


1. General Description
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8. Indicator
9. MT Gear Shift Lever
10. MT Gear Shift Cable
11. MT Gear Select Cable
12. Symptoms and causes

## CONTROL SYSTEMS > General Description

### CAUTION

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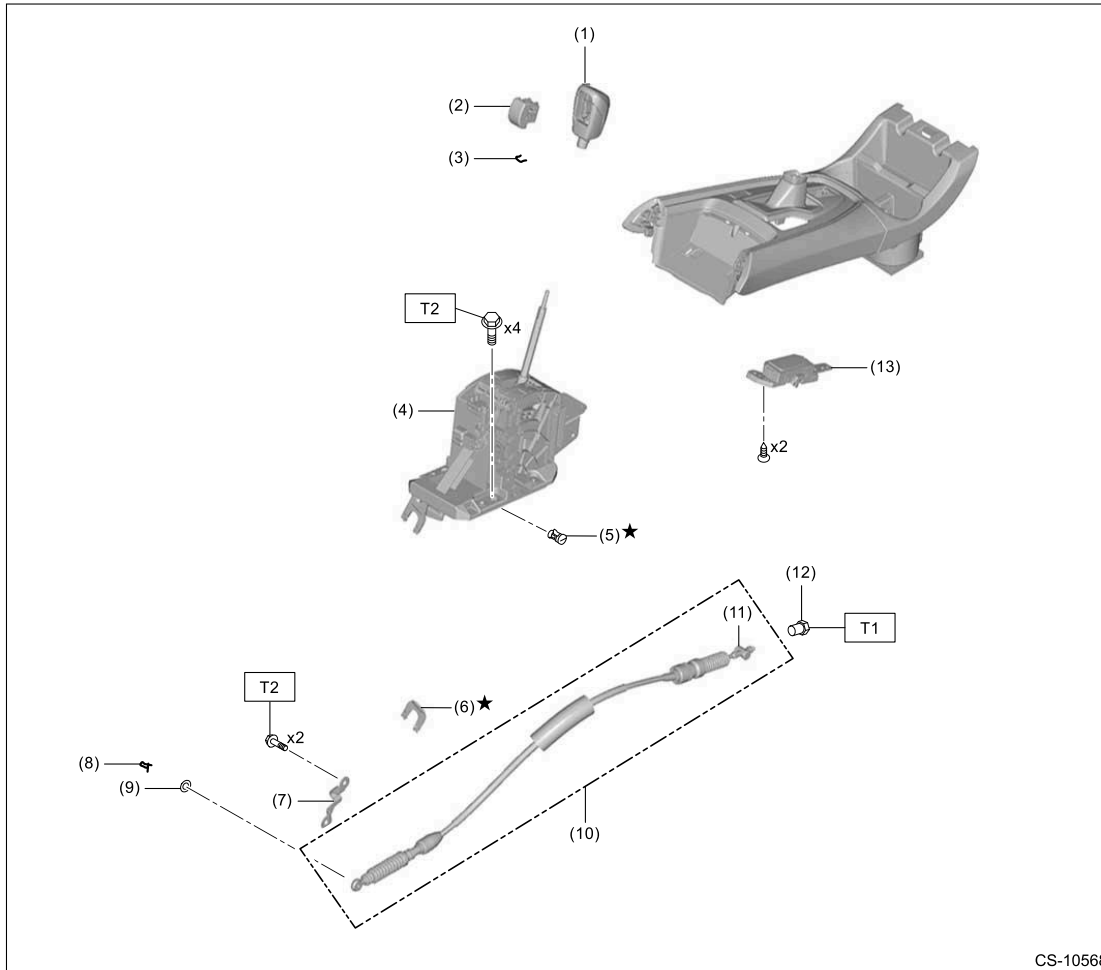
- When performing service operation, refer to "Repair Contents" in "General Description".  [Ref. to REPAIR CONTENTS>Repair Contents.](#)
- Prior to starting work, pay special attention to the following:
  1. Always wear work clothes, a work cap, and protective shoes. Additionally, wear a helmet, protective goggles, etc. if necessary.
  2. Protect the vehicle using a seat cover, fender cover, etc.
  3. Prepare the service tools, clean cloth, containers to catch grease and oil, etc.
- Prevent scattering of grease and oil. If it scatters, wipe it off immediately to prevent it from penetrating the floor or flowing out, to protect the environmental.
- If the grease and oil is spilt over the engine, exhaust pipe or the under cover, completely wipe it off to avoid emission of smoke or causing a fire.
- Vehicle components are extremely hot immediately after driving. Be wary of receiving burns from heated parts.
- When performing a repair, identify the cause of trouble and avoid unnecessary work.
- Before disconnecting connectors of sensors or units, be sure to disconnect the ground terminal from the battery sensor.
- Always use the jack-up point when the lifting device, shop jacks or rigid racks are used to support the vehicle.
- Before starting works, remove dirt and corrosion around the target area.
- Keep the removed parts in order and protect them from dust and dirt.
- All removed parts, if to be reused, should be reinstalled in the original positions with attention to the correct directions, etc.
- For the parts except for the non-reusable parts, replace them with new parts if necessary.
- Be sure to tighten bolts and nuts to the specified torque.

## CONTROL SYSTEMS > General Description

### COMPONENT

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## 1. SELECT LEVER AND SELECT CABLE



CS-10568

(1) Grip

(2) Grip button

(3) Clamp

(4) Select lever

(5) Connector pin

(6) Clamp

(7) Cable bracket

(8) Snap pin

(9) Washer

(10) Select cable

(11) Adjusting nut (front)

(12) Adjusting nut (rear)

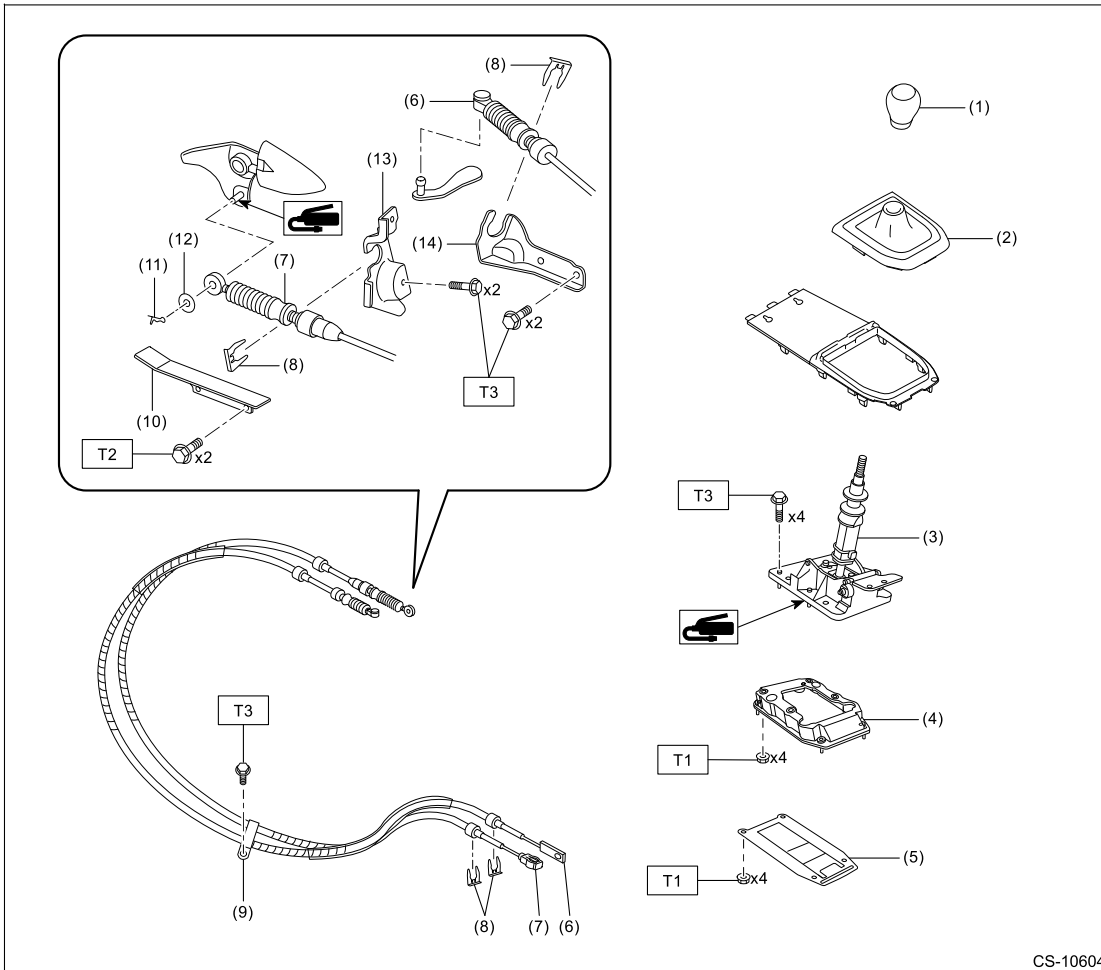
(13) Indicator

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

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

**T2: 18 (1.8, 13.3)**

## 2. MT GEAR SHIFT LEVER & MT GEAR SHIFT CABLE & MT GEAR SELECT CABLE



CS-10604

- |                           |                     |
|---------------------------|---------------------|
| (1) Shift knob            | (8) Clamp           |
| (2) Shift boot            | (9) Cable clamp     |
| (3) MT gear shift lever   | (10) Dust cover     |
| (4) Cable cover ASSY      | (11) Snap pin       |
| (5) Cable cover plate     | (12) Washer         |
| (6) MT gear select cable* | (13) Shift bracket  |
| (7) MT gear shift cable   | (14) Select bracket |

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

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

**T2: 15 (1.5, 11.1)**


**T3: 18 (1.8, 13.3)**

\*: Always use new MT gear select cable if the cable is removed from the transmission body.

## CONTROL SYSTEMS > General Description

### PREPARATION TOOL

#### 1. SUBARU SPECIAL TOOL

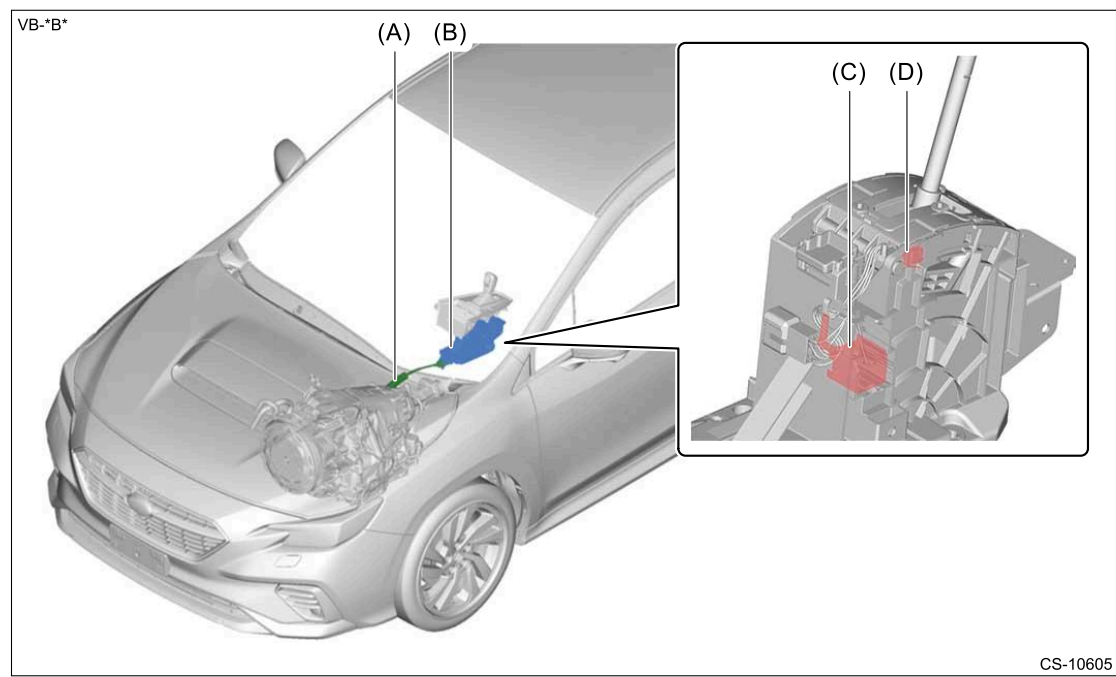
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>STSSM4</p>	—	SUBARU SELECT MONITOR 4	Used for setting of each function and troubleshooting for electrical system. <b>Note:</b> <ul style="list-style-type: none"> <li>• For detailed operation procedures, refer to "Help" of application.</li> <li>• Used together with interface for Subaru Select Monitor (such as DST-i and DST-010).</li> </ul>

#### 2. OTHER

	REMARKS
Circuit tester	Used for measuring resistance, voltage and current.

## CONTROL SYSTEMS > Shift Lock Control System

### LOCATION



(A) Select cable  
(B) Select lever

(C) Shift lock solenoid

(D) "P range" switch

**INSPECTION**

**1. CHECK SHIFT LOCK CONTROL SYSTEM**

**Trouble symptom:**

The select lever cannot be shifted from P range.

**Note:**

Before checking DTC, perform the "Basic Diagnostic Procedure" of "BODY CONTROL (DIAGNOSTICS)". [Ref. to BODY CONTROL\(DIAGNOSTICS\)>Basic Diagnostic Procedure.](#)

**1. CHECK DTC.**

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor, read all DTCs. [Ref. to LAN SYSTEM \(DIAGNOSTICS\)>Diagnostic Trouble Code \(DTC\).](#)

Is DTC displayed?

Yes Perform the diagnosis for the displayed DTCs.

No [Go to 2.](#)

**2. CHECK DATA MONITOR.**

Using Subaru Select Monitor, display [Stop Light Switch] in [Data monitor] of [Body Control]. [Ref. to COMMON \(DIAGNOSTICS\)>Data Monitor.](#)

Does the [Stop Light Switch] display change according to brake pedal operation?

Yes [Go to 3.](#)

No Check the stop light system. [Ref. to LIGHTING SYSTEM>Stop Light System.](#)

**3. CHECK DTC.**


1. Maintain the brake pedal depressed for one second or more.
2. Read the DTC of [Body Control] using the Subaru Select Monitor. [Ref. to COMMON \(DIAGNOSTICS\)>Diagnostic Trouble Code \(DTC\).](#)

Is DTC B1016 displayed? (Current code)

Yes Perform the diagnosis for DTC B1016. [Ref. to BODY CONTROL\(DIAGNOSTICS\)>Diagnostic Trouble Code \(DTC\).](#)

No [Go to 4.](#)

#### 4. CHECK DATA MONITOR.

Using Subaru Select Monitor, display [P SW] in [Data monitor] of [Body Control].  [Ref. to COMMON \(DIAGNOSTICS\)>Data Monitor.](#)

Is "ON" displayed?

Yes  [Go to 7.](#)

No  [Go to 5.](#)

#### 5. CHECK "P RANGE" SWITCH.

Check the "P range" switch.  [Ref. to CONTROL SYSTEMS>Shift Lock Solenoid and P Range Switch>INSPECTION.](#)

Is the check result OK?

Yes  [Go to 6.](#)

No Replace the select lever.  [Ref. to CONTROL SYSTEMS>Select Lever.](#)

#### 6. CHECK HARNESS.

Check the harness for "P range" switch lines.  [Ref. to WIRING SYSTEM>Shift Lock Control System>WIRING DIAGRAM.](#)

Is the check result OK?

Yes  [Go to 7.](#)

No Repair or replace the harness.

#### 7. CHECK SELECT CABLE.

Check the installation condition of select cable.


Is the installation condition normal?

Yes  [Go to 8.](#)

No Install the select cable correctly.

**Note:**  
**Confirm that the select cable is free from damage.**

## 8. CHECK SELECT LEVER.

1. Disconnect the select cable from the transmission main body.  [Ref. to CONTROL SYSTEMS>Select Cable.](#)
2. Shift the select lever to another range.

Does the select lever shift?


Yes

Repair the transmission body.  [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Transmission Assembly>REMOVAL.](#)

No


 [Go to 9.](#)

## 9. CHECK SELECT LEVER.

1. Remove the select cable from the select lever.  [Ref. to CONTROL SYSTEMS>Select Cable.](#)
2. Connect all harnesses.
3. Shift the select lever to another range.

Does the select lever shift?

Yes

Replace the select cable.  [Ref. to CONTROL SYSTEMS>Select Cable.](#)

No

 [Go to 10.](#)

## 10. CHECK SELECT LEVER.

Check the select lever.  [Ref. to CONTROL SYSTEMS>Select Lever.](#)

Is the check result OK?

Yes

Replace the keyless access CM.  [Ref. to SECURITY AND LOCKS>Keyless Access CM.](#)

No

Replace the select lever.  [Ref. to CONTROL SYSTEMS>Select Lever.](#)

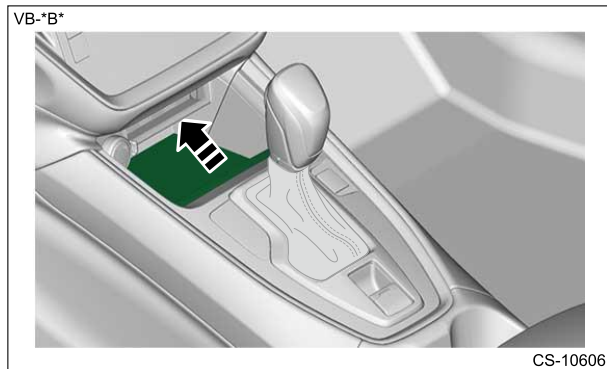
REMOVAL



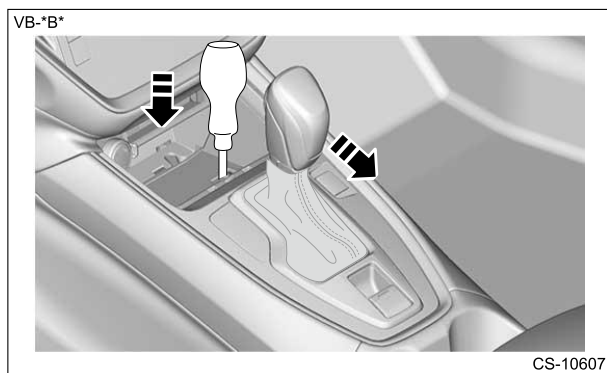
Note:

- The shift lock solenoid, "P range" switch and manual mode switch are integrated with the select lever.
- The select lever cannot be disassembled.

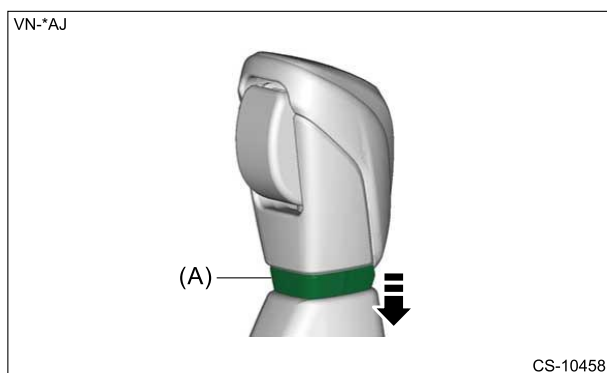
1. Disconnect the ground terminal from battery sensor. [Ref. to REPAIR CONTENTS>NOTE > BATTERY.](#)
2. Remove the mat center tray.



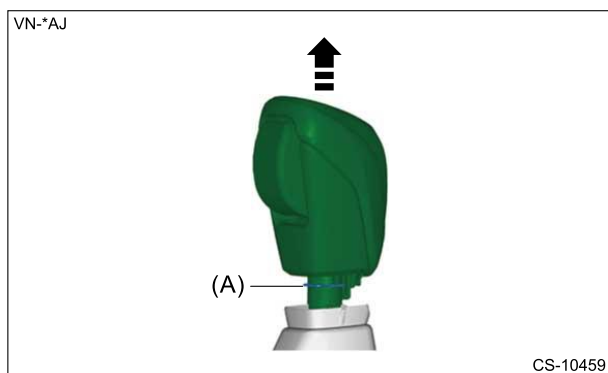
3. Release the shift lock using a screwdriver, etc. and shift the select lever to the "N range".



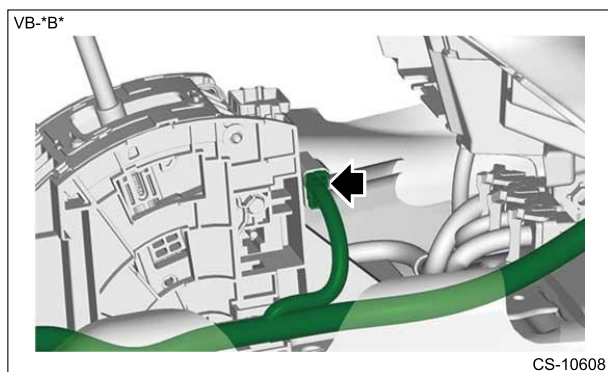
4. Lower the section (A) of the boot.



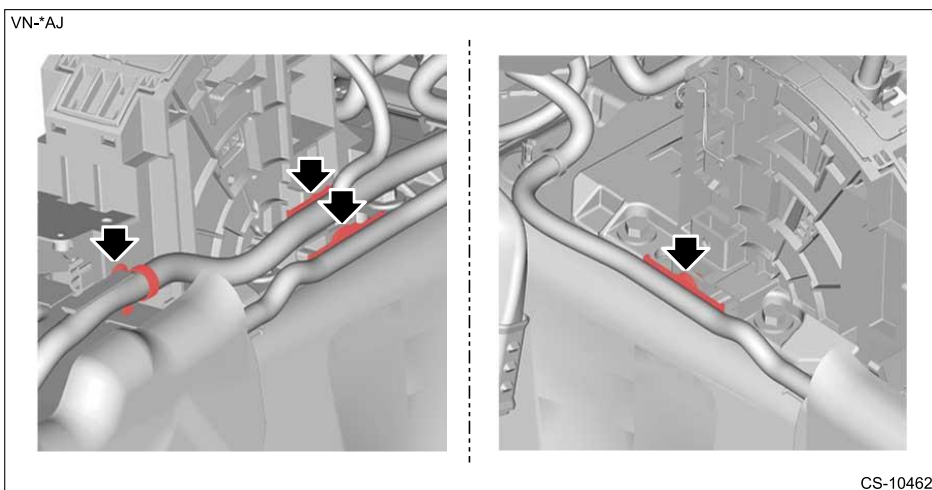
5. Remove the clamp (A) and remove the grip.



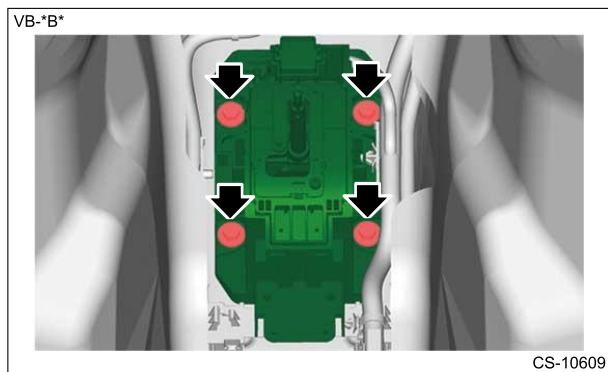
6. Remove the cover center side. [Ref. to EXTERIOR/INTERIOR TRIM>Center Console>REMOVAL.](#)
7. Disconnect the select cable from the transmission main body. [Ref. to CONTROL SYSTEMS>Select Cable>REMOVAL.](#)
8. Disconnect the connector.



9. Remove the clips securing the harness.



10. Remove the select lever.



11. Remove the select cable from the select lever. [Ref. to CONTROL SYSTEMS>Select Cable>REMOVAL.](#)

## CONTROL SYSTEMS > Select Lever

### INSTALLATION

1. Install the select cable to the select lever. [Ref. to CONTROL SYSTEMS>Select Cable>INSTALLATION.](#)

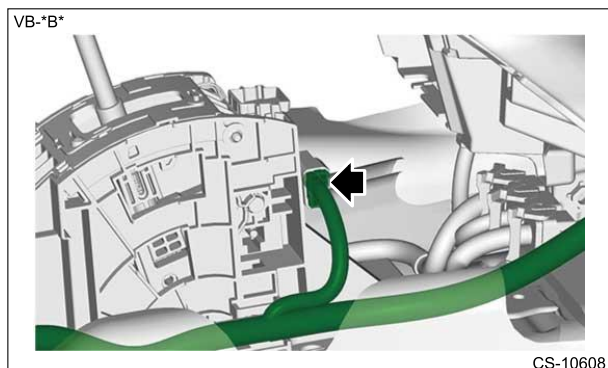
2. Install the select lever.

#### Tightening torque:

18 N·m (1.8 kgf-m, 13.3 ft-lb)

3. Install the clip securing the harness.

4. Connect the connector.



5. Connect the select cable to the transmission main body. [Ref. to CONTROL SYSTEMS>Select Cable>INSTALLATION.](#)

6. Install the cover center side. [Ref. to EXTERIOR/INTERIOR TRIM>Center Console>INSTALLATION.](#)

7. Install the clamp to the grip.

#### Note:

Insert it from the front side.

8. Install the grip.

#### Note:

Install it while pressing on the clamp.

9. Install the boot to the grip.

10. Release the shift lock using a screwdriver, etc. and shift the select lever to the "P range".

11. Install the mat center tray.

12. Connect the ground terminal to battery sensor. [Ref. to REPAIR CONTENTS>NOTE > BATTERY.](#)

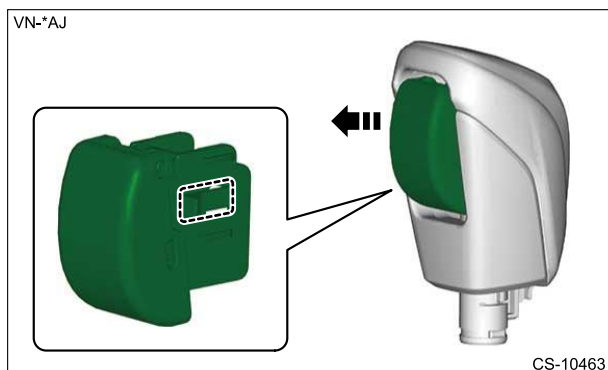
## CONTROL SYSTEMS > Select Lever

### DISASSEMBLY

#### Note:

The select lever cannot be disassembled.

Disengage the claws on the both sides and remove the grip button.



## CONTROL SYSTEMS > Select Lever

## **ASSEMBLY**

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Install the grip button.

**CONTROL SYSTEMS > Select Lever**

## **INSPECTION**

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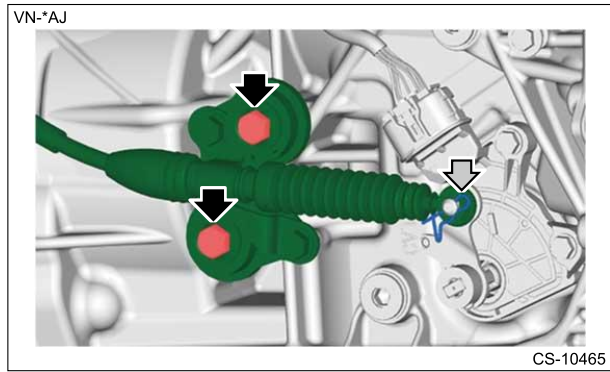
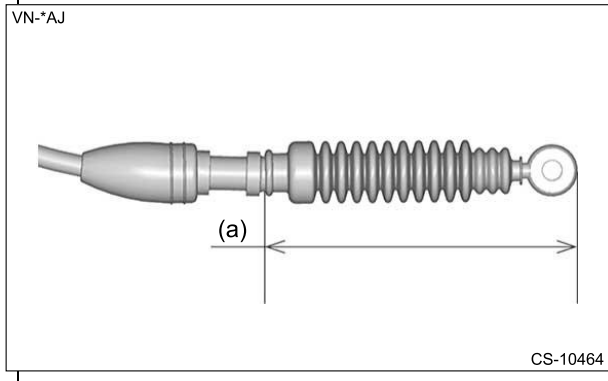
Check that there is no deformation, cracks or other damages.

REMOVAL

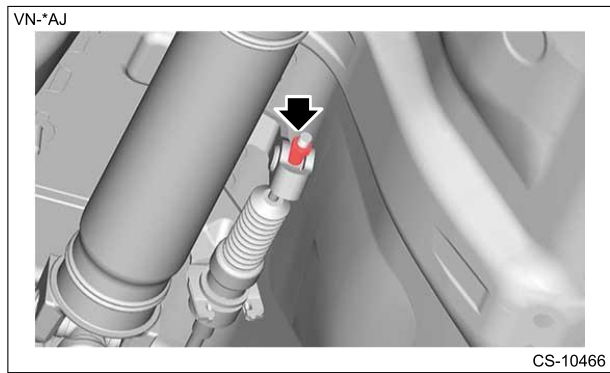


1. Release the shift lock and shift the select lever to the "N range". [Ref. to CONTROL SYSTEMS>Select Lever>REMOVAL.](#)
2. Remove the center exhaust pipe (rear). [Ref. to EXHAUST\(H4DOTC\)>Center Exhaust Pipe>REMOVAL > CENTER EXHAUST PIPE \(REAR\).](#)
3. Remove the center exhaust cover and rear exhaust pipe. [Ref. to EXHAUST\(H4DOTC\)>Rear Exhaust Pipe>REMOVAL.](#)
4. Disconnect the select cable from the transmission main body.

**Caution:**  
**Do not apply excessive load while holding the part (a).**

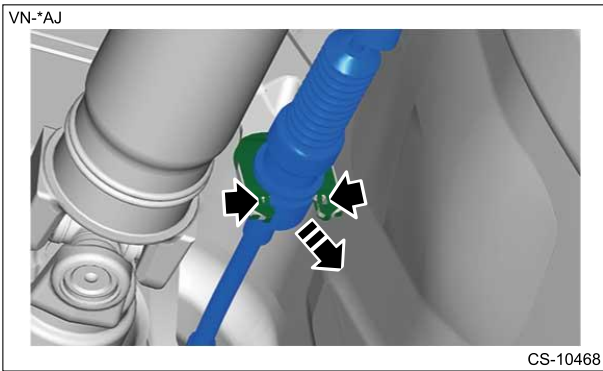
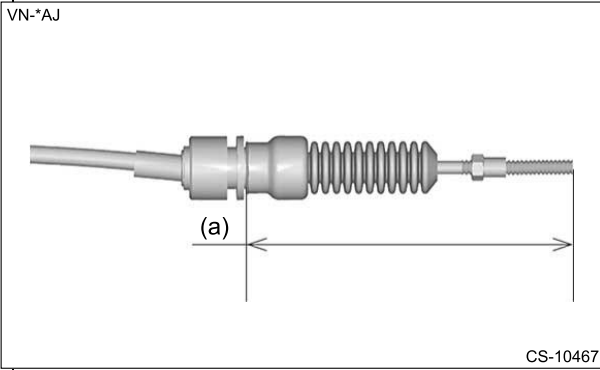


5. Remove the adjusting nut (rear).

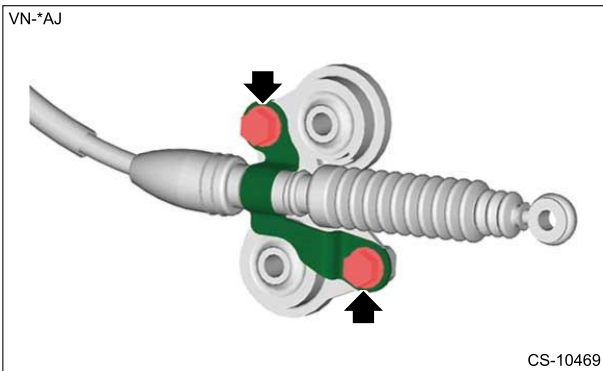


6. Raise the claw of clamp and remove the select cable together with the clamp.

**Caution:**  
Do not apply excessive load while holding the part (a).

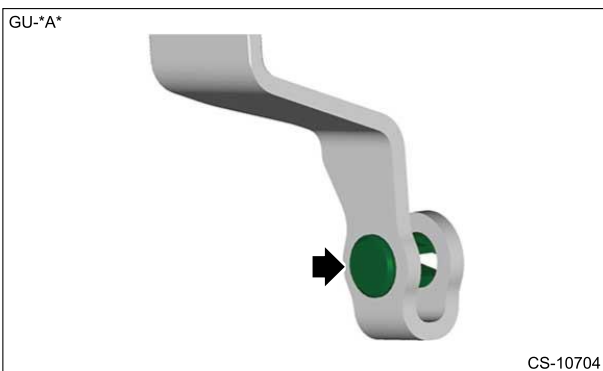


- 7. Remove the clamp from the select cable.
- 8. Remove the cable bracket.



- 9. Remove the connector pin.

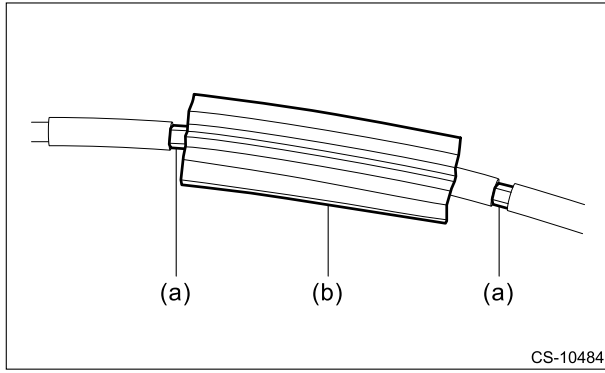
**Note:**  
Perform this procedure only when required.



**INSTALLATION**

**Caution:**

- Check that the protector (b) is set between the clamps (a).
- If the protector (b) is offset, set it between the clamps (a).



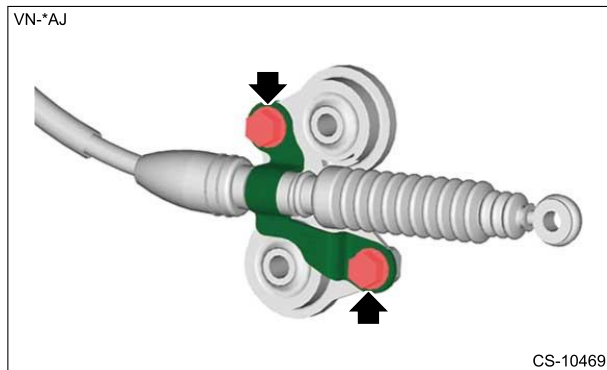
1. Install the cable bracket.

**Caution:**

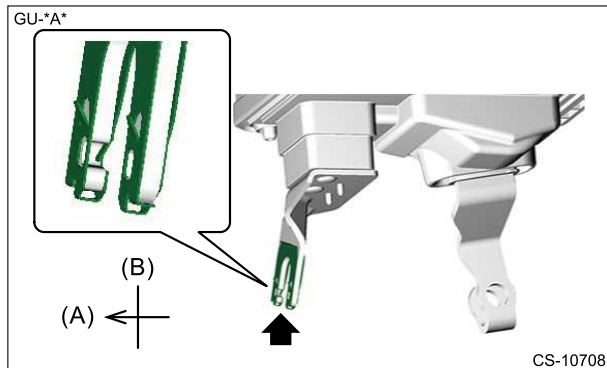
**Be careful not to twist the boot.**

**Tightening torque:**

18 N·m (1.8 kgf-m, 13.3 ft-lb)



2. Set a new clamp on the select lever as shown in the figure.



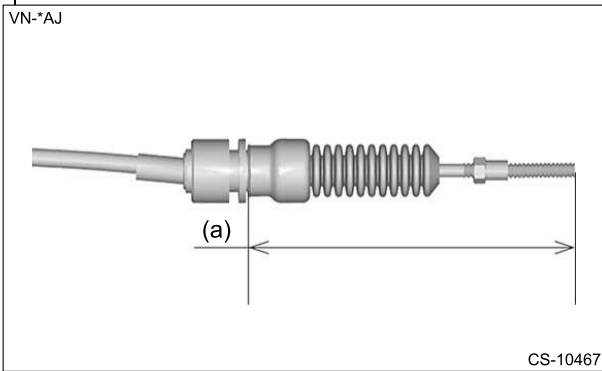
(A) Front side

(B) Upside

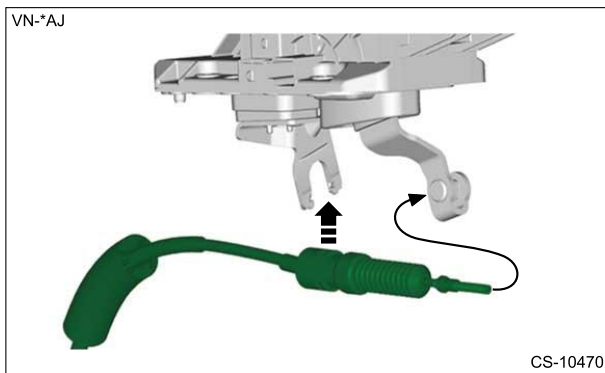
3. Install the select cable to the select lever. (If the connector pin is not removed)

**Caution:**

- Install the cable so that it does not twist.
- Check that the select lever is in "N range".
- If the connector pin is removed, always replace with a new connector pin.
- Do not apply excessive load while holding the part (a).



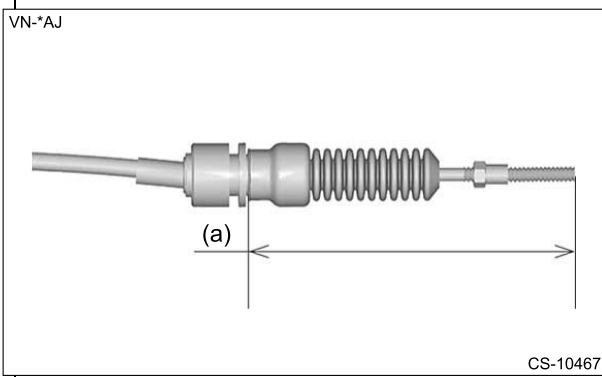
- (1) Insert the select cable to the connector pin.
- (2) Secure the select cable to the clamp.



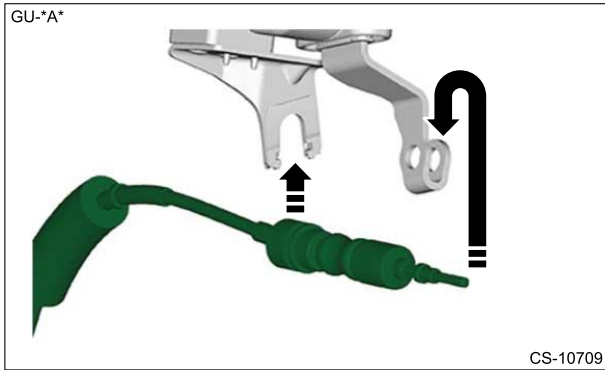
4. Install the select cable to the select lever. (If the connector pin is removed)

**Caution:**

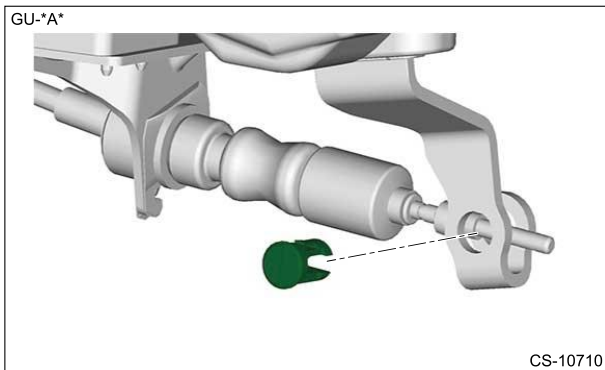
- Install the cable so that it does not twist.
- Check that the select lever is in "N range".
- Do not apply excessive load while holding the part (a).



- (1) Secure the select cable to the clamp.
- (2) Align the cable thread with the select lever arm.



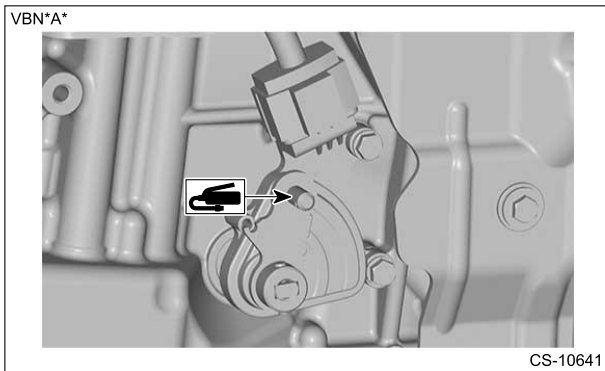
(3) Install a new connector pin.



5. Temporarily Install the adjusting nut (rear) to the select cable.
6. Apply grease to the shifter arm.

**Preparation items:**

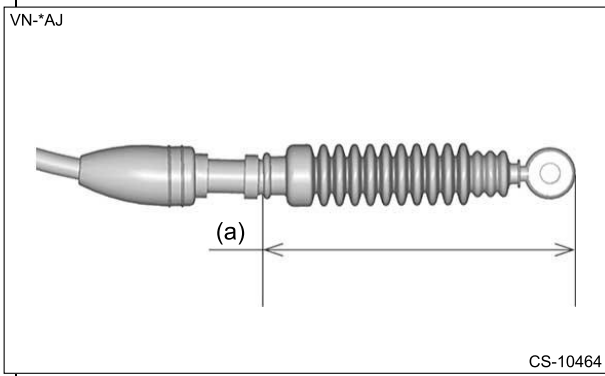
Grease: NIPPON GREASE NIGTIGHT LTS No. 2 or equivalent



7. Connect the select cable to the transmission main body.

**Caution:**

**Do not apply excessive load while holding the part (a).**

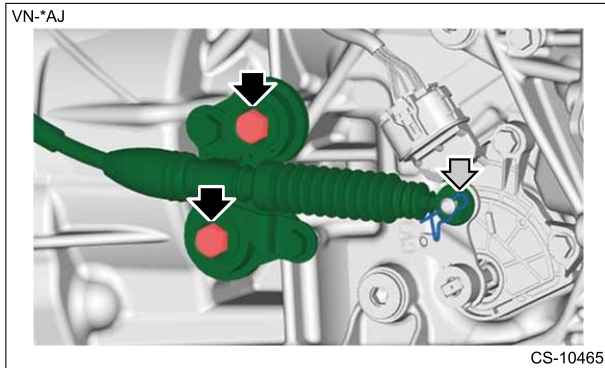


**Note:**

**Set the washer before installing the snap pin.**

**Tightening torque:**

25 N·m (2.5 kgf-m, 18.4 ft-lb)



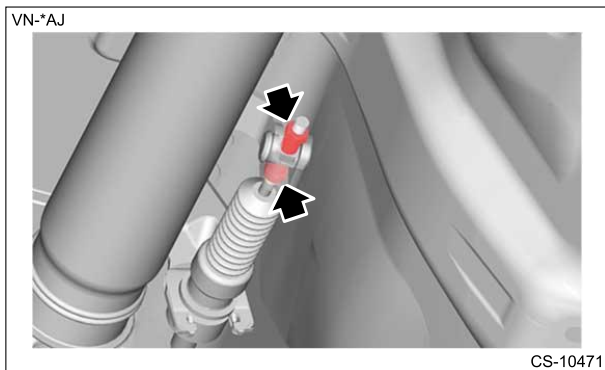
8. Adjust the select cable free play. [Ref. to CONTROL SYSTEMS>Select Cable>ADJUSTMENT.](#)
9. Install the center exhaust cover and rear exhaust pipe. [Ref. to EXHAUST\(H4DOTC\)>Rear Exhaust Pipe>INSTALLATION.](#)
10. Install the center exhaust pipe (rear). [Ref. to EXHAUST\(H4DOTC\)>Center Exhaust Pipe>INSTALLATION > CENTER EXHAUST PIPE \(REAR\).](#)
11. Release the shift lock and shift the select lever to the "P range". [Ref. to CONTROL SYSTEMS>Select Lever>INSTALLATION.](#)

**CONTROL SYSTEMS > Select Cable****INSPECTION**

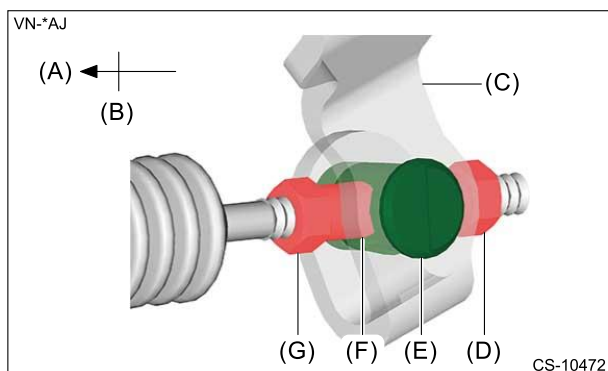
1. Check that there is no deformation, cracks or other damages.
2. Check the select cable for smooth operation.

**CONTROL SYSTEMS > Select Cable****ADJUSTMENT**

1. Release the shift lock and shift the select lever to the "N range". [Ref. to CONTROL SYSTEMS>Select Lever>REMOVAL.](#)
2. Remove the center exhaust pipe (rear). [Ref. to EXHAUST\(H4DOTC\)>Center Exhaust Pipe>REMOVAL > CENTER EXHAUST PIPE \(REAR\).](#)
3. Remove the center exhaust cover and rear exhaust pipe. [Ref. to EXHAUST\(H4DOTC\)>Rear Exhaust Pipe>REMOVAL.](#)
4. Loosen the adjusting nut (front) and adjusting nut (rear).



5. Turn the adjusting nut (front) until it lightly touches the connector pin.



- |                  |                          |                           |
|------------------|--------------------------|---------------------------|
| (A) Front side   | (D) Adjusting nut (rear) | (G) Adjusting nut (front) |
| (B) Downside     | (E) Connector pin        |                           |
| (C) Select lever | (F) Contact point        |                           |

- 6.** While holding the adjusting nut (front) in place, tighten the adjusting nut (rear).

**Tightening torque:**

7.5 N·m (0.8 kgf-m, 5.5 ft-lb)

- 7.** After the completion of adjustment, check that the select lever operates normally at all ranges.

- 8.** Install the center exhaust cover and rear exhaust pipe. [Ref. to EXHAUST\(H4DOTC\)>Rear Exhaust Pipe>INSTALLATION.](#)

- 9.** Install the center exhaust pipe (rear). [Ref. to EXHAUST\(H4DOTC\)>Center Exhaust Pipe>INSTALLATION > CENTER EXHAUST PIPE \(REAR\).](#)

- 10.** Release the shift lock and shift the select lever to the "P range". [Ref. to CONTROL SYSTEMS>Select Lever>INSTALLATION.](#)

## CONTROL SYSTEMS > Shift Lock Solenoid and P Range Switch

### REMOVAL



For removal procedure, refer to "SELECT LEVER". [Ref. to CONTROL SYSTEMS>Select Lever>REMOVAL.](#)

## CONTROL SYSTEMS > Shift Lock Solenoid and P Range Switch

### INSTALLATION

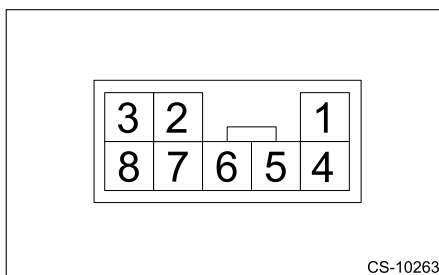
For installation procedure, refer to "SELECT LEVER". [Ref. to CONTROL SYSTEMS>Select Lever>INSTALLATION.](#)

## CONTROL SYSTEMS > Shift Lock Solenoid and P Range Switch

### INSPECTION

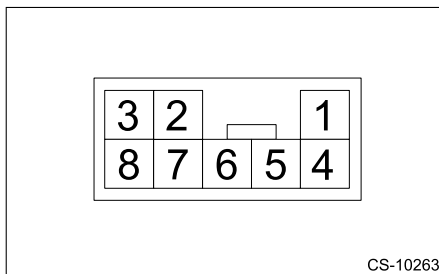
#### 1. CHECK SHIFT LOCK SOLENOID

1. Measure the resistance between the shift lock solenoid connector terminals.



Terminal No.	Inspection conditions	Standard
4 – 3	20°C	27.6 – 30.5 Ω

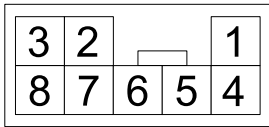
2. Check operation of the shift lock solenoid.



Terminal No.	Inspection conditions	Judgment standards
3 (+) – 4 (-)	Apply battery voltage between terminals 3 and 4.	Shift lock is released.

#### 2. CHECK "P RANGE" SWITCH

Measure the resistance between "P range" switch connector terminals.



CS-10263

Terminal No.	Inspection conditions	Standard
1 – 2	P range	Less than 1 $\Omega$
	Except for P range	1 M $\Omega$ or more

## CONTROL SYSTEMS > Manual Mode Switch

### REMOVAL



For removal procedure, refer to "SELECT LEVER".  [Ref. to CONTROL SYSTEMS>Select Lever>REMOVAL.](#)

## CONTROL SYSTEMS > Manual Mode Switch

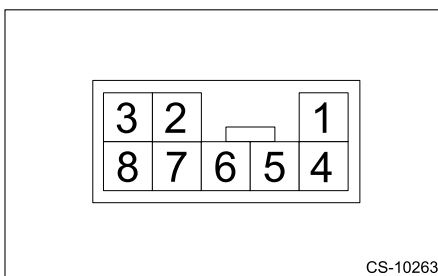
### INSTALLATION

For installation procedure, refer to "SELECT LEVER".  [Ref. to CONTROL SYSTEMS>Select Lever>INSTALLATION.](#)

## CONTROL SYSTEMS > Manual Mode Switch

### INSPECTION

Measure the resistance between connector terminals of manual mode switch.



Terminal No.	Inspection conditions	Standard
7 – 8	M range	Less than 1 $\Omega$
	Except for M range	1 M $\Omega$ or more

## CONTROL SYSTEMS > Paddle Shift Switch

### SPECIFICATION

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For the paddle shift switch, refer to "STEERING WHEEL".  [Ref. to POWER ASSISTED SYSTEM \(POWER STEERING\)>Steering Wheel.](#)

## CONTROL SYSTEMS > Indicator

### REMOVAL

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For removal procedures, refer to "Console Box".  [Ref. to EXTERIOR/INTERIOR TRIM>Console Box>DISASSEMBLY > CVT MODEL.](#)

## CONTROL SYSTEMS > Indicator

### INSTALLATION

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For installation procedures, refer to "Console Box".  [Ref. to EXTERIOR/INTERIOR TRIM>Console Box>ASSEMBLY > CVT MODEL.](#)

## CONTROL SYSTEMS > Indicator

### INSPECTION

---

1. Check that there is no deformation, cracks or other damages.
2. Turn the ignition and headlight switches on and check that the illumination light illuminates.
3. Check the position pointer that corresponds to the select lever position illuminates.

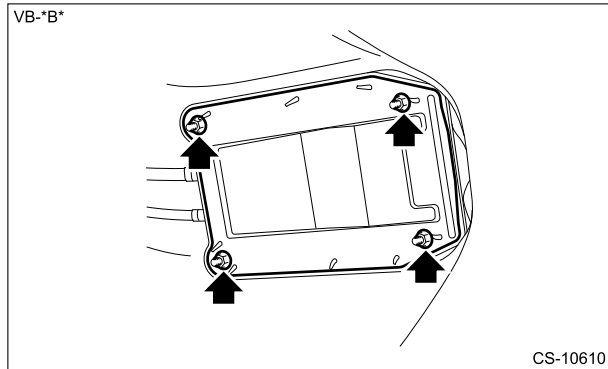
REMOVAL



Note:

The MT gear shift lever cannot be disassembled.

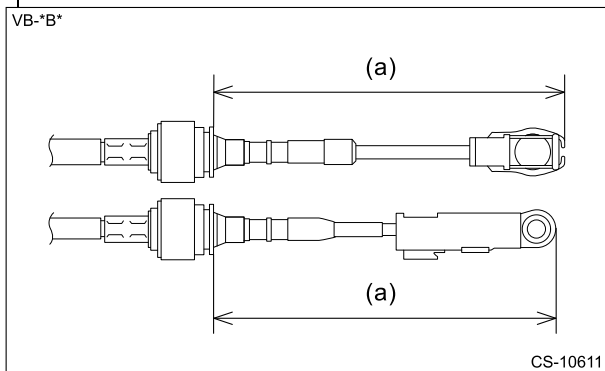
1. Disconnect the ground terminal from battery sensor. Ref. to REPAIR CONTENTS>NOTE > BATTERY.
2. Remove the propeller shaft. Ref. to PROPELLER SHAFT / DRIVE SHAFT / AXLE>Propeller Shaft>REMOVAL.
3. Remove the cable cover plate.



4. Disconnect the MT gear shift cable and MT gear select cable.

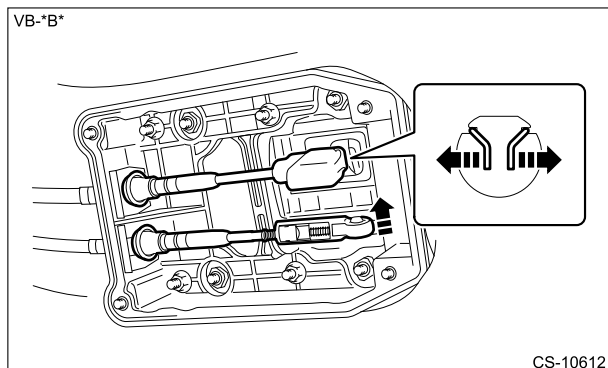
Caution:

- Be careful not to deform the cable inner.
- Do not twist the cable inner more than necessary.
- Do not apply excessive load while holding the part (a).

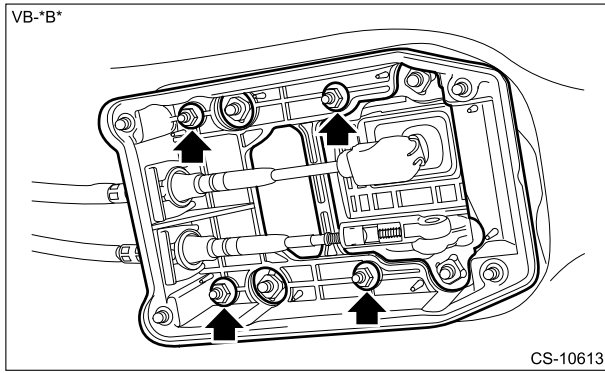


Note:

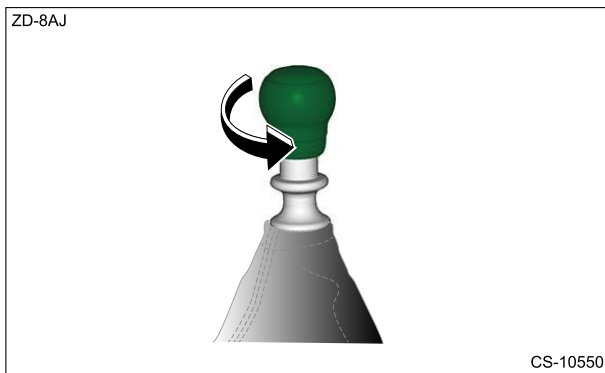
- Remove the MT gear shift cable by spreading the spring.
- Remove the MT gear select cable in the direction of arrow.



5. Remove the cable cover assembly.

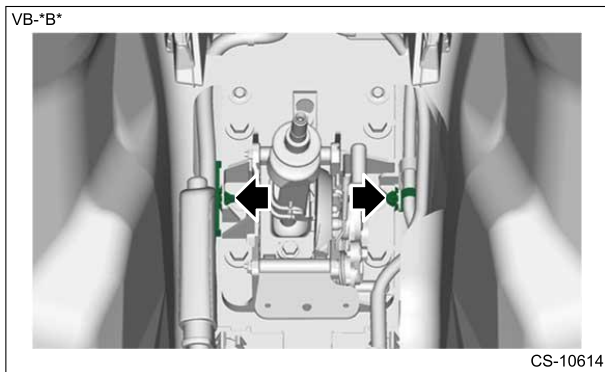


6. Remove the shift knob by turning it counterclockwise.

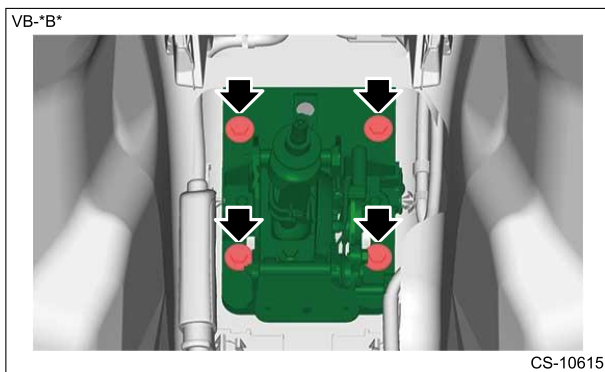


7. Remove the cover center side.  [Ref. to EXTERIOR/INTERIOR TRIM>Center Console>REMOVAL.](#)

8. Remove the clips securing the harness.



9. Remove the MT gear shift lever.



CONTROL SYSTEMS > MT Gear Shift Lever

**INSTALLATION**

---

1. Install the MT gear shift lever.

**Tightening torque:**

18 N·m (1.8 kgf-m, 13.3 ft-lb)

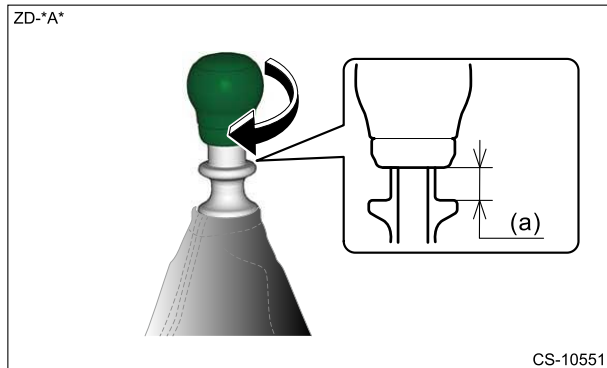
2. Install the clip securing the harness.
3. Install the cover center side.  Ref. to [EXTERIOR/INTERIOR TRIM>Center Console>INSTALLATION](#).
4. Install the shift knob by turning it clockwise.

**Caution:**

**Install it while avoiding the gap (a) between the shift knob and the slider becomes 11 mm (0.4 in) or less.**

**Note:**

- Tighten to the extent where it does not rotate during shift operation.
- Check that it can be shifted to the reverse.



5. Install the cable cover assembly.

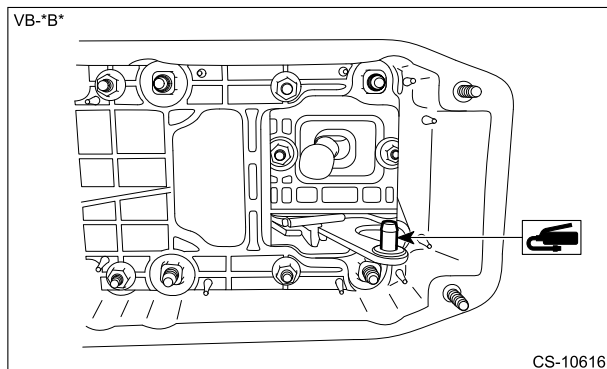
**Tightening torque:**

7.5 N·m (0.8 kgf-m, 5.5 ft-lb)

6. Apply grease to the connection between the MT gear shift lever and the MT gear select cable.

**Preparation items:**

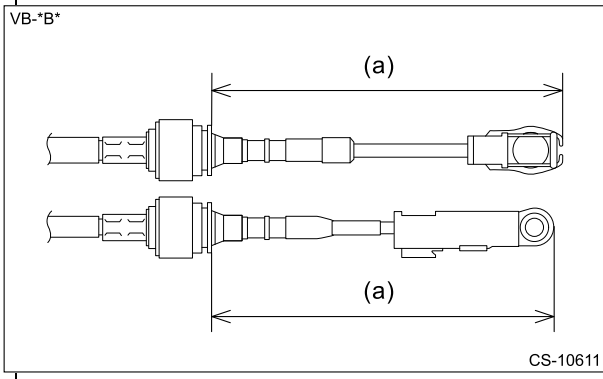
Grease: NIPPON GREASE NIGTIGHT LTS No. 2 or equivalent



7. Connect the MT gear shift cable and MT gear select cable.

**Caution:**

- Be careful not to deform the cable inner.
- Do not twist the cable inner more than necessary.
- Do not apply excessive load while holding the part (a).



8. Attach the cable cover plate.

**Tightening torque:**

7.5 N·m (0.8 kgf-m, 5.5 ft-lb)

9. Install the propeller shaft. [🔗 Ref. to PROPELLER SHAFT / DRIVE SHAFT / AXLE>Propeller Shaft>INSTALLATION.](#)

10. Connect the ground terminal to battery sensor. [🔗 Ref. to REPAIR CONTENTS>NOTE > BATTERY.](#)

11. Check that the MT gear shift lever can be shifted into each position.

12. Adjust the MT gear select cable. [🔗 Ref. to CONTROL SYSTEMS>MT Gear Select Cable>ADJUSTMENT.](#)

**Note:**

**Perform this operation when the MT gear shift lever cannot be shifted into each position.**

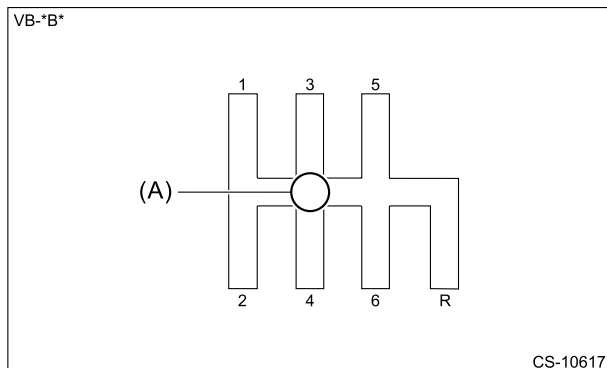
**CONTROL SYSTEMS > MT Gear Shift Lever**

**INSPECTION**

1. Check that there is no deformation, cracks or other damages.
2. Check that there is no problem when shifting the MT gear shift lever from 1st to 6th.
3. Check that the MT gear shift lever returns to the neutral position.
4. Check that selecting to the reverse direction is disable unless the slider is pulled up.
5. Check that selecting to the reverse direction is possible when the slider is pulled up to the full.
6. Check that the slider returns to the initial position when the MT gear shift lever is returned to the neutral position with the slider pulled up to the full.
7. Move the MT gear shift lever to the neutral position, and check the top surface of the shift knob for looseness in the lateral direction.

**Specification:**

1.5 mm (0.06 in) or less




(A) Neutral position

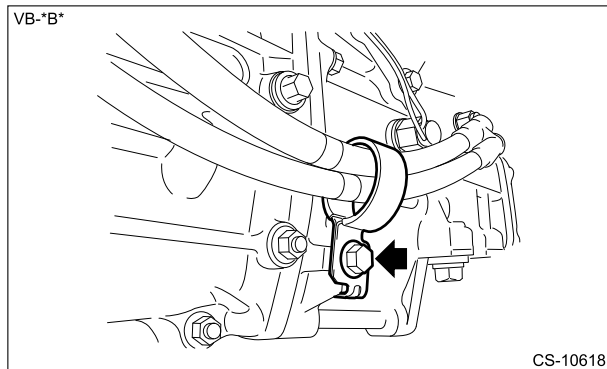
REMOVAL



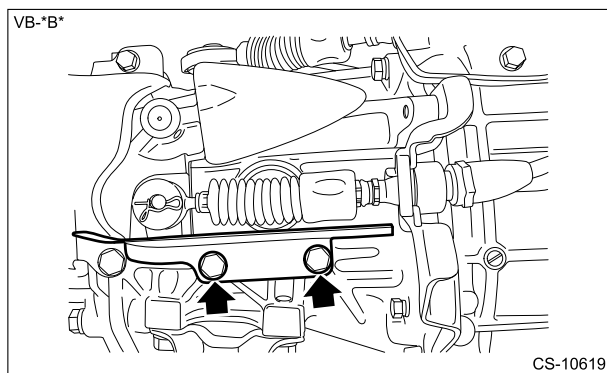
**Caution:**

**Do not bend the MT gear shift cable more than necessary.**

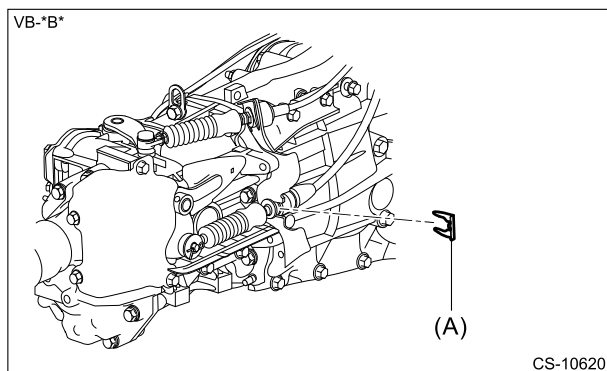
1. Remove the transmission body.  [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transmission Assembly>REMOVAL.](#)
2. Remove the cable clamp.



3. Remove the dust cover.

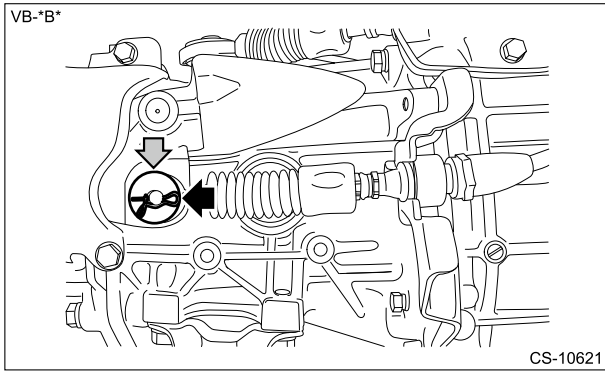


4. Remove the clamp.



(A) Clamp

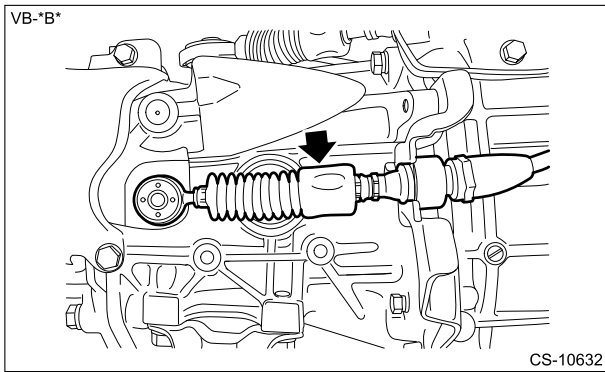
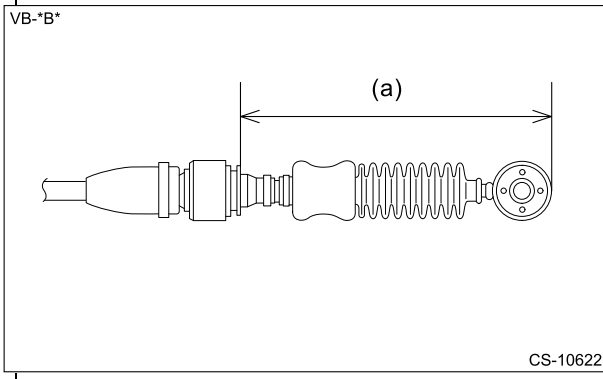
5. Remove the snap pin and washer.



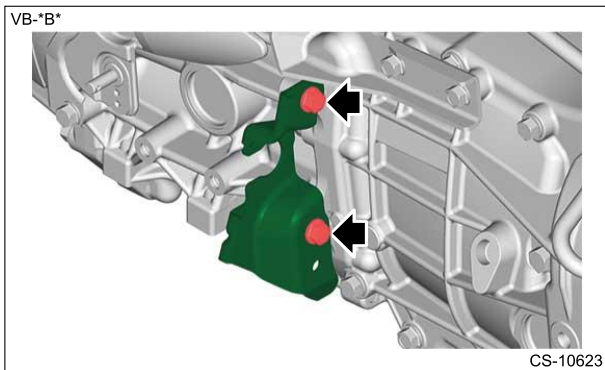
6. Remove the MT gear shift cable.

**Caution:**

**Do not apply excessive load while holding the part (a).**



7. Remove the shift bracket.



**Caution:**

**Do not bend the MT gear shift cable more than necessary.**

1. Install the shift bracket.

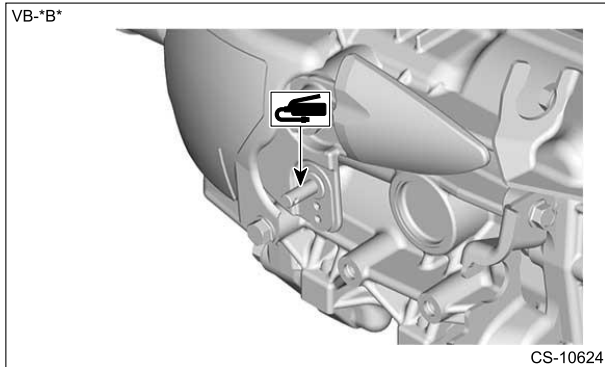
**Tightening torque:**

18 N·m (1.8 kgf-m, 13.3 ft-lb)

2. Apply grease to the shift lever COMPL.

**Preparation items:**

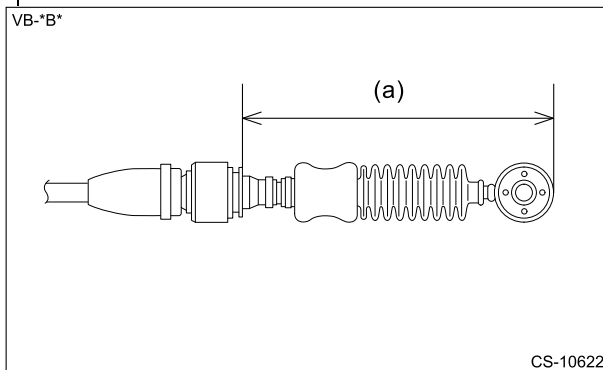
Grease: NIPPON GREASE NIGTIGHT LTS No. 2 or equivalent



3. Install the MT gear shift cable.

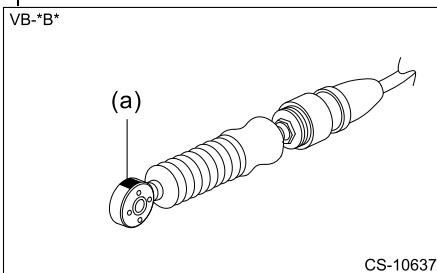
**Caution:**

- Do not twist the cable inner more than necessary.
- Do not apply excessive load while holding the part (a).



**Note:**

**Install the MT gear shift cable with the mark (a) on the cable facing upward.**



4. Install the snap pin and washer.
5. Install the clamp.

**Caution:**

- Do not hit the MT gear shift cable.**
- If you hit the MT gear shift cable by mistake, replace it with a new one.**

6. Install the dust cover.

**Tightening torque:**

15 N·m (1.5 kgf-m, 11.1 ft-lb)


7. Install the cable clamp.

**Note:**

**Pass the MT gear shift cable and MT gear select cable through the cable clamp before installing it.**

**Tightening torque:**

18 N·m (1.8 kgf-m, 13.3 ft-lb)

8. Install the transmission body.  [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transmission Assembly>INSTALLATION.](#)
9. Check that the MT gear shift lever can be shifted into each position.

**CONTROL SYSTEMS > MT Gear Shift Cable****INSPECTION**

---

Check that there is no deformation, cracks or other damages.

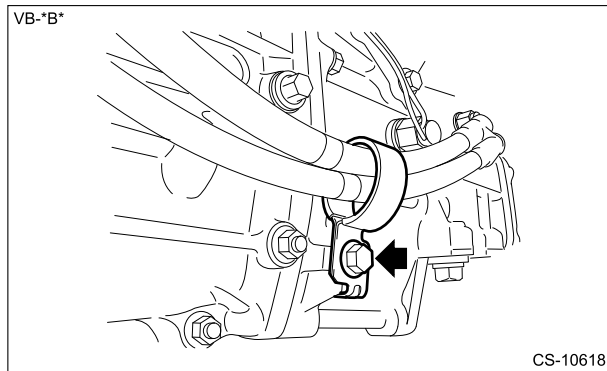
REMOVAL



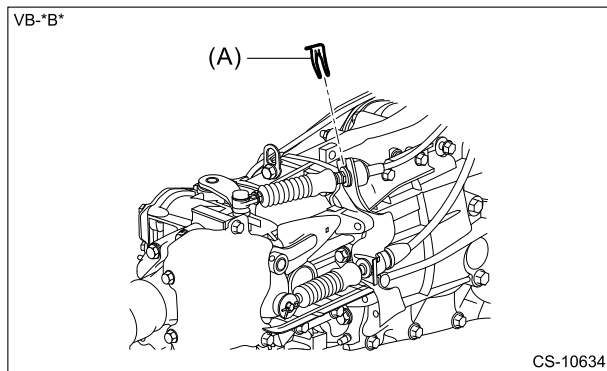
**Caution:**

- Always use new MT gear select cable if the cable is removed from selector lever COMPL of transmission side.
- Do not bend the MT gear select cable more than necessary.
- Do not twist the MT gear select cable more than necessary.

1. Remove the transmission body.  [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transmission Assembly>REMOVAL.](#)
2. Remove the cable clamp.

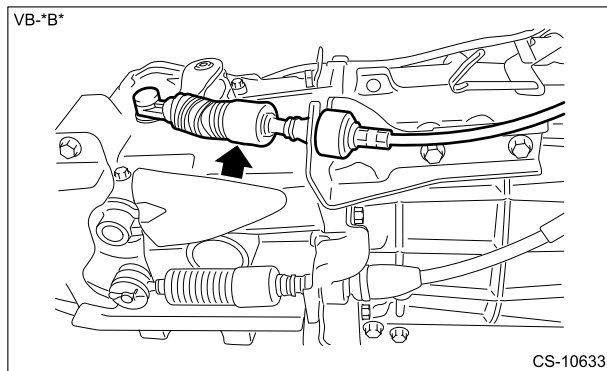


3. Remove the clamp.

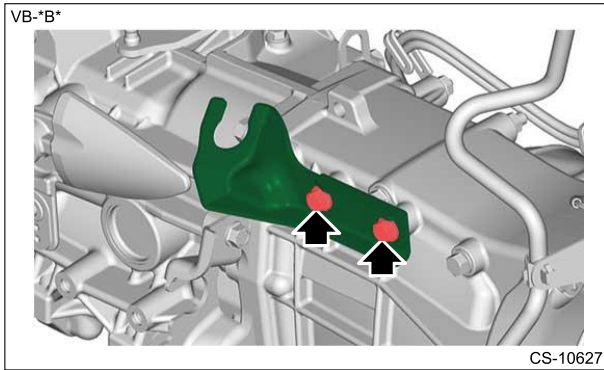


(A) Clamp

4. Remove the MT gear select cable.



5. Remove the select bracket.



## CONTROL SYSTEMS > MT Gear Select Cable

### INSTALLATION

#### Caution:

- Always use new MT gear select cable if the cable is removed from selector lever COMPL of transmission side.
- Do not bend the MT gear select cable more than necessary.
- Do not twist the MT gear select cable more than necessary.

1. Install the select bracket.

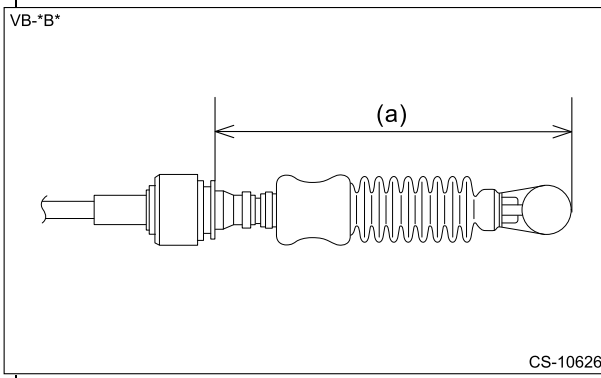
#### Tightening torque:

18 N·m (1.8 kgf-m, 13.3 ft-lb)

2. Install the MT gear select cable.

#### Caution:

- Always use a new MT gear select cable.
- Do not apply excessive load while holding the part (a).



3. Install the clamp.

#### Caution:

- Do not hit the MT gear select cable.
- If you hit the MT gear select cable by mistake, replace it with a new one.

4. Install the cable clamp.

#### Tightening torque:

18 N·m (1.8 kgf-m, 13.3 ft-lb)

5. Check the exposed length of MT gear select cable. [🔗 Ref. to CONTROL SYSTEMS>MT Gear Select Cable>INSPECTION.](#)
6. Install the transmission body. [🔗 Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transmission Assembly>INSTALLATION.](#)
7. Check that the MT gear shift lever can be shifted into each position.

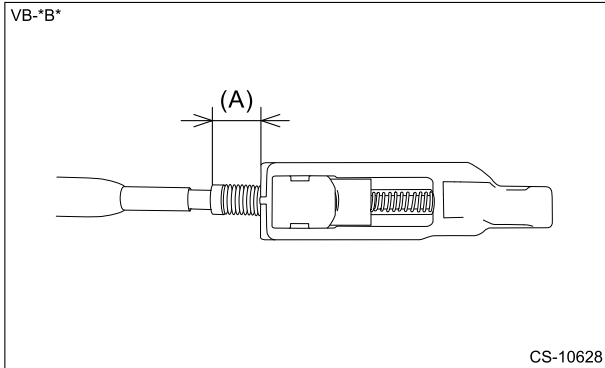
## CONTROL SYSTEMS > MT Gear Select Cable

### INSPECTION

1. Check that there is no deformation, cracks or other damages.
2. Check the exposed length (A) of MT gear select cable.

**Specification:**

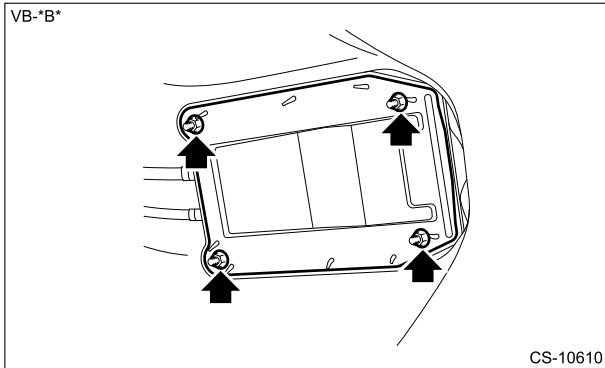
11 mm (0.4 in)



**CONTROL SYSTEMS > MT Gear Select Cable**

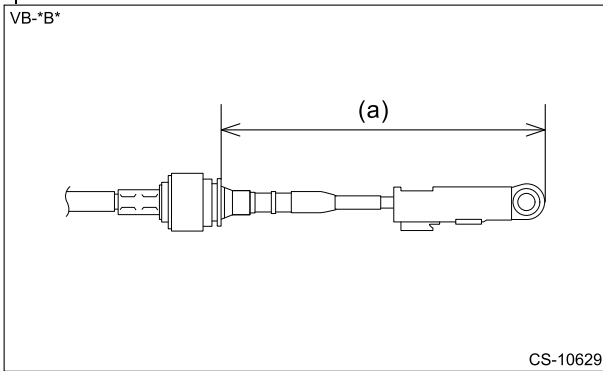
**ADJUSTMENT**

1. Shift the MT shift lever to the 6th.
2. Remove the propeller shaft. [🔗 Ref. to PROPELLER SHAFT / DRIVE SHAFT / AXLE>Propeller Shaft>REMOVAL.](#)
3. Remove the cable cover plate.

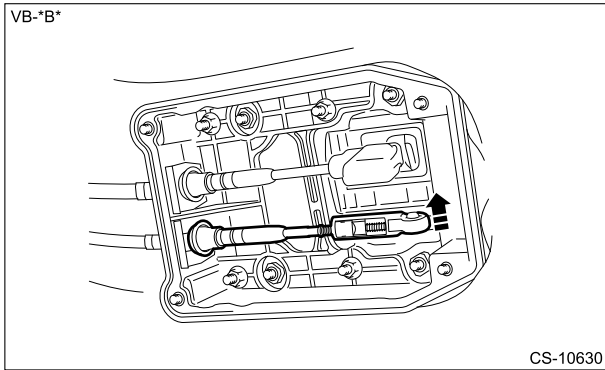


4. Disconnect the MT gear select cable.

**Caution:**  
Do not apply excessive load while holding the part (a).



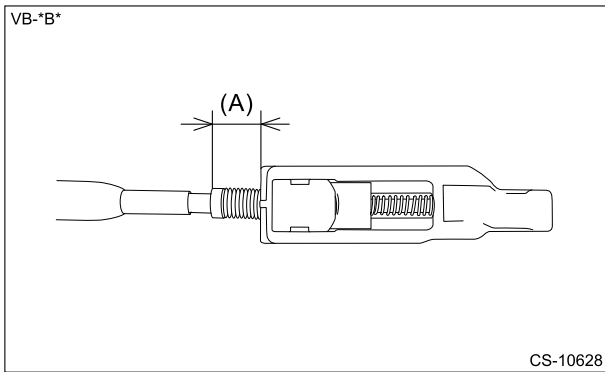
**Note:**  
Remove the MT gear select cable in the direction of arrow.



5. Measure the exposed length (A) of MT gear select cable.

**Specification:**

11 mm (0.4 in)

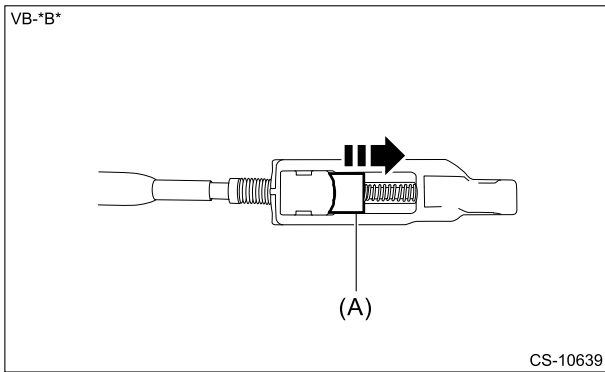


6. Unlock the MT gear select cable.

**Caution:**

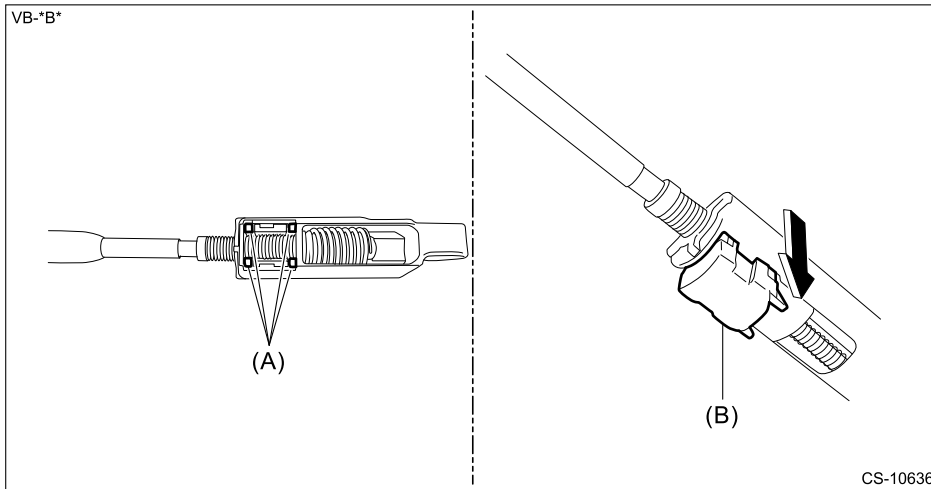
**Do not damage the lock piece.**

(1) Move the slider in the direction of arrow.



(A) Slider

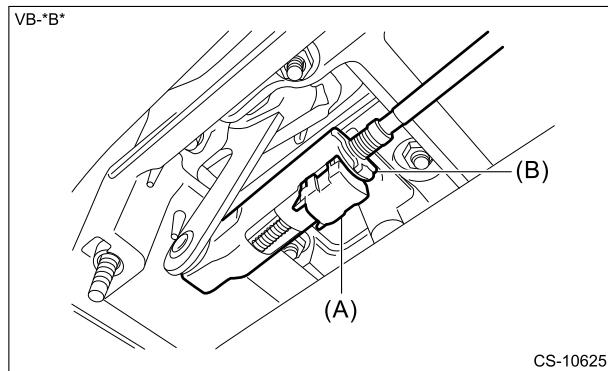
(2) With the slider in the moved position, pull out the lock piece while raising the claws of the lock piece.



(A) Claw

(B) Lock piece

**7.** With the MT gear select cable unlocked, connect the MT gear select cable to the MT gear shift lever.



(A) Lock piece

(B) MT gear select cable

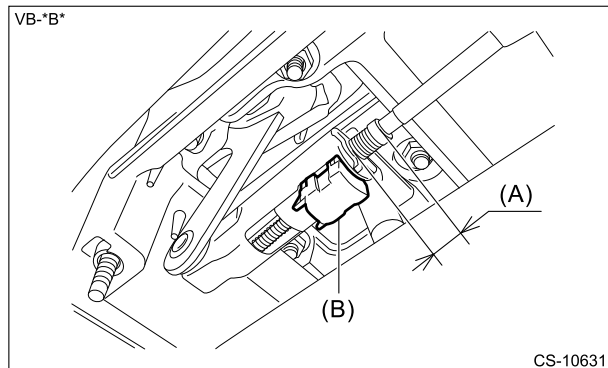
**8.** Move the MT gear shift lever to the reverse side, adjust the exposed length (A) of MT gear select cable, and push the lock piece (B).

**Note:**

- **Two persons are required to perform the MT gear select cable adjustment.**
- **While pulling up the MT gear shift lever slider, operate the lever to the reverse side.**

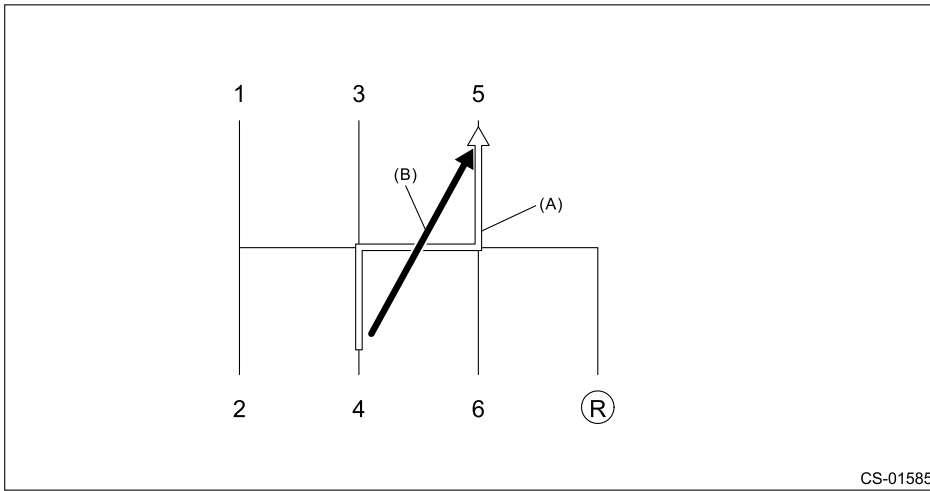
**Specification:**

11 mm (0.4 in)



**9.** Shift to 5th, 6th and reverse, and check for any problems such as stuck.

**10.** Check that the MT gear shift lever can move along the cranking line when shifting the lever from 4th to 5th gear with a load applied toward the 6th gear.



(A) Cranking operation

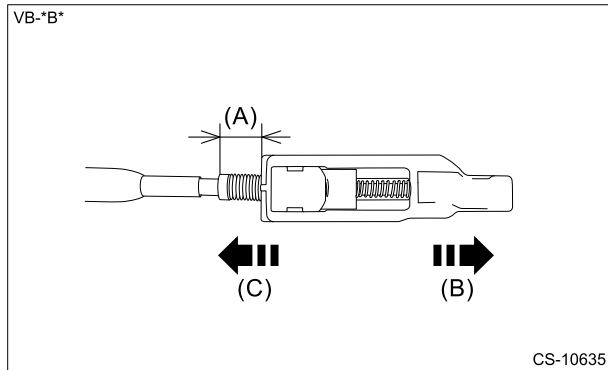
(B) Load direction

11. If the shifting operation is not smooth, readjust the exposed length of MT gear select cable.

**Note:**

**If it cannot be adjusted, replace the MT gear select cable.**

- If 5th and 6th cannot be selected with the MT gear shift lever pressed to the reverse side, extend the exposed length of MT gear select cable.
- If the MT gear shift lever does not move along the cranking line when it is operated from 4th to 5th gear, shorten the exposed length of MT gear select cable.



(A) Exposed length of MT gear select cable

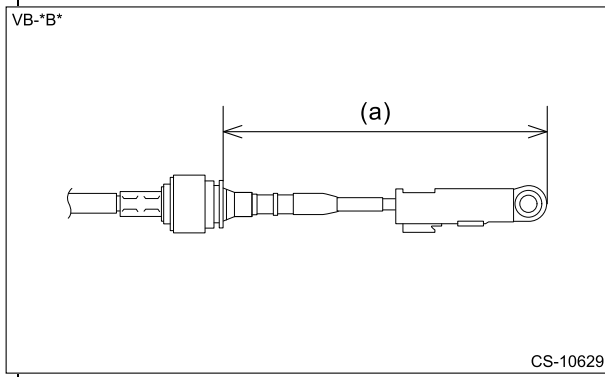
(B) Extend direction of exposed length of MT gear select cable

(C) Shorten direction of exposed length of MT gear select cable

12. Connect the MT gear shift cable.

**Caution:**

**Do not apply excessive load while holding the part (a).**



13. Attach the cable cover plate.

**Tightening torque:**

7.5 N·m (0.8 kgf-m, 5.5 ft-lb)

**14.** Install the propeller shaft.  [Ref. to PROPELLER SHAFT / DRIVE SHAFT / AXLE>Propeller Shaft>INSTALLATION.](#)

**INSPECTION****1. SELECT LEVER**

<b>Symptoms</b>	<b>Problem parts etc.</b>	<b>Possible cause</b>
Cannot shift.	Shift lock solenoid	Faulty shift lock solenoid
	Harness for shift lock solenoid lines	Open or shorted harness in shift lock solenoid lines
	"P range" switch	"P range" switch malfunction
	Harness in "P range" switch lines	Open or shorted harness in "P range" switch lines
	Select lever main body	Faulty shift lock mechanism
	Select cable	Stuck, open circuit or improper installation of the select cable
	Transmission body	Malfunction in the transmission
Manual mode cannot be set.	Manual mode switch	Faulty manual mode switch circuit
	Harness in manual mode switch lines	Open or shorted harness in manual mode switch lines

**2. MT GEAR SHIFT LEVER**

<b>Symptoms</b>	<b>Problem parts etc.</b>	<b>Possible cause</b>
Cannot shift.	Transmission body	Faulty transmission body
	MT gear shift cable	Faulty MT gear shift cable
	MT gear select cable	Faulty MT gear select cable
	MT gear shift lever	Faulty MT gear shift lever
Cannot shift into reverse.	MT gear select cable	Improper adjustment of MT gear select cable
Shifted to 6th though it shifted to reverse.	MT gear select cable	Improper adjustment of MT gear select cable
Can shift into reverse when the slider is not pulled up.	MT gear select cable	Improper adjustment of MT gear select cable
Slider cannot be pulled up or sticks in the pulled-up position.	Transmission body	Faulty transmission body
	MT gear select cable	Improper adjustment of MT gear select cable

# CONTINUOUSLY VARIABLE TRANSMISSION(TR690)

# CVT(TR690)


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1. General Description
2. CVTF
3. Differential Gear Oil
4. Variator Chain Break-in
5. Road Test
6. Stall Test
7. Time Lag Test
8. Secondary Pressure Test
9. Line Pressure Test
10. Transfer Clutch Pressure Test
11. Transmission Assembly
12. Transmission Mounting System
13. Extension Case Oil Seal
14. Differential Side Retainer Oil Seal
15. Inhibitor Switch
16. Secondary Speed Sensor
17. Primary Speed Sensor
18. Front Wheel Speed Sensor
19. Rear Wheel Speed Sensor
20. Secondary Pressure Sensor
21. Primary Pressure Sensor
22. Oil Pan
23. Control Valve Body
24. Transmission Harness
25. Transmission Control Module (TCM)
26. Relay and Fuse
27. CVTF Cooler (With Warmer Function)
28. CVTF Cooler Pipe and Hose
29. CVTF Cooler (Air Cooling)
30. Air Breather Hose
31. Drive Plate
32. Torque Converter
33. Oil Pump Chain
34. Preparation for Overhaul
35. Extension Case
36. Rear Drive Shaft
37. Transfer Clutch
38. Center Differential Carrier
39. Transfer Reduction Driven Gear
40. Parking Pawl
41. Intermediate Case
42. CVTF Filter
43. Reverse Brake
44. Forward Clutch
45. Reduction Driven Gear

46. Transmission Control Device
47. Transmission Case
48. Primary Pulley and Secondary Pulley
49. Variator Chain
50. Drive Pinion
51. Front Differential
52. Oil Pump
53. Converter Case Cover
54. Front Reduction Drive Gear
55. Front Reduction Driven Gear
56. Converter Case
57. AT learning
58. Symptoms and causes

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > General Description

### CAUTION

- When performing service operation, refer to "Repair Contents" in "General Description".  [Ref. to REPAIR CONTENTS>Repair Contents.](#)
- Prior to starting work, pay special attention to the following:
  1. Always wear work clothes, a work cap, and protective shoes. Additionally, wear a helmet, protective goggles, etc. if necessary.
  2. Protect the vehicle using a seat cover, fender cover, etc.
  3. Prepare the service tools, clean cloth, containers to catch grease and oil, etc.
- Prevent scattering of grease and oil. If it scatters, wipe it off immediately to prevent it from penetrating the floor or flowing out, to protect the environmental.
- If the grease and oil is spilt over the engine, exhaust pipe or the under cover, completely wipe it off to avoid emission of smoke or causing a fire.
- Vehicle components are extremely hot immediately after driving. Be wary of receiving burns from heated parts.
- When performing a repair, identify the cause of trouble and avoid unnecessary work.
- Before disconnecting connectors of sensors or units, be sure to disconnect the ground terminal from the battery sensor.
- Always use the jack-up point when the lifting device, shop jacks or rigid racks are used to support the vehicle.
- Before starting works, remove dirt and corrosion around the target area.
- Keep the removed parts in order and protect them from dust and dirt.
- All removed parts, if to be reused, should be reinstalled in the original positions with attention to the correct directions, etc.
- For the parts except for the non-reusable parts, replace them with new parts if necessary.
- Be sure to tighten bolts and nuts to the specified torque.
- Always use new application oil during work.
- Always remove or install the transmission body in an area where lifting devices, transmission jacks, etc. are available for ready use.

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > General Description

### SPECIFICATION

#### 1. TRANSMISSION

Type		Forward continuously variable speed change, 1-reverse
Gear ratio (including transfer reduction ratio)	Forward	3.490 — 0.506
	Reverse	3.394
Number of input clutch plates	pcs. Drive plate	5
	Driven plate	6
Number of forward clutch plates	pcs. Drive plate	6
	Driven plate	6
Number of reverse brake plates	pcs. Drive plate	5
	Driven plate	5

#### 2. TORQUE CONVERTER

Type		Symmetric, 3-element, single stage, 2-phase
Nominal	mm (in)	246 (9.7)
Clutch		Sprag type one-way
Stall torque ratio		2.04
Stall speed (at sea level)	r/min D range	2,010 — 2,510
	R range	2,010 — 2,510

#### 3. OIL PUMP

Type	Internal gear
------	---------------

Driving method		Chain drive	
Number of teeth	pcs.	Inner rotor	8
		Outer rotor	9

#### 4. TRANSFER

Type		Variable torque distribution (VTD)	
Control method		Electronic hydraulic type	
Number of transfer clutch plates	pcs.	Drive plate	3
		Driven plate	3
Gear ratio		1.081	

#### 5. FRONT DIFFERENTIAL

Type of gear		Hypoid gear
LSD type		—
Gear ratio		4.111
Backlash between the differential bevel gear and differential bevel pinion	mm (in)	0.13 — 0.18 (0.005 — 0.007)
Hypoid gear set backlash	mm (in)	

#### 6. CVTF

**Caution:**  
**Always use specified CVTF. Using fluid other than specified CVTF will cause malfunction.**

Specified materials	Capacity
<ul style="list-style-type: none"> <li><b>Specified materials:</b>  SUBARU made  SUBARU High Torque CVT Fluid LV</li> </ul>	L (US qt, Imp qt) 11.98 — 12.48 (12.663 — 13.191, 10.544 — 10.984)

#### 7. DIFFERENTIAL GEAR OIL

**Caution:**  
**Do not mix different kinds of oil.**

**Note:**  
**Using any materials other than recommended may result in abnormal noise, vibration, functional decline, or poor fuel economy.**

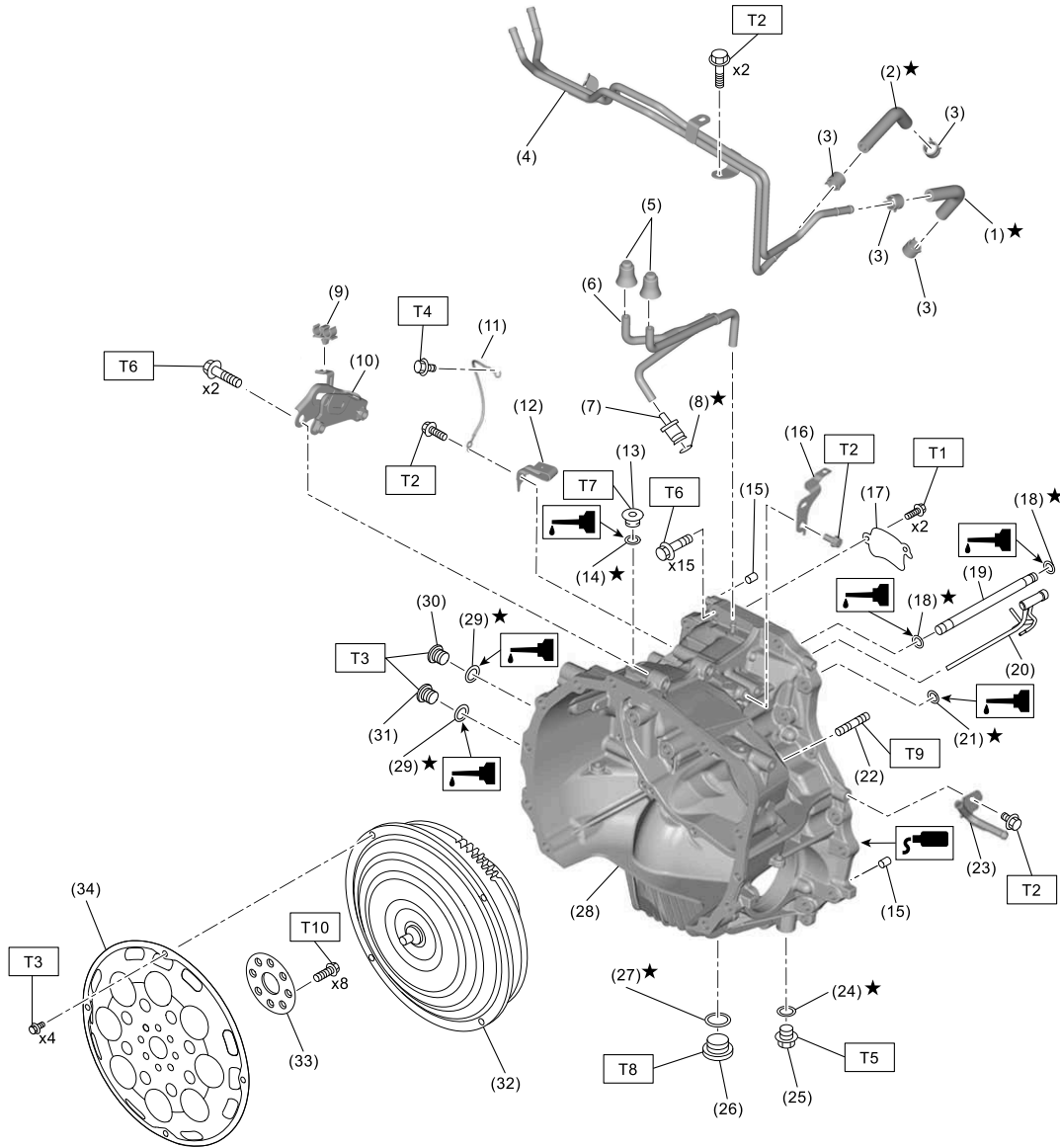
Recommended and alternative materials	Capacity
<ul style="list-style-type: none"> <li><b>Recommended materials:</b>  SUBARU made  GEAR OIL EXTRA MT (75W-80)</li> <li><b>Alternative materials:</b>  API standard GL-5 (75W-90)</li> </ul>	L (US qt, Imp qt) 1.15 — 1.25 (1.216 — 1.321, 1.012 — 1.100)

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > General Description

### COMPONENT

---

# 1. TORQUE CONVERTER & CONVERTER CASE




CVT12920

- |                               |                                |
|-------------------------------|--------------------------------|
| (1) CVTF cooler outlet hose   | (17) Oil stopper plate         |
| (2) CVTF cooler inlet hose    | (18) O-ring                    |
| (3) Hose clamp                | (19) Application pressure pipe |
| (4) CVTF cooler pipe No. 1    | (20) Lubrication pipe          |
| (5) Air breather cap          | (21) O-ring                    |
| (6) Air breather hose         | (22) Stud bolt                 |
| (7) Oil charge pipe cap       | (23) Oil cooler pipe           |
| (8) O-ring                    | (24) Gasket                    |
| (9) Air breather hose bracket | (25) Overflow plug             |
| (10) Pitching stopper bracket | (26) Drain plug                |
| (11) Ground cord              | (27) Gasket                    |
| (12) Stay                     | (28) Converter case            |
| (13) Plug                     | (29) O-ring                    |

- |                                |
|--------------------------------|
| (33) Reinforcement drive plate |
| (34) Drive plate               |

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

- T1: 9 (0.9, 6.6)**  
**T2: 16 (1.6, 11.8)**  
**T3: 25 (2.5, 18.4)**  
**T4: 32.3 (3.3, 23.8)**  
**T5: 35 (3.6, 25.8)**  
**T6: 41 (4.2, 30.2)**  
**T7: 50 (5.1, 36.9)**  
**T8: 70 (7.1, 51.6)**  
**T9:  Ref. to**

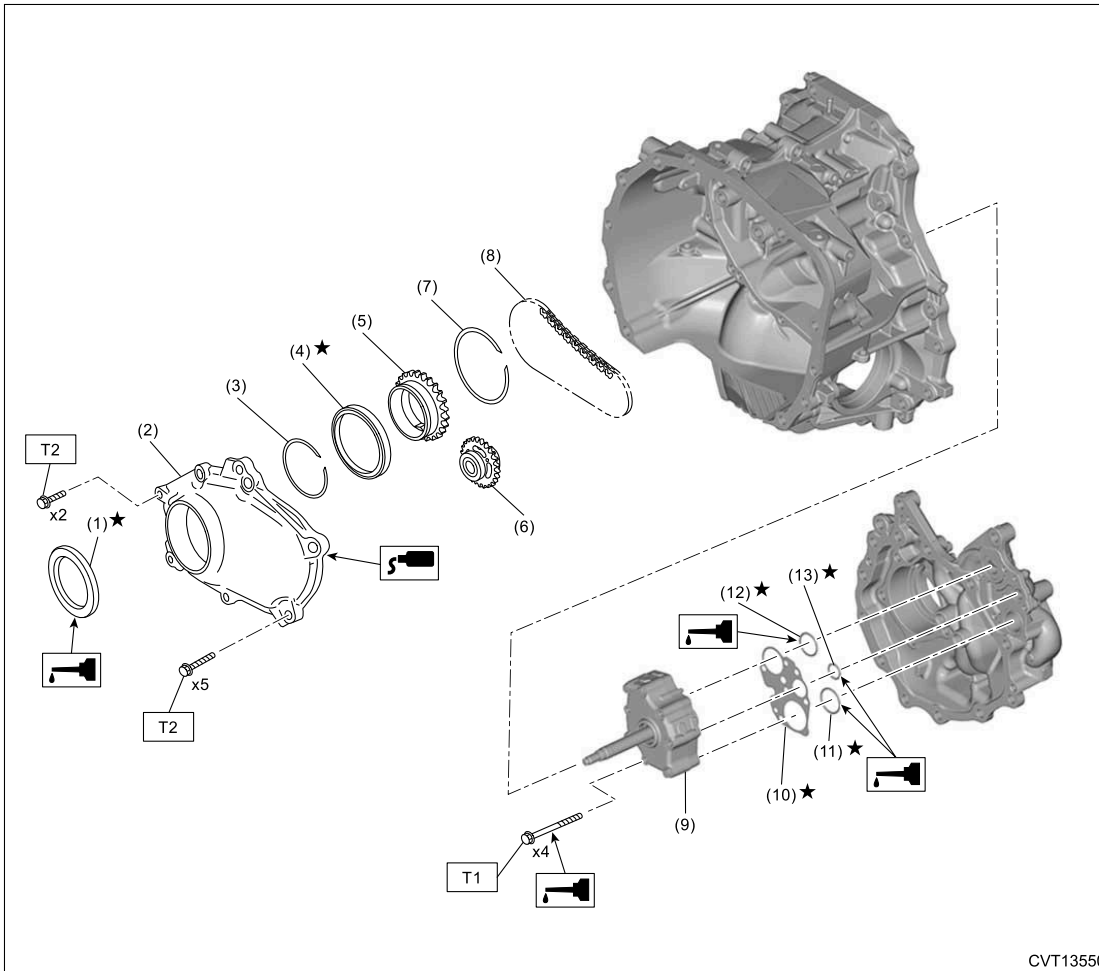
**CONTINUOUSLY VARIABLE**

**TRANSMISSION(TR690)>C  
onverter Case>ASSEMBLY.**

**T10:**  **Ref. to  
CONTINUOUSLY VARIABLE  
TRANSMISSION(TR690)>D  
rive Plate>INSTALLATION.**

- |                   |                                     |
|-------------------|-------------------------------------|
| (14) O-ring       | (30) Plug                           |
| (15) Straight pin | (31) Test plug (secondary pressure) |
| (16) Stay         | (32) Torque converter               |

**2. OIL PUMP**



CVT13550

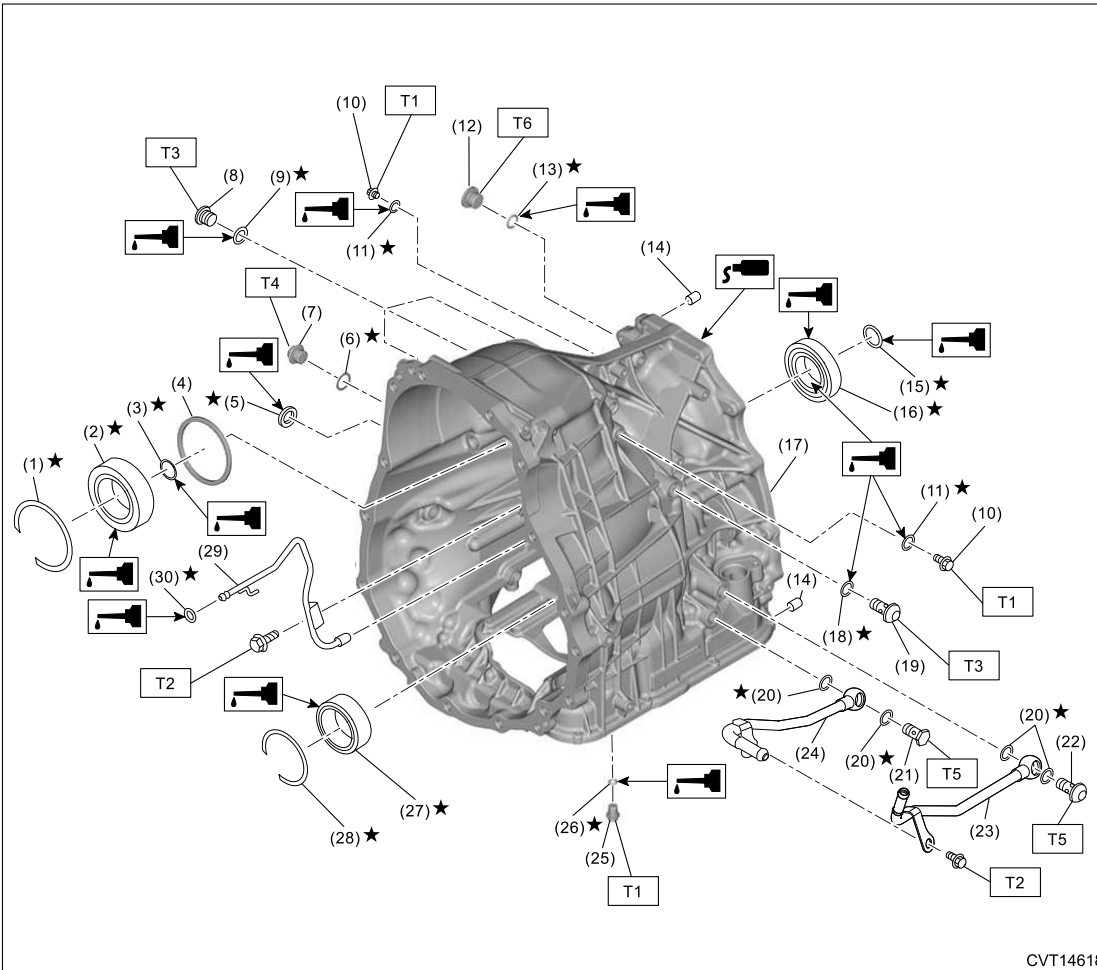
- |                          |                    |             |
|--------------------------|--------------------|-------------|
| (1) Oil seal             | (7) Snap ring      | (13) O-ring |
| (2) Oil pump chain cover | (8) Oil pump chain |             |
| (3) Snap ring            | (9) Oil pump       |             |
| (4) Ball bearing         | (10) Gasket        |             |
| (5) Drive sprocket       | (11) O-ring        |             |
| (6) Driven sprocket      | (12) O-ring        |             |

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

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

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

### 3. TRANSMISSION CASE



CVT14618

- |                                  |                              |                       |
|----------------------------------|------------------------------|-----------------------|
| (1) ★ Snap ring                  | (14) Straight pin            | (27) Roller bearing   |
| (2) ★ Roller bearing             | (15) Seal ring               | (28) Snap ring        |
| (3) ★ Seal ring                  | (16) Ball bearing            | (29) Lubrication pipe |
| (4) ★ Spacer                     | (17) Transmission case       | (30) O-ring           |
| (5) ★ Oil seal                   | (18) O-ring                  |                       |
| (6) ★ Gasket                     | (19) Plug                    |                       |
| (7) ★ Filler plug (for overhaul) | (20) ★ Gasket                |                       |
| (8) ★ Plug                       | (21) ★ Union bolt            |                       |
| (9) ★ O-ring                     | (22) ★ Union bolt            |                       |
| (10) ★ Plug                      | (23) CVTF cooler outlet pipe |                       |
| (11) ★ O-ring                    | (24) CVTF cooler inlet pipe  |                       |
| (12) ★ Test plug (line pressure) | (25) ★ Plug                  |                       |
| (13) ★ O-ring                    | (26) ★ O-ring                |                       |

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

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

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

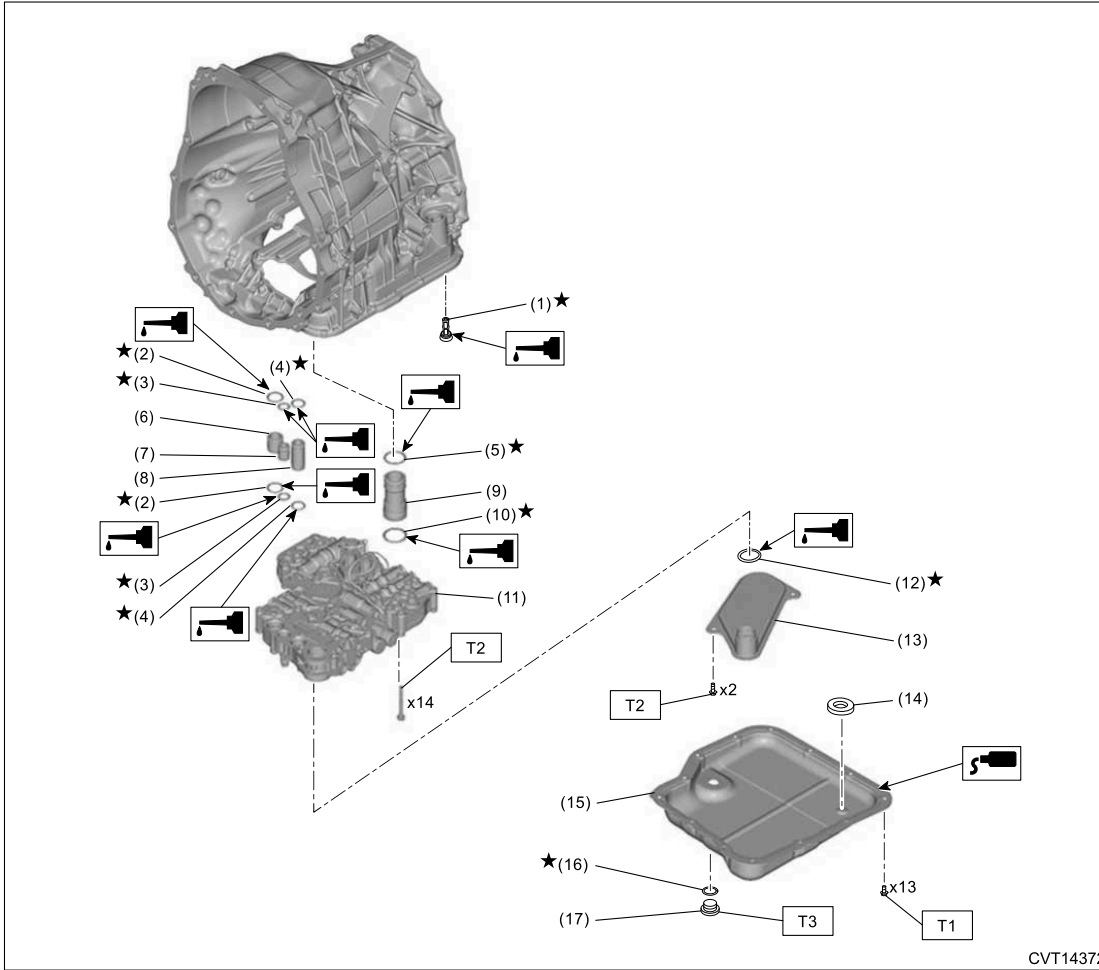
**T3: 25 (2.5, 18.4)**

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

**T5: 40 (4.1, 29.5)**

**T6: 50 (5.1, 36.9)**

## 4. CONTROL VALVE BODY



(1) Filter

(10) O-ring

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

(2) O-ring

(11) Control valve body

**T1: 7.2 (0.7, 5.3)**

(3) O-ring

(12) O-ring

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

(4) O-ring

(13) Oil strainer

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

(5) O-ring

(14) Magnet

(6) Pressure pipe No. 1

(15) Oil pan

(7) Pressure pipe No. 2

(16) Gasket

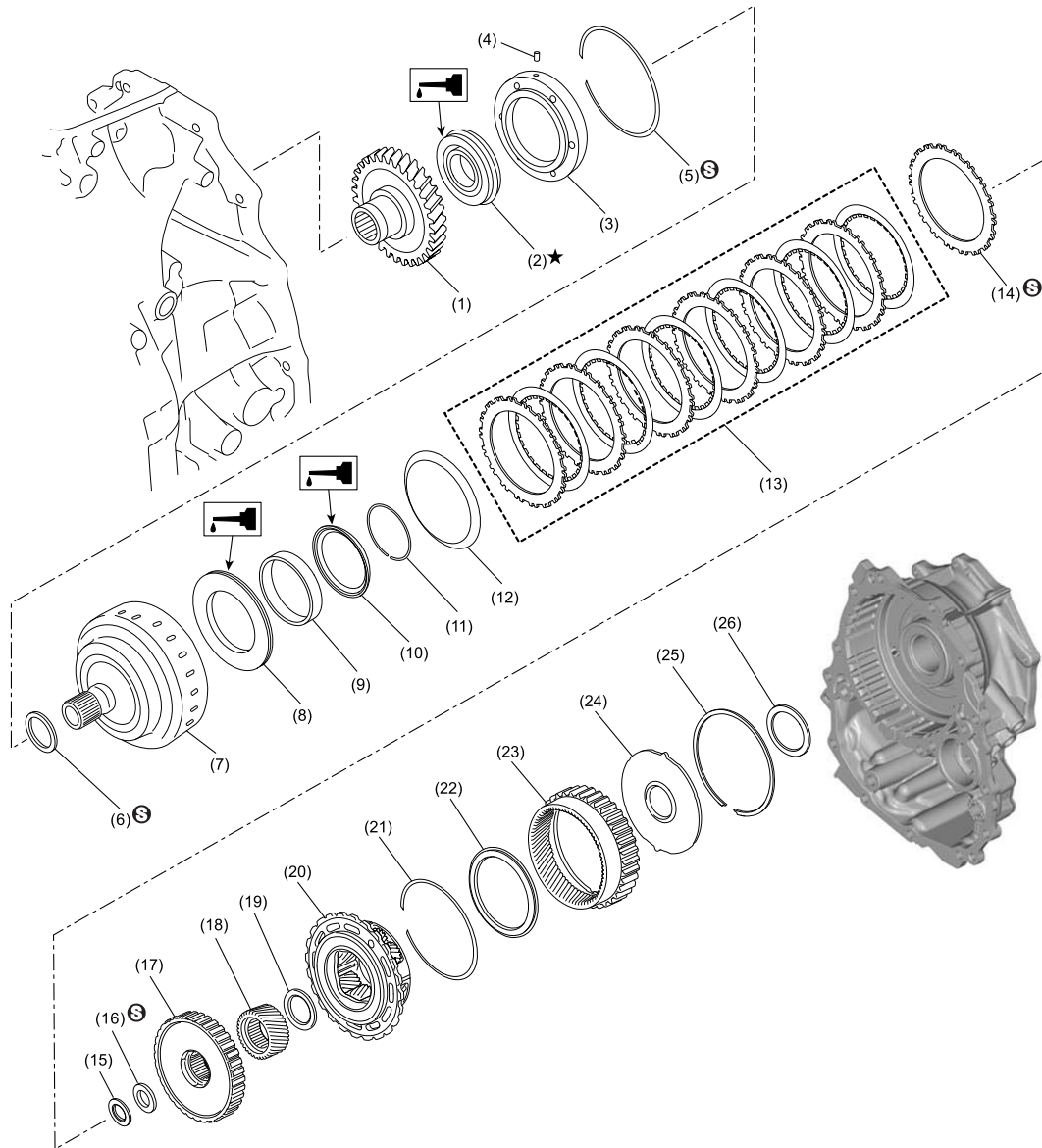
(8) Pressure pipe No. 3

(17) Drain plug

(9) CVTF pipe

CVT14372

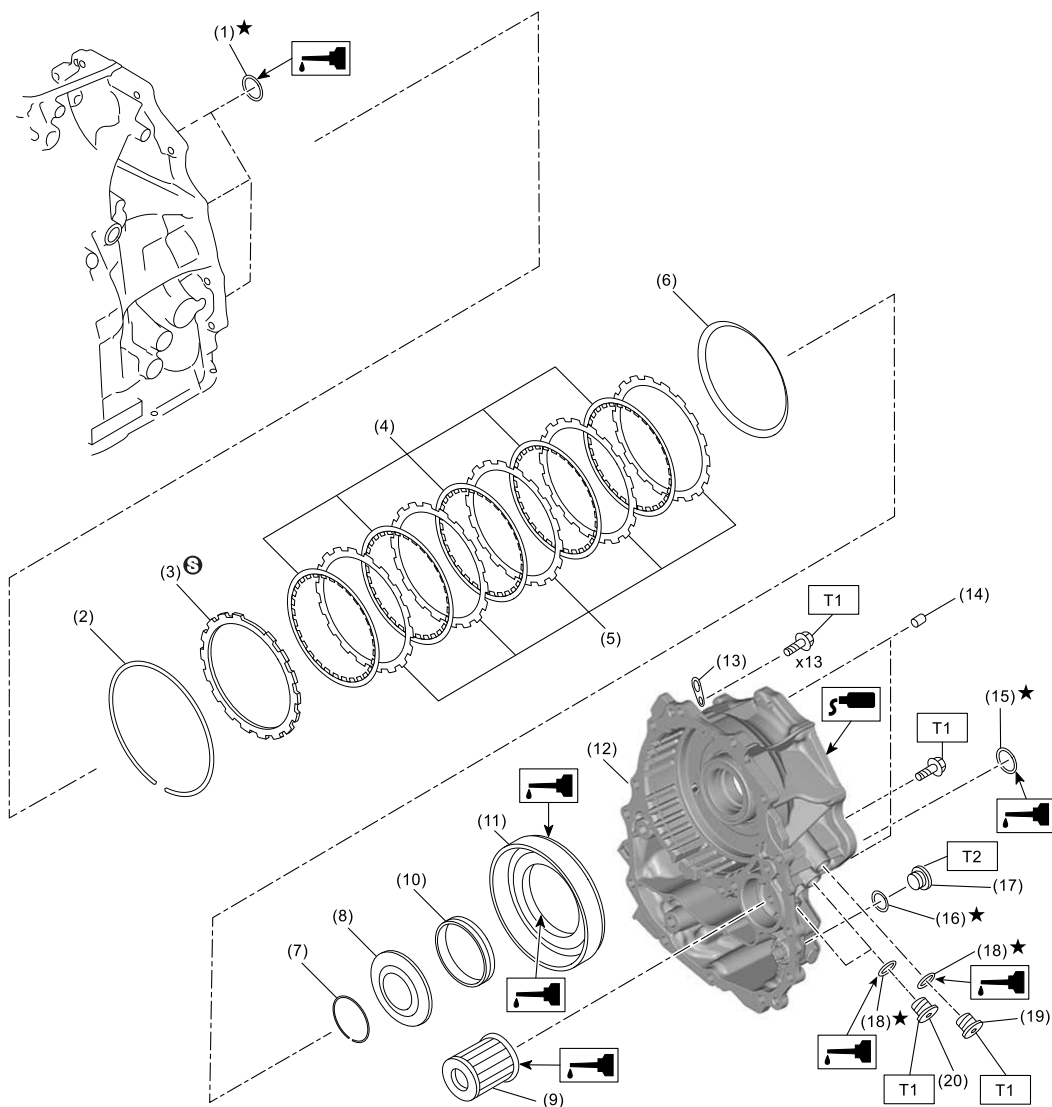
## 5. FORWARD CLUTCH AND REDUCTION DRIVEN GEAR



CVT11941

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

## 6. REVERSE BRAKE AND INTERMEDIATE CASE



CVT13548

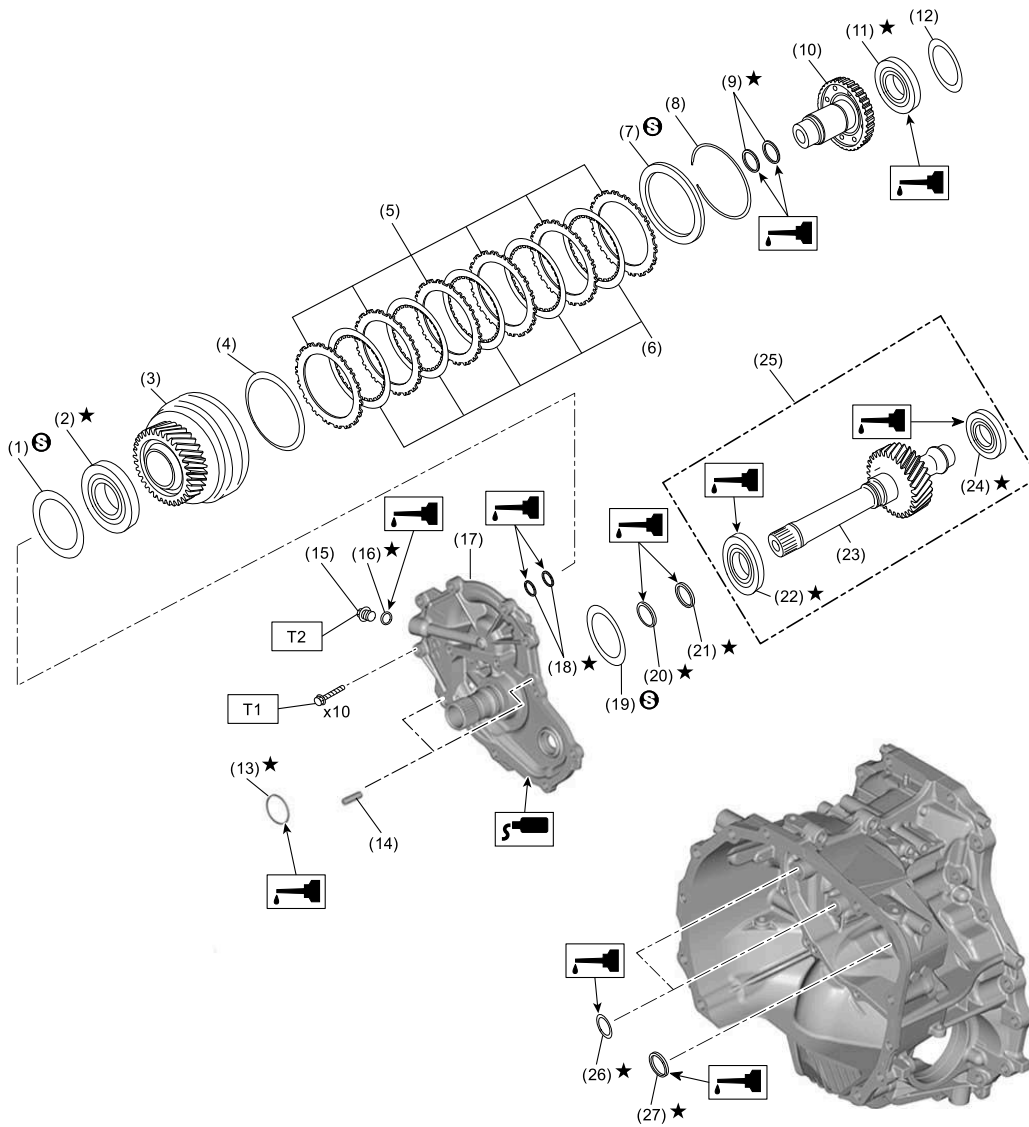
- |                     |                           |   |
|---------------------|---------------------------|---|
| (1) O-ring          | (9) CVTF filter           | (17) Filler plug                          |
| (2) Snap ring       | (10) Return spring        | (18) O-ring                               |
| (3) Retaining plate | (11) Reverse brake piston | (19) Test plug (transfer clutch pressure) |
| (4) Drive plate     | (12) Intermediate case    | (20) Plug                                 |
| (5) Driven plate    | (13) Transmission hanger  |   |
| (6) Dish plate      | (14) Straight pin         |   |
| (7) Snap ring       | (15) O-ring               |   |
| (8) Spring retainer | (16) Gasket               |   |

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

**T1: 25 (2.5, 18.4)**

**T2: 50 (5.1, 36.9)**

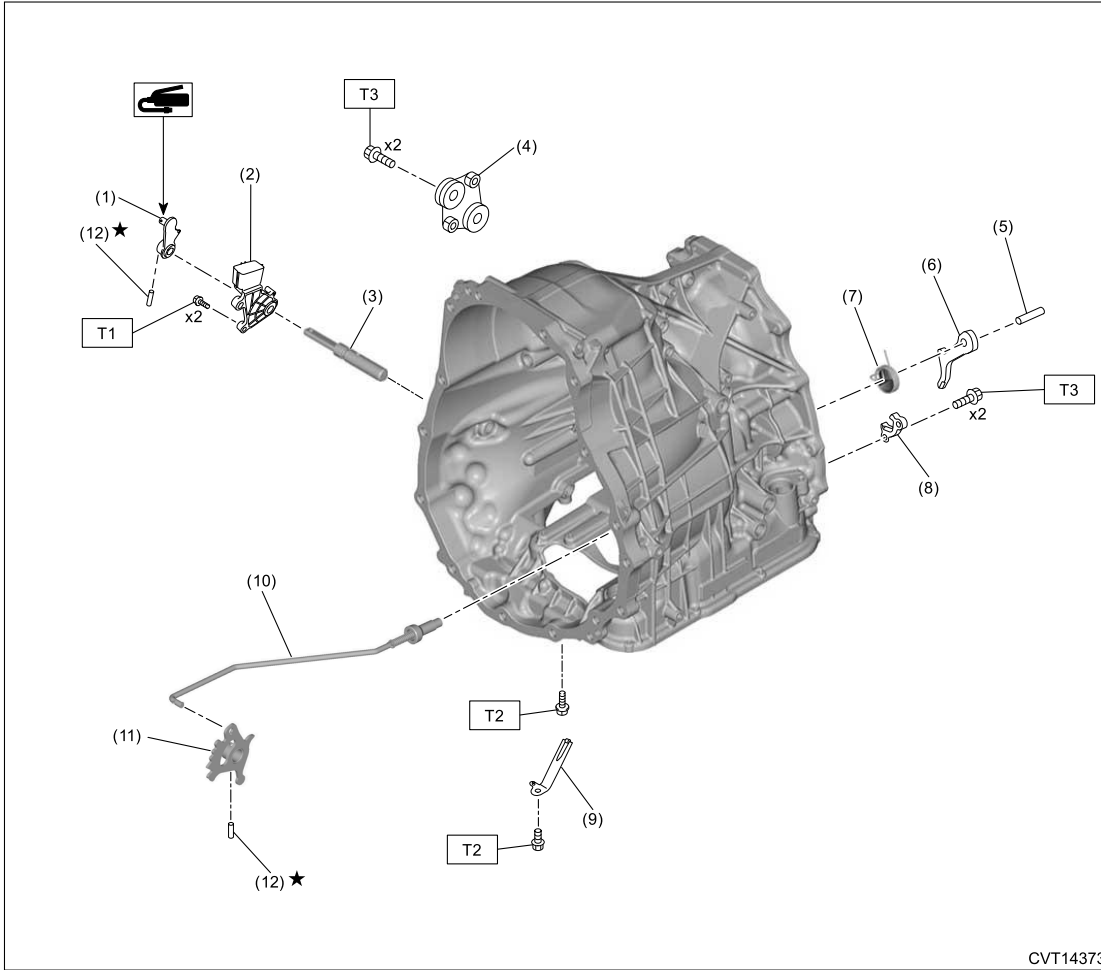
## 7. FRONT REDUCTION DRIVE GEAR AND FRONT REDUCTION DRIVEN GEAR



CVT14210

- |   |   |  |
|---|---|--|
| (1) Front reduction driven gear shim (front side) | (12) Front reduction driven gear shim (rear side) | (23) Front reduction drive gear shim         |
| (2) Ball bearing                                  | (13) Seal ring                                    | (24) Ball bearing (rear side)                |
| (3) Front reduction driven gear                   | (14) Straight pin                                 | (25) Front reduction drive gear ASSY         |
| (4) Dish plate                                    | (15) Plug   | (26) O-ring                                  |
| (5) Driven plate                                  | (16) O-ring                                       | (27) Seal ring                               |
| (6) Drive plate                                   | (17) Converter case cover                         |  |
| (7) Retaining plate                               | (18) Seal ring                                    |  |
| (8) Snap ring                                     | (19) Front reduction drive gear shim (front side) | <b>Tightening torque: N·m (kgf-m, ft-lb)</b> |
| (9) Seal ring                                     | (20) O-ring                                       | <b>T1: 24 (2.4, 17.7)</b>                    |
| (10) Front reduction driven shaft                 | (21) Seal ring                                    | <b>T2: 25 (2.5, 18.4)</b>                    |
| (11) Ball bearing                                 | (22) Ball bearing (front side)                    |  |

## 8. TRANSMISSION CONTROL DEVICE



(1) Shifter arm

(7) Return spring

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

(2) Inhibitor switch

(8) Parking support

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

(3) Shifter arm shaft

(9) Detent spring

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

(4) Cable plate

(10) Parking rod

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

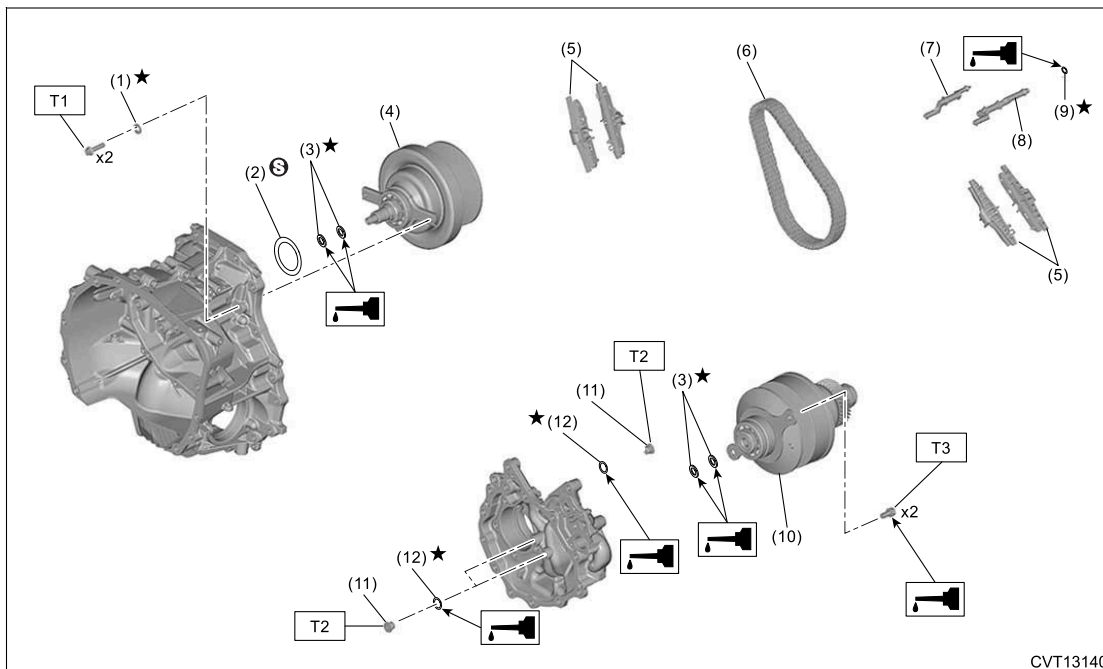
(5) Shaft

(11) Manual plate

(6) Parking pawl

(12) Spring pin

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



- |                         |                        |
|-------------------------|------------------------|
| (1) Seal washer         | (7) Support rod        |
| (2) Primary pulley shim | (8) Lubrication pipe   |
| (3) Seal ring           | (9) O-ring             |
| (4) Primary pulley*     | (10) Secondary pulley* |
| (5) Chain guide         | (11) Plug              |
| (6) Variator chain      | (12) O-ring            |

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

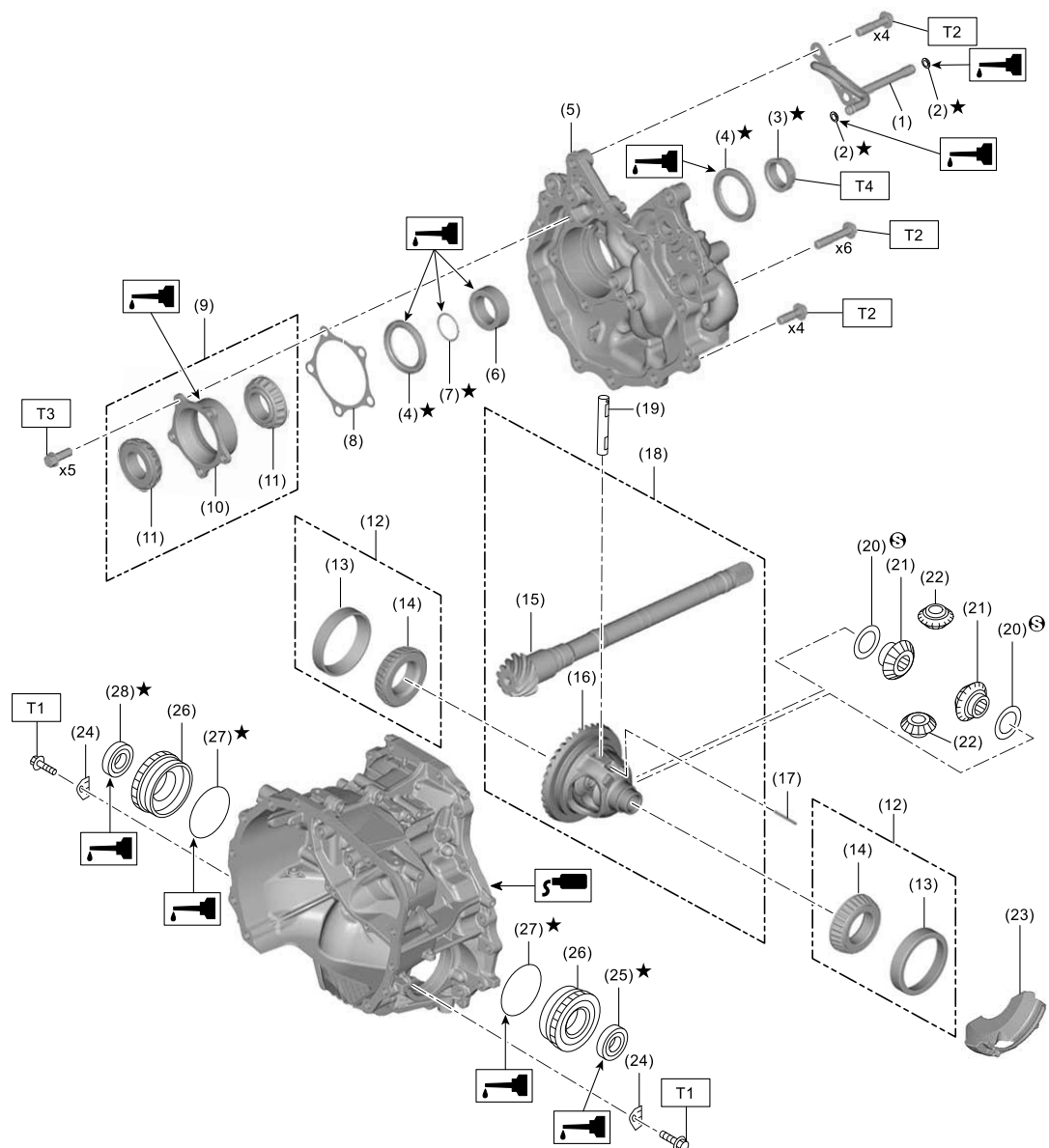
**T1: 21 (2.1, 15.5)**

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

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

\*: The primary pulley and secondary pulley are set parts.

## 10. FRONT DIFFERENTIAL GEAR



CVT13434

- |                                      |                                |   |
|--------------------------------------|--------------------------------|---|
| (1) Release pressure pipe            | (13) Side bearing outer race   | (25) Differential side retainer oil seal LH |
| (2) O-ring                           | (14) Side bearing inner race   | (26) Differential side retainer             |
| (3) Lock nut                         | (15) Drive pinion              | (27) O-ring                                 |
| (4) Oil seal                         | (16) Differential case         | (28) Differential side retainer oil seal RH |
| (5) Drive pinion retainer            | (17) Spring pin                |   |
| (6) Drive pinion collar              | (18) Hypoid gear set           |   |
| (7) O-ring                           | (19) Pinion shaft              |   |
| (8) Drive pinion shim                | (20) Thrust washer             |   |
| (9) Taper roller bearing             | (21) Differential bevel gear   |   |
| (10) Taper roller bearing outer race | (22) Differential bevel pinion |   |
| (11) Taper roller bearing inner race | (23) Oil baffle                |   |
| (12) Side bearing*                   | (24) Lock plate                |   |

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

**T1: 25 (2.5, 18.4)**

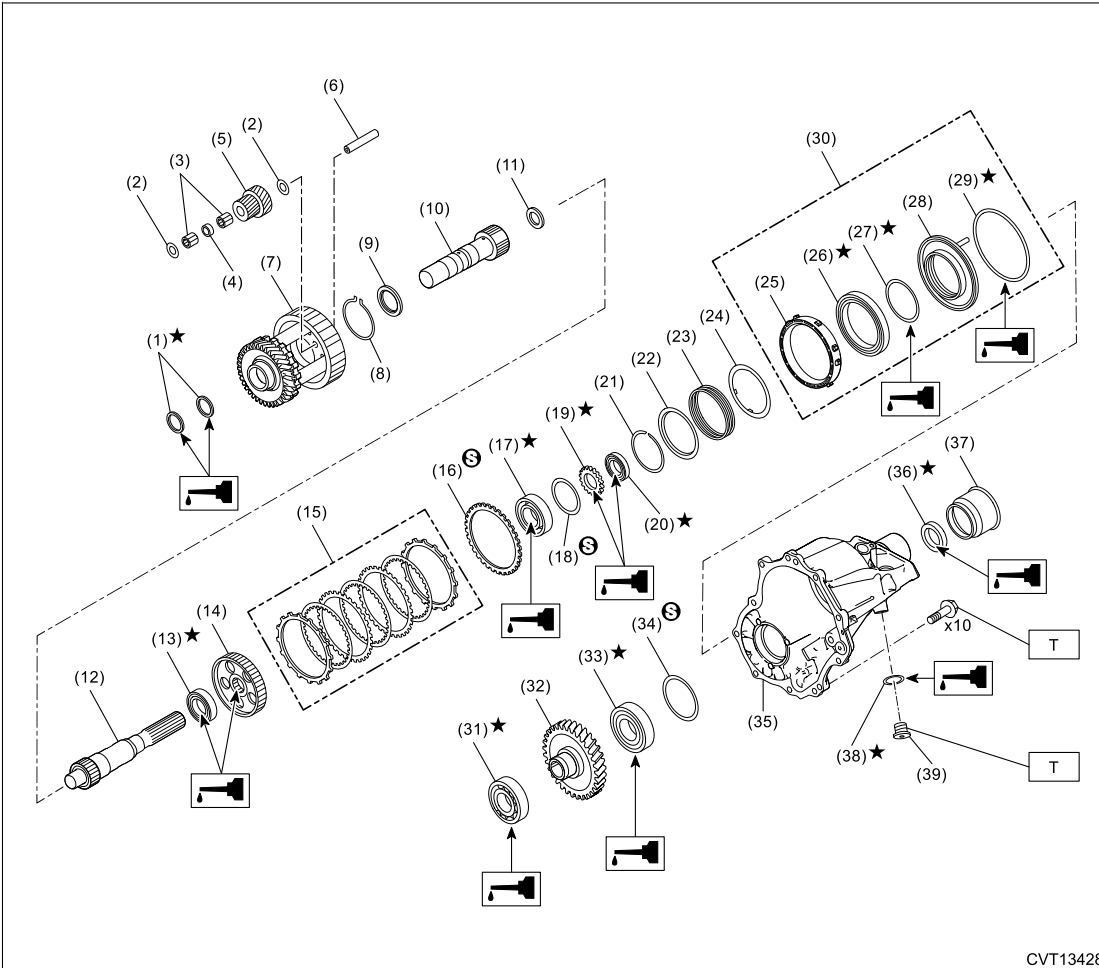
**T2: 43 (4.4, 31.7)**

**T3: 70 (7.1, 51.6)**

**T4: 116 (11.8, 85.6)**

\*: If the side bearing outer race is removed from the differential side retainer or the side bearing inner race is removed from the differential case, replace the side bearing with a new part.

## 11. TRANSFER AND EXTENSION CASE



CVT13428

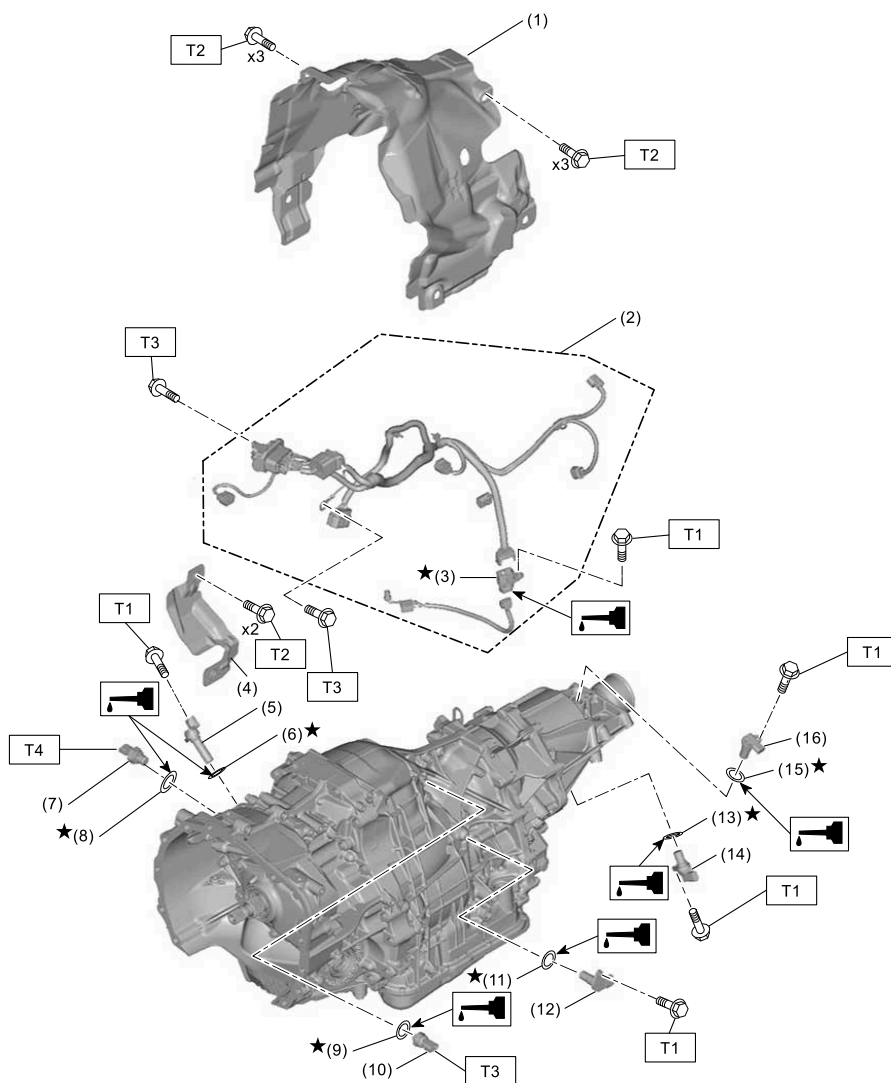
- |                                 |                                       |  |
|---------------------------------|---------------------------------------|--|
| (1) Seal ring                   | (16) Driven plate No. 3               | (31) Ball bearing (intermediate case side) |
| (2) Washer                      | (17) Ball bearing (rear side (large)) | (32) Transfer reduction driven gear        |
| (3) Needle bearing              | (18) Rear drive shaft shim            | (33) Ball bearing (extension case side)    |
| (4) Spacer                      | (19) Revolution gear                  | (34) Transfer reduction driven gear shim   |
| (5) Pinion gear                 | (20) Ball bearing (rear side (small)) | (35) Extension case                        |
| (6) Pinion shaft                | (21) Snap ring                        | (36) Extension case oil seal               |
| (7) Center differential carrier | (22) Clutch spring retainer           | (37) Dust cover                            |
| (8) Snap ring                   | (23) Return spring                    | (38) O-ring                                |
| (9) Thrust bearing              | (24) Spring retainer                  | (39) Plug                                  |
| (10) Intermediate shaft         | (25) Pressure plate                   |  |
| (11) Thrust bearing             | (26) Ball bearing                     |  |
| (12) Rear drive shaft           | (27) O-ring                           |  |
| (13) Ball bearing (front side)  | (28) Transfer clutch piston           |  |
| (14) Clutch hub                 | (29) D-ring                           |  |
| (15) Transfer clutch plate set  | (30) Transfer clutch piston ASSY      |  |

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

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

## 12. TRANSMISSION HARNESS AND SENSOR

- Structural diagram 1



CVT14617

(1) Transmission case cover  
(rear)

(2) Transmission harness

(3) Connector

(4) Transmission case cover  
(front)

(5) Primary speed sensor

(6) O-ring

(7) Secondary pressure sensor

(8) O-ring

(9) O-ring

(10) Primary pressure sensor

(11) O-ring

(12) Secondary speed sensor

(13) O-ring

(14) Front wheel speed sensor

(15) O-ring

(16) Rear wheel speed sensor

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

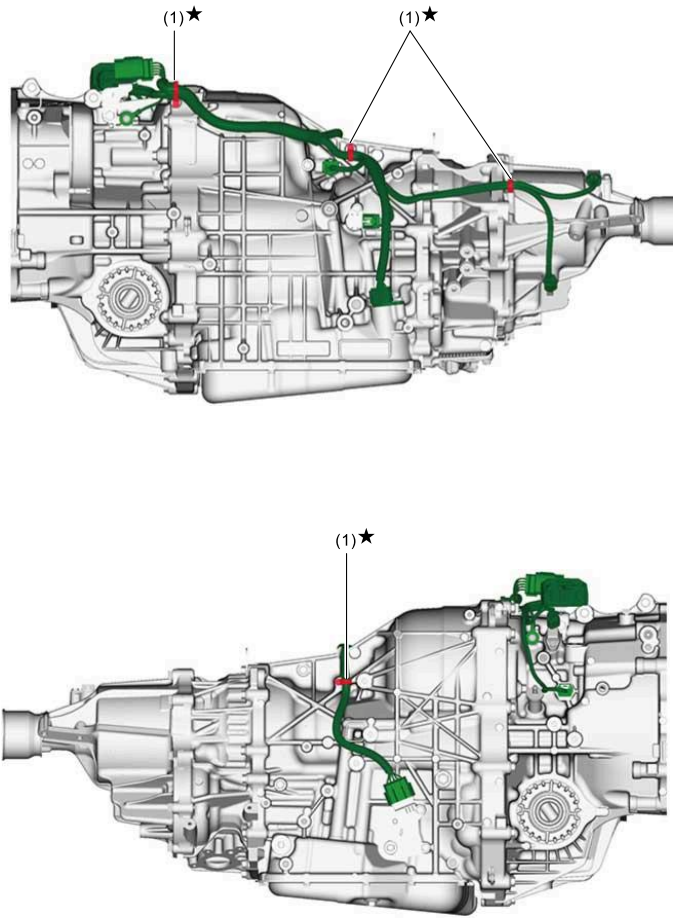
**T1: 7 (0.7, 5.2)**

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

**T3: 13 (1.3, 9.6)**

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

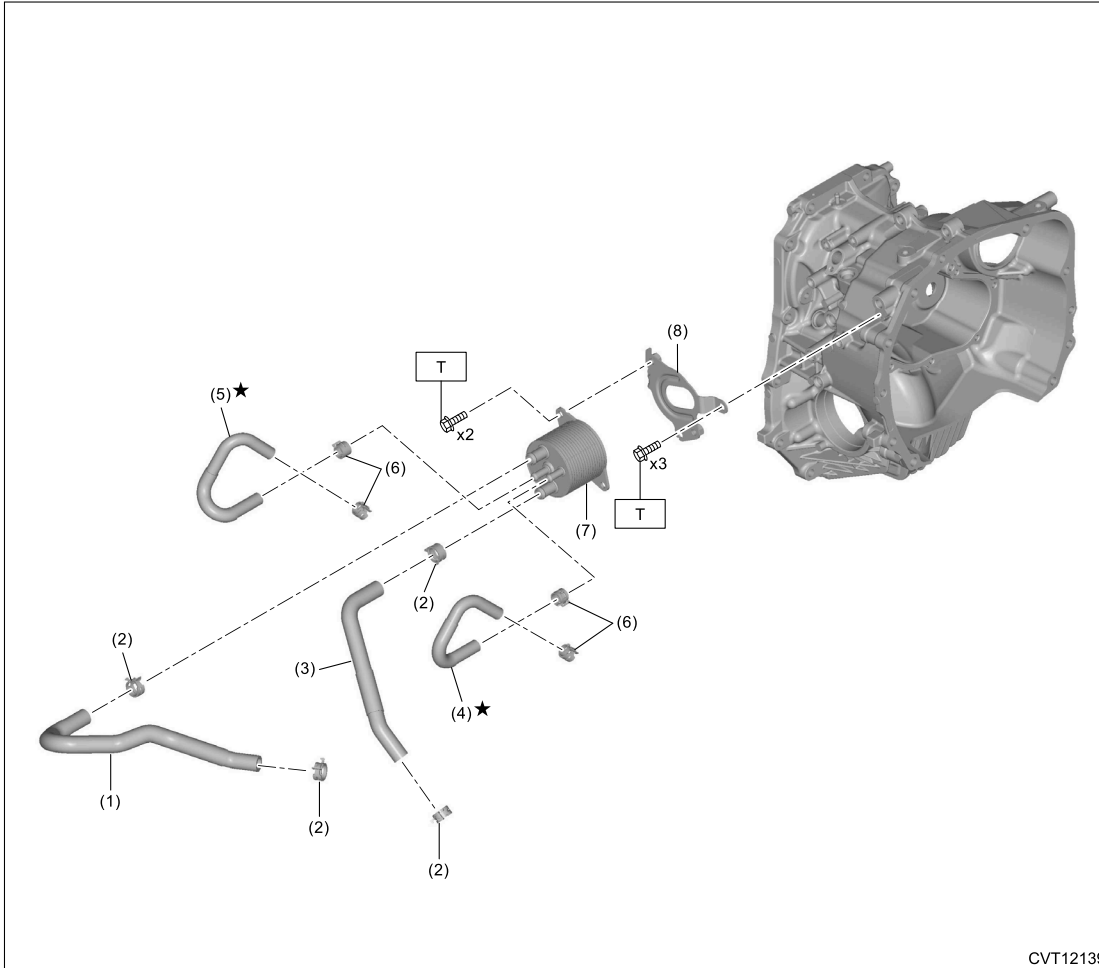
- Structural diagram 2



CVT15322

(1) Clip

### 13. CVTF COOLER (WITH WARMER FEATURE)



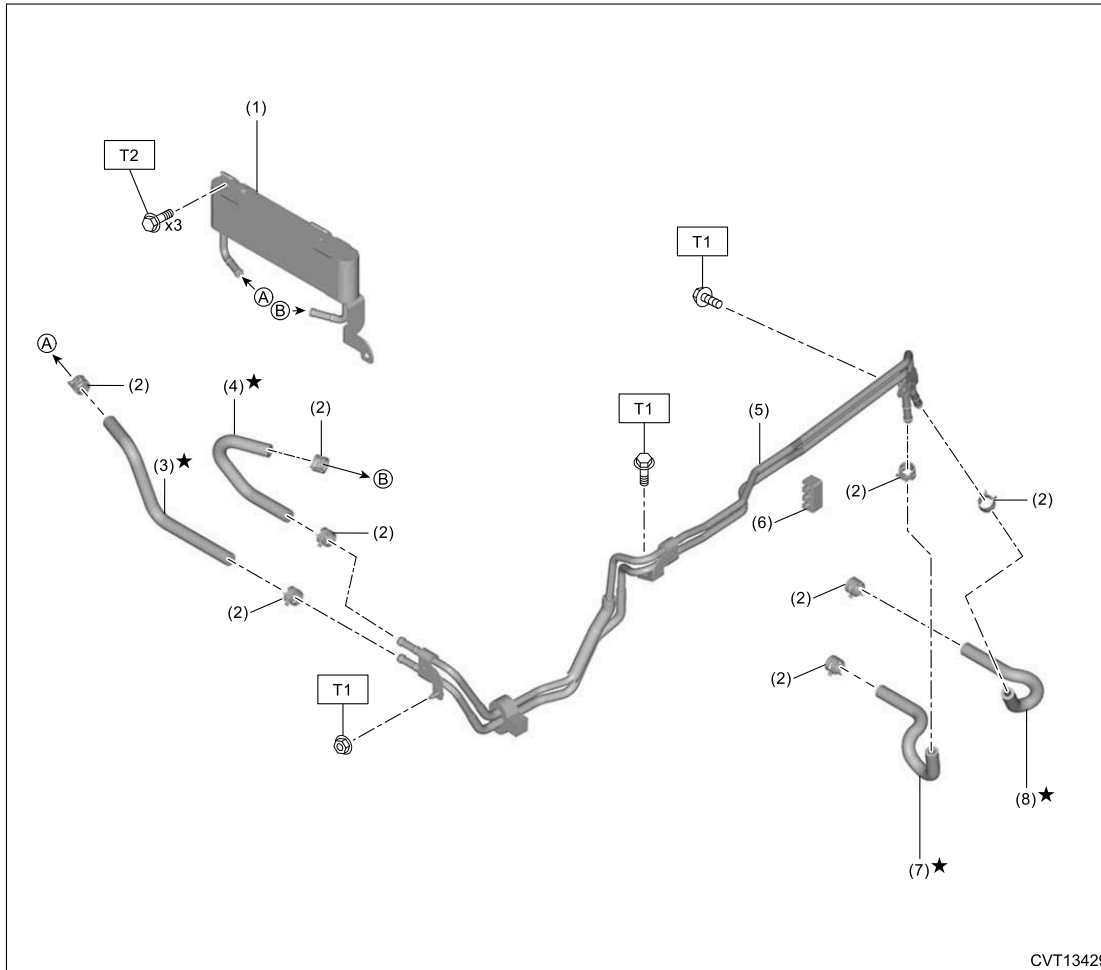
CVT12139

- |                            |                                       |
|----------------------------|---------------------------------------|
| (1) Water hose (outlet)    | (5) CVTF cooler outlet hose           |
| (2) Hose clamp             | (6) Hose clamp                        |
| (3) Water hose (inlet)     | (7) CVTF cooler (with warmer feature) |
| (4) CVTF cooler inlet hose | (8) CVTF cooler bracket               |

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

**T: 23 (2.3, 17.0)**

## 14. CVTF COOLER PIPE & HOSE



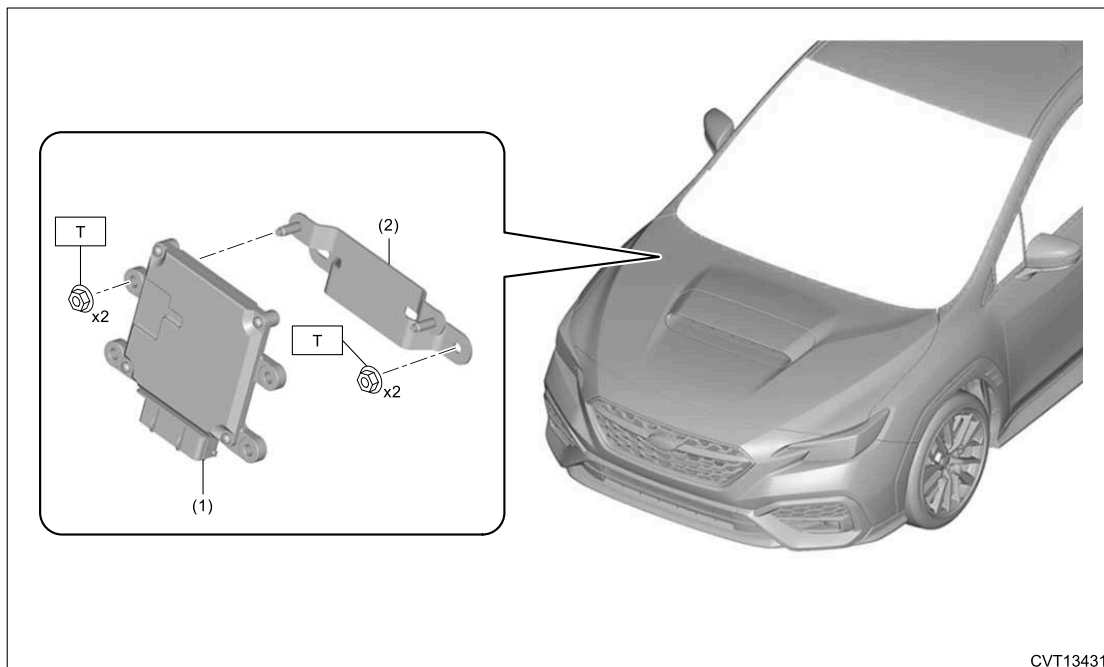
- |  |                            |
|--|----------------------------|
| (1) CVTF cooler (air cool)             | (5) CVTF cooler pipe No. 2 |
| (2) Hose clamp                         | (6) Pipe clamp             |
| (3) CVTF cooler (air cool) inlet hose  | (7) CVTF CVT outlet hose   |
| (4) CVTF cooler (air cool) outlet hose | (8) CVTF CVT inlet hose    |

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

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

**T2: 10 (1.0, 7.4)**

## 15. TRANSMISSION CONTROL MODULE



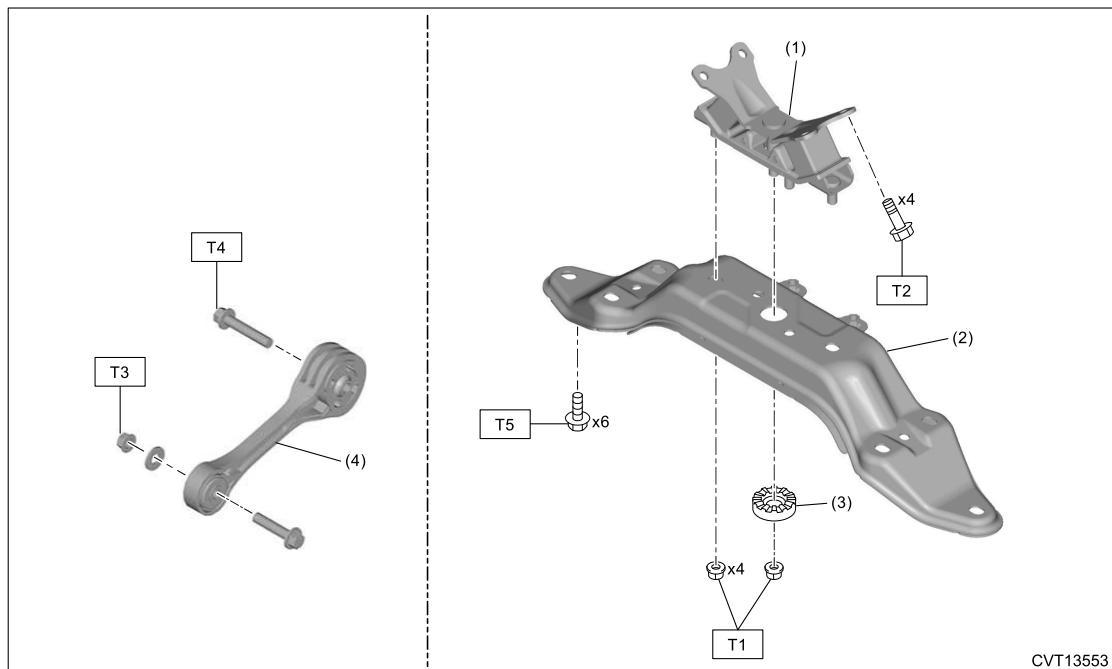
CVT13431

- (1) Transmission control module (TCM)      (2) TCM bracket

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

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

## 16. TRANSMISSION MOUNTING



- (1) Rear cushion rubber
- (2) Transmission rear crossmember
- (3) Stopper
- (4) Pitching stopper

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

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

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

**T3: 50 (5.1, 36.9)**

**T4: 58 (5.9, 42.8)**

**T5: 70 (7.1, 51.6)**

### CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > General Description

#### PREPARATION TOOL

##### 1. SUBARU SPECIAL TOOL

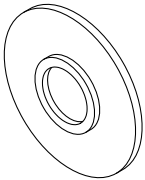
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST-398177700</p>	398177700	INSTALLER	<ul style="list-style-type: none"> <li>Used for installing the ball bearing of reduction driven gear.</li> <li>Used for installing the bearing retainer.</li> <li>Used for installing the ball bearing of the reduction driven gear side in the transmission case.</li> </ul> <p><b>Note:</b> Used together with <b>INSTALLER (20099AE020)</b>.</p> <ul style="list-style-type: none"> <li>Used for installing the ball bearing (rear side) of the front reduction drive gear.</li> </ul> <p><b>Note:</b> Used together with <b>INSTALLER (499757002)</b>.</p>

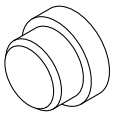
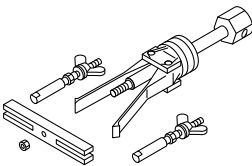
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST-398497701</p>	398497701	SEAT	<ul style="list-style-type: none"> <li>• Used for removing the transfer reduction driven gear.</li> </ul> <div style="border: 1px solid black; padding: 2px;"> <p><b>Note:</b></p> <p><b>Used together with REMOVER (498077600) and REMOVER (899864100).</b></p> </div> <ul style="list-style-type: none"> <li>• Used for removing the reduction driven gear.</li> </ul> <div style="border: 1px solid black; padding: 2px;"> <p><b>Note:</b></p> <p><b>Used together with REMOVER (498077600) and REMOVER (899864100).</b></p> </div> <ul style="list-style-type: none"> <li>• Used for removing and installing the ball bearing of reduction driven gear.</li> </ul> <div style="border: 1px solid black; padding: 2px;"> <p><b>Note:</b></p> <p><b>Used together with REMOVER (498077600) and REMOVER (899864100).</b></p> </div> <ul style="list-style-type: none"> <li>• Used for removing and installing the side bearing inner race.</li> </ul> <div style="border: 1px solid black; padding: 2px;"> <p><b>Note:</b></p> <ul style="list-style-type: none"> <li>• <b>Used together with PULLER ASSY (399703600) when removing.</b></li> <li>• <b>Used together with BUSHING 1-2 INSTALLER (499277100) when installing.</b></li> </ul> </div>
 <p>ST-398527700</p>	398527700	PULLER ASSY	<ul style="list-style-type: none"> <li>• Used for removing the roller bearing of the primary pulley side in the transmission case.</li> <li>• Used for removing the roller bearing of the secondary pulley side in the transmission case.</li> </ul> <div style="border: 1px solid black; padding: 2px;"> <p><b>Note:</b></p> <p><b>Used together with CLAW (18760AA000).</b></p> </div> <ul style="list-style-type: none"> <li>• Used for removing the ball bearing of the reduction driven gear side in the transmission case.</li> <li>• Used for removing the side bearing outer race.</li> <li>• Used for removing the ball bearing of the converter case cover.</li> </ul> <div style="border: 1px solid black; padding: 2px;"> <p><b>Note:</b></p> <p><b>Used together with CLAW (18760AA000).</b></p> </div>

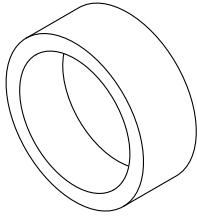
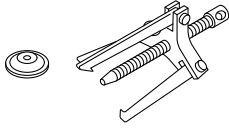
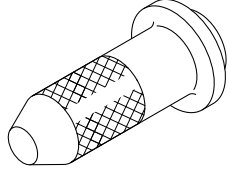
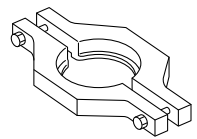
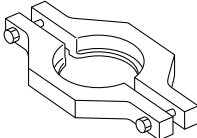
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST-398744300</p>	398744300	PISTON GUIDE	Used for adjusting the transfer clutch driven plate No. 3.
 <p>ST-399703600</p>	399703600	PULLER ASSY	<ul style="list-style-type: none"> <li>Used for removing the side bearing inner race.</li> </ul> <div style="border: 1px solid black; padding: 5px;"> <p><b>Note:</b> Used together with SEAT (398497701).</p> </div> <ul style="list-style-type: none"> <li>PULLER ASSY (399703601) can also be used.</li> </ul>
 <p>ST-498057300</p>	498057300	INSTALLER	Used for installing the extension case oil seal.
 <p>ST-498077400</p>	498077400	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 (rear side) of front reduction drive gear.</li> </ul> <div style="border: 1px solid black; padding: 5px;"> <p><b>Note:</b> Used together with REMOVER (899864100).</p> </div>
 <p>ST-498077600</p>	498077600	REMOVER	<ul style="list-style-type: none"> <li>Used for removing the ball bearing of drive sprocket.</li> </ul> <div style="border: 1px solid black; padding: 5px;"> <p><b>Note:</b> Used together with HOUSING BUSHING INSTALLER AND REMOVER (927720000).</p> </div> <ul style="list-style-type: none"> <li>Used for removing the ball bearing of transfer reduction driven gear.</li> </ul> <div style="border: 1px solid black; padding: 5px;"> <p><b>Note:</b> Used together with SEAT (398497701) and REMOVER (899864100).</p> </div> <ul style="list-style-type: none"> <li>Used for removing ball bearing of reduction driven gear.</li> </ul> <div style="border: 1px solid black; padding: 5px;"> <p><b>Note:</b> Used together with SEAT (398497701) and REMOVER (899864100).</p> </div>

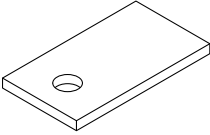
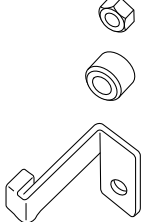
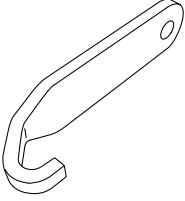
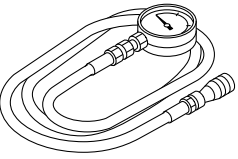
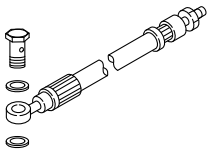
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
			<ul style="list-style-type: none"> <li>Used for removing the taper roller bearing inner race (front side) of drive pinion.</li> <li>Used for removing the ball bearing (front side) of the front reduction drive gear.</li> </ul>
 <p>ST-498255400</p>	498255400	PLATE	Used for measuring the backlash of the hypoid gear set.
 <p>ST-498277200</p>	498277200	STOPPER SET	Used for removing and installing transmission body.
 <p>ST-498497300</p>	498497300	CRANKSHAFT STOPPER	Used for removing and installing the drive plate.
 <p>ST-498575400</p>	498575400	OIL PRESSURE GAUGE ASSY	<p>Used for measuring the transfer clutch pressure.</p> <p><b>Note:</b></p> <ul style="list-style-type: none"> <li>Used together with <b>PRESSURE GAUGE ADAPTER (18681AA000)</b>, <b>ADAPTER HOSE A (34099AC010)</b> and <b>ADAPTER HOSE B (34099AC020)</b>.</li> <li>Use the <b>genuine O-ring (part No. 806908150)</b> for installation.</li> </ul>
 <p>ST-498897700</p>	498897700	OIL PRESSURE ADAPTER SET	<ul style="list-style-type: none"> <li>Used for measuring the secondary pressure.</li> </ul> <p><b>Note:</b></p> <p>Used together with <b>PRESSURE GAUGE ADAPTER (18681AA000)</b> and <b>OIL PRESSURE GAUGE ASSY (18801AA000)</b>.</p> <ul style="list-style-type: none"> <li>Used for measuring line pressure.</li> </ul>

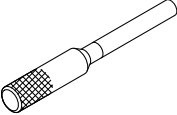
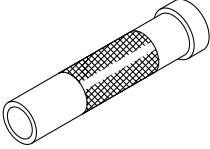
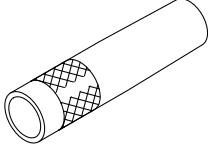
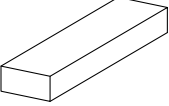
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
			<p><b>Note:</b> Used together with <b>PRESSURE GAUGE ADAPTER (18681AA010)</b> and <b>OIL PRESSURE GAUGE ASSY (18801AA000)</b>.</p>
 <p>ST-499267300</p>	499267300	STOPPER PIN	Used for adjusting the inhibitor switch.
 <p>ST-499277100</p>	499277100	BUSHING 1-2 INSTALLER	<ul style="list-style-type: none"> <li>Used to install the rear drive shaft ball bearing.</li> </ul> <p><b>Note:</b> Used together with <b>INSTALLER (499757002)</b>.</p> <ul style="list-style-type: none"> <li>Used for installing the ball bearing of the transfer reduction driven gear.</li> <li>Used for installing the side bearing inner race.</li> </ul> <p><b>Note:</b> Used together with <b>SEAT (398497701)</b>.</p>
 <p>ST-499277200</p>	499277200	INSTALLER	Used for installing the taper roller bearing inner race (front side) of drive pinion.
 <p>ST-499575400</p>	499575400	GAUGE	<ul style="list-style-type: none"> <li>Used for adjusting the primary pulley shim.</li> <li>Used for adjusting the rear drive shaft shim.</li> <li>Used for adjusting the transfer clutch driven plate No. 3.</li> <li>Used for adjusting the front reduction drive gear shim.</li> <li>Used for adjusting the front reduction driven gear shim (front side).</li> </ul>

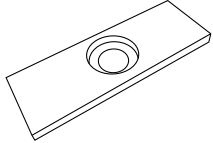
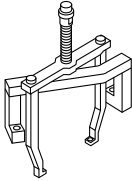
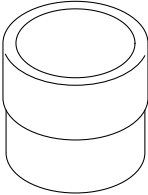
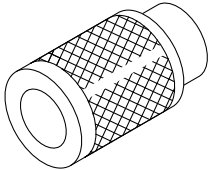
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST-499575600</p>	499575600	GAUGE	<ul style="list-style-type: none"> <li>• Used for adjusting the transfer reduction driven gear shim.</li> <li>• Used for adjusting the forward clutch drum washer.</li> <li>• Used for adjusting the forward clutch washer.</li> </ul> <div style="border: 1px solid black; padding: 2px;"> <p><b>Note:</b> Used together with <b>PULLER SET (499737100)</b>.</p> </div> <ul style="list-style-type: none"> <li>• Used for inspecting clutch clearance.</li> </ul> <div style="border: 1px solid black; padding: 2px;"> <p><b>Note:</b> Used together with <b>OIL SEAL INSTALLER (398437700)</b>.</p> </div> <ul style="list-style-type: none"> <li>• Used for adjusting the drive pinion shim.</li> <li>• Used for adjusting the front reduction drive gear shim.</li> <li>• Used for adjusting the front reduction driven gear shim (front side).</li> </ul>
 <p>ST-499737100</p>	499737100	PULLER SET	<p>Used for adjusting the forward clutch washer.</p> <div style="border: 1px solid black; padding: 2px;"> <p><b>Note:</b></p> <ul style="list-style-type: none"> <li>• Use the rack only.</li> <li>• Used together with <b>GAUGE (499575600)</b>.</li> </ul> </div>
 <p>ST-499755602</p>	499755602	PRESS SNAP RING	<p>Used for installing the roller bearing of the secondary pulley side in the transmission case.</p> <div style="border: 1px solid black; padding: 2px;"> <p><b>Note:</b> Used together with <b>INSTALLER (20099AE020)</b>.</p> </div>
 <p>ST-499757002</p>	499757002	INSTALLER	<ul style="list-style-type: none"> <li>• Used to install the rear drive shaft ball bearing.</li> </ul> <div style="border: 1px solid black; padding: 2px;"> <p><b>Note:</b> Used together with <b>BUSHING 1-2 INSTALLER (499277100)</b>.</p> </div> <ul style="list-style-type: none"> <li>• Used for installing the ball bearing (rear side) of the front reduction drive gear.</li> </ul> <div style="border: 1px solid black; padding: 2px;"> <p><b>Note:</b> Used together with <b>INSTALLER (398177700)</b>.</p> </div>

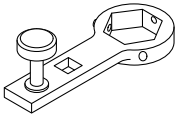
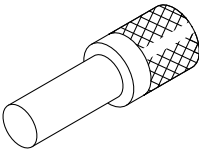
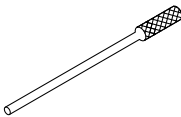
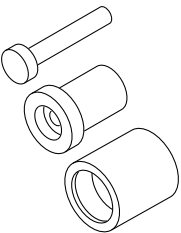
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST-499787700</p>	499787700	WRENCH	<ul style="list-style-type: none"> <li>• Used for adjusting hypoid gear set backlash.</li> </ul> <div style="border: 1px solid black; padding: 2px;"> <p><b>Note:</b></p> <p><b>Used together with HOLDER (18667AA010).</b></p> </div> <ul style="list-style-type: none"> <li>• Used for checking and adjusting the tooth contact of hypoid gear set.</li> </ul> <div style="border: 1px solid black; padding: 2px;"> <p><b>Note:</b></p> <p><b>Used together with HOLDER (18667AA010).</b></p> </div> <ul style="list-style-type: none"> <li>• Used for removing and installing the drive pinion lock nut.</li> </ul> <div style="border: 1px solid black; padding: 2px;"> <p><b>Note:</b></p> <p><b>Used together with HOLDER (18667AA010).</b></p> </div>
 <p>ST-899864100</p>	899864100	REMOVER	<ul style="list-style-type: none"> <li>• Used for removing the transfer reduction driven gear.</li> </ul> <div style="border: 1px solid black; padding: 2px;"> <p><b>Note:</b></p> <p><b>Used together with SEAT (398497701) and REMOVER (498077600).</b></p> </div> <ul style="list-style-type: none"> <li>• Used for removing the reduction driven gear.</li> </ul> <div style="border: 1px solid black; padding: 2px;"> <p><b>Note:</b></p> <p><b>Used together with SEAT (398497701) and REMOVER (498077600).</b></p> </div> <ul style="list-style-type: none"> <li>• Used for removing the ball bearing (rear side) of front reduction drive gear.</li> </ul> <div style="border: 1px solid black; padding: 2px;"> <p><b>Note:</b></p> <p><b>Used together with REMOVER (498077400).</b></p> </div>
 <p>ST-899904100</p>	899904100	STRAIGHT PIN REMOVER	Used for removing the spring pin.
 <p>ST-927720000</p>	927720000	HOUSING BUSHING INSTALLER AND REMOVER	<ul style="list-style-type: none"> <li>• Used for installing the oil seal of the oil pump chain cover.</li> </ul> <div style="border: 1px solid black; padding: 2px;"> <p><b>Note:</b></p> <p><b>Use BUSHING SHAFT (927880000) and BASE TUBE LATERAL LINK (927890000).</b></p> </div> <ul style="list-style-type: none"> <li>• Used for removing the ball bearing of drive sprocket.</li> </ul>


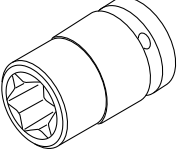
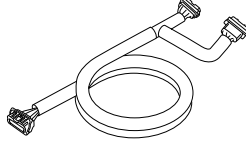
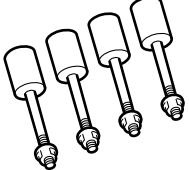
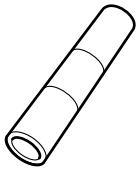
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
			<p><b>Note:</b></p> <ul style="list-style-type: none"> <li>• Use <b>BUSHING SHAFT (927880000)</b>.</li> <li>• Used together with <b>REMOVER (498077600)</b>.</li> </ul>
 <p>ST18270AA040</p>	18270AA040	SOCKET	<p>Used for removing and installing the test plug (transfer clutch pressure).</p> <p><b>Note:</b></p> <p>Used together with <b>SPECIAL TOOL CONDENSER (73099SG000)</b>.</p>
 <p>ST18270KA020</p>	18270KA020	SOCKET (E20)	Used for removing and installing the drive pinion retainer.
 <p>ST18460AA040</p>	18460AA040	CHECK BOARD	Used for measuring voltage and resistance of TCM terminals.
 <p>ST18632AA000</p>	18632AA000	STAND ASSY	<ul style="list-style-type: none"> <li>• Used for removing the transmission harness.</li> <li>• Used for disassembling and assembling the transmission body.</li> </ul>
 <p>ST18651AA000</p>	18651AA000	INSTALLER	Used for installing the ball bearing (front side) of the front reduction drive gear.

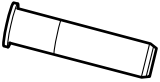
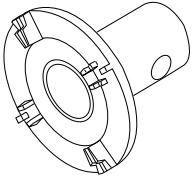
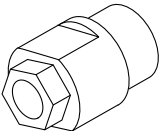
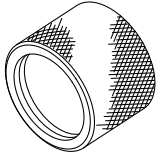
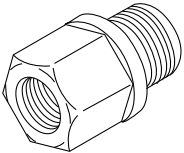
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST18657AA000</p>	18657AA000	INSTALLER	Used for installing the oil seal of inhibitor switch.
 <p>ST18658AA021</p>	18658AA021	WRENCH COMPL RETAINER	<ul style="list-style-type: none"> <li>• Used for removing and installing the differential side retainer.</li> <li>• Used for adjusting hypoid gear set backlash.</li> </ul>
 <p>ST18667AA010</p>	18667AA010	HOLDER	<ul style="list-style-type: none"> <li>• Used for adjusting hypoid gear set backlash.</li> </ul> <div style="border: 1px solid black; padding: 2px;"> <p><b>Note:</b> Used together with WRENCH (499787700).</p> </div> <ul style="list-style-type: none"> <li>• Used for checking and adjusting the tooth contact of hypoid gear set.</li> </ul> <div style="border: 1px solid black; padding: 2px;"> <p><b>Note:</b> Used together with WRENCH (499787700).</p> </div> <ul style="list-style-type: none"> <li>• Used for removing and installing the drive pinion lock nut.</li> </ul> <div style="border: 1px solid black; padding: 2px;"> <p><b>Note:</b> Used together with WRENCH (499787700).</p> </div> <ul style="list-style-type: none"> <li>• Used for measuring the initial load on the taper roller bearing.</li> </ul>
 <p>ST18675AA000</p>	18675AA000	DIFFERENTIAL SIDE OIL SEAL INSTALLER	Used for installing the differential side retainer oil seal.
 <p>ST18681AA000</p>	18681AA000	PRESSURE GAUGE ADAPTER	<ul style="list-style-type: none"> <li>• Used for measuring the secondary pressure.</li> </ul>

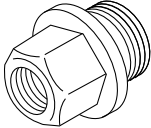
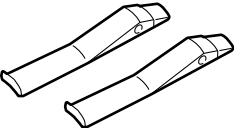
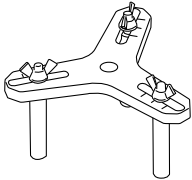
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
			<p><b>Note:</b></p> <ul style="list-style-type: none"> <li>• Use the genuine O-ring (part No. 806911080) for installation.</li> <li>• Used together with OIL PRESSURE ADAPTER SET (498897700) and OIL PRESSURE GAUGE ASSY (18801AA000).</li> </ul> <ul style="list-style-type: none"> <li>• Used for measuring the transfer clutch pressure.</li> </ul> <p><b>Note:</b></p> <ul style="list-style-type: none"> <li>• Use the genuine O-ring (part No. 806911080) for installation.</li> <li>• Used together with OIL PRESSURE GAUGE ASSY (498575400), ADAPTER HOSE A (34099AC010) and ADAPTER HOSE B (34099AC020).</li> </ul>
 <p>ST18681AA010</p>	18681AA010	PRESSURE GAUGE ADAPTER	<p>Used for measuring line pressure.</p> <p><b>Note:</b></p> <ul style="list-style-type: none"> <li>• Use the genuine O-ring (part No. 806916050) for installation.</li> <li>• Used together with OIL PRESSURE ADAPTER SET (498897700) and OIL PRESSURE GAUGE ASSY (18801AA000).</li> </ul>
 <p>ST18760AA000</p>	18760AA000	CLAW	<ul style="list-style-type: none"> <li>• Used for removing the ball bearing of the converter case cover.</li> </ul> <p><b>Note:</b></p> <p>Used together with PULLER ASSY (398527700).</p> <ul style="list-style-type: none"> <li>• Used for removing the roller bearing of the secondary pulley side in the transmission case.</li> </ul> <p><b>Note:</b></p> <p>Used together with PULLER ASSY (398527700).</p>
 <p>ST18762AA001</p>	18762AA001	COMPRESSOR SPECIAL TOOL	<ul style="list-style-type: none"> <li>• Used for removing and installing the transfer clutch piston.</li> <li>• Used for removing and installing the reverse brake piston.</li> <li>• Used for removing and installing the forward clutch piston.</li> <li>• COMPRESSOR SPECIAL TOOL (18762AA000) can also be used.</li> </ul>

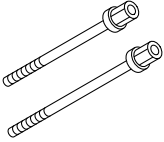
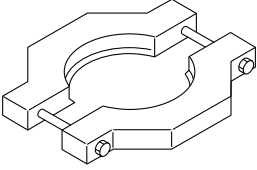
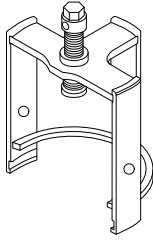
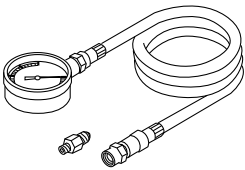
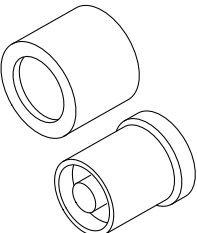
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST18763AA000</p>	18763AA000	COMPRESSOR SHAFT	Used for measuring and adjusting the backlash of the hypoid gear set.
 <p>ST18767AA000</p>	18767AA000	BEARING REMOVER	Used for removing the bearing retainer. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <b>Note:</b>              Used together with <b>INSTALLER (20099AE020)</b>.           </div>
 <p>ST18769AA020</p>	18769AA020	EXPANDER PULLEY	Used for removing and installing the secondary pulley.
 <p>ST18801AA000</p>	18801AA000	OIL PRESSURE GAUGE ASSY	<ul style="list-style-type: none"> <li>• Used for measuring the secondary pressure.</li> </ul> <div style="border: 1px solid black; padding: 5px; margin-top: 5px;"> <b>Note:</b>              Used together with <b>OIL PRESSURE ADAPTER SET (498897700)</b> and <b>PRESSURE GAUGE ADAPTER (18681AA000)</b>.           </div> <ul style="list-style-type: none"> <li>• Used for measuring line pressure.</li> </ul> <div style="border: 1px solid black; padding: 5px; margin-top: 5px;"> <b>Note:</b>              Used together with <b>OIL PRESSURE ADAPTER SET (498897700)</b> and <b>PRESSURE GAUGE ADAPTER (18681AA010)</b>.           </div>
 <p>ST20099AE020</p>	20099AE020	INSTALLER	<ul style="list-style-type: none"> <li>• Used for installing the drive sprocket ball bearing.</li> <li>• Used for removing the bearing retainer.</li> </ul> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <b>Note:</b>              Used together with <b>BEARING REMOVER (18767AA000)</b>.           </div> <ul style="list-style-type: none"> <li>• Used for installing the ball bearing of the reduction driven gear side in the transmission case.</li> </ul>

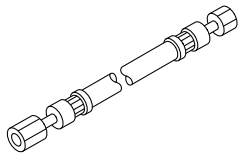
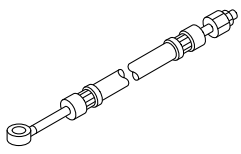
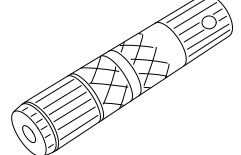
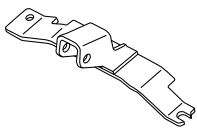
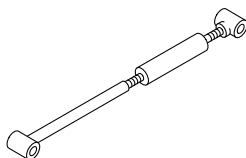
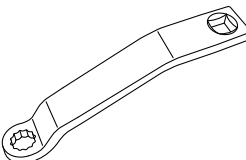

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
			<p><b>Note:</b> Used together with <b>INSTALLER (398177700)</b>.</p> <ul style="list-style-type: none"> <li>Used for installing the roller bearing of the secondary pulley side in the transmission case.</li> </ul> <p><b>Note:</b> Used together with <b>PRESS SNAP RING (499755602)</b>.</p> <ul style="list-style-type: none"> <li>Used for installing the roller bearing of the primary pulley side in the transmission case.</li> <li>Used for installing drive pinion retainer oil seal.</li> <li>Used for installing the ball bearing of the converter case cover.</li> </ul>
 <p>ST34099AC010</p>	34099AC010	ADAPTER HOSE A	<p>Used for measuring the transfer clutch pressure.</p> <p><b>Note:</b> Used together with <b>OIL PRESSURE GAUGE ASSY (498575400)</b>, <b>PRESSURE GAUGE ADAPTER (18681AA000)</b> and <b>ADAPTER HOSE B (34099AC020)</b>.</p>
 <p>ST34099AC020</p>	34099AC020	ADAPTER HOSE B	<p>Used for measuring the transfer clutch pressure.</p> <p><b>Note:</b></p> <ul style="list-style-type: none"> <li>Use the <b>genuine union screw (part No. 801914010)</b> and <b>gasket (part No. 803914060)</b> for installation.</li> <li>Used together with <b>OIL PRESSURE GAUGE ASSY (498575400)</b>, <b>PRESSURE GAUGE ADAPTER (18681AA000)</b>, and <b>ADAPTER HOSE A (34099AC010)</b>.</li> </ul>
 <p>ST38415AA070</p>	38415AA070	AXLE SHAFT	<p>Used for measuring the hypoid gear set backlash and adjusting the thrust washer.</p> <p><b>Note:</b> <b>This is the SUBARU genuine part.</b></p>

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST41099AA012	41099AA012	ENGINE SUPPORT BRACKET	Used for removing and installing transmission body. <b>Note:</b> <b>Used together with ENGINE SUPPORT (41099AA020).</b>
 ST41099AA020	41099AA020	ENGINE SUPPORT	Used for removing and installing transmission body. <b>Note:</b> <b>Used together with ENGINE SUPPORT BRACKET (41099AA012).</b>
 ST73099SG000	73099SG000	SPECIAL TOOL CONDENSER	Used for removing and installing the test plug (transfer clutch pressure). <b>Note:</b> <b>Used together with SOCKET (18270AA040).</b>
 STSSM4	—	SUBARU SELECT MONITOR 4	Used for setting of each function and troubleshooting for electrical system. <b>Note:</b> <ul style="list-style-type: none"> <li>• For detailed operation procedures, refer to "Help" of application.</li> <li>• Used together with interface for Subaru Select Monitor (such as DST-i and DST-010).</li> </ul>

## 2. OTHER

	REMARKS
Oil pan seal cutter	Used for removing oil pan.
Circuit tester	Used for measuring resistance, voltage and current.
Thickness gauge	Used for various inspections.
Caliper	Used for measuring the dimension.
Spring scale	Used for measuring the initial load of the drive pinion.
Micrometer	Used for adjusting the drive pinion shim.
TORX® E10	Used for removing and installing the stud bolts.
TORX® T70	Used for removing and installing the drain plug.
Ko-ken 3/8 12-point 27 mm deep socket (part No. 3305M-27)	Used for removing and installing the secondary pressure sensor.
Angle gauge	Used for installing the drive plate.

	<b>REMARKS</b>
Dial gauge	<ul style="list-style-type: none"> <li>• Used for measuring backlash. (Lever type)  <div style="border: 1px solid black; padding: 2px; margin-top: 5px;"> <b>Note:</b>  <b>Used together with magnet stand.</b> </div> </li> <li>• Used for measuring clutch clearance. (Spindle type)  <div style="border: 1px solid black; padding: 2px; margin-top: 5px;"> <b>Note:</b>  <b>Used together with magnet stand.</b> </div> </li> </ul>
Magnet stand	<ul style="list-style-type: none"> <li>• Used for measuring backlash.  <div style="border: 1px solid black; padding: 2px; margin-top: 5px;"> <b>Note:</b>  <b>Used together with the dial gauge (lever type).</b> </div> </li> <li>• Used for measuring clutch clearance.  <div style="border: 1px solid black; padding: 2px; margin-top: 5px;"> <b>Note:</b>  <b>Used together with the dial gauge (spindle type).</b> </div> </li> </ul>

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > CVTF

### INSPECTION

**Caution:**

- When inspecting CVTF level, observe the specified CVTF temperature.
- Do not add CVTF at a cold condition since the oil may blow out.

**Note:**

When there is no severe conditions or intrusion of water, etc., replacement of CVTF is unnecessary.

1. Prepare the CVTF for refilling.
2. Connect the Subaru Select Monitor.
3. Turn the ignition switch to ON. (Engine OFF)
4. Display [ATF Temp.].
5. Start the engine and raise [ATF Temp.] to 35 – 45 °C (95 – 113 °F).

**Caution:**

Make sure to perform the CVTF level inspection within [ATF Temp.] of 35 – 45 °C (95 – 113 °F).

6. Operate the select lever in P → R → N → D and D → N → R → P to circulate CVTF with the engine idling.
7. With the engine idling, lift up the vehicle and remove the filler plug.

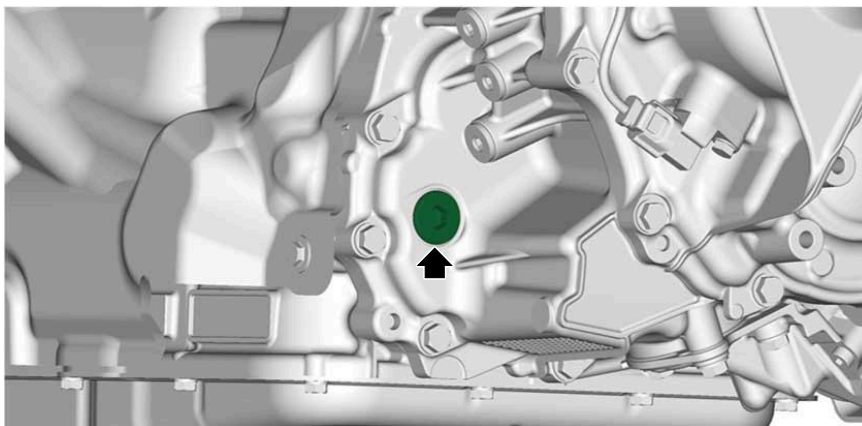
**Caution:**

Prepare a container for draining of CVTF.

**Note:**

CVTF is at the specified level when it is up to the bottom of the filler plug hole.

BWT\*AU



CVT12047

8. If the CVTF level is below the bottom of the filler plug hole, check for oil leakage, and add specified CVTF.

**Caution:**

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

**Preparation items:**

CVTF:  [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>General Description>SPECIFICATION > CVTF.](#)

9. Using a new gasket, install the filler plug.

**Tightening torque:**

50 N·m (5.1 kgf-m, 36.9 ft-lb)

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > CVTF

### REPLACEMENT

**Caution:**

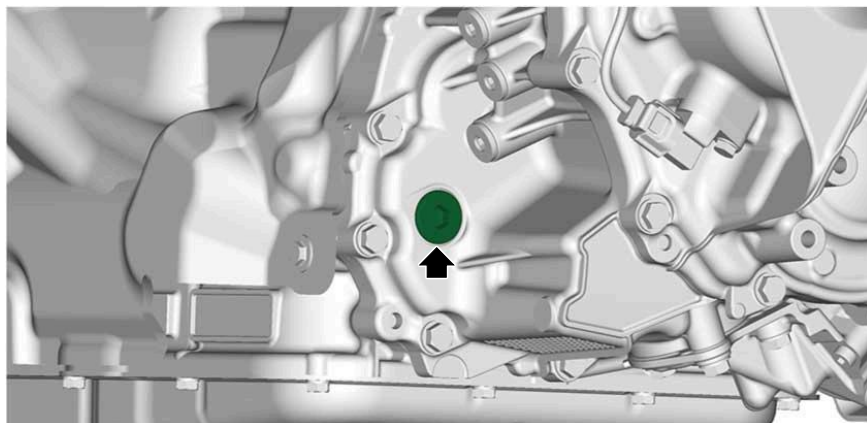
Vehicle components are extremely hot immediately after driving. Be wary of receiving burns from heated parts.

**Note:**

When there is no severe conditions or intrusion of water, etc., replacement of CVTF is unnecessary.

1. Remove the filler plug.

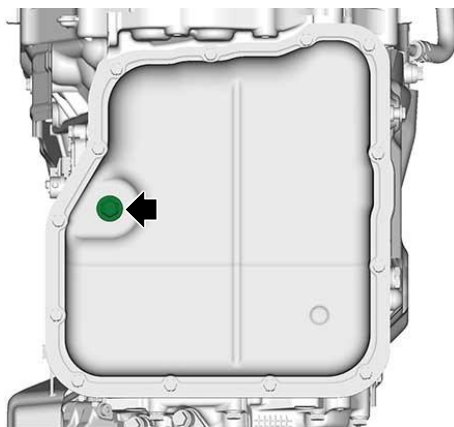
BWT\*AU



CVT12047

- Remove the drain plug to drain CVTF.

BWT\*AU



CVT12048

- Check the CVTF condition.

**Note:**

**Determine the condition inside the transmission by inspecting the drained CVTF.**

CVTF condition	Trouble and possible cause	Corrective action
Metal particles.	Excessive wear of the internal of the transmission body.	Replace CVTF and check if the transmission body operates correctly.
Thick and varnish-form fluid.	Burnt clutches.	Replace CVTF and check if the transmission body operates correctly.
The fluid is cloudy.	Water is mixed in the fluid.	<ul style="list-style-type: none"> <li>Replace CVTF and check if the transmission body operates correctly.</li> <li>Check the water entering point.</li> </ul>

- Install the drain plug using a new gasket.

**Tightening torque:**

39.2 N·m (4.0 kgf-m, 28.9 ft-lb)

- Pour CVTF to the bottom end of filler plug hole.

**Caution:**

**Always use specified CVTF. Using fluid other than specified CVTF will cause malfunction.**

**Preparation items:**

CVTF:  Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>General Description>SPECIFICATION > CVTF.

6. Temporarily install the filler plug.
7. Check the CVTF level.  [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>CVTF>INSPECTION.](#)

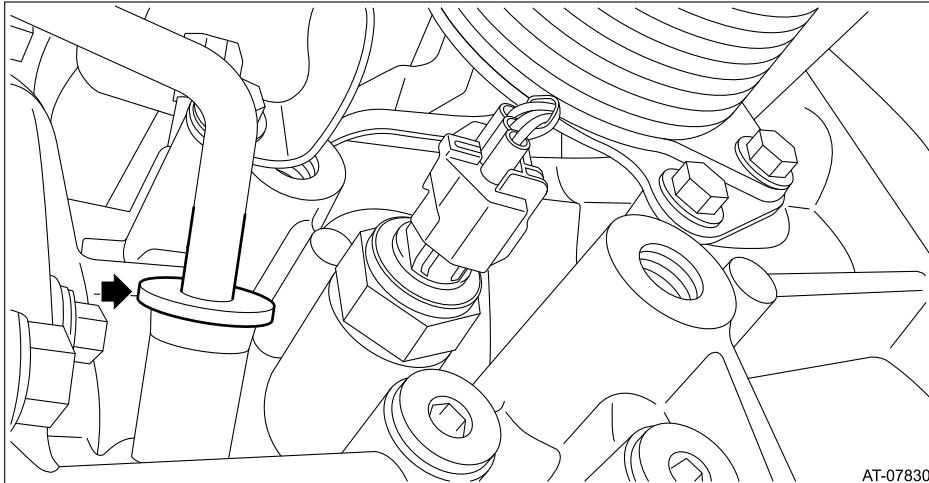
## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Differential Gear Oil

### INSPECTION

#### Caution:

Vehicle components are extremely hot immediately after driving. Be wary of receiving burns from heated parts.

1. Remove the oil charge pipe cap.

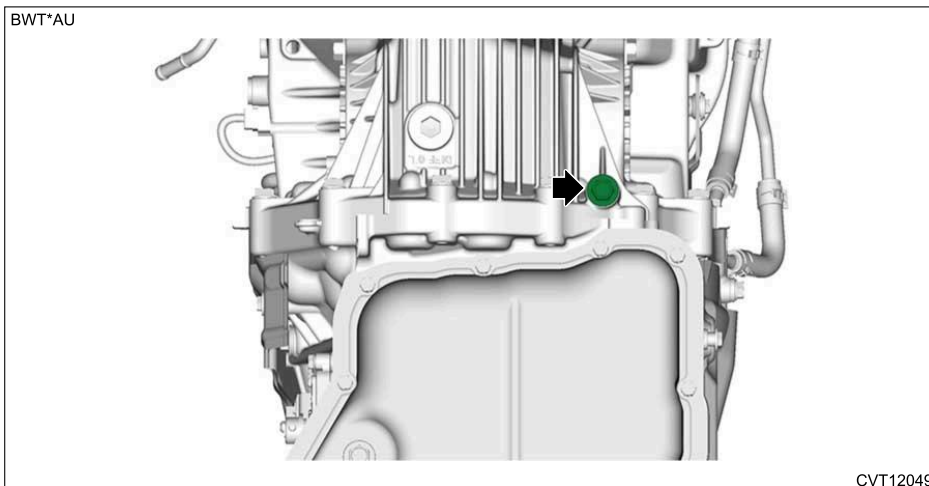


2. Remove the overflow plug.

#### Note:

Though immediately after removing the overflow plug, differential gear oil (approx. 8 cc) remaining in the overflow pipe may come out, this does not indicate that the specified amount is reached.

When checking the differential gear oil level, be sure to fill with the differential gear oil and check that the differential gear oil flows out of the overflow plug hole.



3. Fill it with differential gear oil through the oil charge pipe, and let the oil flow out of the overflow plug hole.

#### Preparation items:

Differential gear oil:  [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>General Description>SPECIFICATION > DIFFERENTIAL GEAR OIL.](#)

4. When the flow of the differential gear oil turns into a narrow stream, install the overflow plug using a new gasket.

#### Tightening torque:

35 N·m (3.6 kgf-m, 25.8 ft-lb)

5. Install the oil charge pipe cap with a new O-ring.

#### Note:

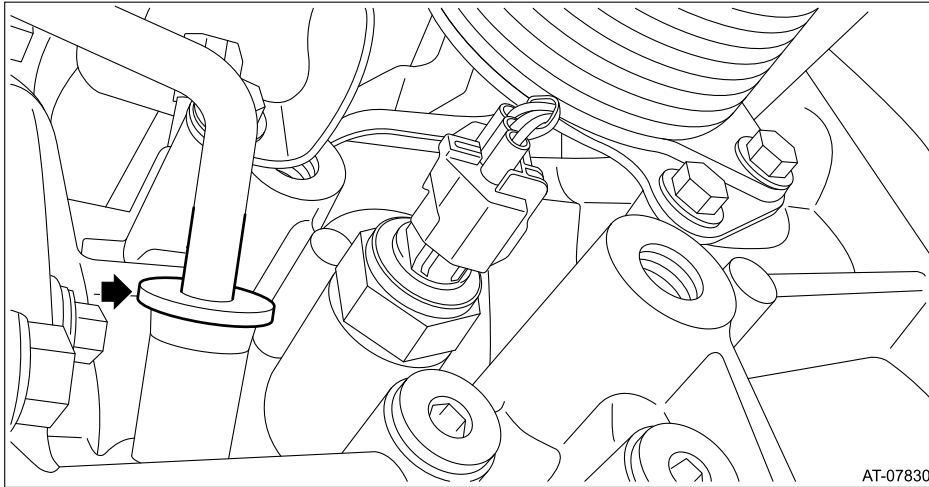
Apply CVTF to the O-rings.

## REPLACEMENT

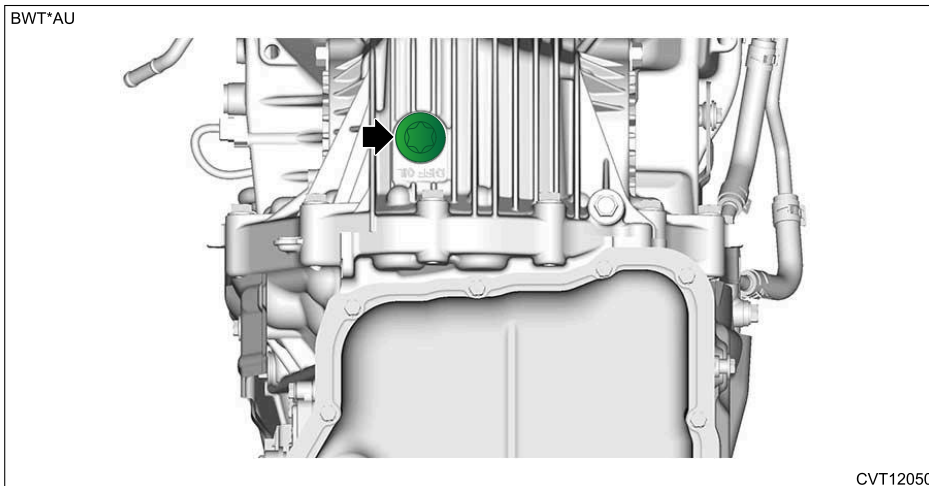
### Caution:

Vehicle components are extremely hot immediately after driving. Be wary of receiving burns from heated parts.

1. Remove the oil charge pipe cap.



2. Drain the differential gear oil by removing drain plug using TORX® T70.



3. Remove the iron powder, etc. from the drain plug.
4. Attach the drain plug using a new gasket, using TORX® T70.


#### Tightening torque:

70 N·m (7.1 kgf-m, 51.6 ft-lb)

5. Fill with differential gear oil through the oil charge pipe.

#### Preparation items:

Differential gear oil:  [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>General Description>SPECIFICATION > DIFFERENTIAL GEAR OIL.](#)

6. Check the differential gear oil level.  [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Differential Gear Oil>INSPECTION.](#)
7. Install the oil charge pipe cap with a new O-ring.

#### Note:

Apply CVTF to the O-rings.


## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Variator Chain Break-in

### PROCEDURE

#### Caution:

- When replacing the variator chain, primary pulley and secondary pulley, perform the variator chain break-in.
- Do not turn the power of the Subaru Select Monitor OFF during work, and do not disconnect the data link connector.

#### 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 COMMON \(DIAGNOSTICS\)>Clear memory>OPERATION.](#)
- If the above malfunction code is detected during variator chain break-in, the system enters into fail-safe 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.
- Make sure that safety is secured where the tiers rotate.

2. Connect the Subaru Select Monitor.
3. Turn the ignition switch to ON. (Engine OFF)
4. Display [ATF Temp.].
5. Apply the parking brake.
6. Start the engine.
7. Raise [ATF Temp.] to 40 – 50 °C (104 – 122 °F).

#### Note:

When the [ATF Temp.] does not rise easily or if you want to rise the [ATF Temp.] faster, maintain the engine speed within 2,000 – 2,500 r/min at "P range" or "N range" to raise the [ATF Temp.].

8. With the select lever in "P" range, increase the engine speed to 3,000 – 3,500 r/min, and maintain the speed for approximately five seconds, then release the accelerator pedal.
9. Depress the accelerator pedal gradually again to increase the engine speed to 3,000 – 3,500 r/min, maintain the speed for approximately five seconds, then release the accelerator pedal.
10. Release the parking brake.
11. Shift the select lever into manual mode and set to 1st.
12. Depress the accelerator pedal gradually, and increase the engine speed to 5,300 r/min.

#### Note:

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

13. Release the accelerator pedal to fully closed position to lower the engine speed to 4,000 r/min.
14. Depress the accelerator pedal gradually again, and increase the engine speed to 5,300 r/min.
15. Repeat procedures 13 and 14 for 40 times.
16. Release the accelerator pedal.
17. Depress the brake pedal to stop the tire rotation.
18. Shift the select lever to "P range".
19. Apply the parking brake.

## INSPECTION

**Caution:**

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

### 1. D RANGE SHIFT FUNCTION

1. Connect the Subaru Select Monitor.

**Caution:**

**Make sure to route the Subaru Select Monitor wires so that they do not disturb the driving.**

2. Turn the ignition switch to ON. (Engine OFF)
3. Display [Vehicle Speed] and [Actual Gear Ratio].
4. Start the engine.
5. 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 up to 1/4 of accelerator opening angle.
6. While the vehicle gradually decelerates from the condition in step 5 and finally stops, check that [Actual Gear Ratio] changes smoothly according to [Vehicle Speed].

**Caution:**

**Make sure to get an assistant on the vehicle and have the person read the data.**

### 2. KICK-DOWN FUNCTION

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

### 3. ENGINE BRAKE OPERATION

- Drive in "8th speed of manual mode" [90 – 100 km/h (56 – 62 MPH)], and shift down from 8th to 7th. Check if the indicator of combination meter switches "8" → "7", and the engine braking applies.
- Drive in "7th speed of manual mode" [80 – 90 km/h (50 – 56 MPH)], and shift down from 7th to 6th. Check if the indicator of combination meter switches "7" → "6", and the engine braking applies.
- 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", and the engine braking applies.
- 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", and the engine braking applies.
- 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", and the engine braking applies.
- 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", and the engine braking applies.
- 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", and the engine braking applies.

### 4. LOCK-UP FUNCTION

When the accelerator pedal is lightly depressed from the condition where the vehicle is driven on a flat road in "D range" at a constant speed of 50 km/h (31 MPH) or more, check that rpm does not change abruptly.

### 5. P RANGE OPERATION

**Warning:**

**Confirm safety in the vicinity and make sure no person is around the vehicle.**

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

**Caution:**

**Release the parking brake while being prepared to depress the brake pedal anytime.**

### 6. NOISE AND VIBRATION

Check that noise and vibration do not occur during driving at a constant speed, accelerating, decelerating and manual shift operation.




## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Stall Test

### INSPECTION

**Warning:**

**During the stall test, confirm safety in the vicinity and make sure no person is around the vehicle.**

Purposes of the stall test:

- Operational check of forward clutch and reverse brake
  - Operational check of the torque converter
  - Engine performance check
- 1.** Check the engine oil level.  [Ref. to LUBRICATION\(H4DOTC\)>Engine Oil>INSPECTION.](#)
  - 2.** Check the engine coolant level.  [Ref. to COOLING\(H4DOTC\)>Engine Coolant>INSPECTION.](#)
  - 3.** Connect the Subaru Select Monitor.
  - 4.** Turn the ignition switch to ON. (Engine OFF)
  - 5.** Display [ATF Temp.] and [Engine Speed].
  - 6.** Turn off all systems causing an electrical load, such as headlights, A/C, seat heater and rear defogger.
  - 7.** Apply the parking brake.
  - 8.** Start the engine.
  - 9.** Turn OFF the pre-collision brake function.
  - 10.** Check the CVTF level.  [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>CVTF>INSPECTION.](#)
  - 11.** Warm up until [ATF Temp.] reaches to 60 — 80 °C (140 — 176 °F).
  - 12.** Place wheel chocks at the front and rear of all wheels.
  - 13.** Shift the select lever to "D range".
  - 14.** Depress the accelerator pedal to the full while fully depressing the brake pedal with your left foot.

**Caution:**

- **Do not perform the stall test for five seconds or more at a time.**  
**Failure to follow this instruction may accelerate the engine oil and CVTF deterioration and affect the engine and transmission adversely.**
- **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 transmission from sustaining damage.**

- 15.** When the engine speed stabilizes, quickly record [Engine Speed] and release accelerator pedal.

**Standard:**

2,010 — 2,510 r/min

**Stall test judgment**

<b>Stall speed (at sea level)</b>	<b>Range</b>	<b>Probable cause</b>
Lower than standard value	D	<ul style="list-style-type: none"><li>• Insufficient engine output</li><li>• Torque converter malfunction</li></ul>
Higher than standard value		<ul style="list-style-type: none"><li>• Forward clutch slippage</li><li>• Secondary pressure is low</li><li>• Variator chain malfunction</li><li>• Torque converter malfunction</li><li>• Control valve body malfunction</li><li>• TCM malfunction</li><li>• Damaged harness and harness connector</li></ul>

**16.** Shift the select lever to "N range", and idle the engine for one minute or more.

**17.** Shift the select lever to "R range" and perform the stall test in the same manner.

**Standard:**

2,010 — 2,510 r/min

**Stall test judgment**

<b>Stall speed (at sea level)</b>	<b>Range</b>	<b>Probable cause</b>
Lower than standard value	R	<ul style="list-style-type: none"><li>• Insufficient engine output</li><li>• Torque converter malfunction</li></ul>
Higher than standard value		<ul style="list-style-type: none"><li>• Reverse brake slippage</li><li>• Secondary pressure is low</li><li>• Variator chain malfunction</li><li>• Torque converter malfunction</li><li>• Control valve body malfunction</li><li>• TCM malfunction</li><li>• Damaged harness and harness connector</li></ul>

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Time Lag Test

### INSPECTION

**Note:**

**When the select lever is shifted while idling, there will be a certain time elapse or lag before shock is felt.**

1. Connect the Subaru Select Monitor.
2. Turn the ignition switch to ON. (Engine OFF)
3. Display [ATF Temp.].
4. Start the engine.
5. Warm up until [ATF Temp.] reaches to 60 — 80 °C (140 — 176 °F).
6. Turn off all systems causing an electrical load, such as headlights, A/C, seat heater and rear defogger.
7. Apply the parking brake.
8. Shift the select lever from "N range" to "D range", and measure the time elapsed from shifting the lever until the shock is felt.

**Note:**

- **Make three measurements and calculate the average value.**
- **Be sure to allow one minute or more interval between tests.**

**Specification:**

1.2 seconds or less

If time lag is longer than specified:

- Secondary pressure is too low
  - Forward clutch is worn
  - Forward clutch piston malfunction
  - Control valve body malfunction
  - Learning is incomplete
9. Shift the select lever from "N range" to "R range", and measure the time elapsed from shifting the lever until the shock is felt.

**Specification:**

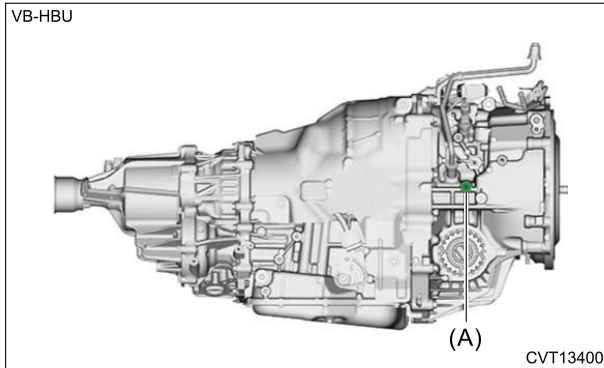
1.5 seconds or less

If time lag is longer than specified:

- Secondary pressure is too low
- Reverse brake is worn
- Reverse brake piston malfunction
- Control valve body malfunction
- Learning is incomplete

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Secondary Pressure Test

### LOCATION



(A) Test plug (secondary pressure)

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Secondary Pressure Test

### INSPECTION

#### Warning:

**During the secondary pressure test, confirm safety in the vicinity and make sure no person is around the vehicle.**

#### Caution:

**Vehicle components are extremely hot immediately after driving. Be wary of receiving burns from heated parts.**

1. Check the engine oil level. [Ref. to LUBRICATION\(H4DOTC\)>Engine Oil>INSPECTION.](#)
2. Check the engine coolant level. [Ref. to COOLING\(H4DOTC\)>Engine Coolant>INSPECTION.](#)
3. Remove the front wheel RH. [Ref. to WHEEL AND TIRE SYSTEM>Tire and Wheel>REMOVAL.](#)
4. Remove the crossmember support rear RH. [Ref. to FRONT SUSPENSION>Crossmember Support>REMOVAL.](#)
5. Remove the test plug (secondary pressure), and install ST1, ST2 and ST3.

#### Caution:

- Due to flowing out of CVTF, quickly install the ST1, ST2 and ST3.
- Be careful when setting the tool so that the ST3 does not touch the exhaust pipe.
- Prepare the container for draining of CVTF.

#### Note:

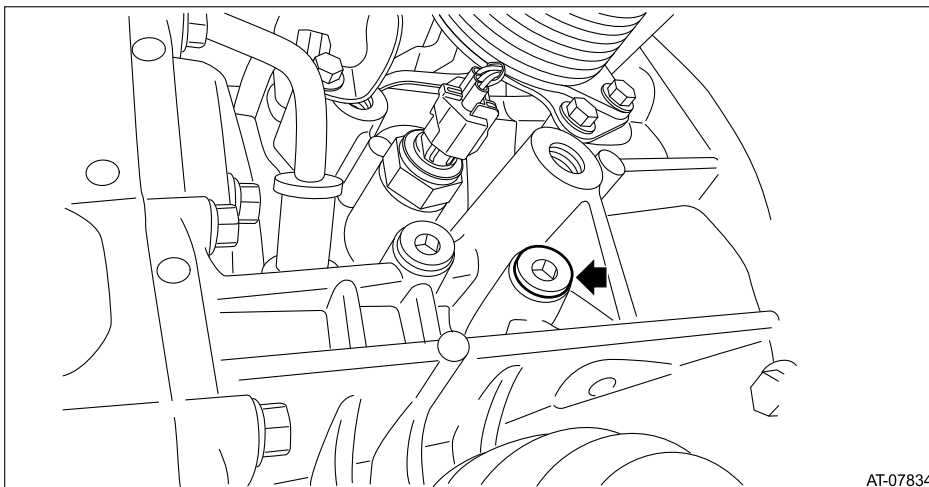
- Use the ST2 with genuine O-ring (part No. 806911080) attached.

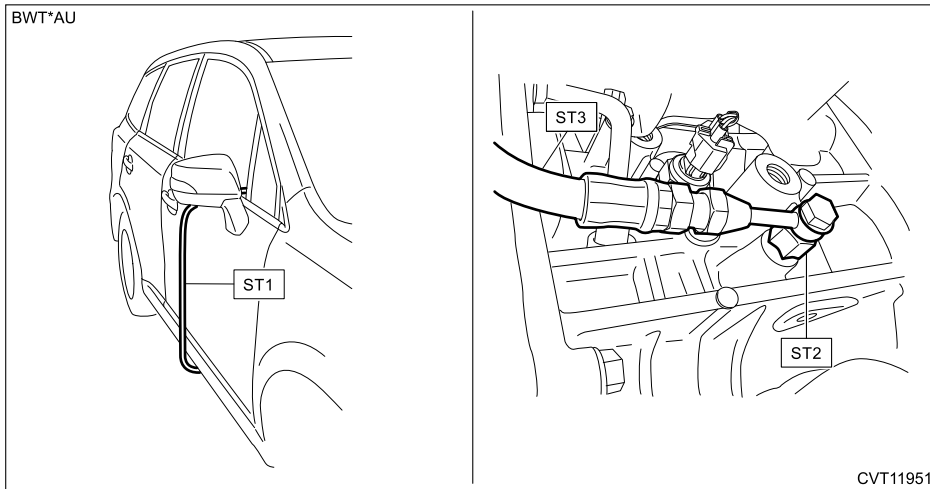
#### Preparation tool:



ST1: OIL PRESSURE GAUGE ASSY (18801AA000)

ST2: PRESSURE GAUGE ADAPTER (18681AA000)

ST3: OIL PRESSURE ADAPTER SET (498897700)





6. Set the gauge so that it can be seen from the driver's seat.
7. Connect the Subaru Select Monitor.
8. Turn the ignition switch to ON. (Engine OFF)
9. Display [ATF Temp.].
10. Turn off all systems causing an electrical load, such as headlights, A/C, seat heater and rear defogger.
11. Apply the parking brake.
12. Start the engine.
13. Turn OFF the pre-collision brake function.
14. Check the CVTF level.  [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>CVTF>INSPECTION.](#)
15. Warm up until [ATF Temperature] reaches to 60 – 80 °C (140 – 176 °F).
16. Install the front wheel RH.  [Ref. to WHEEL AND TIRE SYSTEM>Tire and Wheel>INSTALLATION.](#)
17. Place wheel chocks at the front and rear of all wheels.
18. Shift the select lever to "D range".

**Note:**

**This procedure is necessary for correct measurement.**

19. Shift the select lever to "P range".
20. Record the secondary pressure with the engine idling.

**Specification:**

0.3 – 1.5 MPa (3.1 – 15.3 kgf/cm<sup>2</sup>, 44 – 218 psi)

21. Shift the select lever to "D range".
22. Depress the accelerator pedal to the full while fully depressing the brake pedal with your left foot.

**Caution:**

**Do not perform this procedure for 5 seconds or more at a time.**

23. When the engine speed stabilizes, quickly record the secondary pressure and release the accelerator pedal.


**Specification:**

4.5 – 6.0 MPa (45.9 – 61.2 kgf/cm<sup>2</sup>, 652 – 870 psi)

24. Shift the select lever to "N range", and idle the engine for one minute or more.
25. Shift the select lever to "R range" and perform the secondary pressure test in the same manner.

**Specification:**

4.5 – 6.0 MPa (45.9 – 61.2 kgf/cm<sup>2</sup>, 652 – 870 psi)

26. Remove the front wheel RH.  [Ref. to WHEEL AND TIRE SYSTEM>Tire and Wheel>REMOVAL.](#)
27. Remove the STs (OIL PRESSURE GAUGE ASSY, PRESSURE GAUGE ADAPTER and OIL PRESSURE ADAPTER SET), and then install the test plug (secondary pressure) using a new O-ring.

**Caution:**




- **Because the CVTF will flow out, install the test plug (secondary pressure) quickly.**
- **Prepare the container for draining of CVTF.**

**Note:**

**Apply CVTF to the O-rings.**

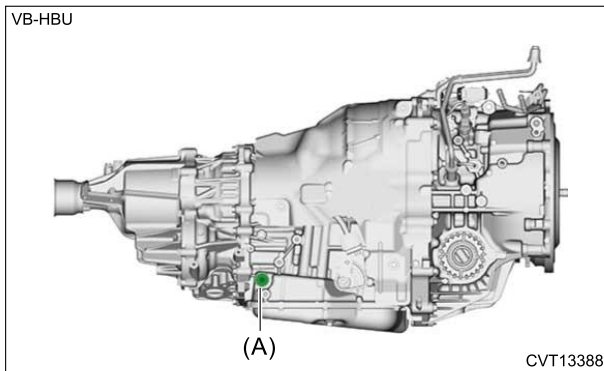
**Tightening torque:**

25 N·m (2.5 kgf·m, 18.4 ft·lb)

- 28.** Check the CVTF level.  [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>CVTF>INSPECTION.](#)
- 29.** Install the crossmember support rear RH.  [Ref. to FRONT SUSPENSION>Crossmember Support>INSTALLATION.](#)
- 30.** Install the front wheel RH.  [Ref. to WHEEL AND TIRE SYSTEM>Tire and Wheel>INSTALLATION.](#)

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Line Pressure Test

### LOCATION



(A) Test plug (line pressure)

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Line Pressure Test



### INSPECTION

#### Warning:

**During the line pressure test, confirm safety in the vicinity and make sure no person is around the vehicle.**

#### Caution:

**Vehicle components are extremely hot immediately after driving. Be wary of receiving burns from heated parts.**

1. Check the engine oil level.  [Ref. to LUBRICATION\(H4DOTC\)>Engine Oil>INSPECTION.](#)
2. Check the engine coolant level.  [Ref. to COOLING\(H4DOTC\)>Engine Coolant>INSPECTION.](#)
3. Remove the test plug (line pressure), and install ST1, ST2 and ST3.

#### Caution:

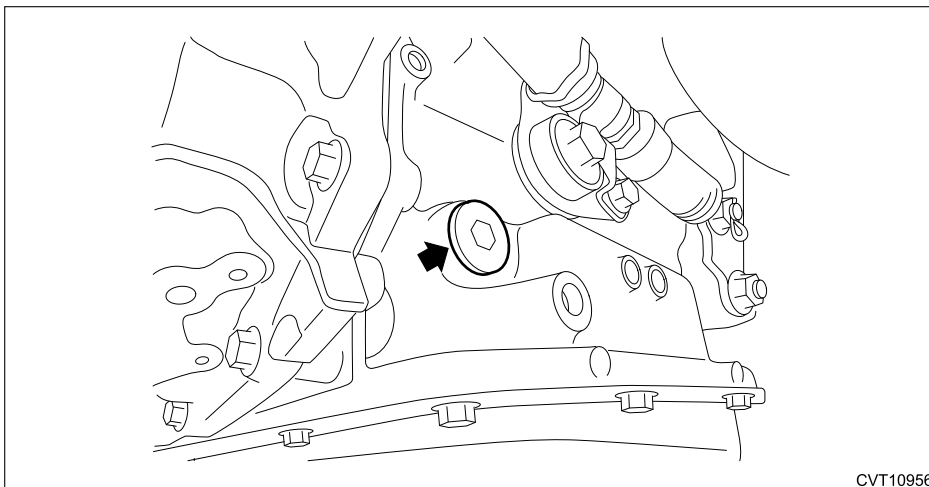
- Due to flowing out of CVTF, quickly install the ST1, ST2 and ST3.
- Be careful when setting the tool so that the ST3 does not touch the exhaust pipe.
- Prepare a container for draining of CVTF.

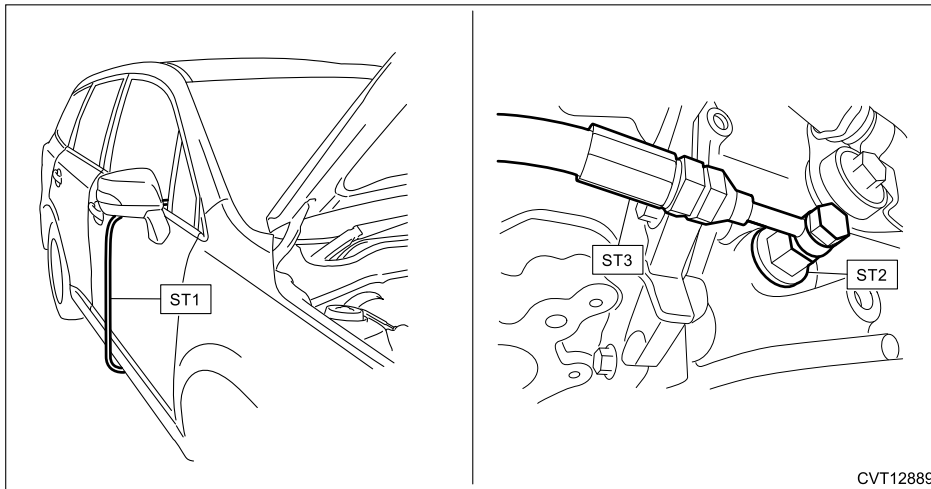
#### Note:

**Use the ST2 with genuine O-ring (part No. 806916050) attached.**

#### Preparation tool:

- ST1: OIL PRESSURE GAUGE ASSY (18801AA000)
- ST2: PRESSURE GAUGE ADAPTER (18681AA010)
- ST3: OIL PRESSURE ADAPTER SET (498897700)





4. Set the gauge so that it can be seen from the driver's seat.
5. Connect the Subaru Select Monitor.
6. Turn the ignition switch to ON. (Engine OFF)
7. Display [ATF Temp.].
8. Turn off all systems causing an electrical load, such as headlights, A/C, seat heater and rear defogger.
9. Apply the parking brake.
10. Start the engine.
11. Turn OFF the pre-collision brake function.
12. Check the CVTF level. [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>CVTF>INSPECTION.](#)
13. Warm up until [ATF Temperature] reaches to 60 — 80 °C (140 — 176 °F).
14. Place wheel chocks at the front and rear of all wheels.
15. Shift the select lever to "D range".

**Note:**

**This procedure is necessary for correct measurement.**

16. Shift the select lever to "P range".
17. Record the line pressure with the engine idling.

**Specification:**

0.5 — 1.5 MPa (5.1 — 15.3 kgf/cm<sup>2</sup>, 72 — 218 psi)

18. Shift the select lever to "D range".
19. Depress the accelerator pedal to the full while fully depressing the brake pedal with your left foot.

**Caution:**

**Do not perform this procedure for 5 seconds or more at a time.**

20. When the engine speed stabilizes, quickly record the line pressure and release the accelerator pedal.

**Specification:**

4.5 — 6.0 MPa (45.9 — 61.2 kgf/cm<sup>2</sup>, 652 — 870 psi)

21. Shift the select lever to "N range", and idle the engine for one minute or more.
22. Shift the select lever to "R range" and perform the line pressure test in the same manner.

**Specification:**

4.5 — 6.0 MPa (45.9 — 61.2 kgf/cm<sup>2</sup>, 652 — 870 psi)

23. Remove the STs (OIL PRESSURE GAUGE ASSY, PRESSURE GAUGE ADAPTER and OIL PRESSURE ADAPTER SET), and then install the test plug (line pressure) using a new O-ring.

**Caution:**

- Because the CVTF will flow out, install the test plug (line pressure) quickly.
- Prepare a container for draining of CVTF.

**Note:**

**Apply CVTF to the O-rings.**

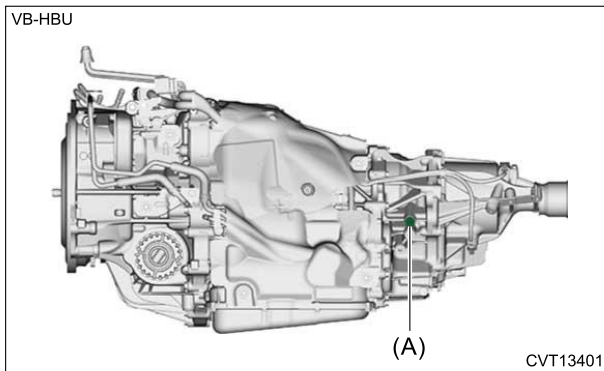
**Tightening torque:**

50 N·m (5.1 kgf-m, 36.9 ft-lb)

24. Check the CVTF level. [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>CVTF>INSPECTION.](#)

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Transfer Clutch Pressure Test

### LOCATION



- (A) Test plug (transfer clutch pressure)

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Transfer Clutch Pressure Test

### INSPECTION

#### Warning:

During the transfer clutch pressure test, confirm safety in the vicinity and make sure no person is around the vehicle.

#### Caution:

Vehicle components are extremely hot immediately after driving. Be wary of receiving burns from heated parts.

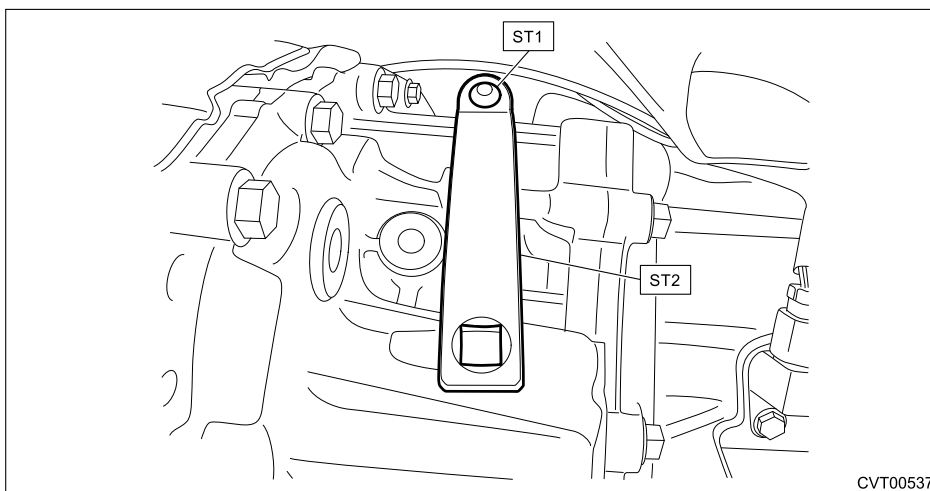
1. Check the engine oil level. Ref. to LUBRICATION(H4DOTC)>Engine Oil>INSPECTION.
2. Check the engine coolant level. Ref. to COOLING(H4DOTC)>Engine Coolant>INSPECTION.
3. Remove the test plug (transfer clutch pressure) using ST1 and ST2.

#### Caution:

Prepare the container for draining of CVTF.

#### Preparation tool:

- ST1: SOCKET (18270AA040)  
ST2: SPECIAL TOOL CONDENSER (73099SG000)



4. Set the ST1, ST2, ST3 and ST4.

#### Caution:

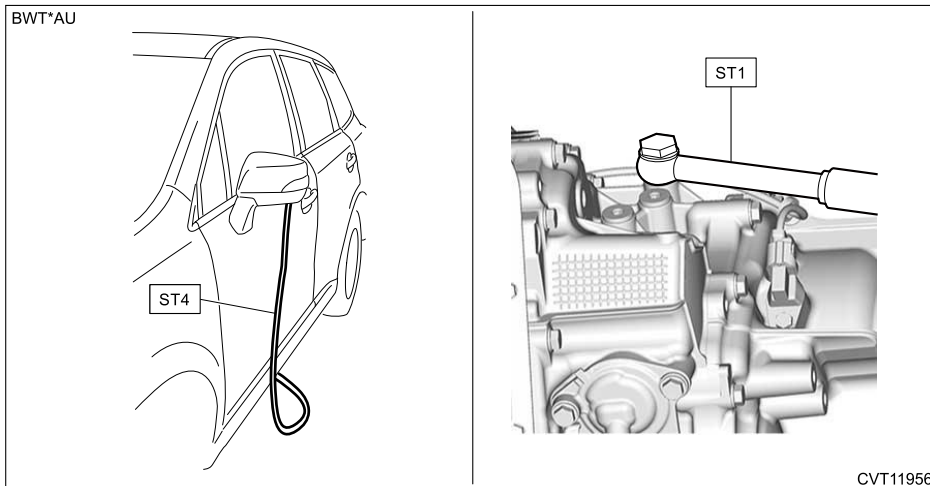
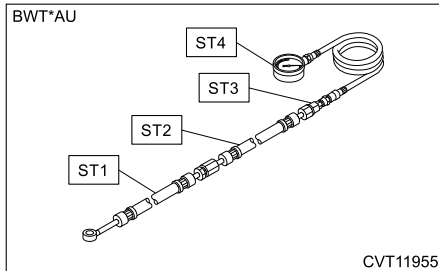
Be careful when setting the tools so that the ST1 and ST2 do not touch the exhaust pipe.


**Note:**

- Use ST1 with genuine union screw (part No. 801914010) and gasket (part No. 803914060) attached.
- Use the ST3 with genuine O-ring (part No. 806911080) attached.
- Use the ST4 with genuine O-ring (part No. 806908150) attached.

**Preparation tool:**

- ST1: ADAPTER HOSE B (34099AC020)  
ST2: ADAPTER HOSE A (34099AC010)  
ST3: PRESSURE GAUGE ADAPTER (18681AA000)  
ST4: OIL PRESSURE GAUGE ASSY (498575400)



5. Set the gauge so that it can be seen from the driver's seat.
6. Connect the Subaru Select Monitor.
7. Turn the ignition switch to ON. (Engine OFF)
8. Display [ATF Temp.] and [AWD. Sol. Set Current].
9. Turn off all systems causing an electrical load, such as headlights, A/C, seat heater and rear defogger.
10. Apply the parking brake.
11. Start the engine.
12. Turn OFF the pre-collision brake function.
13. Check the CVTF level.  [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>CVTF>INSPECTION.](#)
14. Warm up until [ATF Temp.] reaches to 60 — 80 °C (140 — 176 °F).
15. Place wheel chocks at the front and rear of all wheels.
16. Record the transfer clutch pressure with the engine idling.

**Specification:**

0 kPa (0 kgf/cm<sup>2</sup>, 0 psi)

17. Shift the select lever to "D range".
18. While fully depressing the brake pedal with your left foot, depress the accelerator pedal until [AWD. Sol. Set Current] becomes 600 mA.

**Caution:**

**Do not perform this procedure for 5 seconds or more at a time.**

19. When the engine speed stabilizes, quickly record the transfer clutch pressure, and release the accelerator pedal.

**Specification:**

400 — 700 kPa (4.1 — 7.1 kgf/cm<sup>2</sup>, 58 — 102 psi)

- 20. Shift the select lever to "N range", and idle the engine for one minute or more.
- 21. Shift the select lever to "D range".
- 22. Depress the accelerator pedal to the full while fully depressing the brake pedal with your left foot.

**Caution:**  
**Do not perform this procedure for 5 seconds or more at a time.**

- 23. When the engine speed stabilizes, quickly record the transfer clutch pressure, and release the accelerator pedal.

**Specification:**  
 1,100 – 1,400 kPa (11.2 – 14.3 kgf/cm<sup>2</sup>, 160 – 203 psi)

- 24. Shift the select lever to "N range", and idle the engine for one minute or more.
- 25. Remove the STs (ADAPTER HOSE B, ADAPTER HOSE A, PRESSURE GAUGE ADAPTER and OIL PRESSURE GAUGE ASSY), and temporarily install the test plug (transfer clutch pressure) using a new O-ring.

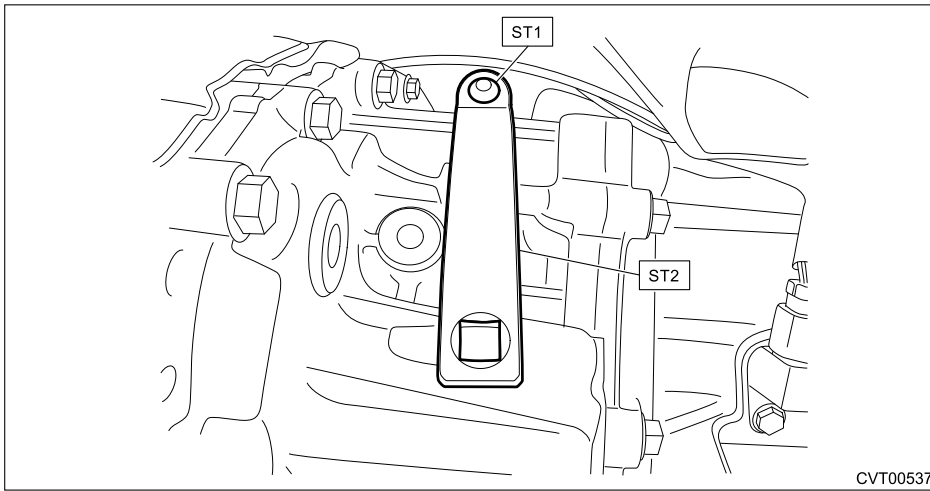
**Note:**  
**Apply CVTF to the O-rings.**

- 26. Tighten the test plug (transfer clutch pressure) using ST1 and ST2.

**Preparation tool:**  
 ST1: SOCKET (18270AA040)  
 ST2: SPECIAL TOOL CONDENSER (73099SG000)

**Tightening torque:**

Calculation formula
$T = 25 \text{ N}\cdot\text{m} (2.5 \text{ kgf}\cdot\text{m}, 18.4 \text{ ft}\cdot\text{lb}) \times L / (100 \text{ mm} (3.94 \text{ in}) + L)$
T: Tightening torque
L: Effective length of torque wrench
<p><b>Note:</b>  <b>If the effective length of the torque wrench used is unknown, consult the manufacturer of the torque wrench.</b></p>
CO-03173
<p>(a) Effective length of the ST2 (100 mm (3.94 in))          (b) Effective length of the torque wrench (L)          (c) Center of drive square of the ST2          (d) Center of drive square of the torque wrench          (e) Center of the position where a force is applied by hand</p>



CVT00537

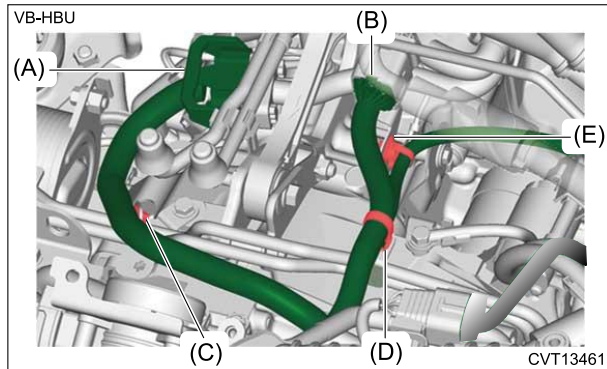
**27.** Check the CVTF level.  Ref. to [CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>CVTF>INSPECTION.](#)

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Transmission Assembly

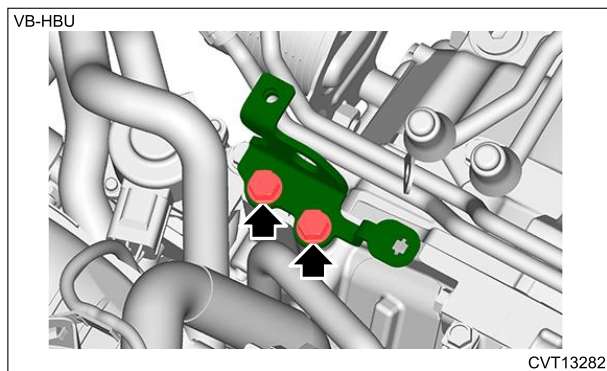
### REMOVAL



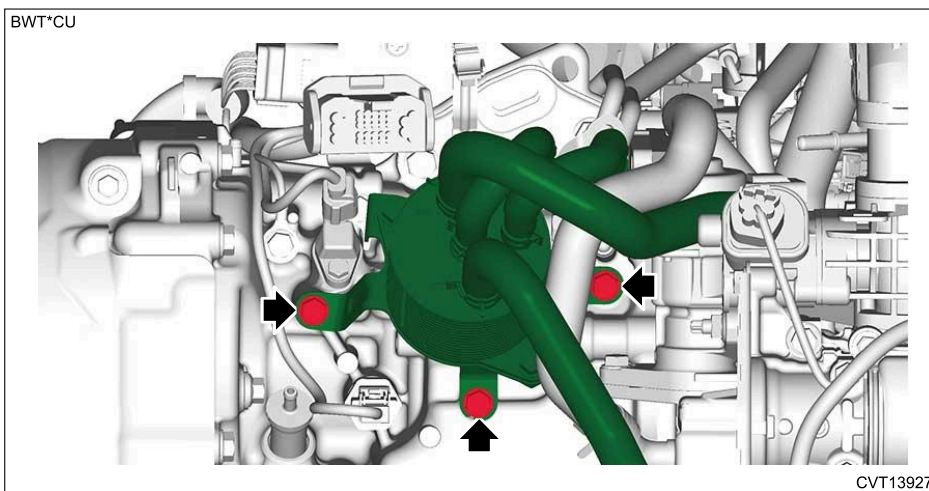
1. Release the parking brake.
2. Disconnect the ground terminal from battery sensor. [Ref. to REPAIR CONTENTS>NOTE > BATTERY.](#)
3. Release the shift lock and shift the select lever to the "N range". [Ref. to CONTROL SYSTEMS>Select Lever>REMOVAL.](#)
4. Remove the air intake duct. [Ref. to INTAKE \(INDUCTION\)\(H4DOTC\)>Air Intake Duct>REMOVAL.](#)
5. Remove the intercooler. [Ref. to INTAKE \(INDUCTION\)\(H4DOTC\)>Intercooler>REMOVAL.](#)
6. Disconnect the connector (A) and connector (B), and remove the clip (C), clip (D) and clip (E).



7. Remove the engine rear hanger.



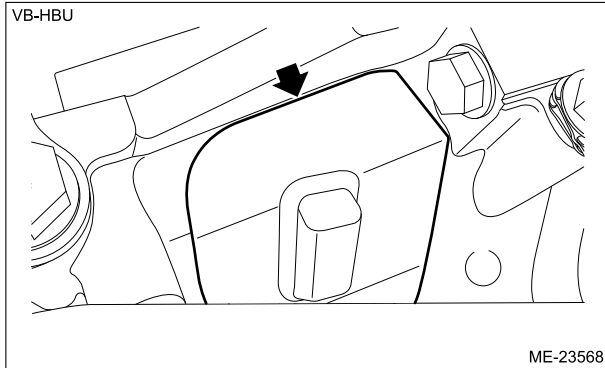
8. Remove the pitching stopper and pitching stopper bracket. [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Transmission Mounting System>REMOVAL > PITCHING STOPPER.](#)
9. Disconnect the CVTF cooler (with warmer feature), and move it aside so that it does not interfere with the operation.



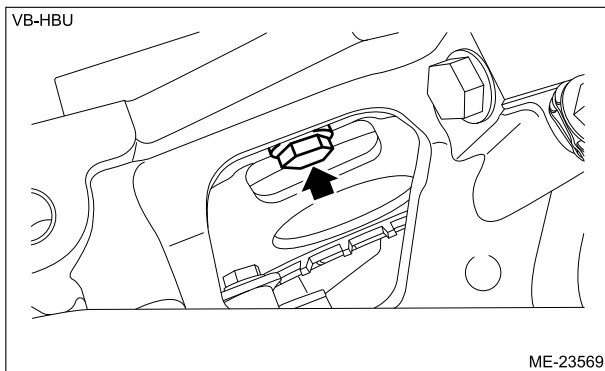
10. Remove the starter. [Ref. to STARTING/CHARGING SYSTEMS\(H4DOTC\)>Starter>REMOVAL.](#)

**11.** Separate the torque converter from drive plate.

(1) Remove the plug from the service hole.



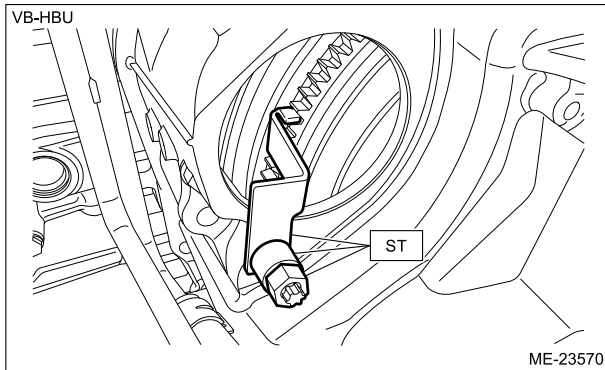
(2) Insert the wrench into the crank pulley bolt, and rotate the crank pulley to remove the bolts (4 places) securing the torque converter to the drive plate.



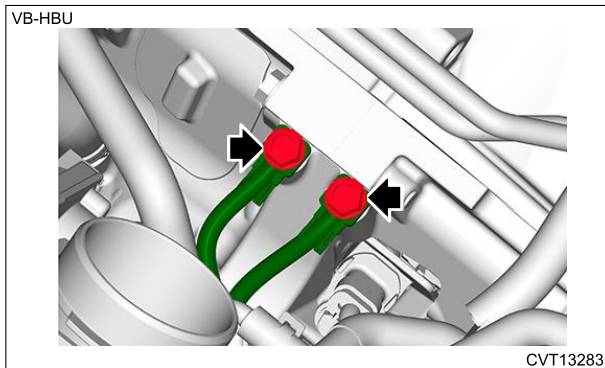
(3) Attach the ST to the converter case.

**Preparation tool:**

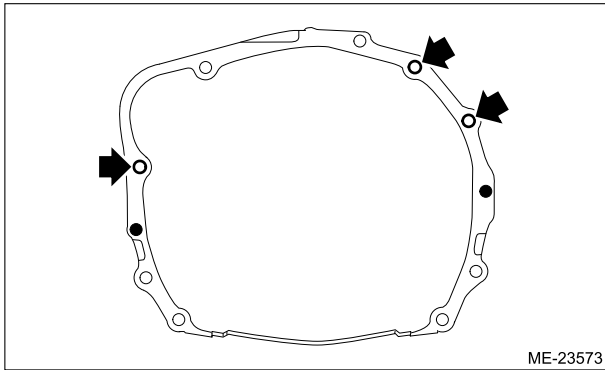
ST: STOPPER SET (498277200)



**12.** Disconnect the engine ground.



**13.** Remove the bolts which hold the upper side of the transmission.

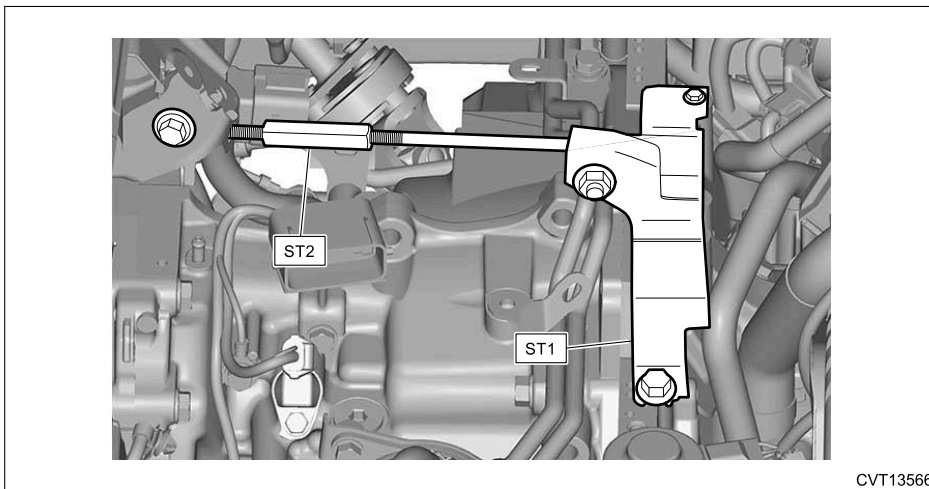


**14.** Set the ST1 and ST2.

**Preparation tool:**

ST1: ENGINE SUPPORT BRACKET (41099AA012)

ST2: ENGINE SUPPORT (41099AA020)



**15.** Drain the CVTF. [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>CVTF>REPLACEMENT.](#)

**16.** Drain differential gear oil. [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Differential Gear Oil>REPLACEMENT.](#)

**17.** Remove the center exhaust pipe (rear) and the hanger bracket. [Ref. to EXHAUST\(H4DOTC\)>Center Exhaust Pipe>REMOVAL > CENTER EXHAUST PIPE \(REAR\).](#)

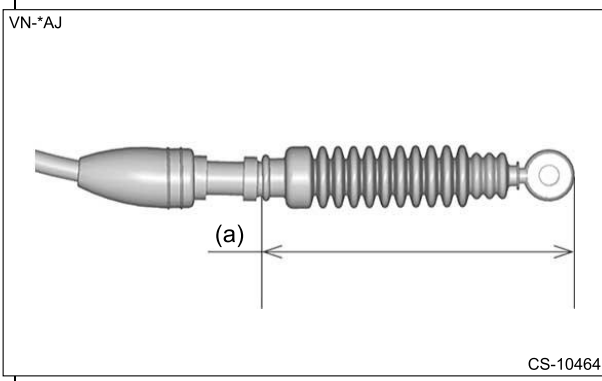
**18.** Remove the front drive shaft. [Ref. to PROPELLER SHAFT / DRIVE SHAFT / AXLE>Front Drive Shaft>REMOVAL.](#)

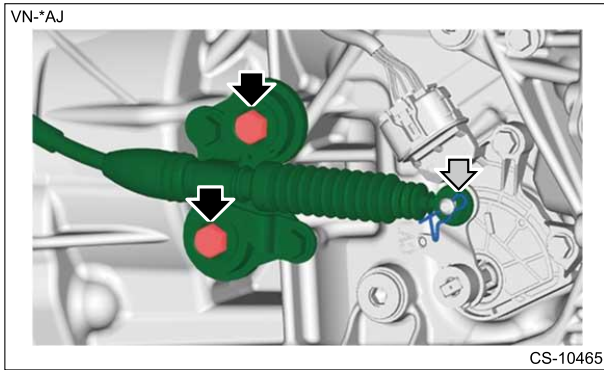
**19.** Remove the propeller shaft. [Ref. to PROPELLER SHAFT / DRIVE SHAFT / AXLE>Propeller Shaft>REMOVAL.](#)

**20.** Disconnect the select cable from the transmission main body.

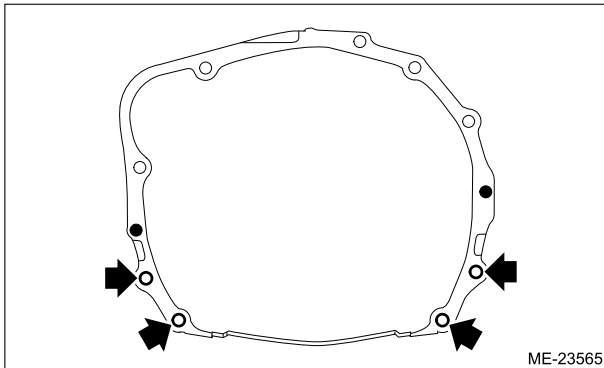
**Caution:**

**Do not apply excessive load while holding the part (a).**





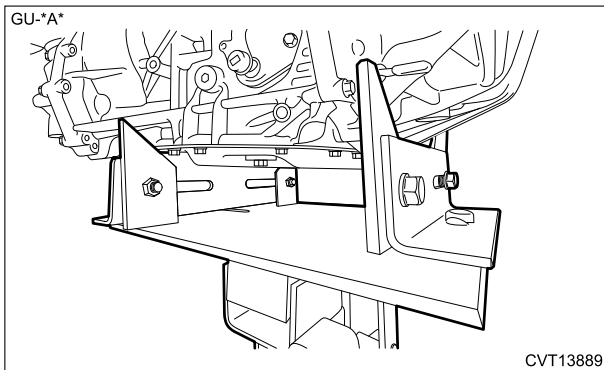
**21.** Remove the bolts and nuts which hold the lower side of transmission.



**22.** Set the transmission jack under the transmission.

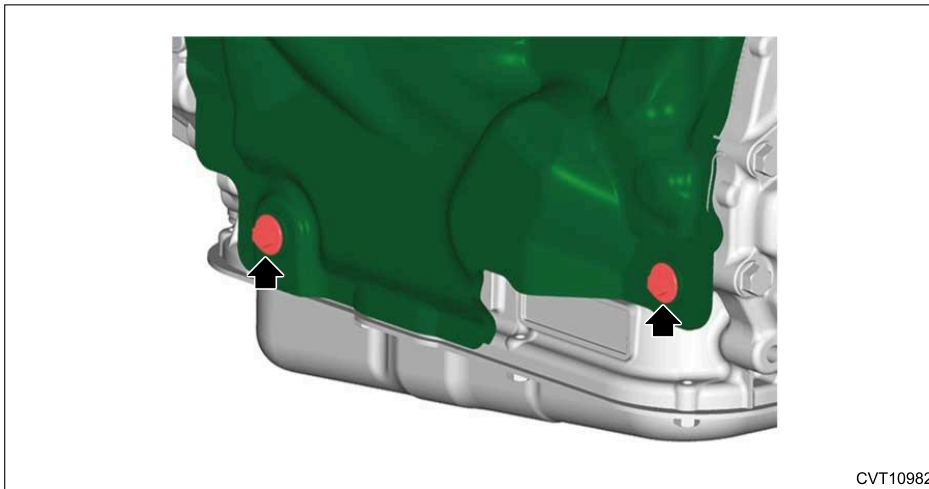
**Caution:**

- **Make sure that the support plates, etc. do not touch the oil pan.**
- **Be sure to use belts, etc. to prevent the transmission from falling.**



**23.** Remove the transmission rear crossmember.  Ref. to [CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Transmission Mounting System>REMOVAL > TRANSMISSION REAR CROSSMEMBER AND REAR CUSHION RUBBER.](#)

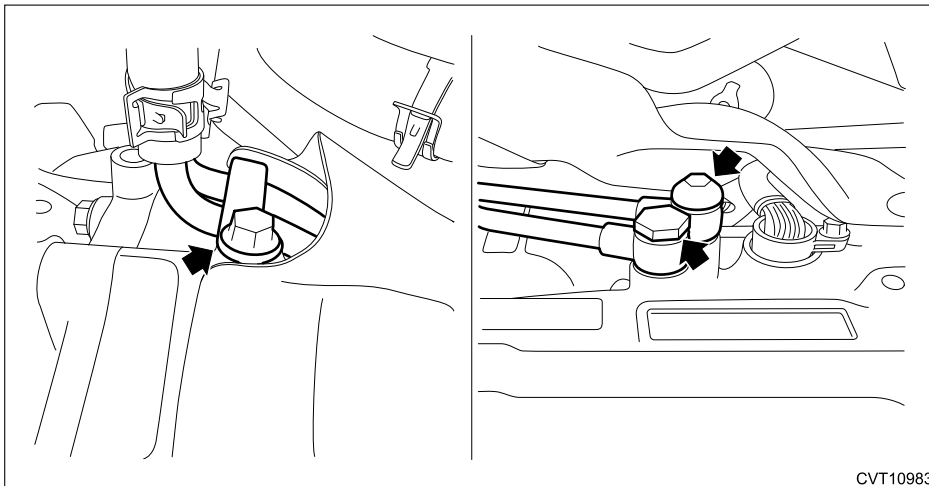
**24.** Remove the bolt securing the transmission case cover (rear).



CVT10982

**25.** Lower the transmission jack by 75 mm (2.95 in).

**26.** Disconnect the CVTF cooler inlet pipe and CVTF cooler outlet pipe, and put them aside so that they do not interfere with work.




CVT10983

**27.** While lowering the transmission jack gradually, retract the ST (ENGINE SUPPORT), and then tilt the engine rearward.

**28.** Remove the transmission body.

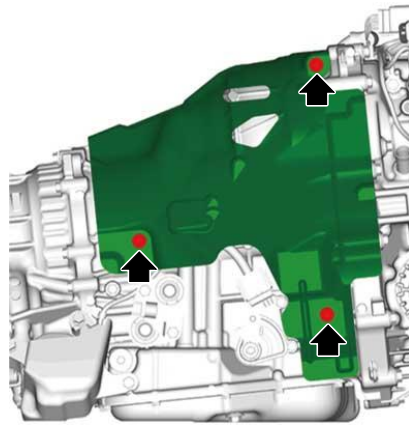
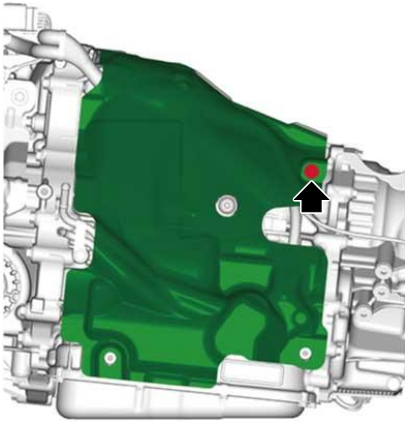
**Note:**

**Adjust the position and angle of the transmission jack so that the engine and the transmission are aligned straight.**

**29.** Remove the rear cushion rubber.  Ref. to [CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Transmission Mounting System>REMOVAL > TRANSMISSION REAR CROSSMEMBER AND REAR CUSHION RUBBER.](#)

**30.** Remove the transmission case cover (rear).

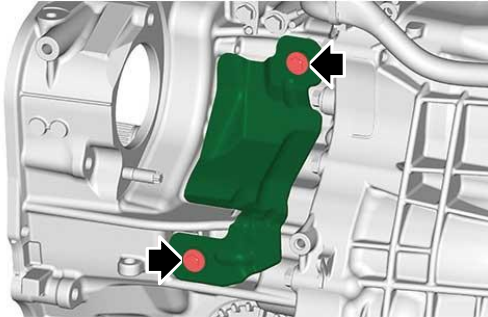
BWT\*AU



CVT11975

**31.** Remove the transmission case cover (front).

VB-HBU



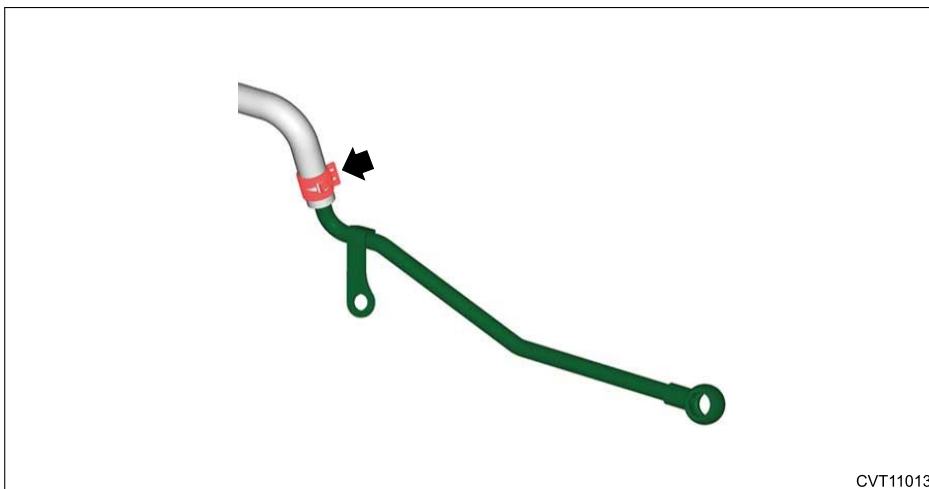
CVT13356

**32.** Remove the CVTF cooler inlet pipe and CVTF cooler outlet pipe.

**Note:**

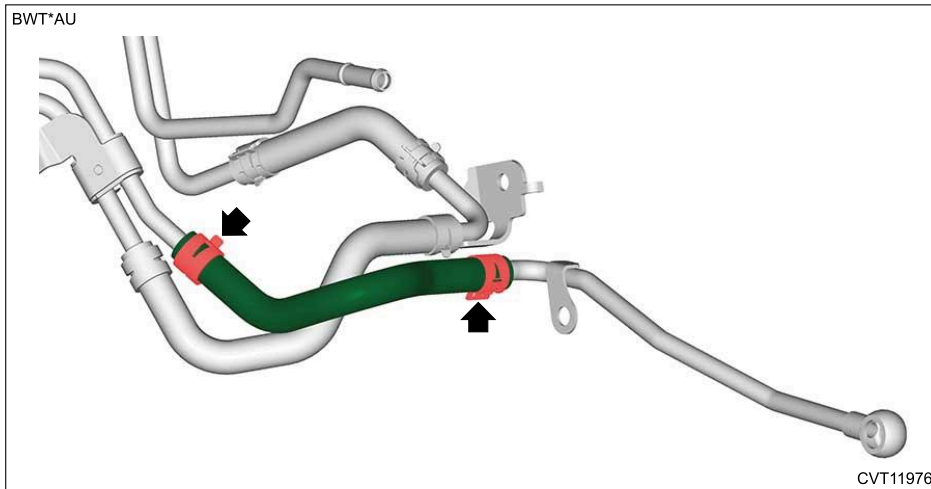
**Perform this procedure only when required.**

(1) Remove the CVTF cooler outlet pipe.

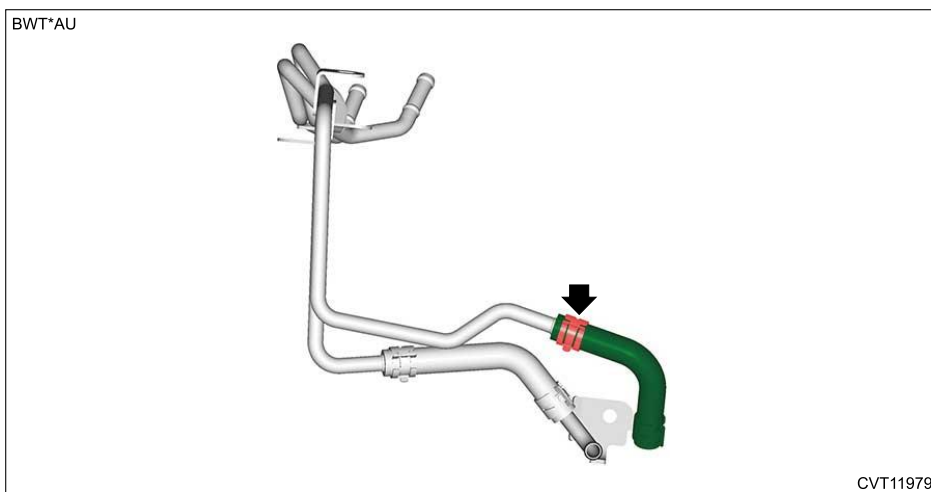


CVT11013

(2) Remove the CVTF CVT inlet hose.





(3) Remove the CVTF cooler outlet hose.

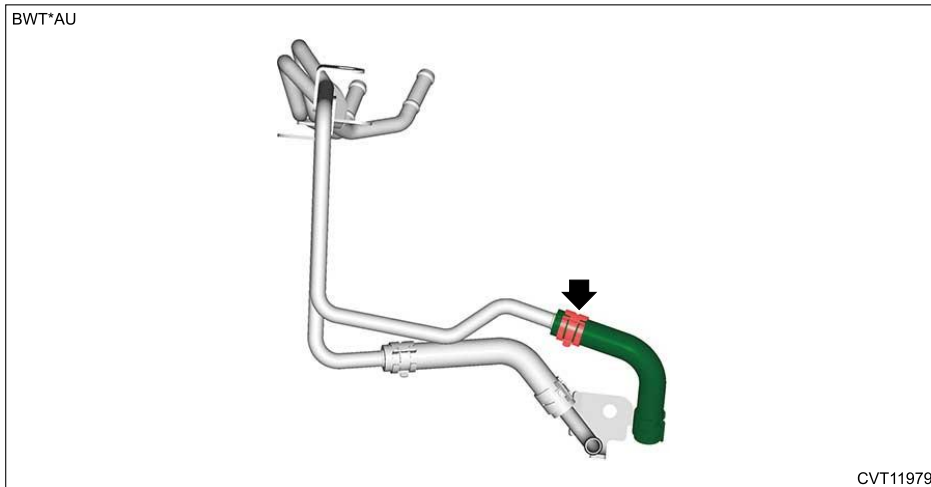


**33.** When overhauling the transmission body, refer to "Preparation for overhaul".  [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Preparation for Overhaul>PROCEDURE > BEFORE OVERHAUL.](#)

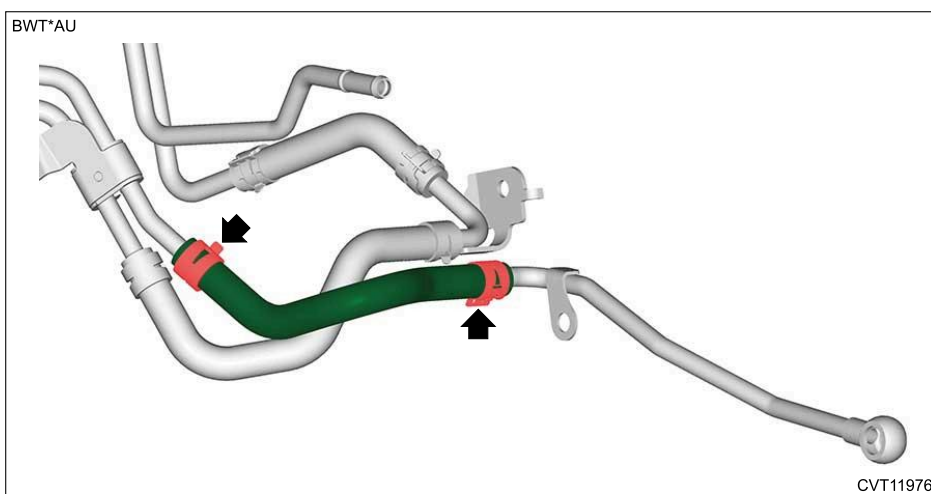
## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Transmission Assembly

### INSTALLATION

- 1.** When having overhauled the transmission body, refer to "Preparation for overhaul".  [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Preparation for Overhaul>PROCEDURE > AFTER OVERHAUL.](#)
- 2.** Replace with a new differential side retainer oil seal.  [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Differential Side Retainer Oil Seal>REPLACEMENT.](#)
- 3.** Install the CVTF cooler inlet pipe and CVTF cooler outlet pipe.
  - (1) Install a new CVTF cooler outlet hose.



(2) Install a new CVTF CVT inlet hose.



(3) Install the CVTF cooler outlet pipe.

4. Install the transmission case cover (front).

**Tightening torque:**

8 N·m (0.8 kgf-m, 5.9 ft-lb)

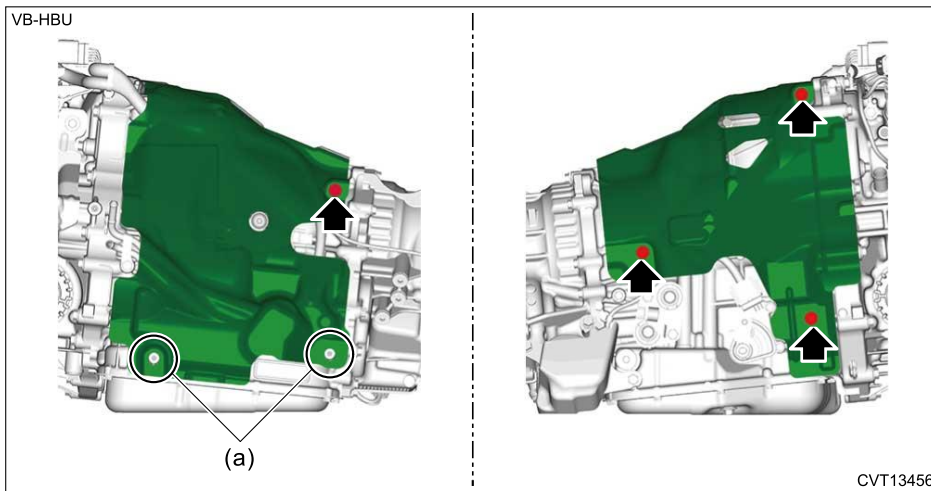
5. Install the transmission case cover (rear).


**Note:**

Before installing the part (a), connect the CVTF cooler inlet pipe and CVTF cooler outlet pipe.

**Tightening torque:**

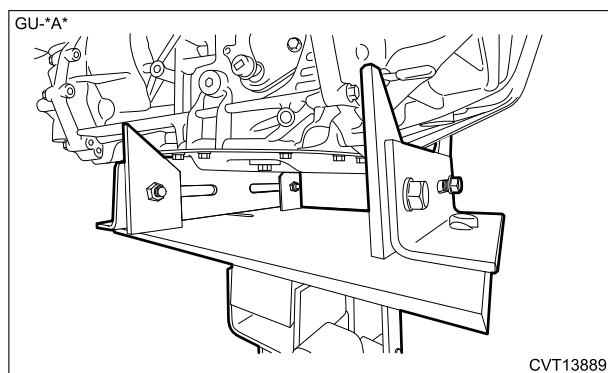
8 N·m (0.8 kgf-m, 5.9 ft-lb)



6. Install the rear cushion rubber.  Ref. to [CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Transmission Mounting System>INSTALLATION > TRANSMISSION REAR CROSSMEMBER AND REAR CUSHION RUBBER.](#)
7. Place the transmission body on the transmission jack.

**Caution:**

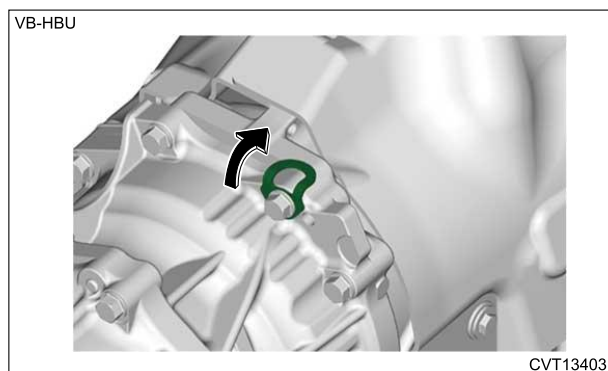
- Make sure that the support plates, etc. do not touch the oil pan.
- Be sure to use belts, etc. to prevent the transmission from falling.



8. Strike and bend the transmission hanger with a rubber hammer etc. so that it gets in contact with the transmission case.

**Caution:**

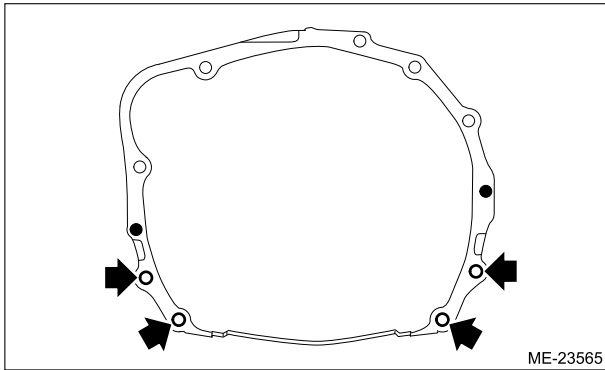
- Do not apply extra overload or impact to the transmission case.



9. Install the transmission body.

**Note:**

- Adjust the position and angle of the transmission jack and engine body if necessary.
- Temporarily install the bolts and nuts which hold lower side of the transmission.



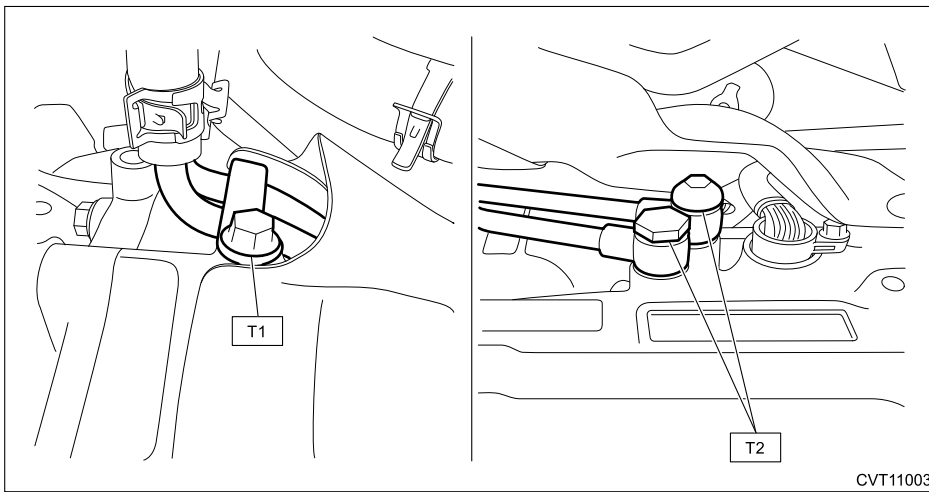
ME-23565

**10.** Connect the CVTF cooler inlet pipe and CVTF cooler outlet pipe with 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)

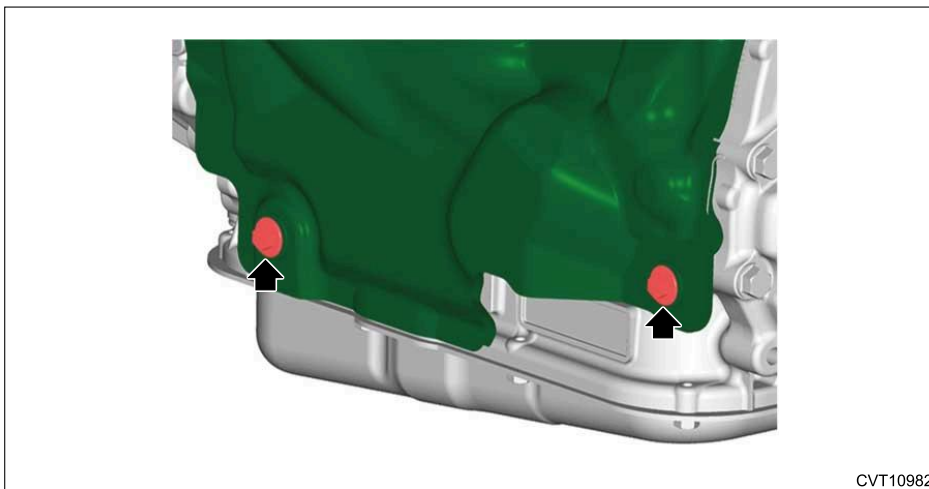


CVT11003

**11.** Install the bolts which hold the transmission case cover (rear).

**Tightening torque:**

8 N·m (0.8 kgf-m, 5.9 ft-lb)



CVT10982

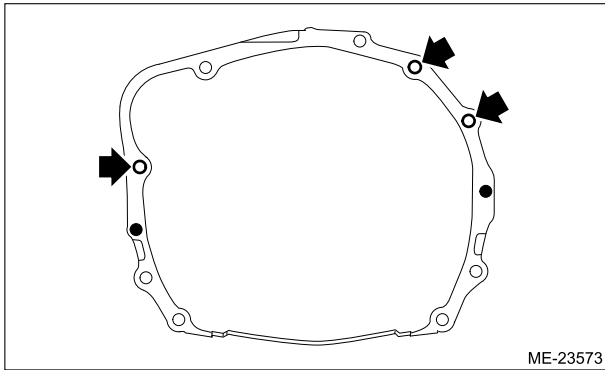
**12.** Install the transmission rear crossmember.  [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Transmission Mounting System>INSTALLATION > TRANSMISSION REAR CROSSMEMBER AND REAR CUSHION RUBBER.](#)

**13.** Remove the transmission jack.

**14.** Install the bolts which hold upper side of transmission.

**Tightening torque:**

50 N·m (5.1 kgf-m, 36.9 ft-lb)



**15.** Tighten the bolts and nuts which hold lower side of the transmission.

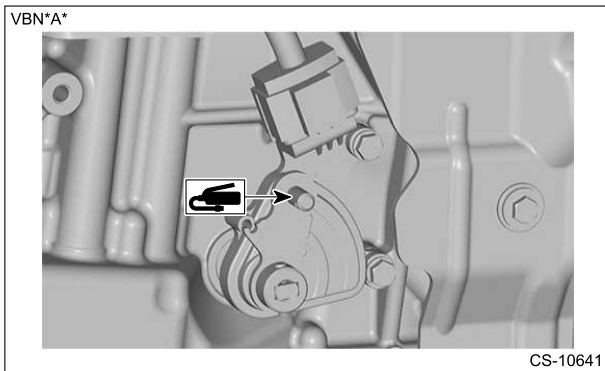
**Tightening torque:**

50 N·m (5.1 kgf-m, 36.9 ft-lb)

**16.** Apply grease to the shifter arm.

**Preparation items:**

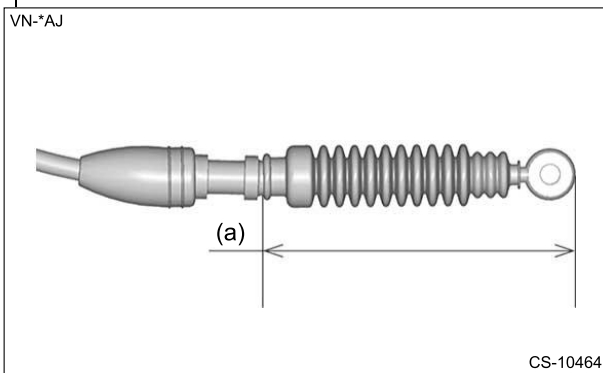
Grease: NIPPON GREASE NIGTIGHT LTS No. 2 or equivalent



**17.** Connect the select cable to the transmission main body.

**Caution:**

**Do not apply excessive load while holding the part (a).**

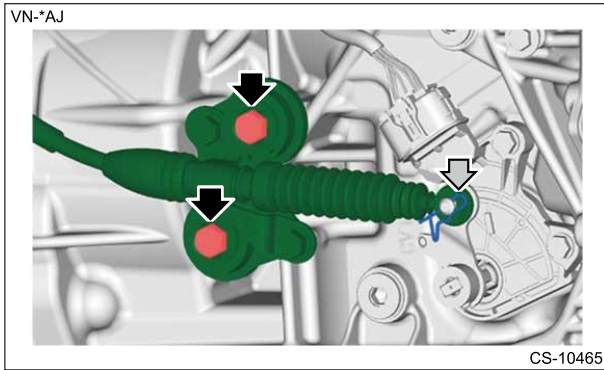


**Note:**

**Set the washer before installing the snap pin.**

**Tightening torque:**

25 N·m (2.5 kgf-m, 18.4 ft-lb)



18. Adjust the select cable free play. [Ref. to CONTROL SYSTEMS>Select Cable>ADJUSTMENT.](#)
19. Install the propeller shaft. [Ref. to PROPELLER SHAFT / DRIVE SHAFT / AXLE>Propeller Shaft>INSTALLATION.](#)
20. Install the front drive shaft. [Ref. to PROPELLER SHAFT / DRIVE SHAFT / AXLE>Front Drive Shaft>INSTALLATION.](#)
21. Install the hanger bracket and the center exhaust pipe (rear). [Ref. to EXHAUST\(H4DOTC\)>Center Exhaust Pipe>INSTALLATION > CENTER EXHAUST PIPE \(REAR\).](#)
22. Remove ST (ENGINE SUPPORT BRACKET and ENGINE SUPPORT).
23. Connect the engine ground.

**Tightening torque:**

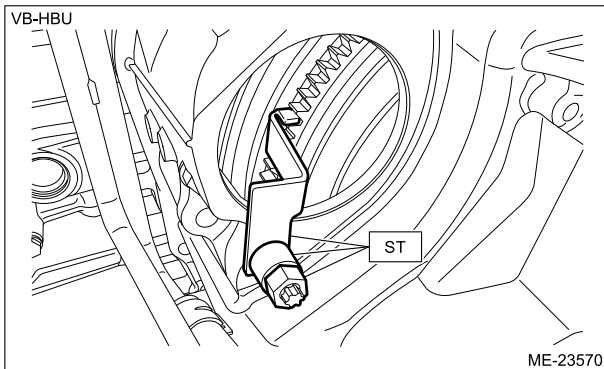
19 N·m (1.9 kgf-m, 14.0 ft-lb)

24. Install the torque converter to drive plate.

- (1) Remove the ST from converter case.

**Note:**

**Be careful not to drop the ST into the converter housing when removing the ST.**



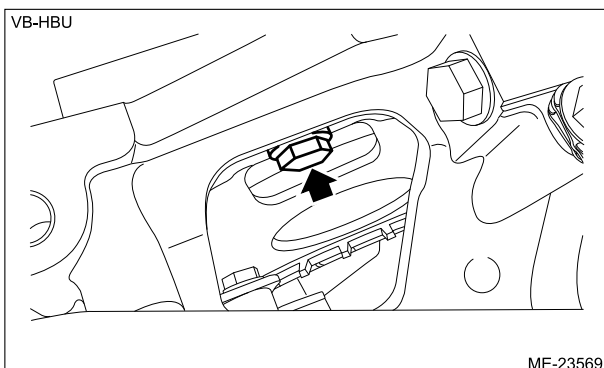
- (2) Insert the wrench into the crank pulley bolt, and rotate the crank pulley to attach the bolts (4 places) securing the torque converter to the drive plate.

**Note:**

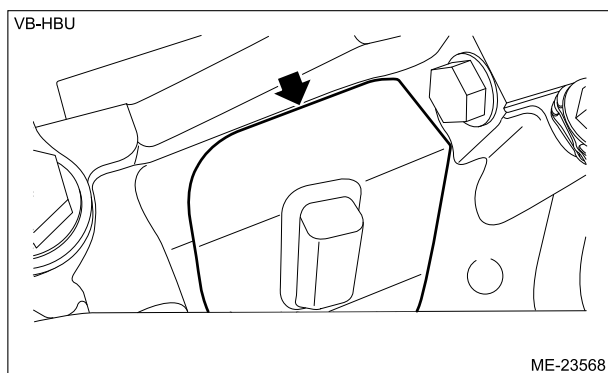
**Be careful not to drop bolts into the converter housing.**

**Tightening torque:**

25 N·m (2.5 kgf-m, 18.4 ft-lb)



- (3) Fit the plug to service hole.



**25.** Install the starter. [Ref. to STARTING/CHARGING SYSTEMS\(H4DOTC\)>Starter>INSTALLATION.](#)

**26.** Connect the CVTF cooler (with warmer feature).

**Tightening torque:**

23 N·m (2.3 kgf-m, 17.0 ft-lb)

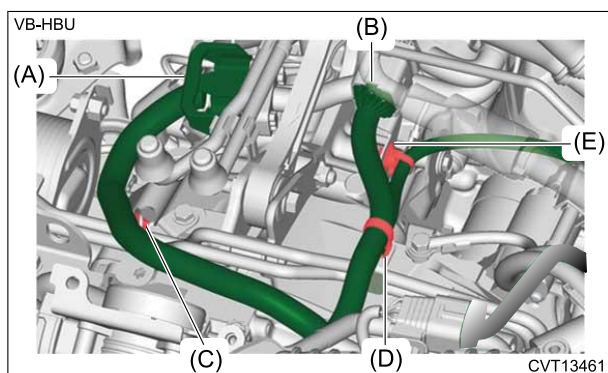
**27.** Install the pitching stopper. [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Transmission Mounting System>INSTALLATION > PITCHING STOPPER.](#)

**28.** Install the engine rear hanger.

**Tightening torque:**

36 N·m (3.7 kgf-m, 26.6 ft-lb)

**29.** Connect the connector (A) and connector (B), and install the clip (C), clip (D) and clip (E).



**30.** Install the intercooler. [Ref. to INTAKE \(INDUCTION\)\(H4DOTC\)>Intercooler>INSTALLATION.](#)

**31.** Install the air intake duct. [Ref. to INTAKE \(INDUCTION\)\(H4DOTC\)>Air Intake Duct>INSTALLATION.](#)

**32.** Release the shift lock and shift the select lever to the "P range". [Ref. to CONTROL SYSTEMS>Select Lever>INSTALLATION.](#)

**33.** Connect the ground terminal to battery sensor. [Ref. to REPAIR CONTENTS>NOTE > BATTERY.](#)

**34.** Apply the parking brake.

**35.** Fill differential gear oil. [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Differential Gear Oil>REPLACEMENT.](#)

**36.** Fill with CVTF. [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>CVTF>REPLACEMENT.](#)

**37.** Perform the [Clear AT learning value] and [AT learning mode] using Subaru Select Monitor. [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>AT learning.](#)

**38.** When replacing the variator chain, primary pulley and secondary pulley, perform the "Variator chain break-in". [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Variator Chain Break-in>PROCEDURE.](#)

**39.** Perform the "road test" to make sure there is no fault. [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Road Test>INSPECTION.](#)

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Transmission Assembly


### INSPECTION

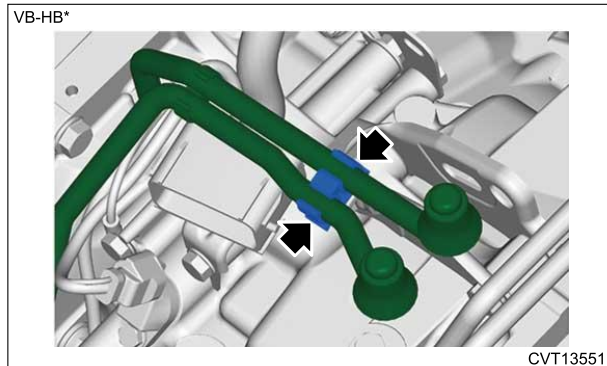
1. Check for oil leaks.
2. Check that there is no deformation, cracks or other damages.

**REMOVAL**

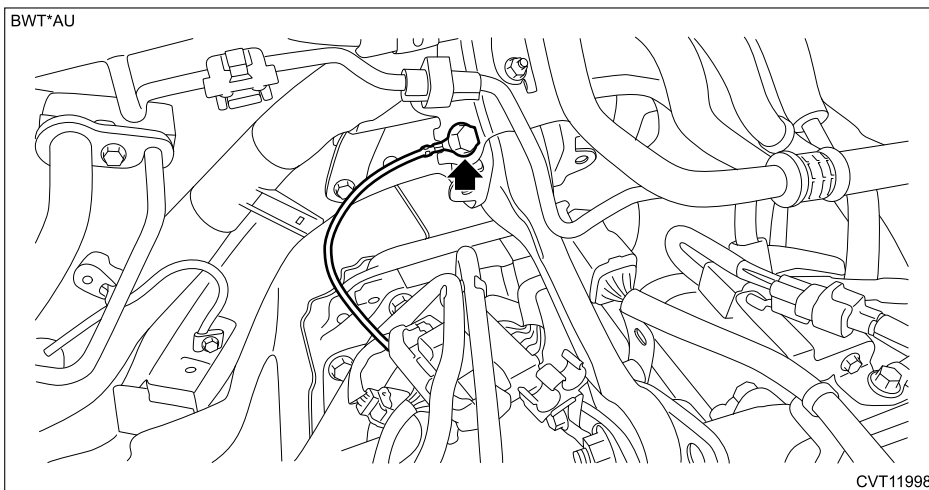


**1. PITCHING STOPPER**

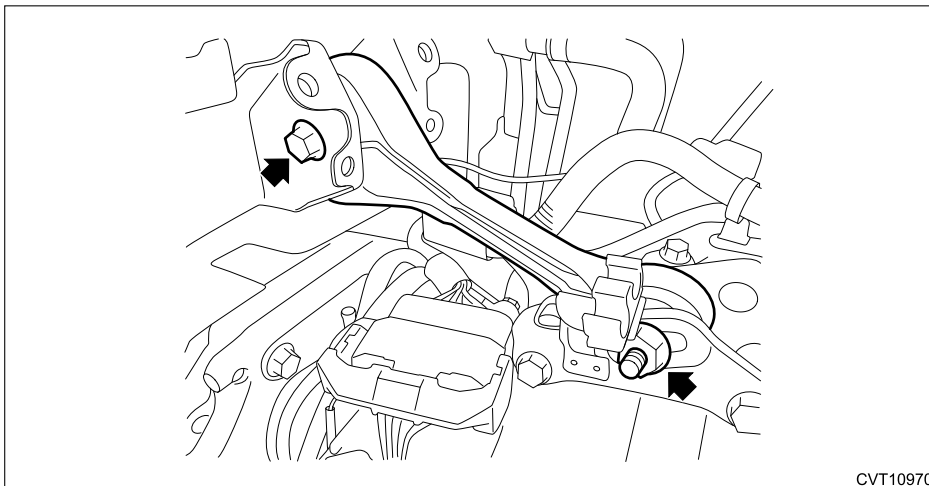
1. Remove the intercooler.  Ref. to [INTAKE \(INDUCTION\)\(H4DOTC\)>Intercooler>REMOVAL.](#)
2. Remove the air breather hose from the air breather hose bracket.



3. Disconnect the ground cord.



4. Remove the pitching stopper.

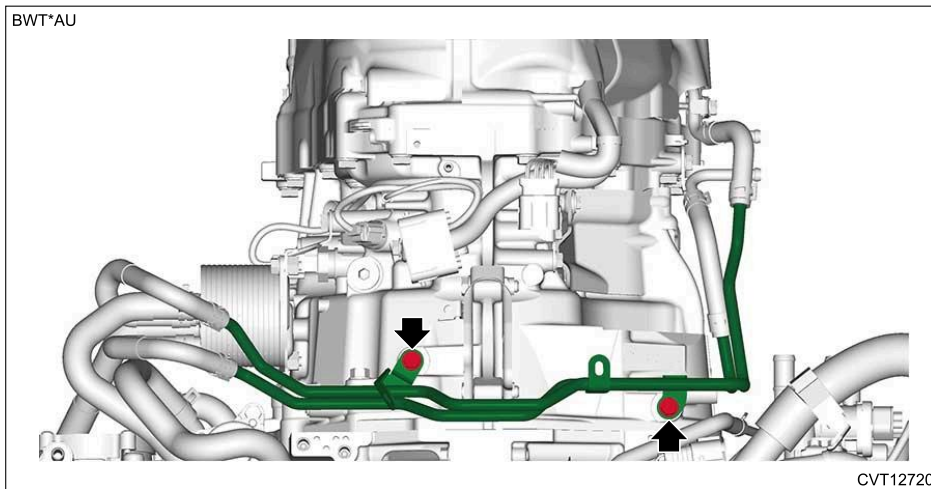


5. Remove the pitching stopper bracket.

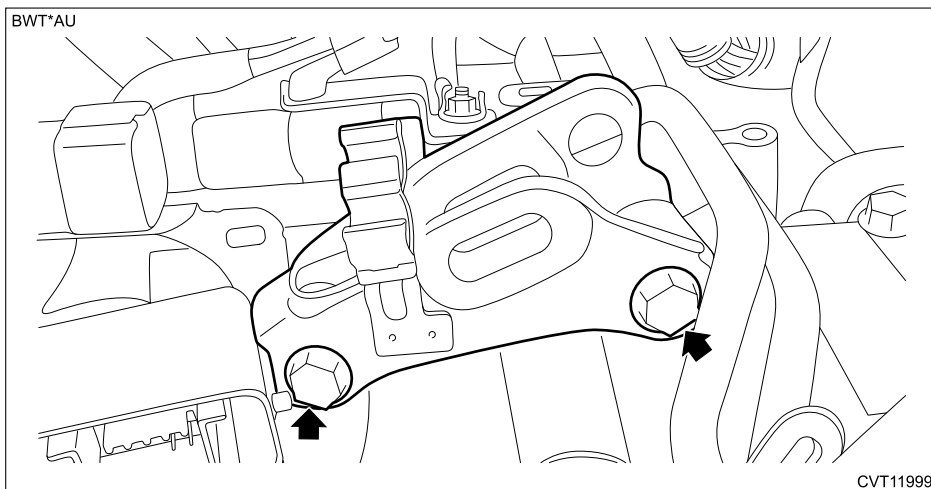
**Note:**

**Perform this procedure only when required.**



- (1) Remove the bolts which secure the CVTF cooler pipe No. 1.



- (2) Remove the pitching stopper bracket.

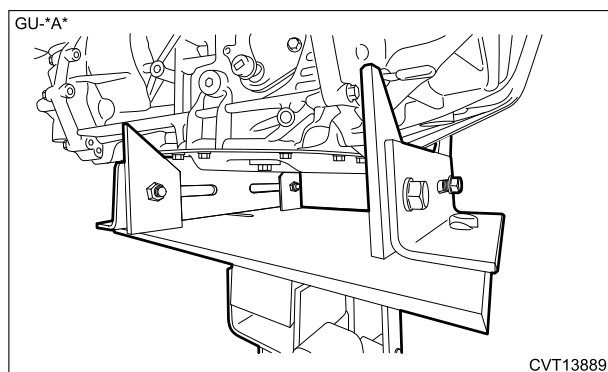


## 2. TRANSMISSION REAR CROSSMEMBER AND REAR CUSHION RUBBER

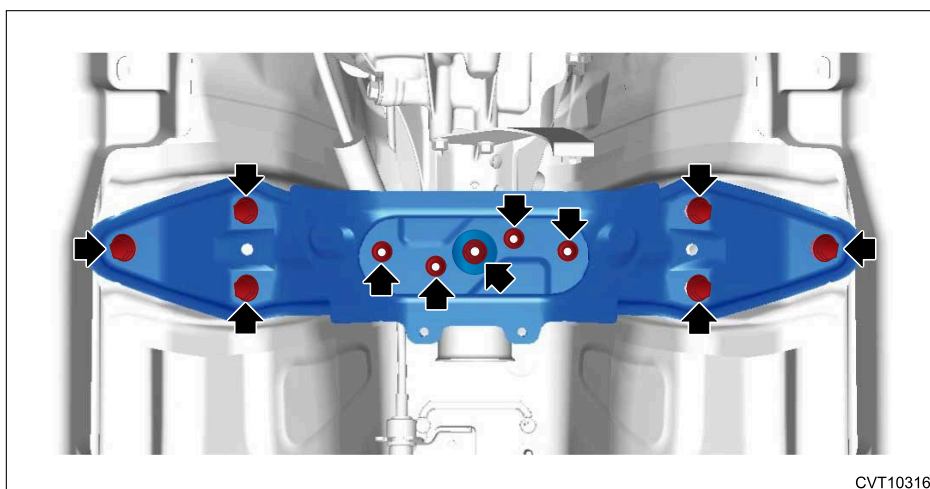
1. Remove the center exhaust pipe (rear).  [Ref. to EXHAUST\(H4DOTC\)>Center Exhaust Pipe>REMOVAL > CENTER EXHAUST PIPE \(REAR\).](#)
2. Remove the center exhaust cover and rear exhaust pipe.  [Ref. to EXHAUST\(H4DOTC\)>Rear Exhaust Pipe>REMOVAL.](#)
3. Set the transmission jack under the transmission.

**Caution:**

**Make sure that the support plates, etc. do not touch the oil pan.**

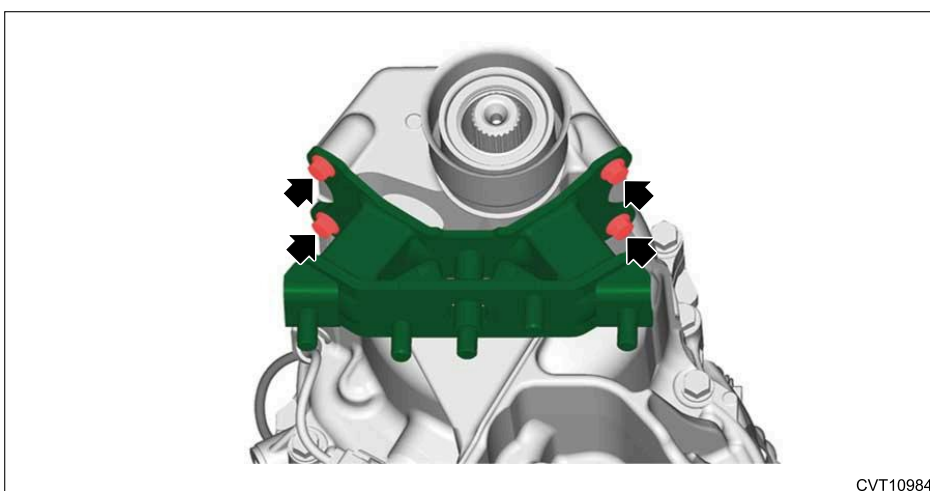


4. Remove the transmission rear crossmember.



CVT10316

5. Remove the rear cushion rubber.



CVT10984

### 3. HANGER BRACKET

For the removal procedure of hanger bracket, refer to "Center Exhaust Pipe (Rear)". [📄 Ref. to EXHAUST\(H4DOTC\)>Center Exhaust Pipe>REMOVAL > CENTER EXHAUST PIPE \(REAR\).](#)

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Transmission Mounting System

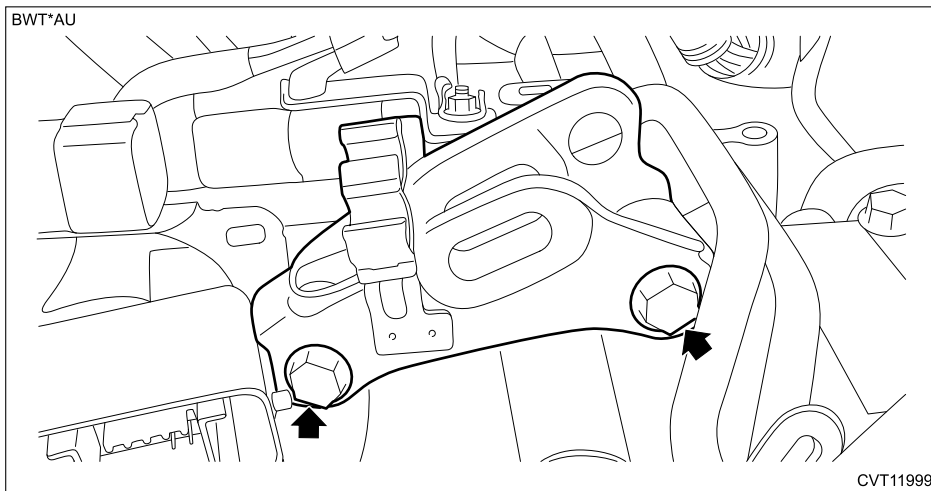
### INSTALLATION

#### 1. PITCHING STOPPER

1. Install the pitching stopper bracket.
  - (1) Install the pitching stopper bracket.

#### Tightening torque:

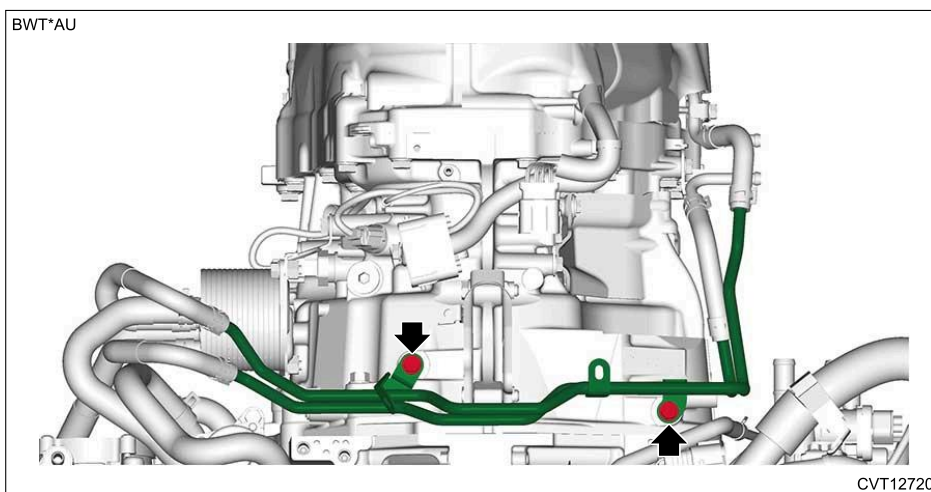
41 N·m (4.2 kgf-m, 30.2 ft-lb)



(2) Install the bolts which secure the CVTF cooler pipe No. 1.

**Tightening torque:**

16 N·m (1.6 kgf-m, 11.8 ft-lb)



2. Install the pitching stopper.

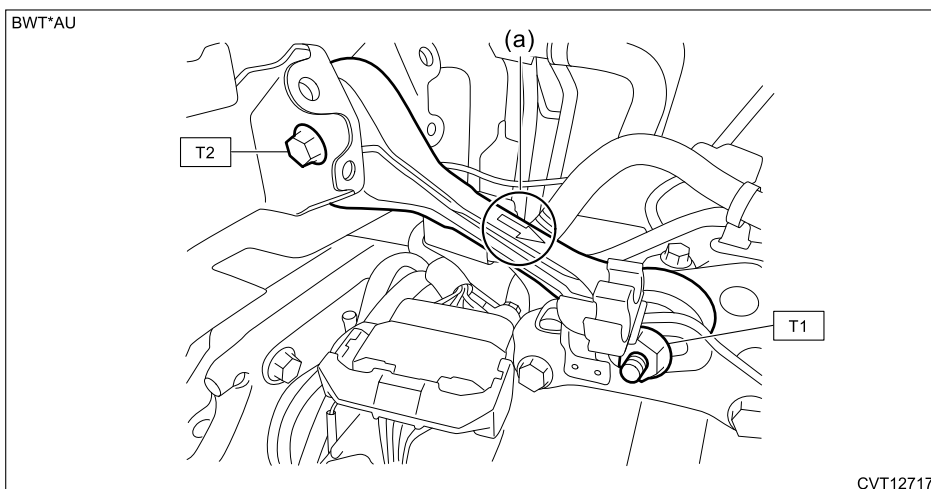
**Note:**

Install with the front mark (a) facing towards the front of the vehicle.

**Tightening torque:**

T1: 50 N·m (5.1 kgf-m, 36.9 ft-lb)

T2: 58 N·m (5.9 kgf-m, 42.8 ft-lb)



3. Connect the ground cord.

**Caution:**

As residual anti-rust grease and dirt on the bolt threads, terminals and seating surfaces may cause overtorque, clean and degrease them.

**Tightening torque:**

32.3 N·m (3.3 kgf-m, 23.8 ft-lb)

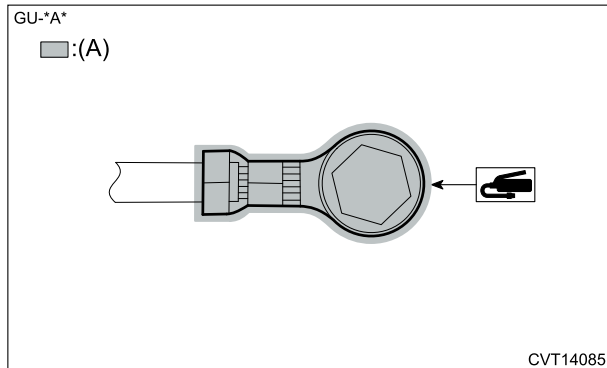
4. Apply a thin coat of grease over the ground terminal.

**Note:**

This procedure is required to prevent rust and suppress sulfation.

**Preparation items:**

Grease: Viscotech R174 or equivalent  [Ref. to RECOMMENDED MATERIALS>GREASE>CVT.](#)



(A) Grease application area

5. Install the air breather hose to the clip.
6. Install the intercooler.  [Ref. to INTAKE \(INDUCTION\)\(H4DOTC\)>Intercooler>INSTALLATION.](#)

## 2. TRANSMISSION REAR CROSSMEMBER AND REAR CUSHION RUBBER

1. Install the rear cushion rubber.

**Tightening torque:**

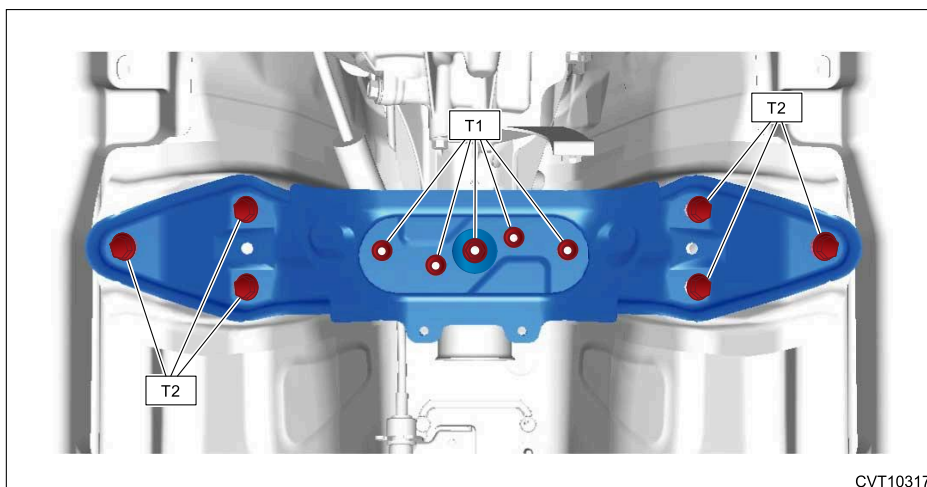
40 N·m (4.1 kgf-m, 29.5 ft-lb)



2. Install the transmission rear crossmember.

**Tightening torque:**


T1: 35 N·m (3.6 kgf-m, 25.8 ft-lb)

T2: 70 N·m (7.1 kgf-m, 51.6 ft-lb)



3. Remove the transmission jack.
4. Install the center exhaust cover and rear exhaust pipe.  [Ref. to EXHAUST\(H4DOTC\)>Rear Exhaust Pipe>INSTALLATION.](#)
5. Install the center exhaust pipe (rear).  [Ref. to EXHAUST\(H4DOTC\)>Center Exhaust Pipe>INSTALLATION > CENTER EXHAUST PIPE \(REAR\).](#)

### 3. HANGER BRACKET

For the installation procedure of hanger bracket, refer to "Center Exhaust Pipe (Rear)".  [Ref. to EXHAUST\(H4DOTC\)>Center Exhaust Pipe>INSTALLATION > CENTER EXHAUST PIPE \(REAR\).](#)

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Transmission Mounting System

#### INSPECTION

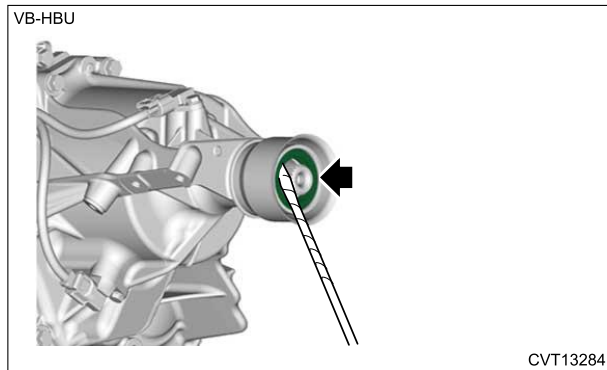
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Check that there is no deformation, cracks or other damages.

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Extension Case Oil Seal

### REPLACEMENT

1. Release the parking brake.
2. Release the shift lock and shift the select lever to the "N range". [Ref. to CONTROL SYSTEMS>Select Lever>REMOVAL.](#)
3. Remove the propeller shaft. [Ref. to PROPELLER SHAFT / DRIVE SHAFT / AXLE>Propeller Shaft>REMOVAL.](#)
4. Remove the center exhaust pipe (rear). [Ref. to EXHAUST\(H4DOTC\)>Center Exhaust Pipe>REMOVAL > CENTER EXHAUST PIPE \(REAR\).](#)
5. Remove the extension case oil seal using a flat tip screwdriver wrapped with protection tape, etc.



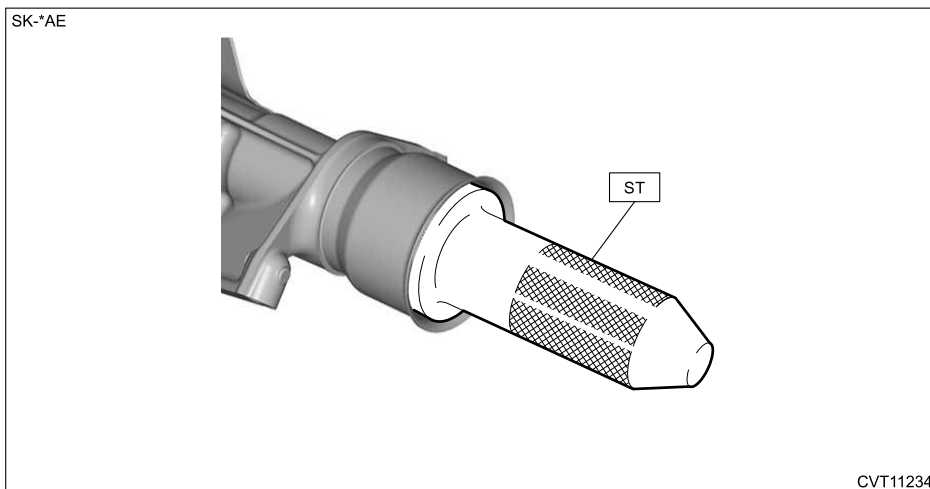
6. Using the ST, install a new extension case oil seal.

#### Note:

**Apply CVTF to the oil seal lip and peripheral surface.**

#### Preparation tool:

ST: INSTALLER (498057300)



7. Install the center exhaust pipe (rear). [Ref. to EXHAUST\(H4DOTC\)>Center Exhaust Pipe>INSTALLATION > CENTER EXHAUST PIPE \(REAR\).](#)
8. Install the propeller shaft. [Ref. to PROPELLER SHAFT / DRIVE SHAFT / AXLE>Propeller Shaft>INSTALLATION.](#)
9. Release the shift lock and shift the select lever to the "P range". [Ref. to CONTROL SYSTEMS>Select Lever>INSTALLATION.](#)
10. Apply the parking brake.
11. Check the CVTF level. [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>CVTF>INSPECTION.](#)



## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Extension Case Oil Seal

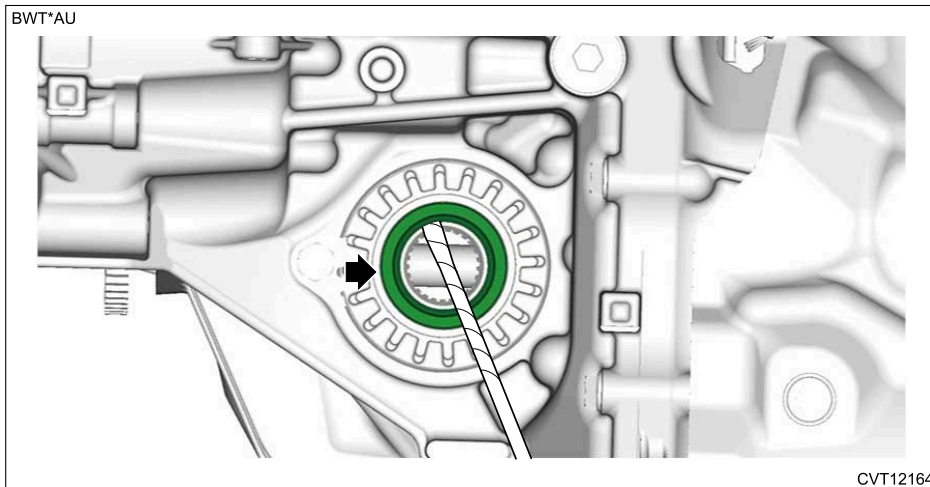
### INSPECTION

1. Check for oil leaks.
2. Check that there is no deformation, cracks or other damages.

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Differential Side Retainer Oil Seal

### REPLACEMENT

1. Drain differential gear oil.  [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Differential Gear Oil>REPLACEMENT.](#)
2. Remove the front drive shaft.  [Ref. to PROPELLER SHAFT / DRIVE SHAFT / AXLE>Front Drive Shaft>REMOVAL.](#)
3. Remove the differential side retainer oil seal using a flat tip screwdriver wrapped with protection tape, etc.



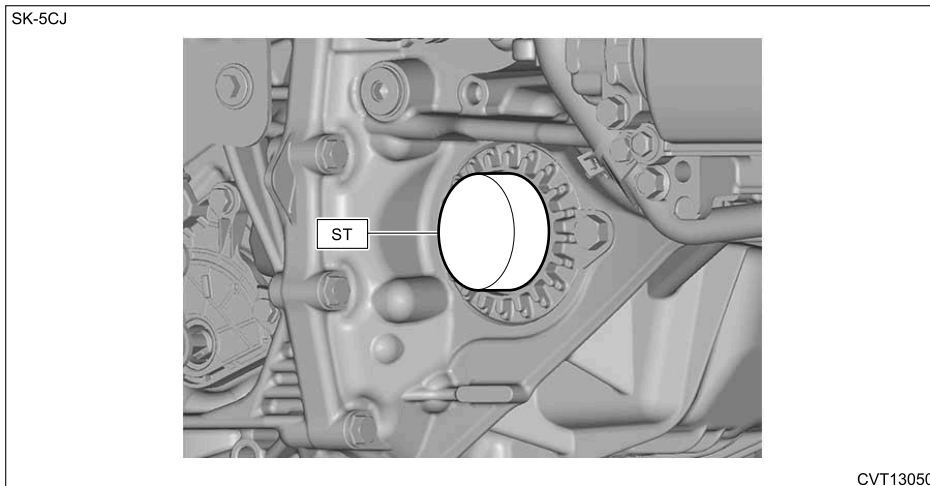
4. Install the new differential side retainer oil seal using the ST.



#### Note:

- Apply differential oil to the lip section of the differential side retainer oil seal.
- Since the differential side retainer oil seal has an identification mark (R or L), be careful not to mix up the RH and LH when installing.

#### Preparation tool:

ST: DIFFERENTIAL SIDE OIL SEAL INSTALLER (18675AA000)



5. Install the front drive shaft.  [Ref. to PROPELLER SHAFT / DRIVE SHAFT / AXLE>Front Drive Shaft>INSTALLATION.](#)
6. Fill differential gear oil.  [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Differential Gear Oil>REPLACEMENT.](#)



## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Differential Side Retainer Oil Seal

### INSPECTION

1. Check for oil leaks.
2. Check that there is no deformation, cracks or other damages.

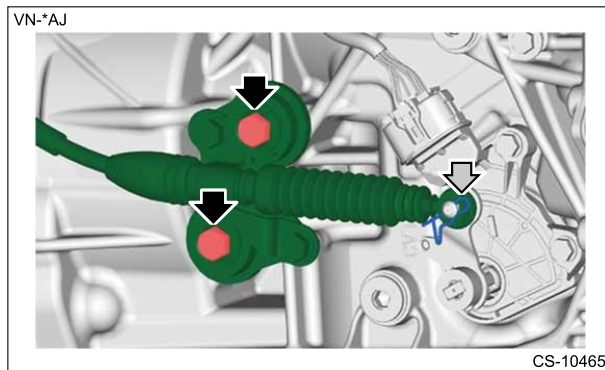
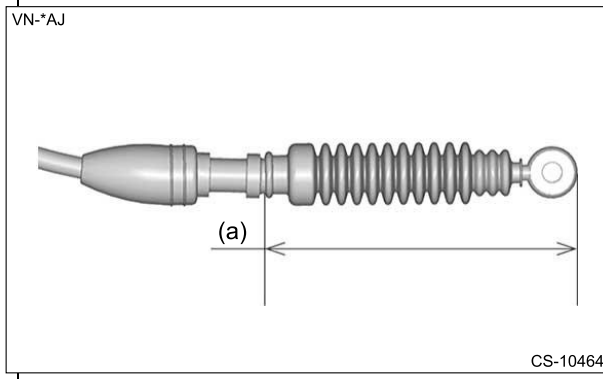
## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Inhibitor Switch

### REMOVAL

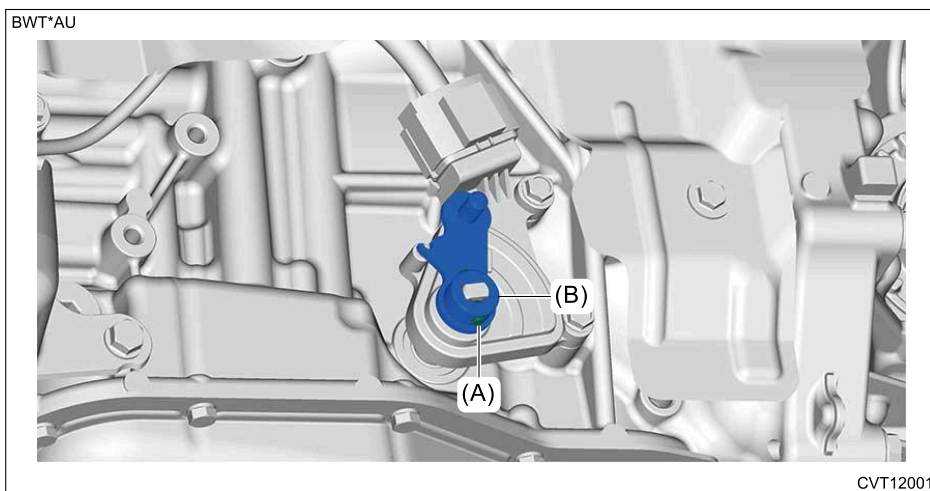
1. Disconnect the ground terminal from battery sensor.  [Ref. to REPAIR CONTENTS>NOTE > BATTERY.](#)
2. Release the shift lock and shift the select lever to the "N range".  [Ref. to CONTROL SYSTEMS>Select Lever>REMOVAL.](#)
3. Disconnect the select cable from the transmission main body.

#### Caution:

**Do not apply excessive load while holding the part (a).**

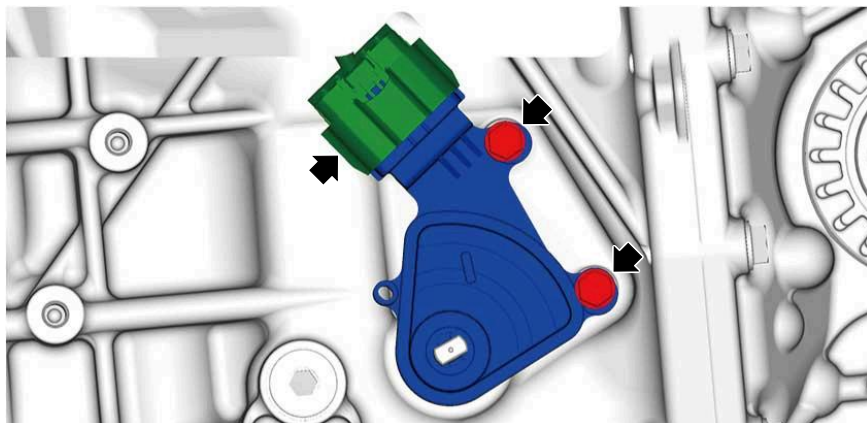


4. Remove the spring pin (A) and remove the shifter arm (B).



5. Disconnect the connector and remove the inhibitor switch.

SK-\*AE



CVT11236

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Inhibitor Switch

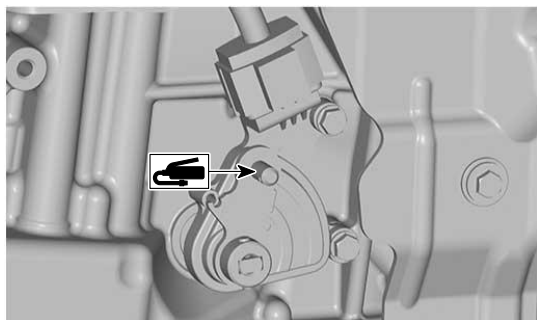
### INSTALLATION

1. Temporarily connect the inhibitor switch, and connect the connector.
2. Install the shifter arm and fix with a new spring pin.
3. Apply grease to the shifter arm.

#### Preparation items:

Grease: NIPPON GREASE NIGTIGHT LTS No. 2 or equivalent

VBN\*A\*



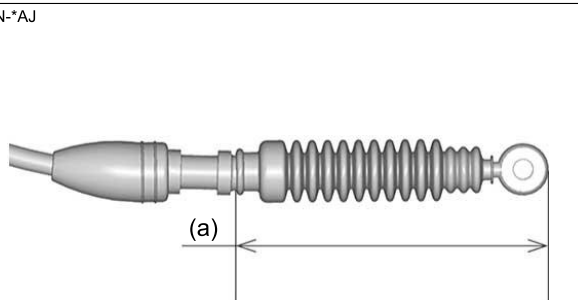
CS-10641

4. Connect the select cable to the transmission main body.

#### Caution:

**Do not apply excessive load while holding the part (a).**

VN-\*AJ



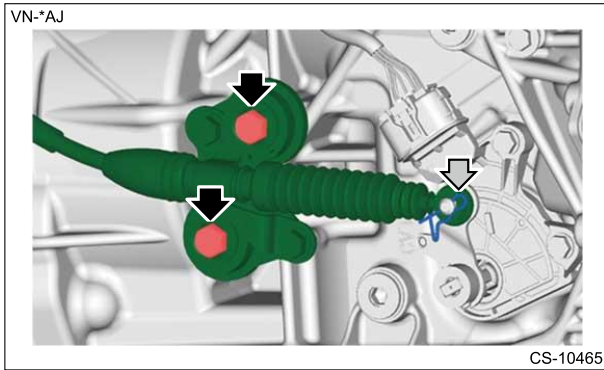
CS-10464

#### Note:

**Set the washer before installing the snap pin.**

#### Tightening torque:

25 N·m (2.5 kgf-m, 18.4 ft-lb)

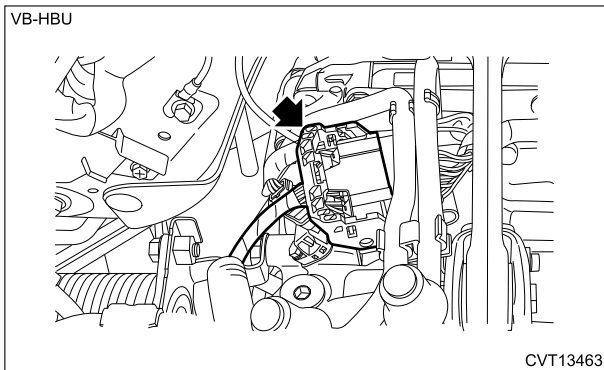


5. Adjust the select cable free play. [Ref. to CONTROL SYSTEMS>Select Cable>ADJUSTMENT.](#)
6. Adjust the inhibitor switch. [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Inhibitor Switch>ADJUSTMENT.](#)
7. Release the shift lock and shift the select lever to the "P range". [Ref. to CONTROL SYSTEMS>Select Lever>INSTALLATION.](#)
8. Connect the ground terminal to battery sensor. [Ref. to REPAIR CONTENTS>NOTE > BATTERY.](#)

### CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Inhibitor Switch

#### INSPECTION

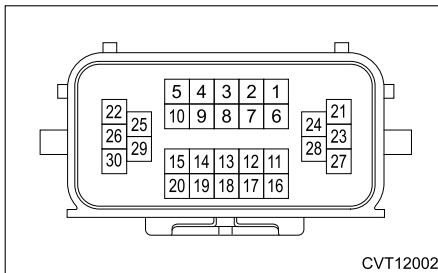
1. Disconnect the ground terminal from battery sensor. [Ref. to REPAIR CONTENTS>NOTE > BATTERY.](#)
2. Remove the intercooler. [Ref. to INTAKE \(INDUCTION\)\(H4DOTC\)>Intercooler>REMOVAL.](#)
3. Disconnect the engine wiring harness connector.



4. Check the inhibitor switch signal circuit.
  - (1) Check the circuit of each range.


**Note:**

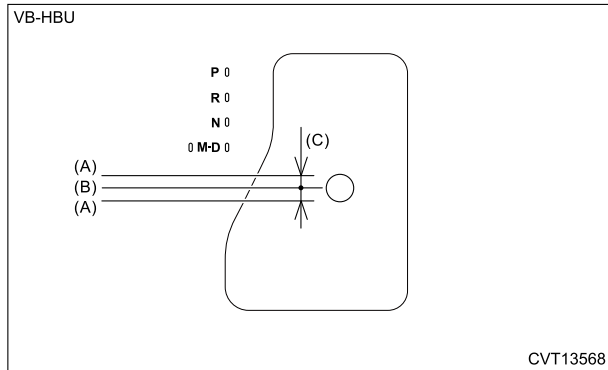
**If faulty, check the transmission harness for open circuit or short circuit, or poor contact.**



Terminal No.	Inspection conditions	Standard
4 – 24	P range	Less than 1 Ω
5 – 24	R range	
9 – 24	N range	
10 – 24	D range	

- (2) Check continuity when the lever is moved 1.5° in the front-rear direction from each range.

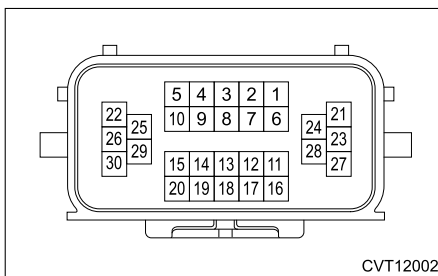
If there is continuity in only one direction or in other points, adjust the inhibitor switch.  [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Inhibitor Switch>ADJUSTMENT.](#)



(A) 1.5 °

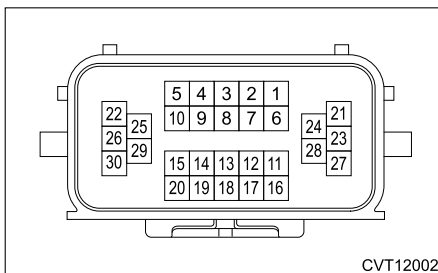
(B) Initial position

(C) Continuity range



Terminal No.	Inspection conditions	Standard
4 – 24	P range	Less than 1 Ω
5 – 24	R range	
9 – 24	N range	
10 – 24	D range	

5. Check the neutral switch signal circuit and back-up light circuit.




Terminal No.	Range	Standard
6 – 8	P range and N range	Less than 1 Ω
25 – 29	Except for R range	∞ Ω
25 – 29	R range	Less than 1 Ω

6. After inspection, install the related parts in the reverse order of removal.

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Inhibitor Switch

### ADJUSTMENT

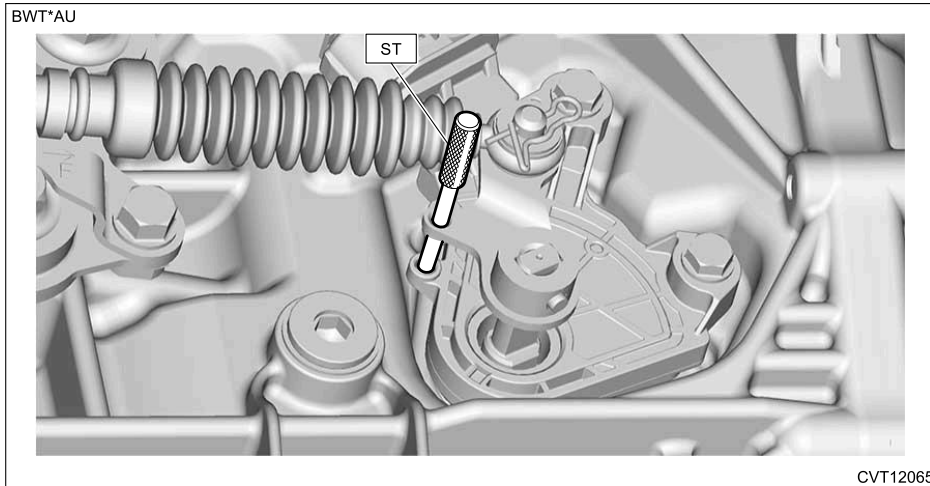
1. Release the shift lock and shift the select lever to the "N range".  [Ref. to CONTROL SYSTEMS>Select Lever>REMOVAL.](#)
2. Loosen the bolts holding the inhibitor switch.
3. Insert the ST into the holes of the shifter arm and inhibitor switch.

**Note:**

Set the parts so that the center points of the holes are aligned.

**Preparation tool:**

ST: STOPPER PIN (499267300)



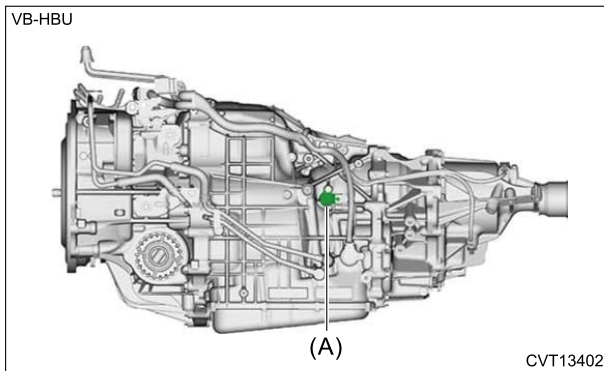
4. Tighten the bolts holding the inhibitor switch.

**Tightening torque:**

5 N·m (0.5 kgf-m, 3.7 ft-lb)

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Secondary Speed Sensor

### LOCATION



(A) Secondary speed sensor


## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Secondary Speed Sensor

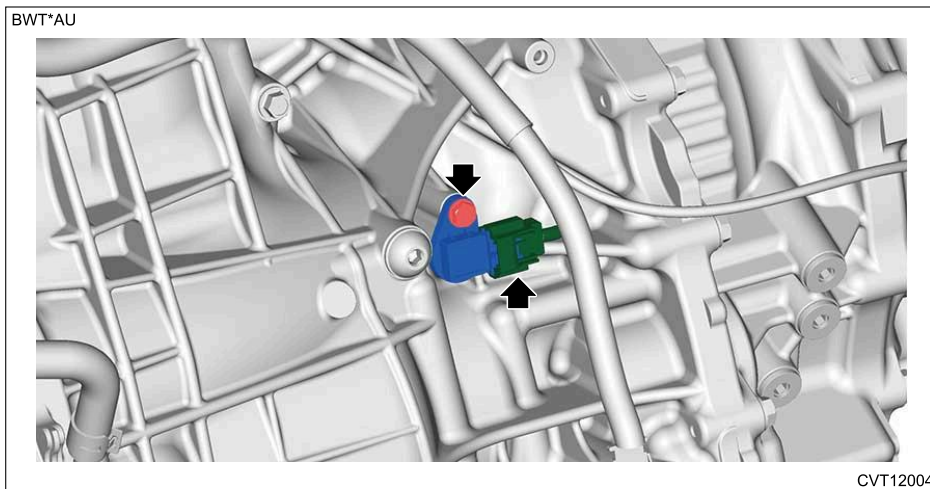
### REMOVAL



#### Caution:

**If water or oil contacts the connector terminal of secondary speed sensor, replace it with a new part.**

1. Remove the transmission body.  [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Transmission Assembly>REMOVAL.](#)
2. Disconnect the connector and remove the secondary speed sensor.



## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Secondary Speed Sensor

### INSTALLATION

#### Caution:

**If water or oil contacts the connector terminal of secondary speed sensor, replace it with a new part.**

1. Install the secondary speed sensor using a new O-ring, and connect the connector.

#### Note:

**Apply CVTF to the O-rings.**

#### Tightening torque:

7 N·m (0.7 kgf-m, 5.2 ft-lb)

2. Install the transmission body. [🔗 Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Transmission Assembly>INSTALLATION.](#)

**CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Secondary Speed Sensor**

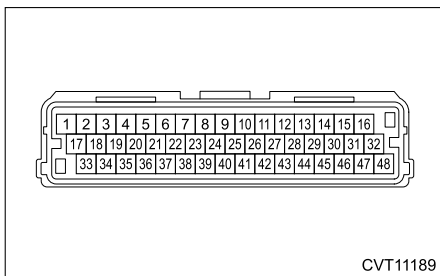
**INSPECTION**

1. Check for oil leaks.
2. Check the output waveform and output voltage of the secondary speed sensor.
  - (1) Disconnect the ground terminal from battery sensor. [🔗 Ref. to REPAIR CONTENTS>NOTE > BATTERY.](#)
  - (2) Disconnect the connector from TCM. [🔗 Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Transmission Control Module \(TCM\)>REMOVAL.](#)
  - (3) Set the ST between TCM and connector. [🔗 Ref. to TRANSMISSION \(DIAGNOSTICS\)>General Description>CAUTION.](#)

**Special tool:**

CHECK BOARD (18460AA040)

- (4) Connect the ground terminal to battery sensor. [🔗 Ref. to REPAIR CONTENTS>NOTE > BATTERY.](#)
- (5) Connect the probe of oscilloscope to ST.



CVT11189

Terminal No.	Probe
13	+
26	-

- (6) Start the engine and warm up completely.
- (7) Check the output waveform and output voltage with engine idling.

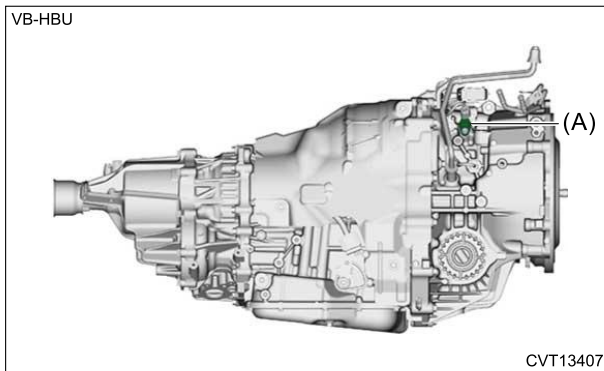
**Note:**

**For the output waveform and output voltage, refer to "TRANSMISSION (DIAGNOSTICS)". [🔗 Ref. to TRANSMISSION \(DIAGNOSTICS\)>Transmission Control Module \(TCM\) I/O Signal>WAVEFORM > SENSOR.](#)**

3. After inspection, install the related parts in the reverse order of removal.

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Primary Speed Sensor

### LOCATION



(A) Primary speed sensor

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Primary Speed Sensor

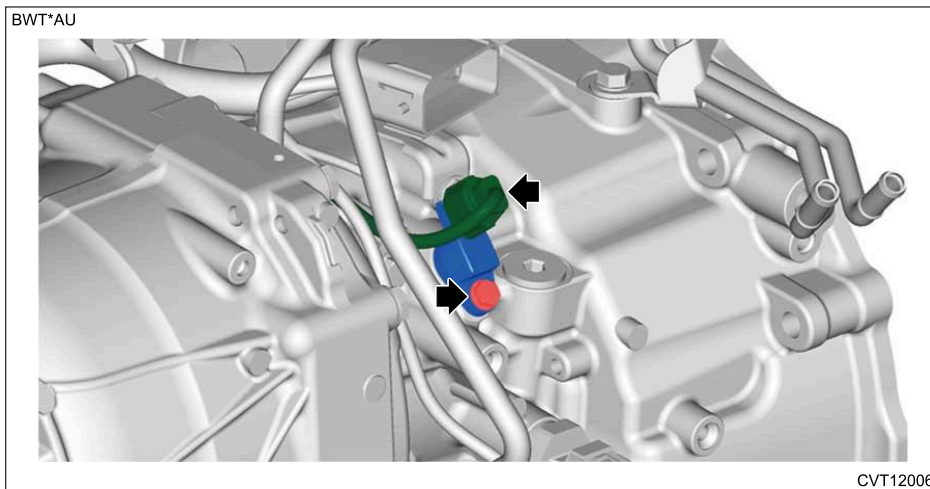
### REMOVAL



#### Caution:

**If water or oil contacts the connector terminal of primary speed sensor, replace it with a new part.**

1. Disconnect the ground terminal from battery sensor. [Ref. to REPAIR CONTENTS>NOTE > BATTERY.](#)
2. Remove the intercooler. [Ref. to INTAKE \(INDUCTION\)\(H4DOTC\)>Intercooler>REMOVAL.](#)
3. Disconnect the connector, and remove the primary speed sensor.



## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Primary Speed Sensor

### INSTALLATION

#### Caution:

**If water or oil contacts the connector terminal of primary speed sensor, replace it with a new part.**

1. Install the primary speed sensor using a new O-ring, and connect the connector.

#### Note:

**Apply CVTF to the O-rings.**

#### Tightening torque:

7 N·m (0.7 kgf-m, 5.2 ft-lb)

2. Install the intercooler. [🔗 Ref. to INTAKE \(INDUCTION\)\(H4DOTC\)>Intercooler>INSTALLATION.](#)
3. Connect the ground terminal to battery sensor. [🔗 Ref. to REPAIR CONTENTS>NOTE > BATTERY.](#)

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Primary Speed Sensor

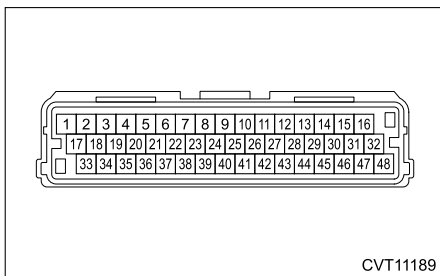
### INSPECTION

1. Check for oil leaks.
2. Check the output waveform and output voltage of the primary speed sensor.
  - (1) Disconnect the ground terminal from battery sensor. [🔗 Ref. to REPAIR CONTENTS>NOTE > BATTERY.](#)
  - (2) Disconnect the connector from TCM. [🔗 Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Transmission Control Module \(TCM\)>REMOVAL.](#)
  - (3) Set the ST between TCM and connector. [🔗 Ref. to TRANSMISSION \(DIAGNOSTICS\)>General Description>CAUTION.](#)

#### Special tool:

CHECK BOARD (18460AA040)

- (4) Connect the ground terminal to battery sensor. [🔗 Ref. to REPAIR CONTENTS>NOTE > BATTERY.](#)
- (5) Connect the probe of oscilloscope to ST.



Terminal No.	Probe
14	+
42	-

- (6) Start the engine and warm up completely.
- (7) Check the output waveform and output voltage with engine idling.

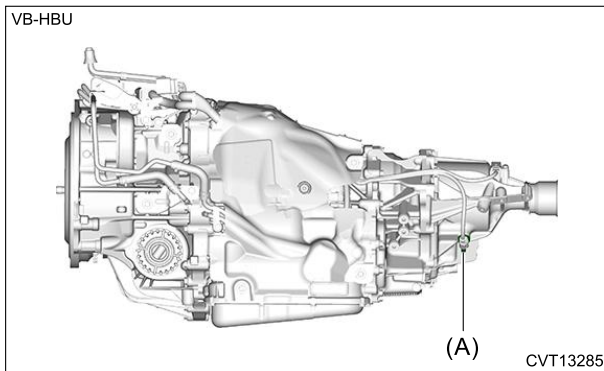
#### Note:

**For the output waveform and output voltage, refer to "TRANSMISSION (DIAGNOSTICS)".** [🔗 Ref. to TRANSMISSION \(DIAGNOSTICS\)>Transmission Control Module \(TCM\) I/O Signal>WAVEFORM > SENSOR.](#)

3. After inspection, install the related parts in the reverse order of removal.

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Front Wheel Speed Sensor

### LOCATION



(A) Front wheel speed sensor

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Front Wheel Speed Sensor

### REMOVAL



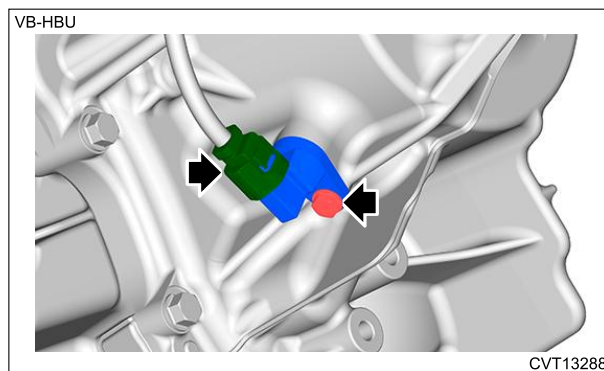
#### Caution:

If water or oil contacts the connector terminal of front wheel speed sensor, replace it with a new part.

1. Disconnect the ground terminal from battery sensor. Ref. to REPAIR CONTENTS>NOTE > BATTERY.
2. Remove the center exhaust pipe (rear). Ref. to EXHAUST(H4DOTC)>Center Exhaust Pipe>REMOVAL > CENTER EXHAUST PIPE (REAR).
3. Disconnect the connector and remove the front wheel speed sensor.

#### Caution:

Prepare a container for draining of CVTF.



## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Front Wheel Speed Sensor

### INSTALLATION

#### Caution:

If water or oil contacts the connector terminal of front wheel speed sensor, replace it with a new part.

1. Install the front wheel speed sensor using a new O-ring, and connect the connector.

#### Note:

Apply CVTF to the O-rings.

#### Tightening torque:

7 N·m (0.7 kgf-m, 5.2 ft-lb)

2. Install the center exhaust pipe (rear). [Ref. to EXHAUST\(H4DOTC\)>Center Exhaust Pipe>INSTALLATION > CENTER EXHAUST PIPE \(REAR\).](#)
3. Connect the ground terminal to battery sensor. [Ref. to REPAIR CONTENTS>NOTE > BATTERY.](#)
4. Check the CVTF level. [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>CVTF>INSPECTION.](#)

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Front Wheel Speed Sensor

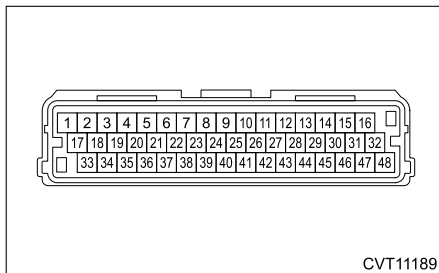
### INSPECTION

1. Check for oil leaks.
2. Check the output waveform and output voltage of the front wheel speed sensor.
  - (1) Disconnect the ground terminal from battery sensor. [Ref. to REPAIR CONTENTS>NOTE > BATTERY.](#)
  - (2) Disconnect the connector from TCM. [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Transmission Control Module \(TCM\)>REMOVAL.](#)
  - (3) Set the ST between TCM and connector. [Ref. to TRANSMISSION \(DIAGNOSTICS\)>General Description>CAUTION.](#)

#### Special tool:

CHECK BOARD (18460AA040)

- (4) Connect the ground terminal to battery sensor. [Ref. to REPAIR CONTENTS>NOTE > BATTERY.](#)
- (5) Connect the probe of oscilloscope to ST.



Terminal No.	Probe
12	+
26	-

- (6) Start the engine and warm up completely.
- (7) Lift up the vehicle.
 

**Warning:**

  - Lift up the vehicle until the tire bottom is 0.3 m (0.98 ft) or more above the ground.
  - Make sure that safety is secured where the tirs rotate.
- (8) Turn OFF the pre-collision brake function.
- (9) Turn the VDC function OFF.
- (10) Release the parking brake.
- (11) Shift the select lever to "D range".
- (12) Release the brake pedal, and then depress the accelerator pedal until the vehicle speed increases to 20 km/h (12 MPH).
- (13) Check the output waveforms and output voltage.

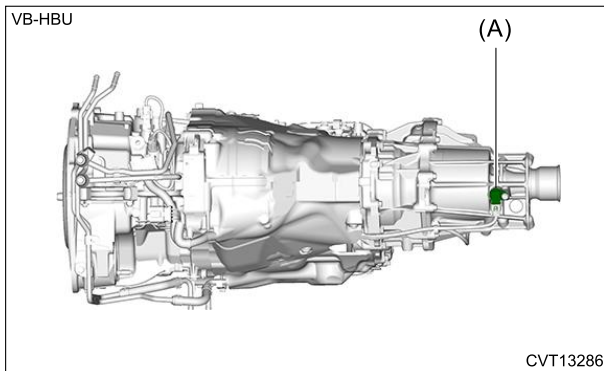
#### Note:

For the output waveform and output voltage, refer to "TRANSMISSION (DIAGNOSTICS)". [Ref. to TRANSMISSION \(DIAGNOSTICS\)>Transmission Control Module \(TCM\) I/O Signal>WAVEFORM > SENSOR.](#)

3. After inspection, install the related parts in the reverse order of removal.

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Rear Wheel Speed Sensor

### LOCATION



(A) Rear wheel speed sensor

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Rear Wheel Speed Sensor

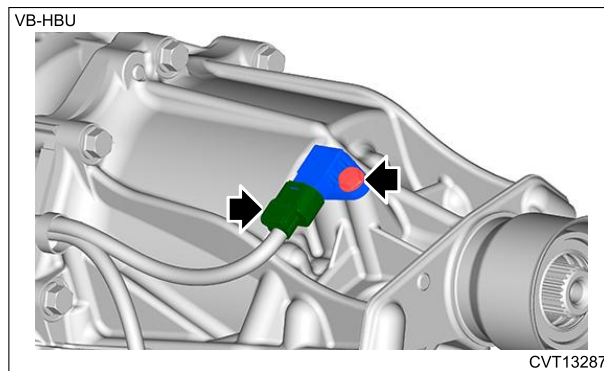
### REMOVAL



#### Caution:

**If water or oil contacts the connector terminal of rear wheel speed sensor, replace it with a new part.**

1. Disconnect the ground terminal from battery sensor. [Ref. to REPAIR CONTENTS>NOTE > BATTERY.](#)
2. Remove the center exhaust pipe (rear). [Ref. to EXHAUST\(H4DOTC\)>Center Exhaust Pipe>REMOVAL > CENTER EXHAUST PIPE \(REAR\).](#)
3. Remove the center exhaust cover and rear exhaust pipe. [Ref. to EXHAUST\(H4DOTC\)>Rear Exhaust Pipe>REMOVAL.](#)
4. Disconnect the connector and remove the rear wheel speed sensor.



## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Rear Wheel Speed Sensor

### INSTALLATION

#### Caution:

**If water or oil contacts the connector terminal of rear wheel speed sensor, replace it with a new part.**

1. Install the rear wheel speed sensor using a new O-ring, and connect the connector.

#### Note:

**Apply CVTF to the O-rings.**

#### Tightening torque:

7 N·m (0.7 kgf-m, 5.2 ft-lb)

2. Install the center exhaust cover and rear exhaust pipe. [Ref. to EXHAUST\(H4DOTC\)>Rear Exhaust Pipe>INSTALLATION.](#)

3. Install the center exhaust pipe (rear). [Ref. to EXHAUST\(H4DOTC\)>Center Exhaust Pipe>INSTALLATION > CENTER EXHAUST PIPE \(REAR\).](#)
4. Connect the ground terminal to battery sensor. [Ref. to REPAIR CONTENTS>NOTE > BATTERY.](#)

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Rear Wheel Speed Sensor

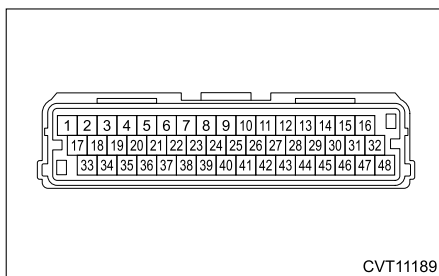
### INSPECTION

1. Check for oil leaks.
2. Check the output waveform and output voltage of the rear wheel speed sensor.
  - (1) Disconnect the ground terminal from battery sensor. [Ref. to REPAIR CONTENTS>NOTE > BATTERY.](#)
  - (2) Disconnect the connector from TCM. [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Transmission Control Module \(TCM\)>REMOVAL.](#)
  - (3) Set the ST between TCM and connector. [Ref. to TRANSMISSION \(DIAGNOSTICS\)>General Description>CAUTION.](#)

#### Special tool:

CHECK BOARD (18460AA040)

- (4) Connect the ground terminal to battery sensor. [Ref. to REPAIR CONTENTS>NOTE > BATTERY.](#)
- (5) Connect the probe of oscilloscope to ST.



Terminal No.	Probe
11	+
26	-

- (6) Start the engine and warm up completely.
- (7) Lift up the vehicle.
 

**Warning:**

  - Lift up the vehicle until the tire bottom is 0.3 m (0.98 ft) or more above the ground.
  - Make sure that safety is secured where the tiers rotate.
- (8) Turn OFF the pre-collision brake function.
- (9) Turn the VDC function OFF.
- (10) Release the parking brake.
- (11) Shift the select lever to "D range".
- (12) Release the brake pedal, and then depress the accelerator pedal until the vehicle speed increases to 20 km/h (12 MPH).
- (13) Check the output waveforms and output voltage.

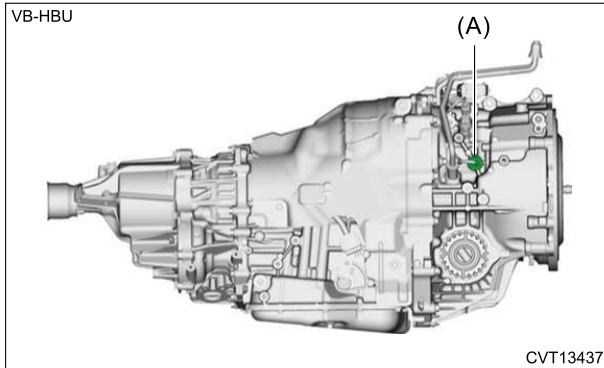
#### Note:

For the output waveform and output voltage, refer to "TRANSMISSION (DIAGNOSTICS)". [Ref. to TRANSMISSION \(DIAGNOSTICS\)>Transmission Control Module \(TCM\) I/O Signal>WAVEFORM > SENSOR.](#)

3. After inspection, install the related parts in the reverse order of removal.

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Secondary Pressure Sensor

### LOCATION



(A) Secondary pressure sensor


## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Secondary Pressure Sensor

### REMOVAL



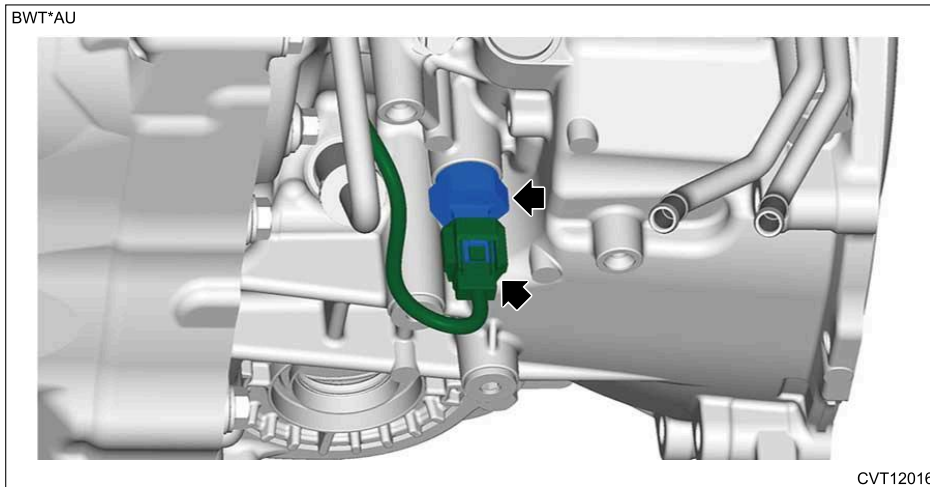
#### Caution:

If water or oil contacts the connector terminal of secondary pressure sensor, replace it with a new part.

1. Disconnect the ground terminal from battery sensor.  Ref. to REPAIR CONTENTS>NOTE > BATTERY.
2. Disconnect the connector, and using Ko-ken 3/8 12-point 27-mm deep socket (part No. 3305M-27), remove the secondary pressure sensor.

#### Caution:

Prepare a container for draining of CVTF.



3. Remove the O-ring from the secondary pressure sensor.

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Secondary Pressure Sensor

### INSTALLATION

#### Caution:

If water or oil contacts the connector terminal of secondary pressure sensor, replace it with a new part.

1. Install a new O-ring.

**Note:****Apply CVTF to the O-rings.**

- Using Ko-ken 3/8 12-point 27-mm deep socket (part No. 3305M-27), install the secondary pressure sensor and connect the connector.

**Tightening torque:**

39 N·m (4.0 kgf-m, 28.8 ft-lb)

- Connect the ground terminal to battery sensor.  [Ref. to REPAIR CONTENTS>NOTE > BATTERY.](#)
- Check the CVTF level.  [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>CVTF>INSPECTION.](#)

**CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Secondary Pressure Sensor****INSPECTION**

---

- Check for oil leaks.
- Check [secondary pressure sensor voltage.] of the secondary pressure sensor.
  - Connect the Subaru Select Monitor.
  - Turn the ignition switch to ON. (Engine OFF)
  - Display [secondary pressure sensor voltage.].
  - Start the engine and warm up completely.
  - Shift the select lever to "D range".
  - Shift the select lever to "P range".
  - Check [secondary pressure sensor voltage.] with the vehicle idling.

**Specification:**

Approx. 0.7 V

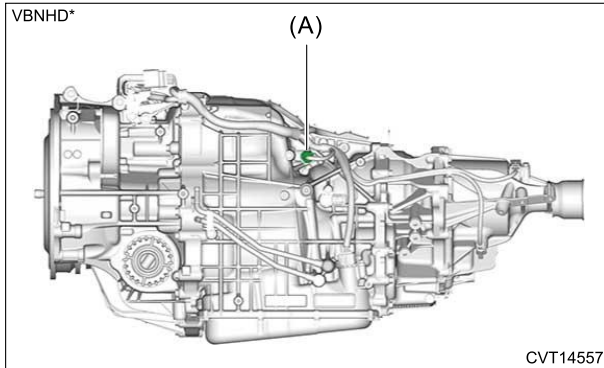
- Stop the engine.
- Turn the ignition switch to ON. (Engine OFF)
- Check [secondary pressure sensor voltage.].

**Specification:**

Approx. 0.5 V

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Primary Pressure Sensor

### LOCATION



(A) Primary pressure sensor


## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Primary Pressure Sensor

### REMOVAL



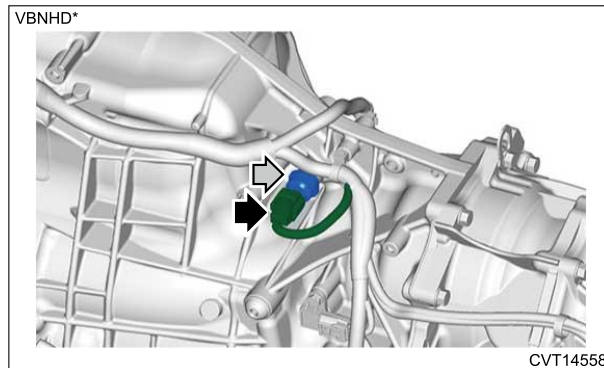
#### Caution:

If water or oil contacts the connector terminal of primary pressure sensor, replace it with a new part.

1. Remove the transmission body.  Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transmission Assembly>REMOVAL.
2. Disconnect the connector, and remove the primary pressure sensor.

#### Caution:

Prepare the container for draining of CVTF.



3. Remove the O-ring from the primary pressure sensor.

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Primary Pressure Sensor

### INSTALLATION

#### Caution:

If water or oil contacts the connector terminal of primary pressure sensor, replace it with a new part.

1. Install a new O-ring.

#### Note:

Apply CVTF to the O-rings.

2. Install the primary pressure sensor and connect the connector.

#### Tightening torque:

13 N·m (1.3 kgf-m, 9.6 ft-lb)

3. Install the transmission body.  [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Transmission Assembly>INSTALLATION.](#)

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Primary Pressure Sensor

### INSPECTION

---

1. Check for oil leaks.
2. Check [Primary Pressure Sensor Voltage.] of the primary pressure sensor.
  - (1) Connect the Subaru Select Monitor.
  - (2) Turn the ignition switch to ON. (Engine OFF)
  - (3) Display [Primary Pressure Sensor Voltage.].
  - (4) Start the engine and warm up completely.
  - (5) Shift the select lever to "D range".
  - (6) Shift the select lever to "P range".
  - (7) Check [Primary Pressure Sensor Voltage.] with the vehicle idling.

**Specification:**

Approx. 0.6 V

- (8) Stop the engine.
- (9) Turn the ignition switch to ON. (Engine OFF)
- (10) Check [Primary Pressure Sensor Voltage.].

**Specification:**

Approx. 0.5 V

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Oil Pan

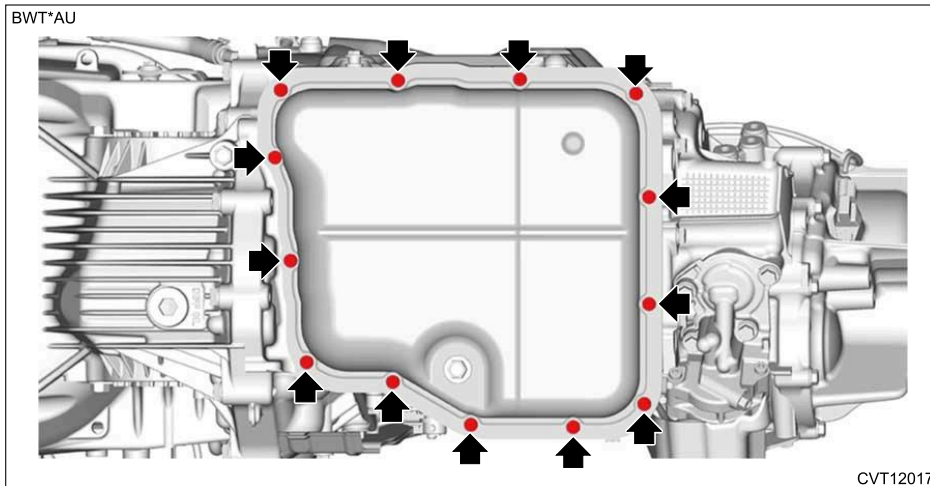
### REMOVAL



#### Caution:

- Vehicle components are extremely hot immediately after driving. Be wary of receiving burns from heated parts.
- If any CVTF adheres to the exhaust pipe, completely wipe it off to avoid emitting smoke and causing a fire.

1. Drain the CVTF. Ref. to [CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>CVTF>REPLACEMENT](#).
2. Remove the bolts which hold the oil pan.



3. Insert an oil pan seal cutter into the gap between oil pan and transmission case, and remove the oil pan.

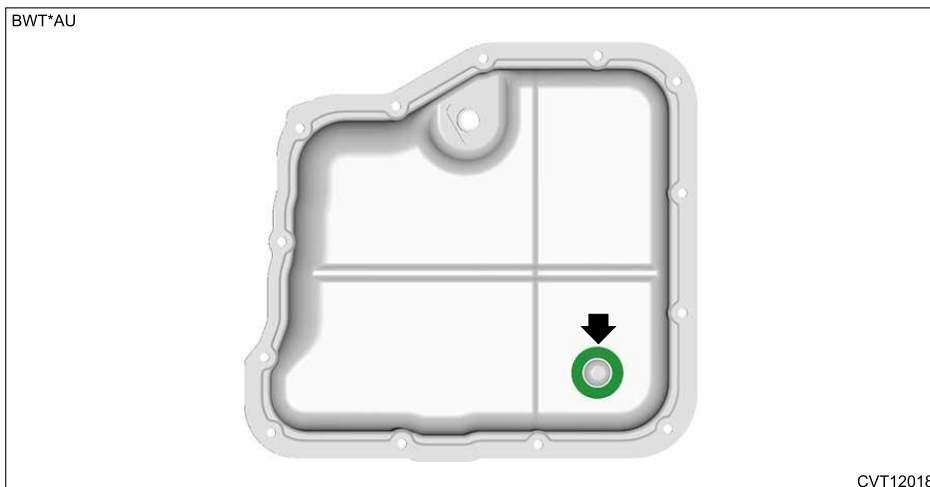
#### Caution:

- Do not use the tools other than the oil pan seal cutter, in order to prevent damaging the oil pan and the transmission case.
- Do not twist with excessive force. The oil pan may be deformed.

4. Remove the magnet.

#### Note:

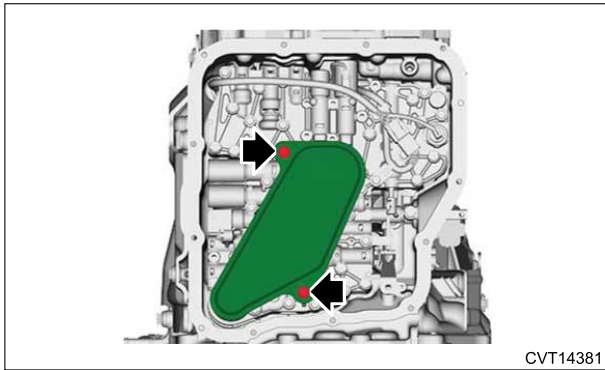
Remove the iron powder, etc. from the magnet.



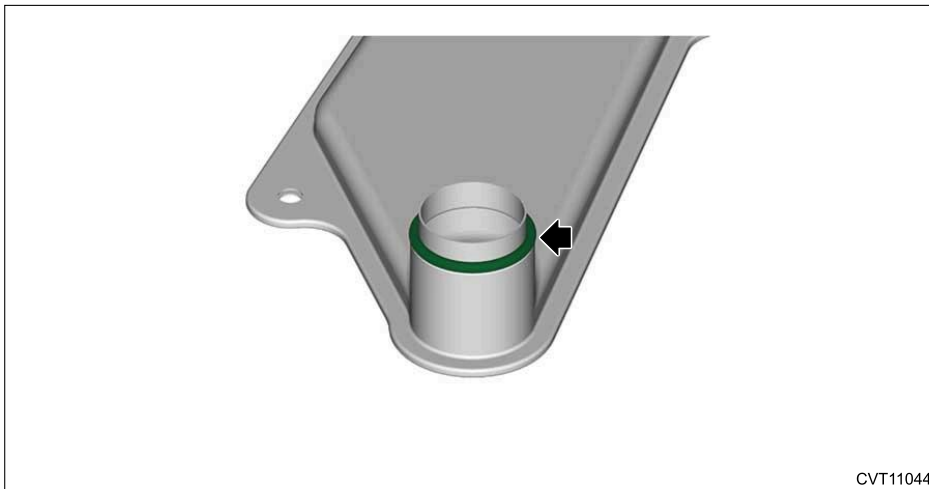
5. Remove the liquid gasket from the oil pan and the transmission case.
6. Remove the oil strainer.

#### Note:

Perform this procedure only when required.



7. Remove the O-rings.



## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Oil Pan

### INSTALLATION

1. Install a new O-ring to the oil strainer.

**Note:**

**Apply CVTF to the O-rings.**

2. Install the oil strainer.

**Tightening torque:**

9 N·m (0.9 kgf-m, 6.6 ft-lb)

3. Attach the magnet on the oil pan.

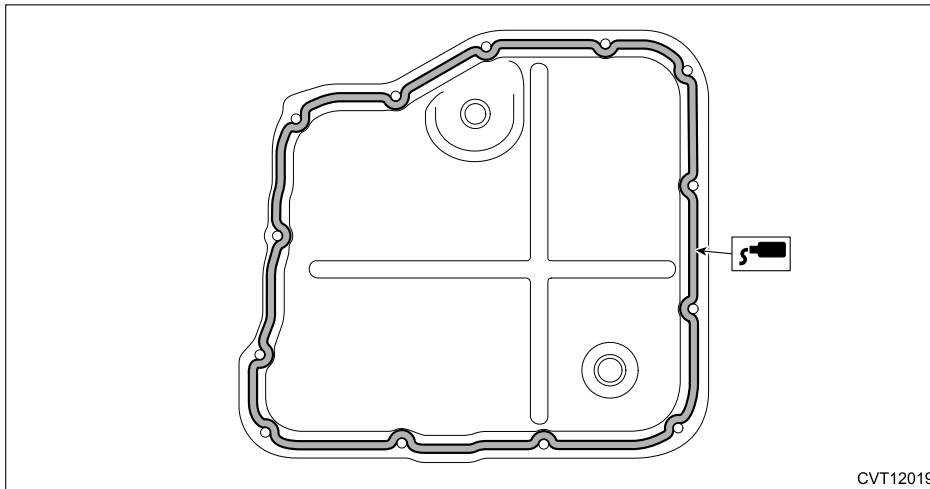
4. Apply liquid gasket to the mating surface of the oil pan as shown in the figure, and install the oil pan.

**Note:**

- Before applying liquid gasket, degrease the old liquid gasket seal surfaces of the oil pan and transmission body.
- Install within 5 min. after applying liquid gasket.

**Preparation items:**

Liquid gasket: THREE BOND 1216J or equivalent



5. Evenly tighten the bolts which hold the oil pan.

**Tightening torque:**

7.2 N·m (0.7 kgf-m, 5.3 ft-lb)

6. Fill with CVTF.  [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>CVTF>REPLACEMENT.](#)

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Oil Pan

### INSPECTION

---

1. Check for oil leaks.
2. Check that there is no deformation, cracks or other damages.
3. Check the oil passages for clogging.

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Control Valve Body

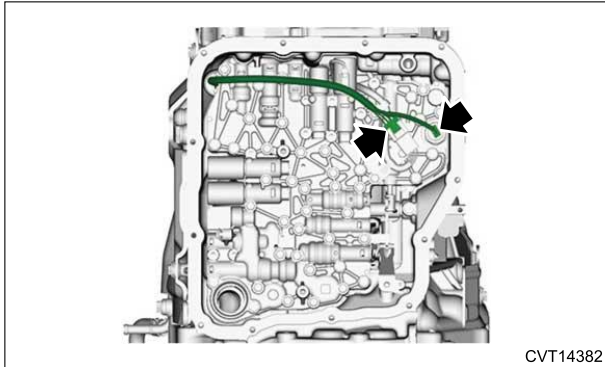
### REMOVAL



#### Note:

The control valve body is a non-disassembly part.

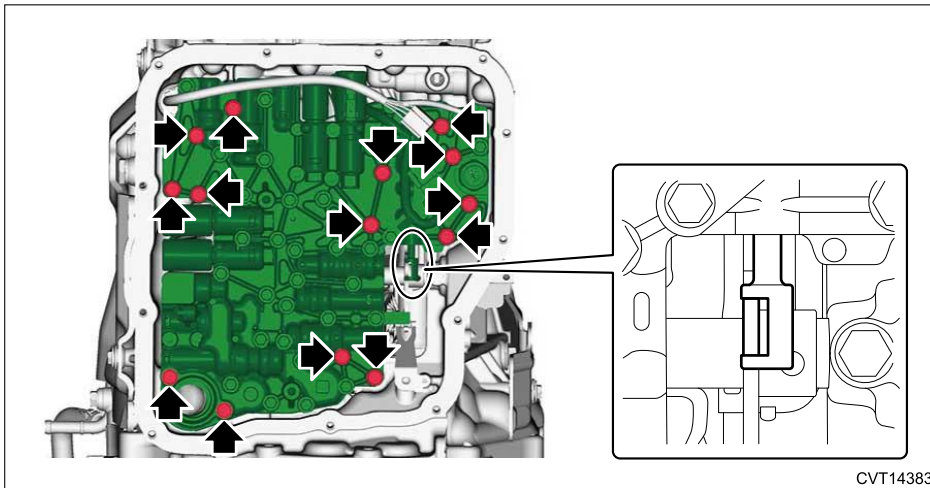
1. Disconnect the ground terminal from battery sensor. Ref. to [REPAIR CONTENTS>NOTE > BATTERY](#).
2. Remove the oil pan and oil strainer. Ref. to [CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Oil Pan>REMOVAL](#).
3. Disconnect the connector.



4. Remove the control valve body.

#### Caution:

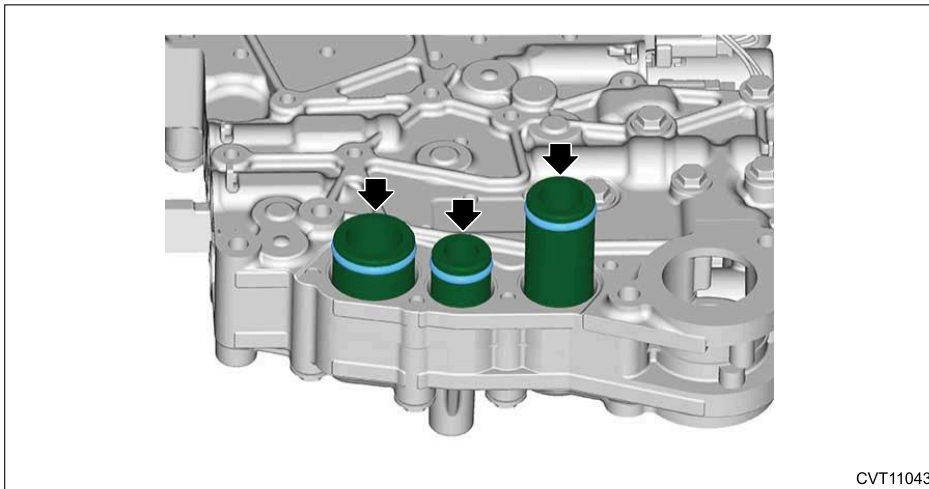
- Do not remove any bolts other than specified in the figure.
- Be careful not to let the manual valve drop off.



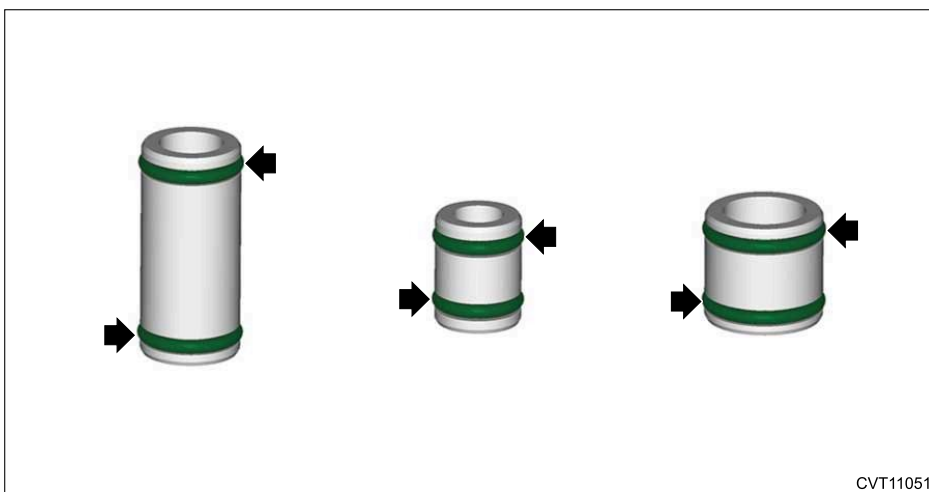
5. Remove the pressure pipe No. 1, pressure pipe No. 2 and pressure pipe No. 3.

#### Note:

It may remain in the transmission case side.

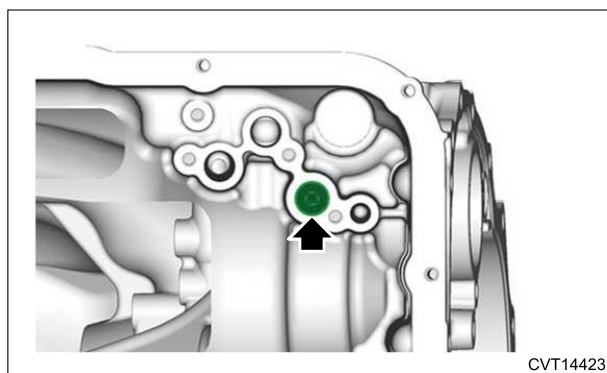


- Remove the O-ring from the pressure pipe No. 1, pressure pipe No. 2 and pressure pipe No. 3.



- Remove the filter from the transmission case.

**Note:**  
Perform this procedure only when required.

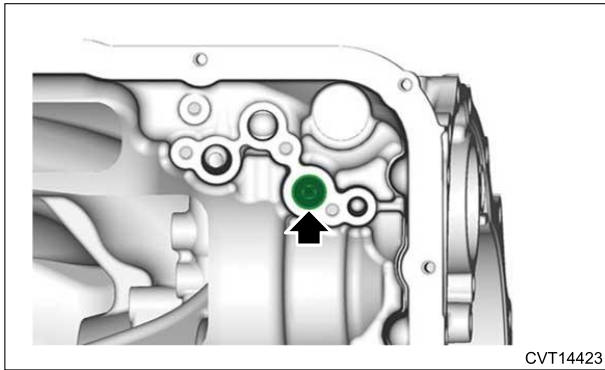


## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Control Valve Body

### INSTALLATION

- Install a new filter to the transmission case.

**Note:**  
Apply CVTF to the O-rings.

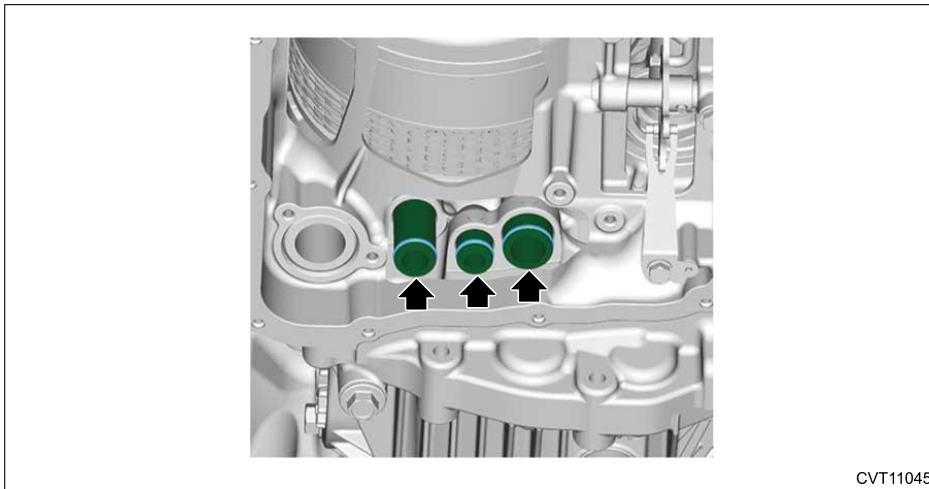


2. Install new O-rings to the pressure pipe No. 1, pressure pipe No. 2 and pressure pipe No. 3.

**Note:**

**Apply CVTF to the O-rings.**

3. Install the pressure pipe No. 1, pressure pipe No. 2 and pressure pipe No. 3 to the transmission case.



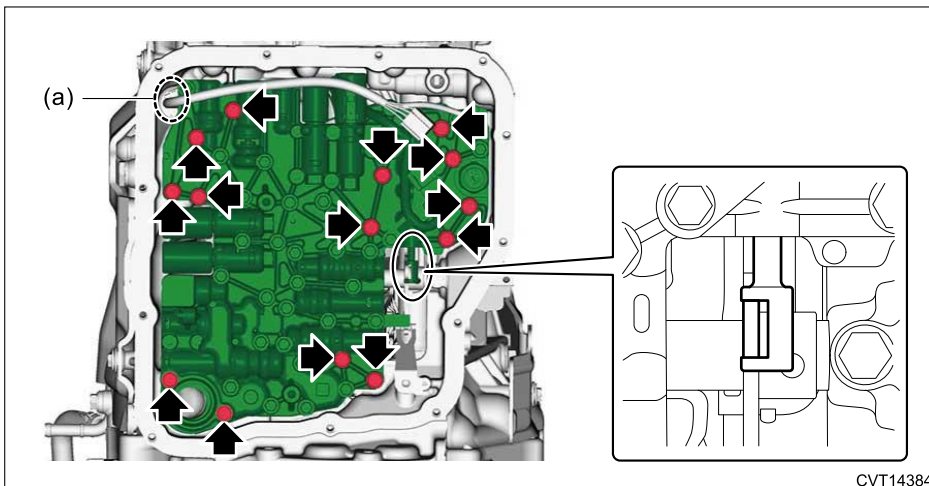
4. Install the control valve body.

**Note:**




- Engage the manual valve to the manual plate.
- Lead the transmission harness through the point indicated by dashed line (a) in the figure in order to prevent it from being caught.

**Tightening torque:**

9 N·m (0.9 kgf-m, 6.6 ft-lb)



5. Connect the connector.
6. Install the oil pan and oil strainer.  [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Oil Pan>INSTALLATION.](#)

7. Connect the ground terminal to battery sensor.  Ref. to REPAIR CONTENTS>NOTE > BATTERY.
8. Refill CVTF to adjust the CVTF level.  Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>CVTF>INSPECTION.
9. Perform the [Clear AT learning value] and [AT learning mode] using Subaru Select Monitor.  Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>AT learning.

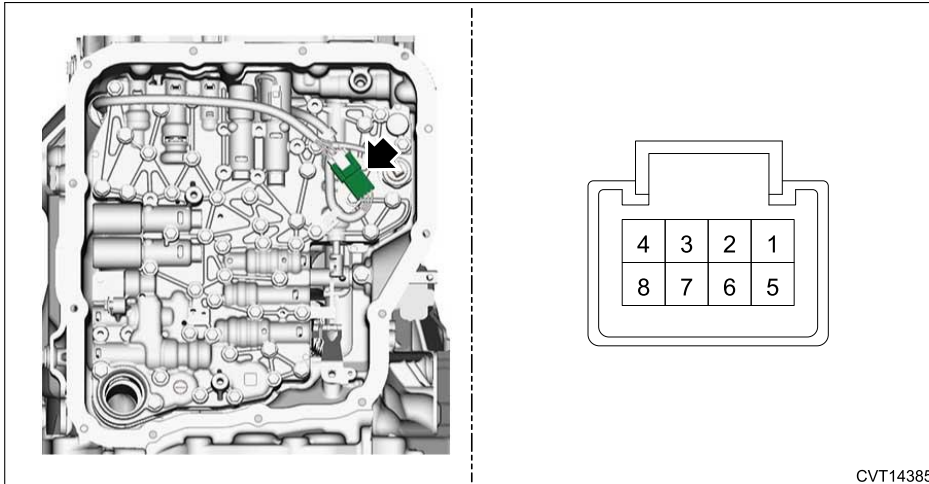
## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Control Valve Body

### INSPECTION

1. Check that there is no deformation, cracks or other damages.
2. Check the resistance of each solenoid.

**Note:**

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





CVT14385

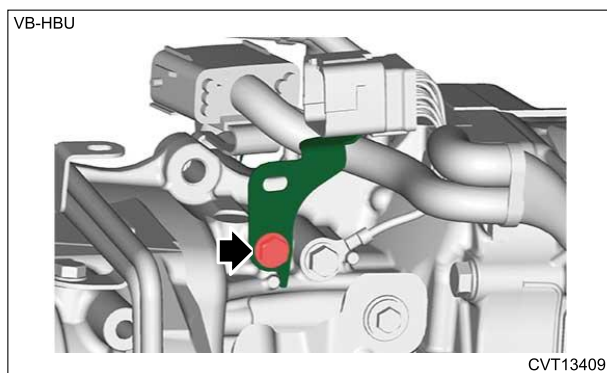
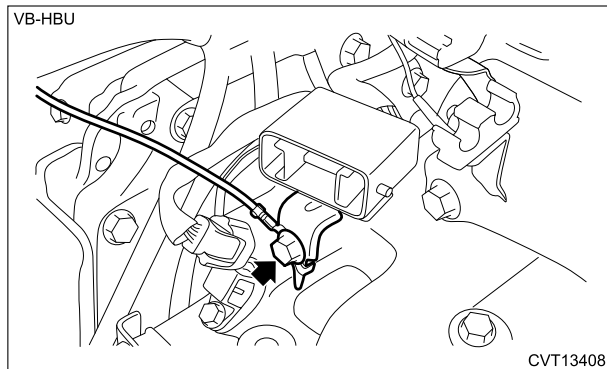
Solenoid	Terminal No.	Standard
Line pressure solenoid	No. 1 — Control valve body	3.3 — 7.3 Ω
Lock-up duty solenoid	No. 2 — Control valve body	10 — 14.2 Ω
F&R solenoid	No. 3 — Control valve body	3.5 — 7.1 Ω
Secondary solenoid	No. 4 — Control valve body	3.3 — 7.3 Ω
Primary DOWN solenoid	No. 6 — Control valve body	10 — 14.2 Ω
Primary UP solenoid	No. 7 — Control valve body	10 — 14.2 Ω
AWD solenoid	No. 8 — Control valve body	3.3 — 7.3 Ω

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Transmission Harness

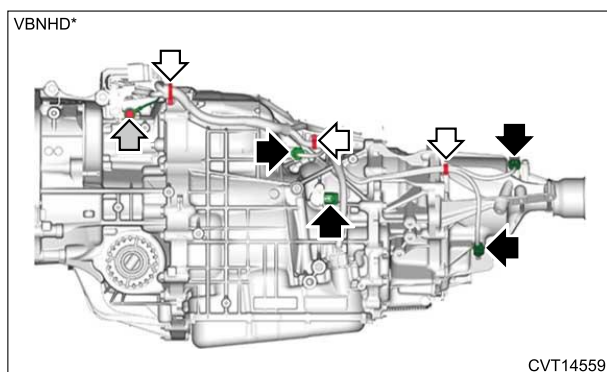
### REMOVAL

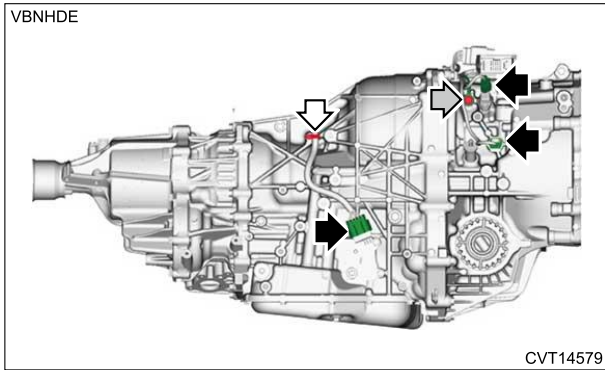


1. Remove the transmission body.  Ref. to [CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Transmission Assembly>REMOVAL](#).
2. Remove the torque converter.  Ref. to [CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Torque Converter>REMOVAL](#).
3. Remove the ground terminal and the stay.



4. Disconnect the connector and ground terminal as shown in the figure, and release the clips.





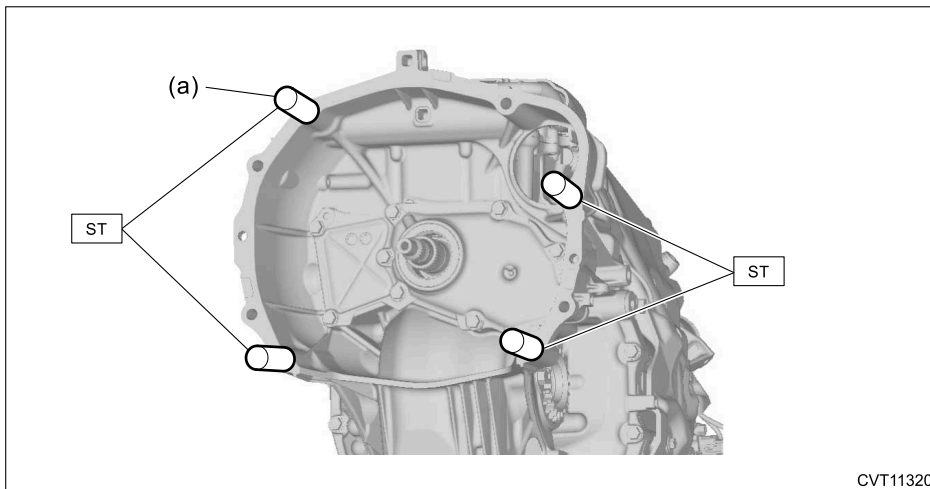
5. Remove the transmission harness from the transmission case.  
 (1) Attach the ST.

**Note:**

**When attaching the ST to the (a) positions, spacers or similar of 2.0 mm (0.08 in) or more in thickness are necessary.**

**Preparation tool:**


ST: STAND ASSY (18632AA000)

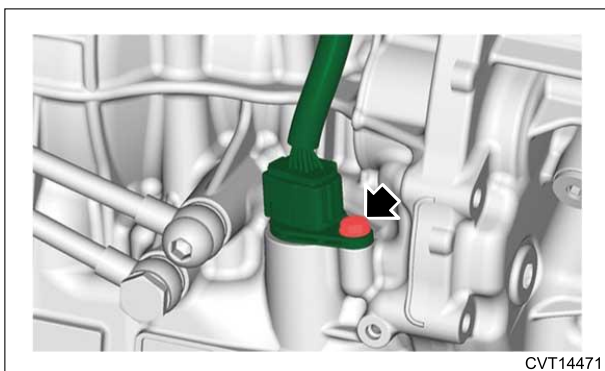


- (2) Place the transmission body.

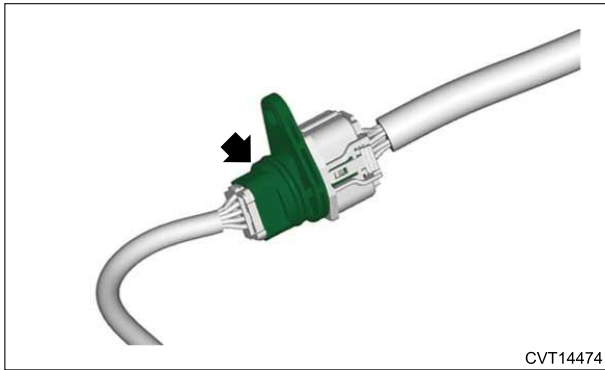
**Caution:**

**Prepare a container for draining of CVTF, because CVTF remaining inside the transmission body may flow out from the input shaft portion.**

- (3) Remove the control valve body.  [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Control Valve Body>REMOVAL.](#)  
 (4) Remove the bolt securing the transmission harness.



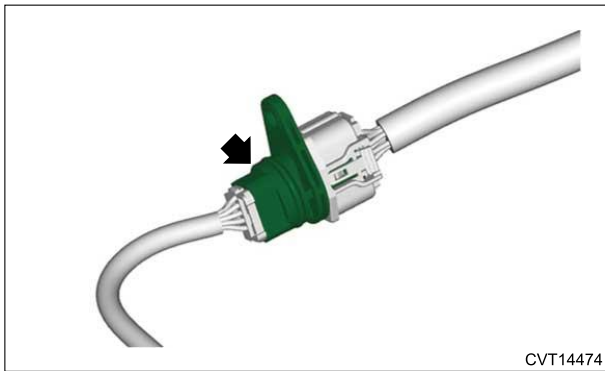
- (5) Remove the transmission harness from the transmission case.  
 (6) Remove the connector from the transmission harness.



## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Transmission Harness

### INSTALLATION

1. Install the transmission harness to the transmission case.
  - (1) Install a new connector to the transmission harness.



- (2) Set the transmission harness to the transmission case.

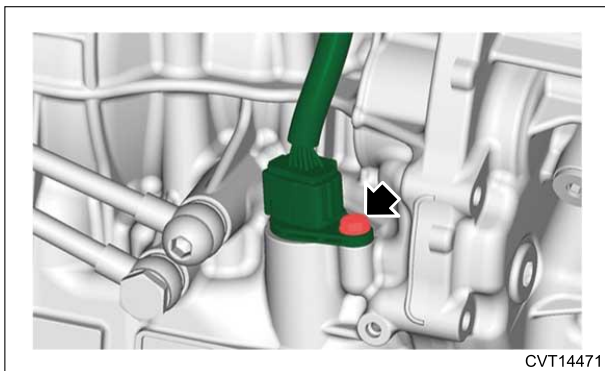
**Note:**


**Apply CVTF to the O-rings.**

- (3) Install the bolt which holds the transmission harness.

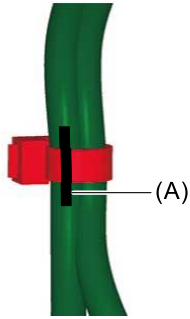
**Tightening torque:**

7 N·m (0.7 kgf-m, 5.2 ft-lb)



- (4) Install the control valve body.  [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Control Valve Body>INSTALLATION.](#)
  - (5) Remove the ST (STAND ASSY).
2. Replace with a new clip. (When the transmission harness is reused)
  - (1) Check the orientation of the clip.
  - (2) Put an alignment mark (A) on the transmission harness and clip.

SL-9A\*



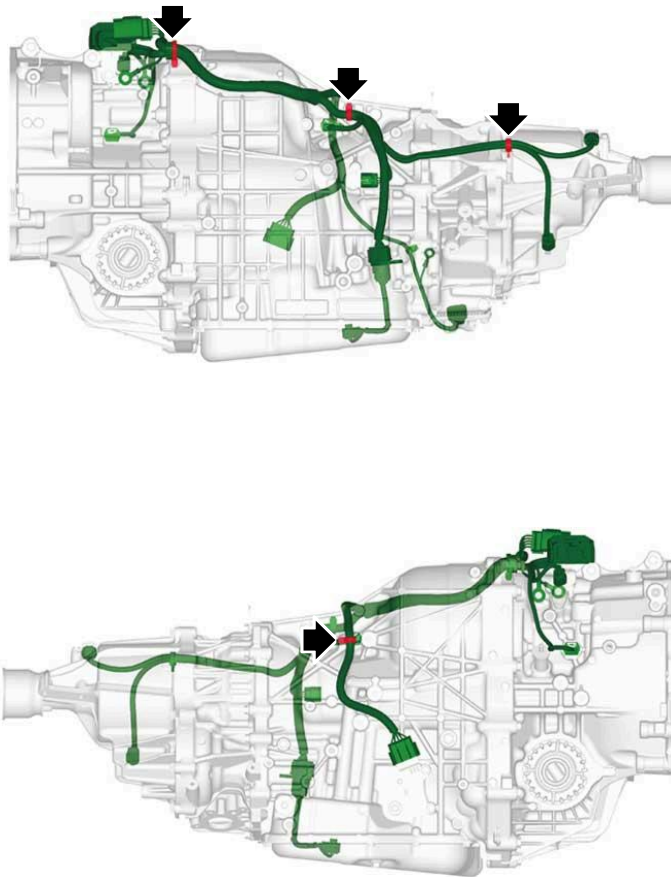
CVT14870

(3) Remove the clip from the transmission harness.

(4) Align the clip orientation and alignment mark, and install the new clip onto the transmission harness.

**Note:**

**Cut off the unnecessary parts of the tie-wraps.**

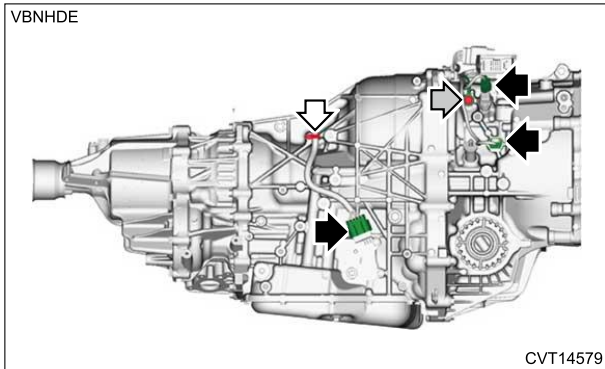
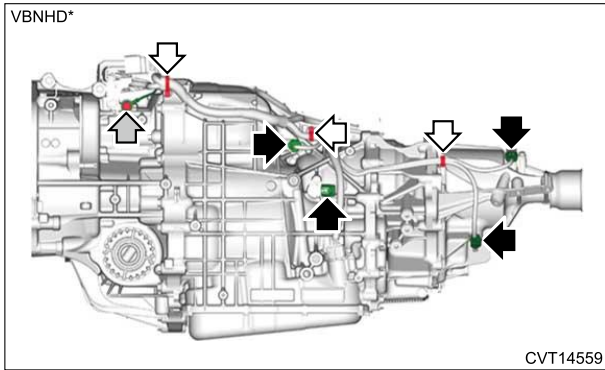


CVT15331

**3.** Connect the connector and ground terminal as shown in the figure, and install each clip.

**Tightening torque:**



13 N·m (1.3 kgf-m, 9.6 ft-lb)



4. Install the ground terminal and the stay.

**Tightening torque:**

16 N·m (1.6 kgf-m, 11.8 ft-lb)

5. Install the torque converter.  [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Torque Converter>INSTALLATION.](#)
6. Install the transmission body.  [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Transmission Assembly>INSTALLATION.](#)

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Transmission Harness


### INSPECTION

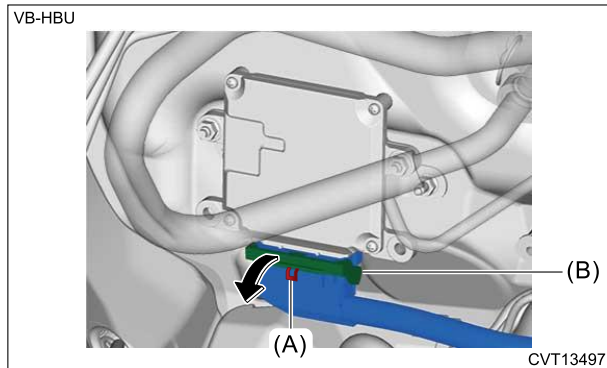
---

1. Check that there is no deformation, cracks or other damages.
2. Check the terminal for rusting.

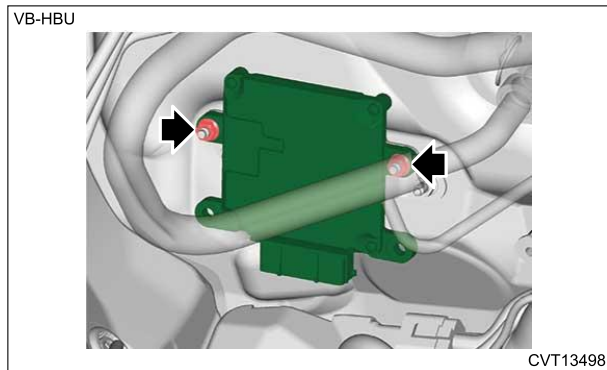
## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Transmission Control Module (TCM)

### REMOVAL

1. Disconnect the ground terminal from battery sensor.  [Ref. to REPAIR CONTENTS>NOTE > BATTERY.](#)
2. Move the lock lever (B) in the arrow direction while pressing the lock button (A), and disconnect the connector.



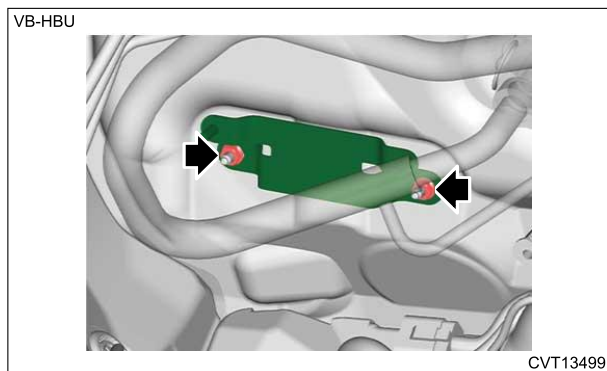
3. Remove the TCM.



4. Remove the bracket.

**Note:**

**Perform this procedure only when required.**



## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Transmission Control Module (TCM)

### INSTALLATION

**Caution:**

**When replacing the TCM, be sure to perform the module registration.**  [Ref. to COMMON \(DIAGNOSTICS\)>Unit Registration>OPERATION.](#)

1. Attach the bracket.

**Tightening torque:**

7.5 N·m (0.8 kgf-m, 5.5 ft-lb)

2. Install the TCM.




**Tightening torque:**

7.5 N·m (0.8 kgf-m, 5.5 ft-lb)

3. Connect the connector.

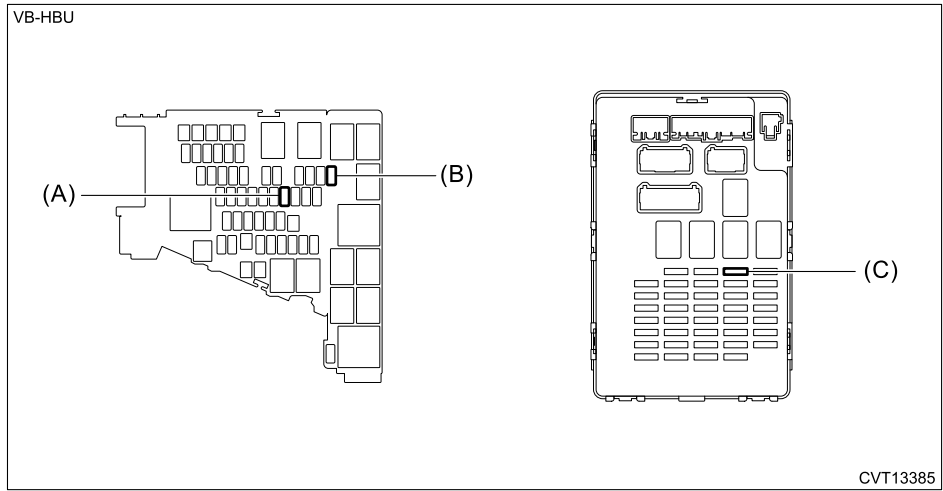
**Note:**

**Move the lock lever and confirm that a clicking sound is heard.**

4. Connect the ground terminal to battery sensor.  [Ref. to REPAIR CONTENTS>NOTE > BATTERY.](#)
5. When the TCM has been replaced, perform the module registration.  [Ref. to COMMON \(DIAGNOSTICS\)>Unit Registration>OPERATION.](#)
6. Perform the [Clear AT learning value] and [AT learning mode] using Subaru Select Monitor.  [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>AT learning.](#)

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Relay and Fuse

**LOCATION**



(A) TCM fuse (15 A)

(B) IG fuse (7.5 A)

(C) IG fuse (7.5 A)

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Relay and Fuse

**INSPECTION**

**1. CHECK FUSE**

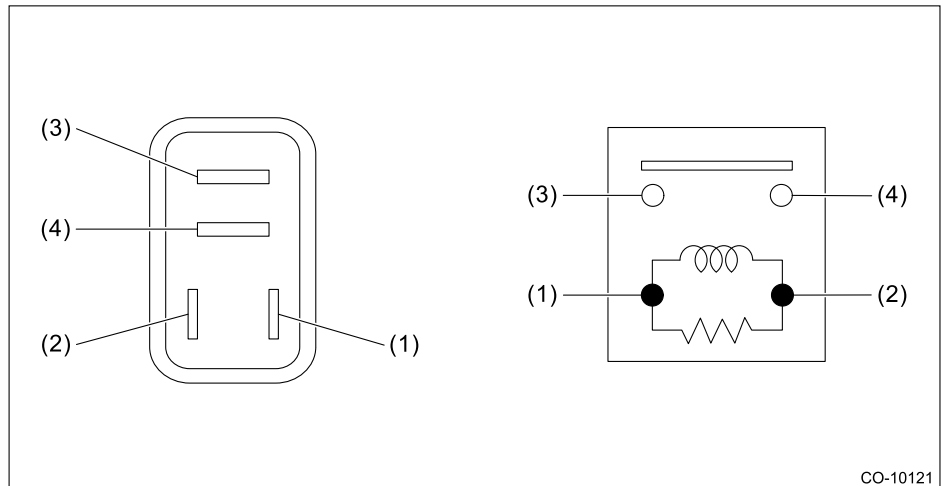
1. Remove the fuse and inspect visually.
2. If the fuse is blown out, replace the fuse.

**Note:**

**If the fuse is blown again, check the system wiring harness.**

**2. CHECK RELAY**

1. Check that there is no deformation, cracks or other damages.
2. Check the resistance between terminals.



Terminal No.	Inspection conditions	Standard
3 – 4	Apply battery voltage between terminals 1 and 2.	Less than 1 Ω
3 – 4	Always	1 MΩ or more





## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > CVTF Cooler (With Warmer Function)

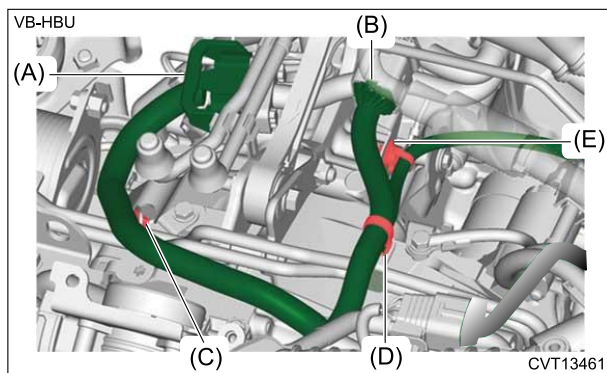
### REMOVAL



#### Caution:

- Wait until the CVTF cools down before starting the procedure.
- If the CVTF and engine coolant is spilt over the engine, exhaust pipe or the under cover, completely wipe it off to avoid emission of smoke or causing a fire.

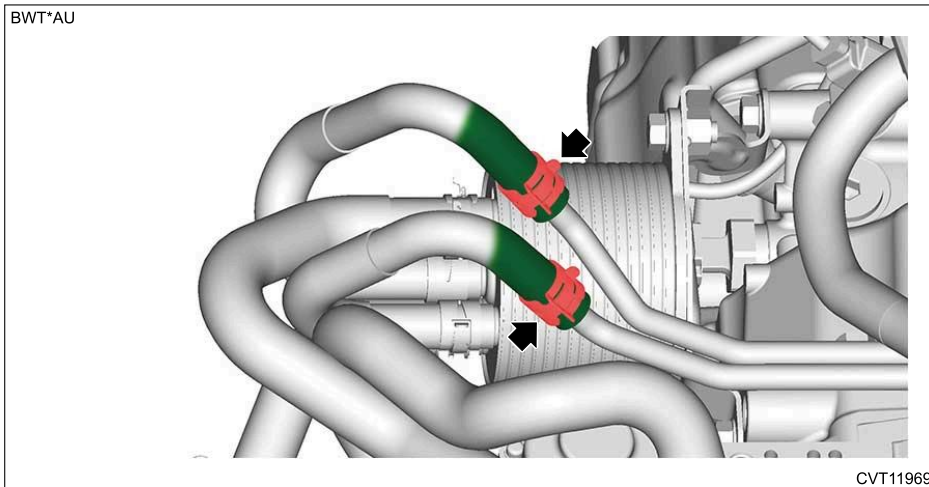
1. Disconnect the ground terminal from battery sensor.  Ref. to [REPAIR CONTENTS>NOTE > BATTERY](#).
2. Drain engine coolant.  Ref. to [COOLING\(H4DOTC\)>Engine Coolant>REPLACEMENT](#).
3. Remove the air intake duct.  Ref. to [INTAKE \(INDUCTION\)\(H4DOTC\)>Air Intake Duct>REMOVAL](#).
4. Remove the intercooler.  Ref. to [INTAKE \(INDUCTION\)\(H4DOTC\)>Intercooler>REMOVAL](#).
5. Disconnect the connector (A) and connector (B), and remove the clip (C), clip (D) and clip (E).



6. Disconnect the CVTF cooler inlet hose and CVTF cooler outlet hose.

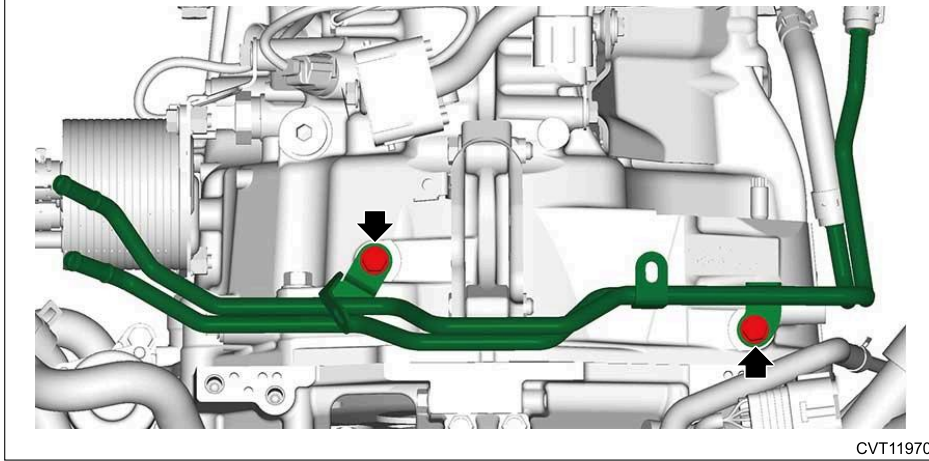
#### Caution:

Prepare a container for draining of CVTF.

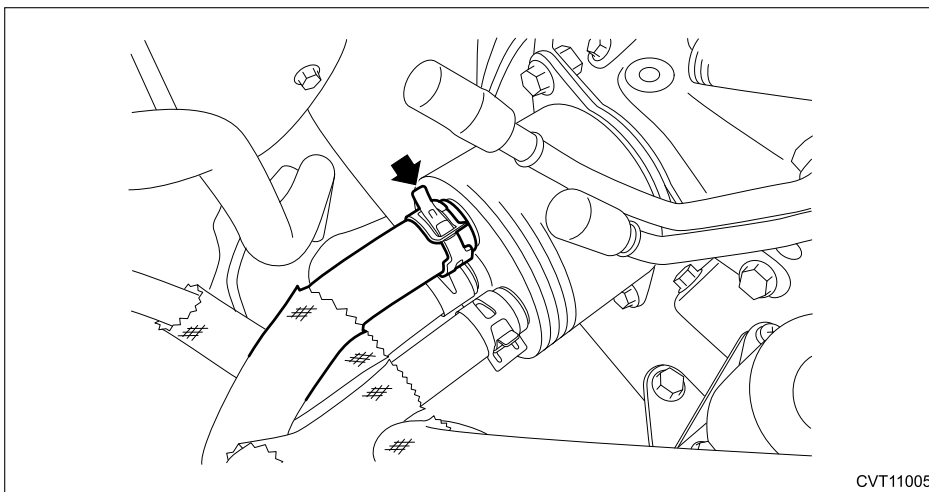


7. Remove the bolts which secure the CVTF cooler pipe No. 1.

BWT\*AU

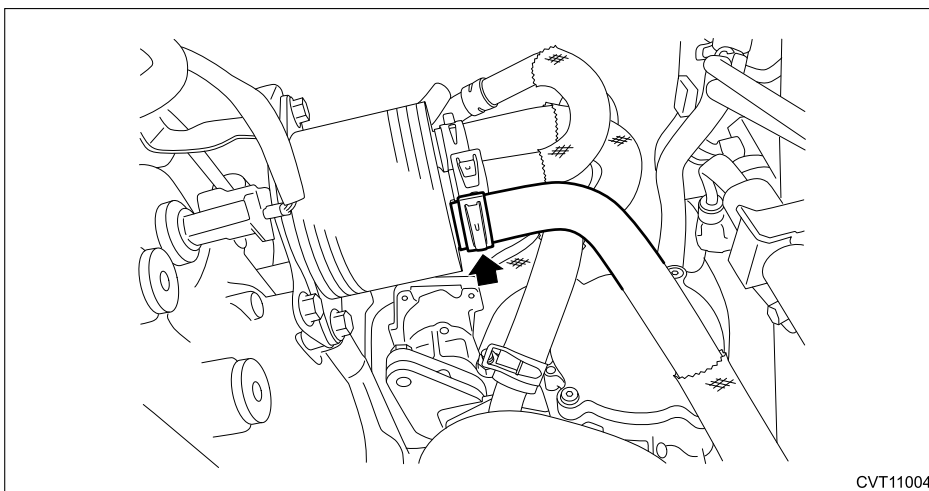


**8.** Disconnect the water hose (outlet).

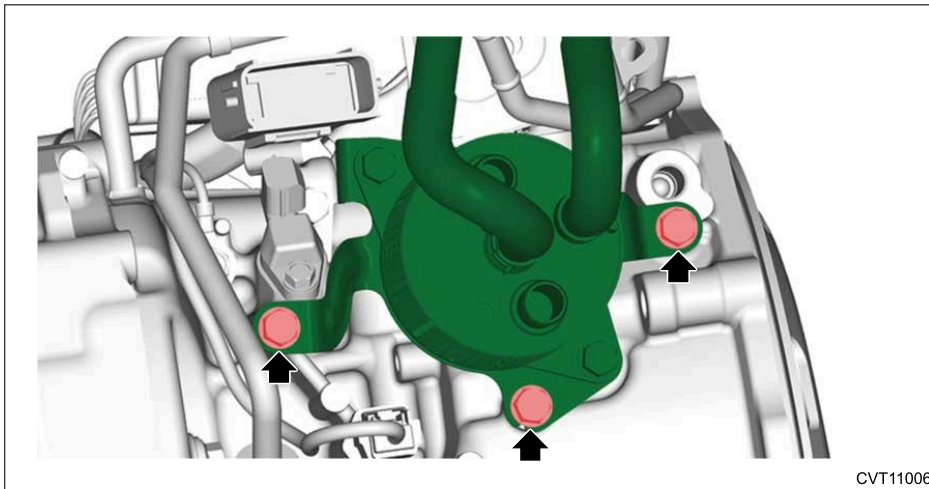


**9.** Remove the crossmember support rear RH.  [Ref. to FRONT SUSPENSION>Crossmember Support>REMOVAL.](#)

**10.** Disconnect the water hose (inlet).

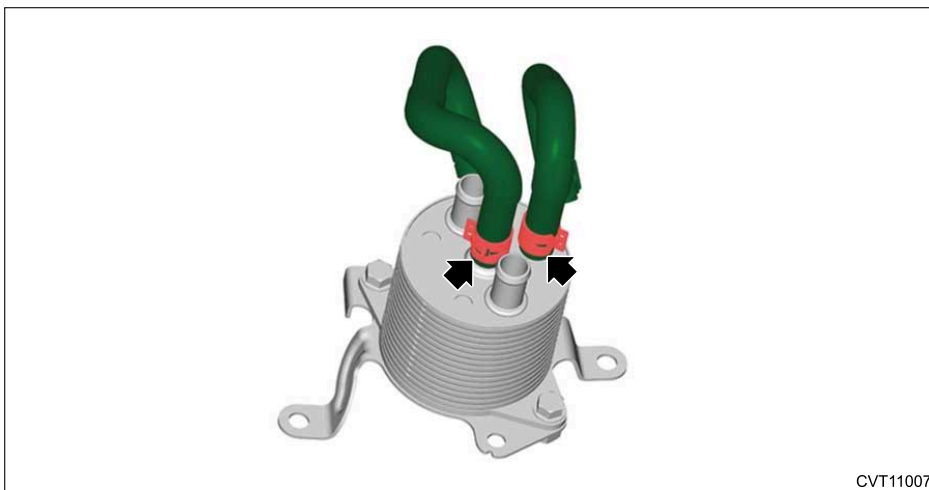


**11.** Remove the CVTF cooler (with warmer feature).



CVT11006

**12.** Remove the CVTF cooler inlet hose and CVTF cooler outlet hose.



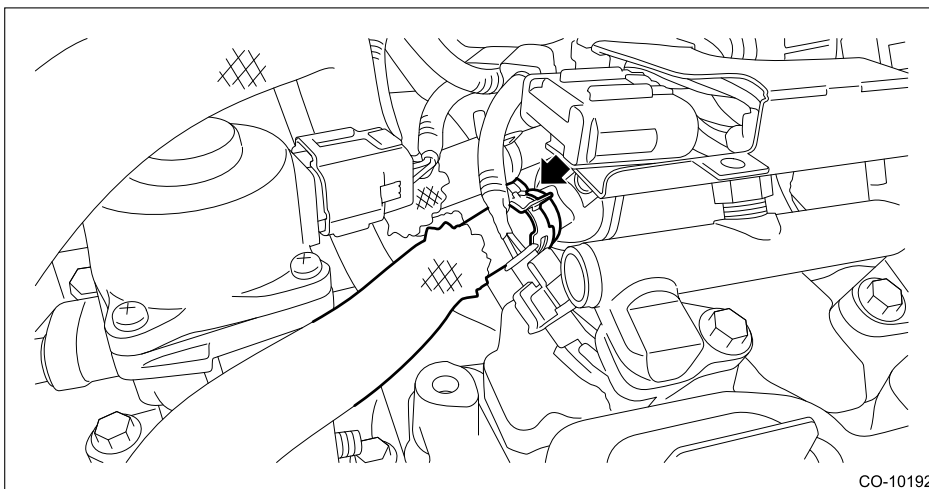
CVT11007

**13.** Remove the water hose (outlet).

**Note:**

**Perform this procedure only when required.**

- (1) Remove the fuel pipe insulator No. 1. [Ref. to FUEL INJECTION \(FUEL SYSTEMS\)\(H4DOTC\)>Fuel Insulator>REMOVAL.](#)
- (2) Remove the water hose (outlet).



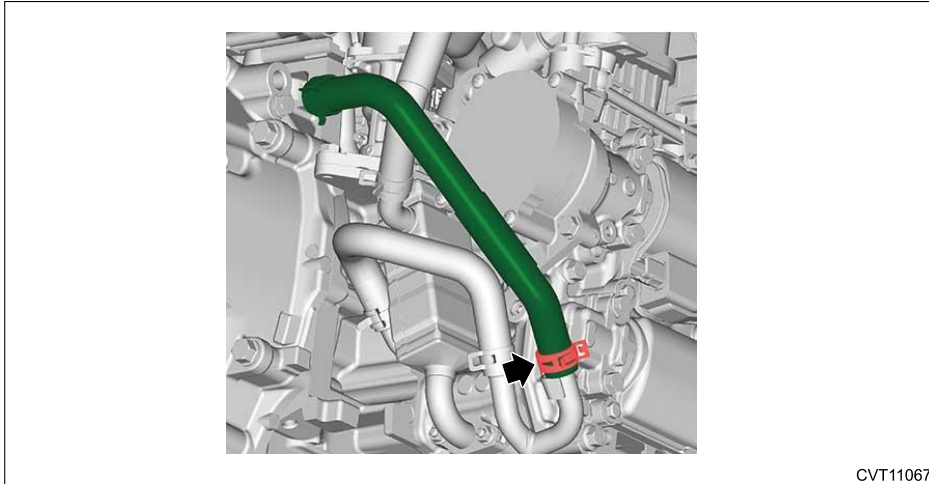
CO-10192

**14.** Remove the water hose (inlet).

**Note:**

**Perform this procedure only when required.**

- (1) Remove the front exhaust pipe.  [Ref. to EXHAUST\(H4DOTC\)>Front Exhaust Pipe>REMOVAL.](#)
- (2) Remove the water hose (inlet).



## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > CVTF Cooler (With Warmer Function)

### INSTALLATION

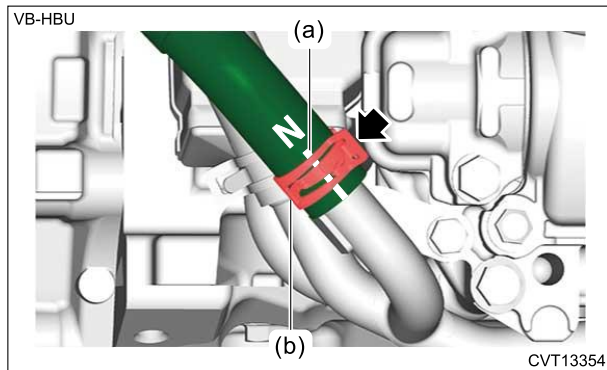
#### Caution:

If the CVTF or engine coolant is spilt over the engine, exhaust pipe or the under cover, completely wipe it off to avoid emission of smoke or causing a fire.

1. Install the water hose (inlet).
  - (1) Install the water hose (inlet).

#### Note:

- Face the mark (a) of water hose (inlet) in the lateral direction.
- Align the claw and the center of the claw of hose clamp (b) with the mark (a) of water hose (inlet).

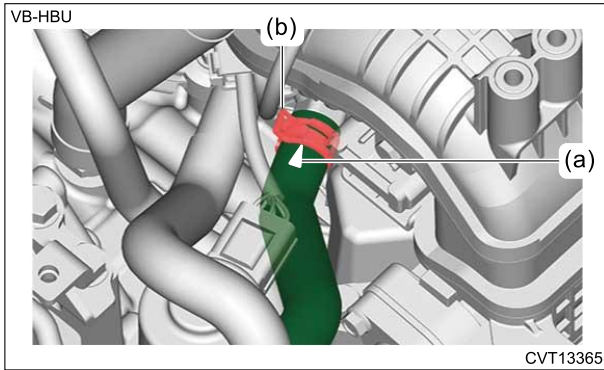


- (2) Install the front exhaust pipe.  [Ref. to EXHAUST\(H4DOTC\)>Front Exhaust Pipe>INSTALLATION.](#)

2. Install the water hose (outlet).
  - (1) Install the water hose (outlet).

#### Note:

- Face the mark (a) of water hose (outlet) in the top direction.
- Align the claw and the center of the claw of hose clamp (b) with the mark (a) of water hose (outlet).

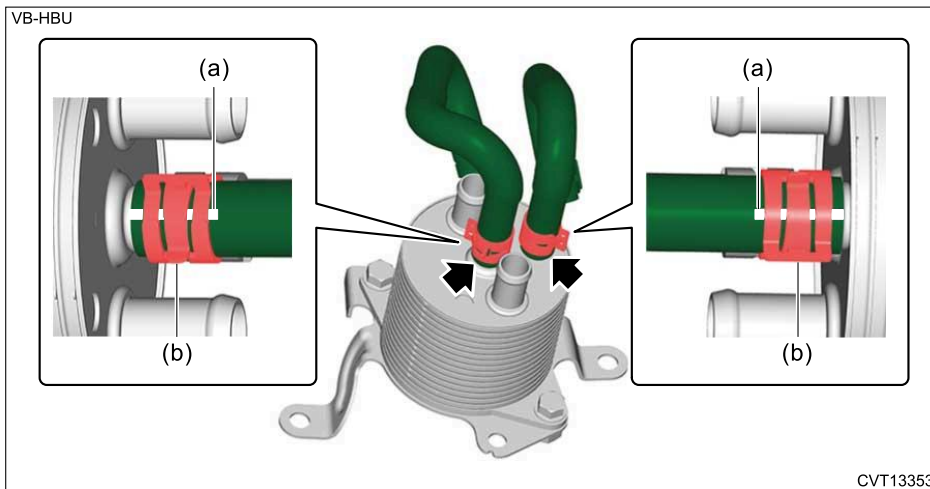


(2) Install the fuel pipe insulator No. 1.  [Ref. to FUEL INJECTION \(FUEL SYSTEMS\)\(H4DOTC\)>Fuel Insulator>INSTALLATION.](#)

3. Install a new CVTF cooler inlet hose and a new CVTF cooler outlet hose.

**Note:**

- Align the claws and the centers of the claws of hose clamps (b) with the marks (a) of CVTF cooler inlet hose and CVTF cooler outlet hose.
- Set the hose clamps (b) so that the both ends of the marks (a) of CVTF cooler inlet hose and CVTF cooler outlet hose can be seen.



4. Install the CVTF cooler (with warmer feature).

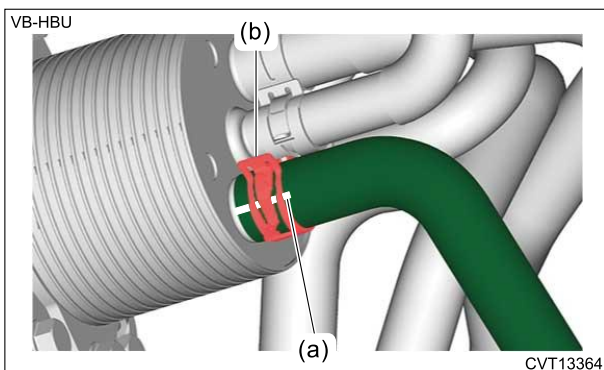
**Tightening torque:**

23 N·m (2.3 kgf-m, 17.0 ft-lb)

5. Connect the water hose (inlet).

**Note:**

- Align the claw and the center of the claw of hose clamp (b) with the mark (a) of water hose (inlet).
- Set the hose clamp (b) so that the both ends of the mark (a) of water hose (inlet) can be seen.

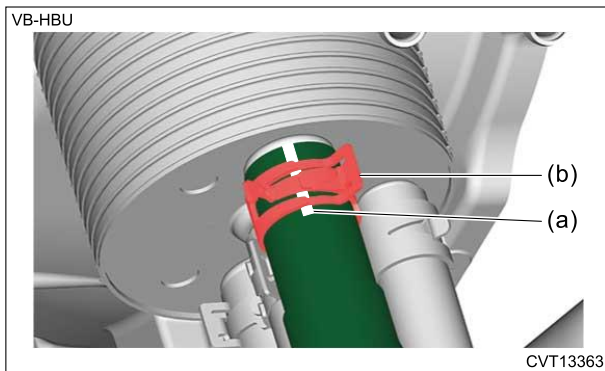


6. Install the crossmember support rear RH.  [Ref. to FRONT SUSPENSION>Crossmember Support>INSTALLATION.](#)

7. Connect the water hose (outlet).

**Note:**

- Align the claw and the center of the claw of hose clamp (b) with the mark (a) of water hose (outlet).
- Set the hose clamp (b) so that the both ends of the mark (a) of water hose (outlet) can be seen.



**8.** Install the bolts which secure the CVTF cooler pipe No. 1.

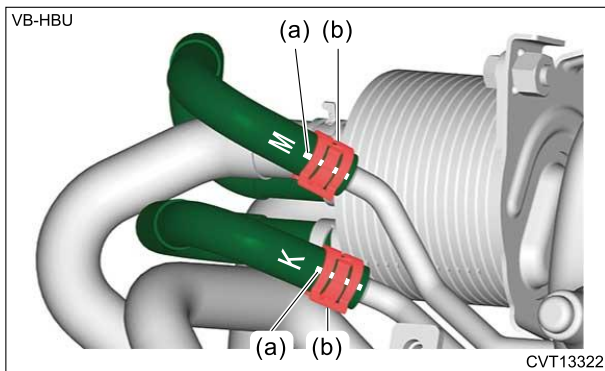
**Tightening torque:**

16 N·m (1.6 kgf-m, 11.8 ft-lb)

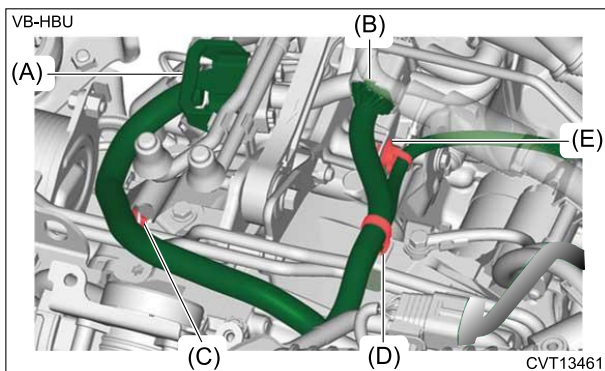
**9.** Connect the CVTF cooler inlet hose and CVTF cooler outlet hose.

**Note:**

- Connect the CVTF cooler inlet hose and CVTF cooler outlet hose with the marks facing up.
- Set the hose clamps (b) so that the both ends of the marks (a) of CVTF cooler inlet hose and CVTF cooler outlet hose can be seen.



**10.** Connect the connector (A) and connector (B), and install the clip (C), clip (D) and clip (E).



**11.** Install the intercooler. [Ref. to INTAKE \(INDUCTION\)\(H4DOTC\)>Intercooler>INSTALLATION.](#)

**12.** Install the air intake duct. [Ref. to INTAKE \(INDUCTION\)\(H4DOTC\)>Air Intake Duct>INSTALLATION.](#)

**13.** Connect the ground terminal to battery sensor. [Ref. to REPAIR CONTENTS>NOTE > BATTERY.](#)

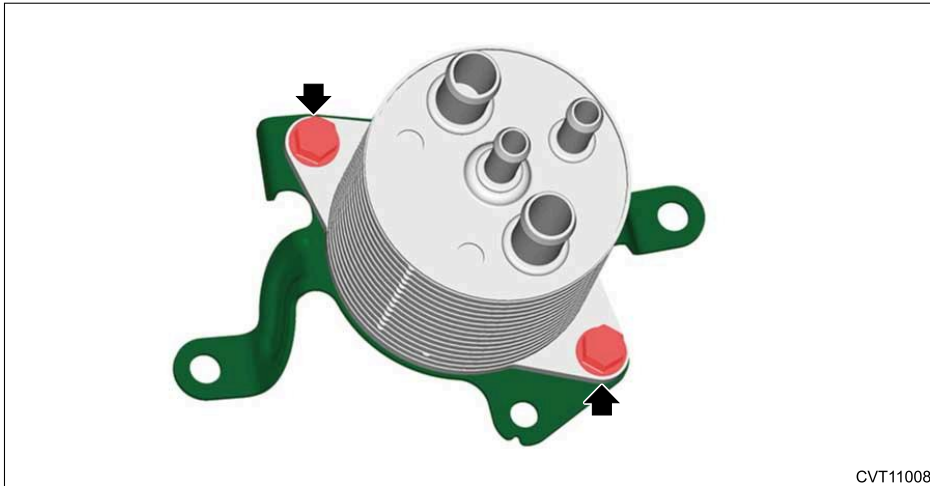
**14.** Fill engine coolant. [Ref. to COOLING\(H4DOTC\)>Engine Coolant>REPLACEMENT.](#)

**15.** Check the CVTF level. [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>CVTF>INSPECTION.](#)

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > CVTF Cooler (With Warmer Function)

**DISASSEMBLY**

Remove the CVTF cooler bracket.



## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > CVTF Cooler (With Warmer Function)

### ASSEMBLY

---

Attach the CVTF cooler bracket.

#### **Tightening torque:**

23 N·m (2.3 kgf-m, 17.0 ft-lb)

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > CVTF Cooler (With Warmer Function)

### INSPECTION

---

1. Check for oil leaks.
2. Check for leaks.
3. Check that there is no deformation, cracks or other damages.




**REMOVAL**

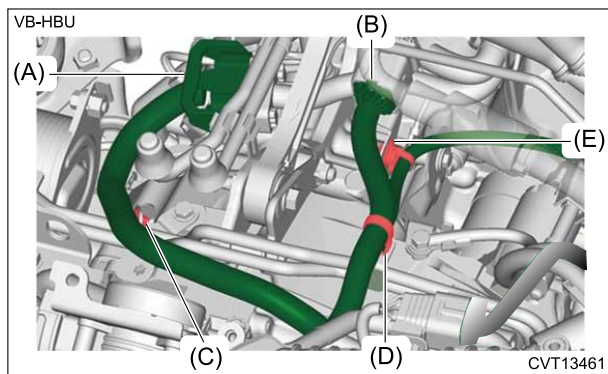


**1. CVTF COOLER PIPE NO. 1**

**Caution:**

- Wait until the CVTF cools down before starting the procedure.
- If CVTF spills over the engine, exhaust pipe, etc., completely wipe it off to avoid emission of smoke and causing a fire.

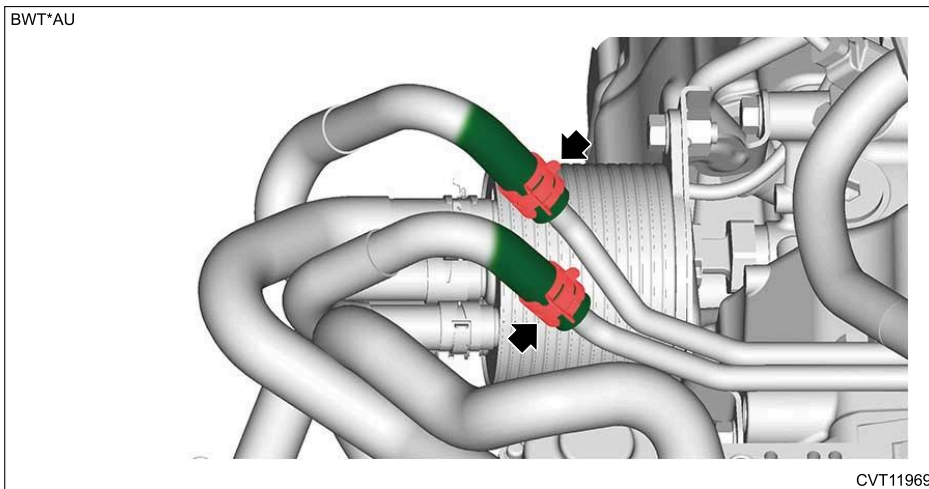
1. Disconnect the ground terminal from battery sensor.  [Ref. to REPAIR CONTENTS>NOTE > BATTERY.](#)
2. Remove the air intake duct.  [Ref. to INTAKE \(INDUCTION\)\(H4DOTC\)>Air Intake Duct>REMOVAL.](#)
3. Remove the intercooler.  [Ref. to INTAKE \(INDUCTION\)\(H4DOTC\)>Intercooler>REMOVAL.](#)
4. Disconnect the connector (A) and connector (B), and remove the clip (C), clip (D) and clip (E).



5. Disconnect the CVTF cooler inlet hose and CVTF cooler outlet hose.

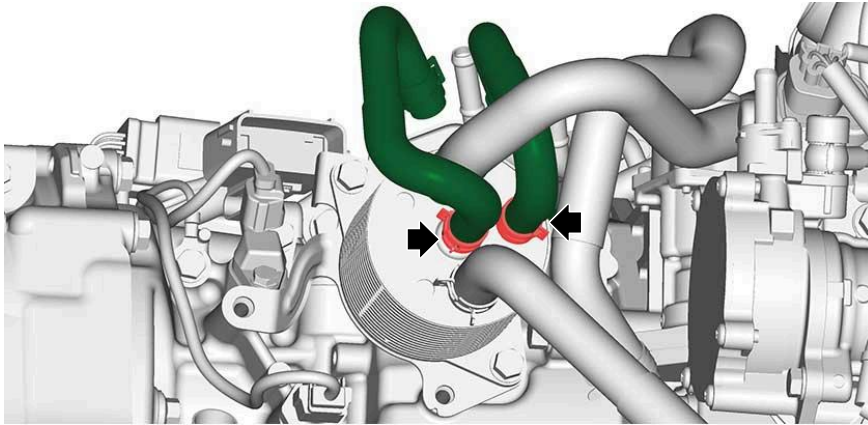
**Caution:**

**Prepare the container for draining of CVTF.**



6. Remove the CVTF cooler inlet hose and CVTF cooler outlet hose.

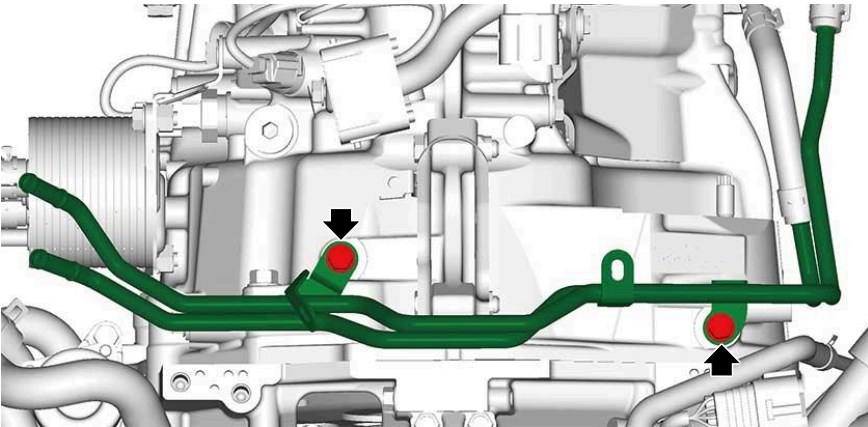
BWT\*AU




CVT11972

7. Remove the bolts securing the CVTF cooler pipe No. 1.

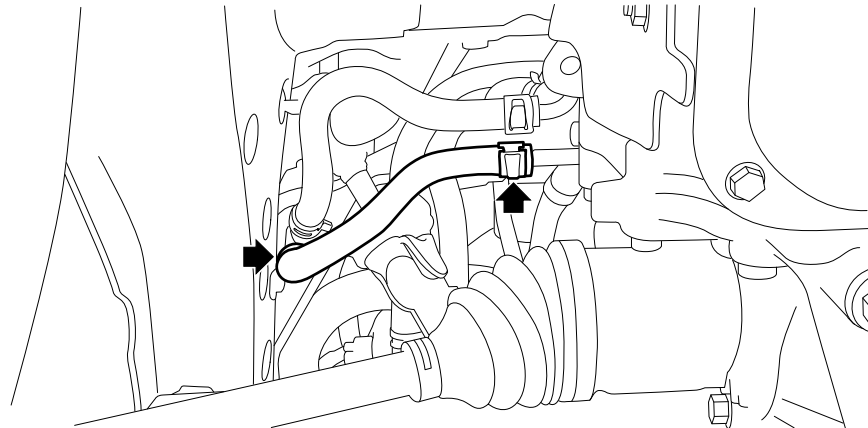
BWT\*AU



CVT11970

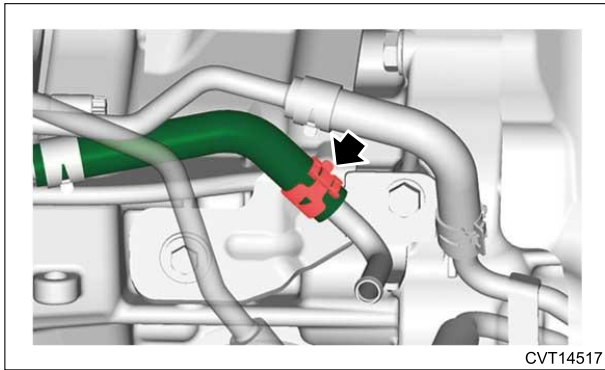
8. Remove the center exhaust pipe (rear).  [Ref. to EXHAUST\(H4DOTC\)>Center Exhaust Pipe>REMOVAL > CENTER EXHAUST PIPE \(REAR\).](#)
9. Remove the CVTF CVT outlet hose.

BWT\*AU



CVT12721

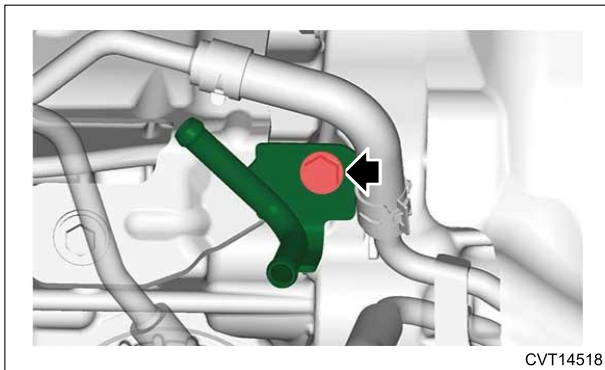
10. Disconnect the CVTF cooler inlet hose.



**11.** Remove the oil cooler pipe.

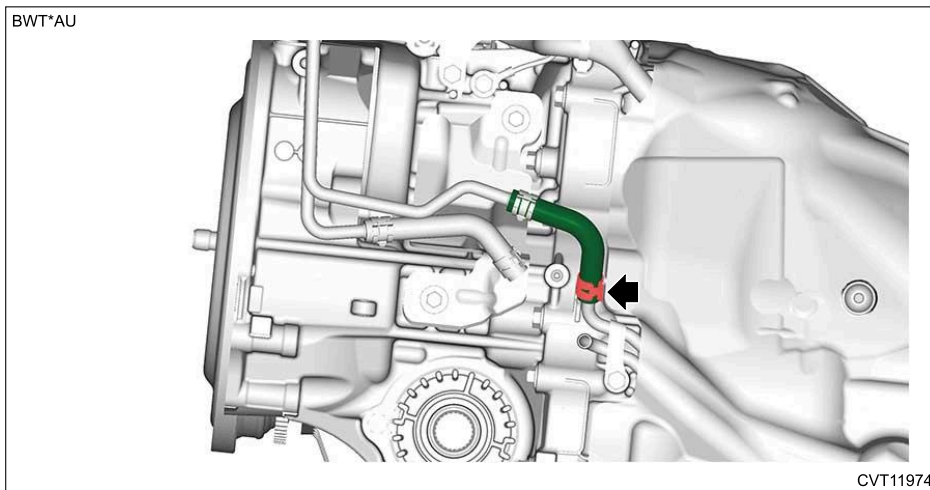
**Note:**

**Perform this procedure only when required.**



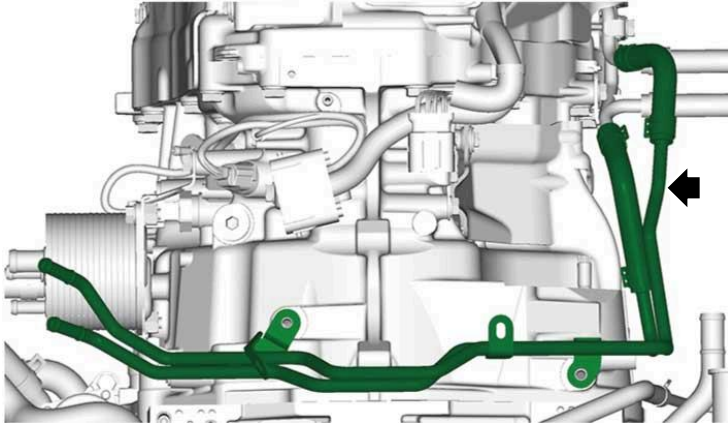
**12.** Disconnect the CVTF cooler outlet hose.

BWT\*AU



**13.** Remove the CVTF cooler pipe No. 1, CVTF cooler inlet hose and CVTF cooler outlet hose as a single unit.

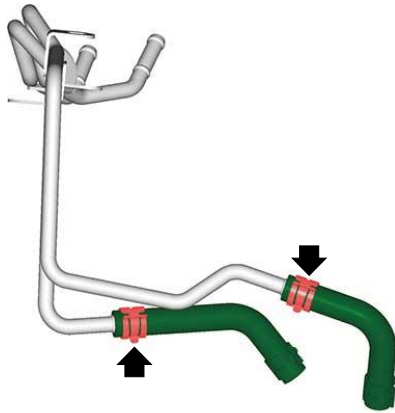
VB-HBU



CVT13561

**14.** Remove the CVTF cooler inlet hose and CVTF cooler outlet hose.

BWT\*AU



CVT11978

## 2. CVTF COOLER PIPE NO. 2

### Caution:

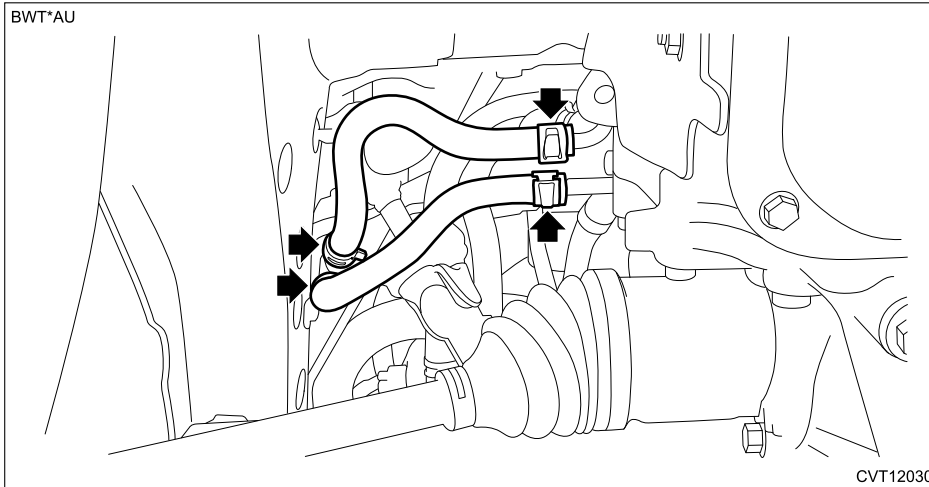
- Wait until the CVTF cools down before starting the procedure.
- If CVTF spills over the engine, exhaust pipe, etc., completely wipe it off to avoid emission of smoke and causing a fire.

1. Remove the battery. [🔧 Ref. to STARTING/CHARGING SYSTEMS\(H4DOTC\)>Battery>REMOVAL.](#)
2. Remove the center exhaust pipe (rear). [🔧 Ref. to EXHAUST\(H4DOTC\)>Center Exhaust Pipe>REMOVAL > CENTER EXHAUST PIPE \(REAR\).](#)
3. Remove the CVTF CVT inlet hose and CVTF CVT outlet hose.

### Caution:

**Prepare the container for draining of CVTF.**

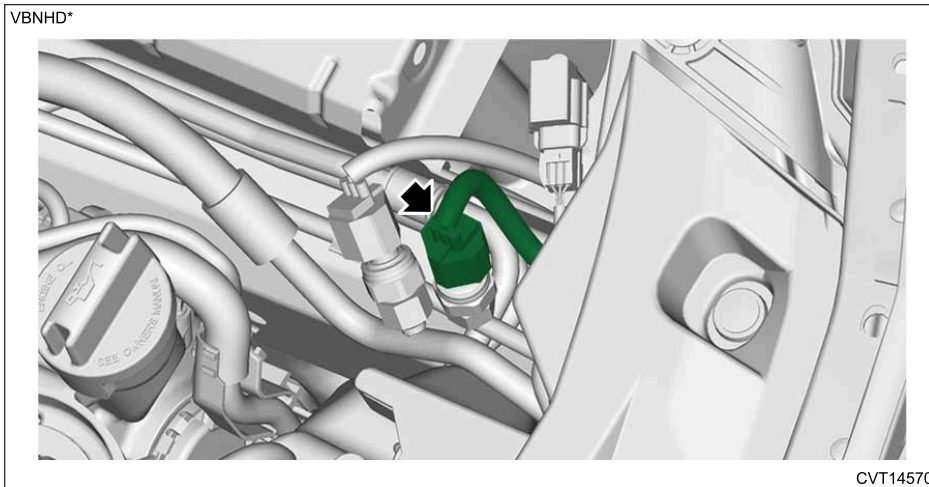
BWT\*AU



CVT12030

4. Disconnect the connector from pressure sensor.

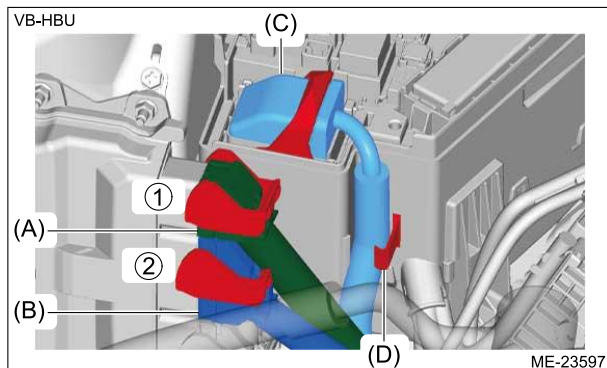
VBNDH\*



CVT14570

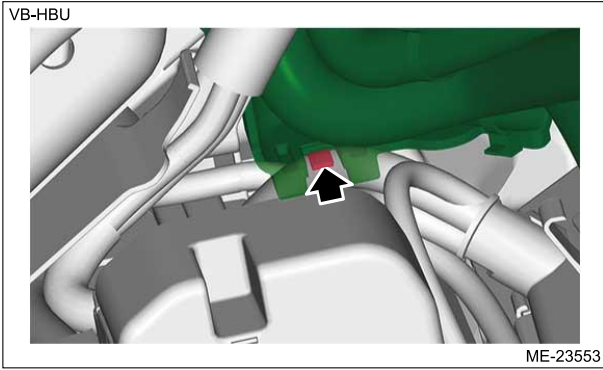
5. Remove the connector (A) and connector (B) in numerical order shown in figure.
6. Disconnect the connector (C), and remove the engine wiring harness from the clip (D).


VB-HBU

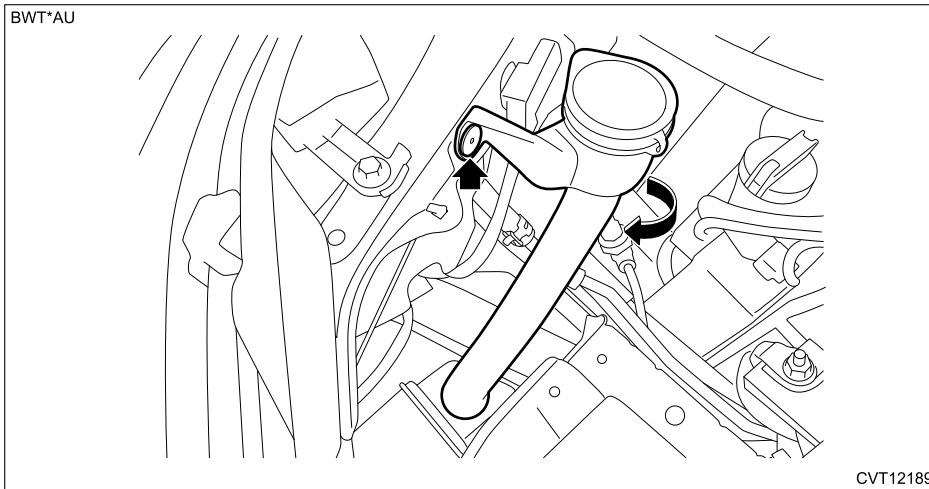


ME-23597

7. Release the claw securing the engine wiring harness to the bracket, and place it aside so that it does not interfere with work.

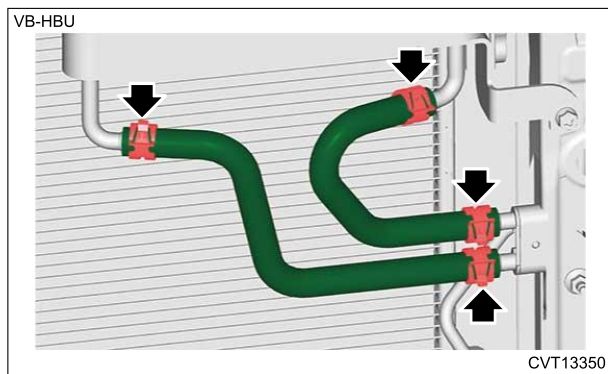


8. Remove the beam COMPL front.  [Ref. to EXTERIOR/INTERIOR TRIM>Front Bumper>REMOVAL > BUMPER BRACKET.](#)
9. Remove the washer tank mounting clips, and rotate it aside so that it does not interfere with work.



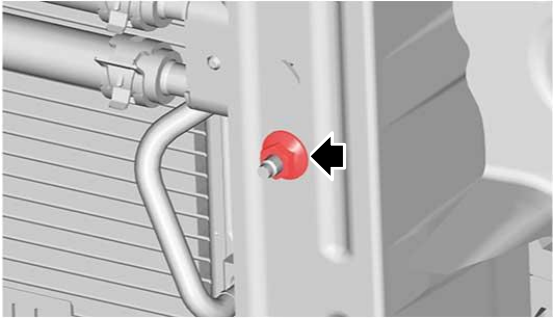
10. Remove the CVTF cooler (air cool) inlet hose and the CVTF cooler (air cool) outlet hose.

**Caution:**  
**Prepare the container for draining of CVTF.**



11. Remove the nut securing the CVTF cooler pipe No. 2.

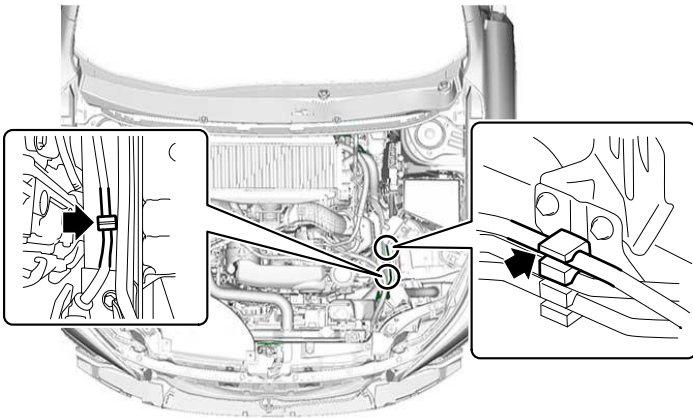
VB-HBU



CVT13367

**12.** Remove the pipe evaporator cooling from the clip and pipe clamp.

VB-HBU



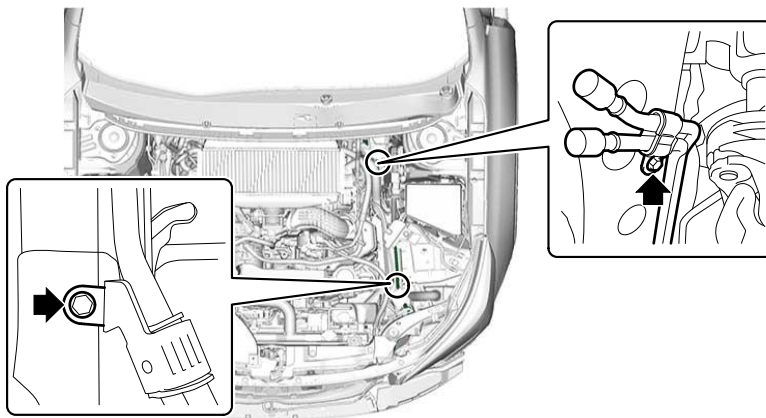
CVT13427

**13.** Remove the CVTF cooler pipe No. 2.

**Caution:**

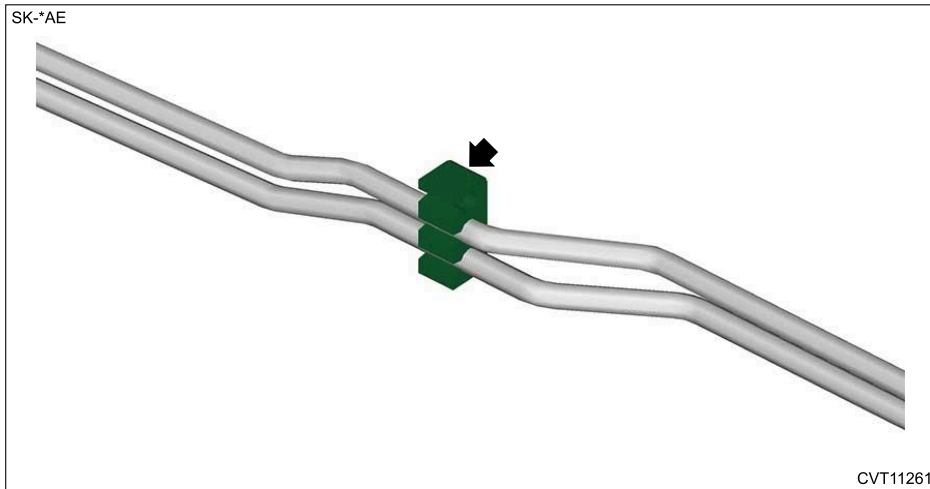
**Be careful not to bend the pipe evaporator cooling.**

BWT\*AU



CVT12035

**14.** Remove the pipe clamp.



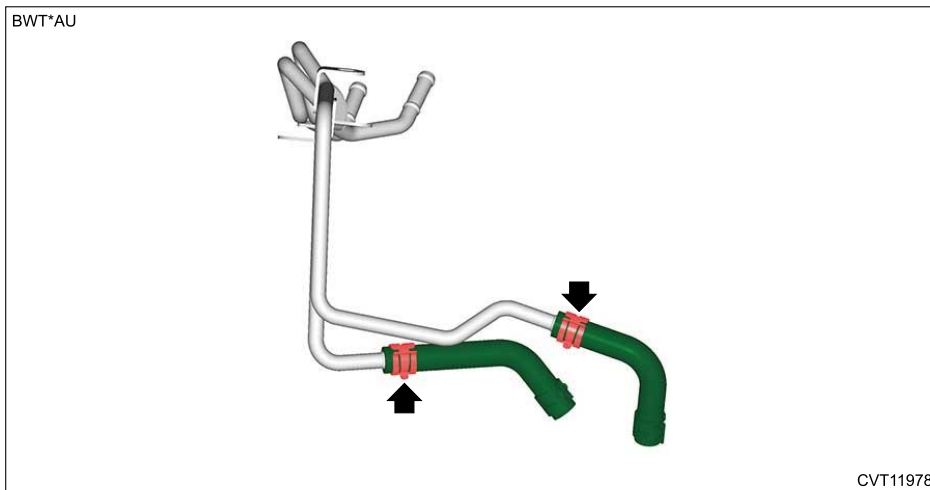
## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > CVTF Cooler Pipe and Hose

### INSTALLATION

---

#### 1. CVTF COOLER PIPE NO. 1

1. Install a new CVTF cooler inlet hose and a new CVTF cooler outlet hose.



2. Install the CVTF cooler pipe No. 1.

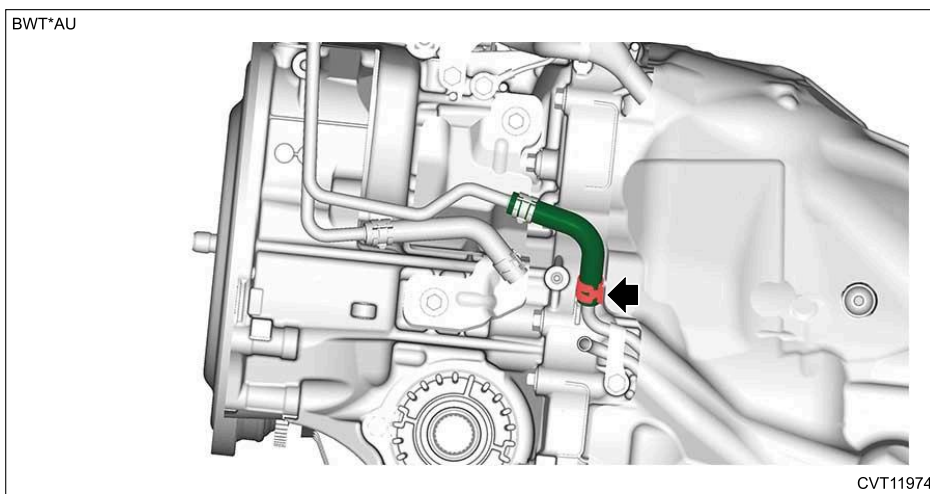
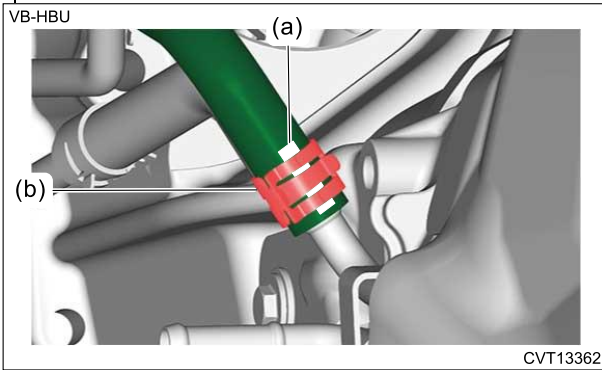
#### **Tightening torque:**

16 N·m (1.6 kgf-m, 11.8 ft-lb)

3. Connect the CVTF cooler outlet hose.

**Note:**

- Face the mark (a) of CVTF cooler outlet hose toward the rear side of the transmission.
- Align the claw and the center of the claw of hose clamp (b) with the mark (a) of CVTF cooler outlet hose.
- Set the hose clamp (b) so that the both ends of the mark (a) of CVTF cooler outlet hose can be seen.



**4.** Install the oil cooler pipe.

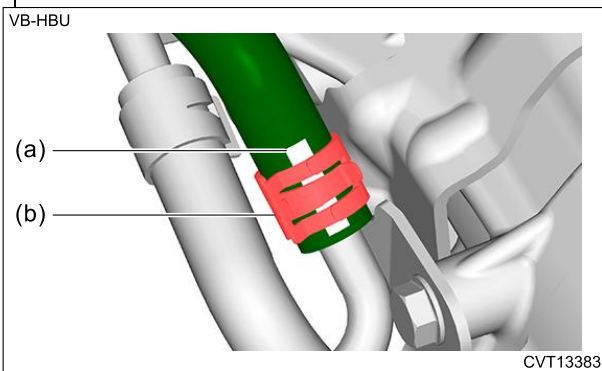
**Tightening torque:**

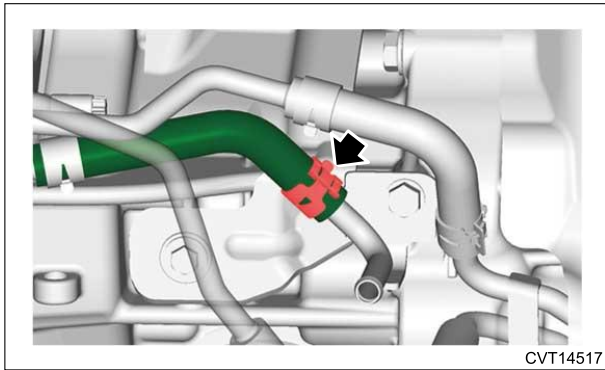
16 N·m (1.6 kgf-m, 11.8 ft-lb)

**5.** Connect the CVTF cooler inlet hose.

**Note:**

- Face the mark (a) of CVTF cooler inlet hose toward the rear side of the transmission.
- Align the claw and the center of the claw of hose clamp (b) with the CVTF cooler inlet hose.
- Set the hose clamp (b) so that the both ends of the mark (a) of CVTF cooler inlet hose can be seen.



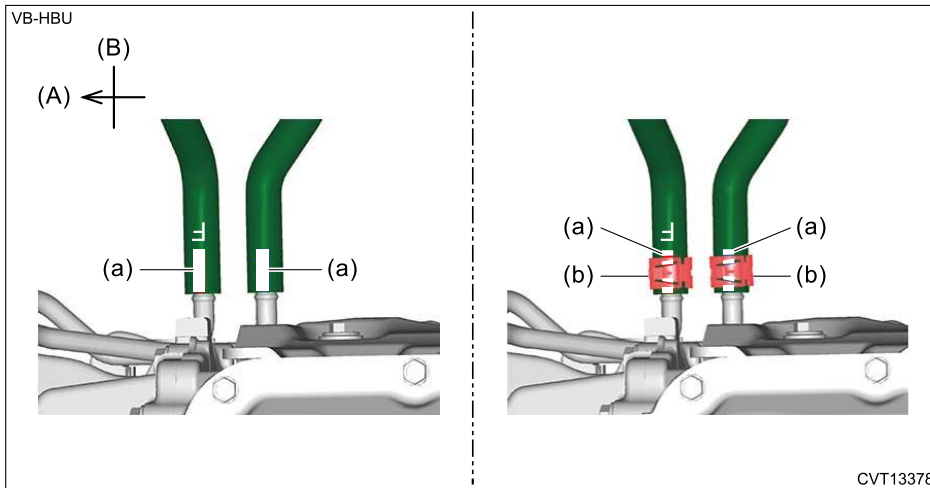


**6.** Install a new CVTF CVT outlet hose.

- Transmission side

**Note:**

- Face the marks (a) of CVTF CVT outlet hose in the bottom direction.
- Align the claw and the center of the claw of hose clamp (b) with the CVTF CVT outlet hose.
- Set the hose clamp (b) so that the both ends of the mark (a) of CVTF CVT outlet hose can be seen.



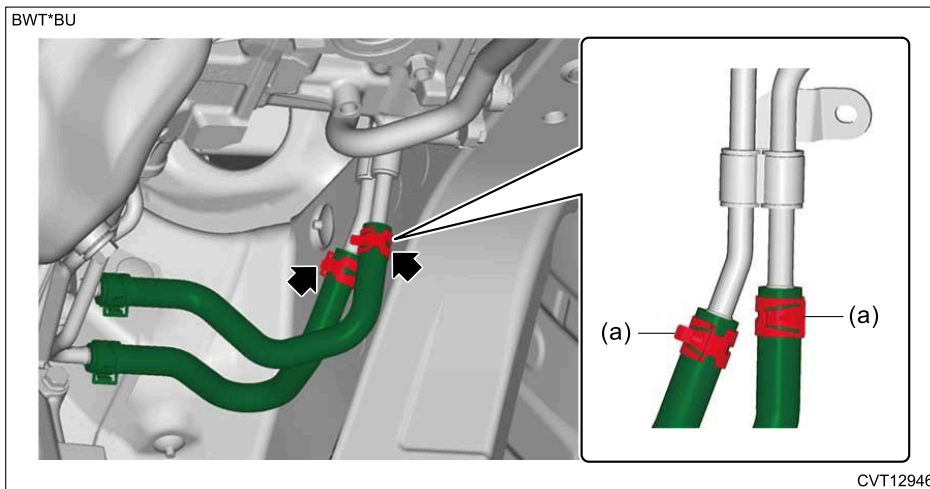
(A) Front side


(B) Vehicle body side

- CVTF cooler pipe No. 2 side

**Note:**

Set the hose clamps (a) as shown in the figure.

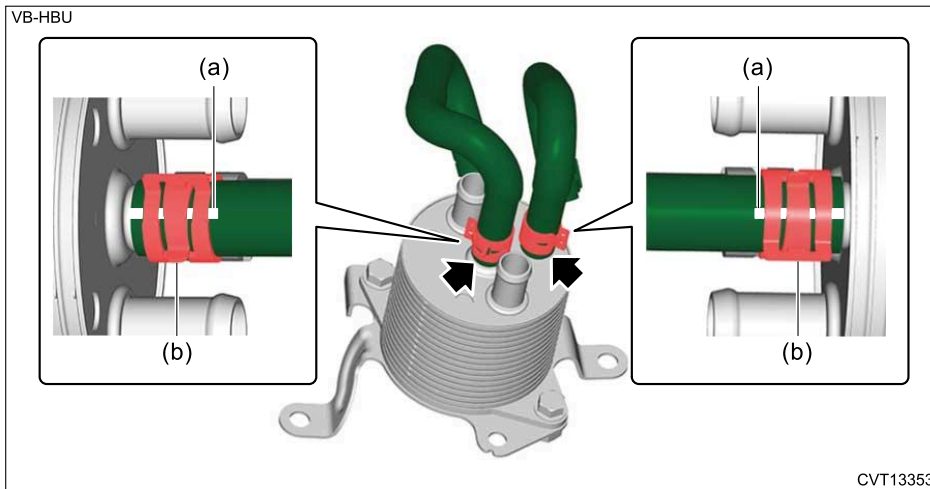


**7.** Install the center exhaust pipe (rear).  [Ref. to EXHAUST\(H4DOTC\)>Center Exhaust Pipe>INSTALLATION > CENTER EXHAUST PIPE \(REAR\).](#)

8. Install a new CVTF cooler inlet hose and a new CVTF cooler outlet hose to the CVTF cooler (with warmer feature).

**Note:**

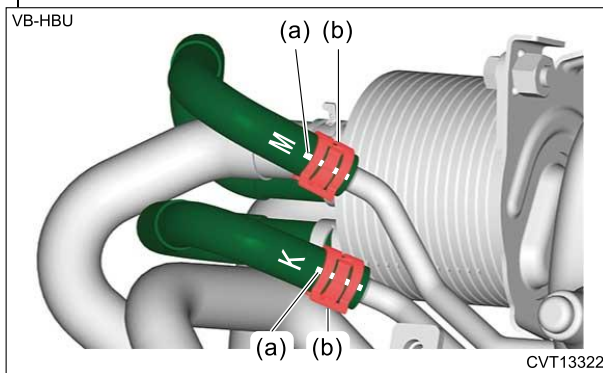
- Align the claws and the centers of the claws of hose clamps (b) with the marks (a) of CVTF cooler inlet hose and CVTF cooler outlet hose.
- Set the hose clamps (b) so that the both ends of the marks (a) of CVTF cooler inlet hose and CVTF cooler outlet hose can be seen.



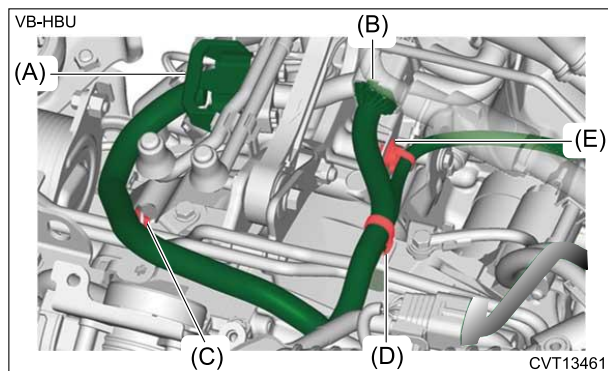
9. Connect the CVTF cooler inlet hose and CVTF cooler outlet hose.

**Note:**

- Face the marks (a) of CVTF cooler inlet hose and CVTF cooler outlet hose in the top direction.
- Align the claws and the centers of the claws of hose clamps (b) with the marks (a) of CVTF cooler inlet hose and CVTF cooler outlet hose.
- Set the hose clamps (b) so that the both ends of the marks (a) of CVTF cooler inlet hose and CVT cooler outlet hose can be seen.



10. Connect the connector (A) and connector (B), and install the clip (C), clip (D) and clip (E).



11. Install the intercooler. [🔗 Ref. to INTAKE \(INDUCTION\)\(H4DOTC\)>Intercooler>INSTALLATION.](#)

12. Install the air intake duct. [🔗 Ref. to INTAKE \(INDUCTION\)\(H4DOTC\)>Air Intake Duct>INSTALLATION.](#)

13. Connect the ground terminal to battery sensor. [🔗 Ref. to REPAIR CONTENTS>NOTE > BATTERY.](#)

14. Check the CVTF level.  [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>CVTF>INSPECTION.](#)

## 2. CVTF COOLER PIPE NO. 2

1. Install the pipe clamp.
2. Install the CVTF cooler pipe No. 2.

**Caution:**

**Be careful not to bend the pipe evaporator cooling.**

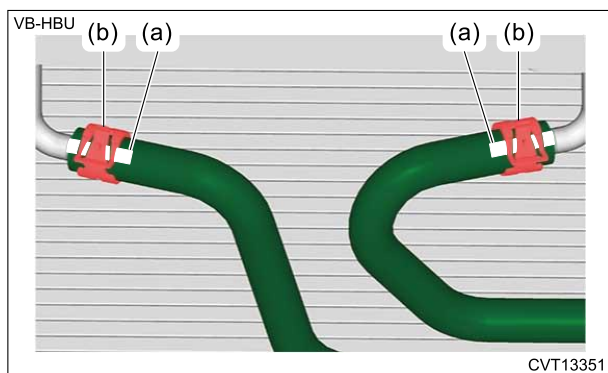
**Tightening torque:**

7.5 N·m (0.8 kgf-m, 5.5 ft-lb)

3. Install the pipe evaporator cooling to the clip and pipe clamp.
4. Install a new CVTF cooler (air cool) inlet hose and a new CVTF cooler (air cool) outlet hose.
  - (1) Install a new CVTF cooler (air cool) inlet hose and a new CVTF cooler (air cool) outlet hose to the CVTF cooler (air cool).

**Note:**

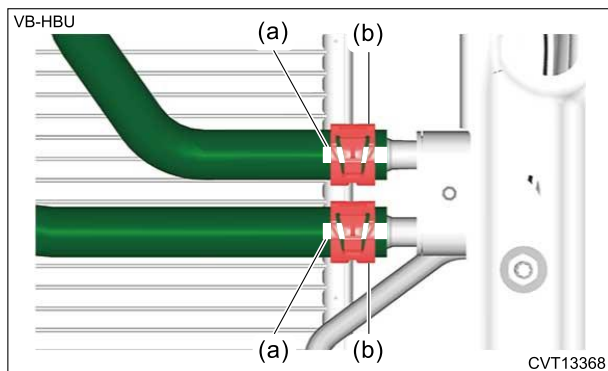
- Face the marks (a) of CVTF cooler (air cool) inlet hose and CVTF cooler (air hose) outlet hose by 45° toward you from the top-facing position.
- Align the claws and the centers of the claws of hose clamps (b) with the marks (a) of CVTF cooler (air cool) inlet hose and CVTF cooler (air cool) outlet hose.
- Set the hose clamps (b) so that the both ends of the marks (a) of CVTF cooler (air cool) inlet hose and CVTF cooler (air cool) outlet hose can be seen.




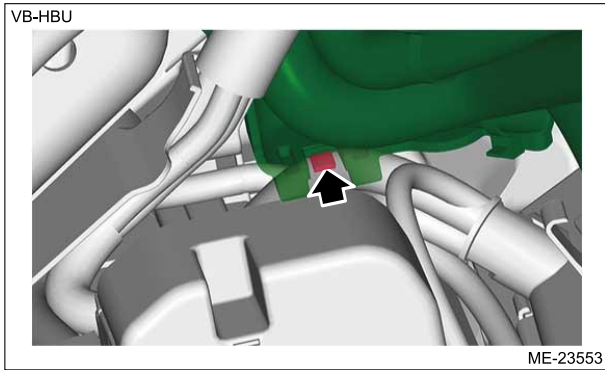
- (2) Connect the CVTF cooler (air cool) inlet hose and CVTF cooler (air cool) outlet hose to the CVTF cooler pipe No. 2.

**Note:**

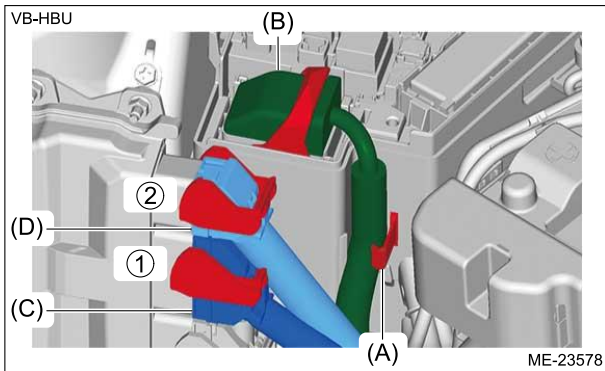
- Face the marks (a) of CVTF cooler (air cool) inlet hose and CVTF cooler (air cool) outlet hose toward the front side.
- Align the claws and the centers of the claws of hose clamps (b) with the marks (a) of CVTF cooler (air cool) inlet hose and CVTF cooler (air cool) outlet hose.
- Set the hose clamps (b) so that the both ends of the marks (a) of CVTF cooler (air cool) inlet hose and CVTF cooler (air cool) outlet hose can be seen.



5. Install the washer tank mounting clips.
6. Install the beam COMPL front.  [Ref. to EXTERIOR/INTERIOR TRIM>Front Bumper>INSTALLATION.](#)
7. Set the engine wiring harness and secure the engine wiring harness to the bracket with the claw.



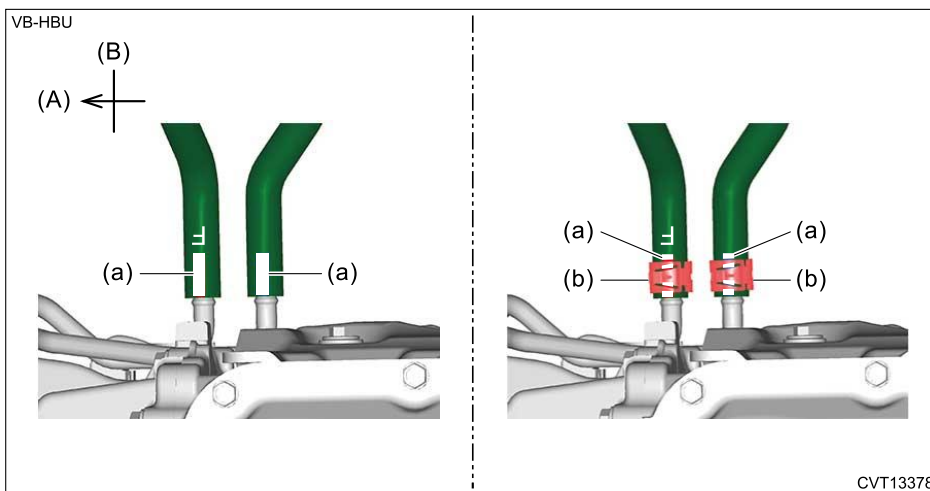
8. Install the engine wiring harness to the clip (A), and connect the connector (B).
9. Connect the connector (C) and connector (D) in numerical order shown in figure.



10. Connect the connector to the pressure sensor.
11. Connect a new CVTF CVT inlet hose and a new CVTF CVT outlet hose.
  - Transmission side

**Note:**

- Face the marks (a) of CVTF CVT inlet hose and CVTF CVT outlet hose in the bottom direction.
- Align the claws and the centers of the claws of hose clamps (b) with the marks (a) of CVTF CVT inlet hose and CVTF CVT outlet hose.
- Set the hose clamps (b) so that the both ends of the marks (a) of CVTF CVT inlet hose and CVTF CVT outlet hose can be seen.

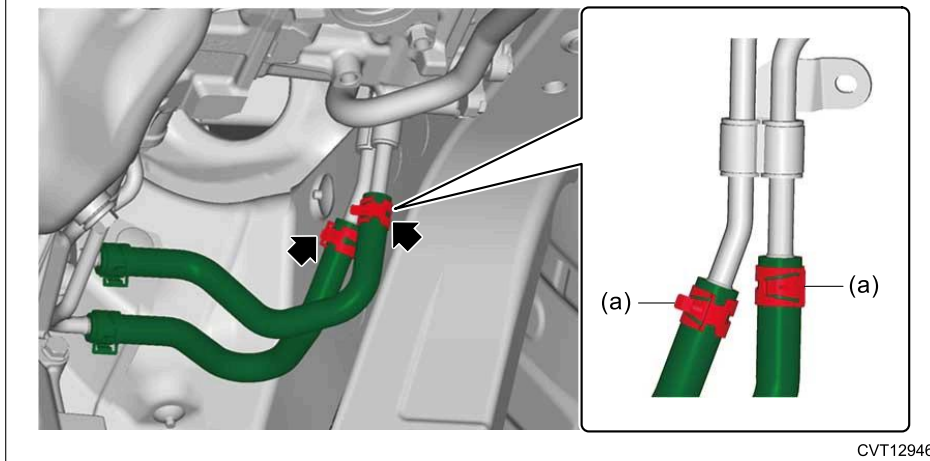


(A) Front side                      (B) Vehicle body side


- CVTF cooler pipe No. 2 side

**Note:**

Set the hose clamps (a) as shown in the figure.



CVT12946

**12.** Install the center exhaust pipe (rear).  [Ref. to EXHAUST\(H4DOTC\)>Center Exhaust Pipe>INSTALLATION > CENTER EXHAUST PIPE \(REAR\).](#)

**13.** Install the battery.  [Ref. to STARTING/CHARGING SYSTEMS\(H4DOTC\)>Battery>INSTALLATION.](#)

**14.** Check the CVTF level.  [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>CVTF>INSPECTION.](#)

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > CVTF Cooler Pipe and Hose

### INSPECTION

---

1. Check for oil leaks.
2. Check that there is no deformation, cracks or other damages.

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > CVTF Cooler (Air Cooling)

### REMOVAL



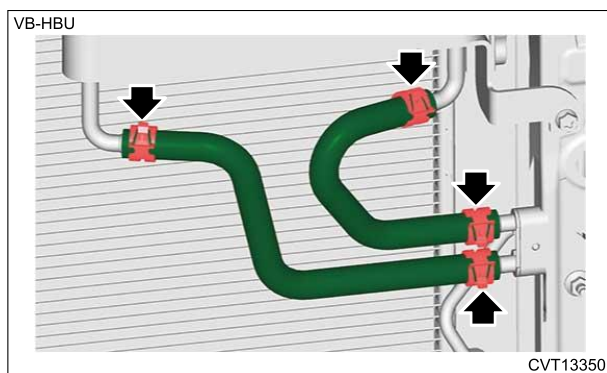
#### Caution:

- Wait until the CVTF cools down before starting the procedure.
- If CVTF spills over the engine, exhaust pipe, etc., completely wipe it off to avoid emission of smoke and causing a fire.

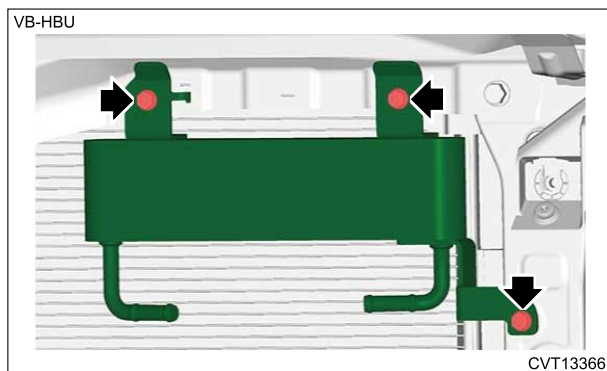
1. Disconnect the ground terminal from battery sensor. Ref. to [REPAIR CONTENTS>NOTE > BATTERY](#).
2. Remove the beam COMPL front. Ref. to [EXTERIOR/INTERIOR TRIM>Front Bumper>REMOVAL](#).
3. Remove the CVTF cooler (air cool) inlet hose and the CVTF cooler (air cool) outlet hose.

#### Caution:

Prepare the container for draining of CVTF.



4. Remove the CVTF cooler (air cool).



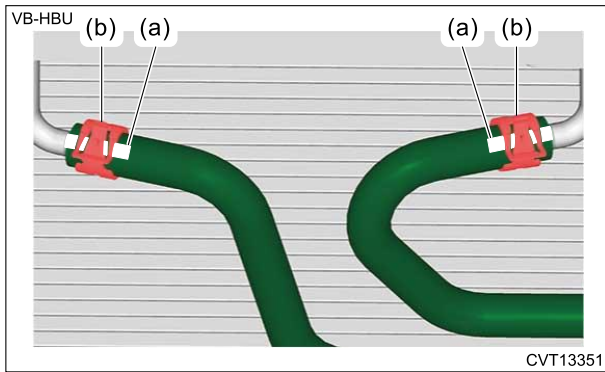
## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > CVTF Cooler (Air Cooling)

### INSTALLATION

1. Install the CVTF cooler (air cool).  
**Tightening torque:**  
10 N·m (1.0 kgf-m, 7.4 ft-lb)
2. Install a new CVTF cooler (air cool) inlet hose and a new CVTF cooler (air cool) outlet hose.
  - Air cooler side

#### Note:

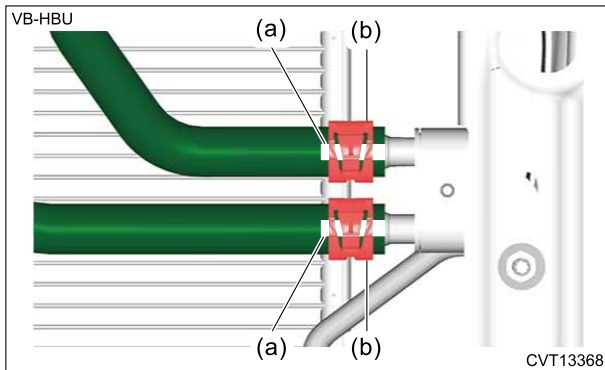
- Face the marks (a) of CVTF cooler (air cool) inlet hose and CVTF cooler (air hose) outlet hose by 45° toward you from the top-facing position.
- Align the claws and the centers of the claws of hose clamps (b) with the marks (a) of CVTF cooler (air cool) inlet hose and CVTF cooler (air cool) outlet hose.
- Set the hose clamps (b) so that the both ends of the marks (a) of CVTF cooler (air cool) inlet hose and CVTF cooler (air cool) outlet hose can be seen.



- CVTF cooler pipe No. 2 side

**Note:**

- Face the marks (a) of CVTF cooler (air cool) inlet hose and CVTF cooler (air hose) outlet hose in the lateral direction.
- Align the claws and the centers of the claws of hose clamps (b) with the marks (a) of CVTF cooler (air cool) inlet hose and CVTF cooler (air cool) outlet hose.
- Set the hose clamps (b) so that the both ends of the marks (a) of CVTF cooler (air cool) inlet hose and CVTF cooler (air cool) outlet hose can be seen.



3. Install the beam COMPL front. [Ref. to EXTERIOR/INTERIOR TRIM>Front Bumper>INSTALLATION.](#)
4. Connect the ground terminal to battery sensor. [Ref. to REPAIR CONTENTS>NOTE > BATTERY.](#)

**CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > CVTF Cooler (Air Cooling)**


**INSPECTION**

1. Check for oil leaks.
2. Check that there is no deformation, cracks or other damages.
3. Check the oil cooler fin for clogging.

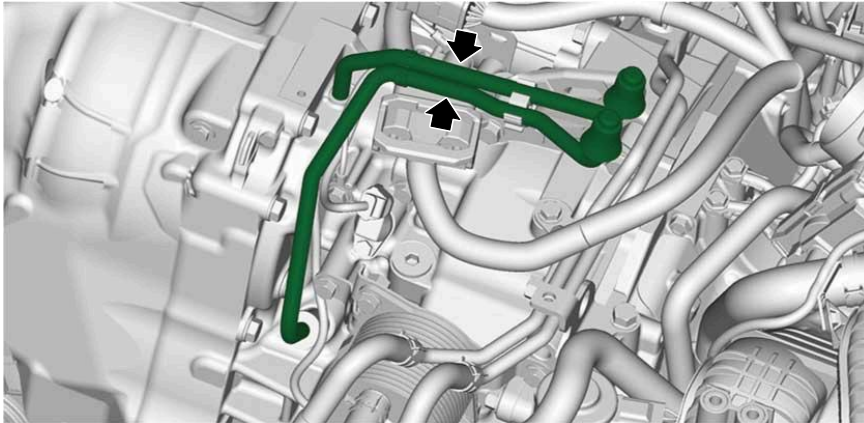
## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Air Breather Hose

### REMOVAL



1. Remove the intercooler.  [Ref. to INTAKE \(INDUCTION\)\(H4DOTC\)>Intercooler>REMOVAL.](#)
2. Remove the air breather hose.

BWT\*AU



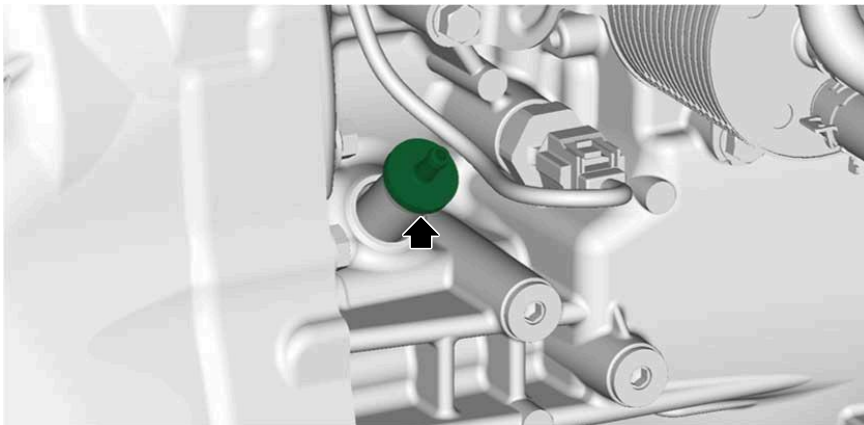
CVT12037

3. Remove the oil charge pipe cap.

#### Note:

**Perform this procedure only when required.**

BWT\*AU



CVT12038

4. Remove the O-rings.

BWT\*AU



CVT12039

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Air Breather Hose


### INSTALLATION

---

1. Install the oil charge pipe cap with a new O-ring.

**Note:**

**Apply CVTF to the O-rings.**

2. Install the air breather hose to the transmission body.
3. Install the air breather hose to the air breather hose bracket.
4. Install the intercooler.  [Ref. to INTAKE \(INDUCTION\)\(H4DOTC\)>Intercooler>INSTALLATION.](#)

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Air Breather Hose

### INSPECTION

---

1. Check that there is no deformation, cracks or other damages.
2. Check the hose for clogging.

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Drive Plate

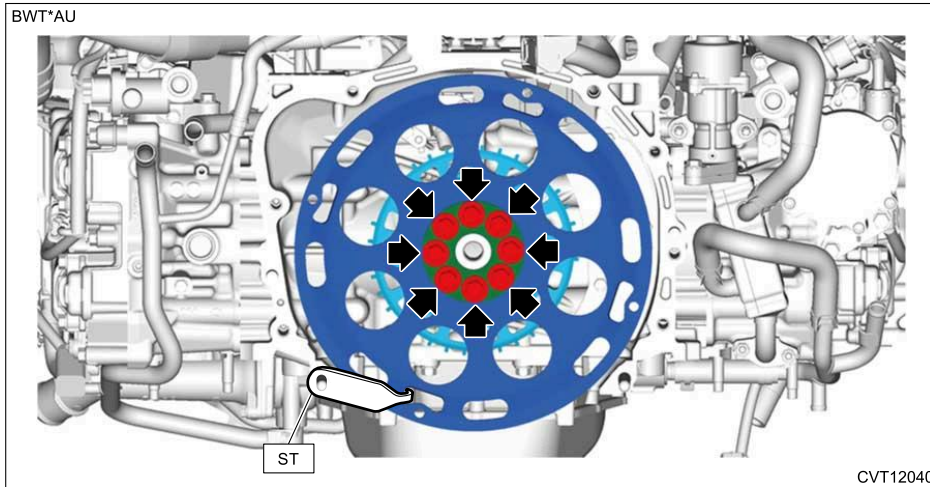
### REMOVAL



1. Remove the transmission body.  Ref. to [CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Transmission Assembly>REMOVAL](#).
2. Set the ST, and then remove the reinforcement drive plate, drive plate and crankshaft position sensor plate.

#### Preparation tool:

ST: CRANKSHAFT STOPPER (498497300)



## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Drive Plate

### INSTALLATION

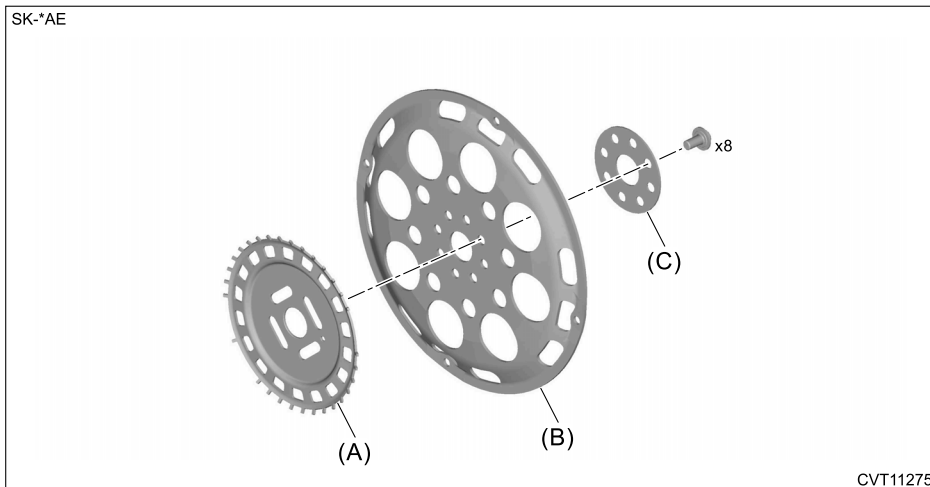
1. Temporarily attach the reinforcement drive plate, drive plate and crankshaft position sensor plate, and set the ST.

#### Caution:

**Install with the stamped mark of the crankshaft position sensor plate facing the transmission side.**

#### Note:

**Align the knock pin hole of the crankshaft position sensor plate to the knock pin of the crankshaft to secure the knock pin.**



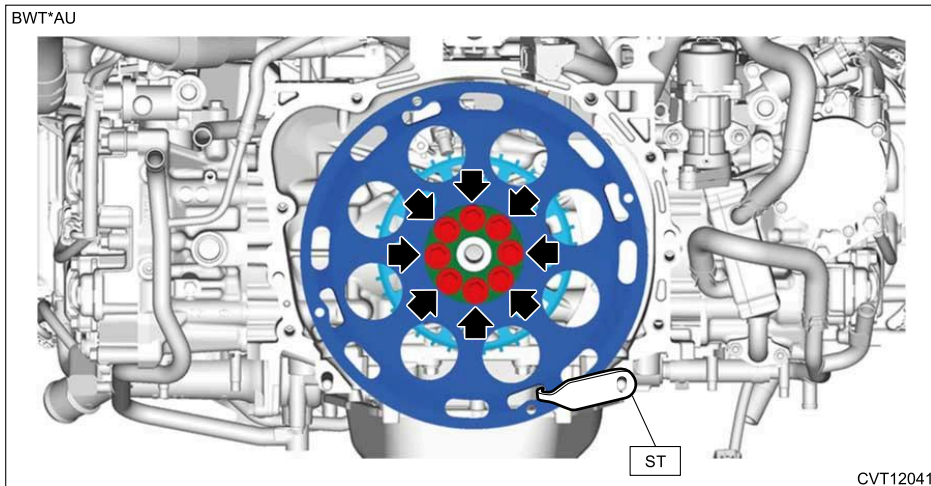
(A) Crankshaft position sensor plate

(B) Drive plate

(C) Reinforcement drive plate

#### Preparation tool:

## ST: CRANKSHAFT STOPPER (498497300)



### 2. Tighten the bolts securing the drive plate.

- (1) Tighten the drive plate mounting bolts in the numerical order shown in the figure.

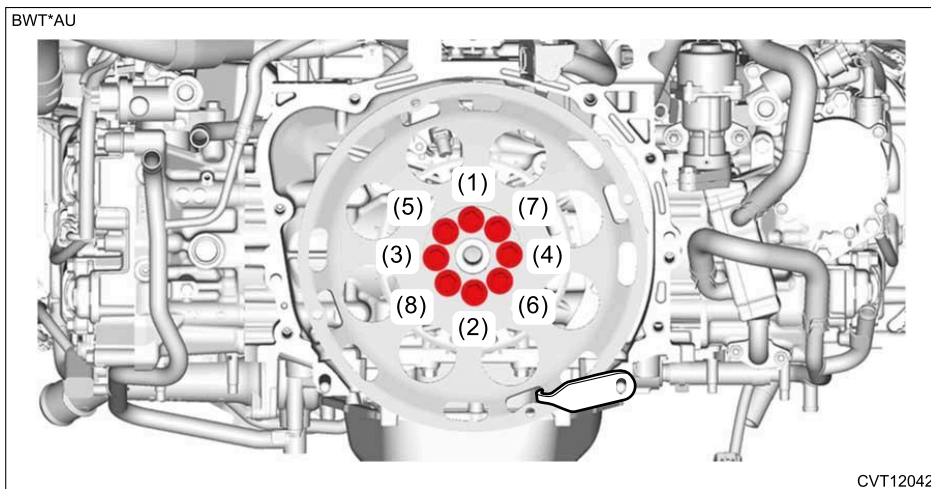
#### Tightening torque:

30 N·m (3.1 kgf·m, 22.1 ft·lb)

- (2) Using an angle gauge, tighten the drive plate mounting bolts to the specified angle in the numerical order shown in the figure.

#### Tightening angle:

30° — 35°



3. Install the transmission body. [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Transmission Assembly>INSTALLATION.](#)

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Drive Plate


### INSPECTION

Check that there is no deformation, cracks or other damages.

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Torque Converter

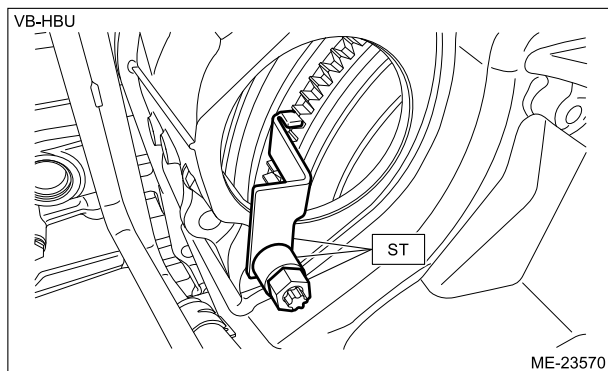
### REMOVAL



1. Remove the transmission body.  Ref. to [CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Transmission Assembly>REMOVAL](#).
2. Remove the ST.

#### Preparation tool:

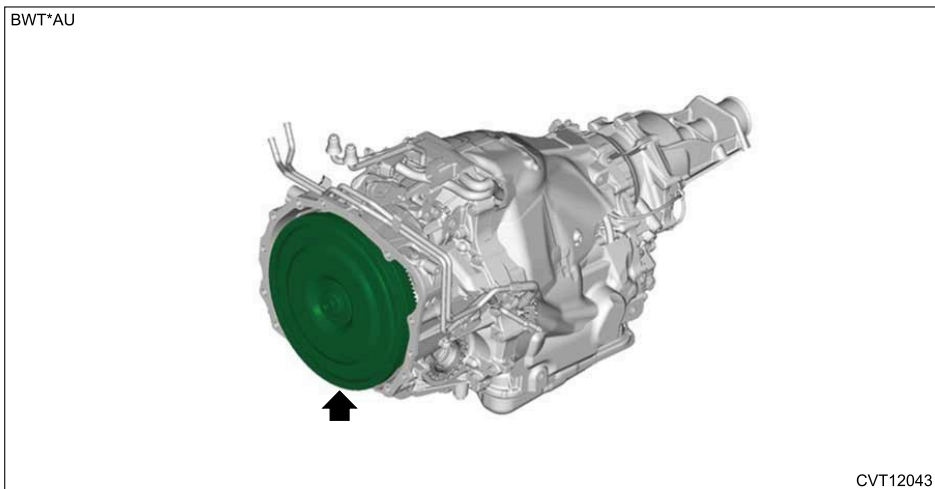
ST: STOPPER SET (498277200)



3. Pull out the torque converter horizontally.

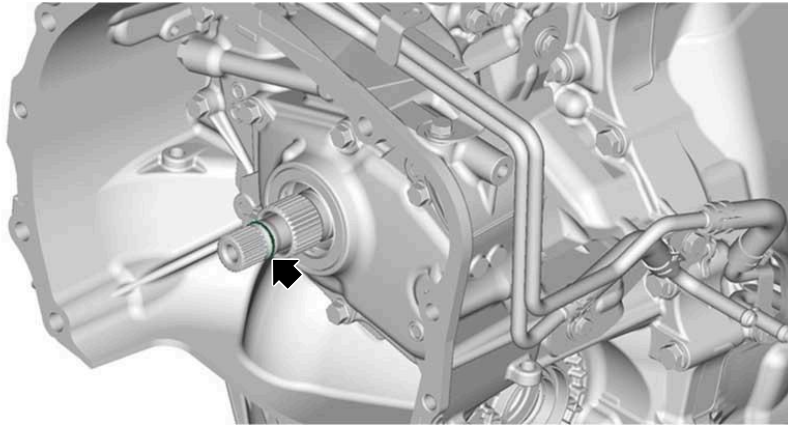
#### Caution:

**Be careful not to scratch the inside of engaging parts.**



4. Remove the O-rings.

BWT\*AU



CVT12044

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Torque Converter

### INSTALLATION

1. Install a new O-ring.

**Note:**

Apply CVTF to the O-rings.

2. Install the torque converter.

**Caution:**

- Do not damage the oil seal and O-ring.
- Be careful not to scratch the inside of engaging parts.

**Note:**

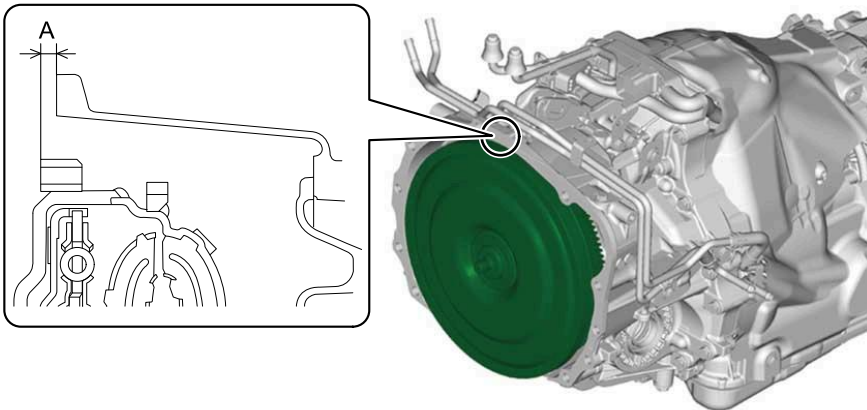
- Apply CVTF to the oil seal lip.
- Engage the splines while gently rotating the torque converter by hand.

3. Measure the dimension "A" from converter case end surface to drive plate mounting surface.

**Specification:**

6.8 mm (0.27 in) or less

BWT\*AU

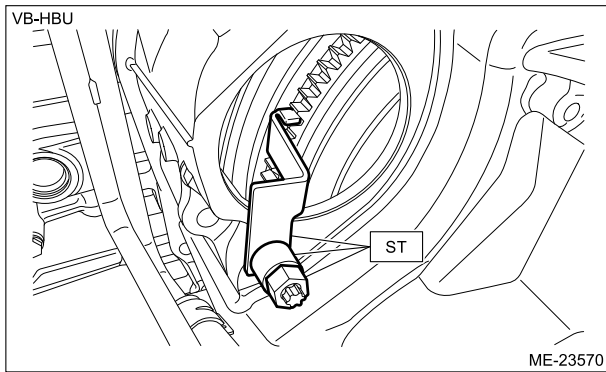


CVT12045

4. Attach the ST to converter case.

**Preparation tool:**

ST: STOPPER SET (498277200)



5. Install the transmission body.  [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Transmission Assembly>INSTALLATION.](#)

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Torque Converter

### INSPECTION


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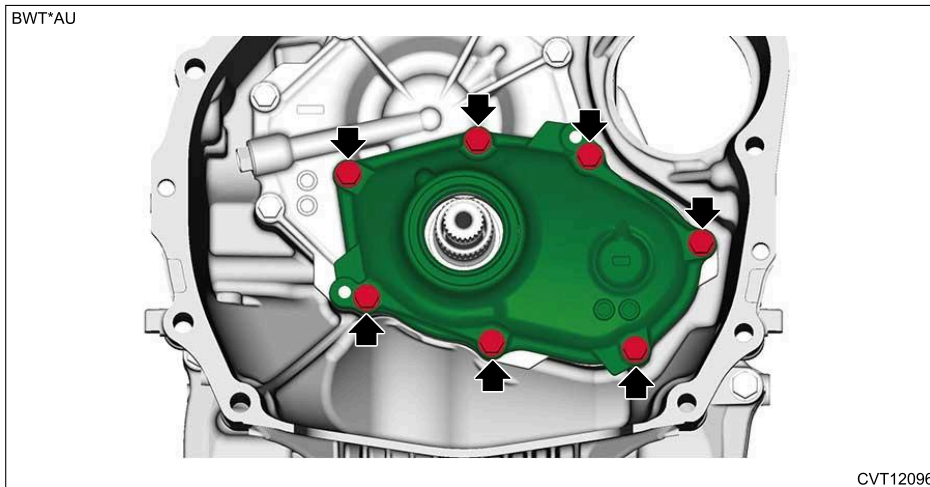
Check that there is no deformation, cracks or other damages.

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Oil Pump Chain

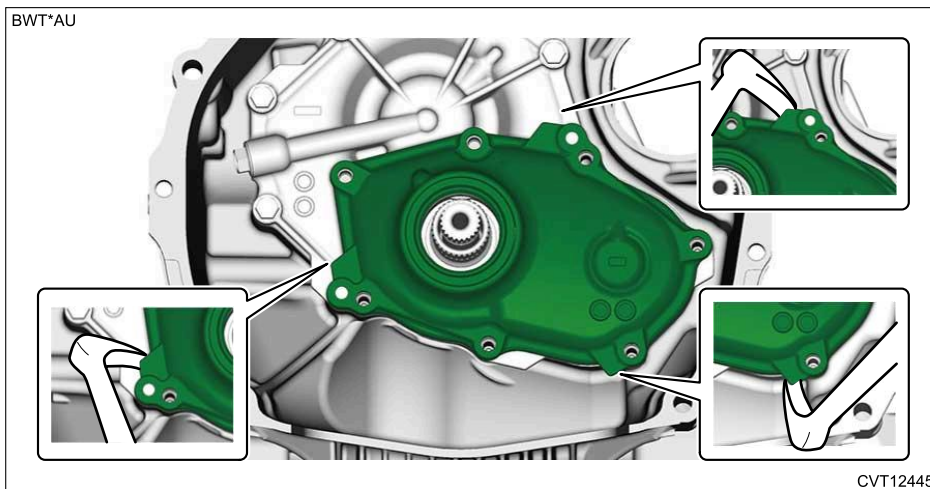
### REMOVAL



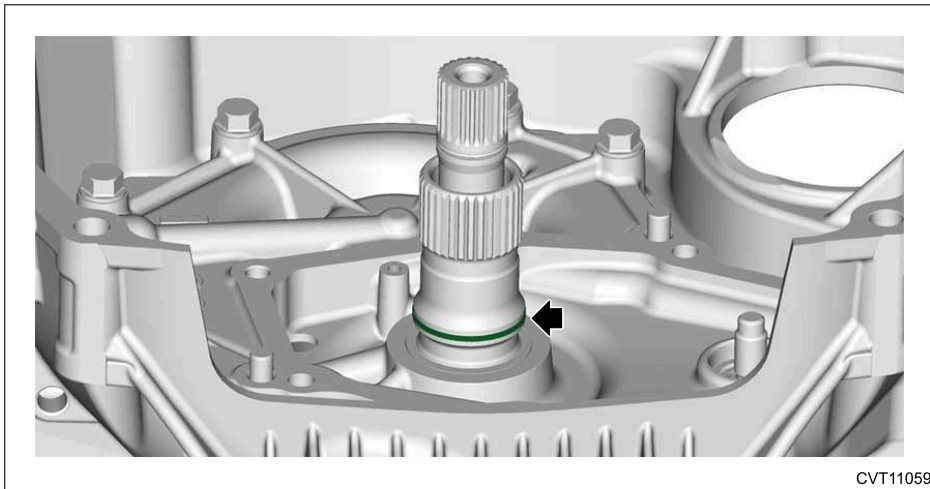
1. Remove the torque converter.  Ref. to [CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Torque Converter>REMOVAL](#).
2. Remove the bolts which hold the oil pump chain cover.



3. Using a crowbar wrapped with protection tape or similar, expand the clearance and remove the oil pump chain cover, oil pump sprocket and oil pump chain as a single unit.



4. Remove the seal rings.



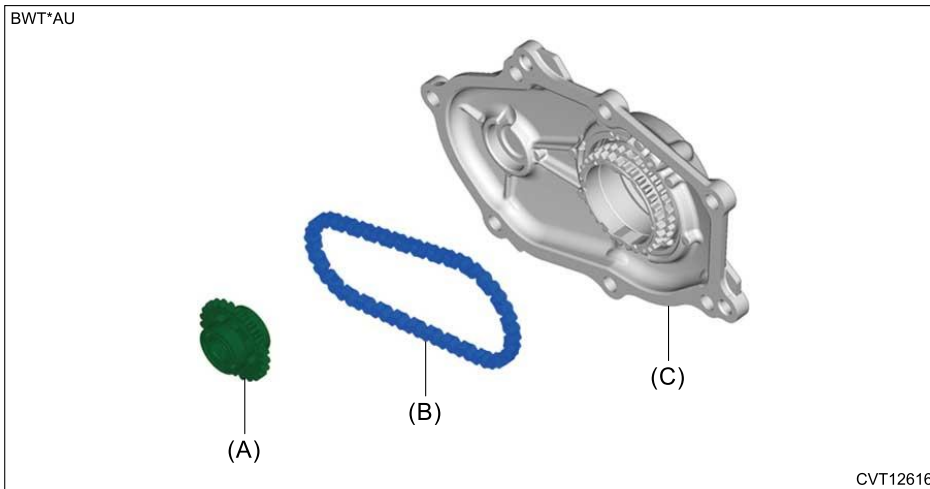
5. Remove the driven sprocket and oil pump chain.

**Caution:**

**If the ball bearing is removed from the driven sprocket, be sure to replace the driven sprocket with a new part.**

**Note:**

**The driven sprocket is a non-disassembly part.**

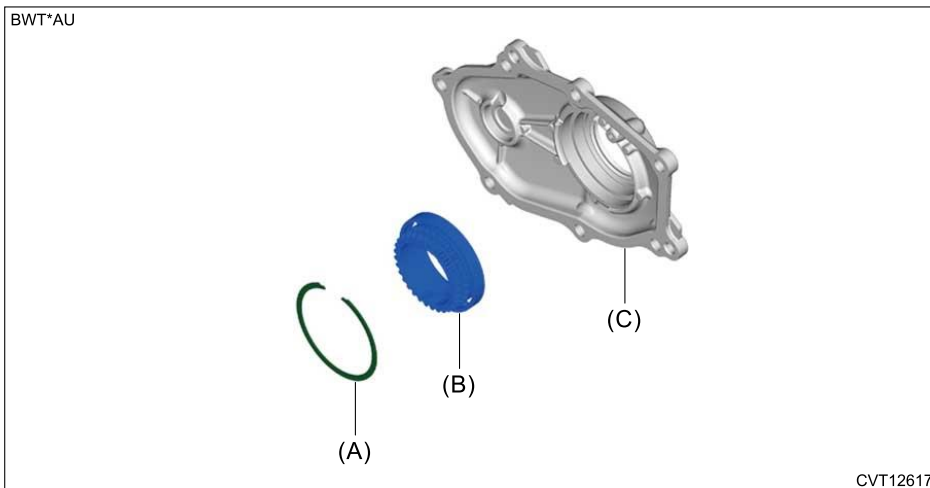


(A) Driven sprocket

(B) Oil pump chain

(C) Oil pump chain cover

6. Remove the snap ring and remove the drive sprocket.

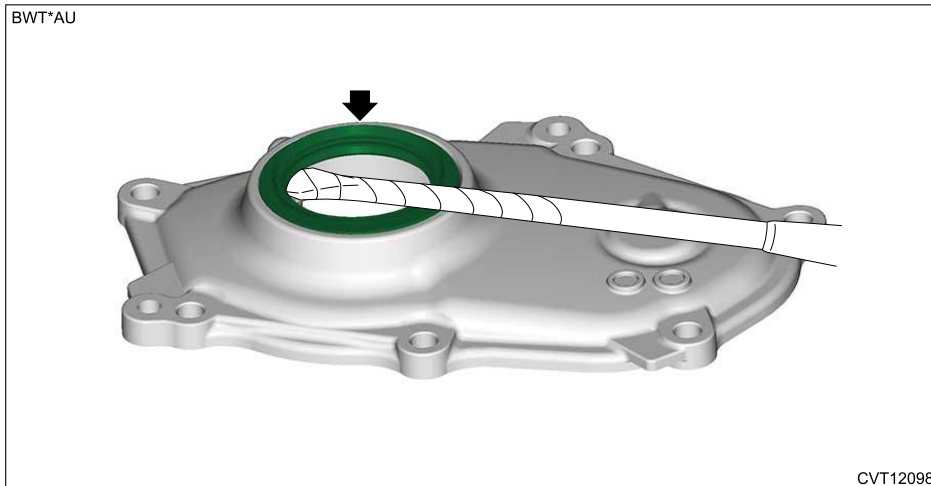


(A) Snap ring

(B) Drive sprocket

(C) Oil pump chain cover

7. Remove the oil seal using a flat tip screwdriver wrapped with protection tape.



8. Remove the liquid gasket from the oil pump chain cover and the converter case.

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Oil Pump Chain

### INSTALLATION

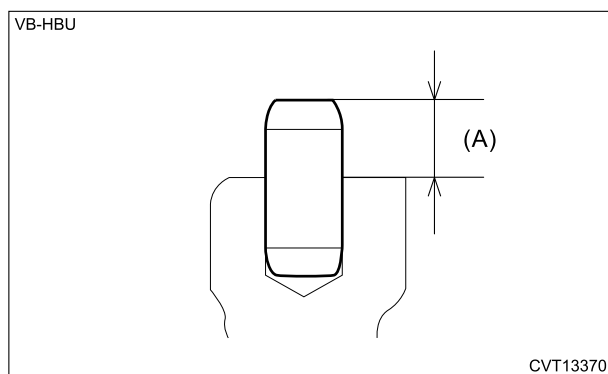
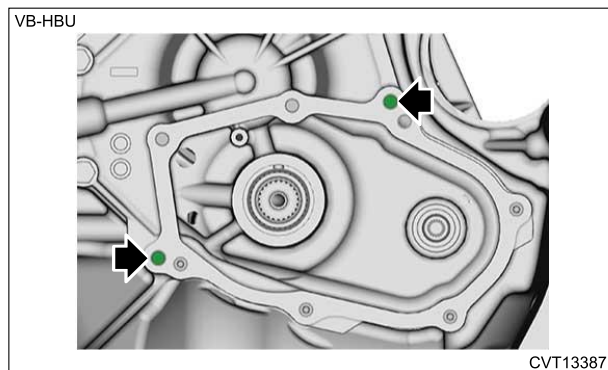
1. Check the projection (A) of the knock pins.

**Note:**

**When attached on the oil pump chain cover side, install on the converter case cover side.**

**Specification:**

7.5 – 8.5 mm (0.30 – 0.33 in)



2. Press-fit a new oil seal using ST and a press.

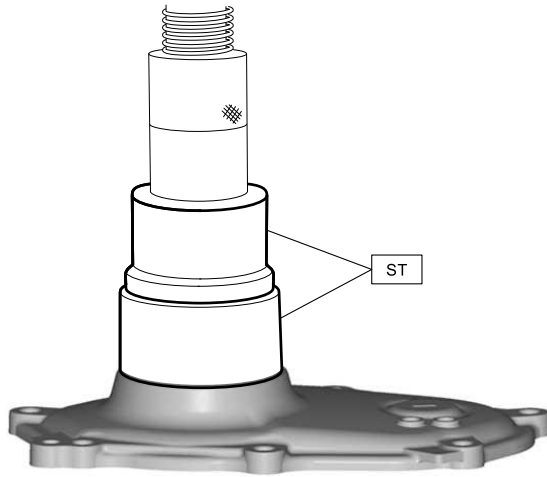
**Note:**

**Apply CVTF to the press-fitting area.**

**Preparation tool:**

ST: HOUSING BUSHING INSTALLER AND REMOVER (927720000)

BWT\*AU



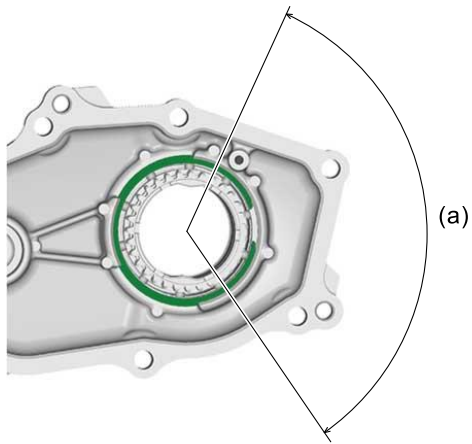
CVT12099

3. Install the drive sprocket and snap ring.

**Note:**

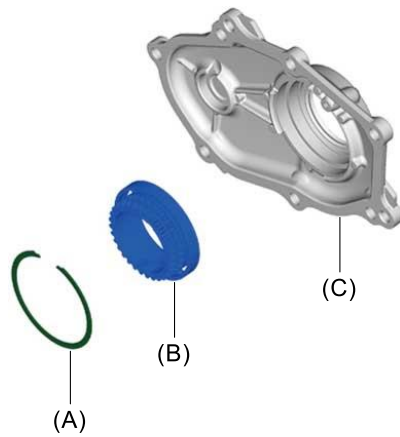
Align the snap ring opening with the position (a) shown in the figure.

BWT\*AU



CVT12318

BWT\*AU



CVT12617

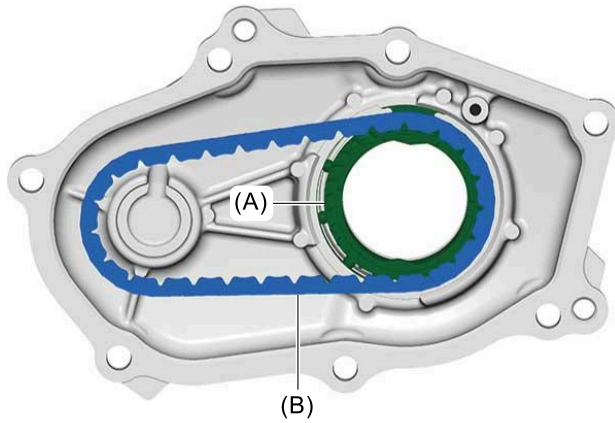
(A) Snap ring

(B) Drive sprocket

(C) Oil pump chain cover

4. Place the oil pump chain (B) on the drive sprocket (A).

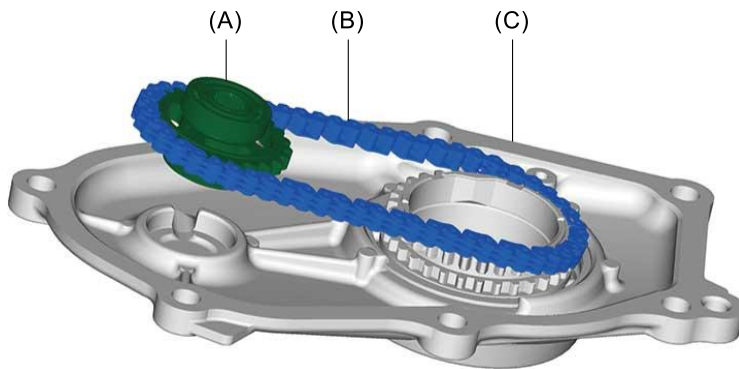
BWT\*AU



CVT12619

5. Place the oil pump chain (B) on the driven sprocket (A), and install the driven sprocket (A) to the oil pump chain cover (C).

BWT\*AU

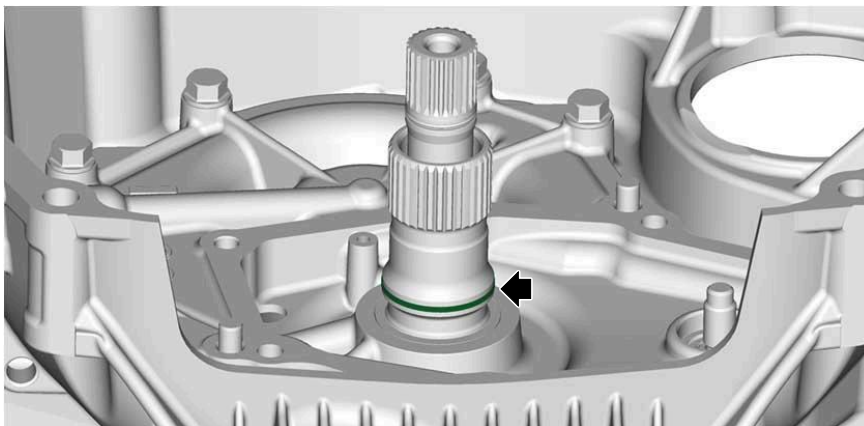


CVT12620

6. Install a new seal ring.

**Note:**

- Apply CVTF to the seal rings.
- Do not stretch the seal ring more than necessary.



CVT11059

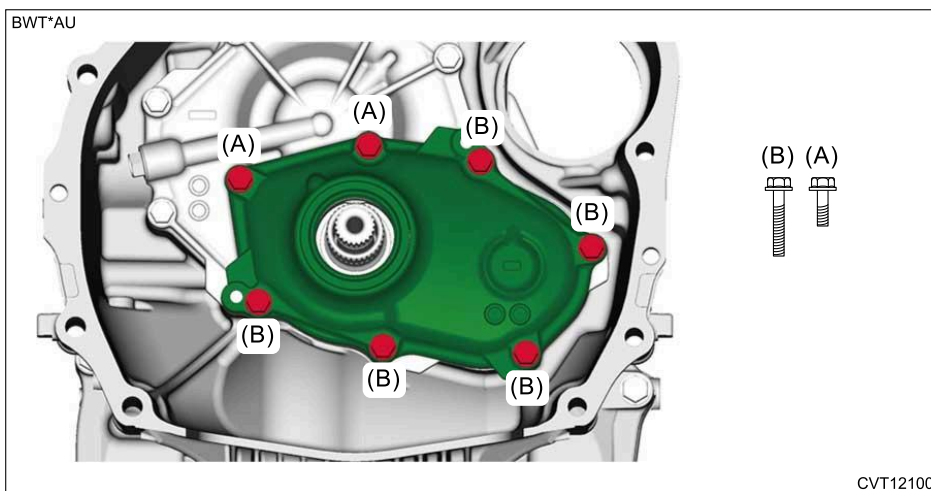
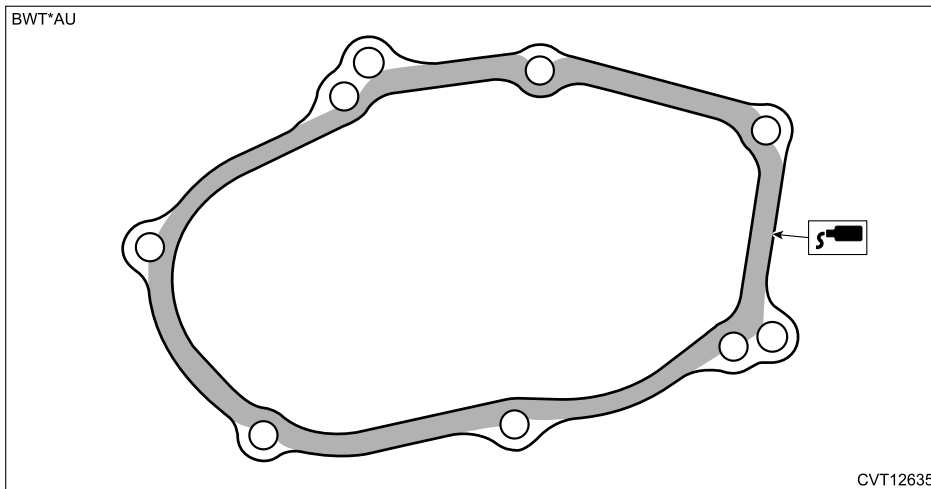
7. Apply liquid gasket to the mating surface of the oil pump chain cover as shown in the figure, and temporarily install the oil pump chain cover.

**Note:**

- Before applying liquid gasket, degrease the old liquid gasket seal surface of the oil pump chain cover and converter case.
- Install within 5 min. after applying liquid gasket.

**Preparation items:**

Liquid gasket: THREE BOND 1216J or equivalent



(A) M8 × 22

(B) M8 × 35

8. Tighten the oil pump chain cover mounting bolts.

**Tightening torque:**

24 N·m (2.4 kgf-m, 17.7 ft-lb)

9. Install the torque converter.  [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Torque Converter>INSTALLATION.](#)

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Oil Pump Chain

**DISASSEMBLY**

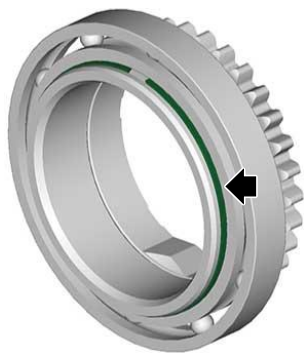


**Note:**

The driven sprocket is a non-disassembly part.

1. Remove the snap ring from the drive sprocket.

BWT\*AU



CVT12233

2. Remove the ball bearing using ST1, ST2 and a press.

**Caution:**

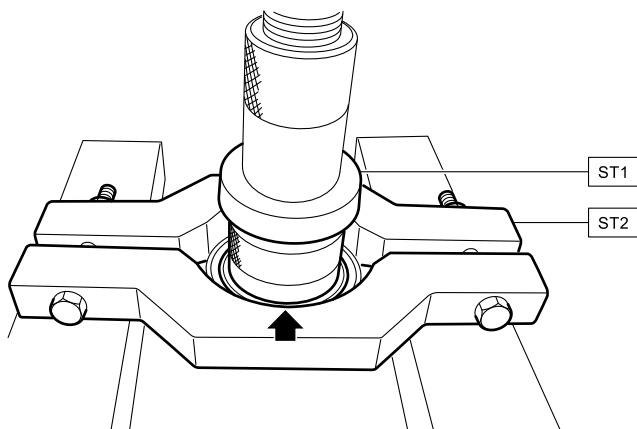
**Be careful not to drop the drive sprocket.**

**Preparation tool:**

ST1: HOUSING BUSHING INSTALLER AND REMOVER (927720000)

ST2: REMOVER (498077600)

BWT\*AU



CVT12446

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Oil Pump Chain

### ASSEMBLY

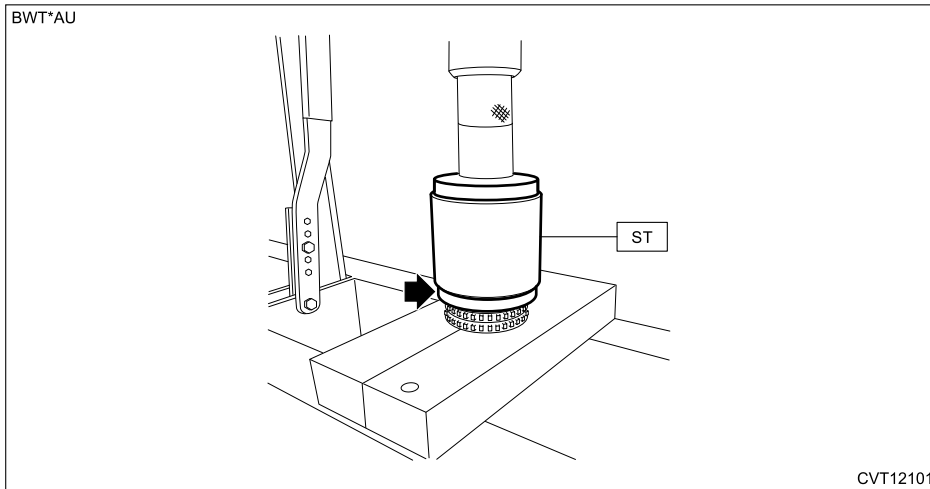
1. Using the ST and a press, press-fit a new ball bearing into the drive sprocket.

**Note:**

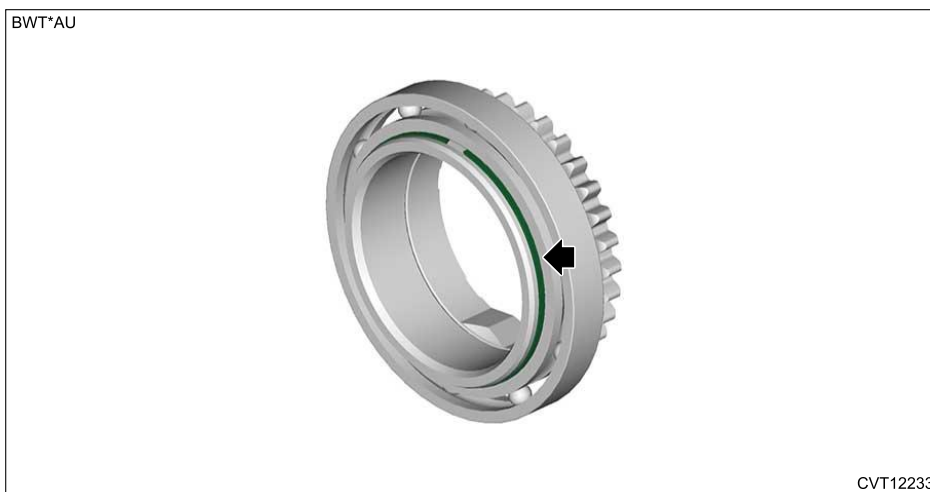
**Apply CVTF to the press-fitting area.**

**Preparation tool:**

ST: INSTALLER (20099AE020)



2. Install the snap ring.



## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Oil Pump Chain

### INSPECTION

---

1. Check that there is no deformation, cracks or other damages.
2. Check the bearing for smooth rotation.
3. Check the bearing for looseness.
4. Check each part for excessive wear.

## PROCEDURE

### 1. BEFORE OVERHAUL

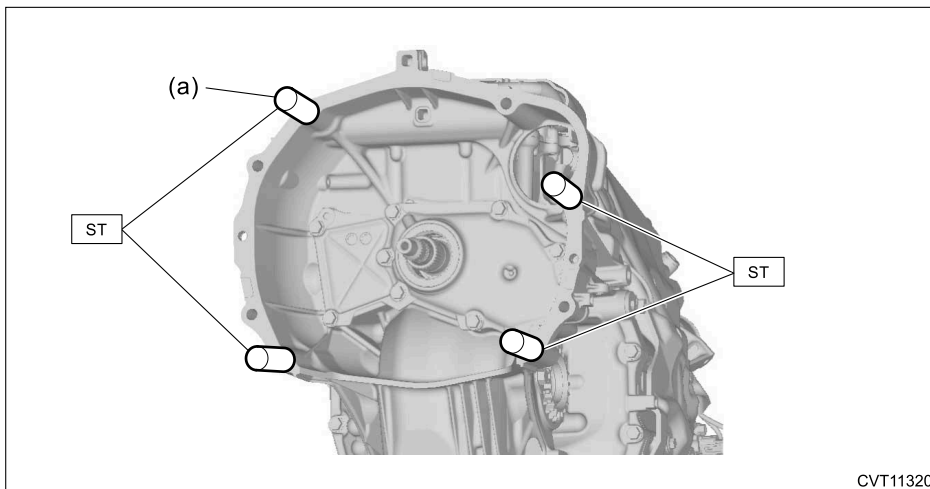
1. Remove the torque converter. [🔗 Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Torque Converter>REMOVAL.](#)
2. Remove the air breather hose. [🔗 Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Air Breather Hose>REMOVAL.](#)
3. Attach the ST.

**Note:**

When attaching the ST to the (a) positions, spacers or similar of 2.0 mm (0.08 in) or more in thickness are necessary.

**Preparation tool:**

ST: STAND ASSY (18632AA000)



4. Place the transmission body.

**Caution:**

Prepare a container for draining of CVTF, because CVTF remaining inside the transmission body may flow out from the input shaft portion.

### 2. AFTER OVERHAUL

1. Remove the ST (STAND ASSY).
2. Install the air breather hose. [🔗 Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Air Breather Hose>INSTALLATION.](#)
3. Install the torque converter. [🔗 Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Torque Converter>INSTALLATION.](#)
4. Remove the filler plug (for overhaul), and refill approx. 10 L (10.6 US qt, 8.8 Imp qt) of CVTF.

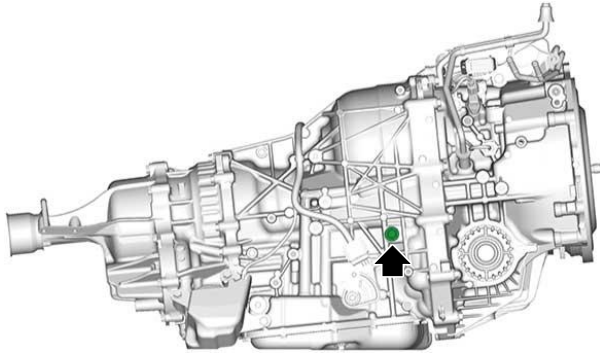
**Caution:**

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

**Preparation items:**

CVTF: [🔗 Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>General Description>SPECIFICATION > CVTF.](#)

BWT\*AU



CVT12046

5. Using a new gasket, install the filler plug (for overhaul).




**Tightening torque:**

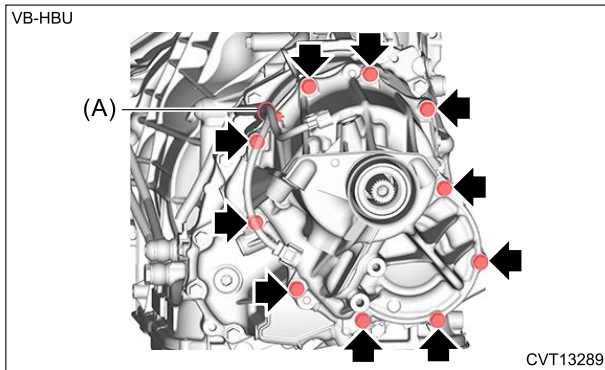
35 N·m (3.6 kgf-m, 25.8 ft-lb)

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Extension Case

### REMOVAL



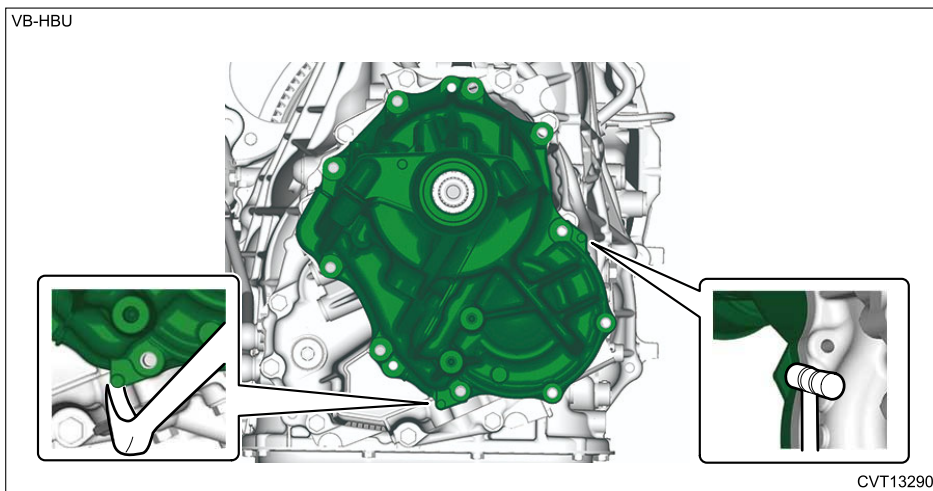
1. Remove the transmission body.  Ref. to [CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Transmission Assembly>REMOVAL](#).
2. Remove the front wheel speed sensor.  Ref. to [CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Front Wheel Speed Sensor>REMOVAL](#).
3. Remove the rear wheel speed sensor.  Ref. to [CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Rear Wheel Speed Sensor>REMOVAL](#).
4. Remove the clip (A), and remove the extension case mounting bolts.



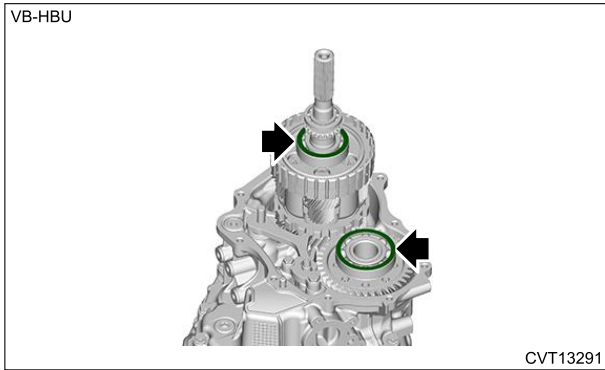
5. Using a plastic hammer and a crowbar wrapped with protection tape or similar, expand the clearance and remove the extension case.

**Caution:**

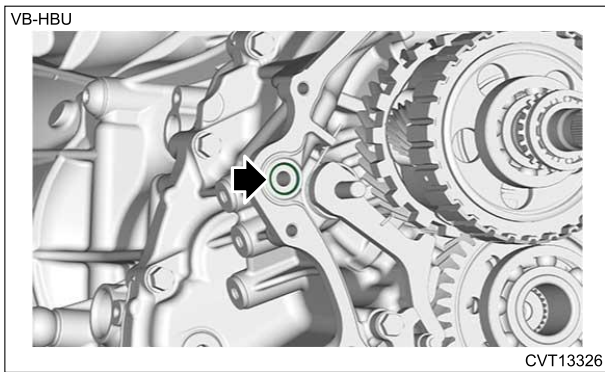
**Be careful not to damage the oil seal of the extension case.**



6. Remove the rear drive shaft shim and the transfer reduction driven gear shim.



7. Remove the O-rings.



8. Remove the liquid gasket from the extension case and intermediate case.

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Extension Case

### INSTALLATION

---

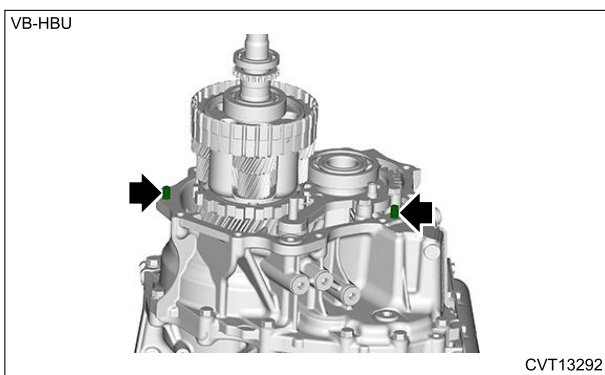
1. Check the projection (A) of the knock pins.

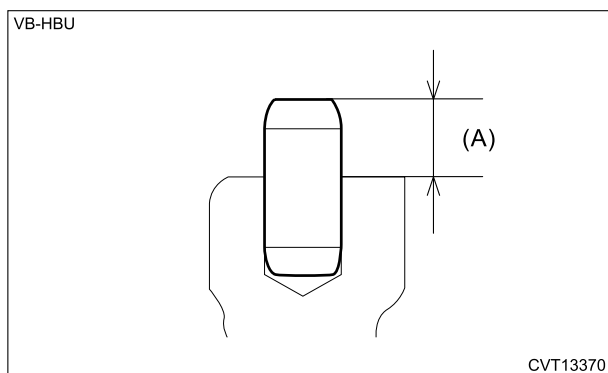
**Note:**

**When attached on the extension case cover side, install on the intermediate case side.**

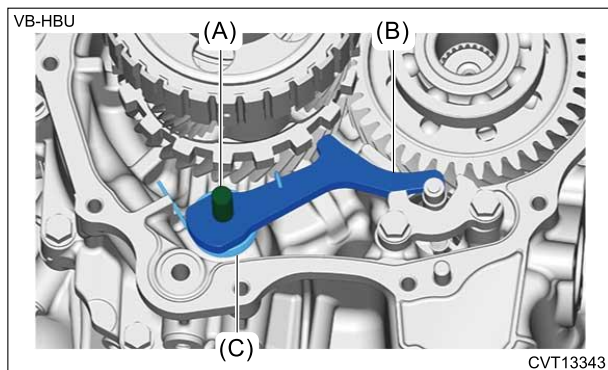
**Specification:**

11.5 – 12.5 mm (0.45 – 0.49 in)



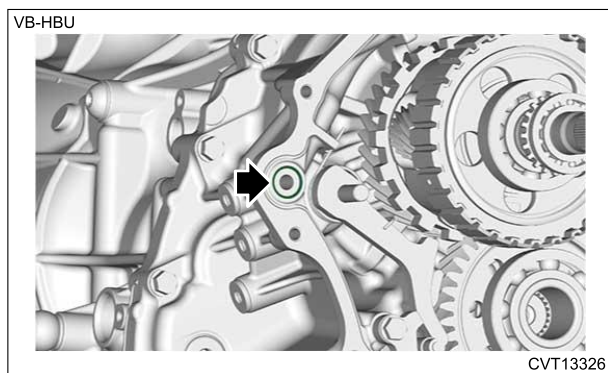


2. Confirm that the shaft (A), parking pawl (B) and return spring (C) are firmly attached.

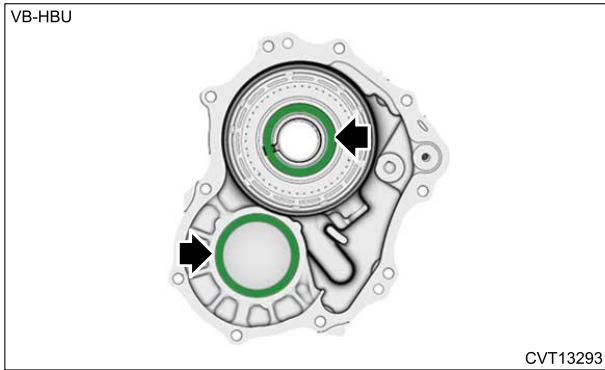


3. Perform the following operations when replacing the extension case.
  - (1) Select the rear drive shaft shim. [📄 Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Rear Drive Shaft>INSTALLATION.](#)
  - (2) Select the transfer reduction driven gear shim. [📄 Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Transfer Reduction Driven Gear>INSTALLATION.](#)
4. Install a new O-ring.

**Note:**  
Apply CVTF to the O-rings.



5. Set the rear drive shaft shim and the transfer reduction driven gear shim to the extension case with white vaseline.



6. Apply liquid gasket to the mating surface of the intermediate case as shown in the figure, and temporarily install the extension case.

**Caution:**

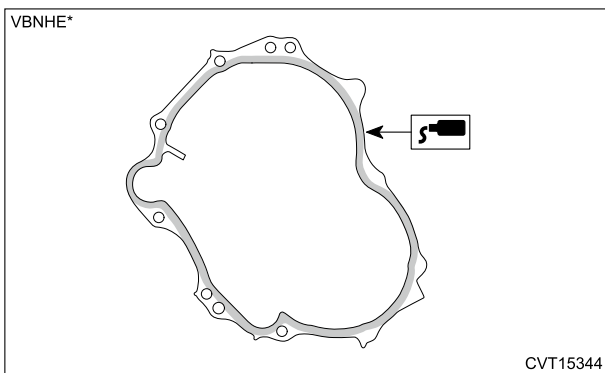
**Be careful not to damage the oil seal of the extension case.**

**Note:**

- Before applying liquid gasket, degrease the liquid gasket seal surfaces of the extension case and intermediate case.
- Install within 5 min. after applying liquid gasket.

**Preparation items:**

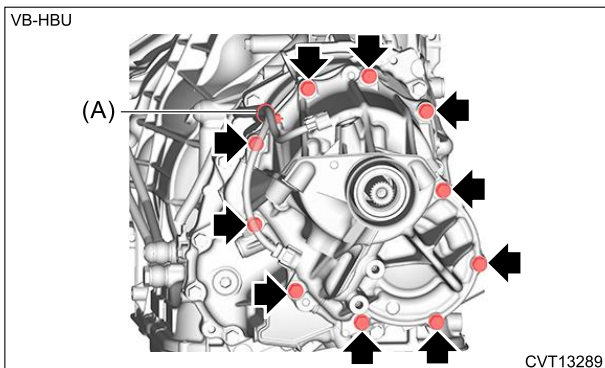
Liquid gasket: THREE BOND 1216J or equivalent






7. Tighten the extension case mounting bolts and install the clip (A).

**Tightening torque:**

25 N·m (2.5 kgf-m, 18.4 ft-lb)

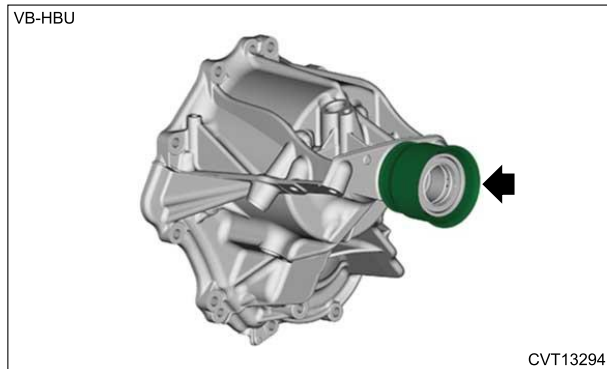


8. Install the rear wheel speed sensor.  [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Rear Wheel Speed Sensor>INSTALLATION.](#)
9. Install the front wheel speed sensor.  [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Front Wheel Speed Sensor>INSTALLATION.](#)
10. Install the transmission body.  [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Transmission Assembly>INSTALLATION.](#)

## DISASSEMBLY



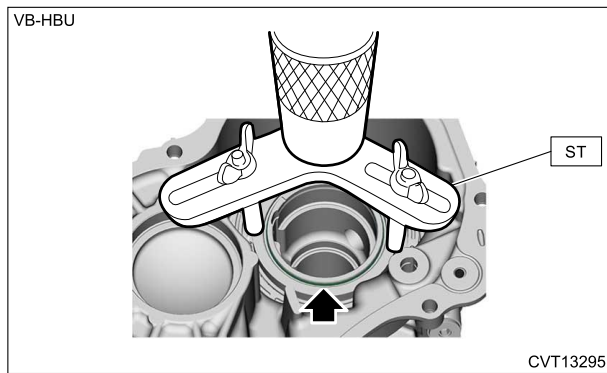
1. Remove the dust cover.



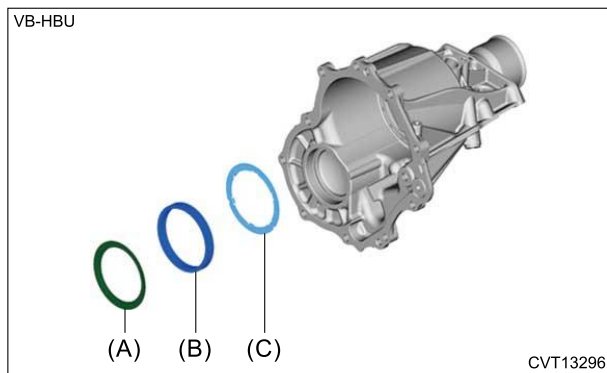
2. Remove the snap ring from the transfer clutch piston using the ST and a press.

### Preparation tool:

ST: COMPRESSOR SPECIAL TOOL (18762AA001)



3. Remove the clutch spring retainer, return spring and spring retainer.

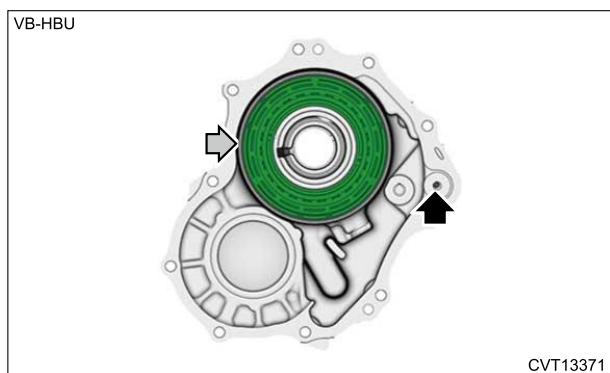


(A) Clutch spring retainer

(B) Return spring

(C) Spring retainer

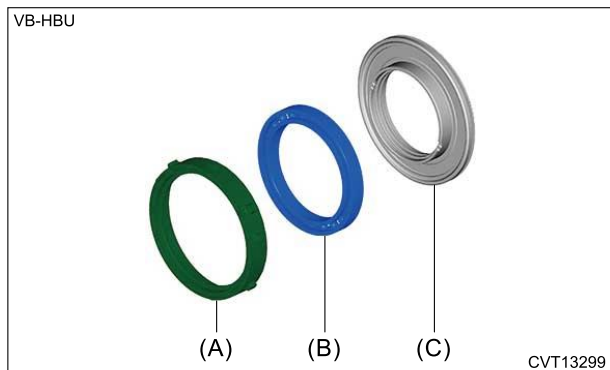
4. Blow compressed air through the hole shown in the figure, and remove the transfer clutch piston.



5. Remove the D-ring and O-ring from the transfer clutch piston.



6. Remove the pressure plate and ball bearing.



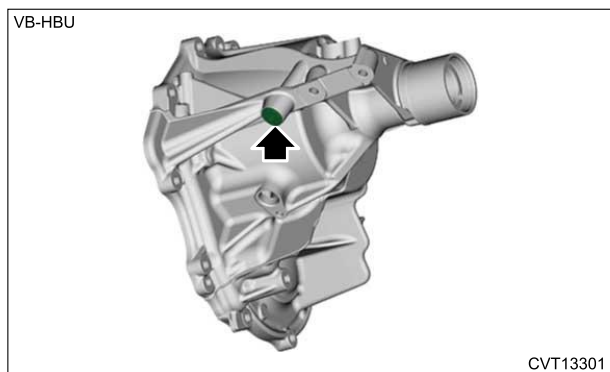
(A) Pressure plate

(B) Ball bearing

(C) Transfer clutch piston

7. Remove the extension case oil seal.  [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Extension Case Oil Seal>REPLACEMENT.](#)

8. Remove the plug.

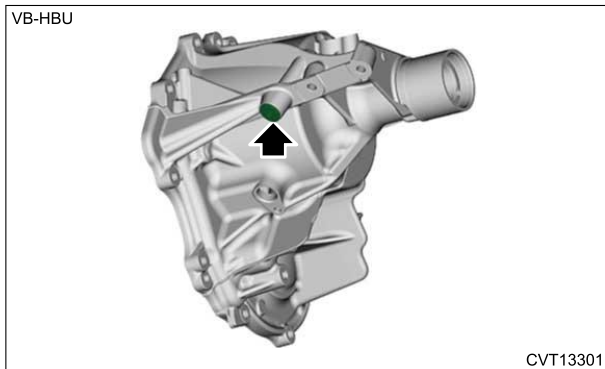



## ASSEMBLY

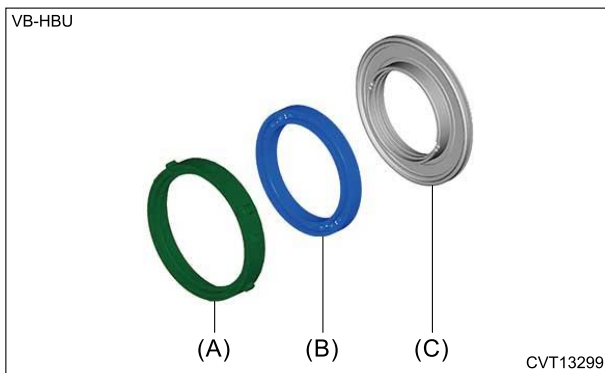
1. Install the plugs with new O-rings.

**Tightening torque:**

25 N·m (2.5 kgf-m, 18.4 ft-lb)



2. Install a new extension case oil seal.  [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Extension Case Oil Seal>REPLACEMENT.](#)
3. Install a new ball bearing and pressure plate to the transfer clutch piston.



(A) Pressure plate

(B) Ball bearing

(C) Transfer clutch piston

4. Install a new D-ring and O-ring.

**Note:**

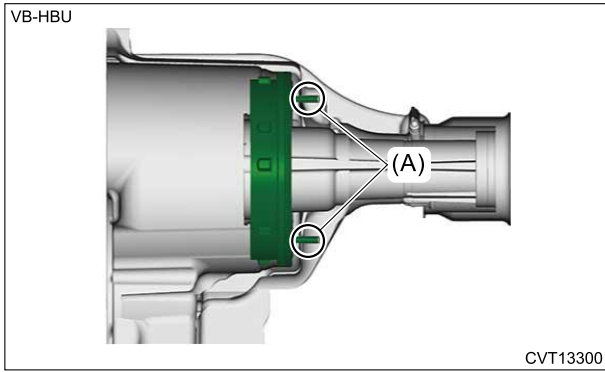
**Apply CVTF to the D-ring and O-ring.**



5. Install the transfer clutch piston to the extension case.

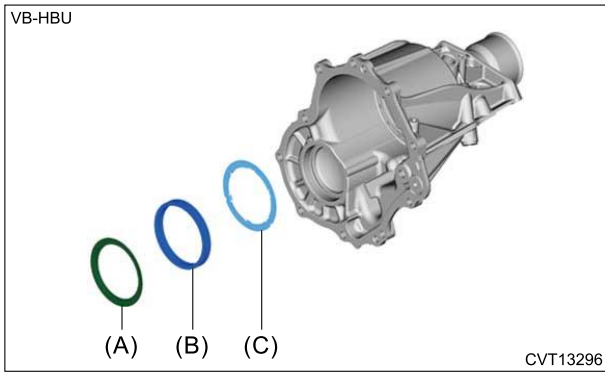
**Note:**

**Align the straight pin position.**



(A) Straight pin

6. Install the spring retainer, return spring and clutch spring retainer.



(A) Clutch spring retainer

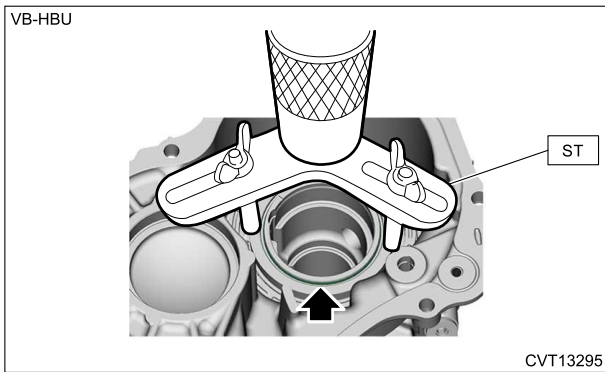
(B) Return spring

(C) Spring retainer

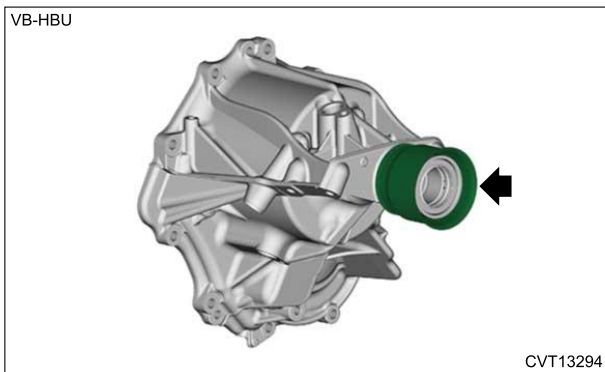
7. Using the ST and a press, install the snap ring.

**Preparation tool:**

ST: COMPRESSOR SPECIAL TOOL (18762AA001)



8. Install the dust cover.



## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Extension Case

### INSPECTION

---

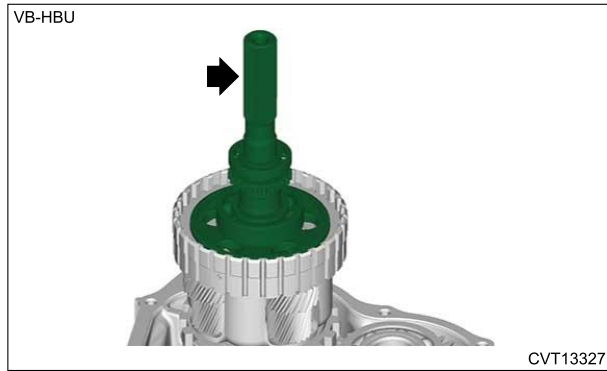
- 1.** Check that there is no deformation, cracks or other damages.
- 2.** Check the bearing for smooth rotation.
- 3.** Check the bearing for looseness.

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Rear Drive Shaft

### REMOVAL



1. Remove the extension case.  Ref. to [CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Extension Case>REMOVAL](#).
2. Remove the rear drive shaft.



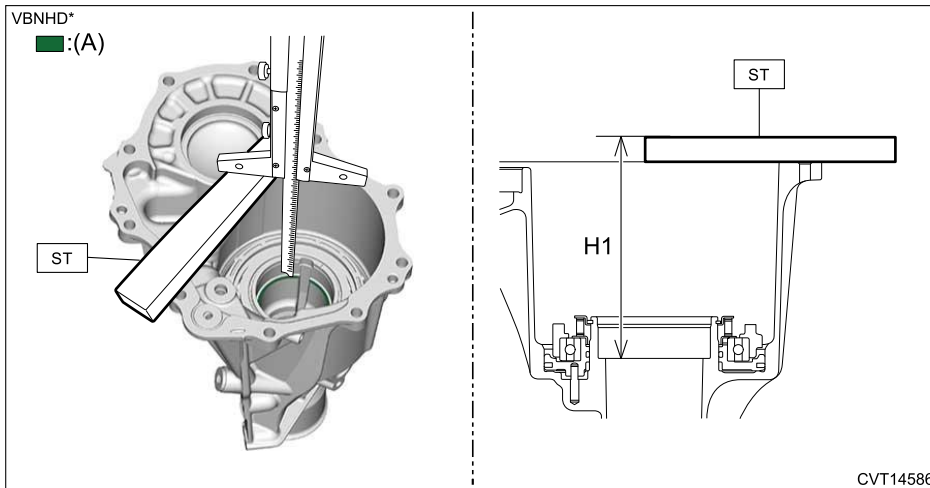
## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Rear Drive Shaft

### INSTALLATION

1. Select the rear drive shaft shim.  
(1) Using the ST, measure the height "H1" from the end surface of ST to the contact surface of ball bearing.

#### Preparation tool:

ST: GAUGE (499575400)



(A) Measurement surface

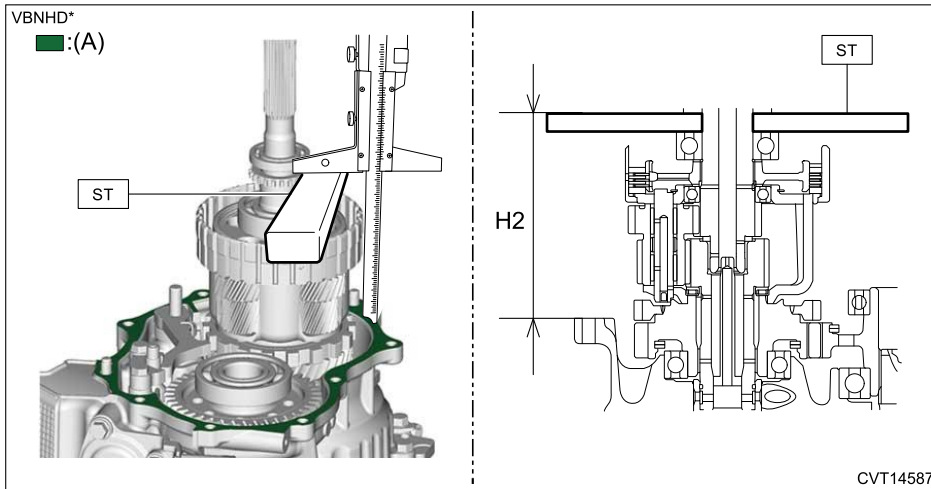
- (2) Using the ST, measure the height "H2" from the ST end face to the intermediate case mating surface.

#### Note:

**Set the ST so that it does not ride on the ball bearing inner race.**

#### Preparation tool:

ST: GAUGE (499575400)



(A) Measurement surface

(3) Using the following calculation, calculate an appropriate thickness "T" of the rear drive shaft shim.

**Note:**

**Adjust using 0 – 4 pieces.**

$$T = H1 - H2 - 0.05 - 0.25 \text{ mm (0.002 - 0.010 in)}$$

T	Rear drive shaft shim thickness (mm (in))
H1	Measured value (mm (in)) of step (1)
H2	Measured value (mm (in)) of step (2)
0.05 – 0.25 mm (0.002 – 0.010 in)	Clearance specification

2. Install the rear drive shaft.

3. Install the extension case.  [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Extension Case>INSTALLATION.](#)

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Rear Drive Shaft

### DISASSEMBLY



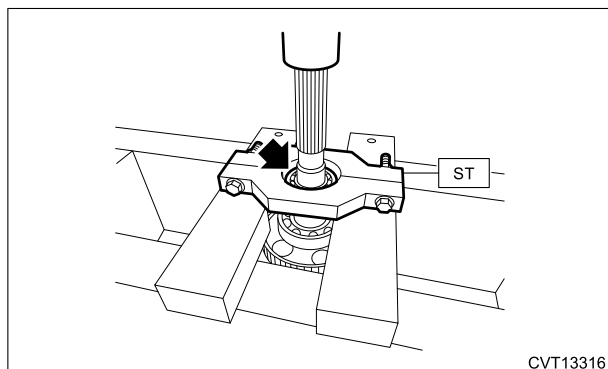
1. Remove the ball bearing (rear side (small)) using the ST and a press.

**Caution:**

**Be careful not to drop the rear drive shaft.**

**Preparation tool:**

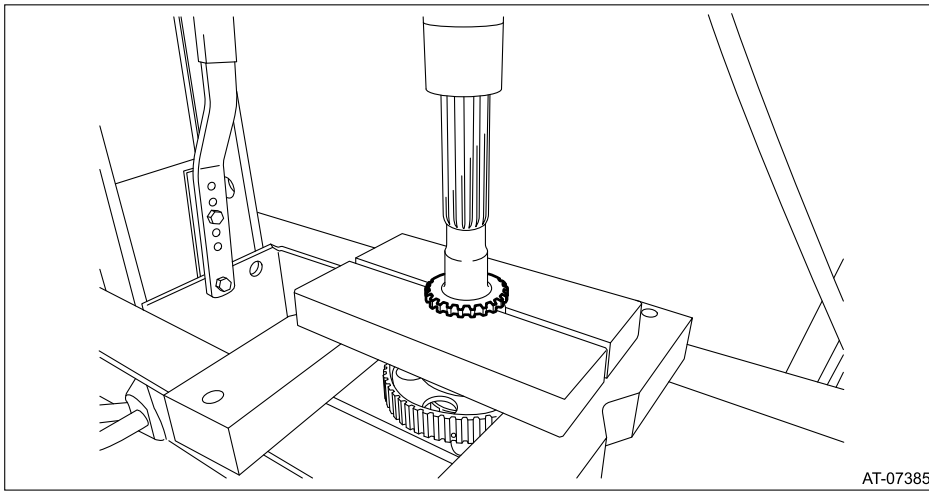
ST: REMOVER (498077400)



2. Using a press, remove the revolution gear.

**Caution:**

**Be careful not to drop the rear drive shaft.**

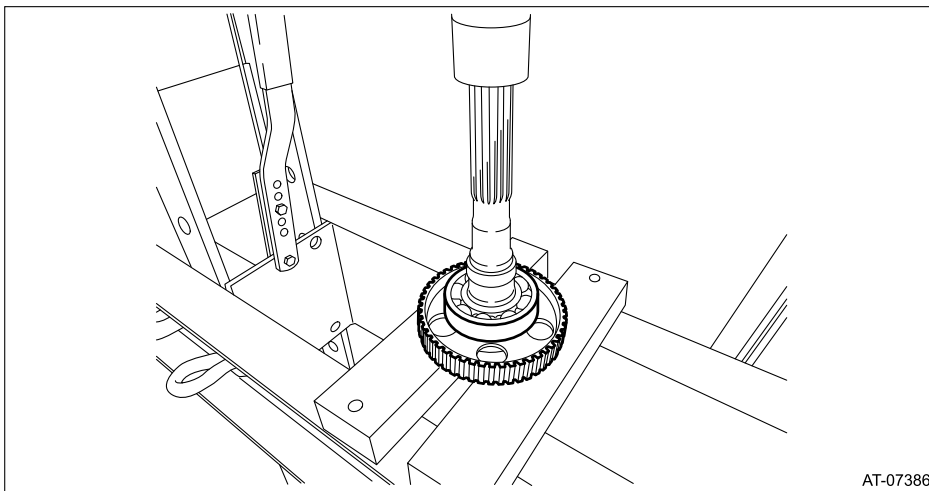


AT-07385

3. Using a press, remove the ball bearing (front side), ball bearing (rear side (large)) and clutch hub as a single unit.

**Caution:**

**Be careful not to drop the rear drive shaft.**



AT-07386

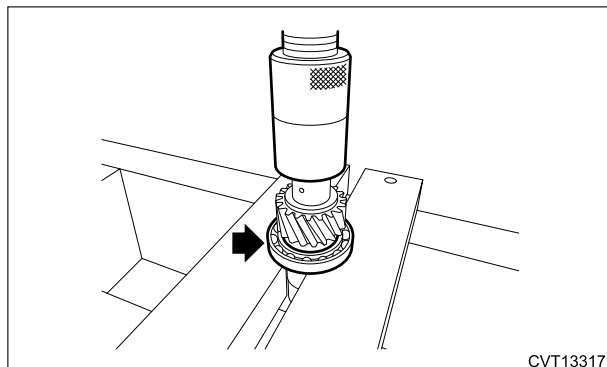
CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Rear Drive Shaft

**ASSEMBLY**

1. Using a press, press-fit a new ball bearing (front side).

**Note:**

- Apply CVTF to the press-fitting area.
- Press-fit the part to the position where it stops.



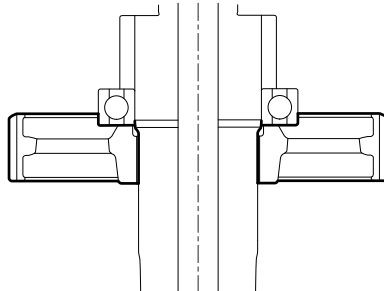
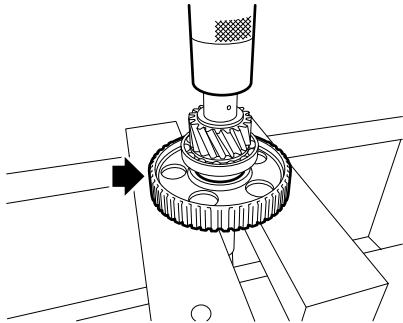
CVT13317

2. Using a press, press-fit the clutch hub.

**Note:**

- Make sure the clutch hub is facing the correct direction.
- Apply CVTF to the press-fitting area.
- Press-fit the part to the position where it stops.

VB-HBU



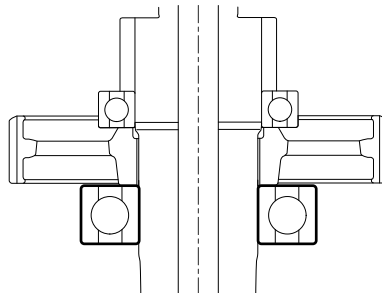
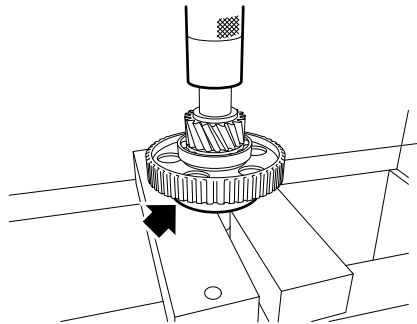
CVT13433

3. Using a press, press-fit a new ball bearing (rear side (large)).

**Note:**

- Apply CVTF to the press-fitting area.
- Press-fit the part to the position where it stops.

VB-HBU

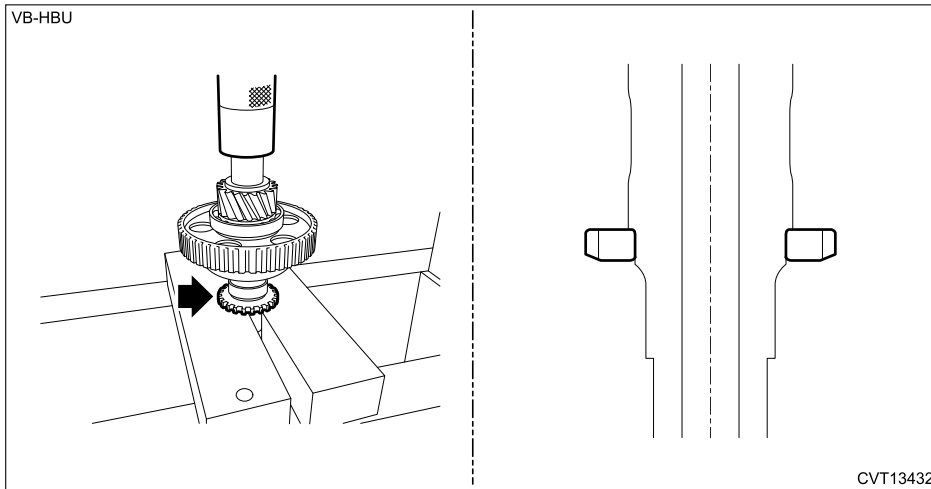


CVT13480

4. Using a press, press-fit a new revolution gear.

**Note:**

- Make sure the revolution gear is facing the correct direction.
- Apply CVTF to the press-fitting area.
- Press-fit the part to the position where it stops.



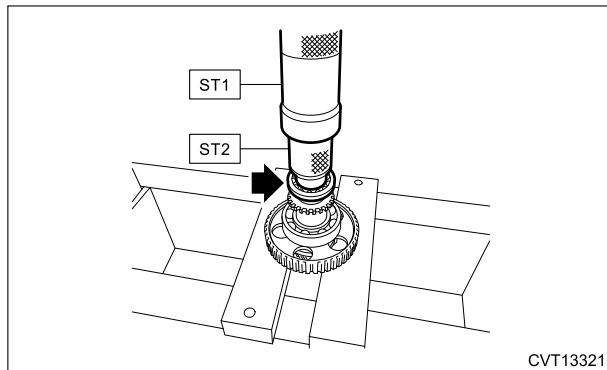
5. Using the ST and a press, press-fit a new ball bearing (rear side (small)).

**Note:**

- Apply CVTF to the press-fitting area.
- Press-fit the part to the position where it stops.

**Preparation tool:**

- ST1: BUSHING 1-2 INSTALLER (499277100)  
 ST2: INSTALLER (499757002)



CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Rear Drive Shaft


**INSPECTION**

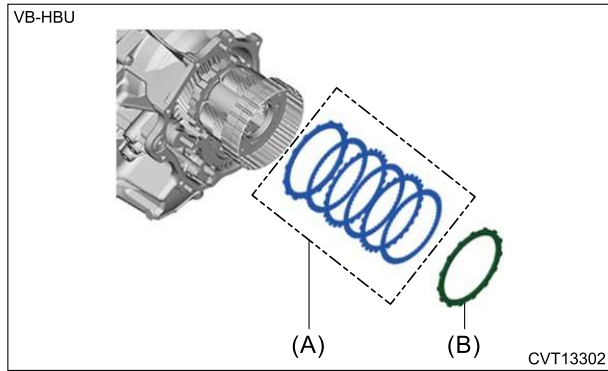
1. Check that there is no deformation, cracks or other damages.
2. Check the bearing for smooth rotation.
3. Check the bearing for looseness.

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Transfer Clutch

### REMOVAL



1. Remove the rear drive shaft.  Ref. to [CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Rear Drive Shaft>REMOVAL](#).
2. Remove the driven plate No. 3 and transfer clutch plate set from the center differential carrier.



(A) Transfer clutch plate set (B) Driven plate No. 3

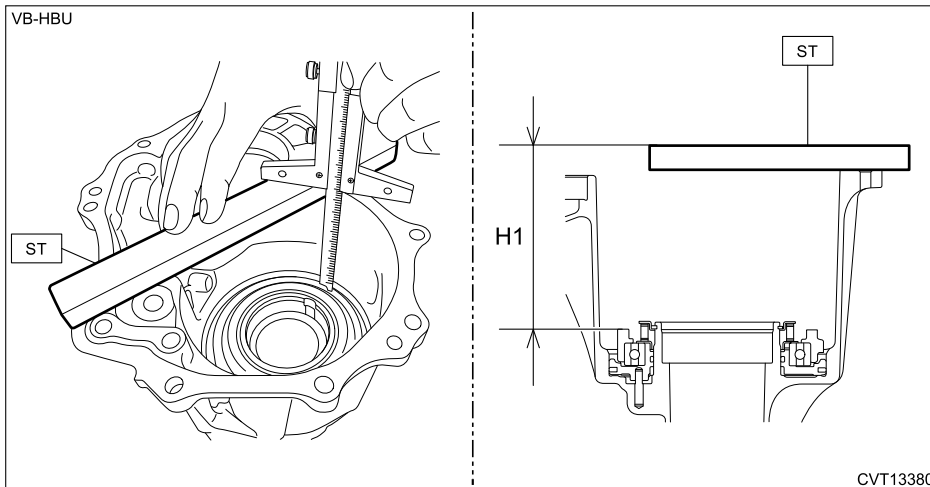
## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Transfer Clutch

### INSTALLATION

1. Install the transfer clutch plate set to the center differential carrier.
2. Select driven plate No. 3.
  - (1) Using the ST, measure the height "H1" from the end surface of ST to the transfer clutch piston.

#### Preparation tool:

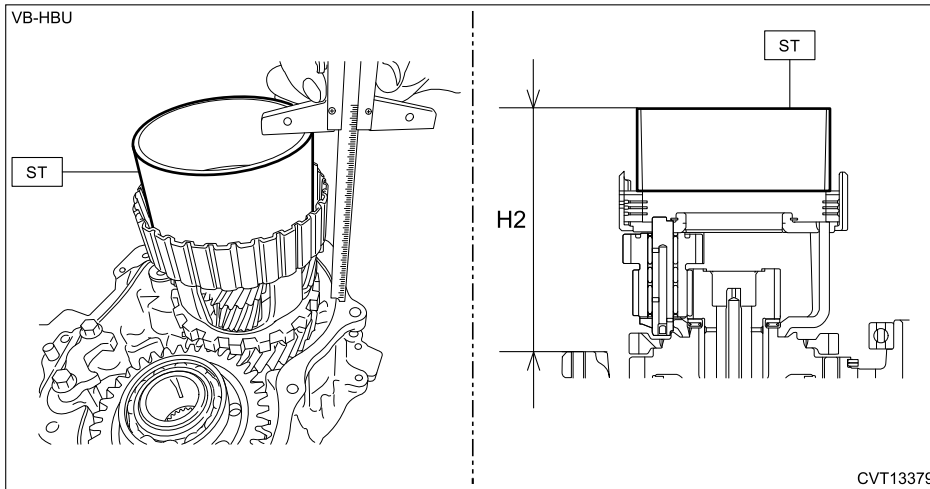
ST: GAUGE (499575400)



- (2) Using the ST, measure the height "H2" from the ST end face to the intermediate case mating surface.

#### Preparation tool:

ST: PISTON GUIDE (398744300)



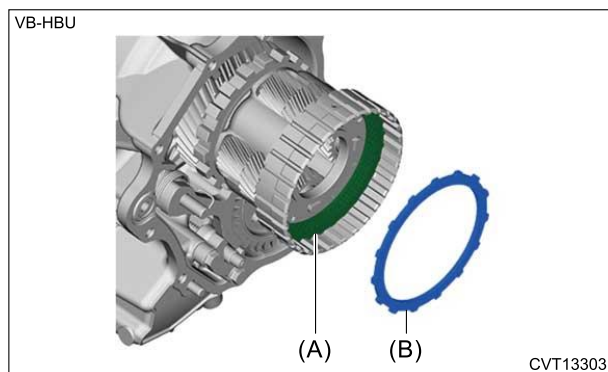
(3) Using the following calculation, calculate an appropriate thickness "T" of the driven plate No. 3.

**Note:**  
Adjust using 1 piece.

$$T = (H1 - 15 \text{ mm (0.591 in)}) - (H2 - 50 \text{ mm (1.970 in)}) - 0.2 - 0.6 \text{ mm (0.008 - 0.024 in)}$$

T	Thickness of driven plate No. 3 (mm (in))
H1	Measured value (mm (in)) of step (1)
H2	Measured value (mm (in)) of step (2)
15 mm (0.591 in)	Thickness of ST (GAUGE)
50 mm (1.970 in)	Thickness of ST (PISTON GUIDE)
0.2 - 0.6 mm (0.008 - 0.024 in)	Clearance specification

**3.** Install the driven plate No. 3.



(A) Transfer clutch plate set (B) Driven plate No. 3

**4.** Install the rear drive shaft.  [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Rear Drive Shaft>INSTALLATION.](#)

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Transfer Clutch

### INSPECTION

1. Check that there is no deformation, cracks or other damages.
2. Check the bearing for smooth rotation.
3. Check the bearing for looseness.
4. Inspect the drive plate facing for excessive wear.
5. Check the driven plate for discoloration (seizure).
6. Check that tight corner braking phenomenon does not occur when the vehicle starts moving with the steering wheel at the maximum steering angle.

If tight corner braking phenomenon occurs, perform the following procedures.

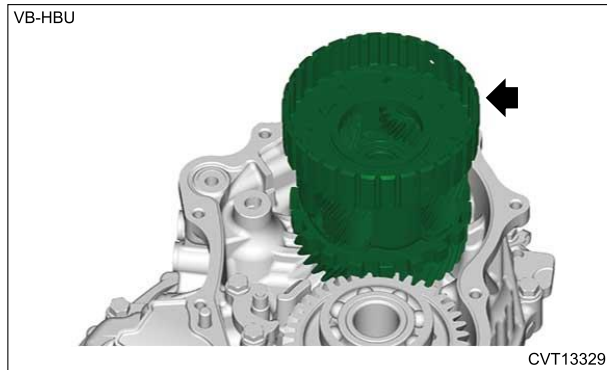
- (1) With the steering wheel at the maximum steering angle, drive the vehicle in "D range" and with vehicle speed at approx. 5 km/h (3 MPH) in both clockwise and counterclockwise directions for approx. ten times each, while repeating acceleration and braking intermittently.
- (2) If the tight corner braking phenomenon still persists, drive the vehicle again in a circle for several laps.

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Center Differential Carrier

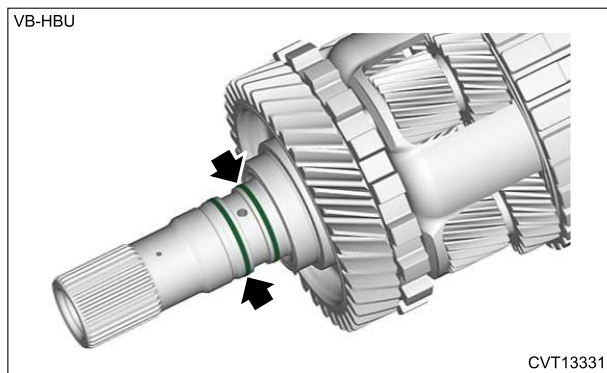
### REMOVAL



1. Remove the transfer clutch. [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Transfer Clutch>REMOVAL.](#)
2. Remove the parking pawl. [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Parking Pawl>REMOVAL.](#)
3. Remove the center differential carrier assembly.



4. Remove the seal rings.



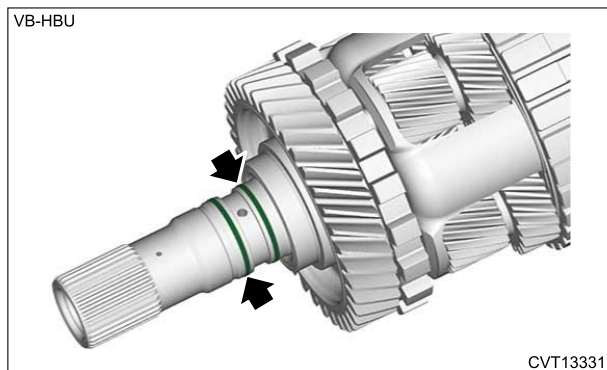
## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Center Differential Carrier

### INSTALLATION

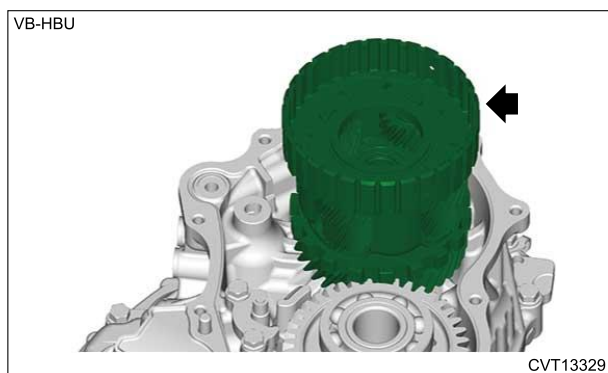
1. Install a new seal ring.

**Note:**

- Do not stretch the seal ring excessively.
- Apply CVTF to the seal rings.



2. Install the center differential carrier.

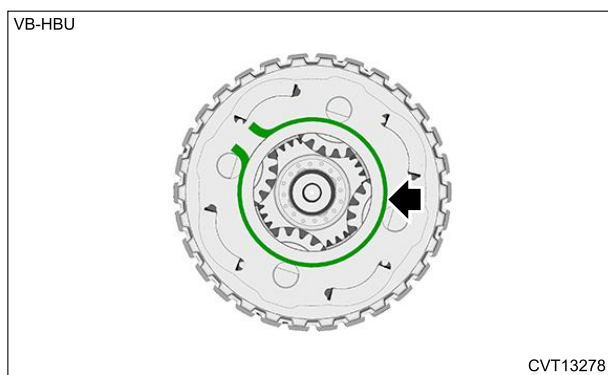


3. Install the transfer clutch.  [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Transfer Clutch>INSTALLATION.](#)

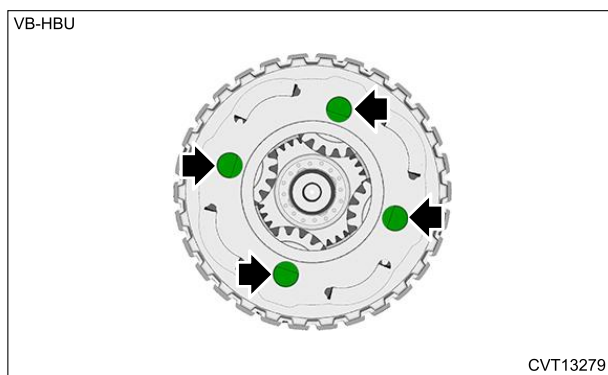
## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Center Differential Carrier

### DISASSEMBLY

1. Remove the snap ring from the center differential carrier.



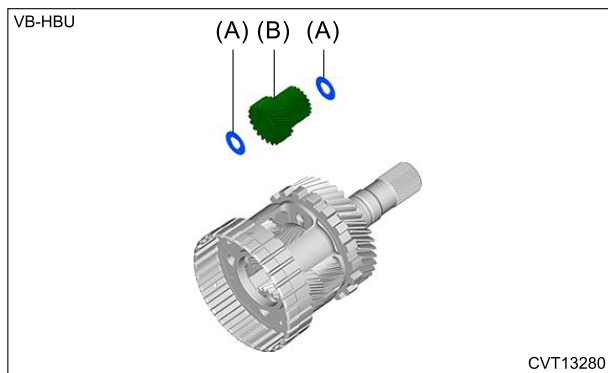
2. Remove the pinion shafts.



3. Remove the pinion gear and washers.

**Note:**

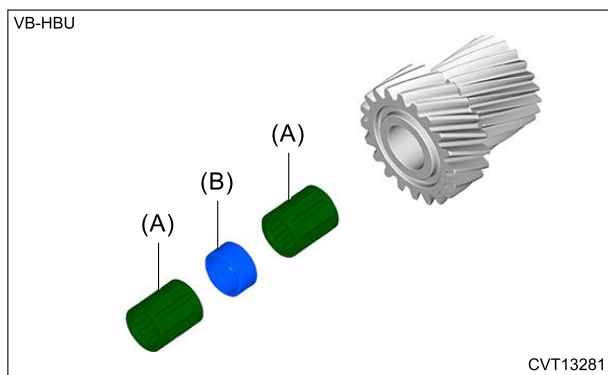
Be careful not to drop the needle bearing and spacer in the pinion gear.



(A) Washer

(B) Pinion gear

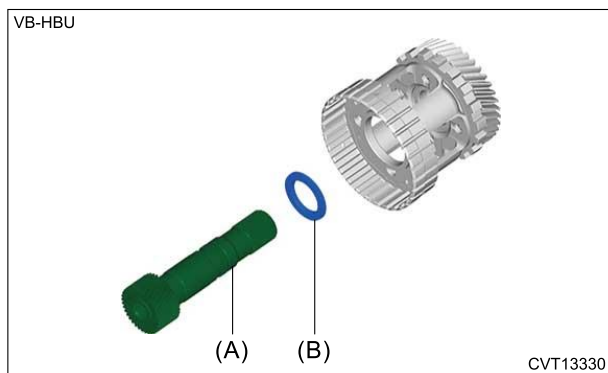
4. Remove the needle bearing and spacer from the pinion gear.



(A) Needle bearing

(B) Spacer

5. Remove the intermediate shaft and thrust bearing.



(A) Intermediate shaft

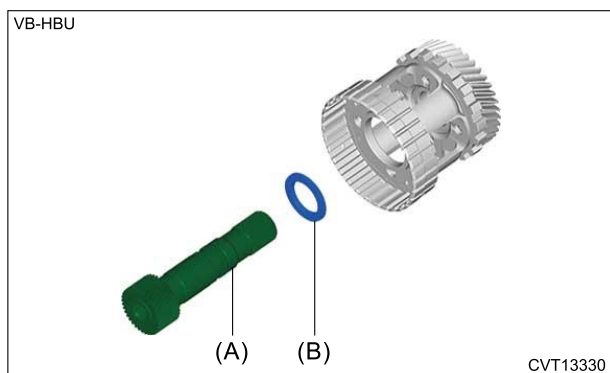
(B) Thrust bearing

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Center Differential Carrier

### ASSEMBLY

---

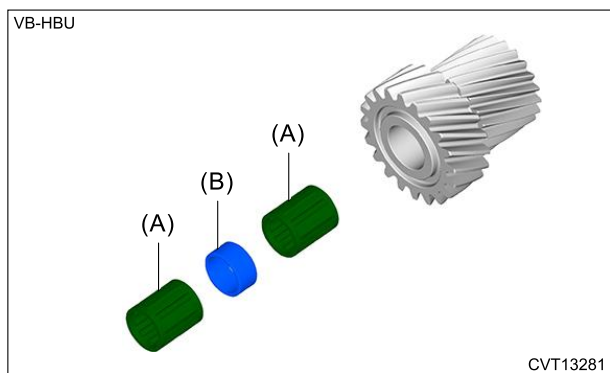
1. Install the intermediate shaft and thrust bearing to the center differential carrier.



(A) Intermediate shaft

(B) Thrust bearing

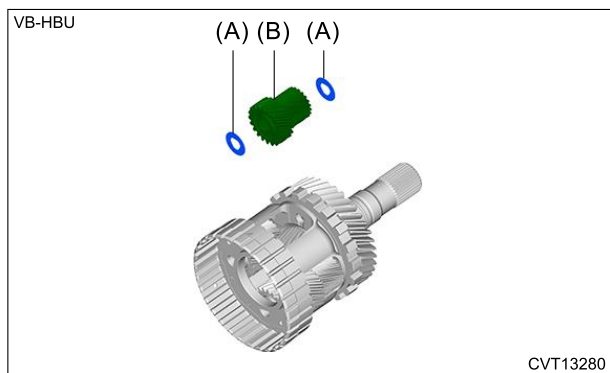
2. Install the needle bearing and spacer to the pinion gear.



(A) Needle bearing

(B) Spacer

3. Install the pinion gear and washers to the center differential carrier.



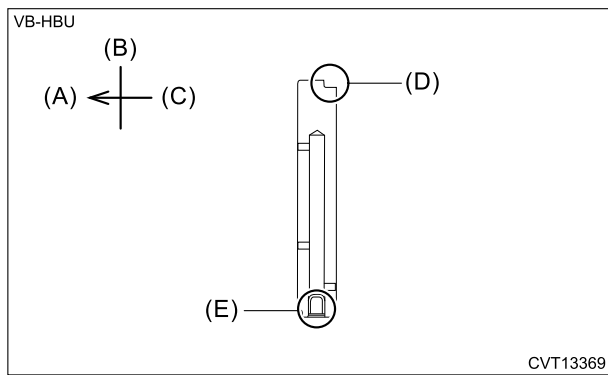
(A) Washer

(B) Pinion gear

4. Install the pinion shaft.

**Note:**

- Install with the plug facing the center differential carrier side.
- Install the pinion shaft with the cutout facing inward.



(A) Outside  
(B) Rear side

(C) Inside  
(D) Cutout portion

(E) Plug

**5.** Install the snap ring.

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Center Differential Carrier

### INSPECTION

---

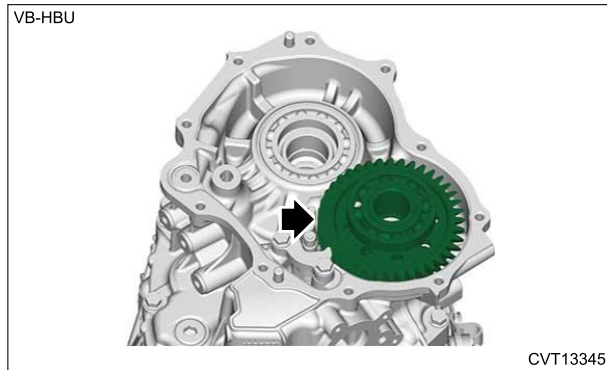
- 1.** Check that there is no deformation, cracks or other damages.
- 2.** Check the bearing for smooth rotation.
- 3.** Check the bearing for looseness.

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Transfer Reduction Driven Gear

### REMOVAL



1. Remove the center differential carrier.  [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Center Differential Carrier>REMOVAL.](#)
2. Remove the transfer reduction driven gear.



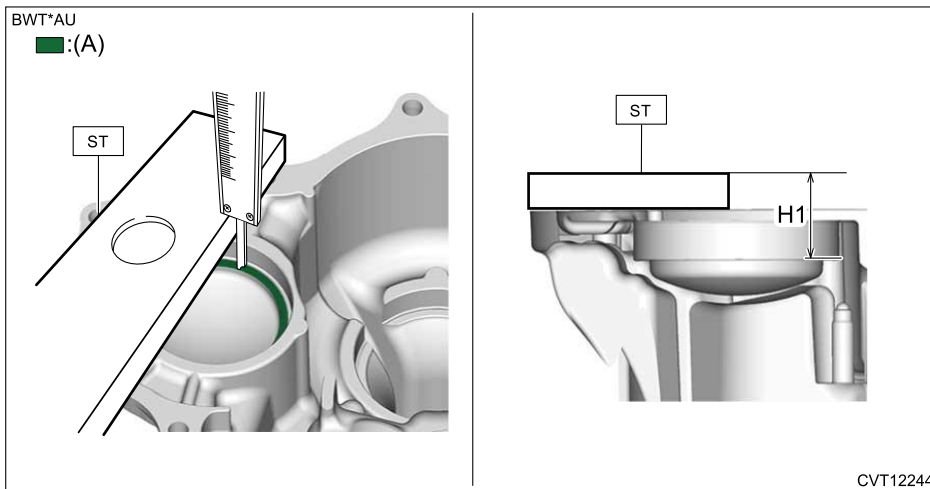
## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Transfer Reduction Driven Gear

### INSTALLATION

1. Select the transfer reduction driven gear shim.
  - (1) Using the ST, measure the height "H1" from the ST end face to the ball bearing catch surface.

**Preparation tool:**

ST: GAUGE (499575600)

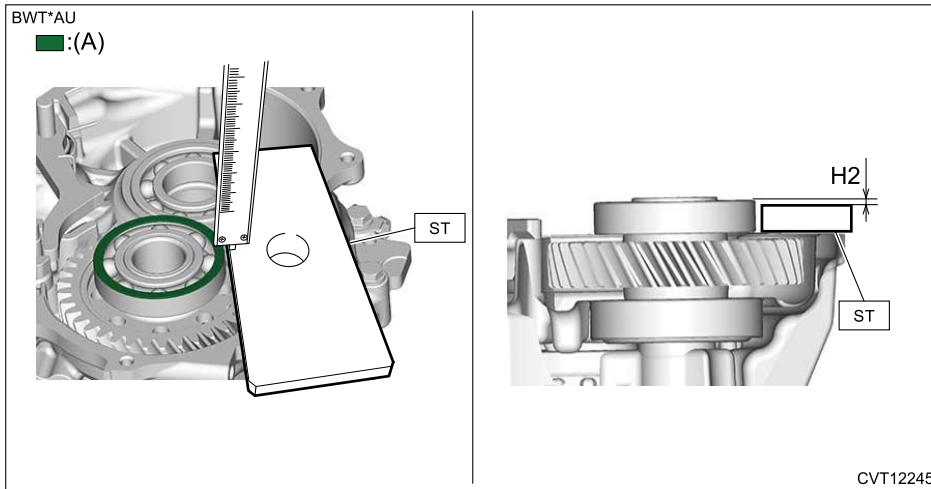


(A) Measurement surface

- (2) Install the transfer reduction driven gear to the intermediate case.
- (3) Using the ST, measure the height "H2" from the end face of the ball bearing outer ring to the ST.

**Preparation tool:**

ST: GAUGE (499575600)



(A) Measurement surface

(4) Using the following calculation, calculate an appropriate thickness "T" of the transfer reduction driven gear shim.

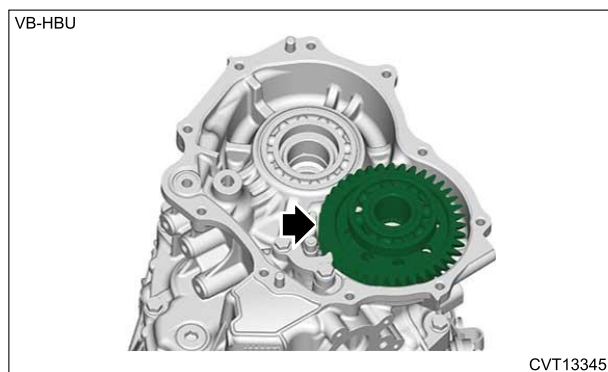
**Note:**

**Adjust using 1 – 3 pieces.**

$$T = (H1 - 15 \text{ mm (0.6 in)}) - (H2 + 15 \text{ mm (0.6 in)}) - 0.05 - 0.25 \text{ mm (0.002 - 0.010 in)}$$

T	Transfer reduction driven gear shim thickness (mm (in))
H1	Measured value (mm (in)) of step (1)
H2	Measured value (mm (in)) of step (3)
15 mm (0.6 in)	Thickness of ST (GAUGE)
0.05 – 0.25 mm (0.002 – 0.010 in)	Clearance specification

2. Install the transfer reduction driven gear.



3. Install the center differential carrier.  [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Center Differential Carrier>INSTALLATION.](#)

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Transfer Reduction Driven Gear

### DISASSEMBLY



1. Remove the ball bearing (intermediate case side) and ball bearing (extension case side) using ST1, ST2, ST3 and a press.

**Caution:**

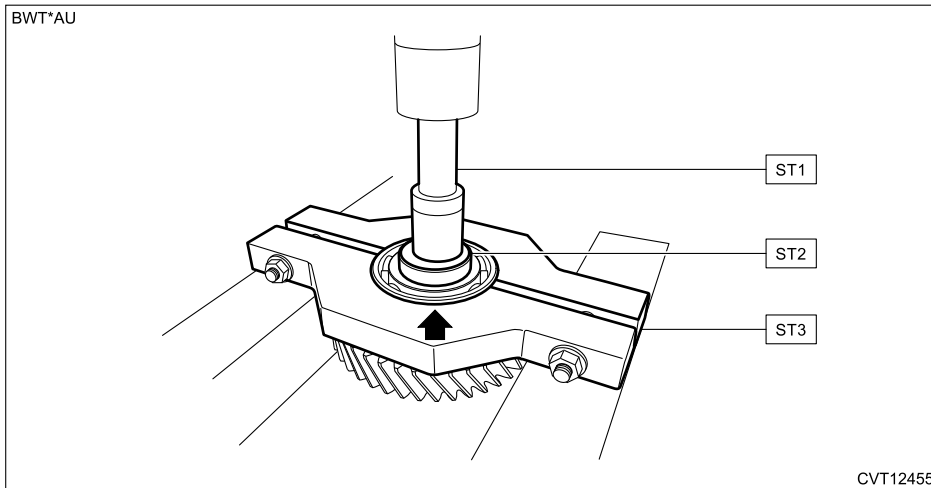
**Be careful not to drop the transfer reduction driven gear.**

**Preparation tool:**

ST1: REMOVER (899864100)

ST2: SEAT (398497701)

### ST3: REMOVER (498077600)



## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Transfer Reduction Driven Gear

### ASSEMBLY

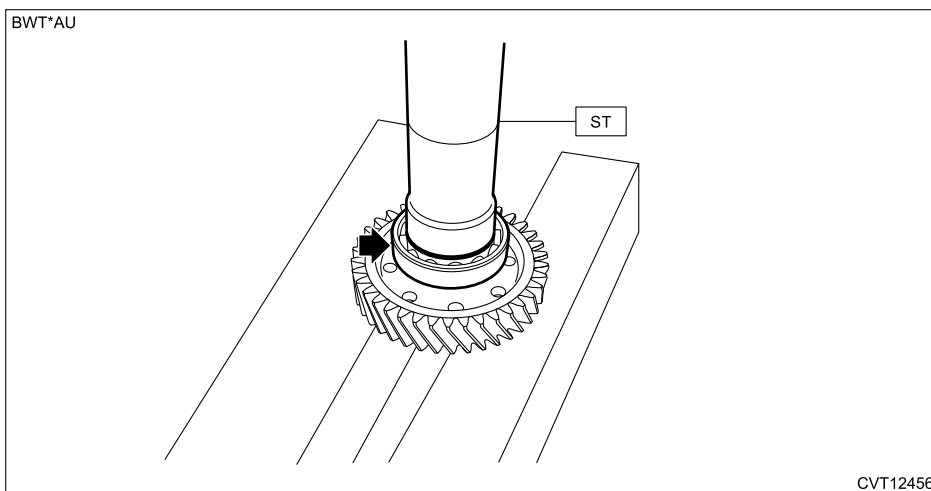
1. Press-fit a new ball bearing (intermediate case side) and a new ball bearing (extension case side) using the ST and a press.

#### Note:

- Apply CVTF to the press-fitting area.
- The axle where a spline is formed is the intermediate case side.

#### Preparation tool:

ST: BUSHING 1-2 INSTALLER (499277100)




## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Transfer Reduction Driven Gear

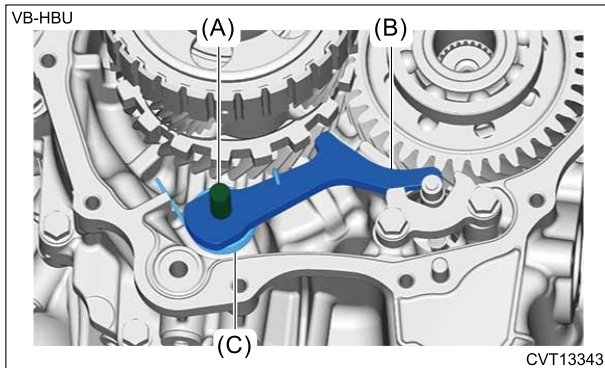
### INSPECTION

1. Check that there is no deformation, cracks or other damages.
2. Check the bearing for smooth rotation.
3. Check the bearing for looseness.

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Parking Pawl

### REMOVAL

1. Remove the extension case.  Ref. to [CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Extension Case>REMOVAL](#).
2. Remove the shaft (A), parking pawl (B) and return spring (C).



## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Parking Pawl

### INSTALLATION

1. Operate the shifter arm to set to the "N range" position.

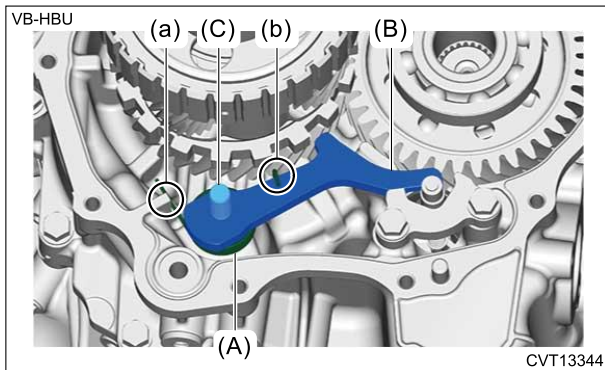
**Note:**

Align the holes of the shifter arm and inhibitor switch.

2. Install the return spring (A), parking pawl (B) and shaft (C).

**Note:**

- Make sure that the end (a) of return spring contacts the rib.
- Make sure that the end (b) of return spring is sticking out of the parking pawl.



3. Install the extension case.  Ref. to [CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Extension Case>INSTALLATION](#).

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Parking Pawl


### INSPECTION

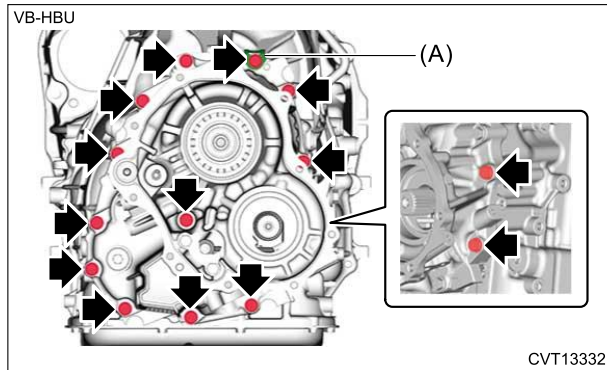
1. Check that there is no deformation, cracks or other damages.
2. Inspect the return springs for fatigue.

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Intermediate Case

### REMOVAL



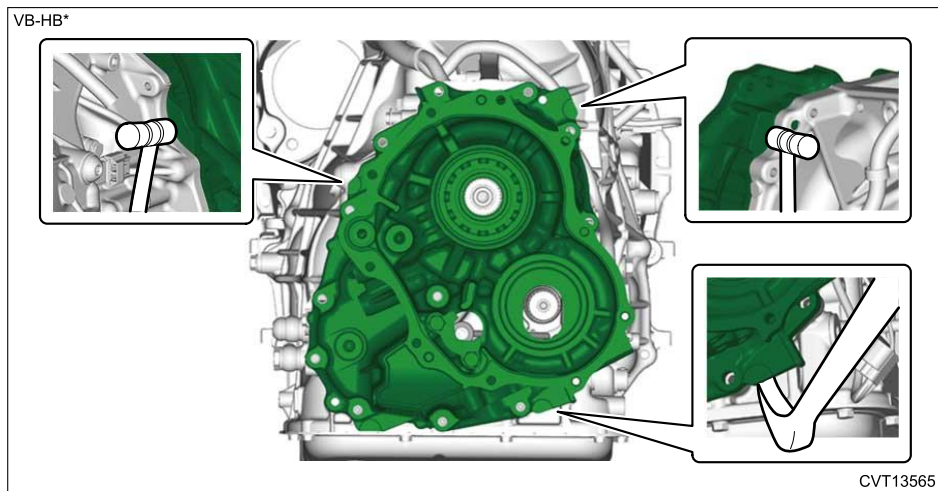
1. Remove the transfer reduction driven gear.  Ref. to [CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Transfer Reduction Driven Gear>REMOVAL](#).
2. Remove the bolt which secures the transmission hanger (A) and intermediate case.



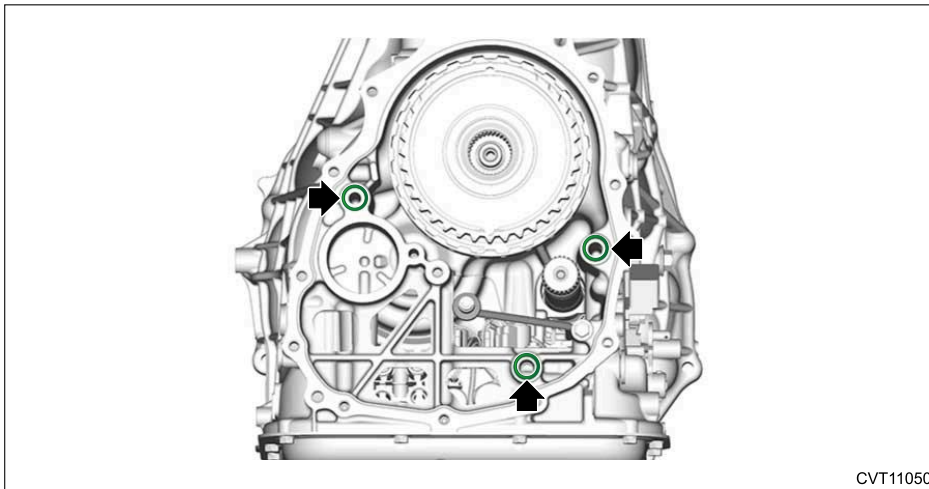
3. Using a plastic hammer and a crowbar wrapped with protection tape or similar, expand the clearance and remove the intermediate case.

**Caution:**

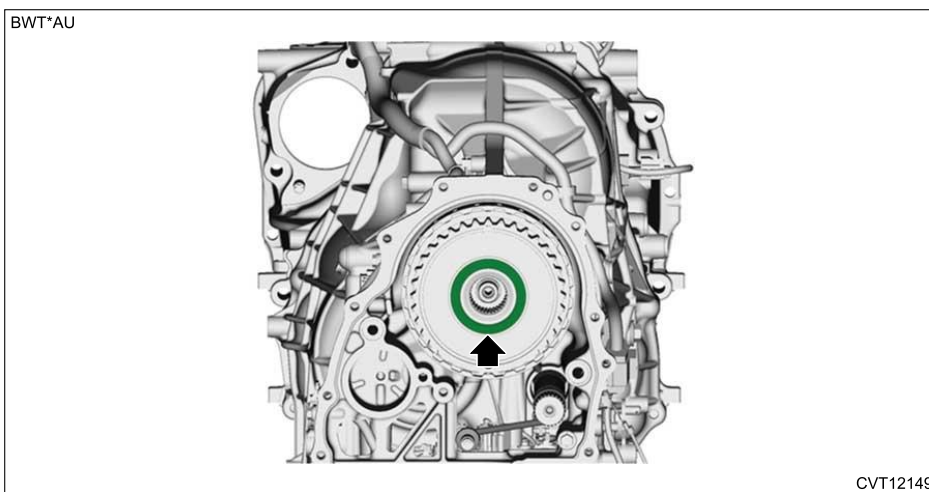
**Be careful not to damage the CVTF filter.**



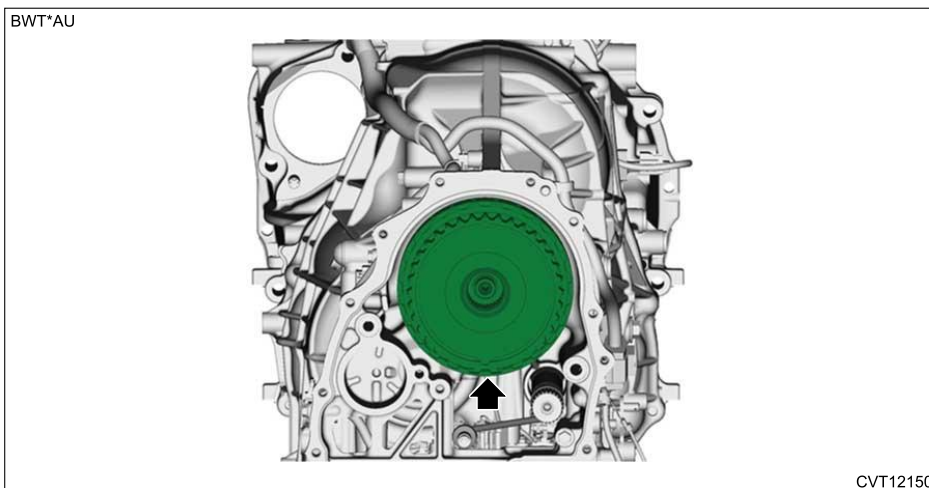
4. Remove the O-rings.



5. Remove the thrust bearing.



6. Remove the planetary gear and forward clutch drum as a single unit.

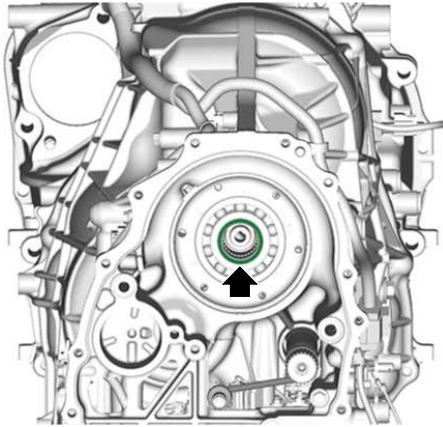


7. Remove the washer.

**Note:**

The washer may remain on the forward clutch drum.

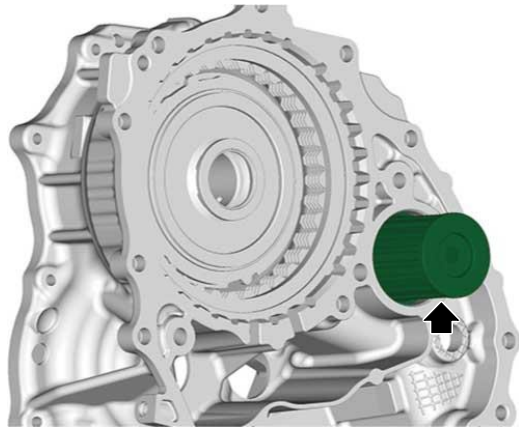
BWT\*AU



CVT12151

8. Remove the CVTF filter from the intermediate case.

BWT\*AU



CVT12132

9. Remove the liquid gasket from the intermediate case and transmission case.

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Intermediate Case

## INSTALLATION

1. Check the projection (A) of the knock pins.

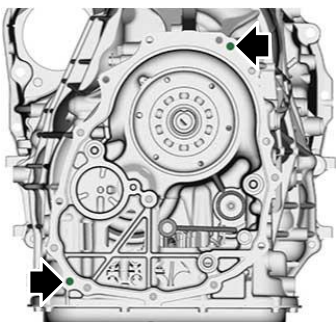
**Note:**

**When attached on the intermediate case side, install on the transmission case side.**

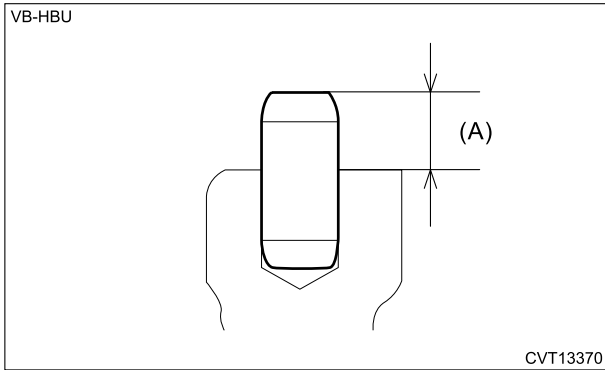
**Specification:**

8.5 – 9.5 mm (0.33 – 0.37 in)

VB-HBU



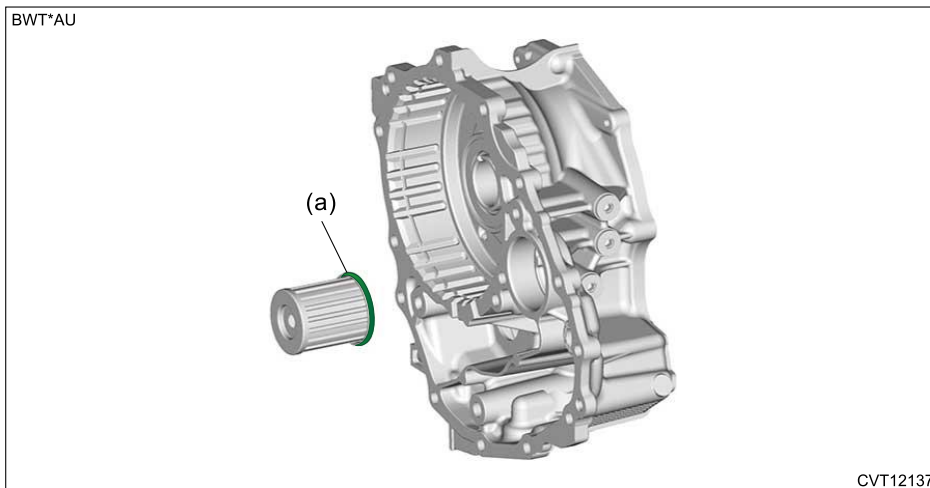
CVT13333



2. Install the CVTF filter to the intermediate case.

**Note:**

- When reusing the CVTF filter, check the filter for clogging.
- Face the O-ring (a) to the intermediate case side.
- Apply CVTF to the O-ring (a).

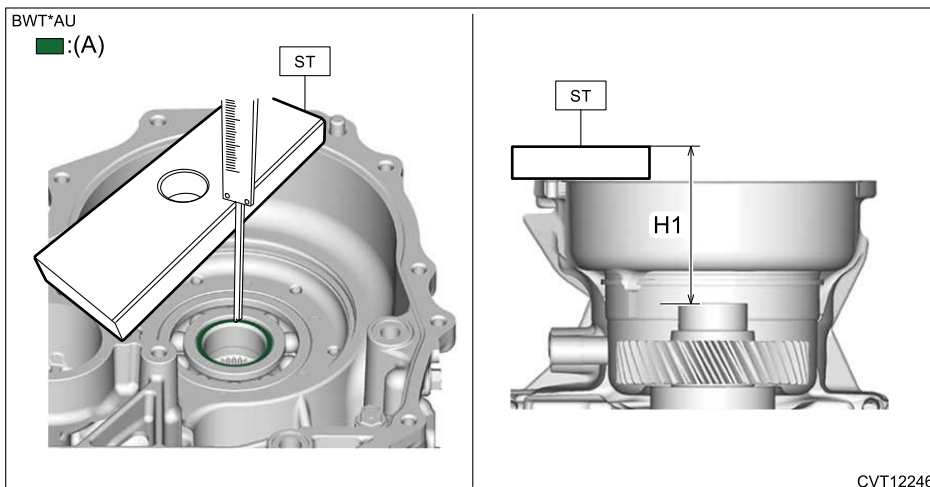


3. Select the washer for the forward clutch drum.

(1) Using the ST, measure the height "H1" from the ST end face to the reduction driven gear washer catch surface.

**Preparation tool:**

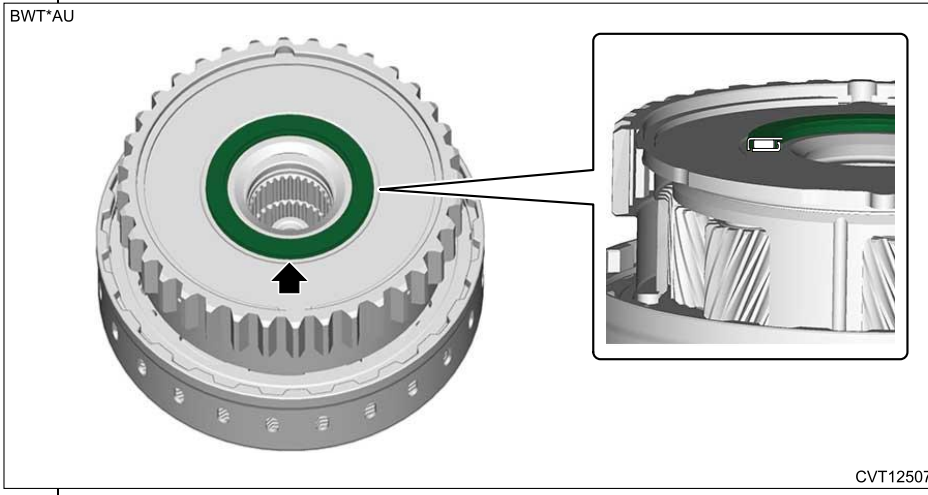
ST: GAUGE (499575600)



(A) Measurement surface

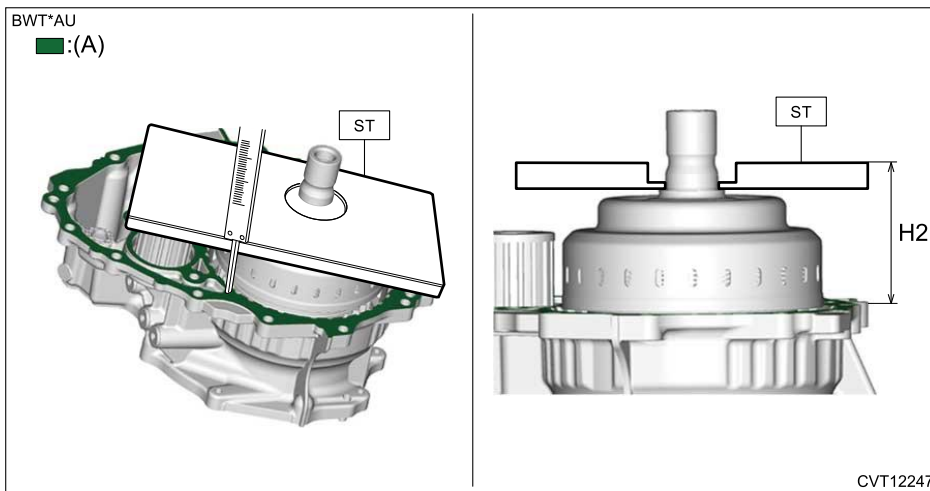
(2) Install the thrust bearing to the planetary gear.

**Note:**  
**Make sure to install in the right direction.**



- (3) Install the planetary gear and forward clutch drum as a single unit to the intermediate case.  
 (4) Using the ST, measure the height "H2" from the ST end face to the intermediate case mating surface.

**Preparation tool:**  
 ST: GAUGE (499575600)



(A) Measurement surface

- (5) Using the following calculation, select an appropriate washer thickness "T".

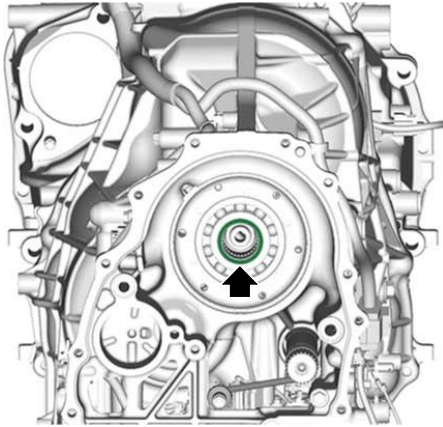
**Note:**  
**Adjust using 1 piece.**

$$T = (H1 - 15 \text{ mm (0.6 in)}) - (H2 - 15 \text{ mm (0.6 in)}) - 0.75 - 0.95 \text{ mm (0.030 - 0.037 in)}$$

T	Washer thickness mm (in)
H1	Measured value (mm (in)) of step (1)
H2	Measured value (mm (in)) of step (4)
15 mm (0.6 in)	Thickness of ST (GAUGE)
0.75 - 0.95 mm (0.030 - 0.037 in)	Clearance specification

- 4.** Install the washer.

BWT\*AU

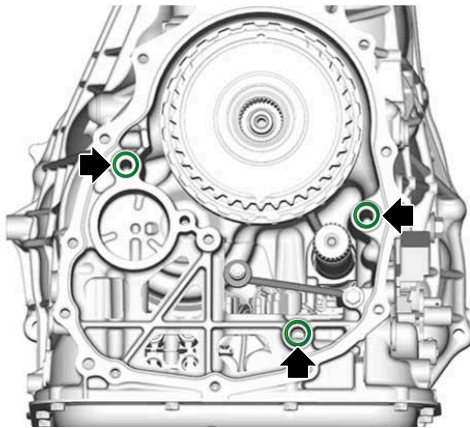


CVT12151

5. Install a new O-ring.

**Note:**

**Apply CVTF to the O-rings.**



CVT11050

6. Apply liquid gasket to the mating surface of the transmission case as shown in the figure.

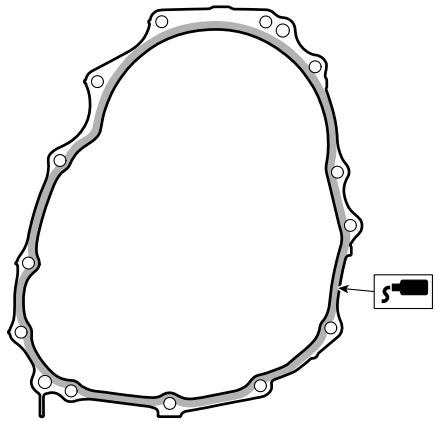
**Note:**

- **Before applying liquid gasket, degrease the liquid gasket seal surfaces of the intermediate case and transmission case.**
- **Install within 5 min. after applying liquid gasket.**

**Preparation items:**

Liquid gasket: THREE BOND 1216J or equivalent

BWT\*AU



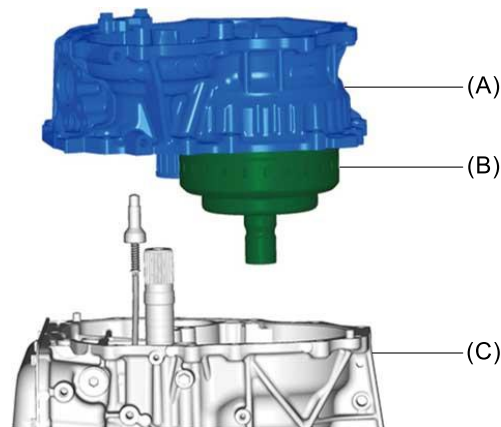
CVT12637

7. Install the intermediate case (A) and the forward clutch (B) as a single unit to the transmission case (C).

**Caution:**

**Do not press-in forcibly because there is a possibility of offset on the reverse brake.**

BWT\*AU



CVT12136

8. Install the transmission hanger (A), and install the bolts which hold the intermediate case.

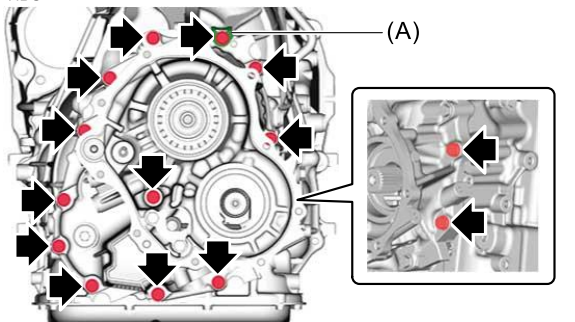
**Caution:**

**Install the bolts after confirming close contact of the intermediate case and transmission case.**

**Tightening torque:**

25 N·m (2.5 kgf·m, 18.4 ft-lb)

VB-HBU



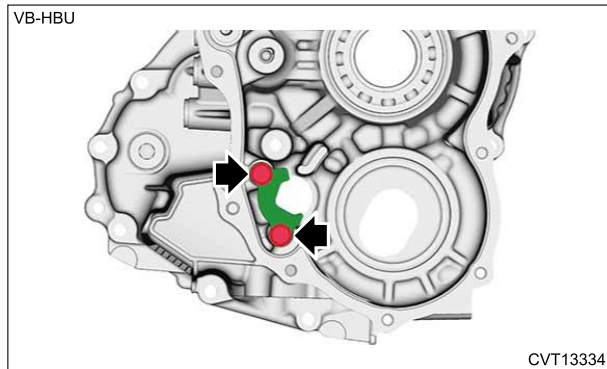
CVT13332

9. Install the transfer reduction driven gear.  [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Transfer Reduction Driven Gear>INSTALLATION.](#)

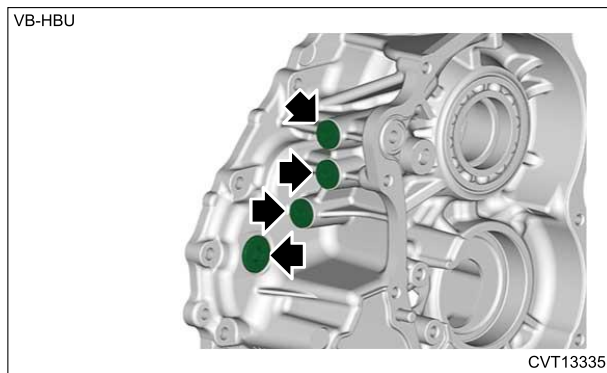
## DISASSEMBLY



1. Remove the parking support.



2. Remove all plugs.



3. Remove the reverse brake.  [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Reverse Brake>DISASSEMBLY.](#)

### CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Intermediate Case

## ASSEMBLY

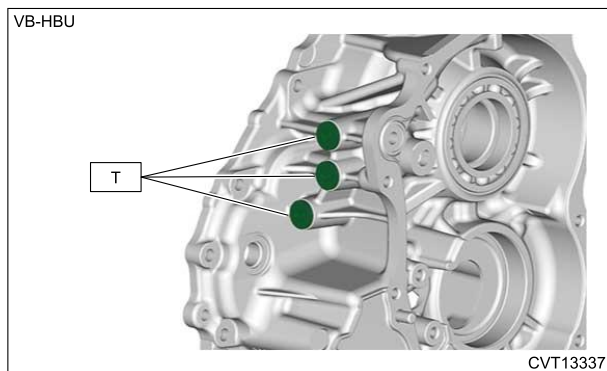
1. Install the reverse brake.  [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Reverse Brake>ASSEMBLY.](#)
2. Install the plugs with new O-rings.

**Note:**

**Apply CVTF to the O-rings.**

**Tightening torque:**

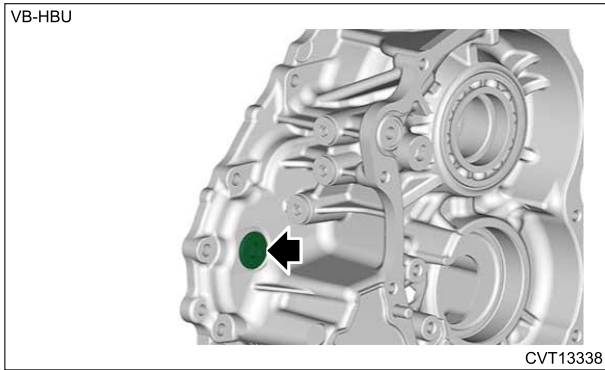
25 N·m (2.5 kgf-m, 18.4 ft-lb)



3. Temporarily install the filler plug.

**Note:**

**Replace the filler plug gasket with a new part after adjusting the level of CVTF.**



4. Install the parking support.

**Tightening torque:**

25 N·m (2.5 kgf-m, 18.4 ft-lb)

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Intermediate Case

**INSPECTION**

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Check that there is no deformation, cracks or other damages.

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > CVTF Filter


### SPECIFICATION

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For the CVTF filter, refer to "Intermediate Case".  [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Intermediate Case.](#)


## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Reverse Brake

### REMOVAL

For removal procedures of reverse brake, refer to "Intermediate Case".  [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Intermediate Case>REMOVAL.](#)

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Reverse Brake

### INSTALLATION

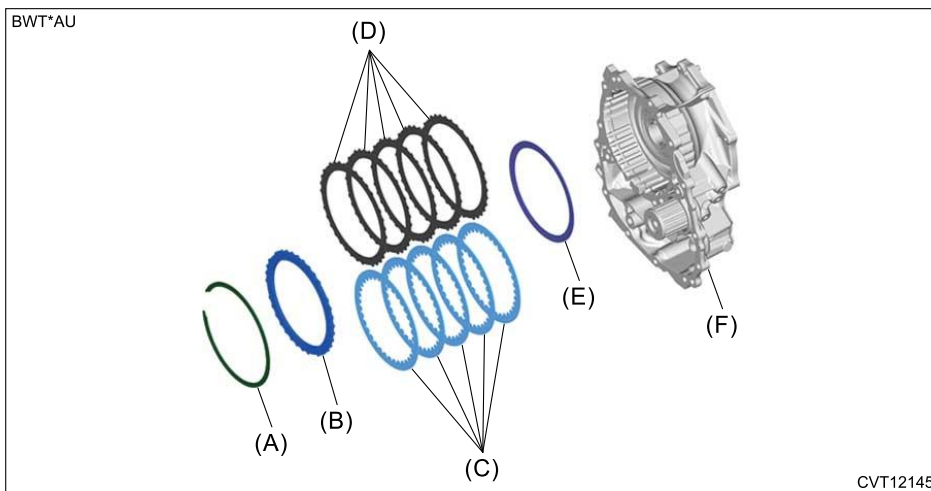
For installation procedures of reverse brake, refer to "Intermediate Case".  [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Intermediate Case>INSTALLATION.](#)

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Reverse Brake

### DISASSEMBLY



1. Remove the snap ring, and then remove the retaining plate, drive plate, driven plate and dish plate.

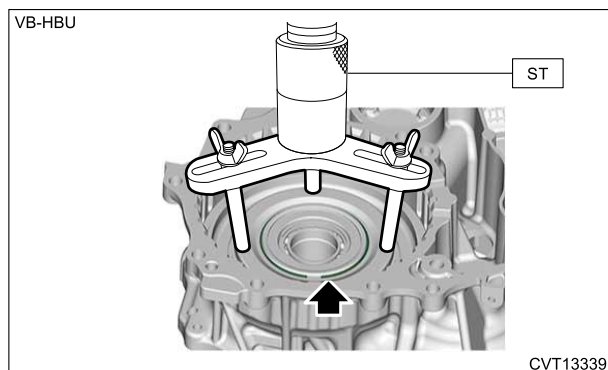


- |                     |                  |                       |
|---------------------|------------------|-----------------------|
| (A) Snap ring       | (C) Drive plate  | (E) Dish plate        |
| (B) Retaining plate | (D) Driven plate | (F) Intermediate case |

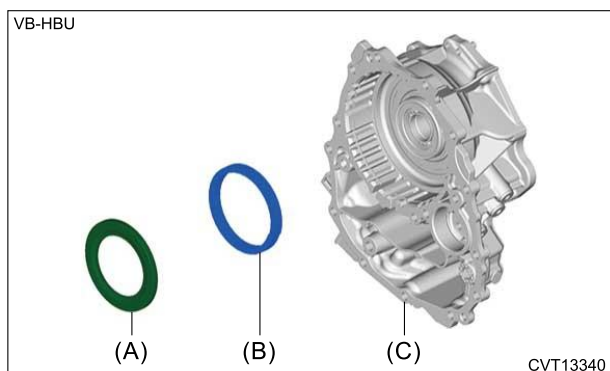
2. Compress the return spring using the ST and a press to remove the snap ring.

#### Preparation tool:

ST: COMPRESSOR SPECIAL TOOL (18762AA001)



3. Remove the spring retainer and return spring.

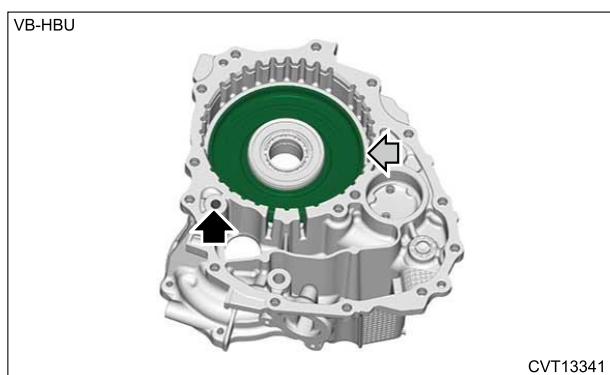


(A) Spring retainer

(B) Return spring

(C) Intermediate case

4. Blow compressed air through the hole shown in the figure, and remove the reverse brake piston.



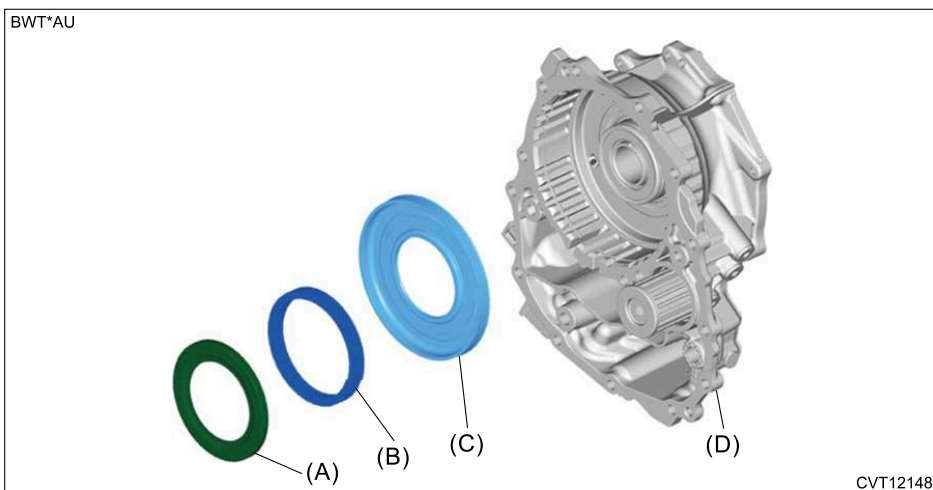
## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Reverse Brake

### ASSEMBLY

1. Install the reverse brake piston, return spring and spring retainer.

**Note:**

Apply CVTF to the sealing area of reverse brake piston.



(A) Spring retainer

(C) Reverse brake piston

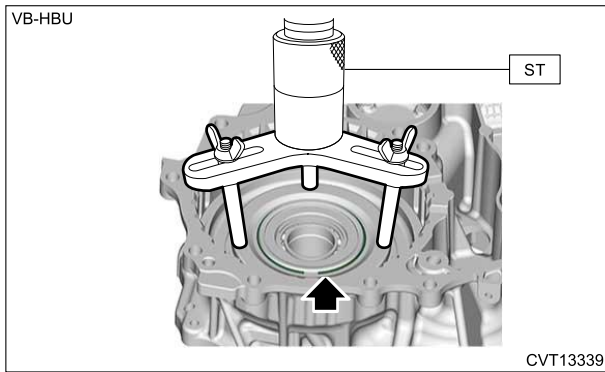
(D) Intermediate case

(B) Return spring

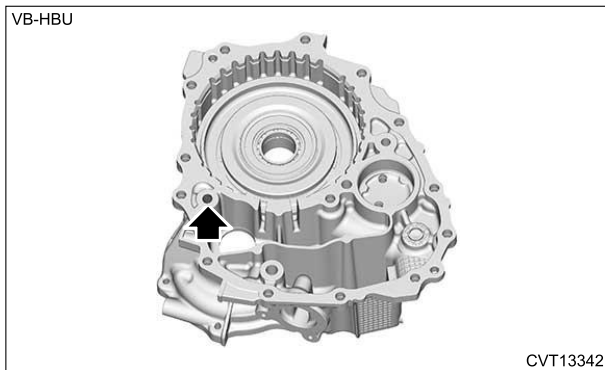
2. Compress the return spring using the ST and a press to install the snap ring.

**Preparation tool:**

ST: COMPRESSOR SPECIAL TOOL (18762AA001)



3. Blow compressed air through the hole shown in the figure, and check the reverse brake piston operation.



4. Check the clutch clearance.

(1) Place the following parts onto the surface plate.

- Driven plate
- Drive plate
- Retaining plate

(2) Set the magnet stand and dial gauge (spindle type) on the surface plate.

(3) Apply the dial gauge (spindle type) to the retaining plate, and adjust the reading to the zero point.

(4) Place weights until the dial gauge (spindle type) needle stops moving.

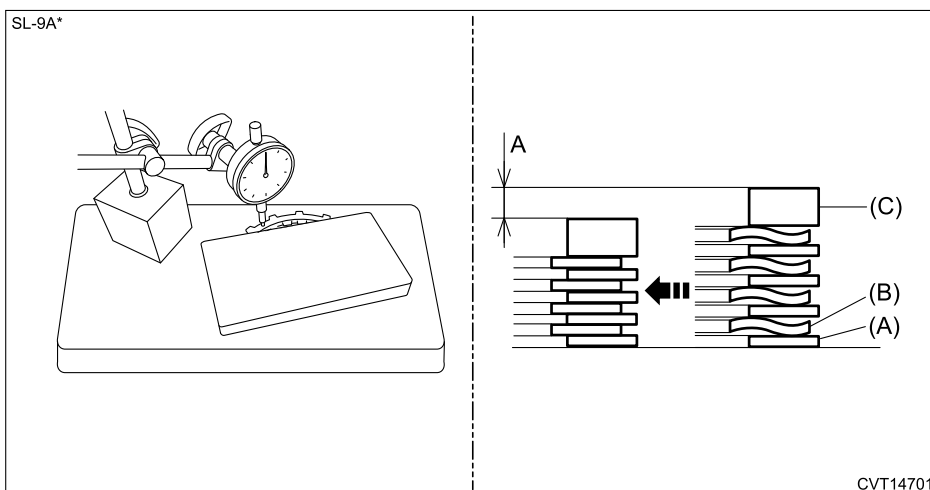
**Note:**

- Prepare a weight with the length of one side equal to or longer than the retaining plate diameter, and also flat shape that allows load to be applied evenly.
- In order to completely compress the drive plates, weight of at least 8.6 kg (18.96 lb) is required.

(5) Measure the compression amount "A".

**Note:**

Measure at four points at 90° intervals and calculate the average.



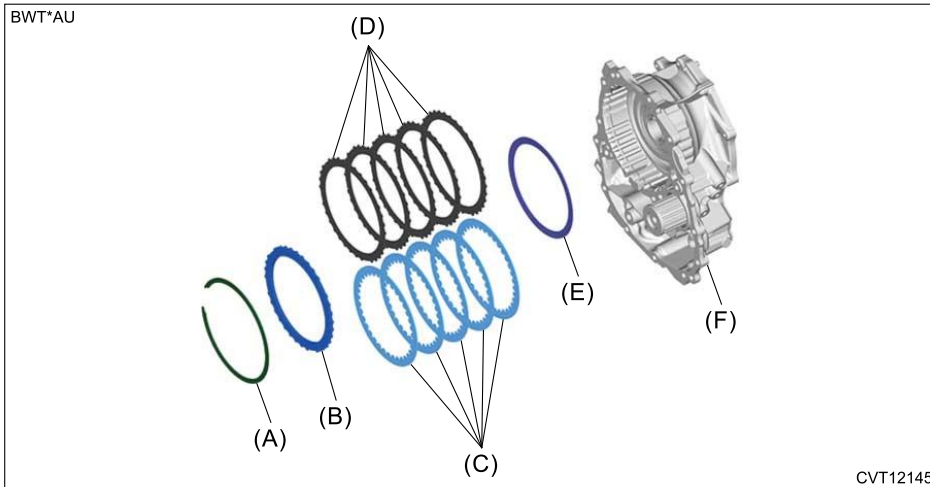
(A) Driven plate

(B) Drive plate

(C) Retaining plate

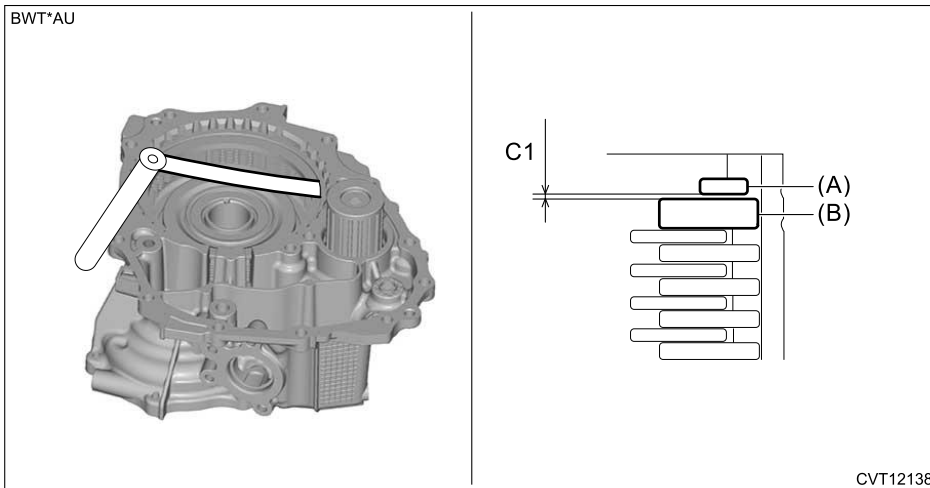
(6) Install the dish plate, drive plate, driven plate, retaining plate and snap ring.

**Note:**  
Face the stamped surface of dish plate toward the reverse brake piston side.



- (A) Snap ring
- (B) Retaining plate
- (C) Drive plate
- (D) Driven plate
- (E) Dish plate
- (F) Intermediate case

(7) Measure the clearance "C1" between snap ring and retaining plate using a thickness gauge.



- (A) Snap ring
- (B) Retaining plate

(8) Using the following calculation, calculate the clutch clearance "C".

**Service limit:**  
3.38 mm (0.133 in)

$$C = A + C1$$

C	Clutch clearance (mm (in))
A	Measured value (mm (in)) of step (3)
C1	Measured value (mm (in)) of step (5)

(9) If the value exceeds the limit, perform the following operations.


- a. Measure thickness of the retaining plate.
- b. Replace the drive plate and driven plate with new parts, and then perform measurement from step (1) again.

**Initial standard:**  
2.88 – 3.18 mm (0.113 – 0.125 in)

- c. If it exceeds the initial standard value, adjust the thickness of retaining plate to be within the initial standard value.


## INSPECTION

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1. Check that there is no deformation, cracks or other damages.
2. Inspect the drive plate facing for excessive wear.
3. Check the driven plate for discoloration (seizure).
4. Check the clutch clearance.  [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Reverse Brake>ASSEMBLY.](#)


## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Forward Clutch

### REMOVAL

For removal procedures of forward clutch, refer to "Intermediate Case".  [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Intermediate Case>REMOVAL.](#)

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Forward Clutch

### INSTALLATION

For installation procedures of forward clutch, refer to "Intermediate Case".  [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Intermediate Case>INSTALLATION.](#)

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Forward Clutch

### DISASSEMBLY

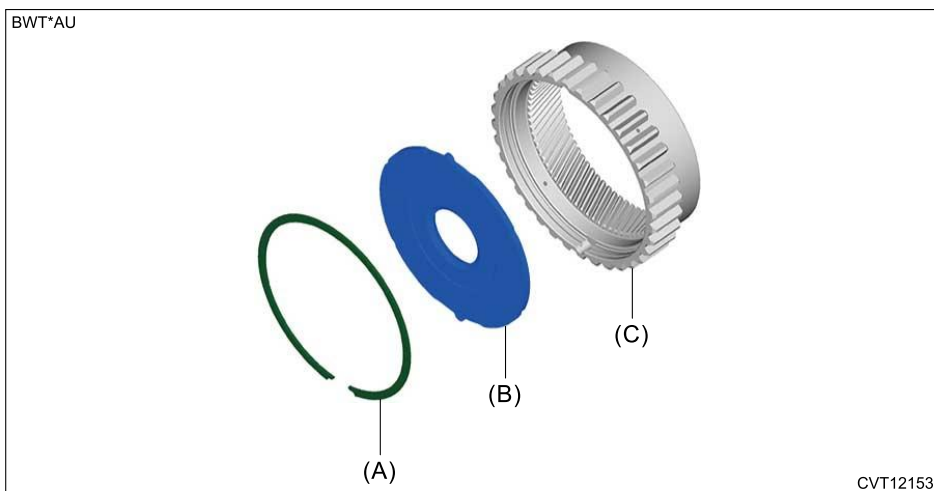


## 1. INTERNAL GEAR

1. Remove the internal gear.



2. Remove the snap ring and thrust gear plate.



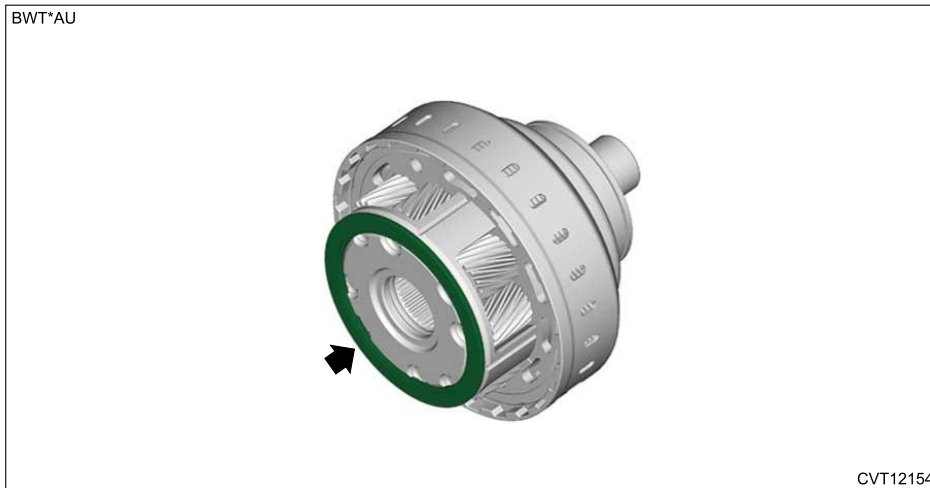
(A) Snap ring

(B) Thrust gear plate

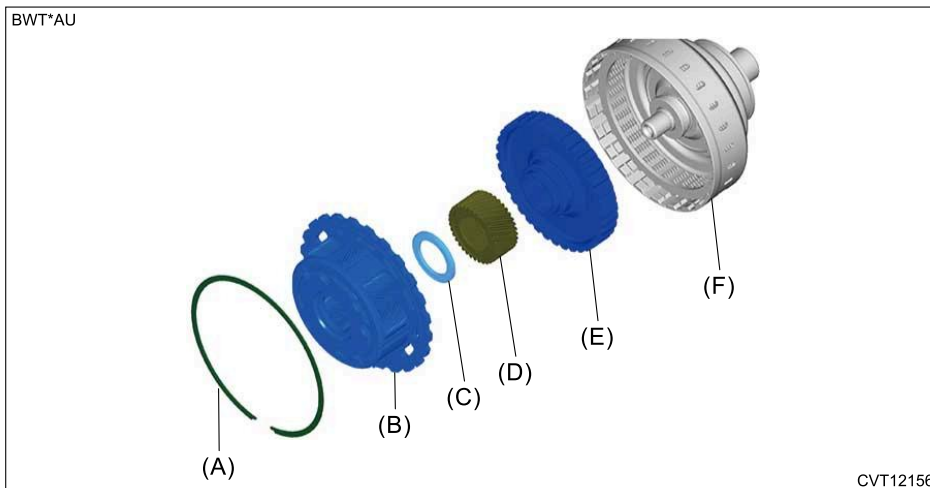
(C) Internal gear

## 2. PLANETARY CARRIER

1. Remove the thrust bearing.



2. Remove the snap ring, planetary carrier, thrust bearing, sun gear and forward clutch hub.



(A) Snap ring

(B) Planetary carrier

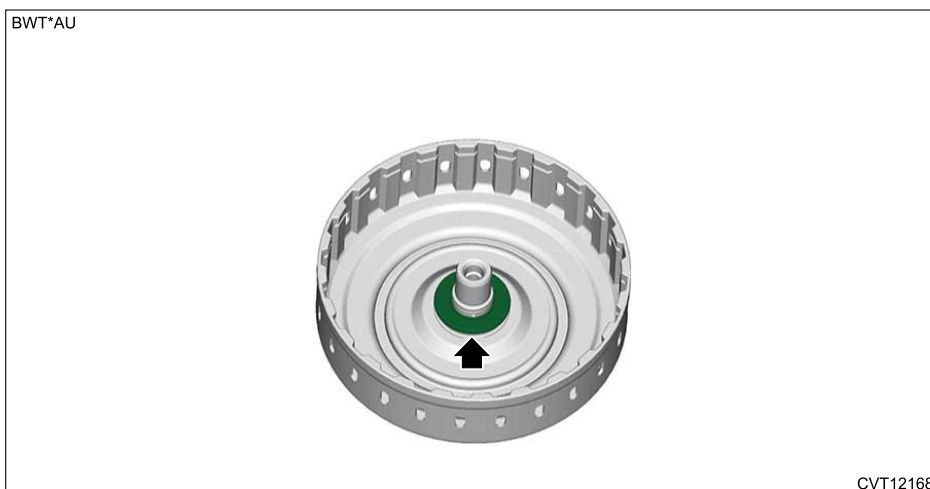
(C) Thrust bearing

(D) Sun gear

(E) Forward clutch hub

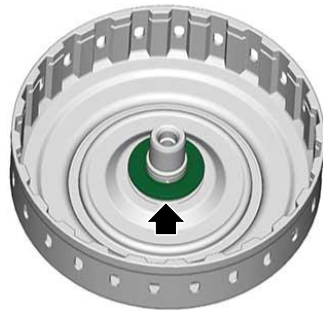
(F) Forward clutch drum

3. Remove the washer.



4. Remove the thrust bearing.

BWT\*AU



CVT12168

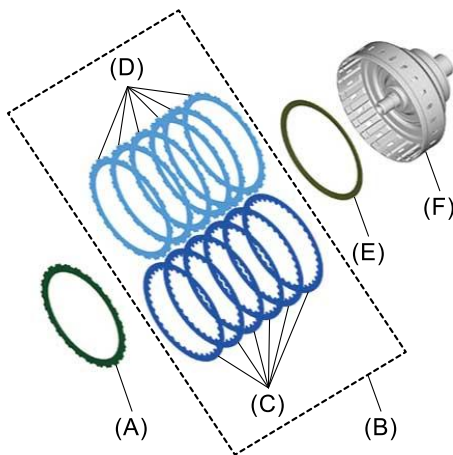
### 3. FORWARD CLUTCH

1. Remove the retaining plate, forward clutch plate set and dish plate.

**Note:**

In order to avoid installing the dish plate in the wrong direction, paint a mark before removal.

BWT\*AU



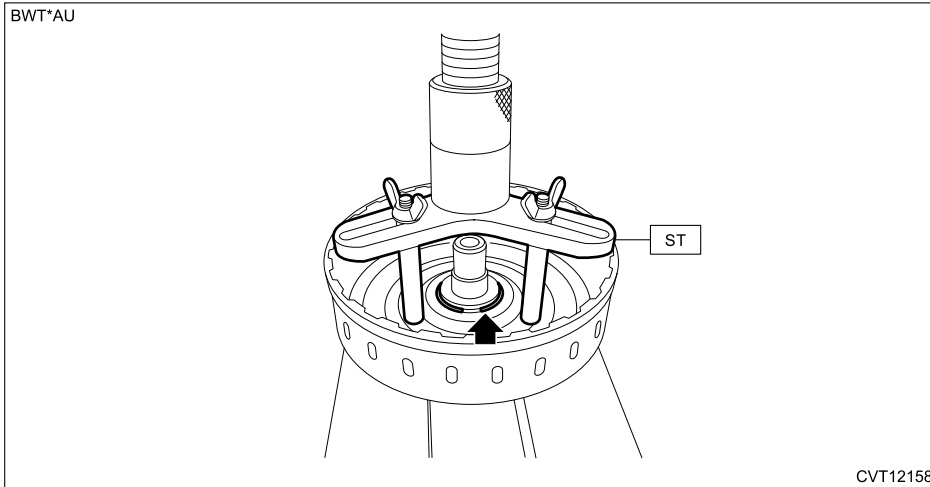
CVT12157

- |                          |                  |                         |
|--------------------------|------------------|-------------------------|
| (A) Retaining plate      | (C) Driven plate | (E) Dish plate          |
| (B) Forward clutch plate | (D) Drive plate  | (F) Forward clutch drum |

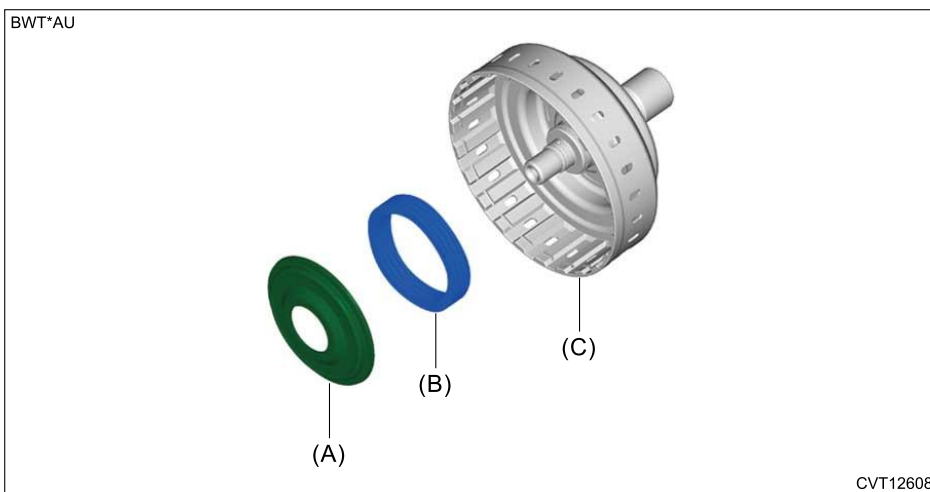
2. Compress the return spring using the ST and a press to remove the snap ring.

**Preparation tool:**

ST: COMPRESSOR SPECIAL TOOL (18762AA001)

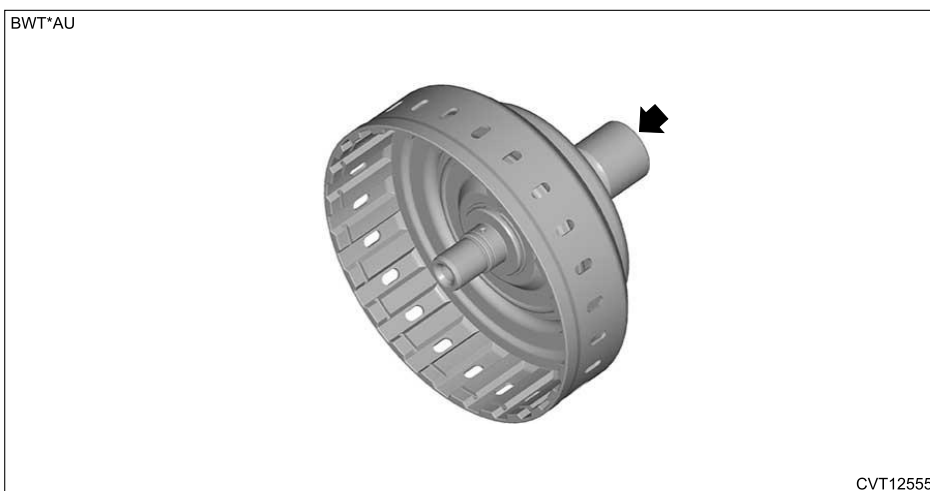


3. Remove the forward clutch piston retainer and return spring.



(A) Forward clutch piston retainer (B) Return spring (C) Forward clutch drum

4. Blow compressed air through the hole shown in the figure, and remove the forward clutch piston.



CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Forward Clutch

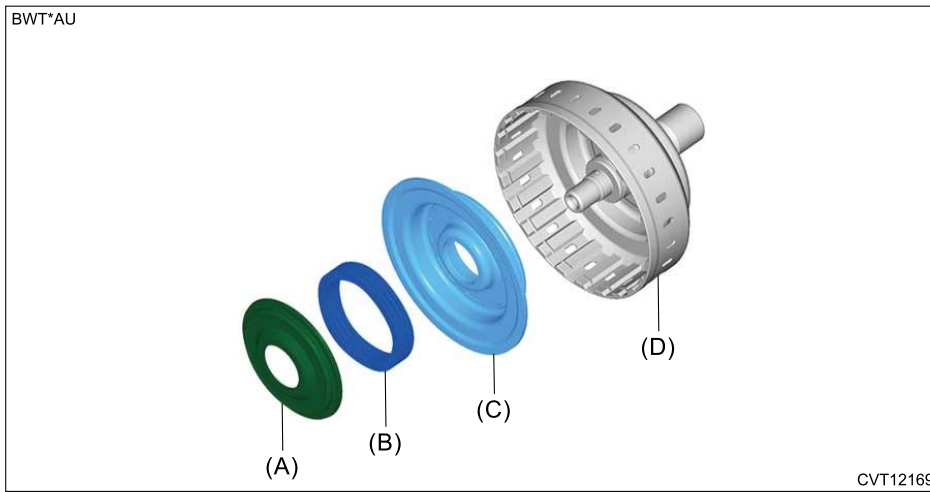
## ASSEMBLY

### 1. FORWARD CLUTCH

1. Install the forward clutch piston, return spring and forward clutch piston retainer.

**Note:**

Apply CVTF to the sealing area of forward clutch piston and the sealing area of forward clutch piston retainer.

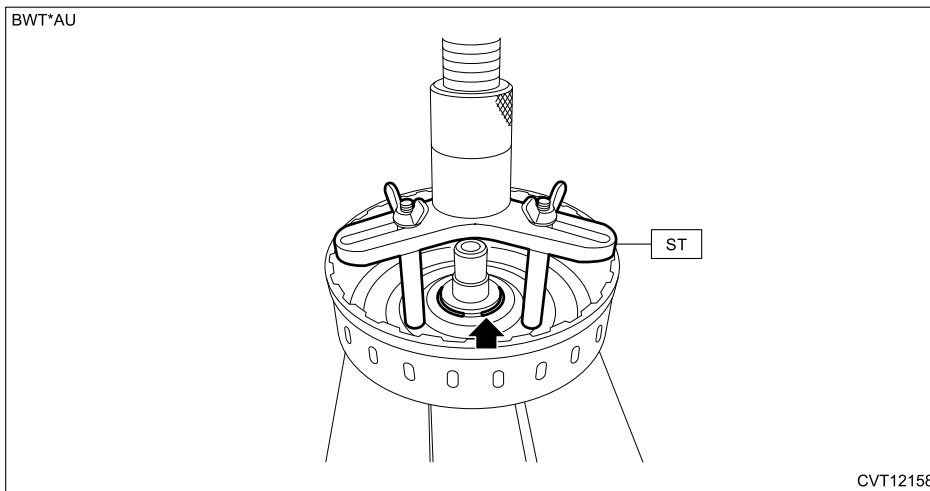


- (A) Forward clutch piston retainer (B) Return spring (C) Forward clutch piston (D) Forward clutch drum

2. Compress the return spring using the ST and a press to install the snap ring.

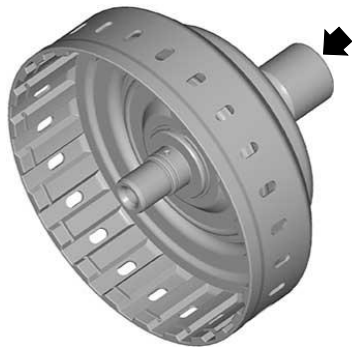
**Preparation tool:**

ST: COMPRESSOR SPECIAL TOOL (18762AA001)



3. Blow compressed air through the hole shown in the figure, and check the forward clutch piston operation.

BWT\*AU



CVT12555

4. Select a washer.  
(1) Install the snap ring.

BWT\*AU



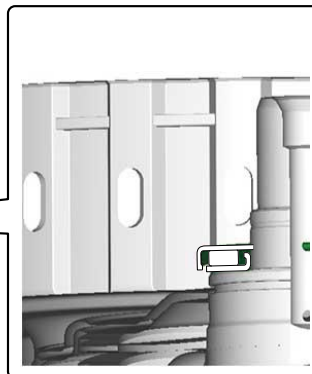
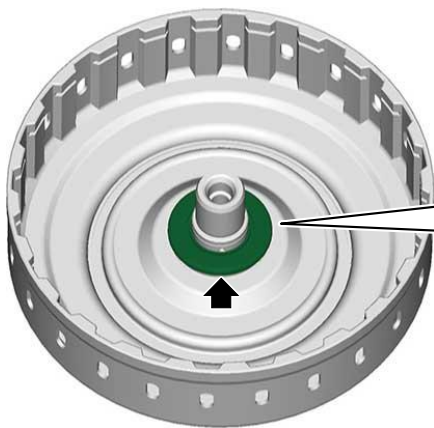
CVT12159

- (2) Install the thrust bearing.

**Note:**

**Make sure to install in the right direction.**

BWT\*AU



CVT12508

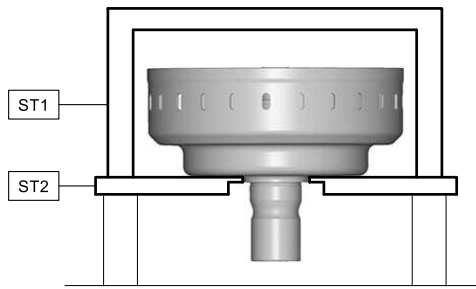
- (3) Place flat boards on the surface plate, and set the ST1, ST2 and forward clutch drum.

**Preparation tool:**

ST1: PULLER SET (499737100)

ST2: GAUGE (499575600)

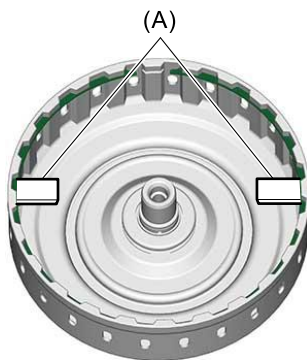
BWT\*AU



CVT12628

(4) Set the shim, etc. (A) between the snap ring and snap ring groove, and lift the snap ring.

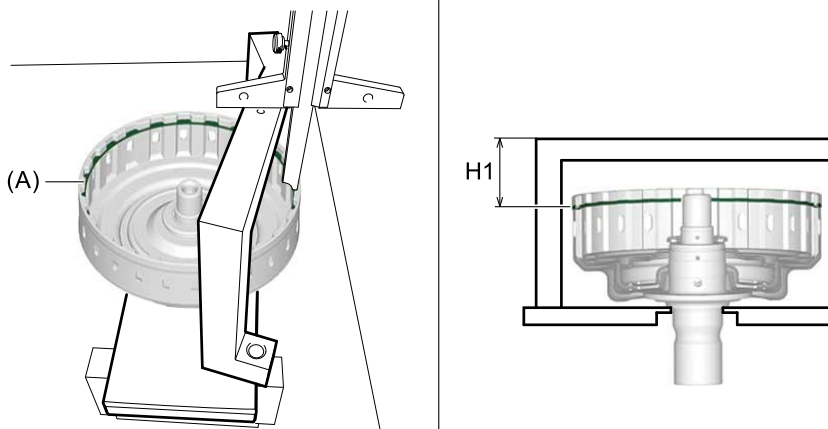
BWT\*AU



CVT12642

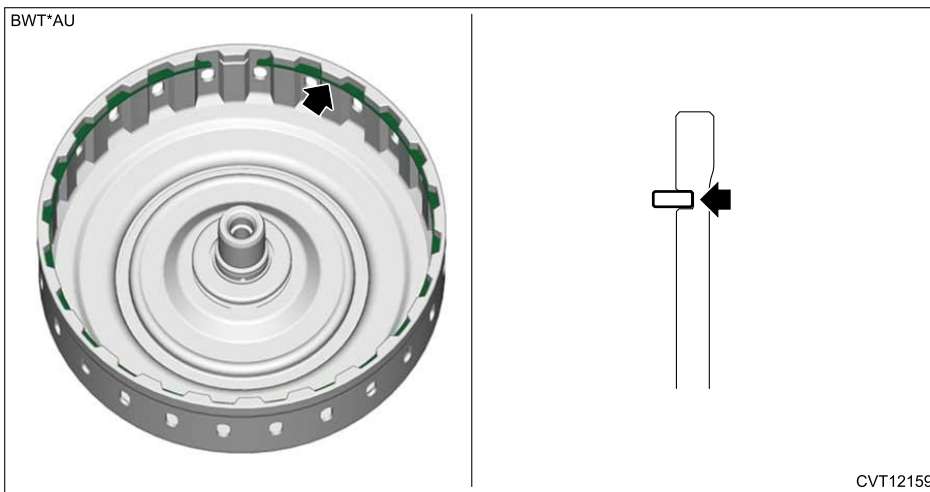
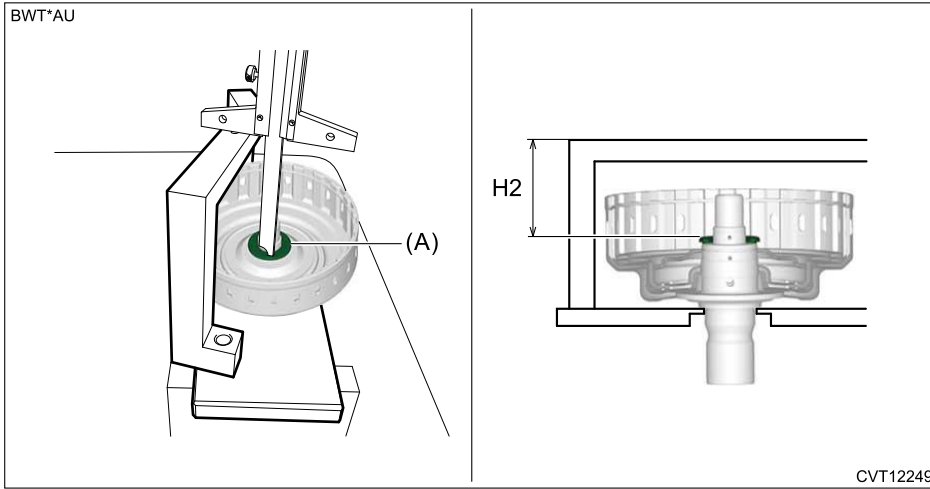
(5) Measure the height "H1" from the ST end face to the snap ring (A).

BWT\*AU

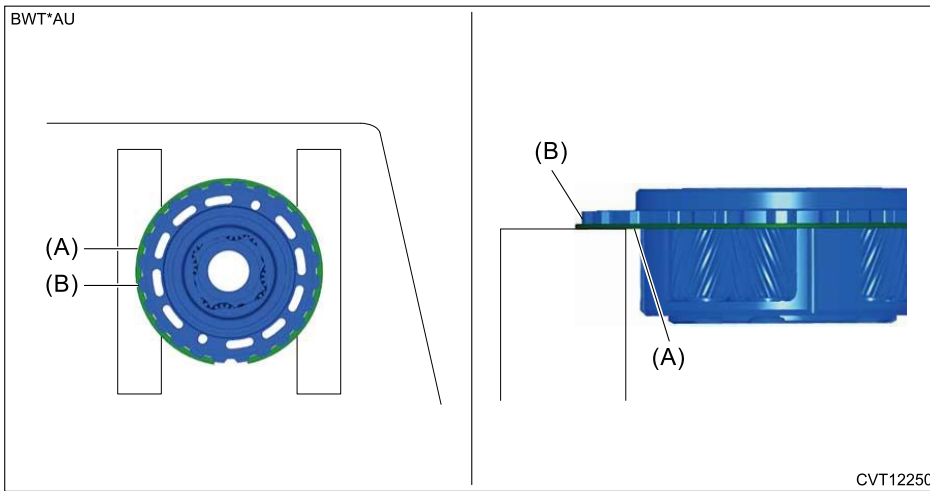


CVT12248

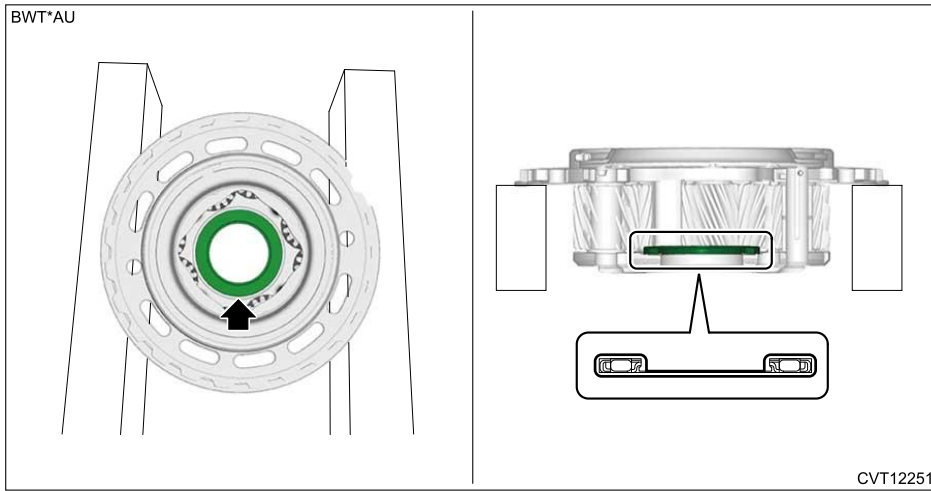
(6) Measure the height "H2" from the ST end face to the thrust bearing (A).



**Note:**  
Place them so that the most outer finished surface of planetary carrier overlaps the snap ring.



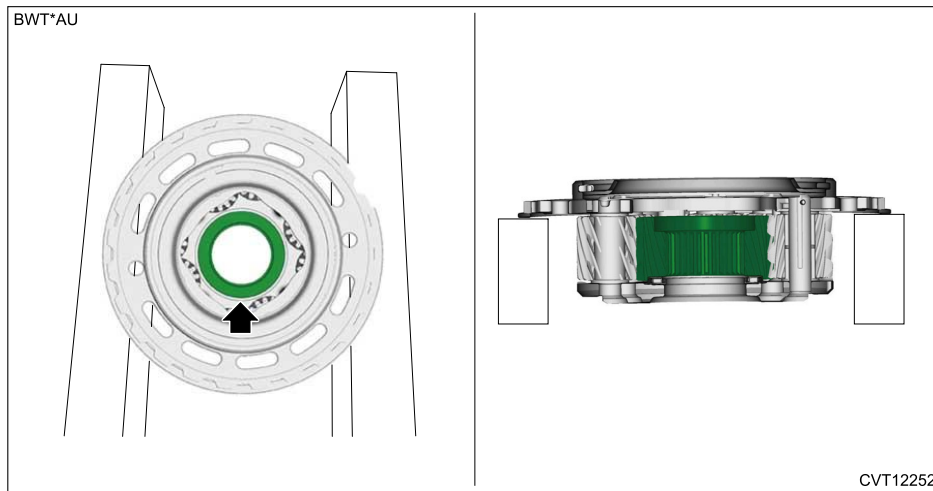
**Note:**  
Make sure to install in the right direction.



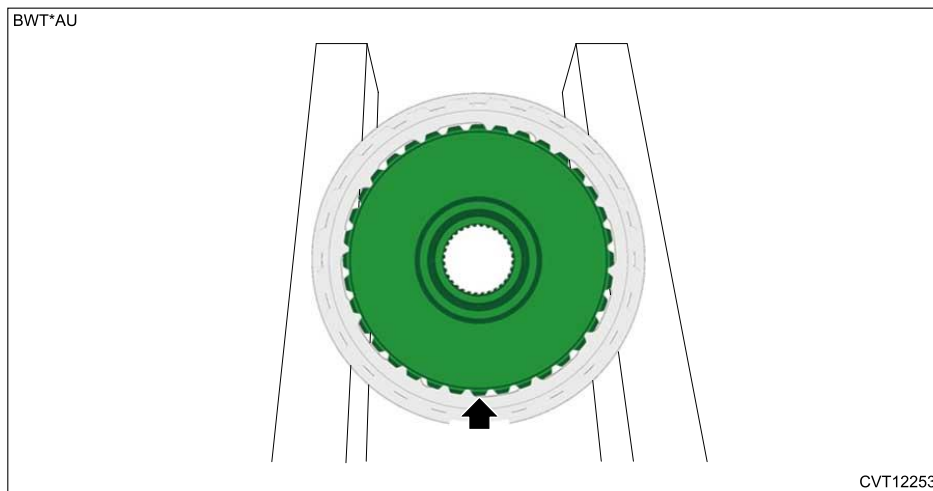
(10) Install the sun gear.

**Note:**

**Make sure to install in the right direction.**



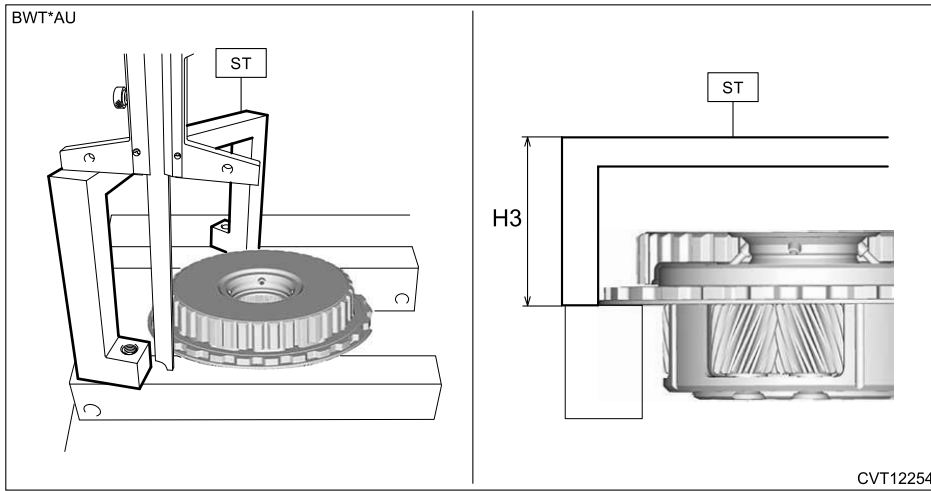
(11) Install the forward clutch hub.



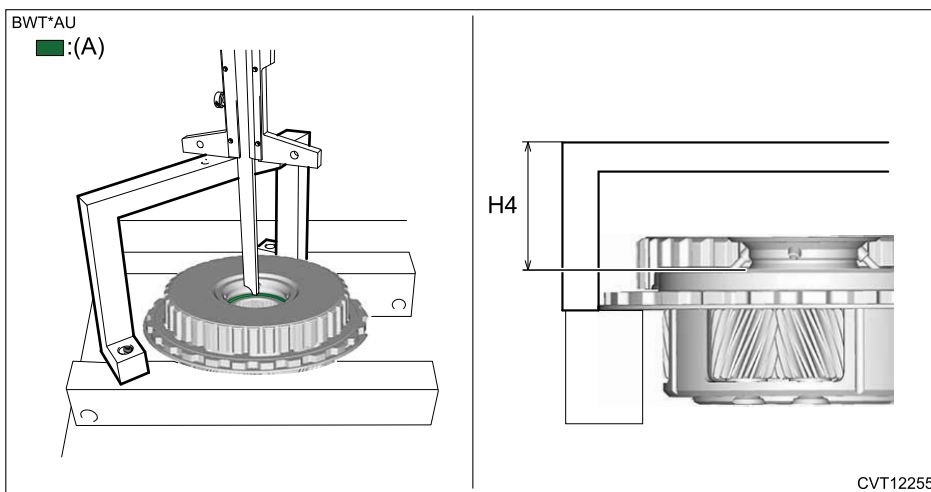
(12) Set the ST on the flat boards, measure the height "H3" from the ST end face to the flat boards.

**Preparation tool:**

ST: PULLER SET (499737100)



(13) Measure the height "H4" from the ST end face to the washer catch surface of the forward clutch hub.



(A) Measurement surface

(14) Using the following calculation, calculate an appropriate washer thickness "T".

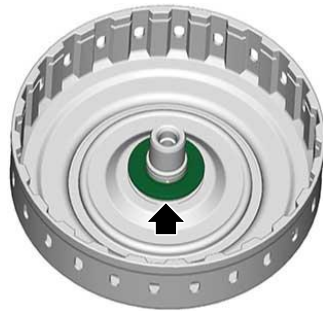
**Note:**  
Adjust using 1 piece.

$$T = (H2 - H1) - (H3 - H4) - 0 - 0.20 \text{ (} 0 - 0.008 \text{ in)}$$

T	Washer thickness mm (in)
H1	Measured value (mm (in)) of step (5)
H2	Measured value (mm (in)) of step (6)
H3	Measured value (mm (in)) of step (12)
H4	Measured value (mm (in)) of step (13)
0 - 0.20 mm (0 - 0.008 in)	Clearance specification

5. Install the washer.

BWT\*AU



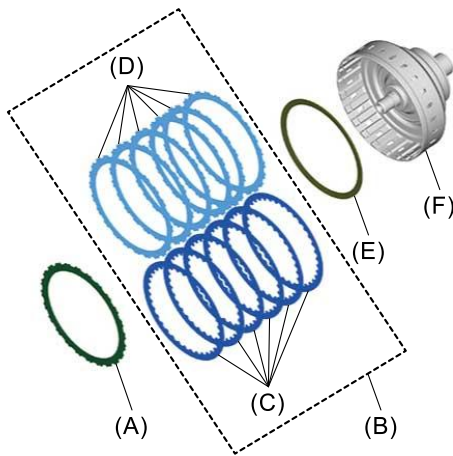
CVT12168

6. Install the dish plate, forward clutch plate set and retaining plate.

**Note:**

Face the painted surface of dish plate toward the forward clutch plate set side.

BWT\*AU



CVT12157

- |                          |                  |                         |
|--------------------------|------------------|-------------------------|
| (A) Retaining plate      | (C) Driven plate | (E) Dish plate          |
| (B) Forward clutch plate | (D) Drive plate  | (F) Forward clutch drum |

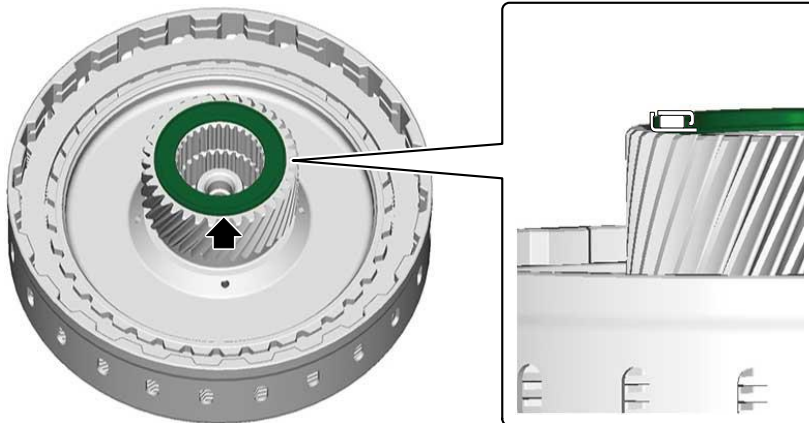
## 2. PLANETARY CARRIER

1. Install the forward clutch hub, sun gear, thrust bearing, planetary carrier and snap ring.

**Note:**

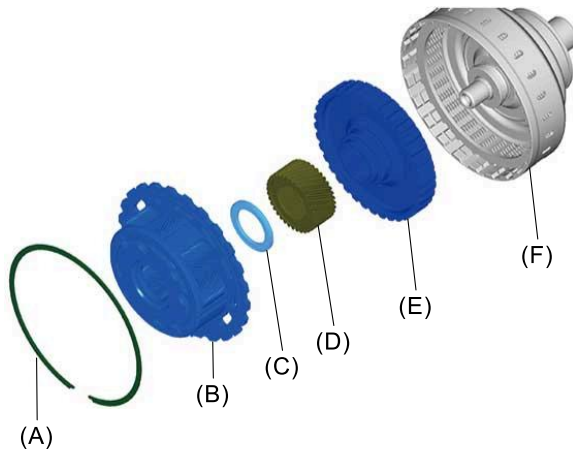
**Make sure to install the thrust bearing in the right direction.**

BWT\*AU



CVT12509

BWT\*AU



CVT12156

- |                       |                    |                         |
|-----------------------|--------------------|-------------------------|
| (A) Snap ring         | (C) Thrust bearing | (E) Forward clutch hub  |
| (B) Planetary carrier | (D) Sun gear       | (F) Forward clutch drum |

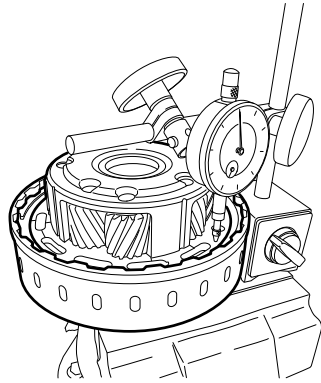
**2.** Measure the clearance between planetary carrier and retaining plate.

(1) Hold the forward clutch drum on a vise, and set the magnet stand and dial gauge (spindle type).

**Caution:**

**In order to prevent damage of forward clutch drum, insert aluminum plates or wooden pieces between the contacting surfaces of the vise and the forward clutch drum.**

BWT\*AU



CVT12457

(2) Lift the planetary carrier and measure the clearance "Q" between planetary carrier and retaining plate.

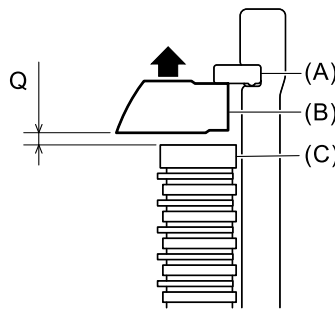
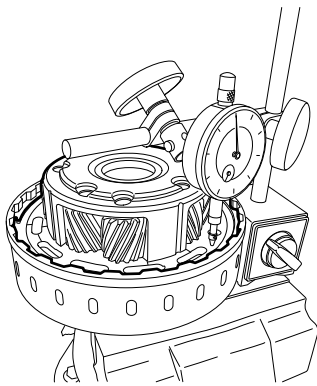
**Note:**

**Measure at four points at 90° intervals and calculate the average.**

**Service limit:**

2.4 mm (0.09 in)

BWT\*AU



CVT12155

(A) Snap ring

(B) Planetary carrier

(C) Retaining plate

(3) If the value exceeds the limit, perform the following procedures.

a. Measure thickness of the retaining plate.

b. Replace the forward clutch plate set with a new part, and then perform measurement from step (1) again.

**Initial standard:**

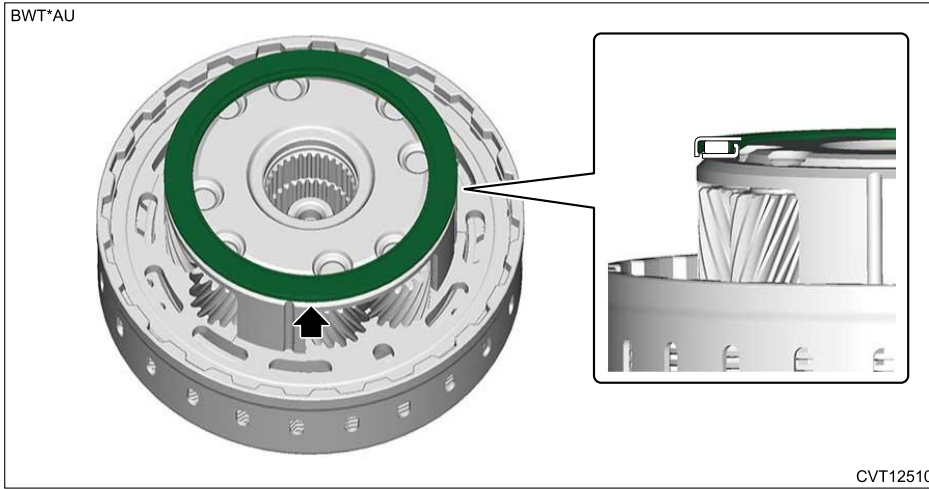
1.2 – 1.6 mm (0.05 – 0.06 in)

c. If it exceeds the initial standard value, adjust the thickness of retaining plate to be within the initial standard value.

**3.** Install the thrust bearing.

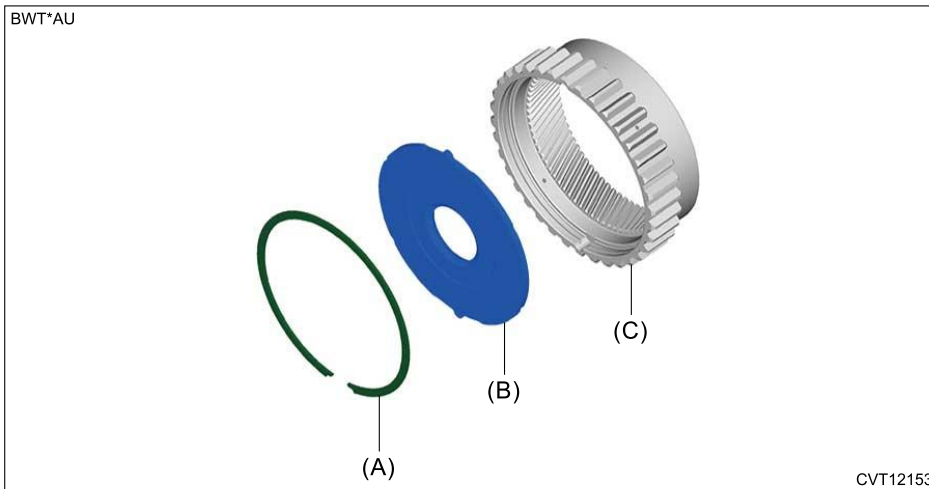
**Note:**

**Make sure to install in the right direction.**



### 3. INTERNAL GEAR

1. Install the snap ring and thrust gear plate.



(A) Snap ring

(B) Thrust gear plate


(C) Internal gear

2. Install the internal gear.



CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Forward Clutch

**INSPECTION**

- 1.** Check that there is no deformation, cracks or other damages.
- 2.** Check the bearing for smooth rotation.
- 3.** Check the bearing for looseness.
- 4.** Inspect the drive plate facing for excessive wear.
- 5.** Check the driven plate for discoloration (seizure).
- 6.** Check clearance between the snap ring and pressure plate.  [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Forward Clutch>ASSEMBLY > PLANETARY CARRIER.](#)

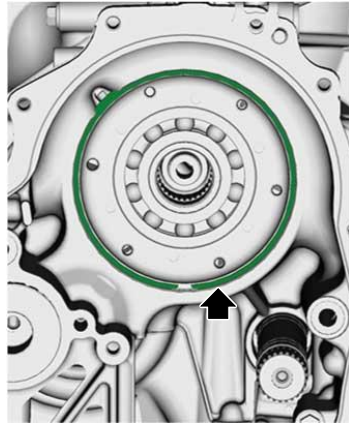
## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Reduction Driven Gear

### REMOVAL



1. Remove the intermediate case.  Ref. to [CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Intermediate Case>REMOVAL.](#)
2. Remove the snap ring.

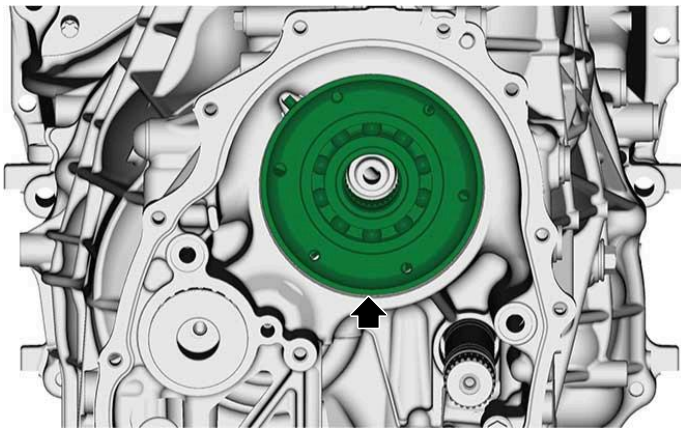
BWT\*AU



CVT12458

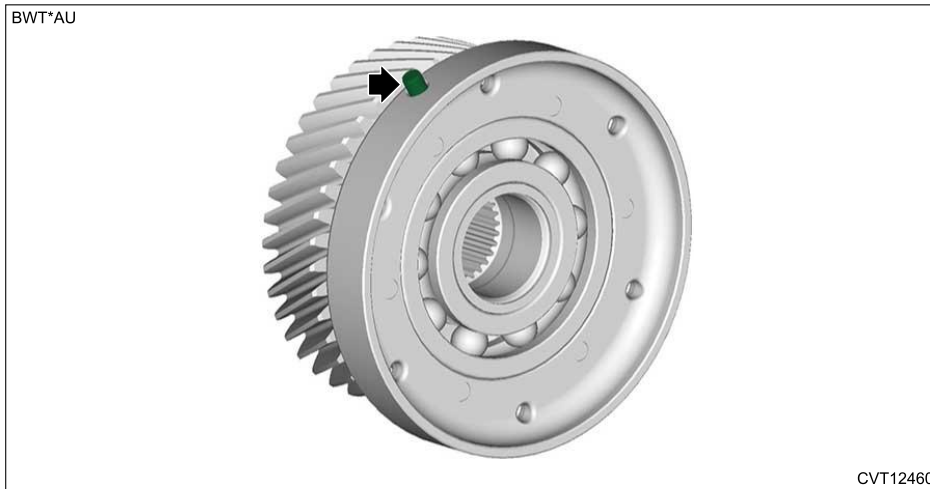
3. Remove the reduction driven gear.

BWT\*AU



CVT12459

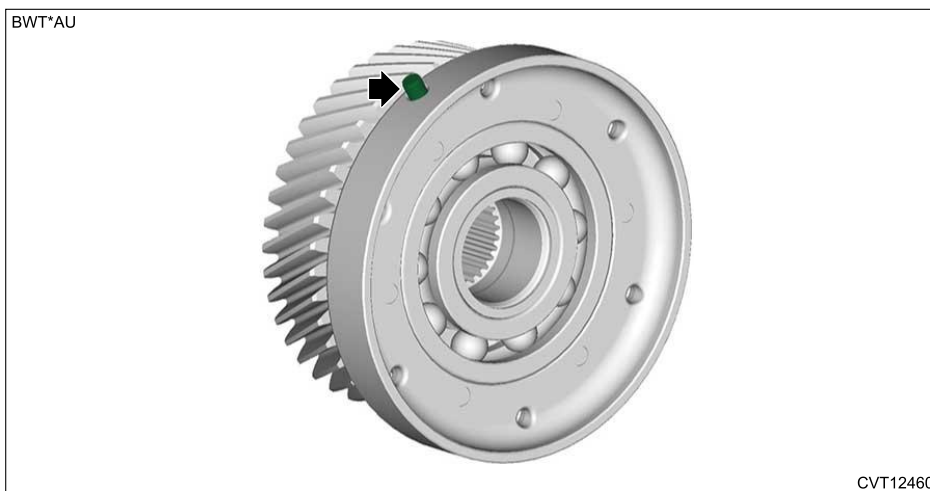
4. Remove the straight pin.



## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Reduction Driven Gear

### INSTALLATION

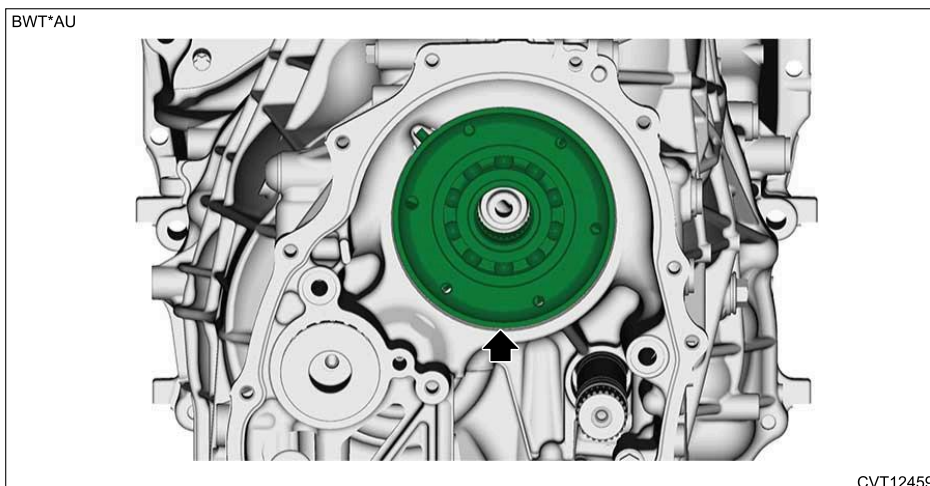
1. Install the straight pin.



2. Install the reduction driven gear.

**Note:**

**Align the straight pin position with the cutout of the transmission case.**

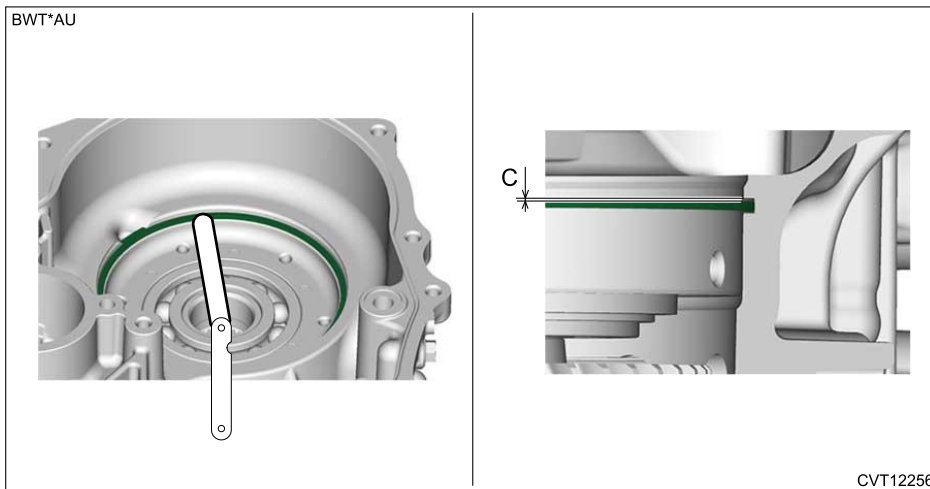



3. Install the snap ring.

4. Measure the clearance "C" between snap ring and transmission case using a thickness gauge.

**Specification:**

0.05 – 0.25 mm (0.002 – 0.010 in)



5. If the value exceeds the standard value, perform the following procedures.
- (1) Measure the snap ring thickness.
  - (2) Select the snap ring of suitable thickness according to the measured value.
6. Install the intermediate case.  [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Intermediate Case>INSTALLATION.](#)

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Reduction Driven Gear

### DISASSEMBLY



1. Remove the bearing retainer using ST1, ST2 and a press.

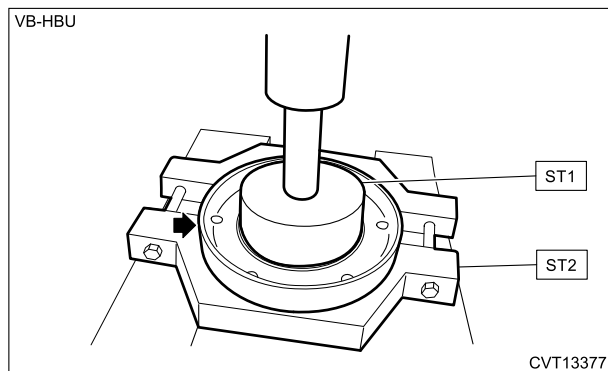
**Caution:**

**Be careful not to drop the reduction driven gear.**

**Preparation tool:**

ST1: INSTALLER (20099AE020)

ST2: BEARING REMOVER (18767AA000)



2. Using the ST1, ST2, ST3 and a press, remove the ball bearing from the reduction driven gear.

**Caution:**

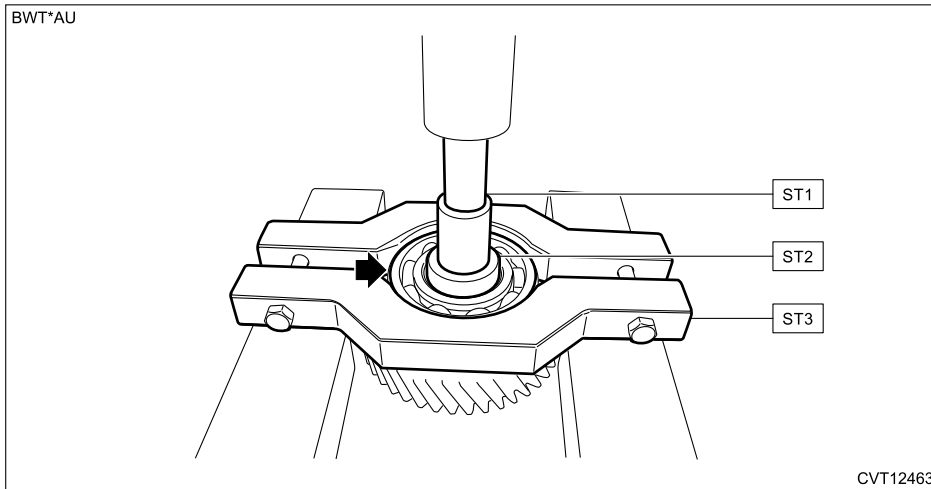
**Be careful not to drop the reduction driven gear.**

**Preparation tool:**

ST1: REMOVER (899864100)

ST2: SEAT (398497701)

ST3: REMOVER (498077600)



3. Remove the snap ring.

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Reduction Driven Gear

### ASSEMBLY

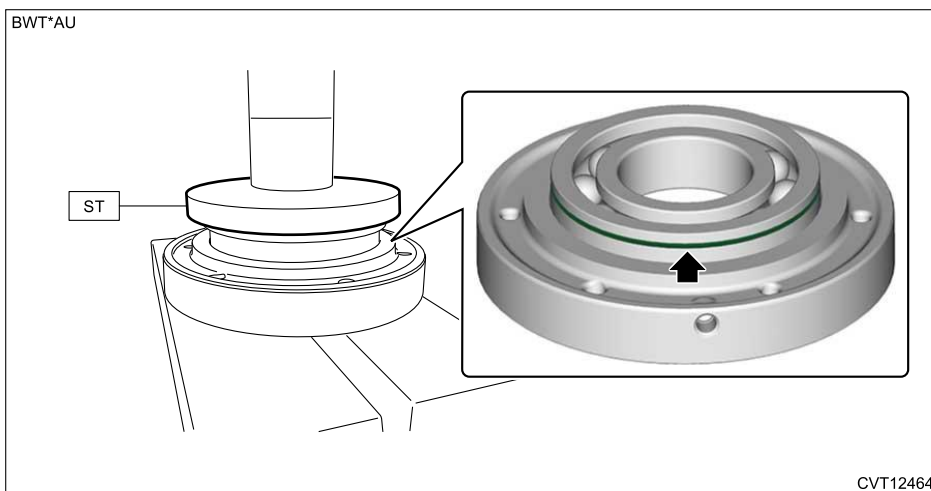
1. Using the ST and a press, press-fit a new ball bearing into the bearing retainer.

**Note:**

- Press-fit into the position where it contacts the snap ring.
- Apply CVTF to the press-fitting area.

**Preparation tool:**

ST: INSTALLER (398177700)

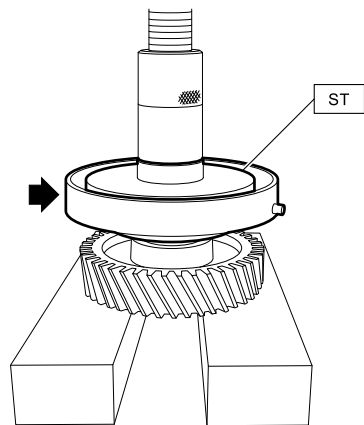


2. Using the ST and a press, press-fit the bearing retainer into the reduction driven gear.

**Preparation tool:**

ST: INSTALLER (398177700)

BWT\*AU




CVT12465

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Reduction Driven Gear

### INSPECTION

---

1. Check that there is no deformation, cracks or other damages.
2. Check the bearing for smooth rotation.
3. Check the bearing for looseness.
4. Check the clearance between snap ring and transmission case.  [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Reduction Driven Gear>INSTALLATION.](#)

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Transmission Control Device

### REMOVAL

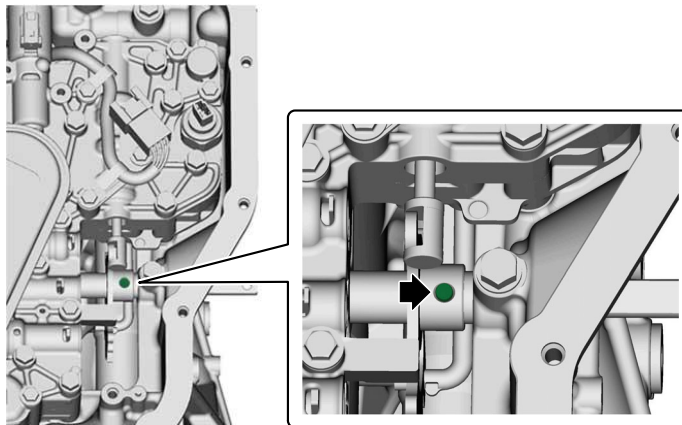


1. Remove the parking pawl. [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Parking Pawl>REMOVAL.](#)
2. Remove the inhibitor switch. [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Inhibitor Switch>REMOVAL.](#)
3. Remove the oil pan. [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Oil Pan>REMOVAL.](#)
4. Remove the spring pin.

**Note:**

**Be careful not to drop the spring pin in the transmission.**

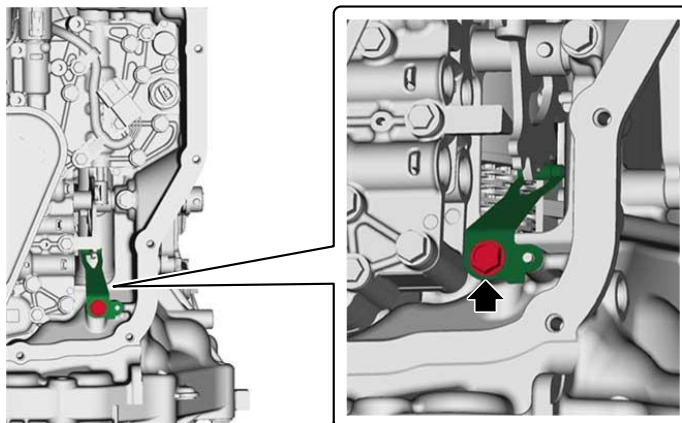
BWT\*AU



CVT12172

5. Remove the detent spring.

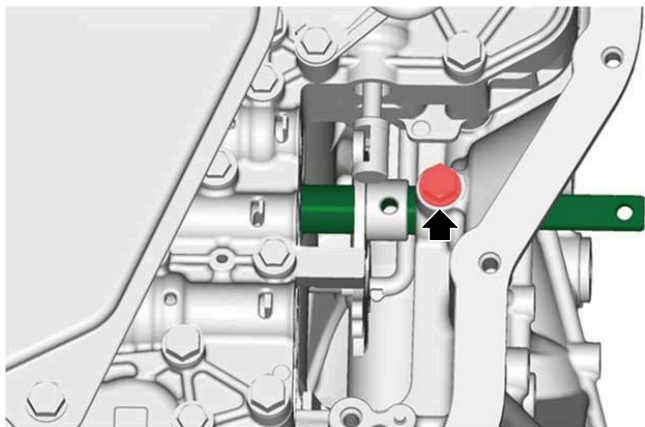
BWT\*AU



CVT12171

6. Remove the shifter arm shaft.

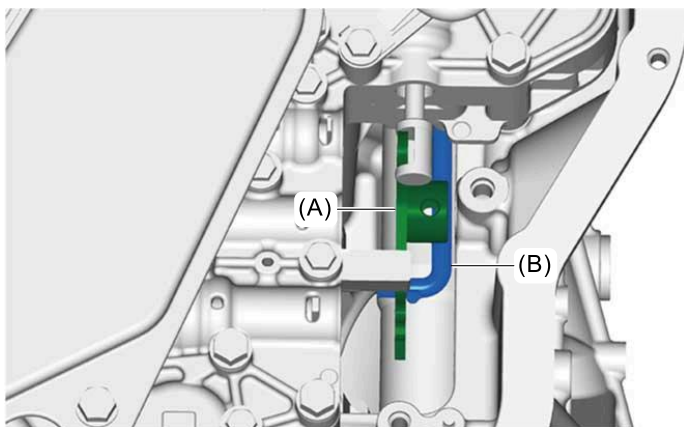
BWT\*AU



CVT12610

7. Remove the manual plate (A) and parking rod (B) as a single unit.

BWT\*AU



CVT12611

8. Remove the parking rod from the manual plate.
9. Remove the oil seal using a flat tip screwdriver wrapped with protection tape.

BWT\*AU



CVT12174

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Transmission Control Device

### INSTALLATION

1. Install a new oil seal using ST.

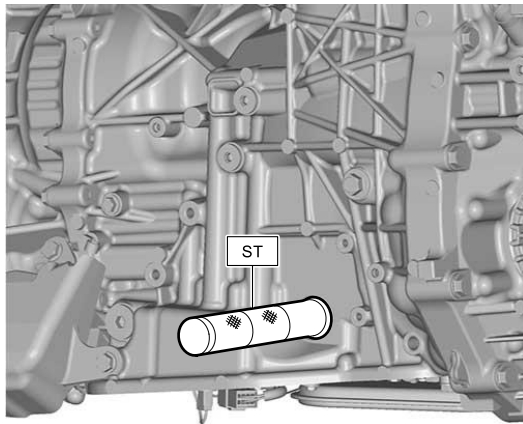
**Note:**

**Apply CVTF to the press-fitting area.**

**Preparation tool:**

ST: INSTALLER (18657AA000)

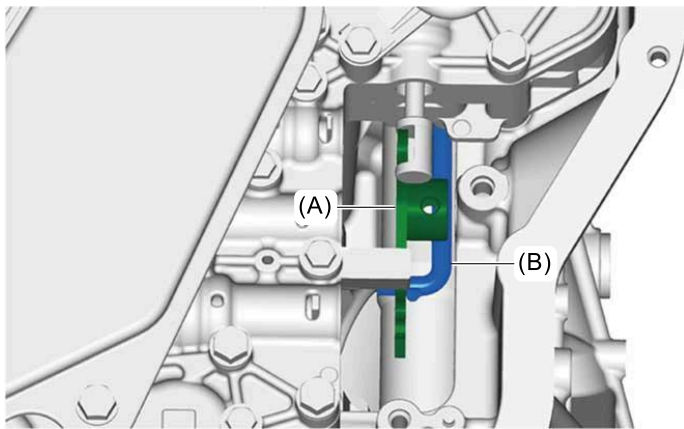
BWT\*AU



CVT12175

2. Install the parking rod to the manual plate.
3. Set the manual plate (A) and parking rod (B) as a single unit.

BWT\*AU



CVT12611

4. Install the detent spring.

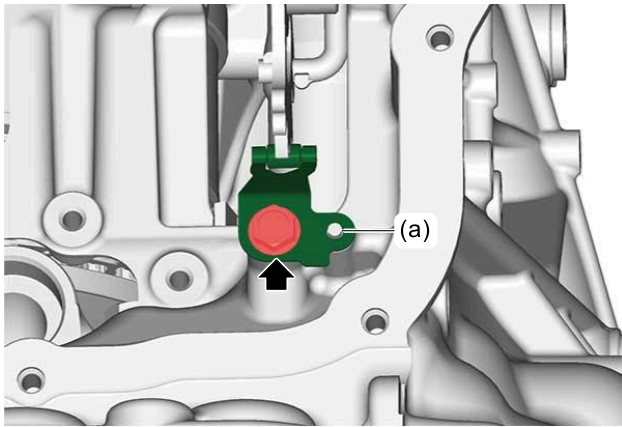
**Note:**

**Make sure that the positioning hole of the detent spring is inserted into the pin (a).**

**Tightening torque:**

7 N·m (0.7 kgf-m, 5.2 ft-lb)

BWT\*AU



CVT12622

**5.** Install the shifter arm shaft.

**Caution:**

**Be careful not to damage the oil seal.**

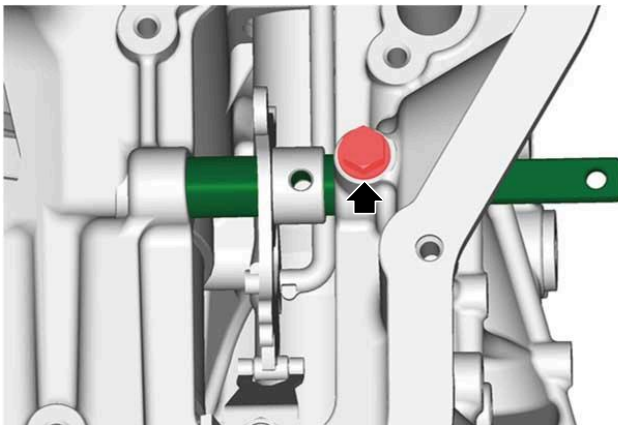
**Note:**

- Apply CVTF to the oil seal lip.
- While raising the detent spring with the manual plate, insert the shifter arm shaft.

**Tightening torque:**

7 N·m (0.7 kgf-m, 5.2 ft-lb)

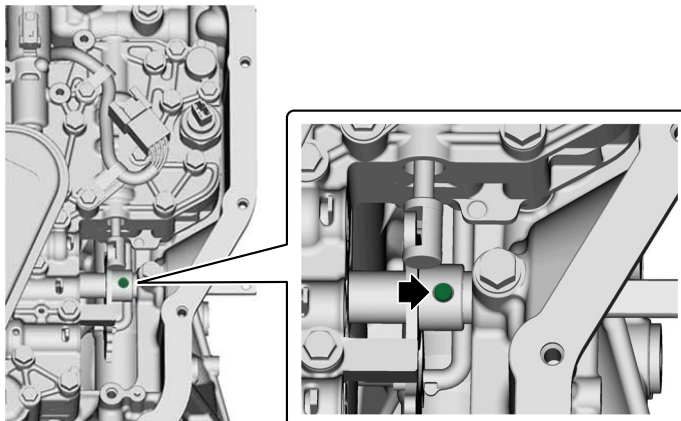
BWT\*AU



CVT12623

**6.** Install a new spring pin.

BWT\*AU



CVT12172

7. Install the inhibitor switch. [🔗 Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Inhibitor Switch>INSTALLATION.](#)
8. Install the oil pan. [🔗 Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Oil Pan>INSTALLATION.](#)
9. Install the parking pawl. [🔗 Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Parking Pawl>INSTALLATION.](#)

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Transmission Control Device

### INSPECTION

---

1. Check that there is no deformation, cracks or other damages.
2. Make sure that the manual plate and detent spring are not worn excessively.

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Transmission Case

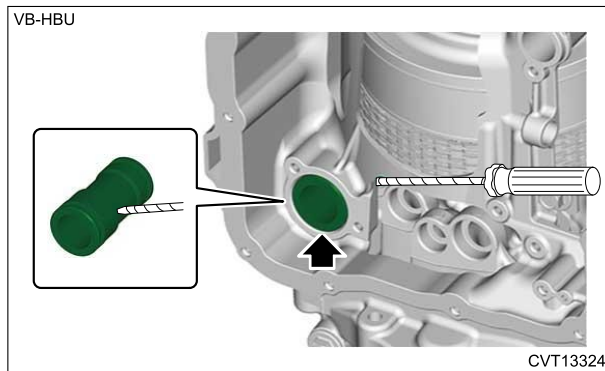
### REMOVAL



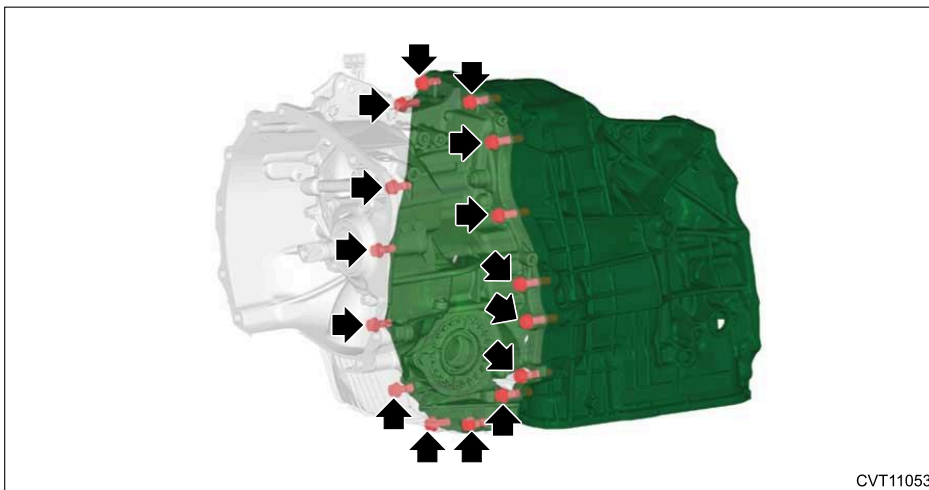
1. Remove the primary pressure sensor. [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Secondary Pressure Sensor>REMOVAL.](#)
2. Remove the secondary speed sensor. [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Secondary Speed Sensor>REMOVAL.](#)
3. Remove the transmission harness. [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Transmission Harness>REMOVAL.](#)
4. Remove the transmission control device. [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Transmission Control Device>REMOVAL.](#)
5. Remove the reduction driven gear. [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Reduction Driven Gear>REMOVAL.](#)
6. Remove the CVTF pipe using a flat tip screwdriver wrapped with protection tape.

**Note:**

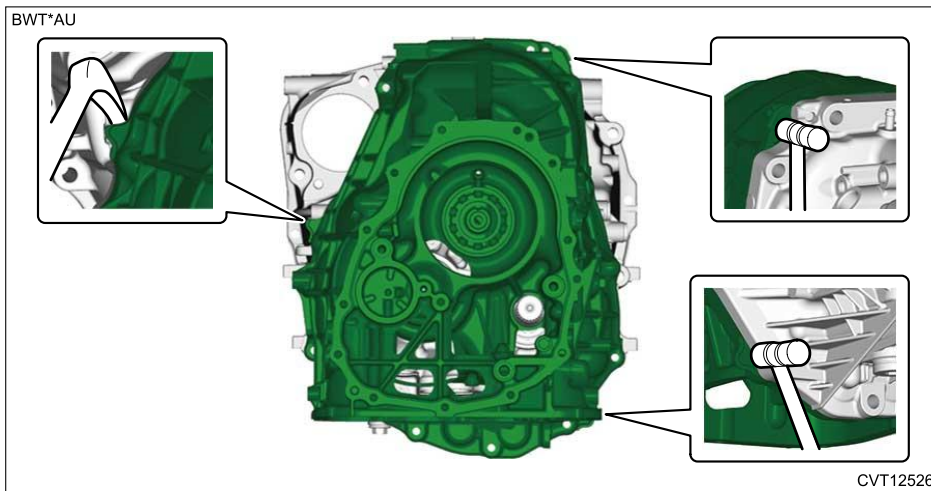
**Engage a flat tip screwdriver tip to the stepped portion of CVTF pipe.**



7. Remove the bolt securing the transmission case.



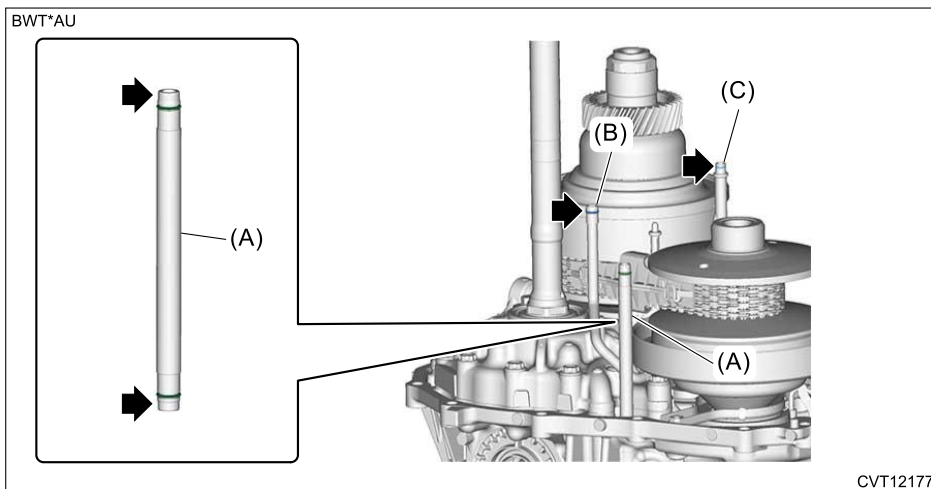
8. Using a plastic hammer and a crowbar wrapped with protection tape or similar, expand the clearance and remove the transmission case.



9. Remove the application pressure pipe (A), and remove the O-rings from the application pressure pipe (A), release pressure pipe (B) and lubrication pipe (C).

**Note:**

The application pressure pipe (A) may remain in the transmission case side.



10. Remove the liquid gasket from the transmission case and converter case.

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Transmission Case

**INSTALLATION**

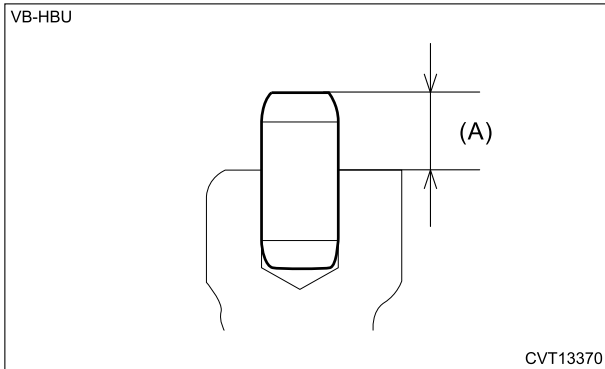
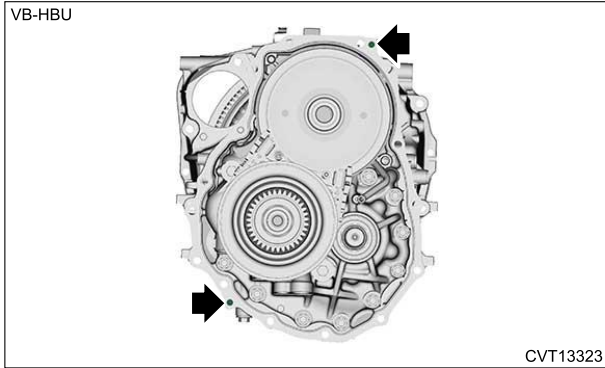
1. Check the projection (A) of the knock pins.

**Note:**

When attached on the transmission case side, install on the converter case side.

**Specification:**

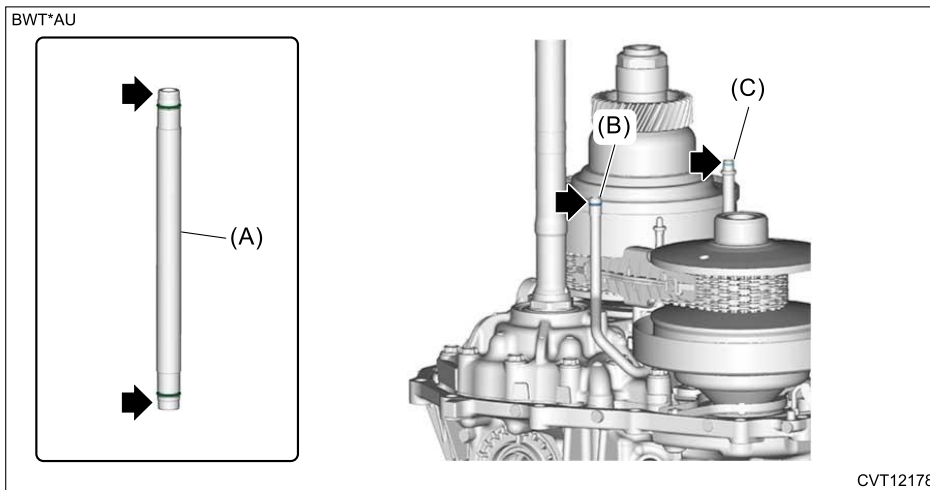
8.5 – 9.5 mm (0.33 – 0.37 in)



2. Install new O-rings to the application pressure pipe (A), release pressure pipe (B) and lubrication pipe (C).

**Note:**

- Apply CVTF to the O-rings.
- Make sure that the lubrication pipe (C) is installed vertically.

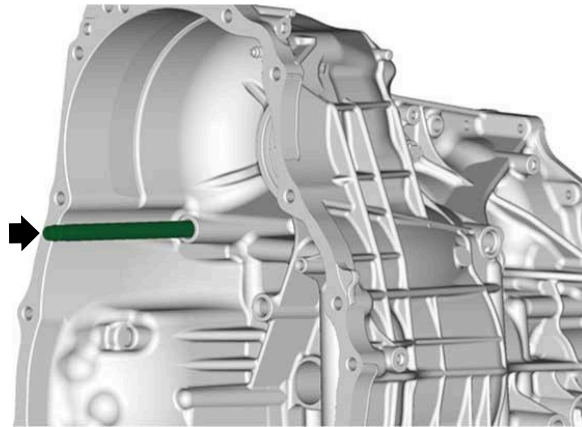


3. Set the application pressure pipe.

**Note:**

- Set so that the application pressure pipe is positioned vertically.

BWT\*AU



CVT12176

4. Apply liquid gasket to the mating surface of the converter case as shown in the figure, and temporarily install the transmission case.

**Caution:**

**Install each pipe while confirming that its location is correct.**

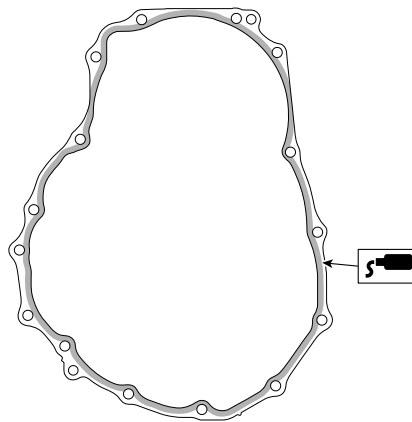
**Note:**

- Before applying liquid gasket, degrease the old liquid gasket seal surface of the transmission case and converter case.
- Install within 5 min. after applying liquid gasket.

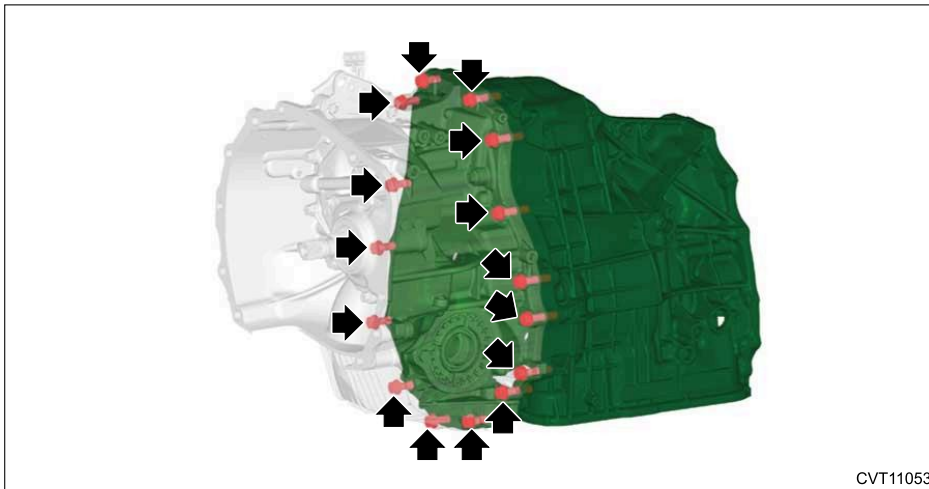
**Preparation items:**

Liquid gasket: THREE BOND 1216J or equivalent

BWT\*AU



CVT12638



5. Tighten the bolts which hold the transmission case.

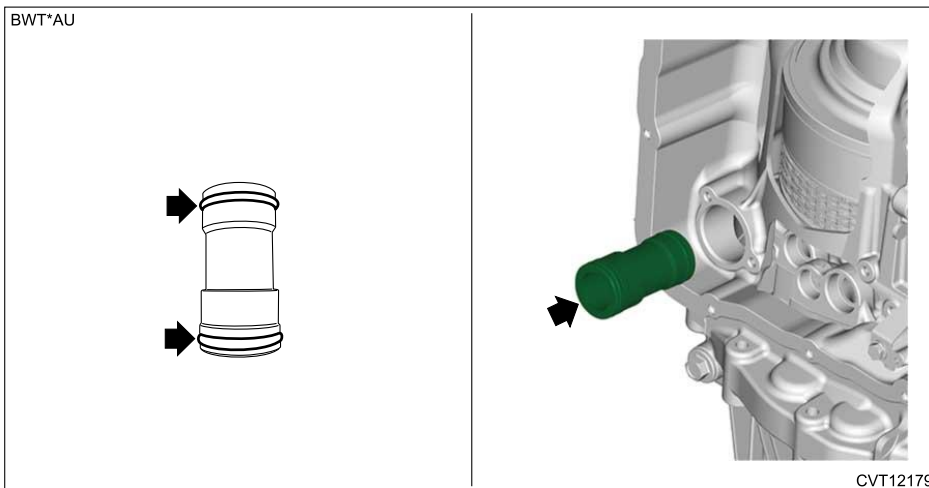
**Tightening torque:**

41 N·m (4.2 kgf-m, 30.2 ft-lb)

6. Install the CVTF pipe using a new O-ring.

**Note:**

- Apply CVTF to the O-rings.
- The smaller opening side of CVTF pipe should be inserted first.



7. Install the reduction driven gear. [📄 Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Reduction Driven Gear>INSTALLATION.](#)

8. Install the control device. [📄 Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Transmission Control Device>INSTALLATION.](#)

9. Install the transmission harness. [📄 Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Transmission Harness>INSTALLATION.](#)

10. Install the secondary speed sensor. [📄 Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Secondary Speed Sensor>INSTALLATION.](#)

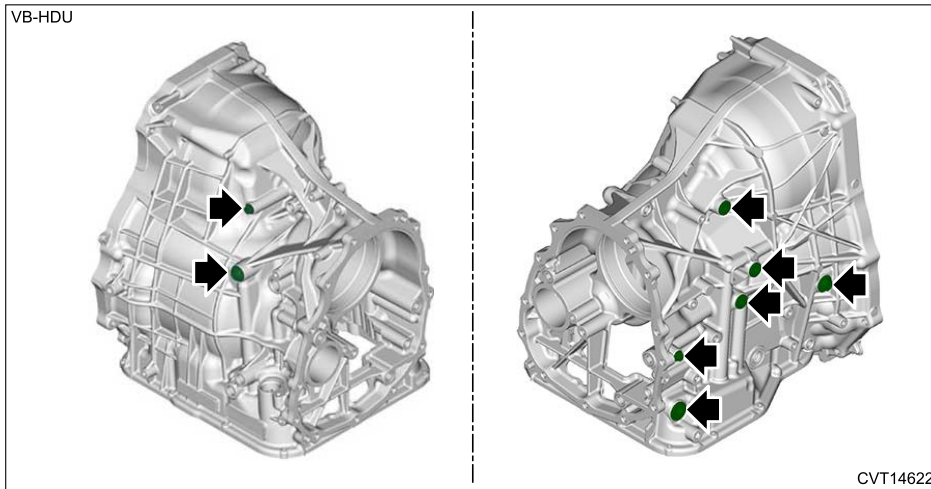
11. Install the primary pressure sensor. [📄 Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Primary Pressure Sensor>INSTALLATION.](#)

**CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Transmission Case**

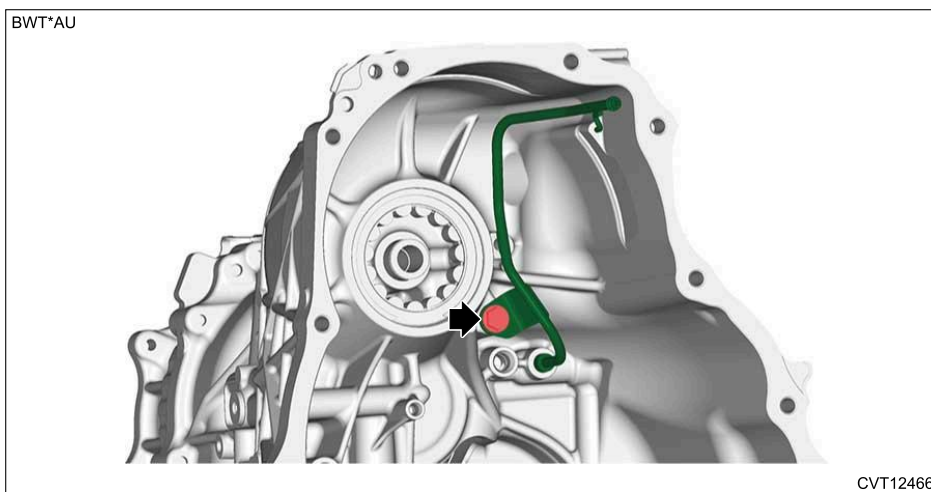
**DISASSEMBLY**



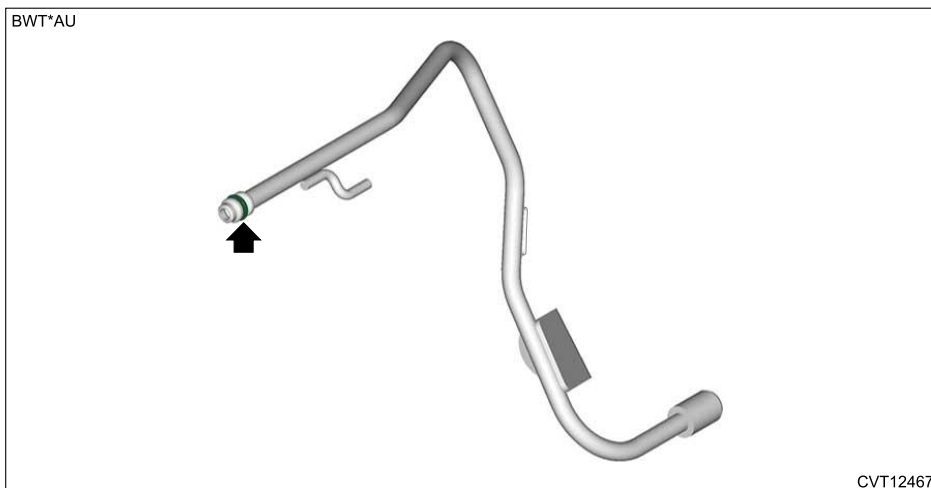
1. Remove all plugs.



2. Remove the lubrication pipe.

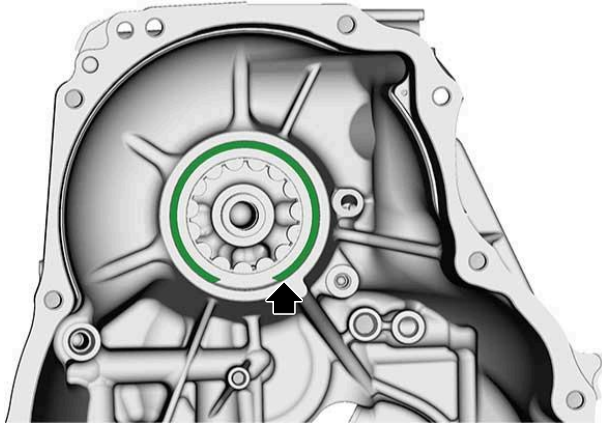


3. Remove the O-rings.



4. Remove the snap ring on the primary pulley side.

BWT\*AU



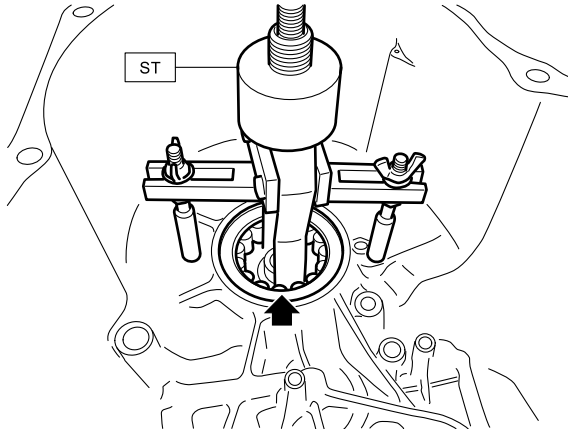
CVT12468

5. Using the ST, remove the roller bearing.

**Preparation tool:**

ST: PULLER ASSY (398527700)

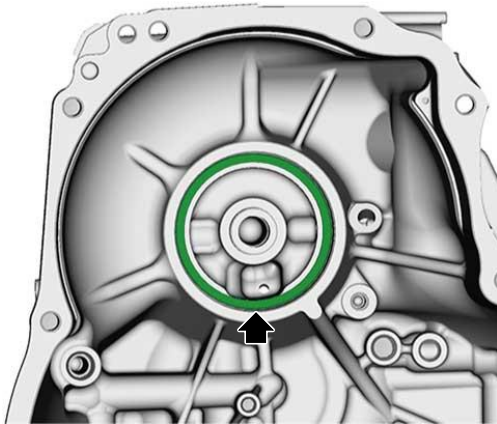
BWT\*AU



CVT12469

6. Remove the spacer.

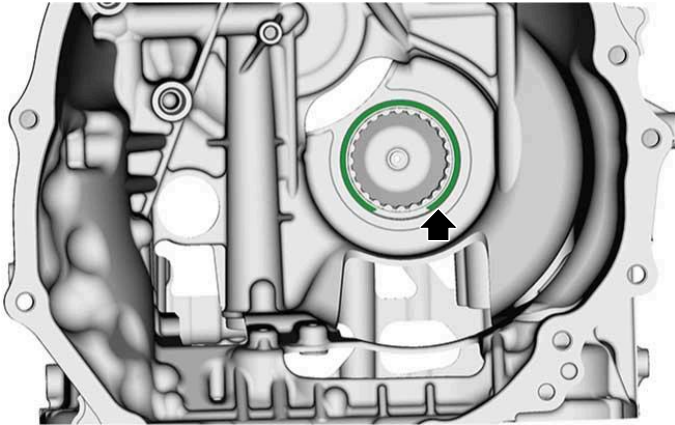
BWT\*AU



CVT12181

7. Remove the snap ring on the secondary pulley side.

BWT\*AU



CVT12470

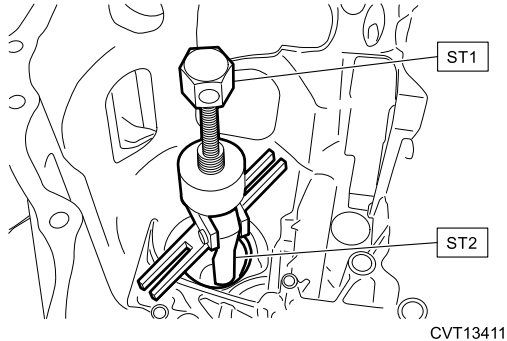
8. Using the ST, remove the roller bearing.

**Preparation tool:**

ST1: PULLER ASSY (398527700)

ST2: CLAW (18760AA000)

VB-HBU



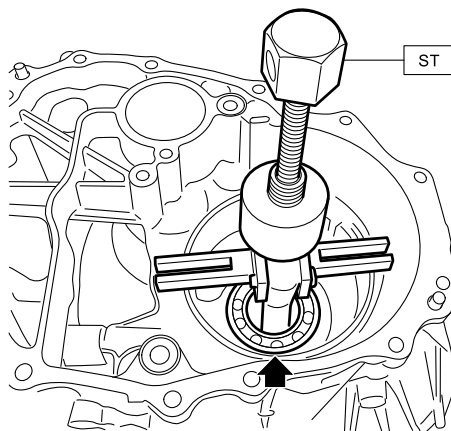
CVT13411

9. Remove the ball bearing on the reduction driven gear side using ST.

**Preparation tool:**

ST: PULLER ASSY (398527700)

BWT\*AU



CVT12472

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Transmission Case

**ASSEMBLY**

1. Press-fit a new ball bearing (reduction driven gear side) using ST1, ST2 and a press.

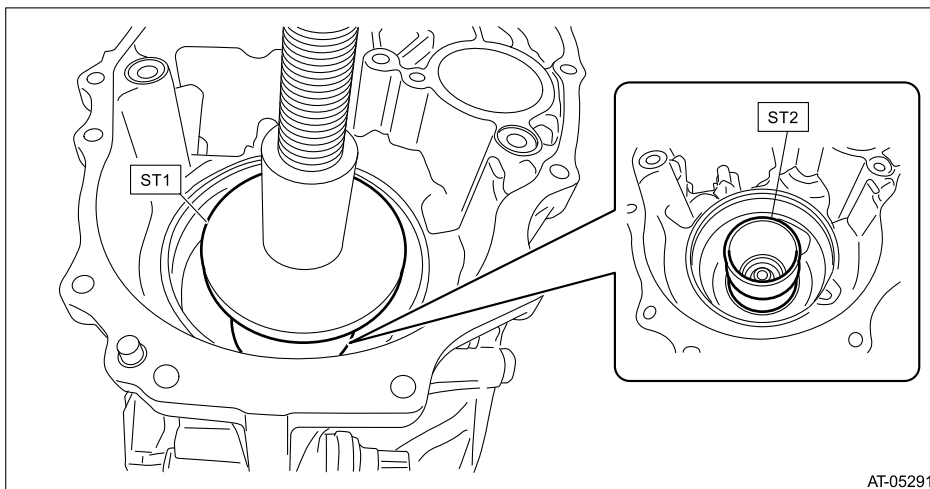
**Note:**

**Apply CVTF to the press-fitting area.**

**Preparation tool:**

ST1: INSTALLER (398177700)

ST2: INSTALLER (20099AE020)



2. Press-fit a new roller bearing using ST1, ST2 and a press.

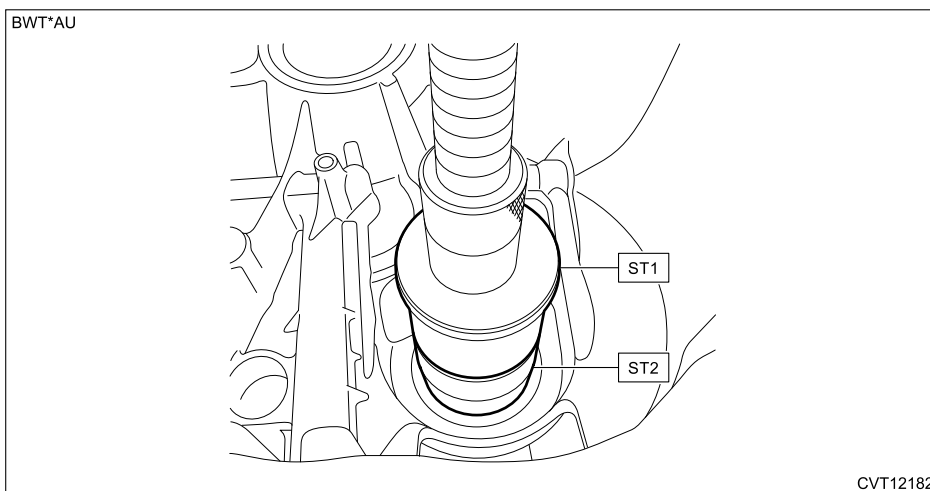
**Note:**

**Apply CVTF to the press-fitting area.**

**Preparation tool:**

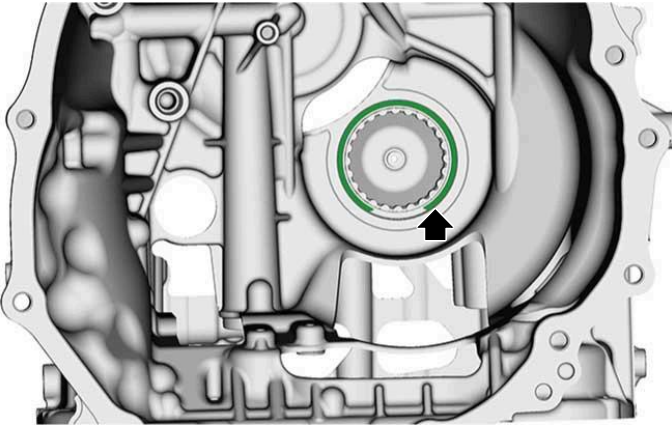
ST1: INSTALLER (20099AE020)

ST2: PRESS SNAP RING (499755602)



3. Install a new snap ring (secondary pulley side).

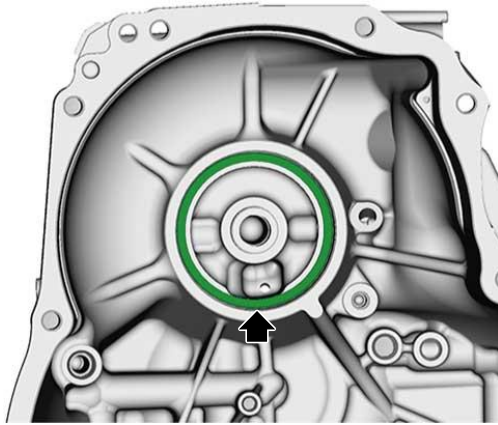
BWT\*AU



CVT12470

4. Set the spacer.

BWT\*AU



CVT12181

5. Using the ST and a press, press-fit a new roller bearing.

**Caution:**

**Be careful not to allow the transmission case to be tilted.**

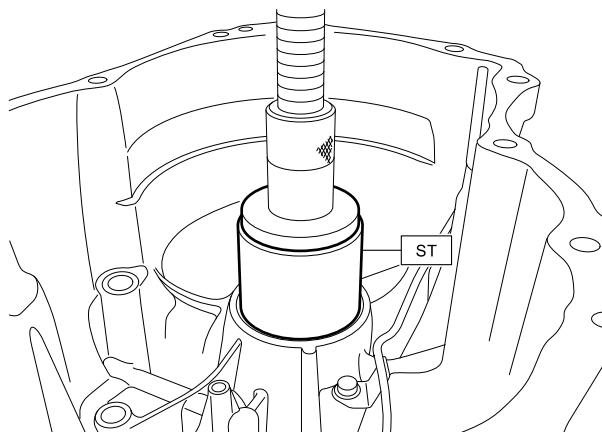
**Note:**

**Apply CVTF to the press-fitting area.**

**Preparation tool:**

ST: INSTALLER (20099AE020)

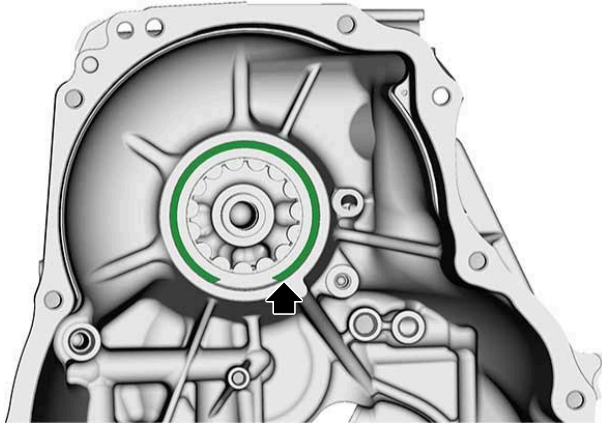
BWT\*AU



CVT12183

6. Install a new snap ring (primary pulley side).

BWT\*AU



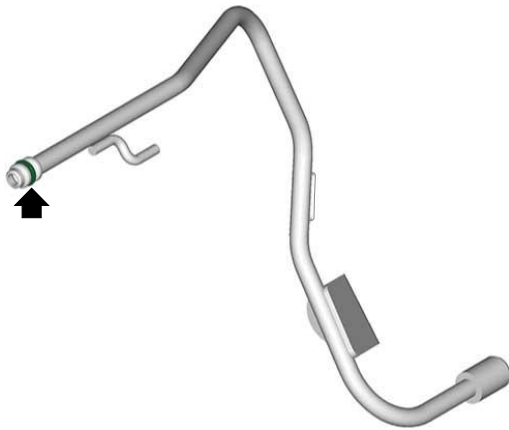
CVT12468

7. Install a new O-ring.

**Note:**

**Apply CVTF to the O-rings.**

BWT\*AU



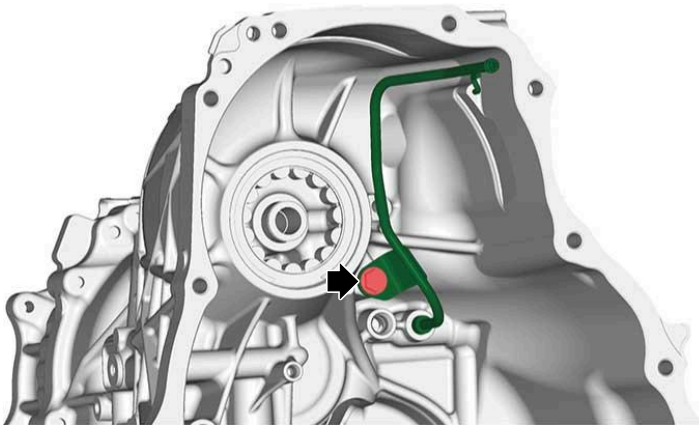
CVT12467

8. Install the lubrication pipe.

**Tightening torque:**

16 N·m (1.6 kgf-m, 11.8 ft-lb)

BWT\*AU



CVT12466

9. Install the plugs with new O-rings.

**Note:**

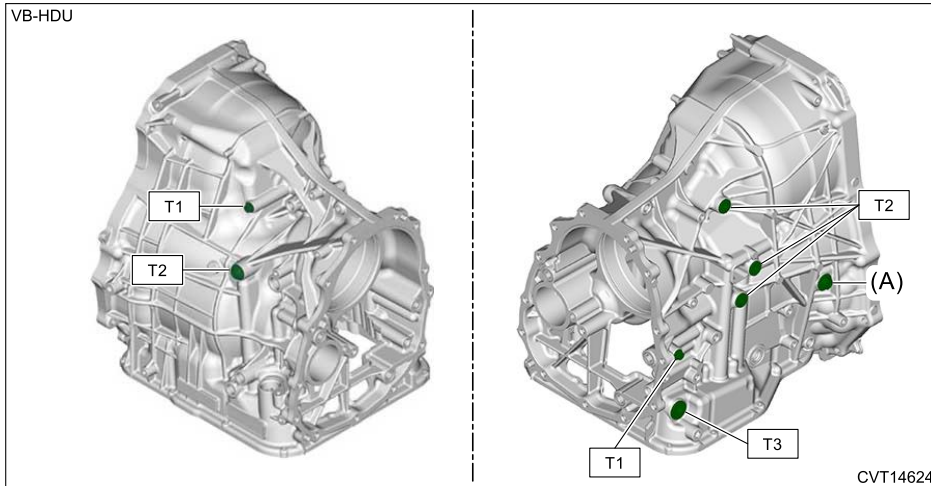
- Apply CVTF to the O-rings.
- Replace the filler plug gasket with a new part after adding CVTF.

**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: 50 N·m (5.1 kgf-m, 36.9 ft-lb)



(A) Filler plug (for overhaul)

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Transmission Case

### INSPECTION

1. Check that there is no deformation, cracks or other damages.
2. Check the bearing for smooth rotation.
3. Check the bearing for looseness.

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Primary Pulley and Secondary Pulley

### REMOVAL



#### Note:

- The primary pulley and secondary pulley cannot be disassembled.
- When replacing the primary pulley and secondary pulley, always replace them as a set.

1. Remove the transmission case.  Ref. to [CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Transmission Case>REMOVAL](#).

2. Remove the chain guide.

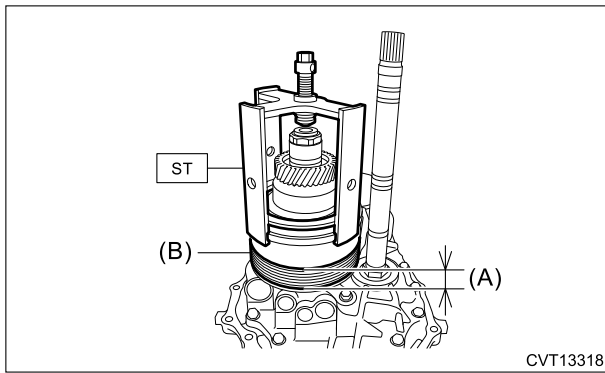
(1) Using the ST, expand the chain groove of the secondary pulley and completely loosen the variator chain.

#### Caution:

**Note that CVTF may blow out.**

#### Preparation tool:

ST: EXPANDER PULLEY (18769AA020)

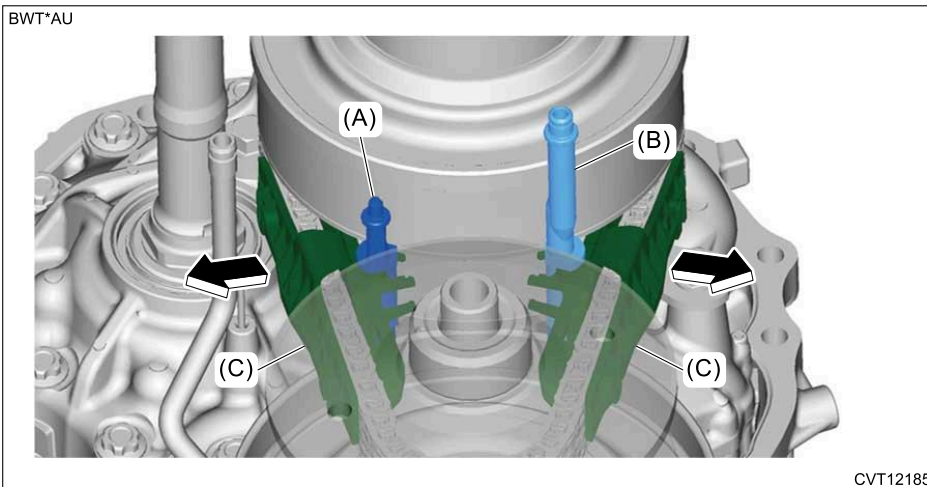


(A) Chain groove

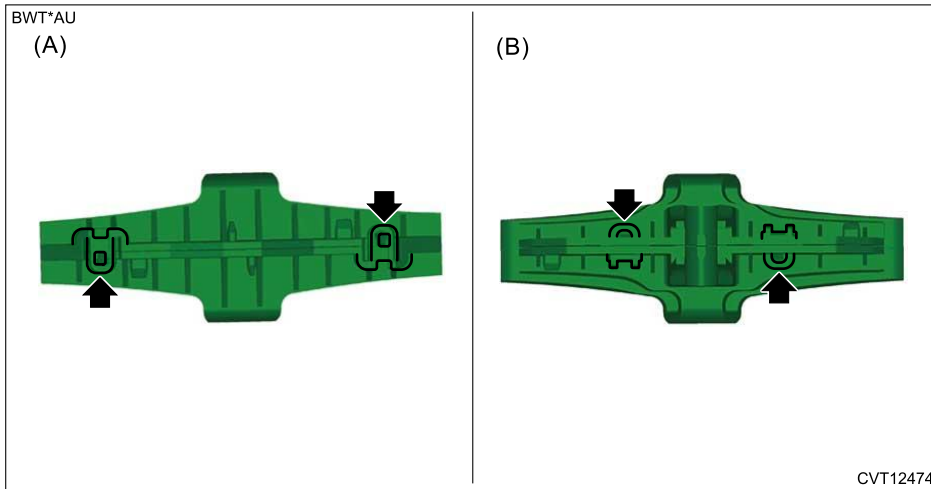
(B) Variator chain

(2) Remove the chain guide (C) from the support rod (A) and lubrication pipe (B).

(3) Remove the support rod (A) and lubrication pipe (B).



(4) Unlock the claws and remove the chain guide.

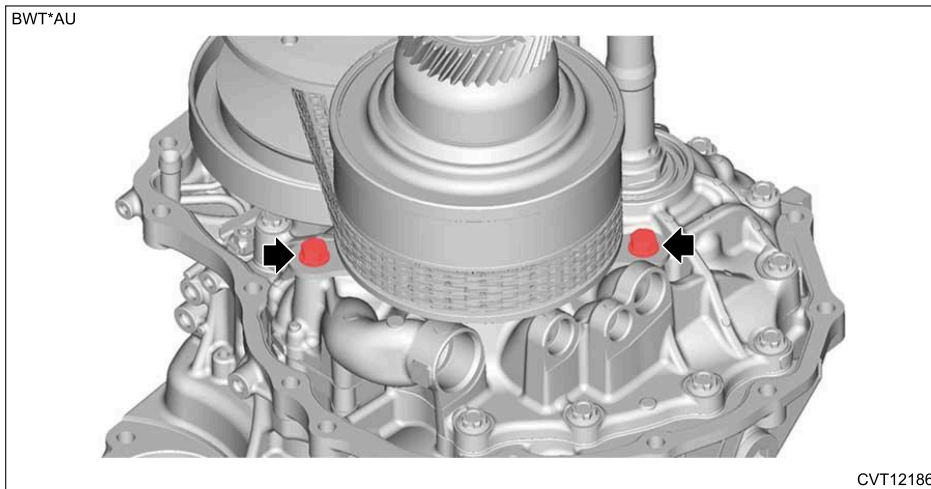


(A) Outside

(B) Inside

**3.** Remove the secondary pulley.

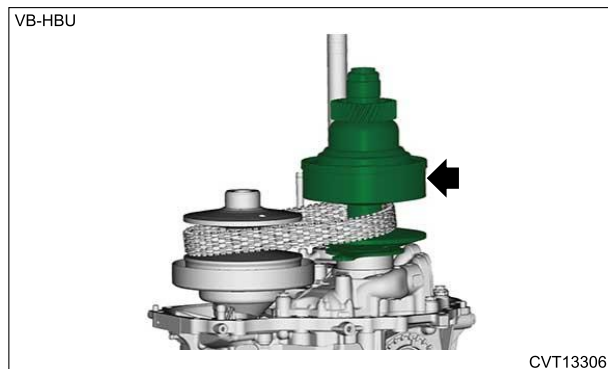
- (1) Remove the secondary pulley mounting bolt.



- (2) Intersect the chain groove of secondary pulley and the chain groove of primary pulley, detach the variator chain and remove the secondary pulley.

**Caution:**

**Be careful not to scratch the primary pulley, secondary pulley and variator chain.**

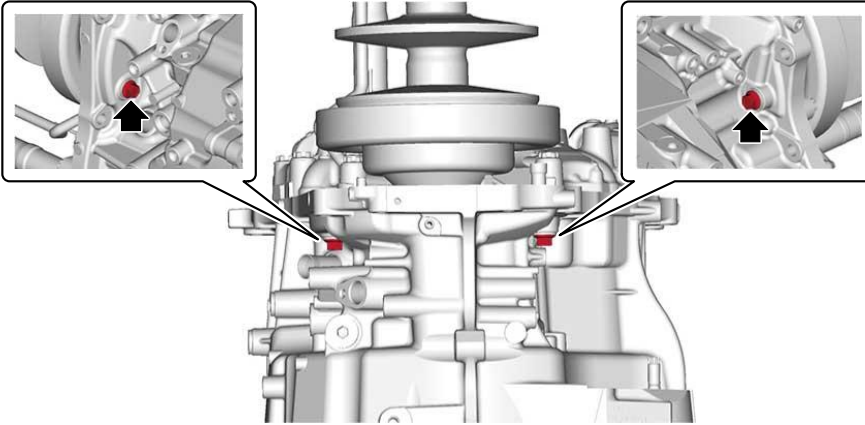


- (3) Remove the ST (EXPANDER PULLEY) from the secondary pulley.

**4.** Remove the primary pulley.

- (1) Remove the variator chain.  
 (2) Remove the bolt securing the primary pulley.

BWT\*AU



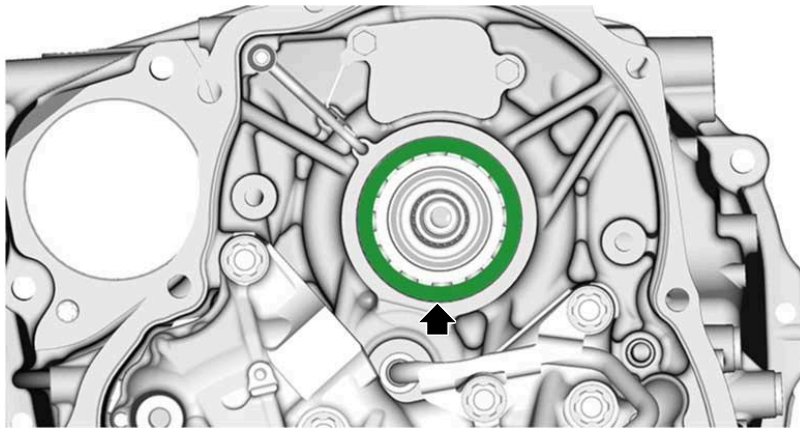
CVT12187

- (3) Remove the primary pulley.
- (4) Remove the primary pulley shim.

**Note:**

The primary pulley shim may be located on the primary pulley side.

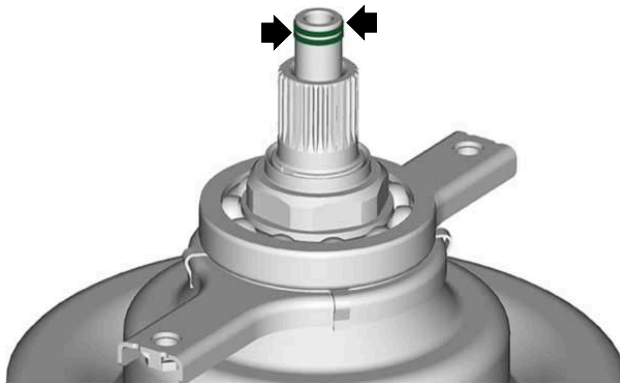
BWT\*AU



CVT12612

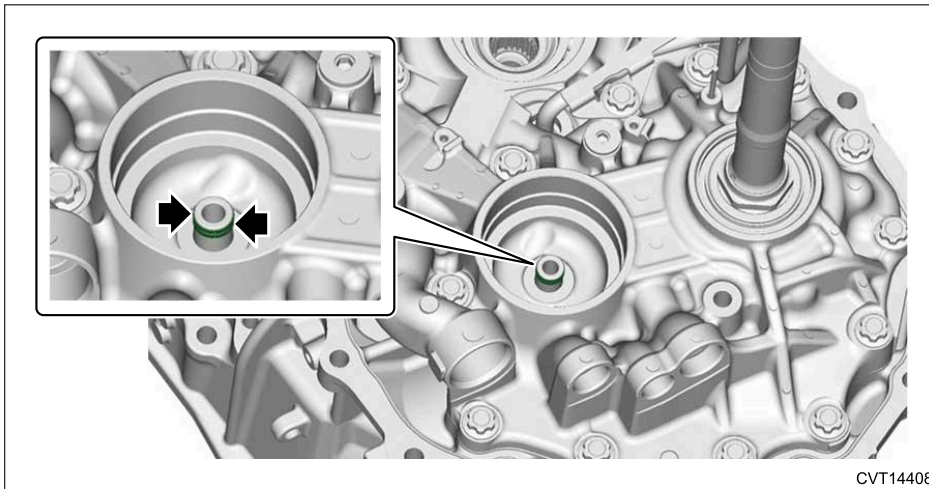
- (5) Remove the seal rings.

BWT\*AU



CVT12475

- 5. Remove the seal rings.



## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Primary Pulley and Secondary Pulley

### INSTALLATION

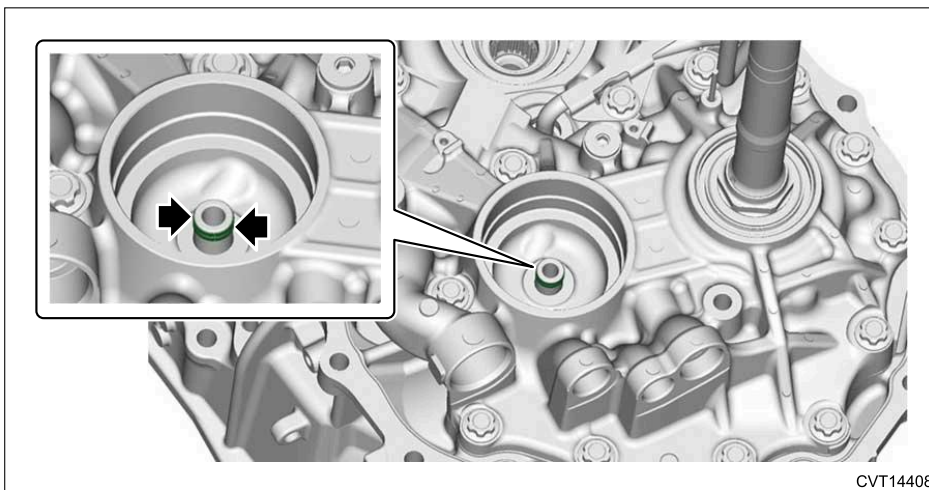
**Note:**

When replacing the primary pulley and secondary pulley, always replace them as a set.

1. Install a new seal ring.

**Note:**

- Apply CVTF to the seal rings.
- Do not stretch the seal ring more than necessary.

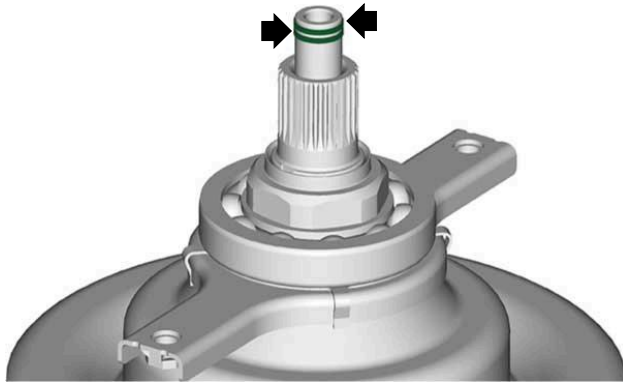


2. Install a new seal ring.

**Note:**

- Apply CVTF to the seal rings.
- Do not stretch the seal ring more than necessary.

BWT\*AU



CVT12475

**3.** When replacing the primary pulley and secondary pulley, select the primary pulley shim.

- (1) Using the ST, measure the height "H1" from the ST end face to the primary pulley bearing catch surface.

**Note:**

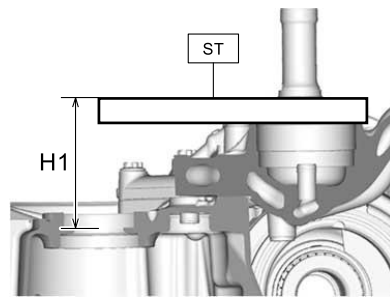
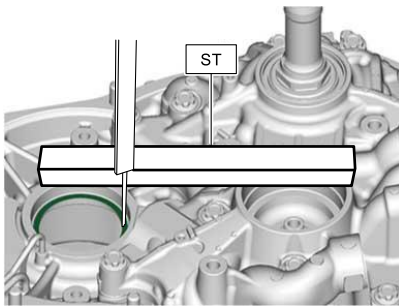
**Measure at four points and calculate the average.**

**Preparation tool:**

ST: GAUGE (499575400)

BWT\*AU

■:(A)



CVT12257

(A) Measurement surface

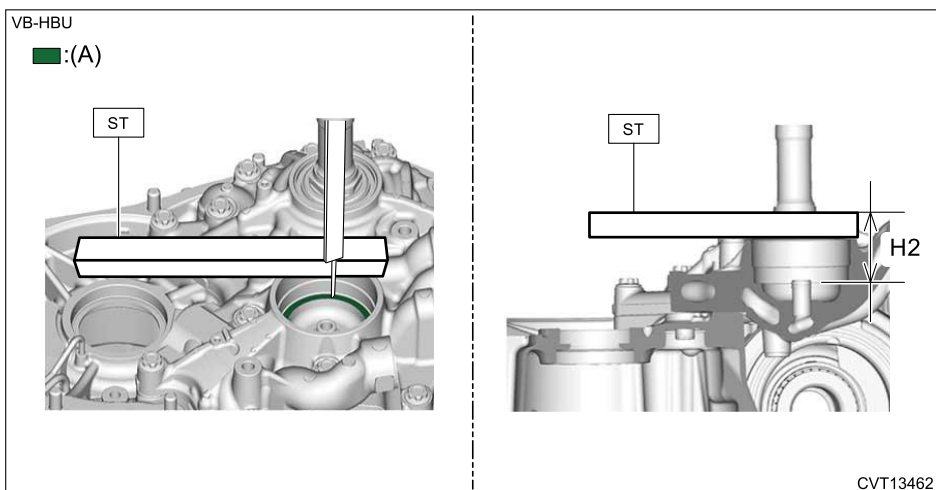
- (2) Using the ST, measure the height "H2" from the ST end face to the secondary pulley bearing catch surface.

**Note:**

**Measure at four points and calculate the average.**

**Preparation tool:**

ST: GAUGE (499575400)



(A) Measurement surface

(3) Using the following calculation and selection criteria table, select an appropriate thickness of the primary pulley shim.

**Note:**

**Adjust using 1 – 2 pieces.**

$$A = (H1 - H2) + C + 32.1195 \text{ mm (1.2645 in)} - B$$

A	Pulley alignment mm (in)
H1	Measured value (mm (in)) of step (1)
H2	Measured value (mm (in)) of step (2)
B	Specified primary pulley dimension*
C	Specified secondary pulley dimension*
32.1195 mm (1.2645 in)	Constant

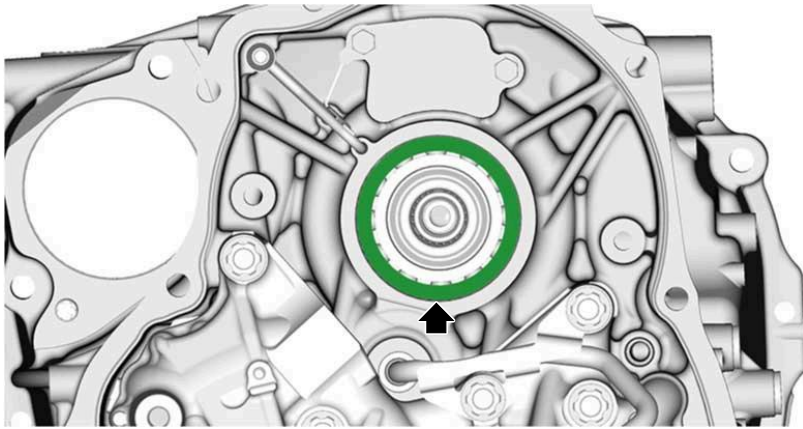
\*: The specified dimensions of the primary pulley and secondary pulley are stamped only on repair parts.

Primary pulley shim selection criteria table for calculated values

Pulley alignment mm (in)	Thickness of primary pulley shim mm (in)
0.026 – 0.150 (0.001 – 0.006)	0.1 (0.004)
0.151 – 0.250 (0.006 – 0.010)	0.2 (0.008)
0.251 – 0.350 (0.010 – 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 (0.034 – 0.037)	0.9 (0.035)
0.951 – 1.056 (0.037 – 0.042)	1.0 (0.039)

4. Set the primary pulley shim.

BWT\*AU



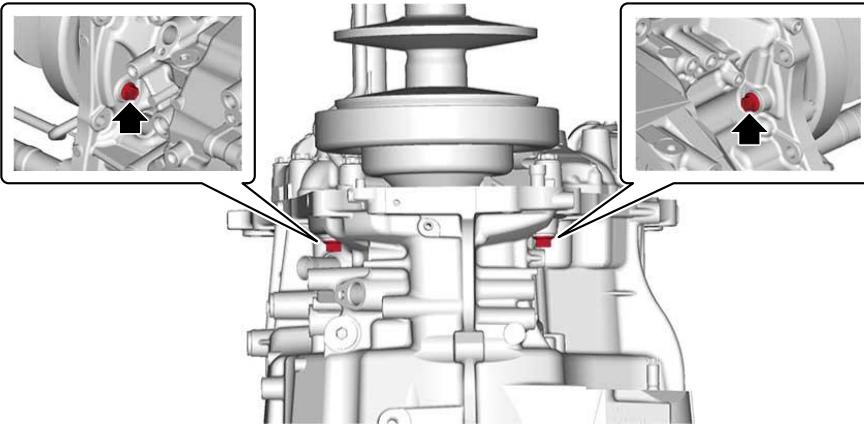
CVT12612

5. Align the bolt hole of primary bearing retainer with the bolt hole of the converter case, and install the primary pulley with a new seal washer.

**Tightening torque:**

21 N·m (2.1 kgf-m, 15.5 ft-lb)

BWT\*AU



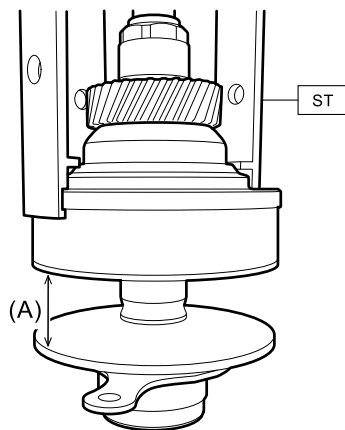
CVT12187

6. Using the ST, expand the chain groove of the secondary pulley.

**Preparation tool:**

ST: EXPANDER PULLEY (18769AA020)

BWT\*AU



CVT12476

(A) Chain groove

**7.** Install the secondary pulley.

(1) Set the variator chain to the primary pulley.

(2) Intersect the chain groove of primary pulley and the chain groove of secondary pulley, and set the secondary pulley while placing the variator chain on the secondary pulley.

**Caution:**

**Be careful not to scratch the primary pulley, secondary pulley and variator chain.**

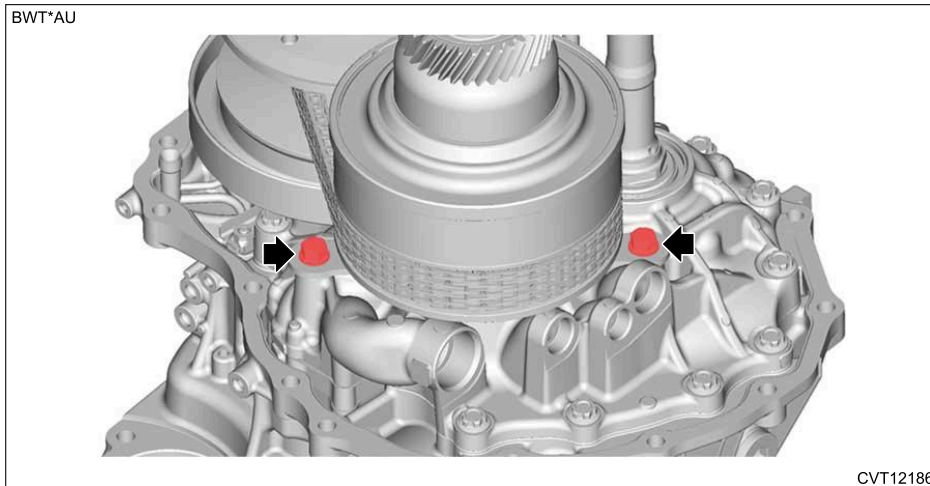
(3) Align the bolt hole of secondary bearing retainer with the bolt hole of drive pinion retainer, and install the secondary pulley mounting bolt.

**Note:**

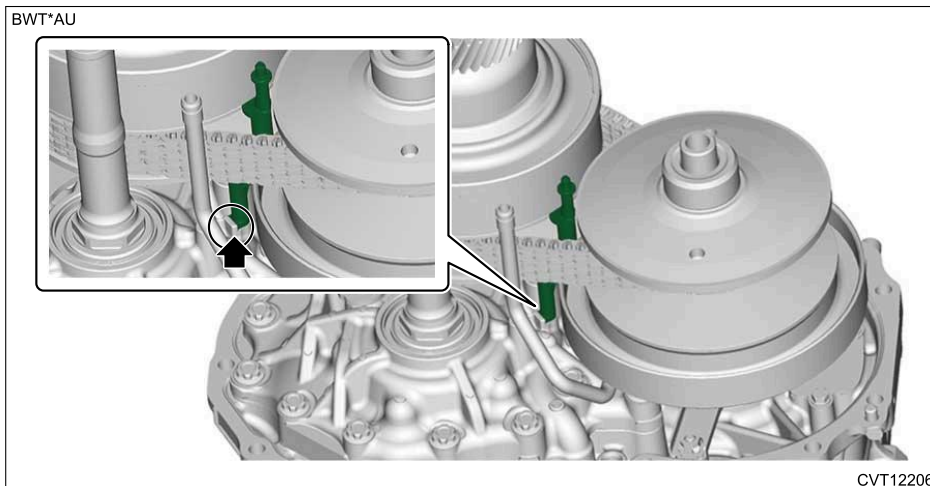
**Apply CVTF to the threaded portion of the bolts and seat surface.**

**Tightening torque:**

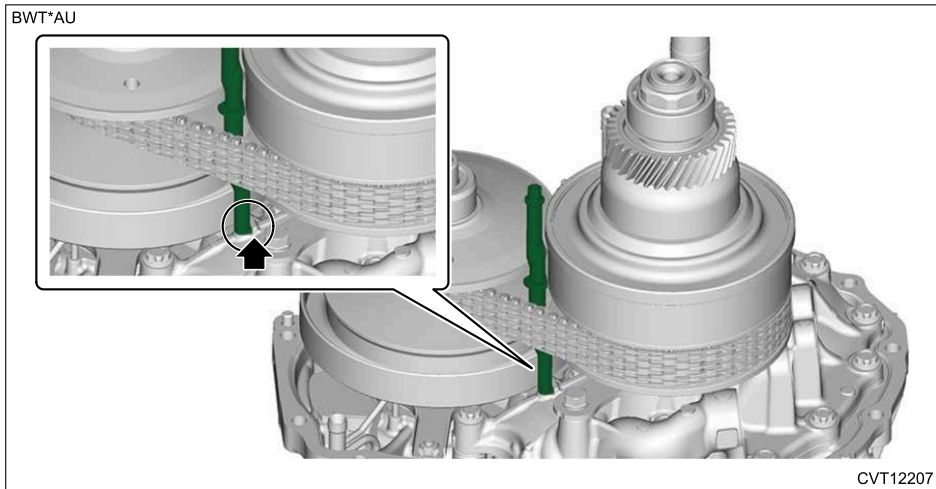
33 N·m (3.4 kgf-m, 24.3 ft-lb)



**8.** Engage the cutout portions of support rod and drive pinion retainer and install the support rod.

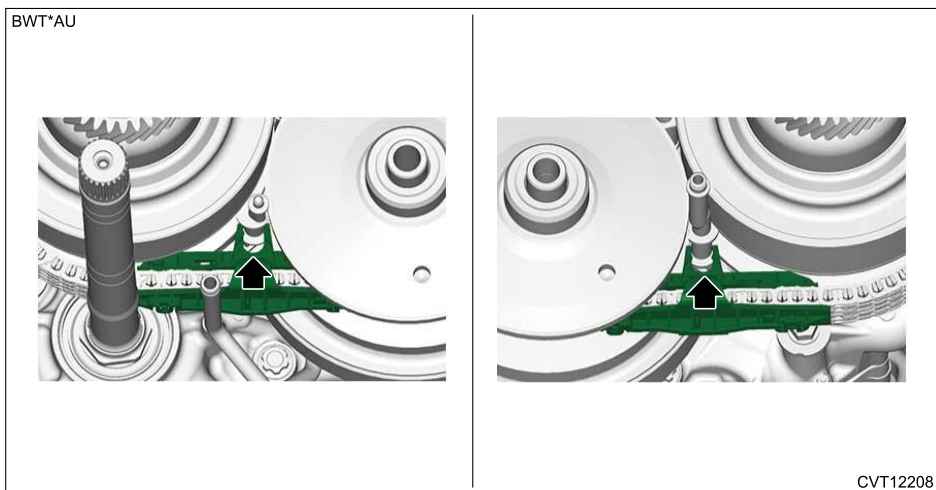


**9.** Align the cutout portions of lubrication pipe with the cutout portions of drive pinion retainer, and install the lubrication pipe.



**10.** Install the chain guide to the variator chain.

**11.** Install the chain guide so that the support rod and lubrication pipe pass through, and then remove the ST (EXPANDER PULLEY).



**12.** Install the transmission case.  [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Transmission Case>INSTALLATION.](#)

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Primary Pulley and Secondary Pulley

### INSPECTION

- 1.** Check that there is no deformation, cracks or other damages.
- 2.** Check the bearing for smooth rotation.
- 3.** Check the bearing for looseness.
- 4.** Check the primary pulley, secondary pulley and variator chain for abnormal wear.

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Variator Chain

### SPECIFICATION


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For the variator chain, refer to "Primary Pulley and Secondary Pulley".  [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Primary Pulley and Secondary Pulley.](#)

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Drive Pinion

### REMOVAL



1. Remove the primary pulley and secondary pulley.  Ref. to [CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Primary Pulley and Secondary Pulley>REMOVAL](#).
2. Perform following measurement when replacing the drive pinion retainer or converter case.

#### Note:

- It is not necessary when the primary pulley and secondary pulley are replaced.
- Clean each part and check for any malfunctions before performing measurement.

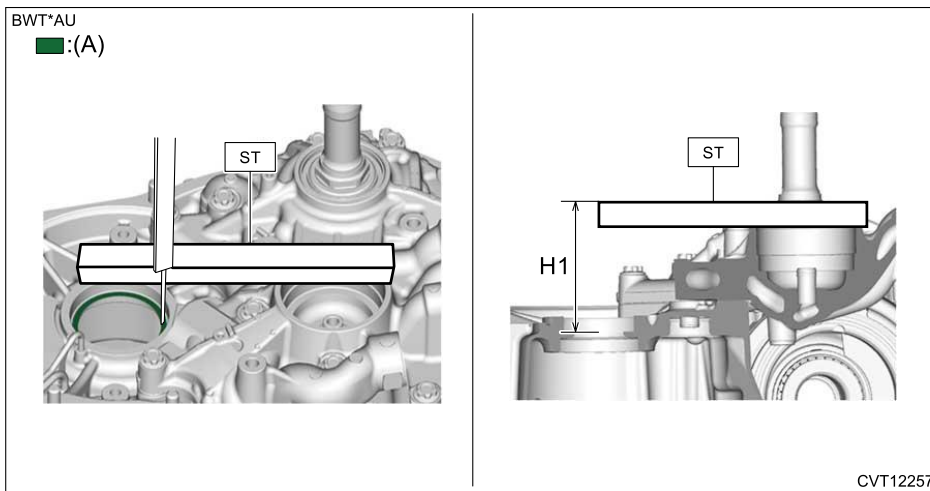
- (1) Measure and record the thickness of primary pulley shim.
- (2) Using the ST, measure the height "H1" from the ST end face to the primary pulley bearing catch surface.

#### Note:

Measure at four points and calculate the average.

#### Preparation tool:

ST: GAUGE (499575400)



(A) Measurement surface

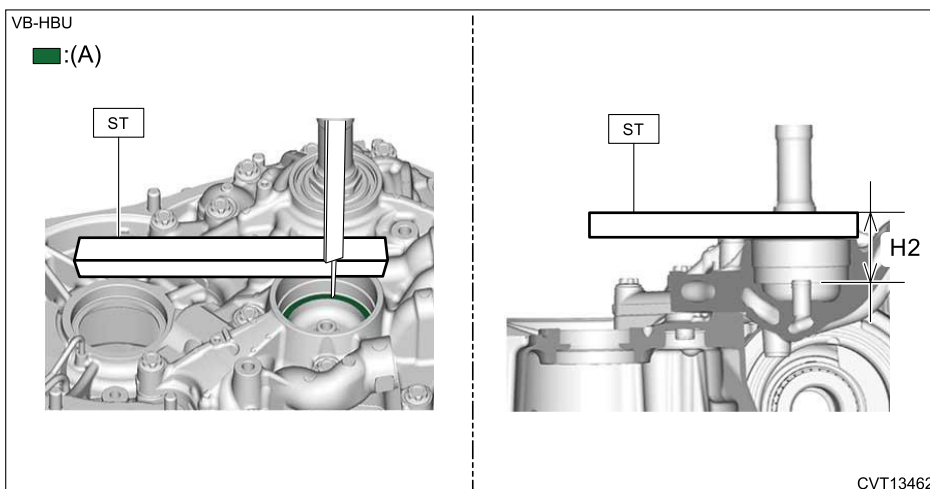
- (3) Using the ST, measure the height "H2" from the ST end face to the secondary pulley bearing catch surface.

#### Note:

Measure at four points and calculate the average.

#### Preparation tool:

ST: GAUGE (499575400)



(A) Measurement surface

(4) Using the following calculation, measure and record the dimension "A" from the primary pulley bearing catch surface to the secondary pulley bearing catch surface.

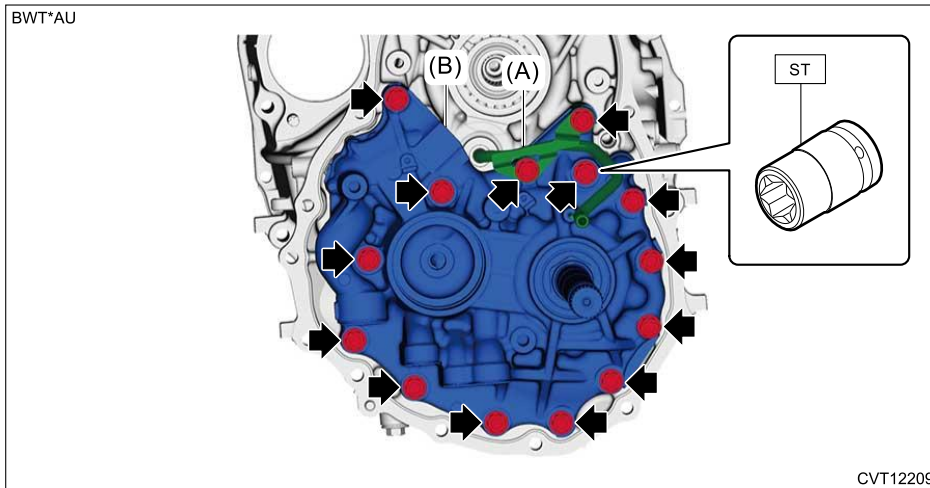
$$A = H1 - H2$$

A	Dimension (mm (in)) from the primary pulley bearing catch surface to the secondary pulley bearing catch surface
H1	Measured value (mm (in)) of step (2)
H2	Measured value (mm (in)) of step (3)

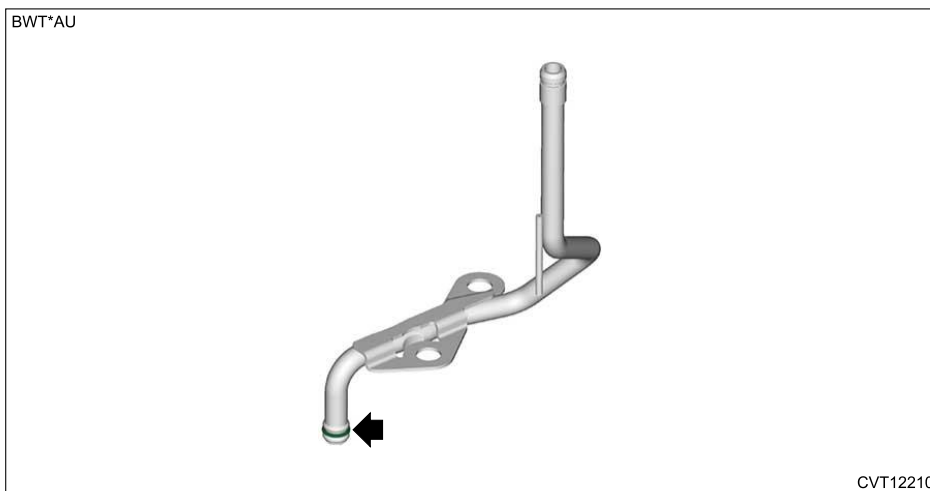
3. Using the ST, remove the bolts which hold the release pressure pipe (A) and the drive pinion retainer (B).

**Preparation tool:**

ST: SOCKET (E20) (18270KA020)

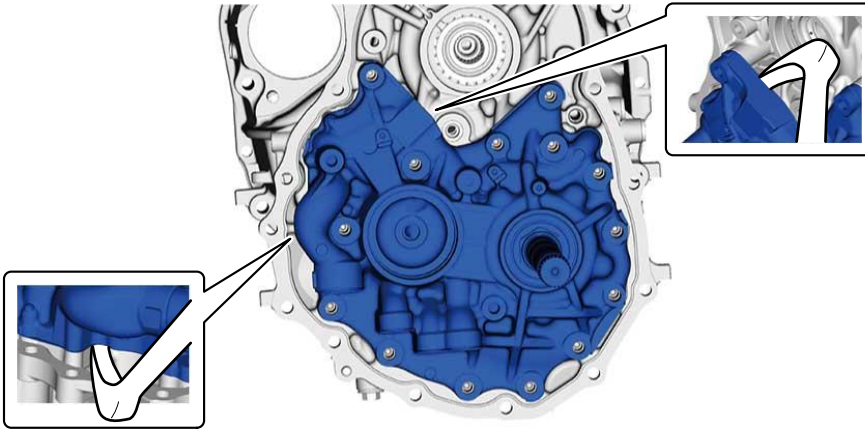


4. Remove the release pressure pipe and then the O-ring.



5. Using a crowbar or similar wrapped with protective tape, expand the clearance and remove the drive pinion retainer.

BWT\*AU



CVT12527

6. Remove the O-rings.

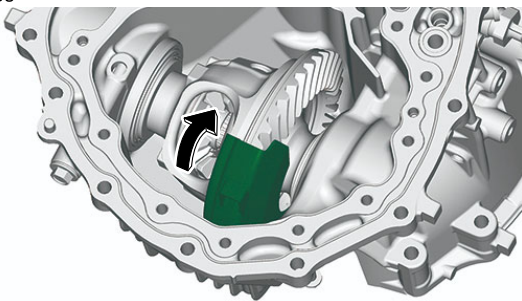
VB-HBU



CVT13346

7. Remove the oil baffle.

VB-HBU

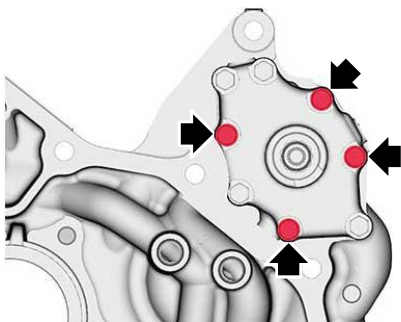


CVT13381

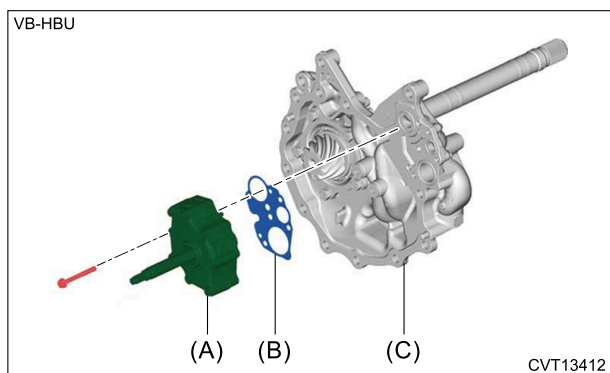
8. Remove the oil pump and the gasket from the drive pinion retainer.

**Caution:**

**Do not remove any bolts other than specified in the figure.**



CVT14405

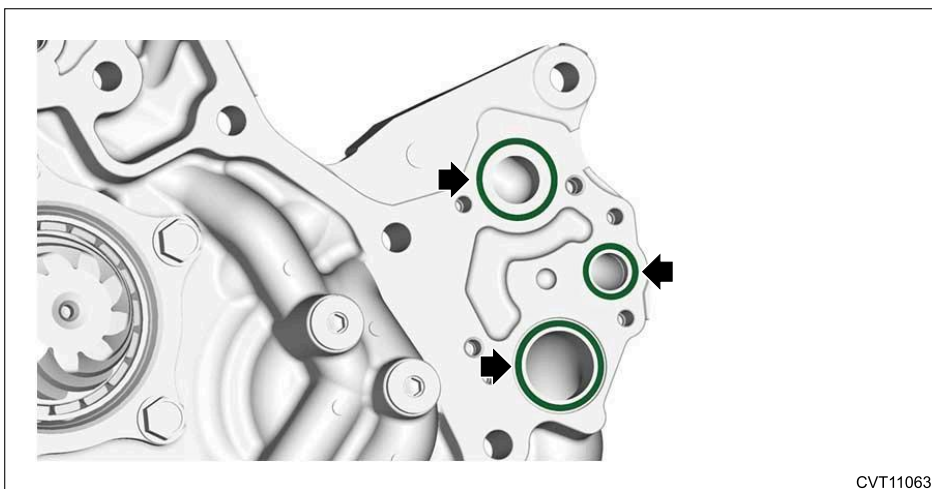


(A) Oil pump

(B) Gasket

(C) Drive pinion retainer

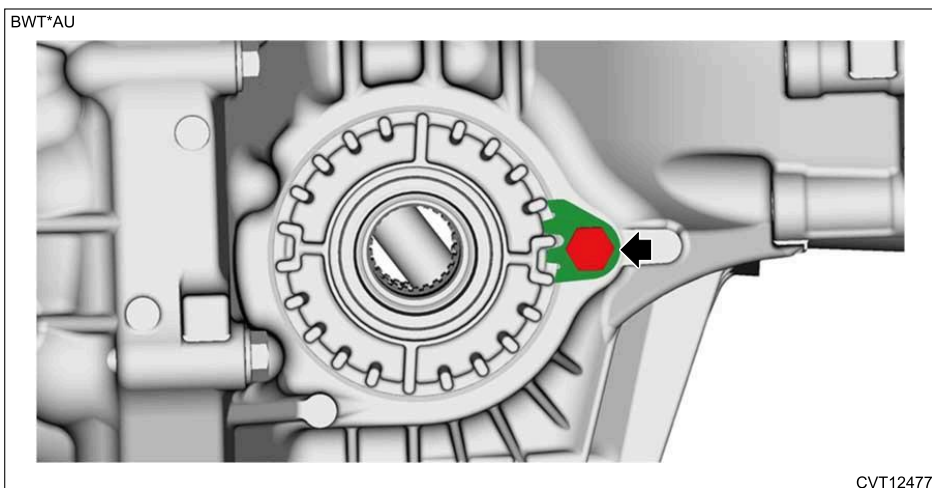
**9.** Remove the O-rings.



**10.** Remove the liquid gasket from the drive pinion retainer and converter case.

**11.** Remove the front differential.

- (1) Remove the lock plate.



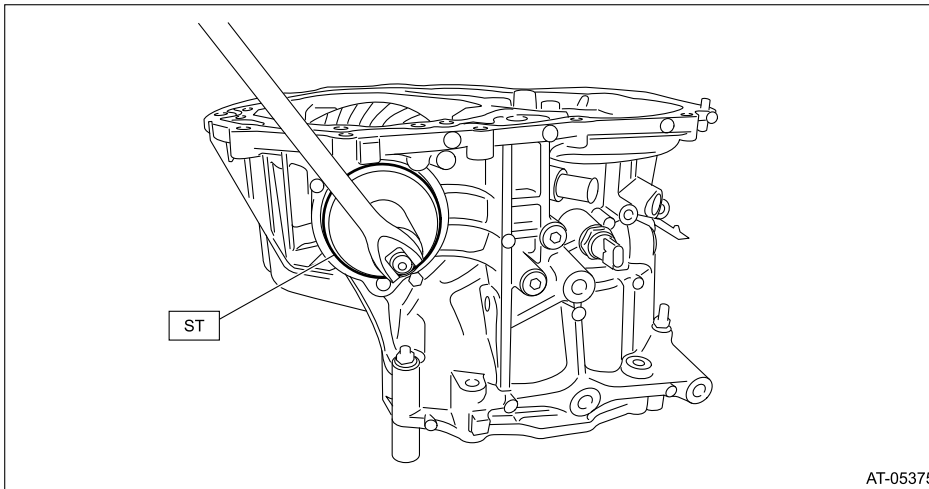
- (2) Remove the differential side retainers using the ST.

**Note:**

- When the ST interferes with the converter case, align the cutout portion with the interference part.
- Support the differential case by hand to avoid damaging the retainer thread hole of the converter case.
- When there is no replacement of the side bearing inner race, do not confuse the left side and right side.

**Preparation tool:**

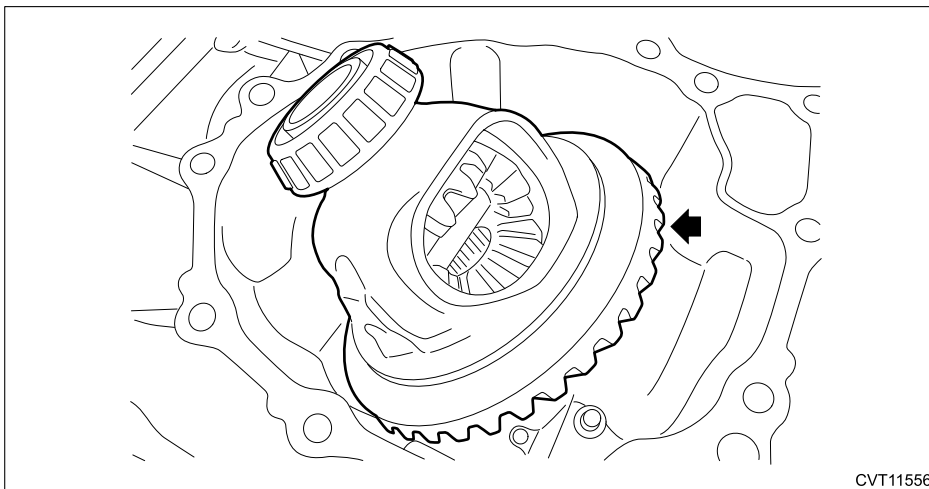
ST: WRENCH COMPL RETAINER (18658AA021)



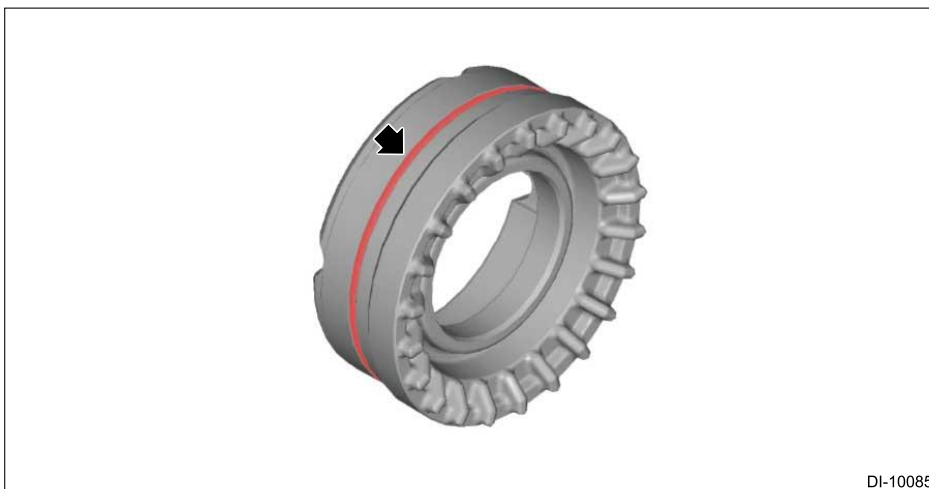
(3) Remove the differential case.

**Caution:**

**Be careful not to damage the attachment section of the differential side retainer.**



(4) Remove the O-ring from the differential side retainer.



CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Drive Pinion

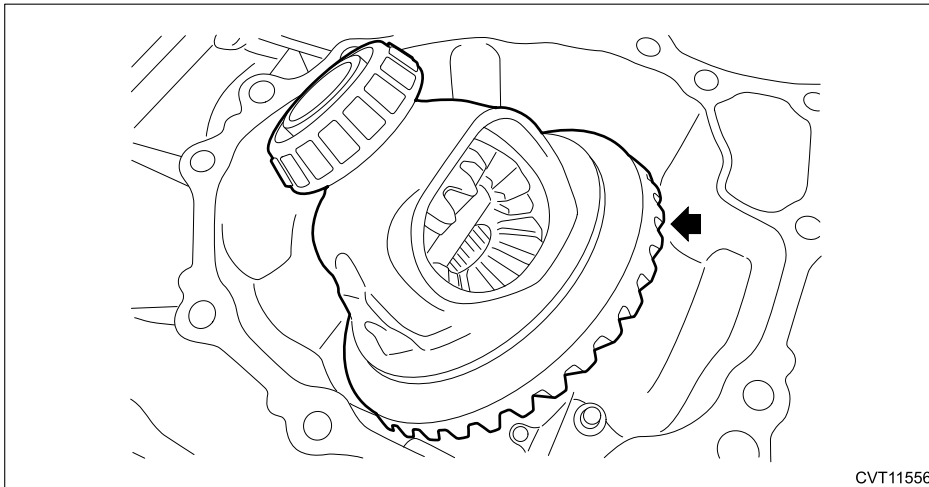
**INSTALLATION**

1. Install the front differential.

(1) Set the differential case.

**Caution:**

**Be careful not to damage the attachment section of the differential side retainer.**



CVT11556

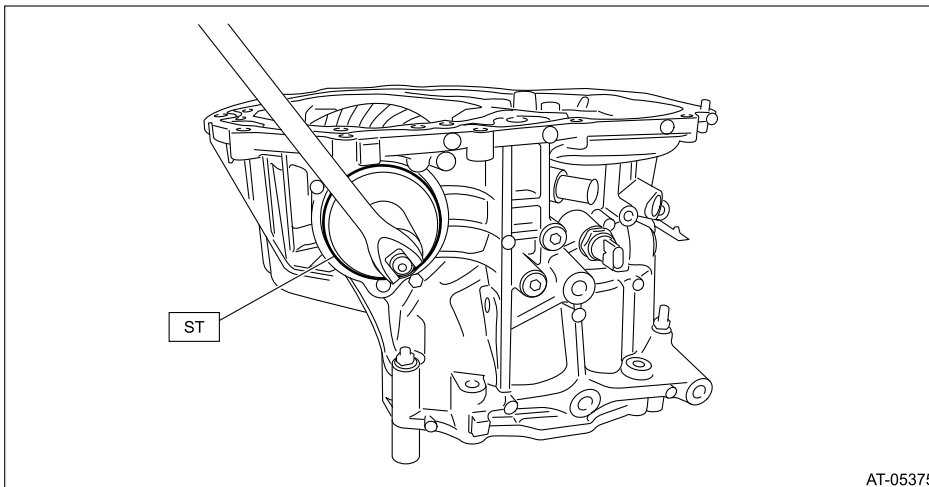
(2) Temporarily install the differential side retainers using the ST.

**Note:**

- Install the O-ring after checking and adjusting the tooth contact of hypoid gear set.
- When there is no replacement of the side bearing inner race, do not confuse the left side and right side.

**Preparation tool:**

ST: WRENCH COMPL RETAINER (18658AA021)



AT-05375

2. Using the ST, install the drive pinion retainer and the release pressure pipe.

**Note:**

**Apply liquid gasket and install the O-ring after checking and adjusting the tooth contact of hypoid gear set.**

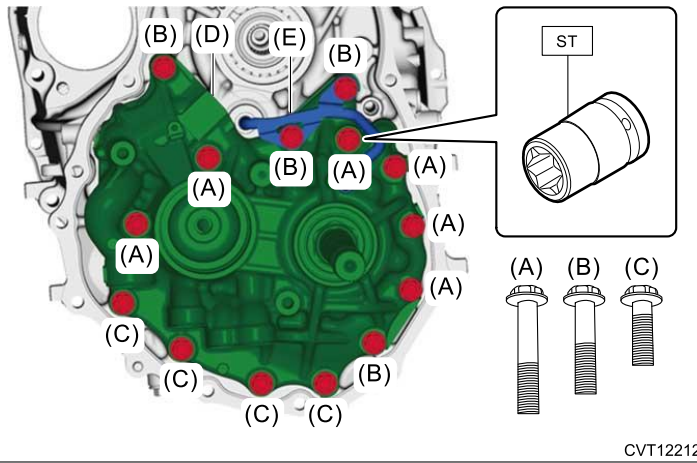
**Preparation tool:**

ST: SOCKET (E20) (18270KA020)

**Tightening torque:**

43 N·m (4.4 kgf-m, 31.7 ft-lb)

BWT\*AU



(A) M10 × 54

(C) M10 × 33

(E) Release pressure pipe

(B) M10 × 45

(D) Drive pinion retainer

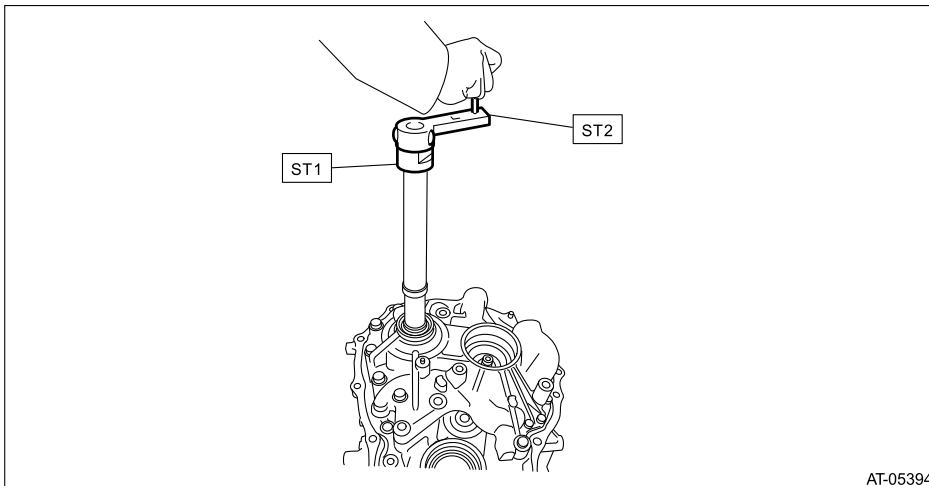
### 3. Hypoid gear set backlash adjustment

(1) Rotate the drive pinion ten times or more using ST1 and ST2.

#### Preparation tool:

ST1: HOLDER (18667AA010)

ST2: WRENCH (499787700)



(2) While rotating the drive pinion, loosen the differential side retainer (RH) using ST, and tighten the differential side retainer (LH) until the drive pinion does not rotate anymore.

#### Note:

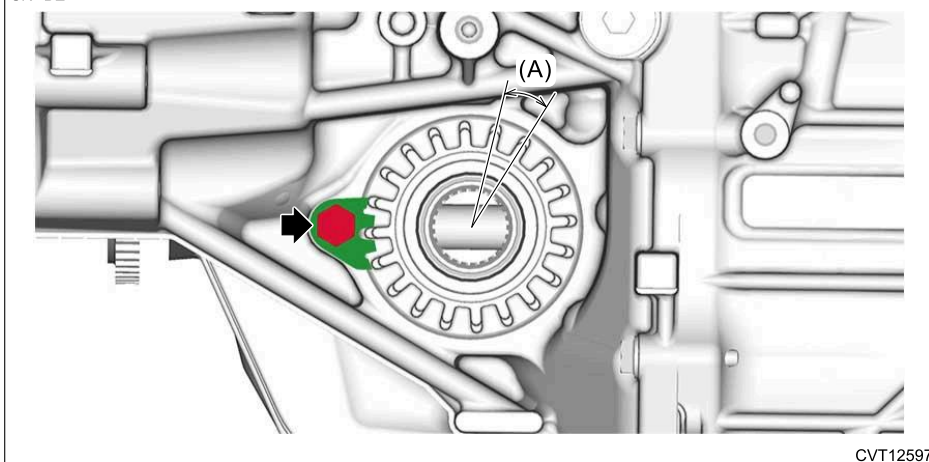
**The backlash is "zero" when the drive pinion comes to the point where it doesn't rotate.**

#### Preparation tool:

ST: WRENCH COMPL RETAINER (18658AA021)

(3) Return the differential side retainer LH by 3 teeth and secure it with the lock plate.

SK\*BE



CVT12597

(A) One tooth

- (4) Tighten until the differential side retainer (RH) does not rotate anymore.

**Caution:**

**Do not tighten with excessive force.**

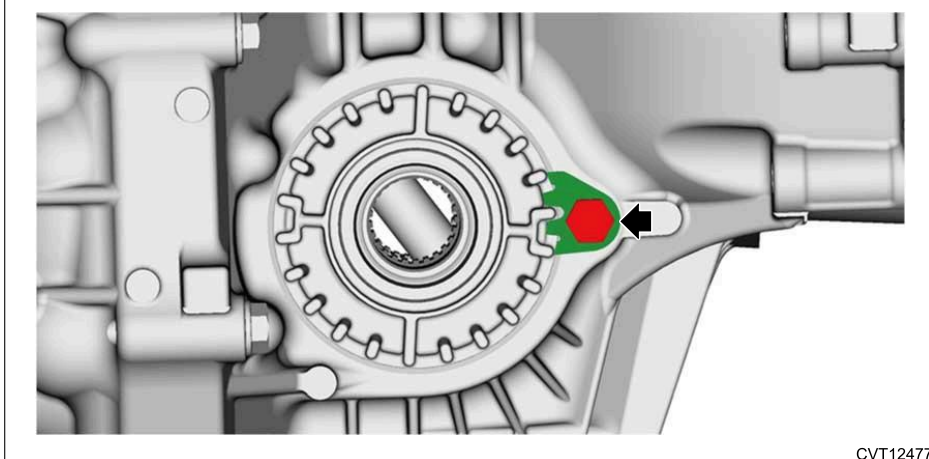
- (5) Rotate the drive pinion 2 or 3 times.  
(6) Further tighten the differential side retainer (RH) by 1 3/4 teeth.

**Note:**

**This sets the preload.**

- (7) Fix the differential side retainer (RH) with the lock plate.

BWT\*AU



CVT12477

- (8) Attach the ST to the converter case.

**Note:**

**The ST is a SUBARU genuine part.**

**Preparation tool:**

ST: AXLE SHAFT (38415AA070)

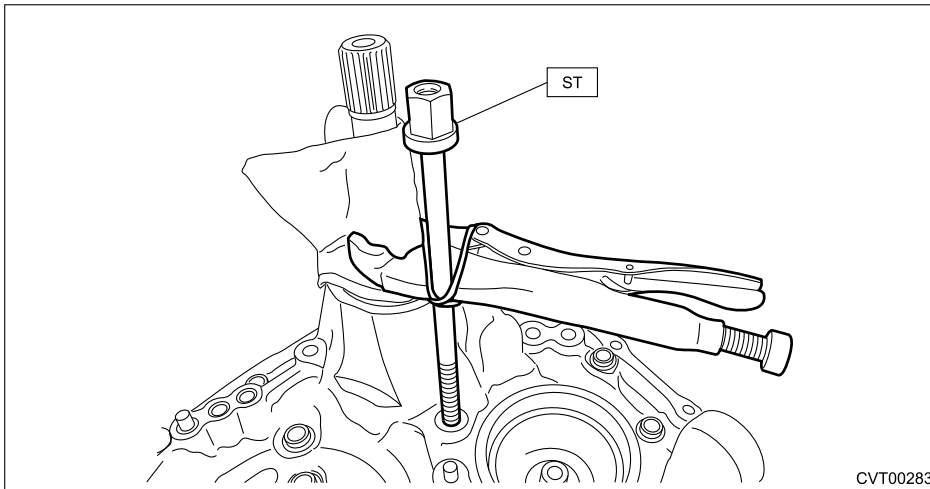
- (9) Install the ST to the drive pinion retainer, and wrap the drive pinion with cloth and pinch with vise pliers. Using a tie-wrap or a wire, fix the vise pliers to the ST.

**Note:**

**Make sure the drive pinion does not move.**

**Preparation tool:**

ST: COMPRESSOR SHAFT (18763AA000)



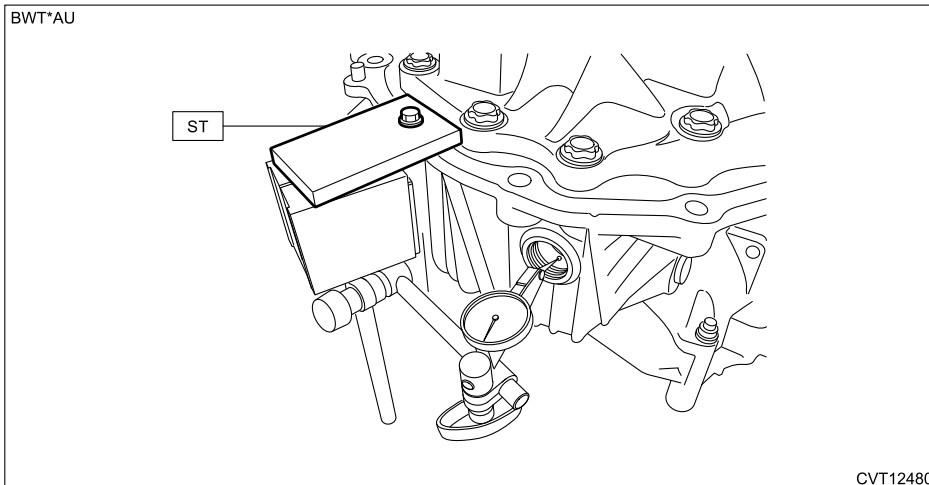
(10) Measure the backlash using ST, dial gauge (lever type) and magnet stand.

**Preparation tool:**

ST: PLATE (498255400)

**Backlash:**

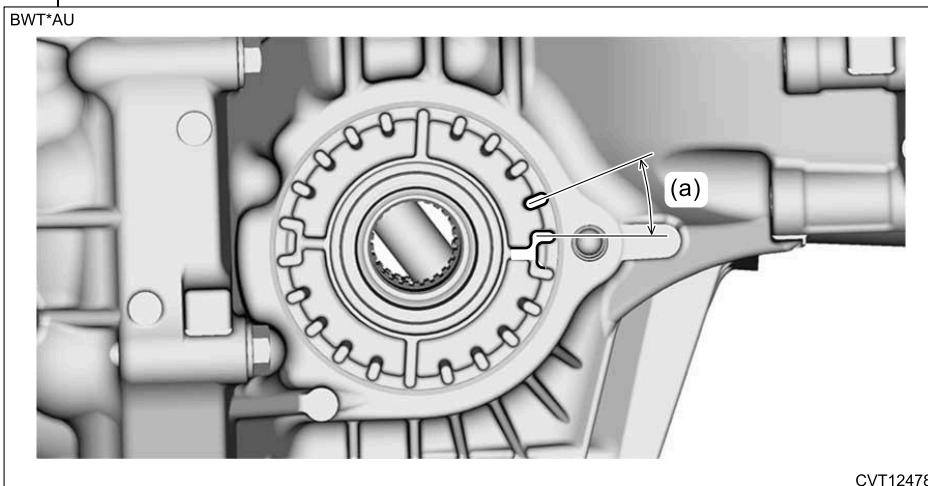
0.13 – 0.18 mm (0.005 – 0.007 in)



(11) If the backlash is outside the standard

**Note:**

Turning the differential side retainer by one tooth (a) changes the backlash approx. 0.05 mm (0.002 in).



- When the backlash is too small

Loosen the differential side retainer (LH) by the required numbers of teeth, and tighten the differential side retainer (RH) by the same numbers of teeth.

- When the backlash is too large

Loosen the differential side retainer (RH) by the required numbers of teeth, and tighten the differential side retainer (LH) by the same numbers of teeth.

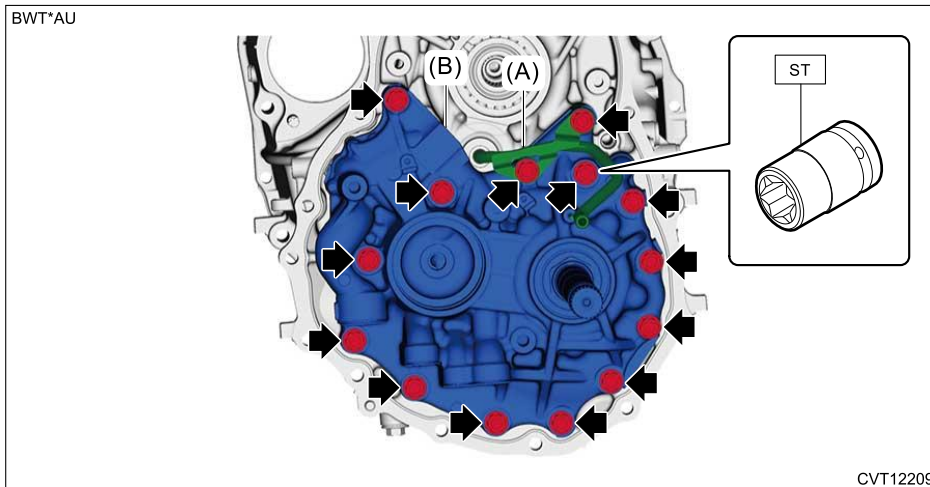
4. Remove the ST (compressor shaft) and vise pliers.

5. Checking and adjusting the tooth contact of hypoid gear set

(1) Using the ST, remove the release pressure pipe (A) and the drive pinion retainer (B).

**Preparation tool:**

ST: SOCKET (E20) (18270KA020)



(2) Apply lead-free red dye evenly on the three to four teeth of the driven gear.

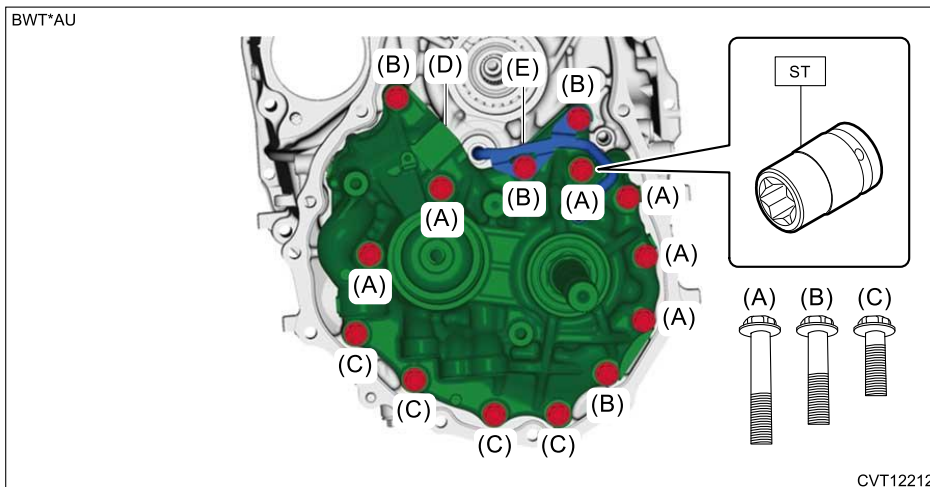
(3) Using the ST, install the drive pinion retainer and the release pressure pipe.

**Preparation tool:**

ST: SOCKET (E20) (18270KA020)

**Tightening torque:**

43 N·m (4.4 kgf-m, 31.7 ft-lb)



(A) M10 × 54

(C) M10 × 33


(E) Release pressure pipe

(B) M10 × 45

(D) Drive pinion retainer

(4) Rotate the drive pinion back and forth several times using ST1 and ST2, and check the tooth contact.

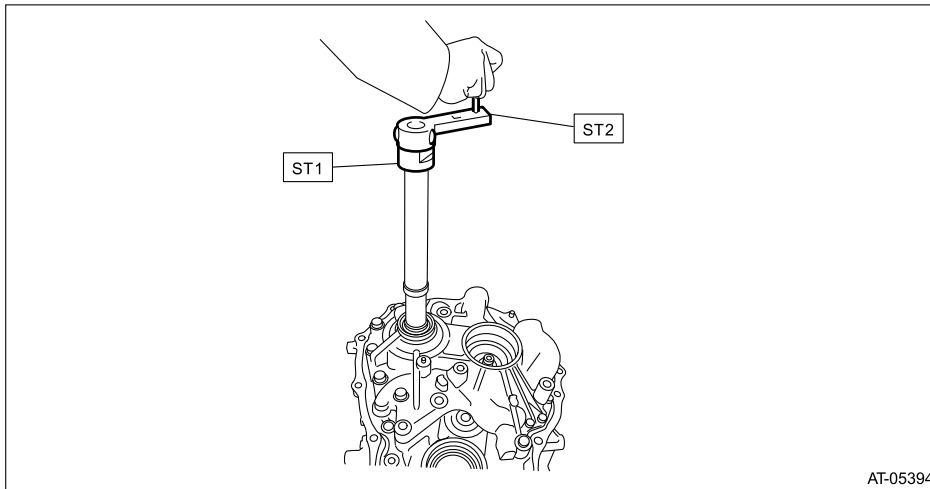
**Note:**

- If proper tooth contact is not obtained, readjust the backlash of hypoid gear set and drive pinion shim. For drive pinion shim adjustment, refer to the "ASSEMBLY".  Ref. to [CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Drive Pinion>ASSEMBLY](#).
- Wipe off the lead-free red dye completely after the check and adjustment are completed.

**Preparation tool:**

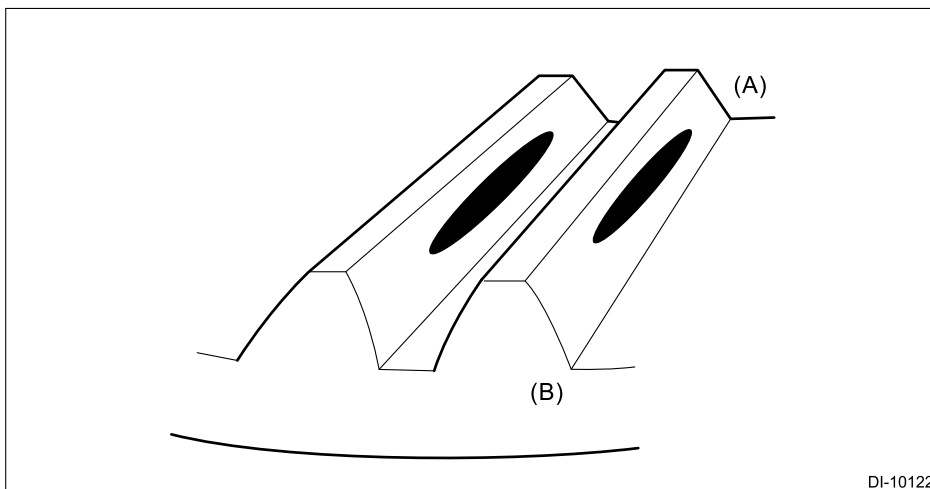
ST1: HOLDER (18667AA010)

ST2: WRENCH (499787700)



**a. Correct tooth contact**

Tooth contact pattern is slightly shifted toward toe side under no-load rotation. (When driving, it moves towards the heel side.)

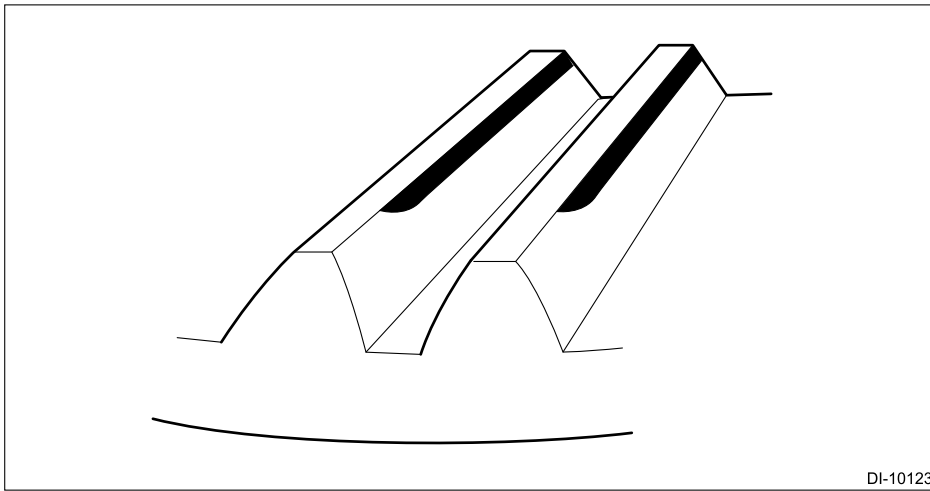


(A) Toe side (inside)

(B) Heel side (outside)

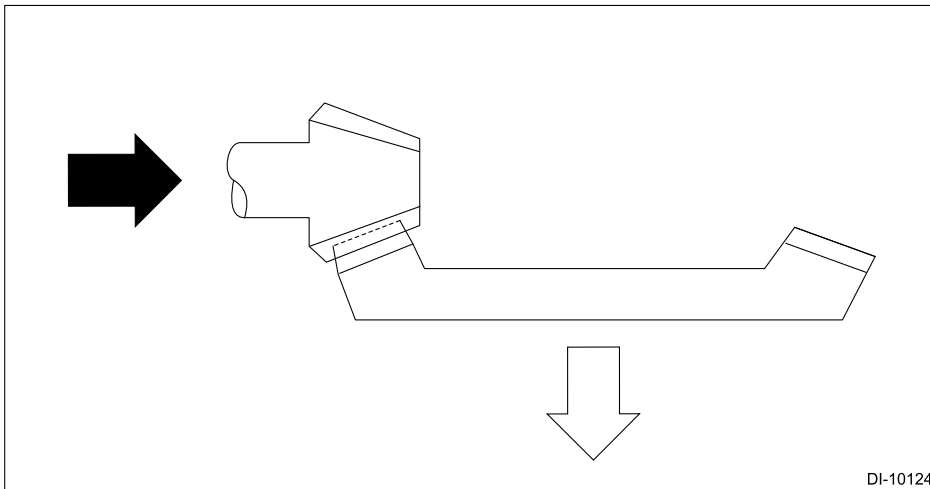
**b. Face contact**

Cause: Excessive backlash



DI-10123

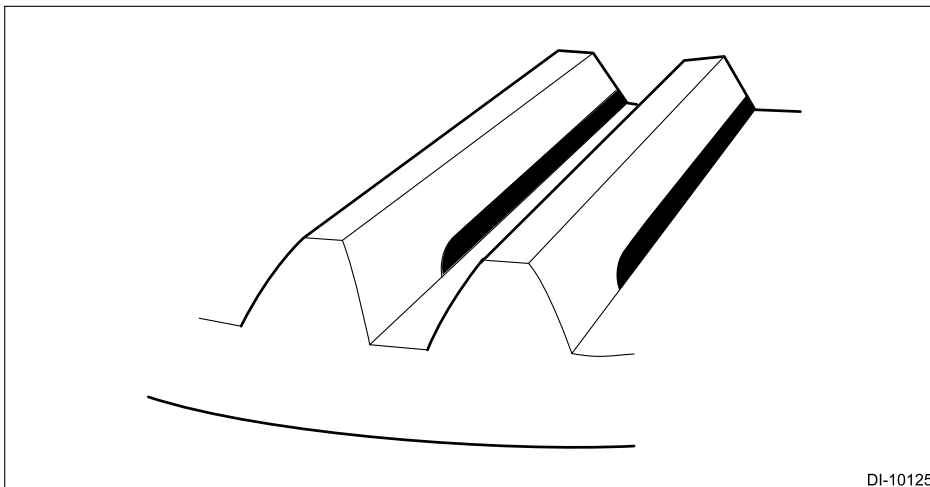
Adjustment: Loosen the differential side retainer (RH) by the required numbers of teeth, and tighten the differential side retainer (LH) by the same numbers of teeth.  
 Otherwise, adjust the drive pinion shim thickness and move the drive pinion to the driven gear side.



DI-10124

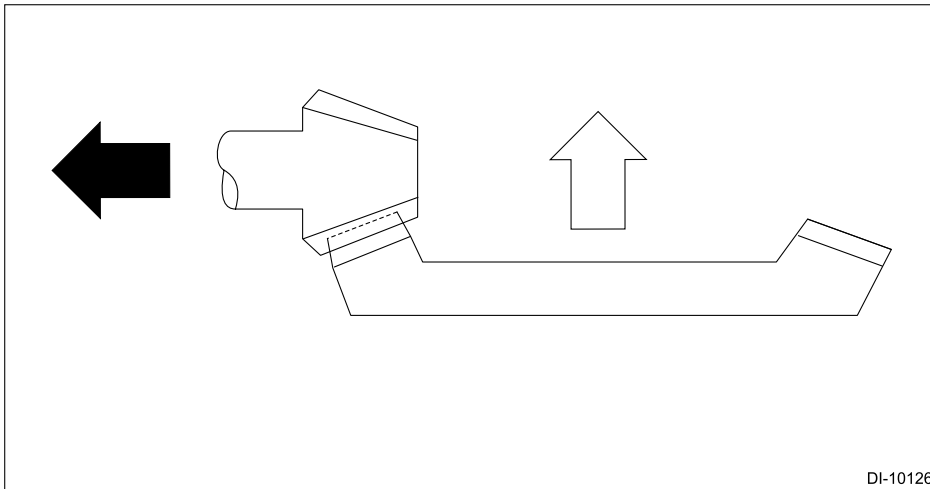
**c. Flank contact**

Cause: Too small backlash



DI-10125

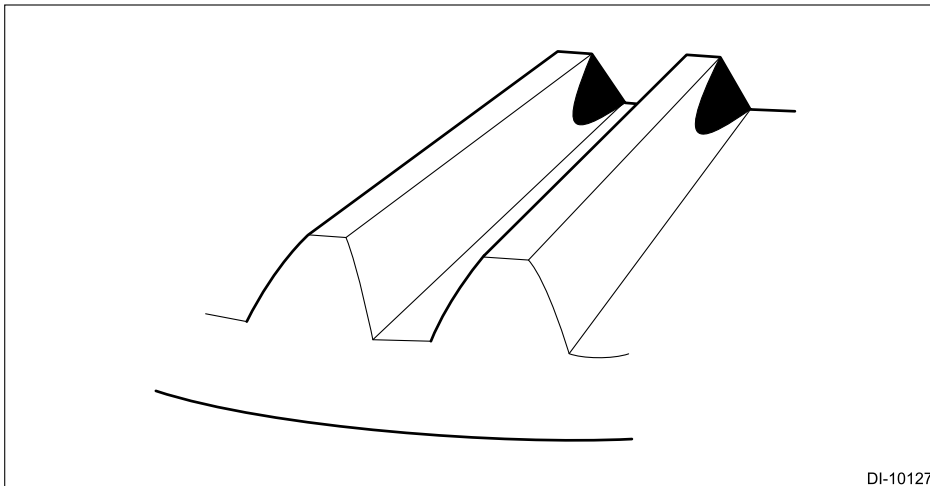
Adjustment: Loosen the differential side retainer (LH) by the required numbers of teeth, and tighten the differential side retainer (RH) by the same numbers of teeth.  
 Otherwise, adjust the drive pinion shim thickness and separate the drive pinion from the driven gear.



DI-10126

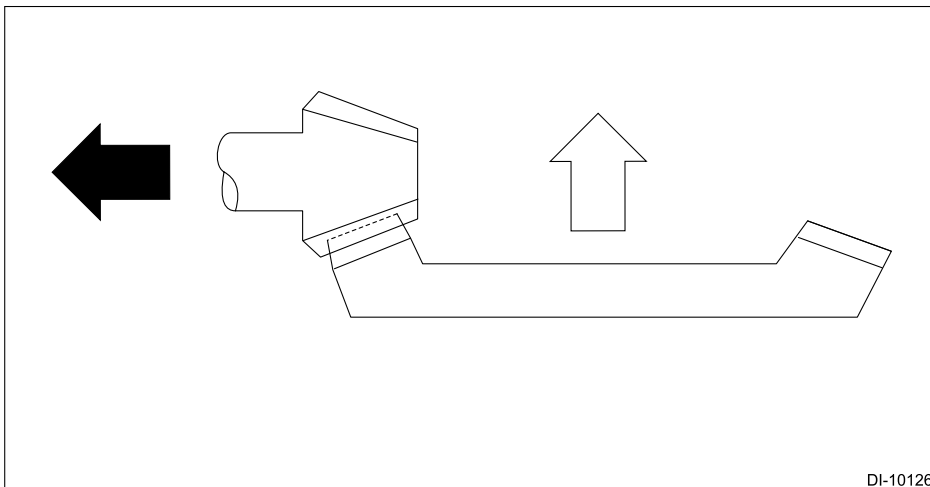
**d. Toe contact (inside contact)**

Cause: Teeth contact area is too small.



DI-10127

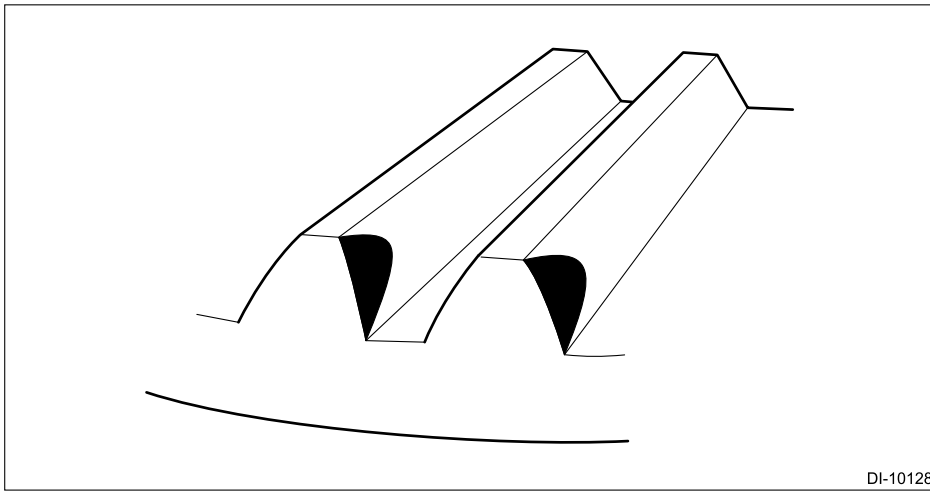
Adjustment: Adjust the drive pinion shim thickness and separate the drive pinion from the driven gear.



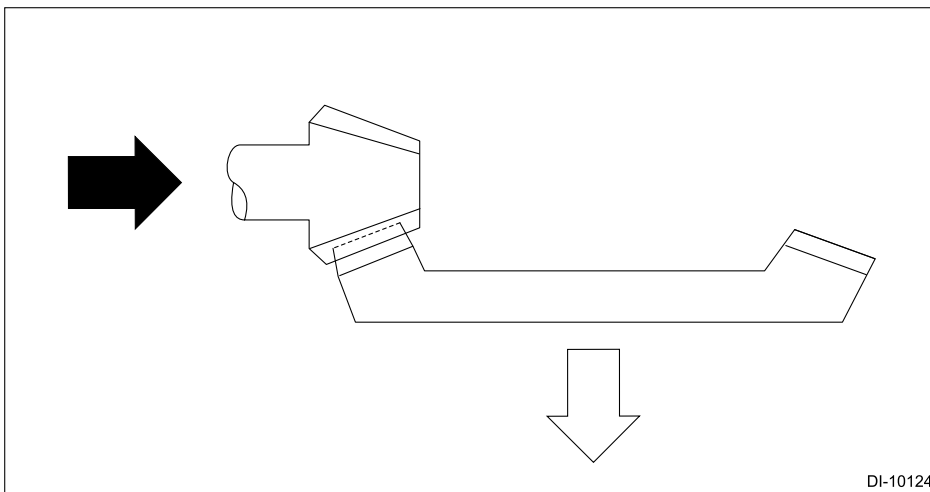
DI-10126

**e. Heel contact (outside end contact)**

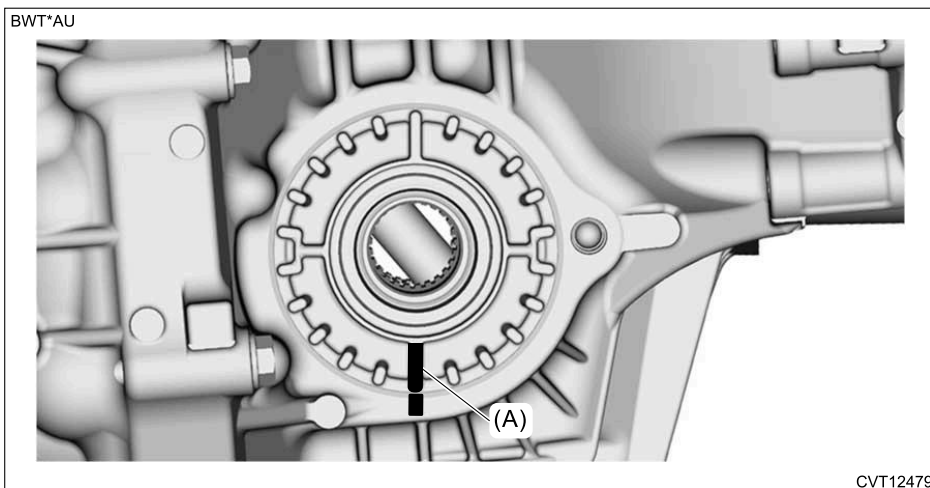
Cause: Teeth contact area is too small.



Adjustment: Adjust the drive pinion shim thickness and move the drive pinion to the driven gear side.



6. Put alignment marks (A) on the converter case and differential side retainer.



7. Install a new O-ring to the differential side retainer.

**Note:**  
**Perform this procedure one side first, then the other side.**

(1) Using the ST, loosen the differential side retainer to the position where the mounting groove of the O-ring appears.

**Note:**  
**Record the number of the turns loosened.**

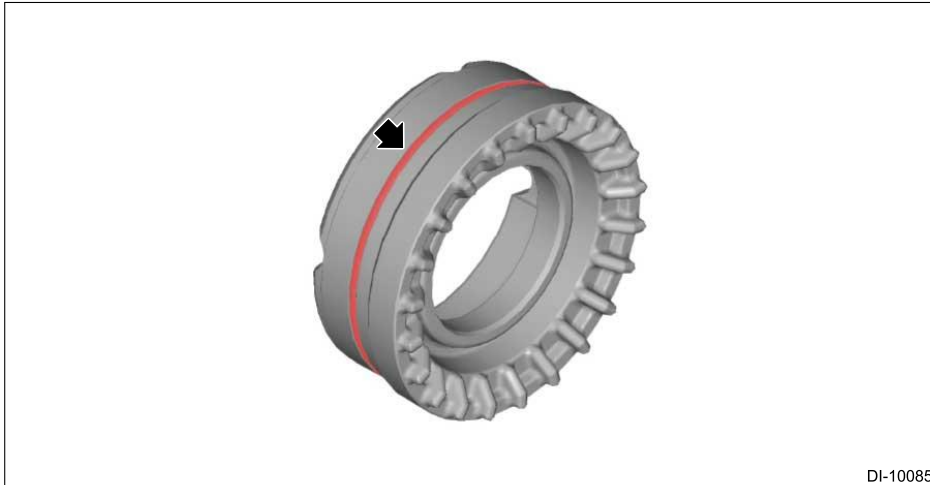
**Preparation tool:**

ST: WRENCH COMPL RETAINER (18658AA021)

- (2) Fit a new O-ring, and tighten the differential side retainer into the position before it was loosened.

**Note:**

**Apply differential gear oil to the threads of the differential side retainer and O-rings.**

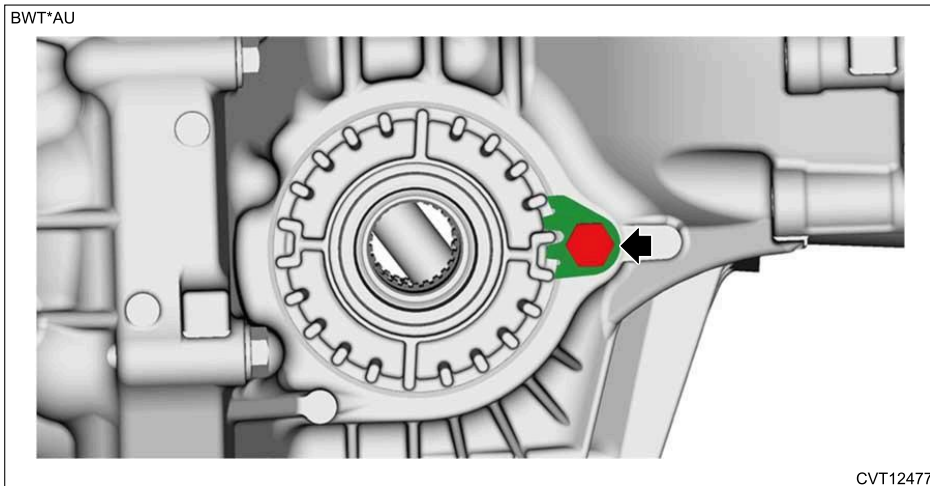


DI-10085

- 8.** Install the lock plate.

**Tightening torque:**

25 N·m (2.5 kgf-m, 18.4 ft-lb)



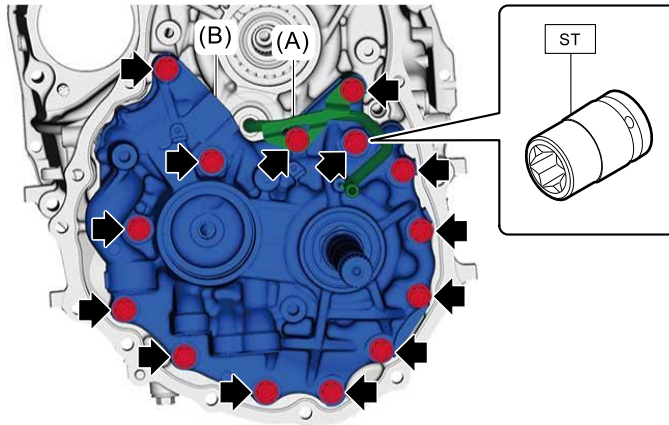
CVT12477

- 9.** Using the ST, remove the release pressure pipe (A) and the drive pinion retainer (B).

**Preparation tool:**

ST: SOCKET (E20) (18270KA020)

BWT\*AU



CVT12209

**10.** Check the projection (A) of the knock pins.

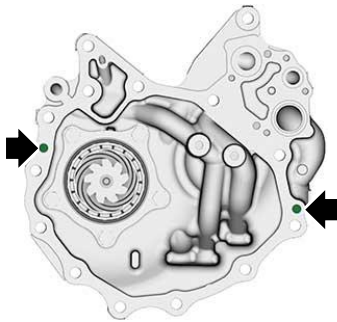
**Note:**

**When attached on the converter case side, install them on the drive pinion retainer side.**

**Specification:**

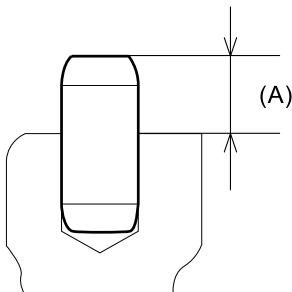
10.5 – 11.5 mm (0.41 – 0.45 in)

VB-HBU



CVT13325

VB-HBU

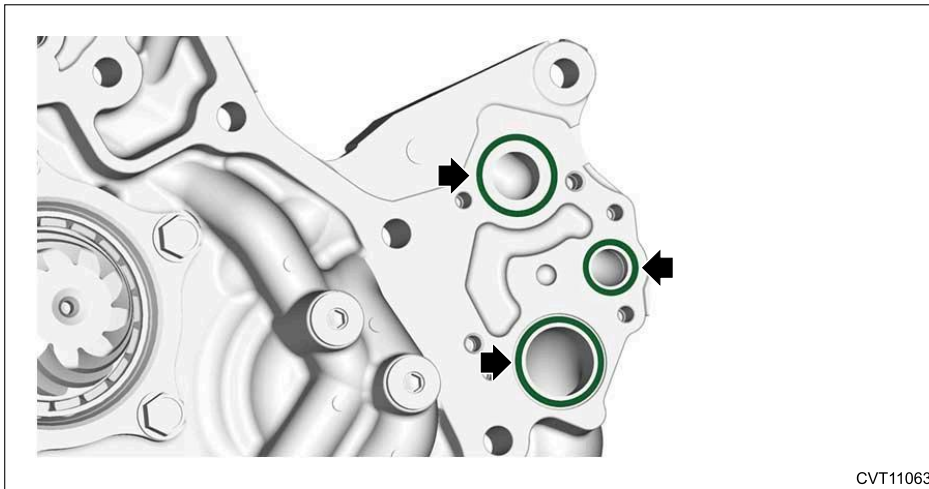


CVT13370

**11.** Install a new O-ring.

**Note:**

**Apply CVTF to the O-rings.**



CVT11063

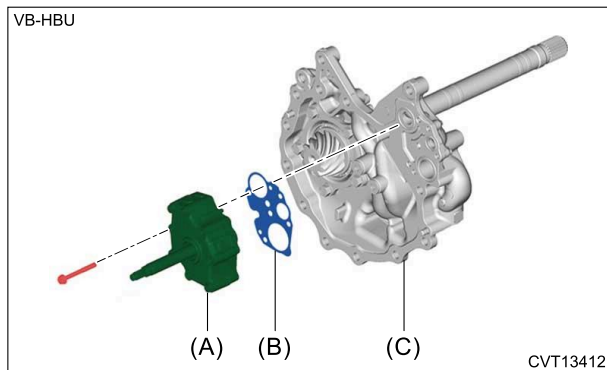
**12.** Using a new gasket, install the oil pump.

**Note:**

**Apply CVTF to the threaded portion of the bolts and seat surface.**

**Tightening torque:**

8.5 N·m (0.9 kgf-m, 6.3 ft-lb)

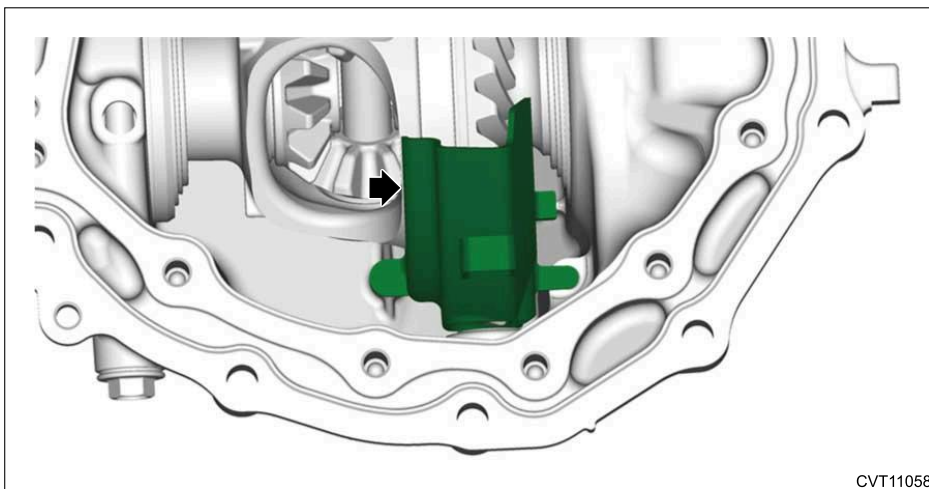


(A) Oil pump

(B) Gasket

(C) Drive pinion retainer

**13.** Install the oil baffle.

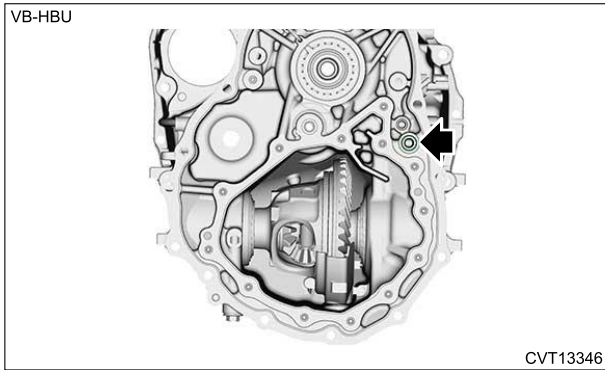


CVT11058

**14.** Install a new O-ring.

**Note:**

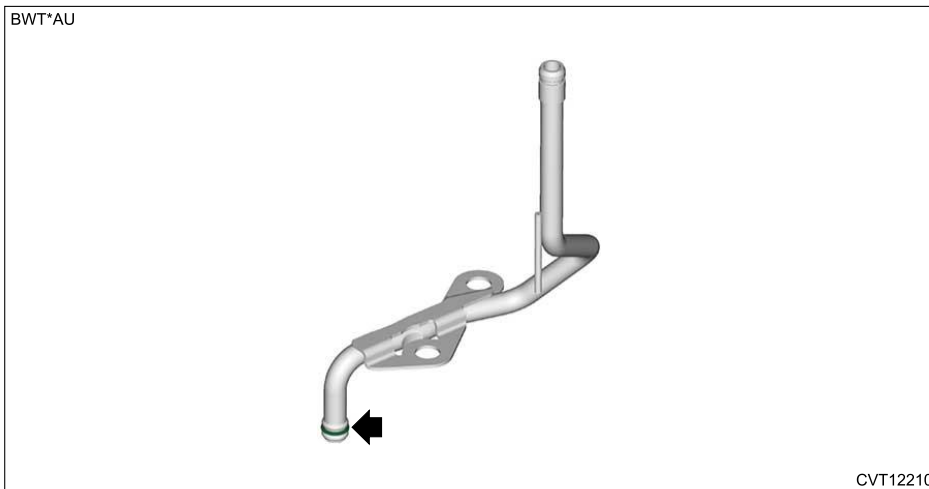
**Apply CVTF to the O-rings.**



**15.** Install a new O-ring to the release pressure pipe.

**Note:**

**Apply CVTF to the O-rings.**



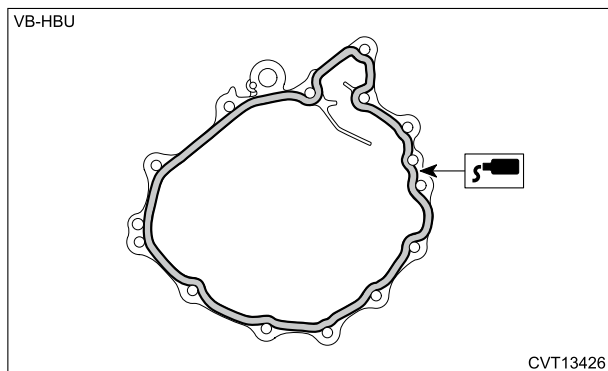
**16.** Apply liquid gasket to the mating surface of the converter case as shown in the figure.

**Note:**

- Before applying liquid gasket, degrease the liquid gasket seal surfaces of the converter case and the drive pinion retainer.
- Install within 5 min. after applying liquid gasket.

**Preparation items:**

Liquid gasket: THREE BOND 1216J or equivalent



**17.** Using the ST, install the drive pinion retainer and the release pressure pipe to the converter case.

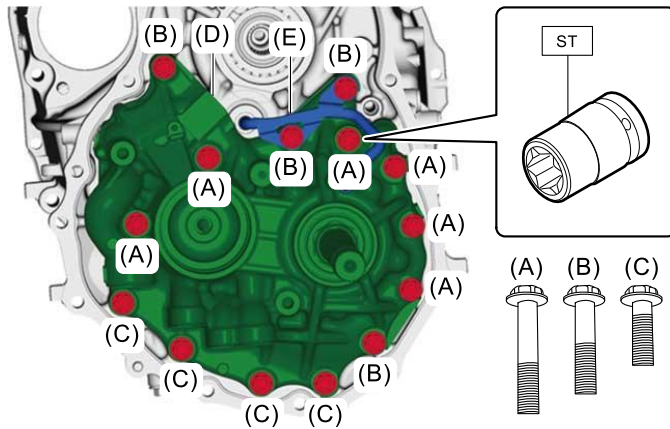
**Preparation tool:**

ST: SOCKET (E20) (18270KA020)

**Tightening torque:**

43 N·m (4.4 kgf-m, 31.7 ft-lb)

BWT\*AU



CVT12212

(A) M10 × 54

(C) M10 × 33

(E) Release pressure pipe

(B) M10 × 45

(D) Drive pinion retainer

**18.** Select the primary pulley shim when the drive pinion retainer or converter case is replaced.

**Note:**

**It is not necessary when the primary pulley and secondary pulley are replaced.**

(1) Using the ST, measure the height "H1" from the ST end face to the primary pulley bearing catch surface.

**Note:**

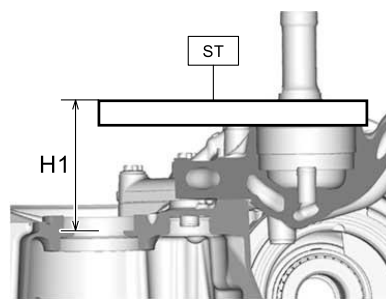
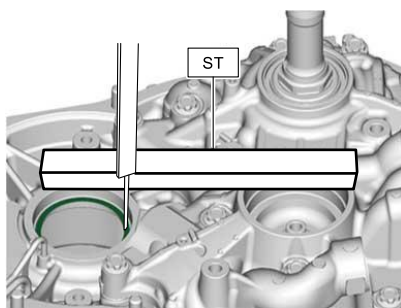
**Measure at four points and calculate the average.**

**Preparation tool:**

ST: GAUGE (499575400)

BWT\*AU

■:(A)



CVT12257

(A) Measurement surface

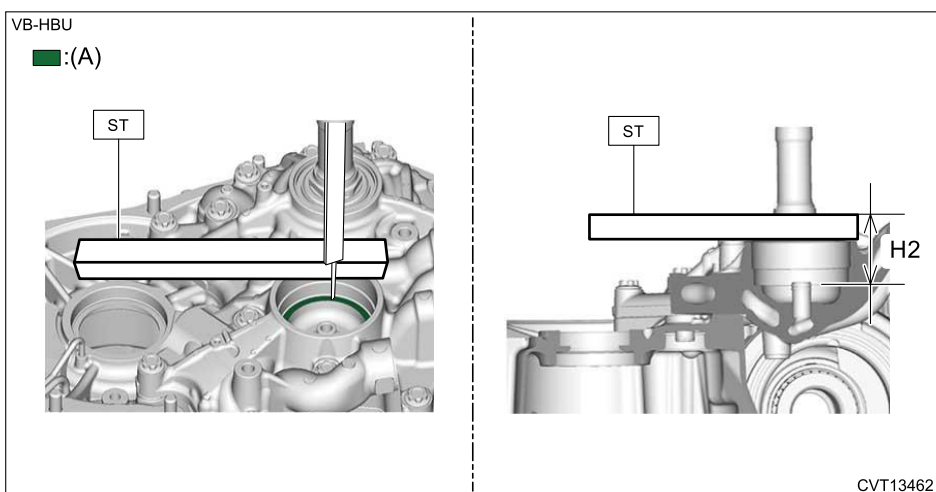
(2) Using the ST, measure the height "H2" from the ST end face to the secondary pulley bearing catch surface.

**Note:**

**Measure at four points and calculate the average.**

**Preparation tool:**

ST: GAUGE (499575400)



(A) Measurement surface

(3) Using the following calculation, measure the dimension "B" from the primary pulley bearing catch surface to the secondary pulley bearing catch surface.

$$B = H1 - H2$$

B	Dimension (mm (in)) from the primary pulley bearing catch surface to the secondary pulley bearing catch surface
H1	Measured value (mm (in)) of step (1)
H2	Measured value (mm (in)) of step (2)

(4) Using the following calculation and selection criteria table, select an appropriate thickness of the primary pulley shim.

**Note:**

**Adjust using 1 – 2 pieces.**

$$C = A - B$$

C	Dimension difference (mm (in))
A	Calculated value (mm (in)) of removal step 2 (4)
B	Calculated value (mm (in)) of step (3)

**Primary pulley shim selection criteria table for calculated values**

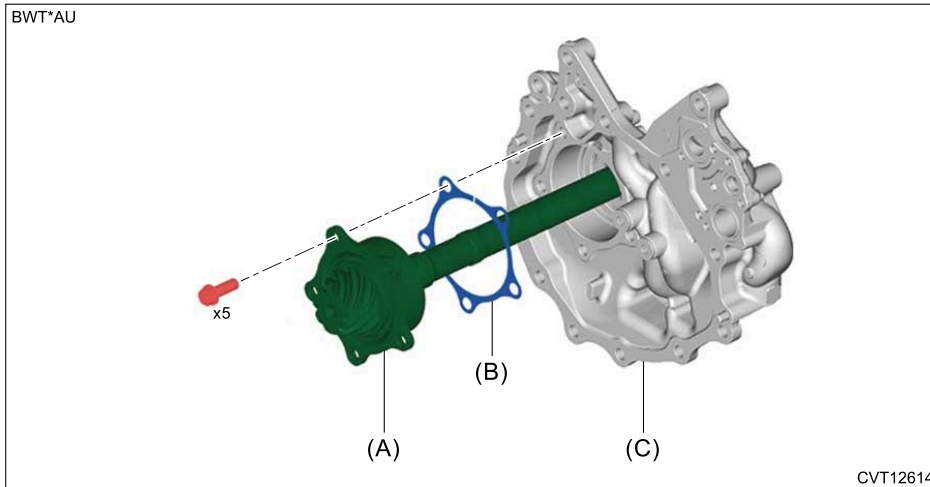
Dimension difference (mm (in))	Thickness of primary pulley shim to be selected
0.281 – 0.300 (0.01106 – 0.01181)	Select the shim 0.3 mm (0.012 in) thicker than the primary pulley shim before replacement.
0.181 – 0.280 (0.00712 – 0.01102)	Select the shim 0.2 mm (0.008 in) thicker than the primary pulley shim before replacement.
0.081 – 0.180 (0.00318 – 0.00708)	Select the shim 0.1 mm (0.004 in) thicker than the primary pulley shim before replacement.
0.080 – –0.070 (0.00315 – –0.00275)	Select a new shim of the same thickness as the primary pulley shim before replacement.
–0.071 – –0.170 (–0.00279 – –0.00669)	Select the shim 0.1 mm (0.004 in) thinner than the primary pulley shim before replacement.
–0.171 – –0.230 (–0.00673 – –0.00905)	Select the shim 0.2 mm (0.008 in) thinner than the primary pulley shim before replacement.
–0.231 – –0.300 (–0.00909 – –0.01181)	Select the shim 0.3 mm (0.012 in) thinner than the primary pulley shim before replacement.

**19.** Install the primary pulley and secondary pulley. Ref. to [CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Primary Pulley and Secondary Pulley>INSTALLATION.](#)

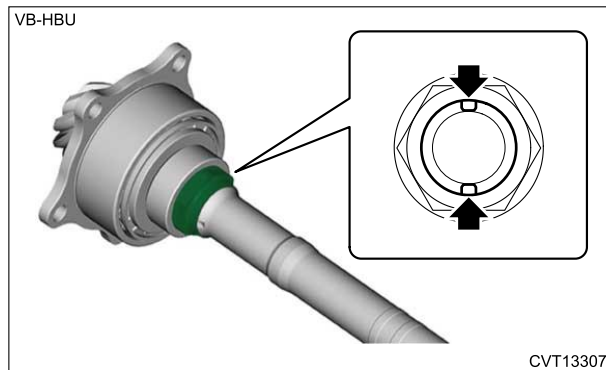
## DISASSEMBLY



1. Remove the drive pinion and drive pinion shim.



2. Flatten the tab of the lock nut.

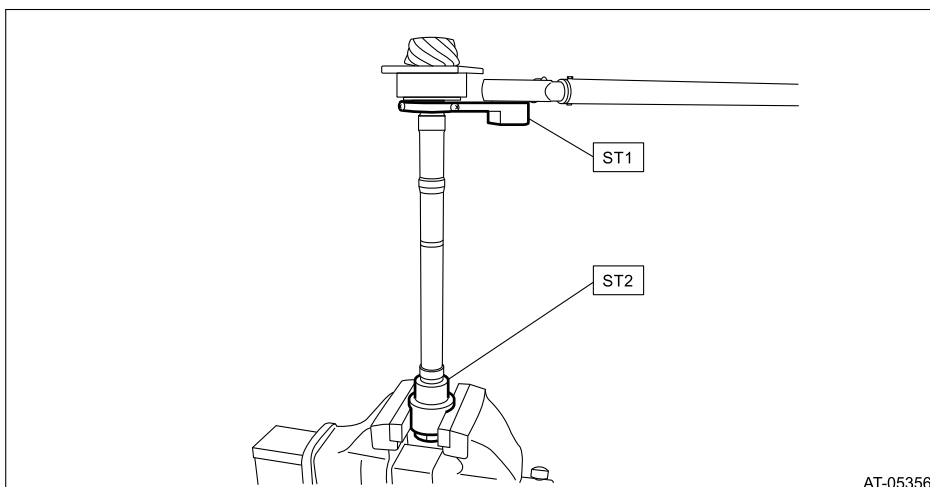


3. Using ST1 and ST2, fix at the spline portion of drive pinion to remove the lock nut.

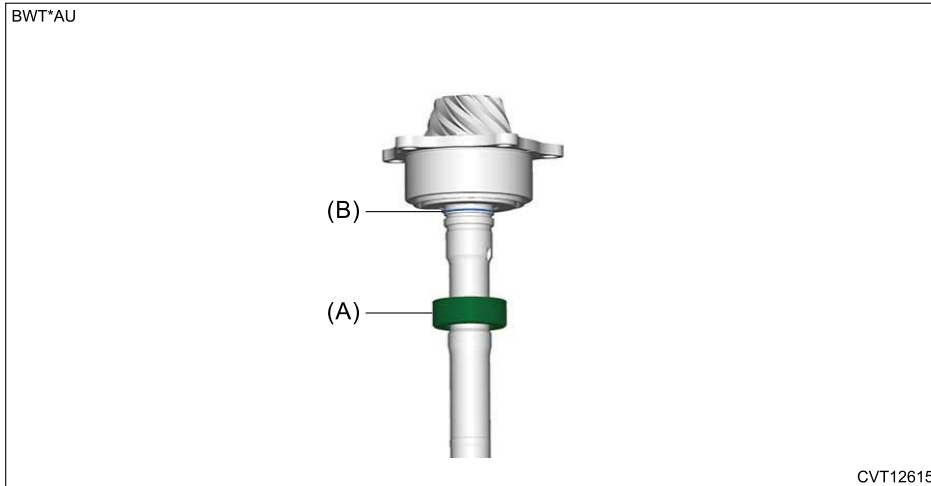
### Preparation tool:

ST1: WRENCH (499787700)

ST2: HOLDER (18667AA010)



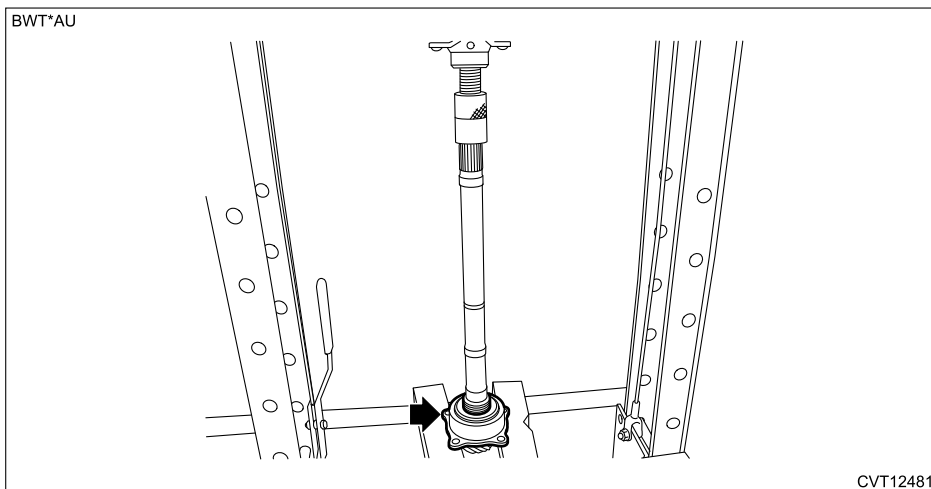
4. Remove the drive pinion collar (A) and O-ring (B).



5. Using a press, remove the taper roller bearing inner race (rear side) and taper roller bearing outer race.

**Caution:**

**Be careful not to drop the drive pinion.**



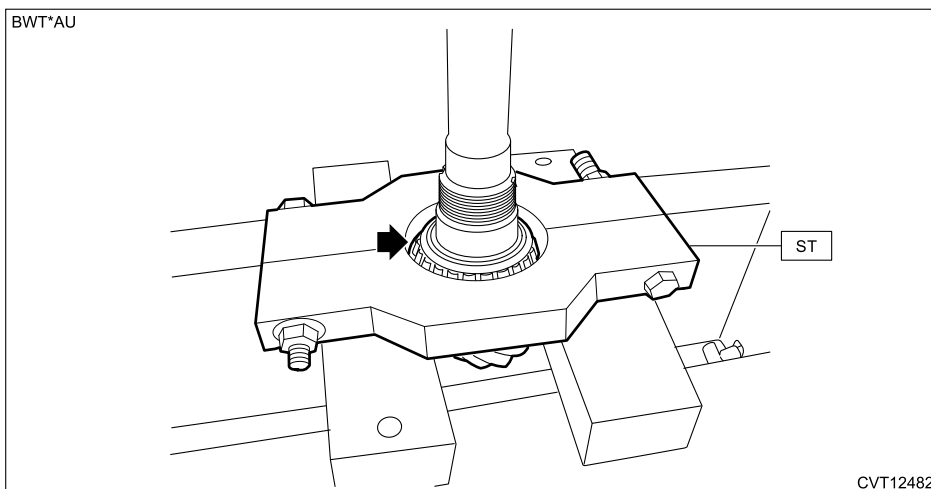
6. Using the ST and a press, remove the taper roller bearing inner race (front side).

**Caution:**

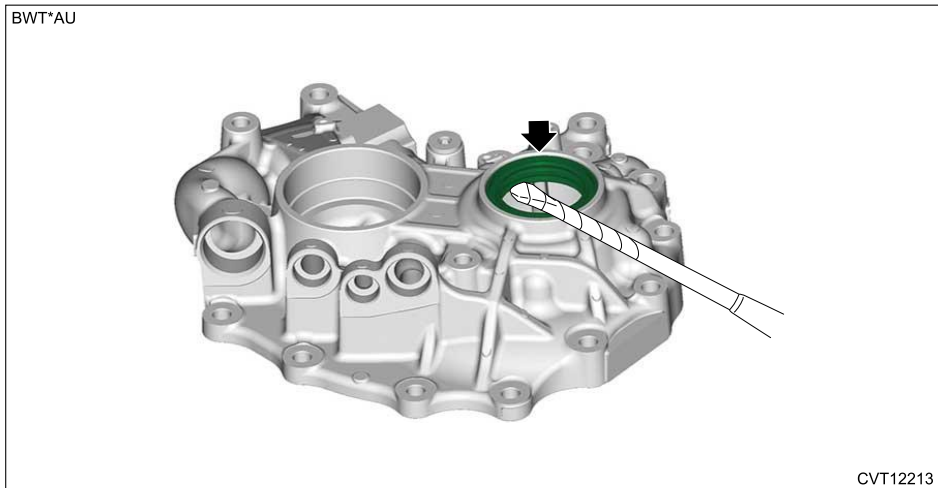
**Be careful not to drop the drive pinion.**

**Preparation tool:**

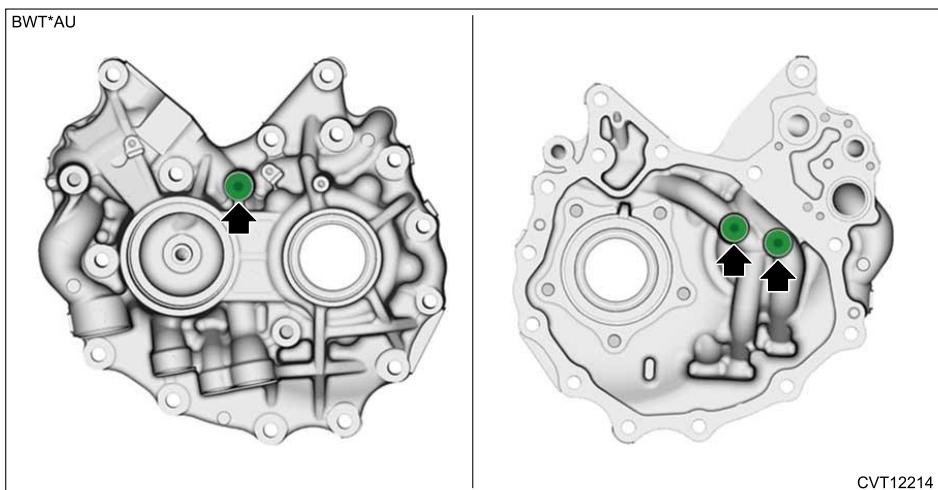
ST: REMOVER (498077600)



7. Remove the oil seal from the drive pinion retainer using a flat tip screwdriver wrapped with protection tape.



8. Remove the plug.



## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Drive Pinion

### ASSEMBLY

1. Install the plugs with new O-rings.

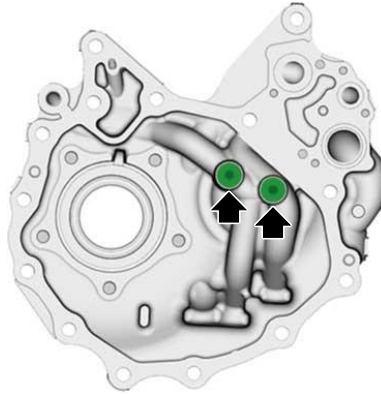
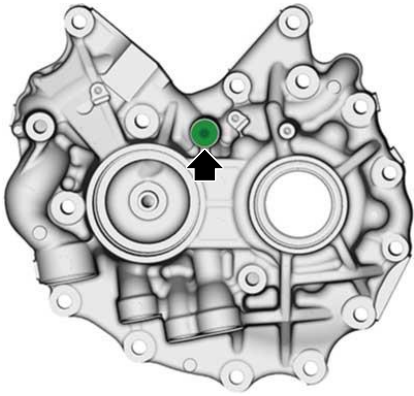
**Note:**

**Apply CVTF to the O-rings.**

**Tightening torque:**

25 N·m (2.5 kgf-m, 18.4 ft-lb)

BWT\*AU



CVT12214

2. Using the ST, install the oil seal.

**Note:**

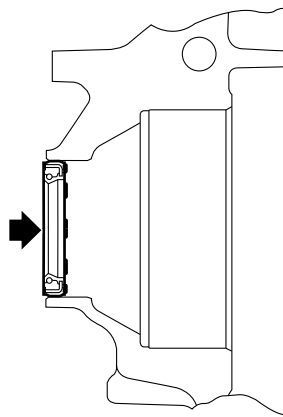
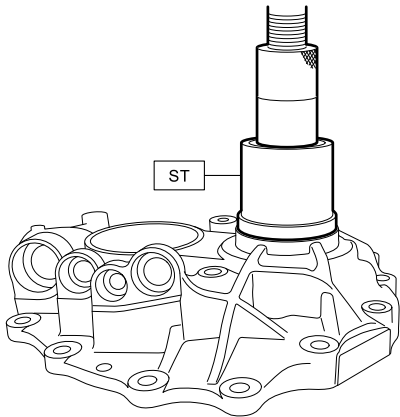
- Apply CVTF to the press-fitting area.
- Make sure to install in the right direction.

**Preparation tool:**

ST: INSTALLER (20099AE020)

- Pulley side

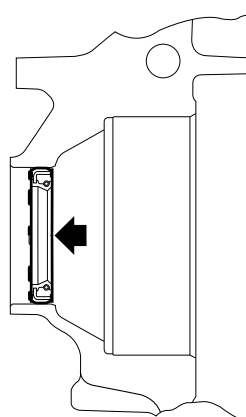
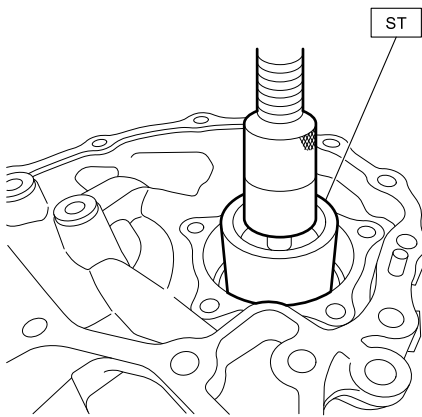
VB-HBU



CVT13372

- Front differential side

VB-HBU



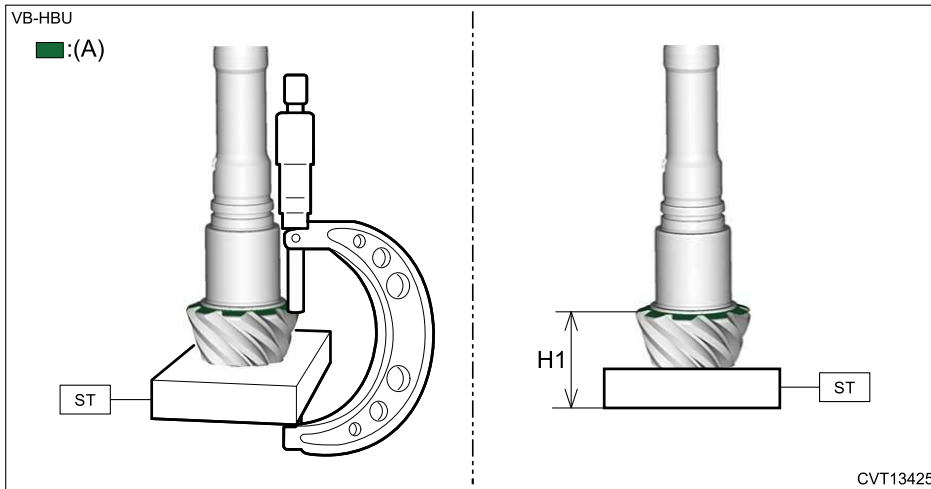
CVT13373

3. Select the drive pinion shim.

(1) Using the ST and a micrometer, measure the dimension "H1" from the ST end face to the drive pinion (gear portion) end face.

**Preparation tool:**

ST: GAUGE (499575600)

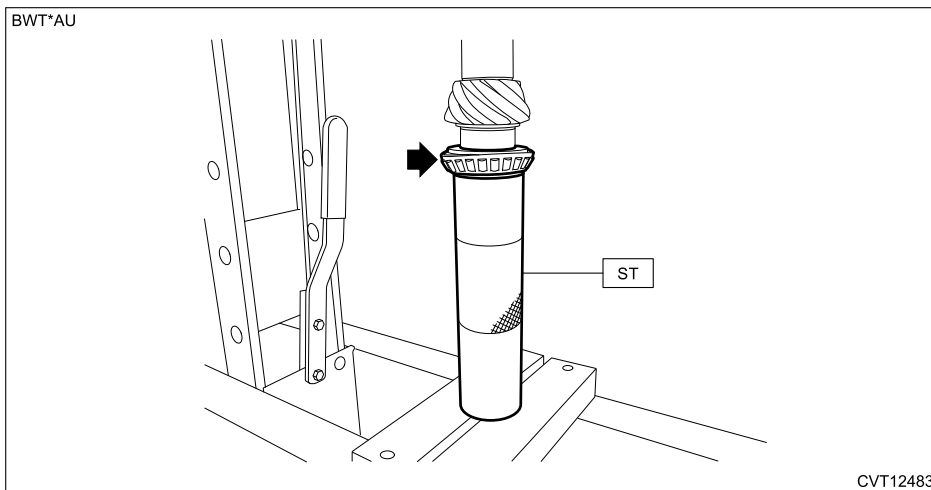


(A) Measurement surface

(2) Using the ST and a press, press-fit a new taper roller bearing inner race (front side).

**Preparation tool:**

ST: INSTALLER (499277200)



(3) Using a press, press-fit a new taper roller bearing outer race (A) and a new taper roller bearing (rear side) (B).

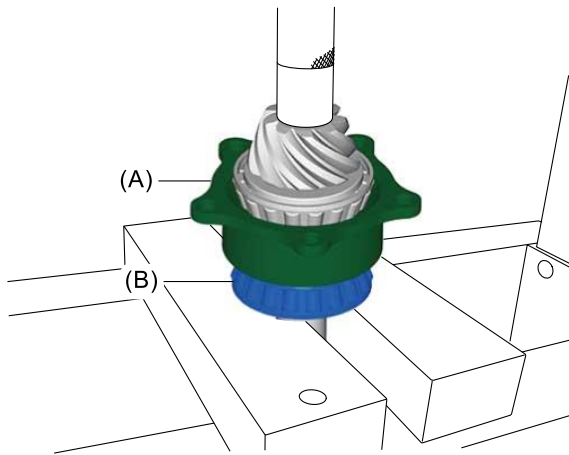
**Caution:**

**Apply differential gear oil to the roller part of taper roller bearing, and rotate it 20 times or more.**

**Note:**

**Press in to a position where the taper roller bearing rotates smoothly without play.**

BWT\*AU



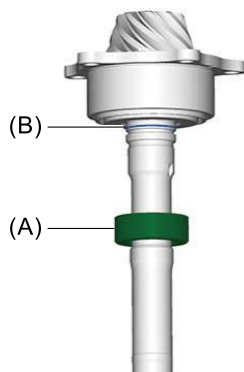
CVT12552

(4) Install a new O-ring (B) and the drive pinion collar (A).

**Note:**

**Apply the differential gear oil to O-ring.**

BWT\*AU



CVT12615

(5) Tighten the lock nuts using ST1 and ST2.

**Caution:**

**Be sure to use a new lock nut.**

**Note:**

**Tighten the lock nut with ST1 and torque wrench aligned straight.**

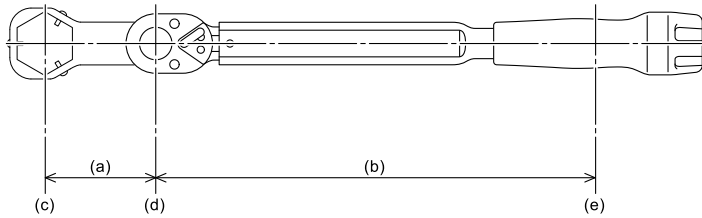
**Preparation tool:**

ST1: WRENCH (499787700)

ST2: HOLDER (18667AA010)

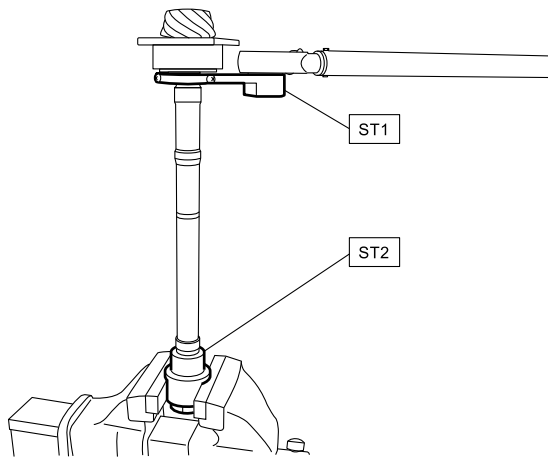
**Tightening torque:**

Calculation formula
$T = 116 \text{ N}\cdot\text{m} (11.8 \text{ kgf}\cdot\text{m}, 85.6 \text{ ft}\cdot\text{lb}) \times L / (100 \text{ mm} (3.94 \text{ in}) + L)$
T: Tightening torque
L: Effective length of torque wrench
<b>Note:</b> <b>If the effective length of the torque wrench used is unknown, consult the manufacturer of the torque wrench.</b>



CVT11149

- (a) Effective length of the ST1 (100 mm (3.94 in))
- (b) Effective length of the torque wrench (L)
- (c) Center of drive square of the ST1
- (d) Center of drive square of the torque wrench
- (e) Center of the position where a force is applied by hand



AT-05356

- (6) Measure the initial load of the taper roller bearing using the ST and a spring scale.

**Caution:**

**Before checking the initial load, apply differential gear oil to the roller part of taper roller bearing, and rotate it 20 times or more to measure the value.**

**Note:**

**If it exceeds the standard value, replace the taper roller bearing.**

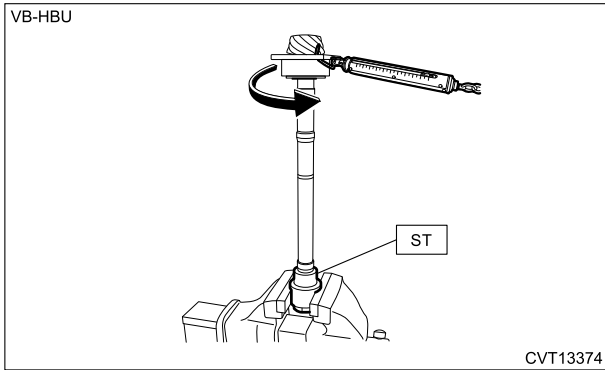
**Initial load:**

**Standard**

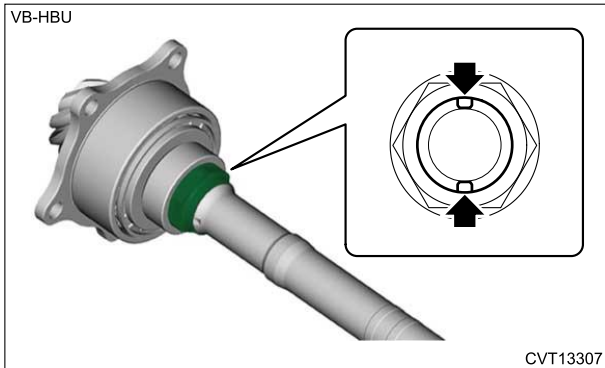
1.5 – 4.7 kgf (14.33 – 46.37 N, 3.22 – 10.42 lbf)

**Preparation tool:**

ST: HOLDER (18667AA010)



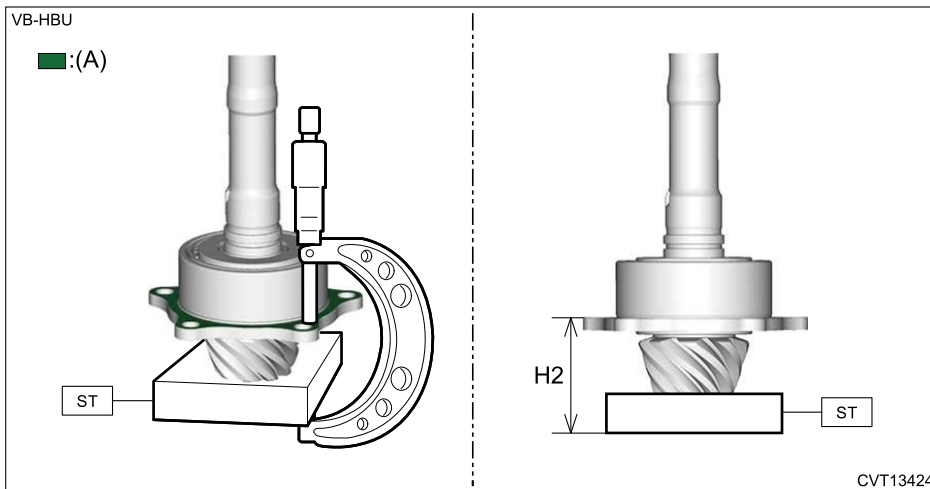
(7) Crimp the lock nut.



(8) Using the ST and a micrometer, measure the dimension "H2" from the ST end face to the taper roller bearing outer race end face.

**Preparation tool:**

ST: GAUGE (499575600)



(A) Measurement surface

(9) Using the following calculation, calculate an appropriate thickness "T" of the drive pinion shim.

**Note:**

**Adjust using 1 – 3 pieces.**

$$T = (H2 - H1) - 6.55 \text{ mm (0.258 in)}$$

T	Drive pinion shim thickness (mm (in))
H1	Measured value (mm (in)) of step (1)
H2	Measured value (mm (in)) of step (8)
6.55 mm (0.258 in)	Constant

4. Install the drive pinion shim and drive pinion.

**Caution:**

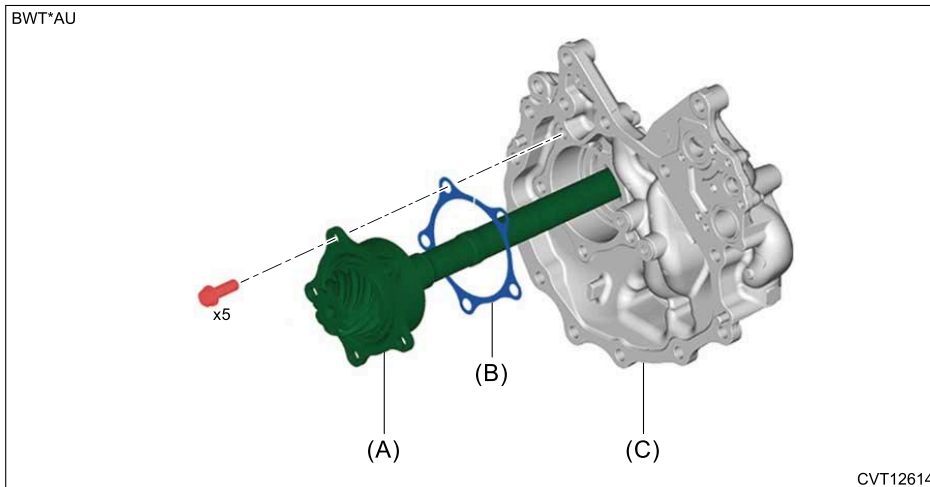
**Be careful not to bend the drive pinion shim.**

**Note:**

**Apply differential gear oil to the oil seal lip.**

**Tightening torque:**

70 N·m (7.1 kgf-m, 51.6 ft-lb)




(A) Drive pinion

(B) Drive pinion shim

(C) Drive pinion retainer


## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Drive Pinion

### INSPECTION

1. Check that there is no deformation, cracks or other damages.
2. Check the bearing for smooth rotation.
3. Check the initial load of the bearing.  [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Drive Pinion>ASSEMBLY.](#)


## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Front Differential

### REMOVAL

For removal procedures of the front differential, refer to "Drive Pinion".  [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Drive Pinion>REMOVAL.](#)

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Front Differential

### INSTALLATION

For installation procedures of the front differential, refer to "Drive Pinion".  [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Drive Pinion>INSTALLATION.](#)

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Front Differential

### DISASSEMBLY



#### Note:

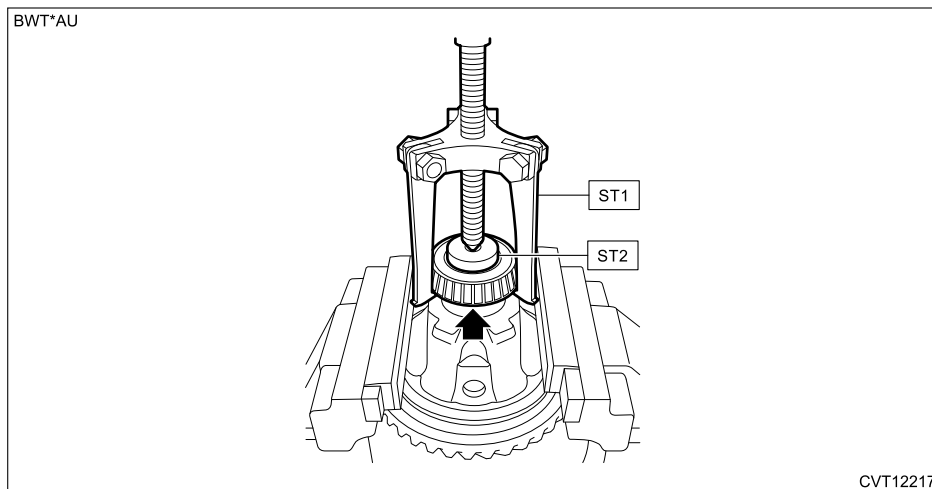
**When replacing the side bearing, always replace it together with inner race and outer race.**

1. Remove the side bearing inner races on both sides using ST1 and ST2.

#### Preparation tool:

ST1: PULLER ASSY (399703600)

ST2: SEAT (398497701)

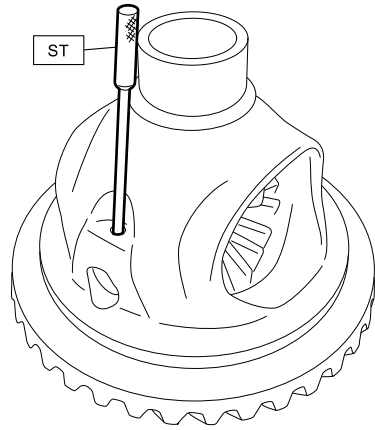


2. Using the ST, remove the spring pin.

#### Preparation tool:

ST: STRAIGHT PIN REMOVER (899904100)

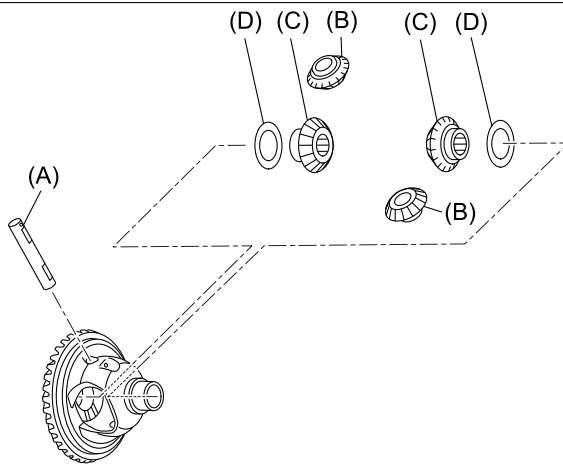
BWT\*AU



CVT12417

3. Remove the pinion shaft, and remove the differential bevel pinion, differential bevel gear and thrust washer.

BWT\*AU



CVT12234

(A) Pinion shaft

(C) Differential bevel gear

(D) Thrust washer

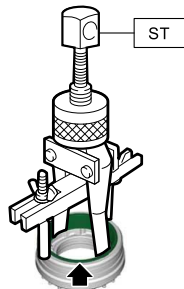
(B) Differential bevel pinion

4. Remove the side bearing outer race using the ST.

**Preparation tool:**

ST: PULLER ASSY (398527700)

VB-HBU



CVT13410

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Front Differential

**ASSEMBLY**

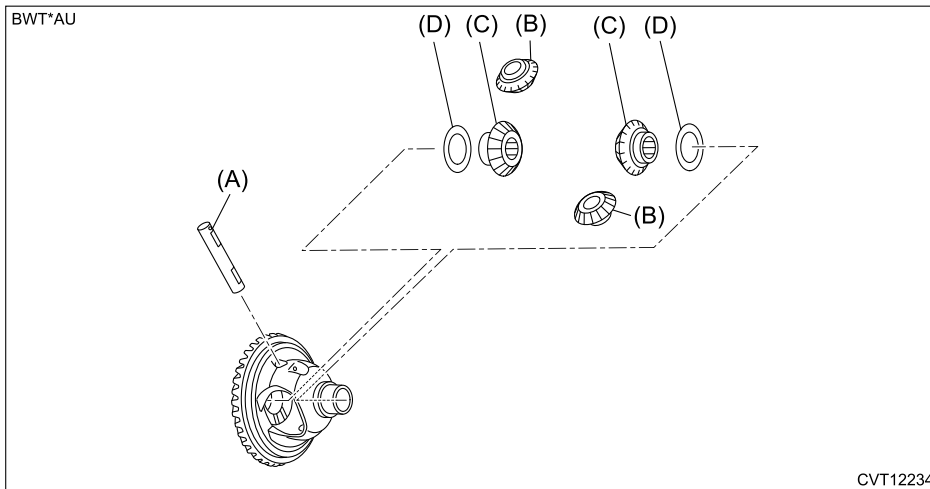
**Note:**

When replacing the side bearing, always replace it together with inner race and outer race.

1. Set the differential bevel pinion, thrust washer and differential bevel gear, and then install the pinion shaft.

**Note:**

Apply differential gear oil on the sliding portion of the differential bevel gear, thrust washer and pinion shaft.



- (A) Pinion shaft                      (C) Differential bevel gear                      (D) Thrust washer  
(B) Differential bevel pinion

2. Measure the backlash between the differential bevel gear and differential bevel pinion, and select a thrust washer.

- (1) Install the ST to the differential case.

**Note:**

The ST is a SUBARU genuine part.

**Preparation tool:**

ST: Axle shaft (38415AA070)

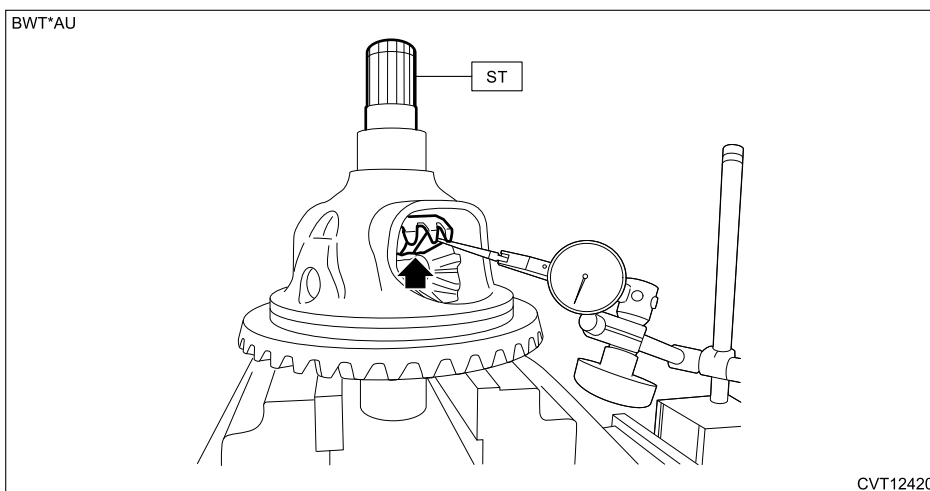
- (2) Measure the backlash between the differential bevel gear and differential bevel pinion using the magnet stand and dial gauge (lever type).

**Note:**

- Set the dial gauge (lever type) so that its needle contacts the differential bevel gear tooth.
- When measuring, fix the differential bevel pinion in place.

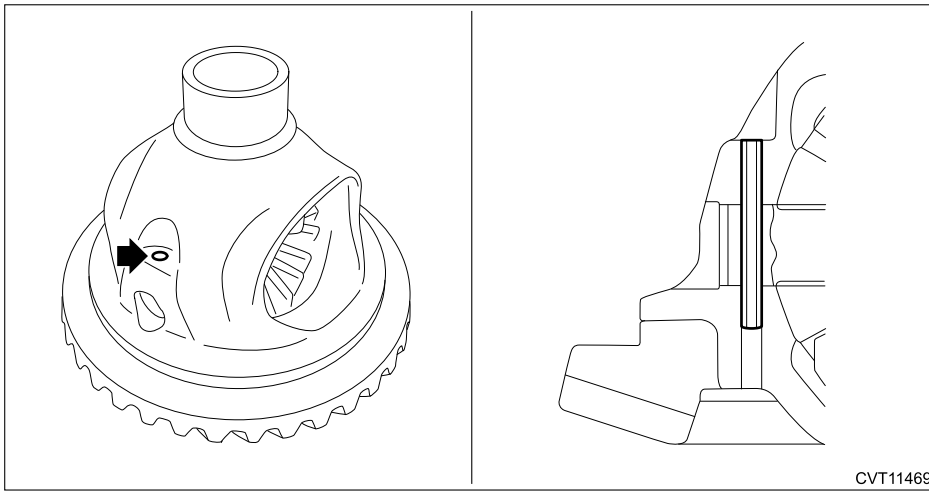
**Specification:**

0.13 – 0.18 mm (0.005 – 0.007 in)



- (3) If the backlash is outside the standard
  - a. Measure the thrust washer thickness.
  - b. Referring to the measured values of backlash and thrust washer, select the thrust washer.

3. Align the pinion shaft and differential case holes, and install a new spring pin from the back side of ring gear.



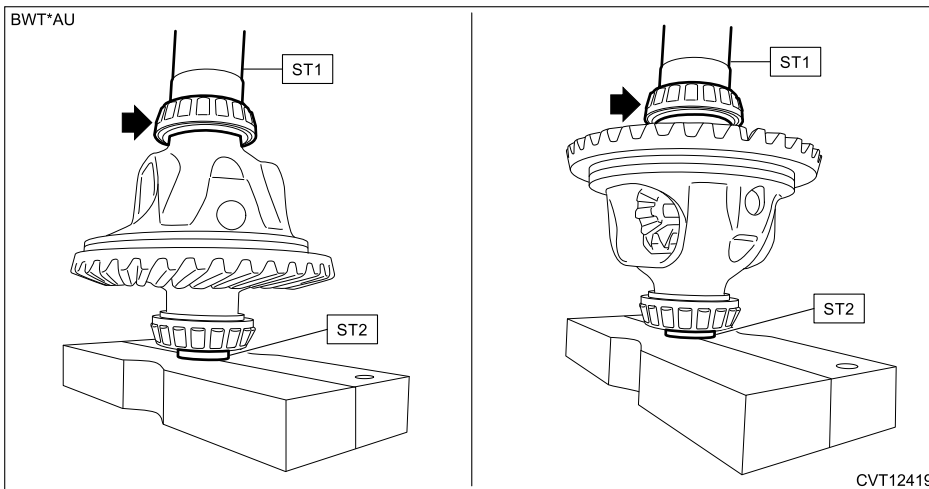
CVT11469

4. Using the ST1, ST2 and a press, press-fit the side bearing inner race RH and LH.

**Preparation tool:**

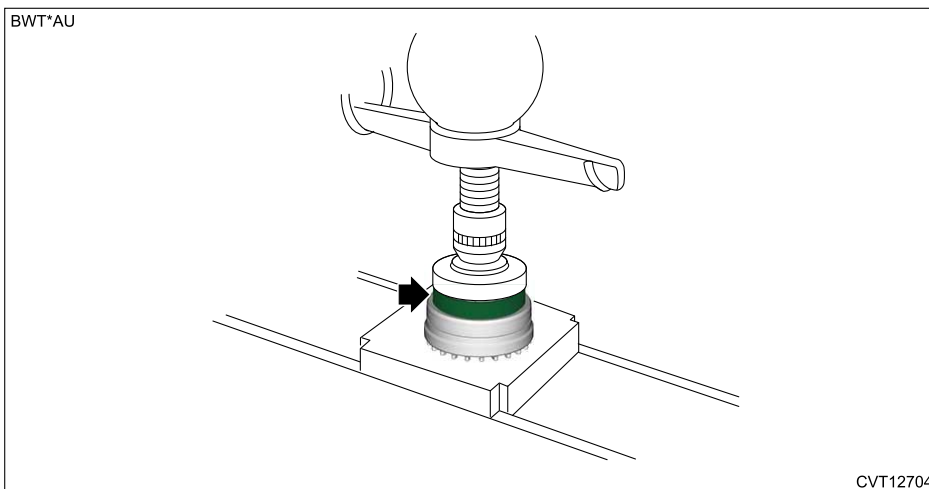
ST1: BUSHING 1-2 INSTALLER (499277100)

ST2: SEAT (398497701)



CVT12419



5. Press-fit the side bearing outer race using a press and a suitable attachment for the press, etc.



CVT12704

**CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Front Differential  
INSPECTION**

**Note:**

- For backlash between the differential bevel gear and differential bevel pinion, refer to "ASSEMBLY".  [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Front Differential>ASSEMBLY.](#)
- For backlash and tooth contact inspection of hypoid gear set, refer to "DRIVE PINION".  [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Drive Pinion>INSTALLATION.](#)

1. Check each part for excessive wear.
2. Check that there is no deformation, cracks or other damages.
3. Check the bearing for smooth rotation.

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Oil Pump

### SPECIFICATION

**Note:**

**The oil pump cannot be disassembled.**

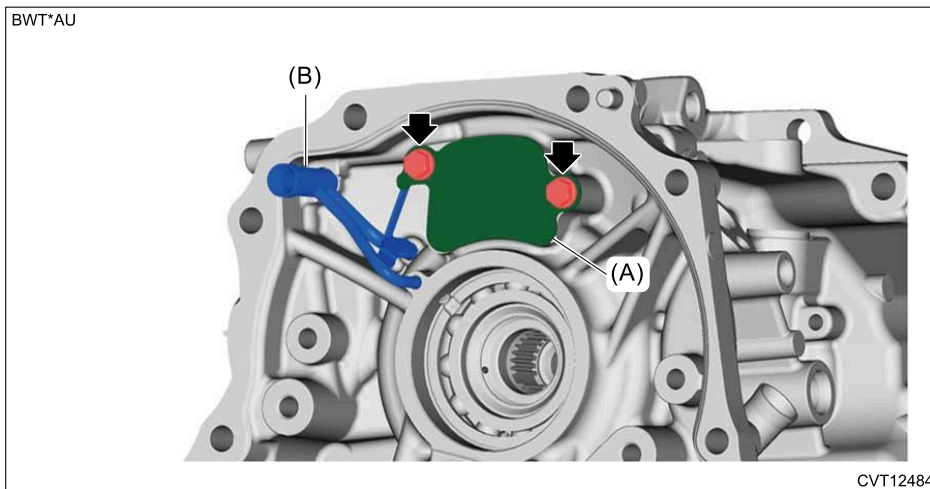
Refer to "Drive Pinion" for the oil pump.  [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Drive Pinion.](#)

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Converter Case Cover

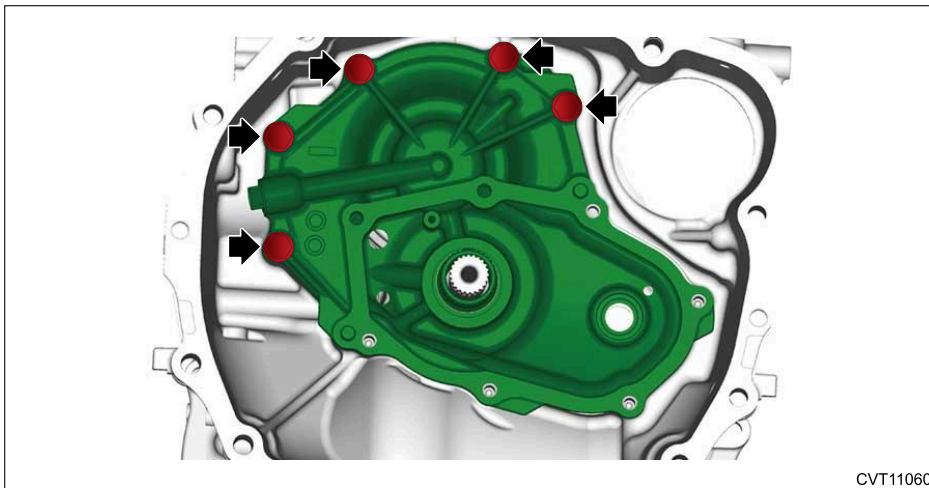
### REMOVAL



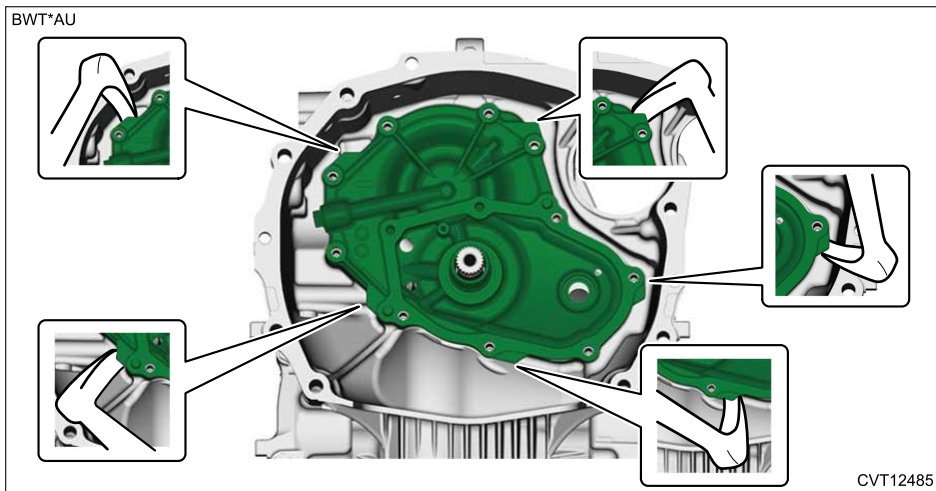
1. Remove the drive pinion. [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Drive Pinion>REMOVAL.](#)
2. Remove the primary speed sensor. [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Primary Speed Sensor>REMOVAL.](#)
3. Remove the oil stopper plate (A) and lubrication pipe (B).



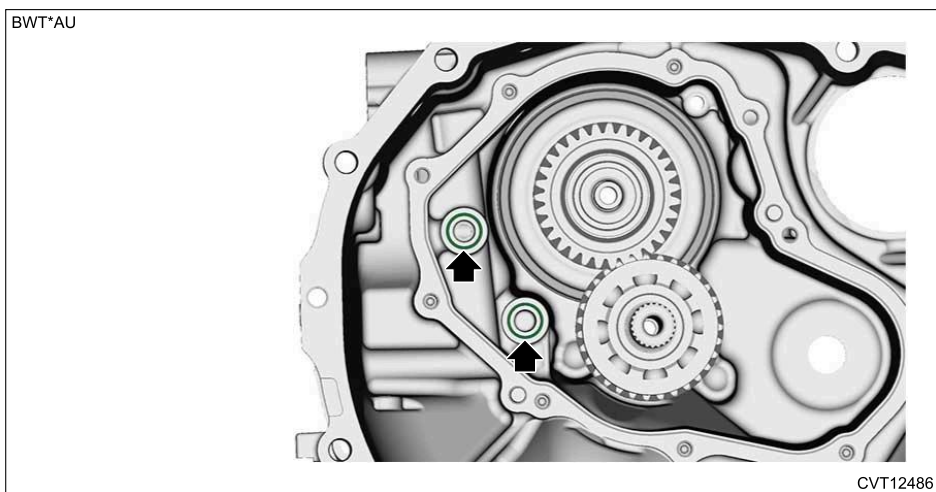
4. Remove the oil pump chain cover and the oil pump chain. [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Oil Pump Chain>REMOVAL.](#)
5. Remove the bolts securing the converter case cover.



6. Using a crowbar wrapped with protection tape or similar, expand the clearance and remove the converter case cover.



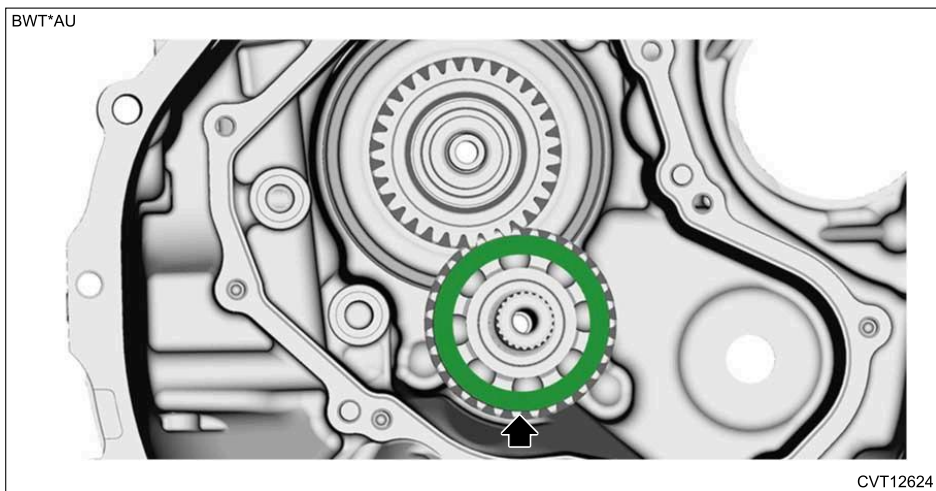
7. Remove the O-rings.



8. Remove the front reduction drive gear shim.

**Note:**

The front reduction drive gear shim may remain on the converter case side.



9. Remove the front reduction driven gear shim (front side).

(1) Remove the ball bearing using the ST1 and ST2.

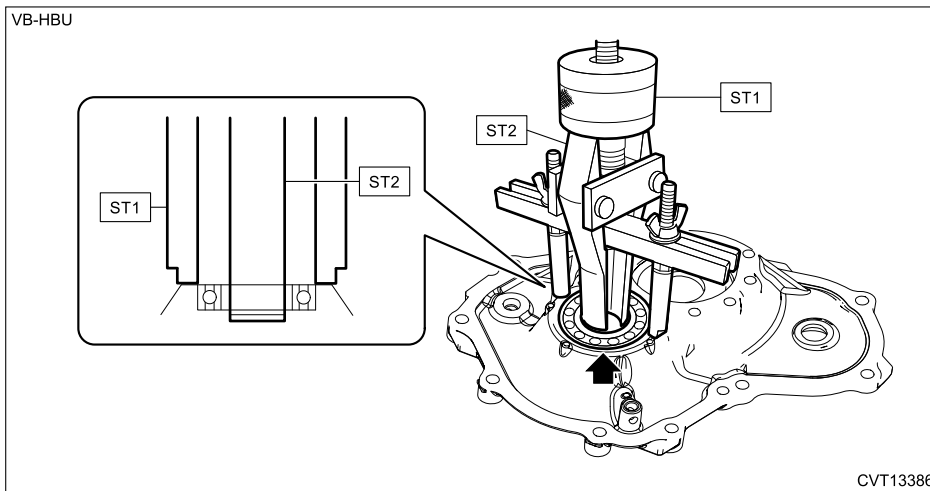
**Note:**

- This procedure is required to adjust the front reduction driven gear shim (front side).
- Face the cutout on ST1 outward.

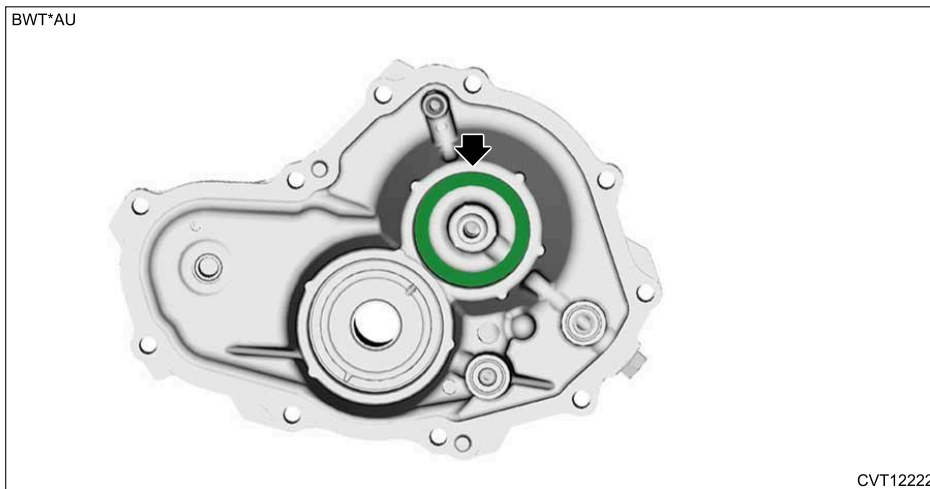
**Preparation tool:**

ST1: PULLER ASSY (398527700)

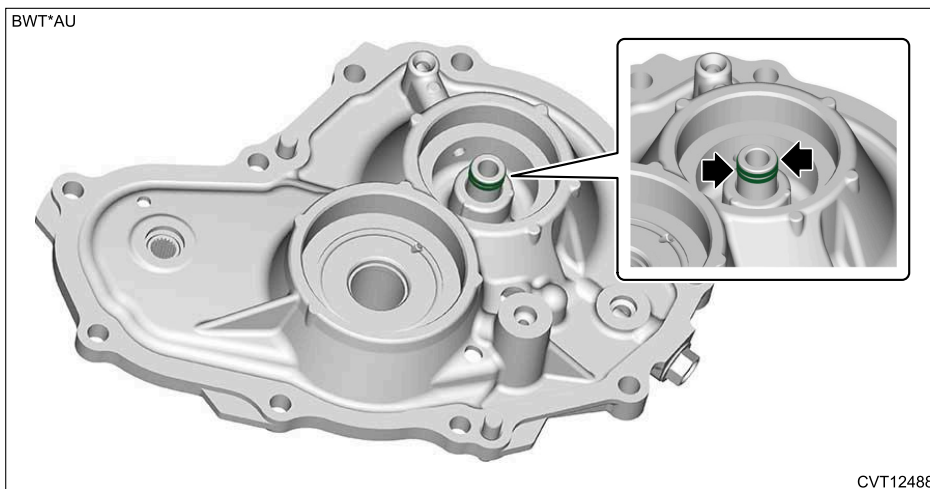
ST2: CLAW (18760AA000)



(2) Remove the front reduction driven gear shim (front side).



**10.** Remove the seal rings.



**11.** Remove the liquid gasket from the converter case and converter case cover.

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Converter Case Cover

**INSTALLATION**

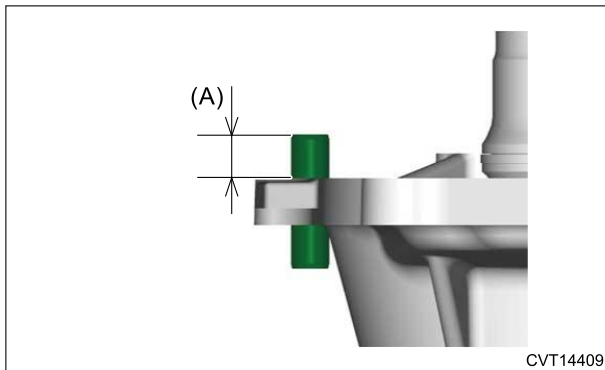
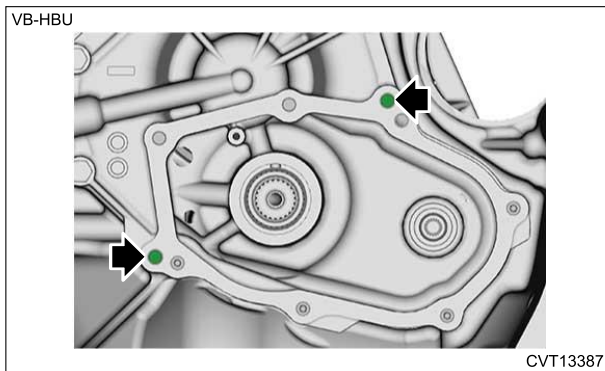
1. Check the projection (A) of the knock pins.

**Note:**

**When attached on the converter case side, install on the converter case cover side.**

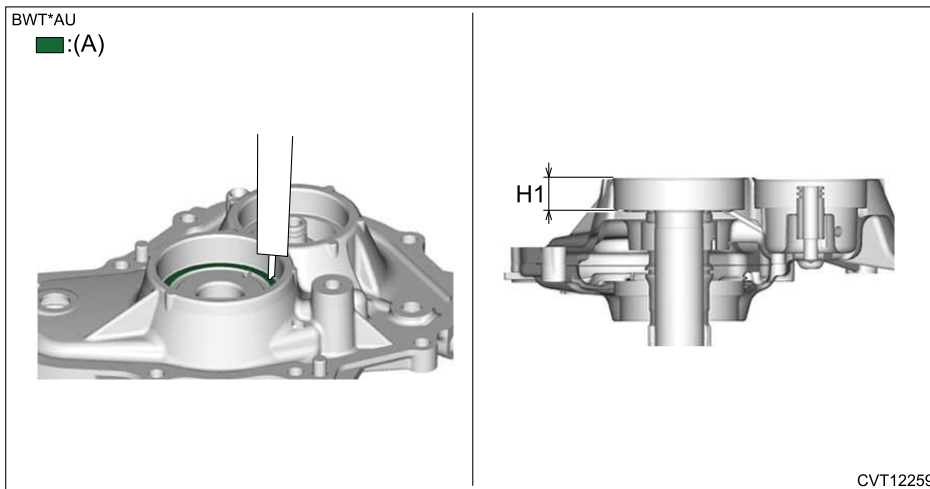
**Specification:**

7.5 – 8.5 mm (0.30 – 0.33 in)



2. Select the front reduction drive gear shim.

(1) Measure the height "H1" from the converter case cover upper face to the ball bearing catch surface.

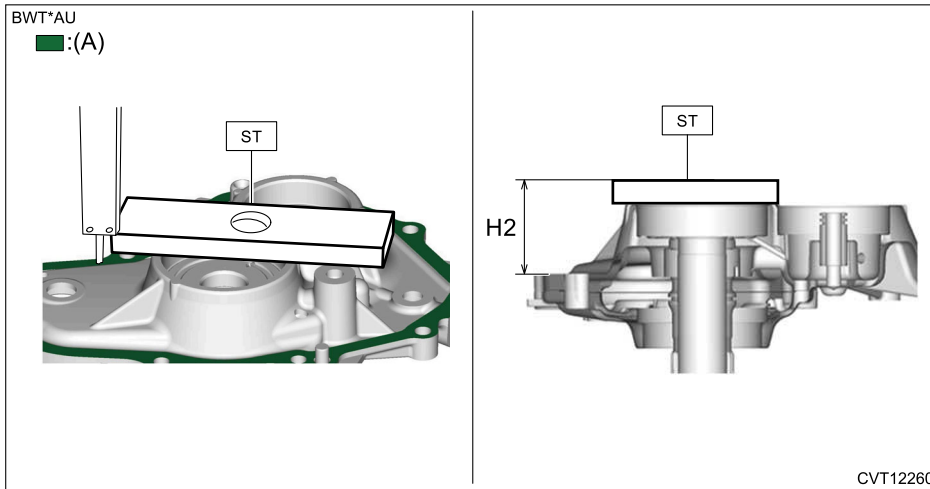


(A) Measurement surface

(2) Using the ST, measure the height "H2" from the ST end face to the converter case cover mating surface.

**Preparation tool:**

ST: GAUGE (499575600)

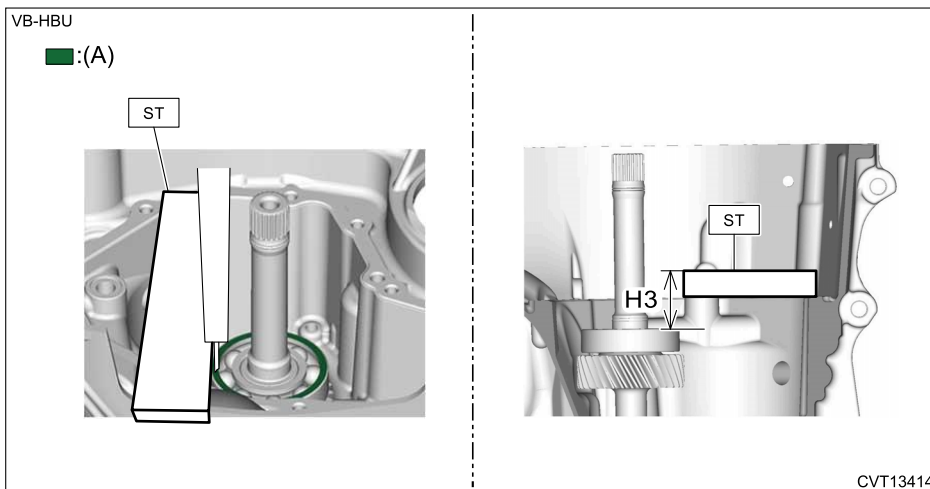


(A) Measurement surface

(3) Using the ST, measure the height "H3" from the ST end face to the ball bearing end face.

**Preparation tool:**

ST: GAUGE (499575400)



(A) Measurement surface

(4) Using the following calculation and selection criteria table, select an appropriate thickness of the front reduction drive gear shim.

**Note:**

**Adjust using 1 piece.**

$$C = (H3 - 15 \text{ mm (0.6 in)}) - ((H2 - 15 \text{ mm (0.6 in)}) - H1)$$

C	Clearance mm (in)
H1	Measured value (mm (in)) of step (1)
H2	Measured value (mm (in)) of step (2)
H3	Measured value (mm (in)) of step (3)
15 mm (0.6 in)	Thickness of ST

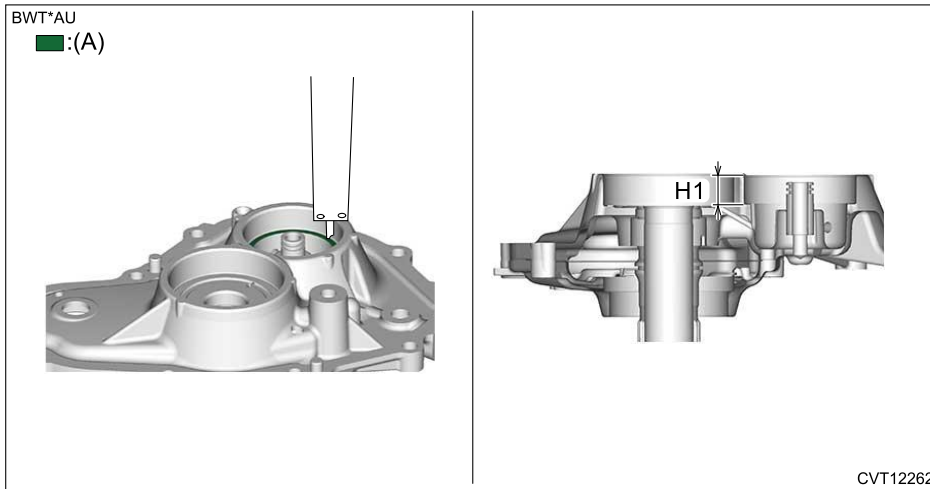
**Selection criteria table for front reduction drive gear shim according to calculated values**

Clearance "C" mm (in)	Front reduction drive gear shim thickness mm (in)
1.070 – 1.174 (0.042 – 0.046)	1.0 (0.039)
1.175 – 1.274 (0.046 – 0.050)	1.1 (0.043)
1.275 – 1.374 (0.050 – 0.054)	1.2 (0.047)
1.375 – 1.474 (0.054 – 0.058)	1.3 (0.051)

Clearance "C" mm (in)	Front reduction drive gear shim thickness mm (in)
1.475 – 1.580 (0.058 – 0.062)	1.4 (0.055)

**3.** Select the front reduction driven gear shim (front side).

(1) Measure the height "H1" from the converter case cover upper face to the ball bearing catch surface.

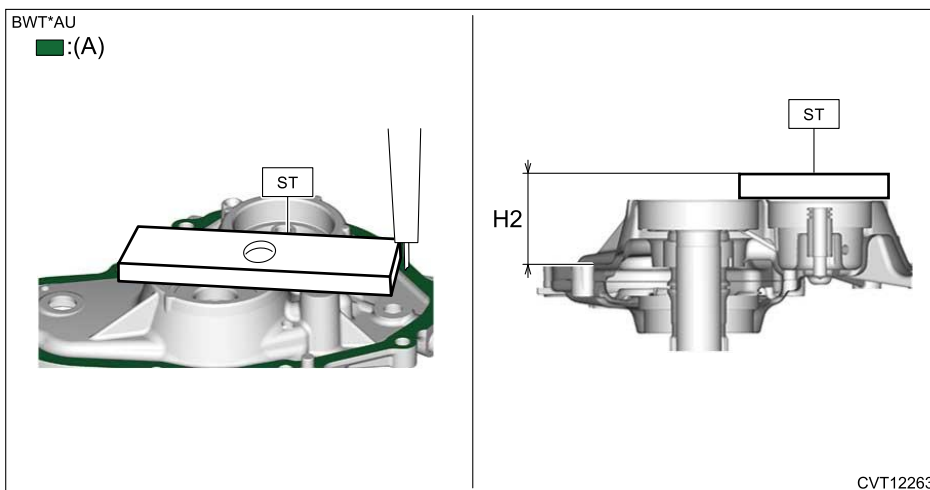


(A) Measurement surface

(2) Using the ST, measure the height "H2" from the ST end face to the converter case cover mating surface.

**Preparation tool:**

ST: GAUGE (499575600)



(A) Measurement surface

(3) Set a new ball bearing to the reduction driven gear.

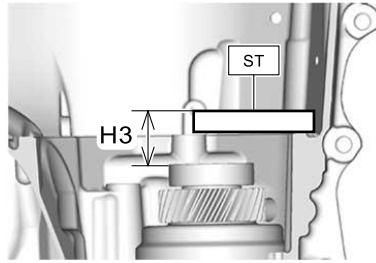
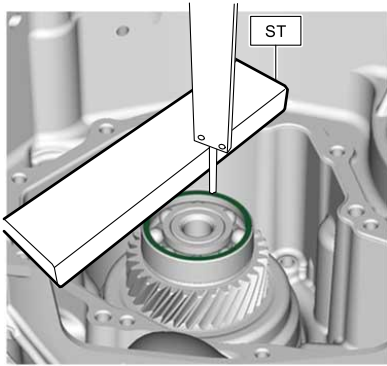
(4) Using the ST, measure the height "H3" from the ST end face to the ball bearing end face.

**Preparation tool:**

ST: GAUGE (499575400)

VB-HBU

■:(A)



CVT13423

(A) Measurement surface

(5) Using the following calculation and selection criteria table, select an appropriate thickness of the front reduction driven gear shim (front side).

**Note:**

**Adjust using 1 – 2 pieces.**

$$C = (H3 - 15 \text{ mm (0.6 in)}) - ((H2 - 15 \text{ mm (0.6 in)}) - H1)$$

C	Clearance mm (in)
H1	Measured value (mm (in)) of step (1)
H2	Measured value (mm (in)) of step (2)
H3	Measured value (mm (in)) of step (4)
15 mm (0.6 in)	Thickness of ST

**Selection criteria table for front reduction driven gear shim (front side) according to calculated values**

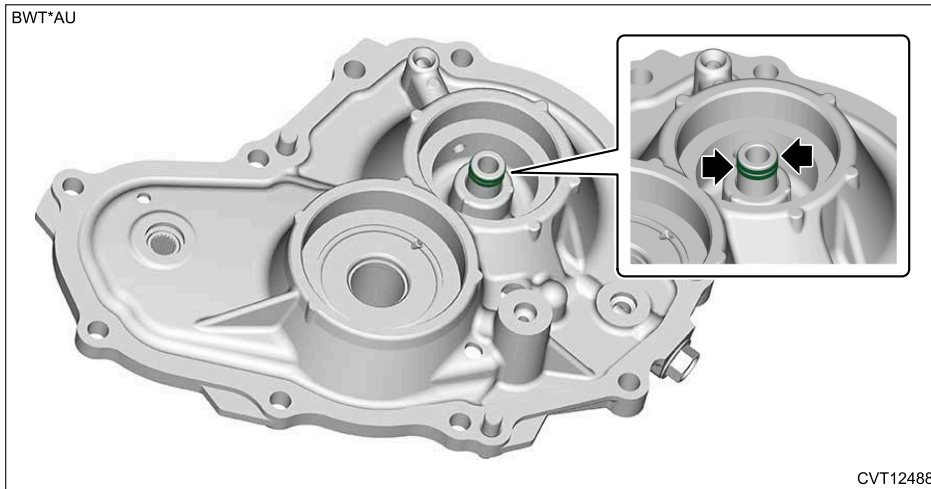
Clearance "C" mm (in)	Front reduction driven gear shim (front side) thickness mm (in)
0.470 – 0.569 (0.019 – 0.022)	0.4 (0.016)
0.570 – 0.669 (0.022 – 0.026)	0.5 (0.020)
0.670 – 0.769 (0.026 – 0.030)	0.6 (0.024)
0.770 – 0.869 (0.030 – 0.034)	0.7 (0.028)
0.870 – 0.980 (0.034 – 0.039)	0.8 (0.031)

(6) Remove the ball bearing from the reduction driven gear.

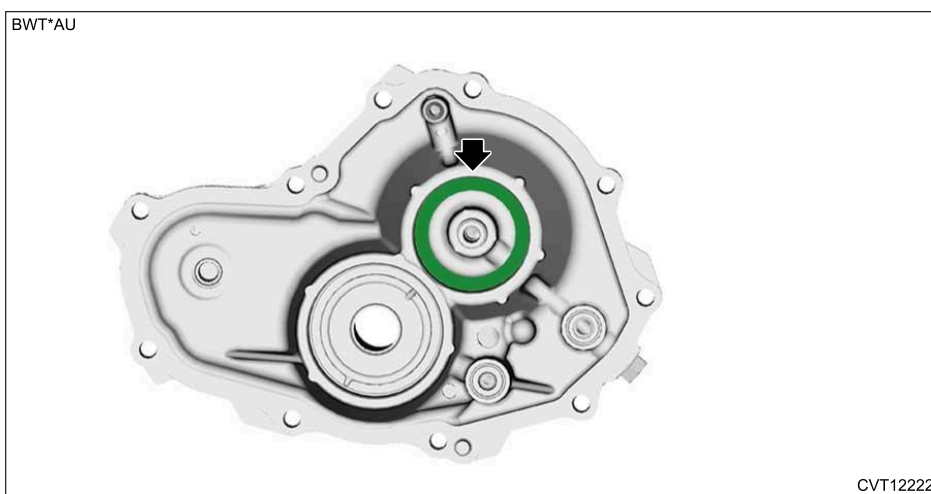
**4.** Install a new seal ring.

**Note:**

- **Apply CVTF to the seal rings.**
- **Do not stretch the seal ring more than necessary.**



5. Install the front reduction driven gear shim (front side).



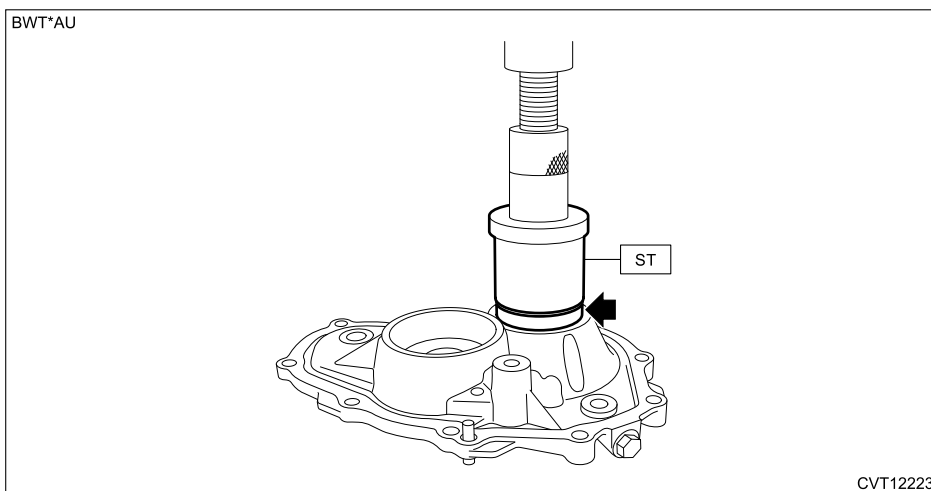
6. Using the ST and a press, press-fit a new ball bearing.

**Note:**

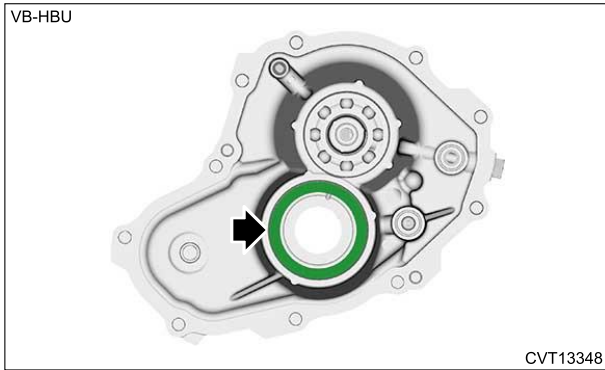
Apply CVTF to the press-fitting area.

**Preparation tool:**

ST: INSTALLER (20099AE020)



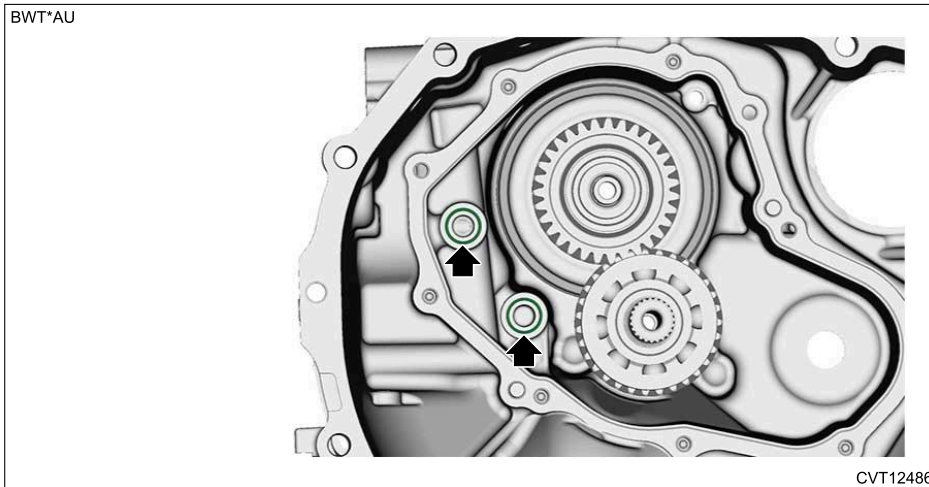
7. Using white vaseline, set the front reduction drive gear shim.



8. Install a new O-ring.

**Note:**

**Apply CVTF to the O-rings.**



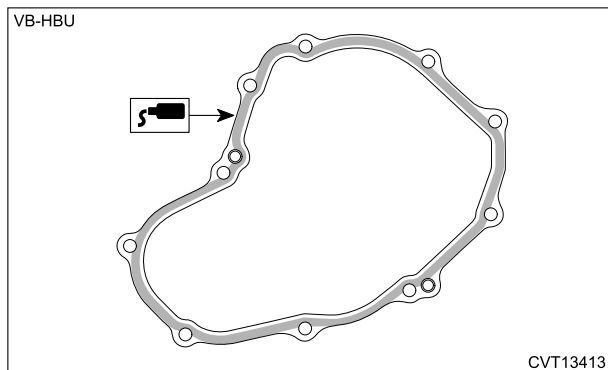
9. Apply liquid gasket to the mating surface of the converter case cover as shown in the figure, and temporarily install the converter case cover.

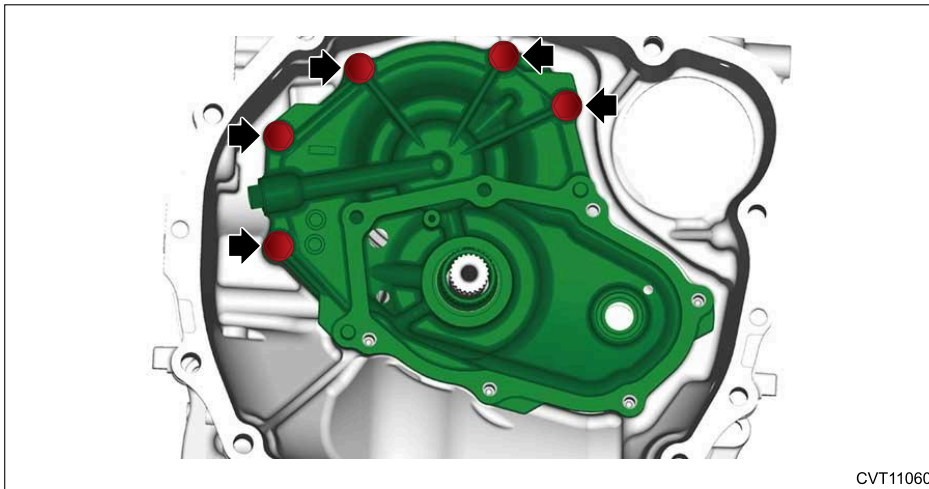
**Note:**

- **Before applying liquid gasket, degrease the liquid gasket seal surface of the converter case and converter case cover.**
- **Install within 5 min. after applying liquid gasket.**

**Preparation items:**

Liquid gasket: THREE BOND 1216J or equivalent






CVT11060

**10.** Tighten the bolts securing the converter case cover.

**Tightening torque:**

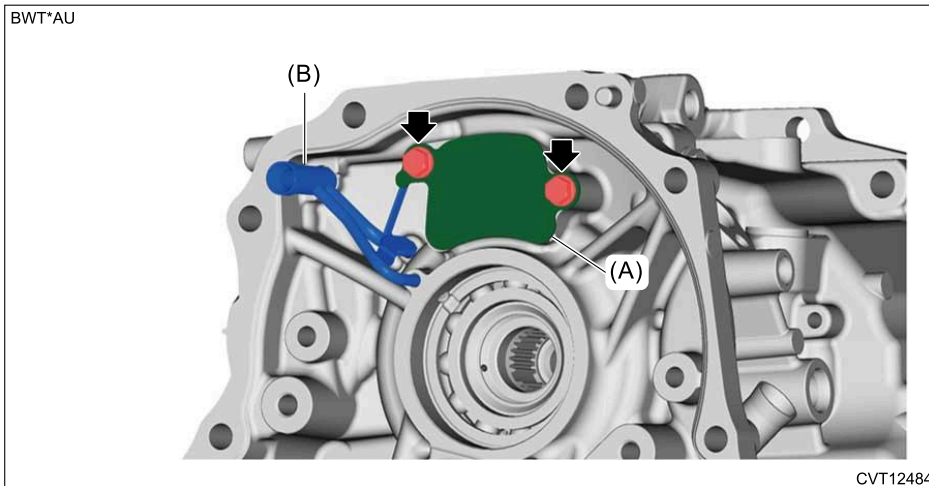
24 N·m (2.4 kgf-m, 17.7 ft-lb)

**11.** Install the oil pump chain cover and the oil pump chain.  [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Oil Pump Chain>INSTALLATION.](#)

**12.** Install the oil stopper plate (A) and lubrication pipe (B).

**Tightening torque:**

9 N·m (0.9 kgf-m, 6.6 ft-lb)



CVT12484

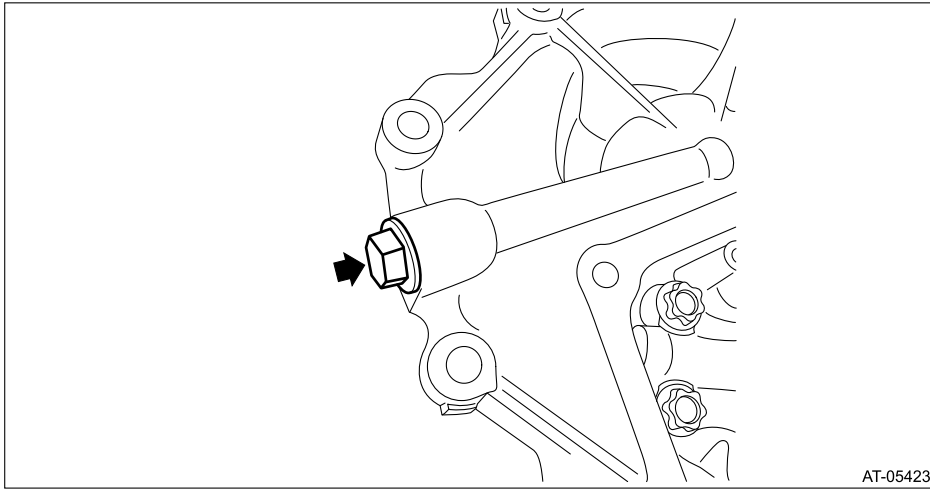
**13.** Install the drive pinion.  [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Drive Pinion>INSTALLATION.](#)

**CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Converter Case Cover**

**DISASSEMBLY**



**1.** Remove the plug and O-ring.



## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Converter Case Cover **ASSEMBLY**

---

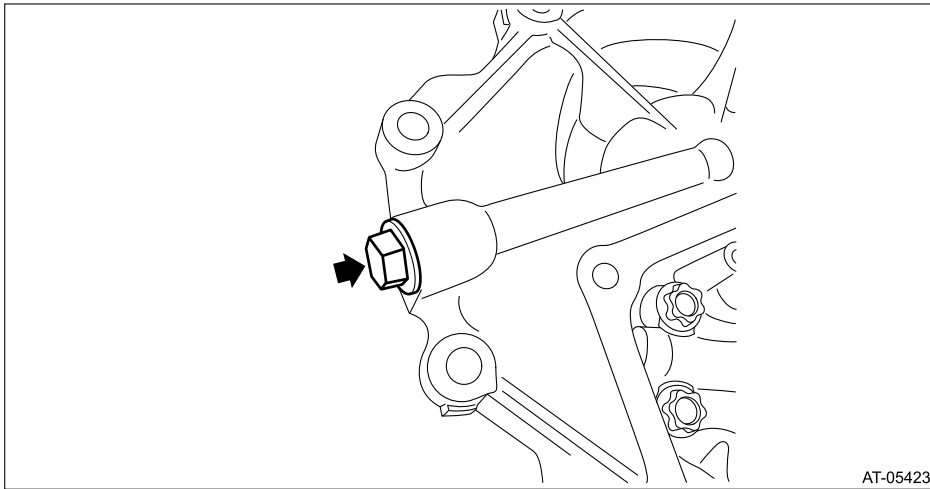
1. Install the plugs with new O-rings.

**Note:**

**Apply CVTF to the O-rings.**

**Tightening torque:**

25 N·m (2.5 kgf-m, 18.4 ft-lb)




## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Converter Case Cover **INSPECTION**

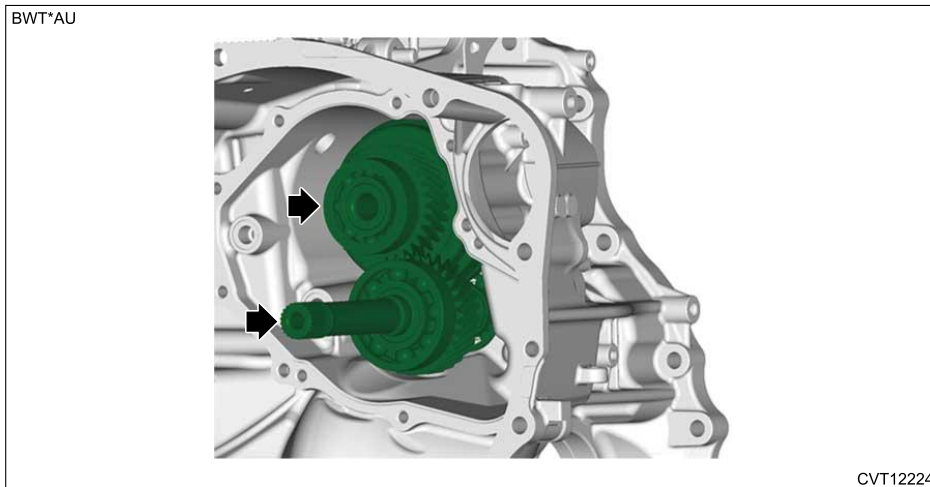
---

Check that there is no deformation, cracks or other damages.

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Front Reduction Drive Gear

### REMOVAL

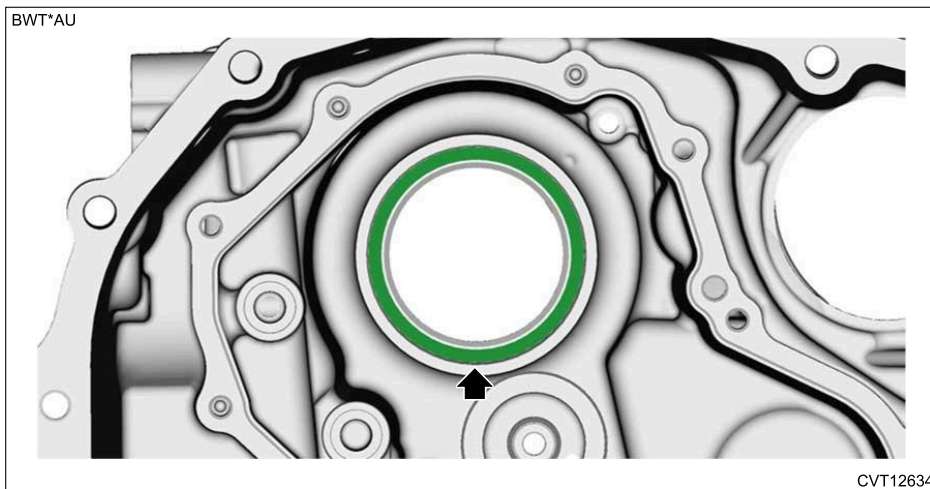
1. Remove the converter case cover.  [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Converter Case Cover>REMOVAL.](#)
2. Remove the front reduction drive gear and front reduction driven gear as a single unit.



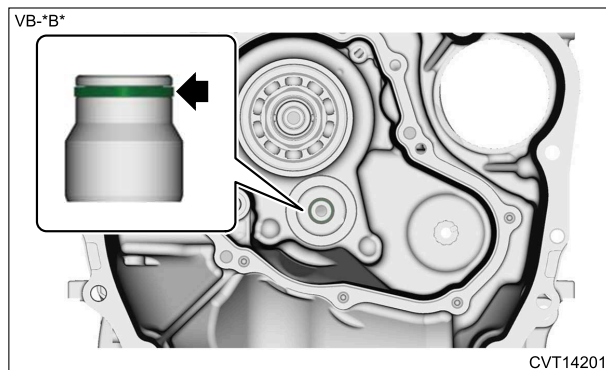
3. Remove the front reduction driven gear shim (rear side).

**Note:**

**The front reduction driven gear shim (front side) may remain on the front reduction driven gear.**



4. Remove the seal rings.



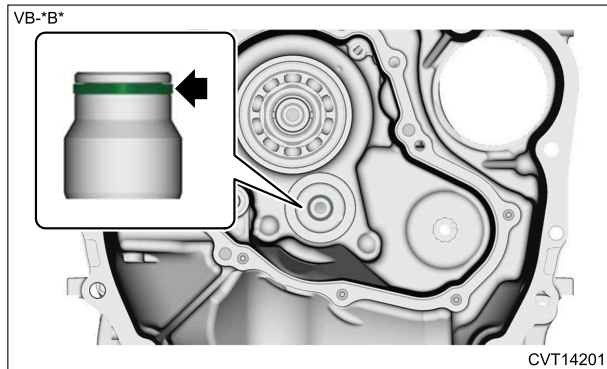
## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Front Reduction Drive Gear

## INSTALLATION

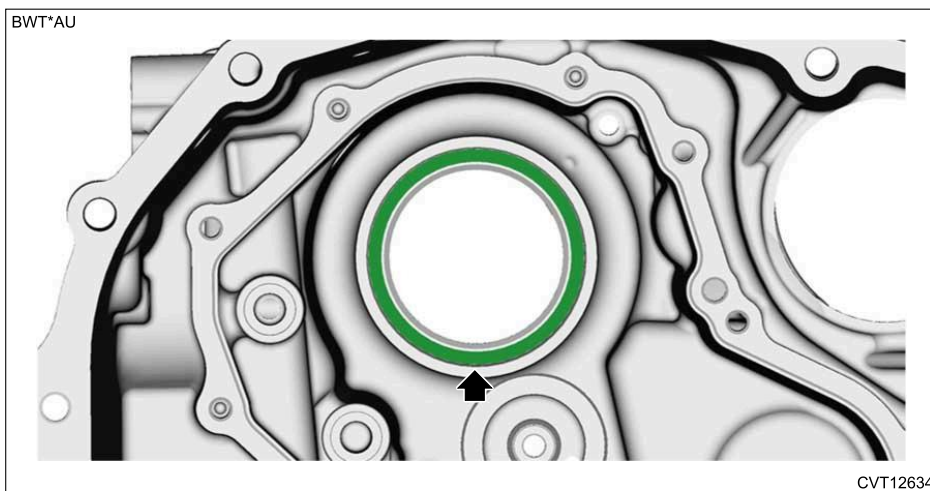
1. Install a new seal ring.

**Note:**

- Apply CVTF to the seal rings.
- Do not stretch the seal ring more than necessary.



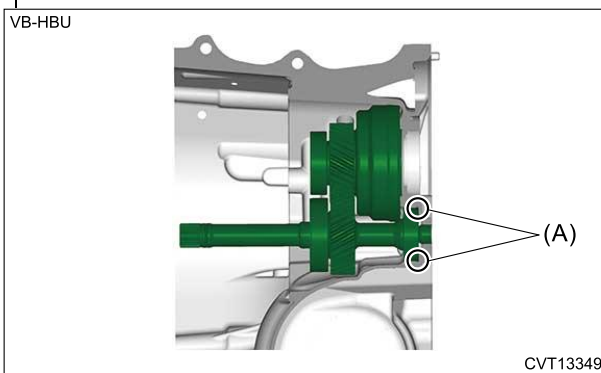
2. Install the front reduction driven gear shim (rear side).




3. Install the front reduction drive gear and front reduction driven gear as a single unit.

**Note:**

- Make sure that the ball bearing (rear side) of the front reduction driven gear is fully in contact with the installation surface (A) of converter case.**



4. Install the converter case cover.  [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Converter Case Cover>INSTALLATION.](#)

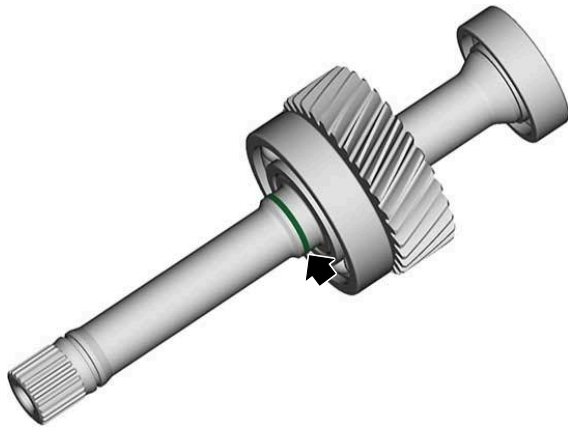
CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Front Reduction Drive Gear

## DISASSEMBLY



1. Remove the seal rings.

BWT\*AU



CVT12489

2. Remove the ball bearing (rear side) using ST1, ST2 and a press.

**Caution:**

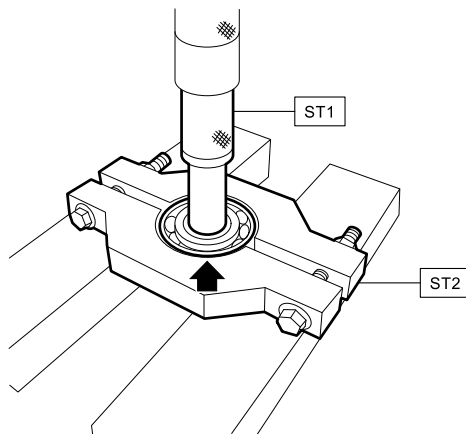
**Be careful not to drop the front reduction drive gear.**

**Preparation tool:**

ST1: REMOVER (899864100)

ST2: REMOVER (498077400)

BWT\*AU



CVT12226

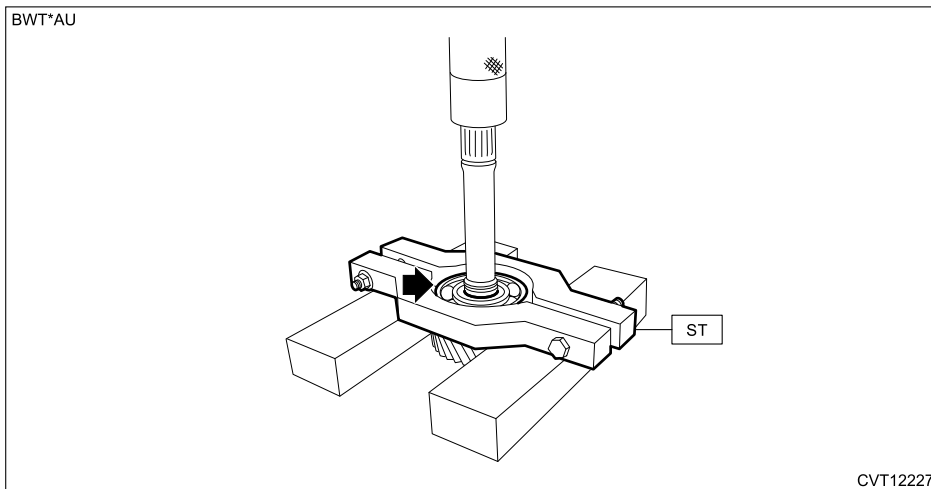
3. Remove the ball bearing (front side) using the ST and a press.

**Caution:**

**Be careful not to drop the front reduction drive gear.**

**Preparation tool:**

ST: REMOVER (498077600)



## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Front Reduction Drive Gear

### ASSEMBLY

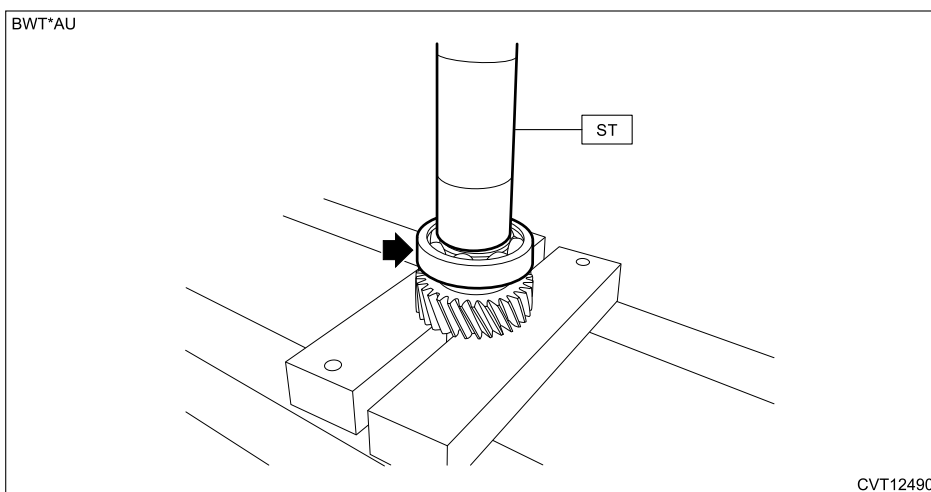
1. Using the ST and a press, press-fit a new ball bearing (front side).

**Note:**

Apply CVTF to the press-fitting area.

**Preparation tool:**

ST: INSTALLER (18651AA000)



2. Press-fit a new ball bearing (rear side) using ST1, ST2 and a press.

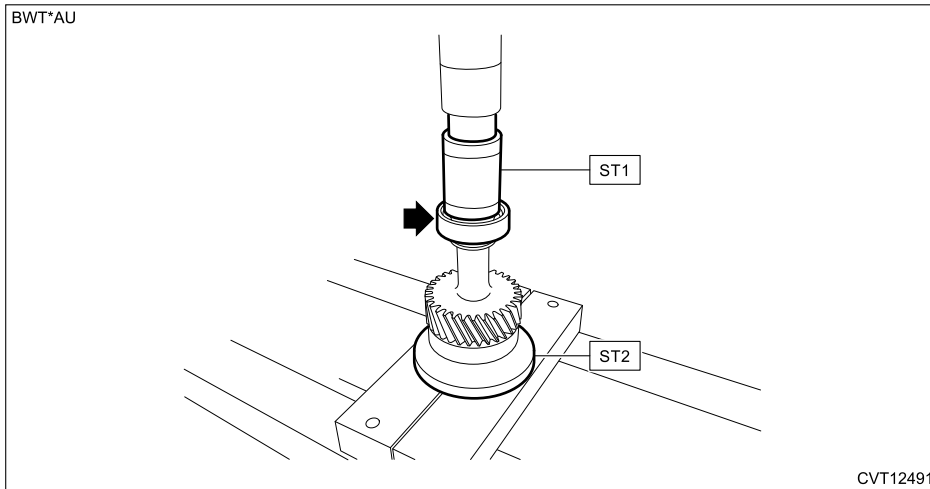
**Note:**

Apply CVTF to the press-fitting area.

**Preparation tool:**

ST1: INSTALLER (499757002)

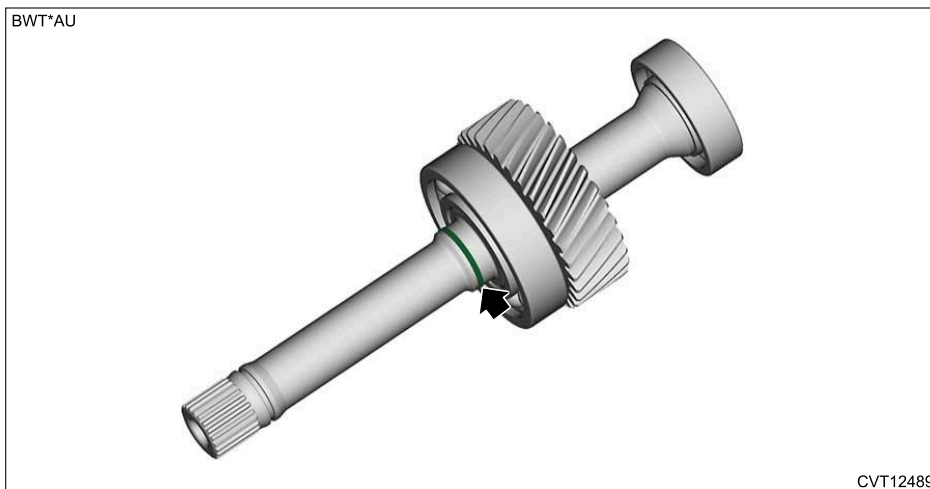
ST2: INSTALLER (398177700)



**3.** Install a new seal ring.

**Note:**

- Apply CVTF to the seal rings.
- Do not stretch the seal ring more than necessary.




CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Front Reduction Drive Gear

**INSPECTION**

- 1.** Check that there is no deformation, cracks or other damages.
- 2.** Check the bearing for smooth rotation.
- 3.** Check the bearing for looseness.


## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Front Reduction Driven Gear

### REMOVAL

For removal procedures of front reduction driven gear, refer to the "Front Reduction Drive Gear".  [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Front Reduction Drive Gear>REMOVAL.](#)

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Front Reduction Driven Gear

### INSTALLATION

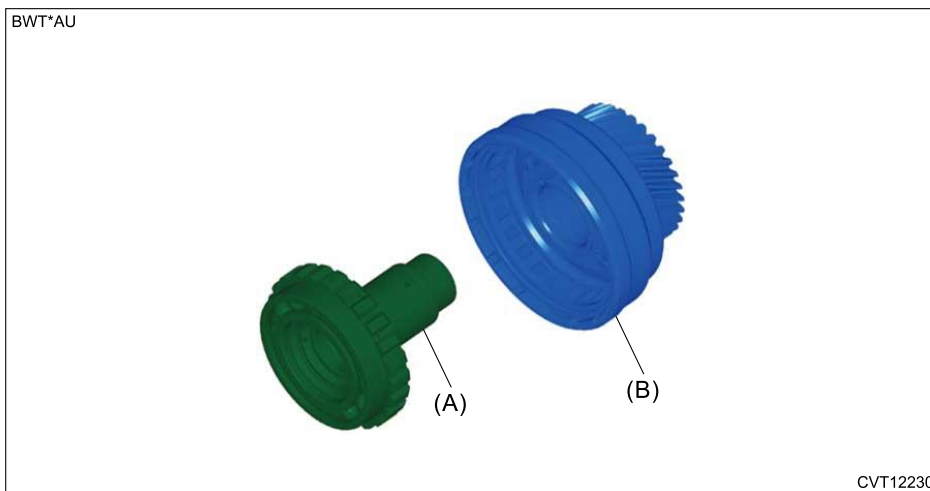
For installation procedures of front reduction driven gear, refer to the "Front Reduction Drive Gear".  [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Front Reduction Drive Gear>INSTALLATION.](#)

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Front Reduction Driven Gear

### DISASSEMBLY

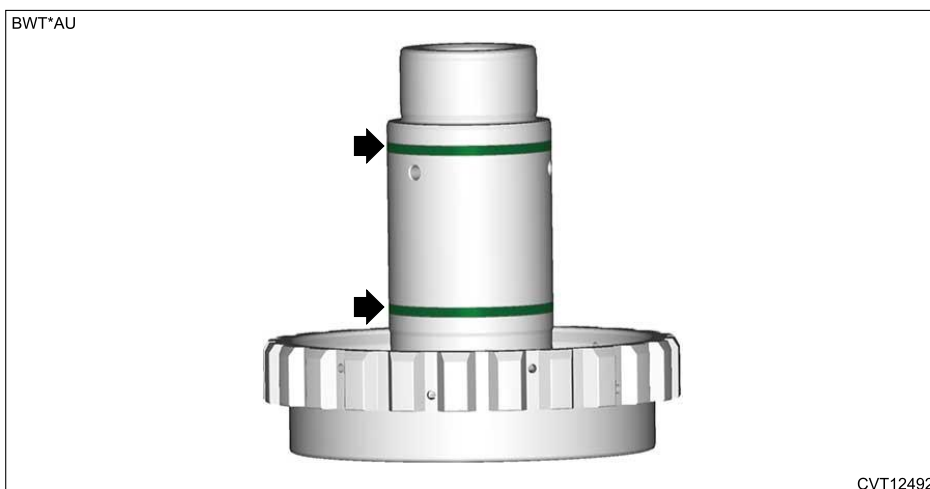


1. Remove the front reduction driven shaft.



(A) Front reduction driven shaft (B) Front reduction driven gear

2. Remove the seal rings.

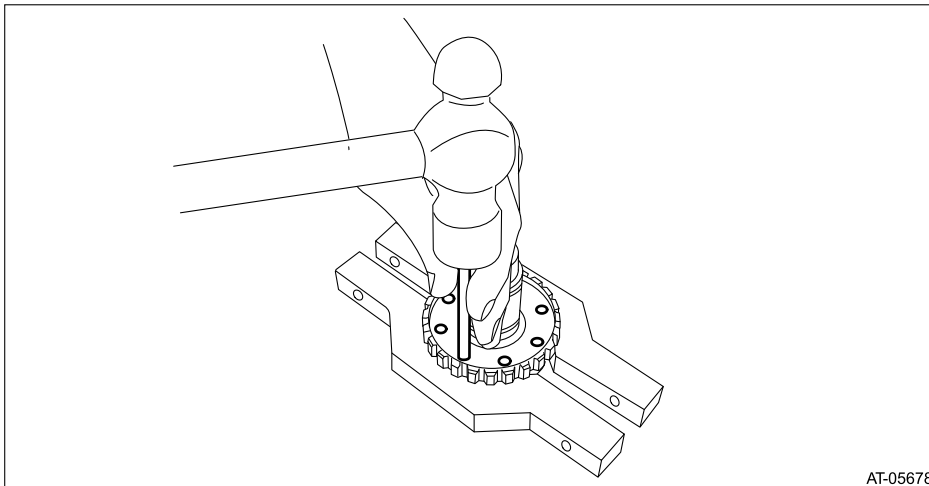


3. Remove the ball bearing.

(1) Tap the ball bearing outer race to remove through the hole of front reduction driven shaft using the round bar with diameter of 7 mm (0.28 in).

**Note:**

Remove by tapping the entire circumference equally.

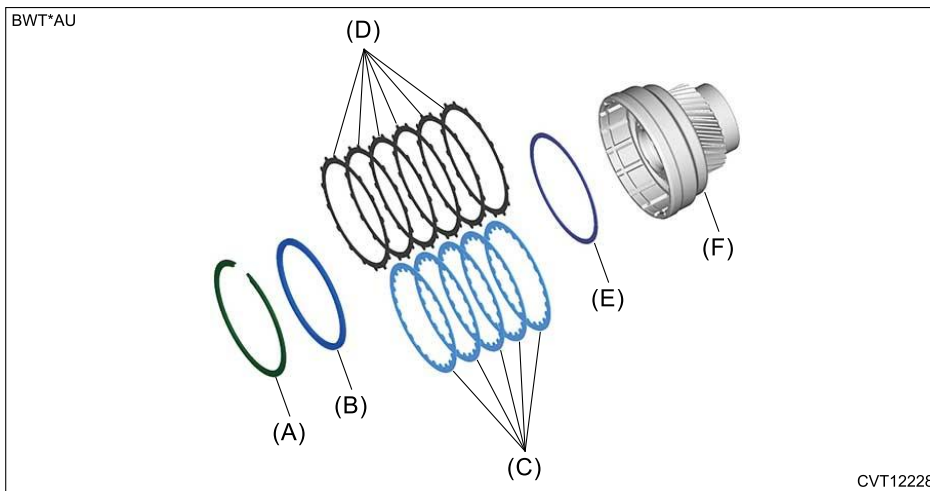


AT-05678

4. Remove the snap ring, and then remove the retaining plate, drive plate, driven plate and dish plate.

**Note:**

In order to avoid installing the dish plate in the wrong direction, paint a mark before removal.



CVT12228

- |                     |                  |                                 |
|---------------------|------------------|---------------------------------|
| (A) Snap ring       | (C) Drive plate  | (E) Dish plate                  |
| (B) Retaining plate | (D) Driven plate | (F) Front reduction driven gear |

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Front Reduction Driven Gear

### ASSEMBLY

1. Check the clutch clearance.
  - (1) Place the following parts onto the surface plate.
    - Driven plate
    - Drive plate
    - Retaining plate
  - (2) Set the magnet stand and dial gauge (spindle type) on the surface plate.
  - (3) Apply the dial gauge (spindle type) to the retaining plate, and adjust the reading to the zero point.
  - (4) Place weights until the dial gauge (spindle type) needle stops moving.

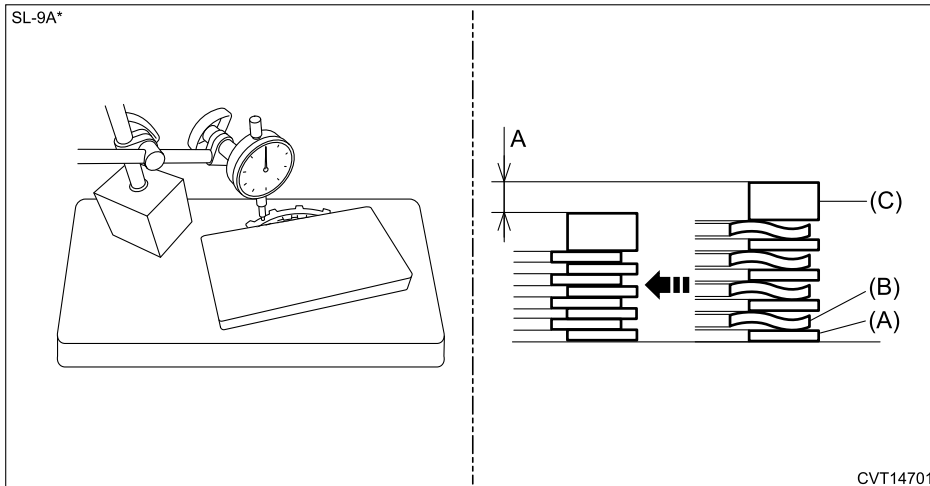
**Note:**

- Prepare a weight with the length of one side equal to or longer than the retaining plate diameter, and also flat shape that allows load to be applied evenly.
- In order to completely compress the drive plates, weight of at least 13.3 kg (29.33 lb) is required.

- (5) Measure the compression amount "A".

**Note:**

**Measure at four points at 90° intervals and calculate the average.**

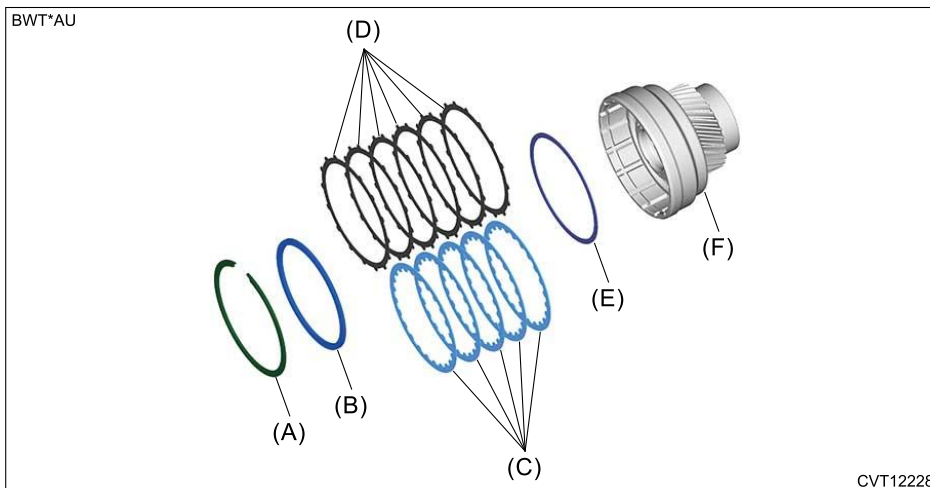


- (A) Driven plate                      (B) Drive plate                      (C) Retaining plate

(6) Install the dish plate, driven plate, drive plate, retaining plate and snap ring.

**Note:**

**Face the painted surface of dish plate toward the driven plate side.**

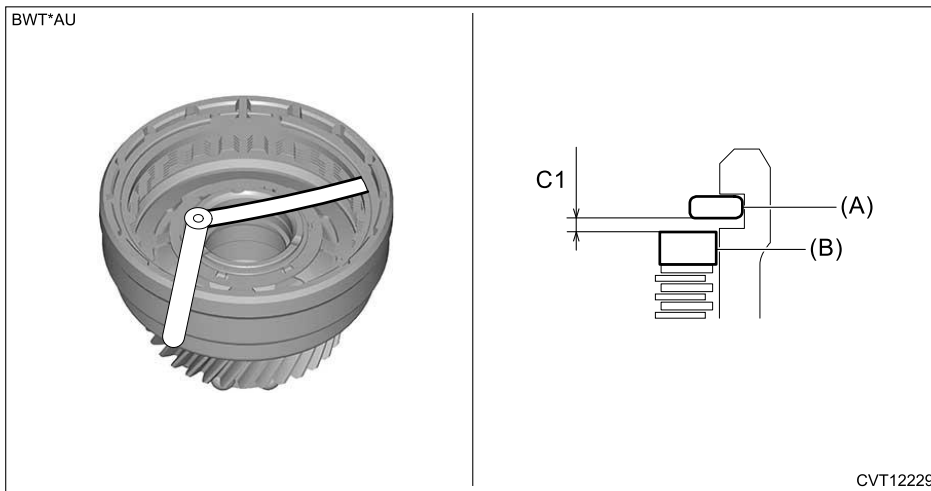


- (A) Snap ring                      (C) Drive plate                      (E) Dish plate  
(B) Retaining plate              (D) Driven plate                      (F) Front reduction driven gear

(7) Measure the clearance "C1" between snap ring and retaining plate using a thickness gauge.

**Note:**

**Before measuring, press down the whole circumference of retaining plate using your finger to fit in.**



(A) Snap ring

(B) Retaining plate

(8) Using the following calculation, calculate the clutch clearance "C".

**Service limit:**

3.36 mm (0.133 in)

$$C = A + C1$$

C	Clutch clearance (mm (in))
A	Measured value (mm (in)) of (3)
C1	Measured value (mm (in)) of (5)

(9) If the value exceeds the limit, perform the following operations.

- Measure thickness of the retaining plate.
- Replace the drive plate and driven plate with new parts, and then perform measurement from step (1) again.

**Initial standard:**

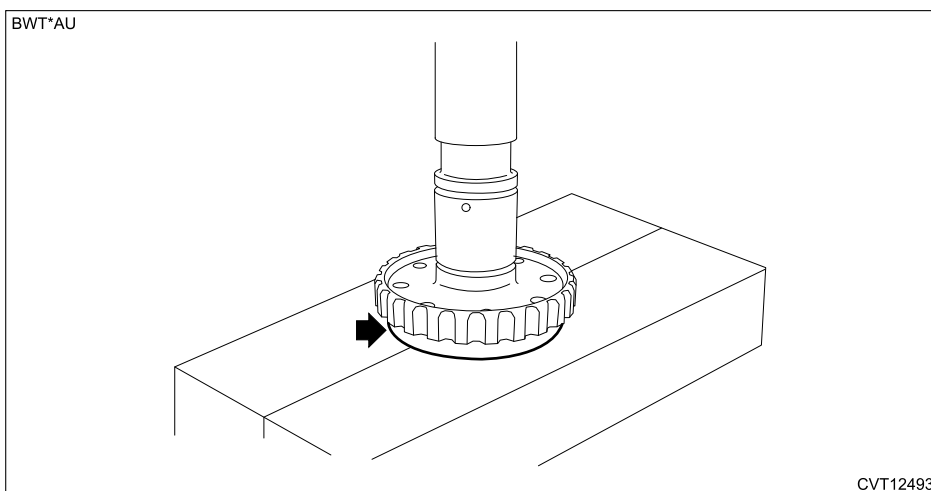
2.4 – 2.8 mm (0.09 – 0.11 in)

- If it exceeds the initial standard value, adjust the thickness of retaining plate to be within the initial standard value.

2. Using a press, press-fit a new ball bearing.

**Note:**

**Apply CVTF to the press-fitting area.**

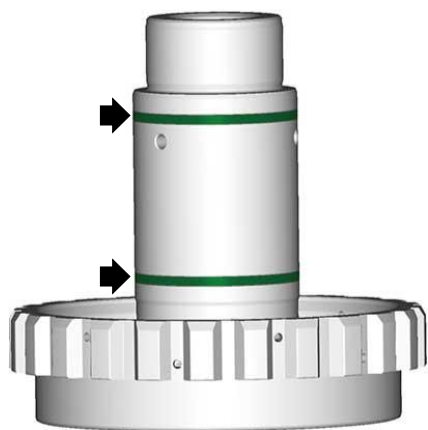


3. Install a new seal ring.

**Note:**

- Apply CVTF to the seal rings.
- Do not stretch the seal ring more than necessary.

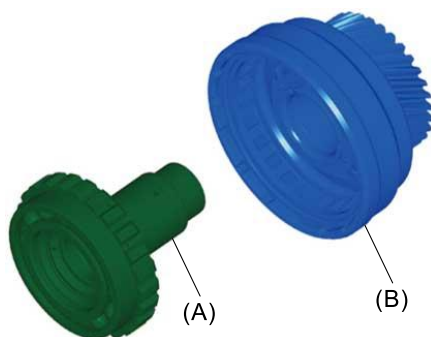
BWT\*AU



CVT12492

4. Install the front reduction driven shaft.

BWT\*AU

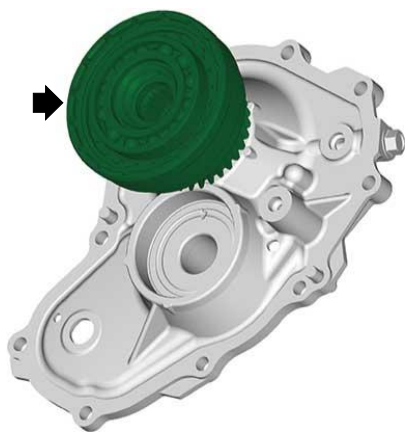


CVT12230

- (A) Front reduction driven shaft (B) Front reduction driven gear

5. Install the front reduction driven gear.

BWT\*AU



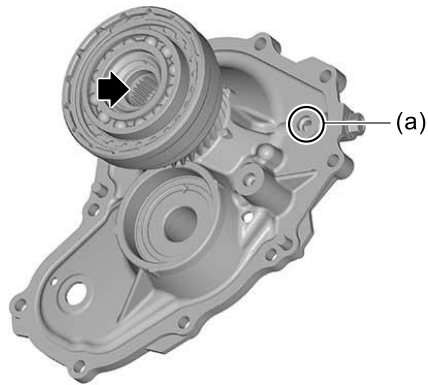
CVT12494

6. Blow compressed air through the hole shown in the figure, and check the piston operation of the front reduction driven gear.

**Note:**

**Hold the hole (a) area with a cloth.**

BWT\*AU




CVT12495

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Front Reduction Driven Gear


### INSPECTION

---

1. Check that there is no deformation, cracks or other damages.
2. Check the bearing for smooth rotation.
3. Check the bearing for looseness.
4. Inspect the drive plate facing for excessive wear.
5. Check the driven plate for discoloration (seizure).
6. Check the clutch clearance.  [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Front Reduction Driven Gear>ASSEMBLY.](#)


## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Converter Case

### REMOVAL

Remove the front reduction drive gear and front reduction driven gear.  [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Front Reduction Drive Gear>REMOVAL.](#)

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Converter Case


### INSTALLATION

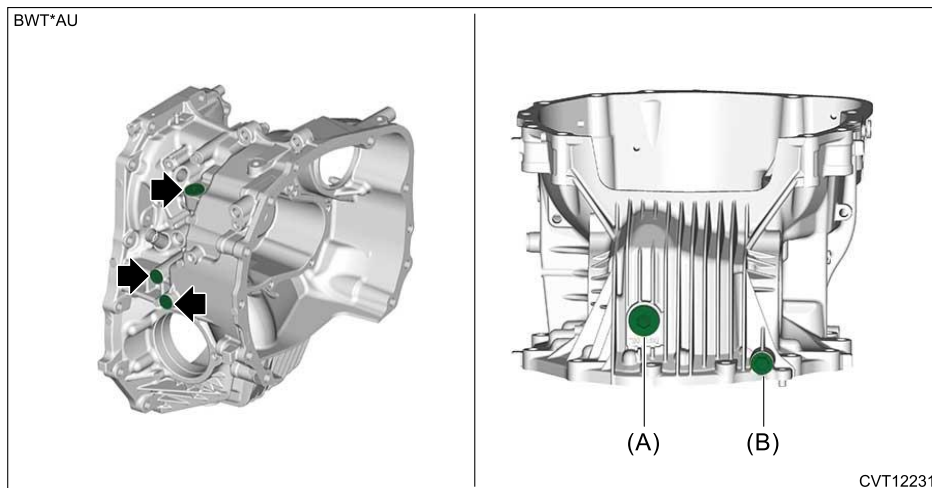
Install the front reduction drive gear and front reduction driven gear.  [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Front Reduction Drive Gear>INSTALLATION.](#)

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Converter Case

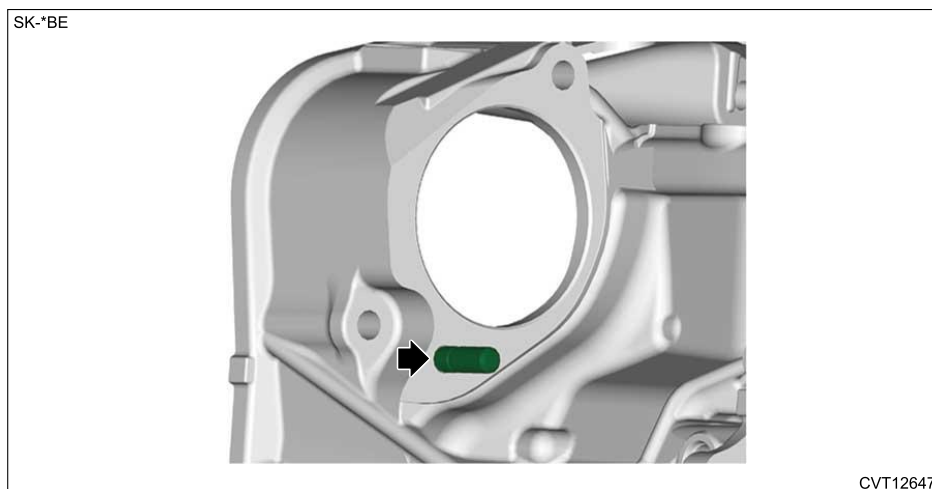
### DISASSEMBLY



1. Remove the secondary pressure sensor.  [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Secondary Pressure Sensor>REMOVAL.](#)
2. Remove the drain plug (A) using TORX® T70.
3. Remove the overflow plug (B).
4. Remove all plugs.



5. Remove the stud bolts using TORX® E10.



## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Converter Case

### ASSEMBLY

1. Install the stud bolts using TORX® E10.

**Note:**

After installing, check that the protruding portion (a) is within the standard.

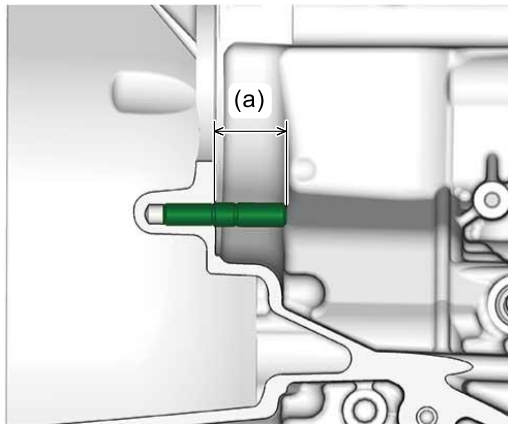
**Tightening torque:**

18 N·m (2.5 kgf-m, 18.4 ft-lb)

**Specification:**

26.5 – 30.2 mm (1.04 – 1.19 in)

SK-\*BE



CVT12648

2. Install the plugs with new O-rings.

**Note:**

Apply CVTF to the O-rings.

**Tightening torque:**

T1: 25 N·m (2.5 kgf-m, 18.4 ft-lb)

T2: 50 N·m (5.1 kgf-m, 36.9 ft-lb)

3. Attach the drain plug (A) using a new gasket, using TORX® T70.

**Tightening torque:**

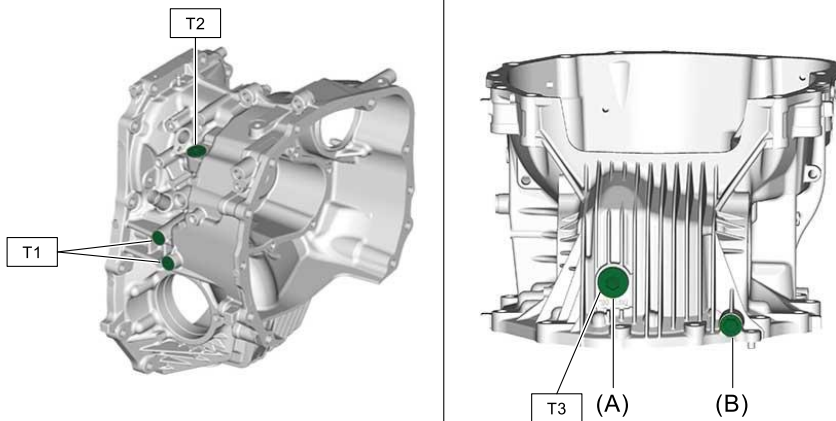
T3: 70 N·m (7.1 kgf-m, 51.6 ft-lb)

4. Temporarily install the overflow plug (B).

**Note:**

Replace the gasket of overflow plug with a new part after adjusting the differential gear oil level.

BWT\*AU



CVT12232

5. Install the secondary pressure sensor. [Ref. to CONTINUOUSLY VARIABLE TRANSMISSION\(TR690\)>Secondary Pressure Sensor>INSTALLATION.](#)

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Converter Case

### INSPECTION

---

Check that there is no deformation, cracks or other damages.

## CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > AT learning

### PROCEDURE

#### Caution:

- When replacement of TCM, replacement or disassembly of transmission body, replacement of control valve body or clearing of AT leaning value is executed, perform AT learning mode.
- Do not turn the power of the Subaru Select Monitor OFF during work, and do not disconnect the data link connector.

### 1. PREPARATION FOR LEARNING

1. Connect the Subaru Select Monitor.
2. Turn the ignition switch to ON. (Engine OFF)
3. Display [ATF Temp.].
4. Warm up or cool down until [ATF Temp.] displayed on the Subaru Select Monitor is 40 — 65 °C (104 — 149 °F).
5. After stopping the vehicle, shift the select lever to "P range".
6. Apply the parking brake.
7. Turn the ignition switch to OFF.
8. 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.
- Make sure that safety is secured where the tiers rotate.

9. Turn the ignition switch to ON. (Engine OFF)
10. Turn off all systems causing an electrical load, such as headlights, A/C, seat heater and rear defogger.

### 2. CLEAR AT LEARNING VALUE

#### Caution:

Be sure to perform the AT learning mode after performing Clear AT learning value.

1. On [Start] screen, select [Diagnosis].
2. On [Vehicle selection] screen, enter vehicle information and select [Set].
3. On [Main Menu] screen, select [Each System].
4. On [Select System] screen, select [Transmission Control System].
5. On [Select Function] screen, select [Work Support].
6. On [Work Support] screen, select [Clear AT learning value].
7. Follow the messages displayed on the screen when working.
8. When [Clear completed. Turn off the ignition switch. Execute AT learning again.] is displayed, Clear AT learning value is completed.

### 3. AT LEARNING MODE

#### Note:

AT learning mode is a learning operation performed with the vehicle lifted, without actually running the vehicle.

1. On [Start] screen, select [Diagnosis].
2. On [Vehicle selection] screen, enter vehicle information and select [Set].
3. On [Main Menu] screen, select [Each System].
4. On [Select System] screen, select [Transmission Control System].
5. On [Select Function] screen, select [Work Support].
6. On [Work Support] screen, select [AT learning mode].
7. Follow the messages displayed on the screen when working.
8. When [AT learning normally ended.] is displayed, AT learning mode is completed.

**Note:**

- If communication error occurs during learning, retry [AT learning mode] from the beginning.
- If the message [Execute AT learning again after fixing troubles of the vehicle] is displayed during learning, select [OK] to display the List of Diagnostics Trouble Code.  
After repairing the locations indicated by the DTC, start [AT learning mode] over from the beginning.
- When communication error occurs during learning, select lever does not shift occasionally.  
If select lever does not shift, turn the ignition switch to OFF before operating the select lever.
- If the message [AT learning ended abnormally. Try again from the beginning.] is displayed, start [AT learning mode] over from the beginning.

<b>Display</b>	<b>Main causes for abnormal termination</b>
[AT learning ended abnormally. Try again from the beginning.]	<ul style="list-style-type: none"><li>• Fault is detected during AT learning.</li><li>• The accelerator pedal is depressed during AT learning.</li><li>• An unspecified operation was performed during AT learning</li><li>• [ATF Temp.] becomes out of specification during AT learning.</li><li>• Battery voltage is low.</li><li>• The malfunction indicator light is lit.</li><li>• Parking brake is not applied hard enough.</li><li>• Brake pedal is not fully depressed.</li><li>• Abnormal idle speed increase, etc.</li></ul>

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Symptoms and causes

**INSPECTION**

**Note:**  
 Check the control operation history.  [Ref. to ENGINE \(DIAGNOSTICS\)\(H4DOTC\)>Work Support>OPERATION.](#)

Symptoms	Problem parts etc.
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>• Transmission harness</li> <li>• TCM</li> <li>• Control valve</li> <li>• Forward/reverse changeover section</li> <li>• CVTF deterioration or lack</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>• Select lever</li> <li>• Parking mechanism</li> <li>• Transmission harness</li> </ul>
Select lever does not shift smoothly.	<ul style="list-style-type: none"> <li>• Select cable</li> <li>• Select lever</li> <li>• Parking mechanism</li> <li>• Transmission harness</li> </ul>
Engine stalls 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>• Engine control system</li> <li>• Transmission harness</li> <li>• TCM</li> <li>• Control valve</li> <li>• Torque converter</li> </ul>
Engine speed rises up and the vehicle does not start, with select lever in "D range" or "R range".	<ul style="list-style-type: none"> <li>• Engine control system</li> <li>• Select cable</li> <li>• Inhibitor switch</li> <li>• Transmission harness</li> <li>• TCM</li> <li>• Control valve</li> <li>• Forward/reverse changeover section</li> <li>• Shift mechanism</li> <li>• CVTF deterioration or lack</li> <li>• Various oil pressure sensors</li> </ul>
Vehicle cannot start or acceleration is very poor when depressing the accelerator pedal with select lever in "D range" or "R range". (Including engine stall. Not including engine speed increase.)	<ul style="list-style-type: none"> <li>• Power supply system</li> <li>• Engine control system</li> <li>• Select cable</li> <li>• Parking mechanism</li> <li>• Transmission harness</li> <li>• TCM</li> <li>• Control valve</li> <li>• Torque converter</li> <li>• Forward/reverse changeover section</li> <li>• Shift mechanism</li> </ul>
Excessive shock occurs at starting, with select lever in "D range" or "R range".	<ul style="list-style-type: none"> <li>• Transmission harness</li> <li>• TCM</li> <li>• Control valve</li> <li>• Forward/reverse changeover section</li> <li>• Shift mechanism</li> <li>• CVTF deterioration or lack</li> </ul>
Excessive lockup shock occurs during driving, with select lever in "D range".	<ul style="list-style-type: none"> <li>• Transmission harness</li> <li>• TCM</li> <li>• Control valve</li> <li>• Torque converter</li> <li>• Forward/reverse changeover section</li> </ul>

<b>Symptoms</b>	<b>Problem parts etc.</b>
	<ul style="list-style-type: none"> <li>• CVTF deterioration or lack</li> <li>• Various oil pressure sensors</li> <li>• Various rotation sensors</li> </ul>
Slipping occurs at lockup, or lockup does not occur during driving, with select lever in "D range".	<ul style="list-style-type: none"> <li>• Transmission harness</li> <li>• TCM</li> <li>• Control valve</li> <li>• Torque converter</li> <li>• CVTF deterioration or lack</li> </ul>
Engine speed suddenly rises up during driving, with select lever in "D range" or "R range".	<ul style="list-style-type: none"> <li>• Transmission harness</li> <li>• TCM</li> <li>• Control valve</li> <li>• Forward/reverse changeover section</li> <li>• CVTF deterioration or lack</li> <li>• Various oil pressure sensors</li> <li>• Various rotation sensors</li> </ul>
Vibration occurs during driving, with select lever in "D range" or "R range".	<ul style="list-style-type: none"> <li>• Transmission harness</li> <li>• TCM</li> <li>• Control valve</li> <li>• Torque converter</li> <li>• Forward/reverse changeover section</li> <li>• Shift mechanism</li> </ul>
Sudden braking occurs during driving, with select lever in "D range" or "R range".	<ul style="list-style-type: none"> <li>• Transmission harness</li> <li>• TCM</li> <li>• Control valve</li> <li>• Various rotation sensors</li> </ul>
Vehicle cannot shift while driving with select lever in "D range".	<ul style="list-style-type: none"> <li>• Power supply system</li> <li>• Transmission harness</li> <li>• TCM</li> <li>• Control valve</li> <li>• Shift mechanism</li> </ul>
Lockup clutch does not disengage until just before halting and vibration occurs or engine stalls while driving with select lever in "D range".	<ul style="list-style-type: none"> <li>• Transmission harness</li> <li>• TCM</li> <li>• Control valve</li> <li>• Torque converter</li> </ul>
Shift indicator in combination meter displays the position which differs from select lever position.	<ul style="list-style-type: none"> <li>• Inhibitor switch</li> <li>• Select cable</li> <li>• Combination meter</li> <li>• TCM</li> </ul>
Manual mode enters even though the select lever and paddle switch is not operated.	<ul style="list-style-type: none"> <li>• Manual mode switch</li> <li>• Paddle shift switch</li> <li>• Select lever</li> <li>• Combination meter</li> <li>• TCM</li> </ul>
Manual mode cannot be set.	<ul style="list-style-type: none"> <li>• Manual mode switch</li> <li>• Paddle shift switch</li> <li>• Select lever</li> <li>• Combination meter</li> <li>• TCM</li> </ul>

# MANUAL TRANSMISSION AND DIFFERENTIAL(TY75)


## ***6MT(TY75)***

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1. General Description
2. Transmission Gear Oil
3. Transmission Assembly
4. Transmission Mounting System
5. Extension Case Oil Seal
6. Differential Side Retainer Oil Seal
7. Switches and Harness
8. Air Breather Hose
9. Preparation for Overhaul
10. Transfer Case and Extension Case
11. Transfer Drive Gear
12. Transfer Driven Gear
13. Center Differential
14. Shift Link
15. Transmission Case
16. Main Shaft
17. Drive Pinion Shaft
18. Front Differential
19. Reverse Idler Gear
20. Shifter Fork and Rod
21. Symptoms and causes

## MANUAL TRANSMISSION AND DIFFERENTIAL(TY75) > General Description

### CAUTION

- When performing service operation, refer to "Repair Contents" in "General Description".  [Ref. to REPAIR CONTENTS>Repair Contents.](#)
- Prior to starting work, pay special attention to the following:
  1. Always wear work clothes, a work cap, and protective shoes. Additionally, wear a helmet, protective goggles, etc. if necessary.
  2. Protect the vehicle using a seat cover, fender cover, etc.
  3. Prepare the service tools, clean cloth, containers to catch grease and oil, etc.
- Prevent scattering of grease and oil. If it scatters, wipe it off immediately to prevent it from penetrating the floor or flowing out, to protect the environmental.
- If the grease and oil is spilt over the engine, exhaust pipe or the under cover, completely wipe it off to avoid emission of smoke or causing a fire.
- Vehicle components are extremely hot immediately after driving. Be wary of receiving burns from heated parts.
- When performing a repair, identify the cause of trouble and avoid unnecessary work.
- Before disconnecting connectors of sensors or units, be sure to disconnect the ground terminal from the battery sensor.
- Always use the jack-up point when the lifting device, shop jacks or rigid racks are used to support the vehicle.
- Before starting works, remove dirt and corrosion around the target area.
- Keep the removed parts in order and protect them from dust and dirt.
- All removed parts, if to be reused, should be reinstalled in the original positions with attention to the correct directions, etc.
- For the parts except for the non-reusable parts, replace them with new parts if necessary.
- Be sure to tighten bolts and nuts to the specified torque.
- Always use new application oil during work.
- Always remove or install the transmission body in an area where lifting devices, transmission jacks, etc. are available for ready use.

## MANUAL TRANSMISSION AND DIFFERENTIAL(TY75) > General Description

### SPECIFICATION

#### 1. MANUAL TRANSMISSION

Model	2.4 L	
Type	6-forward speeds and 1-reverse with synchromesh	
Transmission gear ratio	1st	3.455
	2nd	1.947
	3rd	1.367
	4th	1.029
	5th	0.825
	6th	0.667
	Rev.	3.636

#### 2. FRONT DIFFERENTIAL

Type of gear	Hypoid gear	
Gear ratio	4.111	
Backlash between the differential bevel gear and differential bevel pinion	mm (in)	0.13 – 0.18 (0.005 – 0.007)
Hypoid gear set backlash	mm (in)	

#### 3. CENTER DIFFERENTIAL

Type	Viscous coupling
------	------------------

#### 4. TRANSFER

Gear ratio	1.000
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## 5. TRANSMISSION GEAR OIL

**Caution:**

**Do not mix different kinds of oil.**

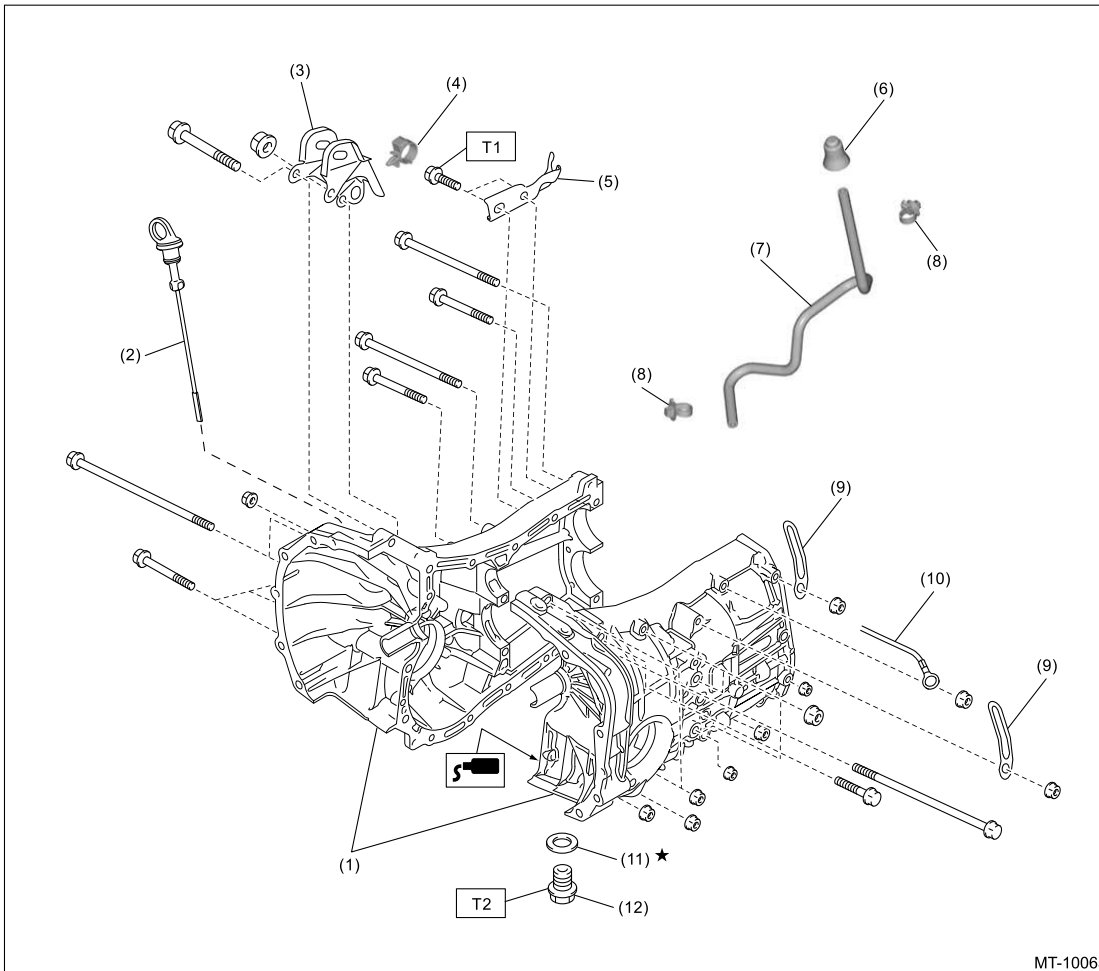
**Note:**

**Using any materials other than recommended may result in abnormal noise, vibration, functional decline, or poor fuel economy.**

Recommended and alternative materials	Capacity
<ul style="list-style-type: none"><li>• <b>Recommended materials:</b> SUBARU made GEAR OIL EXTRA MT (75W-80)                      L (US qt, Imp qt)</li><li>• <b>Alternative materials:</b> API standard GL-5 (75W-90)</li></ul>	3.3 (3.5, 2.9)

**COMPONENT**

**1. TRANSMISSION CASE**



- (1) Transmission case
- (2) Oil level gauge
- (3) Pitching stopper bracket
- (4) Clamp
- (5) Select bracket
- (6) Air breather cap
- (7) Air breather hose
- (8) Clip
- (9) Harness clip
- (10) Transmission radio ground cord
- (11) Gasket
- (12) Drain plug

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

**T1: 18 (1.8, 13.3)**

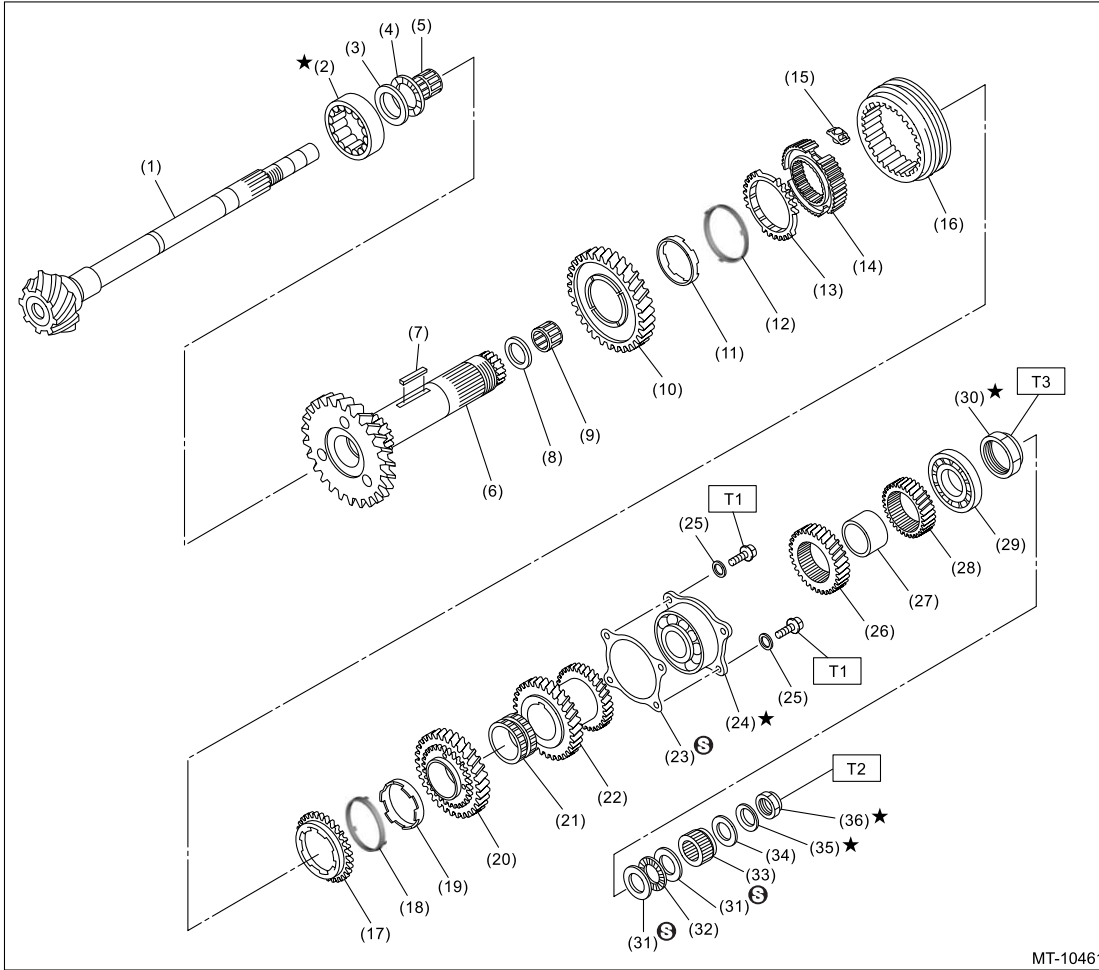
**T2: 70 (7.1, 51.6)**

**Transmission case tightening torque**

	Bolt No.	Bolt size mm	Tightening torque N·m (kgf-m, ft-lb)
	(5) – (15)	8	25 (2.5, 18.4)
	(1) – (4), (16), (17)	10	40 (4.1, 29.5)

MT-00003

## 2. DRIVE PINION SHAFT



MT-10461

- |                               |                              |                                     |
|-------------------------------|------------------------------|-------------------------------------|
| (1) Drive pinion shaft        | (15) 1st-2nd shifting insert | (29) Ball bearing                   |
| (2) Roller bearing            | (16) 1st-2nd coupling sleeve | (30) Lock nut                       |
| (3) Washer                    | (17) 2nd outer baulk ring    | (31) Adjusting washer               |
| (4) Thrust bearing            | (18) 2nd synchro cone        | (32) Thrust bearing                 |
| (5) Needle bearing            | (19) 2nd inner baulk ring    | (33) Differential bevel gear sleeve |
| (6) Driven shaft              | (20) 2nd driven gear         | (34) Washer                         |
| (7) Key                       | (21) 2nd driven gear bushing | (35) Lock washer                    |
| (8) Drive pinion collar       | (22) 3rd-4th driven gear     | (36) Lock nut                       |
| (9) Needle bearing            | (23) Drive pinion shim       |                                     |
| (10) 1st driven gear          | (24) Double ball bearing     |                                     |
|                               | (25) Spring washer           |                                     |
| (11) 1st inner baulk ring     | (26) 5th driven gear         |                                     |
| (12) 1st synchro cone         | (27) Drive pinion spacer     |                                     |
| (13) 1st outer baulk ring     | (28) 6th driven gear         |                                     |
| (14) 1st-2nd synchronizer hub |                              |                                     |
- Tightening torque: N·m (kgf-m, ft-lb)**
- T1: 30 (3.1, 22.1)**
- T2: 126 (12.8, 92.9)**
- T3: 440 (44.9, 324.5)**

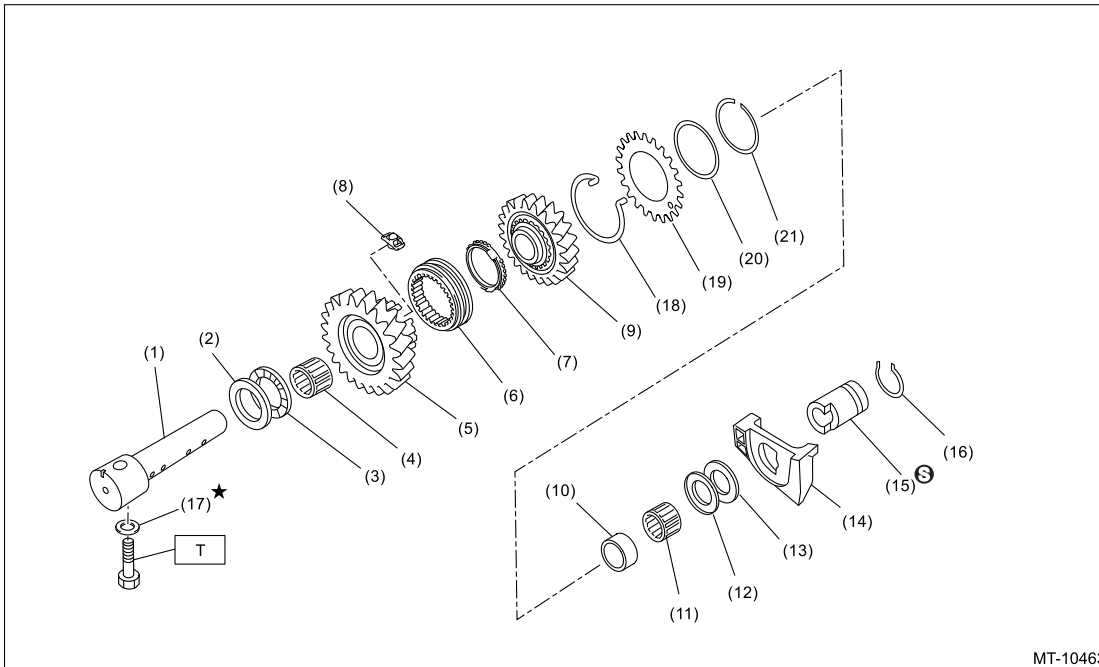
### 3. MAIN SHAFT

- |                               |                                  |                              |
|-------------------------------|----------------------------------|------------------------------|
| (1) Oil seal                  | (13) 4th drive gear              | (25) 5th-6th coupling sleeve |
| (2) Needle bearing            | (14) 4th needle bearing race     | (26) 6th baulk ring          |
| (3) Main shaft (input shaft)  | (15) 4th needle bearing          | (27) 6th drive gear          |
| (4) 3rd needle bearing        | (16) 4th gear thrust washer      | (28) 6th needle bearing race |
| (5) 3rd drive gear            | (17) Double taper roller bearing | (29) 6th needle bearing      |
| (6) 3rd inner baulk ring      | (18) 5th needle bearing race     | (30) Ball bearing            |
| (7) 3rd synchro cone          | (19) 5th needle bearing          | (31) Lock washer             |
| (8) 3rd outer baulk ring      | (20) Main shaft rear plate       | (32) Lock nut                |
| (9) 3rd-4th coupling sleeve   | (21) 5th drive gear              |                              |
| (10) 3rd-4th synchronizer hub | (22) 5th baulk ring              |                              |
| (11) 3rd-4th shifting insert  | (23) 5th-6th synchronizer hub    |                              |
| (12) 4th baulk ring           | (24) 5th-6th shifting insert     |                              |

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

**T: 160 (16.3, 118.0)**

### 4. REVERSE IDLER GEAR



MT-10463

- |                               |                                 |                             |
|-------------------------------|---------------------------------|-----------------------------|
| (1) Reverse idler gear shaft  | (9) Reverse idler gear          | (17) Gasket                 |
| (2) Reverse idler gear washer | (10) Reverse idler gear collar  | (18) Reverse idler spring   |
| (3) Thrust bearing            | (11) Needle bearing             | (19) Reverse idler sub gear |
| (4) Needle bearing            | (12) Thrust bearing             | (20) Friction plate         |
| (5) Reverse idler gear No. 2  | (13) Reverse idler gear washer  | (21) Snap ring              |
| (6) Reverse coupling sleeve   | (14) Oil case guide             |                             |
| (7) Reverse baulk ring        | (15) Reverse idler gear bushing |                             |
| (8) Reverse shifting insert   | (16) Snap ring                  |                             |

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

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

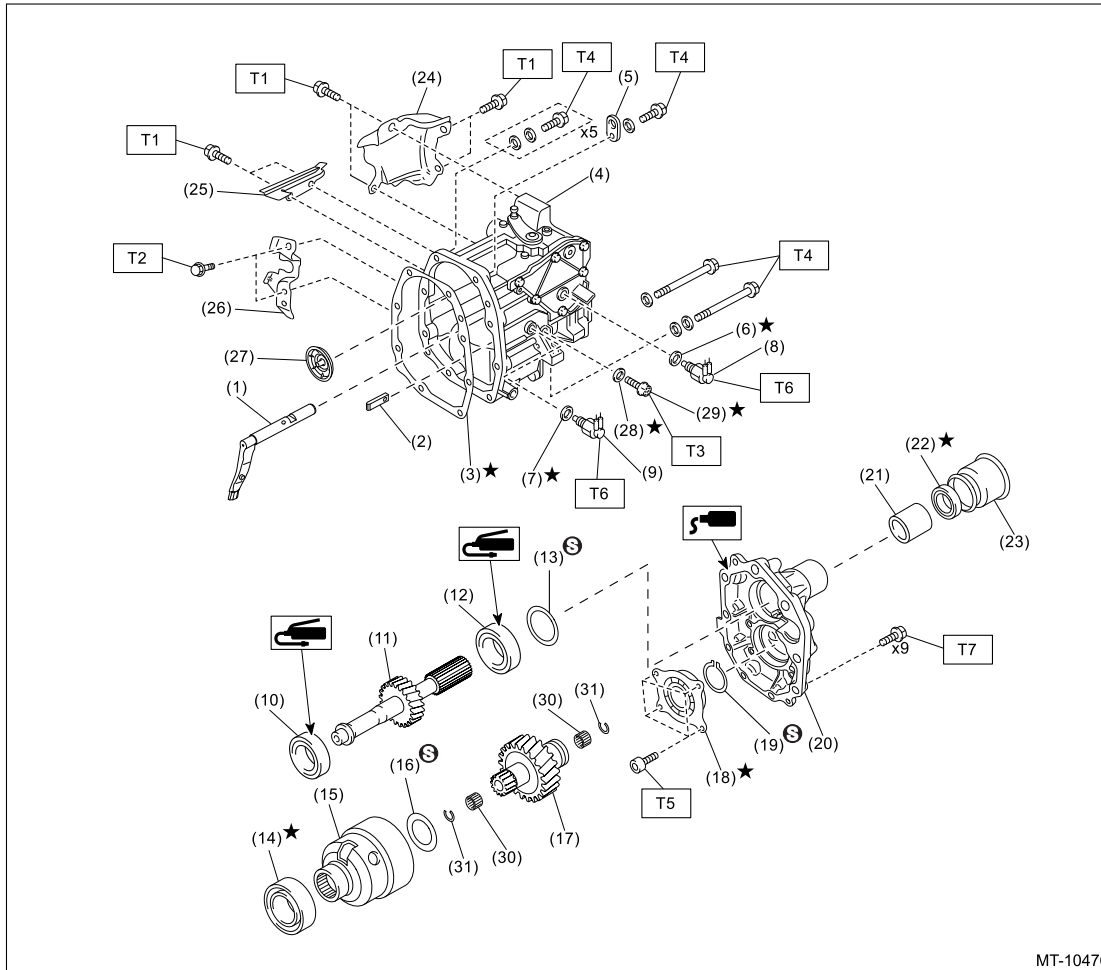
## 5. SHIFTER FORK AND SHIFTER ROD

- |                          |                           |                           |
|--------------------------|---------------------------|---------------------------|
| (1) Shifter arm          | (8) 3rd-4th shifter fork  | (15) Checking ball plug   |
| (2) Selector arm         | (9) 3rd-4th fork rod      | (16) Checking ball spring |
| (3) Straight pin         | (10) 1st-2nd shifter fork | (17) Check ball           |
| (4) Reverse shifter fork | (11) 1st-2nd fork rod     | (18) Gasket               |
| (5) Reverse fork rod     | (12) Interlock plunger    |                           |
| (6) 5th-6th shifter fork | (13) Interlock plunger    |                           |
| (7) 5th-6th fork rod     | (14) Interlock plunger    |                           |

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

**T: 20 (2.0, 14.8)**

## 6. TRANSFER CASE AND EXTENSION



MT-10476

- |   |                              |
|---|------------------------------|
| (1) Shifter arm                                 | (16) Adjusting washer        |
| (2) Interlock plate                             | (17) Transfer drive gear     |
| (3) Gasket                                      | (18) Ball bearing            |
| (4) Transfer case                               | (19) Snap ring               |
| (5) Transmission hanger                         | (20) Extension case          |
| (6) Gasket                                      | (21) Bushing                 |
| (7) Gasket                                      | (22) Extension case oil seal |
| (8) Neutral position switch                     | (23) Dust cover              |
| (9) Back-up light switch                        | (24) Transfer cover          |
| (10) Taper roller bearing (transfer case side)  | (25) Dust cover              |
| (11) Transfer driven gear                       | (26) Shift bracket           |
| (12) Taper roller bearing (extension case side) | (27) Oil guide               |
| (13) Adjusting washer                           | (28) Gasket                  |
| (14) Ball bearing                               | (29) Precoat bolt            |
| (15) Center differential                        | (30) Needle bearing          |
|   | (31) Snap ring               |

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

**T1: 15 (1.5, 11.1)**

**T2: 18 (1.8, 13.3)**

**T3: 20 (2.0, 14.8)**

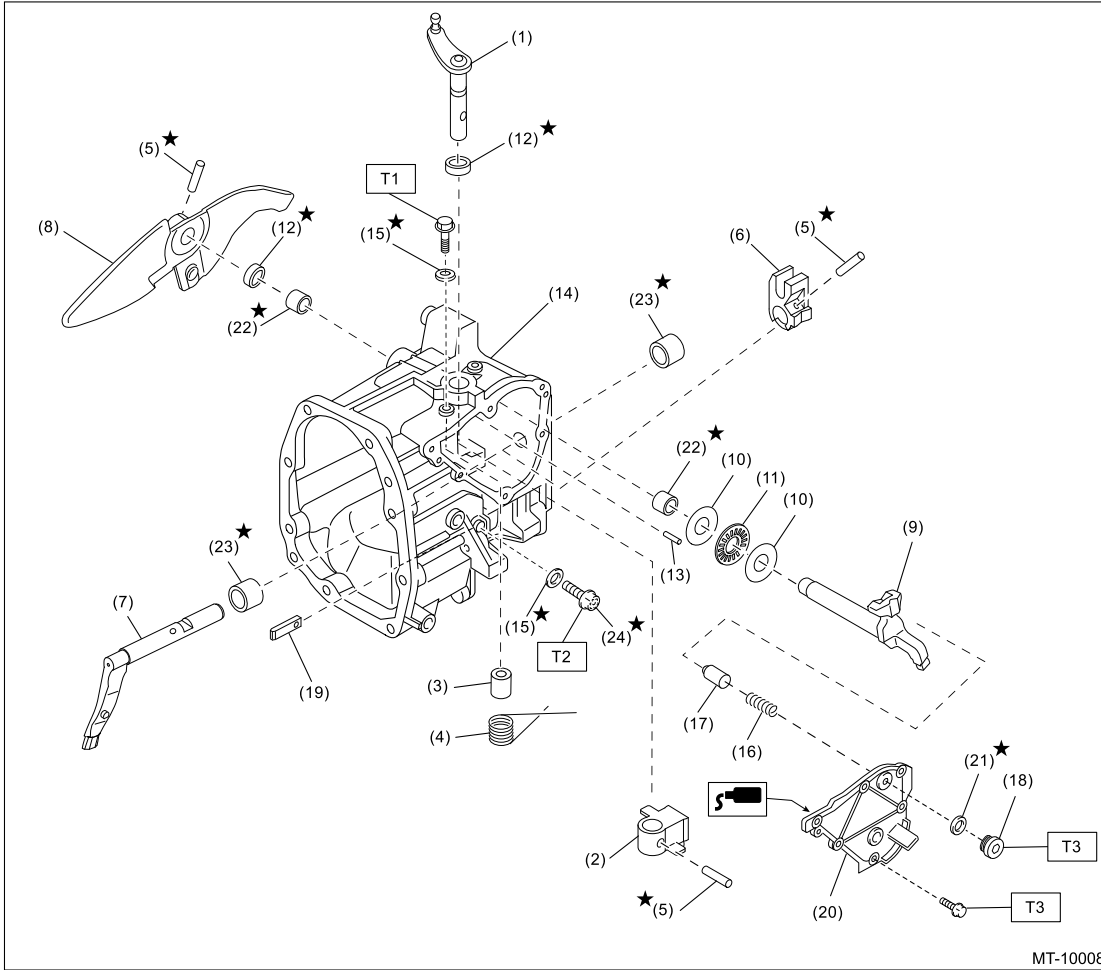
**T4: 24.5 (2.5, 18.1)**

**T5: 26 (2.7, 19.2)**

**T6: 32.3 (3.3, 23.8)**

**T7: 40 (4.1, 29.5)**

## 7. SHIFT LINK



MT-10008

- |                          |                           |                     |
|--------------------------|---------------------------|---------------------|
| (1) Selector lever COMPL | (11) Thrust bearing       | (21) Seal ring      |
| (2) Selector arm No. 2   | (12) Oil seal             | (22) Needle bearing |
| (3) Shifter arm collar   | (13) Straight pin         | (23) Roller bearing |
| (4) Neutral set spring   | (14) Transfer case        | (24) Precoat bolt   |
| (5) Straight pin         | (15) Gasket               |                     |
| (6) Selector arm         | (16) Checking ball spring |                     |
| (7) Shifter arm          | (17) Shift accent plunger |                     |
| (8) Shift lever COMPL    | (18) Seal bolt            |                     |
| (9) Shifter arm No. 2    | (19) Interlock plate      |                     |
| (10) Adjusting washer    | (20) Transmission cover   |                     |

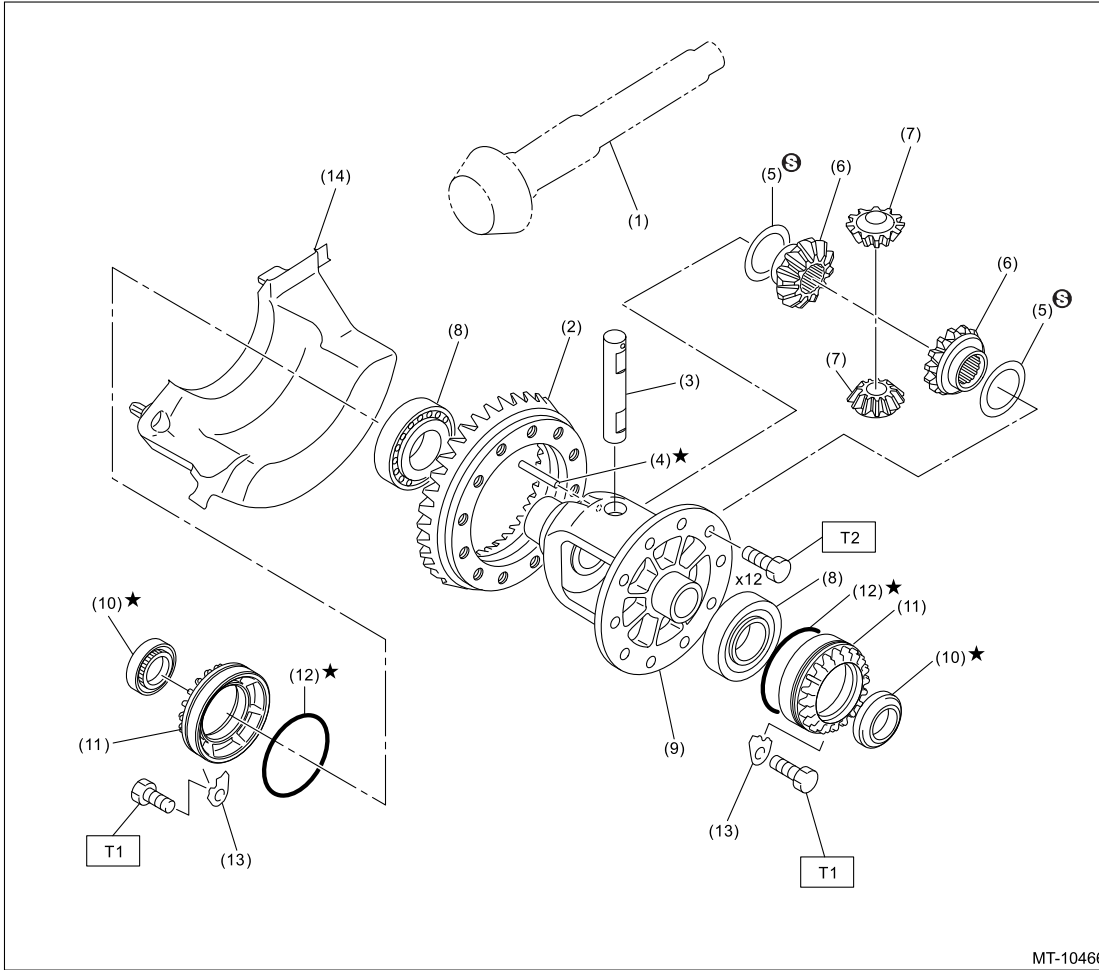
**Tightening torque: N·m (kgf-m, ft-lb)**

**T1: 6.4 (0.7, 4.7)**

**T2: 20 (2.0, 14.8)**

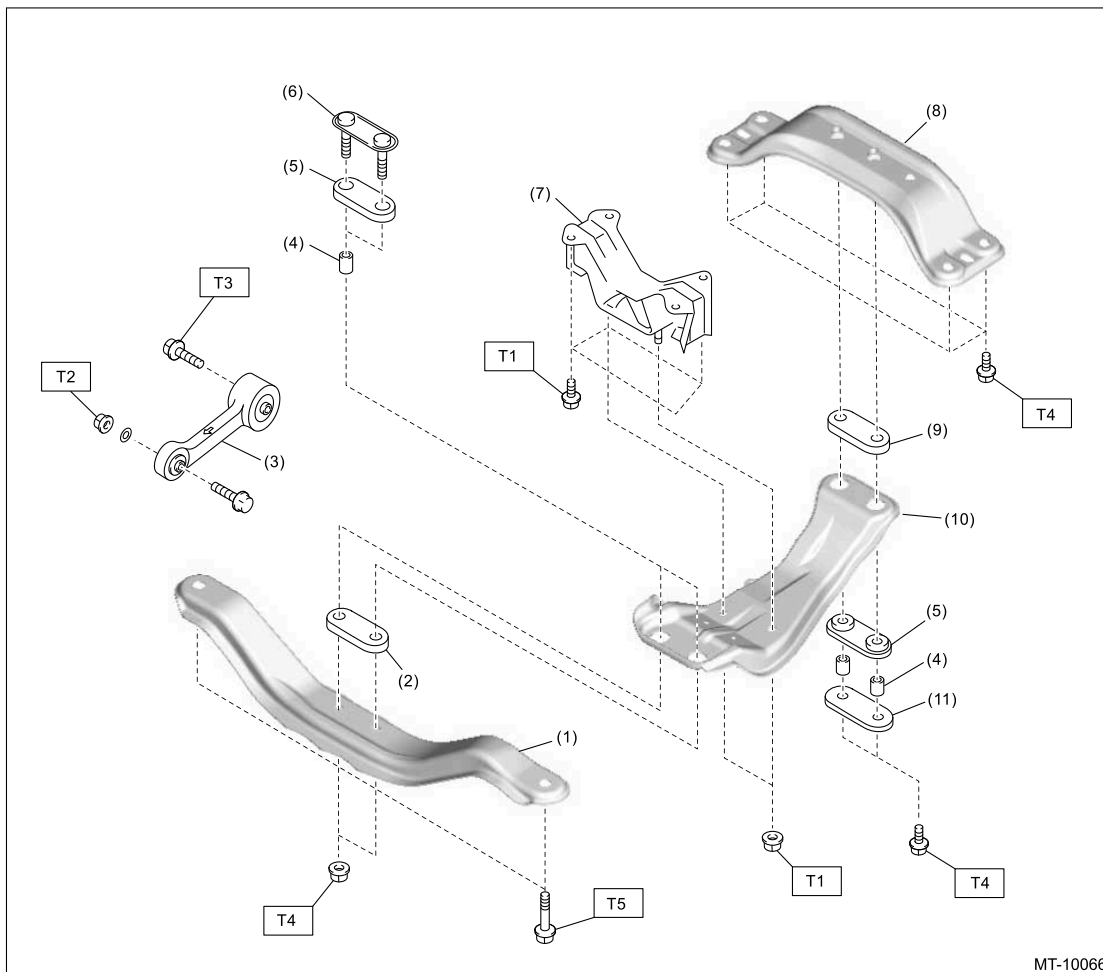
**T3: 25 (2.5, 18.4)**

## 8. FRONT DIFFERENTIAL



- |                             |                                 |  |
|-----------------------------|---------------------------------|--|
| (1) Drive pinion shaft      | (7) Differential bevel pinion   | (13) Retainer lock plate                     |
| (2) Hypoid driven gear      | (8) Taper roller bearing        | (14) Front oil guide                         |
| (3) Pinion shaft            | (9) Differential case           |  |
| (4) Straight pin            | (10) Oil seal                   | <b>Tightening torque: N·m (kgf-m, ft-lb)</b> |
| (5) Adjusting washer        | (11) Differential side retainer | <b>T1: 25 (2.5, 18.4)</b>                    |
| (6) Differential bevel gear | (12) O-ring                     | <b>T2: 62 (6.3, 45.7)</b>                    |

## 9. TRANSMISSION MOUNTING



MT-10066

(1) Front crossmember

(7) Transmission cushion rubber

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

(2) Front cushion rubber

(8) Rear crossmember

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

(3) Pitching stopper

(9) Rear cushion rubber

**T2: 50 (5.1, 36.9)**

(4) Spacer

(10) Center crossmember

**T3: 58 (5.9, 42.8)**

(5) Rear cushion rubber

(11) Rear plate

**T4: 70 (7.1, 51.6)**

(6) Front plate

**T5: 140 (14.3, 103.3)**

**PREPARATION TOOL**

**1. SUBARU SPECIAL TOOL**

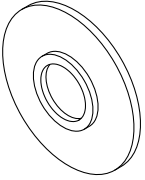
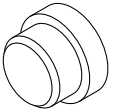
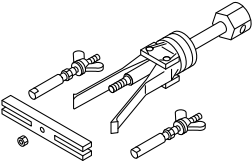
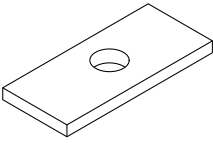
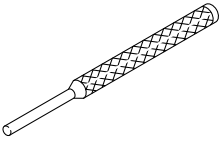
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST-398177700</p>	398177700	INSTALLER	<ul style="list-style-type: none"> <li>Used for installing the ball bearing of the transfer drive gear.</li> <li>Used for installing the 4th drive gear needle bearing race.</li> </ul>
 <p>ST-398497701</p>	398497701	SEAT	<p>Used for installing the front differential taper roller bearing.</p> <div style="border: 1px solid black; padding: 5px; margin-top: 5px;"> <p><b>Note:</b> Used together with BUSHING 1-2 INSTALLER (499277100).</p> </div>
 <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 taper roller bearing outer race of front differential.</li> <li>Used for removing the differential side retainer oil seal.</li> </ul>
 <p>ST-398643600</p>	398643600	GAUGE	Used for adjusting the extension end play.
 <p>ST-398791700</p>	398791700	REMOVER	Used for removing and installing the straight pin.

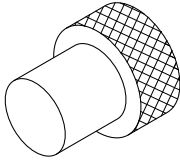
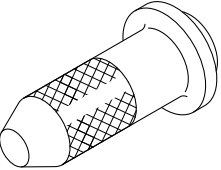
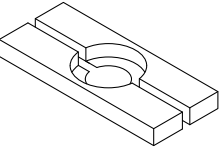
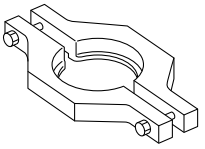
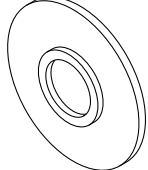
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST-399780104</p>	399780104	WEIGHT	Used for adjusting preload on the front differential taper roller bearing.
 <p>ST-498057300</p>	498057300	INSTALLER	Used for installing the extension case oil seal.
 <p>ST-498077000</p>	498077000	REMOVER	<ul style="list-style-type: none"> <li>• Used for removing the roller bearing and washer of the drive pinion shaft assembly.</li> <li>• Used for removing the taper roller bearing of transfer driven gear.</li> </ul>
 <p>ST-498077600</p>	498077600	REMOVER	Used for removing the center differential ball bearing.
 <p>ST-498175500</p>	498175500	INSTALLER	Used for installing the taper roller bearing of transfer driven gear (extension case side).

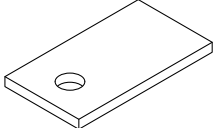
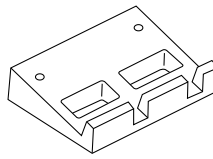
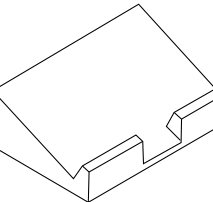
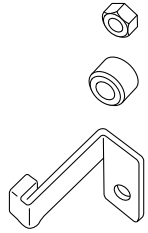
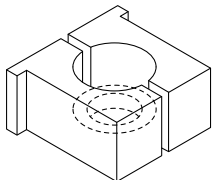
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST-498255400</p>	498255400	PLATE	Used for measuring the hypoid driven gear backlash.
 <p>ST-498267200</p>	498267200	CYLINDER HEAD TABLE	Used for removing and installing the roller bearing of the transfer case.
 <p>ST-498267300</p>	498267300	CYLINDER HEAD TABLE	Used for removing and installing the roller bearing of the transfer case.
 <p>ST-498277200</p>	498277200	STOPPER SET	<p>Used for installing the needle bearing of the transfer case.</p> <div style="border: 1px solid black; padding: 2px;"> <p><b>Note:</b> Use only the spacer.</p> </div>
 <p>ST-498937000</p>	498937000	TRANSMISSION HOLDER	Used for removing and installing the main shaft assembly lock nut.
	499277100	BUSHING 1-2 INSTALLER	<ul style="list-style-type: none"> <li>• Used for installing the drive pinion shaft assembly washer.</li> <li>• Used for installing the front differential taper roller bearing inner race.</li> </ul>

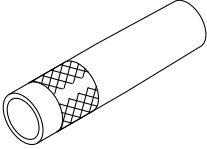
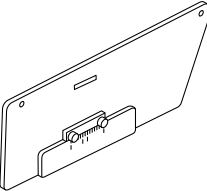
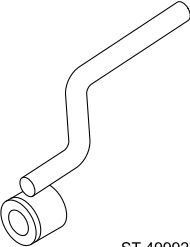
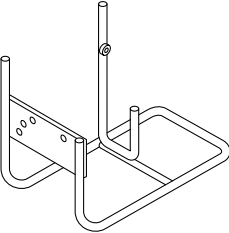
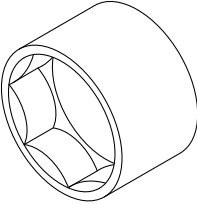
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST-499277200</p>	499277200	INSTALLER	<ul style="list-style-type: none"> <li>• Used for installing the 3rd-4th driven gear, 5th driven gear, ball bearing and 6th driven gear.</li> <li>• Used for installing the drive pinion shaft assembly washer.</li> </ul>
	499877000	RACE 4-5 INSTALLER	<p>Used for installing the 4th, 5th and 6th drive gear needle bearing races and the main shaft double taper roller bearings.</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p><b>Note:</b> Used together with REMOVER (899714110).</p> </div>
 <p>ST-499917500</p>	499917500	DRIVE PINION GAUGE ASSY	Used for adjusting the drive pinion shaft assembly shim.
 <p>ST-499927100</p>	499927100	HANDLE	Used for backlash measurement of the hypoid driven gear and preload adjustment of the front differential taper roller bearing.
 <p>ST-499937100</p>	499937100	TRANSMISSION STAND	Used for disassembling and assembling the transmission.
 <p>ST-499987003</p>	499987003	SOCKET WRENCH (35)	Used for removing and installing the main shaft assembly lock nut.

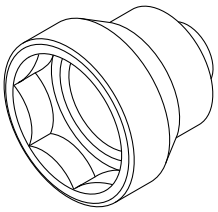
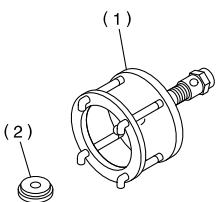
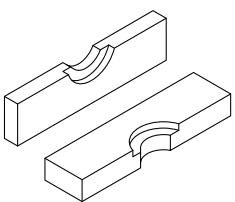
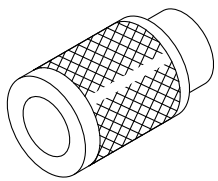
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST-499987300</p>	499987300	SOCKET WRENCH (50)	Used for removing and installing the driven shaft lock nut.
 <p>ST-899524100</p>	899524100	PULLER SET	Used for removing the front differential taper roller bearing. (1) Puller (2) Cap
 <p>ST-899714110</p>	899714110	REMOVER	Used for removing and installing the parts of main shaft assembly and driven shaft.
 <p>ST-899754112</p>	899754112	PRESS	<ul style="list-style-type: none"> <li>• Used for removing driven shaft parts.</li> <li>• Used to install the main shaft assembly ball bearing.</li> </ul>
	899864100	REMOVER	<ul style="list-style-type: none"> <li>• Used for removing the parts of the main shaft assembly.</li> <li>• Used for removing the transfer driven gear taper roller bearing (transfer case side) and for installing it (extension case side).</li> <li>• Used for removing the transfer drive gear ball bearing.</li> <li>• Used for installing the transfer case taper roller bearing.</li> </ul>
	899904100	STRAIGHT PIN REMOVER	Used for removing and installing the straight pin.
	927640000	INSTALLER	Used for installing the taper roller bearing (transfer case side) of transfer driven gear.

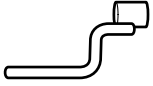
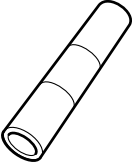
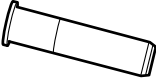
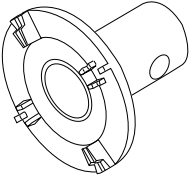
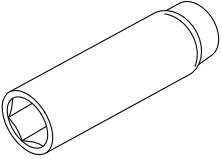
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST18631AA000</p>	18631AA000	HANDLE	Used for installing transfer case assembly and extension case assembly.
 <p>ST18654AA000</p>	18654AA000	INSTALLER	Used for installing the 2nd driven gear bushing.
 <p>ST18657AA000</p>	18657AA000	INSTALLER	Used for installing the transfer case oil seal.
 <p>ST18658AA021</p>	18658AA021	WRENCH COMPL RETAINER	<ul style="list-style-type: none"> <li>• Used for removing and installing the differential side retainer.</li> <li>• Used for adjusting preload on the front differential taper roller bearing.</li> <li>• Used for adjusting the backlash of hypoid driven gear.</li> </ul>
 <p>ST18662AA010</p>	18662AA010	SOCKET (27)	<ul style="list-style-type: none"> <li>• Used for removing and installing the drive pinion shaft assembly lock nut.</li> <li>• Used for measuring the starting torque of the drive pinion shaft assembly.</li> </ul>

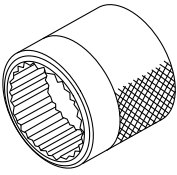
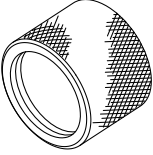
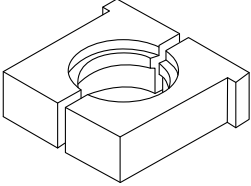

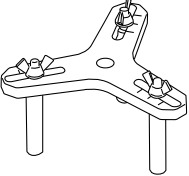
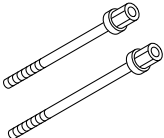
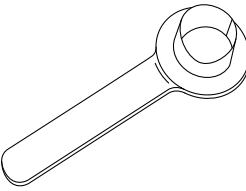
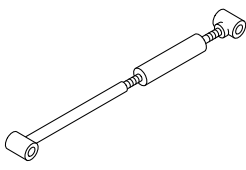
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST18667AA020</p>	18667AA020	HOLDER	<ul style="list-style-type: none"> <li>• Used for removing and installing the drive pinion shaft assembly lock nut.</li> <li>• Used for measuring the hypoid driven gear backlash.</li> <li>• Used for adjusting preload on the front differential taper roller bearing.</li> </ul>
 <p>ST18675AA000</p>	18675AA000	DIFFERENTIAL SIDE OIL SEAL INSTALLER	Used for installing the differential side retainer oil seal.
 <p>ST18680AA020</p>	18680AA020	HOLDER	<ul style="list-style-type: none"> <li>• Used for removing and installing the drive pinion shaft assembly lock nut.</li> <li>• Used for removing and installing the driven shaft lock nut.</li> </ul>
 <p>ST18722AA010</p>	18722AA010	REMOVER	Used for removing the 5th drive gear and 6th drive gear.
 <p>ST18762AA001</p>	18762AA001	COMPRESSOR SPECIAL TOOL	<ul style="list-style-type: none"> <li>• Used for removing the 1st driven gear.</li> <li>• COMPRESSOR SPECIAL TOOL (18762AA000) can also be used.</li> </ul>

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST18763AA000</p>	18763AA000	COMPRESSOR SHAFT	Used for removing and installing the needle bearing of the transfer case.
 <p>ST28399SA010</p>	28399SA010	OIL SEAL PROTECTOR	Used for protecting the oil seal from damage when inserting the front drive shaft.
	41099AA012	ENGINE SUPPORT BRACKET	Used for removing and installing transmission body. <b>Note:</b> Used together with ENGINE SUPPORT (41099AA020).
 <p>ST41099AA020</p>	41099AA020	ENGINE SUPPORT	Used for removing and installing transmission body. <b>Note:</b> Used together with ENGINE SUPPORT BRACKET (41099AA012).

## 2. OTHER

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance, voltage and current.
TORX® T70	Used for removing and installing the drain plug.
Dial gauge (lever type)	Used for measuring backlash. <b>Note:</b> Used together with magnet stand.
Magnet stand	Used for measuring backlash. <b>Note:</b> Used together with the dial gauge (lever type).
Spring pin remover	Used for removing and installing the straight pin. (3 – 3.3 mm)
TORX® T45 (tamper resistant type)	Used for removing and installing interlock plate.

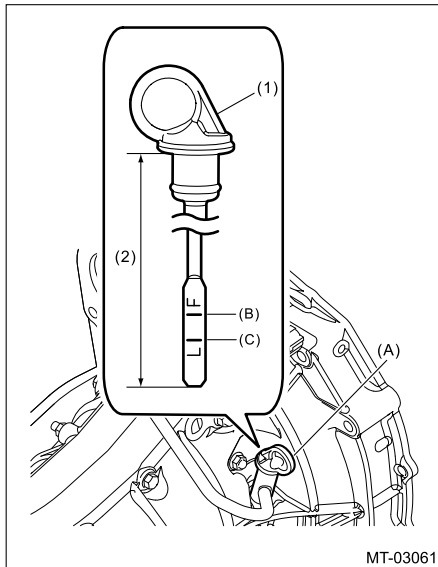
## MANUAL TRANSMISSION AND DIFFERENTIAL(TY75) > Transmission Gear Oil

### INSPECTION

1. Park the vehicle on a level surface.
2. Turn the ignition switch to OFF, and wait until the engine cools.
3. Remove the oil level gauge and wipe it clean.
4. Reinsert the oil level gauge all the way. Be sure that the oil level gauge is correctly inserted in the proper direction.
5. Pull out the oil level gauge again, and check the oil level. If it is below the lower level, check for oil leakage and pour oil through the oil level gauge hole to bring the level up to the upper level.

**Caution:**

**The length of the oil level gauge varies depending on models and destinations. Make sure to use the appropriate oil level gauge.**



- (A) Oil level gauge
- (B) Upper level
- (C) Lower level
- (1) Gray
- (2) 195.9 mm (7.71 in)

## MANUAL TRANSMISSION AND DIFFERENTIAL(TY75) > Transmission Gear Oil

### REPLACEMENT

1. Pull out the oil level gauge.
2. Lift up the vehicle.
3. Using the TORX® T70, remove the drain plug, and drain the transmission gear oil.

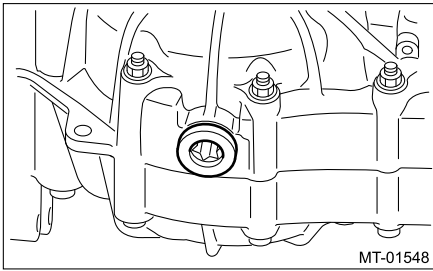
**Caution:**

- **Immediately after the vehicle has been running or after idling for a long time, the gear oil will be hot. Be careful not to receive burns.**
- **Be careful not to spill the gear oil on the exhaust pipe, to prevent emission of smoke or causing a fire. If gear oil is spilled, wipe it off completely.**

4. Attach the drain plug using a new gasket, using TORX® T70.

**Tightening torque:**

70 N·m (7.1 kgf-m, 51.6 ft-lb)



5. Lower the vehicle.
6. Pour gear oil through the oil level gauge hole.

**Caution:**

**Note that you may experience poor functionality and performance if an alternative gear oil is used.**

**Preparation items:**

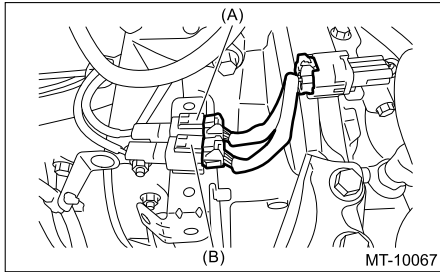
Transmission gear oil:  [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>General Description>SPECIFICATION > TRANSMISSION GEAR OIL.](#)

7. Check the gear oil amount, and confirm that it is within the specification.

**REMOVAL**

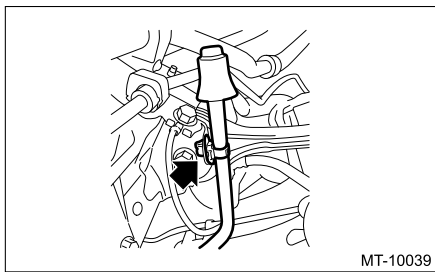


1. Disconnect the ground terminal from battery sensor.  Ref. to [REPAIR CONTENTS>NOTE > BATTERY](#).
2. Remove the intercooler.  Ref. to [INTAKE \(INDUCTION\)\(H4DOTC\)>Intercooler>REMOVAL](#).
3. Remove the coupling harness.

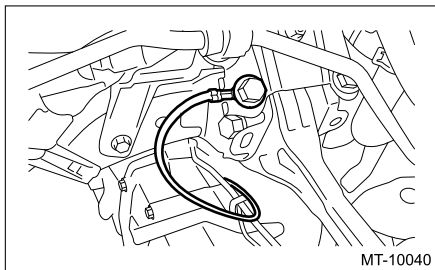


- (A) Neutral position switch connector (2P, brown)
- (B) Back-up light switch connector (2P, gray)

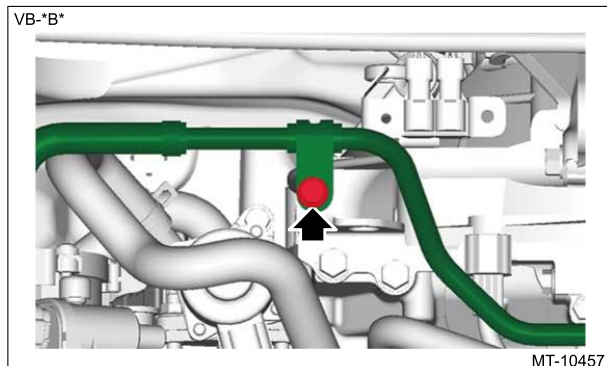
4. Remove the clips and remove the air breather hose.



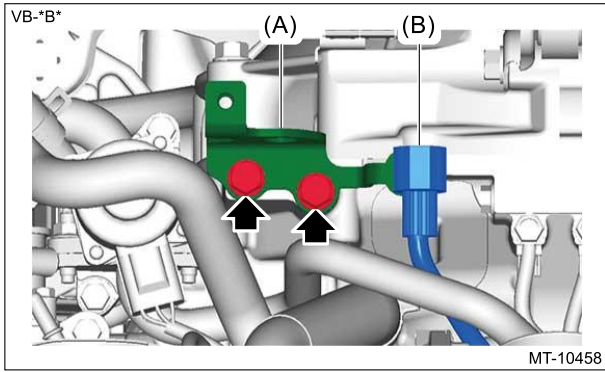
5. Disconnect the transmission radio ground cord terminal.



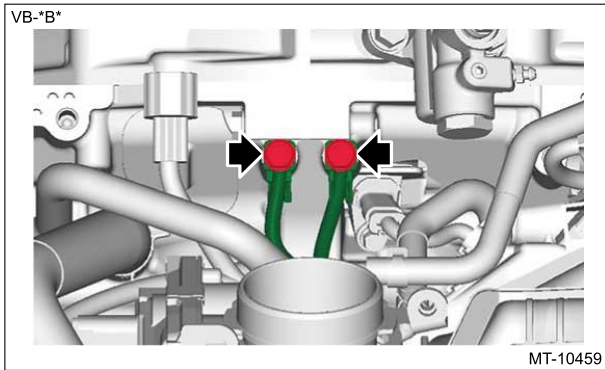
6. Remove the bolts securing the vacuum pipe COMPL to the engine rear hanger.



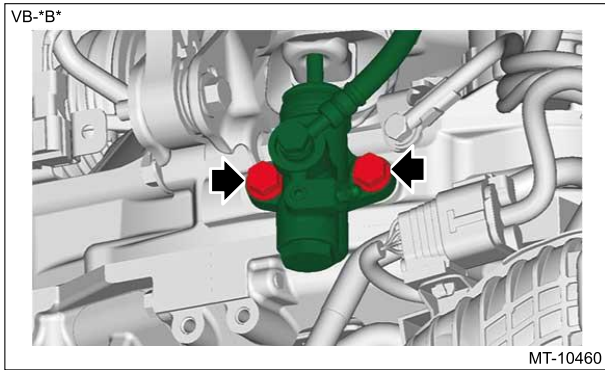
7. Remove the engine rear hanger (A) and connector (B).



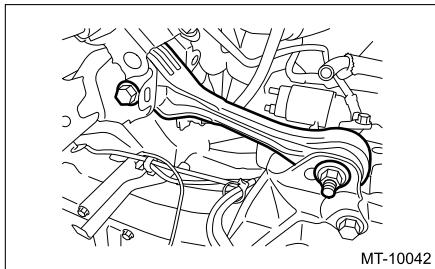
**8.** Disconnect the engine ground terminal.



**9.** Remove the operating cylinder and suspend on a wire.



**10.** Remove the pitching stopper.

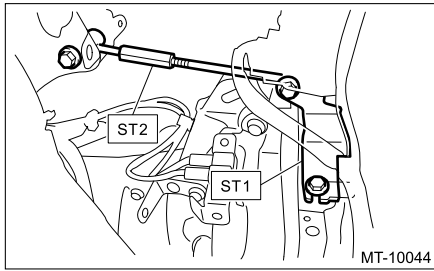


**11.** Set the ST1 and ST2.

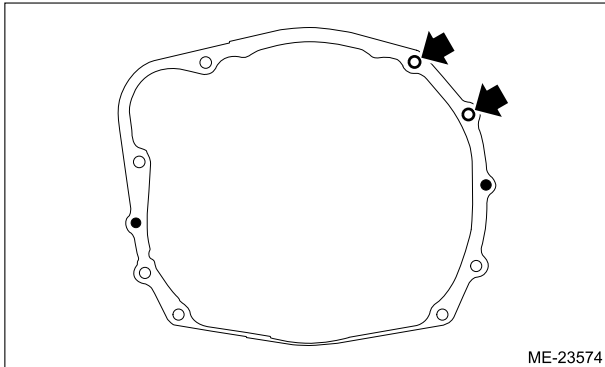
**Preparation tool:**

ST1: ENGINE SUPPORT BRACKET (41099AA012)

ST2: ENGINE SUPPORT (41099AA020)



**12.** Remove the bolts which hold upper side of transmission to engine.



**13.** Remove the starter. [Ref. to STARTING/CHARGING SYSTEMS\(H4DOTC\)>Starter>REMOVAL.](#)

**14.** Remove the front tires. [Ref. to WHEEL AND TIRE SYSTEM>Tire and Wheel>REMOVAL.](#)

**15.** Lift up the vehicle.

**16.** Remove the crossmember support rear.

**17.** Remove the rear exhaust pipe and center exhaust cover. [Ref. to EXHAUST\(H4DOTC\)>Rear Exhaust Pipe>REMOVAL.](#)

**18.** Remove the center exhaust pipe (rear) and the hanger bracket. [Ref. to EXHAUST\(H4DOTC\)>Center Exhaust Pipe>REMOVAL > CENTER EXHAUST PIPE \(REAR\).](#)

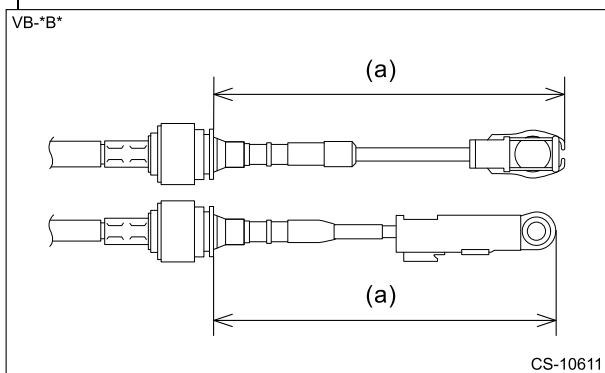
**19.** Drain transmission gear oil completely. [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transmission Gear Oil>REPLACEMENT.](#)

**20.** Remove the propeller shaft. [Ref. to PROPELLER SHAFT / DRIVE SHAFT / AXLE>Propeller Shaft>REMOVAL.](#)

**21.** Remove the MT gear shift cable and MT gear select cable from MT gear shift lever. [Ref. to CONTROL SYSTEMS>MT Gear Shift Lever>REMOVAL.](#)

**Caution:**

- Be careful not to deform the cable inner.
- Do not twist the cable inner more than necessary.
- Do not apply excessive load while holding the part (a).



**22.** Remove the brake hose bracket. [Ref. to FRONT SUSPENSION>Front Strut>REMOVAL.](#)

**Note:**

**Remove only the brake hose bracket.**

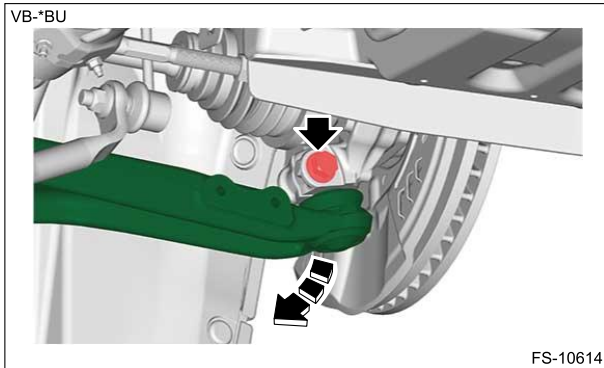
**23.** Disconnect the arm assembly front.

(1) Remove the bolt and nut from the front axle housing.

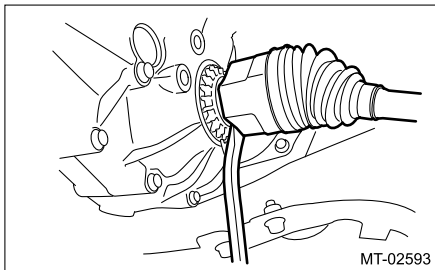
(2) Lower the arm assembly front, and remove the ball stud from the front axle housing.

**Caution:**

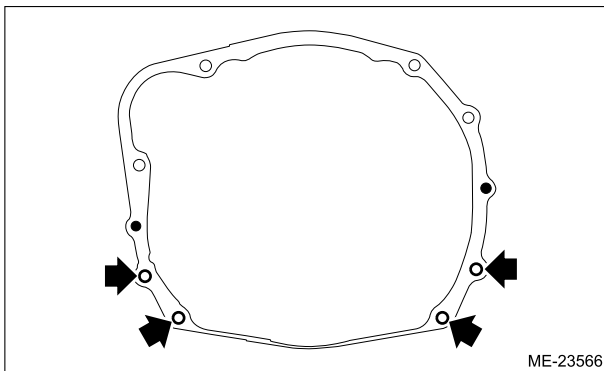
**Be careful not to damage the boot of the ball joint.**



**24.** Using a crowbar, separate the front drive shaft.



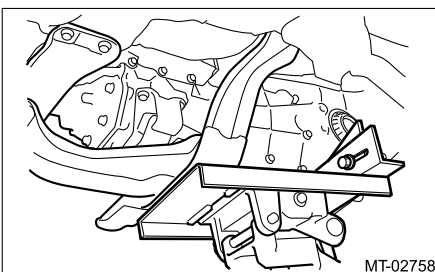
**25.** Remove the bolts and nuts which hold lower side of transmission to engine.



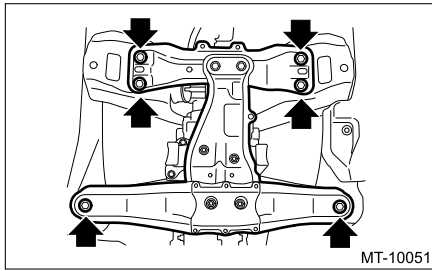
**26.** Set the transmission jack.

**Caution:**

- **Always support the transmission case with a transmission jack.**
- **Be sure to use belts, etc. to prevent the transmission from falling.**



**27.** Remove the front crossmember and the rear crossmember.



28. While lowering the transmission jack, tighten the turnbuckle of the ST (ENGINE SUPPORT), and incline the engine unit rearward.
29. Remove the transmission assembly.

**Caution:**

**Move the transmission jack towards the rear until the main shaft is withdrawn from the clutch cover.**

30. Remove the transmission cushion rubber.
31. Remove the release bearing & lever. [Ref. to CLUTCH SYSTEM>Release Bearing and Lever>REMOVAL.](#)

MANUAL TRANSMISSION AND DIFFERENTIAL(TY75) > Transmission Assembly

**INSTALLATION**

1. Install the release bearing & lever. [Ref. to CLUTCH SYSTEM>Release Bearing and Lever>INSTALLATION.](#)
2. Replace the differential side retainer oil seal with a new part. [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Differential Side Retainer Oil Seal>REPLACEMENT.](#)

**Caution:**

**Be sure to replace the oil seal after removing the front drive shaft.**

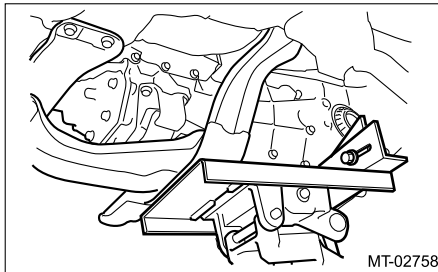
**Note:**

**When a new oil seal has been installed, replacement is not required.**

3. Place the transmission body on the transmission jack.

**Caution:**

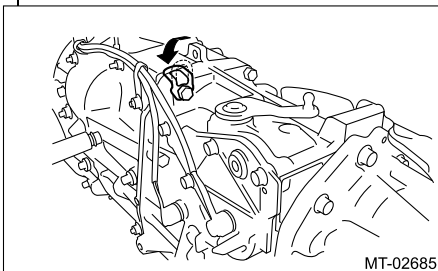
- Always support the transmission case with a transmission jack.
- Be sure to use belts, etc. to prevent the transmission from falling.



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

**Caution:**

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

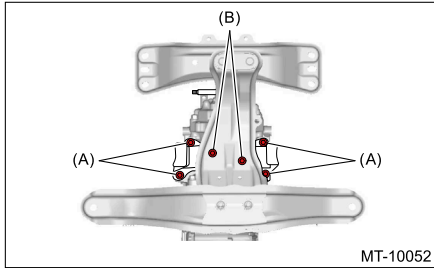


5. Install the transmission cushion rubber to the transmission, and tighten the bolt (A).
6. Install the transmission cushion rubber to the center crossmember, and temporarily tighten the nut (B).

**Tightening torque:**

### Bolt (A)

35 N·m (3.6 kgf-m, 25.8 ft-lb)



7. Install the transmission assembly onto the engine.
  - (1) Lift up the transmission gradually using a transmission jack.
  - (2) Engage at the spline section.

#### Caution:

**Be careful not to hit the main shaft against the clutch cover.**

8. While raising the transmission jack, loosen the turnbuckle of the ST (ENGINE SUPPORT), and set the engine unit to the original position.
9. Install the front crossmember and rear crossmember.
10. Tighten the transmission cushion rubber mounting nut.

#### Tightening torque:

T1: 70 N·m (7.1 kgf-m, 51.6 ft-lb)

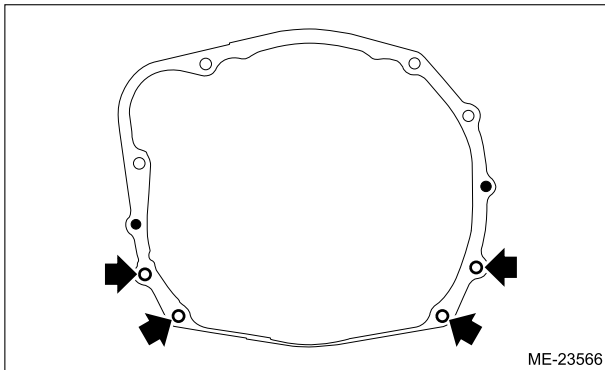
T2: 140 N·m (14.3 kgf-m, 103.3 ft-lb)

T3: 35 N·m (3.6 kgf-m, 25.8 ft-lb)

11. Take out the transmission jack.
12. Tighten the bolts and nuts which hold the lower side of transmission to the engine.

#### Tightening torque:

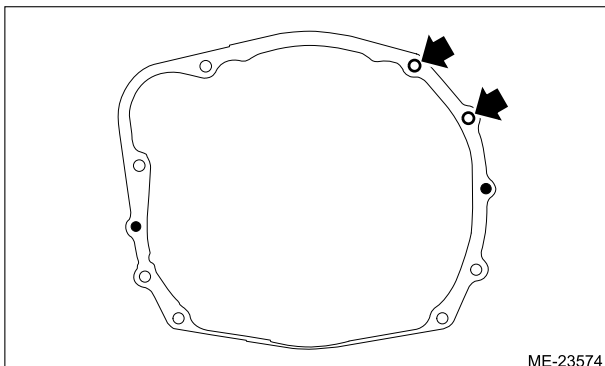
50 N·m (5.1 kgf-m, 36.9 ft-lb)



13. Lower the vehicle.
14. Install the starter. [Ref. to STARTING/CHARGING SYSTEMS\(H4DOTC\)>Starter>INSTALLATION.](#)
15. Tighten the bolts which hold the upper side of the transmission to the engine.

#### Tightening torque:

50 N·m (5.1 kgf-m, 36.9 ft-lb)

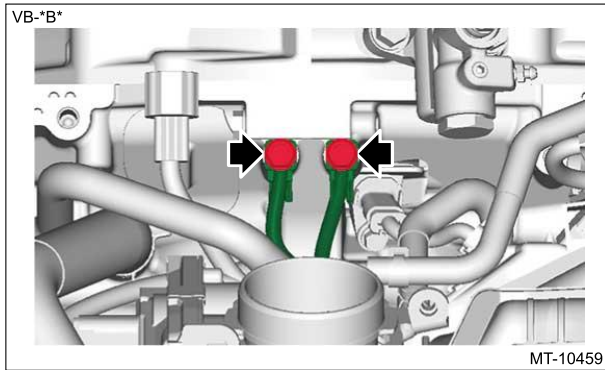


**16.** Remove ST (ENGINE SUPPORT BRACKET and ST ENGINE SUPPORT).

**17.** Install the engine ground terminals.

**Tightening torque:**

19 N·m (1.9 kgf-m, 14.0 ft-lb)

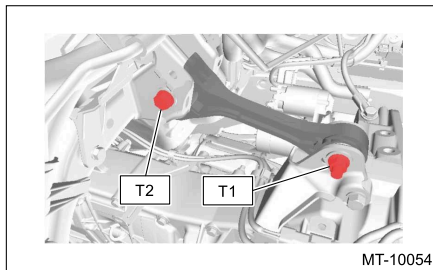


**18.** Install the pitching stopper.

**Tightening torque:**

T1: 50 N·m (5.1 kgf-m, 36.9 ft-lb)

T2: 58 N·m (5.9 kgf-m, 42.8 ft-lb)



**19.** Lift up the vehicle.

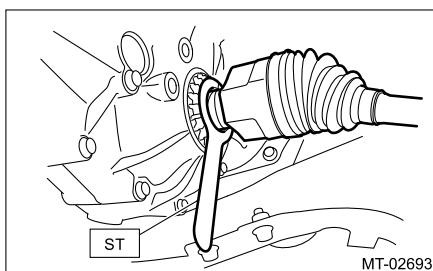
**20.** Set the ST (OIL SEAL PROTECTOR) to the differential side retainer.

**21.** Replace the circlip of the front drive shaft with a new part.

**22.** Install the front drive shaft and remove ST.

**Preparation tool:**

ST: OIL SEAL PROTECTOR (28399SA010)



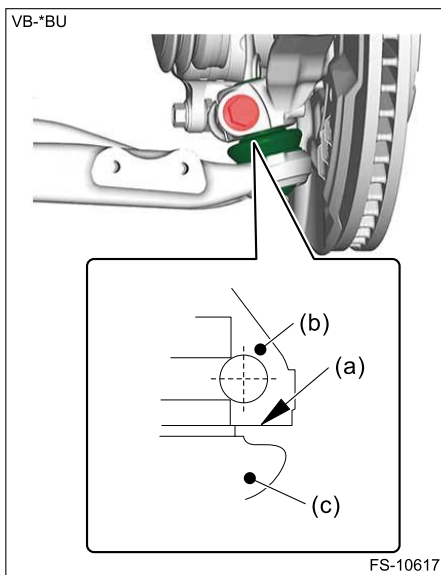
**23.** Connect the arm assembly front.

**Caution:**

- Always use a new flange bolt and a new flange nut.
- Be careful not to damage the boot of the ball joint.
- While holding the bolt side, tighten the nut to the specified torque.

**Tightening torque:**

70 N·m (7.1 kgf-m, 51.6 ft-lb)



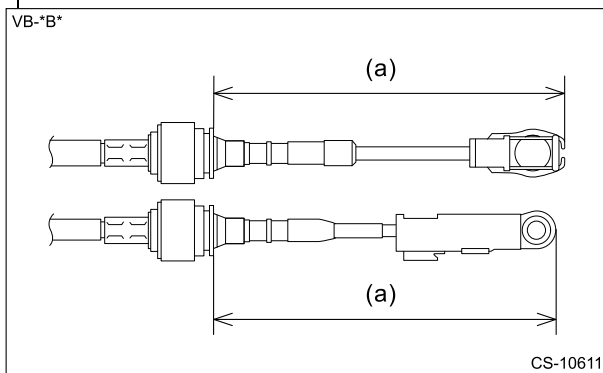
- (a) Bottom surface of front axle housing
- (b) Front axle housing
- (c) Arm ASSY front

**24.** Install the brake hose bracket. [Ref. to FRONT SUSPENSION>Front Strut>INSTALLATION.](#)

**25.** Install the MT gear shift cable and MT gear select cable to MT gear shift lever. [Ref. to CONTROL SYSTEMS>MT Gear Shift Lever>INSTALLATION.](#)

**Caution:**

- Be careful not to deform the cable inner.
- Do not twist the cable inner more than necessary.
- Do not apply excessive load while holding the part (a).



**26.** Install the propeller shaft. [Ref. to PROPELLER SHAFT / DRIVE SHAFT / AXLE>Propeller Shaft>INSTALLATION.](#)

**27.** Install the center exhaust cover and rear exhaust pipe. [Ref. to EXHAUST\(H4DOTC\)>Rear Exhaust Pipe>INSTALLATION.](#)

**28.** Install the hanger bracket and the center exhaust pipe (rear). [Ref. to EXHAUST\(H4DOTC\)>Center Exhaust Pipe>INSTALLATION > CENTER EXHAUST PIPE \(REAR\).](#)

**29.** Install the crossmember support rear.

**Tightening torque:**

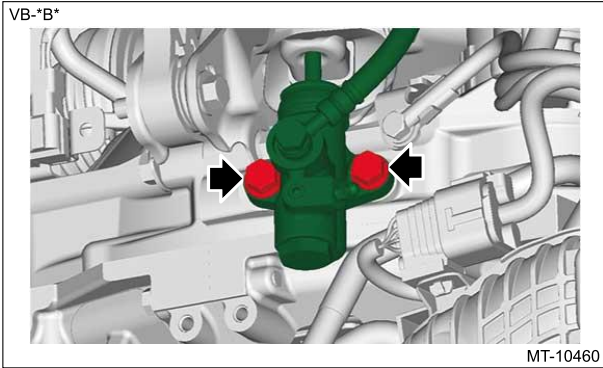
70 N·m (7.1 kgf-m, 51.6 ft-lb)

**30.** Lower the vehicle.

**31.** Install the operating cylinder.

**Tightening torque:**

37 N·m (3.8 kgf-m, 27.3 ft-lb)



**32.** Install the engine rear hanger (A) and connector (B).

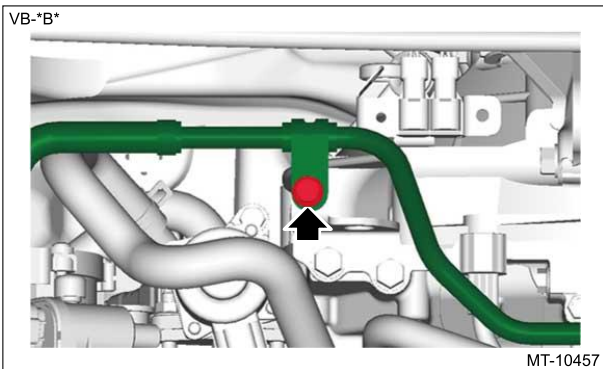
**Tightening torque:**

21 N·m (2.1 kgf-m, 15.5 ft-lb)

**33.** Install the bolts securing the vacuum pipe COMPL to the engine rear hanger.

**Tightening torque:**

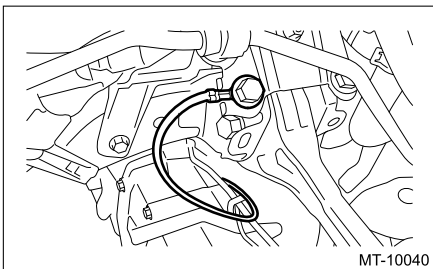
18 N·m (1.8 kgf-m, 13.3 ft-lb)



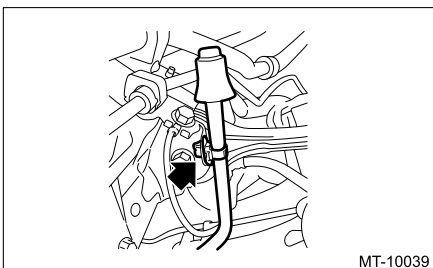
**34.** Install the transmission radio ground cord terminal.

**Tightening torque:**

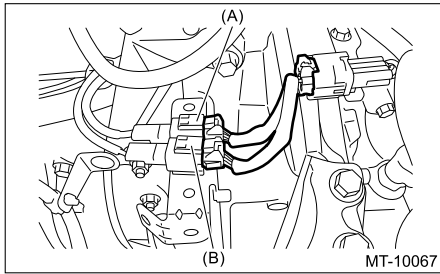
32.3 N·m (3.3 kgf-m, 23.8 ft-lb)



**35.** Connect the air breather hose.




**36.** Install the coupling harness.



(A) Neutral position switch connector (2P, brown)

(B) Back-up light switch connector (2P, gray)

**37.** Pour in transmission gear oil and check the oil level.  [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transmission Gear Oil.](#)

**38.** Install the intercooler.  [Ref. to INTAKE \(INDUCTION\)\(H4DOTC\)>Intercooler>INSTALLATION.](#)

**39.** Install the front tires.  [Ref. to WHEEL AND TIRE SYSTEM>Tire and Wheel>INSTALLATION.](#)

**40.** Connect the ground terminal to battery sensor.  [Ref. to REPAIR CONTENTS>NOTE > BATTERY.](#)

## MANUAL TRANSMISSION AND DIFFERENTIAL(TY75) > Transmission Assembly

### INSPECTION

---

- 1.** Check for oil leaks.
- 2.** Check that there is no deformation, cracks or other damages.
- 3.** Check the seat portion of the input shaft for abnormal looseness.
- 4.** Check the spline portion of the input shaft for abnormal wear.

**REMOVAL**

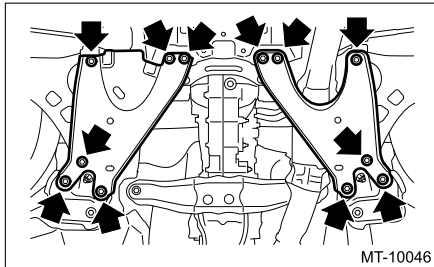


**1. PITCHING STOPPER**

1. Remove the intercooler. [Ref. to INTAKE \(INDUCTION\)\(H4DOTC\)>Intercooler>REMOVAL.](#)
2. Remove the pitching stopper.

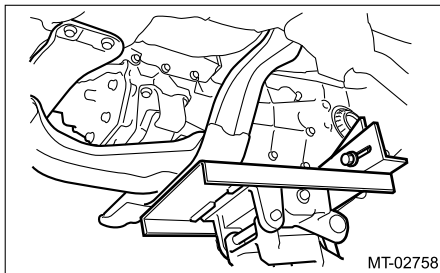
**2. CROSSMEMBER AND CUSHION RUBBER**

1. Lift up the vehicle.
2. Remove the crossmember support rear.

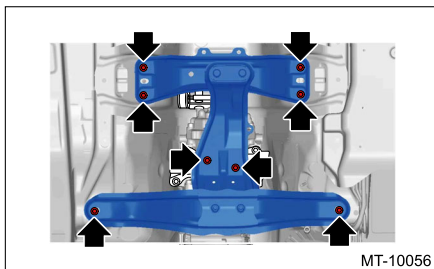


3. Remove the center exhaust pipe (rear). [Ref. to EXHAUST\(H4DOTC\)>Center Exhaust Pipe>REMOVAL > CENTER EXHAUST PIPE \(REAR\).](#)
4. Set the transmission jack.

**Caution:**  
**Always support the transmission case with a transmission jack.**



5. Remove the front crossmember and the rear crossmember.



6. Remove the transmission cushion rubber.

**3. HANGER BRACKET**

For the removal procedure of hanger bracket, refer to "Center Exhaust Pipe (Rear)". [Ref. to EXHAUST\(H4DOTC\)>Center Exhaust Pipe>REMOVAL > CENTER EXHAUST PIPE \(REAR\).](#)

**INSTALLATION**

## 1. PITCHING STOPPER

1. Install the pitching stopper.

### Tightening torque:

T1: 50 N·m (5.1 kgf-m, 36.9 ft-lb)

T2: 58 N·m (5.9 kgf-m, 42.8 ft-lb)

2. Install the intercooler.  [Ref. to INTAKE \(INDUCTION\)\(H4DOTC\)>Intercooler>INSTALLATION.](#)

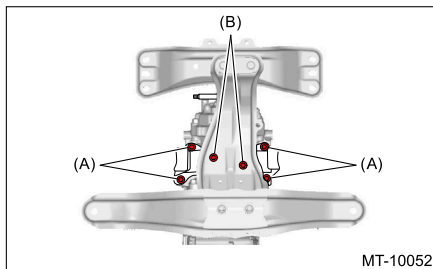
## 2. CROSSMEMBER AND CUSHION RUBBER

1. Install the transmission cushion rubber to the transmission, and tighten the bolt (A).
2. Install the transmission cushion rubber to the center crossmember, and temporarily tighten the nut (B).

### Tightening torque:

#### Bolt (A)

35 N·m (3.6 kgf-m, 25.8 ft-lb)



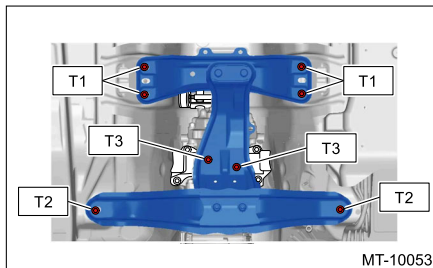
3. Install the front crossmember and rear crossmember.
4. Tighten the transmission cushion rubber mounting nut.


### Tightening torque:

T1: 70 N·m (7.1 kgf-m, 51.6 ft-lb)

T2: 140 N·m (14.3 kgf-m, 103.3 ft-lb)

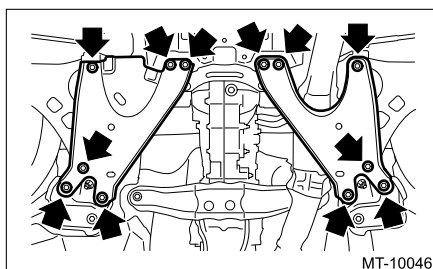
T3: 35 N·m (3.6 kgf-m, 25.8 ft-lb)



5. Remove the transmission jack.
6. Install the center exhaust pipe (rear).  [Ref. to EXHAUST\(H4DOTC\)>Center Exhaust Pipe>INSTALLATION > CENTER EXHAUST PIPE \(REAR\).](#)
7. Install the crossmember support rear.


### Tightening torque:

70 N·m (7.1 kgf-m, 51.6 ft-lb)



8. Lower the vehicle.

## 3. HANGER BRACKET

For the installation procedure of hanger bracket, refer to "Center Exhaust Pipe (Rear)".  [Ref. to EXHAUST\(H4DOTC\)>Center Exhaust Pipe>INSTALLATION > CENTER EXHAUST PIPE \(REAR\).](#)

## MANUAL TRANSMISSION AND DIFFERENTIAL(TY75) > Transmission Mounting System

### INSPECTION

---

Check the following; repair or replace the faulty parts.

#### **1. PITCHING STOPPER**

Check the pitching stopper for bends or damage. Check that the rubber is not stiff, cracked or otherwise damaged.

#### **2. CROSSMEMBER AND CUSHION RUBBER**

Check the crossmember for bending or damage. Check that the cushion rubber does not have hardening, cracks or other damages.

## REPLACEMENT

1. Lift up the vehicle.
2. Clean the transmission exterior.
3. Using the TORX® T70, remove the drain plug, and drain the transmission gear oil.

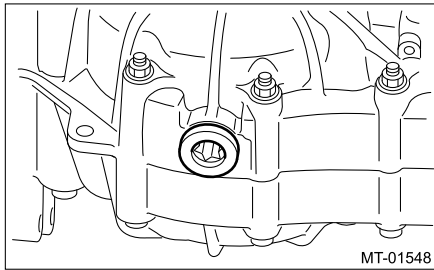
**Caution:**

- Immediately after the vehicle has been running or after idling for a long time, the gear oil will be hot. Be careful not to receive burns.
- Be careful not to spill the gear oil on the exhaust pipe, to prevent emission of smoke or causing a fire. If gear oil is spilled, wipe it off completely.

4. Attach the drain plug using a new gasket, using TORX® T70.

**Tightening torque:**

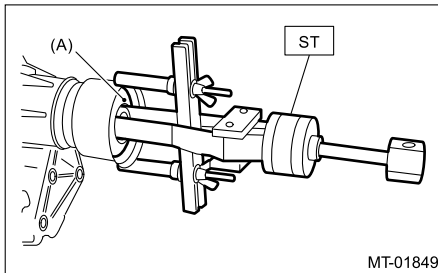
70 N·m (7.1 kgf-m, 51.6 ft-lb)



5. Remove the rear exhaust pipe and center exhaust cover.  [Ref. to EXHAUST\(H4DOTC\)>Rear Exhaust Pipe>REMOVAL.](#)
6. Remove the propeller shaft.  [Ref. to PROPELLER SHAFT / DRIVE SHAFT / AXLE>Propeller Shaft>REMOVAL.](#)
7. Using the ST, remove the oil seal.

**Preparation tool:**

ST: PULLER ASSY (398527700)



(A) Oil seal

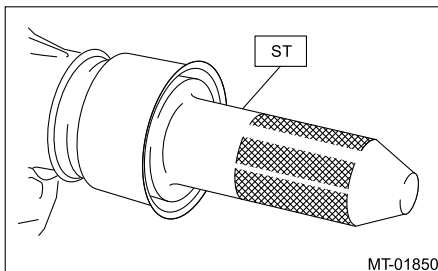
8. Install a new oil seal using ST.



**Note:**


When grease is not applied to the oil seal lips, apply the transmission gear oil to the oil seal lips.

**Preparation tool:**

ST: INSTALLER (498057300)



9. Install the propeller shaft.  [Ref. to PROPELLER SHAFT / DRIVE SHAFT / AXLE>Propeller Shaft>INSTALLATION.](#)
10. Install the center exhaust cover and rear exhaust pipe.  [Ref. to EXHAUST\(H4DOTC\)>Rear Exhaust Pipe>INSTALLATION.](#)
11. Lower the vehicle.

**12.** Pour in transmission gear oil and check the oil level.  [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transmission Gear Oil.](#)


## MANUAL TRANSMISSION AND DIFFERENTIAL(TY75) > Extension Case Oil Seal

### INSPECTION

---

Check for leakage of transmission gear oil from the oil seal. If there is oil leakage, replace the oil seal with the new part and check the propeller shaft.

## REPLACEMENT

1. Remove the front tires.  [Ref. to WHEEL AND TIRE SYSTEM>Tire and Wheel>REMOVAL.](#)
2. Lift up the vehicle.
3. Using the TORX® T70, remove the drain plug, and drain the transmission gear oil.

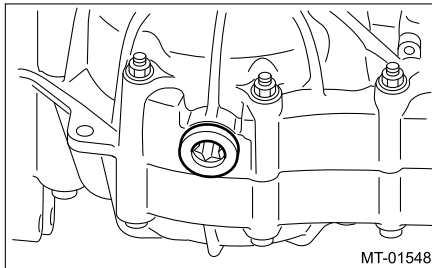
**Caution:**

- **Immediately after the vehicle has been running or after idling for a long time, the gear oil will be hot. Be careful not to receive burns.**
- **Be careful not to spill the gear oil on the exhaust pipe, to prevent emission of smoke or causing a fire. If gear oil is spilled, wipe it off completely.**

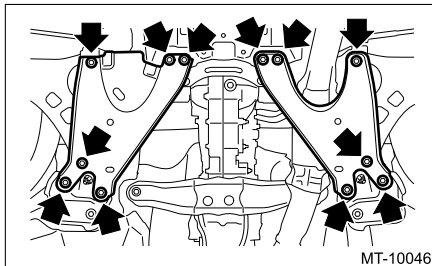
4. Attach the drain plug using a new gasket, using TORX® T70.

**Tightening torque:**

70 N·m (7.1 kgf-m, 51.6 ft-lb)




5. Remove the crossmember support rear.



6. Remove the center exhaust pipe (rear).  [Ref. to EXHAUST\(H4DOTC\)>Center Exhaust Pipe>REMOVAL > CENTER EXHAUST PIPE \(REAR\).](#)

**Note:**

**Perform this procedure only when removing the LH side.**

7. Remove the brake hose bracket.  [Ref. to FRONT SUSPENSION>Front Strut>REMOVAL.](#)

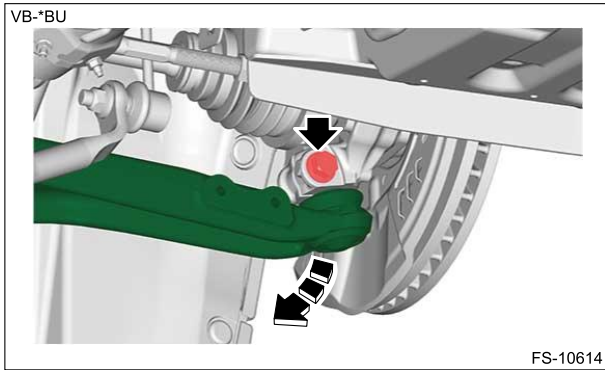
**Note:**

**Remove only the brake hose bracket.**

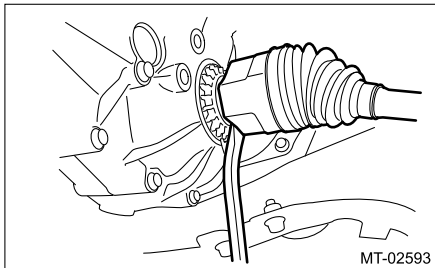
8. Disconnect the arm assembly front.
  - (1) Remove the bolt and nut from the front axle housing.
  - (2) Lower the arm assembly front, and remove the ball stud from the front axle housing.

**Caution:**

**Be careful not to damage the boot of the ball joint.**



**9.** Using a crowbar, separate the front drive shaft.



**10.** Remove the differential side retainer oil seal using the ST (PULLER ASSY).

**Caution:**

**If removing the oil seal with a flat tip screwdriver, be careful not to scratch the differential side retainer.**

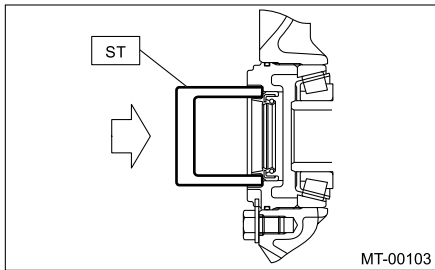
**11.** Using the ST, install a new differential side retainer oil seal by lightly tapping with a plastic hammer.

**Caution:**

- **Apply transmission gear oil to the oil seal lips, and install the oil seal while being careful not to deform the lip.**
- **Check the identification marks (L, R) during installation not to mix up the oil seals RH and LH.**

**Preparation tool:**

ST: DIFFERENTIAL SIDE OIL SEAL INSTALLER (18675AA000)



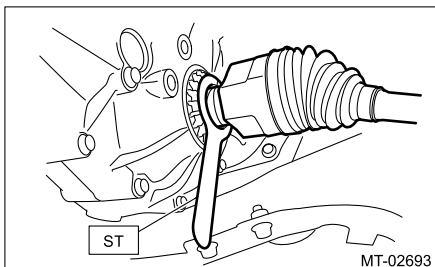
**12.** Set the ST (OIL SEAL PROTECTOR) to the differential side retainer.

**13.** Replace the circlip of the front drive shaft with a new part.

**14.** Install the front drive shaft and remove ST.

**Preparation tool:**

ST: OIL SEAL PROTECTOR (28399SA010)



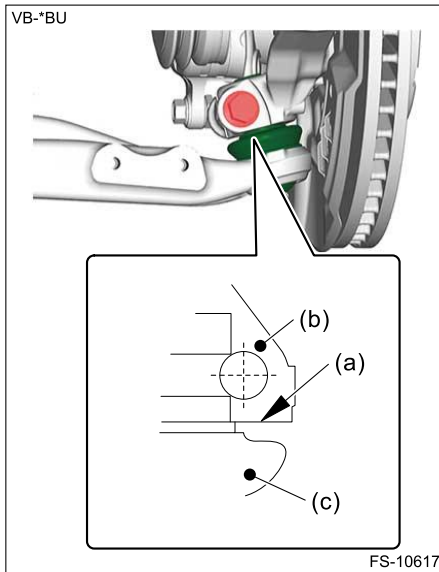
**15.** Connect the arm assembly front.

**Caution:**

- Always use a new flange bolt and a new flange nut.
- Be careful not to damage the boot of the ball joint.
- While holding the bolt side, tighten the nut to the specified torque.

**Tightening torque:**

70 N·m (7.1 kgf-m, 51.6 ft-lb)



- (a) Bottom surface of front axle housing
- (b) Front axle housing
- (c) Arm ASSY front

**16.** Install the brake hose bracket.  [Ref. to FRONT SUSPENSION>Front Strut>INSTALLATION.](#)


**17.** Install the center exhaust pipe (rear).  [Ref. to EXHAUST\(H4DOTC\)>Center Exhaust Pipe>INSTALLATION > CENTER EXHAUST PIPE \(REAR\).](#)

**18.** Install the crossmember support rear.

**Tightening torque:**

70 N·m (7.1 kgf-m, 51.6 ft-lb)

**19.** Lower the vehicle.

**20.** Pour in transmission gear oil and check the oil level.  [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transmission Gear Oil.](#)

**21.** Install the front tires.  [Ref. to WHEEL AND TIRE SYSTEM>Tire and Wheel>INSTALLATION.](#)

**MANUAL TRANSMISSION AND DIFFERENTIAL(TY75) > Differential Side Retainer Oil Seal****INSPECTION**

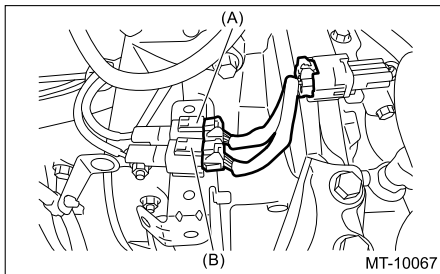
Check for leakage of transmission gear oil from the oil seal. If there is oil leakage, replace the oil seal with the new part and check the drive shaft.

**REMOVAL**



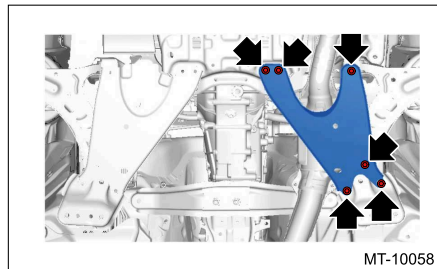
**1. BACK-UP LIGHT AND NEUTRAL POSITION SWITCH**


1. Disconnect the ground terminal from battery sensor.  [Ref. to REPAIR CONTENTS>NOTE > BATTERY.](#)
2. Remove the intercooler.  [Ref. to INTAKE \(INDUCTION\)\(H4DOTC\)>Intercooler>REMOVAL.](#)
3. Remove the coupling harness.



- (A) Neutral position switch connector (2P, brown)
- (B) Back-up light switch connector (2P, gray)

4. Remove the harness connector from bracket.
5. Lift up the vehicle.
6. Remove the crossmember support rear LH.



7. Remove the center exhaust pipe (rear).  [Ref. to EXHAUST\(H4DOTC\)>Center Exhaust Pipe>REMOVAL > CENTER EXHAUST PIPE \(REAR\).](#)
8. Remove the harness from each clip.
9. Remove the back-up light switch & neutral position switch with the harness.
  - (A) Neutral position switch
  - (B) Back-up light switch

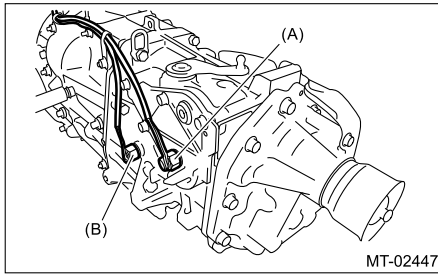
**INSTALLATION**

**1. BACK-UP LIGHT AND NEUTRAL POSITION SWITCH**

1. Replace the gasket with a new part, and install the back-up light switch & neutral position switch together with the harness.

**Tightening torque:**

32.3 N·m (3.3 kgf-m, 23.8 ft-lb)

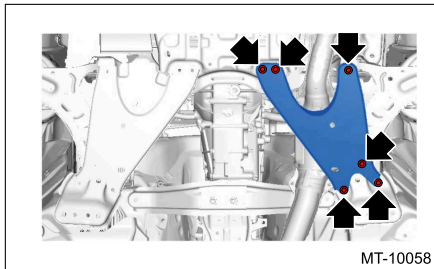


- (A) Neutral position switch
- (B) Back-up light switch

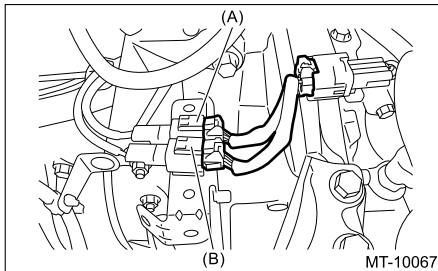
2. Secure the harness to each clip.
3. Install the center exhaust pipe (rear). [Ref. to EXHAUST\(H4DOTC\)>Center Exhaust Pipe>INSTALLATION > CENTER EXHAUST PIPE \(REAR\).](#)
4. Install the crossmember support rear LH.

**Tightening torque:**

70 N·m (7.1 kgf-m, 51.6 ft-lb)



5. Lower the vehicle.
6. Secure the harness connector to the bracket.
7. Install the coupling harness.



- (A) Neutral position switch connector (2P, brown)
- (B) Back-up light switch connector (2P, gray)

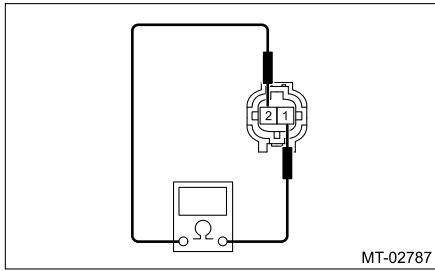
8. Install the intercooler. [Ref. to INTAKE \(INDUCTION\)\(H4DOTC\)>Intercooler>INSTALLATION.](#)
9. Connect the ground terminal to battery sensor. [Ref. to REPAIR CONTENTS>NOTE > BATTERY.](#)

**MANUAL TRANSMISSION AND DIFFERENTIAL(TY75) > Switches and Harness**

**INSPECTION**

**1. BACK-UP LIGHT SWITCH**

1. Turn the ignition switch to OFF.
2. Disconnect the back light switch connector.
3. Measure the resistance between the back-up light switch terminals.



Gear shift position	Terminal No.	Specified resistance
Reverse position	1 and 2	Less than 1 Ω
Other positions		1 MΩ or more

4. Replace faulty parts.

## 2. NEUTRAL POSITION SWITCH

1. Turn the ignition switch to OFF.
2. Disconnect the connector of neutral position switch.
3. Measure the resistance between neutral position switch terminals.


Gear shift position	Terminal No.	Specified resistance
Neutral position	1 and 2	Less than 1 Ω
Other positions		1 MΩ or more

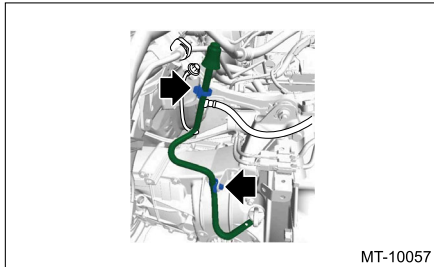
4. Replace faulty parts.

## MANUAL TRANSMISSION AND DIFFERENTIAL(TY75) > Air Breather Hose

### REMOVAL

---

1. Remove the intercooler.  [Ref. to INTAKE \(INDUCTION\)\(H4DOTC\)>Intercooler>REMOVAL.](#)
2. Remove the clips and remove the air breather hose.



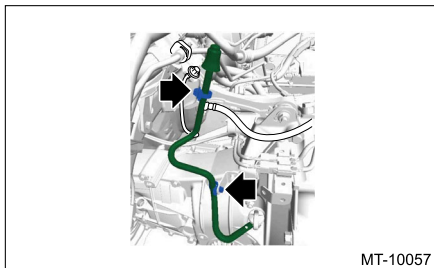
3. Remove the air breather cap.

## MANUAL TRANSMISSION AND DIFFERENTIAL(TY75) > Air Breather Hose

### INSTALLATION

---

1. Install the air breather cap.
2. Install the air breather hose.



3. Install the intercooler.  [Ref. to INTAKE \(INDUCTION\)\(H4DOTC\)>Intercooler>INSTALLATION.](#)

## MANUAL TRANSMISSION AND DIFFERENTIAL(TY75) > Air Breather Hose

### INSPECTION

---

Check the hose for peeling, crack or clogging.

## MANUAL TRANSMISSION AND DIFFERENTIAL(TY75) > Preparation for Overhaul

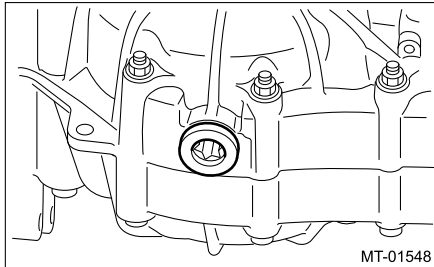
### PROCEDURE

---

1. Clean oil, grease, dirt and dust from the transmission.
2. When transmission gear oil remains in the transmission, use the TORX® T70 to remove the drain plug, and drain the gear oil.
3. Attach the drain plug using a new gasket, using TORX® T70.

#### Tightening torque:

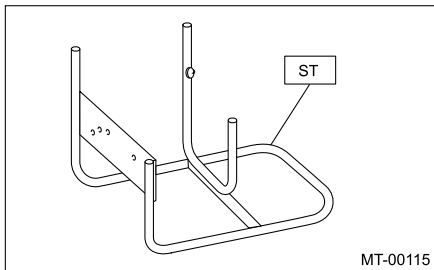
70 N·m (7.1 kgf-m, 51.6 ft-lb)



4. Attach the transmission to the ST.

#### Preparation tool:

ST: TRANSMISSION STAND (499937100)





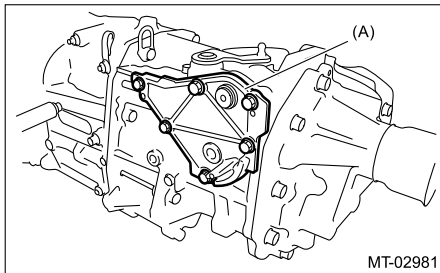
5. Apply transmission gear oil to rotating parts before assembly.
6. All disassembled parts, if to be reused, should be reinstalled in the original positions.
7. Gaskets, lock washers and lock nuts must be replaced with new ones.
8. Apply liquid gasket to the specified areas to prevent leakage.

## MANUAL TRANSMISSION AND DIFFERENTIAL(TY75) > Transfer Case and Extension Case

### REMOVAL

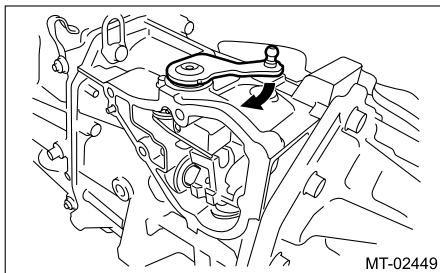


1. Remove the manual transmission assembly from the vehicle.  Ref. to [MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transmission Assembly>REMOVAL](#).
2. Remove the back-up light switch and the neutral position switch.  Ref. to [MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Switches and Harness>REMOVAL > BACK-UP LIGHT AND NEUTRAL POSITION SWITCH](#).
3. Remove the transfer case together with the extension case assembly.
  - (1) Remove the transmission cover.

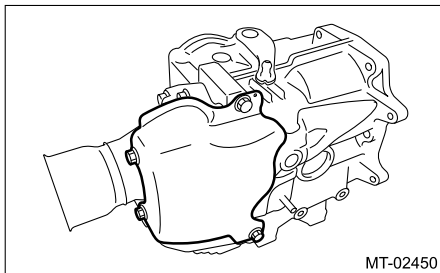


(A) Transmission cover

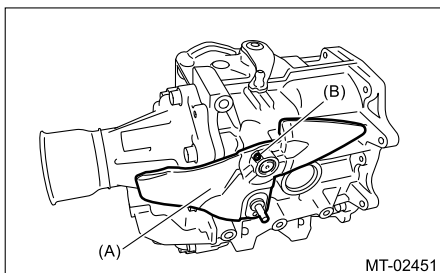
- (2) Set and hold the selector lever COMPL to the 1st-2nd side, and remove the transfer case and extension case as a unit.



4. Remove the transfer cover.



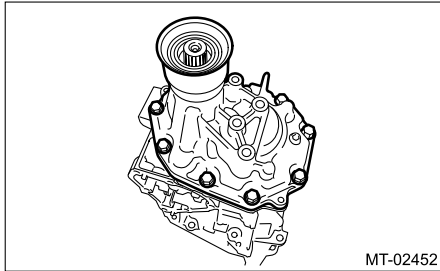
5. Use the ST (REMOVER) to push out the straight pin, and remove the shift lever COMPL.



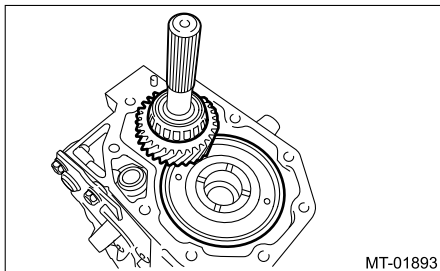
(A) Shift lever COMPL

(B) Straight pin

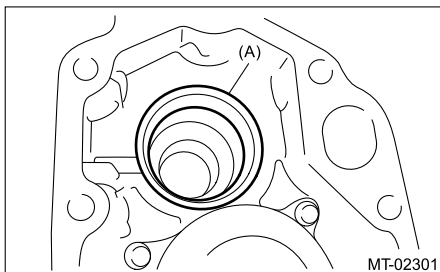
6. Remove the extension case assembly.



7. Remove the transfer driven gear and center differential as a unit.



8. Remove the taper roller bearing (extension case side) outer race and the adjusting washer.



(A) Taper roller bearing (extension case side)  
outer race

## MANUAL TRANSMISSION AND DIFFERENTIAL(TY75) > Transfer Case and Extension Case

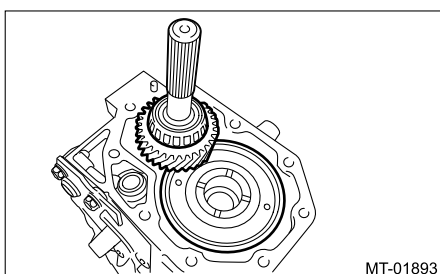
### INSTALLATION

1. Clean the mating surfaces of the transmission case, transfer case and extension case.
2. Apply a coat of grease to the taper roller bearing (transfer case side) of transfer driven gear and the roller rolling surface of the taper roller bearing (extension case side).

#### Preparation items:

Grease: NICHIMOLY N-130 or equivalent

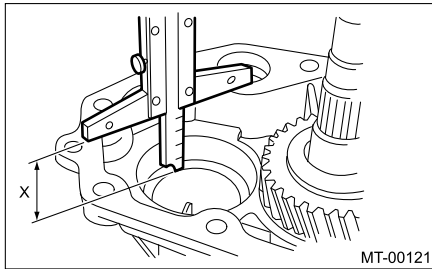
3. Install the center differential and the transfer driven gear.



4. Install the taper roller bearing (extension case side) outer race to the transfer driven gear.
5. While pressing the taper roller bearing (extension case side) outer race horizontally, rotate the transfer driven gear for ten turns.
6. Measure the height "W" between transfer case and taper roller bearing (transfer case side) on the transfer driven gear.
7. Measure the depth "X" of taper roller bearing insertion part of the extension case.

**Note:**

**Measure while the taper roller bearing (extension case side) outer race and the adjusting washer are removed.**



- 8.** Calculate the adjusting washer thickness "T" using the following calculation.  
 $T = X - W + (0.15 - 0.2 \text{ mm } (0.006 - 0.008 \text{ in}))$   
 X: Depth of taper roller bearing insertion part of extension case  
 W: Height between transfer case and taper roller bearing (transfer case side) on transfer driven gear  
 0.15 - 0.20 mm (0.006 - 0.008 in): Amount of standard protrusion
- 9.** Select the adjusting washer with the nearest value in the following table.

**Caution:**

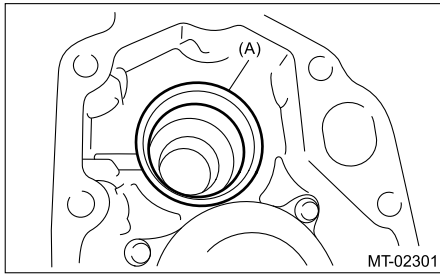
**Be sure that it is always within the preload.**

**Preload of taper roller bearing (extension case side) (amount of standard protrusion):**

0.15 - 0.20 mm (0.006 - 0.008 in)

<b>Adjusting washer (50 × 61 × t)</b>	
<b>Part No.</b>	<b>Thickness mm (in)</b>
803050060	0.50 (0.0197)
803050061	0.55 (0.0217)
803050062	0.60 (0.0236)
803050063	0.65 (0.0256)
803050064	0.70 (0.0276)
803050065	0.75 (0.0295)
803050066	0.80 (0.0315)
803050067	0.85 (0.0335)
803050068	0.90 (0.0354)
803050069	0.95 (0.0374)
803050070	1.00 (0.0394)
803050071	1.05 (0.0413)
803050072	1.10 (0.0433)
803050073	1.15 (0.0453)
803050074	1.20 (0.0472)
803050075	1.25 (0.0492)
803050076	1.30 (0.0512)
803050077	1.35 (0.0531)
803050078	1.40 (0.0551)
803050079	1.45 (0.0571)

- 10.** Install the selected adjusting washer and taper roller bearing (extension case side) outer race.

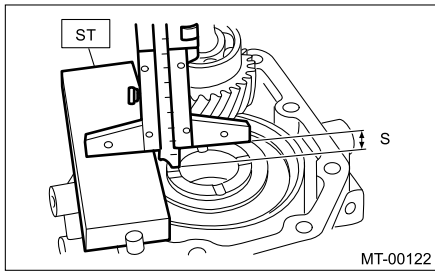


(A) Taper roller bearing (extension case side)  
outer race

11. Measure the depth "S" between the transfer case + ST and the center differential.

**Preparation tool:**

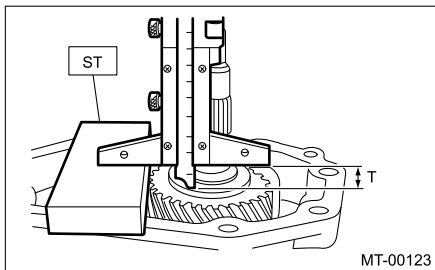
ST: GAUGE (398643600)



12. Measure the height "T" between the extension case + ST and the transfer drive gear.

**Preparation tool:**

ST: GAUGE (398643600)



13. Calculate the adjusting washer thickness "U" using the following calculation.

$$U = S + T - 30 \text{ mm (1.18 in)} - (0.15 - 0.35 \text{ mm (0.0059 - 0.0138 in)})$$

S: Depth between the transfer case + ST (GAUGE) and the center differential

T: Height between the extension case + ST (GAUGE) and the transfer drive gear

30 mm (1.18 in): Thickness of ST (GAUGE) 15 mm (0.59 in) × 2

0.15 - 0.35 mm (0.0059 - 0.0138 in): Clearance

14. Select a suitable adjusting washer in the following table.

**Specification:**

**Clearance:**

0.15 - 0.35 mm (0.0059 - 0.0138 in)

Adjusting washer	
Part No.	Thickness mm (in)
803036050	0.9 (0.035)
803036054	1.0 (0.039)
803036051	1.1 (0.043)
803036055	1.2 (0.047)
803036052	1.3 (0.051)
803036056	1.4 (0.055)
803036053	1.5 (0.059)

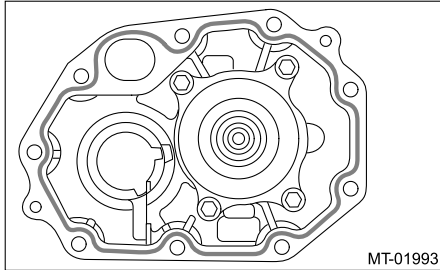
Adjusting washer	
Part No.	Thickness mm (in)
803036057	1.6 (0.063)
803036058	1.7 (0.067)
803036080	1.8 (0.071)
803036081	1.9 (0.075)

**15.** Install the adjusting washer to center differential.

**16.** Apply liquid gasket seamlessly.

**Preparation items:**

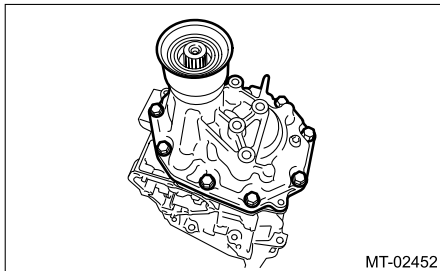
Liquid gasket: THREE BOND 1215B or equivalent



**17.** Install the extension case assembly.

**Tightening torque:**

40 N·m (4.1 kgf-m, 29.5 ft-lb)



**18.** Replace the gasket with a new part, and temporarily install it to the transmission case side.

**19.** Install the transfer case together with the extension case assembly.

(1) While moving the ST to align the spline position, press in the transfer case assembly until the knock pin comes slightly out of transfer case.

**Preparation tool:**

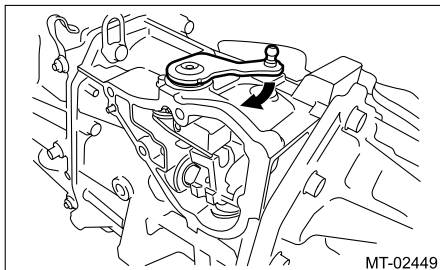
ST: HANDLE (18631AA000)

(A) Transmission case

(B) Transfer case

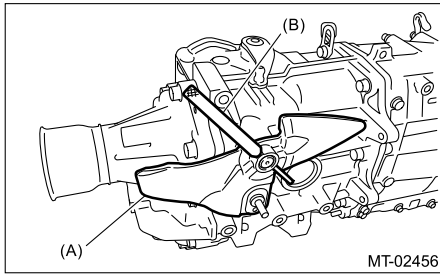
(C) Knock pin

(2) Set and hold the selector lever COMPL to the 1st-2nd side, and install the transfer case assembly so that the shifter arm edge and fork rod does not contact.



**20.** Temporarily install the transfer case assembly.

**21.** Install the shift lever COMPL, then insert the remover or similar tool instead of straight pin.



- (A) Shift lever COMPL
- (B) REMOVER

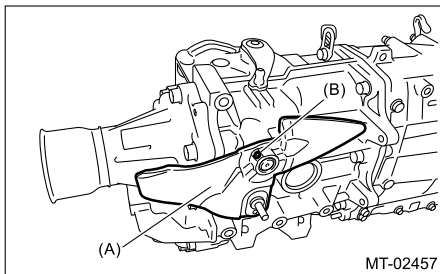
**22.** Operate the selector arm and remover to confirm the correct shifting into each gear is possible.

**23.** Install the transfer case assembly.

**Tightening torque:**

24.5 N·m (2.5 kgf-m, 18.1 ft-lb)

**24.** Install the shift lever COMPL and secure it with a new straight pin.



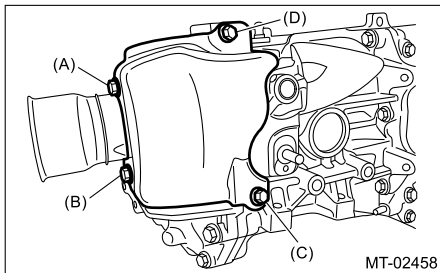
- (A) Shift lever COMPL
- (B) Straight pin

**25.** Install the transfer cover.

- (1) Temporarily tighten the transfer cover mounting bolts.
- (2) Tighten bolts in order of (B), (A), (C), (D) to the specified torque.

**Tightening torque:**

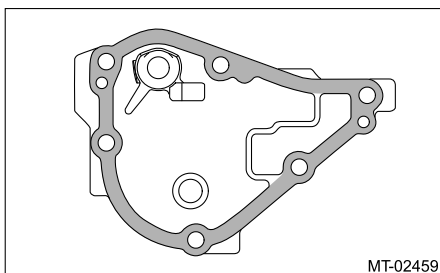
15 N·m (1.5 kgf-m, 11.1 ft-lb)



**26.** Apply liquid gasket seamlessly.

**Preparation items:**

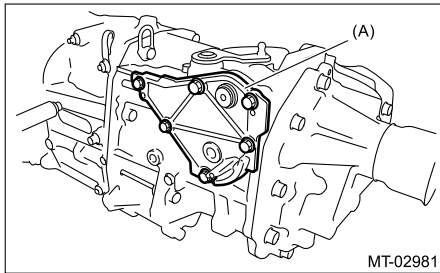
Liquid gasket: THREE BOND 1215B or equivalent



**27.** Install the transmission cover.


**Tightening torque:**

25 N·m (2.5 kgf-m, 18.4 ft-lb)



(A) Transmission cover

28. Install the back-up light switch and the neutral position switch.  Ref. to [MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Switches and Harness>INSTALLATION](#).

29. Install the manual transmission assembly to the vehicle.  Ref. to [MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transmission Assembly>INSTALLATION](#).

## MANUAL TRANSMISSION AND DIFFERENTIAL(TY75) > Transfer Case and Extension Case

### DISASSEMBLY



#### 1. TRANSFER CASE

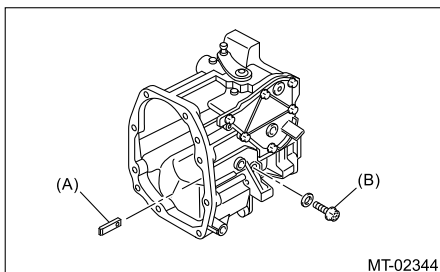
1. Remove the interlock plate using TORX® T45 (tamper resistant type).

**Caution:**

**Do not remove the precoat bolt (B) if the parts are assembled as a transmission assembly.**

**Note:**

**Perform this procedure only when required.**



(A) Interlock plate

(B) Precoat bolt

2. Remove the shift link assembly.  Ref. to [MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Shift Link>REMOVAL](#).

#### 2. EXTENSION CASE

1. Remove the transfer drive gear assembly.  Ref. to [MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transfer Drive Gear>REMOVAL](#).

2. Remove the oil seal from the extension case.  Ref. to [MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Extension Case Oil Seal>REPLACEMENT](#).

3. Remove the dust cover.

## MANUAL TRANSMISSION AND DIFFERENTIAL(TY75) > Transfer Case and Extension Case

### ASSEMBLY

#### 1. TRANSFER CASE

1. Install the shift link assembly to the transfer case. [🔗 Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Shift Link>INSTALLATION.](#)
2. Attach the interlock plate using a new gasket, using TORX® T45 (tamper resistant type).

**Caution:**

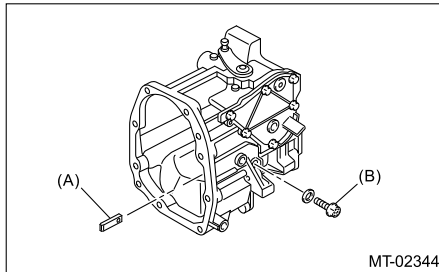
**Always use a new precoat bolt.**

**Note:**

**Clean the bolt threads before installing the interlock plate.**

**Tightening torque:**

20 N·m (2.0 kgf-m, 14.8 ft-lb)



(A) Interlock plate





(B) Precoat bolt

## 2. EXTENSION CASE

1. Using the ST (INSTALLER), install a new oil seal to the extension case. [🔗 Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Extension Case Oil Seal>REPLACEMENT.](#)
2. Install the dust cover.
3. Install the transfer drive gear to the extension case. [🔗 Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transfer Drive Gear>INSTALLATION.](#)

## MANUAL TRANSMISSION AND DIFFERENTIAL(TY75) > Transfer Drive Gear

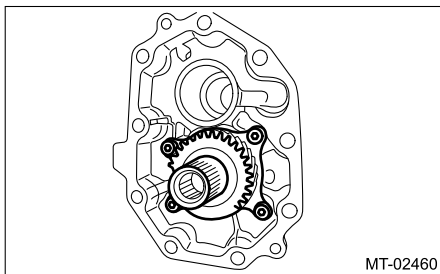
### REMOVAL






1. Remove the manual transmission assembly from the vehicle.  [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transmission Assembly>REMOVAL.](#)
2. Remove the back-up light switch and the neutral position switch.  [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Switches and Harness>REMOVAL.](#)
3. Remove the transfer case together with the extension case assembly.  [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transfer Case and Extension Case>REMOVAL.](#)
4. Remove the extension case assembly.
5. Remove the transfer driven gear.  [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transfer Driven Gear>REMOVAL.](#)
6. Remove the transfer drive gear.

## MANUAL TRANSMISSION AND DIFFERENTIAL(TY75) > Transfer Drive Gear

### INSTALLATION

1. Install the transfer drive gear.  
**Tightening torque:**  
26 N·m (2.7 kgf-m, 19.2 ft-lb)



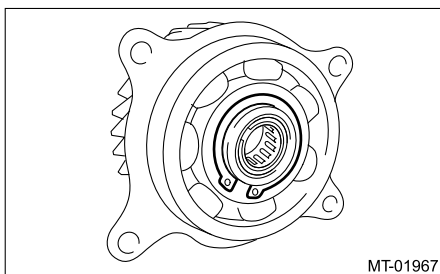
2. Install the transfer driven gear.  [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transfer Driven Gear>INSTALLATION.](#)
3. Select the adjusting washer.  [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transfer Case and Extension Case>INSTALLATION.](#)
4. Install the transfer case and the extension case assembly.  [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transfer Case and Extension Case>INSTALLATION.](#)
5. Install the back-up light switch and the neutral position switch.  [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Switches and Harness>INSTALLATION.](#)
6. Install the manual transmission assembly to the vehicle.  [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transmission Assembly>INSTALLATION.](#)

## MANUAL TRANSMISSION AND DIFFERENTIAL(TY75) > Transfer Drive Gear

### DISASSEMBLY



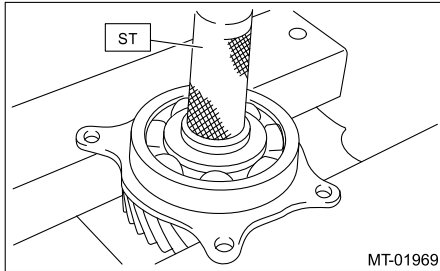
1. Remove the snap ring.



2. Remove the ball bearing using ST.

### Preparation tool:

ST: REMOVER (899864100)



3. Remove the snap ring from transfer drive gear, and remove the needle bearing.

## MANUAL TRANSMISSION AND DIFFERENTIAL(TY75) > Transfer Drive Gear

### ASSEMBLY

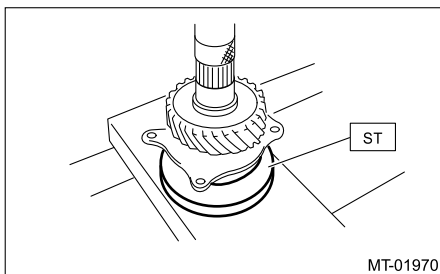
1. Install the needle bearing and snap ring to the transfer drive gear.
2. Set the ST against the inner race of a new ball bearing, and install the transfer drive gear.

#### Caution:

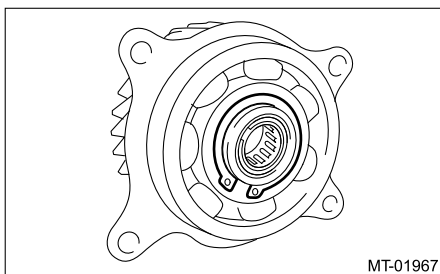
**Do not apply a load in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).**

### Preparation tool:

ST: INSTALLER (398177700)



3. Install the snap ring.



4. Inspect the clearance between the snap ring and the ball bearing. [📄 Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transfer Drive Gear>INSPECTION.](#)

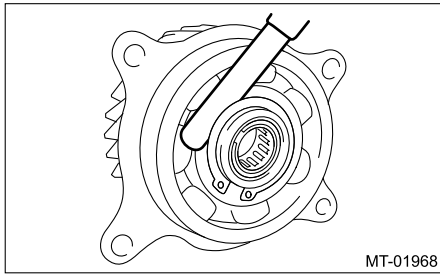
## MANUAL TRANSMISSION AND DIFFERENTIAL(TY75) > Transfer Drive Gear

### INSPECTION

1. Ball bearing  
Replace the bearings in the following cases.
  - In case of broken or rusty bearings
  - In case of worn or damaged bearings
  - When the bearings fail to turn smoothly or emit noise in rotation after transmission gear oil has been applied.
2. Transfer drive gear  
If the drive gear tooth surface and shaft are excessively broken or damaged, replace the drive gear.
3. Measure the clearance between snap ring and inner race of ball bearing with a thickness gauge.

#### Specification:

0.01 – 0.15 mm (0.0004 – 0.0059 in)






If the measurement is not within specification, select a suitable snap ring and replace it.

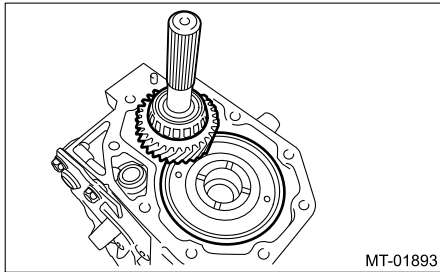
<b>Snap ring (outer-30)</b>	
<b>Part No.</b>	<b>Thickness mm (in)</b>
805030041	1.53 (0.0602)
805030042	1.65 (0.0650)
805030043	1.77 (0.0697)

## MANUAL TRANSMISSION AND DIFFERENTIAL(TY75) > Transfer Driven Gear

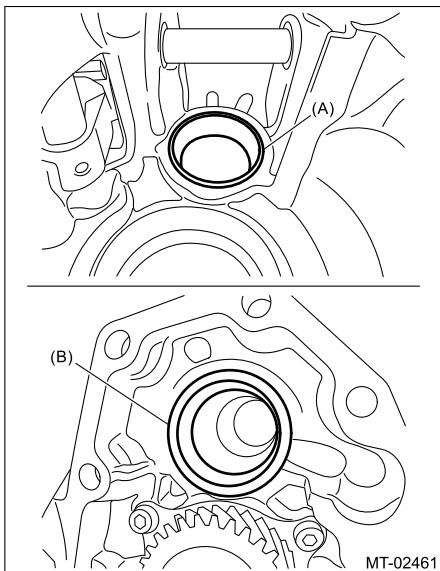
### REMOVAL

---

1. Remove the manual transmission assembly from the vehicle.  [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transmission Assembly>REMOVAL.](#)
2. Remove the back-up light switch and the neutral position switch.  [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Switches and Harness>REMOVAL.](#)
3. Remove the transfer case together with the extension case assembly.  [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transfer Case and Extension Case>REMOVAL.](#)
4. Remove the extension case assembly.
5. Remove the transfer driven gear and center differential as a unit.



6. Remove the taper roller bearing outer race.



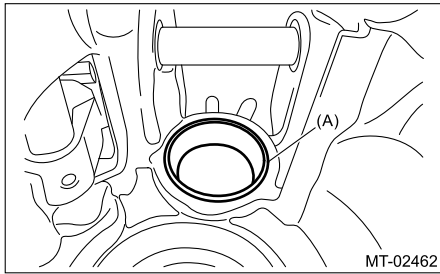
- (A) Taper roller bearing (transfer case side)  
outer race
- (B) Taper roller bearing (extension case side)  
outer race

## MANUAL TRANSMISSION AND DIFFERENTIAL(TY75) > Transfer Driven Gear

### INSTALLATION

---

1. Install the taper roller bearing (transfer case side) outer race.



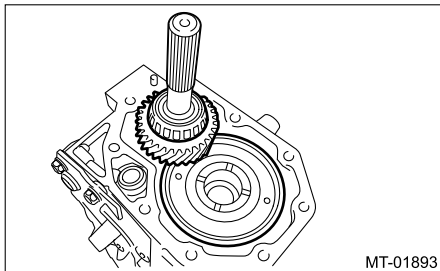
(A) Taper roller bearing (transfer case side)  
outer race

2. Apply a coat of grease to the taper roller bearing (transfer case side) of transfer driven gear and the roller rolling surface of the taper roller bearing (extension case side).

**Preparation items:**

Grease: NICHIMOLY N-130 or equivalent

3. Install the transfer driven gear and center differential as a unit.



4. Select the adjusting washer. [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transfer Case and Extension Case>INSTALLATION.](#)
5. Install the selected adjusting washer and taper roller bearing (extension case side) outer race to the extension case.
6. Install the transfer case and the extension case assembly. [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transfer Case and Extension Case>INSTALLATION.](#)
7. Install the back-up light switch and the neutral position switch. [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Switches and Harness>INSTALLATION.](#)
8. Install the manual transmission assembly to the vehicle. [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transmission Assembly>INSTALLATION.](#)

**MANUAL TRANSMISSION AND DIFFERENTIAL(TY75) > Transfer Driven Gear**

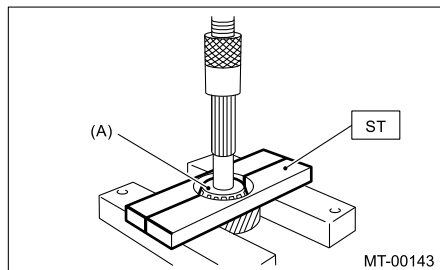
**DISASSEMBLY**



1. Using the ST, remove the taper roller bearing (extension case side).

**Preparation tool:**

ST: REMOVER (498077000)



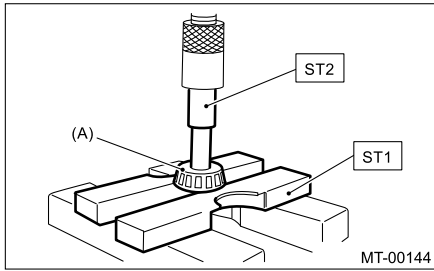
(A) Taper roller bearing (extension case side)

2. Using ST1 and ST2, remove the taper roller bearing (transfer case side).

**Preparation tool:**

ST1: REMOVER (498077000)

ST2: REMOVER (899864100)



(A) Taper roller bearing (transfer case side)

**MANUAL TRANSMISSION AND DIFFERENTIAL(TY75) > Transfer Driven Gear**

**ASSEMBLY**

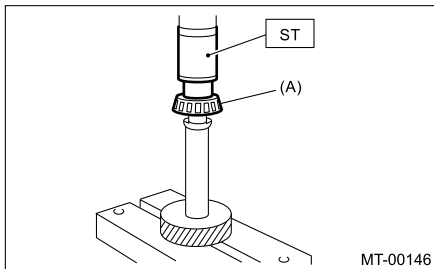
1. Using the ST, install the taper roller bearing (transfer case side).

**Caution:**

- Do not apply a load in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).
- Be careful when handling, because the outer race and inner race of the taper roller bearing are used as a set.

**Preparation tool:**

ST: INSTALLER (927640000)



(A) Taper roller bearing (transfer case side)

2. Using the ST1 and ST2, install the taper roller bearing (extension case side).

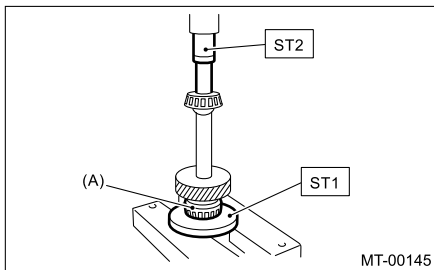
**Caution:**

- Do not apply a load in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).
- Be careful when handling, because the outer race and inner race of the taper roller bearing are used as a set.

**Preparation tool:**

ST1: INSTALLER (498175500)

ST2: REMOVER (899864100)



(A) Taper roller bearing (extension case side)

**MANUAL TRANSMISSION AND DIFFERENTIAL(TY75) > Transfer Driven Gear**

**INSPECTION**

**1.** Taper roller bearing

Replace the bearings in the following cases.





- In case of broken or rusty bearings
- In case of worn or damaged bearings
- When the bearings fail to turn smoothly or emit noise in rotation after transmission gear oil has been applied.

**2.** Transfer driven gear

If the tooth face of driven gear and the shaft are excessively broken or damaged, replace the driven gear.






## MANUAL TRANSMISSION AND DIFFERENTIAL(TY75) > Center Differential

### REMOVAL

1. Remove the manual transmission assembly from the vehicle.  [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transmission Assembly>REMOVAL.](#)
2. Remove the back-up light switch and the neutral position switch.  [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Switches and Harness>REMOVAL.](#)
3. Remove the transfer case together with the extension case assembly.  [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transfer Case and Extension Case>REMOVAL.](#)
4. Remove the extension case assembly.
5. Remove the center differential and transfer driven gear as a unit.  [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transfer Driven Gear>REMOVAL.](#)

## MANUAL TRANSMISSION AND DIFFERENTIAL(TY75) > Center Differential

### INSTALLATION

1. Install the center differential and transfer driven gear into the transfer case as a unit.  [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transfer Driven Gear>INSTALLATION.](#)
2. Select the adjusting washer.  [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transfer Case and Extension Case>INSTALLATION.](#)
3. Install the transfer case together with the extension case assembly.  [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transfer Case and Extension Case>INSTALLATION.](#)
4. Install the back-up light switch and the neutral position switch.  [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Switches and Harness>INSTALLATION.](#)
5. Install the manual transmission assembly to the vehicle.  [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transmission Assembly>INSTALLATION.](#)

## MANUAL TRANSMISSION AND DIFFERENTIAL(TY75) > Center Differential

### DISASSEMBLY



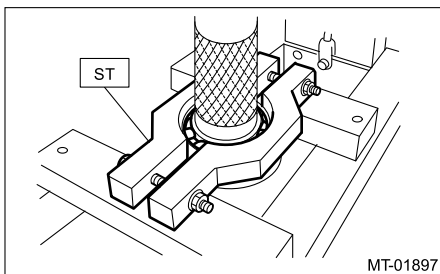
Remove the ball bearing using ST.

#### Caution:

**Center differential is a non-disassembled part which should not be disassembled.**

#### Preparation tool:

ST: REMOVER (498077600)



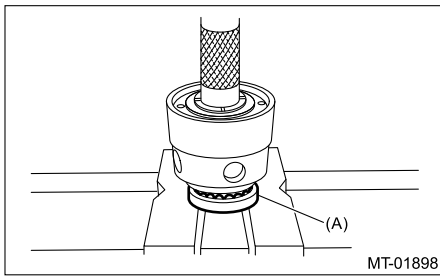
## MANUAL TRANSMISSION AND DIFFERENTIAL(TY75) > Center Differential

### ASSEMBLY

Install new ball bearings.

#### Caution:

**Do not apply a load in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).**



(A) Ball bearing

## MANUAL TRANSMISSION AND DIFFERENTIAL(TY75) > Center Differential

### INSPECTION

---

#### 1. Ball bearing

Replace the bearings in the following cases.

- In case of broken or rusty bearings
- In case of worn or damaged bearings
- When the bearings fail to turn smoothly or emit noise in rotation after transmission gear oil has been applied.
- When bearing has other defects.

#### 2. Center differential

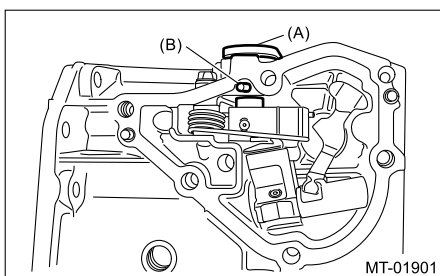
If there is wear or damage, replace the center differential assembly.

## MANUAL TRANSMISSION AND DIFFERENTIAL(TY75) > Shift Link

### REMOVAL



1. Remove the manual transmission assembly from the vehicle. [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transmission Assembly>REMOVAL.](#)
2. Remove the back-up light switch and the neutral position switch. [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Switches and Harness>REMOVAL.](#)
3. Remove the transfer case together with the extension case assembly. [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transfer Case and Extension Case>REMOVAL.](#)
4. Remove the extension case assembly.
5. Remove the center differential and transfer driven gear as a unit. [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transfer Driven Gear>REMOVAL.](#)
6. Pull out the straight pin.

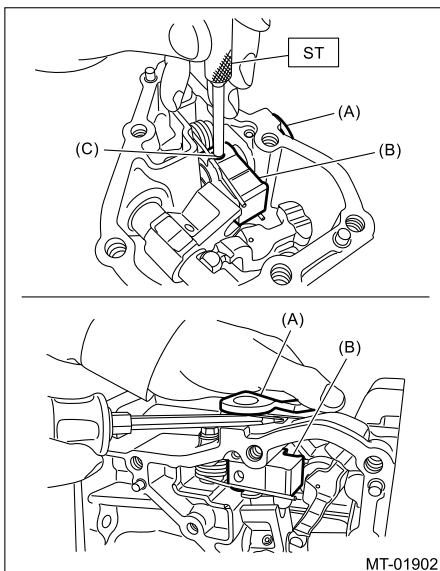


- (A) Selector lever COMPL  
(B) Straight pin

7. Use the ST to remove the straight pin, and remove the selector lever COMPL.

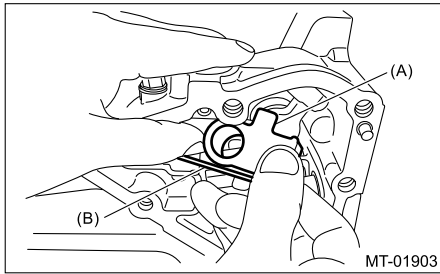
#### Preparation tool:

ST: REMOVER (398791700)



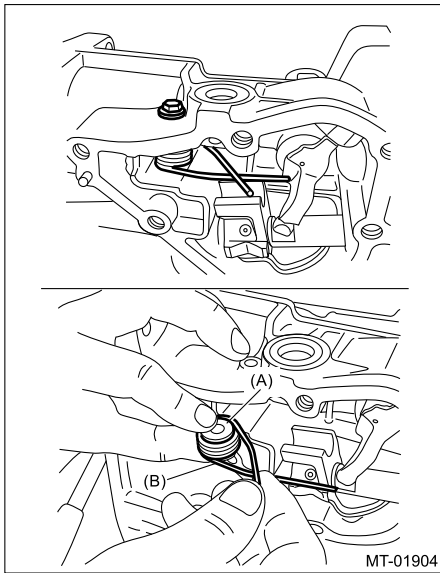
- (A) Selector lever COMPL  
(B) Selector arm No. 2  
(C) Straight pin

8. Pull out the selector arm No. 2.



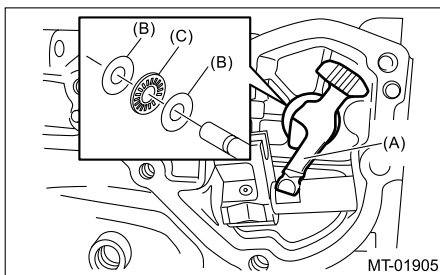
- (A) Selector arm No. 2
- (B) Neutral set spring

**9.** Remove the bolts and remove the shifter arm collar and neutral set spring.



- (A) Shifter arm collar
- (B) Neutral set spring

**10.** Remove the shifter arm No. 2, adjusting washers and thrust bearing.

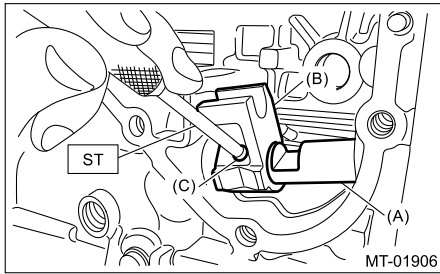


- (A) Shifter arm No. 2
- (B) Adjusting washer
- (C) Thrust bearing

**11.** Use the ST to remove the straight pin, and remove the shifter arm and selector arm.

**Preparation tool:**

ST: REMOVER (398791700)

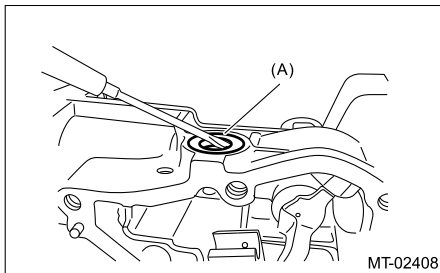


- (A) Shifter arm
- (B) Selector arm
- (C) Straight pin

**12.** Remove the oil seal using a screwdriver wrapped with tape, etc.

**Note:**

The illustration shows the oil seal of selector lever COMPL. Perform the same procedures for removing the shifter arm No. 2.

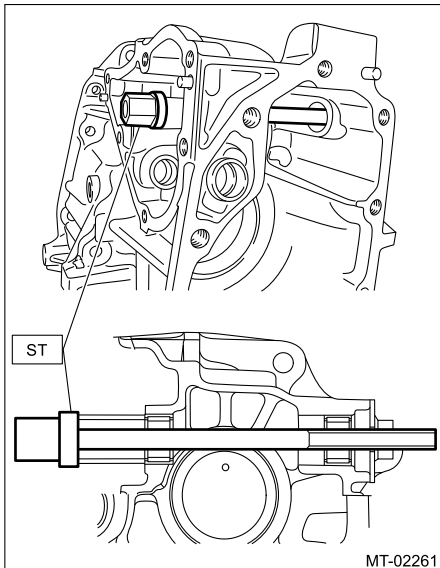


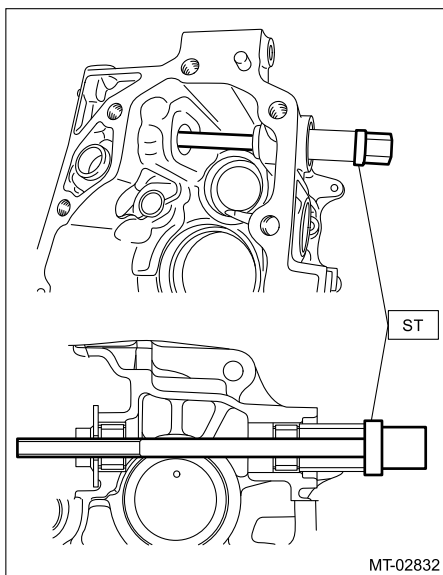
- (A) Oil seal

**13.** Remove the needle bearing by using a tube with the diameter of 20 mm (0.79 in) or 21 mm (0.83 in) and the ST.

**Preparation tool:**

ST: COMPRESSOR SHAFT (18763AA000)





**14.** Set ST1, ST2 and the transfer case to a press.

**Note:**

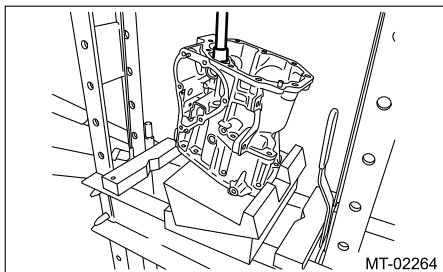
- Set the ST2 under ST1.
- Set the transfer case so that the hole for shifter arm is positioned vertically.

**Preparation tool:**

ST1: CYLINDER HEAD TABLE (498267300)

ST2: CYLINDER HEAD TABLE (498267200)

**15.** Remove the roller bearing by using a round bar with the diameter of 22 mm (0.87 in) or 23 mm (0.91 in).

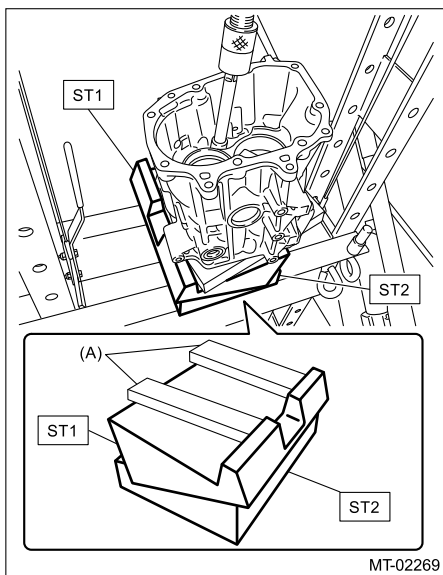


**16.** Flip over the transfer case, and set an iron plate between transfer case and ST (CYLINDER HEAD TABLE).

**Note:**

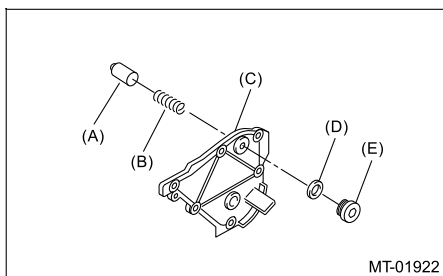
- Insert the iron plate which is thicker than the exposed length of the transfer case knock pin between ST (CYLINDER HEAD TABLE) and transfer case.
- Set the iron plate so that the transfer case knock pin does not ride on the iron plate.

**17.** Remove the roller bearing by using a tube with the diameter of 22 mm (0.87 in) or 23 mm (0.91 in).



(A) Iron plate

**18.** Remove the shift accent plunger and the check ball spring.



- (A) Shift accent plunger
- (B) Checking ball spring
- (C) Transmission cover
- (D) Seal ring
- (E) Seal bolt

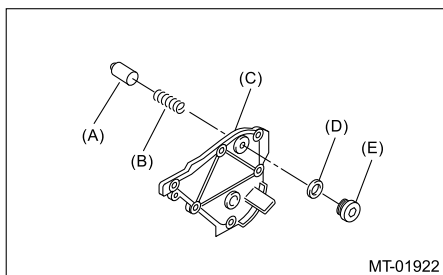
## MANUAL TRANSMISSION AND DIFFERENTIAL(TY75) > Shift Link

### INSTALLATION

1. Clean the mating surface of the transmission cover and transfer case.
2. Replace the seal ring with a new part, and install the shift accent plunger and the check ball spring.

#### Tightening torque:

25 N·m (2.5 kgf-m, 18.4 ft-lb)



- (A) Shift accent plunger
- (B) Checking ball spring
- (C) Transmission cover

(D) Seal ring

(E) Seal bolt

3. Install a new needle bearing using the ST1 and ST2.

**Caution:**

**If the press-fit depth exceeds the service limit, replace with a new needle bearing.**

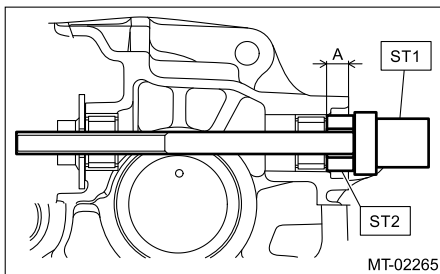
**Preparation tool:**

ST1: COMPRESSOR SHAFT (18763AA000)

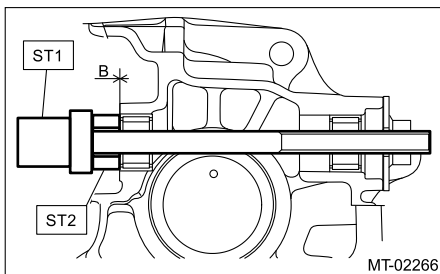
ST2: STOPPER SET (498277200)

**Specification:**

A:  $8.5 \pm 0.2$  mm ( $0.33 \pm 0.01$  in) from the end of transfer case



B:  $0.2 \pm 0.2$  mm ( $0.01 \pm 0.01$  in) from the end of transfer case



4. Set ST1, ST2 and the transfer case to a press.

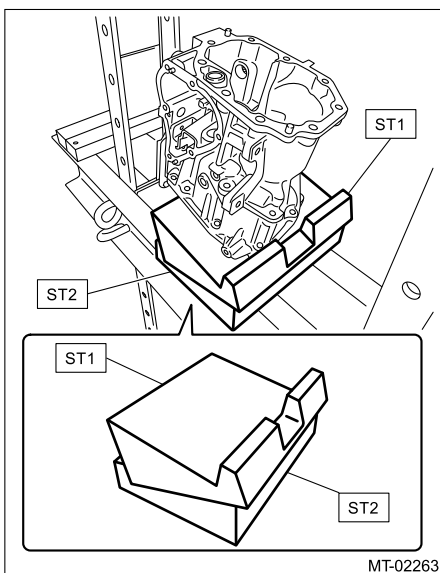
**Note:**

- Set the ST2 under ST1.
- Set the transfer case so that the hole for shifter arm is positioned vertically.

**Preparation tool:**

ST1: CYLINDER HEAD TABLE (498267300)

ST2: CYLINDER HEAD TABLE (498267200)



5. Using the ST, install a new roller bearing.

**Caution:**

**If the press-fit depth exceeds the service limit, replace with a new bearing.**

**Note:**

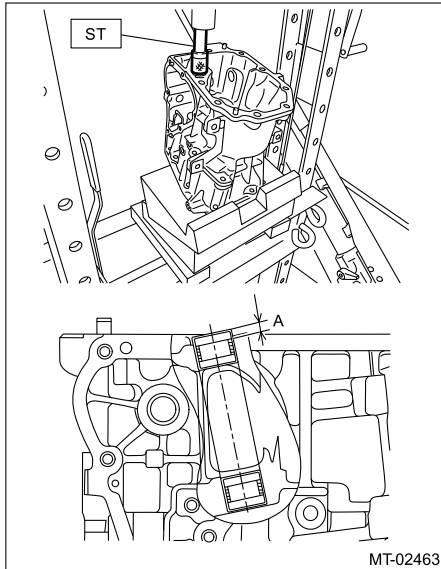
**Gradually perform the press-fit operation while measuring the press-fit depth.**

**Preparation tool:**

ST: REMOVER (899864100)

**Specification:**

A:  $5.1 \pm 0.2$  mm ( $0.20 \pm 0.01$  in) from the finished surface of transfer case



6. Flip over the transfer case, and set an iron plate between transfer case and ST (CYLINDER HEAD TABLE).

**Note:**

- Insert the iron plate which is thicker than the exposed length of the transfer case knock pin between ST (CYLINDER HEAD TABLE) and transfer case.
- Set the parts while taking care that the transfer case knock pin and the roller bearing do not ride over the iron plate.

7. Using the ST, install a new roller bearing.

**Caution:**

**If the press-fit depth exceeds the service limit, replace with a new bearing.**

**Note:**

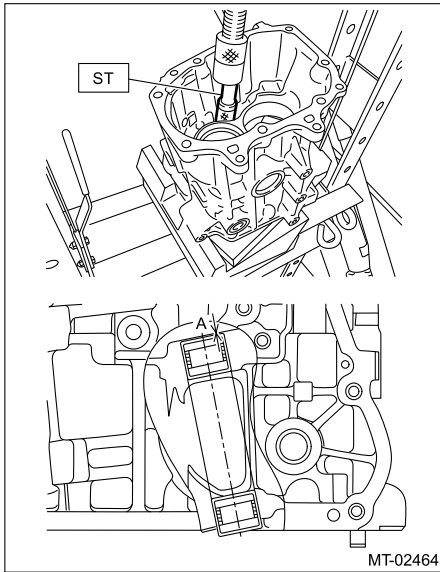
**Gradually perform the press-fit operation while measuring the press-fit depth.**

**Preparation tool:**

ST: REMOVER (899864100)

**Specification:**

A:  $0 \pm 0.2$  mm ( $0 \pm 0.01$  in) from the end of transfer case



MT-02464

**8.** Install a new oil seal using ST.

**Note:**

- The illustration shows the oil seal of selector lever **COMPL**. Perform the same procedures for installing the oil seal of shifter arm No. 2.
- Apply transmission gear oil to the oil seal lips.

**Preparation tool:**

ST: INSTALLER (18657AA000)

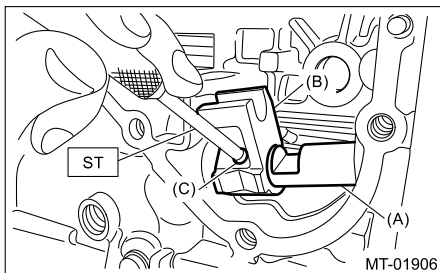
**Specification:**

1±0.2 mm (0.04±0.01 in) from the end of transfer case

**9.** Insert the shifter arm and fix with a new straight pin.

**Preparation tool:**

ST: REMOVER (398791700)



MT-01906

- (A) Shifter arm
- (B) Selector arm
- (C) Straight pin

**10.** Install the shifter arm No. 2, adjusting washers and thrust bearing.

**Caution:**

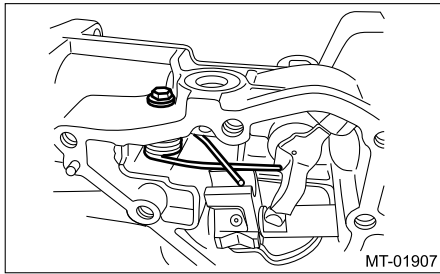
**Be careful not to damage the oil seal.**

- (A) Shifter arm No. 2
- (B) Adjusting washer
- (C) Thrust bearing

**11.** Replace the gasket with a new part, and install the shifter arm collar and neutral set spring.

**Tightening torque:**

6.4 N·m (0.7 kgf-m, 4.7 ft-lb)



**12.** Install the selector arm No. 2.

- (A) Selector arm No. 2
- (B) Neutral set spring

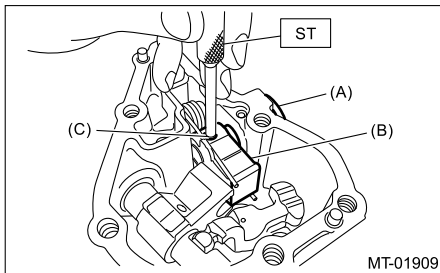
**13.** Insert the selector lever COMPL and fix with a new straight pin using the ST.

**Caution:**

**Be careful not to damage the oil seal.**

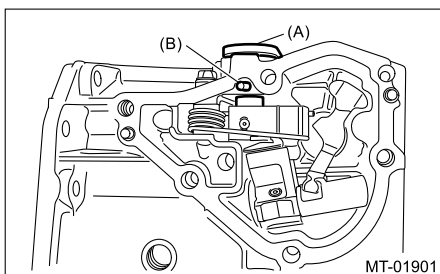
**Special tool:**

ST: REMOVER (398791700)




- (A) Selector lever COMPL
- (B) Selector arm No. 2
- (C) Straight pin

**14.** Insert a new straight pin.



- (A) Selector lever COMPL
- (B) Straight pin

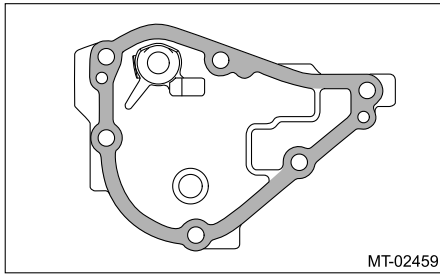
**15.** Install the center differential and transfer driven gear as a unit.

**16.** Install the transfer case and the extension case assembly.  [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transfer Case and Extension Case>INSTALLATION.](#)

**17.** Apply liquid gasket seamlessly.

**Preparation items:**

Liquid gasket: THREE BOND 1215B or equivalent





**18.** Install the transmission cover.

**Tightening torque:**

25 N·m (2.5 kgf-m, 18.4 ft-lb)

(A) Transmission cover

**19.** Install the back-up light switch and the neutral position switch.  [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Switches and Harness>INSTALLATION.](#)

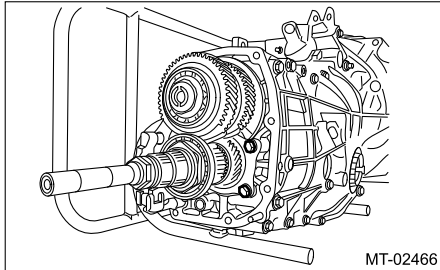
**20.** Install the manual transmission assembly to the vehicle.  [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transmission Assembly>INSTALLATION.](#)

## MANUAL TRANSMISSION AND DIFFERENTIAL(TY75) > Transmission Case

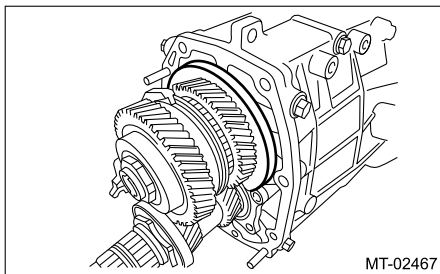
### REMOVAL



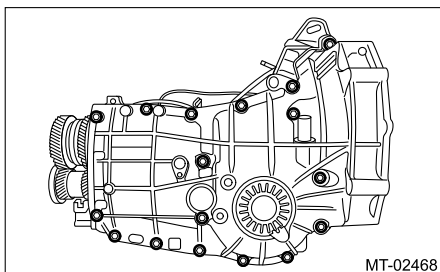
1. Remove the manual transmission assembly from the vehicle. [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transmission Assembly>REMOVAL.](#)
2. Remove the clutch release lever and the release bearing. [Ref. to CLUTCH SYSTEM>Release Bearing and Lever>REMOVAL.](#)
3. Remove the transfer case together with the extension case assembly. [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transfer Case and Extension Case>REMOVAL.](#)
4. Remove the bearing mounting bolt.



5. Remove the main shaft rear plate.



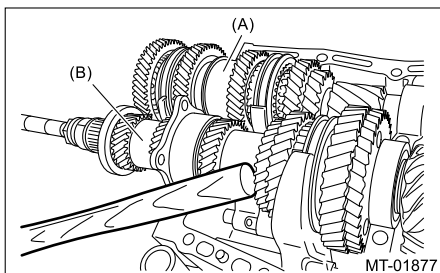
6. Remove the bolts and nuts, and separate the transmission case.



7. Remove the drive pinion shaft assembly.

**Note:**

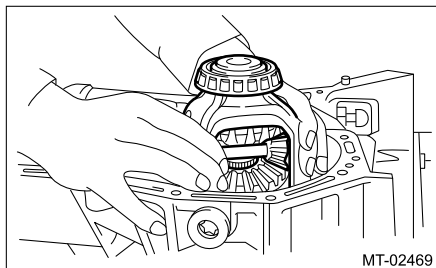
**Use a hammer handle, etc. to remove if too tight.**



(A) Main shaft

(B) Drive pinion shaft

8. Remove the main shaft assembly.
9. Remove the front differential assembly.

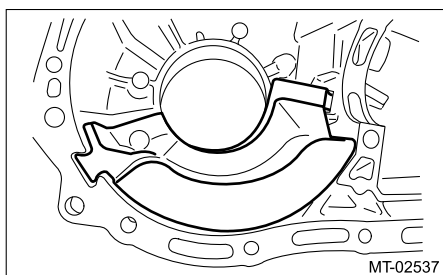


10. Remove the differential side retainers and taper roller bearing outer races. [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Front Differential>REMOVAL.](#)

**Caution:**

**Do not confuse the right and left taper roller bearing outer races.**

11. Remove the reverse idler gear. [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Reverse Idler Gear>REMOVAL.](#)
12. Remove the shifter fork and rod. [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Shifter Fork and Rod>REMOVAL.](#)
13. Remove the front oil guide.



## MANUAL TRANSMISSION AND DIFFERENTIAL(TY75) > Transmission Case

### INSTALLATION

1. Wipe off grease, oil and dust on the mating surfaces of transmission cases with cleaning solvent.
2. Install the shifter fork and rod. [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Shifter Fork and Rod>INSTALLATION.](#)
3. Install the reverse idler gear. [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Reverse Idler Gear>INSTALLATION.](#)
4. Select the drive pinion shim. [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Drive Pinion Shaft>INSTALLATION.](#)
5. Install the taper roller bearing outer race to the transmission case LH side, and install the differential side retainer with the O-ring removed.
6. Install the front differential assembly.
7. Install the main shaft assembly.

**Note:**

**Align to install the needle bearing knock pin hole to the transmission case knock pin.**

8. Install the selected drive pinion shims and drive pinion shaft assembly.

**Note:**

**Align the roller bearing knock pin hole to the transmission case knock pin.**

9. Align the transmission cases with each other, and tighten them with 17 mounting bolts.

**Caution:**

- **Insert bolts (11) and (16) from the LH side of the transmission case.**
- **Match the cases together so that the drive pinion shims are not caught between the cases.**

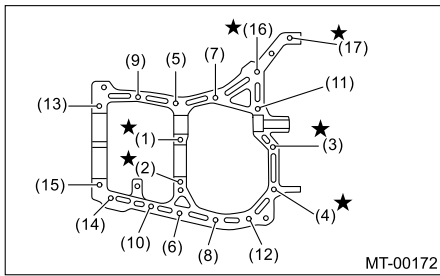
**Tightening torque:**

**8 mm bolt**

25 N·m (2.5 kgf-m, 18.4 ft-lb)

**★10 mm bolt**

40 N·m (4.1 kgf-m, 29.5 ft-lb)

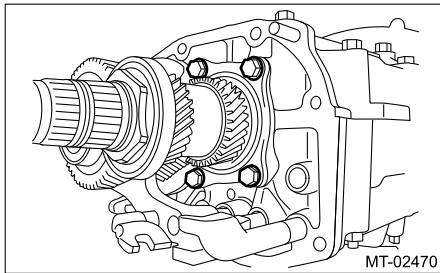


MT-00172

- 10.** Install the taper roller bearing outer race to the RH side of the transmission case.
- 11.** Tighten the bearing mounting bolts.

**Tightening torque:**

30 N·m (3.1 kgf-m, 22.1 ft-lb)

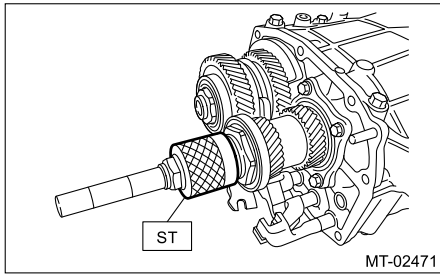


MT-02470

- 12.** Perform backlash adjustment of the hypoid driven gear and preload adjustment of the taper roller bearing.
- (1) Attach the ST on drive pinion shaft assembly.

**Preparation tool:**

ST: HOLDER (18667AA020)



MT-02471

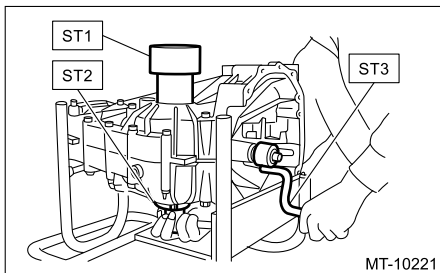
- (2) Place the transmission case with the LH side facing downward, and put ST1 on the taper roller bearing outer race.
  - (3) Screw-in the differential side retainer from the bottom to the LH side case using ST2. Fit the ST3 on the main shaft. Shift the gear into 4th or 5th, and turn the shaft several times. Screw in the side retainer while rotating the ST3 until a slight resistance is felt on ST2.
- This is the contact point of the hypoid driven gear and the drive pinion shaft. Repeat the above sequence several times to ensure the contact point.

**Preparation tool:**

ST1: WEIGHT (399780104)

ST2: WRENCH COMPL RETAINER (18658AA021)

ST3: HANDLE (499927100)



MT-10221

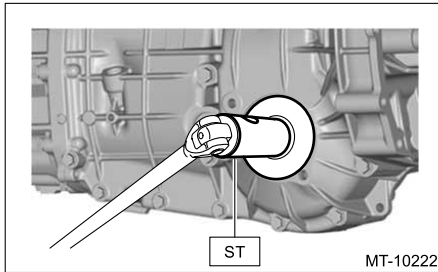
- (4) Remove the WEIGHT, and screw in the differential side retainer without the O-ring into the RH side of the transmission case using ST, and stop at the point where a slight resistance is felt.

**Note:**

**In this condition, the backlash between hypoid driven gear and drive pinion shaft is zero.**

**Preparation tool:**

ST: WRENCH COMPL RETAINER (18658AA021)




- (5) Loosen the differential side retainer on the LH side of the transmission case by 3 notches, and screw in the side retainer on the RH side of the transmission case by 3 notches in order to apply backlash.
- (6) Screw in the differential side retainer of the RH side of the transmission case additionally by 1 notch in order to apply preload on taper roller bearing.
- (7) Temporarily tighten both the retainer lock plates LH and RH, and put marks on both the differential side retainer and lock plate for later readjustment.

**Note:**

**If it is hard to install the lock plates, reverse the sides and install them.**

- (8) Turn the transmission main shaft several times while tapping around the differential side retainer lightly with plastic hammer.

**13.** Inspect and adjust backlash and tooth contact of the hypoid driven gear.  Ref. to [MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Front Differential>INSPECTION.](#)

**14.** Separate the transmission case.

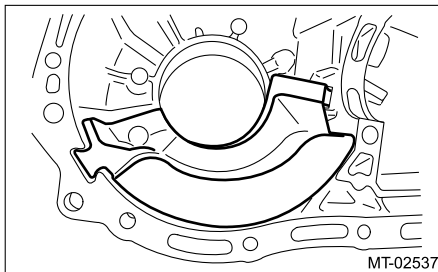
**15.** Check each shifter fork.  Ref. to [MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Shifter Fork and Rod>INSPECTION.](#)

**16.** Select a main shaft rear plate.  Ref. to [MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Main Shaft>ADJUSTMENT.](#)

**17.** Install the front oil guide.

**Note:**

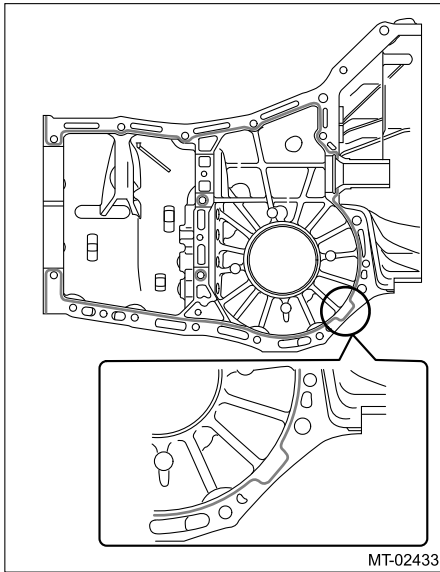
**Fit in all the way.**



**18.** Apply liquid gasket, then join the transmission cases with each other.

**Preparation items:**

Liquid gasket: THREE BOND 1215B or equivalent



**19.** Tighten 17 bolts with brackets and clips as shown in the figure.

**Caution:**

- **Insert bolts (11) and (16) from the LH side of the transmission case.**
- **Match the cases together so that the drive pinion shims are not caught between the cases.**

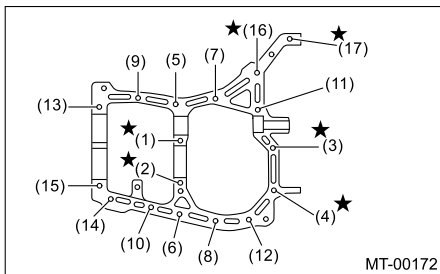
**Tightening torque:**

**8 mm bolt**

25 N·m (2.5 kgf-m, 18.4 ft-lb)

**★10 mm bolt**

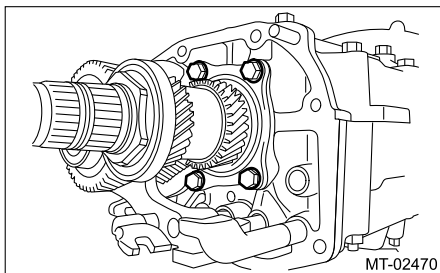
40 N·m (4.1 kgf-m, 29.5 ft-lb)



**20.** Tighten the bearing mounting bolts.

**Tightening torque:**

30 N·m (3.1 kgf-m, 22.1 ft-lb)



**21.** Remove the retainer lock plate, and loosen the differential side retainer until the groove of the O-ring appears. Fit a new O-ring into the groove and tighten the side retainer into the position where it was not loosened.

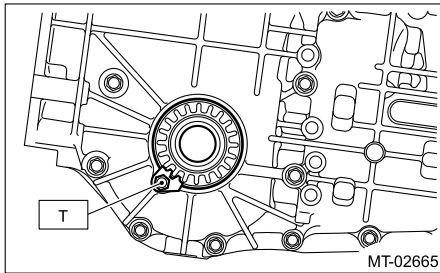
**Note:**




- **When loosening the side retainer, record the number of the turns made.**
- **Perform this for both left and right side retainers.**
- **Apply transmission gear oil to O-ring.**

**22.** Install the retainer lock plate.

**Tightening torque:**

T: 25 N·m (2.5 kgf-m, 18.4 ft-lb)



- 23.** Install the transfer case together with the extension case assembly.  [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transfer Case and Extension Case>INSTALLATION.](#)
- 24.** Install the clutch release lever and release bearing.  [Ref. to CLUTCH SYSTEM>Release Bearing and Lever>INSTALLATION.](#)
- 25.** Install the manual transmission assembly to the vehicle.  [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transmission Assembly>INSTALLATION.](#)

## MANUAL TRANSMISSION AND DIFFERENTIAL(TY75) > Transmission Case

### INSPECTION





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Check the transmission case for cracks, damage, or oil leaks.

## MANUAL TRANSMISSION AND DIFFERENTIAL(TY75) > Main Shaft

### REMOVAL



1. Remove the manual transmission assembly from the vehicle.  [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transmission Assembly>REMOVAL.](#)
2. Remove the transfer case together with the extension case assembly.  [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transfer Case and Extension Case>REMOVAL.](#)
3. Remove the transmission case.  [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transmission Case>REMOVAL.](#)
4. Remove the drive pinion shaft assembly.  [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Drive Pinion Shaft>REMOVAL.](#)
5. Remove the main shaft assembly.

## MANUAL TRANSMISSION AND DIFFERENTIAL(TY75) > Main Shaft

### INSTALLATION

1. Attach the needle bearing and new oil seal to the front of the main shaft assembly.

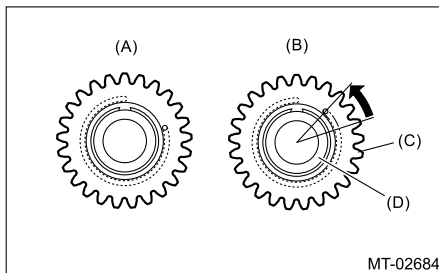
#### Note:

- **Wrap the clutch splined section with vinyl tape to prevent damage to the oil seal.**
- **Apply NICHIMOLY N-130 or the equivalent to the sealing lip of the oil seal.**

#### Preparation items:

Grease: NICHIMOLY N-130 or equivalent

2. Rotate the reverse idler sub gear by two teeth from free status in the direction of the arrow to make it engage with the reverse gear of the main shaft and install the main shaft assembly.
  - (1) When the reverse idler sub gear is at free status, put alignment marks on reverse idler sub gear and reverse idler gear.
  - (2) Rotate the alignment mark on the reverse idler sub gear side in the arrow direction by two teeth, and secure it with a wire.









- (A) Free status
- (B) Set status
- (C) Reverse idler sub gear
- (D) Reverse idler gear

3. Fit the transmission case knock pin to the knock pin hole of the needle bearing outer race and install the main shaft assembly.

#### Note:

- **Align the end face of the seal with surface (A) when installing the oil seal.**
- **Face the cutout portion of the snap ring for the double taper roller bearing to the drive pinion shaft assembly.**

4. After installing the main shaft, check that the reverse idler gear and reverse idler sub gear are misaligned by two teeth and remove the wire.
5. Install the drive pinion shaft assembly.  [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Drive Pinion Shaft>INSTALLATION.](#)
6. Check each shifter fork.  [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Shifter Fork and Rod>INSPECTION.](#)
7. Select a main shaft rear plate.  [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Main Shaft>ADJUSTMENT.](#)
8. Install the transmission case.  [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transmission Case>INSTALLATION.](#)
9. Install the transfer case together with the extension case assembly.  [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transfer Case and Extension Case>INSTALLATION.](#)

10. Install the manual transmission assembly to the vehicle.  Ref. to [MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transmission Assembly>INSTALLATION.](#)

## MANUAL TRANSMISSION AND DIFFERENTIAL(TY75) > Main Shaft

### DISASSEMBLY



#### Note:

**When replacing the coupling sleeve and synchronizer hub, replace them as a set. Because these must engage at the specified point, avoid disassembly as much as possible. If it is necessary to disassemble, mark the engaging points on the splines beforehand.**

1. Put vinyl tape around the main shaft spline and pull out the oil seal and needle bearing by hand to prevent the oil seal from being damaged.
2. Remove the lock nut and lock washer using ST1 and ST2.

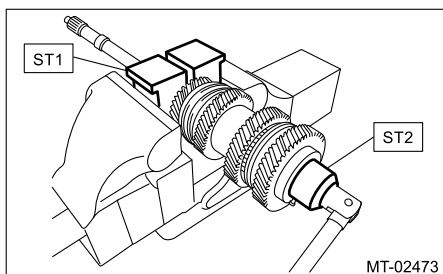
#### Note:

**Flatten the lock nut tab before removing the lock nut.**

#### Preparation tool:

ST1: TRANSMISSION HOLDER (498937000)

ST2: SOCKET WRENCH (35) (499987003)

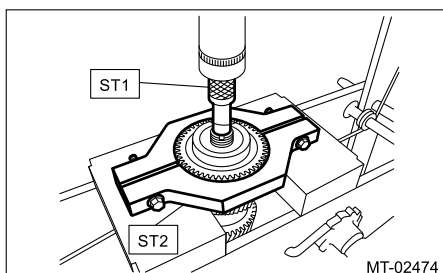


3. Remove the 6th drive gear and ball bearing using the ST1, ST2 and a press.

#### Preparation tool:

ST1: REMOVER (899864100)

ST2: REMOVER (18722AA010)



4. Remove the 6th needle bearing, 6th baulk ring, 5th-6th shifting insert and 5th-6th coupling sleeve.

#### Caution:

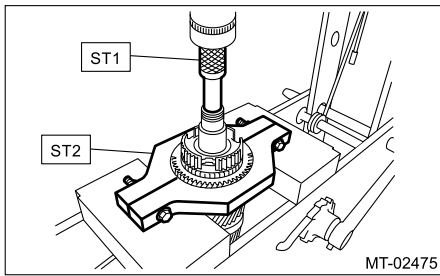
**When removing the 5th-6th coupling sleeve, be careful not to lose the 5th-6th shifting insert.**

5. Remove the 5th drive gear, 6th needle bearing race, 5th baulk ring, 5th-6th synchronizer hub and 5th needle bearing using the ST1, ST2 and a press.

#### Preparation tool:

ST1: REMOVER (899864100)

ST2: REMOVER (18722AA010)

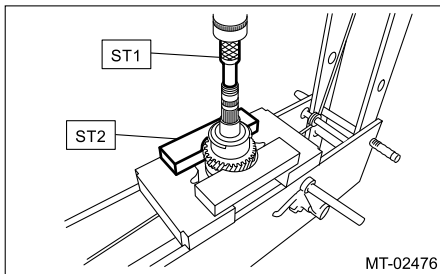


6. Shift the 3rd-4th coupling sleeve to the 3rd side.
7. Remove the 4th drive gear, 4th gear thrust washer, double taper roller bearing and 5th needle bearing race using the ST1, ST2 and a press.

**Preparation tool:**

ST1: REMOVER (899864100)

ST2: REMOVER (899714110)



8. Remove the 4th baulk ring, 4th needle bearing, 3rd-4th shifting insert and 3rd-4th coupling sleeve.

**Caution:**

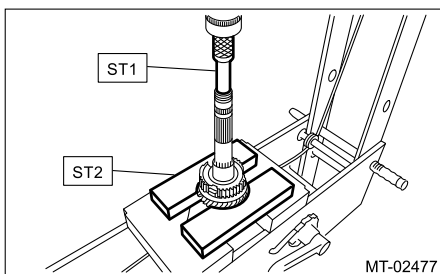
**When removing the 3rd-4th coupling sleeve, be careful not to lose the 3rd-4th shifting insert.**

9. Remove the 3rd drive gear, 4th needle bearing race, 3rd-4th synchronizer hub, 3rd inner baulk ring, 3rd synchro cone, 3rd outer baulk ring and 3rd needle bearing using the ST1, ST2 and a press.

**Preparation tool:**

ST1: REMOVER (899864100)

ST2: REMOVER (899714110)

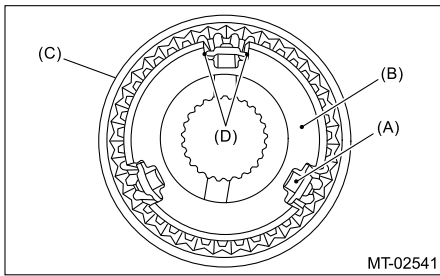


MANUAL TRANSMISSION AND DIFFERENTIAL(TY75) > Main Shaft

**ASSEMBLY**

**Note:**

- Match the alignment marks, and install the coupling sleeve and then install the shifting insert.
- Make sure that there is no large clearance at both sides of the shifting insert after assembly.

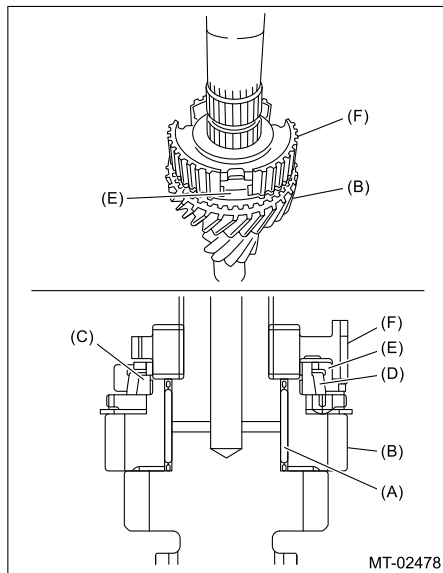


- (A) Shifting insert
- (B) Synchronizer hub
- (C) Coupling sleeve
- (D) There is no large clearance at this part.

**1.** Install the 3rd needle bearing, 3rd drive gear, 3rd outer baulk ring, 3rd synchro cone, 3rd inner baulk ring and 3rd-4th synchronizer hub.

**Note:**

- **Install the 3rd-4th synchronizer hub in the correct direction.**
- **Align the protrusion of the 3rd outer baulk ring into the groove of the 3rd-4th synchronizer hub.**



- (A) 3rd needle bearing
- (B) 3rd drive gear
- (C) 3rd inner baulk ring
- (D) 3rd synchro cone
- (E) 3rd outer baulk ring
- (F) 3rd-4th synchronizer hub

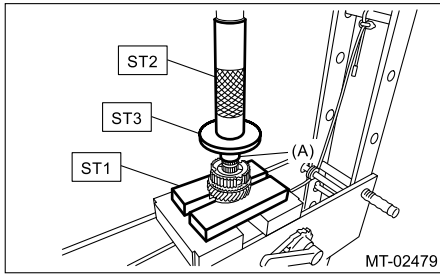
**2.** Install the 4th needle bearing race using ST1, ST2, ST3 and a press.

**Caution:**

**Do not apply a load in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).**

**Preparation tool:**

- ST1: REMOVER (899714110)
- ST2: RACE 4-5 INSTALLER (499877000)
- ST3: INSTALLER (398177700)



(A) 4th needle bearing race

**3.** Install the 3rd-4th coupling sleeve.

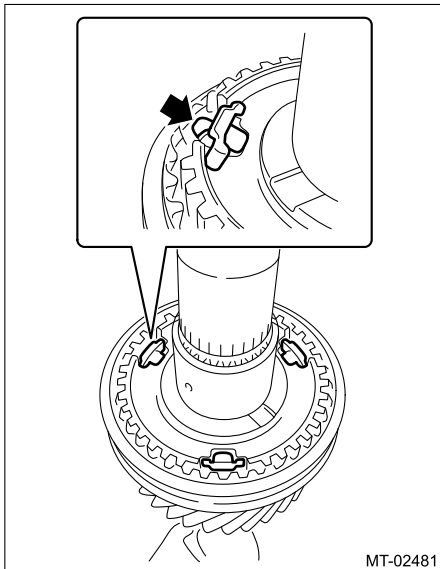
**Note:**

- Install the 3rd-4th coupling sleeve in the correct direction.
- Align the alignment marks of 3rd-4th coupling sleeve and the 3rd-4th synchronizer hub.

(A) 3rd-4th coupling sleeve

**4.** Install the 3rd-4th shifting insert.

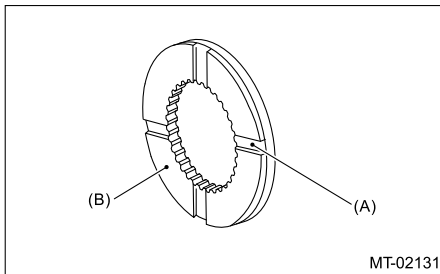
**Note:**  
Press in the ball part to install.



**5.** Install the 4th baulk ring, 4th needle bearing, 4th drive gear and 4th gear thrust washer.

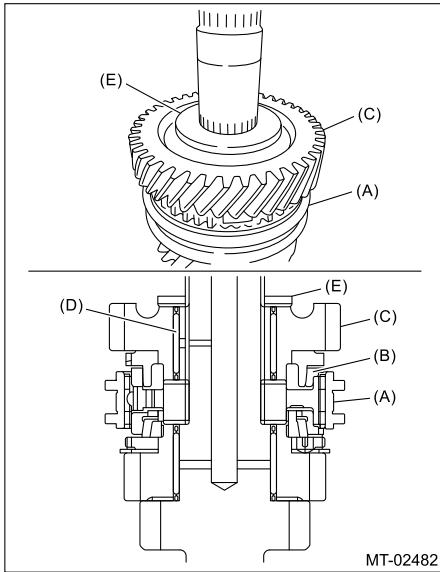
**Note:**

- Align the protrusion of the 4th baulk ring into the groove of the 3rd-4th synchronizer hub.
- Install the 4th gear thrust washer with the groove side facing the 4th drive gear.



(A) Groove

(B) Face this surface to the 4th gear side.



- (A) 3rd-4th coupling sleeve
- (B) 4th baulk ring
- (C) 4th drive gear
- (D) 4th needle bearing
- (E) 4th gear thrust washer

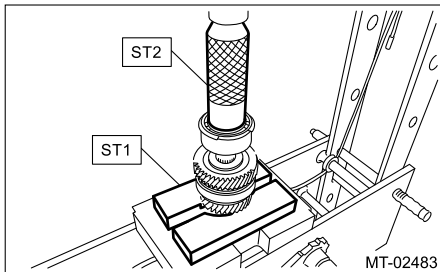
6. Install a new double taper roller bearing using the ST1, ST2 and a press.

**Caution:**

- Do not apply a load in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).
- Install the double taper roller bearing with its snap ring side facing the 5th drive gear side.

**Preparation tool:**

- ST1: REMOVER (899714110)
- ST2: RACE 4-5 INSTALLER (499877000)



7. Make sure that the double taper roller bearing turns smoothly.

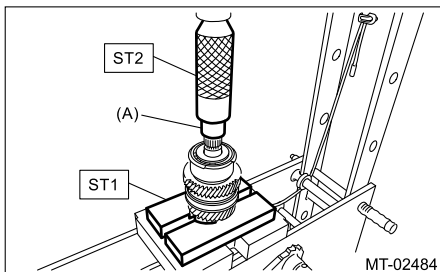
8. Install the 5th needle bearing race using ST1, ST2 and a press.

**Caution:**

- Do not apply a load in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

**Preparation tool:**

- ST1: REMOVER (899714110)
- ST2: RACE 4-5 INSTALLER (499877000)

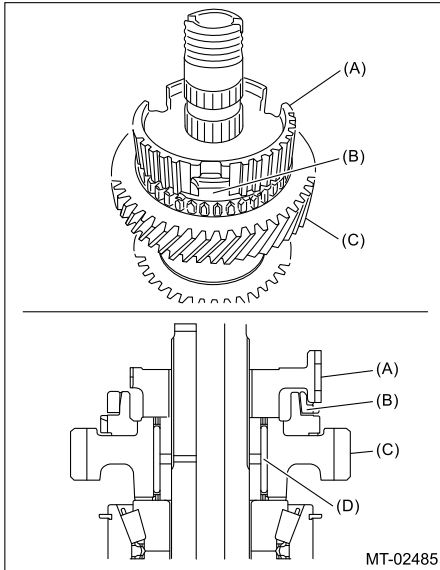


(A) 5th needle bearing race

9. Install the 5th needle bearing, 5th drive gear, 5th baulk ring, and 5th-6th synchronizer hub.

**Note:**

- **Align the protrusion part of the 5th baulk ring with the groove of the 5th-6th synchronizer hub.**
- **Install the 5th-6th synchronizer hub in the correct direction.**



- (A) 5th-6th synchronizer hub
- (B) 5th baulk ring
- (C) 5th drive gear
- (D) 5th needle bearing (cage: black)

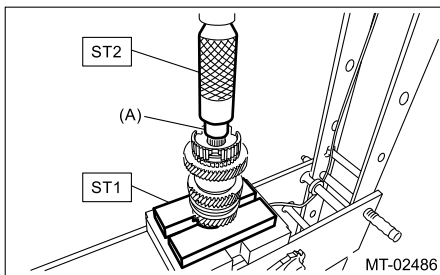
10. Install the 6th needle bearing race using ST1, ST2 and a press.

**Caution:**

**Do not apply a load in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).**

**Preparation tool:**

- ST1: REMOVER (899714110)
- ST2: RACE 4-5 INSTALLER (499877000)



(A) 6th needle bearing race

11. Install the 5th-6th coupling sleeve.

**Note:**

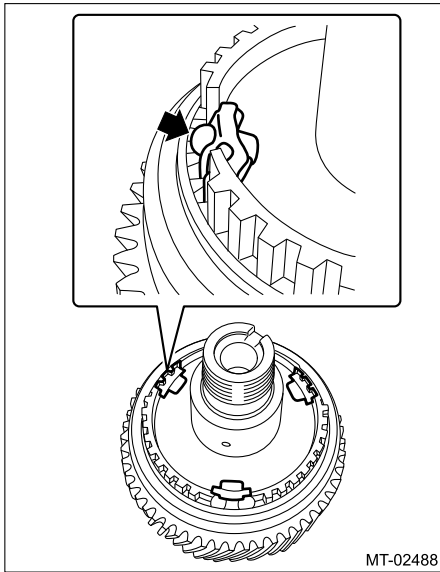
- **Install the 5th-6th coupling sleeve in the correct direction.**
- **Align the alignment marks of 5th-6th coupling sleeve and the 5th-6th synchronizer hub.**

(A) 5th-6th coupling sleeve

12. Install the 5th-6th shifting insert.

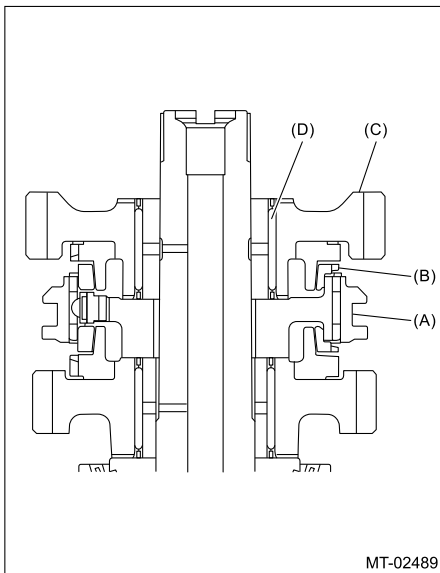
**Note:**

**Press in the ball part to install.**



MT-02488

**13.** Install the 6th baulk ring, 6th drive gear and 6th needle bearing.



MT-02489

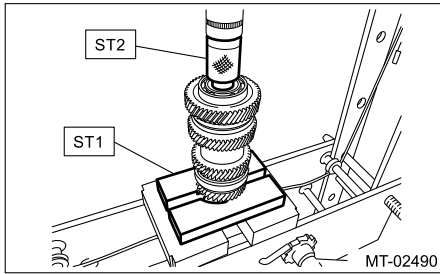
- (A) 5th-6th coupling sleeve
- (B) 6th baulk ring
- (C) 6th drive gear
- (D) 6th needle bearing (cage: silver)

**14.** Install the ball bearing using ST1, ST2 and a press.

**Caution:**  
**Do not apply a load in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).**

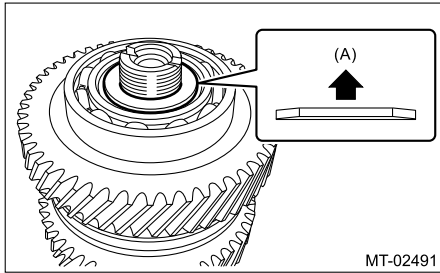
**Note:**  
**Install the ball bearing with the side which does not have lock nut mounting dent facing 6th drive gear.**

- Preparation tool:**
- ST1: REMOVER (899714110)
  - ST2: PRESS (899754112)



15. Install a new lock washer.

**Caution:**  
**Make sure the lock washer is facing the correct direction.**



(A) Lock nut side

16. Install a new lock nuts using ST1 and ST2.

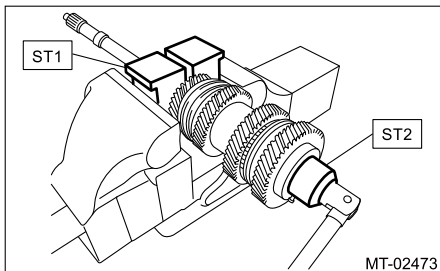
**Tightening torque:**

160 N·m (16.3 kgf·m, 118.0 ft·lb)

**Preparation tool:**

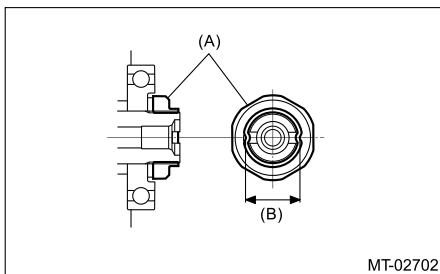
ST1: TRANSMISSION HOLDER (498937000)

ST2: SOCKET WRENCH (35) (499987003)



17. Crimp the lock nut at two locations so that the dimension (B) becomes 23.3 mm (0.92 in) or less.

**Caution:**  
**When crimping the lock nut, be careful not to crack it.**



(A) Lock nut

(B) Outer dimension after crimping

MANUAL TRANSMISSION AND DIFFERENTIAL(TY75) > Main Shaft

**INSPECTION**

Disassembled parts should be washed with cleaning solvent first, then inspected carefully.

**1. Bearing**

Replace the bearings in the following cases.

- When the bearing balls, outer races and inner races are broken or rusty.
- When the bearing is worn.
- When the bearings fail to turn smoothly or emit noise in rotation after transmission gear oil has been applied.
- When bearing has other defects.

**2. Bushing (each gear)**

Replace the bushing in following cases.

- When the sliding surface is damaged or abnormally worn.
- When the inner wall is abnormally worn.

**3. Gear**

Replace gears in the following cases.

- Replace the gear with new part if its tooth surfaces are broken, damaged or excessively worn.
- Correct or replace if the cone that contacts the baulk ring is rough or damaged.
- Repair or replace if the inner surface or end face is damaged.

**4. Baulk ring, synchro cone**

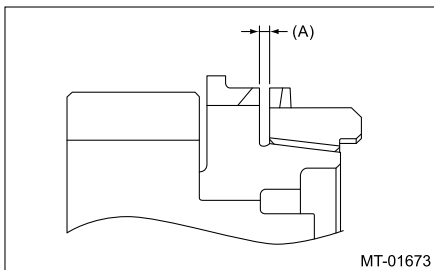
Replace the baulk ring and synchro cone in the following cases.

- When the inner surface or end face is damaged.
- When the baulk ring inner surface is abnormally or partially worn down.
- When the contact surface of the baulk ring insert section is cracked or abnormally worn.
- If the gap between the end faces of the baulk ring and the gear splined part is excessively small, check the clearance (A) while pressing the ring against the cone.

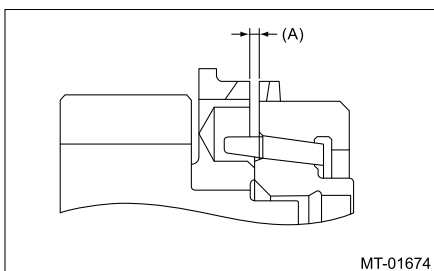
**Specification:**

0.5 mm (0.020 in) or more

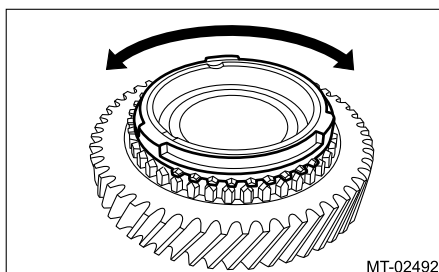
- Single cone



- Double cone



- Apply transmission gear oil to the cone of the gear and while press-fitting the baulk ring, check there is no rotation in the circumferential direction.

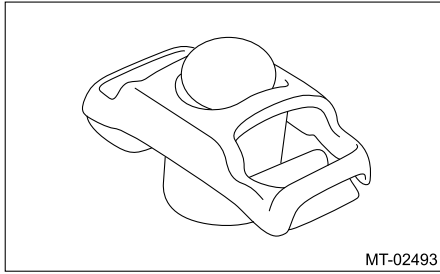


**5. Coupling sleeve and synchronizer hub**

- Check the slipping condition of the coupling sleeve.
- Check the splines on the coupling sleeve and synchronizer hub for wear.

**6. Shifting insert**

Replace the shifting insert if there is deformation, excessive wear on the ball section or any defectiveness.



**7. Oil seal**

Replace the oil seal if the lip is deformed, hardened, worn or defective in any way.

**8. Gearshift mechanism**

Repair or replace the gearshift mechanism if excessively worn, bent or defective in any way.

**MANUAL TRANSMISSION AND DIFFERENTIAL(TY75) > Main Shaft**

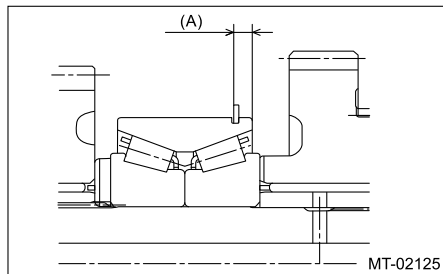
**ADJUSTMENT**

Selection of main shaft rear plate:

Measure the protrusion amount (A) of double taper roller bearing from transmission main case surface, and select a suitable plate in the following table.

**Note:**  
**Before measuring, tap the end of main shaft with a plastic hammer lightly in order to make the clearance zero between the main case surface and moving flange of bearing.**




<b>Dimension (A) mm (in)</b>	<b>Part No.</b>	<b>Mark</b>
4.00 – 4.13 (0.1575 – 0.1626)	32294AA041	1
3.87 – 4.00 (0.1524 – 0.1575)	32294AA051	2



## MANUAL TRANSMISSION AND DIFFERENTIAL(TY75) > Drive Pinion Shaft

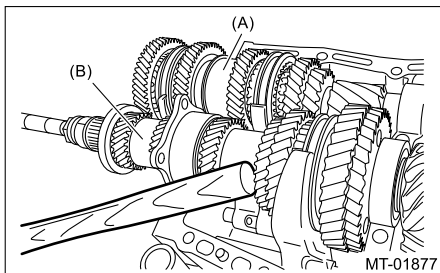
### REMOVAL



1. Remove the manual transmission assembly from the vehicle.  [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transmission Assembly>REMOVAL.](#)
2. Remove the transfer case together with the extension case assembly.  [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transfer Case and Extension Case>REMOVAL.](#)
3. Remove the transmission case.  [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transmission Case>REMOVAL.](#)
4. Remove the drive pinion shaft assembly.

#### Note:

Use a hammer handle, etc. to remove if too tight.



(A) Main shaft ASSY

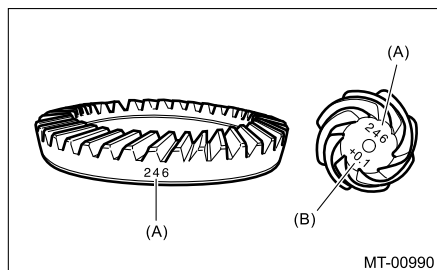
(B) Drive pinion shaft ASSY

5. Remove the main shaft assembly.  [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Main Shaft>REMOVAL.](#)

## MANUAL TRANSMISSION AND DIFFERENTIAL(TY75) > Drive Pinion Shaft

### INSTALLATION

1. Remove the front differential assembly.
2. Hypoid gear set match mark/No.: The number (A) on top of the drive pinion, and the number on the hypoid driven gear are set numbers for the two gears. Use a pair having the same numbers.  
The figure (B) below shows a number for shim adjustment. If no number is shown, the value is zero.



(A) Set number

(B) Number for shim adjustment

3. Place the drive pinion shaft assembly on transmission main case RH without shim and tighten the bearing mounting bolts.
4. Perform the adjustment of ST.
  - (1) Loosen the two bolts and adjust so that the scale indicates 0.5 correctly when the plate end and the scale end are on the same level.

#### Preparation tool:

ST: DRIVE PINION GAUGE ASSY (499917500)

(A) Plate

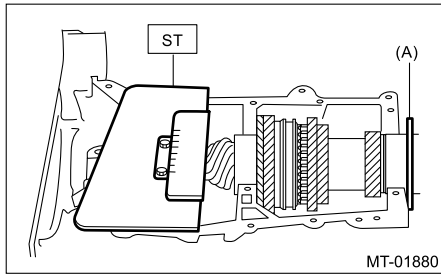
(B) Scale

- (2) Tighten the two bolts.

5. Position the ST (DRIVE PINION GAUGE ASSY) by inserting the knock pin of ST into the knock hole of transmission case.
6. Slide the scale of ST with finger tip and read the value at the point where it matches with the end face of drive pinion.

**Preparation tool:**

ST: DRIVE PINION GAUGE ASSY (499917500)



(A) Adjust the clearance to zero without drive pinion shims.

7. The thickness of drive pinion shims shall be determined by adding the value indicated on drive pinion to the value indicated on the ST (DRIVE PINION GAUGE ASSY). (Add if the number on drive pinion is prefixed by +, and subtract if the number is prefixed by -.)
8. Select one to three drive pinion shim(s) from the following table for the value determined as described above, and take the shim(s) whose thickness is closest to the said value.

**Note:**

**Install the shim with it's cut in facing the shifter fork & rod side.**

Drive pinion shim	
Part No.	Thickness mm (in)
32295AA031	0.150 (0.0059)
32295AA041	0.175 (0.0069)
32295AA051	0.200 (0.0079)
32295AA061	0.225 (0.0089)
32295AA071	0.250 (0.0098)
32295AA081	0.275 (0.0108)
32295AA091	0.300 (0.0118)
32295AA101	0.500 (0.0197)

9. Install the front differential assembly. [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Front Differential>INSTALLATION.](#)
10. Fit the transmission case knock pin to the knock pin hole of the roller bearing and install the drive pinion shaft assembly.
11. Install the main shaft assembly. [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Main Shaft>INSTALLATION.](#)
12. Check each shifter fork. [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Shifter Fork and Rod>INSPECTION.](#)
13. Install the transmission case. [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transmission Case>INSTALLATION.](#)
14. Install the transfer case together with the extension case assembly. [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transfer Case and Extension Case>INSTALLATION.](#)
15. Install the manual transmission assembly to the vehicle. [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transmission Assembly>INSTALLATION.](#)

**MANUAL TRANSMISSION AND DIFFERENTIAL(TY75) > Drive Pinion Shaft**

**DISASSEMBLY**



**Note:**

- Attach a cloth to the end of driven shaft (on the frictional side of the thrust needle bearing) to prevent damage during disassembly or reassembly.
- When replacing the coupling sleeve and synchronizer hub, replace them as a set. Because these must engage at the specified point, avoid disassembly as much as possible. If it is necessary to disassemble, mark the engaging points on the splines beforehand.

1. Using ST1, ST2 and ST3, remove the lock nut.

**Note:**

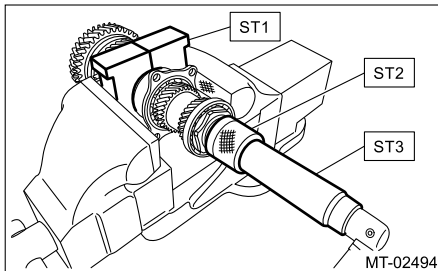
**Flatten the lock nut tab before removing the lock nut.**

**Preparation tool:**

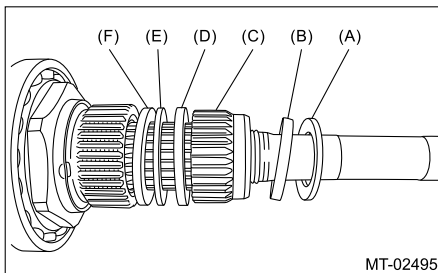
ST1: HOLDER (18680AA020)

ST2: HOLDER (18667AA020)

ST3: SOCKET (27) (18662AA010)

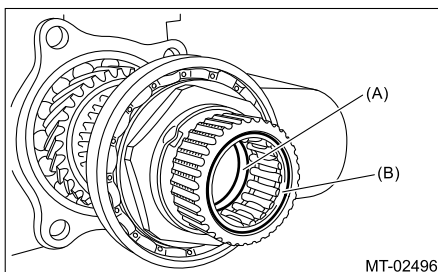


2. Remove the lock washer, washer, differential bevel gear sleeve, adjusting washer No. 1, thrust bearing and adjusting washer No. 2.



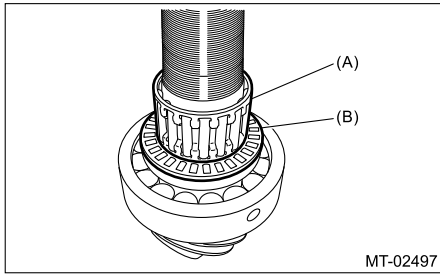
- (A) Lock washer
- (B) Washer
- (C) Differential bevel gear sleeve
- (D) Adjusting washer No. 1 (25 × 36 × t)
- (E) Thrust bearing (25 × 36 × 2)
- (F) Adjusting washer No. 2 (25 × 36 × t)

3. Draw out the drive pinion shaft from driven shaft.  
4. Remove the needle bearing and drive pinion collar.



- (A) Drive pinion collar
- (B) Needle bearing (25 × 30 × 20)

5. Remove the needle bearing and thrust bearing.

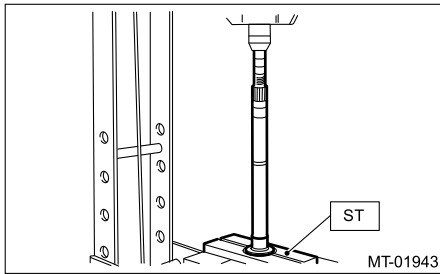


- (A) Needle bearing (30 × 37 × 23)
- (B) Thrust bearing (33 × 50 × 3)

6. Remove the roller bearing and washer using ST and a press.

**Preparation tool:**

ST: REMOVER (498077000)



7. Using ST1 and ST2, remove the lock nut.

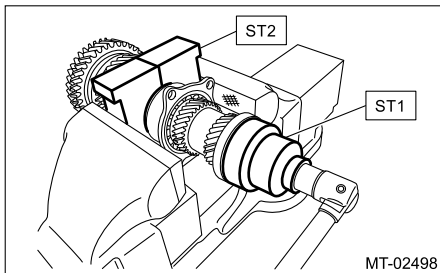
**Note:**

**Flatten the lock nut tab before removing the lock nut.**

**Preparation tool:**

ST1: SOCKET WRENCH (50) (499987300)

ST2: HOLDER (18680AA020)

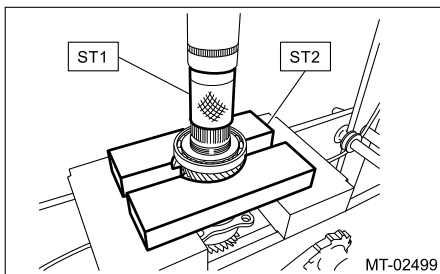


8. Remove the ball bearing, 6th driven gear and drive pinion spacer using the ST1, ST2 and a press.

**Preparation tool:**

ST1: PRESS (899754112)

ST2: REMOVER (899714110)

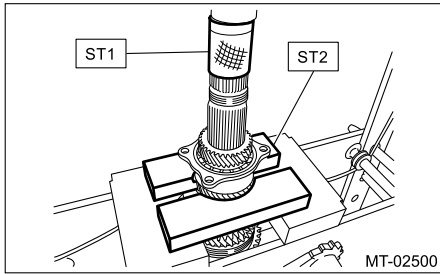


9. Remove the 5th driven gear, double ball bearing and 3rd-4th driven gear using ST1, ST2 and a press.

**Preparation tool:**

ST1: PRESS (899754112)

ST2: REMOVER (899714110)



10. Remove the key.

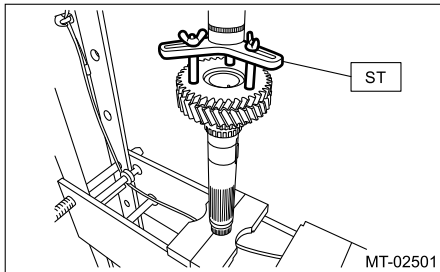
11. Remove the 2nd driven gear, 2nd inner baulk ring, 2nd synchro cone, 2nd outer baulk ring, 1st-2nd shifting insert and 1st-2nd coupling sleeve.

**Caution:**  
**When removing 1st-2nd coupling sleeve, be careful not to lose the 1st-2nd shifting insert.**

12. Remove the 1st driven gear, 1st inner baulk ring, 1st synchro cone, 1st outer baulk ring, 2nd driven gear bushing and 1st-2nd synchronizer hub using ST and a press.

**Preparation tool:**

ST: COMPRESSOR SPECIAL TOOL (18762AA001)

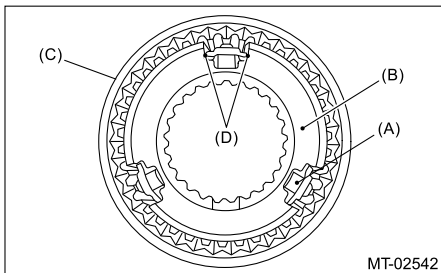


**MANUAL TRANSMISSION AND DIFFERENTIAL(TY75) > Drive Pinion Shaft**

**ASSEMBLY**

**Note:**

- Match the alignment marks, and install the coupling sleeve and then install the shifting insert.
- Make sure that there is no large clearance at both sides of the shifting insert after assembly.

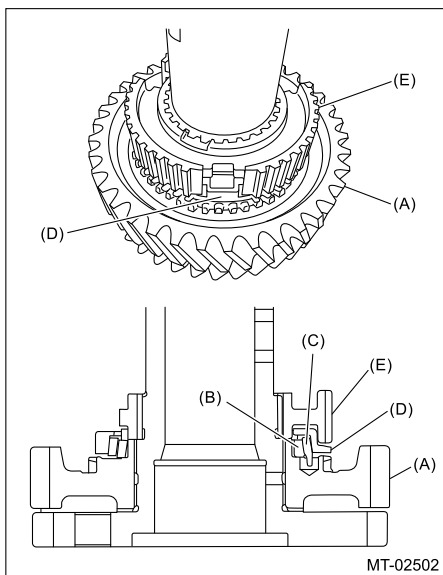


- (A) Shifting insert
- (B) Synchronizer hub
- (C) Coupling sleeve
- (D) There is no large clearance at this part.

1. Install the 1st driven gear, 1st inner baulk ring, 1st synchro cone, 1st outer baulk ring and 1st-2nd synchronizer hub.

**Note:**

- Install the 1st-2nd synchronizer hub in proper direction.
- Align the protrusion of the 1st outer baulk ring into the groove of the 1st-2nd synchronizer hub.



- (A) 1st driven gear
- (B) 1st inner baulk ring
- (C) 1st synchro cone
- (D) 1st outer baulk ring
- (E) 1st-2nd synchronizer hub

2. Install the 2nd driven gear bushing using ST and a press.

**Caution:**

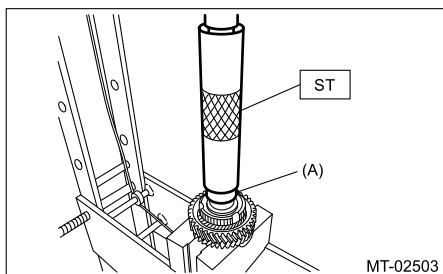
**Do not apply a load in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).**

**Note:**

- Attach a cloth to the end of the driven shaft to prevent damage.
- When press fitting, align the oil holes of the driven shaft and 2nd driven gear bushing.

**Preparation tool:**

ST: INSTALLER (18654AA000)

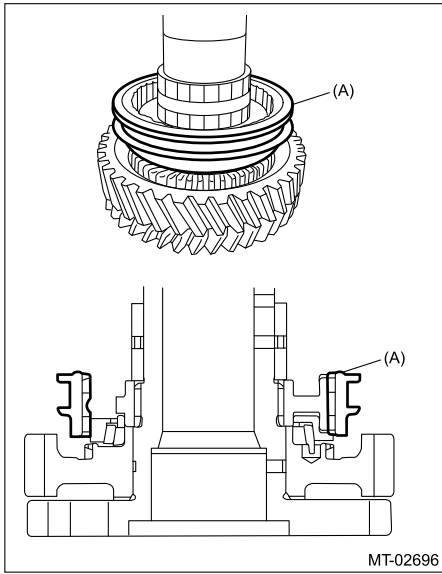


- (A) 2nd driven gear bushing

3. Install the 1st-2nd coupling sleeve.

**Note:**

- Install the 1st-2nd coupling sleeve in proper direction.
- Align the alignment marks of 1st-2nd coupling sleeve and the 1st-2nd synchronizer hub.

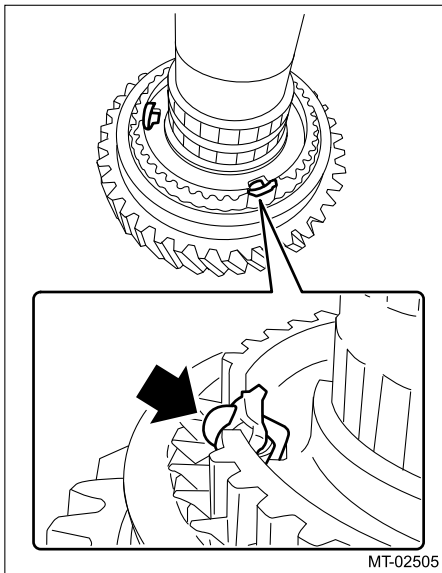


(A) 1st-2nd coupling sleeve

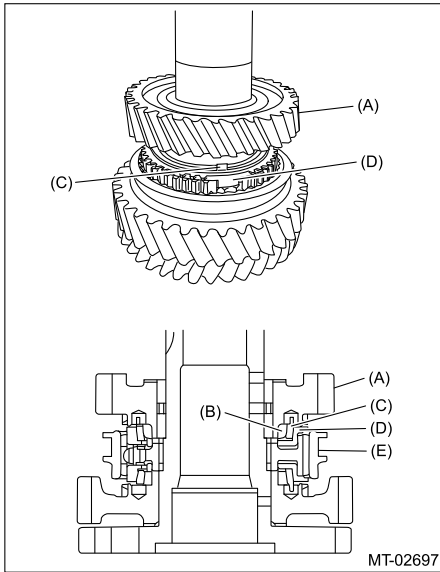
4. Install the 1st-2nd shifting insert.

**Note:**

**Press in the ball part to install.**



5. Install the 2nd outer baulk ring, 2nd synchro cone, 2nd inner baulk ring and 2nd driven gear.



- (A) 2nd driven gear
- (B) 2nd inner baulk ring
- (C) 2nd synchro cone
- (D) 2nd outer baulk ring
- (E) 1st-2nd coupling sleeve

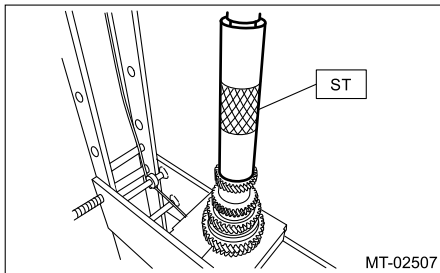
6. Install the key to the driven shaft.
7. Using the ST and a press, install the 3rd-4th driven gear.

**Caution:**  
**Do not apply a load in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).**

**Note:**

- Match the groove on the 3rd-4th driven gear to the key.
- Install the 3rd-4th driven gear in the proper direction.

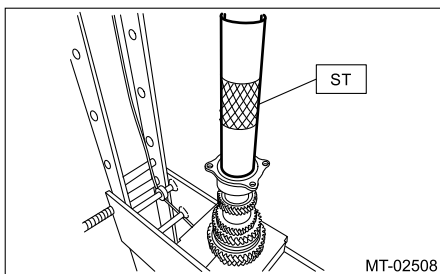
**Preparation tool:**  
 ST: INSTALLER (499277200)



8. Using the ST and a press, install a new double ball bearing.

**Caution:**  
**Do not apply a load in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).**

**Preparation tool:**  
 ST: INSTALLER (499277200)



9. Using the ST and a press, install the 5th driven gear.

**Caution:**

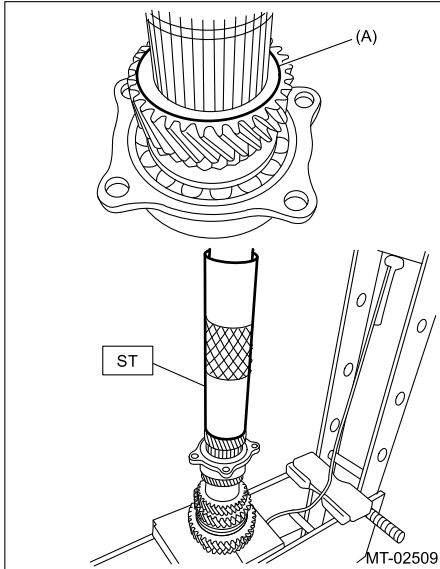
**Do not apply a load in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).**

**Note:**

**Install the 5th driven gear with the groove side facing the 6th driven gear.**

**Preparation tool:**

ST: INSTALLER (499277200)



(A) Install with the groove side facing the 6th driven gear.

10. Install the drive pinion spacer to the driven shaft.

11. Using the ST and a press, install the 6th driven gear.

**Caution:**

**Do not apply a load in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).**

**Note:**

**Install with the stepped side on the end surface of the 6th driven gear facing the rear ball bearing side.**

**Preparation tool:**

ST: INSTALLER (499277200)

(A) Install with the stepped side facing the rear ball bearing.

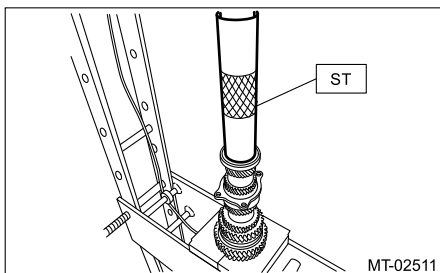
12. Using the ST and a press, install the ball bearing.

**Caution:**

**Do not apply a load in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).**

**Preparation tool:**

ST: INSTALLER (499277200)



13. Install a new lock nuts using ST1 and ST2.

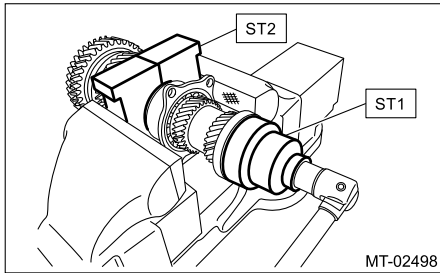
**Tightening torque:**

440 N·m (44.9 kgf·m, 324.5 ft·lb)

**Preparation tool:**

ST1: SOCKET WRENCH (50) (499987300)

ST2: HOLDER (18680AA020)

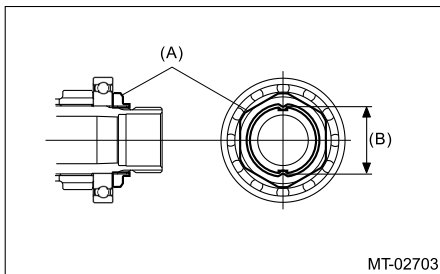


**14.** Using a spring scale, check that the initial load of the ball bearings is 0.1 – 1.5 N (0.01 – 0.15 kgf, 0.02 – 0.34 lbf).

**15.** Crimp the lock nut at two locations so that the dimension (B) becomes 39.1 mm (1.54 in) or less.

**Caution:**

**When crimping the lock nut, be careful not to crack it.**



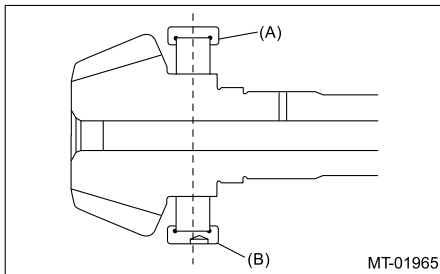
(A) Lock nut

(B) Outer dimension after crimping

**16.** Install a new roller bearing.

**Note:**

**Install the knock pin hole of the roller bearing outer race, facing the rear side.**



(A) Roller bearing

(B) Knock pin hole

**17.** Install the washer using ST1, ST2 and a press.

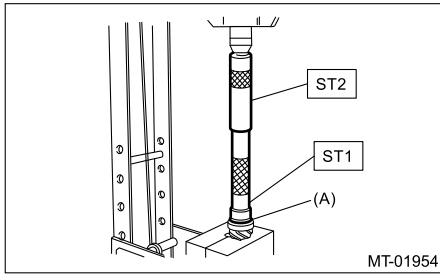
**Caution:**

**Do not apply a load in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).**

**Preparation tool:**

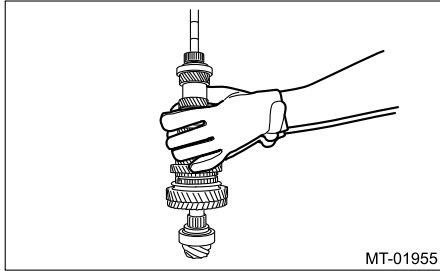
ST1: BUSHING 1-2 INSTALLER (499277100)

ST2: INSTALLER (499277200)

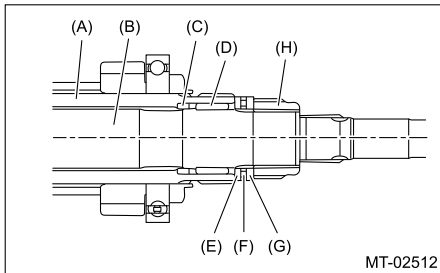


(A) Washer


**18.** Install the thrust bearing and needle bearing and install the driven shaft.



**19.** Install the drive pinion collar, needle bearing, adjusting washer No. 2, thrust bearing, adjusting washer No. 1 and differential bevel gear sleeve in this order.



- (A) Driven shaft
- (B) Drive pinion shaft
- (C) Drive pinion collar
- (D) Needle bearing (25 × 30 × 20)
- (E) Adjusting washer No. 2 (25 × 36 × t)
- (F) Thrust bearing (25 × 36 × 2)
- (G) Adjusting washer No. 1 (25 × 36 × t)
- (H) Differential bevel gear sleeve

**20.** Adjust the thrust bearing preload.  [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Drive Pinion Shaft>ADJUSTMENT > THRUST BEARING PRELOAD.](#)

## MANUAL TRANSMISSION AND DIFFERENTIAL(TY75) > Drive Pinion Shaft

### INSPECTION

Disassembled parts should be washed with cleaning solvent first, then inspected carefully.

#### 1. Bearing

Replace the bearings in the following cases.

- When the bearing balls, outer races and inner races are broken or rusty.
- When the bearing is worn.
- When the bearings fail to turn smoothly or emit noise in rotation after transmission gear oil has been applied.
- The double ball bearing of the drive pinion shaft should be checked for smooth rotation before the drive pinion shaft assembly is disassembled. In this case, because a preload is working on the bearing, its rotation feels like it is slightly dragging unlike other bearings.

(A) Drive pinion shaft

(B) Double ball bearing

- When bearing has other defects.

## 2. Bushing (each gear)

Replace the bushing in following cases.

- When the sliding surface is damaged or abnormally worn.
- When the inner wall is abnormally worn.

## 3. Gear

Replace gears in the following cases.

- Replace the gear with new part if its tooth surfaces are broken, damaged or excessively worn.
- Correct or replace if the cone that contacts the baulk ring is rough or damaged.
- Correct or replace if the inner surface or end face is damaged.

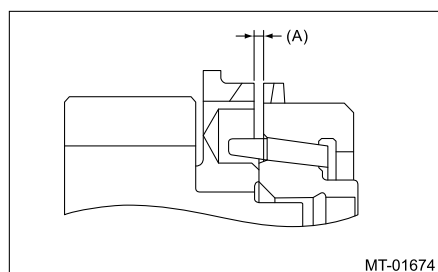
## 4. Baulk ring, synchro cone

Replace the baulk ring and synchro cone in the following cases.

- When the inner surface and end face are damaged.
- When the baulk ring inner surface is abnormally or partially worn down.
- If the gap between the end faces of the baulk ring and the gear splined part is excessively small, check the clearance (A) while pressing the ring against the cone.

### Specification:

0.5 mm (0.020 in) or more



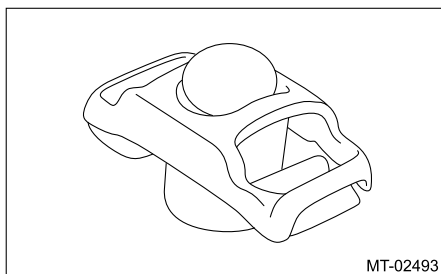
- When the contact surface of the baulk ring insert section is damaged or abnormally worn.
- Apply transmission gear oil to the cone of the gear and while press-fitting the baulk ring, check there is no rotation in the circumferential direction.

## 5. Coupling sleeve and synchronizer hub

- Check the slipping condition of the coupling sleeve.
- Check the splines on the coupling sleeve and synchronizer hub for wear.

## 6. Shifting insert

Replace the shifting insert if there is deformation, excessive wear on the ball section or any defectiveness.



## MANUAL TRANSMISSION AND DIFFERENTIAL(TY75) > Drive Pinion Shaft

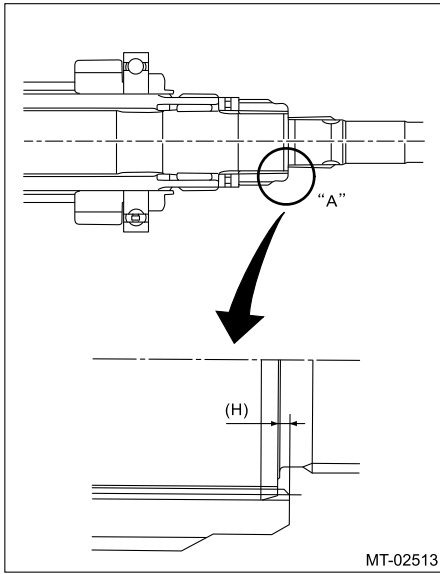
### ADJUSTMENT

#### 1. THRUST BEARING PRELOAD

1. Select a suitable adjusting washer No. 1 so that dimension (H) will be zero in a visual check. Position the washer (20 × 31 × 4) and a new lock washer (20 × 31 × 2.3).

#### Caution:

**Make sure the lock washer is facing the correct direction.**



2. Tighten a new lock nuts using ST1, ST2 and ST3.

**Tightening torque:**

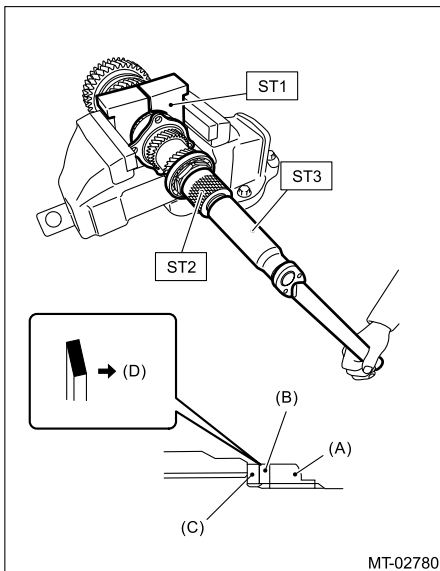
126 N·m (12.8 kgf-m, 92.9 ft-lb)

**Preparation tool:**

ST1: HOLDER (18680AA020)

ST2: HOLDER (18667AA020)

ST3: SOCKET (27) (18662AA010)



- (A) Lock nut
- (B) Lock washer
- (C) Washer
- (D) Lock nut side

3. After removing the ST (HOLDER) used in step 2), measure the starting torque using ST3 and a torque driver.

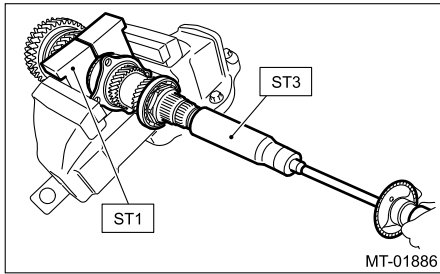
**Specification:**

0.3 – 0.8 N·m (0.03 – 0.08 kgf-m, 0.2 – 0.6 ft-lb)

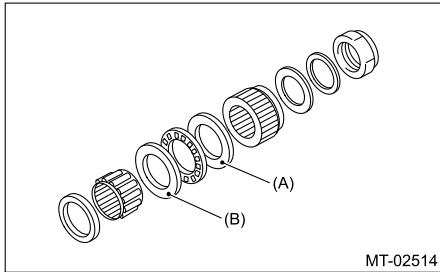
**Preparation tool:**

ST1: HOLDER (18680AA020)

ST3: SOCKET (27) (18662AA010)



4. If the starting torque is not within the standard value, select new adjusting washer No. 1 and recheck starting torque.

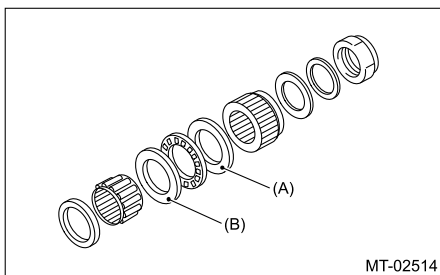


(A) Adjusting washer No. 1

(B) Adjusting washer No. 2

Adjusting washer No. 1	
Part No.	Thickness mm (in)
803025071	2.925 (0.1152)
803025072	2.950 (0.1161)
803025073	2.975 (0.1171)
803025074	3.000 (0.1181)
803025075	3.025 (0.1191)
803025076	3.050 (0.1201)
803025077	3.075 (0.1211)

5. If the standard starting torque cannot be obtained by the selection of adjusting washer No. 1, select adjusting washer No. 2 from the list below. Repeat steps 1) through 4) to adjust starting torque.



(A) Adjusting washer No. 1

(B) Adjusting washer No. 2

Starting torque	Dimension H	Adjusting washer No. 2
Low	Small	Select thicker one.
High	Large	Select thinner one.

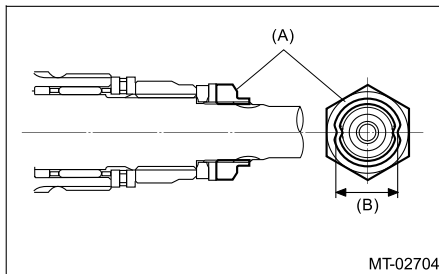
### Adjusting washer No. 2

Part No.	Thickness mm (in)
803025070	2.850 (0.1122)
803025074	3.000 (0.1181)
803025078	3.150 (0.1240)

6. Recheck that the starting torque is within the standard value, and crimp the lock nut at two locations so that the dimension (B) becomes 20.1 mm (0.79 in) or less.

**Caution:**

**When crimping the lock nut, be careful not to crack it.**








(A) Lock nut

(B) Outer dimension after crimping

## MANUAL TRANSMISSION AND DIFFERENTIAL(TY75) > Front Differential

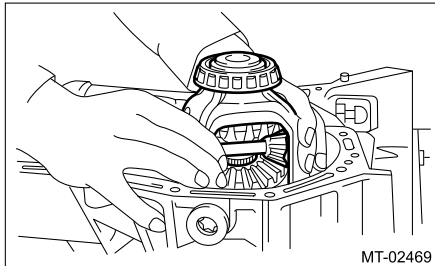
### REMOVAL



1. Remove the manual transmission assembly from the vehicle.  [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transmission Assembly>REMOVAL.](#)
2. Remove the transfer case together with the extension case assembly.  [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transfer Case and Extension Case>REMOVAL.](#)
3. Remove the transmission case.  [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transmission Case>REMOVAL.](#)
4. Remove the drive pinion shaft assembly.  [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Drive Pinion Shaft>REMOVAL.](#)
5. Remove the main shaft assembly.  [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Main Shaft>REMOVAL.](#)
6. Remove the front differential assembly.

#### Caution:

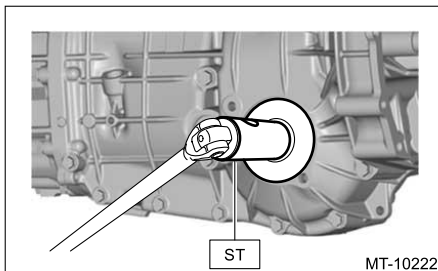
- Do not confuse the right and left taper roller bearing outer races.
- Be careful not to damage the oil seal of differential side retainer.



7. Remove the differential side retainers using the ST.

#### Preparation tool:

ST: WRENCH COMPL RETAINER (18658AA021)



8. Remove the taper roller bearing outer race from the transmission case using the ST (PULLER ASSY).

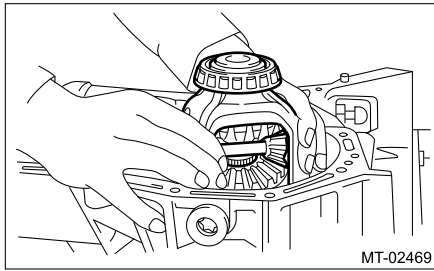
## MANUAL TRANSMISSION AND DIFFERENTIAL(TY75) > Front Differential






### INSTALLATION

1. Install the differential side retainers using the ST (WRENCH COMPL RETAINER).
2. Install the taper roller bearing outer race to the transmission case.
3. Install the front differential assembly.

#### Caution:

- Make sure the oil seal lip is not folded.



4. Install the main shaft assembly.  [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Main Shaft>INSTALLATION.](#)
5. Install the drive pinion shaft assembly.  [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Drive Pinion Shaft>INSTALLATION.](#)
6. Install the transmission case.  [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transmission Case>INSTALLATION.](#)
7. Install the transfer case together with the extension case assembly.  [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transfer Case and Extension Case>INSTALLATION.](#)
8. Install the manual transmission assembly to the vehicle.  [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transmission Assembly>INSTALLATION.](#)

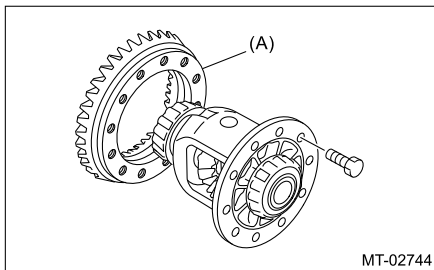
## MANUAL TRANSMISSION AND DIFFERENTIAL(TY75) > Front Differential

### DISASSEMBLY



#### 1. DIFFERENTIAL CASE

1. Loosen the twelve bolts and remove hypoid driven gear.

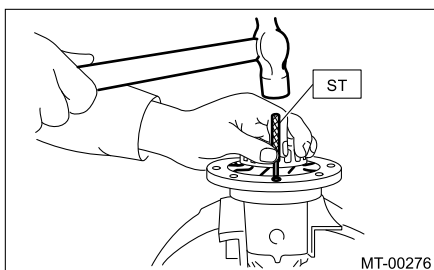


(A) Hypoid driven gear

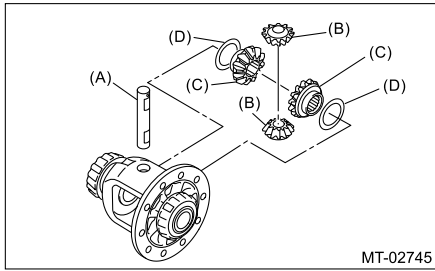
2. Using the ST, drive out the straight pin from differential toward hypoid driven gear side.

#### Preparation tool:

ST: STRAIGHT PIN REMOVER (899904100)



3. Pull out the pinion shaft, and remove the differential bevel pinion, differential bevel gear and adjusting washer.

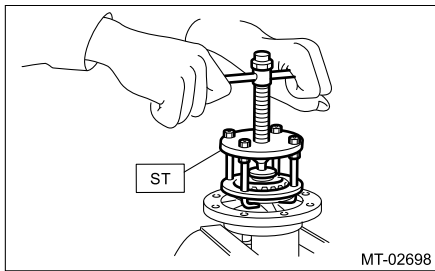


- (A) Pinion shaft
- (B) Differential bevel pinion
- (C) Differential bevel gear
- (D) Adjusting washer

4. Using the ST, remove the taper roller bearing.

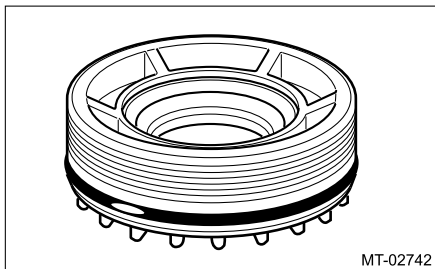
**Preparation tool:**

ST: PULLER SET (899524100)



**2. DIFFERENTIAL SIDE RETAINER**

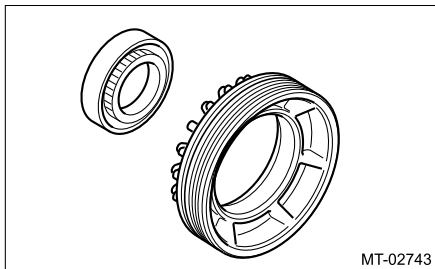
1. Remove the O-rings.



2. Remove the oil seal.

**Note:**

Remove it using a flat tip screwdriver wrapped with cloth or tape, etc.

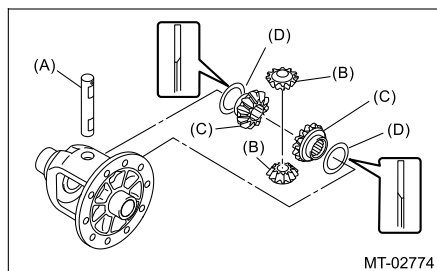


**1. DIFFERENTIAL CASE**

1. Install the differential bevel gear and differential bevel pinion together with adjusting washer, and insert the pinion shaft.

**Caution:**

**Face the chamfered side of adjusting washer toward bevel gear.**



- (A) Pinion shaft
- (B) Differential bevel pinion
- (C) Differential bevel gear
- (D) Adjusting washer

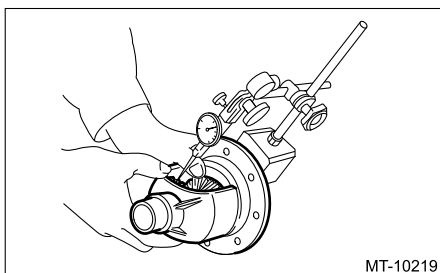
2. Using a dial gauge and a magnet base, measure the backlash between the differential bevel gear and differential bevel pinion. Adjust the backlash if not within specified limit. [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Front Differential>INSPECTION > DIFFERENTIAL BEVEL PINION GEAR BACKLASH.](#)

**Note:**

**Be sure the bevel pinion gear teeth contact adjacent gear teeth during measurement.**

**Specification:**

0.13 – 0.18 mm (0.0051 – 0.0071 in)



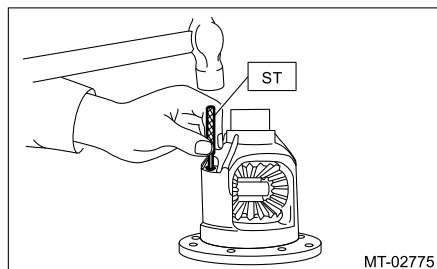
3. Align the pinion shaft pin hole with the differential case pin hole, and drive a new straight pin into the holes from the hypoid driven gear side using the ST.

**Caution:**

**After driving, crimp the area around the hole, and make sure that the straight pin will not come out.**

**Preparation tool:**

ST: STRAIGHT PIN REMOVER (899904100)



4. Using the ST1 and ST2, install the taper roller bearing.

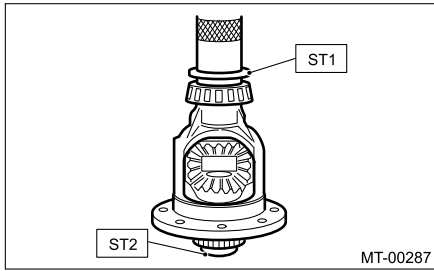
**Caution:**

- Do not apply a load in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).
- Be careful when handling because the taper roller bearing and the outer race are used as a set.

**Preparation tool:**

ST1: BUSHING 1-2 INSTALLER (499277100)

ST2: SEAT (398497701)



5. Install the hypoid driven gear using twelve bolts.

**Tightening torque:**

T: 62 N·m (6.3 kgf-m, 45.7 ft-lb)

- (A) Hypoid driven gear
- (B) Differential case

## 2. DIFFERENTIAL SIDE RETAINER

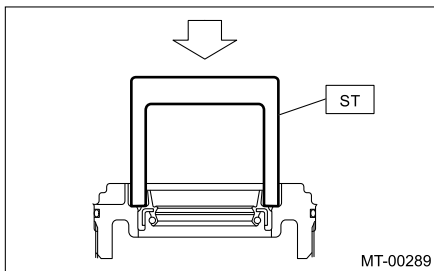
1. Using the ST, install a new oil seal by lightly tapping with a plastic hammer.

**Caution:**

- Apply transmission gear oil to the oil seal lips, and install the oil seal while being careful not to deform the lip.
- Check the identification marks (L, R), and attach the oil seals RH and LH.

**Preparation tool:**

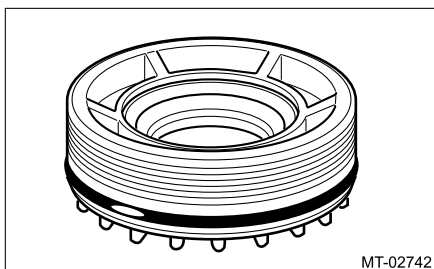
ST: DIFFERENTIAL SIDE OIL SEAL INSTALLER (18675AA000)



2. Install a new O-ring.

**Note:**

- Apply transmission gear oil to O-ring.
- Do not stretch or damage the O-ring.
- Install the O-ring after adjusting the hypoid driven gear backlash and completing the tooth contact inspection.



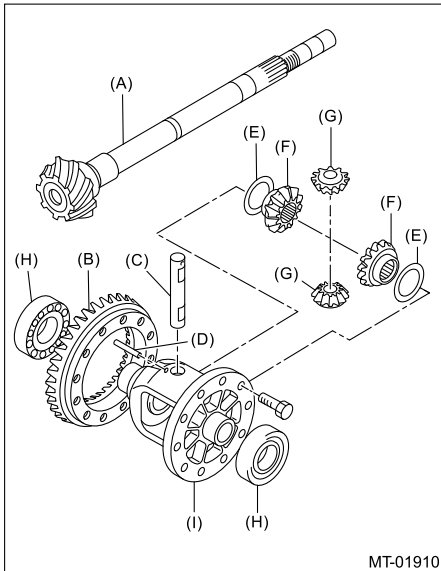
## MANUAL TRANSMISSION AND DIFFERENTIAL(TY75) > Front Differential

### INSPECTION

Repair or replace the differential gear in the following cases:

- When the hypoid driven gear and drive pinion shaft tooth surfaces are damaged, excessively worn, or seized.
- When the roller bearing on the drive pinion shaft has a worn or damaged roller path.
- When there is damage, wear or seizure of the differential bevel pinion, differential bevel gear, adjusting washer, pinion shaft or straight pin.

- When the differential case sliding surfaces are worn or damaged.



- (A) Drive pinion shaft
- (B) Hypoid driven gear
- (C) Pinion shaft
- (D) Straight pin
- (E) Adjusting washer
- (F) Differential bevel gear
- (G) Differential bevel pinion
- (H) Taper roller bearing
- (I) Differential case

## 1. DIFFERENTIAL BEVEL PINION GEAR BACKLASH

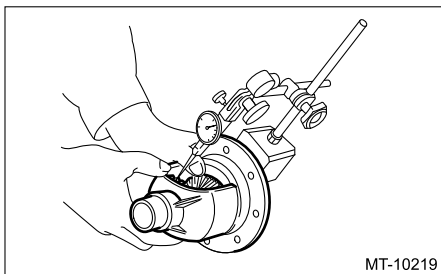
Using a dial gauge and a magnet base, measure the backlash between the differential bevel gear and differential bevel pinion. Adjust the backlash if not within specified limit. [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Front Differential>ADJUSTMENT.](#)

### Note:

**Be sure the bevel pinion gear teeth contact adjacent gear teeth during measurement.**

### Specification:

0.13 – 0.18 mm (0.0051 – 0.0071 in)

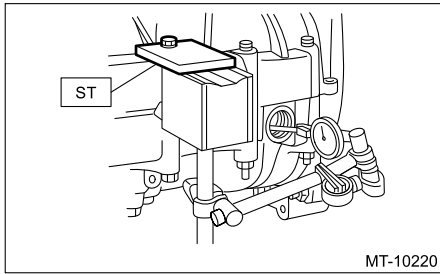


## 2. HYPOID DRIVEN GEAR BACKLASH

1. Using the ST, a dial gauge and a magnet stand, check the backlash by inserting the dial gauge through the drain plug hole.

### Preparation tool:

ST: PLATE (498255400)



2. Install SUBARU genuine axle shafts to both sides, rotate in the inversion direction so that the gauge contacts the tooth surface, and read the dial gauge.

**Note:**

**If the backlash is outside the specified range, adjust it by turning the differential side retainer on the left and right side.**

**Specification:**

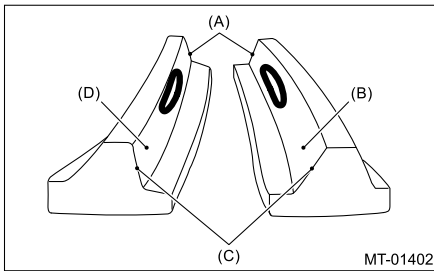
0.13 – 0.18 mm (0.0051 – 0.0071 in)

**Part No. 38415AA100 AXLE SHAFT**

### 3. TOOTH CONTACT OF HYPOID DRIVEN GEAR

Check tooth contact of hypoid driven gear as follows: Apply a thin uniform coat of red lead on both teeth surfaces on 3 or 4 teeth of the driven gear. Rotate the main shaft to move the driven gear back and forth until a definite contact pattern is developed on the driven gear, and judge whether face contact is correct. When the contact pattern is not correct, adjust. [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Front Differential>ADJUSTMENT.](#)

- Tooth contact is correct.



- (A) Toe
- (B) Coast side
- (C) Heel
- (D) Drive side

## MANUAL TRANSMISSION AND DIFFERENTIAL(TY75) > Front Differential

### ADJUSTMENT

#### 1. DIFFERENTIAL BEVEL PINION GEAR BACKLASH

1. Disassemble the front differential assembly. [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Front Differential>DISASSEMBLY.](#)
2. Select the adjusting washer from the table and install.

Adjusting washer	
Part No.	Thickness mm (in)
803038021	0.925 – 0.950 (0.0364 – 0.0374)
803038022	0.975 – 1.000 (0.0384 – 0.0394)
803038023	1.025 – 1.050 (0.0404 – 0.0413)

3. Adjust until the standard value is obtained.

**Specification:**

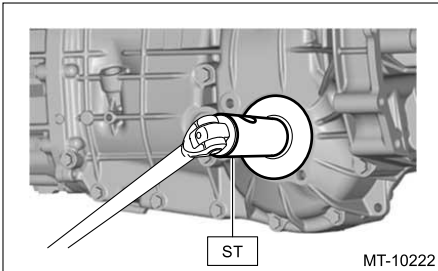
0.13 — 0.18 mm (0.0051 — 0.0071 in)

## 2. HYPOID DRIVEN GEAR BACKLASH

Using the ST, adjust by turning the differential side retainer on the left and right side.

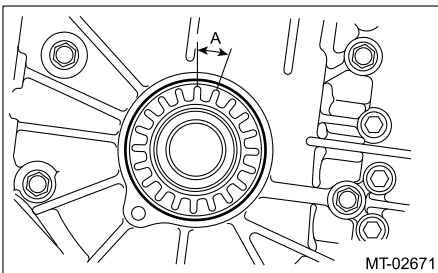
**Preparation tool:**

ST: WRENCH COMPL RETAINER (18658AA021)



**Note:**

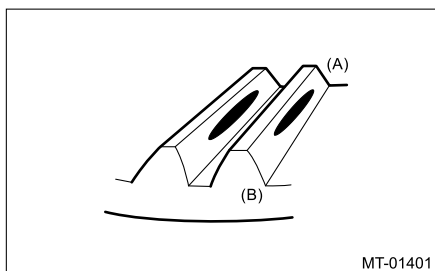
Each time the side retainer rotates by one notch (A), the backlash changes by 0.05 mm (0.0020 in).



## 3. TOOTH CONTACT OF HYPOID DRIVEN GEAR

1. Adjust until correct teeth contact is obtained.
2. Check tooth contact, and perform the adjustment as follows.
  - Correct tooth contact

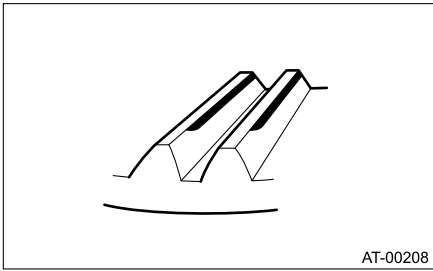
**Check item: Tooth contact surface is slightly shifted toward the toe side under a no-load condition. (When driving, it moves towards the heel side.)**



(A) Toe side

(B) Heel side

- Face contact  
**Check item: Backlash is too large.**  
Contact pattern



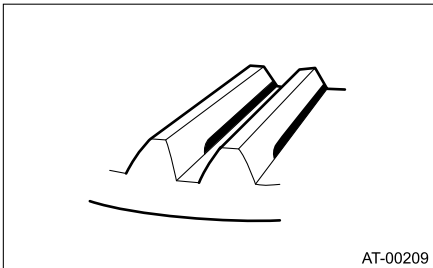
AT-00208

Corrective action: Tighten the differential side retainer to move the driven gear closer to the drive pinion shaft.

- Flank contact

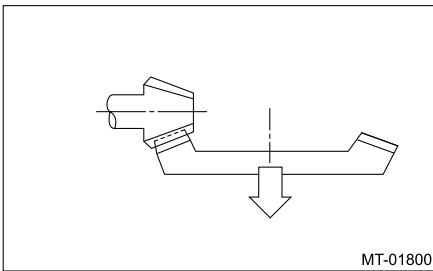
**Check item: Backlash is too small.**

Contact pattern



AT-00209

Corrective action: Loosen the differential side retainer to move the driven gear away from the drive pinion shaft.



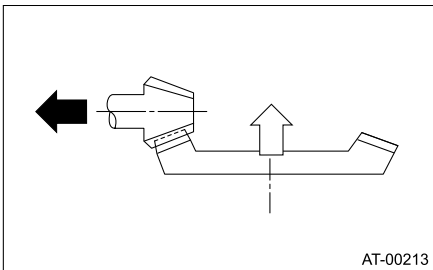
MT-01800

- Toe contact (inside contact)

**Check item: Teeth contact area is too small.**

Contact pattern

Corrective action: Increase the thickness of drive pinion shim and tighten the differential side retainer to move the driven gear closer to the drive pinion shaft according to the procedure for bringing drive pinion shaft away from the driven gear.

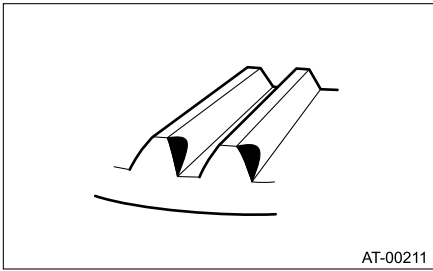


AT-00213

- Heel contact (outside end contact)

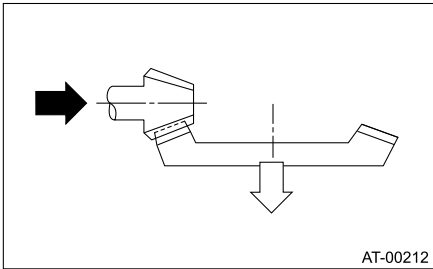
**Check item: Teeth contact area is too small.**

Contact pattern



AT-00211

Corrective action: Reduce the thickness of drive pinion shim and loosen the differential side retainer to move the driven gear away from the drive pinion shaft according to the procedure for bringing drive pinion shaft closer to the driven gear.










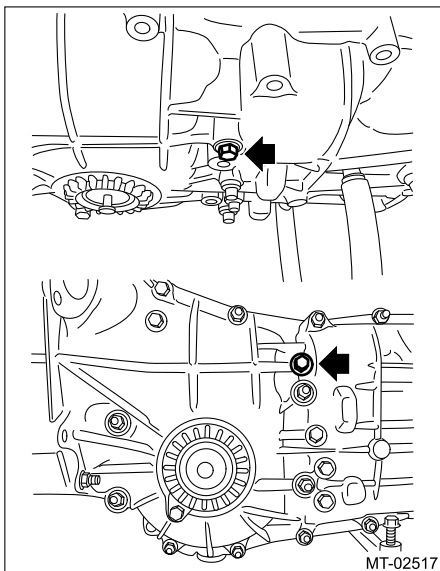
AT-00212

## MANUAL TRANSMISSION AND DIFFERENTIAL(TY75) > Reverse Idler Gear

### REMOVAL



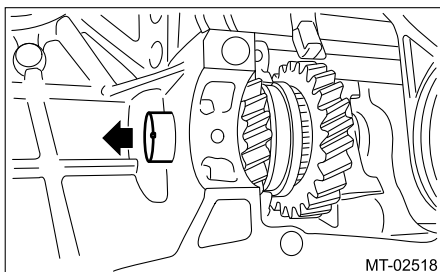
1. Remove the manual transmission assembly from the vehicle.  [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transmission Assembly>REMOVAL.](#)
2. Remove the back-up light switch and the neutral position switch.  [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Switches and Harness>REMOVAL.](#)
3. Remove the transfer case together with the extension case assembly.  [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transfer Case and Extension Case>REMOVAL.](#)
4. Remove the transmission case.  [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transmission Case>REMOVAL.](#)
5. Remove the drive pinion shaft assembly.  [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Drive Pinion Shaft>REMOVAL.](#)
6. Remove the main shaft assembly.  [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Main Shaft>REMOVAL.](#)
7. Remove the front differential assembly.  [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Front Differential>REMOVAL.](#)
8. Shift the gear into 4th gear position.
9. Remove the snap ring.
10. Remove the reverse idler gear shaft securing bolt.



11. Remove the reverse idler gear shaft by pushing it out.

#### Note:

**Support the reverse idler gear assembly with hands to avoid collapsing.**



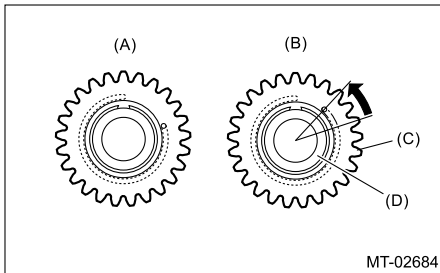
12. Remove the reverse idler gear.
13. Remove the reverse idler gear bushing.

## MANUAL TRANSMISSION AND DIFFERENTIAL(TY75) > Reverse Idler Gear

### INSTALLATION

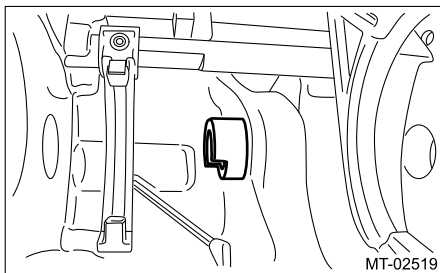
**Note:**

**Rotate the reverse idler sub gear by two teeth from free status in the direction of the arrow to make it engage with the reverse gear of the main shaft and install the main shaft assembly.**



- (A) Free status
- (B) Set status
- (C) Reverse idler sub gear
- (D) Reverse idler gear

1. Install the reverse idler gear bushing with the cutout portion of the reverse idler gear bushing facing the front of the transmission.

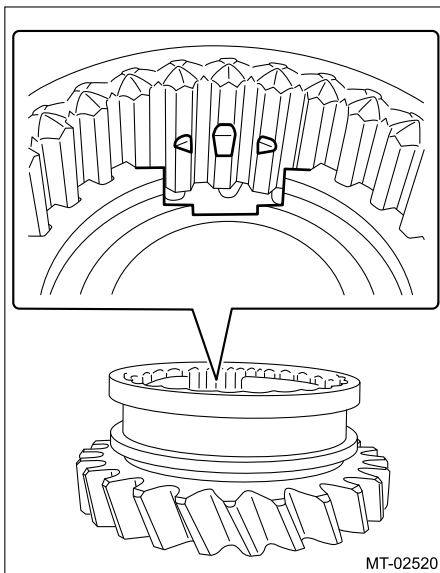


2. Assembling reverse idler gear assembly

- (1) Install the reverse coupling sleeve to the reverse idler gear No. 2.

**Note:**

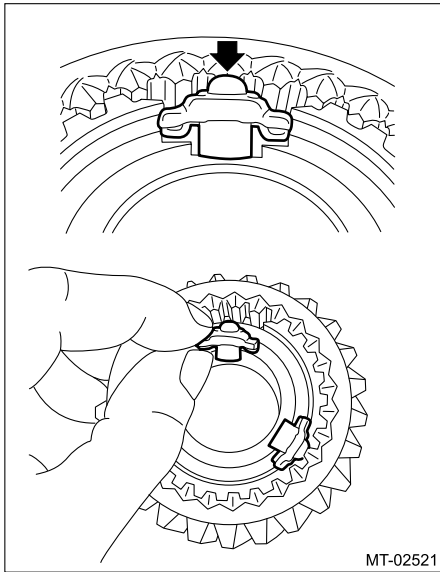
- **Install the reverse coupling sleeve in the correct direction.**
- **Make sure that the oval-shaped cutout portion inside the reverse coupling sleeve matches the center of the reverse idler gear No. 2 groove.**



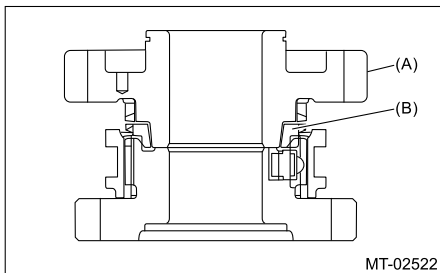
- (2) Install the reverse shifting insert.

**Note:**

**Press in the ball part to install.**

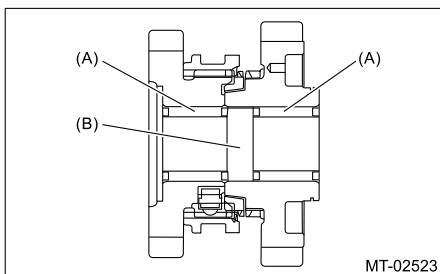


(3) Install the reverse baulk ring and reverse idler gear.



- (A) Reverse idler gear
- (B) Reverse baulk ring

(4) Install the needle bearing and reverse idler gear collar.



- (A) Needle bearing
- (B) Reverse idler gear collar

(5) Install the thrust bearing and reverse idler gear washer.

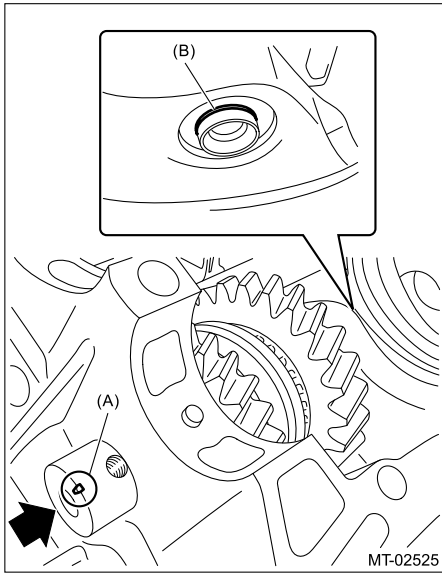
**Note:**

**Install the thrust bearing in the correct direction.**

3. Install the assembled reverse idler gear assembly to the transmission case and hold it with hands.
4. Install the reverse idler gear shaft.

**Note:**

- Install with the cutout portion of the reverse idler gear shaft facing the RH side of the transmission case.
- Make sure that the groove of the reverse idler gear shaft comes out of the reverse idler gear bushing.



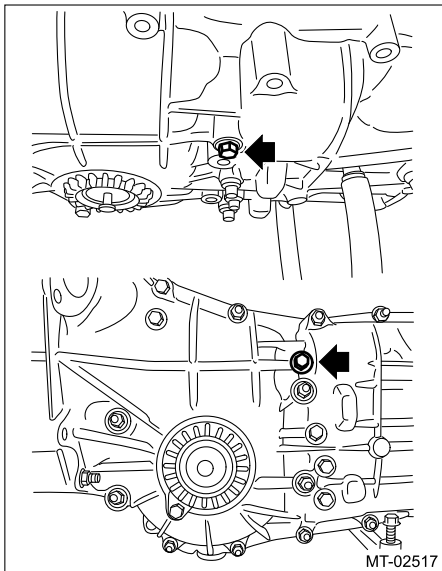
(A) Cutout portion of the reverse idler gear shaft

(B) Snap ring installation groove

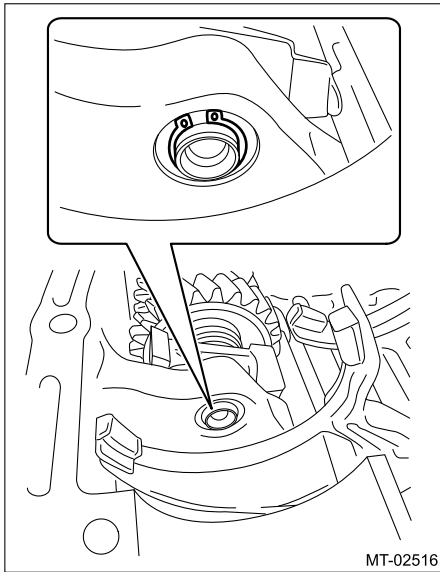
5. Install the reverse idler gear shaft securing bolt.



**Tightening torque:**

25 N·m (2.5 kgf-m, 18.4 ft-lb)



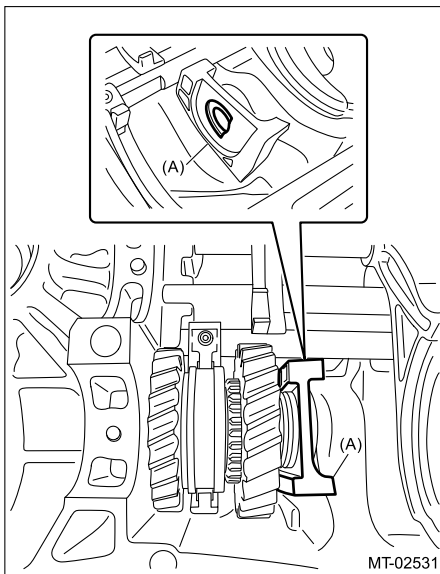
6. Install the snap ring.



7. Select the reverse idler gear bushing.  [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Reverse Idler Gear>ADJUSTMENT.](#)
8. Remove the reverse idler gear assembly and replace with the selected bushing.  [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Reverse Idler Gear>REMOVAL.](#)
9. Install the reverse idler gear assembly, oil case guide and reverse idler gear shaft.

**Note:**

- Install with the cutout portion of the reverse idler gear shaft facing the RH side of the transmission case.
- Make sure that the groove of the reverse idler gear shaft comes out of the reverse idler gear bushing.
- Insert the cutout portion of the reverse idler gear bushing into the oil case guide.

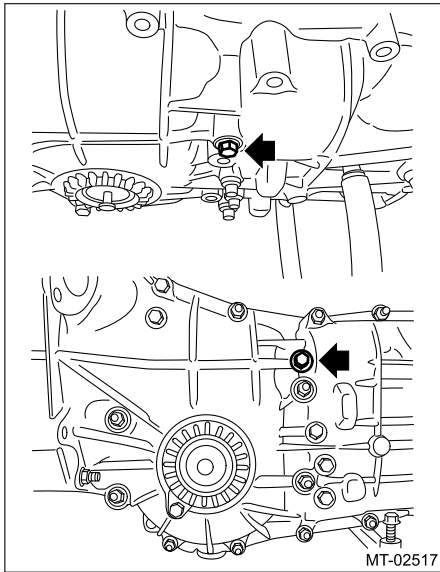


(A) Oil case guide

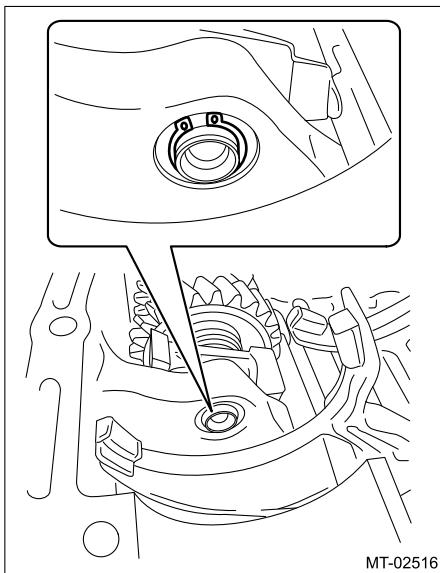
10. Replace with a new gasket, and install the reverse idler gear shaft securing bolt.

**Tightening torque:**

25 N·m (2.5 kgf-m, 18.4 ft-lb)



**11.** Install the snap ring.



**12.** Check the reverse shifter fork. [📖 Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Shifter Fork and Rod>INSPECTION.](#)

**13.** Install the front differential assembly. [📖 Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Front Differential>INSTALLATION.](#)

**14.** Install the main shaft assembly. [📖 Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Main Shaft>INSTALLATION.](#)

**15.** Install the drive pinion shaft assembly. [📖 Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Drive Pinion Shaft>INSTALLATION.](#)

**16.** Install the transmission case. [📖 Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transmission Case>INSTALLATION.](#)

**17.** Install the transfer case together with the extension case assembly. [📖 Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transfer Case and Extension Case>INSTALLATION.](#)

**18.** Install the back-up light switch and the neutral position switch. [📖 Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Switches and Harness>INSTALLATION.](#)

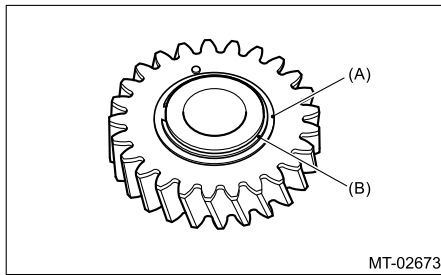
**19.** Install the manual transmission assembly to the vehicle. [📖 Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transmission Assembly>INSTALLATION.](#)

**MANUAL TRANSMISSION AND DIFFERENTIAL(TY75) > Reverse Idler Gear**

**DISASSEMBLY**

## 1. REVERSE IDLER GEAR

1. Remove the snap ring and friction plate.



- (A) Friction plate
- (B) Snap ring

2. Remove the reverse idler sub gear and reverse idler spring.
  - (A) Reverse idler sub gear
  - (B) Reverse idler spring
  - (C) Reverse idler gear

## MANUAL TRANSMISSION AND DIFFERENTIAL(TY75) > Reverse Idler Gear

### ASSEMBLY

---

## 1. REVERSE IDLER GEAR

1. Attach the reverse idler sub gear and reverse idler spring.

**Note:**

**Point the stamp (marking A) towards the outside, and install the reverse idler sub gear.**

- (A) Reverse idler sub gear
- (B) Reverse idler spring
- (C) Reverse idler gear
- (D) Stamp (marking A)

2. Install the friction plate and snap ring.

**Caution:**

**Make sure the friction plate is installed in the proper direction.**

- (A) Friction plate
- (B) Snap ring

## MANUAL TRANSMISSION AND DIFFERENTIAL(TY75) > Reverse Idler Gear

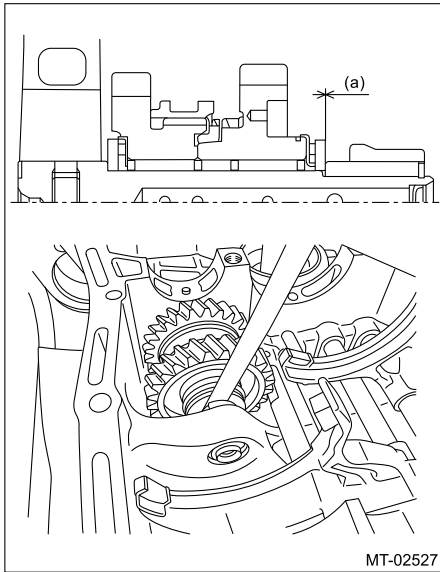
### INSPECTION

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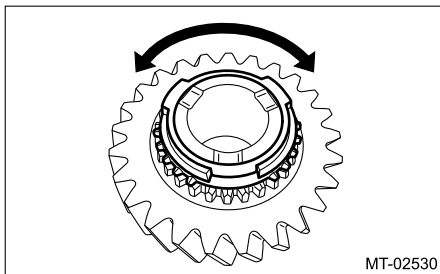
1. Check the clearance (a) between the reverse idler gear bushing and reverse idler gear washer. If the value is out of the standard value, select the appropriate reverse idler gear bushing and adjust.

**Specification:**

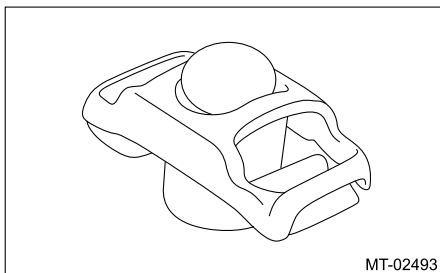
0.1 – 0.3 mm (0.004 – 0.012 in)



2. Check the reverse idler gear and reverse idler gear shaft for damage. Replace if it is damaged.
3. Apply transmission gear oil to the cone of the reverse idler gear and while press-fitting the reverse baulk ring, check there is no rotation in the circumferential direction.



4. Reverse coupling sleeve
  - Check the sliding condition of the reverse coupling sleeve.
  - Check the splines on the reverse coupling sleeve and reverse idler gear for wear.
5. Reverse shifting insert  
Replace the reverse shifting insert if there is deformation, excessive wear on the ball section or any defectiveness.



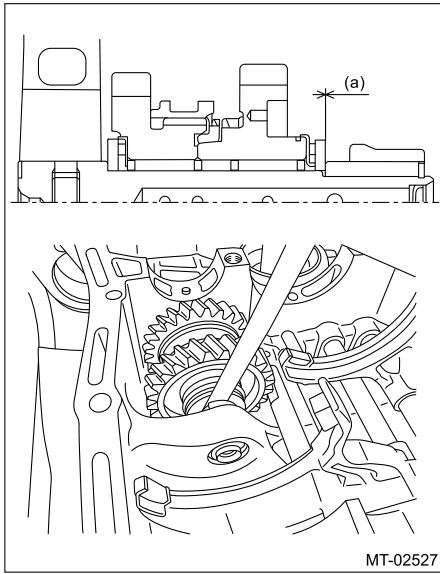
## MANUAL TRANSMISSION AND DIFFERENTIAL(TY75) > Reverse Idler Gear

### ADJUSTMENT

1. Select the appropriate reverse idler gear bushing from the table below, and adjust until the clearance (a) between the reverse idler gear and reverse idler gear washer is within the standard value.

#### Specification:

0.1 – 0.3 mm (0.004 – 0.012 in)



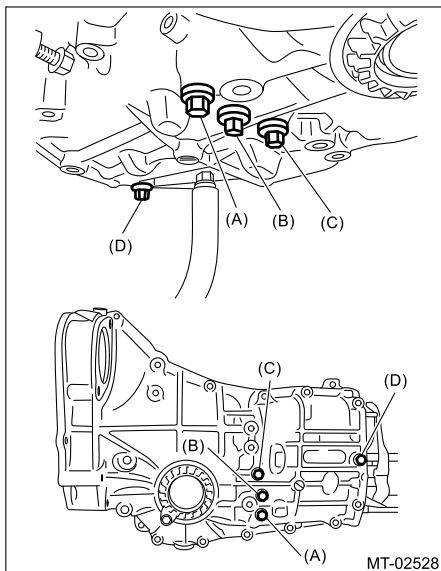
<b>Reverse idler gear bushing</b>		
<b>Part No.</b>	<b>Thickness mm (in)</b>	<b>Groove for identification</b>
32289AA080	27.75 (1.093)	None
32289AA090	27.90 (1.098)	1
32289AA100	28.05 (1.104)	2
32289AA110	28.20 (1.110)	3
32289AA120	28.35 (1.116)	4

## MANUAL TRANSMISSION AND DIFFERENTIAL(TY75) > Shifter Fork and Rod

### REMOVAL



1. Remove the manual transmission assembly from the vehicle. [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transmission Assembly>REMOVAL.](#)
2. Remove the back-up light switch and the neutral position switch. [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Switches and Harness>REMOVAL.](#)
3. Remove the transfer case together with the extension case assembly. [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transfer Case and Extension Case>REMOVAL.](#)
4. Remove the transmission case. [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transmission Case>REMOVAL.](#)
5. Remove the drive pinion shaft assembly. [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Drive Pinion Shaft>REMOVAL.](#)
6. Remove the main shaft assembly. [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Main Shaft>REMOVAL.](#)
7. Remove the front differential assembly. [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Front Differential>REMOVAL.](#)
8. Remove the reverse idler gear assembly. [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Reverse Idler Gear>REMOVAL.](#)
9. Remove the check ball plugs, check ball springs and check balls.



- (A) 1st-2nd
- (B) 3rd-4th
- (C) 5th-6th
- (D) Rev.

10. Use the ST (REMOVER) to push out the straight pin of 5th-6th shifter fork and reverse shifter fork, and remove the 5th-6th shifter fork, reverse shifter fork, 5th-6th fork rod and reverse fork rod.

#### Caution:

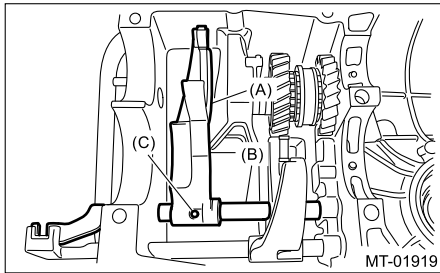
Since removing in the neutral position is impossible due to the narrow clearance to the transmission case, set the gear into the reverse position when tapping out the straight pin.

- (A) 5th-6th shifter fork
- (B) Reverse shifter fork
- (C) Straight pin
- (D) 5th-6th fork rod
- (E) Reverse fork rod

11. Drive out the straight pin by tapping with the ST (REMOVER), and remove the 3rd-4th shifter fork and 3rd-4th fork rod.

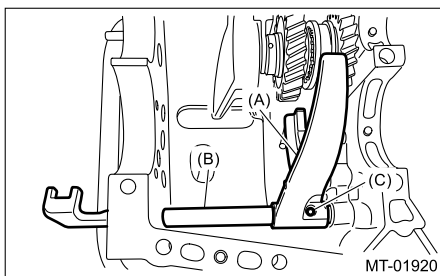
**Caution:**

**When removing the 3rd-4th fork rod, set the other fork rods in neutral position.**



- (A) 3rd-4th shifter fork
- (B) 3rd-4th fork rod
- (C) Straight pin

**12.** Drive out the straight pin by tapping with the ST (REMOVER), and remove the 1st-2nd shifter fork and 1st-2nd fork rod.

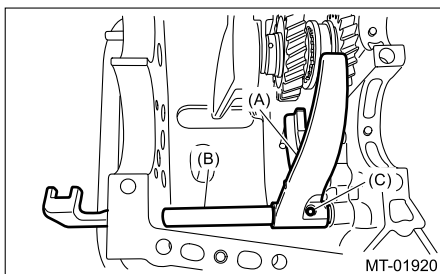


- (A) 1st-2nd shifter fork
- (B) 1st-2nd fork rod
- (C) Straight pin

## MANUAL TRANSMISSION AND DIFFERENTIAL(TY75) > Shifter Fork and Rod

### INSTALLATION

- 1.** Install the 1st-2nd fork rod to the 1st-2nd shifter fork through the hole on the rear of the transmission case.
- 2.** Align the holes on the 1st-2nd fork rod and 1st-2nd shifter fork, and drive a new straight pin into these holes using the ST (REMOVER) to fix.

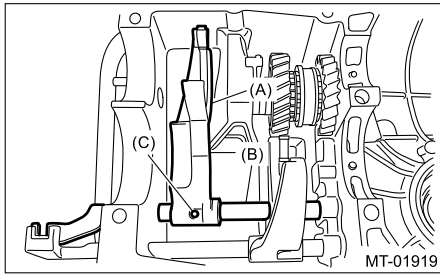


- (A) 1st-2nd shifter fork
- (B) 1st-2nd fork rod
- (C) Straight pin

- 3.** Install the 3rd-4th fork rod to the 3rd-4th shifter fork through the hole on the rear of the transmission case.
- 4.** Align the holes on the 3rd-4th fork rod and 3rd-4th shifter fork, and drive a new straight pin into these holes using the ST (REMOVER) to fix.

**Caution:**

- **Set other fork rods to neutral.**
- **Check that the positions of interlock plunger is correct.**

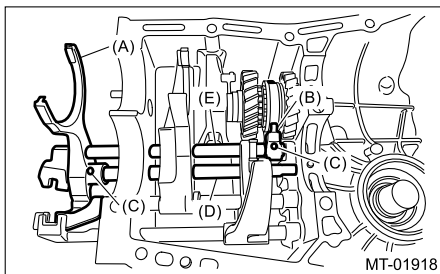


- (A) 3rd-4th shifter fork
- (B) 3rd-4th fork rod
- (C) Straight pin

5. Install the 5th-6th fork rod into 5th-6th shifter fork, then insert through the hole on the rear of transmission case. Align the hole of the 5th-6th shifter fork with the hole on the transmission case, then insert the reverse fork rod to install the reverse shifter fork.
6. Align the holes on the 5th-6th fork rod and 5th-6th shifter fork, and drive a new straight pin into these holes using the ST (REMOVER) to fix.

**Caution:**

- Set other fork rods to neutral.
- Check that the positions of interlock plunger is correct.

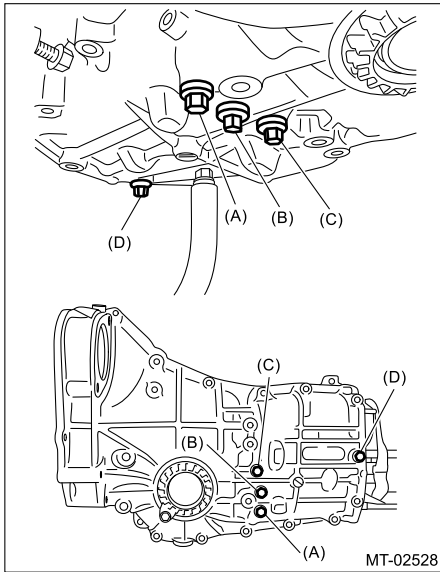


- (A) 5th-6th shifter fork
- (B) Reverse shifter fork
- (C) Straight pin
- (D) 5th-6th fork rod
- (E) Reverse fork rod

7. Install the check ball plugs, check ball springs and check balls.

**Tightening torque:**

20 N·m (2.0 kgf-m, 14.8 ft-lb)



- (A) 1st-2nd
- (B) 3rd-4th
- (C) 5th-6th
- (D) Rev.

8. Install the reverse idler gear assembly. [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Reverse Idler Gear>INSTALLATION.](#)
9. Install the front differential assembly. [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Front Differential>INSTALLATION.](#)
10. Install the main shaft assembly. [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Main Shaft>INSTALLATION.](#)
11. Install the drive pinion shaft assembly. [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Drive Pinion Shaft>INSTALLATION.](#)
12. Install the transmission case. [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transmission Case>INSTALLATION.](#)
13. Install the transfer case together with the extension case assembly. [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transfer Case and Extension Case>INSTALLATION.](#)
14. Install the back-up light switch and the neutral position switch. [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Switches and Harness>INSTALLATION.](#)
15. Install the manual transmission assembly to the vehicle. [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transmission Assembly>INSTALLATION.](#)

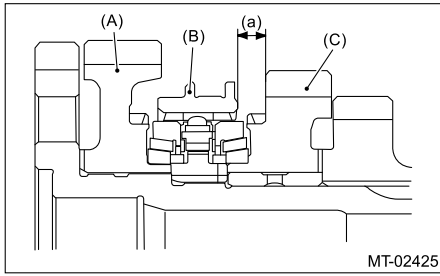
## MANUAL TRANSMISSION AND DIFFERENTIAL(TY75) > Shifter Fork and Rod

### INSPECTION

1. Check the shifter fork and fork rod for damage. Replace if it is damaged.
2. Gearshift mechanism  
Repair or replace the gearshift mechanism if excessively worn, bent or defective in any way.
3. Inspect the clearance (a) between 2nd driven gear and coupling sleeve. If it is outside the standard value, replace the shifter fork as required.

#### Specification:

7.4 – 7.8 mm (0.291 – 0.307 in)



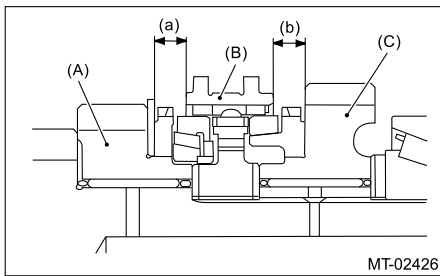
- (A) 1st driven gear
- (B) Coupling sleeve
- (C) 2nd driven gear

1st-2nd shifter fork		
Part No.	Mark	Contents
32804AA120	1	Approaches 2nd gear by 0.2 mm (0.008 in).
32804AA130	No mark	Specification
32804AA140	2	Approaches 1st gear by 0.2 mm (0.008 in).

4. Inspect the clearances (a) and (b) between the 3rd, 4th drive gear and the coupling sleeve. If it is outside the standard value, replace the shifter fork as required.

**Specification:**

7.5 – 7.8 mm (0.295 – 0.307 in)



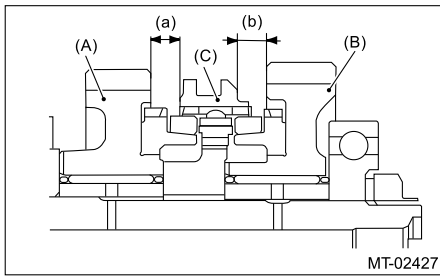
- (A) 3rd drive gear
- (B) Coupling sleeve
- (C) 4th drive gear

3rd-4th shifter fork		
Part No.	Mark	Contents
32810AA300	1	Approaches 4th gear by 0.2 mm (0.008 in).
32810AA310	No mark	Specification
32810AA320	3	Approaches 3rd gear by 0.2 mm (0.008 in).

5. Inspect the clearances (a) and (b) between the 5th, 6th drive gear and the coupling sleeve. If it is outside the standard value, replace the shifter fork as required.

**Specification:**

7.5 – 7.8 mm (0.295 – 0.307 in)



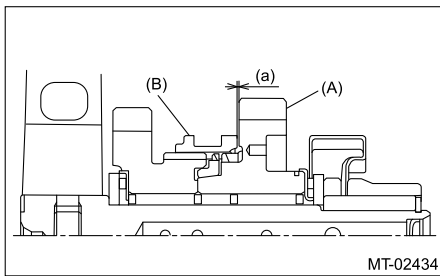
- (A) 5th drive gear
- (B) 6th drive gear
- (C) Coupling sleeve

5th-6th shifter fork		
Part No.	Mark	Contents
32940AA050	1	Approaches 5th gear by 0.2 mm (0.008 in).
32940AA060	No mark	Specification
32940AA070	2	Approaches 6th gear by 0.2 mm (0.008 in).

6. Check the clearance (a) between the reverse idler gear and reverse coupling sleeve. If it is outside the standard value, replace the shifter fork as required.

**Specification:**

0.50 mm (0.020 in) or less



- (A) Reverse idler gear
- (B) Reverse coupling sleeve

Reverse shifter fork		
Part No.	Mark	Contents
32941AA070	2	Approaches reverse idler gear by 0.3 mm (0.012 in).
32941AA060	No mark	Specification
32941AA050	1	Approaches reverse idler gear No. 2 by 0.3 mm (0.012 in).

7. Inspect the rod end clearances (A) and (B). If any clearance is outside the standard value, replace the rod or fork as required.

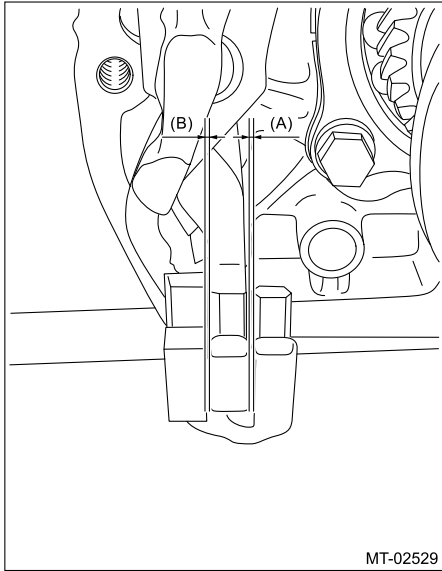
**Specification:**

**Clearance (A):**

0.1 – 0.9 mm (0.004 – 0.035 in)

**Clearance (B):**


0.2 — 1.0 mm (0.008 — 0.039 in)



- (A) 3rd-4th — 5th-6th
- (B) 1st-2nd — 3rd-4th

**INSPECTION**

**Caution:**  
**If noise occurs, identify the cause before work.**

**Note:**  
 Check the control operation history.  [Ref. to ENGINE \(DIAGNOSTICS\)\(H4DOTC\)>Work Support>OPERATION.](#)

**1. MANUAL TRANSMISSION**

Symptoms	Possible cause	Corrective action
1. Gears are difficult to intermesh  <b>Note:</b> <b>The cause for difficulty in shifting gears can be classified into two types: One is a defective gear shift system and the other is defective transmission. However, if the operation is heavy and engagement of the gears is difficult, a defective clutch disengagement may also be responsible. Check whether the clutch is correctly functioning, before checking the gear shift system and transmission.</b>	(a) Worn, damaged or burred chamfer at internal spline of the sleeve	Replace.
	(b) Worn, damaged or burred chamfer of gear spline	Replace.
	(c) Worn or scratched bushings	Replace.
	(d) Incorrect contact or wear between baulk ring and gear cone	Repair or replace.
2. Gear slip-out • Gear slips out when coasting on rough road. • Gear slips out during acceleration.	(a) Defective pitching stopper adjustment	Replace.
	(b) Loose engine mounting bolts	Tighten or replace.
	(c) Worn shifter fork or broken check ball spring	Replace.
	(d) Worn or damaged ball bearing	Replace.
	(e) Excessive clearance between splines of synchronizer hub and synchronizer sleeve	Replace.
	(f) Synchronizer hub tooth step wear	Replace.
	(g) Worn 1st driven gear and driven shaft	Replace.
	(h) Worn 2nd driven gear and bushing	Replace.
	(i) Worn 3rd drive gear and needle bearing	Replace.
	(j) Worn 4th drive gear and needle bearing	Replace.
	(k) Worn 5th drive gear and needle bearing	Replace.
(l) Worn 6th drive gear and needle bearing	Replace.	

Symptoms	Possible cause	Corrective action
	(m) Worn reverse idler gear and needle bearing	Replace.
3. Noise emitted from transmission	(a) Insufficient or improper lubrication	Lubricate with specified oil or replace.
<b>Note:</b> <b>If a noise is heard when the vehicle is parked with its engine idling and if a noise ceases when the clutch is disengaged, it may be considered that the noise is coming from the transmission.</b>	(b) Worn or damaged gears and bearings	Replace.
	<b>Note:</b> <b>If the trouble is only wear of the gear teeth surfaces, only a high whirring noise will occur at high speeds, but if any part is broken, rhythmical clicking sounds will be heard even at low speeds.</b>	

## 2. DIFFERENTIAL

Symptoms	Possible cause	Corrective action
1. Broken differential (case, gear, bearing, etc.)  <b>Note:</b> <b>Noise will occur, and eventually the differential will not be able to operate due to broken pieces obstructing the gear revolution.</b>	(a) Insufficient or improper oil	Disassemble the differential and replace the broken component parts. At the same time, check other component parts for any trouble, and replace if necessary.
	(b) Use of vehicle under severe conditions such as excessive load or improper use of the clutch	Readjust the preload and backlash of the bearing, and the contact surface of gear.
	(c) Improper adjustment of taper roller bearing	Adjust.
	(d) Improper adjustment of the drive pinion and the hypoid driven gear	Adjust.
	(e) Excessive backlash of a vehicle under severe operating conditions due to worn differential side gear, adjusting washer or differential pinion	Pour recommended oil to the specified level. Do not use vehicle under severe operating conditions.
	(f) Loose hypoid driven gear clamping bolts	Tighten.
2. Differential and hypoid gear noises Troubles of the differential and hypoid gear always appear as noise problems. Therefore noise is the first indication of trouble. However, noises from the engine, muffler, tire, exhaust gas, bearing, body, etc. are easily mistaken for the differential noise. Pay special attention to the hypoid gear noise because it is easily confused with other gear noises.	(a) Insufficient oil	Fill or replace with the specified amount of recommended oil.
	(b) Improper adjustment of hypoid driven gear and drive pinion	Check the tooth contact.
	(c) Worn teeth of hypoid driven gear and drive pinion	Replace as a set. Readjust the bearing preload.

Symptoms	Possible cause	Corrective action
<p>There are the following four kinds of noises.</p> <ul style="list-style-type: none"> <li>• Gear noise when driving: If noise increases as the vehicle speed increases, it may be due to insufficient gear oil, incorrect gear engagement, damaged gears, etc.</li> <li>• Gear noise when coasting: Damaged gears due to misadjusted bearings and incorrect shim adjustment</li> <li>• Bearing noise when driving or coasting: Cracked, broken or damaged bearings</li> <li>• Noise mainly when turning: Noise from differential side gear, differential pinion or differential pinion shaft, etc.</li> </ul>	(d) Loose roller bearing	Readjust the backlash of the hypoid driven gear to drive pinion, and check the tooth contact.
	(e) Distorted hypoid driven gear or differential case	Replace.
	(f) Worn adjusting washer and differential pinion shaft	Replace.

1. General Description
2. Clutch Disc and Cover
3. Flywheel
4. Release Bearing and Lever
5. Master Cylinder
6. Operating Cylinder
7. Clutch Pipe and Hose
8. Clutch Fluid
9. Air Bleeding
10. Clutch Pedal
11. Clutch Switch
12. Symptoms and causes

## CLUTCH SYSTEM > General Description

### CAUTION

- When performing service operation, refer to "Repair Contents" in "General Description". [Ref. to REPAIR CONTENTS>Repair Contents.](#)
- Prior to starting work, pay special attention to the following:
  1. Always wear work clothes, a work cap, and protective shoes. Additionally, wear a helmet, protective goggles, etc. if necessary.
  2. Protect the vehicle using a seat cover, fender cover, etc.
  3. Prepare the service tools, clean cloth, containers to catch grease and oil, etc.
- Prevent scattering of grease and oil. If it scatters, wipe it off immediately to prevent it from penetrating the floor or flowing out, to protect the environmental.
- If the grease and oil is spilt over the engine, exhaust pipe or the under cover, completely wipe it off to avoid emission of smoke or causing a fire.
- Vehicle components are extremely hot immediately after driving. Be wary of receiving burns from heated parts.
- When performing a repair, identify the cause of trouble and avoid unnecessary work.
- Before disconnecting connectors of sensors or units, be sure to disconnect the ground terminal from the battery sensor.
- Always use the jack-up point when the lifting device, shop jacks or rigid racks are used to support the vehicle.
- Before starting works, remove dirt and corrosion around the target area.
- Keep the removed parts in order and protect them from dust and dirt.
- All removed parts, if to be reused, should be reinstalled in the original positions with attention to the correct directions, etc.
- For the parts except for the non-reusable parts, replace them with new parts if necessary.
- Be sure to tighten bolts and nuts to the specified torque.

## CLUTCH SYSTEM > General Description

### SPECIFICATION

#### 1. CLUTCH COVER

Type	Dry, single plate, diaphragm spring type
Set load	N (kgf, lbf) 8,400 (856.5, 1,888.7)

#### 2. CLUTCH DISC

Facing material		Semi-mold	
O.D. × I.D. × Thickness	mm (in)	Flywheel side	240.0 × 160.0 × 3.2 (9.45 × 6.30 × 0.13)
		Clutch cover side	240.0 × 160.0 × 3.5 (9.45 × 6.30 × 0.14)
Spline part	Outer diameter	mm (in)	25.2 (0.99)
	Number of teeth		24
Depth of rivet head	mm (in)	Flywheel side	1.35 — 1.95 (0.053 — 0.077)
		Clutch cover side	1.65 — 2.25 (0.065 — 0.089)
		Limit of sinking	0.8 (0.03)
Limit of runout		mm (in)	0.7 (0.03)

#### 3. RELEASE LEVER

Lever ratio	1.6
-------------	-----

#### 4. CLUTCH PEDAL

Full stroke	mm (in)	135 (5.3)
Free play	mm (in)	4.6 — 17.5 (0.18 — 0.69)

## 5. FLYWHEEL

Type	Flexible
------	----------

## 6. CLUTCH FLUID

### Caution:

- Do not let clutch fluid come into contact with the painted surface of the vehicle. Wash away with water immediately and wipe off if it is spilled by accident.
- Do not mix different kinds of clutch fluid.
- Do not allow water or foreign matter to enter the reservoir tank.
- Always use new clutch fluid when replacing or refilling the clutch fluid.

### Recommended and alternative materials

- Recommended materials:  
FMVSS No. 116 DOT3 or DOT4

## CLUTCH SYSTEM > General Description

### COMPONENT

#### 1. CLUTCH

- |                     |                   |
|---------------------|-------------------|
| (1) Flywheel        | (6) Release lever |
| (2) Pilot bearing   | (7) Lever spring  |
| (3) Clutch disc     | (8) Pivot         |
| (4) Clutch cover    | (9) Dust cover    |
| (5) Release bearing |                   |

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

**T1: 16 (1.6, 11.8)**

**T2: [Ref. to CLUTCH SYSTEM>Clutch Disc and Cover>INSTALLATION.](#)**

**T3: [Ref. to CLUTCH SYSTEM>Flywheel>INSTALLATION.](#)**

## 2. MASTER CYLINDER, OPERATING CYLINDER, CLUTCH PIPE & HOSE

(1) Operating cylinder	(10) Hose clamp	(19) Clip
(2) Clutch hose	(11) Mass damper	
(3) Gasket	(12) Clamp	<b>Tightening torque: N·m (kgf-m, ft-lb)</b>
(4) Clamp	(13) Clutch pipe A	<b>T1: 7.5 (0.8, 5.5)</b>
(5) Clutch hose bracket	(14) Clutch pipe C	<b>T2: 7.8 (0.8, 5.8)</b>
(6) Clutch pipe B	(15) Clutch pipe D	<b>T3: 15.5 (1.6, 11.4)</b>
(7) Two-way connector	(16) Clutch damper	<b>T4: 18 (1.8, 13.3)</b>
(8) Clutch connector bracket	(17) Master cylinder	<b>T5: 25 (2.5, 18.4)</b>
(9) Reservoir hose ASSY*	(18) Clevis pin A	<b>T6: 37 (3.8, 27.3)</b>

\*: The reservoir hose assembly is set parts.

## 3. CLUTCH PEDAL

For an exploded view of the clutch pedal, refer to "Brake Pedal". [Ref. to BRAKE>General Description>COMPONENT > BRAKE PEDAL.](#)

### CLUTCH SYSTEM > General Description

#### PREPARATION TOOL

#### 1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
	498255400	PLATE	Used for measuring clutch disc run-out.

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
	498497100	CRANKSHAFT STOPPER	Used for removing and installing flywheel.
	499747100	CLUTCH DISC GUIDE	Used for installing the clutch disc.
	—	SUBARU SELECT MONITOR 4	Used for setting of each function and troubleshooting for electrical system. <div style="border: 1px solid black; padding: 5px; margin-top: 5px;"> <b>Note:</b> <ul style="list-style-type: none"> <li>For detailed operation procedures, refer to “Help” of application.</li> <li>Used together with interface for Subaru Select Monitor (such as DST-i and DST-010).</li> </ul> </div>

## 2. GENERAL TOOL

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance, voltage and current.
Magnet stand	Used for measuring clutch disc run-out. <div style="border: 1px solid black; padding: 5px; margin-top: 5px;"> <b>Note:</b>  Used together with the dial gauge (spindle type). </div>
DIAL GAUGE (spindle type)	Used for measuring clutch disc run-out. <div style="border: 1px solid black; padding: 5px; margin-top: 5px;"> <b>Note:</b>  Used together with magnet stand. </div>
Depth gauge or caliper gauge	Used for measuring the remaining amount of clutch disc.
Pilot bearing puller	Used for removing the pilot bearing.
Angle gauge	Used for installing the flywheel.
Crowfoot wrench (10 mm)	Used for installing the clutch pipe.

## CLUTCH SYSTEM > Clutch Disc and Cover

### REMOVAL

---

#### Note:

The clutch cover and clutch disc cannot be disassembled.

1. Remove the transmission body. [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transmission Assembly>REMOVAL.](#)
2. Remove the release bearing and release lever. [Ref. to CLUTCH SYSTEM>Release Bearing and Lever>REMOVAL.](#)
3. Mark an alignment mark (A) on the clutch cover and flywheel.

#### Note:

This operation is required only when reusing the existing clutch cover and flywheel.

4. Remove the clutch cover and clutch disc.

#### Caution:

- Be careful not to drop the clutch disc.
- Do not wash the pilot bearing since it is filled with grease.

## CLUTCH SYSTEM > Clutch Disc and Cover

### INSTALLATION

---

1. Using the ST, set the clutch disc.

#### Caution:

Install the clutch disc so that its part number is on the transmission side.

#### Note:

- Center the clutch disc.
- Before installing the clutch disc, check its facing surface, the pressure plate, and the flywheel for foreign matter adhesion.

#### Preparation tool:

ST: CLUTCH DISC GUIDE (499747100)

(A) Clutch disc

(B) Flywheel

(C) Pilot bearing

2. Temporarily install the clutch cover.

**Note:**

**Temporarily install the bolts with your hand.**

- When replacing the existing flywheel and clutch cover with new ones

(A) Imbalance mark

(B) 120 ° or more

- When reusing the existing flywheel and clutch cover

(A) Alignment mark

3. Tighten the bolts in the numerical order as shown in the figure.

**Note:**

- **Equally tighten the bolts several times.**
- **To prevent the clutch disc from moving from the center, adjust its position by using the ST (CLUTCH DISC GUIDE).**

**Tightening torque:**

16 N·m (1.6 kgf-m, 11.8 ft-lb)

4. Remove the ST (CLUTCH DISC GUIDE).
5. Install the release bearing and release lever. [Ref. to CLUTCH SYSTEM>Release Bearing and Lever>INSTALLATION.](#)
6. Install the transmission body. [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transmission Assembly>INSTALLATION.](#)

**CLUTCH SYSTEM > Clutch Disc and Cover**

**INSPECTION**

---

**1. CLUTCH DISC**

1. Check the facing surface for foreign matter adhesion.
2. Measure the depth from the facing surface to the rivet head by using a depth gauge or caliper gauge.

**Service limit:**

0.8 mm (0.03 in)

3. Check the spline portion (A) for excessive or uneven wear.
4. Check rivet (B) for looseness.
5. Check the damper spring (C) for deformations or breakage.

6. Check the clutch disc runout.
  - (1) Check the spline portion of the input shaft. [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transmission Assembly>INSPECTION.](#)
  - (2) Install the clutch disc to the input shaft.

(3) Set the ST, magnet stand, and dial gauge (spindle type).

**Preparation tool:**

ST: PLATE (498255400)

(4) Place the dial gauge (spindle type) 3 — 5 mm (0.1 — 0.2 in) from the outer periphery of the clutch disc.

(5) Slowly rotate the input shaft with your hand once, and measure the clutch disc runout.

**Note:**

- **During the measurement, be careful not to come in contact with burrs, scratches, other damage.**
- **Measure only the facing surface.**

**Limit (difference between maximum value and minimum value):**

0.7 mm (0.03 in)

(A) Measuring point

(B) 5 mm (0.2 in)

(C) 3 mm (0.1 in)

## 2. CLUTCH COVER

1. Check that there is no deformation, cracks or other damages.
2. Check the thrust rivet (A) for looseness.
3. Check the release bearing contact area of the diaphragm spring (B) for excessive wear.

4. Check the clutch disc contact area of the pressure plate (A) for excessive wear.
5. Check the mounting portion of the strap plate (B) for looseness.

## CLUTCH SYSTEM > Flywheel

### REMOVAL

#### Caution:

**Do not wash the pilot bearing since it is filled with grease.**

1. Remove the transmission body. [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transmission Assembly>REMOVAL.](#)
2. Remove the clutch cover and clutch disc. [Ref. to CLUTCH SYSTEM>Clutch Disc and Cover>REMOVAL.](#)
3. Using the ST, fasten the flywheel.

#### Note:

**Use bolts with M8 × P1.25 and a bolt length of approx. 15 mm for securing ST and the flywheel.**

#### Preparation tool:

ST: CRANKSHAFT STOPPER (498497100)

(A) Flywheel

4. Remove the flywheel and crankshaft position sensor plate.

(A) Flywheel

(B) Crankshaft position sensor  
plate

5. Remove ST (CRANKSHAFT STOPPER).
6. Using the pilot bearing puller or similar tool, remove the pilot bearings.

#### Note:

**Perform this procedure only when required.**

(A) Pilot bearing

## CLUTCH SYSTEM > Flywheel

### INSTALLATION

---

1. Press-fit a new pilot bearing using a press and an attachment of a suitable size, etc.

**Caution:**

- **Make sure the pilot bearing is not slanted.**
- **Be sure to push the outer race.**

**Press-fit depth from the end surface of the flywheel:**

0 – 0.4 mm (0 – 0.02 in)

(A) 0 – 0.4 mm (0 – 0.02 in)

(B) Attachment

(C) Pilot bearing

2. Temporarily install the crankshaft position sensor plate and flywheel.

**Caution:**

**Install with the stamped mark of the crankshaft position sensor plate facing the transmission side.**

**Note:**

**Align the knock pin hole of the crankshaft position sensor plate to the knock pin of the crankshaft to secure the knock pin.**

(A) Flywheel

(B) Crankshaft position sensor  
plate

3. Using the ST, fasten the flywheel.

**Note:**

**Use bolts with M8 × P1.25 and a bolt length of approx. 15 mm for securing ST and the flywheel.**

**Preparation tool:**

ST: CRANKSHAFT STOPPER (498497100)

4. Tighten the bolts which fasten the flywheel.

(1) Tighten the bolts which fasten the flywheel in the numerical order shown in the figure.

**Tightening torque:**

30 N·m (3.1 kgf-m, 22.1 ft-lb)

(2) Using an angle gauge, tighten the bolts which fasten the flywheel in the numerical order shown in the figure.

**Tightening angle:**

30° — 35°

5. Remove ST (CRANKSHAFT STOPPER).

6. Install the clutch disc and clutch cover. [Ref. to CLUTCH SYSTEM>Clutch Disc and Cover>INSTALLATION.](#)

7. Install the transmission body. [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transmission Assembly>INSTALLATION.](#)

## CLUTCH SYSTEM > Flywheel

### INSPECTION

---

1. Check that there is no deformation, cracks or other damages.
2. Check the clutch disc contact area (A) for excessive or uneven wear.
3. Check the ring gear (B) for excessive wear.

4. Check the bearing for smooth rotation.
5. Check the bearing for looseness.



(A) Release lever

(B) Release bearing

6. Remove the lever spring from the release lever.

7. Clean the release lever and release bearing.

**Caution:**

**Do not wash the release bearing since it is filled with grease.**

8. Clean the input shaft and pivot.

9. Remove the pivot.

## CLUTCH SYSTEM > Release Bearing and Lever

### INSTALLATION

---

1. Install the pivot.

**Tightening torque:**

16 N·m (1.6 kgf-m, 11.8 ft-lb)

2. Install the dust cover.

3. Apply grease to the release lever.

**Preparation items:**

Grease: NICHIMOLY N-130 or equivalent

4. Install the lever spring to the release lever.
5. Apply grease to the spline portion of the input shaft and inner periphery of the release bearing.

**Preparation items:**

Grease: NICHIMOLY N-130 or equivalent

6. Set the release bearing to the release lever.
7. Install the release lever and release bearing as a unit.

**Note:**

- **Make sure the lever spring is engaged with the pivot.**
- **After installing the parts, move the release lever back and forth and check if the release bearing moves smoothly.**

8. Install the transmission body. [Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL\(TY75\)>Transmission Assembly>INSTALLATION.](#)

## CLUTCH SYSTEM > Release Bearing and Lever

### INSPECTION

---

#### 1. RELEASE BEARING

1. Check that there is no deformation, cracks or other damages.
2. Check the release lever contact area for excessive wear.
3. Check the bearing for smooth rotation.

**Note:**

**Rotate the bearing while applying pressure in the thrust direction.**

4. Check the bearing for looseness in the radial direction.

**Specification:**

1.6 mm (0.06 in)

## **2. RELEASE LEVER**

1. Check that there is no deformation, cracks or other damages.
2. Check the pivot contact area (A) and the release bearing contact area (B) for excessive wear.

## CLUTCH SYSTEM > Master Cylinder

### REMOVAL

#### Caution:

- Do not let clutch fluid come into contact with the painted surface of the vehicle. Wash away with water immediately and wipe off if it is spilled by accident.
- Before handling the airbag system components, refer to "CAUTION" of "General Description" in "AIRBAG SYSTEM". [Ref. to AIRBAG SYSTEM>General Description>CAUTION.](#)

#### Note:

The master cylinder cannot be disassembled.

1. Disconnect the ground terminal from the battery sensor, and wait for at least 60 seconds before starting work. [\\_Ref. to REPAIR CONTENTS>NOTE > BATTERY.](#)
2. Remove the clutch pedal. [\\_Ref. to BRAKE>Brake Pedal>REMOVAL.](#)
3. Remove the clip and clevis pin A, and then disconnect the clutch pedal and the master cylinder.

4. Disconnect the clutch pipe C and clutch pipe D from the master cylinder.

5. Remove the master cylinder.

6. Separate the master cylinder and the push rod.

(A) Master cylinder

(B) Push rod

## CLUTCH SYSTEM > Master Cylinder

### INSTALLATION

---

1. Apply grease to the push rod.

**Preparation items:**

Grease: Silicone grease G-40M or equivalent

2. Set the push rod to the master cylinder.
3. Install the master cylinder.

**Tightening torque:**

18 N·m (1.8 kgf-m, 13.3 ft-lb)

4. Connect the clutch pipe C and clutch pipe D using a crowfoot wrench.

**Tightening torque:**

Calculation formula
$T = 15.5 \text{ N}\cdot\text{m} (1.6 \text{ kgf}\cdot\text{m}, 11.4 \text{ ft}\cdot\text{lb}) \times L1 / (L1 + L2)$
T: Reading of the torque wrench L1: Effective length of the torque wrench L2: Effective length of the crowfoot wrench

**Note:**

If the effective length of the tool used is unknown, consult the manufacturer of the tool.

- (a) Effective length of the crowfoot wrench (L2)
- (b) Effective length of the torque wrench (L1)
- (c) Center of the open end of crowfoot wrench
- (d) Center of drive square of the torque wrench
- (e) Center of the position where a force is applied by hand

5. Apply grease to the outer periphery of the clevis pin A.

**Caution:**

**Always use a new clevis pin A.**

**Preparation items:**

Grease: NIPPON GREASE NIGTIGHT LTS No. 2 or equivalent

6. Align the holes on the clutch pedal and push rod, and install the clevis pin A and clip.

**Caution:**

**Always use a new clip.**

7. Install the clutch pedal. [\\_Ref. to BRAKE>Brake Pedal>INSTALLATION.](#)
8. Bleed air from the clutch fluid. [\\_Ref. to CLUTCH SYSTEM>Air Bleeding>PROCEDURE.](#)
9. Connect the ground terminal to battery sensor. [\\_Ref. to REPAIR CONTENTS>NOTE > BATTERY.](#)

## CLUTCH SYSTEM > Master Cylinder

### INSPECTION

---

1. Check for clutch fluid leaks.
2. Check that there is no deformation, cracks or other damages.
3. Check for excessive rusting.

## CLUTCH SYSTEM > Operating Cylinder

### REMOVAL

---

**Caution:**

**Do not let clutch fluid come into contact with the painted surface of the vehicle.  
Wash away with water immediately and wipe off if it is spilled by accident.**

**Note:**

**The operating cylinder cannot be disassembled.**

1. Remove the intercooler. [\\_Ref. to INTAKE \(INDUCTION\)\(H4DOTC\)>Intercooler>REMOVAL.](#)
2. Disconnect the clutch hose.

**Caution:**

**Prepare the container for draining of the clutch fluid.**

3. Remove the operating cylinder.

## CLUTCH SYSTEM > Operating Cylinder

### INSTALLATION

---

1. Install the operating cylinder.  
**Tightening torque:**  
37 N·m (3.8 kgf-m, 27.3 ft-lb)
2. Using a new gasket, connect the clutch hose.

**Note:**

Face the mark (a) of the clutch hose in the top direction.

**Tightening torque:**

18 N·m (1.8 kgf-m, 13.3 ft-lb)

3. Bleed air from the clutch fluid. [Ref. to CLUTCH SYSTEM>Air Bleeding>PROCEDURE.](#)
4. Install the intercooler. [Ref. to INTAKE \(INDUCTION\)\(H4DOTC\)>Intercooler>INSTALLATION.](#)

**CLUTCH SYSTEM > Operating Cylinder**

**INSPECTION**

---

1. Check for clutch fluid leaks.
2. Check that there is no deformation, cracks or other damages.
3. Check for excessive rusting.

## CLUTCH SYSTEM > Clutch Pipe and Hose

### REMOVAL

#### Caution:

- Do not let clutch fluid come into contact with the painted surface of the vehicle. Wash away with water immediately and wipe off if it is spilled by accident.
- Before handling the airbag system components, refer to "CAUTION" of "General Description" in "AIRBAG SYSTEM". [Ref. to AIRBAG SYSTEM>General Description>CAUTION.](#)

1. Disconnect the ground terminal from the battery sensor, and wait for at least 60 seconds before starting work. [Ref. to REPAIR CONTENTS>NOTE > BATTERY.](#)
2. Remove the clutch pedal. [Ref. to BRAKE>Brake Pedal>REMOVAL.](#)
3. Remove the reservoir hose assembly.

4. Remove the clutch pipe B.

5. Remove the clamp, and disconnect the clutch hose from the clutch hose bracket.

6. Remove the clutch hose from the operating cylinder.

7. Remove the clutch hose bracket.

**Note:**

**Perform this procedure only when required.**

8. Remove the clutch connector bracket.

**Note:**

**Perform this procedure only when required.**

9. Remove the clutch pipe A.

**Note:**

**Remove the mass damper and clamp as a unit.**

**10.** Remove the mass damper.

**Note:**

**Perform this procedure only when required.**

(1) Remove the mass damper and clamp as a unit from the clutch pipe A.

(2) Disassemble the mass damper and clamp.

(A) Clamp

(B) Mass damper

**11.** Remove the two-way connector.

**Note:**

**Perform this procedure only when required.**

**12.** Remove the clutch pipe C.

**13.** Remove the clamp.

**Note:**

**Perform this procedure only when required.**

**14.** Remove the clutch pipe D.

**15.** Remove the clutch damper.

## CLUTCH SYSTEM > Clutch Pipe and Hose

### INSTALLATION

---

1. Install the clutch damper.

**Tightening torque:**

18 N·m (1.8 kgf-m, 13.3 ft-lb)

2. Install the clutch pipe D using a crowfoot wrench.

**Tightening torque:**

Calculation formula
$T = 15.5 \text{ N}\cdot\text{m} (1.6 \text{ kgf}\cdot\text{m}, 11.4 \text{ ft}\cdot\text{lb}) \times L1 / (L1 + L2)$
T: Reading of the torque wrench L1: Effective length of the torque wrench L2: Effective length of the crowfoot wrench
<b>Note:</b> <b>If the effective length of the tool used is unknown, consult the manufacturer of the tool.</b>
(a) Effective length of the crowfoot wrench (L2) (b) Effective length of the torque wrench (L1) (c) Center of the open end of crowfoot wrench (d) Center of drive square of the torque wrench (e) Center of the position where a force is applied by hand

3. Install the clamp.

4. Install the clutch pipe C using a crowfoot wrench.

**Tightening torque:**

Calculation formula
$T = 15.5 \text{ N}\cdot\text{m} (1.6 \text{ kgf}\cdot\text{m}, 11.4 \text{ ft}\cdot\text{lb}) \times L1 / (L1 + L2)$
T: Reading of the torque wrench

L1: Effective length of the torque wrench

L2: Effective length of the crowfoot wrench

**Note:**

**If the effective length of the tool used is unknown, consult the manufacturer of the tool.**

- (a) Effective length of the crowfoot wrench (L2)
- (b) Effective length of the torque wrench (L1)
- (c) Center of the open end of crowfoot wrench
- (d) Center of drive square of the torque wrench
- (e) Center of the position where a force is applied by hand

**5.** Install the mass damper.

- (1) Assemble the mass damper and clamp.
- (2) Install the mass damper and clamp as a unit to the clutch pipe A.

**6.** Install the two-way connector to the clutch pipe A using a crowfoot wrench.

**Tightening torque:**

Calculation formula

$$T = 15.5 \text{ N}\cdot\text{m} (1.6 \text{ kgf}\cdot\text{m}, 11.4 \text{ ft}\cdot\text{lb}) \times L1 / (L1 + L2)$$

T: Reading of the torque wrench

L1: Effective length of the torque wrench

L2: Effective length of the crowfoot wrench

**Note:**

**If the effective length of the tool used is unknown, consult the manufacturer of the tool.**

- (a) Effective length of the crowfoot wrench (L2)
- (b) Effective length of the torque wrench (L1)
- (c) Center of the open end of crowfoot wrench
- (d) Center of drive square of the torque wrench

(e) Center of the position where a force is applied by hand

7. Install the clutch pipe A using a crowfoot wrench.

**Tightening torque:**

Calculation formula
$T = 15.5 \text{ N}\cdot\text{m} (1.6 \text{ kgf}\cdot\text{m}, 11.4 \text{ ft}\cdot\text{lb}) \times L1 / (L1 + L2)$
T: Reading of the torque wrench L1: Effective length of the torque wrench L2: Effective length of the crowfoot wrench
<b>Note:</b> <b>If the effective length of the tool used is unknown, consult the manufacturer of the tool.</b>
(a) Effective length of the crowfoot wrench (L2) (b) Effective length of the torque wrench (L1) (c) Center of the open end of crowfoot wrench (d) Center of drive square of the torque wrench (e) Center of the position where a force is applied by hand

8. Install the clutch connector bracket.

**Tightening torque:**

7.5 N·m (0.8 kgf·m, 5.5 ft·lb)

9. Install the clutch hose bracket.

**Tightening torque:**

25 N·m (2.5 kgf·m, 18.4 ft·lb)

10. Install the clutch hose to the operating cylinder using a new gasket.

**Note:**  
**Face the mark (a) of the clutch hose in the top direction.**

**Tightening torque:**

18 N·m (1.8 kgf·m, 13.3 ft·lb)

11. Install the clutch hose to the clutch hose bracket using a clamp.

**12.** Install the clutch pipe B using a crowfoot wrench.

**Tightening torque:**

Calculation formula
$T = 15.5 \text{ N}\cdot\text{m} (1.6 \text{ kgf}\cdot\text{m}, 11.4 \text{ ft}\cdot\text{lb}) \times L1 / (L1 + L2)$
T: Reading of the torque wrench L1: Effective length of the torque wrench L2: Effective length of the crowfoot wrench
<b>Note:</b> <b>If the effective length of the tool used is unknown, consult the manufacturer of the tool.</b>
(a) Effective length of the crowfoot wrench (L2) (b) Effective length of the torque wrench (L1) (c) Center of the open end of crowfoot wrench (d) Center of drive square of the torque wrench (e) Center of the position where a force is applied by hand

**13.** Install the reservoir hose assembly.

<b>Note:</b> <b>Face the mark (a) of the reservoir hose assembly in the top direction.</b>
---

**14.** Install the clutch pedal. [Ref. to BRAKE>Brake Pedal>INSTALLATION.](#)

**15.** Bleed air from the clutch fluid. [Ref. to CLUTCH SYSTEM>Air Bleeding>PROCEDURE.](#)

**16.** Connect the ground terminal to battery sensor. [Ref. to REPAIR CONTENTS>NOTE > BATTERY.](#)

**CLUTCH SYSTEM > Clutch Pipe and Hose**

**INSPECTION**

1. Check for clutch fluid leaks.
2. Check that there is no deformation, cracks or other damages.
3. Check for excessive rusting.

## CLUTCH SYSTEM > Clutch Fluid

### INSPECTION

---

**Caution:**

- Do not let clutch fluid come into contact with the painted surface of the vehicle. Wash away with water immediately and wipe off if it is spilled by accident.
- Do not mix different kinds of clutch fluid.
- Do not allow water or foreign matter to enter the reservoir tank.
- Always use new clutch fluid when replacing or refilling the clutch fluid.

1. Park the vehicle on a level surface.
2. Check the clutch fluid for any significant discoloration.
3. Check that the clutch fluid level is between "MIN" and "MAX".

**Caution:**

When using a tool such as a dropper to adjust the fluid amount, do not use one that has been utilized for deteriorated clutch fluid or other liquids.  
Doing so may cause the sealing parts or clutch fluid to deteriorate, resulting in a malfunction.

**Note:**

If it is necessary to add the fluid, make sure that there are no clutch fluid leaks.

**Preparation items:**

Clutch fluid: [Ref. to CLUTCH SYSTEM>General Description>SPECIFICATION > CLUTCH FLUID.](#)

## CLUTCH SYSTEM > Clutch Fluid

### REPLACEMENT

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For the clutch fluid replacement procedure, refer to "Air Bleeding". [Ref. to CLUTCH SYSTEM>Air Bleeding>PROCEDURE.](#)

## CLUTCH SYSTEM > Air Bleeding

### PROCEDURE

**Caution:**

- Do not let clutch fluid come into contact with the painted surface of the vehicle. Wash away with water immediately and wipe off if it is spilled by accident.
- Do not mix different kinds of clutch fluid.
- Cover the bleeder plug with cloth to prevent clutch fluid from being splashed on surrounding parts when loosening the plug.
- Do not allow water or foreign matter to enter the reservoir tank.
- Always use new clutch fluid when replacing or refilling the clutch fluid.
- During the operation, replenish the clutch fluid to keep its level at "MIN" or higher at all times and to prevent entry of air.
- After the operation, wipe off any clutch fluid around the bleeder plug and reservoir tank.

**Note:**

For convenience and safety, perform the work with 2 people.

1. Remove the intercooler. [Ref. to INTAKE \(INDUCTION\)\(H4DOTC\)>Intercooler>REMOVAL.](#)
2. Connect a transparent vinyl tube or a similar tool to the bleeder plug of the operating cylinder.

**Caution:**

Prepare the container for draining of the clutch fluid.

3. Slowly depress the clutch pedal several times and keep it depressed.
4. Loosen the bleeder plug, and drain the clutch fluid.

**Note:**

Keep the clutch pedal depressed.

5. Tighten the bleeder plug, and slowly release the clutch pedal.
6. Repeat steps 3 – 5, until there are no more air bubbles.
7. Tighten the bleeder plug.

**Tightening torque:**

7.8 N·m (0.8 kgf-m, 5.8 ft-lb)

8. Depress the clutch pedal 10 times or more.

**Caution:**

**Be sure to perform the operation before starting the engine.**

- 9.** Check for clutch fluid leaks.
- 10.** Check the clutch fluid amount. [Ref. to CLUTCH SYSTEM>Clutch Fluid>INSPECTION.](#)
- 11.** Install the intercooler. [Ref. to INTAKE \(INDUCTION\)\(H4DOTC\)>Intercooler>INSTALLATION.](#)
- 12.** Perform the road test to make sure there is no fault.

## CLUTCH SYSTEM > Clutch Pedal

### REMOVAL

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For the clutch pedal removal procedure, refer to "Brake Pedal". [Ref. to BRAKE>Brake Pedal>REMOVAL.](#)

## CLUTCH SYSTEM > Clutch Pedal

### INSTALLATION

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For the clutch pedal installation procedure, refer to "Brake Pedal". [Ref. to BRAKE>Brake Pedal>INSTALLATION.](#)

## CLUTCH SYSTEM > Clutch Pedal

### DISASSEMBLY

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1. Remove the clutch pipe. [Ref. to CLUTCH SYSTEM>Clutch Pipe and Hose>REMOVAL.](#)
  2. Remove the master cylinder. [Ref. to CLUTCH SYSTEM>Master Cylinder>REMOVAL.](#)
  3. Remove the clutch switches. [Ref. to CLUTCH SYSTEM>Clutch Switch>REMOVAL.](#)
  4. Remove the clutch start switch. [Ref. to CLUTCH SYSTEM>Clutch Switch>REMOVAL.](#)
  5. Remove the harness connector.

6. Remove the clip and assist pin, and remove the assist spring assembly.

7. Disassemble the assist rod A, assist bushing A, assist spring, assist rod B, and assist bushing B.

(A) Assist rod B

(B) Assist spring

(C) Assist bushing B

(D) Assist rod A

(E) Assist bushing A

**8.** Remove the clutch pedal.

**9.** Remove the bushing B, spacer and stopper.

(A) Bushing B

(B) Spacer

(C) Stopper

**10.** Remove the pedal pad.

(A) Pedal pad

11. Remove the bushing A.

**Note:**

**Perform this procedure only when required.**

(A) Bushing A

## CLUTCH SYSTEM > Clutch Pedal

### ASSEMBLY

---

1. Using a press, press-fit the bushing A.

**Caution:**

**Be careful not to set the bushing A at an angle.**

**Note:**

**Press-in the part so that it is parallel to the lever.**

2. Install the pedal pad.
3. Apply grease to the outer periphery of the spacer.

**Preparation items:**

Grease: NIPPON GREASE NIGTIGHT LTS No. 2 or equivalent

4. Install the stopper, spacer and bushing B.
5. Install the clutch pedal.

**Tightening torque:**

30 N·m (3.1 kgf-m, 22.1 ft-lb)

6. Apply grease to the sliding surfaces of the assist rod B, assist bushing A, assist bushing B, assist spring, and assist pin.

**Preparation items:**

Grease: NIPPON GREASE NIGTIGHT LTS No. 2 or equivalent

7. Assemble the assist bushing B, assist rod B, assist spring, assist bushing A, and assist rod A.
8. Set the assist spring assembly, and then install the assist pin and clip.

**Caution:**

**Always use a new clip.**

9. Attach the harness connector.
10. Install the clutch start switch. [Ref. to CLUTCH SYSTEM>Clutch Switch>INSTALLATION.](#)
11. Install the clutch switch. [Ref. to CLUTCH SYSTEM>Clutch Switch>INSTALLATION.](#)
12. Install the master cylinder. [Ref. to CLUTCH SYSTEM>Master Cylinder>INSTALLATION.](#)
13. Install the clutch pipe. [Ref. to CLUTCH SYSTEM>Clutch Pipe and Hose>INSTALLATION.](#)

**CLUTCH SYSTEM > Clutch Pedal****INSPECTION**

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1. Check that there is no deformation, cracks or other damages.
2. Shake the clutch pedal in the lateral direction with a force of approximately 10 N (1.0 kgf, 2.2 lbf) to check the clutch pedal play.

**Service limit:**

4.0 mm (0.16 in)

3. Check the full stroke (A) of the clutch pedal.

**Specification:**

135 — 140 mm (5.3 — 5.5 in)

## CLUTCH SYSTEM > Clutch Pedal

### ADJUSTMENT

#### Caution:

- Before handling the airbag system components, refer to "CAUTION" of "General Description" in "AIRBAG SYSTEM". [Ref. to AIRBAG SYSTEM>General Description>CAUTION.](#)
- When adjusting the full stroke of the clutch pedal, do not turn the clutch switch.

1. Disconnect the ground terminal from the battery sensor, and wait for at least 60 seconds before starting work. [\\_Ref. to REPAIR CONTENTS>NOTE > BATTERY.](#)
2. Remove the duct foot driver. [\\_Ref. to AIR CONDITIONER>Air Vent Duct>REMOVAL > FOOT DUCT.](#)
3. Loosen the clutch switch nut.

4. Adjust the full stroke (A) of the clutch pedal using the clutch switch.

#### Specification:

135 – 140 mm (5.3 – 5.5 in)

5. Tighten the nut of the clutch switch.

#### Tightening torque:

8 N·m (0.8 kgf-m, 5.9 ft-lb)

6. Install the duct foot driver. [\\_Ref. to AIR CONDITIONER>Air Vent Duct>INSTALLATION > FOOT DUCT.](#)
7. Connect the ground terminal to battery sensor. [\\_Ref. to REPAIR CONTENTS>NOTE > BATTERY.](#)

## REMOVAL

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### 1. CLUTCH SWITCH

**Caution:**

**Before handling the airbag system components, refer to "CAUTION" of "General Description" in "AIRBAG SYSTEM".**  
**[Ref. to AIRBAG SYSTEM>General Description>CAUTION.](#)**

1. Disconnect the ground terminal from the battery sensor, and wait for at least 60 seconds before starting work. [Ref. to REPAIR CONTENTS>NOTE > BATTERY.](#)
2. Remove the duct foot driver. [Ref. to AIR CONDITIONER>Air Vent Duct>REMOVAL > FOOT DUCT.](#)
3. Disconnect the connector.

4. Remove the clutch switches.

### 2. CLUTCH START SWITCH

**Caution:**

**Before handling the airbag system components, refer to "CAUTION" of "General Description" in "AIRBAG SYSTEM".**  
**[Ref. to AIRBAG SYSTEM>General Description>CAUTION.](#)**

1. Disconnect the ground terminal from the battery sensor, and wait for at least 60 seconds before starting work. [Ref. to REPAIR CONTENTS>NOTE > BATTERY.](#)
2. Remove the duct foot driver. [Ref. to AIR CONDITIONER>Air Vent Duct>REMOVAL > FOOT DUCT.](#)
3. Disconnect the connector.

4. Remove the clutch start switch.

## CLUTCH SYSTEM > Clutch Switch

### INSTALLATION

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#### 1. CLUTCH SWITCH

1. Temporarily install the clutch switch.
2. Adjust the full stroke of the clutch pedal. [Ref. to CLUTCH SYSTEM>Clutch Pedal>ADJUSTMENT.](#)
3. Connect the connector to the clutch switch.
4. Install the duct foot driver. [Ref. to AIR CONDITIONER>Air Vent Duct>INSTALLATION > FOOT DUCT.](#)
5. Connect the ground terminal to battery sensor. [Ref. to REPAIR CONTENTS>NOTE > BATTERY.](#)
6. Carry out an operation inspection for the clutch switch. [Ref. to CLUTCH SYSTEM>Clutch Switch>INSPECTION.](#)

#### 2. CLUTCH START SWITCH

1. Temporarily install the clutch start switch.
2. Adjust the amount of protrusion for the clutch start switch. [Ref. to CLUTCH SYSTEM>Clutch Switch>ADJUSTMENT.](#)
3. Connect the connector to the clutch start switch.
4. Install the duct foot driver. [Ref. to AIR CONDITIONER>Air Vent Duct>INSTALLATION > FOOT DUCT.](#)
5. Connect the ground terminal to battery sensor. [Ref. to REPAIR CONTENTS>NOTE > BATTERY.](#)
6. Carry out an operation inspection for the clutch start switch. [Ref. to CLUTCH SYSTEM>Clutch Switch>INSPECTION.](#)

## CLUTCH SYSTEM > Clutch Switch

### INSPECTION

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#### 1. CLUTCH SWITCH

##### CHECK OPERATION

1. Check that engine does not start with the clutch pedal not depressed.
2. Check that engine starts with the clutch pedal fully depressed.

##### UNIT INSPECTION

1. Check that there is no deformation, cracks or other damages.
2. Measure the resistance between switch terminals.

**Terminal No.:**

1 – 2

**Judgment standards:**

When section (A) is 5.0 – 6.5 mm (0.20 – 0.26 in) long, it turns ON ↔ OFF.

**Resistance value:**

ON: Less than 1  $\Omega$

OFF: 1 M $\Omega$  or more

## **2. CLUTCH START SWITCH**

**CHECK OPERATION**

- 1.** Check that engine does not start with the clutch pedal not depressed.
- 2.** Check that engine starts with the clutch pedal fully depressed.

**UNIT INSPECTION**

- 1.** Check that there is no deformation, cracks or other damages.
- 2.** Measure the resistance between switch terminals.

**Terminal No.:**

1 – 2

**Judgment standards:**

When section (A) is 9.0 – 10.0 mm (0.35 – 0.39 in) long, it turns ON ↔ OFF.

**Resistance value:**

ON: Less than 1 Ω

OFF: 1 MΩ or more

**CLUTCH SYSTEM > Clutch Switch****ADJUSTMENT**

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**1. CLUTCH SWITCH**

For the clutch switch adjustment procedure, refer to "Clutch Pedal". [Ref. to CLUTCH SYSTEM>Clutch Pedal>ADJUSTMENT.](#)

**2. CLUTCH START SWITCH****Caution:**

**Before handling the airbag system components, refer to "CAUTION" of "General Description" in "AIRBAG SYSTEM".**  
[Ref. to AIRBAG SYSTEM>General Description>CAUTION.](#)

1. Disconnect the ground terminal from the battery sensor, and wait for at least 60 seconds before starting work. [Ref. to REPAIR CONTENTS>NOTE > BATTERY.](#)
2. Remove the duct foot driver. [Ref. to AIR CONDITIONER>Air Vent Duct>REMOVAL > FOOT DUCT.](#)
3. Loosen the nut of the clutch start switch.
4. Fully depress the clutch pedal and hold it. Next, adjust the amount of protrusion (A) for the clutch start switch.

**Specification:**

7.7 mm (0.30 in)

5. Tighten the nut of the clutch start switch.

**Tightening torque:**

8 N·m (0.8 kgf-m, 5.9 ft-lb)

6. Install the duct foot driver. [Ref. to AIR CONDITIONER>Air Vent Duct>INSTALLATION > FOOT DUCT.](#)
7. Connect the ground terminal to battery sensor. [Ref. to REPAIR CONTENTS>NOTE > BATTERY.](#)

## CLUTCH SYSTEM > Symptoms and causes

### INSPECTION

Symptoms	Problem parts etc.	Possible cause
The engine speed rises but the vehicle cannot accelerate. (The clutch slips.)	Clutch disc	Clutch disc wear, seizure, or oil contamination
	Clutch cover	Diaphragm spring damage or fatigue
	Flywheel	Flywheel distortion, seizure, or oil contamination
	Clutch pedal	Improper stroke adjustment
The clutch does not disengage.	Clutch disc	Clutch disc misalignment, runout, facing surface damage, dirt, seizure, oil contamination, or improper spline portion lubrication
	Clutch cover	Diaphragm spring damage or fatigue
	Master cylinder	Faulty master cylinder
	Operating cylinder	Faulty operating cylinder
	Clutch fluid	Air entry in fluid
	Clutch pipe	Clutch fluid leaks or clogs
	Clutch hose	Clutch fluid leaks or clogs
	Clutch pedal	Improper stroke adjustment
Vibrations occur when the clutch is engaged.	Clutch disc	Clutch disc runout, oil contamination, wear, or damage
	Clutch cover	Uneven diaphragm spring height
	Flywheel	Flywheel distortion, uneven wear, or seizure
	Transmission rear crossmember	Loose transmission rear crossmember
Noise is emitted.	Release bearing	Release bearing wear, dirt, or damage
	Pilot bearing	Pilot bearing wear, dirt, or damage
	Clutch disc	Clutch disc damage
	Release lever	Improper release lever lubrication
It is difficult to change gears.	Clutch disc	Faulty clutch disc
	Clutch cover	Diaphragm spring damage or uneven height
	Master cylinder	Faulty master cylinder
	Operating cylinder	Faulty operating cylinder
	Clutch fluid	Air entry in fluid
	Clutch pipe	Clutch fluid leaks or clogs
	Clutch hose	Clutch fluid leaks or clogs
	Clutch pedal	Improper stroke adjustment
The clutch does not engage.	Clutch disc	Clutch disc misalignment, runout, facing surface damage, dirt, seizure, oil contamination, or improper spline portion lubrication

<b>Symptoms</b>	<b>Problem parts etc.</b>	<b>Possible cause</b>
	Clutch cover	Diaphragm spring damage or uneven height
	Master cylinder	Faulty master cylinder
	Operating cylinder	Faulty operating cylinder
	Clutch fluid	Air entry in fluid
	Clutch pipe	Clutch fluid leaks or clogs
	Clutch hose	Clutch fluid leaks or clogs
	Clutch pedal	Improper stroke adjustment
Clutch pedal is not responsive when depressed.	Master cylinder	Faulty master cylinder
	Operating cylinder	Faulty operating cylinder
	Clutch fluid	Air entry in fluid
	Clutch pipe	Clutch fluid leaks
	Clutch hose	Clutch fluid leaks
	Clutch cover	Diaphragm spring damage