **Tightening torque:**

**8 N·m (0.8 kgf·m, 5.9 ft·lb)**

10) Install the transmission assembly. <Ref. to CVT(TR690)-77, INSTALLATION, Automatic Transmission Assembly.>

## **C: INSPECTION**

- 1) Visually check the harness and connector for damage or crack.
- 2) Check the harness terminal for rust, disconnection or poor contact.
- 3) Check the continuity between harness terminals and oil temperature sensor.

### **NOTE:**

Refer to WIRING SECTION for transmission harness terminal and oil temperature sensor terminal. <Ref. to WI-166, WIRING DIAGRAM, CVT Control System.>

### **Harness continuity standard:**

**Less than 1  $\Omega$**

### **Oil temperature sensor standard:**

**Approx. 2.6 k $\Omega$  (at 20°C)**

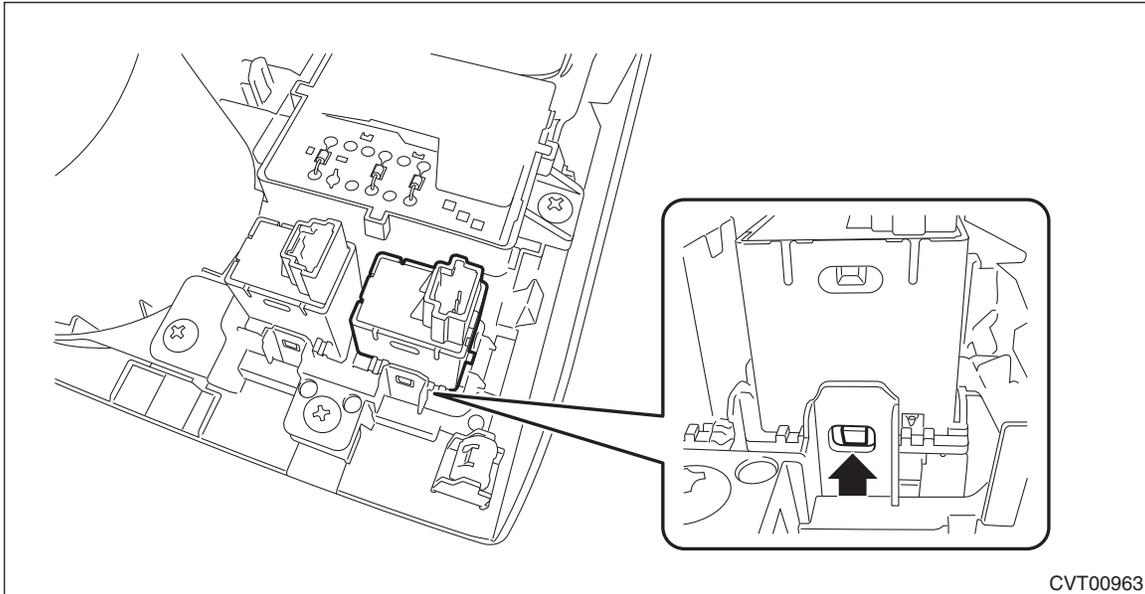
## X MODE Switch

CONTINUOUSLY VARIABLE TRANSMISSION

### 22.X MODE Switch

#### A: REMOVAL

- 1) Disconnect the ground terminal from battery sensor. <Ref. to RC-3, BATTERY, NOTE, Repair Contents.>
- 2) Remove the cover assembly - front. <Ref. to EI-80, REMOVAL, Console Box.>
- 3) Remove the X mode switch from the cover assembly - front.



CVT00963

#### B: INSTALLATION

- 1) Install X mode switch to the cover assembly - front.
- 2) Install the cover assembly - front. <Ref. to EI-81, INSTALLATION, Console Box.>
- 3) Connect the ground terminal to battery sensor. <Ref. to RC-3, BATTERY, NOTE, Repair Contents.>

# X MODE Switch

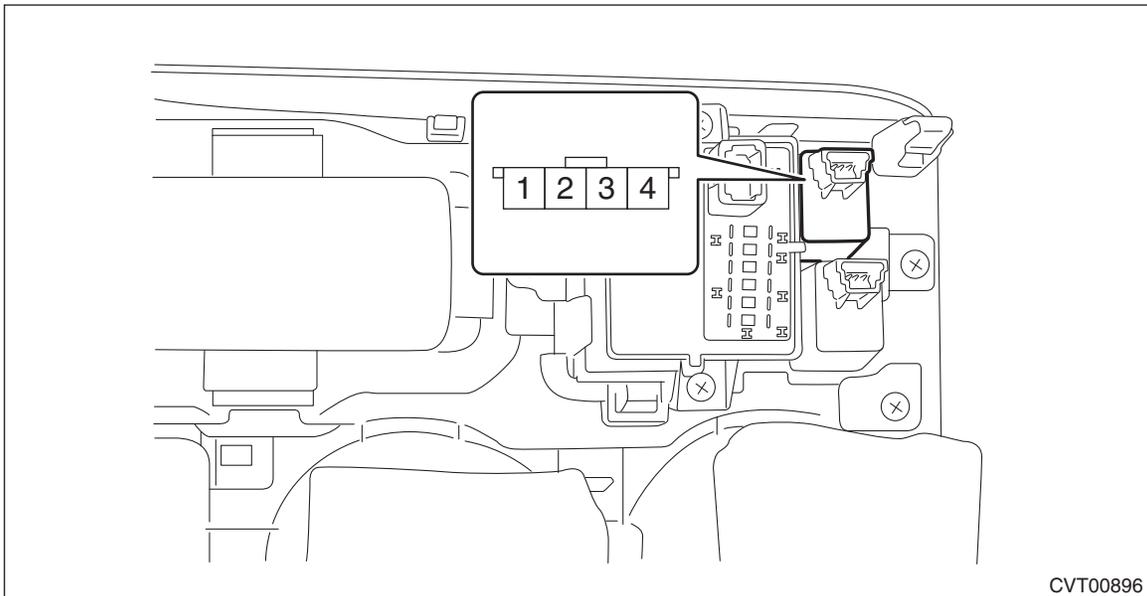
CONTINUOUSLY VARIABLE TRANSMISSION

## C: INSPECTION

### 1. CHECK SWITCH UNIT

Measure the resistance between connector terminals of the X mode switch.

	Terminal No.	Standard
OFF (when measured without operating the switch)	No. 1 — No. 4	1 M $\Omega$ or more
ON (when measured with the switch held down)		Less than 1 $\Omega$



### 2. CHECK X MODE SYSTEM

Refer to “CVT (TR580)” section for X mode system inspection. <Ref. to CVT(TR580)-160, CHECK X MODE SYSTEM, INSPECTION, X MODE Switch.>

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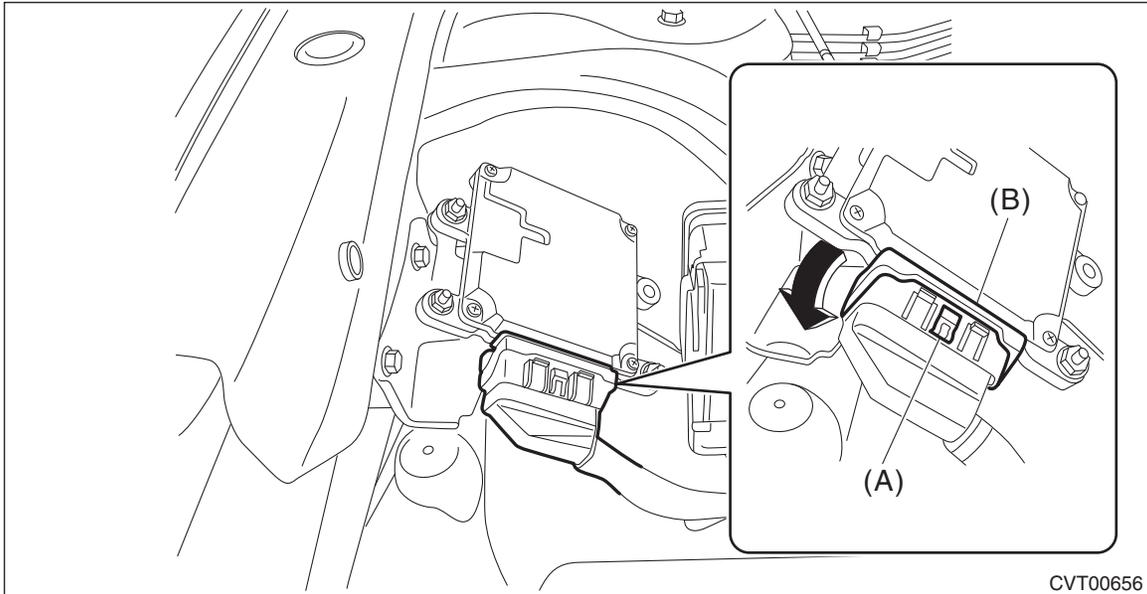
# Transmission Control Module (TCM)

CONTINUOUSLY VARIABLE TRANSMISSION

## 23. Transmission Control Module (TCM)

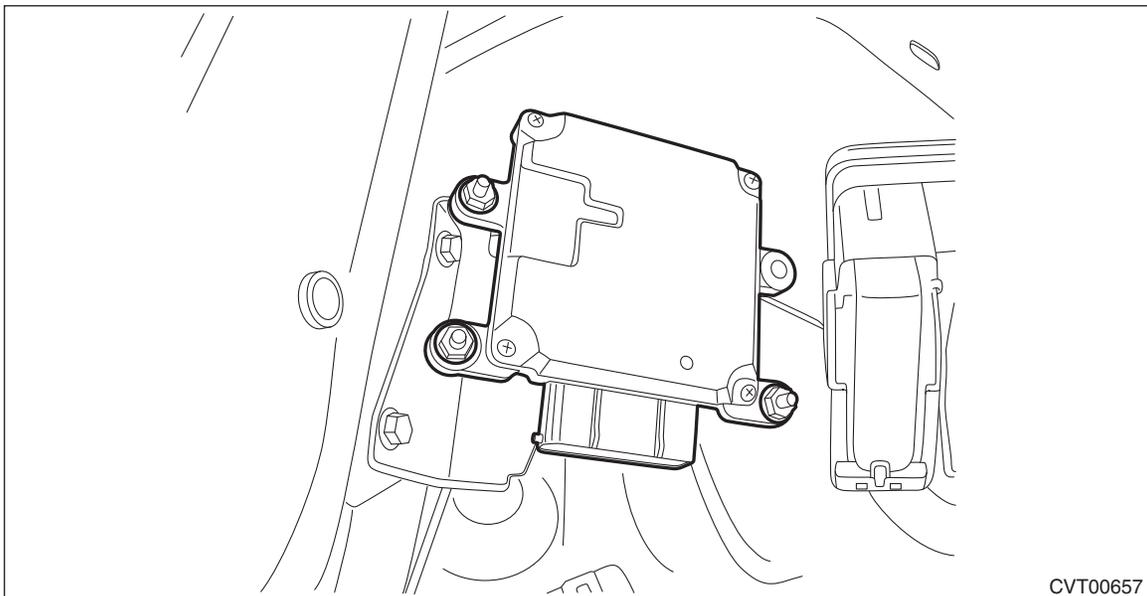
### A: REMOVAL

- 1) Disconnect the ground terminal from battery sensor. <Ref. to RC-3, BATTERY, NOTE, Repair Contents.>
- 2) Remove the air cleaner case. <Ref. to IN(H6DO)-8, REMOVAL, Air Cleaner Case.>
- 3) Move the lock lever in the arrow direction while pressing the lock button, and disconnect the connector.



- (A) Lock button  
(B) Lock lever

- 4) Remove the TCM.



### B: INSTALLATION

- 1) Install the TCM.

**Tightening torque:**

**7.5 N·m (0.8 kgf·m, 5.5 ft·lb)**

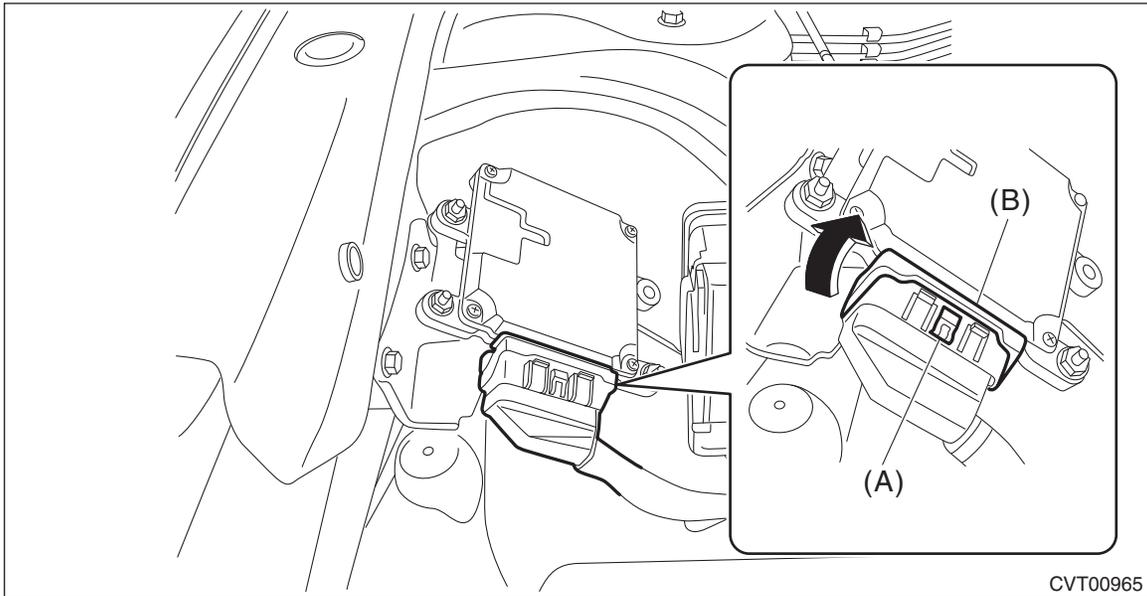
- 2) Install the harness connector to TCM.

# Transmission Control Module (TCM)

CONTINUOUSLY VARIABLE TRANSMISSION

## NOTE:

- Install the connector in the reverse order of removal.
- Move the lock lever in the arrow direction, and confirm that a clicking sound is heard.



(A) Lock button

(B) Lock lever

- 3) Install the air cleaner case. <Ref. to IN(H6DO)-8, INSTALLATION, Air Cleaner Case.>
- 4) Connect the ground terminal to battery sensor. <Ref. to RC-3, BATTERY, NOTE, Repair Contents.>
- 5) Perform the operation of AT learning mode. <Ref. to CVT(diag)-33, Learning Control.>

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# CVTF Cooler Pipe and Hose

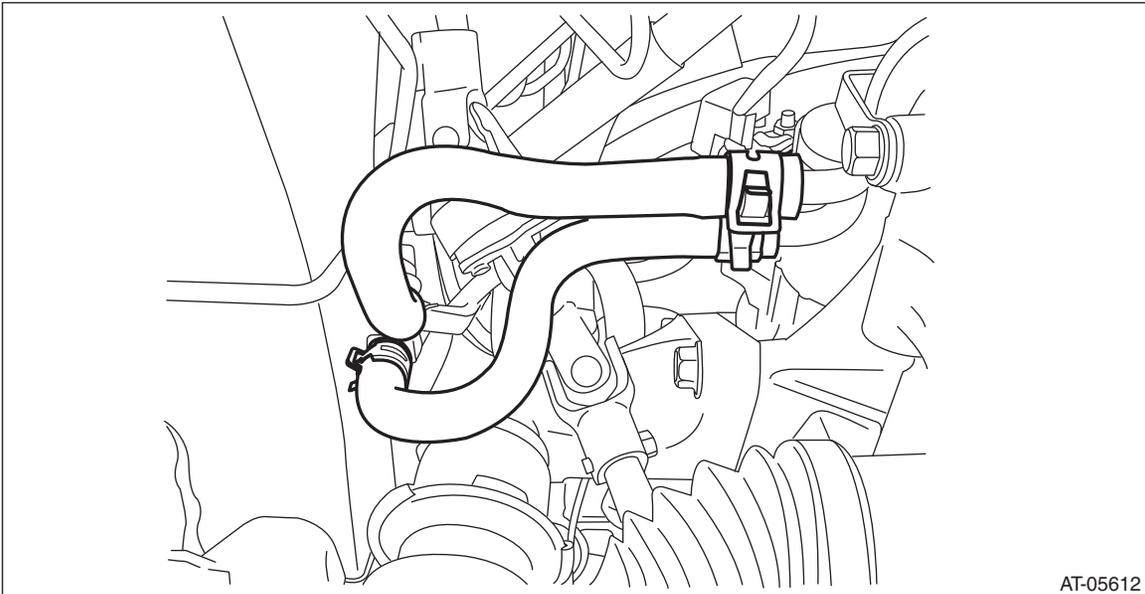
CONTINUOUSLY VARIABLE TRANSMISSION

## 24. CVTF Cooler Pipe and Hose

### A: REMOVAL

#### CAUTION:

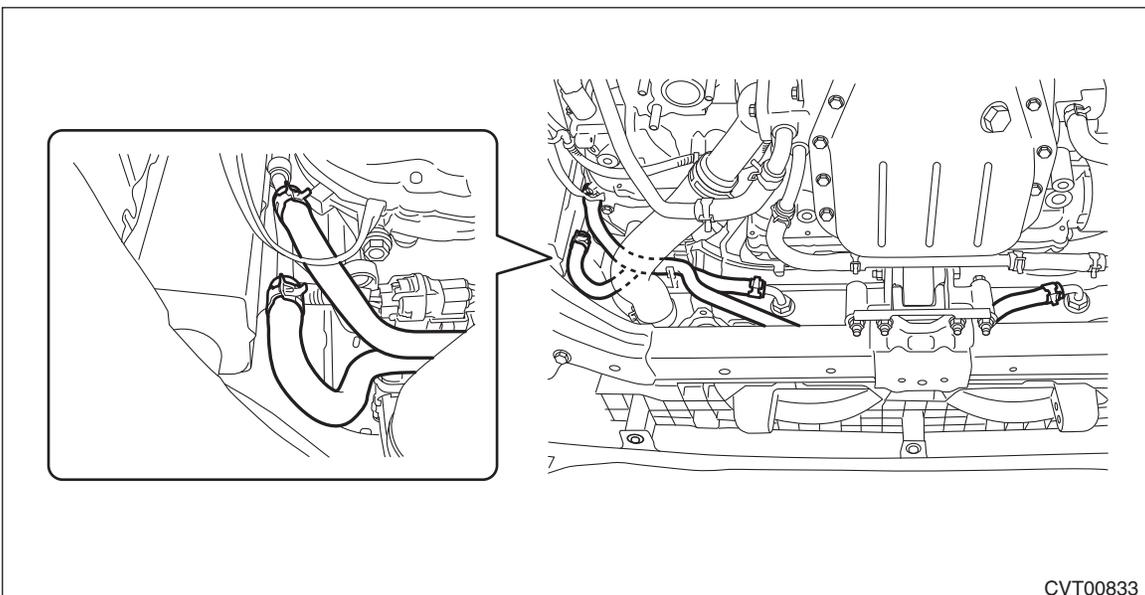
- Immediately after the vehicle has been running or after idling for a long time, the CVTF will be hot. Be careful not to burn yourself.
  - If the CVTF is spilt over exhaust pipe, wipe it off with cloth to avoid emitting smoke or causing a fire.
  - When removing the CVTF cooler pipe assembly on vehicle side, be careful not to bend the A/C pipe.
- 1) Lift up the vehicle.
  - 2) Remove the front exhaust pipe. <Ref. to EX(H6DO)-6, REMOVAL, Front Exhaust Pipe.>
  - 3) Remove the CVTF CVT inlet hose and CVTF CVT outlet hose.



- 4) Remove the CVTF radiator inlet hose and CVTF radiator outlet hose on radiator side.

#### CAUTION:

Do not use a screwdriver or other pointed tools.

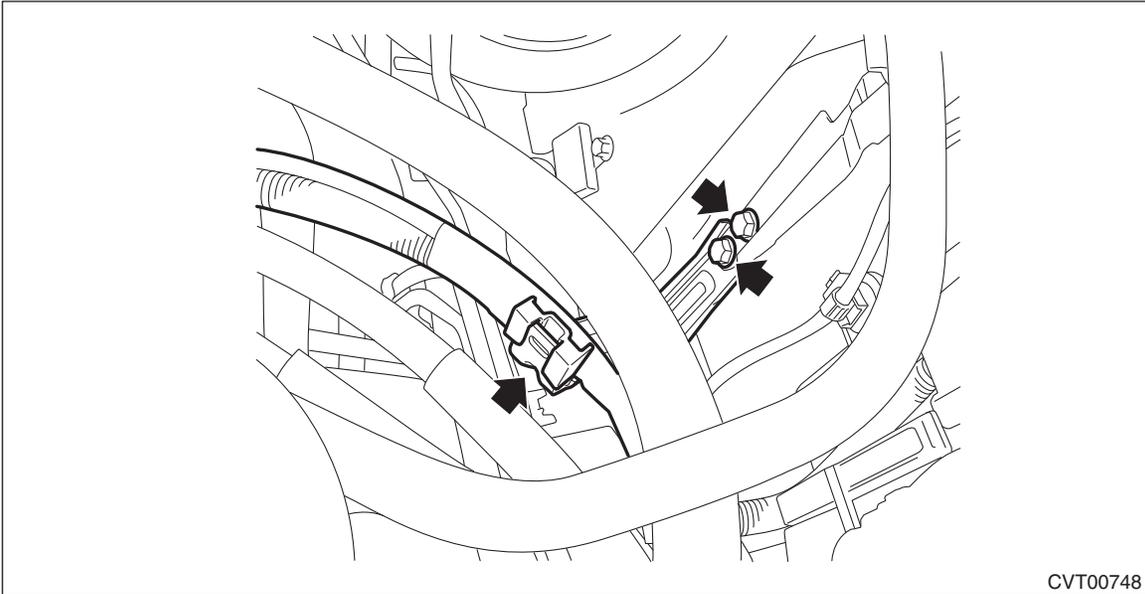


- 5) Lower the vehicle.

## CVTF Cooler Pipe and Hose

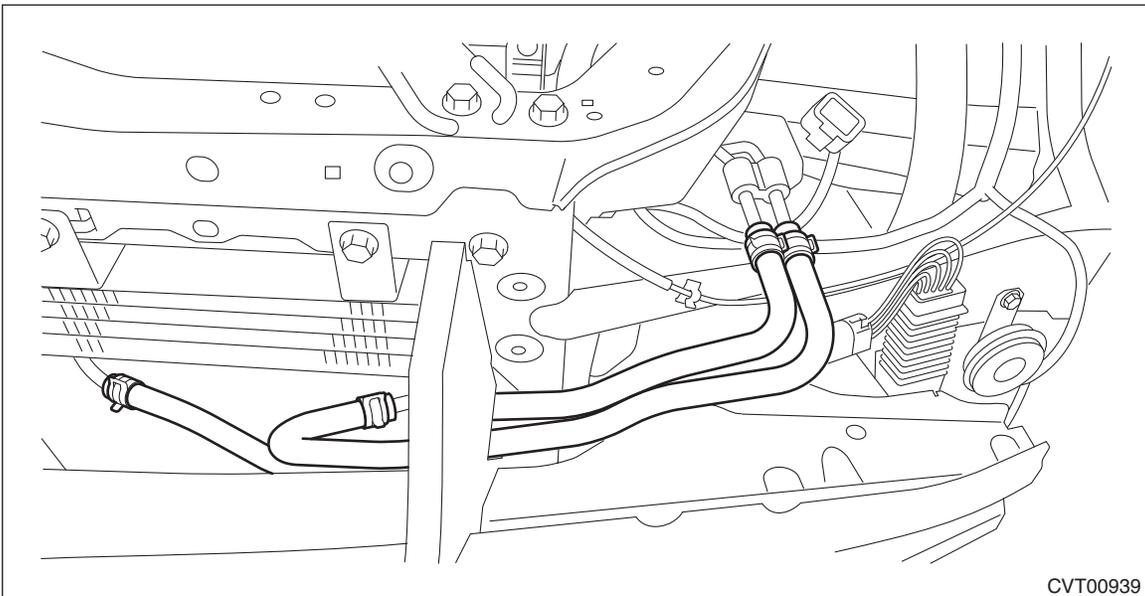
CONTINUOUSLY VARIABLE TRANSMISSION

- 6) Remove the battery and battery box. <Ref. to SC(H6DO)-58, REMOVAL, Battery.>
- 7) Remove the engine coolant reservoir tank. <Ref. to CO(H6DO)-47, REMOVAL, Reservoir Tank.>
- 8) Remove the battery cable clip from the bracket, and remove the battery cable bracket.



CVT00748

- 9) Remove the front bumper. (OUTBACK model) <Ref. to EI-32, REMOVAL, Front Bumper.>
- 10) Remove the headlight assembly LH. (OUTBACK model) <Ref. to LI-37, REMOVAL, Headlight Assembly.>
- 11) Remove the CVTF cooler (air cool) inlet hose and the CVTF cooler (air cool) outlet hose. (OUTBACK model)

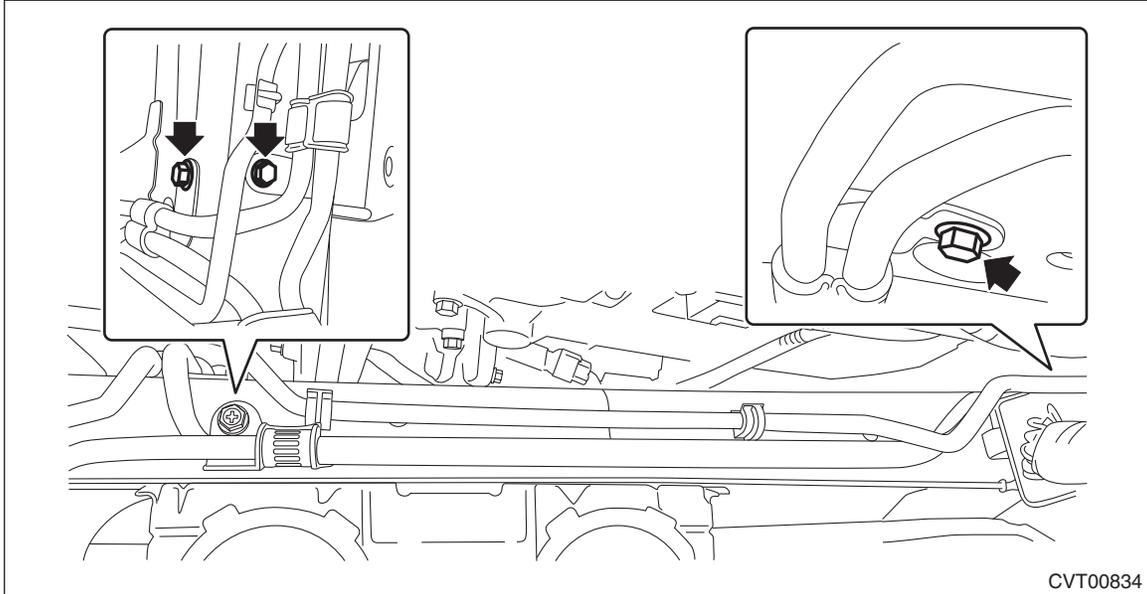


CVT00939

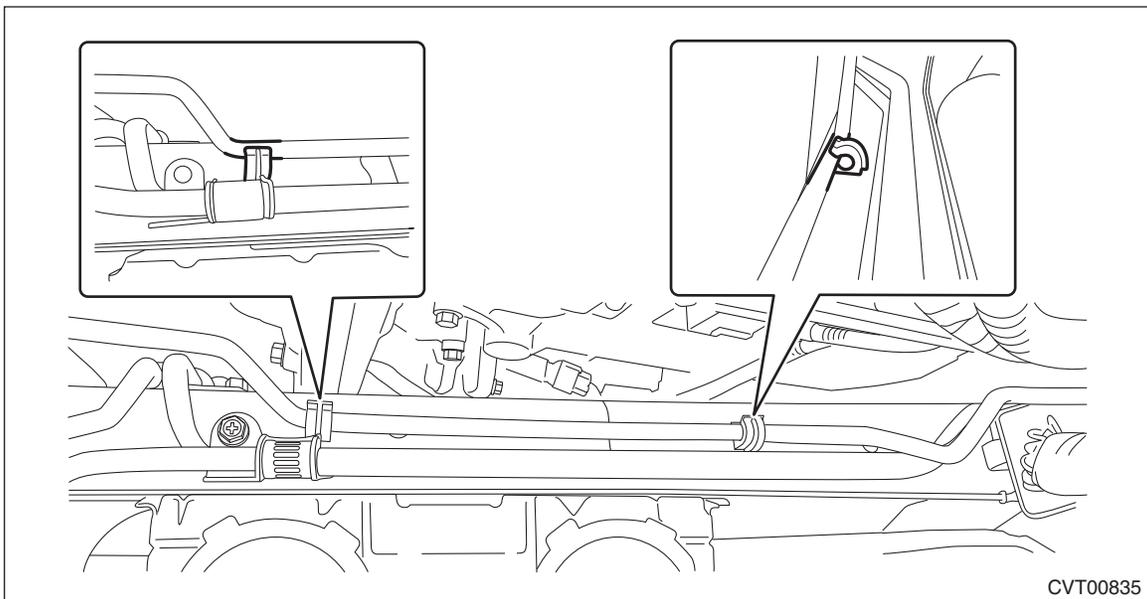
## CVTF Cooler Pipe and Hose

CONTINUOUSLY VARIABLE TRANSMISSION

12) Remove the CVTF cooler pipe assembly mounting bolt.



13) Detach the A/C pipe from clip.



14) Remove the CVTF cooler pipe assembly.

# CVTF Cooler Pipe and Hose

CONTINUOUSLY VARIABLE TRANSMISSION

## B: INSTALLATION

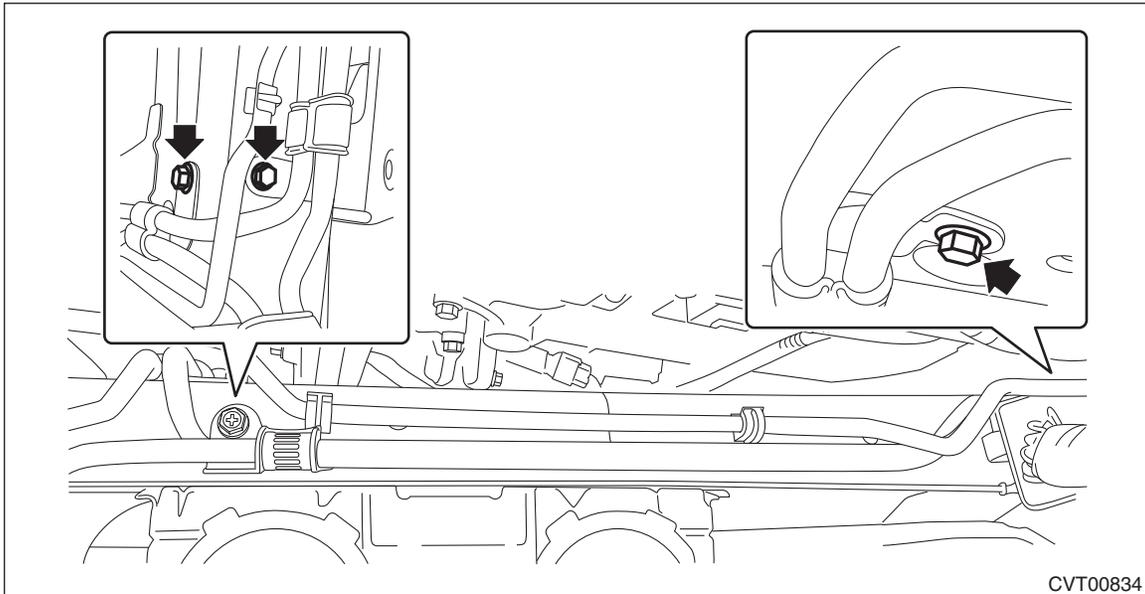
### CAUTION:

When installing the CVTF cooler pipe assembly on vehicle side, be careful not to bend the A/C pipe.

1) Install the CVTF cooler pipe assembly to vehicle.

### Tightening torque:

**7.5 N·m (0.8 kgf-m, 5.5 ft-lb)**

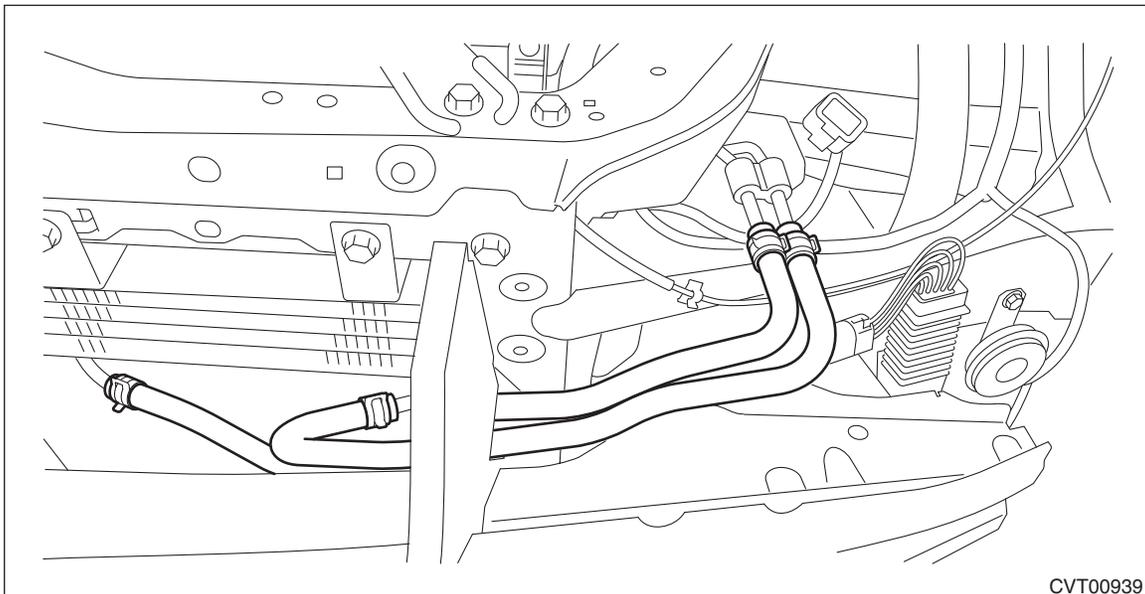


2) Install the A/C pipe to clip.

3) Install the CVTF cooler (air cool) inlet hose and the CVTF cooler (air cool) outlet hose. (OUTBACK model)

### NOTE:

Use new CVTF cooler (air cool) inlet hose and the CVTF cooler (air cool) outlet hose.



4) Install the headlight assembly LH. (OUTBACK model) <Ref. to LI-38, INSTALLATION, Headlight Assembly.>

5) Install the front bumper. (OUTBACK model) <Ref. to EI-35, INSTALLATION, Front Bumper.>

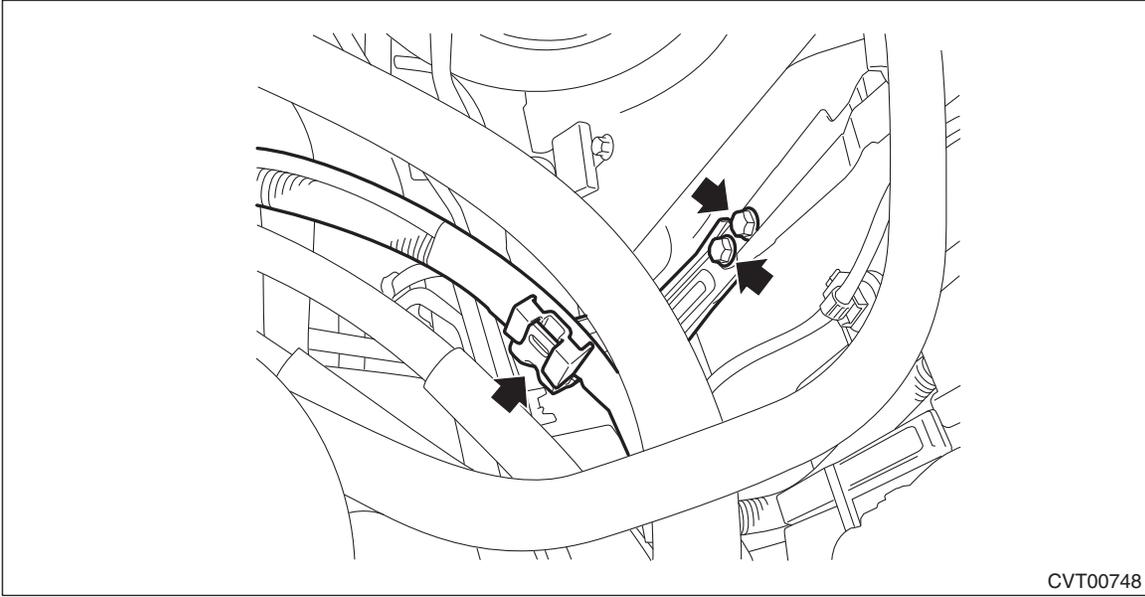
6) Install the battery cable bracket, and install the battery cable clip to the bracket.

## CVTF Cooler Pipe and Hose

CONTINUOUSLY VARIABLE TRANSMISSION

**Tightening torque:**

**7.5 N·m (0.8 kgf-m, 5.5 ft-lb)**



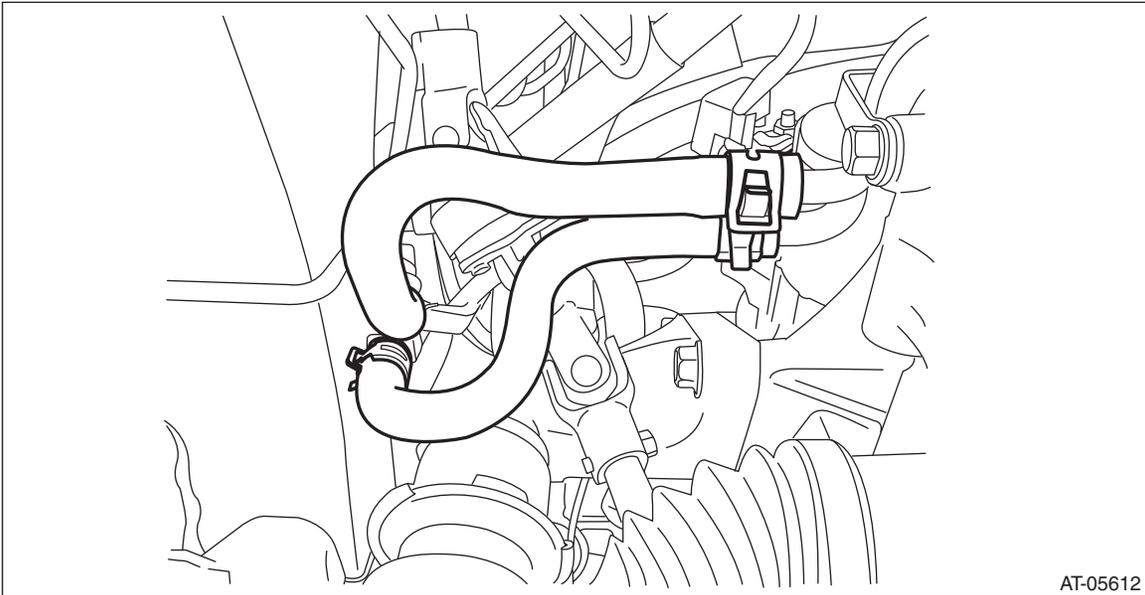
CVT00748

7) Lift up the vehicle.

8) Install the CVTF CVT inlet hose and CVTF CVT outlet hose.

**NOTE:**

Use new CVTF CVT inlet hose and CVTF CVT outlet hose.



AT-05612

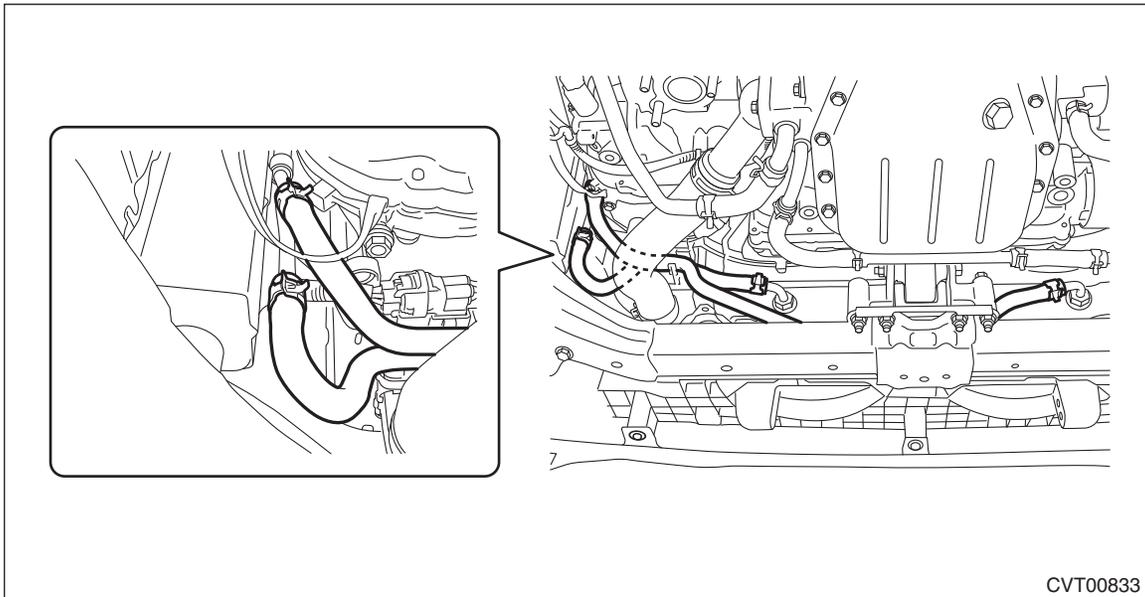
9) Install the CVTF radiator inlet hose and CVTF radiator outlet hose on radiator side.

# CVTF Cooler Pipe and Hose

CONTINUOUSLY VARIABLE TRANSMISSION

## NOTE:

Use new CVTF radiator inlet hose and CVTF radiator outlet hose.



- 10) Install the front exhaust pipe. <Ref. to EX(H6DO)-7, INSTALLATION, Front Exhaust Pipe.>
- 11) Lower the vehicle.
- 12) Install the engine coolant reservoir tank. <Ref. to CO(H6DO)-47, INSTALLATION, Reservoir Tank.>
- 13) Install the battery and battery box. <Ref. to SC(H6DO)-58, INSTALLATION, Battery.>
- 14) Adjust the CVTF level and check there is no leakage. <Ref. to CVT(TR690)-39, ADJUSTMENT, CVTF.>

## C: INSPECTION

Repair or replace any faulty hoses, pipes, and clamps found in the inspection below.

- Check for CVTF leaks in joints at the transmission, radiator, CVTF cooler (air cool), pipes, and hoses.
- Check the clamp for deformation.
- Lightly bend the hose and check for cracks in the surface or other damages.
- Pinch the hose with your fingers and check for poor elasticity. Also check for poor elasticity in the parts where the clamp was installed by pressing with your fingernail.
- Check for peeling, cracks, and deformation at the tip of the hose.

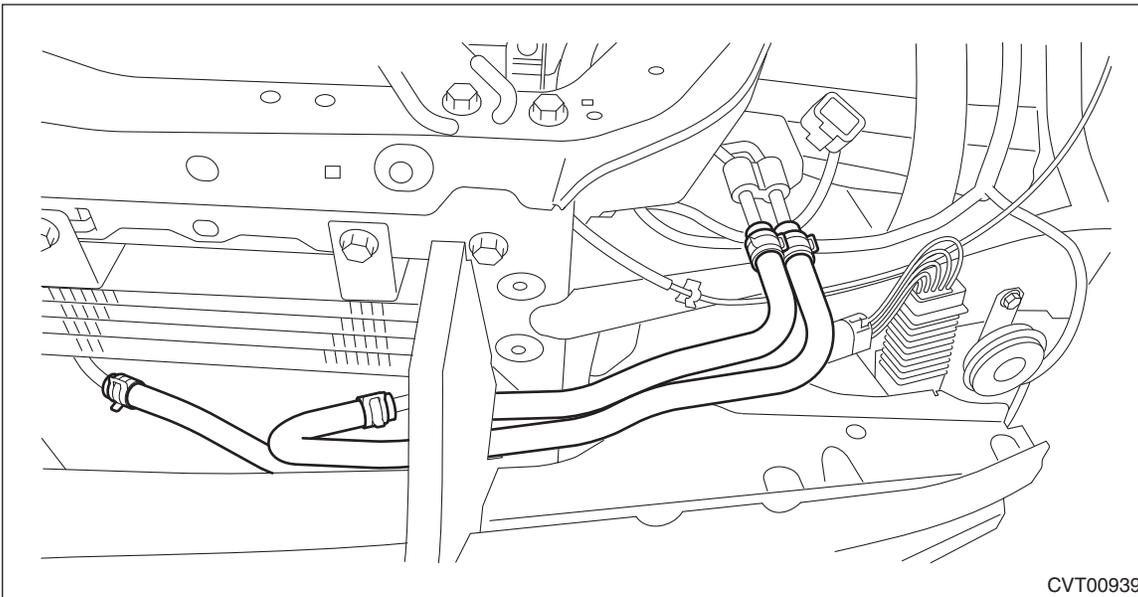
## CVTF Cooler (Air Cooling)

CONTINUOUSLY VARIABLE TRANSMISSION

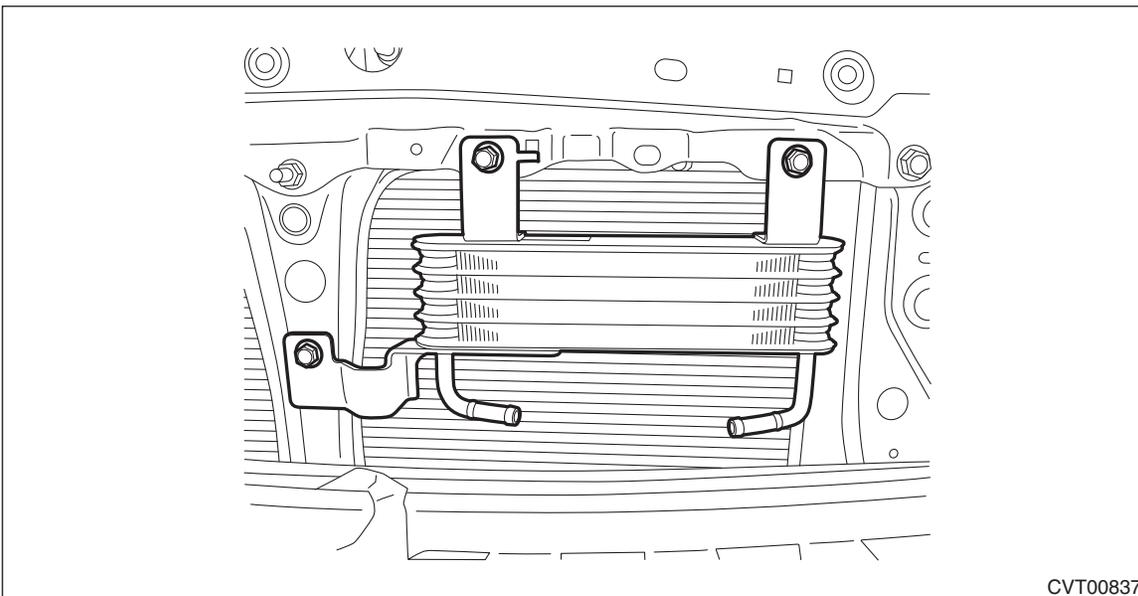
### 25. CVTF Cooler (Air Cooling)

#### A: REMOVAL

- 1) Disconnect the ground terminal from battery sensor. <Ref. to RC-3, BATTERY, NOTE, Repair Contents.>
- 2) Remove the front bumper. <Ref. to EI-32, REMOVAL, Front Bumper.>
- 3) Remove the headlight assembly LH. <Ref. to LI-37, REMOVAL, Headlight Assembly.>
- 4) Remove the CVTF cooler (air cool) inlet hose and the CVTF cooler (air cool) outlet hose.



- 5) Remove the CVTF cooler (air cool).



#### B: INSTALLATION

- 1) Install the CVTF cooler (air cool).

##### **Tightening torque:**

**12 N·m (1.2 kgf-m, 8.9 ft-lb)**

- 2) Install the CVTF cooler (air cool) inlet hose and the CVTF cooler (air cool) outlet hose.

##### **NOTE:**

Use new CVTF cooler (air cool) inlet hose and the CVTF cooler (air cool) outlet hose.

- 3) Install the headlight assembly LH. <Ref. to LI-38, INSTALLATION, Headlight Assembly.>

## CVTF Cooler (Air Cooling)

CONTINUOUSLY VARIABLE TRANSMISSION

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- 4) Install the front bumper. <Ref. to EI-35, INSTALLATION, Front Bumper.>
- 5) Connect the ground terminal to battery sensor. <Ref. to RC-3, BATTERY, NOTE, Repair Contents.>

### **C: INSPECTION**

Check that the CVTF cooler (air cool) has no deformation, cracks or other damages.

# Air Breather Hose

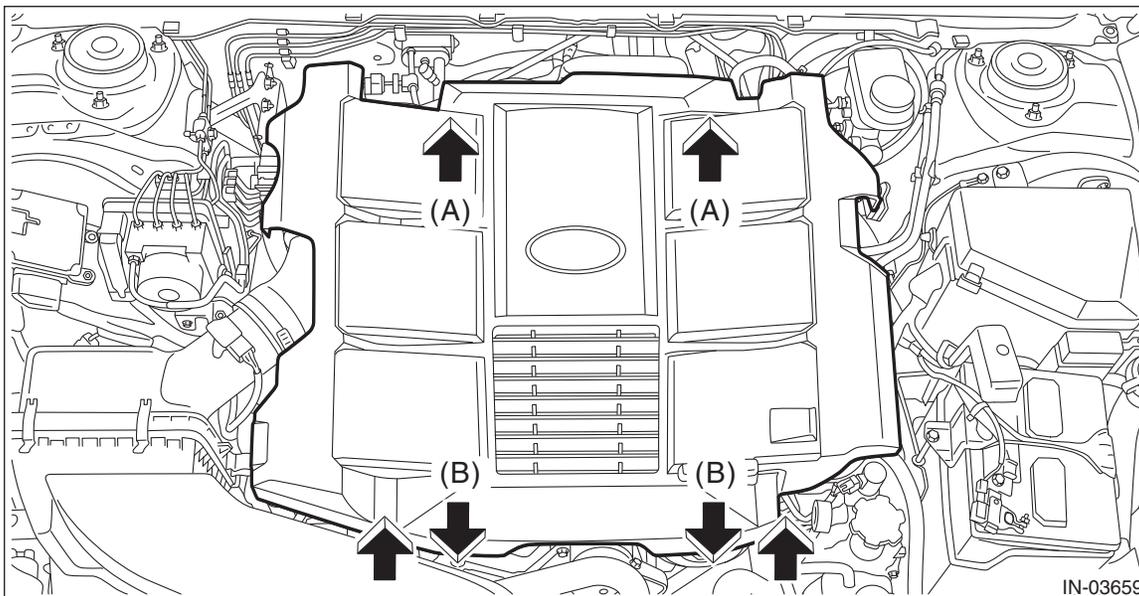
CONTINUOUSLY VARIABLE TRANSMISSION

## 26. Air Breather Hose

### A: REMOVAL

1) Remove the collector cover.

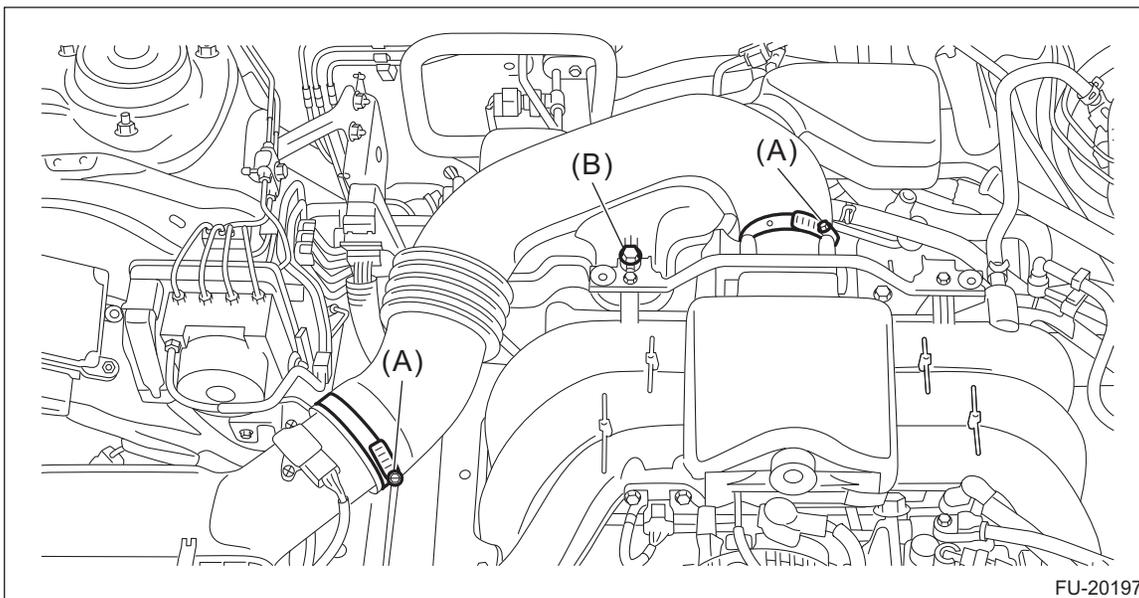
- (1) Carefully pull up the rear of collector cover at two positions (A).
- (2) Carefully pull up the front of collector cover at two positions (B) while moving it forward.



2) Disconnect the ground terminal from battery sensor. <Ref. to RC-3, BATTERY, NOTE, Repair Contents.>

3) Loosen the clamp (A) which connects the air intake boot.

4) Loosen the bolt (B) securing the air intake boot to the collector cover bracket.



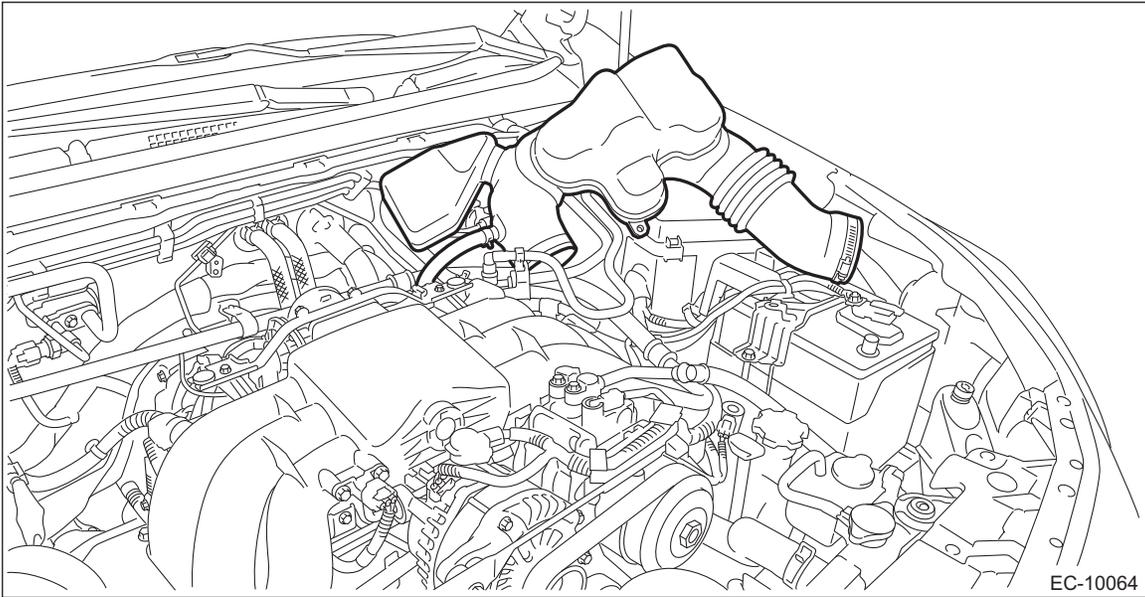
5) Remove the air intake boot from the throttle body and the air cleaner case (rear), and move it to the left side wheel apron.

# Air Breather Hose

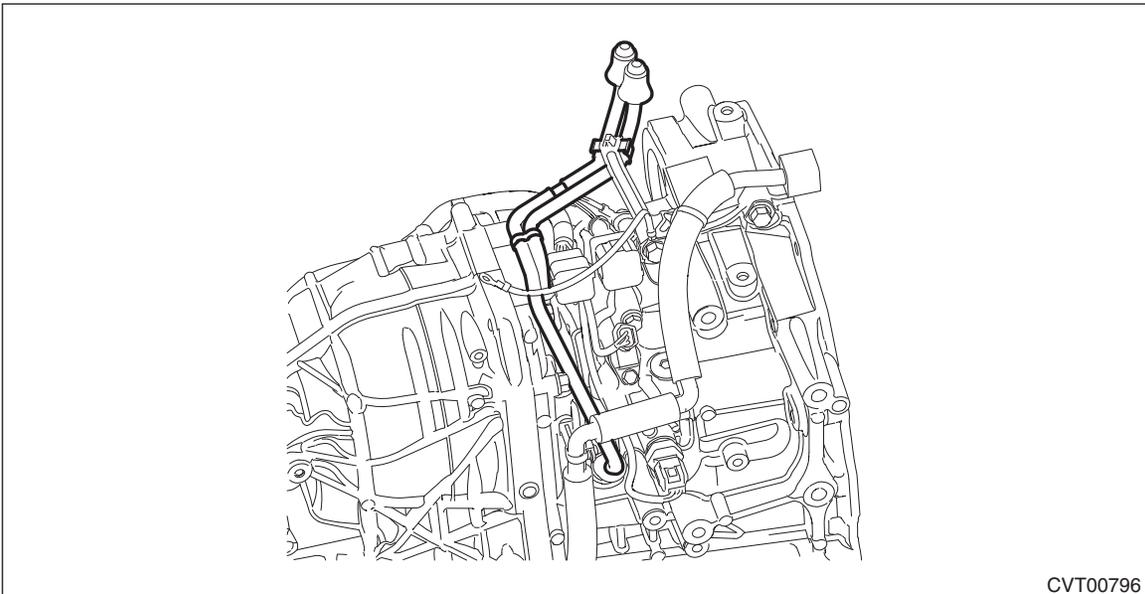
CONTINUOUSLY VARIABLE TRANSMISSION

**CAUTION:**

**Be careful not to allow the air intake boot to contact the air conditioner pipe.**



6) Remove the two air breather hoses.



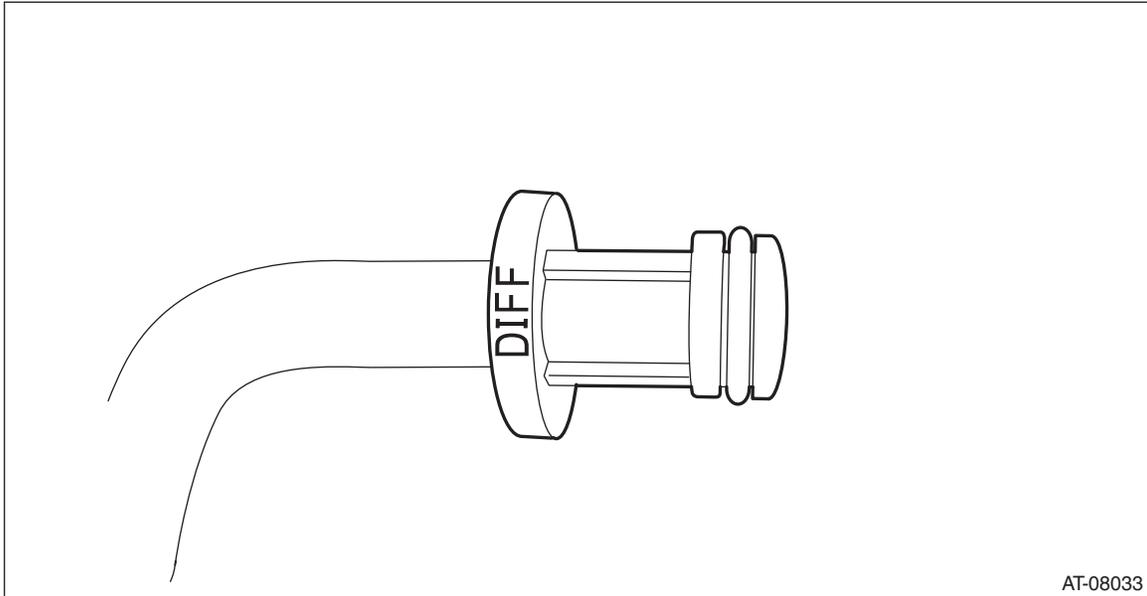
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# Air Breather Hose

CONTINUOUSLY VARIABLE TRANSMISSION

---

7) Remove the oil cap.



## B: INSTALLATION

1) Install the oil cap.

NOTE:

Use new O-rings.

2) Install the two air breather hoses.

3) Install the air intake boot. <Ref. to IN(H6DO)-10, INSTALLATION, Air Intake Boot.>

4) Connect the ground terminal to battery sensor. <Ref. to RC-3, BATTERY, NOTE, Repair Contents.>

5) Install the collector cover.

## C: INSPECTION

- Check the hose for peeling, crack or clogging.
- Check the oil cap is not cracked or clogged.
- Check O-ring of oil cap is not damaged.

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## 27. Drive Plate

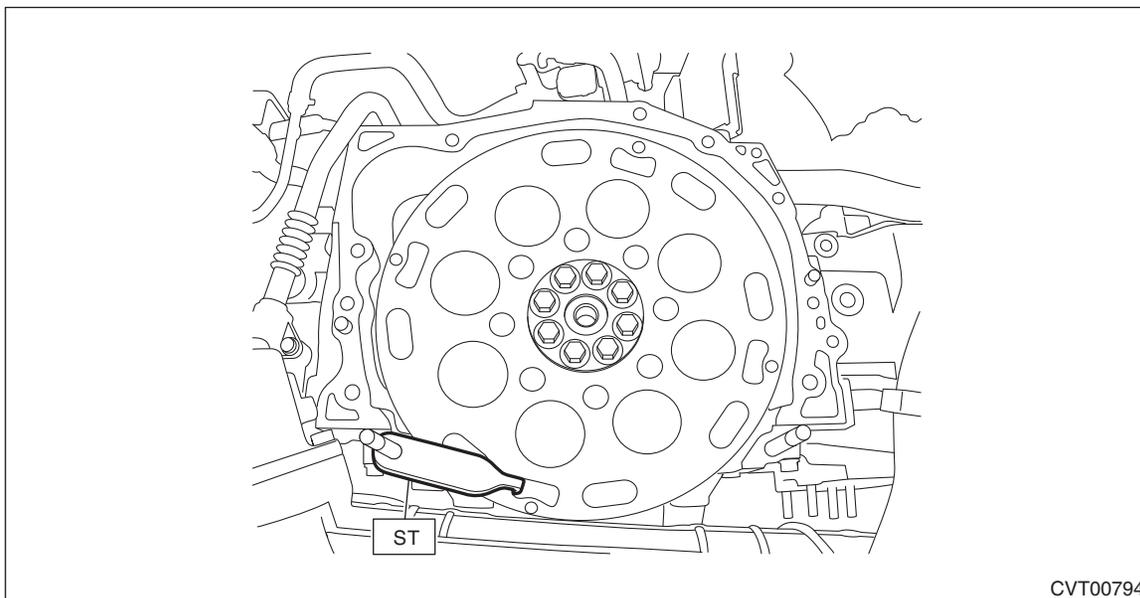
### A: REMOVAL

- 1) Remove the transmission assembly from the vehicle. <Ref. to CVT(TR690)-59, REMOVAL, Automatic Transmission Assembly.>
- 2) Set the ST.

#### NOTE:

Set the ST to the drive plate referring to the illustration.

ST 498497300 CRANKSHAFT STOPPER



- 3) Remove the drive plate and reinforcement drive plate.

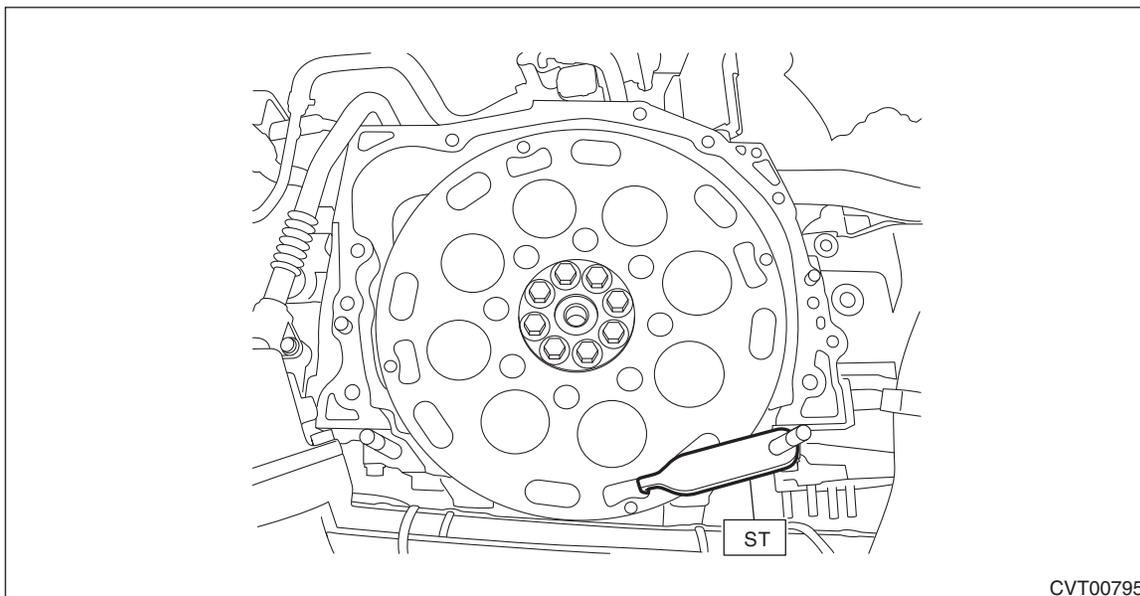
### B: INSTALLATION

- 1) Temporarily install the drive plate and reinforcement drive plate.
- 2) Set the ST.

#### NOTE:

Set the ST to the drive plate referring to the illustration.

ST 498497300 CRANKSHAFT STOPPER



## Drive Plate

### CONTINUOUSLY VARIABLE TRANSMISSION

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3) Tighten the drive plate mounting bolt in two stages.

#### NOTE:

Fix the engine unit.

(1) Tighten the drive plate mounting bolt.

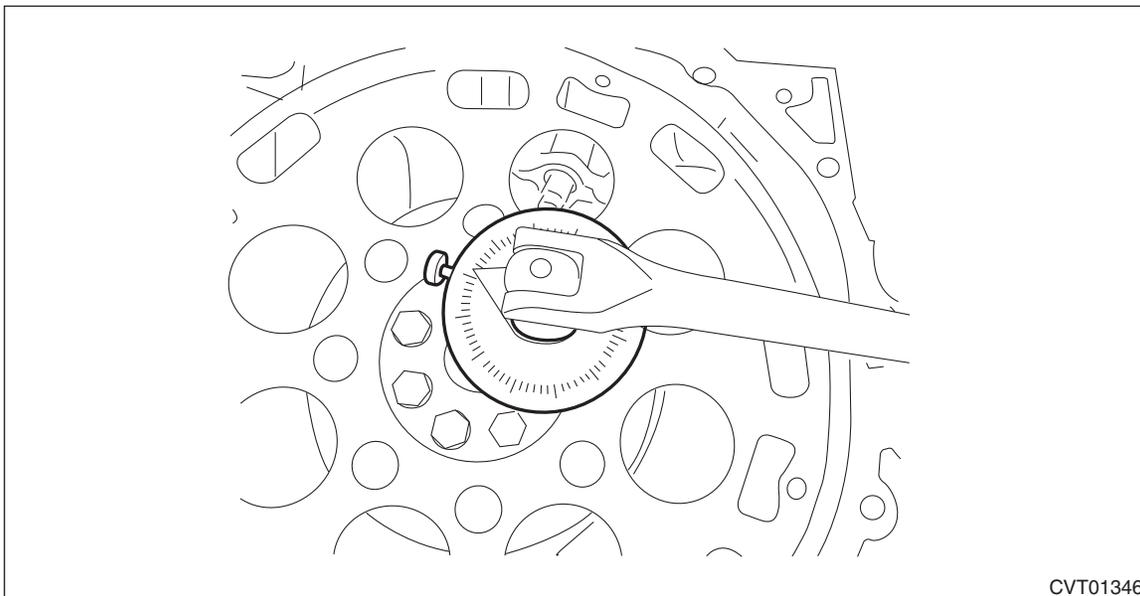
#### **Tightening torque:**

**10 N·m (1.0 kgf·m, 7.4 ft·lb)**

(2) While checking the tightening angle with the angle gauge, tighten the drive plate mounting bolts to the specified angle.

#### **Tightening angle:**

**41° — 45°**



4) Install the transmission assembly to the vehicle. <Ref. to CVT(TR690)-77, INSTALLATION, Automatic Transmission Assembly.>

### **C: INSPECTION**

Check the drive cable for damage.

## 28. Preparation for Overhaul

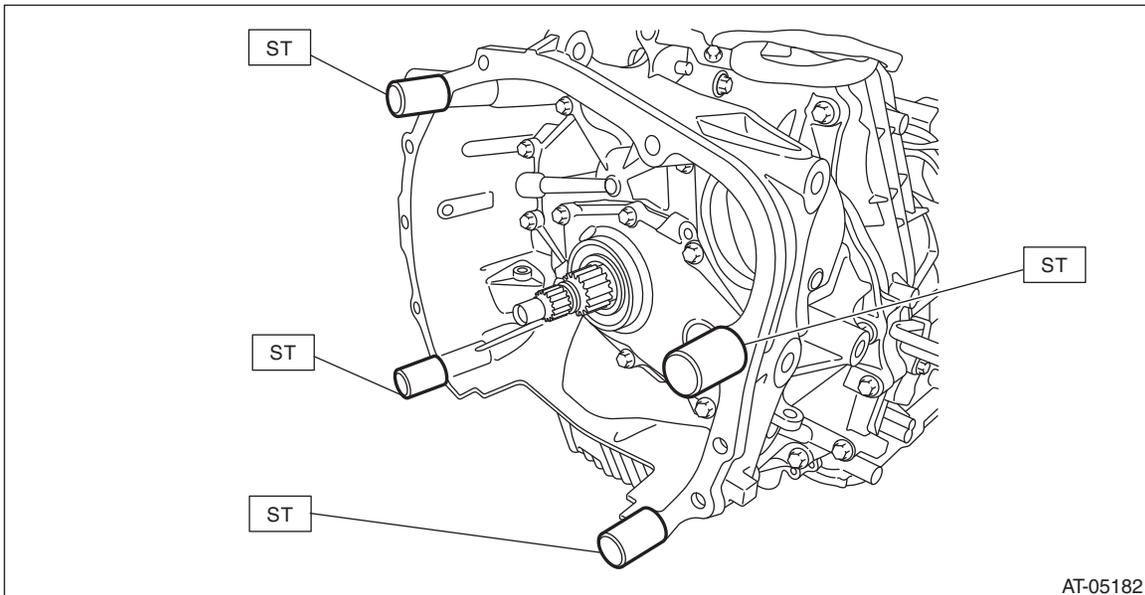
### A: GENERAL DESCRIPTION

Before disassembling and assembling the transmission, follow the following procedures to prepare.

### B: PROCEDURE

- 1) Clean the transmission exterior.
- 2) Remove the torque converter assembly. <Ref. to CVT(TR690)-162, REMOVAL, Torque Converter Assembly.>
- 3) Attach the ST on the transmission.

ST 18632AA000 STAND ASSY



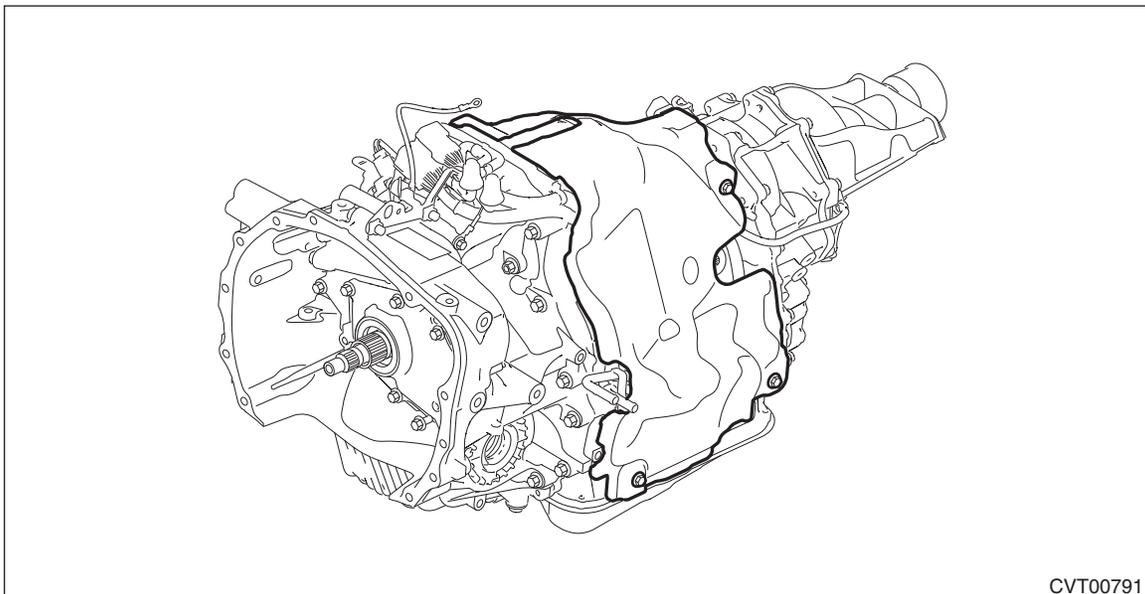
- 4) Remove the transmission cover on the transmission upper side.

NOTE:

Install using the following tightening torque.

**Tightening torque:**

**8 N·m (0.8 kgf·m, 5.9 ft·lb)**



- 5) Place the transmission assembly on end.

# Torque Converter Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

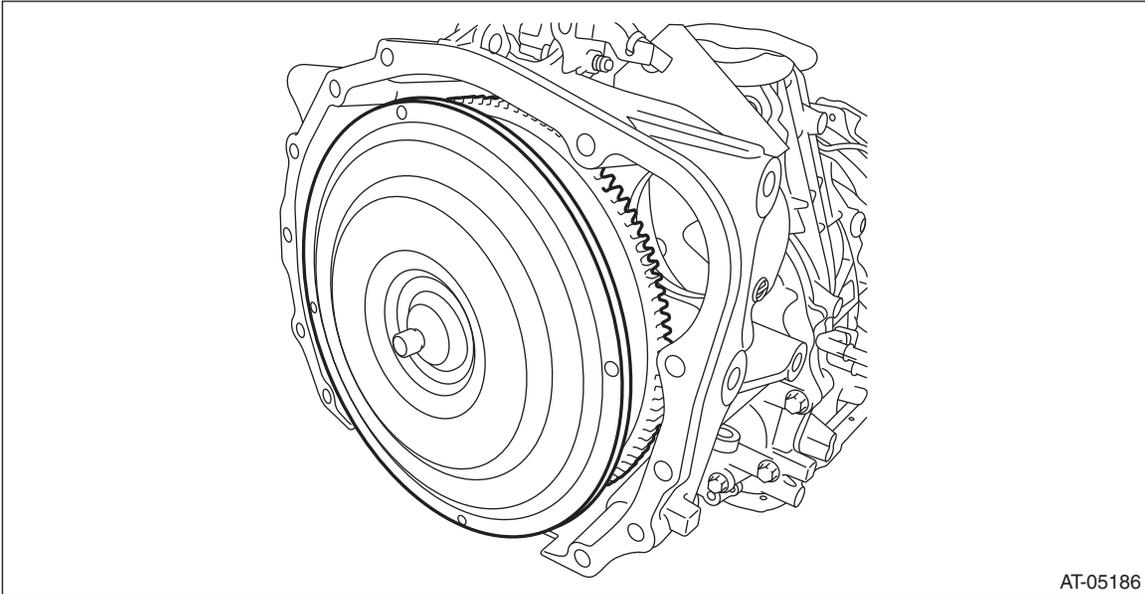
## 29. Torque Converter Assembly

### A: REMOVAL

- 1) Remove the transmission assembly from the vehicle. <Ref. to CVT(TR690)-59, REMOVAL, Automatic Transmission Assembly.>
- 2) Pull out the torque converter assembly horizontally.

#### CAUTION:

Do not scratch the inside of engaging parts.



- 3) Remove the O-ring from the front reduction drive gear.

### B: INSTALLATION

- 1) Install the O-ring to front reduction drive gear.

#### NOTE:

- Use new O-rings.
- Apply CVTF to the O-rings.

- 2) While holding the torque converter assembly by hand, carefully install it into the torque converter case.

#### NOTE:

- Apply CVTF to the oil seal lip.
- Do not damage the oil seal and O-ring.

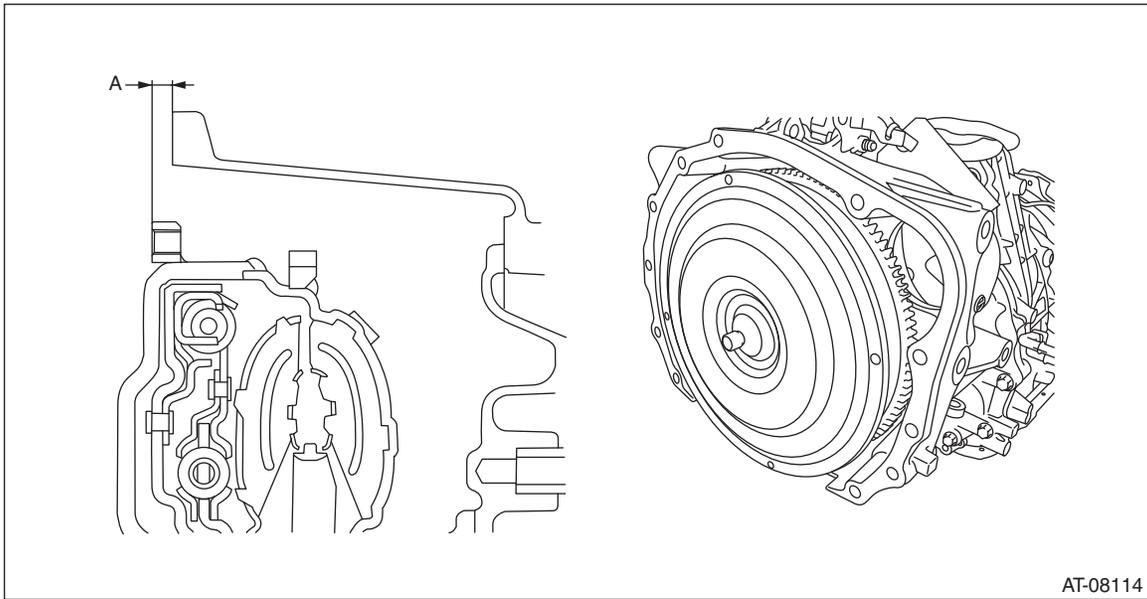
- 3) Engage the splines while gently rotating the torque converter assembly by hand, and securely insert the assembly.

- 4) Measure depth "A", from converter case end surface to drive plate contacting surface.

# Torque Converter Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

**Standard (reference):**  
**6.8 mm (0.268 in) or less**



5) Install the transmission assembly to the vehicle. <Ref. to CVT(TR690)-77, INSTALLATION, Automatic Transmission Assembly.>

## **C: INSPECTION**

- Check the protrusion of torque converter center (front boss) is not deformed or damaged.
- Check the ring gear and exterior for break or damage.

## Extension Case

CONTINUOUSLY VARIABLE TRANSMISSION

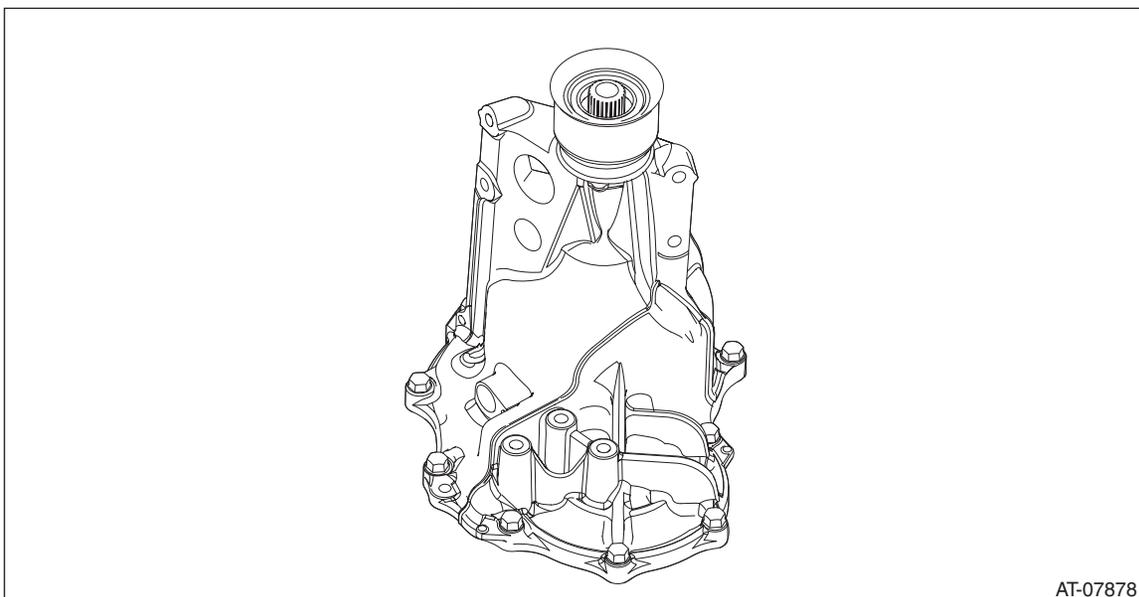
### 30.Extension Case

#### A: REMOVAL

- 1) Remove the transmission assembly from the vehicle. <Ref. to CVT(TR690)-59, REMOVAL, Automatic Transmission Assembly.>
- 2) Remove the front wheel speed sensor. <Ref. to CVT(TR690)-125, REMOVAL, Front Wheel Speed Sensor.>
- 3) Remove the harness clip, and remove the extension case.

#### NOTE:

The total number of extension case mounting bolts is 10.



#### B: INSTALLATION

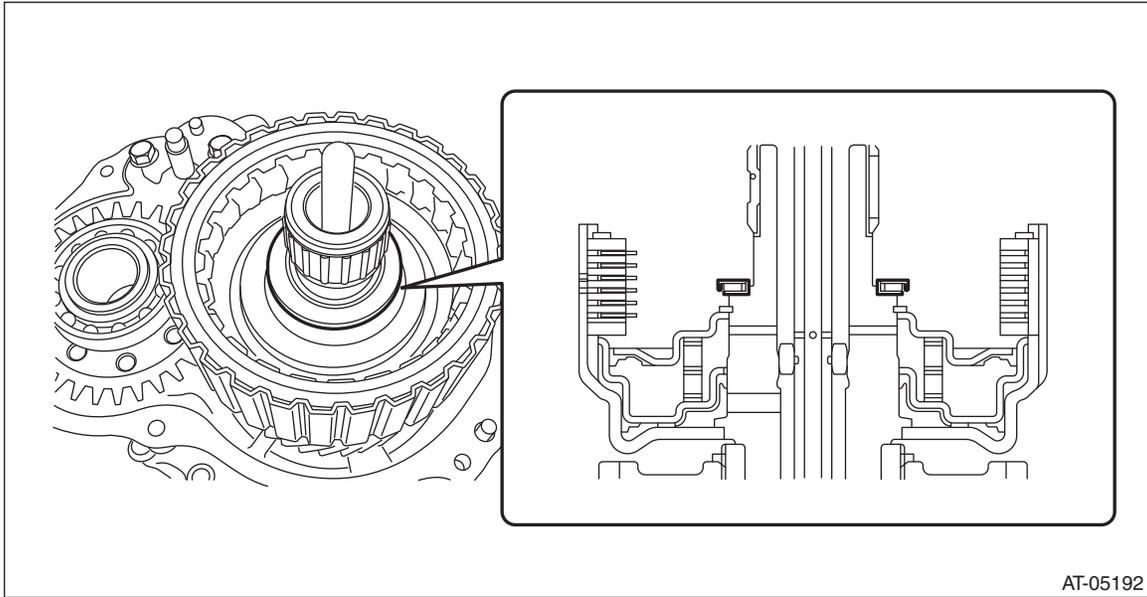
- 1) Clean the mating surface of the extension case and intermediate case.
- 2) Select the thrust needle bearing. <Ref. to CVT(TR690)-169, ADJUSTMENT, Rear Drive Shaft.>
- 3) Select the shim for transfer reduction driven gear. <Ref. to CVT(TR690)-187, ADJUSTMENT, Transfer Reduction Driven Gear.>
- 4) Install the selected thrust needle bearing to transfer clutch assembly.

## Extension Case

CONTINUOUSLY VARIABLE TRANSMISSION

**NOTE:**

Install the thrust needle bearing in the correct direction.

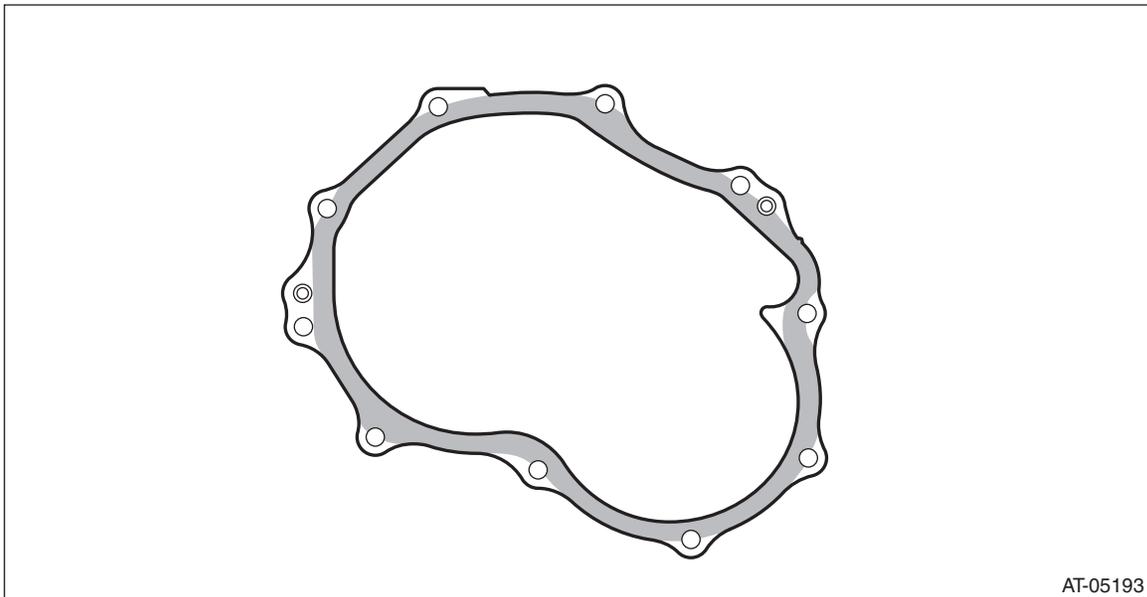


5) Attach the selected shim to transfer reduction driven gear assembly.

6) Apply liquid gasket to extension case seamlessly.

**Liquid gasket:**

**THREE BOND 1215B or equivalent**



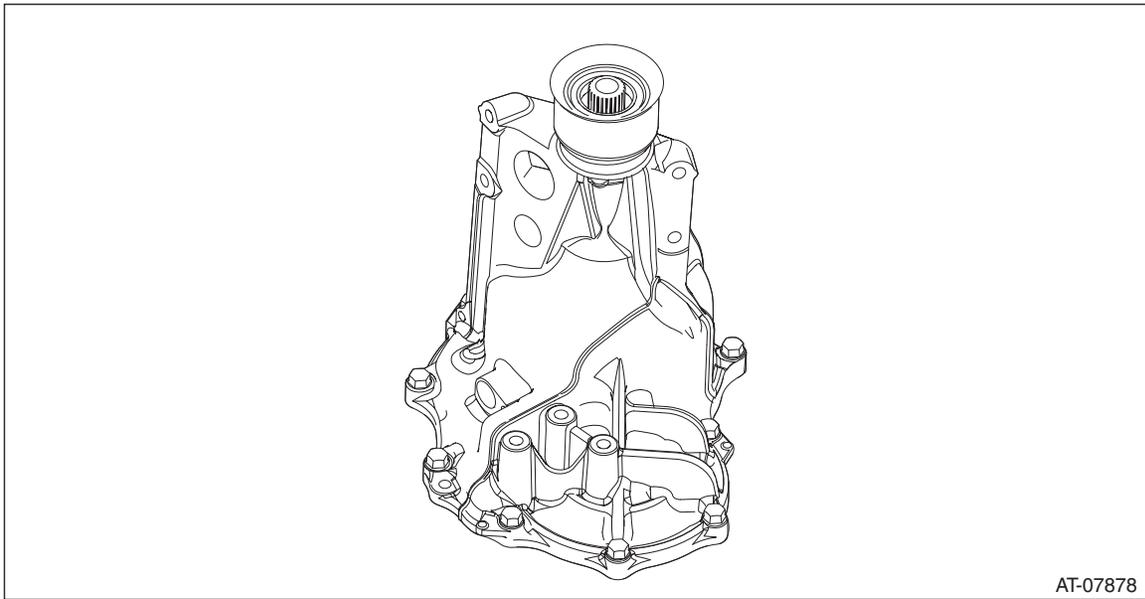
7) Install the extension case.

## Extension Case

CONTINUOUSLY VARIABLE TRANSMISSION

### **Tightening torque:**

**25 N·m (2.5 kgf·m, 18.4 ft·lb)**



8) Install the front wheel speed sensor. <Ref. to CVT(TR690)-125, INSTALLATION, Front Wheel Speed Sensor.>

9) Install the transmission assembly. <Ref. to CVT(TR690)-77, INSTALLATION, Automatic Transmission Assembly.>

### **C: DISASSEMBLY**

- 1) Remove the dust cover from extension case.
- 2) Remove the extension case oil seal from the extension case.

### **D: ASSEMBLY**

- 1) Press-fit the dust cover into extension case.
- 2) Install the extension case oil seal to extension case.

ST 498057300 INSTALLER

### **E: INSPECTION**

- Check there is no leak of CVTF from the joint between extension case and intermediate case.
- Check there is no damage or cracks on the extension case.

### **F: ADJUSTMENT**

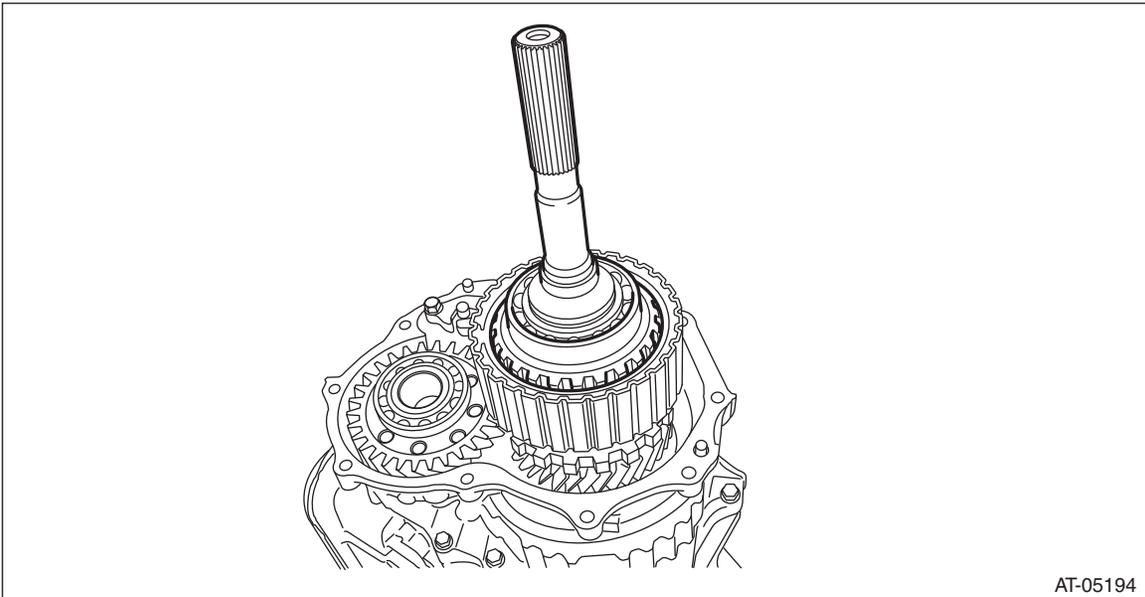
NOTE:

When replacing the extension case, select the shims for rear drive shaft thrust needle bearing and transfer reduction driven gear. <Ref. to CVT(TR690)-169, ADJUSTMENT, Rear Drive Shaft.> <Ref. to CVT(TR690)-187, ADJUSTMENT, Transfer Reduction Driven Gear.>

## 31.Rear Drive Shaft

### A: REMOVAL

- 1) Remove the transmission assembly from the vehicle. <Ref. to CVT(TR690)-59, REMOVAL, Automatic Transmission Assembly.>
- 2) Remove the extension case. <Ref. to CVT(TR690)-164, REMOVAL, Extension Case.>
- 3) Remove the rear drive shaft.



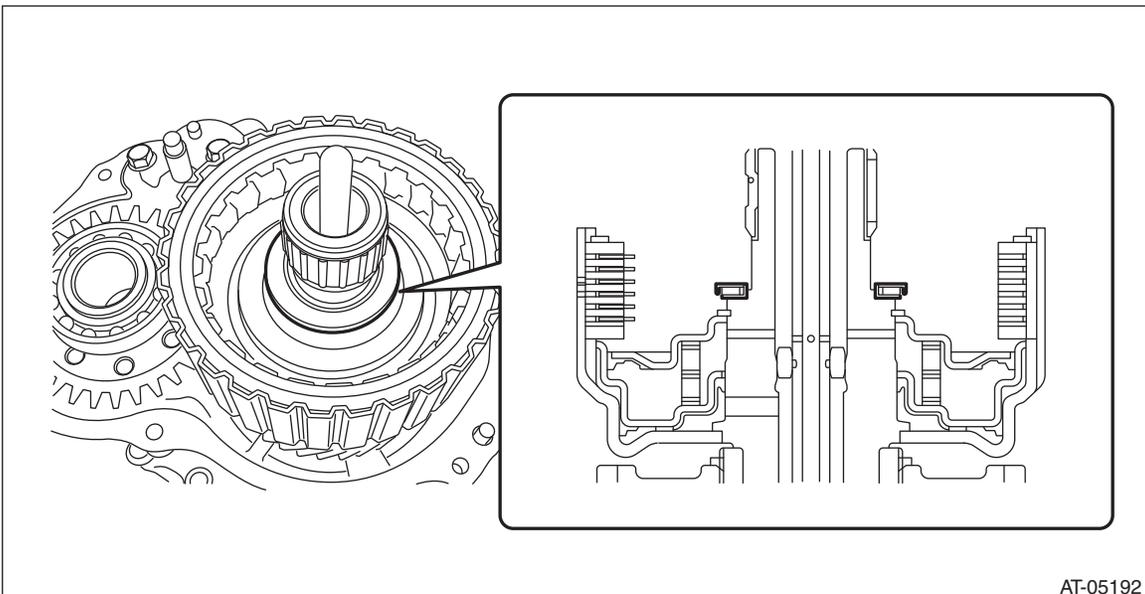
AT-05194

### B: INSTALLATION

- 1) Select the thrust needle bearing. <Ref. to CVT(TR690)-169, ADJUSTMENT, Rear Drive Shaft.>
- 2) Install the selected thrust needle bearing to transfer clutch assembly.

#### NOTE:

Install the thrust needle bearing in the correct direction.

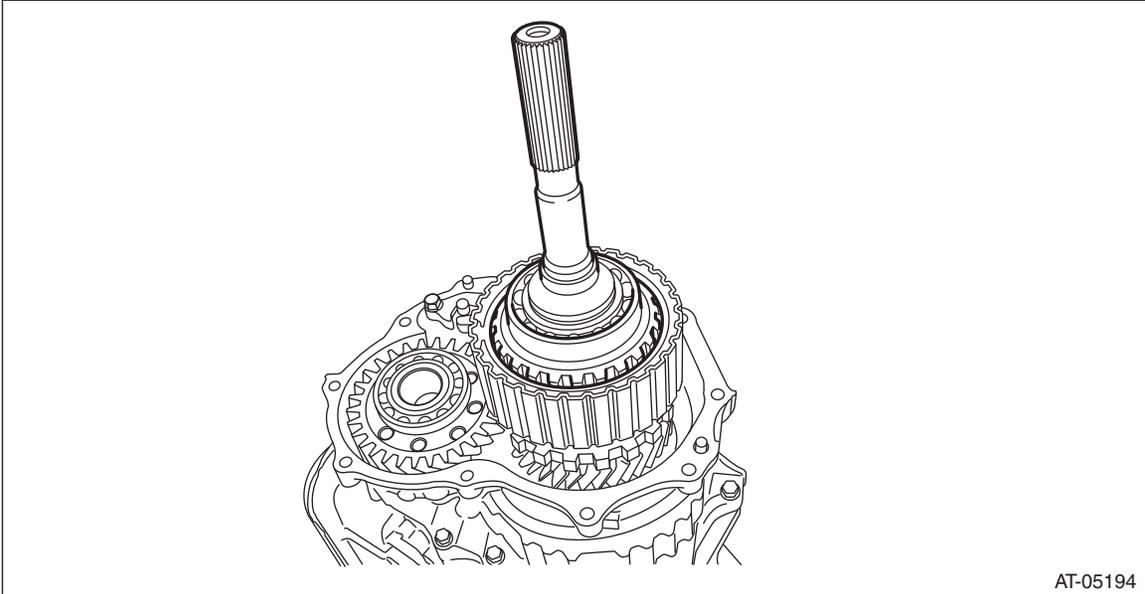


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## Rear Drive Shaft

### CONTINUOUSLY VARIABLE TRANSMISSION

3) Install the rear drive shaft.

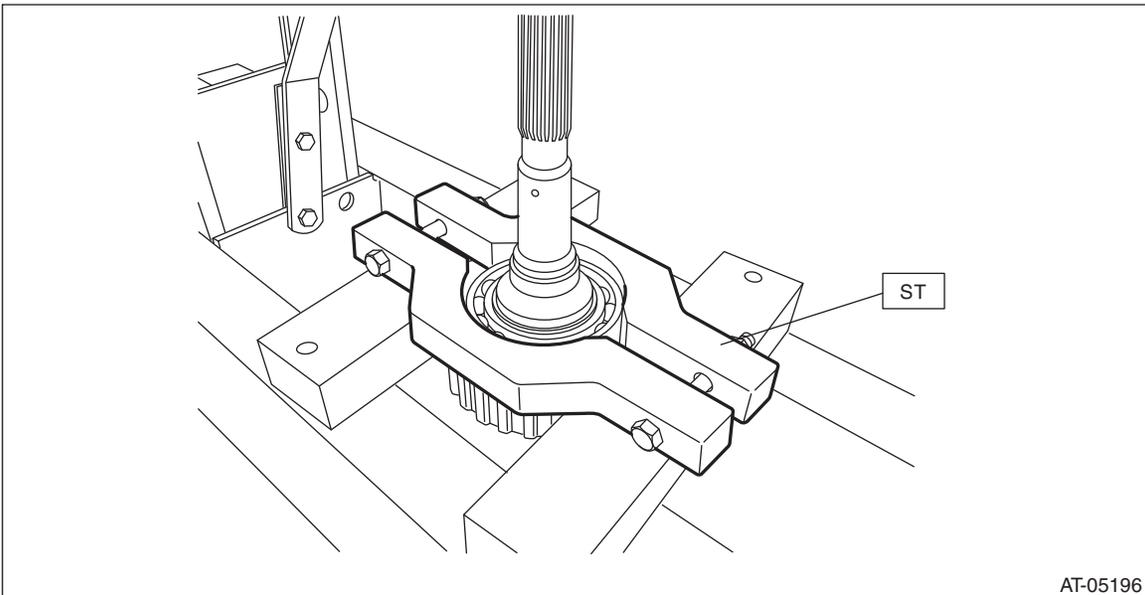


4) Install the extension case. <Ref. to CVT(TR690)-164, INSTALLATION, Extension Case.>

5) Install the transmission assembly to the vehicle. <Ref. to CVT(TR690)-77, INSTALLATION, Automatic Transmission Assembly.>

### C: DISASSEMBLY

1) Remove the ball bearing using ST.  
ST 498077600 REMOVER



### D: ASSEMBLY

1) Using the ST, install the ball bearing.

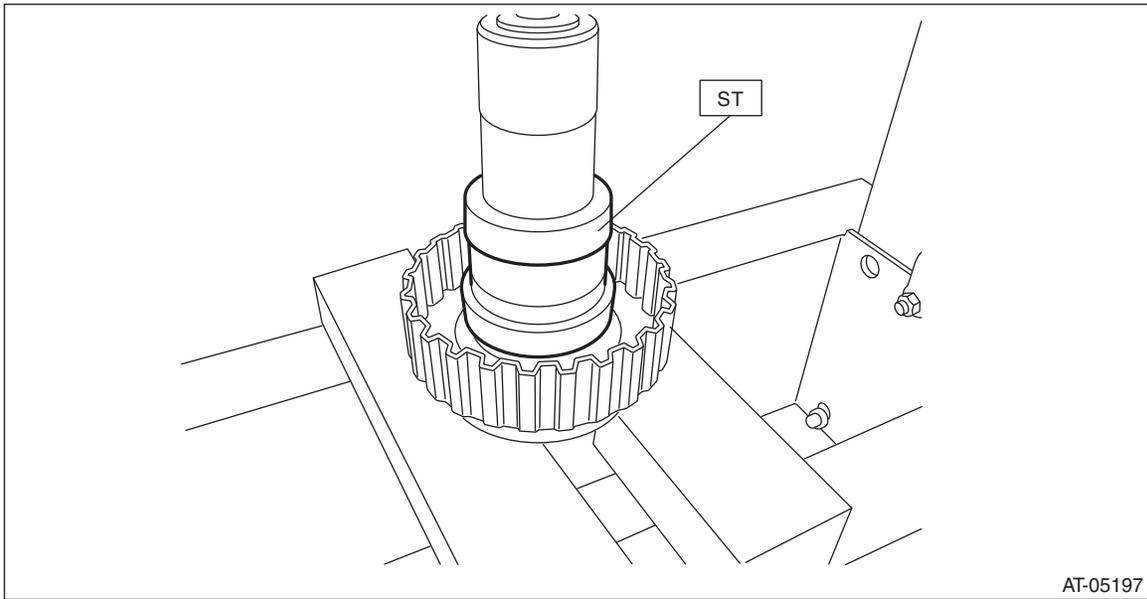
NOTE:

- Use a new ball bearing.

# Rear Drive Shaft

CONTINUOUSLY VARIABLE TRANSMISSION

- Apply CVTF to press-fitting surface of ball bearing.
- ST 399513600 INSTALLER



## E: INSPECTION

- Check each part for crack, damage or dust.
- Check the ball bearing for smooth rotation.
- Check the ball bearing for excessive looseness.

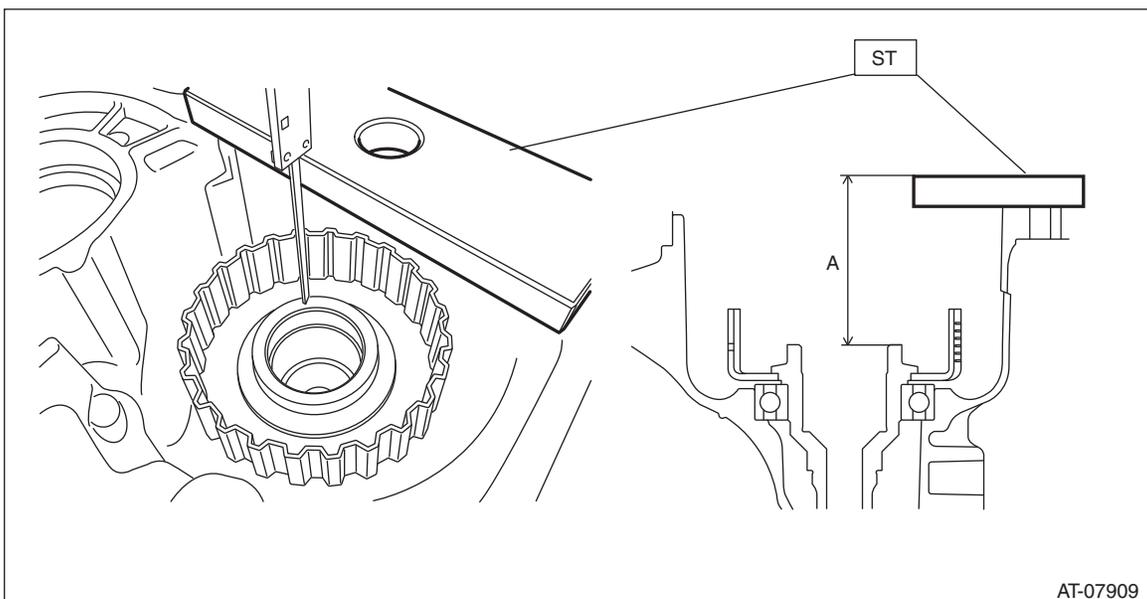
## F: ADJUSTMENT

### NOTE:

When replacing the rear drive shaft or bearing, select the thrust needle bearing.

1) Using the ST, measure the distance "A" from ST end face to rear drive shaft thrust needle bearing catch surface.

ST 398643600 GAUGE



2) Using the ST, measure the height "B" from the intermediate case mating surface to the ST end face.

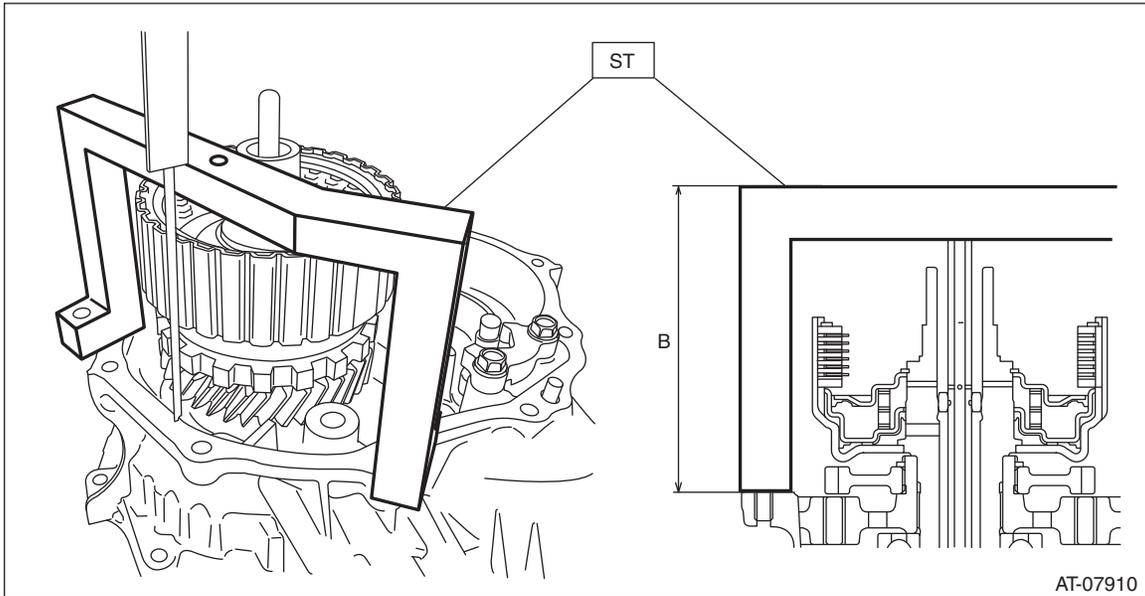
# Rear Drive Shaft

## CONTINUOUSLY VARIABLE TRANSMISSION

### NOTE:

Place the measurement tool at the dent on ST upper side to measure.

ST 499737100 PULLER SET

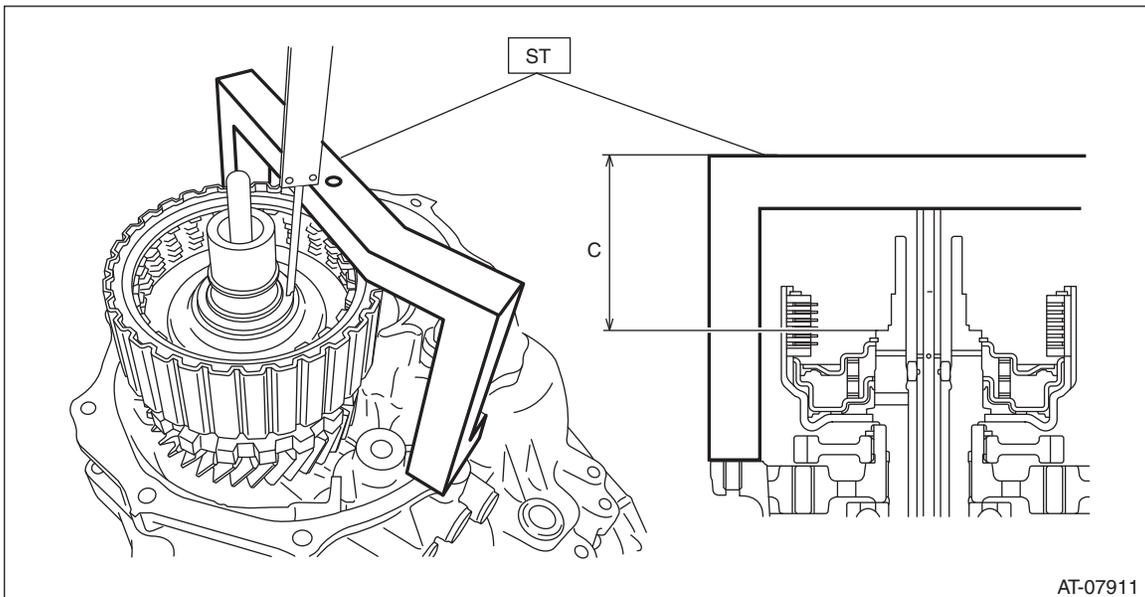


3) Using the ST, measure the height "C" from ST end face to transfer clutch assembly thrust needle bearing catch surface.

### NOTE:

Place the measurement tool at the dent on ST upper side to measure.

ST 499737100 PULLER SET



## Rear Drive Shaft

CONTINUOUSLY VARIABLE TRANSMISSION

4) Obtain the thickness of thrust bearing using the following formula to select the thrust bearing.

$$T \text{ mm} = (A - 15) - (B - C) - (0.05 - 0.25)$$

$$[T \text{ in} = (A - 0.591) - (B - C) - (0.002 - 0.01)]$$

T: Thrust bearing thickness

A: Height from the ST end face to the rear drive shaft thrust needle bearing catch surface

B: Height from the mating surface of the intermediate case to the ST end face

C: Height from the ST end face to the transfer clutch assembly thrust needle bearing catch surface

15 mm (0.591 in): Thickness of ST

0.05 — 0.25 mm (0.002 — 0.01 in): Clearance

Thrust bearing	
Part No.	Thickness mm (in)
806536020	3.8 (0.15)
806535030	4.0 (0.157)
806535040	4.2 (0.165)
806535050	4.4 (0.173)
806535060	4.6 (0.181)
806535070	4.8 (0.189)
806535090	5.0 (0.197)

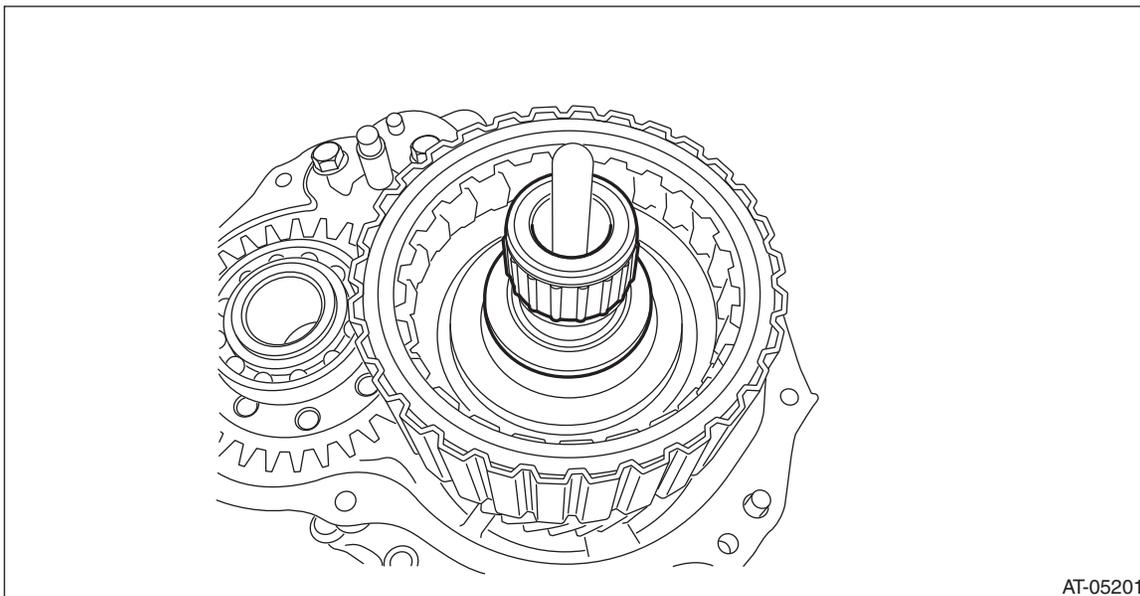
# Transfer Clutch

CONTINUOUSLY VARIABLE TRANSMISSION

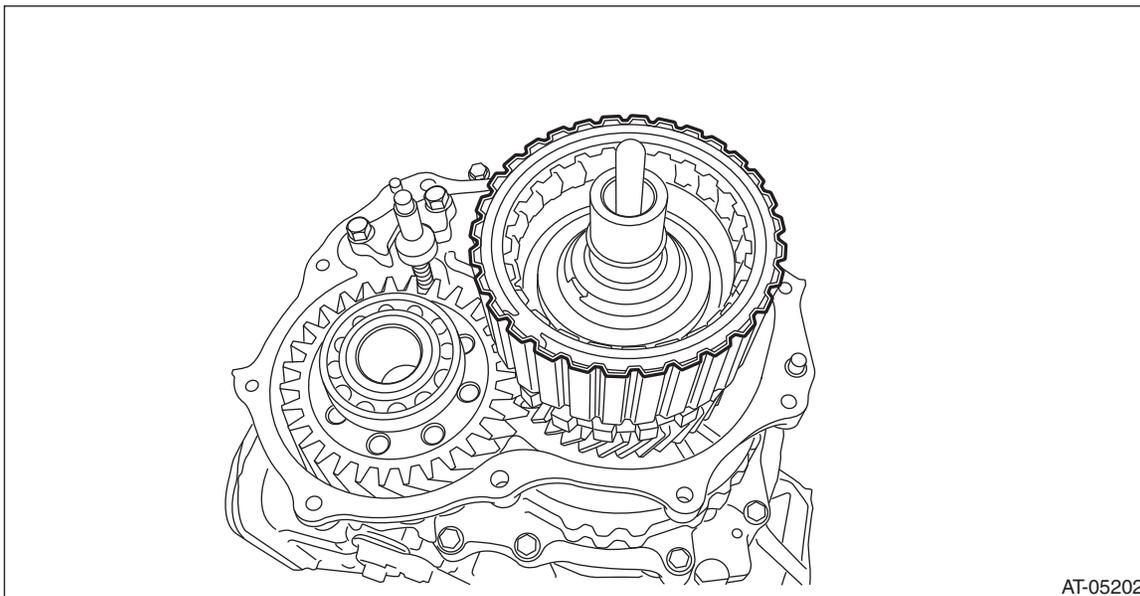
## 32. Transfer Clutch

### A: REMOVAL

- 1) Remove the transmission assembly from the vehicle. <Ref. to CVT(TR690)-59, REMOVAL, Automatic Transmission Assembly.>
- 2) Remove the extension case. <Ref. to CVT(TR690)-164, REMOVAL, Extension Case.>
- 3) Remove the rear drive shaft. <Ref. to CVT(TR690)-167, REMOVAL, Rear Drive Shaft.>
- 4) Remove the thrust needle bearing and needle bearing.



- 5) Remove the transfer clutch assembly.

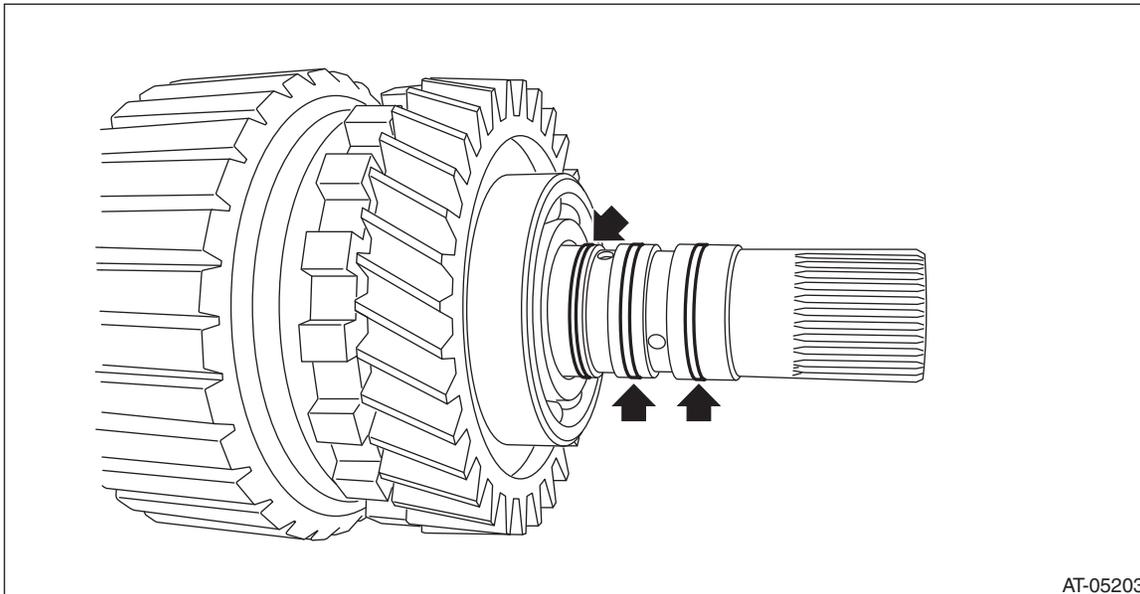


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# Transfer Clutch

CONTINUOUSLY VARIABLE TRANSMISSION

6) Remove the seal ring from transfer clutch assembly.

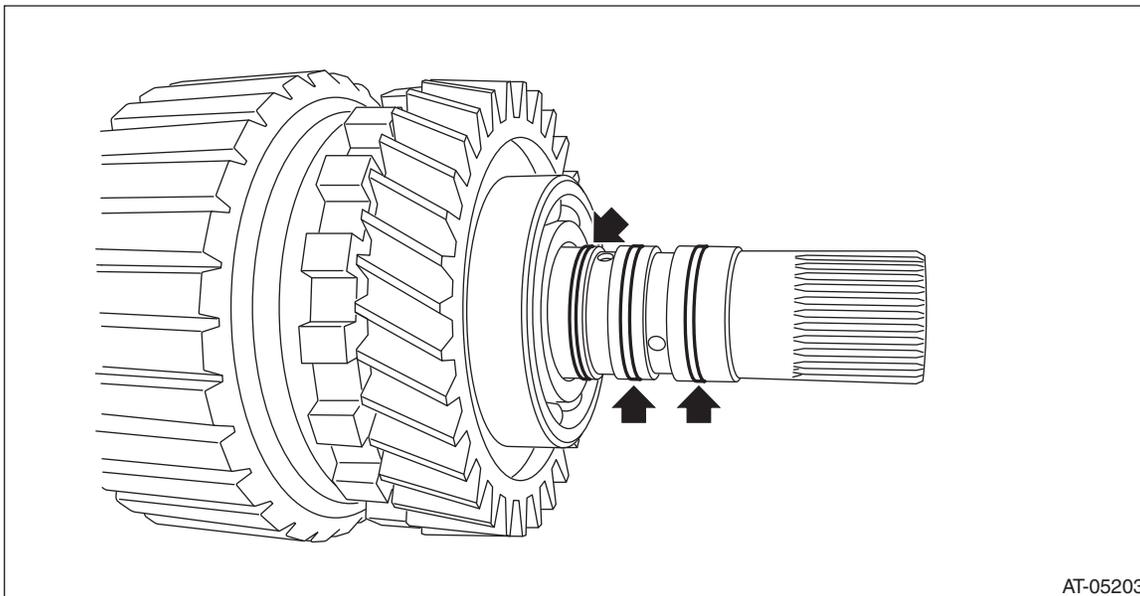


## B: INSTALLATION

1) Apply CVTF to the seal ring and attach it to the seal ring groove of transfer clutch assembly.

NOTE:

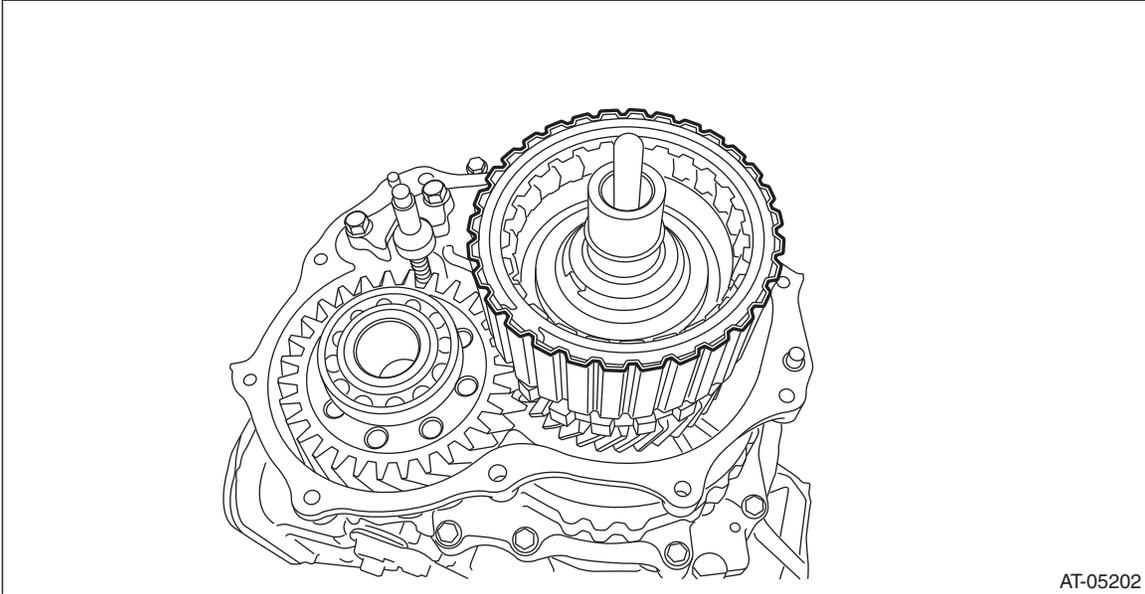
- Use new seal rings.
- When installing the seal rings, do not expand the seal rings too much.



## Transfer Clutch

### CONTINUOUSLY VARIABLE TRANSMISSION

2) Install the transfer clutch assembly.

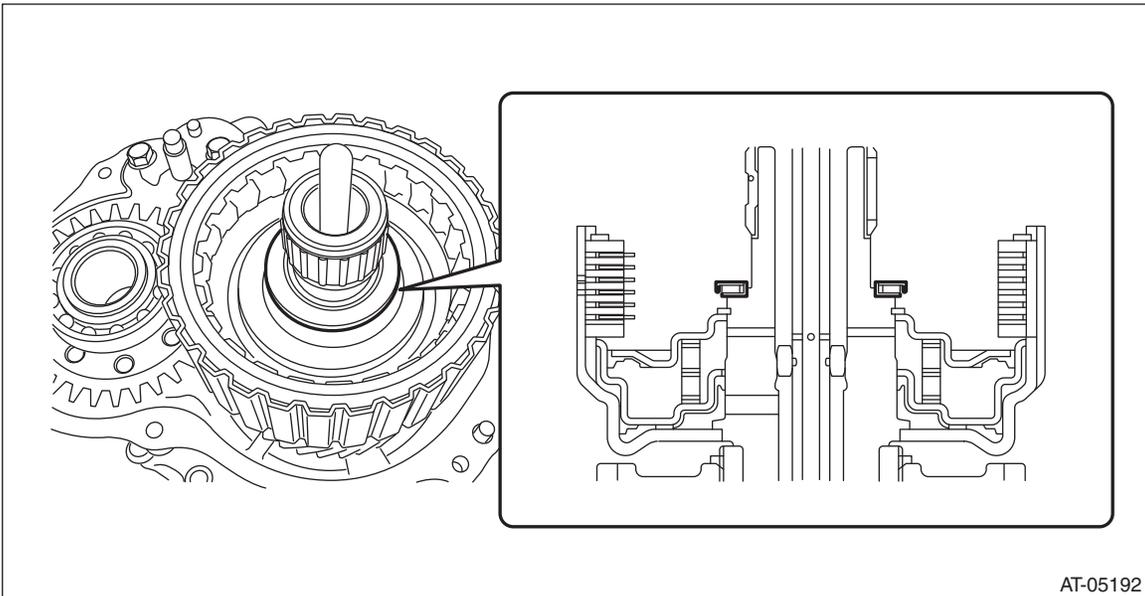


AT-05202

3) Select the thrust needle bearing. <Ref. to CVT(TR690)-169, ADJUSTMENT, Rear Drive Shaft.>  
4) Install the selected thrust needle bearing and needle bearing to transfer clutch assembly.

#### NOTE:

Install the thrust needle bearing in the correct direction.



AT-05192

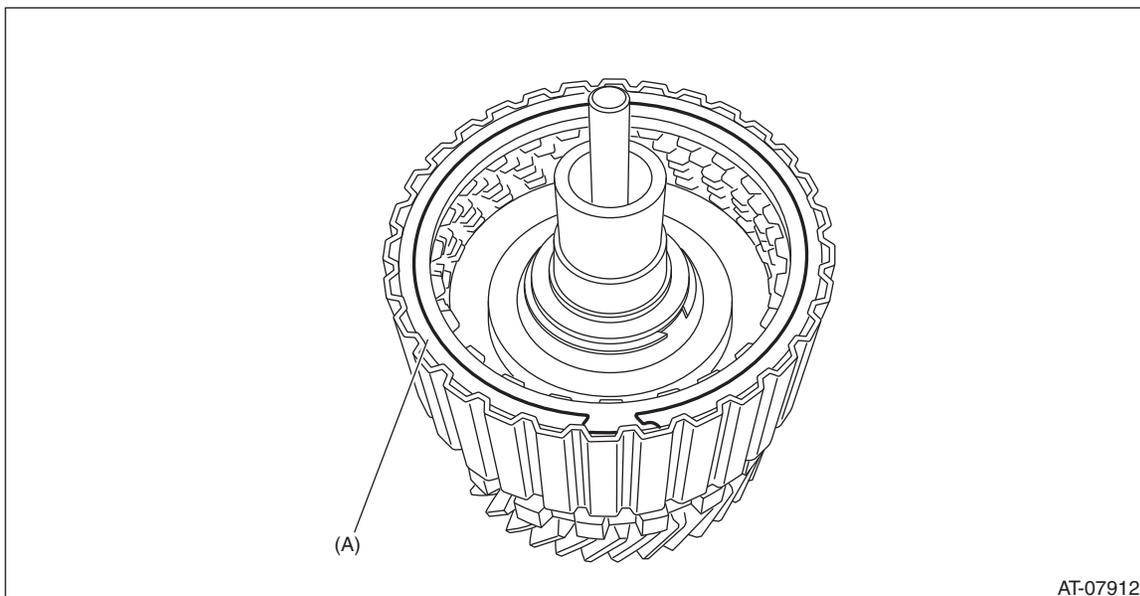
5) Install the rear drive shaft. <Ref. to CVT(TR690)-167, INSTALLATION, Rear Drive Shaft.>  
6) Install the extension case. <Ref. to CVT(TR690)-164, INSTALLATION, Extension Case.>  
7) Install the transmission assembly to the vehicle. <Ref. to CVT(TR690)-77, INSTALLATION, Automatic Transmission Assembly.>

# Transfer Clutch

CONTINUOUSLY VARIABLE TRANSMISSION

## C: DISASSEMBLY

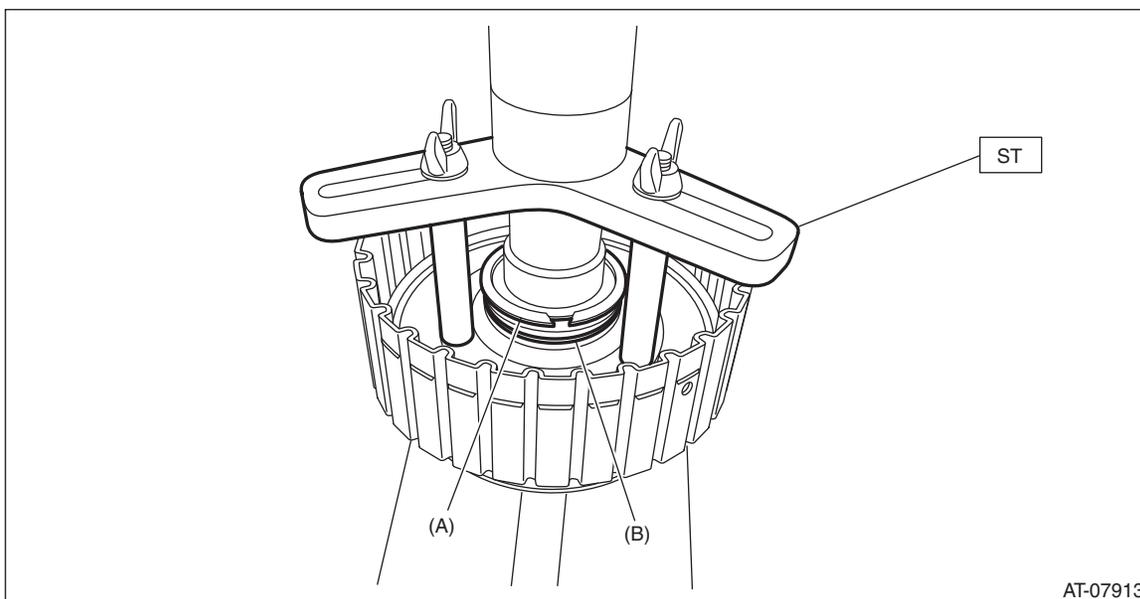
1) Remove the snap ring, and then remove the pressure plate, drive plate and driven plate.



(A) Snap ring

2) Using the ST, remove the snap ring.

ST 18762AA001 COMPRESSOR SPECIAL TOOL



(A) Snap ring

(B) Transfer clutch piston seal

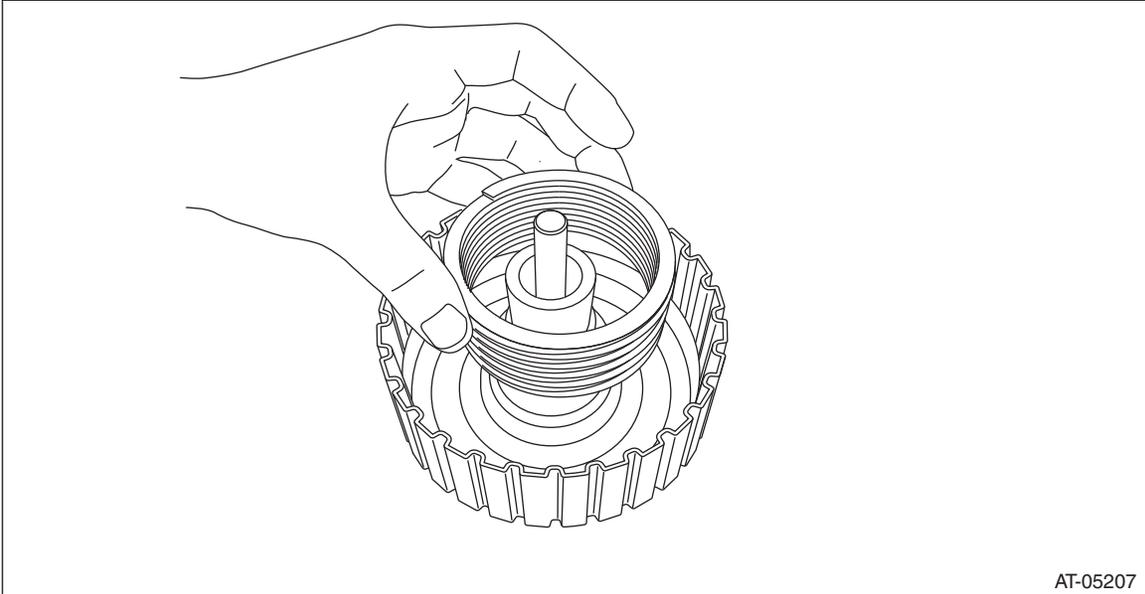
3) Remove the transfer clutch piston seal.

# Transfer Clutch

## CONTINUOUSLY VARIABLE TRANSMISSION

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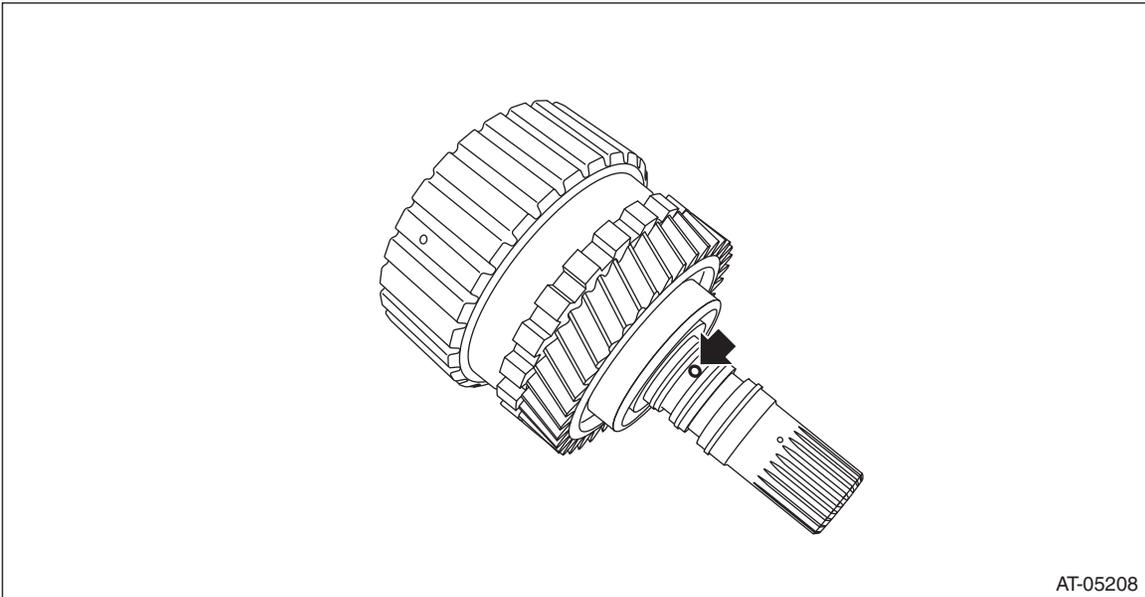
4) Remove the return spring.



5) Remove the transfer clutch piston by blowing compressed air through transfer clutch assembly hole.

**NOTE:**

Block the hole opposite to the one to be blown with compressed air by your finger.



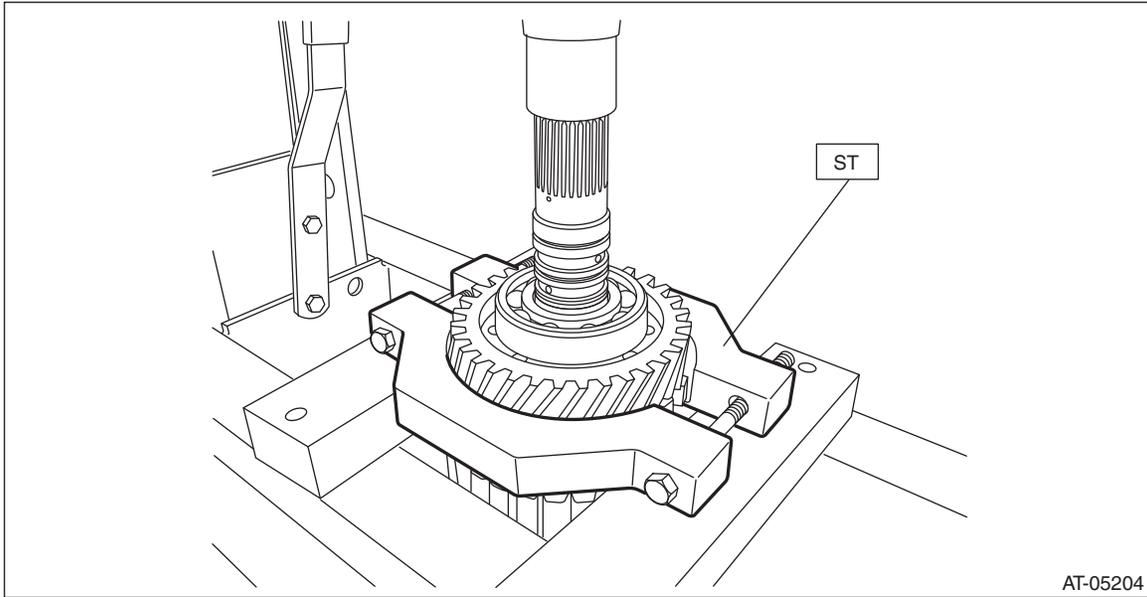
6) Using ST, remove transfer drive gear, parking gear and ball bearing.

ST 18767AA000 BEARING REMOVER

# Transfer Clutch

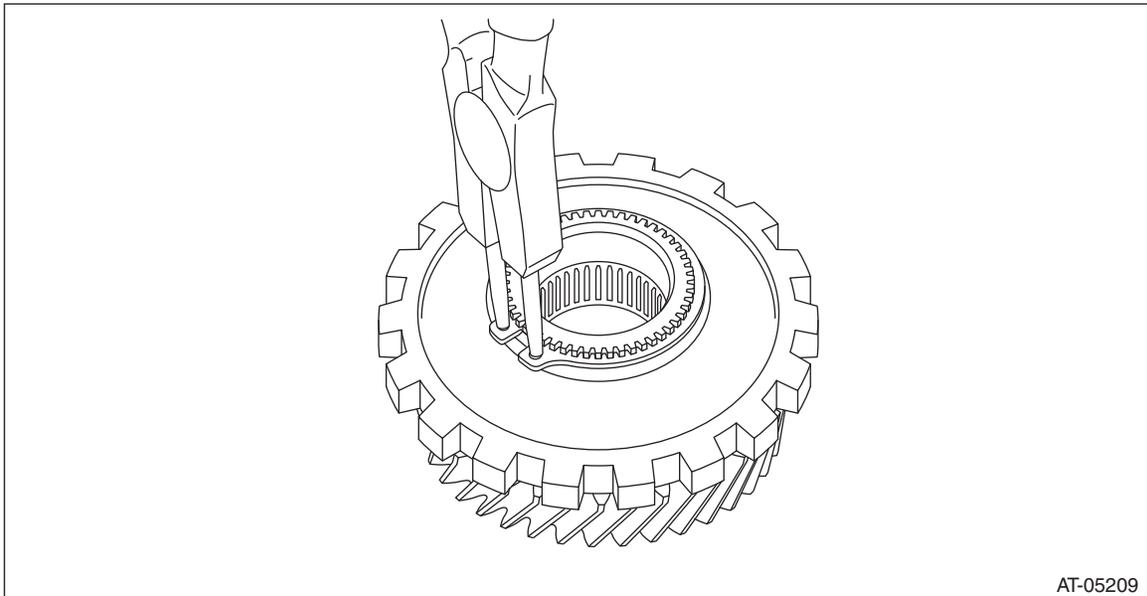
CONTINUOUSLY VARIABLE TRANSMISSION

NOTE:  
Let the ST sit on the parking gear.



AT-05204

7) Remove the snap ring from transfer reduction drive gear.



AT-05209

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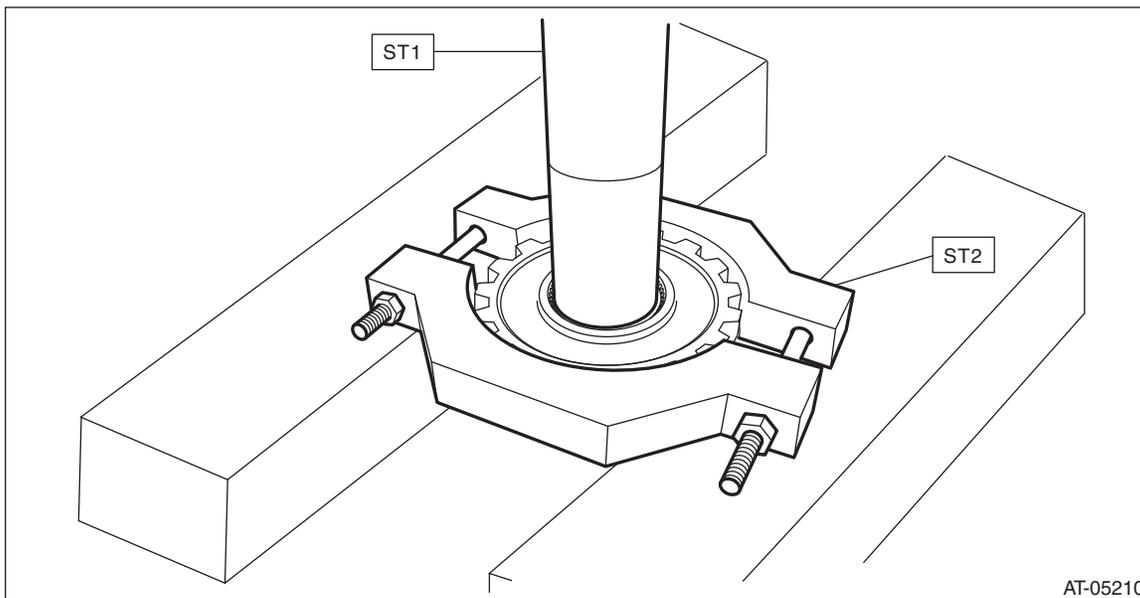
## Transfer Clutch

### CONTINUOUSLY VARIABLE TRANSMISSION

8) Using the ST, remove the parking gear from transfer reduction drive gear.

ST1 499277100 BUSHING 1-2 INSTALLER

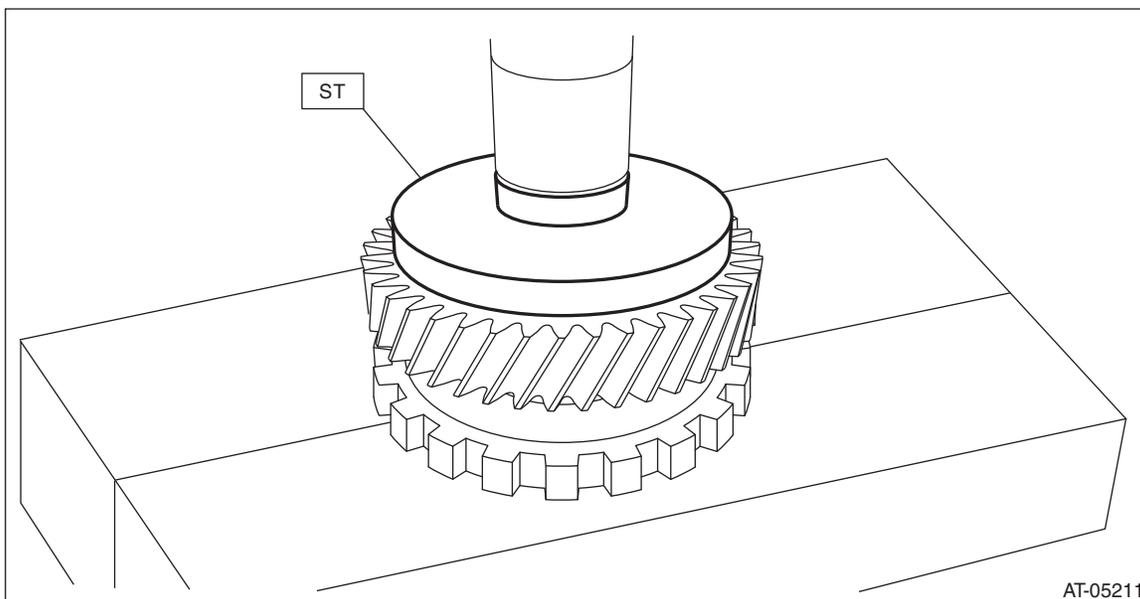
ST2 18767AA000 BEARING REMOVER



### D: ASSEMBLY

1) Using the ST, install the parking gear to transfer reduction drive gear.

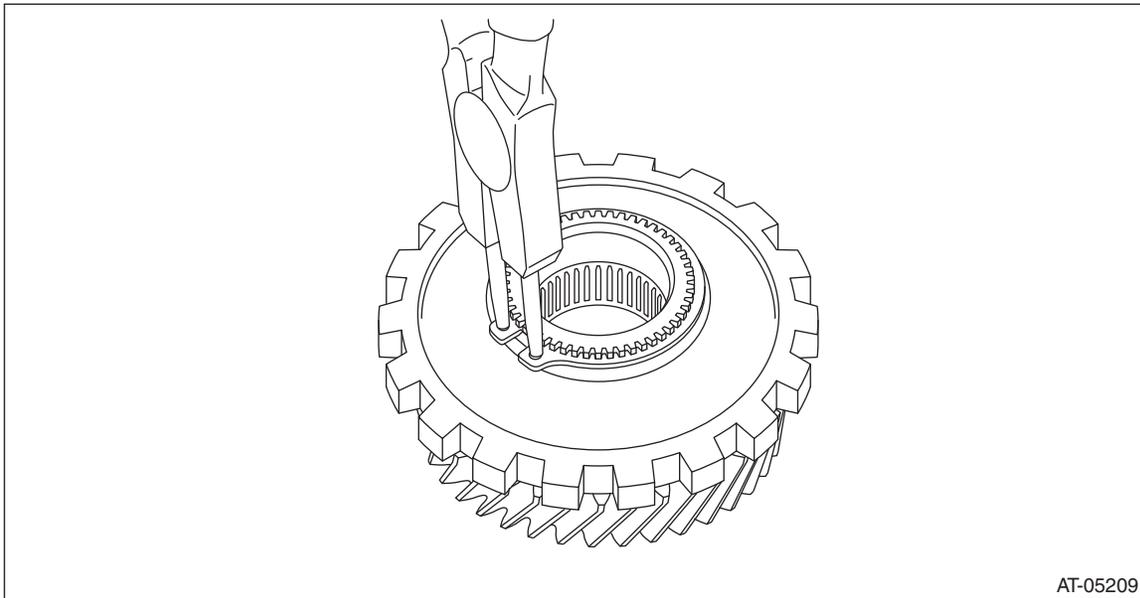
ST 398177700 INSTALLER



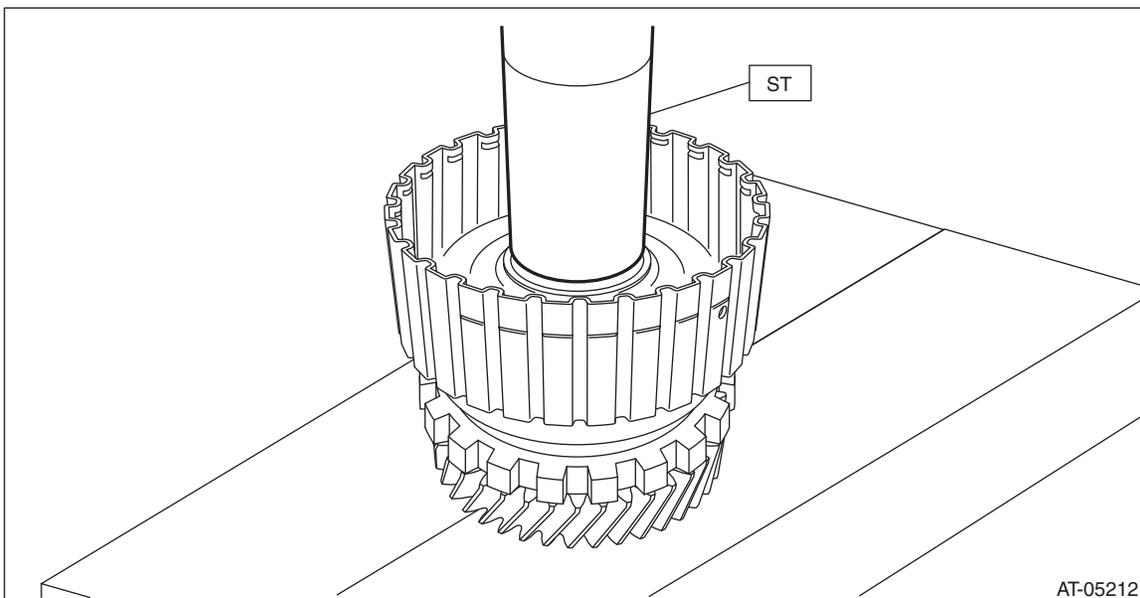
# Transfer Clutch

CONTINUOUSLY VARIABLE TRANSMISSION

2) Install the snap ring to transfer reduction drive gear.



3) Using the ST, install the transfer reduction drive gear to transfer reduction drive gear shaft.  
ST 499277100 BUSHING 1-2 INSTALLER



4) Using the ST, install the ball bearing.

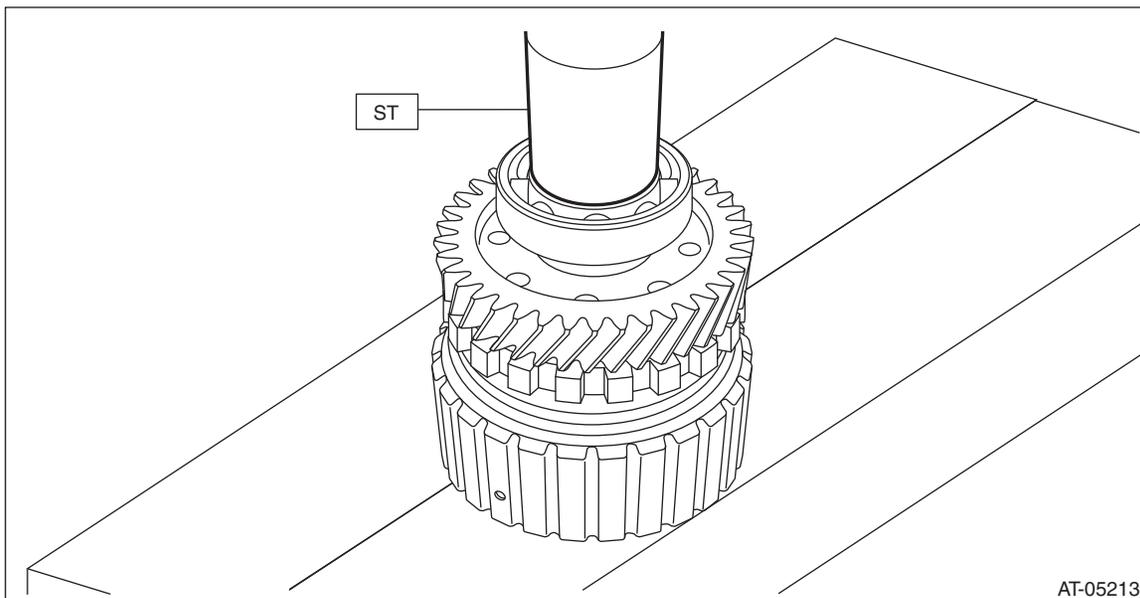
# Transfer Clutch

CONTINUOUSLY VARIABLE TRANSMISSION

**NOTE:**

Use a new ball bearing.

ST 499277100 BUSHING 1-2 INSTALLER

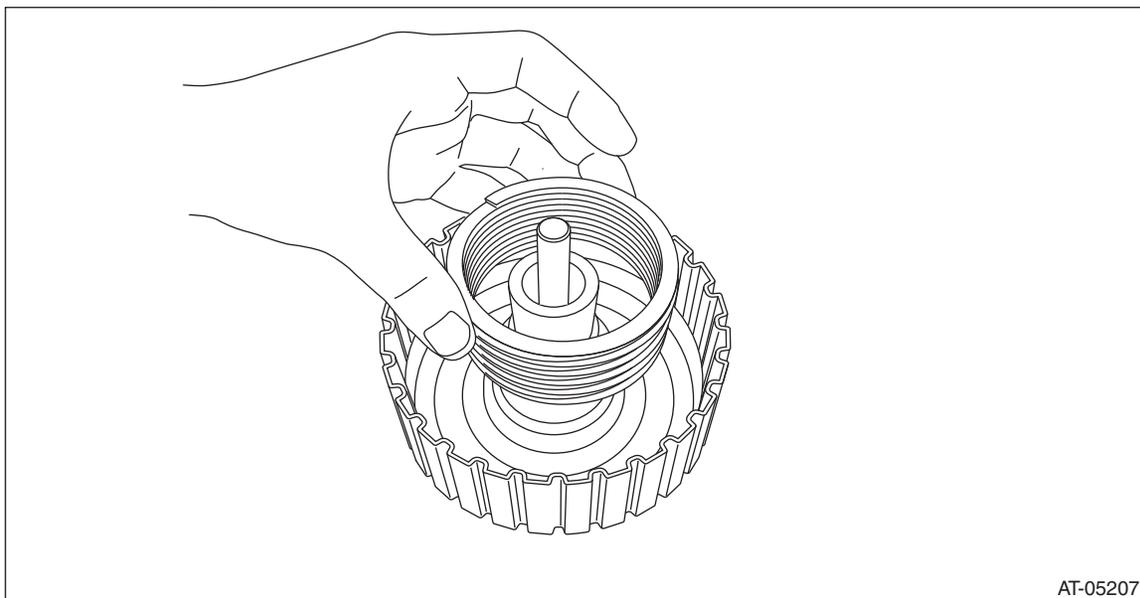


5) Attach the transfer clutch piston to the reduction drive gear shaft.

**NOTE:**

Apply CVTF to the transfer clutch piston lip.

6) Install the return spring.



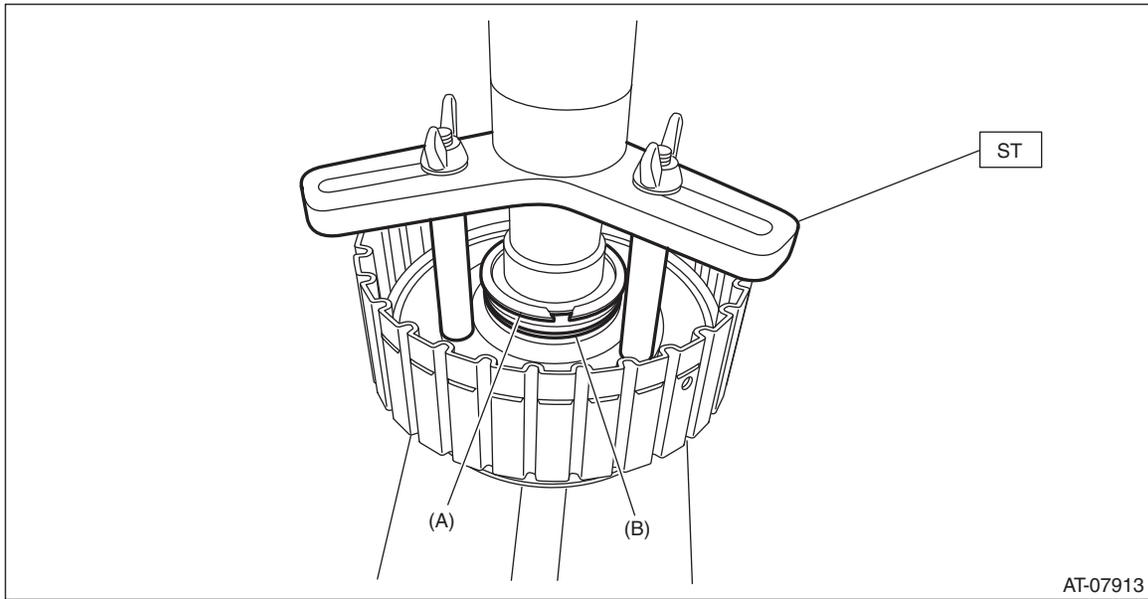
7) Install the transfer clutch piston seal.

# Transfer Clutch

CONTINUOUSLY VARIABLE TRANSMISSION

8) Using the ST, install the snap ring.

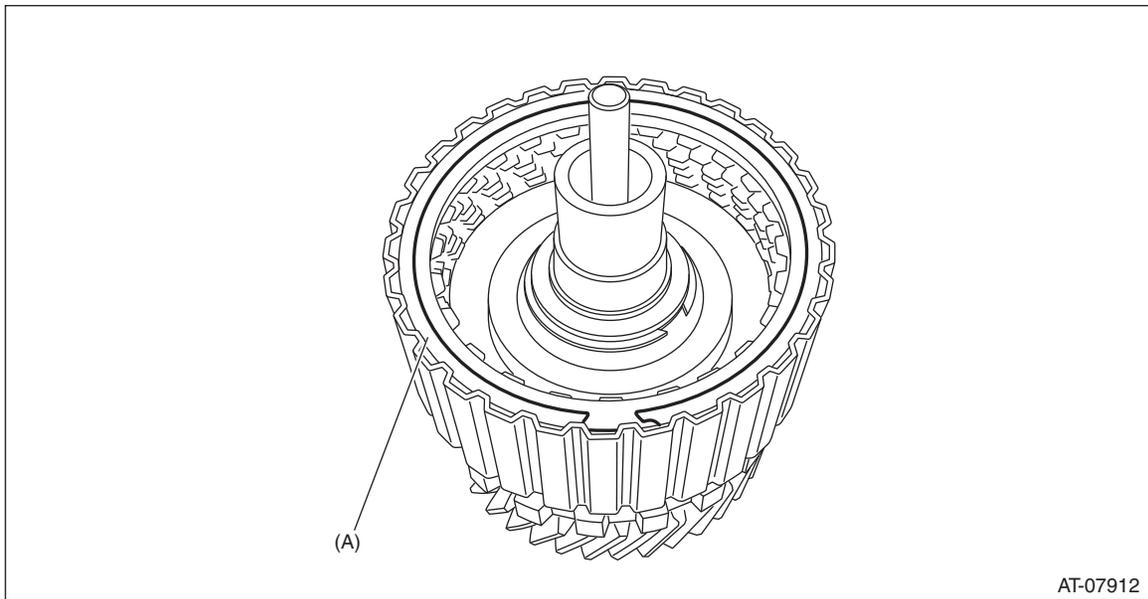
ST 18762AA001 COMPRESSOR SPECIAL TOOL



(A) Snap ring

(B) Transfer clutch piston seal

9) Install the pressure plate, driven plate, drive plate and snap ring.



(A) Snap ring

10) Before measuring clearance "A", place same thickness shims on both sides to prevent the pressure plate from tilting.

11) When the clearance "A" exceeds the limit for use, select the transfer clutch plate set and pressure plate, and adjust the clearance "A" within the initial specified value.

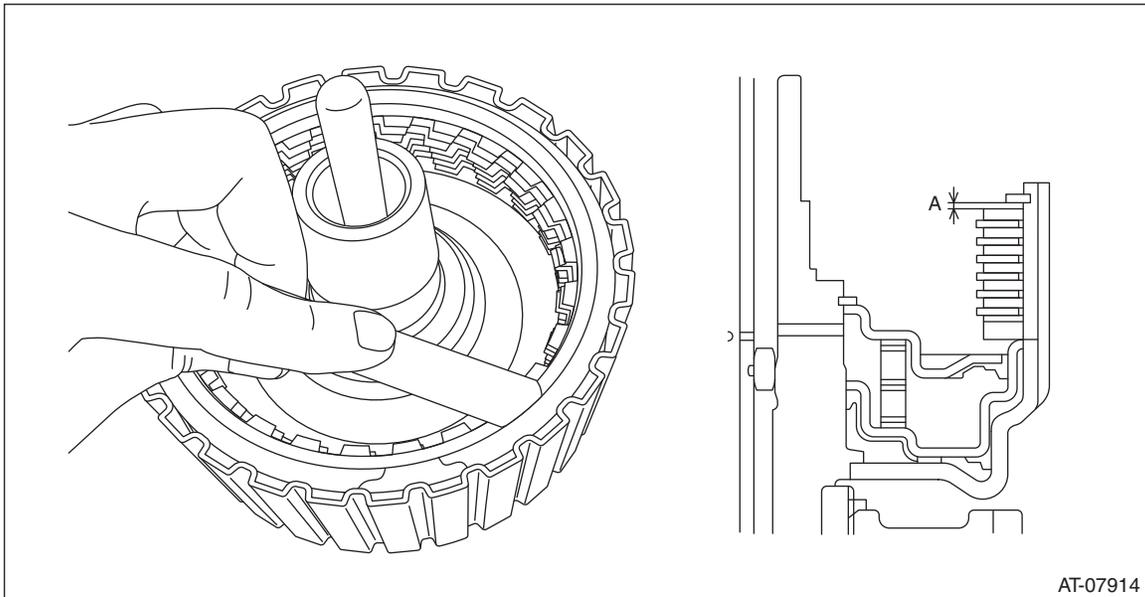
**Initial standard:**

**0.7 — 1.1 mm (0.028 — 0.043 in)**

# Transfer Clutch

CONTINUOUSLY VARIABLE TRANSMISSION

**Limit thickness:**  
**1.6 mm (0.063 in)**



AT-07914

- (1) Measure the thickness of the pressure plate for the transfer clutch plate set that has been used before replacement.
- (2) Select the transfer clutch plate set that uses the pressure plate of which the value is close to the measured value in (1), and check the clearance "A".

Transfer clutch plate set	
Part No.	Pressure plate thickness mm (in)
31523AA450	3.3 (0.130)
31523AA460	3.7 (0.146)
31523AA470	4.1 (0.161)
31523AA480	4.5 (0.177)

- (3) When the clearance "A" exceeds the limit for use in step (2), replace the pressure plate installed on the lower side of the transfer clutch plate set, and check the clearance "A" again.

Pressure plate	
Part No.	Thickness mm (in)
31593AA151	3.3 (0.130)
31593AA161	3.7 (0.146)

- (4) When the clearance "A" exceeds the limit for use in step (3), select the transfer clutch plate set that was not used in step (2), and adjust the clearance "A" again.
- 12) Check the clearance between snap ring and pressure plate. <Ref. to CVT(TR690)-182, INSPECTION, Transfer Clutch.>

## E: INSPECTION

- Inspect the drive plate facing for wear and damage.
- Check the driven plate for discoloration (burnt color).
- Make sure the snap ring is not worn and the return spring has no permanent distortion, damage, or deformation.
- Check the lip seal for damage.
- Inspect the extension end play, and adjust it to within the standard value. <Ref. to CVT(TR690)-183, ADJUSTMENT, Transfer Clutch.>

- 1) Before measuring clearance "A" between snap ring and pressure plate, place same thickness shims on both sides to prevent the pressure plate from tilting.

# Transfer Clutch

CONTINUOUSLY VARIABLE TRANSMISSION

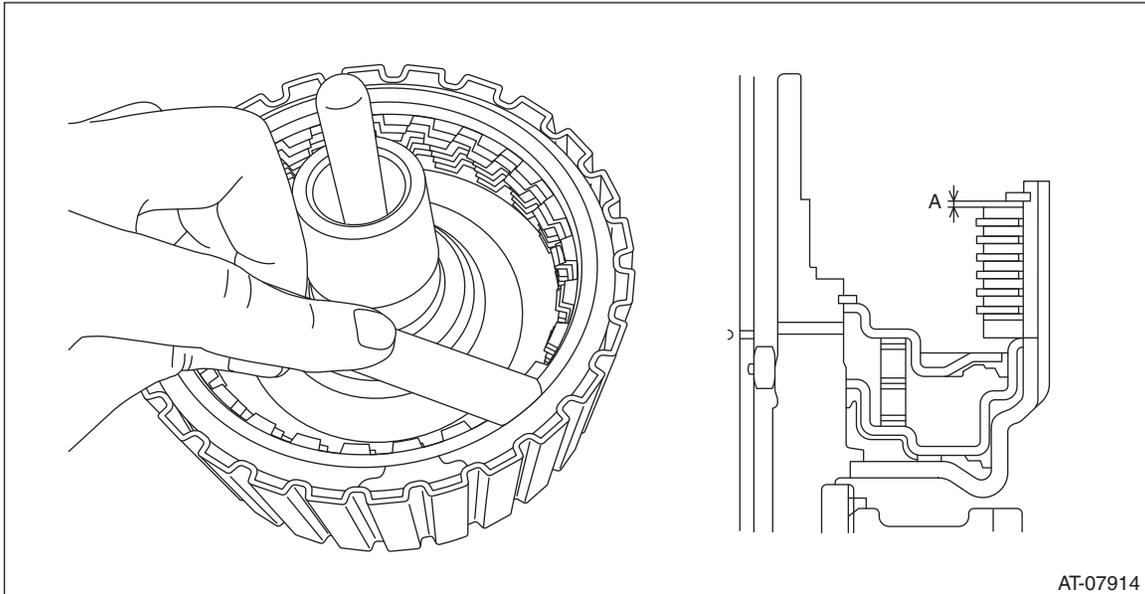
2) When clearance “A” exceeds the limit for use, replace the drive plate and driven plate as a set, and select the pressure plate within the initial specified value.

**Initial standard:**

**0.7 — 1.1 mm (0.028 — 0.043 in)**

**Limit thickness:**

**1.6 mm (0.063 in)**



3) Check for tight corner braking phenomenon when the vehicle is moved forward with the steering fully turned. If tight corner braking occurs, perform the following procedures.

**NOTE:**

Turn OFF the X mode switch and perform inspection.

(1) With the steering wheel held at fully turned position, drive the vehicle in “D” range and with vehicle speed at approx. 5 km/h (3 MPH) in both clockwise and counterclockwise directions for approx. ten times each, while repeating acceleration and braking intermittently.

(2) If the tight corner braking phenomenon still persists, drive the vehicle again in a circle for several laps.

## F: ADJUSTMENT

**NOTE:**

Refer to the Rear Drive Shaft. <Ref. to CVT(TR690)-169, ADJUSTMENT, Rear Drive Shaft.>

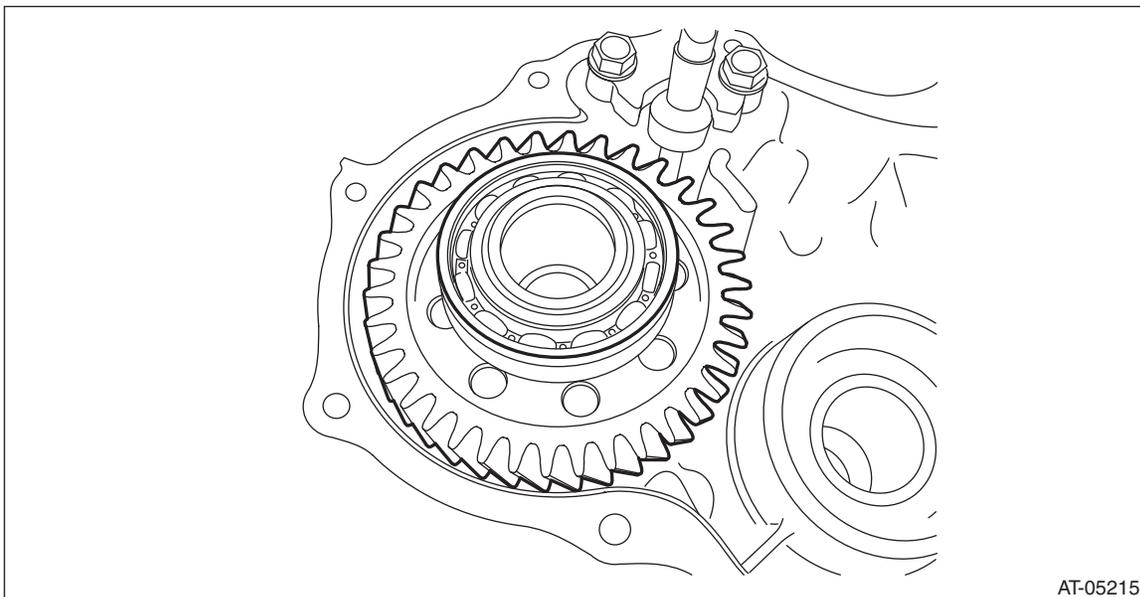
# Transfer Reduction Driven Gear

CONTINUOUSLY VARIABLE TRANSMISSION

## 33. Transfer Reduction Driven Gear

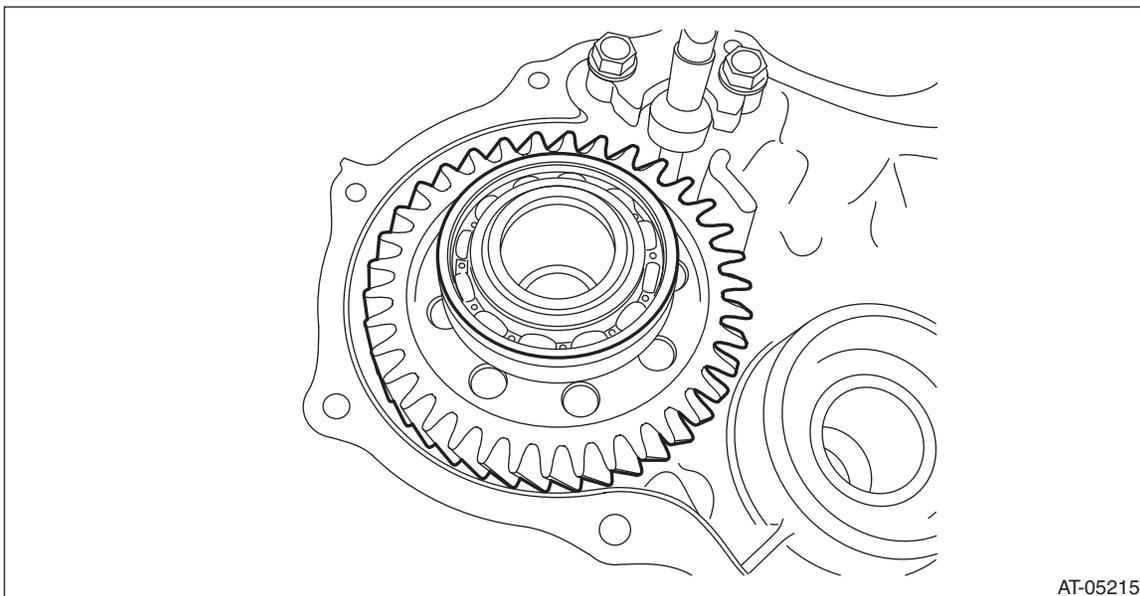
### A: REMOVAL

- 1) Remove the transmission assembly from the vehicle. <Ref. to CVT(TR690)-59, REMOVAL, Automatic Transmission Assembly.>
- 2) Remove the extension case. <Ref. to CVT(TR690)-164, REMOVAL, Extension Case.>
- 3) Remove the rear drive shaft. <Ref. to CVT(TR690)-167, REMOVAL, Rear Drive Shaft.>
- 4) Remove the transfer clutch assembly. <Ref. to CVT(TR690)-172, REMOVAL, Transfer Clutch.>
- 5) Remove the transfer reduction driven gear assembly.



### B: INSTALLATION

- 1) Install the reduction driven gear assembly.



- 2) Select shims. <Ref. to CVT(TR690)-187, ADJUSTMENT, Transfer Reduction Driven Gear.>
- 3) Install the transfer clutch assembly. <Ref. to CVT(TR690)-173, INSTALLATION, Transfer Clutch.>
- 4) Install the rear drive shaft. <Ref. to CVT(TR690)-167, INSTALLATION, Rear Drive Shaft.>
- 5) Mount the selected shim onto ball bearing.
- 6) Install the extension case. <Ref. to CVT(TR690)-164, INSTALLATION, Extension Case.>

# Transfer Reduction Driven Gear

CONTINUOUSLY VARIABLE TRANSMISSION

7) Install the transmission assembly to the vehicle. <Ref. to CVT(TR690)-77, INSTALLATION, Automatic Transmission Assembly.>

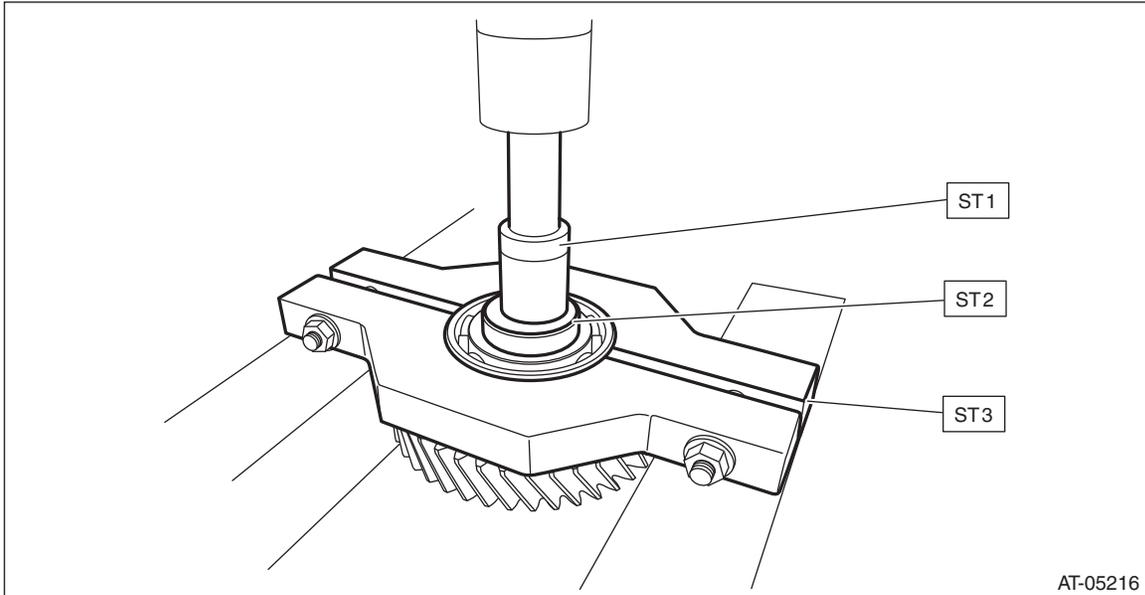
## C: DISASSEMBLY

1) Using the ST, remove the ball bearing (large) from transfer reduction driven gear.

ST1 899864100 REMOVER

ST2 398497701 SEAT

ST3 498077600 REMOVER

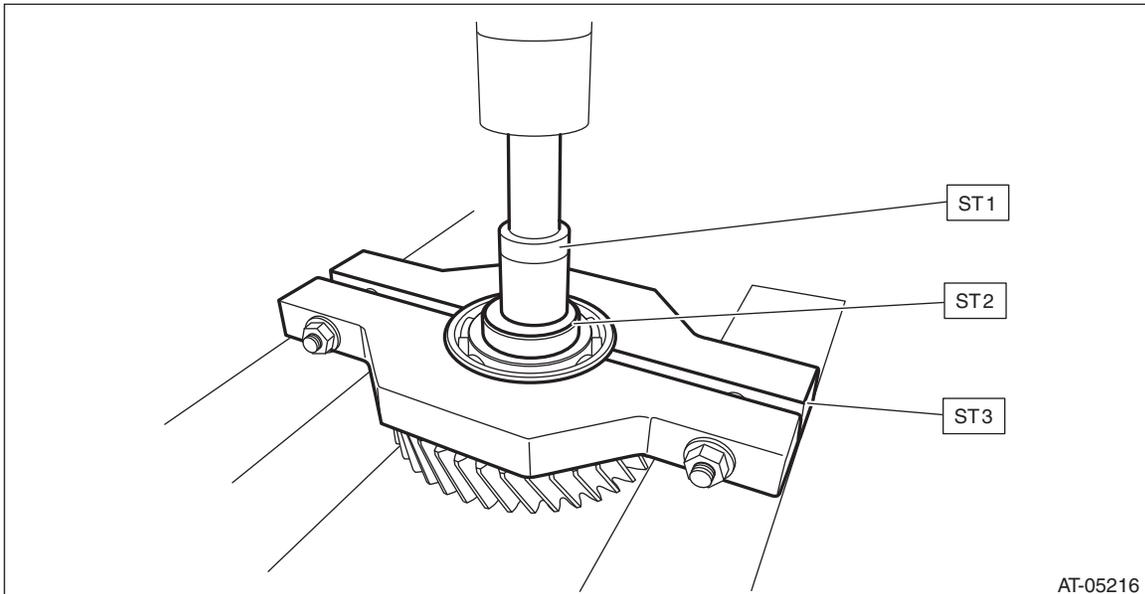


2) Using the ST, remove the ball bearing (small) from transfer reduction driven gear.

ST1 899864100 REMOVER

ST2 398497701 SEAT

ST3 18720AA000 REMOVER



## D: ASSEMBLY

1) Install the new ball bearing (large) to reduction driven gear using the ST.

ST 499277100 BUSHING 1-2 INSTALLER

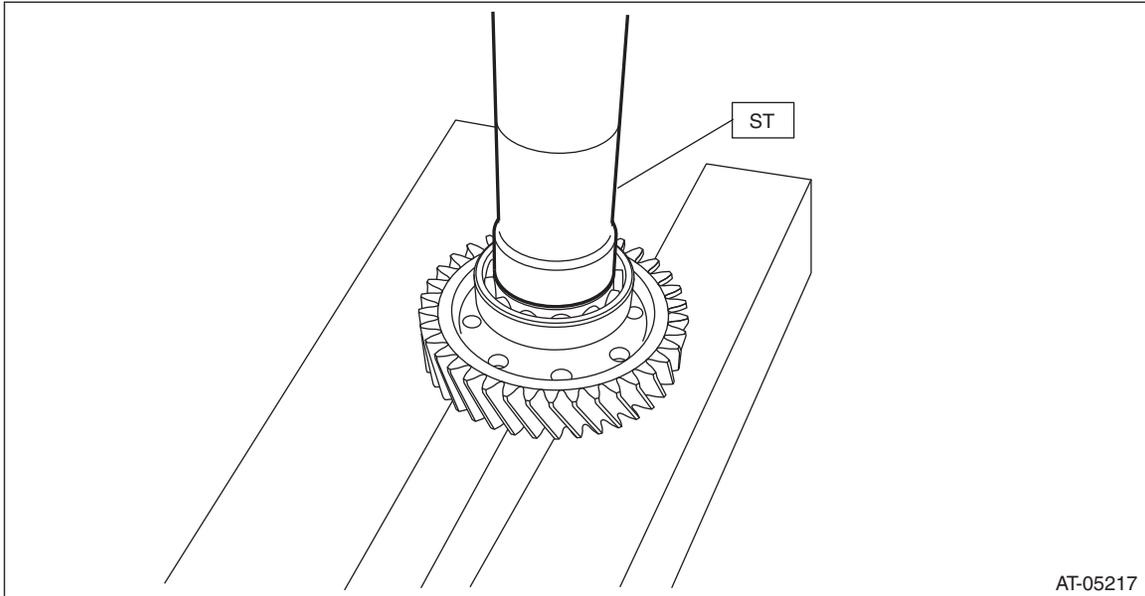
NOTE:

- Use a new ball bearing.

# Transfer Reduction Driven Gear

## CONTINUOUSLY VARIABLE TRANSMISSION

- Install to the splines inside transfer reduction driven gear shaft.

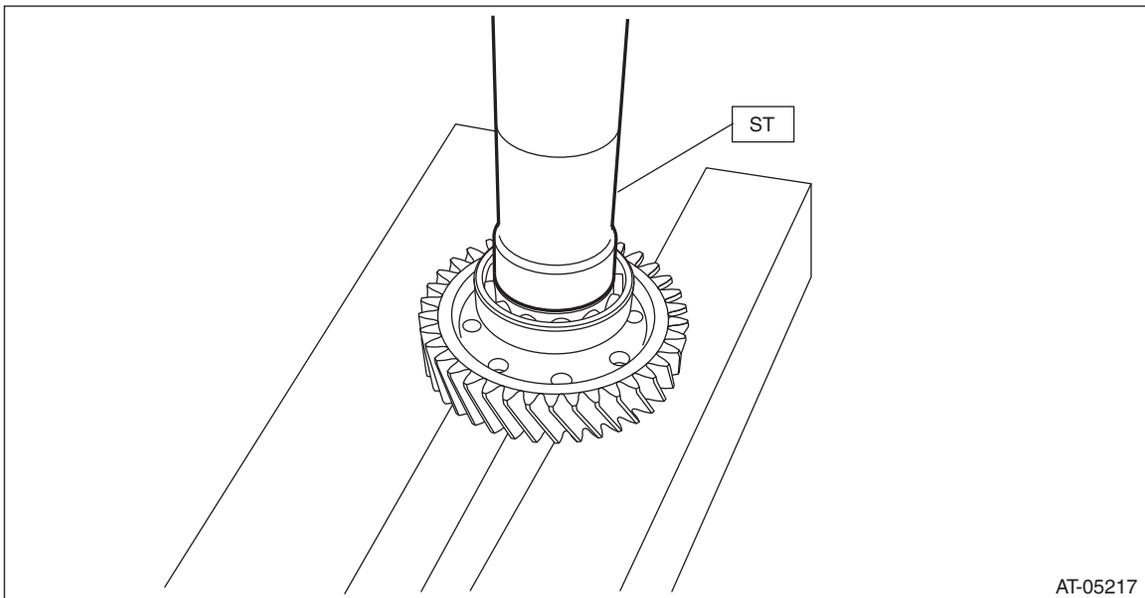


- 2) Install the new ball bearing (small) to reduction driven gear.

### NOTE:

Use a new ball bearing.

ST 499277100 BUSHING 1-2 INSTALLER



### E: INSPECTION

- Check the ball bearing for smooth rotation.
- Check the ball bearing for excessive looseness.
- Make sure the gear is not broken or damaged.

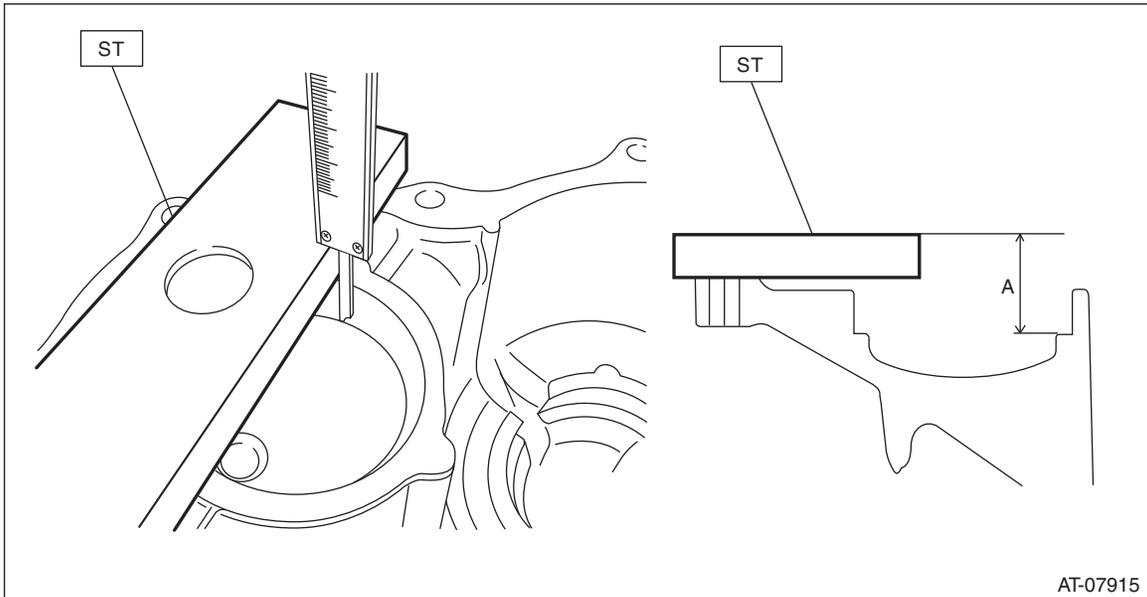
# Transfer Reduction Driven Gear

CONTINUOUSLY VARIABLE TRANSMISSION

## F: ADJUSTMENT

1) Measure depth "A" from the ST upper face to the ball bearing catch surface.

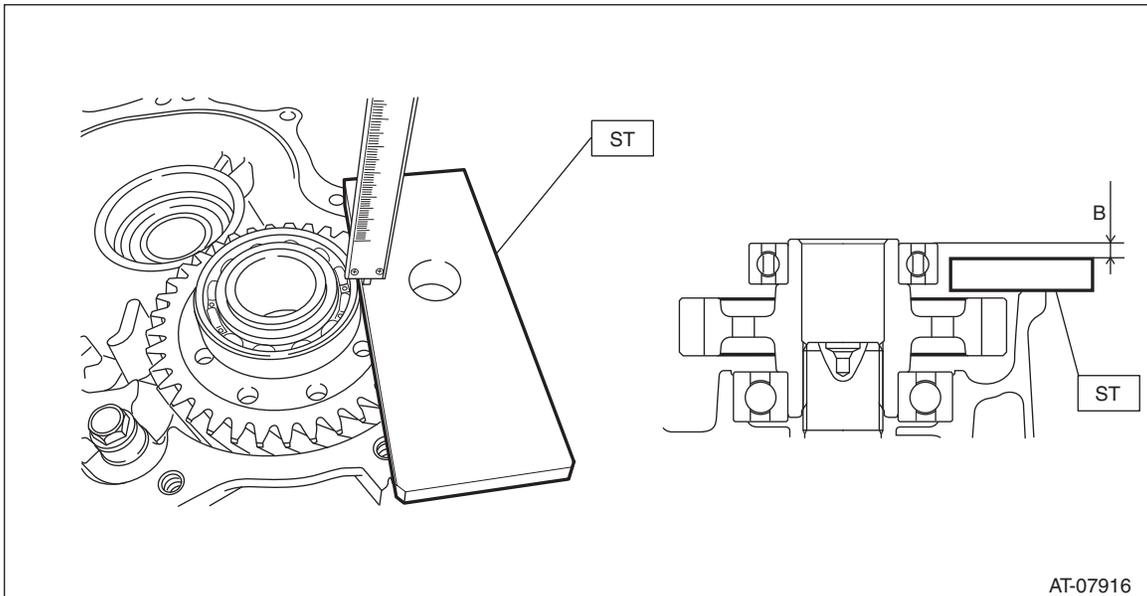
ST 398643600 GAUGE



AT-07915

2) Measure height "B" from the ST to the end of the ball bearing outer ring.

ST 398643600 GAUGE



AT-07916

3) Obtain the thickness of shim using the following formula to select none to two shims.

$$T \text{ mm} = (A - 15) - (B + 15) - (0.05 - 0.25)$$

$$[T \text{ in} = (A - 0.591) - (B + 0.591) - (0.002 - 0.01)]$$

T: Shim thickness

A: Depth from the ST upper face to the ball bearing catch surface

B: Height from the ST to the end of the ball bearing outer ring

15 mm (0.591 in): Thickness of ST

0.05 — 0.25 mm (0.002 — 0.01 in): Clearance

Shim	
Part No.	Thickness mm (in)
31288AA190	0.2 (0.008)
31288AA200	0.3 (0.012)

# Transfer Reduction Driven Gear

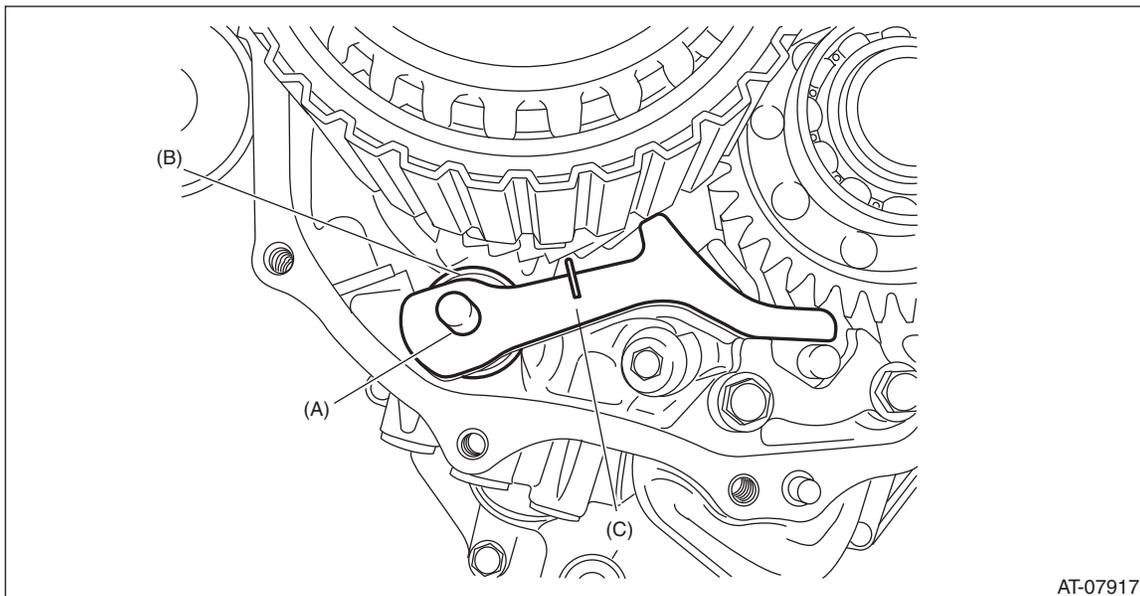
CONTINUOUSLY VARIABLE TRANSMISSION

Shim	
Part No.	Thickness mm (in)
31288AA210	0.5 (0.02)

## 34. Parking Pawl

### A: REMOVAL

- 1) Remove the transmission assembly from the vehicle. <Ref. to CVT(TR690)-59, REMOVAL, Automatic Transmission Assembly.>
- 2) Shift the range select lever to "N" range.
- 3) Remove the extension case. <Ref. to CVT(TR690)-164, REMOVAL, Extension Case.>
- 4) Remove the parking pawl shaft, return spring and parking pawl.



- (A) Parking pawl shaft
- (B) Return spring
- (C) Parking pawl

### B: INSTALLATION

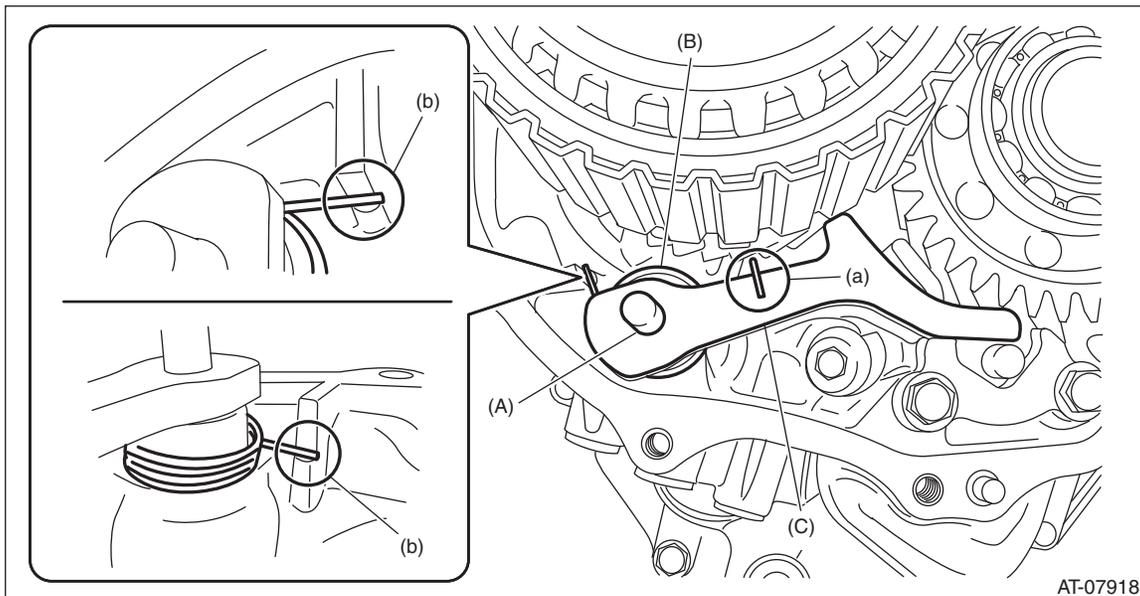
- 1) Set the range select lever to the "N" range.
- 2) Install the parking pawl shaft, return spring and parking pawl.

## Parking Pawl

### CONTINUOUSLY VARIABLE TRANSMISSION

#### NOTE:

Make sure that the end of return spring sticks out of parking pawl as shown in (a). Make sure that the other end contacts the rib of intermediate case as shown in (b).



- (A) Parking pawl shaft
- (B) Return spring
- (C) Parking pawl

3) Install the extension case. <Ref. to CVT(TR690)-164, INSTALLATION, Extension Case.>

4) Install the transmission assembly to the vehicle. <Ref. to CVT(TR690)-77, INSTALLATION, Automatic Transmission Assembly.>

### C: INSPECTION

- Check the parking pawl for breakage or damage.
- Check the return spring for fatigue.

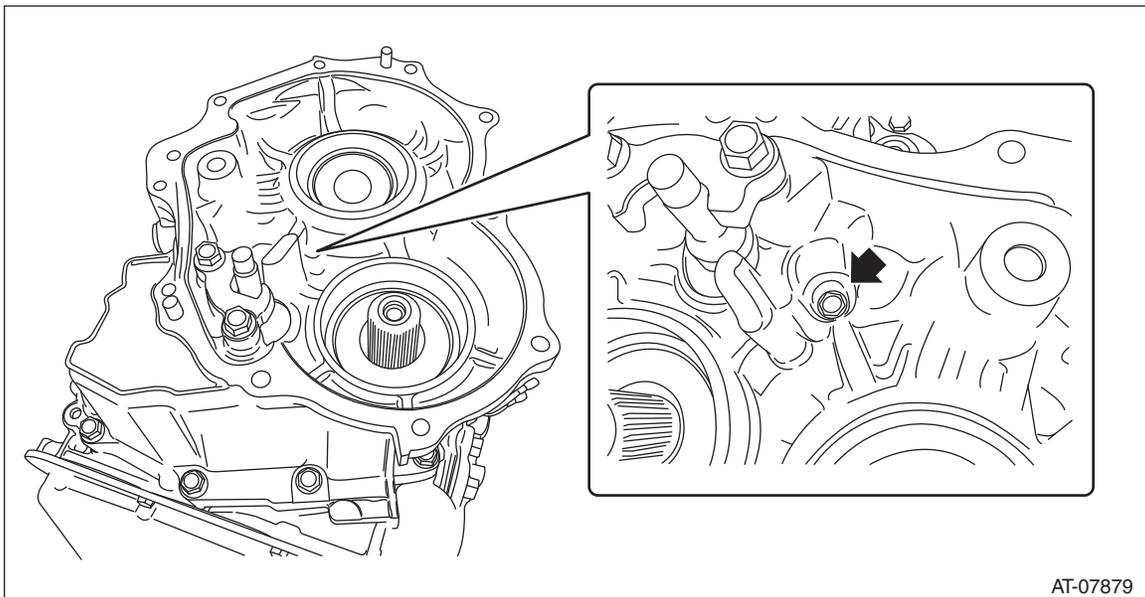
## 35. Intermediate Case

### A: REMOVAL

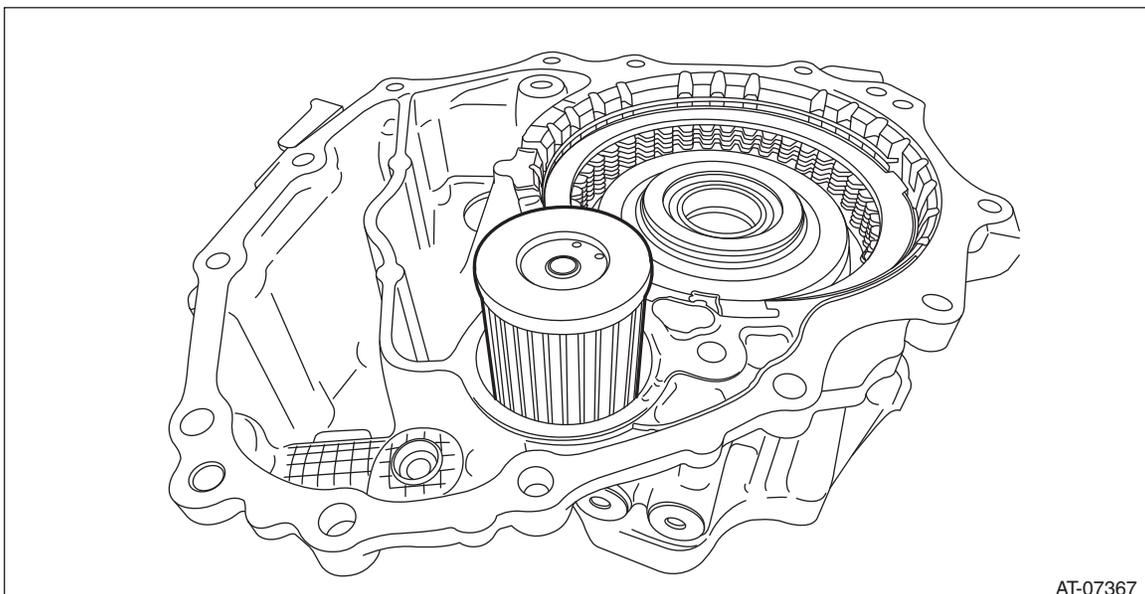
- 1) Remove the transmission assembly from vehicle body. <Ref. to CVT(TR690)-59, REMOVAL, Automatic Transmission Assembly.>
- 2) Remove the extension case. <Ref. to CVT(TR690)-164, REMOVAL, Extension Case.>
- 3) Remove the parking pawl. <Ref. to CVT(TR690)-189, REMOVAL, Parking Pawl.>
- 4) Remove the rear drive shaft. <Ref. to CVT(TR690)-167, REMOVAL, Rear Drive Shaft.>
- 5) Remove the transfer clutch assembly. <Ref. to CVT(TR690)-172, REMOVAL, Transfer Clutch.>
- 6) Remove the transfer reduction driven gear assembly. <Ref. to CVT(TR690)-184, REMOVAL, Transfer Reduction Driven Gear.>
- 7) Remove the intermediate case.

#### NOTE:

- The total number of intermediate case mounting bolts is 14.
- Inside the transmission is a single bolt (arrowed).



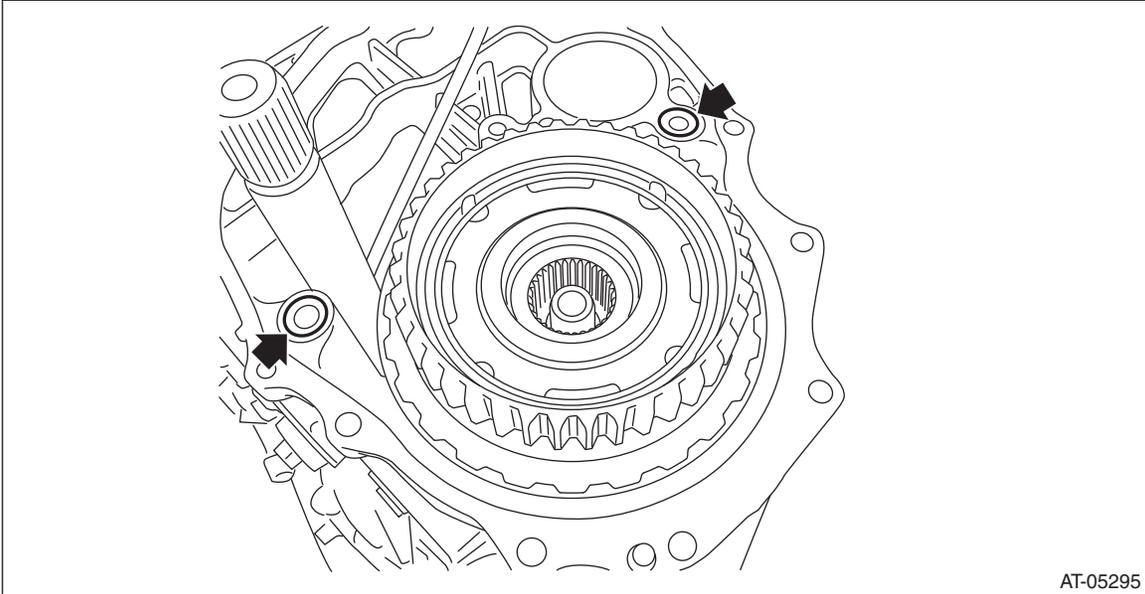
- 8) Remove the CVTF filter.



## Intermediate Case

### CONTINUOUSLY VARIABLE TRANSMISSION

9) Remove the O-ring from the transmission case.

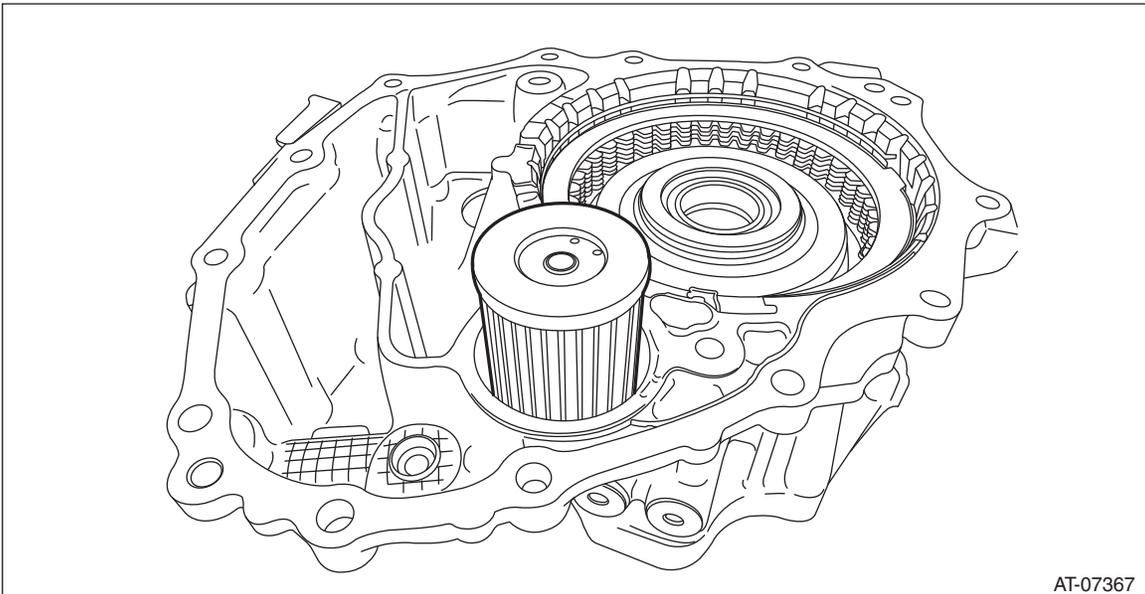


### B: INSTALLATION

- 1) Clean the mating surface of intermediate case and transmission case.
- 2) Face the O-ring side of the CVTF filter to the intermediate case side, and install the CVTF filter.

#### NOTE:

Apply CVTF to the O-rings.



3) Install the O-ring to the transmission case.

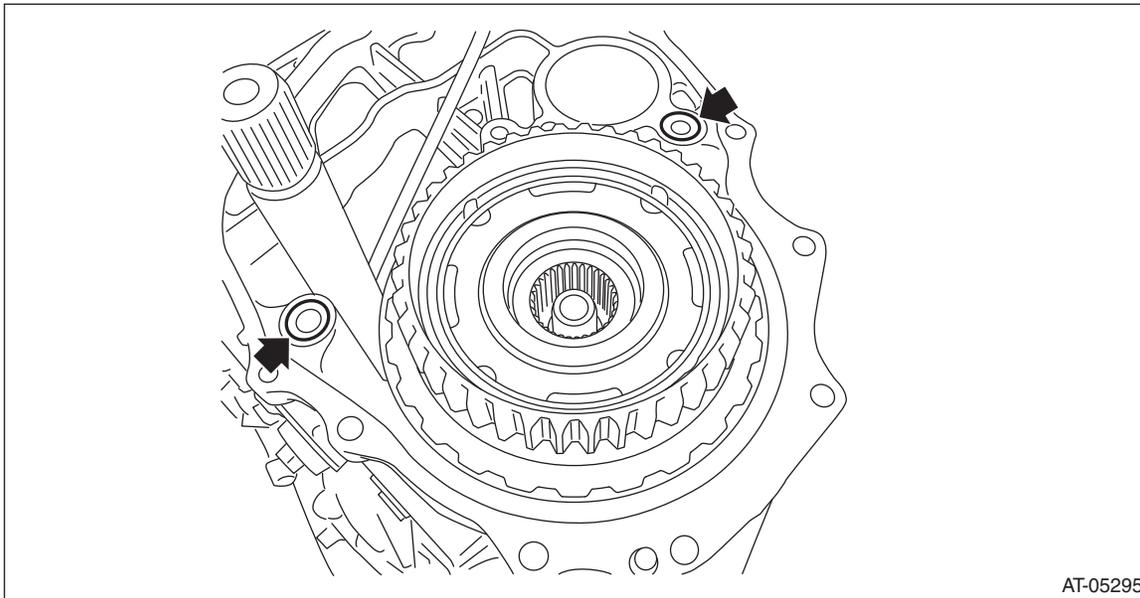
#### NOTE:

- Use new O-rings.

## Intermediate Case

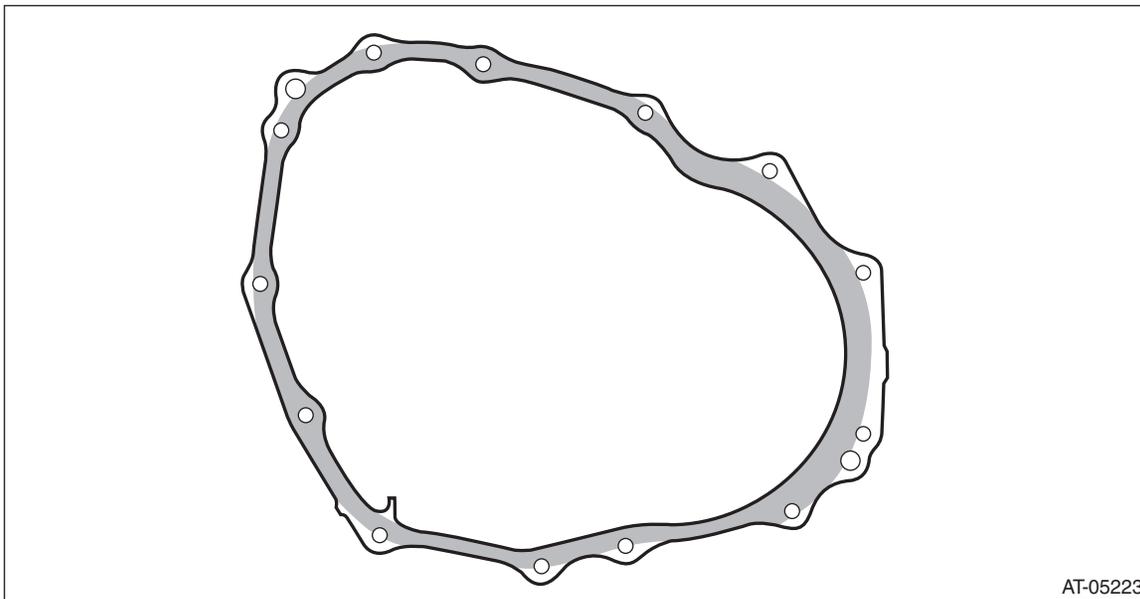
CONTINUOUSLY VARIABLE TRANSMISSION

- Apply CVTF to the O-rings.



- 4) Apply liquid gasket to intermediate case seamlessly.

**Liquid gasket:**  
**THREE BOND 1215B or equivalent**



- 5) Install the intermediate case and the transmission hanger to the transmission case.

**NOTE:**

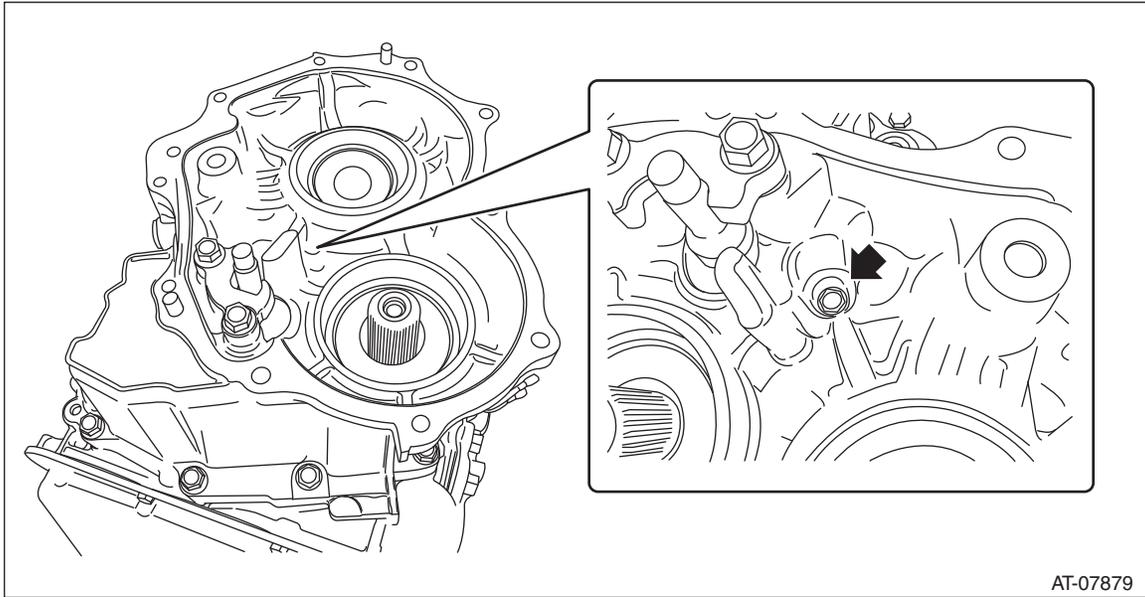
Make sure to install the arrowed bolt.

## Intermediate Case

CONTINUOUSLY VARIABLE TRANSMISSION

### Tightening torque:

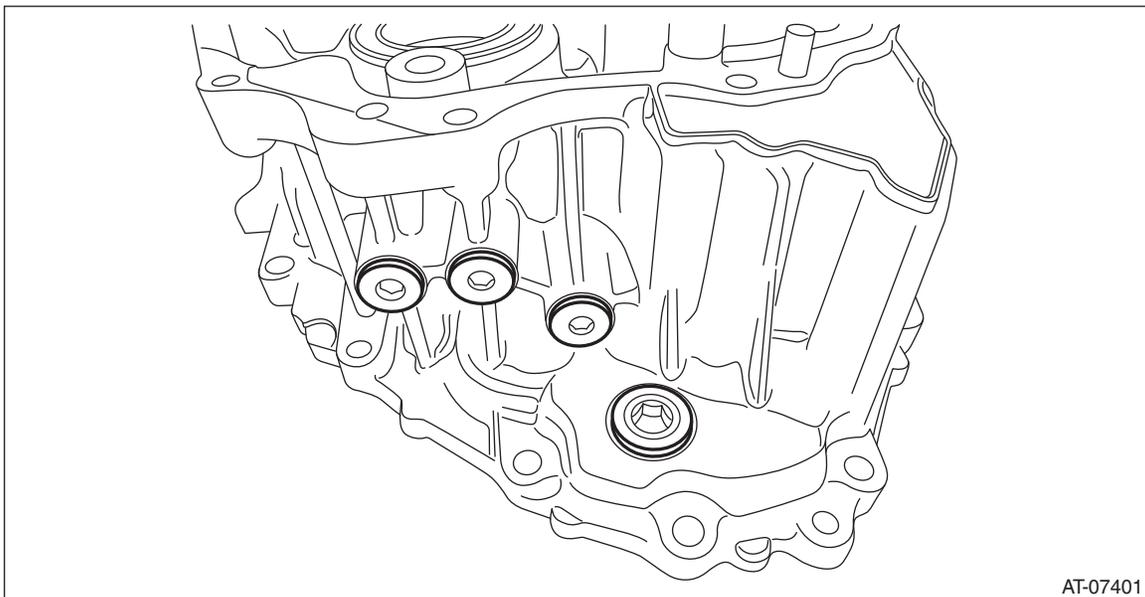
**25 N·m (2.5 kgf·m, 18.4 ft·lb)**



- 6) Install the transfer reduction driven gear assembly. <Ref. to CVT(TR690)-184, INSTALLATION, Transfer Reduction Driven Gear.>
- 7) Install the transfer clutch assembly. <Ref. to CVT(TR690)-173, INSTALLATION, Transfer Clutch.>
- 8) Install the rear drive shaft. <Ref. to CVT(TR690)-167, INSTALLATION, Rear Drive Shaft.>
- 9) Install the parking pawl. <Ref. to CVT(TR690)-189, INSTALLATION, Parking Pawl.>
- 10) Install the extension case. <Ref. to CVT(TR690)-164, INSTALLATION, Extension Case.>
- 11) Install the transmission to vehicle. <Ref. to CVT(TR690)-77, INSTALLATION, Automatic Transmission Assembly.>

### C: DISASSEMBLY

- 1) Remove the parking support.
- 2) Remove the CVTF filler plug.
- 3) Remove all plugs from intermediate case.



- 4) Remove the reverse brake assembly. <Ref. to CVT(TR690)-197, DISASSEMBLY, Reverse Brake Assembly.>

## Intermediate Case

CONTINUOUSLY VARIABLE TRANSMISSION

### D: ASSEMBLY

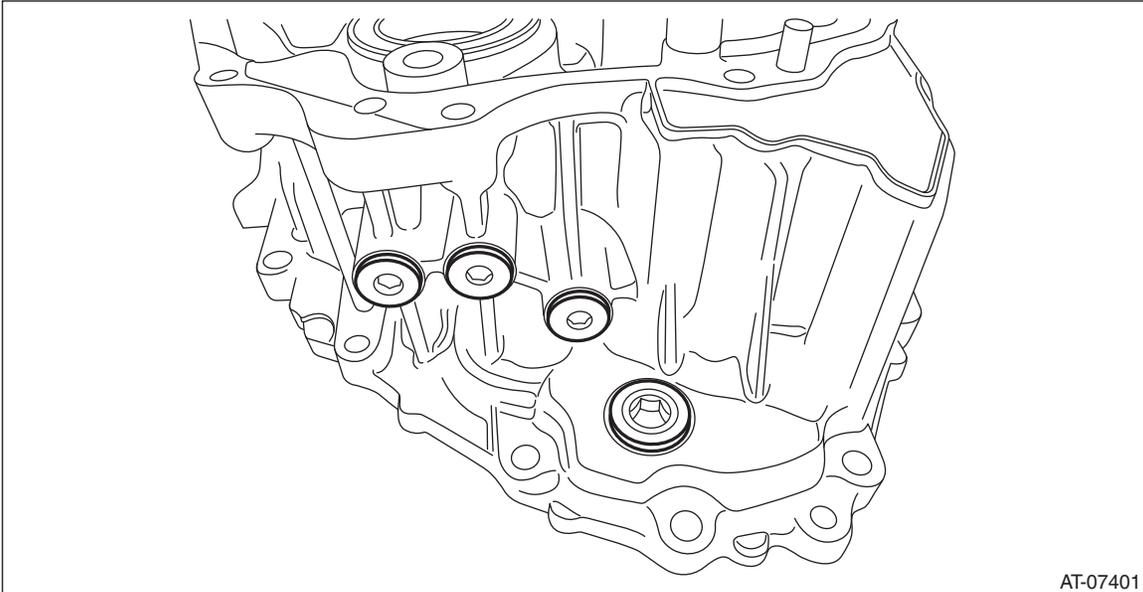
- 1) Install the reverse brake. <Ref. to CVT(TR690)-200, ASSEMBLY, Reverse Brake Assembly.>
- 2) install all plugs to intermediate case.

#### **Tightening torque:**

**25 N·m (2.5 kgf·m, 18.4 ft·lb)**

#### **NOTE:**

Use new O-rings.



AT-07401

- 3) Install the parking support.

#### **Tightening torque:**

**25 N·m (2.5 kgf·m, 18.4 ft·lb)**

- 4) Temporarily install the CVTF filler plug.

#### **NOTE:**

Replace the gasket of CVTF filler plug with a new part after installing the transmission assembly to vehicle and adjusting CVTF fluid.

### E: INSPECTION

- Check the intermediate case for fissures, cracks or damage.
- Check for leakage of CVTF from the connections between intermediate case and transmission case, and between intermediate case and extension case.

### 36. CVTF Filter

#### A: REMOVAL

NOTE:

- Although CVTF filter is a maintenance-free part, replace it if a large quantity of wear debris and metal particles are found in CVTF and CVTF filter.
- For removal of CVTF filter, refer to “Intermediate Case”. <Ref. to CVT(TR690)-191, REMOVAL, Intermediate Case.>

#### B: INSTALLATION

NOTE:

For installation of CVTF filter, refer to “Intermediate Case”. <Ref. to CVT(TR690)-192, INSTALLATION, Intermediate Case.>

#### C: INSPECTION

- Check if a large quantity of wear debris or metal particles are in CVTF and CVTF filter.
- Check for broken part or damaged O-ring.

## 37.Reverse Brake Assembly

### A: REMOVAL

**NOTE:**

For removal of reverse brake assembly, refer to “Intermediate Case”. <Ref. to CVT(TR690)-191, REMOVAL, Intermediate Case.>

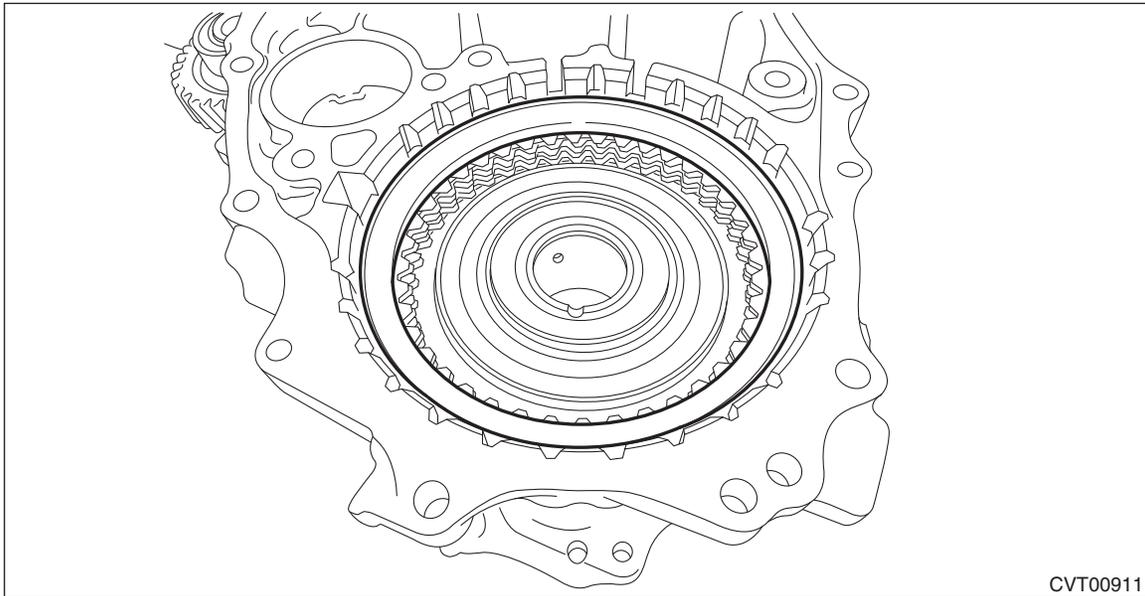
### B: INSTALLATION

**NOTE:**

For installation of reverse brake assembly, refer to “Intermediate Case”. <Ref. to CVT(TR690)-192, INSTALLATION, Intermediate Case.>

### C: DISASSEMBLY

- 1) Remove the snap ring.
- 2) Remove the retaining plate, drive plate, driven plate and dish plate.



CVT00911

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# Reverse Brake Assembly

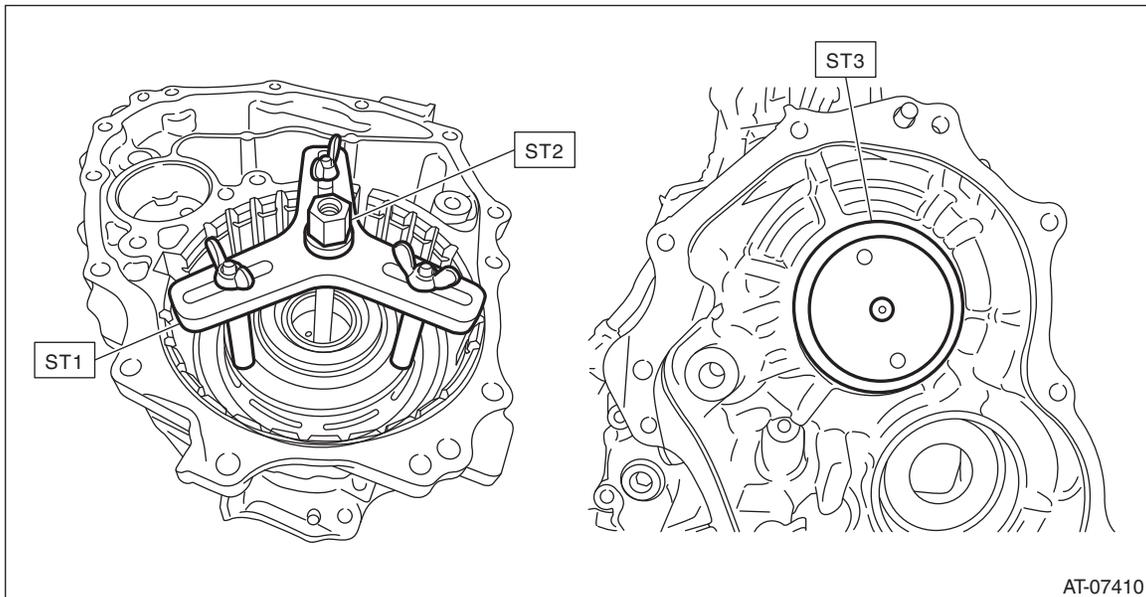
CONTINUOUSLY VARIABLE TRANSMISSION

3) Set the ST1, ST2 and ST3 to intermediate case.

ST1 18762AA001 COMPRESSOR SPECIAL TOOL

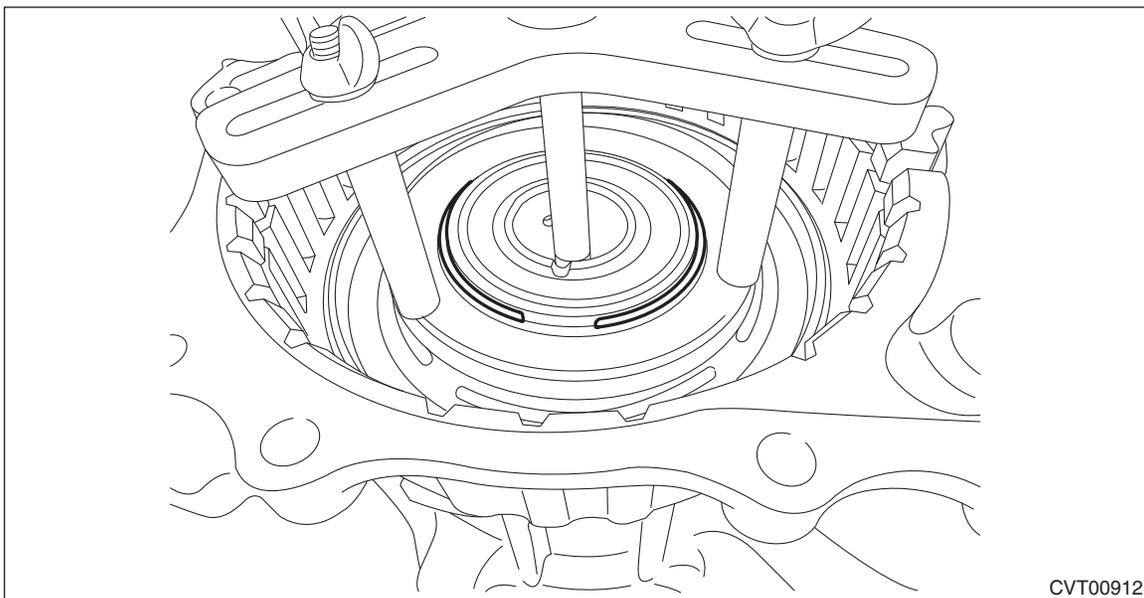
ST2 18763AA000 COMPRESSOR SHAFT

ST3 18765AA000 COMPRESSOR SUPPORT



AT-07410

4) Compress the return spring using the set ST to remove the snap ring.

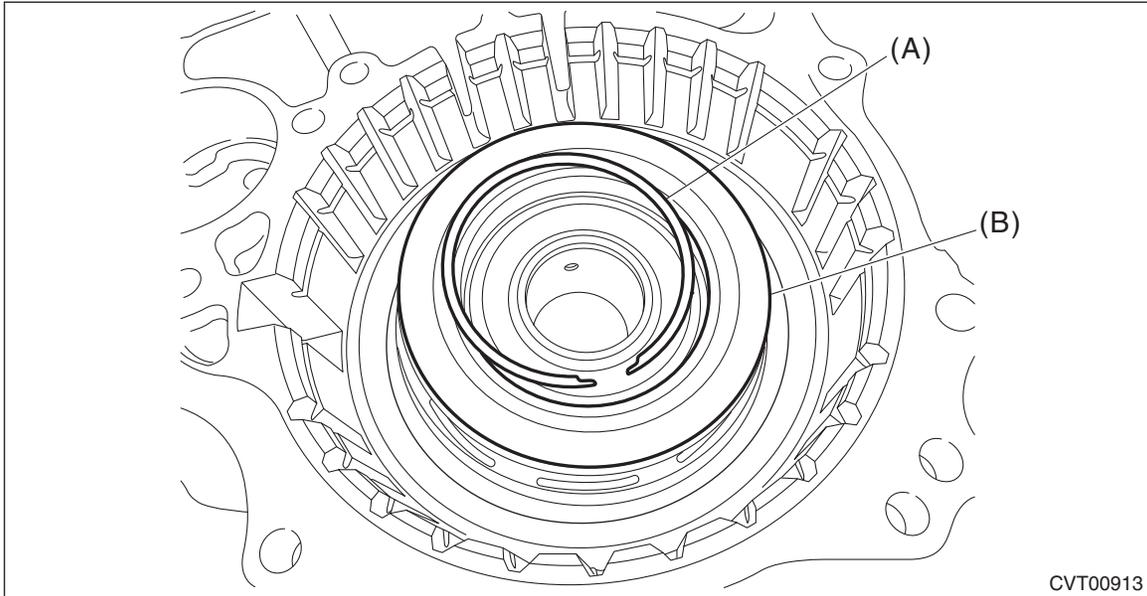


CVT00912

# Reverse Brake Assembly

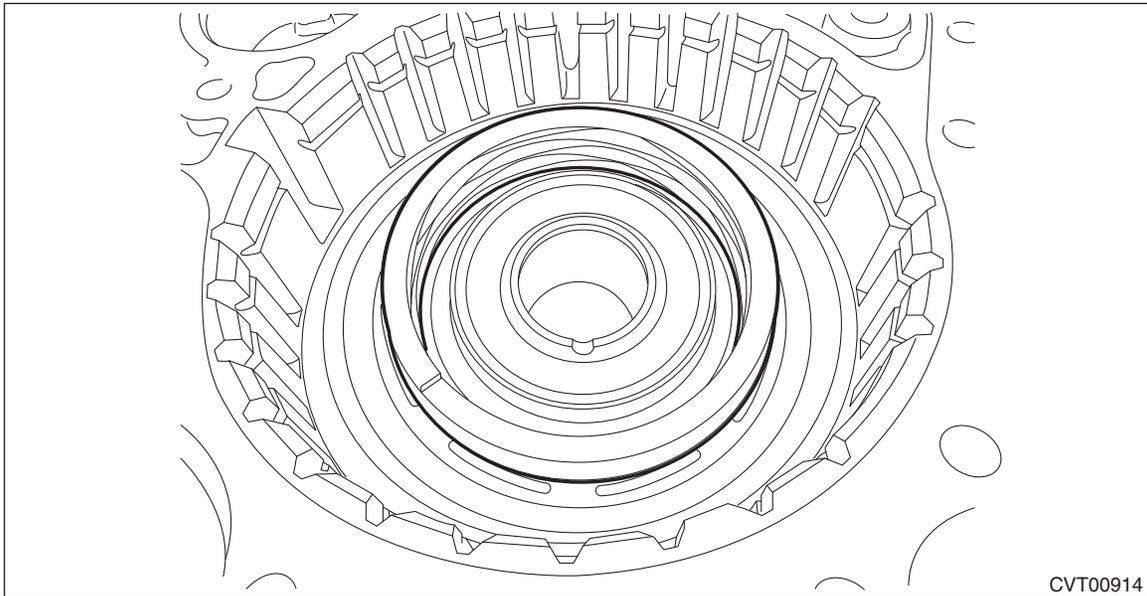
CONTINUOUSLY VARIABLE TRANSMISSION

5) Using the ST, remove the snap ring and spring retainer.



- (A) Snap ring
- (B) Spring retainer

6) Remove the return spring.

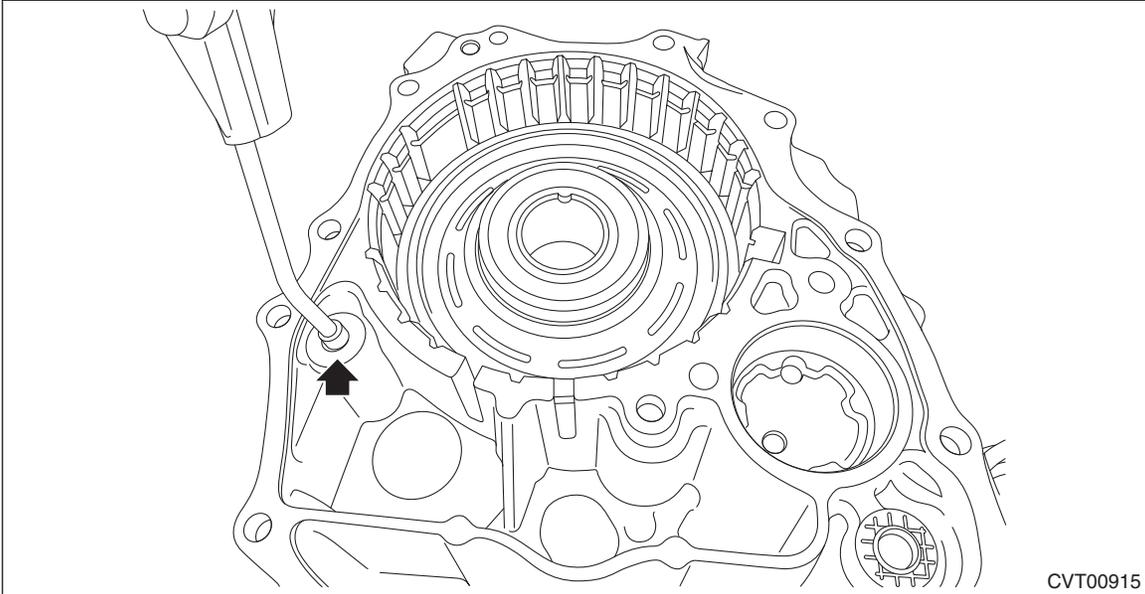


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# Reverse Brake Assembly

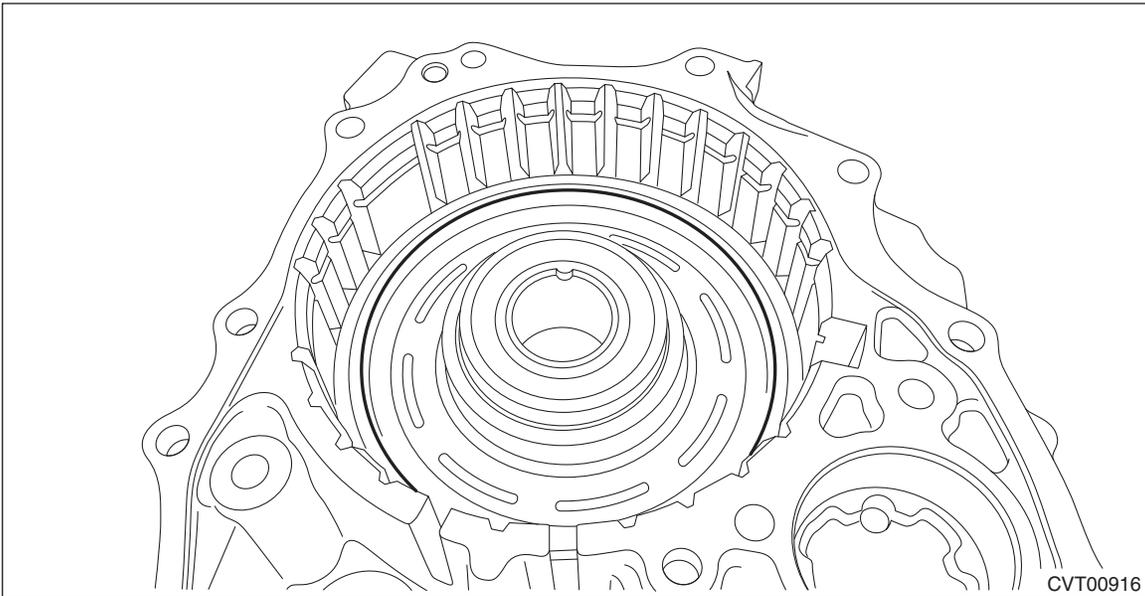
## CONTINUOUSLY VARIABLE TRANSMISSION

7) Remove the reverse brake piston by blowing compressed air intermittently from intermediate case hole.



### D: ASSEMBLY

1) Apply CVTF to the seal of reverse brake piston and install it to intermediate case.

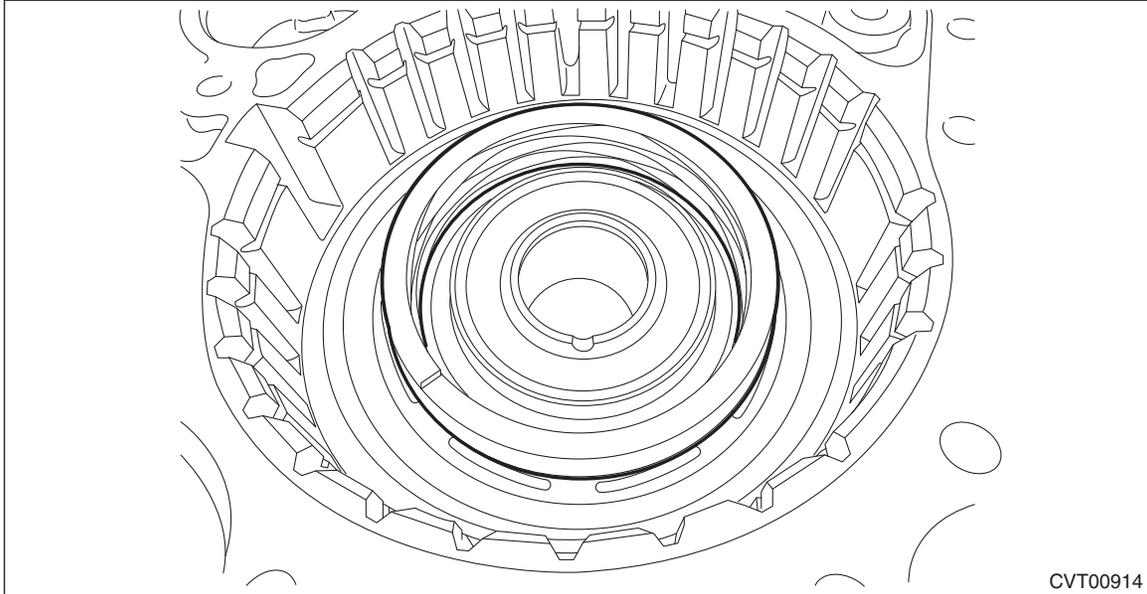


cardiagn.com

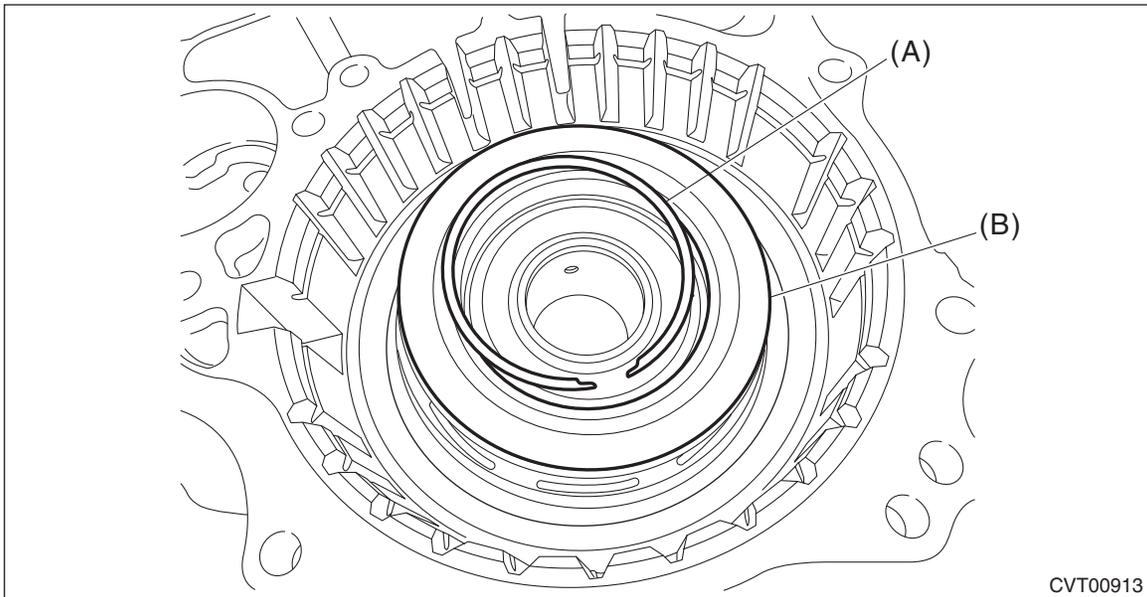
# Reverse Brake Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

2) Install the return spring.



3) Set the spring retainer and snap ring.



- (A) Snap ring
- (B) Spring retainer

# Reverse Brake Assembly

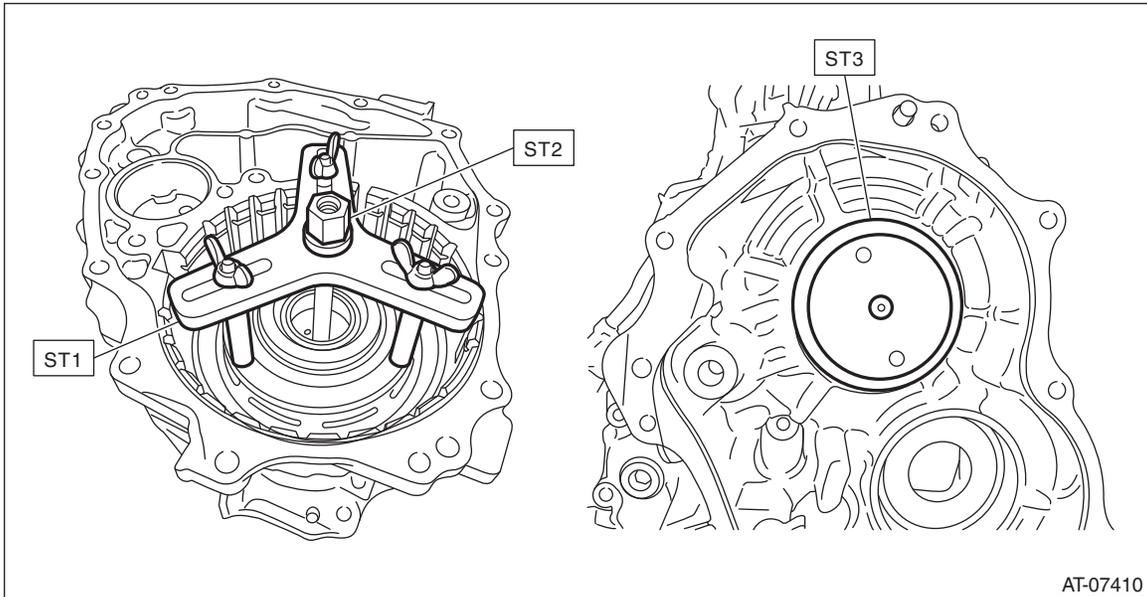
CONTINUOUSLY VARIABLE TRANSMISSION

4) Set the ST1, ST2 and ST3 to intermediate case.

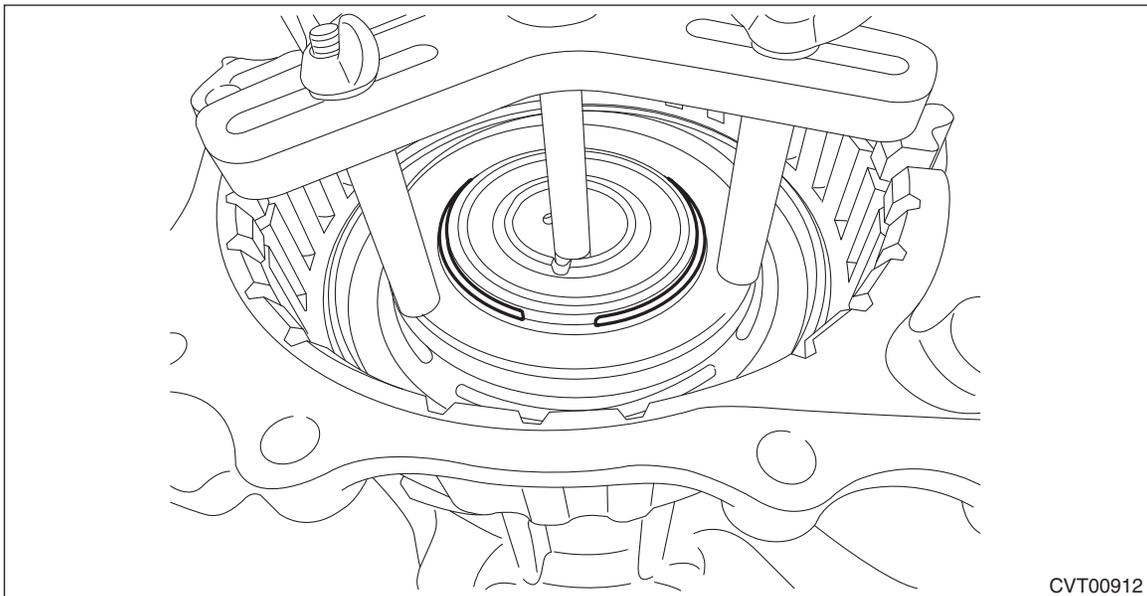
ST1 18762AA001 COMPRESSOR SPECIAL TOOL

ST2 18763AA000 COMPRESSOR SHAFT

ST3 18765AA000 COMPRESSOR SUPPORT



5) Compress the return spring using the ST attached, and install the snap ring.

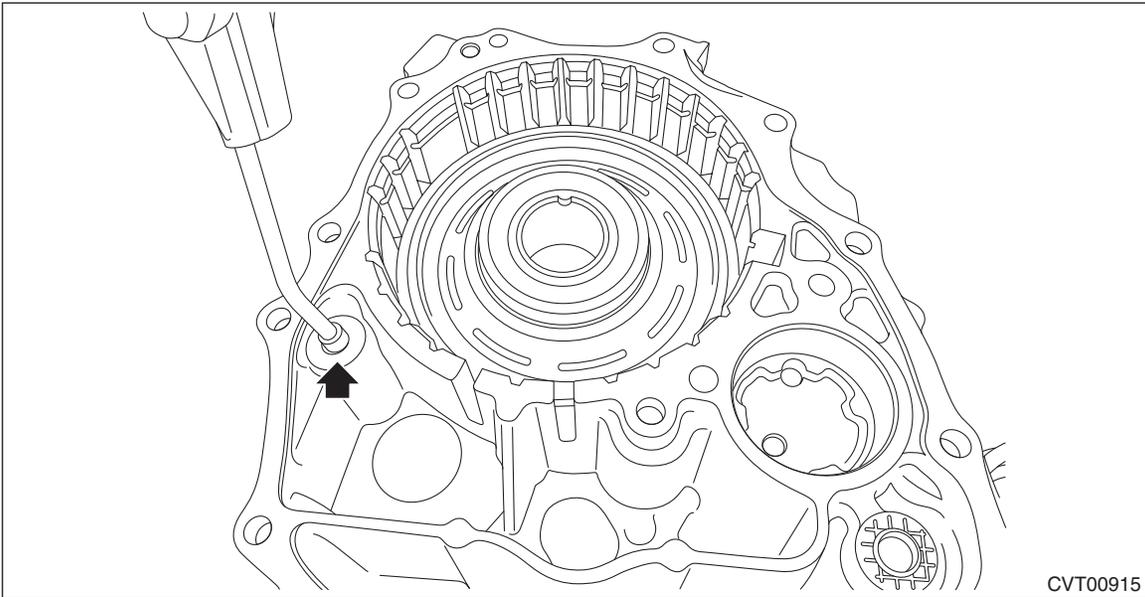


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## Reverse Brake Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

6) Check the operation of reverse brake piston by blowing compressed air intermittently from intermediate case hole.



7) Place the dish plate, driven plate, drive plate and retaining plate neatly in this order on surface table.

8) Set the dial gauge to retaining plate, and read its scale.

### NOTE:

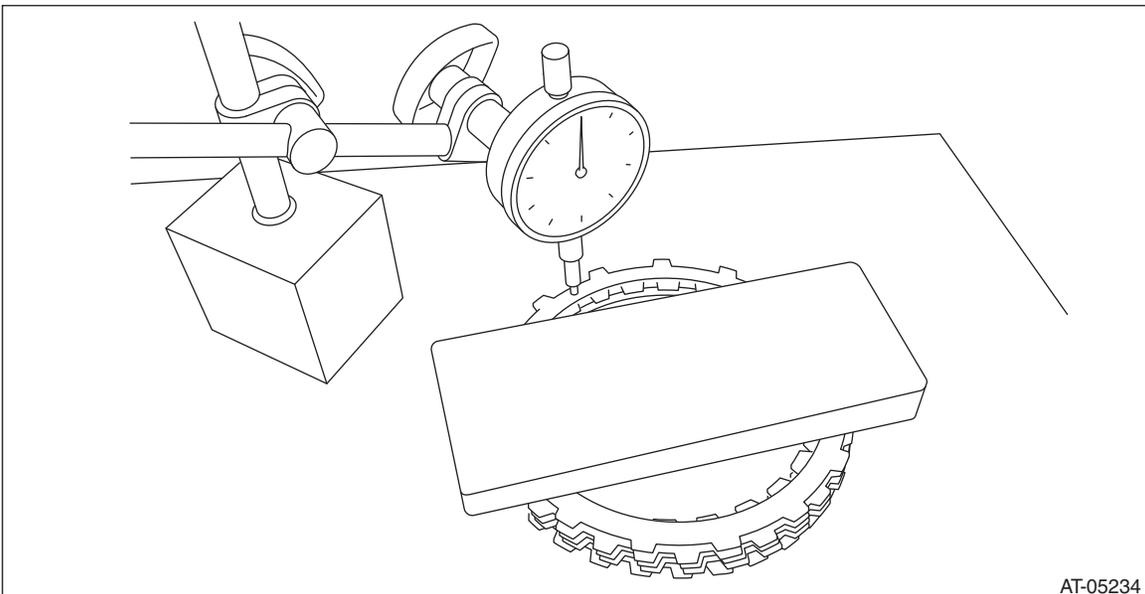
The value, which is read in the gauge at this time, is zero point.

9) Scale and record the weight "Z" of a flat board which will be put on retaining plate.

### NOTE:

- Use a stiff board which does not bend against load as a flat board to be put on retaining plate.
- Use a flat board weighing less than 84 N (8.6 kgf, 18.9 lb).

10) Put the flat board on retaining plate.



11) Using the following formula, read the push/pull gauge and calculate "N".

$$N = 84 \text{ N (8.6 kgf, 18.9 lb)} - Z$$

84 N (8.6 kgf, 18.9 lb): Load applied to clutch plate

Z: Flat board weight

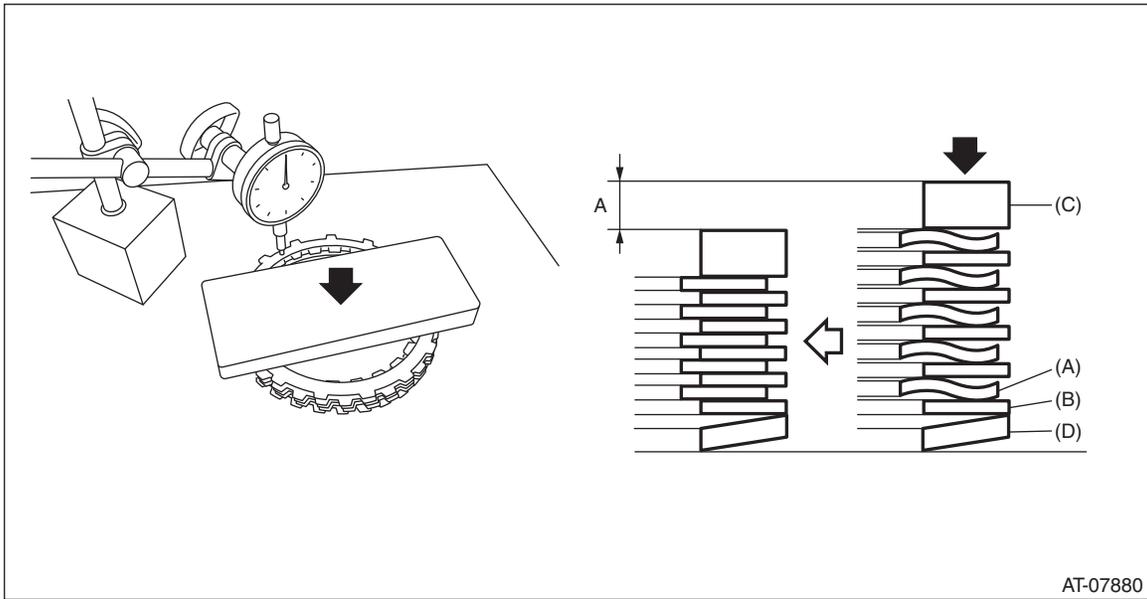
12) Press the center of retaining plate by applying a force of "N" or more using push/pull gauge, and then measure and record the compression amount "A".

# Reverse Brake Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

NOTE:

Measure at four points with a 90° interval and calculate the average.



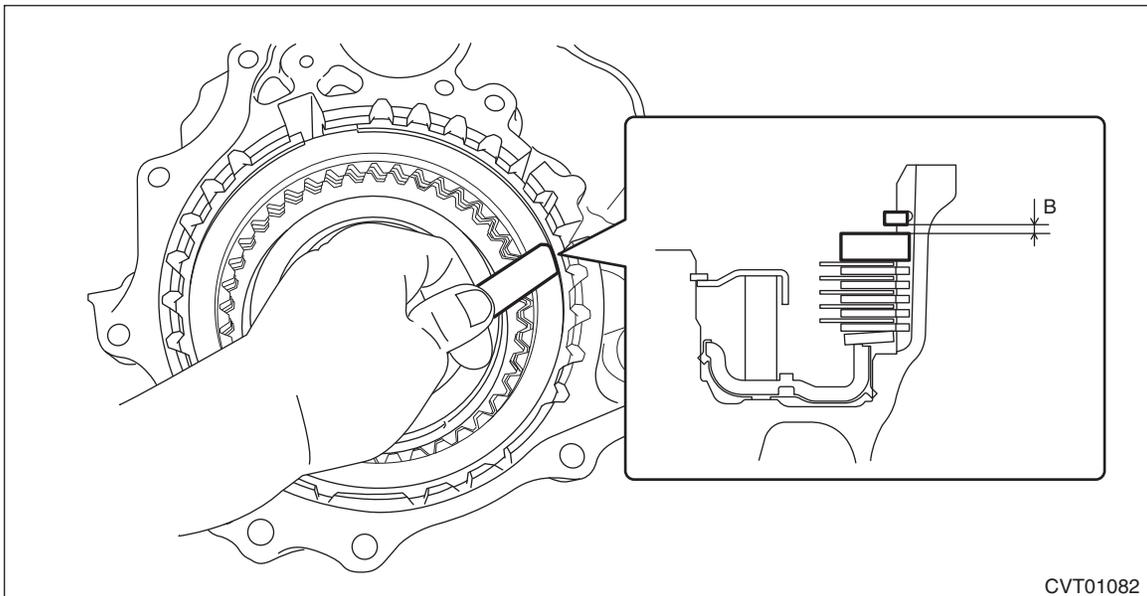
- (A) Drive plate
- (B) Driven plate
- (C) Retaining plate
- (D) Dish plate

13) Install the dish plate, drive plate, driven plate, retaining plate and snap ring to intermediate case.

NOTE:

Install the dish plate in the correct direction.

14) Measure and record the clearance "B" between the retaining plate and snap ring.



# Reverse Brake Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

## 15) Piston stroke calculation

Calculate with A and B dimensions recorded before. If it exceeds the limit, replace with a new drive plate and adjust within the initial standard value.

$$S \text{ mm (in)} = A + B$$

S: Piston stroke

A: Compression amount of drive plate and dish plate

B: Clearance between retaining plate and snap ring

### **Initial standard:**

**2.88 — 3.18 mm (0.113 — 0.125 in)**

### **Limit thickness:**

**3.38 mm (0.133 in)**

Retaining plate	
Part No.	Thickness mm (in)
31567AB920	5.6 (0.220)
31567AB930	5.8 (0.228)
31567AB940	6.0 (0.236)
31567AB950	6.2 (0.244)

## **E: INSPECTION**

- Inspect the drive plate facing for wear and damage.
- Check the driven plate for discoloration (burnt color).
- Check for worn snap ring, fatigue or damaged return spring or deformed spring retainer.
- Make sure the clearance between retaining plate and snap ring of reverse brake is within the limit. If it exceeds the limit, replace with a new drive plate and select and adjust the retaining plate within the initial standard value. <Ref. to CVT(TR690)-200, ASSEMBLY, Reverse Brake Assembly.>

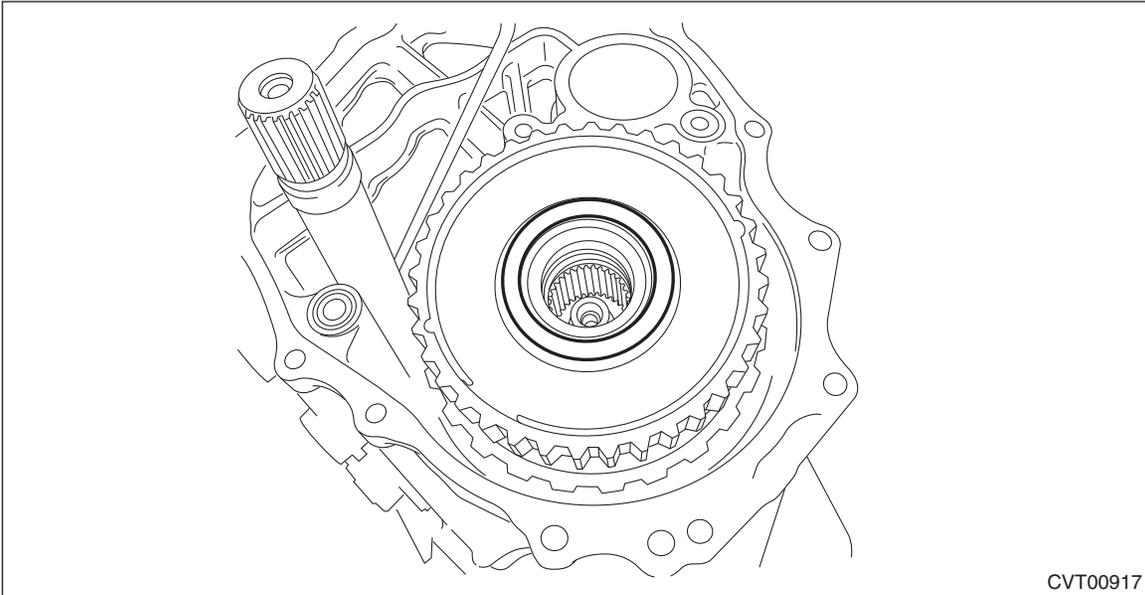
# Forward Clutch Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

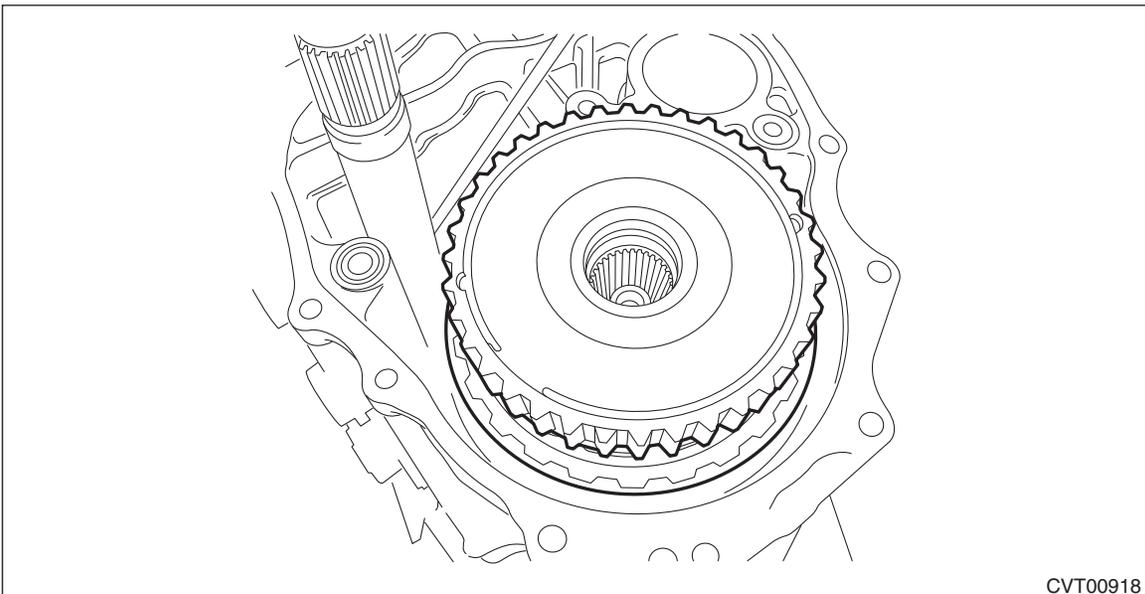
## 38. Forward Clutch Assembly

### A: REMOVAL

- 1) Remove the transmission from the vehicle. <Ref. to CVT(TR690)-59, REMOVAL, Automatic Transmission Assembly.>
- 2) Remove the extension case. <Ref. to CVT(TR690)-164, REMOVAL, Extension Case.>
- 3) Remove the rear drive shaft. <Ref. to CVT(TR690)-167, REMOVAL, Rear Drive Shaft.>
- 4) Remove the transfer clutch assembly. <Ref. to CVT(TR690)-172, REMOVAL, Transfer Clutch.>
- 5) Remove the transfer reduction driven gear. <Ref. to CVT(TR690)-184, REMOVAL, Transfer Reduction Driven Gear.>
- 6) Remove the intermediate case. <Ref. to CVT(TR690)-191, REMOVAL, Intermediate Case.>
- 7) Remove the thrust needle bearing.



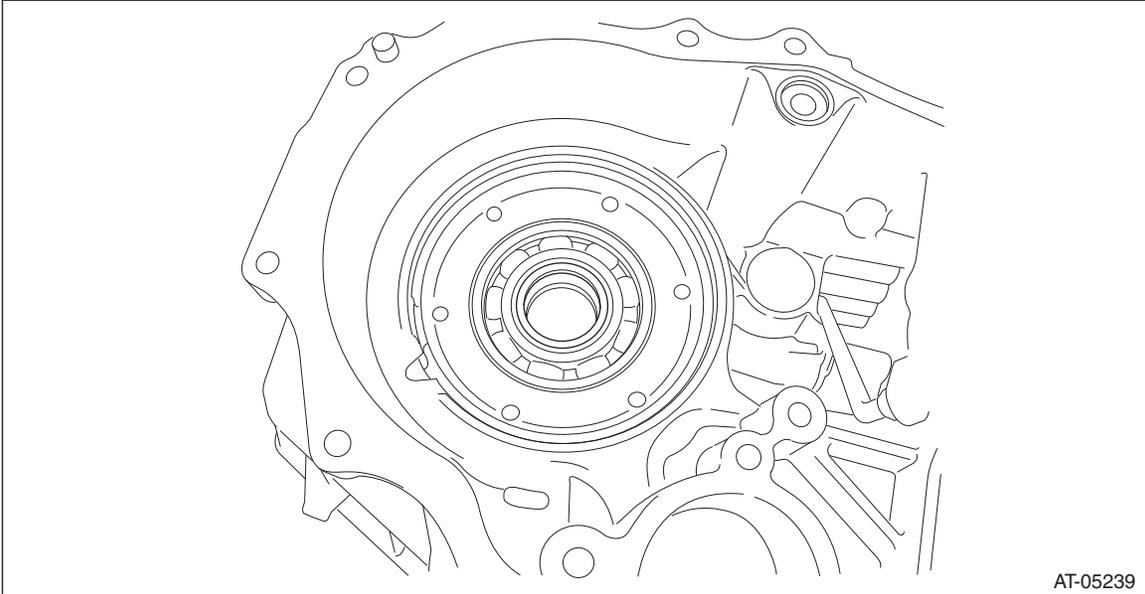
- 8) Remove the forward clutch assembly.



# Forward Clutch Assembly

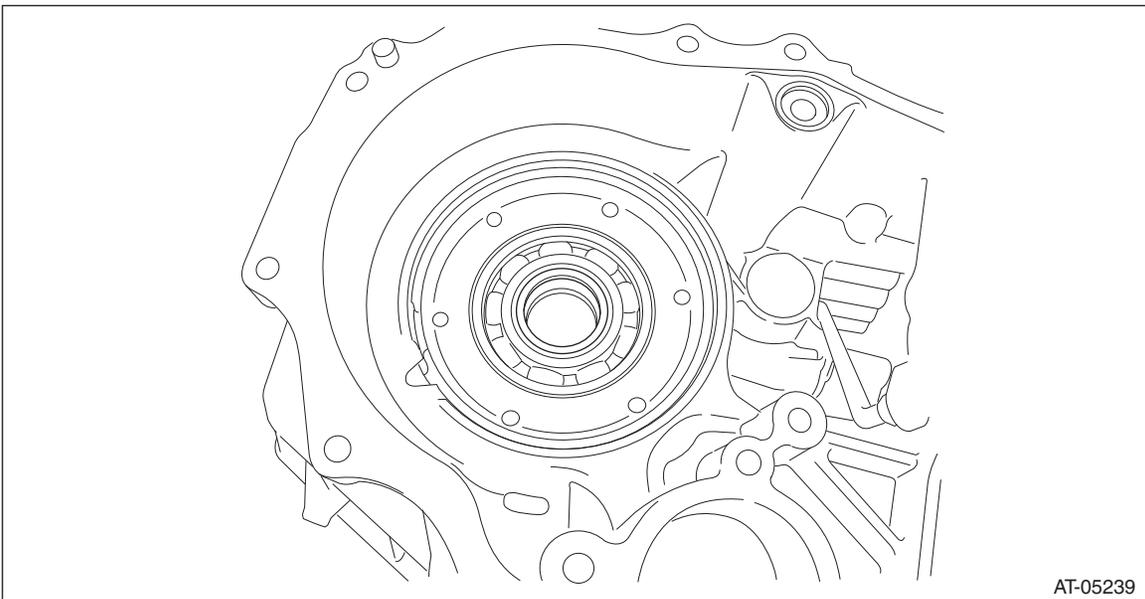
CONTINUOUSLY VARIABLE TRANSMISSION

9) Remove the washer.



## B: INSTALLATION

- 1) Select a washer. <Ref. to CVT(TR690)-233, ADJUSTMENT, Forward Clutch Assembly.>
- 2) Install the selected washer.

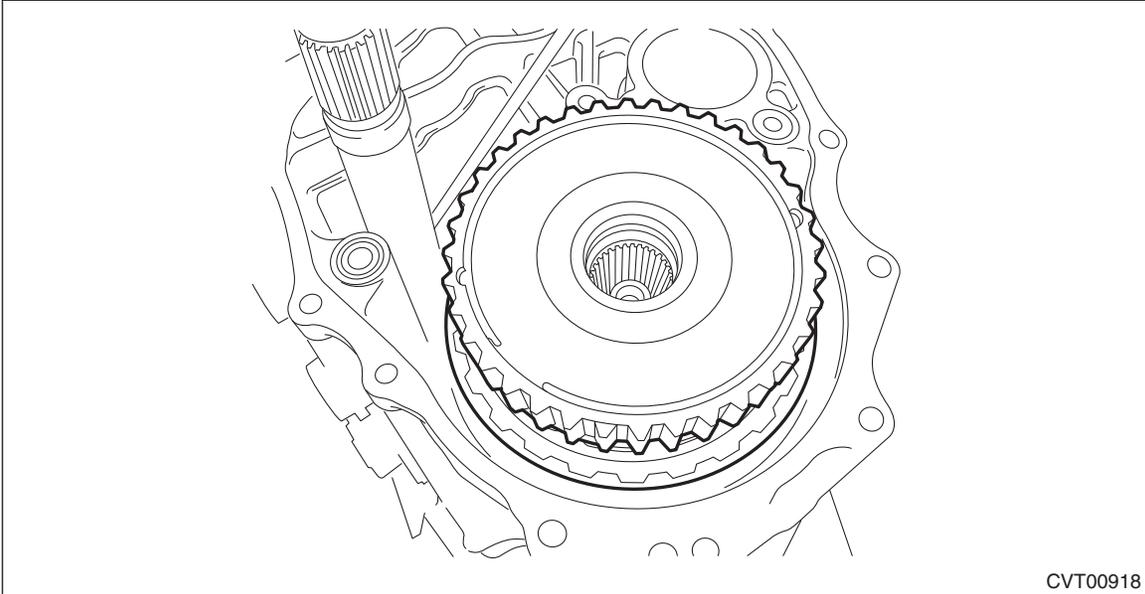


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# Forward Clutch Assembly

## CONTINUOUSLY VARIABLE TRANSMISSION

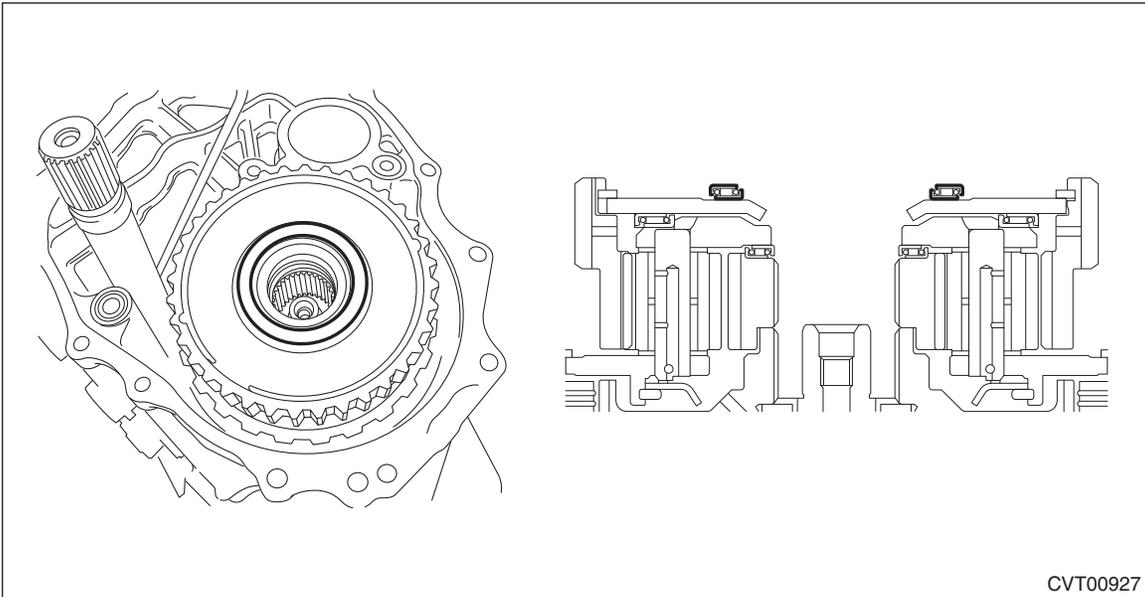
3) Install the forward clutch assembly.



4) Install the thrust needle bearing.

**NOTE:**

Install the thrust needle bearing in the correct direction.



5) Install the intermediate case. <Ref. to CVT(TR690)-192, INSTALLATION, Intermediate Case.>

6) Install the transfer reduction driven gear assembly. <Ref. to CVT(TR690)-184, INSTALLATION, Transfer Reduction Driven Gear.>

7) Install the transfer clutch assembly. <Ref. to CVT(TR690)-173, INSTALLATION, Transfer Clutch.>

8) Install the rear drive shaft. <Ref. to CVT(TR690)-167, INSTALLATION, Rear Drive Shaft.>

9) Install the extension case. <Ref. to CVT(TR690)-164, INSTALLATION, Extension Case.>

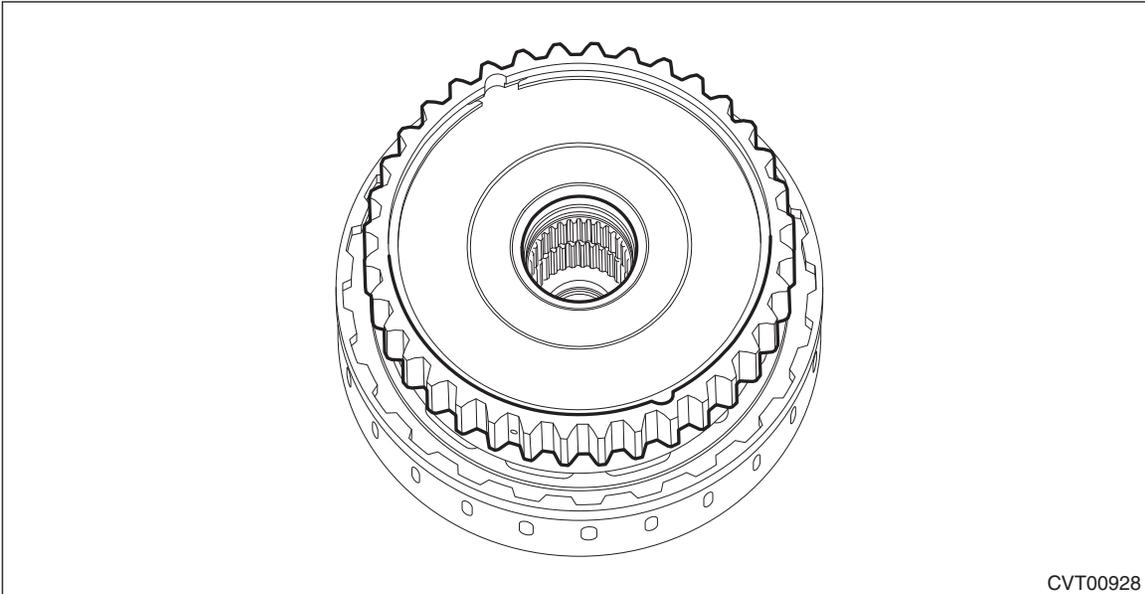
10) Install the transmission to vehicle. <Ref. to CVT(TR690)-77, INSTALLATION, Automatic Transmission Assembly.>

# Forward Clutch Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

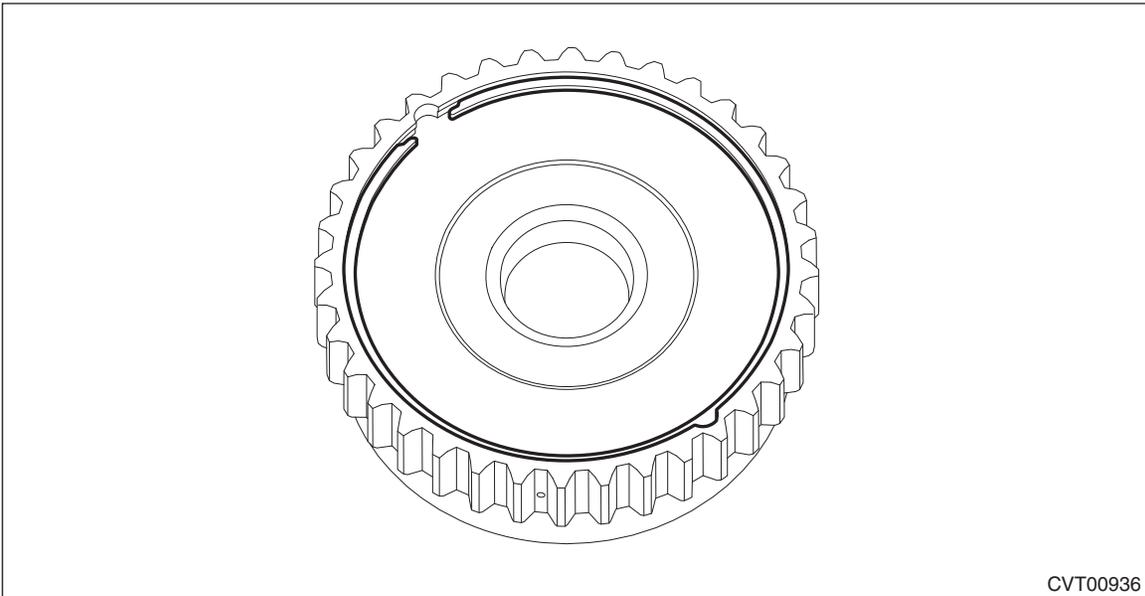
## C: DISASSEMBLY

- 1) Remove the internal gear assembly.



CVT00928

- 2) Remove the snap ring from the internal gear assembly.



CVT00936

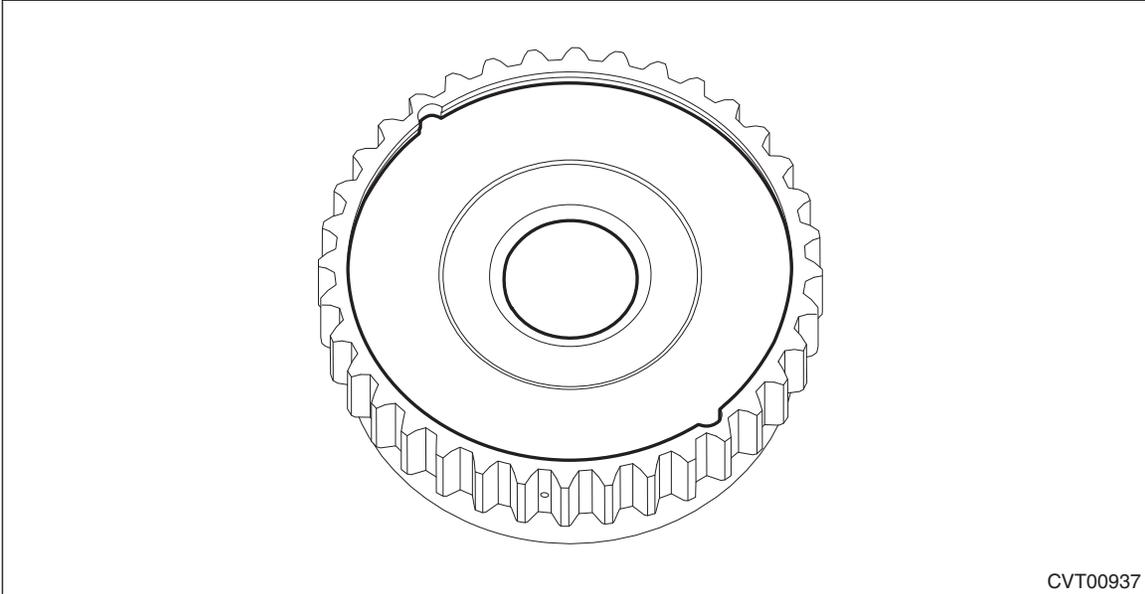
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# Forward Clutch Assembly

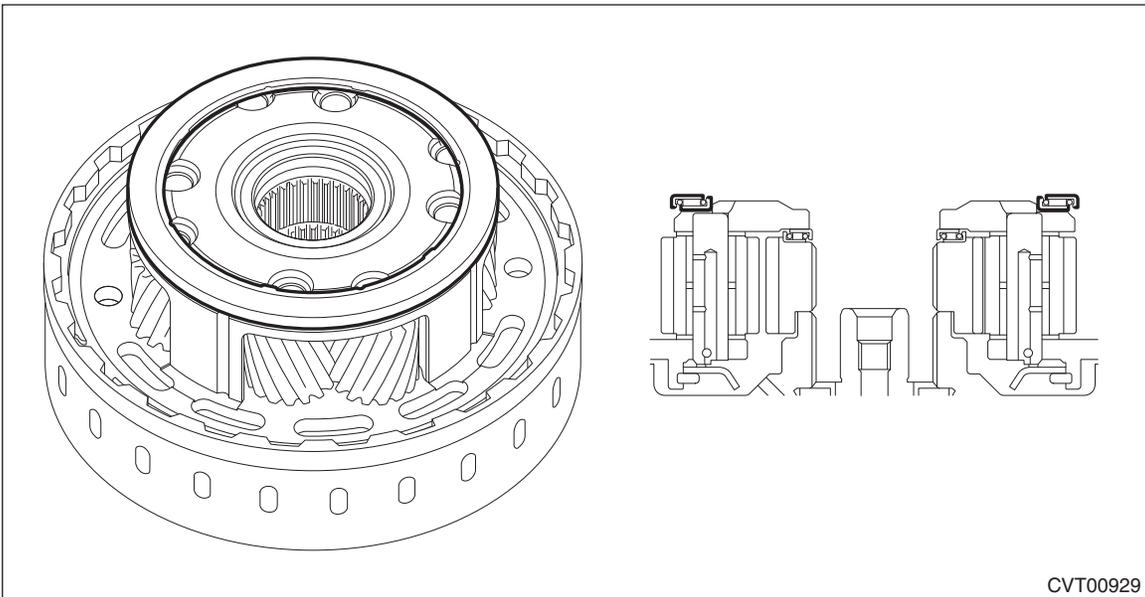
CONTINUOUSLY VARIABLE TRANSMISSION

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3) Remove the thrust gear plate.



4) Remove the thrust needle bearing.

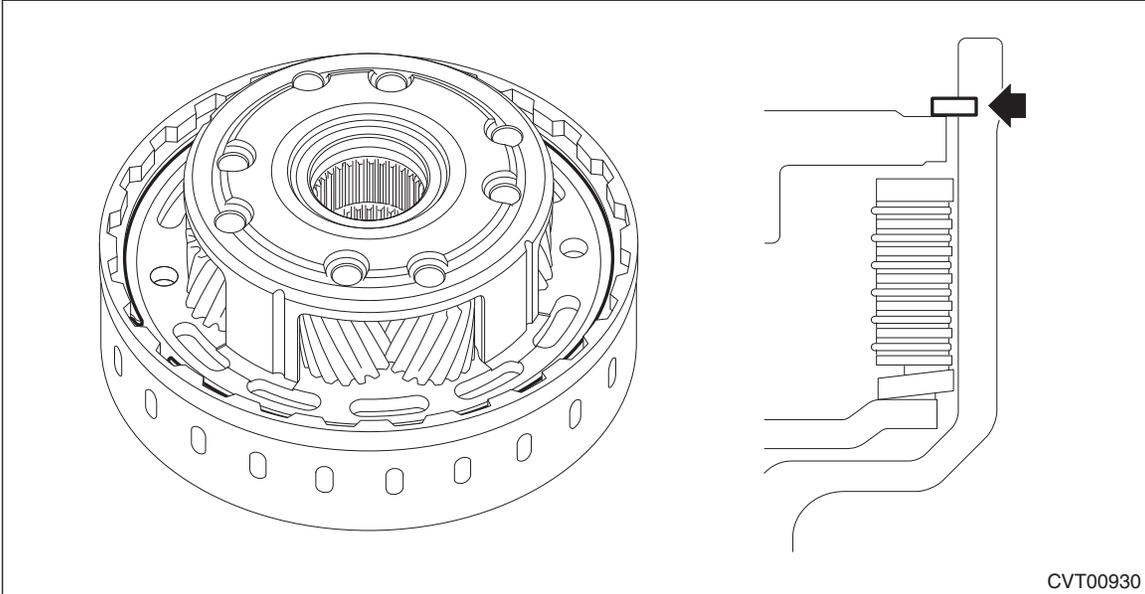


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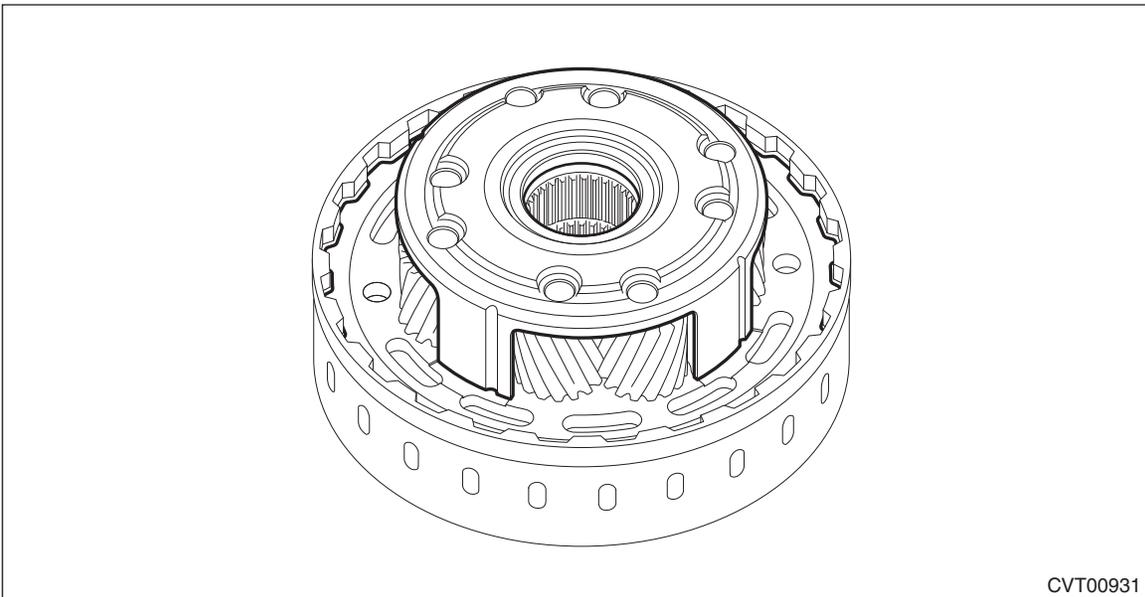
# Forward Clutch Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

5) Remove the snap ring.



6) Remove the planetary carrier assembly.

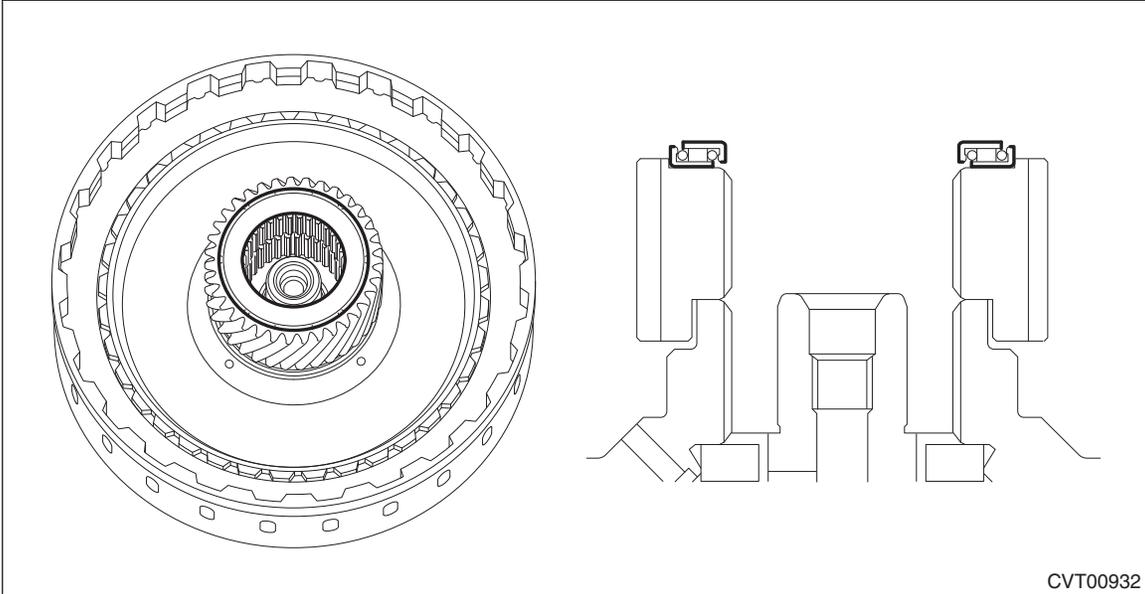


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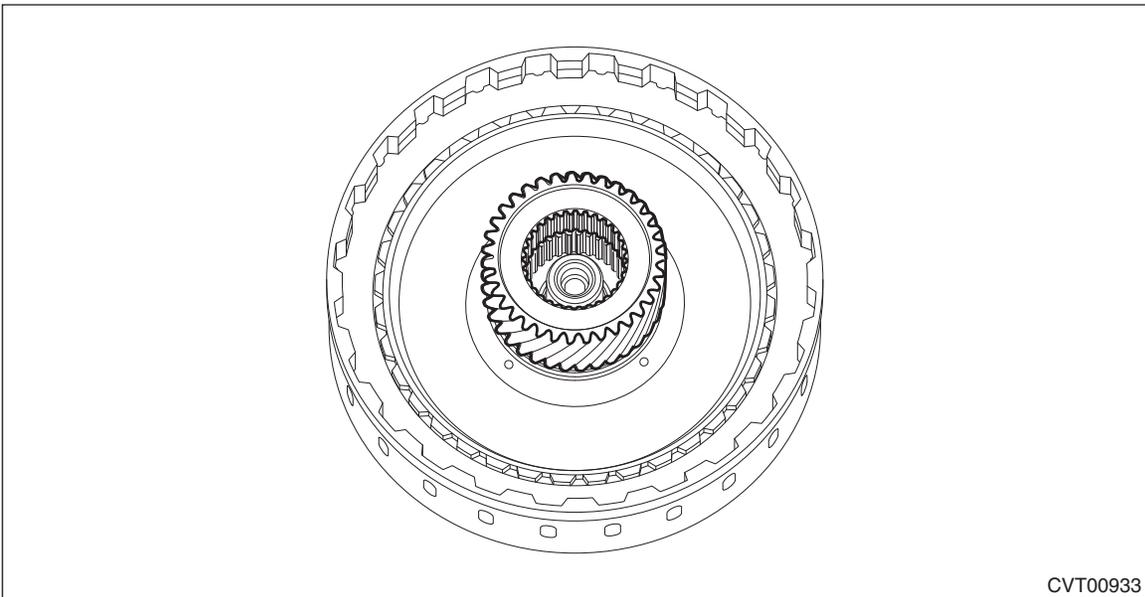
# Forward Clutch Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

7) Remove the thrust needle bearing.



8) Remove the sun gear.

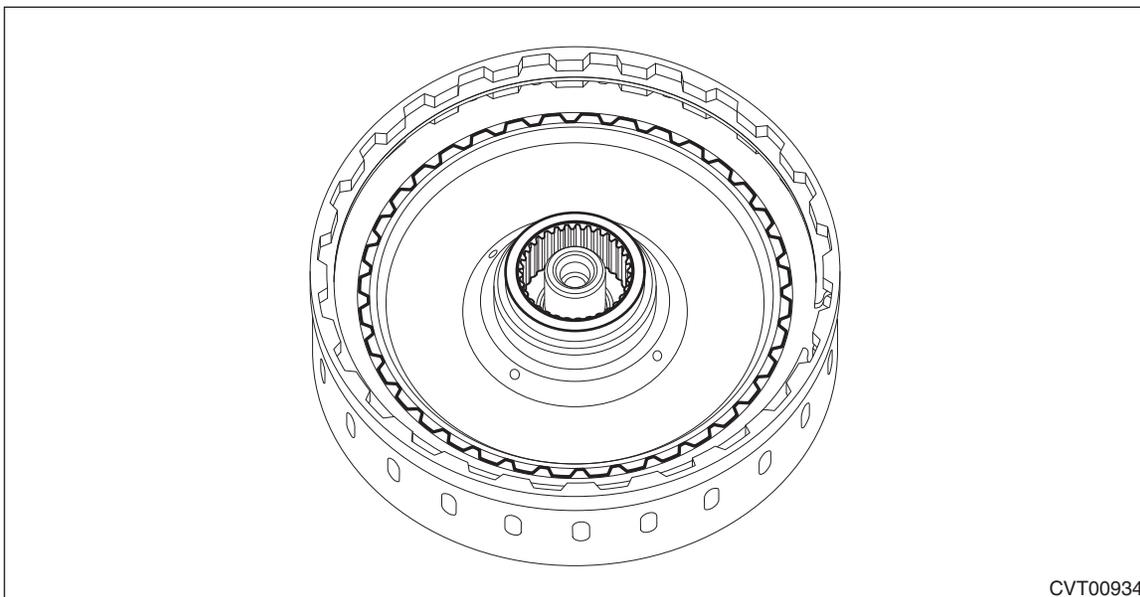


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# Forward Clutch Assembly

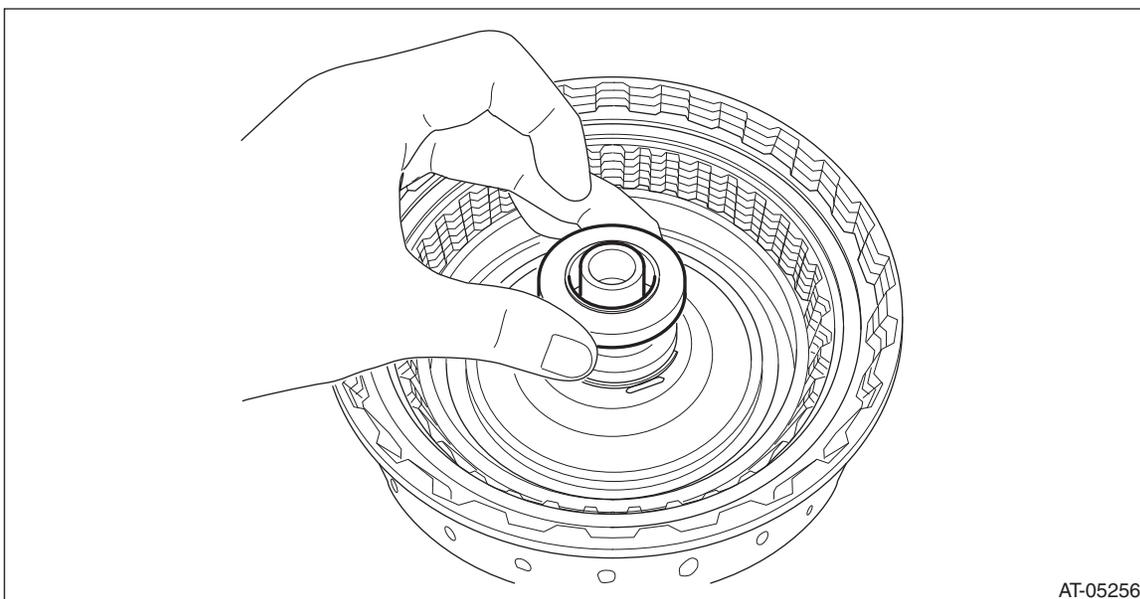
CONTINUOUSLY VARIABLE TRANSMISSION

9) Remove the forward clutch hub.



CVT00934

10) Remove the washer.



AT-05256

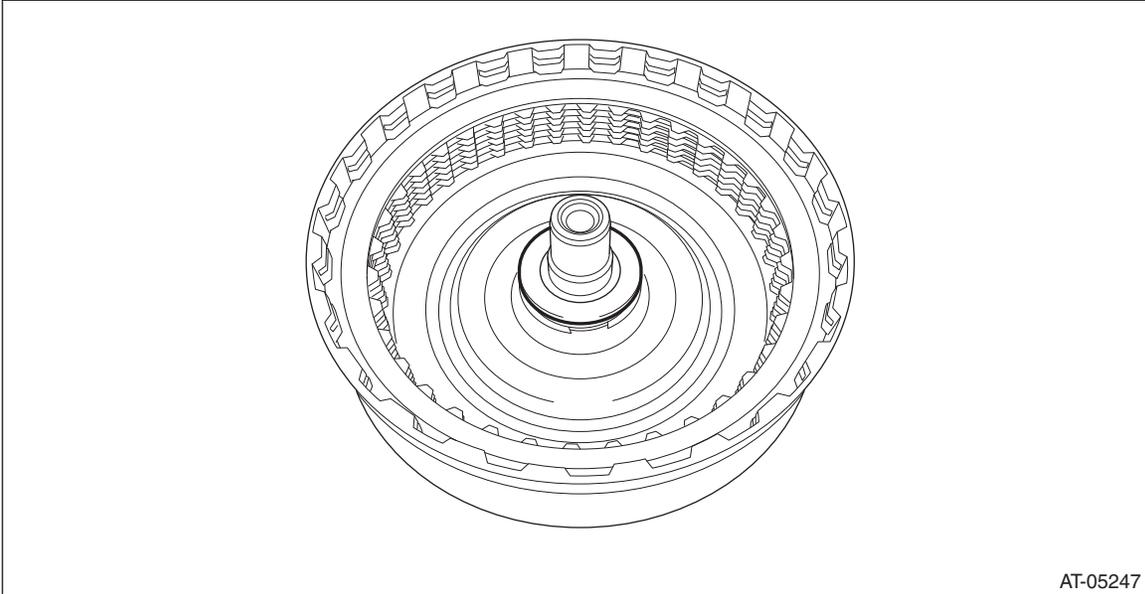
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# Forward Clutch Assembly

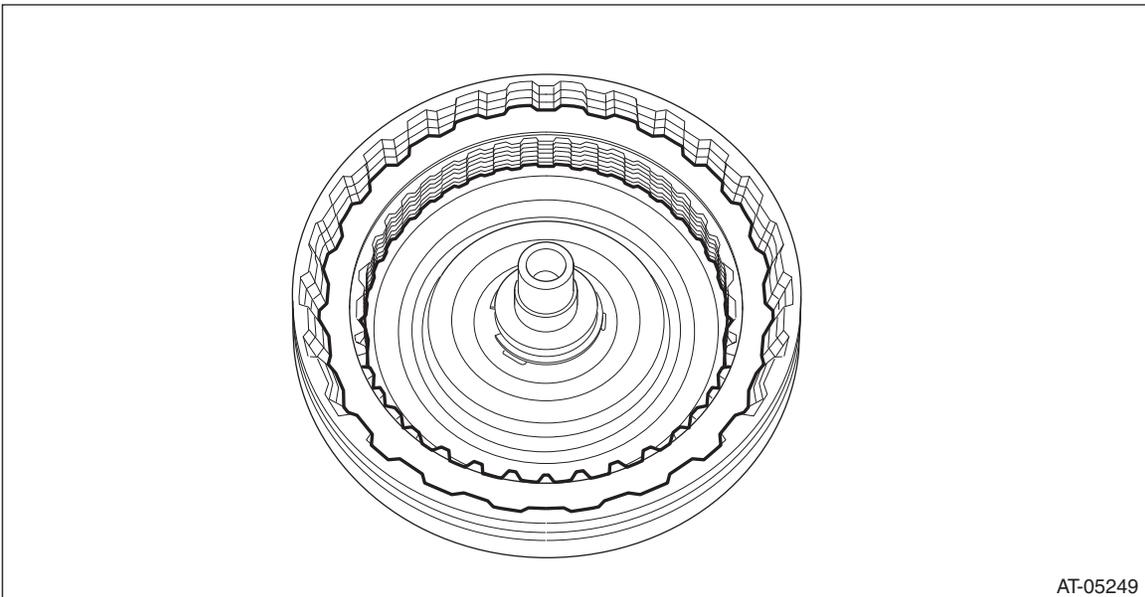
CONTINUOUSLY VARIABLE TRANSMISSION

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11) Remove the thrust needle bearing.



12) Remove the retaining plate, drive plate, driven plate and dish plate.



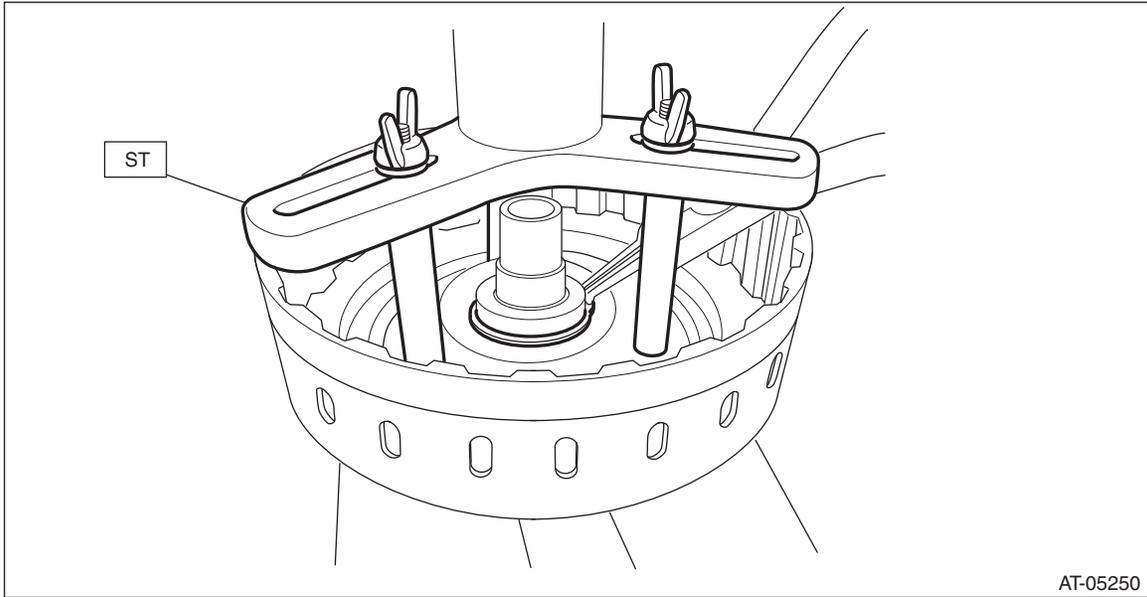
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# Forward Clutch Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

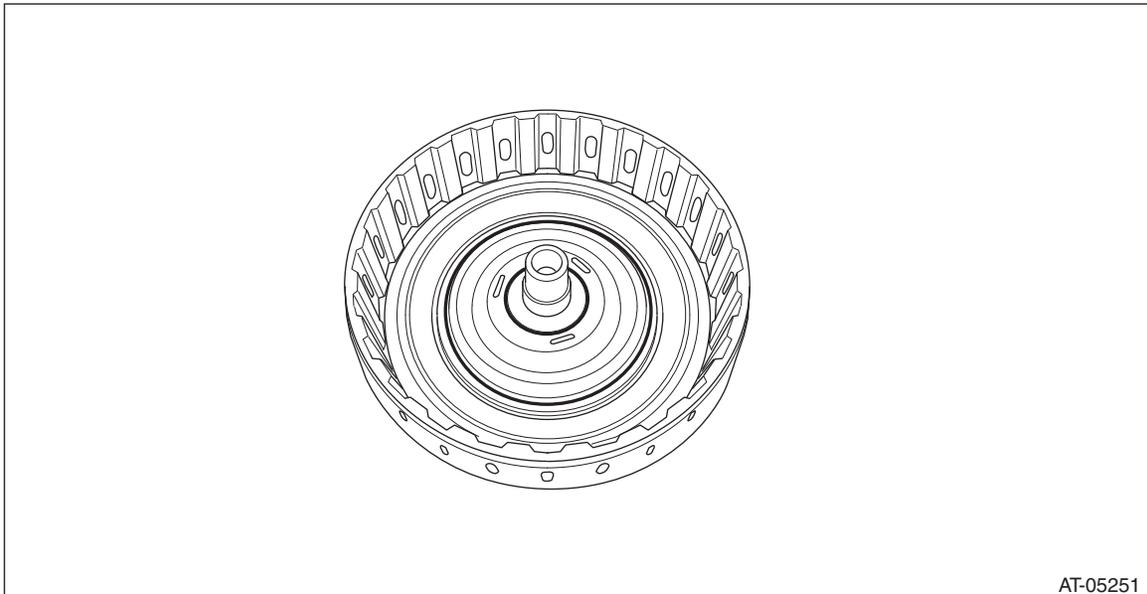
13) Using the ST, remove the snap ring.

ST 18762AA001 COMPRESSOR SPECIAL TOOL



AT-05250

14) Remove the forward clutch piston retainer.



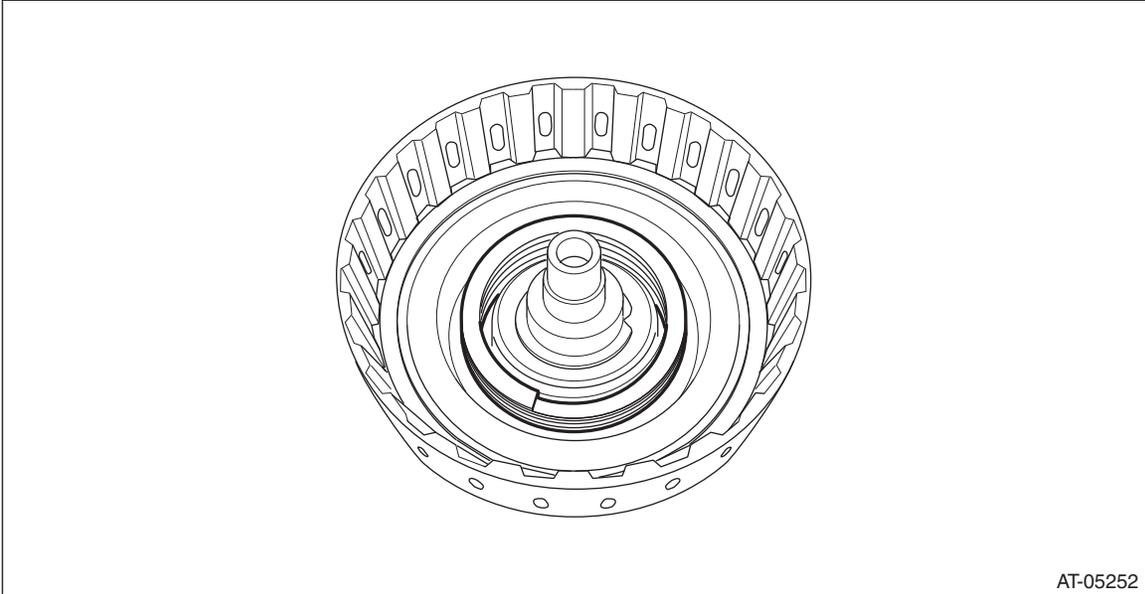
AT-05251

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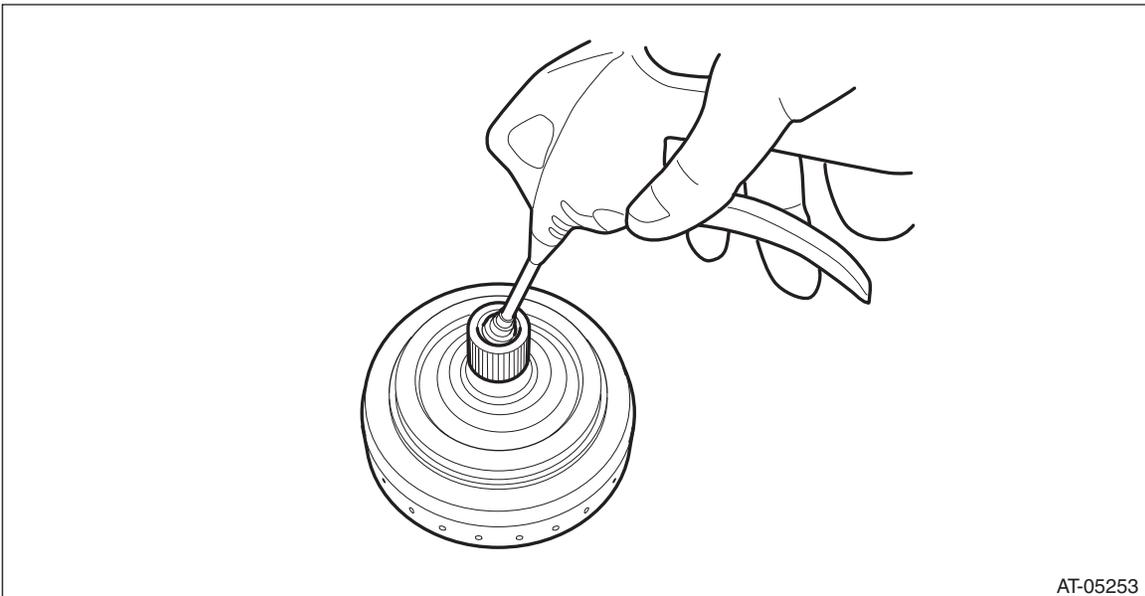
# Forward Clutch Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

15) Remove the return spring.



16) Remove the forward clutch piston by blowing compressed air intermittently from the end of forward clutch drum.



## D: ASSEMBLY

1) Install the forward clutch piston to forward clutch drum.

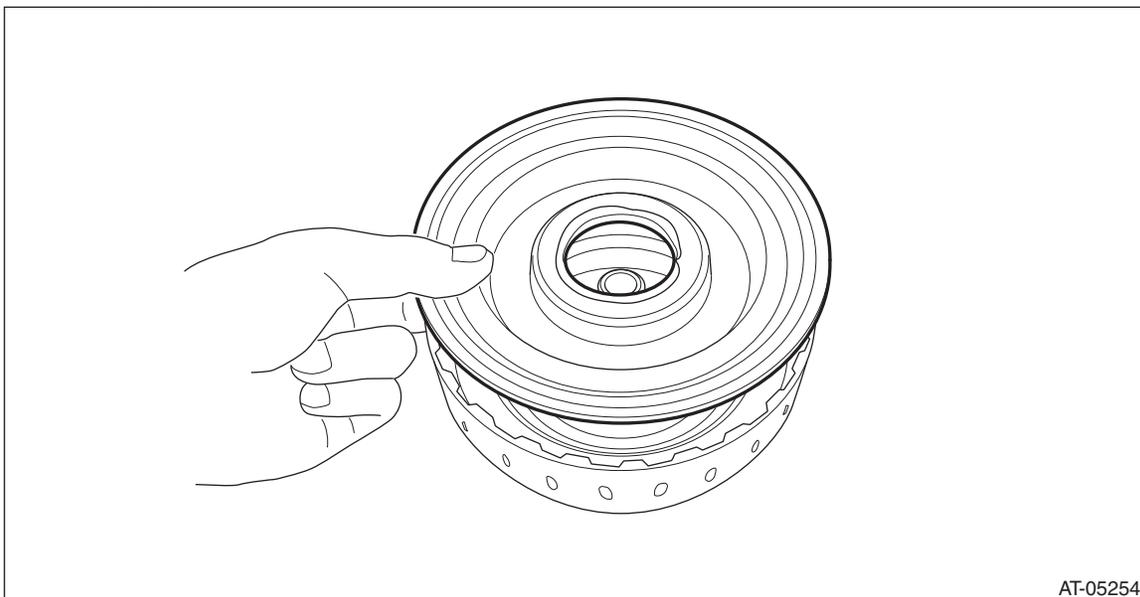
NOTE:

- Apply CVTF to the seal of forward clutch piston.

# Forward Clutch Assembly

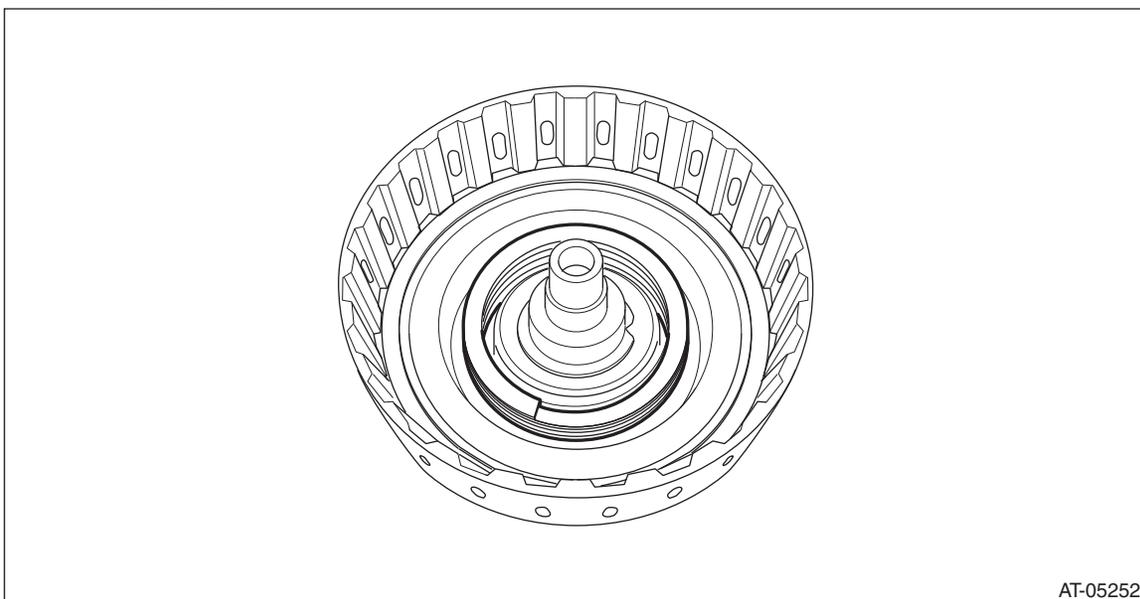
CONTINUOUSLY VARIABLE TRANSMISSION

- Insert it all the way to the end.



AT-05254

- 2) Install the return spring.



AT-05252

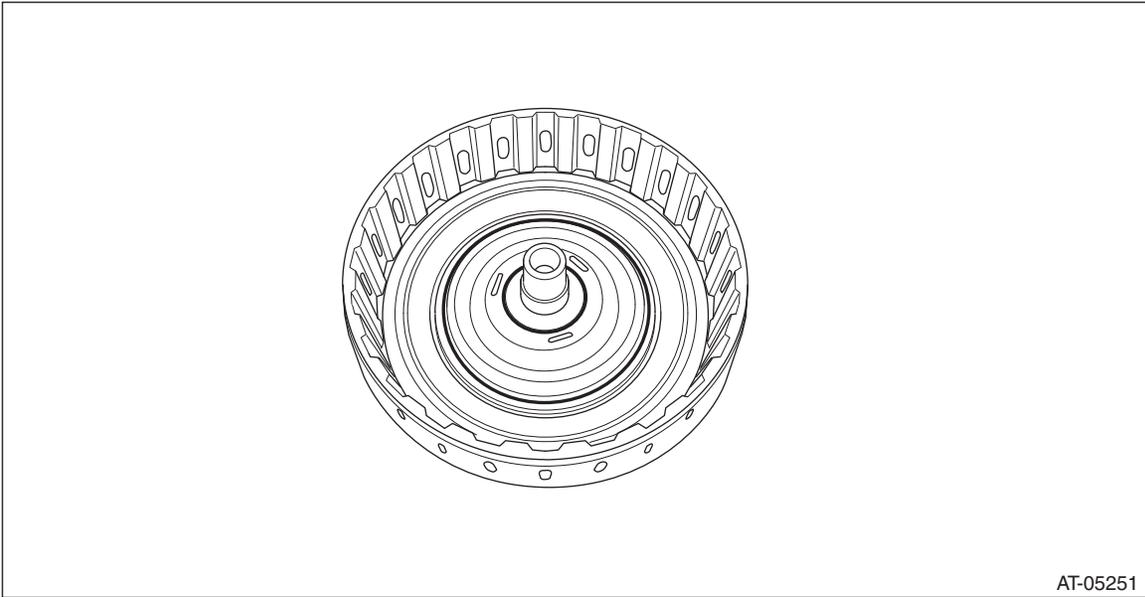
- 3) Install the forward clutch piston retainer.

# Forward Clutch Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

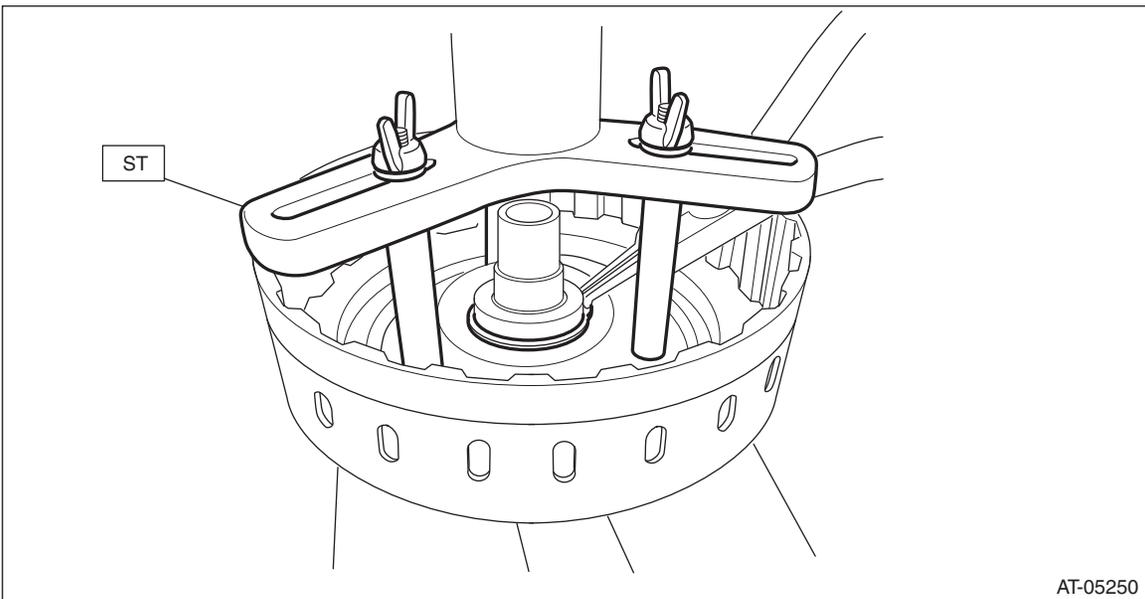
NOTE:

Apply CVTF to the sealing portion of the forward clutch piston retainer.



AT-05251

- 4) Compress the return spring using the ST to install the snap ring.  
ST 18762AA001 COMPRESSOR SPECIAL TOOL



AT-05250

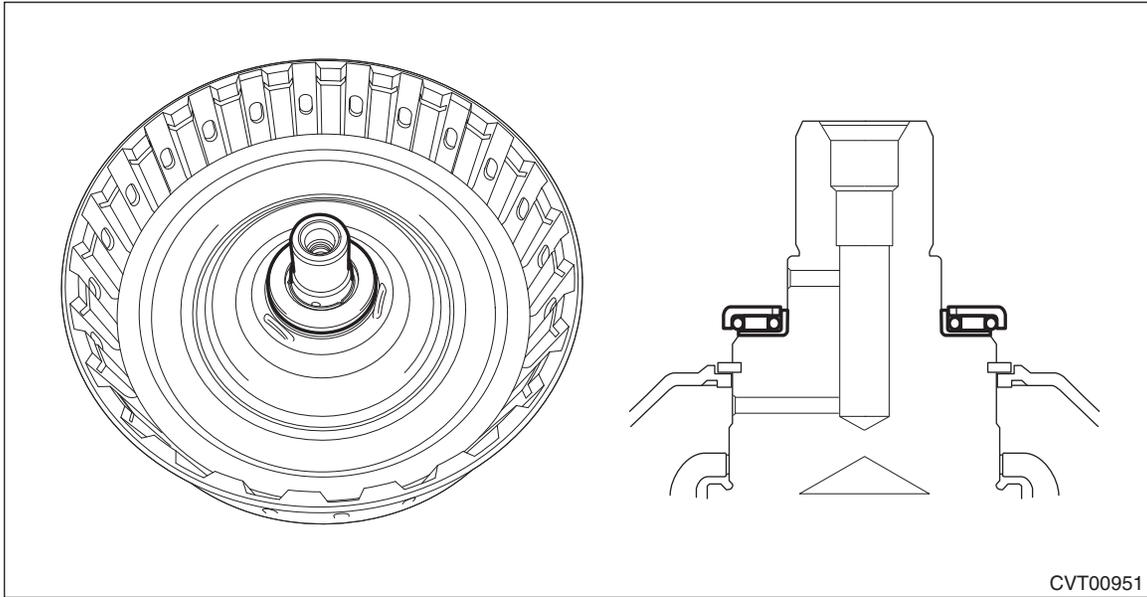
- 5) Install the thrust needle bearing.

# Forward Clutch Assembly

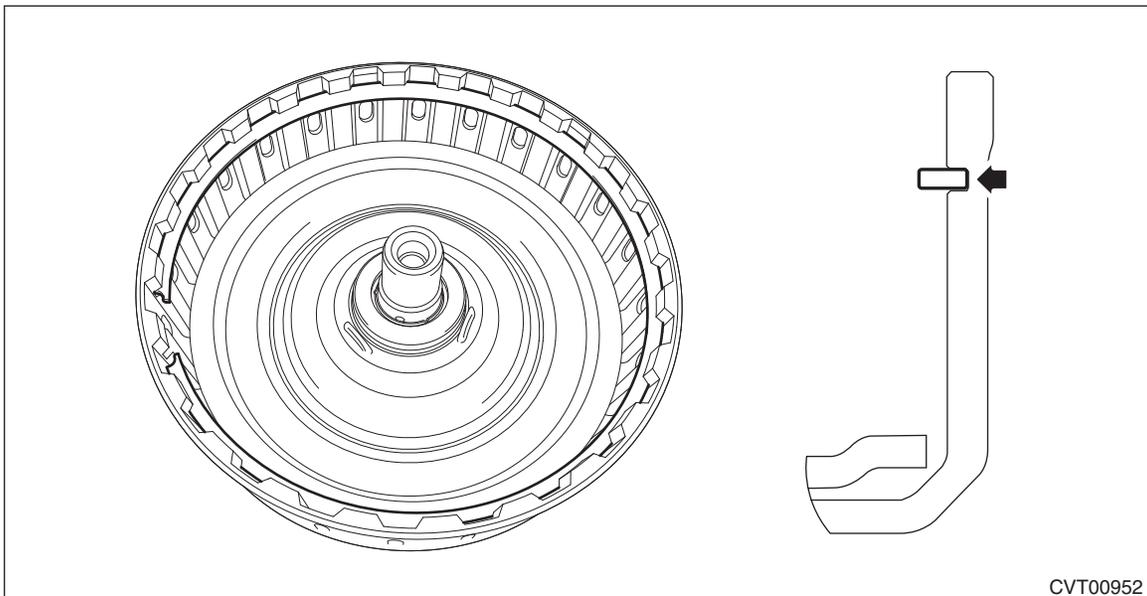
CONTINUOUSLY VARIABLE TRANSMISSION

**NOTE:**

Install the thrust needle bearing in the correct direction.



6) Install the snap ring.



7) Measure the height "A" from the ST end surface to the snap ring of forward clutch drum using the ST on the surface plate.

**NOTE:**

- Measure while lifting the snap ring.

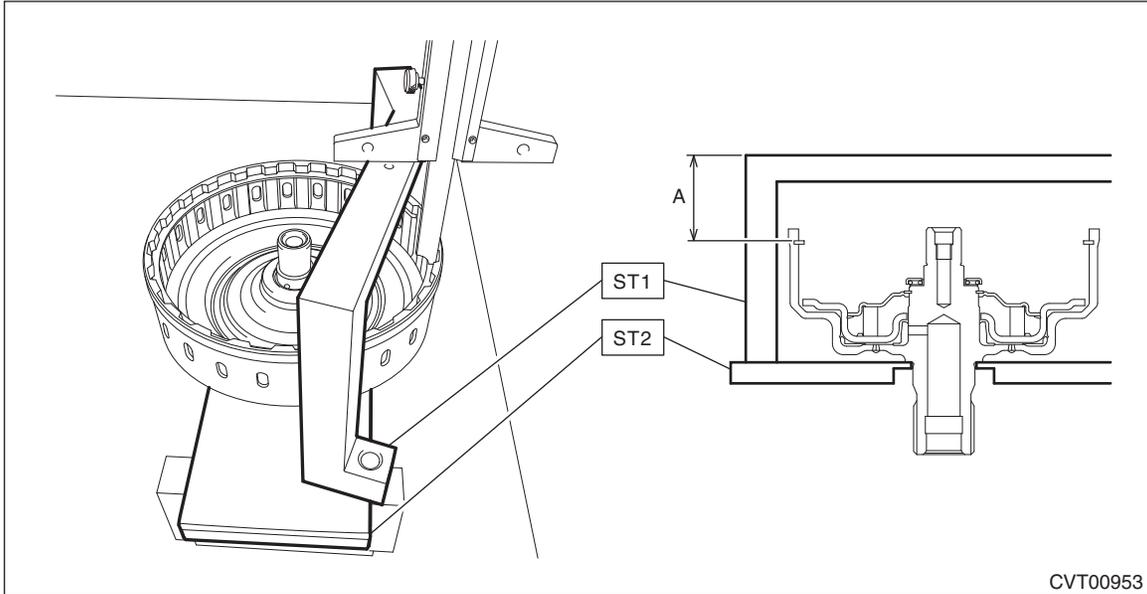
# Forward Clutch Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

- Place the measurement tool at the dent on ST upper side to measure.

ST1 499737100 PULLER SET

ST2 499575600 GAUGE



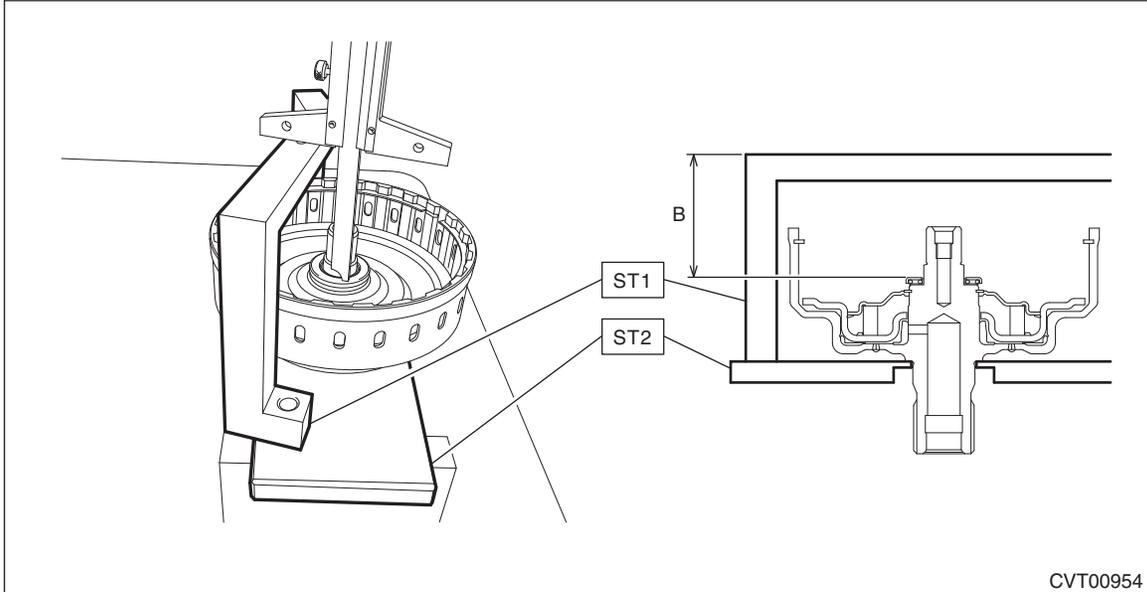
- 8) Measure height "B" from the ST end surface to the thrust needle bearing using the ST.

NOTE:

Place the measurement tool at the dent on ST upper side to measure.

ST1 499737100 PULLER SET

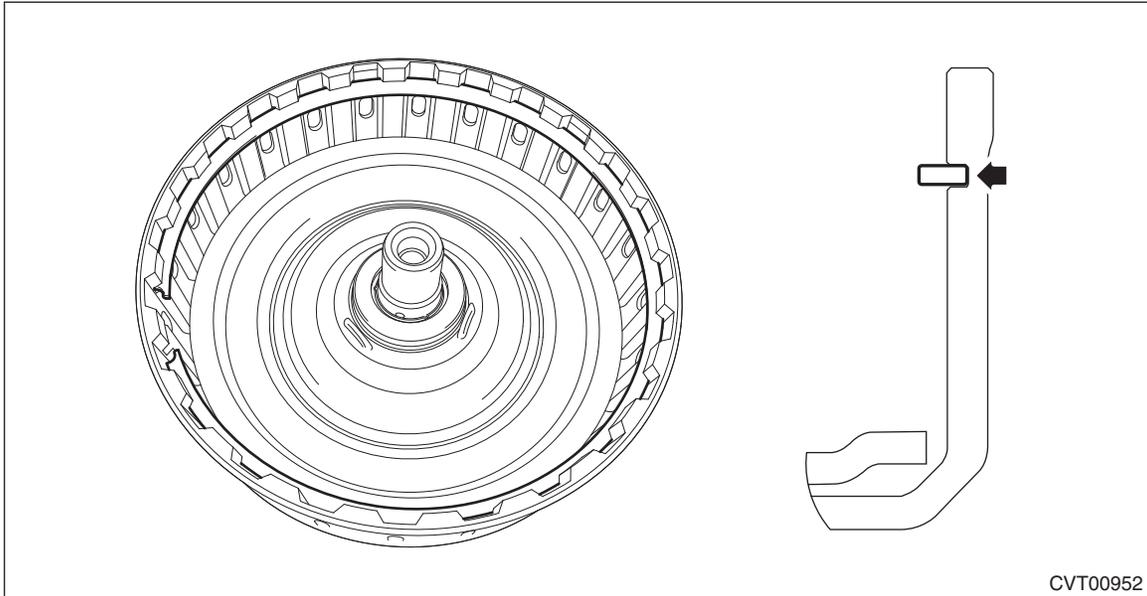
ST2 499575600 GAUGE



# Forward Clutch Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

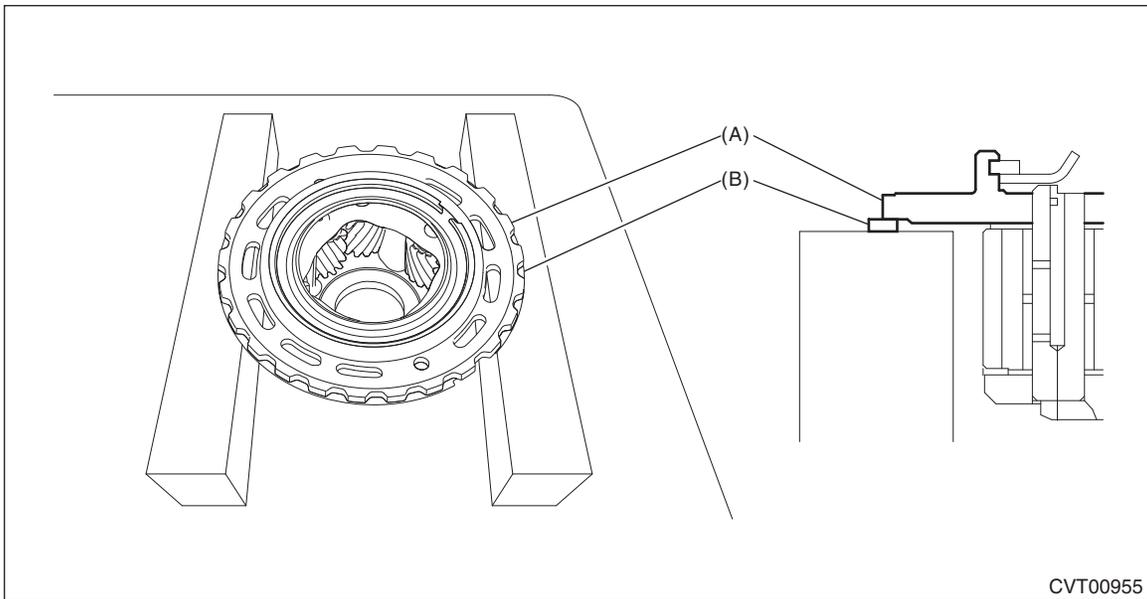
9) Remove the snap ring.



10) Place flat boards on the surface plate, and place the snap ring and then planetary carrier assembly overlapping neatly.

**NOTE:**

Carefully place them so that the most outer finished surface of planetary carrier assembly overlaps the snap ring.



- (A) Planetary carrier ASSY
- (B) Snap ring

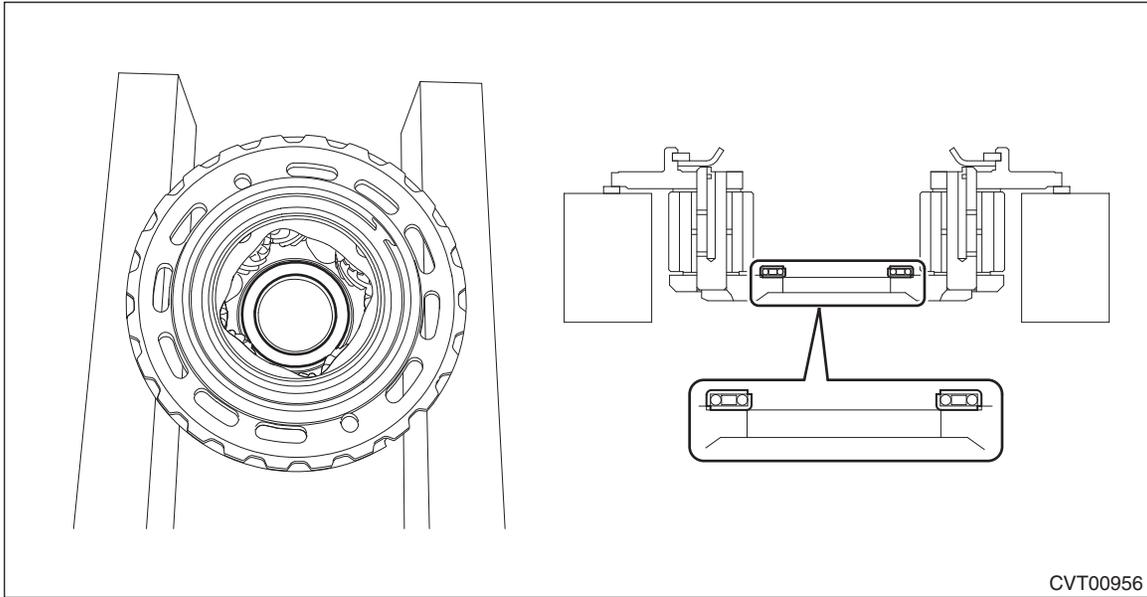
11) Install the thrust needle bearing.

# Forward Clutch Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

NOTE:

Make sure to install in the right direction.

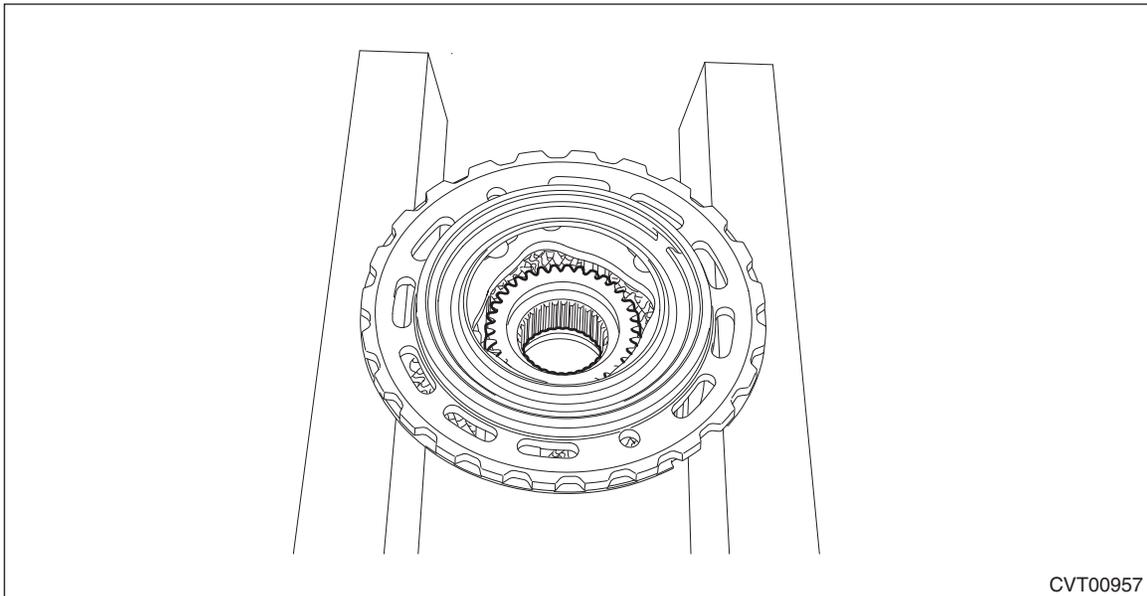


CVT00956

12) Install the sun gear.

NOTE:

Make sure to install in the right direction.



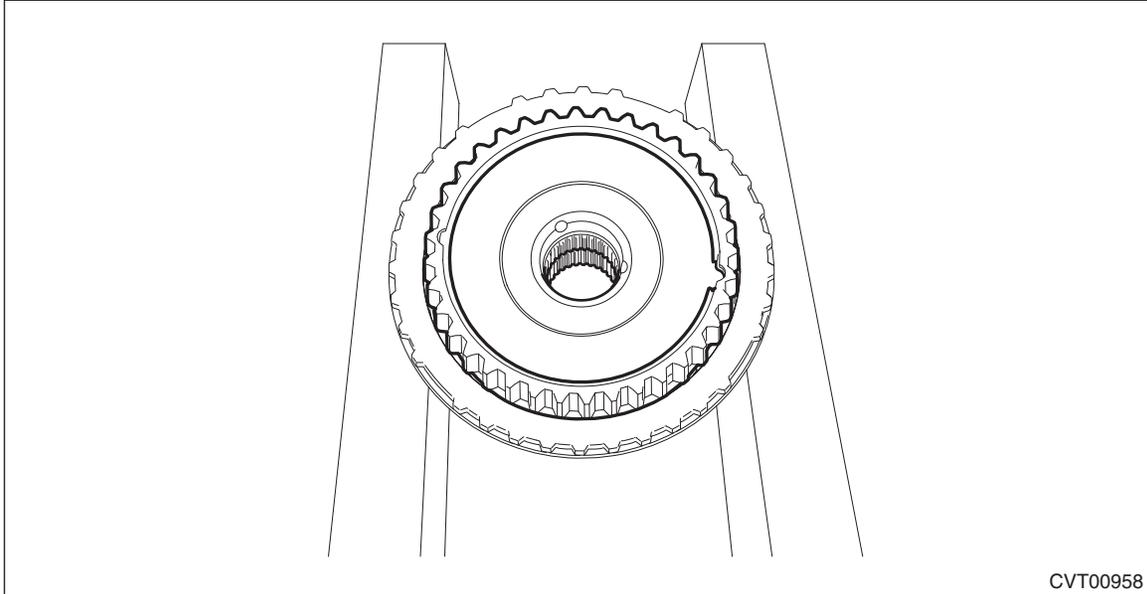
CVT00957

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# Forward Clutch Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

13) Install the forward clutch hub.



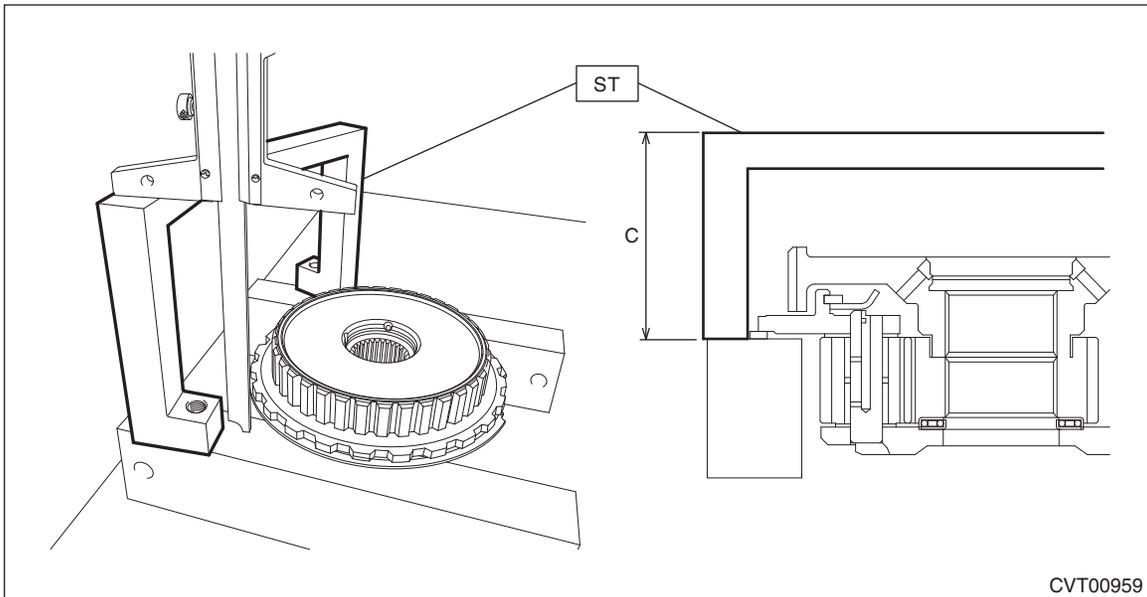
CVT00958

14) Using the ST, measure the height "C" from the ST end surface to the flat board with the snap ring placed on.

NOTE:

Place the measurement tool at the dent on ST upper side to measure.

ST 499737100 PULLER SET



CVT00959

15) Using the ST, measure the height "D" from the ST end surface to the washer catch surface of the forward clutch hub.

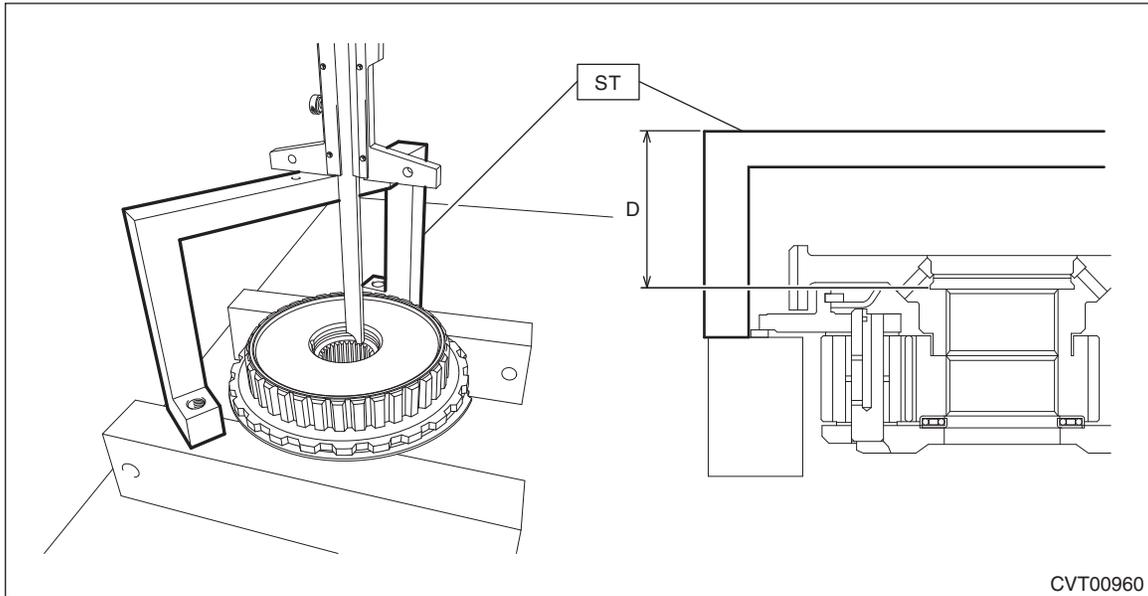
# Forward Clutch Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

**NOTE:**

Place the measurement tool at the dent on ST upper side to measure.

ST 499737100 PULLER SET



CVT00960

16) Obtain the thickness of washer using the values measured from step 7) to step 15).

Calculation formula:

$$T \text{ mm} = (B - A) - (C - D) - (0.0 - 0.20)$$

$$[T \text{ in} = (B - A) - (C - D) - (0.0 - 0.008)]$$

T: Washer thickness

A: Height from the ST end surface to the snap ring of the forward clutch drum

B: Height from the ST end surface to the thrust needle bearing

C: Height from the ST end surface to the flat board with the snap ring placed on

D: Height from the ST end surface to the washer catch surface of the forward clutch hub

0.0 - 0.20 mm (0.0 - 0.008 in): Clearance

17) Select the washer to meet the value "T" obtained from step 16).

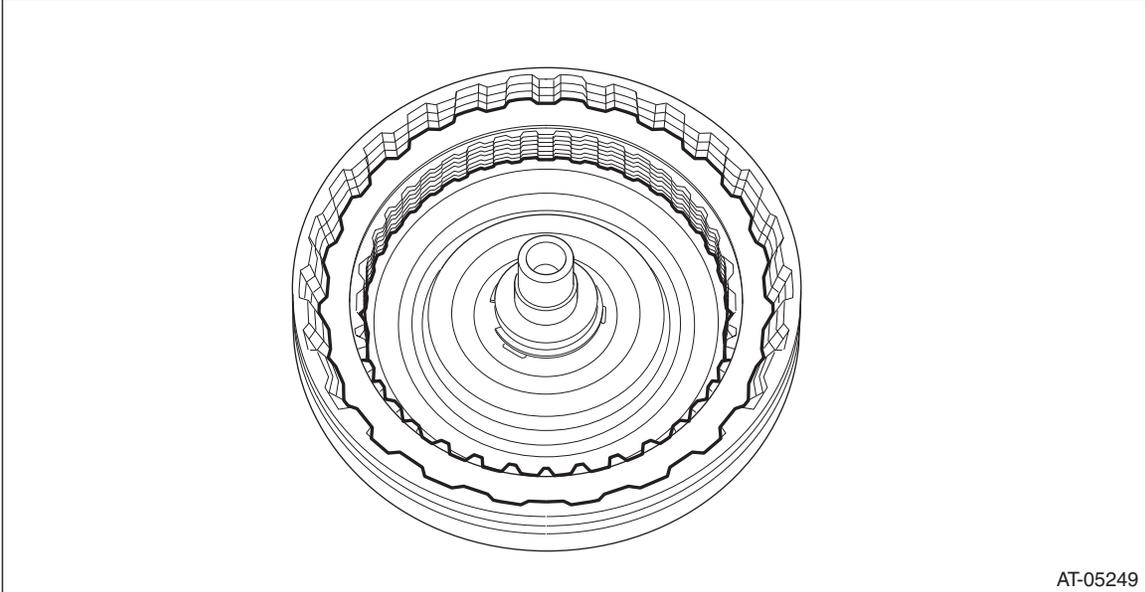
Washer	
Part No.	Thickness mm (in)
31598AA090	4.7 (0.185)
31598AA100	4.8 (0.189)
31598AA110	4.9 (0.193)
31598AA060	5.0 (0.197)
31598AA120	5.1 (0.201)
31598AA130	5.2 (0.205)
31598AA140	5.3 (0.209)

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# Forward Clutch Assembly

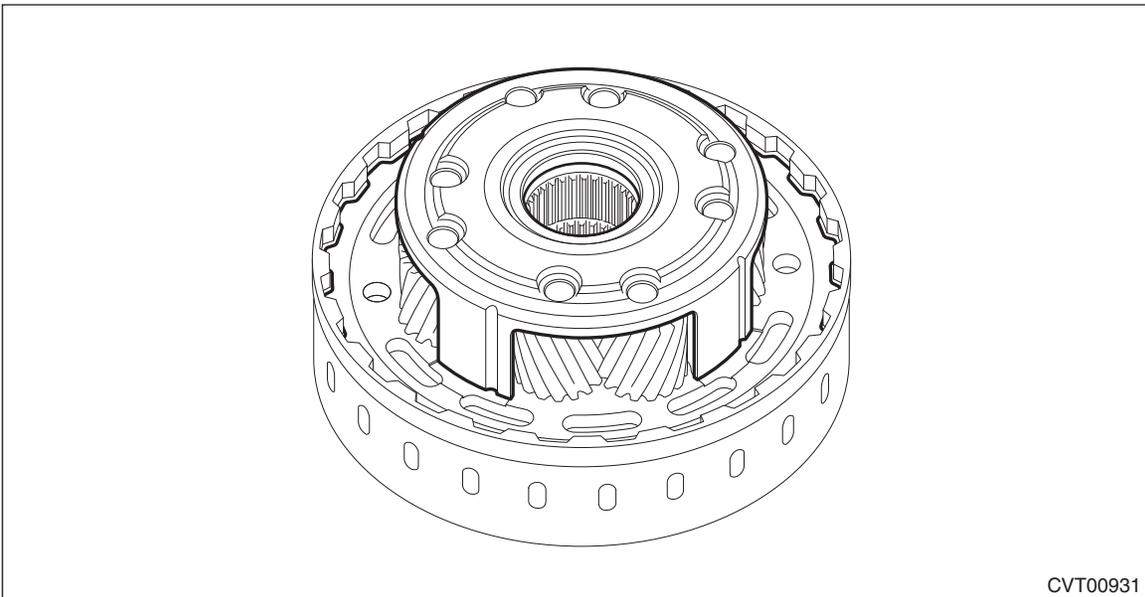
CONTINUOUSLY VARIABLE TRANSMISSION

18) Install the dish plate, drive plate, driven plate and retaining plate.



AT-05249

19) Install the planetary carrier assembly.



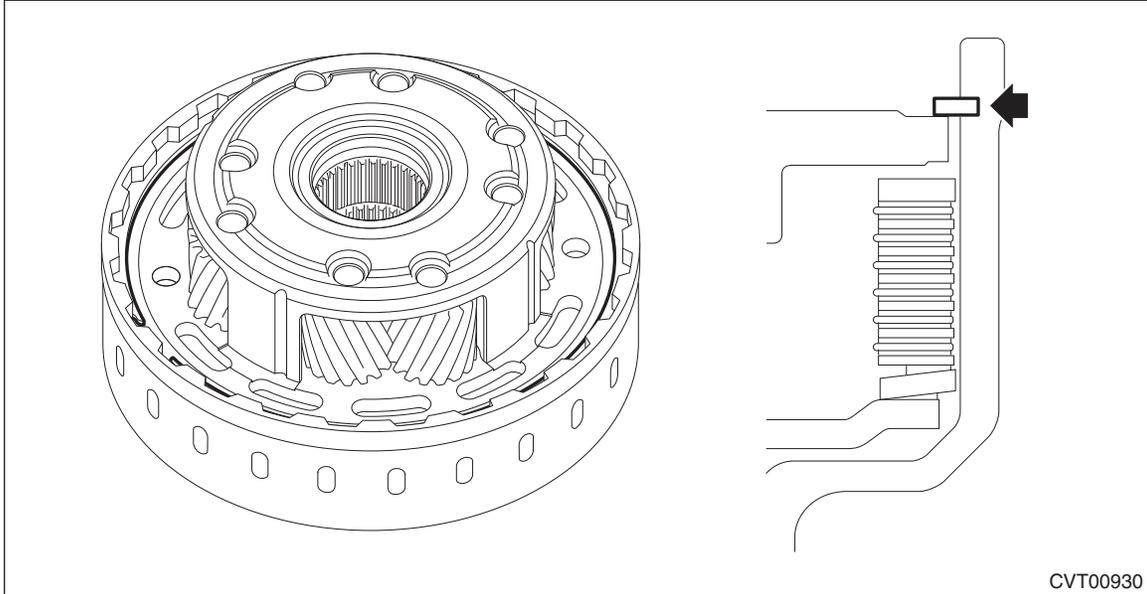
CVT00931

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# Forward Clutch Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

20) Install the snap ring.

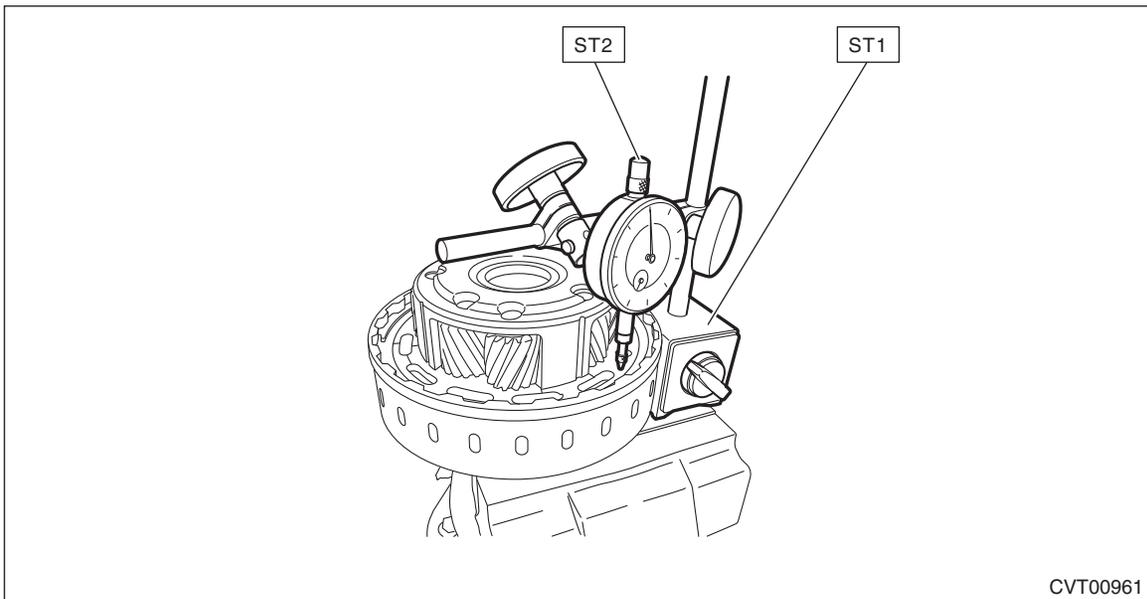


CVT00930

21) Hold the forward clutch drum on a vise, and set the ST.

ST1 498247001 MAGNET BASE

ST2 498247100 DIAL GAUGE



CVT00961

22) Lift the planetary carrier assembly, and read the value "A" indicated on the dial gauge.

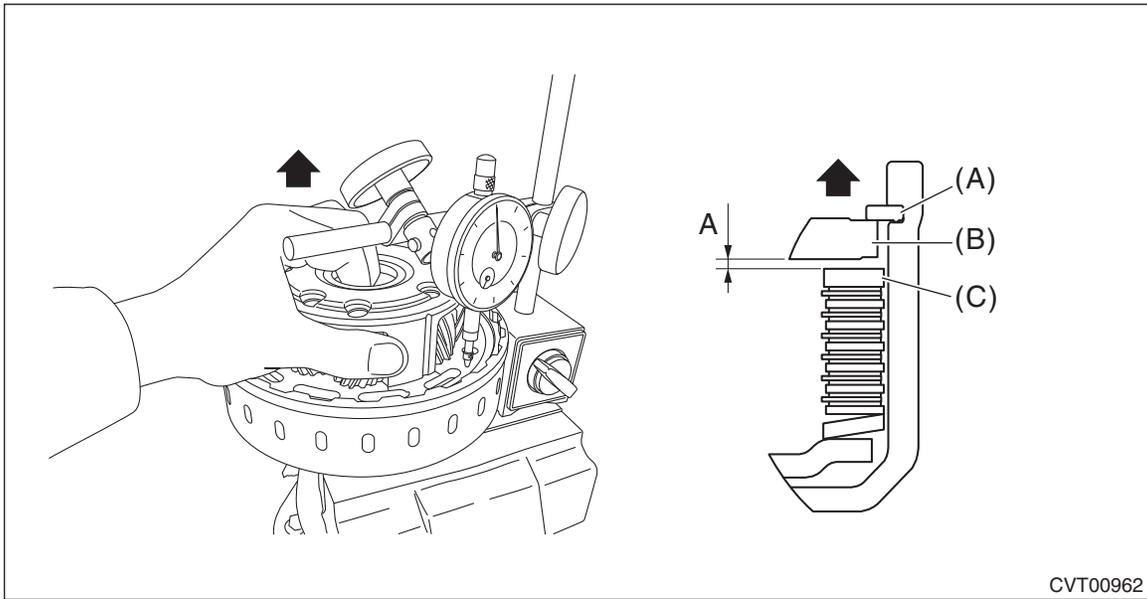
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# Forward Clutch Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

**NOTE:**

Measure at four points with a 90° interval and calculate the average.



CVT00962

- (A) Snap ring
- (B) Planetary carrier ASSY
- (C) Retaining plate

23) If the value “A” obtained from step 22) exceeds the limit for use, replace the drive plate and driven plate with new parts and select the retaining plate within the initial standard value.

**Initial standard:**

**1.2 — 1.6 mm (0.047 — 0.063 in)**

**Limit thickness:**

**2.4 mm (0.09 in)**

Retaining plate	
Part No.	Thickness mm (in)
31567AB890	2.0 (0.079)
31567AB900	2.2 (0.087)
31567AB910	2.4 (0.094)
31567AB640	2.6 (0.102)

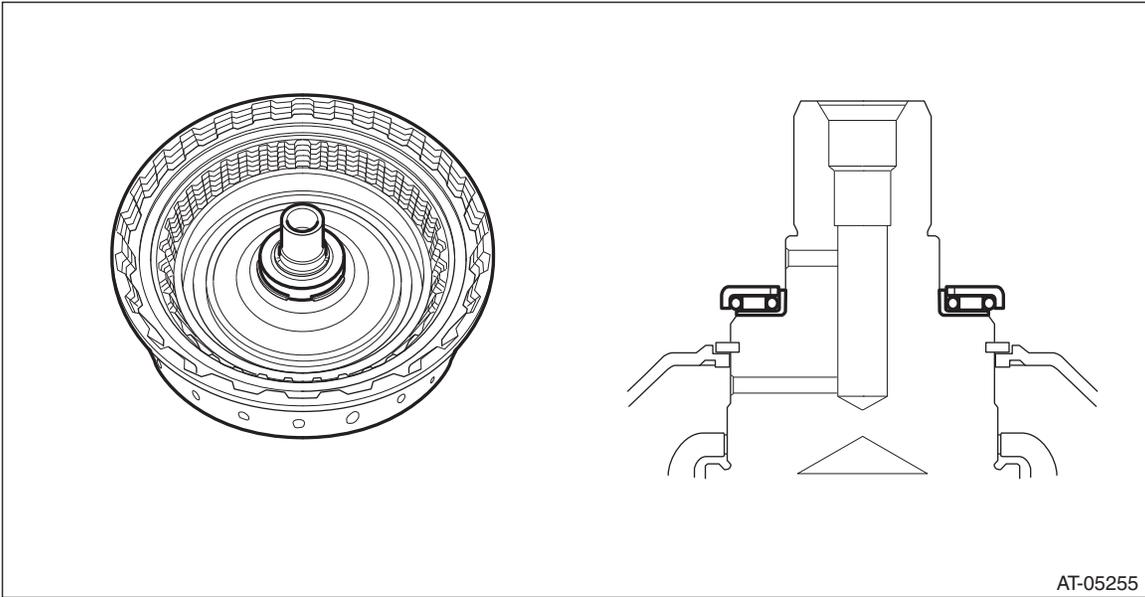
- 24) Remove the snap ring and the planetary carrier assembly.
- 25) Replace with the retaining plate selected in step 23) to install.
- 26) Install the thrust needle bearing.

# Forward Clutch Assembly

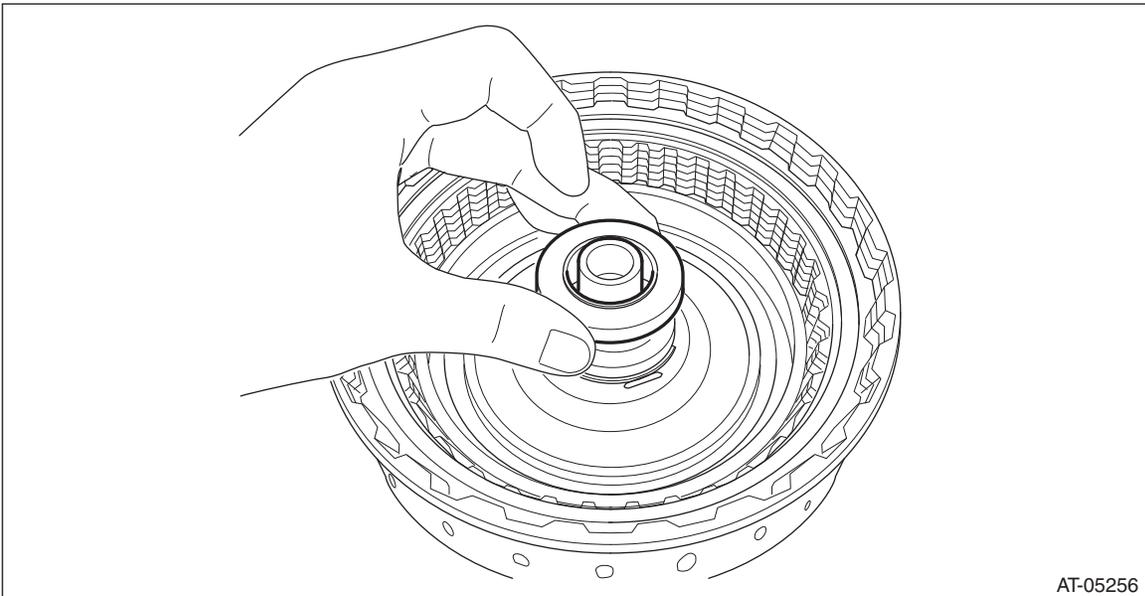
CONTINUOUSLY VARIABLE TRANSMISSION

**NOTE:**

Install the thrust needle bearing in the correct direction.



27) Install the washer selected in step 17).

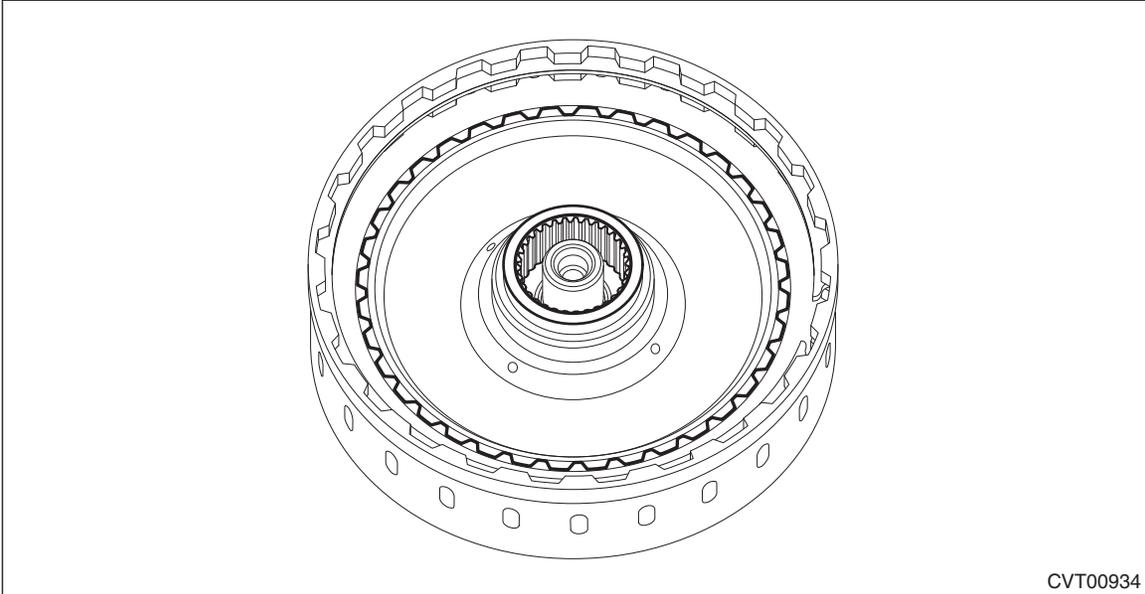


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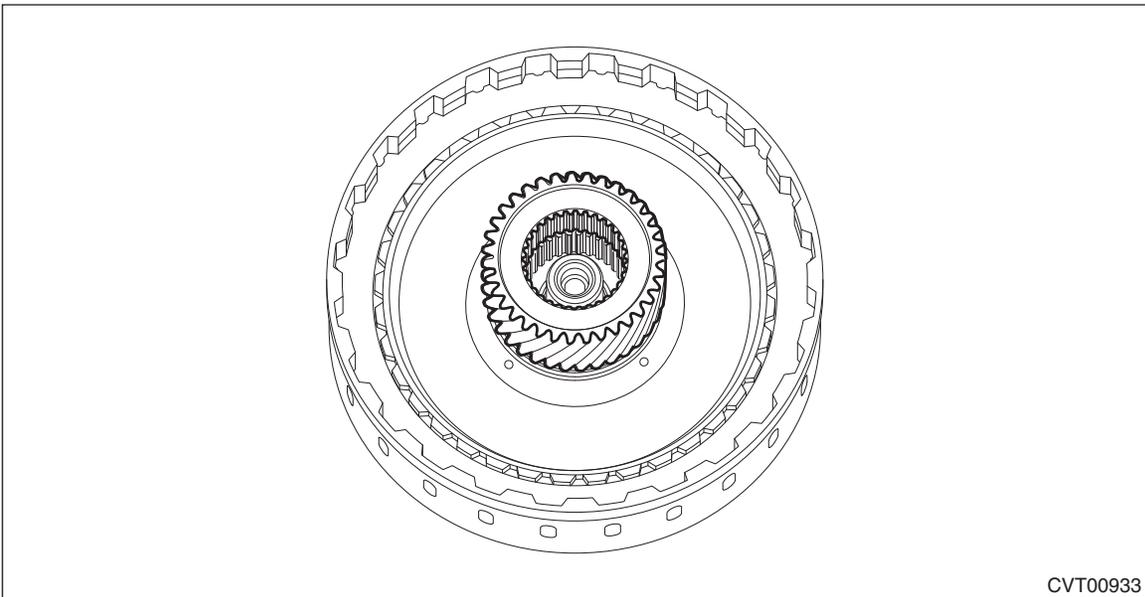
# Forward Clutch Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

28) Install the forward clutch hub.



29) Install the sun gear.



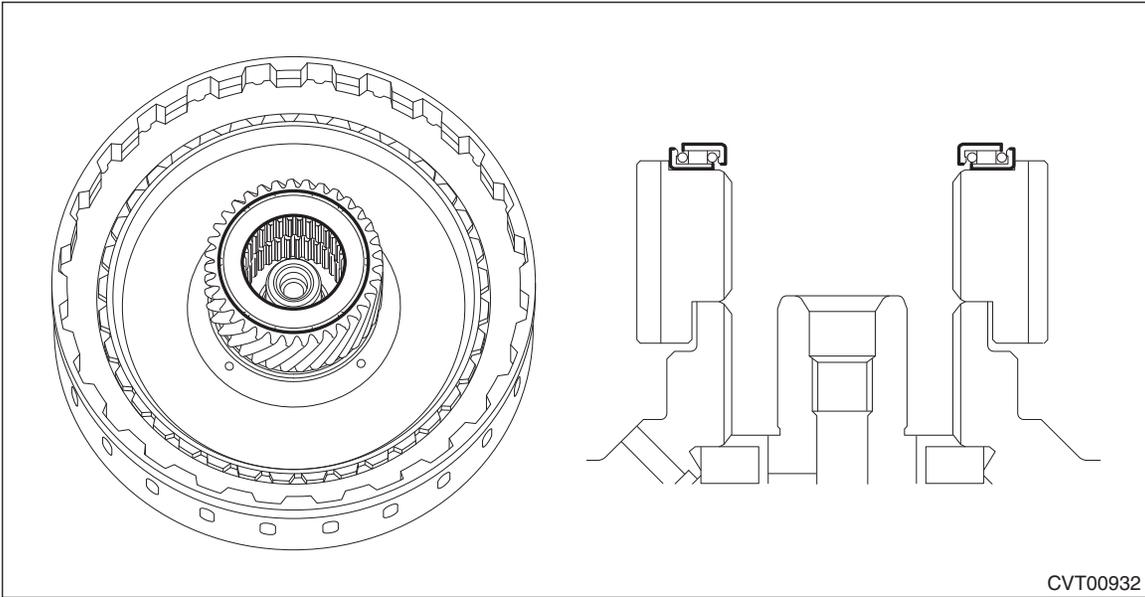
30) Install the thrust needle bearing.

# Forward Clutch Assembly

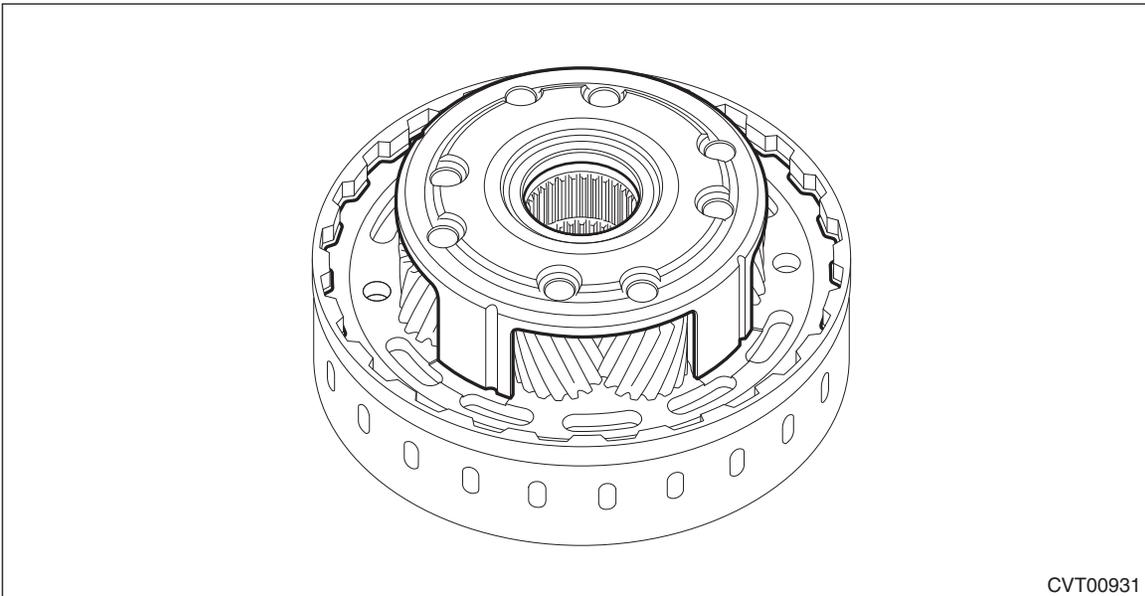
CONTINUOUSLY VARIABLE TRANSMISSION

**NOTE:**

Install the thrust needle bearing in the correct direction.



31) Install the planetary carrier assembly.

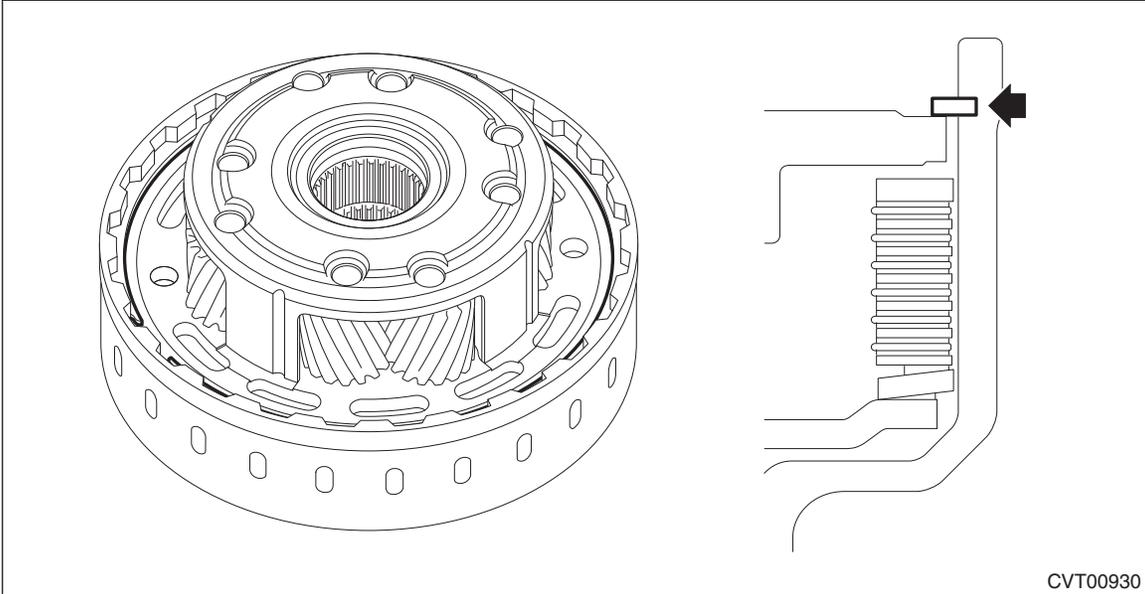


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# Forward Clutch Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

32) Install the snap ring.

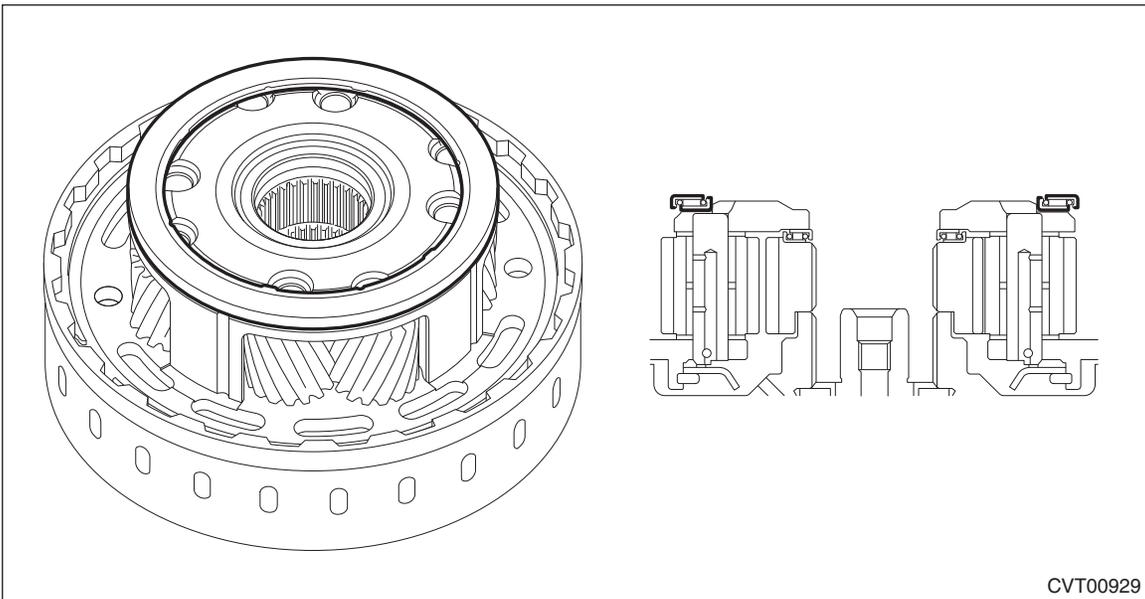


CVT00930

33) Install the thrust needle bearing.

NOTE:

Install the thrust needle bearing in the correct direction.



CVT00929

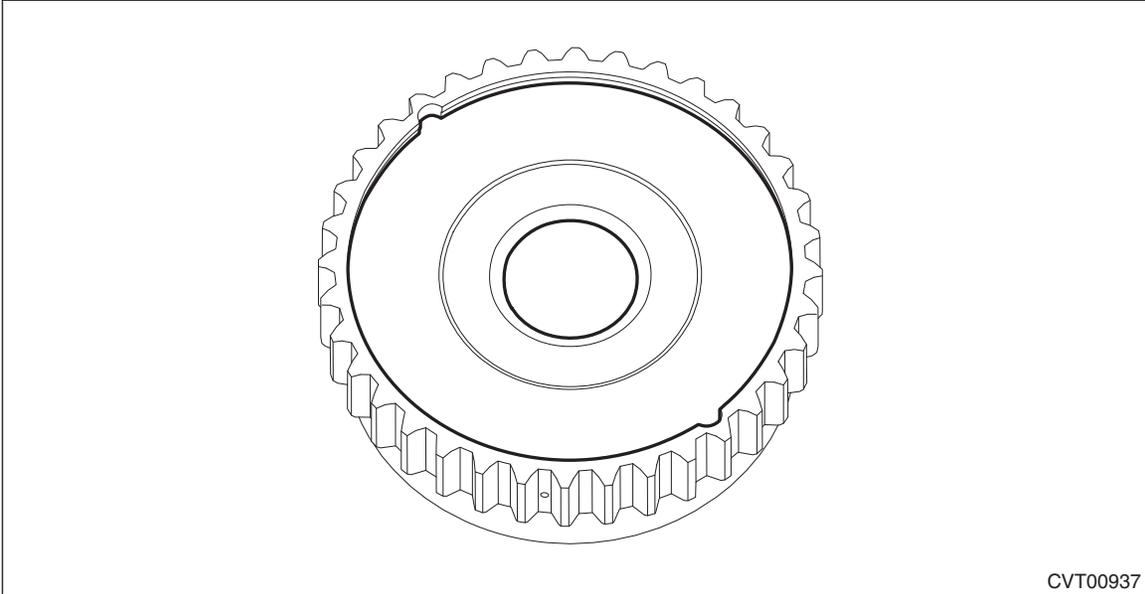
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# Forward Clutch Assembly

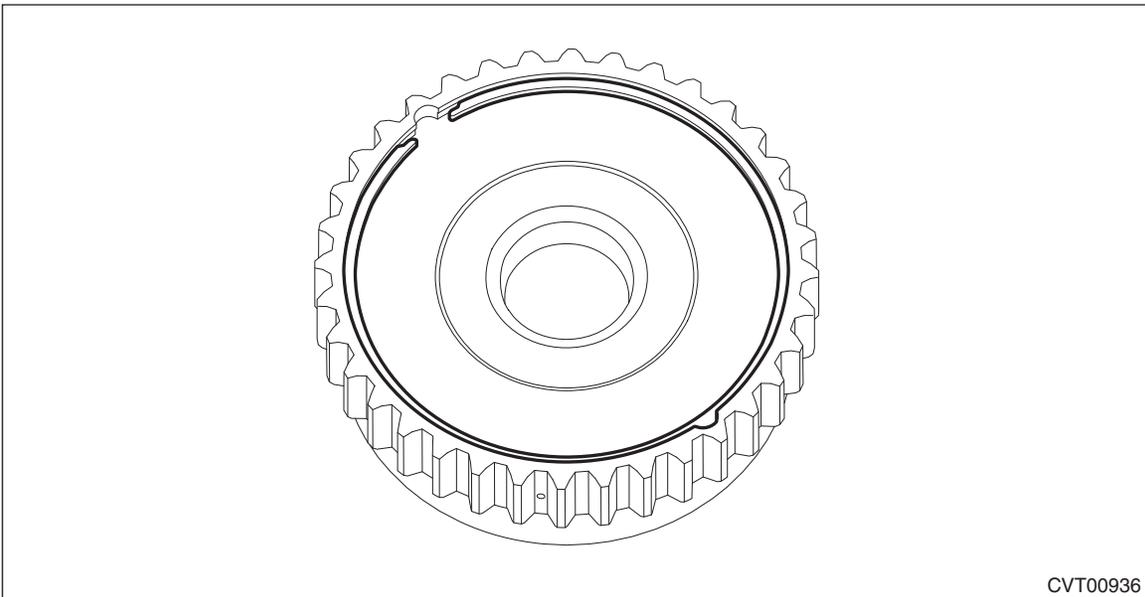
CONTINUOUSLY VARIABLE TRANSMISSION

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34) Install the thrust gear plate to the internal gear.



35) Install the snap ring.

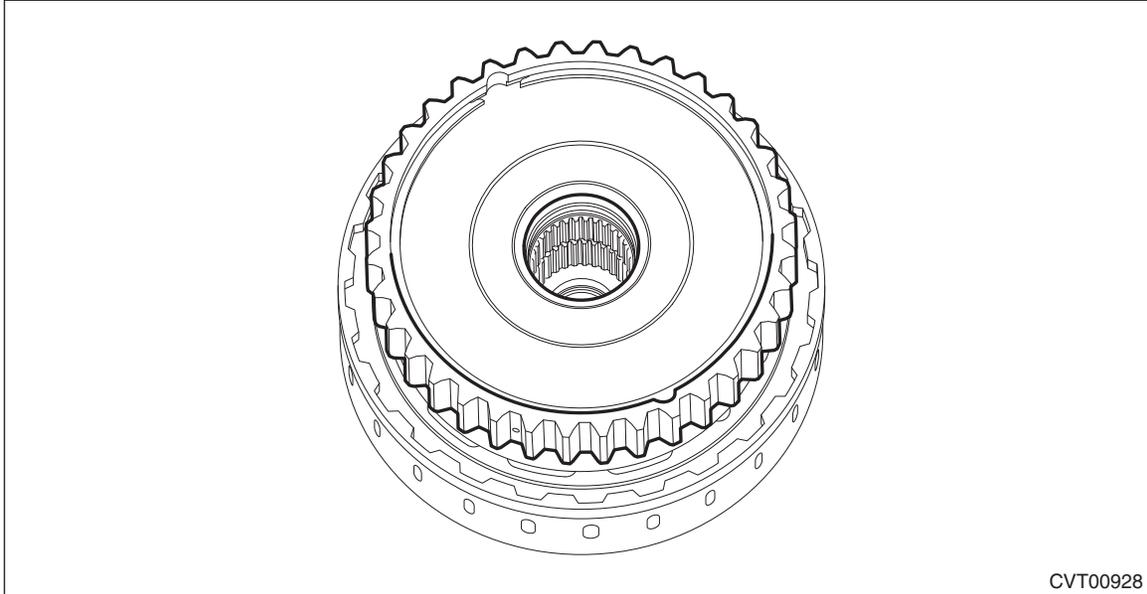


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# Forward Clutch Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

36) Install the internal gear assembly.

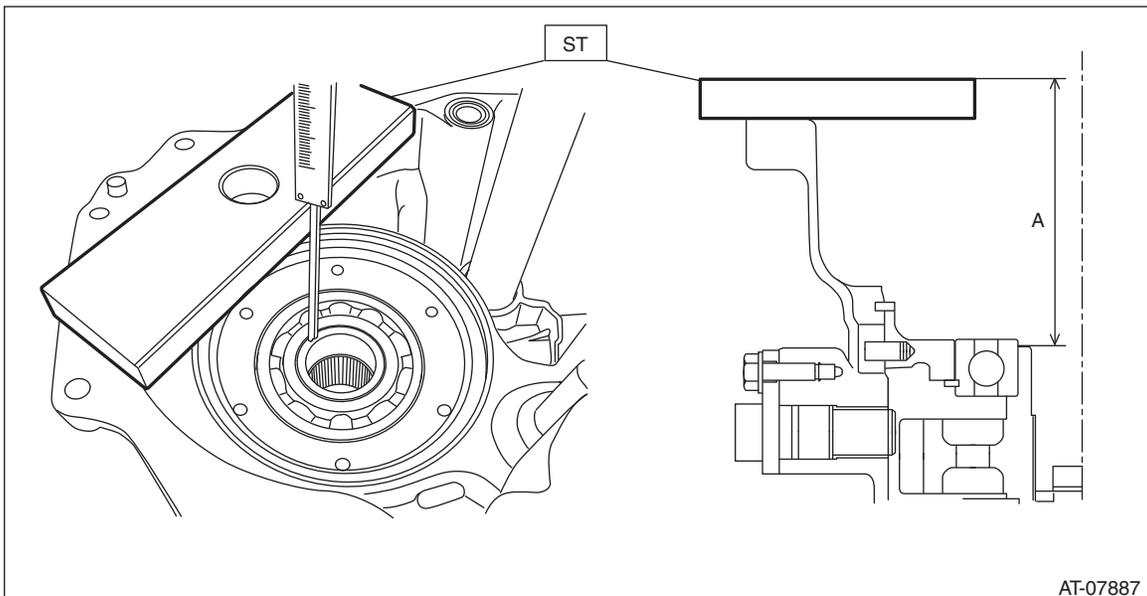


## E: INSPECTION

- Check the forward clutch drum, internal gear, sun gear and forward clutch piston lip for wear or damage.
- Inspect the drive plate facing for wear and damage.
- Check the driven plate for discoloration (burnt color).
- Check for worn snap ring, fatigue or damaged return spring or deformed spring retainer.
- Make sure the clearance between the retaining plate of forward clutch and the planetary carrier assembly is within the limit. If it exceeds the standard, replace the forward clutch assembly. <Ref. to CVT(TR690)-216, ASSEMBLY, Forward Clutch Assembly.>

## F: ADJUSTMENT

- 1) Measure depth "A" from the ST upper face to the washer catch surface.  
ST 398643600 GAUGE

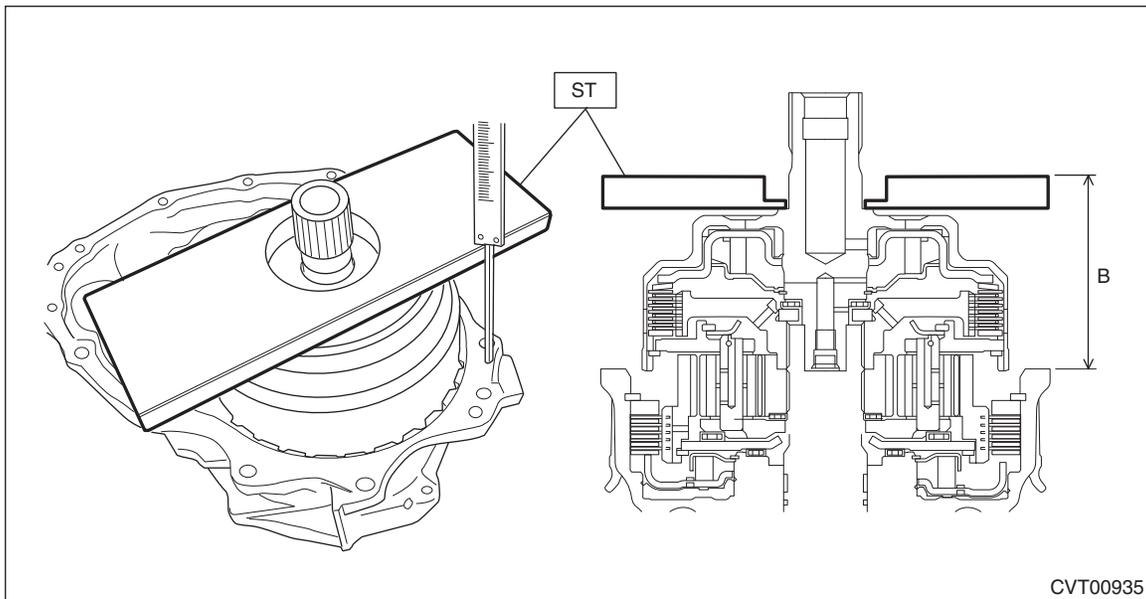


2) Install the forward clutch assembly to intermediate case.

# Forward Clutch Assembly

## CONTINUOUSLY VARIABLE TRANSMISSION

3) Setting the ST, measure height "B" from the ST upper side to the intermediate case mating surface.  
ST 499575600 GAUGE



4) Obtain the thickness of washer using the following formula.

Calculation formula:

$$T \text{ (mm)} = (A - 15) - (B - 15) - (0.75 - 0.95)$$

$$[T \text{ (in)} = (A - 0.591) - (B - 0.591) - (0.030 - 0.037)]$$

T: Washer thickness

A: Depth from the ST upper face to the washer catch surface

B: Height from the upper surface of the ST to the mating surface of the intermediate case

15 mm (0.591 in): Thickness of ST

0.75 — 0.95 mm (0.030 — 0.037 in): Clearance

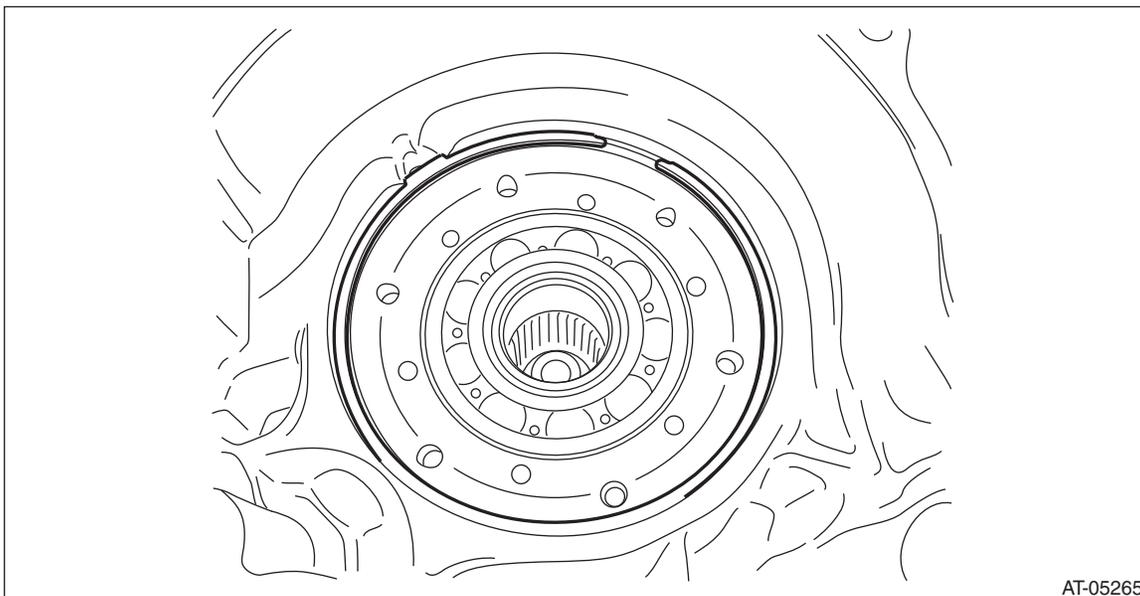
5) Select the washer to meet the value "T" obtained from step 4).

Washer	
Part No.	Washer thickness mm (in)
803034044	0.8 (0.031)
803034045	0.9 (0.035)
803034040	1.0 (0.039)
803034046	1.1 (0.043)
803034041	1.2 (0.047)
803034047	1.3 (0.051)
803034042	1.4 (0.055)
803034048	1.5 (0.059)
803034043	1.6 (0.063)

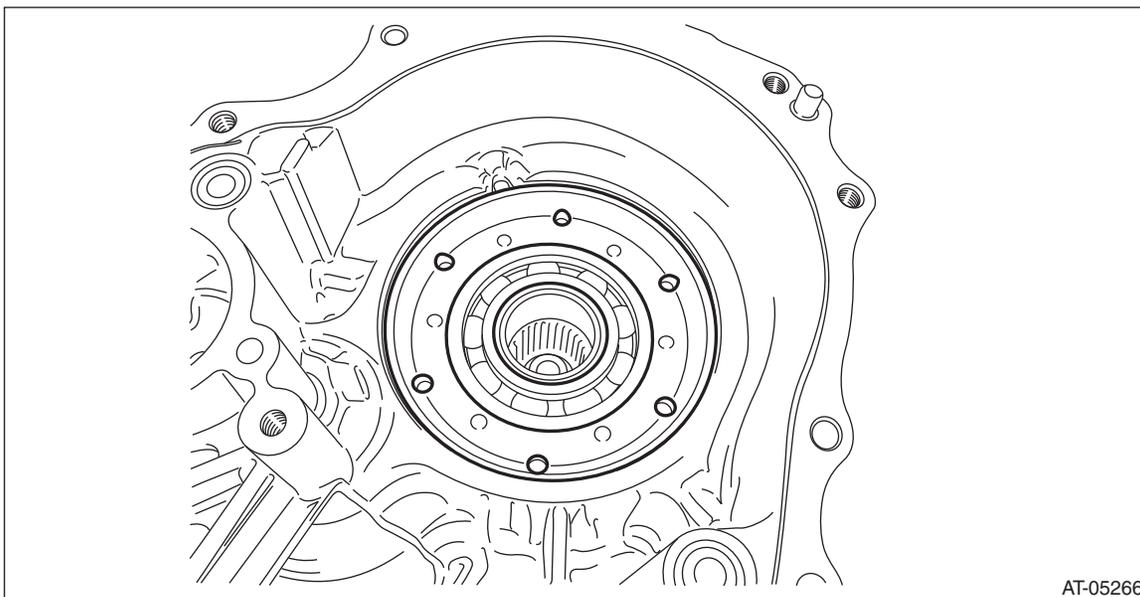
## 39.Reduction Driven Gear

### A: REMOVAL

- 1) Remove the transmission from the vehicle. <Ref. to CVT(TR690)-59, REMOVAL, Automatic Transmission Assembly.>
- 2) Remove the extension case. <Ref. to CVT(TR690)-164, REMOVAL, Extension Case.>
- 3) Remove the rear drive shaft. <Ref. to CVT(TR690)-167, REMOVAL, Rear Drive Shaft.>
- 4) Remove the transfer clutch assembly. <Ref. to CVT(TR690)-172, REMOVAL, Transfer Clutch.>
- 5) Remove the transfer reduction driven gear assembly. <Ref. to CVT(TR690)-184, REMOVAL, Transfer Reduction Driven Gear.>
- 6) Remove the intermediate case. <Ref. to CVT(TR690)-191, REMOVAL, Intermediate Case.>
- 7) Remove the forward clutch assembly. <Ref. to CVT(TR690)-206, REMOVAL, Forward Clutch Assembly.>
- 8) Remove the snap ring.



- 9) Remove the reduction driven gear assembly.

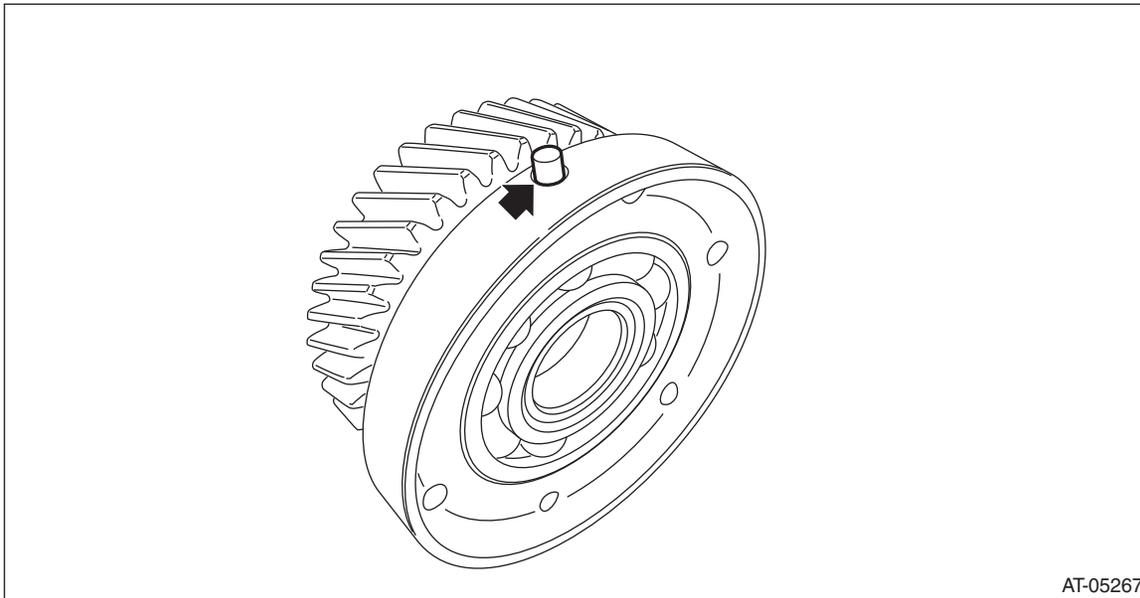


# Reduction Driven Gear

CONTINUOUSLY VARIABLE TRANSMISSION

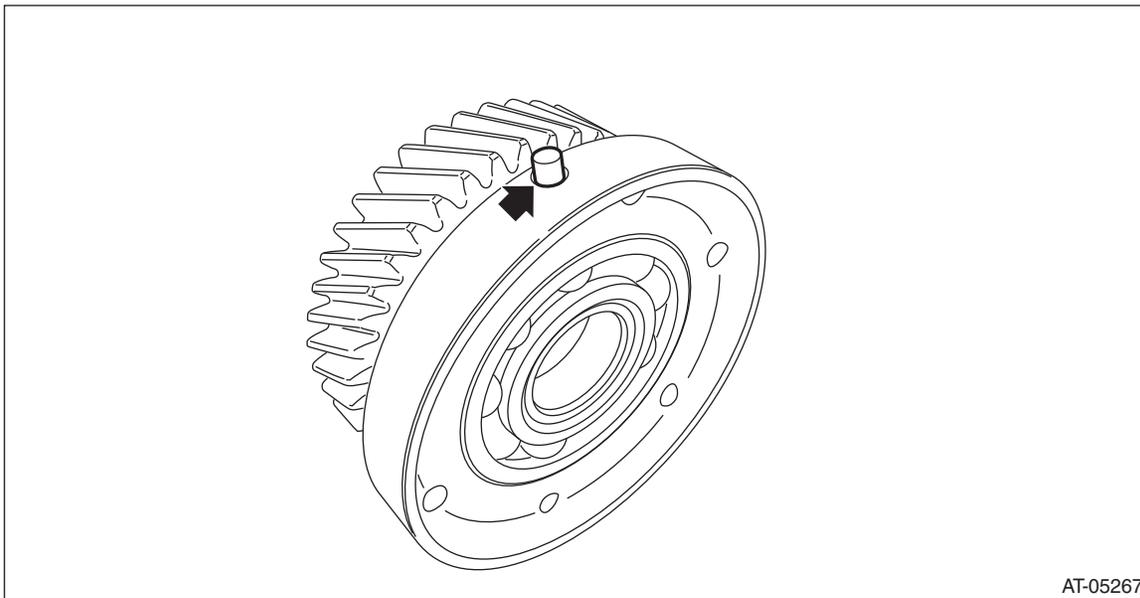
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10) Remove the straight pin.



## B: INSTALLATION

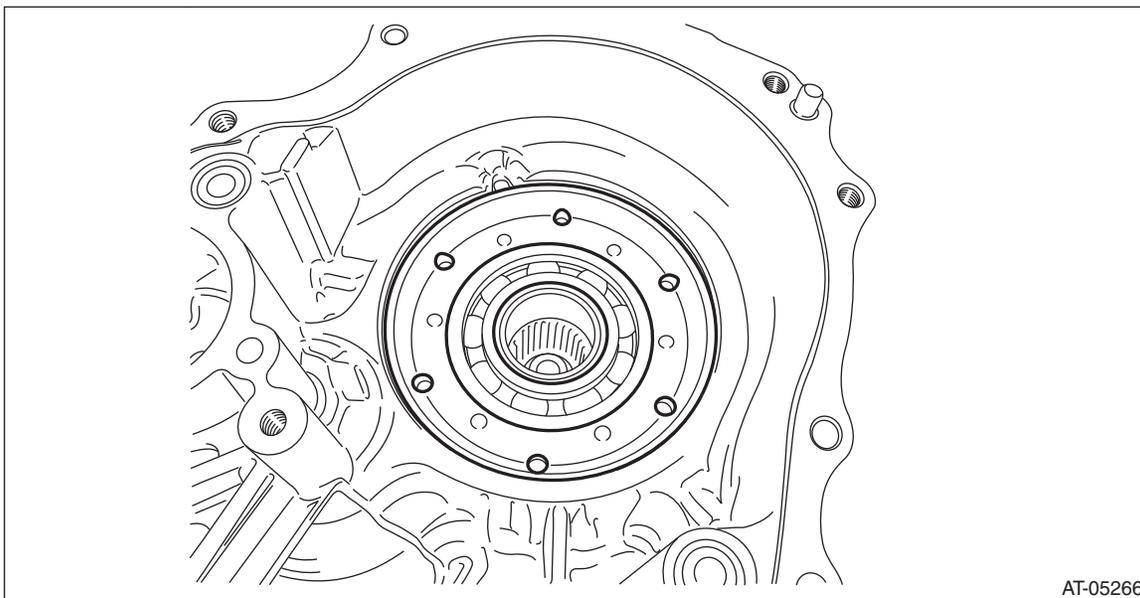
1) Install the straight pin to reduction driven gear assembly.



## Reduction Driven Gear

CONTINUOUSLY VARIABLE TRANSMISSION

2) Fit the straight pin portion to the recess portion of transmission case and install the reduction driven gear and install the snap ring.



3) Select the snap ring. <Ref. to CVT(TR690)-240, ADJUSTMENT, Reduction Driven Gear.>

4) Replace with the selected snap ring.

### NOTE:

If the clearance measured in step 3) is within standard, the snap ring replacement is not necessary.

5) Install the forward clutch assembly. <Ref. to CVT(TR690)-207, INSTALLATION, Forward Clutch Assembly.>

6) Install the intermediate case. <Ref. to CVT(TR690)-192, INSTALLATION, Intermediate Case.>

7) Install the transfer reduction driven gear assembly. <Ref. to CVT(TR690)-184, INSTALLATION, Transfer Reduction Driven Gear.>

8) Install the transfer clutch assembly. <Ref. to CVT(TR690)-173, INSTALLATION, Transfer Clutch.>

9) Install the rear drive shaft. <Ref. to CVT(TR690)-167, INSTALLATION, Rear Drive Shaft.>

10) Install the extension case. <Ref. to CVT(TR690)-164, INSTALLATION, Extension Case.>

11) Install the transmission to vehicle. <Ref. to CVT(TR690)-77, INSTALLATION, Automatic Transmission Assembly.>

# Reduction Driven Gear

CONTINUOUSLY VARIABLE TRANSMISSION

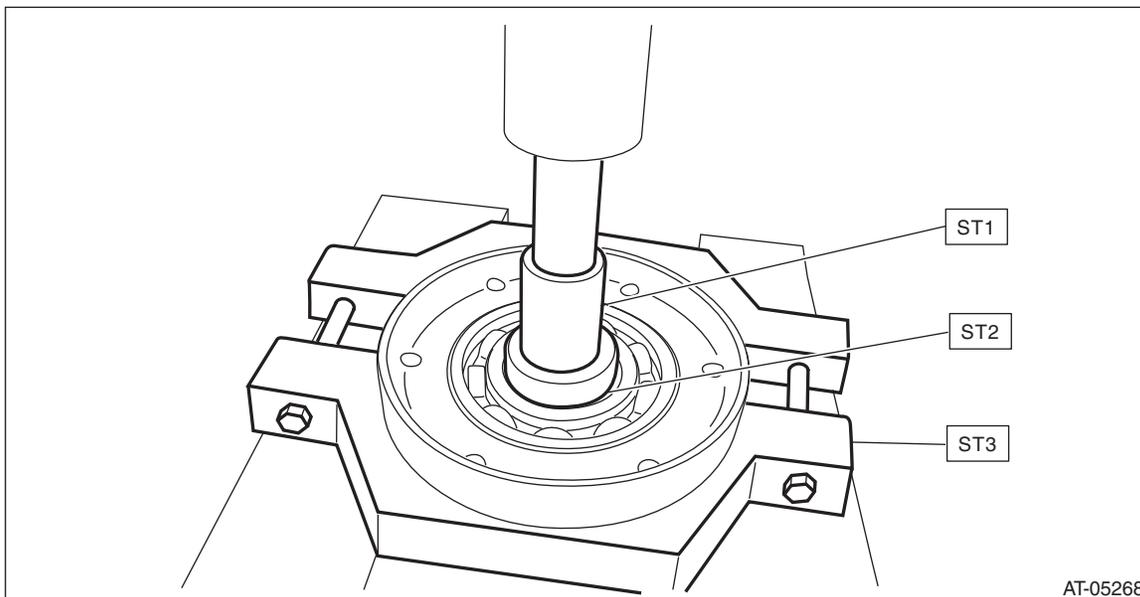
## C: DISASSEMBLY

1) Remove the bearing retainer using ST1, ST2 and ST3.

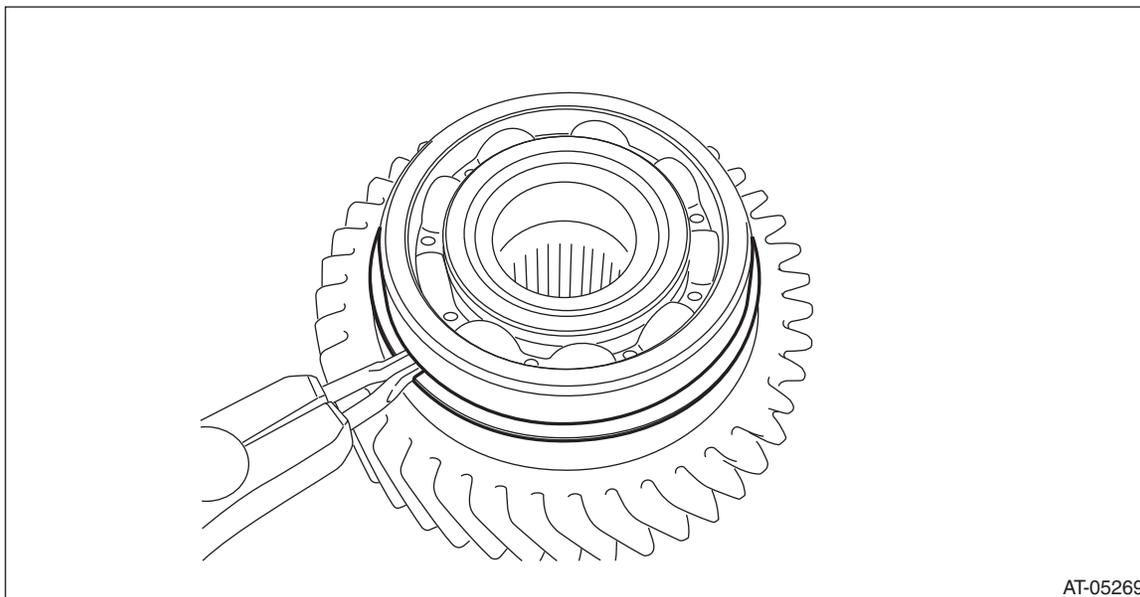
ST1 899864100 REMOVER

ST2 398497701 SEAT

ST3 18767AA000 BEARING REMOVER



2) Remove the snap ring.



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# Reduction Driven Gear

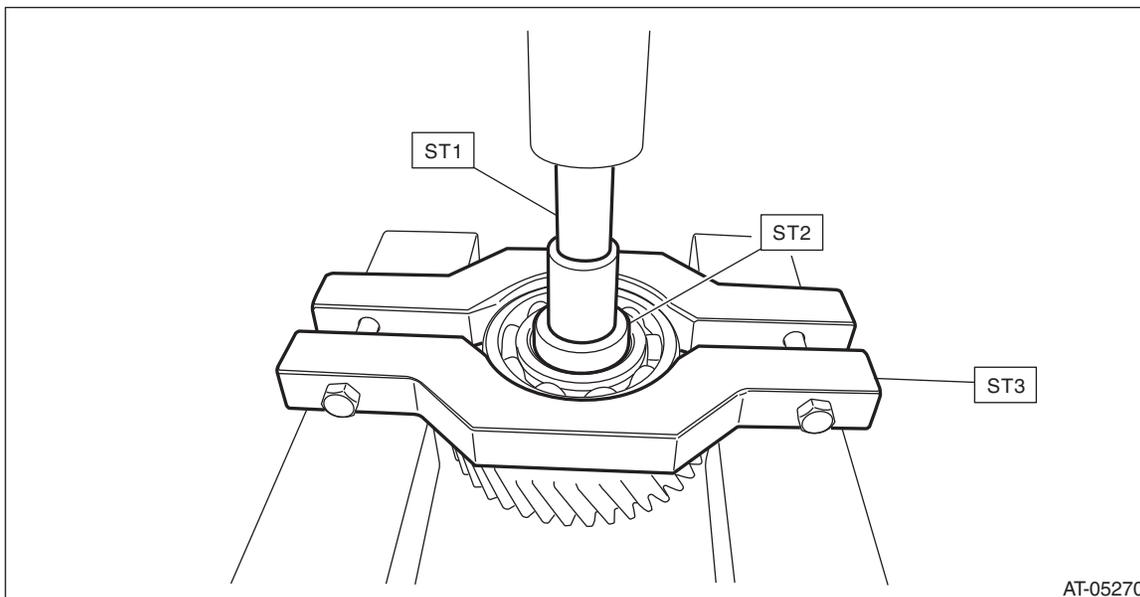
CONTINUOUSLY VARIABLE TRANSMISSION

3) Remove the ball bearing using ST1, ST2 and ST3.

ST1 899864100 REMOVER

ST2 398497701 SEAT

ST3 498077600 REMOVER



AT-05270

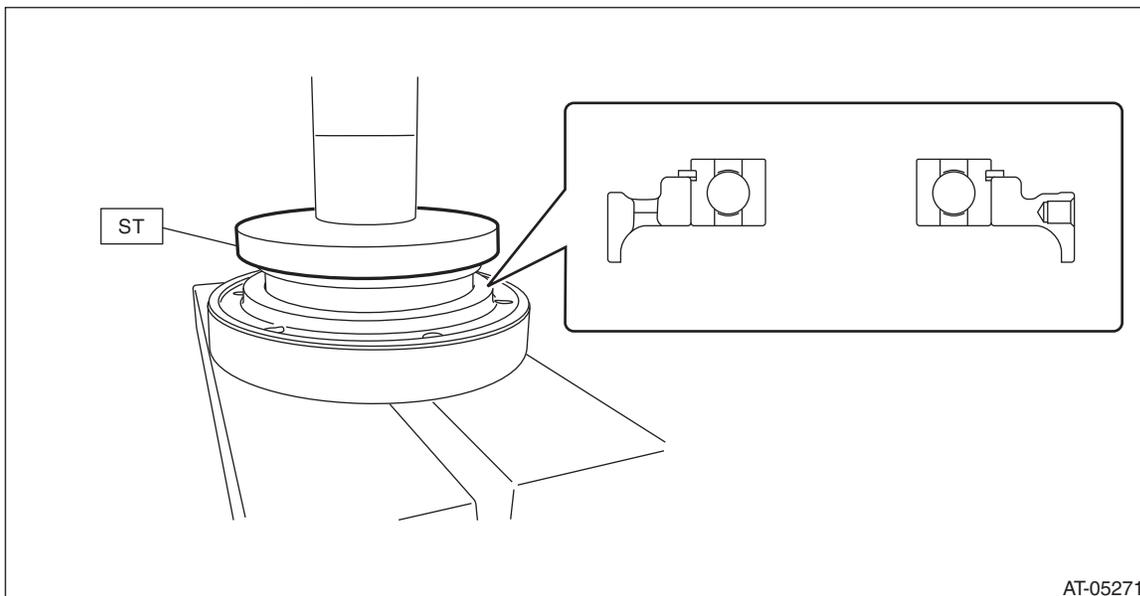
## D: ASSEMBLY

1) Using the ST, install the ball bearing to bearing retainer.

ST 398177700 INSTALLER

NOTE:

- Use a new ball bearing.
- Make sure to install the ball bearing in the right direction.
- Apply CVTF to the press-fitting area.



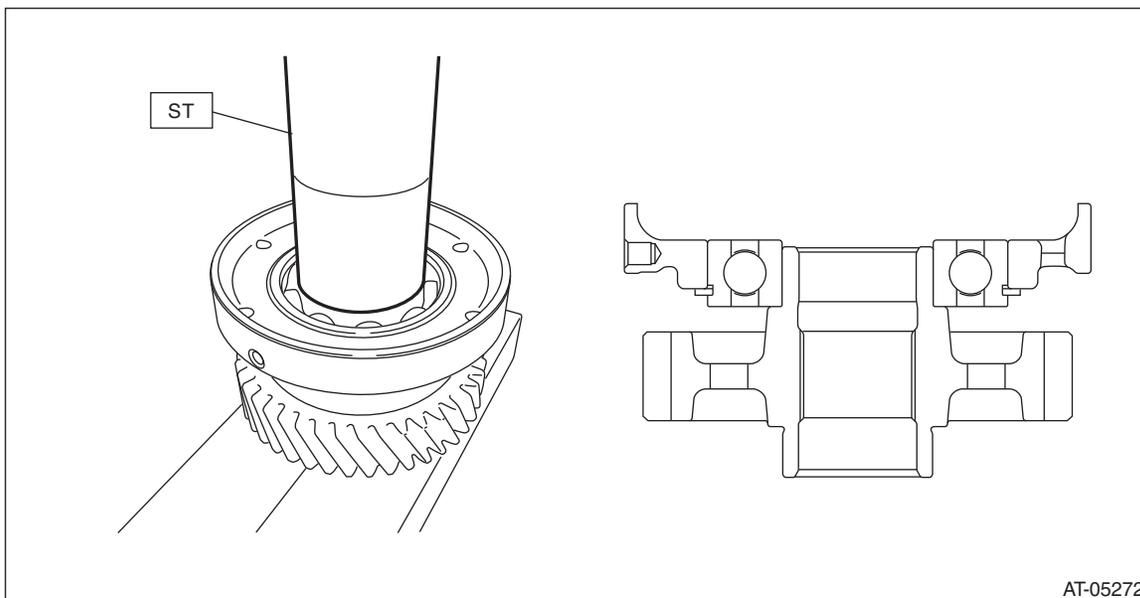
AT-05271

2) Install the snap ring.

# Reduction Driven Gear

CONTINUOUSLY VARIABLE TRANSMISSION

3) Using the ST, install the reduction driven gear.  
ST 499277200 INSTALLER



AT-05272

## E: INSPECTION

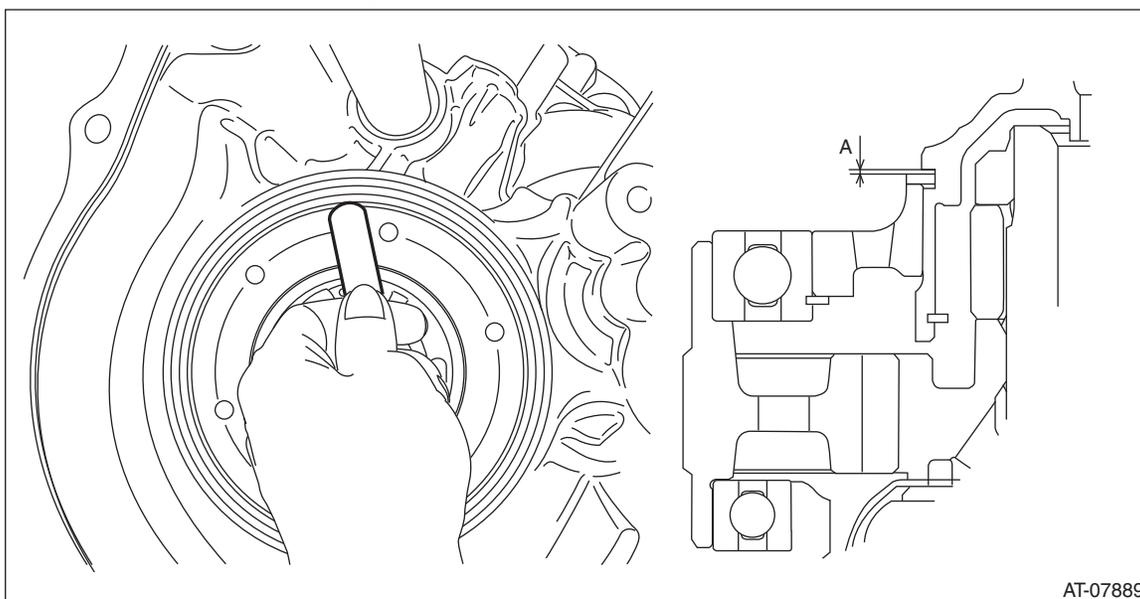
- Check the ball bearing for smooth rotation.
- Check the ball bearing for excessive looseness.
- Check the reduction driven gear for breakage or damage.
- Check the clearance between snap ring and transmission case and replace the snap ring as necessary.

## F: ADJUSTMENT

1) Measure clearance "A" between snap ring and transmission case.

### Specification:

**0.05 — 0.25 mm (0.002 — 0.01 in)**



AT-07889

2) If clearance "A" is out of standard, select the snap ring within standard.

Snap ring	
Part No.	Thickness mm (in)
805100460	2.0 (0.079)
805100461	2.1 (0.083)

**CVT(TR690)-240**

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# Reduction Driven Gear

CONTINUOUSLY VARIABLE TRANSMISSION

Snap ring	
Part No.	Thickness mm (in)
805100462	2.2 (0.087)
805100463	2.3 (0.091)
805100464	2.4 (0.094)

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# Transmission Control Device

CONTINUOUSLY VARIABLE TRANSMISSION

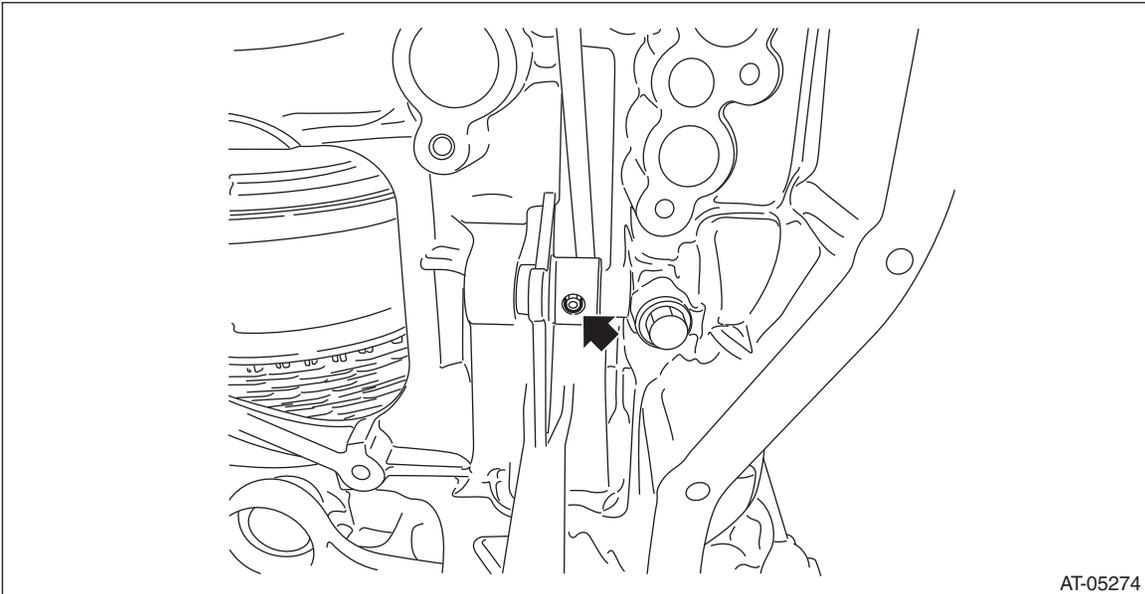
## 40. Transmission Control Device

### A: REMOVAL

- 1) Remove the transmission assembly from the vehicle. <Ref. to CVT(TR690)-59, REMOVAL, Automatic Transmission Assembly.>
- 2) Remove the oil pan and control valve body. <Ref. to CVT(TR690)-129, REMOVAL, Control Valve Body.>
- 3) Remove the inhibitor switch. <Ref. to CVT(TR690)-109, REMOVAL, Inhibitor Switch.>
- 4) Remove the spring pin.

#### NOTE:

Prevent the spring pin from dropping in the transmission using paper towel etc.



- 5) Remove the bolt and remove the range select lever, manual plate and parking rod.

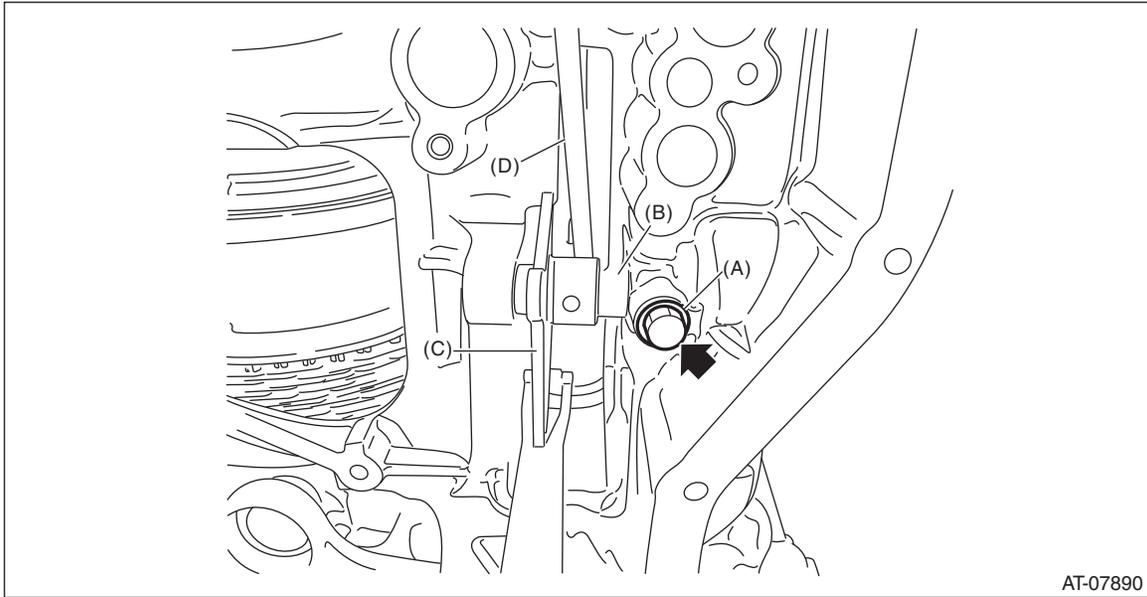
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# Transmission Control Device

CONTINUOUSLY VARIABLE TRANSMISSION

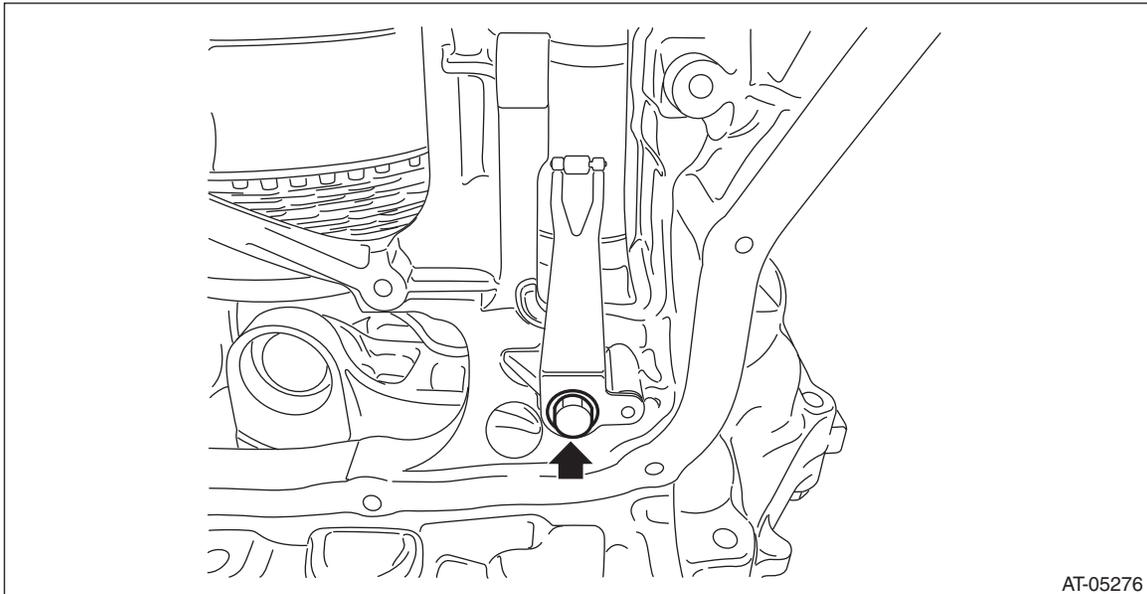
**NOTE:**

Do not damage the lip of oil seal press-fitted in the case.



- (A) Bolt
- (B) Range select lever
- (C) Manual plate
- (D) Parking rod

6) Remove the detent spring.



## B: INSTALLATION

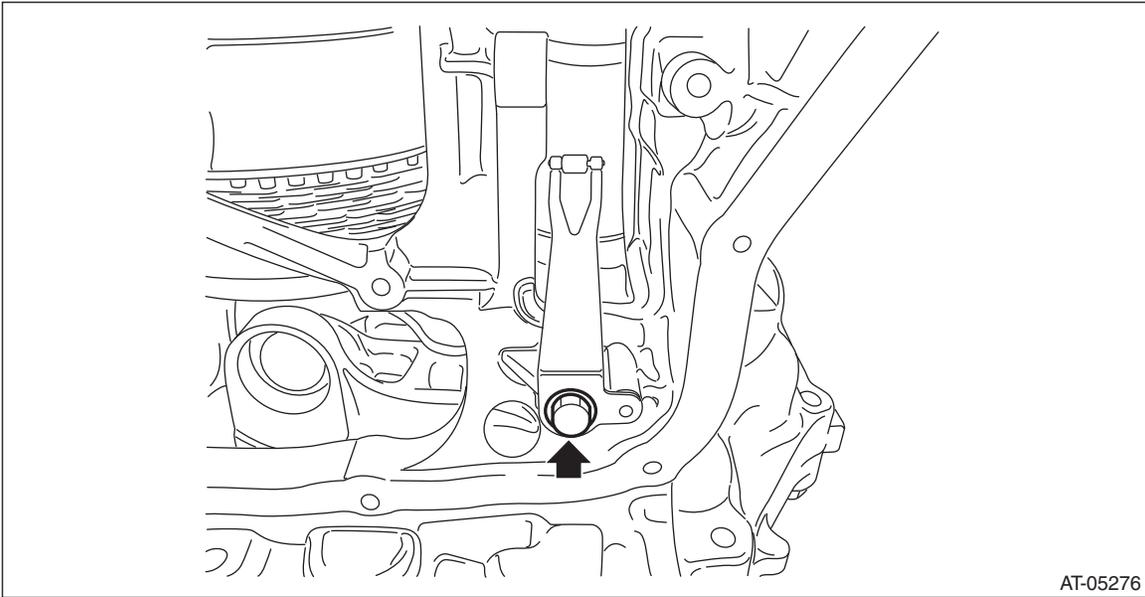
1) Install the detent spring.

# Transmission Control Device

CONTINUOUSLY VARIABLE TRANSMISSION

**Tightening torque:**

**7 N·m (0.7 kgf·m, 5.2 ft-lb)**

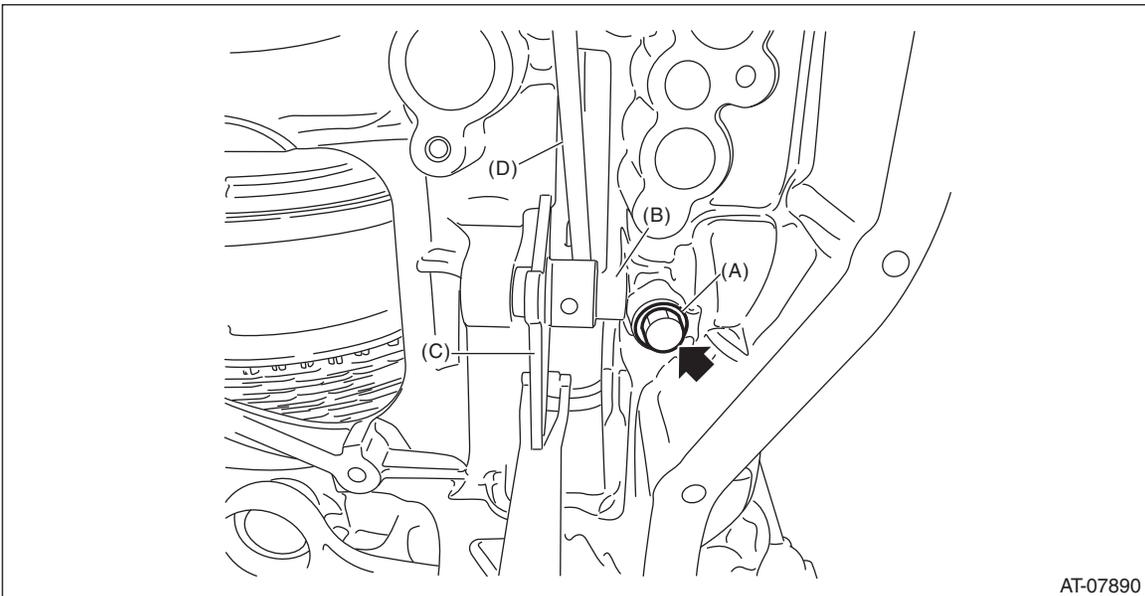


AT-05276

2) Install the manual plate, parking rod, range select lever and bolt.

**Tightening torque:**

**7 N·m (0.7 kgf·m, 5.2 ft-lb)**



AT-07890

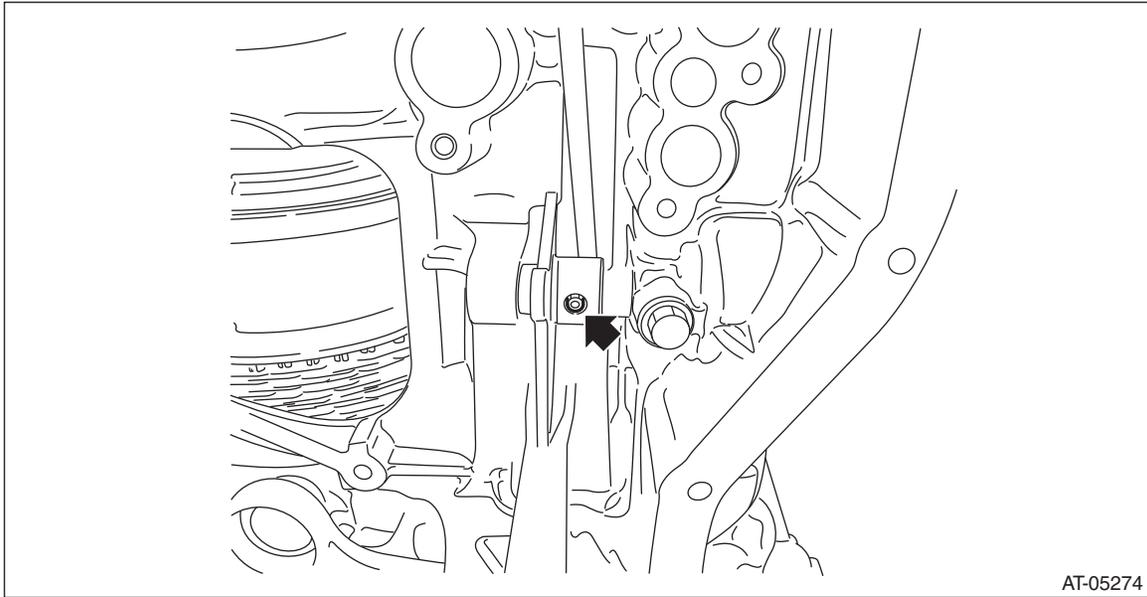
- (A) Bolt
- (B) Range select lever
- (C) Manual plate
- (D) Parking rod

3) Install the spring pin.

# Transmission Control Device

CONTINUOUSLY VARIABLE TRANSMISSION

NOTE:  
Use new spring pin.



- 4) Install the inhibitor switch. <Ref. to CVT(TR690)-113, INSTALLATION, Inhibitor Switch.>
- 5) Adjust the inhibitor switch. <Ref. to CVT(TR690)-108, ADJUSTMENT, Inhibitor Switch.>
- 6) Install the control valve body and oil pan. <Ref. to CVT(TR690)-133, INSTALLATION, Control Valve Body.>
- 7) Install the transmission assembly to the vehicle. <Ref. to CVT(TR690)-77, INSTALLATION, Automatic Transmission Assembly.>

## **C: INSPECTION**

Make sure that the manual lever and detent spring are not worn or otherwise damaged.

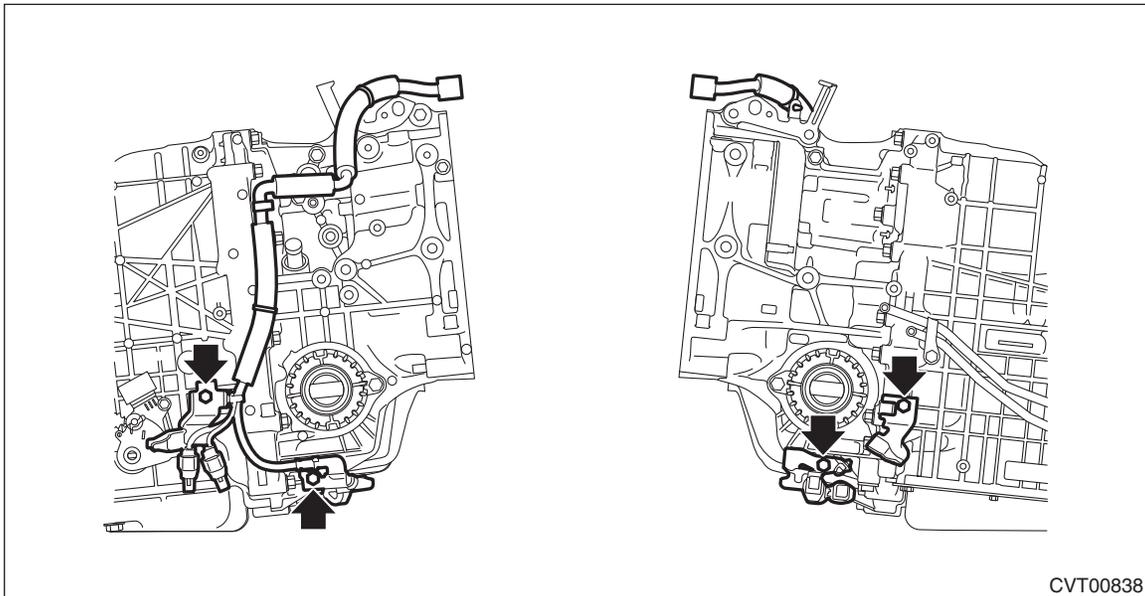
# Transmission Case

CONTINUOUSLY VARIABLE TRANSMISSION

## 41. Transmission Case

### A: REMOVAL

- 1) Remove the transmission assembly from the vehicle. <Ref. to CVT(TR690)-59, REMOVAL, Automatic Transmission Assembly.>
- 2) Remove the air breather hose. <Ref. to CVT(TR690)-156, REMOVAL, Air Breather Hose.>
- 3) Remove the transmission harness. <Ref. to CVT(TR690)-139, REMOVAL, Transmission Harness.>
- 4) Remove the secondary speed sensor. <Ref. to CVT(TR690)-117, REMOVAL, Secondary Speed Sensor.>
- 5) Remove the oxygen sensor harness and harness bracket.



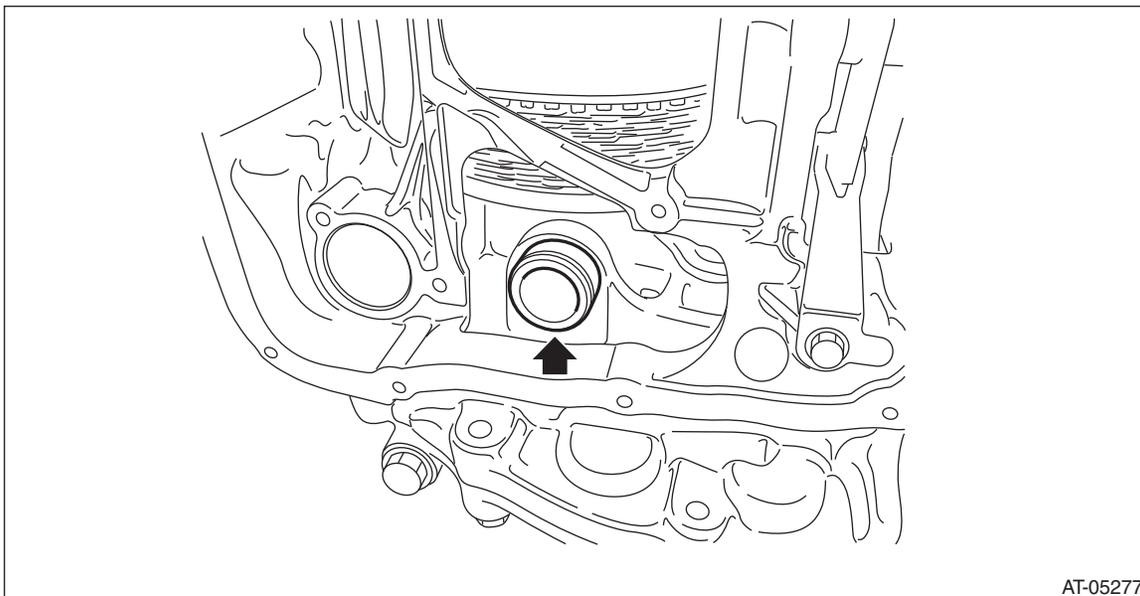
- 6) Remove the inhibitor switch. <Ref. to CVT(TR690)-109, REMOVAL, Inhibitor Switch.>
- 7) Remove the extension case. <Ref. to CVT(TR690)-164, REMOVAL, Extension Case.>
- 8) Remove the rear drive shaft. <Ref. to CVT(TR690)-167, REMOVAL, Rear Drive Shaft.>
- 9) Remove the transfer clutch assembly. <Ref. to CVT(TR690)-172, REMOVAL, Transfer Clutch.>
- 10) Remove the transfer reduction driven gear assembly. <Ref. to CVT(TR690)-184, REMOVAL, Transfer Reduction Driven Gear.>
- 11) Remove the intermediate case. <Ref. to CVT(TR690)-191, REMOVAL, Intermediate Case.>
- 12) Remove the forward clutch assembly. <Ref. to CVT(TR690)-206, REMOVAL, Forward Clutch Assembly.>
- 13) Remove the reduction driven gear. <Ref. to CVT(TR690)-235, REMOVAL, Reduction Driven Gear.>
- 14) Remove the oil pan and control valve body. <Ref. to CVT(TR690)-129, REMOVAL, Control Valve Body.>

# Transmission Case

CONTINUOUSLY VARIABLE TRANSMISSION

**NOTE:**

When removing the control valve body, also remove the pressure pipe if it is attached on the case.

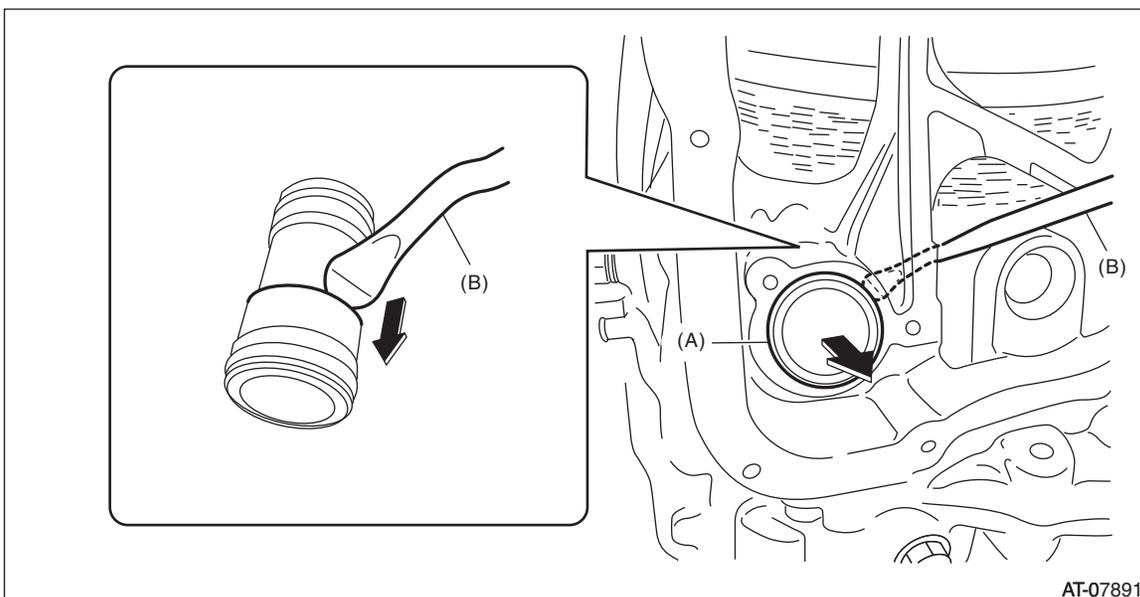


AT-05277

15) Remove the CVTF pipe using a tire lever etc.

**NOTE:**

Remove by hooking the stepped portion of CVTF pipe with a tire lever etc.



AT-07891

(A) CVTF pipe

(B) Tire lever

16) Remove the transmission case.

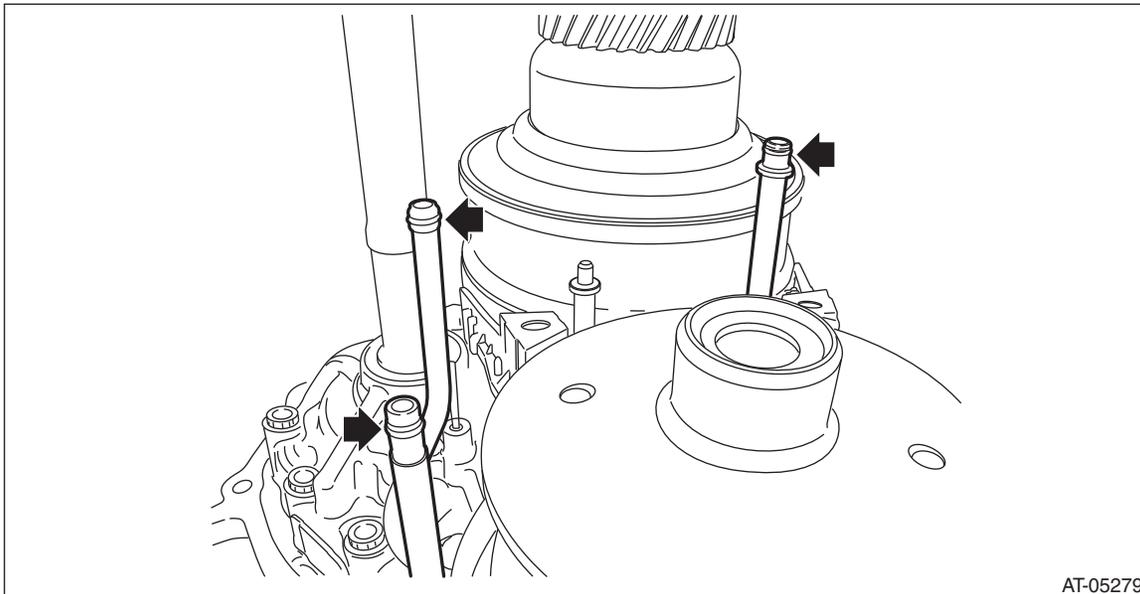
**NOTE:**

The total number of transmission case mounting bolts is 15.

# Transmission Case

## CONTINUOUSLY VARIABLE TRANSMISSION

17) Remove the O-ring of lubrication pipe.



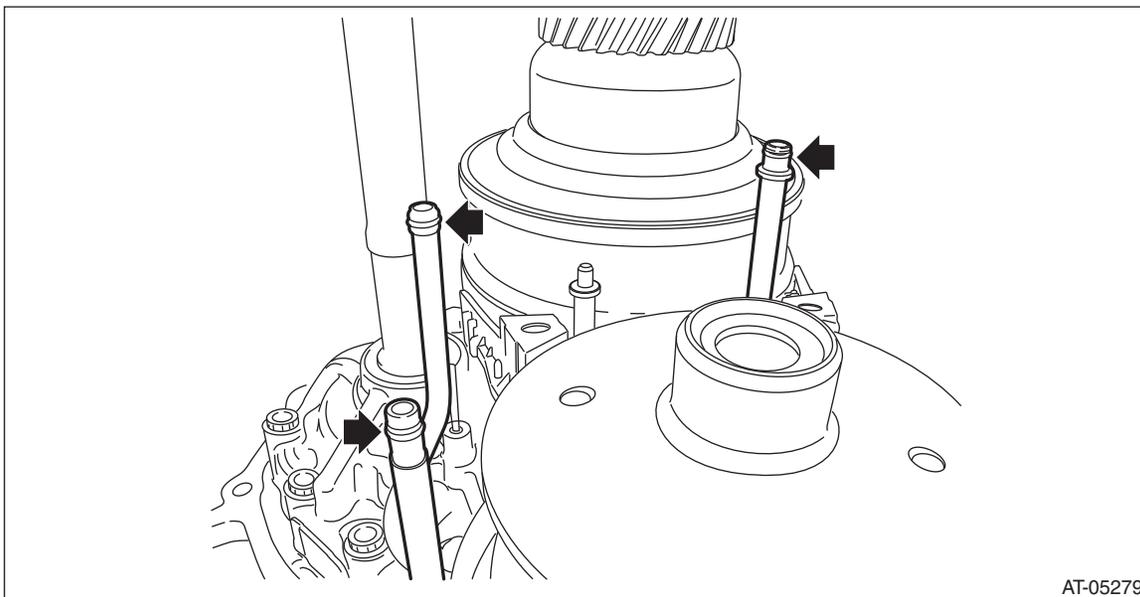
18) Remove the control device system. <Ref. to CVT(TR690)-242, REMOVAL, Transmission Control Device.>

### B: INSTALLATION

- 1) Clean the mating surface of transmission case and converter case.
- 2) Install the control device system. <Ref. to CVT(TR690)-243, INSTALLATION, Transmission Control Device.>
- 3) Install the O-ring to the lubrication pipe.

#### NOTE:

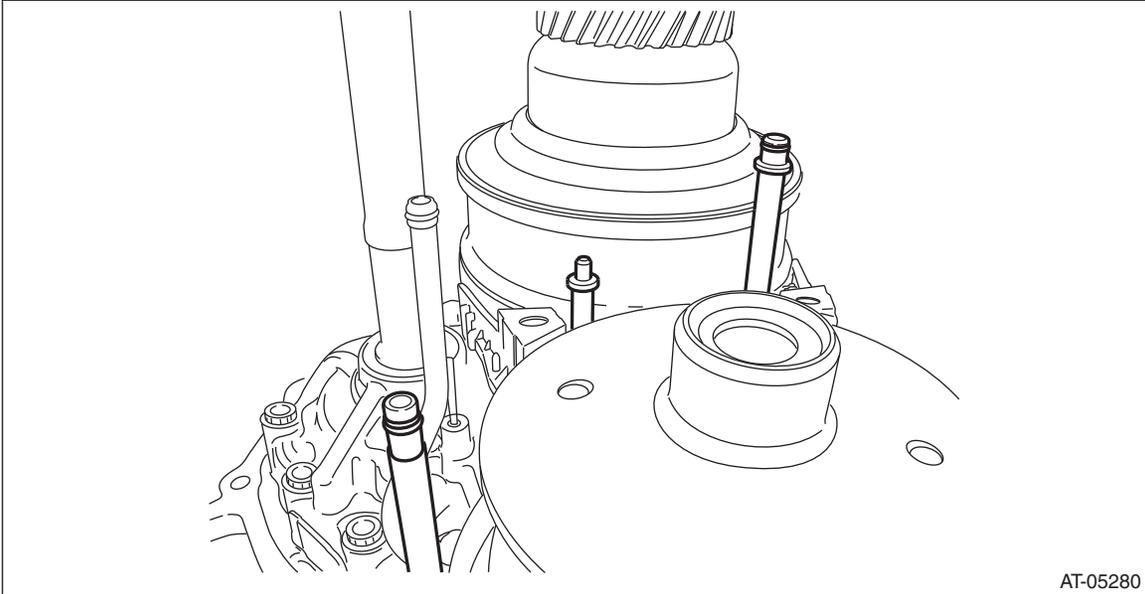
- Use new O-rings.
- Apply CVTF to the O-rings.



# Transmission Case

CONTINUOUSLY VARIABLE TRANSMISSION

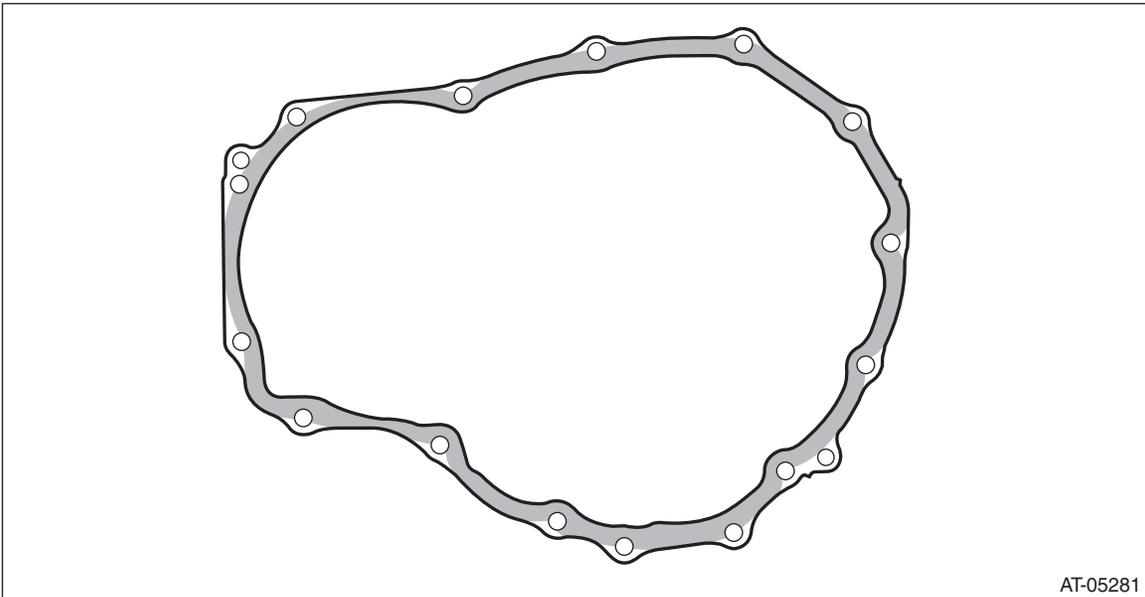
4) Make sure the lubrication pipe and support rod are in vertical position.



5) Apply liquid gasket seamlessly to the mating surface of transmission case.

**Liquid gasket:**

**THREE BOND 1215B or equivalent**



6) Install the transmission case.

**CAUTION:**

**If the transmission case gets in contact with the lubrication pipe and support rod, do not install the transmission case forcibly.**

**NOTE:**

- Install while checking the lubrication pipe and support rod is being inserted properly into transmission case.
- If installing the transmission case is difficult, check if the lubrication pipe and support rod are bent.
- The total number of transmission case mounting bolts is 15.

**Tightening torque:**

**41 N·m (4.2 kgf-m, 30.2 ft-lb)**

7) Install the O-ring to CVTF pipe.

## Transmission Case

### CONTINUOUSLY VARIABLE TRANSMISSION

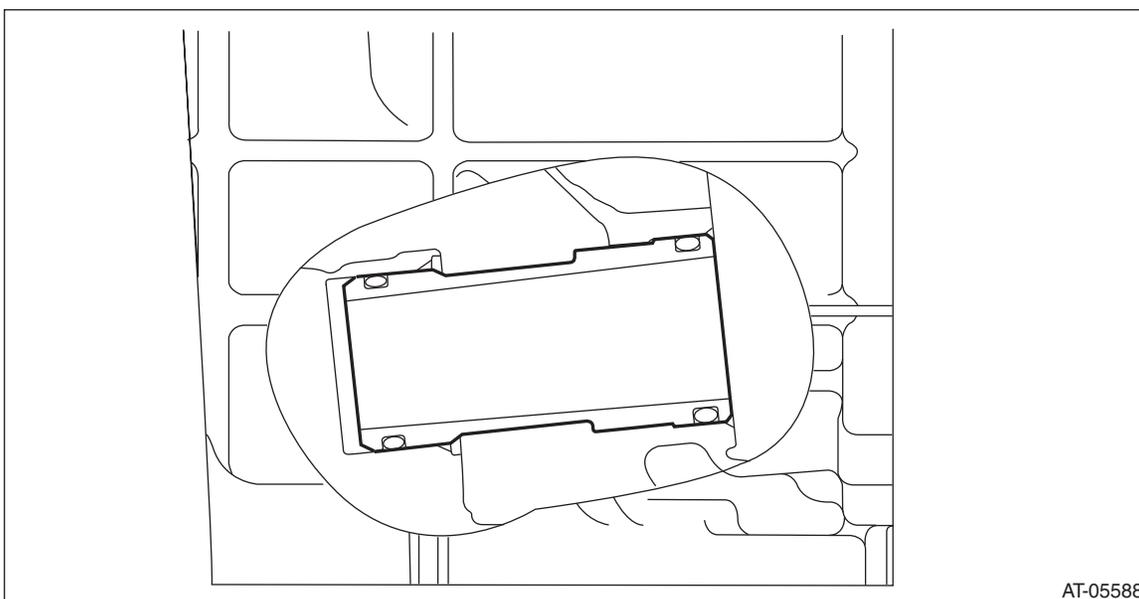
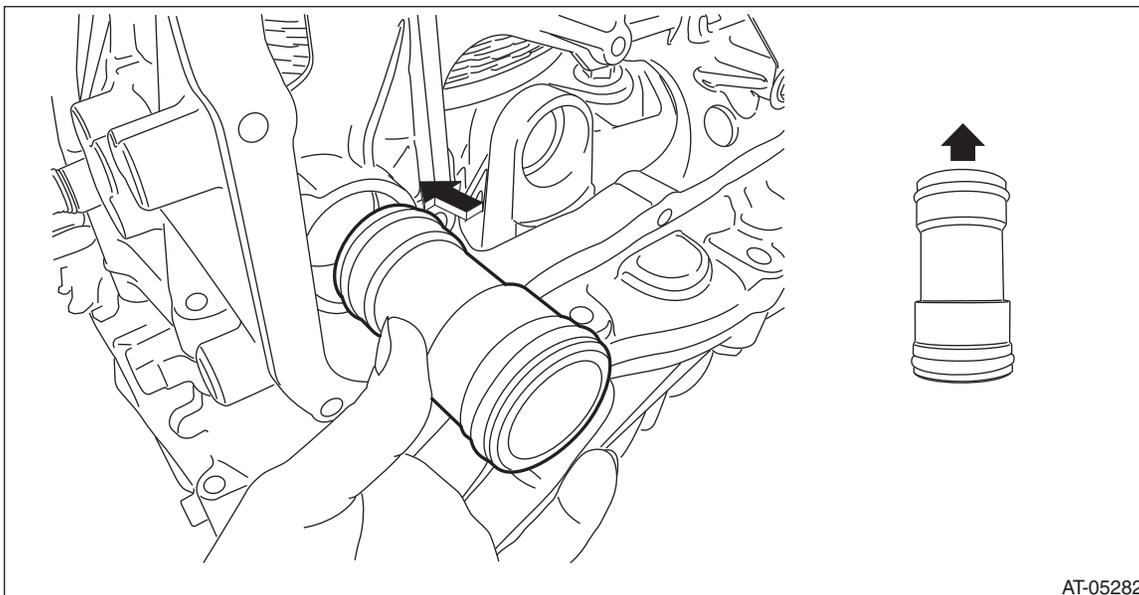
**NOTE:**

Use new O-rings.

8) The smaller opening of CVTF pipe should be inserted to transmission.

**NOTE:**

After installing, make sure the CVTF pipe does not stick out of transmission case.



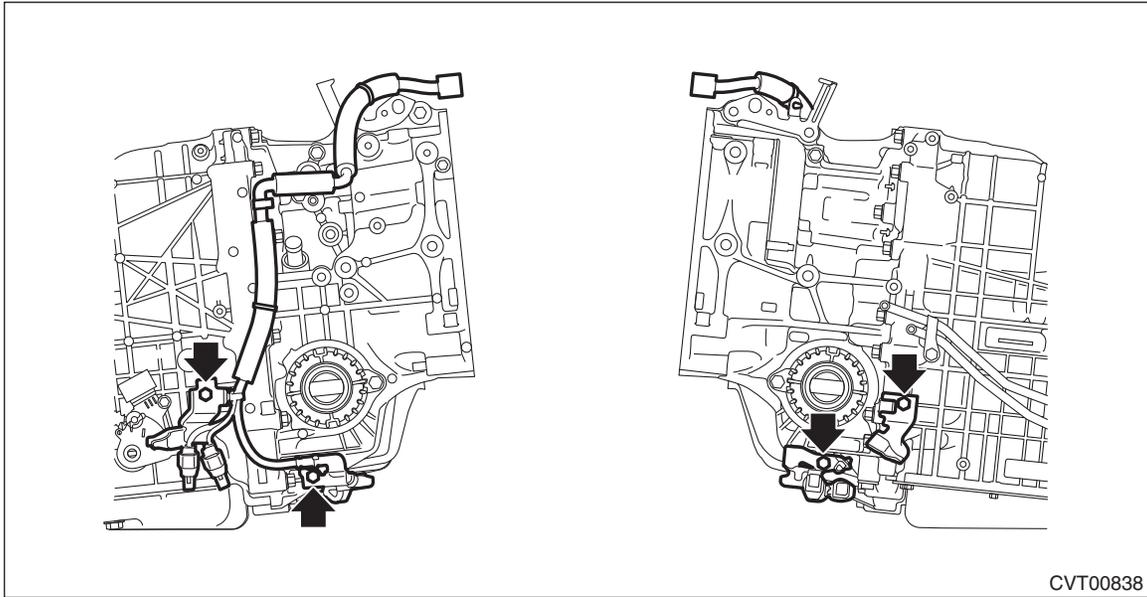
- 9) Install the reduction driven gear. <Ref. to CVT(TR690)-236, INSTALLATION, Reduction Driven Gear.>
- 10) Install the forward clutch assembly. <Ref. to CVT(TR690)-207, INSTALLATION, Forward Clutch Assembly.>
- 11) Install the intermediate case. <Ref. to CVT(TR690)-192, INSTALLATION, Intermediate Case.>
- 12) Install the transfer reduction driven gear assembly. <Ref. to CVT(TR690)-184, INSTALLATION, Transfer Reduction Driven Gear.>
- 13) Install the transfer clutch assembly. <Ref. to CVT(TR690)-173, INSTALLATION, Transfer Clutch.>
- 14) Install the rear drive shaft. <Ref. to CVT(TR690)-167, INSTALLATION, Rear Drive Shaft.>
- 15) Install the extension case. <Ref. to CVT(TR690)-164, INSTALLATION, Extension Case.>
- 16) Install the inhibitor switch. <Ref. to CVT(TR690)-113, INSTALLATION, Inhibitor Switch.>
- 17) Install the oxygen sensor harness and harness bracket.

# Transmission Case

CONTINUOUSLY VARIABLE TRANSMISSION

## Tightening torque:

18 N·m (1.8 kgf·m, 13.3 ft·lb)



18) Install the secondary speed sensor. <Ref. to CVT(TR690)-117, INSTALLATION, Secondary Speed Sensor.>

19) Install the transmission harness. <Ref. to CVT(TR690)-140, INSTALLATION, Transmission Harness.>

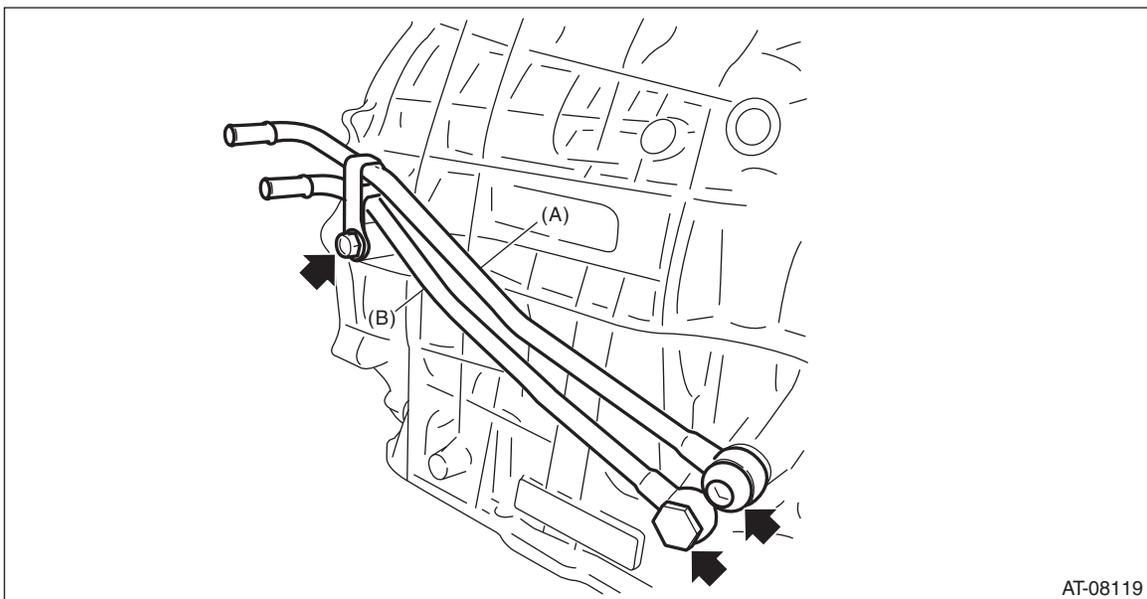
20) Install the control valve body and oil pan. <Ref. to CVT(TR690)-133, INSTALLATION, Control Valve Body.>

21) Install the air breather hose. <Ref. to CVT(TR690)-158, INSTALLATION, Air Breather Hose.>

22) Install the transmission assembly to the vehicle. <Ref. to CVT(TR690)-77, INSTALLATION, Automatic Transmission Assembly.>

## C: DISASSEMBLY

1) Remove the CVTF inlet pipe and CVTF outlet pipe.



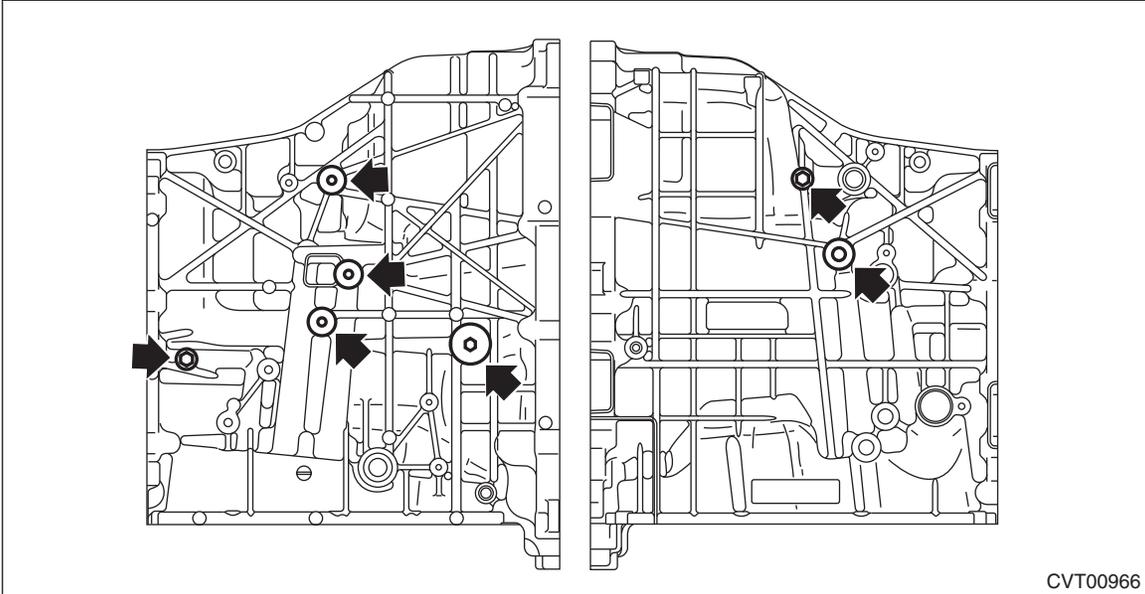
(A) CVTF outlet pipe

(B) CVTF inlet pipe

# Transmission Case

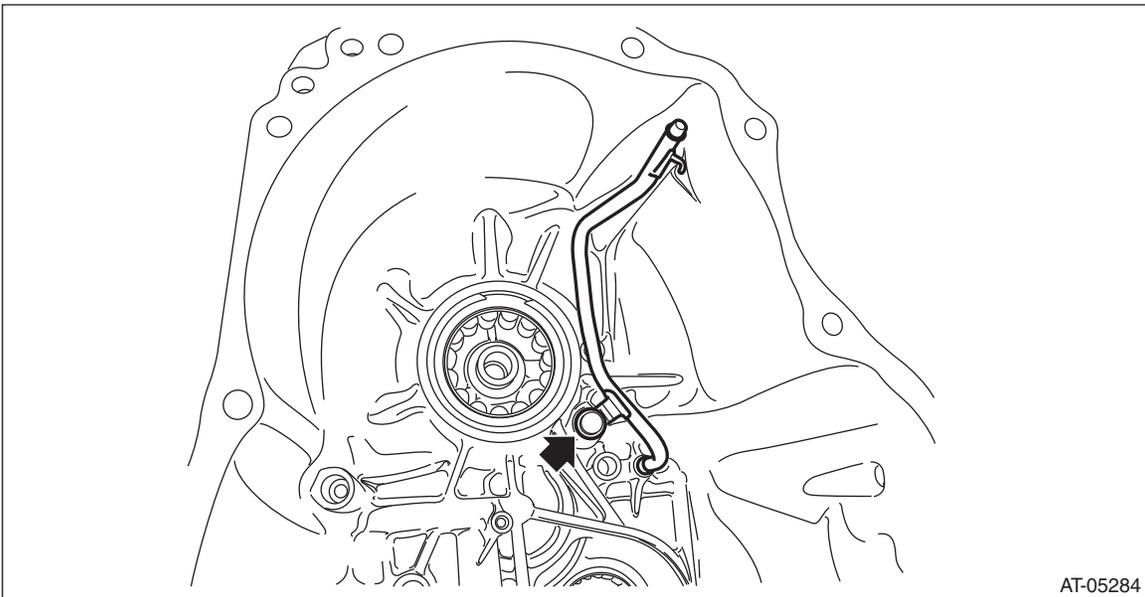
## CONTINUOUSLY VARIABLE TRANSMISSION

2) Remove all plugs from the transmission case.



CVT00966

3) Remove the lubrication pipe.



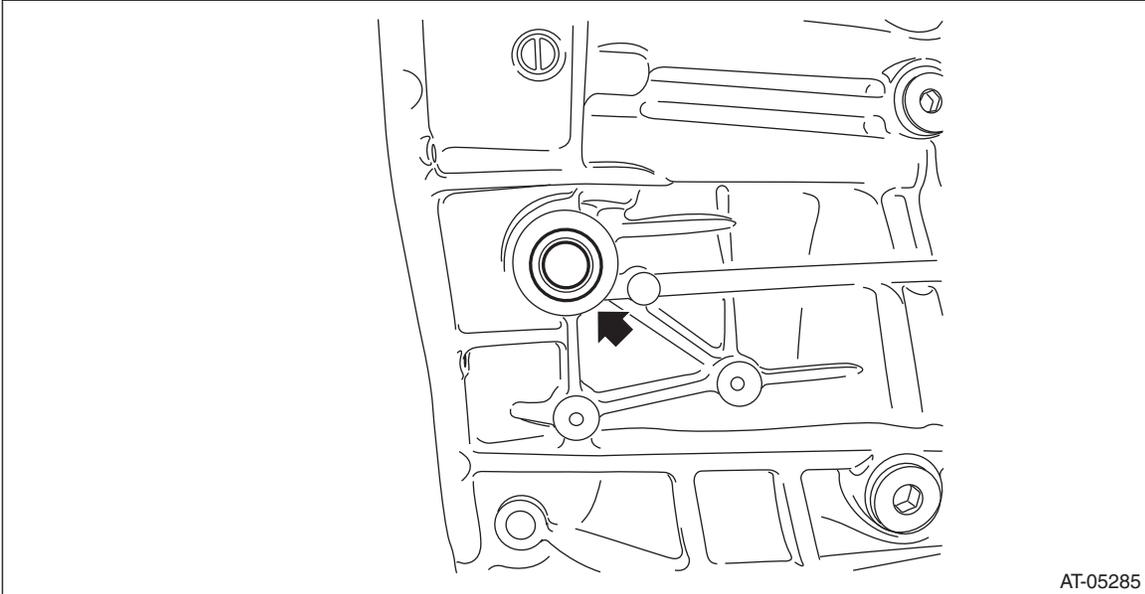
AT-05284

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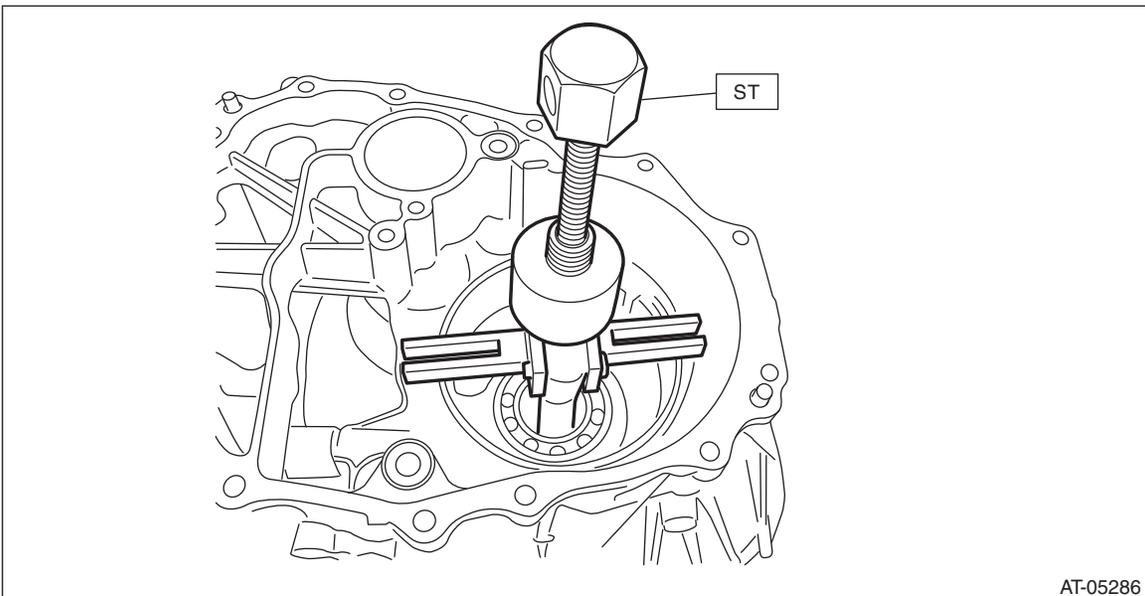
# Transmission Case

CONTINUOUSLY VARIABLE TRANSMISSION

- 4) Remove the oil seal using a screwdriver wrapped with cloth etc.



- 5) Remove the ball bearing from reduction driven gear using ST.  
ST 398527700 PULLER ASSY

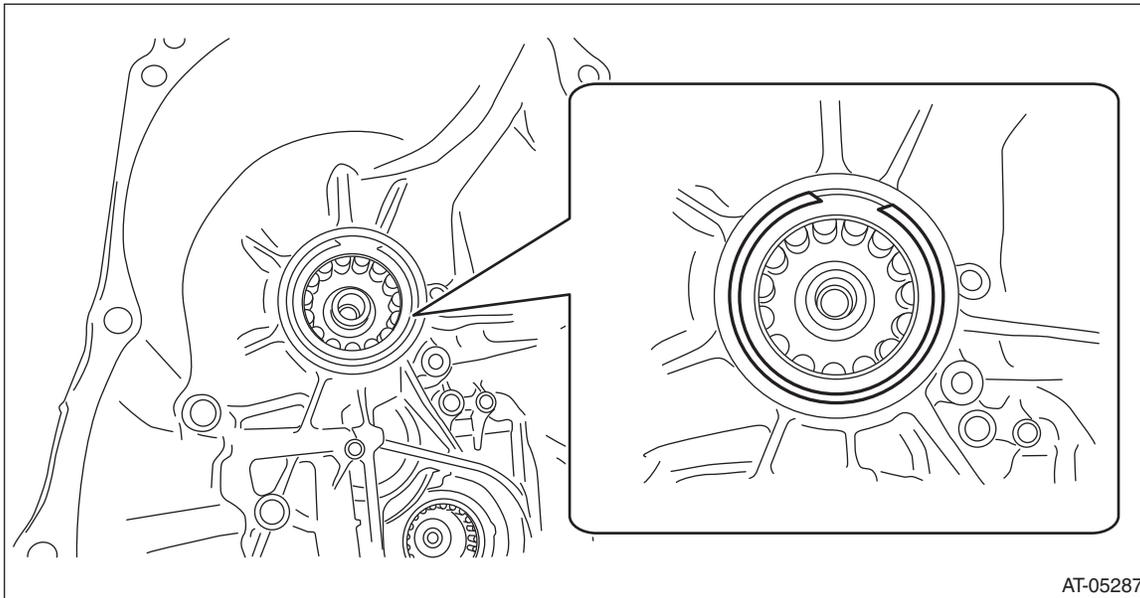


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# Transmission Case

## CONTINUOUSLY VARIABLE TRANSMISSION

6) Remove the snap ring on primary pulley side.

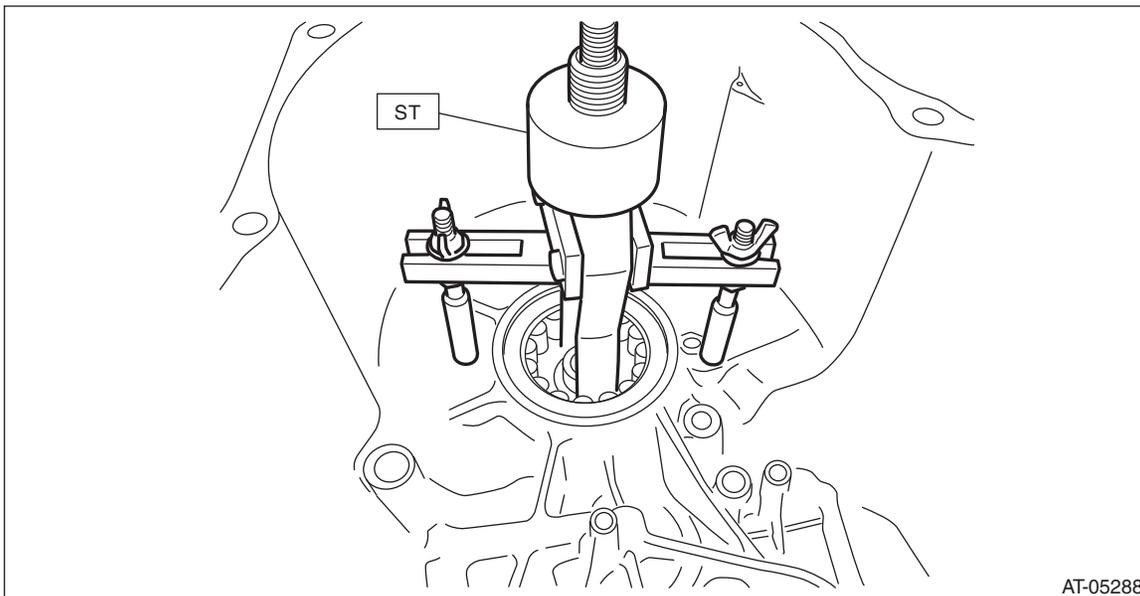


7) Using the ST, remove the roller bearing on primary pulley side.

**NOTE:**

Loosen the bearing area of transmission case using a drier or heat gun.

ST 398527700 PULLER ASSY

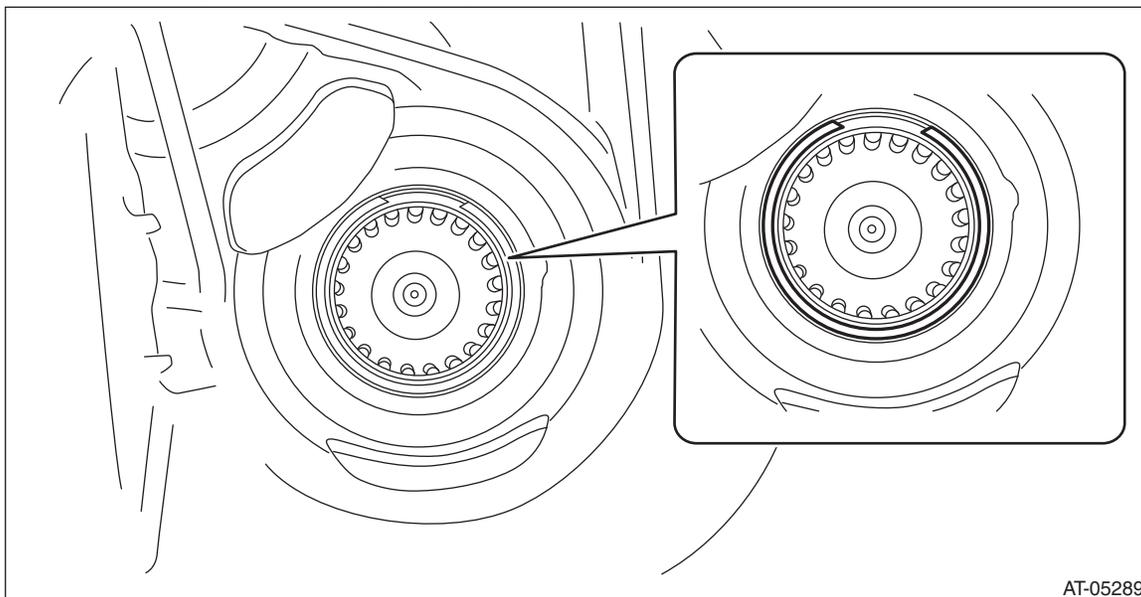


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# Transmission Case

CONTINUOUSLY VARIABLE TRANSMISSION

8) Remove the snap ring on secondary pulley side.

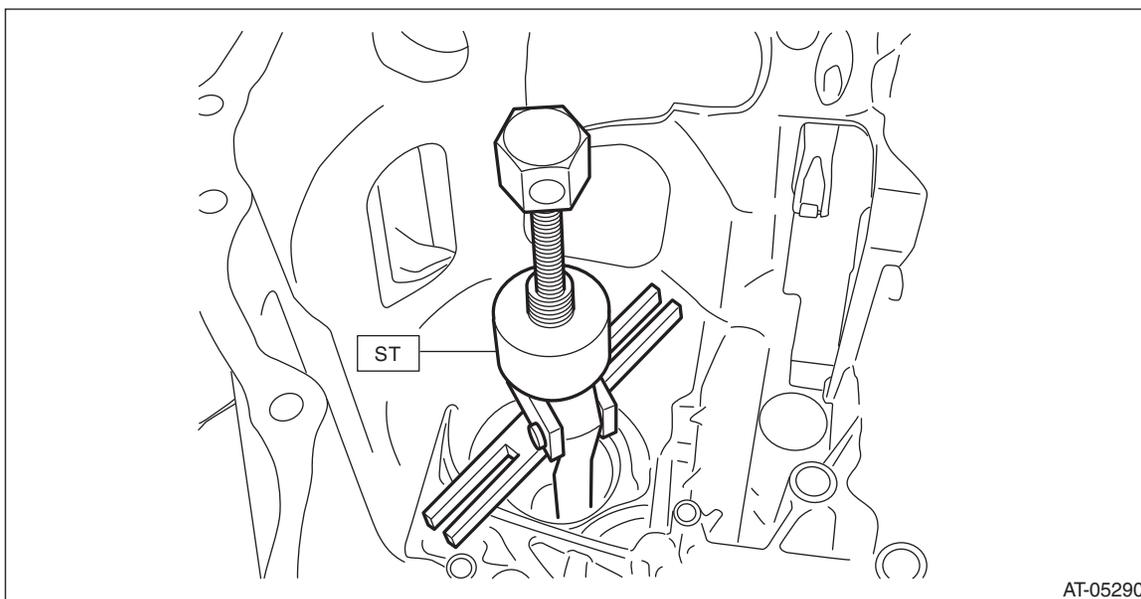


9) Using the ST, remove the roller bearing on secondary pulley side.

NOTE:

Loosen the bearing area of transmission case using a drier or heat gun.

ST 398527700 PULLER ASSY



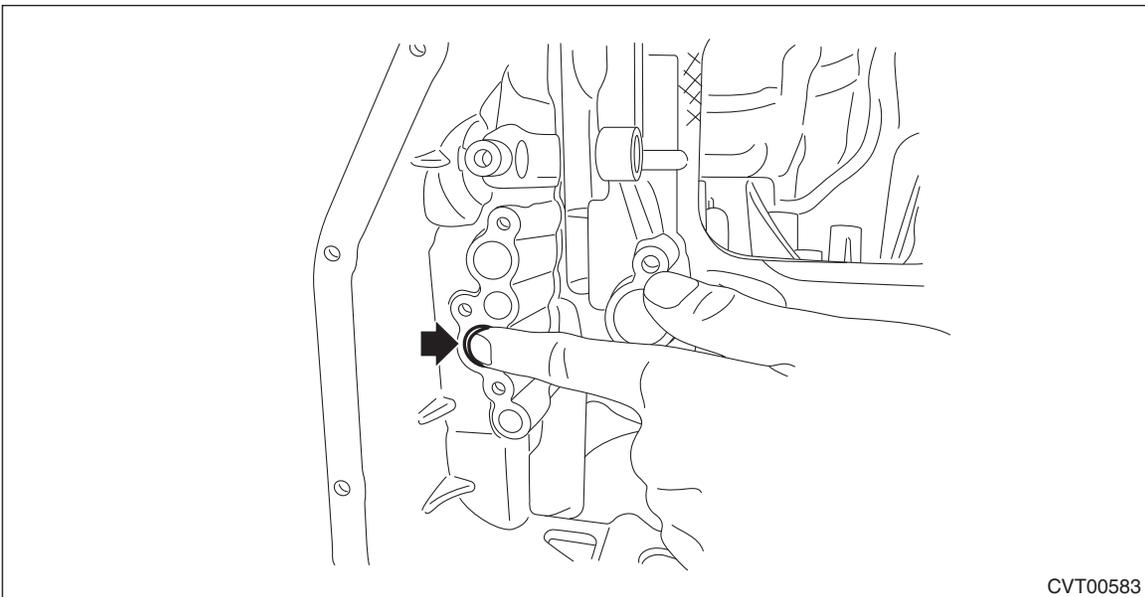
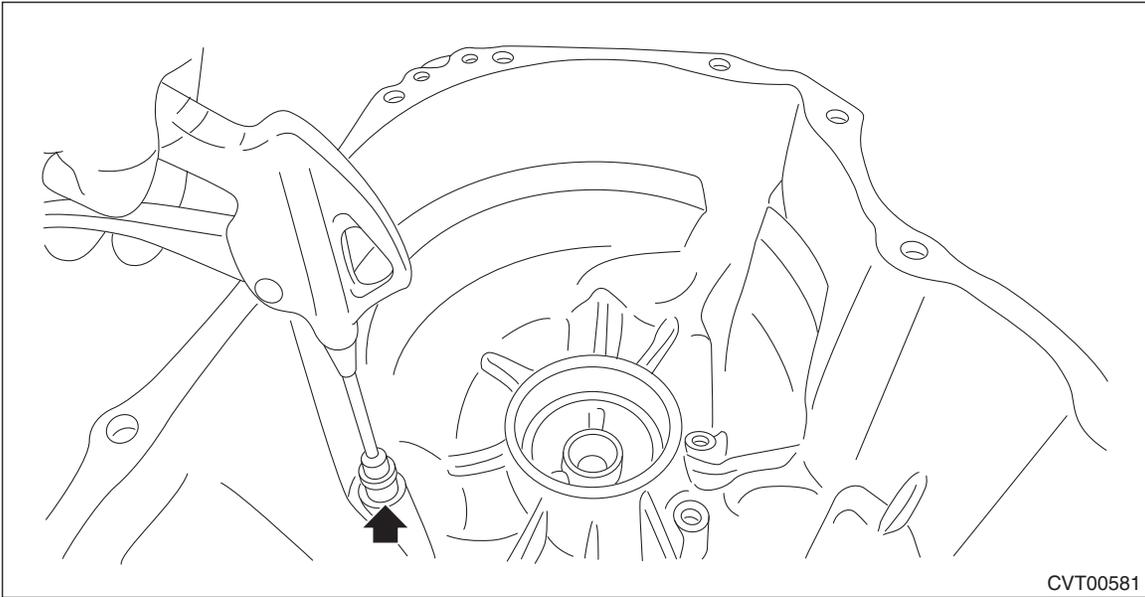
10) Remove the CVTF filter by blowing compressed air through the transmission case hole.

# Transmission Case

## CONTINUOUSLY VARIABLE TRANSMISSION

### NOTE:

Hold the CVTF filter with a finger to prevent compressed air from leaking.



### D: ASSEMBLY

1) Install the CVTF filter.

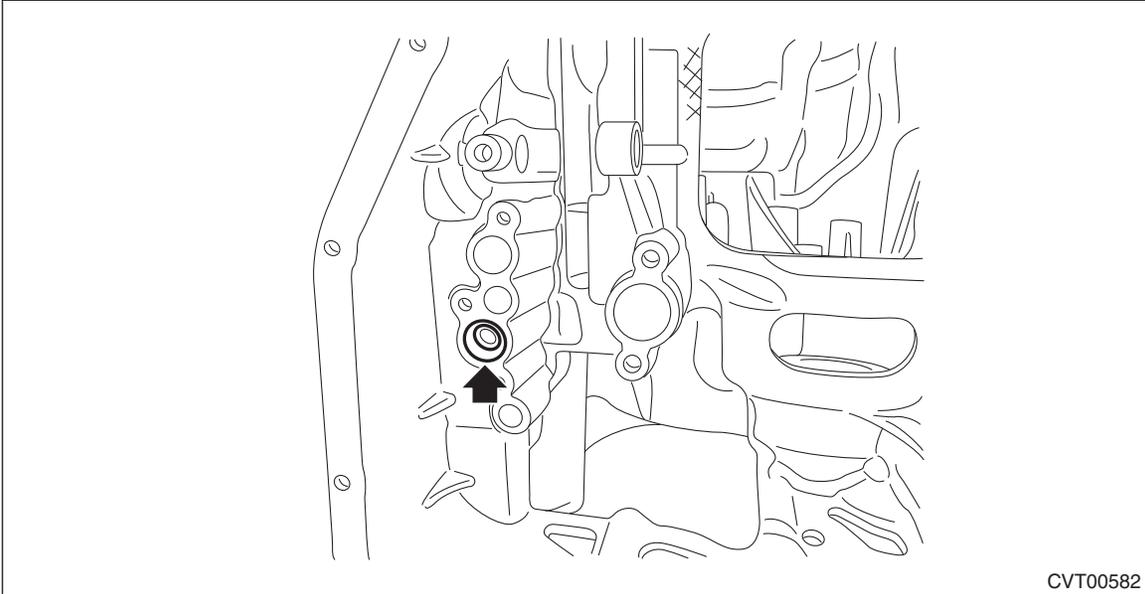
### NOTE:

- Use a new CVTF filter.
- Apply CVTF to the CVTF filter.

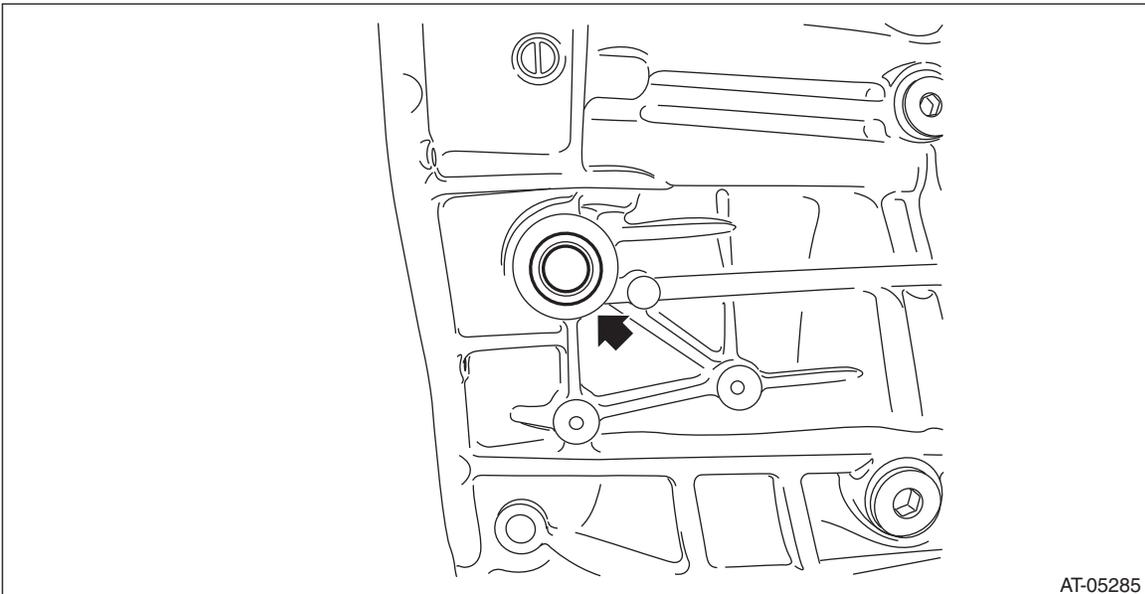
# Transmission Case

CONTINUOUSLY VARIABLE TRANSMISSION

- Make sure that the CVTF filter does not protrude from the transmission case.



- 2) Using the ST, install the oil seal.  
ST 18657AA000 INSTALLER



- 3) Using ST1 and ST2, install the ball bearing on the reduction gear side.

# Transmission Case

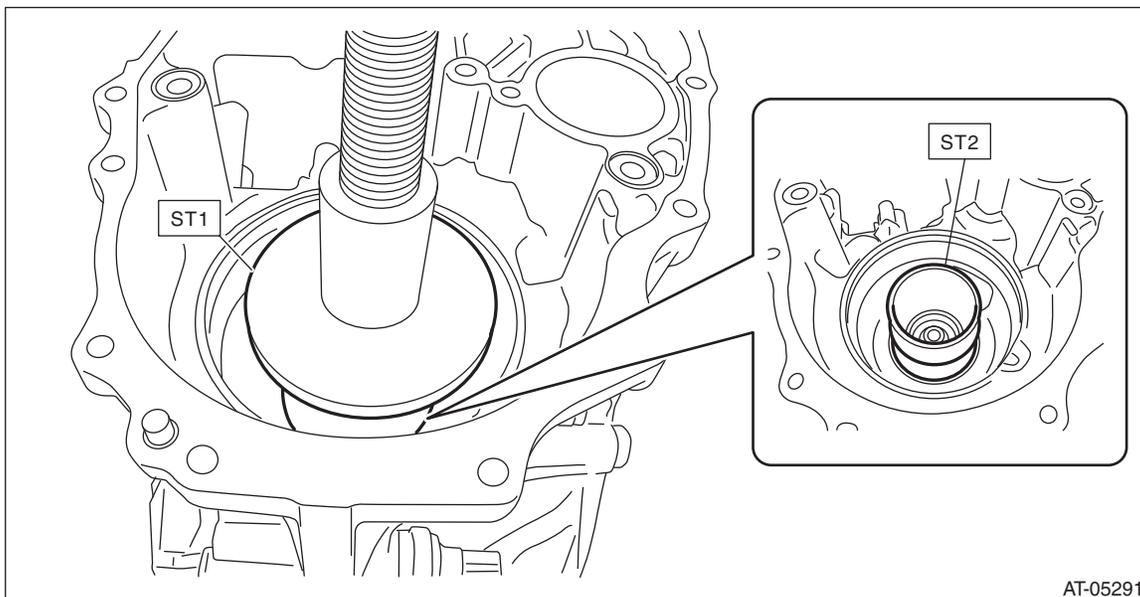
## CONTINUOUSLY VARIABLE TRANSMISSION

### NOTE:

Use a new ball bearing.

ST1 398177700 INSTALLER

ST2 499755602 PRESS SNAP RING



4) Using ST1 and ST2, install the roller bearing on primary pulley side.

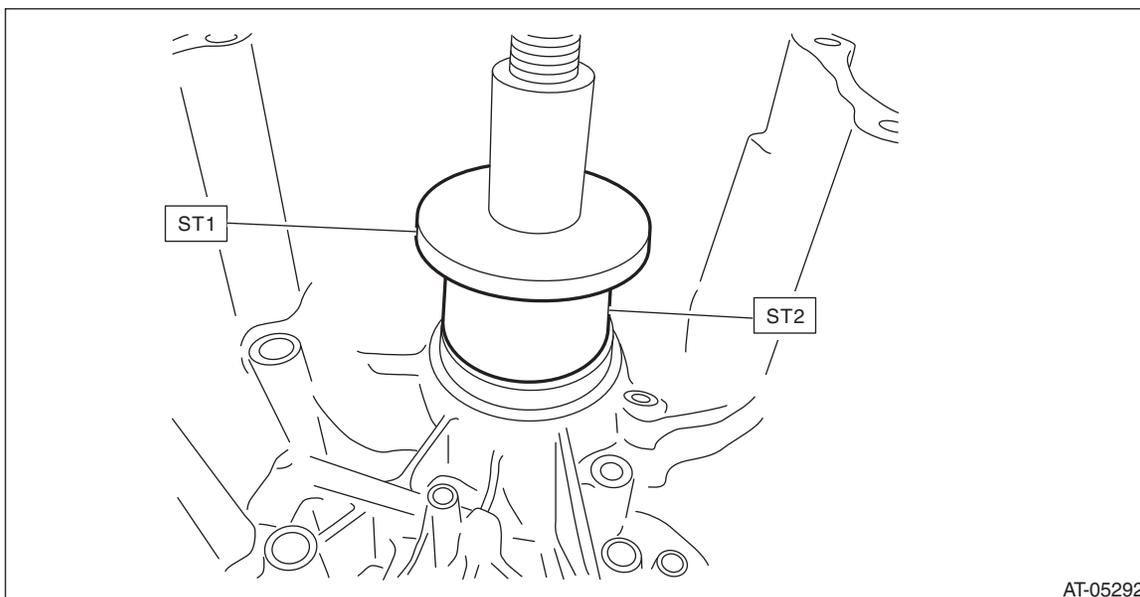
### NOTE:

- Use a new roller bearing.

- Make adjustment so that the press gets in contact with the center of ST2.

ST1 398177700 INSTALLER

ST2 20299AG010 BASE



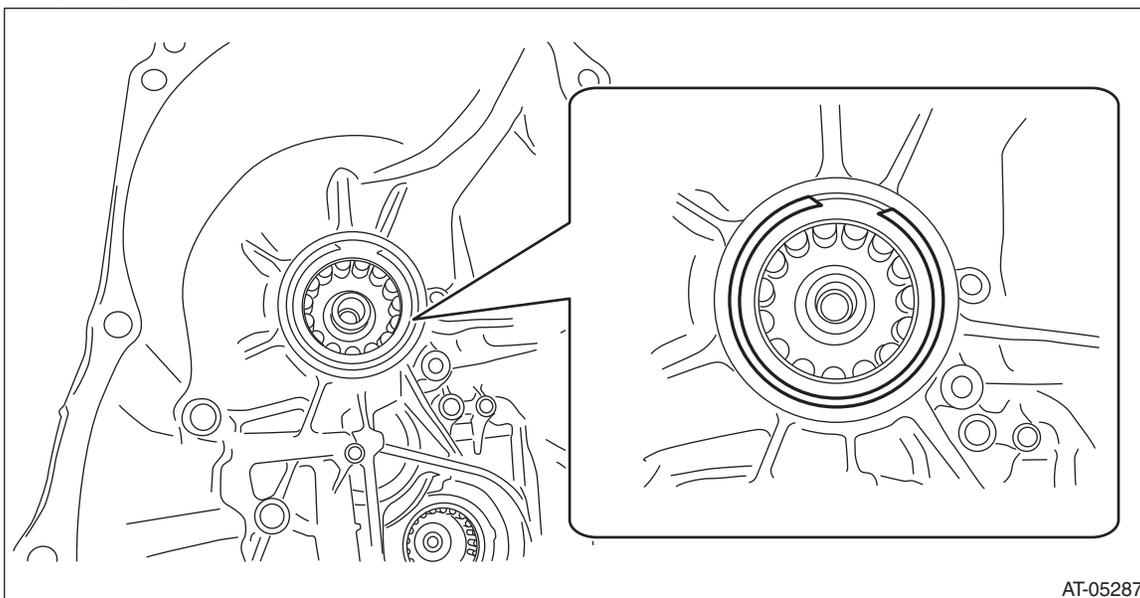
5) Install the snap ring on primary pulley side.

# Transmission Case

CONTINUOUSLY VARIABLE TRANSMISSION

**NOTE:**

Use new snap rings.



AT-05287

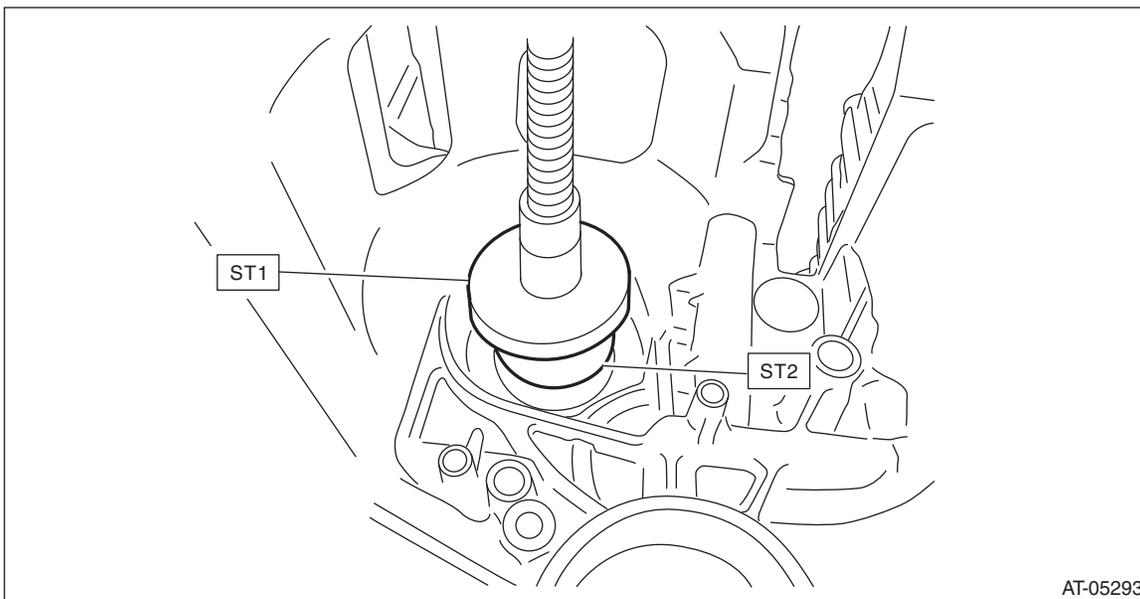
6) Using ST1 and ST2, install the roller bearing on secondary pulley side.

**NOTE:**

- Use a new roller bearing.
- Make adjustment so that the press gets in contact with the center of ST2.

ST1 398177700 INSTALLER

ST2 499755602 PRESS SNAP RING



AT-05293

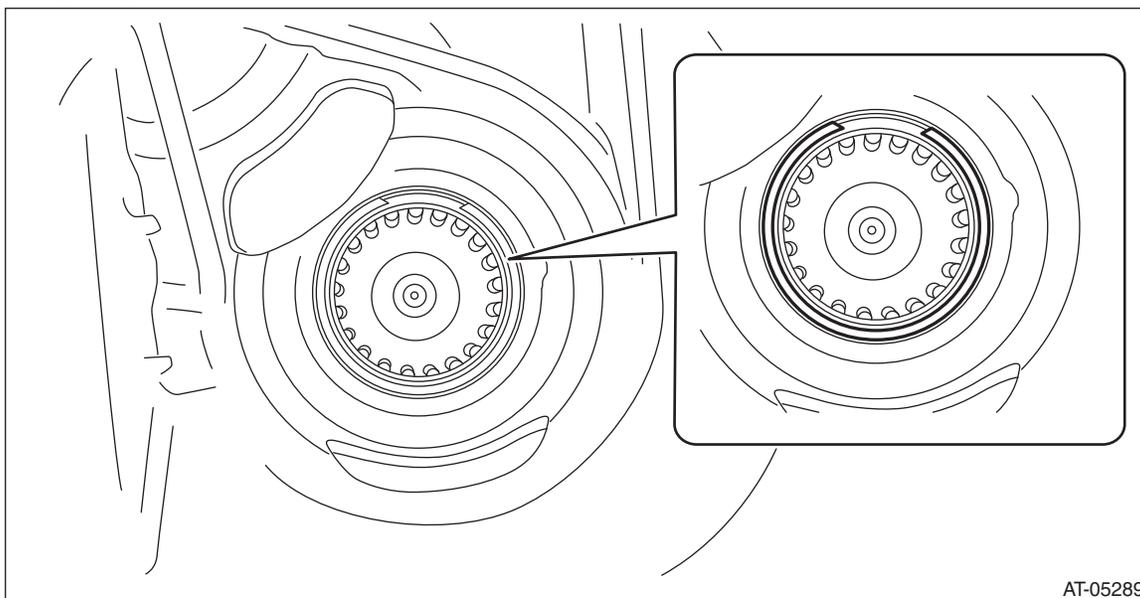
7) Install the snap ring on secondary pulley side.

# Transmission Case

## CONTINUOUSLY VARIABLE TRANSMISSION

### NOTE:

Use new snap rings.



8) Install all plugs.

### NOTE:

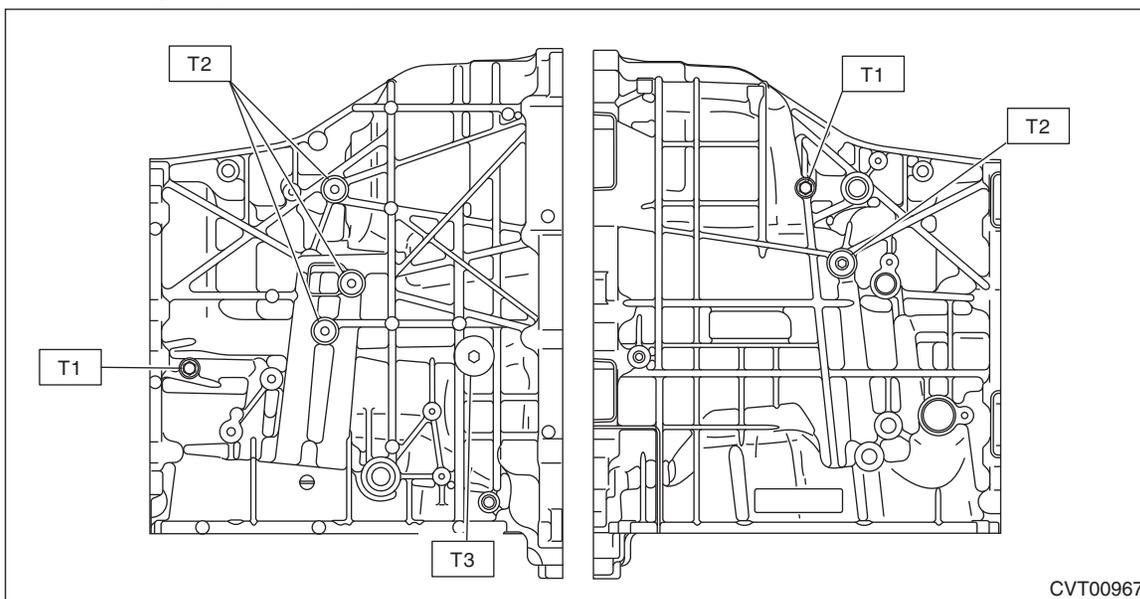
Use new gaskets and O-rings.

### Tightening torque:

**T1: 13 N·m (1.3 kgf-m, 9.6 ft-lb)**

**T2: 25 N·m (2.5 kgf-m, 18.4 ft-lb)**

**T3: 35 N·m (3.5 kgf-m, 25.8 ft-lb)**



9) Install the lubrication pipe and O-ring.

### NOTE:

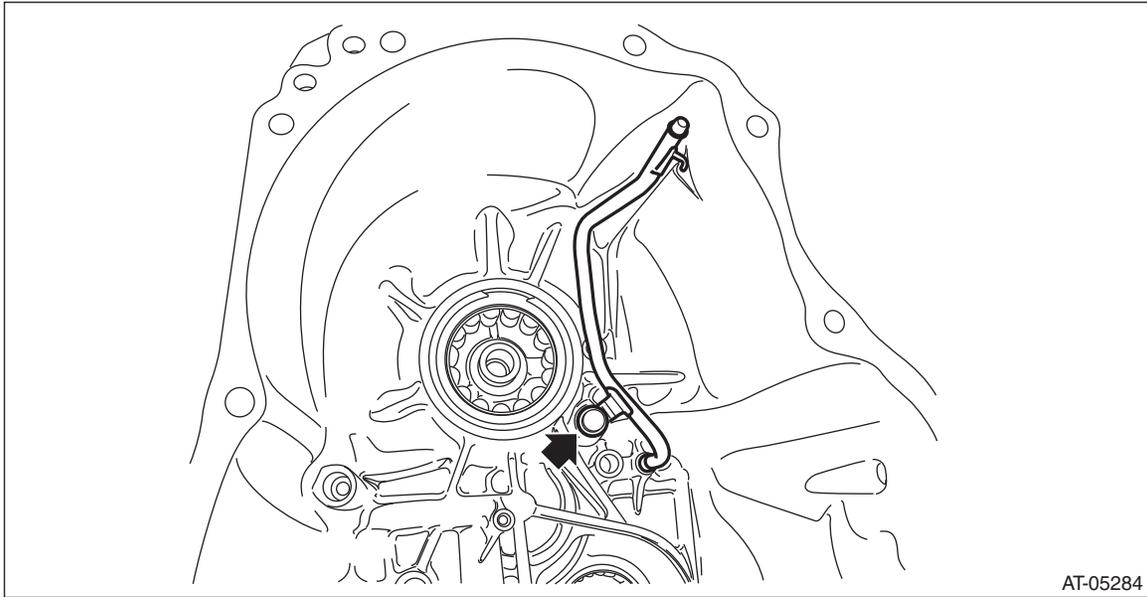
- Use new O-rings.
- Apply CVTF to the O-rings.

# Transmission Case

CONTINUOUSLY VARIABLE TRANSMISSION

## Tightening torque:

**16 N·m (1.6 kgf-m, 11.8 ft-lb)**



10) Install the CVTF inlet pipe and CVTF outlet pipe.

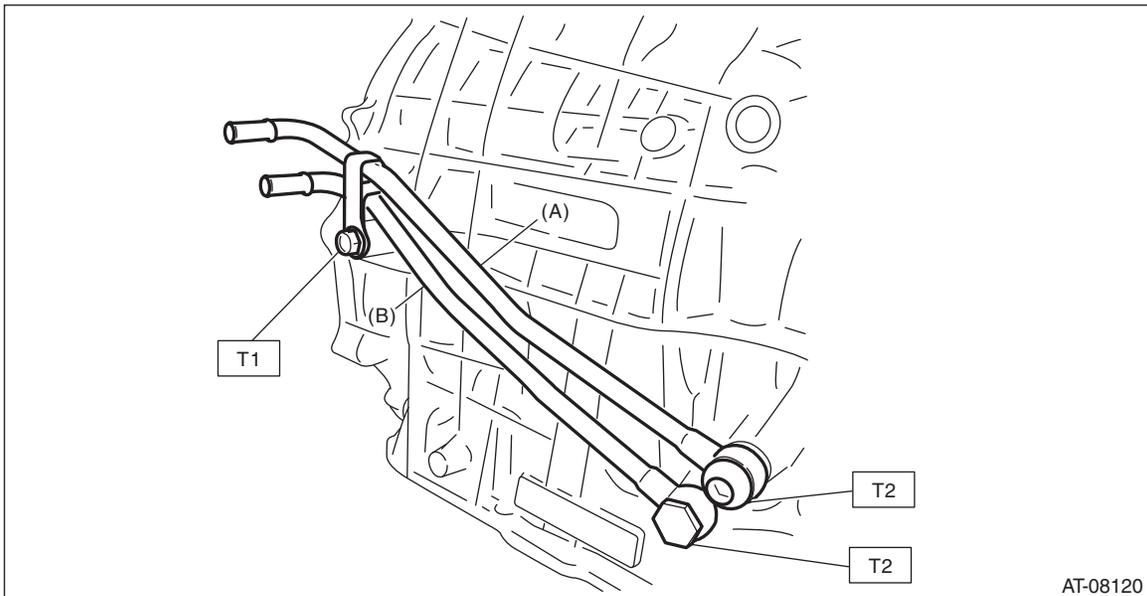
## NOTE:

Use a new gasket.

## Tightening torque:

**T1: 16 N·m (1.6 kgf-m, 11.8 ft-lb)**

**T2: 40 N·m (4.1 kgf-m, 29.5 ft-lb)**



(A) CVTF outlet pipe

(B) CVTF inlet pipe

## E: INSPECTION

- Check the transmission case for damage.
- Check for leakage of CVTF from the connection between converter case and transmission case.
- Check for leakage of CVTF from the connection between intermediate case and transmission case.
- Check the lubrication pipe for bend or damage.

**CVT(TR690)-261**

## Transmission Case

### CONTINUOUSLY VARIABLE TRANSMISSION

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- Check the bearing for smooth operation.
- Check the bearing for seizure or wear.

### **F: ADJUSTMENT**

#### NOTE:

When replacing the transmission case with a new part, perform the following check and adjustment for the selection.

- Select the thrust bearing for the forward clutch assembly. <Ref. to CVT(TR690)-233, ADJUSTMENT, Forward Clutch Assembly.>
- Select the snap ring for the reduction gear. <Ref. to CVT(TR690)-240, ADJUSTMENT, Reduction Driven Gear.>

## 42.Primary Pulley and Secondary Pulley

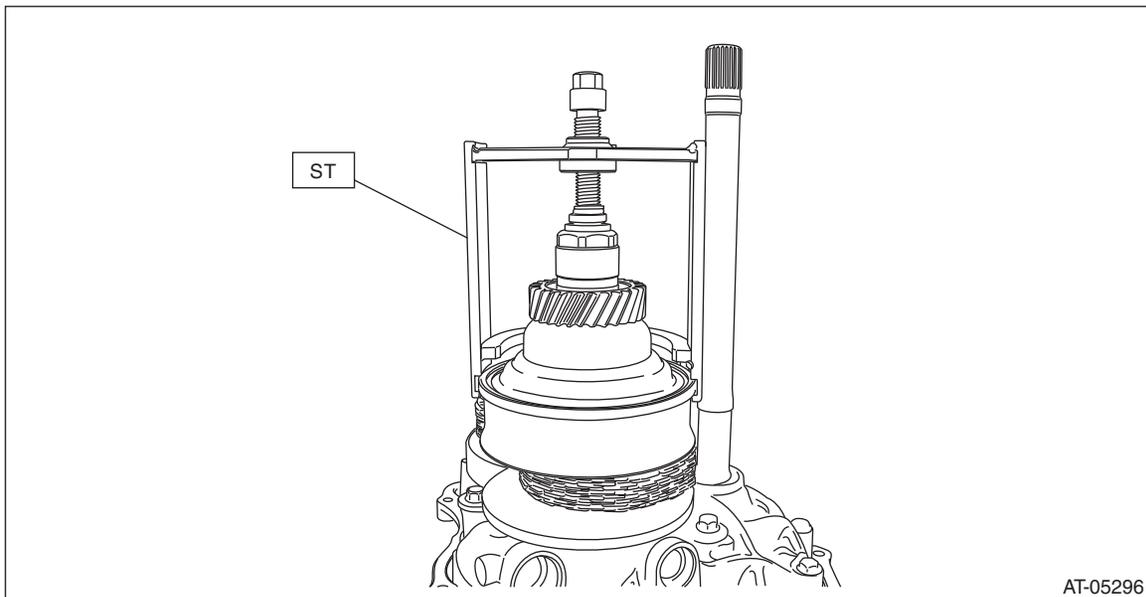
### A: REMOVAL

#### NOTE:

Always replace primary pulley and secondary pulley as an assembly because they are non-disassembled parts.

- 1) Remove the transmission assembly from the vehicle. <Ref. to CVT(TR690)-59, REMOVAL, Automatic Transmission Assembly.>
- 2) Remove the air breather hose. <Ref. to CVT(TR690)-156, REMOVAL, Air Breather Hose.>
- 3) Remove the oil pan and control valve body. <Ref. to CVT(TR690)-129, REMOVAL, Control Valve Body.>
- 4) Remove the transmission harness. <Ref. to CVT(TR690)-139, REMOVAL, Transmission Harness.>
- 5) Remove the extension case. <Ref. to CVT(TR690)-164, REMOVAL, Extension Case.>
- 6) Remove the rear drive shaft. <Ref. to CVT(TR690)-167, REMOVAL, Rear Drive Shaft.>
- 7) Remove the transfer clutch assembly. <Ref. to CVT(TR690)-172, REMOVAL, Transfer Clutch.>
- 8) Remove the transfer reduction driven gear assembly. <Ref. to CVT(TR690)-184, REMOVAL, Transfer Reduction Driven Gear.>
- 9) Remove the intermediate case. <Ref. to CVT(TR690)-191, REMOVAL, Intermediate Case.>
- 10) Remove the forward clutch assembly. <Ref. to CVT(TR690)-206, REMOVAL, Forward Clutch Assembly.>
- 11) Remove the transmission case. <Ref. to CVT(TR690)-246, REMOVAL, Transmission Case.>
- 12) Set the ST to the secondary pulley, and expand the V groove of pulley until the variator chain gets completely loose.

ST 18769AA000 EXPANDER PULLEY

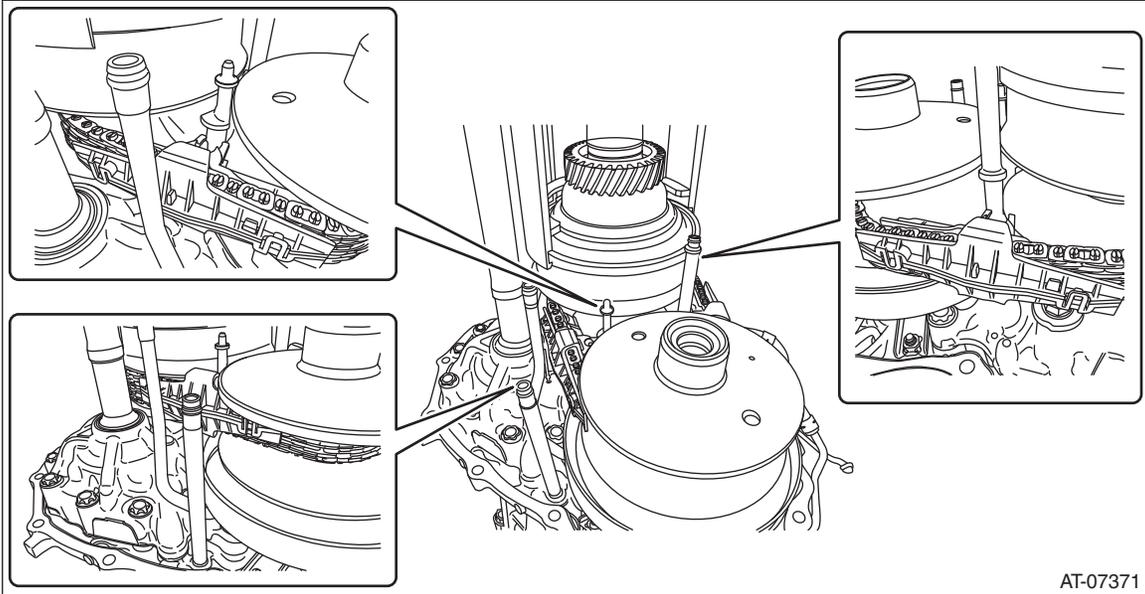


- 13) Remove the chain guide from lubrication pipe and support rod.

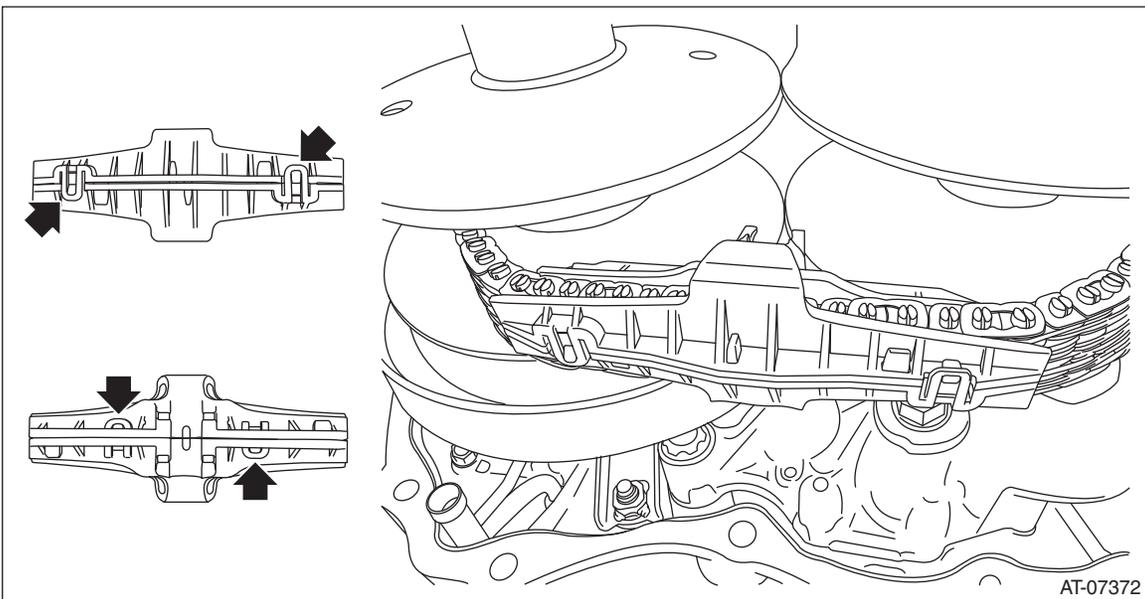
# Primary Pulley and Secondary Pulley

## CONTINUOUSLY VARIABLE TRANSMISSION

14) Remove the lubrication pipe and support rod.



15) Detach the four claws to remove the two chain guides.

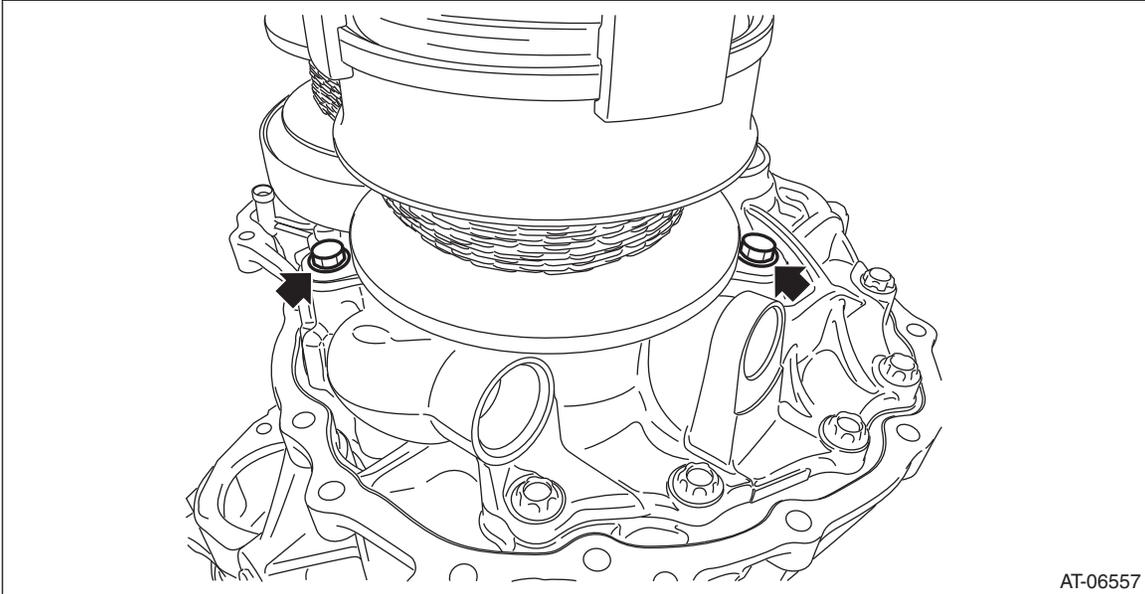


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## Primary Pulley and Secondary Pulley

CONTINUOUSLY VARIABLE TRANSMISSION

16) Remove the secondary pulley mounting bolt.



AT-06557

17) Remove the secondary pulley from drive pinion retainer and intersect the V groove of secondary pulley and V groove of primary pulley. Remove the variator chain from secondary pulley and remove the secondary pulley.

**CAUTION:**

**Cover the V grooves of secondary pulley and primary pulley with cloth to protect the both pulleys and variator chain from scratching.**



AT-05300

18) Remove the variator chain from primary pulley.

# Primary Pulley and Secondary Pulley

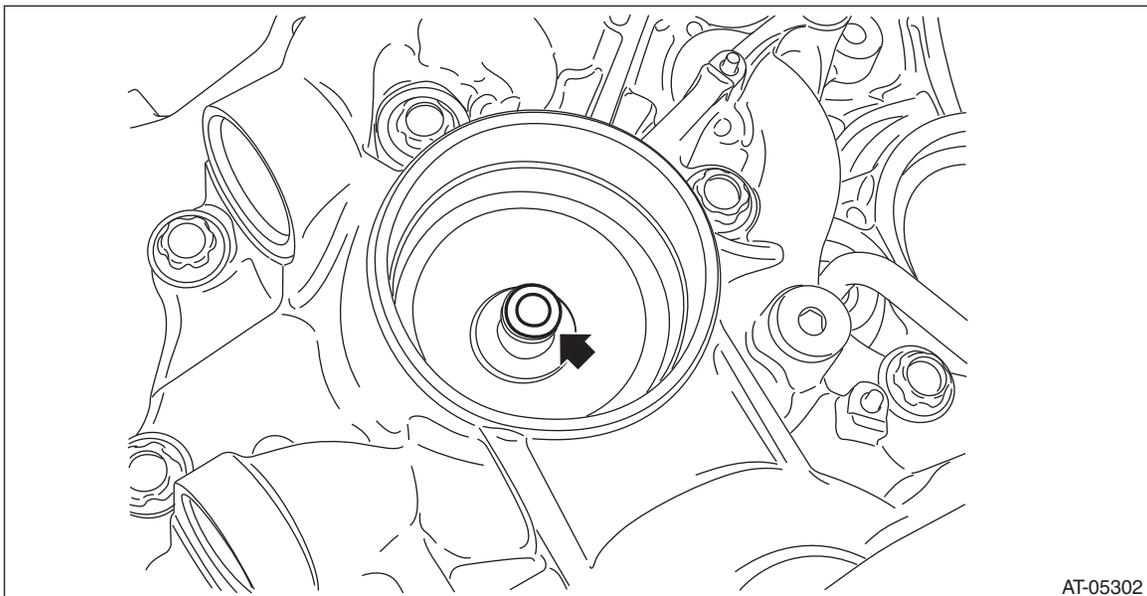
CONTINUOUSLY VARIABLE TRANSMISSION

19) Remove the primary pulley mounting bolt.



20) Remove the primary pulley.

21) Remove the two seal rings from drive pinion retainer.

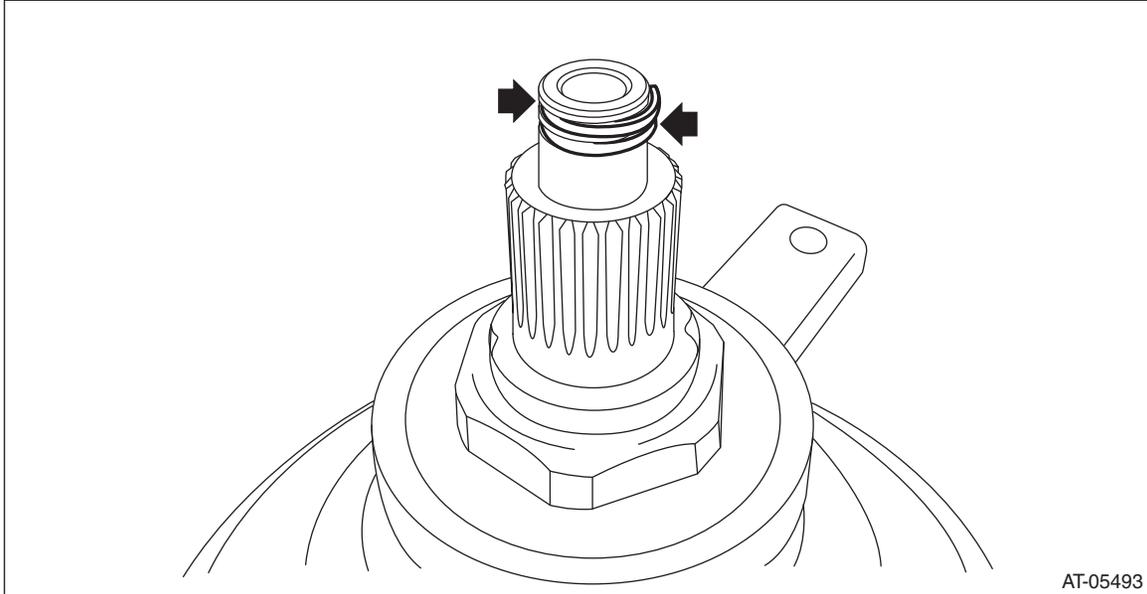


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# Primary Pulley and Secondary Pulley

CONTINUOUSLY VARIABLE TRANSMISSION

22) Remove the two seal rings from primary pulley.



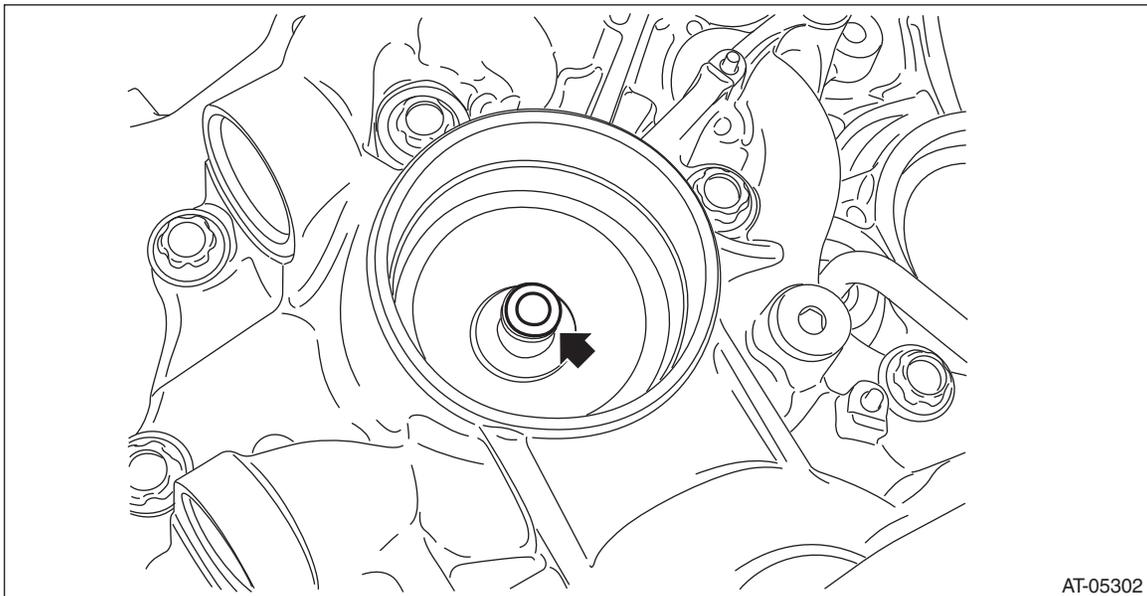
## B: INSTALLATION

1) Select shims for pulley alignment. <Ref. to CVT(TR690)-273, ADJUSTMENT, Primary Pulley and Secondary Pulley.>

2) Install the two seal rings to drive pinion retainer.

### NOTE:

- Use new seal rings.
- Apply CVTF to the seal rings.
- When installing the seal rings, do not expand the seal rings too much.



3) Install the selected shims to the primary pulley bearing catch surface.

4) Install the two seal rings to primary pulley.

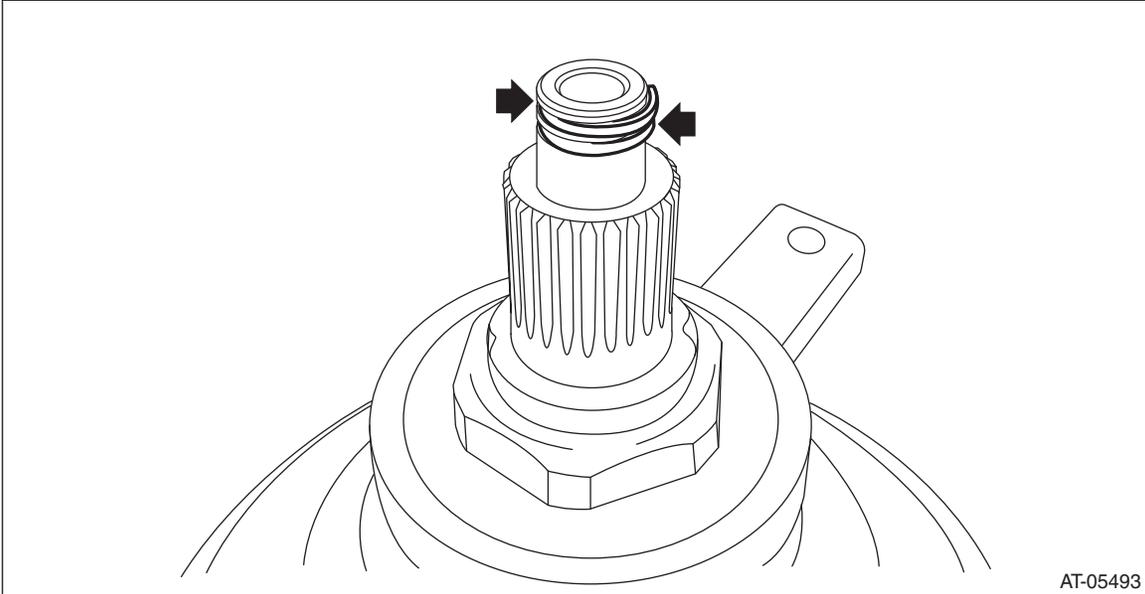
### NOTE:

- Use new seal rings.

# Primary Pulley and Secondary Pulley

CONTINUOUSLY VARIABLE TRANSMISSION

- Apply CVTF to the seal rings.



5) Install the primary pulley and adjust the position of bolt holes of primary bearing retainer and converter case to tighten the primary pulley bolt.

NOTE:

Use a new seal washer.

**Tightening torque:**

**21 N·m (2.1 kgf-m, 15.5 ft-lb)**

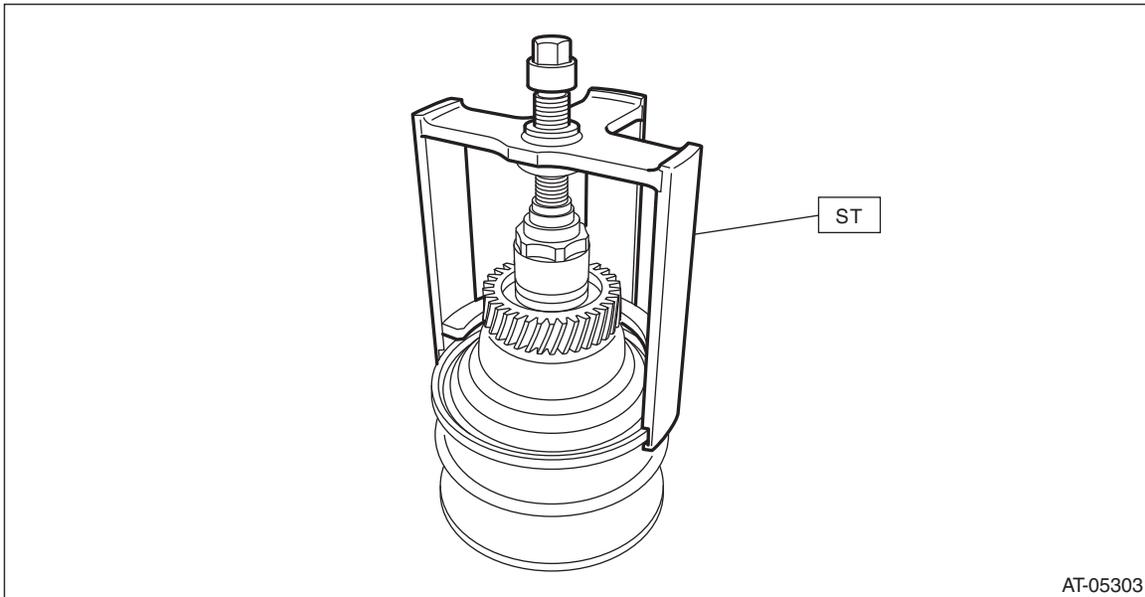


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## Primary Pulley and Secondary Pulley

CONTINUOUSLY VARIABLE TRANSMISSION

- 6) Set the ST to secondary pulley and expand the V groove of pulley.  
ST 18769AA000 EXPANDER PULLEY

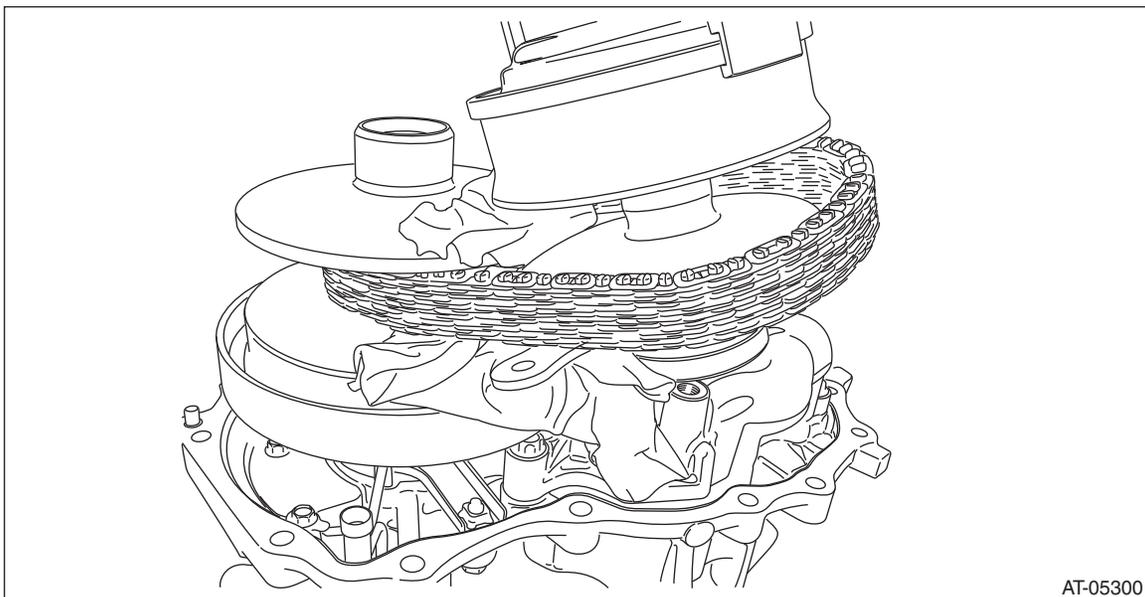


- 7) Place the variator chain on the primary pulley groove and attach the secondary pulley and variator chain together to the drive pinion retainer.

### CAUTION:

**Cover the V grooves of primary pulley and secondary pulley with cloth to protect the both pulleys and variator chain from scratching.**

- (1) Place the variator chain on primary pulley.
- (2) Intersect the V groove of primary pulley and the V groove of secondary pulley and install the secondary pulley while placing the variator chain on secondary pulley.



- (3) While aligning the bolt hole of secondary bearing retainer and the bolt hole of driving pinion retainer, install the secondary pulley to drive pinion retainer.
- 8) Install the secondary pulley bolt.

### NOTE:

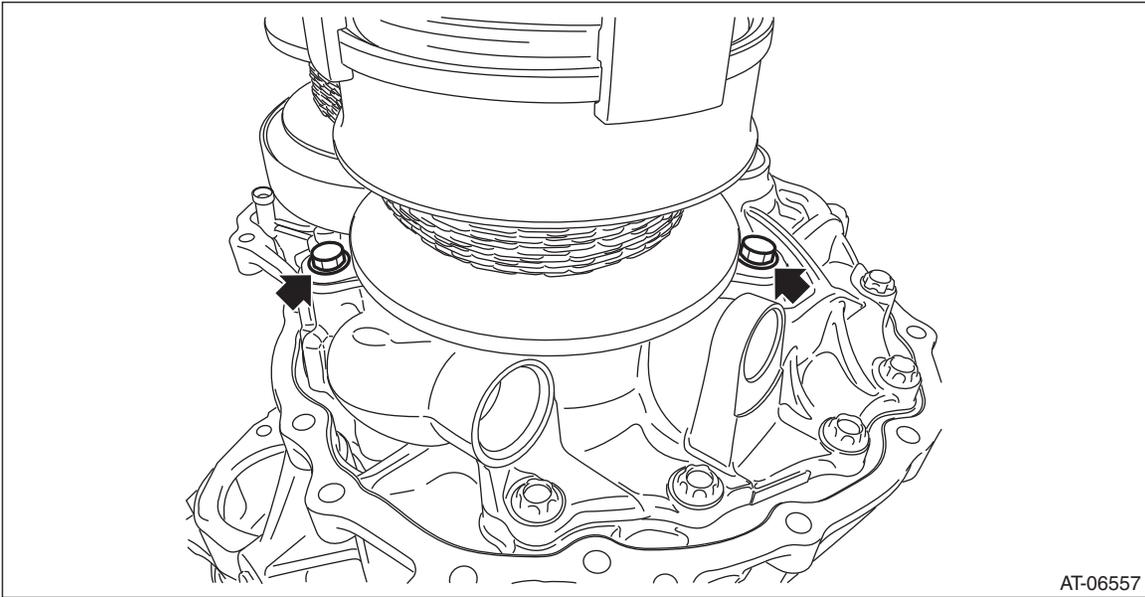
Apply CVTF to the bolt.

# Primary Pulley and Secondary Pulley

CONTINUOUSLY VARIABLE TRANSMISSION

**Tightening torque:**

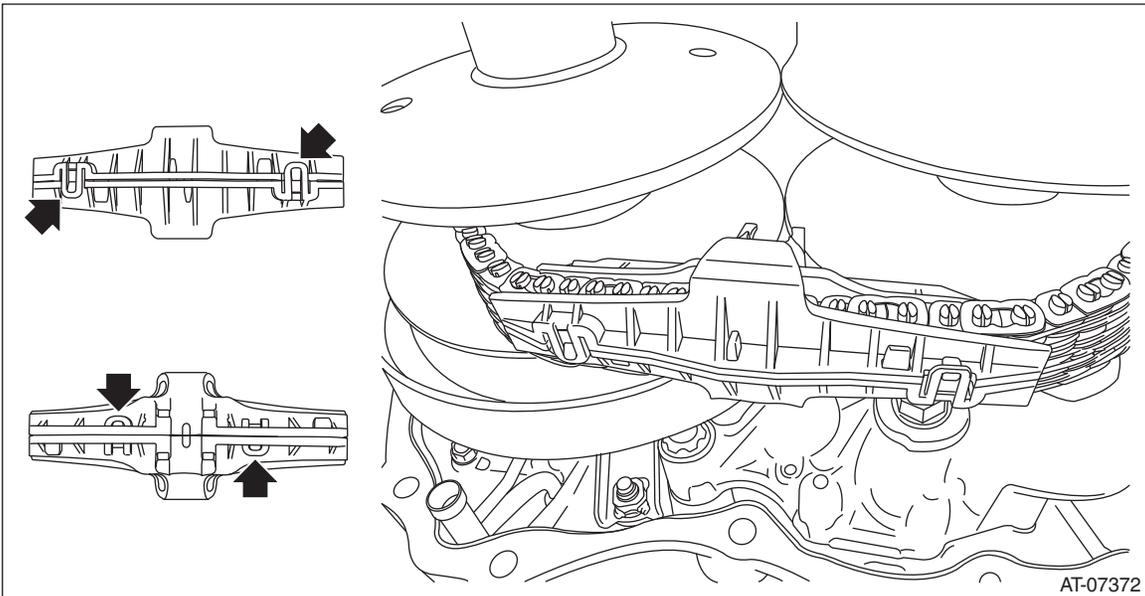
**33 N·m (3.4 kgf·m, 24.3 ft·lb)**



9) Install the chain guide.

**NOTE:**

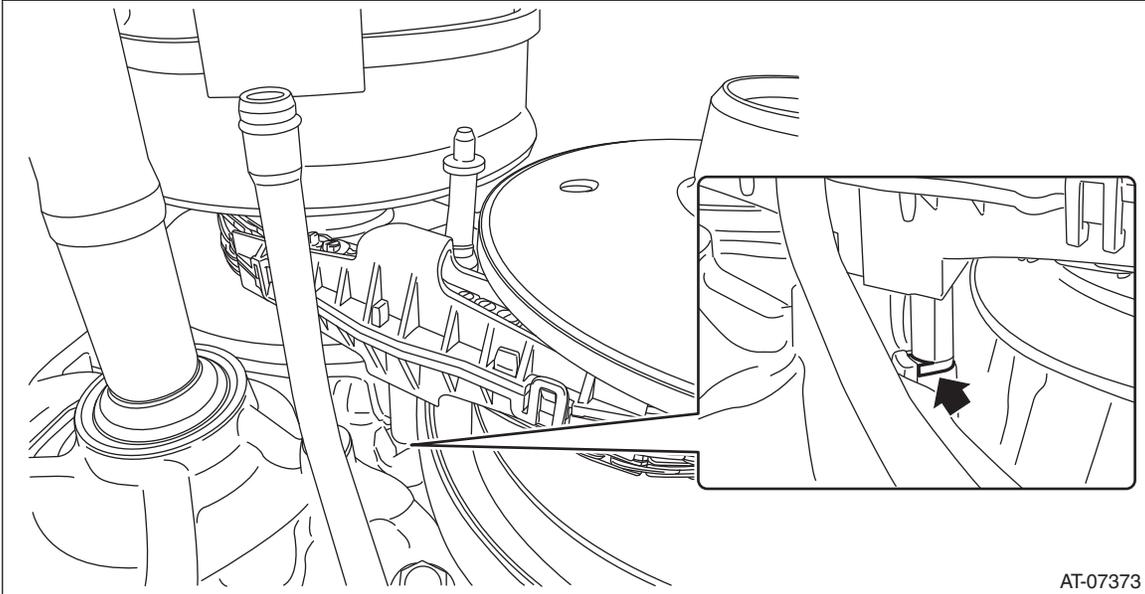
Install it with two claws facing outward and with two claws facing inward.



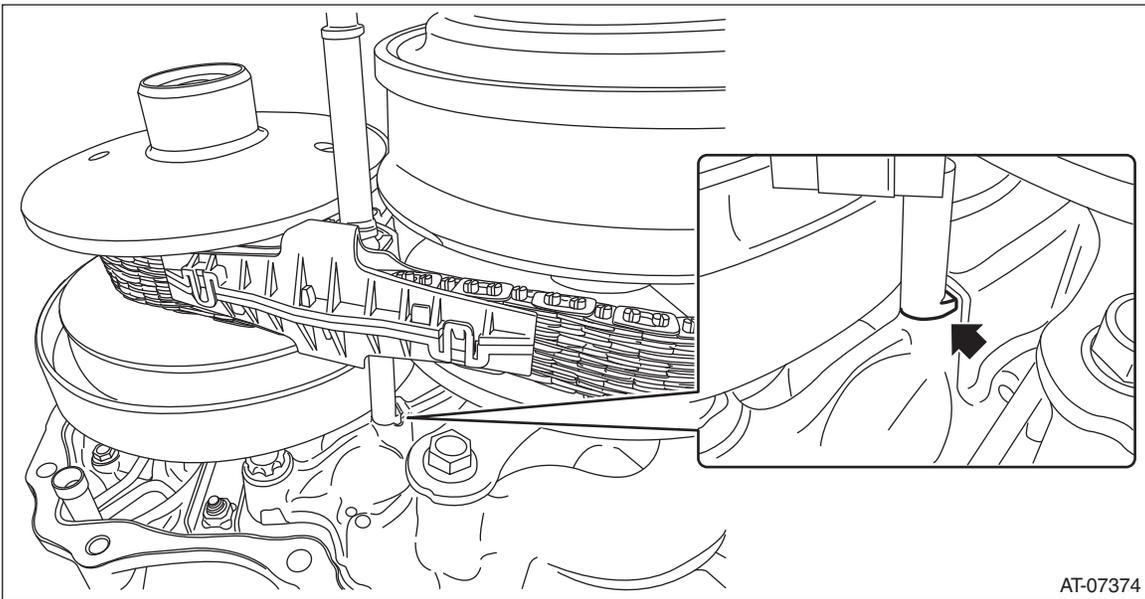
# Primary Pulley and Secondary Pulley

CONTINUOUSLY VARIABLE TRANSMISSION

- 10) Engage the cutout portions of support rod and drive pinion retainer and install the support rod.



- 11) Engage the cutout portions of lubrication pipe and drive pinion retainer and install the lubrication pipe.

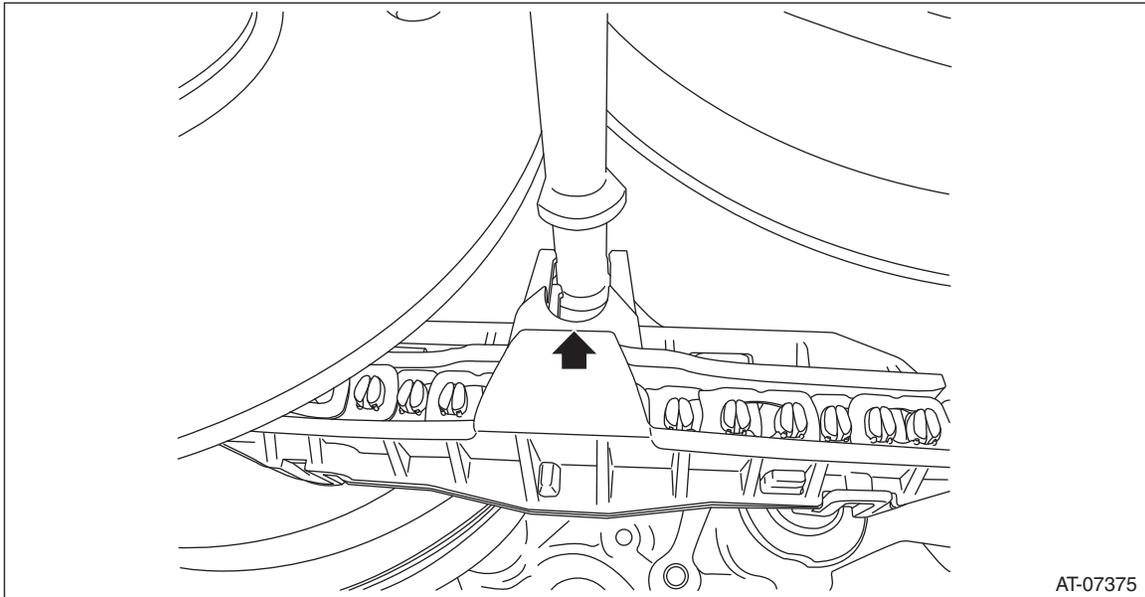


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## Primary Pulley and Secondary Pulley

### CONTINUOUSLY VARIABLE TRANSMISSION

12) Install the chain guide so that the lubrication pipe and support rod run through between the protrusions of each chain guide. Then remove the ST (EXPANDER PULLEY).

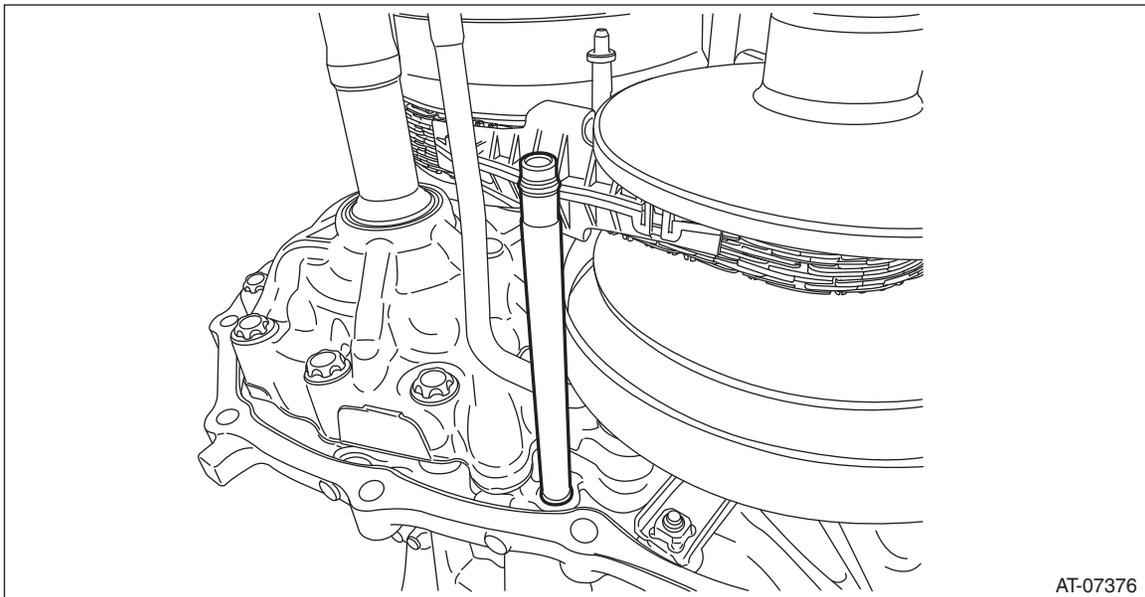


13) Install the O-ring to the lubrication pipe.

#### NOTE:

Use new O-rings.

14) Install the lubrication pipe.



15) Install the transmission case. <Ref. to CVT(TR690)-248, INSTALLATION, Transmission Case.>

16) Install the forward clutch assembly. <Ref. to CVT(TR690)-207, INSTALLATION, Forward Clutch Assembly.>

17) Install the intermediate case. <Ref. to CVT(TR690)-192, INSTALLATION, Intermediate Case.>

18) Install the transfer reduction driven gear assembly. <Ref. to CVT(TR690)-184, INSTALLATION, Transfer Reduction Driven Gear.>

19) Install the transfer clutch assembly. <Ref. to CVT(TR690)-173, INSTALLATION, Transfer Clutch.>

20) Install the rear drive shaft. <Ref. to CVT(TR690)-167, INSTALLATION, Rear Drive Shaft.>

21) Install the extension case. <Ref. to CVT(TR690)-164, INSTALLATION, Extension Case.>

22) Install the transmission harness. <Ref. to CVT(TR690)-140, INSTALLATION, Transmission Harness.>

23) Install the control valve body and oil pan. <Ref. to CVT(TR690)-133, INSTALLATION, Control Valve Body.>

# Primary Pulley and Secondary Pulley

CONTINUOUSLY VARIABLE TRANSMISSION

24) Install the air breather hose. <Ref. to CVT(TR690)-158, INSTALLATION, Air Breather Hose.>

25) Install the transmission assembly to the vehicle. <Ref. to CVT(TR690)-77, INSTALLATION, Automatic Transmission Assembly.>

## C: INSPECTION

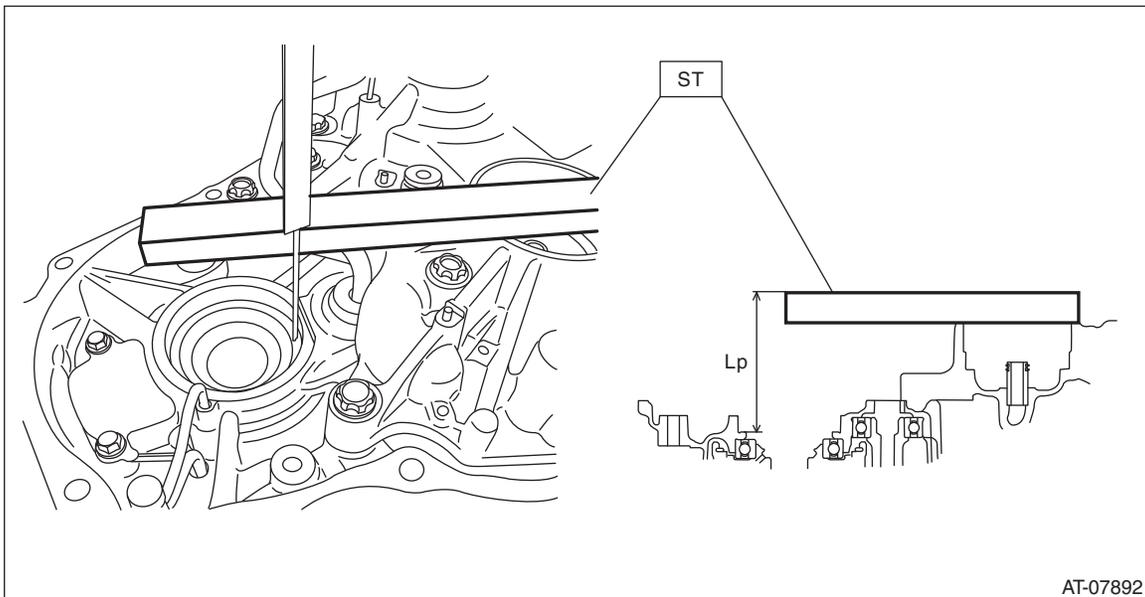
- Check the surface of primary and secondary pulley cones for damage or wear.
- Check the primary and secondary pulley for damage.
- Check the bearing for seizure or wear.
- Apply CVTF to bearing and rotate the bearing to check for noise or dragging etc.

## D: ADJUSTMENT

### 1. PROCEDURE IN REPLACEMENT OF PRIMARY AND SECONDARY PULLEY, OR IN REPLACEMENT OF PRIMARY PULLEY, SECONDARY PULLEY AND VARIATOR CHAIN

1) Measure depth "Lp" from the ST upper face to the primary pulley bearing catch surface at several points and calculate the average.

ST 499575400 GAUGE

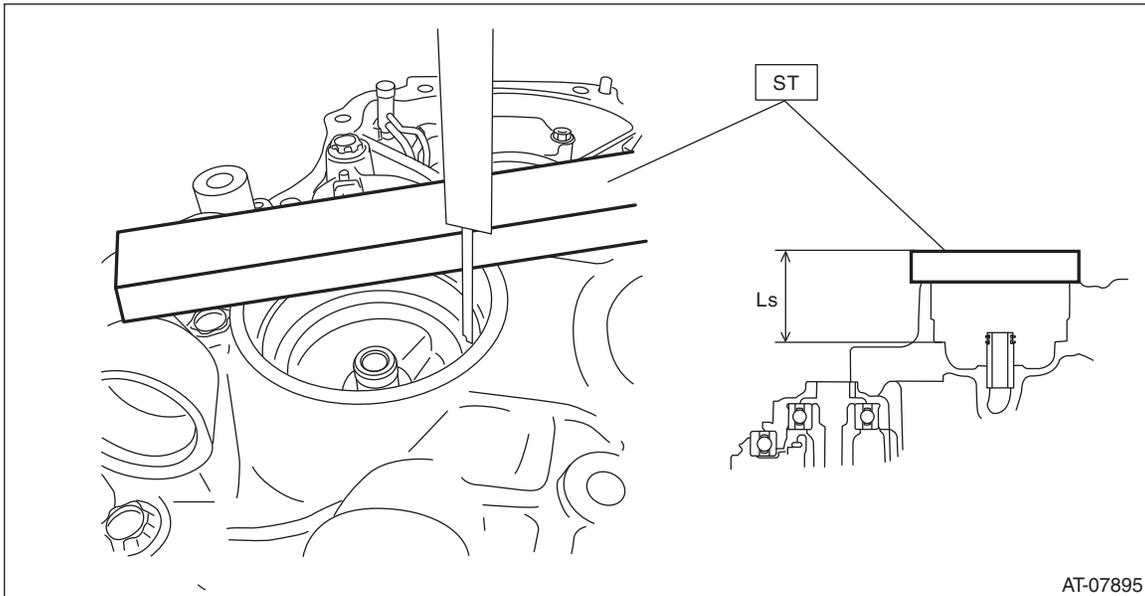


## Primary Pulley and Secondary Pulley

### CONTINUOUSLY VARIABLE TRANSMISSION

2) Measure height “Ls” from the drive pinion retainer upper face to the secondary pulley bearing catch surface at several points and calculate the average.

ST 499575400 GAUGE



3) Calculate the following formula.

Calculation formula:

$$T \text{ (mm)} = B + (L_p - L_s) + 31.601 - A$$

$$[T \text{ (in)} = B + (L_p - L_s) + 1.224 - A]$$

T: Pulley alignment

A: Specified primary pulley dimension

B: Specified secondary pulley dimension

L<sub>p</sub>: Depth from the ST upper face to the primary pulley bearing catch surface

L<sub>s</sub>: Depth from the ST upper face to the secondary pulley bearing catch surface

31.601 mm (1.224 in): Constant

Pulley alignment T mm (in)	Shim thickness mm (in)
0.050 — 0.150 (0.002 — 0.006)	0.1 (0.004)
0.151 — 0.250 (0.006 — 0.01)	0.2 (0.008)
0.251 — 0.350 (0.01 — 0.014)	0.3 (0.012)
0.351 — 0.450 (0.014 — 0.018)	0.4 (0.016)
0.451 — 0.550 (0.018 — 0.022)	0.5 (0.020)
0.551 — 0.650 (0.022 — 0.026)	0.6 (0.024)
0.651 — 0.750 (0.026 — 0.030)	0.7 (0.028)
0.751 — 0.850 (0.030 — 0.033)	0.8 (0.031)
0.851 — 0.950 (0.033 — 0.037)	0.9 (0.035)

4) Select one to two shims so that the total thickness meets the value obtained from step 3).

Part No.	Shim thickness mm (in)
32451AA000	0.1 (0.004)
32451AA010	0.2 (0.008)
32451AA020	0.3 (0.012)
32451AA030	0.4 (0.016)
32451AA040	0.5 (0.020)

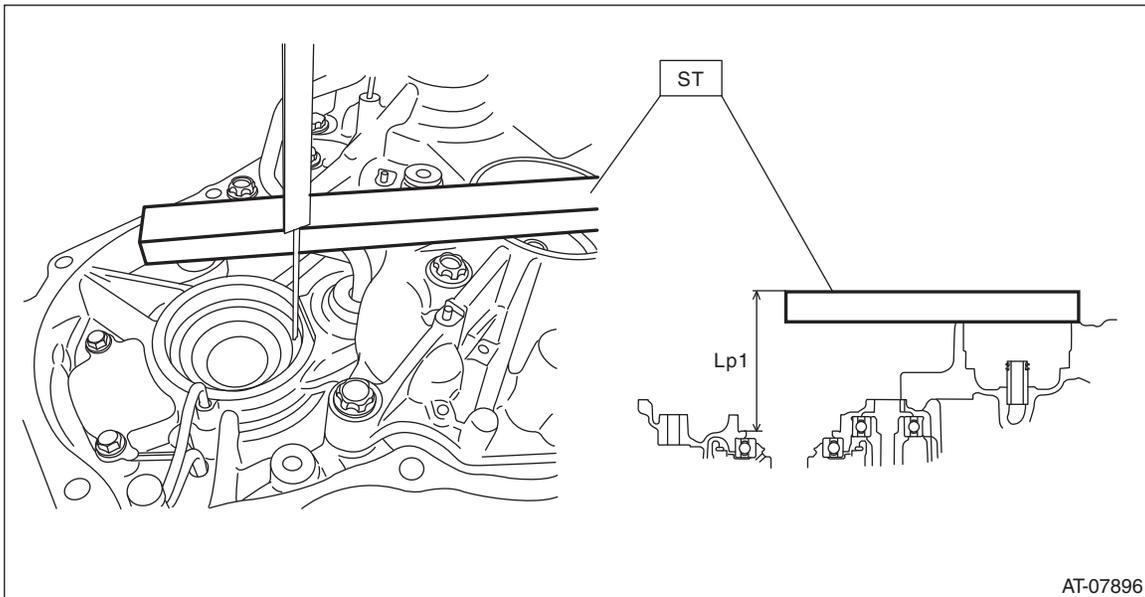
# Primary Pulley and Secondary Pulley

CONTINUOUSLY VARIABLE TRANSMISSION

## 2. PROCEDURE WHEN REPLACING ONLY DRIVE PINION RETAINER OR CONVERTER CASE

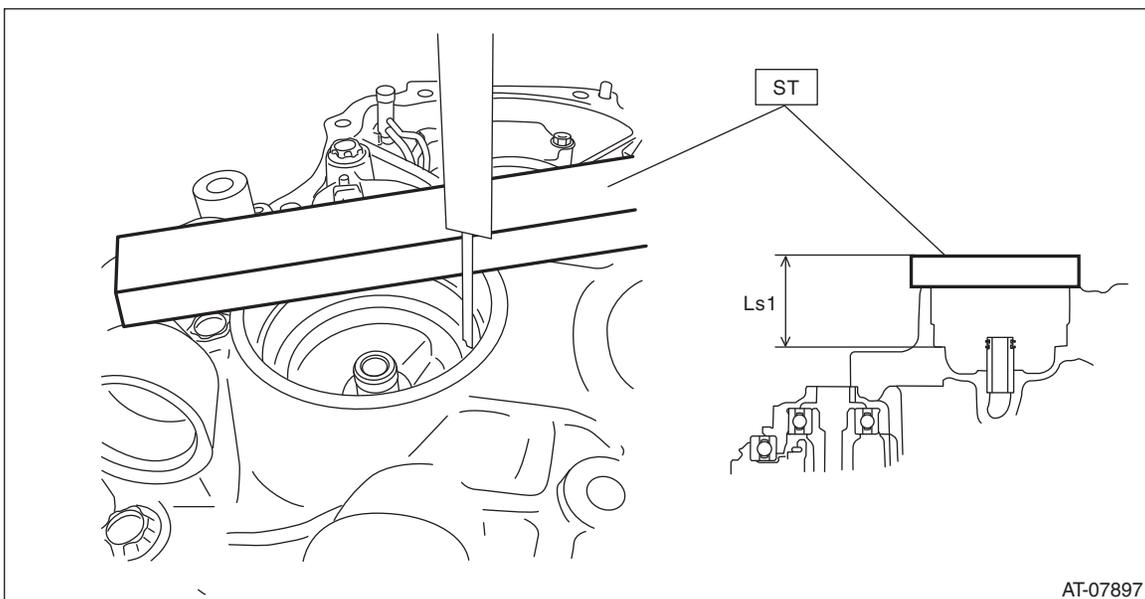
- 1) Clean the mating surface of current drive pinion retainer and converter case.
- 2) Measure and record the shim thickness that is attached on the current converter case.
- 3) Using the current drive pinion retainer, measure depth “Lp1” from the ST upper face to the primary pulley bearing catch surface at several points and calculate the average.

ST 499575400 GAUGE



- 4) Using the current drive pinion retainer or current converter case, measure depth “Ls1” from the ST upper face to the secondary pulley bearing catch surface at several points and calculate the average.

ST 499575400 GAUGE



- 5) Calculate the “LD1” using the following formula and record it.

Calculation formula:

$$LD1 \text{ mm (in)} = Lp1 - Ls1$$

LD1: Height from the primary pulley bearing catch surface to the secondary pulley bearing catch surface

Lp1: Depth from the ST upper face to the primary pulley bearing catch surface

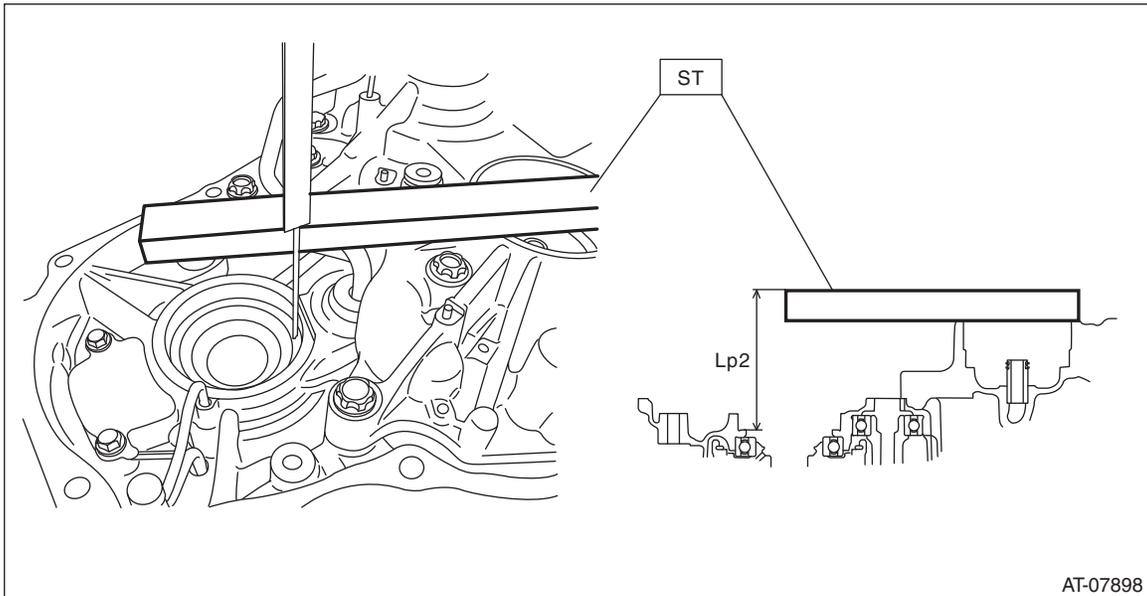
Ls1: Depth from the ST upper face to the secondary pulley bearing catch surface

## Primary Pulley and Secondary Pulley

### CONTINUOUSLY VARIABLE TRANSMISSION

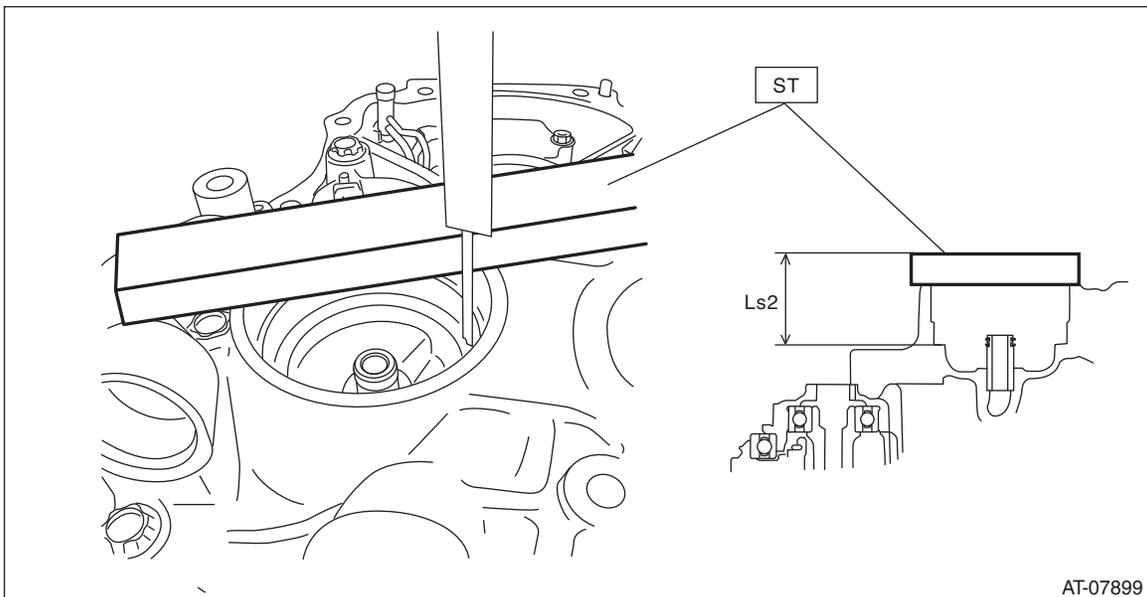
6) Using the new drive pinion retainer or new converter case, measure depth “Lp2” from the ST upper face to the primary pulley bearing catch surface at several points and calculate the average.

ST 499575400 GAUGE



7) Using the new drive pinion retainer or new converter case, measure depth “Ls2” from the ST upper face to the secondary pulley bearing catch surface at several points and calculate the average.

ST 499575400 GAUGE



8) Calculate the “LD2” using the following formula and record it.

Calculation formula:

$$LD2 \text{ mm (in)} = Lp2 - Ls2$$

LD2: Height from the primary pulley bearing catch surface to the secondary pulley bearing catch surface

Lp2: Depth from the ST upper face to the primary pulley bearing catch surface

Ls2: Depth from the ST upper face to the secondary pulley bearing catch surface

# Primary Pulley and Secondary Pulley

CONTINUOUSLY VARIABLE TRANSMISSION

9) Calculate the recorded values of “LD1” and “LD2” to obtain the positive number to select the shims.

Calculation formula:  $T1 \text{ mm (in)} = LD1 - LD2$  or  $T2 \text{ mm (in)} = LD2 - LD1$

T1, T2: Difference between new drive pinion retainer or new converter case and current drive pinion retainer or current converter case

LD1: Calculated value of current drive pinion retainer or current converter case

LD2: Calculated value of new drive pinion retainer or new converter case

Difference of the case (T1) mm (in)	Shim selection procedure
0 — 0.020 (0 — 0.00078)	Select new shim of same thickness with the shim that is used on primary pulley side of the current converter case.
0.021 — 0.070 (0.000827 — 0.00275)	Select new shim of same thickness with the shim that is used on primary pulley side of the current converter case.
0.071 — 0.125 (0.00279 — 0.00492)	Select the shim 0.1 mm thinner than the shim that is used on primary pulley side of the current converter case.
0.126 — 0.170 (0.00496 — 0.00669)	Select the shim 0.1 mm thinner than the shim that is used on primary pulley side of the current converter case.
0.171 — 0.230 (0.00673 — 0.00905)	Select the shim 0.2 mm thinner than the shim that is used on primary pulley side of the current converter case.
0.231 — 0.250 (0.00909 — 0.00984)	Select the shim 0.3 mm thinner than the shim that is used on primary pulley side of the current converter case.
0.251 — 0.300 (0.00988 — 0.01181)	Select the shim 0.3 mm thinner than the shim that is used on primary pulley side of the current converter case.

Difference of the case (T2) mm (in)	Shim selection procedure
0 — 0.020 (0 — 0.00078)	Select new shim of same thickness with the shim that is used on primary pulley side of the current converter case.
0.021 — 0.080 (0.000827 — 0.00315)	Select new shim of same thickness with the shim that is used on primary pulley side of the current converter case.
0.081 — 0.100 (0.00318 — 0.00393)	Select the shim 0.1 mm thicker than the shim that is used on primary pulley side of the current converter case.
0.101 — 0.120 (0.00397 — 0.00472)	Select the shim 0.1 mm thicker than the shim that is used on primary pulley side of the current converter case.
0.121 — 0.180 (0.00476 — 0.00708)	Select the shim 0.1 mm thicker than the shim that is used on primary pulley side of the current converter case.
0.181 — 0.220 (0.00712 — 0.00866)	Select the shim 0.2 mm thicker than the shim that is used on primary pulley side of the current converter case.
0.221 — 0.280 (0.00870 — 0.01102)	Select the shim 0.2 mm thicker than the shim that is used on primary pulley side of the current converter case.
0.281 — 0.300 (0.01106 — 0.01181)	Select the shim 0.3 mm thicker than the shim that is used on primary pulley side of the current converter case.

Part No.	Shim thickness mm (in)
32451AA000	0.1 (0.004)
32451AA010	0.2 (0.008)
32451AA020	0.3 (0.012)
32451AA030	0.4 (0.016)
32451AA040	0.5 (0.020)

## Variator Chain

CONTINUOUSLY VARIABLE TRANSMISSION

---

### 43. Variator Chain

#### **A: REMOVAL**

For removal of variator chain, refer to “Primary Pulley and Secondary Pulley”. <Ref. to CVT(TR690)-263, REMOVAL, Primary Pulley and Secondary Pulley.>

#### **B: INSTALLATION**

For installation of variator chain, refer to “Primary Pulley and Secondary Pulley”. <Ref. to CVT(TR690)-267, INSTALLATION, Primary Pulley and Secondary Pulley.>

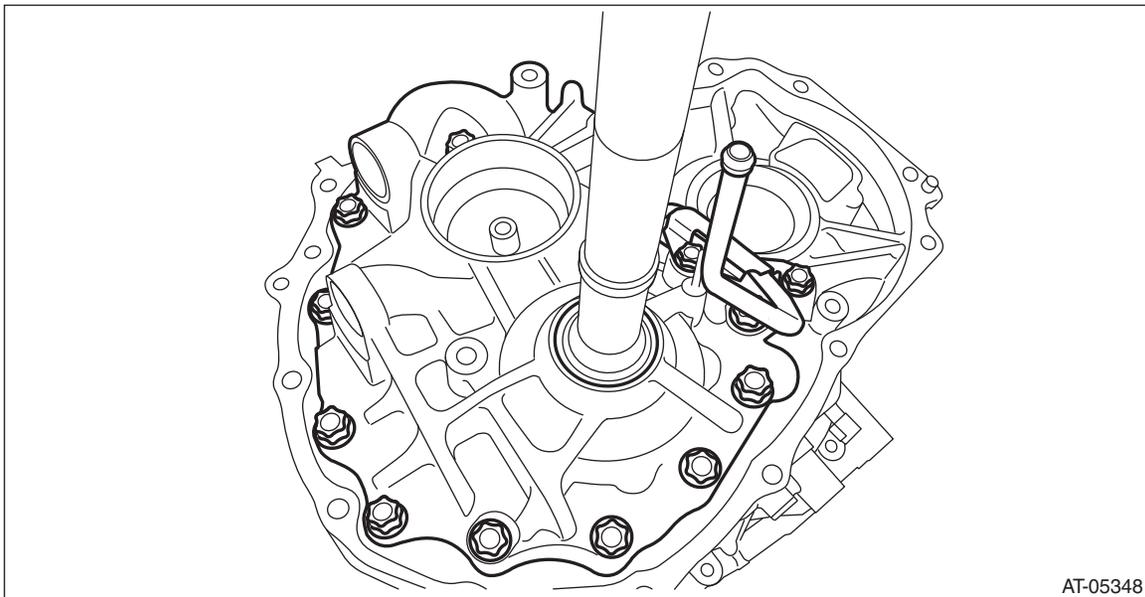
#### **C: INSPECTION**

Check the variator chain for damage and wear.

## 44. Drive Pinion Shaft Assembly

### A: REMOVAL

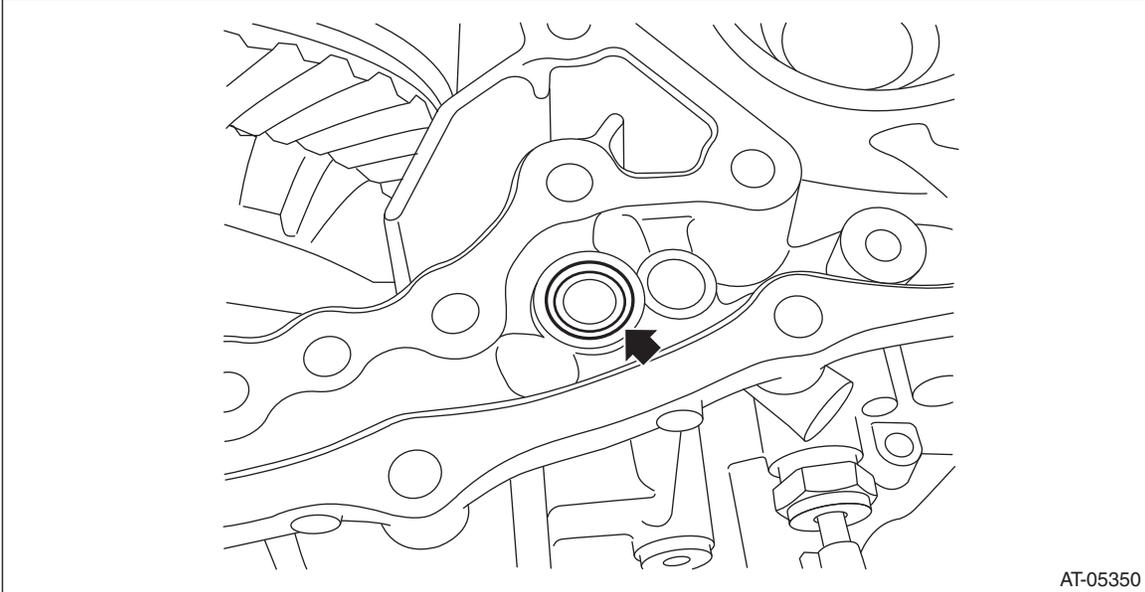
- 1) Remove the transmission assembly from the vehicle. <Ref. to CVT(TR690)-59, REMOVAL, Automatic Transmission Assembly.>
- 2) Remove the air breather hose. <Ref. to CVT(TR690)-156, REMOVAL, Air Breather Hose.>
- 3) Remove the oil pan and control valve body. <Ref. to CVT(TR690)-129, REMOVAL, Control Valve Body.>
- 4) Remove the transmission harness. <Ref. to CVT(TR690)-139, REMOVAL, Transmission Harness.>
- 5) Remove the extension case. <Ref. to CVT(TR690)-164, REMOVAL, Extension Case.>
- 6) Remove the rear drive shaft. <Ref. to CVT(TR690)-167, REMOVAL, Rear Drive Shaft.>
- 7) Remove the transfer clutch assembly. <Ref. to CVT(TR690)-172, REMOVAL, Transfer Clutch.>
- 8) Remove the transfer reduction driven gear assembly. <Ref. to CVT(TR690)-184, REMOVAL, Transfer Reduction Driven Gear.>
- 9) Remove the intermediate case. <Ref. to CVT(TR690)-191, REMOVAL, Intermediate Case.>
- 10) Remove the forward clutch assembly. <Ref. to CVT(TR690)-206, REMOVAL, Forward Clutch Assembly.>
- 11) Remove the transmission case. <Ref. to CVT(TR690)-246, REMOVAL, Transmission Case.>
- 12) Remove the primary pulley, secondary pulley and variator chain. <Ref. to CVT(TR690)-263, REMOVAL, Primary Pulley and Secondary Pulley.>
- 13) Using the ST, remove the drive pinion retainer and lubrication pipe.  
ST 18270KA020 SOCKET (E20)



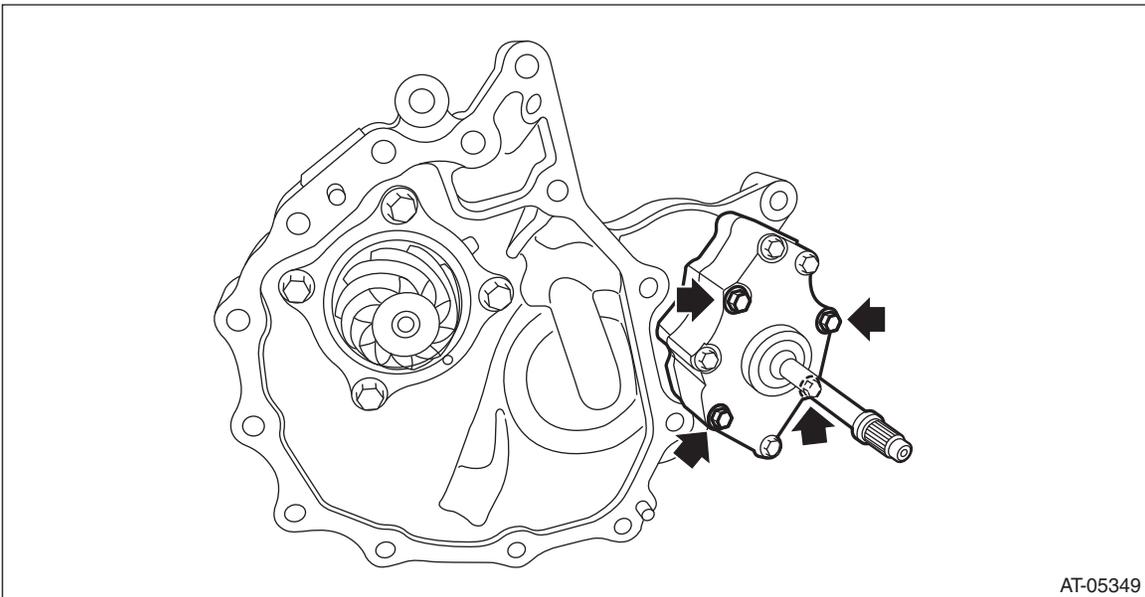
# Drive Pinion Shaft Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

14) Remove the O-rings.



15) Remove the oil pump and the plate.

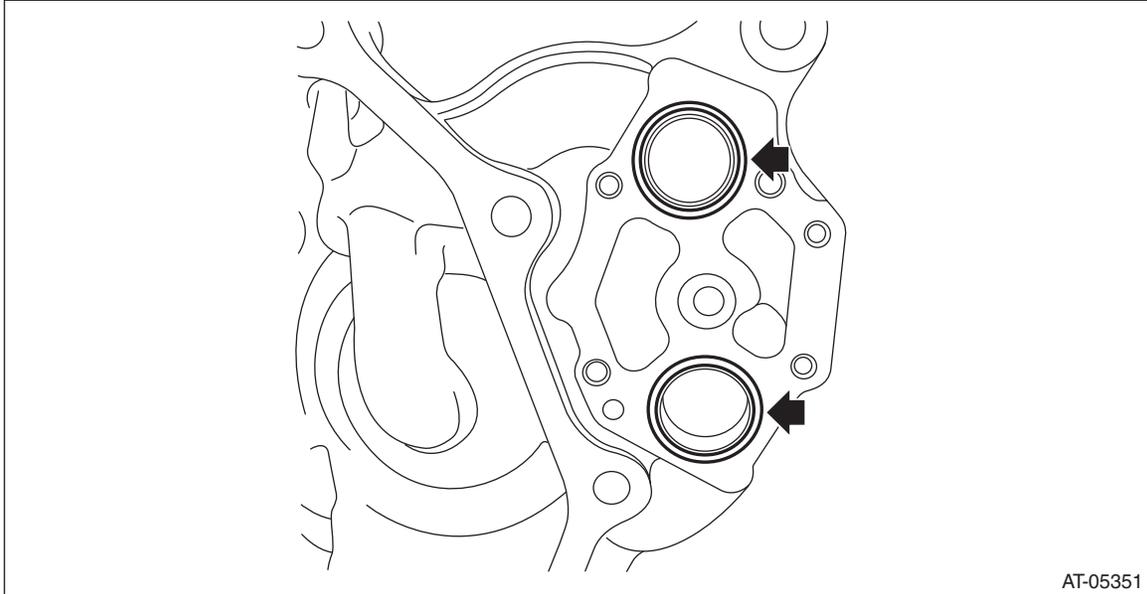


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# Drive Pinion Shaft Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

16) Remove the O-rings.

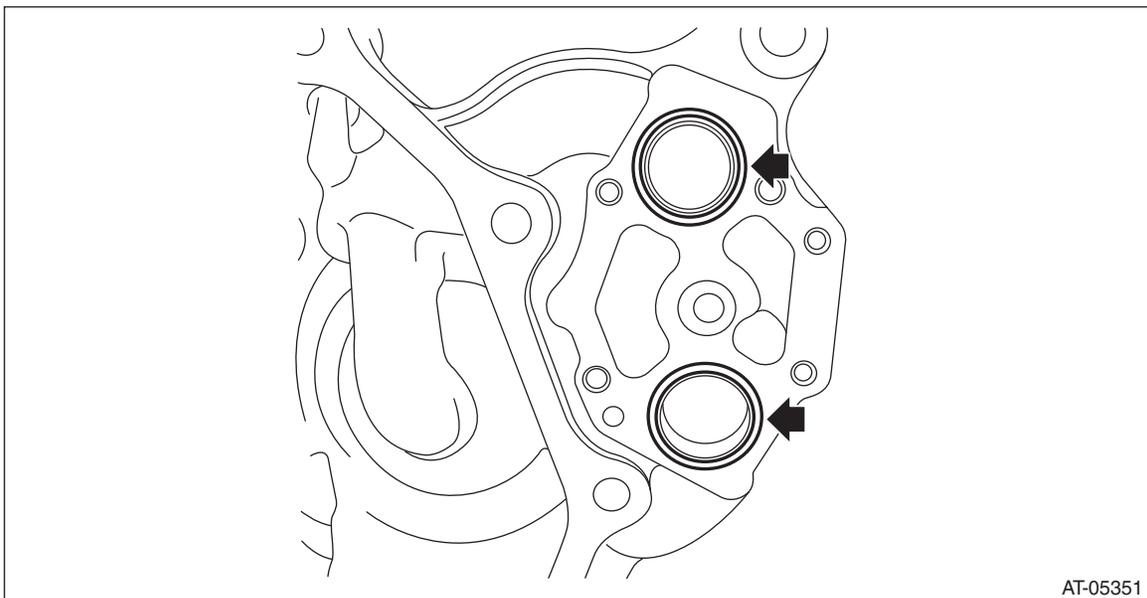


## B: INSTALLATION

- 1) Clean the mating surface of drive pinion retainer and converter case.
- 2) Adjust the backlash and tooth contact between drive pinion shaft assembly and the front differential side gear. <Ref. to CVT(TR690)-292, ADJUSTMENT, Drive Pinion Shaft Assembly.>
- 3) Install the O-ring for oil pump to drive pinion retainer.

### NOTE:

- Use new O-rings.
- Apply CVTF to the O-rings.



4) Install the plate and the oil pump.

### NOTE:

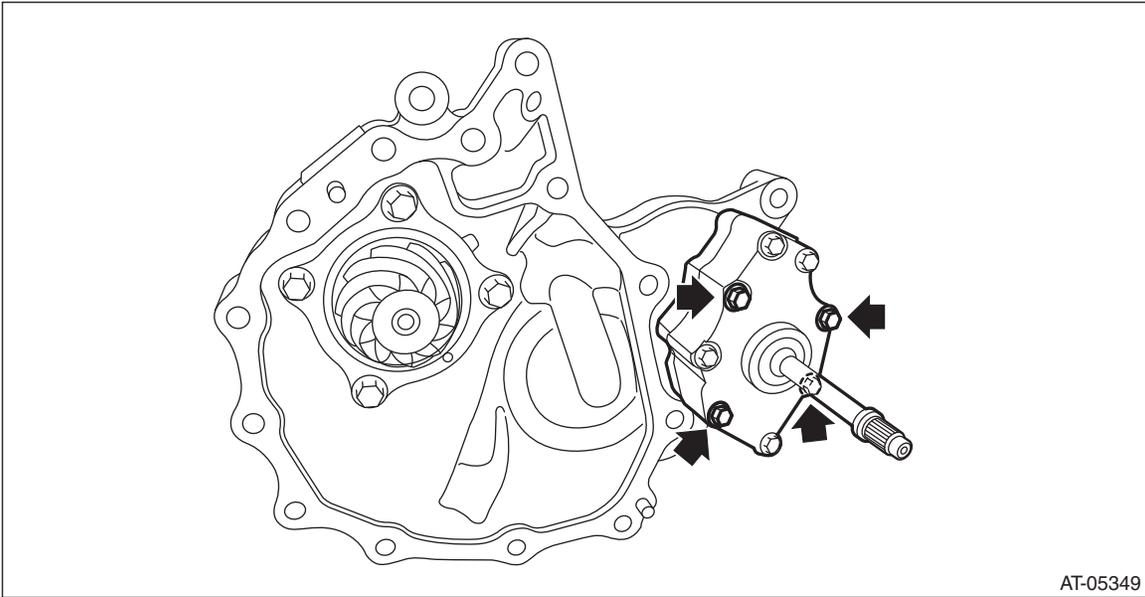
Apply CVTF to the bolt.

# Drive Pinion Shaft Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

**Tightening torque:**

**8.5 N·m (0.9 kgf-m, 6.3 ft-lb)**



AT-05349

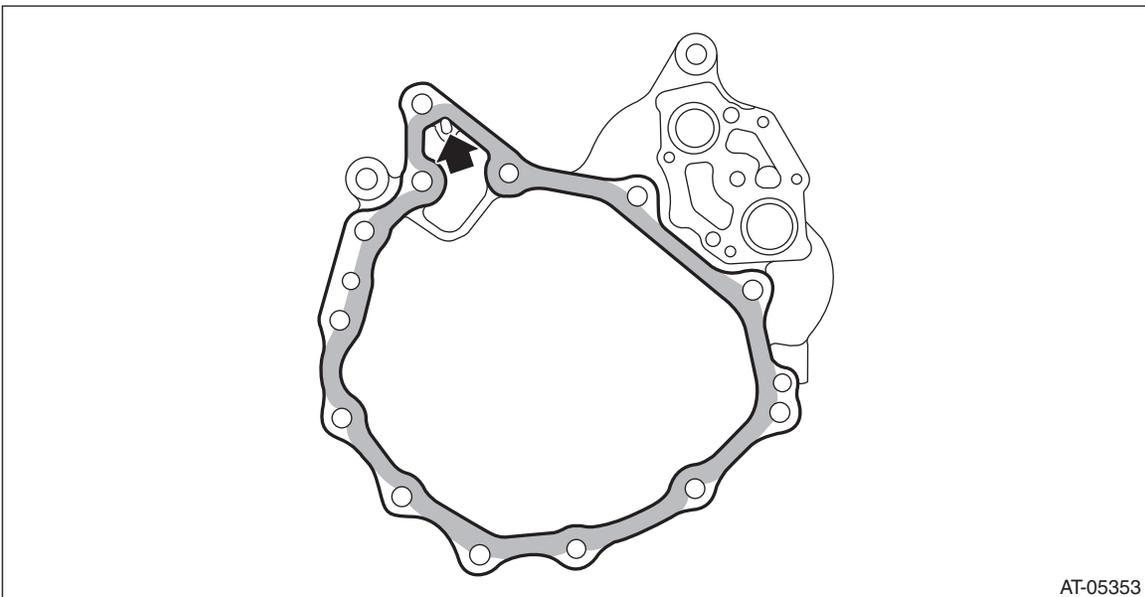
5) Apply liquid gasket seamlessly to the mating surface of drive pinion retainer.

NOTE:

Be careful not to block the arrowed hole when applying liquid gasket.

**Liquid gasket:**

**THREE BOND 1215B or equivalent**



AT-05353

6) Install the O-ring to the lubrication pipe.

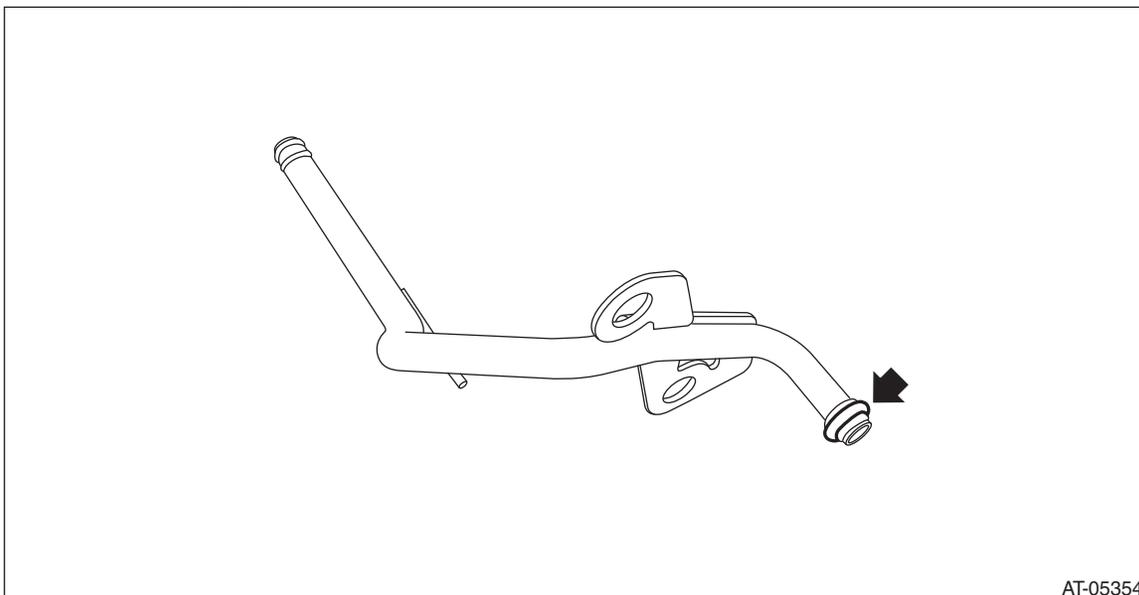
NOTE:

- Use new O-rings.

# Drive Pinion Shaft Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

- Apply CVTF to the O-rings.



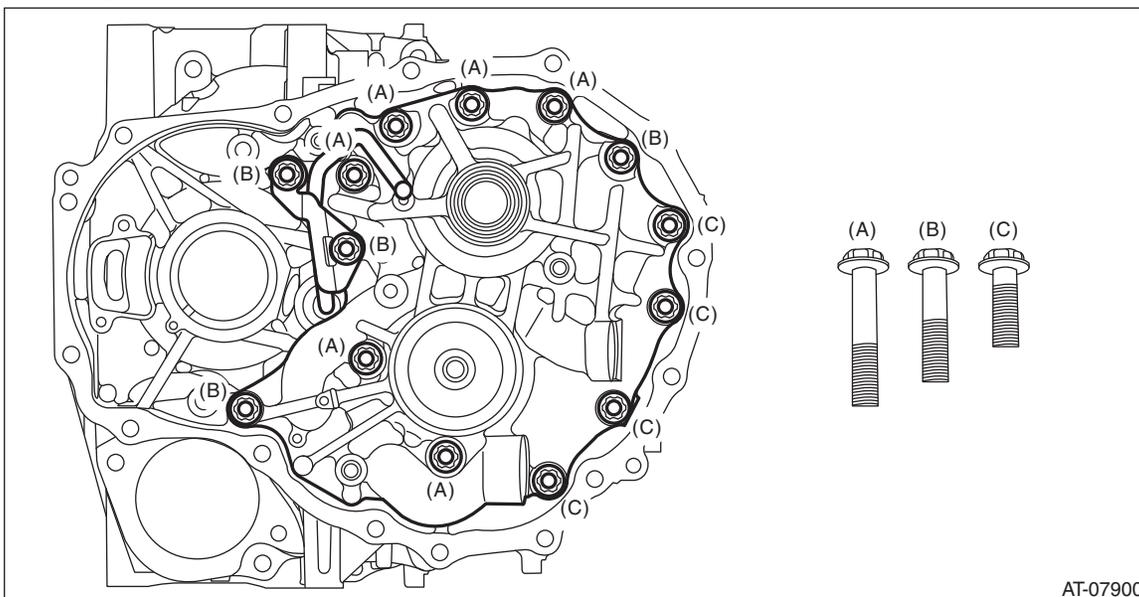
7) Install the drive pinion retainer and lubrication pipe to converter case and tighten the bolt using the ST. ST 18270KA020 SOCKET (E20)

**NOTE:**

Do not confuse the three different-length bolts when installing.

**Tightening torque:**

**43 N·m (4.4 kgf·m, 31.7 ft·lb)**



8) Install the primary pulley, secondary pulley and variator chain. <Ref. to CVT(TR690)-267, INSTALLATION, Primary Pulley and Secondary Pulley.>

9) Install the transmission case. <Ref. to CVT(TR690)-248, INSTALLATION, Transmission Case.>

10) Install the forward clutch assembly. <Ref. to CVT(TR690)-207, INSTALLATION, Forward Clutch Assembly.>

11) Install the intermediate case. <Ref. to CVT(TR690)-192, INSTALLATION, Intermediate Case.>

12) Install the transfer reduction driven gear assembly. <Ref. to CVT(TR690)-184, INSTALLATION, Transfer Reduction Driven Gear.>

13) Install the transfer clutch assembly. <Ref. to CVT(TR690)-173, INSTALLATION, Transfer Clutch.>

14) Install the rear drive shaft. <Ref. to CVT(TR690)-167, INSTALLATION, Rear Drive Shaft.>

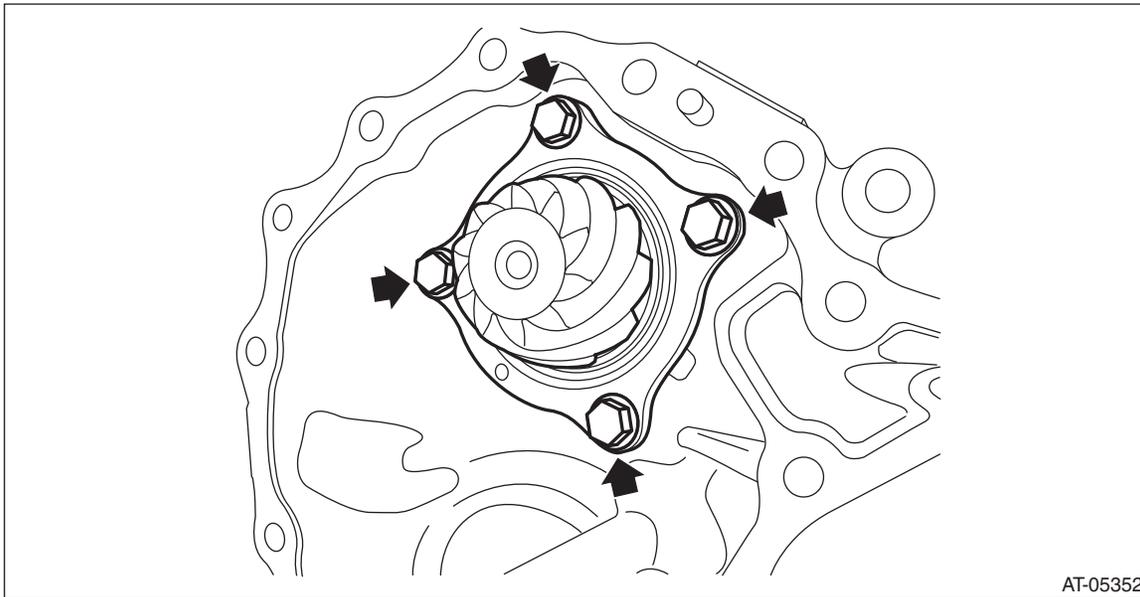
# Drive Pinion Shaft Assembly

## CONTINUOUSLY VARIABLE TRANSMISSION

- 15) Install the extension case. <Ref. to CVT(TR690)-164, INSTALLATION, Extension Case.>
- 16) Install the transmission harness. <Ref. to CVT(TR690)-140, INSTALLATION, Transmission Harness.>
- 17) Install the oil pan and control valve body. <Ref. to CVT(TR690)-133, INSTALLATION, Control Valve Body.>
- 18) Install the air breather hose. <Ref. to CVT(TR690)-158, INSTALLATION, Air Breather Hose.>
- 19) Install the transmission assembly to the vehicle. <Ref. to CVT(TR690)-77, INSTALLATION, Automatic Transmission Assembly.>

### C: DISASSEMBLY

- 1) Remove the drive pinion assembly.

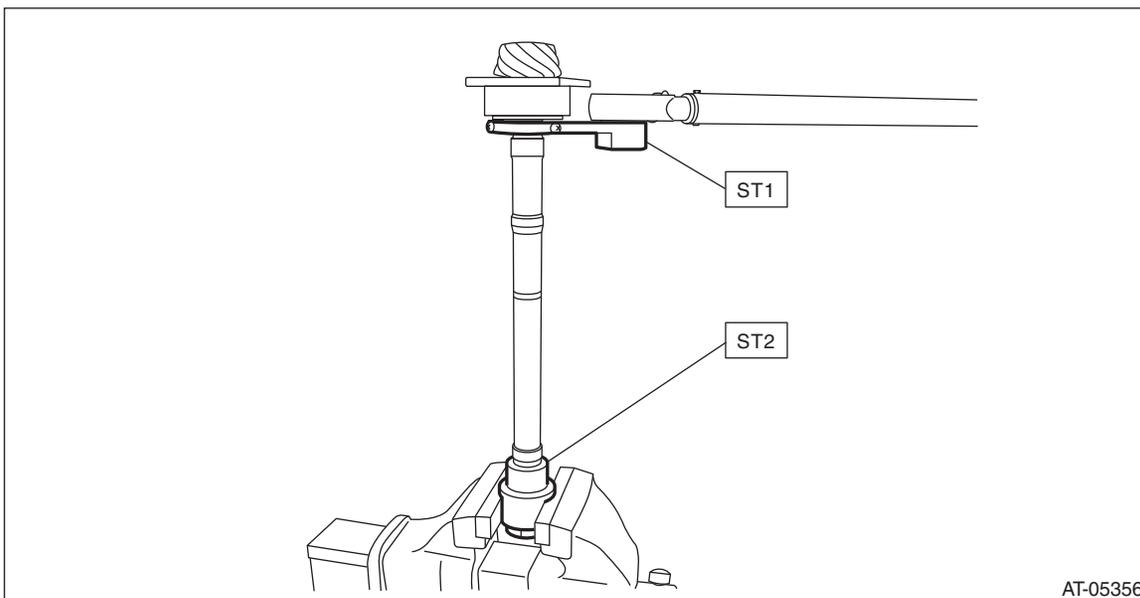


- 2) Flatten the tab of the lock nut.

- 3) Using ST1 and ST2, fix at the spline portion of drive pinion shaft to remove the lock nut.

ST1 18621AA000 ADAPTER WRENCH

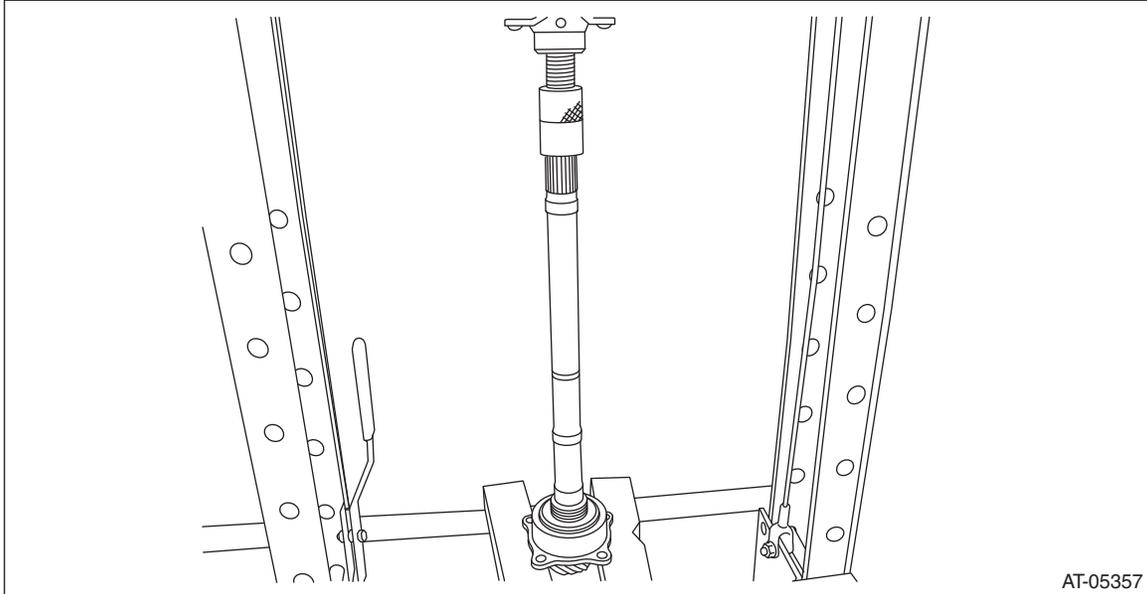
ST2 18667AA010 HOLDER



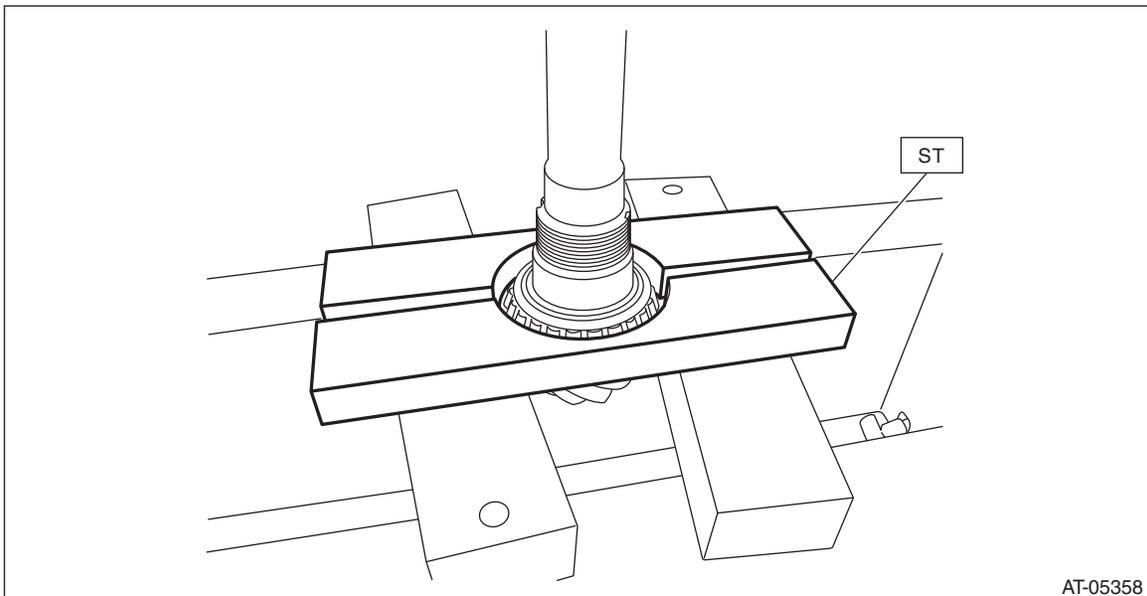
# Drive Pinion Shaft Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

- 4) Remove the taper roller bearing and outer race from drive pinion shaft.



- 5) Remove the inner bearing inner race from the drive pinion shaft using ST.  
ST 498077000 REMOVER



- 6) Remove the two oil seals using a screwdriver wrapped with cloth, etc.

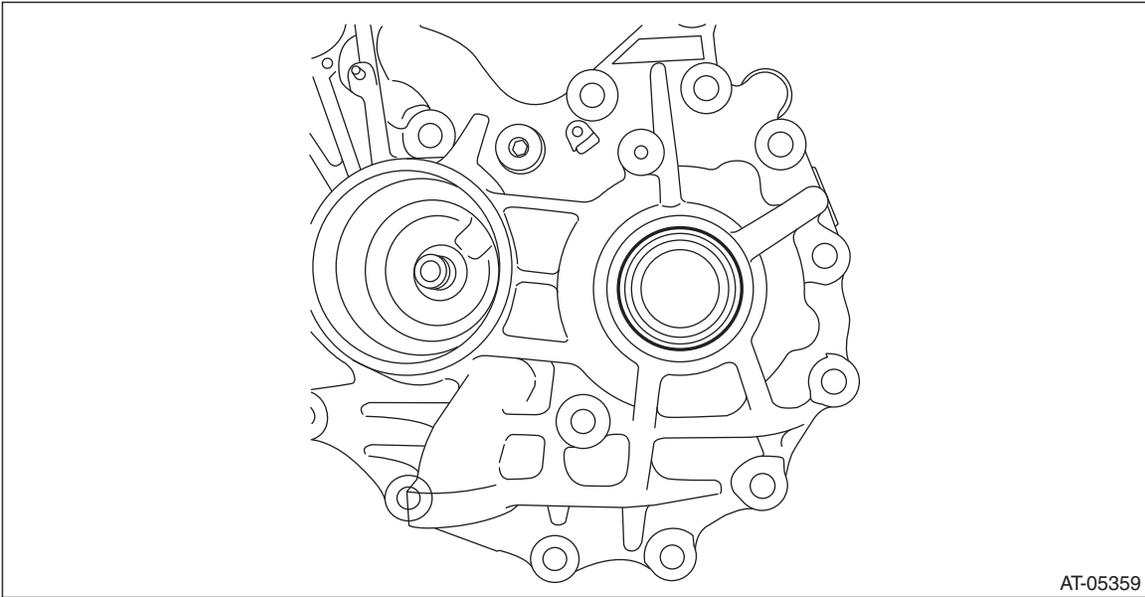
# Drive Pinion Shaft Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

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## CAUTION:

Do not damage the fitting surface of drive pinion bearing.



7) Remove the plug from drive pinion retainer.

## D: ASSEMBLY

1) Install the O-ring to plug and install the plug to drive pinion retainer.

NOTE:

- Use new O-rings.
- Apply CVTF to the O-rings.

**Tightening torque:**

**25 N·m (2.5 kgf-m, 18.4 ft-lb)**

2) Using the ST, install the oil seal to drive pinion retainer.

NOTE:

- Apply CVTF to the oil seal press-fitting surface and lip.

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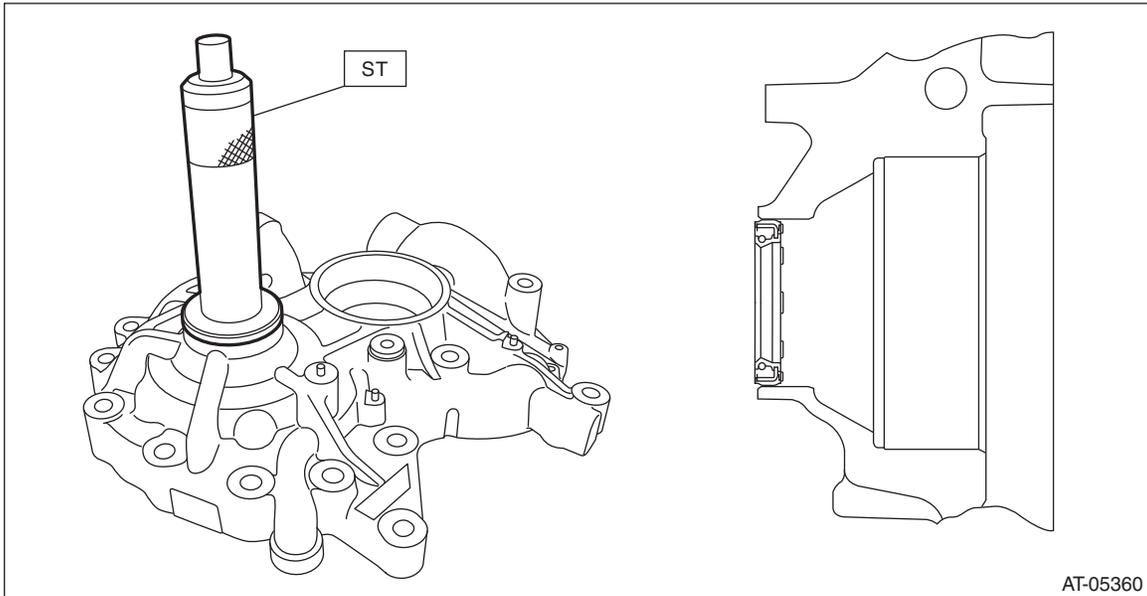
# Drive Pinion Shaft Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

- Install the oil seal in the correct direction.

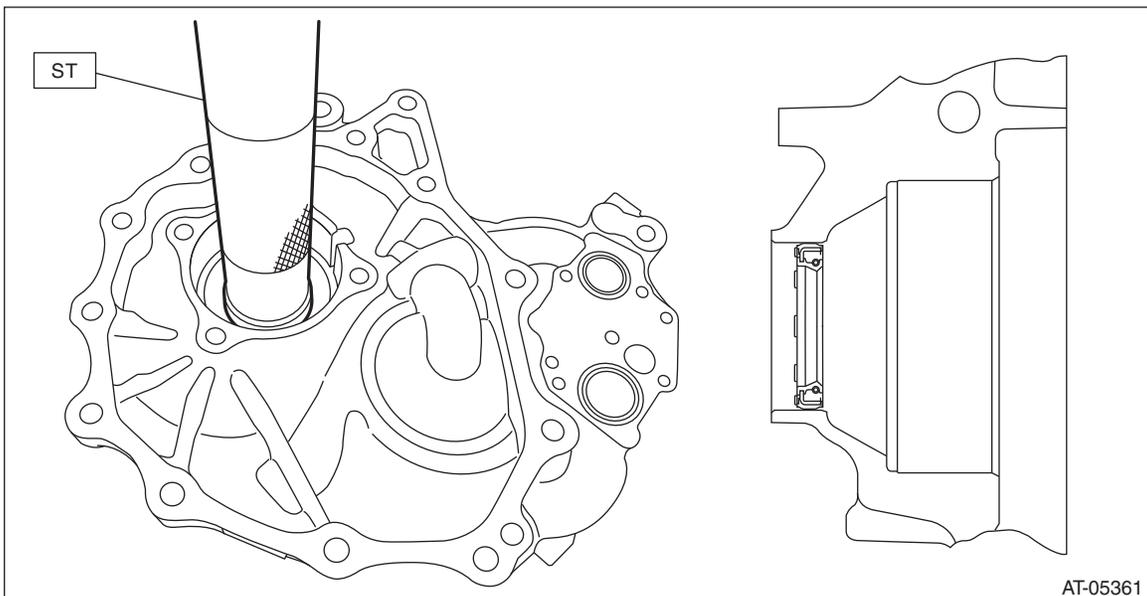
## Pulley side

ST 18657AA020 OIL SEAL INSTALLER



## Front differential side

ST 499277100 BUSHING 1-2 INSTALLER



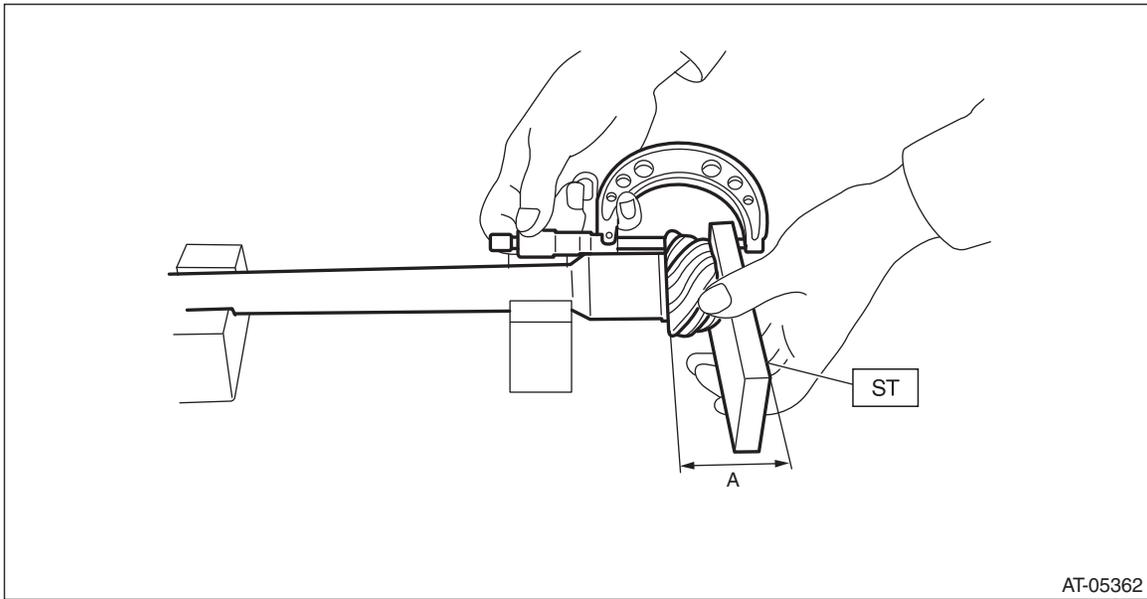
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# Drive Pinion Shaft Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

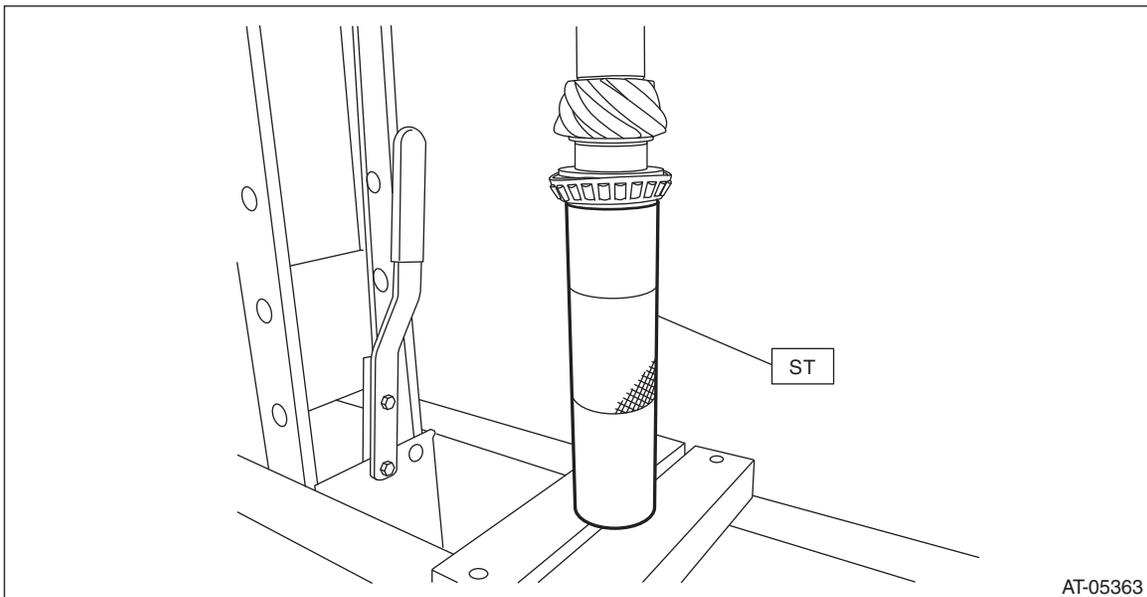
3) Measure the dimension "A" of drive pinion shaft.

ST 398643600 GAUGE



4) Press-fit the new taper roller bearing front side inner race using the ST.

ST 499277200 INSTALLER



5) Press-fit the new taper roller bearing rear side inner race and outer race together.

**CAUTION:**

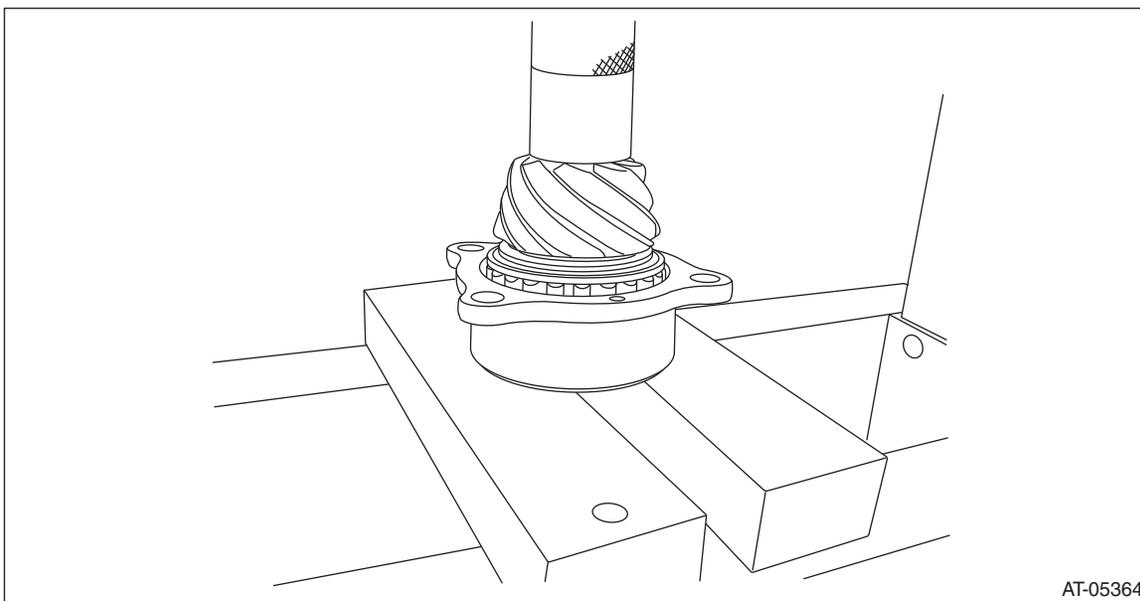
**Damage may result if too much force is applied to the roller bearing.**

# Drive Pinion Shaft Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

**NOTE:**

Press in to a position where the bearing rotates smoothly without play.



6) Tighten a new lock nut using the ST.

Using the following formula, calculate the torque for a torque wrench.

$$T2 = L2 / (L1 + L2) \times T1$$

T1: 130 N·m (13.3 kgf·m, 95.9 ft·lb)

[Required torque setting]

T2: Tightening torque

L1: ST1 length 0.1 m (3.94 in)

L2: Torque wrench length

Example:

Torque wrench length m (in)	Tightening torque N·m (kgf·m, ft·lb)
0.4 (15.75)	104 (10.6, 76.7)
0.45 (17.72)	106 (10.8, 78.2)
0.5 (19.69)	108 (11.0, 79.7)
0.55 (21.65)	110 (11.2, 81.1)

ST1 18621AA000 ADAPTER WRENCH

ST2 18667AA010 HOLDER

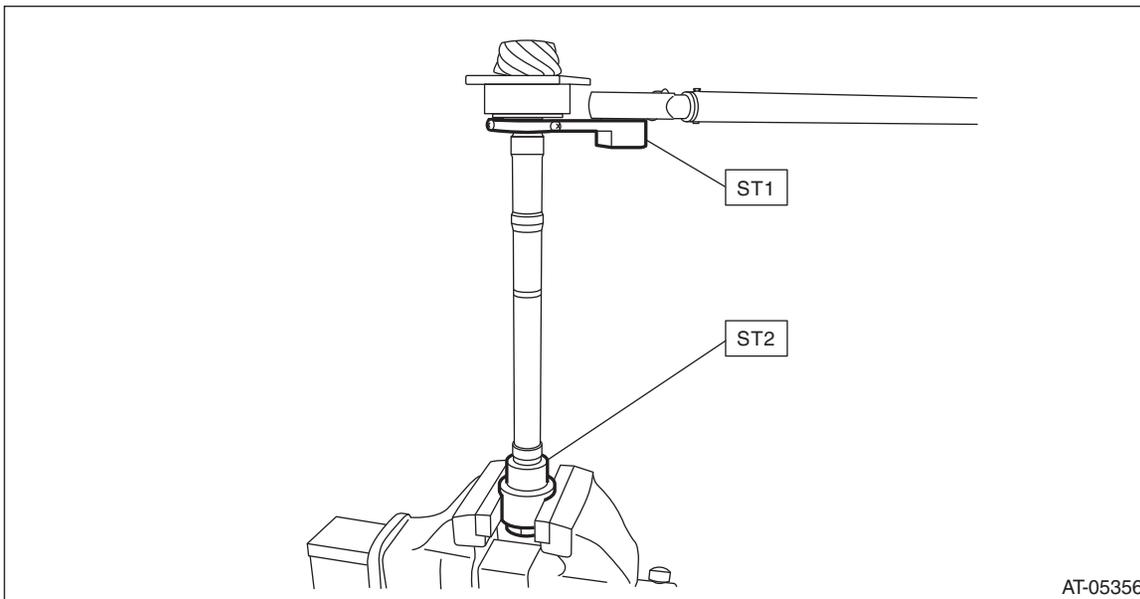
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# Drive Pinion Shaft Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

**NOTE:**

Tighten the lock nut while directly aligning ST1 and torque wrench.

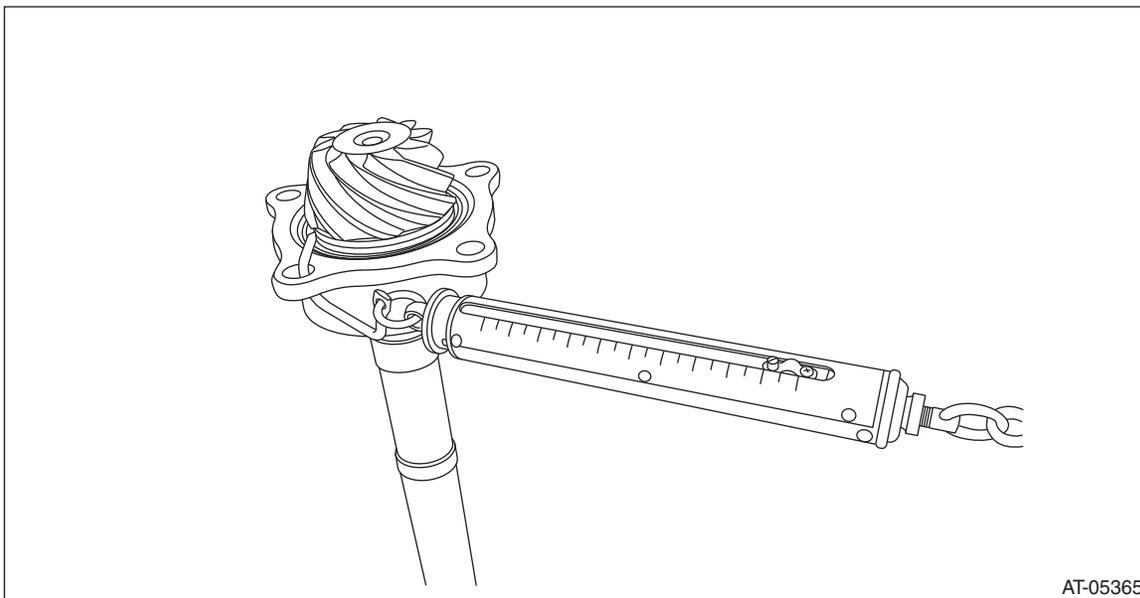


7) Apply differential gear oil to roller of bearing and rotate the bearing several times.

8) Measure the starting torque of the bearing. Make sure the starting torque is within the specified range. If the torque is not within specified range, replace the roller bearing.

**Starting torque:**

**16.3 — 42.7 N (1.7 — 4.4 kgf, 4.4 — 9.6 lbf)**



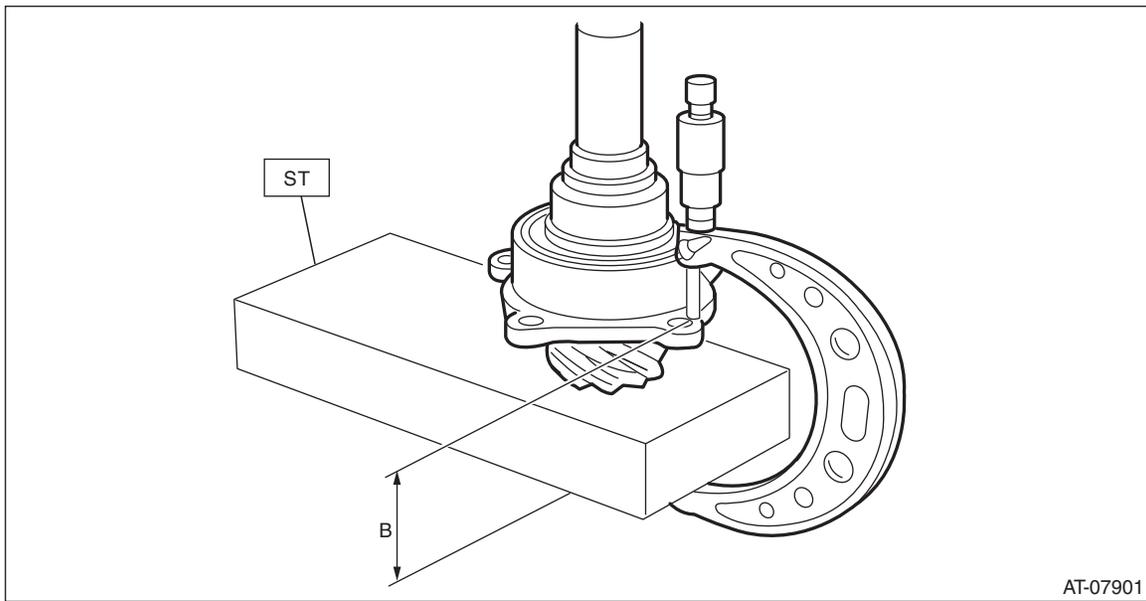
9) Crimp the lock nut in 2 locations.

# Drive Pinion Shaft Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

10) Measure the dimension "B" of the drive pinion shaft.

ST 398643600 GAUGE



AT-07901

11) Obtain the thickness "T" mm (in) of the drive pinion shim using the following formula.

$$T = 6.55 \pm 0.1225 - (B - A)$$

$$[T \text{ in} = 0.258 \pm 0.0048 - (B - A)]$$

T: Shim thickness

A: Height from ST to drive pinion shaft bearing catch saucer

B: Height from ST to drive pinion retainer case side end face

12) Select three or less shims from following table.

Drive pinion shim	
Part No.	Thickness mm (in)
31451AA050	0.150 (0.0059)
31451AA060	0.175 (0.0069)
31451AA070	0.200 (0.0079)
31451AA080	0.225 (0.0089)
31451AA090	0.250 (0.0098)
31451AA100	0.275 (0.0108)
31451AA240	0.300 (0.0118)

13) Install the shims selected for drive pinion retainer and drive pinion shaft assembly.

NOTE:

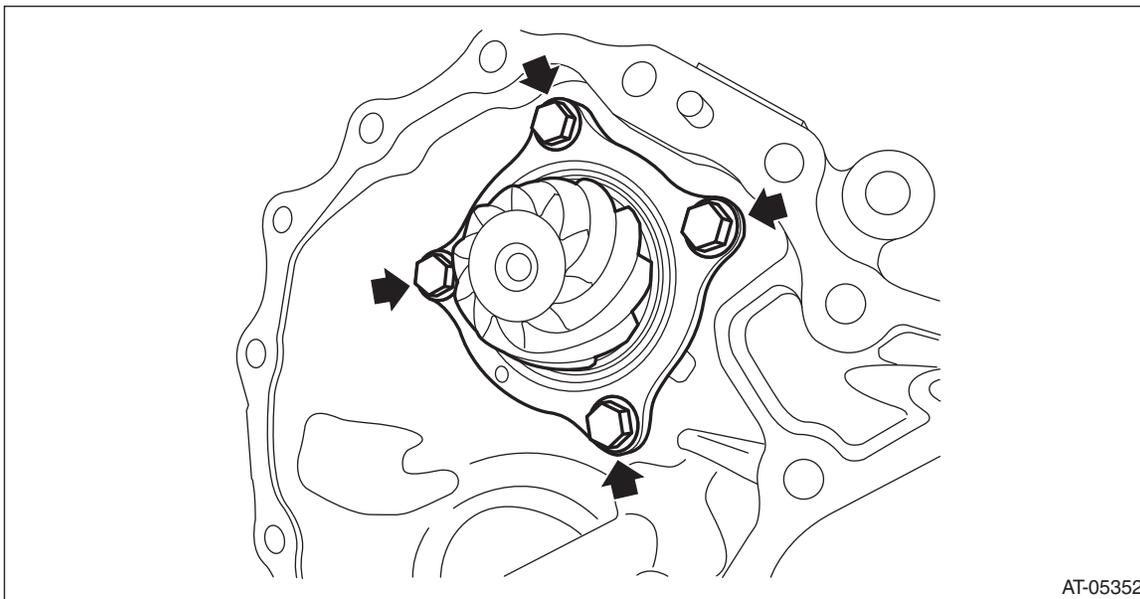
Be careful not to bend the shim.

# Drive Pinion Shaft Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

## Tightening torque:

**70 N·m (7.1 kgf-m, 51.6 ft-lb)**



AT-05352

## E: INSPECTION

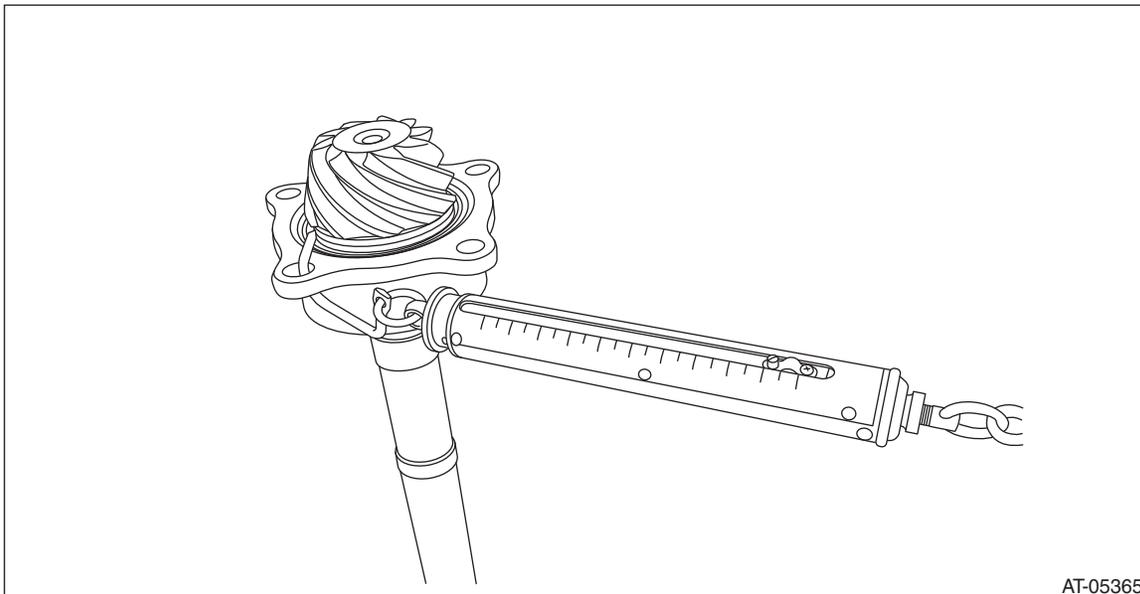
- Make sure that all component parts are free of scratches, holes and other faults.
- Check the tooth contact. <Ref. to CVT(TR690)-292, ADJUSTMENT, Drive Pinion Shaft Assembly.>
- Apply CVTF to bearing and rotate the bearing to check for noise or dragging etc.
- Check the bearing preload of drive pinion shaft.

### CAUTION:

**Before measuring, apply differential gear oil to roller of bearing and rotate the bearing several times.**

## Starting torque:

**16.3 — 42.7 N (1.7 — 4.4 kgf, 4.4 — 9.6 lbf)**



AT-05365

## F: ADJUSTMENT

- 1) Remove the liquid gasket from the mating surface completely.
- 2) Using the ST, install the drive pinion retainer to converter case.  
ST 18270KA020 SOCKET (E20)

**CVT(TR690)-292**

# Drive Pinion Shaft Assembly

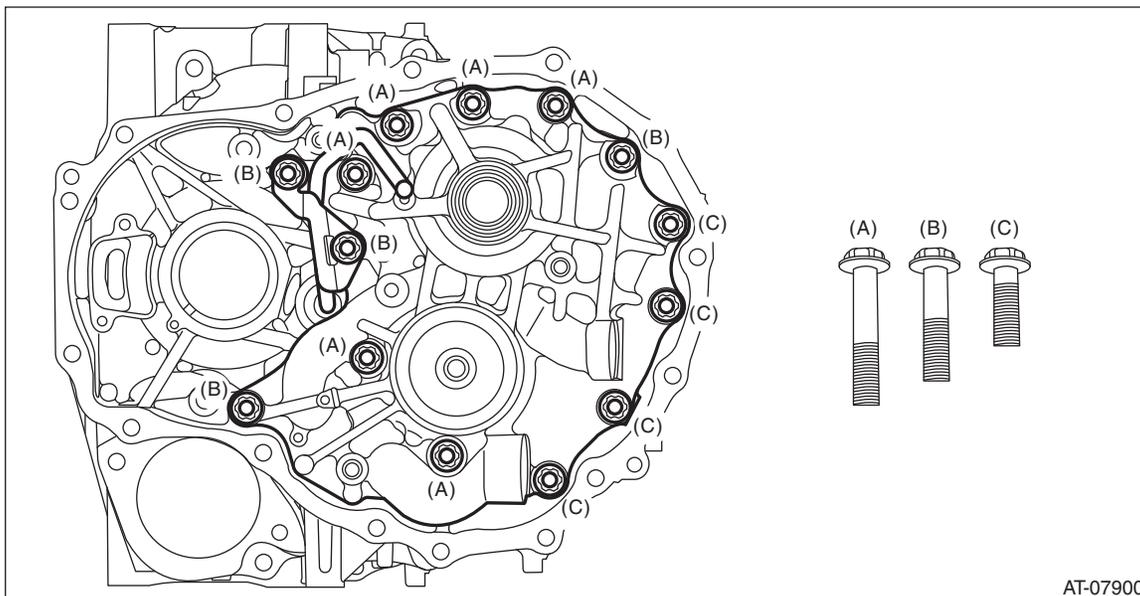
CONTINUOUSLY VARIABLE TRANSMISSION

## NOTE:

Do not confuse the three different-length bolts when installing.

## Tightening torque:

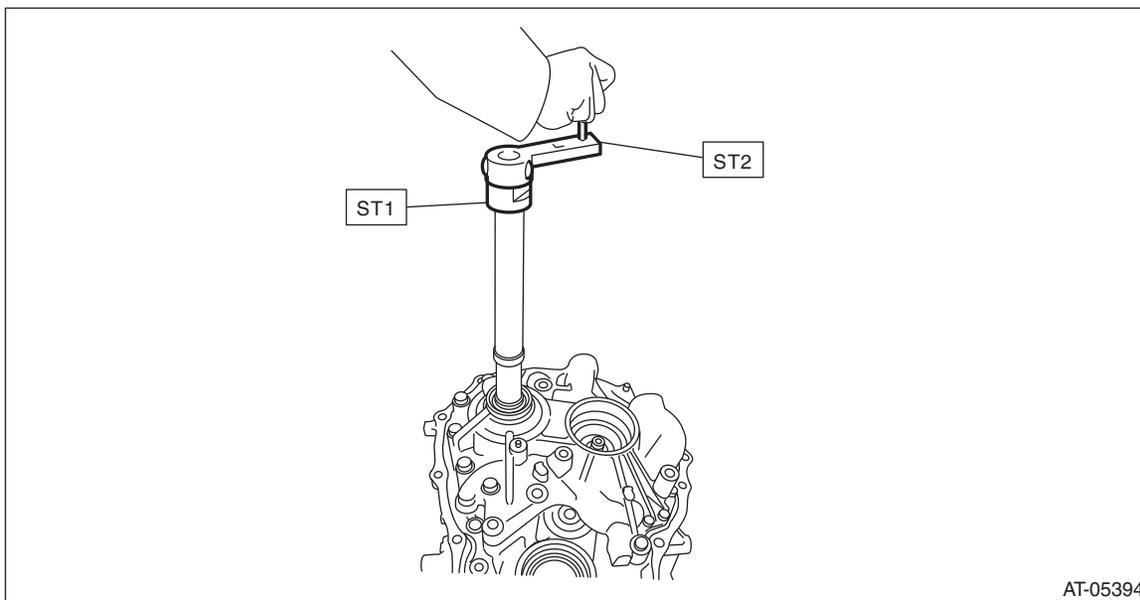
**43 N·m (4.4 kgf·m, 31.7 ft·lb)**



3) Rotate the drive pinion several times using ST1 and ST2.

ST1 18667AA010 HOLDER

ST2 499787700 WRENCH



4) Adjust the drive pinion and hypoid driven gear backlash. <Ref. to CVT(TR690)-314, ADJUSTMENT, Front Differential Assembly.>

5) Using the ST, remove the drive pinion retainer from converter case.

ST 18270KA020 SOCKET (E20)

6) Apply lead-free red dye evenly on the both sides of three to four teeth of the hypoid driven gear. Then install the drive pinion retainer and rotate the drive pinion in both directions several times. Remove the drive pinion retainer and check the tooth contact pattern.

If the teeth contact is inappropriate, adjust the backlash or thickness of the shim. <Ref. to CVT(TR690)-314, ADJUSTMENT, Front Differential Assembly.>

# Drive Pinion Shaft Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

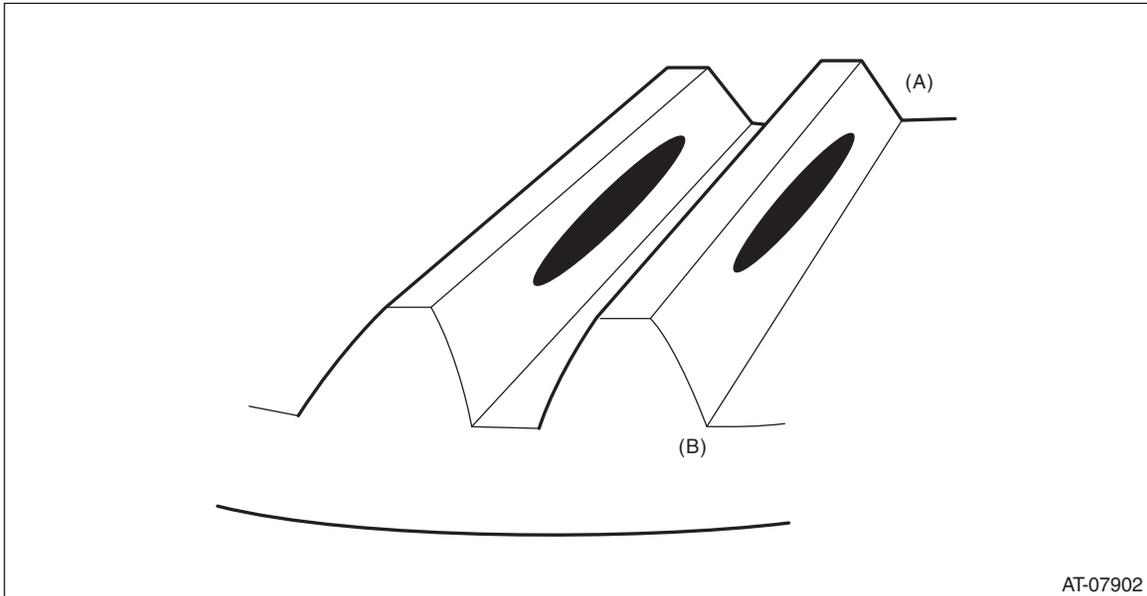
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**NOTE:**

After correction, wipe off the lead-free red dye.

- Correct tooth contact

**Check item: Tooth contact surface is slightly shifted toward the toe side under a no-load condition.  
(When driving, it moves towards the heel side.)**



- (A) Toe side
- (B) Heel side

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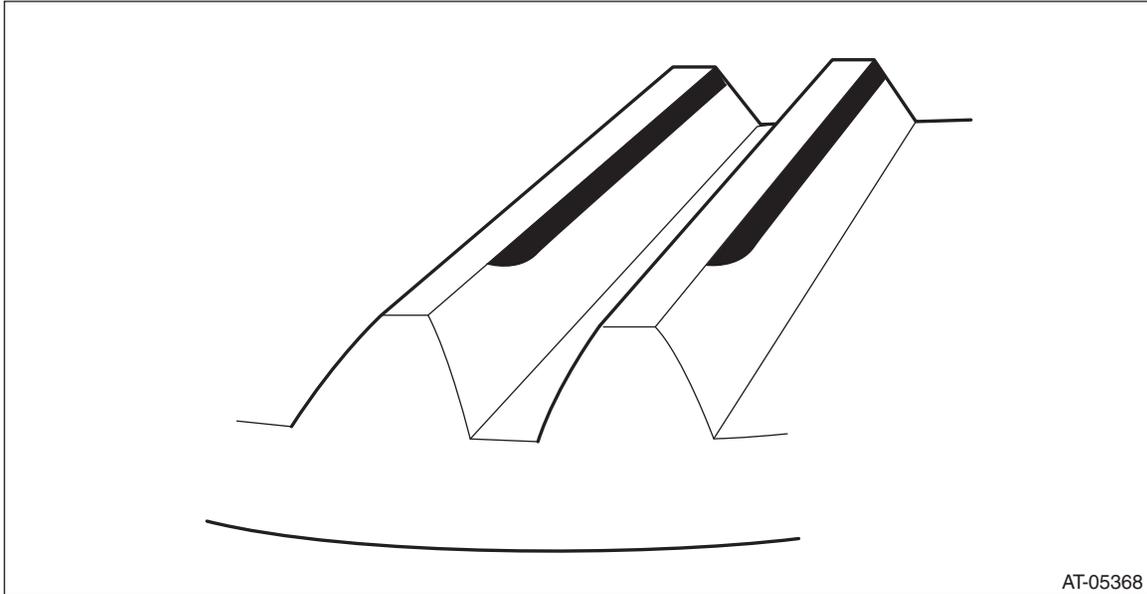
# Drive Pinion Shaft Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

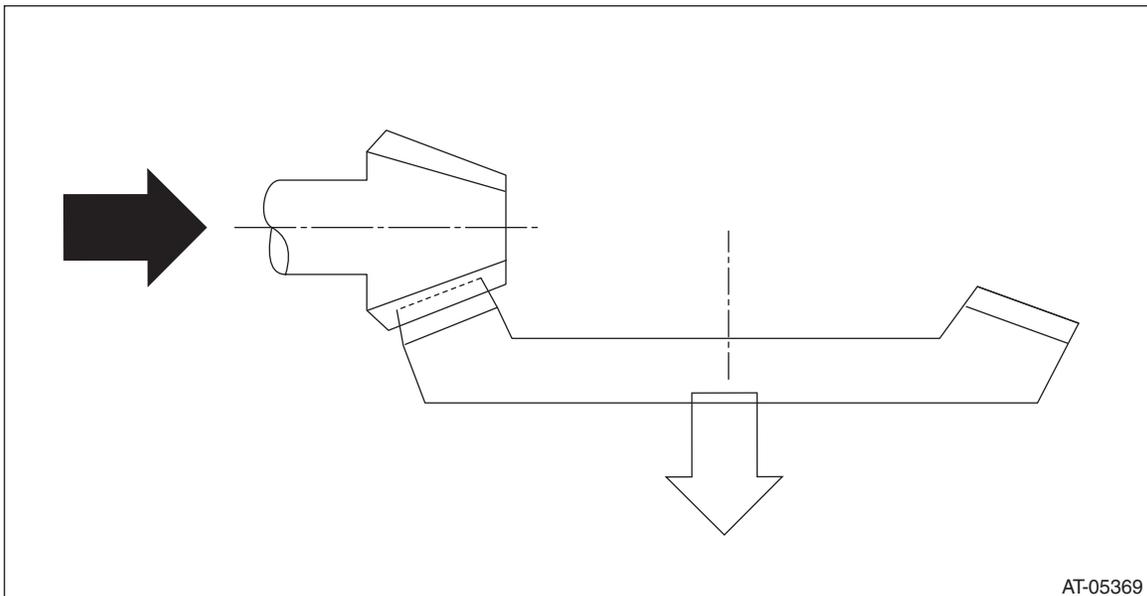
- Face contact

**Check item: Backlash is too large.**

Contact pattern



Corrective action: Increase thickness of pinion height adjusting washer according to the procedure for bringing drive pinion close to hypoid driven gear side.



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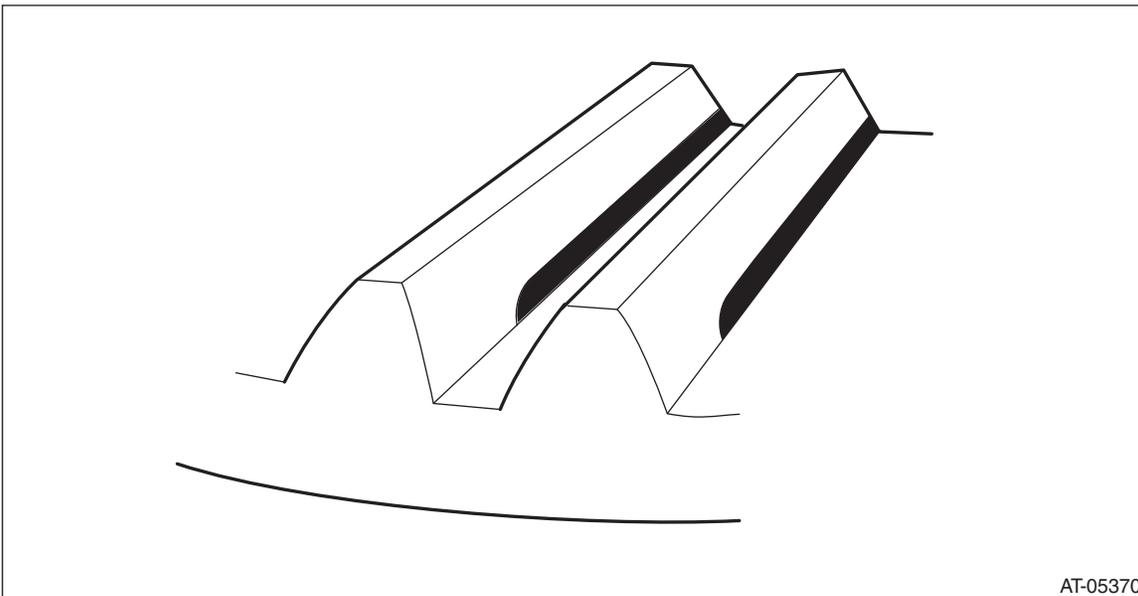
# Drive Pinion Shaft Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

- Flank contact

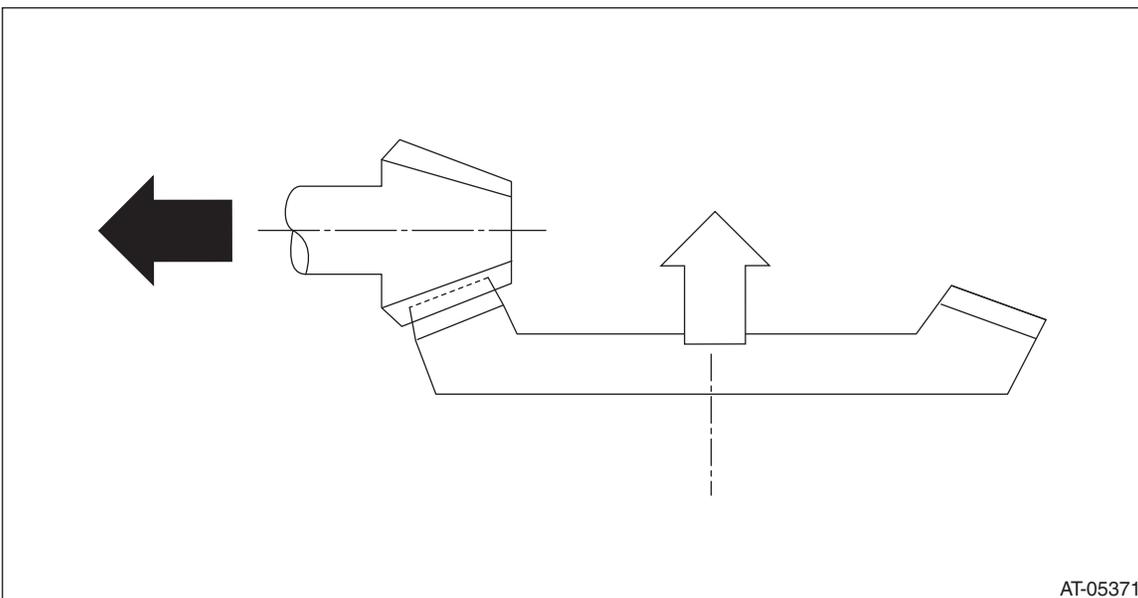
**Check item: Backlash is too small.**

Contact pattern



AT-05370

Corrective action: Reduce the thickness of pinion height adjusting washer according to the procedure for bringing drive pinion away from hypoid driven gear.



AT-05371

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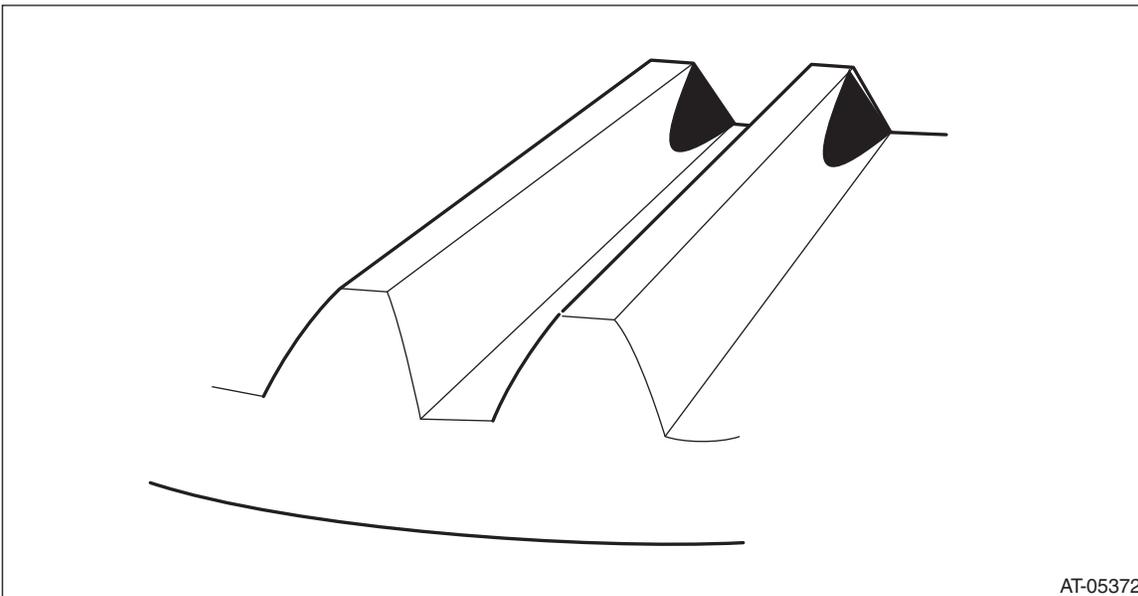
# Drive Pinion Shaft Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

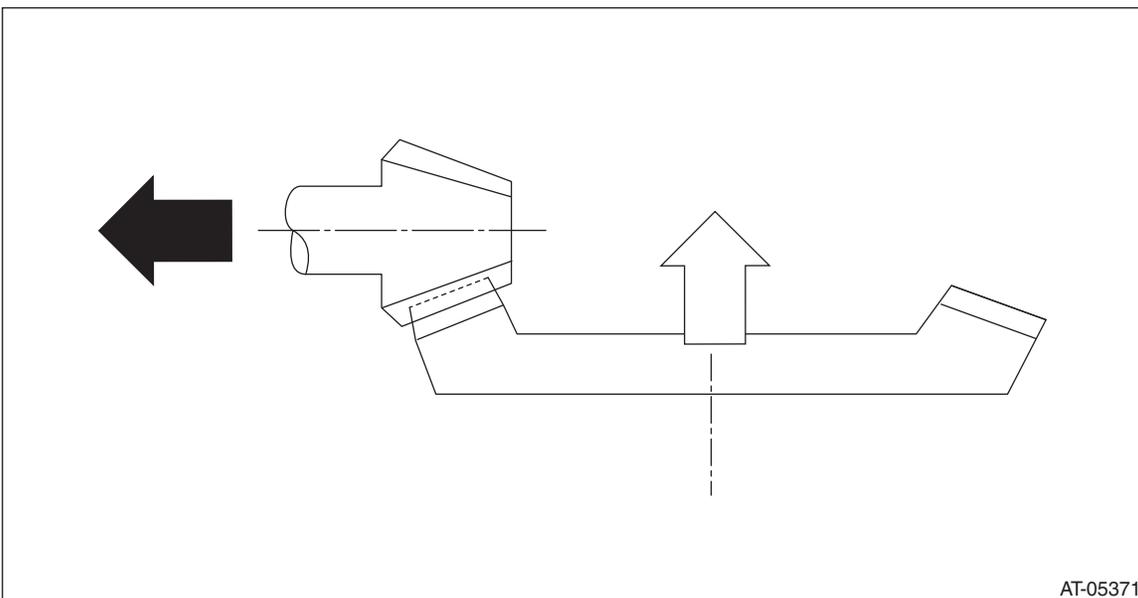
- Toe contact (inside contact)

**Check item: Teeth contact area is too small.**

Contact pattern



Corrective action: Reduce the thickness of pinion height adjusting washer according to the procedure for bringing drive pinion away from hypoid driven gear side.



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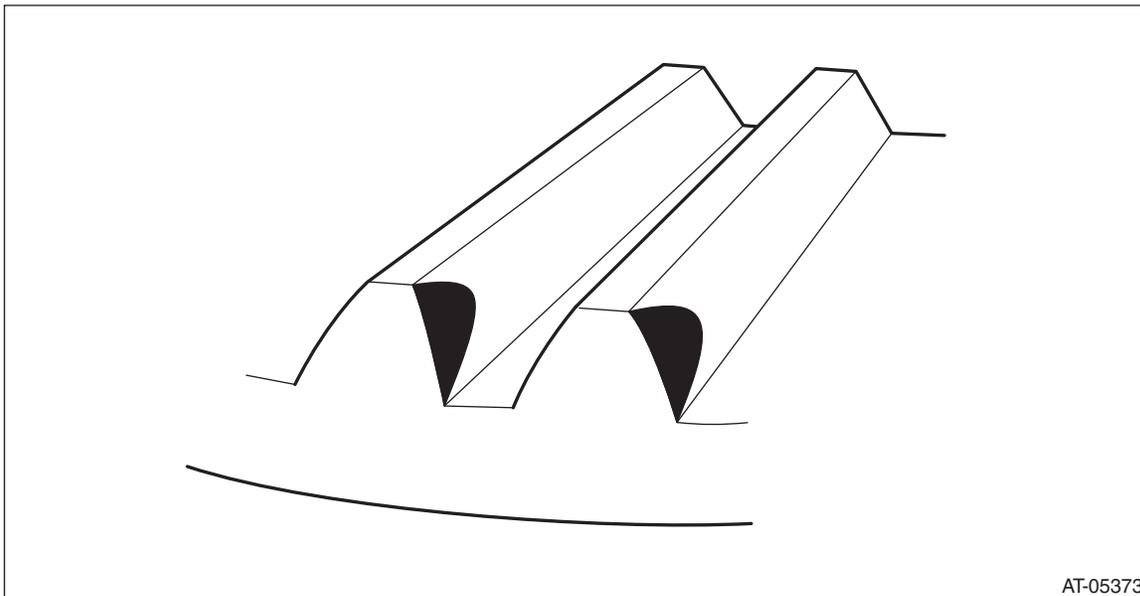
# Drive Pinion Shaft Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

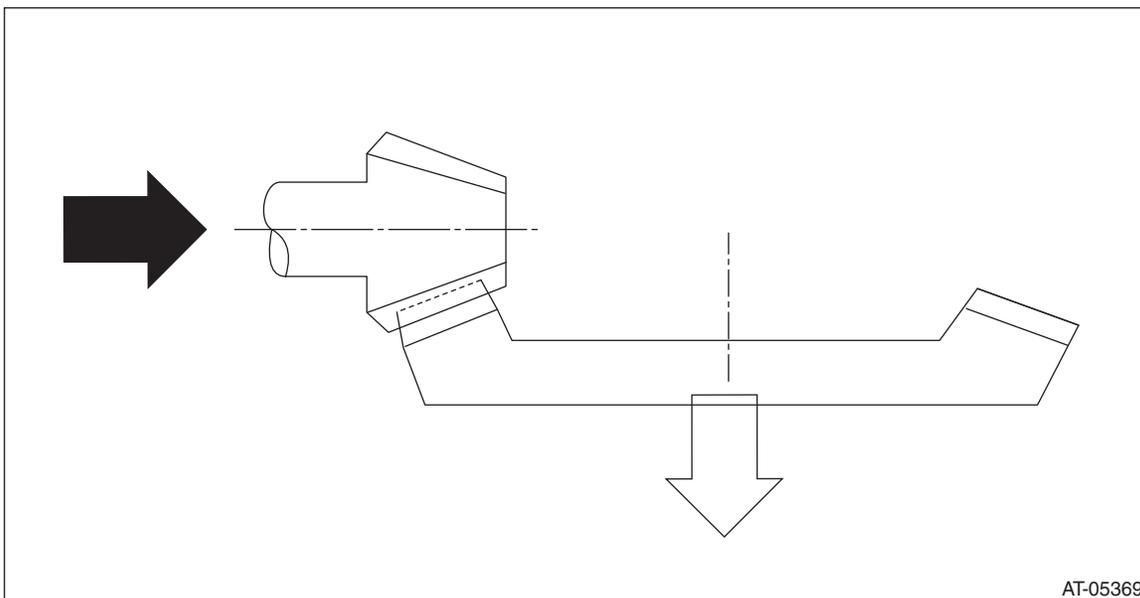
- Heel contact (outside end contact)

**Check item: Teeth contact area is too small.**

Contact pattern



Corrective action: Increase the thickness of the pinion height adjusting washer according to the procedures for moving the drive pinion closer to the hypoid driven gear.

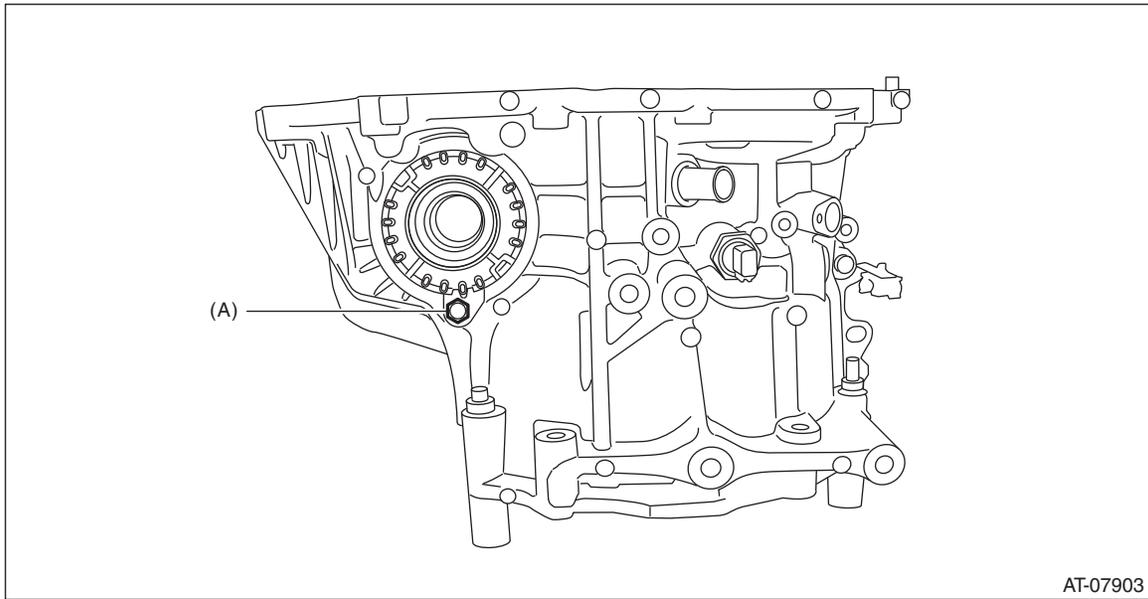


- 7) If tooth contact is correct, mark the differential side retainer position and loosen. After fitting a new O-ring and oil seal, screw in the differential side retainer to the marked position.
- 8) Tighten the lock plate with specified torque.

# Drive Pinion Shaft Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

**Tightening torque:**  
**25 N·m (2.5 kgf·m, 18.4 ft·lb)**



(A) Lock plate

AT-07903

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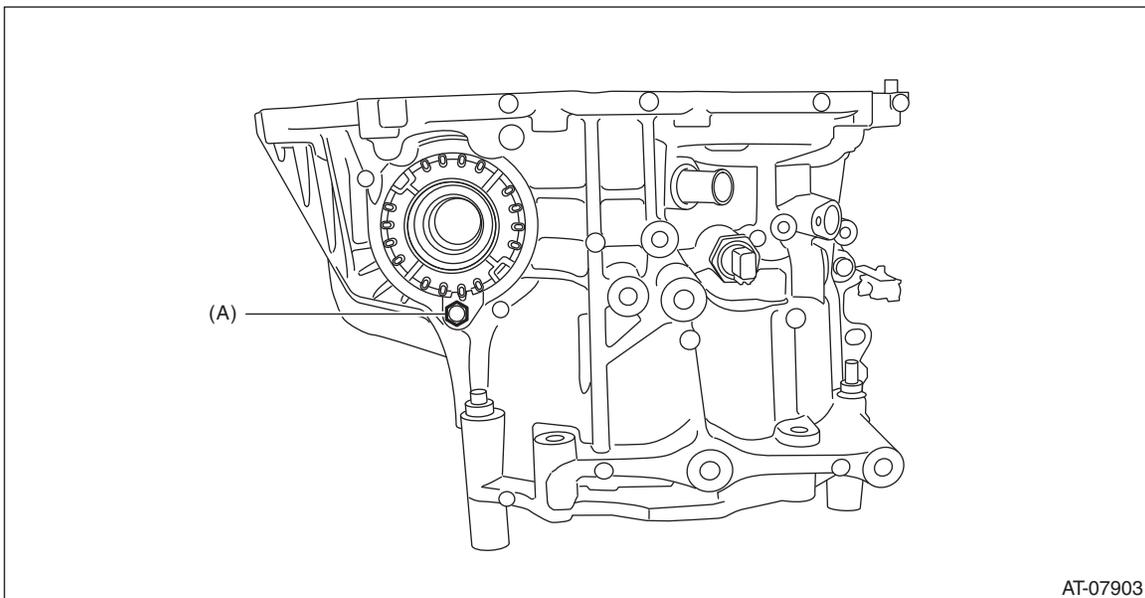
# Front Differential Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

## 45. Front Differential Assembly

### A: REMOVAL

- 1) Remove the transmission assembly from the vehicle. <Ref. to CVT(TR690)-59, REMOVAL, Automatic Transmission Assembly.>
- 2) Remove the air breather hose. <Ref. to CVT(TR690)-156, REMOVAL, Air Breather Hose.>
- 3) Remove the oil pan and control valve body. <Ref. to CVT(TR690)-129, REMOVAL, Control Valve Body.>
- 4) Remove the transmission harness. <Ref. to CVT(TR690)-139, REMOVAL, Transmission Harness.>
- 5) Remove the extension case. <Ref. to CVT(TR690)-164, REMOVAL, Extension Case.>
- 6) Remove the rear drive shaft. <Ref. to CVT(TR690)-167, REMOVAL, Rear Drive Shaft.>
- 7) Remove the transfer clutch assembly. <Ref. to CVT(TR690)-172, REMOVAL, Transfer Clutch.>
- 8) Remove the transfer reduction driven gear assembly. <Ref. to CVT(TR690)-184, REMOVAL, Transfer Reduction Driven Gear.>
- 9) Remove the intermediate case. <Ref. to CVT(TR690)-191, REMOVAL, Intermediate Case.>
- 10) Remove the forward clutch assembly. <Ref. to CVT(TR690)-206, REMOVAL, Forward Clutch Assembly.>
- 11) Remove the transmission case. <Ref. to CVT(TR690)-246, REMOVAL, Transmission Case.>
- 12) Remove the primary pulley, secondary pulley and variator chain. <Ref. to CVT(TR690)-263, REMOVAL, Primary Pulley and Secondary Pulley.>
- 13) Remove the drive pinion shaft assembly. <Ref. to CVT(TR690)-279, REMOVAL, Drive Pinion Shaft Assembly.>
- 14) Remove the lock plates on both sides.



(A) Lock plate

- 15) Remove the differential side retainers using ST.  
ST 18658AA020 WRENCH COMPL RETAINER

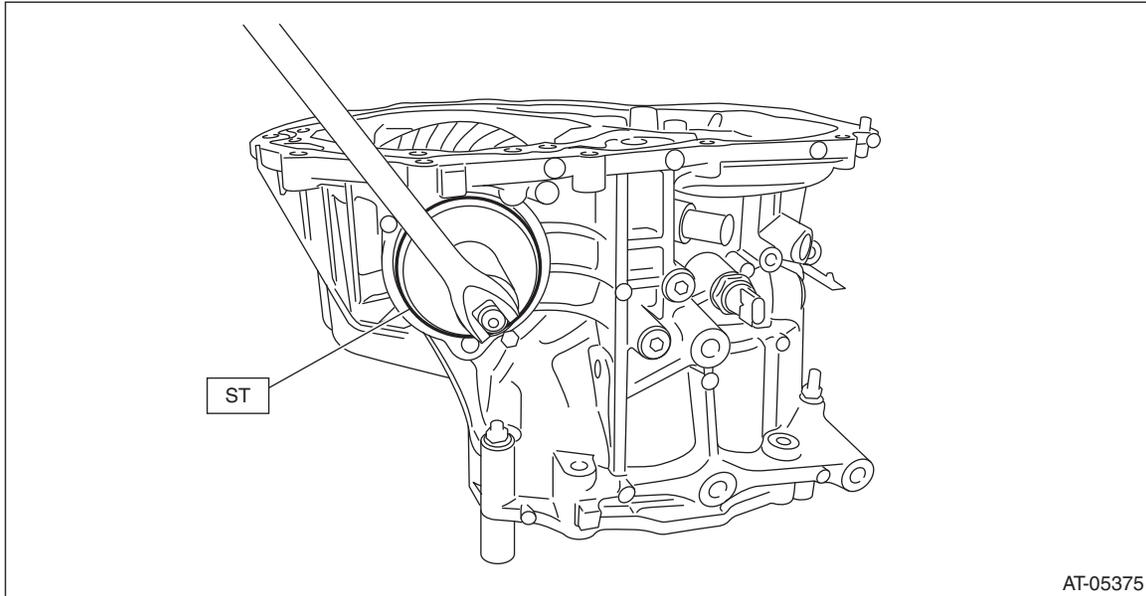
#### NOTE:

- Support the differential case assembly by hand to avoid damaging the retainer mounting hole of the converter case.

# Front Differential Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

- When keeping the retainers aside, use labels etc. to avoid confusing the left and right.



16) Remove the front differential assembly while being careful not to damage the attachment part of the retainer.

17) Remove the oil seals and O-rings from both differential side retainers. <Ref. to CVT(TR690)-305, SIDE RETAINER, DISASSEMBLY, Front Differential Assembly.>

## B: INSTALLATION

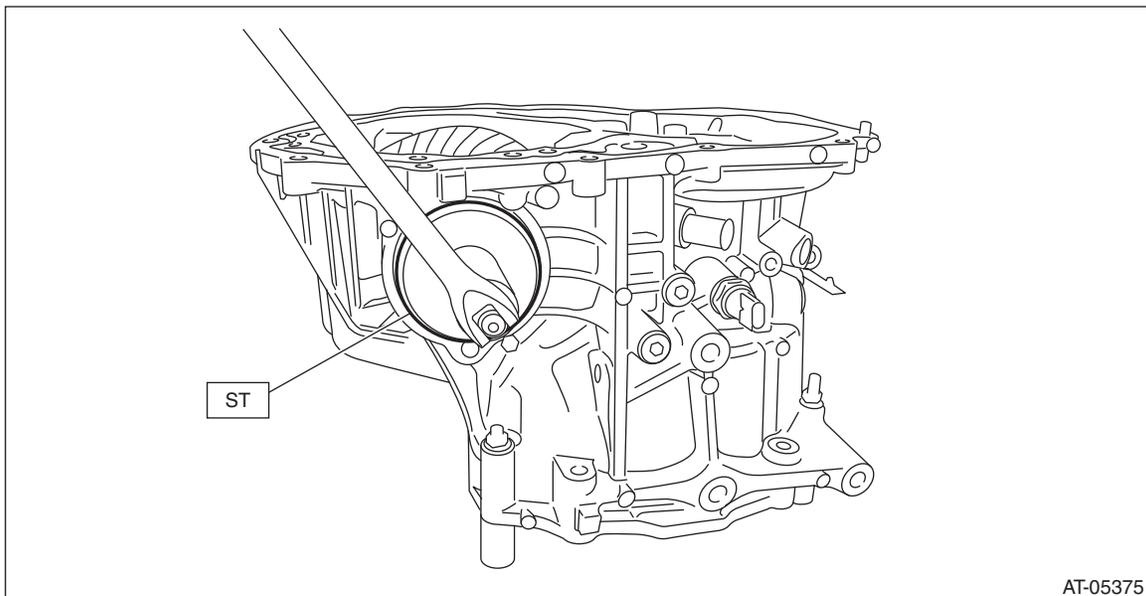
1) Install the front differential assembly to the converter case.

### NOTE:

Be careful not to damage the inside of the case (especially the mating surface of the differential side retainers).

2) Temporarily install the differential side retainers using ST.

ST 18658AA020 WRENCH COMPL RETAINER



3) Adjust the backlash of the front differential. <Ref. to CVT(TR690)-314, ADJUSTMENT, Front Differential Assembly.>

4) Inspect and adjust the tooth contact. <Ref. to CVT(TR690)-292, ADJUSTMENT, Drive Pinion Shaft Assembly.>

# Front Differential Assembly

## CONTINUOUSLY VARIABLE TRANSMISSION

5) Remove the differential side retainers and install the O-rings and oil seals. <Ref. to CVT(TR690)-312, SIDE RETAINER, ASSEMBLY, Front Differential Assembly.>

### NOTE:

- Record how many turns were needed to remove.
- Use new O-rings and oil seals.

6) Install the differential side retainers using ST.

### NOTE:

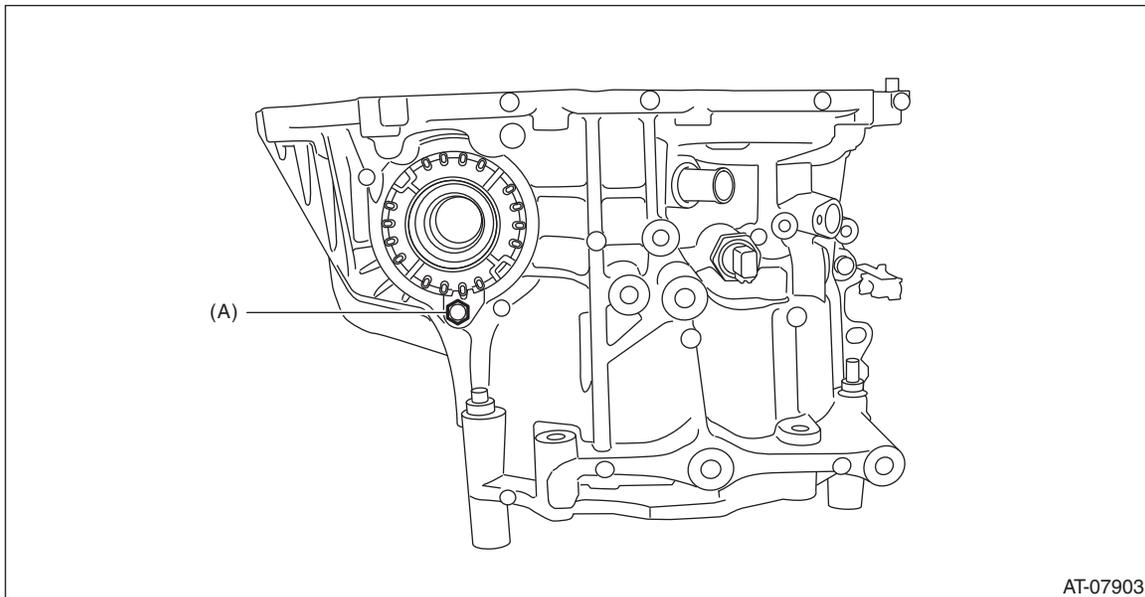
When attaching, turn the differential side retainer by the same number of turns it took to remove, and align the marks.

ST 18658AA020 WRENCH COMPL RETAINER

7) Install the lock plate.

### **Tightening torque:**

**25 N·m (2.5 kgf·m, 18.4 ft·lb)**



(A) Lock plate

8) Install the drive pinion shaft assembly. <Ref. to CVT(TR690)-281, INSTALLATION, Drive Pinion Shaft Assembly.>

9) Install the primary pulley, secondary pulley and variator chain. <Ref. to CVT(TR690)-267, INSTALLATION, Primary Pulley and Secondary Pulley.>

10) Install the transmission case. <Ref. to CVT(TR690)-248, INSTALLATION, Transmission Case.>

11) Install the forward clutch assembly. <Ref. to CVT(TR690)-207, INSTALLATION, Forward Clutch Assembly.>

12) Install the intermediate case. <Ref. to CVT(TR690)-192, INSTALLATION, Intermediate Case.>

13) Install the transfer reduction driven gear assembly. <Ref. to CVT(TR690)-184, INSTALLATION, Transfer Reduction Driven Gear.>

14) Install the transfer clutch assembly. <Ref. to CVT(TR690)-173, INSTALLATION, Transfer Clutch.>

15) Install the rear drive shaft. <Ref. to CVT(TR690)-167, INSTALLATION, Rear Drive Shaft.>

16) Install the extension case. <Ref. to CVT(TR690)-164, INSTALLATION, Extension Case.>

17) Install the transmission harness. <Ref. to CVT(TR690)-140, INSTALLATION, Transmission Harness.>

18) Install the control valve body and oil pan. <Ref. to CVT(TR690)-133, INSTALLATION, Control Valve Body.>

19) Install the air breather hose. <Ref. to CVT(TR690)-158, INSTALLATION, Air Breather Hose.>

20) Install the transmission assembly to the vehicle. <Ref. to CVT(TR690)-77, INSTALLATION, Automatic Transmission Assembly.>

# Front Differential Assembly

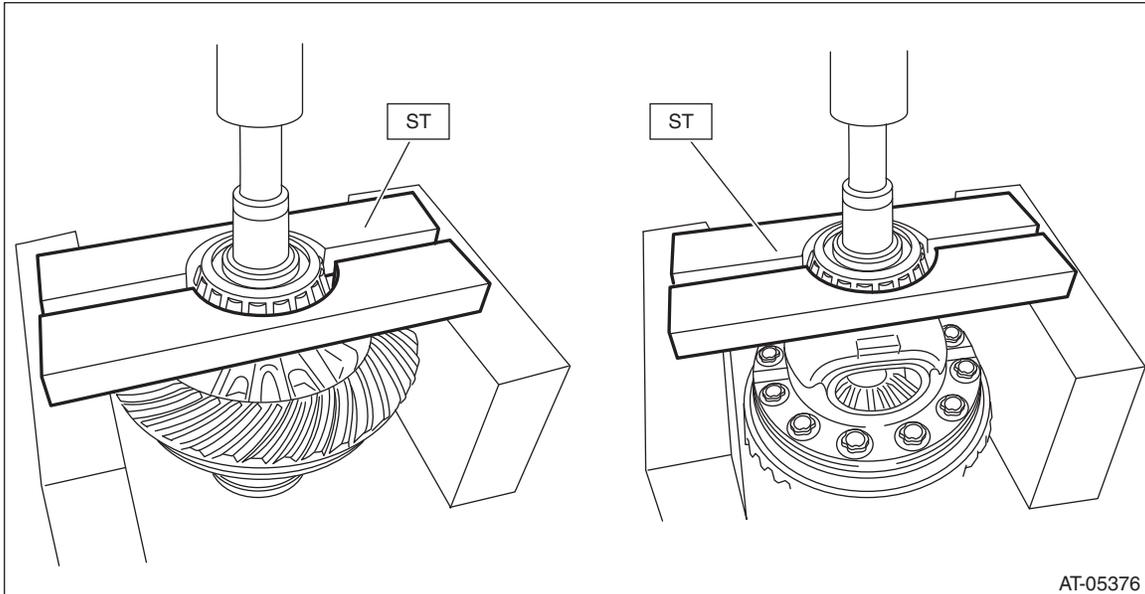
CONTINUOUSLY VARIABLE TRANSMISSION

## C: DISASSEMBLY

### 1. DIFFERENTIAL CASE ASSEMBLY

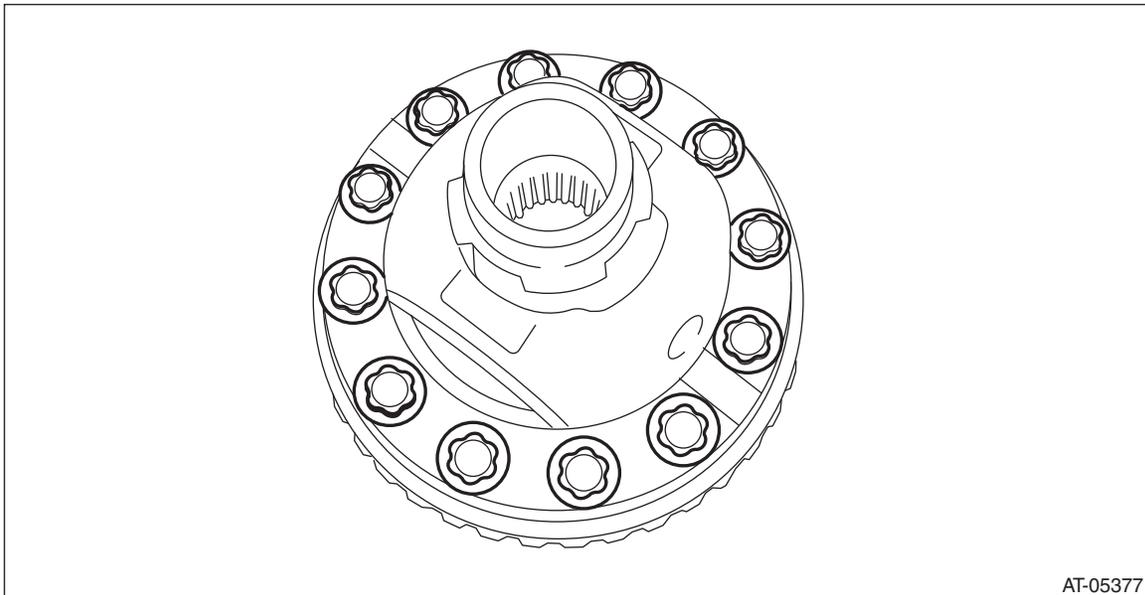
1) Remove the taper roller bearing using the ST.

ST 498077000 REMOVER



2) Remove the hypoid driven gear mounting bolt using the ST.

ST 18270KA020 SOCKET (E20)



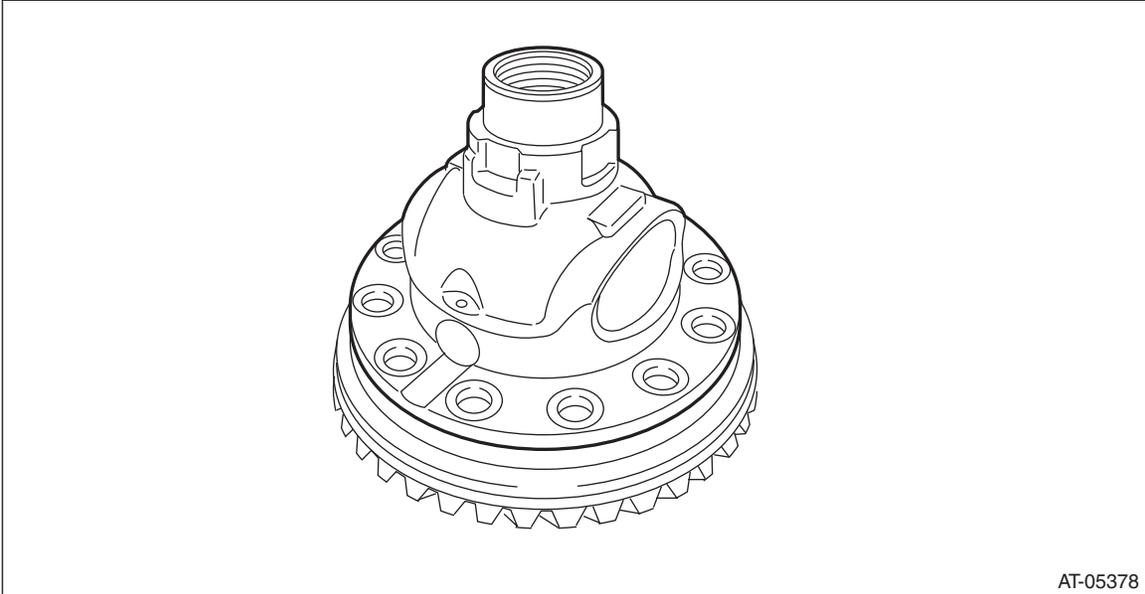
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# Front Differential Assembly

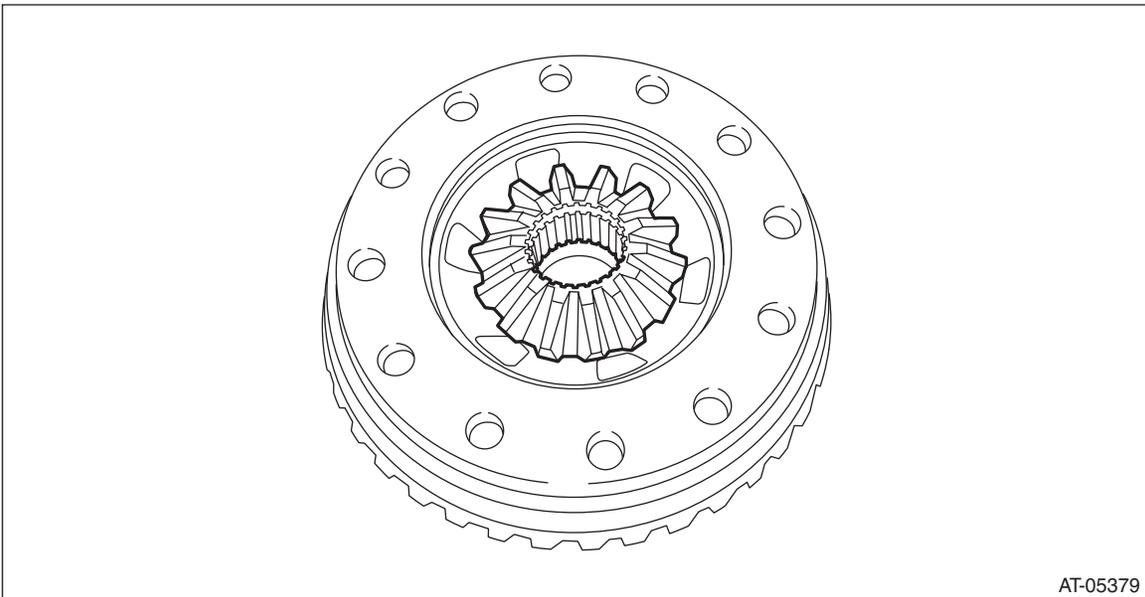
CONTINUOUSLY VARIABLE TRANSMISSION

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3) Remove the differential case (LH).



4) Remove the differential bevel gear and washer from differential case.

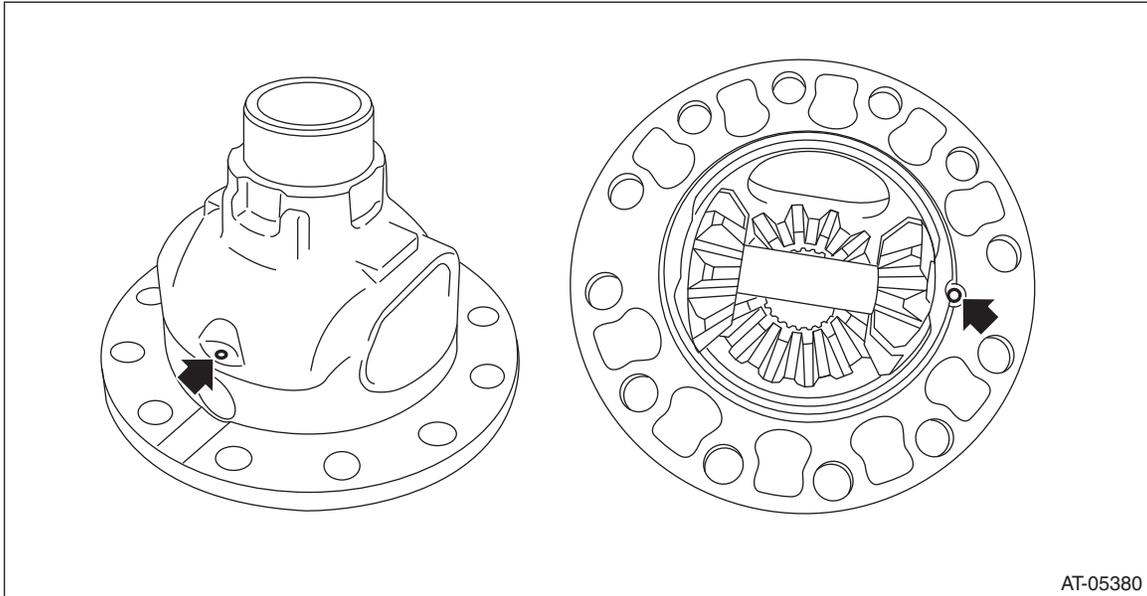


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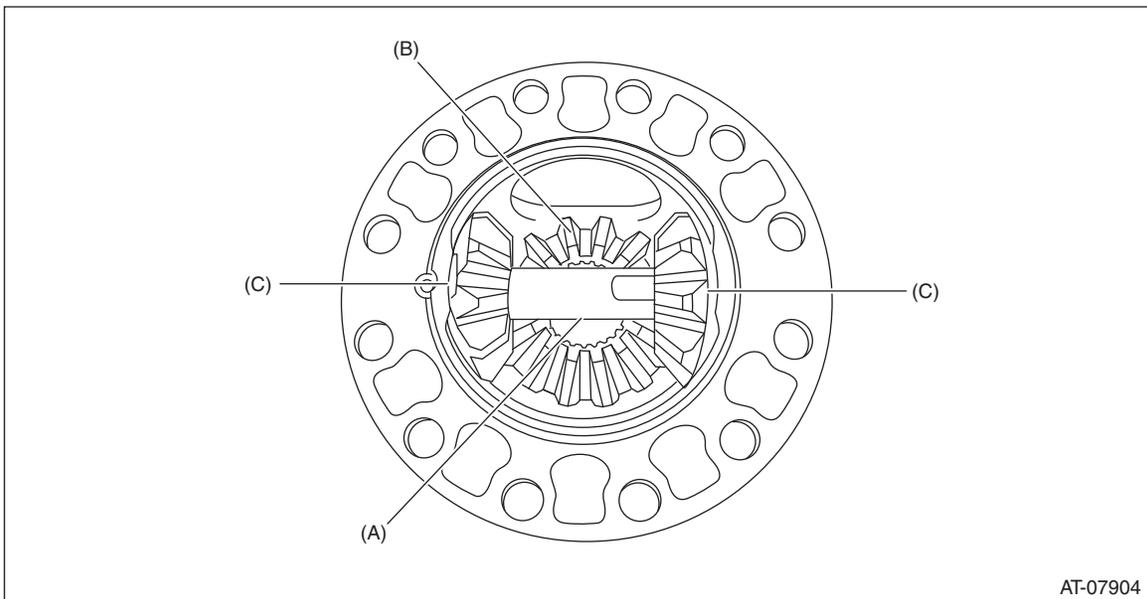
# Front Differential Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

5) Remove the straight pin.



6) Remove the pinion shaft, then remove the differential bevel gear, washer and differential bevel pinion.



- (A) Pinion shaft
- (B) Differential bevel gear
- (C) Differential bevel pinion

## 2. SIDE RETAINER

NOTE:

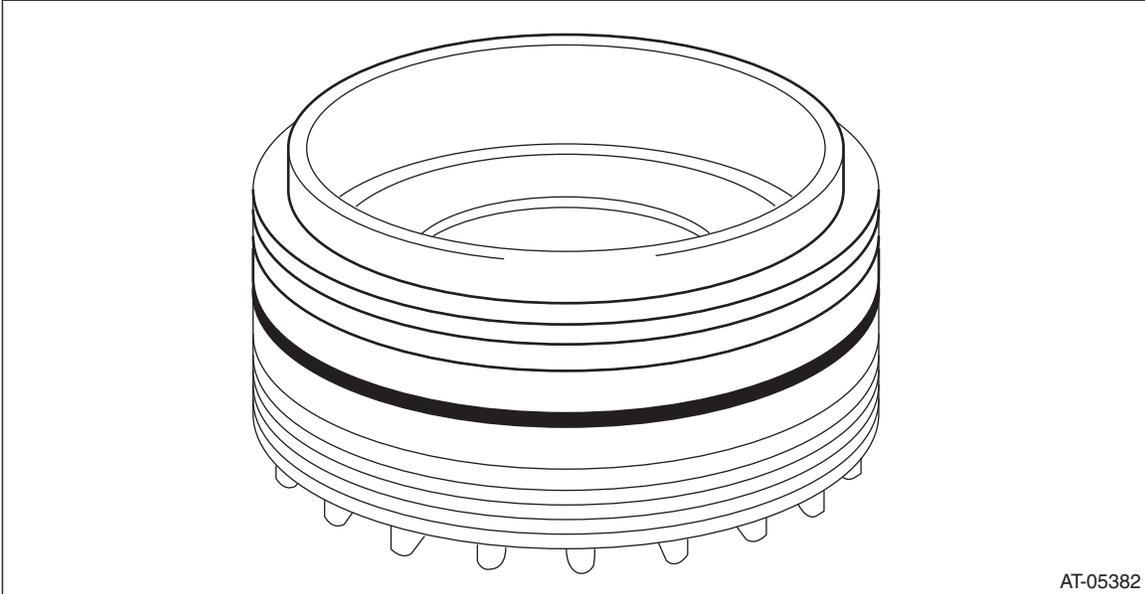
After adjusting the drive pinion backlash and tooth contact, replace the oil seal and O-ring with new parts.

# Front Differential Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

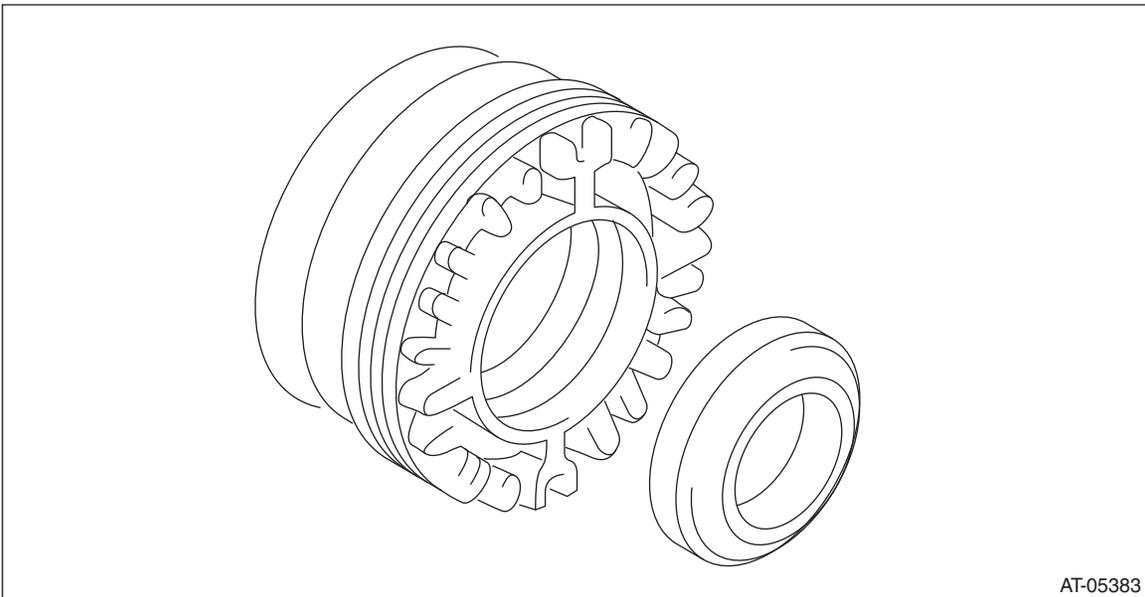
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1) Remove the O-rings.



AT-05382

2) Remove the oil seal.



AT-05383

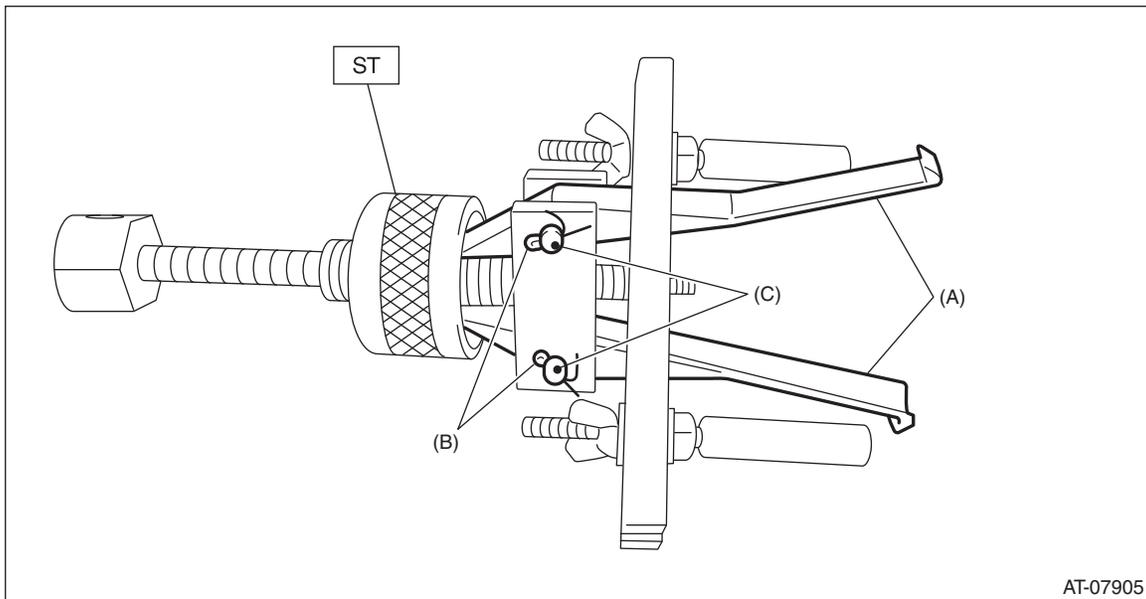
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# Front Differential Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

3) Remove the SPLIT PIN (ST), and then remove the claw.

ST 398527700 PULLER ASSY

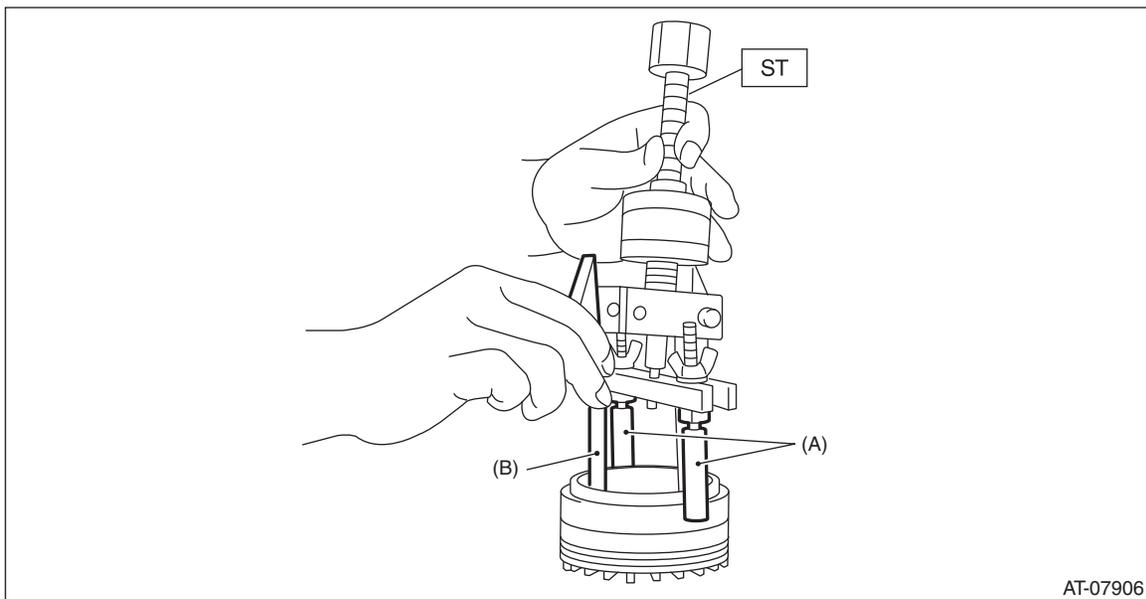


AT-07905

- (A) Claw
- (B) Split pin
- (C) Pin

4) Attach two claws to the outer race, and set the ST to side retainer.

ST 398527700 PULLER ASSY



AT-07906

- (A) Shaft
- (B) Claw

5) Restore the removed claws to original position, and install the pin and split pin.

6) Hold the shaft of ST to avoid removing from side retainer, and then remove the bearing outer race.

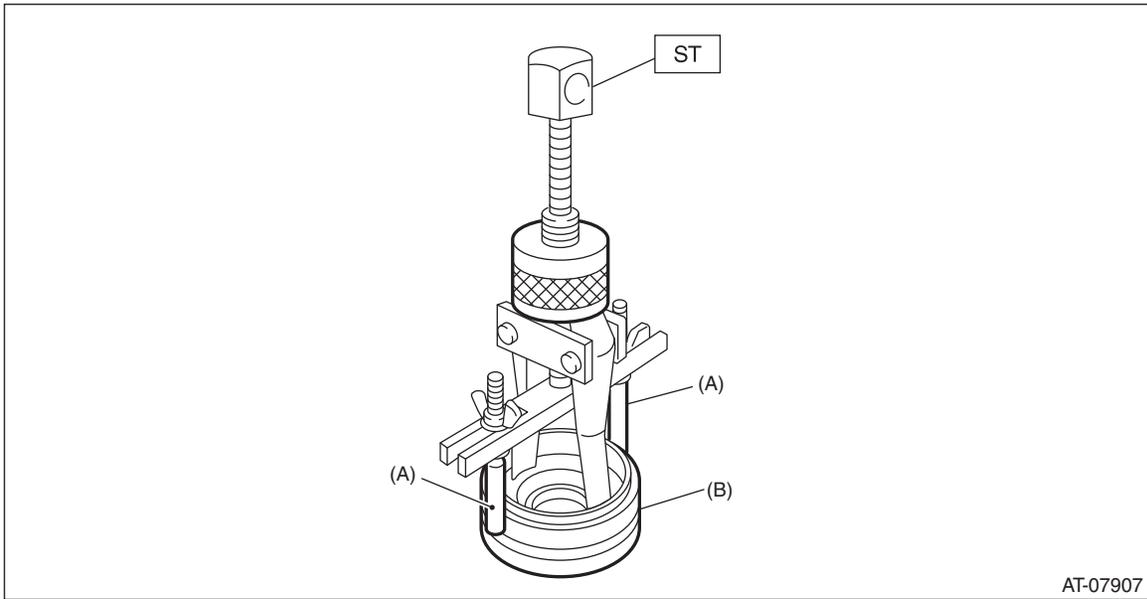
ST 398527700 PULLER ASSY

# Front Differential Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

## NOTE:

Replace the bearing inner and outer races as a single unit.

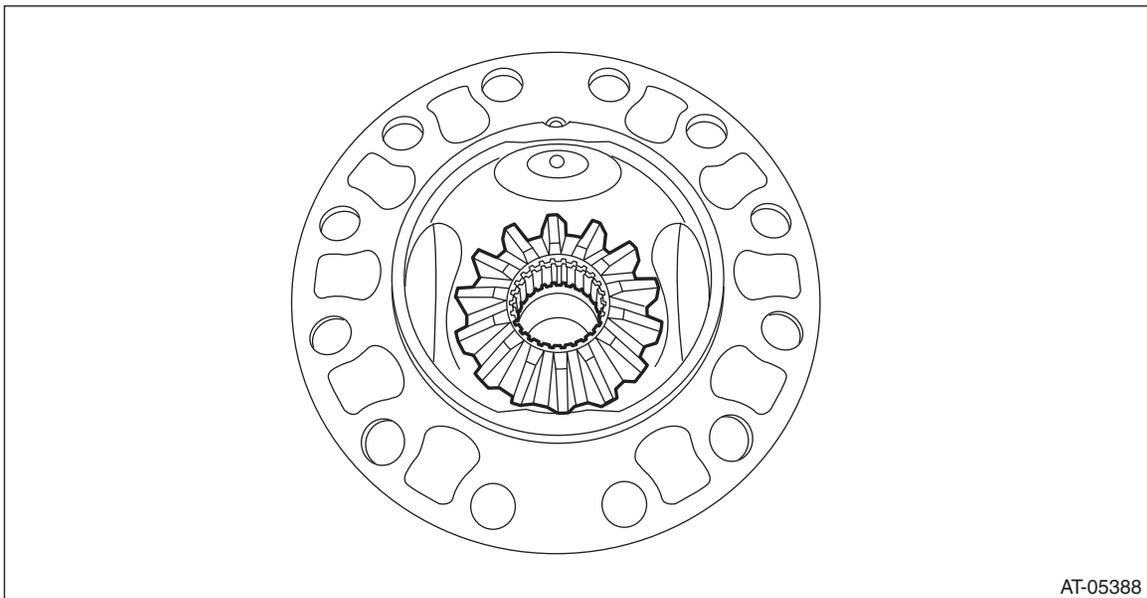


- (A) Shaft
- (B) Side retainer

## D: ASSEMBLY

### 1. DIFFERENTIAL CASE ASSEMBLY

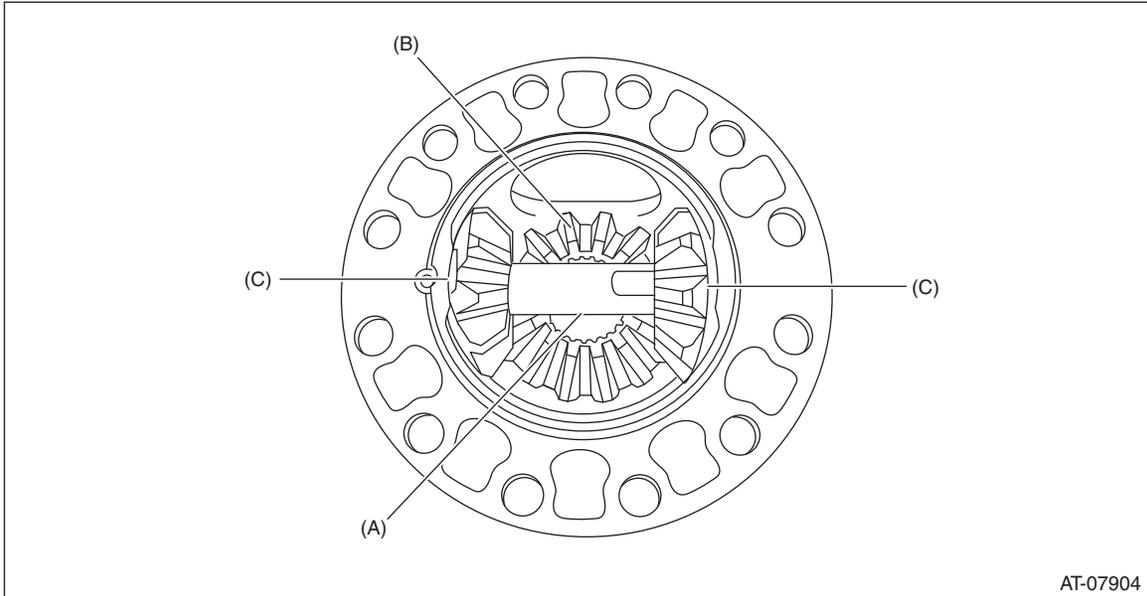
- 1) Install the washer and differential bevel gear into differential case (LH).



# Front Differential Assembly

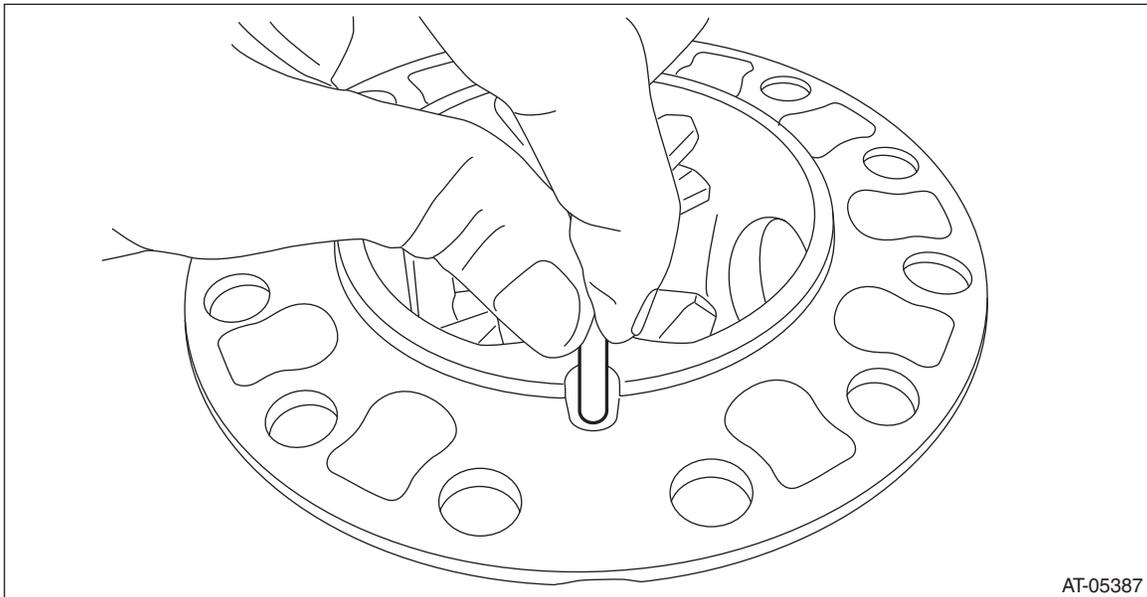
CONTINUOUSLY VARIABLE TRANSMISSION

2) Install the differential bevel gear pinions into differential case (LH) and install the pinion shaft.



- (A) Pinion shaft
- (B) Differential bevel gear
- (C) Differential bevel pinion

3) Install the straight pin.



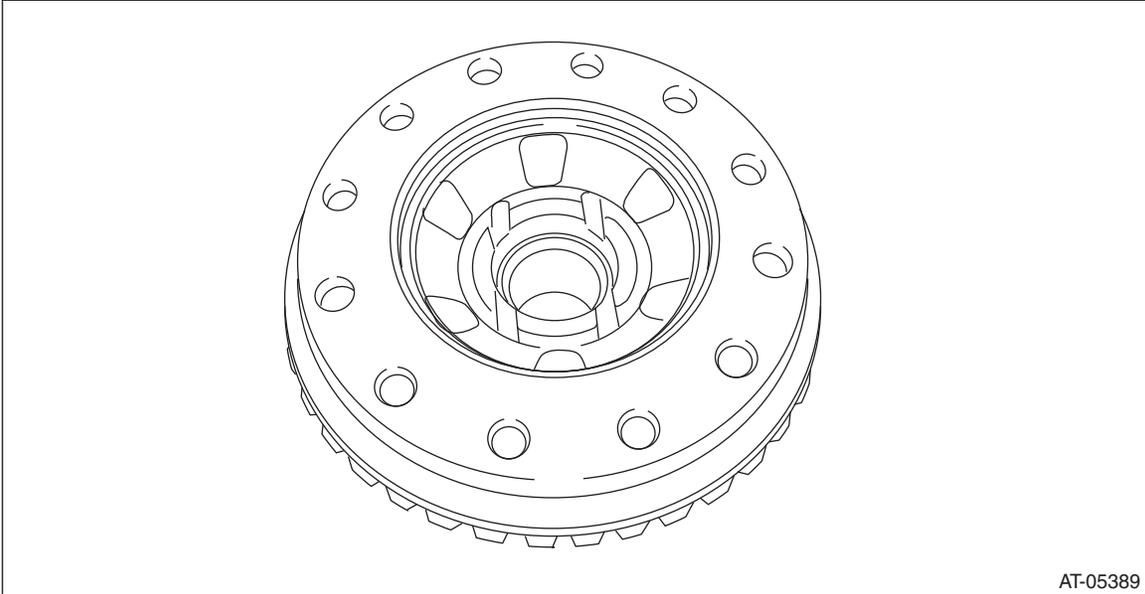
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# Front Differential Assembly

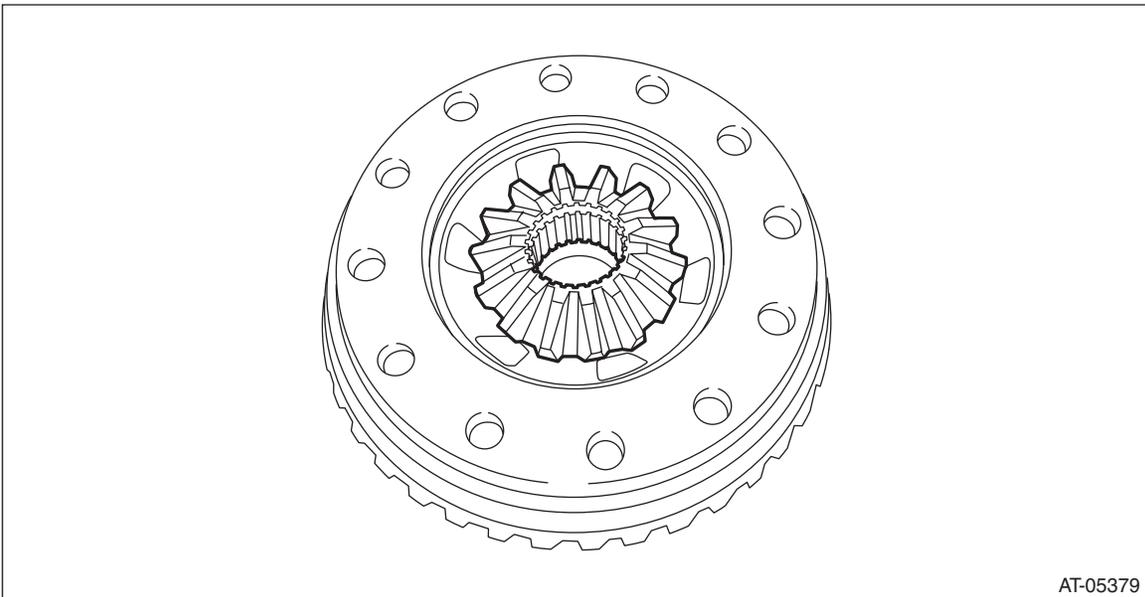
CONTINUOUSLY VARIABLE TRANSMISSION

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4) Install the differential case (RH) to hypoid driven gear and secure with vise.



5) Install the washer and differential bevel gear to the differential case (RH).



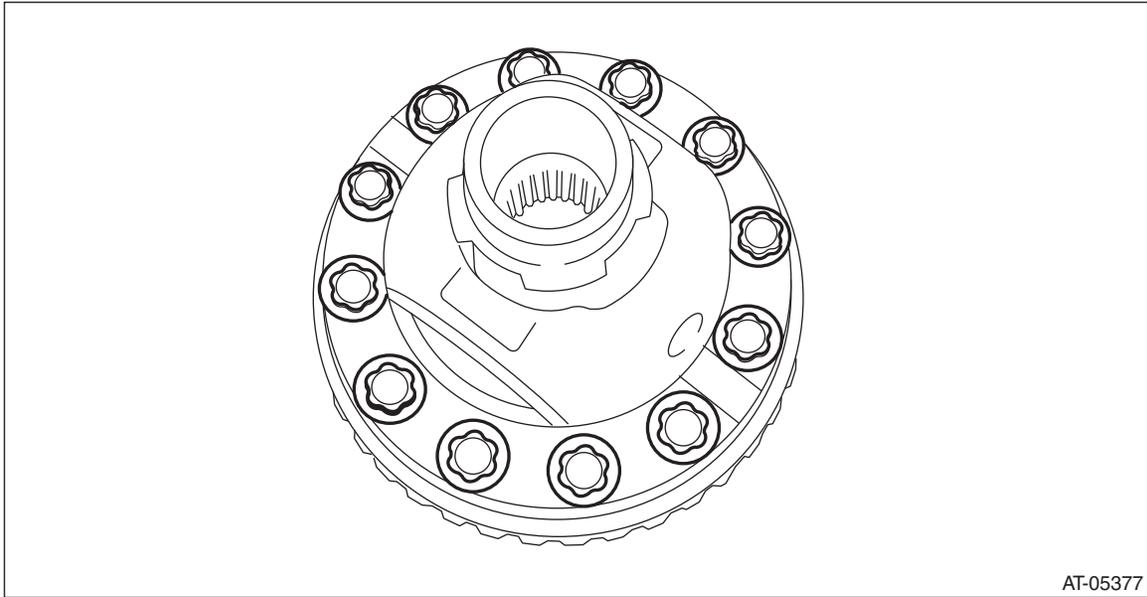
6) Using the ST, install the hypoid driven gear by tightening the installation bolt.  
ST 18270KA020 SOCKET (E20)

# Front Differential Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

## Tightening torque:

**20 N·m (2.0 kgf-m, 14.8 ft-lb)**



7) While checking the tightening angle with the angle gauge, further tighten the hypoid driven gear mounting bolts.

## Tightening angle:

**$45^{\circ} \pm 2^{\circ}$**

8) Measurement of backlash (selection of washer)

(1) Install the SUBARU genuine axle shaft to differential case.

Part No. 38415AA070 Axle shaft

(2) Measure the gear backlash using ST1 and ST2, and then insert the ST2 through the window of differential case.

ST1 498247001 MAGNET BASE

ST2 498247100 DIAL GAUGE

## NOTE:

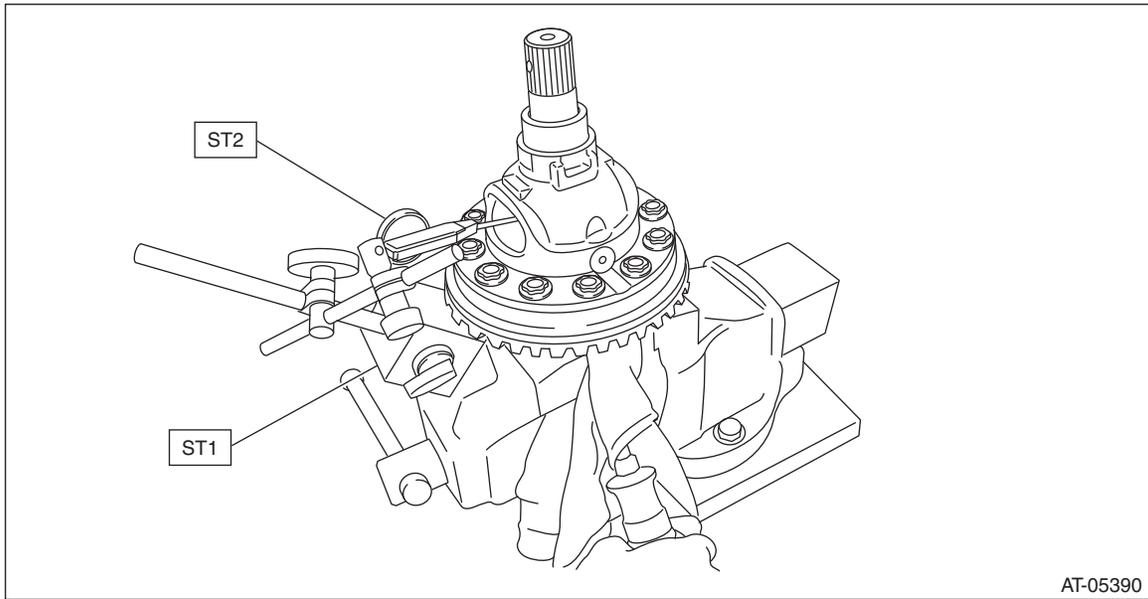
- Measure the backlash by applying a differential bevel pinion tooth between two differential bevel gear teeth.
- When measuring, fix the differential bevel pinion in place with a screwdriver covered with cloth, or a similar tool.

# Front Differential Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

## Specification:

0.13 — 0.18 mm (0.0051 — 0.0071 in)



AT-05390

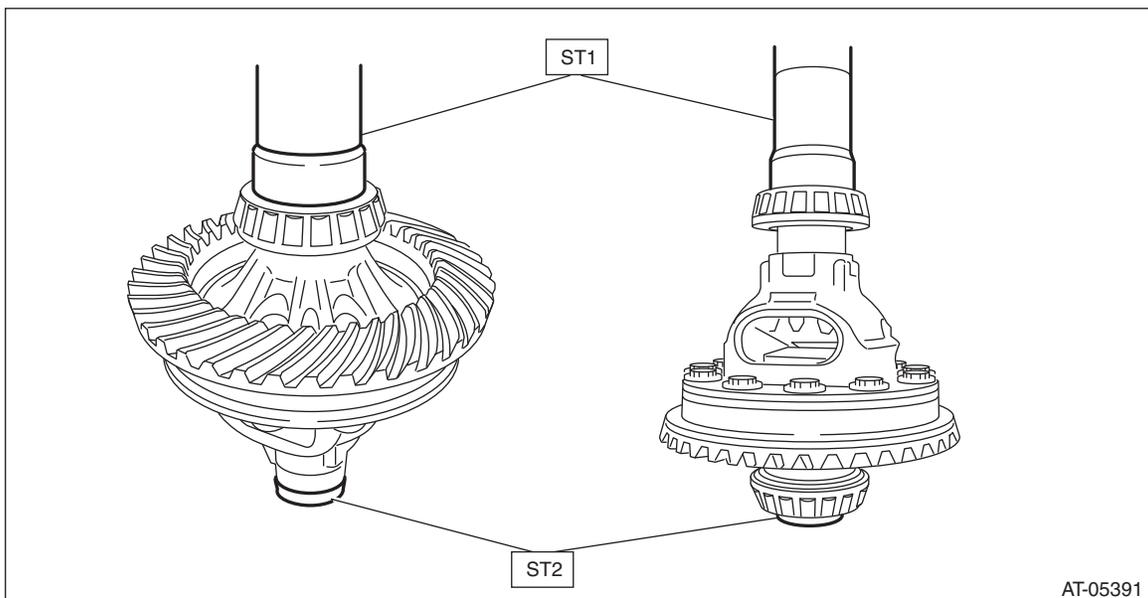
(3) If the backlash is not within specification, select a washer from the table below and replace.

Washer	
Part No.	Thickness mm (in)
803038021	0.95 (0.037)
803038022	1.00 (0.039)
803038023	1.05 (0.041)

9) Using the ST, install the left and right taper roller bearings.

ST1 499277100 BUSHING 1-2 INSTALLER

ST2 398497701 SEAT



AT-05391

## 2. SIDE RETAINER

### NOTE:

After adjusting the backlash and tooth contact, replace the oil seal and O-ring of side retainer with new parts.

- 1) Press-fit the bearing outer race to side retainer.
- 2) Using the ST, install the oil seal.

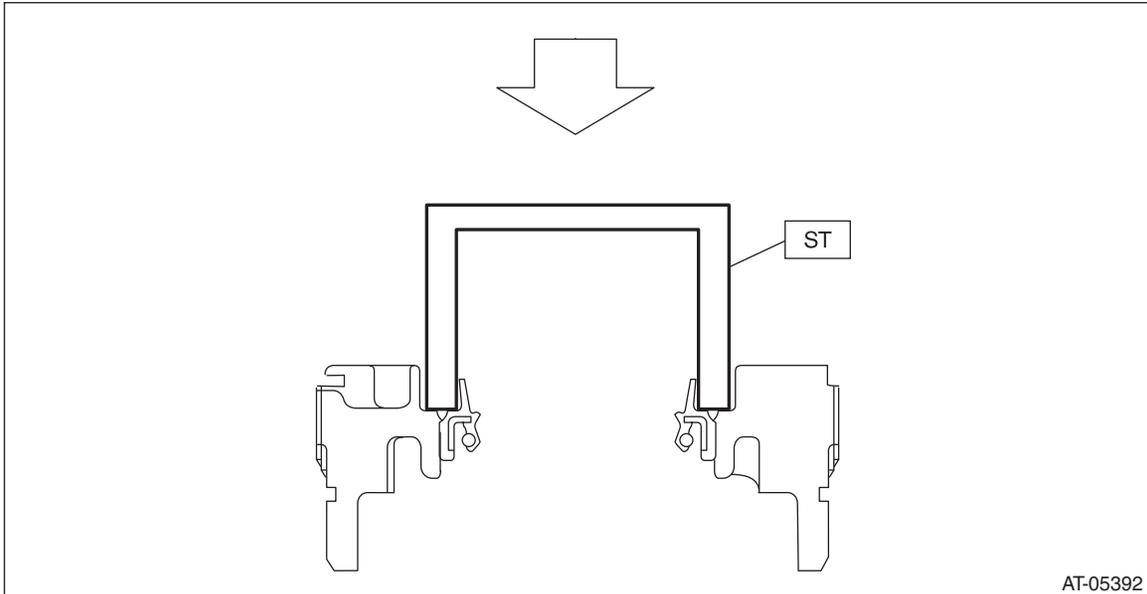
# Front Differential Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

## NOTE:

- Use a new oil seal.
- Apply differential oil to the oil seal lip.
- Oil seal has an identification mark (R, L). When installing oil seals, do not confuse the left and right.

ST 18675AA000 DIFFERENTIAL SIDE OIL SEAL INSTALLER

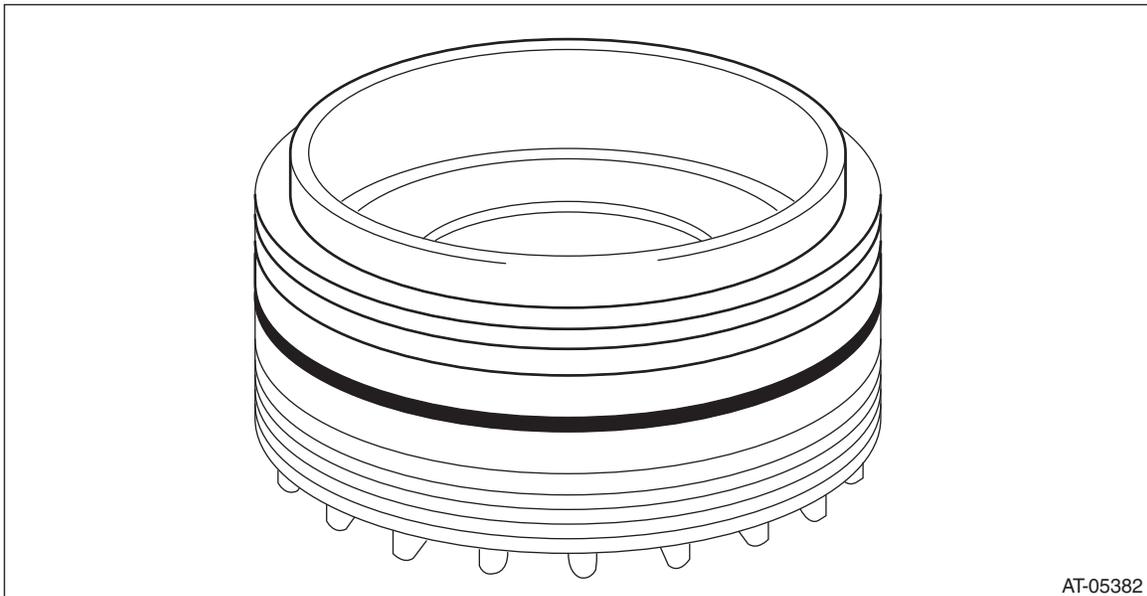


AT-05392

3) Install the O-rings.

## NOTE:

- Use new O-rings.
- Apply gear oil to O-ring.



AT-05382

## E: INSPECTION

- Check each component for scratches, damage or other faults.
- Inspect the backlash of the pinion gear.

ST1 498247001 MAGNET BASE

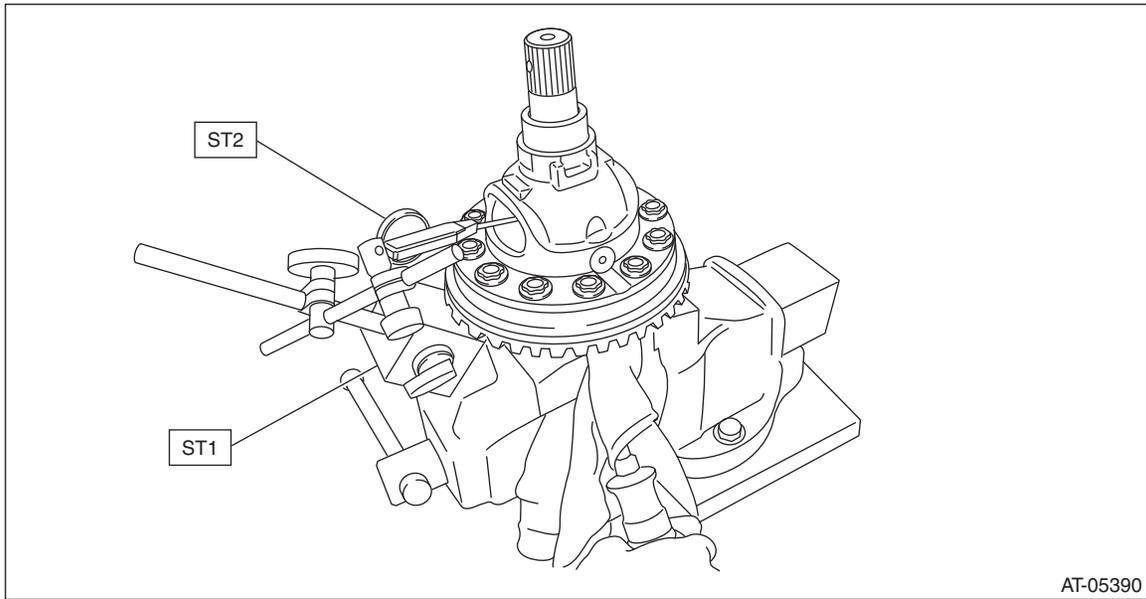
ST2 498247100 DIAL GAUGE

# Front Differential Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

## Specification:

0.13 — 0.18 mm (0.0051 — 0.0071 in)



- Measure the hypoid gear backlash, and then adjust it to be within specification. <Ref. to CVT(TR690)-314, ADJUSTMENT, Front Differential Assembly.>

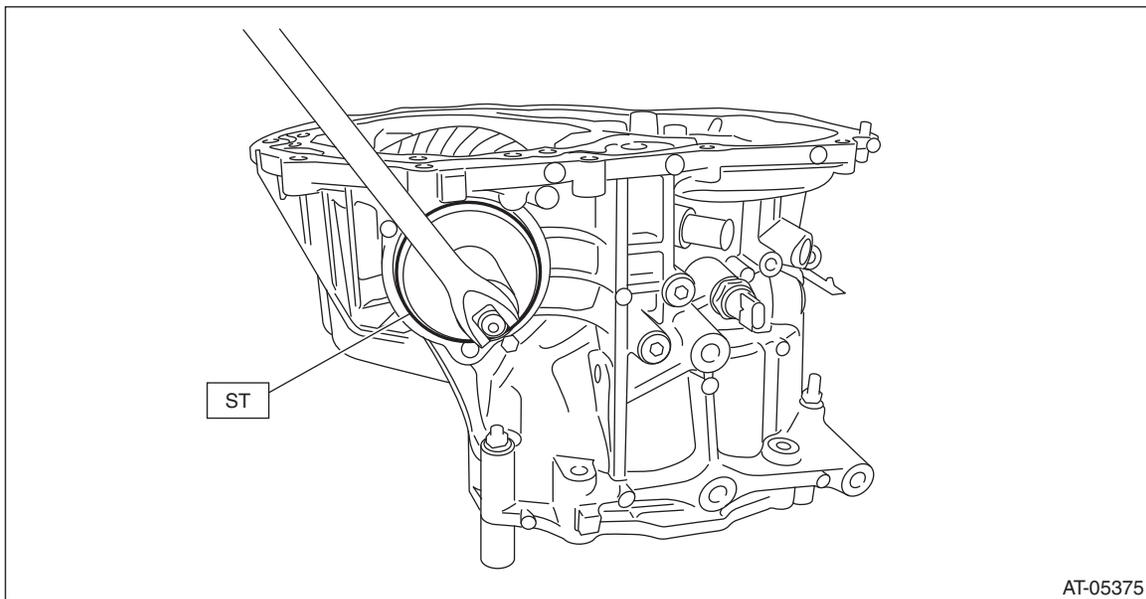
## F: ADJUSTMENT

- 1) Using the ST, screw-in the retainer until resistance is felt.

### NOTE:

RH side should be screwed-in more than LH side.

ST 18658AA020 WRENCH COMPL RETAINER



- 2) Remove the remaining liquid gasket from the mating surface completely.
  - 3) Using the ST, install the drive pinion assembly to converter case.
- ST 18270KA020 SOCKET (E20)

### NOTE:

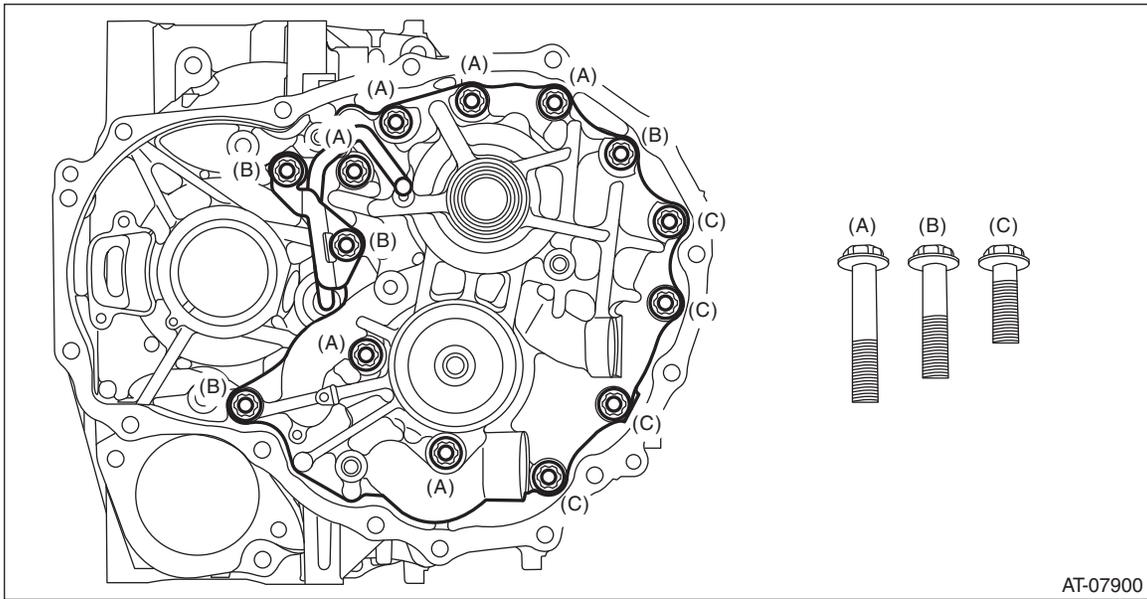
Do not confuse the three different-length bolts when installing.

# Front Differential Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

**Tightening torque:**

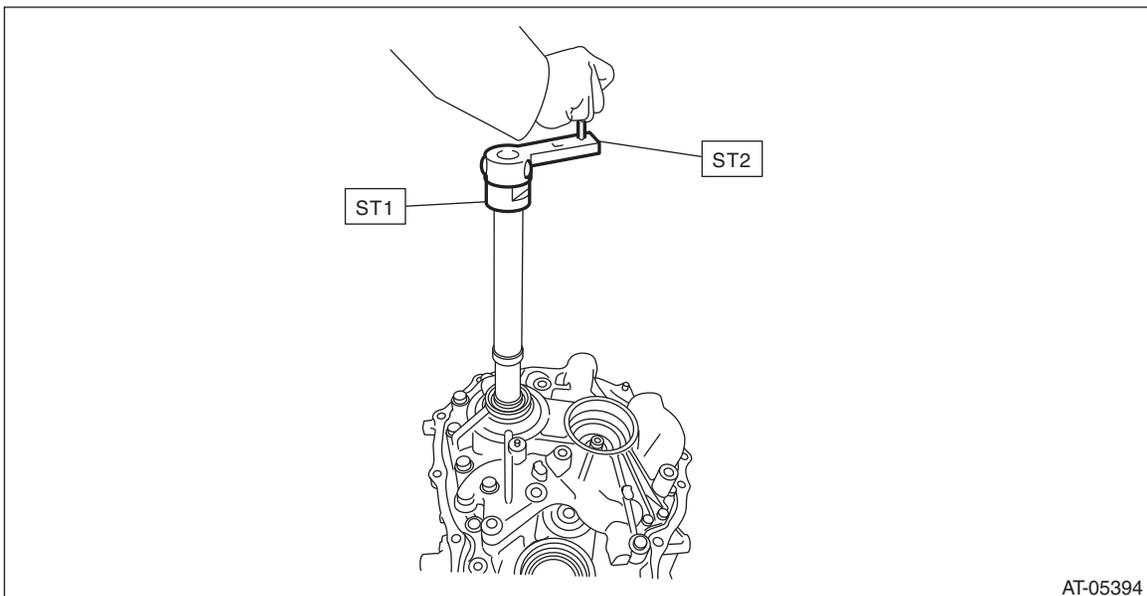
**43 N·m (4.4 kgf·m, 31.7 ft·lb)**



4) Rotate the drive pinion shaft ten times or more using ST1 and ST2.

ST1 18667AA010 HOLDER

ST2 499787700 WRENCH

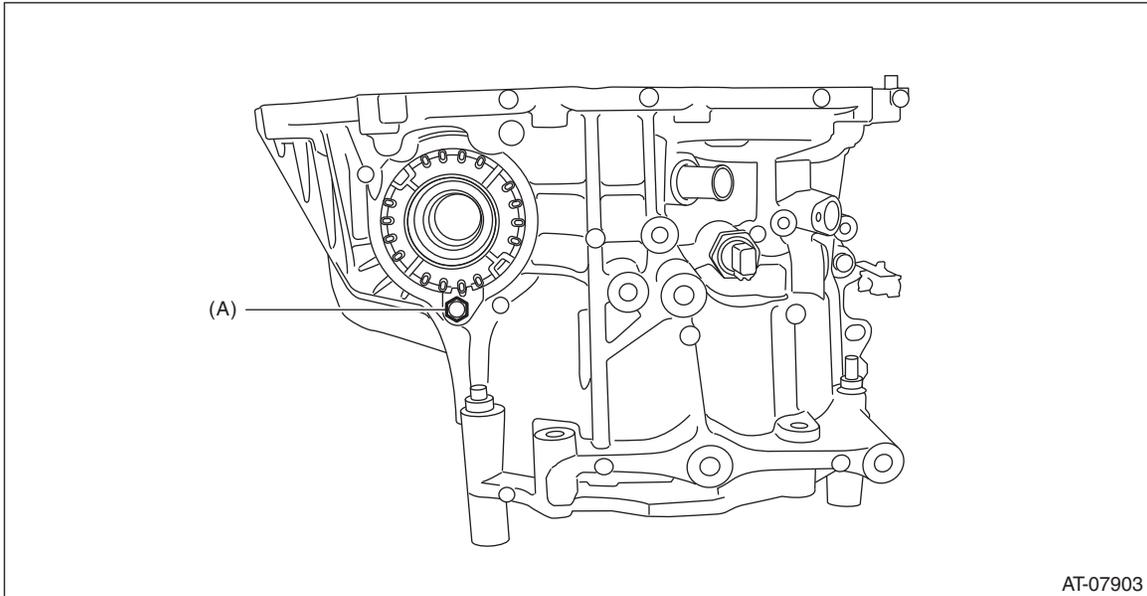


5) While rotating the pinion shaft, tighten the retainer LH and loosen the retainer RH until the shaft can't be turned anymore. The backlash is "zero" when the pinion shaft comes to the point where it doesn't rotate.

# Front Differential Assembly

## CONTINUOUSLY VARIABLE TRANSMISSION

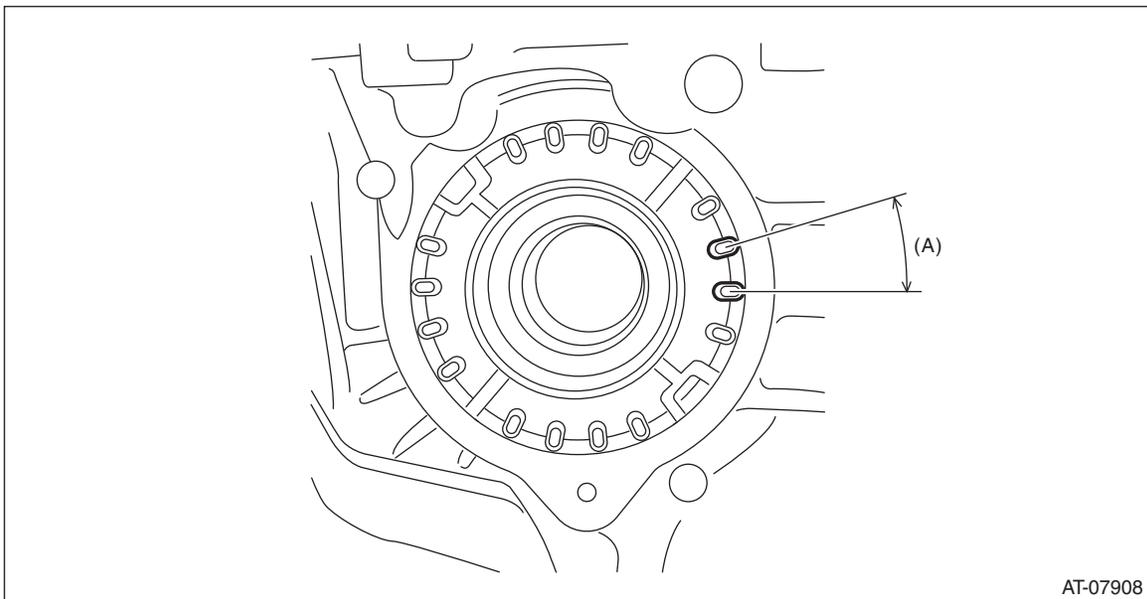
6) After the “zero” state is established, loosen the retainer LH by 3 notches and secure it with the lock plate. Loosen the retainer RH and retighten until it stops. Rotate the drive pinion 2 or 3 times. Tighten the retainer RH further 1-3/4 notches. This sets the preload. Finally, secure the retainer with its lock plate.



(A) Lock plate

### NOTE:

Turning the retainer by every one tooth changes the backlash approx. 0.05 mm (0.0020 in).



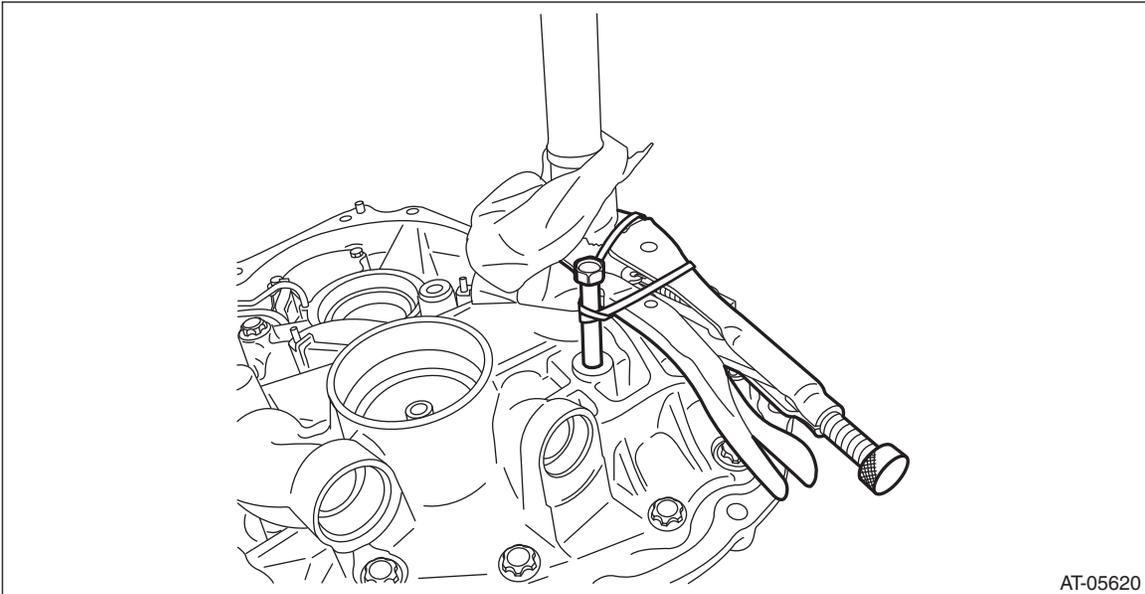
(A) 1 tooth

7) Insert the two SUBARU genuine axle shafts into differential case.  
Part No. 38415AA070Axle shaft

# Front Differential Assembly

CONTINUOUSLY VARIABLE TRANSMISSION

8) Wrap the drive shaft pinion shaft with cloth and pinch with vise pliers. Install the bolt into the installation bolt hole of secondary pulley, and secure the bolt and vise pliers using a tie-wrap or wire. Make sure the drive pinion shaft does not move.

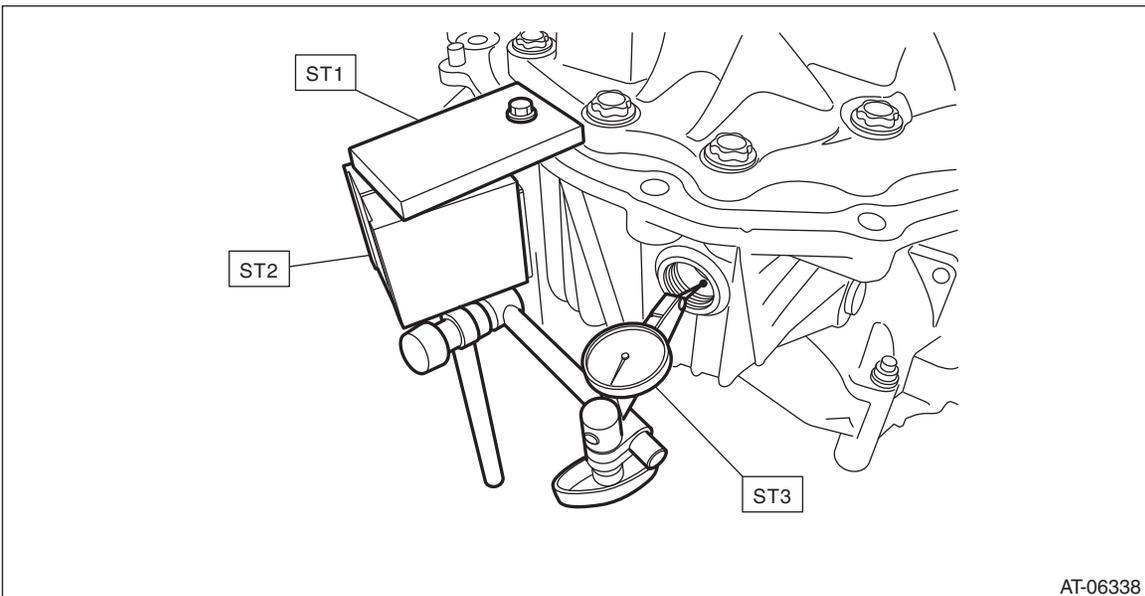


9) Check the backlash is within specification using ST1, ST2 and ST3.

ST1 498255400 PLATE  
ST2 498247001 MAGNET BASE  
ST3 498247100 DIAL GAUGE

### **Backlash:**

**0.13 — 0.18 mm (0.005 — 0.007 in)**



10) Adjust the teeth contact of the front differential and drive shaft. <Ref. to CVT(TR690)-292, ADJUSTMENT, Drive Pinion Shaft Assembly.>

# Oil Pump

CONTINUOUSLY VARIABLE TRANSMISSION

---

## 46.Oil Pump

### A: REMOVAL

NOTE:

Refer to "Drive Pinion Shaft" for removal procedures. <Ref. to CVT(TR690)-279, REMOVAL, Drive Pinion Shaft Assembly.>

### B: INSTALLATION

NOTE:

Refer to "Drive Pinion Shaft" for installation procedures. <Ref. to CVT(TR690)-281, INSTALLATION, Drive Pinion Shaft Assembly.>

### C: INSPECTION

Check the following items.

- Check the oil pump for damage and wear.
  - Rotate the oil pump by hand, and check that it rotates smoothly.
- 1) Measure the secondary pressure. <Ref. to CVT(TR690)-52, INSPECTION, Secondary Pressure (Line Pressure) Test.>
  - 2) Remove the oil pan and oil strainer. <Ref. to CVT(TR690)-129, REMOVAL, Control Valve Body.>
  - 3) Check oil strainer for clogging.

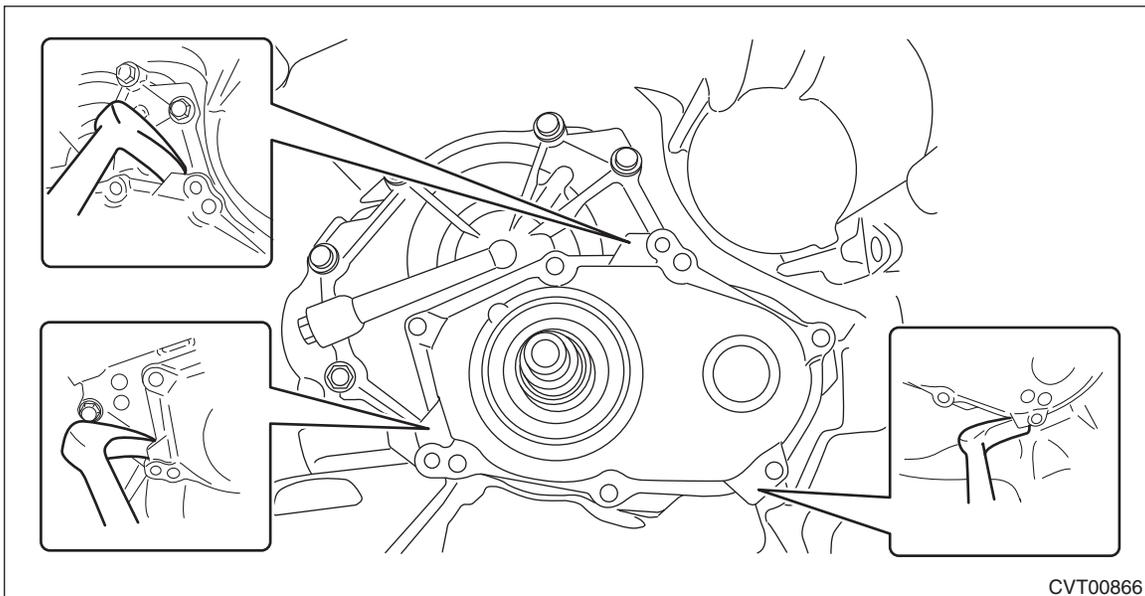
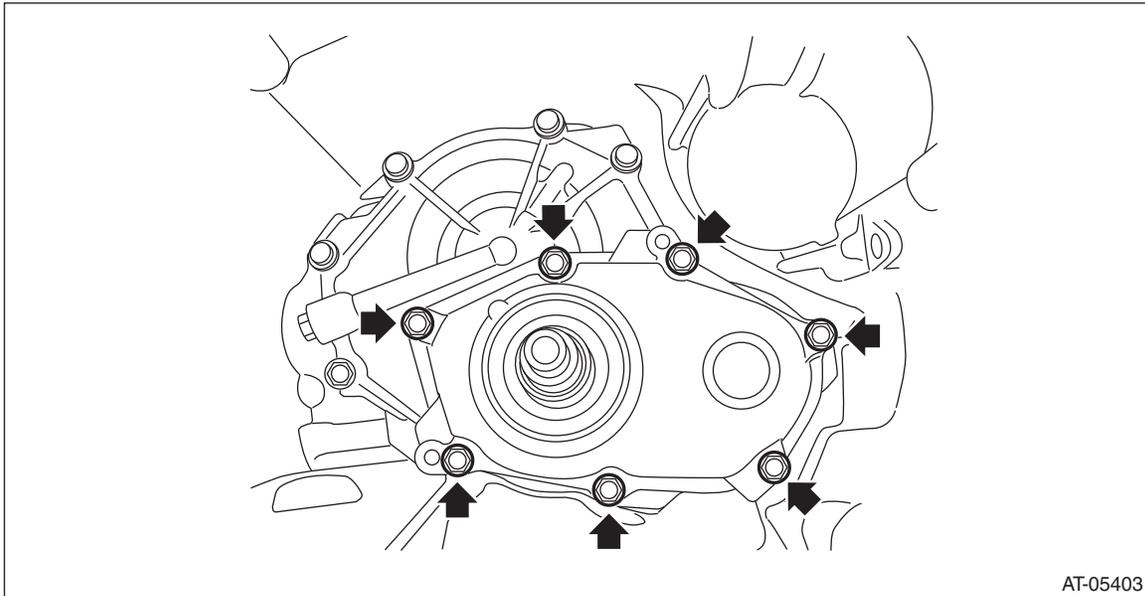
When oil strainer has no clogging, replace the oil pump.

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## 47.Oil Pump Chain

### A: REMOVAL

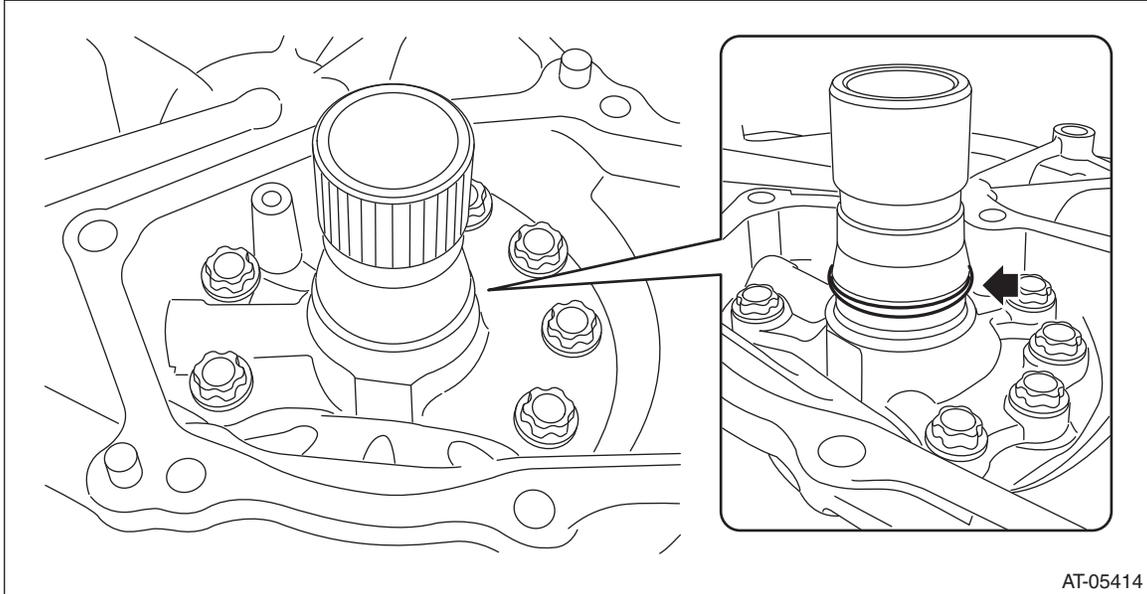
- 1) Remove the transmission assembly from the vehicle. <Ref. to CVT(TR690)-59, REMOVAL, Automatic Transmission Assembly.>
- 2) Remove the torque converter assembly. <Ref. to CVT(TR690)-162, REMOVAL, Torque Converter Assembly.>
- 3) Remove the oil pump chain cover.



# Oil Pump Chain

CONTINUOUSLY VARIABLE TRANSMISSION

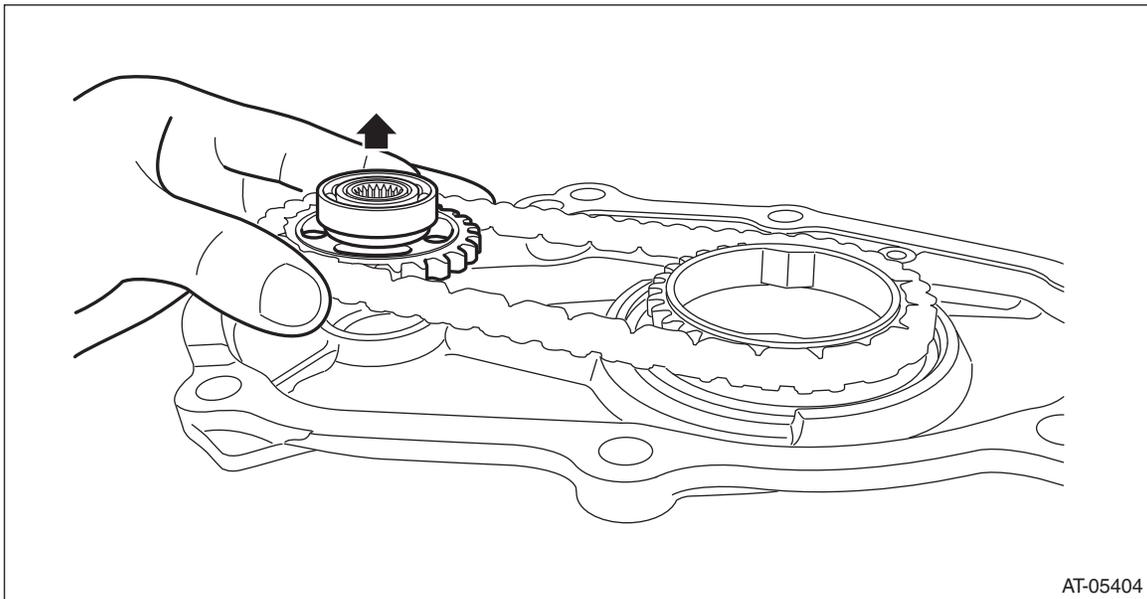
4) Remove the seal rings.



5) Remove the driven sprocket from oil pump chain cover to remove the oil pump chain.

NOTE:

The driven sprocket is replaced as an assembly only, because it is a non-disassembly part.

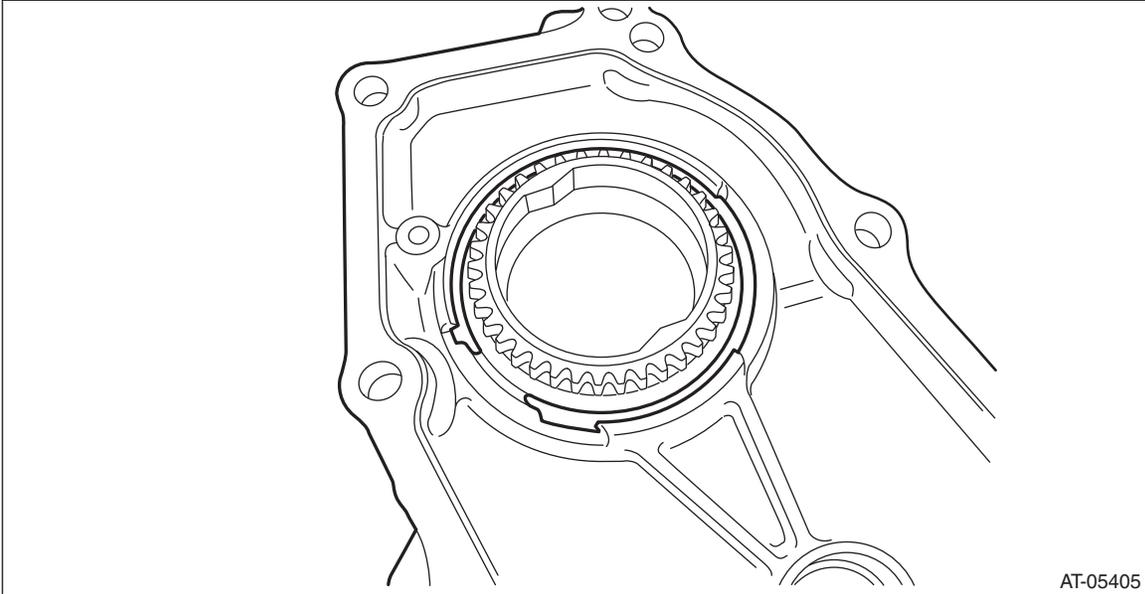


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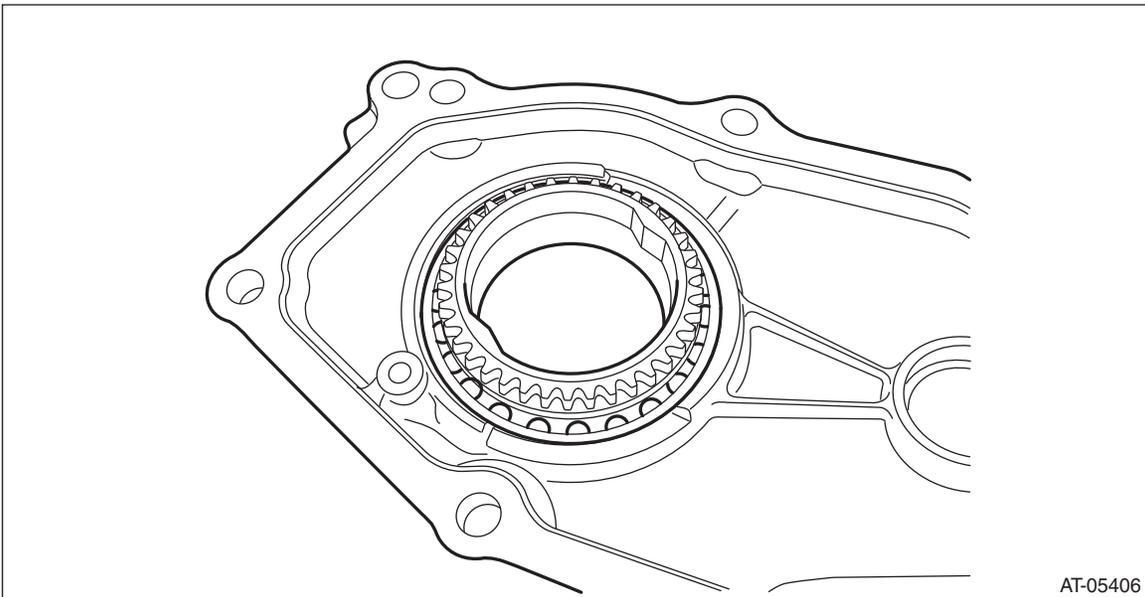
# Oil Pump Chain

CONTINUOUSLY VARIABLE TRANSMISSION

6) Remove the snap ring.



7) Remove the drive sprocket.



8) Remove the oil seal from the oil pump chain cover.

## **B: INSTALLATION**

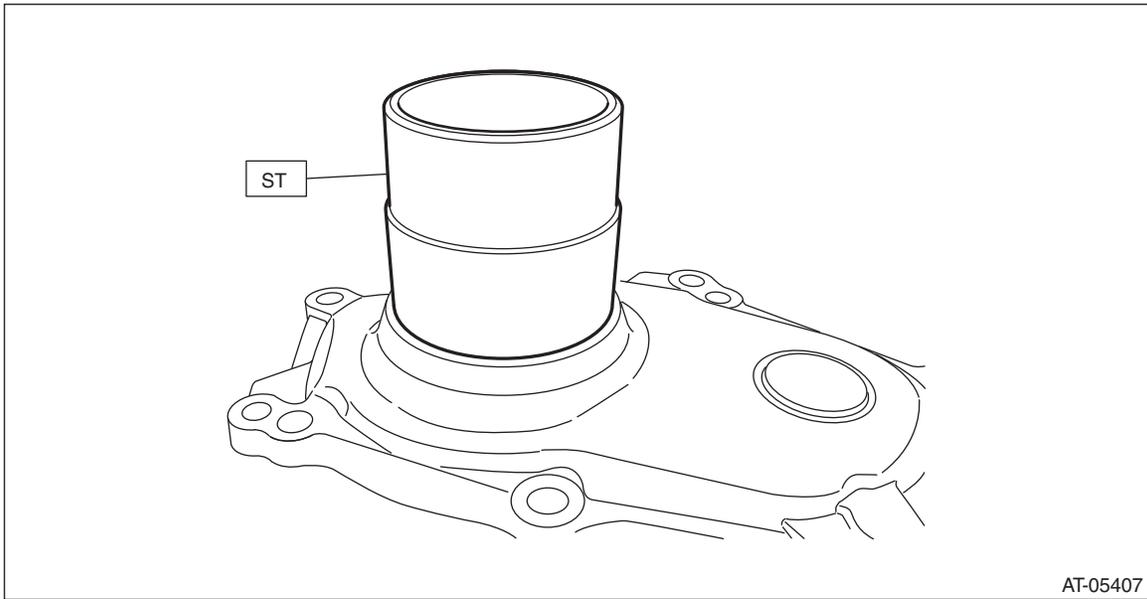
1) Clean the mating surface of oil pump chain cover and converter case cover.

# Oil Pump Chain

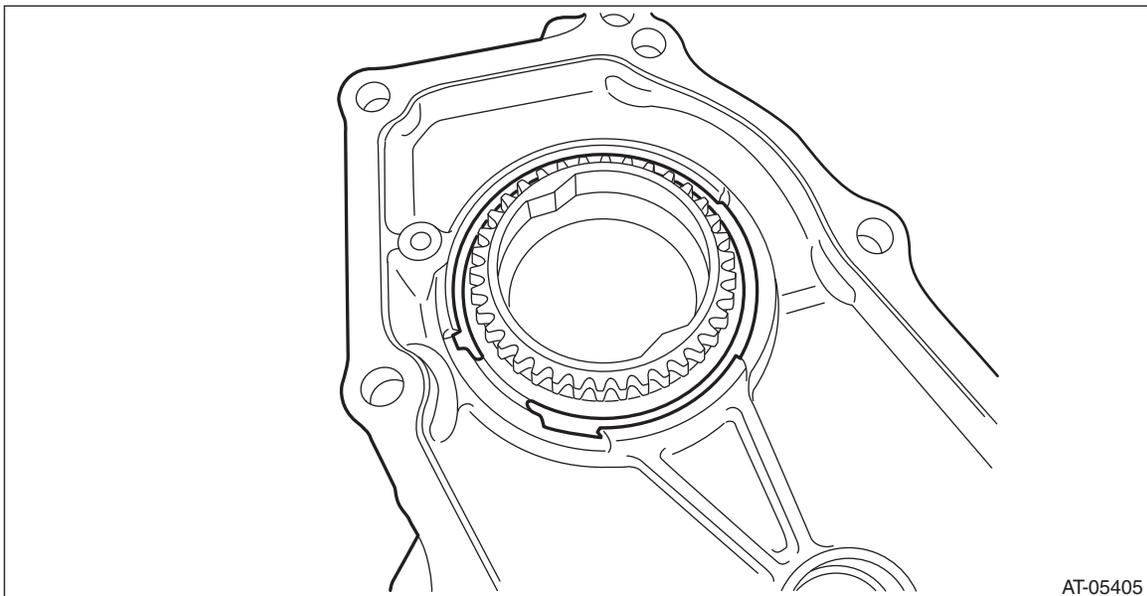
CONTINUOUSLY VARIABLE TRANSMISSION

2) Using the ST, install the oil seal.

ST 499755602 PRESS SNAP RING



3) Install the drive sprocket and install the snap ring.

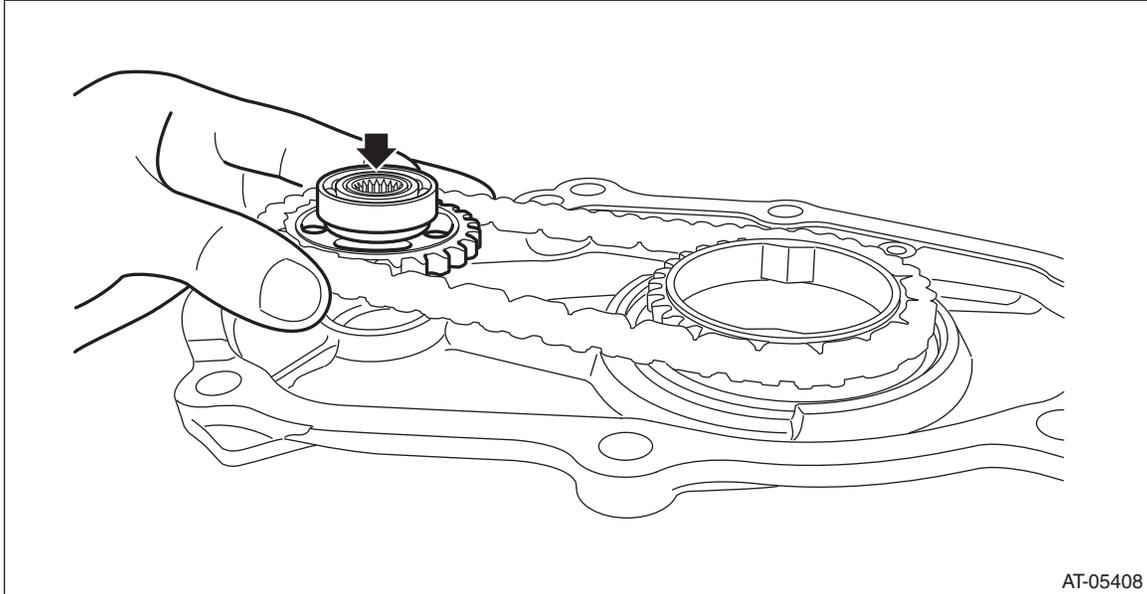


4) Place the oil pump chain on drive sprocket.

# Oil Pump Chain

CONTINUOUSLY VARIABLE TRANSMISSION

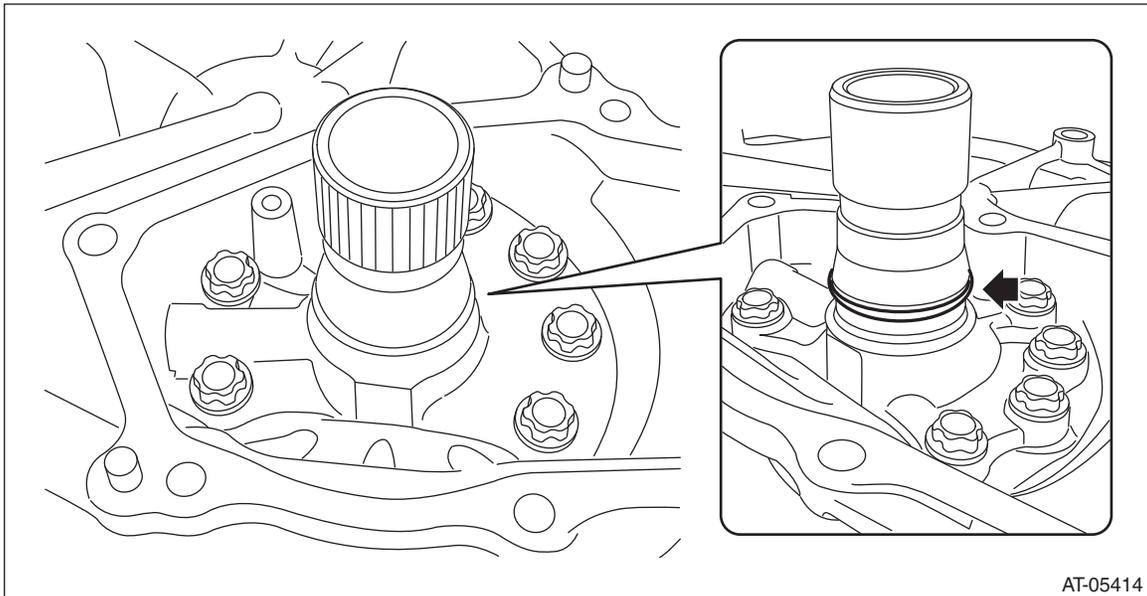
5) Place the oil pump chain on driven sprocket and install the driven sprocket to oil pump chain cover.



6) Install the seal rings.

NOTE:

- Use new seal rings.
- Apply CVTF to the seal rings.



7) Apply liquid gasket seamlessly to the mating surface of oil pump chain cover.

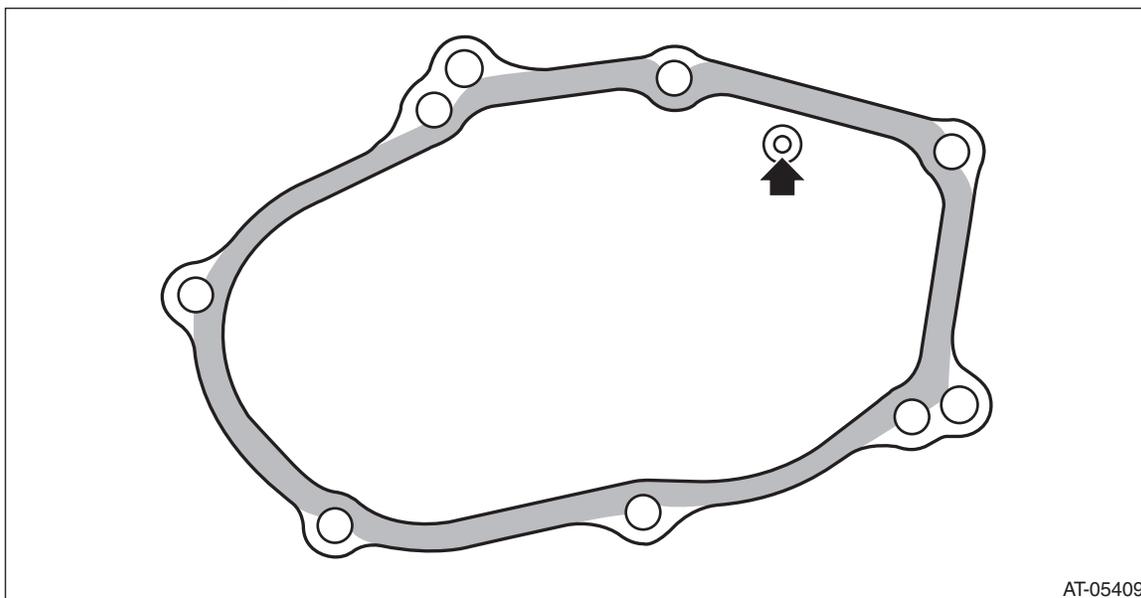
**CAUTION:**

**Do not apply liquid gasket at the arrowed hole.**

# Oil Pump Chain

CONTINUOUSLY VARIABLE TRANSMISSION

**Liquid gasket:**  
**THREE BOND 1216B or equivalent**



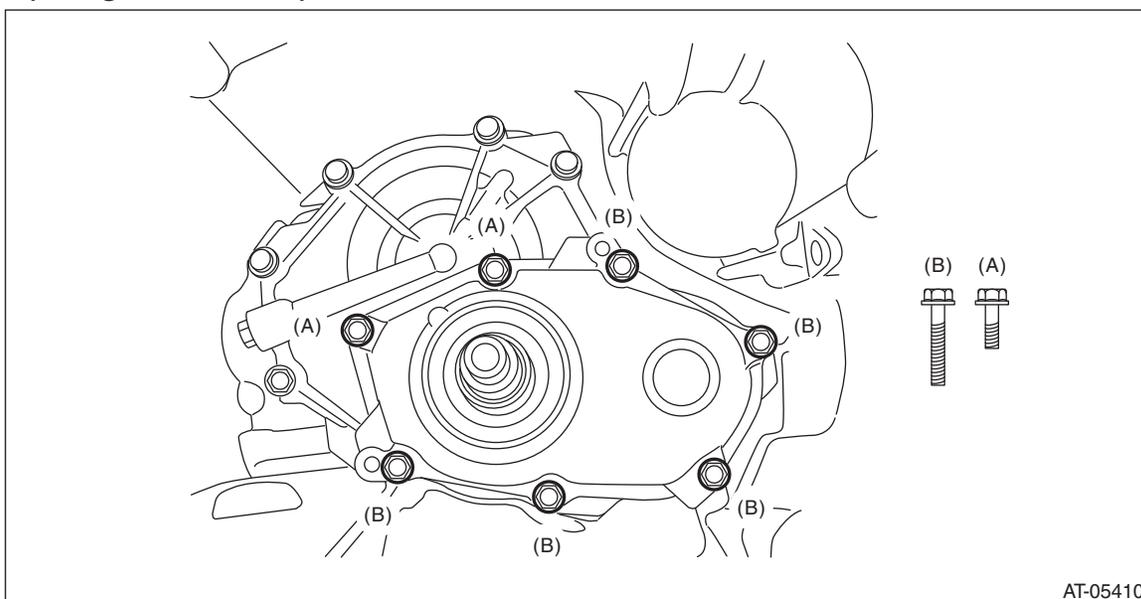
8) Install the oil pump chain cover.

NOTE:

There are two types of bolt.

**Tightening torque:**

**24 N·m (2.4 kgf·m, 17.7 ft·lb)**



9) Install the torque converter assembly. <Ref. to CVT(TR690)-162, INSTALLATION, Torque Converter Assembly.>

10) Install the transmission assembly to the vehicle. <Ref. to CVT(TR690)-77, INSTALLATION, Automatic Transmission Assembly.>

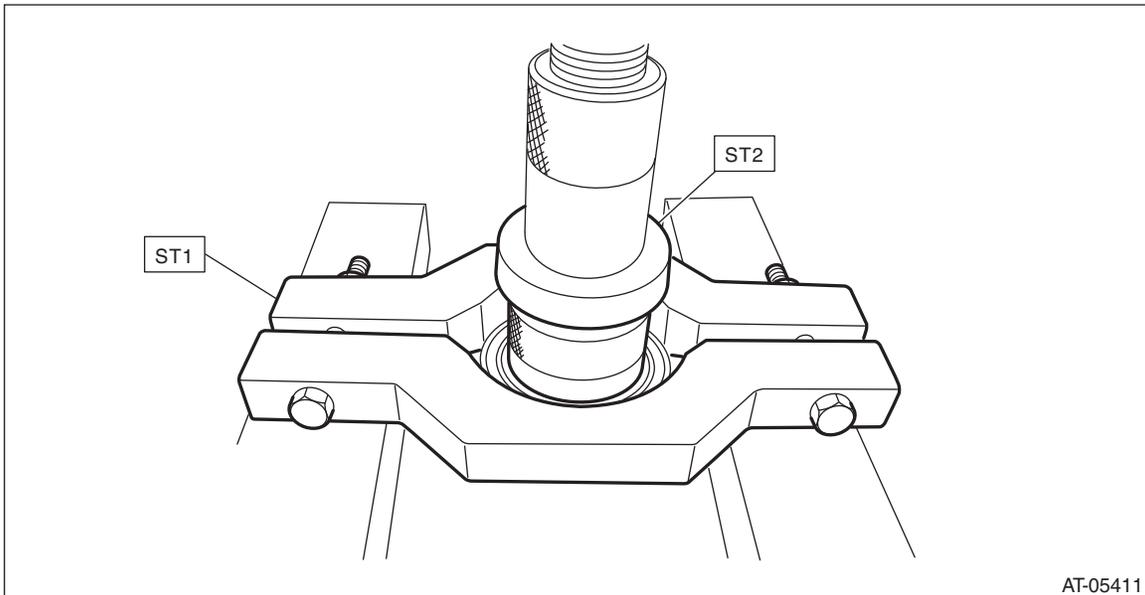
## C: DISASSEMBLY

### 1. DRIVE SPROCKET

1) Remove the ball bearing using ST.

ST1 498077600 REMOVER

ST2 399513600 INSTALLER



## D: ASSEMBLY

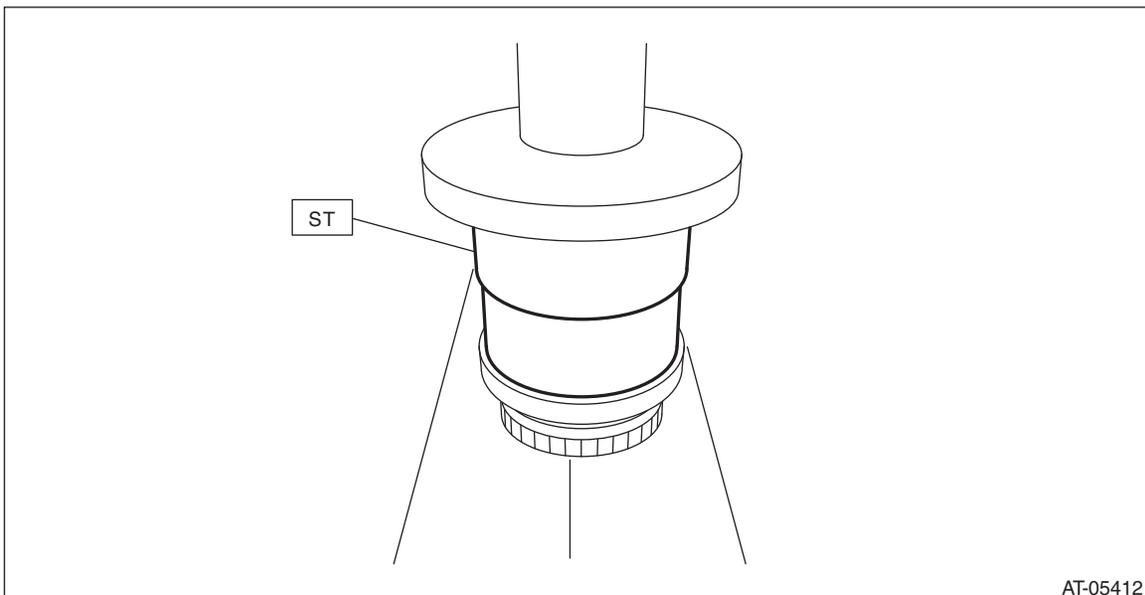
### 1. DRIVE SPROCKET

1) Using the ST, install the ball bearing.

NOTE:

Use a new ball bearing.

ST 499755602 PRESS SNAP RING



## E: INSPECTION

- Check the oil pump chain for damage.
- Replace if gear teeth are broken, damaged, sharpen or excessively worn.
- Check the bearing for seizure or wear.

## Oil Pump Chain

### CONTINUOUSLY VARIABLE TRANSMISSION

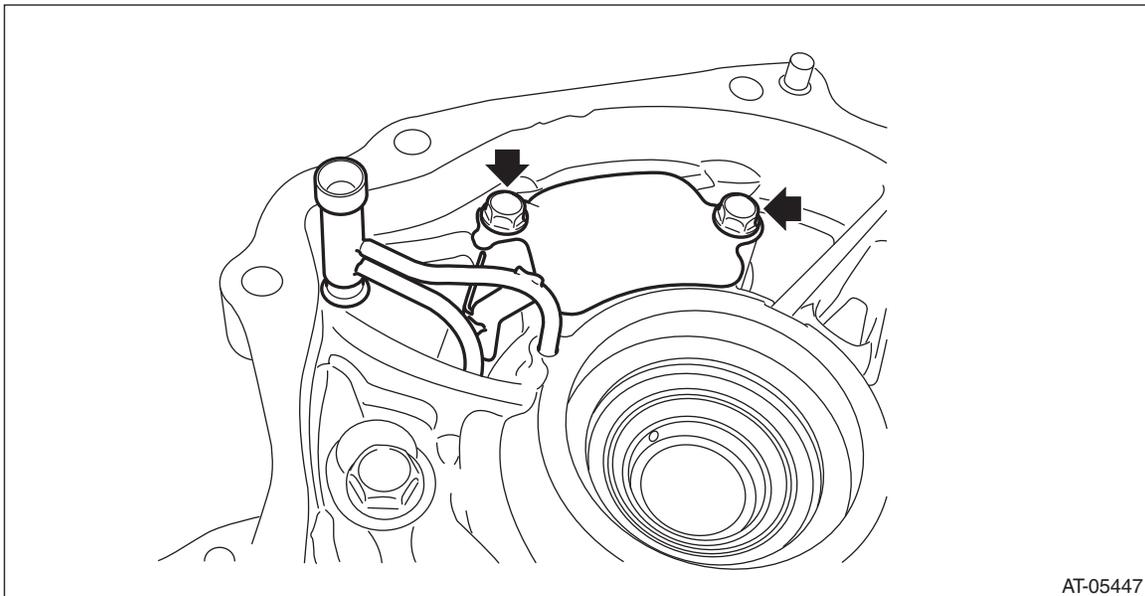
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- Apply CVTF to bearing and rotate the bearing to check for noise or dragging etc.
- Check the oil pump chain cover for damage.
- Check for leakage of CVTF from the mating surface of oil pump chain cover.
- Check the oil seal for damage.

## 48. Converter Case Cover

### A: REMOVAL

- 1) Remove the transmission assembly from the vehicle. <Ref. to CVT(TR690)-59, REMOVAL, Automatic Transmission Assembly.>
- 2) Remove the air breather hose. <Ref. to CVT(TR690)-156, REMOVAL, Air Breather Hose.>
- 3) Remove the oil pan and control valve body. <Ref. to CVT(TR690)-129, REMOVAL, Control Valve Body.>
- 4) Remove the transmission harness. <Ref. to CVT(TR690)-139, REMOVAL, Transmission Harness.>
- 5) Remove the extension case. <Ref. to CVT(TR690)-164, REMOVAL, Extension Case.>
- 6) Remove the rear drive shaft. <Ref. to CVT(TR690)-167, REMOVAL, Rear Drive Shaft.>
- 7) Remove the transfer clutch assembly. <Ref. to CVT(TR690)-172, REMOVAL, Transfer Clutch.>
- 8) Remove the transfer reduction driven gear assembly. <Ref. to CVT(TR690)-184, REMOVAL, Transfer Reduction Driven Gear.>
- 9) Remove the intermediate case. <Ref. to CVT(TR690)-191, REMOVAL, Intermediate Case.>
- 10) Remove the forward clutch assembly. <Ref. to CVT(TR690)-206, REMOVAL, Forward Clutch Assembly.>
- 11) Remove the transmission case. <Ref. to CVT(TR690)-246, REMOVAL, Transmission Case.>
- 12) Remove the primary pulley, secondary pulley and variator chain. <Ref. to CVT(TR690)-263, REMOVAL, Primary Pulley and Secondary Pulley.>
- 13) Remove the drive pinion shaft assembly. <Ref. to CVT(TR690)-279, REMOVAL, Drive Pinion Shaft Assembly.>
- 14) Remove the oil stopper plate and lubrication pipe.



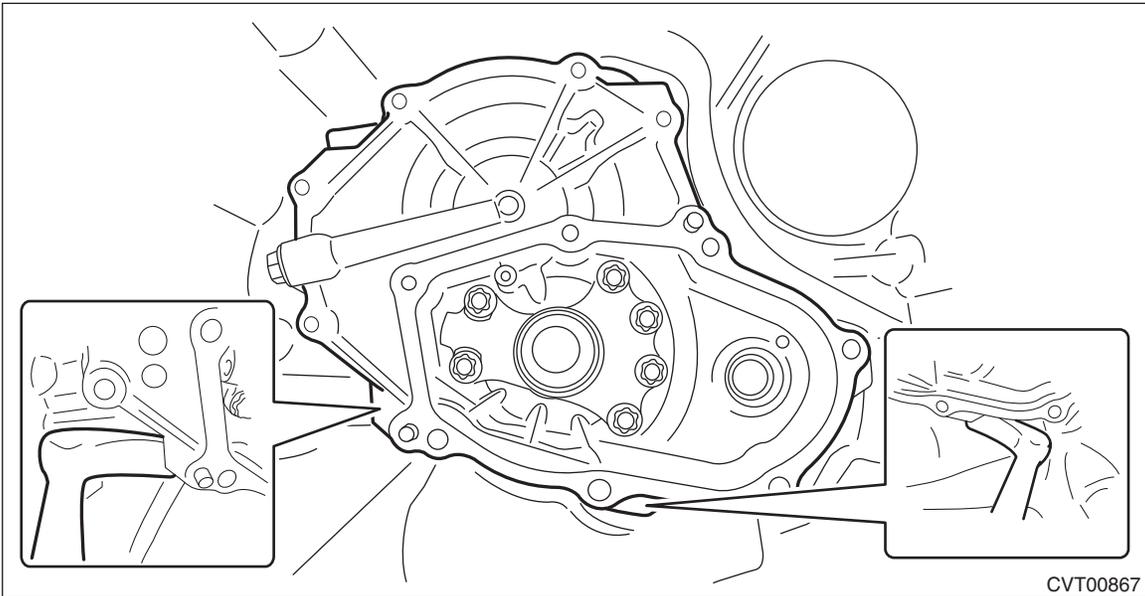
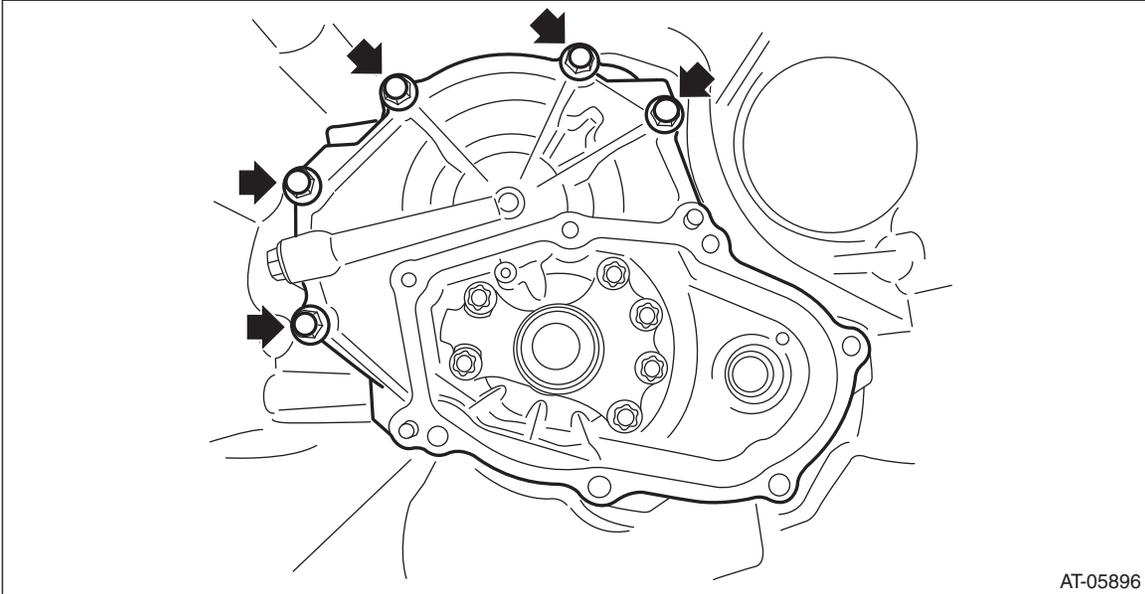
AT-05447

- 15) Flip over the converter case.
- 16) Remove the oil pump chain cover and the oil pump chain. <Ref. to CVT(TR690)-319, REMOVAL, Oil Pump Chain.>

# Converter Case Cover

CONTINUOUSLY VARIABLE TRANSMISSION

17) Remove the converter case cover.

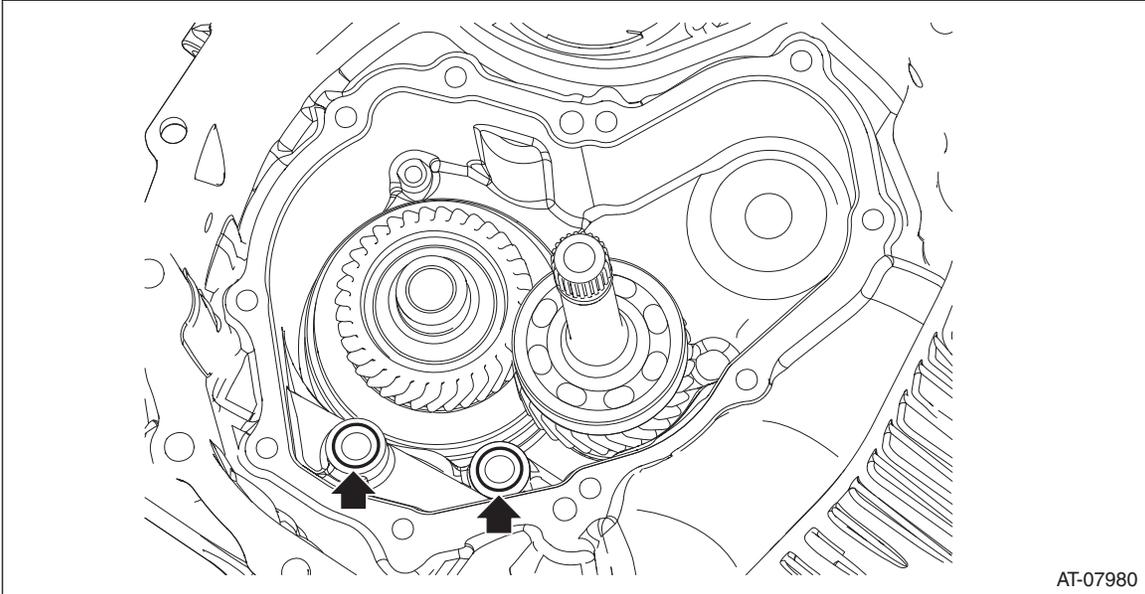


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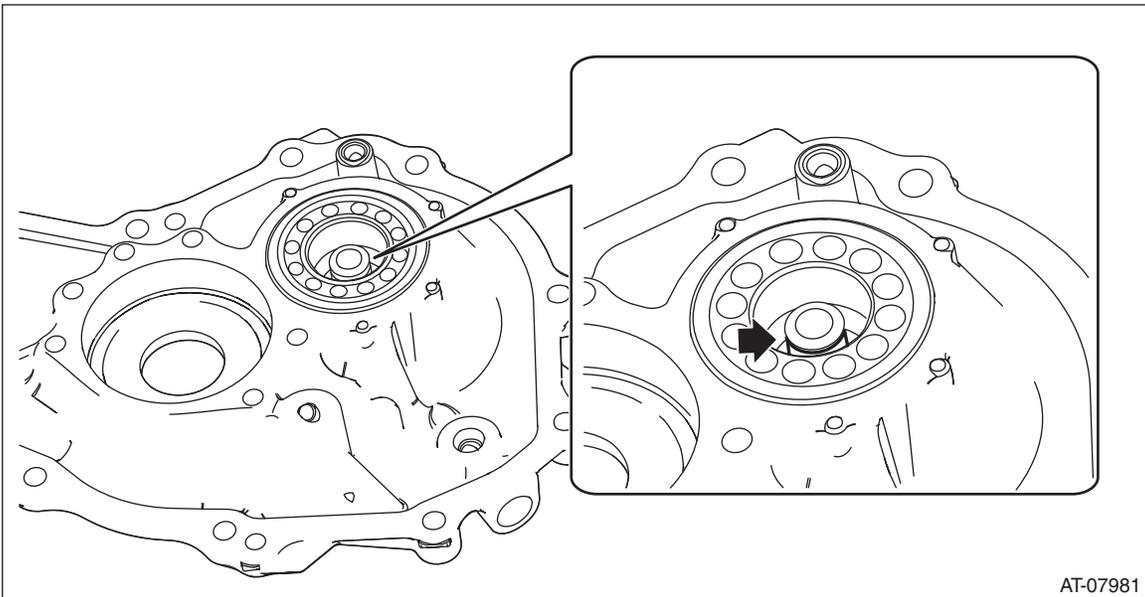
# Converter Case Cover

CONTINUOUSLY VARIABLE TRANSMISSION

18) Remove the O-rings.



19) Remove the seal ring from converter case cover.



20) Using the ST, remove the ball bearing from the converter case cover.

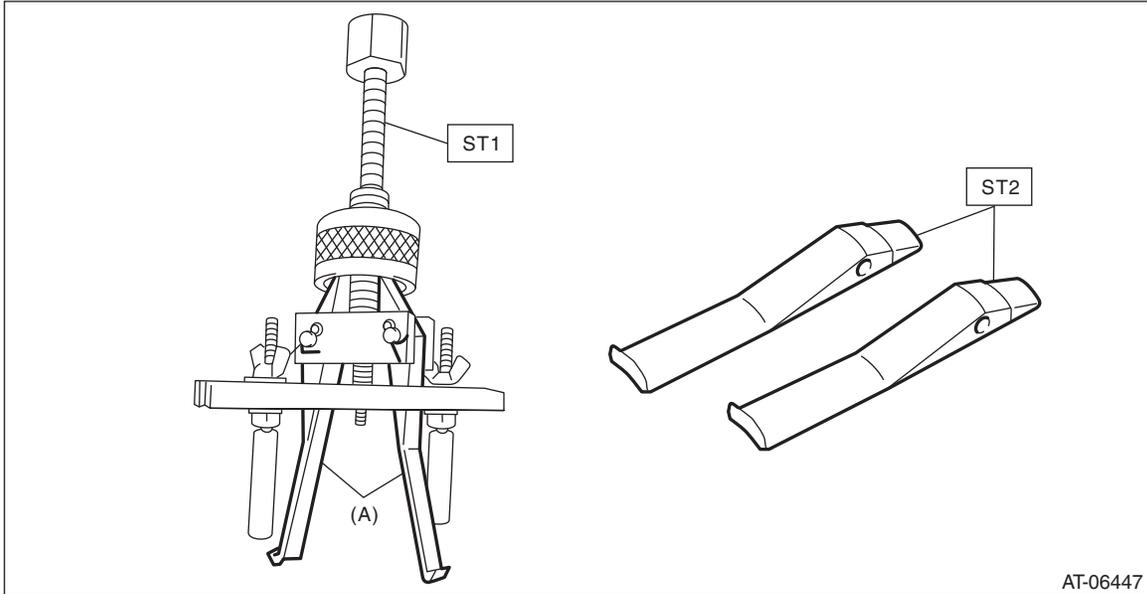
# Converter Case Cover

## CONTINUOUSLY VARIABLE TRANSMISSION

(1) Remove the claw of ST1, and attach the claw of ST2.

ST1 398527700 PULLER ASSY

ST2 18760AA000 CLAW

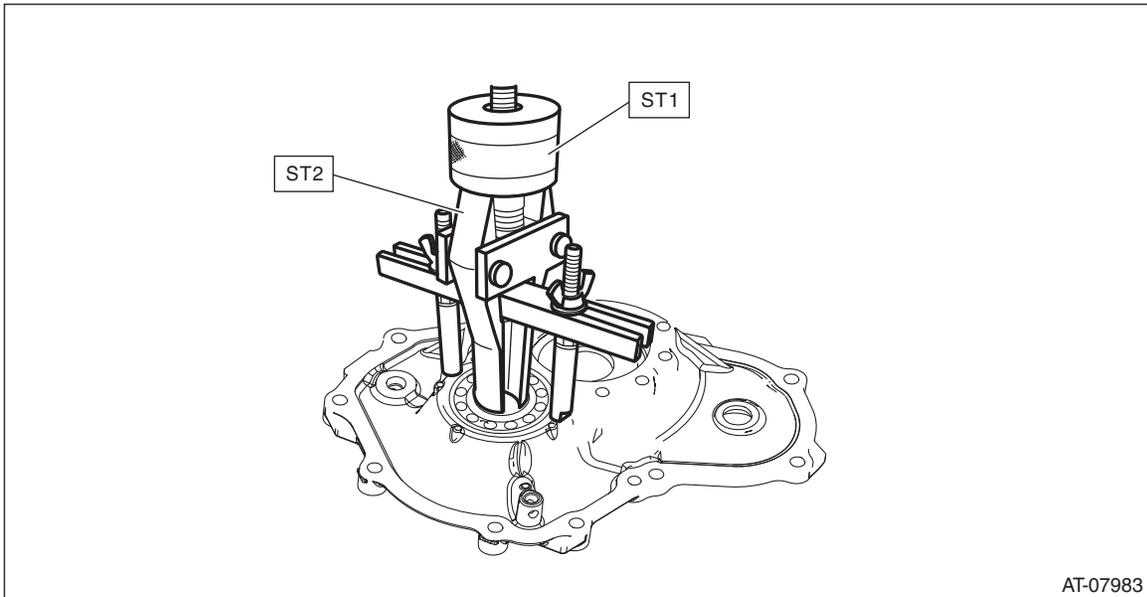


(A) Claw

(2) Using the ST, remove the ball bearing from the converter case cover.

ST1 398527700 PULLER ASSY

ST2 18760AA000 CLAW



## B: INSTALLATION

- 1) Clean the mating surface of converter case cover and converter case.
- 2) Adjust the shims of front reduction drive gear and front reduction driven gear. <Ref. to CVT(TR690)-343, ADJUSTMENT, Front Reduction Drive Gear.> <Ref. to CVT(TR690)-350, ADJUSTMENT, Front Reduction Driven Gear.>
- 3) Apply CVTF to the selected shims and install on the bearing catch surface of the front reduction driven gear.
- 4) Using the ST, install the ball bearing to the converter case cover.

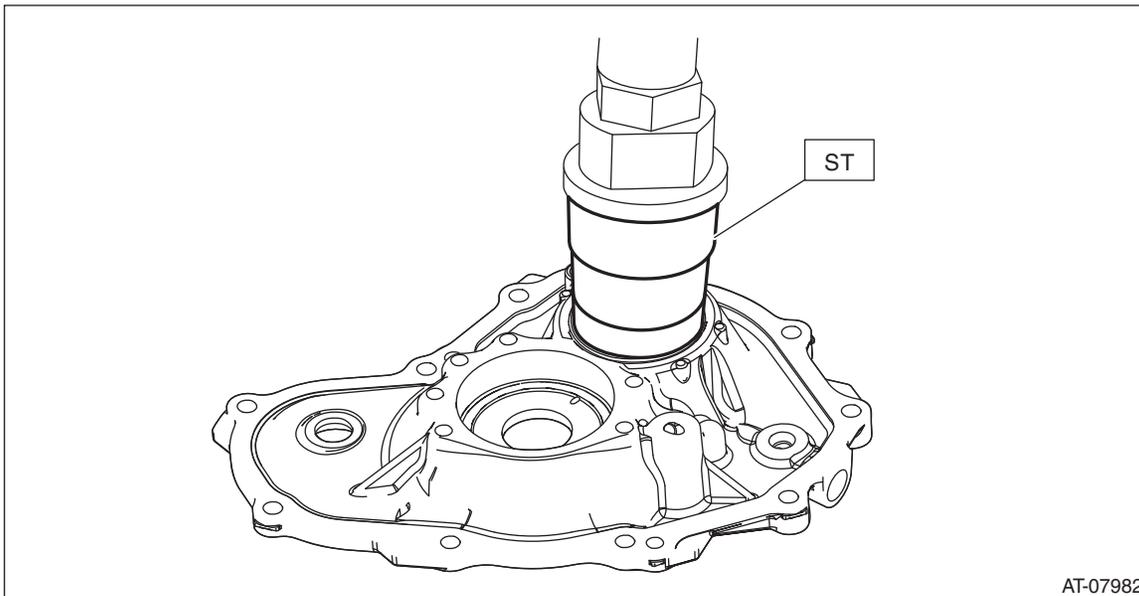
# Converter Case Cover

CONTINUOUSLY VARIABLE TRANSMISSION

**NOTE:**

Use a new ball bearing.

ST 499755602 PRESS SNAP RING

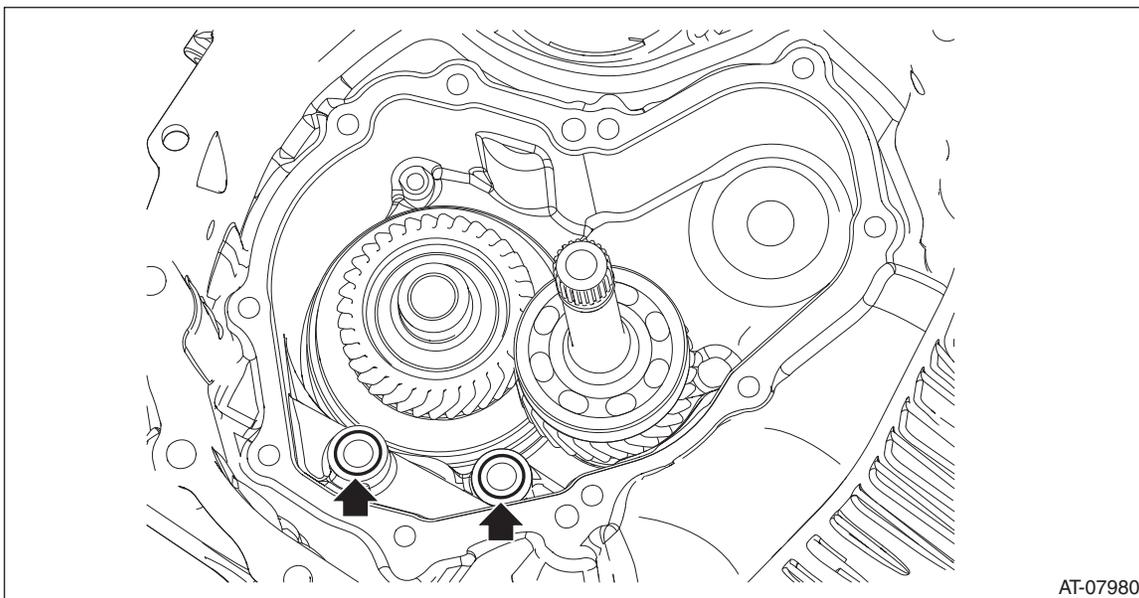


AT-07982

5) Install the O-rings.

**NOTE:**

- Use new O-rings.
- Apply CVTF to the O-rings.



AT-07980

6) Apply CVTF to the selected shims and install on the bearing catch surface of the front reduction drive gear.

7) Install the seal ring to converter case cover.

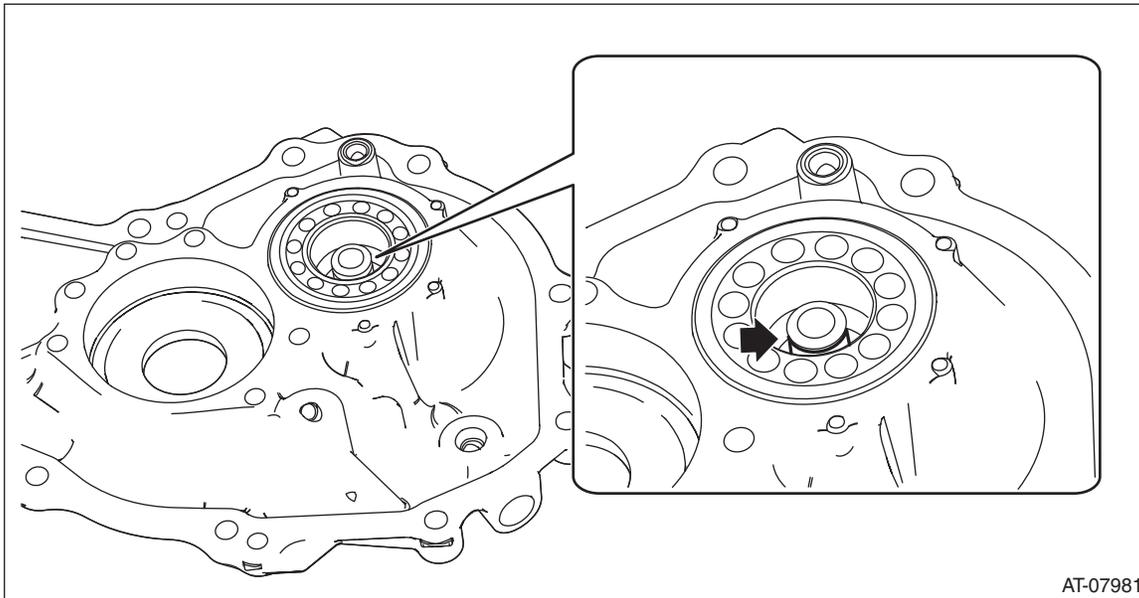
**NOTE:**

- Use new seal rings.

## Converter Case Cover

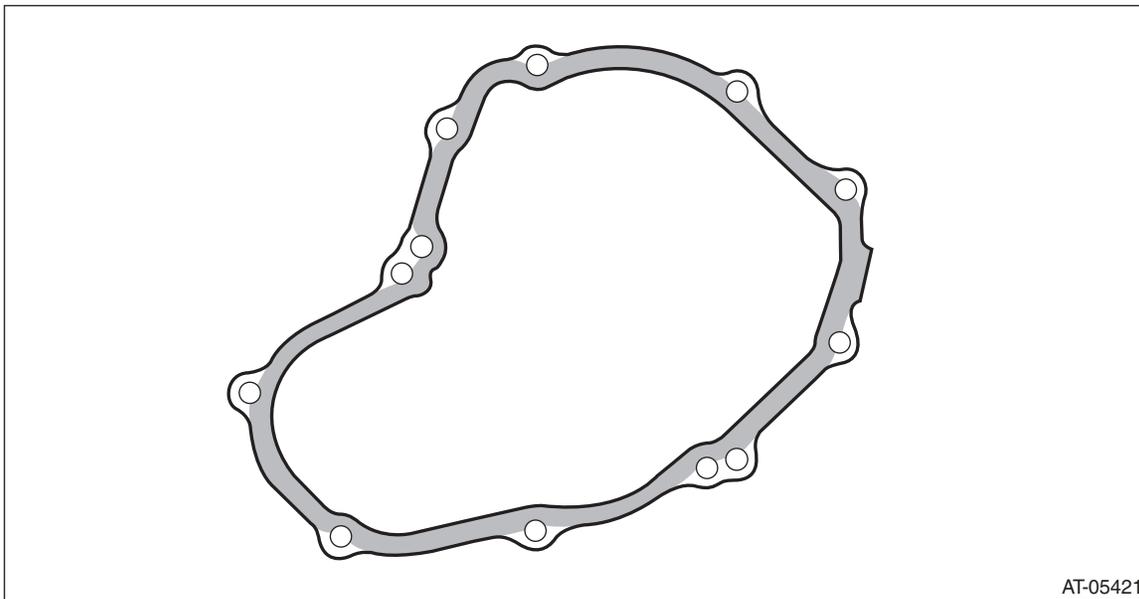
### CONTINUOUSLY VARIABLE TRANSMISSION

- When installing the seal rings, do not expand the seal rings too much.



- 8) Apply liquid gasket seamlessly to the mating surface of converter case cover.

**Liquid gasket:**  
**THREE BOND 1216B or equivalent**



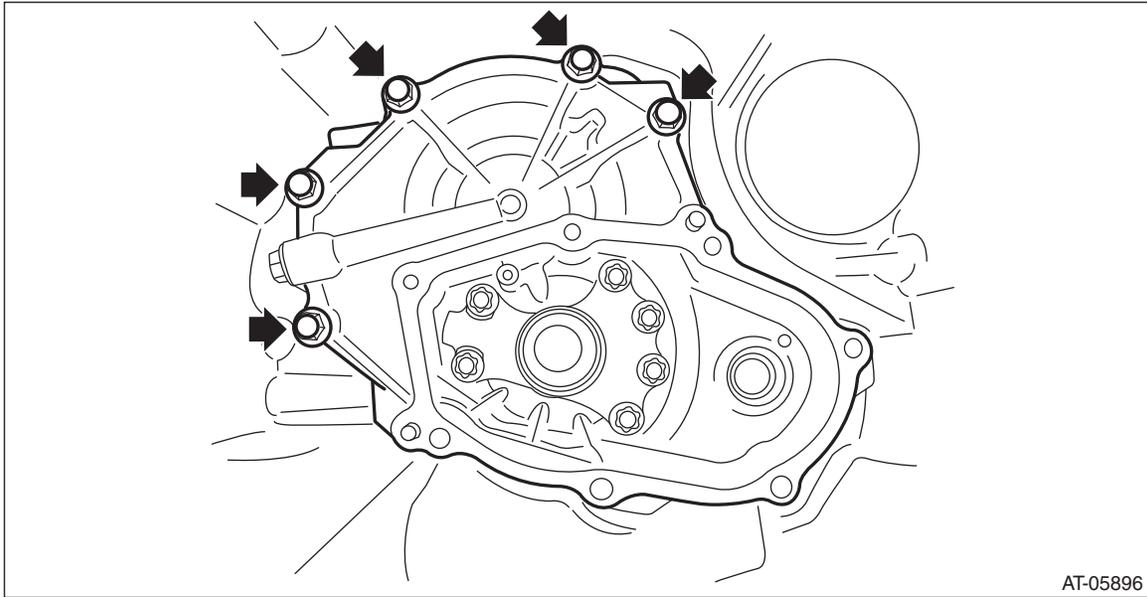
- 9) Install the converter case cover.

## Converter Case Cover

CONTINUOUSLY VARIABLE TRANSMISSION

### **Tightening torque:**

**24 N·m (2.4 kgf·m, 17.7 ft·lb)**



AT-05896

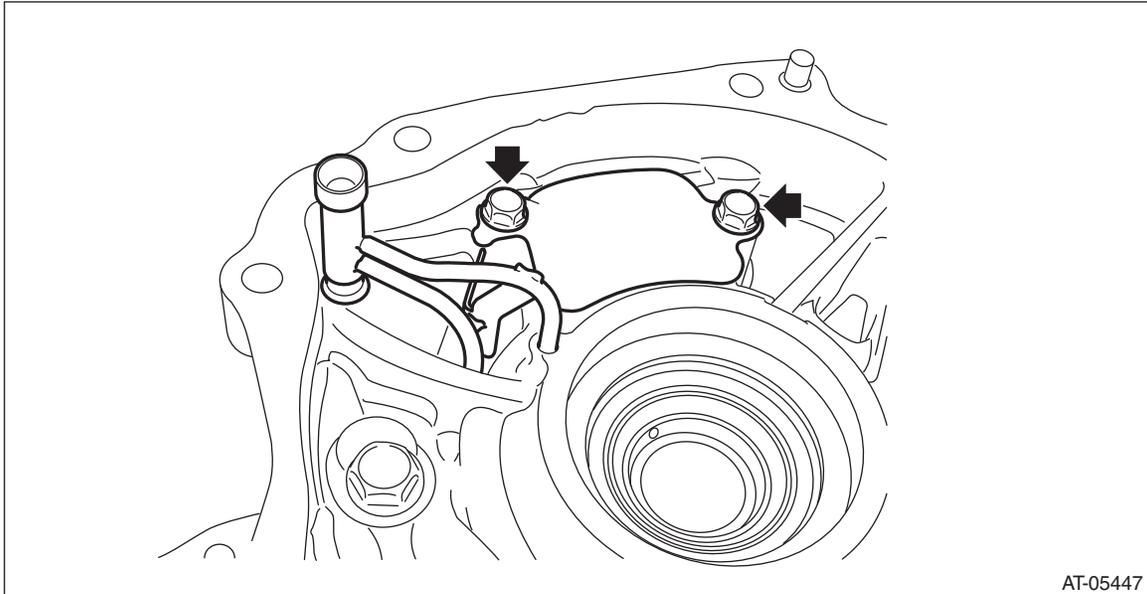
10) Install the oil pump chain cover and the oil pump chain. <Ref. to CVT(TR690)-321, INSTALLATION, Oil Pump Chain.>

11) Flip over the converter case cover.

12) Install the oil stopper plate and lubrication pipe.

### **Tightening torque:**

**9 N·m (0.9 kgf·m, 6.6 ft·lb)**



AT-05447

13) Install the drive pinion shaft assembly. <Ref. to CVT(TR690)-281, INSTALLATION, Drive Pinion Shaft Assembly.>

14) Install the primary pulley, secondary pulley and variator chain. <Ref. to CVT(TR690)-267, INSTALLATION, Primary Pulley and Secondary Pulley.>

15) Install the transmission case. <Ref. to CVT(TR690)-248, INSTALLATION, Transmission Case.>

16) Install the forward clutch assembly. <Ref. to CVT(TR690)-207, INSTALLATION, Forward Clutch Assembly.>

17) Install the intermediate case. <Ref. to CVT(TR690)-192, INSTALLATION, Intermediate Case.>

18) Install the transfer reduction driven gear assembly. <Ref. to CVT(TR690)-184, INSTALLATION, Transfer Reduction Driven Gear.>

**CVT(TR690)-333**

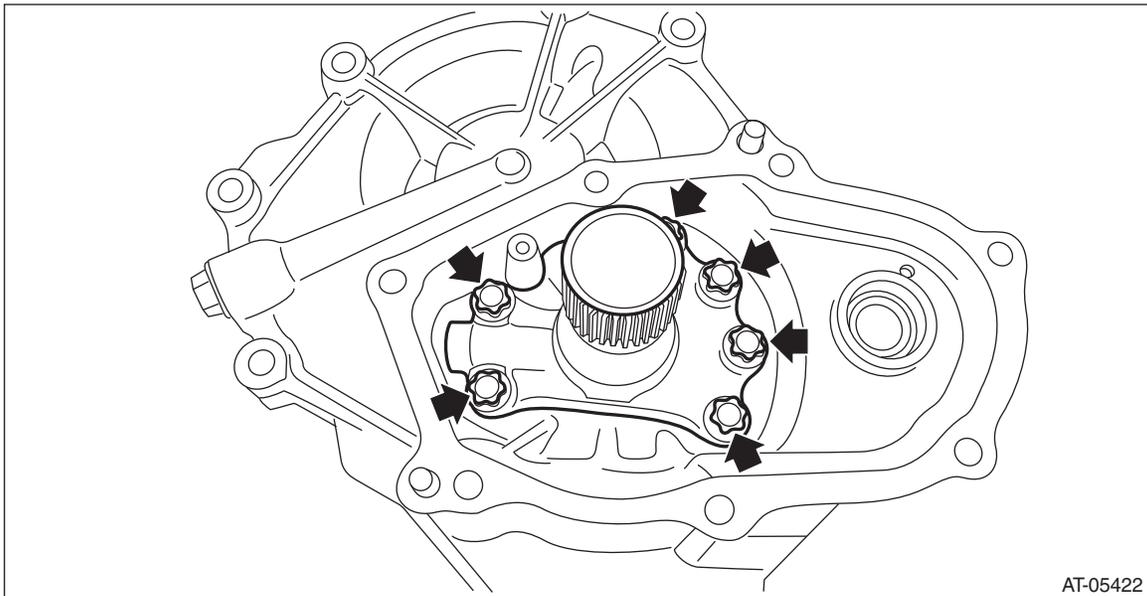
## Converter Case Cover

### CONTINUOUSLY VARIABLE TRANSMISSION

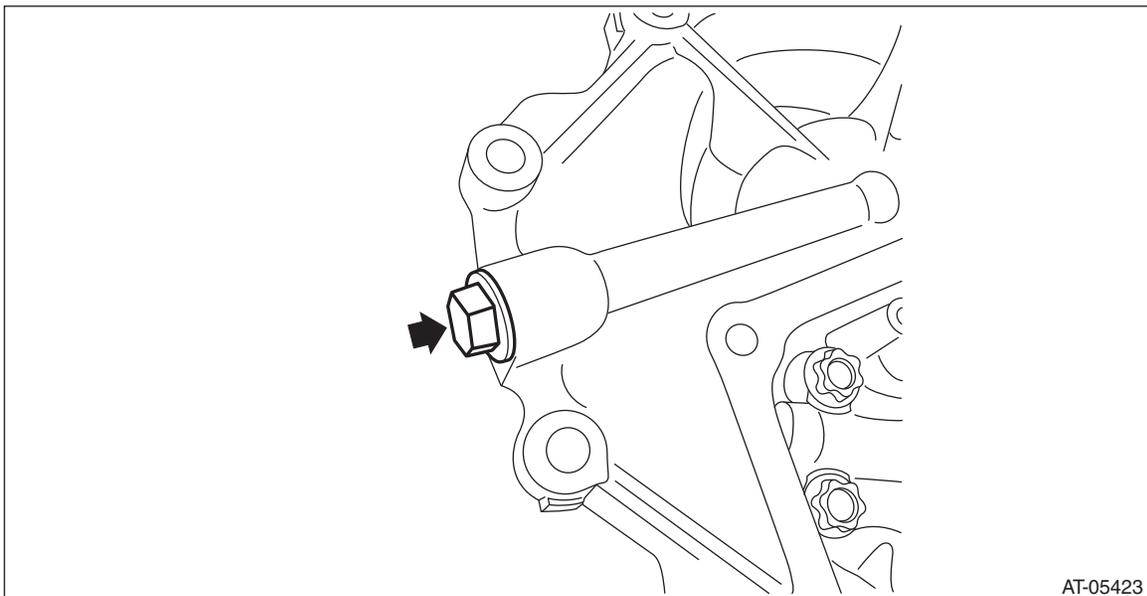
- 19) Install the transfer clutch assembly. <Ref. to CVT(TR690)-173, INSTALLATION, Transfer Clutch.>
- 20) Install the rear drive shaft. <Ref. to CVT(TR690)-167, INSTALLATION, Rear Drive Shaft.>
- 21) Install the extension case. <Ref. to CVT(TR690)-164, INSTALLATION, Extension Case.>
- 22) Install the transmission harness. <Ref. to CVT(TR690)-140, INSTALLATION, Transmission Harness.>
- 23) Install the control valve body and oil pan. <Ref. to CVT(TR690)-133, INSTALLATION, Control Valve Body.>
- 24) Install the air breather hose. <Ref. to CVT(TR690)-158, INSTALLATION, Air Breather Hose.>
- 25) Install the transmission assembly to the vehicle. <Ref. to CVT(TR690)-77, INSTALLATION, Automatic Transmission Assembly.>

### C: DISASSEMBLY

- 1) Using ST, remove the center support COMPL. (Bolt fixing type)  
ST 18270KA010 SOCKET (E16)



- 2) Remove the plug and O-ring.



### D: ASSEMBLY

- 1) Install the plugs.

# Converter Case Cover

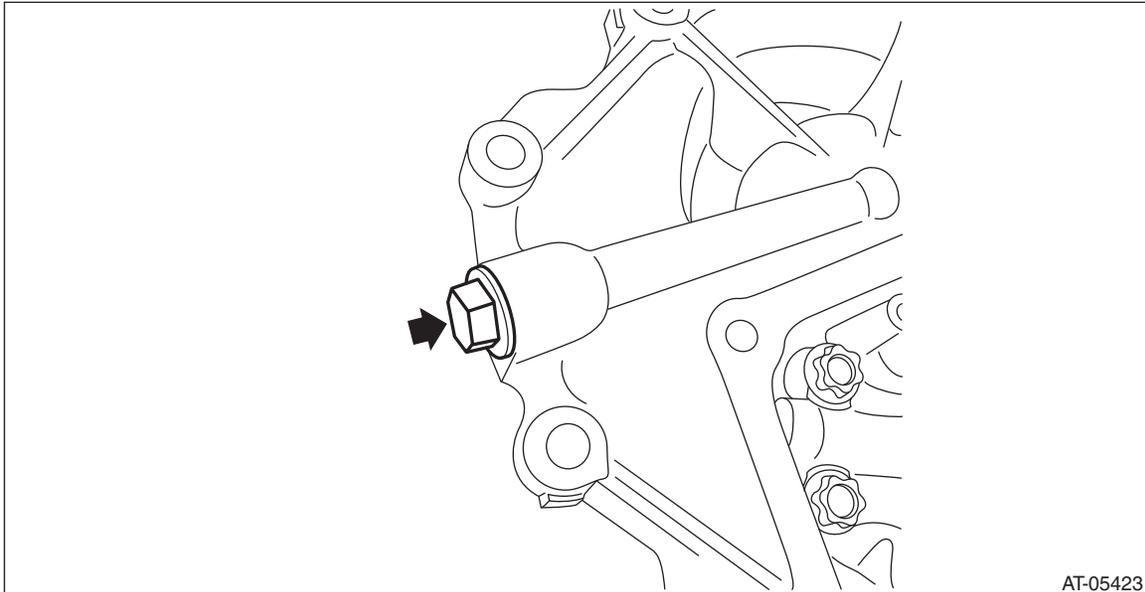
CONTINUOUSLY VARIABLE TRANSMISSION

## NOTE:

- Use new O-rings.
- Apply CVTF to the O-rings.

## Tightening torque:

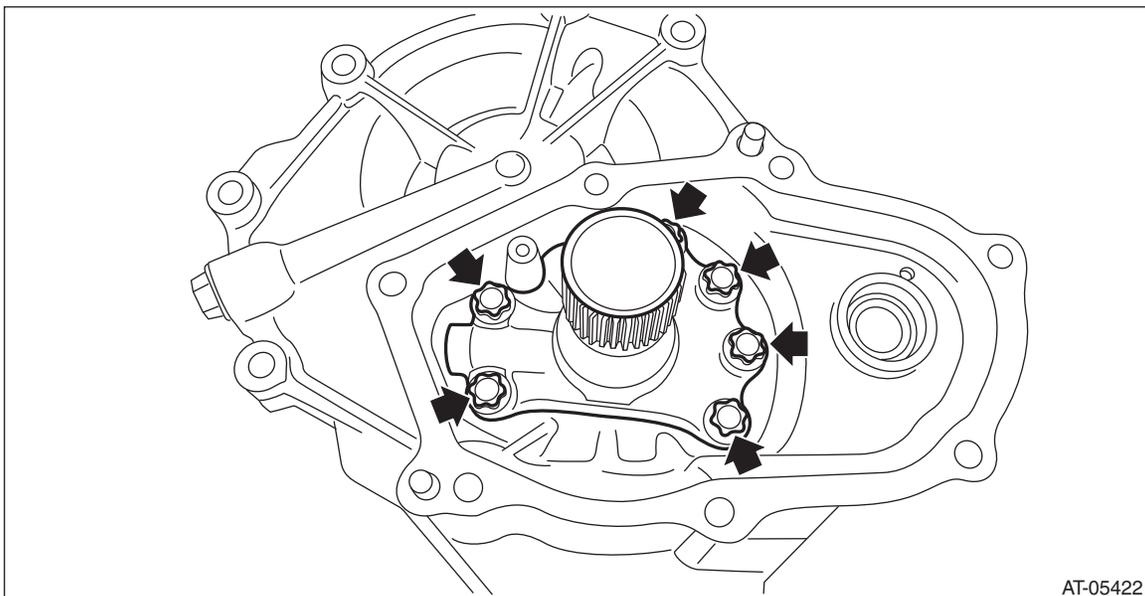
**25 N·m (2.5 kgf·m, 18.4 ft·lb)**



2) Using ST, install the center support COMPL. (Bolt fixing type)  
ST 18270KA010 SOCKET (E16)

## Tightening torque:

**21.5 N·m (2.2 kgf·m, 15.9 ft·lb)**



## E: INSPECTION

- Check for leakage of CVTF from the connection between converter case and converter case cover.
- Check there is no damage or cracks on the converter case cover.

## F: ADJUSTMENT

When replacing the converter case cover, select the following shims.

- Select the shim for front reduction drive gear. <Ref. to CVT(TR690)-343, ADJUSTMENT, Front Reduction Drive Gear.>

**CVT(TR690)-335**

## Converter Case Cover

CONTINUOUSLY VARIABLE TRANSMISSION

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- Select the shim for front reduction driven gear. <Ref. to CVT(TR690)-350, ADJUSTMENT, Front Reduction Driven Gear.>

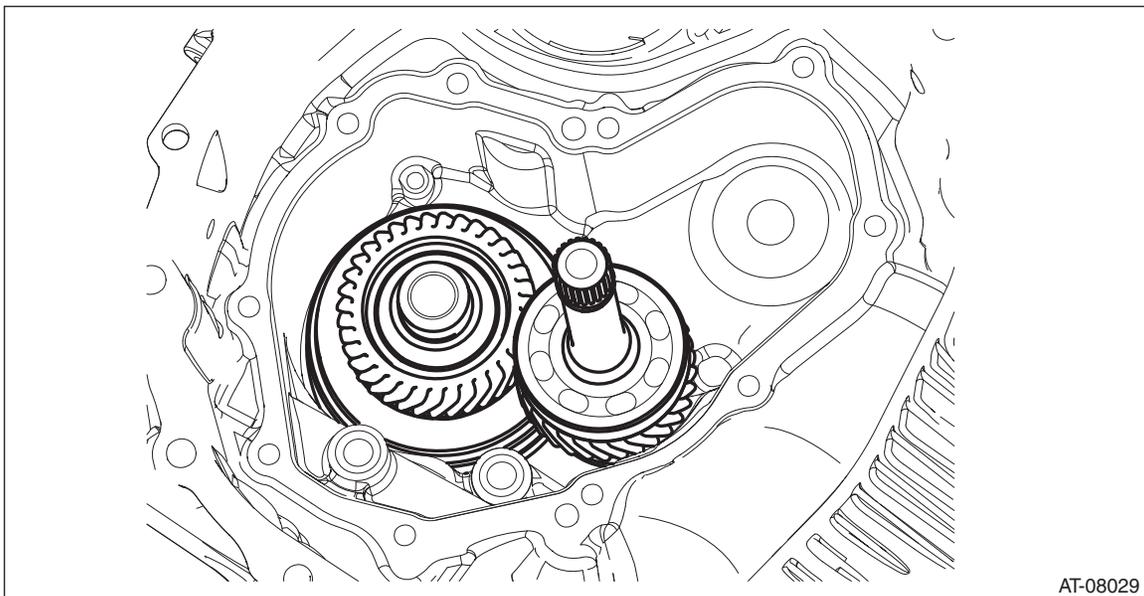
## 49. Front Reduction Drive Gear

### A: REMOVAL

- 1) Remove the transmission assembly from the vehicle. <Ref. to CVT(TR690)-59, REMOVAL, Automatic Transmission Assembly.>
- 2) Remove the air breather hose. <Ref. to CVT(TR690)-156, REMOVAL, Air Breather Hose.>
- 3) Remove the oil pan and control valve body. <Ref. to CVT(TR690)-129, REMOVAL, Control Valve Body.>
- 4) Remove the transmission harness. <Ref. to CVT(TR690)-139, REMOVAL, Transmission Harness.>
- 5) Remove the primary speed sensor. <Ref. to CVT(TR690)-120, REMOVAL, Primary Speed Sensor.>
- 6) Remove the extension case. <Ref. to CVT(TR690)-164, REMOVAL, Extension Case.>
- 7) Remove the rear drive shaft. <Ref. to CVT(TR690)-167, REMOVAL, Rear Drive Shaft.>
- 8) Remove the transfer clutch assembly. <Ref. to CVT(TR690)-172, REMOVAL, Transfer Clutch.>
- 9) Remove the transfer reduction driven gear assembly. <Ref. to CVT(TR690)-184, REMOVAL, Transfer Reduction Driven Gear.>
- 10) Remove the intermediate case. <Ref. to CVT(TR690)-191, REMOVAL, Intermediate Case.>
- 11) Remove the forward clutch assembly. <Ref. to CVT(TR690)-206, REMOVAL, Forward Clutch Assembly.>
- 12) Remove the transmission case. <Ref. to CVT(TR690)-246, REMOVAL, Transmission Case.>
- 13) Remove the primary pulley, secondary pulley and variator chain. <Ref. to CVT(TR690)-263, REMOVAL, Primary Pulley and Secondary Pulley.>
- 14) Remove the drive pinion shaft assembly. <Ref. to CVT(TR690)-279, REMOVAL, Drive Pinion Shaft Assembly.>
- 15) Remove the oil pump chain cover and the oil pump chain. <Ref. to CVT(TR690)-319, REMOVAL, Oil Pump Chain.>
- 16) Remove the converter case cover. <Ref. to CVT(TR690)-327, REMOVAL, Converter Case Cover.>
- 17) Remove the front reduction drive gear and front reduction driven gear together.

#### NOTE:

Remove the front reduction driven shaft while holding it.

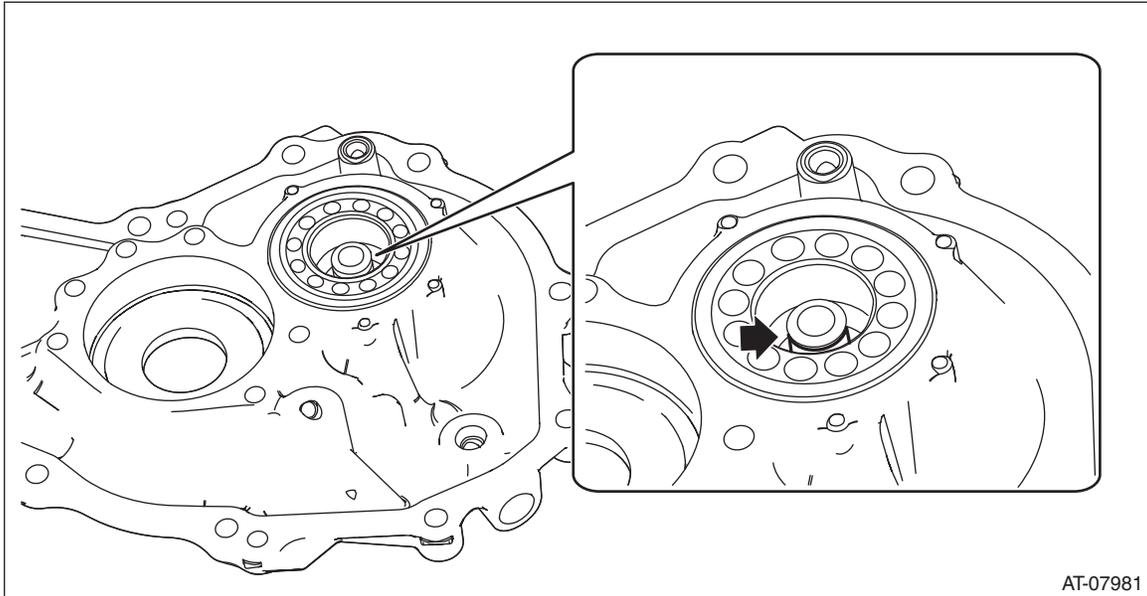


- 18) Remove the shims of the front reduction driven gear from the converter case.

# Front Reduction Drive Gear

## CONTINUOUSLY VARIABLE TRANSMISSION

19) Remove the seal rings.

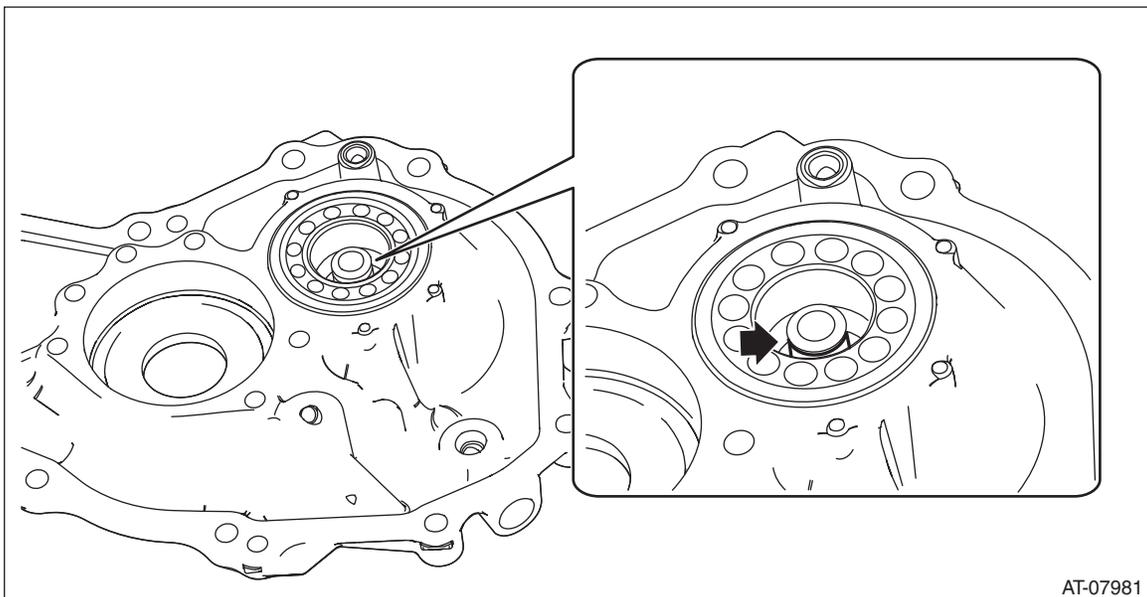


### B: INSTALLATION

- 1) Clean the mating surface of converter case cover and converter case.
- 2) Select the shim for front reduction drive gear. <Ref. to CVT(TR690)-343, ADJUSTMENT, Front Reduction Drive Gear.>
- 3) Apply CVTF to the shims and install on the bearing catch surface of the front reduction drive gear.
- 4) Install the seal ring to converter case cover.

#### NOTE:

- Use new seal rings.
- When installing the seal rings, do not expand the seal rings too much.



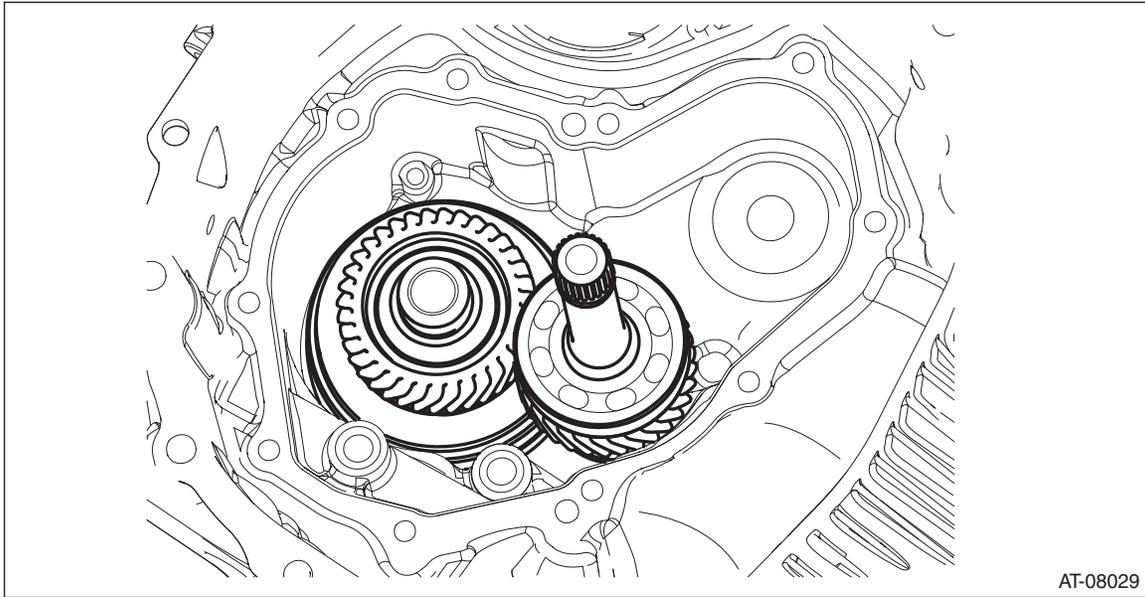
5) Install the front reduction drive gear and front reduction driven gear together.

## Front Reduction Drive Gear

CONTINUOUSLY VARIABLE TRANSMISSION

### CAUTION:

Be careful not to detach the spline of input clutch and the spline of front reduction driven shaft.



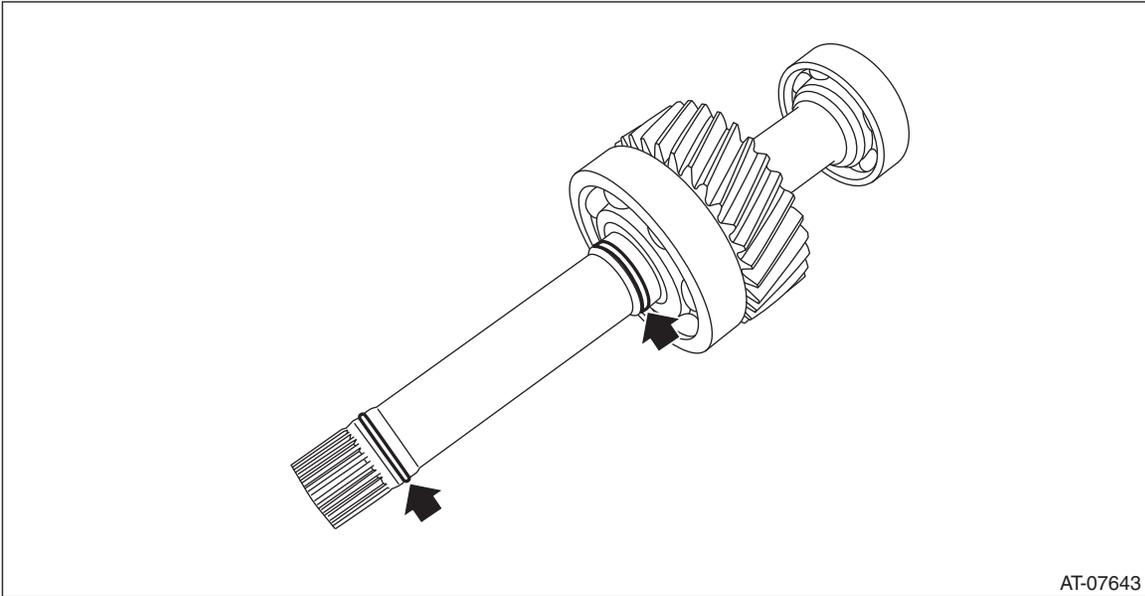
- 6) Install the converter case cover. <Ref. to CVT(TR690)-330, INSTALLATION, Converter Case Cover.>
- 7) Install the oil pump chain cover and the oil pump chain. <Ref. to CVT(TR690)-321, INSTALLATION, Oil Pump Chain.>
- 8) Install the drive pinion shaft assembly. <Ref. to CVT(TR690)-281, INSTALLATION, Drive Pinion Shaft Assembly.>
- 9) Install the primary pulley, secondary pulley and variator chain. <Ref. to CVT(TR690)-267, INSTALLATION, Primary Pulley and Secondary Pulley.>
- 10) Install the transmission case. <Ref. to CVT(TR690)-248, INSTALLATION, Transmission Case.>
- 11) Install the forward clutch assembly. <Ref. to CVT(TR690)-207, INSTALLATION, Forward Clutch Assembly.>
- 12) Install the intermediate case. <Ref. to CVT(TR690)-192, INSTALLATION, Intermediate Case.>
- 13) Install the transfer reduction driven gear assembly. <Ref. to CVT(TR690)-184, INSTALLATION, Transfer Reduction Driven Gear.>
- 14) Install the transfer clutch assembly. <Ref. to CVT(TR690)-173, INSTALLATION, Transfer Clutch.>
- 15) Install the rear drive shaft. <Ref. to CVT(TR690)-167, INSTALLATION, Rear Drive Shaft.>
- 16) Install the extension case. <Ref. to CVT(TR690)-164, INSTALLATION, Extension Case.>
- 17) Install the primary speed sensor. <Ref. to CVT(TR690)-122, INSTALLATION, Primary Speed Sensor.>
- 18) Install the transmission harness. <Ref. to CVT(TR690)-140, INSTALLATION, Transmission Harness.>
- 19) Install the control valve body and oil pan. <Ref. to CVT(TR690)-133, INSTALLATION, Control Valve Body.>
- 20) Install the air breather hose. <Ref. to CVT(TR690)-158, INSTALLATION, Air Breather Hose.>
- 21) Install the transmission assembly to the vehicle. <Ref. to CVT(TR690)-77, INSTALLATION, Automatic Transmission Assembly.>

# Front Reduction Drive Gear

CONTINUOUSLY VARIABLE TRANSMISSION

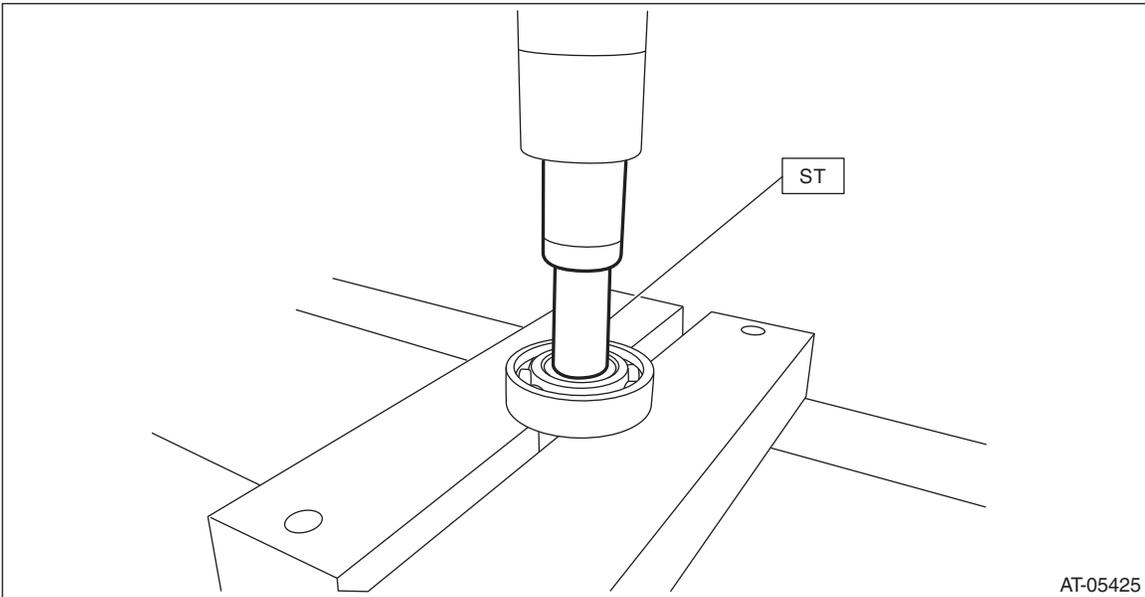
## C: DISASSEMBLY

1) Remove the seal ring and O-ring.



AT-07643

2) Using the ST, remove the ball bearing from front reduction drive gear.  
ST 899864100 REMOVER



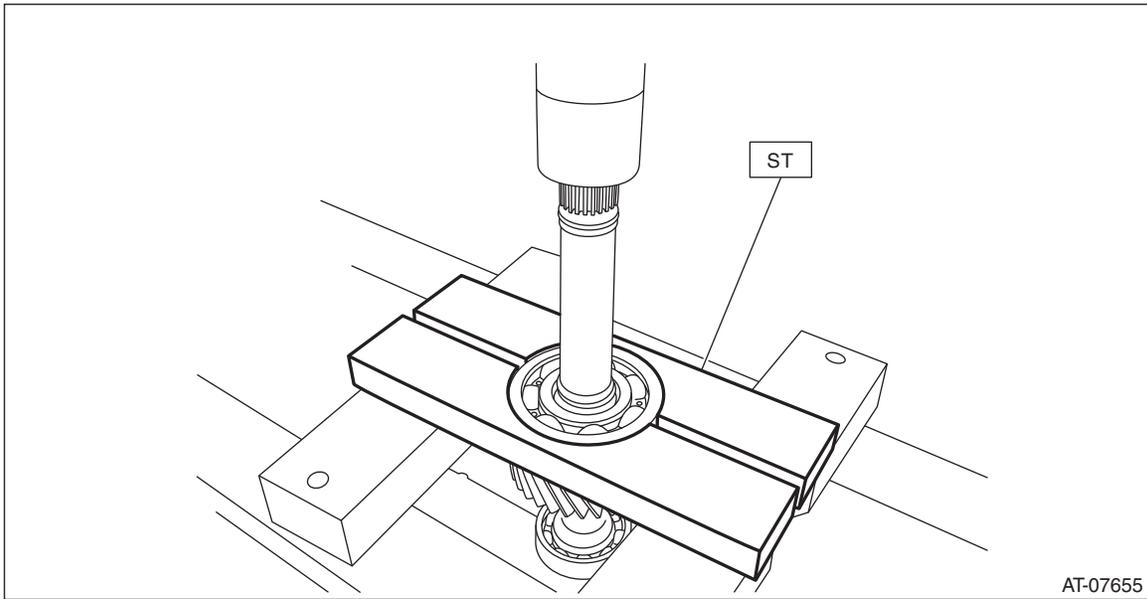
AT-05425

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# Front Reduction Drive Gear

CONTINUOUSLY VARIABLE TRANSMISSION

- 3) Using the ST, remove the ball bearing from front reduction drive gear.  
ST 498077000 REMOVER



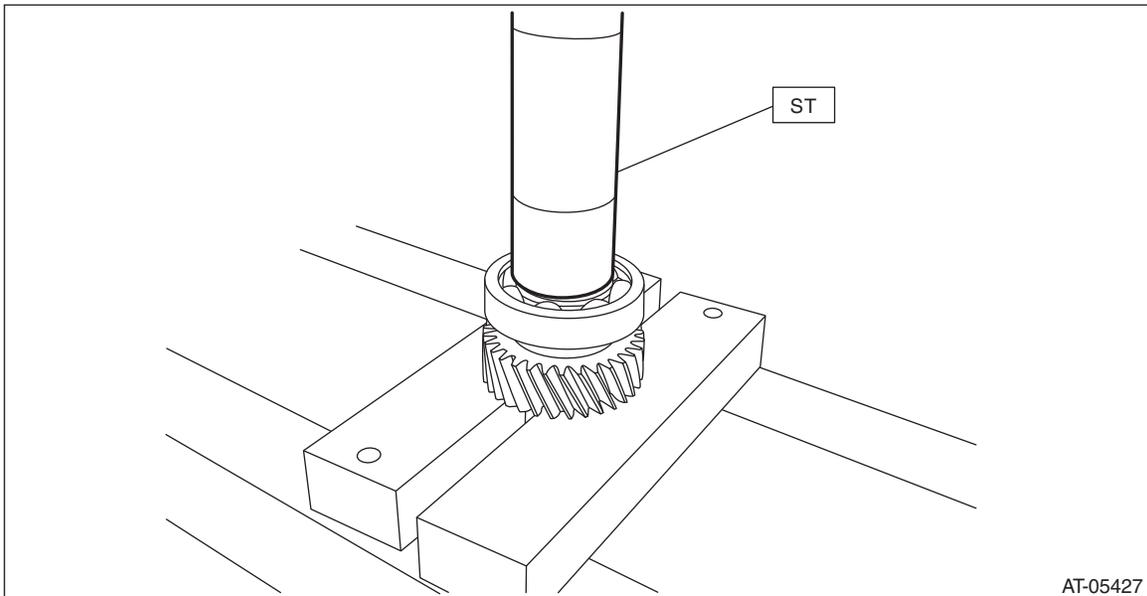
## D: ASSEMBLY

- 1) Using the ST, install the ball bearing to front reduction drive gear.

NOTE:

Use a new ball bearing.

ST 18651AA000 INSTALLER



- 2) Using ST1 and ST2, install the ball bearing to front reduction drive gear.

# Front Reduction Drive Gear

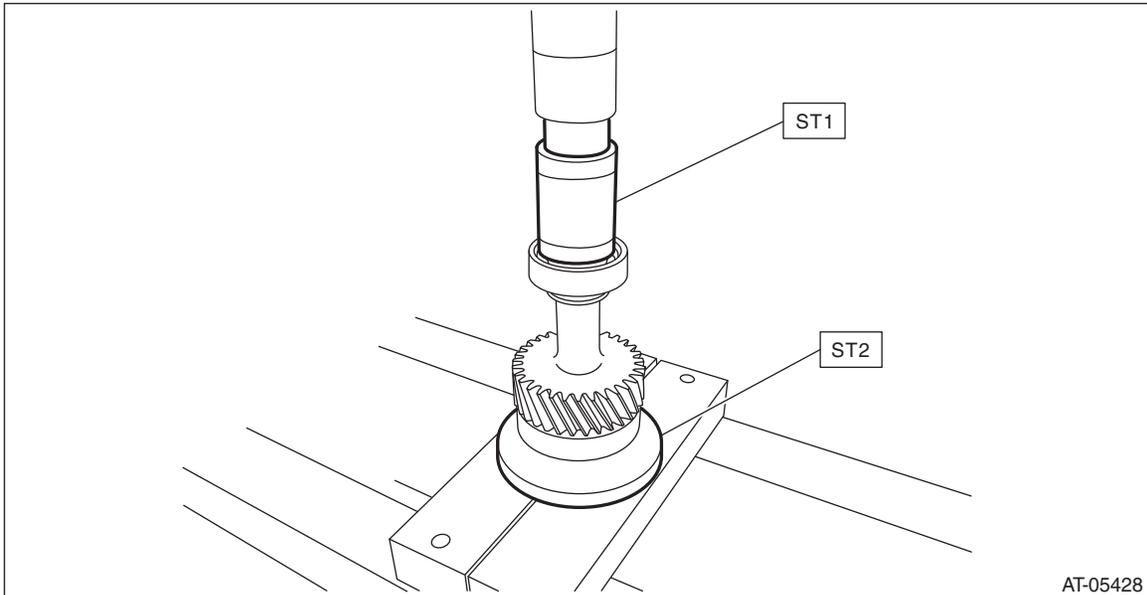
CONTINUOUSLY VARIABLE TRANSMISSION

## NOTE:

Use a new ball bearing.

ST1 499757002 INSTALLER

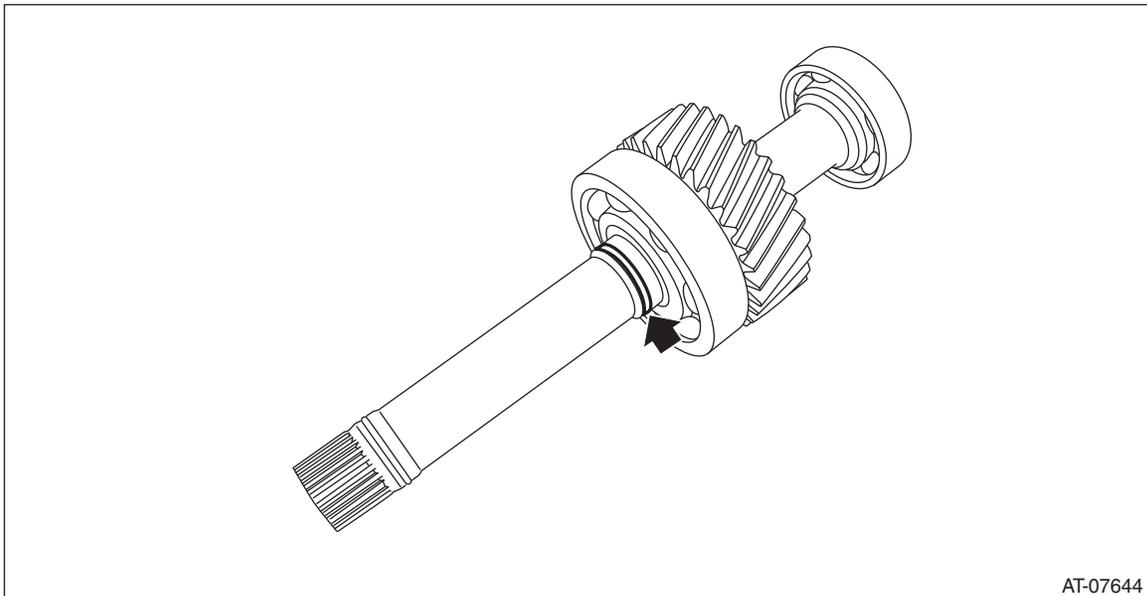
ST2 398177700 INSTALLER



3) Install the seal rings.

## NOTE:

- Use new seal rings.
- When installing the seal rings, do not expand the seal rings too much.
- Install the O-ring when installing the torque converter assembly.



## E: INSPECTION

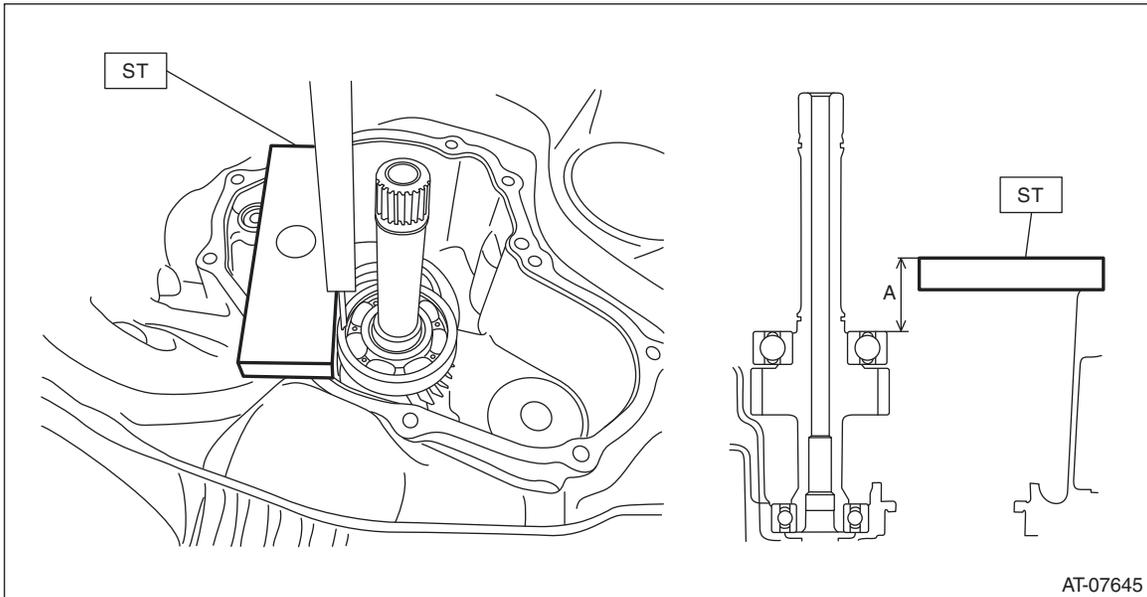
- Replace if its tooth surfaces are broken, damaged or excessively worn.
- Check the bearing for seizure or wear.
- Apply CVTF to bearing and rotate the bearing to check for noise or dragging etc.

# Front Reduction Drive Gear

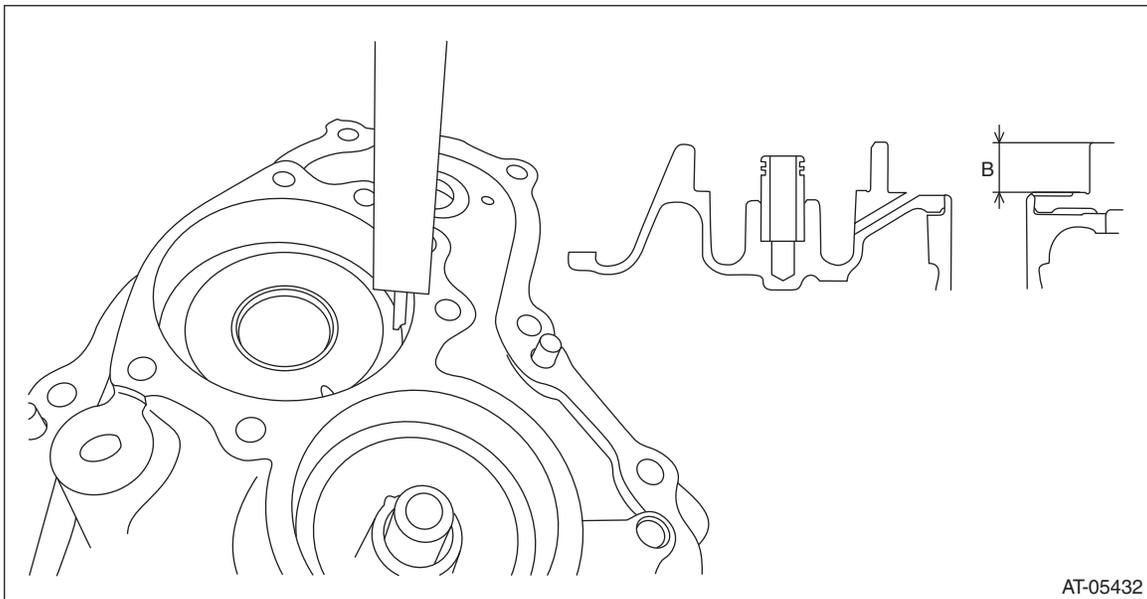
CONTINUOUSLY VARIABLE TRANSMISSION

## F: ADJUSTMENT

- 1) Measure height "A" from the ST upper face to the bearing end face using the ST.  
ST 398643600 GAUGE



- 2) Measure depth "B" from the converter case cover upper face to the bearing catch surface.

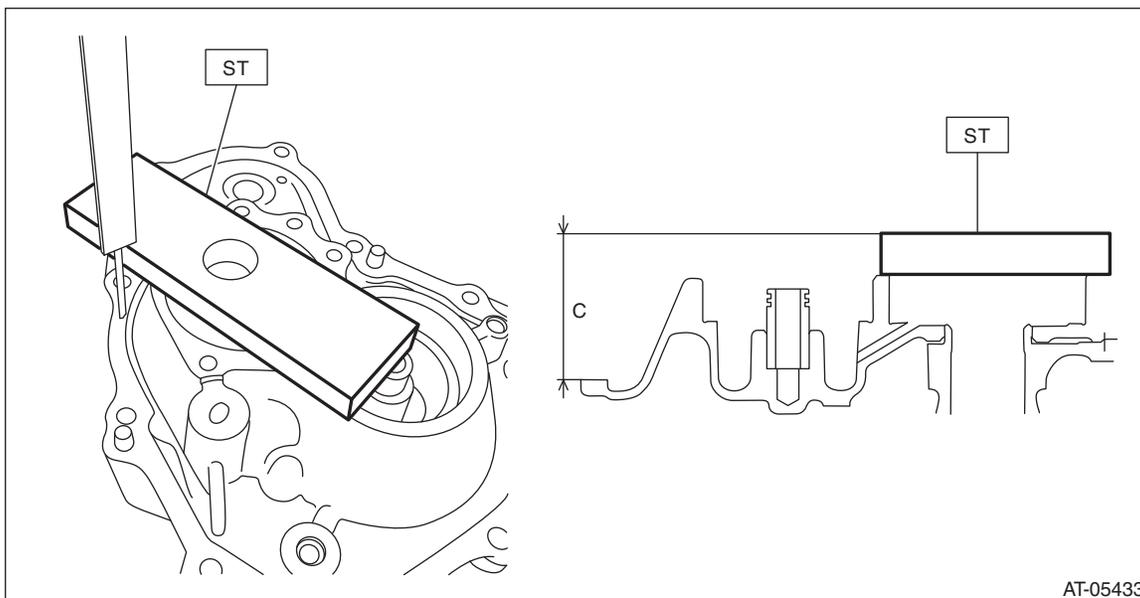


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# Front Reduction Drive Gear

## CONTINUOUSLY VARIABLE TRANSMISSION

3) Using the ST, measure height "C" from the ST upper face to the converter case cover mating surface.  
ST 398643600 GAUGE



AT-05433

4) Using the following formula, calculate clearance "T" to select shims.

Calculation formula:

$$T \text{ mm} = (A - 15) - ((C - 15) - B)$$

$$[T \text{ in} = (A - 0.591) - ((C - 0.591) - B)]$$

T: Clearance

A: Depth from the ST upper face to the bearing end surface

B: Depth from the converter case cover upper face to the bearing catch surface

C: Height from the ST upper face to the converter case cover mating surface

15 mm (0.591 in): Thickness of ST

Clearance "T" mm (in)	Thickness of shim mm (in)	Part No.
1.070 — 1.174 (0.042 — 0.045)	1.0 (0.039)	31288AA160
1.175 — 1.274 (0.046 — 0.049)	1.1 (0.043)	31288AA170
1.275 — 1.374 (0.050 — 0.053)	1.2 (0.047)	31288AA180
1.375 — 1.474 (0.054 — 0.057)	1.3 (0.051)	31288AA220
1.475 — 1.580 (0.058 — 0.062)	1.4 (0.055)	31288AA230

## 50. Front Reduction Driven Gear

### A: REMOVAL

NOTE:

For removal of front reduction driven gear, refer to the "Front Reduction Drive Gear". <Ref. to CVT(TR690)-337, REMOVAL, Front Reduction Drive Gear.>

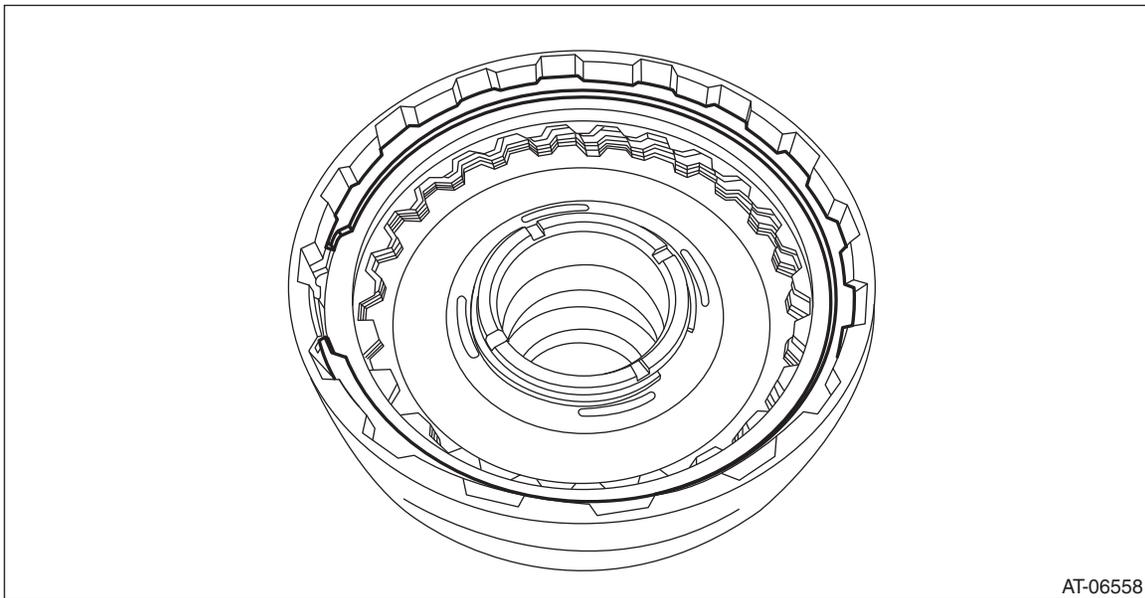
### B: INSTALLATION

NOTE:

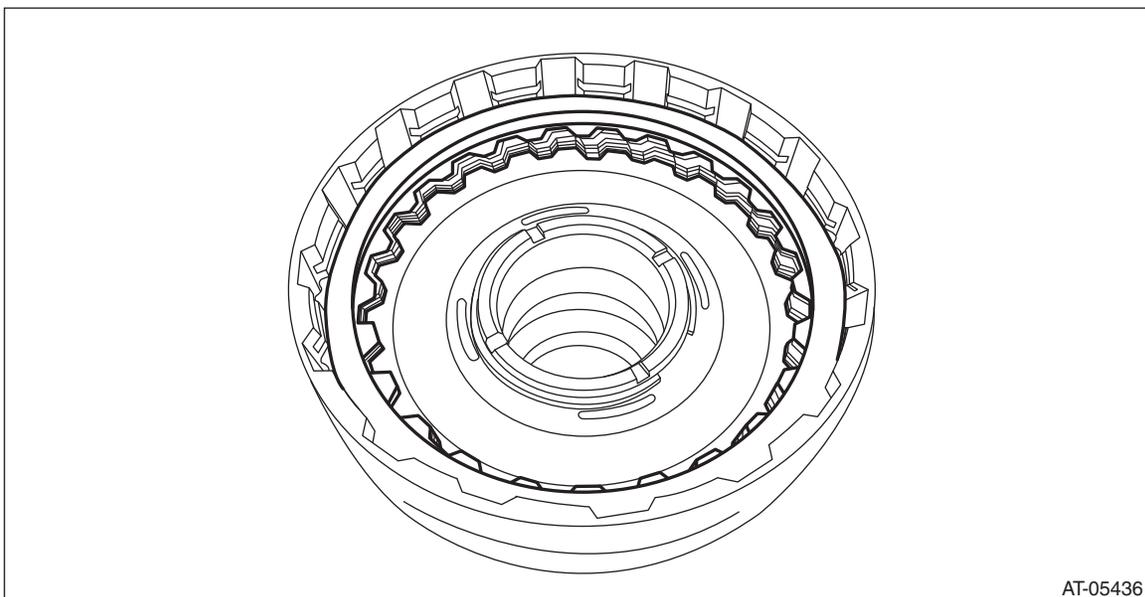
For installation of front reduction driven gear, refer to the "Front Reduction Drive Gear". <Ref. to CVT(TR690)-338, INSTALLATION, Front Reduction Drive Gear.>

### C: DISASSEMBLY

- 1) Remove the front reduction driven shaft from the front reduction driven gear.
- 2) Remove the snap ring.



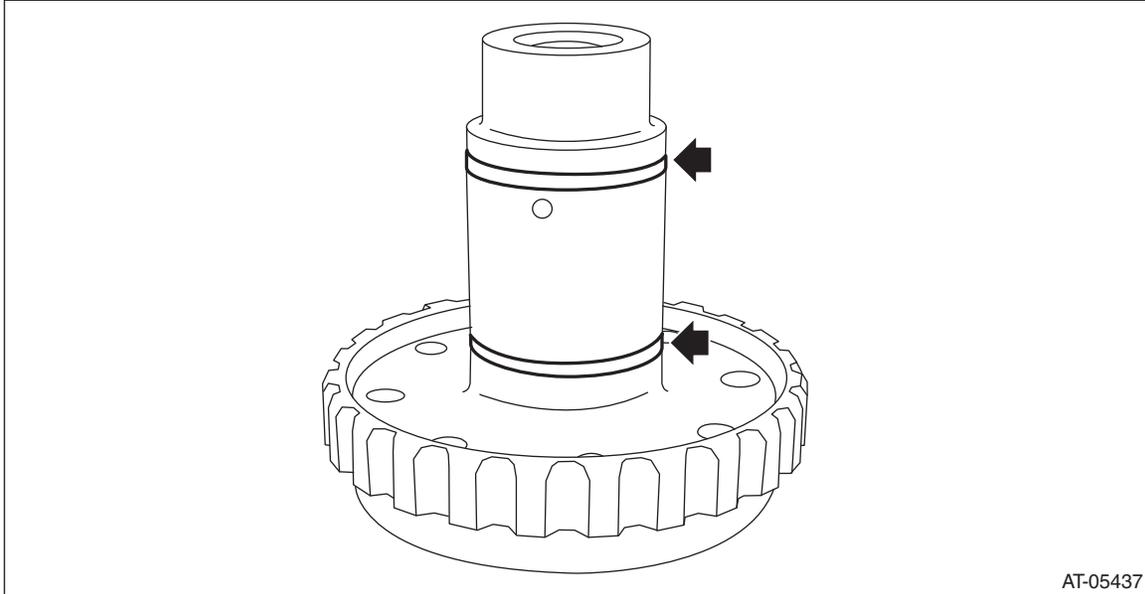
- 3) Remove the retaining plate, drive plate, driven plate and dish plate.



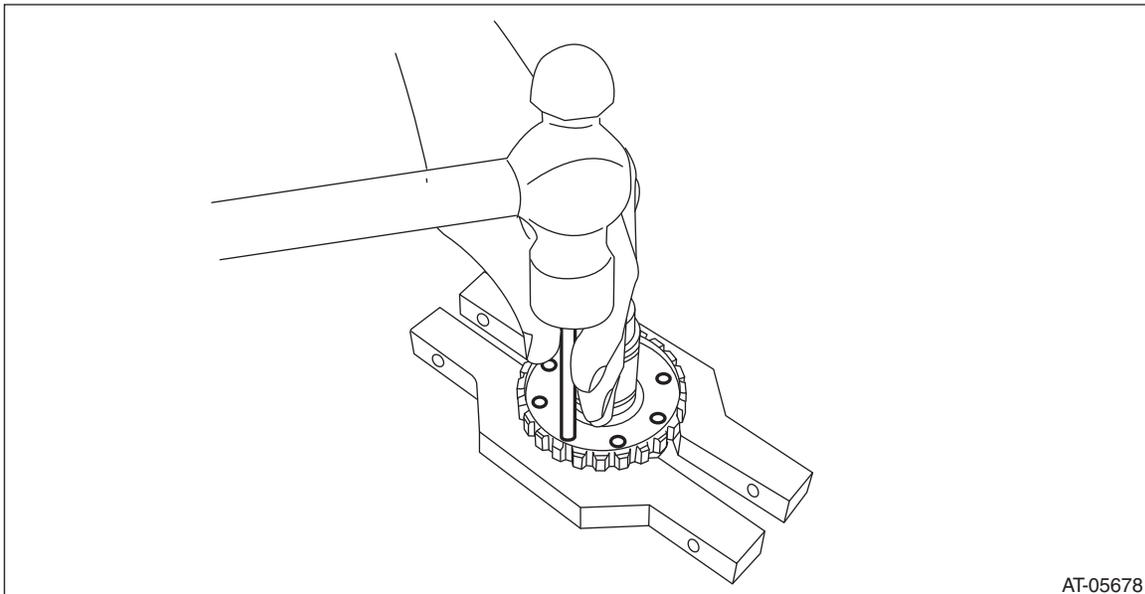
# Front Reduction Driven Gear

## CONTINUOUSLY VARIABLE TRANSMISSION

4) Remove the seal ring from front reduction driven shaft.



5) Remove the ball bearing, while tapping the entire circumference around the ball bearing outer race a little at a time through the front reduction driven shaft hole using the round bar with diameter of 7 mm (0.28 in).



## D: ASSEMBLY

1) Place the dish plate, driven plate, drive plate and retaining plate neatly in this order on surface table.

NOTE:

Make sure of the direction of dish plate.

2) Set the dial gauge to retaining plate, and read its scale.

NOTE:

The value, which is read in the gauge at this time, is zero point.

3) Scale and record the weight "Z" of a flat board which will be put on retaining plate.

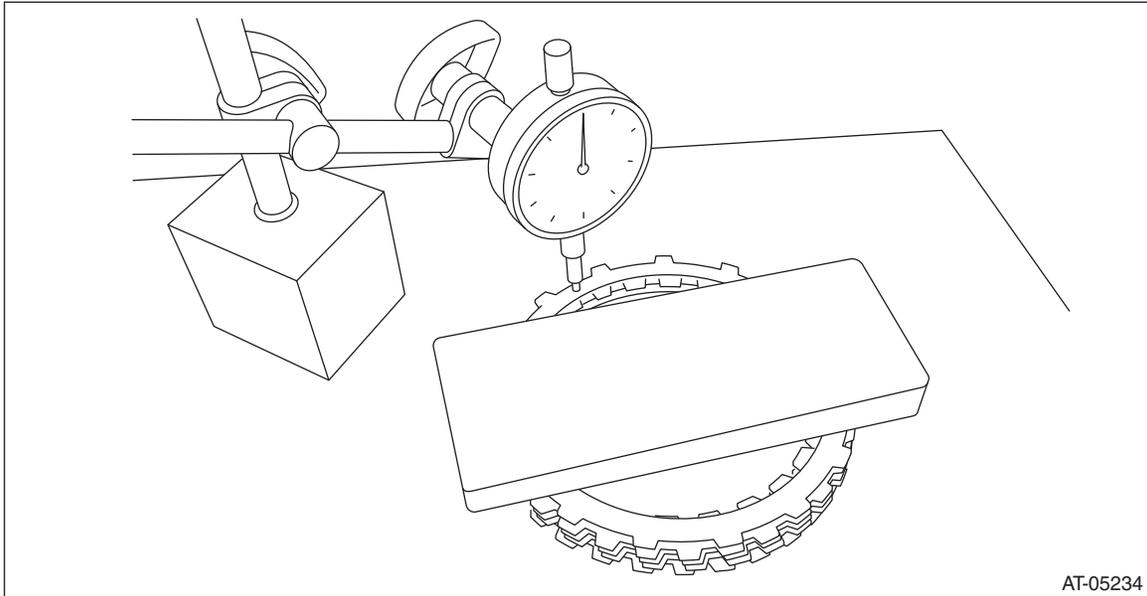
NOTE:

- Use a stiff board which does not bend against load as a flat board to be put on retaining plate.
- Use a flat board weighing less than 130 N (13.3 kgf, 29.2 lb).

# Front Reduction Driven Gear

CONTINUOUSLY VARIABLE TRANSMISSION

4) Put the flat board on retaining plate.



5) Using the following formula, calculate load “N”, a force of pressing with push/pull gauge.

$$N = 130N (13.3 \text{ kgf}, 29.2 \text{ lb}) - Z$$

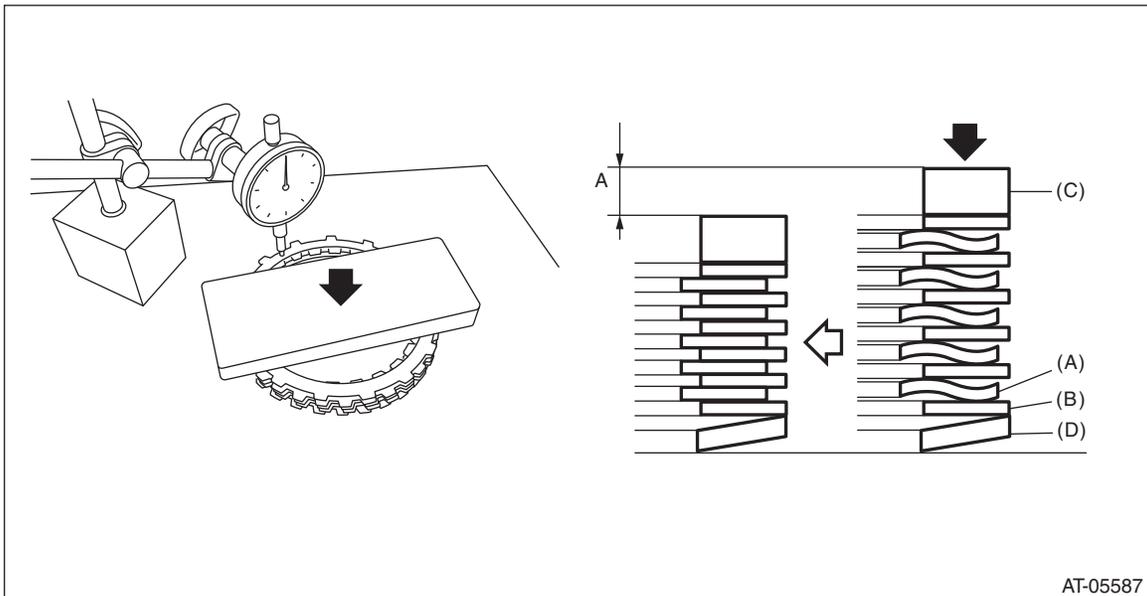
130 N (13.3 kgf, 29.2 lb): Load applied to clutch plate

Z: Flat board weight

6) Press the center of retaining plate by applying a force of “N” using push/pull gauge, and then measure and record the compression amount “A”.

NOTE:

Measure at four points with a 90° interval and calculate the average.



- (A) Drive plate
- (B) Driven plate
- (C) Retaining plate
- (D) Dish plate

7) Install the dish plate, driven plate, drive plate, retaining plate and snap ring.

NOTE:

Make sure of the direction of dish plate.

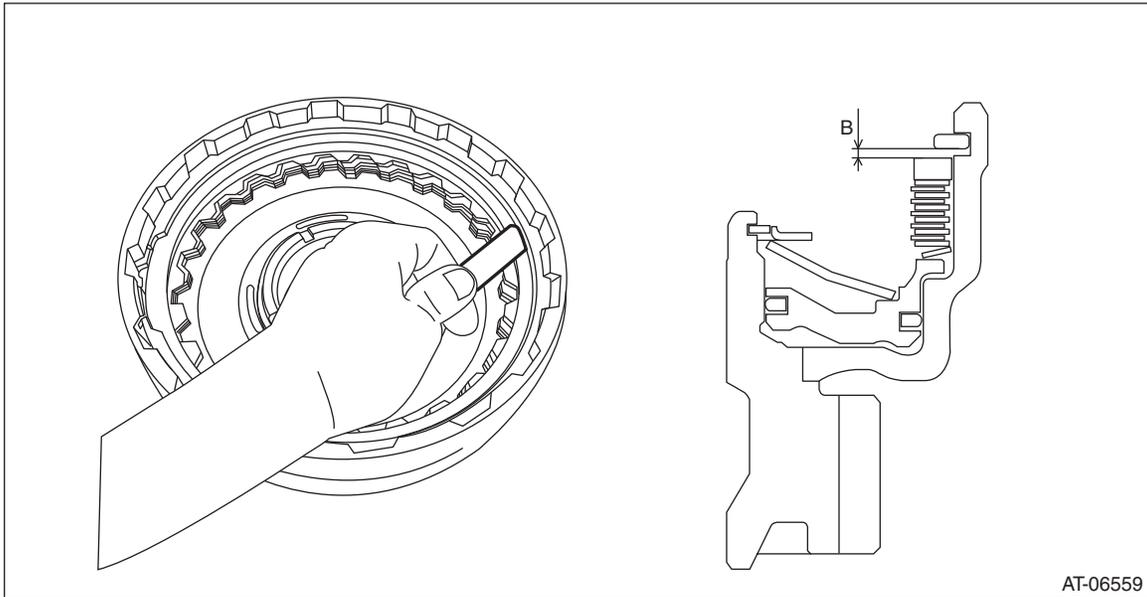
# Front Reduction Driven Gear

## CONTINUOUSLY VARIABLE TRANSMISSION

8) Measure and record the clearance “B” between the retaining plate and snap ring.

**NOTE:**

Before measuring, press down the whole circumference of retaining plate using your finger.



9) Piston stroke calculation

Calculate with A and B dimensions recorded before.

If out of standard, replace with a new drive plate and adjust it within standard.

$$S \text{ mm (in)} = A + B$$

S: Piston stroke

A: Compression amount of drive plate and dish plate

B: Clearance between retaining plate and snap ring

**Specification:**

**2.4 — 2.8 mm (0.094 — 0.11 in)**

Retaining plate	
Part No.	Thickness mm (in)
31667AA430	3.1 (0.122)
31667AA440	3.3 (0.130)
31667AA450	3.5 (0.138)

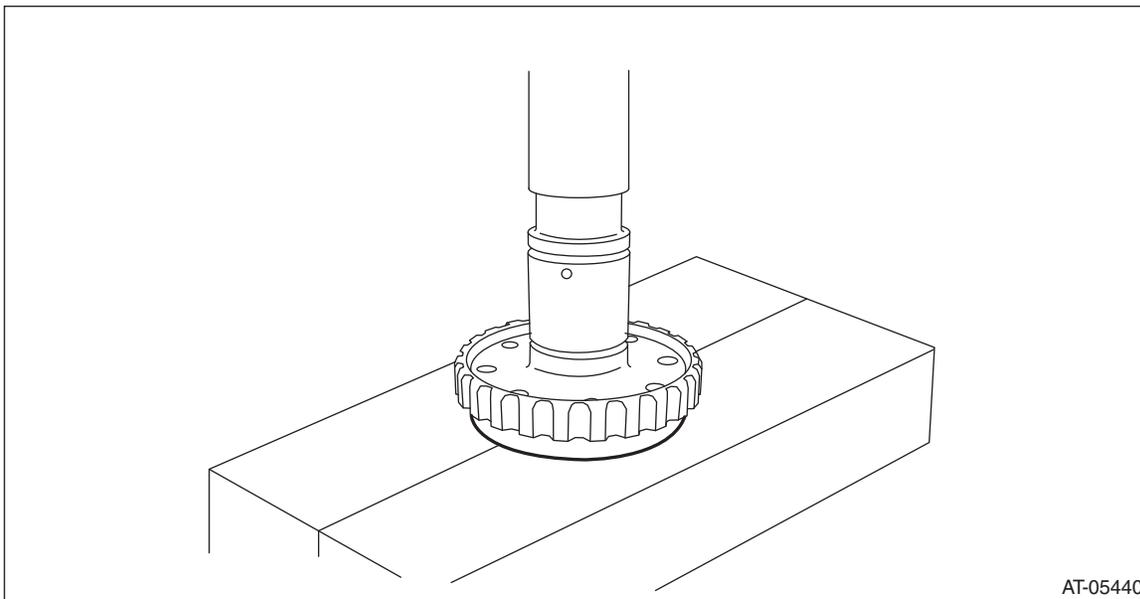
10) Press-fit the ball bearing into front driven shaft.

# Front Reduction Driven Gear

CONTINUOUSLY VARIABLE TRANSMISSION

NOTE:

Use a new ball bearing.

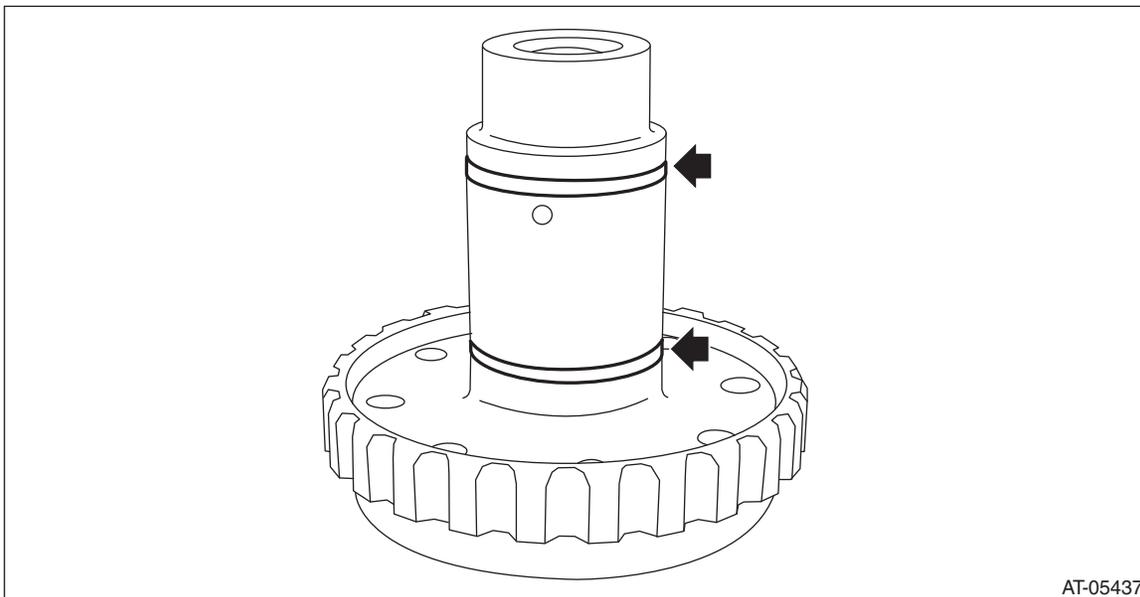


AT-05440

11) Install the seal ring to the front driven shaft.

NOTE:

- Install a new seal ring.
- Apply CVTF to the seal rings.



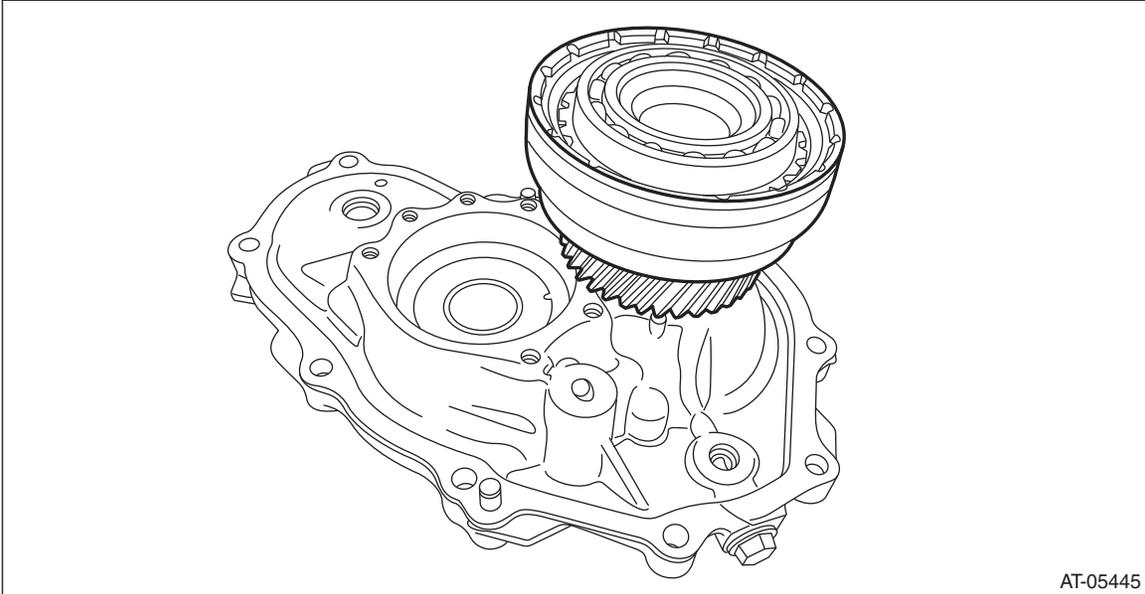
AT-05437

12) Install the front reduction driven shaft to the front reduction driven gear.

# Front Reduction Driven Gear

## CONTINUOUSLY VARIABLE TRANSMISSION

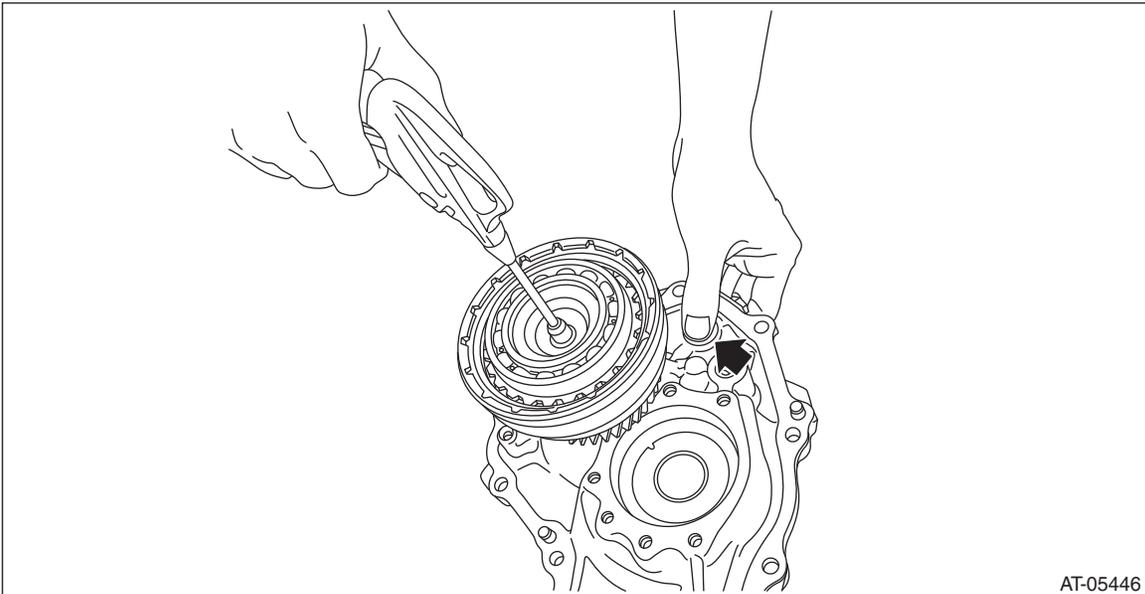
13) Install the front reduction driven gear assembly to converter case cover.



14) Apply compressed air intermittently to check the piston operation.

### NOTE:

Hold the arrowed area with a finger.



## E: INSPECTION

- Check the drive plate for wear and damage.
- Check the driven plate for discoloration (burnt color).
- Check for worn snap ring, fatigue or damaged return spring or deformed piston retainer.
- Replace if its tooth surfaces are broken, damaged or excessively worn.
- Check the bearing for seizure or wear.
- Apply CVTF to bearing and rotate the bearing to check for noise or dragging etc.

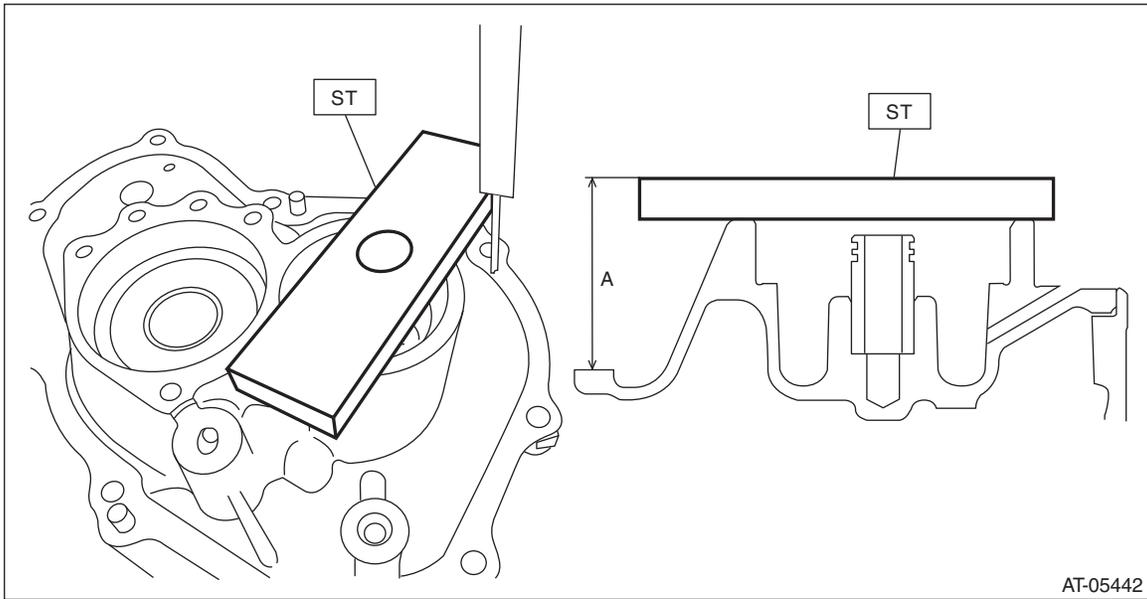
## F: ADJUSTMENT

1) If the ball bearing is attached, remove the bearing and shims. <Ref. to CVT(TR690)-327, REMOVAL, Converter Case Cover.>

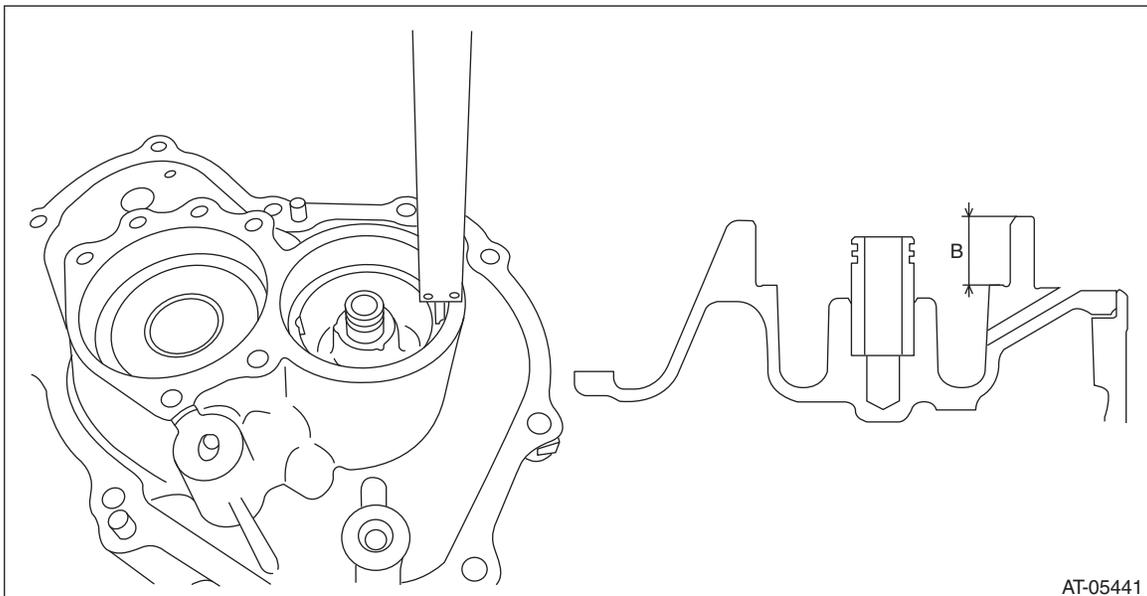
## Front Reduction Driven Gear

CONTINUOUSLY VARIABLE TRANSMISSION

- 2) Using the ST, measure height "A" from the ST upper face to the mating surface of the case.  
ST 398643600 GAUGE



- 3) Measure depth "B" from the converter case cover upper face to the bearing catch surface.



- 4) Install the ball bearing to the reduction driven gear.

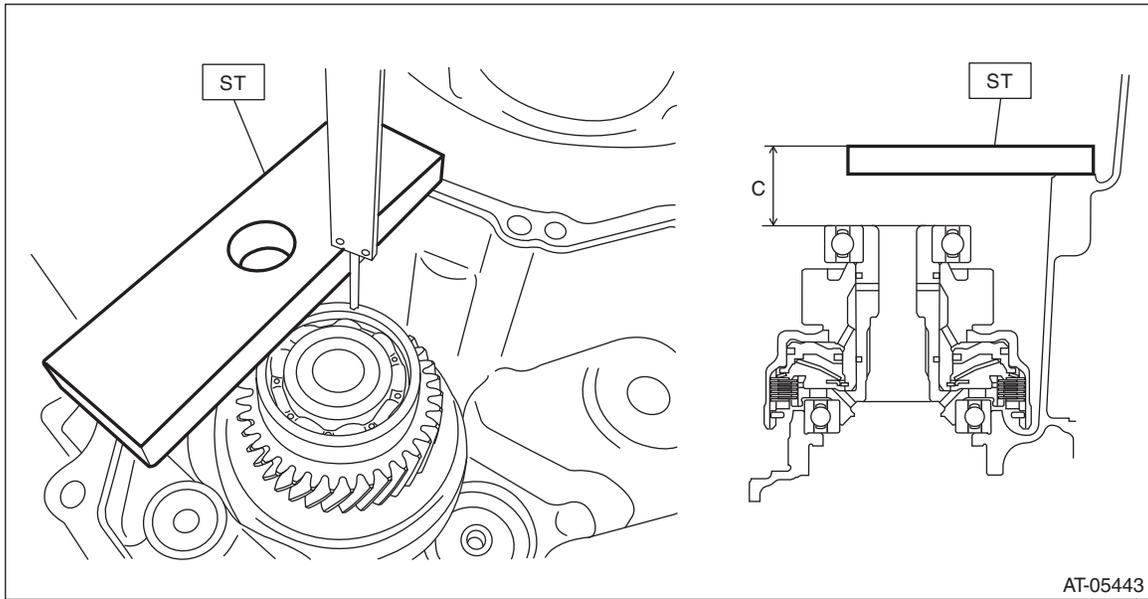
NOTE:

Use a new ball bearing.

# Front Reduction Driven Gear

## CONTINUOUSLY VARIABLE TRANSMISSION

5) Measure depth "C" from the ST upper face to the bearing end face using the ST.  
ST 398643600 GAUGE



AT-05443

6) Calculate clearance "T" using the following formula.

Formula:  $T \text{ mm} = (C - 15) - ((A - 15) - B)$

$[T \text{ in} = (C - 0.591) - ((A - 0.591) - B)]$

T: Clearance

A: Height from the ST upper face to the converter case mating surface

B: Depth from the converter case cover upper face to the bearing catch surface

C: Depth from the ST upper face to the bearing end face

15 mm (0.591 in): Thickness of ST

Clearance "T" mm (in)	Thickness of shim mm (in)
0.470 — 0.569 (0.019 — 0.021)	0.4 (0.016)
0.570 — 0.669 (0.022 — 0.025)	0.5 (0.020)
0.670 — 0.769 (0.026 — 0.029)	0.6 (0.024)
0.770 — 0.869 (0.030 — 0.033)	0.7 (0.028)
0.870 — 0.980 (0.034 — 0.039)	0.8 (0.031)

7) Select one to two shims so that the total thickness meets the value obtained from above.

Part No.	Thickness of shim mm (in)
31288AA130	0.2 (0.008)
31288AA140	0.3 (0.012)
31288AA150	0.5 (0.020)

## 51. Converter Case

### A: REMOVAL

- 1) Remove the transmission assembly from the vehicle. <Ref. to CVT(TR690)-59, REMOVAL, Automatic Transmission Assembly.>
- 2) Remove the air breather hose. <Ref. to CVT(TR690)-156, REMOVAL, Air Breather Hose.>
- 3) Remove the oil pan and control valve body. <Ref. to CVT(TR690)-129, REMOVAL, Control Valve Body.>
- 4) Remove the transmission harness. <Ref. to CVT(TR690)-139, REMOVAL, Transmission Harness.>
- 5) Remove the secondary pressure sensor. <Ref. to CVT(TR690)-127, REMOVAL, Secondary Pressure Sensor.>
- 6) Remove the primary speed sensor. <Ref. to CVT(TR690)-120, REMOVAL, Primary Speed Sensor.>
- 7) Remove the extension case. <Ref. to CVT(TR690)-164, REMOVAL, Extension Case.>
- 8) Remove the rear drive shaft. <Ref. to CVT(TR690)-167, REMOVAL, Rear Drive Shaft.>
- 9) Remove the transfer clutch assembly. <Ref. to CVT(TR690)-172, REMOVAL, Transfer Clutch.>
- 10) Remove the transfer reduction driven gear assembly. <Ref. to CVT(TR690)-184, REMOVAL, Transfer Reduction Driven Gear.>
- 11) Remove the intermediate case. <Ref. to CVT(TR690)-191, REMOVAL, Intermediate Case.>
- 12) Remove the forward clutch assembly. <Ref. to CVT(TR690)-206, REMOVAL, Forward Clutch Assembly.>
- 13) Remove the transmission case. <Ref. to CVT(TR690)-246, REMOVAL, Transmission Case.>
- 14) Remove the primary pulley, secondary pulley and variator chain. <Ref. to CVT(TR690)-263, REMOVAL, Primary Pulley and Secondary Pulley.>
- 15) Remove the drive pinion shaft assembly. <Ref. to CVT(TR690)-279, REMOVAL, Drive Pinion Shaft Assembly.>
- 16) Remove the front differential assembly. <Ref. to CVT(TR690)-300, REMOVAL, Front Differential Assembly.>
- 17) Remove the oil pump chain cover and the oil pump chain. <Ref. to CVT(TR690)-319, REMOVAL, Oil Pump Chain.>
- 18) Remove the converter case cover. <Ref. to CVT(TR690)-327, REMOVAL, Converter Case Cover.>
- 19) Remove the front reduction drive gear and front reduction driven gear. <Ref. to CVT(TR690)-337, REMOVAL, Front Reduction Drive Gear.>

### B: INSTALLATION

- 1) Install the front reduction drive gear and front reduction driven gear. <Ref. to CVT(TR690)-338, INSTALLATION, Front Reduction Drive Gear.>
- 2) Install the converter case cover. <Ref. to CVT(TR690)-330, INSTALLATION, Converter Case Cover.>
- 3) Install the oil pump chain cover and the oil pump chain. <Ref. to CVT(TR690)-321, INSTALLATION, Oil Pump Chain.>
- 4) Install the front differential assembly. <Ref. to CVT(TR690)-301, INSTALLATION, Front Differential Assembly.>
- 5) Install the drive pinion shaft assembly. <Ref. to CVT(TR690)-281, INSTALLATION, Drive Pinion Shaft Assembly.>
- 6) Install the primary pulley, secondary pulley and variator chain. <Ref. to CVT(TR690)-267, INSTALLATION, Primary Pulley and Secondary Pulley.>
- 7) Install the transmission case. <Ref. to CVT(TR690)-248, INSTALLATION, Transmission Case.>
- 8) Install the forward clutch assembly. <Ref. to CVT(TR690)-207, INSTALLATION, Forward Clutch Assembly.>
- 9) Install the intermediate case. <Ref. to CVT(TR690)-192, INSTALLATION, Intermediate Case.>
- 10) Install the transfer reduction driven gear. <Ref. to CVT(TR690)-184, INSTALLATION, Transfer Reduction Driven Gear.>
- 11) Install the transfer clutch assembly. <Ref. to CVT(TR690)-173, INSTALLATION, Transfer Clutch.>
- 12) Install the rear drive shaft. <Ref. to CVT(TR690)-167, INSTALLATION, Rear Drive Shaft.>
- 13) Install the extension case. <Ref. to CVT(TR690)-164, INSTALLATION, Extension Case.>
- 14) Install the primary speed sensor. <Ref. to CVT(TR690)-122, INSTALLATION, Primary Speed Sensor.>
- 15) Install the secondary pressure sensor. <Ref. to CVT(TR690)-127, INSTALLATION, Secondary Pressure Sensor.>

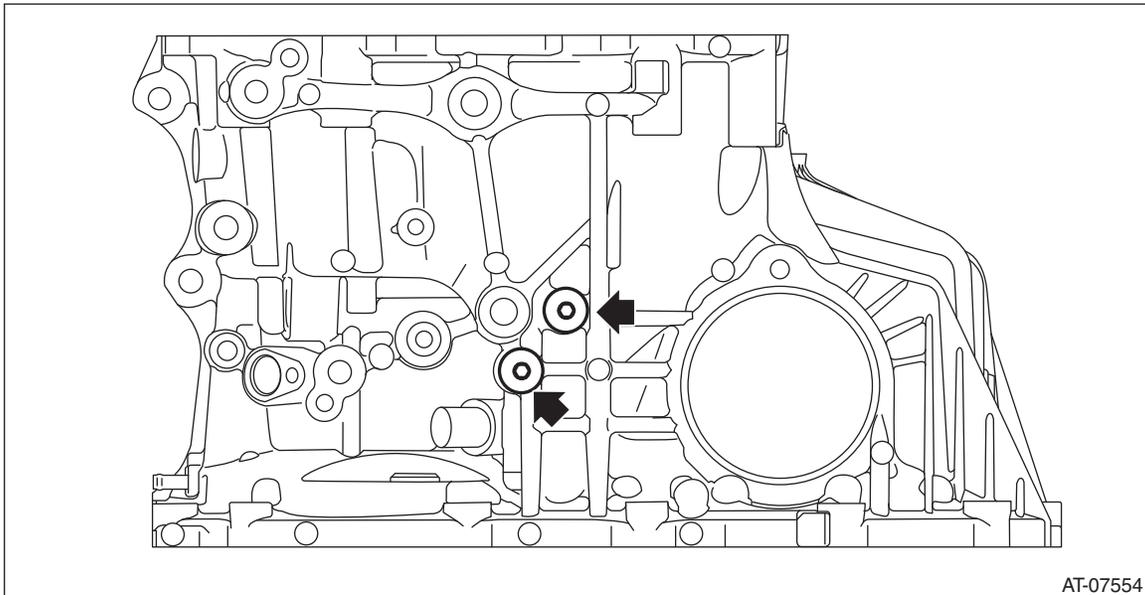
# Converter Case

## CONTINUOUSLY VARIABLE TRANSMISSION

- 16) Install the transmission harness. <Ref. to CVT(TR690)-140, INSTALLATION, Transmission Harness.>
- 17) Install the control valve body and oil pan. <Ref. to CVT(TR690)-133, INSTALLATION, Control Valve Body.>
- 18) Install the air breather hose. <Ref. to CVT(TR690)-158, INSTALLATION, Air Breather Hose.>
- 19) Install the transmission assembly to the vehicle. <Ref. to CVT(TR690)-77, INSTALLATION, Automatic Transmission Assembly.>

### C: DISASSEMBLY

- 1) Remove the transmission hanger and transmission radio ground cord, if mounted.
- 2) Remove the oil drain plug and overflow drain plug. <Ref. to CVT(TR690)-44, REPLACEMENT, Differential Gear Oil.>
- 3) Remove all plugs.



### D: ASSEMBLY

- 1) Install the oil drain plug.

NOTE:

Use a new gasket.

**Tightening torque:**

**70 N·m (7.1 kgf-m, 51.6 ft-lb)**

- 2) Temporarily install the overflow drain plug.

NOTE:

Replace the gasket of overflow drain plug with a new part after installing the transmission assembly to vehicle and adjusting differential gear oil.

- 3) Install all plugs.

NOTE:

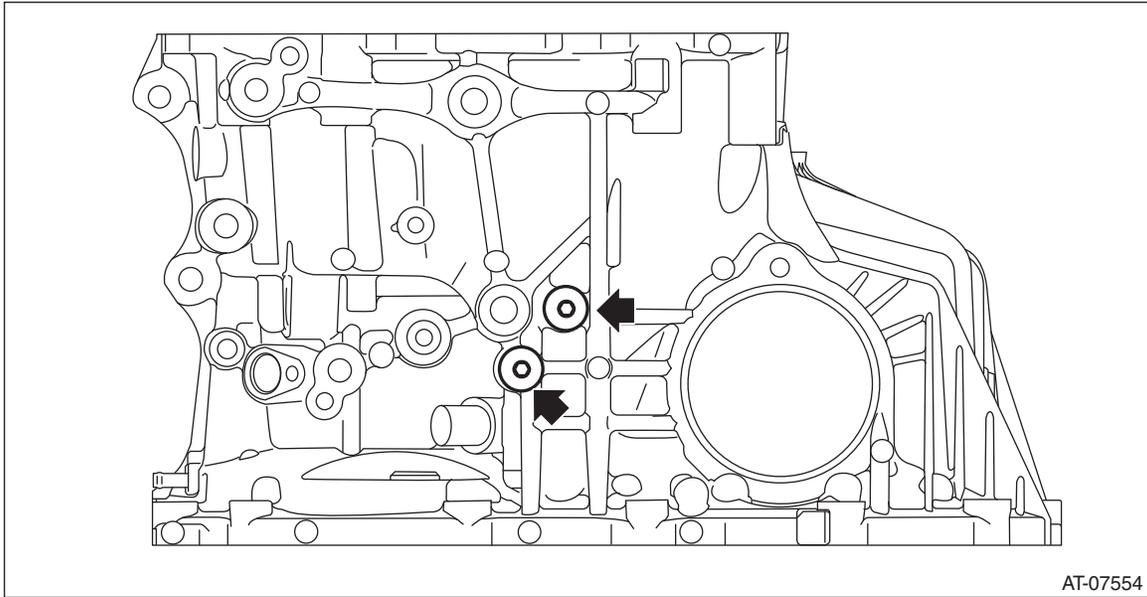
Use new O-rings.

# Converter Case

CONTINUOUSLY VARIABLE TRANSMISSION

## **Tightening torque:**

**25 N·m (2.5 kgf·m, 18.4 ft·lb)**



4) Install the transmission hanger and transmission radio ground cord.

## **Tightening torque:**

**41 N·m (4.2 kgf·m, 30.2 ft·lb)**

## **E: INSPECTION**

- Check for leakage of CVTF from the connection between converter case and transmission case.
- Check there is no damage or cracks on the converter case.

## **F: ADJUSTMENT**

When replacing the converter case, select the following shims.

- Select the shim for front reduction drive gear. <Ref. to CVT(TR690)-343, ADJUSTMENT, Front Reduction Drive Gear.>
- Select the shim for front reduction driven gear. <Ref. to CVT(TR690)-350, ADJUSTMENT, Front Reduction Driven Gear.>
- Select shims for primary pulley. <Ref. to CVT(TR690)-273, ADJUSTMENT, Primary Pulley and Secondary Pulley.>

## Diagnostics with Phenomenon

CONTINUOUSLY VARIABLE TRANSMISSION

### 52. Diagnostics with Phenomenon

#### A: INSPECTION

Symptoms	Faulty parts
Stall speed is low after warming-up, with select lever in "D" or "R" range.	Engine control system
Vehicle does not move despite engine speed rising up, with select lever in "D" or "R" range.	<ul style="list-style-type: none"> <li>• Engine control system</li> <li>• Select cable</li> <li>• CVTF</li> <li>• Secondary pressure circuit</li> <li>• Pulley, gear and variator chain</li> <li>• Forward/reverse changeover section</li> <li>• TCM</li> <li>• Control valve body</li> <li>• Inhibitor switch</li> </ul>
Vehicle does not move by engine stall, with select lever in "D" or "R" range.	<ul style="list-style-type: none"> <li>• Parking mechanism</li> <li>• Select cable</li> <li>• Bearing</li> <li>• Forward/reverse changeover section</li> </ul>
Excessive shock occurs at starting, with select lever in "D" or "R" range.	<ul style="list-style-type: none"> <li>• Secondary pressure circuit</li> <li>• Pulley, gear and variator chain</li> </ul>
Acceleration speed from standstill is insufficient, with select lever in "D" or "R" range.	<ul style="list-style-type: none"> <li>• Control valve body</li> <li>• Forward/reverse changeover section</li> </ul>
Engine speed suddenly rises up during driving, with select lever in "D" or "R" range.	<ul style="list-style-type: none"> <li>• Control valve body</li> <li>• Secondary pressure circuit</li> <li>• Primary pressure circuit</li> </ul>
Vibration occurs during driving, with select lever in "D" or "R" range.	<ul style="list-style-type: none"> <li>• Secondary pressure circuit</li> <li>• Primary pressure circuit</li> <li>• Forward/reverse changeover section</li> <li>• Pulley and variator chain</li> <li>• Torque converter assembly</li> <li>• Hydraulic pressure circuit to torque converter</li> <li>• Control valve body</li> </ul>
Sudden braking occurs during driving, with select lever in "D" or "R" range.	<ul style="list-style-type: none"> <li>• Secondary pressure circuit</li> <li>• Primary pressure circuit</li> <li>• Control valve body</li> </ul>
During deceleration, lockup clutch does not disengage until just before halting, with select lever in "D" or "R" range.	<ul style="list-style-type: none"> <li>• Control valve body</li> <li>• Torque converter assembly</li> </ul>
Engine stalls with vehicle at a standstill, with select lever in "D" or "R" range.	<ul style="list-style-type: none"> <li>• Engine control system</li> <li>• Control valve body</li> </ul>
Excessive lockup shock occurs during driving, with select lever in "D" range.	Control valve body
Slipping occurs at lockup, or lockup does not occur during driving, with select lever in "D" range.	<ul style="list-style-type: none"> <li>• Control valve body</li> <li>• Lockup hydraulic line</li> <li>• Torque converter assembly</li> </ul>
Excessive shift shock occurs when shifting the select lever from "N" range to "D" range, or from "N" range to "R" range.	<ul style="list-style-type: none"> <li>• Inhibitor switch</li> <li>• Control valve body</li> <li>• Forward/reverse changeover section</li> </ul>
Vehicle does not keep at standstill with select lever in "P" range, or parking cannot be released when shifting from "P" range to another range.	<ul style="list-style-type: none"> <li>• Select cable</li> <li>• Parking mechanism</li> </ul>
Select lever does not shift smoothly.	<ul style="list-style-type: none"> <li>• Select cable</li> <li>• Inhibitor switch</li> <li>• Detent spring</li> <li>• Manual plate</li> </ul>

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