INSPECTION

1. CLUTCH DISC

1. Facing wear

Measure the depth from the facing surface to the rivet head. Replace if the face is worn locally or worn down to less than the specified value.

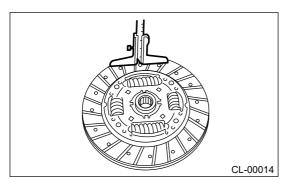
Depth to rivet head:

Limit of sinking

0.8 mm (0.031 in)

Note:

Do not wash the clutch disc with any type of cleaning fluid.

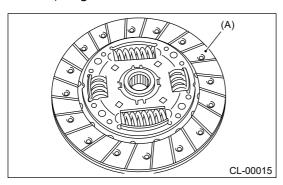


2. Hardened facing

Replace the clutch disc.

3. Oil soakage on facing

Replace the clutch disc and inspect the transmission front oil seal, transmission case mating surface, engine rear oil seal and other locations for oil leakage.



(A) Clutch facing

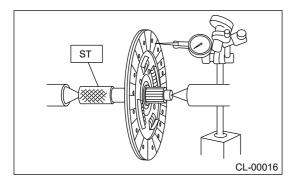
4. Deflection on facing

If deflection exceeds the specified value at the outer circumference of the facing, replace the clutch disc.

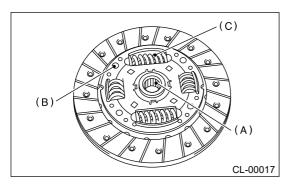
ST 499747100 CLUTCH DISC GUIDE

Limit for deflection:

0.7 mm (0.028 in) at R = 110 mm (4.33 in)



5. If there is spline wear, loose rivets, failed damper springs, etc., replace the clutch disc.



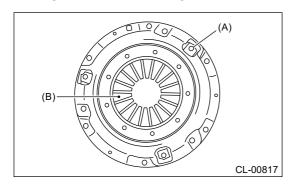
- (A) Spline
- (B) Rivet
- (C) Damper spring

2. CLUTCH COVER

Note:

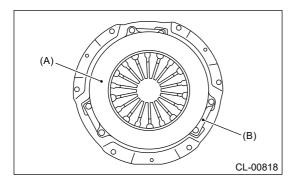
Visually check the following items without disassembling, and replace or repair if defective.

- 1. Loose thrust rivet
- 2. Damaged or worn bearing contact area at the center of diaphragm spring



- (A) Thrust rivet
- (B) Diaphragm spring
- 3. Damaged or worn disc contact surface of the pressure plate
- 4. Loose strap plate installation area

5. Worn diaphragm sliding area



- (A) Pressure plate
- (B) Strap plate

CLUTCH SYSTEM > Clutch Disc and Cover

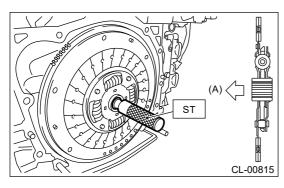
INSTALLATION

1. Insert the ST into the clutch disc and insert the ST end into the pilot bearing.

Note:

When installing the clutch disc, be careful to attach in the correct direction.

ST 499747100 CLUTCH DISC GUIDE



(A) Flywheel side

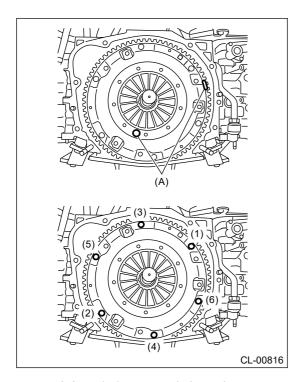
2. Install the clutch cover and tighten the bolts to specified torque.

Note:

- When installing a clutch cover, position the clutch cover so that the spacing between the unbalance marks (paint mark) on the flywheel and clutch cover is 120° or more apart. (The unbalance mark indicates the direction of residual unbalance.)
- Temporarily tighten the bolts by hand. Each bolt should be tightened to the specified torque in a crisscross order.

Tightening torque:

16 N·m (1.6 kgf-m, 11.8 ft-lb)



(A) Unbalance mark (paint)

3. Remove the ST.

ST 499747100 CLUTCH DISC GUIDE

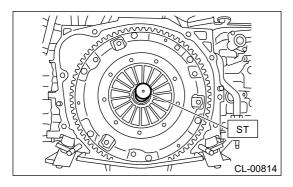
4. Install the transmission assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Manual Transmission Assembly>INSTALLATION.

CLUTCH SYSTEM > Clutch Disc and Cover

REMOVAL

- 1. Remove the transmission assembly from the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Manual Transmission Assembly>REMOVAL.
- **2.** Attach the ST on the flywheel.

ST 499747100 CLUTCH DISC GUIDE



3. Remove the clutch cover and clutch disc.

Note:

- Take care not to allow oil to touch the clutch disc face.
- Do not disassemble the clutch cover or clutch disc.

CLUTCH SYSTEM > Clutch Fluid Air Bleeding

PROCEDURE

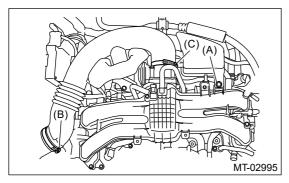
Caution:

Be careful not to spill the brake fluid. Brake fluid spilled on the vehicle body will harm the paint surface; wash it off with water and wipe clean quickly if spilled.

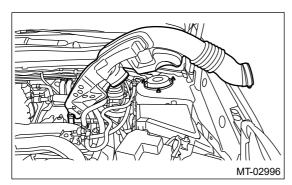
Note:

Bleed air from the oil line with help of a co-worker.

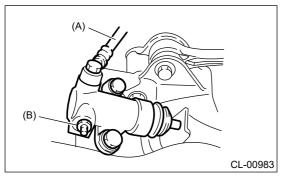
- 1. Remove the clip (A) from the air intake boot.
- 2. Loosen the clamp (B) connecting the air intake boot and air cleaner case (rear).
- **3.** Loosen the clamp (C) which connects the air intake boot and throttle body.



4. Remove the air intake boot from the throttle body, and move it to the left side wheel apron.



5. Fit one end of a vinyl tube into the air bleeder of the operating cylinder, and put the other end into a container.



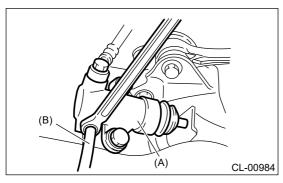
- (A) Clutch hose
- (B) Air bleeder

6. Slowly depress the clutch pedal and keep it depressed. Then open the air bleeder to discharge air together with the brake fluid.

Release the air bleeder for 1 or 2 seconds. Next, close the air bleeder, and slowly release the clutch pedal.

Caution:

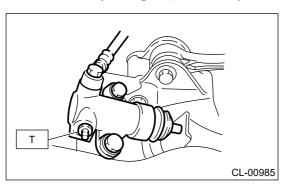
Cover the air bleeder with cloth to prevent brake fluid from being splashed on surrounding parts when loosening the bleeder.



- (A) Operating cylinder
- (B) Vinyl tube
- 7. Repeat procedure 6), until there are no more air bubbles appearing from the air bleeder.
- **8.** Tighten the air bleeder.

Tightening torque:

T: 7.8 N·m (0.8 kgf-m, 5.8 ft-lb)



- **9.** After stepping on the clutch pedal, make sure that there are no leaks evident in the entire clutch system.
- **10.** After bleeding the air from clutch system, ensure that the clutch operates properly.
- 11. Install the air intake boot. Ref. to INTAKE (INDUCTION)(H4DO)>Air Intake Boot>INSTALLATION.

CLUTCH SYSTEM > Clutch Fluid

INSPECTION

Caution:

Be careful not to spill the brake fluid. Brake fluid spilled on the vehicle body will harm the paint surface; wash it off with water and wipe clean quickly if spilled.

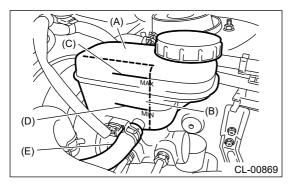
- 1. Park the vehicle on a level surface.
- **2.** Check the brake fluid level using the scale on the outside of the reservoir tank. If the level is below "MIN", add fluid to bring it up to "MAX", and also inspect for leakage.

Caution:

This reservoir tank has the brake fluid chamber and the clutch fluid chamber. When checking the fluid level, always check the fluid from the clutch fluid chamber side where the tank hose is connected.

Recommended brake fluid:

New FMVSS No. 116 DOT3 or DOT4



- (A) Reservoir tank
- (B) Clutch fluid chamber
- (C) MAX. level
- (D) MIN. level
- (E) Tank hose

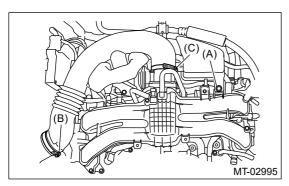
REPLACEMENT

Caution:

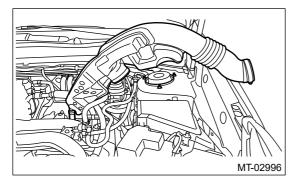
- Be careful not to spill the brake fluid. Brake fluid spilled on the vehicle body will harm the paint surface; wash it off with water and wipe clean quickly if spilled.
- Use new FMVSS No. 116 DOT3 or DOT4.
- Cover the air bleeder with cloth to prevent brake fluid from being splashed on surrounding parts when loosening the bleeder.
- Avoid mixing brake fluid of different brands to prevent fluid performance from degrading.
- Be careful not to allow dirt or dust to enter the reservoir tank.

Note:

- During the bleeding operation, keep the reservoir tank filled with brake fluid to prevent entry of air.
- Clutch pedal must be operated very slowly.
- Bleed air from the oil line with help of a co-worker.
- The required amount of brake fluid is approximately 150 mL (5.1 US fl oz, 5.3 Imp fl oz) for total clutch system.
- 1. Remove the clip (A) from the air intake boot.
- 2. Loosen the clamp (B) connecting the air intake boot and air cleaner case (rear).
- **3.** Loosen the clamp (C) which connects the air intake boot and throttle body.



4. Remove the air intake boot from the throttle body, and move it to the left side wheel apron.



- **5.** Drain the brake fluid from the air bleeder of the operating cylinder.
- 6. Refill the reservoir tank with recommended brake fluid.

Recommended brake fluid:

New FMVSS No. 116 DOT3 or DOT4

- 7. Bleed air from brake fluid. Ref. to CLUTCH SYSTEM>Clutch Fluid Air Bleeding.
- **8.** Install the air intake boot. Ref. to INTAKE (INDUCTION)(H4DO)>Air Intake Boot>INSTALLATION.

ADJUSTMENT

1. Turn the lock nut until the full stroke of clutch pedal becomes within the specification.

Caution:

When adjusting the full stroke of clutch pedal, do not turn the clutch switch. Note:

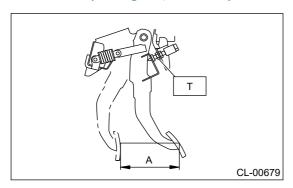
If the lock nut cannot adjust the full stroke of clutch pedal to the specified value, adjust it by turning the master cylinder push rod.

Clutch pedal full stroke A:

130 - 135 mm (5.12 - 5.31 in)

Tightening torque (clutch switch lock nut):

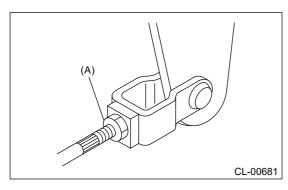
T: 8 N·m (0.8 kgf-m, 5.9 ft-lb)



2. If the full stroke is not within the specified value, loosen the clutch switch lock nut to adjust. **Tightening torque:**

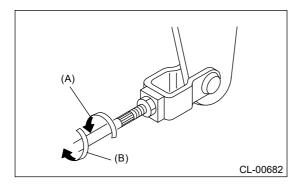
8 N·m (0.8 kgf-m, 5.9 ft-lb)

3. Loosen the push rod lock nuts.

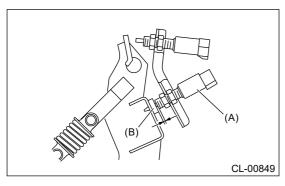


(A) Push rod lock nut

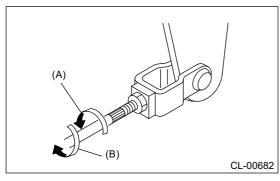
4. Make sure that the clutch pedal contacts the clutch pedal bracket stopper when the clutch pedal is at the maximum stroke position.



- (A) In the longer direction
- (B) In the shorter direction
- **5.** Make sure that the clutch pedal contacts the clutch switch side when the pedal is released.
- **6.** Turn the push rod to shorten until a clearance is gained on the clutch switch side.



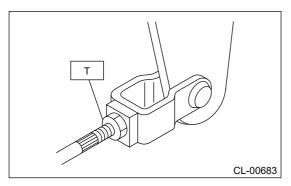
- (A) Clutch switch
- (B) Stopper
- 7. Turn the push rod to lengthen until clutch pedal contacts the clutch switch.
- 8. Turn further in the direction that will shorten the push rod by 270°.



- (A) In the longer direction
- (B) In the shorter direction
- **9.** Check that the clevis pin moves smoothly by moving it in the left and right directions.
- **10.** Tighten the push rod lock nut.

Tightening torque (push rod lock nut):

T: 10 N·m (1.0 kgf-m, 7.4 ft-lb)

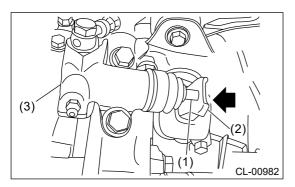


- 11. Depress and release the clutch pedal two or three times to ensure that the clutch pedal and release lever operate smoothly. If the clutch pedal and release lever do not operate smoothly, bleed air from the clutch hydraulic system. Ref. to CLUTCH SYSTEM>Clutch Fluid Air Bleeding.
- **12.** Measure the clutch pedal full stroke length again to ensure that it is within specifications. If it is not within specifications, repeat adjustment procedures again from the beginning.

Clutch pedal full stroke:

$$130 - 135 \text{ mm} (5.12 - 5.31 \text{ in})$$

13. Push the release lever until the operating cylinder push rod retracts. Check that the brake fluid level in the reservoir tank increases.



- (1) Push rod
- (2) Release lever
- (3) Operating cylinder
- **14.** If the brake fluid level increases, hydraulic clutch play is correct.
- **15.** If the brake fluid level does not increase or push rod does not retract, readjust the clutch pedal.
- **16.** Check the brake fluid level using the scale on the reservoir tank. Ref. to CLUTCH SYSTEM>Clutch Fluid>INSPECTION.

CLUTCH SYSTEM > Clutch Pedal

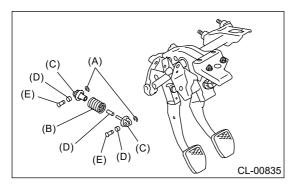
ASSEMBLY

- 1. Install the stopper and pedal pad to the clutch pedal.
- 2. Install the clutch switch to the pedal bracket.
- **3.** Clean the pedal bushing holes of the clutch pedal and the brake pedal, apply grease, and install the pedal bushings.
- 4. Install the clutch pedal, brake pedal and lever to the pedal bracket, and fix with a spring pin.
- **5.** Install the assist rod A, assist rod B, assist bushing and assist spring to the clutch pedal and pedal bracket.

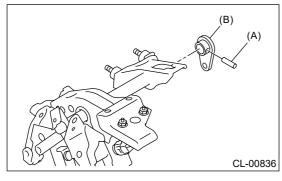
CLUTCH SYSTEM > Clutch Pedal

DISASSEMBLY

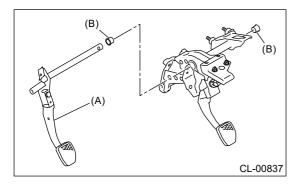
- 1. Remove the clutch switches.
- 2. Remove the clip, assist spring, rod and bushing.



- (A) Clip
- (B) Assist spring
- (C) Assist rod
- (D) Bushing
- (E) Clevis pin
- 3. Remove the spring pin and lever.



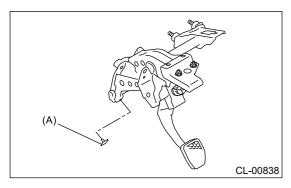
- (A) Spring pin
- (B) Lever
- 4. Remove the clutch pedal and pedal bushings.



(A) Clutch pedal

(B) Pedal bushing

5. Remove the stopper.



(A) Stopper

6. Remove the clutch pedal pad.

CLUTCH SYSTEM > Clutch Pedal

INSPECTION

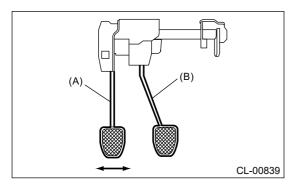
Move the clutch pedal pads in the lateral direction with a force of approximately 10 N (1 kgf, 2 lbf) to check that the clutch pedal deflection is within the service limit.

Caution:

If it exceeds the service limit, replace the clutch pedal assembly with a new part. Deflection of the clutch pedal:

Service limit

4.0 mm (0.157 in) or less



- (A) Clutch pedal
- (B) Brake pedal

CLUTCH SYSTEM > Clutch Pedal

INSTALLATION

1. Install in the reverse order of removal.

Caution:

Always use a new clevis pin.

Tightening torque:

Clutch pedal

18 N·m (1.8 kgf-m, 13.3 ft-lb)

Knee airbag module

7.5 N·m (0.76 kgf-m, 5.5 ft-lb)

Air intake boot

3 N·m (0.3 kgf-m, 2.2 ft-lb)

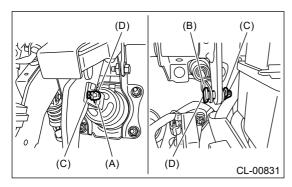
- **2.** Adjust the clutch pedal after installation. Ref. to CLUTCH SYSTEM>Clutch Pedal>ADJUSTMENT.
- 3. Check the clutch start system.

REMOVAL

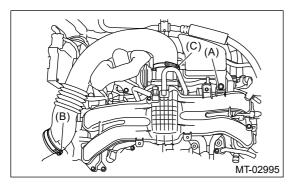
Caution:

Before handling the airbag system components, refer to "CAUTION" of "General Description" in "AIRBAG SYSTEM". Ref. to AIRBAG SYSTEM>General Description>CAUTION.

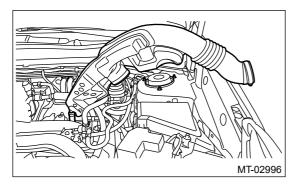
- 1. Turn the ignition switch to OFF.
- 2. Disconnect the ground cable from battery and wait for at least 60 seconds before starting work. Ref. to NOTE>NOTE > BATTERY.
- **3.** Remove the steering column. Ref. to POWER ASSISTED SYSTEM (POWER STEERING)>Steering Column>REMOVAL.
- 4. Disconnect the connector from the stop light switch and clutch switch.
- **5.** Remove the snap pins from clevis pins which secure the lever to the push rod and operating rod
- **6.** Pull out the clevis pins which secures the lever to the push rod and operating rod.



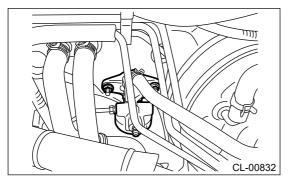
- (A) Operating rod
- (B) Push rod
- (C) Snap pin
- (D) Clevis pin
- 7. Remove the clip (A) from the air intake boot.
- **8.** Loosen the clamp (B) connecting the air intake boot and air cleaner case (rear).
- **9.** Loosen the clamp (C) which connects the air intake boot and throttle body.



10. Remove the air intake boot from the throttle body, and move it to the left side wheel apron.



11. Remove the nut which secures the clutch master cylinder.



12. Remove the bolts and nuts which secure the brake pedal and clutch pedal, and remove the pedal assembly.

Note:

Hold the clutch master cylinder with a wire or a string onto the vehicle body to avoid the clutch pipe from bending.

CLUTCH SYSTEM > Clutch Pipe and Hose

INSPECTION

Check the pipes and hoses for breaks and damage. Check the joint for brake fluid leakage. If crack, breakage or damage is found, repair or replace the faulty pipe or hose.

CLUTCH SYSTEM > Clutch Pipe and Hose

INSTALLATION

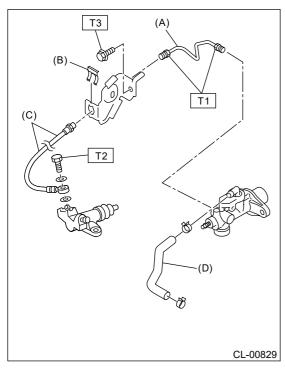
Install in the reverse order of removal.

Note:

Bleed air from brake fluid. Ref. to CLUTCH SYSTEM>Clutch Fluid Air Bleeding.

Tightening torque:

T1: 15 N·m (1.5 kgf-m, 11.1 ft-lb) T2: 18 N·m (1.8 kgf-m, 13.3 ft-lb) T3: 25 N·m (2.5 kgf-m, 18.4 ft-lb)



- (A) Clutch pipe
- (B) Clamp
- (C) Clutch hose
- (D) Tank hose

Tightening torque:

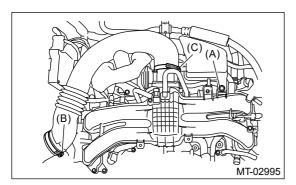
Air intake boot

3 N·m (0.3 kgf-m, 2.2 ft-lb)

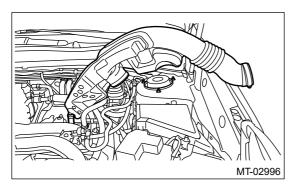
CLUTCH SYSTEM > Clutch Pipe and Hose

REMOVAL

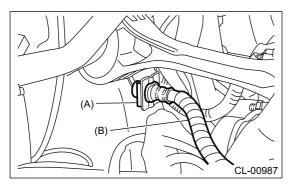
- 1. Remove the clip (A) from the air intake boot.
- 2. Loosen the clamp (B) connecting the air intake boot and air cleaner case (rear).
- **3.** Loosen the clamp (C) which connects the air intake boot and throttle body.



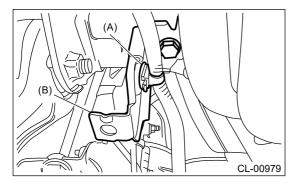
4. Remove the air intake boot from the throttle body, and move it to the left side wheel apron.



- 5. Drain the brake fluid. Ref. to CLUTCH SYSTEM>Clutch Fluid.
- **6.** Disconnect the clutch pipe from the clutch hose and master cylinder.
- **7.** Remove the clamp, and then remove the clutch hose.



- (A) Clamp
- (B) Clutch hose
- **8.** Disconnect the hose from operating cylinder.
- 9. Remove the harness clip.

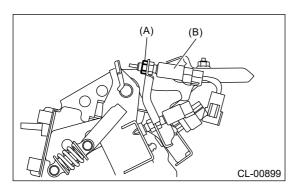


- (A) Harness clip
- (B) Clutch hose bracket
- **10.** Remove the clutch hose bracket.

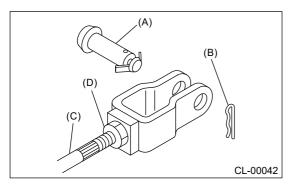
CLUTCH SYSTEM > Clutch Switch

ADJUSTMENT

1. Loosen the lock nut of the clutch start switch.



- (A) Lock nut
- (B) Clutch start switch
- 2. Disconnect the harness connector of the clutch start switch.
- **3.** Remove the snap pin and clevis pin connecting the clutch pedal and operating rod.



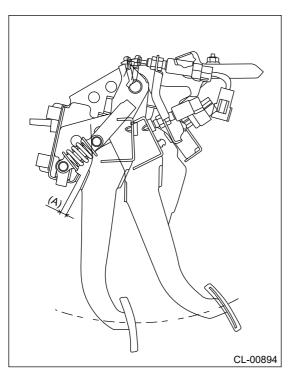
- (A) Clevis pin
- (B) Snap pin
- (C) Push rod
- (D) Lock nut
- **4.** Adjust the clutch start switch so that the switch turns on when the clearance between clutch pedal stopper and clutch pedal is within the specification described below, and then tighten the lock nut.

Clearance A:

6.3—8.6 mm (0.25—0.34 in)

Tightening torque:

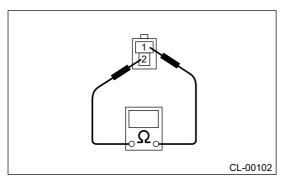
8 N·m (0.8 kgf-m, 5.9 ft-lb)



Note:

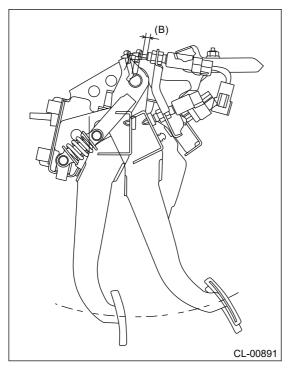
- Using a plate of the same thickness for the clearance facilitates the adjustment operation.
- Using the Subaru Select Monitor or a tester, check the position where the switch turns on.

Check the following figure for the terminal layout of the harness connector.



• When performing adjustment by the clearance between clutch start switch and clutch pedal plate, perform installation according to the following gap. Clearance B:

8.6-9.0 mm (0.34-0.35 in)

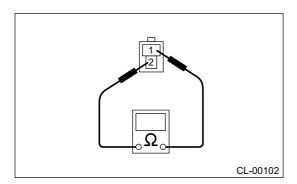


5. Connect the clutch start switch connector.

1. CLUTCH START SWITCH

- **1.** Perform the following inspections. If the clutch start switch does not operate normally, adjust the switch, and check it again. Ref. to CLUTCH SYSTEM>Clutch Switch>ADJUSTMENT.
 - Make sure that engine does not start with clutch pedal not depressed.
 - Make sure that engine starts with clutch pedal fully depressed.
- 2. When the clutch start switch does not operate normally even if it is adjusted, check the clutch start switch for continuity.
 - (1) Remove the clutch start switch. Ref. to CLUTCH SYSTEM>Clutch Switch>REMOVAL.
 - (2) Measure the resistance between terminal 1 and 2 of the switch. If the resistance is not at the standard value, replace the switch.

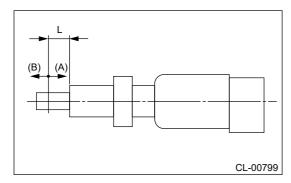
Condition	Terminal No.	Specified resistance
ON	No. 1 — No. 2	Less than 1 Ω
OFF	No. 1 — No.	1 MΩ or more



(3) Check that the switch is turned on and off in dimension L.

Dimension L:

$$9 - 10 \text{ mm} (0.35 - 0.39 \text{ in})$$



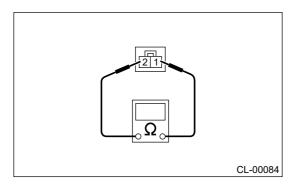
- (A) ON
- (B) OFF

(4) Install the clutch start switch. Ref. to CLUTCH SYSTEM>Clutch Switch>INSTALLATION > CLUTCH START SWITCH.

2. CLUTCH SWITCH

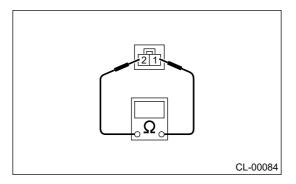
- 1. Check the clutch switch for continuity.
 - (1) Disconnect the connector of clutch switch.
 - (2) Measure the resistance between terminal 1 and 2 of the switch. If the resistance is not within the specification, check the clutch stroke and installation condition, and check the clutch switch again.

Condition	Terminal No.	Specified resistance
When clutch pedal is depressed	No. 1 — No. 2	$1~\text{M}\Omega$ or more
When the clutch pedal is not depressed	No. 1 — No. 2	Less than 1 Ω



- 2. When the clutch switch does not operate normally even if the clutch stroke and installation condition are normal, check the clutch switch for continuity.
 - (1) Remove the clutch switches. Ref. to CLUTCH SYSTEM>Clutch Switch>REMOVAL.
 - (2) Measure the resistance between terminal 1 and 2 of the switch. If the resistance is not at the standard value, replace the switch.

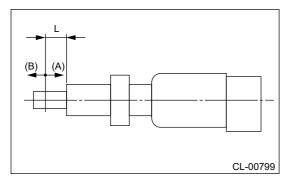
Condition	Terminal No.	Specified resistance
ON	No. 1 — No. 2	Less than 1 Ω
OFF	No. 1 — No. 2	1 MΩ or more



(3) Check that the switch is turned on and off in dimension L.

Dimension L:

$$5 - 6.5 \text{ mm} (0.2 - 0.26 \text{ in})$$



- (A) ON
- (B) OFF
- (4) Install the clutch switch. Ref. to CLUTCH SYSTEM>Clutch Switch>INSTALLATION > CLUTCH SWITCH.

INSTALLATION

1. CLUTCH SWITCH

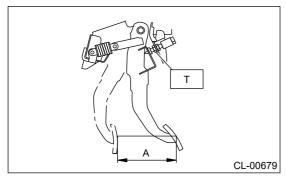
- 1. Install the clutch switch.
- 2. Move the clevis pin of push rod to left and right, retain it at the position where it moves smoothly, and measure the clutch pedal stroke.

Clutch pedal full stroke A:

130 - 135 mm (5.12 - 5.31 in)

Tightening torque:

T: 8 N·m (0.8 kgf-m, 5.9 ft-lb)



- **3.** If the clutch pedal stroke is out of specification, adjust the stroke. Ref. to CLUTCH SYSTEM>Clutch Pedal>ADJUSTMENT.
- **4.** Connect the clutch switch connector.
- **5.** Thereafter, install in the reverse order of removal.

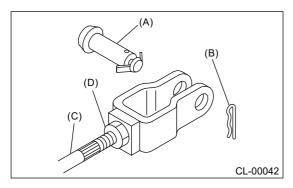
Tightening torque:

Knee airbag module

7.5 N·m (0.76 kgf-m, 5.5 ft-lb)

2. CLUTCH START SWITCH

1. Remove the snap pin and clevis pin connecting the clutch pedal and operating rod.



- (A) Clevis pin
- (B) Snap pin
- (C) Push rod
- (D) Lock nut

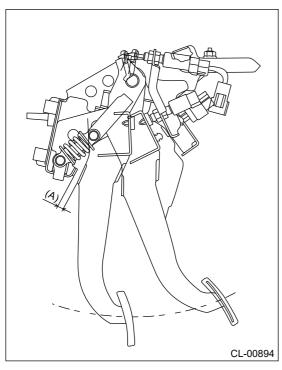
2. Install the clutch start switch so that the clutch switch turns on when the clearance between clutch pedal stopper and clutch pedal is within the specification described below.

Clearance A:

$$6.3 - 8.6 \text{ mm} (0.25 - 0.34 \text{ in})$$

Tightening torque:

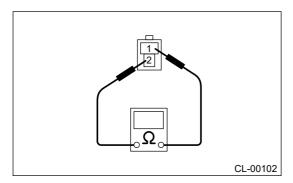
8 N·m (0.8 kgf-m, 5.9 ft-lb)



Note:

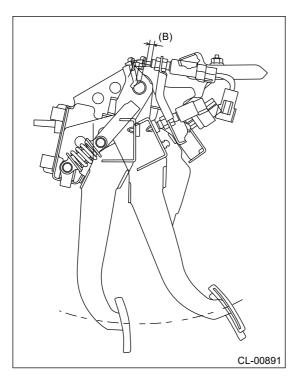
- Using a plate of the same thickness for the clearance facilitates the adjustment operation.
- Using the Subaru Select Monitor or a tester, check the position where the switch turns on.

Check the following figure for the terminal layout of the harness connector.



 When performing adjustment by the clearance between clutch start switch and clutch pedal plate, perform installation according to the following gap.
 Clearance B:

$$8.6 - 9.0 \text{ mm} (0.34 - 0.35 \text{ in})$$



- 3. Connect the clutch start switch connector.
- 4. Make sure that engine does not start with clutch pedal not depressed.
- 5. Make sure that engine starts with clutch pedal depressed.
- **6.** Thereafter, install in the reverse order of removal.

Tightening torque:

Knee airbag module

7.5 N·m (0.76 kgf-m, 5.5 ft-lb)

CLUTCH SYSTEM > Clutch Switch

REMOVAL

Caution:

- Before handling the airbag system components, refer to "CAUTION" of "General Description" in "AIRBAG SYSTEM". Ref. to AIRBAG SYSTEM>General Description>CAUTION.
- 1. Turn the ignition switch to OFF.
- 2. Disconnect the ground cable from battery and wait for at least 60 seconds before starting work. Ref. to NOTE>NOTE > BATTERY.
- **3.** Remove the cover assembly instrument panel LWR driver. Ref. to EXTERIOR/INTERIOR TRIM>Instrument Panel Lower Cover>REMOVAL.
- 4. Remove the knee airbag module. Ref. to AIRBAG SYSTEM>Knee Airbag Module>REMOVAL.
- 5. Disconnect the connector from the clutch switch and clutch start switch.
- 6. Remove the clutch switch and clutch start switch.

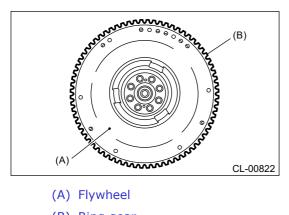
CLUTCH SYSTEM > Flywheel

INSPECTION

Caution:

Because the center pilot bearing is grease-sealed and is a non-lubrication type, do not wash with gasoline or solvents.

1. If there is damage or defectiveness in the facing sliding surface or ring gear, replace the flywheel.



- (A) Flywheel
- (B) Ring gear
- 2. Smoothness of rotation Rotate the ball bearing while applying pressure in the thrust direction.
- 3. If any noise or excessive play is noted, replace the pilot bearing.

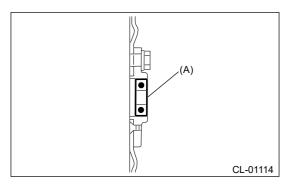
CLUTCH SYSTEM > Flywheel

INSTALLATION

1. Press in a new pilot bearing to the position where it is flush with the flywheel surface or up to -0.4 mm (0.016 in) deeper than that.

Caution:

Do not press the bearing inner ring.



(A) Pilot bearing

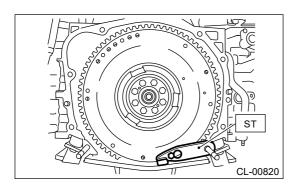
2. Temporarily tighten the crankshaft position sensor plate and flywheel.

Note:

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

3. Attach the ST.

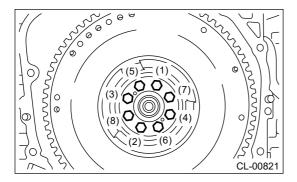
ST 498497100 CRANKSHAFT STOPPER



- **4.** Tighten the flywheel mounting bolts in two stages.
 - (1) Tighten the flywheel attachment bolts.

Tightening torque:

30 N·m (3.1 kgf-m, 22.1 ft-lb)



(2) While checking the tightening angle with the angle gauge, further tighten the flywheel mounting bolts.

Tightening angle:

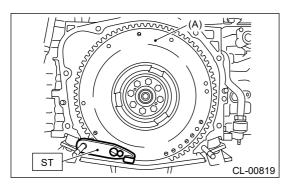
- **5.** Install the clutch disc and clutch cover. Ref. to CLUTCH SYSTEM>Clutch Disc and Cover>INSTALLATION.
- **6.** Install the transmission assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Manual Transmission Assembly>INSTALLATION.

CLUTCH SYSTEM > Flywheel

REMOVAL

- 1. Remove the transmission assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Manual Transmission Assembly>REMOVAL.
- **2.** Remove the clutch cover and clutch disc. Ref. to CLUTCH SYSTEM>Clutch Disc and Cover>REMOVAL.
- 3. Attach the ST.

ST 498497100 CRANKSHAFT STOPPER



(A) Flywheel

- 4. Remove the flywheel and crankshaft position sensor plate.
- 5. Drive out the pilot bearing from the flywheel.

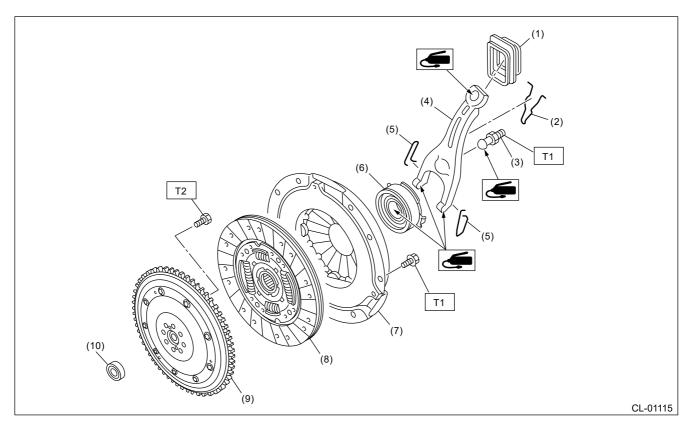
CLUTCH SYSTEM > General Description

CAUTION

- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- · Keep the disassembled parts in order and protect them from dust and dirt.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
- Vehicle components are extremely hot after driving. Be wary of receiving burns from heated parts.
- Use SUBARU genuine fluid, grease etc. or equivalent. Do not mix fluid, grease, etc. of different grades or manufacturers.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Apply grease onto sliding or revolving surfaces before installation.
- Before installing O-rings or snap rings, apply sufficient amount of fluid to avoid damage and deformation.
- Before securing a part in a vise, place cushioning material such as wood blocks, aluminum plate or cloth between the part and the vise.
- Keep fluid away from the vehicle body. If any fluid contacts the vehicle body, immediately flush the area with water.

COMPONENT

1. CLUTCH ASSEMBLY



(1) Dust cover

- (6) Release bearing
- Tightening torque: N⋅m (kgf-m, ft-lb)

(2) Lever spring

(7) Clutch cover

(3) Pivot

(8) Clutch disc

T1: 16 (1.6, 11.8)

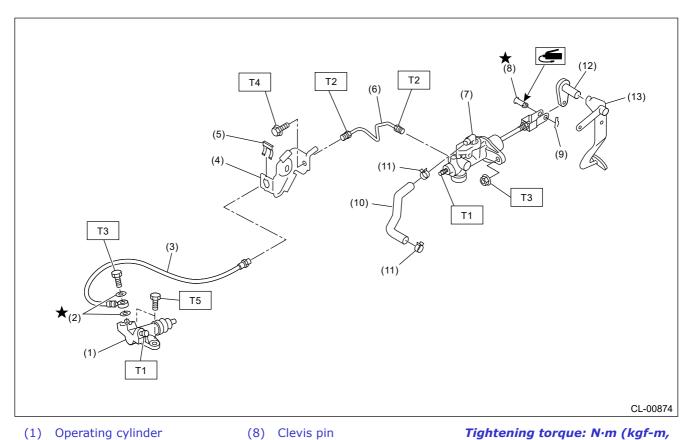
- (4) Release lever
- (9) Flexible flywheel

(5) Clip

(10) Pilot bearing

T2: SYSTEM>Flywheel>INSTAL
LATION.

2. CLUTCH PIPE AND HOSE



(1)	Operating	cylinder

ft-lb)

(3) Clutch hose

(2) Gasket

(9) Snap pin

- (10) Tank hose
- (4) Clutch hose bracket (5) Clamp
- (11) Clamp (12) Lever

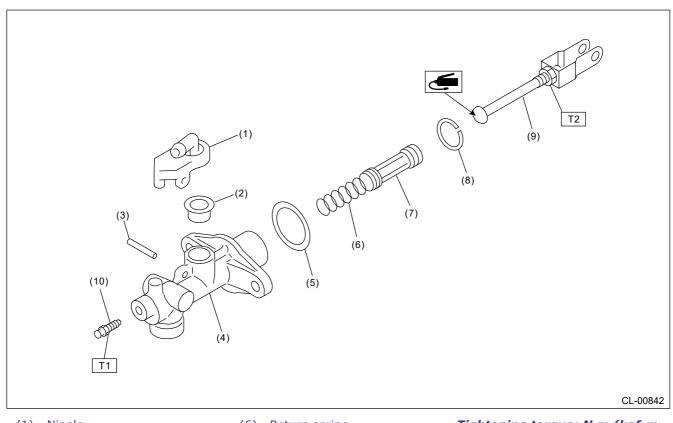
(6) Clutch pipe

- (13) Pedal

- T1: 7.8 (0.8, 5.8) T2: 15 (1.5, 11.1)
- T3: 18 (1.8, 13.3)
- T4: 25 (2.5, 18.4)
- T5: 37 (3.8, 27.3)

3. MASTER CYLINDER

(7) Master cylinder ASSY



(1) Nipple

(6) Return spring

Tightening torque: N·m (kgf-m,

ft-lb)

(2) Oil seal

(7) Piston

T1: 7.8 (0.8, 5.8)

(3) Straight pin

(8) Piston stop ring(9) Push rod ASSY

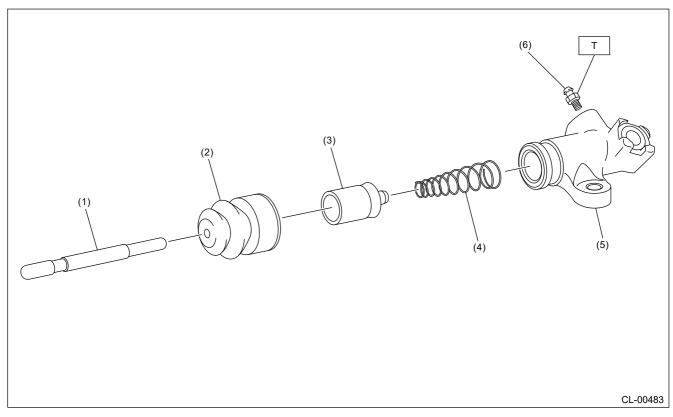
T2: 10 (1.0, 7.4)

(4) Master cylinder

(5) Seat

(10) Bleeder screw

4. OPERATING CYLINDER



(1) Push rod

(4) Piston spring

Tightening torque: N·m (kgf-m, ft-lb)

(2) Boot

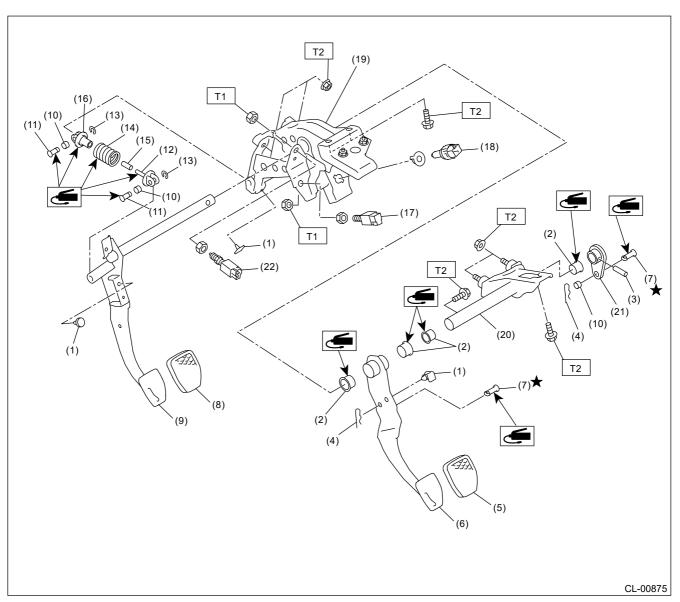
(5) Operating cylinder

T: 7.8 (0.8, 5.8)

(3) Piston

(6) Bleeder screw

5. CLUTCH PEDAL



- (1) Stopper
- (2) Pedal bushing
- (3) Spring pin
- (4) Snap pin
- (5) Brake pedal pad
- (6) Brake pedal
- (7) Clevis pin
- (8) Clutch pedal pad
- (9) Clutch pedal

- (10) Bushing C
- (11) Clutch clevis pin
- (12) Assist rod A
- (13) Clip
- (14) Assist spring
- (15) Assist bushing
- (16) Assist rod B
- (17) Clutch switch
- (18) Stop light switch

- (19) Pedal bracket
- (20) Clutch master cylinder bracket
- (21) Lever
- (22) Clutch start switch (model with push button start)

Tightening torque: N·m (kgf-m, ft-lb)

T1: 8 (0.8, 5.9)

T2: 18 (1.8, 13.3)

1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
(0)	498497100	CRANKSHAFT STOPPER	Used for stopping rotation of the flywheel.
0			
ST-498497100			
	499747100	CLUTCH DISC GUIDE	Used for installing the clutch disc to the flywheel.
ST-499747100			
CCIVI	(Newly adopted	SUBARU SELECT MONITOR 4	Used for setting of each function and troubleshooting for electrical system
55M 4	tool)	MONITOR 4	Note: For detailed operation procedures of Subaru Select Monitor 4, refer to "Application help".
STSSM4			

2. GENERAL TOOL

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance, voltage and current.
Dial gauge	Used for measuring clutch disc run-out.
Depth gauge	Used for measuring clutch disc wear.
Angle gauge	Used for tightening the flywheel.
DST-i	Used together with Subaru Select Monitor 4.

CLUTCH SYSTEM > General Description

SPECIFICATION

			_
Model			2.5 L
Transmission type			6MT
Clutch	Туре		Push type
cover	Diaphragm set load	N (kgf, lbf)	5,688 (580, 1,279)
	Facing material		Woven (non-asbestos)
O.D. × I.D. ×		Flywheel side	230 × 155 × 3.2 (9.06 × 6.10 × 0.126)
Thickness mm (in) Spline outer diameter disc	Clutch cover side	230 × 155 × 3.5 (9.06 × 6.10 × 0.138)	
	mm (in)	25.2 (0.992), (number of teeth: 24)	
	Flywheel side	1.35 — 1.95 (0.053 — 0.077)	
	Depth of rivet head mm (in)	Clutch cover side	1.65 — 2.25 (0.065 — 0.089)
		Limit of sinking	0.8 (0.031)
	Deflection limit	mm (in)	0.7 (0.028) at R = 110 (4.33)
Clutch rele	ease lever ratio		1.6
Release be	earing		Grease-packed self-aligning
Clutch	Full stroke	mm (in)	130 — 135 (5.12 — 5.31)
pedal	Free play	mm (in)	4 — 11 (0.16 — 0.43)
Flywheel	Туре		Flexible
,	1.750		Πολίδιο

INSPECTION

1. CLUTCH

Symptoms	Possible cause	Corrective action
1. Clutch slippage	(a) Oil on the clutch face	Replace.
It is hard to perceive clutch		
slippage in the early stage, but		
pay attention to the following		
symptoms.	(b) Worn clutch face	Replace.
• Engine temporarily speeds up when the accelerator ON		
immediately after shifting.		
High-speed driving is not		
possible; especially rapid	(c) Deteriorated diaphragm	Replace.
acceleration is not possible	spring	
and vehicle speed does not		
increase in proportion to the		
increase in engine speed.		
Power drops particularly		
when ascending a slope, and		
there is a burning smell of	(d) Warped pressure plate or	Repair or replace.
the clutch plate.Method of testing: Park the	flywheel	
vehicle and fully apply the		
parking brake. Disengage		
the clutch and shift the		
transmission gear into the		
1st. Gradually increase the		
engine speed while gradually	(e) Defective release bearing	Repair or replace.
allowing the clutch to	holder	
engage. The clutch function		
is satisfactory if the engine		
stalls. However, the clutch is		
slipping if the vehicle does not move forward and the		
engine does not stall.		
2. Clutch drags.	(a) Worn or rusty clutch disc	Replace the clutch disc.
As a symptom of this trouble, a	hub spline	replace the claten disc.
harsh scratching noise occurs		
and control becomes difficult		
when shifting gears. The		
symptom becomes more	(b) Excessive deflection of clutch	Repair or replace.
apparent when shifting into the	disc face	
1st gear. However, because most		

trouble of this sort is due to a		
defective synchronization mechanism, perform the following tests. • Method of testing: Ref. to CLUTCH SYSTEM>General	(c) Crankshaft pilot needle bearing sticking	Replace.
<u>Diagnostic</u> <u>Table>INSPECTION ></u>	(d) Cracked clutch disc face	Replace.
DIAGNOSTIC DIAGRAM OF CLUTCH DRAG. The problem is caused by insufficient disengagement of the clutch if an abnormal noise occurs during this test.	(e) Stuck clutch disc (smeared by oil or water)	Replace.
3. Clutch chatters. Clutch chattering is an	(a) Adhesion of oil on the clutch face	Replace the clutch disc.
unpleasant vibration to the whole vehicle when the vehicle	(b) Weak or broken damper spring	Replace the clutch disc.
is just started with clutch partially engaged.	(c) Poor contact of the disc surface or excessively worn disc	Replace the faulty clutch disc.
	(d) Warped pressure plate or flywheel	Repair or replace.
	(e) Loose disc rivets	Replace the clutch disc.
	(f) Loose engine mounting	Retighten or replace mounting.
	(g) Loose pitching stopper	Retighten or replace the pitching stopper.
4. Noisy clutch Examine whether the noise is generated when the clutch is	(a) Broken, worn or insufficiently lubricated release bearing	Replace the release bearing.
disengaged, engaged, or partially engaged.	(b) Insufficient lubrication of the pilot bearing	Replace the pilot bearing.
	(c) Loose clutch disc hub	Replace the clutch disc.
	(d) Loose damper spring retainer	Replace the clutch disc.
	(e) Deteriorated or broken damper spring	Replace the clutch disc.
5. Clutch grabs suddenly.	(a) Grease or oil on facing	Replace the clutch disc.
When starting the vehicle with the clutch partially engaged, the	(b) Deteriorated cushioning spring	Replace the clutch disc.
clutch engages suddenly and the	(c) Worn or rusted spline of	Take off rust, apply grease or
vehicle jumps instead of making a smooth start.	clutch disc or main shaft	replace clutch disc or main shaft.
a smooth start.	(d) Deteriorated or broken damper spring	Replace the clutch disc.
	(e) Loose engine mounting	Retighten or replace mounting.
	(f) Deteriorated diaphragm	Replace.

2. CLUTCH PEDAL

Symptoms	Corrective action
Insufficient clutch pedal free play	Adjust the free play of the pedal.
Excessively worn and damaged pedal shaft and/or	Replace the bushing or shaft with a new part.
bushing	

3. DIAGNOSTIC DIAGRAM OF CLUTCH DRAG

1. CHECK GEAR NOISE.



- 1. Start the engine.
- **2.** While idling the engine, step on the clutch pedal and quickly shift from neutral to reverse.

Is there any abnormal noise from the transmission gear?



Go to 2.



Clutch is normal.

2. CHECK GEAR NOISE.



Depress the clutch pedal at idle and shift from neutral to reverse within 0.5-1.0 second.

Is there any abnormal noise from the transmission gear?



Go to 3.



Defective transmission or excessive clutch drag torque. Inspect pilot bearing, clutch disc, transmission and clutch disc hub spline.

3. CHECK GEAR NOISE.



- 1. Depress the clutch pedal at idle and shift from neutral to reverse within 0.5—1.0 second.
- **2.** While stepping on the clutch pedal, shift from neutral to reverse, reverse to neutral several times.

Is there any abnormal noise from the transmission gear?



Inadequate clutch disengage. Inspect the clutch disc, clutch cover, clutch

release, and clutch pedal free play.



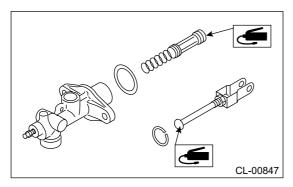
Clutch and flywheel seizure. Inspect the clutch disc and the spline of the clutch disc hub.

ASSEMBLY

1. Apply a coat of grease to the contact surfaces of the push rod and piston before installation.

Grease:

SILICONE GREASE G-40M or equivalent



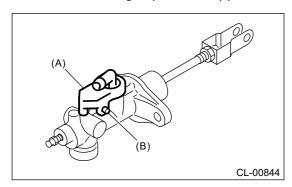
2. Assemble in the reverse order of disassembly.

Tightening torque:

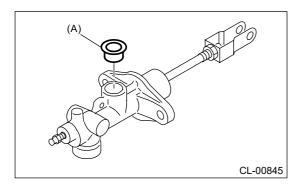
10 N·m (1.0 kgf-m, 7.4 ft-lb)

DISASSEMBLY

1. Remove the straight pin and nipple.

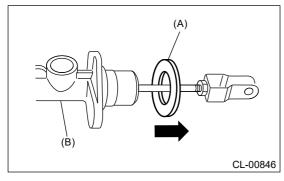


- (A) Nipple
- (B) Straight pin
- 2. Remove the oil seal.



(A) Oil seal

3. Move the seat towards the rear.



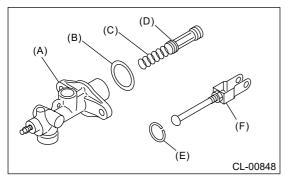
- (A) Seat
- (B) Master cylinder
- 4. Remove the piston stop ring.

Caution:

When removing the piston stop ring, be careful to prevent the rod, washer, piston and return spring from popping out.

INSPECTION

If any damage, deformation, wear, swelling, rust or other faults are found on the cylinder, piston, push rod, nipple, return spring, bleeder screw, seat or hose, replace the faulty part.



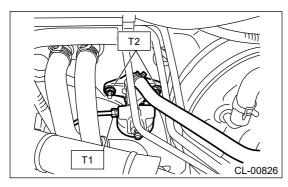
- (A) Master cylinder body
- (B) Seat
- (C) Return spring
- (D) Piston
- (E) Piston stop ring
- (F) Push rod ASSY

INSTALLATION

1. Install the master cylinder to the body, and connect the clutch pipe and the tank hose.

Tightening torque:

T1: 15 N·m (1.5 kgf-m, 11.1 ft-lb) T2: 18 N·m (1.8 kgf-m, 13.3 ft-lb)



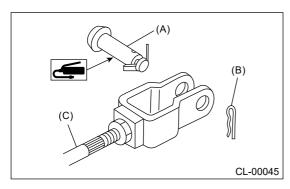
2. Connect the push rod of the master cylinder, and install the clevis pin and snap pin.

Caution:

Always use a new clevis pin.

Note:

Apply grease to the clevis pin.

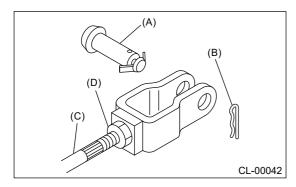


- (A) Clevis pin
- (B) Snap pin
- (C) Push rod
- 3. Install the knee airbag module. Ref. to AIRBAG SYSTEM>Knee Airbag Module>INSTALLATION.
- 4. Fill the recommended brake fluid. <a> Ref. to CLUTCH SYSTEM>Clutch Fluid.
- **5.** After bleeding air from the clutch system, ensure that the clutch operates properly. Ref. to CLUTCH SYSTEM>Clutch Fluid Air Bleeding.
- **6.** Install the cover assembly instrument panel LWR driver. Ref. to EXTERIOR/INTERIOR TRIM>Instrument Panel Lower Cover>INSTALLATION.
- 7. Install the air intake boot assembly. Ref. to INTAKE (INDUCTION)(H4DO)>Air Intake Boot>INSTALLATION.
- **8.** Connect the battery ground terminal.

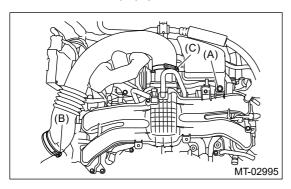
REMOVAL

Caution:

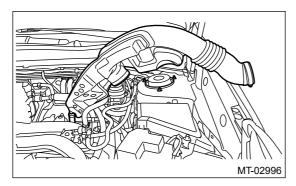
- Be careful not to spill the brake fluid. Brake fluid spilled on the vehicle body will harm the paint surface; wash it off with water and wipe clean quickly if spilled.
- Before handling the airbag system components, refer to "CAUTION" of "General Description" in "AIRBAG SYSTEM". Ref. to AIRBAG SYSTEM>General Description>CAUTION.
- 1. Turn the ignition switch to OFF.
- 2. Disconnect the ground cable from battery and wait for at least 60 seconds before starting work. Ref. to NOTE>NOTE > BATTERY.
- 3. Drain the brake fluid. Ref. to CLUTCH SYSTEM>Clutch Fluid.
- **4.** Remove the cover assembly instrument panel LWR driver. Ref. to EXTERIOR/INTERIOR TRIM>Instrument Panel Lower Cover>REMOVAL.
- 5. Remove the knee airbag module. Ref. to AIRBAG SYSTEM>Knee Airbag Module>REMOVAL.
- **6.** Remove the snap pin and clevis pin, and then separate the push rod of the master cylinder from clutch pedal.



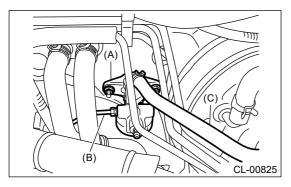
- (A) Clevis pin
- (B) Snap pin
- (C) Push rod
- (D) Lock nut
- 7. Remove the clip (A) from the air intake boot.
- **8.** Loosen the clamp (B) connecting the air intake boot and air cleaner case (rear).
- **9.** Loosen the clamp (C) which connects the air intake boot and throttle body.



10. Remove the air intake boot from the throttle body, and move it to the left side wheel apron.



- **11.** Disconnect the clutch pipe and tank hose from the master cylinder.
- 12. Remove the master cylinder.



- (A) Master cylinder
- (B) Clutch pipe
- (C) Tank hose

ASSEMBLY

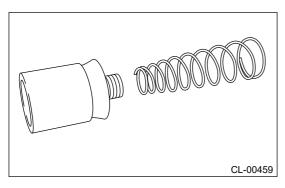
Note:

During assembly, apply hydraulic oil to all parts.

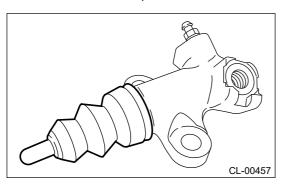
Recommended brake fluid:

New FMVSS No. 116 DOT3 or DOT4

1. Install the piston spring.

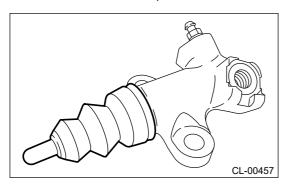


- 2. Insert piston into the operating cylinder.
- **3.** Install push rod to the boot.
- 4. Install the boot and push rod.



DISASSEMBLY

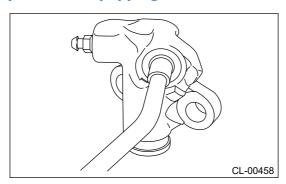
1. Remove the boot and push rod.



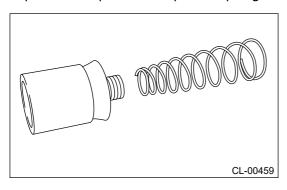
2. Apply compressed air through clutch hose attachment hole.

Note:

Face the piston hole down and place a piece of wood underneath to prevent the piston from popping out.



3. Separate the piston and piston spring.



INSPECTION

- **1.** Check that the operating cylinder is not damaged. Replace the operating cylinder if it is damaged.
- **2.** Check the brake fluid leakage on the operating cylinder or the boot for damage. Replace the operating cylinder if brake fluid leaks or boot damages are noted.

INSTALLATION

1. Install in the reverse order of removal.

Note:

• Before installing the operating cylinder, apply grease to the contact point of the release lever and operating cylinder.

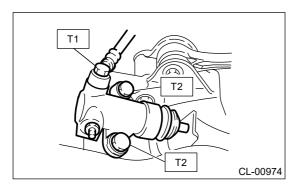
Grease:

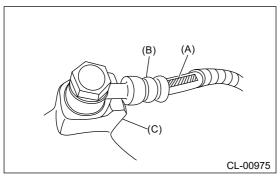
NICHIMOLY N-130 or equivalent

- Be sure to install the clutch hose with the mark side facing upward.
- Be careful not to twist the clutch hose during installation.
- Use a new gasket.

Tightening torque:

T1: 18 N·m (1.8 kgf-m, 13.3 ft-lb) T2: 37 N·m (3.8 kgf-m, 27.3 ft-lb)





- (A) Mark
- (B) Clutch hose
- (C) Operating cylinder

Tightening torque:

Air intake boot

3 N·m (0.3 kgf-m, 2.2 ft-lb)

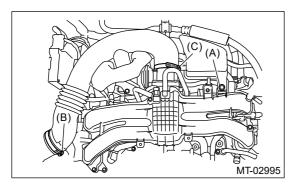
2. After bleeding air from the operating cylinder, ensure that the clutch operates properly. Ref. to CLUTCH SYSTEM>Clutch Fluid Air Bleeding.

REMOVAL

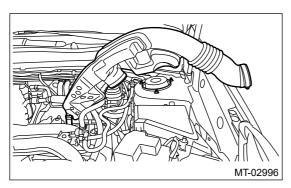
Caution:

Brake fluid spilled on the vehicle body will harm the paint surface; therefore, wash it off with water and wipe clean quickly if spilled.

- 1. Remove the clip (A) from the air intake boot.
- 2. Loosen the clamp (B) connecting the air intake boot and air cleaner case (rear).
- 3. Loosen the clamp (C) which connects the air intake boot and throttle body.



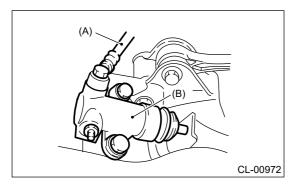
4. Remove the air intake boot from the throttle body, and move it to the left side wheel apron.



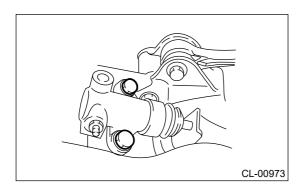
5. Disconnect the clutch hose.

Caution:

Cover the hose joint to prevent the brake fluid from flowing out.



- (A) Clutch hose
- (B) Operating cylinder
- **6.** Remove the operating cylinder.



1. RELEASE BEARING

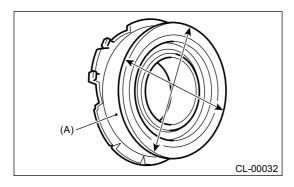
Caution:

Since this bearing is grease-sealed and is a non-lubrication type, do not wash with gasoline or any other solvent when servicing the clutch.

1. Check the bearing for smooth movement by applying force to the bearing in the radial direction.

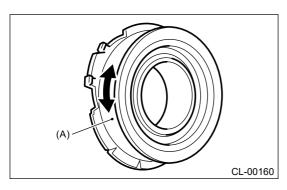
Radial direction stroke:

1.4 mm (0.055 in) or more



(A) Bearing case

2. While applying force to the bearing in the rotational direction, check the bearing for smooth rotation.

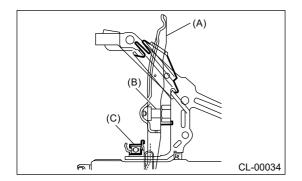


(A) Bearing case

3. Check for wear and damage at the bearing case surface in contact with the lever.

2. RELEASE LEVER

Check the pivot portion of the lever and the contact area with the release bearing case for wear.



- (A) Release lever
- (B) Pivot
- (C) Release bearing

INSTALLATION

Note:

Apply the specified grease to lubricate to the following points before installation.

- Contact surface of lever and pivot
- Contact surface of lever and bearing
- · Transmission main shaft spline
- Contact surface of release bearing and transmission case

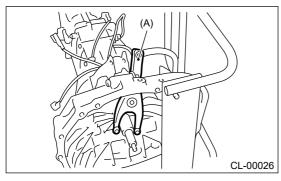
Grease

NICHIMOLY N-130 or equivalent

1. While pushing the release lever to the pivot and twisting it to both sides, fit the lever spring onto the raised portion of the pivot.

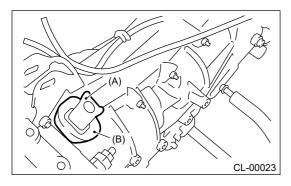
Note:

Observing from the main case hole, check that the lever spring is installed securely.



(A) Release lever

- 2. Install the release bearing and fasten it with two clips.
- 3. Install the dust cover.



- (A) Release lever
- (B) Dust cover
- **4.** Operate the release lever and check if the release bearing moves smoothly.
- **5.** Apply grease to the contact point of the release lever and operating cylinder.

Grease

NICHIMOLY N-130 or equivalent

6. Install the transmission assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Manual Transmission Assembly>INSTALLATION.

CLUTCH SYSTEM > Release Bearing and Lever

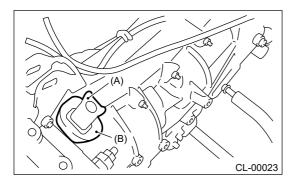
REMOVAL

- **1.** Remove the transmission assembly from the vehicle.
 - Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Manual Transmission Assembly>REMOVAL.
- **2.** Remove the two clips from the release lever and remove the release bearing.

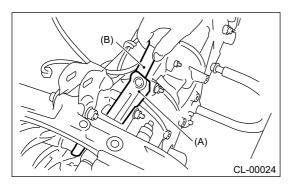
Caution:

Be careful not to deform the clips.

3. Remove the dust cover.



- (A) Release lever
- (B) Dust cover
- **4.** Remove the attachment point of lever spring by inserting a screwdriver through the clutch housing release lever hole. Then remove the release lever.



- (A) Release lever
- (B) Screwdriver

CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Air Breather Hose

INSPECTION

Check the hose for peeling, crack or clogging.

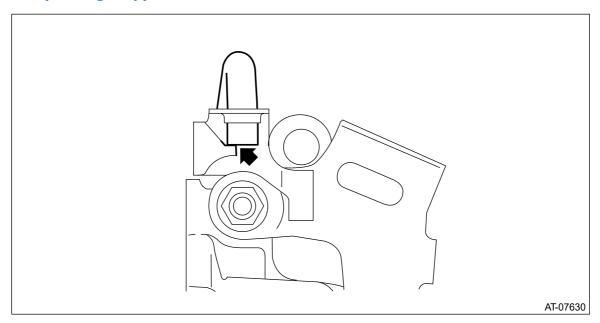
INSTALLATION

1. FRONT DIFFERENTIAL SIDE

Install in the reverse order of removal.

Note:

Securely insert the air breather hose until the hose end contacts the catch of the pitching stopper bracket.



2. TRANSMISSION CASE SIDE

Install in the reverse order of removal.

Tightening torque:

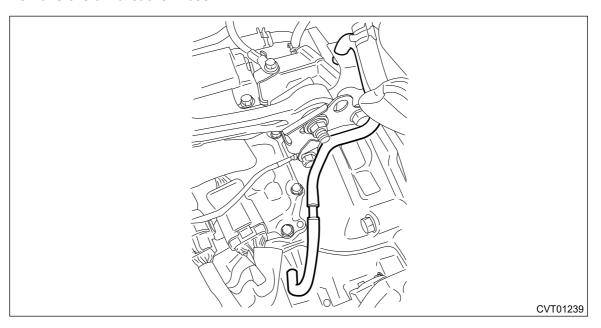
Transmission case cover 8 N·m (0.8 kgf-m, 5.9 ft-lb)

Air breather hose

5 N·m (0.5 kgf-m, 3.7 ft-lb)

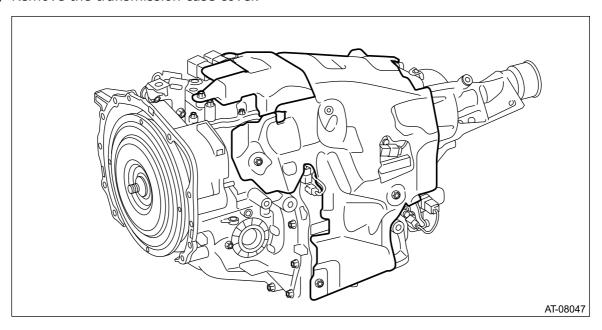
1. FRONT DIFFERENTIAL SIDE

- 1. Remove the air intake boot assembly. Ref. to INTAKE (INDUCTION)(H4DO)>Air Intake Boot>REMOVAL.
- 2. Remove the air breather hose.

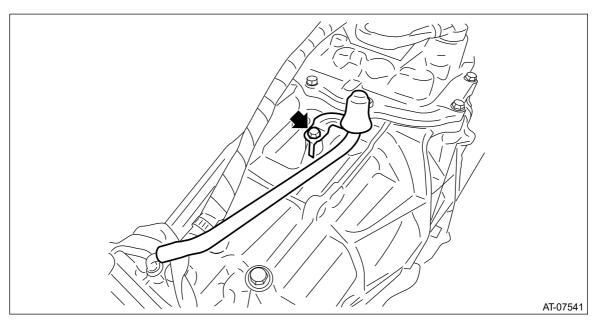


2. TRANSMISSION CASE SIDE

- 1. Remove the transmission assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Automatic Transmission Assembly>REMOVAL.
- 2. Remove the transmission case cover.



3. Remove the air breather hose.



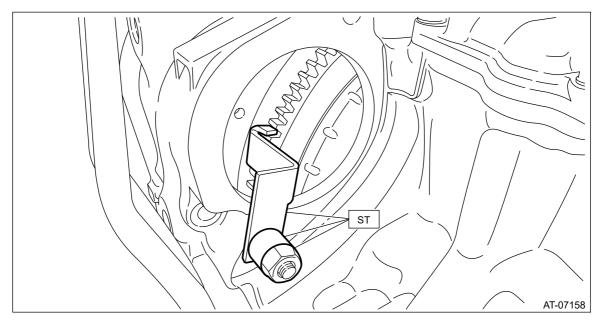
4. Remove the air breather cap.

CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Automatic Transmission Assembly

INSTALLATION

1. Attach the ST to converter case.

ST 498277200 STOPPER SET



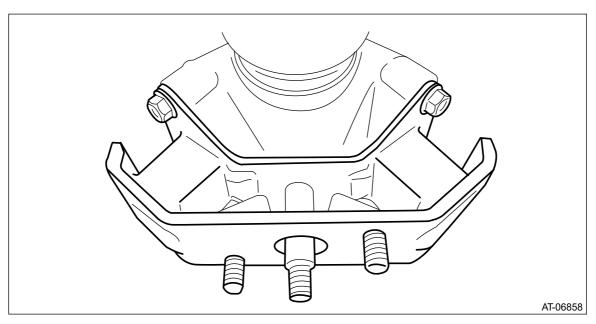
- 2. When completely overhauling the transmission, refill CVTF through the transmission right side plug. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Preparation for Overhaul.
- **3.** Replace the front differential side retainer oil seal. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Differential Side Retainer Oil Seal>REPLACEMENT.

Note:

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

Tightening torque:

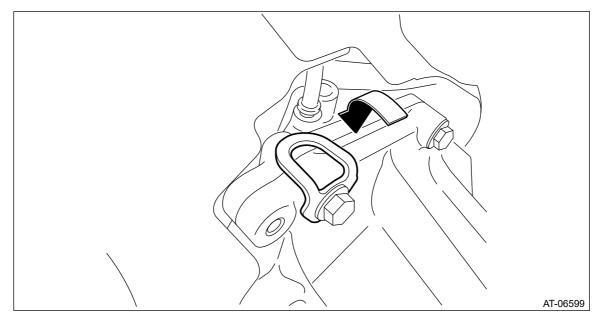
40 N·m (4.1 kgf-m, 29.5 ft-lb)



- **5.** Mount the transmission onto the transmission jack.
- **6.** 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 extra overload or impact to the transmission case.



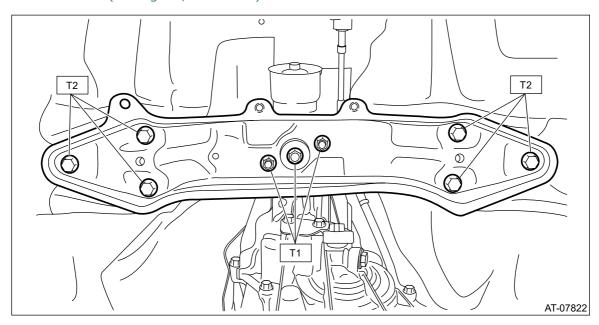
- **7.** Remove the pitching stopper bracket, if mounted.
- 8. Install the transmission onto the engine.

Note:

- While raising the transmission jack gradually, turn the screw of engine support, then tilt the engine forward.
- Temporarily attach the two engine connecting bolts and two nuts (lower side).
- **9.** Install the transmission rear crossmember.

Tightening torque:

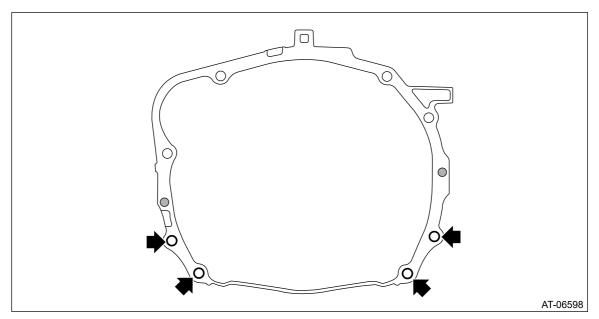
T1: 35 N·m (3.6 kgf-m, 25.8 ft-lb) T2: 70 N·m (7.1 kgf-m, 51.6 ft-lb)



10. Tighten the two engine connecting bolts and two nuts (lower side).

Tightening torque:

50 N·m (5.1 kgf-m, 36.9 ft-lb)



- 11. Remove the transmission jack.
- **12.** Tighten the hanger bracket.

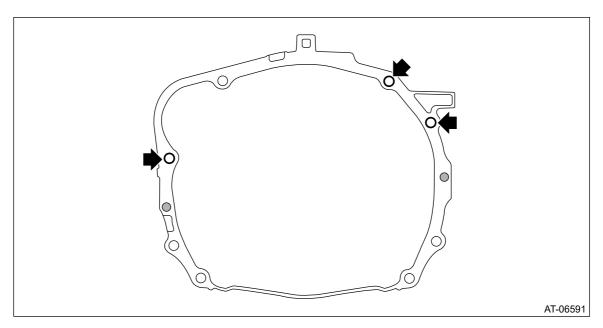
Tightening torque:

23 N·m (2.3 kgf-m, 17.0 ft-lb)

- **13.** Lower the vehicle.
- 14. Install the three engine mounting bolts (upper side).

Tightening torque:

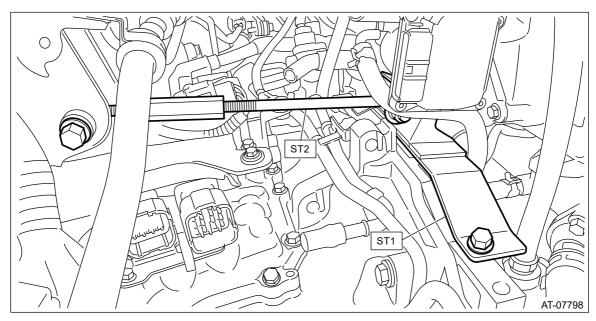
50 N·m (5.1 kgf-m, 36.9 ft-lb)



- 15. Remove the ST (STOPPER SET) from converter case.
- 16. Remove the ST (ENGINE SUPPORT BRACKET and ENGINE SUPPORT).

ST1 41099AA012 ENGINE SUPPORT BRACKET

ST2 41099AA020 ENGINE SUPPORT



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

Caution:

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

Tightening torque:

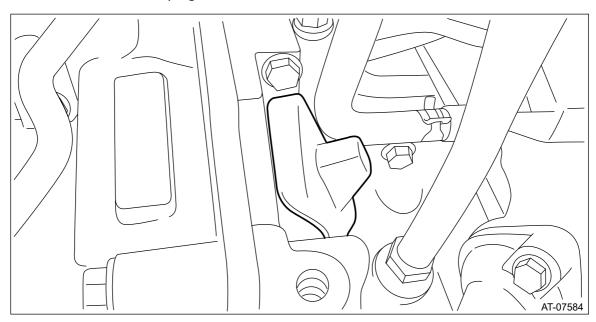
25 N·m (2.5 kgf-m, 18.4 ft-lb)

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

Tightening torque:

25 N·m (2.5 kgf-m, 18.4 ft-lb)

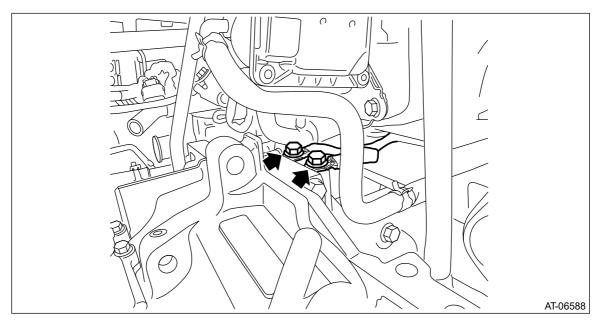
19. Install the service hole plug.



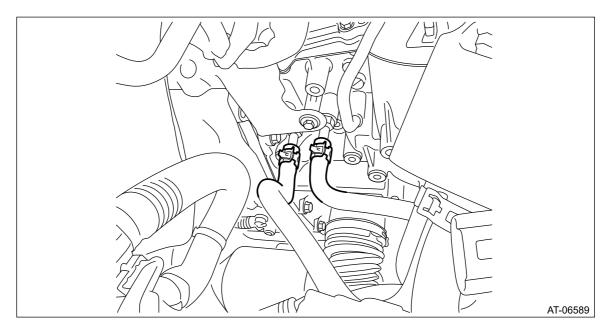
20. Install the engine ground terminals.

Tightening torque:

19 N·m (1.9 kgf-m, 14.0 ft-lb)



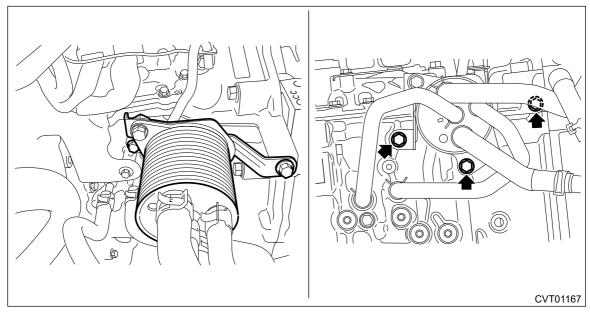
- **21.** Replace the CVTF inlet hose and CVTF outlet hose. <a> Ref. to CONTINUOUSLY VARIABLE CVTF Cooler (With Warmer Function)">TRANSMISSION(TR580)>CVTF Cooler (With Warmer Function).
- **22.** Install the CVTF inlet hose and CVTF outlet hose to transmission.



23. Install the CVTF cooler (with warmer feature) to the transmission.

Tightening torque:

23 N·m (2.3 kgf-m, 17.0 ft-lb)

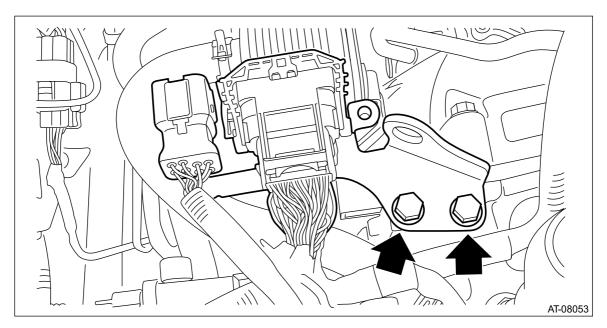


24. Install the starter. Ref. to STARTING/CHARGING SYSTEMS(H4DO)>Starter>INSTALLATION.

25. Install the engine rear hanger.

Tightening torque:

21 N·m (2.1 kgf-m, 15.5 ft-lb)



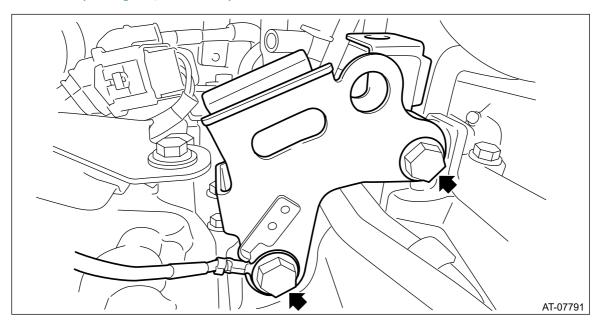
26. Install the pitching stopper bracket and transmission radio ground cord.

Caution:

Be careful not to deform or damage the terminal of transmission radio ground cord.

Tightening torque:

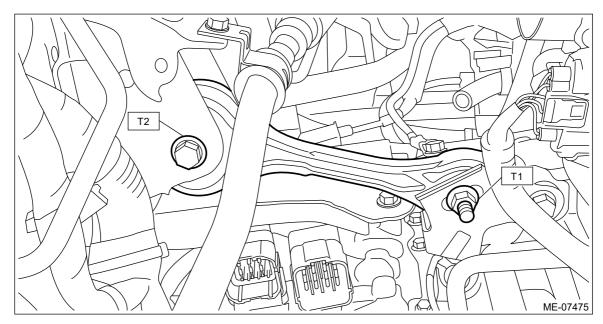
41 N·m (4.2 kgf-m, 30.2 ft-lb)



- **27.** Install the air breather hose to the pitching stopper bracket.
- 28. 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)



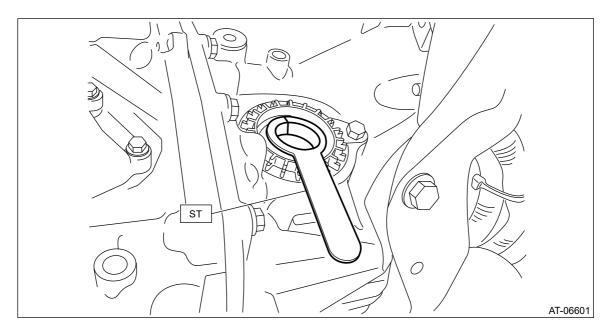
- **29.** Connect the EGR control valve harness connector, throttle position sensor harness connector and manifold absolute pressure sensor harness connector.
- **30.** Connect the engine harness connectors, then install the harness connector bracket.

Tightening torque:

7.5 N·m (0.8 kgf-m, 5.5 ft-lb)

- **31.** Lift up the vehicle.
- **32.** Apply grease to the side retainer oil seal lip.
- **33.** Set the ST to side retainer.

ST 28399SA010 OIL SEAL PROTECTOR



- **34.** Replace the circlip of the drive shaft with a new part.
- **35.** Insert the front drive shaft spline section into transmission and remove the ST (OIL SEAL PROTECTOR).

Note:

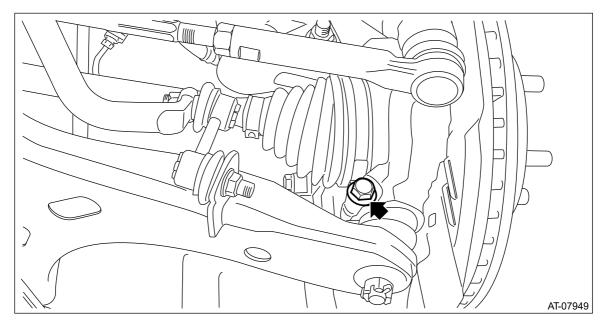
- Before inserting the RH front drive shaft into transmission, turn the steering wheel to the right hand at full lock.
- Before inserting the LH front drive shaft into transmission, turn the steering wheel to the left hand at full lock.
- **36.** Insert the drive shaft into the transmission securely by pressing the housing from outside of the vehicle.
- **37.** Insert the ball joint into housing and secure with bolt.

Tightening torque:

50 N·m (5.1 kgf-m, 36.9 ft-lb)

Caution:

- Do not apply grease to the tapered portion of ball stud.
- Before tightening, make sure the lower side of housing and stepped section of ball joint are in contact.



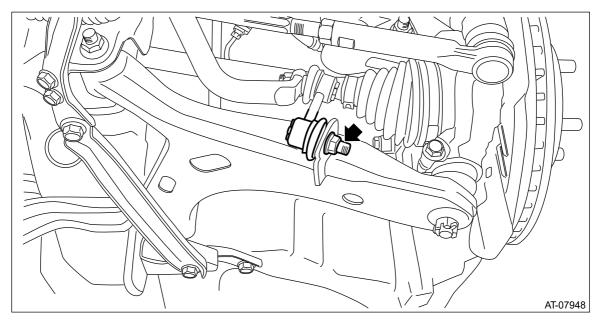
38. Attach the stabilizer link to the front arm.

Note

Use a new flange nut.

Tightening torque:

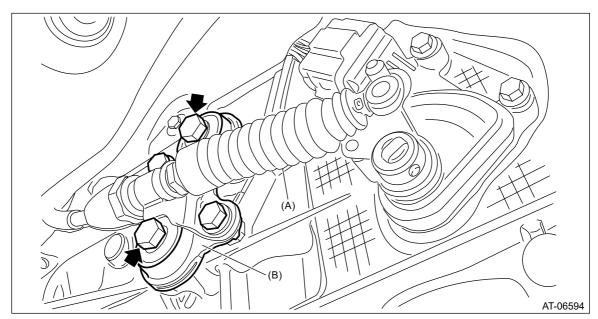
60 N·m (6.1 kgf-m, 44.3 ft-lb)



39. Install the plate assembly to transmission.

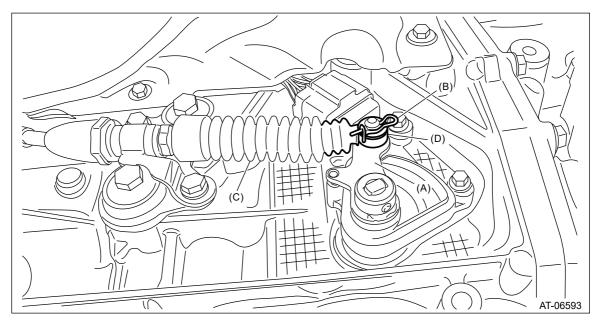
Tightening torque:

25 N·m (2.5 kgf-m, 18.4 ft-lb)



- (A) Select cable
- (B) Plate ASSY

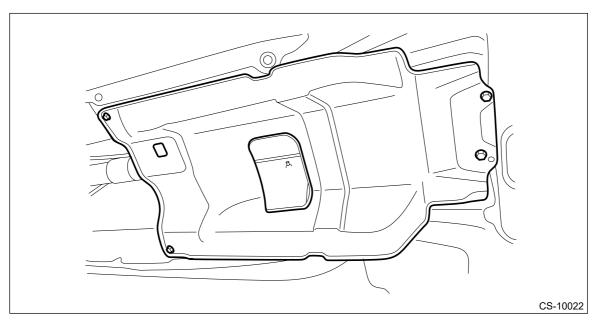
40. Install the washer and snap pin to the shifter arm.



- (A) Shifter arm
- (B) Snap pin
- (C) Select cable
- (D) Washer
- **41.** Install the propeller shaft. Ref. to DRIVE SHAFT SYSTEM>Propeller Shaft>INSTALLATION.
- **42.** Install the center exhaust cover.

Tightening torque:

18 N·m (1.8 kgf-m, 13.3 ft-lb)



- **43.** Install the center exhaust pipe. Ref. to EXHAUST(H4DO)>Center Exhaust Pipe>INSTALLATION.
- 44. Install the under cover front.
- 45. Install the under cover front transmission.

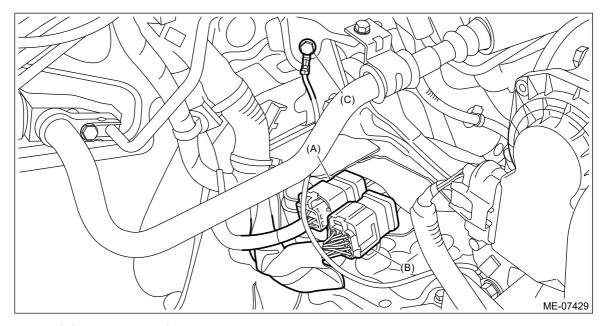
Tightening torque:

18 N·m (1.8 kgf-m, 13.3 ft-lb)

- 46. Lower the vehicle.
- **47.** Connect the following harness connectors.
 - · Transmission harness connectors
 - · Inhibitor harness connector
 - Transmission radio ground terminal

Tightening torque:

13 N·m (1.3 kgf-m, 9.6 ft-lb)



- (A) Transmission harness connectors
- (B) Inhibitor harness connector
- (C) Transmission radio ground terminal
- **48.** Install the air intake boot assembly. Ref. to INTAKE (INDUCTION)(H4DO)>Air Intake Boot>INSTALLATION.
- 49. Install the front tires. Ref. to WHEEL AND TIRE SYSTEM>Tire and Wheel>INSTALLATION.
- **50.** Connect the battery ground terminal.
- **51.** Refill differential gear oil to adjust the differential gear oil amount. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580) Differential Gear Oil.
- **52.** Refill CVTF to adjust the CVTF amount. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>CVTF>ADJUSTMENT.
- **53.** Using the Subaru Select Monitor, perform [Clear AT learning value] on [Work Support], and perform [AT learning mode]. Ref. to TRANSMISSION (DIAGNOSTICS)>Learning Control>PROCEDURE.
- **54.** Execute the rear differential inspection mode. Ref. to DIFFERENTIALS>Rear Differential Inspection Mode.

Caution:

Always execute the rear differential inspection mode at the replacement of the following.

Replacement of transmission assembly

- Replacement of front differential hypoid gear set
- **55.** Perform the road test to make sure there is no fault. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Road Test>INSPECTION.

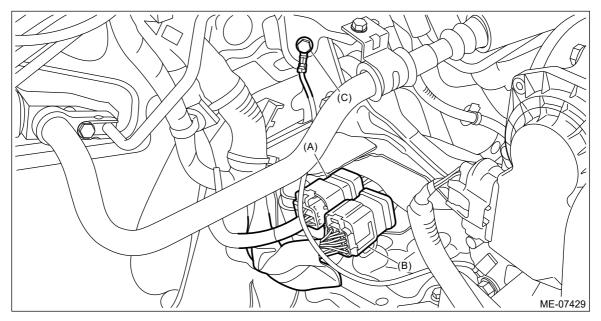
CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Automatic Transmission Assembly

REMOVAL

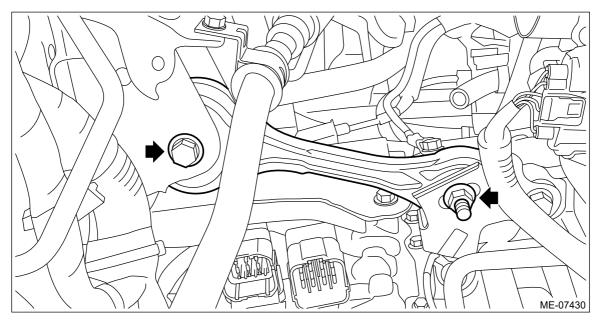
1. Disconnect the ground cable from battery. Ref. to NOTE>NOTE > BATTERY.

For model with battery sensor, disconnect the ground terminal from battery sensor.

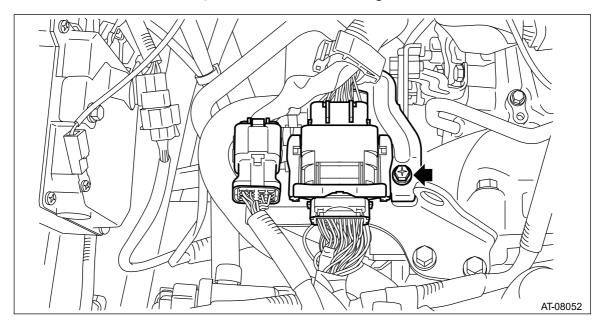
- 2. Remove the air intake boot assembly. Ref. to INTAKE (INDUCTION)(H4DO)>Air Intake Boot>REMOVAL.
- **3.** Disconnect the following connectors.
 - Transmission harness connectors
 - · Inhibitor harness connector
 - Transmission radio ground terminal



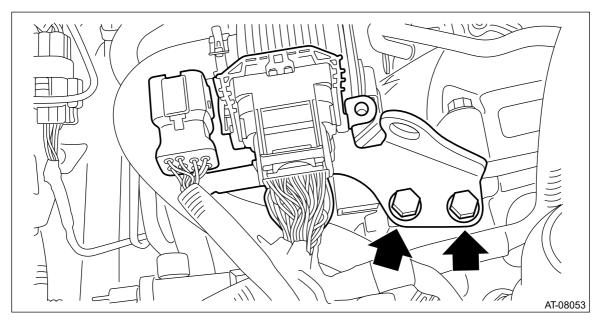
- (A) Transmission harness connectors
- (B) Inhibitor harness connector
- (C) Transmission radio ground terminal
- 4. Remove the starter. Remove the starter. Remove the starter.
- **5.** Remove the pitching stopper.



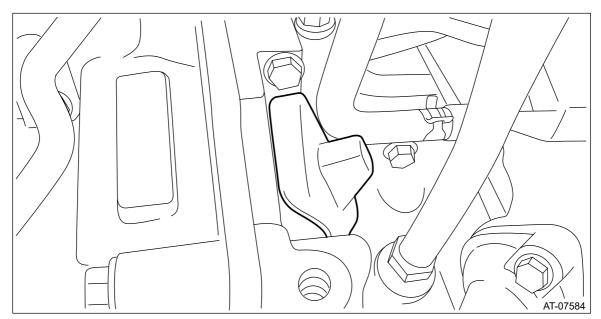
6. Remove the harness bracket, and then remove the engine harness connector.



- **7.** Disconnect the EGR control valve harness connector, throttle position sensor harness connector and manifold absolute pressure sensor harness connector.
- 8. Remove the engine rear hanger.



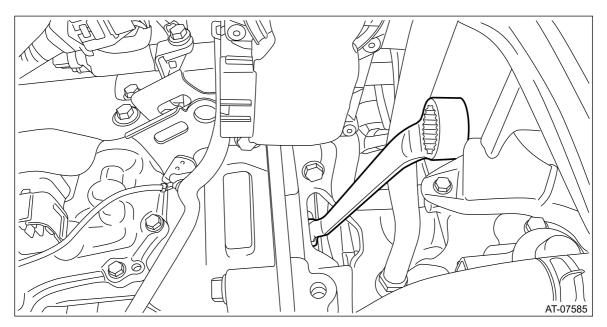
9. Remove the service hole plug.



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

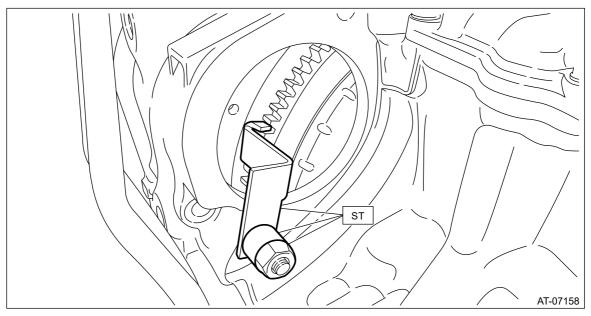
Caution:

- Be careful not to drop bolts into the converter housing.
- Be careful not to damage the mounting bolts.

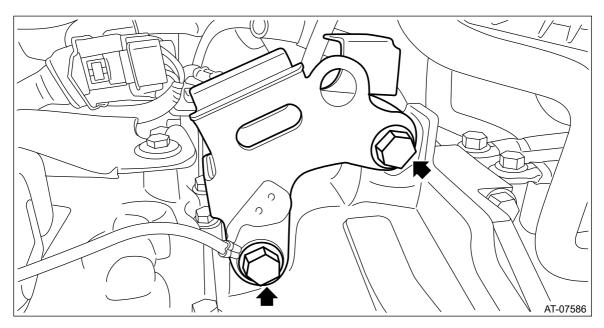


- **11.** Make sure the torque converter moves freely by rotating with finger through the starter installation hole.
- **12.** Attach the ST to the converter case.

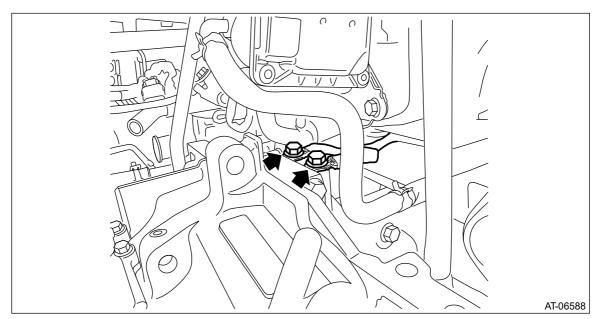
ST 498277200 STOPPER SET



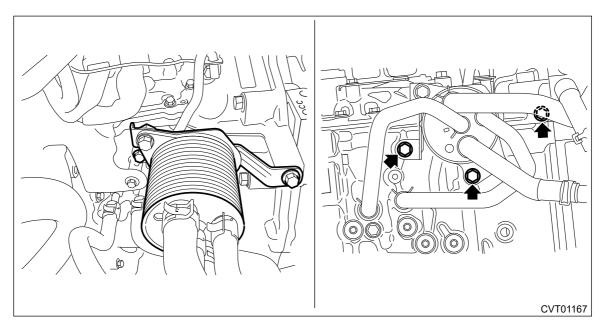
13. Remove the air breather hose from the pitching stopper bracket, and then remove the pitching stopper bracket and transmission radio ground cord.



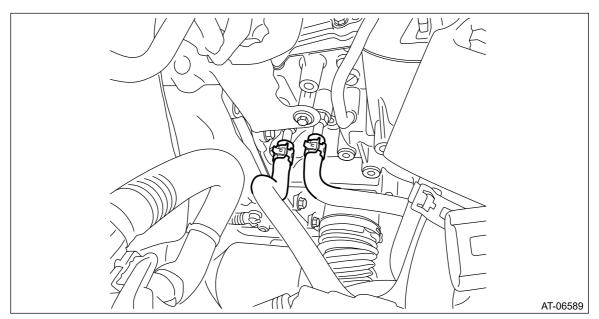
14. Remove the engine ground terminal.



15. Remove the CVTF cooler (with warmer feature) from the transmission, and using a piece of wire, affix to a location of the body where it will not interfere with the removal/installation of the transmission.



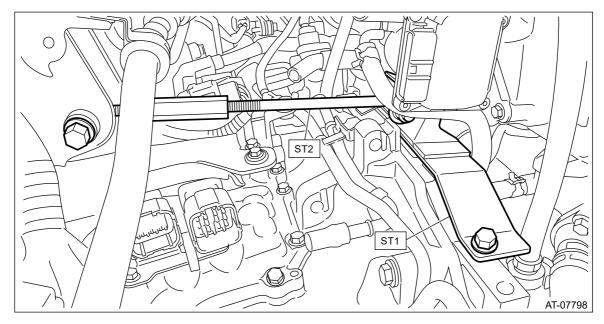
16. Remove the CVTF inlet hose and outlet hose from the pipe.



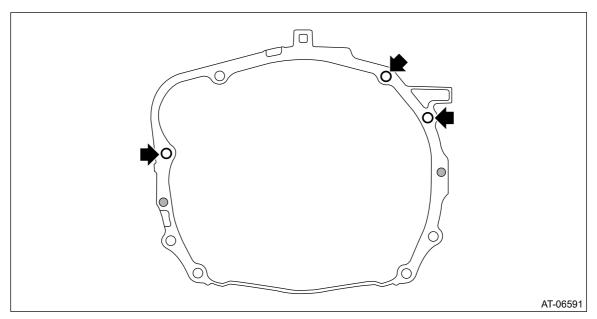
17. Set the ST.

ST1 41099AA012 ENGINE SUPPORT BRACKET

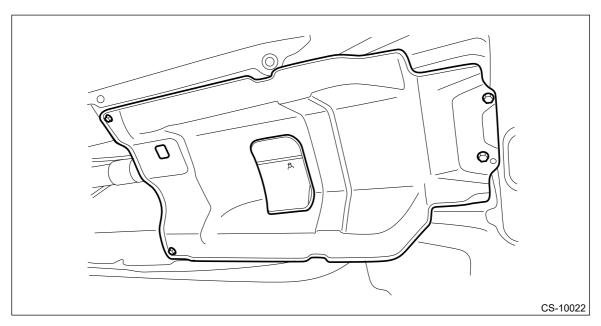
ST2 41099AA020 ENGINE SUPPORT



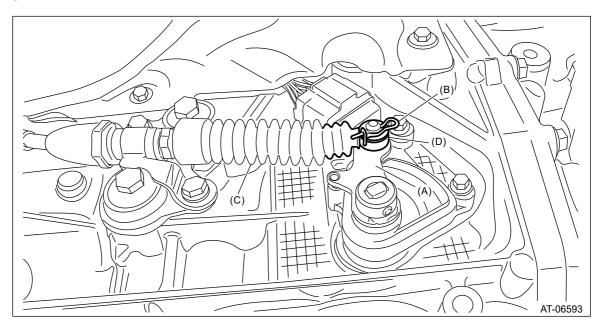
18. Remove the three transmission connecting bolts.



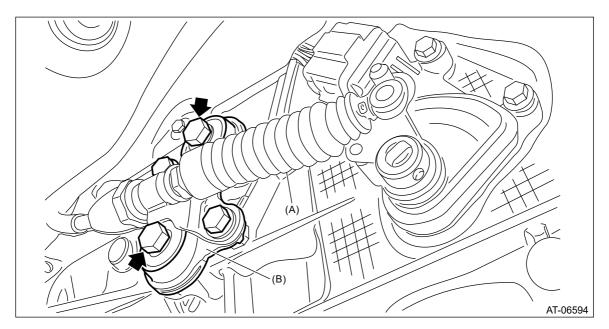
- 19. Lift up the vehicle.
- **20.** Remove the front tires. <a> Ref. to WHEEL AND TIRE SYSTEM>Tire and Wheel>REMOVAL.
- **21.** Remove the under cover front and the under cover front transmission.
- **22.** Remove the center exhaust pipe. Ref. to EXHAUST(H4DO)>Center Exhaust Pipe>REMOVAL.
- 23. Remove the center exhaust cover.



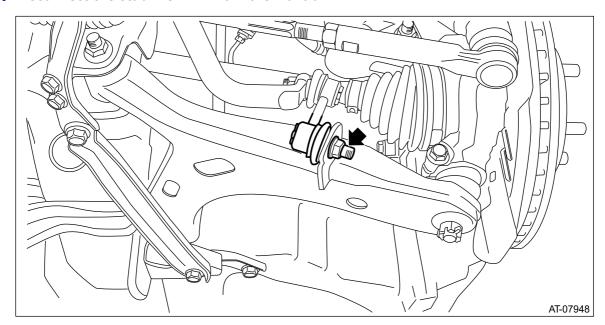
- **24.** Remove the CVTF drain plug to drain CVTF. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>CVTF>REPLACEMENT.
- **25.** Drain differential gear oil. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Differential Gear Oil>REPLACEMENT.
- **26.** Remove the snap pin and washer from shifter arm and remove the select cable from shifter arm.



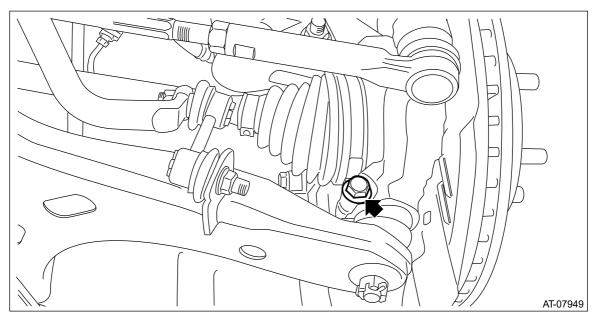
- (A) Shifter arm
- (B) Snap pin
- (C) Select cable
- (D) Washer
- **27.** Remove the plate assembly from the transmission case.



- (A) Select cable
- (B) Plate ASSY
- 28. Remove the propeller shaft. Remove the propeller shaft. Removal.
- **29.** Disconnect the stabilizer link from the front arm.



30. Remove the bolts which secure to the front housing, and separate the front arm and housing.



31. Using a tire lever or a crow bar, etc., pull out until the front drive shaft transmission side joint slides move smoothly.

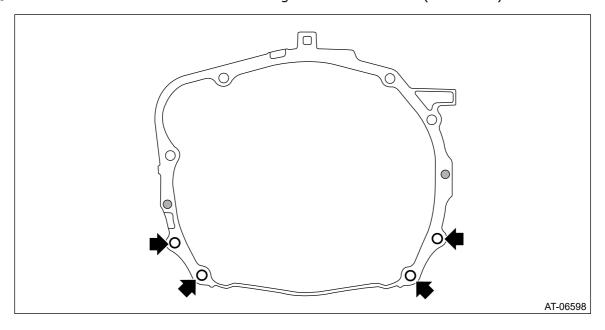
Note:

Place cloth between the tire lever or bar and the transmission in order to avoid damaging the transmission side retainer.

32. Hold the transmission side joint of the front drive shaft by hand and extract the housing from the transmission while pressing the housing outward, so as not to stretch the boot.

Note:

- Before pulling the RH front drive shaft from transmission, turn the steering wheel to the right hand at full lock.
- Before pulling the LH front drive shaft from transmission, turn the steering wheel to the left hand at full lock.
- 33. Remove the hanger bracket.
- **34.** Remove the two transmission connecting bolts and two nuts (lower side).

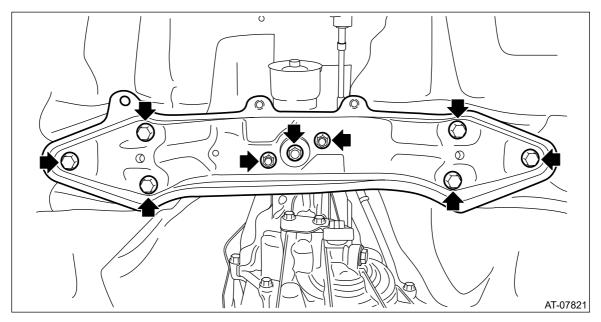


35. Set the transmission jack under the transmission.

Note:

Make sure that the support plates of transmission jack do not touch the oil pan.

36. Remove the transmission rear crossmember from the vehicle.

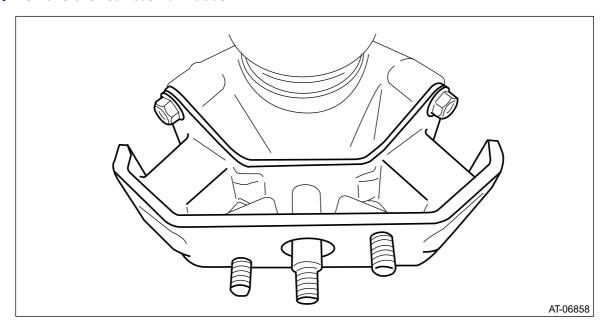


- **37.** While lowering the transmission jack gradually, fully retract the engine support, and then tilt the engine rearward.
- 38. Remove the transmission assembly.

Note:

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

39. Remove the rear cushion rubber.



CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > AWD ON/OFF Switching Mode

GENERAL DESCRIPTION

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

CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > AWD ON/OFF Switching Mode

PROCEDURE

Caution:

- Do not turn the power of the Subaru Select Monitor OFF during work, and do not disconnect the data link connector.
- · On completing the work in FWD, switch back in AWD.
- 1. Shift the select lever to "P" range.
- **2.** Connect the Subaru Select Monitor to data link connector.
- **3.** Turn the ignition switch to ON. (For model with push button start, press the push button ignition switch twice without depressing brake pedal.)
- **4.** Turn off all switches causing an electrical load, such as headlights, A/C, seat heater and rear defogger.
- 5. Select [Diagnosis] on [Start] display of Subaru Select Monitor.
- **6.** On [Vehicle selection] display, enter vehicle information and select [OK].
- 7. On [Main Menu] display, select [Each System].
- **8.** On [Select System] display, select [Transmission].
- **9.** On [Select Function] display, select [Work Support].
- 10. On [Work Support] display, select [AWD ON/OFF switching mode].
- **11.** Follow the messages displayed on the Subaru Select Monitor screen when working. Switching completes successfully if any of the following messages is displayed.
 - When switching from AWD to FWD: «Switched to FF. To return to AWD, perform basic mode again.»
 - When switching from FWD to AWD: «Switched to AWD. To return to FF, perform basic mode again.»

Note:

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

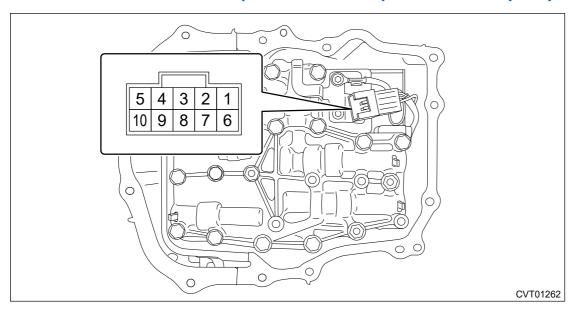
CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Control Valve Body

INSPECTION

- Check each part for damage or dust.
- Measure the resistance of each solenoid, sensor and ground wire.

Note:

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



Solenoid

Solciiola		
Solenoid	Terminal No.	Standard
Primary UP solenoid	No. 2 — Control valve body	Approx. $10 - 13.5 Ω$
Secondary solenoid	No. 3 — Control valve body	Approx. 5 $-$ 7 Ω
F&R clutch solenoid	No. 4 — Control valve body	Approx. 4 $-$ 6 Ω
Primary DOWN solenoid	No. 7 — Control valve body	Approx. $10 - 13.5 Ω$
Lock-up duty solenoid	No. 9 — Control valve body	Approx. $10 - 13.5 Ω$
AWD solenoid	No. 10 — Control valve body	Approx. 2 — 4.5 Ω

Oil temperature sensor

Sensor	Terminal No.	Standard At 20°C (68°F)
Oil temperature sensor	No. 1 — No. 6	Approx. 2.5 kΩ

Transmission ground

Terminal No.	Standard
No. 8 — Control valve body	Less than 1 Ω

CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Control Valve Body

INSTALLATION

1. Clean the mating surface of valve cover and transmission side.

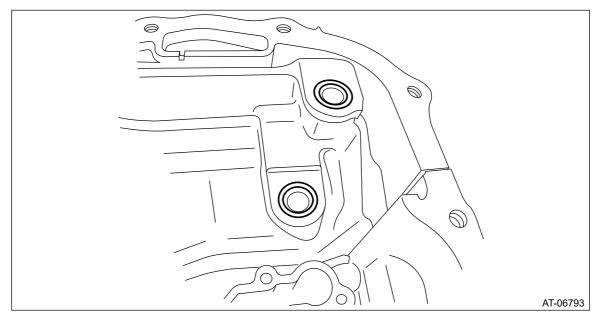
Caution:

When cleaning the mating surface of the transmission side, be careful not to allow any dust, foreign matter and used liquid gasket to enter the transmission.

- 2. Check the control valve body for dust and other foreign matter.
- 3. Install the O-rings.

Note:

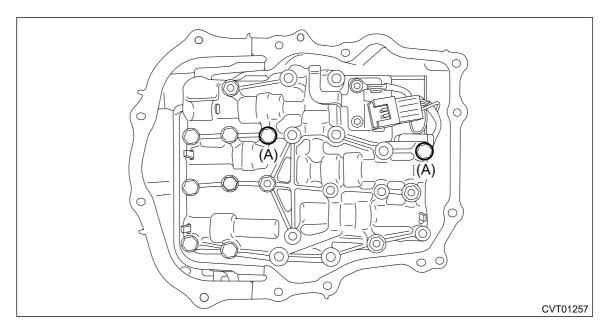
- Use new O-rings.
- Apply CVTF to the O-rings.



- 4. Install the control valve body.
 - (1) Install the control valve body to the transmission.

Caution:

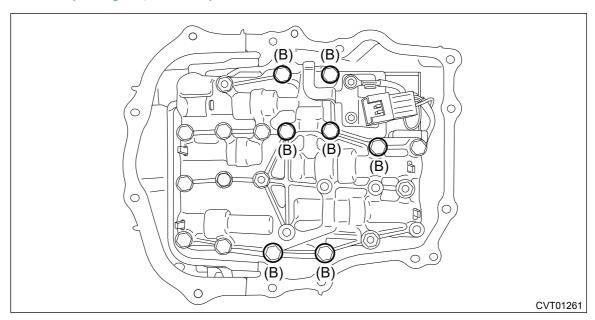
- Do not damage the O-ring.
- Perform installation so that the O-ring is not displaced.
- (2) Temporarily tighten the bolt (A: silver).



(3) Attach the bolt (B).

Tightening torque:

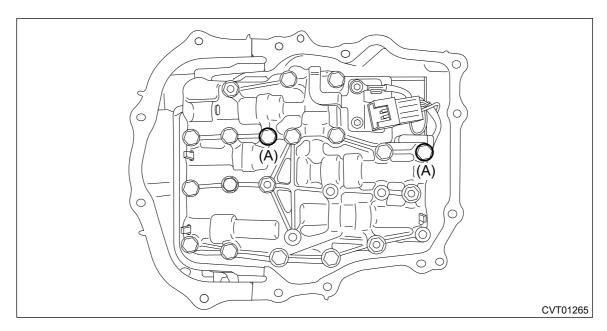
9 N·m (0.9 kgf-m, 6.6 ft-lb)



(4) Tighten the bolt (A: silver).

Tightening torque:

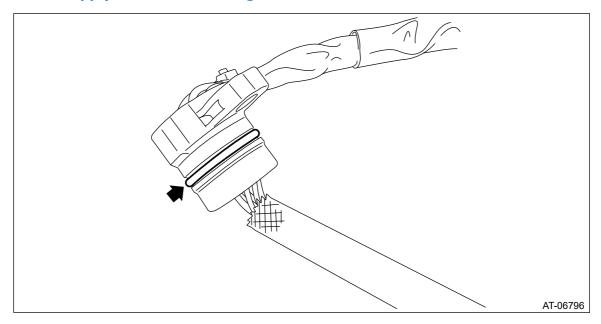
9 N·m (0.9 kgf-m, 6.6 ft-lb)



5. Install the O-ring to the transmission harness.

Note:

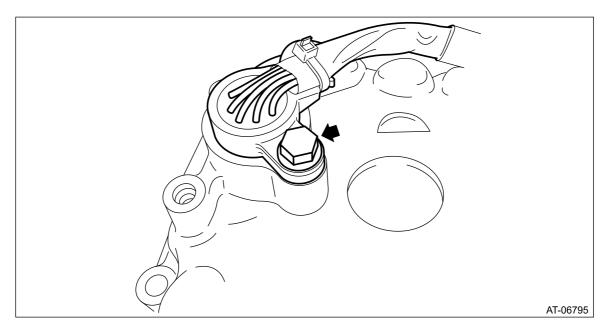
- Use new O-rings.
- Apply CVTF to the O-rings.



6. Install the transmission harness to the valve cover.

Tightening torque:

7 N·m (0.7 kgf-m, 5.2 ft-lb)



7. Install the gasket to the transmission.

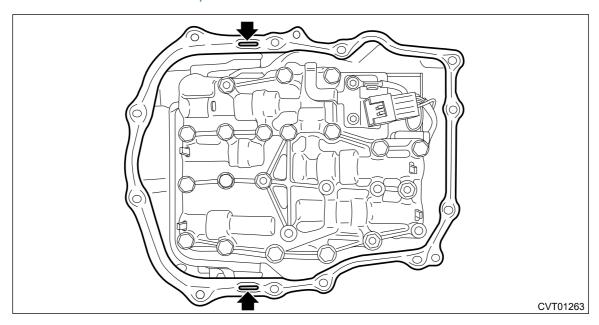
Note:

Use a new gasket.

8. Apply liquid gasket to the oval hole of gasket.

Liquid gasket:

THREE BOND 1215B or equivalent



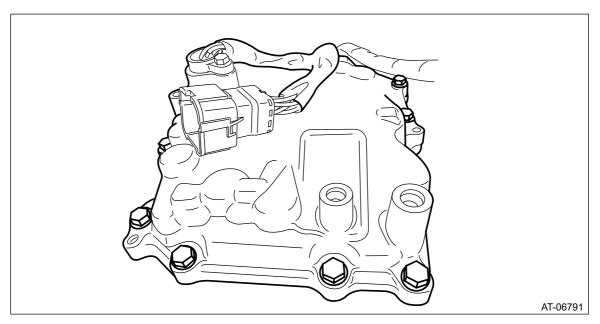
9. Connect the transmission harness connector to the control valve body, and install the valve cover.

Caution:

Be careful not to catch the sheet of the ST.

Tightening torque:

8 N·m (0.8 kgf-m, 5.9 ft-lb)



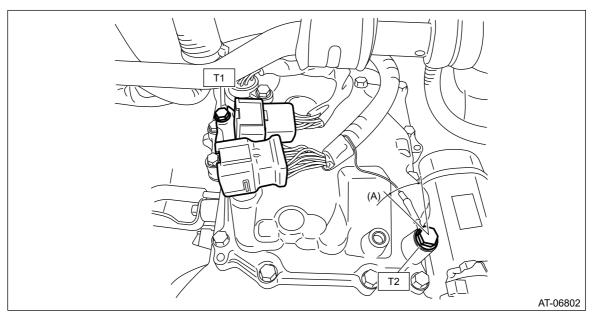
- 10. Remove the ST (SHEET SPECIAL TOOL).
- **11.** Install the throttle body. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DO)>Throttle Body>INSTALLATION.
- 12. Install the transmission harness connector to the harness stay.
- 13. Install the transmission harness stay and transmission ground terminal.

Note:

Install the transmission ground terminal in the direction within the range of approx. 30° (A).

Tightening torque:

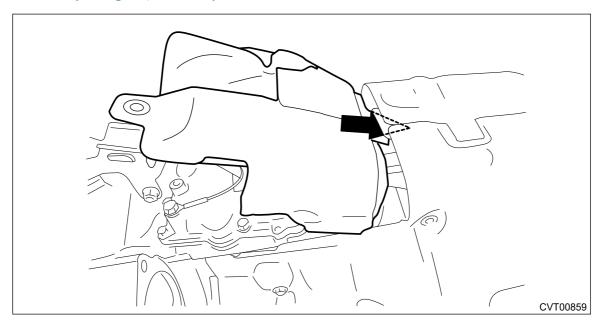
T1: 7 N·m (0.7 kgf-m, 5.2 ft-lb) T2: 14 N·m (1.4 kgf-m, 10.3 ft-lb)

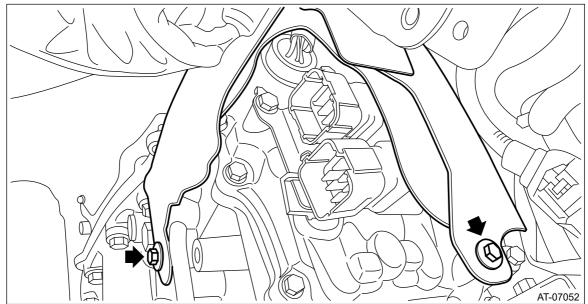


14. Insert the transmission case cover (small) between transmission case cover (large) and transmission to install.

Tightening torque:

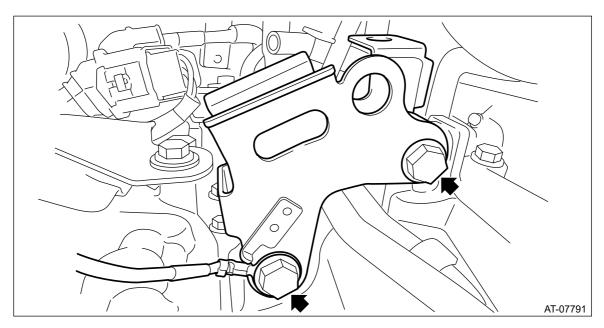
8 N·m (0.8 kgf-m, 5.9 ft-lb)





15. Install the pitching stopper bracket and transmission radio ground cord. **Tightening torque:**

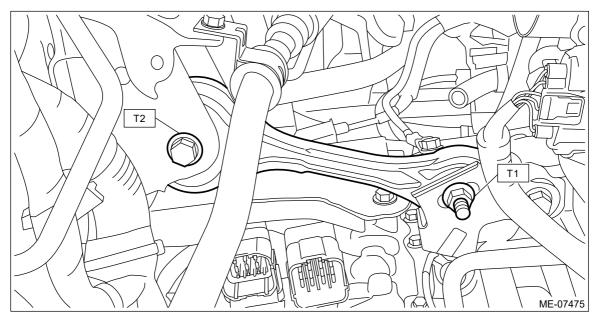
41 N·m (4.2 kgf-m, 30.2 ft-lb)



- **16.** Install the air breather hose to the pitching stopper bracket.
- 17. Install the pitching stopper.

Tightening torque:

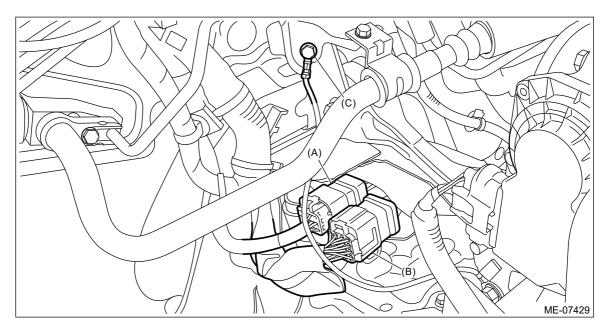
T1: 50 N·m (5.1 kgf-m, 36.9 ft-lb) T2: 58 N·m (5.9 kgf-m, 42.8 ft-lb)



- 18. Connect the following harness connectors.
 - · Transmission harness connectors
 - Inhibitor harness connector
 - Transmission radio ground terminal

Tightening torque:

13 N·m (1.3 kgf-m, 9.6 ft-lb)



- (A) Transmission harness connectors
- (B) Inhibitor harness connector
- (C) Transmission radio ground terminal
- 19. Install the air intake boot assembly. Ref. to INTAKE (INDUCTION)(H4DO)>Air Intake Boot>INSTALLATION.
- **20.** Adjust the amount of CVTF. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>CVTF>ADJUSTMENT.
- **21.** Using the Subaru Select Monitor, perform [Clear AT learning value] on [Work Support], and perform [AT learning mode]. Ref. to TRANSMISSION (DIAGNOSTICS)>Learning Control>PROCEDURE.

CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Control Valve Body

REMOVAL

Caution:

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

Note:

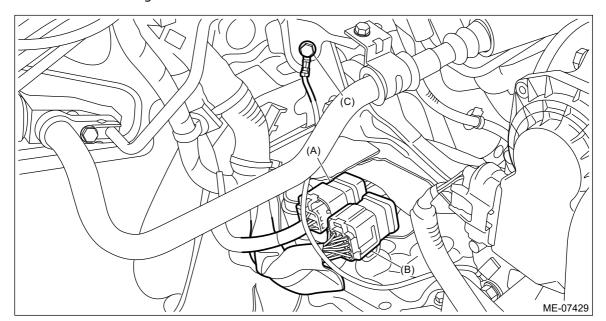
The control valve body is replaced as an assembly only, because it is a nondisassembly part.

1. Disconnect the ground cable from battery. <a> Ref. to NOTE>NOTE > BATTERY.

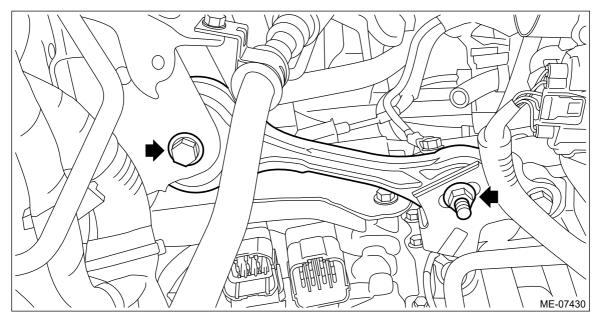
Note:

For model with battery sensor, disconnect the ground terminal from battery sensor.

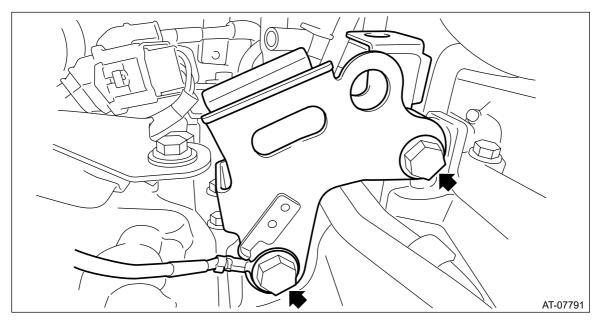
- 2. Remove the air intake boot assembly. Ref. to INTAKE (INDUCTION)(H4DO)>Air Intake Boot>REMOVAL.
- 3. Disconnect the following connectors.
 - Transmission harness connectors
 - · Inhibitor harness connector
 - · Transmission radio ground terminal



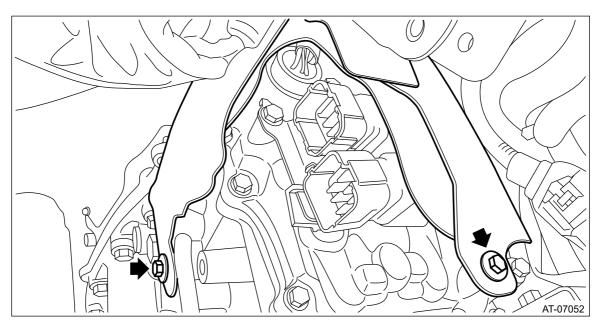
- (A) Transmission harness connectors
- (B) Inhibitor harness connector
- (C) Transmission radio ground terminal
- **4.** Remove the pitching stopper.



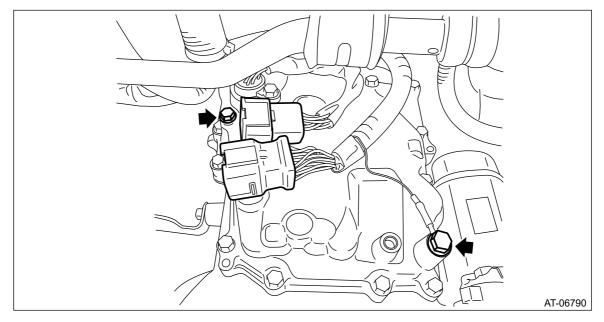
5. Remove the air breather hose from the pitching stopper bracket, and then remove the pitching stopper bracket and transmission radio ground cord.



6. Remove the transmission case cover.



7. Remove the transmission harness stay and ground terminal.



- **8.** Remove the transmission harness connector from the harness stay.
- **9.** Remove the throttle body, and move it aside so that it will not interfere with the removal of the control valve. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DO)>Throttle Body>REMOVAL.

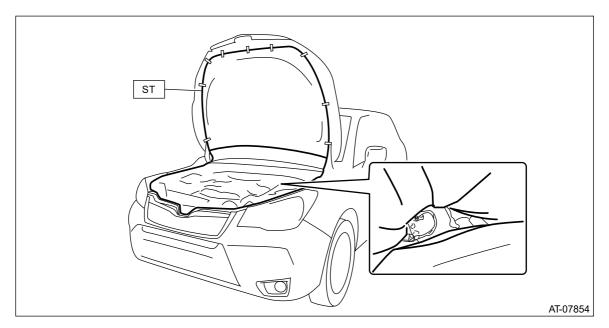
Do not remove the preheater hose.

- 10. Clean the transmission exterior.
- 11. Fix the ST with tape, and set the ST to the vehicle.

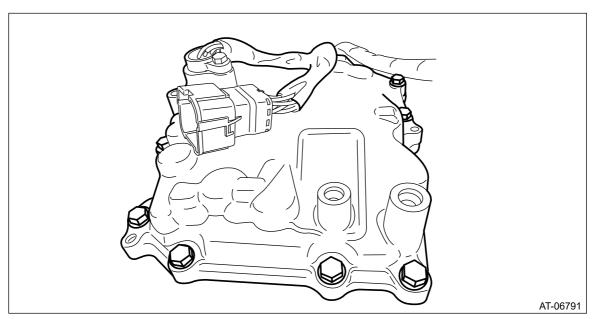
Note:

When replacing the control valve body, the sheet is included in the control valve body for repairs.

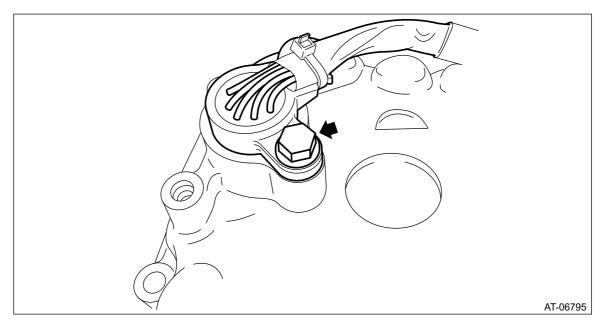
ST 18761AA010 SHEET SPECIAL TOOL



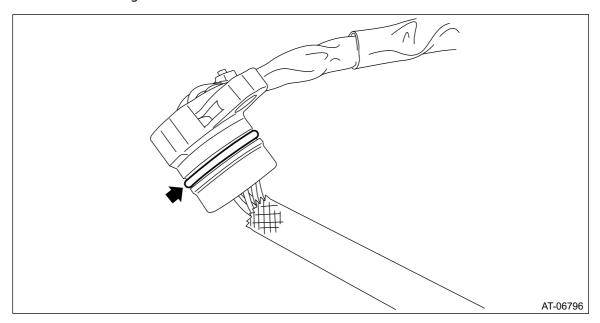
12. Remove the valve cover and gasket.



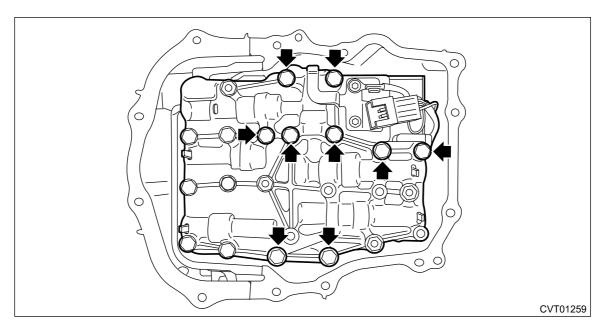
- 13. Disconnect the harness connector from the control valve body.
- 14. Remove the transmission harness from the valve cover.



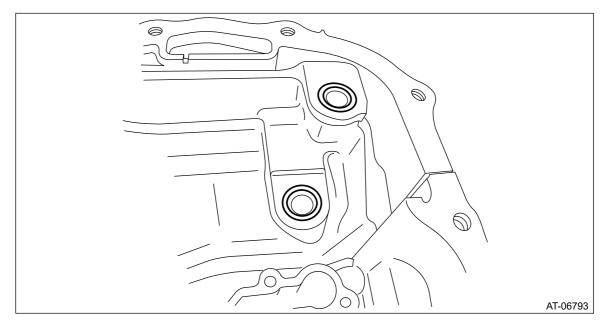
15. Remove the O-ring from the transmission harness.



16. Remove the control valve body.



17. Remove the O-ring from the transmission.



CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Converter Case

ASSEMBLY

1. Install the oil drain plug.

Tightening torque:

70 N·m (7.1 kgf-m, 51.6 ft-lb)

2. Install the overflow drain plug.

Note:

Overflow drain plug of differential gear oil is temporarily attached.

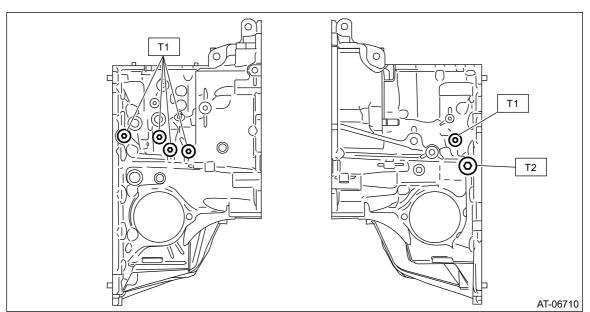
3. Install all plugs.

Note:

Use new O-rings.

Tightening torque:

T1: 22 N·m (2.2 kgf-m, 16.2 ft-lb) T2: 22.5 N·m (2.3 kgf-m, 16.6 ft-lb)



4. Install the pitching stopper bracket and transmission radio ground cord.

Caution:

Be careful not to deform or damage the terminal of transmission radio ground cord.

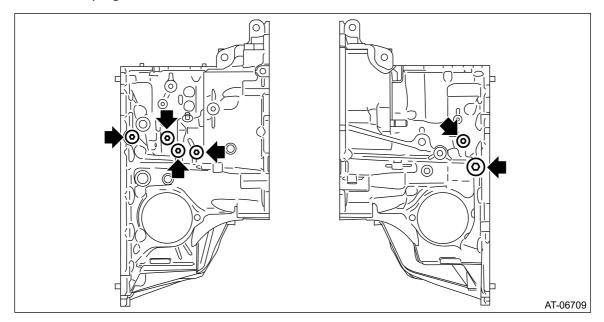
Tightening torque:

41 N·m (4.2 kgf-m, 30.2 ft-lb)

CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Converter Case

DISASSEMBLY

- 1. Remove the pitching stopper bracket and transmission radio ground cord, if mounted.
- 2. Remove the filler plug, oil drain plug and overflow drain plug. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Differential Gear Oil>REPLACEMENT.
- **3.** Remove all plugs.



CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Converter Case

INSPECTION

- Check for leakage of CVTF from the connection between converter case and transmission case.
- Check there is no damage or cracks on the converter case.

CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Converter Case

INSTALLATION

- 1. Install the oil pump. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Oil Pump>INSTALLATION.
- **2.** Install the oil pump chain cover. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Oil Pump Chain>INSTALLATION.
- **3.** Install the front differential assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Front Differential Assembly>INSTALLATION.
- **4.** Install the drive pinion shaft assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Drive Pinion Shaft Assembly>INSTALLATION.
- **5.** Install the forward clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Forward Clutch Assembly>INSTALLATION.
- **6.** Install the reverse brake assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Reverse Brake Assembly>INSTALLATION.
- 7. Install the primary pulley, secondary pulley and variator chain. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Primary Pulley and Secondary Pulley>INSTALLATION.
- **8.** Install the reduction drive gear. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Reduction Drive Gear>INSTALLATION.
- **9.** Install the transmission case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transmission Case>INSTALLATION.
- **10.** Install the transmission control device. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transmission Control Device>INSTALLATION.
- 11. Install the oil strainer and oil pan. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Oil Pan and Strainer>INSTALLATION.
- **12.** Install the reduction driven gear assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Reduction Driven Gear>INSTALLATION.
- 13. Install the parking pawl. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Parking Pawl>INSTALLATION.
- **14.** Install the transfer driven gear assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transfer Driven Gear>INSTALLATION.
- **15.** Install the transfer clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transfer Clutch>INSTALLATION.
- **16.** Install the extension case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Extension Case>INSTALLATION.
- 17. Install the inhibitor switch. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Inhibitor Switch>INSTALLATION.
- 18. Install the secondary speed sensor. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Secondary Speed Sensor>INSTALLATION.
- 19. Install the primary speed sensor. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Primary Speed Sensor>INSTALLATION.
- **20.** Install the turbine speed sensor. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Turbine Speed Sensor>INSTALLATION.
- **21.** Install the transmission harness. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transmission Harness>INSTALLATION.

- **22.** Install the control valve body. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Control Valve Body>INSTALLATION.
- **23.** Install the air breather hose. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Air Breather Hose>INSTALLATION.
- **24.** Install the transmission assembly to the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Automatic Transmission Assembly>INSTALLATION.

CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Converter Case

REMOVAL

- 1. Remove the transmission assembly from the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Automatic Transmission Assembly>REMOVAL.
- **2.** Remove the air breather hose. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Air Breather Hose>REMOVAL.
- **3.** Remove the control valve body. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Control Valve Body>REMOVAL.
- **4.** Remove the transmission harness. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transmission Harness>REMOVAL.
- **5.** Remove the turbine speed sensor. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Turbine Speed Sensor>REMOVAL.
- **6.** Remove the secondary speed sensor. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Secondary Speed Sensor>REMOVAL.
- **7.** Remove the primary speed sensor. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Primary Speed Sensor>REMOVAL.
- **8.** Remove the inhibitor switch. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Inhibitor Switch>REMOVAL.
- **9.** Remove the extension case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Extension Case>REMOVAL.
- **10.** Remove the transfer clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transfer Clutch>REMOVAL.
- **11.** Remove the transfer driven gear assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transfer Driven Gear>REMOVAL.
- **12.** Remove the parking pawl. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Parking Pawl>REMOVAL.
- **13.** Remove the reduction driven gear assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Reduction Driven Gear>REMOVAL.
- **14.** Remove the oil pan and oil strainer. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Oil Pan and Strainer>REMOVAL.
- **15.** Remove the transmission control device. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transmission Control Device>REMOVAL.
- **16.** Remove the transmission case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transmission Case>REMOVAL.
- **17.** Remove the reduction drive gear. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Reduction Drive Gear>REMOVAL.
- 18. Remove the primary pulley, secondary pulley and variator chain. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Primary Pulley and Secondary Pulley>REMOVAL.
- **19.** Remove the reverse brake assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Reverse Brake Assembly>REMOVAL.
- **20.** Remove the forward clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Forward Clutch Assembly>REMOVAL.
- **21.** Remove the drive pinion shaft assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Drive Pinion Shaft Assembly>REMOVAL.

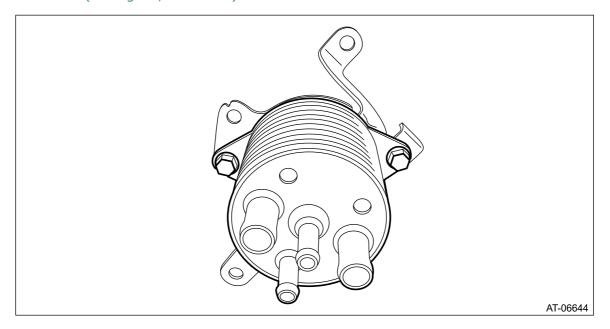
- **22.** Remove the front differential assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Front Differential Assembly>REMOVAL.
- **23.** Remove the oil pump chain cover. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Oil Pump Chain>REMOVAL.
- **24.** Remove the oil pump. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Oil Pump>REMOVAL.

ASSEMBLY

1. Attach the bracket.

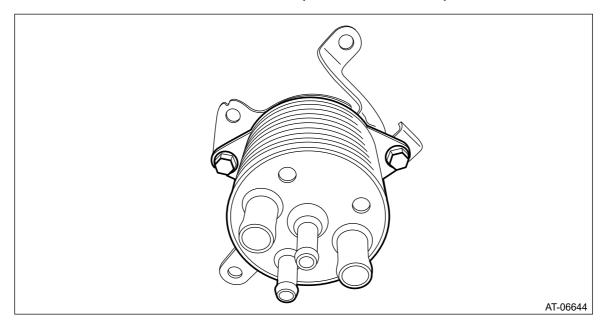
Tightening torque:

23 N·m (2.3 kgf-m, 17.0 ft-lb)



DISASSEMBLY

1. Remove the bracket from the CVTF cooler (with warmer feature).



INSPECTION

Replace any faulty CVTF cooler hoses and clamps found in the inspection below.

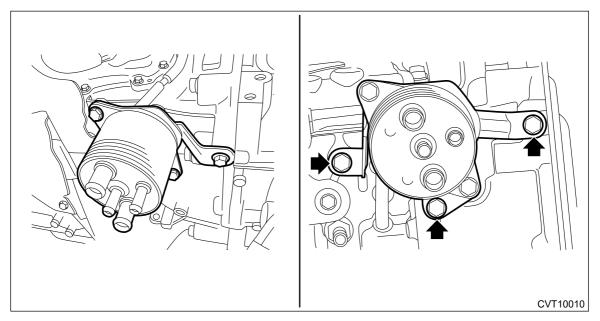
- 1. Check that there are no CVTF or engine coolant leaks from the connections.
- 2. Check the clamp for deformation.
- 3. Lightly bend the CVTF cooler hose and check for cracks in the surface or other damages.
- **4.** Pinch the CVTF cooler hose with your fingers and check for poor elasticity. Also check for poor elasticity in the parts where the clamp was installed by pressing with your fingernail.
- **5.** Check for peeling, cracks, and deformation at the tip of the hose.
- **6.** Check the CVTF cooler (with warmer feature) for any damage.

INSTALLATION

1. Install the CVTF cooler (with warmer feature) to the transmission.

Tightening torque:

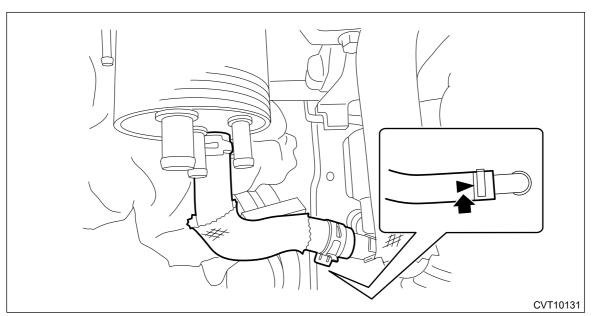
23 N·m (2.3 kgf-m, 17.0 ft-lb)



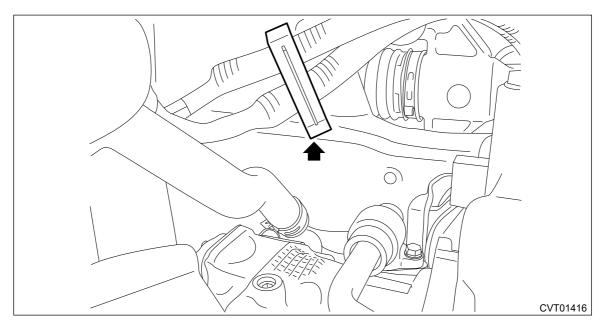
2. Install the engine coolant inlet hose to the engine coolant pipe.

Note:

With the triangle mark on the engine coolant inlet hose facing the vehicle outside, install the hose to the engine side pipe.



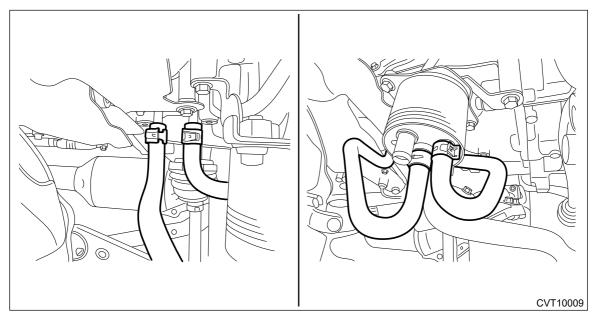
3. Secure the electric power steering harness with the clip.



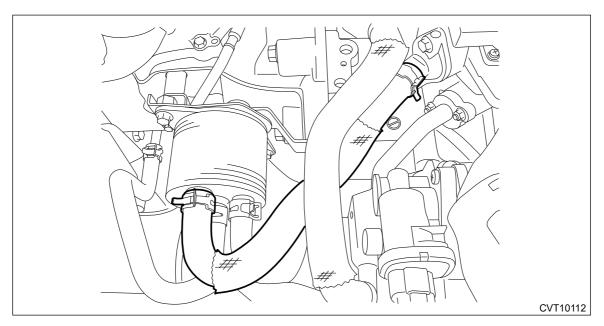
4. Install the CVTF inlet hose and CVTF outlet hose to transmission.

Note:

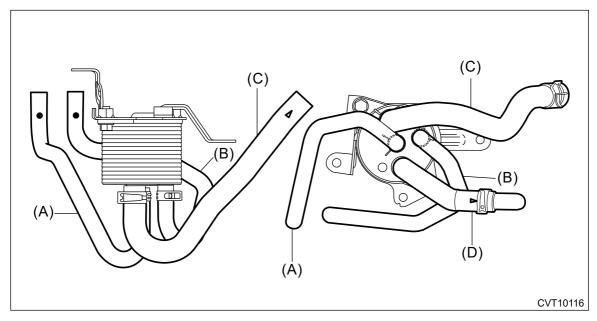
Use the new CVTF inlet hose and CVTF outlet hose.



5. Connect the engine coolant outlet hose.



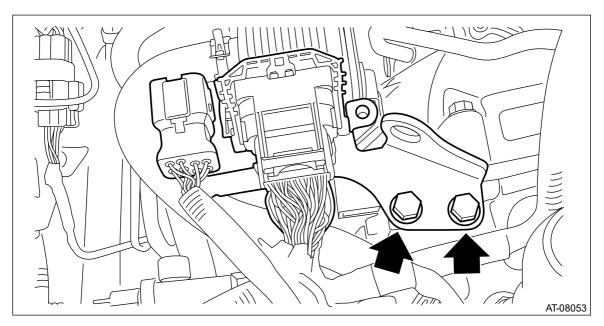
- 6. Check installation condition of each hose.
 - Make sure the hoses do not interfere with each other or with other components.
 - Check each hose for bent, excess curve, and twisting conditions.



- (A) CVTF cooler inlet hose
- (B) CVTF cooler outlet hose
- (C) Engine coolant outlet hose
- (D) Engine coolant inlet hose
- 7. Install the engine rear hanger.

Tightening torque:

21 N·m (2.1 kgf-m, 15.5 ft-lb)



- **8.** Connect the EGR control valve harness connector, throttle position sensor harness connector and manifold absolute pressure sensor harness connector.
- **9.** Connect the engine harness connectors, then install the harness connector bracket. **Tightening torque:**

Harness connector bracket 7.5 N·m (0.8 kgf-m, 5.5 ft-lb)

- **10.** Install the air intake boot assembly. Ref. to INTAKE (INDUCTION)(H4DO)>Air Intake Boot>INSTALLATION.
- **11.** Connect the battery ground terminal.
- 12. Fill engine coolant. Ref. to COOLING(H4DO)>Engine Coolant>REPLACEMENT.
- 13. Adjust the CVTF level. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>CVTF>ADJUSTMENT.

REMOVAL

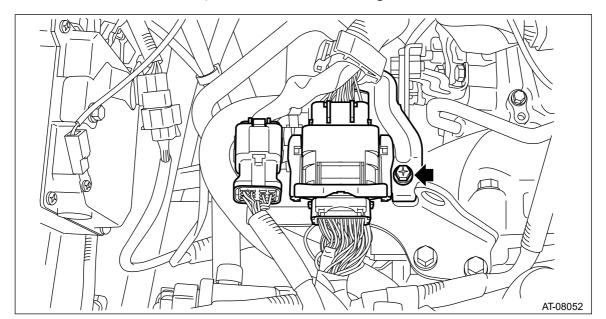
Caution:

If the CVTF and engine coolant is spilt over exhaust pipe, wipe it off with cloth to avoid emitting smoke or causing a fire.

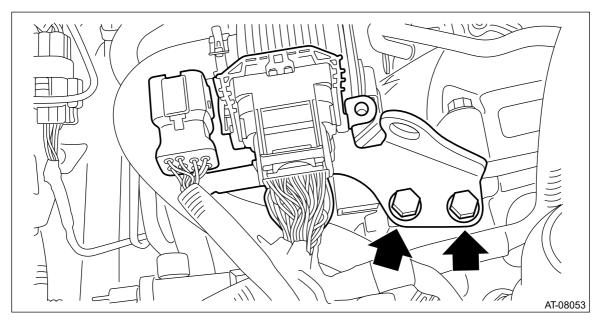
1. Disconnect the ground cable from battery. Ref. to NOTE>NOTE > BATTERY.

For model with battery sensor, disconnect the ground terminal from battery sensor.

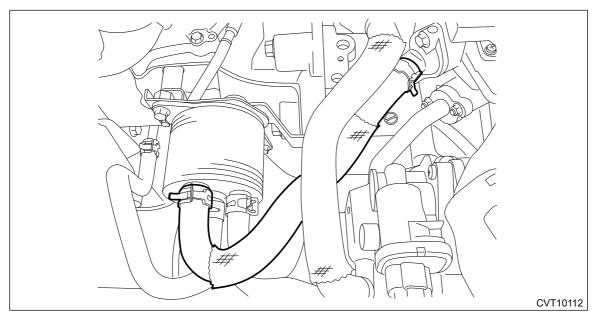
- 2. Drain engine coolant. Ref. to COOLING(H4DO)>Engine Coolant>REPLACEMENT.
- **3.** Remove the air intake boot assembly. Ref. to INTAKE (INDUCTION)(H4DO)>Air Intake Boot>REMOVAL.
- 4. Remove the harness bracket, and then remove the engine harness connector.



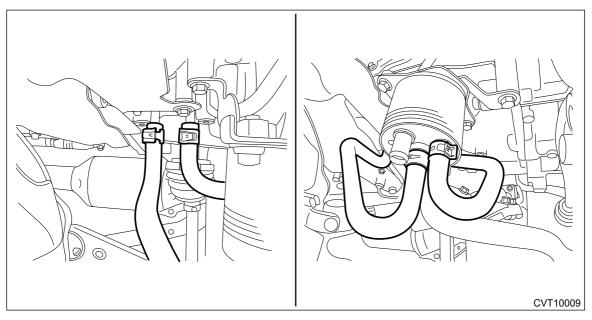
- **5.** Disconnect the EGR control valve harness connector, throttle position sensor harness connector and manifold absolute pressure sensor harness connector.
- **6.** Remove the engine rear hanger.



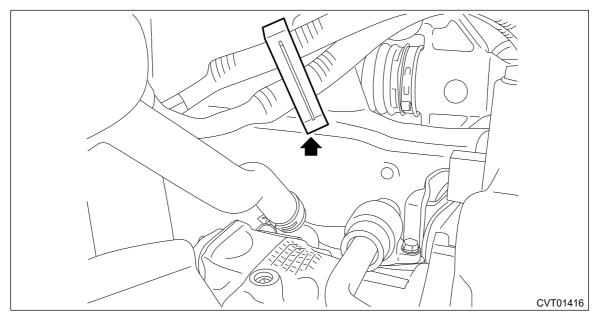
7. Remove the engine coolant outlet hose.



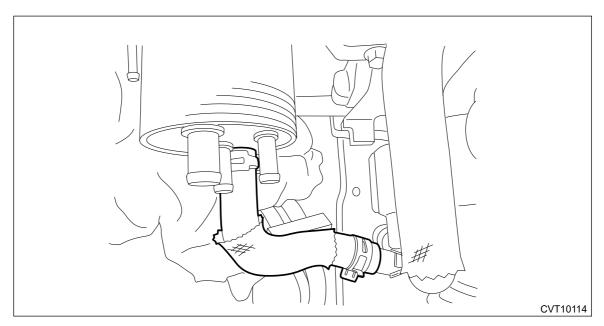
8. Remove the CVTF inlet hose and outlet hose.



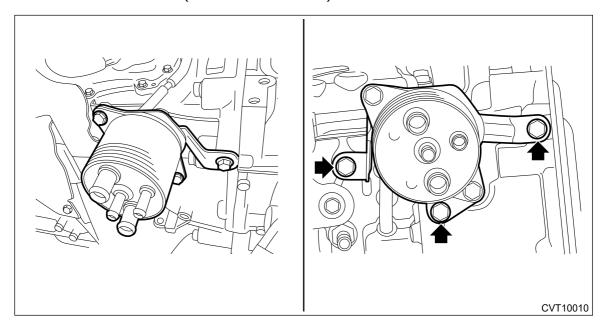
9. Remove the electric power steering harness from the clip.



10. Remove the engine coolant inlet hose.



11. Remove the CVTF cooler (with warmer feature) from the transmission.



INSPECTION

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

INSTALLATION

Note:

For installation of CVTF filter, refer to "Transmission Case". Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transmission Case>ASSEMBLY.
Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transmission
Case>INSTALLATION.

REMOVAL

Note:

- Although CVTF filter is a maintenance-free part, replace it if a large quantity of wear debris and metal particles are found in CVTF and CVTF filter.
- For removal of CVTF filter, refer to "Transmission Case". Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transmission Case>REMOVAL. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transmission Case>DISASSEMBLY.

ADJUSTMENT

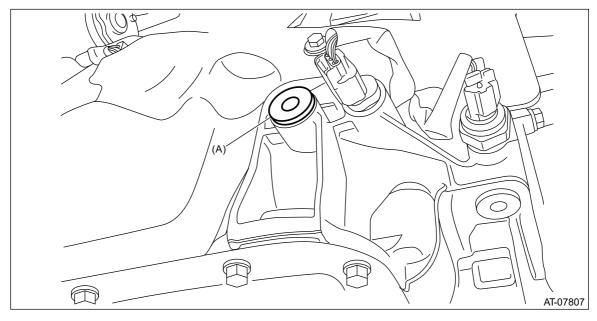
Caution:

- CVTF level changes along with CVTF temperature. When inspecting CVTF level, observe the specified CVTF temperature.
- Always use specified CVTF. Using other fluid will cause malfunction.
- **1.** Idle the engine to raise CVTF temperature to $35-45^{\circ}$ C ($95-113^{\circ}$ F) on Subaru Select Monitor.
- **2.** Operate the select lever in $P \to R \to N \to D$ and $D \to N \to R \to P$ to circulate CVTF with the engine idling.
- **3.** Lift up the vehicle while the engine is running.
- 4. Remove the under cover front transmission.
- **5.** Remove the filler plug.

Caution:

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

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



(A) Filler plug

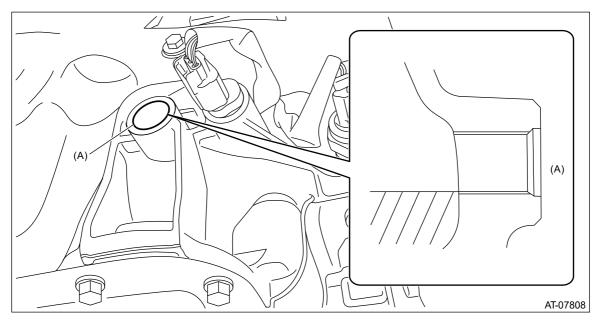
6. When there is no CVTF leakage from the transmission, add the specified fluid up to the filler plug hole lower section.

Specified fluid:

Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>General Description>SPECIFICATION > HYDRAULIC CONTROL AND LUBRICATION.

Caution:

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



(A) Filler plug hole

7. Install the filler plug.

Note:

Use a new gasket.

Tightening torque:

50 N·m (5.1 kgf-m, 36.9 ft-lb)

8. Install the under cover front - transmission.

Tightening torque:

18 N·m (1.8 kgf-m, 13.3 ft-lb)

CONDITION CHECK

Note:

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

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

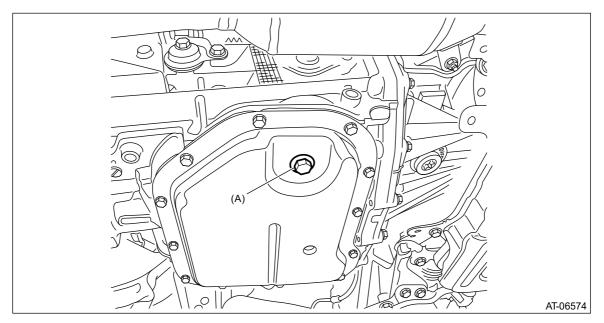
INSPECTION

Check for leakage of CVTF from transmission.

REPLACEMENT

Caution:

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



(A) CVTF drain plug

- **4.** Check the CVTF condition. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>CVTF>CONDITION CHECK.
- 5. Install the CVTF drain plug and gasket.

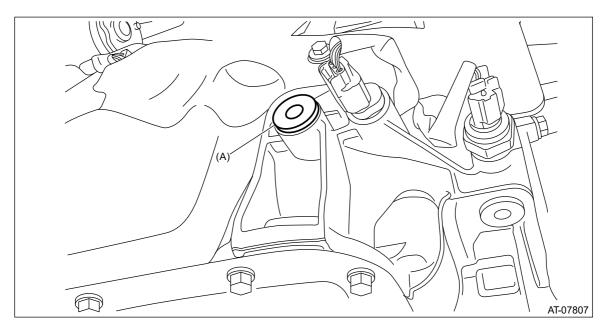
Note:

· Use a new gasket.

Tightening torque:

31 N·m (3.2 kgf-m, 22.9 ft-lb)

6. Remove the filler plug.



(A) Filler plug

7. Add the specified fluid up to the filler plug hole lower section.

Specified fluid:

Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>General Description>SPECIFICATION > HYDRAULIC CONTROL AND LUBRICATION.

- **8.** Temporarily tighten the filler plug.
- **9.** Idle the engine to raise CVTF temperature to $35-45^{\circ}\text{C}$ ($95-113^{\circ}\text{F}$) on Subaru Select Monitor.
- **10.** Operate the select lever in $P \to R \to N \to D$ and $D \to N \to R \to P$ to circulate CVTF with the engine idling.

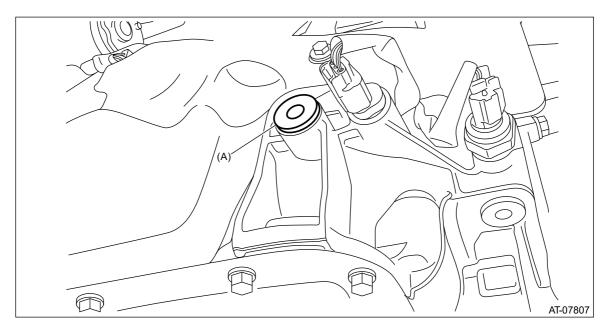
Caution:

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

- 11. With the select lever shifted to "P" range and the engine started, lift up the vehicle. Adjust the CVTF level and check for leakage. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>CVTF>ADJUSTMENT.
- **12.** Replace with a new gasket, and attach the filler plug.

Tightening torque:

50 N·m (5.1 kgf-m, 36.9 ft-lb)



(A) Filler plug

13. Install the under cover front - transmission.

Tightening torque:

18 N·m (1.8 kgf-m, 13.3 ft-lb)

CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Diagnostics with Phenomenon

INSPECTION

Symptoms	Faulty parts
Stall speed is low after warming-up, with select	Engine control system
lever in "D" or "R" range.	
Vehicle does not move despite engine speed rising up, with select lever in "D" or "R" range.	 Engine control system Select cable CVTF Secondary pressure circuit Pulley, gear and variator chain Forward/reverse changeover section TCM Control valve body Inhibitor switch
Vehicle does not move by engine stall, with select lever in "D" or "R" range.	Parking mechanismSelect cableBearingForward/reverse changeover section
Excessive shock occurs at starting, with select lever in "D" or "R" range.	Secondary pressure circuitPulley, gear and variator chain
Acceleration speed from standstill is insufficient, with select lever in "D" or "R" range.	Control valve bodyForward/reverse changeover section
Engine speed suddenly rises up during driving, with select lever in "D" or "R" range.	Control valve bodySecondary pressure circuitPrimary pressure circuit
Vibration occurs during driving, with select lever in "D" or "R" range.	 Secondary pressure circuit Primary pressure circuit Forward/reverse changeover section Pulley and variator chain Torque converter assembly Hydraulic pressure circuit to torque converter Control valve body
Sudden braking occurs during driving, with select lever in "D" or "R" range.	Secondary pressure circuitPrimary pressure circuitControl valve body
During deceleration, lockup clutch does not disengage until just before halting, with select lever in "D" or "R" range.	Control valve bodyTorque converter assembly
Engine stalls with vehicle at a standstill, with select lever in "D" or "R" range.	Engine control systemControl valve body
Excessive lockup shock occurs during driving, with select lever in "D" range.	Control valve body

Slipping occurs at lockup, or lockup does not occur during driving, with select lever in "D" range.	Control valve bodyLockup hydraulic lineTorque converter assembly
Excessive shift shock occurs when shifting the select lever from "N" range to "D" range, or from "N" range to "R" range.	Inhibitor switchControl valve bodyForward/reverse changeover section
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.	Select cable Parking mechanism
Select lever does not shift smoothly.	Select cableInhibitor switchDetent springManual plate

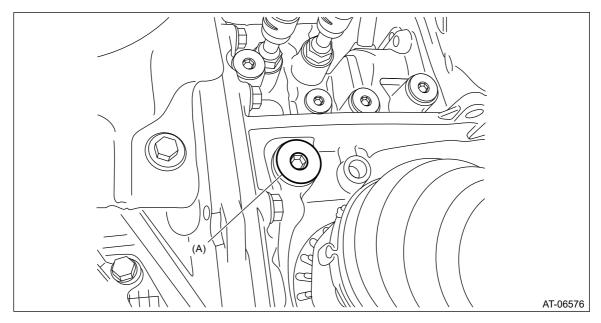
CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Differential Gear Oil

ADJUSTMENT

Note:

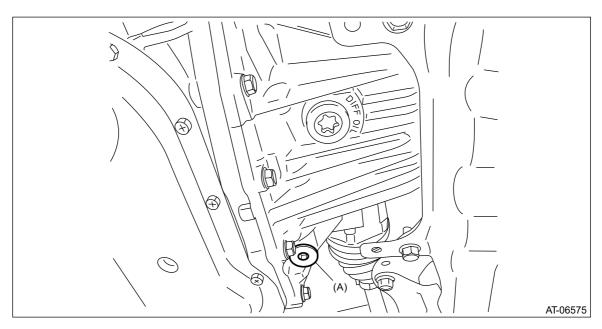
Immediately after removing the overflow drain plug, remaining gear oil (approx. 8 cc) may come out of the overflow pipe. This is not included in the specified amount. When removing the overflow drain plug, make sure the gear oil flows out of the overflow drain plug hole by filling with gear oil.

- 1. Lift up the vehicle.
- 2. Remove the under cover front transmission.
- **3.** Remove the filler plug.



(A) Filler plug

4. Remove the overflow drain plug.



(A) Overflow drain plug

5. Fill in the differential gear oil through the filler plug hole up to where the oil flows out of the overflow drain plug.

Recommended gear oil:

Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>General Description>SPECIFICATION > FRONT DIFFERENTIAL GEAR OIL.

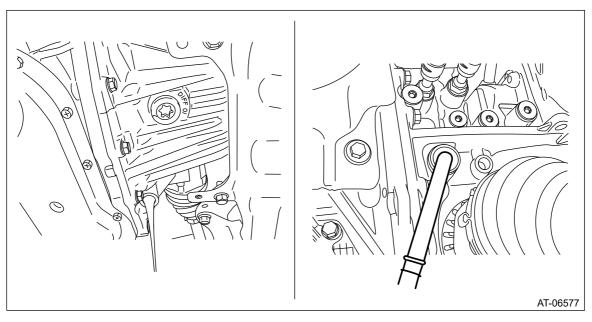
6. When the flow of the differential gear oil turns into a narrow stream, install the overflow drain plug.

Note:

Use a new gasket.

Tightening torque:

50 N·m (5.1 kgf-m, 36.9 ft-lb)



7. Install the filler plug.

Note:

Use a new gasket.

Tightening torque:

50 N·m (5.1 kgf-m, 36.9 ft-lb)

8. Install the under cover front - transmission.

Tightening torque:

18 N·m (1.8 kgf-m, 13.3 ft-lb)

CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Differential Gear Oil

INSPECTION

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

CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Differential Gear Oil

REPLACEMENT

Caution:

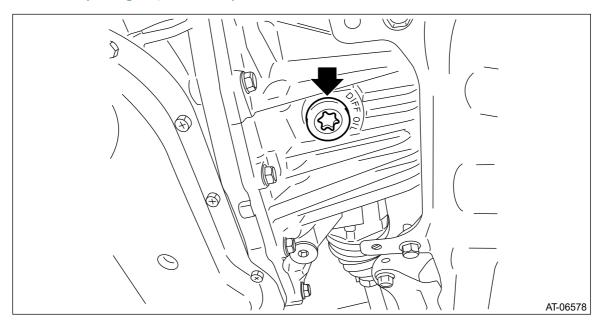
- Immediately after the vehicle has been running or after idling for a long time, the differential gear oil will be hot. Be careful not to burn yourself.
- Be careful not to spill differential gear oil on the exhaust pipe to prevent it from emitting smoke or causing a fire. If gear oil adheres, wipe it off completely.
- 1. Lift up the vehicle.
- 2. Remove the under cover front transmission.
- 3. Remove the differential gear oil drain plug using TORX® bit T70. Drain differential gear oil.
- 4. Install the differential gear oil drain plug using TORX® bit T70.

Note:

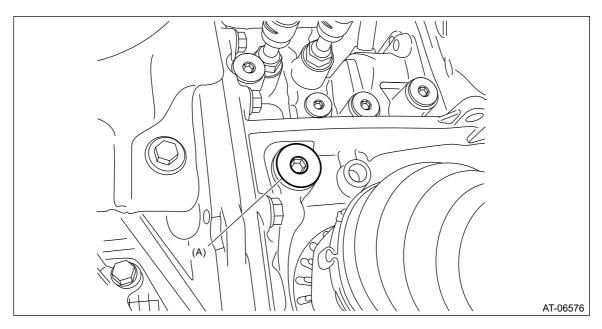
Use a new gasket.

Tightening torque:

70 N•m (7.1 kgf-m, 51.6 ft-lb)



5. Remove the filler plug.



(A) Filler plug

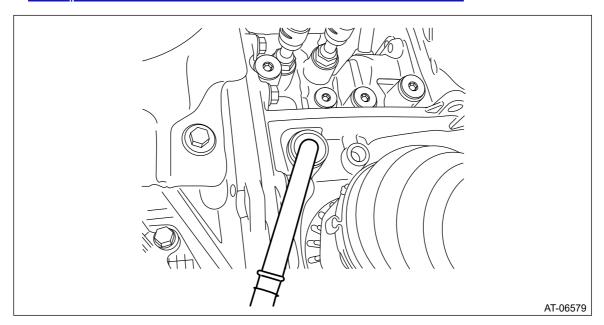
6. Pour gear oil into the filler plug hole.

Recommended gear oil:

Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>General Description>SPECIFICATION > FRONT DIFFERENTIAL GEAR OIL.

Gear oil capacity:

Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>General Description>SPECIFICATION > FRONT DIFFERENTIAL GEAR OIL.



7. Adjust the level of differential gear oil. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Differential Gear Oil>ADJUSTMENT.

CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Differential Side Retainer Oil Seal

INSPECTION

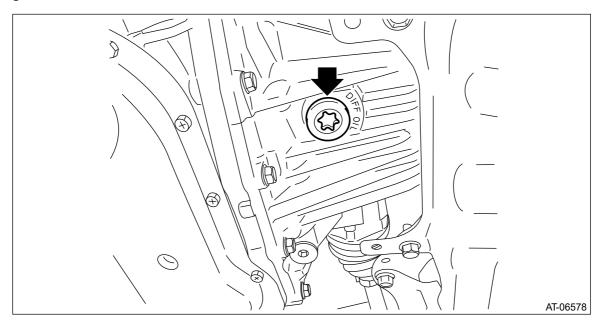
Check for leakage of gear oil from differential side retainer oil seal part. If there is an oil leak, inspect the front drive shaft and replace the oil seal.

CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Differential Side Retainer Oil Seal

Caution:

REPLACEMENT

- Immediately after the vehicle has been running or after idling for a long time, the differential gear oil will be hot. Be careful not to burn yourself.
- Be careful not to spill the differential gear oil on exhaust pipe to prevent it from emitting smoke or fire. If differential gear oil is spilled on the exhaust pipe, wipe it off completely.
- 1. Remove the front tires. Ref. to WHEEL AND TIRE SYSTEM>Tire and Wheel>REMOVAL.
- **2.** Remove the center exhaust pipe. Ref. to EXHAUST(H4DO)>Center Exhaust Pipe>REMOVAL.
- **3.** Remove the differential gear oil drain plug using TORX[®] bit T70, and then drain differential gear oil.



4. Tighten the differential gear oil drain plug.

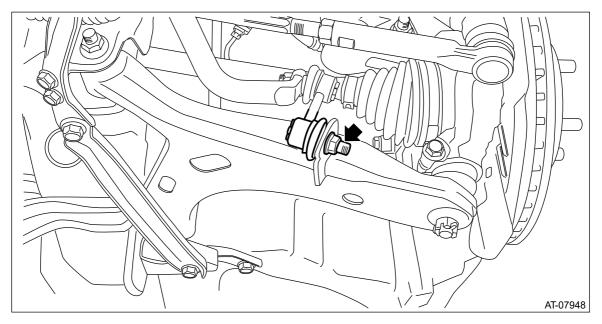
Note:

Use a new gasket.

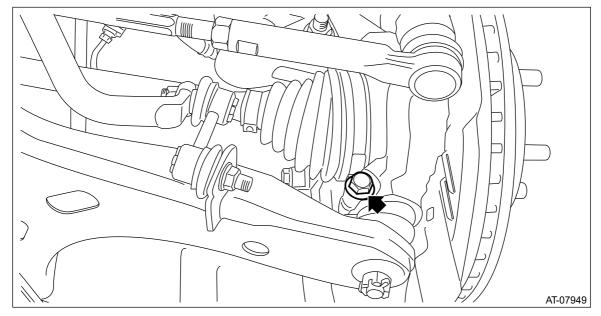
Tightening torque:

70 N·m (7.1 kgf-m, 51.6 ft-lb)

5. Disconnect the stabilizer link from the front arm.



6. Remove the bolts which secure to the front housing, and separate the front arm and housing.



7. Using a crowbar, etc., pull out until the front drive shaft transmission side joint slides move smoothly.

Note:

Place cloth between the crowbar and the transmission in order to avoid damaging the transmission side retainer.

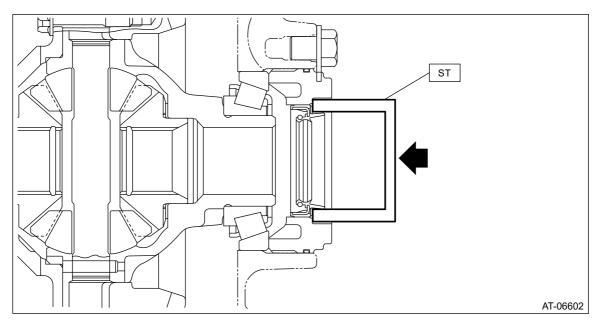
8. Hold the transmission side joint of the front drive shaft by hand and extract the housing from the transmission while pressing the housing outward, so as not to stretch the boot.

Note:

- Before pulling the RH front drive shaft from transmission, turn the steering wheel to the right hand at full lock.
- Before pulling the LH front drive shaft from transmission, turn the steering wheel to the left hand at full lock.
- **9.** Remove the differential side retainer oil seal using driver wrapped with vinyl tape etc.

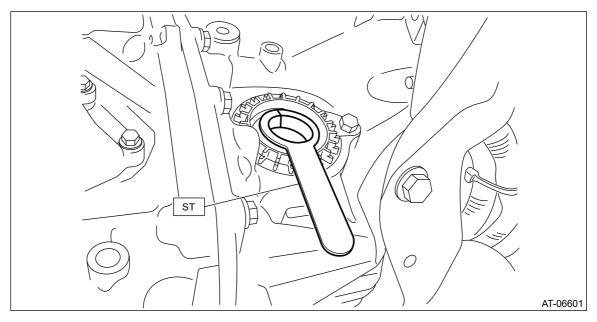
- 10. Using the ST, install the differential side retainer oil seal by lightly tapping with a hammer.
 Note:
 - Apply differential gear oil to the lip surface, so that the oil seal lip is not deformed.
 - Apply differential gear oil to the press-fitting surface of oil seal and the differential side retainer.
 - Oil seal has an identification mark (R, L). When installing oil seals, do not confuse the left and right.

ST 18675AA000 DIFFERENTIAL SIDE OIL SEAL INSTALLER



11. Set the ST to side retainer.

ST 28399SA010 OIL SEAL PROTECTOR



12. Replace the circlip of the drive shaft with a new part.

13. Insert the front drive shaft spline section into transmission and remove the ST (DIFFERENTIAL SIDE OIL SEAL INSTALLER).

Note:

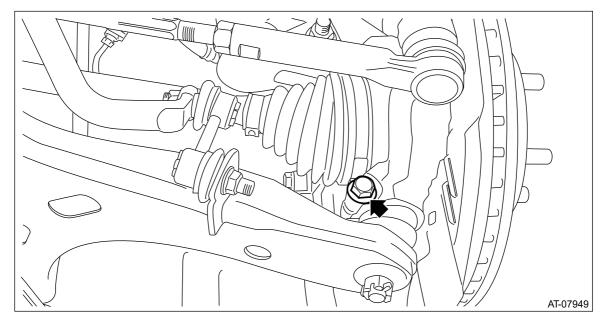
- Apply grease to the side retainer oil seal lip.
- Before inserting the RH front drive shaft into transmission, turn the steering wheel to the right hand at full lock.
- Before inserting the LH front drive shaft into transmission, turn the steering wheel to the left hand at full lock.
- **14.** Insert the drive shaft into the transmission securely by pressing the housing from outside of the vehicle.
- **15.** Insert the ball joint into housing and secure with bolt.

Tightening torque:

50 N·m (5.1 kgf-m, 36.9 ft-lb)

Caution:

- Do not apply grease to the tapered portion of ball stud.
- Before tightening, make sure the lower side of housing and stepped section of ball joint are in contact.



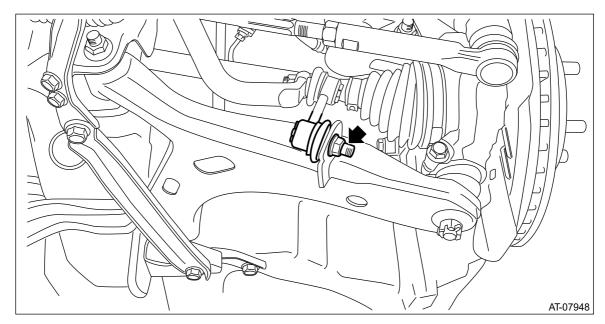
16. Attach the stabilizer link to the front arm.

Note:

Use a new flange nut.

Tightening torque:

60 N·m (6.1 kgf-m, 44.3 ft-lb)



- 17. Install the center exhaust pipe. Ref. to EXHAUST(H4DO)>Center Exhaust Pipe>INSTALLATION.
- **18.** Fill differential gear oil. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Differential Gear Oil.
- **19.** Adjust the differential gear oil level, and check for leakage. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Differential Gear Oil>ADJUSTMENT.
- **20.** Install the under cover front transmission.

Tightening torque:

18 N·m (1.8 kgf-m, 13.3 ft-lb)

21. Install the front tires. Ref. to WHEEL AND TIRE SYSTEM>Tire and Wheel>INSTALLATION.

CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Drive Pinion Shaft Assembly

ADJUSTMENT

- 1. Remove the liquid gasket from the mating surface completely.
- **2.** Using the ST, install the drive pinion retainer to converter case.

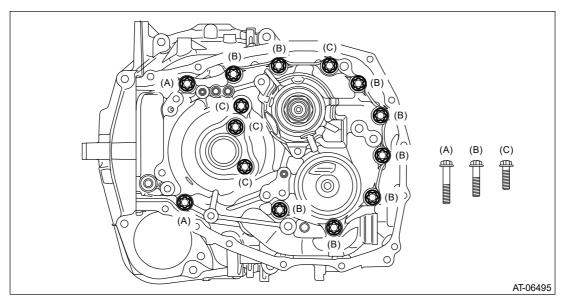
ST 18270KA020 SOCKET (E20)

Note:

Do not confuse the three different-length bolts when installing.

Tightening torque:

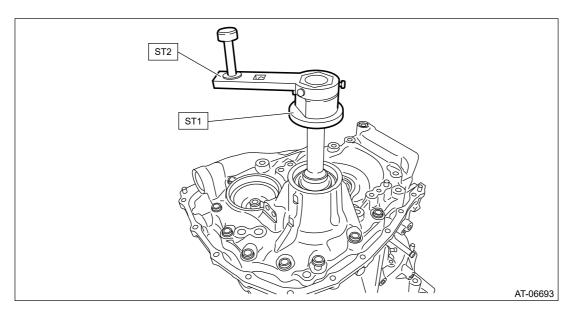
43 N·m (4.4 kgf-m, 31.7 ft-lb)



3. Rotate the drive pinion several times using ST1 and ST2.

ST1 498937110 HOLDER

ST2 499787700 WRENCH



4. Adjust the drive pinion and hypoid driven gear backlash. Ref. to CONTINUOUSLY VARIABLE

TRANSMISSION(TR580)>Front Differential Assembly>ADJUSTMENT.

5. Using the ST, remove the drive pinion retainer from converter case.

ST 18270KA020 SOCKET (E20)

6. Apply lead-free red dye evenly on the both sides of three to four teeth of the hypoid driven gear. Then install the drive pinion retainer and rotate the drive pinion in both directions several times. Remove the drive pinion retainer and check the tooth contact pattern.

If the teeth contact is inappropriate, readjust the backlash and shim thickness (Select 1-3 shims.). Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Front Differential Assembly>ADJUSTMENT.

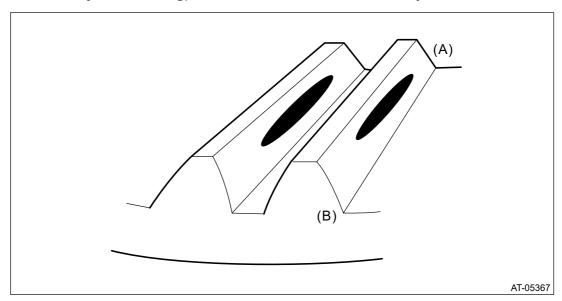
Note:

After correction, wipe off the lead-free red dye.

Drive pinion shim		
Part No.	Thickness mm (in)	
31451AA320	0.150 (0.0059)	
31451AA330	0.175 (0.0069)	
31451AA340	0.200 (0.0079)	
31451AA350	0.225 (0.0089)	
31451AA360	0.250 (0.0098)	
31451AA370	0.275 (0.0108)	

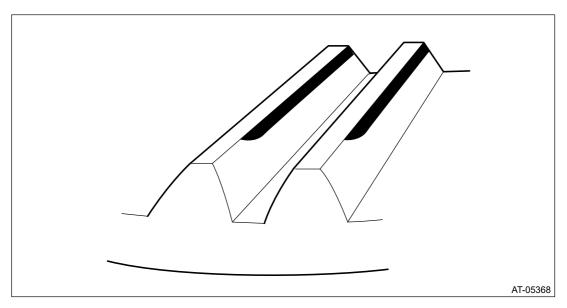
· Correct tooth contact

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.)

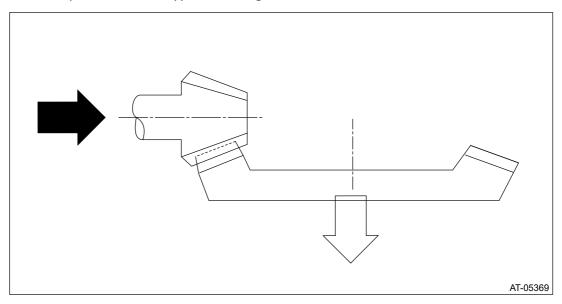


- (A) Toe side
- (B) Heel side
- Face contact

Check item: Backlash is too large.

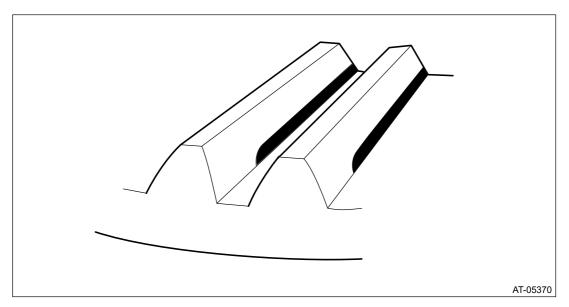


Corrective action: Increase thickness of drive pinion shim according to the procedures for moving the drive pinion close to hypoid driven gear.

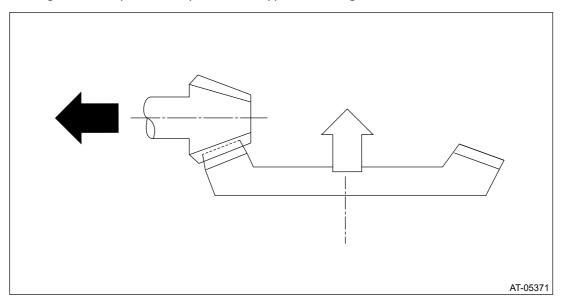


• Flank contact

Check item: Backlash is too small.

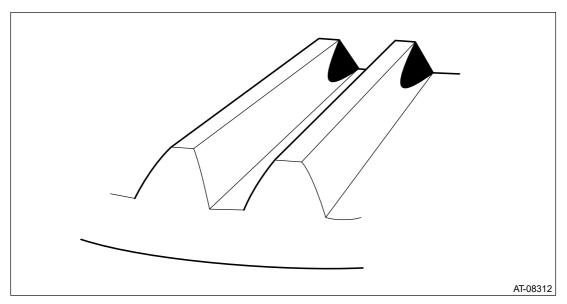


Corrective action: Reduce the thickness of the drive pinion shim according to the procedures for moving the drive pinion away from the hypoid driven gear.

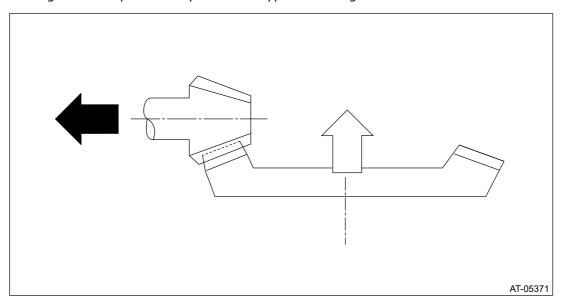


• Toe contact (inside contact)

Check item: Teeth contact area is too small.

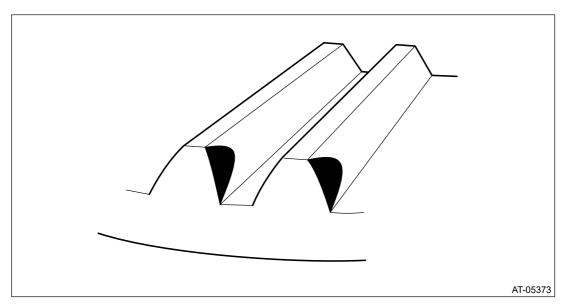


Corrective action: Reduce the thickness of the drive pinion shim according to the procedures for moving the drive pinion away from the hypoid driven gear side.

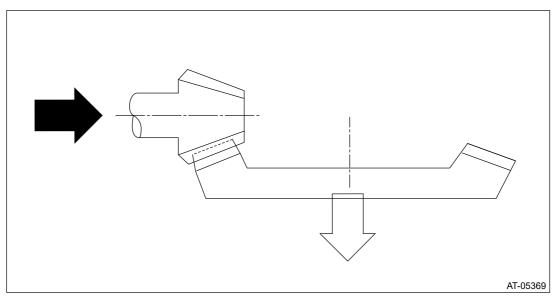


• Heel contact (outside end contact)

Check item: Teeth contact area is too small.



Corrective action: Increase the thickness of the drive pinion shim according to the procedures for moving the drive pinion closer to the hypoid driven gear.



7. Using the ST, loosen the differential side retainer until the mounting groove of the O-ring appears, and then install the O-ring.

Note:

- When loosening the differential side retainer, record the number of the turns made.
- · Perform this for both left and right differential side retainers.
- Use new O-rings.
- Apply the differential gear oil to O-ring.

ST 18658AA020 WRENCH COMPL RETAINER

8. Using the ST, tighten the retainer to the position before it is loosened.

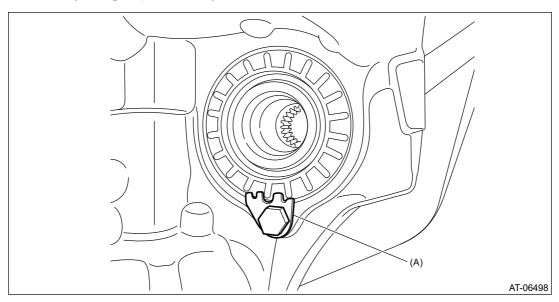
ST 18658AA020 WRENCH COMPL RETAINER

9. Replace the differential side retainer oil seal with a new part. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Differential Side Retainer Oil Seal.

10. Install the lock plate.

Tightening torque:

25 N·m (2.5 kgf-m, 18.4 ft-lb)



(A) Lock plate

CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Drive Pinion Shaft Assembly

ASSEMBLY

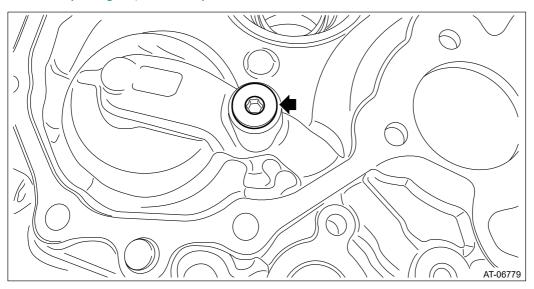
1. Install the plug to drive pinion retainer.

Note:

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

Tightening torque:

22 N·m (2.2 kgf-m, 16.2 ft-lb)

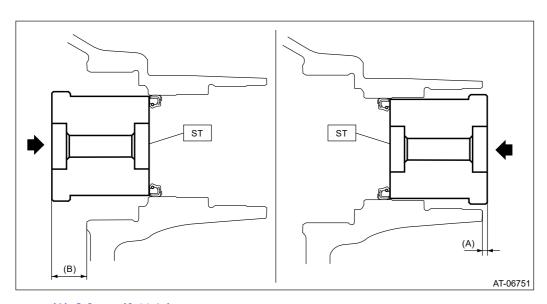


2. Using the ST, install the oil seal to drive pinion retainer.

Note:

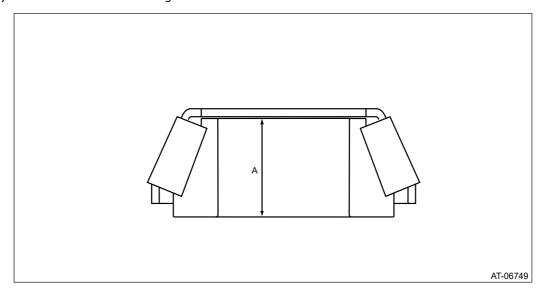
- Apply differential gear oil to the press-fitting surface and lip portion of oil seal.
- Install the oil seal in the correct direction.

ST 927720000 HOUSING BUSHING INSTALLER AND REMOVER

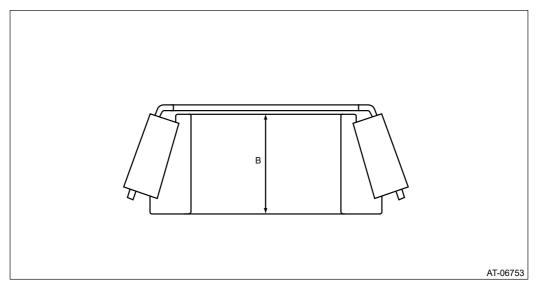


- (A) 2.8 mm (0.11 in)
- (B) 18.7 mm (0.74 in)

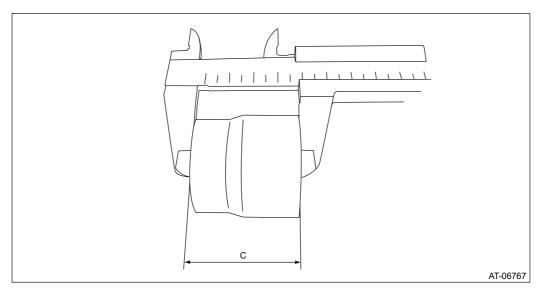
- **3.** Select the drive pinion washer.
 - (1) Measure the roller bearing inner race width "A" on the front side.



(2) Measure the roller bearing inner race width "B" on the rear side.



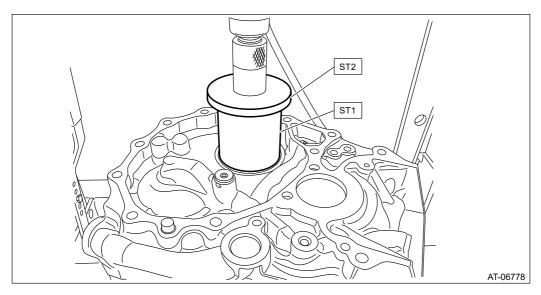
(3) Measure the spacer width "C".



(4) Using the ST, install the front roller bearing outer race to the drive pinion retainer.

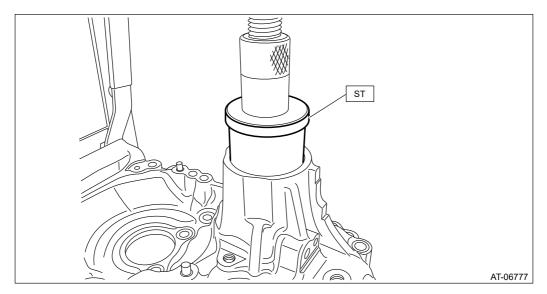
ST1 28499TC010 PRESS SNAP RING

ST2 398177700 INSTALLER



(5) Using the ST, install the rear roller bearing outer race to the drive pinion retainer.

ST 20099AE020 INSTALLER

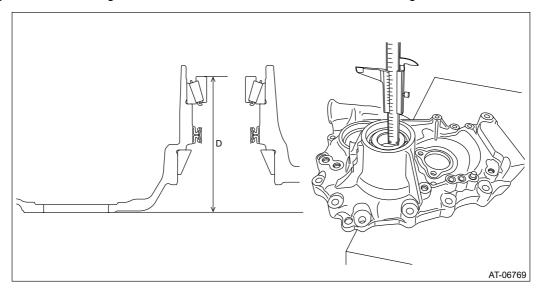


(6) Place the drive pinion retainer on the surface plate, and install the inner race to the rear roller bearing outer race.

Note:

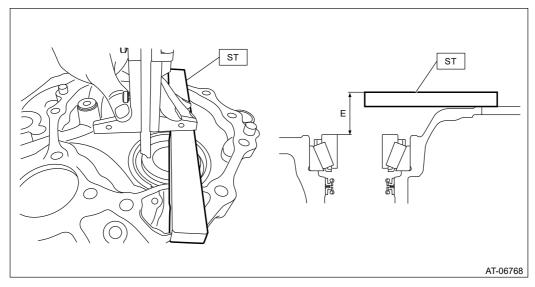
Place the drive pinion retainer so that the mating surface of the drive pinion retainer (mating surface with the converter case) contacts the surface plate.

(7) Measure the height "D" from the end face of the rear roller bearing inner race to the surface plate.



- (8) Install the inner race to the front roller bearing outer race.
- (9) Measure the depth "E" from the end face of the front roller bearing inner race to the end face of the ST.

ST 499575400 GAUGE



(10) Using following formula, select one to three drive pinion washers.

$$T mm = D - (A + B + C + E - 15) - (0 \pm 0.0125)$$

$$[T in = D - (A + B + C + E - 0.591) - (0 \pm 0.0005)]$$

A: Front roller bearing width

B: Rear roller bearing width

C: Spacer width

D: Height from end face of rear roller bearing inner race to surface plate

E: Depth from end face of front roller bearing inner race to end face of ST

15 mm (0.591 in): Thickness of ST T: Drive pinion washer thickness

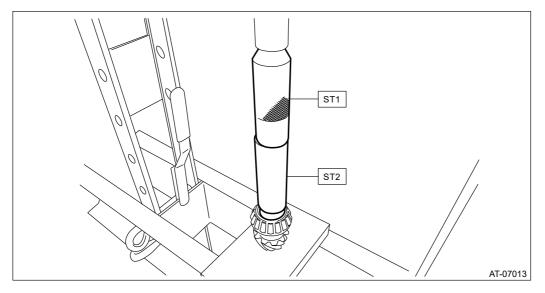
0±0.0125 mm (0±0.0005 in): Clearance

Drive pinion washer		
Part No.	Thickness mm (in)	
38336AA750	0.150 (0.0059)	
38336AA760	0.175 (0.0069)	
38336AA770	0.200 (0.0079)	
38336AA780	0.225 (0.0089)	
38336AA790	0.250 (0.0098)	
38336AA800	0.275 (0.0108)	
38336AA810	0.300 (0.0118)	
38336AA820	0.400 (0.0157)	

- 4. Measure and record the drive pinion shim thickness to be reused.
- **5.** Install the drive pinion shim that is reused for the drive pinion shaft.
- **6.** Using the ST1 and ST2, press-fit the inner race to the drive pinion shaft.

ST1 899580100 INSTALLER

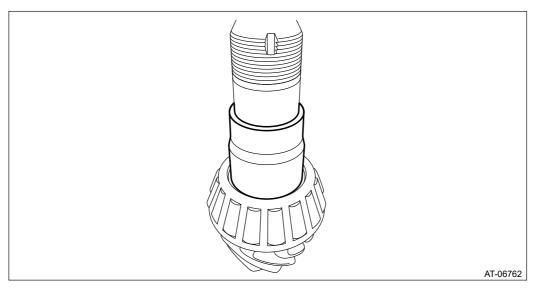
ST2 927130000 EXTENSION DRIVE SHAFT



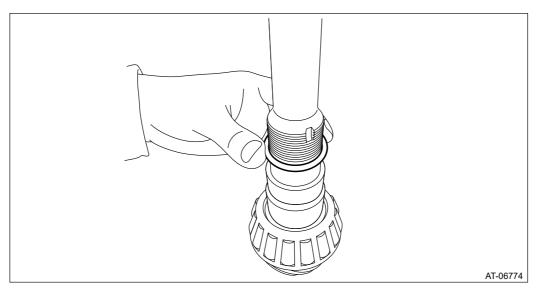
7. Install the drive pinion spacer.

Note:

Replace the O-ring with a new part after tooth contact inspection.



8. Install the selected drive pinion washer.



9. Insert the drive pinion shaft into the drive pinion retainer.

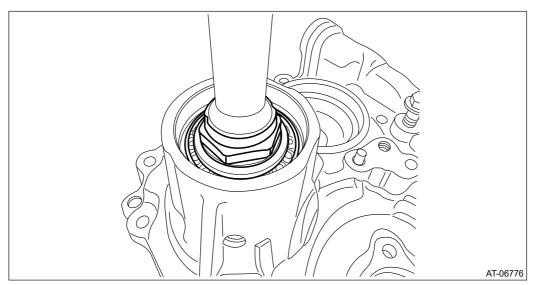
Caution:

Be careful not to damage the oil seal.

10. Install the inner bearing and lock nut.

Note:

- Use a new lock nut.
- Apply differential gear oil to the drive pinion shaft screw threads.



11. Using the ST, tighten the lock nut to the specified torque so that the starting torque of the drive pinion shaft is within the specified range.

Caution:

Before inspecting the starting torque, apply differential gear oil to roller of bearing and rotate the bearing several times.

Note:

- Tighten the lock nut while directly aligning ST2 and torque wrench.
- If the starting torque is not within the specified range, select the drive pinion washer, and repeat the step until the starting torque is within the specified range.
- When a thicker drive pinion washer is selected, the starting torque decreases. When a thinner drive pinion washer is selected, the starting torque increases.

Starting torque:

5.1 - 17.1 N (0.5 - 1.7 kgf, 1.1 - 3.8 lbf)

ST1 499787500 ADAPTER

ST2 499787700 WRENCH

ST3 498937110 HOLDER

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

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

T1: 170 - 250 N·m (17.3 - 25.5 kgf-m, 125.4 - 184.4 ft-lb) [Specified tightening torque range]

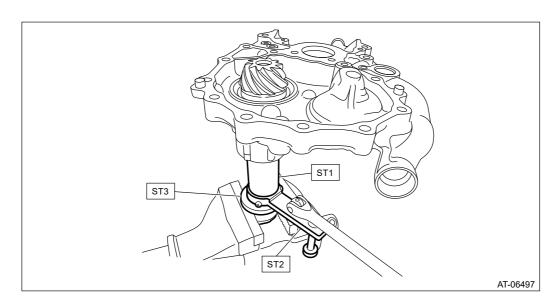
T2: Tightening torque

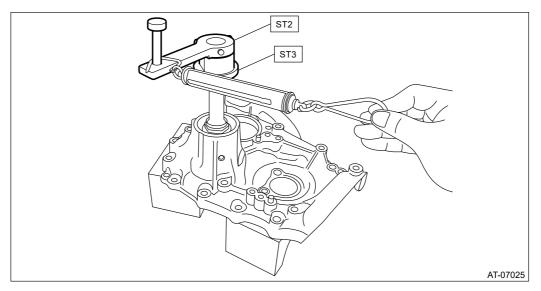
L1: ST1 length 0.072 m (2.83 in)

L2: Torque wrench length

Example:

Torque wrench length m (in)	Tightening torque N·m (kgf-m, ft-lb)
0.4 (15.75)	144 — 211 (14.7 — 21.5, 106.2 — 155.6)
0.45 (17.72)	147 — 215 (15.0 — 21.9, 108.4 — 158.6)
0.5 (19.69)	149 — 218 (15.2 — 22.2, 109.9 — 160.8)
0.55 (21.65)	150 — 221 (15.3 — 22.5, 110.6 — 163.0)

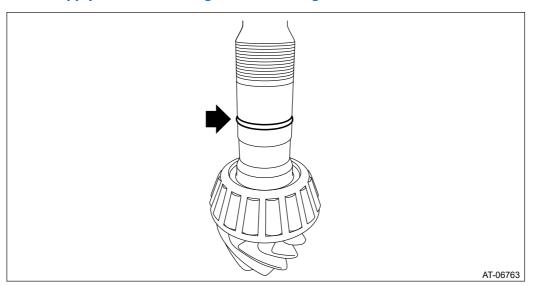




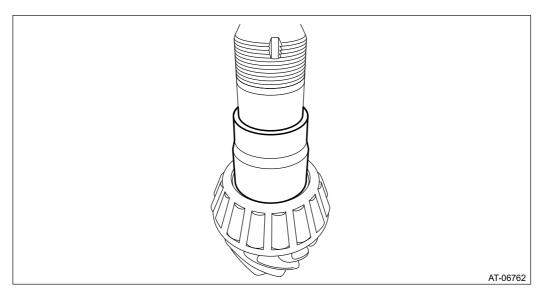
- 12. Install the drive pinion retainer to the converter case, and check the backlash and tooth contact. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Drive Pinion Shaft Assembly>ADJUSTMENT. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Front Differential Assembly>ADJUSTMENT.
- **13.** Remove the drive pinion retainer from converter case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Drive Pinion Shaft Assembly>REMOVAL.
- **14.** Remove the drive pinion spacer from the drive pinion shaft. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Drive Pinion Shaft Assembly>DISASSEMBLY.
- 15. Install the O-ring to the drive pinion shaft.

Note:

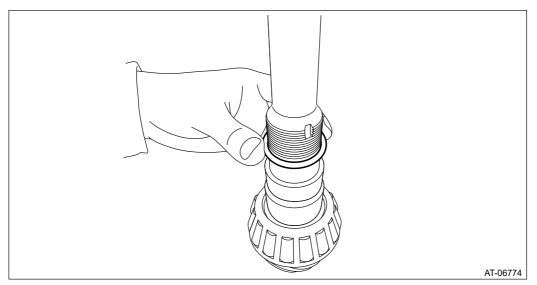
- Use new O-rings.
- · Apply the differential gear oil to O-ring.



16. Install the drive pinion spacer to the drive pinion shaft.



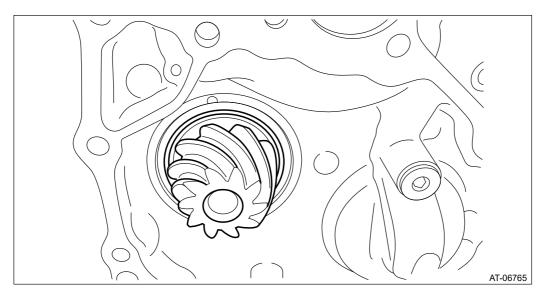
17. Install the drive pinion washer.



18. Insert the drive pinion shaft into the drive pinion retainer.

Caution:

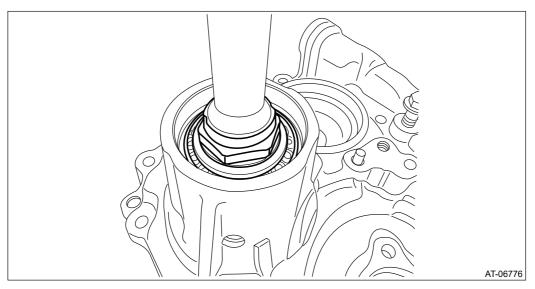
Be careful not to damage the oil seal.



19. Install the inner bearing and lock nut.

Note:

Apply differential gear oil to the drive pinion shaft screw threads.



20. Using the ST, tighten the lock nut to the specified torque so that the starting torque of the drive pinion shaft is within the specified range.

Caution:

Before inspecting the starting torque, apply differential gear oil to roller of bearing and rotate the bearing several times.

Note:

- Tighten the lock nut while directly aligning ST2 and torque wrench.
- If the starting torque is not within the specified range, select the drive pinion washer, and repeat the step until the starting torque is within the specified range.
- When a thicker drive pinion washer is selected, the starting torque decreases. When a thinner drive pinion washer is selected, the starting torque increases.

Starting torque:

5.1 - 17.1 N (0.5 - 1.7 kgf, 1.1 - 3.8 lbf)

ST1 499787500 ADAPTER

ST2 499787700 WRENCH

ST3 498937110 HOLDER

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

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

T1: $170 - 250 \text{ N} \cdot \text{m} (17.3 - 25.5 \text{ kgf-m}, 125.4 - 184.4 \text{ ft-lb}) [Specified tightening torque range]$

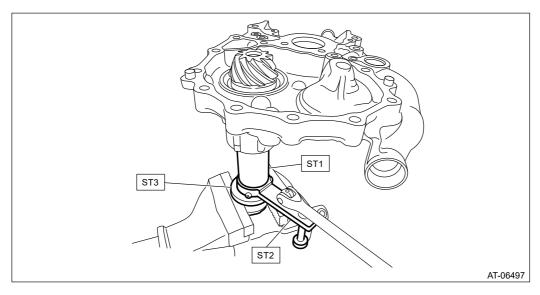
T2: Tightening torque

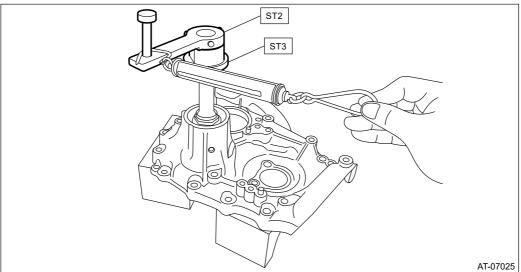
L1: ST1 length 0.072 m (2.83 in)

L2: Torque wrench length

Example:

Torque wrench length m (in)	Tightening torque N·m (kgf-m, ft-lb)
0.4 (15.75)	144 — 211 (14.7 — 21.5, 106.2 — 155.6)
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0.5 (19.69)	149 — 218 (15.2 — 22.2, 109.9 — 160.8)
0.55 (21.65)	150 - 221 (15.3 - 22.5, 110.6 - 163.0)

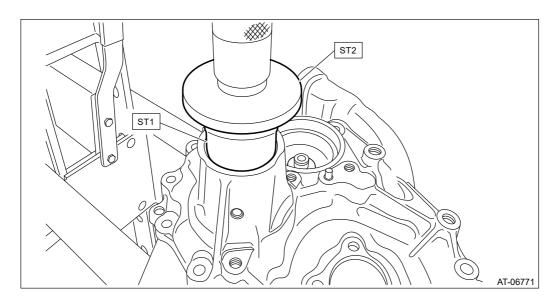




- **21.** Crimp the lock nut in 2 locations.
- 22. Using the ST, install the plug.

ST1 499755602 PRESS SNAP RING

ST2 398177700 INSTALLER



CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Drive Pinion Shaft Assembly

DISASSEMBLY

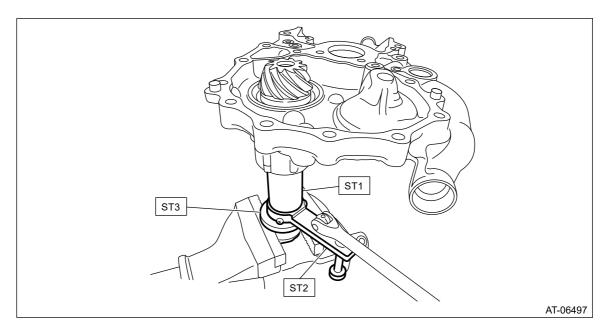
1. Flatten the tab of the lock nut.

2. Using ST1, ST2 and ST3, fix at the spline portion of drive pinion shaft to remove the lock nut.

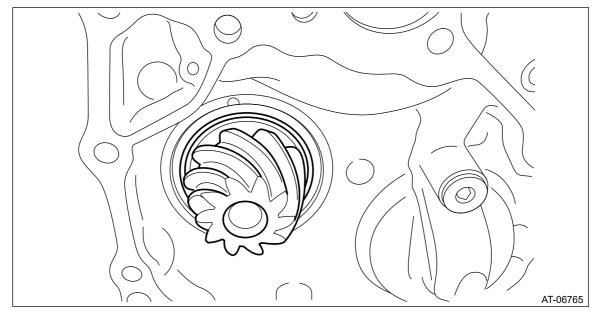
ST1 499787500 ADAPTER

ST2 499787700 WRENCH

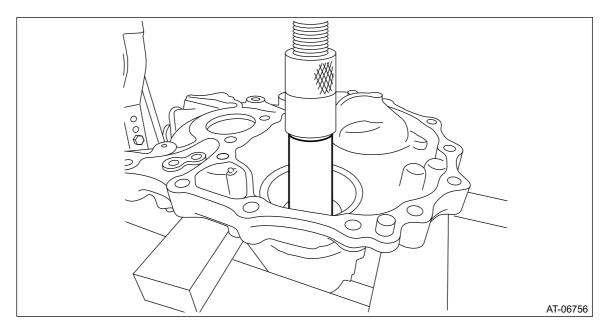
ST3 498937110 HOLDER



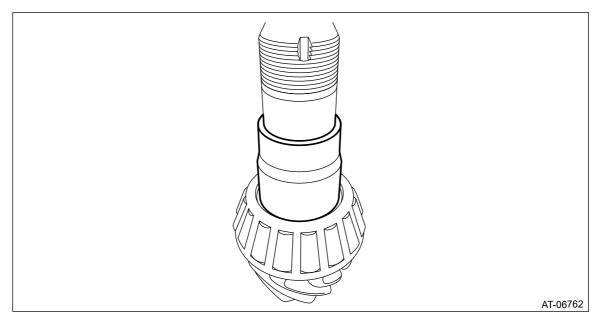
3. Remove the drive pinion shaft from the drive pinion retainer.



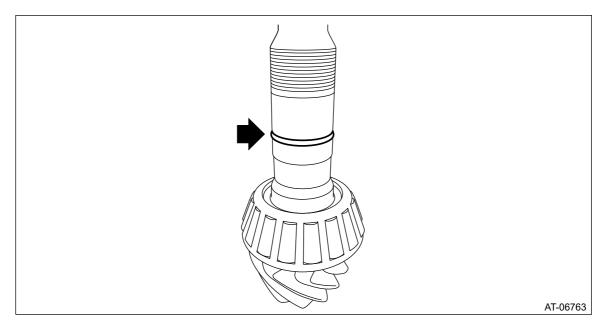
4. Using the round bar with diameter of 36 mm (1.42 in) or 37 mm (1.46 in), remove the bearing inner race and plug.



- **5.** Remove the drive pinion washer.
- 6. Remove the drive pinion spacer.

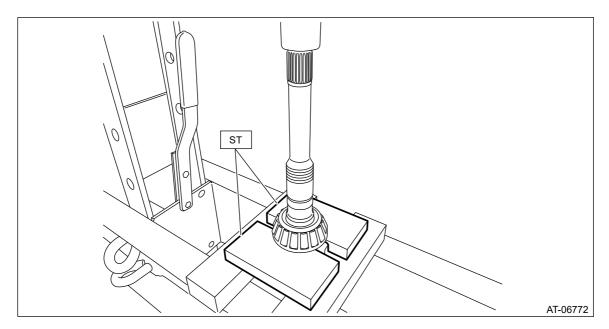


7. Remove the O-rings.



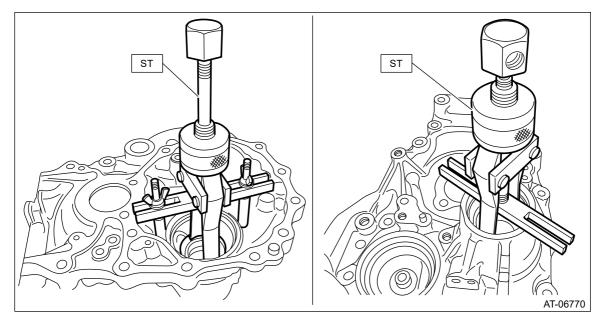
8. Remove the inner race and drive pinion shim from drive pinion shaft using ST.

ST 498515500 REMOVER



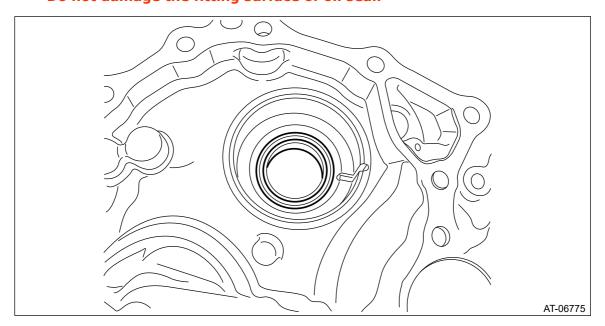
9. Using the ST, remove the outer race.

ST 398527700 PULLER ASSY

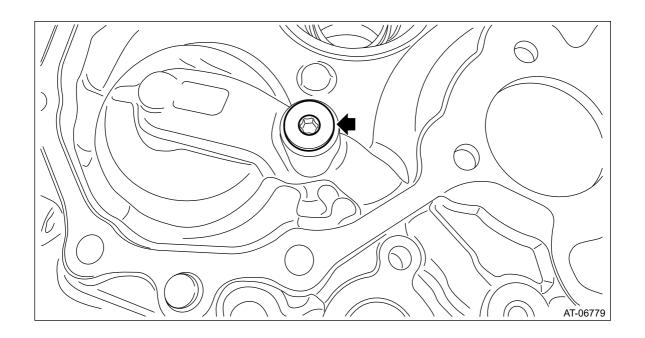


10. Remove the two oil seals using a screwdriver wrapped with cloth, etc.
Caution:

Do not damage the fitting surface of oil seal.



11. Remove the plug from drive pinion retainer.



CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Drive Pinion Shaft Assembly

INSPECTION

- Make sure that all component parts are free of scratches, holes and other faults.
- Check the tooth contact. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Drive Pinion Shaft Assembly>ADJUSTMENT.
- Apply CVTF to bearing and rotate the bearing to check for noise or dragging etc.
- Check the starting torque of drive pinion shaft.

Caution:

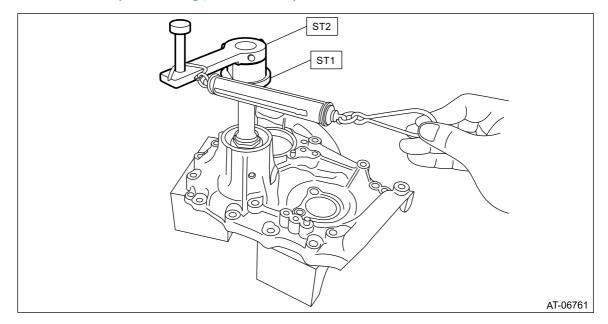
Before measuring, apply differential gear oil to roller of bearing and rotate the bearing several times.

ST1 498937110 HOLDER

ST2 499787700 WRENCH

Starting torque:

5.1—17.1 N (0.5—1.7 kgf, 1.1—3.8 lbf)



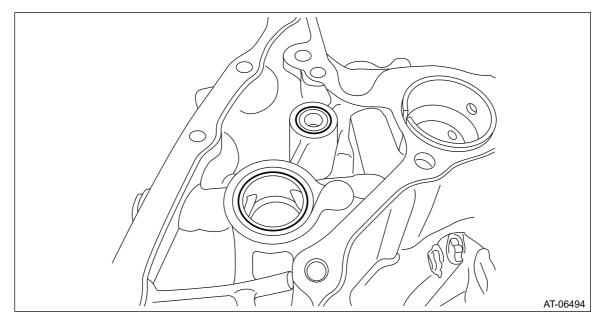
CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Drive Pinion Shaft Assembly

INSTALLATION

- 1. Clean the mating surface of drive pinion retainer and converter case.
- 2. Adjust the backlash and tooth contact between drive pinion shaft assembly and the front differential side gear. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Drive Pinion Shaft Assembly>ADJUSTMENT.
- **3.** Install O-rings in two locations to the converter case.

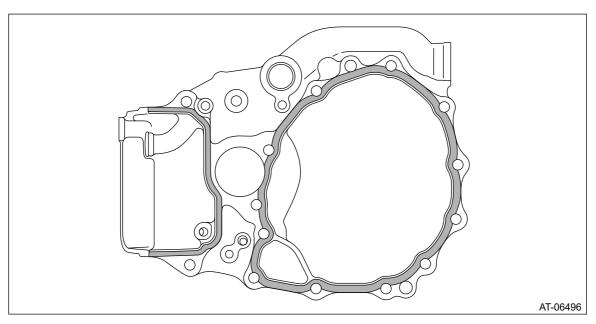
Note:

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



4. Apply liquid gasket seamlessly to the mating surface of drive pinion retainer. **Liquid gasket:**

THREE BOND 1215B or equivalent



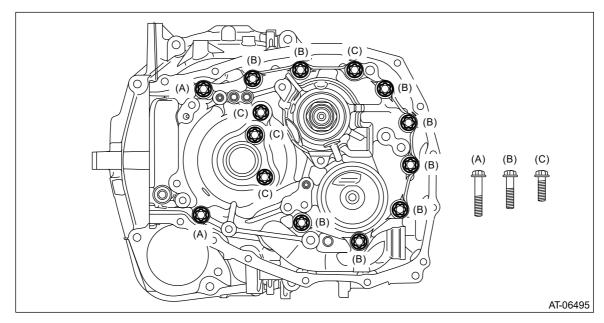
5. Install the drive pinion retainer to converter case, and tighten the bolt using the ST.

ST 18270KA020 SOCKET (E20)

Note:

Do not confuse the three different-length bolts when installing. Tightening torque:

43 N·m (4.4 kgf-m, 31.7 ft-lb)



- **6.** Install the forward clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Forward Clutch Assembly>INSTALLATION.
- 7. Install the reverse brake assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Reverse Brake Assembly>INSTALLATION.
- 8. Install the primary pulley, secondary pulley and variator chain. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Primary Pulley and Secondary Pulley>INSTALLATION.
- **9.** Install the reduction drive gear. Ref. to CONTINUOUSLY VARIABLE

TRANSMISSION(TR580)>Reduction Drive Gear>INSTALLATION.

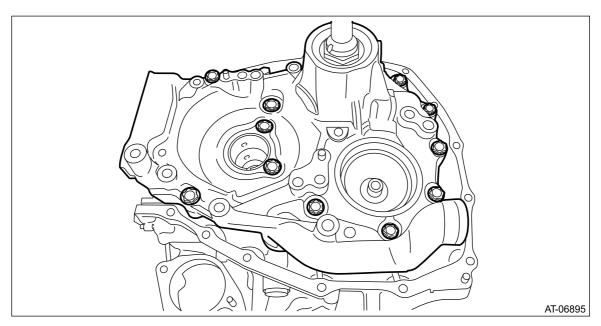
- **10.** Install the transmission case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transmission Case>INSTALLATION.
- **11.** Install the transmission control device. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transmission Control Device>INSTALLATION.
- **12.** Install the oil strainer and oil pan. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Oil Pan and Strainer>INSTALLATION.
- 13. Install the reduction driven gear assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Reduction Driven Gear>INSTALLATION.
- **14.** Install the parking pawl. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Parking Pawl>INSTALLATION.
- **15.** Install the transfer driven gear assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transfer Driven Gear>INSTALLATION.
- **16.** Install the transfer clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transfer Clutch>INSTALLATION.
- 17. Install the extension case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Extension Case>INSTALLATION.
- **18.** Install the inhibitor switch. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Inhibitor Switch>INSTALLATION.
- 19. Install the secondary speed sensor. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Secondary Speed Sensor>INSTALLATION.
- **20.** Install the primary speed sensor. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Primary Speed Sensor>INSTALLATION.
- **21.** Install the turbine speed sensor. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Turbine Speed Sensor>INSTALLATION.
- **22.** Install the transmission harness. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transmission Harness>INSTALLATION.
- **23.** Install the control valve body. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Control Valve Body>INSTALLATION.
- **24.** Install the air breather hose. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Air Breather Hose>INSTALLATION.
- **25.** Install the transmission assembly to the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Automatic Transmission Assembly>INSTALLATION.

CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Drive Pinion Shaft Assembly

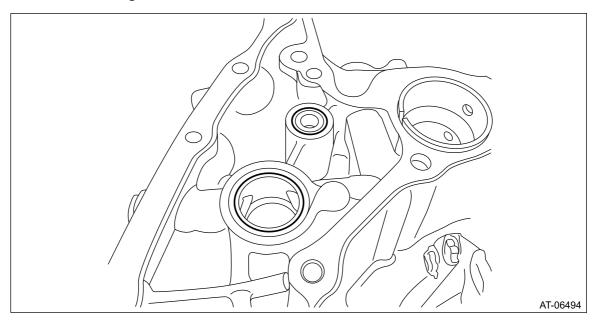
REMOVAL

- **1.** Remove the transmission assembly from the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Automatic Transmission Assembly>REMOVAL.
- **2.** Remove the air breather hose. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Air Breather Hose>REMOVAL.
- **3.** Remove the control valve body. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Control Valve Body>REMOVAL.
- **4.** Remove the transmission harness. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transmission Harness>REMOVAL.
- **5.** Remove the turbine speed sensor. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Turbine Speed Sensor>REMOVAL.
- **6.** Remove the secondary speed sensor. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Secondary Speed Sensor>REMOVAL.
- **7.** Remove the primary speed sensor. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Primary Speed Sensor>REMOVAL.
- **8.** Remove the inhibitor switch. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Inhibitor Switch>REMOVAL.
- **9.** Remove the extension case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Extension Case>REMOVAL.
- **10.** Remove the transfer clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transfer Clutch>REMOVAL.
- **11.** Remove the transfer driven gear assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transfer Driven Gear>REMOVAL.
- **12.** Remove the parking pawl. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Parking Pawl>REMOVAL.
- **13.** Remove the reduction driven gear assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Reduction Driven Gear>REMOVAL.
- **14.** Remove the oil pan and oil strainer. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Oil Pan and Strainer>REMOVAL.
- **15.** Remove the transmission control device. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transmission Control Device>REMOVAL.
- **16.** Remove the transmission case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transmission Case>REMOVAL.
- **17.** Remove the reduction drive gear. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Reduction Drive Gear>REMOVAL.
- 18. Remove the primary pulley, secondary pulley and variator chain. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Primary Pulley and Secondary Pulley>REMOVAL.
- **19.** Remove the reverse brake assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Reverse Brake Assembly>REMOVAL.
- **20.** Remove the forward clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Forward Clutch Assembly>REMOVAL.
- **21.** Using the ST, remove the drive pinion retainer.

ST 18270KA020 SOCKET (E20)



22. Remove the O-rings.



CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Drive Plate

INSPECTION

Check the drive cable for damage.

CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Drive Plate

INSTALLATION

1. Temporarily install the drive plate and reinforcement drive plate.

Note:

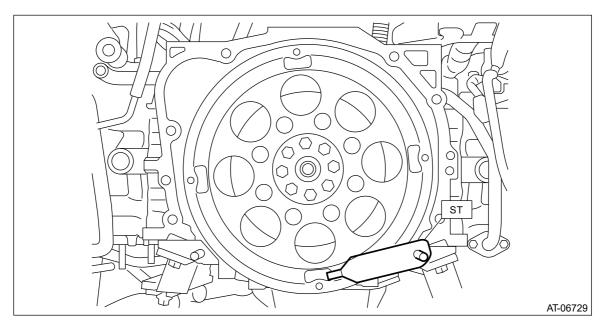
Align the knock pin hole of the crankshaft position sensor plate to the knock pin of the crankshaft to secure the knock pin.

2. Set the ST.

Note:

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

ST 498497300 CRANKSHAFT STOPPER

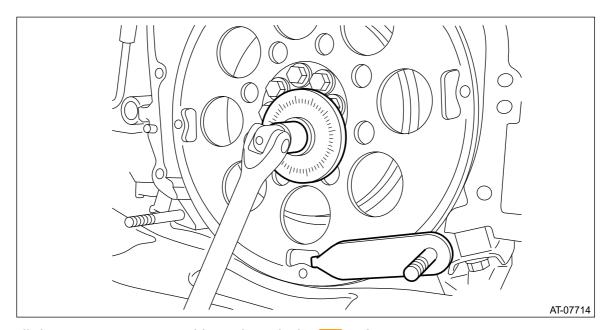


- 3. Tighten the drive plate mounting bolt in two stages.
 - (1) Tighten the drive plate mounting bolt.

Tightening torque:

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

Tightening angle:



4. Install the transmission assembly to the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Automatic Transmission Assembly>INSTALLATION.

CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Drive Plate

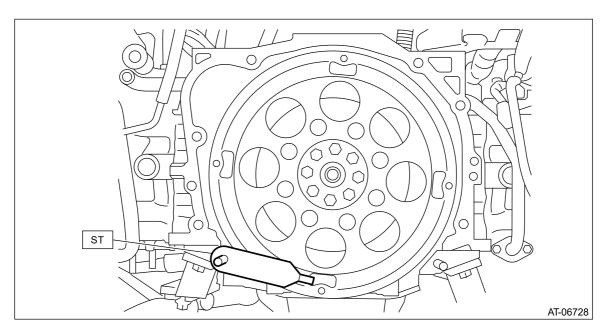
REMOVAL

- 1. Remove the transmission assembly from the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Automatic Transmission Assembly>REMOVAL.
- 2. Set the ST.

Note:

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

ST 498497300 CRANKSHAFT STOPPER



3. Remove the drive plate and reinforcement drive plate.

INSPECTION

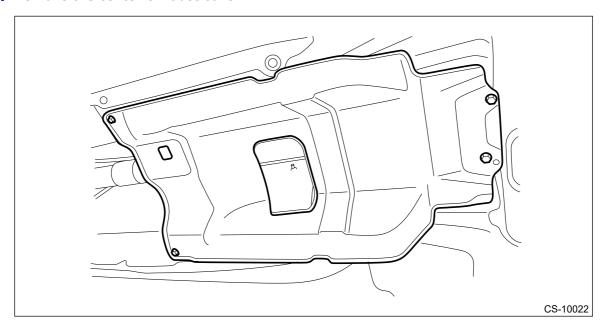
Check for leakage of CVTF from the joint section of transmission and propeller shaft. If a leak is found, inspect the propeller shaft and replace the oil seal.

REPLACEMENT

Caution:

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

- 1. Lift up the vehicle.
- **2.** Remove the center exhaust pipe. Ref. to EXHAUST(H4DO)>Center Exhaust Pipe>REMOVAL.
- 3. Remove the center exhaust cover.



- 4. Clean the transmission exterior.
- 5. Remove the propeller shaft. Remove the propeller Shaft>Removal.
- **6.** Using a screwdriver or ST, remove the oil seal trying not to damage the extension case.

ST 398527700 PULLER ASSY

7. Using the ST, install the oil seal.

Note:

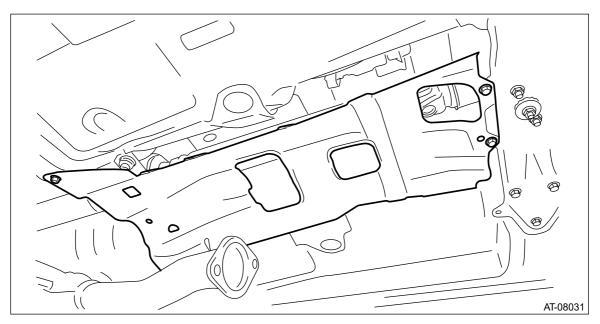
- Use a new oil seal.
- Apply CVTF to the oil seal lip and press-fitting surface.

ST 498057300 INSTALLER

- 8. Install the propeller shaft. Ref. to DRIVE SHAFT SYSTEM>Propeller Shaft>INSTALLATION.
- **9.** Install the center exhaust cover.

Tightening torque:

18 N•m (1.8 kgf-m, 13.3 ft-lb)



- **10.** Install the center exhaust pipe. Ref. to EXHAUST(H4DO)>Center Exhaust Pipe>INSTALLATION.
- **11.** Adjust the CVTF level and check there is no leakage. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>CVTF>ADJUSTMENT.

ADJUSTMENT

Note:

When replacing the extension case, select the transfer drive gear shim and transfer driven gear shim. Ref. to CONTINUOUSLY VARIABLE

TRANSMISSION(TR580)>Reduction Drive Gear>ADJUSTMENT. Ref. to
CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transfer Clutch>ADJUSTMENT.

ASSEMBLY

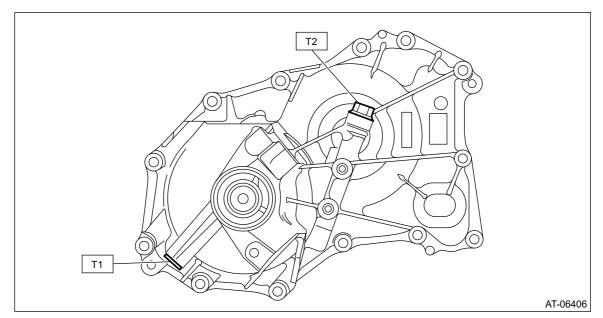
- 1. Press-fit the dust cover into extension case.
- 2. Install the extension case oil seal to extension case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Extension Case Oil Seal>REPLACEMENT.
- 3. Install all plugs.

Note:

- Use a new O-ring or a gasket.
- Apply CVTF to the O-rings.

Tightening torque:

T1: 22 N·m (2.2 kgf-m, 16.2 ft-lb) T2: 35 N·m (3.6 kgf-m, 25.8 ft-lb)



DISASSEMBLY

- **1.** Remove the dust cover from extension case.
- **2.** Remove the extension case oil seal from the extension case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Extension Case Oil Seal>REPLACEMENT.
- **3.** Remove all plugs.

INSPECTION

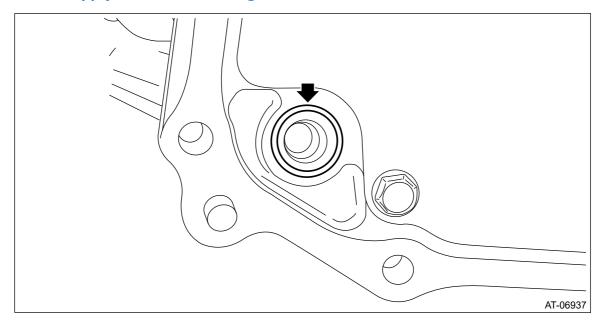
- Check there is no leak of CVTF from the joint between extension case and transmission case.
- Check there is no damage or cracks on the extension case and other parts.

INSTALLATION

- 1. Clean the mating surface of extension case and transmission case.
- **2.** Select the transfer drive gear shim. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Reduction Drive Gear>ADJUSTMENT.
- **3.** Select the transfer driven gear shim. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transfer Clutch>ADJUSTMENT.
- **4.** Attach the selected transfer drive gear shim to extension case with vaseline.
- 5. Attach the selected transfer driven gear shim to extension case with vaseline.
- **6.** Install the O-ring to the transmission case.

Note:

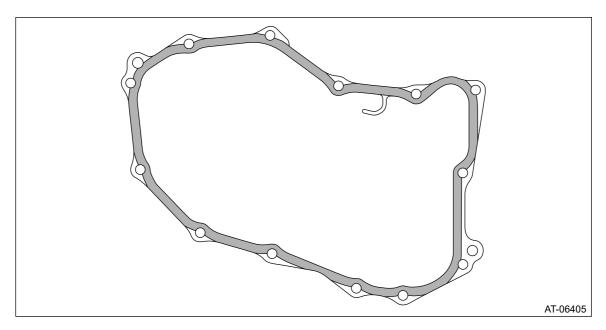
- Use new O-rings.
- Apply CVTF to the O-rings.



7. Apply liquid gasket to extension case seamlessly.

Liquid gasket:

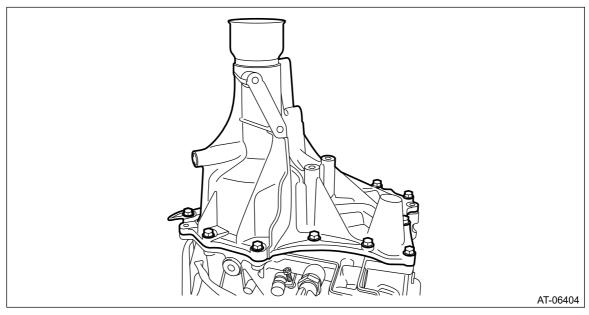
THREE BOND 1215B or equivalent



8. Install the extension case to transmission hanger.

Tightening torque:

25 N·m (2.5 kgf-m, 18.4 ft-lb)



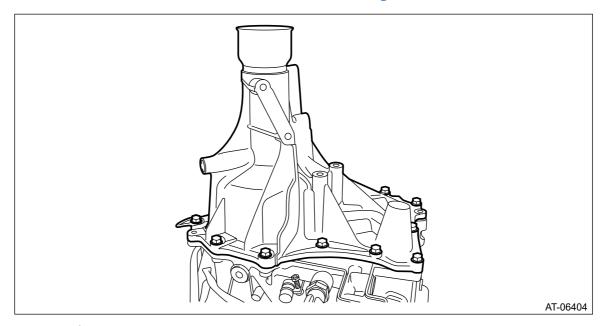
9. Install the transmission assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Automatic Transmission Assembly>INSTALLATION.

REMOVAL

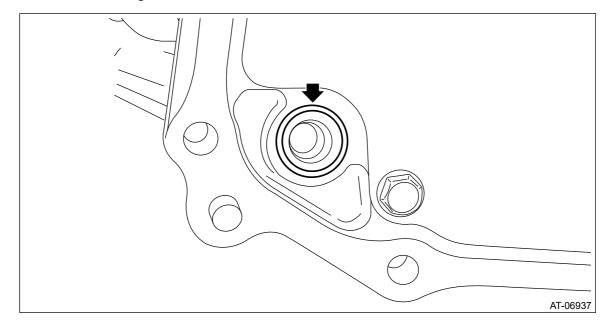
- 1. Remove the transmission assembly from the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Automatic Transmission Assembly>REMOVAL.
- **2.** Remove the extension case and transmission hanger.

Note:

The total number of extension case mounting bolts is 13.



3. Remove the O-ring.



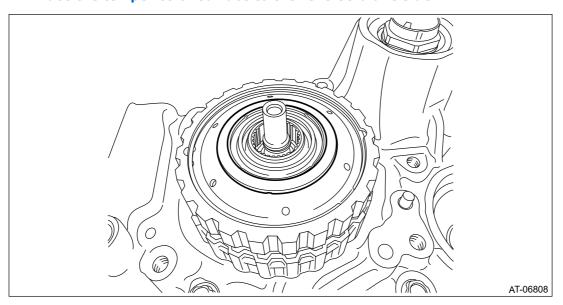
CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Forward Clutch Assembly

ADJUSTMENT

1. Install the thrust bearing to the internal gear.

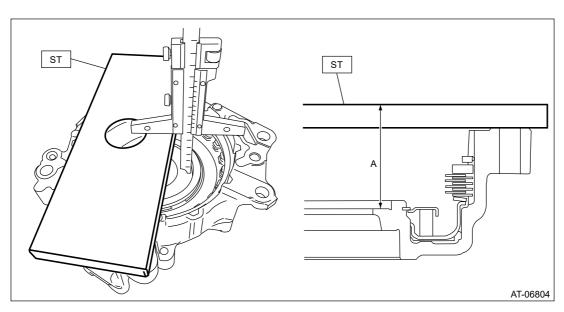
Note:

Face the temper color surface to the reverse brake side.



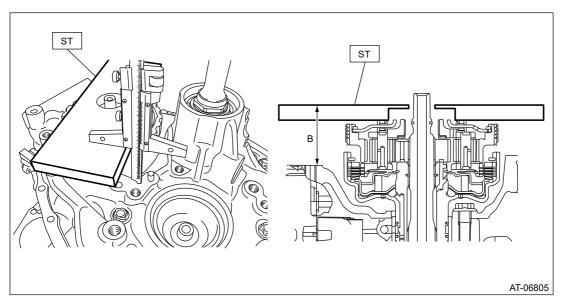
2. Measure depth "A" from the ST upper face to the washer mounting surface.

ST 499575600 GAUGE



3. Measure the height "B" from the ST upper face to the mating surface of the drive pinion retainer.

ST 499575600 GAUGE



4. Obtain the thickness of washer using the following formula to select the washer.

T mm = A - B - (0.35 - 0.70)

[T in = A - B - (0.014 - 0.028)]

T: Washer thickness

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

B: Height from ST upper face to the drive pinion retainer mating surface

0.35-0.70 mm (0.014-0.028 in): Clearance

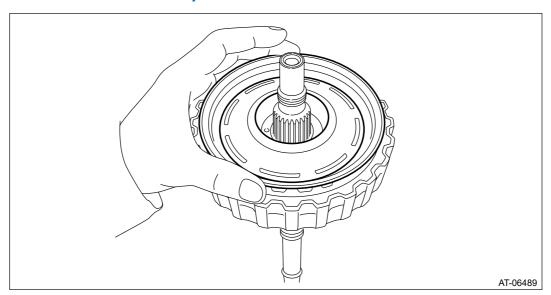
Washer					
Part No.	Thickness mm (in)				
803064020	1.3 (0.051)				
803064021	1.55 (0.061)				
803064022	1.8 (0.071)				
803064023	2.05 (0.081)				
803064024	2.3 (0.091)				
803064025	2.55 (0.100)				

1. FORWARD CLUTCH ASSEMBLY

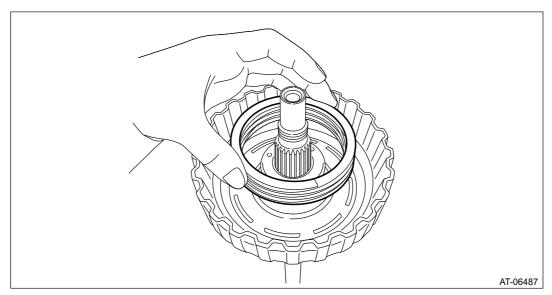
1. Install the forward clutch piston to forward clutch drum.

Note:

- Apply CVTF to the seal of forward clutch piston.
- Insert it all the way to the end.



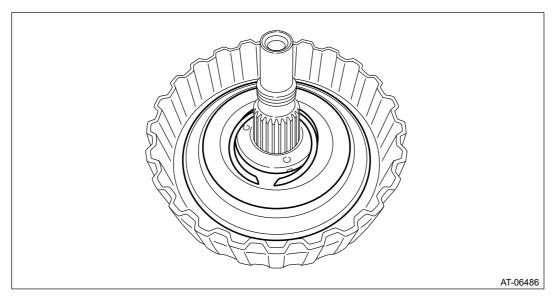
2. Install the return spring.



3. Install the chamber COMPL.

Note:

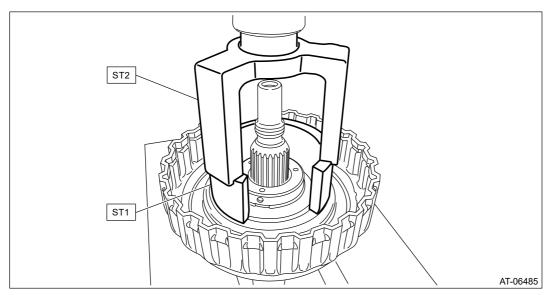
Apply CVTF to the sealing area of chamber COMPL.



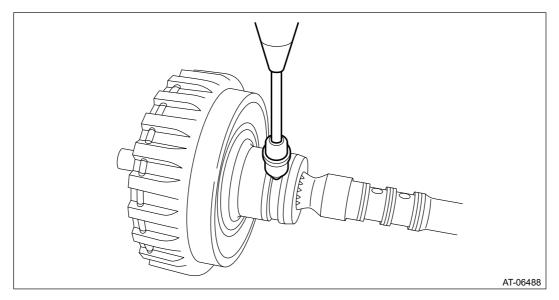
4. Compress the return spring using the ST to install the snap ring.

ST1 18762AA010 COMPRESSOR SPECIAL TOOL

ST2 398673600 COMPRESSOR



5. Check the operation of forward clutch piston by blowing compressed air intermittently from forward clutch carrier hole.



- 6. Place the driven plate, drive plate and retaining plate neatly in this order on surface table.
- 7. Set the dial gauge to retaining plate, and read its scale.

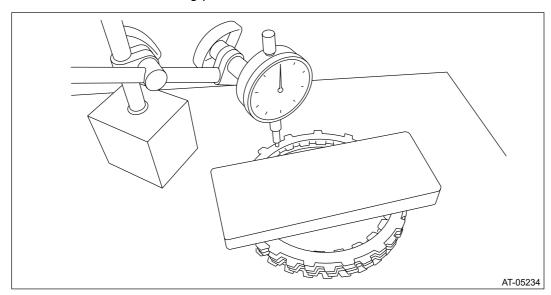
Note:

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

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

Note:

- Use a stiff board which does not bend against load as a flat board to be put on retaining plate.
- Use a flat board weighing less than 52 N (5.3 kgf, 11.7 lb).
- 9. Put the flat board on retaining plate.



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

N = 52 N (5.3 kgf, 11.7 lb) - Z

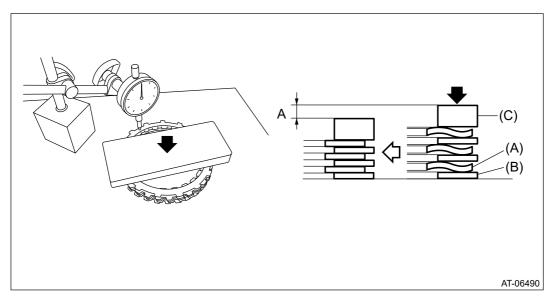
52 N (5.3 kgf, 11.7 lb): Load applied to clutch plate

Z: Flat board weight

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

Note:

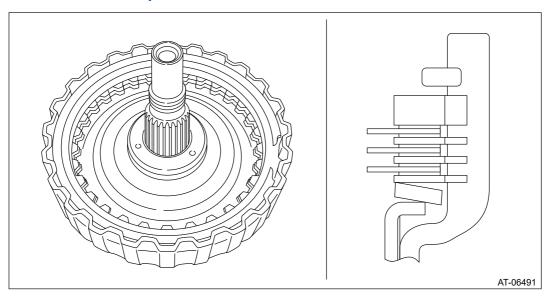
Measure at four points with a 90° interval and calculate the average.



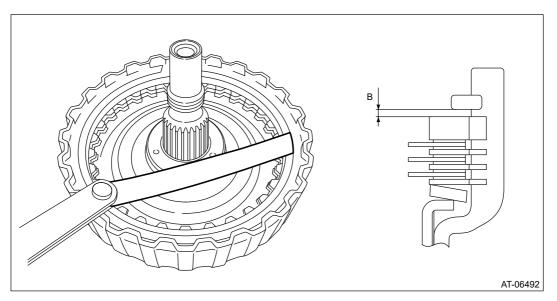
- (A) Driven plate
- (B) Drive plate
- (C) Retaining plate
- **12.** Install the dish plate, drive plate, driven plate, retaining plate and snap ring to the forward clutch carrier.

Note:

Install the dish plate in the correct direction.



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



14. Piston stroke calculation

Calculate with A and B dimensions recorded before.

If it exceeds the limit, replace with a new drive plate and adjust within the initial standard value.

S mm (in) = A + B

S: Piston stroke

A: Compression amount of drive plate and dish plate

B: Clearance between retaining plate and snap ring

Initial standard:

1.0-1.4 mm (0.040-0.055 in)

Limit thickness:

1.6 mm (0.063 in)

Retaining plate				
Item number	Thickness mm (in)			
31567AB760	4.2 (0.165)			
31567AB770	4.4 (0.173)			
31567AB780	4.6 (0.181)			
31567AB790	4.8 (0.189)			
31567AB830	5.0 (0.197)			

2. PLANETARY CARRIER ASSEMBLY

Note:

Assemble in the reverse order of disassembly.

3. INTERNAL GEAR

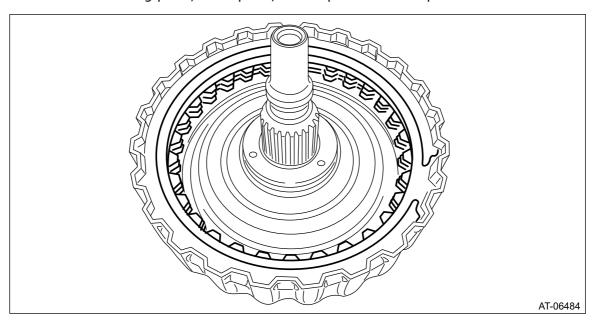
Note:

Assemble in the reverse order of disassembly.

DISASSEMBLY

1. FORWARD CLUTCH ASSEMBLY

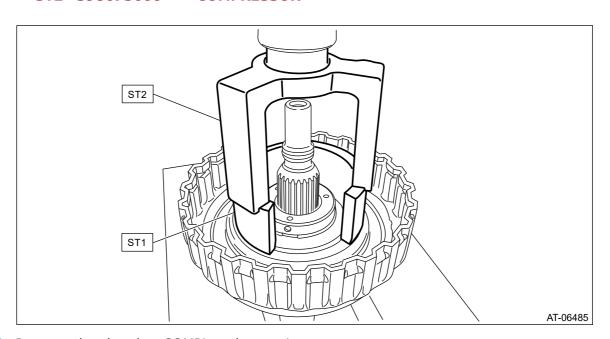
- 1. Remove the snap ring.
- **2.** Remove the retaining plate, drive plate, driven plate and dish plate.



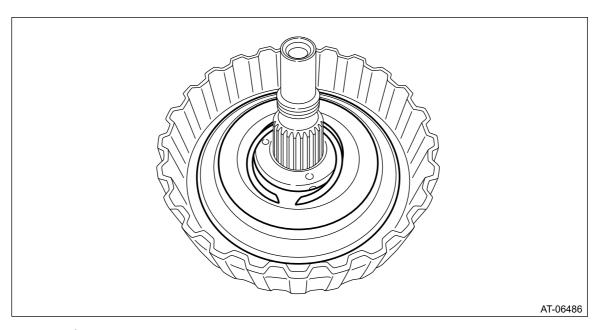
3. Compress the return spring using the ST to remove the snap ring.

ST1 18762AA010 COMPRESSOR SPECIAL TOOL

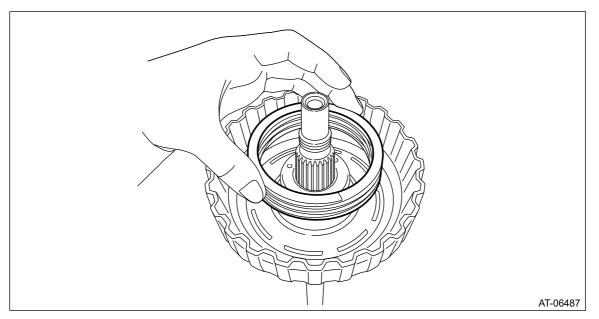
ST2 398673600 COMPRESSOR



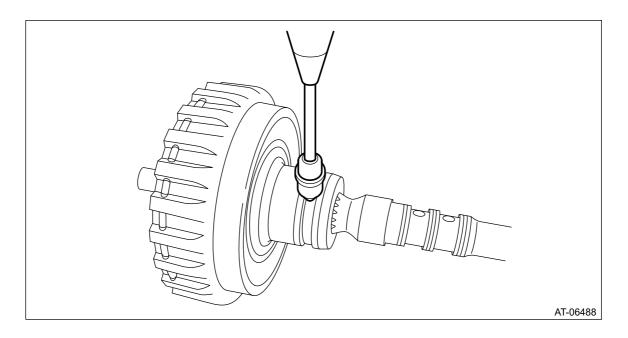
4. Remove the chamber COMPL and snap ring.



5. Remove the return spring.



6. Remove the forward clutch piston by blowing compressed air intermittently from the forward clutch carrier hole.

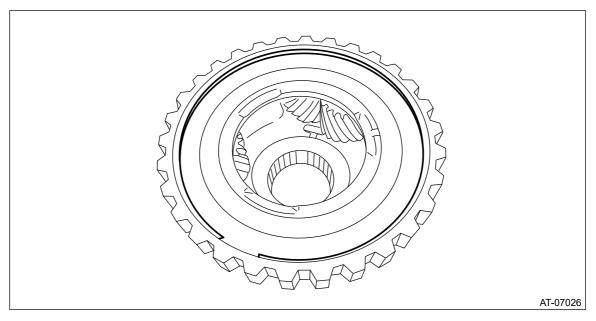


2. PLANETARY CARRIER ASSEMBLY

Note:

Disassemble the balance oil guide only.

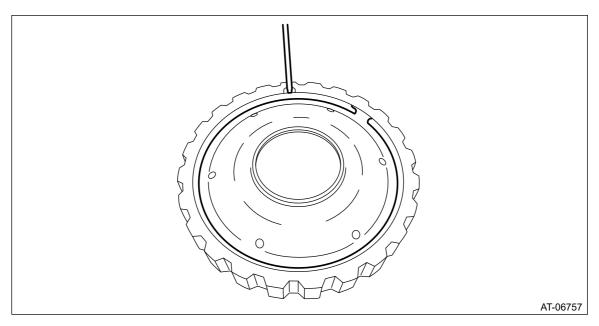
1. Remove the snap ring.



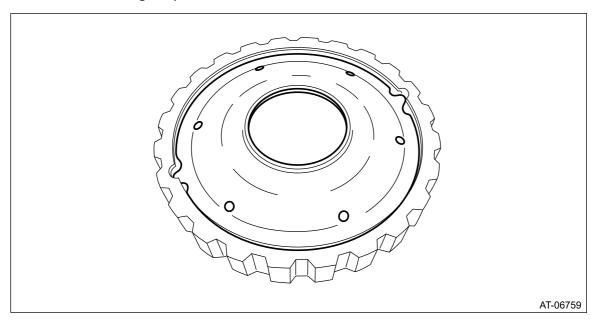
2. Remove the balance oil guide.

3. INTERNAL GEAR

1. Remove the snap ring.



2. Remove the thrust gear plate.



CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Forward Clutch Assembly

INSPECTION

- Check the forward clutch drum, internal gear, sun gear and forward clutch piston lip for wear or damage.
- Inspect the drive plate facing for wear and damage.
- Check the driven plate for discoloration (burnt color).
- Check for worn snap ring, fatigue or damaged return spring or deformed spring retainer.
- Make sure the clearance between retaining plate and internal gear of forward clutch is within the limit. If it exceeds the standard, replace the forward clutch. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Forward Clutch Assembly>ASSEMBLY.

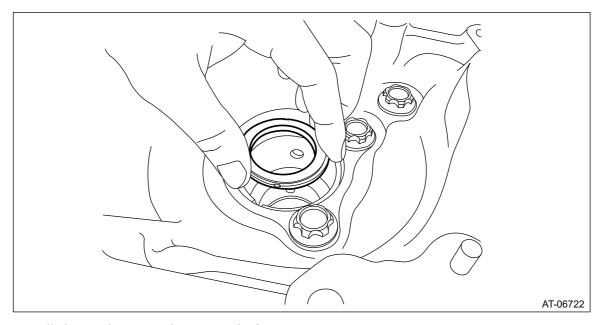
CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Forward Clutch Assembly

INSTALLATION

1. Install the thrust bearing to the converter case.

Note:

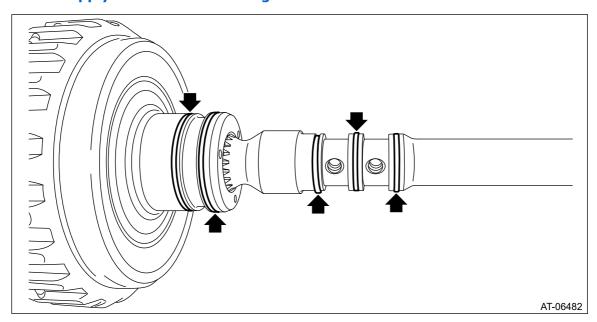
Face the temper color surface to the converter case side.



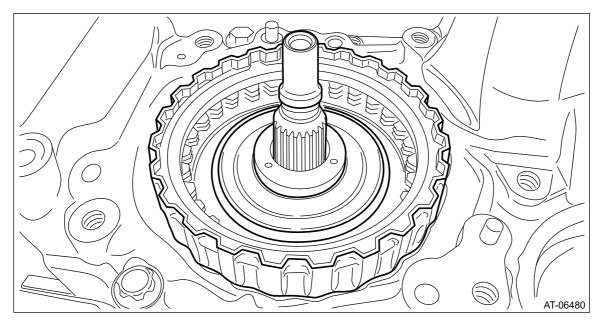
2. Install the seal ring to the input shaft.

Note:

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



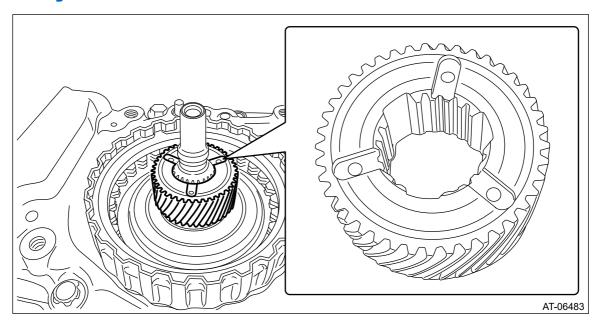
3. Install the forward clutch assembly to the converter case.



4. Install the sun gear.

Note:

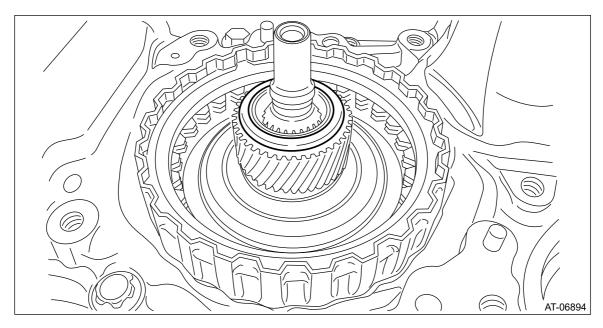
Face the end face of the sun gear to the reverse brake side as shown in the figure.



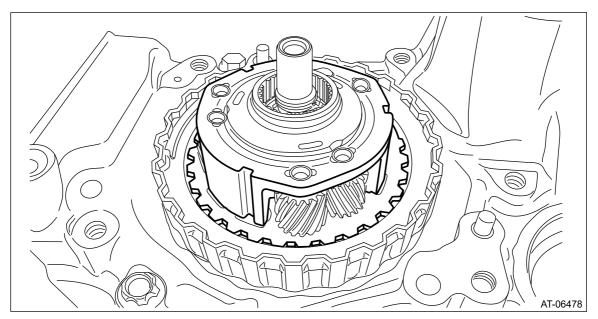
5. Install the thrust bearing to the sun gear.

Note:

Face the temper color surface to the reverse brake side.



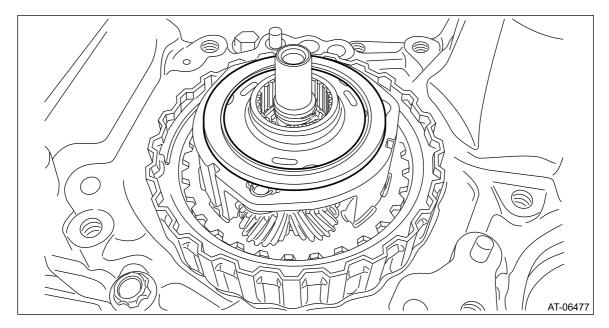
6. Install the planetary carrier.



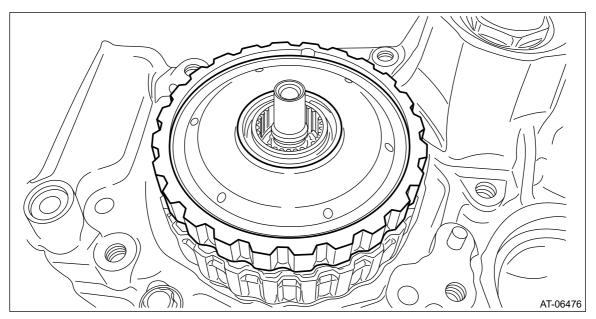
7. Install the thrust bearing.

Note:

Face the temper color surface to the reverse brake side.



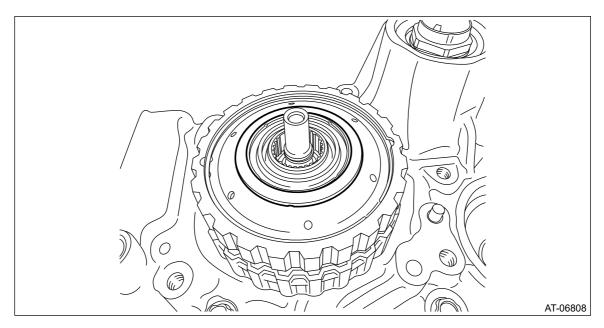
8. Install the internal gear.



9. Install the thrust bearing to the internal gear.

Note:

Face the temper color surface to the reverse brake side.



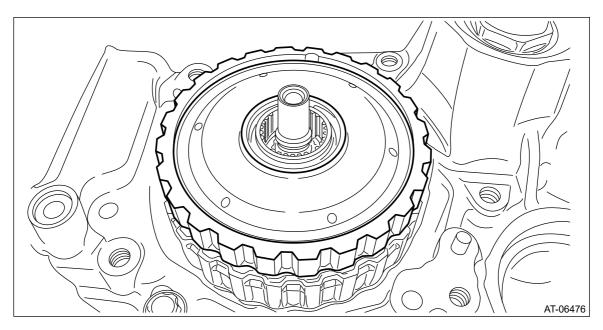
- **10.** Select a washer. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Forward Clutch Assembly>ADJUSTMENT.
- 11. Install the reverse brake assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Reverse Brake Assembly>INSTALLATION.
- 12. Install the primary pulley, secondary pulley and variator chain. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Primary Pulley and Secondary Pulley>INSTALLATION.
- 13. Install the reduction drive gear. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Reduction Drive Gear>INSTALLATION.
- **14.** Install the transmission case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transmission Case>INSTALLATION.
- **15.** Install the transmission control device. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transmission Control Device>INSTALLATION.
- **16.** Install the oil strainer and oil pan. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Oil Pan and Strainer>INSTALLATION.
- 17. Install the reduction driven gear assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Reduction Driven Gear>INSTALLATION.
- **18.** Install the parking pawl. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Parking Pawl>INSTALLATION.
- 19. Install the transfer driven gear assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transfer Driven Gear>INSTALLATION.
- **20.** Install the transfer clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transfer Clutch>INSTALLATION.
- **21.** Install the extension case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Extension Case>INSTALLATION.
- **22.** Install the inhibitor switch. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Inhibitor Switch>INSTALLATION.
- **23.** Install the secondary speed sensor. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Secondary Speed Sensor>INSTALLATION.
- **24.** Install the primary speed sensor. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Primary Speed Sensor>INSTALLATION.

- **25.** Install the turbine speed sensor. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Turbine Speed Sensor>INSTALLATION.
- **26.** Install the transmission harness. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transmission Harness>INSTALLATION.
- **27.** Install the control valve body. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Control Valve Body>INSTALLATION.
- **28.** Install the air breather hose. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Air Breather Hose>INSTALLATION.
- **29.** Install the transmission assembly to the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Automatic Transmission Assembly>INSTALLATION.

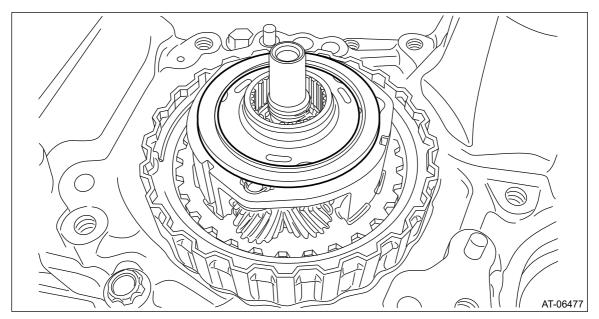
CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Forward Clutch Assembly

REMOVAL

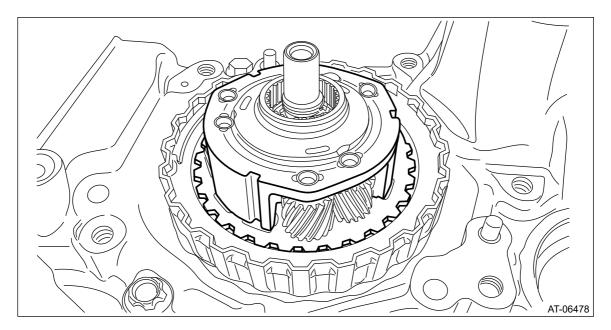
- 1. Remove the transmission assembly from the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Automatic Transmission Assembly>REMOVAL.
- **2.** Remove the air breather hose. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Air Breather Hose>REMOVAL.
- **3.** Remove the control valve body. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Control Valve Body>REMOVAL.
- **4.** Remove the transmission harness. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transmission Harness>REMOVAL.
- **5.** Remove the turbine speed sensor. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Turbine Speed Sensor>REMOVAL.
- **6.** Remove the secondary speed sensor. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Secondary Speed Sensor>REMOVAL.
- **7.** Remove the primary speed sensor. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Primary Speed Sensor>REMOVAL.
- **8.** Remove the inhibitor switch. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Inhibitor Switch>REMOVAL.
- **9.** Remove the extension case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Extension Case>REMOVAL.
- **10.** Remove the transfer clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transfer Clutch>REMOVAL.
- **11.** Remove the transfer driven gear assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transfer Driven Gear>REMOVAL.
- **12.** Remove the parking pawl. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Parking Pawl>REMOVAL.
- **13.** Remove the reduction driven gear assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Reduction Driven Gear>REMOVAL.
- **14.** Remove the oil pan and oil strainer. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Oil Pan and Strainer>REMOVAL.
- **15.** Remove the transmission control device. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transmission Control Device>REMOVAL.
- **16.** Remove the transmission case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transmission Case>REMOVAL.
- **17.** Remove the reduction drive gear. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Reduction Drive Gear>REMOVAL.
- **18.** Remove the primary pulley, secondary pulley and variator chain. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Primary Pulley and Secondary Pulley>REMOVAL.
- **19.** Remove the reverse brake assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Reverse Brake Assembly>REMOVAL.
- **20.** Remove the internal gear.



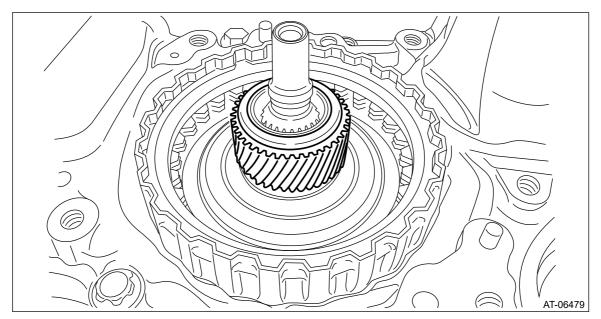
21. Remove the thrust bearing.



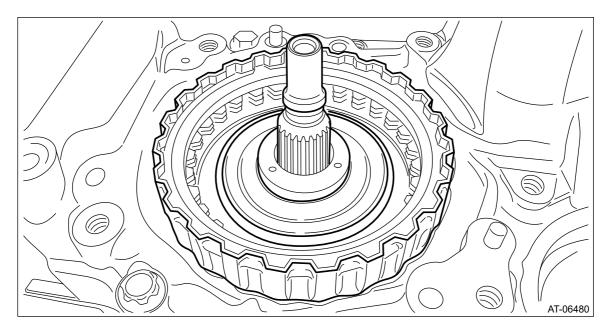
22. Remove the planetary carrier.



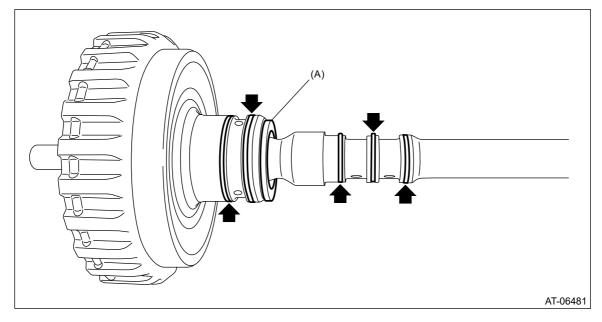
23. Remove the thrust bearing and sun gear.



24. Remove the forward clutch assembly.



25. Remove the thrust bearing and seal ring.



(A) Thrust bearing

CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Front Differential Assembly

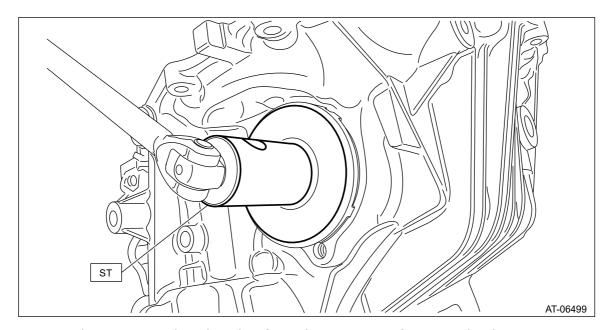
ADJUSTMENT

1. Using the ST, screw-in the retainer until resistance is felt.

Note:

RH side should be screwed-in more than LH side.

ST 18658AA020 WRENCH COMPL RETAINER



- 2. Remove the remaining liquid gasket from the mating surface completely.
- **3.** Using the ST, install the drive pinion assembly to converter case.

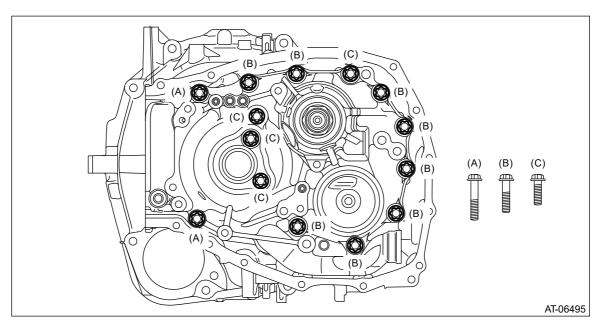
ST 18270KA020 SOCKET (E20)

Note:

Do not confuse the three different-length bolts when installing.

Tightening torque:

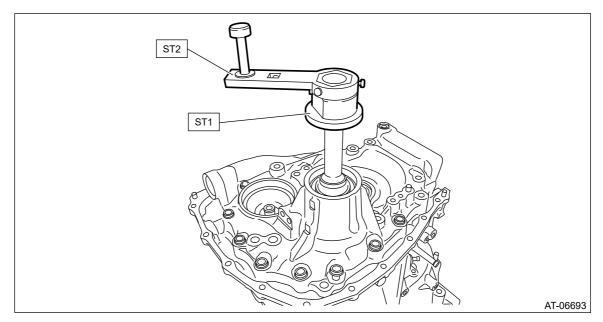
43 N·m (4.4 kgf-m, 31.7 ft-lb)



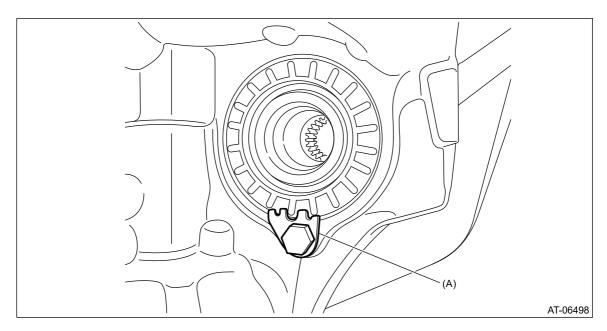
4. Rotate the drive pinion shaft ten times or more using ST1 and ST2.

ST1 18667AA010 HOLDER

ST2 499787700 WRENCH



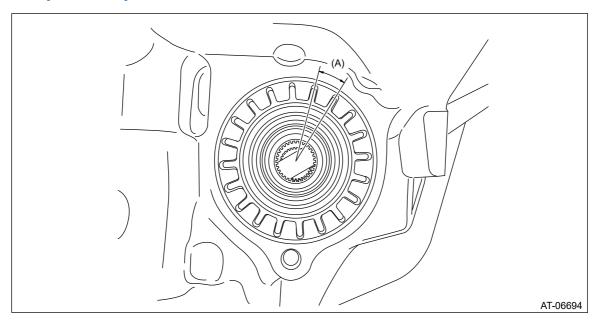
- 5. While rotating the pinion shaft, tighten the retainer LH and loosen the retainer RH until the shaft can't be turned anymore. The backlash is "zero" when the pinion shaft comes to the point where it doesn't rotate.
- **6.** After the "zero" state is established, loosen the retainer LH by 3 notches and secure it with the lock plate. Retighten the retainer RH until it stops. Rotate the drive pinion 2 or 3 times. Tighten the retainer RH further 1-3/4 notches. This sets the preload. Finally, secure the retainer with its lock plate.



(A) Lock plate

Note:

Turning the retainer by every one tooth changes the backlash approx. 0.05 mm (0.0020 in).



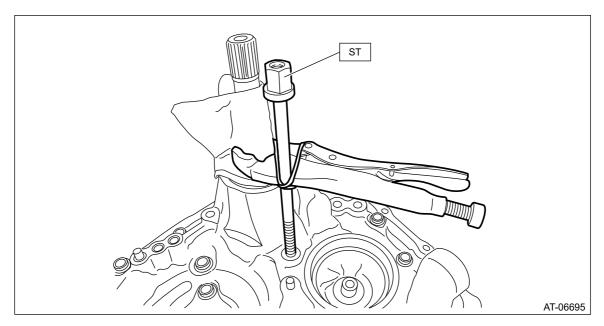
(A) 1 tooth

7. Insert the two SUBARU genuine axle shafts into differential case.

Part No. 38415AA070 Axle shaft

8. Install the ST to the drive pinion retainer, and wrap the drive pinion shaft with cloth and pinch with vise pliers. Using a tie-wrap or a wire, fix the vise pliers to the ST. Make sure the drive pinion shaft does not move.

ST 18763AA000 COMPRESSOR SHAFT



9. Check the backlash is within specification using ST1, ST2 and ST3.

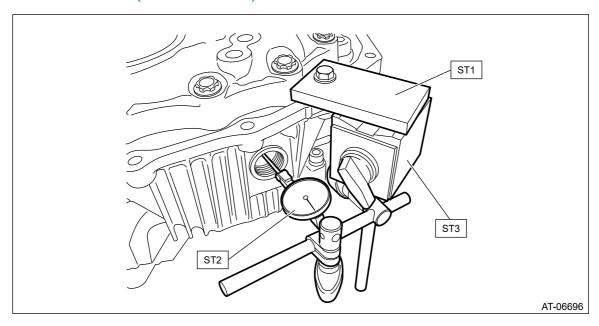
ST1 498255400 PLATE

ST2 498247100 DIAL GAUGE

ST3 498247001 MAGNET BASE

Backlash:

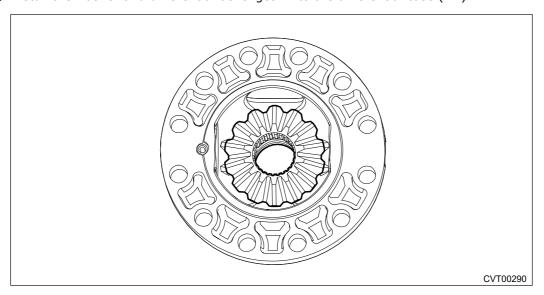
0.13-0.18 mm (0.005-0.007 in)



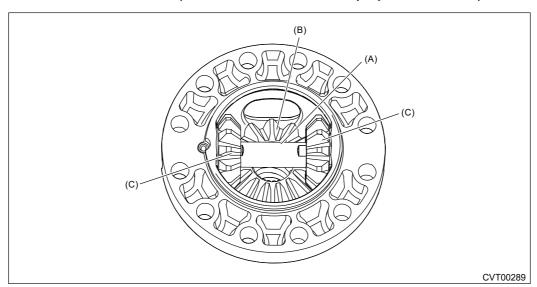
10. Adjust the teeth contact of the front differential and drive shaft. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Drive Pinion Shaft Assembly>ADJUSTMENT.

1. DIFFERENTIAL CASE ASSEMBLY

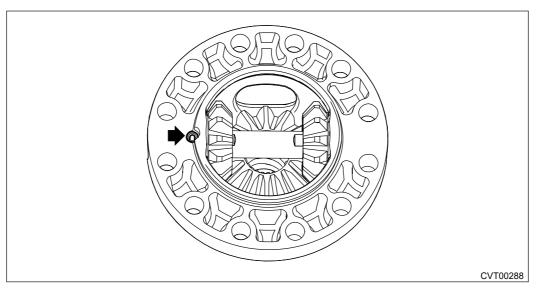
1. Install the washer and differential bevel gear into the differential case (RH).



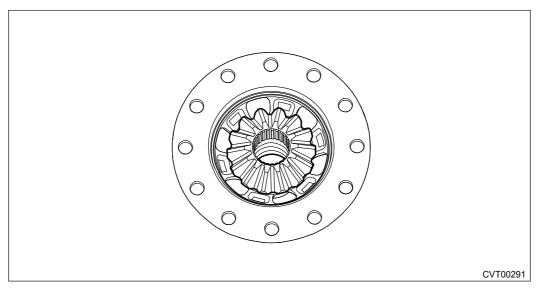
2. Install the differential bevel pinions into differential case (RH) and install the pinion shaft.



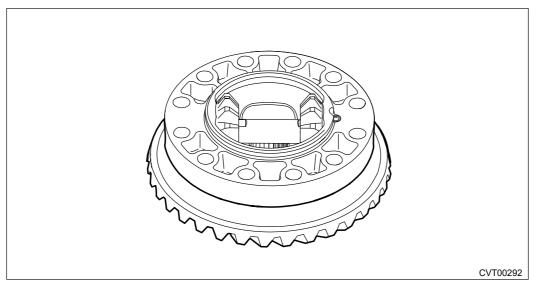
- (A) Pinion shaft
- (B) Differential bevel gear
- (C) Differential bevel pinion
- 3. Install the straight pin.



4. Install the washer and differential bevel gear to the differential case (LH).



5. Install the differential case (RH) to the hypoid driven gear.



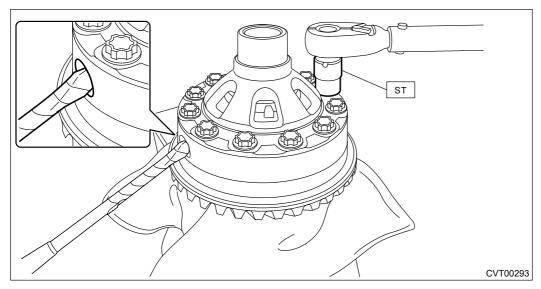
6. Install the differential case (LH) to the differential case (RH).

7. Using the ST, install the hypoid driven gear by tightening the installation bolt.

ST 18270KA020 SOCKET (E20)

Tightening torque:

64 N·m (6.5 kgf-m, 47.2 ft-lb)



- **8.** Measure the backlash, and select the washer.
 - (1) Install the SUBARU genuine axle shaft to differential case.

Part No. 38415AA070 Axle shaft

(2) Using ST1 and ST2, insert the ST2 through the window of differential case. Measure the backlash of the gear.

Note:

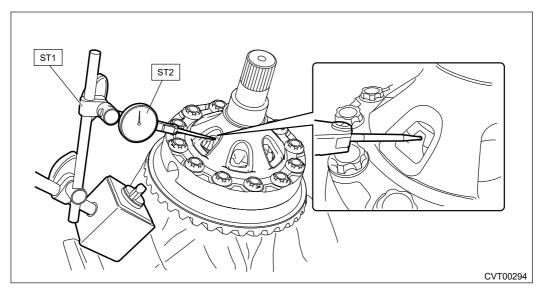
- Measure the backlash by applying a differential bevel pinion tooth between two differential bevel gear teeth.
- When measuring, fix the differential bevel pinion in place with a screwdriver covered with cloth, or a similar tool.

ST1 498247001 MAGNET BASE

ST2 498247100 DIAL GAUGE

Specification:

0.13-0.18 mm (0.0051-0.0071 in)



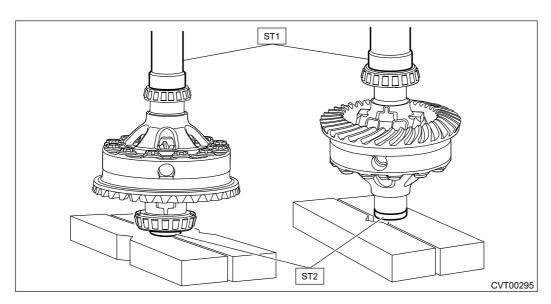
(3) If the backlash is not within specification, select a washer from the table below and replace.

Washer				
Part No.	Thickness mm (in)			
803038021	0.95 (0.037)			
803038022	1.00 (0.039)			
803038023	1.05 (0.041)			

9. Using the ST, install the left and right taper roller bearings.

ST1 499277100 BUSHING 1-2 INSTALLER

ST2 398497701 SEAT



2. SIDE RETAINER

Note:

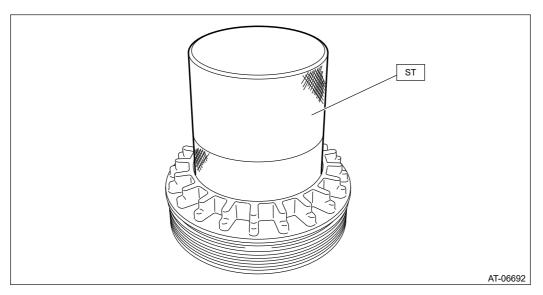
After adjusting the backlash and tooth contact, replace the oil seal and O-ring of side retainer with new parts.

1. Using the ST, install the oil seal.

Note:

- Use a new oil seal.
- Apply differential gear oil to the oil seal lip and press-fitting surface.
- Oil seal has an identification mark (R, L). When installing oil seals, do not confuse the left and right.

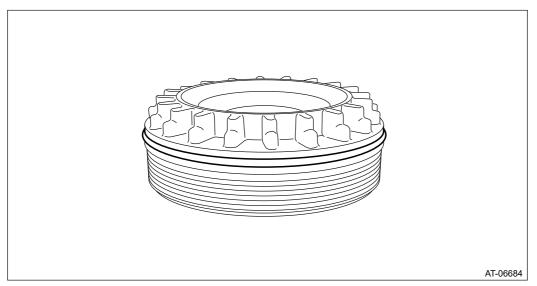
ST 18675AA000 DIFFERENTIAL SIDE OIL SEAL INSTALLER



2. Install the O-rings.

Note:

- Use new O-rings.
- Apply the differential gear oil to O-ring.



DISASSEMBLY

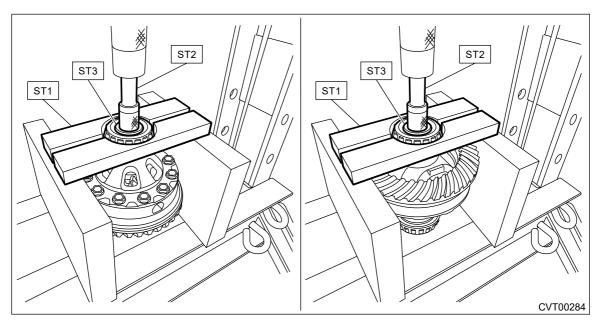
1. DIFFERENTIAL CASE ASSEMBLY

1. Remove the taper roller bearing using the ST.

ST1 498077000 REMOVER

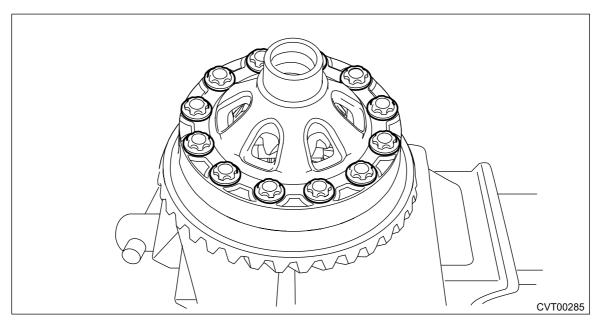
ST2 899864100 REMOVER

ST3 398497701 SEAT

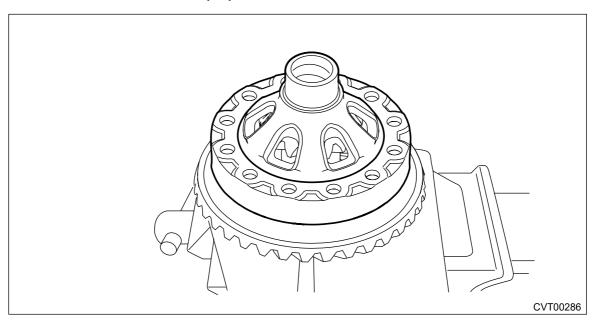


2. Remove the hypoid driven gear mounting bolt using the ST.

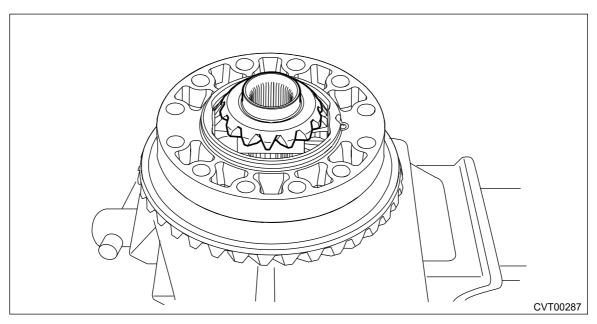
ST 18270KA020 SOCKET (E20)



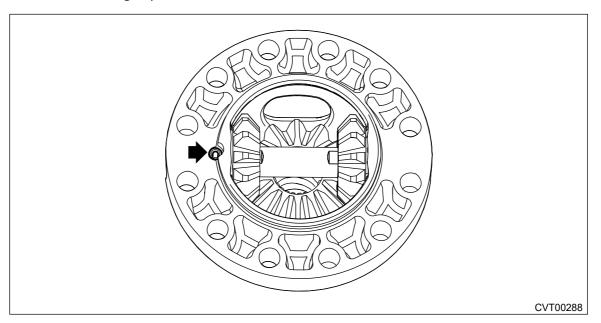
3. Remove the differential case (LH).



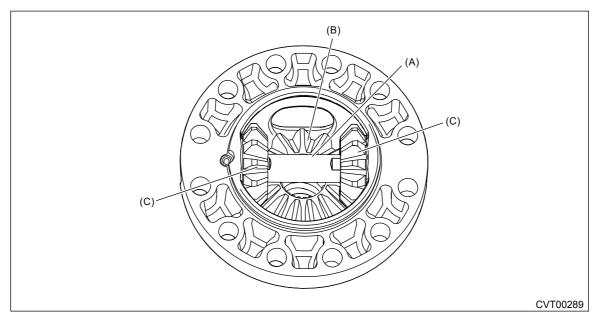
4. Remove the differential bevel gear and washer from differential case.



5. Remove the straight pin.



6. Remove the pinion shaft, then remove the differential bevel gear, washer and differential bevel pinion.



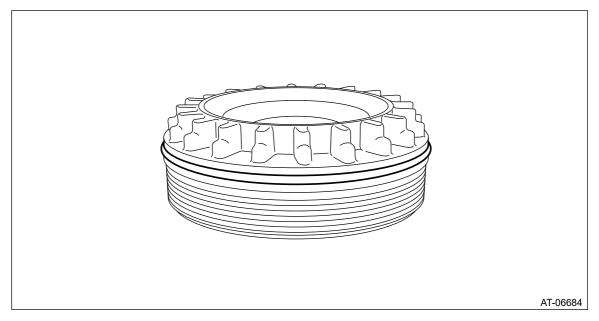
- (A) Pinion shaft
- (B) Differential bevel gear
- (C) Differential bevel pinion

2. SIDE RETAINER

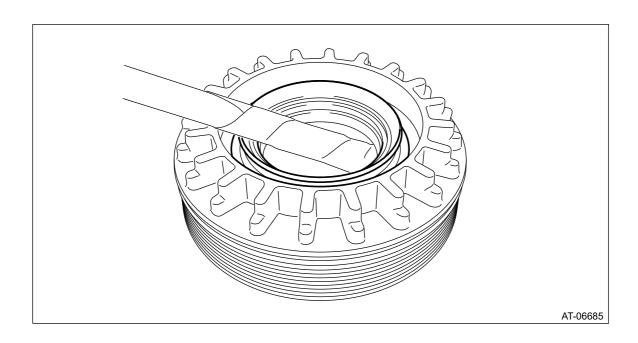
Note:

After adjusting the drive pinion backlash and tooth contact, replace the oil seal and O-ring with new parts.

1. Remove the O-rings.



2. Remove the oil seal.



CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Front Differential Assembly

INSPECTION

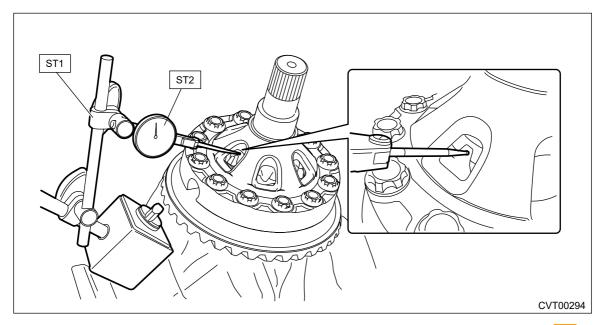
- Check each component for scratches, damage or other faults.
- Using the ST, check the backlash of pinion gear.

ST1 498247001 MAGNET BASE

ST2 498247100 DIAL GAUGE

Specification:

0.13-0.18 mm (0.0051-0.0071 in)



• Measure the hypoid gear backlash, and then adjust it to be within specification. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Front Differential Assembly>ADJUSTMENT.

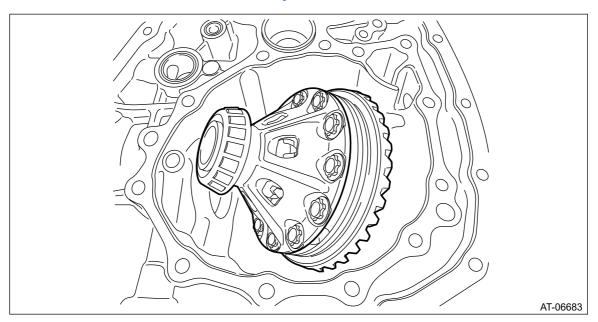
CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Front Differential Assembly

INSTALLATION

1. Install the front differential assembly to the converter case.

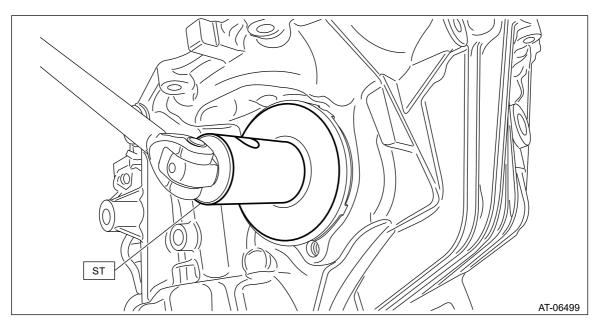
Note:

Be careful not to damage the inside of the case (especially the mounting surface of the differential side retainers).



- **2.** Install the bearing outer race.
- **3.** Temporarily install the differential side retainers using ST.

ST 18658AA020 WRENCH COMPL RETAINER



4. Adjust the backlash of the front differential. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Front Differential Assembly>ADJUSTMENT.

- **5.** Inspect and adjust the tooth contact. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Drive Pinion Shaft Assembly>ADJUSTMENT.
- **6.** Using the ST, loosen the differential side retainer until the mounting groove of the O-ring appears, and then install the O-ring.

Note:

- When loosening the differential side retainer, record the number of the turns made.
- Perform this for both left and right differential side retainers.
- Use new O-rings.
- Apply the differential gear oil to O-ring.

ST 18658AA020 WRENCH COMPL RETAINER

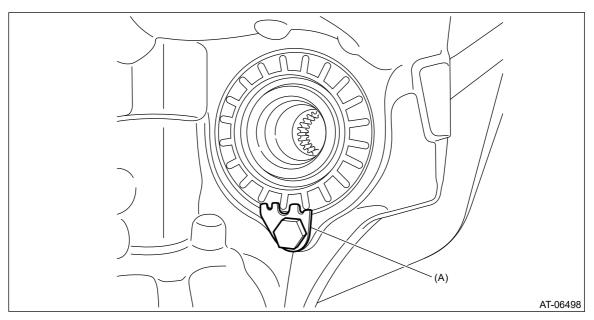
7. Using the ST, tighten the retainer to the position before it is loosened.

ST 18658AA020 WRENCH COMPL RETAINER

- **8.** Install the oil seal to the differential side retainer. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Differential Side Retainer Oil Seal.
- **9.** Install the lock plate.

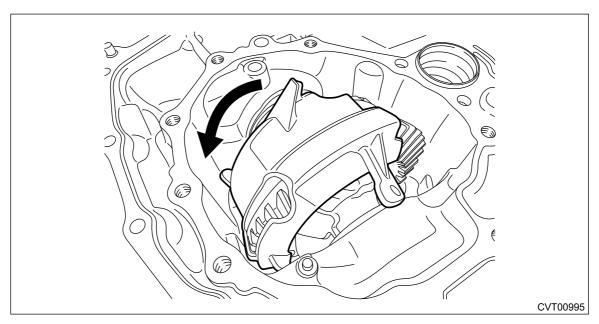
Tightening torque:

25 N•m (2.5 kgf-m, 18.4 ft-lb)



(A) Lock plate

10. Install the oil baffle.



- **11.** Install the drive pinion shaft assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Drive Pinion Shaft Assembly>INSTALLATION.
- **12.** Install the forward clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Forward Clutch Assembly>INSTALLATION.
- 13. Install the reverse brake assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Reverse Brake Assembly>INSTALLATION.
- **14.** Install the primary pulley, secondary pulley and variator chain. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Primary Pulley and Secondary Pulley>INSTALLATION.
- **15.** Install the reduction drive gear. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Reduction Drive Gear>INSTALLATION.
- **16.** Install the transmission case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transmission Case>INSTALLATION.
- 17. Install the transmission control device. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transmission Control Device>INSTALLATION.
- **18.** Install the oil strainer and oil pan. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Oil Pan and Strainer>INSTALLATION.
- 19. Install the reduction driven gear assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Reduction Driven Gear>INSTALLATION.
- **20.** Install the parking pawl. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Parking Pawl>INSTALLATION.
- **21.** Install the transfer driven gear assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transfer Driven Gear>INSTALLATION.
- **22.** Install the transfer clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transfer Clutch>INSTALLATION.
- **23.** Install the extension case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Extension Case>INSTALLATION.
- **24.** Install the inhibitor switch. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Inhibitor Switch>INSTALLATION.
- **25.** Install the secondary speed sensor. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Secondary Speed Sensor>INSTALLATION.

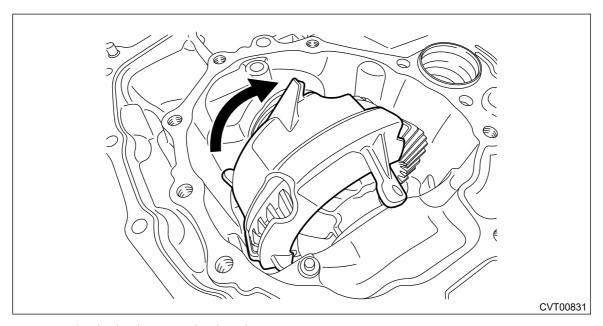
- **26.** Install the primary speed sensor. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Primary Speed Sensor>INSTALLATION.
- **27.** Install the turbine speed sensor. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Turbine Speed Sensor>INSTALLATION.
- **28.** Install the transmission harness. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transmission Harness>INSTALLATION.
- **29.** Install the control valve body. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Control Valve Body>INSTALLATION.
- **30.** Install the air breather hose. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Air Breather Hose>INSTALLATION.
- **31.** Install the transmission assembly to the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Automatic Transmission Assembly>INSTALLATION.

CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Front Differential Assembly

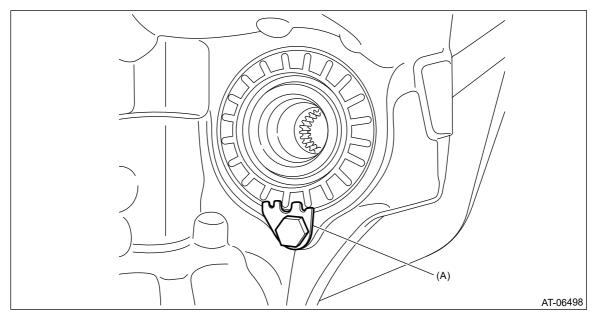
REMOVAL

- **1.** Remove the transmission assembly from the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Automatic Transmission Assembly>REMOVAL.
- **2.** Remove the air breather hose. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Air Breather Hose>REMOVAL.
- **3.** Remove the control valve body. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Control Valve Body>REMOVAL.
- **4.** Remove the transmission harness. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transmission Harness>REMOVAL.
- **5.** Remove the turbine speed sensor. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Turbine Speed Sensor>REMOVAL.
- **6.** Remove the secondary speed sensor. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Secondary Speed Sensor>REMOVAL.
- **7.** Remove the primary speed sensor. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Primary Speed Sensor>REMOVAL.
- **8.** Remove the inhibitor switch. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Inhibitor Switch>REMOVAL.
- **9.** Remove the extension case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Extension Case>REMOVAL.
- **10.** Remove the transfer clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transfer Clutch>REMOVAL.
- **11.** Remove the transfer driven gear assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transfer Driven Gear>REMOVAL.
- **12.** Remove the parking pawl. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Parking Pawl>REMOVAL.
- **13.** Remove the reduction driven gear assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Reduction Driven Gear>REMOVAL.
- **14.** Remove the oil pan and oil strainer. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Oil Pan and Strainer>REMOVAL.
- **15.** Remove the transmission control device. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transmission Control Device>REMOVAL.
- **16.** Remove the transmission case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transmission Case>REMOVAL.
- **17.** Remove the reduction drive gear. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Reduction Drive Gear>REMOVAL.
- **18.** Remove the primary pulley, secondary pulley and variator chain. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Primary Pulley and Secondary Pulley>REMOVAL.
- **19.** Remove the reverse brake assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Reverse Brake Assembly>REMOVAL.
- **20.** Remove the forward clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Forward Clutch Assembly>REMOVAL.
- **21.** Remove the drive pinion shaft assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Drive Pinion Shaft Assembly>REMOVAL.

22. Remove the oil baffle.



23. Remove the lock plates on both sides.



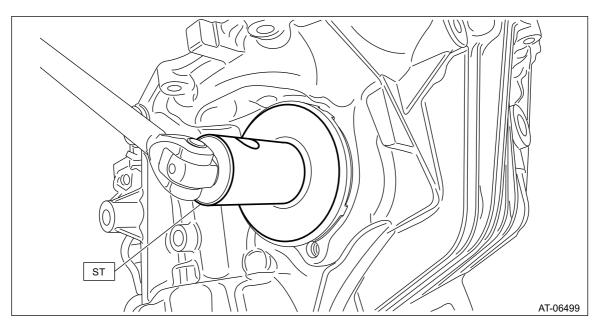
(A) Lock plate

24. Remove the differential side retainers using ST.

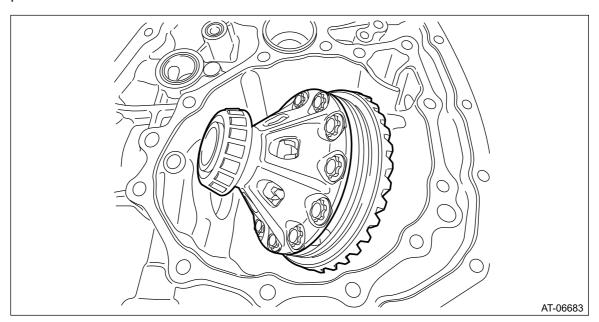
Note:

- When the wrench COMPL retainer interferes with the converter case, align the cutout portion with the interference part.
- Support the differential case assembly by hand to avoid damaging the retainer mounting hole of the converter case.
- Keep the left and right differential side retainers and left and right bearing outer races by attaching tags or in similar ways to make it possible to identify RH and LH sides.

ST 18658AA020 WRENCH COMPL RETAINER



25. Remove the front differential assembly while being careful not to damage the attachment part of the retainer.



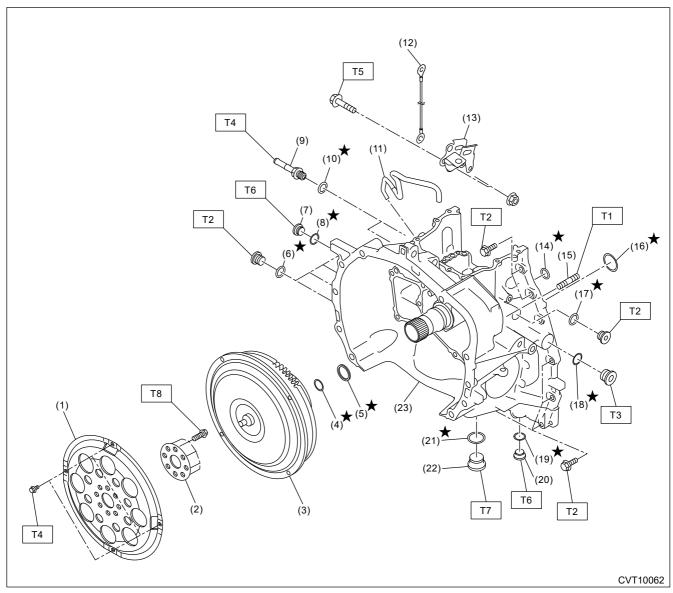
26. Remove the oil seals and O-rings from both differential side retainers. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Front Differential Assembly>DISASSEMBLY > SIDE RETAINER.

CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > General Description

CAUTION

- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust and dirt.
- Do not place the valve cover with its inner side facing up until it is installed, to prevent intrusion of foreign matter into the control valve body.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
- When disassembling the case and other light alloy parts, use a plastic hammer to force it apart. Do not pry apart with screwdrivers or other tools.
- Vehicle components are extremely hot after driving. Be wary of receiving burns from heated parts.
- Use SUBARU genuine CVTF and recommended grease. Do not mix CVTF, grease etc. of different grades or manufacturers.
- Be sure to tighten bolts and nuts to the specified torque.
- Apply CVTF onto sliding or revolving surfaces before installation.
- Replace deformed or damaged snap rings with new parts.
- Before installing O-rings or oil seals, apply sufficient amount of CVTF or gear oil to appropriate locations in order to avoid damage and deformation.
- Be careful not to incorrectly install or fail to install O-rings, snap rings and other such parts.
- Before securing a part on a vise, place cushioning material such as wood blocks, aluminum plate, or cloth between the part and the vise.
- Avoid damaging the mating surface of the case.
- Before applying liquid gasket, completely remove and clean the old liquid gasket.
- After removing the sensors, breather hose and plugs, plug the holes to avoid foreign materials intruding as necessary.
- During disassembly or assembly, be sure to use nylon gloves or paper towels. Do not use cloth gloves or waste cloth.
- Be careful of handling the oil seal, O-ring and gasket. If the contact surface of them is damaged, oil leakage may occur.
- When replacing the taper roller bearing, replace the outer race and inner race as a set.
- When replacing the hypoid gear, replace the hypoid gear and drive pinion shaft as a set.
- Replace the bolts if the seating surface or the thread surface is excessively rusted.

1. TORQUE CONVERTER ASSEMBLY AND CONVERTER CASE



(1)	Drive plate	(13)	Pitching stopper bracket	Tightening torque: N·m (kgf-m, ft-lb)
(2)	Reinforcement drive plate	(14)	O-ring	T1: 18 (1.8, 13.3)
(3)	Torque converter ASSY	(15)	Stud bolt	T2: 22 (2.2, 16.2)
(4)	O-ring	(16)	O-ring	T3: 22.5 (2.3, 16.6)
(5)	Seal ring	(17)	O-ring	T4: 25 (2.5, 18.4)
(6)	O-ring	(18)	O-ring	T5: 41 (4.2, 30.2)
(7)	Front differential gear oil filler	(19)	Gasket	T6: 50 (5.1, 36.9)
	plug			
(8)	O-ring	(20)	Overflow drain plug	T7: 70 (7.1, 51.6)

- (9) Oil cooler pipe
- (21) Gasket

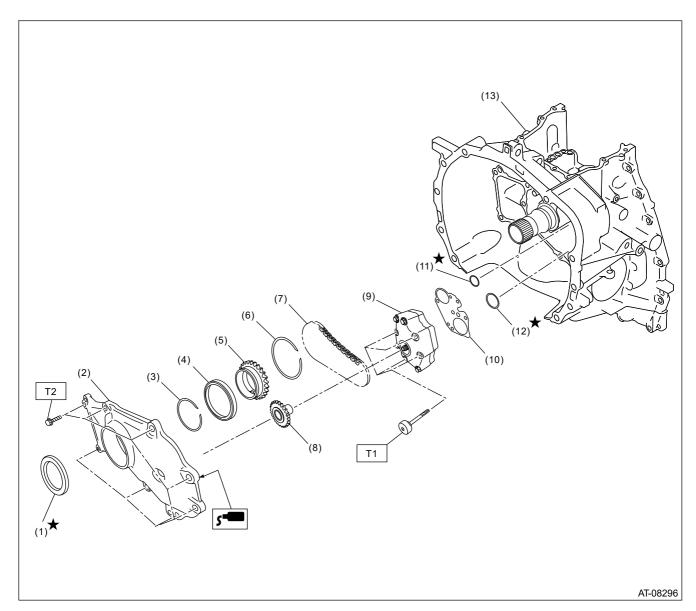
T8: @ Ref. to CONTINUOUSLY **VARIABLE** TRANSMISSION(TR580)>D

rive Plate>INSTALLATION.

(10) O-ring

- (22) Front differential gear oil drain plug
- (11) Air breather hose
- (23) Converter case
- (12) Transmission radio ground cord

2. OIL PUMP ASSEMBLY



- (1) Oil seal
- (7) Oil pump chain

- (2) Oil pump chain cover
- (8) Driven sprocket
- (13) Converter case

(3) Snap ring

(9) Oil pump ASSY

Tightening torque: N·m (kgf-m,

ft-lb)

(4) Ball bearing

(10) Plate

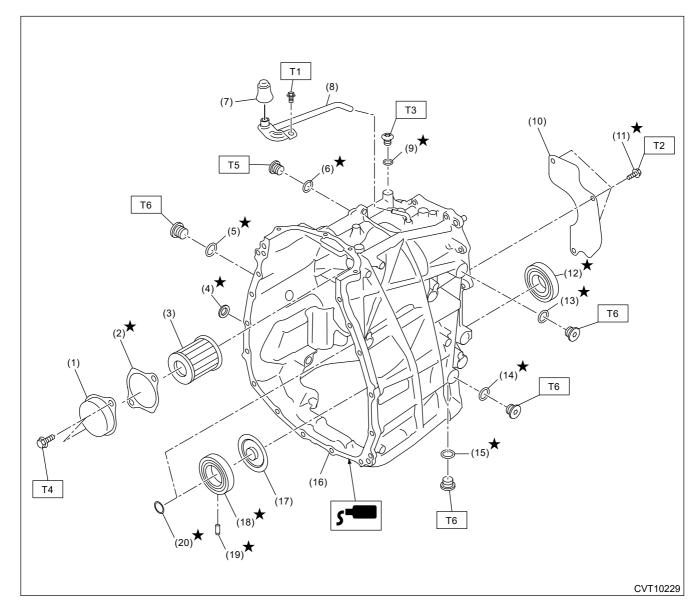
T1: 8.5 (0.9, 6.3)

- (5) Drive sprocket
- (11) O-ring (small)
- T2: 21 (2.1, 15.5)

(6) Snap ring

(12) O-ring (large)

3. TRANSMISSION CASE



- (1) CVTF filter cover
- (11) Micro-encapsulated bolt
- ft-lb)

- (2) Gasket
- (3) CVTF filter
- (4) Oil seal
- (5) Gasket
- (6) O-ring
- (7) Air breather cap
- (8) Air breather hose
- (9) O-ring
- (10) Oil stopper plate

- (12) Ball bearing
- (13) O-ring
- (14) Gasket
- (15) O-ring
- (16) Transmission case
- (17) Oil guide
- (18) Ball bearing
- (19) Roll pin
- (20) Seal ring

Tightening torque: N·m (kgf-m,

T1: 5 (0.5, 3.7)

T2: 9 (0.9, 6.6)

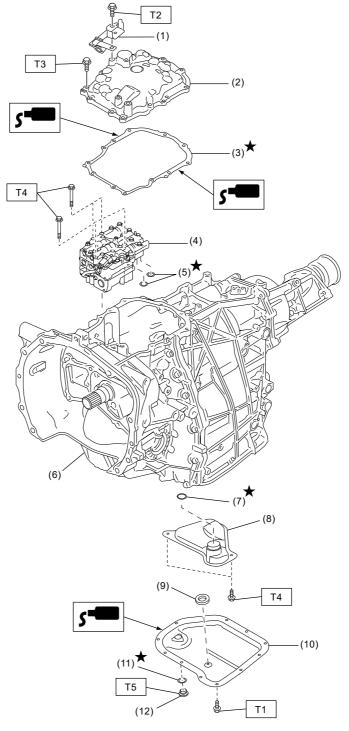
T3: 13 (1.3, 9.6)

T4: 17 (1.7, 12.5)

T5: 22 (2.2, 16.2)

T6: 50 (5.1, 25.8)

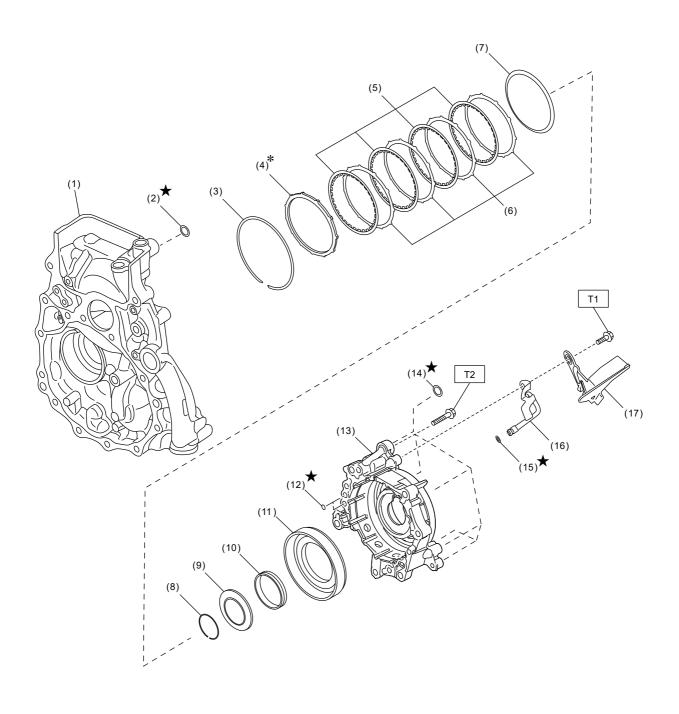
4. CONTROL VALVE BODY



(1)	Transmission harness stay	(7)	O-ring	Tightening torque: N·m (kgf-m,
				ft-lb)
(2)	Valve cover	(8)	Oil strainer	T1: 5 (0.5, 3.7)
(3)	Gasket	(9)	Magnet	T2: 7 (0.7, 5.2)
(4)	Control valve body	(10)	Oil pan	T3: 8 (0.8, 5.9)
(5)	O-ring	(11)	Gasket	T4: 9 (0.9, 6.6)
(6)	Transmission ASSY	(12)	CVTF drain plug	T5: 31 (3.2, 22.9)

CVT01159

5. REVERSE BRAKE ASSEMBLY



CVT00661

((Τ)	Drive	pinion	retainer	

- (2) O-ring
- (3) Snap ring
- (4) Retaining plate
- (5) Drive plate
- (6) Driven plate

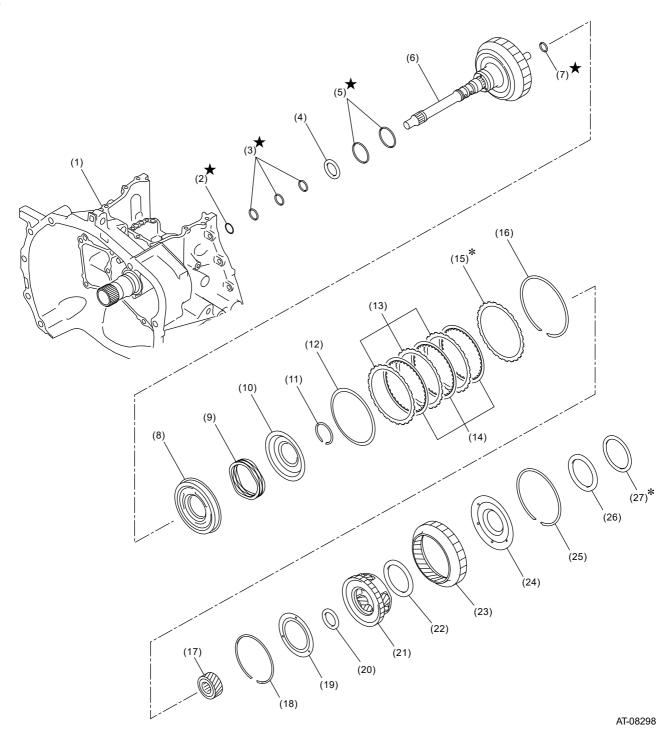
- (8) Snap ring
- (9) Spring retainer
- (10) Return spring
- (11) Reverse brake piston
- (12) O-ring
- (13) Reverse brake housing

- (15) O-ring
- (16) Lubrication pipe
- (17) Oil guide

Tightening torque: N·m (kgf-m, ft-lb)

T1: 16 (1.6, 11.8)

6. FORWARD CLUTCH ASSEMBLY



- (1) Converter case
- (2) O-ring
- (3) Seal ring
- (4) Thrust bearing
- (5) Seal ring

- (10) Chamber COMPL
- (11) Snap ring
- (12) Dish plate
- (13) Driven plate
- (14) Drive plate

- (19) Balance oil guide
- (20) Thrust bearing
- (21) Planetary carrier ASSY
- (22) Thrust bearing
- (23) Internal gear

(6) Forward clutch drum ASSY

(7) Seal ring

(8) Forward clutch piston

(9) Return spring

(15) Retaining plate

(16) Snap ring

(17) Sun gear

(18) Snap ring

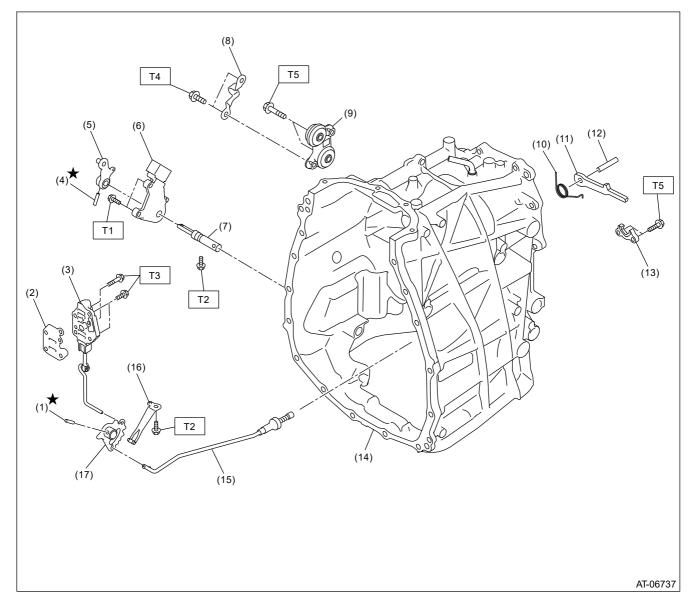
(24) Thrust gear plate

(25) Snap ring

(26) Thrust bearing

(27) Washer

7. TRANSMISSION CONTROL DEVICE



(1) Spring pin

(2) Separator plate

(3) Manual valve ASSY

(4) Spring pin

(5) Shifter arm

(6) Inhibitor switch

(7) Shifter arm shaft

(8) Cable bracket

(10) Return spring

(11) Parking pawl

(12) Shaft

(13) Parking support

(14) Transmission case

(15) Parking rod

(16) Detent spring

(17) Manual plate

Tightening torque: N·m (kgf-m, ft-lb)

T1: 5 (0.5, 3.7)

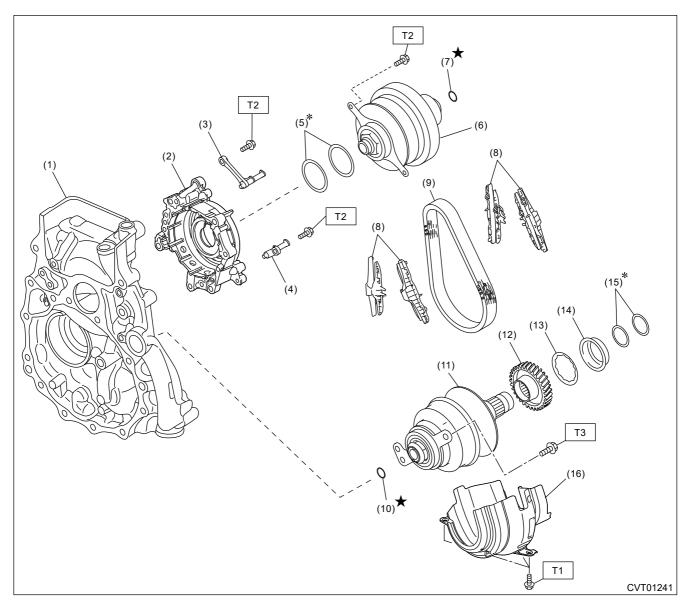
T2: 7 (0.7, 5.2)

T3: 9 (0.9, 6.6)

T4: 18 (1.8, 13.3)

T5: 25 (2.5, 18.4)

8. PRIMARY PULLEY, SECONDARY PULLEY & VARIATOR CHAIN AND REDUCTION DRIVE GEAR



- (1) Drive pinion retainer
- (2) Reverse brake housing
- (3) Support rod
- (4) Lubrication pipe
- (5) Primary pulley shim
- (6) Primary pulley ASSY
- (7) Seal ring

- (8) Chain guide
- (9) Variator chain
- (10) Seal ring
- (11) Secondary pulley ASSY
- (12) Reduction drive gear
- (13) Dish plate
- (14) Spring retainer

- (15) Reduction gear shim
- (16) Oil baffle

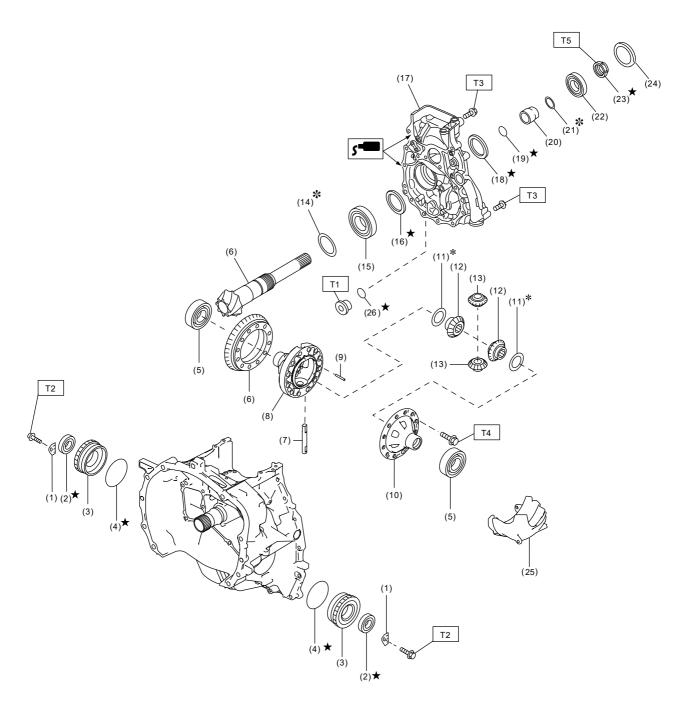
Tightening torque: N·m (kgf-m, ft-lb)

T1: 16 (1.6, 11.8)

T2: 21 (2.1, 15.5)

T3: 67.5 (6.9, 49.8)

9. FRONT DIFFERENTIAL GEAR



CVT10053

(\perp)	LO	CK	ρı	a	ιe
` '			٠.		

(2) Oil seal

(3) Differential side retainer

(4) O-ring

(5) Taper roller bearing

(6) Drive pinion gear set

(7) Pinion shaft

(12) Differential bevel gear

(13) Differential bevel pinion

(14) Drive pinion shim

(15) Taper roller bearing

(16) Oil seal

(18) Oil seal

(17) Drive pinion retainer

(23) Lock nut

(24) Plug

(25) Oil baffle

(26) O-ring

Tightening torque: N·m (kgf-m, ft-lb)

T1: 22 (2.2, 16.2)

 (8) Differential case RH
 (19) O-ring
 T2: 25 (2.5, 18.4)

 (9) Straight pin
 (20) Drive pinion spacer
 T3: 43 (4.4, 31.7)

 (10) Differential case LH
 (21) Drive pinion washer
 T4: 64 (6.5, 47.2)

 (11) Washer
 (22) Taper roller bearing
 T5: Ref. to CONTIN

75: Ref. to CONTINUOUSLY

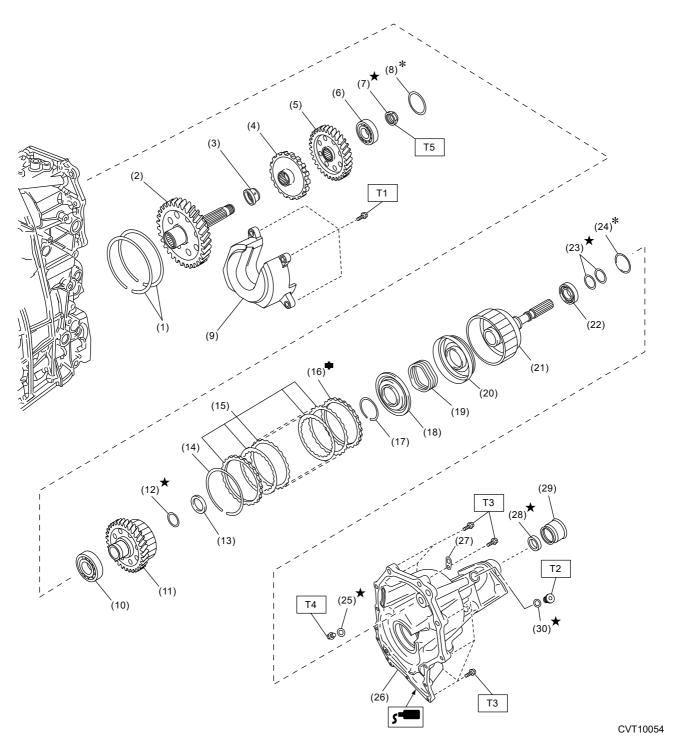
VARIABLE

TRANSMISSION(TR580)>Driv

e Pinion Shaft

Assembly>ASSEMBLY.

10. TRANSFER AND EXTENSION CASE



- (1) Snap ring
- (2) Reduction driven gear COMPL
- (3) Collar
- (4) Parking gear
- (5) Transfer drive gear
- (6) Ball bearing
- (7) Lock nut

- (14) Snap ring
- (15) Transfer clutch plate set
- (16) Pressure plate
- (17) Snap ring
- (18) Transfer clutch piston seal
- (19) Transfer clutch piston return spring
- (20) Transfer clutch piston

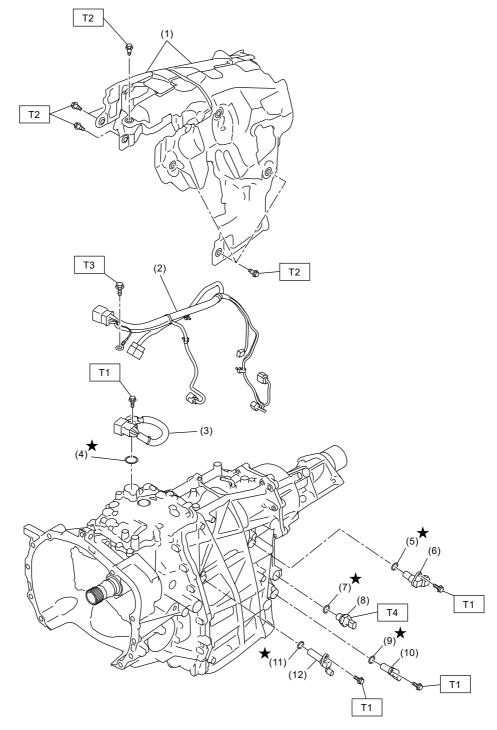
- (27) Transmission hanger
- (28) Oil seal
- (29) Dust cover
- (30) O-ring

Tightening torque: N·m (kgf-m, ft-lb)

T1: 17 (1.7, 12.5)

(8)	Transfer drive gear shim	(21)	Rear drive shaft	T2:	22 (2.2, 16.2)
(9)	Spacer oil	(22)	Ball bearing	T3:	25 (2.5, 18.4)
(10)	Ball bearing	(23)	Seal ring	T4:	35 (3.6, 25.8)
(11)	Transfer driven gear	(24)	Transfer driven gear shim	T5:	95 (9.7, 70.1)
(12)	Seal ring	(25)	Gasket		
(13)	Thrust bearing	(26)	Extension case		

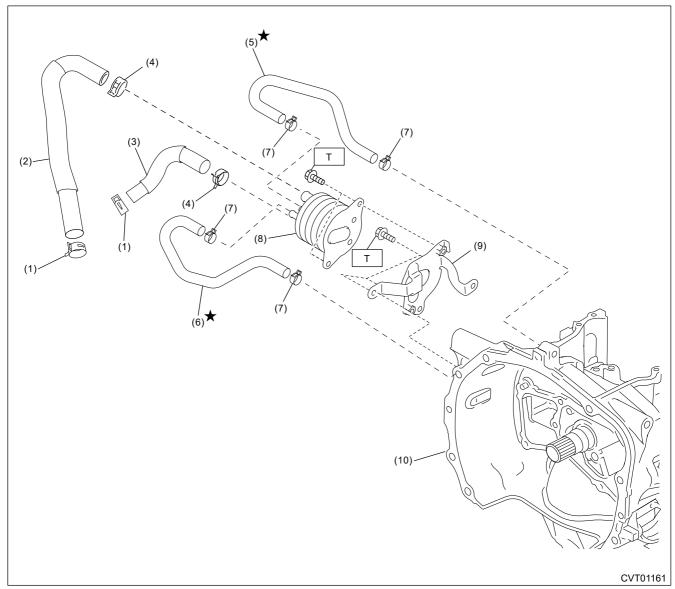
11. TRANSMISSION HARNESS AND SENSOR



AT-08301

- (1) Transmission case cover (7) O-ring Tightening torque: N·m (kgf-m, ft-lb) (2) Inhibitor harness (8) Secondary pressure sensor T1: 7 (0.7, 3.7) (3) Transmission harness (9) O-ring T2: 8 (0.8, 5.9) T3: 14 (1.4, 10.3) (4) O-ring (10) Secondary speed sensor T4: 39 (4.0, 28.8) (5) O-ring (11) O-ring
- (6) Primary speed sensor (12) Turbine speed sensor

12. CVTF COOLER (WITH WARMER FEATURE)

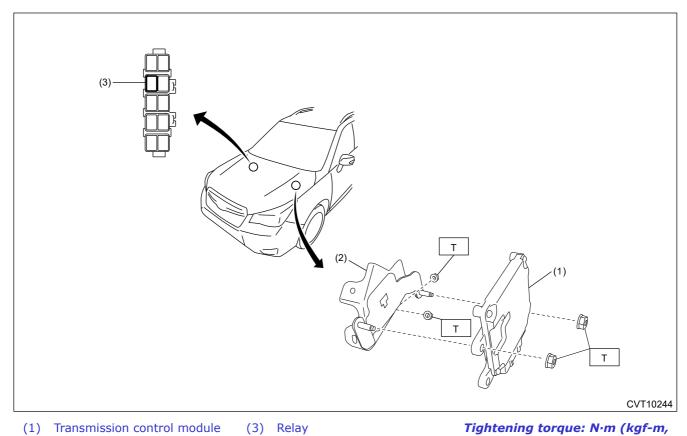


- (1) Hose clamp (6) CVTF cooler outlet hose **Tightening torque: N·m (kgf-m, ft-lb)**
- (2) Engine coolant outlet hose (7) Hose clamp **T: 23 (2.3, 17.0)**

feature)

- 3) Engine coolant inlet hose (8) CVTF cooler (with warmer
- (4) Hose clamp (9) CVTF cooler bracket

13. TRANSMISSION CONTROL MODULE



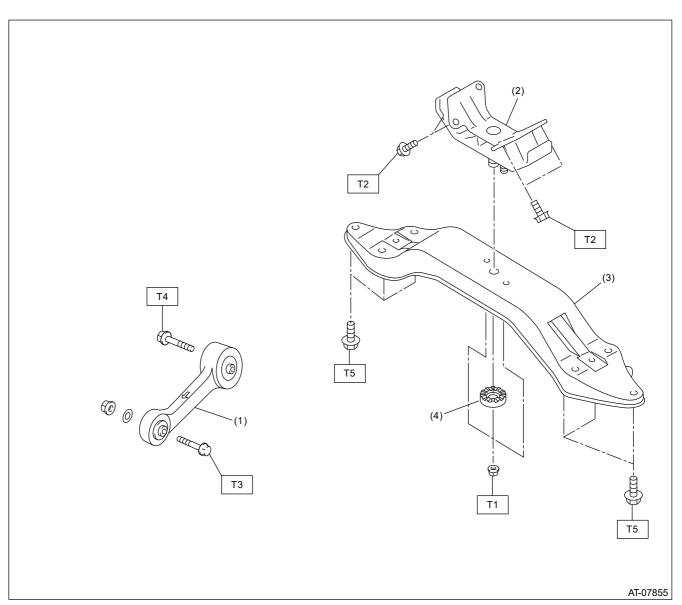
(1) Transmission control module (3) Relay (TCM)

T: 7.5 (0.8, 5.5)

ft-lb)

(2) TCM bracket

14. TRANSMISSION MOUNTING



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

1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
ST18769AA010	18769AA010	EXPANDER PULLEY	Used for removing and installing the secondary pulley assembly.
ST18767AA010	18767AA010	BEARING REMOVER	Used for removing the ball bearing of transfer clutch assembly.
ST18762AA010	18762AA010	COMPRESSOR SPECIAL TOOL	Used for removing and installing snap ring of forward clutch assembly.
ST18761AA010	18761AA010	SHEET SPECIAL TOOL	 Used for removing and installing control valve body. Used for removing and installing valve cover. Used for removing and installing transmission harness.
	18681AA010	PRESSURE GAUGE ADAPTER	Used for measuring the secondary pressure (line pressure). Note:

ST18681AA010			Used together with the genuine O-ring (part No. 806916050).
ST18801AA000	18801AA000	OIL PRESSURE GAUGE ASSY	Used for measuring the secondary pressure (line pressure).
ST18658AA020	18658AA020	WRENCH COMPL RETAINER	Used for removing and installing the differential side retainer.
ST18460AA040	18460AA040	CHECK BOARD	Used for measuring TCM terminal voltage and resistance.
ST34099AC020	34099AC020	ADAPTER HOSE B	Used for measuring the transfer clutch hydraulic pressure. Note: Used with genuine union screw (Part No. 801914010) and gasket (Part No. 803914060).

	34099AC010	ADAPTER HOSE A	Used for measuring the transfer clutch hydraulic pressure.
ST34099AC010			
	18681AA000	PRESSURE GAUGE ADAPTER	Used for measuring the transfer clutch hydraulic pressure. Note: Used together with the genuine O-ring (part No. 806911080).
ST18681AA000			
	498575400	OIL PRESSURE GAUGE ASSY	Used for measuring the transfer clutch hydraulic pressure.
ST-498575400			
ST-498277200	498277200	STOPPER SET	 Used for removing and installing transmission assembly to engine. Used for preventing the torque converter from dropping off.
The state of the s	398527700	PULLER ASSY	 Used for removing the extension case oil seal. Used for removing the bearing outer race of the drive pinion shaft. Used for removing the bearing of transmission case.

ST18760AA000	18760AA000	CLAW	 Used for removing the bearing of transmission case. Used together with PULLER ASSY (398527700).
ST-398673600	398673600	COMPRESSOR	Used for removing and installing snap ring of forward clutch assembly.
ST18355AA000	18355AA000	PULLEY WRENCH	 Used for removing and installing the lock nut of reduction driven gear. Used together with PIN SET (18334AA000).
ST18334AA000	18334AA000	PULLEY WRENCH PIN SET	 Used for removing and installing the lock nut of reduction driven gear. Used together with PULLEY WRENCH (18355AA000).
ST-499987003	499987003	SOCKET WRENCH (35)	Used for removing and installing the lock nut of reduction driven gear.

ST-498057300	498057300	INSTALLER	Used for installing the extension case oil seal.
ST18632AA000	18632AA000	STAND ASSY	Used for disassembling and assembling the transmission.
ST-498515500	498515500	REMOVER	Used for removing the bearing inner race of the drive pinion shaft.
ST-498255400	498255400	PLATE	Used for measuring the backlash of hypoid gear.
ST-498247001	498247001	MAGNET BASE	 Used for measuring the backlash of differential bevel pinion gear. Used for measuring the backlash of hypoid gear. Used together with DIAL GAUGE (498247100).

ST-498247100	498247100	DIAL GAUGE	 Used for measuring the backlash of differential bevel pinion gear. Used for measuring the backlash of hypoid gear. Used together with MAGNET BASE (498247001).
ST18675AA000	18675AA000	DIFFERENTIAL SIDE OIL SEAL INSTALLER	Used for installing the differential side retainer oil seal.
ST18762AA001	18762AA001	COMPRESSOR SPECIAL TOOL	 Used for disassembling and installing the multi-plate clutch piston. COMPRESSOR SPECIAL TOOL (18762AA000) can also be used.
ST-927720000	927720000	HOUSING BUSHING INSTALLER AND REMOVER	Used for installing the oil seal. Use BUSHING SHAFT (927880000).
	18763AA000	COMPRESSOR SHAFT	Used for measuring the backlash of hypoid gear.
ST18763AA000			

ST28399SA010	28399SA010	OIL SEAL PROTECTOR	Used for protecting oil seal when installing front drive shaft.
ST-498937110	498937110	HOLDER	 Used for removing and installing the drive pinion lock nut. Used as a holder to rotate gear when checking tooth contact.
ST41099AA012	41099AA012	ENGINE SUPPORT BRACKET	Used for supporting the engine. ENGINE SUPPORT BRACKET (41099AA010 or 41099AA011) can also be used.
ST41099AA020	41099AA020	ENGINE SUPPORT	Used for supporting the engine.
ST18270KA020	18270KA020	SOCKET (E20)	 Used for removing and installing the hypoid driven gear. Used for removing and installing the drive pinion shaft retainer.

	398497701	SEAT	Used for removing and installing the bearing.
ST-398497701			
ST-398177700	398177700	INSTALLER	 Used for installing the ball bearing Used for installing the parking gear. Used for installing the bearing outer race. Used for installing the plug.
	28499TC010	PRESS SNAP RING	 Used for installing the ball bearing of the transmission case. Used for installing the bearing outer race of drive pinion shaft.
ST28499TC010 ST-899864100	899864100	REMOVER	 Used for removing and installing the ball bearing. Used for removing the parking gear and transfer drive gear. Used for removing the bearing inner race of the front differential.
\$1-899864100	498077000	REMOVER	Used for removing the bearing inner
			race of the front differential.
ST-498077000	1		

	18657AA010	INSTALLER	Used for installing the oil seal at shifter arm shaft portion.
ST18657AA010			
	498077600	REMOVER	Used for removing the ball bearing of drive sprocket.
ST-498077600			
	18720AA000	REMOVER	Used for removing the ball bearing of transfer clutch assembly.
ST18720AA000			
	498497300	CRANKSHAFT STOPPER	Used for stopping the drive plate rotation when removing and installing the drive plate.
ST-498497300			
	399513600	INSTALLER	Used for removing the ball bearing of drive sprocket.
ST-399513600			
'		1	1

	499267300	STOPPER PIN	Used for adjusting the inhibitor switch.
ST-499267300			
	499277100	BUSHING 1-2 INSTALLER	 Used for installing the bearing of the transmission case. Used for installing the ball bearing. Used for installing the bearing inner race.
ST-499277100			
	499277200	INSTALLER	Used for installing the ball bearing of the transfer clutch assembly.
ST-499277200			
	499575400	GAUGE	Used for measuring height of end play.
ST-499575400			
ST-499575500	499575500	GAUGE	Used for measuring height of end play.
51-4995/5500			

ST-499787500	499787500	ADAPTER	 Used for removing and installing the drive pinion shaft lock nut. Used for measuring the preload of the drive pinion shaft. Used for measuring the backlash of hypoid gear.
ST-499575600	499575600	GAUGE	Used for measuring height of end play.
ST-499787700	499787700	WRENCH	 Used for removing and installing the drive pinion shaft lock nut. Used for measuring the preload of the drive pinion shaft. Used for measuring the backlash of hypoid gear.
ST-499757002	499757002	INSTALLER	 Used for removing the bearing of reduction driven gear. Used for installing the parking gear. Used for installing the transfer drive gear.
ST-899580100	899580100	INSTALLER	 Used for installing the collar of reduction driven gear. Used for installing the ball bearing of the transfer driven gear. Used for installing the bearing inner race of drive pinion shaft.

ST-498077300	498077300	REMOVER	Used for installing the ball bearing of reduction driven gear.
ST-499755602	499755602	PRESS SNAP RING	 Used for installing the oil seal. Used for installing the ball bearing and roller bearing. Used for installing the plug.
ST-498077400	498077400	REMOVER	Used for removing the ball bearing of transfer driven gear.
ST-20099AE020	20099AE020	INSTALLER	Used for installing the bearing outer race of drive pinion shaft.
ST-927130000	927130000	EXTENSION DRIVE SHAFT	Used for installing the bearing inner race of drive pinion shaft.

	18270AA040	SOCKET	Used for removing and installing the transfer clutch pressure test plug.
ST18270AA040			
ST73099SG000	73099SG000	SPECIAL TOOL CONDENSER	Used for installing the transfer clutch pressure test plug.
SSM ₄	— (Newly adopted tool)	SUBARU SELECT MONITOR 4	Used for setting of each function and troubleshooting for electrical system. Note: For detailed operation procedures of Subaru Select Monitor 4, refer to "Application help".

2. GENERAL TOOL

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance, voltage and current.
Thickness gauge	Used for measuring the clearance in reverse brake, forward clutch and transfer clutch.
Caliper	Used for measuring the dimension.
Spring scale	Used for measuring the starting torque of the drive pinion.
TORX [®] bit T40	Used for removing and installing the secondary pressure (line pressure) test plug and plug.
TORX [®] bit T70	Used for removing and installing differential gear oil drain plug.
STRAIGHT PIN REMOVER	Used for removing and installing the straight pin and spring pin.
Push/pull gauge	Used for measuring clutch clearance.

Angle gauge	Used for installing the drive plate.
TONE 3/8 6-point 27 mm deep socket	Used for removing and installing the secondary
(manufacturer product No. 3SEN-27)	pressure sensor.
DST-i	Used together with Subaru Select Monitor 4.

SPECIFICATION

1. TORQUE CONVERTER

Model	DOHC non-turbo
Туре	Symmetric, 3-element, single stage, 2-phase torque converter
Stall torque ratio	2.07
Nominal mm (in)	236 (9.29)
Stall speed (at sea level)	2,000 — 2,750 (D range)
r/min	1,900 — 2,650 (R range)
One-way clutch	Sprag type one-way clutch

2. OIL PUMP

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

3. TRANSMISSION CONTROL ELEMENT

Туре	Forward continuously variable speed change, 1
Турс	reverse, planetary gear
Multi-plate clutch	1 sets
Multi-plate brake	1 sets

4. TRANSMISSION GEAR RATIO

Forward	3.581 - 0.570
Rev	3.667

5. PLATE

Number of forward clutch drive plates	3
Number of reverse brake drive plates	4

6. SELECTOR POSITION

P (Park)	Transmission neutral, output shaft locked, engine start enabled
R (Reverse)	Rev
N (Neutral)	Transmission neutral, engine start enabled
D (Drive)	Forward continuously variable speed change
M (Manual mode) (paddle shift +side)	Manual gear change

	$1st \rightarrow 2nd \rightarrow 3rd \rightarrow 4th \rightarrow 5th \rightarrow 6th$
M (Manual mode) (paddle shift —side)	Manual gear change 1st ← 2nd ← 3rd ← 4th ← 5th ← 6th
L (Low)	Forward continuously variable speed change (engine brake)

7. HYDRAULIC CONTROL AND LUBRICATION

Туре	Electronic hydraulic control (gear ratio is changed by signals of vehicle speed and accelerator opening angle.)
Fluid lubrication system	Specified fluid: SUBARU CVT FLUID LINEARTRONIC II Caution: Always use specified CVTF. Using other fluid will cause malfunction.
Fluid capacity L (US qt, Imp qt)	11.68 — 12.18 (12.3 — 12.9, 10.3 — 10.7)
Lubrication system	Forced feed lubrication with oil pump

8. COOLING AND HARNESS

Cooling system	CVTF cooler (with warmer feature)
Inhibitor switch harness	16 poles
Transmission harness	12 poles

9. TRANSFER

Transfer type	Multi-plate transfer (MP-T)
Number of transfer clutch drives & driven plates	5
Control method	Electronic hydraulic type
Reduction gear ratio	1.000 (43/43)

10. REDUCTION GEAR RATIO

Front final reduction gear ratio	3.700
Front final reduction gear ratio	3.700

11. FRONT DIFFERENTIAL GEAR OIL

	Recommended fluid: SUBARU GEAR OIL EXTRA
	MT Caution:
Fluid	If an alternative transmission oil is
i iuid	used, you may not have expected
	functionality and performance.
	Alternative fluid: GL-5 (75W-90)
Fluid capacity L (US qt, Imp qt)	1.14 — 1.24 (1.2 — 1.3, 1.0 — 1.1)

CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Inhibitor Switch

ADJUSTMENT

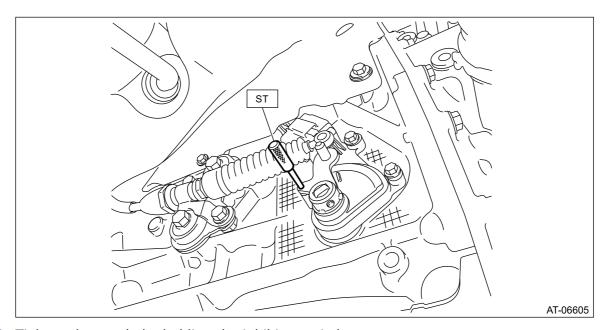
1. Disconnect the ground cable from battery. <a> Ref. to NOTE>NOTE > BATTERY.

Note:

For model with battery sensor, disconnect the ground terminal from battery sensor.

- 2. While pressing the shift lock release button, shift the select lever to the "N" range.
- 3. Lift up the vehicle.
- **4.** Loosen the two bolts holding the inhibitor switch.
- **5.** Insert the ST vertically into the holes of the shifter arm and switch body.

ST 499267300 STOPPER PIN



6. Tighten the two bolts holding the inhibitor switch.

Tightening torque:

5 N•m (0.5 kgf-m, 3.7 ft-lb)

7. Repeat the inspection of the inhibitor switch. If the inhibitor switch is determined to be "faulty", replace it.

CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Inhibitor Switch

INSPECTION

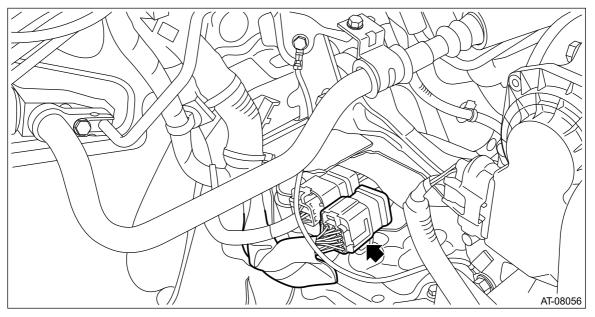
When the driving condition or starter motor operation is improper, first check the shift linkage for improper operation. If the shift linkage is functioning properly, check the inhibitor switch.

1. Disconnect the ground cable from battery. <a> Ref. to NOTE>NOTE > BATTERY.

Note:

For model with battery sensor, disconnect the ground terminal from battery sensor.

- 2. Remove the air intake boot assembly. Ref. to INTAKE (INDUCTION)(H4DO)>Air Intake Boot>REMOVAL.
- 3. Disconnect the inhibitor harness connector.

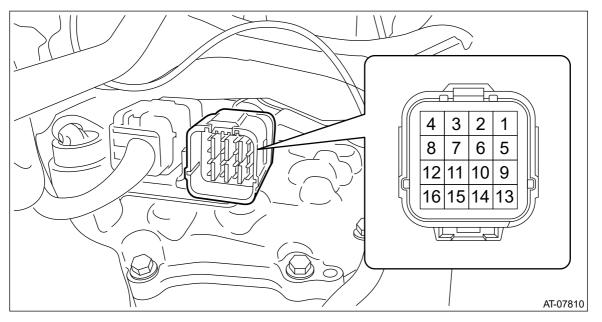


4. Check for continuity in inhibitor switch circuit by shifting the select lever in "P", "R", "N" and "D" respectively.

Note:

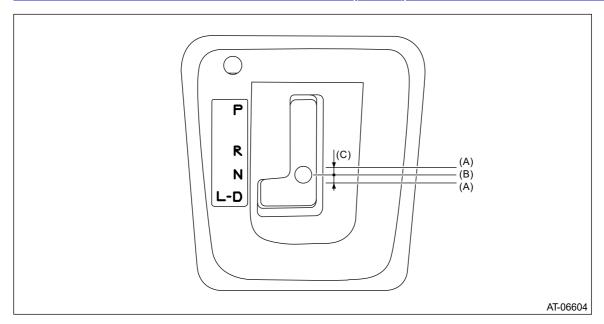
- Check that there is no continuity in the starter circuit when the select lever is in the "R" and "D" ranges.
- When inhibitor switch is normal, check there is no poor contact in vehicle side connector and no open circuit in harness.

Signal sent to TCM	Range	Terminal No.
	Р	1 — 7
	R	2 — 7
	N	3 — 7
	D	4 — 7
Starter circuit	P/N	15 — 16
Back-up light circuit	R	13 — 14



5. Check that there is continuity at equal points when the select lever is moved 1.5° in both directions from the "N" range.

If there is continuity in only one direction or in other points, adjust the inhibitor switch. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Inhibitor Switch>ADJUSTMENT.

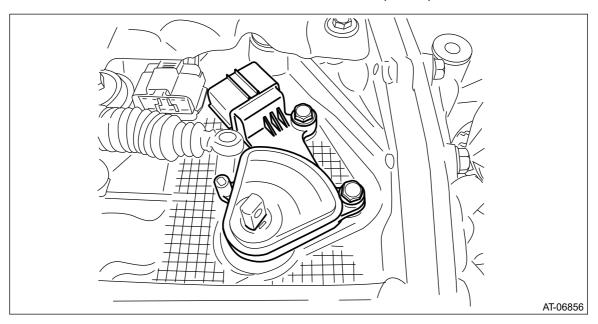


- (A) Continuity does not exist.
- (B) Continuity exists.
- (C) 1.5°
- **6.** Repeat the above inspection in other gear ranges. If there is fault, adjust the inhibitor switch and select cable. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Inhibitor Switch>ADJUSTMENT. Ref. to CONTROL SYSTEMS>Select Cable>ADJUSTMENT.

CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Inhibitor Switch

INSTALLATION

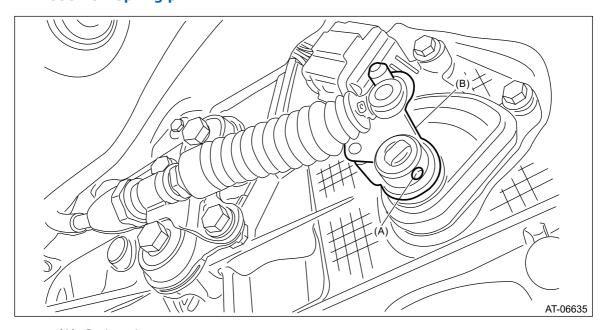
1. Install the inhibitor switch to the transmission case temporarily.



- **2.** Connect the inhibitor harness connector to the inhibitor switch.
- 3. Install the shifter arm and fix with the spring pin.

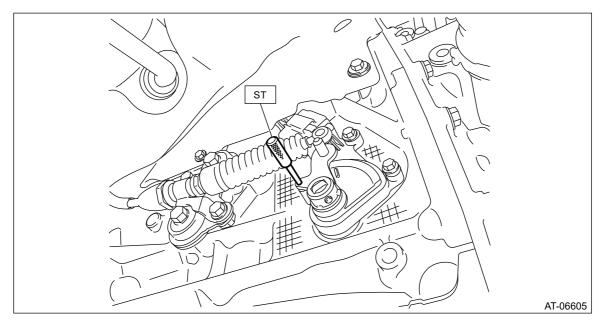
Note:

Use new spring pin.



- (A) Spring pin
- (B) Shifter arm
- **4.** Shift the shifter arm to "N" range.
- 5. Install the ST vertically in the cutout of shifter arm and the hole of switch body.

ST 499267300 STOPPER PIN

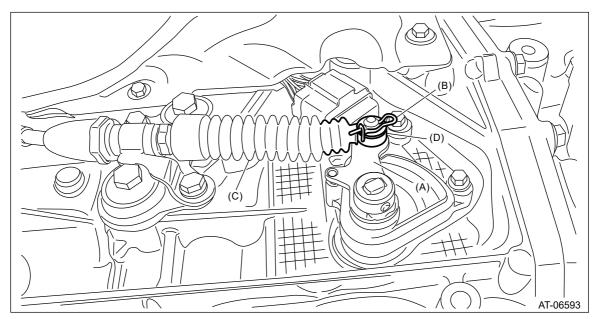


6. Tighten the two bolts holding the inhibitor switch.

Tightening torque:

5 N·m (0.5 kgf-m, 3.7 ft-lb)

- 7. Install the select cable to the shifter arm.
- **8.** Install the washer and snap pin to the shifter arm.



- (A) Shifter arm
- (B) Snap pin
- (C) Select cable
- (D) Washer
- **9.** Install the center exhaust pipe. Ref. to EXHAUST(H4DO)>Center Exhaust Pipe>INSTALLATION.

- **10.** Lower the vehicle.
- **11.** Connect the battery ground terminal.
- **12.** Check the inhibitor switch. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Inhibitor Switch>INSPECTION.

CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Inhibitor Switch

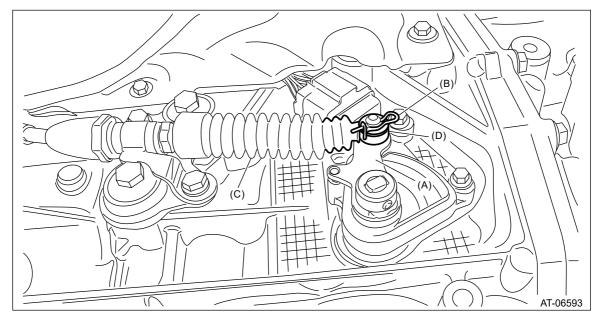
REMOVAL

- 1. Shift the select lever to "N" range.
- 2. Disconnect the ground cable from battery. Ref. to NOTE>NOTE > BATTERY.

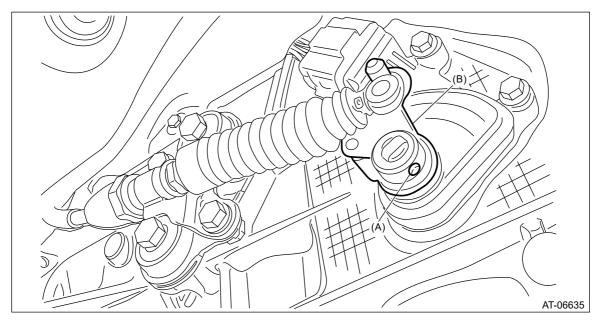
 Note:

For model with battery sensor, disconnect the ground terminal from battery sensor.

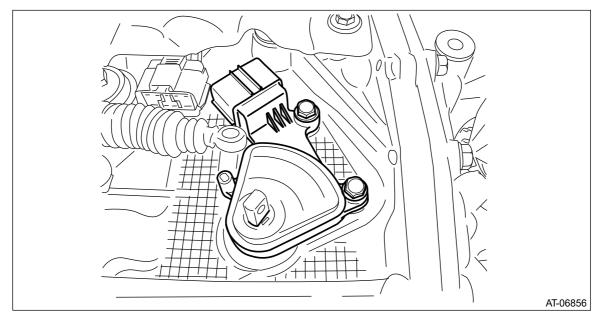
- **3.** Lift up the vehicle.
- **4.** Remove the center exhaust pipe. Ref. to EXHAUST(H4DO)>Center Exhaust Pipe>REMOVAL.
- **5.** Remove the snap pin and washer from the shifter arm.



- (A) Shifter arm
- (B) Snap pin
- (C) Select cable
- (D) Washer
- 6. Remove the spring pin and shifter arm.



- (A) Spring pin
- (B) Shifter arm
- 7. Remove the inhibitor harness connector from inhibitor switch.
- **8.** Remove the two inhibitor switch securing bolts.



9. Remove the inhibitor switch from the transmission case.

CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Oil Pan and Strainer

INSPECTION

- Check each part for damage or dust.
- Check oil strainer for clogging.

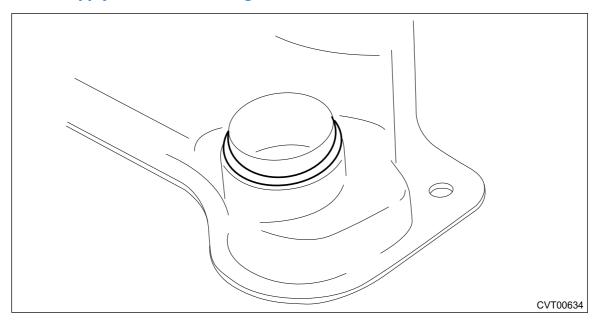
CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Oil Pan and Strainer

INSTALLATION

- 1. Clean the mating surface of oil pan and transmission case.
- 2. Install the O-ring to the oil strainer.

Note:

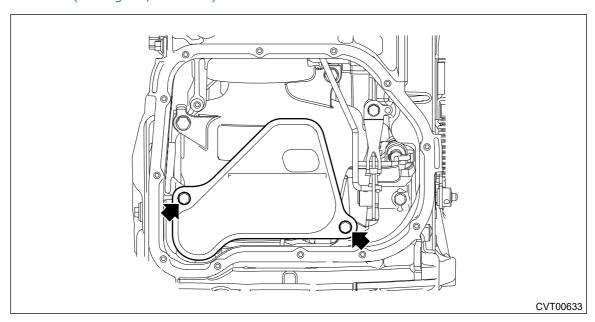
- Use new O-rings.
- Apply CVTF to the O-rings.



3. Install the oil strainer.

Tightening torque:

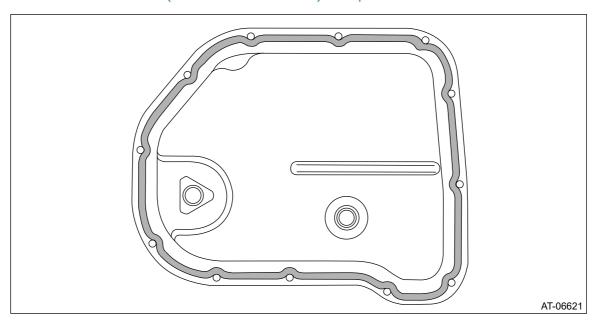
9 N•m (0.9 kgf-m, 6.6 ft-lb)



- 4. Clean the magnet.
- **5.** Attach the magnet at the specified position of the oil pan.

6. Apply liquid gasket all around the oil pan mating surface seamlessly. Liquid gasket:

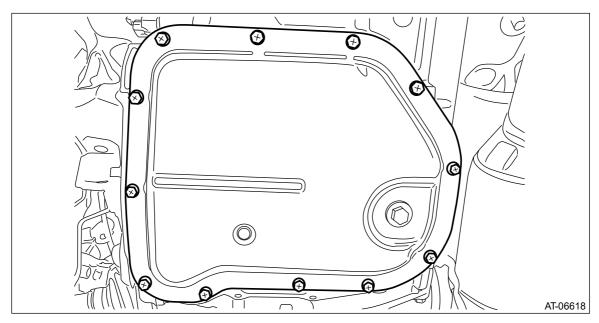
THREE BOND 1217B (Part No. K0877YA020) or equivalent



7. Install the oil pan by equally tightening the bolts.

Tightening torque:

5 N•m (0.5 kgf-m, 3.7 ft-lb)



8. Refill CVTF and adjust the level. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>CVTF>REPLACEMENT.

CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Oil Pan and Strainer

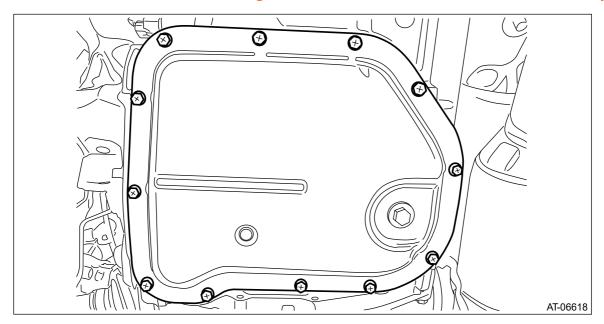
REMOVAL

Caution:

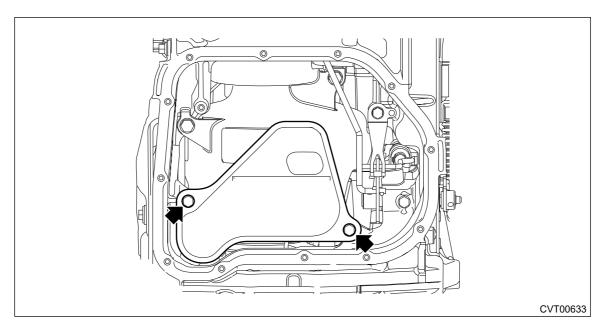
- Directly after the vehicle has been running or the engine has been idling for a long time, the CVTF is hot. Be careful not to burn yourself.
- Be careful not to spill CVTF on the exhaust pipe to prevent it from emitting smoke or causing a fire. If the CVTF adheres, wipe it off completely.
- 1. Lift up the vehicle.
- 2. Clean the transmission exterior.
- 3. Remove the CVTF drain plug to drain CVTF.
- **4.** Remove the oil pan.

Caution:

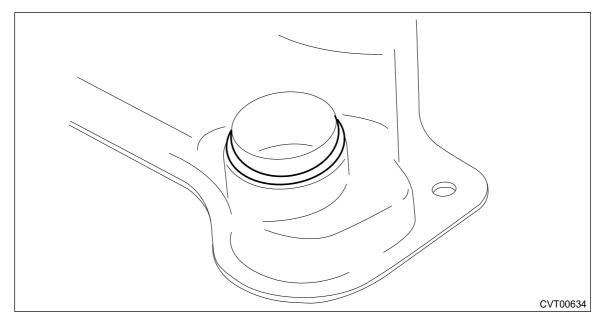
Be careful not to allow foreign matter such as dust or dirt to enter the oil pan.



- 5. Remove the magnet.
- **6.** Remove the oil strainer.



7. Remove the O-ring from oil strainer.



ASSEMBLY

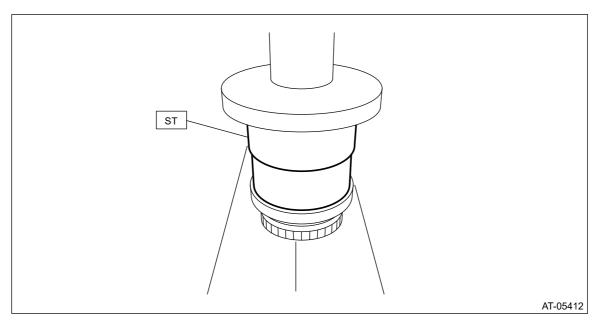
1. DRIVE SPROCKET

1. Using the ST, install the ball bearing.

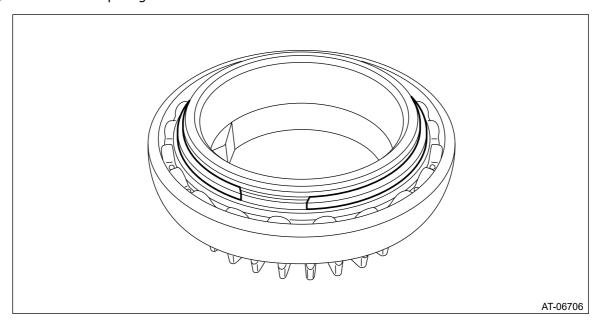
Note:

Use a new ball bearing.

ST 499755502 PRESS SNAP RING



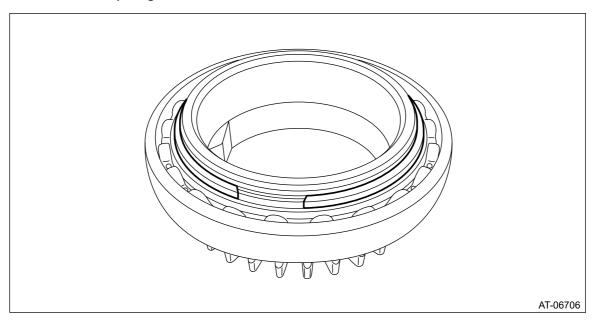
2. Install the snap ring.



DISASSEMBLY

1. DRIVE SPROCKET

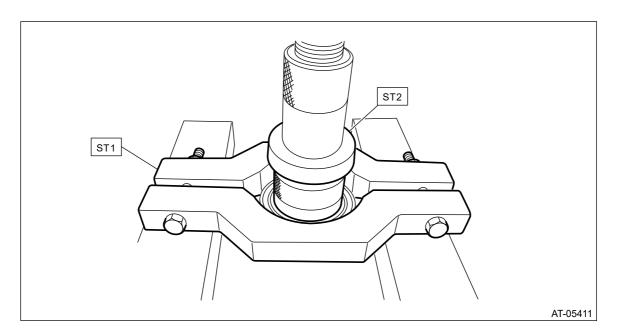
1. Remove the snap ring.



2. Remove the ball bearing using ST.

ST1 498077600 REMOVER

ST2 399513600 INSTALLER



CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Oil Pump Chain

INSPECTION

- Check the oil pump chain for damage.
- Replace if gear teeth are broken, damaged, sharpen or excessively worn.
- Check the bearing for seizure or wear.
- Apply CVTF to bearing and rotate the bearing to check for noise or dragging etc.
- Check the oil pump chain cover for damage.
- Check for leakage of CVTF from the mating surface of oil pump chain cover.
- Check the oil seal for damage.

CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Oil Pump Chain

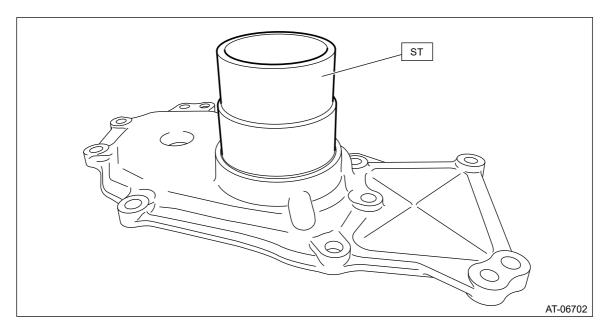
INSTALLATION

- 1. Clean the mating surface of oil pump chain cover and converter case.
- 2. Using the ST, install the oil seal.

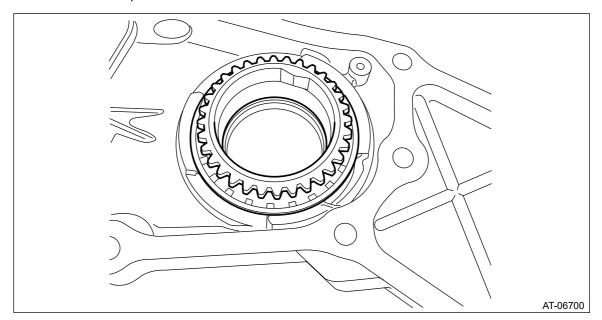
Note:

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

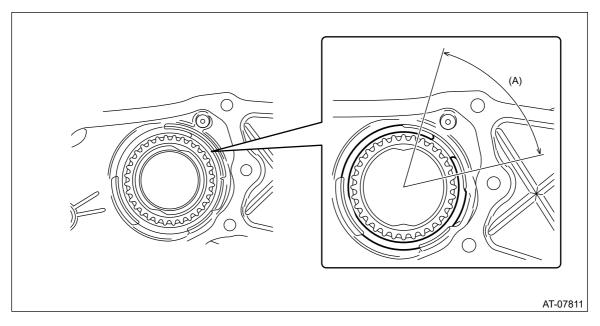
ST 499755602 PRESS SNAP RING



3. Install the drive sprocket.

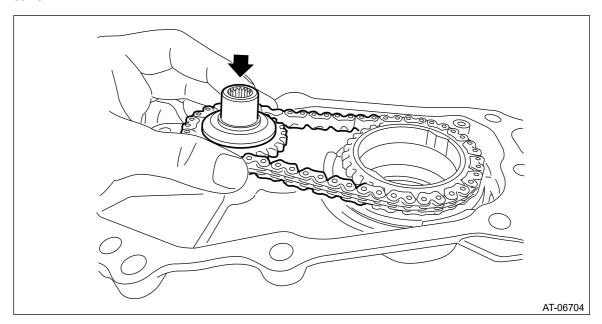


4. Install the snap ring so that its cutout portion is securely fitted into the snap ring groove of the oil pump chain cover.



(A) Installation range of cutout portion for snap ring

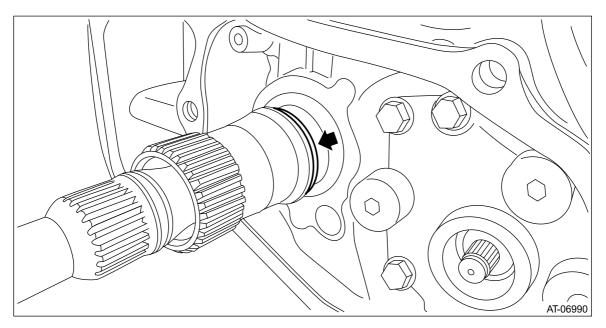
- **5.** Place the oil pump chain on drive sprocket.
- **6.** Place the oil pump chain on driven sprocket and install the driven sprocket to oil pump chain cover.



7. Install the seal rings.

Note:

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



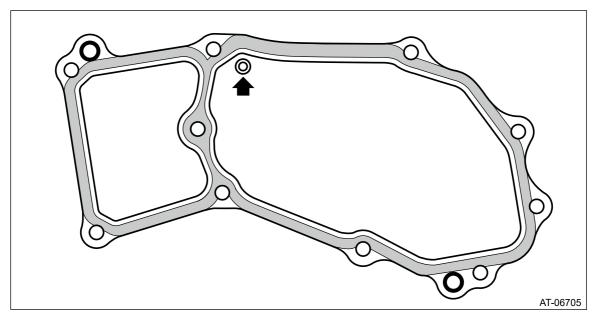
8. Apply liquid gasket seamlessly to the mating surface of oil pump chain cover.

Caution:

Do not apply liquid gasket at the arrowed hole.

Liquid gasket:

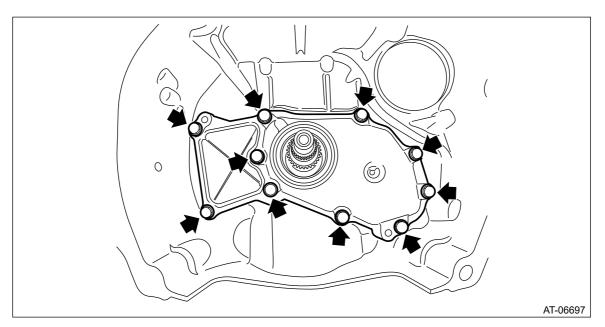
THREE BOND 1215B or equivalent



9. Install the oil pump chain cover.

Tightening torque:

21 N·m (2.1 kgf-m, 15.5 ft-lb)



- **10.** Install the torque converter assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Torque Converter Assembly>INSTALLATION.
- **11.** Install the transmission assembly to the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Automatic Transmission Assembly>INSTALLATION.

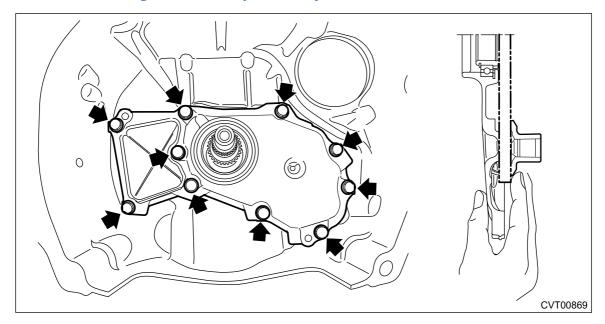
CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Oil Pump Chain

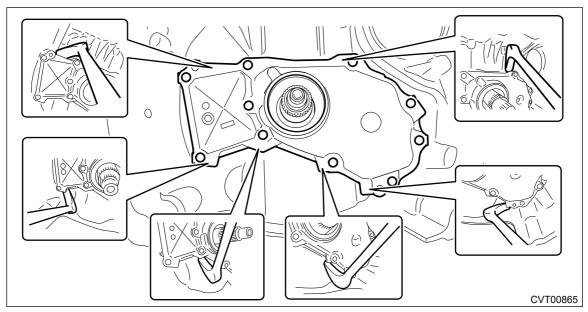
REMOVAL

- **1.** Remove the transmission assembly from the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Automatic Transmission Assembly>REMOVAL.
- **2.** Remove the torque converter assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Torque Converter Assembly>REMOVAL.
- **3.** Remove the oil pump chain cover.

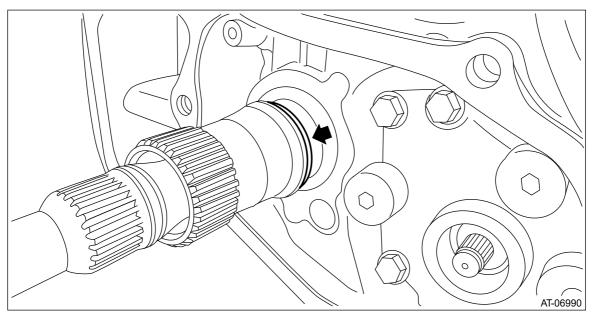
Note:

Oil pump chain cover may be hard to remove because the driven sprocket is installed to the shaft side of the oil pump. Do not remove it forcibly. Remove it while holding the driven sprocket by hand.

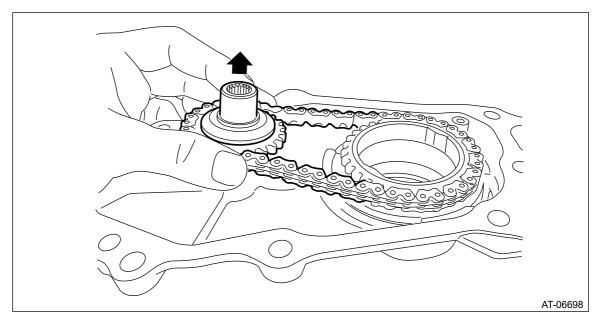




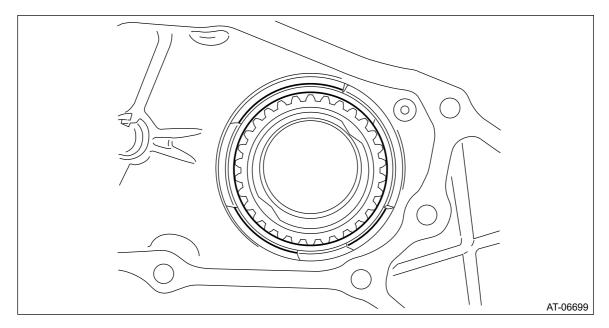
4. Remove the seal rings.



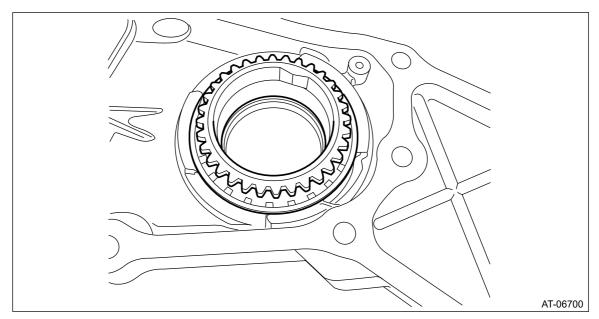
- 5. Remove the driven sprocket from oil pump chain cover to remove the oil pump chain.
 Note:
 - The driven sprocket is replaced as an assembly only, because it is a nondisassembly part.
 - If the ball bearing is removed from the driven sprocket, replace with a new part.



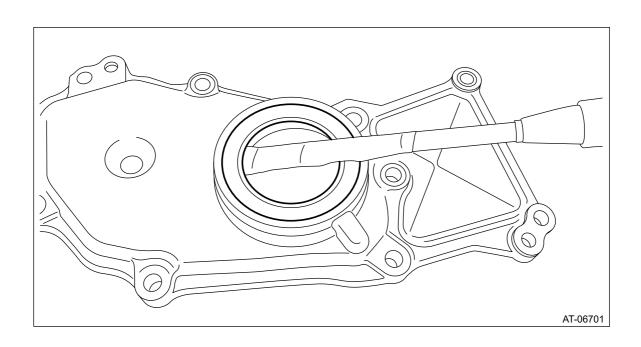
6. Remove the snap ring.



7. Remove the drive sprocket.



8. Remove the oil seal from the oil pump chain cover.



CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Oil Pump

INSPECTION

Check the following items.

- Check the oil pump for damage and wear.
- Rotate the oil pump by hand, and check that it rotates smoothly.
 - 1. Measure the secondary pressure. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Secondary Pressure (Line Pressure) Test>INSPECTION.
- **2.** Remove the oil pan and oil strainer. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Oil Pan and Strainer>REMOVAL.
- **3.** Check oil strainer for clogging. When oil strainer has no clogging, replace the oil pump.

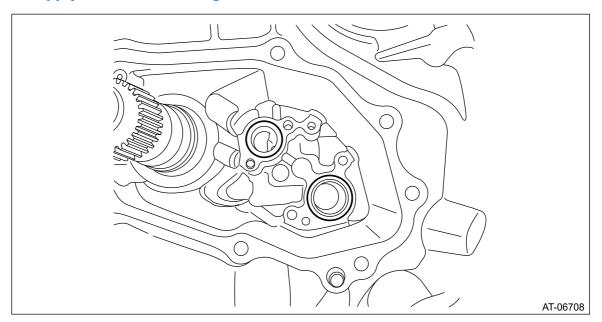
CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Oil Pump

INSTALLATION

1. Install the O-ring.

Note:

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



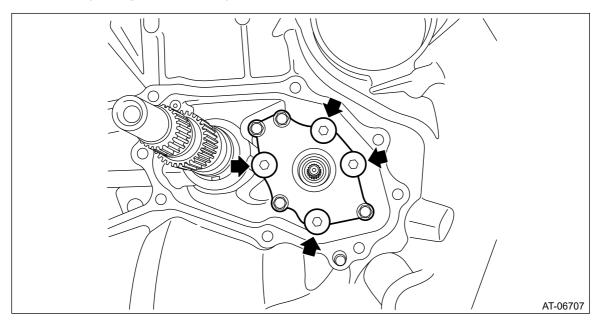
2. Install the plate and the oil pump.

Note:

Apply CVTF to the bolt.

Tightening torque:

8.5 N·m (0.9 kgf-m, 6.3 ft-lb)



3. Install the oil pump chain cover. Ref. to CONTINUOUSLY VARIABLE

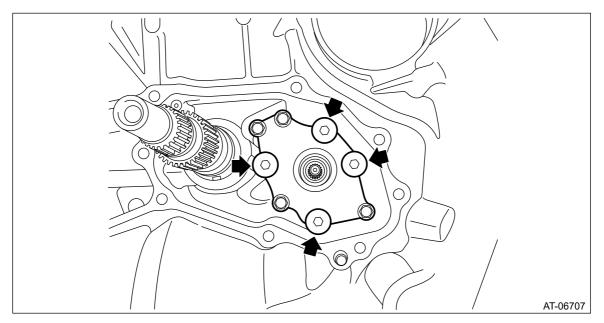
TRANSMISSION(TR580)>Oil Pump Chain>INSTALLATION.

- **4.** Install the torque converter assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Torque Converter Assembly>INSTALLATION.
- **5.** Install the transmission assembly to the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Automatic Transmission Assembly>INSTALLATION.

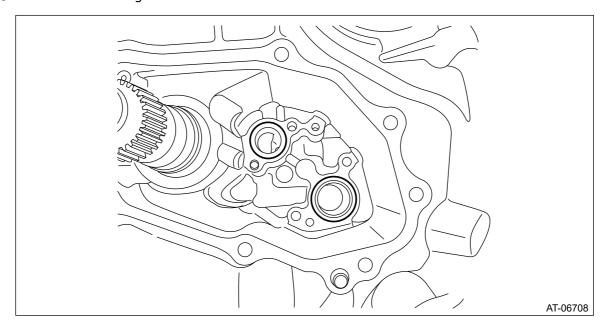
CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Oil Pump

REMOVAL

- **1.** Remove the transmission assembly from the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Automatic Transmission Assembly>REMOVAL.
- **2.** Remove the torque converter assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Torque Converter Assembly>REMOVAL.
- **3.** Remove the oil pump chain cover. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Oil Pump Chain>REMOVAL.
- 4. Remove the oil pump and the plate.



5. Remove the O-ring.



CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Parking Pawl

INSPECTION

- Check the parking pawl for breakage or damage.
- Check for worn, broken and/or damaged return spring.

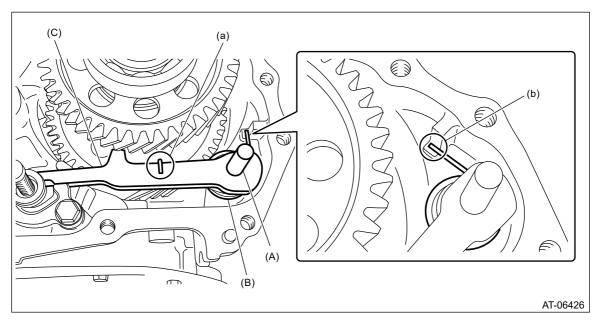
CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Parking Pawl

INSTALLATION

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

Note:

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

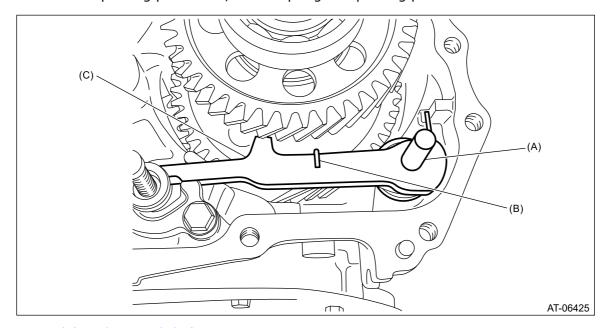


- (A) Parking pawl shaft
- (B) Return spring
- (C) Parking pawl
- **3.** Install the extension case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Extension Case>INSTALLATION.
- **4.** Install the transmission assembly to the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Automatic Transmission Assembly>INSTALLATION.

CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Parking Pawl

REMOVAL

- **1.** Remove the transmission assembly from the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Automatic Transmission Assembly>REMOVAL.
- **2.** Shift the range select lever to "N" range.
- **3.** Remove the extension case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Extension Case>REMOVAL.
- 4. Remove the parking pawl shaft, return spring and parking pawl.



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

CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Preparation for Overhaul

GENERAL DESCRIPTION

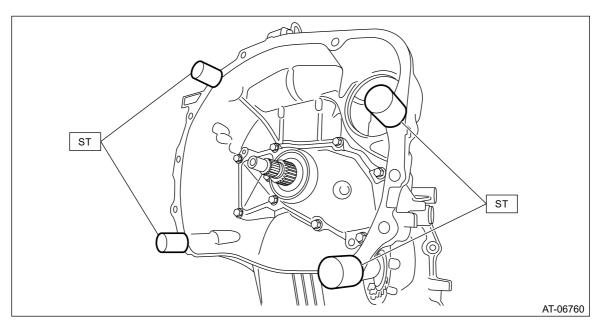
Before disassembling and assembling the transmission, follow the following procedures to prepare.

CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Preparation for Overhaul

PROCEDURE

- 1. Clean the transmission exterior.
- **2.** Remove the torque converter assembly. <u>Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Torque Converter Assembly.</u>
- 3. Attach the ST on the transmission.

ST 18632AA000 STAND ASSY



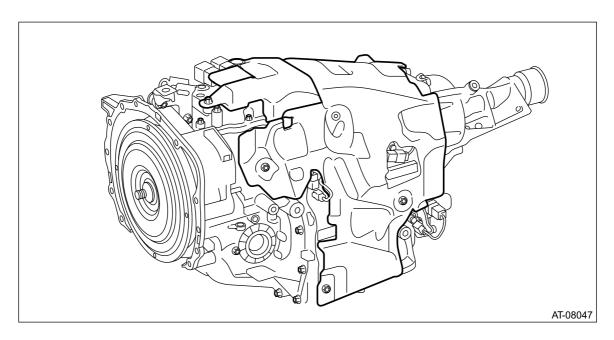
4. Remove the transmission case cover on the transmission upper side.

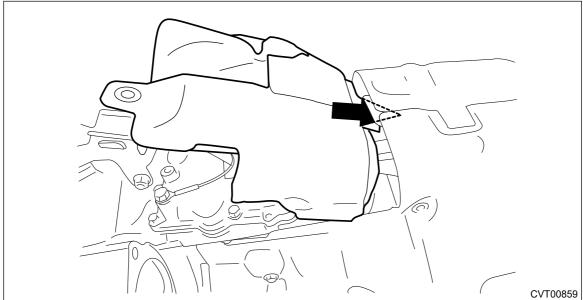
Note:

For installation, first install the transmission case cover (large), then insert the transmission case cover (small) between the transmission case cover (large) and the transmission to install.

Tightening torque:

8 N·m (0.8 kgf-m, 5.9 ft-lb)





- 5. Place the transmission assembly on end.
- **6.** When completely overhauling the transmission, refill approx. 10 L (2.6 US qt, 8.8 Imp qt) of CVTF through the transmission right side plug, and install the plug. Finally, install the transmission case cover.

Caution:

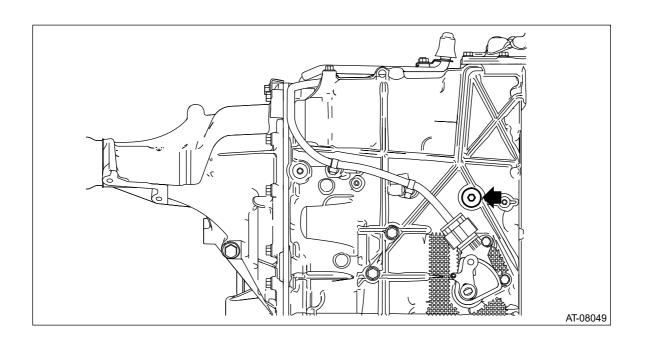
Always use specified CVTF. Using other fluid will cause malfunction. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>General Description>SPECIFICATION > HYDRAULIC CONTROL AND LUBRICATION.

Note:

Use a new gasket.

Tightening torque:

50 N·m (5.1 kgf-m, 36.9 ft-lb)

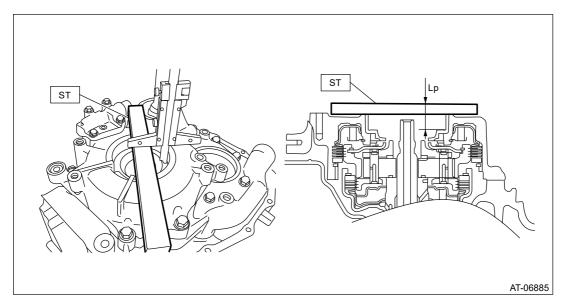


ADJUSTMENT

1. PROCEDURE IN REPLACEMENT OF PRIMARY AND SECONDARY PULLEY, OR IN REPLACEMENT OF PRIMARY PULLEY, SECONDARY PULLEY AND VARIATOR CHAIN

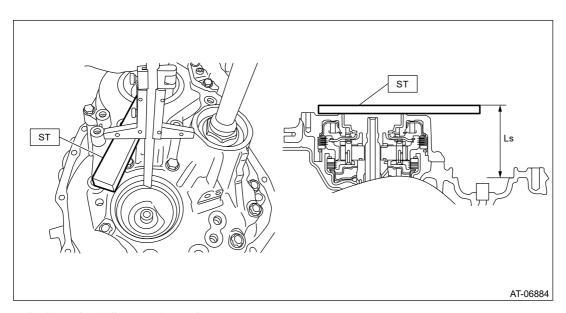
1. Measure depth "Lp" from the ST upper face to the primary pulley bearing catch surface at several points and calculate the average.

ST 499575400 GAUGE



2. Measure the depth "Ls" from the ST upper face to the secondary pulley bearing catch surface at several points and calculate the average.

ST 499575400 GAUGE



3. Calculate the following formula.

Calculation formula:

T (mm) = B - A + Lp - Ls -28.602

[T (in) = B - A + Lp - Ls - 1.126]

T: Pulley alignment

A: Specified primary pulley dimension

B: Specified secondary pulley dimension

Lp: Depth from the ST upper face to the primary pulley bearing catch surface

Ls: Depth from the ST upper face to the secondary pulley bearing catch surface

28.602 mm (1.126 in): Constant

Pulley alignment T mm (in)	Thickness of shim mm (in)
-0.05—0.049 (-0.002—0.002)	No shims
0.050-0.149 (0.002-0.006)	0.1 (0.004)
0.150-0.249 (0.006-0.010)	0.2 (0.008)
0.250-0.349 (0.010-0.014)	0.3 (0.012)
0.350-0.449 (0.014-0.018)	0.4 (0.016)
0.450-0.549 (0.018-0.022)	0.5 (0.020)
0.550-0.649 (0.022-0.026)	0.6 (0.024)
0.650-0.749 (0.026-0.029)	0.7 (0.028)
0.750-0.849 (0.029-0.033)	0.8 (0.031)
0.850-0.949 (0.033-0.037)	0.9 (0.035)
0.950-1.049 (0.037-0.041)	1.0 (0.039)
1.050-1.149 (0.041-0.045)	1.1 (0.043)

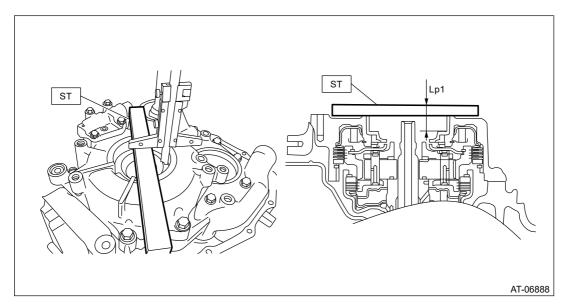
4. Select one to two shims so that the total thickness meets the value obtained from step 3).

Part No.	Shim thickness mm (in)
32451AA050	0.1 (0.004)
32451AA060	0.2 (0.008)
32451AA070	0.3 (0.012)
32451AA080	0.4 (0.016)
32451AA090	0.5 (0.020)
32451AA100	0.6 (0.024)

2. PROCEDURE WHEN REPLACING ONLY DRIVE PINION RETAINER OR REVERSE BRAKE HOUSING

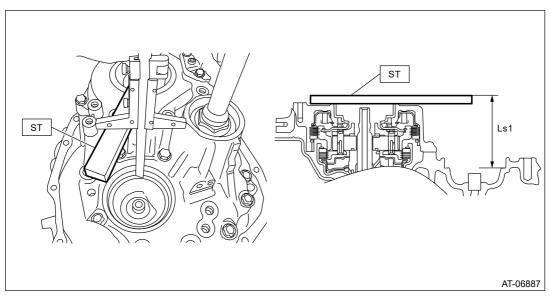
- 1. Clean the mating surface of current drive pinion retainer and converter case.
- 2. Measure and record the shim thickness that is attached on the current reverse brake housing.
- **3.** Using the current drive pinion retainer, measure depth "Lp1" from the ST upper face to the primary pulley bearing catch surface at several points and calculate the average.

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4. Using the current drive pinion retainer or current reverse brake housing, measure the depth "Ls1" from the ST upper face to the secondary pulley bearing catch surface at several points and calculate the average.

ST 499575400 GAUGE



5. Calculate the "LD1" using the following formula and record it. Calculation formula:

LD1 mm (in) = Ls1 - Lp1

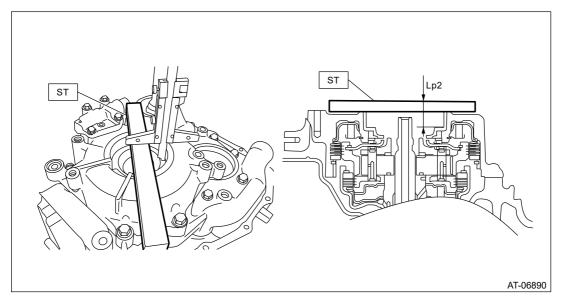
LD1: Height from the primary pulley bearing catch surface to the secondary pulley bearing catch surface

Lp1: Depth from the ST upper face to the primary pulley bearing catch surface

Ls1: Depth from the ST upper face to the secondary pulley bearing catch surface

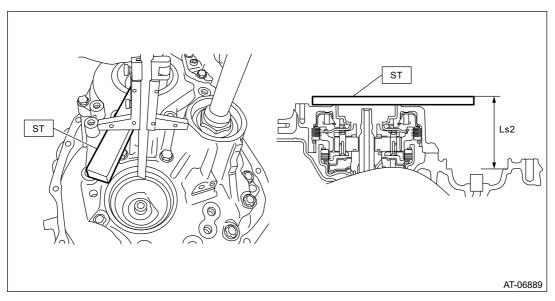
6. Using the new drive pinion retainer or new reverse brake housing, measure the depth "Lp2" from the ST upper face to the primary pulley bearing catch surface at several points and calculate the average.

ST 499575400 GAUGE



7. Using the new drive pinion retainer or new reverse brake housing, measure the depth "Ls2" from the ST upper face to the secondary pulley bearing catch surface at several points and calculate the average.

ST 499575400 GAUGE



8. Calculate the "LD2" using the following formula and record it. Calculation formula:

LD2 mm (in) = Ls2 - Lp2

LD2: Height from the primary pulley bearing catch surface to the secondary pulley bearing catch surface

Lp2: Depth from the ST upper face to the primary pulley bearing catch surface

Ls2: Depth from the ST upper face to the secondary pulley bearing catch surface

9. Calculate the recorded values of "LD1" and "LD2" to obtain the positive number to select the shims. Calculation formula: T1 mm (in) = LD1 - LD2 or T2 mm (in) = LD2 - LD1

T1, T2: Difference between new drive pinion retainer or new reverse brake housing and current drive pinion retainer or current reverse brake housing

LD1: Calculated value of current drive pinion retainer or current reverse brake housing

LD2: Calculated value of new drive pinion retainer or new reverse brake housing

Difference of the case (T1) mm (in)	Shim selection procedure
0 -0.050 (0 -0.00197)	Select a new shim of the same thickness with the shim that is used on
	the primary pulley side of the current reverse brake housing.
0.051-0.150 (0.00201-	Select a shim which is 0.1 mm (0.004 in) thicker than the shim that is
0.00591)	used on the primary pulley side of the current reverse brake housing.
0.151-0.250 (0.00594-	Select a shim which is 0.2 mm (0.008 in) thicker than the shim that is
0.00984)	used on the primary pulley side of the current reverse brake housing.
0.251-0.350 (0.00988-	Select a shim which is 0.3 mm (0.012 in) thicker than the shim that is
0.01378)	used on the primary pulley side of the current reverse brake housing.
0.351-0.450 (0.01382-	Select a shim which is 0.4 mm (0.016 in) thicker than the shim that is
0.01772)	used on the primary pulley side of the current reverse brake housing.
0.451-0.550 (0.01776-	Select a shim which is 0.5 mm (0.020 in) thicker than the shim that is
0.02165)	used on the primary pulley side of the current reverse brake housing.
0.551-0.600 (0.02169-	Select a shim which is 0.6 mm (0.024 in) thicker than the shim that is
0.02362)	used on the primary pulley side of the current reverse brake housing.

Difference of the case (T2) mm (in)	Shim selection procedure
0 -0.050 (0 -0.00197)	Select a new shim of the same thickness with the shim that is used on the primary pulley side of the current reverse brake housing.
0.051—0.150 (0.00201— 0.00591)	Select a shim which is 0.1 mm (0.004 in) thinner than the shim that is used on the primary pulley side of the current reverse brake housing.
0.151—0.250 (0.00594— 0.00984)	Select a shim which is 0.2 mm (0.008 in) thinner than the shim that is used on the primary pulley side of the current reverse brake housing.
0.251—0.350 (0.00988— 0.01378)	Select a shim which is 0.3 mm (0.012 in) thinner than the shim that is used on the primary pulley side of the current reverse brake housing.
0.351—0.450 (0.01382— 0.01772)	Select a shim which is 0.4 mm (0.016 in) thinner than the shim that is used on the primary pulley side of the current reverse brake housing.
0.451—0.550 (0.01776— 0.02165)	Select a shim which is 0.5 mm (0.020 in) thinner than the shim that is used on the primary pulley side of the current reverse brake housing.
0.551—0.600 (0.02169— 0.02362)	Select a shim which is 0.6 mm (0.024 in) thinner than the shim that is used on the primary pulley side of the current reverse brake housing.

Part No.	Shim thickness mm (in)
32451AA050	0.1 (0.004)
32451AA060	0.2 (0.008)
32451AA070	0.3 (0.012)
32451AA080	0.4 (0.016)
32451AA090	0.5 (0.020)
32451AA100	0.6 (0.024)

CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Primary Pulley and Secondary Pulley

INSPECTION

- Check the surface of primary and secondary pulley cones for damage or wear.
- Check the primary and secondary pulley for damage.
- Check the bearing for seizure or wear.
- Apply CVTF to bearing and rotate the bearing to check for noise or dragging etc.

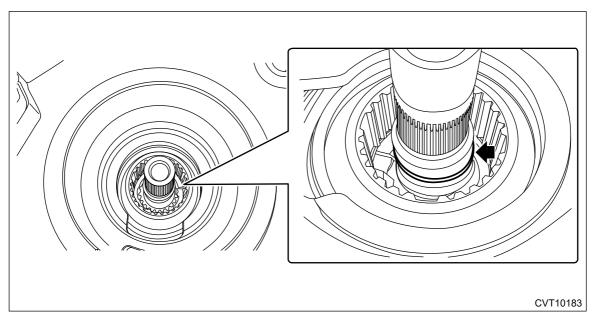
CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Primary Pulley and Secondary Pulley

INSTALLATION

- 1. Select shims for pulley alignment. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Primary Pulley and Secondary Pulley>ADJUSTMENT.
- **2.** Install the seal ring to the input shaft.

Note:

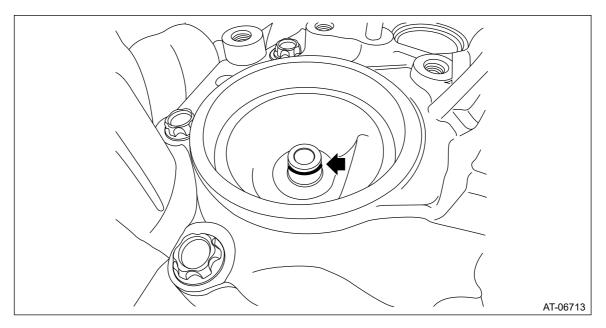
- Use new seal rings.
- When installing the seal rings, do not expand the seal rings too much.
- Apply CVTF to the seal rings.



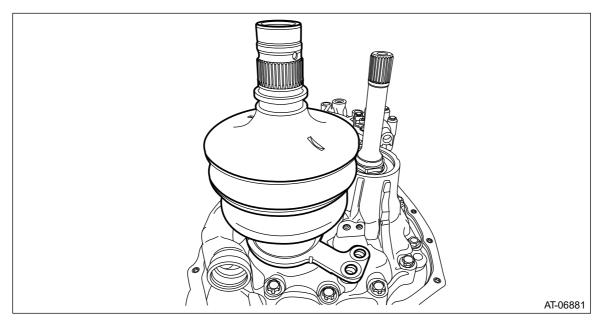
3. Install the seal ring to drive pinion retainer.

Note:

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



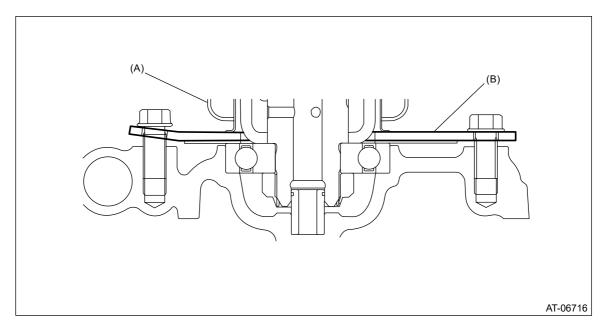
- **4.** Install the selected shims to the primary pulley bearing catch surface.
- **5.** Install the secondary pulley to the drive pinion retainer.



- **6.** Install and tighten the secondary pulley securing bolts.
 - (1) Tighten the three bolts until the seating surfaces contact the bearing retainer.

Note:

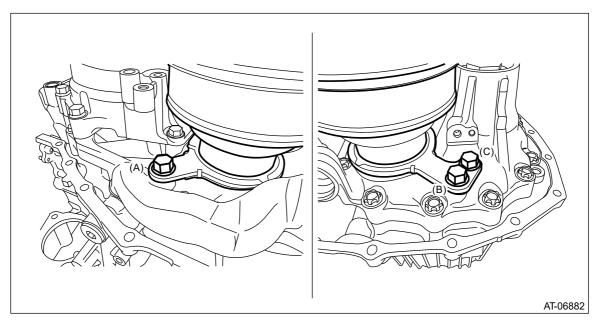
- Be careful not to tilt the bearing retainer of the secondary pulley.
- Apply CVTF to the bolt.



- (A) Secondary pulley
- (B) Bearing retainer
- (2) Tighten the bolts in the order of (A) \rightarrow (B) \rightarrow (C) \rightarrow (B).

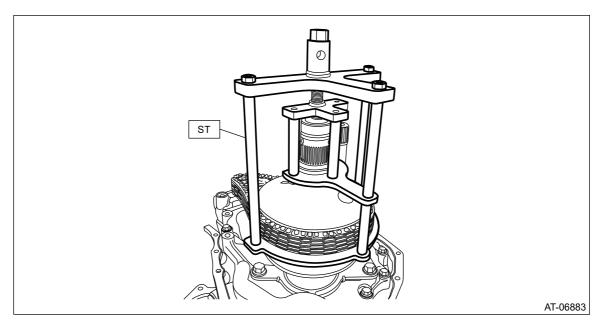
Tightening torque:

67.5 N·m (6.9 kgf-m, 49.8 ft-lb)



7. Place the variator chain on the V groove of the secondary pulley, and set the ST.

ST 18769AA010 EXPANDER PULLEY

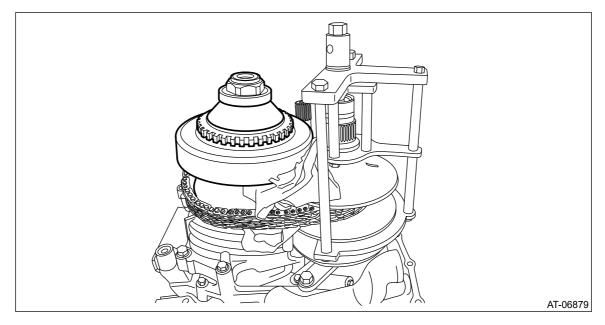


- **8.** Expand the V groove of the secondary pulley.
- **9.** Install the primary pulley to the reverse brake housing together with the variator chain.

Caution:

Cover the V grooves of primary pulley and secondary pulley with cloth to protect the both pulleys and variator chain from scratching.

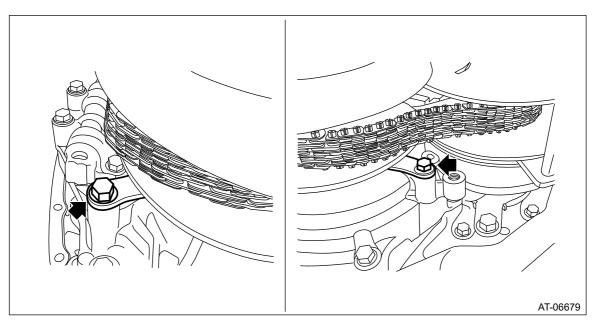
(1) Intersect the V groove of primary pulley and the V groove of secondary pulley and install the secondary pulley while placing the variator chain on secondary pulley.



- (2) Install the primary pulley to the reverse brake housing so that the bolt hole of primary bearing retainer and the bolt hole of reverse brake housing are aligned.
- 10. Install the primary pulley bolt.

Tightening torque:

21 N·m (2.1 kgf-m, 24.3 ft-lb)

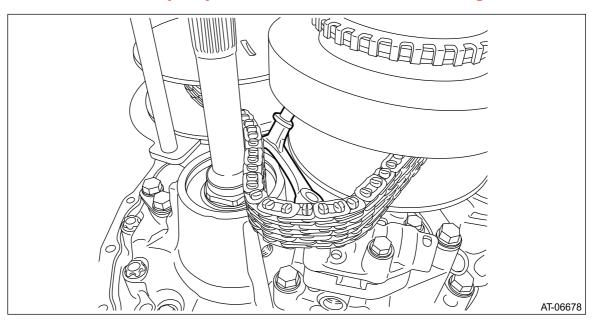


11. Install the chain guide.

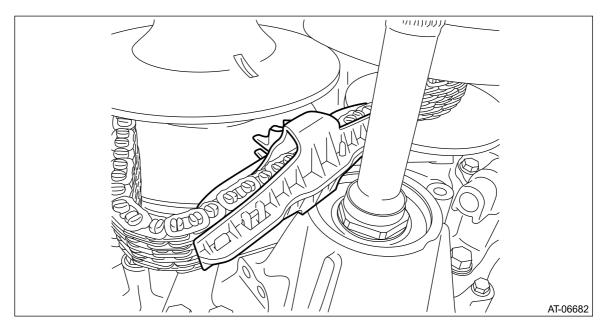
(1) Place the support rod inside of the variator chain.

Caution:

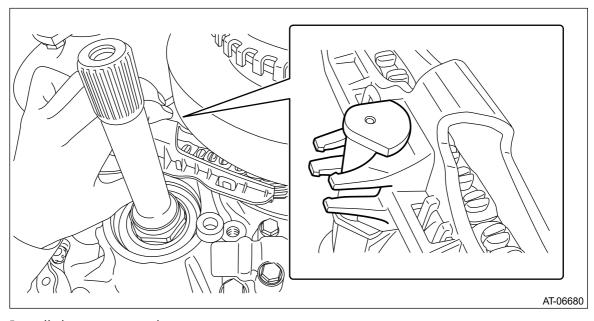
Protect the both pulleys and variator chain from scratching.



(2) Install the chain guide to the variator chain.



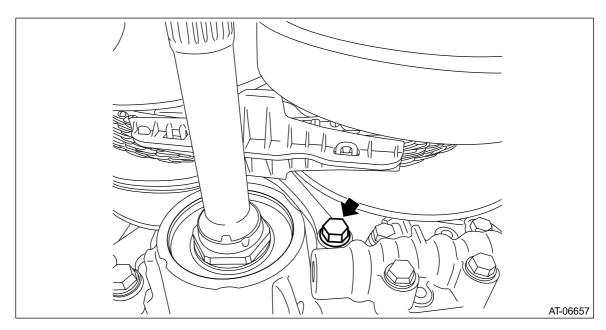
- (3) Move the chain guide to the support rod side.
- (4) While holding the support rod, press the chain guide so that the support rod runs through between the protrusions of chain guide and install the chain guide to the support rod.



(5) Install the support rod.

Tightening torque:

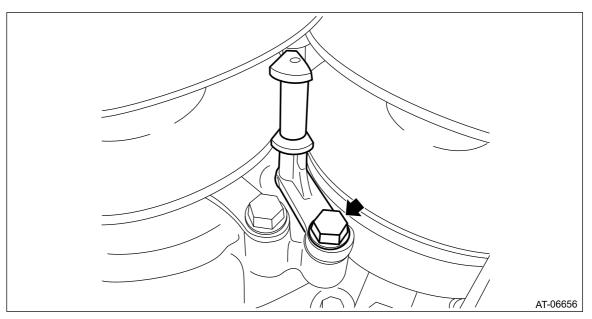
21 N·m (2.1 kgf-m, 15.5 ft-lb)



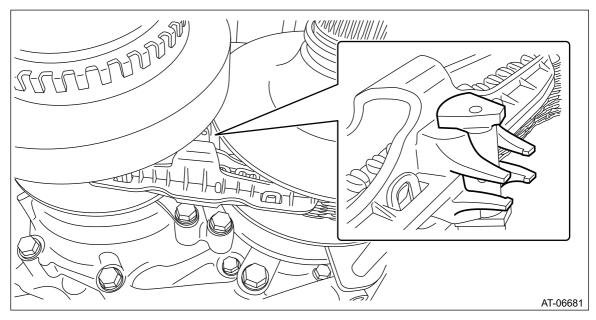
(6) Install the lubrication pipe.

Tightening torque:

21 N·m (2.1 kgf-m, 15.5 ft-lb)



(7) Install the chain guide so that the lubrication pipe runs through between the protrusions of each chain guide. Then remove the ST (PULLEY EXPANDER).



- **12.** Install the reduction drive gear. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Reduction Drive Gear>INSTALLATION.
- **13.** Select the reduction drive gear shim. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Reduction Drive Gear>ADJUSTMENT.
- **14.** Install the transmission case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transmission Case>INSTALLATION.
- **15.** Install the transmission control device. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transmission Control Device>INSTALLATION.
- **16.** Install the oil strainer and oil pan. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Oil Pan and Strainer>INSTALLATION.
- 17. Install the reduction driven gear assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Reduction Driven Gear>INSTALLATION.
- 18. Install the parking pawl. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Parking Pawl>INSTALLATION.
- 19. Install the transfer driven gear assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transfer Driven Gear>INSTALLATION.
- **20.** Install the transfer clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transfer Clutch>INSTALLATION.
- **21.** Install the extension case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Extension Case>INSTALLATION.
- **22.** Install the inhibitor switch. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Inhibitor Switch>INSTALLATION.
- **23.** Install the secondary speed sensor. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Secondary Speed Sensor>INSTALLATION.
- **24.** Install the primary speed sensor. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Primary Speed Sensor>INSTALLATION.
- **25.** Install the turbine speed sensor. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Turbine Speed Sensor>INSTALLATION.
- **26.** Install the transmission harness. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transmission Harness>INSTALLATION.

- **27.** Install the control valve body. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Control Valve Body>INSTALLATION.
- **28.** Install the air breather hose. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Air Breather Hose>INSTALLATION.
- **29.** Install the transmission assembly to the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Automatic Transmission Assembly>INSTALLATION.

CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Primary Pulley and Secondary Pulley

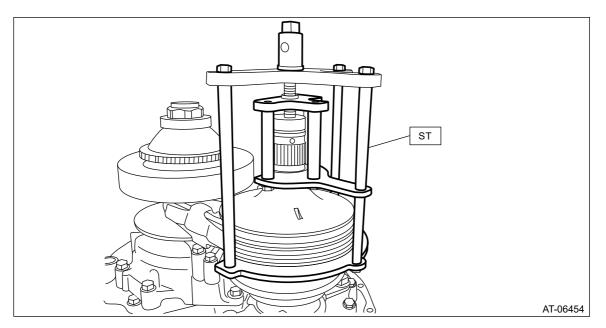
REMOVAL

Note:

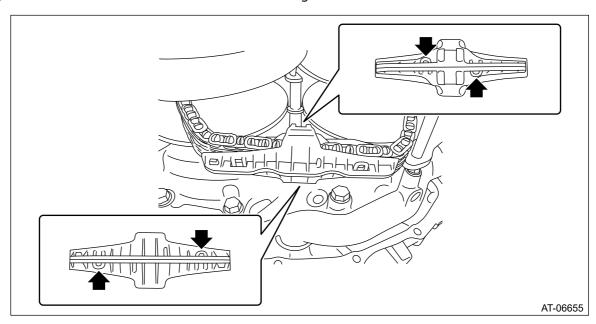
Always replace primary pulley and secondary pulley as an assembly because they are non-disassembled parts.

- 1. Remove the transmission assembly from the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Automatic Transmission Assembly>REMOVAL.
- **2.** Remove the air breather hose. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Air Breather Hose>REMOVAL.
- **3.** Remove the control valve body. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Control Valve Body>REMOVAL.
- **4.** Remove the transmission harness. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transmission Harness>REMOVAL.
- **5.** Remove the turbine speed sensor. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Turbine Speed Sensor>REMOVAL.
- **6.** Remove the secondary speed sensor. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Secondary Speed Sensor>REMOVAL.
- 7. Remove the primary speed sensor. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Primary Speed Sensor>REMOVAL.
- **8.** Remove the inhibitor switch. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Inhibitor Switch>REMOVAL.
- **9.** Remove the extension case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Extension Case>REMOVAL.
- **10.** Remove the transfer clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transfer Clutch>REMOVAL.
- **11.** Remove the transfer driven gear assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transfer Driven Gear>REMOVAL.
- **12.** Remove the parking pawl. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Parking Pawl>REMOVAL.
- 13. Remove the reduction driven gear assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Reduction Driven Gear>REMOVAL.
- **14.** Remove the oil pan and oil strainer. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Oil Pan and Strainer>REMOVAL.
- **15.** Remove the transmission control device. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transmission Control Device>REMOVAL.
- **16.** Remove the transmission case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transmission Case>REMOVAL.
- **17.** Remove the reduction drive gear. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Reduction Drive Gear>REMOVAL.
- **18.** Set the ST to secondary pulley, expand the V groove of pulley, and then completely loosen the variator chain.

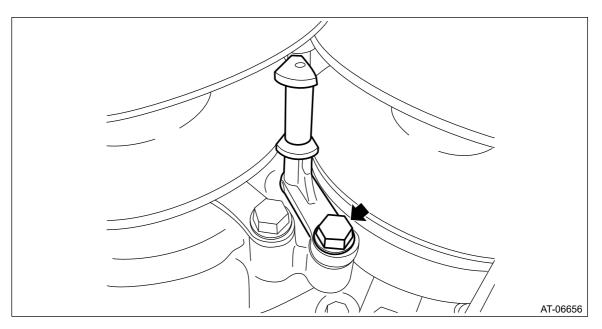
ST 18769AA010 EXPANDER PULLEY



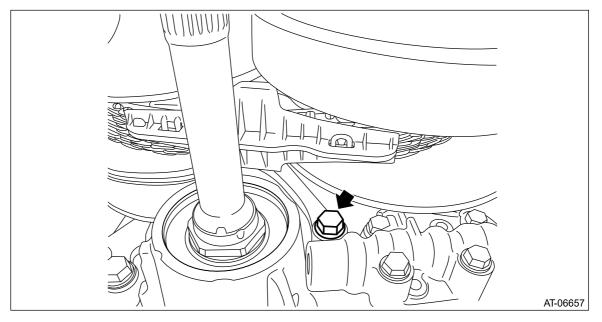
- 19. Remove the chain guide.
 - (1) Remove the chain guide from lubrication pipe.
 - (2) Detach the four claws to remove the chain guide.



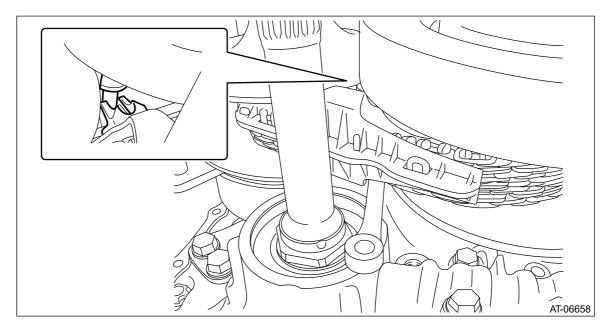
(3) Remove the lubrication pipe.



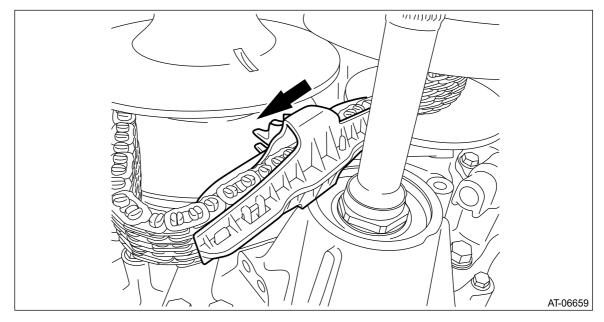
(4) Remove the support rod mounting bolts.



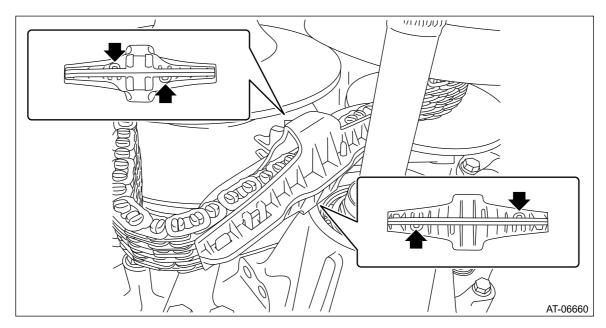
(5) Raise the support rod to remove the chain guide.



(6) Move the chain guide to the secondary pulley side.



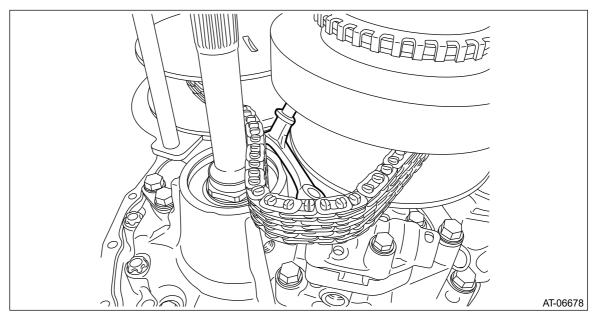
(7) Detach the four claws to remove the chain guide.



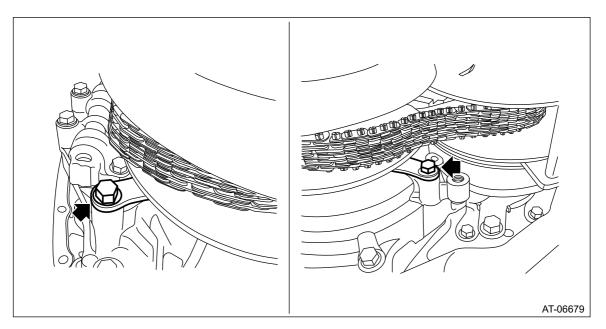
(8) Remove the support rod.

Caution:

Protect the both pulleys and variator chain from scratching.



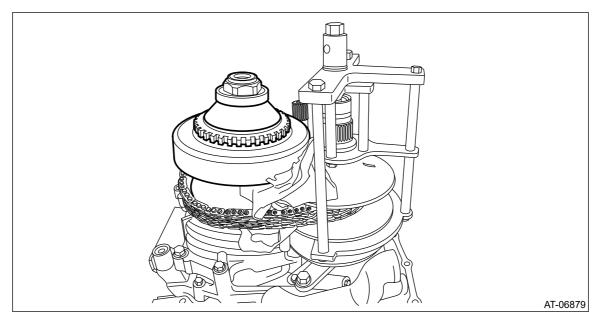
20. Remove the primary pulley mounting bolt.



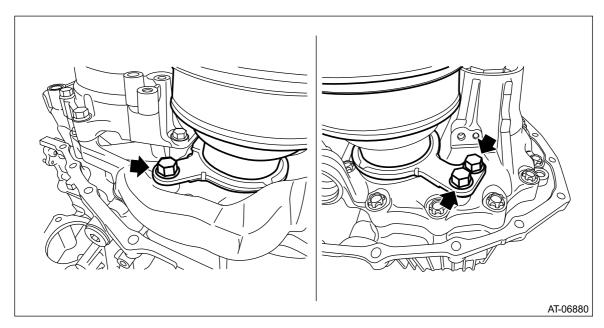
21. Remove the primary pulley from the reverse brake housing and intersect the V groove of secondary pulley and the V groove of primary pulley. Remove the variator chain from primary pulley, and remove the primary pulley.

Caution:

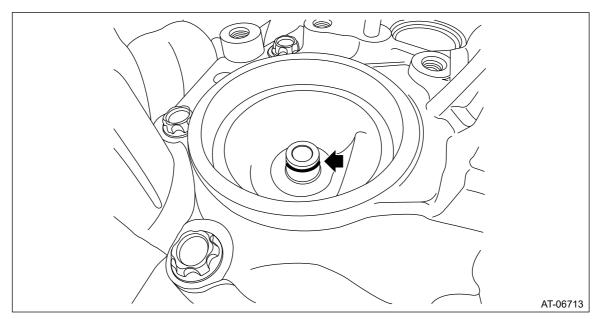
Cover the V grooves of secondary pulley and primary pulley with cloth to protect the both pulleys and variator chain from scratching.



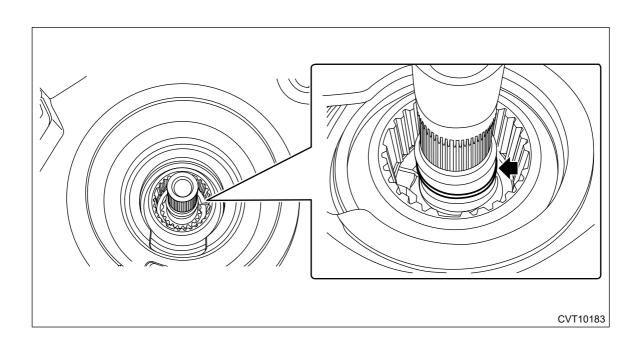
- 22. Remove the ST (EXPANDER PULLEY) from the secondary pulley.
- **23.** Remove the variator chain from secondary pulley.
- **24.** Remove the secondary pulley mounting bolts, and remove the secondary pulley.



25. Remove the seal ring from drive pinion retainer.



26. Remove the seal ring from the input shaft.



CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Primary Speed Sensor

INSPECTION

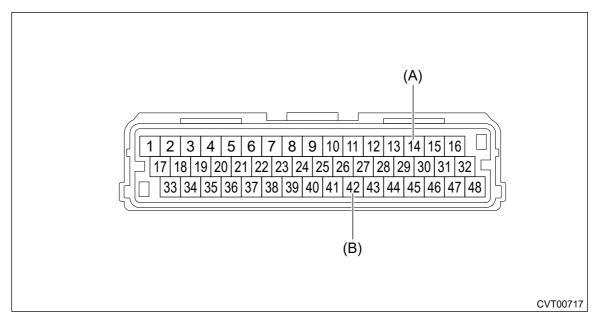
1. Set the ST between the TCM and bulkhead harness. Ref. to TRANSMISSION (DIAGNOSTICS)>General Description>CAUTION.

ST 18460AA040 CHECK BOARD

2. Set the probe of oscilloscope to TCM harness connector.

Terminals

No. 14
$$(+)$$
 — No. 42 $(-)$:



- (A) + probe
- (B) probe
- 3. Start and warm up the engine.
- **4.** Lift up the vehicle.

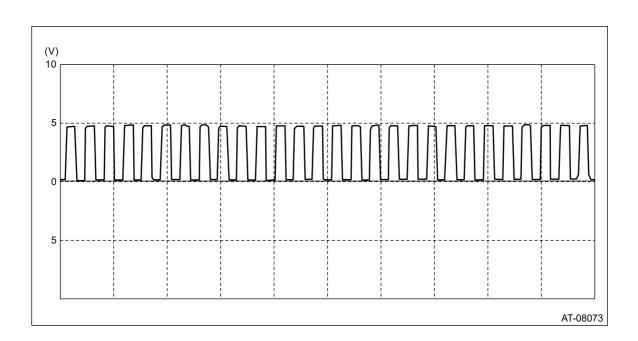
Caution:

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

- 5. Shift the select lever to "D" range.
- **6.** Check the waveform and output voltage of the primary speed sensor with engine idling.

Note:

The waveform cycle changes as the speed changes.



CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Primary Speed Sensor

INSTALLATION

Caution:

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

Install in the reverse order of removal.

Note:

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

Tightening torque:

7 N·m (0.7 kgf-m, 5.2 ft-lb)

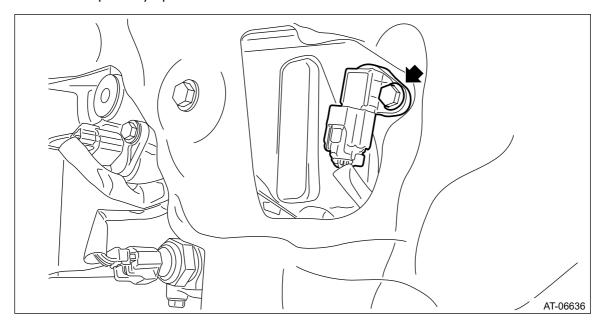
CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Primary Speed Sensor

REMOVAL

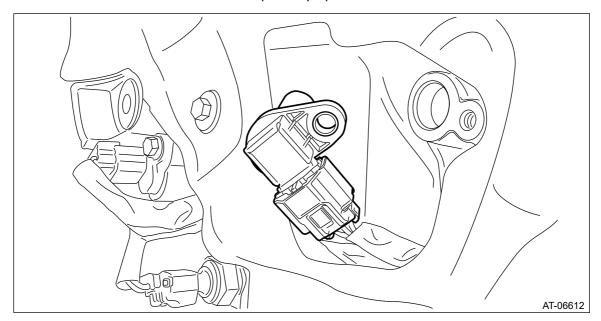
Caution:

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

- 1. Remove the transmission assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Automatic Transmission Assembly>REMOVAL.
- **2.** Remove the primary speed sensor.



3. Remove the harness connector from primary speed sensor.



ADJUSTMENT

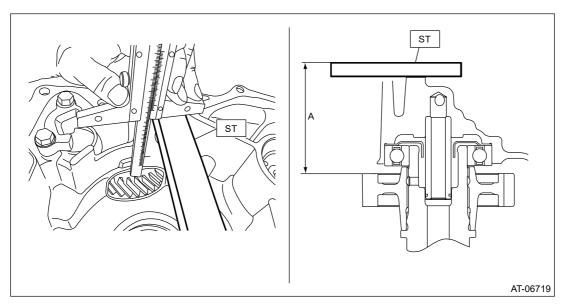
- 1. Remove the spring retainers and reduction drive gear shims.
- **2.** Install the transmission case, and secure it with four or five bolts.

Tightening torque:

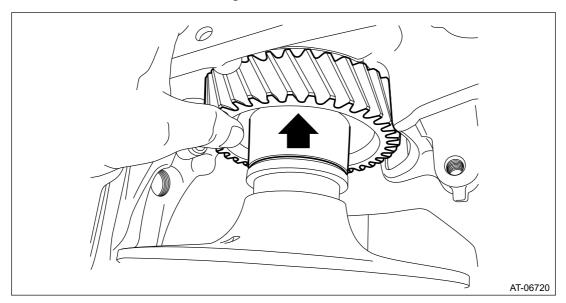
22 N·m (2.2 kgf-m, 16.2 ft-lb)

3. Measure depth "A" from the ST upper face to the reduction drive gear end face.

ST 499575400 GAUGE

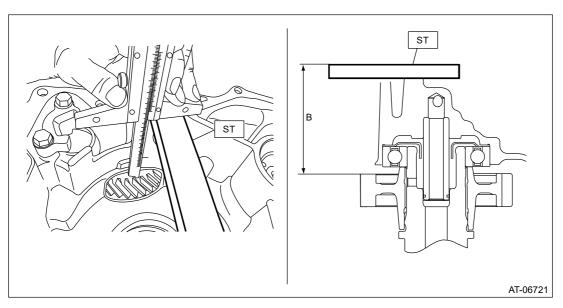


4. Raise and hold the reduction drive gear.



5. Measure depth "B" from the ST upper face to the reduction drive gear end face.

ST 499575400 GAUGE



6. Calculate the following formula.

T mm = A - B - 1.0

[T in = A - B - 0.039]

T: Moving distance of reduction drive gear

A: Depth from the ST upper face to the reduction drive gear end surface

B: Depth from the ST upper face to the reduction drive gear end surface

1.0 mm (0.039 in): Thickness of spring retainer

Moving distance of transfer drive gear [T]	Total shim thickness mm (in)
0.420-0.519 (0.0165-0.0204)	0.3 (0.012)
0.520-0.619 (0.0205-0.0242)	0.4 (0.016)
0.620-0.719 (0.0244-0.0283)	0.5 (0.020)
0.720-0.819 (0.0283-0.0322)	0.6 (0.024)
0.820-0.919 (0.0323-0.0362)	0.7 (0.028)
0.920—1.019 (0.0362—0.0401)	0.8 (0.031)
1.020—1.119 (0.0402—0.0441)	0.9 (0.035)
1.120-1.219 (0.0441-0.0480)	1.0 (0.039)
1.220—1.319 (0.0480—0.0519)	1.1 (0.043)
1.320—1.419 (0.0520—0.0559)	1.2 (0.047)
1.420—1.519 (0.0559—0.0598)	1.3 (0.051)
1.520—1.619 (0.0598—0.0637)	1.4 (0.055)
1.620—1.719 (0.0638—0.0677)	1.5 (0.059)
1.720—1.819 (0.0677—0.0716)	1.6 (0.063)
1.820—1.920 (0.0717—0.0756)	1.7 (0.067)

7. Select one to three reduction drive gear shims so that the total thickness meets the value obtained from step 6).

Part No.	Reduction drive gear shim thickness mm (in)		
31288AA260	0.3 (0.012)		
31288AA270	0.4 (0.016)		

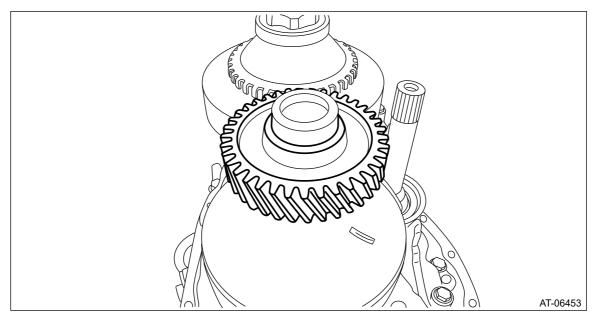
31288AA280	0.5 (0.020)
31288AA290	0.6 (0.024)

INSPECTION

Check the reduction drive gear for breakage or damage.

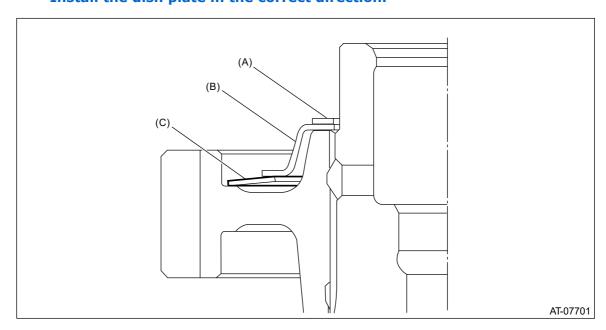
INSTALLATION

1. Install the reduction drive gear to secondary pulley.



- **2.** Select the reduction drive gear shim. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Reduction Drive Gear>ADJUSTMENT.
- 3. Install the dish plates, spring retainers, and selected reduction drive gear shims.
 Note:

Install the dish plate in the correct direction.

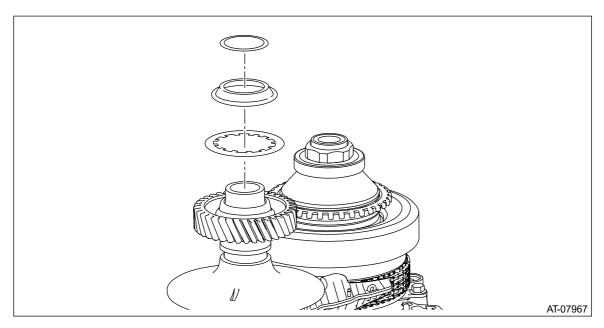


- (A) Reduction drive gear shim
- (B) Spring retainer
- (C) Dish plate

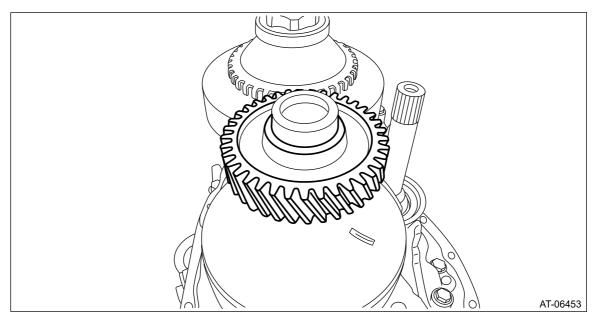
- **4.** Install the transmission case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transmission Case>INSTALLATION.
- **5.** Install the transmission control device. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transmission Control Device>INSTALLATION.
- **6.** Install the oil strainer and oil pan. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Oil Pan and Strainer>INSTALLATION.
- 7. Install the reduction driven gear assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Reduction Driven Gear>INSTALLATION.
- **8.** Install the parking pawl. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Parking Pawl>INSTALLATION.
- **9.** Install the transfer driven gear assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transfer Driven Gear>INSTALLATION.
- **10.** Install the transfer clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transfer Clutch>INSTALLATION.
- **11.** Install the extension case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Extension Case>INSTALLATION.
- **12.** Install the inhibitor switch. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Inhibitor Switch>INSTALLATION.
- 13. Install the secondary speed sensor. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Secondary Speed Sensor>INSTALLATION.
- **14.** Install the primary speed sensor. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Primary Speed Sensor>INSTALLATION.
- **15.** Install the turbine speed sensor. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Turbine Speed Sensor>INSTALLATION.
- **16.** Install the transmission harness. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transmission Harness>INSTALLATION.
- 17. Install the control valve body. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Control Valve Body>INSTALLATION.
- **18.** Install the air breather hose. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Air Breather Hose>INSTALLATION.
- 19. Install the transmission assembly to the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Automatic Transmission Assembly>INSTALLATION.

REMOVAL

- **1.** Remove the transmission assembly from the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Automatic Transmission Assembly>REMOVAL.
- **2.** Remove the air breather hose. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Air Breather Hose>REMOVAL.
- **3.** Remove the control valve body. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Control Valve Body>REMOVAL.
- **4.** Remove the transmission harness. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transmission Harness>REMOVAL.
- **5.** Remove the turbine speed sensor. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Turbine Speed Sensor>REMOVAL.
- **6.** Remove the secondary speed sensor. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Secondary Speed Sensor>REMOVAL.
- **7.** Remove the primary speed sensor. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Primary Speed Sensor>REMOVAL.
- **8.** Remove the inhibitor switch. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Inhibitor Switch>REMOVAL.
- **9.** Remove the extension case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Extension Case>REMOVAL.
- **10.** Remove the transfer clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transfer Clutch>REMOVAL.
- **11.** Remove the transfer driven gear assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transfer Driven Gear>REMOVAL.
- **12.** Remove the parking pawl. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Parking Pawl>REMOVAL.
- **13.** Remove the reduction driven gear assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Reduction Driven Gear>REMOVAL.
- **14.** Remove the oil pan and oil strainer. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Oil Pan and Strainer>REMOVAL.
- **15.** Remove the transmission control device. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transmission Control Device>REMOVAL.
- **16.** Remove the transmission case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transmission Case>REMOVAL.
- 17. Remove the reduction drive gear shims, spring retainers, and dish plates.



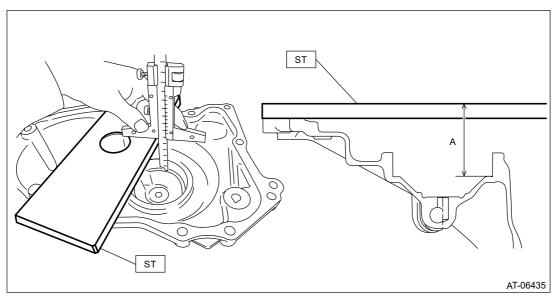
18. Remove the reduction drive gear.



ADJUSTMENT

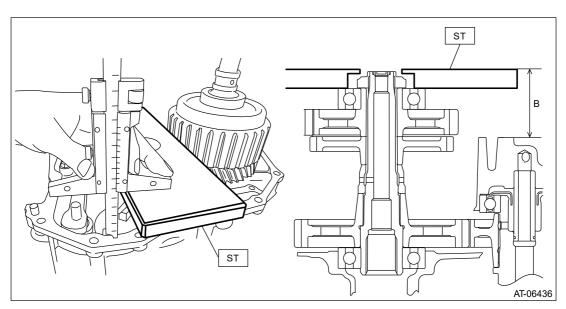
1. Measure the height "A" from the ST upper face to the ball bearing catch surface.

ST 499575600 GAUGE



2. Measure the height "B" from the ST to the mating surface of the transmission case.

ST 499575600 GAUGE



3. Obtain the thickness of transfer drive gear shim using the following formula to select one to three transfer drive gear shims.

T mm = A - B - (0.05 - 0.25)

[T in = A - B - (0.002-0.01)]

T: Shim thickness

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

B: Height from ST to transmission case mating surface

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

Transfer drive gear shim				
Part No. Thickness mm (in)				
33279AA090	0.3 (0.012)			
33279AA100	0.4 (0.016)			
33279AA110	0.5 (0.020)			

ASSEMBLY

1. Install the snap ring to reduction driven gear.

Note:

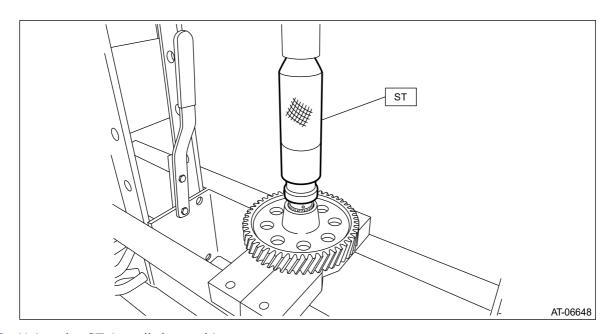
Use a new reduction driven gear COMPL.

2. Using the ST, attach the collar.

Note:

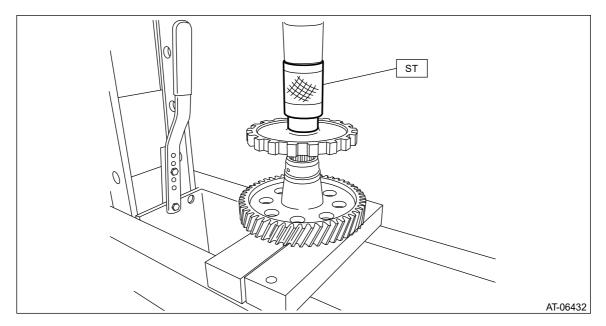
Attach the collar in the correct direction.

ST 899580100 INSTALLER



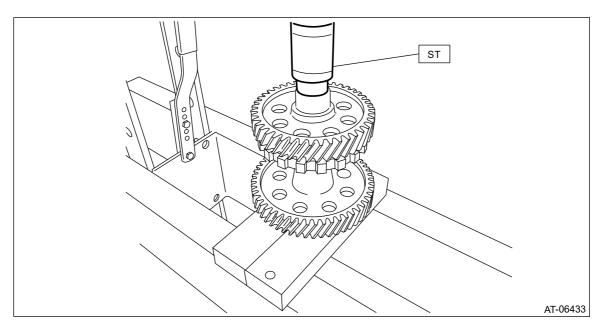
3. Using the ST, install the parking gear.

ST 499757002 INSTALLER



4. Using the ST, install the transfer drive gear.

ST 499757002 INSTALLER

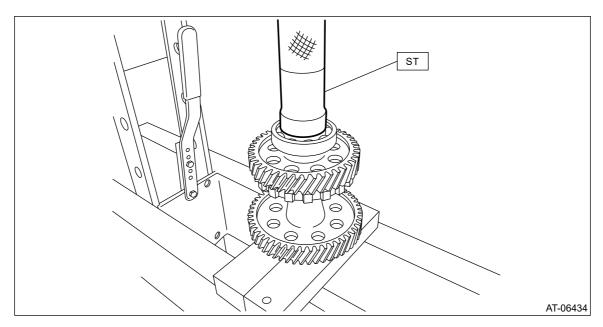


5. Using the ST, install the ball bearing.

Note:

Use a new ball bearing.

ST 499277100 BUSHING 1-2 INSTALLER



6. Using the ST, counter the rotation of the reduction driven gear assembly, and install the lock nut.

Note:

Use a new lock nut.

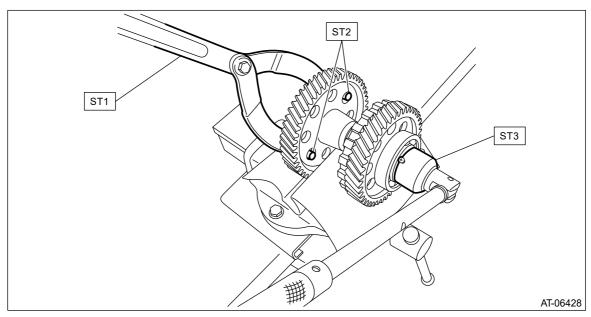
ST1 18355AA000 PULLEY WRENCH

ST2 18334AA000 PULLEY WRENCH PIN SET

ST3 499987003 SOCKET WRENCH (35)

Tightening torque:

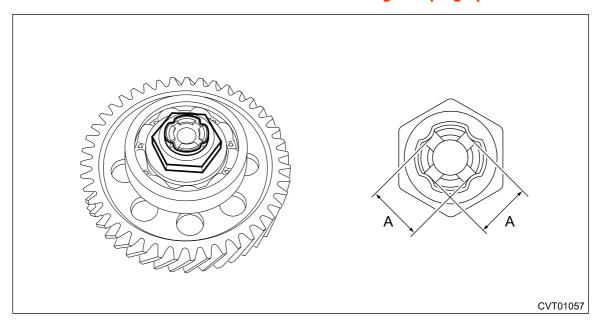
95 N·m (9.7 kgf-m, 70.1 ft-lb)



7. Crimp the lock nut at four locations so that the dimension of A becomes 18.9 mm (0.74 in) or less.

Caution:

Do not allow the lock nut to be cracked during crimping operation.



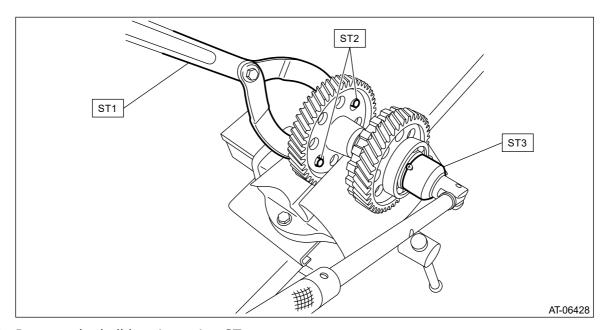
DISASSEMBLY

- **1.** Flatten the tab of the lock nut.
- **2.** Using the ST, counter the rotation of the reduction driven gear assembly, and remove the lock nut.

ST1 18355AA000 PULLEY WRENCH

ST2 18334AA000 PULLEY WRENCH PIN SET

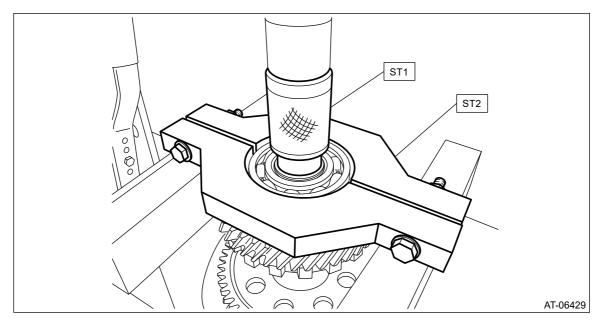
ST3 499987003 SOCKET WRENCH (35)



3. Remove the ball bearing using ST.

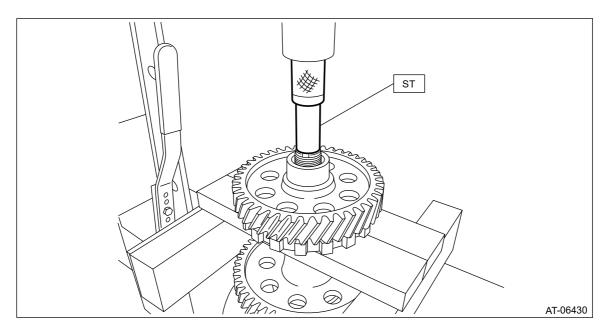
ST1 499757002 INSTALLER

ST2 498077300 REMOVER



4. Using the ST, remove the parking gear and transfer drive gear.

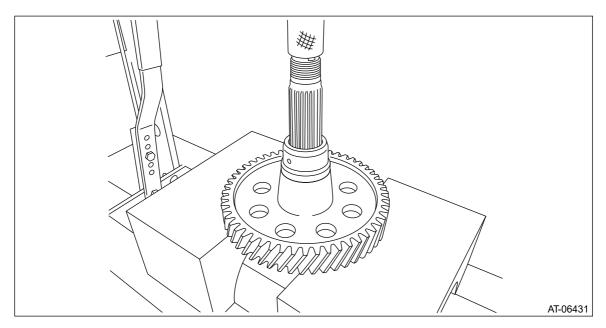
ST 899864100 REMOVER



5. Remove the collar.

Note:

When collar has been removed, do not reuse the reduction driven gear and/or shaft, and replace it with reduction driven gear COMPL.



6. Remove the snap ring from reduction driven gear.

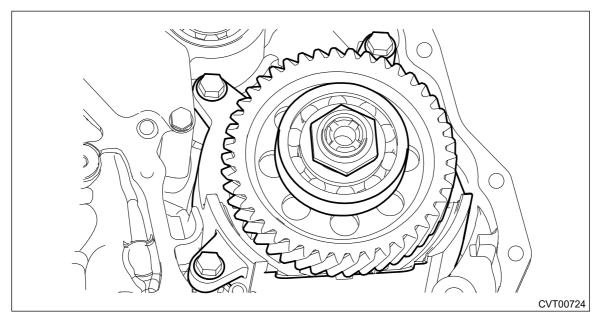
INSPECTION

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

INSTALLATION

Install the reduction driven gear assembly and spacer oil.
 Tightening torque:

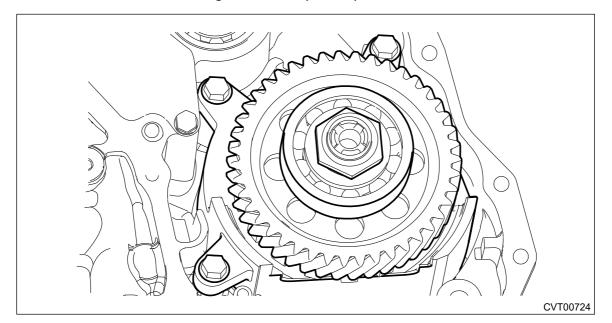
17 N•m (1.7 kgf-m, 12.5 ft-lb)



- **2.** Select the transfer drive gear shim. <a> Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Reduction Drive Gear>ADJUSTMENT.
- **3.** Install the parking pawl. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Parking Pawl>INSTALLATION.
- 4. Attach the selected transfer drive gear shim to extension case with vaseline.
- **5.** Install the transfer driven gear assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transfer Driven Gear>INSTALLATION.
- **6.** Install the transfer clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transfer Clutch>INSTALLATION.
- 7. Install the extension case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Extension Case>INSTALLATION.
- **8.** Install the transmission assembly to the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Automatic Transmission Assembly>INSTALLATION.

REMOVAL

- **1.** Remove the transmission assembly from the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Automatic Transmission Assembly>REMOVAL.
- **2.** Remove the extension case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Extension Case>REMOVAL.
- **3.** Remove the transfer clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transfer Clutch>REMOVAL.
- **4.** Remove the transfer driven gear assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transfer Driven Gear>REMOVAL.
- **5.** Remove the parking pawl. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Parking Pawl>REMOVAL.
- 6. Remove the reduction driven gear assembly and spacer oil.



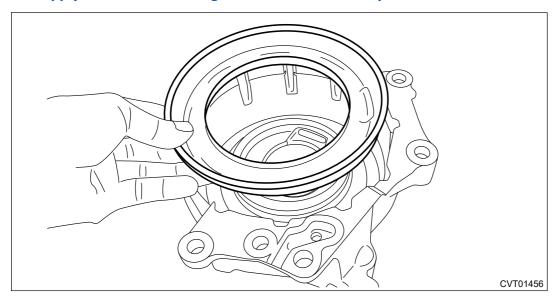
CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Reverse Brake Assembly

ASSEMBLY

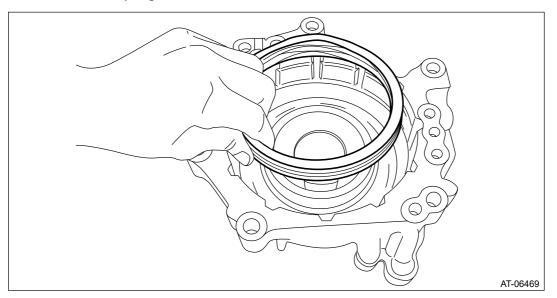
1. Install the reverse brake piston.

Note:

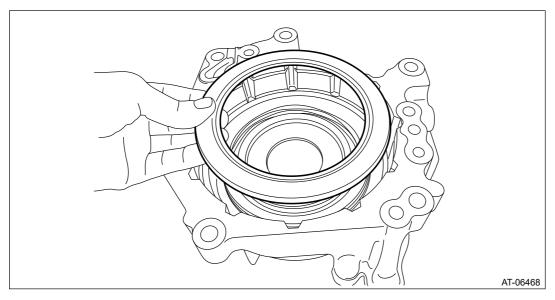
Apply CVTF to the sealing area of reverse brake piston.



2. Install the return spring.

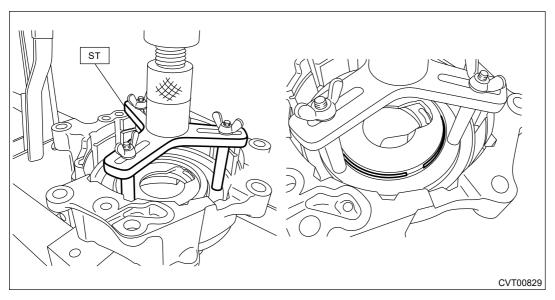


3. Install the spring retainer.

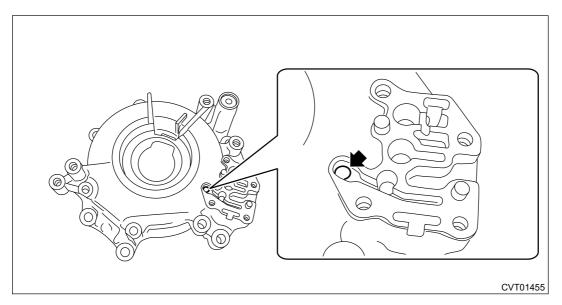


4. Compress the return spring using the ST to install the snap ring.

ST1 18762AA001 COMPRESSOR SPECIAL TOOL



5. Check the operation of reverse brake piston by blowing compressed air intermittently from reverse brake housing hole.



- 6. Place the driven plate, drive plate and retaining plate neatly in this order on surface table.
- **7.** Set the dial gauge to retaining plate, and read its scale.

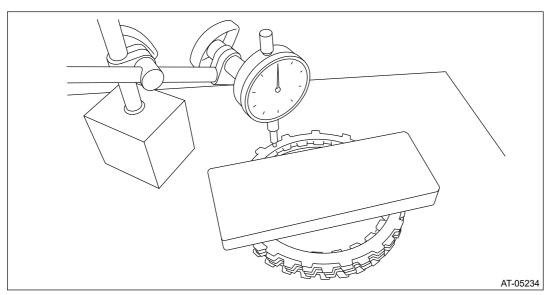
Note:

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

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

Note:

- Use a stiff board which does not bend against load as a flat board to be put on retaining plate.
- Use a flat board weighing less than 29 N (3.0 kgf, 6.5 lb).
- **9.** Put the flat board on retaining plate.



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

N = 29 N (3.0 kgf, 6.5 lb) - Z

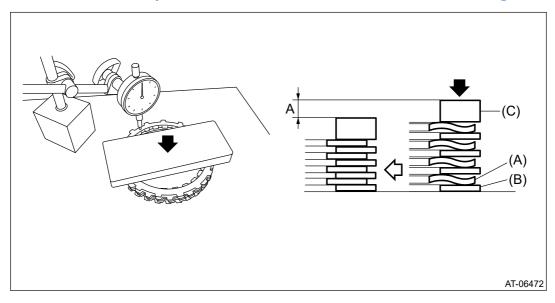
29 N (3.0 kgf, 6.5 lb): Load applied to clutch plate

Z: Flat board weight

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

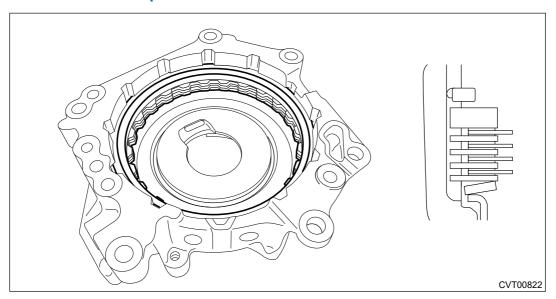
Note:

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

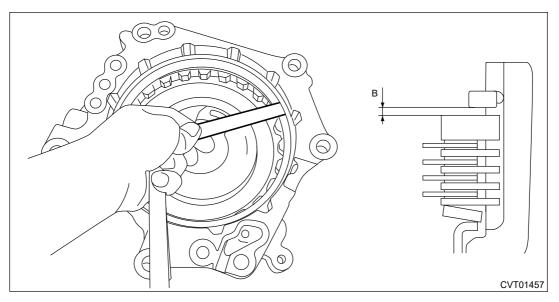


- (A) Drive plate
- (B) Driven plate
- (C) Retaining plate
- **12.** Install the dish plate, drive plate, driven plate, retaining plate and snap ring to the reverse brake housing.

Note:
Install the dish plate in the correct direction.



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



14. Piston stroke calculation

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

S mm (in) = A + B

S: Piston stroke

A: Compression amount of drive plate and dish plate

B: Clearance between retaining plate and snap ring

Initial standard:

2.3 - 2.7 mm (0.091 - 0.106 in)

Limit thickness:

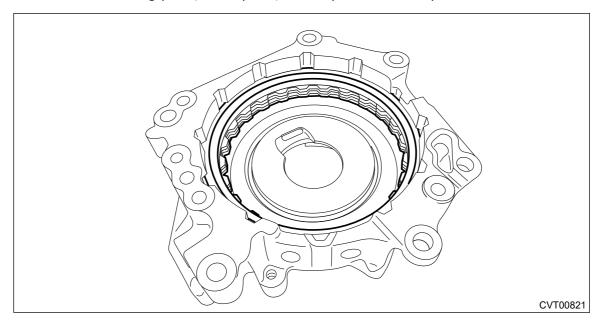
2.9 mm (0.114 in)

Retainin	ng plate
Part No.	Thickness mm (in)
31567AB750	4.2 (0.165)
31567AB800	4.4 (0.173)
31567AB810	4.6 (0.181)
31567AB820	4.8 (0.189)

CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Reverse Brake Assembly

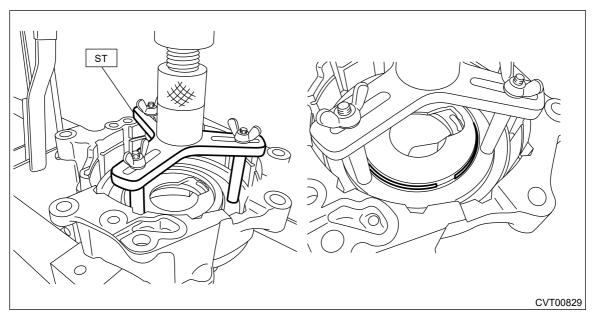
DISASSEMBLY

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

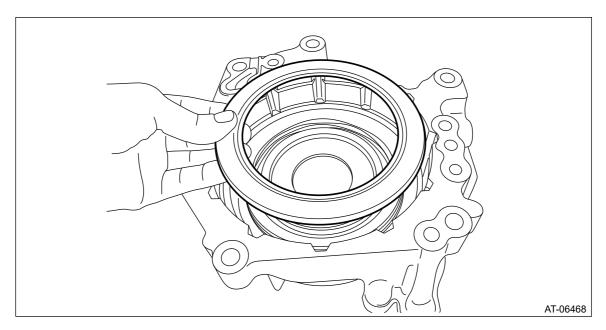


3. Compress the return spring using the ST to remove the snap ring.

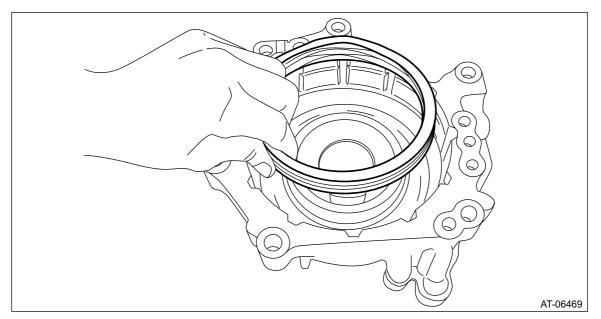
ST 18762AA001 COMPRESSOR SPECIAL TOOL



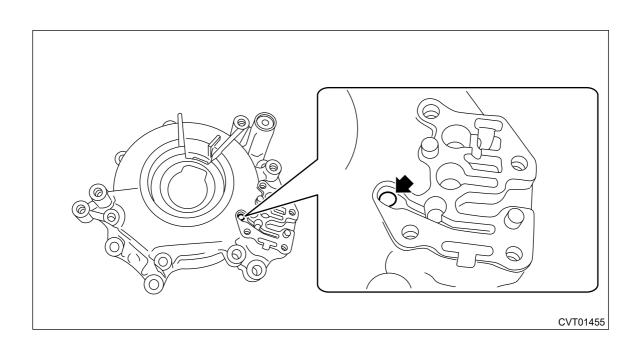
4. Using the ST, remove the snap ring and spring retainer.



5. Remove the return spring.



6. Remove the reverse brake piston by blowing compressed air intermittently from reverse brake housing hole.



CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Reverse Brake Assembly

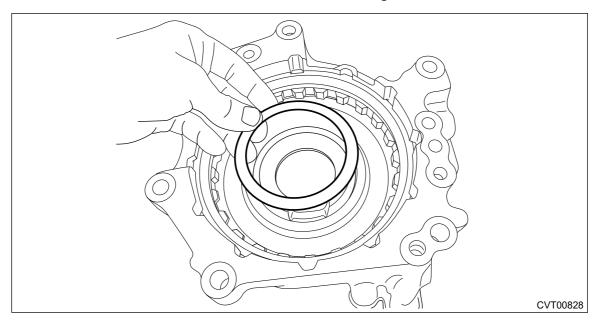
INSPECTION

- Inspect the drive plate facing for wear and damage.
- Check the driven plate for discoloration (burnt color).
- Check for worn snap ring, fatigue or damaged return spring or deformed spring retainer.
- Make sure the clearance between retaining plate and snap ring of reverse brake is within the limit. If it exceeds the limit, replace with a new drive plate and select and adjust the retaining plate within the initial standard value. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Reverse Brake Assembly>ASSEMBLY.

CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Reverse Brake Assembly

INSTALLATION

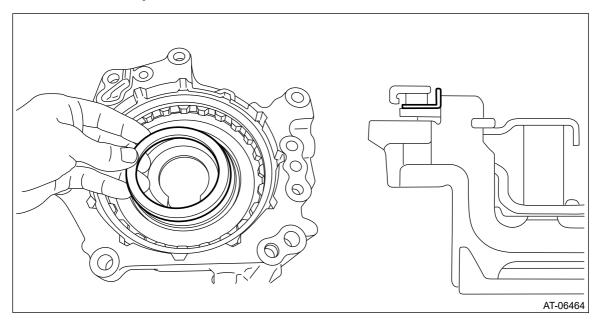
- 1. Select a washer. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Forward Clutch Assembly>ADJUSTMENT.
- 2. Install the selected washer to the reverse brake housing.



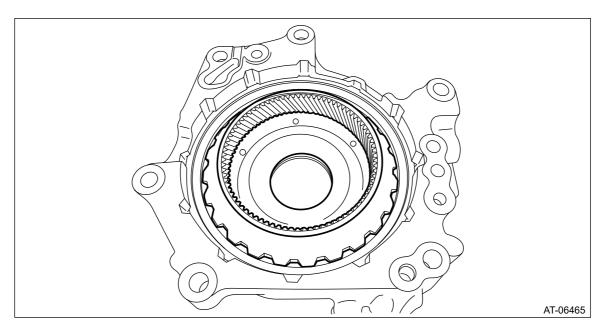
3. Install the thrust bearing to the reverse brake housing.

Note:

Face the temper color surface to the reverse brake side.



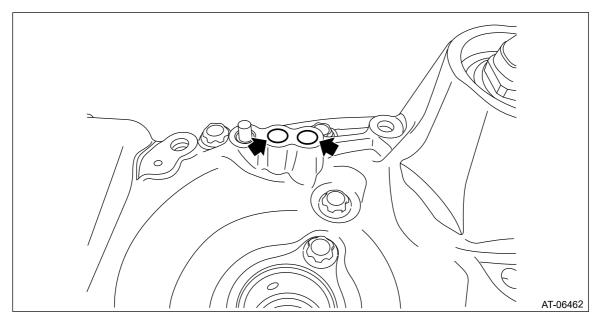
4. Remove the internal gear from the forward clutch assembly, and install it to the reverse brake housing.



5. Install the O-rings.

Note:

- Install a new O-ring.
- Apply CVTF to the O-rings.

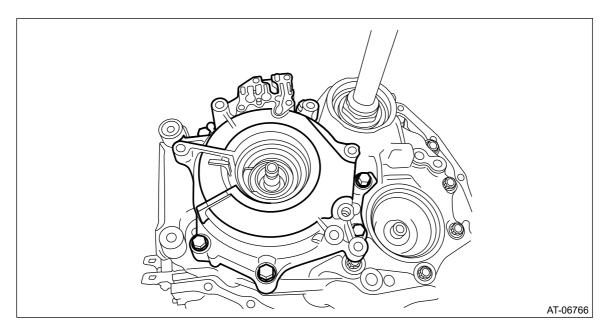


6. Install the reverse brake assembly and internal gear as a unit to the drive pinion retainer.
Note:

Slowly rotate the input shaft by hand to engage the internal gear and pinion gear of planetary carrier.

Tightening torque:

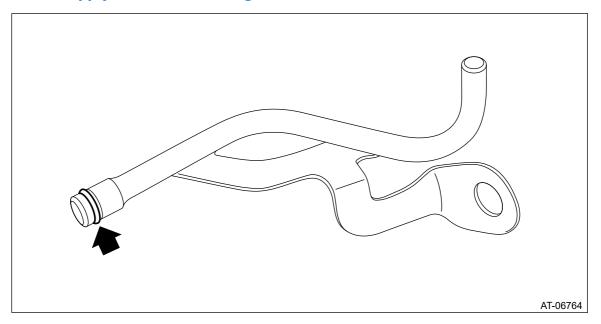
37 N•m (3.8 kgf-m, 27.3 ft-lb)



7. Install the O-ring to the lubrication pipe.

Note:

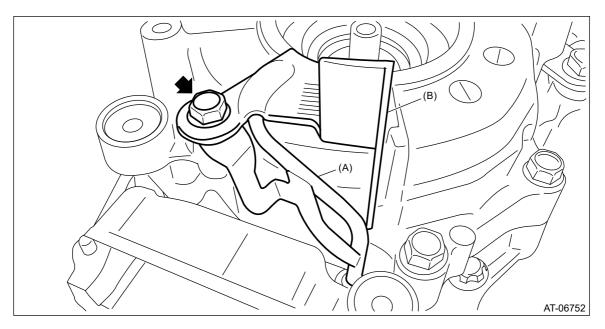
- Install a new O-ring.
- Apply CVTF to the O-rings.



8. Install the lubrication pipe and oil guide.

Tightening torque:

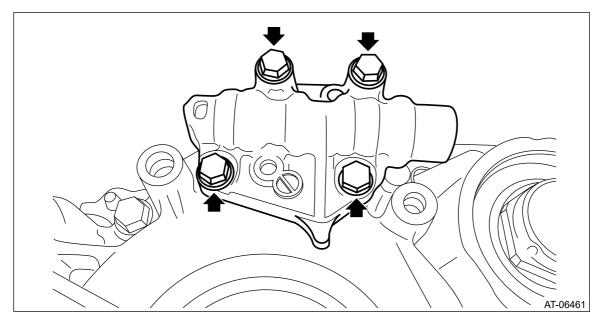
16 N•m (1.6 kgf-m, 11.8 ft-lb)



- (A) Lubrication pipe
- (B) Oil guide
- 9. Install the manual valve assembly and separator plate.

Tightening torque:

9 N•m (0.9 kgf-m, 6.6 ft-lb)



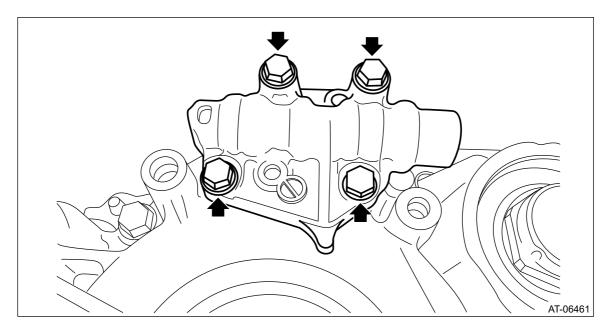
- **10.** Install the primary pulley, secondary pulley and variator chain. <a> Ref. to CONTINUOUSLY <a> VARIABLE TRANSMISSION(TR580)>Primary Pulley and Secondary Pulley>INSTALLATION.
- **11.** Install the reduction drive gear. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Reduction Drive Gear>INSTALLATION.
- **12.** Install the transmission case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transmission Case>INSTALLATION.
- 13. Install the transmission control device. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transmission Control Device>INSTALLATION.

- **14.** Install the oil strainer and oil pan. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Oil Pan and Strainer>INSTALLATION.
- **15.** Install the reduction driven gear assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Reduction Driven Gear>INSTALLATION.
- **16.** Install the parking pawl. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Parking Pawl>INSTALLATION.
- 17. Install the transfer driven gear assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transfer Driven Gear>INSTALLATION.
- **18.** Install the transfer clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transfer Clutch>INSTALLATION.
- 19. Install the extension case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Extension Case>INSTALLATION.
- **20.** Install the inhibitor switch. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Inhibitor Switch>INSTALLATION.
- **21.** Install the secondary speed sensor. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Secondary Speed Sensor>INSTALLATION.
- **22.** Install the primary speed sensor. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Primary Speed Sensor>INSTALLATION.
- **23.** Install the turbine speed sensor. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Turbine Speed Sensor>INSTALLATION.
- **24.** Install the transmission harness. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transmission Harness>INSTALLATION.
- **25.** Install the control valve body. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Control Valve Body>INSTALLATION.
- **26.** Install the air breather hose. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Air Breather Hose>INSTALLATION.
- **27.** Install the transmission assembly to the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Automatic Transmission Assembly>INSTALLATION.

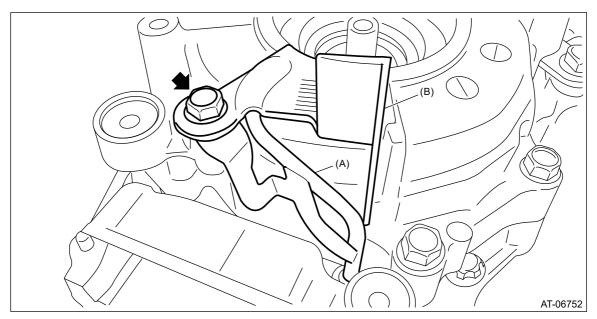
CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Reverse Brake Assembly

REMOVAL

- 1. Remove the transmission assembly from the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Automatic Transmission Assembly>REMOVAL.
- **2.** Remove the air breather hose. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Air Breather Hose>REMOVAL.
- **3.** Remove the control valve body. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Control Valve Body>REMOVAL.
- **4.** Remove the transmission harness. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transmission Harness>REMOVAL.
- **5.** Remove the turbine speed sensor. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Turbine Speed Sensor>REMOVAL.
- **6.** Remove the secondary speed sensor. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Secondary Speed Sensor>REMOVAL.
- **7.** Remove the primary speed sensor. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Primary Speed Sensor>REMOVAL.
- **8.** Remove the inhibitor switch. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Inhibitor Switch>REMOVAL.
- **9.** Remove the extension case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Extension Case>REMOVAL.
- **10.** Remove the transfer clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transfer Clutch>REMOVAL.
- **11.** Remove the transfer driven gear assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transfer Driven Gear>REMOVAL.
- **12.** Remove the parking pawl. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Parking Pawl>REMOVAL.
- **13.** Remove the reduction driven gear assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Reduction Driven Gear>REMOVAL.
- **14.** Remove the oil pan and oil strainer. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Oil Pan and Strainer>REMOVAL.
- **15.** Remove the transmission control device. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transmission Control Device>REMOVAL.
- **16.** Remove the transmission case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transmission Case>REMOVAL.
- **17.** Remove the reduction drive gear. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Reduction Drive Gear>REMOVAL.
- **18.** Remove the primary pulley, secondary pulley and variator chain. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Primary Pulley and Secondary Pulley>REMOVAL.
- 19. Remove the manual valve assembly.

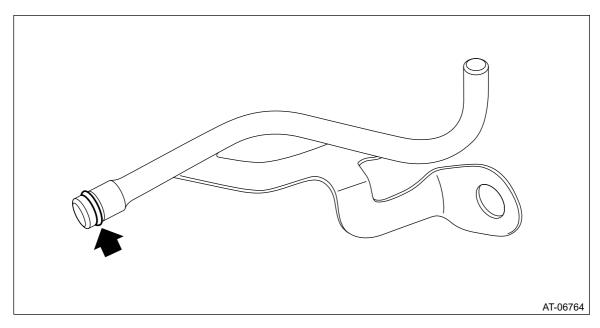


20. Remove the oil guide and lubrication pipe.

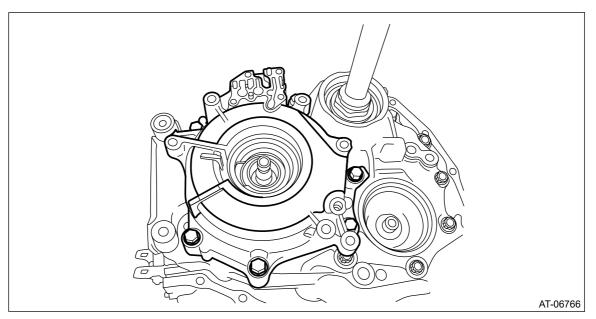


- (A) Lubrication pipe
- (B) Oil guide

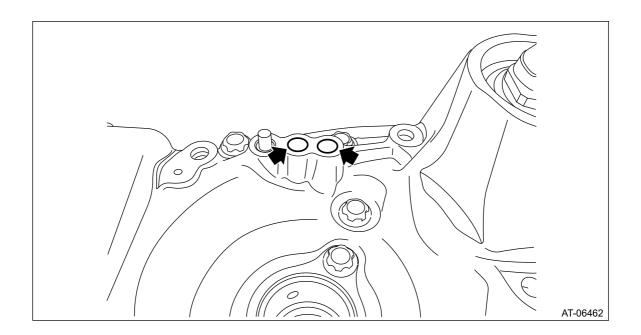
21. Remove the O-ring from lubrication pipe.



22. Remove the reverse brake assembly.



23. Remove the O-ring.



INSPECTION

Note:

For models with X mode switch, turn OFF the switch for inspection.

1. GENERAL PRECAUTION

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

Caution:

Always observe the local traffic laws when performing the test.

2. D RANGE SHIFT FUNCTION

Make sure that the engine speed is 1,000-1,300 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. Then stop the vehicle. Check normal gear change has occurred while the vehicle speed changes from a constant speed to zero.

3. KICK-DOWN FUNCTION

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

4. ENGINE BRAKE OPERATION

• MODEL WITH MANUAL MODE

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

• MODEL WITHOUT MANUAL MODE

Drive in D range at [50 - 60 km/h (31 - 37 MPH)], and shift to "L" range. Check if the indicator of combination meter switches "D" \rightarrow "L". At the same time, check the engine brake in L range.

5. LOCK-UP FUNCTION

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

6. P RANGE OPERATION

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

7. NOISE AND VIBRATION

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

8. OIL LEAKAGE

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

CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Secondary Pressure (Line Pressure) Test

INSPECTION

Caution:

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

Note:

- If the pulley and variator chain, clutch or brake show signs of slipping or shift feel is not correct, check the secondary pressure (line pressure).
- Connect Subaru Select Monitor to vehicle so as to measure the engine speed and actual secondary pressure (secondary pressure (line pressure)).
- In many cases, slippage or inability to operate the vehicle may be due to insufficient oil pressure for the operation of clutch, brake or control valve.
- 1. Lift up the vehicle.
- 2. Remove the secondary pressure (line pressure) test plug, and install ST1 and ST2.

Caution:

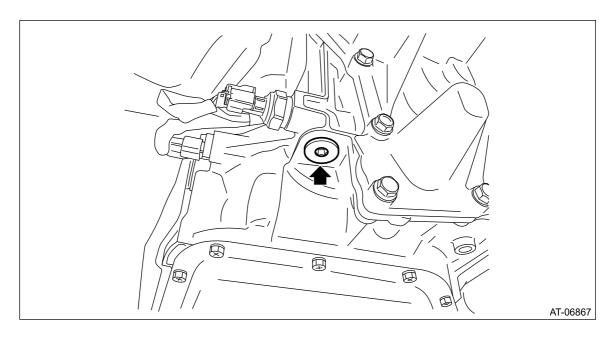
Removal of the test plug and installation of the ST shall be both performed quickly.

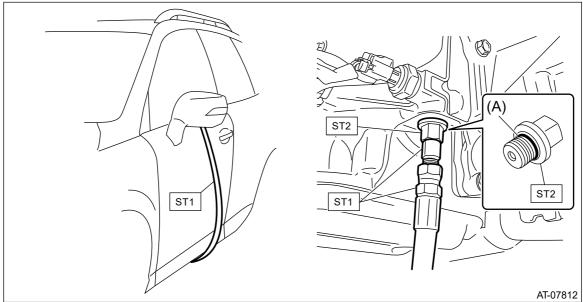
Note:

Use ST2 PRESSURE GAUGE ADAPTER with genuine O-ring (Part No. 806916050) attached.

ST1 18801AA000 OIL PRESSURE GAUGE ASSY

ST2 18681AA010 PRESSURE GAUGE ADAPTER





(A) O-ring (genuine part)

- 3. Lower the vehicle.
- 4. Set the gauge so that it can be seen from the driver's seat.
- 5. Using the Subaru Select Monitor, check if the throttle valve operates when you depress the accelerator pedal. Ref. to ENGINE (DIAGNOSTICS)(H4DO)>Subaru Select Monitor>OPERATION > FREEZE FRAME DATA.
- 6. Check the engine oil level. Ref. to LUBRICATION(H4DO)>Engine Oil.
- 7. Check the coolant level. Ref. to COOLING(H4DO)>Engine Coolant.
- **8.** Adjust the CVTF level. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>CVTF>ADJUSTMENT.
- **9.** Increase the CVTF temperature to $60 80^{\circ}\text{C}$ (140 176°F) with the engine running and the select lever shifted to "N" or "P" range.
- 10. Hold down the pre-collision brake OFF switch to turn OFF the pre-collision brake function.

(With EyeSight)

- 11. Shift the select lever to "D" range.
- **12.** Depress the accelerator pedal to the full while fully depressing the foot brake pedal with your left foot.
- 13. Immediately after the engine speed becomes steady, record the reading of the secondary pressure (line pressure), engine speed and actual secondary pressure on Subaru Select Monitor. And then release the accelerator pedal. Shift the select lever to "N" range. Let the engine idle for one minute or more to cool it down.

Note:

- Do not continue the stall test for 5 seconds or more at a time (from fully closed throttle, fully open throttle to secondary pressure (line pressure) reading). Failure to follow this instruction will cause the engine oil and CVTF to deteriorate and the clutch and brake to be adversely affected.
- After performing the secondary pressure (line pressure) test, be sure to cool down the engine for at least one minute with the select lever set in "P" or "N" range and with the idle speed at 1,200 r/min or less.
- Under each condition, check that the measured pressure matches almost totally with actual secondary pressure.
- When both measured pressure and actual secondary pressure are out of specification, judge as control valve malfunction.
- The value at stall is for reference because the pressure changes under different conditions or circumstances.
- The value at idling is steady because it is not affected by any condition or circumstance.
- When the engine is started with the select lever in the "P" range and the secondary pressure at idling is measured without shifting the select lever, the value may be higher than the standard. Shift the select lever to the "D" or "R" range, then measure the value.

	Secondary pressure (line pressure) standard				
	Range	Throttle	Brake	Secondary pressure (line pressure) (MPa (kgf/cm², psi))	
Stall	D, R	Full open	ON	4.5 — 6.0 (45.9 — 61.2, 652 — 870)	
Idling	P, N	Full closed	OFF	0.5 — 1.5 (5.1 — 15.3, 72 — 218)	

14. Remove the ST and install the plug after measurement.

Caution:

Removal of the ST and installation of the test plug shall be both performed quickly.

Note:

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

Tightening torque:

50 N·m (5.1 kgf-m, 36.9 ft-lb)

15. Adjust the CVTF level. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>CVTF>ADJUSTMENT.

CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Secondary Pressure Sensor

INSPECTION

- 1. Start and warm up the engine.
- **2.** Depress the brake pedal, and shift the select lever to "D" range.
- **3.** Shift the select lever to "P" or "N" range.
- 4. Depress the brake pedal and hold it.
- 5. Check "secondary pressure sensor voltage" by using Subaru Select Monitor while the engine is idling. Ref. to TRANSMISSION (DIAGNOSTICS)>Subaru Select Monitor>OPERATION.
 Standard

Approx. 0.8 V

6. Check "secondary pressure sensor voltage" by using Subaru Select Monitor while the engine is stopped and the ignition switch is turned on. Ref. to TRANSMISSION (DIAGNOSTICS)>Subaru Select Monitor>OPERATION.

Specification:

Approx. 0.5 V

CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Secondary Pressure Sensor

Caution:

INSTALLATION

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

Install in the reverse order of removal.

Note:

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

Tightening torque:

Secondary pressure sensor

39 N•m (4.0 kgf-m, 28.8 ft-lb)

Under cover front - transmission

18 N•m (1.8 kgf-m, 13.3 ft-lb)

CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Secondary Pressure Sensor REMOVAL

Caution:

- Be sure to prevent water or oil from contacting the connector terminal of secondary pressure sensor. If adhesion occurs, replace with a new part.
- When secondary pressure sensor is removed, CVTF leaks. After installing the secondary pressure sensor, adjust the CVTF level.
- 1. Disconnect the ground cable from battery. <a> Ref. to NOTE>NOTE > BATTERY.

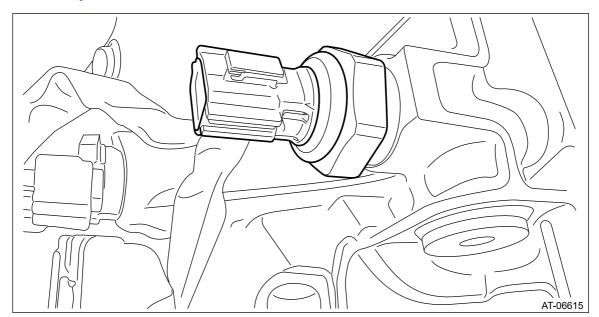
Note:

For model with battery sensor, disconnect the ground terminal from battery sensor.

- 2. Lift up the vehicle.
- 3. Remove the under cover front transmission.
- **4.** Remove the secondary pressure sensor connector.
- **5.** Remove the secondary pressure sensor.

Note:

Use TONE 3/8 6-point 27 mm (manufacturer product No. 3SEN-27) deep socket or equivalent.



CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Secondary Speed Sensor

INSPECTION

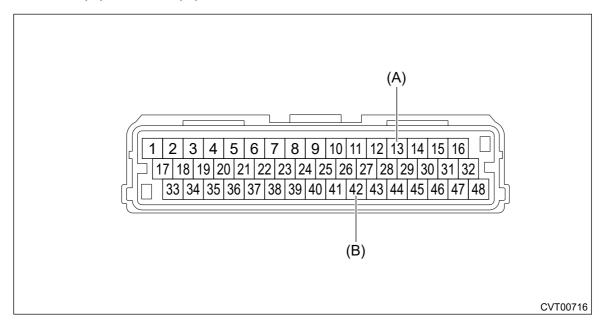
1. Set the ST between the TCM and bulkhead harness. Ref. to TRANSMISSION (DIAGNOSTICS)>General Description>CAUTION.

ST 18460AA040 CHECK BOARD

2. Set the probe of oscilloscope to the check board connector.

Terminals

No. 13
$$(+)$$
 — No. 42 $(-)$:



- (A) + probe
- (B) probe
- 3. Start and warm up the engine.
- **4.** Lift up the vehicle.

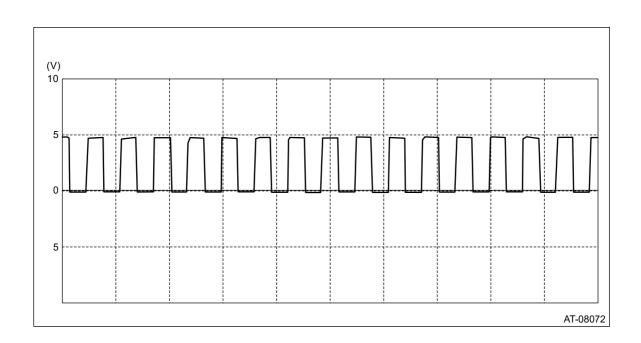
Caution:

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

- 5. Shift the select lever to "D" range.
- **6.** Check the waveform and output voltage of the secondary speed sensor with engine idling.

Note:

The waveform cycle changes as the speed changes.



CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Secondary Speed Sensor INSTALLATION

Caution:

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

Install in the reverse order of removal.

Note:

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

Tightening torque:

Secondary speed sensor

7 N·m (0.7 kgf-m, 5.2 ft-lb)

Under cover front - transmission

18 N·m (1.8 kgf-m, 13.3 ft-lb)

CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Secondary Speed Sensor REMOVAL

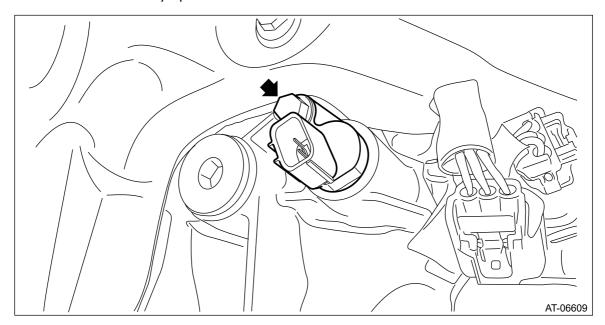
Caution:

- Be sure to prevent water or oil from contacting the connector terminal of secondary speed sensor. If adhesion occurs, replace with a new part.
- When secondary speed sensor is removed, CVTF leaks. After installing the secondary speed sensor, adjust the CVTF level.
- 1. Disconnect the ground cable from battery. Ref. to NOTE>NOTE > BATTERY.

 Note:

For model with battery sensor, disconnect the ground terminal from battery sensor.

- 2. Lift up the vehicle.
- 3. Remove the under cover front transmission.
- **4.** Remove the harness connector from secondary speed sensor.
- **5.** Remove the secondary speed sensor.



CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Stall Test

INSPECTION

Caution:

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

Note

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

Purposes of the stall test:

- · Operational check of forward clutch and reverse brake
- Operational check of the torque converter assembly
- Engine performance check
- 1. Place wheel chocks at the front and rear of all wheels and engage the parking brake.
- 2. Turn the A/C OFF.
- 3. Using the Subaru Select Monitor, check if the throttle valve operates when you depress the accelerator pedal.

 Ref. to ENGINE (DIAGNOSTICS)(H4DO)>Subaru Select Monitor>OPERATION > FREEZE FRAME DATA.
- 4. Check the engine oil level. Ref. to LUBRICATION(H4DO)>Engine Oil.
- **5.** Check the coolant level. Ref. to COOLING(H4DO)>Engine Coolant.
- 6. Adjust the CVTF level. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>CVTF>ADJUSTMENT.
- 7. Increase the CVTF temperature to $60-80^{\circ}\text{C}$ (140 176°F) with the engine running and the select lever shifted to "N" or "P" range.
- 8. Hold down the pre-collision brake OFF switch to turn OFF the pre-collision brake function. (With EyeSight)
- 9. Shift the select lever to "D" range.
- 10. Depress the accelerator pedal to the full while fully depressing the foot brake pedal with your left foot.
- **11.** When the engine speed stabilizes, quickly record the engine speed and release accelerator pedal. Shift the select lever to "N" range. Let the engine idle for one minute or more to cool it down.
- 12. Shift to "R" range and perform the same stall test.

Note:

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

D range: 2,000 - 2,750r/min R range: 1,900 - 2,650 r/min

Stall test judgment

Range	Range	Probable cause
Lower than standard value	D, R	Insufficient engine outputTorque converter malfunction
Higher than standard value	D	Forward clutch slippageSecondary pressure (line pressure) is low.Variator chain malfunction
	R	Reverse brake slippageSecondary pressure (line pressure) is low.Variator chain malfunction
	D, R	Torque converter malfunctionControl valve body malfunctionTCM malfunction

Damaged harness and harness	connector

CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Time Lag Test

INSPECTION

Note:

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

- Perform the test at normal operation CVTF temperature of $60-80^{\circ}\text{C}$ (140 176°F).
- Be sure to allow one minute or more interval between tests.
- Make three measurements and take the average value.
- **1.** [Apply the parking brake.]
- **2.** Start the engine. Check the idle speed. (A/C OFF)
- **3.** Shift the select lever from "N" to "D" range. Using a stop watch, measure the time elapsed from shifting the lever until the shock is felt.

Time lag standard:

1.5seconds or less

If "N" \rightarrow "D" time lag is longer than specified:

- Secondary pressure (line pressure) is too low.
- · Forward clutch worn
- Forward clutch piston malfunction
- · Control valve body malfunction
- · Learning incomplete
- 4. In the same manner, measure the time lag when shifting from "N" range to "R" range.

Time lag standard:

1.5seconds or less

If "N" \rightarrow "R" time lag is longer than specified:

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

CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Torque Converter Assembly

INSPECTION

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

CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Torque Converter Assembly

INSTALLATION

1. Install the O-ring to the input shaft.

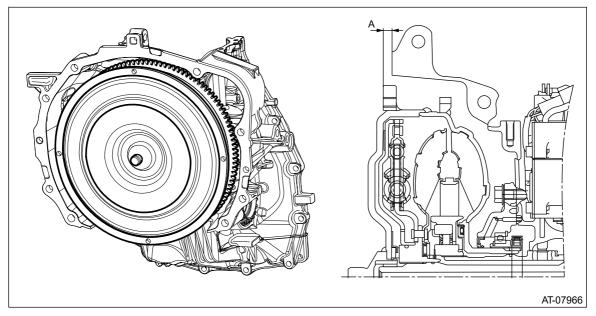
Note:

- Use new O-rings.
- Apply CVTF to the O-ring.
- 2. While holding the torque converter assembly by hand, carefully install it into the torque converter case.

Note:

- Apply CVTF to the oil seal lip.
- Do not damage the oil seal and O-ring.
- **3.** Engage the splines while gently rotating the torque converter assembly by hand, and securely insert the assembly.
- **4.** Measure depth "A", from converter case end surface to drive plate contacting surface. **Standard (reference):**

6.8 mm (0.268 in) or less



5. Install the transmission assembly to the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Automatic Transmission Assembly>INSTALLATION.

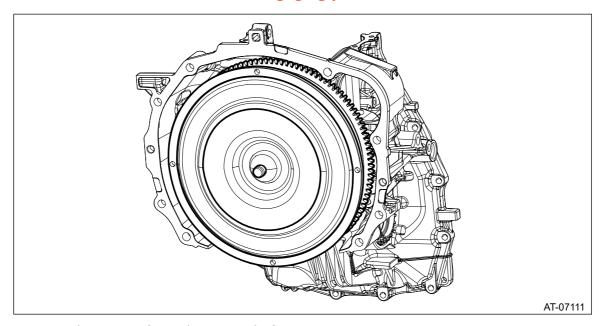
CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Torque Converter Assembly

REMOVAL

- **1.** Remove the transmission assembly from the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Automatic Transmission Assembly>REMOVAL.
- **2.** Pull out the torque converter assembly horizontally.

Caution:

Do not scratch the inside of engaging parts.



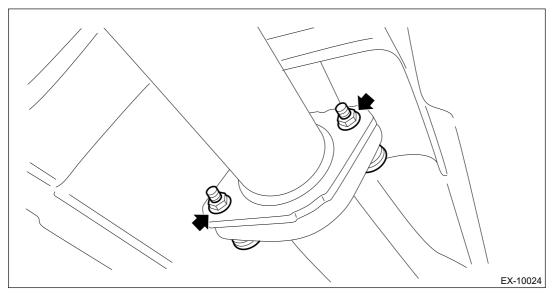
3. Remove the O-ring from the input shaft.

CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Transfer Clutch Pressure Test

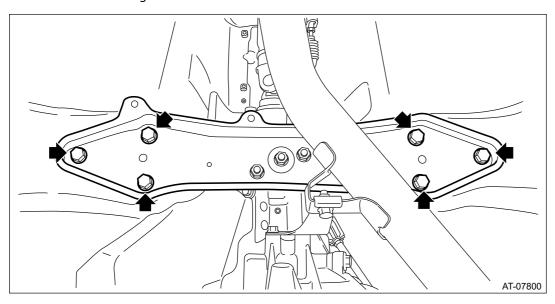
INSPECTION

Caution:

- Directly after the vehicle has been running or the engine has been idling for a long time, the CVTF is hot. Be careful not to burn yourself.
- Make sure no other person is around the vehicle during transfer clutch pressure test measurement.
- 1. Lift up the vehicle.
- 2. Remove the under cover front transmission. (With under cover front transmission)
- **3.** Remove the rear exhaust pipe from center exhaust pipe.

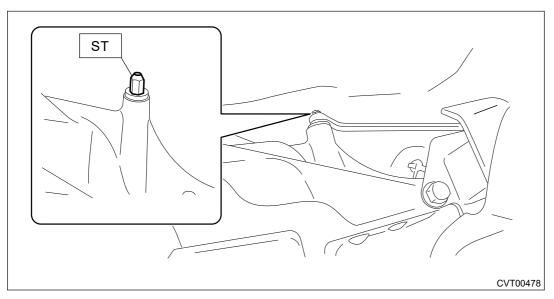


- 4. Remove the center exhaust cover.
- **5.** Set the transmission jack under the transmission.
- 6. Remove the mounting bolt of rear crossmember.



- 7. Lower the rear side of transmission until the transfer clutch pressure test plug can be removed.
- **8.** Using the ST, remove the transfer clutch pressure test plug.

ST 18270AA040 SOCKET



9. Set the ST1, ST2, ST3 and ST4 to the transmission.

Note:

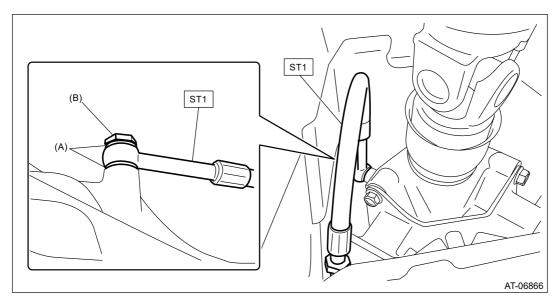
- Use ST1 ADAPTER HOSE B with genuine union screw (Part No. 801914010) and gasket (Part No. 803914060) attached.
- Use ST3 PRESSURE GAUGE ADAPTER with genuine O-ring (Part No. 806911080) attached.

ST1 34099AC020 ADAPTER HOSE B

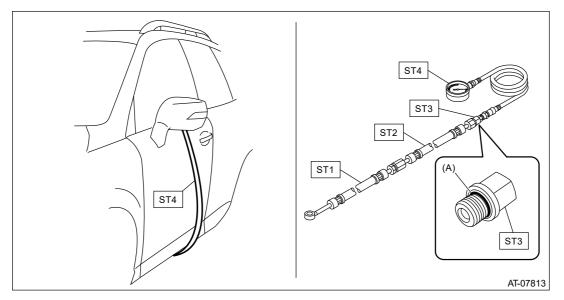
ST2 34099AC010 ADAPTER HOSE A

ST3 18681AA000 PRESSURE GAUGE ADAPTER

ST4 498575400 OIL PRESSURE GAUGE ASSY



- (A) Gasket (genuine part)
- (B) Union screw (genuine part)

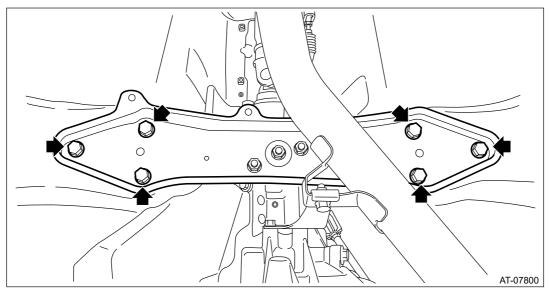


(A) O-ring (genuine part)

10. Raise the transmission, and install the rear crossmember.

Tightening torque:

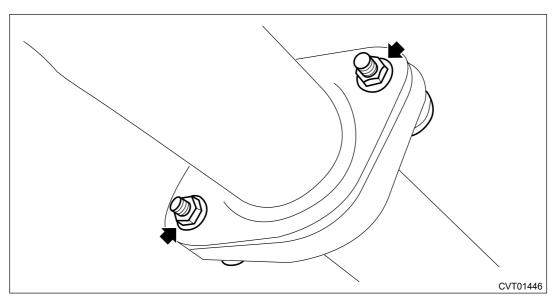
70 N·m (7.1 kgf-m, 51.6 ft-lb)



11. Install the rear exhaust pipe to center exhaust pipe.

Tightening torque:

18 N·m (1.8 kgf-m, 13.3 ft-lb)



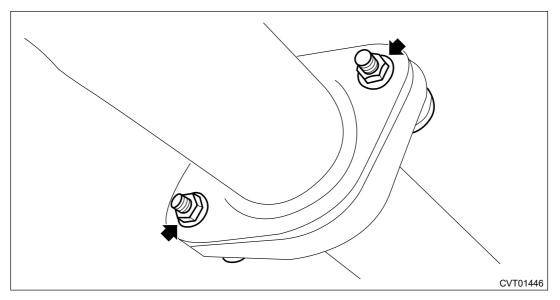
12. Lower the vehicle.

Note:

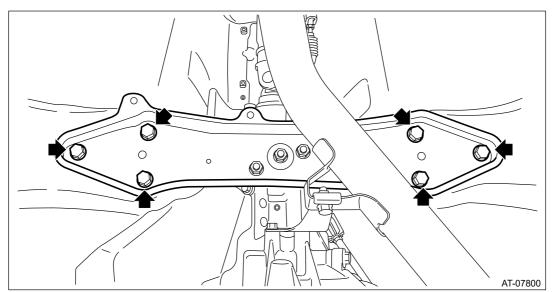
- 13. Connect the Subaru Select Monitor to the data link connector and read the current data.
- 14. Check the transfer clutch pressure as in secondary pressure (line pressure) test. Ref. to
 Secondary Pressure (Line Pressure) Test.">Line Pressure) Test.
 - For models with X mode switch, turn OFF the switch for inspection.
 - Use Subaru Select Monitor for switching to FWD mode. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>AWD ON/OFF Switching Mode.
 - If no oil pressure is produced, if it does not change in AWD mode or if oil pressure is produced in FWD mode, there may be a problem in the control valve body.

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

- 15. Lift up the vehicle.
- **16.** Remove the rear exhaust pipe from center exhaust pipe.



- 17. Set the transmission jack under the transmission.
- 18. Remove the mounting bolt of rear crossmember.



- 19. Lower the rear side of transmission to the position where the ST can be removed.
- 20. Remove the ST.
- **21.** Install the test plug using ST1 and ST2.

Note:

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

ST1 18270AA040 SOCKET

ST2 73099SG000 SPECIAL TOOL CONDENSER

Tightening torque:

Calculation formula

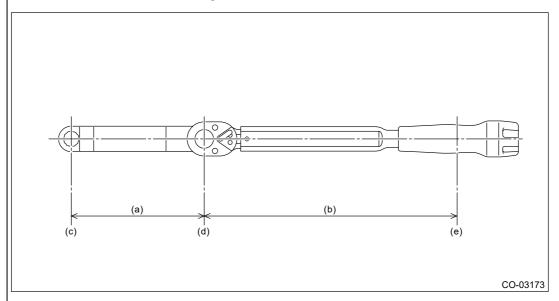
 $T = L/(100 \text{ mm} (3.94 \text{ in}) + L) \times 22 \text{ N·m} (2.2 \text{ kgf-m}, 16.2 \text{ ft-lb})$

T: Tightening torque

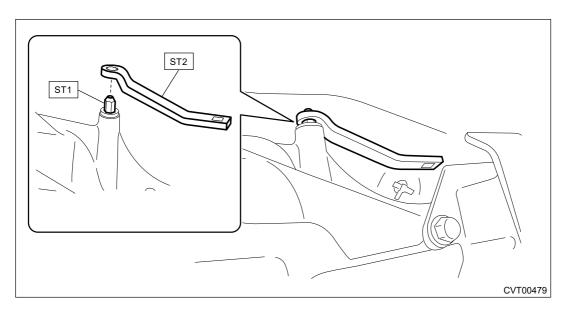
L: Effective length of torque wrench

Note:

If the effective length of the torque wrench used is unknown, consult the manufacturer of the torque wrench.



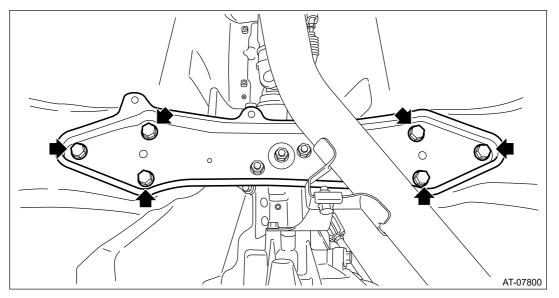
- (a) Effective length of the ST2
- (b) Effective length of the torque wrench
- (c) Center of drive angle of the ST2
- (d) Center of drive angle of the torque wrench
- (e) Center of the position where a force is applied by hand



22. Raise the transmission, and install the rear crossmember.

Tightening torque:

70 N·m (7.1 kgf-m, 51.6 ft-lb)



23. Install the center exhaust cover.

Tightening torque:

18 N·m (1.8 kgf-m, 13.3 ft-lb)

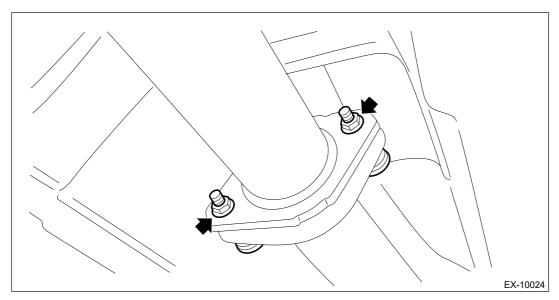
24. Install the rear exhaust pipe to center exhaust pipe.

Note:

Use a new gasket.

Tightening torque:

18 N·m (1.8 kgf-m, 13.3 ft-lb)



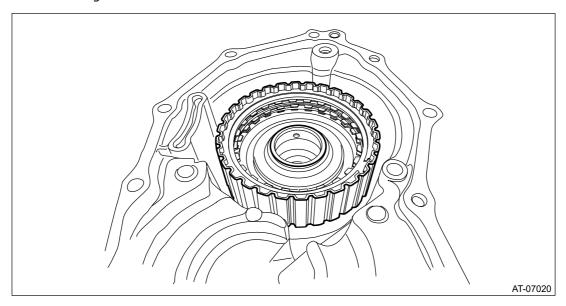
25. Install the under cover front - transmission. (With under cover front - transmission) **Tightening torque:**

18 N·m (1.8 kgf-m, 13.3 ft-lb)

26. Lower the vehicle.

ADJUSTMENT

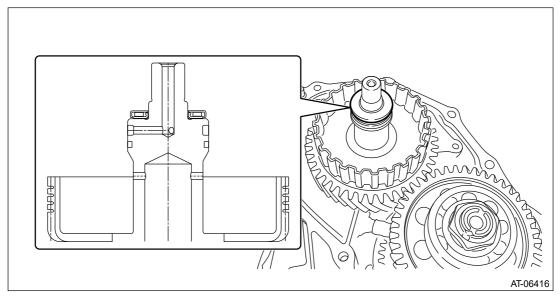
1. Install the transfer clutch assembly to the extension case with the transfer driven gear shims and thrust bearings removed.



2. Install the thrust bearing to the transfer driven gear.

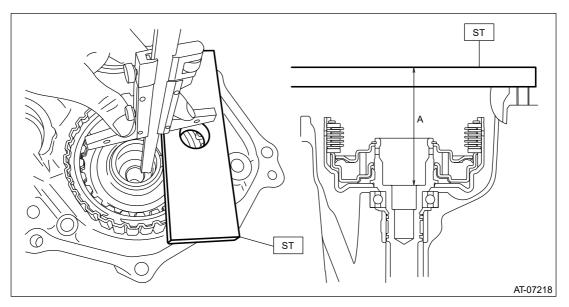
Note:

Make sure to install in the right direction.



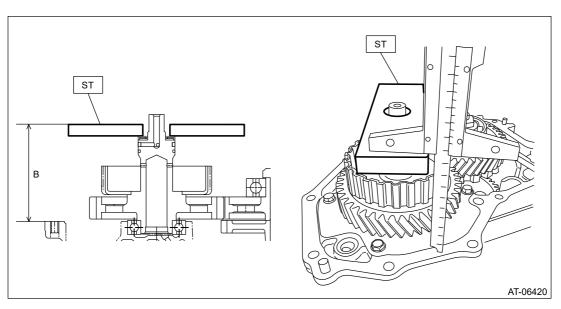
3. Using the ST, measure the height "A" from the ST end face to the thrust bearing catch surface of the transfer clutch assembly.

ST 499575500 GAUGE



4. Using the ST, measure the height "B" from the transmission case mating surface to the end of ST.

ST 499575500 GAUGE



5. Obtain the thickness of transfer driven gear shim using the following formula to select one to three transfer driven gear shims.

T mm = A - B - (0.05 - 0.25)

[T in = A - B - (0.002-0.01)]

T: Transfer driven gear shim thickness

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

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

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

Transfer driven gear shim				
Part No.	Thickness mm (in)			
33280AA030	0.3 (0.012)			
33280AA040	0.4 (0.016)			
33280AA050	0.5 (0.020)			

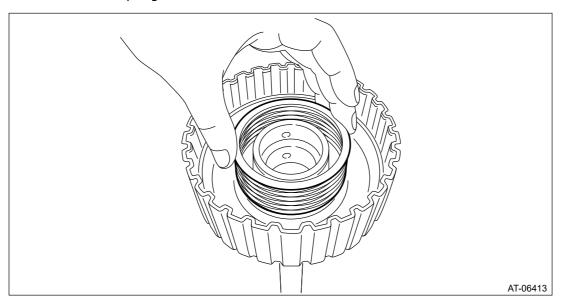
ASSEMBLY

1. Install the transfer clutch piston.

Note:

Apply CVTF to the transfer clutch piston lip.

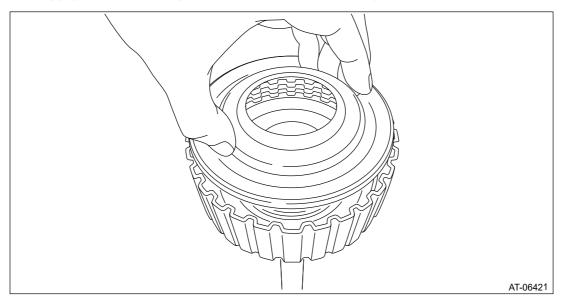
2. Install the return spring.



3. Install the transfer clutch piston seal.

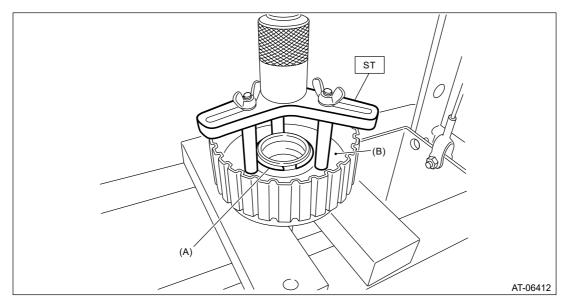
Note:

Apply CVTF to the lip section of transfer clutch piston seal.

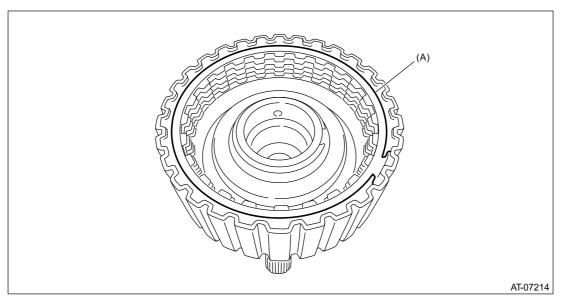


4. Compress the return spring using the ST to install the snap ring.

ST 18762AA001 COMPRESSOR SPECIAL TOOL



- (A) Snap ring
- (B) Transfer clutch piston seal
- 5. Install the pressure plate, driven plate, drive plate and snap ring.

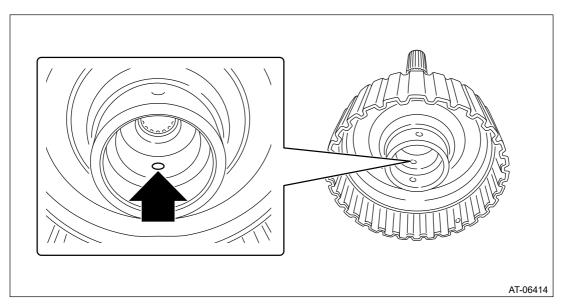


(A) Snap ring

6. Blow compressed air through transfer clutch assembly hole, and check the transfer clutch piston operation.

Note:

Plug the holes through which the compressed air is not blown.



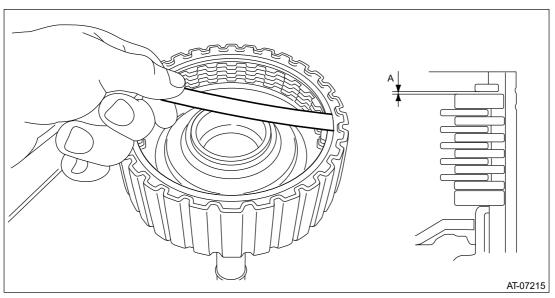
- **7.** Before measuring clearance "A", place same thickness shims on both sides to prevent the plate from tilting.
- **8.** When clearance "A" exceeds the limit for use, replace the drive plate and driven plate as a set, and select and adjust the pressure plate within the initial specified value.

Initial standard:

0.7-1.1 mm (0.028-0.043 in)

Limit thickness:

1.45 mm (0.057 in)



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

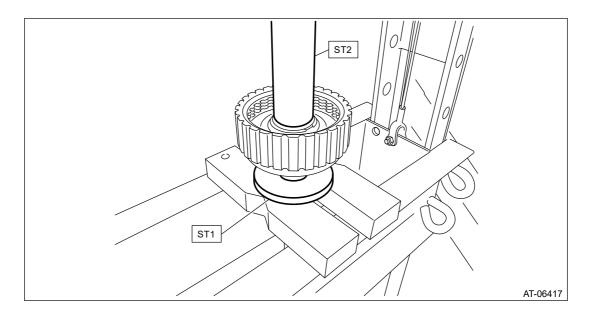
- **9.** Recheck the clearance. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transfer Clutch>INSPECTION.
- **10.** Using the ST, install the ball bearing.

Note:

Use a new ball bearing.

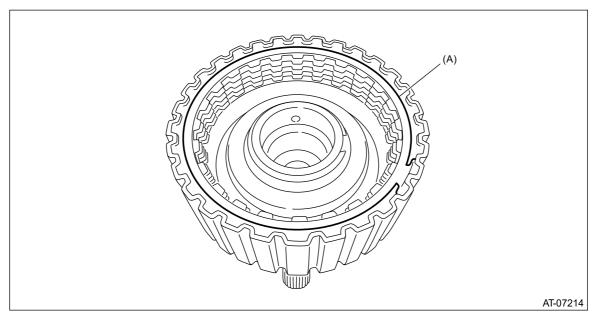
ST1 398177700 INSTALLER

ST2 499277000 INSTALLER



DISASSEMBLY

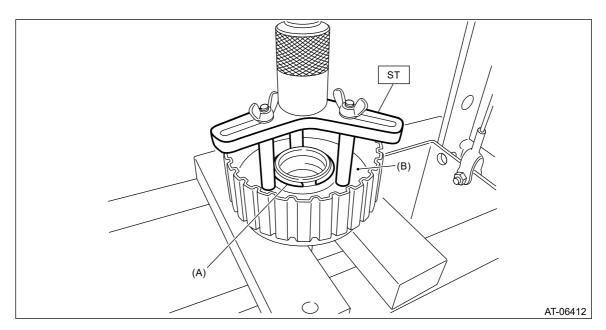
1. Remove the snap ring, and then remove the retaining plate, drive plate and driven plate.



(A) Snap ring

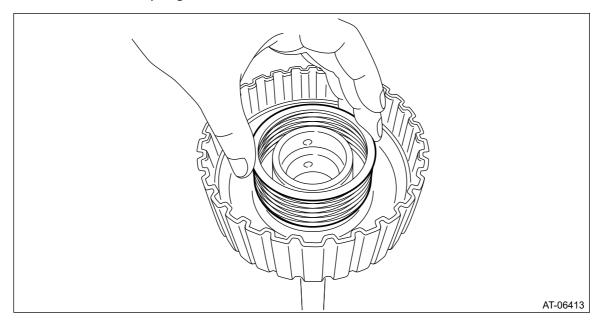
2. Compress the return spring using the ST to remove the snap ring.

ST 18762AA001 COMPRESSOR SPECIAL TOOL



- (A) Snap ring
- (B) Transfer clutch piston seal
- 3. Remove the transfer clutch piston seal.

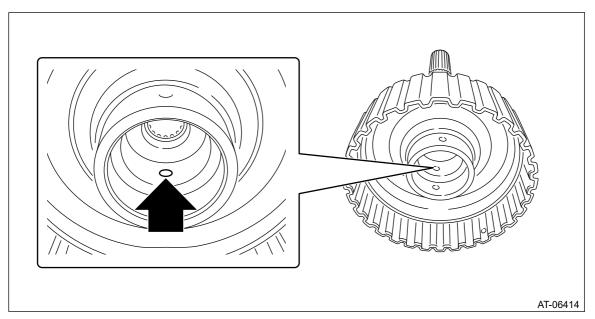
4. Remove the return spring.



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

Note:

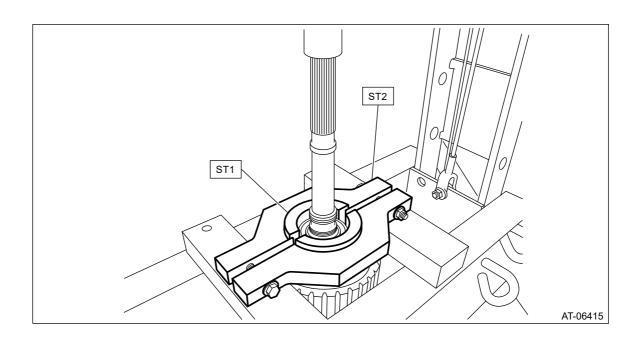
Plug the holes through which the compressed air is not blown.



6. Remove the ball bearing using ST.

ST1 18767AA010 BEARING REMOVER

ST2 18723AA000 REMOVER



INSPECTION

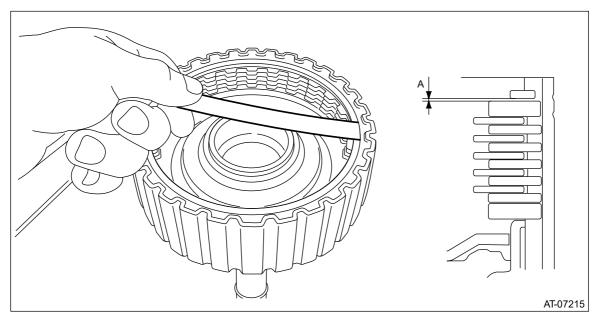
- Inspect the drive plate facing for wear and damage.
- Driven plate for discoloration (burned color)
- Make sure the snap ring is not worn and the return spring has no permanent distortion, damage, or deformation.
- Check the lip seal for damage.
- Inspect the extension end play, and adjust it to within the standard value. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transfer Clutch>ADJUSTMENT.
- 1. Before measuring clearance "A" between snap ring and driven plate, place same thickness shims on both sides to prevent the plate from tilting.
- 2. When clearance "A" exceeds the limit for use, replace the drive plate and driven plate as a set, and select the pressure plate within the initial specified value.

Initial standard:

0.7-1.1 mm (0.028-0.043 in)

Limit thickness:

1.45 mm (0.057 in)



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

Note:

For models with X MODE switch, turn OFF the switch for inspection.

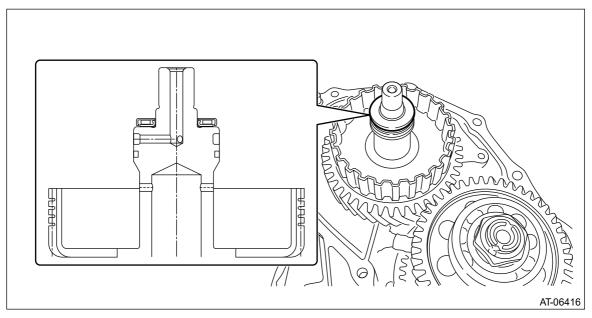
- (1) With the steering wheel held at fully turned position, drive the vehicle in "D" range and with vehicle speed at approx. 5 km/h (3 MPH) in both clockwise and counterclockwise directions for approx. ten times each, while repeating acceleration and braking intermittently.
- (2) If the tight corner braking phenomenon still persists, drive the vehicle again in a circle for several laps.

INSTALLATION

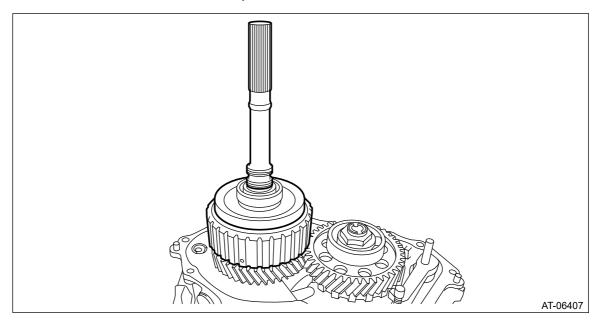
1. Install the thrust bearing.

Note:

Make sure to install in the right direction.



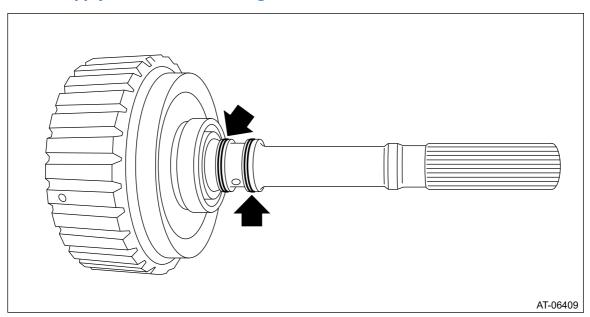
2. Install the transfer clutch assembly.



- **3.** Select the transfer driven gear shim. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transfer Clutch>ADJUSTMENT.
- 4. Attach the selected transfer driven gear shim to extension case with vaseline.
- 5. Remove the transfer clutch assembly.
- **6.** Install the seal ring to the transfer clutch assembly.

Note:

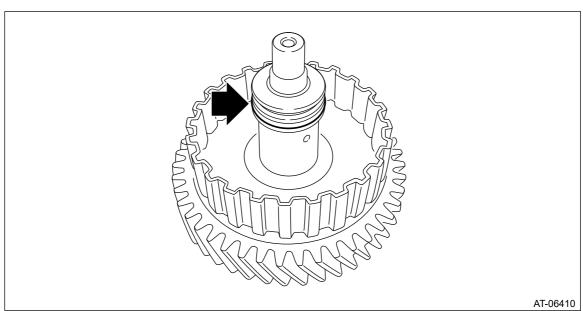
- Use a new seal ring.
- When installing the seal ring, do not expand the seal ring too much.
- Apply CVTF to the seal rings.



7. Install the seal ring to the transfer driven gear assembly.

Note:

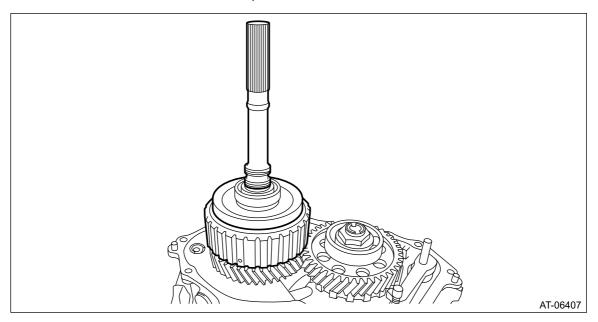
- Use a new seal ring.
- When installing the seal ring, do not expand the seal ring too much.
- Apply CVTF to the seal rings.



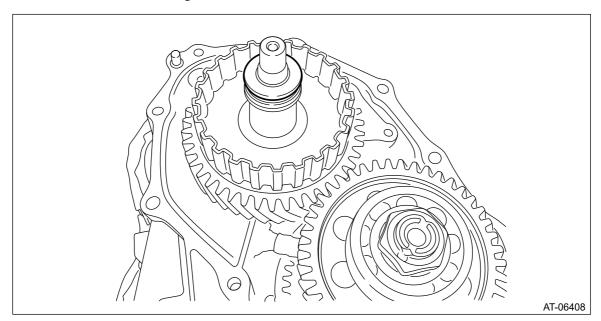
- **8.** Install the transfer clutch assembly.
- **9.** Install the extension case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Extension Case>INSTALLATION.
- **10.** Install the transmission assembly to the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Automatic Transmission Assembly>INSTALLATION.

REMOVAL

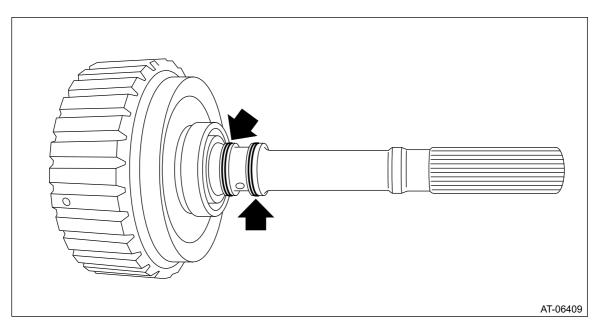
- **1.** Remove the transmission assembly from the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Automatic Transmission Assembly>REMOVAL.
- **2.** Remove the extension case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Extension Case>REMOVAL.
- 3. Remove the transfer clutch assembly.



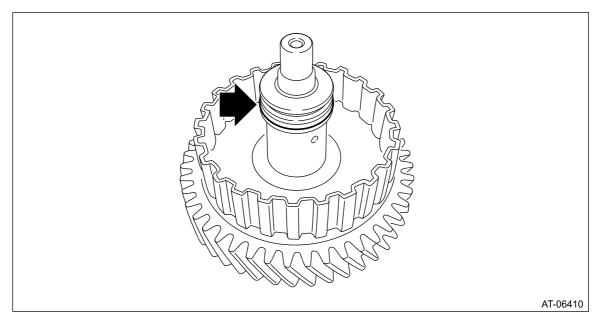
4. Remove the thrust bearing.



5. Remove the seal ring from transfer clutch assembly.



6. Remove the seal ring from the transfer driven gear assembly.



CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Transfer Driven Gear

ADJUSTMENT

Note:

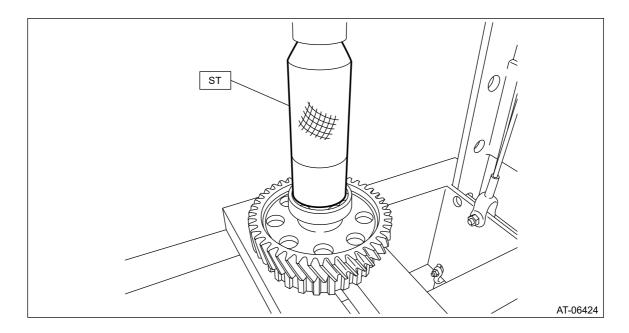
When the transfer driven gear or bearing is replaced, select the transfer driven gear shim. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transfer Clutch>ADJUSTMENT.

CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Transfer Driven Gear

ASSEMBLY

1. Using the ST, install the ball bearing.

ST 899580100 INSTALLER



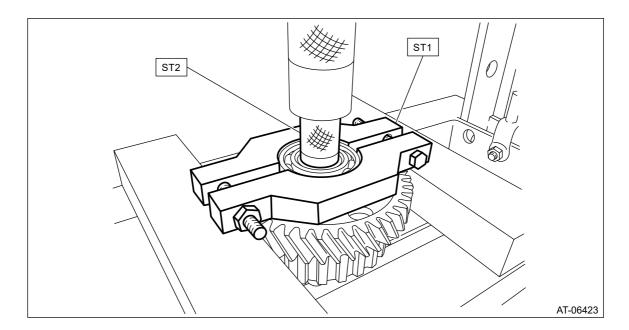
CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Transfer Driven Gear

DISASSEMBLY

1. Remove the ball bearing using ST.

ST1 498077400 REMOVER

ST2 899864100 REMOVER



CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Transfer Driven Gear

INSPECTION

- Check the ball bearing for smooth rotation.
- Check the ball bearing for excessive looseness.
- Check the transfer driven gear for breakage or damage.

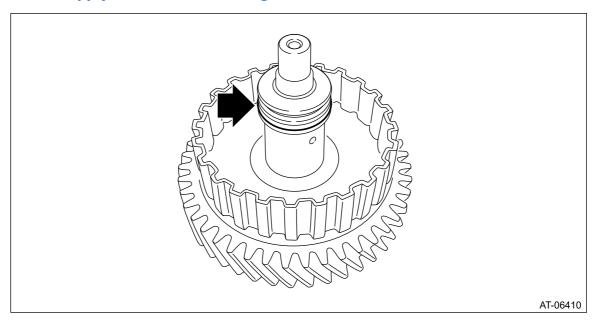
CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Transfer Driven Gear

INSTALLATION

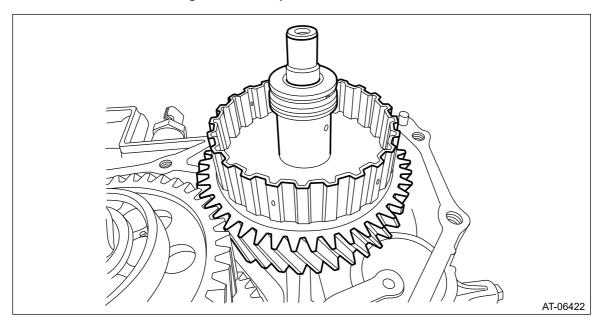
1. Install the seal ring to the transfer driven gear assembly.

Note:

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



2. Install the transfer driven gear assembly.



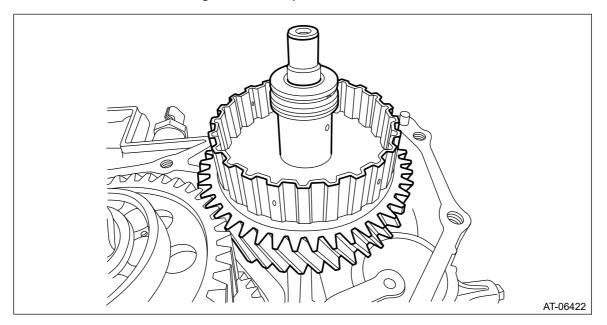
- **3.** Install the transfer clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transfer Clutch>INSTALLATION.
- **4.** Select the transfer driven gear shim. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transfer Clutch>ADJUSTMENT.

- **5.** Install the extension case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Extension Case>INSTALLATION.
- **6.** Install the transmission assembly to the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Automatic Transmission Assembly>INSTALLATION.

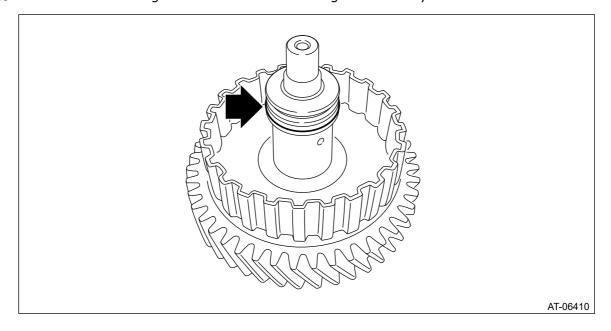
CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Transfer Driven Gear

REMOVAL

- **1.** Remove the transmission assembly from the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Automatic Transmission Assembly>REMOVAL.
- **2.** Remove the extension case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Extension Case>REMOVAL.
- **3.** Remove the transfer clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transfer Clutch>REMOVAL.
- 4. Remove the transfer driven gear assembly.



5. Remove the seal ring from the transfer driven gear assembly.



ADJUSTMENT

Note:

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

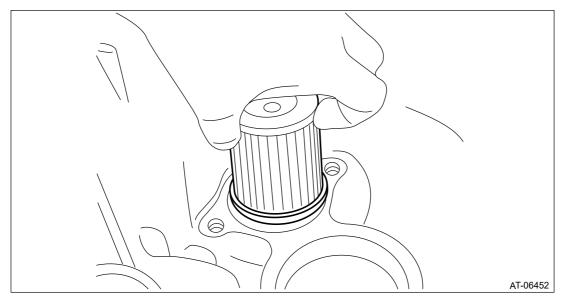
- Select the transfer driven gear shim. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transfer Clutch>ADJUSTMENT.
- Select the transfer drive gear shim. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Reduction Driven Gear>ADJUSTMENT.
- Select the reduction drive gear shim. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Reduction Drive Gear>ADJUSTMENT.

ASSEMBLY

1. Face the O-ring side of the CVTF filter to the transmission case side, and install the CVTF filter.

Note:

Apply CVTF to the O-ring of CVTF filter.



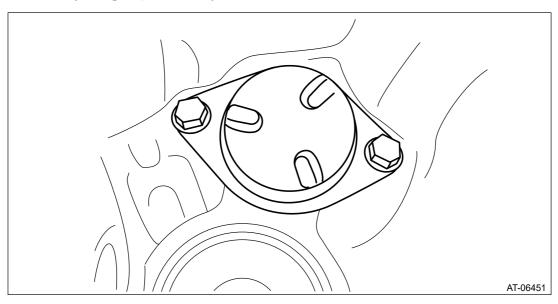
2. Install the CVTF filter cover and gasket.

Note:

Use a new gasket.

Tightening torque:

17 N·m (1.7 kgf-m, 12.5 ft-lb)

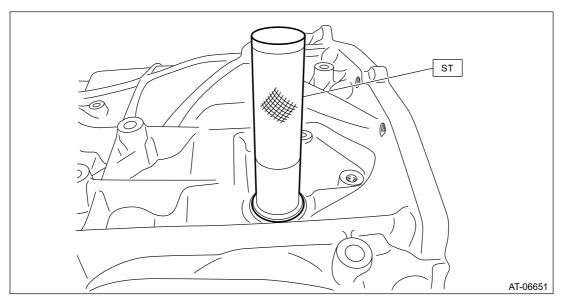


3. Using the ST, install the oil seal.

Note:

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

ST 18657AA000 INSTALLER



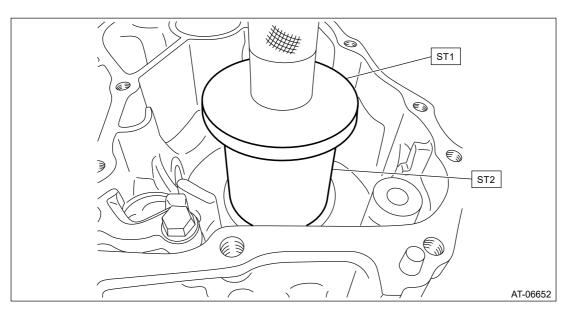
4. Using ST1 and ST2, install the ball bearing on the reduction driven gear side.

Note:

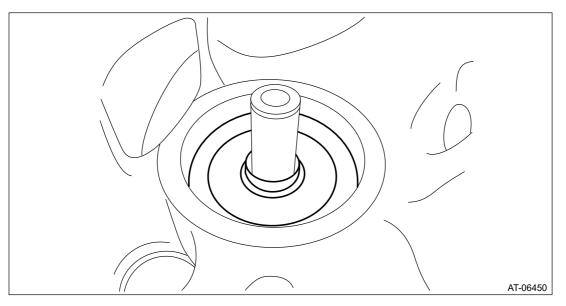
Use a new ball bearing.

ST1 398177700 INSTALLER

ST2 28499TC010 PRESS SNAP RING



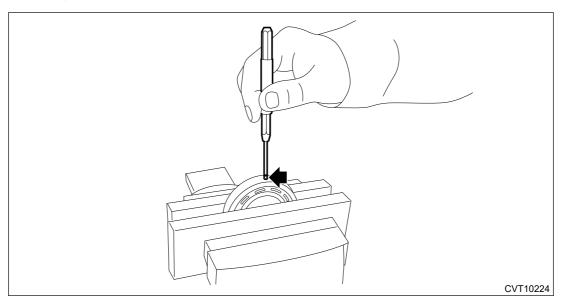
5. Install the oil guide.



- **6.** Press-fit the roll pin into the ball bearing on the secondary pulley side.
 - (1) Hold the roll pin using a knock pin punch, etc. and press-fit with a hummer.

Note:

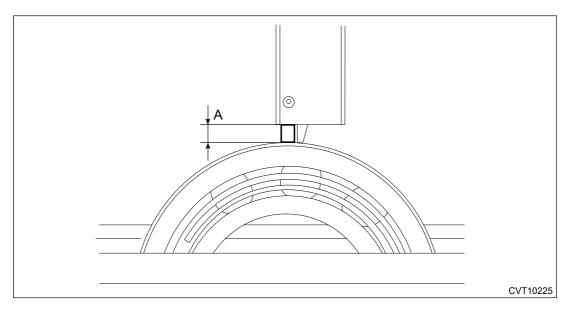
- Use a new ball bearing.
- When securing the ball bearing in a vise, place it between wooden blocks to protect the bearing race from damage.



(2) Measure the height "A" of the roll pin.

Standard (reference):

4.4 mm (0.173 in) or less



7. Using ST1, ST2 and ST3, install the ball bearing on the secondary pulley side.

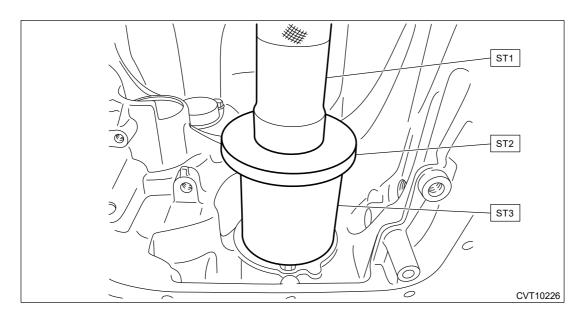
Note:

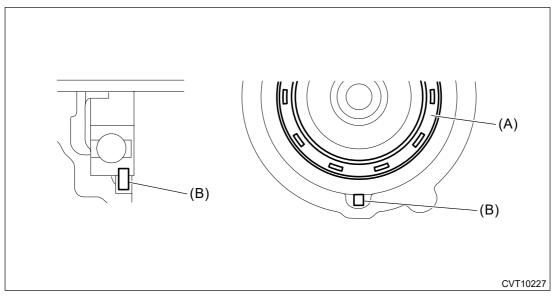
- Align the roll pin position with the cutout of the transmission case.
- Press-fit so that the pin faces forward (while the holding device can be seen from you).

ST1 499277100 BUSHING 1-2 INSTALLER

ST2 398177700 INSTALLER

ST3 28499TC010 PRESS SNAP RING





(A) Holding device

(B) Roll pin

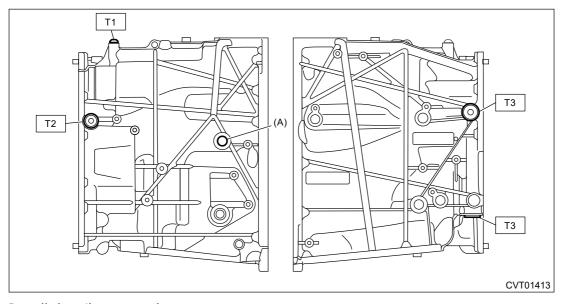
8. Install all plugs.

Note:

- Use new O-rings.
- Apply CVTF to the O-rings.
- For the plug (A), fill the CVTF, and then tighten the plug using a new O-ring.

Tightening torque:

T1: 13 N·m (1.3 kgf-m, 9.6 ft-lb) T2: 22 N·m (2.2 kgf-m, 16.2 ft-lb) T3: 50 N·m (5.1 kgf-m, 36.9 ft-lb)



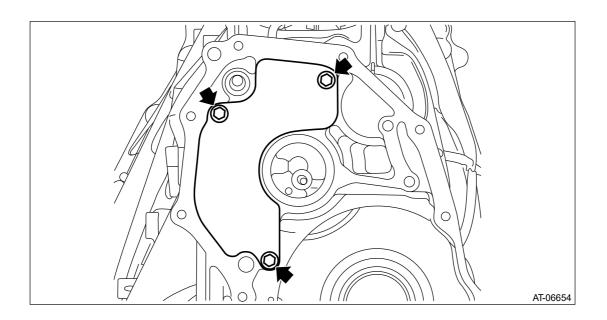
9. Install the oil stopper plate.

Note:

Use a new bolt.

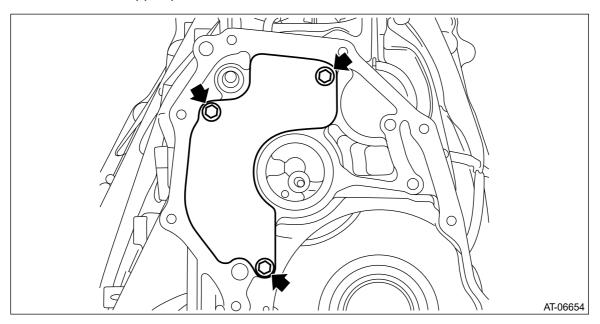
Tightening torque:

9 N·m (0.9 kgf-m, 6.6 ft-lb)

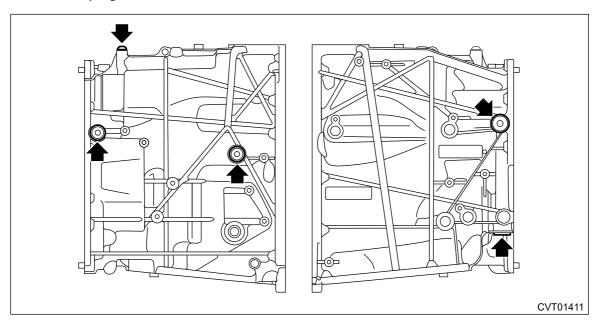


DISASSEMBLY

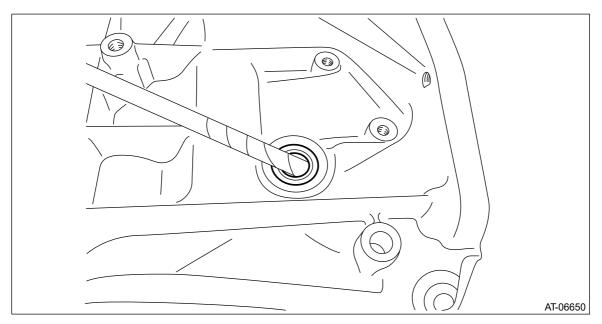
1. Remove the oil stopper plate.



2. Remove all plugs from the transmission case.



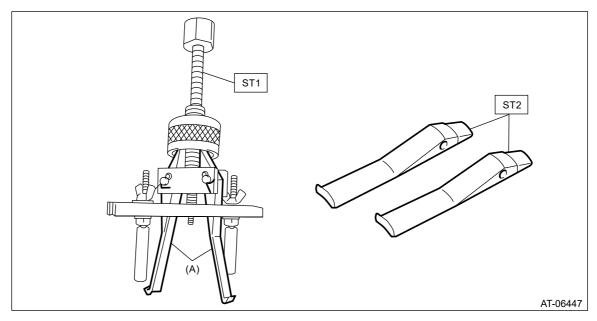
3. Remove the oil seal using a screwdriver wrapped with cloth etc.



- **4.** Using the ST, remove the ball bearing of the secondary pulley.
 - (1) Remove the claw of ST1, and attach the claw of ST2.

ST1 398527700 PULLER ASSY

ST2 18760AA000 CLAW

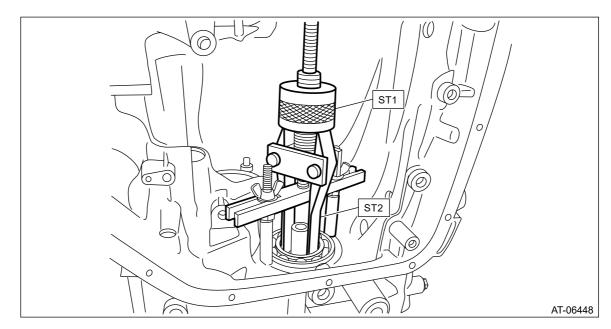


(A) Claw

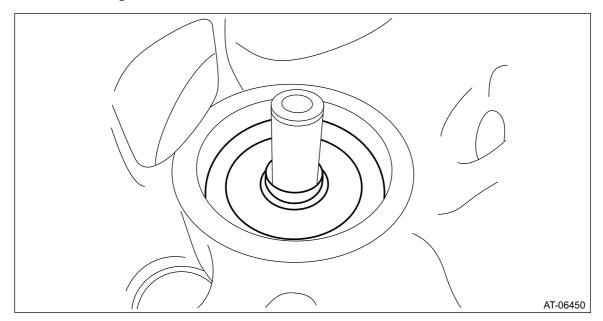
(2) Using the ST, remove the ball bearing of the secondary pulley.

ST1 398527700 PULLER ASSY

ST2 18760AA000 CLAW

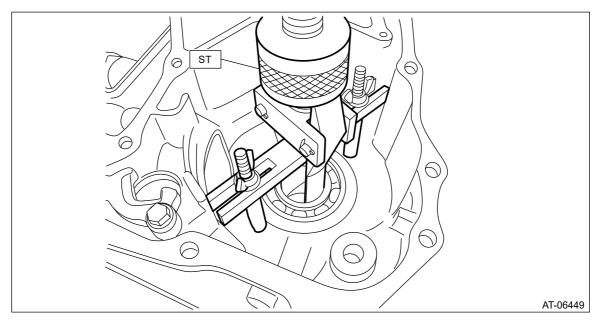


5. Remove the oil guide.

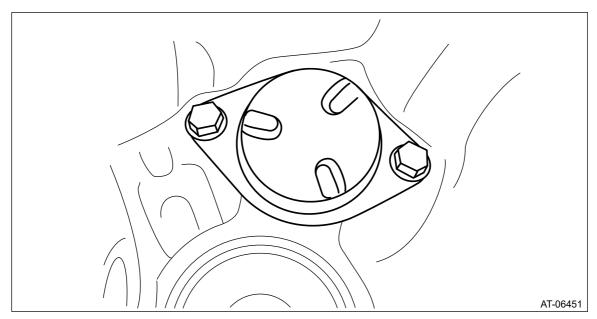


6. Remove the ball bearing from reduction driven gear using ST.

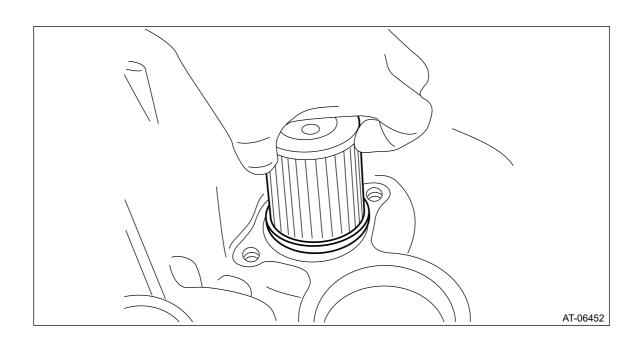
ST 398527700 PULLER ASSY



7. Remove the CVTF filter cover and gasket.



8. Remove the CVTF filter.



INSPECTION

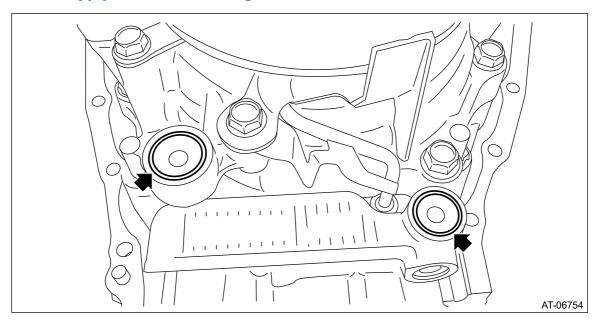
- Check the transmission case for damage.
- Check for leakage of CVTF from the connection between converter case and transmission case.
- Check the bearing for smooth operation.
- Check the bearing for seizure or wear.
- Check each part for damage.

INSTALLATION

- 1. Clean the mating surface of transmission case and converter case.
- **2.** Select the reduction gear shim. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Reduction Drive Gear>ADJUSTMENT.
- **3.** Remove the transmission case, and install the selected reduction gear shim to the reduction drive gear.
- **4.** Install the O-rings to the reverse clutch housing and drive pinion retainer.

Note:

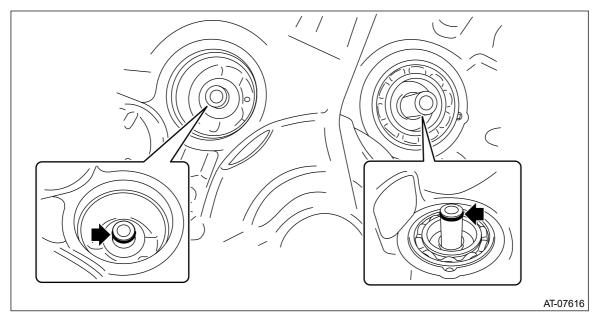
- Use new O-rings.
- Apply CVTF to the O-rings.



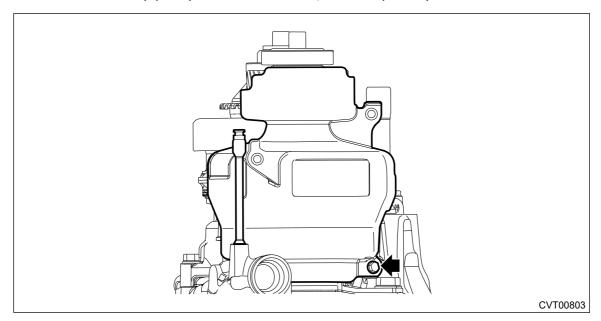
5. Install the seal ring to the transmission case.

Note:

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

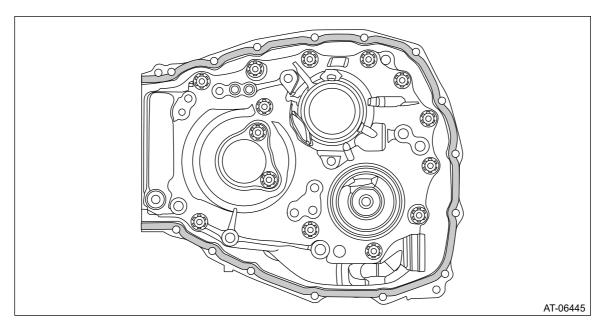


6. Cover the secondary pulley with the oil baffle, and temporarily install it with bolts.



7. Apply liquid gasket seamlessly to the mating surface of transmission case. Liquid gasket:

THREE BOND 1215B or equivalent



8. Install the transmission case.

Note:

The total number of transmission case mounting bolts is 15.

Tightening torque:

22 N•m (2.2 kgf-m, 16.2 ft-lb)

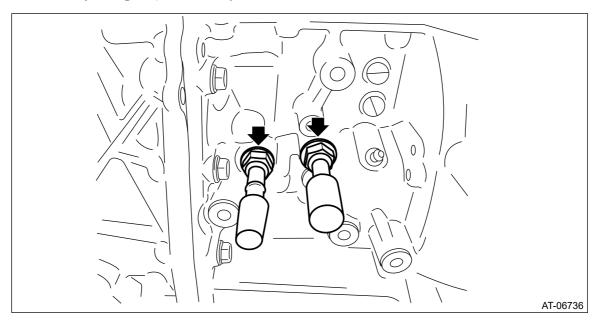
9. Install the oil cooler pipe.

Note:

Use new O-rings.

Tightening torque:

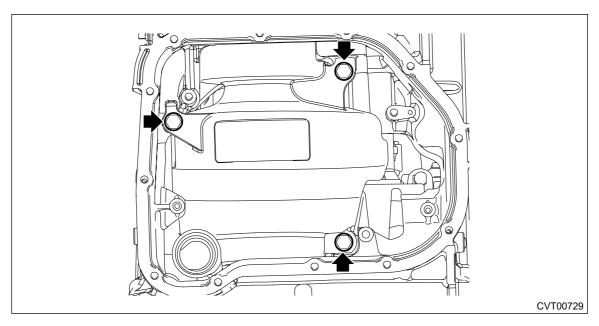
25 N•m (2.5 kgf-m, 18.4 ft-lb)



10. Install the oil baffle securing bolt.

Tightening torque:

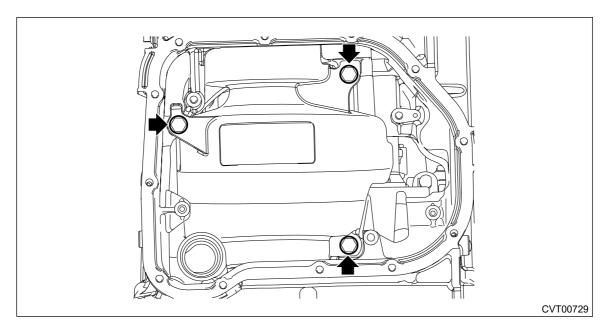
16 N•m (1.6 kgf-m, 11.8 ft-lb)



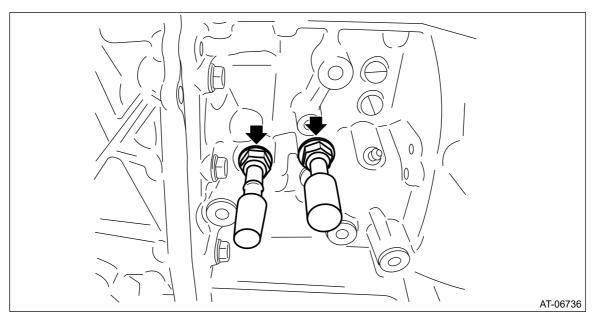
- 11. Install the transmission control device. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transmission Control Device>INSTALLATION.
- **12.** Install the oil pan and oil strainer. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Oil Pan and Strainer>INSTALLATION.
- 13. Install the reduction driven gear assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Reduction Driven Gear>INSTALLATION.
- **14.** Install the parking pawl. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Parking Pawl>INSTALLATION.
- **15.** Install the transfer driven gear assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transfer Driven Gear>INSTALLATION.
- **16.** Install the transfer clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transfer Clutch>INSTALLATION.
- 17. Install the extension case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Extension Case>INSTALLATION.
- **18.** Install the inhibitor switch. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Inhibitor Switch>INSTALLATION.
- 19. Install the secondary speed sensor. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Secondary Speed Sensor>INSTALLATION.
- **20.** Install the primary speed sensor. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Primary Speed Sensor>INSTALLATION.
- **21.** Install the turbine speed sensor. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Turbine Speed Sensor>INSTALLATION.
- **22.** Install the transmission harness. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transmission Harness>INSTALLATION.
- **23.** Install the control valve body. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Control Valve Body>INSTALLATION.
- **24.** Install the air breather hose. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Air Breather Hose>INSTALLATION.
- **25.** Install the transmission assembly to the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Automatic Transmission Assembly>INSTALLATION.

REMOVAL

- **1.** Remove the transmission assembly from the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Automatic Transmission Assembly>REMOVAL.
- **2.** Remove the air breather hose. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Air Breather Hose>REMOVAL.
- **3.** Remove the control valve body. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Control Valve Body>REMOVAL.
- **4.** Remove the transmission harness. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transmission Harness>REMOVAL.
- **5.** Remove the turbine speed sensor. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Turbine Speed Sensor>REMOVAL.
- **6.** Remove the secondary speed sensor. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Secondary Speed Sensor>REMOVAL.
- **7.** Remove the primary speed sensor. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Primary Speed Sensor>REMOVAL.
- **8.** Remove the inhibitor switch. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Inhibitor Switch>REMOVAL.
- **9.** Remove the extension case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Extension Case>REMOVAL.
- **10.** Remove the transfer clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transfer Clutch>REMOVAL.
- **11.** Remove the transfer driven gear assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transfer Driven Gear>REMOVAL.
- **12.** Remove the parking pawl. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Parking Pawl>REMOVAL.
- **13.** Remove the reduction driven gear assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Reduction Driven Gear>REMOVAL.
- **14.** Remove the oil pan and oil strainer. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Oil Pan and Strainer>REMOVAL.
- **15.** Remove the transmission control device. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Transmission Control Device>REMOVAL.
- 16. Remove the oil baffle securing bolt.



17. Remove the oil cooler pipe.

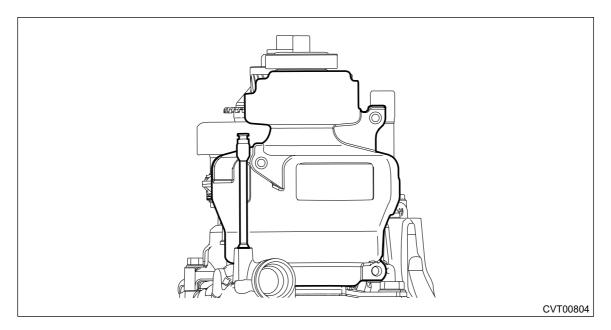


18. Remove the transmission case.

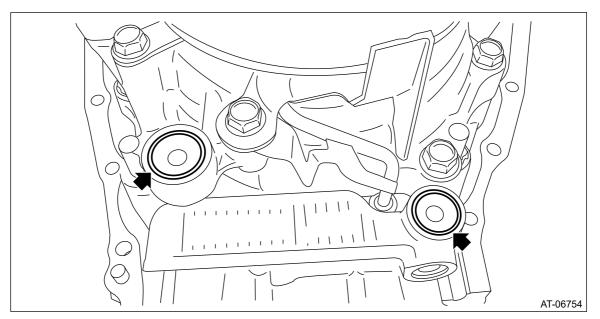
Note:

The total number of transmission case mounting bolts is 15.

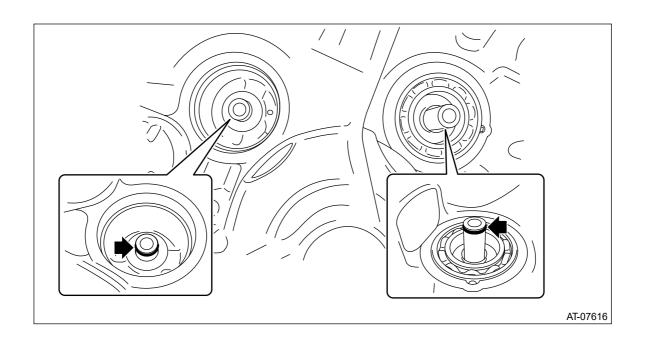
19. Remove the oil baffle.



20. Remove the O-rings.



21. Remove the seal ring from the transmission case.



CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Transmission Control Device INSPECTION

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

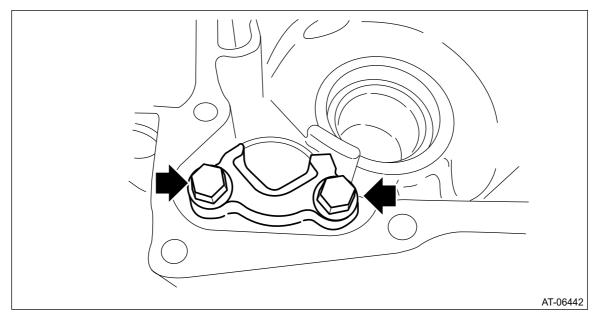
CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Transmission Control Device

INSTALLATION

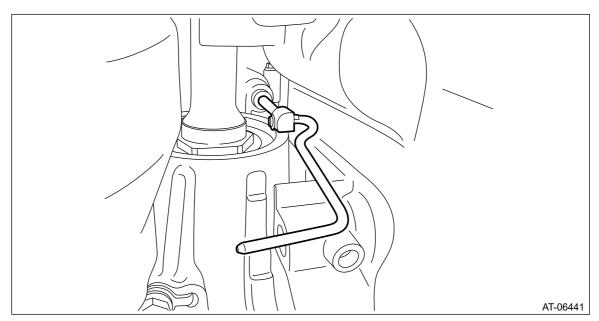
1. Install the parking support.

Tightening torque:

25 N·m (2.5 kgf-m, 18.4 ft-lb)



- 2. Install the extension case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Extension Case>INSTALLATION.
- 3. Install the manual valve.



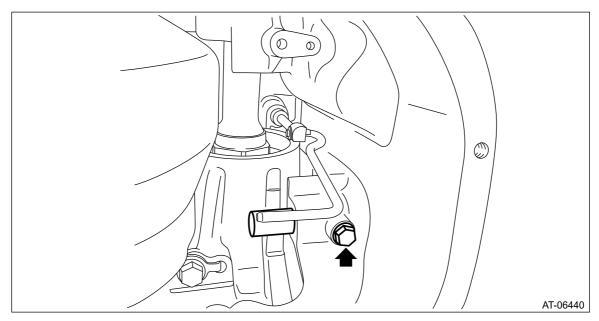
4. Install the shifter arm shaft and bolt.

Note:

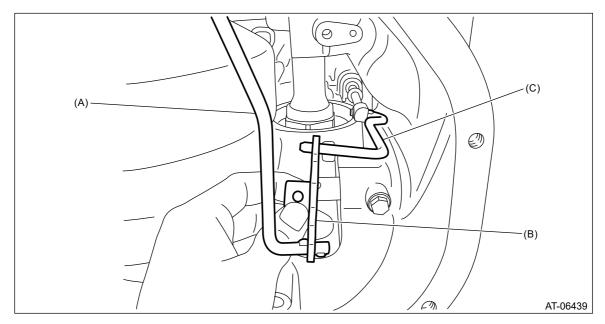
Do not damage the lip of oil seal press-fitted in the case.

Tightening torque:

7 N·m (0.7 kgf-m, 5.2 ft-lb)



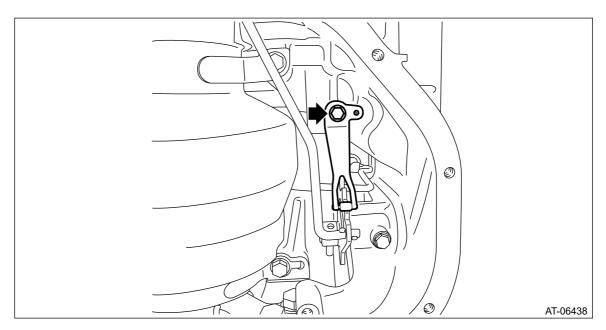
- 5. Install the parking rod to the manual plate.
- **6.** Insert the parking rod into the transmission case, and install the shift connecting rod of the manual valve to the manual plate.



- (A) Parking rod
- (B) Manual plate
- (C) Shift connecting rod
- 7. Install the manual plate to the shifter arm shaft.
- **8.** Install the detent spring to the transmission case.

Tightening torque:

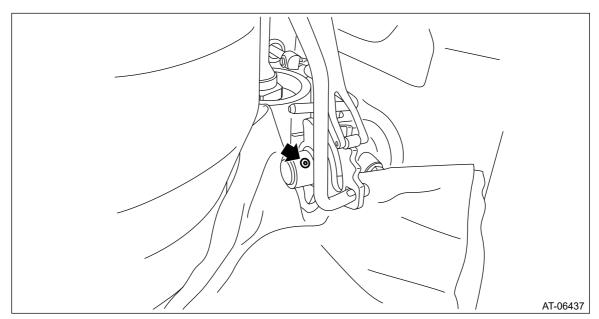
7 N·m (0.7 kgf-m, 5.2 ft-lb)



9. Install the spring pin.

Note:

Use new spring pin.



- **10.** Install the inhibitor switch. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Inhibitor Switch>INSTALLATION.
- **11.** Adjust the inhibitor switch. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Inhibitor Switch>ADJUSTMENT.
- **12.** Install the oil strainer and oil pan. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Oil Pan and Strainer>INSTALLATION.
- 13. Install the transmission assembly to the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Automatic Transmission Assembly>INSTALLATION.

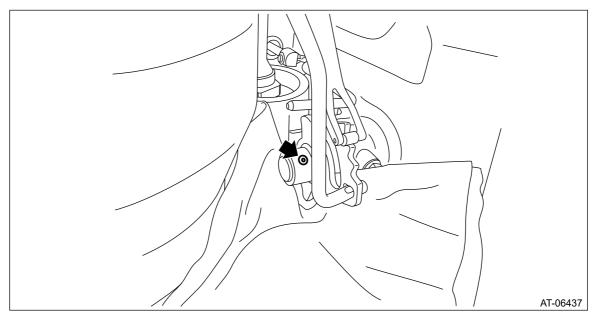
CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Transmission Control Device

REMOVAL

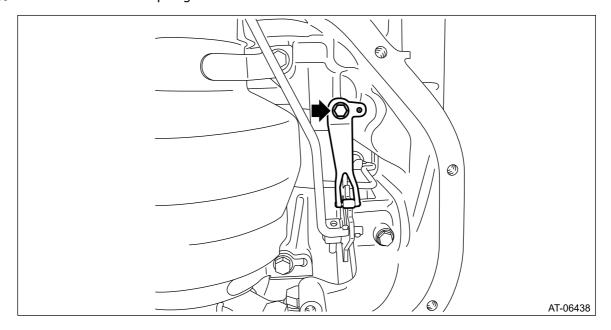
- **1.** Remove the transmission assembly from the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Automatic Transmission Assembly>REMOVAL.
- **2.** Remove the inhibitor switch. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Inhibitor Switch>REMOVAL.
- **3.** Remove the oil pan and oil strainer. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Oil Pan and Strainer>REMOVAL.
- 4. Shift the manual plate to "N" range, and remove the spring pin.

Note:

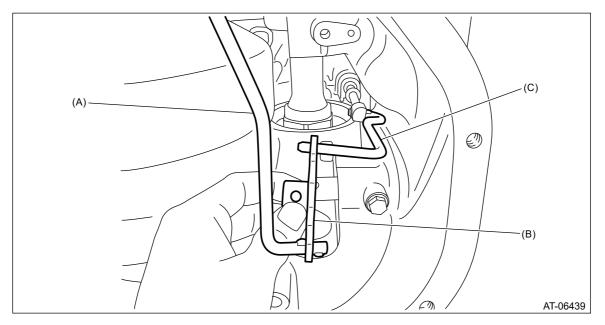
Prevent the spring pin from dropping in the transmission using paper towel etc.



5. Remove the detent spring.



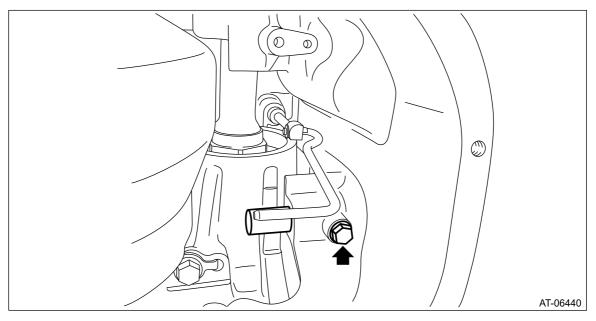
6. Remove the manual plate from the shifter arm shaft, and remove the shift connecting rod of the manual valve.



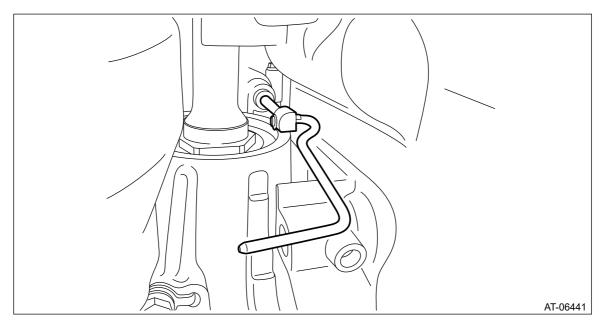
- (A) Parking rod
- (B) Manual plate
- (C) Shift connecting rod
- 7. Remove the manual plate and parking rod.
- **8.** Remove the bolt, and remove the shifter arm shaft.

Note:

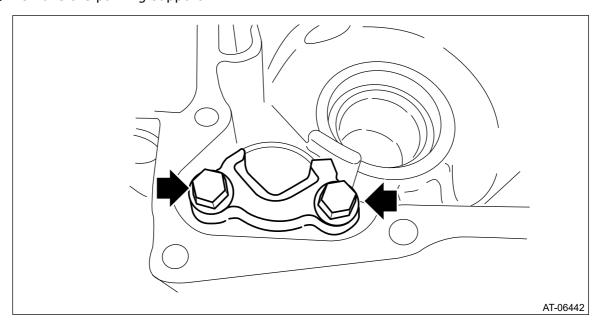
Do not damage the lip of oil seal press-fitted in the case.



9. Remove the manual valve.



- **10.** Remove the extension case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Extension Case>REMOVAL.
- 11. Remove the parking support.



CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Transmission Control Module (TCM)

INSTALLATION

1. Install the TCM to the bracket.

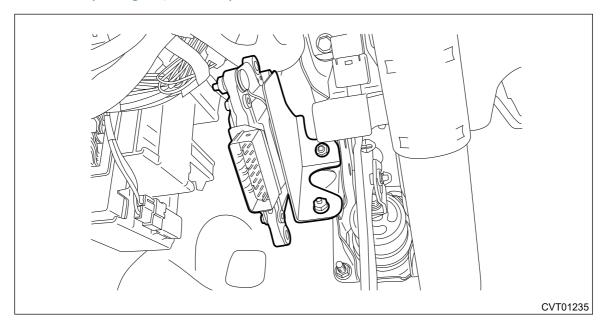
Tightening torque:

7.5 N·m (0.8 kgf-m, 5.5 ft-lb)

2. Install the TCM.

Tightening torque:

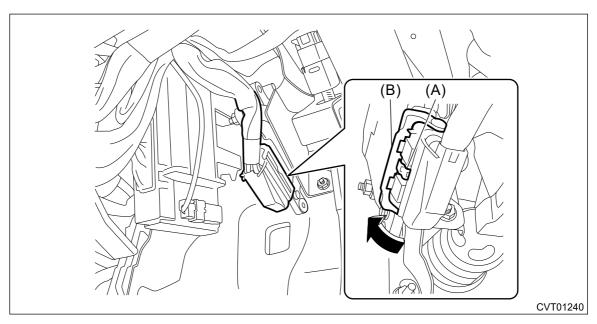
7.5 N·m (0.8 kgf-m, 5.5 ft-lb)



3. Install the harness connector to TCM.

Note:

Move the lock lever in the arrow direction, and confirm that a clicking sound is heard.



- (A) Lock button
- (B) Lock lever
- **4.** Using the Subaru Select Monitor, perform [Clear AT learning value] on [Work Support], and perform [AT learning mode]. Ref. to TRANSMISSION (DIAGNOSTICS)>Learning Control>PROCEDURE.

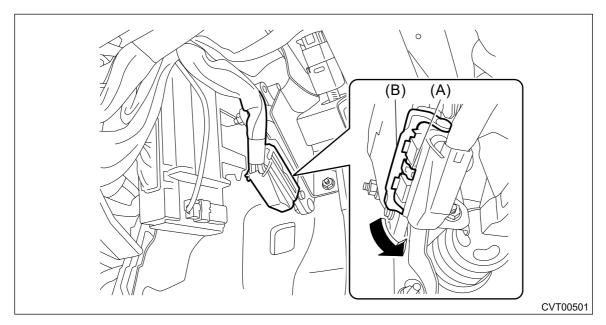
CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Transmission Control Module (TCM)

REMOVAL

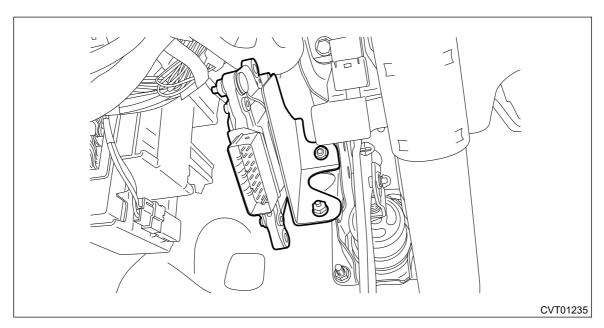
1. Disconnect the ground cable from battery. Ref. to NOTE>NOTE > BATTERY.
Note:

For model with battery sensor, disconnect the ground terminal from battery sensor.

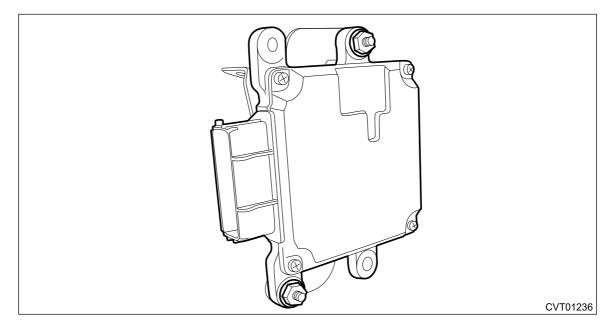
2. Move the lock lever in the arrow direction while pressing the lock button, and disconnect the connector.



- (A) Lock button
- (B) Lock lever
- 3. Remove the TCM.



4. Remove the TCM from the bracket.



CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Transmission Harness

INSPECTION

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

Note:

For details of transmission harness circuit, refer to wiring diagram. Ref. to WIRING SYSTEM>CVT Control System>WIRING DIAGRAM.

Harness continuity standard

Less than 1 Ω

INSTALLATION

1. INHIBITOR HARNESS

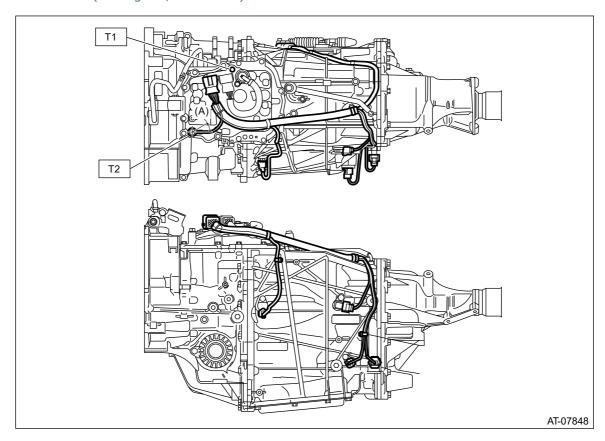
Install in the reverse order of removal.

Note:

Install the transmission ground terminal in the direction within the range of approx. 30° (A).

Tightening torque:

T1: 7 N·m (0.7 kgf-m, 3.7 ft-lb) T2: 14 N·m (1.4 kgf-m, 10.3 ft-lb)



2. TRANSMISSION HARNESS

1. Clean the mating surface of valve cover and transmission side.

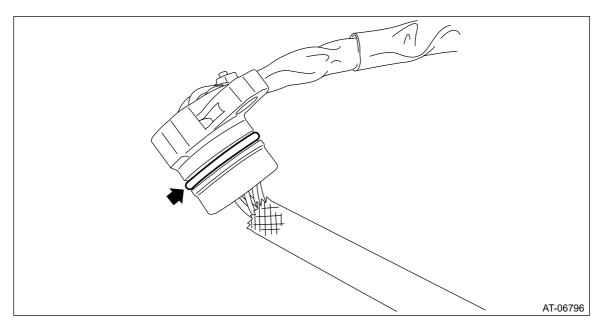
Caution:

When cleaning the mating surface of the transmission side, be careful not to allow any dust, foreign matter and used liquid gasket to enter the transmission.

- 2. Check the control valve body for dust and other foreign matter.
- 3. Install the O-ring to the transmission harness.

Note:

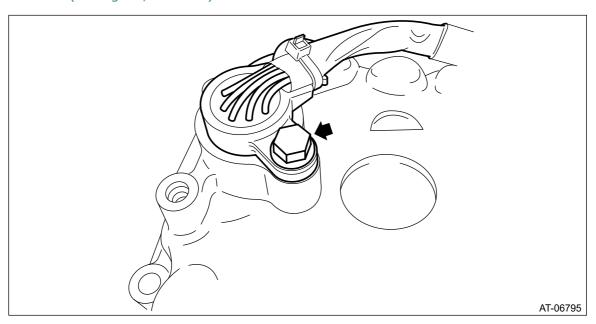
- Use new O-rings.
- Apply CVTF to the O-rings.



4. Install the transmission harness to the valve cover.

Tightening torque:

7 N·m (0.7 kgf-m, 5.2 ft-lb)



5. Install the gasket to the transmission.

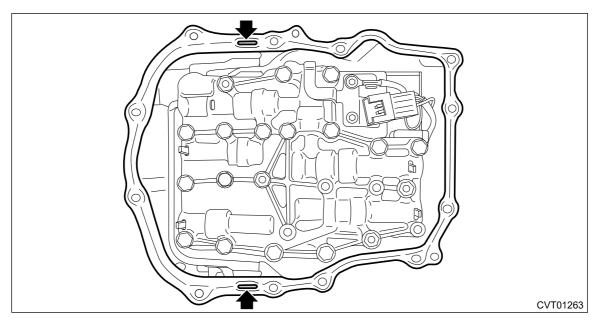
Note:

Use a new gasket.

6. Apply liquid gasket to the oval hole of gasket.

Liquid gasket:

THREE BOND 1215B or equivalent



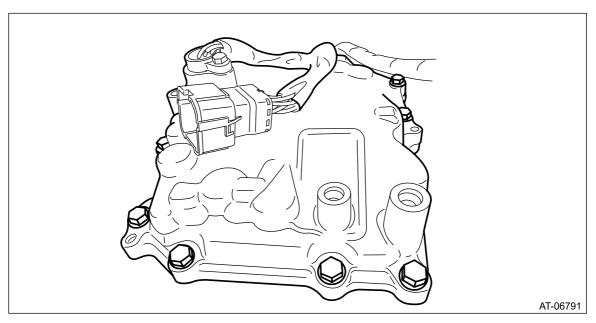
7. Connect the transmission harness connector to the control valve body, and install the valve cover.

Caution:

Be careful not to catch the sheet of the ST.

Tightening torque:

8 N·m (0.8 kgf-m, 5.9 ft-lb)



- **8.** Remove the ST (SHEET SPECIAL TOOL).
- **9.** Install the transmission harness connector to the harness stay.
- 10. Install the transmission harness stay and transmission ground terminal.

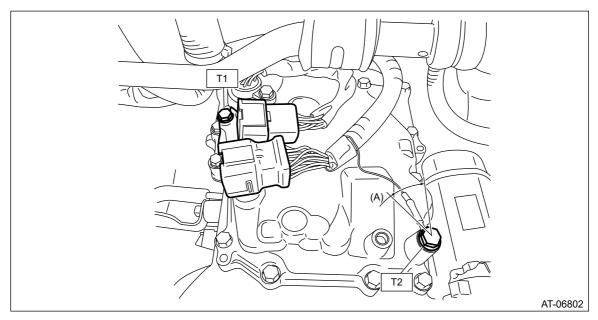
Note:

Install the transmission ground terminal in the direction within the range of approx. 30° (A).

Tightening torque:

T1: 7 N·m (0.7 kgf-m, 5.2 ft-lb)

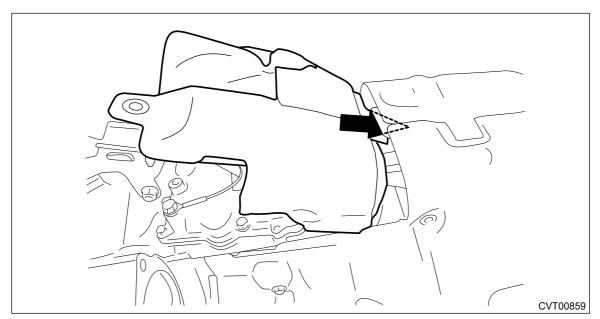
T2: 14 N·m (1.4 kgf-m, 10.3 ft-lb)

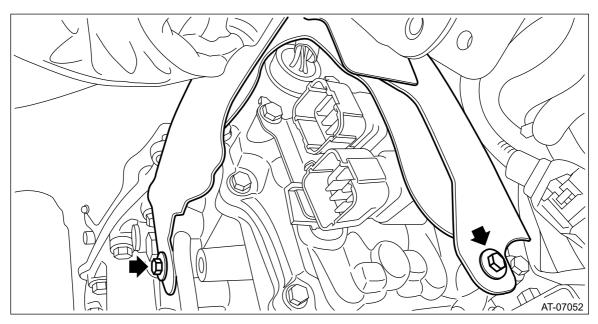


11. Insert the transmission case cover (small) between transmission case cover (large) and transmission to install.

Tightening torque:

8 N·m (0.8 kgf-m, 5.9 ft-lb)

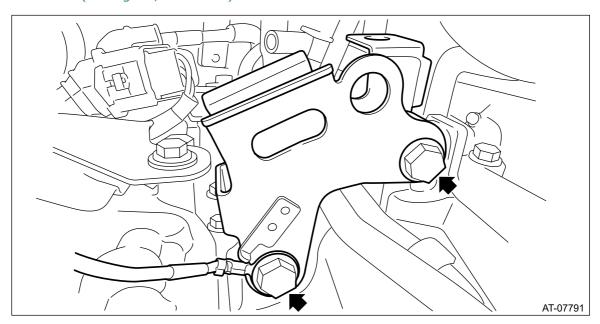




12. Install the pitching stopper bracket and transmission radio ground cord.

Tightening torque:

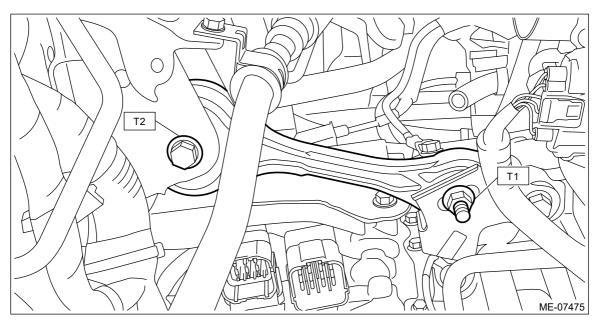
41 N·m (4.2 kgf-m, 30.2 ft-lb)



- **13.** Install the air breather hose to the pitching stopper bracket.
- 14. Install the pitching stopper.

Tightening torque:

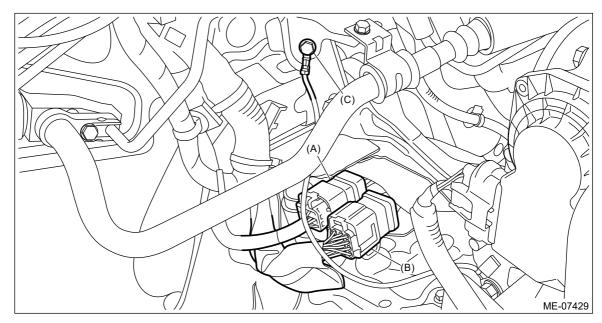
T1: 50 N·m (5.1 kgf-m, 36.9 ft-lb) T2: 58 N·m (5.9 kgf-m, 42.8 ft-lb)



- **15.** Connect the following harness connectors.
 - Transmission harness connectors
 - Inhibitor harness connector
 - Transmission radio ground terminal

Tightening torque:

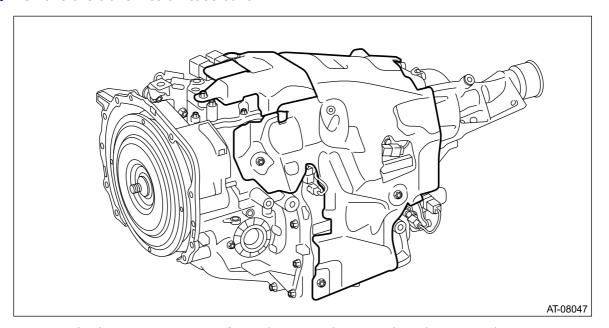
13 N·m (1.3 kgf-m, 9.6 ft-lb)



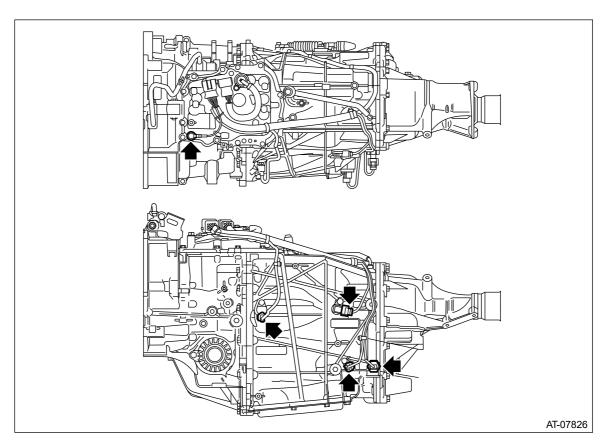
- (A) Transmission harness connectors
- (B) Inhibitor harness connector
- (C) Transmission radio ground terminal
- **16.** Install the air intake boot assembly. <a>Ref. to INTAKE (INDUCTION)(H4DO)>Air Intake Boot>INSTALLATION.
- **17.** Adjust the CVTF level. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>CVTF>ADJUSTMENT.

1. INHIBITOR HARNESS

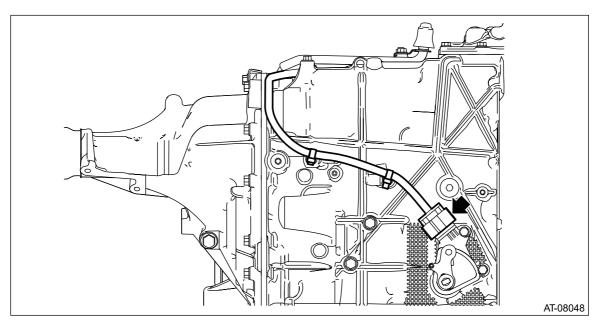
- 1. Remove the transmission from the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Automatic Transmission Assembly>REMOVAL.
- 2. Remove the transmission case cover.



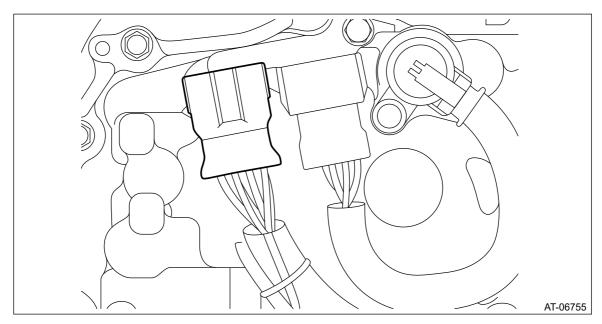
3. Remove the harness connector from the ground terminal, turbine speed sensor, primary speed sensor, secondary speed sensor and secondary pressure sensor.



4. Remove the harness connector from inhibitor switch.



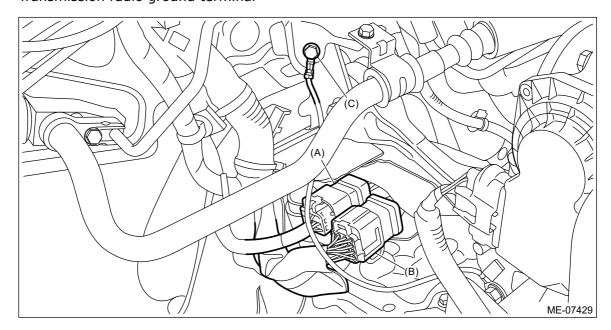
5. Remove the inhibitor harness connector from the transmission harness stay.



6. Remove the harness clip from the transmission, and remove the inhibitor harness.

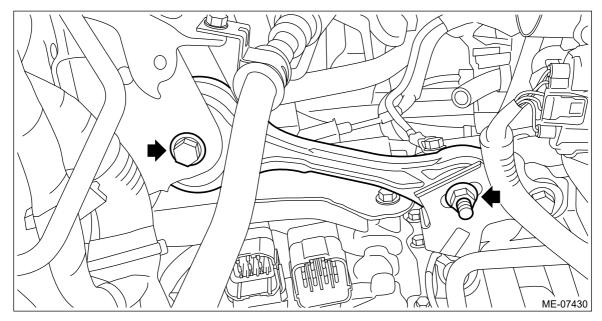
2. TRANSMISSION HARNESS

- 1. Disconnect the ground cable from battery.
- 2. Remove the air intake boot assembly. Ref. to INTAKE (INDUCTION)(H4DO)>Air Intake Boot>REMOVAL.
- **3.** Disconnect the following connectors.
 - Transmission harness connectors
 - Inhibitor harness connector
 - · Transmission radio ground terminal

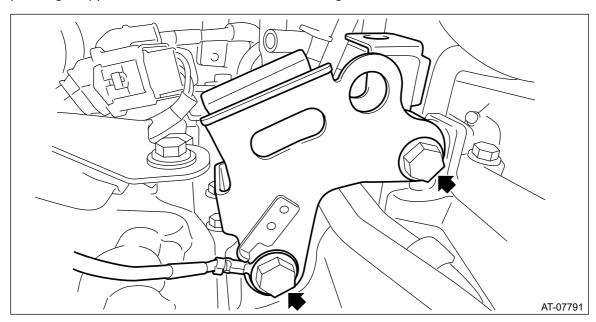


- (A) Transmission harness connectors
- (B) Inhibitor harness connector
- (C) Transmission radio ground terminal

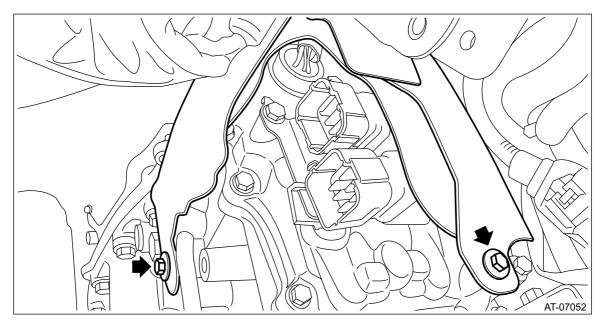
4. Remove the pitching stopper.



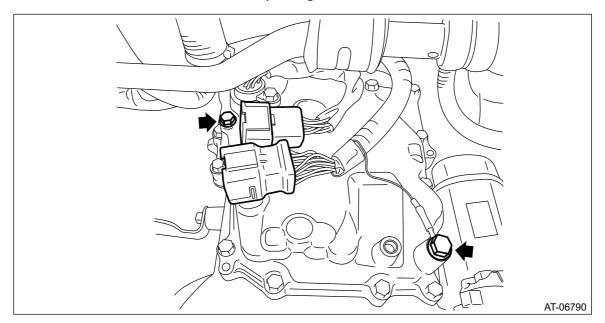
5. Remove the air breather hose from the pitching stopper bracket, and then remove the pitching stopper bracket and transmission radio ground cord.



6. Remove the transmission case cover.

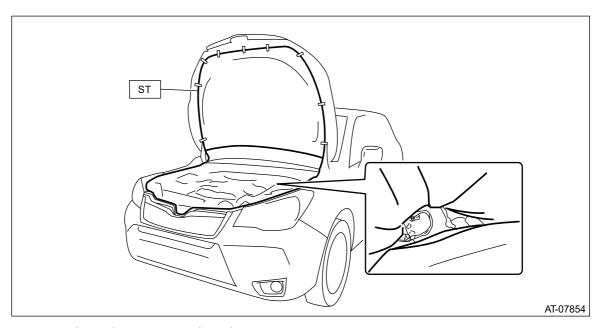


7. Remove the transmission harness stay and ground terminal.

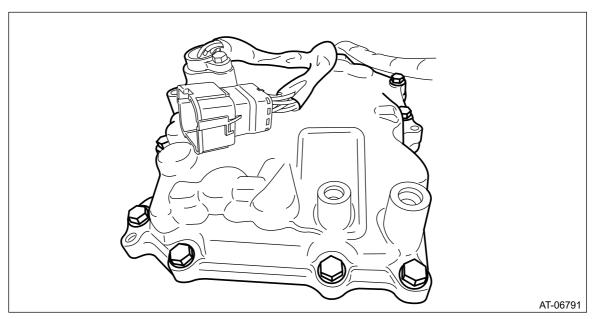


- **8.** Remove the transmission harness connector from the harness stay.
- **9.** Clean the transmission exterior.
- 10. Set the ST on the vehicle.

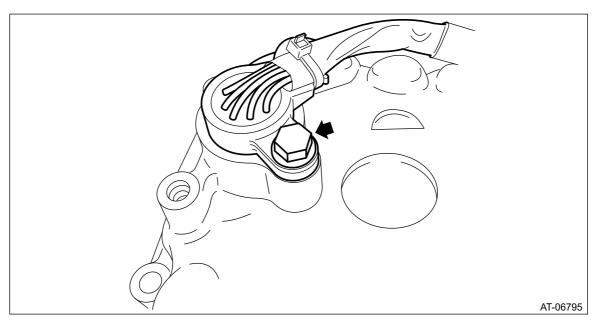
ST 18761AA010 SHEET SPECIAL TOOL



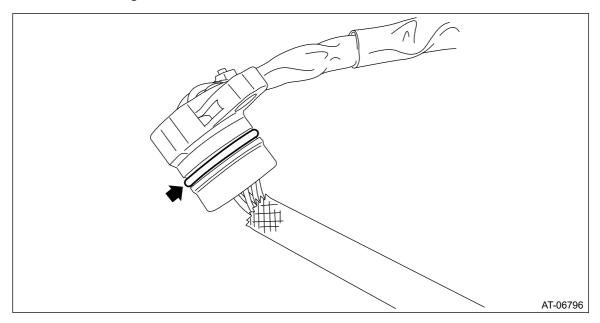
11. Remove the valve cover and gasket.



- 12. Remove the transmission harness connector from the control valve body.
- 13. Remove the transmission harness from the valve cover.



14. Remove the O-ring from the transmission harness.



CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Transmission Mounting System

INSPECTION

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

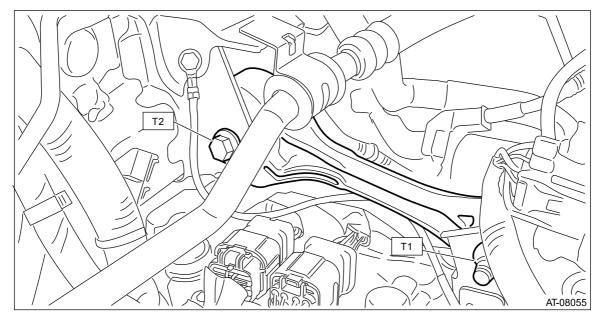
INSTALLATION

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)



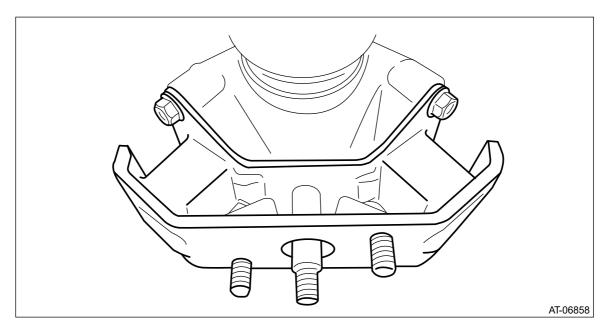
- 2. Install the air intake boot assembly. Ref. to INTAKE (INDUCTION)(H4DO)>Air Intake Boot>INSTALLATION.
- **3.** Connect the battery ground terminal.

2. TRANSMISSION REAR CROSSMEMBER AND REAR CUSHION RUBBER

1. Attach the rear cushion rubber to the transmission.

Tightening torque:

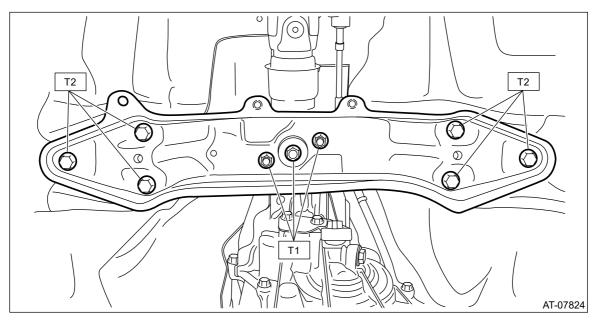
40 N•m (4.1 kgf-m, 29.5 ft-lb)



2. Install the crossmember.

Tightening torque:

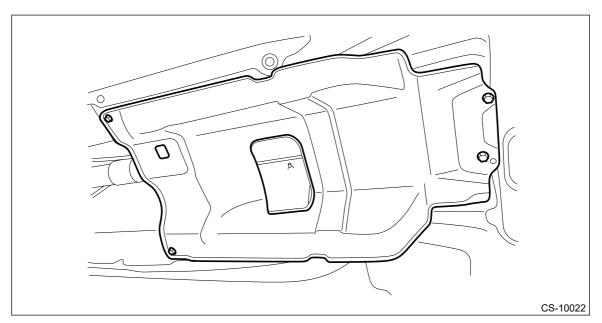
T1: 35 N•m (3.6 kgf-m, 25.8 ft-lb) T2: 70 N•m (7.1 kgf-m, 51.6 ft-lb)



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

Tightening torque:

18 N•m (1.8 kgf-m, 13.3 ft-lb)



- **5.** Install the center exhaust pipe. Ref. to EXHAUST(H4DO)>Center Exhaust Pipe>INSTALLATION.
- **6.** Install the under cover front transmission.

Tightening torque:

18 N•m (1.8 kgf-m, 13.3 ft-lb)

7. Connect the battery ground terminal.

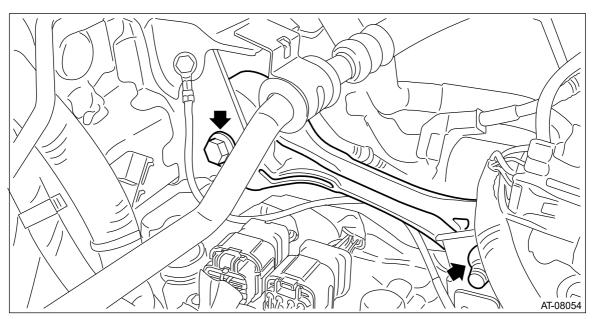
1. PITCHING STOPPER

1. Disconnect the ground cable from battery. Ref. to NOTE>NOTE > BATTERY.

Note:

For model with battery sensor, disconnect the ground terminal from battery sensor.

- 2. Remove the air intake boot assembly. Ref. to INTAKE (INDUCTION)(H4DO)>Air Intake Boot>REMOVAL.
- **3.** Remove the pitching stopper.



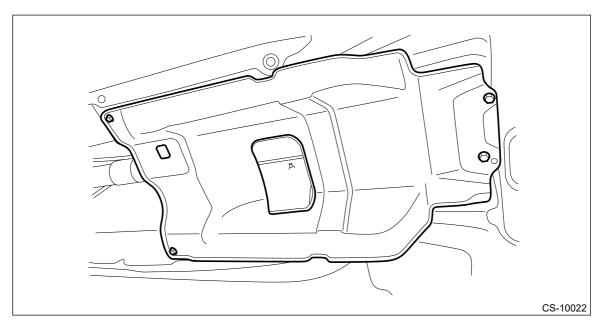
2. TRANSMISSION REAR CROSSMEMBER AND REAR CUSHION RUBBER

1. Disconnect the ground cable from battery. <a> Ref. to NOTE>NOTE > BATTERY.

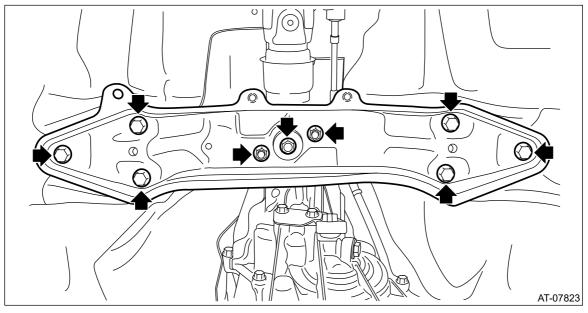
Note:

For model with battery sensor, disconnect the ground terminal from battery sensor.

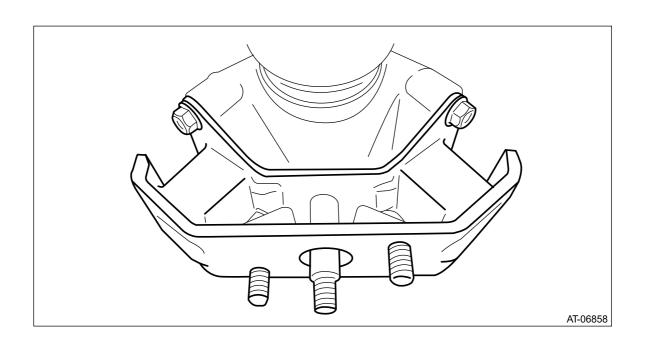
- 2. Lift up the vehicle.
- 3. Remove the under cover front transmission.
- **4.** Remove the center exhaust pipe. Ref. to EXHAUST(H4DO)>Center Exhaust Pipe>REMOVAL.
- 5. Remove the center exhaust cover.



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



8. Remove the rear cushion rubber.



CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Turbine Speed Sensor

INSPECTION

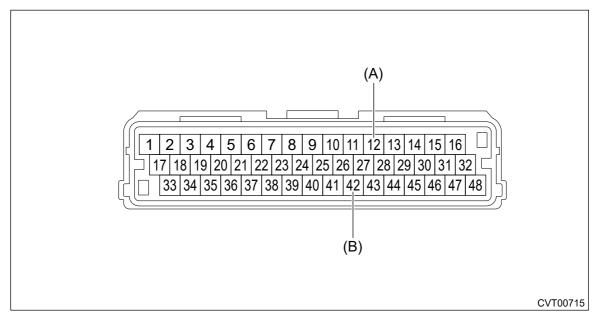
1. Set the ST between the TCM and bulkhead harness. Ref. to TRANSMISSION (DIAGNOSTICS)>General Description>CAUTION.

ST 18460AA040 CHECK BOARD

2. Set the probe of oscilloscope to the check board connector.

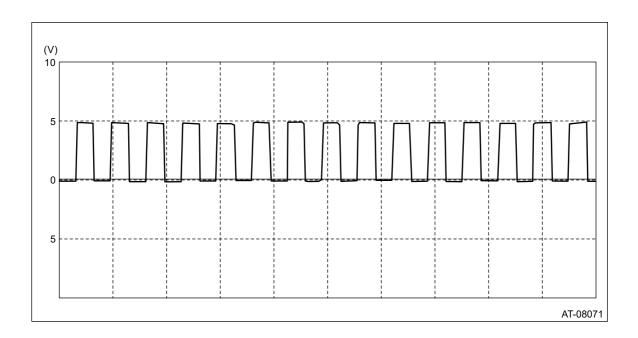
Terminals

No. 12
$$(+)$$
 — No. 42 $(-)$:



- (A) + probe
- (B) probe
- 3. Start and warm up the engine.
- 4. Check the waveform and output voltage of the turbine speed sensor with engine idling.
 Note:

The waveform cycle changes as the speed changes.



CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Turbine Speed Sensor

INSTALLATION

Caution:

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

Install in the reverse order of removal.

Note:

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

Tightening torque:

Turbine speed sensor

7 N·m (0.7 kgf-m, 5.2 ft-lb)

Under cover front - transmission

18 N·m (1.8 kgf-m, 13.3 ft-lb)

CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Turbine Speed Sensor

REMOVAL

Caution:

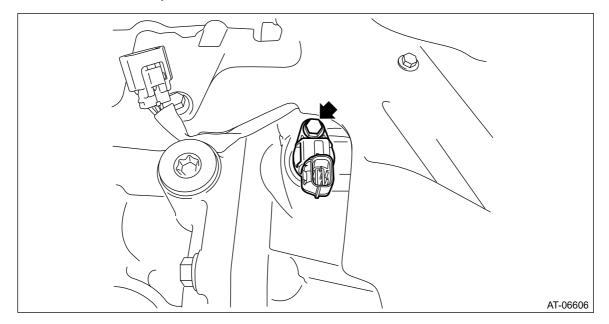
Be sure to prevent water or oil from contacting the connector terminal of turbine speed sensor. If adhesion occurs, replace with a new part.

1. Disconnect the ground cable from battery. <a> Ref. to NOTE>NOTE > BATTERY.

Note:

For model with battery sensor, disconnect the ground terminal from battery sensor.

- 2. Lift up the vehicle.
- 3. Remove the under cover front transmission.
- 4. Remove the harness connector from turbine speed sensor.
- 5. Remove the turbine speed sensor.



CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Variator Chain

INSPECTION

Check the variator chain for damage and wear.

CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Variator Chain

INSTALLATION

For installation of variator chain, refer to "Primary Pulley and Secondary Pulley". Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Primary Pulley and Secondary Pulley>INSTALLATION.

CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > Variator Chain

REMOVAL

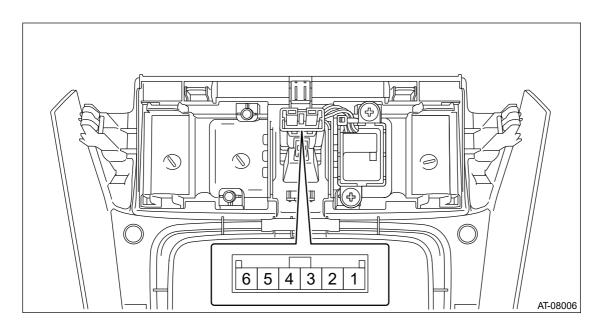
For removal of variator chain, refer to "Primary Pulley and Secondary Pulley". Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>Primary Pulley and Secondary Pulley>REMOVAL.

INSPECTION

1. CHECK SWITCH UNIT

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

	Terminal No.	Standard
OFF (when measured without operating the switch)	No. 4 —No. 5	1 M Ω or more
ON (when measured with the switch held down)	110. 4 —110. J	Less than 1 Ω



2. CHECK X MODE SYSTEM

DIAGNOSIS:

It does not switch to X mode.

Caution:

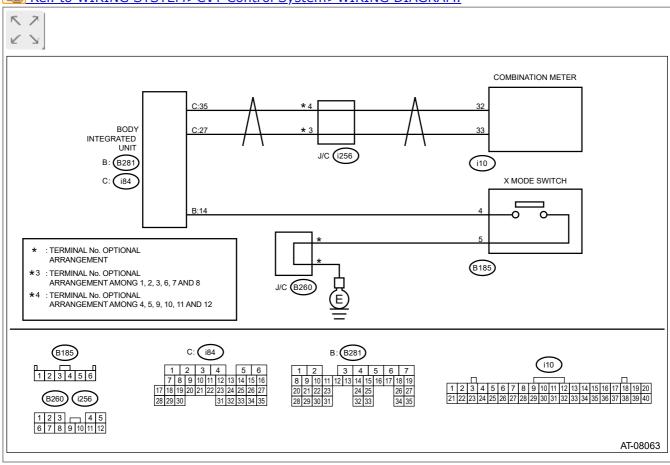
Note that the system performs the following controls when switching to X mode.

- 1. When turning the engine OFF and then ON again, it switches to I (intelligent) mode although in the mode prior to engine OFF.
- 2. Switches to S (Sport) when the malfunction indicator light illuminates while the engine is running. In this case, switching to S# (Sport Sharp), I (Intelligent) or X is not available.
- 3. If there is a possible engine coolant or engine oil temperature overheat condition, it will not be possible to switch to X mode. Switches to S (Sport) while driving in X mode.
- 4. If the ignition switch is in ON position before starting engine, switching to X mode is not available.

3. PRESSING X MODE SWITCH DOES NOT CHANGE THE X MODE DISPLAY IN THE COMBINATION METER AND MODE DOES NOT SWITCH TO X MODE

WIRING DIAGRAM:





1. CHECK X MODE SWITCH.



- 1. Turn the ignition switch to OFF.
- 2. Disconnect the connector from body integrated unit.
- **3.** Measure the resistance when the X mode switch is operated.

Connector & terminal

(B281) No. 14 — Chassis ground:

Does the resistance change as below?

1 M Ω or more \rightarrow less than 10 Ω



Go to 5.



Go to 2.

2. CHECK HARNESS BETWEEN BODY INTEGRATED UNIT AND X MODE SWITCH CONNECTOR.



Measure the resistance of harness between the body integrated unit connector and X mode switch connector.

Connector & terminal

(B281) No. 14 — (B185) No. 4:

Is the resistance less than 10 Ω ?



Go to 3.



Repair the harness and connector.

Note:

In this case, repair the following item:

- Open circuit of harness between the body integrated unit connector and X mode switch connector
- Poor contact of connector

3. CHECK HARNESS BETWEEN BODY INTEGRATED UNIT AND X MODE SWITCH CONNECTOR.



Measure the resistance of harness between X mode switch connector and chassis ground.

Connector & terminal

(B185) No. 4 — Chassis ground:

Is the resistance 1 $M\Omega$ or more?



Go to 4.



Repair the ground short circuit of harness between body integrated unit and X mode switch connector.

4. CHECK HARNESS BETWEEN X MODE SWITCH CONNECTOR AND CHASSIS GROUND.



Measure the resistance between body integrated unit connector and chassis ground.

Connector & terminal

(B185) No. 5 — Chassis ground:

Is the resistance less than 10 Ω ?



Repair the poor contact of X mode switch connector. Replace the X mode switch if faulty. Ref. to CONTINUOUSLY VARIABLE

TRANSMISSION(TR580)>X MODE Switch. Ref. to CONTINUOUSLY

VARIABLE TRANSMISSION(TR690)>X MODE Switch.

No

Repair the harness and connector.

Note:

In this case, repair the following item:

- Open circuit in harness between X mode switch connector and chassis ground
- Poor contact of joint connector

5. RECHECK FAULT.



- 1. Connect all connectors.
- 2. Switch to X mode.

Is there any fault?



Repair poor contact in the body integrated unit connector. Replace the meter case assembly if defective.

No

The circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again.

Note:

In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.

4. WHEN SWITCHED TO X MODE, "S", "I", "S#" OR "X" MODE DISPLAY IN COMBINATION METER FLASHES IN APPROX. 5 SECONDS

1. CHECK DTC.



Is DTC displayed?



Check the appropriate DTC using the "List of Diagnostic Trouble Code (DTC)" concerning the respective units.



Go to 2.

2. CHECK COMBINATION METER AND CLOCK DISPLAY.



Check for abnormal displays other than "S", "I", "S#" or "X" flashing. Examples:

- Malfunction indicator light illuminates.
- Fuel economy display area is not ON.

Note:

The system enters into fail mode with ignition ON and engine OFF.

Is there an abnormal display other than "S", "I", "S#" or "X" flashing?

Yes For the dia

For the diagnostic procedure, refer to LAN section. Ref. to LAN SYSTEM (DIAGNOSTICS)>Basic Diagnostic Procedure.

No

Go to 3.

3. CHECK ECM AND COMBINATION METER.



Is the part number of ECM and combination meter correct?

Yes

Replace the meter case assembly. Ref. to INSTRUMENTATION/DRIVER INFO>Combination Meter.

No

Replace ECM or meter case assembly with the one with the correct part number. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Engine Control Module (ECM). Ref. to FUEL INJECTION (FUEL SYSTEMS)

(H4DO)>Engine Control Module (ECM). Ref. to INSTRUMENTATION/DRIVER INFO>Combination Meter.

5. WHEN SWITCHED TO X MODE, "S", "I", "S#" OR "X" MODE DISPLAY IN COMBINATION METER FLASHES

Note:

In this case, there may be a fault other than in X mode system.

1. CHECK MALFUNCTION INDICATOR LIGHT.



- **1.** Start the engine.
- **2.** Check if malfunction indicator light illuminates.

Does the malfunction indicator light illuminate?

Yes

Read the DTC using Subaru Select Monitor and check the indicated DTC. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Read Diagnostic Trouble Code (DTC). Ref. to ENGINE (DIAGNOSTICS)(H4DO)>Read Diagnostic Trouble Code (DTC).

No

@ Go to 2.

2. CHECK COOLANT TEMPERATURE WARNING LIGHT.



- 1. Turn the ignition switch to ON.
- 2. Check the coolant temperature warning light.

Does it indicate overheating?



Inspect for the cause of overheating and repair.



Go to 3.

3. CHECK ENGINE OIL TEMPERATURE.



- **1.** Turn the ignition switch to ON.
- **2.** Check the value of Oil Temperature using Subaru Select Monitor.

Note:

For detailed operation procedures, refer to "Current Data Display For Engine". Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Subaru Select Monitor. Ref. to ENGINE (DIAGNOSTICS)(H4DO)>Subaru Select Monitor.

Is the value of Oil Temperature 117°C (243°F) or more?



Inspect and repair the cause of engine oil temperature rise.

Note:

Ask the customer whether the vehicle has experienced a long drive in low gear or towing of heavy load. If not, drive the vehicle again after the engine oil temperature lowers, and check if the engine oil temperature rises.

No

Go to 4.

4. CHECK COMBINATION METER INDICATION.



- **1.** Start the engine.
- 2. Switch to X mode.
- **3.** Check X mode display in the combination meter.

Does "S", "I", "S#" or "X" display in the combination meter flash?

Yes

Replace the meter case assembly. Ref. to INSTRUMENTATION/DRIVER INFO>Combination Meter.

No

Perform test operation and check the malfunction indicator light, engine coolant temperature warning light, and engine oil temperature. If they are

normal, finish the diagnosis.

CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > X MODE Switch

INSTALLATION

Install in the reverse order of removal.

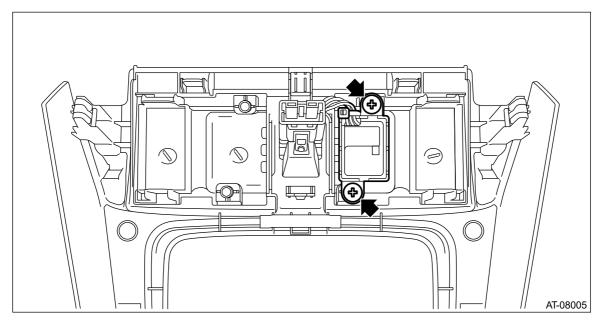
CONTINUOUSLY VARIABLE TRANSMISSION(TR580) > X MODE Switch

REMOVAL

1. Disconnect the ground cable from battery. Ref. to NOTE>NOTE > BATTERY.

For model with battery sensor, disconnect the ground terminal from battery sensor.

- 2. Remove the cover shift lever. Ref. to EXTERIOR/INTERIOR TRIM>Console Box>REMOVAL.
- **3.** Remove the X mode switch from the cover shift lever.



4. Remove the X mode switch connector from the cover - shift lever.

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Air Breather Hose

INSPECTION

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

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Air Breather Hose

INSTALLATION

Install in the reverse order of removal.

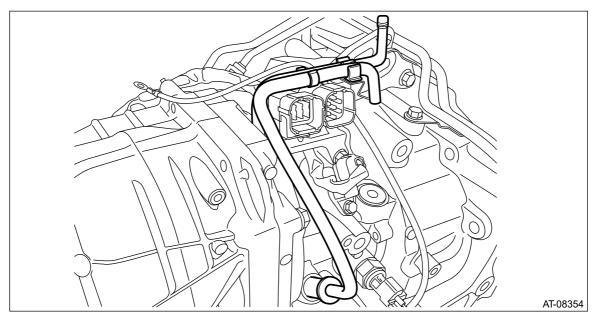
Note:

Use new O-rings.

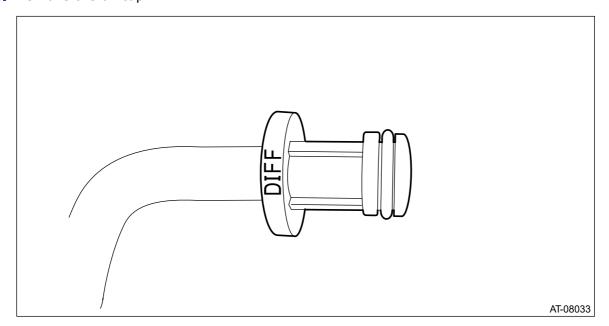
CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Air Breather Hose

REMOVAL

- **1.** Disconnect the ground cable from battery.
- 2. Remove the intercooler. Ref. to INTAKE (INDUCTION)(H4DOTC)>Intercooler>REMOVAL.
- 3. Remove the two air breather hoses.



4. Remove the oil cap.

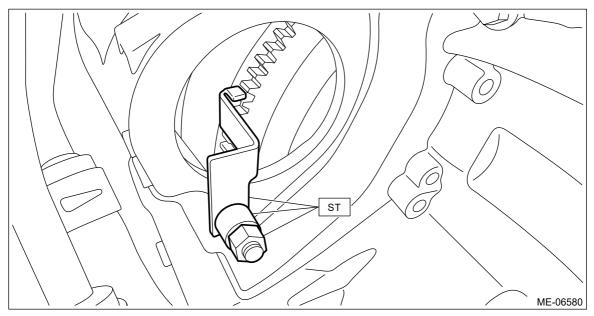


CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Automatic Transmission Assembly

INSTALLATION

1. Attach the ST to converter case.

ST 498277200 STOPPER SET



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

Caution:

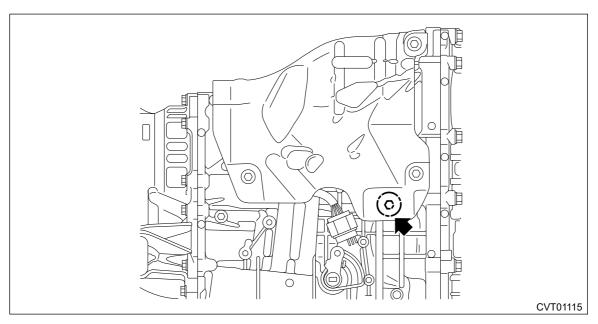
Always use specified CVTF. Using other fluid will cause malfunction. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>General Description>SPECIFICATION > HYDRAULIC CONTROL AND LUBRICATION.

Note:

Use a new gasket.

Tightening torque:

35 N·m (3.6 kgf-m, 25.8 ft-lb)



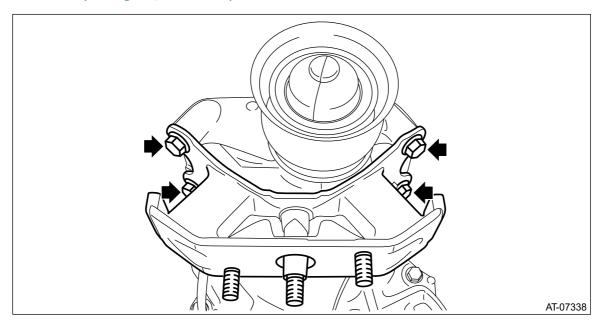
3. Replace the front differential side retainer oil seal. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690) Differential Side Retainer Oil Seal>REPLACEMENT.

Note:

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

Tightening torque:

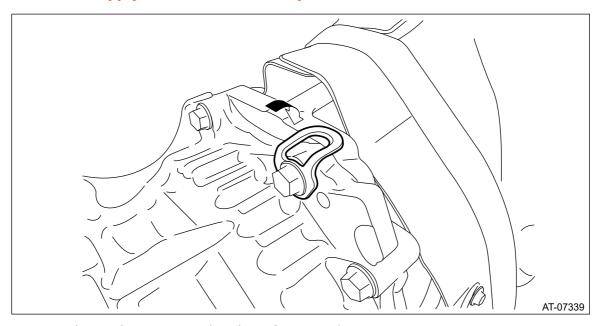
40 N·m (4.1 kgf-m, 29.5 ft-lb)



- **5.** Mount the transmission onto the transmission jack.
- **6.** 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 extra overload or impact to the transmission case.



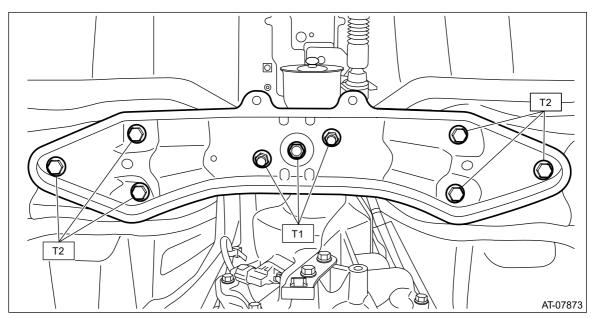
- **7.** Remove the pitching stopper bracket, if mounted.
- 8. Install the transmission onto the engine.

Note:

- While raising the transmission jack gradually, turn the screw of engine support, then tilt the engine forward.
- Temporarily attach the two engine connecting bolts and two nuts (lower side).
- **9.** Install the transmission rear crossmember.

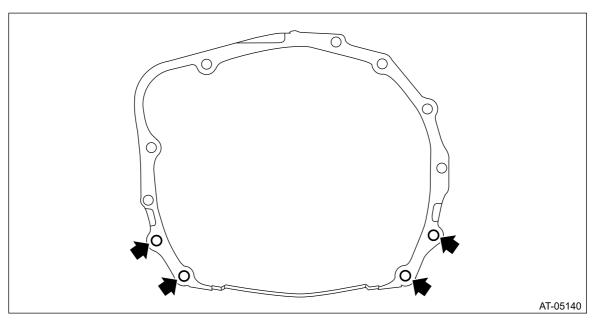
Tightening torque:

T1: 35 N·m (3.6 kgf-m, 25.8 ft-lb) T2: 70 N·m (7.1 kgf-m, 51.6 ft-lb)



10. Tighten the two engine connecting bolts and two nuts (lower side).
Tightening torque:

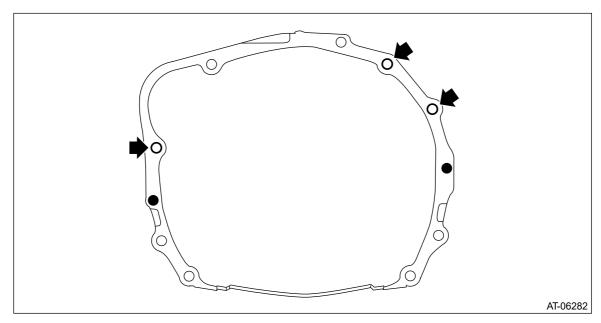
50 N·m (5.1 kgf-m, 36.9 ft-lb)



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

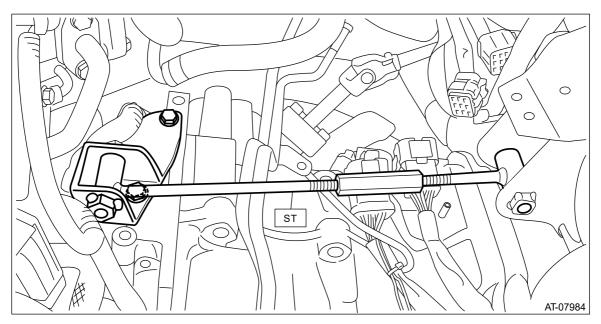
Tightening torque:

50 N·m (5.1 kgf-m, 36.9 ft-lb)



- 14. Remove the ST (STOPPER SET) from converter case.
- 15. Remove the ST (ENGINE SUPPORT ASSY).

ST 41099AC000 ENGINE SUPPORT ASSY



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

Caution:

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

Tightening torque:

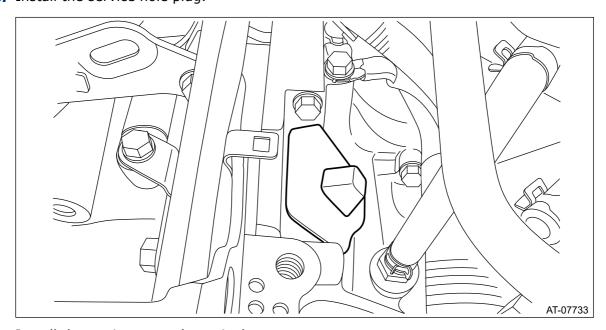
25 N·m (2.5 kgf-m, 18.4 ft-lb)

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

Tightening torque:

25 N·m (2.5 kgf-m, 18.4 ft-lb)

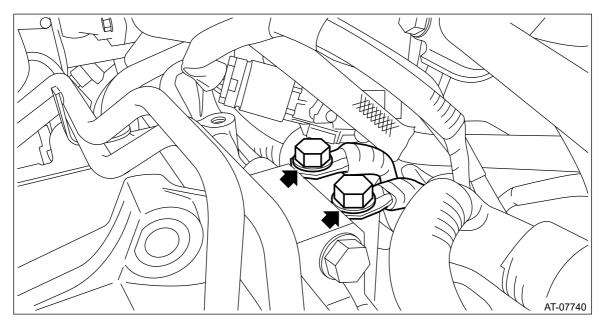
18. Install the service hole plug.



19. Install the engine ground terminals.

Tightening torque:

19 N·m (1.9 kgf-m, 14.0 ft-lb)



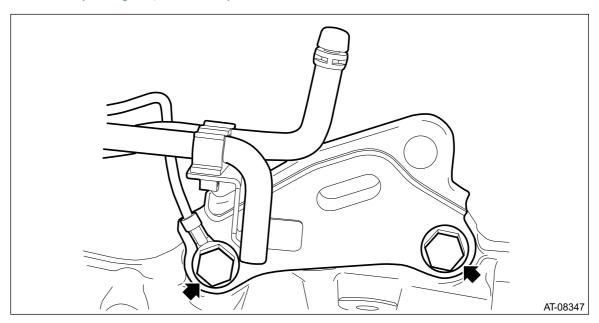
20. Install the pitching stopper bracket and transmission radio ground cord.

Caution:

Be careful not to deform or damage the terminal of transmission radio ground cord.

Tightening torque:

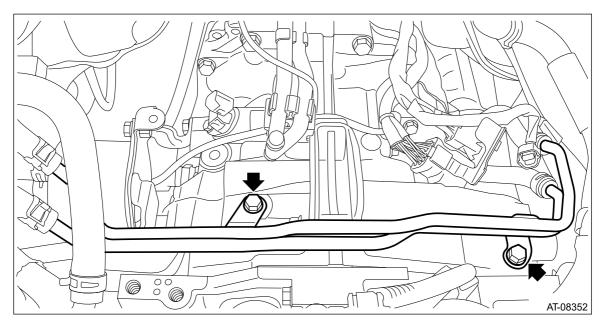
41 N·m (4.2 kgf-m, 30.2 ft-lb)



21. Install the CVTF cooler pipe COMPL.

Tightening torque:

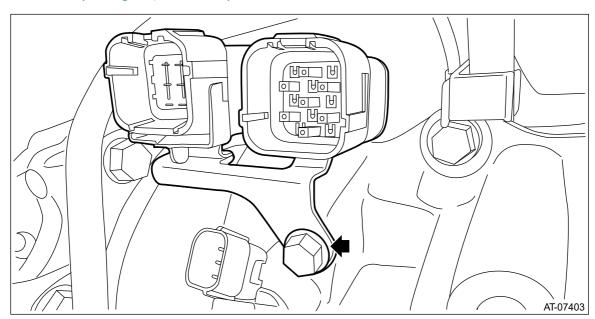
16 N·m (1.6 kgf-m, 11.8 ft-lb)



- **22.** Install the starter. Ref. to STARTING/CHARGING SYSTEMS(H4DOTC)>General Description.
- **23.** Install the transmission harness stay.

Tightening torque:

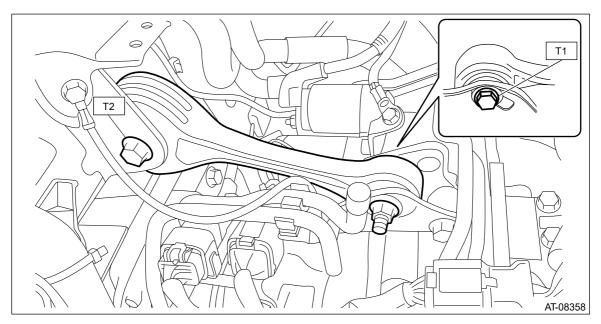
16 N·m (1.6 kgf-m, 11.8 ft-lb)



24. Install the pitching stopper.

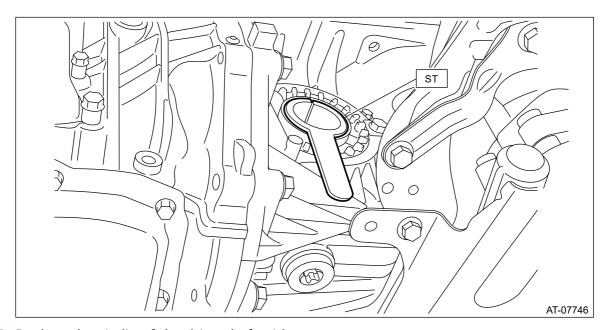
Tightening torque:

T1: 50 N·m (5.1 kgf-m, 36.9 ft-lb) T2: 58 N·m (5.9 kgf-m, 42.8 ft-lb)



- 25. Lift up the vehicle.
- **26.** Set the ST to differential side retainer.

ST 28399SA010 OIL SEAL PROTECTOR



- **27.** Replace the circlip of the drive shaft with a new part.
- **28.** Insert the front drive shaft spline section into transmission and remove the ST (OIL SEAL PROTECTOR).

Note:

- Before inserting the front drive shaft RH, turn the steering wheel to the right hand at full lock.
- Before inserting the front drive shaft LH, turn the steering wheel to the left hand at full lock.
- **29.** Insert the drive shaft into the transmission securely by pressing the housing from outside of the vehicle.

30. Insert the ball joint into housing and secure with bolt.

Tightening torque:

50 N·m (5.1 kgf-m, 36.9 ft-lb)

Caution:

- Do not apply grease to the tapered portion of ball stud.
- Before tightening, make sure the lower side of housing and stepped section of ball joint are in contact.
- **31.** Install the stabilizer link.

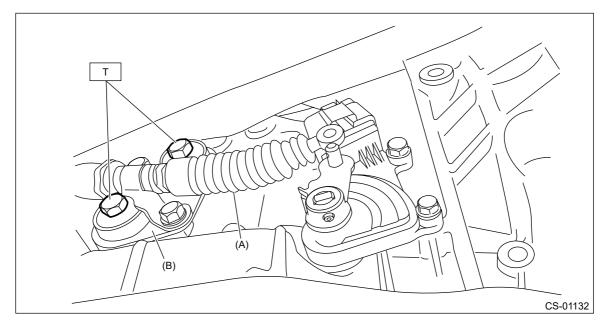
Tightening torque:

60 N·m (6.1 kgf-m, 44.3 ft-lb)

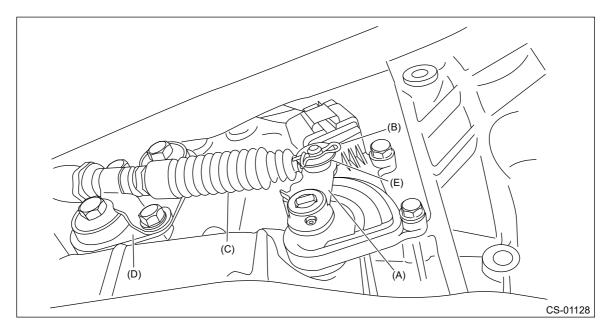
- **32.** Install the propeller shaft. Ref. to DRIVE SHAFT SYSTEM>Propeller Shaft>INSTALLATION.
- **33.** Install the cable plate assembly.

Tightening torque:

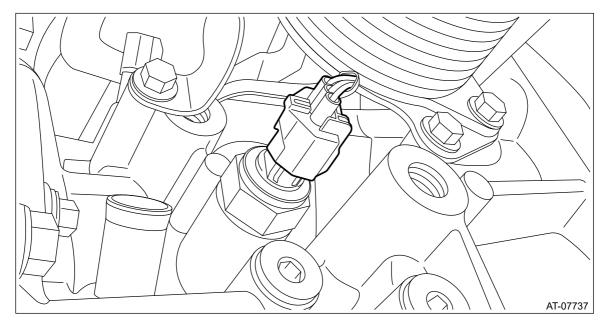
T: 25 N·m (2.5 kgf-m, 18.4 ft-lb)



- (A) Select cable
- (B) Cable plate ASSY
- **34.** Install the washer and snap pin.



- (A) Shifter arm
- (B) Snap pin
- (C) Select cable
- (D) Cable plate ASSY
- (E) Washer
- **35.** Connect the secondary pressure sensor harness connector.



36. Install the exhaust hanger bracket.

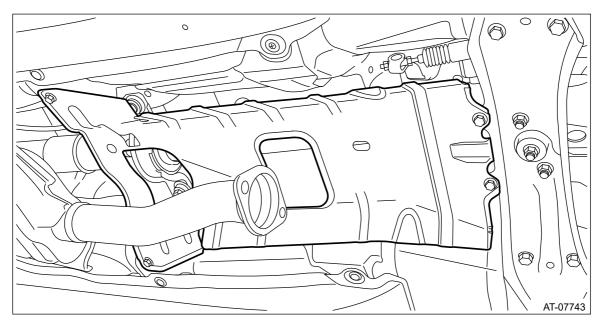
Tightening torque:

23 N·m (2.3 kgf-m, 17.0 ft-lb)

37. Install the center exhaust cover.

Tightening torque:

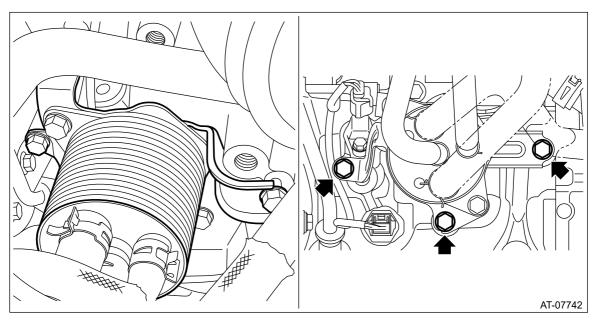
18 N·m (1.8 kgf-m, 13.3 ft-lb)



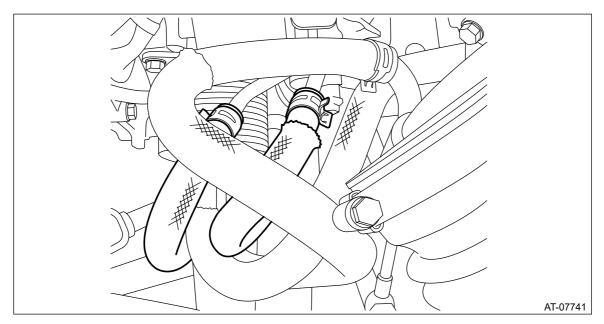
- **38.** Install the center exhaust pipe. Ref. to EXHAUST(H4DOTC)>Center Exhaust Pipe>INSTALLATION.
- **39.** Install the under cover.
- 40. Lower the vehicle.
- **41.** Replace the CVTF inlet hose and CVTF outlet hose. <a> Ref. to CONTINUOUSLY VARIABLE CVTF Cooler (With Warmer Function)>ASSEMBLY.">TRANSMISSION(TR690)>CVTF Cooler (With Warmer Function)>ASSEMBLY.
- **42.** Install the CVTF cooler (with warmer feature).

Tightening torque:

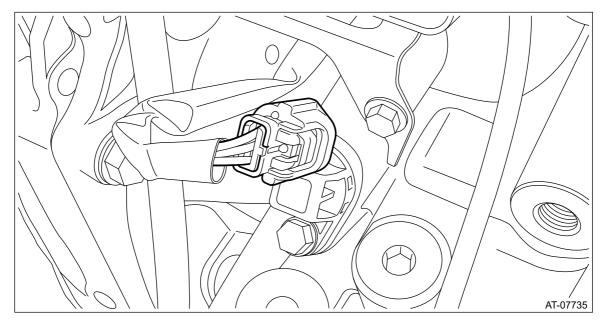
23 N·m (2.3 kgf-m, 17.0 ft-lb)



43. Connect the CVTF inlet hose and the outlet hose.



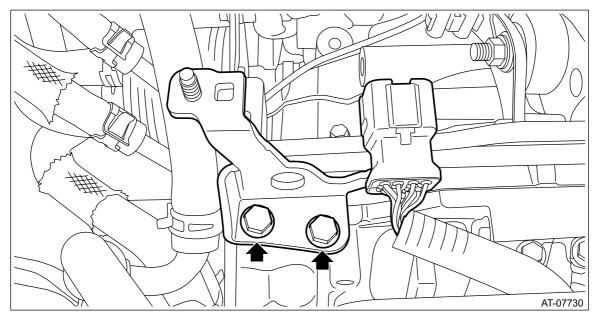
- **44.** Install the air breather hose to the pitching stopper bracket.
- **45.** Connect the primary pressure sensor harness connector.



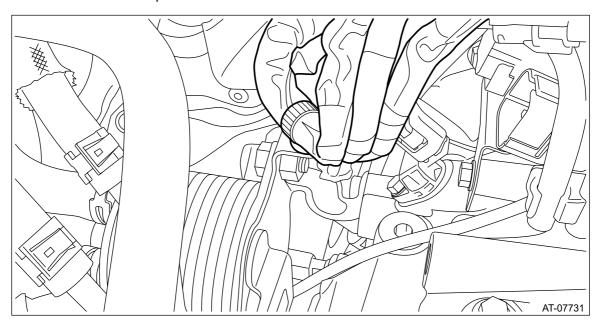
46. Install the engine hanger rear.

Tightening torque:

21 N·m (2.1 kgf-m, 15.5 ft-lb)



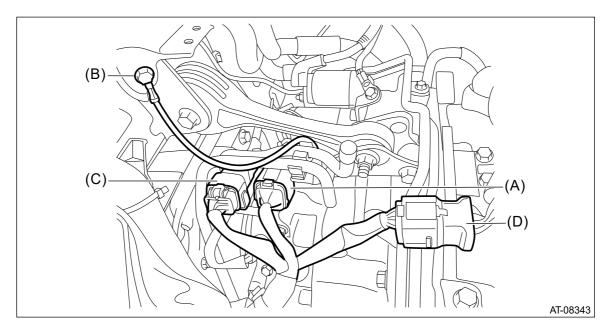
47. Install the harness clip.



- 48. Connect the following harness connectors.
 - Transmission harness connectors
 - Transmission radio ground terminal
 - Inhibitor harness connector
 - Engine harness connectors

Tightening torque:

13 N·m (1.3 kgf-m, 9.6 ft-lb)



- (A) Transmission harness connectors
- (B) Transmission radio ground terminal
- (C) Inhibitor harness connector
- (D) Engine harness connectors
- **49.** Install the intercooler. Ref. to INTAKE (INDUCTION) (H4DOTC)>Intercooler>INSTALLATION.
- **50.** Install the air intake duct. Ref. to INTAKE (INDUCTION)(H4DOTC)>Air Intake Duct>INSTALLATION.
- **51.** Install the front tires.
- **52.** Connect the battery ground terminal.
- **53.** Refill differential gear oil to adjust the differential gear oil amount. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)> Differential Gear Oil.
- **54.** Refill CVTF to adjust the CVTF amount. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>CVTF>ADJUSTMENT.
- **55.** Perform the variator chain break-in. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Variator Chain Break-in>PROCEDURE.

Caution:

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

- Variator chain replacement
- · Primary pulley and secondary pulley replacement
- **56.** Using the Subaru Select Monitor, perform [Clear AT learning value] on [Work Support], and perform [AT learning mode]. Ref. to TRANSMISSION (DIAGNOSTICS)>Learning Control>PROCEDURE.
- **57.** Execute the rear differential inspection mode. Ref. to DIFFERENTIALS>Rear Differential Inspection Mode.

Caution:

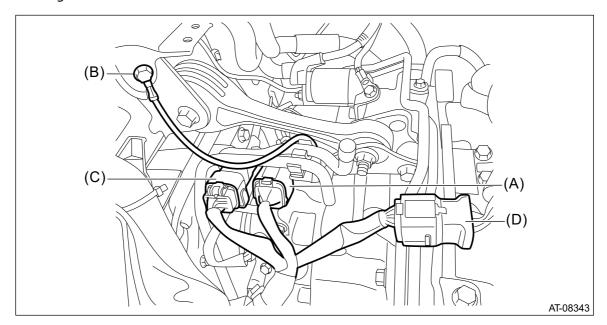
Always execute the rear differential inspection mode at the replacement of the following.

- Replacement of transmission assembly
- Replacement of front differential hypoid gear set
- **58.** Perform the road test to make sure there is no fault. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Road Test>INSPECTION.

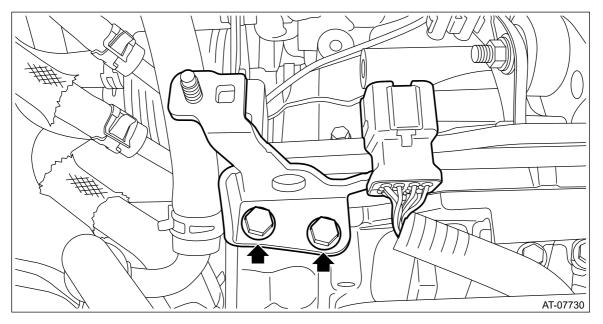
CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Automatic Transmission Assembly

REMOVAL

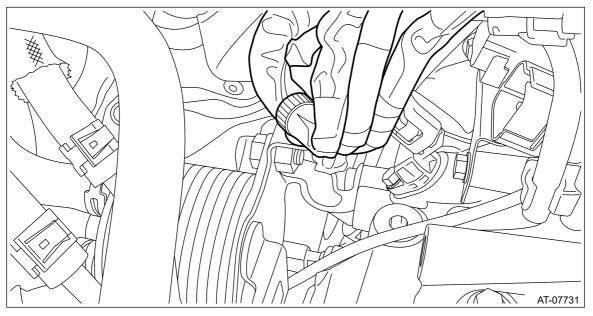
- 1. Remove the front tires.
- 2. Disconnect the ground cable from battery.
- **3.** Remove the air intake duct. Ref. to INTAKE (INDUCTION)(H4DOTC)>Air Intake Duct>REMOVAL.
- 4. Remove the intercooler. Ref. to INTAKE (INDUCTION)(H4DOTC)>Intercooler>REMOVAL.
- **5.** Disconnect the following connectors.
 - Transmission harness connectors
 - · Transmission radio ground terminal
 - Inhibitor harness connector
 - Engine harness connectors



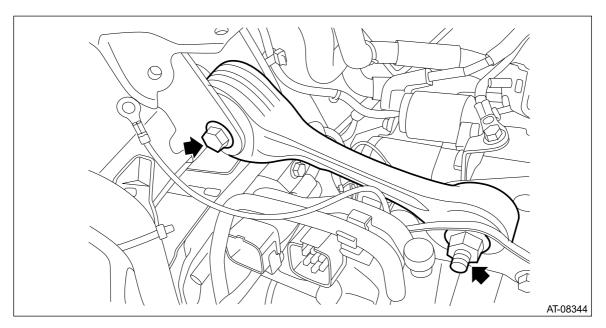
- (A) Transmission harness connectors
- (B) Transmission radio ground terminal
- (C) Inhibitor harness connector
- (D) Engine harness connectors
- 6. Remove the engine hanger rear.



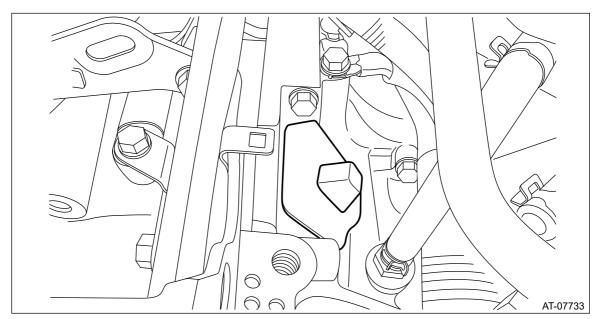
7. Remove the harness clip.



- **8.** Remove the starter. Ref. to STARTING/CHARGING SYSTEMS(H4DOTC)>General Description.
- **9.** Remove the pitching stopper.



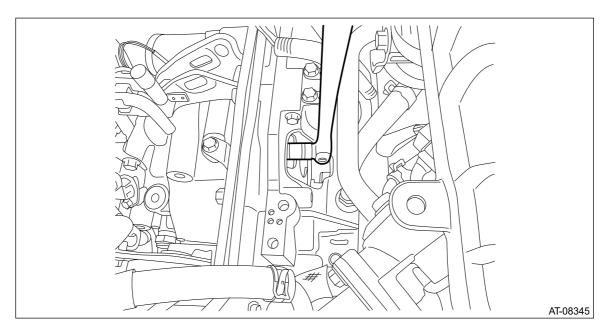
10. Remove the service hole plug.



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

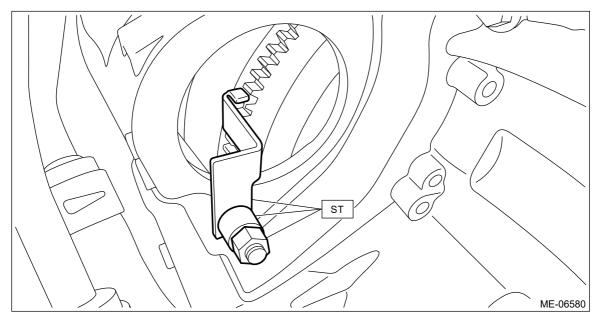
Caution:

- Be careful not to drop bolts into the converter housing.
- Be careful not to damage the mounting bolts.

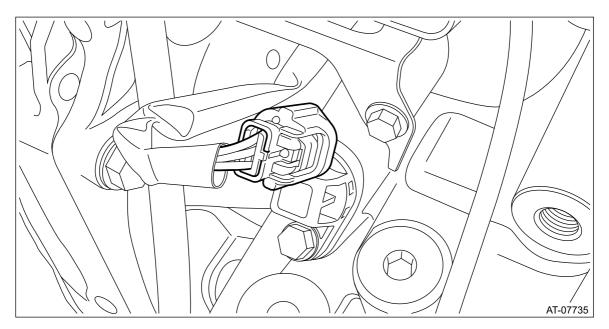


- **12.** Make sure the torque converter moves freely by rotating with finger through the starter installation hole.
- 13. Attach the ST to the converter case.

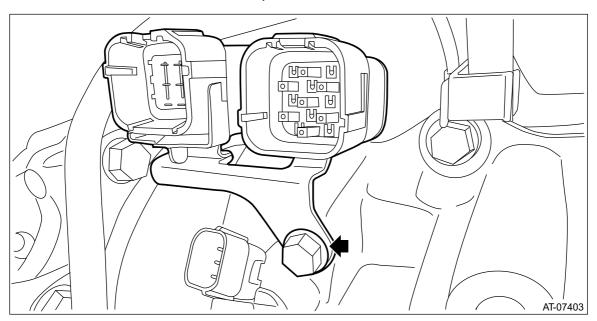
ST 498277200 STOPPER SET



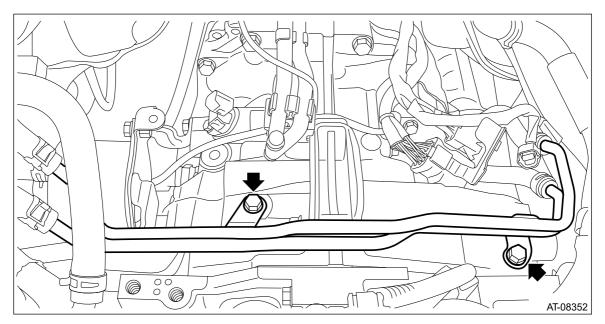
14. Remove the primary speed sensor harness connector.



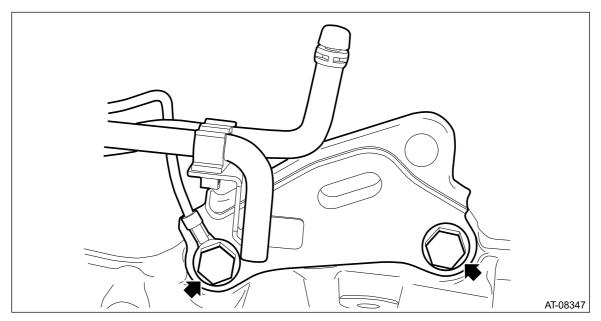
15. Remove the transmission harness stay.



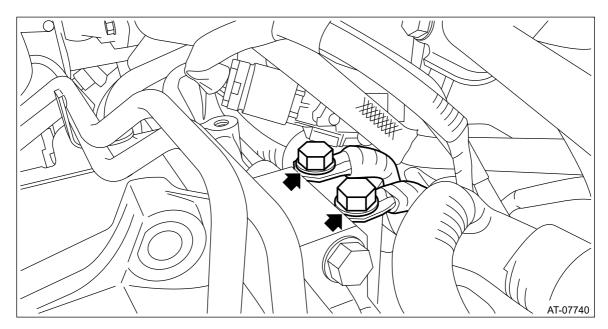
16. Remove the CVTF cooler pipe COMPL mounting bolt.



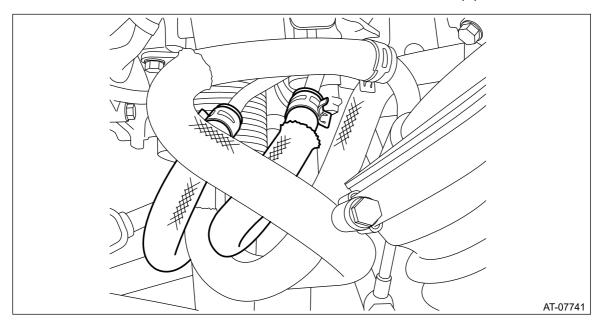
17. Remove the air breather hose from the pitching stopper bracket, and then remove the pitching stopper bracket and transmission radio ground cord.



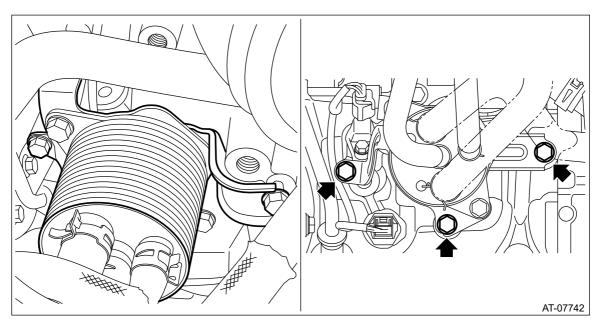
18. Remove the engine ground terminal.



19. Remove the CVTF inlet hose and outlet hose from the CVTF cooler pipe COMPL.



20. Remove the CVTF cooler (with warmer feature), and using a piece of wire, affix to a location of the body where it will not interfere with the removal/installation of the transmission.

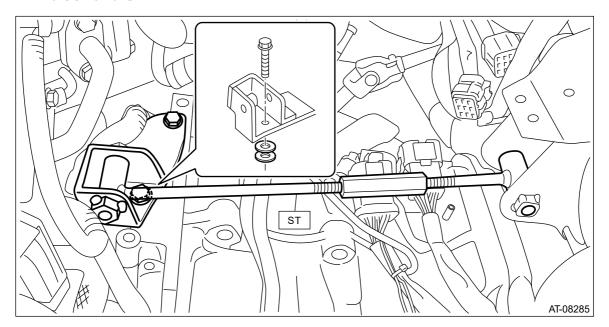


21. Set the ST.

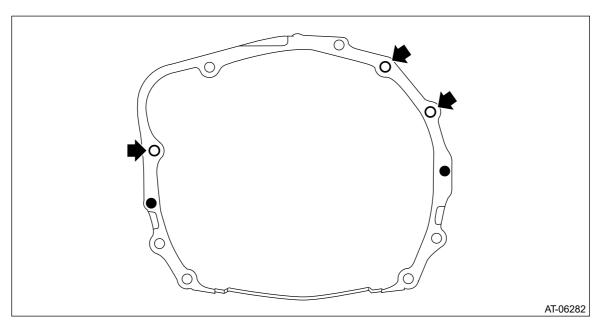
ST 41099AC000 ENGINE SUPPORT ASSY

Note:

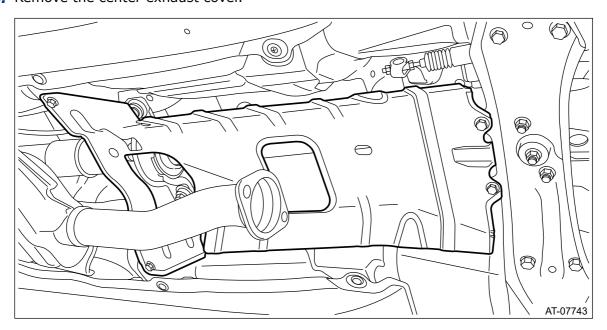
Place a washer with 4 mm (0.16 in) thickness into the gap between the engine block and ST.



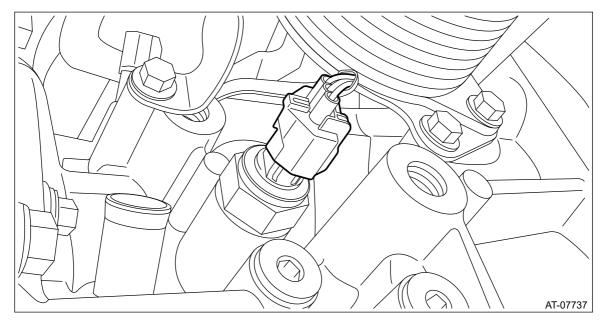
22. Remove the three transmission connecting bolts.



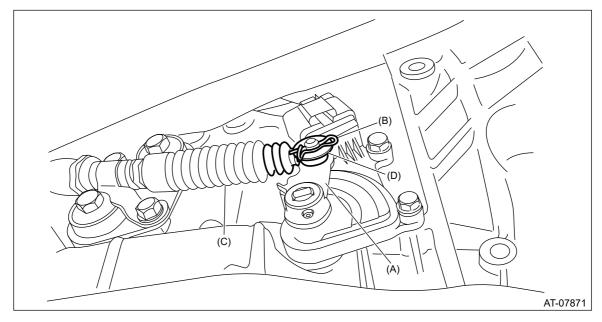
- 23. Lift up the vehicle.
- **24.** Remove the under cover.
- **25.** Remove the center exhaust pipe. Ref. to EXHAUST(H4DOTC)>Center Exhaust Pipe>REMOVAL.
- **26.** Remove the exhaust hanger bracket.
- **27.** Remove the CVTF drain plug to drain CVTF. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>CVTF>REPLACEMENT.
- 28. Remove the center exhaust cover.



29. Remove the secondary pressure sensor harness connector.

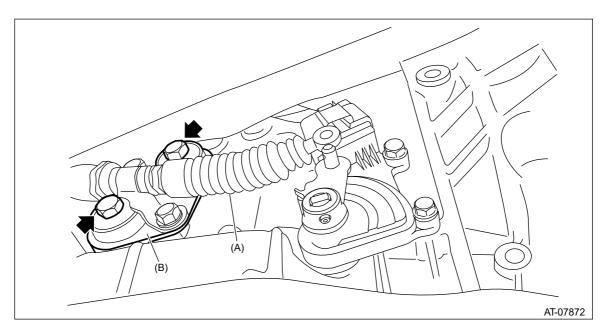


30. Remove the snap pin and washer, and remove the select cable.



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

31. Remove the cable plate assembly.



- (A) Select cable
- (B) Cable plate ASSY
- **32.** Drain differential gear oil. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Differential Gear Oil>REPLACEMENT.
- **33.** Remove the propeller shaft. Remove the propeller shaft. Remove the propeller shaft.
- **34.** Remove the stabilizer link. Ref. to FRONT SUSPENSION>Front Stabilizer>REMOVAL.
- **35.** Disconnect the lower arm ball joint and housing.
- **36.** Pull out the front drive shaft from transmission using a crowbar.

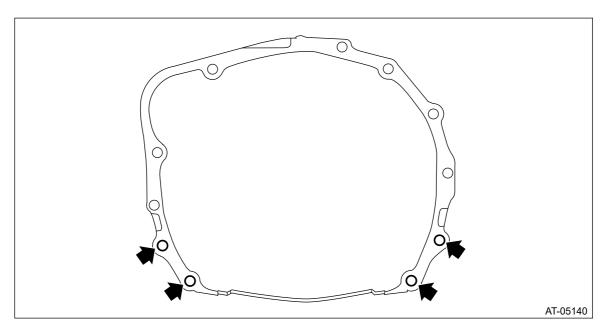
Note:

Place cloth between the tire lever or bar and the transmission in order to avoid damaging the transmission side retainer.

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

Note:

- Before pulling the front drive shaft RH, turn the steering wheel to the right hand at full lock.
- Before pulling the front drive shaft LH, turn the steering wheel to the left hand at full lock.
- **38.** Remove the two transmission connecting bolts and two nuts (lower side).

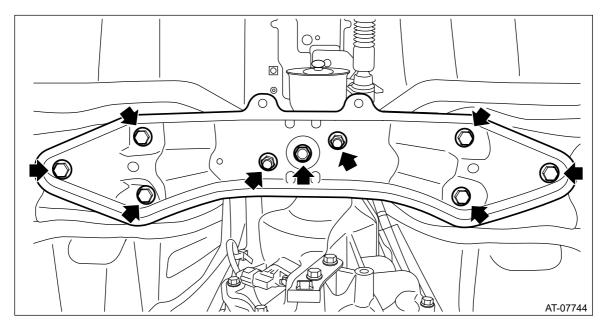


39. Set the transmission jack under the transmission.

Note

Make sure that the support plates of transmission jack do not touch the oil pan.

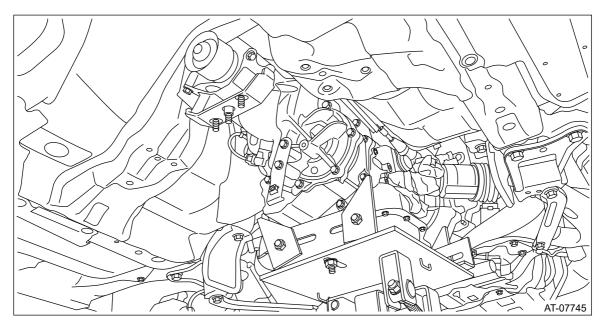
40. Remove the transmission rear crossmember.



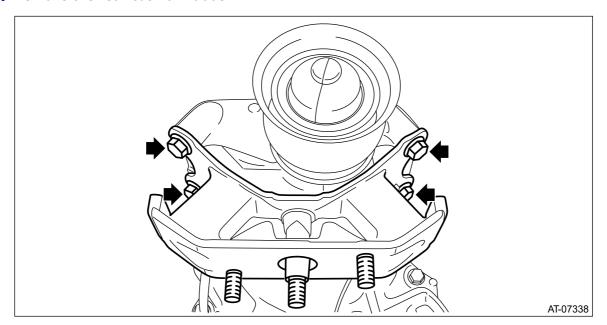
- **41.** While lowering the transmission jack gradually, fully retract the engine support, and then tilt the engine rearward.
- **42.** Remove the transmission assembly.

Note:

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



43. Remove the rear cushion rubber.



CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > AWD ON/OFF Switching Mode

GENERAL DESCRIPTION

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

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > AWD ON/OFF Switching Mode

PROCEDURE

Caution:

- Do not turn the power of the Subaru Select Monitor OFF during work, and do not disconnect the data link connector.
- · On completing the work in FWD, switch back in AWD.
- 1. Shift the select lever to "P" range.
- **2.** Connect the Subaru Select Monitor to data link connector.
- **3.** Turn the ignition switch to ON. (For model with push button start, press the push button ignition switch twice without depressing brake pedal.)
- **4.** Turn off all switches causing an electrical load, such as headlights, A/C, seat heater and rear defogger.
- 5. Select «Diagnosis» in the «Start» screen of Subaru Select Monitor.
- 6. On «Vehicle selection» display, input the vehicle information and select «Confirmed».
- 7. On «Main Menu» display, select «Each System».
- 8. On «Select System» display, select «Transmission Control System».
- 9. On «Select Function» display, select «Work Support».
- 10. Select «AWD ON/OFF switching mode» in the «Work Support» screen.
- **11.** Follow the messages displayed on the Subaru Select Monitor screen when working. Switching completes successfully if any of the following messages is displayed.
 - When switching from AWD to FWD: Switched to FF. To return to AWD, perform basic mode again.
 - When switching from FWD to AWD: Switched to AWD. To return to FF, perform basic mode again.

Note:

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

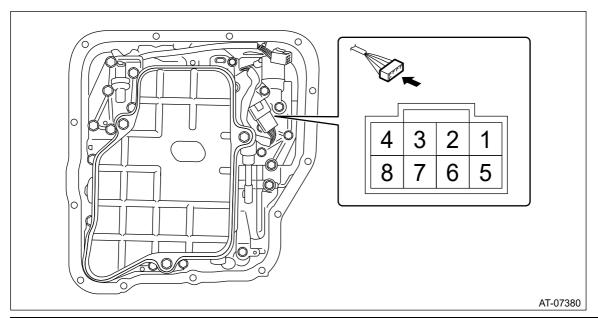
CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Control Valve Body

INSPECTION

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

Note:

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



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

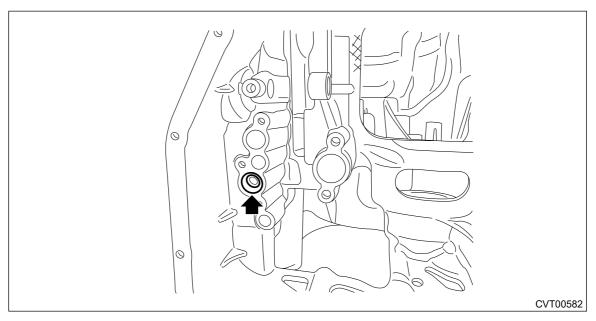
CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Control Valve Body

INSTALLATION

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

Note:

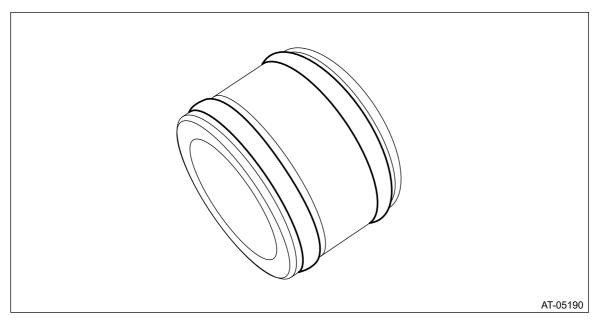
Make sure that the CVTF filter does not protrude from the transmission case.



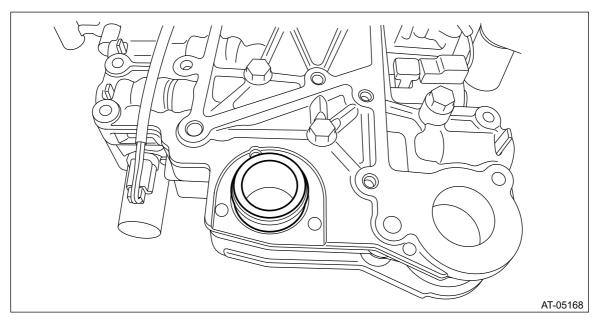
- **3.** Check the control valve body for dust and other foreign matter.
- **4.** Install the O-ring to the pressure pipe.

Note:

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



5. Install the pressure pipe.



6. Install the control valve body.

Caution:

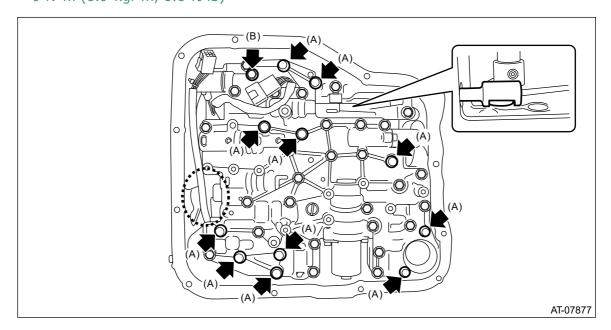
- Beware of the transmission harness getting caught in between.
- Do not impact or bend the transmission harness because it has the oil temperature sensor inside.

Note:

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

Tightening torque:

9 N•m (0.9 kgf-m, 6.6 ft-lb)



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

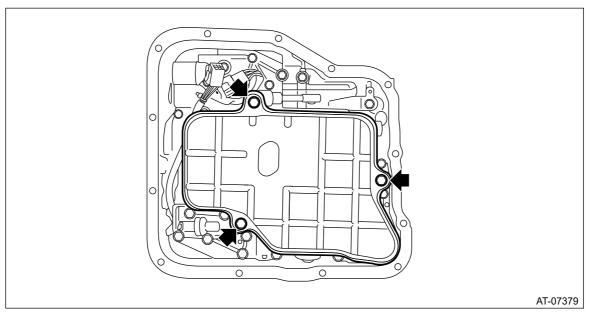
7. Install the O-ring to oil strainer and install the oil strainer.

Note:

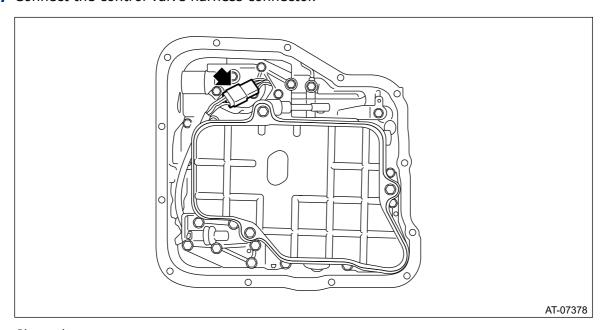
- Use new O-rings.
- Apply CVTF to the O-rings.
- Let the transmission harness run between control valve body and oil strainer.

Tightening torque:

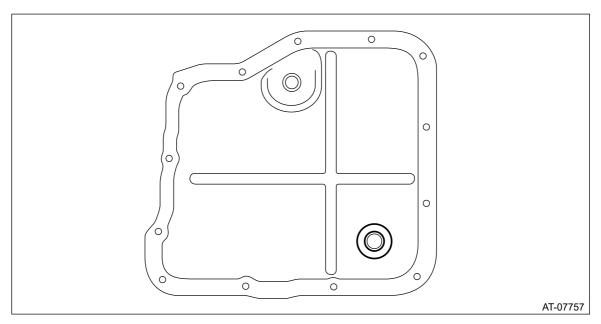
9 N•m (0.9 kgf-m, 6.6 ft-lb)



8. Connect the control valve harness connector.

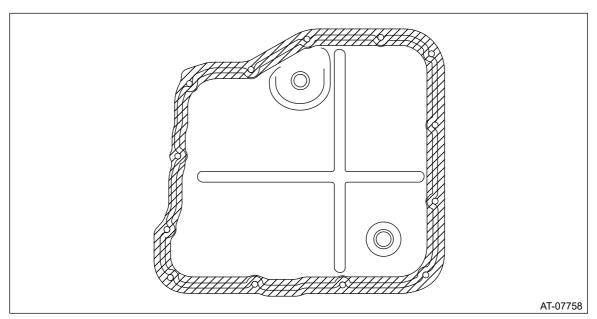


- 9. Clean the magnet.
- 10. Attach the magnet at the specified position of the oil pan.



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

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



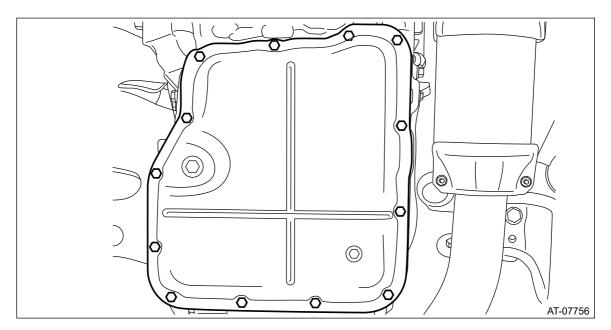
12. Install the oil pan by equally tightening the bolts.

Caution:

Beware of the transmission harness getting caught in between.

Tightening torque:

5 N•m (0.5 kgf-m, 3.7 ft-lb)



- **13.** Connect the battery ground terminal.
- **14.** Refill CVTF to adjust the CVTF amount. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>CVTF>ADJUSTMENT.
- **15.** Using the Subaru Select Monitor, perform [Clear AT learning value] on [Work Support], and perform [AT learning mode]. Ref. to TRANSMISSION (DIAGNOSTICS)>Learning Control>PROCEDURE.

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Control Valve Body

REMOVAL

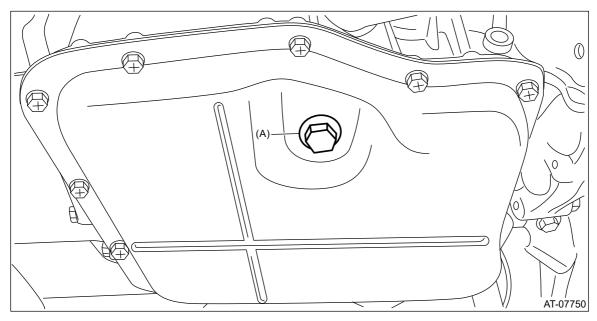
Caution:

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

Note:

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

- 1. Disconnect the ground cable from battery.
- 2. Lift up the vehicle.
- 3. Clean the transmission exterior.
- 4. Remove the CVTF drain plug to drain CVTF.



(A) CVTF drain plug

5. Install the CVTF drain plug.

Note:

Use a new gasket.

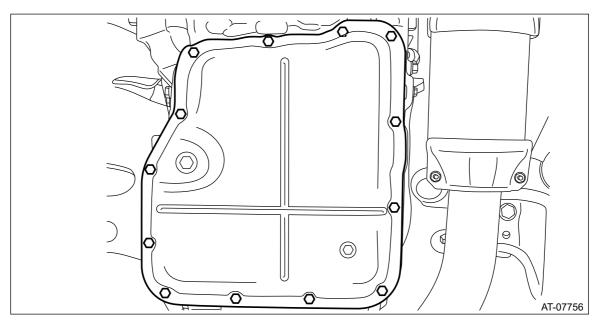
Tightening torque:

39.2 N·m (4.0 kgf-m, 28.9 ft-lb)

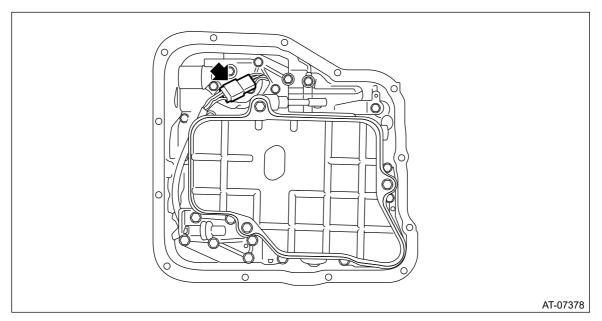
6. Remove the oil pan.

Caution:

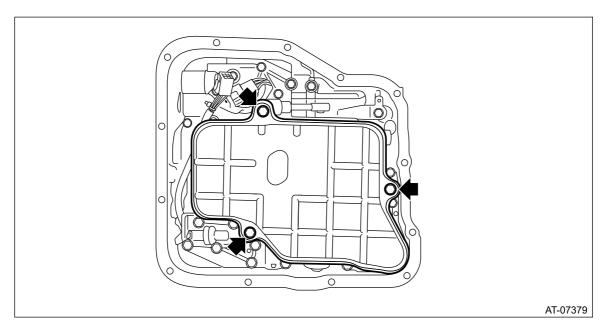
Be careful not to allow foreign matter such as dust or dirt to enter the oil pan.



- 7. Remove the magnet.
- **8.** Disconnect the control valve harness connector.



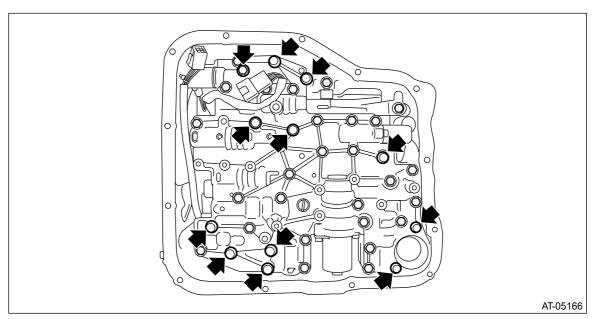
9. Remove the oil strainer.



10. Remove the control valve body.

Caution:

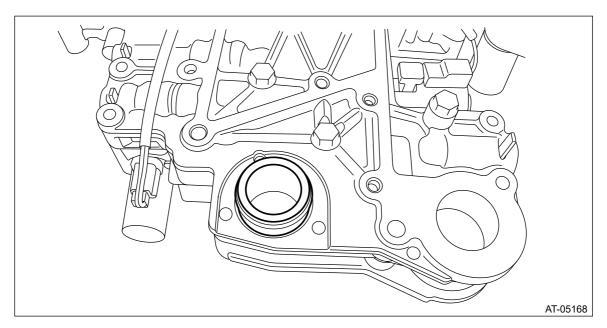
Do not let the manual valve drop off.



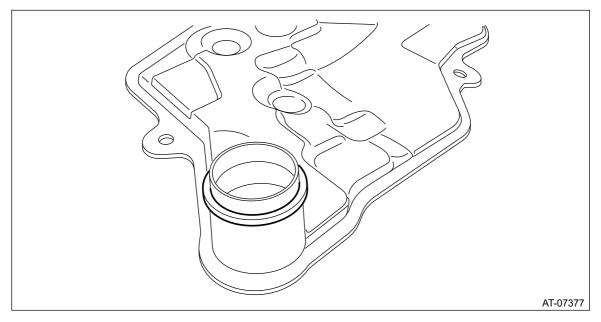
11. Remove the pressure pipe.

Note

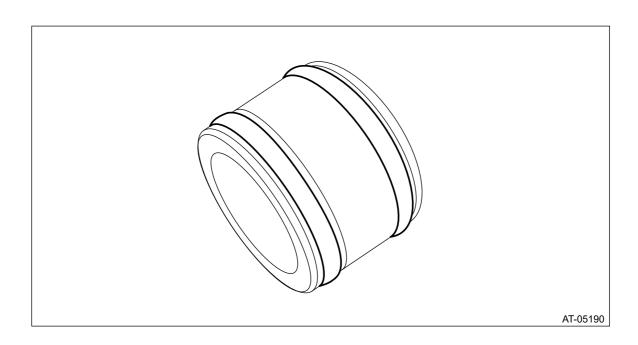
It may be located in transmission case side.



12. Remove the O-ring from oil strainer.



13. Remove the O-ring from pressure pipe.



ADJUSTMENT

When replacing the converter case cover, select the following shims.

- Select the shim for front reduction drive gear. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Front Reduction Drive Gear>ADJUSTMENT.
- Select the shim for front reduction driven gear. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Front Reduction Driven Gear>ADJUSTMENT.

ASSEMBLY

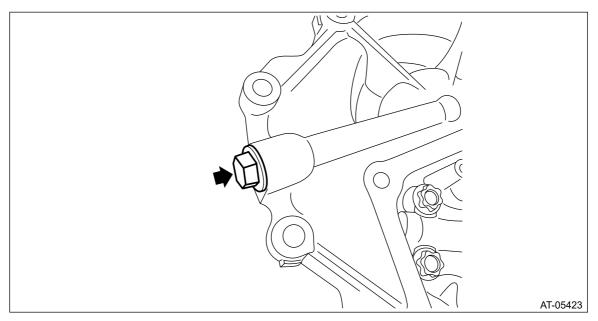
1. Install the plugs.

Note:

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

Tightening torque:

25 N·m (2.5 kgf-m, 18.4 ft-lb)

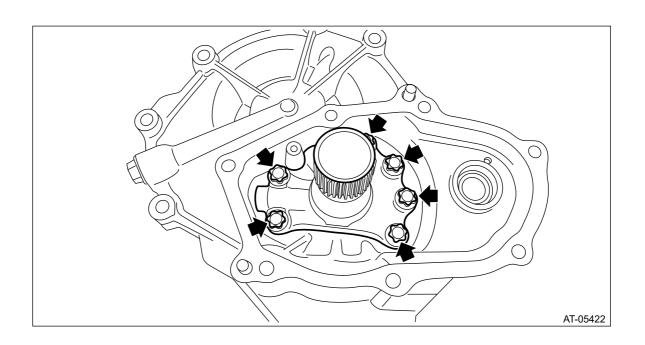


2. Using ST, install the center support COMPL.

ST 18270KA010 SOCKET (E16)

Tightening torque:

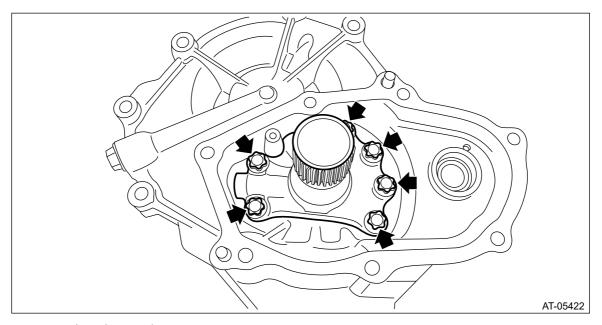
21.5 N·m (2.2 kgf-m, 15.9 ft-lb)



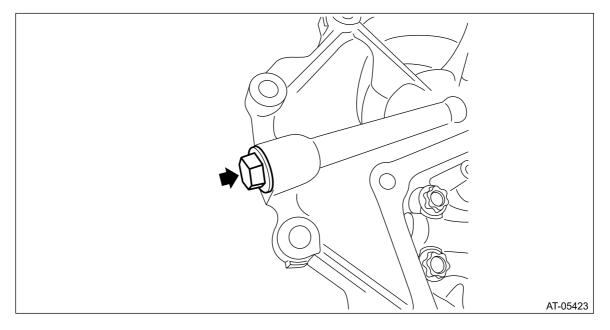
DISASSEMBLY

1. Using ST, remove the center support COMPL.

ST 18270KA010 SOCKET (E16)



2. Remove the plug and O-ring.



INSPECTION

- Check for leakage of CVTF from the connection between converter case and converter case cover.
- Check there is no damage or cracks on the converter case cover.

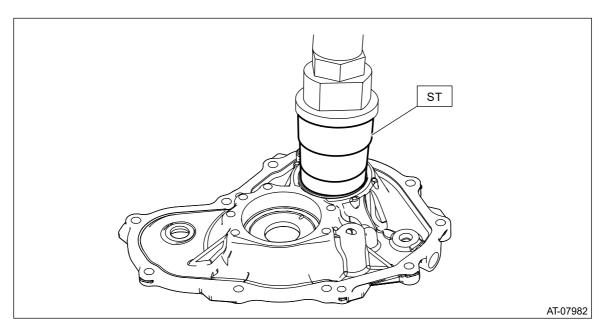
INSTALLATION

- 1. Clean the mating surface of converter case cover and converter case.
- 2. Adjust the shims of front reduction drive gear and front reduction driven gear. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Front Reduction Drive Gear>ADJUSTMENT. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Front Reduction Driven Gear>ADJUSTMENT.
- **3.** Apply CVTF to the selected shims and install on the bearing catch surface of the front reduction driven gear.
- **4.** Using the ST, install the ball bearing to the converter case cover.

Note:

Use a new ball bearing.

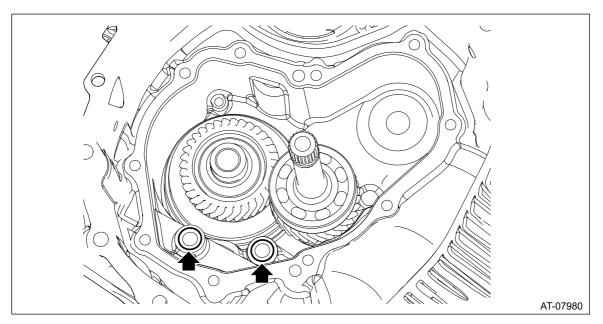
ST 499755602 PRESS SNAP RING



5. Install the O-rings.

Note:

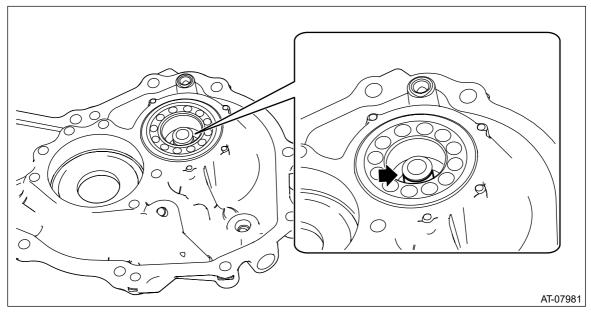
- Use new O-rings.
- Apply CVTF to the O-rings.



- **6.** Apply CVTF to the selected shims and install on the bearing catch surface of the front reduction drive gear.
- 7. Install the seal ring to converter case cover.

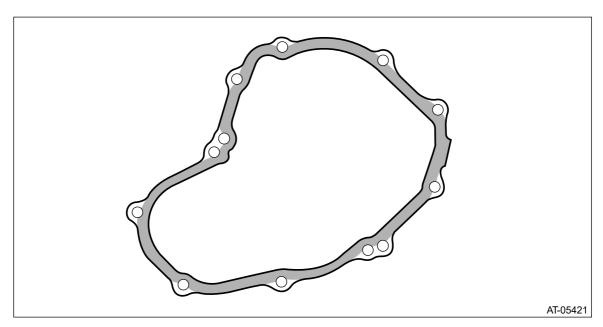
Note:

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



8. Apply liquid gasket seamlessly to the mating surface of converter case cover. Liquid gasket:

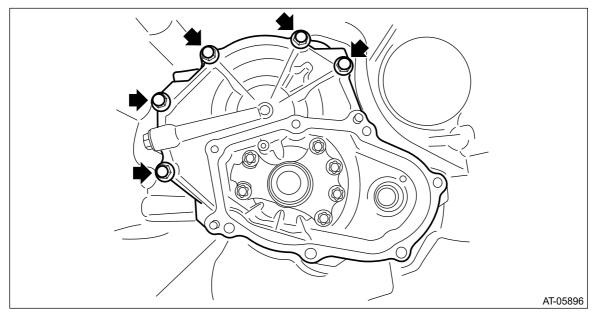
THREE BOND 1215B or equivalent



9. Install the converter case cover.

Tightening torque:

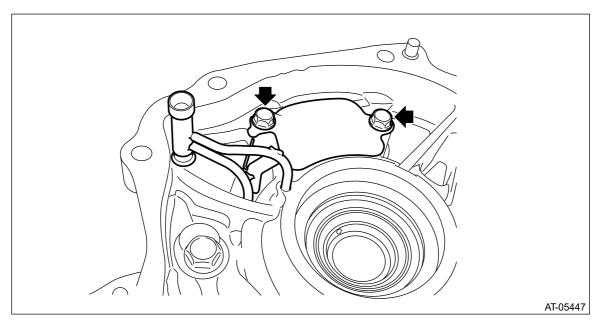
24 N·m (2.4 kgf-m, 17.7 ft-lb)



- **10.** Install the oil pump chain cover and the oil pump chain. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Oil Pump Chain>INSTALLATION.
- **11.** Flip over the converter case cover.
- 12. Install the oil stopper plate and lubrication pipe.

Tightening torque:

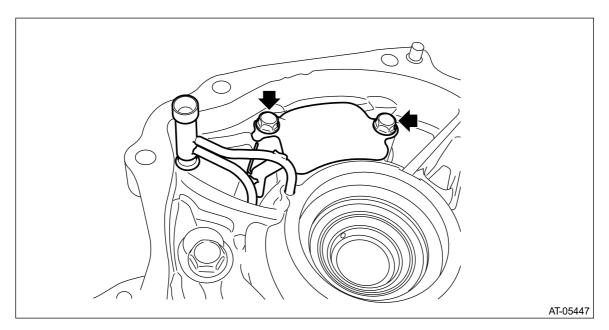
9 N·m (0.9 kgf-m, 6.6 ft-lb)



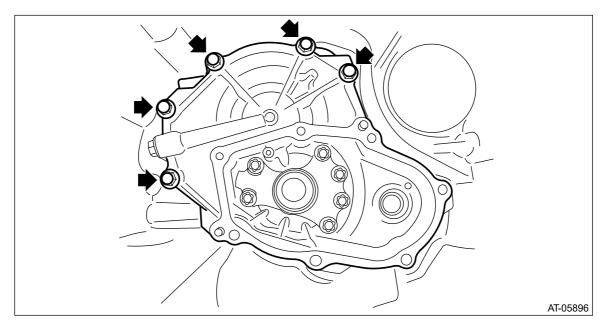
- 13. Install the drive pinion shaft assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Drive Pinion Shaft Assembly>INSTALLATION.
- 14. Install the primary pulley, secondary pulley and variator chain. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Primary Pulley and Secondary Pulley>INSTALLATION.
- **15.** Install the transmission case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transmission Case>INSTALLATION.
- **16.** Install the forward clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Forward Clutch Assembly>INSTALLATION.
- **17.** Install the intermediate case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Intermediate Case>INSTALLATION.
- **18.** Install the transfer reduction driven gear assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transfer Reduction Driven Gear>INSTALLATION.
- 19. Install the transfer clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transfer Clutch>INSTALLATION.
- **20.** Install the rear drive shaft. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Rear Drive Shaft>INSTALLATION.
- **21.** Install the extension case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Extension Case>INSTALLATION.
- **22.** Install the transmission harness. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transmission Harness>INSTALLATION.
- 23. Install the control valve body and oil pan. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Control Valve Body>INSTALLATION.
- **24.** Install the air breather hose. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Air Breather Hose>INSTALLATION.
- **25.** Install the transmission assembly to the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Automatic Transmission Assembly>INSTALLATION.

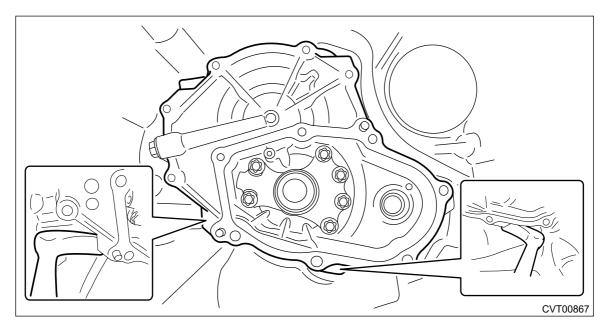
REMOVAL

- **1.** Remove the transmission assembly from the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Automatic Transmission Assembly>REMOVAL.
- **2.** Remove the air breather hose. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Air Breather Hose>REMOVAL.
- **3.** Remove the oil pan and control valve body. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Control Valve Body>REMOVAL.
- **4.** Remove the transmission harness. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transmission Harness>REMOVAL.
- **5.** Remove the extension case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Extension Case>REMOVAL.
- **6.** Remove the rear drive shaft. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Rear Drive Shaft>REMOVAL.
- **7.** Remove the transfer clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transfer Clutch>REMOVAL.
- **8.** Remove the transfer reduction driven gear assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transfer Reduction Driven Gear>REMOVAL.
- **9.** Remove the intermediate case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Intermediate Case>REMOVAL.
- **10.** Remove the forward clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Forward Clutch Assembly>REMOVAL.
- **11.** Remove the transmission case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transmission Case>REMOVAL.
- **12.** Remove the primary pulley, secondary pulley and variator chain. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Primary Pulley and Secondary Pulley>REMOVAL.
- **13.** Remove the drive pinion shaft assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Drive Pinion Shaft Assembly>REMOVAL.
- **14.** Remove the oil stopper plate and lubrication pipe.

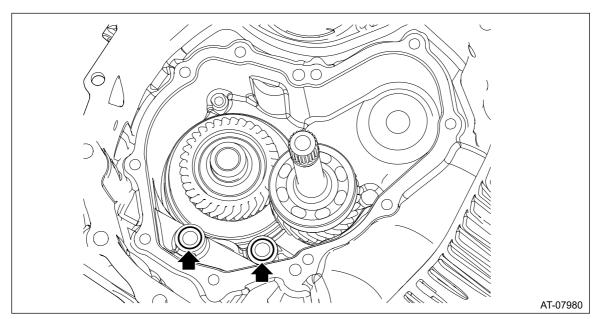


- **15.** Flip over the converter case.
- **16.** Remove the oil pump chain cover and the oil pump chain. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Oil Pump Chain>REMOVAL.
- **17.** Remove the converter case cover.

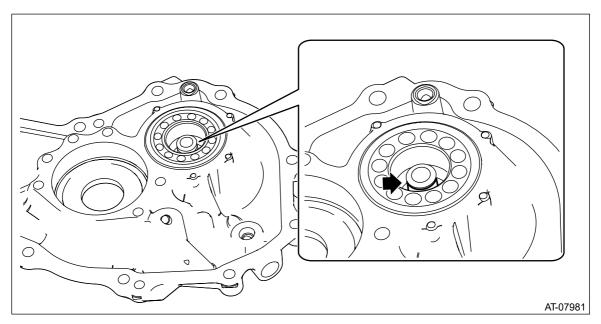




18. Remove the O-rings.



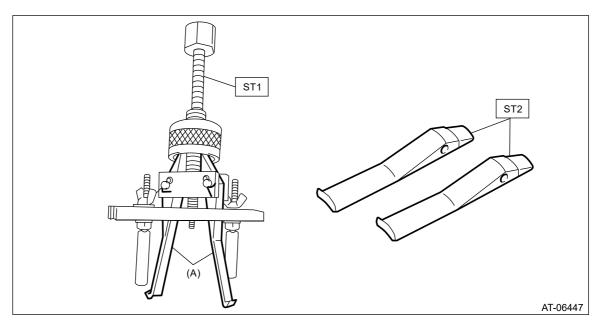
19. Remove the seal ring from converter case cover.



- **20.** Using the ST, remove the ball bearing from the converter case cover.
 - (1) Remove the claw of ST1, and attach the claw of ST2.

ST1 398527700 PULLER ASSY

ST2 18760AA000 CLAW

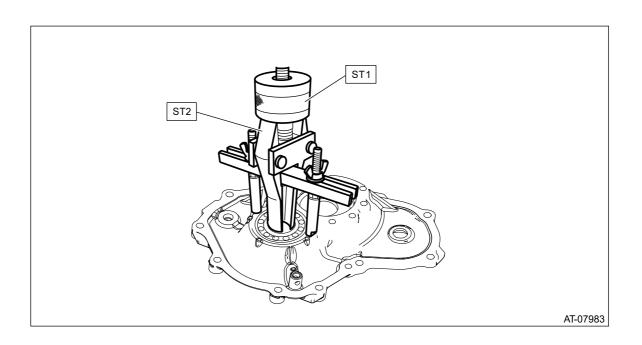


(A) Claw

(2) Using the ST, remove the ball bearing from the converter case cover.

ST1 398527700 PULLER ASSY

ST2 18760AA000 CLAW



ADJUSTMENT

When replacing the converter case cover, select the following shims.

- Select the shim for front reduction drive gear. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Front Reduction Drive Gear>ADJUSTMENT.
- Select the shim for front reduction driven gear. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Front Reduction Driven Gear>ADJUSTMENT.
- Select shims for primary pulley. Ref. to CONTINUOUSLY VARIABLE

 TRANSMISSION(TR690)>Primary Pulley and Secondary Pulley>ADJUSTMENT.

ASSEMBLY

1. Install the oil drain plug.

Note:

Use a new gasket.

Tightening torque:

70 N•m (7.1 kgf-m, 51.6 ft-lb)

2. Temporarily install the overflow drain plug.

Note:

Replace the gasket of overflow drain plug with a new part after installing the transmission assembly to vehicle and adjusting differential gear oil.

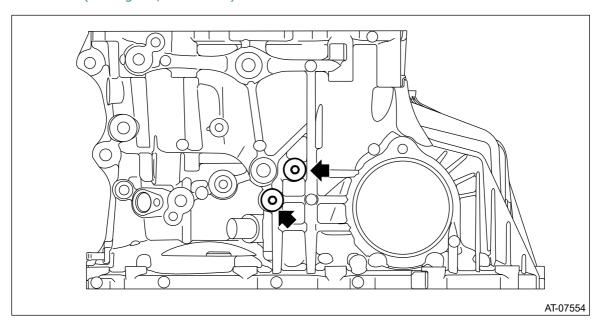
3. Install all plugs.

Note:

Use new O-rings.

Tightening torque:

25 N•m (2.5 kgf-m, 18.4 ft-lb)



4. Install the pitching stopper bracket and transmission radio ground cord.

Caution:

Be careful not to deform or damage the terminal of transmission radio ground cord.

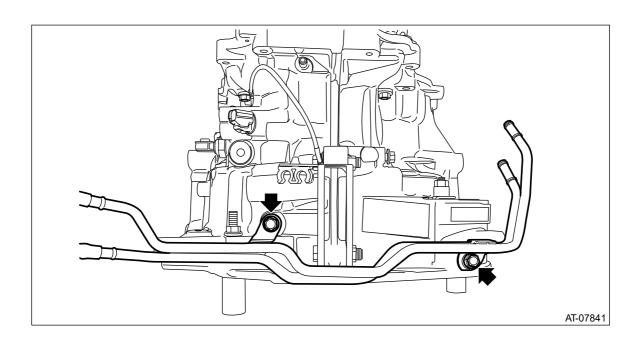
Tightening torque:

41 N•m (4.2 kgf-m, 30.2 ft-lb)

5. Install the CVTF cooler pipe COMPL.

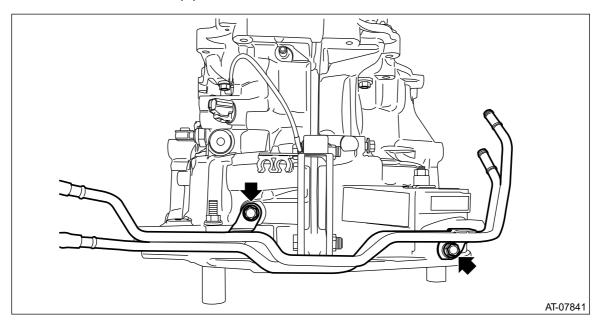
Tightening torque:

16 N•m (1.6 kgf-m, 11.8 ft-lb)

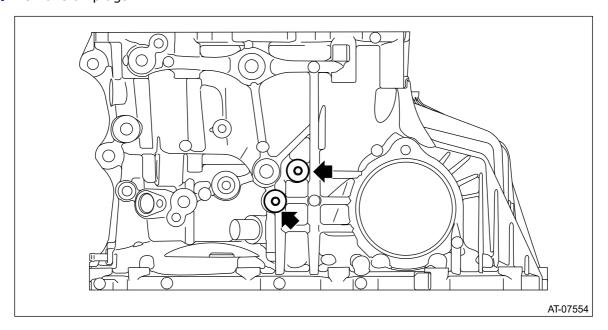


DISASSEMBLY

1. Remove the CVTF cooler pipe COMPL.



- **2.** Remove the pitching stopper bracket and transmission radio ground cord, if mounted.
- **3.** Remove the oil drain plug and overflow drain plug. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Differential Gear Oil>REPLACEMENT.
- 4. Remove all plugs.



INSPECTION

- Check for leakage of CVTF from the connection between converter case and transmission case.
- Check there is no damage or cracks on the converter case.

INSTALLATION

- **2.** Install the converter case cover. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Converter Case Cover>INSTALLATION.
- **3.** Install the oil pump chain cover and the oil pump chain. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Oil Pump Chain>INSTALLATION.
- **4.** Install the front differential assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Front Differential Assembly>INSTALLATION.
- **5.** Install the drive pinion shaft assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Drive Pinion Shaft Assembly>INSTALLATION.
- **6.** Install the primary pulley, secondary pulley and variator chain. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Primary Pulley and Secondary Pulley>INSTALLATION.
- 7. Install the transmission case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transmission Case>REMOVAL.
- **8.** Install the forward clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Forward Clutch Assembly>INSTALLATION.
- **9.** Install the intermediate case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Intermediate Case>INSTALLATION.
- **10.** Install the transfer reduction driven gear. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transfer Reduction Driven Gear>INSTALLATION.
- **11.** Install the transfer clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transfer Clutch>INSTALLATION.
- 12. Install the rear drive shaft. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Rear Drive Shaft>INSTALLATION.
- 13. Install the extension case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Extension Case>INSTALLATION.
- **14.** Install the primary speed sensor. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Primary Speed Sensor>INSTALLATION.
- **15.** Install the secondary pressure sensor. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Secondary Pressure Sensor>INSTALLATION.
- **16.** Install the transmission harness. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transmission Harness>INSTALLATION.
- 17. Install the control valve body and oil pan. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Control Valve Body>INSTALLATION.
- **18.** Install the air breather hose. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Air Breather Hose>INSTALLATION.
- 19. Install the transmission assembly to the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Automatic Transmission Assembly>INSTALLATION.

REMOVAL

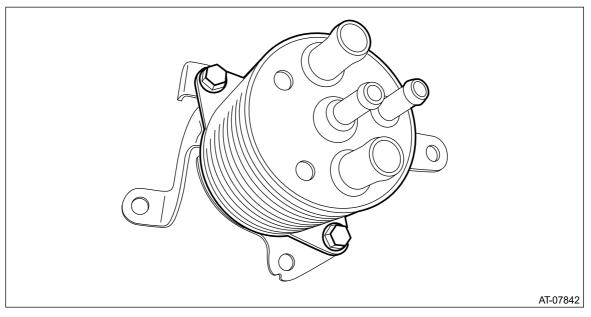
- **1.** Remove the transmission assembly from the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Automatic Transmission Assembly>REMOVAL.
- **2.** Remove the air breather hose. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Air Breather Hose>REMOVAL.
- **3.** Remove the oil pan and control valve body. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Control Valve Body>REMOVAL.
- **4.** Remove the transmission harness. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transmission Harness>REMOVAL.
- **5.** Remove the secondary pressure sensor. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Secondary Pressure Sensor>REMOVAL.
- **6.** Remove the primary speed sensor. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Primary Speed Sensor>REMOVAL.
- 7. Remove the extension case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Extension Case>REMOVAL.
- **8.** Remove the rear drive shaft. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Rear Drive Shaft>REMOVAL.
- **9.** Remove the transfer clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transfer Clutch>REMOVAL.
- **10.** Remove the transfer reduction driven gear assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transfer Reduction Driven Gear>REMOVAL.
- **11.** Remove the intermediate case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Intermediate Case>REMOVAL.
- **12.** Remove the forward clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Forward Clutch Assembly>REMOVAL.
- **13.** Remove the transmission case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transmission Case>REMOVAL.
- **14.** Remove the primary pulley, secondary pulley and variator chain. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Primary Pulley and Secondary Pulley>REMOVAL.
- **15.** Remove the drive pinion shaft assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Drive Pinion Shaft Assembly>REMOVAL.
- **16.** Remove the front differential assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Front Differential Assembly>REMOVAL.
- **17.** Remove the oil pump chain cover and the oil pump chain. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Oil Pump Chain>REMOVAL.
- **18.** Remove the converter case cover. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Converter Case Cover>REMOVAL.
- 19. Remove the front reduction drive gear and front reduction driven gear. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Front Reduction Drive Gear>REMOVAL.

ASSEMBLY

1. Attach the bracket.

Tightening torque:

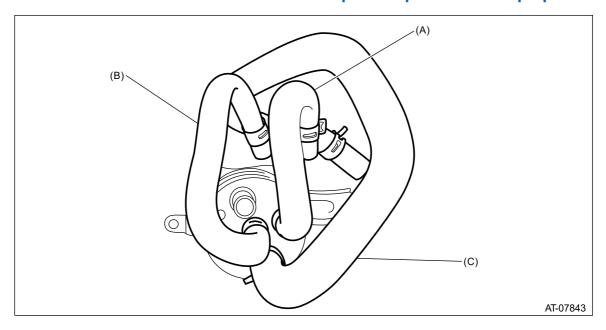
23 N•m (2.3 kgf-m, 17.0 ft-lb)



2. Install each hose.

Note:

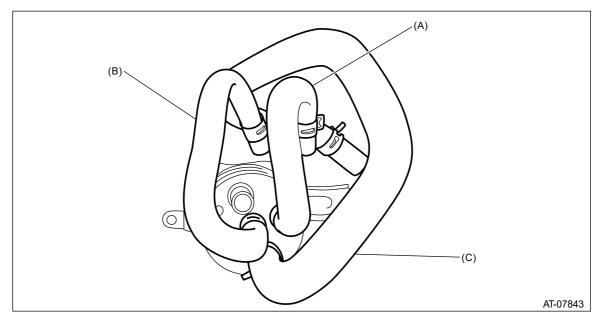
- Use a new CVTF cooler hose.
- Install so that the CVTF cooler hose is not folded over, excessively bent or twisted.
- Insert the CVTF cooler hose to the specified position in the proper direction.



- (A) CVTF cooler outlet hose
- (B) CVTF cooler inlet hose
- (C) Engine coolant outlet hose

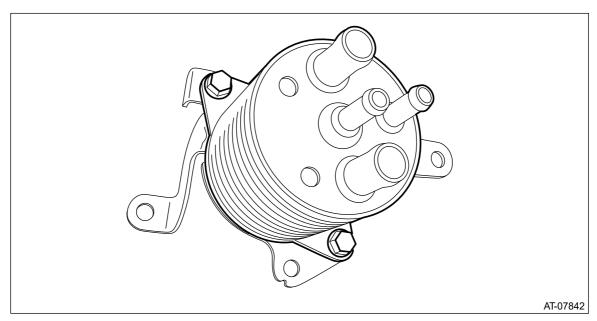
DISASSEMBLY

1. Remove each hose.



- (A) CVTF cooler outlet hose
- (B) CVTF cooler inlet hose
- (C) Engine coolant outlet hose

2. Remove the bracket.



INSPECTION

Replace any faulty CVTF cooler hoses, CVTF cooler pipes and clamps found in the inspection below.

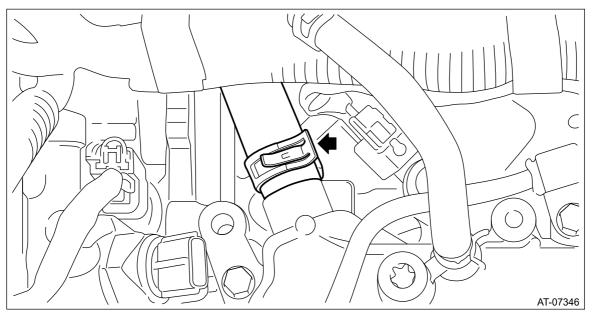
- 1. Check that there are no CVTF or engine coolant leaks from the connections.
- **2.** Check the clamp for deformation.
- 3. Lightly bend the CVTF cooler hose and check for cracks in the surface or other damages.
- **4.** Pinch the CVTF cooler hose with your fingers and check for poor elasticity. Also check for poor elasticity in the parts where the clamp was installed by pressing with your fingernail.
- **5.** Check for peeling, cracks, and deformation at the tip of the hose.
- **6.** Check the CVTF cooler (with warmer feature) for any damage.

INSTALLATION

1. Connect the engine coolant inlet hose.

Note:

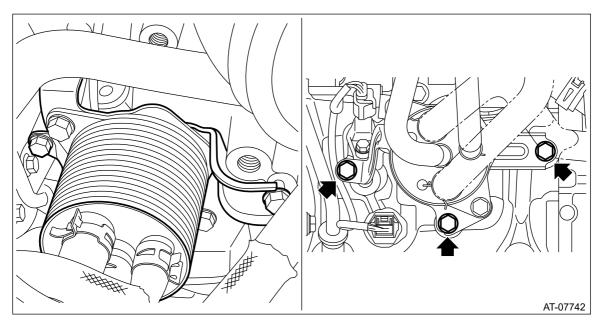
When installing the engine coolant inlet hose, the triangle marking should face upward.



- 2. Install the insulator, EGR valve, and the intake manifold. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Intake Manifold>INSTALLATION. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>EGR Control Valve>INSTALLATION.
- **3.** Replace the CVTF inlet hose and the outlet hose.
- 4. Install the CVTF cooler (with warmer feature).

Tightening torque:

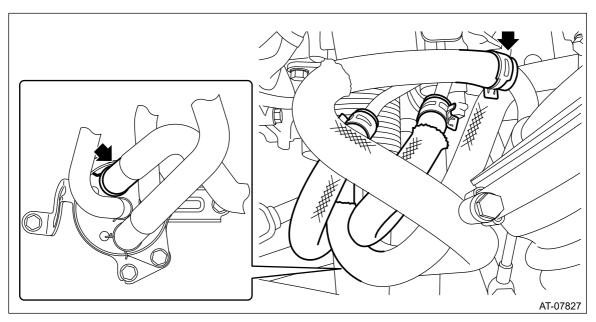
23 N•m (2.3 kgf-m, 17.0 ft-lb)



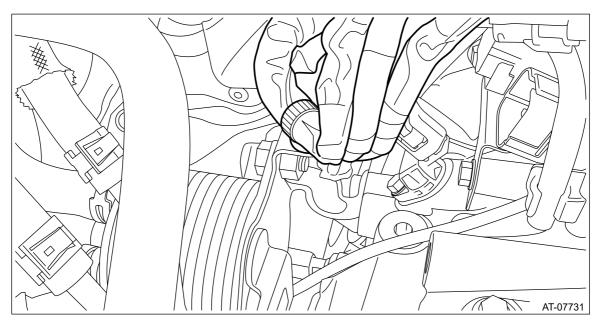
5. Install the engine coolant outlet hose, engine coolant inlet hose, CVTF inlet hose and CVTF outlet hose.

Note:

Use new CVTF hoses.



- 6. Check installation condition of hoses.
 - Make sure the hoses do not interfere with each other or with other components.
 - Check each hose for bent, excess curve, and twisting conditions.
- 7. Install the harness clip.



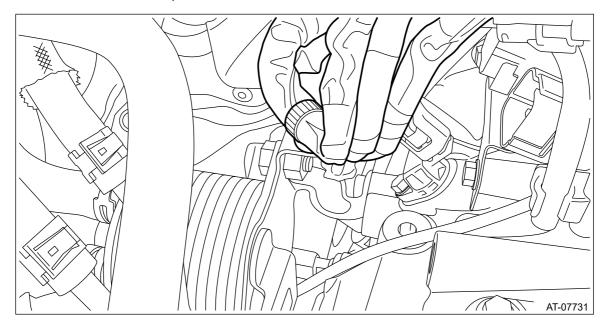
- **8.** Install the intercooler. Ref. to INTAKE (INDUCTION) (H4DOTC)>Intercooler>INSTALLATION.
- **9.** Connect the battery ground terminal.
- 10. Fill engine coolant. REPLACEMENT.
- **11.** Adjust the CVTF level. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>CVTF>ADJUSTMENT.

REMOVAL

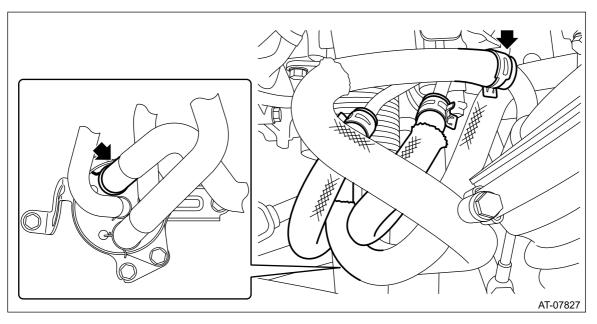
Caution:

If the CVTF and engine coolant is spilt over exhaust pipe, wipe it off with cloth to avoid emitting smoke or causing a fire.

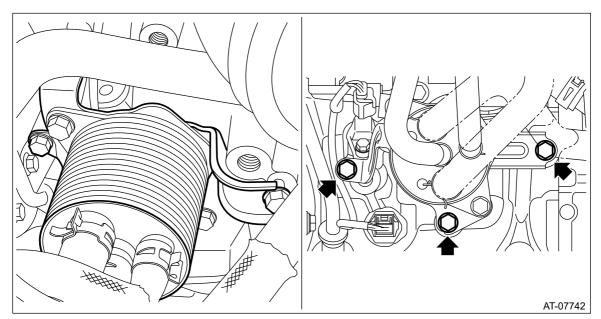
- 1. Disconnect the ground cable from battery.
- 2. Drain engine coolant. Ref. to COOLING(H4DOTC)>Engine Coolant>REPLACEMENT.
- 3. Remove the intercooler. Ref. to INTAKE (INDUCTION)(H4DOTC)>Intercooler>REMOVAL.
- 4. Remove the harness clip.



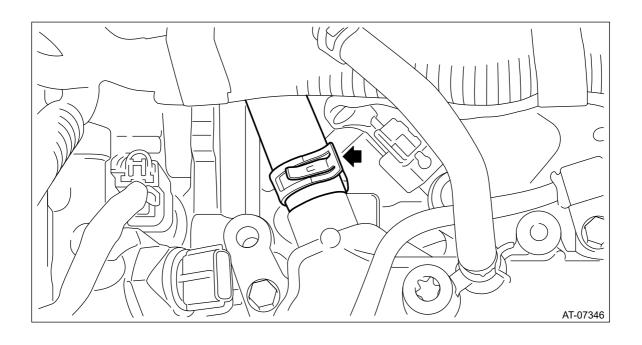
5. Remove the engine coolant outlet hose, engine coolant inlet hose, CVTF inlet hose and CVTF outlet hose.



6. Remove the CVTF cooler (with warmer feature).



- 7. Remove the intake manifold, EGR valve, and the insulator. Ref. to FUEL INJECTION (FUEL SYSTEMS)(H4DOTC)>Intake Manifold>REMOVAL. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(H4DOTC)>EGR Control Valve>REMOVAL.
- **8.** Disconnect the engine coolant inlet hose.



CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > CVTF Filter

INSPECTION

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

INSTALLATION

Note:

For installation of CVTF filter, refer to "Intermediate Case". Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Intermediate Case>INSTALLATION.

REMOVAL

Note:

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

ADJUSTMENT

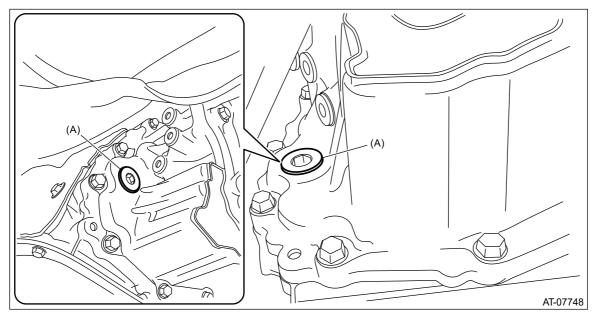
Caution:

- CVTF level changes along with CVTF temperature. When inspecting CVTF level, observe the specified CVTF temperature.
- Always use specified CVTF. Using other fluid will cause malfunction.
- **1.** Idle the engine to raise CVTF temperature to $35-45^{\circ}$ C ($95-113^{\circ}$ F) on Subaru Select Monitor
- **2.** Operate the select lever in $P \to R \to N \to D$ and $D \to N \to R \to P$ to circulate CVTF with the engine idling.
- **3.** With the engine running, lift up the vehicle and remove the filler plug.

Caution:

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

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



(A) Filler plug

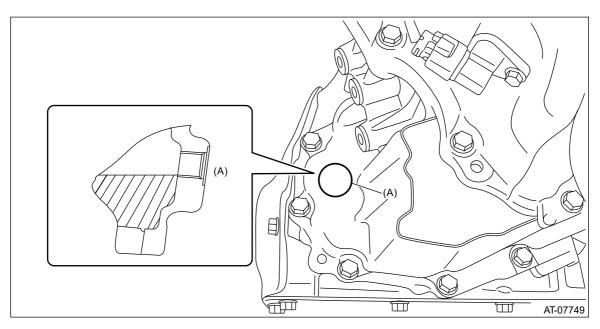
4. When there is no CVTF leakage from the transmission, add the specified fluid up to the filler plug hole lower section.

Specified fluid:

Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>General Description>SPECIFICATION > HYDRAULIC CONTROL AND LUBRICATION.

Caution:

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



(A) Filler plug hole

5. Install the filler plug.

Note:

Use a new gasket.

Tightening torque:

50 N·m (5.1 kgf-m, 36.9 ft-lb)

CONDITION CHECK

Note:

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

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

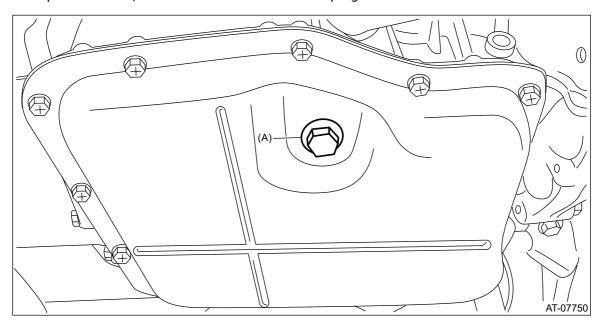
INSPECTION

Check for leakage of CVTF from transmission.

REPLACEMENT

Caution:

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



(A) CVTF drain plug

- **2.** Check the CVTF condition. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>CVTF>CONDITION CHECK.
- **3.** Install the CVTF drain plug and gasket.

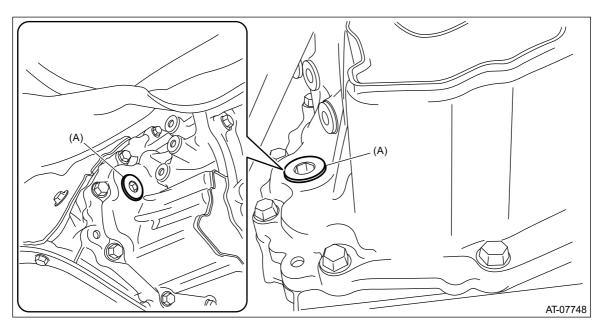
Note:

Use a new gasket.

Tightening torque:

39.2 N·m (4.0 kgf-m, 28.9 ft-lb)

4. Remove the filler plug.



(A) Filler plug

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

Specified fluid:

Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>General Description>SPECIFICATION > HYDRAULIC CONTROL AND LUBRICATION.

- **6.** Temporarily tighten the filler plug.
- 7. Idle the engine to raise CVTF temperature to $35-45^{\circ}\text{C}$ ($95-113^{\circ}\text{F}$) on Subaru Select Monitor.
- **8.** Operate the select lever in $P \to R \to N \to D$ and $D \to N \to R \to P$ to circulate CVTF with the engine idling.

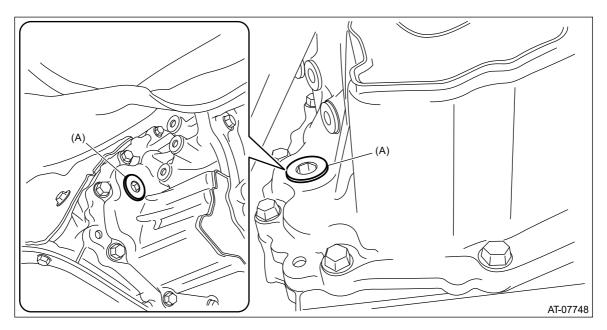
Caution:

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

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

Tightening torque:

50 N·m (5.1 kgf-m, 36.9 ft-lb)



(A) Filler plug

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Diagnostics with Phenomenon

INSPECTION

Symptoms	Faulty parts
Stall speed is low after warming-up, with select	Engine Control System
lever in "D" or "R" range.	
Vehicle does not move despite engine speed rising up, with select lever in "D" or "R" range.	 Engine Control System Select cable CVTF Secondary pressure circuit Pulley, gear and variator chain Forward/reverse changeover section TCM Control valve body Inhibitor switch
Vehicle does not move by engine stall, with select lever in "D" or "R" range.	Parking mechanismSelect cableBearingForward/reverse changeover section
Excessive shock occurs at starting, with select lever in "D" or "R" range.	Secondary pressure circuitPulley, gear and variator chain
Acceleration speed from standstill is insufficient, with select lever in "D" or "R" range.	Control valve bodyForward/reverse changeover section
Engine speed suddenly rises up during driving, with select lever in "D" or "R" range.	Control valve bodySecondary pressure circuitPrimary pressure circuit
Vibration occurs during driving, with select lever in "D" or "R" range.	 Secondary pressure circuit Primary pressure circuit Forward/reverse changeover section Pulley and variator chain Torque converter assembly Hydraulic pressure circuit to torque converter Control valve body
Sudden braking occurs during driving, with select lever in "D" or "R" range.	Secondary pressure circuitPrimary pressure circuitControl valve body
During deceleration, lockup clutch does not disengage until just before halting, with select lever in "D" or "R" range.	Control valve bodyTorque converter assembly
Engine stalls with vehicle at a standstill, with select lever in "D" or "R" range.	Engine Control SystemControl valve body
Excessive lockup shock occurs during driving, with select lever in "D" range.	control valve body

Slipping occurs at lockup, or lockup does not occur during driving, with select lever in "D" range.	Control valve bodyLockup hydraulic lineTorque converter assembly
Excessive shift shock occurs when shifting the select lever from "N" range to "D" range, or from "N" range to "R" range.	Inhibitor switchControl valve bodyForward/reverse changeover section
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.	Select cable Parking mechanism
Select lever does not shift smoothly.	Select cableInhibitor switchDetent springManual plate

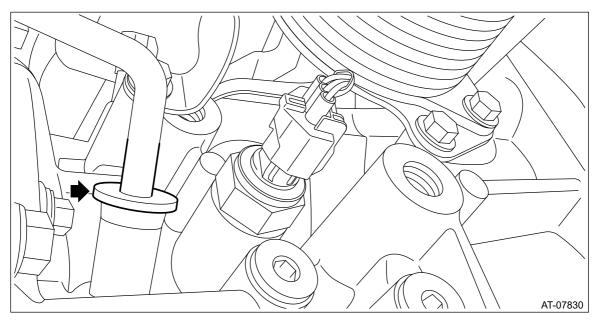
CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Differential Gear Oil

ADJUSTMENT

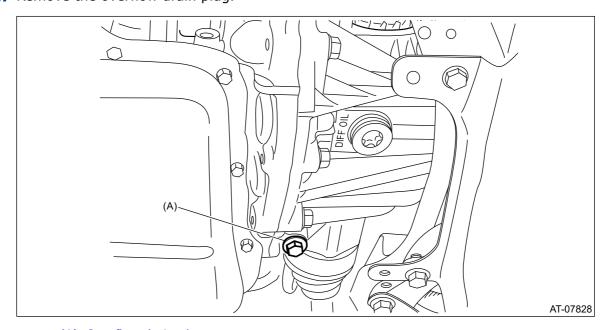
Note:

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

- 1. Lift up the vehicle.
- 2. Remove the oil charge pipe cap.



3. Remove the overflow drain plug.



(A) Overflow drain plug

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

Recommended gear oil:

Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>General Description>SPECIFICATION > FRONT DIFFERENTIAL GEAR OIL.

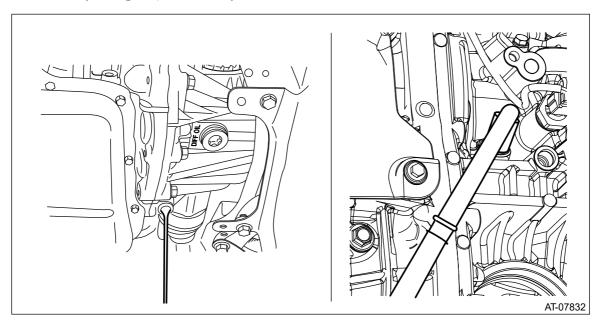
5. When the flow of the differential gear oil turns into a narrow stream, install the overflow drain plug.

Note:

Use a new gasket.

Tightening torque:

35 N•m (3.6 kgf-m, 25.8 ft-lb)



6. Install the oil charge pipe cap.

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Differential Gear Oil

INSPECTION

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

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Differential Gear Oil

REPLACEMENT

Caution:

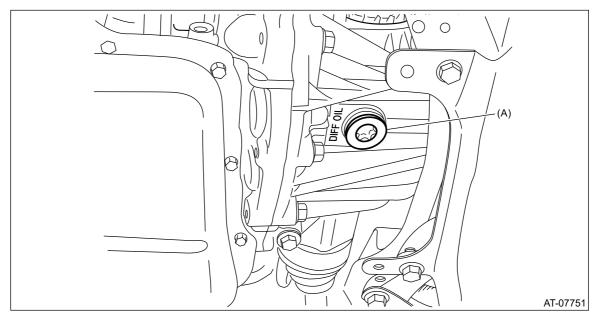
- Immediately after the vehicle has been running or after idling for a long time, the differential gear oil will be hot. Be careful not to burn yourself.
- Be careful not to spill differential gear oil on the exhaust pipe to prevent it from emitting smoke or causing a fire. If gear oil adheres, wipe it off completely.
- 1. Lift up the vehicle.
- 2. Remove the differential gear oil drain plug using TORX® bit T70. Drain differential gear oil.
- 3. Install the differential gear oil drain plug using TORX[®] bit T70.

Note:

Use a new gasket.

Tightening torque:

70 N•m (7.1 kgf-m, 51.6 ft-lb)



(A) Differential gear oil drain plug

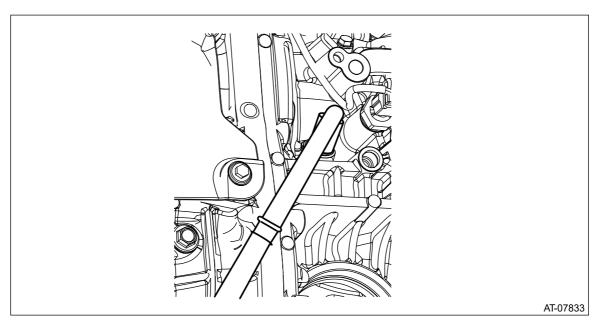
4. Pour gear oil from the charge pipe.

Recommended gear oil:

Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>General Description>SPECIFICATION > FRONT DIFFERENTIAL GEAR OIL.

Gear oil capacity:

Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>General Description>SPECIFICATION > FRONT DIFFERENTIAL GEAR OIL.



5. Adjust the level of differential gear oil. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690) Differential Gear Oil>ADJUSTMENT.

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

INSPECTION

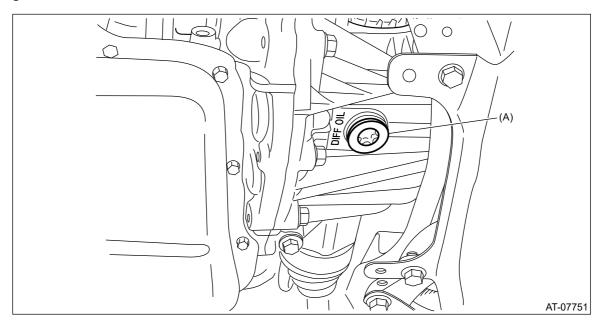
Check for leakage of gear oil from the oil seal. If there is an oil leak, inspect the front drive shaft and replace the oil seal.

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

REPLACEMENT

Caution:

- Immediately after the vehicle has been running or after idling for a long time, the differential gear oil will be hot. Be careful not to burn yourself.
- Be careful not to spill the differential gear oil on exhaust pipe to prevent it from emitting smoke or fire. If differential gear oil is spilled on the exhaust pipe, wipe it off completely.
- 1. Remove the front tires.
- **2.** Remove the center exhaust pipe. Ref. to EXHAUST(H4DOTC)>Center Exhaust Pipe>REMOVAL.
- **3.** Remove the differential gear oil drain plug using TORX[®] bit T70, and then drain differential gear oil.



(A) Differential gear oil drain plug

4. Tighten the differential gear oil drain plug.

Note:

Use a new gasket.

Tightening torque:

70 N·m (7.1 kgf-m, 51.6 ft-lb)

- 5. Remove the stabilizer link. Ref. to FRONT SUSPENSION>Front Stabilizer>REMOVAL.
- **6.** Disconnect the lower arm ball joint and housing.
- **7.** Pull out the front drive shaft from transmission using a crowbar.

Note:

Place a cloth between the tire lever or bar and the transmission in order to avoid damaging the differential side retainer.

8. Holding the joint of front drive shaft from transmission side, pull out the drive shaft from

transmission with care not to stretch the boot.

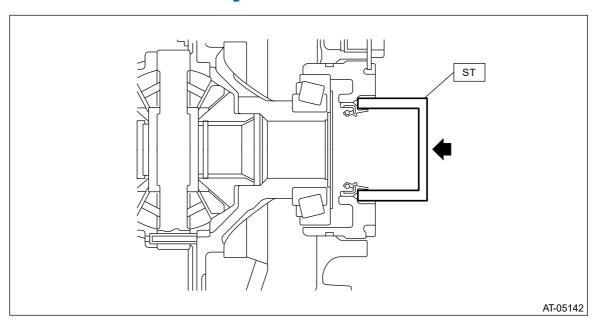
Note:

- Before pulling the front drive shaft RH, turn the steering wheel to the right hand at full lock.
- Before pulling the front drive shaft LH, turn the steering wheel to the left hand at full lock.
- **9.** Remove the differential side retainer oil seal using driver wrapped with vinyl tape etc.
- **10.** Using the ST, install the differential side retainer oil seal by lightly tapping with a hammer.

ST 18675AA000 DIFFERENTIAL SIDE OIL SEAL INSTALLER

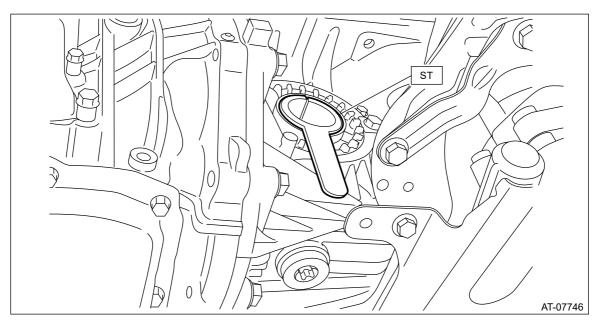
Note:

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



11. Set the ST to differential side retainer.

ST 28399SA010 OIL SEAL PROTECTOR



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

Caution:

- Do not apply grease to the tapered portion of ball stud.
- Before tightening, make sure the lower side of housing and stepped section of ball joint are in contact.

Tightening torque:

50 N·m (5.1 kgf-m, 36.9 ft-lb)

16. Install the stabilizer link.

Tightening torque:

60 N·m (6.1 kgf-m, 44.3 ft-lb)

- **17.** Install the center exhaust pipe. Ref. to EXHAUST(H4DOTC)>Center Exhaust Pipe>INSTALLATION.
- 18. Lower the vehicle.
- **19.** Refill differential gear oil from the charge pipe. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Differential Gear Oil.
- **20.** Adjust the differential gear oil level, and check for leakage. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Differential Gear Oil>ADJUSTMENT.
- **21.** Install the front tires.

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Drive Pinion Shaft Assembly

ADJUSTMENT

- 1. Remove the liquid gasket from the mating surface completely.
- **2.** Using the ST, install the drive pinion retainer to converter case.

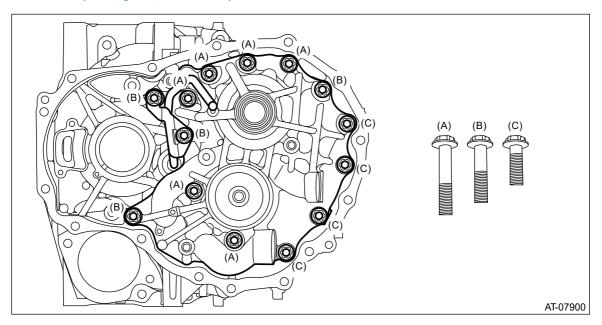
ST 18270KA020 SOCKET (E20)

Note:

Do not confuse the three different-length bolts when installing.

Tightening torque:

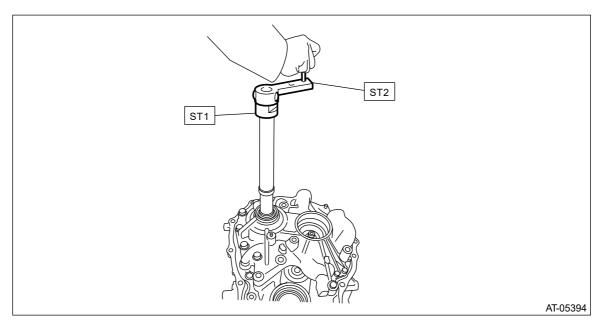
43 N·m (4.4 kgf-m, 31.7 ft-lb)



3. Rotate the drive pinion several times using ST1 and ST2.

ST1 18667AA010 HOLDER

ST2 499787700 WRENCH



- **4.** Adjust the drive pinion and hypoid driven gear backlash. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Front Differential Assembly>ADJUSTMENT.
- **5.** Using the ST, remove the drive pinion retainer from converter case.

ST 18270KA020 SOCKET (E20)

6. Apply lead-free red dye evenly on the both sides of three to four teeth of the hypoid driven gear. Then install the drive pinion retainer and rotate the drive pinion in both directions several times. Remove the drive pinion retainer and check the tooth contact pattern.

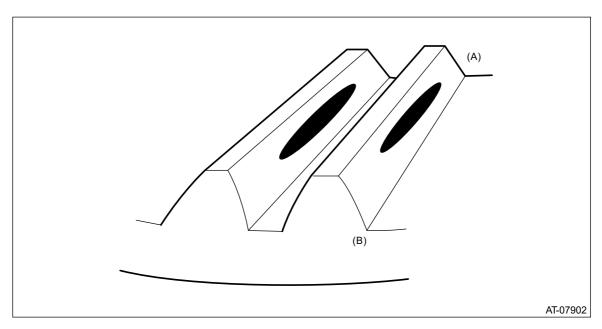
If the teeth contact is inappropriate, adjust the backlash or thickness of the shim. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Front Differential Assembly>ADJUSTMENT.

Note:

After correction, wipe off the lead-free red dye.

· Correct tooth contact

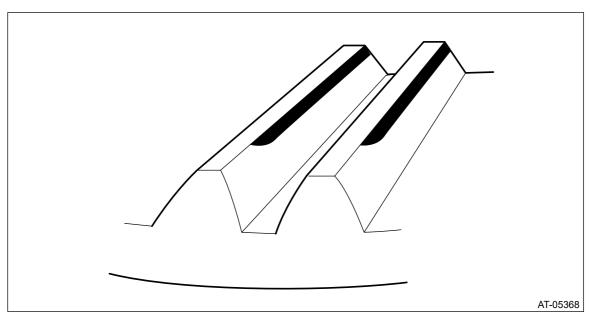
Check item: Tooth contact surface is slightly shifted toward the toe side under a no-load condition. (When driving, it moves towards the heel side.)



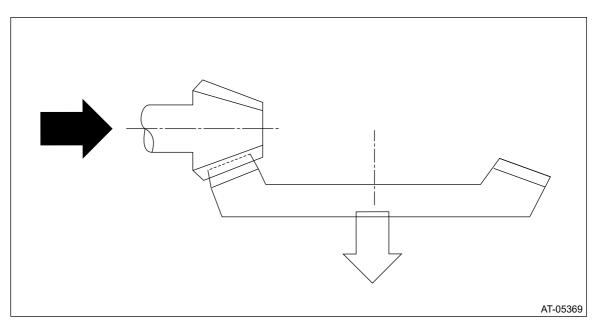
- (A) Toe side
- (B) Heel side
- Face contact

Check item: Backlash is too large.

Contact pattern



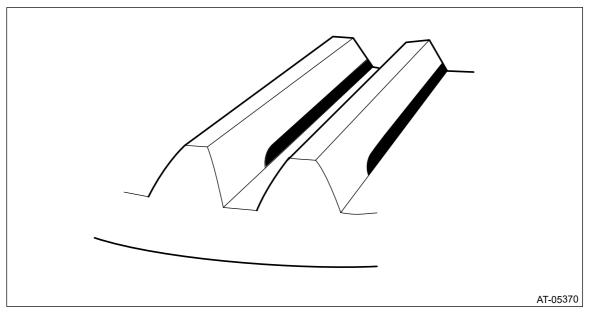
Corrective action: Increase thickness of pinion height adjusting washer according to the procedure for bringing drive pinion close to hypoid driven gear side.



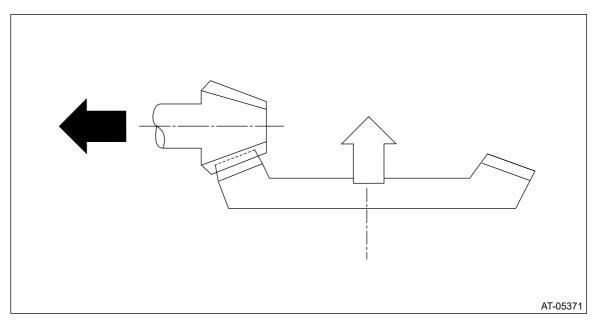
• Flank contact

Check item: Backlash is too small.

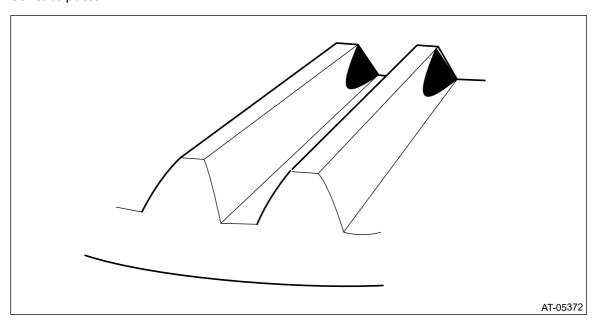
Contact pattern



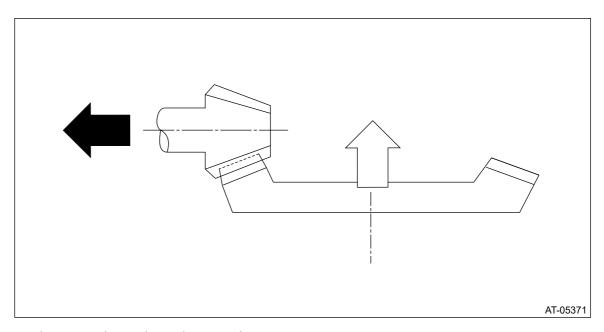
Corrective action: Reduce the thickness of pinion height adjusting washer according to the procedure for bringing drive pinion away from hypoid driven gear.



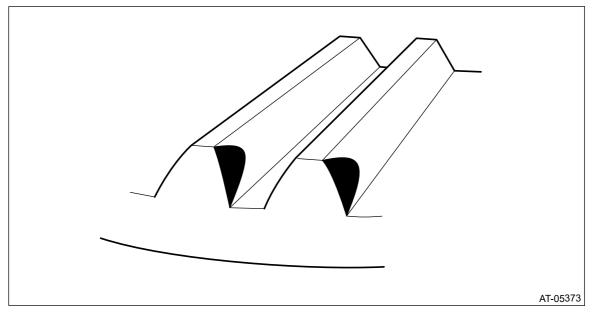
Toe contact (inside contact)
 Check item: Teeth contact area is too small.
 Contact pattern



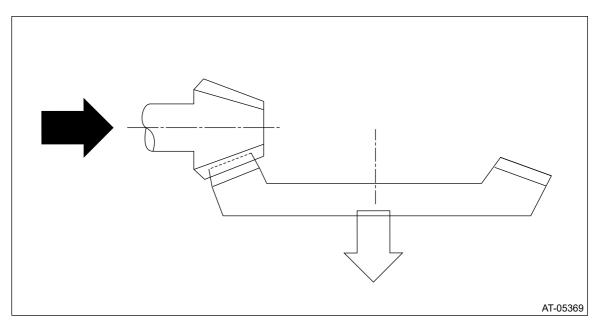
Corrective action: Reduce the thickness of pinion height adjusting washer according to the procedure for bringing drive pinion away from hypoid driven gear side.



Heel contact (outside end contact)
 Check item: Teeth contact area is too small.
 Contact pattern



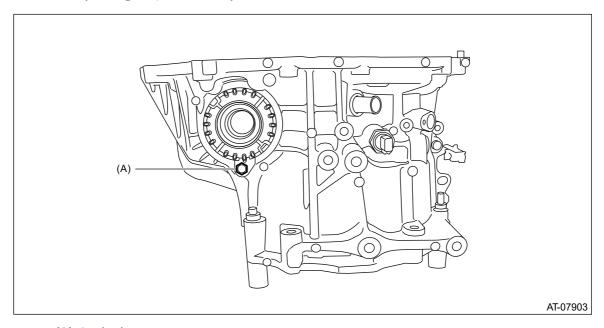
Corrective action: Increase the thickness of the pinion height adjusting washer according to the procedures for moving the drive pinion closer to the hypoid driven gear.



- 7. If tooth contact is correct, mark the differential side retainer position and loosen. After fitting a new O-ring and oil seal, screw in the differential side retainer to the marked position.
- **8.** Tighten the lock plate with specified torque.

Tightening torque:

25 N·m (2.5 kgf-m, 18.4 ft-lb)



(A) Lock plate

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Drive Pinion Shaft Assembly

ASSEMBLY

1. Install the O-ring to plug and install the plug to drive pinion retainer.

Note

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

Tightening torque:

25 N·m (2.5 kgf-m, 18.4 ft-lb)

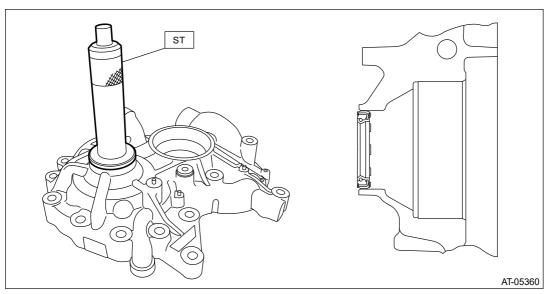
2. Using the ST, install the oil seal to drive pinion retainer.

Note:

- Apply CVTF to the oil seal press-fitting surface and lip.
- Install the oil seal in the correct direction.

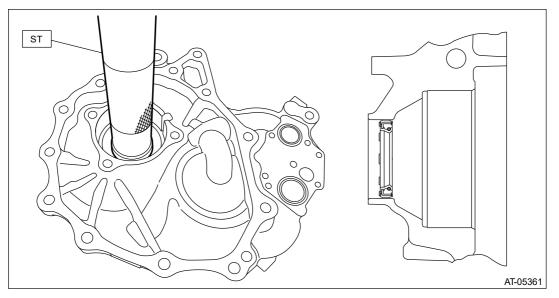
Pulley side

ST 18657AA020 OIL SEAL INSTALLER



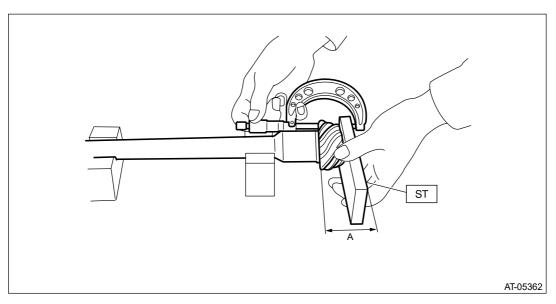
Front differential side

ST 499277100 BUSHING 1-2 INSTALLER



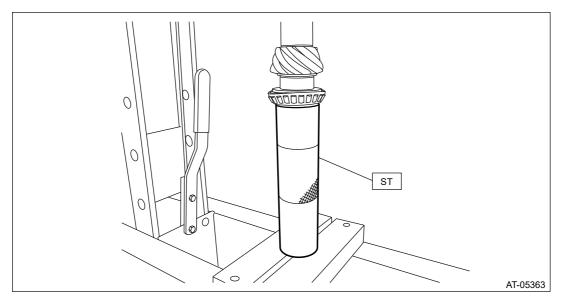
3. Measure the dimension "A" of drive pinion shaft.

ST 398643600 GAUGE



4. Press-fit the new taper roller bearing front side inner race using the ST.

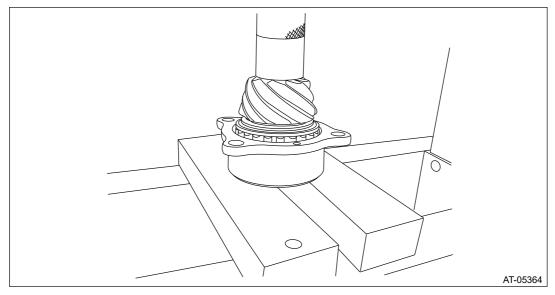
ST 499277200 INSTALLER



5. Press-fit the new taper roller bearing rear side inner race and outer race together. **Caution:**

Damage may result if too much force is applied to the roller bearing. Note:

Press in to a position where the bearing rotates smoothly without play.



6. Tighten a new lock nut using the ST.

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

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

T1: 130 N·m (13.3 kgf-m, 95.9 ft-lb)

[Required torque setting]

T2: Tightening torque

L1: ST1 length 0.1 m (3.94 in)

L2: Torque wrench length

Example:

Torque wrench length m (in)	Tightening torque N·m (kgf-m, ft-lb)

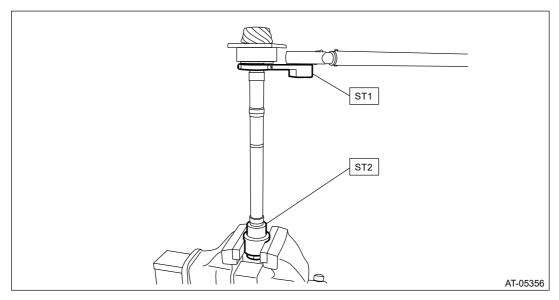
0.4 (15.75)	104 (10.6, 76.7)
0.45 (17.72)	106 (10.8, 78.2)
0.5 (19.69)	108 (11.0, 79.7)
0.55 (21.65)	110 (11.2, 81.1)

ST1 18621AA000 ADAPTER WRENCH

ST2 18667AA010 HOLDER

Note:

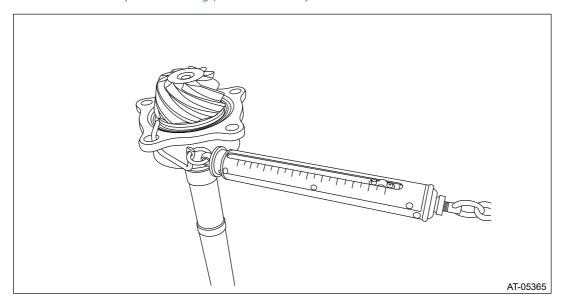
Tighten the lock nut while directly aligning ST1 and torque wrench.



- **7.** Apply differential gear oil to roller of bearing and rotate the bearing several times.
- **8.** Measure the starting torque of the bearing. Make sure the starting torque is within the specified range. If the torque is not within specified range, replace the roller bearing.

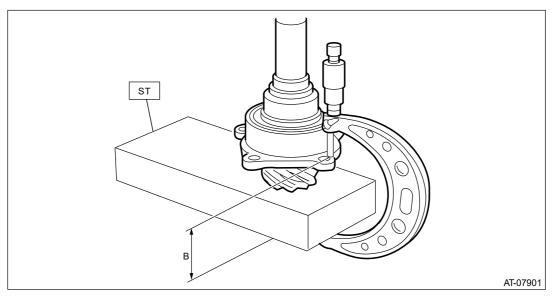
Starting torque:

$$16.3 - 42.7 \text{ N} (1.7 - 4.4 \text{ kgf}, 4.4 - 9.6 \text{ lbf})$$



- **9.** Crimp the lock nut in 2 locations.
- 10. Measure the dimension "B" of the drive pinion shaft.

ST 398643600 GAUGE



11. Obtain the thickness "T" mm (in) of the drive pinion shim using the following formula.

 $T = 6.55 \pm 0.1225 - (B - A)$

 $[T in = 0.258 \pm 0.0048 - (B - A)]$

T: Shim thickness

A: Height from ST to drive pinion shaft bearing catch saucer

B: Height from ST to drive pinion retainer case side end face

12. Select three or less shims from following table.

Drive pinion shim			
Part No.	Thickness mm (in)		
31451AA050	0.150 (0.0059)		
31451AA060	0.175 (0.0069)		
31451AA070	0.200 (0.0079)		
31451AA080	0.225 (0.0089)		
31451AA090	0.250 (0.0098)		
31451AA100	0.275 (0.0108)		
31451AA240	0.300 (0.0118)		

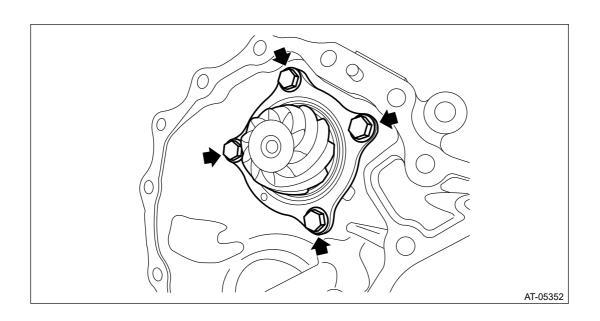
13. Install the shims selected for drive pinion retainer and drive pinion shaft assembly.

Note:

Be careful not to bend the shim.

Tightening torque:

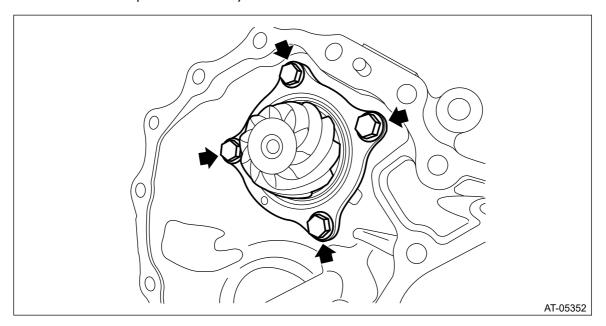
70 N·m (7.1 kgf-m, 51.6 ft-lb)



CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Drive Pinion Shaft Assembly

DISASSEMBLY

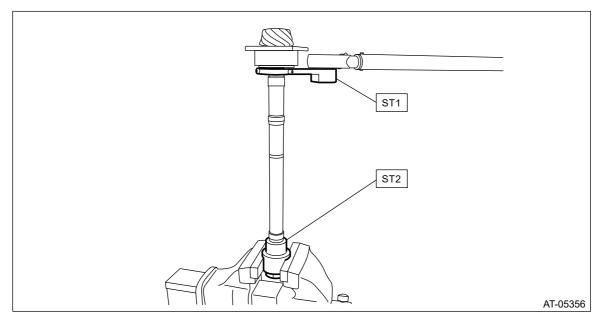
1. Remove the drive pinion assembly.



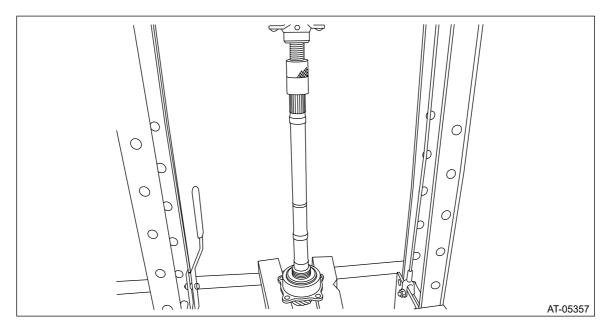
- 2. Flatten the tab of the lock nut.
- 3. Using ST1 and ST2, fix at the spline portion of drive pinion shaft to remove the lock nut.

ST1 18621AA000 ADAPTER WRENCH

ST2 18667AA010 HOLDER

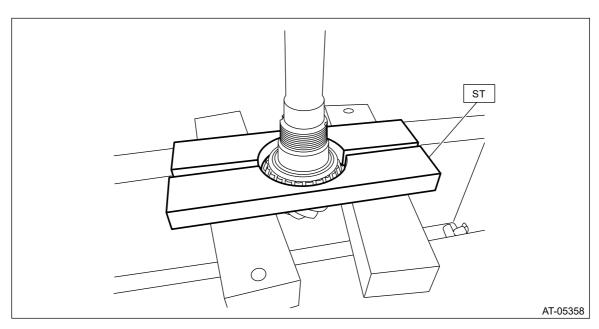


4. Remove the taper roller bearing and outer race from drive pinion shaft.



5. Remove the inner bearing inner race from the drive pinion shaft using ST.

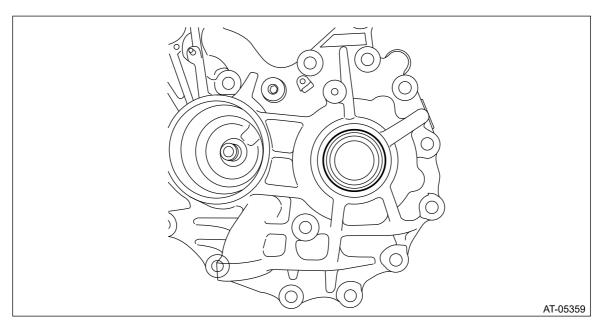
ST 498077000 REMOVER



6. Remove the two oil seals using a screwdriver wrapped with cloth etc.

Caution:

Do not damage the fitting surface of drive pinion bearing.



7. Remove the plug from drive pinion retainer.

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Drive Pinion Shaft Assembly

INSPECTION

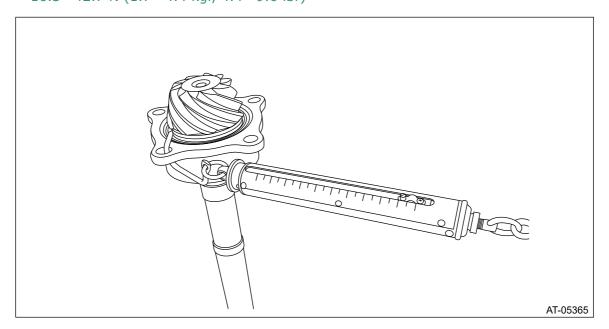
- Make sure that all component parts are free of scratches, holes and other faults.
- Check the tooth contact. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Drive Pinion Shaft Assembly>ADJUSTMENT.
- Apply CVTF to bearing and rotate the bearing to check for noise or dragging etc.
- Check the bearing preload of drive pinion shaft.

Caution:

Before measuring, apply differential gear oil to roller of bearing and rotate the bearing several times.

Starting torque:

16.3-42.7 N (1.7-4.4 kgf, 4.4-9.6 lbf)



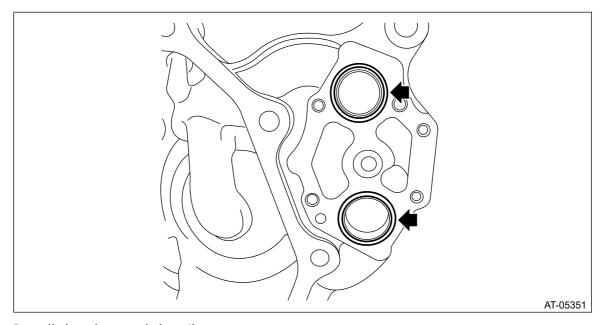
CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Drive Pinion Shaft Assembly

INSTALLATION

- 1. Clean the mating surface of drive pinion retainer and converter case.
- 2. Adjust the backlash and tooth contact between drive pinion shaft assembly and the front differential side gear. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Drive Pinion Shaft Assembly>ADJUSTMENT.
- **3.** Install the O-ring for oil pump to drive pinion retainer.

Note:

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



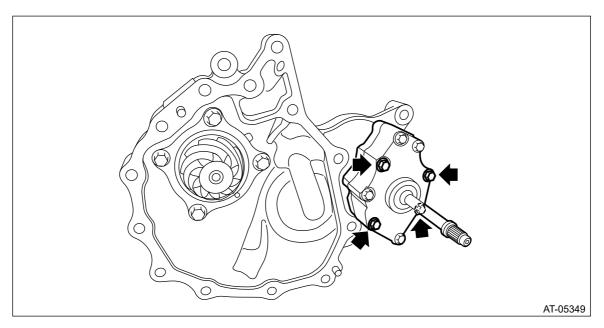
4. Install the plate and the oil pump.

Note:

Apply CVTF to the bolt.

Tightening torque:

8.5 N·m (0.9 kgf-m, 6.3 ft-lb)

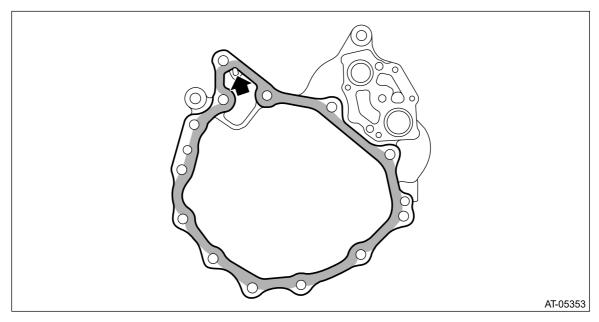


5. Apply liquid gasket seamlessly to the mating surface of drive pinion retainer.

Note:

Be careful not to block the arrowed hole when applying liquid gasket. Liquid gasket:

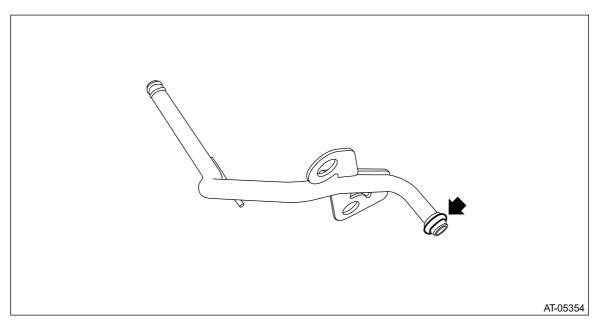
THREE BOND 1215B or equivalent



6. Install the O-ring to the lubrication pipe.

Note:

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



7. Install the drive pinion retainer and lubrication pipe to converter case and tighten the bolt using the ST.

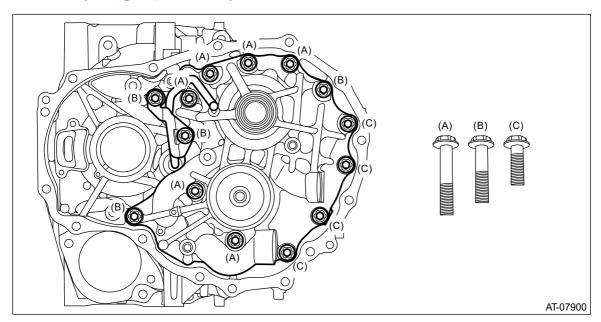
ST 18270KA020 SOCKET (E20)

Note:

Do not confuse the three different-length bolts when installing.

Tightening torque:

43 N·m (4.4 kgf-m, 31.7 ft-lb)



- 8. Install the primary pulley, secondary pulley and variator chain. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Primary Pulley and Secondary Pulley>INSTALLATION.
- **9.** Install the transmission case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transmission Case>INSTALLATION.
- **10.** Install the forward clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Forward Clutch Assembly>INSTALLATION.

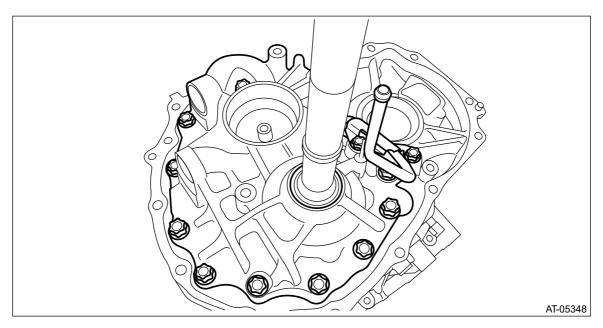
- **11.** Install the intermediate case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Intermediate Case>INSTALLATION.
- 12. Install the transfer reduction driven gear assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transfer Reduction Driven Gear>INSTALLATION.
- 13. Install the transfer clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transfer Clutch>INSTALLATION.
- **14.** Install the rear drive shaft. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Rear Drive Shaft>INSTALLATION.
- **15.** Install the extension case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Extension Case>INSTALLATION.
- **16.** Install the transmission harness. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transmission Harness>INSTALLATION.
- 17. Install the oil pan and control valve body. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Control Valve Body>INSTALLATION.
- **18.** Install the air breather hose. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Air Breather Hose>INSTALLATION.
- 19. Install the transmission assembly to the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Automatic Transmission Assembly>INSTALLATION.

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Drive Pinion Shaft Assembly

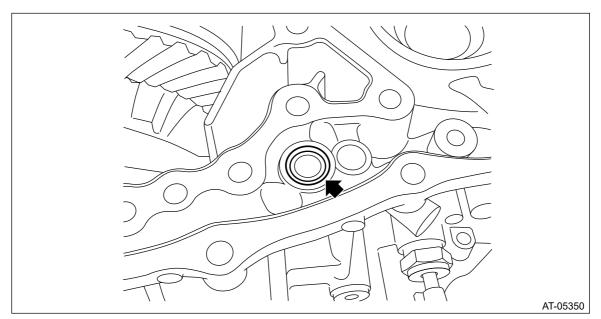
REMOVAL

- **1.** Remove the transmission assembly from the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Automatic Transmission Assembly>REMOVAL.
- **2.** Remove the air breather hose. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Air Breather Hose>REMOVAL.
- **3.** Remove the oil pan and control valve body. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Control Valve Body>REMOVAL.
- **4.** Remove the transmission harness. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transmission Harness>REMOVAL.
- **5.** Remove the extension case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Extension Case>REMOVAL.
- **6.** Remove the rear drive shaft. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Rear Drive Shaft>REMOVAL.
- **7.** Remove the transfer clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transfer Clutch>REMOVAL.
- **8.** Remove the transfer reduction driven gear assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transfer Reduction Driven Gear>REMOVAL.
- **9.** Remove the intermediate case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Intermediate Case>REMOVAL.
- **10.** Remove the forward clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Forward Clutch Assembly>REMOVAL.
- **11.** Remove the transmission case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transmission Case>REMOVAL.
- **12.** Remove the primary pulley, secondary pulley and variator chain. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Primary Pulley and Secondary Pulley>REMOVAL.
- **13.** Using the ST, remove the drive pinion retainer and lubrication pipe.

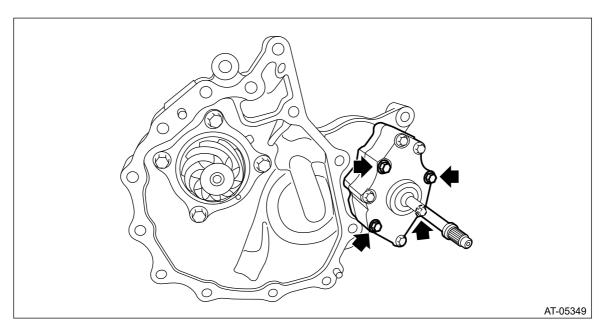
ST 18270KA020 SOCKET (E20)



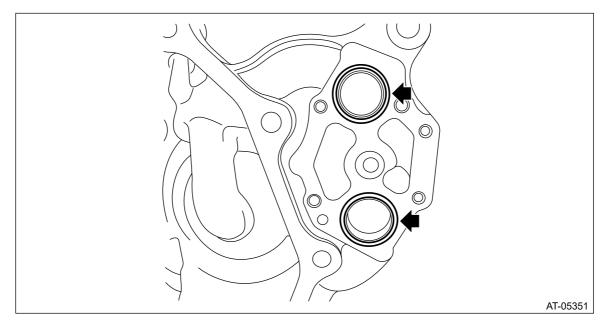
14. Remove the O-ring.



15. Remove the oil pump and the plate.



16. Remove the O-ring.



CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Drive Plate

INSPECTION

Check the drive cable for damage.

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Drive Plate

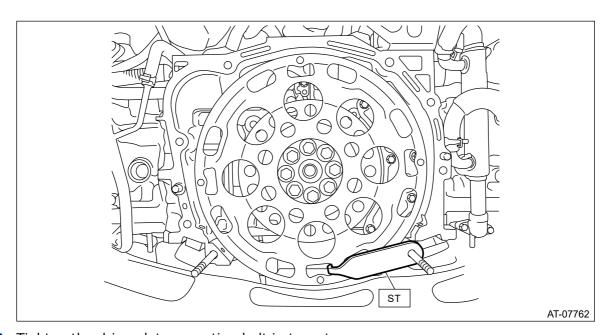
INSTALLATION

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

Note:

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

ST 498497300 CRANKSHAFT STOPPER



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

Note:

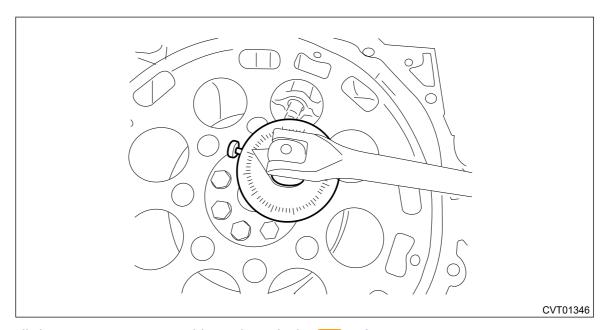
Fix the engine unit.

(1) Tighten the drive plate mounting bolt.

Tightening torque:

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

Tightening angle:



4. Install the transmission assembly to the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Automatic Transmission Assembly>INSTALLATION.

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Drive Plate

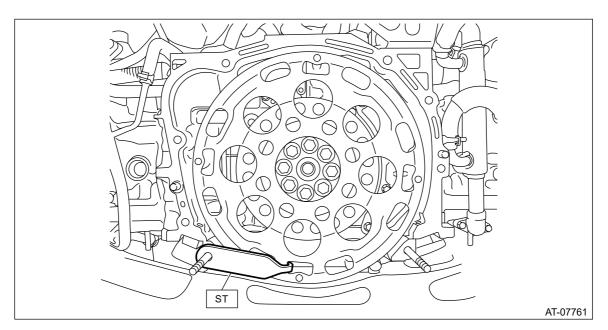
REMOVAL

- 1. Remove the transmission assembly from the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Automatic Transmission Assembly>REMOVAL.
- 2. Set the ST.

Note:

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

ST 498497300 CRANKSHAFT STOPPER



3. Remove the drive plate and reinforcement drive plate.

INSPECTION

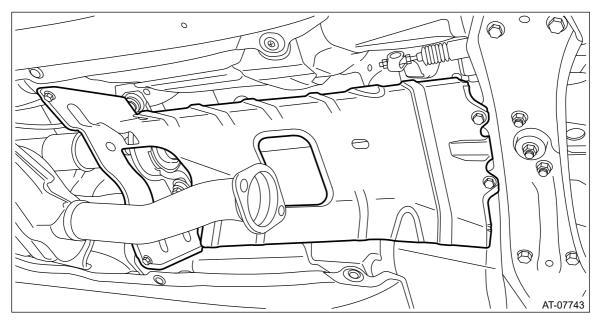
Check for leakage of CVTF from the joint section of transmission and propeller shaft. If a leak is found, inspect the propeller shaft and replace the oil seal.

REPLACEMENT

Caution:

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

- 1. Lift up the vehicle.
- **2.** Remove the center exhaust pipe. Ref. to EXHAUST(H4DOTC)>Center Exhaust Pipe>REMOVAL.
- 3. Remove the center exhaust cover.



- 4. Clean the transmission exterior.
- 5. Remove the propeller shaft. Remove the propeller Shaft>Removal.
- **6.** Using a screwdriver or ST, remove the oil seal trying not to damage the extension case.

ST 398527700 PULLER ASSY

7. Using the ST, install the oil seal.

Note:

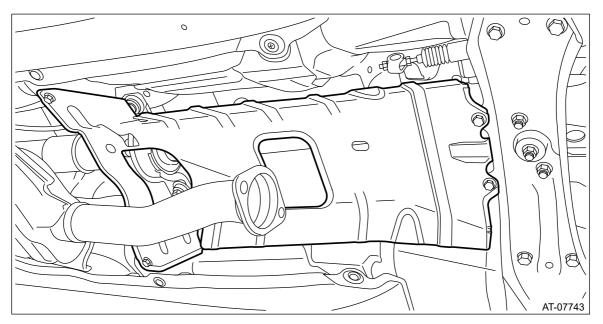
- Use a new oil seal.
- Apply CVTF to the oil seal lip and press-fitting surface.

ST 498057300 INSTALLER

- 8. Install the propeller shaft. Ref. to DRIVE SHAFT SYSTEM>Propeller Shaft>INSTALLATION.
- **9.** Install the center exhaust cover.

Tightening torque:

18 N•m (1.8 kgf-m, 13.3 ft-lb)



- **10.** Install the center exhaust pipe. Ref. to EXHAUST(H4DOTC)>Center Exhaust Pipe>INSTALLATION.
- **11.** Adjust the CVTF level and check there is no leakage. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>CVTF>ADJUSTMENT.

ADJUSTMENT

Note:

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

ASSEMBLY

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

ST 498057300 INSTALLER

DISASSEMBLY

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

INSPECTION

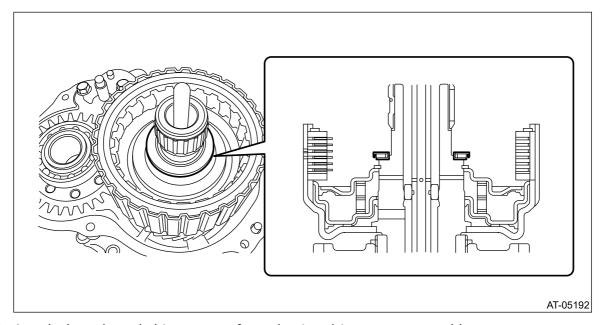
- Check there is no leak of CVTF from the joint between extension case and intermediate case.
- Check there is no damage or cracks on the extension case.

INSTALLATION

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

Note:

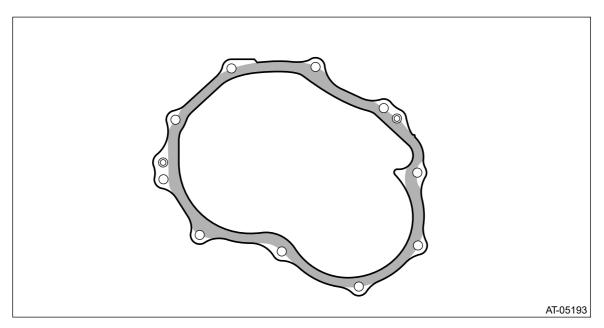
Install the thrust needle bearing in the correct direction.



- **5.** Attach the selected shim to transfer reduction driven gear assembly.
- 6. Apply liquid gasket to extension case seamlessly.

Liquid gasket:

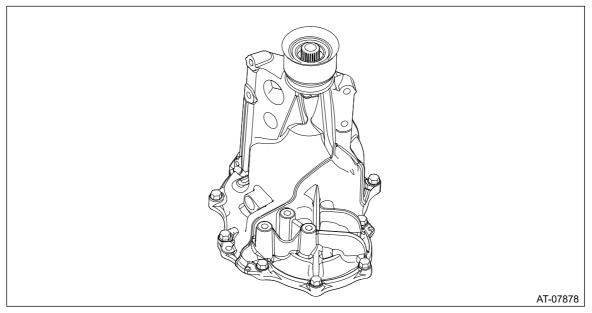
THREE BOND 1215B or equivalent



7. Install the extension case.

Tightening torque:

25 N·m (2.5 kgf-m, 18.4 ft-lb)



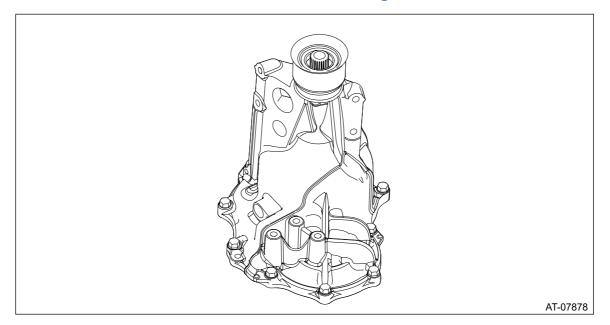
- **8.** Install the front wheel speed sensor. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Front Wheel Speed Sensor>INSTALLATION.
- **9.** Install the transmission assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Automatic Transmission Assembly>INSTALLATION.

REMOVAL

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

Note:

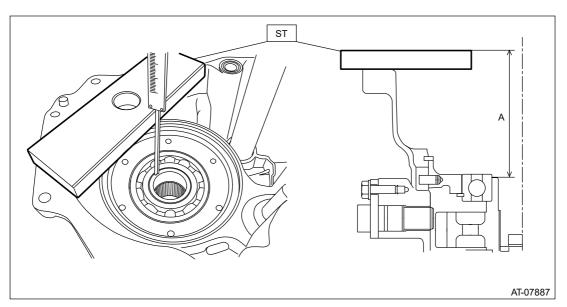
The total number of extension case mounting bolts is 10.



ADJUSTMENT

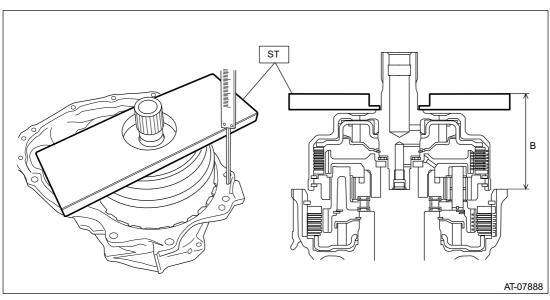
1. Measure depth "A" from the ST upper face to the washer catch surface.

ST 398643600 GAUGE



- 2. Install the forward clutch assembly to intermediate case.
- 3. Setting the ST, measure height "B" from the ST upper side to the intermediate case mating surface.

ST 499575600 GAUGE



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

Calculation formula:

$$T (mm) = (A - 15) - (B - 15) - (0.35 - 0.70)$$

$$[T (in) = (A - 0.591) - (B - 0.591) - (0.014-0.028)]$$

T: Washer thickness

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

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

15 mm (0.591 in): Thickness of ST

0.35-0.70 mm (0.014-0.028 in): Clearance

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

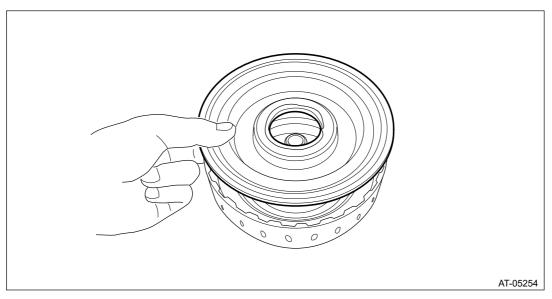
Washer			
Part No.	Washer thickness mm (in)		
803034040	1.0 (0.039)		
803034041	1.2 (0.047)		
803034042	1.4 (0.055)		
803034043	1.6 (0.063)		

ASSEMBLY

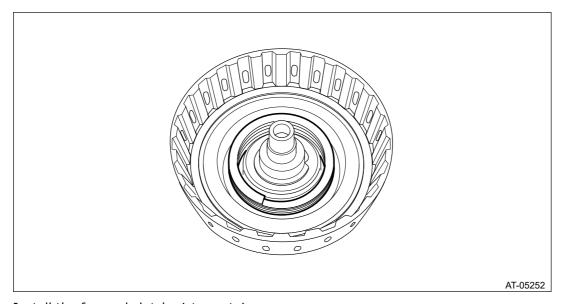
1. Install the forward clutch piston to forward clutch drum.

Note

- Apply CVTF to the seal of forward clutch piston.
- Insert it all the way to the end.



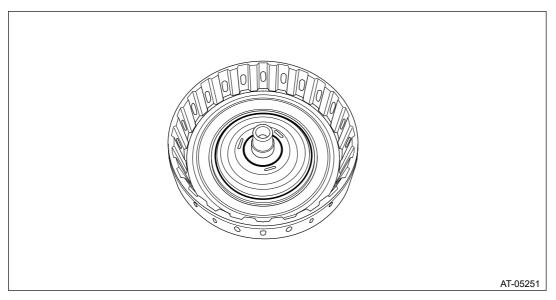
2. Install the return spring.



3. Install the forward clutch piston retainer.

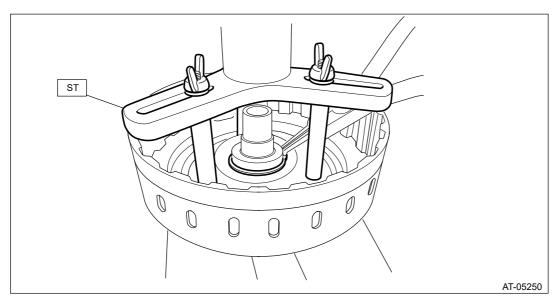
Note

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

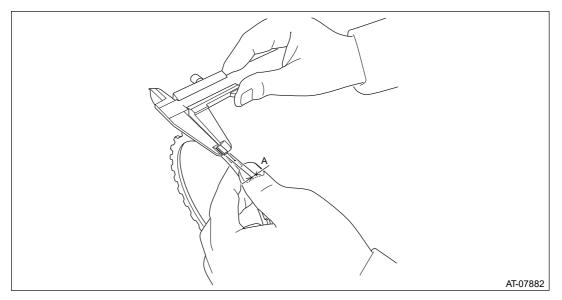


4. Compress the return spring using the ST to install the snap ring.

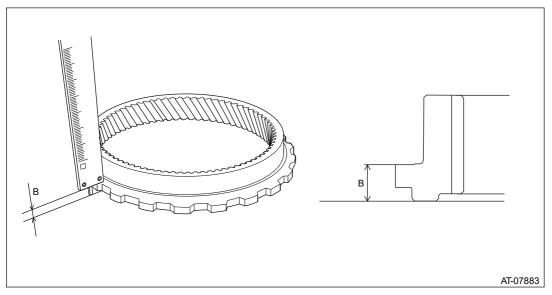
ST 18762AA000 or 18762AA001 COMPRESSOR SPECIAL TOOL



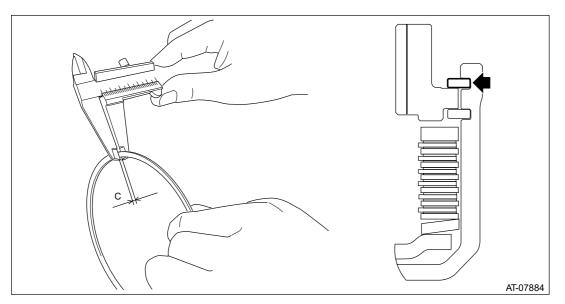
5. Measure thickness "A" of the retaining plate installed.



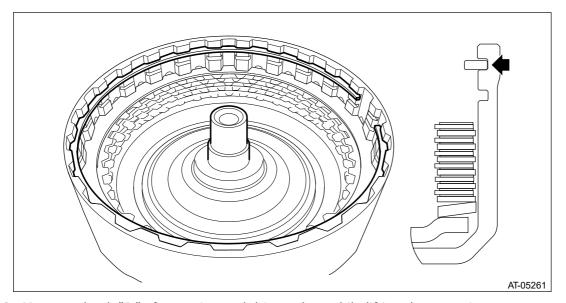
6. Measure thickness "B" of the internal gear on a surface plate.



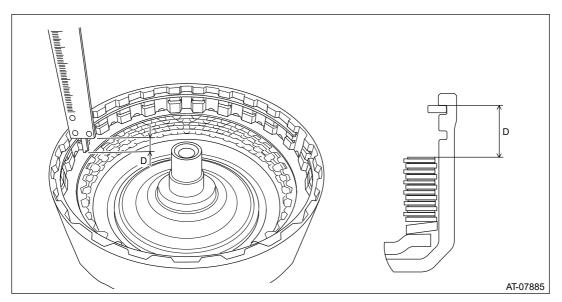
7. Measure thickness "C" of labelled or marked snap ring.



- 8. Install the dish plate, drive plate and driven plate.
- **9.** Install the snap ring at the location (upper groove) indicated in the figure.



10. Measure depth "D" of snap ring and driven plate while lifting the snap ring.



11. Calculate clearance "T" from internal gear to retaining plate with the obtained value from step 5) through step 10).

Formula: T mm (in) = D - A - B - C

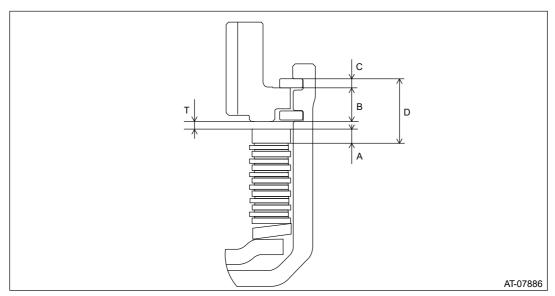
T: Clearance from internal gear to retaining plate

A: Thickness of retaining plate

B: Thickness of internal gear

C: Thickness of snap ring

D: Depth of snap ring and driven plate, with snap ring raised upward



12. If the value "T" obtained from step 11) exceeds the limit for use, replace the drive plate and driven plate with new parts and select the retaining plate within the initial standard value.

$$1.2 - 1.6 \text{ mm} (0.047 - 0.063 \text{ in})$$

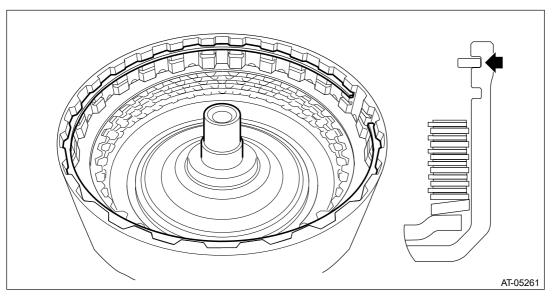
Limit thickness:

2.4 mm (0.09 in)

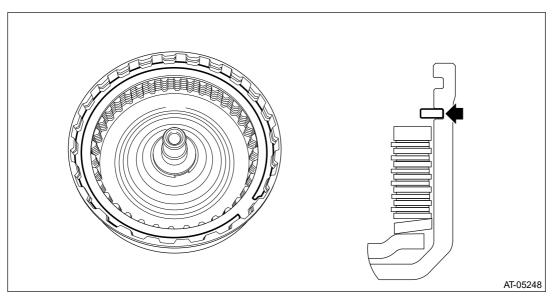
Retaining plate			
Item number	Thickness mm (in)		
31567AB670	3.2 (0.126)		

31567AB660	3.0 (0.118)
31567AB650	2.8 (0.110)
31567AB640	2.6 (0.102)

13. Remove the snap ring.



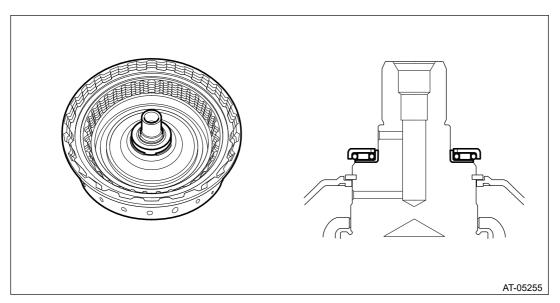
- **14.** Replace with the selected retaining plate to install.
- **15.** Install the snap ring to the lower groove.



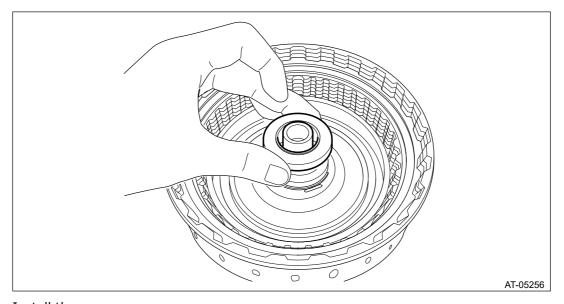
16. Install the thrust needle bearing.

Note:

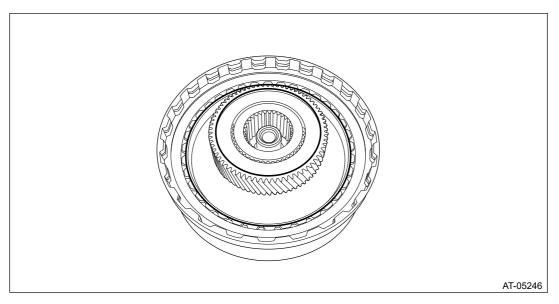
Install the thrust needle bearing in the correct direction.



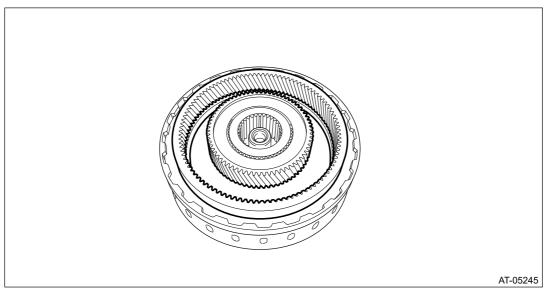
17. Install the washer.



18. Install the sun gear.



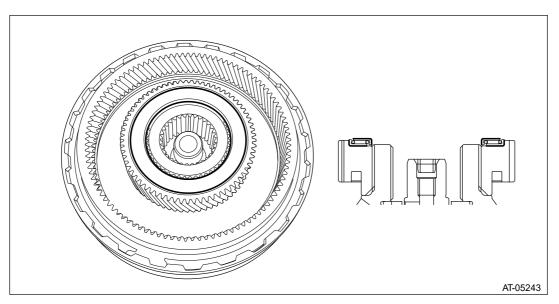
19. Install the internal gear.



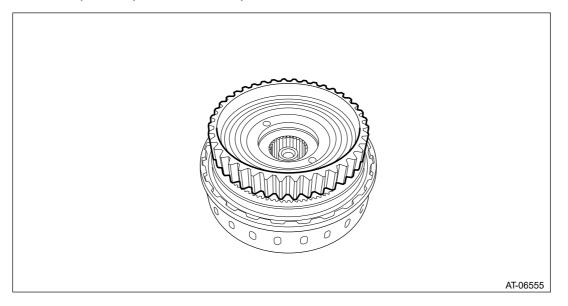
- **20.** Install the snap ring.
- **21.** Install the thrust needle bearing.

Note:

Make sure to install in the right direction.

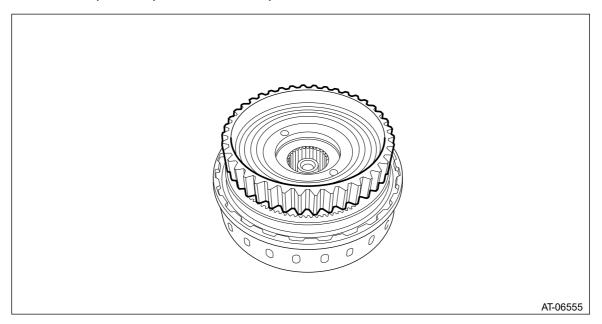


22. Install the planetary carrier assembly.

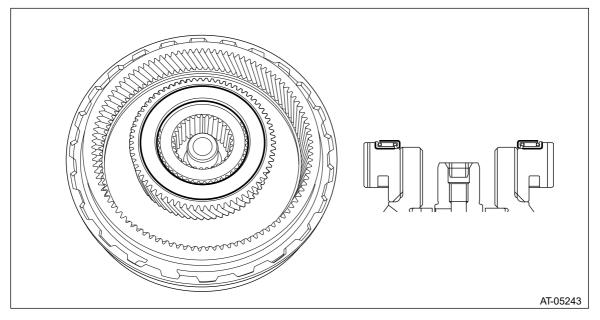


DISASSEMBLY

1. Remove the planetary carrier assembly.



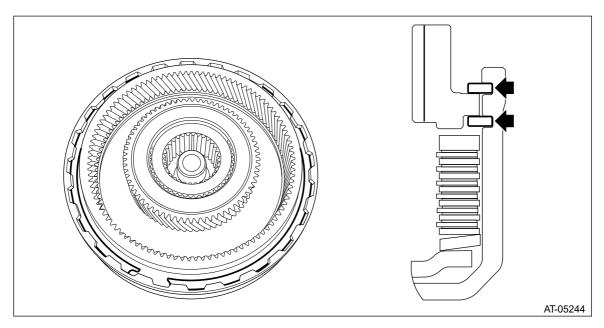
2. Remove the thrust needle bearing.



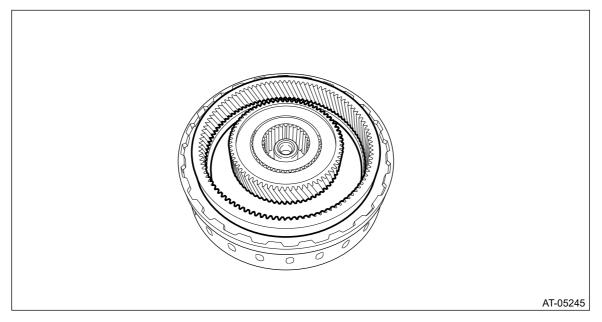
3. Remove the snap ring.

Note:

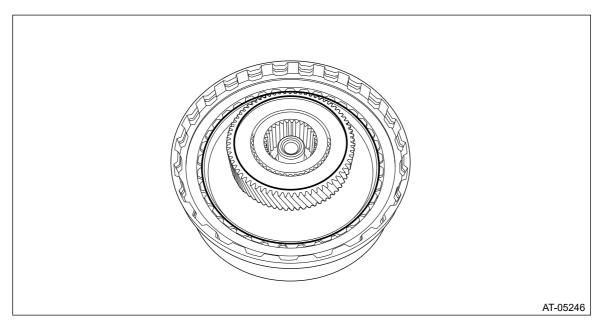
Use marking or labeling to the upper snap ring for measurement of the snap ring thickness when selecting the retaining plate.



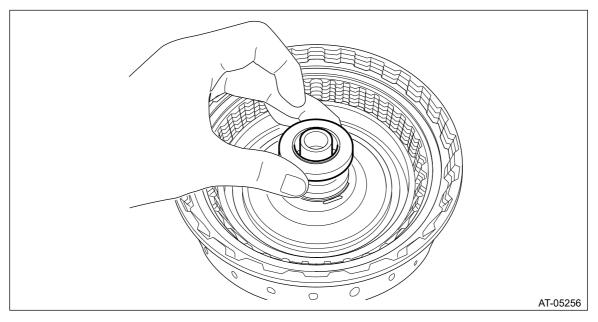
4. Remove the internal gear.



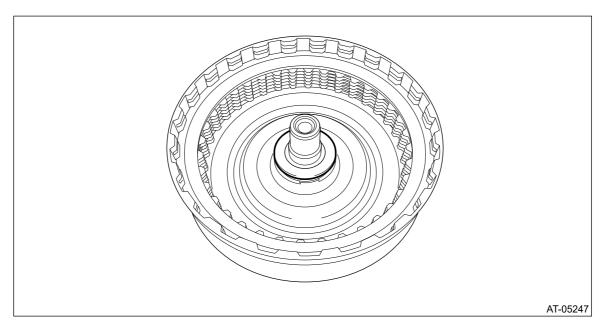
5. Remove the sun gear.



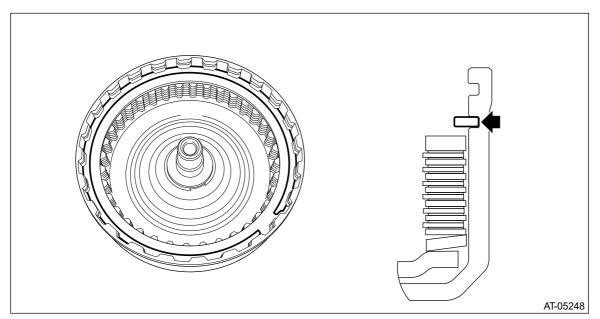
6. Remove the washer.



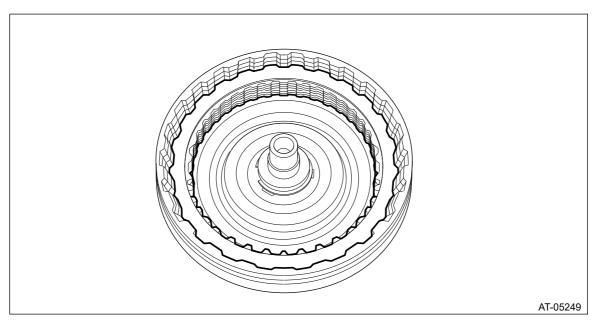
7. Remove the thrust needle bearing.



8. Remove the snap ring.

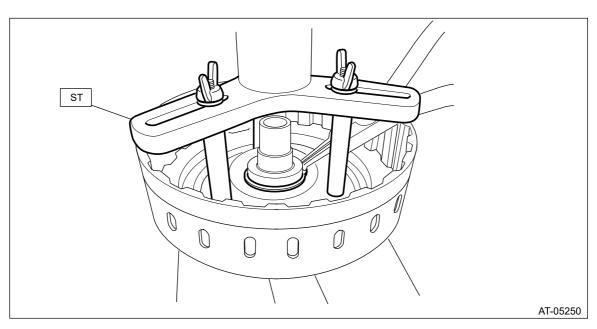


9. Remove the retaining plate, drive plate, driven plate and dish plate.

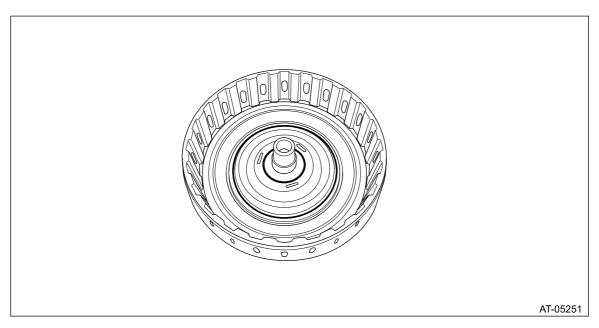


10. Using the ST, remove the snap ring.

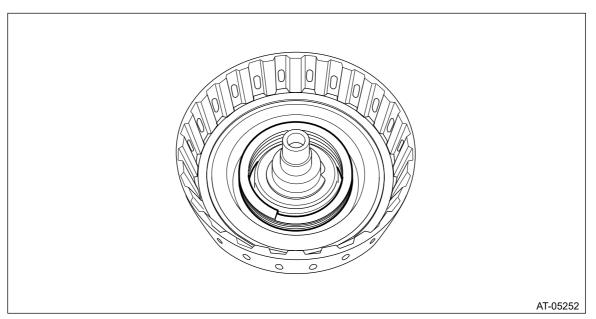
ST 18762AA000 or 18762AA001 COMPRESSOR SPECIAL TOOL



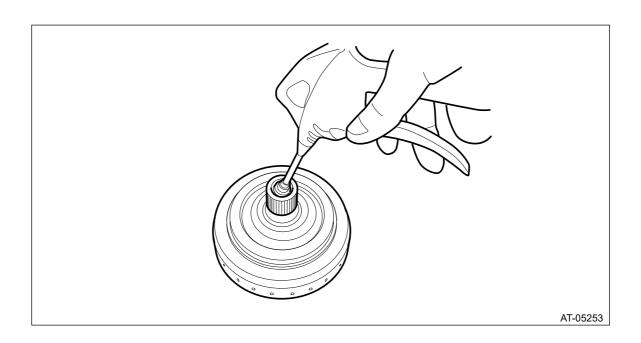
11. Remove the forward clutch piston retainer.



12. Remove the return spring.



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

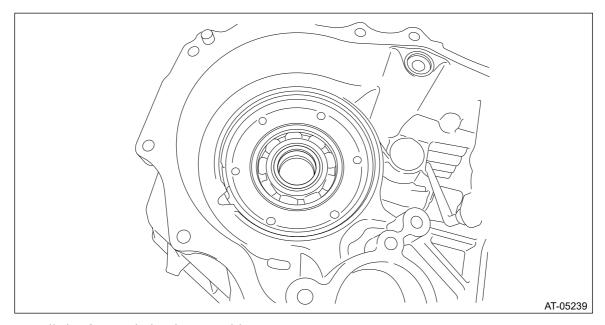


INSPECTION

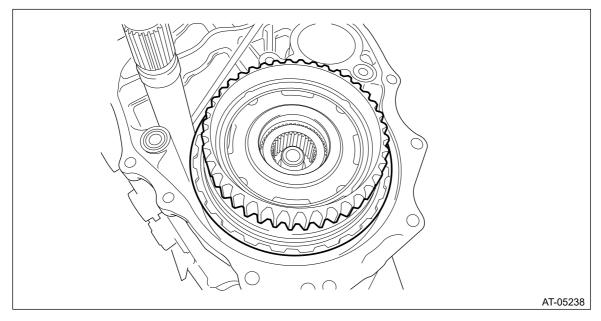
- Check the forward clutch drum, internal gear, sun gear and forward clutch piston lip for wear or damage.
- Inspect the drive plate facing for wear and damage.
- Check the driven plate for discoloration (burnt color).
- Check for worn snap ring, fatigue or damaged return spring or deformed spring retainer.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

INSTALLATION

- 1. Select a washer. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Forward Clutch Assembly>ADJUSTMENT.
- 2. Install the selected washer.



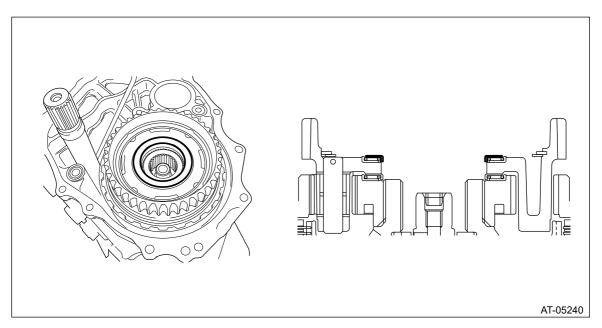
3. Install the forward clutch assembly.



4. Install the thrust needle bearing.

Note:

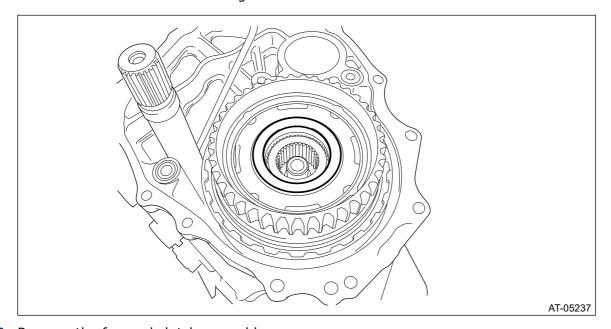
Install the thrust needle bearing in the correct direction.



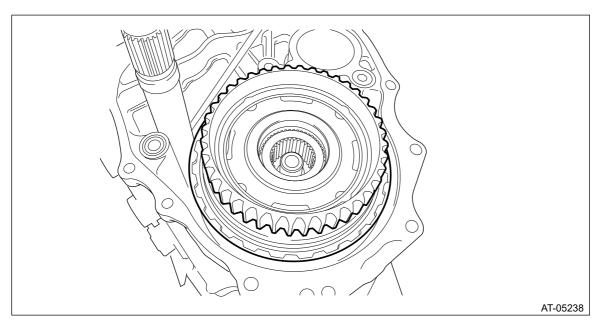
- **5.** Install the intermediate case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Intermediate Case>INSTALLATION.
- **6.** Install the transfer reduction driven gear assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transfer Reduction Driven Gear>INSTALLATION.
- 7. Install the transfer clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transfer Clutch>INSTALLATION.
- **8.** Install the rear drive shaft. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Rear Drive Shaft>INSTALLATION.
- **9.** Install the extension case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Extension Case>INSTALLATION.
- **10.** Install the transmission to vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Automatic Transmission Assembly>INSTALLATION.

REMOVAL

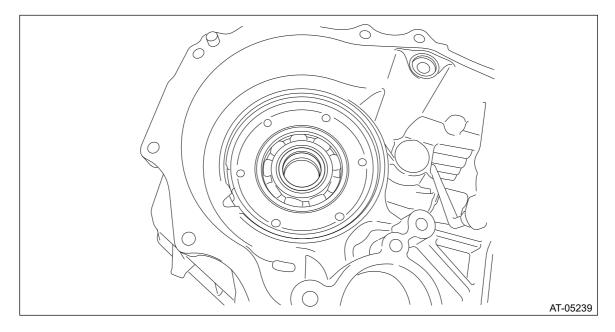
- **1.** Remove the transmission from the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Automatic Transmission Assembly>REMOVAL.
- **2.** Remove the extension case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Extension Case>REMOVAL.
- **3.** Remove the rear drive shaft. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Rear Drive Shaft>REMOVAL.
- **4.** Remove the transfer clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transfer Clutch>REMOVAL.
- **5.** Remove the transfer reduction driven gear. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transfer Reduction Driven Gear>REMOVAL.
- **6.** Remove the intermediate case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Intermediate Case>REMOVAL.
- 7. Remove the thrust needle bearing.



8. Remove the forward clutch assembly.



9. Remove the washer.



CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Front Differential Assembly

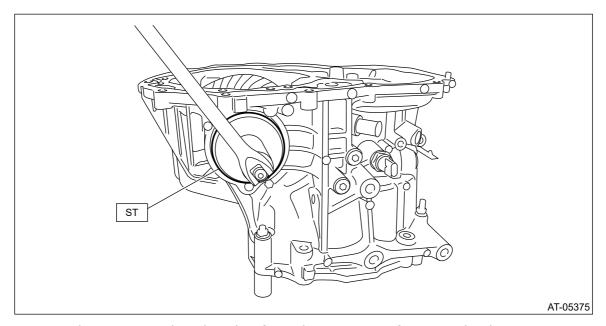
ADJUSTMENT

1. Using the ST, screw-in the retainer until resistance is felt.

Note:

RH side should be screwed-in more than LH side.

ST 18658AA020 WRENCH COMPL RETAINER



- **2.** Remove the remaining liquid gasket from the mating surface completely.
- **3.** Using the ST, install the drive pinion assembly to converter case.

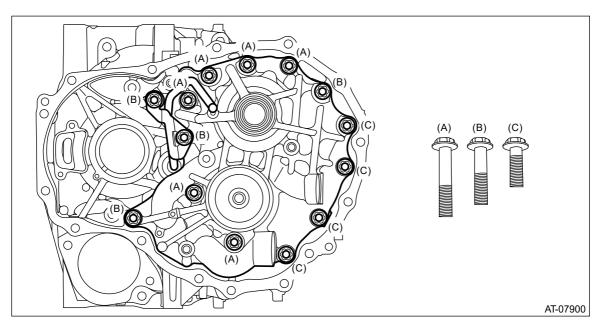
ST 18270KA020 SOCKET (E20)

Note:

Do not confuse the three different-length bolts when installing.

Tightening torque:

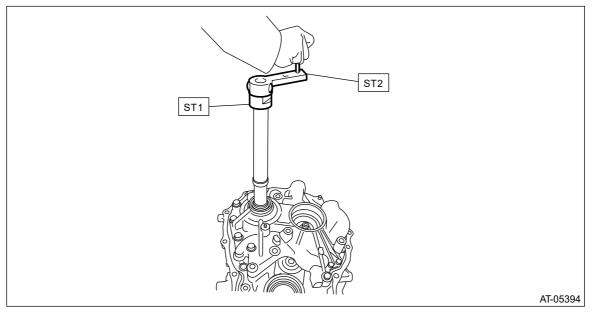
43 N·m (4.4 kgf-m, 31.7 ft-lb)



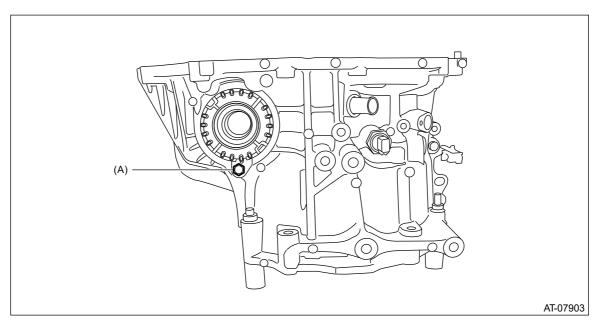
4. Rotate the drive pinion shaft ten times or more using ST1 and ST2.

ST1 18667AA010 HOLDER

ST2 499787700 WRENCH



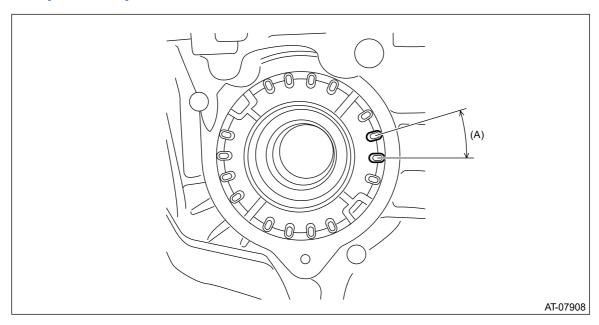
- 5. While rotating the pinion shaft, tighten the retainer LH and loosen the retainer RH until the shaft can't be turned anymore. The backlash is "zero" when the pinion shaft comes to the point where it doesn't rotate.
- **6.** After the "zero" state is established, loosen the retainer LH by 3 notches and secure it with the lock plate. Loosen the retainer RH and retighten until it stops. Rotate the drive pinion 2 or 3 times. Tighten the retainer RH further 1-3/4 notches. This sets the preload. Finally, secure the retainer with its lock plate.



(A) Lock plate

Note:

Turning the retainer by every one tooth changes the backlash approx. 0.05 mm (0.0020 in).



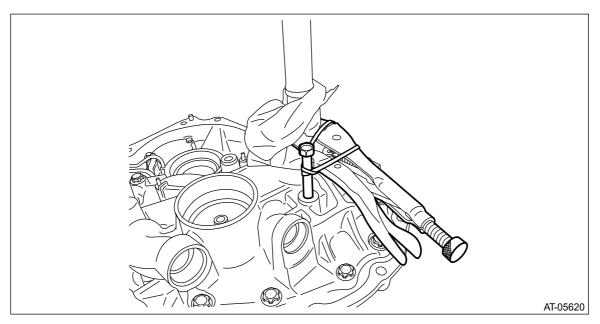
(A) 1 tooth

7. Insert the two SUBARU genuine axle shafts into differential case.

Part No.38415AA070 Axle shaft

8. Wrap the drive shaft pinion shaft with cloth and pinch with vise pliers. Install the installation bolt into the bolt hole of secondary pulley and secure the bolt and vise pliers using a band or wire.

Make sure the drive pinion shaft does not move.



9. Check the backlash is within specification using ST1, ST2 and ST3.

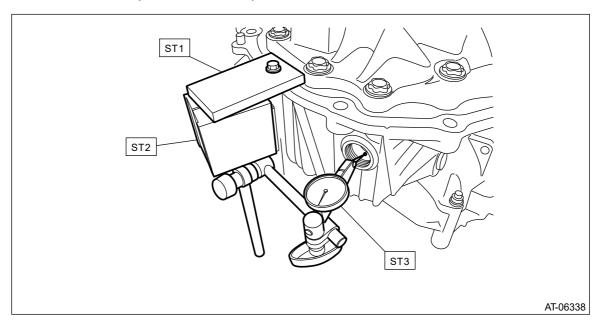
ST1 498255400 PLATE

ST2 498247001 MAGNET BASE

ST3 498247100 DIAL GAUGE

Backlash:

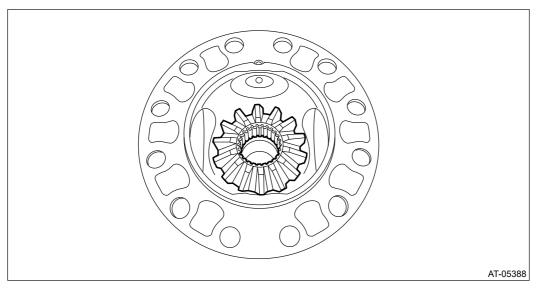
0.13-0.18 mm (0.005-0.007 in)



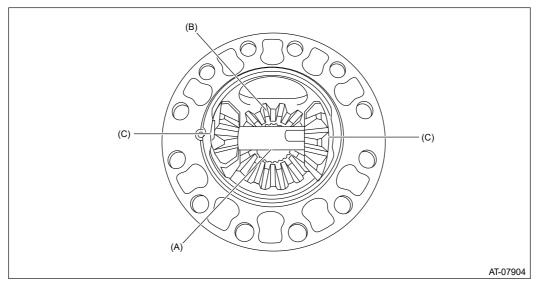
10. Adjust the teeth contact of the front differential and drive shaft. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Drive Pinion Shaft Assembly>ADJUSTMENT.

1. DIFFERENTIAL CASE ASSEMBLY

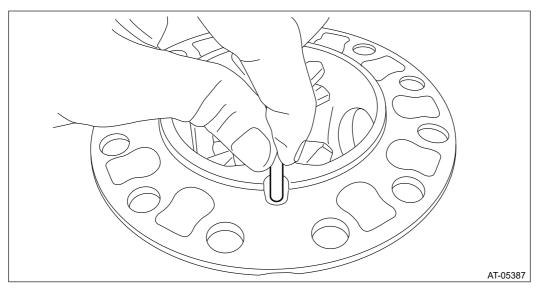
1. Install the washer and differential bevel gear into differential case (LH).



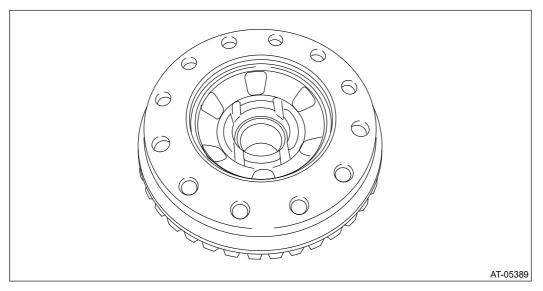
2. Install the differential bevel gear pinions into differential case (LH) and install the pinion shaft.



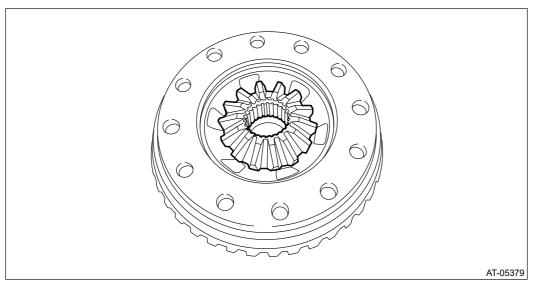
- (A) Pinion shaft
- (B) Differential bevel gear
- (C) Differential bevel pinion
- 3. Install the straight pin.



4. Install the differential case (RH) to hypoid driven gear and secure with vise.



5. Install the washer and differential bevel gear to the differential case (RH).

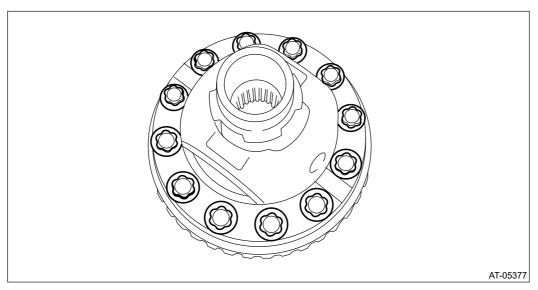


6. Using the ST, install the hypoid driven gear by tightening the installation bolt.

ST 18270KA020 SOCKET (E20)

Tightening torque:

20 N·m (2.0 kgf-m, 14.8 ft-lb)



7. While checking the tightening angle with the angle gauge, further tighten the hypoid driven gear mounting bolts.

Tightening angle:

45°±2°

- **8.** Measurement of backlash (selection of washer)
 - (1) Install the SUBARU genuine axle shaft to differential case.

Part No. 38415AA070 Axle shaft

(2) Measure the gear backlash using ST1 and ST2, and then insert the ST2 through the window of differential case.

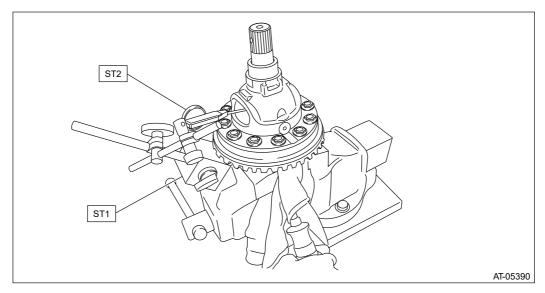
ST1 498247001 MAGNET BASE
ST2 498247100 DIAL GAUGE

Note:

- Measure the backlash by applying a differential bevel pinion tooth between two differential bevel gear teeth.
- When measuring, fix the differential bevel pinion in place with a screwdriver covered with cloth, or a similar tool.

Specification:

0.13-0.18 mm (0.0051-0.0071 in)



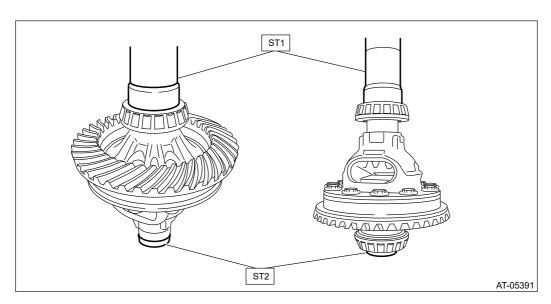
(3) If the backlash is not within specification, select a washer from the table below and replace.

Washer			
Part No.	Thickness mm (in)		
803038021	0.95 (0.037)		
803038022	1.00 (0.039)		
803038023	1.05 (0.041)		

9. Using the ST, install the left and right taper roller bearings.

ST1 499277100 BUSHING 1-2 INSTALLER

ST2 398497701 SEAT



2. SIDE RETAINER

Note:

After adjusting the backlash and tooth contact, replace the oil seal and O-ring of side retainer with new parts.

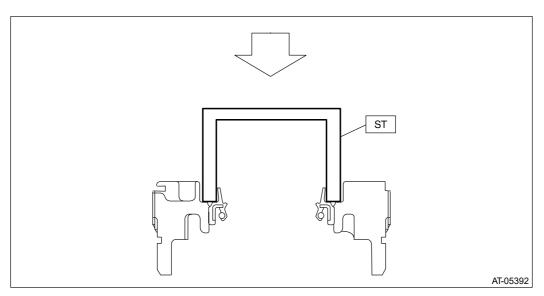
1. Press-fit the bearing outer race to side retainer.

2. Using the ST, install the oil seal.

Note:

- Use a new oil seal.
- Apply differential oil to the oil seal lip.
- Oil seal has an identification mark (R, L). When installing oil seals, do not confuse the left and right.

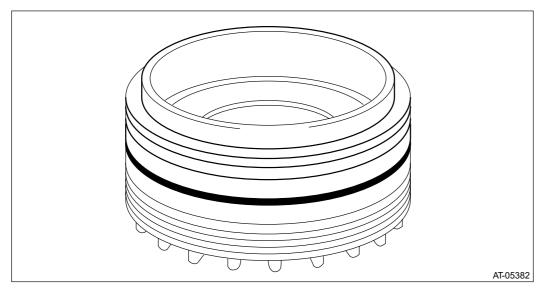
ST 18675AA000 DIFFERENTIAL SIDE OIL SEAL INSTALLER



3. Install the O-rings.

Note:

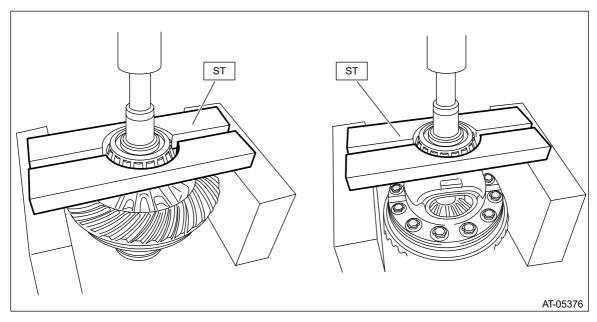
- Use new O-rings.
- Apply gear oil to O-ring.



1. DIFFERENTIAL CASE ASSEMBLY

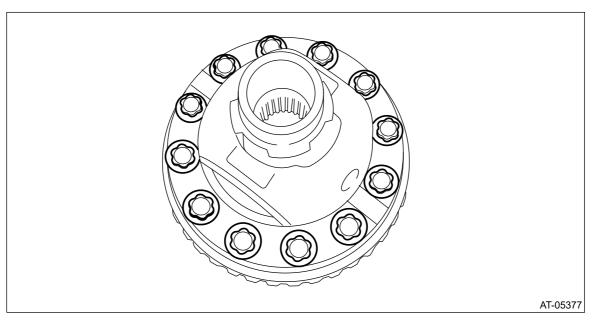
1. Remove the taper roller bearing using the ST.

ST 498077000 REMOVER

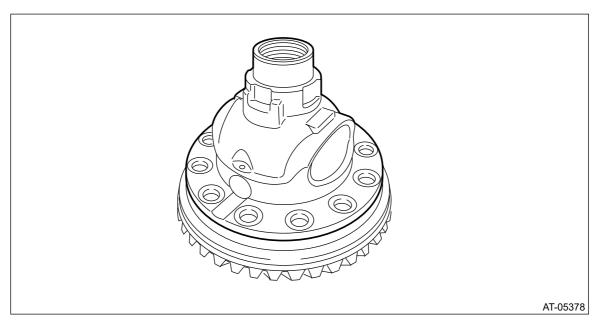


2. Remove the hypoid driven gear mounting bolt using the ST.

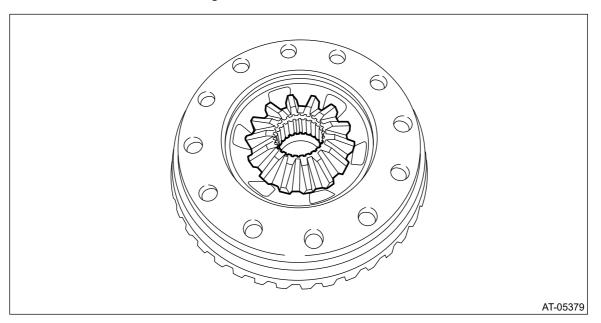
ST 18270KA020 SOCKET (E20)



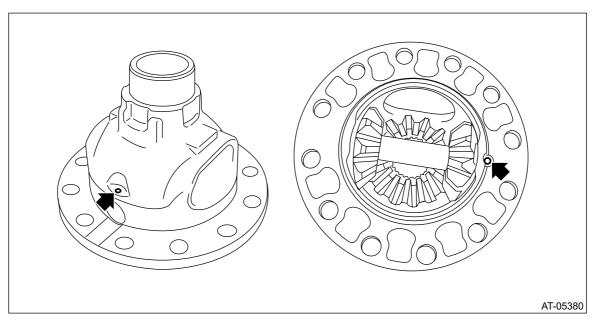
3. Remove the differential case (LH).



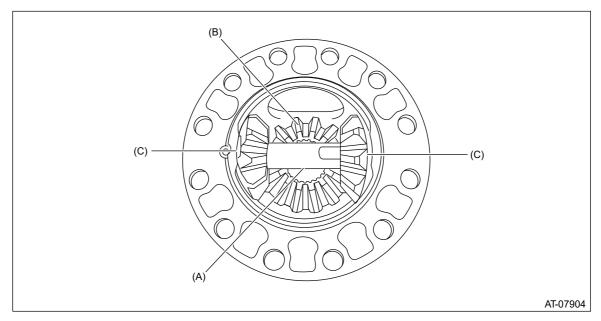
4. Remove the differential bevel gear and washer from differential case.



5. Remove the straight pin.



6. Remove the pinion shaft, then remove the differential bevel gear, washer and differential bevel pinion.



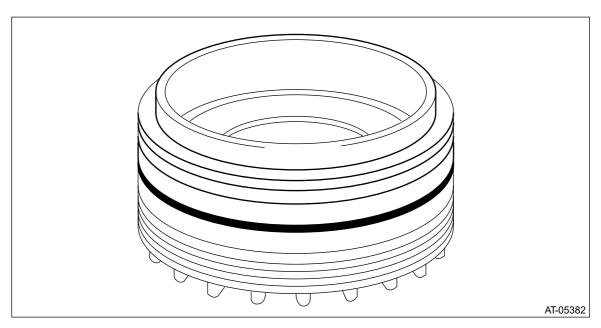
- (A) Pinion shaft
- (B) Differential bevel gear
- (C) Differential bevel pinion

2. SIDE RETAINER

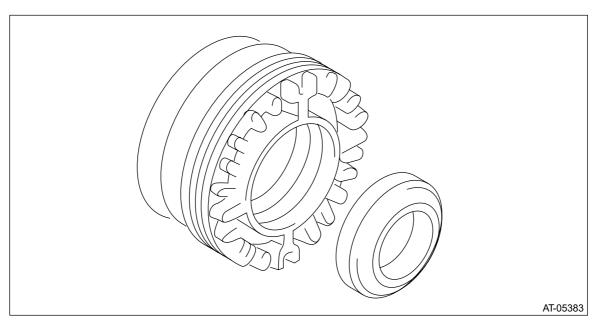
Note:

After adjusting the drive pinion backlash and tooth contact, replace the oil seal and O-ring with new parts.

1. Remove the O-rings.

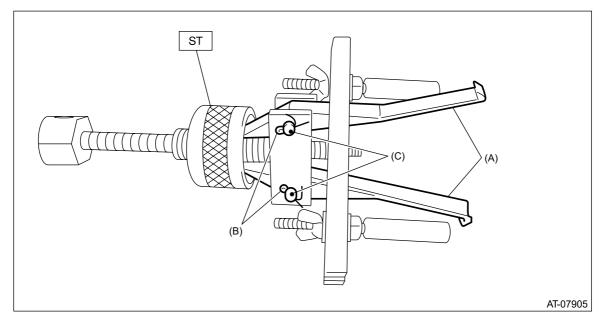


2. Remove the oil seal.



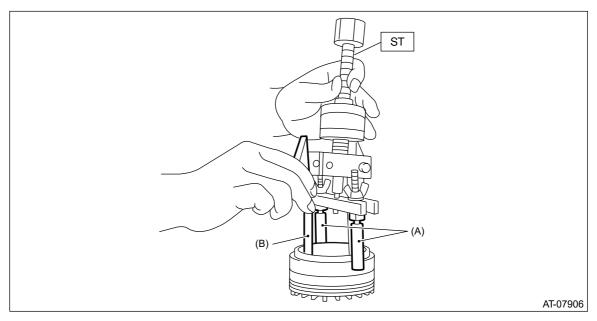
3. Remove the SPLIT PIN (ST), and then remove the claw.

ST 398527700 PULLER ASSY



- (A) Claw
- (B) Split pin
- (C) Pin
- **4.** Attach two claws to the outer race, and set the ST to side retainer.

ST 398527700 PULLER ASSY

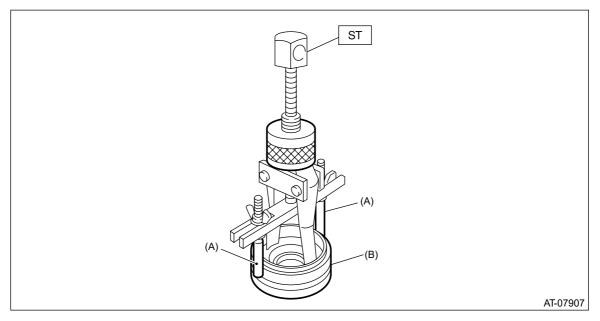


- (A) Shaft
- (B) Claw
- 5. Restore the removed claws to original position, and install the pin and split pin.
- **6.** Hold the shaft of ST to avoid removing from side retainer, and then remove the bearing outer race.

ST 398527700 PULLER ASSY

Note:

Replace the bearing inner and outer races as a single unit.



- (A) Shaft
- (B) Side retainer

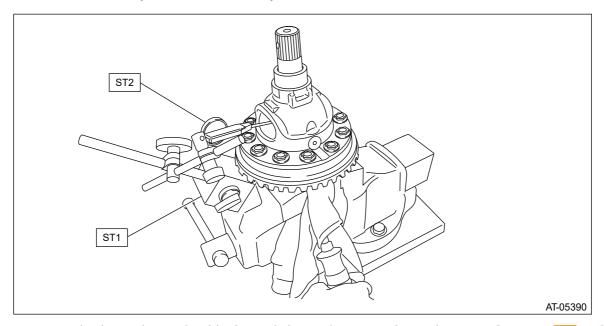
CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Front Differential Assembly

INSPECTION

- Check each component for scratches, damage or other faults.
- Inspect the backlash of the pinion gear.

Specification:

0.13-0.18 mm (0.0051-0.0071 in)



• Measure the hypoid gear backlash, and then adjust it to be within specification. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Front Differential Assembly>ADJUSTMENT.

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Front Differential Assembly

INSTALLATION

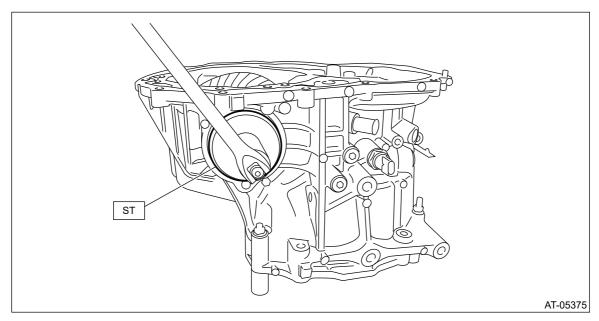
1. Install the front differential assembly to the converter case.

Note:

Be careful not to damage the inside of the case (especially the mating surface of the differential side retainers).

2. Temporarily install the differential side retainers using ST.

ST 18658AA020 WRENCH COMPL RETAINER



- **3.** Adjust the backlash of the front differential. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Front Differential Assembly>ADJUSTMENT.
- **4.** Inspect and adjust the tooth contact. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Drive Pinion Shaft Assembly>ADJUSTMENT.
- 5. Remove the differential side retainers and install the O-rings and oil seals. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Front Differential Assembly>ASSEMBLY > SIDE RETAINER.

Note:

- · Record how many turns were needed to remove.
- Use new O-rings and oil seals.
- 6. Install the differential side retainers using ST.

Note:

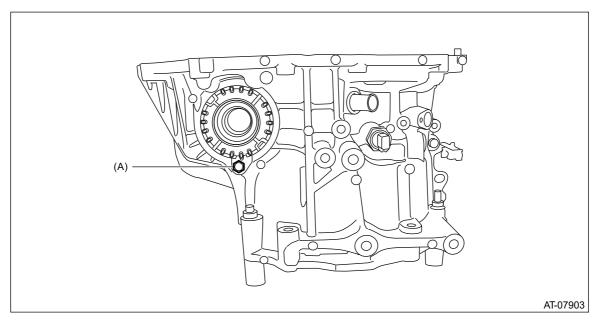
When attaching, turn the differential side retainer by the same number of turns it took to remove, and align the marks.

ST 18658AA020 WRENCH COMPL RETAINER

7. Install the lock plate.

Tightening torque:

25 N·m (2.5 kgf-m, 18.4 ft-lb)



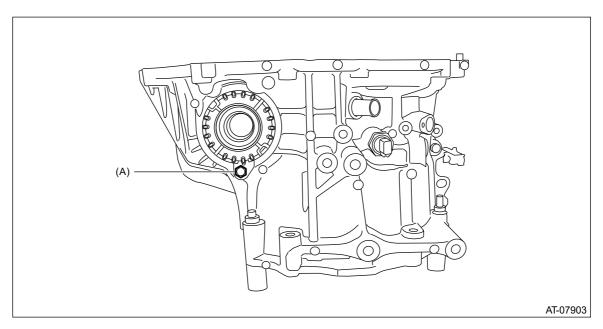
(A) Lock plate

- **8.** Install the drive pinion shaft assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Drive Pinion Shaft Assembly>INSTALLATION.
- **9.** Install the primary pulley, secondary pulley and variator chain. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Primary Pulley and Secondary Pulley>INSTALLATION.
- **10.** Install the transmission case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transmission Case>INSTALLATION.
- **11.** Install the forward clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Forward Clutch Assembly>INSTALLATION.
- 12. Install the intermediate case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Intermediate Case>INSTALLATION.
- 13. Install the transfer reduction driven gear assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transfer Reduction Driven Gear>INSTALLATION.
- **14.** Install the transfer clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transfer Clutch>INSTALLATION.
- **15.** Install the rear drive shaft. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Rear Drive Shaft>INSTALLATION.
- **16.** Install the extension case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Extension Case>INSTALLATION.
- **17.** Install the transmission harness. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transmission Harness>INSTALLATION.
- **18.** Install the control valve body and oil pan. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Control Valve Body>INSTALLATION.
- 19. Install the air breather hose. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Air Breather Hose>INSTALLATION.
- **20.** Install the transmission assembly to the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Automatic Transmission Assembly>INSTALLATION.

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Front Differential Assembly

REMOVAL

- **1.** Remove the transmission assembly from the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Automatic Transmission Assembly>REMOVAL.
- **2.** Remove the air breather hose. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Air Breather Hose>REMOVAL.
- **3.** Remove the oil pan and control valve body. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Control Valve Body>REMOVAL.
- **4.** Remove the transmission harness. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transmission Harness>REMOVAL.
- **5.** Remove the extension case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Extension Case>REMOVAL.
- **6.** Remove the rear drive shaft. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Rear Drive Shaft>REMOVAL.
- **7.** Remove the transfer clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transfer Clutch>REMOVAL.
- **8.** Remove the transfer reduction driven gear assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transfer Reduction Driven Gear>REMOVAL.
- **9.** Remove the intermediate case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Intermediate Case>REMOVAL.
- **10.** Remove the forward clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Forward Clutch Assembly>REMOVAL.
- **11.** Remove the transmission case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transmission Case>REMOVAL.
- **12.** Remove the primary pulley, secondary pulley and variator chain. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Primary Pulley and Secondary Pulley>REMOVAL.
- **13.** Remove the drive pinion shaft assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Drive Pinion Shaft Assembly>REMOVAL.
- 14. Remove the lock plates on both sides.



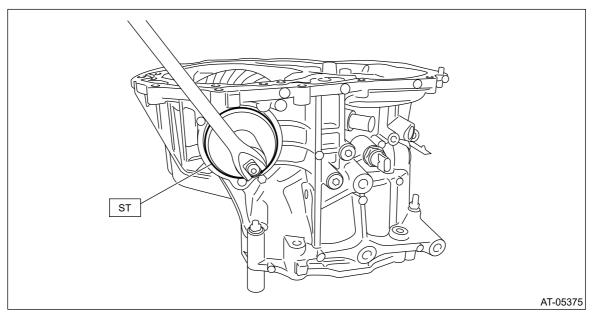
(A) Lock plate

15. Remove the differential side retainers using ST.

ST 18658AA020 WRENCH COMPL RETAINER

Note:

- Support the differential case assembly by hand to avoid damaging the retainer mounting hole of the converter case.
- When keeping the retainers aside, use labels etc. to avoid confusing the left and right.



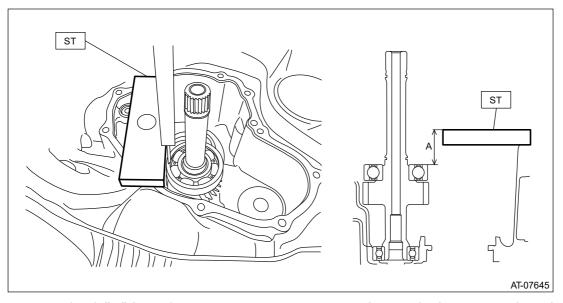
- **16.** Remove the front differential assembly while being careful not to damage the attachment part of the retainer.
- **17.** Remove the oil seals and O-rings from both differential side retainers. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Front Differential

<u>Assembly > DISASSEMBLY > SIDE RETAINER.</u>

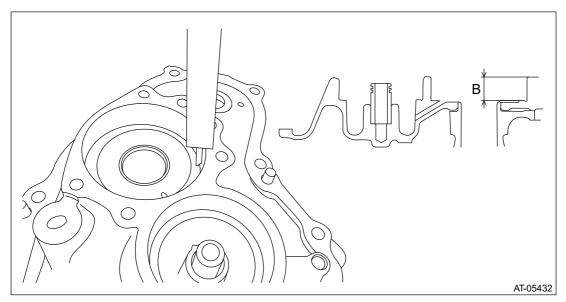
ADJUSTMENT

1. Measure height "A" from the ST upper face to the bearing end face using the ST.

ST 398643600 GAUGE

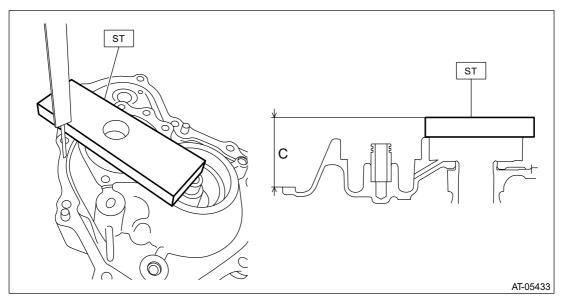


2. Measure depth "B" from the converter case cover upper face to the bearing catch surface.



3. Using the ST, measure height "C" from the ST upper face to the converter case cover mating surface.

ST 398643600 GAUGE



4. Using the following formula, calculate clearance "T" to select shims.

Calculation formula:

$$T mm = (A - 15) - ((C - 15) - B)$$

$$[T in = (A - 0.591) - ((C - 0.591) - B)]$$

T: Clearance

A: Depth from the ST upper face to the bearing end surface

B: Depth from the converter case cover upper face to the bearing catch surface

C: Height from the ST upper face to the converter case cover mating surface

15 mm (0.591 in): Thickness of ST

Clearance "T" mm (in)	Thickness of shim mm (in)	Part No.
1.070-1.174 (0.042-0.045)	1.0 (0.039)	31288AA160
1.175—1.274 (0.046—0.049)	1.1 (0.043)	31288AA170
1.275—1.374 (0.050—0.053)	1.2 (0.047)	31288AA180
1.375—1.474 (0.054—0.057)	1.3 (0.051)	31288AA220
1.475—1.580 (0.058—0.062)	1.4 (0.055)	31288AA230

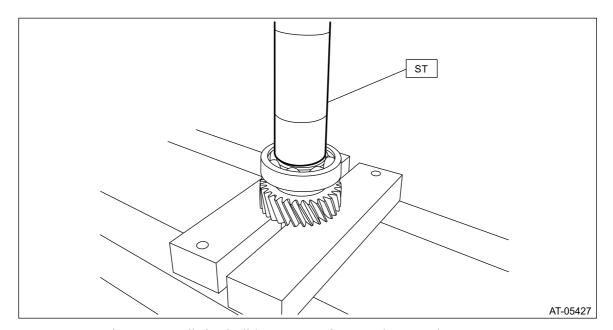
ASSEMBLY

1. Using the ST, install the ball bearing to front reduction drive gear.

Note:

Use a new ball bearing.

ST 18651AA000 INSTALLER



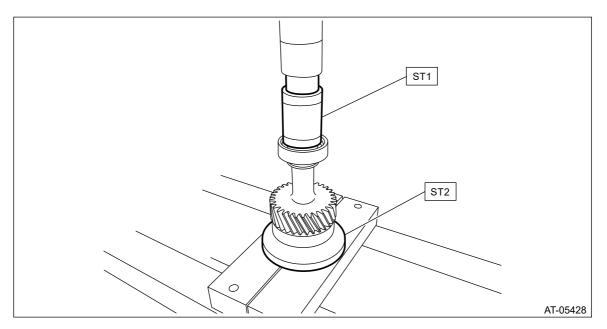
2. Using ST1 and ST2, install the ball bearing to front reduction drive gear.

Note:

Use a new ball bearing.

ST1 499757002 INSTALLER

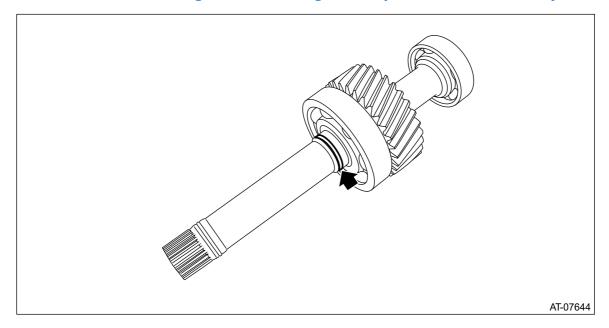
ST2 398177700 INSTALLER



3. Install the seal rings.

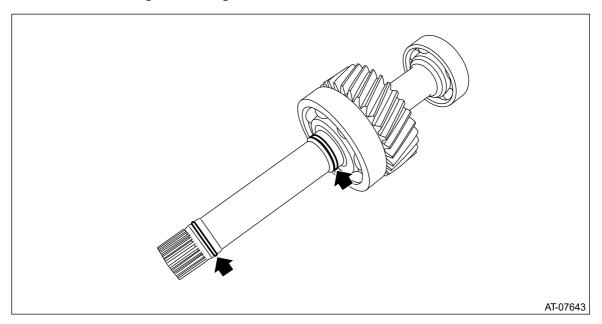
Note:

- Use new seal rings.
- When installing the seal rings, do not expand the seal rings too much.
- Install the O-ring when installing the torque converter assembly.



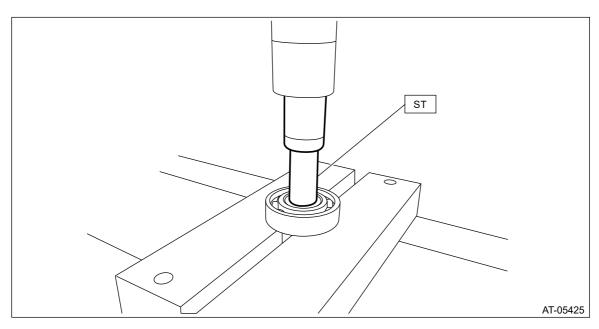
DISASSEMBLY

1. Remove the seal ring and O-ring.



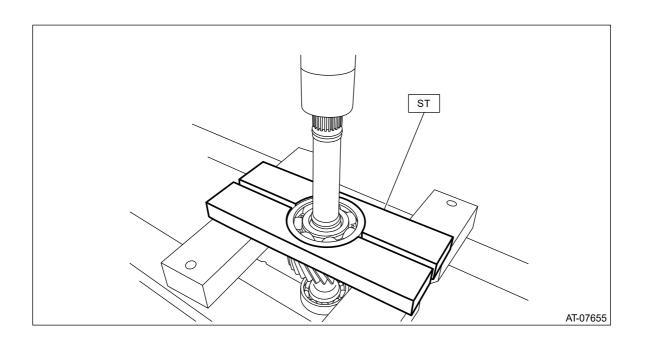
2. Using the ST, remove the ball bearing from front reduction drive gear.

ST 899864100 REMOVER



3. Using the ST, remove the ball bearing from front reduction drive gear.

ST 498077000 REMOVER



INSPECTION

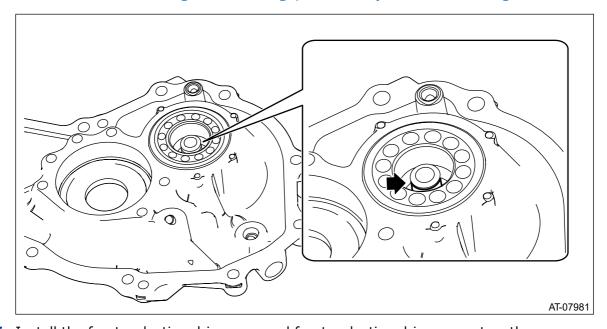
- Replace if its tooth surfaces are broken, damaged or excessively worn.
- Check the bearing for seizure or wear.
- Apply CVTF to bearing and rotate the bearing to check for noise or dragging etc.

INSTALLATION

- 1. Clean the mating surface of converter case cover and converter case.
- **2.** Select the shim for front reduction drive gear. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Front Reduction Drive Gear>ADJUSTMENT.
- **3.** Apply CVTF to the shims and install on the bearing catch surface of the front reduction driven gear.
- 4. Install the seal ring to converter case cover.

Note:

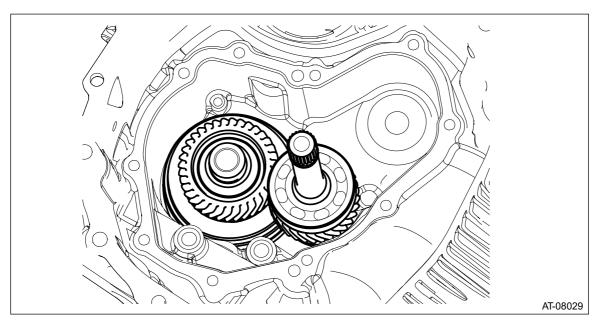
- Use new seal rings.
- When installing the seal rings, do not expand the seal rings too much.



5. Install the front reduction drive gear and front reduction driven gear together.

Caution:

Be careful not to detach the spline of input clutch and the spline of front reduction driven shaft.



- **6.** Install the converter case cover. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Converter Case Cover>INSTALLATION.
- 7. Install the oil pump chain cover and the oil pump chain. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Oil Pump Chain>INSTALLATION.
- **8.** Install the drive pinion shaft assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Drive Pinion Shaft Assembly>INSTALLATION.
- **9.** Install the primary pulley, secondary pulley and variator chain. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Primary Pulley and Secondary Pulley>INSTALLATION.
- **10.** Install the transmission case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transmission Case>INSTALLATION.
- **11.** Install the forward clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Forward Clutch Assembly>INSTALLATION.
- 12. Install the intermediate case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Intermediate Case>INSTALLATION.
- 13. Install the transfer reduction driven gear assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transfer Reduction Driven Gear>INSTALLATION.
- **14.** Install the transfer clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transfer Clutch>INSTALLATION.
- **15.** Install the rear drive shaft. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Rear Drive Shaft>INSTALLATION.
- **16.** Install the extension case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Extension Case>INSTALLATION.
- 17. Install the primary speed sensor. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Primary Speed Sensor>INSTALLATION.
- **18.** Install the transmission harness. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transmission Harness>INSTALLATION.
- **19.** Install the control valve body and oil pan. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Control Valve Body>INSTALLATION.
- **20.** Install the air breather hose. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Air Breather Hose>INSTALLATION.

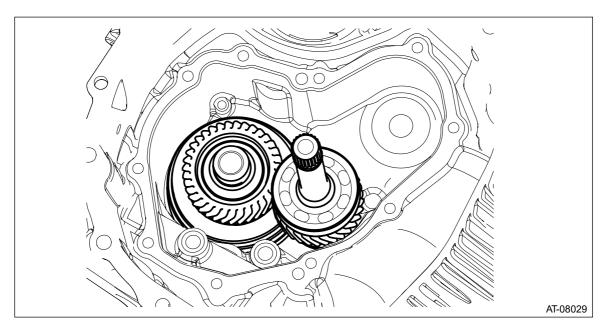
21.	Install the transmission assembly to the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Automatic Transmission Assembly>INSTALLATION.

REMOVAL

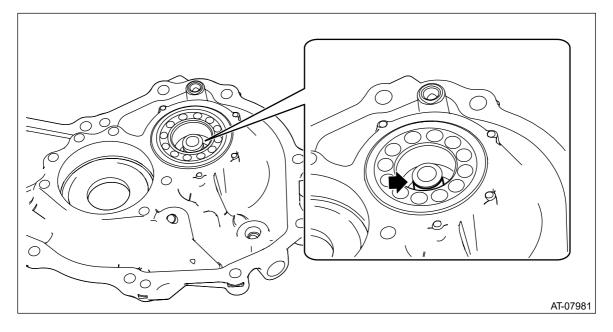
- **1.** Remove the transmission assembly from the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Automatic Transmission Assembly>REMOVAL.
- **2.** Remove the air breather hose. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Air Breather Hose>REMOVAL.
- **3.** Remove the oil pan and control valve body. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Control Valve Body>REMOVAL.
- **4.** Remove the transmission harness. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transmission Harness>REMOVAL.
- **5.** Remove the primary speed sensor. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Primary Speed Sensor>REMOVAL.
- **6.** Remove the extension case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Extension Case>REMOVAL.
- 7. Remove the rear drive shaft. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Rear Drive Shaft>REMOVAL.
- **8.** Remove the transfer clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transfer Clutch>REMOVAL.
- **9.** Remove the transfer reduction driven gear assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transfer Reduction Driven Gear>REMOVAL.
- **10.** Remove the intermediate case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Intermediate Case>REMOVAL.
- **11.** Remove the forward clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Forward Clutch Assembly>REMOVAL.
- **12.** Remove the transmission case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transmission Case>REMOVAL.
- 13. Remove the primary pulley, secondary pulley and variator chain. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Primary Pulley and Secondary Pulley>REMOVAL.
- **14.** Remove the drive pinion shaft assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Drive Pinion Shaft Assembly>REMOVAL.
- **15.** Remove the oil pump chain cover and the oil pump chain. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Oil Pump Chain>REMOVAL.
- **16.** Remove the converter case cover. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Converter Case Cover>REMOVAL.
- 17. Remove the front reduction drive gear and front reduction driven gear together.

 Note:

Remove the front reduction driven shaft while holding it.



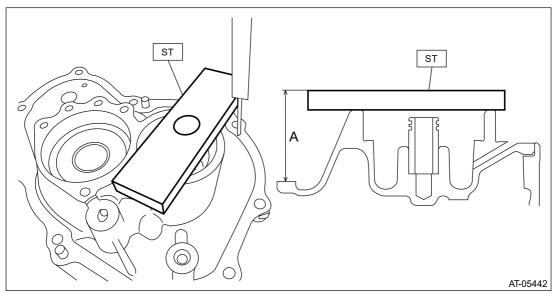
- 18. Remove the shims of the front reduction driven gear from the converter case.
- **19.** Remove the seal rings.



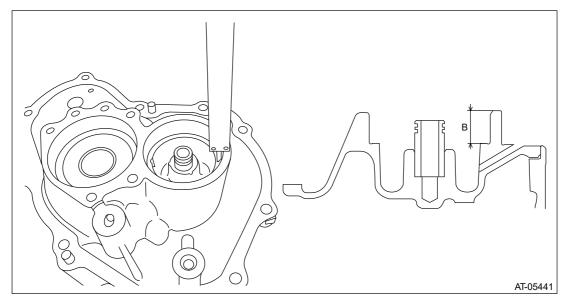
ADJUSTMENT

- 1. If the ball bearing is attached, remove the bearing and shims. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Converter Case Cover>REMOVAL.
- 2. Using the ST, measure height "A" from the ST upper face to the mating surface of the case.

ST 398643600 GAUGE



3. Measure depth "B" from the converter case cover upper face to the bearing catch surface.



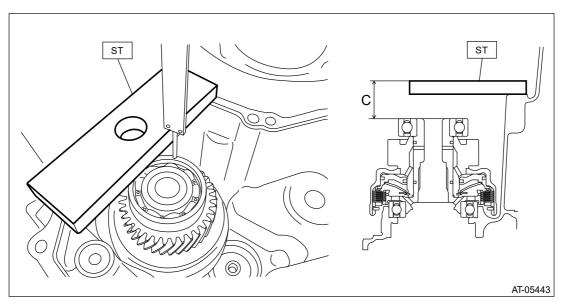
4. Install the ball bearing to the reduction driven gear.

Note:

Use a new ball bearing.

5. Measure depth "C" from the ST upper face to the bearing end face using the ST.

ST 398643600 GAUGE



6. Calculate clearance "T" using the following formula.

Formula:
$$T mm = (C - 15) - ((A - 15) - B)$$

$$[T in = (C - 0.591) - ((A - 0.591) - B)]$$

T: Clearance

A: Height from the ST upper face to the converter case mating surface

B: Depth from the converter case cover upper face to the bearing catch surface

C: Depth from the ST upper face to the bearing end face

15 mm (0.591 in): Thickness of ST

Clearance "T"	Thickness of shim
mm (in)	mm (in)
0.470-0.569 (0.019-0.021)	0.4 (0.016)
0.570-0.669 (0.022-0.025)	0.5 (0.020)
0.670-0.769 (0.026-0.029)	0.6 (0.024)
0.770-0.869 (0.030-0.033)	0.7 (0.028)
0.870-0.980 (0.034-0.039)	0.8 (0.031)

7. Select one to two shims so that the total thickness meets the value obtained from above.

Part No.	Thickness of shim mm (in)
31288AA130	0.2 (0.008)
31288AA140	0.3 (0.012)
31288AA150	0.5 (0.020)

ASSEMBLY

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

Note

Make sure of the direction of dish plate.

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

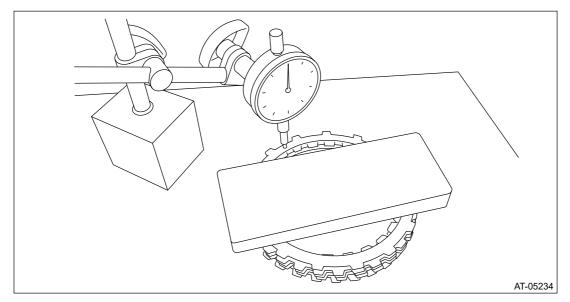
Note:

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

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

Note:

- Use a stiff board which does not bend against load as a flat board to be put on retaining plate.
- Use a flat board weighing less than 130 N (13.3 kgf, 29.2 lb).
- 4. Put the flat board on retaining plate.



5. Using the following formula, calculate load "N", a force of pressing with push/pull gauge.

N = 130 N (13.3 kgf, 29.2 lb) - Z

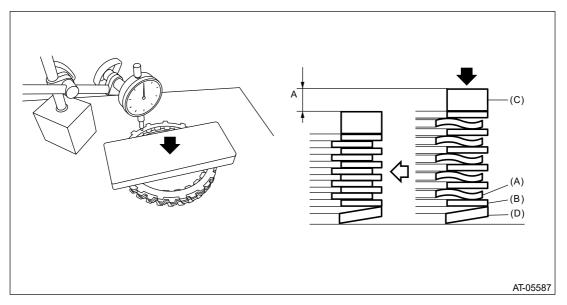
130 N (13.3 kgf, 29.2 lb): Load applied to clutch plate

Z: Flat board weight

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

Note:

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



- (A) Drive plate
- (B) Driven plate
- (C) Retaining plate
- (D) Dish plate
- 7. Install the dish plate, driven plate, drive plate, retaining plate and snap ring.

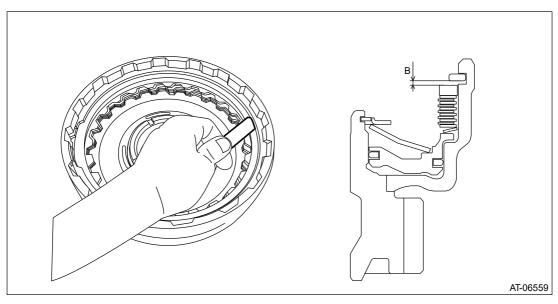
Note:

Make sure of the direction of dish plate.

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

Note:

Before measuring, press down the whole circumference of retaining plate using your finger.



9. Piston stroke calculation

Calculate with A and B dimensions recorded before.

If out of standard, replace with a new drive plate and adjust it within standard.

S mm (in) = A + B

S: Piston stroke

A: Compression amount of drive plate and dish plate

B: Clearance between retaining plate and snap ring

Specification:

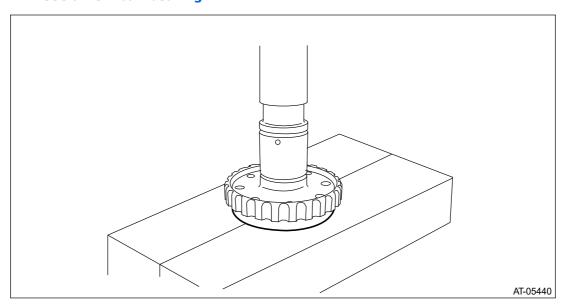
2.4 - 2.8 mm (0.094 - 0.11 in)

Retaining plate		
Part No.	Thickness mm (in)	
31667AA430	3.1 (0.122)	
31667AA440	3.3 (0.130)	
31667AA450	3.5 (0.138)	

10. Press-fit the ball bearing into front driven shaft.

Note:

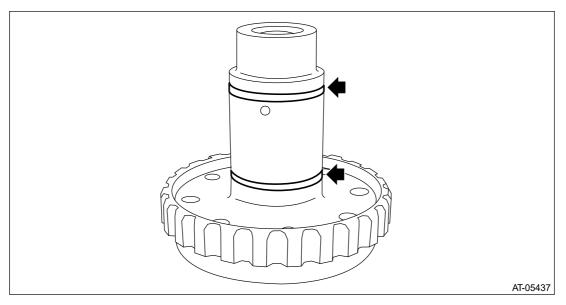
Use a new ball bearing.



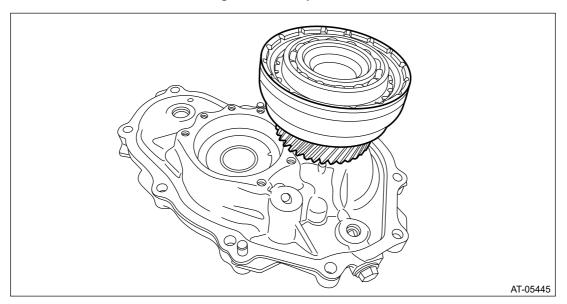
11. Install the seal ring to the front driven shaft.

Note:

- Install a new seal ring.
- Apply CVTF to the seal rings.



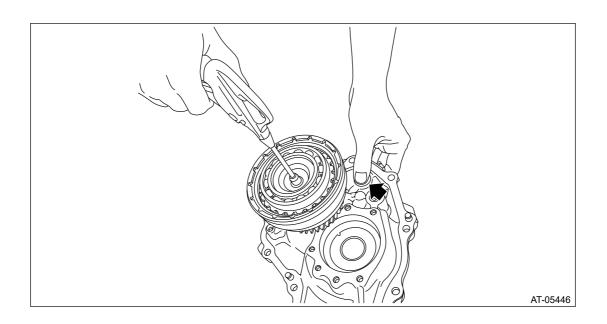
- 12. Install the front reduction driven shaft to the front reduction driven gear.
- **13.** Install the front reduction driven gear assembly to converter case cover.



14. Apply compressed air intermittently to check the piston operation.

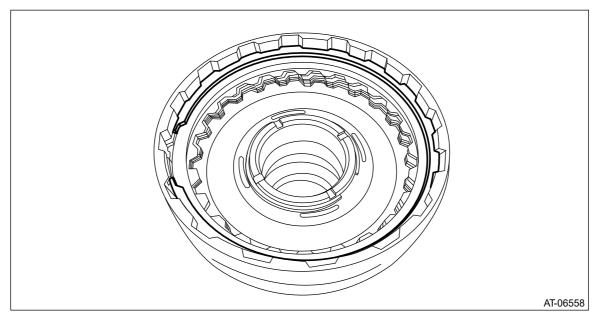
Note:

Hold the arrowed area with a finger.

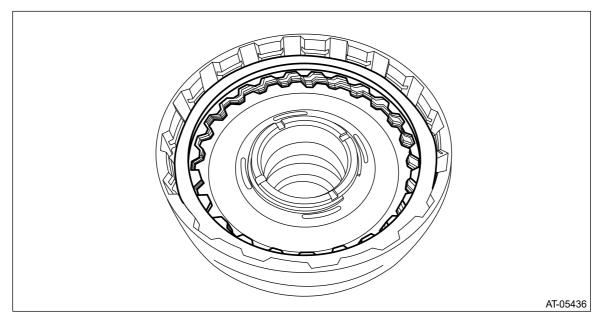


DISASSEMBLY

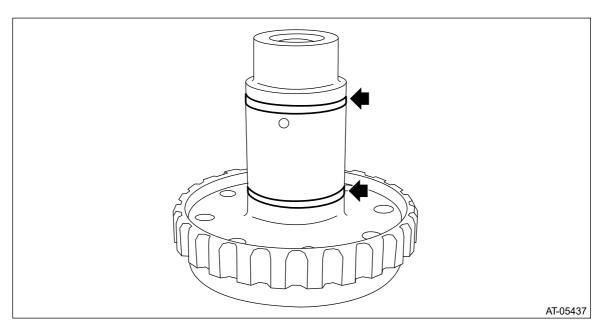
- 1. Remove the front reduction driven shaft from the front reduction driven gear.
- 2. Remove the snap ring.



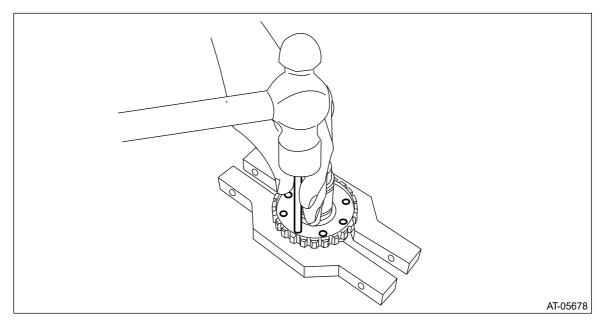
3. Remove the retaining plate, drive plate, driven plate and dish plate.



4. Remove the seal ring from front reduction driven shaft.



5. Remove the ball bearing, while tapping the entire circumference around the ball bearing outer race a little at a time through the front reduction driven shaft hole using the round bar with diameter of 7 mm (0.28 in).



INSPECTION

- Check the drive plate for wear and damage.
- Check the driven plate for discoloration (burnt color).
- Check for worn snap ring, fatigue or damaged return spring or deformed piston retainer.
- Replace if its tooth surfaces are broken, damaged or excessively worn.
- Check the bearing for seizure or wear.
- Apply CVTF to bearing and rotate the bearing to check for noise or dragging etc.

INSTALLATION

Note:

For installation 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

REMOVAL

Note:

For removal 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 Wheel Speed Sensor

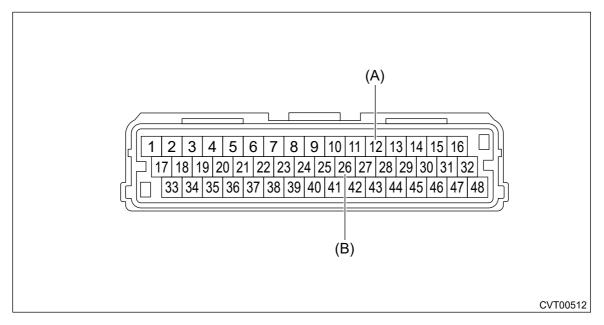
INSPECTION

- 1. Remove the bulkhead harness connector from TCM. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transmission Control Module (TCM)>REMOVAL.
- 2. Set the ST between the TCM and bulkhead harness.

ST 18460AA040 CHECK BOARD

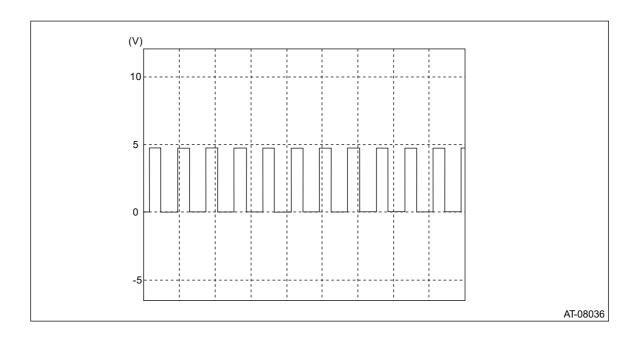
3. Set the probe of oscilloscope to the check board connector.

Terminals:



- (A) + probe
- (B) probe
- 4. Lift up the vehicle and raise the vehicle speed up to 20 km/h (12 MPH).
- 5. Check the waveform of front wheel speed sensor when vehicle speed is at 20 km/h (12 MPH).
 Note:

The waveform cycle changes as the speed changes.



CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Front Wheel Speed Sensor

Caution:

INSTALLATION

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

Install in the reverse order of removal.

Note:

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

Tightening torque:

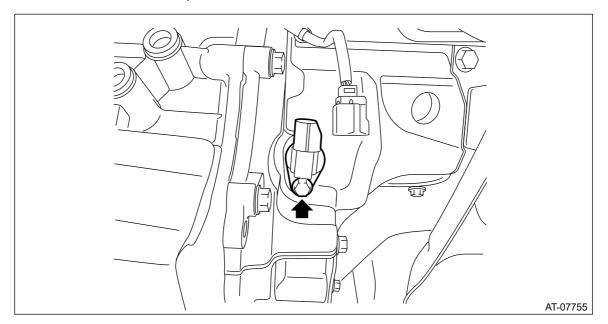
5 N·m (0.5 kgf-m, 3.7 ft-lb)

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Front Wheel Speed Sensor

REMOVAL

Caution:

- Be sure to prevent water or oil from contacting the connector terminal of front wheel speed sensor. If adhesion occurs, replace with a new part.
- When removing front wheel speed sensor, CVTF may let out. If CVTF has leaked, adjust the CVTF level after installing the front wheel speed sensor.
- **1.** Disconnect the ground cable from battery.
- 2. Lift up the vehicle.
- **3.** Clean the transmission exterior.
- **4.** Remove the front wheel speed sensor harness connector.
- 5. Remove the front wheel speed sensor.

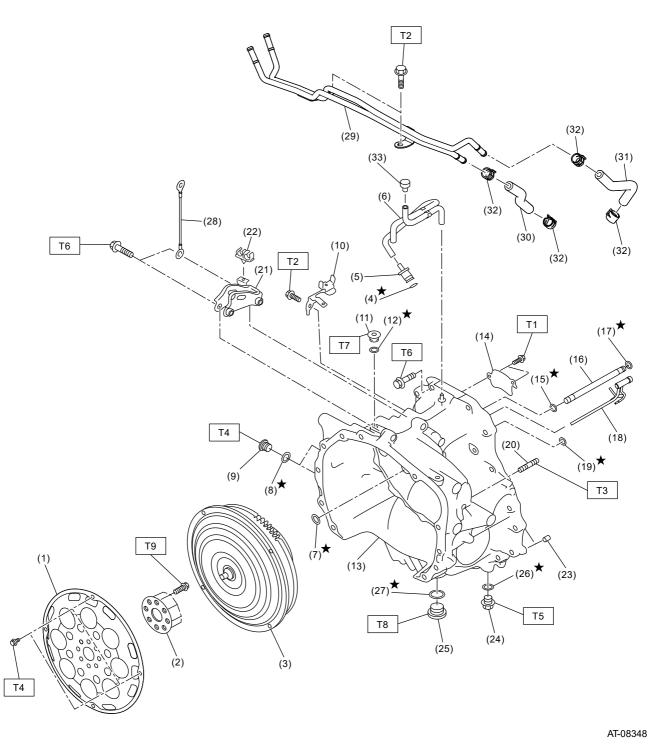


CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > General Description

CAUTION

- Wear appropriate work clothing, including a cap, protective goggles and protective shoes when performing any work.
- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- · Keep the disassembled parts in order and protect them from dust and dirt.
- Do not place the oil pan with its inner side facing up until it is installed, to prevent intrusion of foreign matter into the control valve body.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
- When disassembling the case and other light alloy parts, use a plastic hammer to force it apart. Do not pry apart with screwdrivers or other tools.
- Vehicle components are extremely hot after driving. Be wary of receiving burns from heated parts.
- Use SUBARU genuine CVTF and recommended grease. Do not mix CVTF, grease etc. of different grades or manufacturers.
- Be sure to tighten bolts and nuts to the specified torque.
- Place lifts, shop jacks or rigid racks at specified locations.
- Apply CVTF onto sliding or revolving surfaces before installation.
- Apply CVTF onto the press-fitting surface of the part before press-fitting the part using a press.
- Replace deformed or damaged snap rings with new parts.
- Before installing O-rings or oil seals, apply sufficient amount of CVTF to avoid damage and deformation.
- Be careful not to incorrectly install or fail to install O-rings, snap rings and other such parts.
- Before securing a part on a vise, place cushioning material such as wood blocks, aluminum plate, or cloth between the part and the vise.
- Avoid damaging the mating surface of the case.
- Before applying liquid gasket, completely remove the old liquid gasket.
- After removing the sensors, breather hose and plugs, plug the holes to avoid foreign materials intruding as necessary.
- During disassembly or assembly, be sure to use nylon gloves or paper towels. Do not use cloth gloves or waste cloth.

1. TORQUE CONVERTER ASSEMBLY AND CONVERTER CASE



(1) Drive plate

(2) Reinforcement drive plate

(3) Torque converter ASSY

(16) Lubrication pipe

(17) O-ring

(18) Lubrication pipe

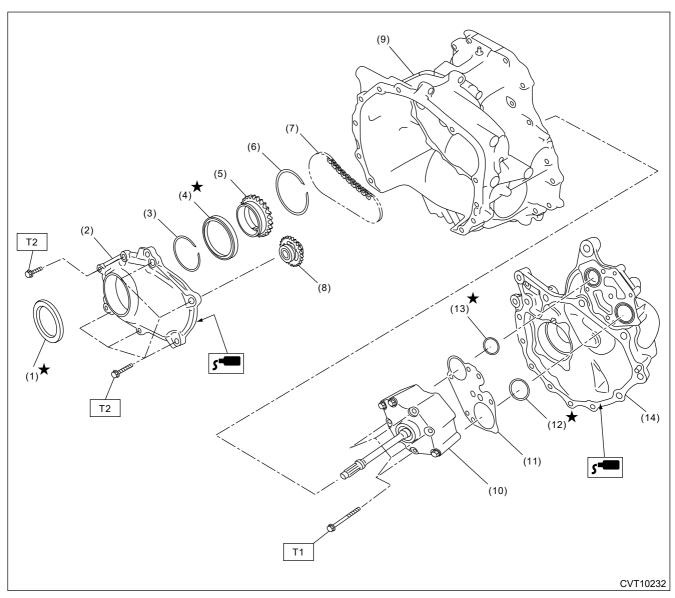
(31) CVTF hose

(32) Clamp

(33) Air breather cap

(4)	O-ring	(19)	O-ring	
(5)	Oil charge pipe cap	(20)	Stud bolt	Tightening torque: N·m (kgf-m, ft-lb)
(6)	Air breather hose ASSY	(21)	Pitching stopper bracket	T1: 9 (0.9, 6.6)
(7)	O-ring	(22)	Clip	T2: 16 (1.6, 11.8)
(8)	O-ring	(23)	Straight pin	T3: 18 (1.8, 13.3)
(9)	Plug	(24)	Overflow drain plug	T4: 25 (2.5, 18.4)
(10)	Transmission harness stay	(25)	Front differential gear oil drain plug	T5: 35 (3.6, 25.8)
(11)	Plug	(26)	Gasket	T6: 41 (4.2, 30.2)
(12)	O-ring	(27)	Gasket	T7: 50 (5.1, 36.9)
(13)	Converter case	(28)	Transmission radio ground cord	T8: 70 (7.1, 51.6)
(14)	Oil stopper plate	(29)	CVT cooler pipe COMPL	T9: Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>D rive Plate>INSTALLATION.
(15)	O-ring	(30)	CVTF hose	

2. OIL PUMP ASSEMBLY



- (1) Oil seal
- (2) Oil pump chain cover
- (3) Snap ring
- (4) Ball bearing
- (5) Drive sprocket
- (6) Snap ring

- (7) Oil pump chain
- (8) Driven sprocket
- (9) Converter case
- (10) Oil pump ASSY
- (11) Plate
- (12) O-ring (large)

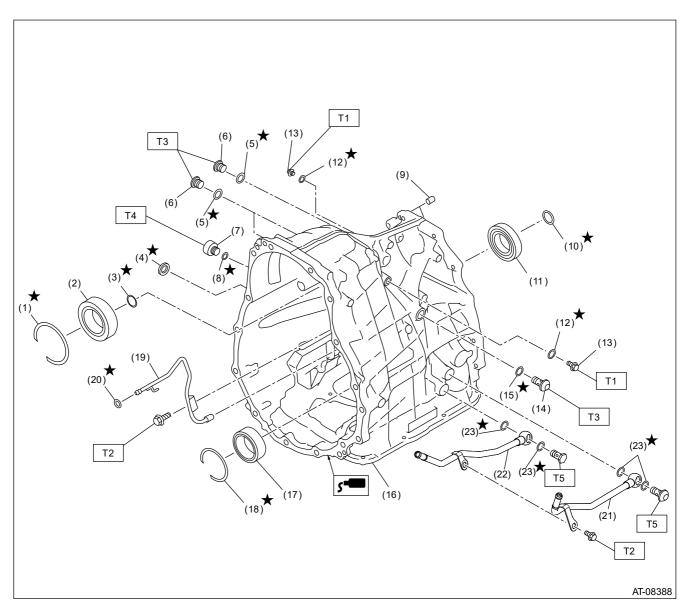
- (13) O-ring (small)
- (14) Drive pinion retainer

Tightening torque: N·m (kgf-m, ft-lb)

T1: 8.5 (0.9, 6.3)

T2: 24 (2.4, 17.7)

3. TRANSMISSION CASE



(1)) Snap	ring
	,	

(2) Roller bearing

(3) Seal ring

(4) Oil seal

(5) O-ring

(6) Plug

(7) Plug

(8) Gasket

(9) Straight pin

(10) Seal ring

(11) Ball bearing

(12) O-ring

(13) Plug

(14) Plug

(15) O-ring

(16) Transmission case

(17) Roller bearing

(18) Snap ring

(19) Lubrication pipe

(20) O-ring

(21) CVTF outlet pipe

(22) CVTF inlet pipe

(23) Gasket

Tightening torque: N·m (kgf-m, ft-lb)

T1: 13 (1.3, 9.6)

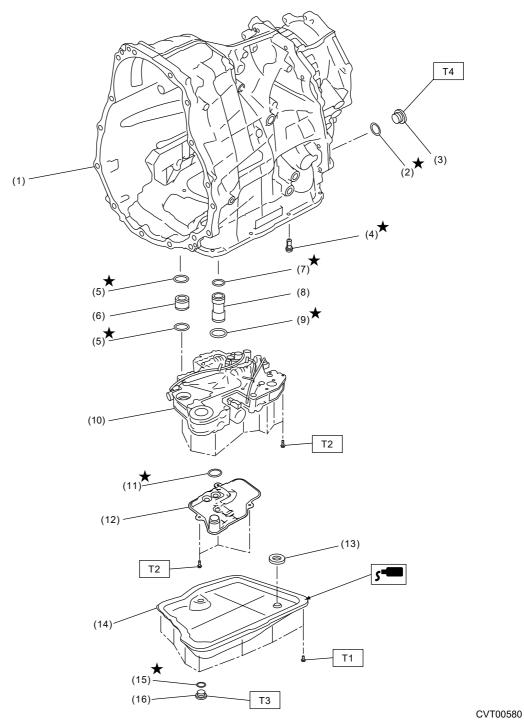
T2: 16 (1.6, 11.8)

T3: 25 (2.5, 18.4)

T4: 35 (3.6, 25.8)

T5: 40 (4.1, 29.5)

4. CONTROL VALVE BODY



(1) Transmission case

(9) O-ring (large)

Tightening torque: N·m (kgf-m,

- (2) Gasket
- (3) Filler plug
- (4) CVTF filter
- (5) O-ring
- (6) Pressure pipe
- (7) O-ring (small)

- (10) Control valve body
- (11) O-ring
- (12) Oil strainer
- (13) Magnet
- (14) Oil pan
- (15) Gasket

ft-lb)

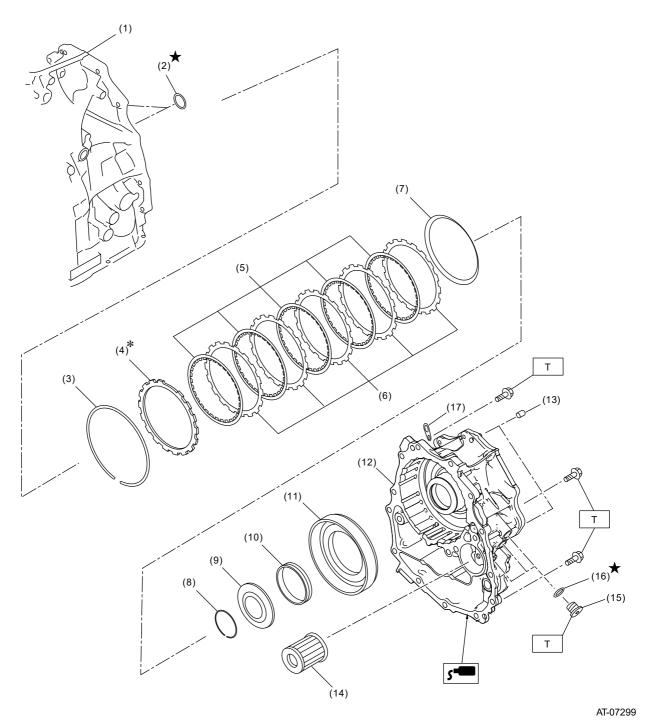
T1: 5 (0.5, 3.7)

T2: 9 (0.9, 6.6)

T3: 39.2 (4.0, 28.9)

T4: 50 (5.1, 36.9)

5. REVERSE BRAKE ASSEMBLY AND INTERMEDIATE CASE



- (1) Transmission case
- (2) O-ring
- (3) Snap ring
- (4) Retaining plate
- (5) Drive plate

- (8) Snap ring
- (9) Spring retainer
- (10) Return spring
- (11) Reverse brake piston
- (12) Intermediate case
- (15) Plug
- (16) O-ring
- (17) Transmission hanger

Tightening torque: N·m (kgf-m,

(6) Driven plate

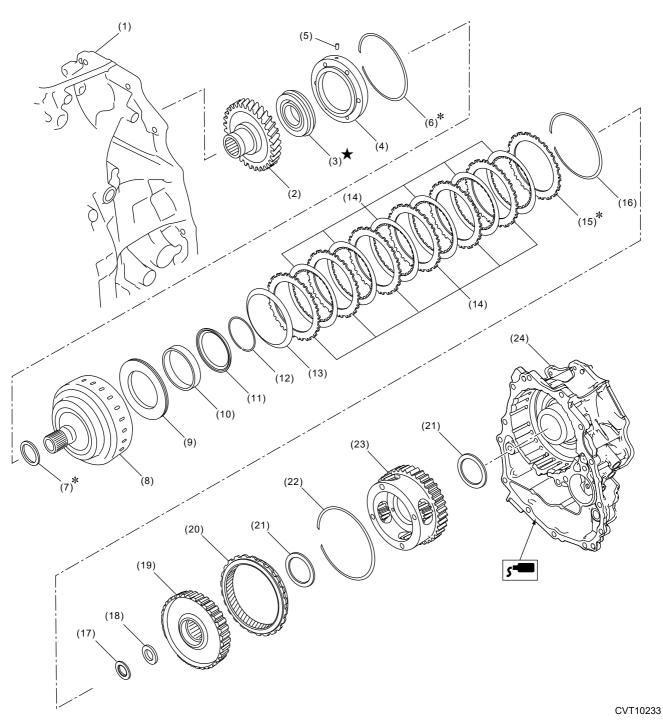
(13) Straight pin

T: 25 (2.5, 18.4)

(7) Dish plate

(14) CVTF filter

6. FORWARD CLUTCH ASSEMBLY AND REDUCTION DRIVEN GEAR



(1) Transmission case

(2) Reduction driven gear

(3) Ball bearing

(10) Return spring

(11) Forward clutch piston retainer (20) Internal gear

(12) Snap ring

(19) Sun gear ASSY

(21) Thrust needle bearing

(4) Reduction driven gear retainer (13) Dish plate

(5) Straight pin (14) Forward clutch plate

(6) Snap ring (15) Retaining plate

(7) Washer (16) Snap ring

(8) Forward clutch drum (17) Thrust needle bearing

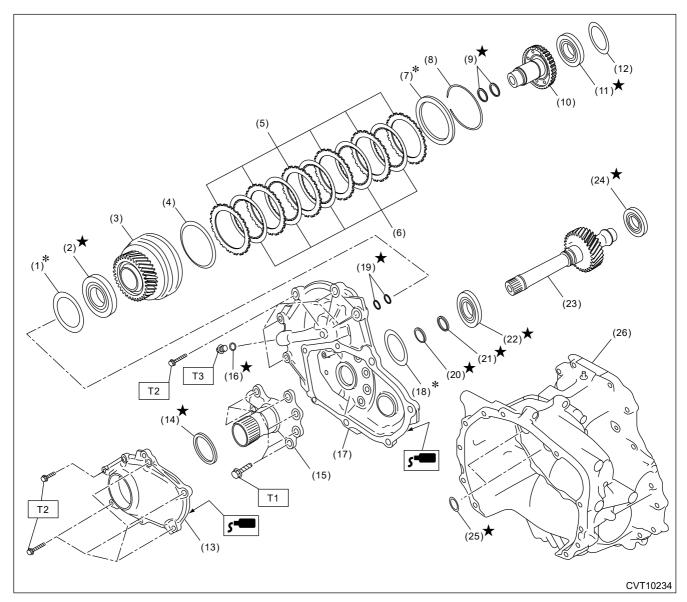
(9) Forward clutch piston (18) Washer

(22) Snap ring

(23) Planetary carrier ASSY

(24) Intermediate case

7. FRONT REDUCTION DRIVE GEAR AND FRONT REDUCTION DRIVEN GEAR



(1) Shim

(2) Ball bearing

(3) Front reduction driven gear

(4) Dish plate

(5) Driven plate

(6) Drive plate

(12) Shim

(13) Oil pump chain cover

(14) Seal ring

(15) Center support COMPL

(16) O-ring

(17) Converter case cover

(23) Front reduction drive gear

(24) Ball bearing

(25) O-ring

(26) Converter case

Tightening torque: N·m (kgf-m, ft-lb)

 (7) Retaining plate
 (18) Shim
 T1: 21.5 (2.2, 15.9)

 (8) Snap ring
 (19) Seal ring
 T2: 24 (2.4, 17.7)

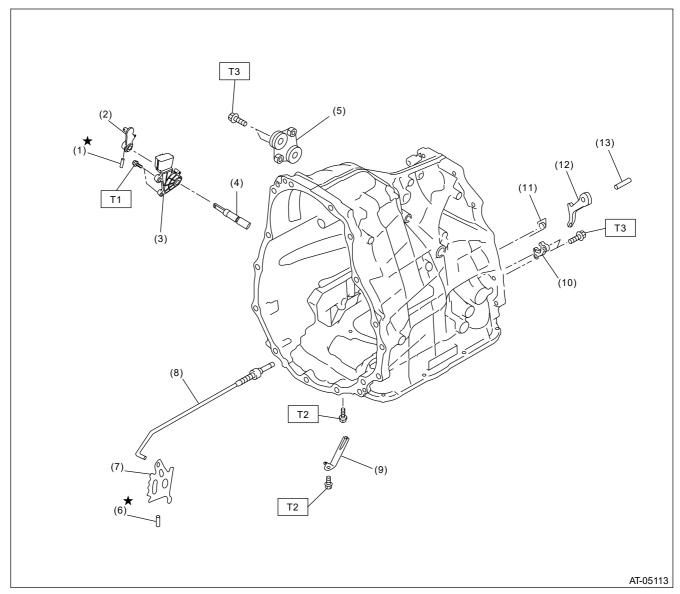
(9) Seal ring (20) O-ring **73: 25 (2.5, 18.4)**

(10) Front reduction driven shaft (21) Seal ring

(22) Ball bearing

8. TRANSMISSION CONTROL DEVICE

(11) Ball bearing



(1) Spring pin (8) Parking rod **Tightening torque: N·m (kgf-m, ft-lb)**

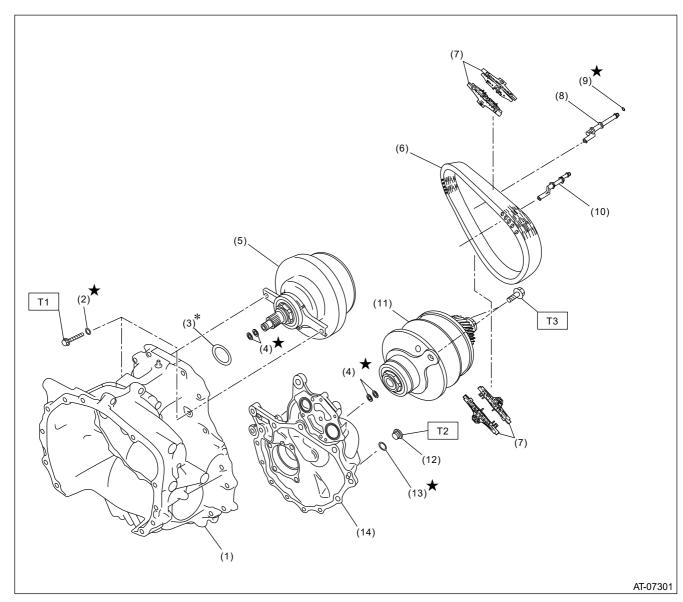
(2) Shifter arm (9) Detent spring **T1: 5 (0.5, 3.7)**(3) Inhibitor switch (10) Parking support **T2: 7 (0.7, 5.2)**

(4) Shifter arm shaft (11) Return spring **73: 25 (2.5, 18.4)**

(5) Cable plate ASSY (12) Parking pawl

(6) Spring pin(13) Shaft(7) Manual plate

9. PRIMARY PULLEY, SECONDARY PULLEY AND VARIATOR CHAIN



(1) Converter case

(2) Seal washer

(3) Shim

(4) Seal ring

(5) Primary pulley ASSY

(6) Variator chain

(7) Chain guide

(8) Lubrication pipe

(9) O-ring

(10) Support rod

(11) Secondary pulley ASSY

(12) Plug

(13) O-ring

(14) Drive pinion retainer

Tightening torque: N·m (kgf-m,

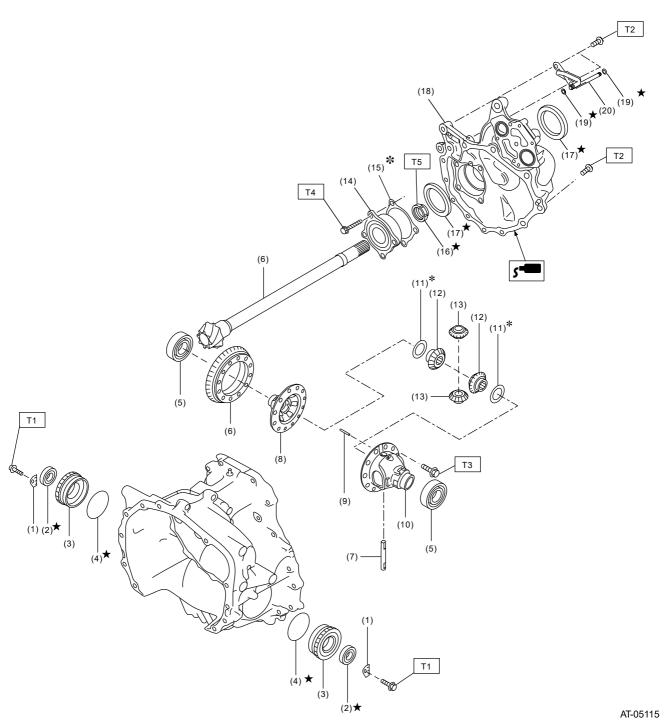
ft-lb)

T1: 21 (2.1, 15.5)

T2: 25 (2.5, 18.4)

T3: 33 (3.4, 24.3)

10. FRONT DIFFERENTIAL GEAR



(1) Lock plate

(2) Oil seal

(3) Differential side retainer

(4) O-ring

(5) Taper roller bearing

(6) Drive pinion gear set

(7) Pinion shaft

(10) Differential case LH

(11) Washer

(12) Differential bevel gear

(13) Differential bevel pinion

(14) Taper roller bearing

(15) Shim

(16) Lock nut

(19) O-ring

(20) Lubrication pipe

Tightening torque: N·m (kgf-m, ft-lb)

T1: 25 (2.5, 18.4)

T2: 43 (4.4, 31.7)

T3: @ Ref. to CONTINUOUSLY

VARIABLE

TRANSMISSION(TR690)>F

ront Differential

Assembly>ASSEMBLY >

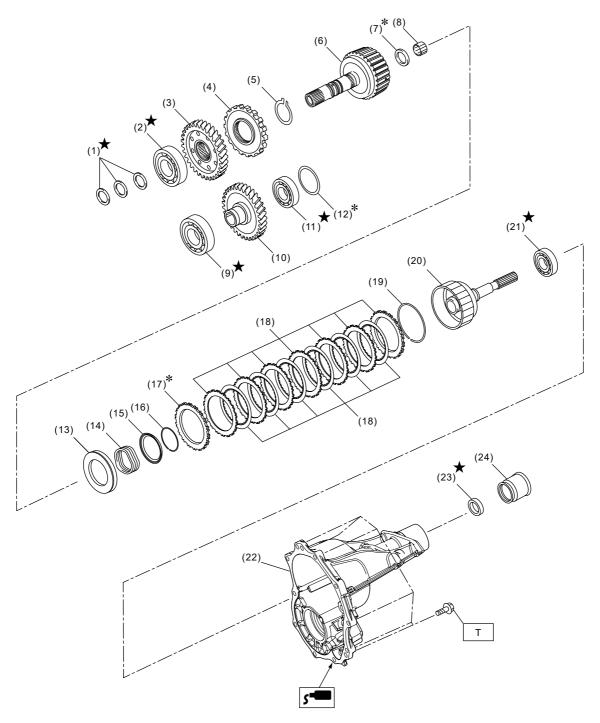
DIFFERENTIAL CASE

ASSEMBLY.

(8) Differential case RH
(17) Oil seal
(9) Straight pin
(18) Drive pinion retainer T4: 70 (7.1, 51.6)

T5: 130 (13.3, 95.9)

11. TRANSFER AND EXTENSION CASE



CVT10237

(1) Seal ring

(2) Ball bearing

(3) Transfer drive gear

(4) Parking gear

(5) Snap ring

(6) Reduction drive gear shaft

(7) Thrust needle bearing

(8) Needle bearing

(10) Transfer reduction driven gear (19) Snap ring

(11) Ball bearing

(12) Shim

(13) Transfer piston

(14) Return spring

(15) Transfer piston seal

(16) Snap ring

(17) Pressure plate

(20) Rear drive shaft

(21) Ball bearing

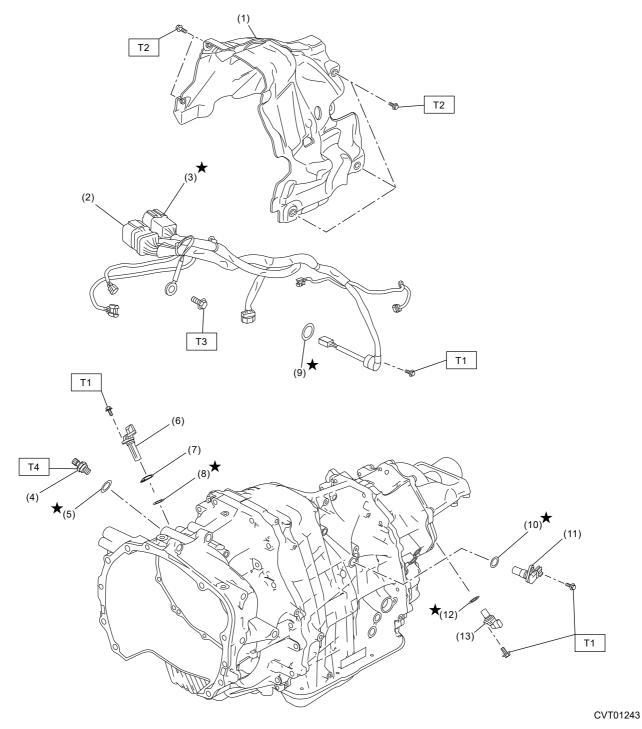
(22) Extension case

(23) Oil seal

(24) Dust cover

Tightening torque: N·m (kgf-m,

12. TRANSMISSION HARNESS AND SENSOR



(1) Transmission cover

(8) O-ring

Tightening torque: N·m (kgf-m, ft-lb)

(2) Transmission harness

(9) O-ring

T1: 5 (0.5, 3.7)

(3) Inhibitor harness

(10) O-ring

T2: 8 (0.8, 5.9)

(4) Secondary pressure sensor (11) Secondary speed sensor

T3: 16 (1.6, 11.8)

(5) O-ring

(12) O-ring

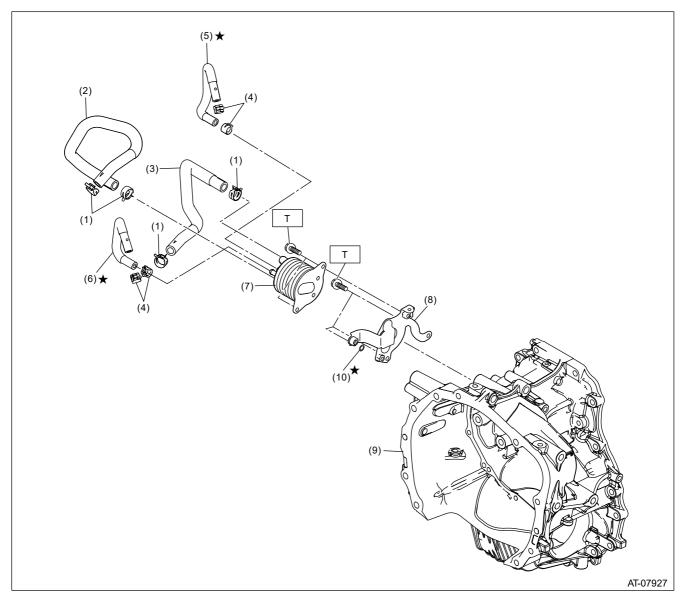
T4: 39 (4.0, 28.8)

(6) Primary speed sensor

(13) Front wheel speed sensor

(7) Spacer

13. CVTF COOLER (WITH WARMER FEATURE)



(1) Hose clamp

(6) CVTF cooler outlet hose

Tightening torque: N·m (kgf-m, ft-lb)

(2) Engine coolant outlet hose

(7) CVTF cooler (with warmer feature)

T: 23 (2.3, 17.0)

(3) Engine coolant inlet hose

(8) CVTF cooler bracket

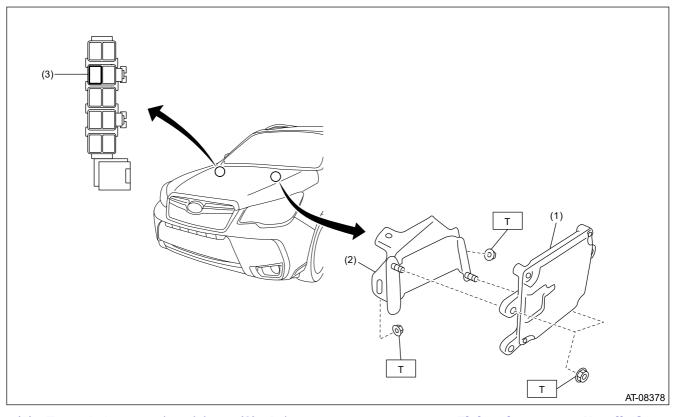
(4) Hose clamp

(9) Converter case

(5) CVTF cooler inlet hose

(10) O-ring

14. TRANSMISSION CONTROL MODULE



(1) Transmission control module (TCM)

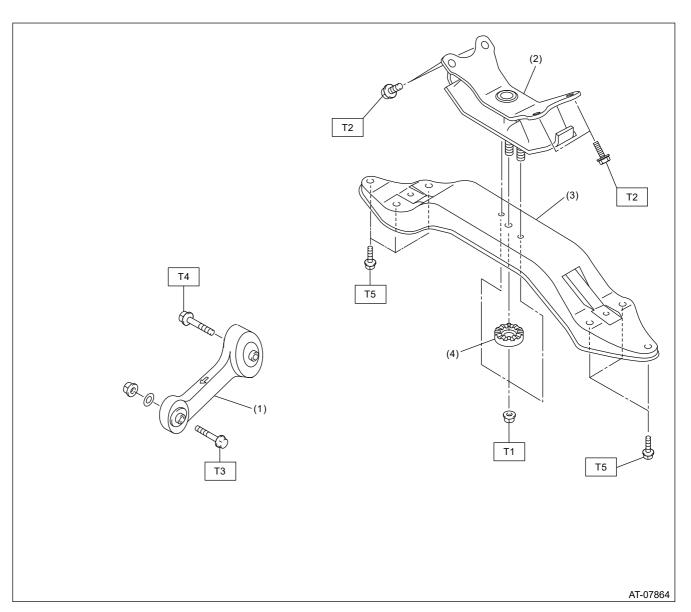
(3) Relay

Tightening torque: N·m (kgf-m, ft-lb)

(2) TCM bracket

T: 7.5 (0.8, 5.5)

15. TRANSMISSION MOUNTING



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

1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
ST41099AC000	41099AC000	ENGINE SUPPORT ASSY	Used for supporting engine.
ST18801AA000	18801AA000	OIL PRESSURE GAUGE ASSY	Used for measuring the secondary pressure (line pressure).
ST18658AA020	18658AA020	WRENCH COMPL RETAINER	Used for removing and installing the differential side retainer.
ST18681AA000	18681AA000	PRESSURE GAUGE ADAPTER	Used for measuring the secondary pressure (line pressure) and transfer clutch hydraulic pressure. Note: Used together with the genuine O-ring (part No. 806911080).
	18769AA000	EXPANDER PULLEY	Used for removing and installing the secondary pulley assembly.

ST18769AA000			
ST-498897700	498897700	OIL PRESSURE ADAPTER SET	Used for measuring the secondary pressure (line pressure) and transfer clutch hydraulic pressure.
ST-498575400	498575400	OIL PRESSURE GAUGE ASSY	Used for measuring the transfer clutch hydraulic pressure.
ST-498277200	498277200	STOPPER SET	 Used for removing and installing automatic transmission assembly to engine. Used for preventing the torque converter from dropping off.
ST-398527700	398527700	PULLER ASSY	 Used for removing the extension case oil seal. Used for removing the roller bearing of the primary pulley and secondary pulley. Used for removing the bearing of reduction driven gear. Used for removing the differential side retainer bearing outer race.

ST18760AA000	18760AA000	CLAW	 Used for removing ball bearing of front reduction driven gear. Used together with PULLER ASSY (398527700).
ST-498057300	498057300	INSTALLER	Used for installing the extension case oil seal.
ST18632AA000	18632AA000	TRANSMISSION STAND	Used for disassembling and assembling the transmission.
ST-498255400	498255400	PLATE	Used for measuring the backlash of hypoid gear.
ST-498247001	498247001	MAGNET BASE	 Used for measuring the backlash of differential bevel pinion. Used for measuring the backlash of hypoid gear. Used together with DIAL GAUGE (498247100).

ST-498247100	498247100	DIAL GAUGE	 Used for measuring the backlash of differential bevel pinion. Used for measuring the backlash of hypoid gear. Used together with MAGNET BASE (498247001).
ST18675AA000	18675AA000	DIFFERENTIAL SIDE OIL SEAL INSTALLER	Used for installing the differential side retainer oil seal.
ST18762AA001	18762AA001	COMPRESSOR SPECIAL TOOL	 Used for disassembling and installing the multi-plate clutch piston for shifting. COMPRESSOR SPECIAL TOOL (18762AA000) can also be used.
ST18765AA000	18765AA000	COMPRESSOR SUPPORT	Used for disassembling and installing the multi-plate clutch for shifting.
ST18763AA000	18763AA000	COMPRESSOR SHAFT	Used for disassembling and installing the multi-plate clutch for shifting.

	28399SA010	OIL SEAL PROTECTOR	Used for protecting oil seal when installing front drive shaft.
ST28399SA010			
	18667AA010	HOLDER	 Used for removing and installing the drive pinion lock nut. Used as a holder to rotate gear when checking tooth contact.
ST18667AA010			
	18270KA010	SOCKET (E16)	Used for removing and installing the center support COMPL.
ST18270KA010			
	18270KA020	SOCKET (E20)	 Used for removing and installing the hypoid driven gear. Used for removing and installing the drive pinion shaft retainer.
ST18270KA020			
	398497701	SEAT	Used for removing and installing the ball bearing.

ST-398177700	398177700	INSTALLER	 Used for removing and installing the ball bearing and tapered roller bearing. Used for installing the parking gear.
ST-398643600	398643600	GAUGE	Used for measuring the total end play, extension end play and drive pinion height.
ST-899864100	899864100	REMOVER	Used for removing and installing the ball bearing.
ST-498077000	498077000	REMOVER	 Used for removing ball bearing of front reduction drive gear. Used for removing the inner bearing inner race of the drive pinion shaft. Used for removing the differential taper roller bearing.
ST18657AA010	18657AA010	INSTALLER	Used for installing the oil seal of inhibitor switch.

	18657AA020	OIL SEAL INSTALLER	Used for installing the oil seal.
ST18657AA020			
	18621AA000	ADAPTER WRENCH	Used for removing and installing the drive pinion shaft lock nut.
ST18621AA000			
ST18651AA000	18651AA000	INSTALLER	Used for installing the bearing of front reduction drive gear.
ST18720AA000	18720AA000	REMOVER	Used for removing ball bearing of reduction driven gear.
	498497300	CRANKSHAFT STOPPER	Used for stopping the drive plate rotation when removing and installing the drive plate.

ST20299AG010	20299AG010	BASE	Used for installing the bearing on primary pulley side.
ST-399513600	399513600	INSTALLER	 Used to install the rear drive shaft ball bearing. Used for removing the bearing of the oil pump chain sprocket.
ST-499267300	499267300	STOPPER PIN	Used for adjusting the inhibitor switch.
ST-499277100	499277100	BUSHING 1-2 INSTALLER	 Used for installing the front differential taper roller bearing. Used for removing and installing the transfer reduction drive gear. Used for installing the ball bearing of the transfer reduction drive gear. Used for installing the oil seal. Used for installing the ball bearing of the transfer reduction driven gear.
	499277200	INSTALLER	 Used for installing the inner bearing inner race of drive pinion shaft. Used for installing the reduction driven gear.

ST-499277200	400575400		
ST-499575400	499575400	GAUGE	Used for measuring height of end play.
ST-499737100	499737100	PULLER SET	 Used for measuring the transfer end play. Use the rack only.
ST-499575600	499575600	GAUGE	Used for measuring height of end play.
	499787700	WRENCH	Used for measuring the differential pinion shaft backlash.
ST-499787700			

ST-499757002	499757002	INSTALLER	Used for installing the bearing of front reduction driven gear.
ST18767AA000	18767AA000	BEARING REMOVER	 Used for removing the transfer reduction drive gear. Used for removing the reduction driven gear bearing retainer.
ST-499755602	499755602	PRESS SNAP RING	 Used for installing the oil seal. Used for installing the ball bearing and roller bearing.
ST-498077600	498077600	REMOVER	 Used for removing the ball bearing of the rear drive shaft. Used for removing the ball bearing of transfer reduction driven gear. Used for removing ball bearing of reduction driven gear. Used for removing the ball bearing of drive sprocket.
	18460AA040	CHECK BOARD	Used for measuring TCM terminal voltage and resistance.
ST18460AA040			

SSM 4	— (Newly adopted tool)	SUBARU SELECT MONITOR 4	Used for setting of each function and troubleshooting for electrical system. Note: For detailed operation procedures of Subaru Select Monitor 4, refer to "Application help".
STSSM4			

2. GENERAL TOOL

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance, voltage and
Circuit tester	current.
Thickness gauge	Used for the clearance in reverse brake, forward
Trickness gauge	clutch, transfer clutch and input clutch.
Caliper	Used for measuring the clearance at the parts.
Spring coals	Used for measuring the starting torque of the
Spring scale	drive pinion.
TODY® L'IL TZO	Used for removing and installing differential gear
TORX [®] bit T70	oil drain plug.
STRAIGHT PIN REMOVER	Used for removing and installing the spring pin.
	Used for removing and installing the secondary
	pressure sensor.
Deep socket	Note:
	Use Ko-ken 3/8 12-point 27 mm
	(manufacturer product No. 3305M-27).
Push/pull gauge	Used for measuring clutch clearance.
Angle gauge	Used for installing the hypoid driven gear.
Angle gauge	 Used for installing the drive plate.
DST-i	Used together with Subaru Select Monitor 4.

SPECIFICATION

1. TORQUE CONVERTER

Model		2.0 L DOHC turbo
Туре		Symmetric, 3-element, single stage, 2-phase torque converter
Stall torque ratio		2.09
Nominal	mm (in)	246 (9.69)
Stall speed (at sea level)		2,080 — 2,600
One-way clutch		Sprag type one-way clutch

2. OIL PUMP

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

3. TRANSMISSION CONTROL ELEMENT

Туре	Forward continuously variable speed change, 1 reverse, planetary gear
Multi-plate clutch	1 sets
Multi-plate brake	1 sets

4. TRANSMISSION GEAR RATIO

Forward	3.505 — 0.544
Rev	2.345

5. PLATE

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

6. SELECTOR POSITION

P (Park)	Transmission neutral, output shaft locked, engine start enabled
R (Reverse)	Rev
N (Neutral)	Transmission neutral, engine start enabled
D (Drive)	Forward continuously variable speed change and
D (Drive)	8 speed step change*1
M (Manual mode) (paddle shift +side)	Manual gear change

	1st \rightarrow 2nd \rightarrow 3rd \rightarrow 4th \rightarrow 5th \rightarrow 6th \rightarrow 7th*1 \rightarrow
	8th* ¹
	Manual gear change
M (Manual mode) (paddle shift —side)	1st ← 2nd ← 3rd ← 4th ← 5th ← 6th ← 7th *1 ←
	8th* ¹

^{*1:} Only when in S# mode

7. HYDRAULIC CONTROL AND LUBRICATION

Туре	Electronic hydraulic control (speed changed by signals of vehicle speed and accelerator opening angle)
Fluid	Specified fluid: Subaru High Torque CVT Fluid Caution: Always use specified CVTF. Using other fluid will cause malfunction.
Fluid capacity L (US qt, Imp qt)	12.11 — 12.61 (12.8 — 13.3, 10.7 — 11.1)
Lubrication system	Forced feed lubrication with oil pump

8. COOLING AND HARNESS

Cooling system	CVTF cooler (with warmer feature)
Inhibitor switch harness	12 poles
Transmission harness	20 poles

9. TRANSFER

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

10. REDUCTION GEAR RATIO

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

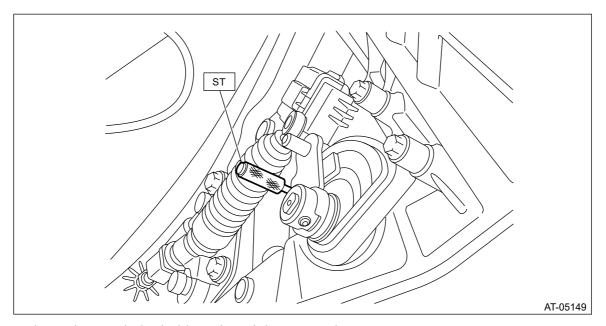
Fluid		Recommended fluid: SUBARU GEAR OIL EXTRA MT Caution: If an alternative transmission oil is used, you may not have expected functionality and performance.
		Alternative fluid: GL-5 (75W-90)
Fluid capacity	L (US qt, Imp qt)	1.3 - 1.5 (1.4 - 1.6, 1.1 - 1.3)

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Inhibitor Switch

ADJUSTMENT

- 1. Shift the select lever to "N" range.
- 2. Loosen the two bolts holding the inhibitor switch.
- **3.** Insert the ST vertically into the holes of the shifter arm and switch body.

ST 499267300 STOPPER PIN



4. Tighten the two bolts holding the inhibitor switch.

Tightening torque:

5 N·m (0.5 kgf-m, 3.7 ft-lb)

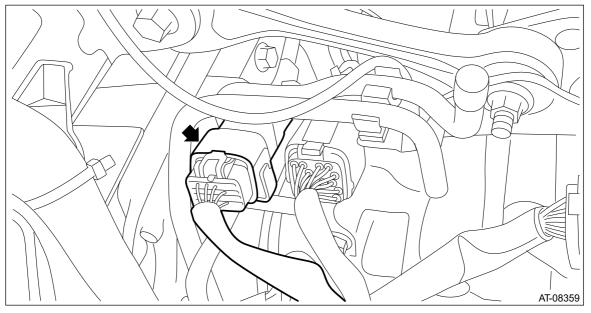
5. Repeat the inspection of the inhibitor switch. If the inhibitor switch is determined to be "faulty", replace it.

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Inhibitor Switch

INSPECTION

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

- 1. Remove the intercooler. Ref. to INTAKE (INDUCTION)(H4DOTC)>Intercooler>REMOVAL.
- 2. Disconnect the inhibitor harness connector.

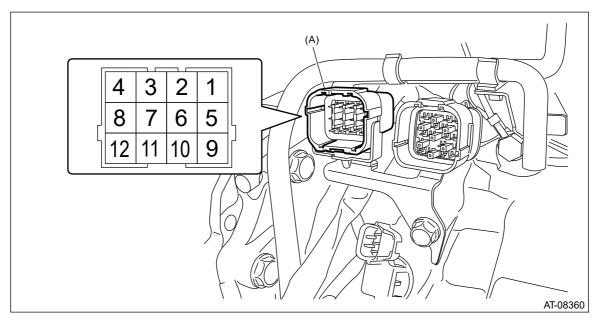


3. Check for continuity in inhibitor switch circuit by shifting the select lever in "P", "R", "N" and "D" respectively.

Note:

- Check that there is no continuity in the starter circuit when the select lever is in the "R" and "D" ranges.
- When inhibitor switch is normal, check there is no poor contact in vehicle side connector and no open circuit in harness.

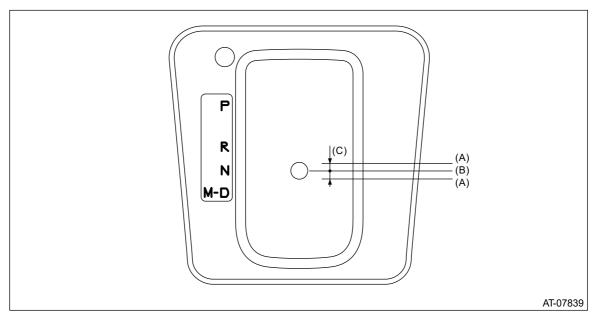
Signal sent to TCM	Range	Terminal No.
	Р	4 — 3
	R	4 — 2
	N	4 — 1
	D	4 — 8
Starter circuit	P/N	12 — 11
Back-up light circuit	R	10 — 9



(A) Inhibitor harness connector

4. Check that there is continuity at equal points when the select lever is moved 1.5° in both directions from the "N" range.

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

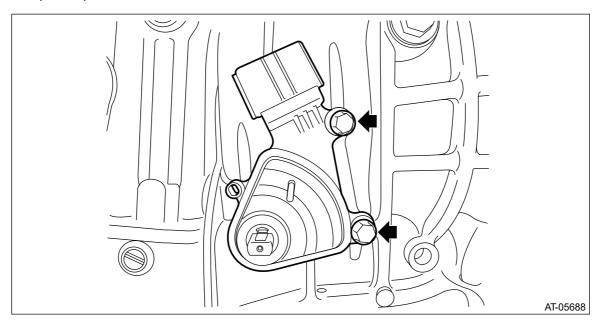


- (A) Continuity does not exist.
- (B) Continuity exists.
- (C) 1.5°
- **5.** Repeat the above inspection in other gear ranges. If there is fault, adjust the inhibitor switch and select cable. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Inhibitor Switch>ADJUSTMENT. Ref. to CONTROL SYSTEMS>Select Cable>ADJUSTMENT.

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Inhibitor Switch

INSTALLATION

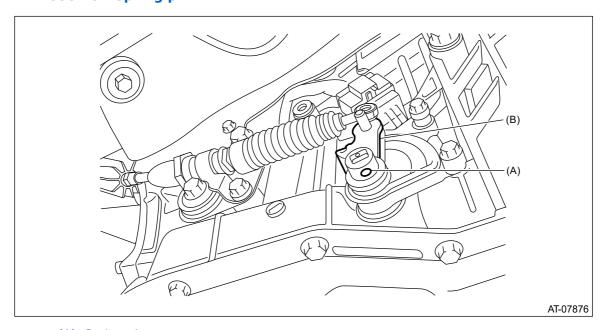
1. Temporarily install the inhibitor switch.



- **2.** Connect the inhibitor harness connector to the inhibitor switch.
- 3. Install the shifter arm and fix with the spring pin.

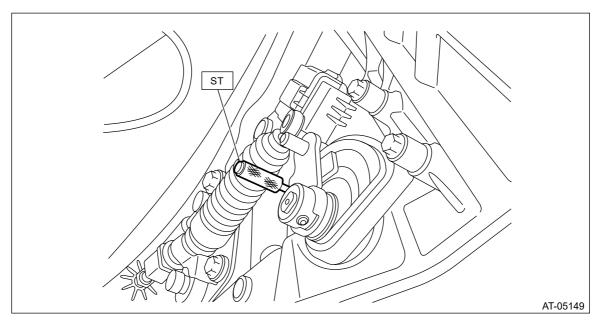
Note:

Use new spring pin.



- (A) Spring pin
- (B) Shifter arm
- **4.** Shift the shifter arm to "N" range.
- 5. Install the ST vertically in the cutout of shifter arm and the hole of switch body.

ST 499267300 STOPPER PIN

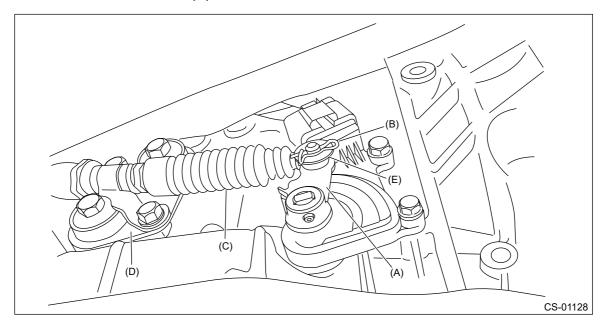


6. Tighten the two bolts holding the inhibitor switch.

Tightening torque:

5 N·m (0.5 kgf-m, 3.7 ft-lb)

- 7. Install the select cable to the shifter arm.
- 8. Install the washer and snap pin.



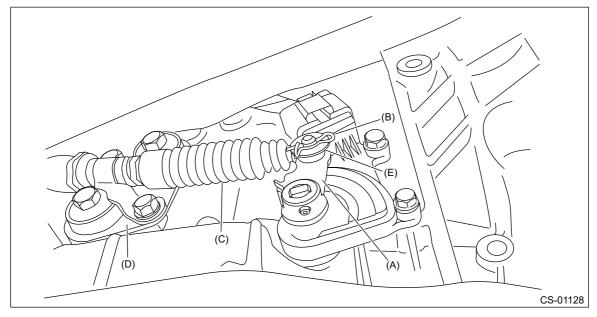
- (A) Shifter arm
- (B) Snap pin
- (C) Select cable
- (D) Cable plate ASSY
- (E) Washer
- 9. Lower the vehicle.

- **10.** Connect the battery ground terminal.
- **11.** Check the inhibitor switch. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Inhibitor Switch>INSPECTION.

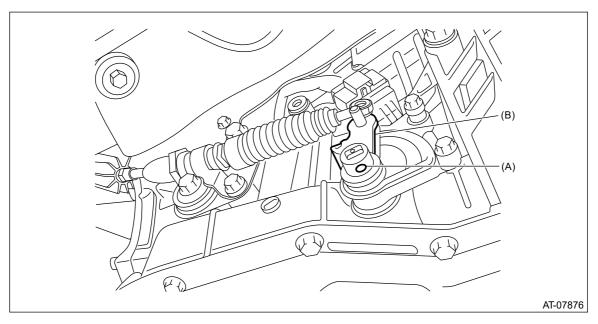
CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Inhibitor Switch

REMOVAL

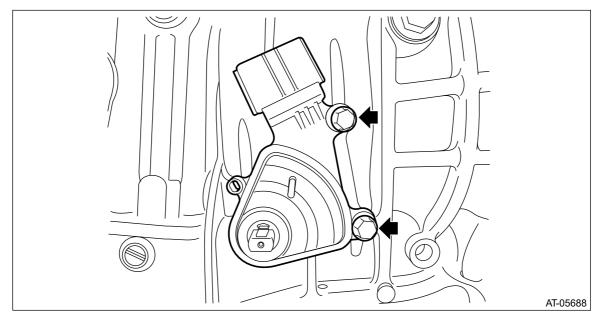
- 1. Shift the select lever to "N" range.
- **2.** Disconnect the ground cable from battery.
- 3. Lift up the vehicle.
- 4. Remove the snap pin and washer.



- (A) Shifter arm
- (B) Snap pin
- (C) Select cable
- (D) Cable plate ASSY
- (E) Washer
- **5.** Remove the spring pin and shifter arm.



- (A) Spring pin
- (B) Shifter arm
- **6.** Remove the inhibitor harness connector from inhibitor switch.
- 7. Remove the two inhibitor switch securing bolts.



8. Remove the inhibitor switch.

ASSEMBLY

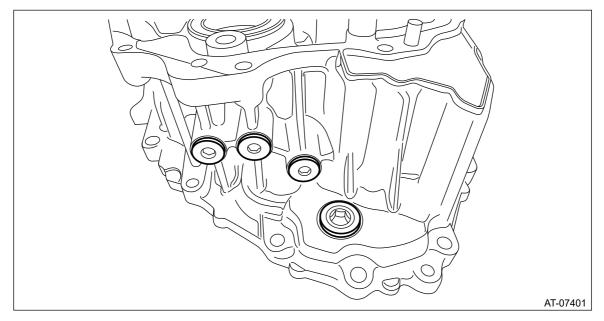
- 1. Install the reverse brake. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Reverse Brake Assembly>ASSEMBLY.
- 2. install all plugs to intermediate case.

Tightening torque:

25 N·m (2.5 kgf-m, 18.4 ft-lb)

Note:

Use new O-rings.



3. Install the parking support.

Tightening torque:

25 N·m (2.5 kgf-m, 18.4 ft-lb)

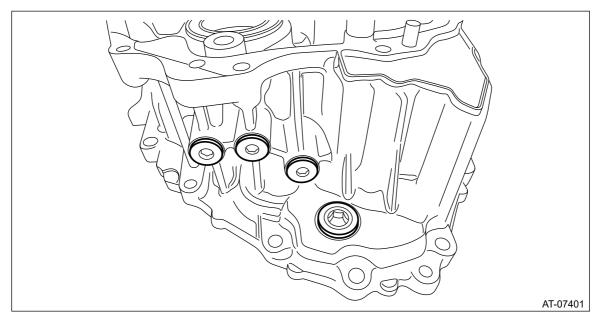
4. Temporarily install the CVTF filler plug.

Note:

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

DISASSEMBLY

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



4. Remove the reverse brake assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Reverse Brake Assembly>DISASSEMBLY.

INSPECTION

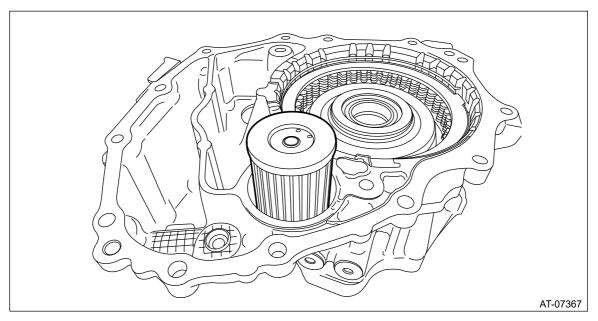
- Check the intermediate case for fissures, cracks or damage.
- Check for leakage of CVTF from the connections between intermediate case and transmission case, and between intermediate case and extension case.

INSTALLATION

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

 Note:

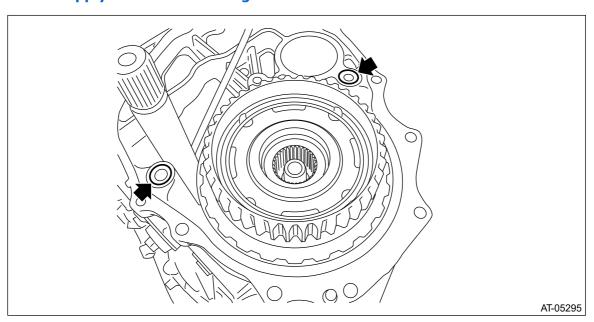
Apply CVTF to the O-rings.



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

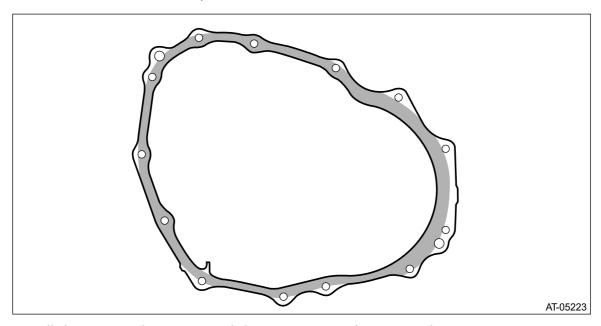
Note:

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



Apply liquid gasket to intermediate case seamlessly.
 Liquid gasket:

THREE BOND 1215B or equivalent



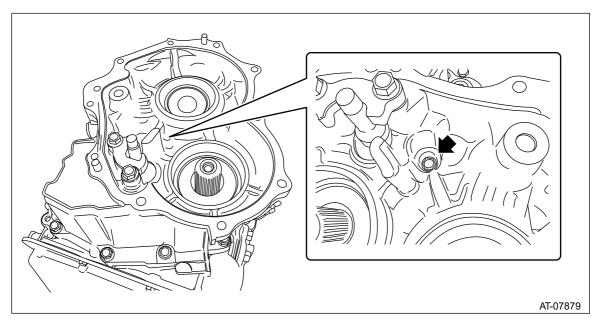
5. Install the intermediate case and the transmission hanger to the transmission case.

Note

Make sure to install the arrowed bolt.

Tightening torque:

25 N·m (2.5 kgf-m, 18.4 ft-lb)



- **6.** Install the transfer reduction driven gear assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transfer Reduction Driven Gear>INSTALLATION.
- 7. Install the transfer clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transfer Clutch>INSTALLATION.
- **8.** Install the rear drive shaft. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Rear Drive Shaft>INSTALLATION.
- **9.** Install the parking pawl. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Parking Pawl>INSTALLATION.

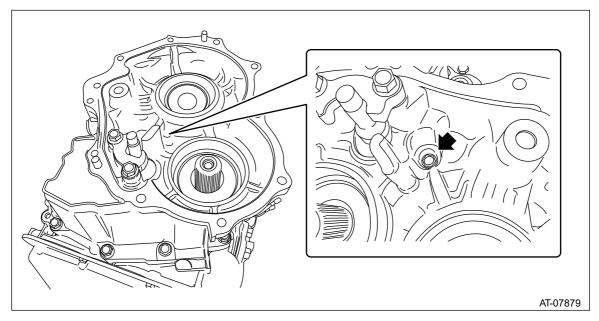
- **10.** Install the extension case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Extension Case>INSTALLATION.
- **11.** Install the transmission to vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Automatic Transmission Assembly>INSTALLATION.

REMOVAL

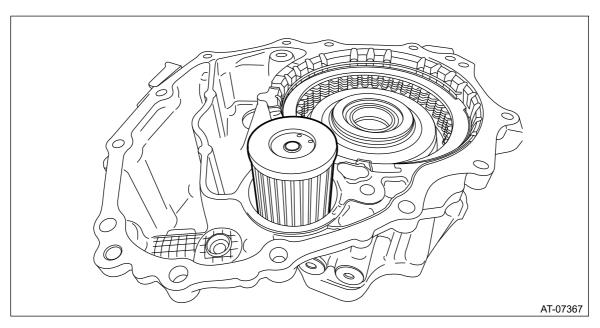
- 1. Remove the transmission assembly from vehicle body. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Automatic Transmission Assembly>REMOVAL.
- **2.** Remove the extension case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Extension Case>REMOVAL.
- **3.** Remove the parking pawl. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Parking Pawl>REMOVAL.
- **4.** Remove the rear drive shaft. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Rear Drive Shaft>REMOVAL.
- **5.** Remove the transfer clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transfer Clutch>REMOVAL.
- **6.** Remove the transfer reduction driven gear assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transfer Reduction Driven Gear>REMOVAL.
- 7. Remove the intermediate case.

Note:

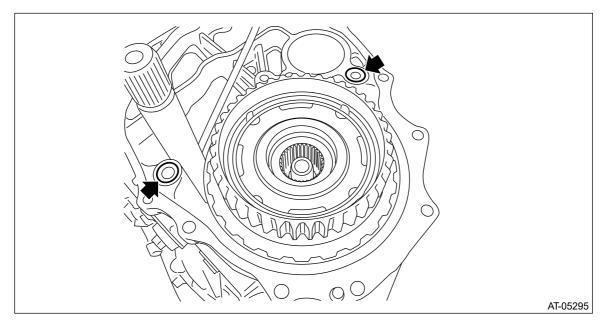
- The total number of intermediate case mounting bolts is 14.
- Inside the transmission is a single bolt (arrowed).



8. Remove the CVTF filter.



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



ASSEMBLY

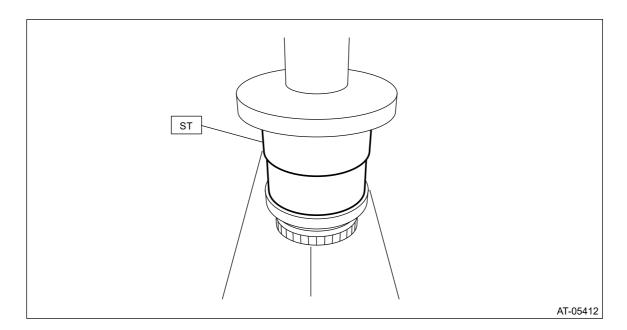
1. DRIVE SPROCKET

1. Using the ST, install the ball bearing.

Note:

Use a new ball bearing.

ST 499755602 PRESS SNAP RING



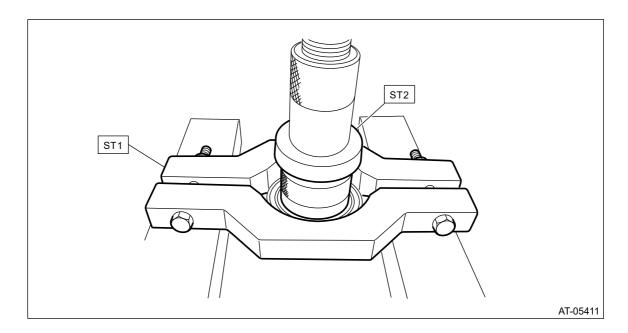
DISASSEMBLY

1. DRIVE SPROCKET

1. Remove the ball bearing using ST.

ST1 498077600 REMOVER

ST2 399513600 INSTALLER



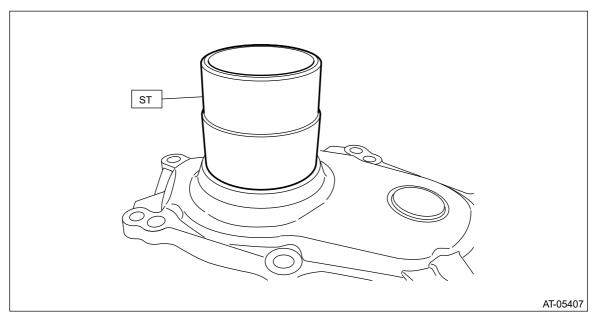
INSPECTION

- Check the oil pump chain for damage.
- Replace if gear teeth are broken, damaged, sharpen or excessively worn.
- Check the bearing for seizure or wear.
- Apply CVTF to bearing and rotate the bearing to check for noise or dragging etc.
- Check the oil pump chain cover for damage.
- Check for leakage of CVTF from the mating surface of oil pump chain cover.
- Check the oil seal for damage.

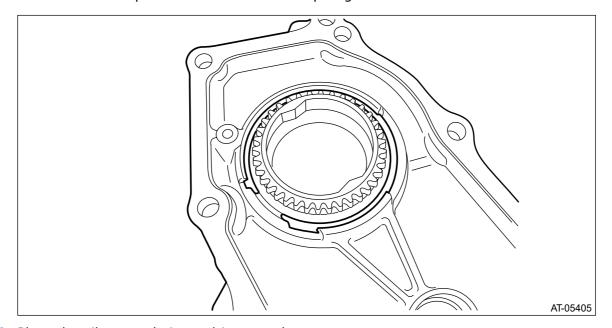
INSTALLATION

- 1. Clean the mating surface of oil pump chain cover and converter case cover.
- 2. Using the ST, install the oil seal.

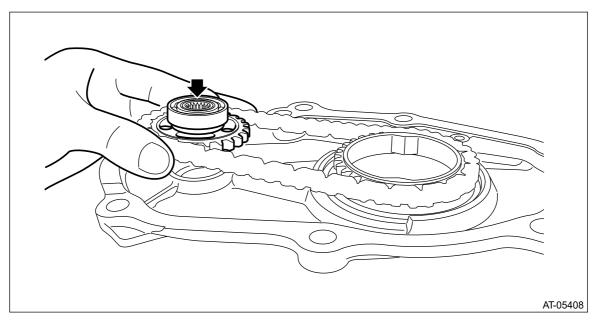
ST 499755602 PRESS SNAP RING



3. Install the drive sprocket and install the snap ring.



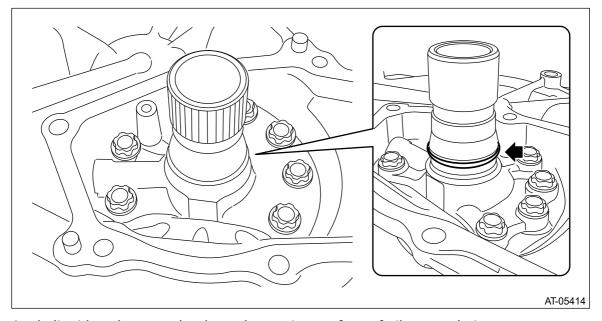
- 4. Place the oil pump chain on drive sprocket.
- **5.** Place the oil pump chain on driven sprocket and install the driven sprocket to oil pump chain cover.



6. Install the seal ring to center support COMPL.

Note:

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



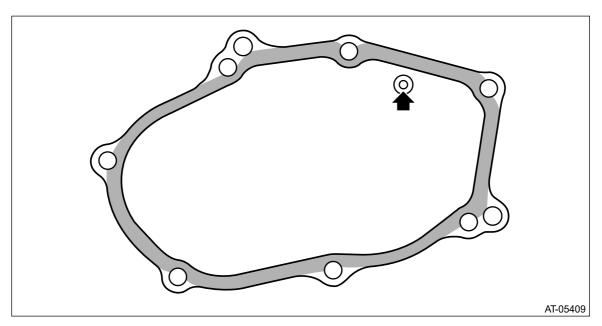
7. Apply liquid gasket seamlessly to the mating surface of oil pump chain cover.

Caution:

Do not apply liquid gasket at the arrowed hole.

Liquid gasket:

THREE BOND 1215B or equivalent



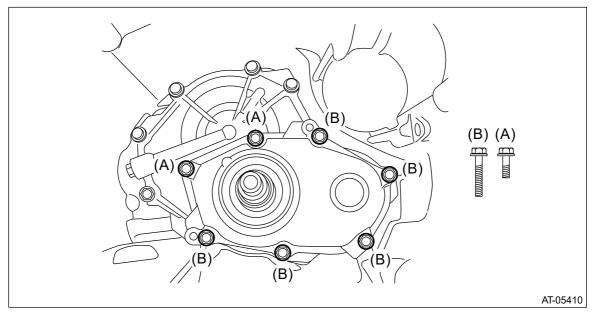
8. Install the oil pump chain cover.

Note:

There are two types of bolt.

Tightening torque:

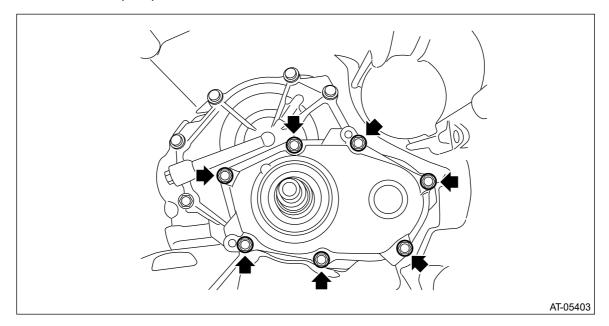
24 N·m (2.4 kgf-m, 17.7 ft-lb)

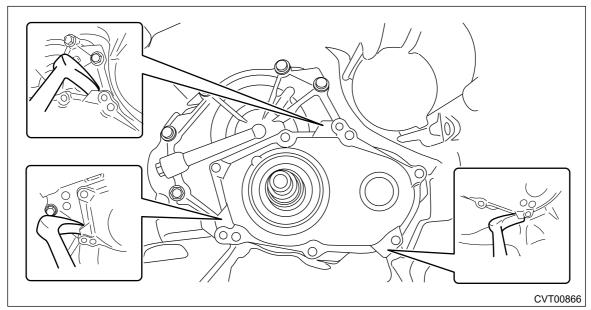


- **9.** Install the torque converter assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Torque Converter Assembly>INSTALLATION.
- **10.** Install the transmission assembly to the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Automatic Transmission Assembly>INSTALLATION.

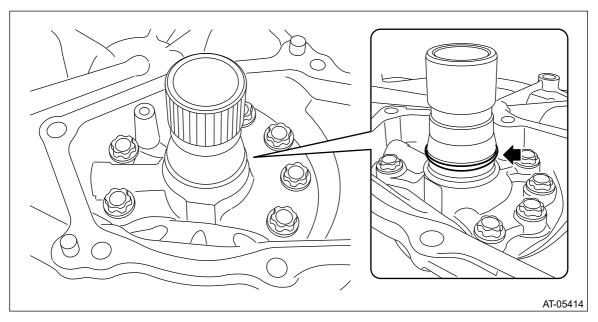
REMOVAL

- **1.** Remove the transmission assembly from the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Automatic Transmission Assembly>REMOVAL.
- **2.** Remove the torque converter assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Torque Converter Assembly>REMOVAL.
- **3.** Remove the oil pump chain cover.



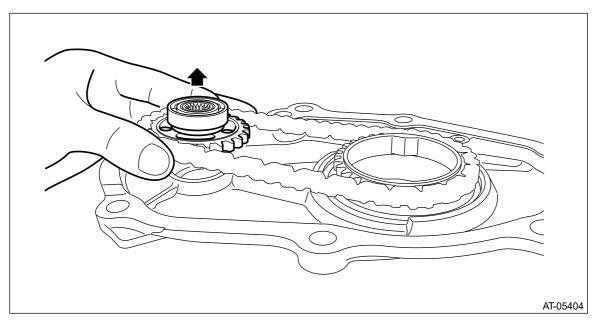


4. Remove the seal ring from center support COMPL.

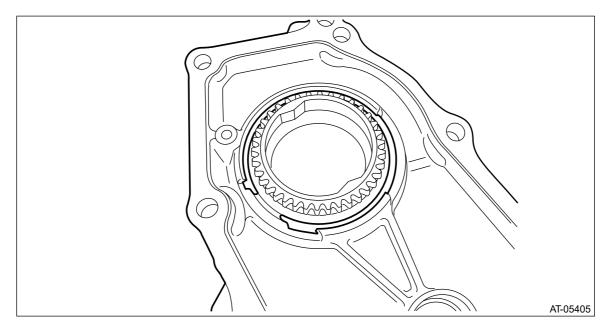


5. Remove the driven sprocket from oil pump chain cover to remove the oil pump chain.
Note:

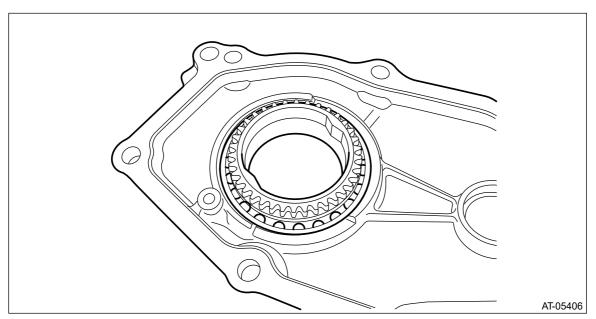
The driven sprocket is replaced as an assembly only, because it is a nondisassembly part.



6. Remove the snap ring.



7. Remove the drive sprocket.



8. Remove the oil seal from the oil pump chain cover.

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Oil Pump

INSPECTION

Check the following items.

- Check the oil pump for damage and wear.
- Rotate the oil pump by hand, and check that it rotates smoothly.
 - 1. Measure the secondary pressure. Ref. to CONTINUOUSLY VARIABLE
 TRANSMISSION(TR690)>Secondary Pressure (Line Pressure) Test>INSPECTION.
- **2.** Remove the oil pan and oil strainer. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Control Valve Body>REMOVAL.
- **3.** Check oil strainer for clogging. When oil strainer has no clogging, replace the oil pump.

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Oil Pump

INSTALLATION

Note:

Refer to "Drive Pinion Shaft" for installation procedures. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Drive Pinion Shaft Assembly>INSTALLATION.

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Oil Pump

REMOVAL

Note:

Refer to "Drive Pinion Shaft" for removal procedures.

Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Drive Pinion Shaft Assembly>REMOVAL.

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Parking Pawl

INSPECTION

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

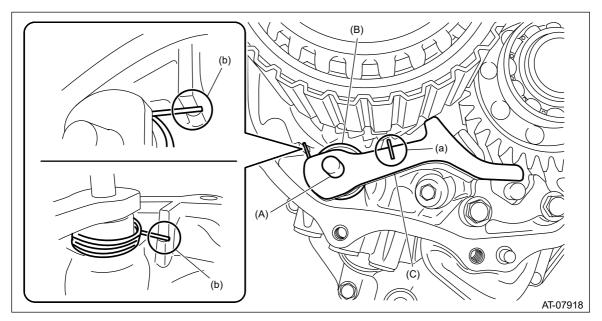
CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Parking Pawl

INSTALLATION

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

Note:

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

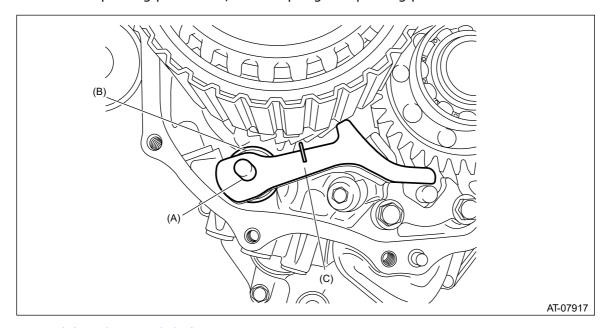


- (A) Parking pawl shaft
- (B) Return spring
- (C) Parking pawl
- **3.** Install the extension case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Extension Case>INSTALLATION.
- **4.** Install the transmission assembly to the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Automatic Transmission Assembly>INSTALLATION.

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Parking Pawl

REMOVAL

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



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

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Preparation for Overhaul

GENERAL DESCRIPTION

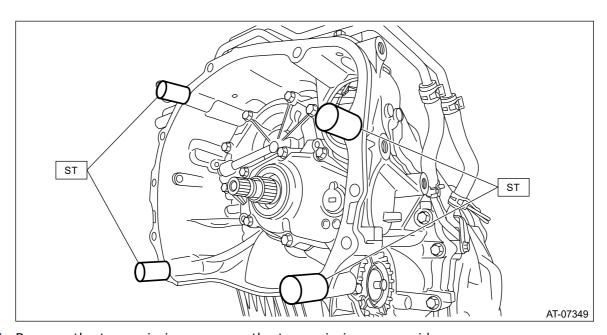
Before disassembling and assembling the transmission, follow the following procedures to prepare.

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Preparation for Overhaul

PROCEDURE

- 1. Clean the transmission exterior.
- **2.** Remove the torque converter assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Torque Converter Assembly>REMOVAL.
- **3.** Attach the ST on the transmission.

ST 18632AA000 STAND ASSY



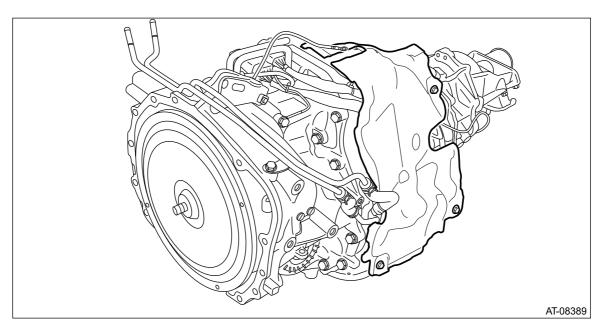
4. Remove the transmission cover on the transmission upper side.

Note:

Install using the following tightening torque.

Tightening torque:

8 N·m (0.8 kgf-m, 5.9 ft-lb)

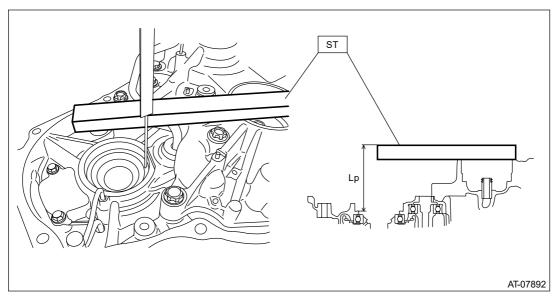


5. Place the transmission assembly on end.

1. PROCEDURE IN REPLACEMENT OF PRIMARY AND SECONDARY PULLEY, OR IN REPLACEMENT OF PRIMARY PULLEY, SECONDARY PULLEY AND VARIATOR CHAIN

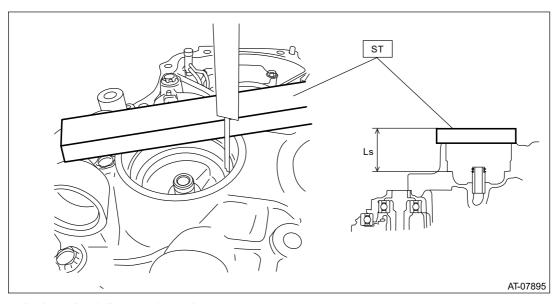
1. Measure depth "Lp" from the ST upper face to the primary pulley bearing catch surface at several points and calculate the average.

ST 499575400 GAUGE



2. Measure height "Ls" from the drive pinion retainer upper face to the secondary pulley bearing catch surface at several points and calculate the average.

ST 499575400 GAUGE



3. Calculate the following formula.

Calculation formula:

T (mm) = B + (Lp - Ls) + 31.601 - A

[T (in) = B + (Lp - Ls) +1.224 - A]

T: Pulley alignment

A: Specified primary pulley dimension

B: Specified secondary pulley dimension

Lp: Depth from the ST upper face to the primary pulley bearing catch surface

Ls: Depth from the ST upper face to the secondary pulley bearing catch surface

31.601 mm (1.224 in): Constant

Pulley alignment T mm (in)	Shim thickness mm (in)
0.050 - 0.150 (0.002 - 0.006)	0.1 (0.004)
0.151 - 0.250 (0.006 - 0.01)	0.2 (0.008)
0.251 - 0.350 (0.01 - 0.014)	0.3 (0.012)
0.351 - 0.450 (0.014 - 0.018)	0.4 (0.016)
0.451 - 0.550 (0.018 - 0.022)	0.5 (0.020)
0.551 - 0.650 (0.022 - 0.026)	0.6 (0.024)
0.651 - 0.750 (0.026 - 0.030)	0.7 (0.028)
0.751 - 0.850 (0.030 - 0.033)	0.8 (0.031)
0.851 - 0.950 (0.033 - 0.037)	0.9 (0.035)

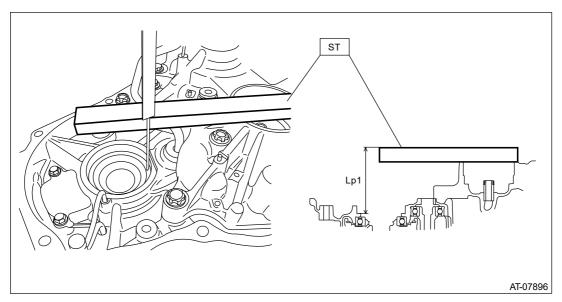
4. Select one to two shims so that the total thickness meets the value obtained from step 3).

Part No.	Shim thickness mm (in)
32451AA000	0.1 (0.004)
32451AA010	0.2 (0.008)
32451AA020	0.3 (0.012)
32451AA030	0.4 (0.016)
32451AA040	0.5 (0.020)

2. PROCEDURE WHEN REPLACING ONLY DRIVE PINION RETAINER OR CONVERTER CASE

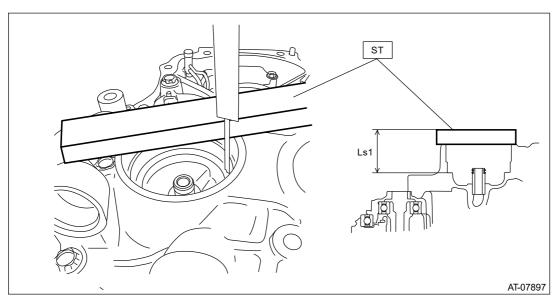
- 1. Clean the mating surface of current drive pinion retainer and converter case.
- 2. Measure and record the shim thickness that is attached on the current converter case.
- **3.** Using the current drive pinion retainer, measure depth "Lp1" from the ST upper face to the primary pulley bearing catch surface at several points and calculate the average.

ST 499575400 GAUGE



4. Using the current drive pinion retainer or current converter case, measure the depth "Ls1" from the ST upper face to the secondary pulley bearing catch surface at several points and calculate the average.

ST 499575400 GAUGE



5. Calculate the "LD1" using the following formula and record it.

Calculation formula:

LD1 mm (in) = Lp1 - Ls1

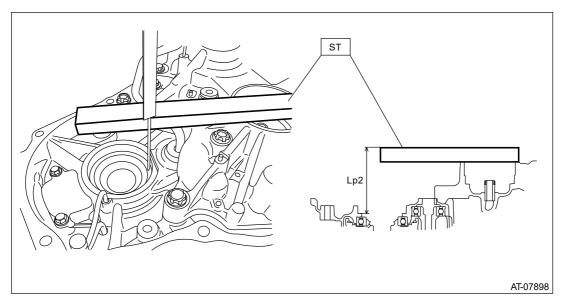
LD1: Height from the primary pulley bearing catch surface to the secondary pulley bearing catch surface

Lp1: Depth from the ST upper face to the primary pulley bearing catch surface

Ls1: Depth from the ST upper face to the secondary pulley bearing catch surface

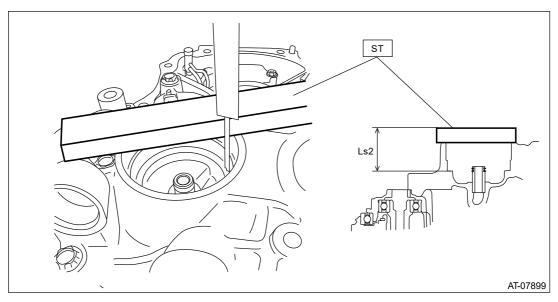
6. Using the new drive pinion retainer or new converter case, measure depth "Lp2" from the ST upper face to the primary pulley bearing catch surface at several points and calculate the average.

ST 499575400 GAUGE



7. Using the new drive pinion retainer or new converter case, measure the depth "Ls2" from the ST upper face to the secondary pulley bearing catch surface at several points and calculate the average.

ST 499575400 GAUGE



8. Calculate the "LD2" using the following formula and record it.

Calculation formula:

LD2 mm (in) = Lp2 - Ls2

LD2: Height from the primary pulley bearing catch surface to the secondary pulley bearing catch surface

Lp2: Depth from the ST upper face to the primary pulley bearing catch surface

Ls2: Depth from the ST upper face to the secondary pulley bearing catch surface

9. Calculate the recorded values of "LD1" and "LD2" to obtain the positive number to select the shims. Calculation formula: T1 mm (in) = LD1 - LD2 or T2 mm (in) = LD2 - LD1

T1, T2: Difference between new drive pinion retainer or new converter case and current drive pinion retainer or current converter case

LD1: Calculated value of current drive pinion retainer or current converter case

LD2: Calculated value of new drive pinion retainer or new converter case

Difference of the case	Shim selection procedure
(T1) mm (in)	
0 - 0.020 (0 - 0.00078)	Select new shim of same thickness with the shim that is used on primary
	pulley side of the current converter case.
0.021 - 0.070 (0.000827	Select new shim of same thickness with the shim that is used on primary
— 0.00275)	pulley side of the current converter case.
0.071 — 0.125 (0.00279	Select the shim 0.1 mm thinner than the shim that is used on primary
- 0.00492)	pulley side of the current converter case.
0.126 — 0.170 (0.00496	Select the shim 0.1 mm thinner than the shim that is used on primary
- 0.00669)	pulley side of the current converter case.
0.171 — 0.230 (0.00673	Select the shim 0.2 mm thinner than the shim that is used on primary
— 0.00905)	pulley side of the current converter case.
0.231 — 0.250 (0.00909	Select the shim 0.3 mm thinner than the shim that is used on primary
- 0.00984)	pulley side of the current converter case.
0.251 — 0.300 (0.00988	Select the shim 0.3 mm thinner than the shim that is used on primary
- 0.01181)	pulley side of the current converter case.

Difference of the case (T2) mm (in)	Shim selection procedure
0 — 0.020 (0 — 0.00078)	Select new shim of same thickness with the shim that is used on primary pulley side of the current converter case.
0.021 — 0.080 (0.000827 — 0.00315)	Select new shim of same thickness with the shim that is used on primary pulley side of the current converter case.
0.081 — 0.100 (0.00318 — 0.00393)	Select the shim 0.1 mm thicker than the shim that is used on primary pulley side of the current converter case.
0.101 — 0.120 (0.00397 — 0.00472)	Select the shim 0.1 mm thicker than the shim that is used on primary pulley side of the current converter case.
0.121 — 0.180 (0.00476 — 0.00708)	Select the shim 0.1 mm thicker than the shim that is used on primary pulley side of the current converter case.
0.181 — 0.220 (0.00712 — 0.00866)	Select the shim 0.2 mm thicker than the shim that is used on primary pulley side of the current converter case.
0.221 — 0.280 (0.00870 — 0.01102)	Select the shim 0.2 mm thicker than the shim that is used on primary pulley side of the current converter case.
0.281 — 0.300 (0.01106 — 0.01181)	Select the shim 0.3 mm thicker than the shim that is used on primary pulley side of the current converter case.

Part No.	Shim thickness mm (in)
32451AA000	0.1 (0.004)
32451AA010	0.2 (0.008)
32451AA020	0.3 (0.012)
32451AA030	0.4 (0.016)
32451AA040	0.5 (0.020)

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Primary Pulley and Secondary Pulley

INSPECTION

- Check the surface of primary and secondary pulley cones for damage or wear.
- Check the primary and secondary pulley for damage.
- Check the bearing for seizure or wear.
- Apply CVTF to bearing and rotate the bearing to check for noise or dragging etc.

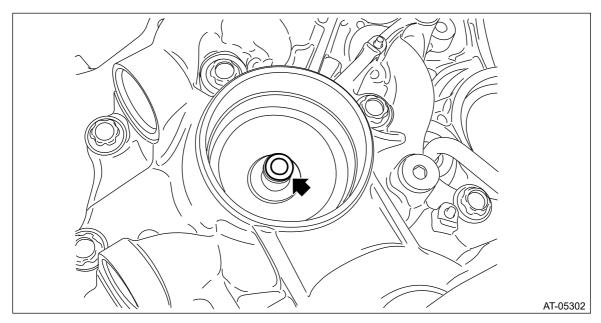
CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Primary Pulley and Secondary Pulley

INSTALLATION

- 1. Select shims for pulley alignment. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Primary Pulley and Secondary Pulley>ADJUSTMENT.
- 2. Install the two seal rings to drive pinion retainer.

Note:

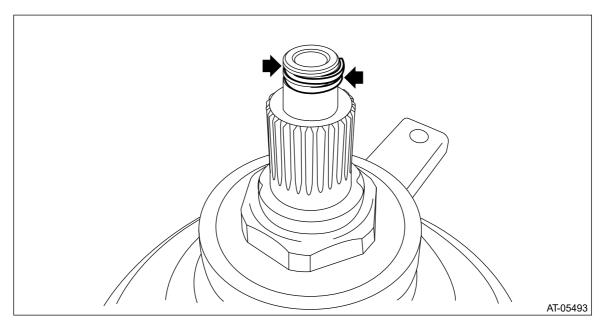
- Use a new seal ring.
- Apply CVTF to the seal rings.
- When installing the seal ring, do not expand the seal ring too much.



- **3.** Install the selected shims to the primary pulley bearing catch surface.
- 4. Install the two seal rings to primary pulley.

Note:

- Use a new seal ring.
- Apply CVTF to the seal rings.



5. Install the primary pulley and adjust the position of bolt holes of primary bearing retainer and converter case to tighten the primary pulley bolt.

Note:

Use a new seal washer.

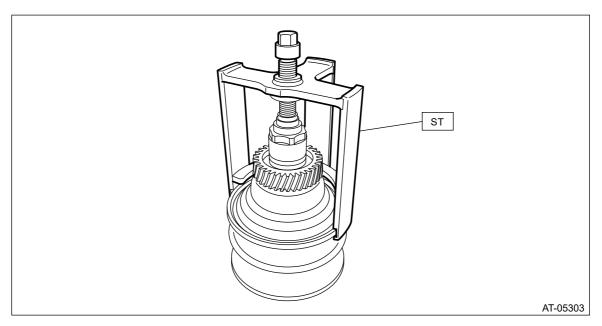
Tightening torque:

21 N·m (2.1 kgf-m, 15.5 ft-lb)



6. Set the ST to secondary pulley and expand the V groove of pulley.

ST 18769AA000 EXPANDER PULLEY

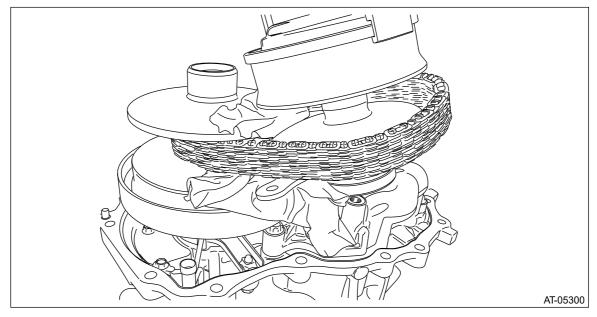


7. Place the variator chain on the primary pulley groove and attach the secondary pulley and variator chain together to the drive pinion retainer.

Caution:

Cover the V grooves of primary pulley and secondary pulley with cloth to protect the both pulleys and variator chain from scratching.

- (1) Place the variator chain on primary pulley.
- (2) Intersect the V groove of primary pulley and the V groove of secondary pulley and install the secondary pulley while placing the variator chain on secondary pulley.



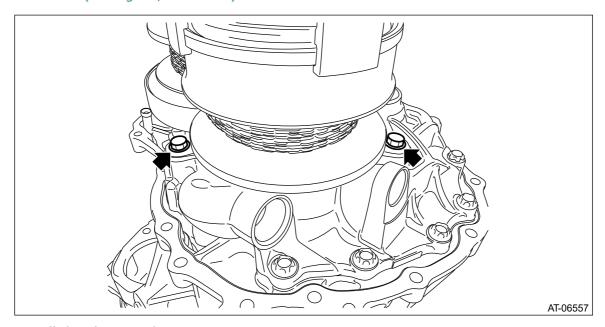
- (3) While aligning the bolt hole of secondary bearing retainer and the bolt hole of driving pinion retainer, install the secondary pulley to drive pinion retainer.
- 8. Install the secondary pulley bolt.

Note:

Apply CVTF to the bolt.

Tightening torque:

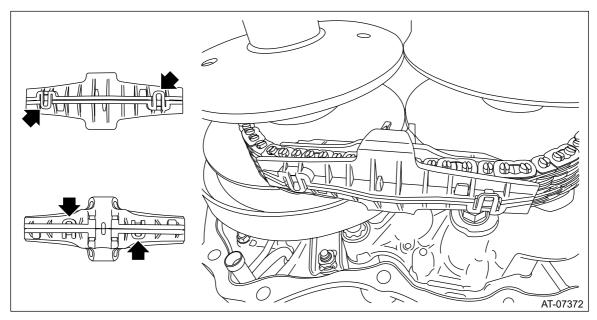
33 N·m (3.4 kgf-m, 24.3 ft-lb)



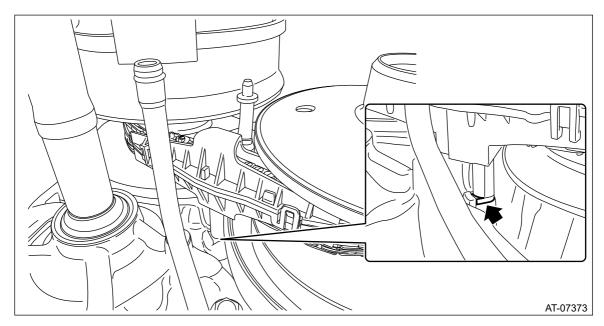
9. Install the chain guide.

Note:

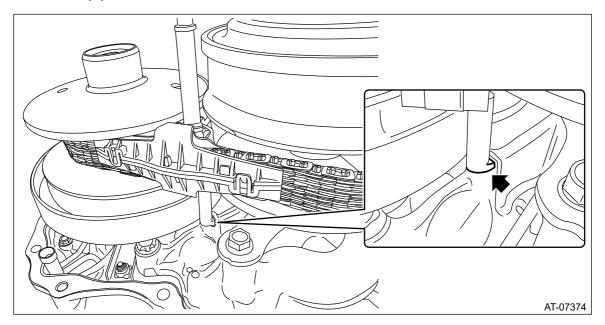
Install it with two claws facing outward and with two claws facing inward.



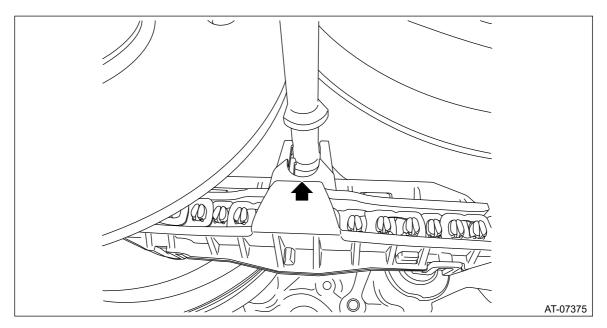
10. Engage the cutout portions of support rod and drive pinion retainer and install the support rod.



11. Engage the cutout portions of lubrication pipe and drive pinion retainer and install the lubrication pipe.



12. Install the chain guide so that the lubrication pipe and support rod run through between the protrusions of each chain guide. Then remove the ST (EXPANDER PULLEY).

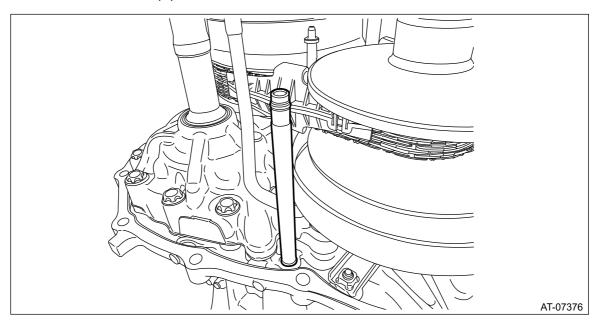


13. Install the O-ring to the lubrication pipe.

Note:

Use new O-rings.

14. Install the lubrication pipe.



- **15.** Install the transmission case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transmission Case>INSTALLATION.
- **16.** Install the forward clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Forward Clutch Assembly>INSTALLATION.
- 17. Install the intermediate case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Intermediate Case>INSTALLATION.
- **18.** Install the transfer reduction driven gear assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transfer Reduction Driven Gear>INSTALLATION.
- **19.** Install the transfer clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transfer Clutch>INSTALLATION.

- **20.** Install the rear drive shaft. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Rear Drive Shaft>INSTALLATION.
- **21.** Install the extension case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Extension Case>INSTALLATION.
- **22.** Install the transmission harness. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transmission Harness>INSTALLATION.
- **23.** Install the control valve body and oil pan. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Control Valve Body>INSTALLATION.
- **24.** Install the air breather hose. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Air Breather Hose>INSTALLATION.
- **25.** Install the transmission assembly to the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Automatic Transmission Assembly>INSTALLATION.

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Primary Pulley and Secondary Pulley

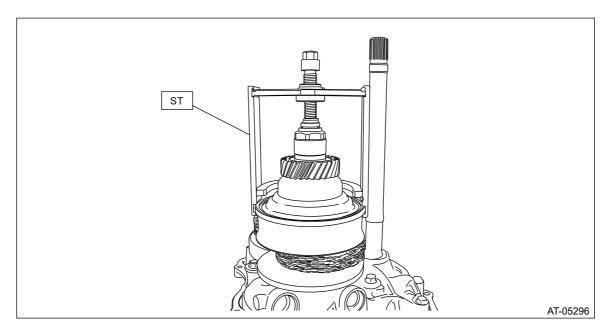
REMOVAL

Note:

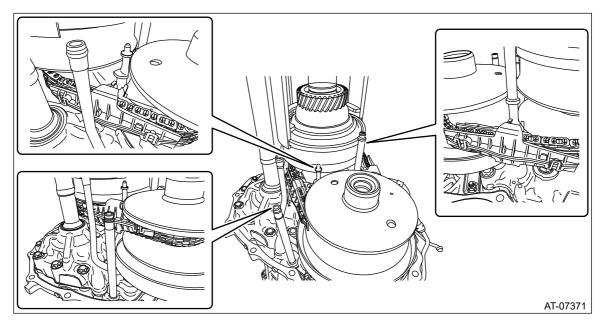
Always replace primary pulley and secondary pulley as an assembly because they are non-disassembled parts.

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

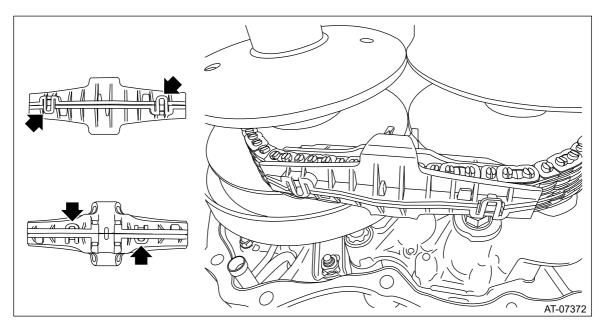
ST 18769AA000 EXPANDER PULLEY



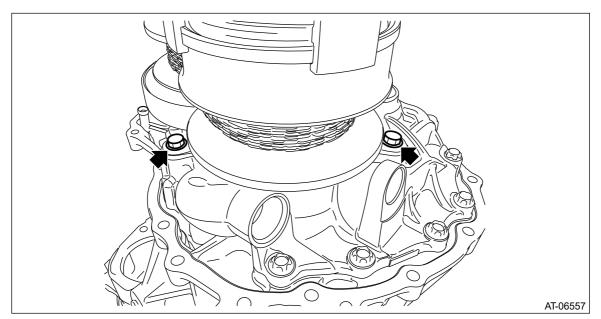
- 13. Remove the chain guide from lubrication pipe and support rod.
- 14. Remove the lubrication pipe and support rod.



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



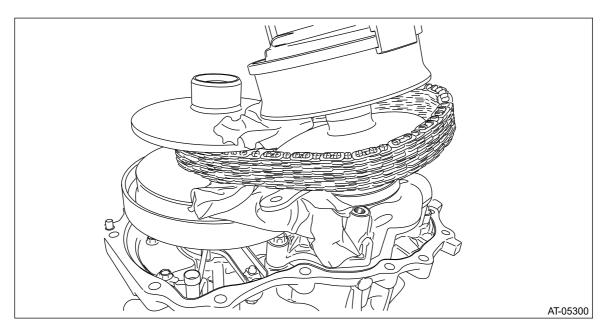
16. Remove the secondary pulley mounting bolt.



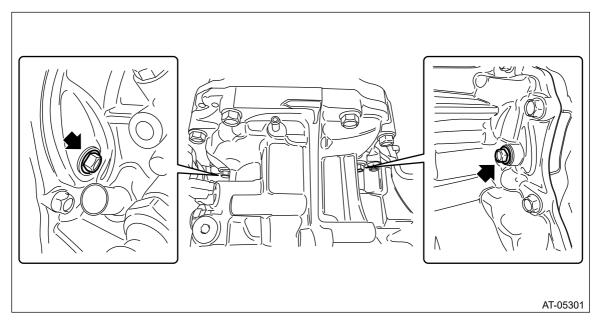
17. Remove the secondary pulley from drive pinion retainer and intersect the V groove of secondary pulley and V groove of primary pulley. Remove the variator chain from secondary pulley and remove the secondary pulley.

Caution:

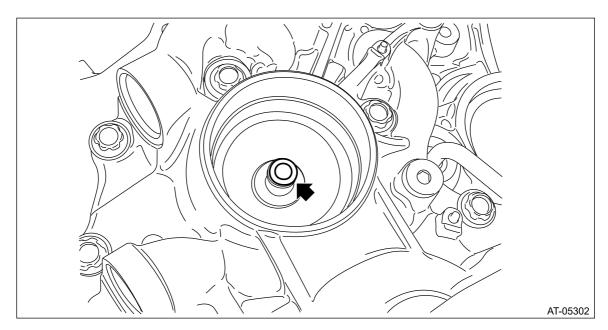
Cover the V grooves of secondary pulley and primary pulley with cloth to protect the both pulleys and variator chain from scratching.



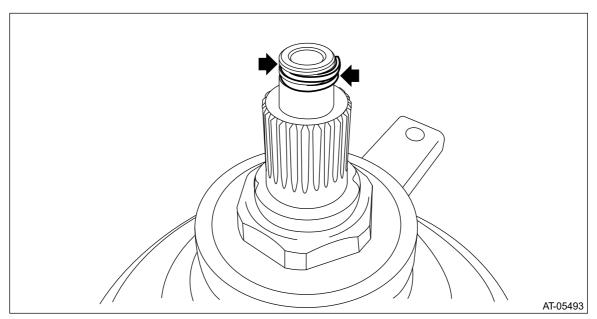
- 18. Remove the variator chain from primary pulley.
- 19. Remove the primary pulley mounting bolt.



- **20.** Remove the primary pulley.
- **21.** Remove the two seal rings from drive pinion retainer.



22. Remove the two seal rings from primary pulley.



CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Primary Speed Sensor

INSPECTION

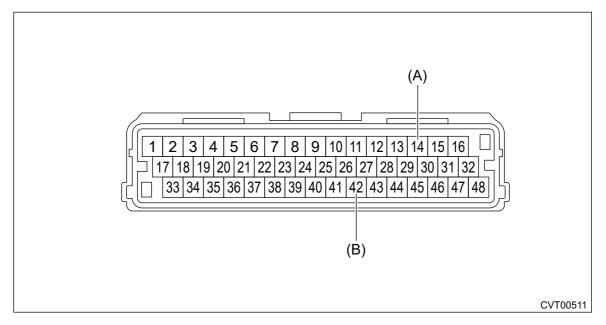
- 1. Remove the bulkhead harness connector from TCM. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transmission Control Module (TCM)>REMOVAL.
- 2. Set the ST between the TCM and bulkhead harness.

ST 18460AA040 CHECK BOARD

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

Terminals:

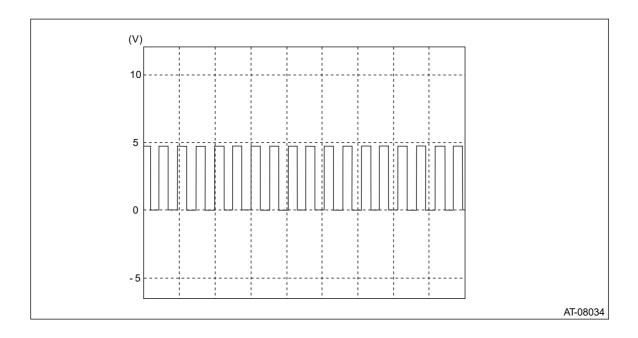
No. 14
$$(+)$$
 — No. 42 $(-)$



- (A) + probe
- (B) probe
- 4. Start and warm up the engine.
- 5. Check the waveform of primary speed sensor with engine idling.

Note:

The waveform cycle changes as the speed changes.



CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Primary Speed Sensor

INSTALLATION

Caution:

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

Install in the reverse order of removal.

Caution:

Do not forget to install the spacer.

Note:

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

Tightening torque:

Primary speed sensor

5 N·m (0.5 kgf-m, 3.7 ft-lb)

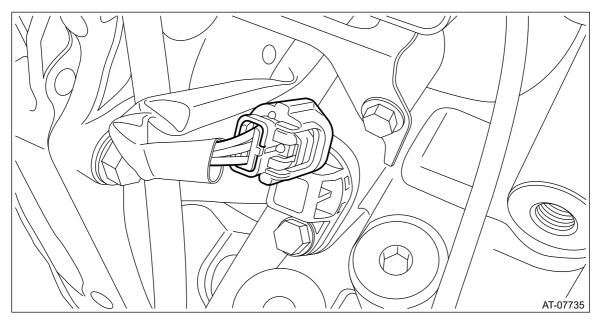
CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Primary Speed Sensor

REMOVAL

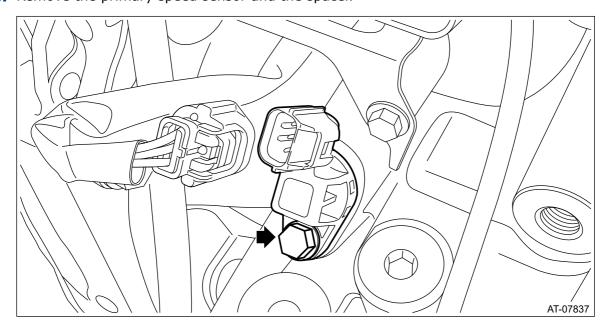
Caution:

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

- 1. Disconnect the ground cable from battery.
- 2. Remove the intercooler. Ref. to INTAKE (INDUCTION)(H4DOTC)>Intercooler>REMOVAL.
- **3.** Clean the transmission exterior.
- **4.** Remove the primary speed sensor harness connector.



5. Remove the primary speed sensor and the spacer.



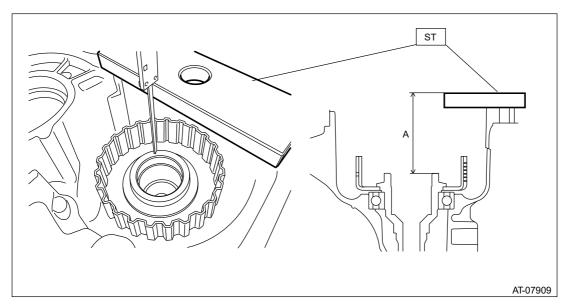
ADJUSTMENT

Note:

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

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

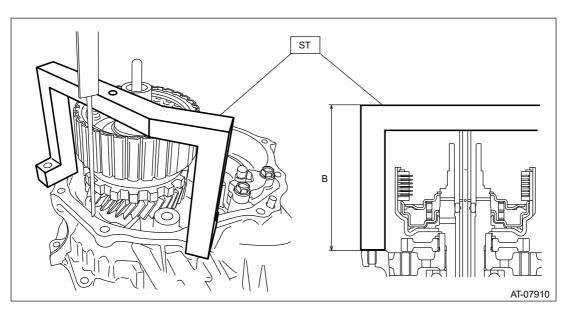
ST 398643600 GAUGE



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

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

ST 499737100 PULLER SET



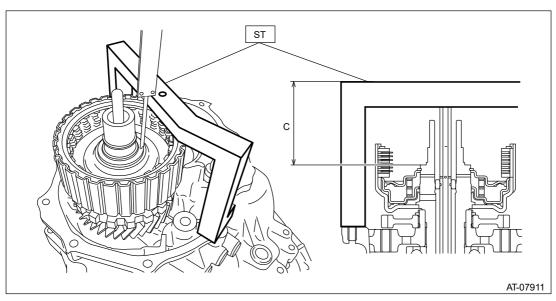
3. Using the ST, measure the height "C" from ST end face to transfer clutch assembly thrust needle

bearing catch surface.

Note:

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

ST 499737100 PULLER SET



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

$$T mm = (A - 15) - (B - C) - (0.05 - 0.25)$$

$$[T in = (A - 0.591) - (B - C) - (0.002-0.01)]$$

T: Thrust bearing thickness

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

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

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

15 mm (0.591 in): Thickness of ST

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

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

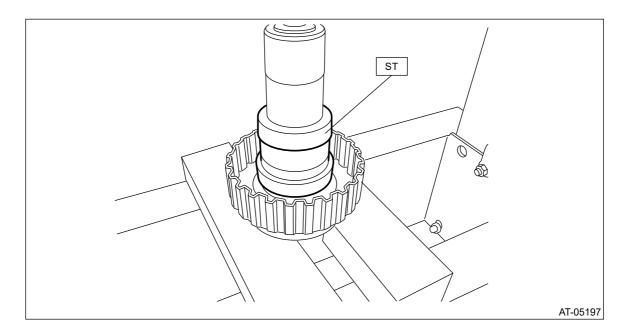
ASSEMBLY

1. Using the ST, install the ball bearing.

Note:

- Use a new ball bearing.
- Apply CVTF to press-fitting surface of ball bearing.

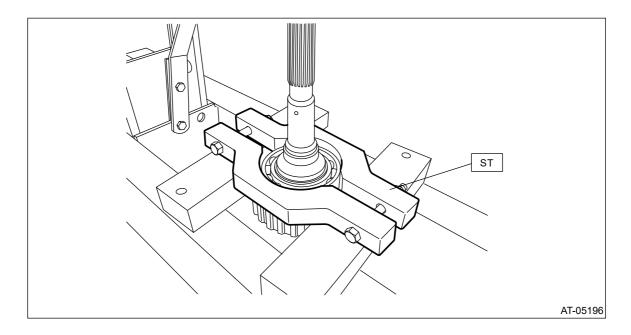
ST 399513600 INSTALLER



DISASSEMBLY

1. Remove the ball bearing using ST.

ST 498077600 REMOVER



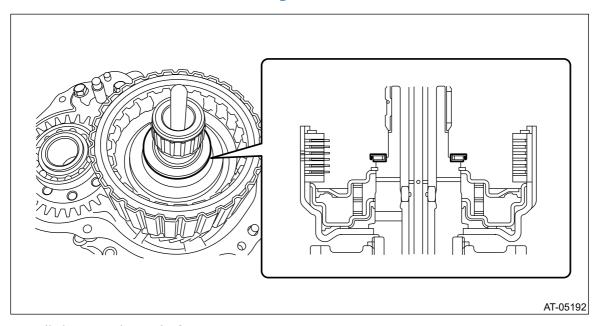
INSPECTION

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

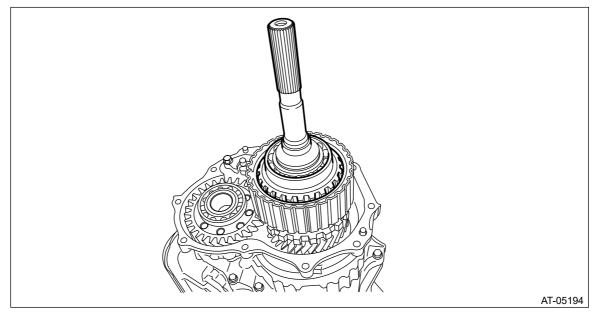
INSTALLATION

- **1.** Select the thrust needle bearing. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Rear Drive Shaft>ADJUSTMENT.
- 2. Install the selected thrust needle bearing to transfer clutch assembly.
 Note:

Install the thrust needle bearing in the correct direction.



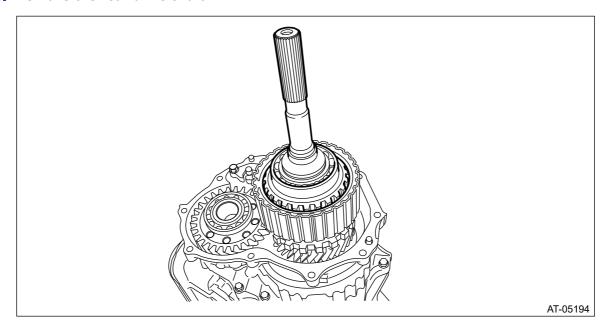
3. Install the rear drive shaft.



- **4.** Install the extension case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Extension Case>INSTALLATION.
- **5.** Install the transmission assembly to the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Automatic Transmission Assembly>INSTALLATION.

REMOVAL

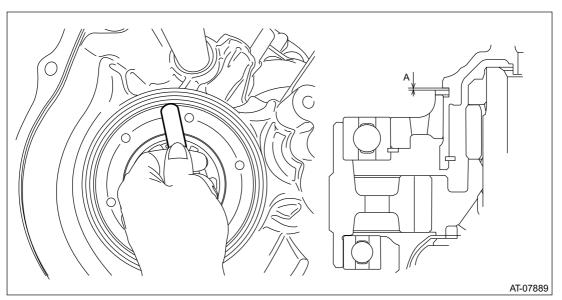
- 1. Remove the transmission assembly from the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Automatic Transmission Assembly>REMOVAL.
- **2.** Remove the extension case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Extension Case>REMOVAL.
- 3. Remove the rear drive shaft.



ADJUSTMENT

Measure clearance "A" between snap ring and transmission case.
 Specification:

0.05-0.25 mm (0.002-0.01 in)



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

Snap ring				
Part No.	Thickness mm (in)			
805100460	2.0 (0.079)			
805100461	2.1 (0.083)			
805100462	2.2 (0.087)			
805100463	2.3 (0.091)			
805100464	2.4 (0.094)			

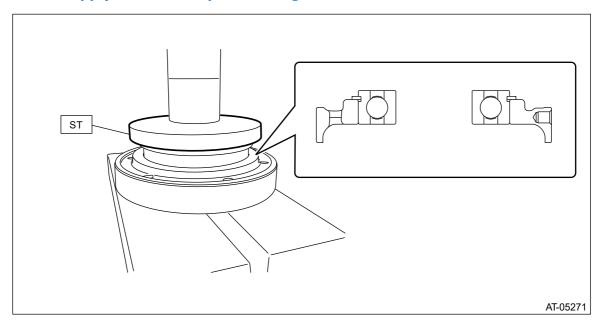
ASSEMBLY

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

ST 398177700 INSTALLER

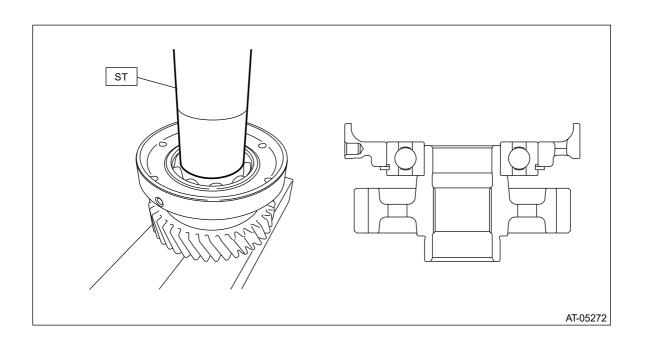
Note:

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



- 2. Install the snap ring.
- **3.** Using the ST, install the reduction driven gear.

ST 499277200 INSTALLER



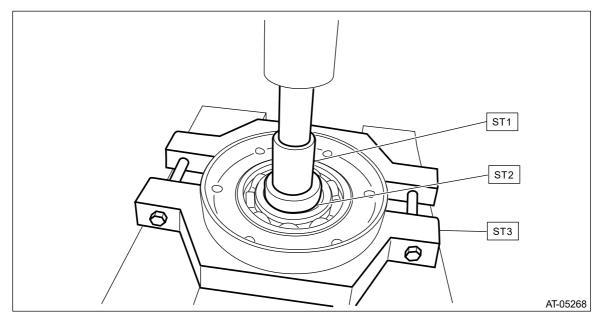
DISASSEMBLY

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

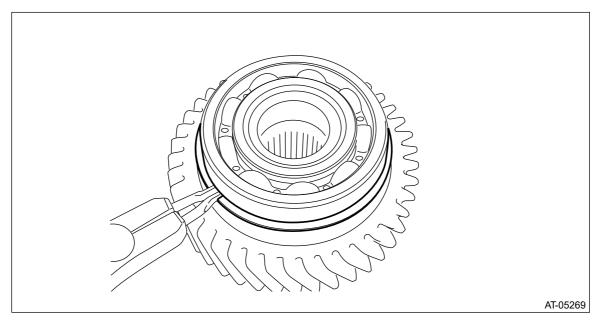
ST1 899864100 REMOVER

ST2 398497701 SEAT

ST3 18767AA000 BEARING REMOVER



2. Remove the snap ring.

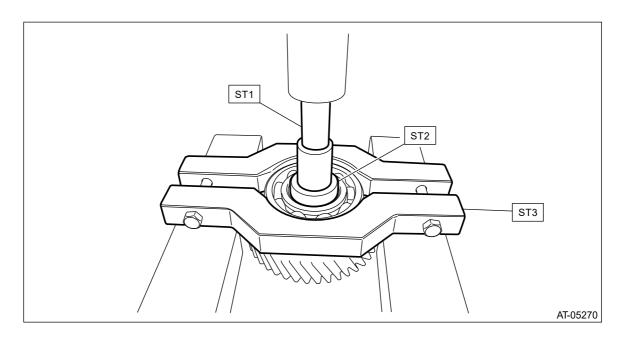


3. Remove the ball bearing using ST1, ST2 and ST3.

ST1 899864100 REMOVER

ST2 398497701 SEAT

ST3 498077600 REMOVER

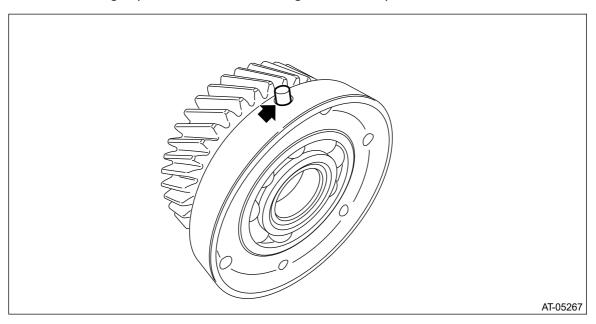


INSPECTION

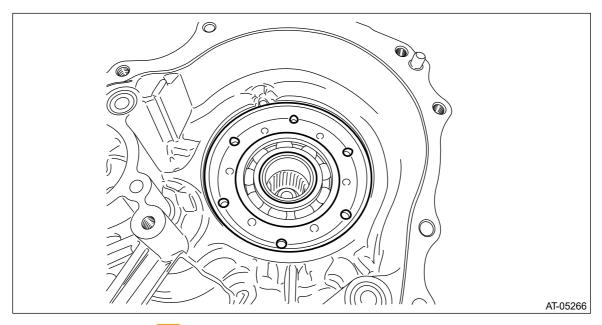
- Check the ball bearing for smooth rotation.
- Check the ball bearing for excessive looseness.
- Check the reduction driven gear for breakage or damage.
- Check the clearance between snap ring and transmission case and replace the snap ring as necessary.

INSTALLATION

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



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



- **3.** Select the snap ring. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Reduction Driven Gear>ADJUSTMENT.
- 4. Replace with the selected snap ring.

Note:

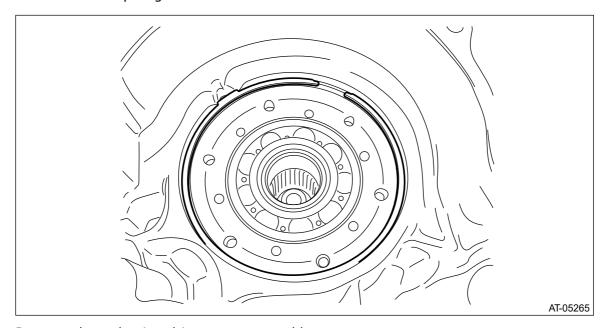
If the clearance measured in step 3) is within standard, the snap ring replacement is not necessary.

5. Install the forward clutch assembly. <a>Ref. to CONTINUOUSLY VARIABLE

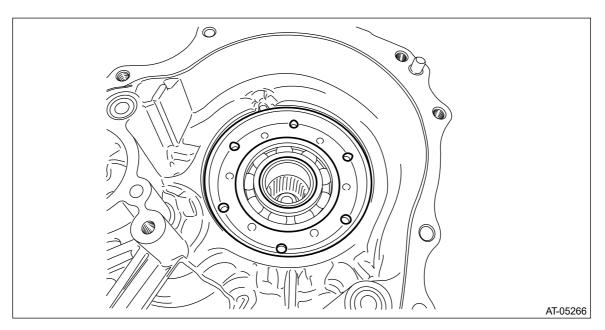
- TRANSMISSION(TR690)>Forward Clutch Assembly>INSTALLATION.
- **6.** Install the intermediate case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Intermediate Case>INSTALLATION.
- 7. Install the transfer reduction driven gear assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transfer Reduction Driven Gear>INSTALLATION.
- **8.** Install the transfer clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transfer Clutch>INSTALLATION.
- **9.** Install the rear drive shaft. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Rear Drive Shaft>INSTALLATION.
- **10.** Install the extension case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Extension Case>INSTALLATION.
- **11.** Install the transmission to vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Automatic Transmission Assembly>INSTALLATION.

REMOVAL

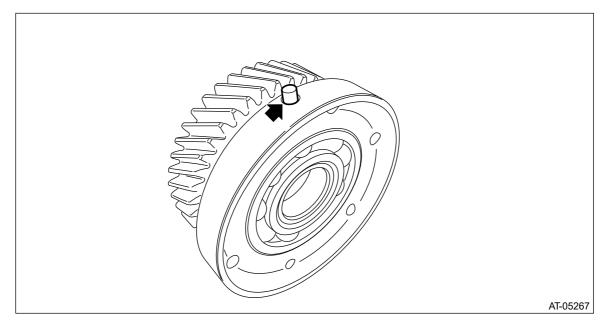
- **1.** Remove the transmission from the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Automatic Transmission Assembly>REMOVAL.
- **2.** Remove the extension case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Extension Case>REMOVAL.
- **3.** Remove the rear drive shaft. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Rear Drive Shaft>REMOVAL.
- **4.** Remove the transfer clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transfer Clutch>REMOVAL.
- **5.** Remove the transfer reduction driven gear assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transfer Reduction Driven Gear>REMOVAL.
- **6.** Remove the intermediate case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Intermediate Case>REMOVAL.
- 7. Remove the forward clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Forward Clutch Assembly>REMOVAL.
- 8. Remove the snap ring.



9. Remove the reduction driven gear assembly.



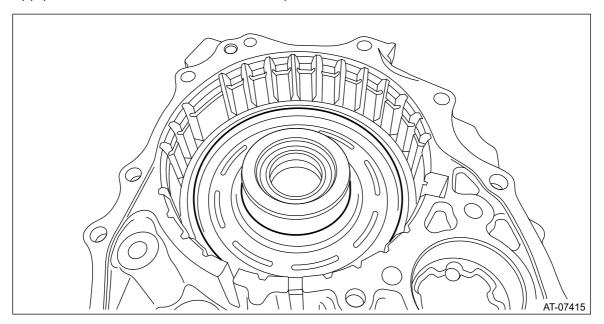
10. Remove the straight pin.



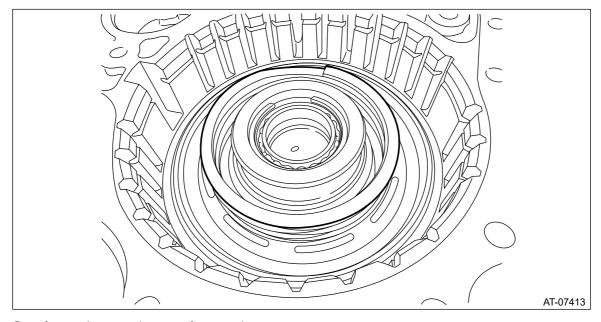
CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Reverse Brake Assembly

ASSEMBLY

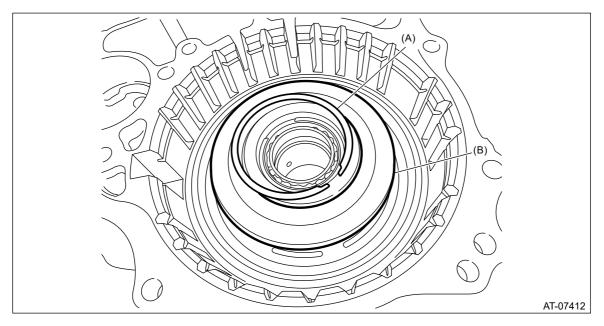
1. Apply CVTF to the seal of reverse brake piston and install it to intermediate case.



2. Install the return spring.



3. Set the spring retainer and snap ring.

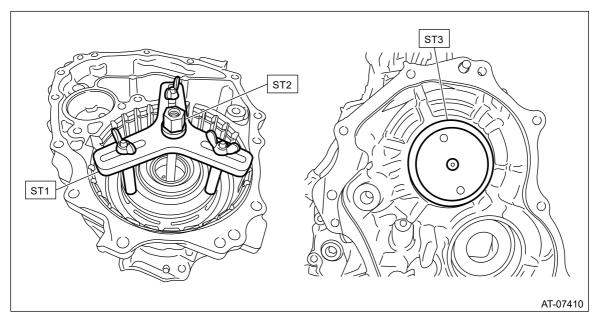


- (A) Snap ring
- (B) Spring retainer
- 4. Set the ST1, ST2 and ST3 to intermediate case.

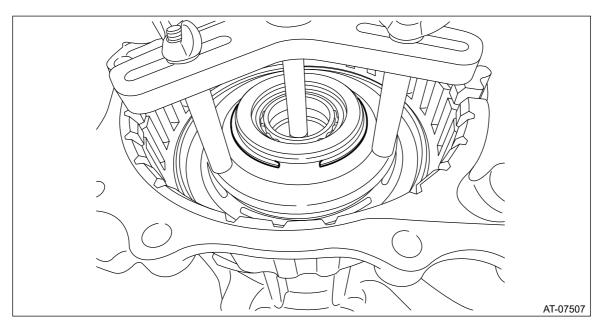
ST1 18762AA000 or 18762AA001 COMPRESSOR SPECIAL TOOL

ST2 18763AA000 COMPRESSOR SHAFT

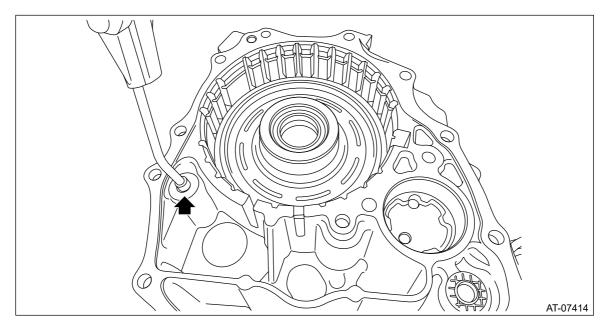
ST3 18765AA000 COMPRESSOR SUPPORT



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



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



- **7.** Place the dish plate, driven plate, drive plate and retaining plate neatly in this order on surface table.
- **8.** Set the dial gauge to retaining plate, and read its scale.

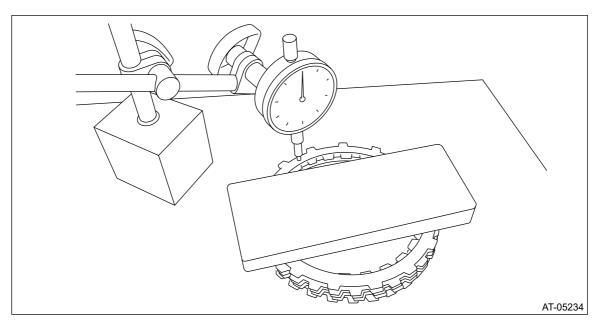
Note:

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

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

Note:

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



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

N = 84 N (8.6 kgf, 18.9 lb) - Z

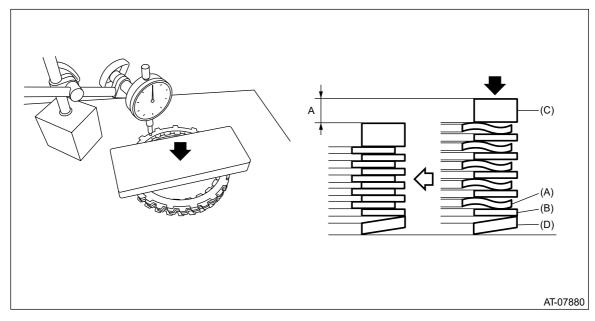
84 N (8.6 kgf, 18.9 lb): Load applied to clutch plate

Z: Flat board weight

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

Note:

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



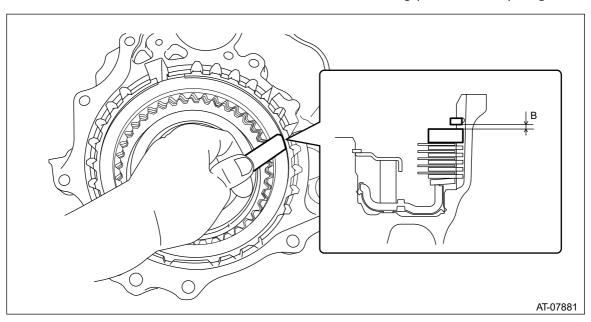
- (A) Drive plate
- (B) Driven plate
- (C) Retaining plate
- (D) Dish plate
- 13. Install the dish plate, drive plate, driven plate, retaining plate and snap ring to intermediate

case.

Note:

Install the dish plate in the correct direction.

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



15. Piston stroke calculation

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

$$S mm (in) = A + B$$

S: Piston stroke

A: Compression amount of drive plate and dish plate

B: Clearance between retaining plate and snap ring

Initial standard:

$$2.88 - 3.18 \text{ mm} (0.113 - 0.125 \text{ in})$$

Limit thickness:

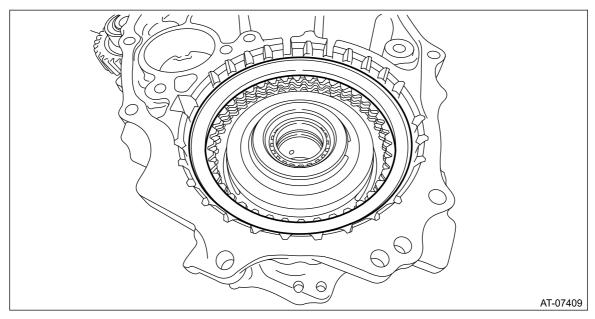
3.38 mm (0.133 in)

Retaining plate			
Part No.	Thickness mm (in)		
31567AB680	5.6 (0.220)		
31567AB690	5.8 (0.228)		
31567AB700	6.0 (0.236)		
31579AB710	6.2 (0.244)		

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Reverse Brake Assembly

DISASSEMBLY

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

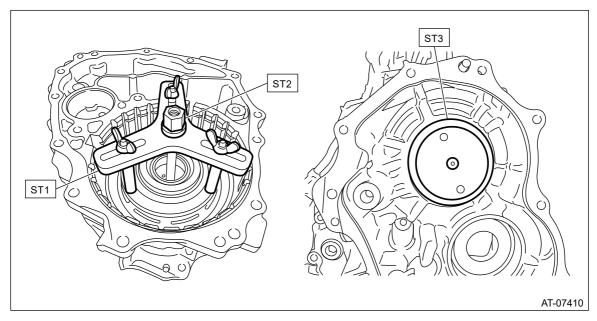


3. Set the ST1, ST2 and ST3 to intermediate case.

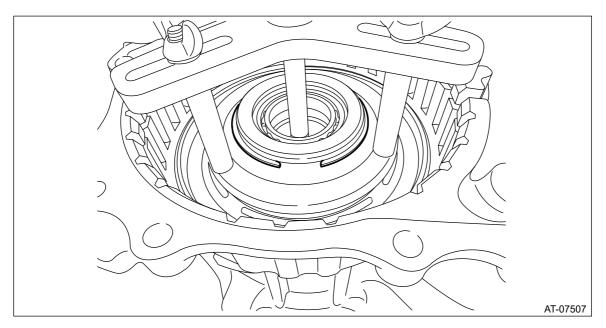
ST1 18762AA000 or 18762AA001 COMPRESSOR SPECIAL TOOL

ST2 18763AA000 COMPRESSOR SHAFT

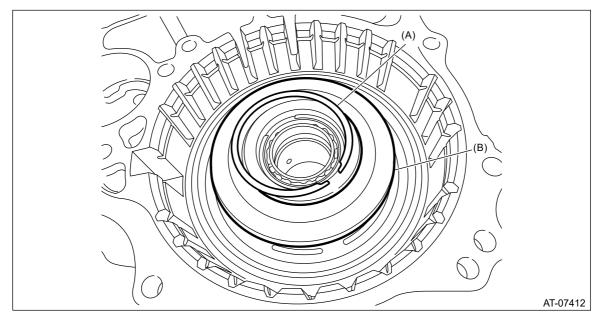
ST3 18765AA000 COMPRESSOR SUPPORT



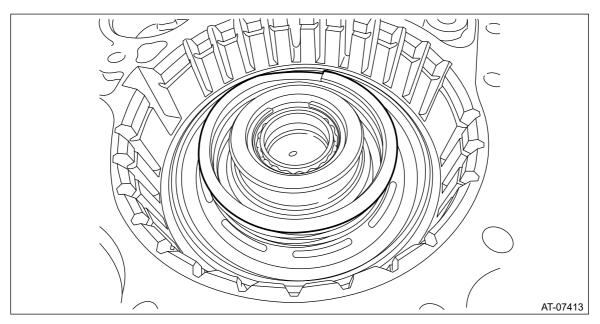
4. Compress the return spring using the set ST to remove the snap ring.



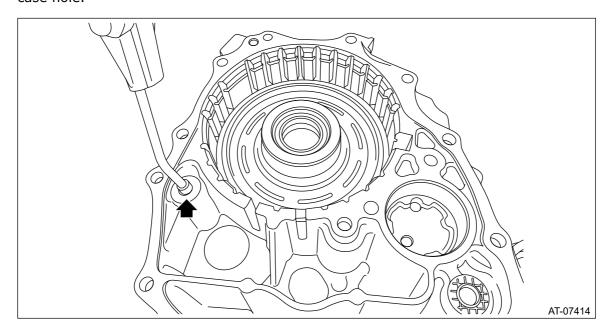
5. Using the ST, remove the snap ring and spring retainer.



- (A) Snap ring
- (B) Spring retainer
- 6. Remove the return spring.



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



CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Reverse Brake Assembly

INSPECTION

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

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Reverse Brake Assembly

INSTALLATION

Note:

For installation of reverse brake assembly, refer to "Intermediate Case". Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Intermediate Case>INSTALLATION.

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Reverse Brake Assembly

REMOVAL

Note:

For removal of reverse brake assembly, refer to "Intermediate Case". Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Intermediate Case>REMOVAL.

INSPECTION

Note:

Turn OFF the X mode switch and perform inspection.

1. GENERAL PRECAUTION

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

Caution:

Always observe the local traffic laws when performing the test.

2. D RANGE SHIFT FUNCTION

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

3. KICK-DOWN FUNCTION

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

4. ENGINE BRAKE OPERATION

In each mode of SI-DRIVE, check down shifting operation, engine braking, and indicators inside the meters.

When in S# mode

- 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". At the same time, check engine braking in 7th gear.
- 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". At the same time,
 check engine braking in 6th gear.
- 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" \rightarrow "5". At the same time, check the engine brake in 5th gear.
- Drive in "5th speed of manual mode" [60 70 km/h (37 43 MPH)], and shift down from 5th to 4th. Check if the indicator of combination meter switches "5" → "4". At the same time, check the engine brake in 4th gear.
- Drive in "4th speed of manual mode" [50 60 km/h (31 37 MPH)], and shift down from 4th to 3rd. Check if the indicator of combination meter switches "4" → "3". At the same time, check the engine brake in 3rd gear.
- Drive in "3rd speed of manual mode" [30 40 km/h (19 25 MPH)], and shift down from 3rd to 2nd. Check if the indicator of combination meter switches "3" \rightarrow "2". At the same time, check the engine brake in 2nd gear.

• Drive in "2nd speed of manual mode" [20 - 30 km/h (12 - 19 MPH)], and shift down from 2nd to 1st. Check if the indicator of combination meter switches "2" \rightarrow "1". At the same time, check the engine brake in 1st gear.

Other than in S# mode

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

5. LOCK-UP FUNCTION

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

6. P RANGE OPERATION

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

7. NOISE AND VIBRATION

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

8. OIL LEAKAGE

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

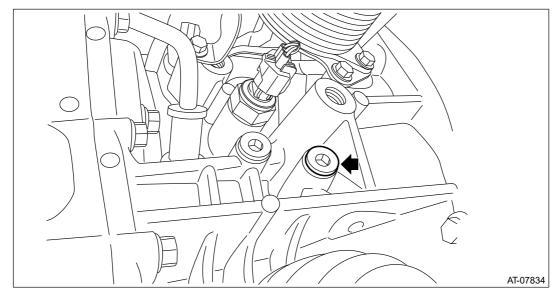
CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Secondary Pressure (Line Pressure) Test INSPECTION

Caution:

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

Note:

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



4. Attach ST1, ST2 and ST3 to transmission.

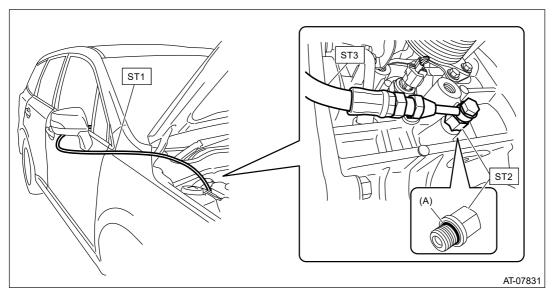
ST1 18801AA000 OIL PRESSURE GAUGE ASSY

ST2 18681AA000 PRESSURE GAUGE ADAPTER

ST3 498897700 OIL PRESSURE ADAPTER SET

Note:

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



(A) O-ring (genuine part)

- 5. Lower the vehicle.
- **6.** Set the gauge so that it can be seen from the driver's seat.
- 7. Install the front wheel RH. <a> Ref. to WHEEL AND TIRE SYSTEM>Tire and Wheel>INSTALLATION.
- **8.** Using the Subaru Select Monitor, check if the throttle valve operates when you depress the accelerator pedal. Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Subaru Select Monitor>OPERATION > DATA MONITOR.
- **9.** Check the engine oil level. <a> Ref. to LUBRICATION(H4DOTC)>General Description.
- 10. Check the coolant level. Ref. to COOLING(H4DOTC)>Engine Coolant.
- **11.** Adjust the CVTF level. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>CVTF>ADJUSTMENT.
- **12.** Increase the CVTF temperature to $60 80^{\circ}\text{C}$ ($140 176^{\circ}\text{F}$) by idling the engine with the select lever shifted to "N" or "P" range.
- 13. Hold down the pre-collision brake OFF switch to turn OFF the pre-collision brake. (With EyeSight)
- 14. Shift the select lever to "D" range.
- **15.** Depress the accelerator pedal to the full while fully depressing the foot brake pedal with your left foot.
- **16.** Immediately after the engine speed becomes steady, record the reading of the secondary pressure (line pressure), engine speed and actual secondary pressure on Subaru Select Monitor. And then release the accelerator pedal. Shift the select lever to "N" range. Let the engine idle for one minute or more to cool it down.

Note:

- Do not continue the stall test for 5 seconds or more at a time (from fully closed throttle, fully open throttle to secondary pressure (line pressure) reading). Failure to follow this instruction will cause the engine oil and CVTF to deteriorate and the clutch and brake to be adversely affected.
- After performing the secondary pressure (line pressure) test, be sure to cool down the engine for at least one minute with the select lever set in "P" or "N" range and with the idle speed at 1,200 r/min or less.
- Under each condition, check that the measured pressure matches almost totally with actual secondary pressure.

When both meaning anomore and natural accordance and are set of

- wnen both measured pressure and actual secondary pressure are out of specification, judge as control valve malfunction.
- The value at stall is for reference because the pressure changes under different conditions or circumstances.
- The value at idling is steady because it is not affected by any condition or circumstance.

Secondary pressure (line pressure) standard					
	Range	Throttle	Brake	Secondary pressure (line pressure) (MPa (kgf/cm², psi))	
Stall	D, R	Full open	ON	4.5— 6 (45.9—61.2, 652 — 870)	
Idling	P, N	Full closed	OFF	0.5—1.5 (5.1—15.3, 72 — 218)	

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

Note:

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

Tightening torque:

25 N·m (2.5 kgf-m, 18.4 ft-lb)

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Secondary Pressure Sensor

INSPECTION

- 1. Start and warm up the engine.
- 2. Shift the select lever to "P" or "N" range.
- 3. Depress the brake pedal and hold it.
- 4. Check "secondary pressure sensor voltage" by using Subaru Select Monitor while the engine is idling. Ref. to TRANSMISSION (DIAGNOSTICS)>Subaru Select Monitor>OPERATION.
 Standard

Approx. 0.8 V

5. Check "secondary pressure sensor voltage" by using Subaru Select Monitor while the engine is stopped and the ignition switch is turned on. Ref. to TRANSMISSION (DIAGNOSTICS)>Subaru Select Monitor>OPERATION.
Specification:

Approx. 0.5 V

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Secondary Pressure Sensor INSTALLATION

Caution:

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

Install in the reverse order of removal.

Note:

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

Tightening torque:

39 N•m (4.0 kgf-m, 28.8 ft-lb)

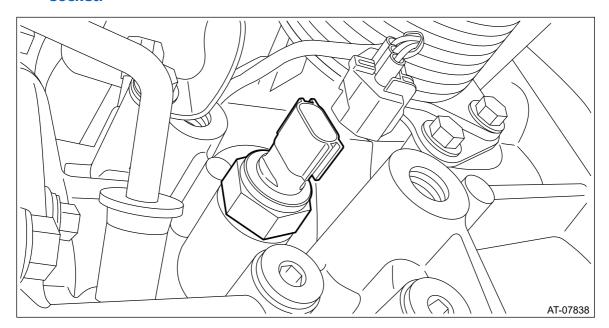
CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Secondary Pressure Sensor REMOVAL

Caution:

- Be sure to prevent water or oil from contacting the connector terminal of secondary pressure sensor. If adhesion occurs, replace with a new part.
- When removing secondary pressure sensor, CVTF may let out. If CVTF has leaked, adjust the CVTF level after installing the secondary pressure sensor.
- 1. Disconnect the ground cable from battery.
- 2. Lift up the vehicle.
- **3.** Clean the transmission exterior.
- **4.** Remove the secondary pressure sensor harness connector.
- **5.** Remove the secondary pressure sensor.

Note:

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



CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Secondary Speed Sensor

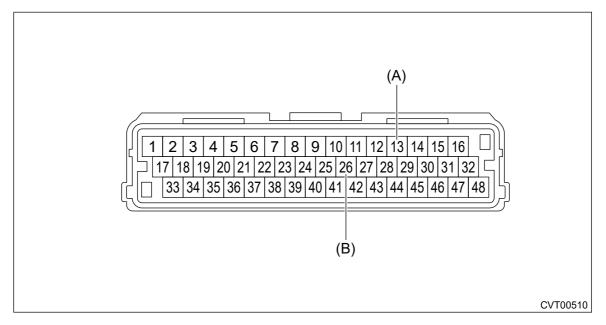
INSPECTION

- 1. Remove the bulkhead harness connector from TCM. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transmission Control Module (TCM)>REMOVAL.
- 2. Set the ST between the TCM and bulkhead harness.

ST 18460AA040 CHECK BOARD

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

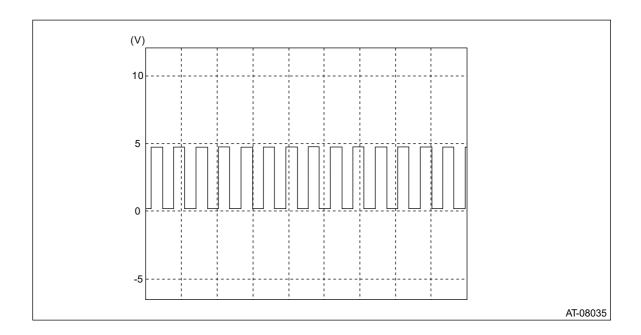
Terminals:



- (A) + probe
- (B) probe
- 4. Start and warm up the engine.
- 5. Check the waveform of secondary speed sensor with engine idling.

Note:

The waveform cycle changes as the speed changes.



CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Secondary Speed Sensor

INSTALLATION

Caution:

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

Install in the reverse order of removal.

Note:

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

Tightening torque:

Secondary speed sensor

5 N·m (0.5 kgf-m, 3.7 ft-lb)

Transmission cover

8 N·m (0.8 kgf-m, 5.9 ft-lb)

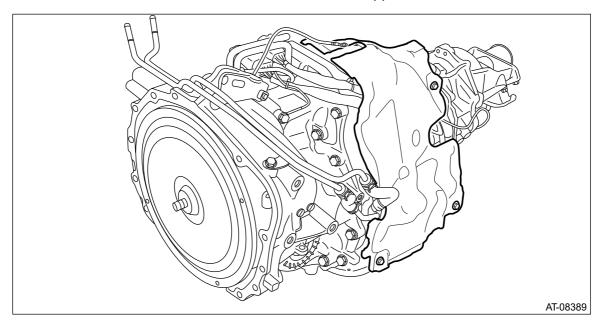
CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Secondary Speed Sensor

REMOVAL

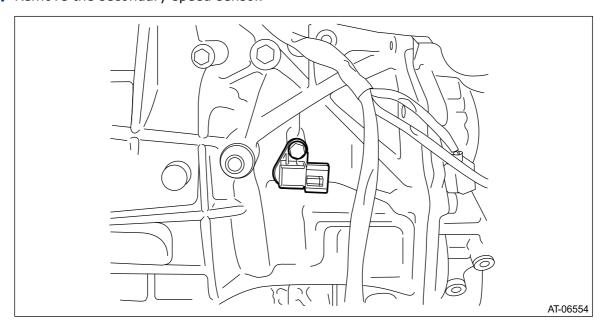
Caution:

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

- 1. Remove the transmission from the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Automatic Transmission Assembly>REMOVAL.
- **2.** Remove the transmission cover on the transmission upper side.



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



CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Stall Test

INSPECTION

Caution:

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

Note

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

Purposes of the stall test:

- · Operational check of forward clutch and reverse brake
- Operational check of the torque converter assembly
- Engine performance check
- 1. Place wheel chocks at the front and rear of all wheels and engage the parking brake.
- 2. Turn the A/C OFF.
- 3. Using the Subaru Select Monitor, check if the throttle valve operates when you depress the accelerator pedal.

 Ref. to ENGINE (DIAGNOSTICS)(H4DOTC)>Subaru Select Monitor>OPERATION > DATA MONITOR.
- 4. Check the engine oil level. Ref. to LUBRICATION(H4DOTC)>General Description.
- 5. Check the coolant level. Ref. to COOLING(H4DOTC)>Engine Coolant.
- 6. Adjust the CVTF level. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>CVTF>ADJUSTMENT.
- 7. Increase the CVTF temperature to $60-80^{\circ}\text{C}$ ($140-176^{\circ}\text{F}$) by idling the engine with the select lever shifted to "N" or "P" range.
- 8. Hold down the pre-collision brake OFF switch to turn OFF the pre-collision brake. (With EyeSight)
- **9.** Shift the select lever to "D" range.
- 10. Depress the accelerator pedal to the full while fully depressing the foot brake pedal with your left foot.
- **11.** When the engine speed stabilizes, quickly record the engine speed and release accelerator pedal. Shift the select lever to "N" range. Let the engine idle for one minute or more to cool it down.
- 12. Shift to "R" range and perform the same stall test.

Note:

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

2,080 - 2,600 r/min

Stall test judgment

Range	Range	Probable cause
		Throttle valve is not fully open.
Lower than standard value	D, R	Insufficient engine output
		Torque converter malfunction
Higher than standard value		Forward clutch slippage
	D	Secondary pressure (line pressure) is low.
		Variator chain malfunction
		Input clutch slippage
	R	Reverse brake slippage
		Secondary pressure (line pressure) is low.
		Variator chain malfunction
		Input clutch slippage
	D, R	Torque converter malfunction

Control valve body malfunction
TCM malfunction
Damaged harness and harness connector

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Time Lag Test

INSPECTION

Note:

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

- Perform the test at normal operation CVTF temperature of $60-80^{\circ}\text{C}$ (140 176°F).
- Be sure to allow one minute or more interval between tests.
- Make three measurements and take the average value.
- **1.** [Apply the parking brake.]
- **2.** Start the engine. Check the idle speed. (A/C OFF)
- **3.** Shift the select lever from "N" to "D" range. Using a stop watch, measure the time elapsed from shifting the lever until the shock is felt.

Time lag standard:

1.2seconds or less

If "N" \rightarrow "D" time lag is longer than specified:

- Secondary pressure (line pressure) is too low.
- Forward clutch worn
- Piston malfunction
- · Control valve body malfunction
- · Learning incomplete
- 4. In the same manner, measure the time lag when shifting from "N" range to "R" range.

Time lag standard:

1.5seconds or less

If "N" \rightarrow "R" time lag is longer than specified:

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

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Torque Converter Assembly

INSPECTION

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

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Torque Converter Assembly

INSTALLATION

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

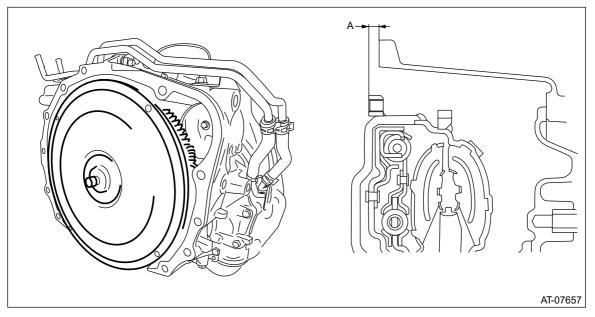
Note:

- Use new O-rings.
- Apply CVTF to the O-ring.
- 2. While holding the torque converter assembly by hand, carefully install it into the torque converter case.

Note:

- Apply CVTF to the oil seal lip.
- Do not damage the oil seal and O-ring.
- **3.** Engage the splines while gently rotating the torque converter assembly by hand, and securely insert the assembly.
- **4.** Measure depth "A", from converter case end surface to drive plate contacting surface. **Standard (reference):**

6.8 mm (0.268 in) or less



5. Install the transmission assembly to the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Automatic Transmission Assembly>INSTALLATION.

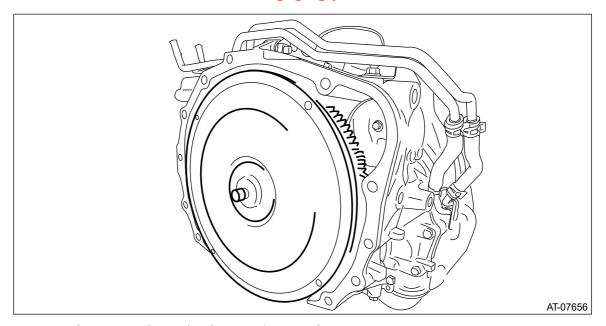
CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Torque Converter Assembly

REMOVAL

- 1. Remove the transmission assembly from the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Automatic Transmission Assembly>REMOVAL.
- **2.** Pull out the torque converter assembly horizontally.

Caution:

Do not scratch the inside of engaging parts.

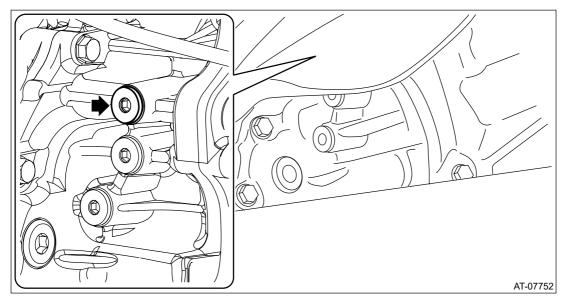


3. Remove the O-ring from the front reduction drive gear.

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Transfer Clutch Pressure Test

INSPECTION

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



3. Set the ST1, ST2 and ST3 to transmission.

Caution:

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

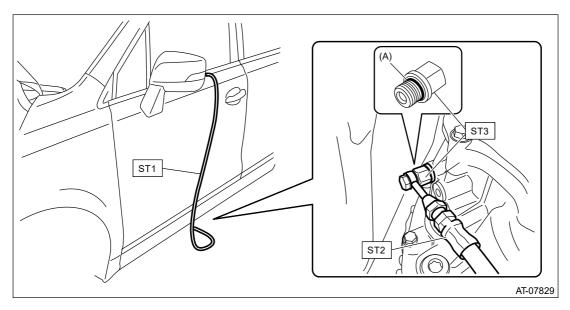
ST1 498575400 OIL PRESSURE GAUGE ASSY

ST2 498897700 OIL PRESSURE ADAPTER SET

ST3 18681AA000 PRESSURE GAUGE ADAPTER

Note:

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



(A) O-ring (genuine part)

- 4. Lower the vehicle.
- 5. Connect the Subaru Select Monitor to the data link connector and read the current data.
- **6.** Check the transfer clutch pressure as in secondary pressure (line pressure) test. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Secondary Pressure (Line Pressure) Test.

Note:

- Turn OFF the X mode switch and perform inspection.
- If oil pressure is not produced or it does not change, the control valve body may be malfunctioning.

Range position	ON Duty ratio (%)	accelerator opening angle (%)	Standard transfer clutch pressure kPa (kgf/cm², psi)
	95 — 100	Fully opened (100)	1,000—1,200 (10.2—12.2, 145—174)
D	60	Adjust ON Duty ratio to 60%.	400 — 700 (4.1—7.1, 58 — 102)
	0	Fully closed (0)	_
N or P	0	Fully closed (0)	0

7. Remove the ST and install the plug after measurement.

Note:

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

Tightening torque:

25 N·m (2.5 kgf-m, 18.4 ft-lb)

ADJUSTMENT

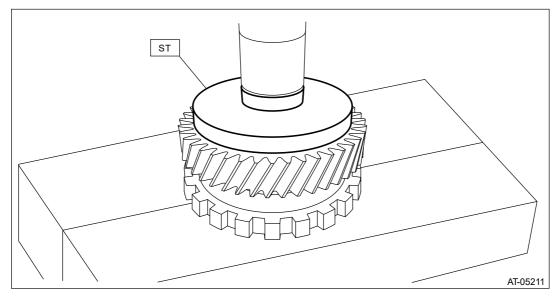
Note:

Refer to the Rear Drive Shaft. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Rear Drive Shaft>ADJUSTMENT.

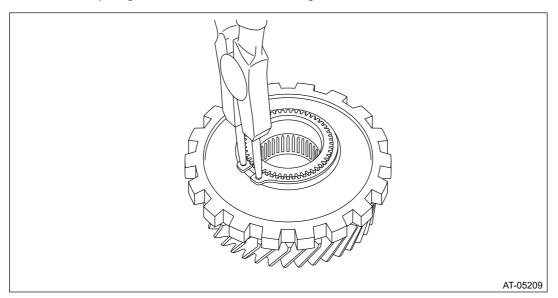
ASSEMBLY

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

ST 398177700 INSTALLER

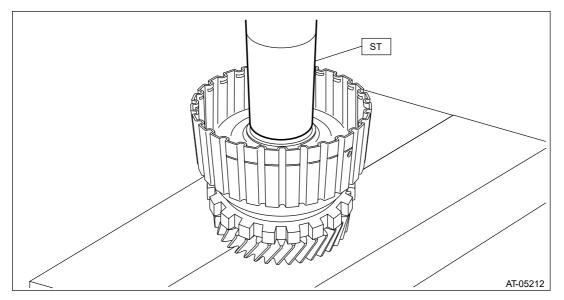


2. Install the snap ring to transfer reduction drive gear.



3. Using the ST, install the transfer reduction drive gear to transfer reduction drive gear shaft.

ST 499277100 BUSHING 1-2 INSTALLER

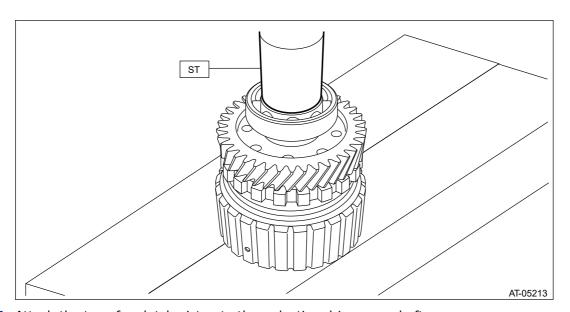


4. Using the ST, install the ball bearing.

Note:

Use a new ball bearing.

ST 499277100 BUSHING 1-2 INSTALLER

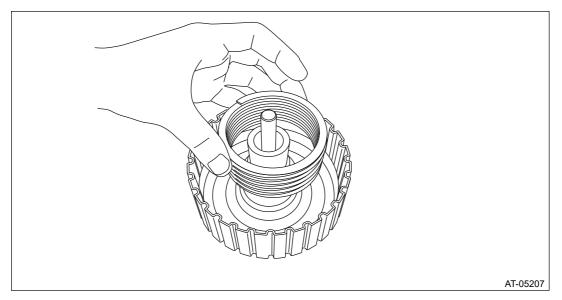


5. Attach the transfer clutch piston to the reduction drive gear shaft.

Note:

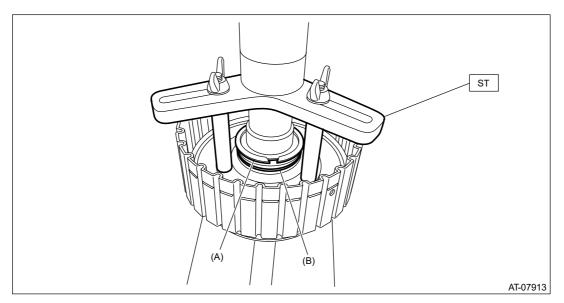
Apply CVTF to the transfer clutch piston lip.

6. Install the return spring.

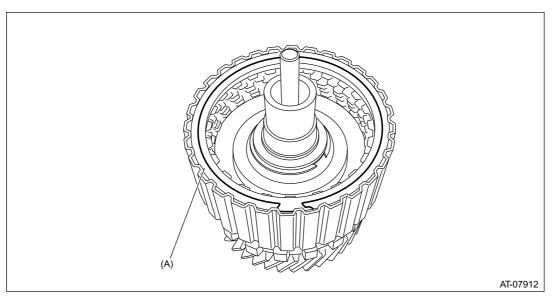


- 7. Install the transfer clutch piston seal.
- **8.** Using the ST, install the snap ring.

ST 18762AA000 or 18762AA001 COMPRESSOR SPECIAL TOOL



- (A) Snap ring
- (B) Transfer clutch piston seal
- **9.** Install the pressure plate, driven plate, drive plate and snap ring.



(A) Snap ring

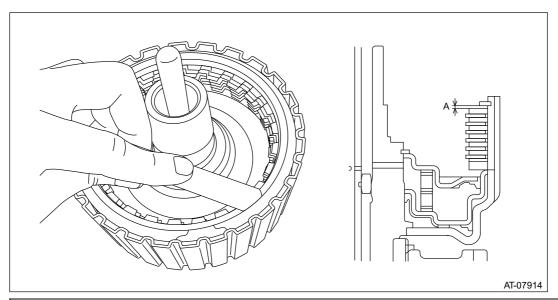
- **10.** Before measuring clearance "A", place same thickness shims on both sides to prevent the pressure plate from tilting.
- **11.** When clearance "A" exceeds the limit for use, replace the drive plate and driven plate as a set, and select and adjust the pressure plate within the initial specified value.

Initial standard:

0.7 - 1.1 mm (0.028 - 0.043 in)

Limit thickness:

1.6 mm (0.063 in)

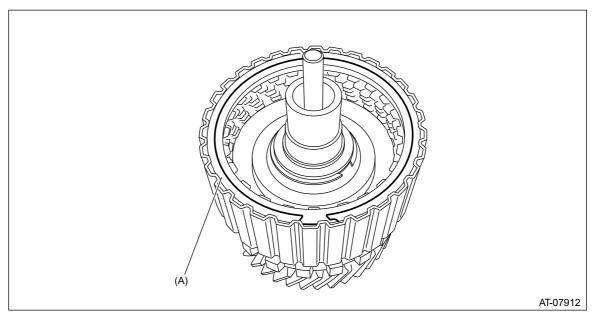


Pressure plate				
Part No. Thickness mm (in)				
31593AA151	3.3 (0.130)			
31593AA161	3.7 (0.146)			

12. Check the clearance between the snap ring and pressure plate. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transfer Clutch>INSPECTION.

DISASSEMBLY

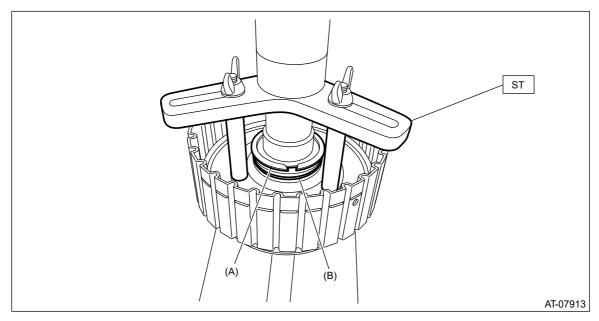
1. Remove the snap ring, and then remove the pressure plate, drive plate and driven plate.



(A) Snap ring

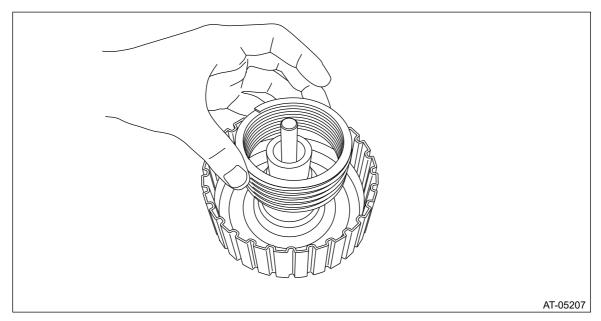
2. Using the ST, remove the snap ring.

ST 18762AA000 or 18762AA001 COMPRESSOR SPECIAL TOOL



- (A) Snap ring
- (B) Transfer clutch piston seal
- 3. Remove the transfer clutch piston seal.

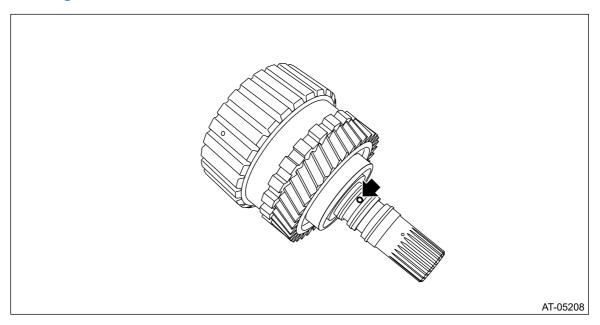
4. Remove the return spring.



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

Note:

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

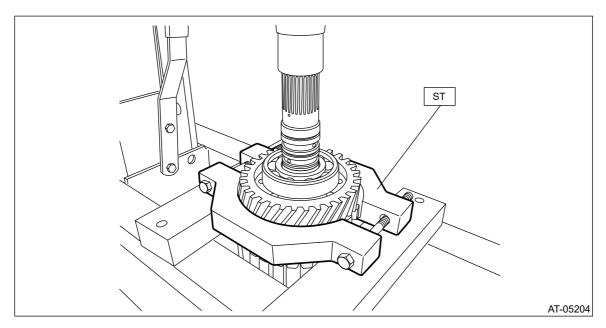


6. Using ST, remove transfer drive gear, parking gear and ball bearing.

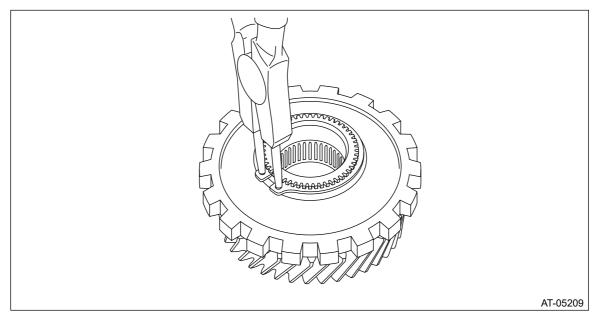
ST 18767AA000 BEARING REMOVER

Note:

Let the ST sit on the parking gear.



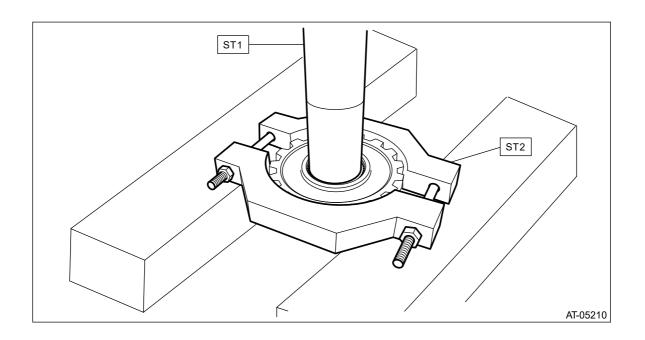
7. Remove the snap ring from transfer reduction drive gear.



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

ST1 499277100 BUSHING 1-2 INSTALLER

ST2 18767AA000 BEARING REMOVER



INSPECTION

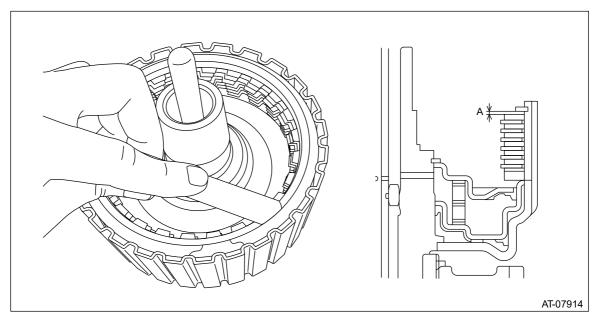
- Inspect the drive plate facing for wear and damage.
- Driven plate for discoloration (burnt color)
- Make sure the snap ring is not worn and the return spring has no permanent distortion, damage, or deformation.
- Check the lip seal for damage.
- Inspect the extension end play, and adjust it to within the standard value. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transfer Clutch>ADJUSTMENT.
- **1.** Before measuring clearance "A" between snap ring and pressure plate, place same thickness shims on both sides to prevent the pressure plate from tilting.
- 2. When clearance "A" exceeds the limit for use, replace the drive plate and driven plate as a set, and select the pressure plate within the initial specified value.

Initial standard:

0.7 - 1.1 mm (0.028 - 0.043 in)

Limit thickness:

1.6 mm (0.063 in)



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

Note:

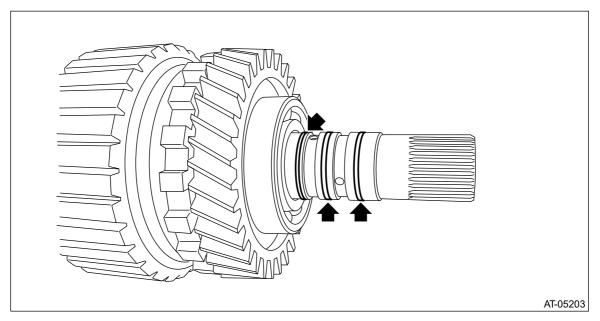
Turn OFF the X mode switch and perform inspection.

- (1) With the steering wheel held at fully turned position, drive the vehicle in "D" range and with vehicle speed at approx. 5 km/h (3 MPH) in both clockwise and counterclockwise directions for approx. ten times each, while repeating acceleration and braking intermittently.
- (2) If the tight corner braking phenomenon still persists, drive the vehicle again in a circle for several laps.

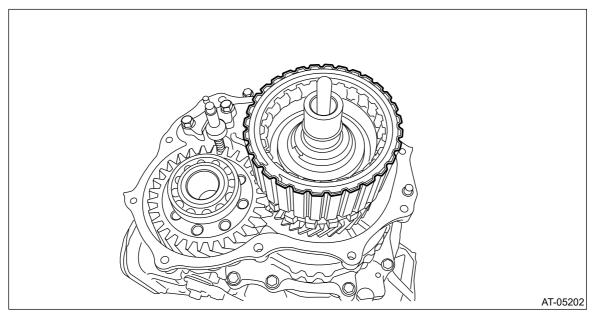
INSTALLATION

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

 Note:
 - Use a new seal ring.
 - When installing the seal ring, do not expand the seal ring too much.

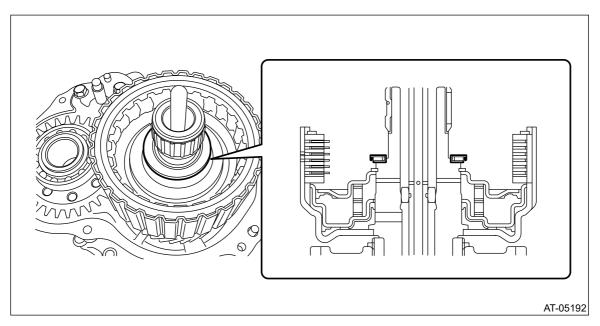


2. Install the transfer clutch assembly.



- **3.** Select the thrust needle bearing. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Rear Drive Shaft>ADJUSTMENT.
- 4. Install the selected thrust needle bearing and needle bearing to transfer clutch assembly.
 Note:

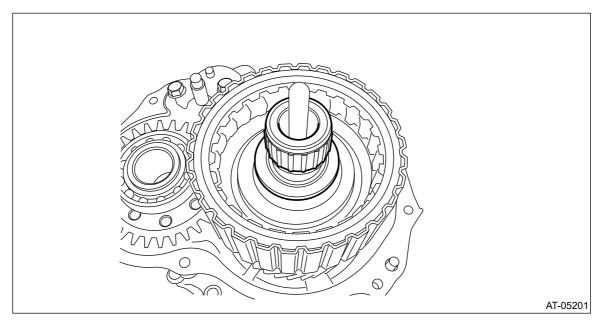
Install the thrust needle bearing in the correct direction.



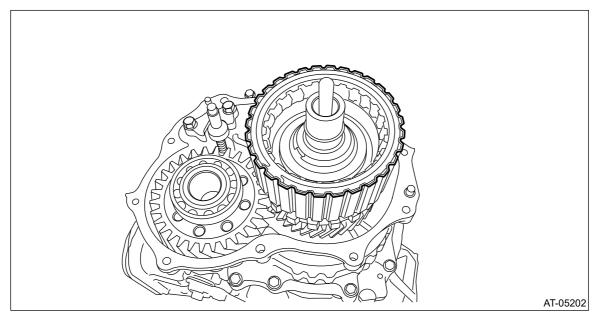
- **5.** Install the rear drive shaft. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Rear Drive Shaft.
- **6.** Install the extension case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Extension Case>INSTALLATION.
- 7. Install the transmission assembly to the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Automatic Transmission Assembly>INSTALLATION.

REMOVAL

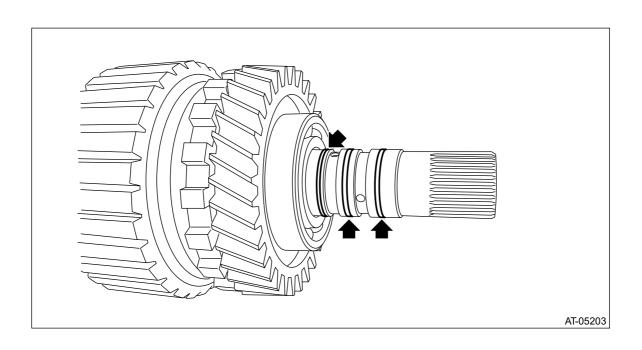
- **1.** Remove the transmission assembly from the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Automatic Transmission Assembly>REMOVAL.
- **2.** Remove the extension case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Extension Case>REMOVAL.
- **3.** Remove the rear drive shaft. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Rear Drive Shaft>REMOVAL.
- 4. Remove the thrust needle bearing and needle bearing.



5. Remove the transfer clutch assembly.



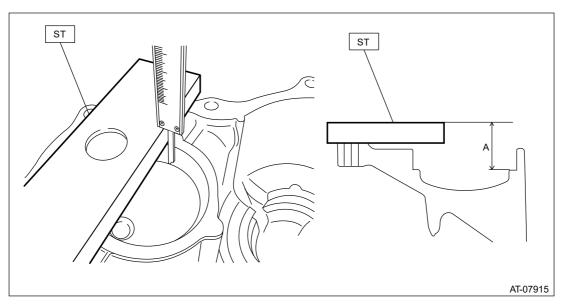
6. Remove the seal ring from transfer clutch assembly.



ADJUSTMENT

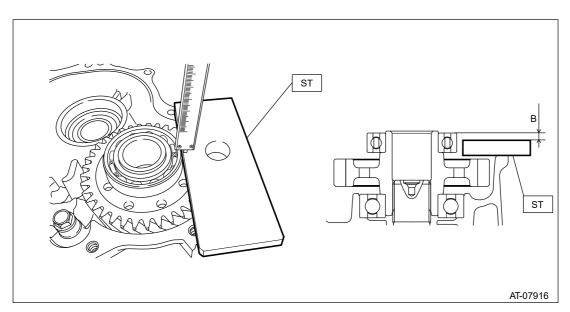
1. Measure depth "A" from the ST upper face to the ball bearing catch surface.

ST 398643600 GAUGE



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

ST 398643600 GAUGE



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

$$T mm = (A - 15) - (B + 15) - (0.05 - 0.25)$$

$$[T in = (A - 0.591) - (B + 0.591) - (0.002-0.01)]$$

T: Shim thickness

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

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

15 mm (0.591 in): Thickness of ST

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

Shim				
Part No.	Thickness mm (in)			
31288AA190	0.2 (0.008)			
31288AA200	0.3 (0.012)			
31288AA210	0.5 (0.02)			

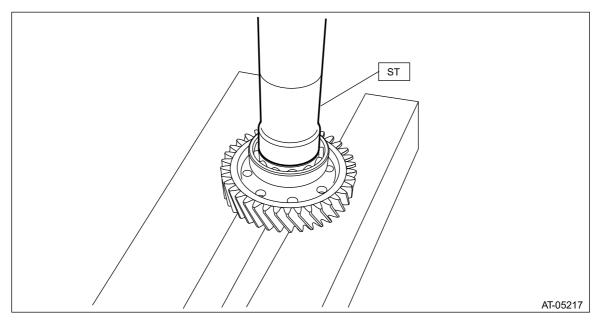
ASSEMBLY

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

ST 499277100 BUSHING 1-2 INSTALLER

Note:

- Use a new ball bearing.
- Install to the splines inside transfer reduction driven gear shaft.

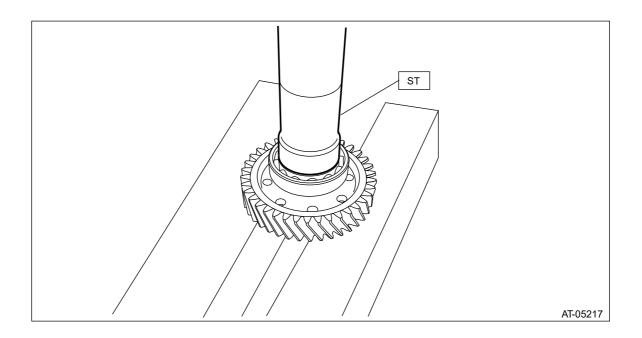


2. Install the new ball bearing (small) to reduction driven gear.

Note:

Use a new ball bearing.

ST 499277100 BUSHING 1-2 INSTALLER



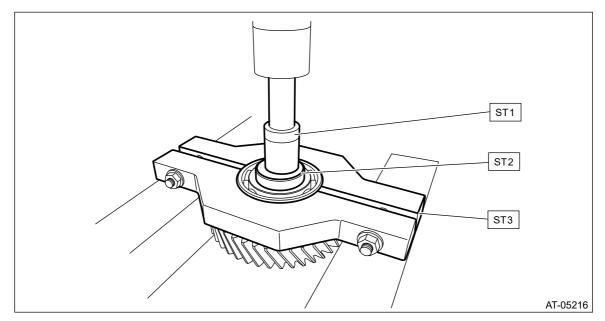
DISASSEMBLY

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

ST1 899864100 REMOVER

ST2 398497701 SEAT

ST3 498077600 REMOVER

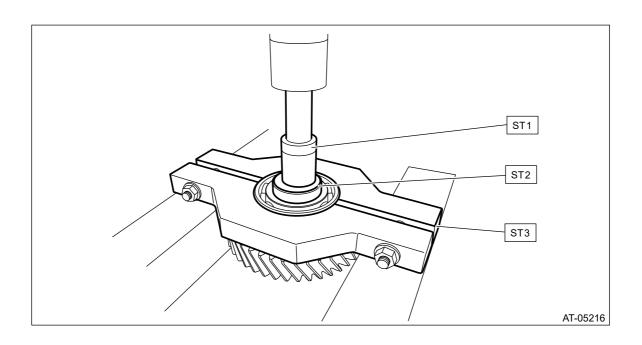


2. Using the ST, remove the ball bearing (small) from transfer reduction driven gear.

ST1 899864100 REMOVER

ST2 398497701 SEAT

ST3 18720AA000 REMOVER

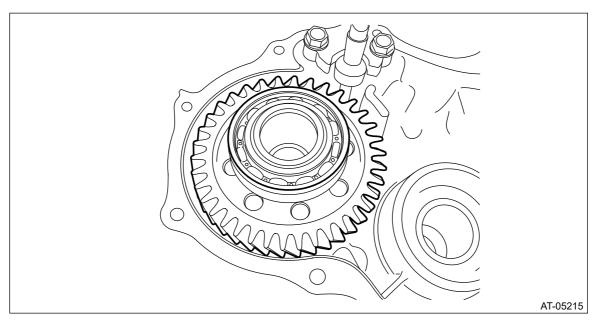


INSPECTION

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

INSTALLATION

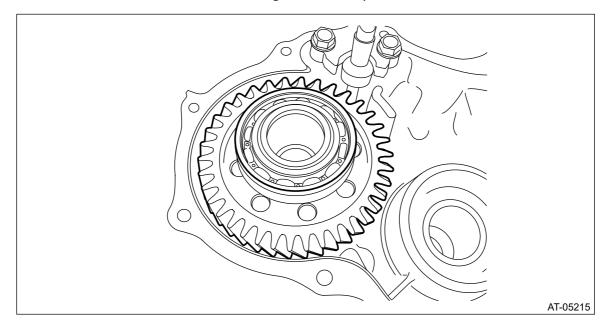
1. Install the reduction driven gear assembly.



- 2. Select shims. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transfer Reduction Driven Gear>ADJUSTMENT.
- **3.** Install the transfer clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transfer Clutch>INSTALLATION.
- **4.** Install the rear drive shaft. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Rear Drive Shaft>INSTALLATION.
- **5.** Mount the selected shim onto ball bearing.
- **6.** Install the extension case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Extension Case>INSTALLATION.
- 7. Install the transmission assembly to the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Automatic Transmission Assembly>INSTALLATION.

REMOVAL

- 1. Remove the transmission assembly from the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Automatic Transmission Assembly>REMOVAL.
- **2.** Remove the extension case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Extension Case>REMOVAL.
- **3.** Remove the rear drive shaft. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Rear Drive Shaft>REMOVAL.
- **4.** Remove the transfer clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transfer Clutch>REMOVAL.
- **5.** Remove the transfer reduction driven gear assembly.



CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Transmission Case

ADJUSTMENT

Note:

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

- Select the thrust bearing for the forward clutch assembly. <u>Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Forward Clutch Assembly>ADJUSTMENT.</u>
- Select the snap ring for the reduction gear. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Reduction Driven Gear>ADJUSTMENT.

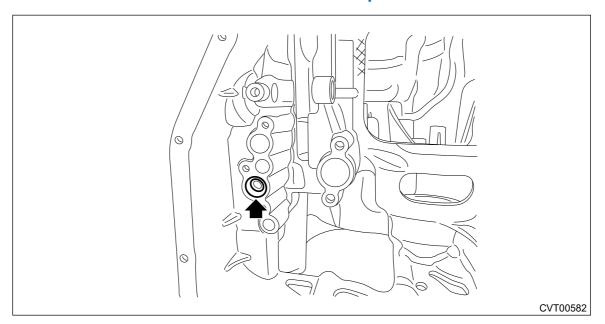
CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Transmission Case

ASSEMBLY

1. Install the CVTF filter.

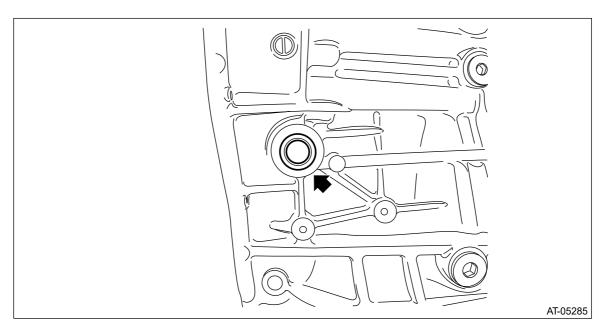
Note:

- Use a new CVTF filter.
- Apply CVTF to the CVTF filter.
- Make sure that the CVTF filter does not protrude from the transmission case.



2. Using the ST, install the oil seal.

ST 18657AA000 INSTALLER

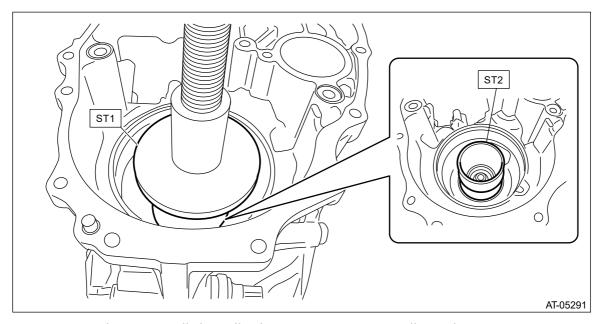


3. Using ST1 and ST2, install the ball bearing on the reduction gear side.
Note:

Use a new ball bearing.

ST1 398177700 INSTALLER

ST2 499755602 PRESS SNAP RING



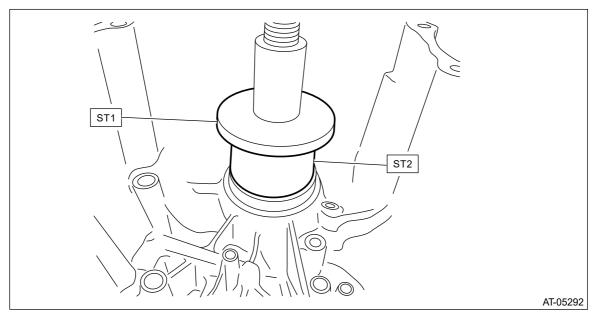
4. Using ST1 and ST2, install the roller bearing on primary pulley side.

Note:

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

ST1 398177700 INSTALLER

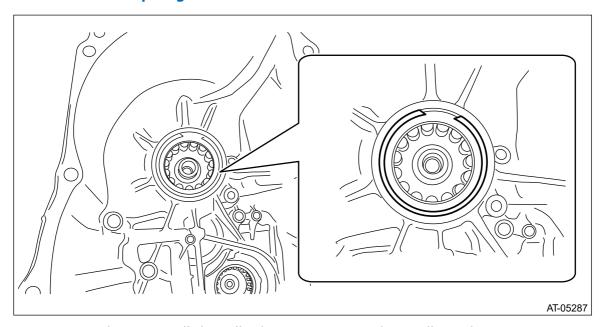
ST2 20299AG010 BASE



5. Install the snap ring on primary pulley side.

Note:

Use new snap rings.



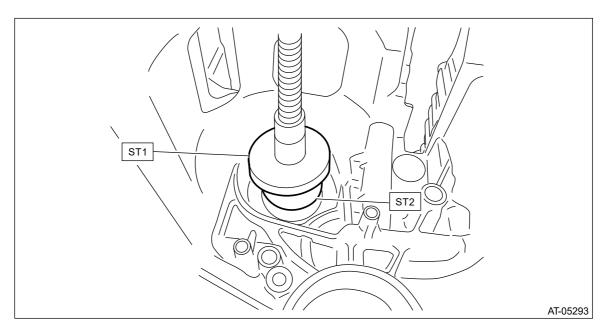
6. Using ST1 and ST2, install the roller bearing on secondary pulley side.

Note:

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

ST1 398177700 INSTALLER

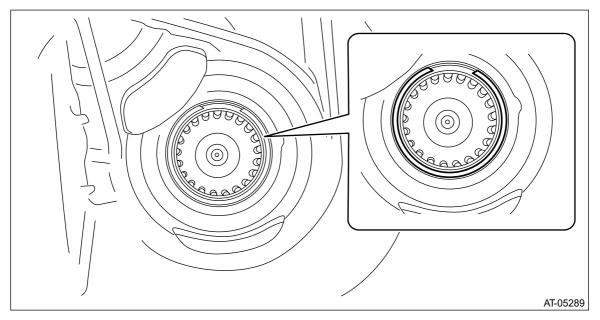
ST2 499755602 PRESS SNAP RING



7. Install the snap ring on secondary pulley side.

Note:

Use new snap rings.



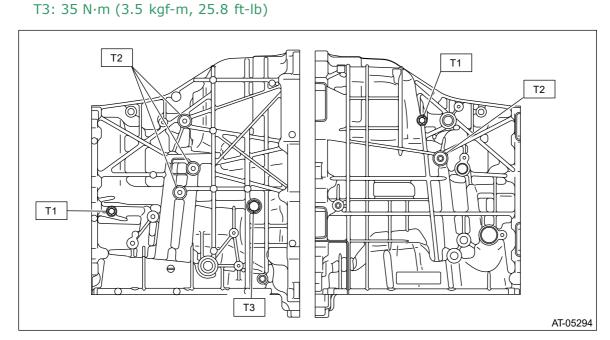
8. Install all plugs.

Note:

Use new gaskets and O-rings.

Tightening torque:

T1: 13 N·m (1.3 kgf-m, 9.6 ft-lb) T2: 25 N·m (2.5 kgf-m, 18.4 ft-lb)



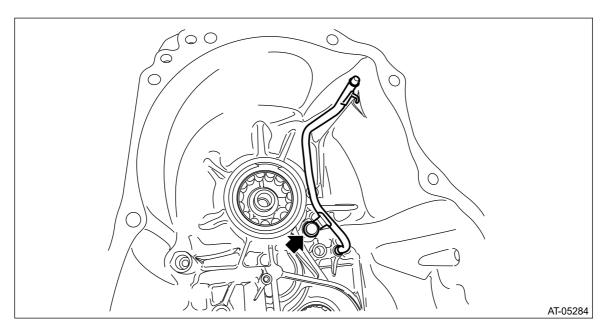
9. Install the lubrication pipe and O-ring.

Note:

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

Tightening torque:

16 N·m (1.6 kgf-m, 11.8 ft-lb)



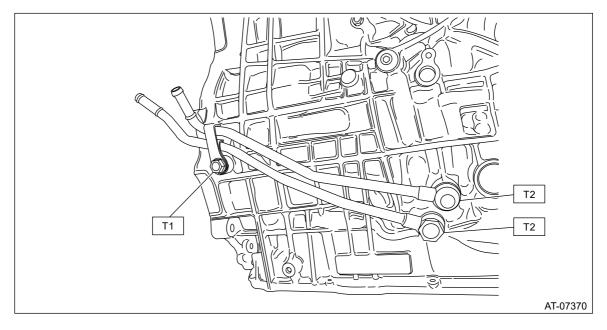
10. Install the CVTF inlet pipe and CVTF outlet pipe.

Note:

Use a new gasket.

Tightening torque:

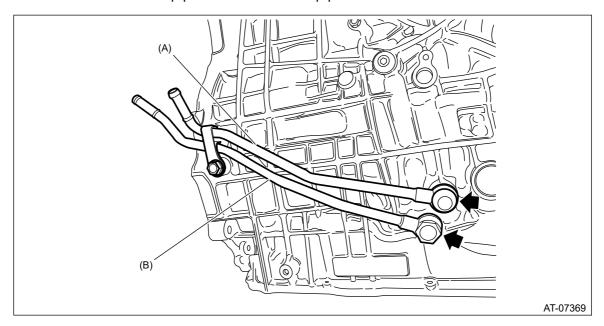
T1: 16 N·m (1.6 kgf-m, 11.8 ft-lb) T2: 40 N·m (4.1 kgf-m, 29.5 ft-lb)



CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Transmission Case

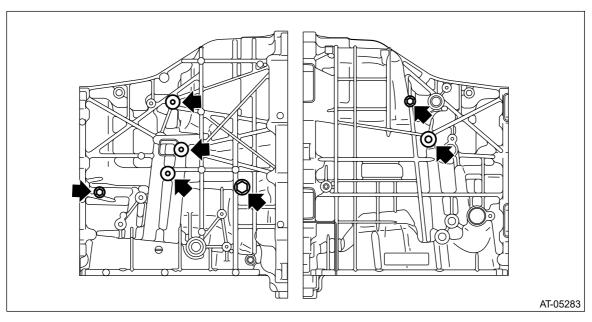
DISASSEMBLY

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

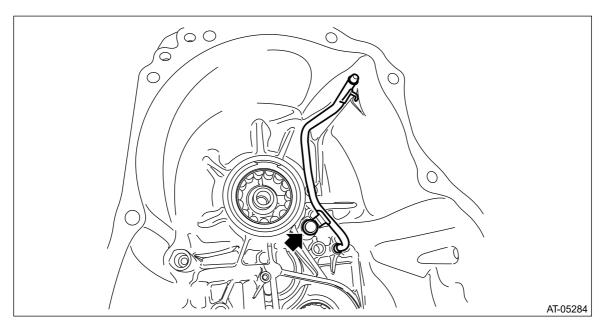


- (A) CVTF outlet pipe
- (B) CVTF inlet pipe

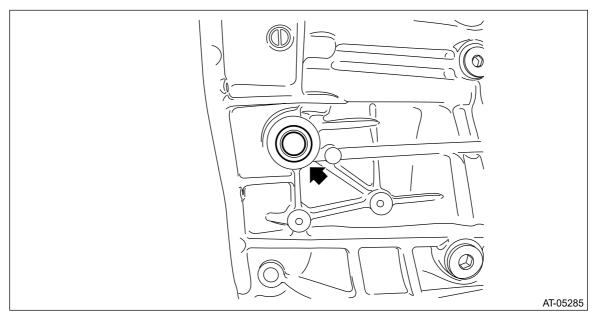
2. Remove all plugs from the transmission case.



3. Remove the lubrication pipe.

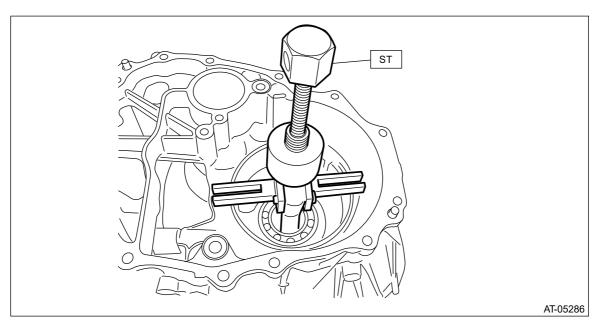


4. Remove the oil seal using a screwdriver wrapped with cloth etc.

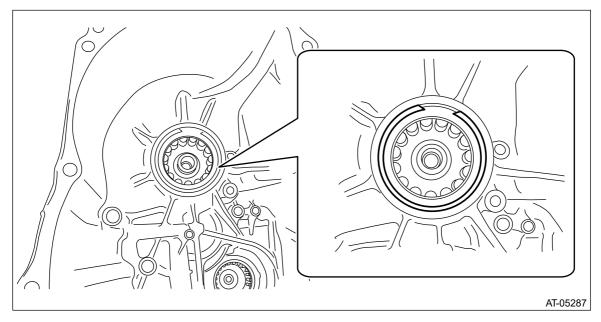


5. Remove the ball bearing from reduction driven gear using ST.

ST 398527700 PULLER ASSY



6. Remove the snap ring on primary pulley side.

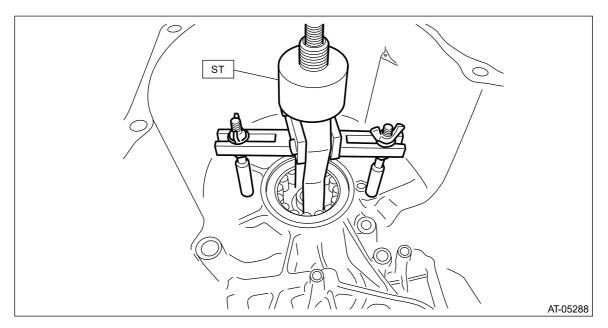


7. Using the ST, remove the roller bearing on primary pulley side.

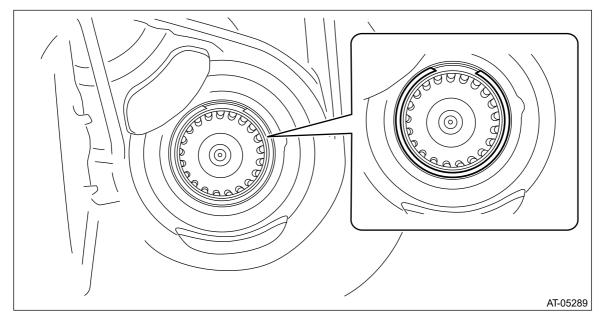
Note:

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

ST 398527700 PULLER ASSY



8. Remove the snap ring on secondary pulley side.

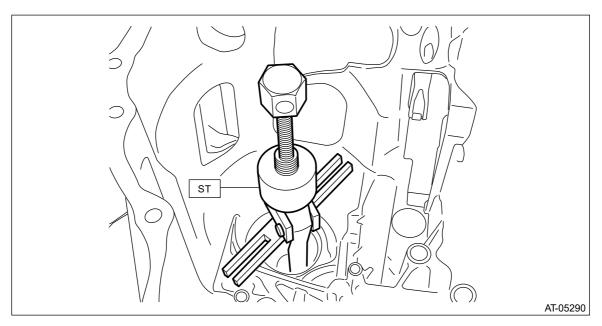


9. Using the ST, remove the roller bearing on secondary pulley side.

Note:

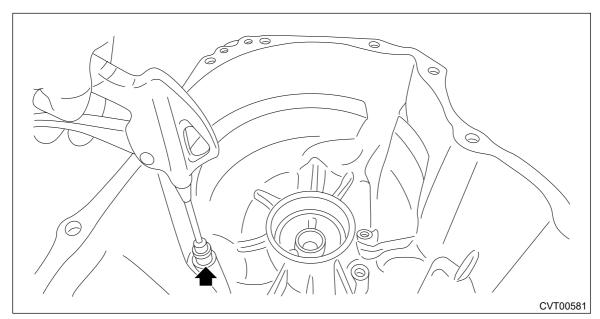
Warm up the bearing area of transmission case using a drier or heat gun.

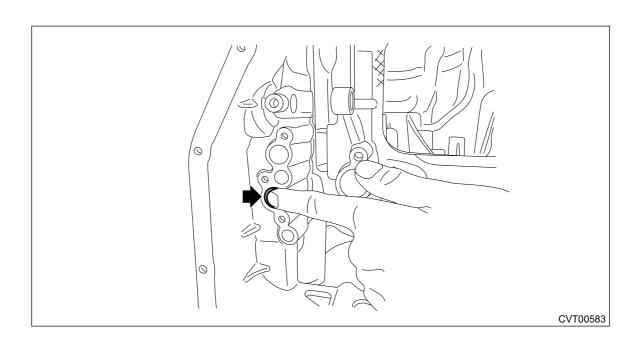
ST 398527700 PULLER ASSY



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

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





CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Transmission Case

INSPECTION

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

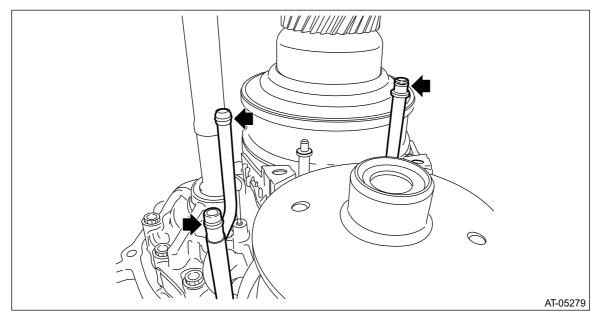
CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Transmission Case

INSTALLATION

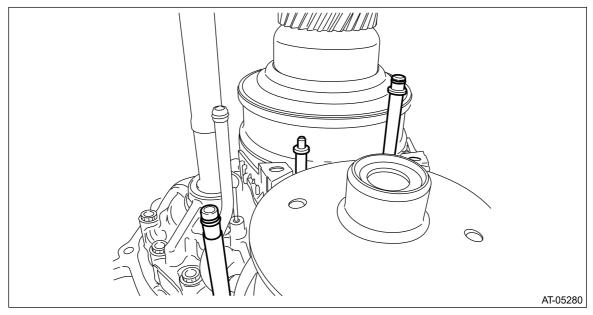
- 1. Clean the mating surface of transmission case and converter case.
- 2. Install the control device system. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transmission Control Device>INSTALLATION.
- 3. Install the O-ring to the lubrication pipe.

Note:

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

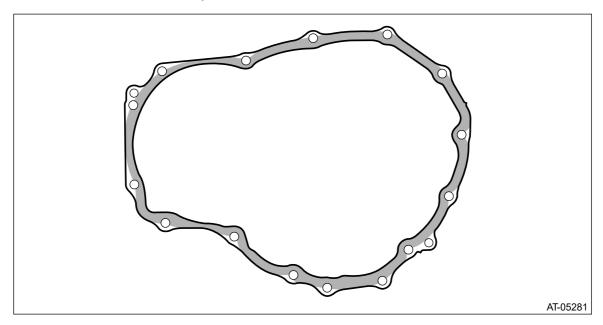


4. Make sure the lubrication pipe and support rod are in vertical position.



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

THREE BOND 1215B or equivalent



6. Install the transmission case.

Caution:

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

Note:

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

Tightening torque:

41 N·m (4.2 kgf-m, 30.2 ft-lb)

7. Install the O-ring to CVTF pipe.

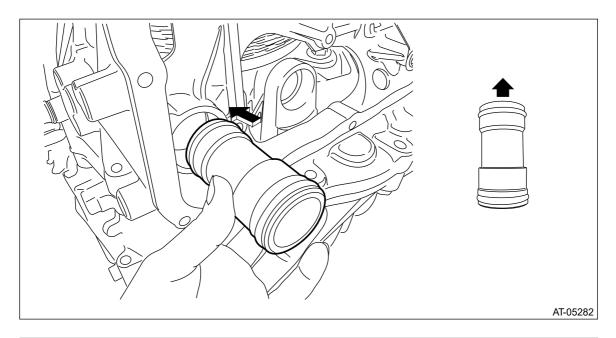
Note:

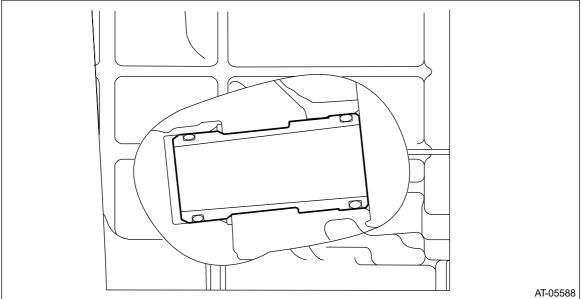
Use new O-rings.

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

Note:

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

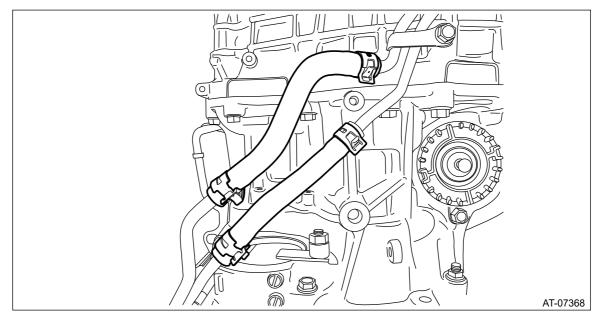




9. Install the CVTF hose.

Note:

- Use new CVTF hoses.
- Install the CVTF hose with the painted position facing the rear side of transmission.



- **10.** Install the reduction driven gear. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Reduction Driven Gear>INSTALLATION.
- **11.** Install the forward clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Forward Clutch Assembly>INSTALLATION.
- **12.** Install the intermediate case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Intermediate Case>INSTALLATION.
- 13. Install the transfer reduction driven gear assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transfer Reduction Driven Gear>INSTALLATION.
- **14.** Install the transfer clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transfer Clutch>INSTALLATION.
- **15.** Install the rear drive shaft. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Rear Drive Shaft>INSTALLATION.
- **16.** Install the extension case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Extension Case>INSTALLATION.
- 17. Install the inhibitor switch. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Inhibitor Switch>INSTALLATION.
- **18.** Install the secondary speed sensor. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Secondary Speed Sensor>INSTALLATION.
- **19.** Install the transmission harness. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transmission Harness>INSTALLATION.
- **20.** Install the control valve body and oil pan. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Control Valve Body>INSTALLATION.
- **21.** Install the air breather hose. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Air Breather Hose>INSTALLATION.
- **22.** Install the transmission assembly to the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Automatic Transmission Assembly>INSTALLATION.

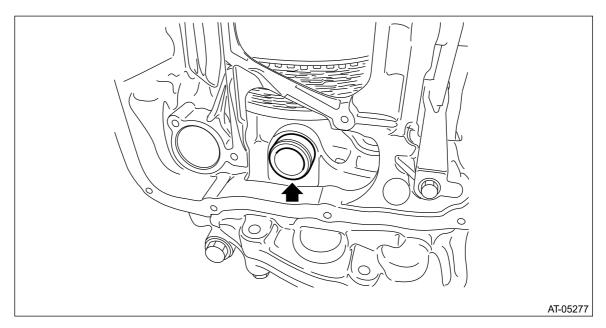
CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Transmission Case

REMOVAL

- **1.** Remove the transmission assembly from the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Automatic Transmission Assembly>REMOVAL.
- **2.** Remove the air breather hose. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Air Breather Hose>REMOVAL.
- **3.** Remove the transmission harness. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transmission Harness>REMOVAL.
- **4.** Remove the secondary speed sensor. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Secondary Speed Sensor>REMOVAL.
- **5.** Remove the inhibitor switch. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Inhibitor Switch>REMOVAL.
- **6.** Remove the extension case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Extension Case>REMOVAL.
- 7. Remove the rear drive shaft. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Rear Drive Shaft>REMOVAL.
- **8.** Remove the transfer clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transfer Clutch>REMOVAL.
- **9.** Remove the transfer reduction driven gear assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transfer Reduction Driven Gear>REMOVAL.
- **10.** Remove the intermediate case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Intermediate Case>REMOVAL.
- **11.** Remove the forward clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Forward Clutch Assembly>REMOVAL.
- **12.** Remove the reduction driven gear. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Reduction Driven Gear>REMOVAL.
- **13.** Remove the oil pan and control valve body. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Control Valve Body>REMOVAL.

Note:

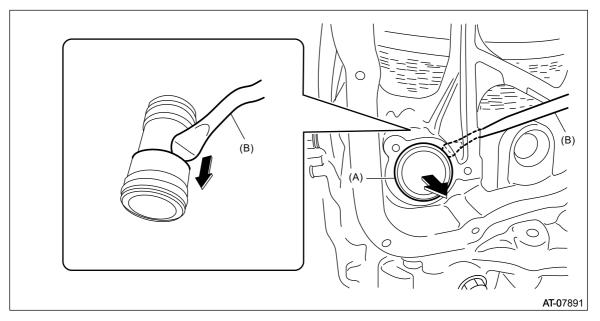
When removing the control valve body, also remove the pressure pipe if it is attached on the case.



14. Remove the CVTF pipe using a tire lever etc.

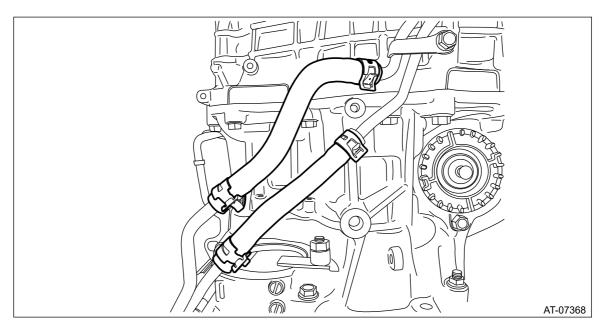
Note:

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



- (A) CVTF pipe
- (B) Tire lever

15. Remove the CVTF cooler hose.

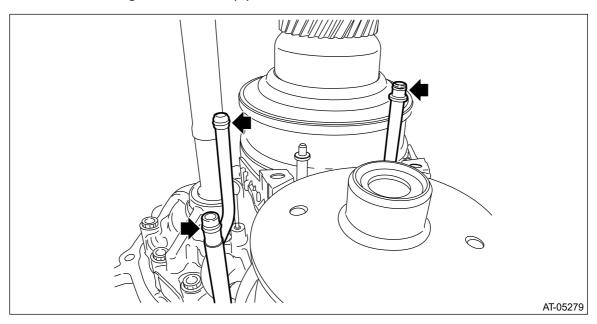


16. Remove the transmission case.

Note:

The total number of transmission case mounting bolts is 15.

17. Remove the O-ring of lubrication pipe.



18. Remove the control device system. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transmission Control Device>REMOVAL.

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Transmission Control Device INSPECTION

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

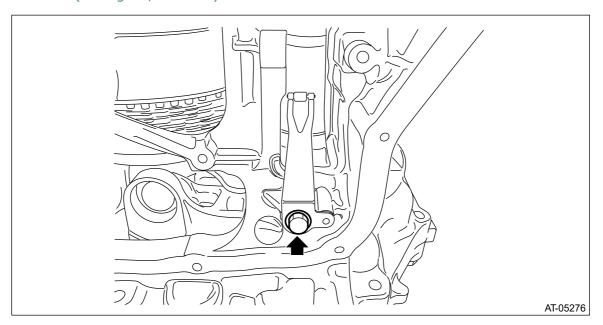
CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Transmission Control Device

INSTALLATION

1. Install the detent spring.

Tightening torque:

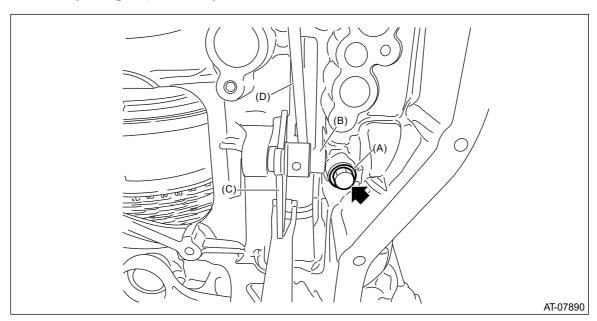
7 N•m (0.7 kgf-m, 5.2 ft-lb)



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

Tightening torque:

7 N•m (0.7 kgf-m, 5.2 ft-lb)

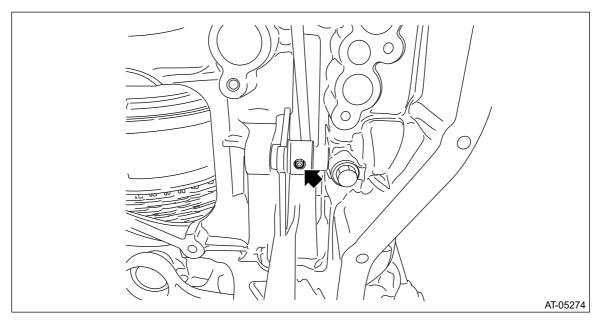


- (A) Bolt
- (B) Range select lever
- (C) Manual plate
- (D) Parking rod

3. Install the spring pin.

Note:

Use new spring pin.



- **4.** Install the inhibitor switch. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Inhibitor Switch.
- **5.** Adjust the inhibitor switch. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Inhibitor Switch.
- **6.** Install the control valve body and oil pan. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Control Valve Body>INSTALLATION.
- 7. Install the transmission assembly to the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Automatic Transmission Assembly>INSTALLATION.

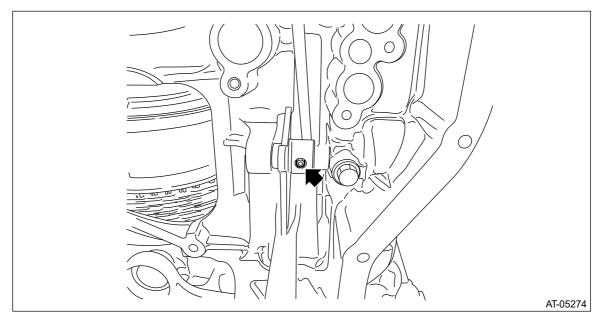
CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Transmission Control Device

REMOVAL

- **1.** Remove the transmission assembly from the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Automatic Transmission Assembly>REMOVAL.
- **2.** Remove the oil pan and control valve body. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Control Valve Body>REMOVAL.
- **3.** Remove the inhibitor switch. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Inhibitor Switch>REMOVAL.
- 4. Remove the spring pin.

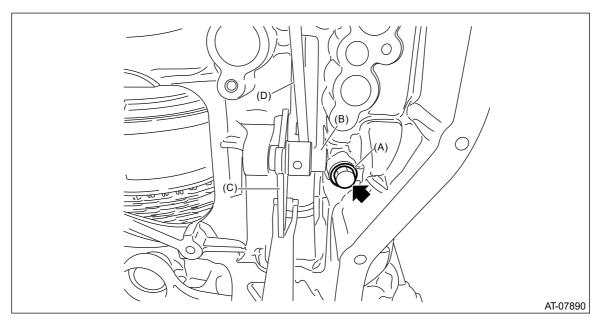
Note:

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



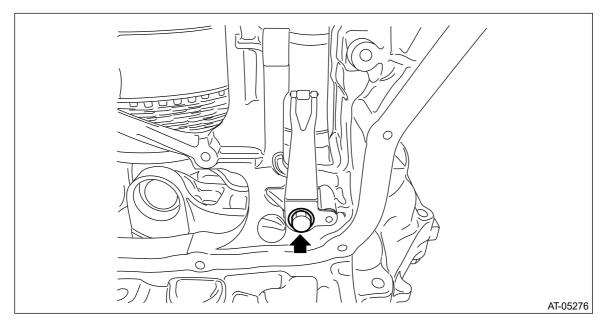
5. Remove the bolt and remove the range select lever, manual plate and parking rod.
Note:

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



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

6. Remove the detent spring.



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

INSTALLATION

1. Install the TCM to the bracket.

Tightening torque:

7.5 N·m (0.8 kgf-m, 5.5 ft-lb)

2. Install the TCM.

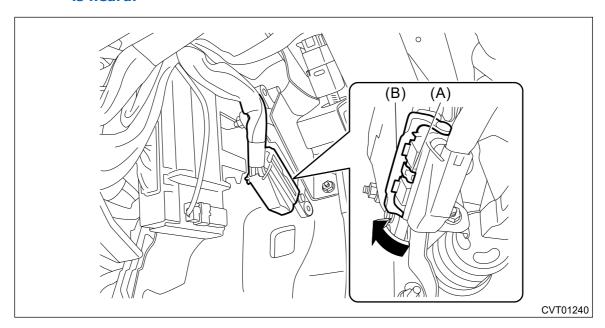
Tightening torque:

7.5 N·m (0.8 kgf-m, 5.5 ft-lb)

3. Install the harness connector to TCM.

Note:

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

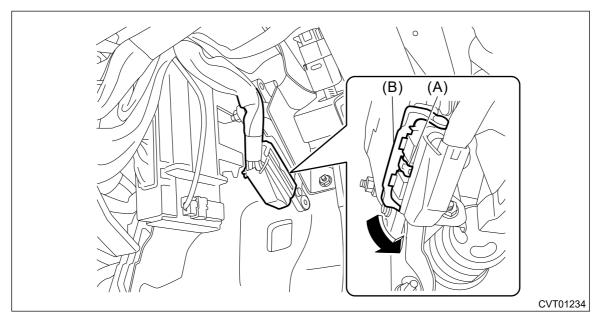


- (A) Lock button
- (B) Lock lever
- **4.** Connect the battery ground terminal.
- **5.** Using the Subaru Select Monitor, perform [Clear AT learning value] on [Work Support], and perform [AT learning mode]. Ref. to TRANSMISSION (DIAGNOSTICS)>Learning Control>PROCEDURE.

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

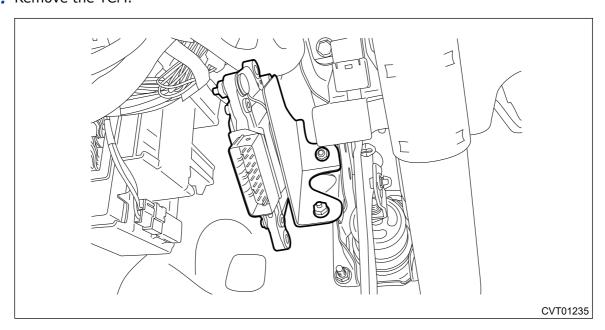
REMOVAL

- 1. Disconnect the ground cable from battery.
- **2.** Move the lock lever in the arrow direction while pressing the lock button, and disconnect the connector.

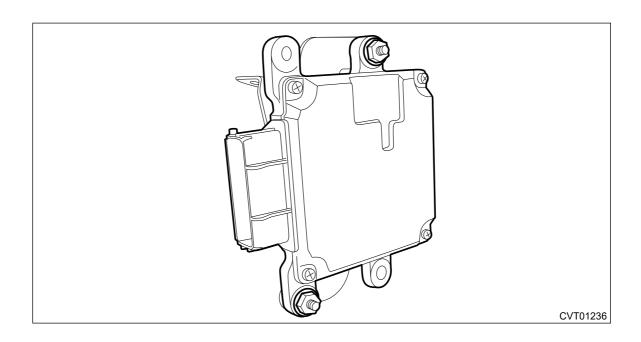


- (A) Lock button
- (B) Lock lever

3. Remove the TCM.



4. Remove the TCM from the bracket.



CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Transmission Harness

INSPECTION

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

Note:

Refer to WIRING SECTION for transmission harness terminal and oil temperature sensor terminal. Ref. to WIRING SYSTEM>CVT Control System>WIRING DIAGRAM.

Harness continuity standard

Less than 1 Ω

Oil temperature sensor standard

Approx. 2.6 k Ω (at 20°C)

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Transmission Harness

INSTALLATION

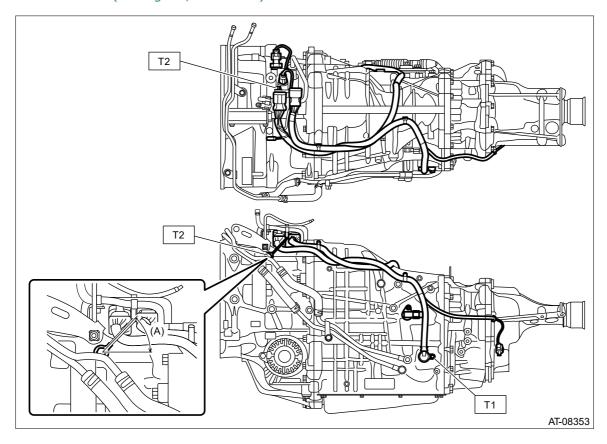
Install in the reverse order of removal.

Note:

- Use new O-rings.
- Do not impact or bend the transmission harness because it has the oil temperature sensor inside.
- Install the transmission ground terminal at an approximately 45° angle (A).

Tightening torque:

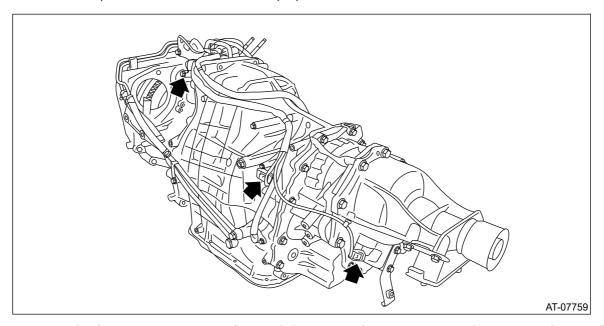
T1: 5 N·m (0.5 kgf-m, 3.7 ft-lb) T2: 16 N·m (1.6 kgf-m, 11.8 ft-lb)



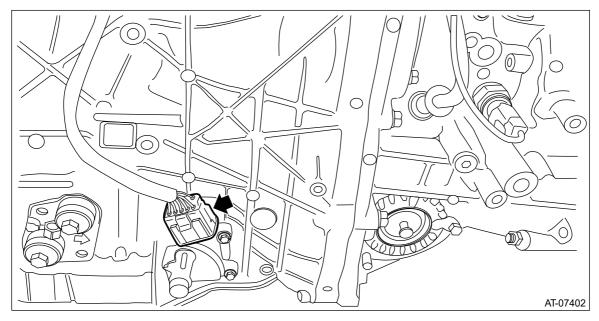
CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Transmission Harness

REMOVAL

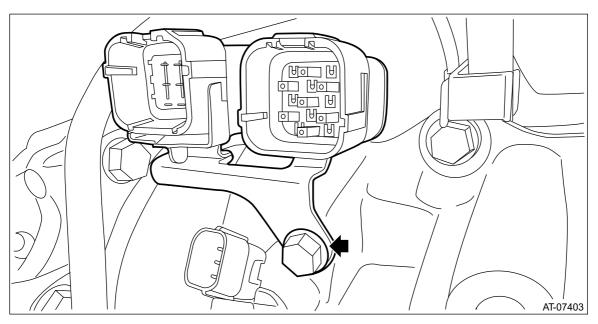
- **1.** Remove the transmission from the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Automatic Transmission Assembly>REMOVAL.
- **2.** Prepare for overhaul. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Preparation for Overhaul.
- **3.** Remove the transmission harness ground terminal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



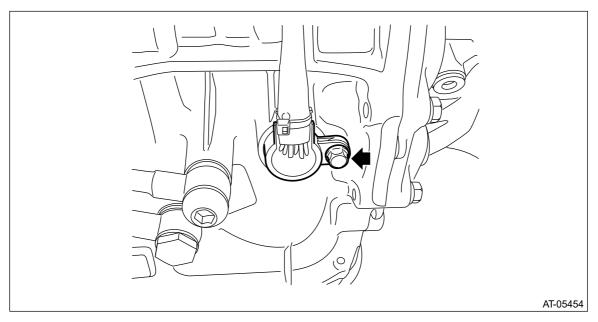
4. Remove the harness connectors from inhibitor switch, primary speed sensor and secondary pressure sensor.



5. Remove the transmission harness stay.



- 6. Remove transmission harness connector and inhibitor harness connector from harness stay.
- 7. Remove the control valve body. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Control Valve Body>REMOVAL.
- **8.** Remove the mounting bolt to pull out the bushing of transmission harness from transmission case round hole.



9. Remove the harness clip from transmission assembly.

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Transmission Mounting System

INSPECTION

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

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Transmission Mounting System

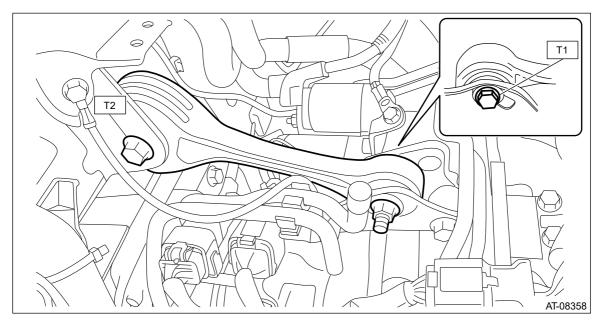
INSTALLATION

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)



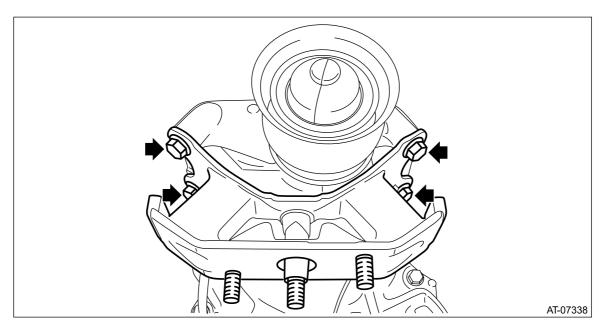
- **2.** Install the intercooler. Ref. to INTAKE (INDUCTION) (H4DOTC)>Intercooler>INSTALLATION.
- **3.** Connect the battery ground terminal.

2. TRANSMISSION REAR CROSSMEMBER AND REAR CUSHION RUBBER

1. Install the rear cushion rubber.

Tightening torque:

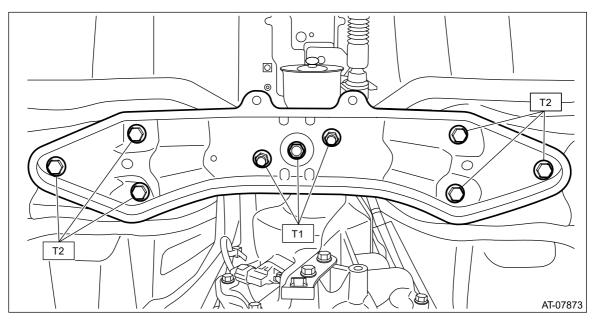
40 N·m (4.1 kgf-m, 29.5 ft-lb)



2. Install the transmission rear crossmember.

Tightening torque:

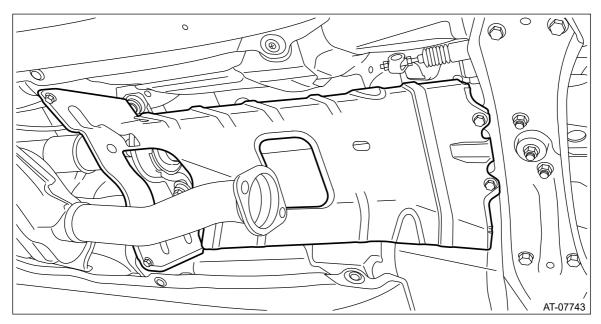
T1: 35 N·m (3.6 kgf-m, 25.8 ft-lb) T2: 70 N·m (7.1 kgf-m, 51.6 ft-lb)



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

Tightening torque:

18 N·m (1.8 kgf-m, 13.3 ft-lb)



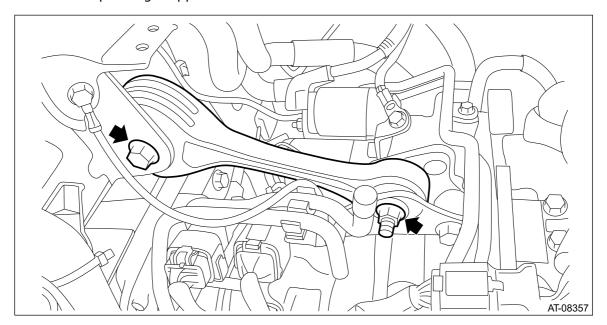
- **5.** Install the center exhaust pipe. Ref. to EXHAUST(H4DOTC)>Center Exhaust Pipe>INSTALLATION.
- **6.** Connect the battery ground terminal.

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Transmission Mounting System

REMOVAL

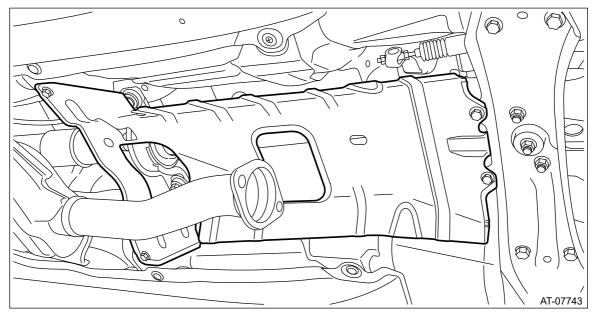
1. PITCHING STOPPER

- 1. Disconnect the ground cable from battery.
- **2.** Remove the intercooler. Ref. to INTAKE (INDUCTION)(H4DOTC)>Intercooler>REMOVAL.
- **3.** Remove the pitching stopper.

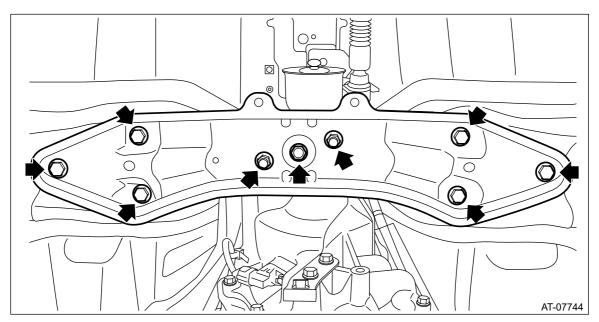


2. TRANSMISSION REAR CROSSMEMBER AND REAR CUSHION RUBBER

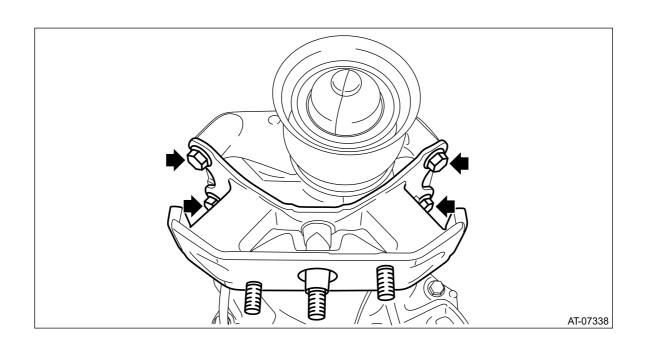
- 1. Disconnect the ground cable from battery.
- **2.** Lift up the vehicle.
- **3.** Remove the center exhaust pipe. Ref. to EXHAUST(H4DOTC)>Center Exhaust Pipe>REMOVAL.
- 4. Remove the center exhaust cover.



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



7. Remove the rear cushion rubber.



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

GENERAL DESCRIPTION

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

- Variator chain replacement
- Primary pulley and secondary pulley replacement

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

PROCEDURE

Note:

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

Caution:

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

- 2. Shift the select lever to "P" or "N" range.
- 3. Apply the parking brake.
- 4. Connect the Subaru Select Monitor to data link connector.
- 5. Idle the engine to raise the CVTF temperature to $40-50^{\circ}\text{C}$ ($104-122^{\circ}\text{F}$) displayed on the Subaru Select Monitor.

Note:

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

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

Note:

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

- **11.** Release the accelerator pedal to fully closed position to lower the engine speed to 4,000 r/min.
- **12.** Depress the accelerator pedal gradually again, and increase the engine speed to 5,300 r/min.
- 13. Repeat the steps 11) and 12) for 40 times.
- **14.** Release the accelerator pedal to return the engine speed to idling.

15. Shift the select lever to "P" range, and then turn the engine to OFF.

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Variator Chain

INSPECTION

Check the variator chain for damage and wear.

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Variator Chain

INSTALLATION

For installation of variator chain, refer to "Primary Pulley and Secondary Pulley". Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Primary Pulley and Secondary Pulley>INSTALLATION.

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Variator Chain

REMOVAL

For removal of variator chain, refer to "Primary Pulley and Secondary Pulley". Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Primary Pulley and Secondary Pulley>REMOVAL.

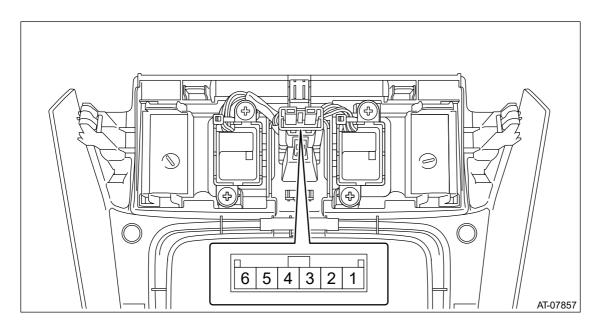
CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > X MODE Switch

INSPECTION

1. CHECK SWITCH UNIT

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

	Terminal No.	Standard
OFF (when measured without operating the switch)	No. 4 — No. 5	1 M Ω or more
ON (when measured with the switch held down)	NO. 4 — NO. 5	Less than 1 Ω



2. CHECK X MODE SYSTEM

Refer to "CVT (TR580)" section for X mode system inspection. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR580)>X MODE Switch>INSPECTION > CHECK X MODE SYSTEM.

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > X MODE Switch

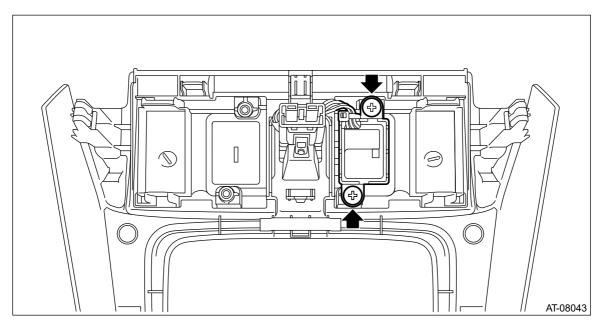
INSTALLATION

Install in the reverse order of removal.

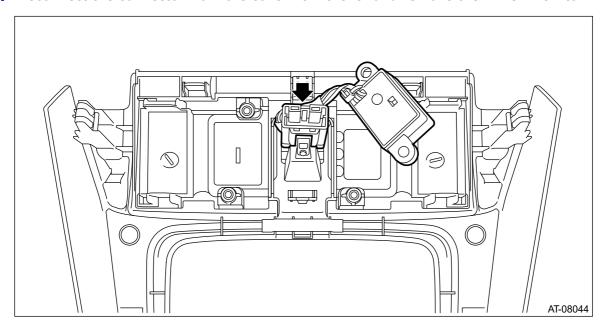
CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > X MODE Switch

REMOVAL

- **1.** Disconnect the ground cable from battery.
- 2. Remove the cover shift lever. Ref. to EXTERIOR/INTERIOR TRIM>Console Box>REMOVAL.
- 3. Remove the screws which secure the X MODE switch from the cover shift lever.

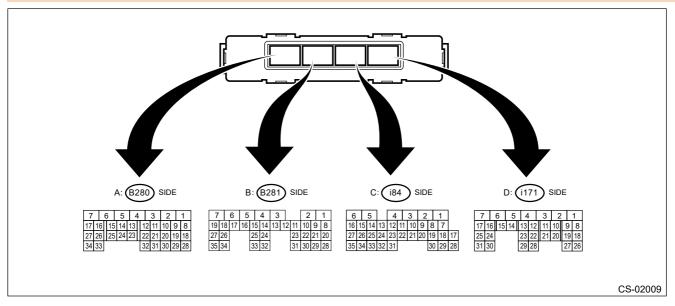


4. Disconnect the connector from the cover - shift lever and remove the X MODE switch.



CONTROL SYSTEMS > AT Shift Lock Control System

ELECTRICAL SPECIFICATION



• Model without push button ignition switch

	Connector Termina	Terminal	Input/Output signal
Item			Measured value and measuring
			conditions
	B281	6	
Battery power supply		7	9 — 16 V
	i84	6	
	B280	32	10-15 V when ignition switch is at ACC.
Ignition power supply	B281	3	10-15 V when ignition switch is at ON or START.
TCM (\\D" range\	:04	27	Can not be measured because of digital
TCM ("P" range)	i84	35	communication
Stop light and brake switch	B280	10	9 — 16 V when the stop light & brake switch is ON. 0 V when the stop light & brake switch is OFF.
"P" range switch	B281	18	Less than 1.5 V when select lever is in "P" range. 8 V or more when select lever is in positions other than "P" range.
Solenoid unit signal	B281	5	8.5 — 16 V when shift lock is released 0 V when shift lock is operating.
Key warning switch signal	B280	4	9 — 16 V when key is inserted. 0 V when key is removed.
Key lock solenoid signal	B281	4	7.5 — 16 V when the key is inserted with the select lever shifted in positions other than "P" range.

			0 V at other conditions than above.
Ground	B280	1	
Ground	i84	1	_

• Model with push button ignition switch

	Connector Term		Input/Output signal
Item	No.	Terminal No.	Measured value and measuring conditions
	B281	6	
Battery power supply	D201	7	9 — 16 V
	i84	6	
	B280	32	10-15 V when ignition switch is at ACC.
Ignition power supply	B281	3	10-15 V when ignition switch is at ON or START.
TCM ("P" range)	i84	27	Can not be measured because of digital
	104	35	communication
Stop light and brake switch	B280	10	9 — 16 V when the stop light & brake switch is ON. 0 V when the stop light & brake switch is OFF.
"P" range switch	B281	18	Less than 1.5 V when select lever is in "P" range. 8 V or more when select lever is in positions other than "P" range.
Solenoid unit signal	B281	5	8.5 — 16 V when shift lock is released 0 V when shift lock is operating.
Cround	B280	1	
Ground	i84	1	

1. SHIFT LOCK OPERATION

• Model without push button ignition switch

1. CHECK COMMUNICATION OF SUBARU SELECT MONITOR.



- 1. Turn the ignition switch to ON.
- **2.** Using the Subaru Select Monitor, check whether communication to all systems can be executed normally.

Is the system name displayed?



Go to 2.



Perform the inspection following the diagnostic procedure in BODY CONTROL SYSTEM (DIAGNOSTICS) section. Ref. to BODY CONTROL(DIAGNOSTICS)>Basic Diagnostic Procedure.

2. CHECK SHIFT LOCK.



- 1. Turn the ignition switch to ON.
- 2. Shift the select lever to "P" range.

While brake pedal is not depressed, is it possible to move the select lever from the "P" range to other ranges?

Yes

Perform the inspection of "SELECT LEVER CANNOT BE LOCKED OR RELEASED".

Ref. to CONTROL SYSTEMS>AT Shift Lock Control System>INSPECTION > SELECT LEVER CANNOT BE LOCKED OR RELEASED.



Go to 3.

3. CHECK SHIFT LOCK.



While brake pedal is depressed, is it possible to move the select lever from the "P" range to other ranges?



Go to 4.



No

Perform the inspection of "SELECT LEVER CANNOT BE LOCKED OR RELEASED".

Ref. to CONTROL SYSTEMS>AT Shift Lock Control System>INSPECTION >
SELECT LEVER CANNOT BE LOCKED OR RELEASED.

4. CHECK SHIFT LOCK.



Shift the select lever to "N" range.

Is it possible to move the select lever from the "N" range to the "P" range?



Go to 5.



Perform the inspection of "SELECT LEVER CANNOT BE LOCKED OR RELEASED".

Ref. to CONTROL SYSTEMS>AT Shift Lock Control System>INSPECTION >
SELECT LEVER CANNOT BE LOCKED OR RELEASED.

5. CHECK SHIFT LOCK.



- 1. Shift the select lever to "N" range.
- 2. Turn the ignition switch to ACC.

While brake pedal is depressed, is it possible to move the select lever from the "N" range to the "P" range?



<u>Go to 6.</u>



Perform the inspection of "SELECT LEVER CANNOT BE LOCKED OR RELEASED".

Ref. to CONTROL SYSTEMS>AT Shift Lock Control System>INSPECTION >
SELECT LEVER CANNOT BE LOCKED OR RELEASED.

6. CHECK KEY INTERLOCK.



- 1. Turn the ignition switch to OFF.
- **2.** Shift the select lever to other than "P" range.

Can the ignition key be removed?



Perform the inspection of "KEY INTERLOCK CANNOT BE LOCKED OR RELEASED". Ref. to CONTROL SYSTEMS>AT Shift Lock Control

System>INSPECTION > KEY INTERLOCK CANNOT BE LOCKED OR RELEASED.

No

Go to 7.

7. CHECK KEY INTERLOCK.



Shift the select lever to "P" range.

Can the ignition key be removed?



AT shift lock system is normal.



Perform the inspection of "KEY INTERLOCK CANNOT BE LOCKED OR RELEASED". Ref. to CONTROL SYSTEMS>AT Shift Lock Control System>INSPECTION > KEY INTERLOCK CANNOT BE LOCKED OR RELEASED.

Model with push button ignition switch

1. CHECK COMMUNICATION OF SUBARU SELECT MONITOR.



- 1. Turn the ignition switch to ON.
- **2.** Using the Subaru Select Monitor, check whether communication to all systems can be executed normally.

Is the system name displayed?



Go to 2.



Perform the inspection following the diagnostic procedure in BODY CONTROL SYSTEM (DIAGNOSTICS) section. Ref. to BODY CONTROL(DIAGNOSTICS)>Basic Diagnostic Procedure.

2. CHECK SHIFT LOCK.



- 1. Turn the ignition switch to ON.
- 2. Shift the select lever to "P" range.

While brake pedal is not depressed, is it possible to move the select lever from the "P" range to other ranges?

Yes

Perform the inspection of "SELECT LEVER CANNOT BE LOCKED OR RELEASED".

Ref. to CONTROL SYSTEMS>AT Shift Lock Control System>INSPECTION >
SELECT LEVER CANNOT BE LOCKED OR RELEASED.

No

Go to 3.

3. CHECK SHIFT LOCK.



While brake pedal is depressed, is it possible to move the select lever from the "P" range to other ranges?



Go to 4.



Perform the inspection of "SELECT LEVER CANNOT BE LOCKED OR RELEASED".

Ref. to CONTROL SYSTEMS>AT Shift Lock Control System>INSPECTION >
SELECT LEVER CANNOT BE LOCKED OR RELEASED.

4. CHECK SHIFT LOCK.



Shift the select lever to "N" range.

Is it possible to move the select lever from the "N" range to the "P" range?



Go to 5.



Perform the inspection of "SELECT LEVER CANNOT BE LOCKED OR RELEASED".

Ref. to CONTROL SYSTEMS>AT Shift Lock Control System>INSPECTION >
SELECT LEVER CANNOT BE LOCKED OR RELEASED.

5. CHECK SHIFT LOCK.



- 1. Shift the select lever to "N" range.
- **2.** Turn the ignition switch to ACC.

While brake pedal is depressed, is it possible to move the select lever from the "N" range to the "P" range?



AT shift lock system is normal.



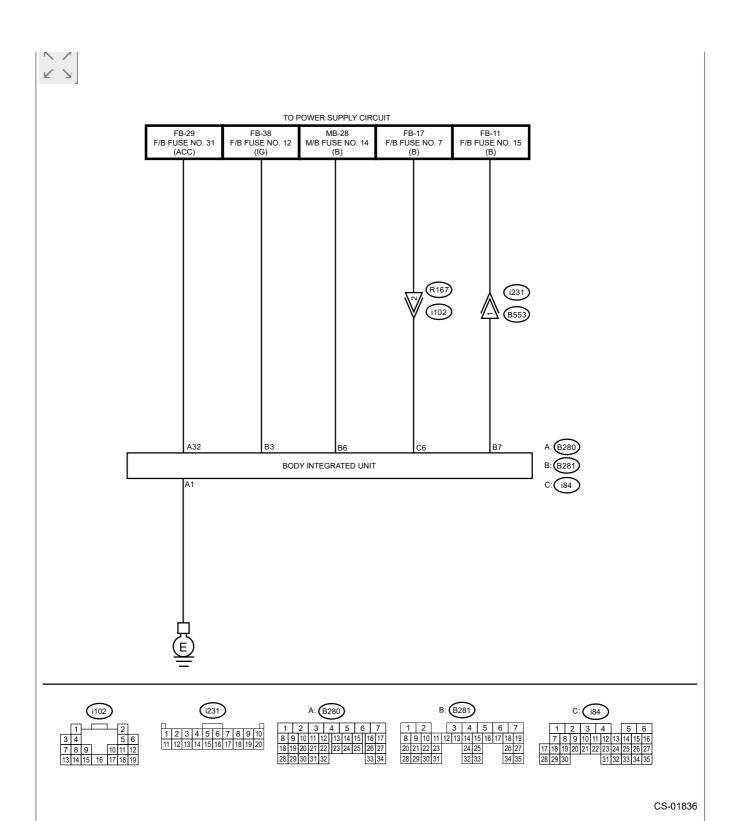
Perform the inspection of "SELECT LEVER CANNOT BE LOCKED OR RELEASED".

Ref. to CONTROL SYSTEMS>AT Shift Lock Control System>INSPECTION >
SELECT LEVER CANNOT BE LOCKED OR RELEASED.

2. BODY INTEGRATED UNIT POWER SUPPLY AND GROUND CIRCUIT

Note:

For the DC power supply circuit, refer to "WIRING DIAGRAMS". Ref. to WIRING SYSTEM>Power Supply Circuit.



1. CHECK DTC OF BODY INTEGRATED UNIT.



Check DTC of body integrated unit. Ref. to BODY CONTROL(DIAGNOSTICS)>Diagnostic Trouble Code (DTC)>OPERATION.

Is the DTC of power line displayed on body integrated unit?

Yes

Repair or replace it according to the DTC.



@ Go to 2.

2. CHECK HARNESS BETWEEN BODY INTEGRATED UNIT AND BATTERY.



- 1. Turn the ignition switch to ON.
- 2. Measure the voltage between body integrated unit and chassis ground.

Connector & terminal

```
(B281) No. 3 (+) — Chassis ground (-): (B280) No. 32 (+) — Chassis ground (-): (B281) No. 6 (+) — Chassis ground (-): (B281) No. 7 (+) — Chassis ground (-): (i84) No. 6 (+) — Chassis ground (-):
```

Is the voltage 9 - 16 V?



Go to 3.



Check harness for open circuit between the body integrated unit and the battery or a blown fuse.

3. CHECK HARNESS BETWEEN BODY INTEGRATED UNIT AND CHASSIS GROUND.



- 1. Turn the ignition switch to OFF.
- 2. Measure the harness resistance between the body integrated unit and chassis ground.

Connector & terminal

```
(B280) No. 1 — Chassis ground:
```

Is the resistance less than 1 Ω ?



Go to 4.

No

Repair the open circuit of harness between the body integrated unit and chassis ground.

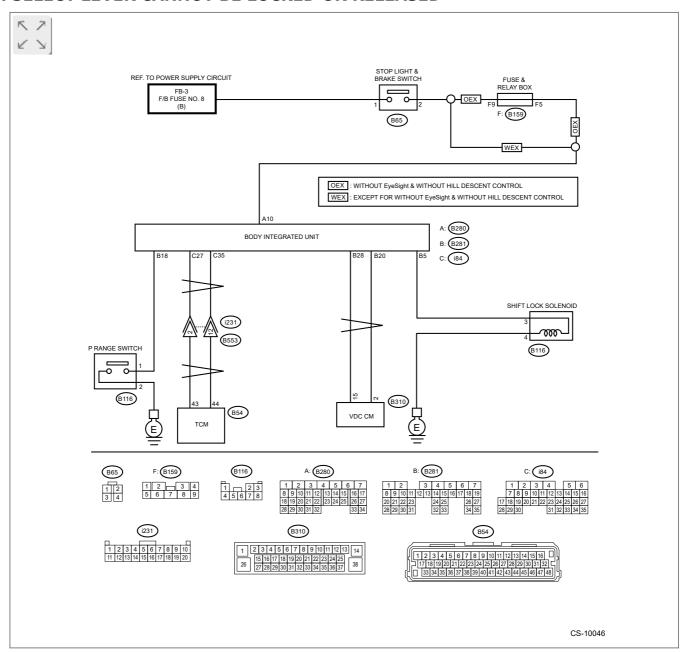
4. CHECK FOR POOR CONTACT.



Is there poor contact of connector?



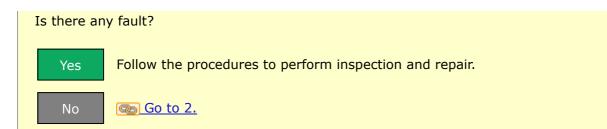
3. SELECT LEVER CANNOT BE LOCKED OR RELEASED



1. CHECK BODY INTEGRATED UNIT POWER SUPPLY AND GROUND CIRCUIT.



Ref. to CONTROL SYSTEMS>AT Shift Lock Control System>INSPECTION > BODY INTEGRATED UNIT POWER SUPPLY AND GROUND CIRCUIT.



2. CHECK CURRENT DATA.



- 1. Connect the Subaru Select Monitor.
- 2. Shift the select lever to "P" range.
- **3.** Turn the ignition switch to ON.
- **4.** Select the current data display and display P SW. Ref. to BODY CONTROL(DIAGNOSTICS)>Data Monitor>OPERATION.

Is the display {ON} in the P range and {OFF} in ranges other than P?



3. CHECK CURRENT DATA.



Select the current data display and display [Stop Light Switch]. Ref. to BODY CONTROL(DIAGNOSTICS)>Data Monitor>OPERATION.

Is {ON} displayed when the brake pedal is depressed and {OFF} displayed when the brake pedal is released?



4. CHECK BODY INTEGRATED UNIT DTC.



Check the DTC of the body integrated unit when the brake pedal is pressed and when it is released.

(Hold each condition for 5 seconds or more.)

Is there a DTC of a current malfunction?



Follow the DTC to perform inspection and repair.

5. CHECK CURRENT DATA.



Select the current data display and display [Shift lock solenoid output]. Ref. to BODY CONTROL(DIAGNOSTICS)>Data Monitor>OPERATION.

Is {ON} displayed when the brake pedal is depressed and {OFF} displayed when the brake pedal is released?



Go to 6.



Replace the body integrated unit.

6. CHECK CURRENT DATA.



Select the current data display and display Shift Position. Ref. to BODY CONTROL(DIAGNOSTICS)>Data Monitor>OPERATION.

Is the display "P" in the P range and other than "P" in ranges other than P?



Go to 7.



Check the following items.

- · Inhibitor switch
- Harness between inhibitor switch and TCM
- TCM input signal
- TCM CAN communication
- · Body integrated unit CAN receive

7. CHECK CURRENT DATA.



- 1. Select the current data display and display [Front Wheel Speed]. Ref. to BODY CONTROL(DIAGNOSTICS)>Data Monitor>OPERATION.
- 2. Start the engine.
- 3. Raise vehicle speed gradually up to approximately 20 km/h (12 MPH).

Is a figure equivalent to the speedometer being indicated?



Go to 12.

Check the following items.

- Wheel speed sensor
- · CAN communication by VDC unit
- · Body integrated unit CAN receive

Replace the wheel speed sensor, VDC unit or body integrated unit, or both.

8. CHECK HARNESS BETWEEN BODY INTEGRATED UNIT AND "P" RANGE SWITCH.



- 1. Disconnect the connector from body integrated unit.
- 2. Disconnect the connector of "P" range switch.
- **3.** Check for open circuit of harness, short circuit to battery or short circuit to ground between the body integrated unit and "P" range switch.

Connector & terminal

```
(B281) No. 18 — (B116) No. 1:
```

Is there any fault in the harness?



Repair or replace the harness between the body integrated unit and the "P" range switch.



60 to 9.

9. CHECK HARNESS BETWEEN "P" RANGE SWITCH AND CHASSIS GROUND.



Measure the resistance of harness between "P" range switch and chassis ground.

Connector & terminal

(B116) No. 2 — Chassis ground:

Is it less than 10 Ω ?



@ Go to 10.



Repair or replace the harness between the "P" range switch and chassis ground.

10. CHECK "P" RANGE SWITCH.



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

Terminals

No. 2 - No. 1:

Is it less than 10 Ω in the "P" range, and 1 M Ω or more in ranges other than "P"?



Replace the body integrated unit.



Replace the "P" range switch.

11. CHECK STOP LIGHT SWITCH INPUT SIGNAL.



- 1. Disconnect the connector from body integrated unit.
- **2.** Measure the voltage between the body integrated unit connector terminal and chassis ground.

Connector & terminal

```
(B280) No. 10 (+) — Chassis ground (-):
```

Is the voltage 9 V to 16 V when the brake pedal is depressed, and approx. 0 V when not depressed?



Replace the body integrated unit.

No

Check the stop light system.

12. CHECK SOLENOID UNIT OPERATION.



Connect the battery to the solenoid unit connector terminal, and operate the solenoid unit.

Terminals

No. 3 (+) — No. 4 (-):



Check the lock mechanism of the select lever body.



Replace the solenoid unit.

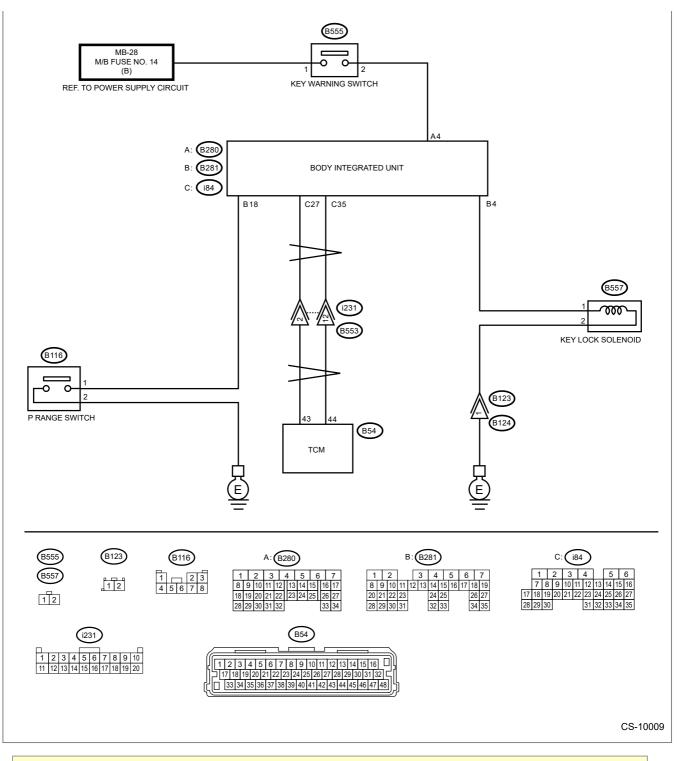
Does the solenoid unit operate normally?

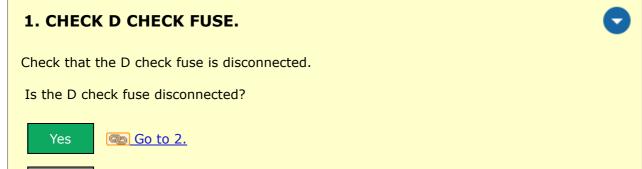
4. KEY INTERLOCK CANNOT BE LOCKED OR RELEASED

Note:

Check of this item only applies to models without a push button ignition switch.







2. CHECK BODY INTEGRATED UNIT POWER SUPPLY AND GROUND CIRCUIT.



Ref. to CONTROL SYSTEMS>AT Shift Lock Control System>INSPECTION > BODY INTEGRATED UNIT POWER SUPPLY AND GROUND CIRCUIT.

Is there any fault?



Follow the procedures to inspect and repair.



Go to 3.

3. CHECK CURRENT DATA.



- 1. Connect the Subaru Select Monitor.
- **2.** Shift the select lever to "P" range.
- **3.** Turn the ignition switch to ON.
- **4.** Select the current data display and display P SW. Ref. to BODY CONTROL(DIAGNOSTICS)>Data Monitor>OPERATION.

Is the display {ON} in the P range and {OFF} in ranges other than P?



@ Go to 4.



Go to 7.

4. CHECK CURRENT DATA.



- 1. Select the current data display and display [Key-lock Warning SW]. Ref. to BODY CONTROL(DIAGNOSTICS)>Data Monitor>OPERATION.
- **2.** Turn the ignition switch to OFF.

Does the display change in $\{ON\} \longleftrightarrow \{OFF\}$ when the key is inserted and removed?



Go to 5.



@ Go to 10.

5. CHECK CURRENT DATA.



- 1. Turn the ignition switch to ON.
- 2. Select the current data display and display Key lock solenoid output. Ref. to BODY CONTROL(DIAGNOSTICS)>Data Monitor>OPERATION.

Is the display {OFF} in the P range and {ON} in ranges other than P?



@ Go to 11.



Go to 6.

6. CHECK DTC OF BODY INTEGRATED UNIT.



- 1. Set the select lever to other than "P" range.
- 2. Check DTC of body integrated unit.

Is B1015 (key interlock circuit abnormal) a current malfunction?



Follow the DTC to perform inspection and repair.



@ Go to 11.

7. CHECK HARNESS BETWEEN BODY INTEGRATED UNIT AND "P" RANGE SWITCH.



- 1. Disconnect the connector from body integrated unit.
- 2. Disconnect the connector of "P" range switch.
- **3.** Check for open circuit of harness, short circuit to battery or short circuit to ground between the body integrated unit and "P" range switch.

Connector & terminal

(B281) No. 18 — (B116) No. 1:

Is there any fault in the harness?



Repair or replace the harness between the body integrated unit and the "P" range switch.



@ Go to 8.

8. CHECK HARNESS BETWEEN "P" RANGE SWITCH AND CHASSIS GROUND.



Measure the resistance of harness between "P" range switch and chassis ground.

Connector & terminal

(B116) No. 2 — Chassis ground:

Is it less than 10 Ω ?



Go to 9.



Repair or replace the harness between the "P" range switch and chassis ground.

9. CHECK "P" RANGE SWITCH.



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

Terminals

No. 2 - No. 1:

Is it less than 10 Ω in the "P" range, and 1 M Ω or more in ranges other than "P"?



Replace the body integrated unit.



Replace the "P" range switch.

10. CHECK HARNESS BETWEEN BATTERY AND KEY WARNING SWITCH AND BODY INTEGRATED UNIT.



- 1. Disconnect the connector from body integrated unit.
- 2. Measure the voltage between body integrated unit and chassis ground.

Connector & terminal

(B280) No. 4 (+) — Chassis ground (-):

Is the display 9 V or more when the key is inserted, and less than 1.5 V with the key removed?



Replace the body integrated unit.



Check the following items.

- Key warning switch
- Harness/fuse
- Ignition circuit

11. CHECK HARNESS BETWEEN BODY INTEGRATED UNIT AND KEY LOCK SOLENOID.



- 1. Disconnect the connector from body integrated unit.
- 2. Disconnect the connector of key lock solenoid.
- **3.** Check for open circuit of harness, short circuit to battery or short circuit to ground between the body integrated unit and key lock solenoid.

Connector & terminal

(B281) No. 4 - (B557) No. 1:

Is there any fault in the harness?



Repair or replace the harness between the body integrated unit and the key lock solenoid.



Go to 12.

12. CHECK HARNESS BETWEEN KEY LOCK SOLENOID AND CHASSIS GROUND.



Measure the resistance of harness between key lock solenoid and chassis ground.

Connector & terminal

(B557) No. 2 — Chassis ground:

Is it less than 10 Ω ?



Go to 13.



Repair or replace the harness between the key lock solenoid and chassis ground.

13. CHECK KEY LOCK SOLENOID OPERATION.



Connect the battery to the key lock solenoid connector terminal, and operate the solenoid. **Terminals**

No. 2 (+) — No. 1 (-):

Does the key lock solenoid operate normally?



@ Go to 14.

14. CHECK OUTPUT OF BODY INTEGRATED UNIT.



- 1. Connect all connectors.
- 2. Insert the key.
- **3.** Measure the voltage between body integrated unit and chassis ground.

Connector & terminal

(B281) No. 4 — Chassis ground:

Is it 7.5 to 16 V in ranges other than "P", and 0 V in the "P" range?

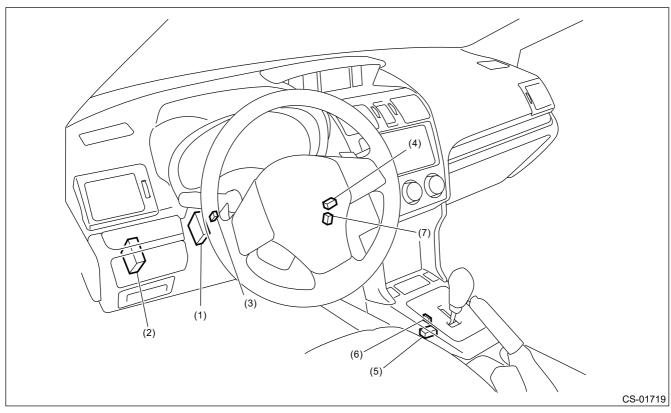


Check the lock mechanism of the steering lock body.

No

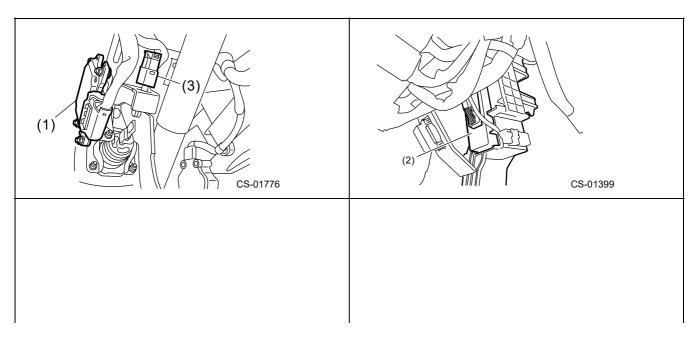
Replace the body integrated unit.

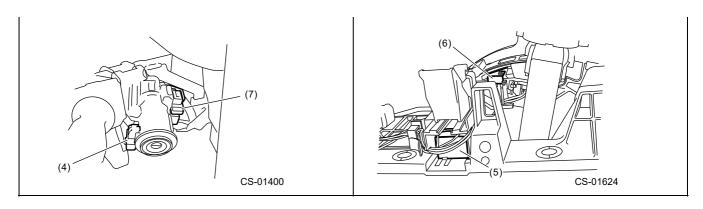
1. MODEL WITHOUT PUSH BUTTON IGNITION SWITCH



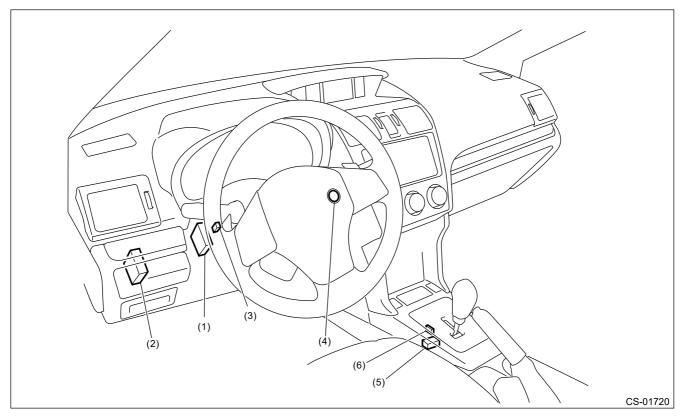
- (1) TCM ("P" range)
- (4) Key cylinder (with built-in key (6) "P" range switch warning switch)
- (2) Body integrated unit
- (5) Solenoid unit
- (7) Key lock solenoid

(3) Stop light and brake switch

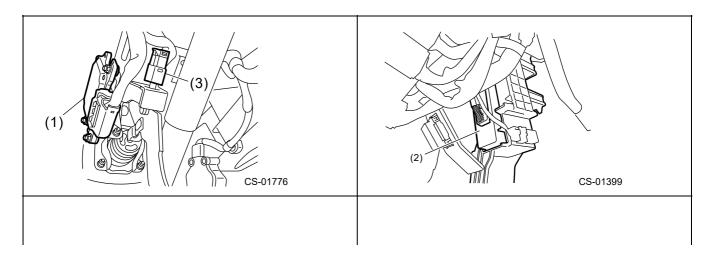


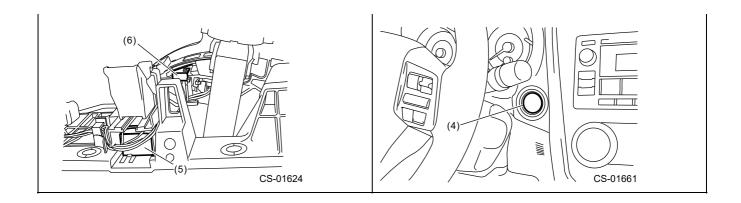


2. MODEL WITH PUSH BUTTON IGNITION SWITCH

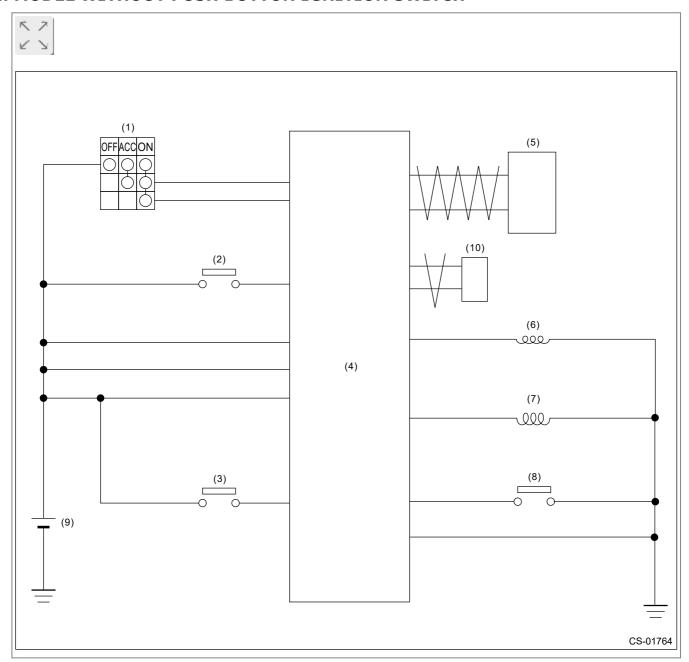


- (1) TCM ("P" range)
- (2) Body integrated unit
- (3) Stop light and brake switch
- (4) Push button ignition switch
- (5) Solenoid unit
- (6) "P" range switch





1. MODEL WITHOUT PUSH BUTTON IGNITION SWITCH



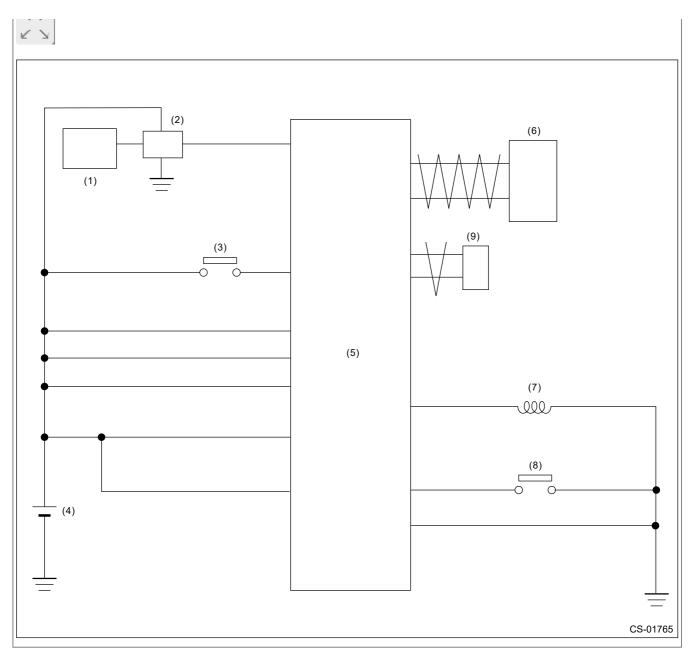
- (1) Ignition switch
- (5) TCM (shift range information)
- (9) Battery

- (2) Stop light and brake switch
- (6) Key lock solenoid
- (10) VDC CM (vehicle speed information)

- (3) Key warning switch
- (7) Shift lock solenoid
- (4) Body integrated unit
- (8) "P" range switch

2. MODEL WITH PUSH BUTTON IGNITION SWITCH





- (1) Keyless access CM
- (2) IG relay 1 (push button start)
- (3) Stop light and brake switch
- (4) Battery
- (5) Body integrated unit
- (6) TCM (shift range information)
- (7) Shift lock solenoid
- (8) "P" range switch
- (9) VDC CM (vehicle speed information)

1. CHECK SOLENOID UNIT.



Measure the resistance of solenoid unit connector terminals.

Terminals

No.
$$4 - No. 3$$
:

Is the resistance $27.6 - 30.5 \Omega$?



Go to 2.



Replace the solenoid unit. Ref. to CONTROL SYSTEMS>AT Shift Lock Solenoid and P" Range Switch.

2. CHECK SOLENOID UNIT.



Connect the battery to the solenoid unit connector terminals, and then operate the solenoid.

Terminals

No.
$$3(+)$$
 — No. $4(-)$:

Does the solenoid unit operate normally?



Go to 3.



Replace the solenoid unit. Ref. to CONTROL SYSTEMS>AT Shift Lock Solenoid and "P" Range Switch.

3. CHECK "P" RANGE SWITCH.



- **1.** Shift the select lever to "P" range.
- **2.** Measure the resistance between "P" range switch connector terminals.

Terminals

No.
$$1 - No. 2$$
:

Is the resistance less than 1 Ω ?



Go to 4.

Replace the "P" range switch. Ref. to CONTROL SYSTEMS>AT Shift Lock Solenoid and "P" Range Switch.

4. CHECK "P" RANGE SWITCH.



- 1. Set the select lever to other than "P" range.
- **2.** Measure the resistance between "P" range switch connector terminals.

Terminals

No. 1 - No. 2:

Is the resistance 1 $M\Omega$ or more?



Normal.



Replace the "P" range switch. Ref. to CONTROL SYSTEMS>AT Shift Lock Solenoid and "P" Range Switch.

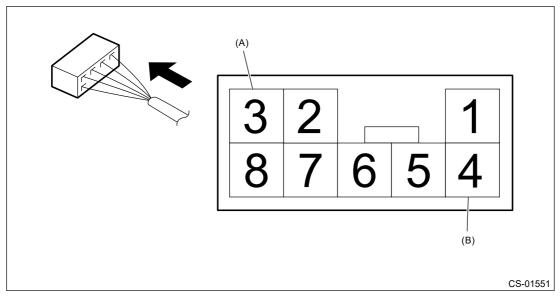
CONTROL SYSTEMS > AT Shift Lock Solenoid and "P" Range Switch

INSTALLATION

Install in the reverse order of removal.

Note:

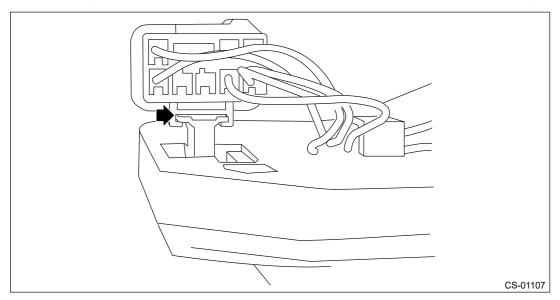
Insert the solenoid unit terminals to the harness connector.



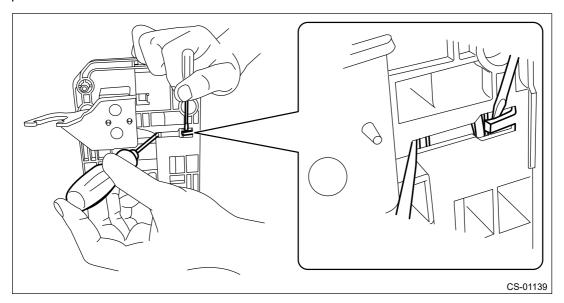
- (A) Solenoid unit (color code: blue)
- (B) Solenoid unit (color code: black)

1. SOLENOID UNIT

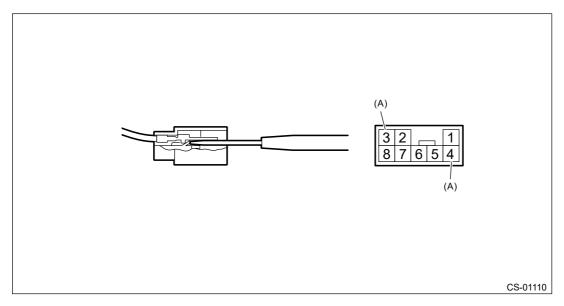
- 1. Remove the AT select lever. Ref. to CONTROL SYSTEMS>Select Lever>REMOVAL.
- 2. Remove the spacer and gasket. Ref. to CONTROL SYSTEMS>Select Lever>DISASSEMBLY.
- 3. Using a flat tip screwdriver with a thin tip, remove the harness connector from the plate COMPL.



4. Raise the claw using a flat tip screwdriver with a thin tip, and remove the solenoid unit from the plate COMPL.



5. Using a flat tip screwdriver with a thin tip, remove the solenoid unit terminals from the harness connector.



(A) Solenoid unit terminals

2. "P" RANGE SWITCH

For the removal of "P" range switch, refer to the procedure for AT select lever. Ref. to CONTROL SYSTEMS>Select Lever>DISASSEMBLY.

CONTROL SYSTEMS > Body Integrated Unit

NOTE

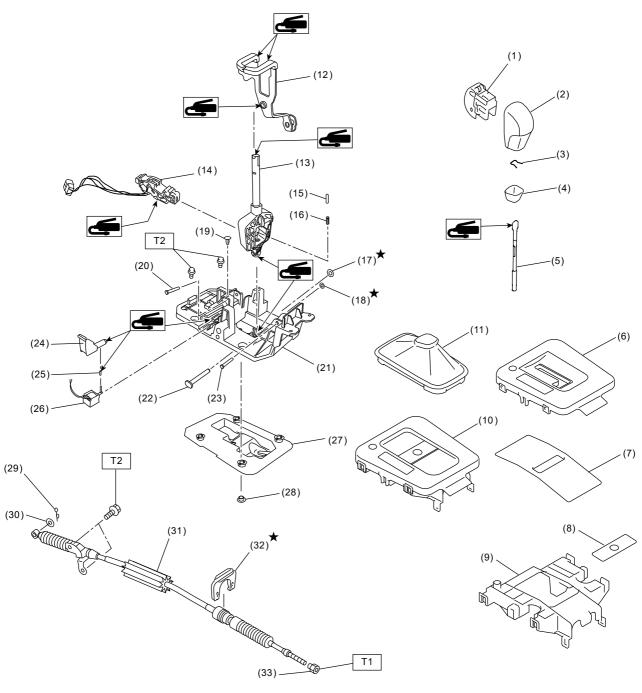
Refer to "Body Integrated Unit" for removal and installation procedure. Ref. to SECURITY AND LOCKS>Body Integrated Unit.

CONTROL SYSTEMS > General Description

CAUTION

- Wear appropriate work clothing, including a cap, protective goggles and protective shoes when performing any work.
- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust and dirt.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
- Use SUBARU genuine fluid, grease etc. or equivalent. Do not mix fluid, grease, etc. of different grades or manufacturers.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or rigid racks at the specified points.
- Apply grease onto sliding or revolving surfaces before installation.
- Before installing O-rings or snap rings, apply sufficient amount of fluid to avoid damage and deformation.
- Before securing a part in a vise, place cushioning material such as wood blocks, aluminum plate or cloth between the part and the vise.
- Before disconnecting electrical connectors, be sure to disconnect the negative terminal from battery.

1. AT SELECT LEVER

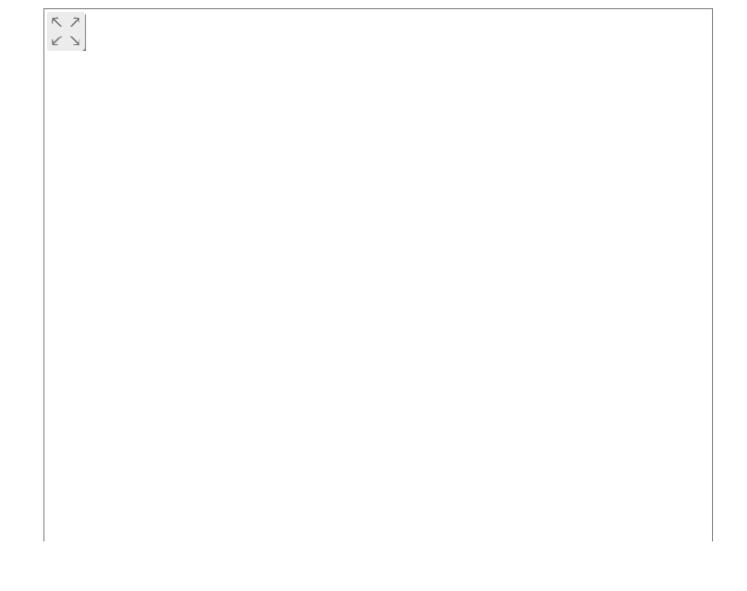


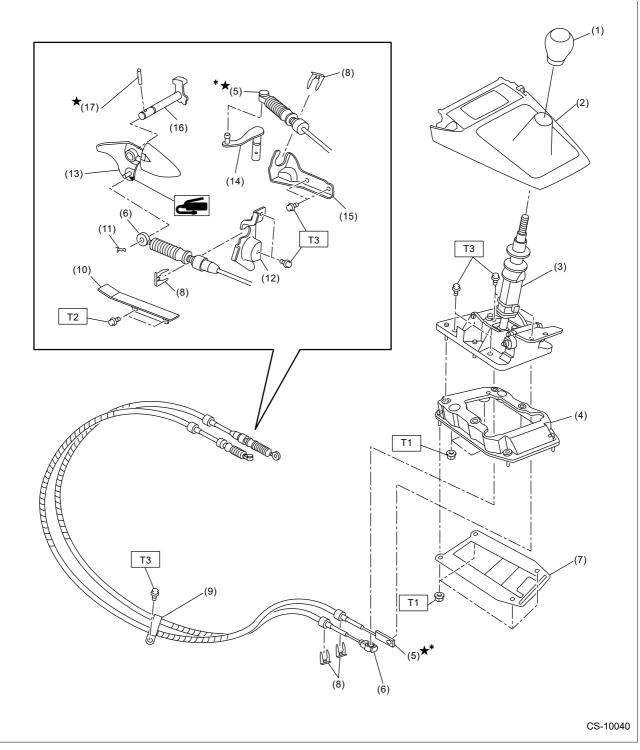
CS-01862

- (1) Button ASSY-AT
- (2) Grip sub ASSY
- (3) Clamp grip pin
- (14) Plate guide
- (15) Rod detent
- (16) Detent spring
- (27) Gasket
- (28) Spacer plate
- (29) Snap pin

(4)	Cover grip AT (model with gate shifter)	(17)	Clamp push nut	(30) Washer
(5)	Rod COMPL	(18)	Clamp push nut	(31) Select cable
(6)	Indicator cover (model with gate shifter)	(19)	Clamp pin	(32) Clamp
(7)	Blind A (model with gate shifter)	(20)	Spacer pin guide	(33) Nut
(8)	Blind B (model with gate shifter)	(21)	Plate COMPL	
(9)	Housing (model with gate shifter)	(22)	Shaft control	Tightening torque: N·m (kgf-m, ft-lb)
(10)	Indicator ASSY (model with boot shifter)	(23)	Spacer pin guide	T1: 7.5 (0.8, 5.5)
(11)		(24)	Rod shift lock	T2: 18 (1.8, 13.3)
	shifter)			
(12)		(25)	Cushion solenoid	
	•		Cushion solenoid Solenoid unit	

2. 6MT GEAR SHIFT LEVER





- (1) Shift knob
- (2) Cover shift lever
- (3) Gear shift lever ASSY
- (4) Cable cover ASSY
- (5) MT gear select cable
- (6) MT gear shift cable
- (7) Cable cover plate

- (9) Cable clamp
- (10) Dust cover
- (11) Snap pin
- (12) Shift bracket
- (13) Shift lever COMPL
- (14) Selector lever COMPL
- (15) Select bracket

(17) Spring pin

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)

(8) Clamp (16) Shifter arm No. 2

*: Always use new MT gear select cable if the cable is removed from select lever COMPL of transmission side.

PREPARATION TOOL

1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
	— (Newly adopted	SUBARU SELECT	Used for setting of each function and troubleshooting for electrical system.
SSM	tool)	MONITOR 4	Note: For detailed operation procedures of Subaru Select Monitor 4, refer to "Application help".

2. GENERAL TOOL

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance, voltage and current.
DST-i	Used together with Subaru Select Monitor 4.

CONTROL SYSTEMS > General Diagnostic Table

INSPECTION

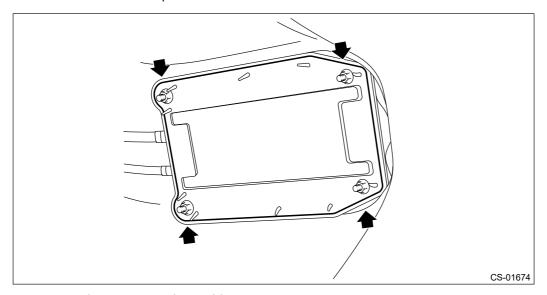
Symptoms	Possible cause	Corrective action	
AT select lever	Starter does not run.	Adjust the select cable and inhibitor switch, or inspect the circuit.	
	Back-up light does not illuminate.	Adjust the select cable and inhibitor switch, or inspect the circuit.	
	AT shift lock system does not operate normally.	Adjust the select cable and inhibitor switch, or inspect the circuit.	
	Will not change to manual mode or L mode.	Inspect the mode switch and select lever, or inspect the circuit.	
	Up-shift is not engaged at manual mode.	Check the shift-up switch and circuit.	
	Down-shift is not engaged at manual mode.	Check the shift-down switch and circuit.	
MT gear shift lever	Cannot shift into reverse.	Adjust the MT gear select cable.	
	Shifted to 6th though it shifted to reverse.	Adjust or replace the MT gear select cable.	
	Can shift into reverse when the slider is not pulled up.	Adjust or replace the MT gear select cable.	
	Slider cannot be pulled up or sticks in the pulled-up position.	 Check the shift link system of the transmission. Adjust or replace the MT gear select cable. 	

ADJUSTMENT

Note:

Two persons are required to perform the MT gear select cable adjustment. (Only the step 7) requires two workers.)

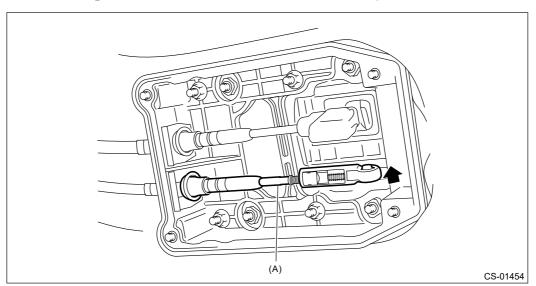
- 1. Shift the select lever to the 6th.
- 2. Remove the cable cover plate.



3. Disconnect the MT gear select cable.

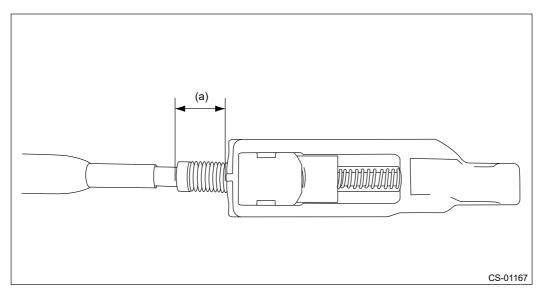
Note:

Push the MT gear select cable in the direction of arrow, and remove it.



(A) MT gear select cable

4. Measure the exposed length (a) of MT gear select cable.



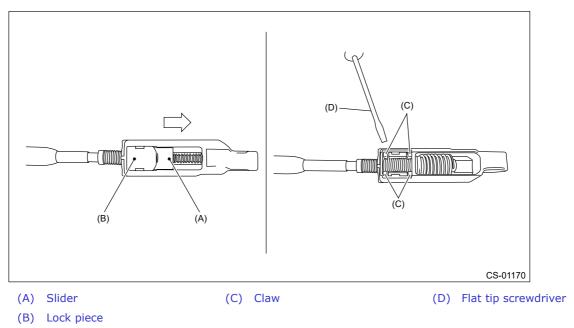
- (a) Measurement value
- **5.** Slide the slider (green) in the direction of the arrow and release the lock piece (pink) by using flat tip screwdriver etc.

Caution:

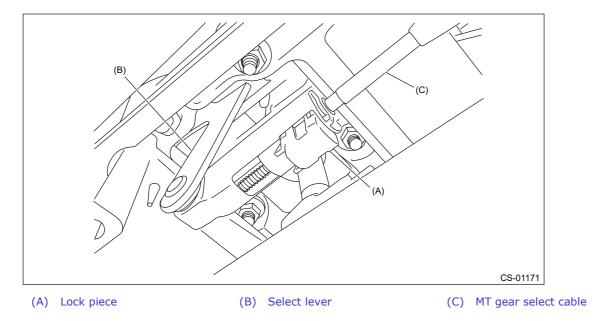
Lock piece is easily damaged for the resin. When the lock piece is broken, replace the new MT gear select cable.

Note:

Rotate the MT gear select cable to 180 degrees, slide the slider in the direction of the arrow and push the claw of lock piece.



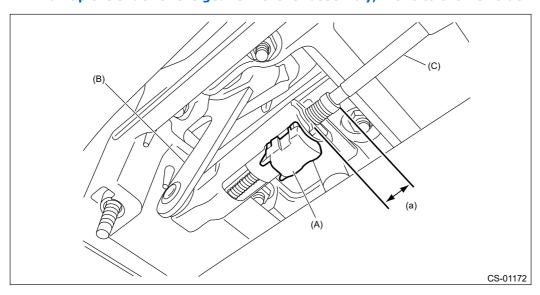
6. Connect the MT gear select cable to the select lever, with the lock piece released.



7. Move the select lever to the Rev side, keep the exposed length (a) of MT gear select cable to 11 mm (0.4 in), and push the lock piece.

Note:

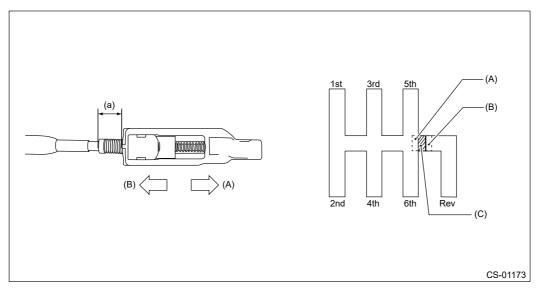
Pull up the slider of the gear shift lever assembly, move to the Rev side.



- (a) Exposed length 11 mm (0.4 in)
- (A) Lock piece

- (B) Select lever
- (C) MT gear select cable

- **8.** Shift to 5th \longleftrightarrow 6th and Rev, and check for stuck.
- **9.** If no fault is found in the shift and select operation, restore the vehicle.
- **10.** If the shifting operation is not smooth, readjust the exposed length (a) of MT gear select cable by referring to the following figure.



- (a) Exposed length of MT gear select cable
- (A) Extend direction of exposed length of MT gear select cable
- (B) Shorten direction of exposed length of MT gear select cable
- (C) Specification of exposed length (a)
- If the shift cannot be inserted to push the reverse lock bracket 5th and 6th.
- ⇒ Extend the exposed length (a) of MT gear select cable.
 - When operate the select lever to 4th \rightarrow 5th, it cannot be operated at select lever crank line.
- ⇒ Shorten the exposed length (a) of MT gear select cable.

Note:

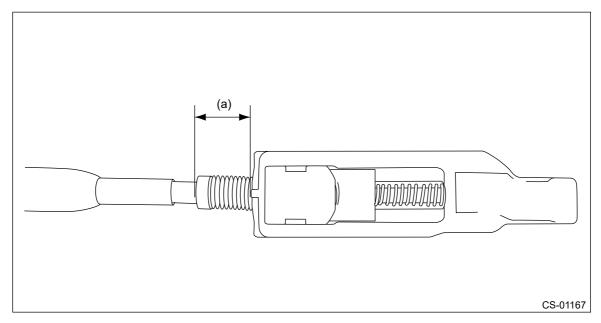
If it cannot adjust, replace the MT gear select cable.

CONTROL SYSTEMS > MT Gear Select Cable

INSPECTION

1. Check that exposed length (a) of MT gear select cable is within specification. Exposed length (a) of MT gear select cable:

Specification: 11 mm (0.4 in)



2. If it is not within the specification, perform the adjustment. Ref. to CONTROL SYSTEMS>MT Gear Select Cable>ADJUSTMENT.

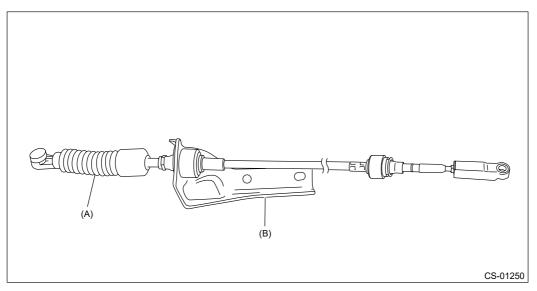
INSTALLATION

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 sharply.
- Do not twist the inner cable excessively.
- 1. Remove the MT gear select cable from the select bracket.

Caution

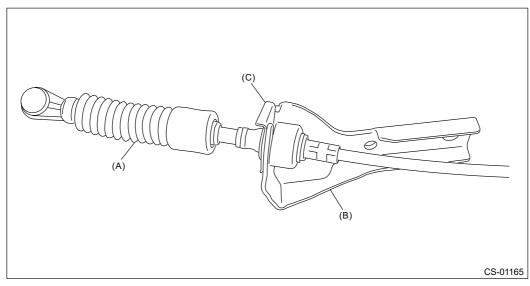
Check for assembling position before removing the MT gear select cable from the select bracket.



- (A) MT gear select cable
- (B) Select bracket
- 2. Set to the new MT gear select cable to the select bracket and secure it with the clamp.

 Caution:

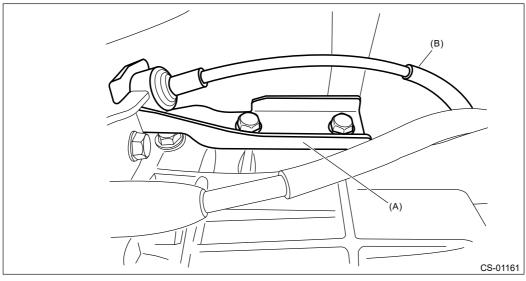
Be careful not to mistake the MT gear select cable installing direction.



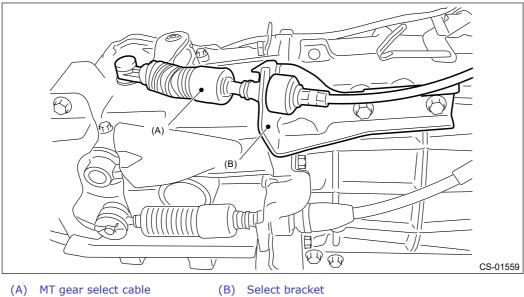
- (A) MT gear select cable
- (B) Select bracket
- (C) Clamp

3. Install the MT gear select cable and select bracket as a single unit to the transmission body. **Tightening torque:**

18 N·m (1.8 kgf-m, 13.3 ft-lb)

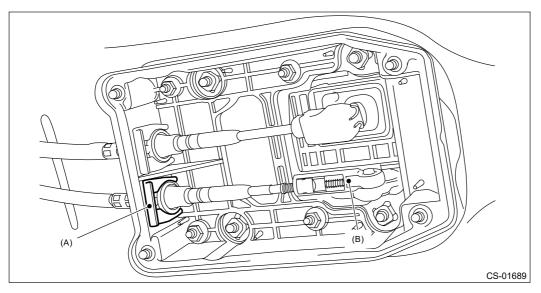


- (A) Select bracket
- (B) MT gear select cable
- 4. Install the MT gear select cable to the select lever COMPL.



- (A) MT gear select cable

5. Insert the MT gear select cable into cable cover assembly, and secure it with the clamp.

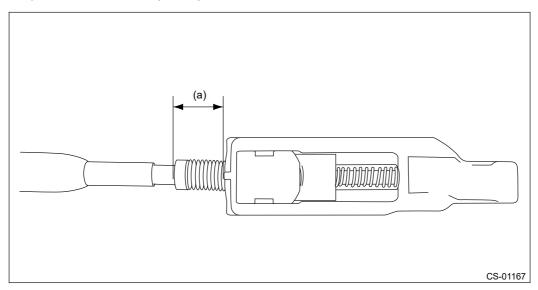


(A) Clamp

(B) MT gear select cable

6. Measure the exposed length (a) of MT gear select cable. If the value is out of specification, adjust the MT gear select cable. Ref. to CONTROL SYSTEMS>MT Gear Select Cable>ADJUSTMENT.
Exposed length (a) of MT gear select cable:

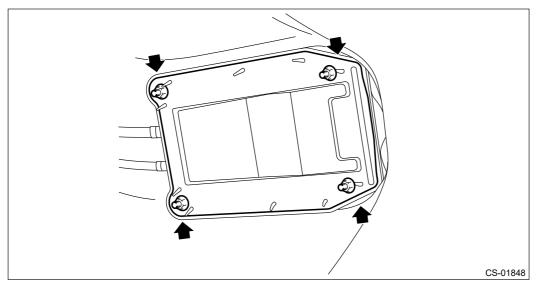
Specification: 11 mm (0.4 in)



- 7. Connect the MT gear select cable.
- 8. Attach the cable cover plate.

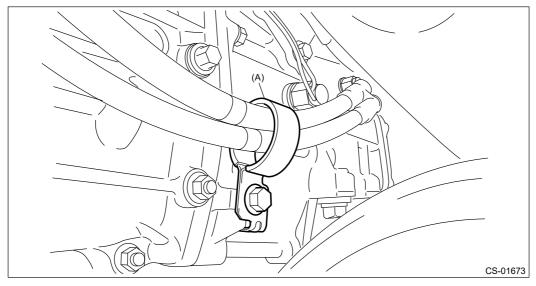
Tightening torque:

7.5 N·m (0.8 kgf-m, 5.5 ft-lb)



9. Insert the MT gear select cable into cable clamp, and install to the transmission. **Tightening torque:**

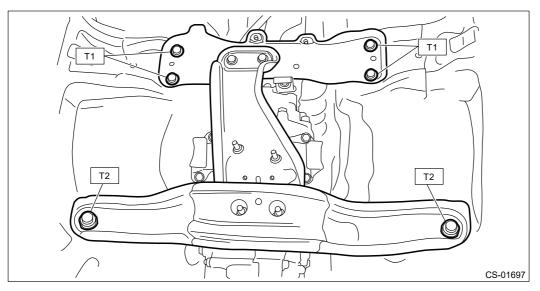
18 N·m (1.8 kgf-m, 13.3 ft-lb)



(A) Cable clamp

10. Raise the transmission jack, install the front crossmember and rear crossmember.
Tightening torque:

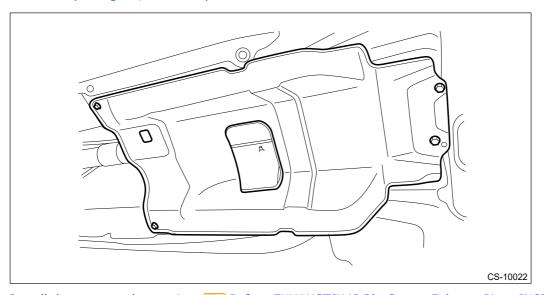
T1: 70 N·m (7.1 kgf-m, 51.6 ft-lb) T2: 140 N·m (14.3 kgf-m, 103.3 ft-lb)



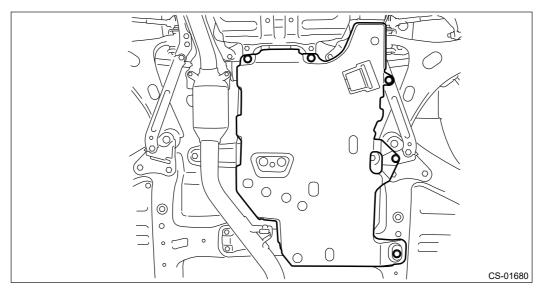
- **11.** Take out the transmission jack.
- 12. Install the propeller shaft. Ref. to DRIVE SHAFT SYSTEM>Propeller Shaft>INSTALLATION.
- 13. Install the center exhaust cover.

Tightening torque:

18 N·m (1.8 kgf-m, 13.3 ft-lb)



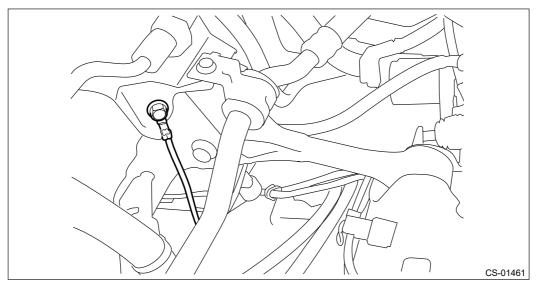
- 14. Install the center exhaust pipe. Ref. to EXHAUST(H4DO)>Center Exhaust Pipe>INSTALLATION.
- 15. Install the transmission under cover.



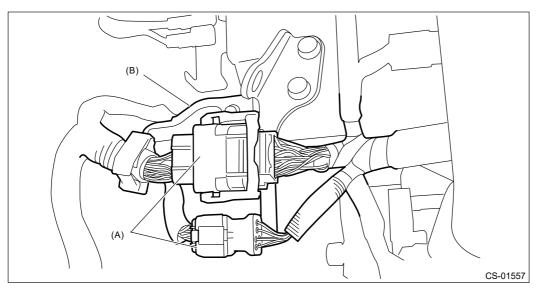
- 16. Lower the vehicle.
- 17. Install the pitching stopper. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Transmission Mounting System>INSTALLATION > PITCHING STOPPER.
- 18. Install the transmission radio ground cord terminal.

Tightening torque:

13 N·m (1.3 kgf-m, 9.6 ft-lb)



19. Connect the engine harness connector, then attach the harness bracket.



- (A) Engine harness connectors
- (B) Harness bracket
- 20. Install the air intake boot. Ref. to INTAKE (INDUCTION)(H4DO)>Air Intake Boot>INSTALLATION.
- **21.** Connect the battery ground terminal.
- **22.** Make sure the gears can be shifted accurately into each gear.

REMOVAL

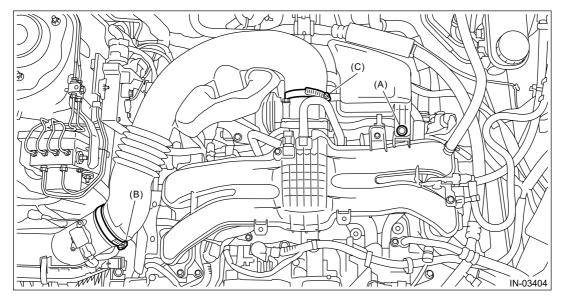
Caution:

Always use new MT gear select cable if the cable is removed from selector lever COMPL of transmission side.

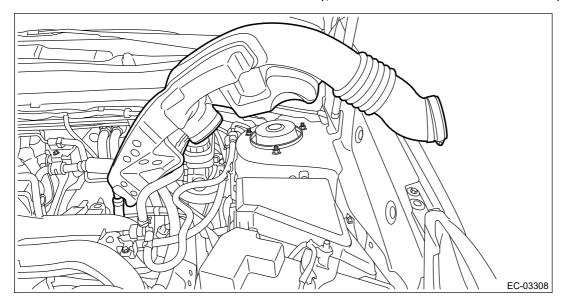
1. Disconnect the ground cable from battery. Ref. to NOTE>NOTE > BATTERY.

For model with battery sensor, disconnect the ground terminal from battery sensor.

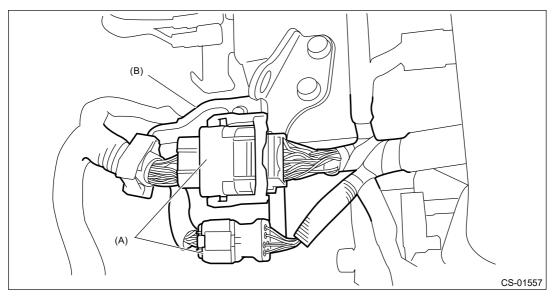
- 2. Remove the clip (A) from the air intake boot.
- **3.** Loosen the clamp (B) connecting the air intake boot and air cleaner case (rear).
- 4. Loosen the clamp (C) which connects the air intake boot and throttle body.



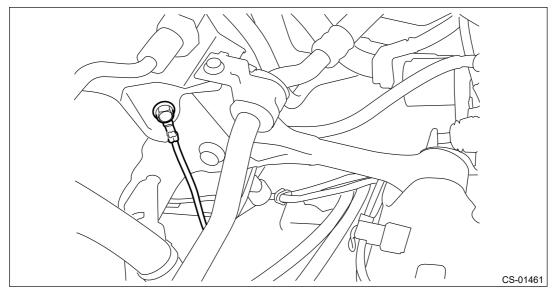
5. Remove the air intake boot from the throttle body, and move it to the left side wheel apron.



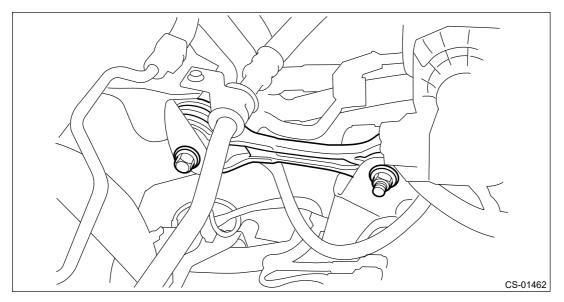
6. Disconnect the engine harness connectors, then remove the harness bracket.



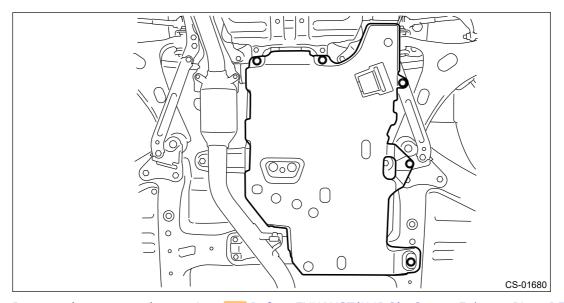
- (A) Engine harness connectors
- (B) Harness bracket
- **7.** Disconnect the transmission radio ground cord terminal.



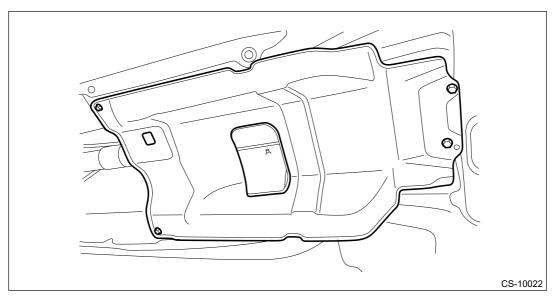
8. Remove the pitching stopper.



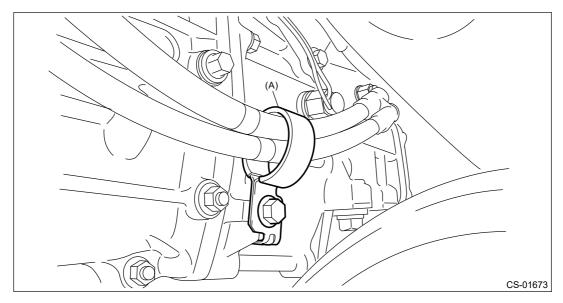
- 9. Lift up the vehicle.
- 10. Remove the transmission under cover.



- 11. Remove the center exhaust pipe. Ref. to EXHAUST(H4DO)>Center Exhaust Pipe>REMOVAL.
- **12.** Remove the center exhaust cover.

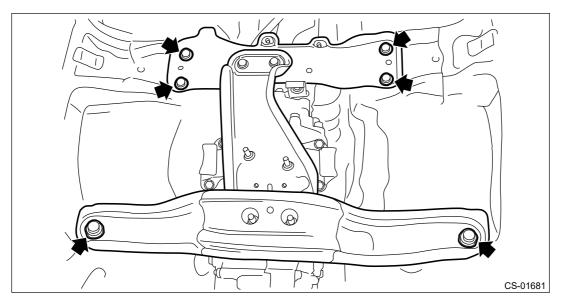


- 13. Remove the propeller shaft. <a> Ref. to DRIVE SHAFT SYSTEM>Propeller Shaft>REMOVAL.
- 14. Remove the cable clamp and take out the MT gear select cable from the clamp.



(A) Cable clamp

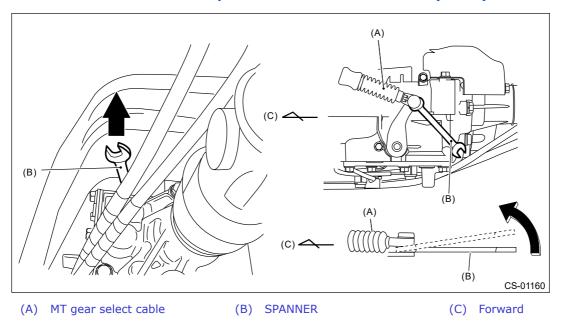
- **15.** Place the transmission jack under the transmission.
- **16.** Remove the mounting bolt of front crossmember and rear crossmember, and lower the transmission approx. 100 mm (4 in).



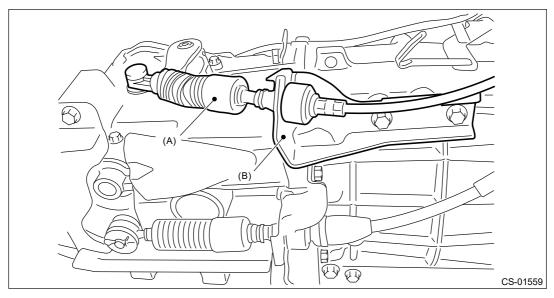
17. Insert a spanner between the selector lever COMPL and the MT gear select cable, and remove the MT gear select cable by raising the handle.

Note:

- Use a spanner with 11 to 13 in size.
- The thickness of the spanner must not exceed 6 mm (0.2 in).

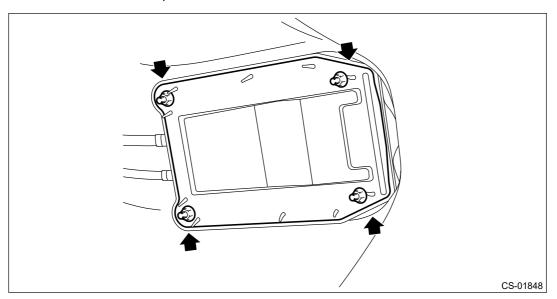


18. Remove the MT gear select cable and select bracket as a single unit from the transmission body.



- (A) MT gear select cable
- (B) Select bracket

19. Remove the cable cover plate.



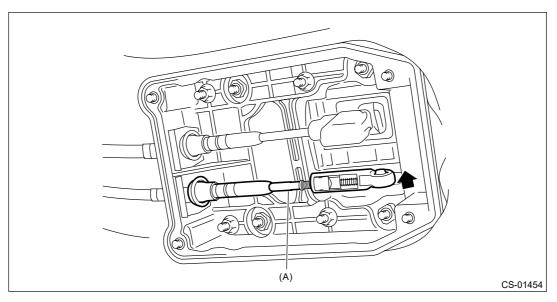
20. Disconnect the MT gear select cable.

Caution:

Be careful not to deform the cable inner.

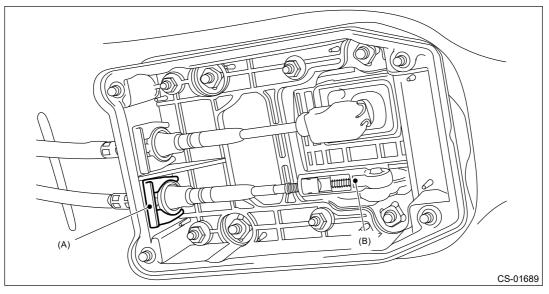
Note:

Push the MT gear select cable in the direction of arrow, and remove it.



(A) MT gear select cable

21. Remove the clamp which holds the MT gear select cable.



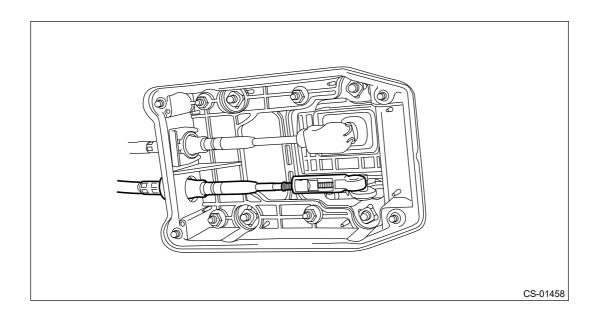
(A) Clamp

(B) MT gear select cable

22. Pull out the MT gear select cable from cable cover assembly.

Caution:

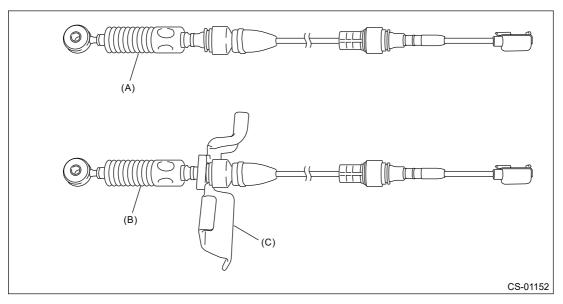
Do not bend the MT gear select cable sharply.



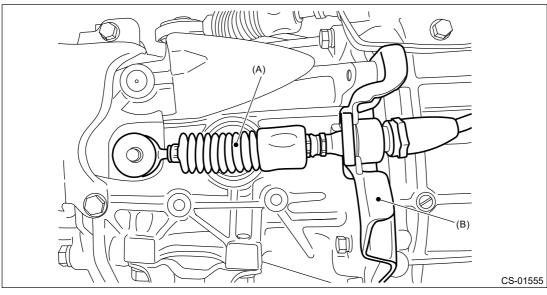
INSTALLATION

Caution:

- Do not bend MT gear shift cable at a sharp angle.
- When replacing the new MT gear shift cable, secure it to shift bracket with the clamps, be careful not to mistake the installing direction.



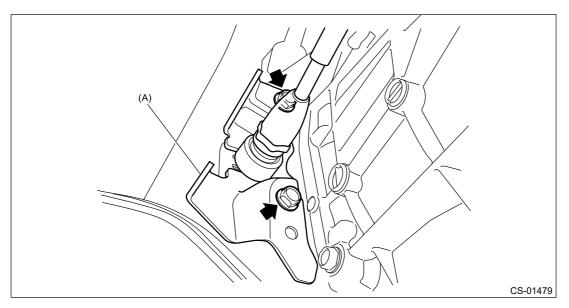
- (A) Old MT gear shift cable
- (B) New MT gear shift cable
- (C) Shift bracket
- 1. Install the MT gear shift cable and shift bracket as a single unit onto transmission.



- (A) MT gear shift cable
- (B) Shift bracket
- 2. Tighten the shift bracket with specified torque.

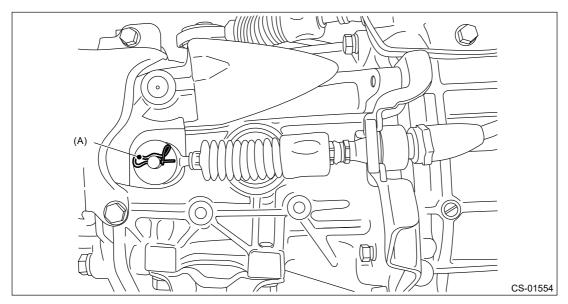
Tightening torque:

18 N·m (1.8 kgf-m, 13.3 ft-lb)



(A) Shift bracket

3. Install the snap pin to the shift lever COMPL.

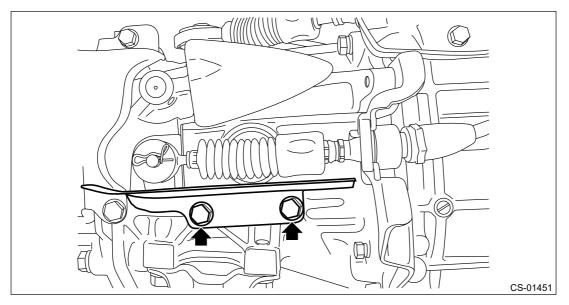


(A) Snap pin

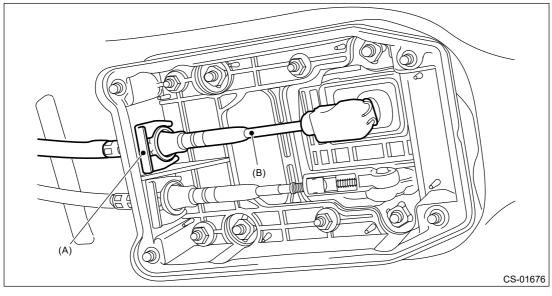
4. Install the dust cover to the transmission body.

Tightening torque:

15 N·m (1.5 kgf-m, 11.1 ft-lb)



5. Insert the MT gear shift cable into cable cover assembly, and secure it with the clamp.



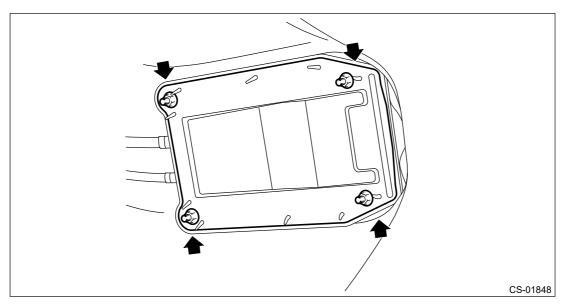
(A) Clamp

(B) MT gear shift cable

- **6.** Connect the MT gear shift cable.
- 7. Attach the cable cover plate.

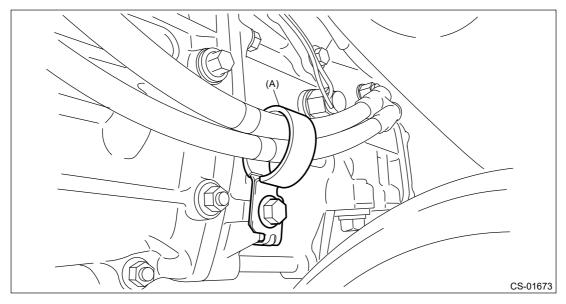
Tightening torque:

7.5 N·m (0.8 kgf-m, 5.5 ft-lb)



8. Insert the MT gear shift cable into cable clamp, and install to the transmission. Tightening torque:

18 N·m (1.8 kgf-m, 13.3 ft-lb)

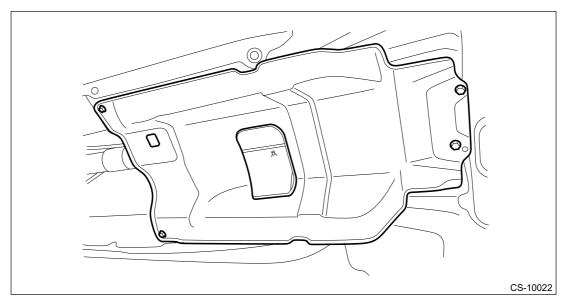


(A) Cable clamp

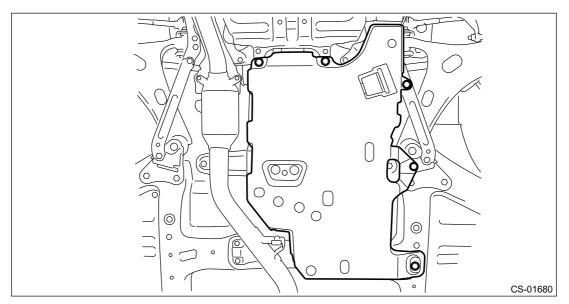
9. Install the center exhaust cover.

Tightening torque:

18 N·m (1.8 kgf-m, 13.3 ft-lb)



- 10. Install the center exhaust pipe. Ref. to EXHAUST(H4DO)>Center Exhaust Pipe>INSTALLATION.
- 11. Install the transmission under cover.



- 12. Lower the vehicle.
- 13. Connect the battery ground terminal.
- 14. Make sure the gears can be shifted accurately into each gear.

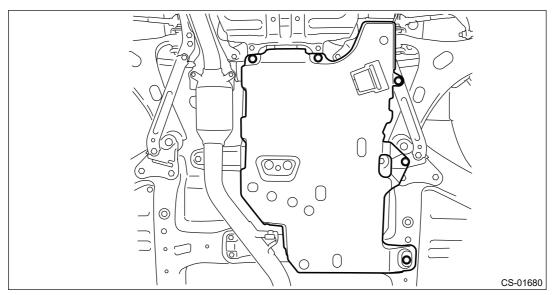
CONTROL SYSTEMS > MT Gear Shift Cable

REMOVAL

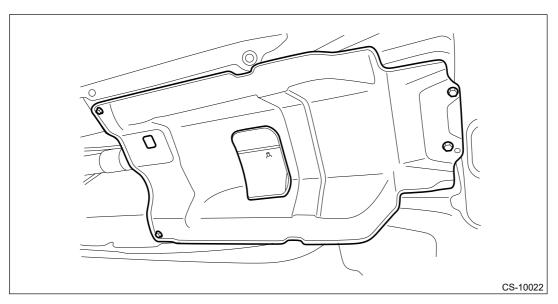
1. Disconnect the ground cable from battery. Ref. to NOTE > BATTERY.

For model with battery sensor, disconnect the ground terminal from battery sensor.

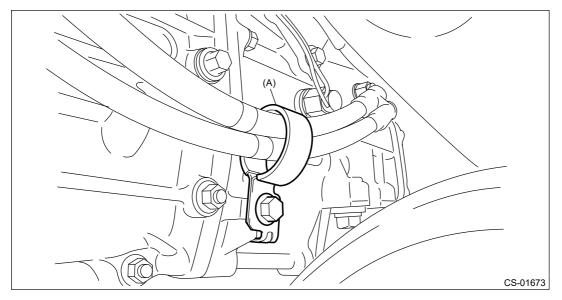
- 2. Lift up the vehicle.
- 3. Remove the transmission under cover.



- 4. Remove the center exhaust pipe. Ref. to EXHAUST(H4DO)>Center Exhaust Pipe>REMOVAL.
- 5. Remove the center exhaust cover.

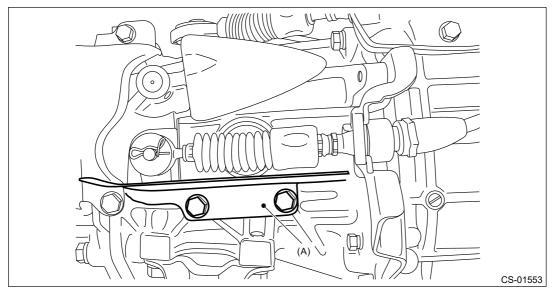


6. Remove the cable clamp and take out the MT gear shift cable from the clamp.



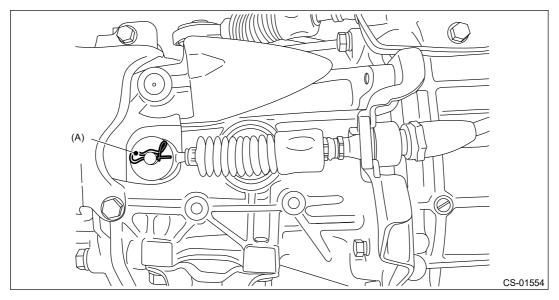
(A) Cable clamp

7. Remove the dust cover from transmission body.



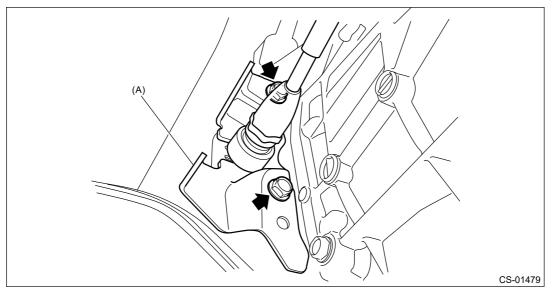
(A) Dust cover

8. Remove the snap pin from the shift lever COMPL.



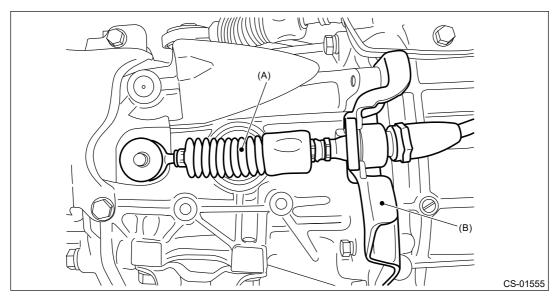
(A) Snap pin

9. Remove the bolts holding the shift bracket.

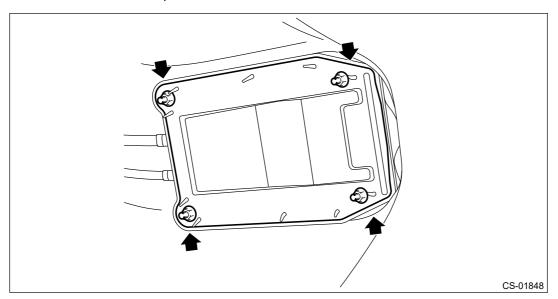


(A) Shift bracket

10. Remove the shift bracket and MT gear shift cable as a single unit from the transmission body.



- (A) MT gear shift cable
- (B) Shift bracket
- 11. Remove the cable cover plate.



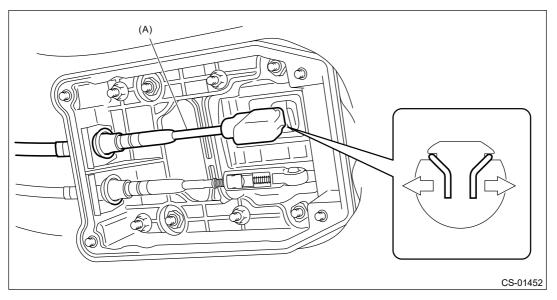
12. Disconnect the MT gear shift cable.

Caution:

Be careful not to deform the cable inner.

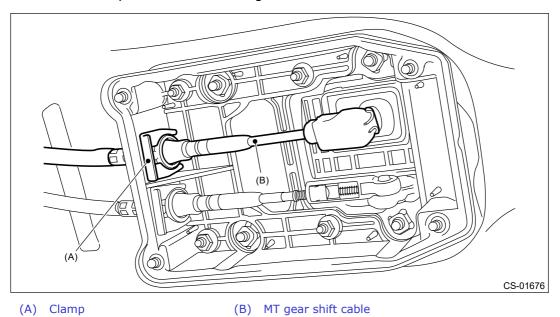
Note:

Pull out down the MT gear shift cable to spread the spring.

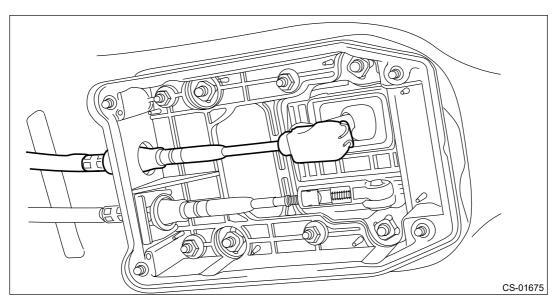


(A) MT gear shift cable

13. Remove the clamp which holds the MT gear shift cable.



14. Pull out the MT gear shift cable from cable cover assembly.



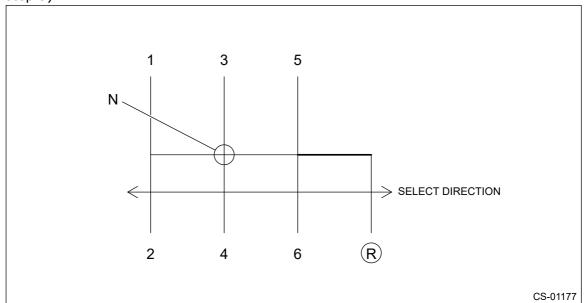
Caution:

- Do not bend MT gear shift cable at a sharp angle.
- Do not twist the cable inner excessively.

CONTROL SYSTEMS > MT Gear Shift Lever

INSPECTION

- 1. Check the parts for deformation, damage and wear. Repair or replace if necessary. Compare the removed parts with new parts to confirm if there are damages or not.
- **2.** Check that selecting to the reverse direction is disable unless the slider is pulled up.
- 3. Check that selecting to the reverse direction is possible when the slider is pulled up to the full.
- **4.** Check that the shift lever moves to initial position, when the slider backs to "N" position from step 3).



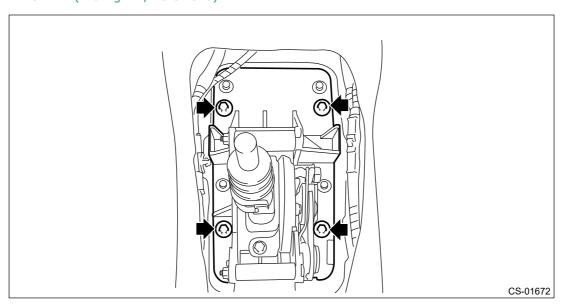
CONTROL SYSTEMS > MT Gear Shift Lever

INSTALLATION

1. Install the gear shift lever assembly.

Tightening torque:

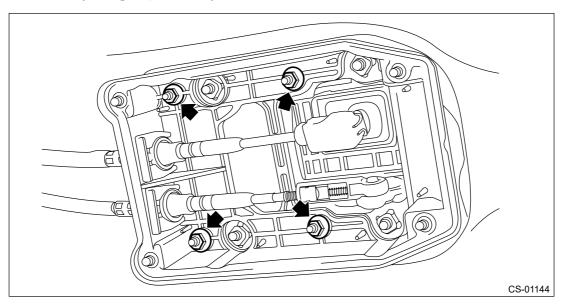
18 N·m (1.8 kgf-m, 13.3 ft-lb)



- 2. Install the harness clamp.
- 3. Lift up the vehicle.
- 4. Install the cable cover assembly.

Tightening torque:

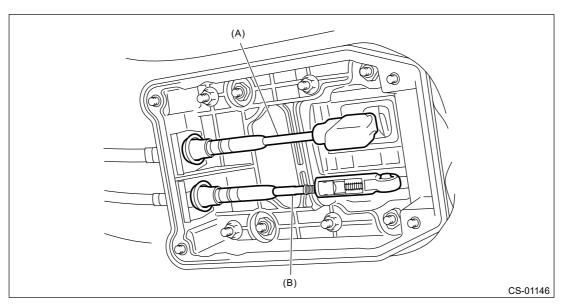
7.5 N·m (0.8 kgf-m, 5.5 ft-lb)



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

Caution:

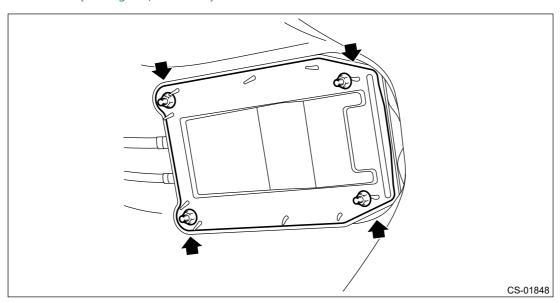
Be careful not to deform the cable inner.



- (A) MT gear shift cable
- (B) MT gear select cable
- 6. Attach the cable cover plate.

Tightening torque:

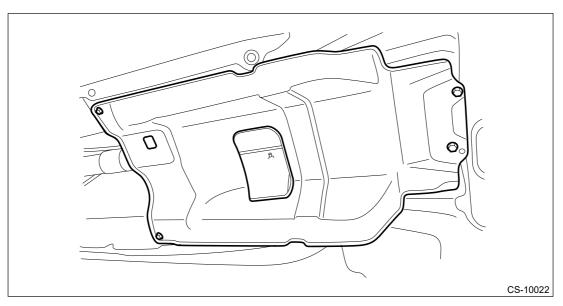
7.5 N·m (0.8 kgf-m, 5.5 ft-lb)



7. Install the center exhaust cover.

Tightening torque:

18 N·m (1.8 kgf-m, 13.3 ft-lb)



- 8. Install the center exhaust pipe. Ref. to EXHAUST(H4DO)>Center Exhaust Pipe>INSTALLATION.
- **9.** Lower the vehicle.
- **10.** Install the panel center LWR LH and RH. Ref. to EXTERIOR/INTERIOR TRIM>Console Box>INSTALLATION.
- **11.** Install the console box assembly. Ref. to EXTERIOR/INTERIOR TRIM>Console Box>INSTALLATION.
- 12. Install the cover shift lever, and install the gear shift knob. Ref. to EXTERIOR/INTERIOR TRIM>Console Box>INSTALLATION.
- **13.** Install the ornament panel consoles LH and RH. Ref. to EXTERIOR/INTERIOR TRIM>Console Box>INSTALLATION.
- **14.** Make sure the gears can be shifted accurately into each gear. Adjust the MT gear select lever, if the gears cannot be shifted correctly. Ref. to CONTROL SYSTEMS>MT Gear Select Cable>ADJUSTMENT.
- **15.** Connect the battery ground terminal.

CONTROL SYSTEMS > MT Gear Shift Lever

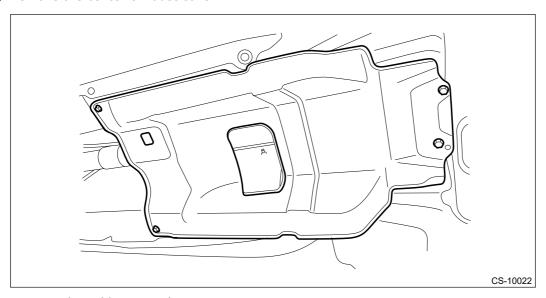
REMOVAL

1. Disconnect the ground cable from battery. Ref. to NOTE>NOTE > BATTERY.

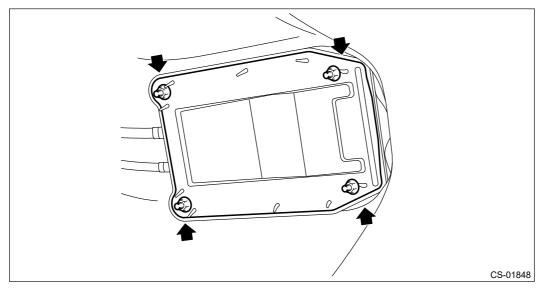
Note:

For model with battery sensor, disconnect the ground terminal from battery sensor.

- 2. Lift up the vehicle.
- 3. Remove the center exhaust pipe. <a>Ref. to EXHAUST(H4DO)>Center Exhaust Pipe>REMOVAL.
- 4. Remove the center exhaust cover.



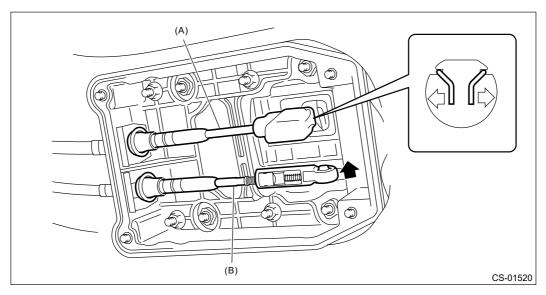
5. Remove the cable cover plate.



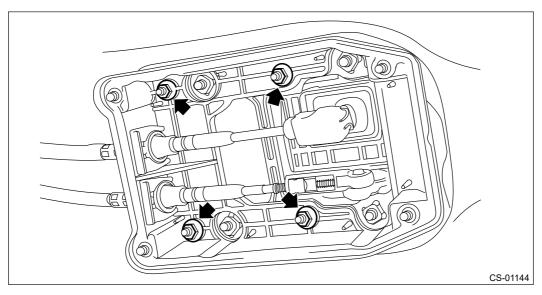
6. Disconnect the MT gear shift cable and MT gear select cable from the gear shift lever assembly. **Caution:**

Be careful not to deform the cable inner.

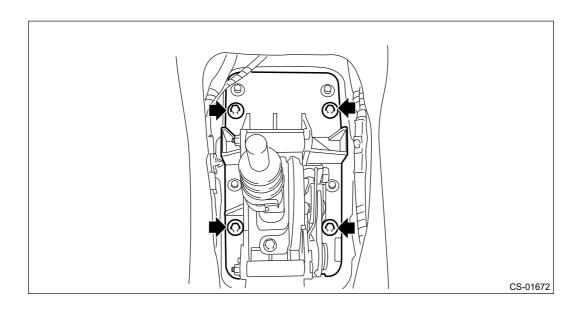
- (1) Pull out down the MT gear shift cable to spread the spring.
- (2) Push the MT gear select cable in the direction of arrow, and remove it.



- (A) MT gear shift cable
- (B) MT gear select cable
- 7. Remove the cable cover assembly.



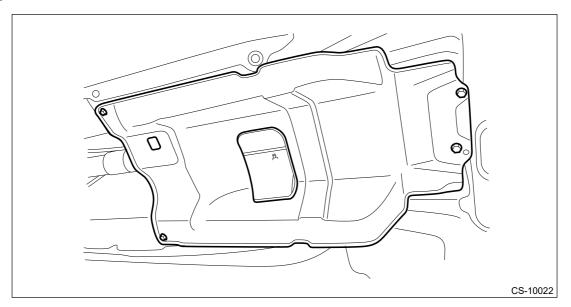
- **8.** Lower the vehicle.
- **9.** Remove the ornament panel consoles LH and RH. Ref. to EXTERIOR/INTERIOR TRIM>Console Box>REMOVAL.
- **10.** Remove the gear shift knob and remove the cover shift lever. Ref. to EXTERIOR/INTERIOR TRIM>Console Box>REMOVAL.
- 11. Remove the console box assembly. Ref. to EXTERIOR/INTERIOR TRIM>Console Box>REMOVAL.
- **12.** Remove the panel center LWR LH and RH. Ref. to EXTERIOR/INTERIOR TRIM>Console Box>REMOVAL.
- 13. Remove the harness clamp.
- **14.** Remove the gear shift lever assembly mounting bolt and remove the gear shift lever assembly from the vehicle.



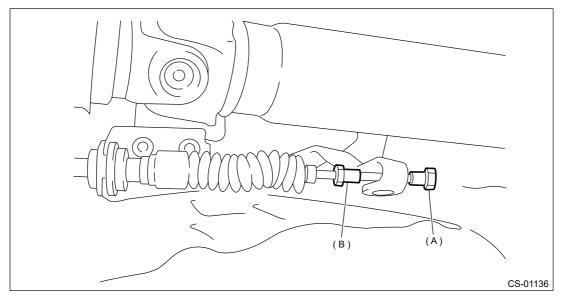
CONTROL SYSTEMS > Select Cable

ADJUSTMENT

- 1. Shift the select lever to "N" range.
- 2. Lift up the vehicle.
- **3.** Remove the center exhaust pipe. (Non-turbo model) Ref. to EXHAUST(H4DO)>Center Exhaust Pipe>REMOVAL.
- **4.** Remove the center exhaust pipe (rear). (Turbo model) Ref. to EXHAUST(H4DOTC)>Center Exhaust Pipe>REMOVAL.
- 5. Remove the center exhaust cover.



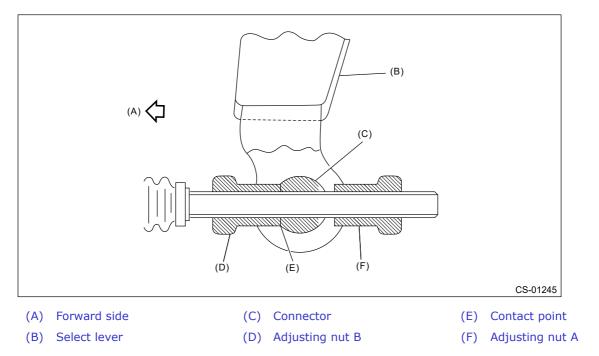
6. Loosen the adjusting nuts on both sides.



(A) Adjusting nut A

(B) Adjusting nut B

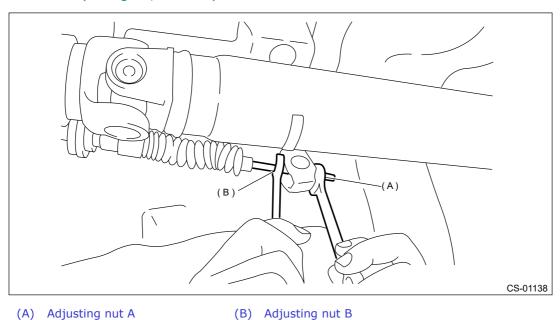
7. Turn adjusting nut B until it lightly touches the connector.



8. Set a spanner wrench to adjusting nut B so that it does not rotate, and then tighten the adjusting nut A.

Tightening torque:

7.5 N•m (0.8 kgf-m, 5.5 ft-lb)



- 9. After the completion of adjustment, confirm that the select lever operates normally at all ranges.
- **10.** Installing procedure hereafter is in the reverse order of removal.

CONTROL SYSTEMS > Select Cable

INSPECTION

Check the removed cable and replace or adjust if damaged, rusty or malfunctioning.

- 1. Check the cable for smooth operation.
- **2.** Check the inner cable for damage and rust.
- **3.** Check the outer cable for damage, bends and cracks.
- 4. Check the boot for damage, cracks and deterioration.
- **5.** Move the select lever from "P" to "D" range. Check the existence of feel to contact the detents in each range. If the detents cannot be felt or the position pointer is improperly aligned, adjust the cable.
- **6.** Check if the starter motor rotates when the select lever is set to "P" range.
- 7. Check the back-up light illumination when the select lever is in "R" range.
- **8.** Check the parking lock operation when the select lever is in "P" range.

INSTALLATION

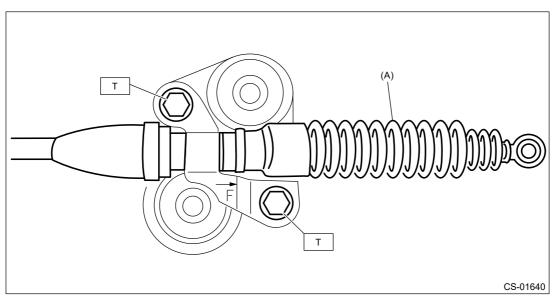
1. Position the select cable as shown in the figure, and install it to the plate assembly.

Caution:

- If the cable is installed in the wrong direction, loosen the bracket bolts, and then reinstall the cable in the correct direction.
- Do not forcibly turn the cable (wire side) to align the direction correctly.

Tightening torque:

T: 18 N•m (1.8 kgf-m, 13.3 ft-lb)

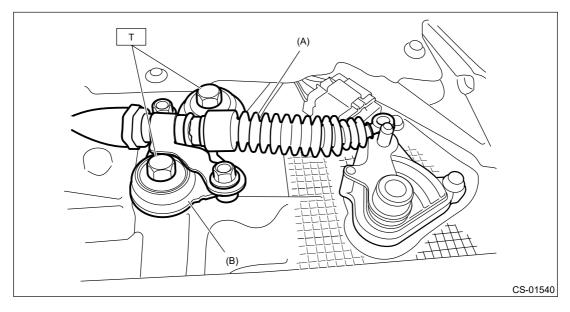


(A) Select cable

- 2. Install the select cable to the shifter arm.
- 3. Install the plate assembly to transmission.

Tightening torque:

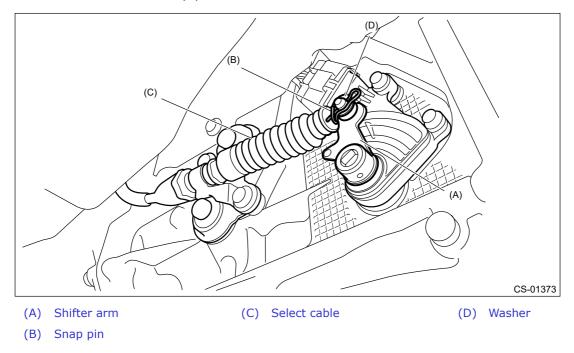
T: 25 N•m (2.5 kgf-m, 18.4 ft-lb)



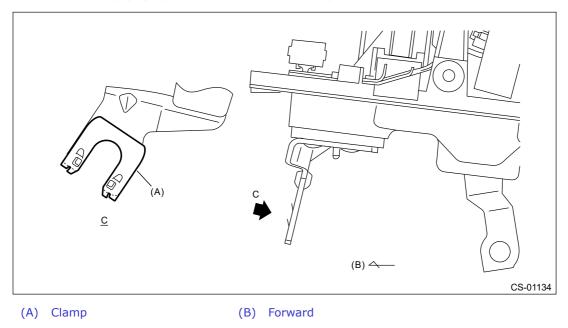
(A) Select cable

(B) Plate ASSY

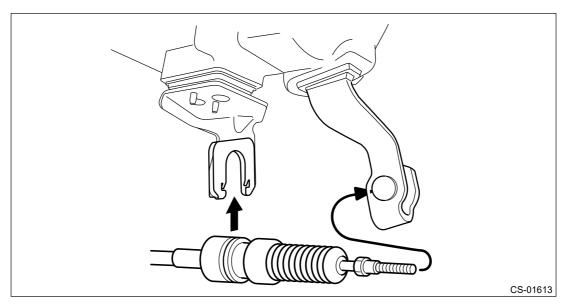
4. Install the washer and snap pin to the shifter arm.



5. Install new clamp paying attention to the installing direction.



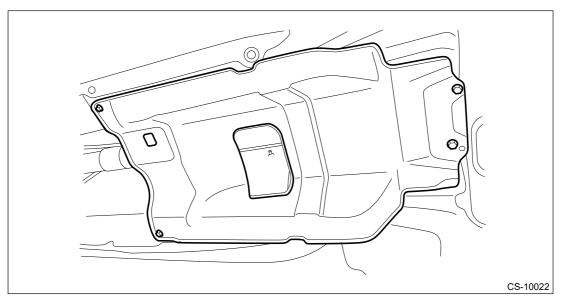
6. Insert the tip of inner cable into connector hole of select lever, and fix the cable to bracket.



- 7. Shift the select lever to the "N" range, and then adjust the select cable position. Ref. to CONTROL SYSTEMS>Select Cable>ADJUSTMENT.
- 8. Install the center exhaust cover.

Tightening torque:

18 N•m (1.8 kgf-m, 13.3 ft-lb)



- **9.** Install the center exhaust pipe. (Non-turbo model) Ref. to EXHAUST(H4DO)>Center Exhaust Pipe>INSTALLATION.
- **10.** Install the center exhaust pipe (rear). (Turbo model) Ref. to EXHAUST(H4DOTC)>Center Exhaust Pipe>INSTALLATION.
- 11. Lower the vehicle.
- 12. Connect the battery ground terminal.

CONTROL SYSTEMS > Select Cable

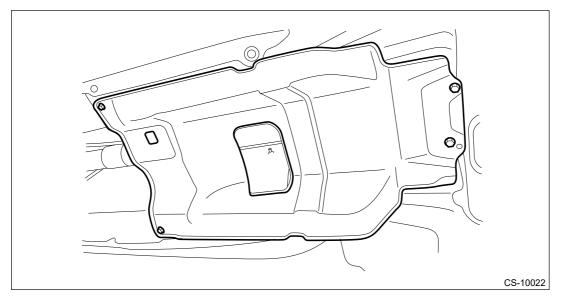
REMOVAL

- 1. Shift the select lever to "N" range.
- 2. Disconnect the ground cable from battery. Ref. to NOTE>NOTE > BATTERY.

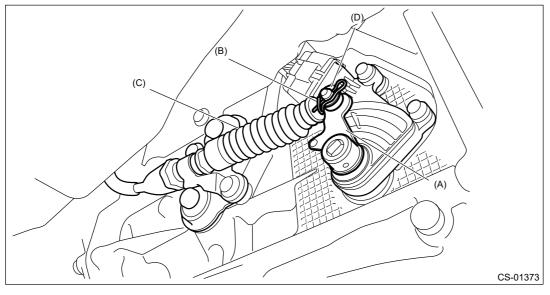
Note:

For model with battery sensor, disconnect the ground terminal from battery sensor.

- **3.** Lift up the vehicle.
- **4.** Remove the center exhaust pipe. (Non-turbo model) Ref. to EXHAUST(H4DO)>Center Exhaust Pipe>REMOVAL.
- **5.** Remove the center exhaust pipe (rear). (Turbo model) Ref. to EXHAUST(H4DOTC)>Center Exhaust Pipe>REMOVAL.
- 6. Remove the center exhaust cover.



7. Remove the snap pin and washer from the shifter arm.



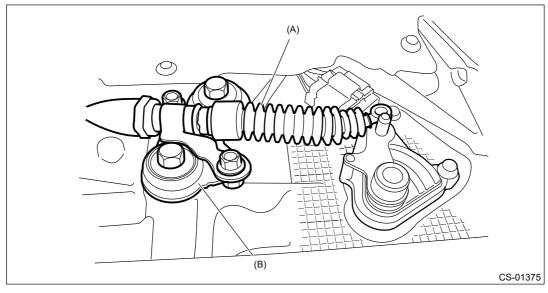
(A) Shifter arm

(C) Select cable

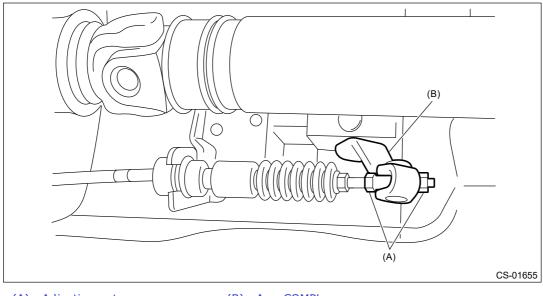
(D) Washer

(B) Snap pin

8. Remove the plate assembly from the transmission case.



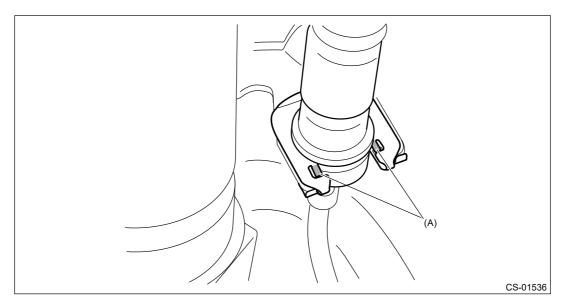
- (A) Select cable
- (B) Plate ASSY
- 9. Disconnect the cable from arm COMPL.



(A) Adjusting nut

(B) Arm COMPL

10. Raise the claw of clamp to remove the cable from bracket.



(A) Claw

11. Remove the select cable from plate assembly.

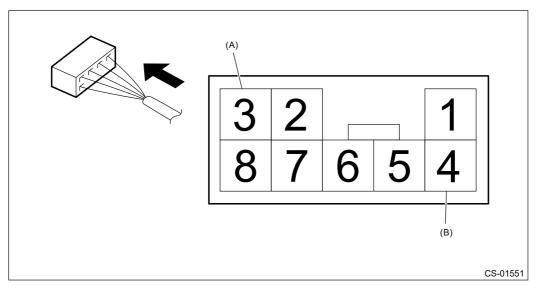
CONTROL SYSTEMS > Select Lever

ASSEMBLY

- 1. Clean all the parts before assembly.
- 2. Apply Multemp D or equivalent to the sliding portion of each part.
- **3.** Assemble in the reverse order of disassembly.

Note:

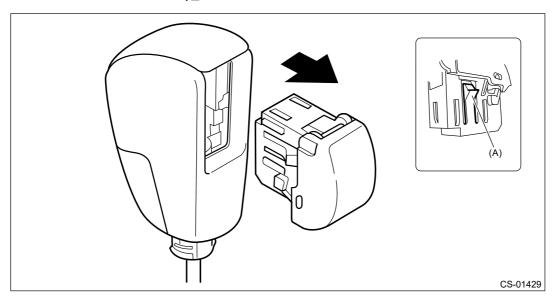
Insert the solenoid unit terminals to the harness connector.



- (A) Solenoid unit (color code: blue)
- (B) Solenoid unit (color code: black)
- 4. After installation, check the following points.
 - The select indicator matches the select lever position when the select lever is changed from "P" range to "D" range.
 - The select lever position and the position mark match each other.
 - Operating force to move the select lever from "P" to "D" range.

1. GRIP ASSY

1. Remove the button assembly_AT.

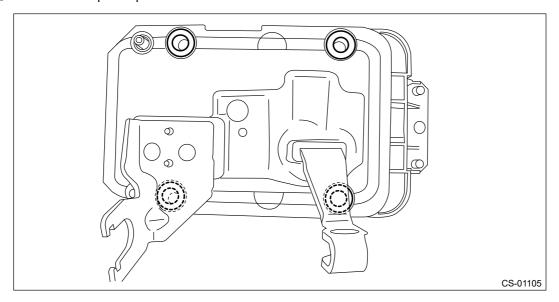


(A) Claw

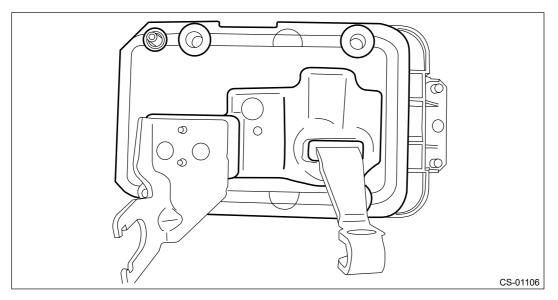
2. Remove the rod COMPL.

2. AT SELECT LEVER ASSEMBLY

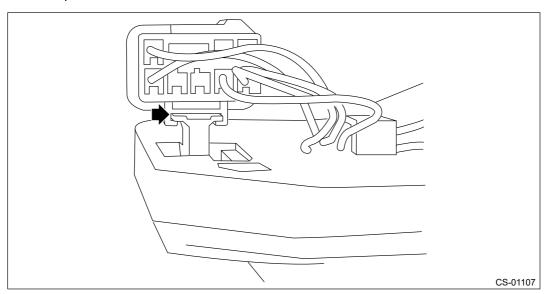
1. Remove the spacer plate.



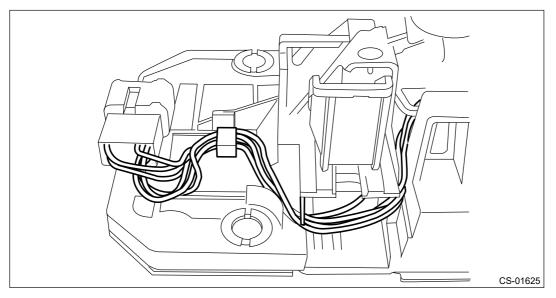
2. Remove the gasket.



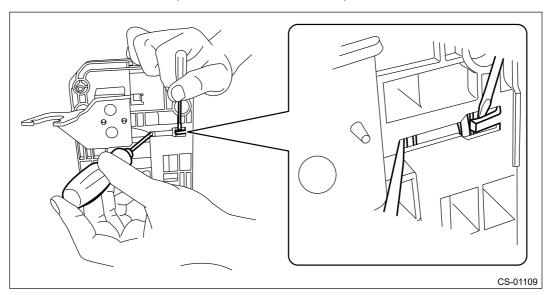
3. Insert a flat tip screwdriver with a thin tip under the connector and disconnect the harness connector from the plate COMPL.



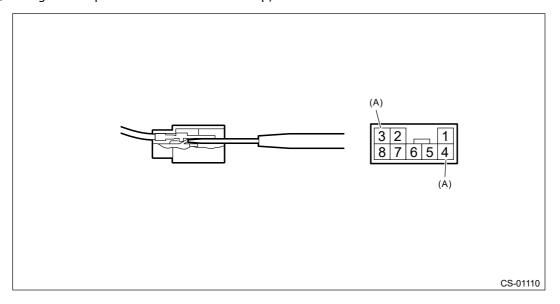
4. Remove the harness from the plate COMPL.



5. Raise the claw with a flat tip screwdriver with a thin tip and remove the solenoid unit.



6. Using a flat tip screwdriver with a thin tip, remove the solenoid unit terminals from the connector.

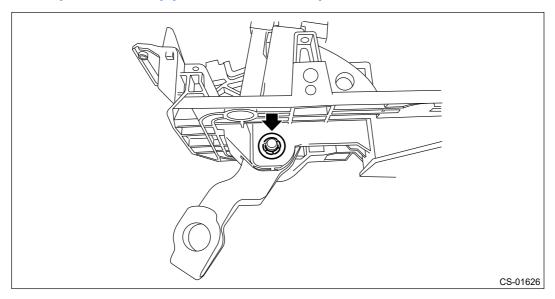


(A) Solenoid unit terminals

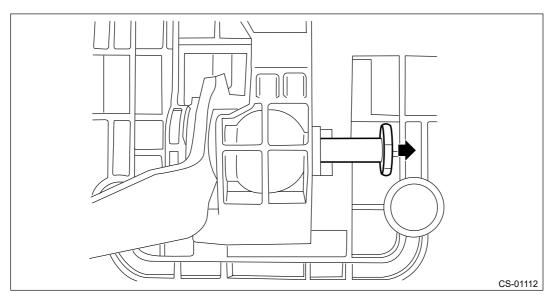
7. Remove the clamp push nut.

Note:

Replace the clamp push nut with a new part.



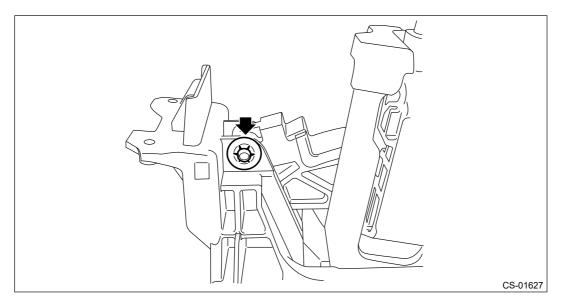
8. Pull out shaft control.



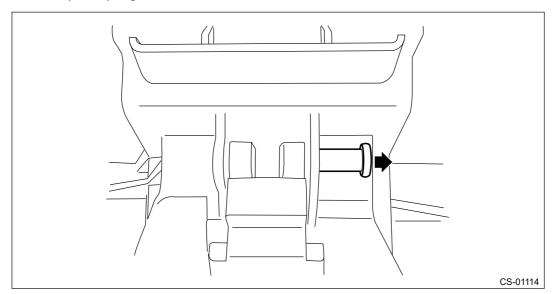
9. Remove the clamp push nut.

Note:

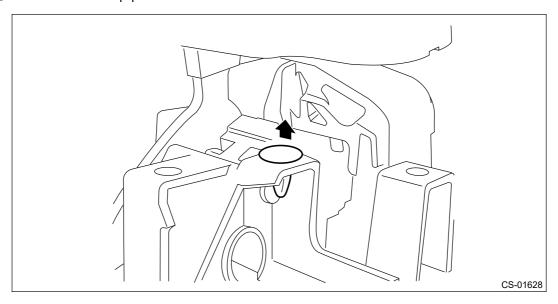
Replace the clamp push nut with a new part.



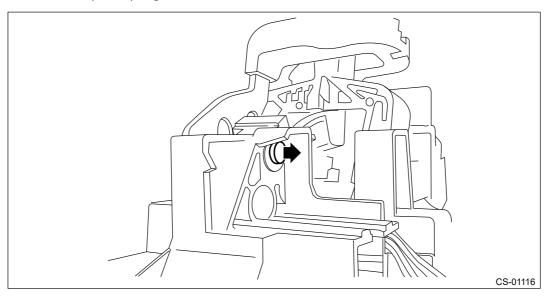
10. Pull out spacer pin guide.



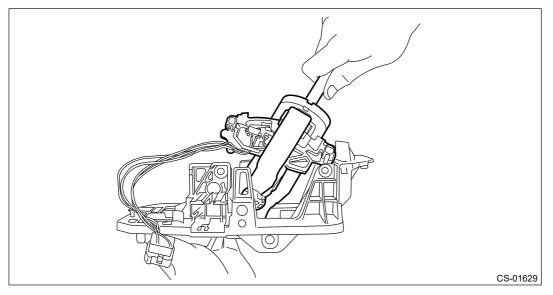
11. Remove the clamp pin.



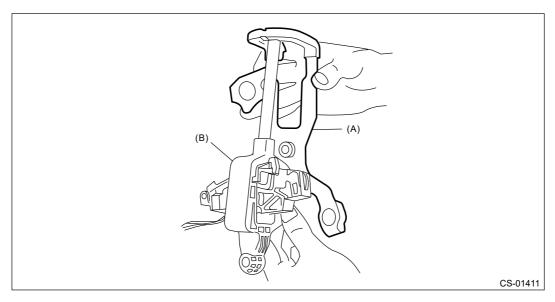
12. Remove the spacer pin guide.



13. Remove the select lever COMPL from the plate COMPL.



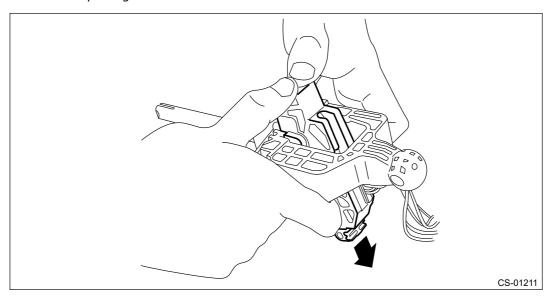
14. Remove the arm COMPL.



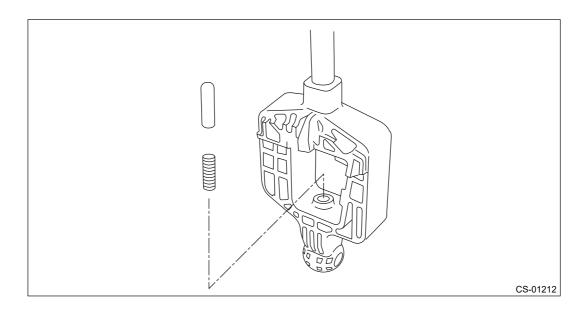
(A) Arm COMPL

(B) Selector lever COMPL

15. Remove the plate guide from the select lever COMPL.



16. Remove the rod detent and detent spring from the select lever COMPL.

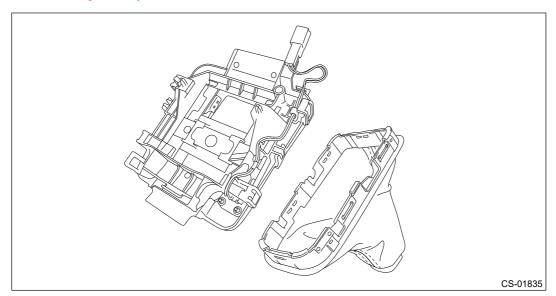


3. INDICATOR ASSY

1. Remove the boot assembly from the indicator assembly.

Caution:

When removing the boot assembly, be careful not to damage the boot assembly claws and adjacent parts.



CONTROL SYSTEMS > Select Lever

INSPECTION

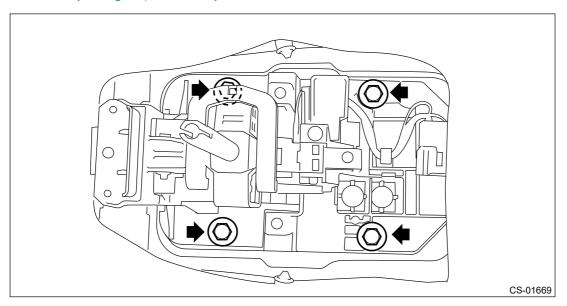
- 1. Inspect the removed parts by comparing with new parts for deformation, damage and wear. Repair or replace if defective.
- **2.** Inspect the select lever assembly operating condition before assembly. Normal if it operates smoothly.

CONTROL SYSTEMS > Select Lever

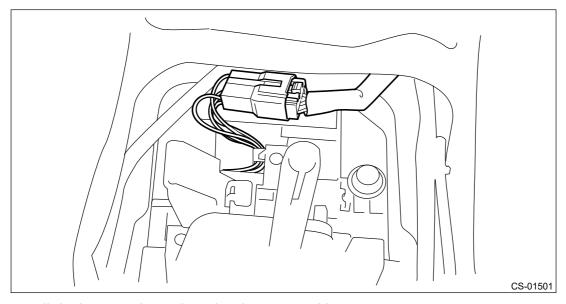
INSTALLATION

- 1. Set the select lever assembly to the vehicle body.
- 2. Tighten the four mounting bolts to attach the select lever assembly to the vehicle body. Tightening torque:

18 N·m (1.8 kgf-m, 13.3 ft-lb)



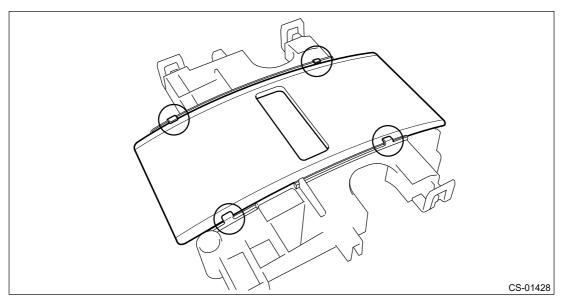
3. Connect the harness connector.



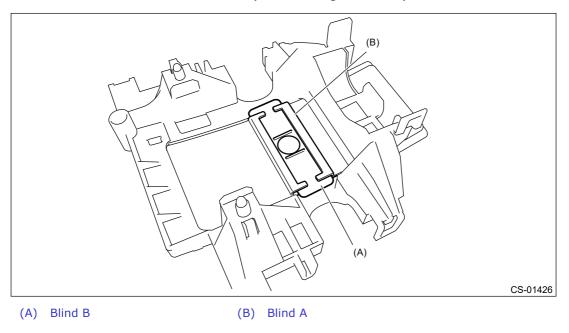
- 4. Install the harness clip to the select lever assembly.
- 5. Shift the select lever to "N" range.
- **6.** Install the blind A to the housing. (Model with gate shifter)

Note:

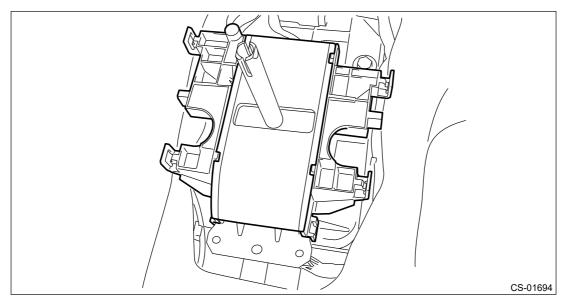
The blind A should be installed so that it is securely caught inside the tab of the housing.



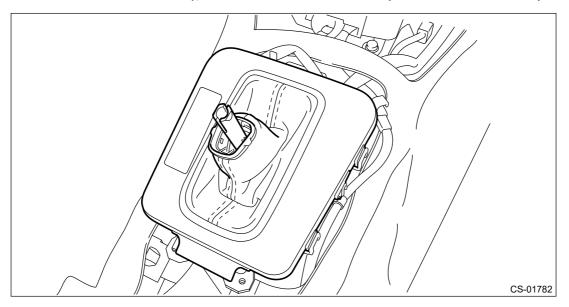
7. Install the blind B behind the blind A. (Model with gate shifter)



8. Install the housing. (Model with gate shifter)

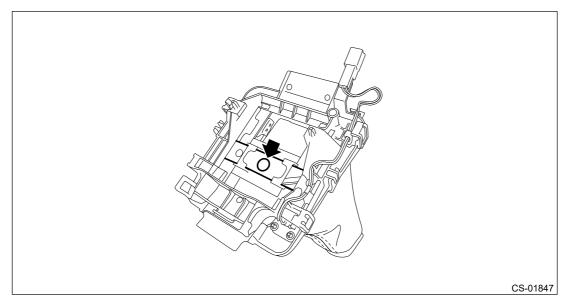


9. Install the indicator assembly, then connect the connector. (Model with boot shifter)

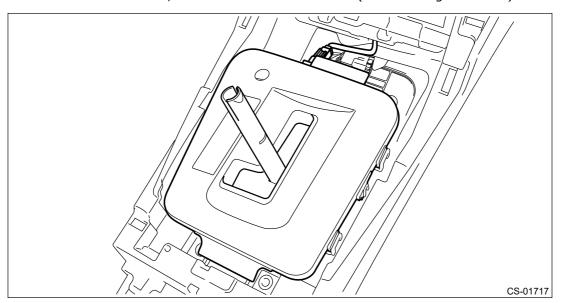


Note:

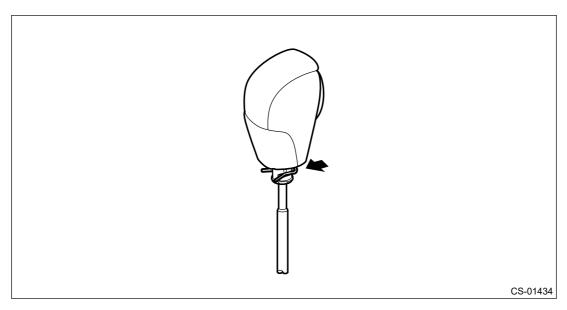
Insert the select lever through the blind hole sufficiently.



- **10.** Install the panel center LWR LH and RH. Ref. to EXTERIOR/INTERIOR TRIM>Console Box>INSTALLATION.
- **11.** Install the indicator cover, then connect the connector. (Model with gate shifter)



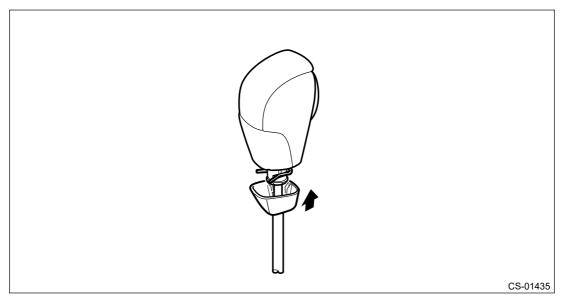
- **12.** Install the console box assembly. <a>Ref. to EXTERIOR/INTERIOR TRIM>Console Box>INSTALLATION.
- 13. Install the cover shift lever. See Ref. to EXTERIOR/INTERIOR TRIM>Console Box>INSTALLATION.
- **14.** Install the ornament panel consoles LH and RH. Ref. to EXTERIOR/INTERIOR TRIM>Console Box>INSTALLATION.
- **15.** Accessing from the button side of the grip, attach the clamp grip pin.



16. Install the cover grip AT securely. (Model with gate shifter)

Note:

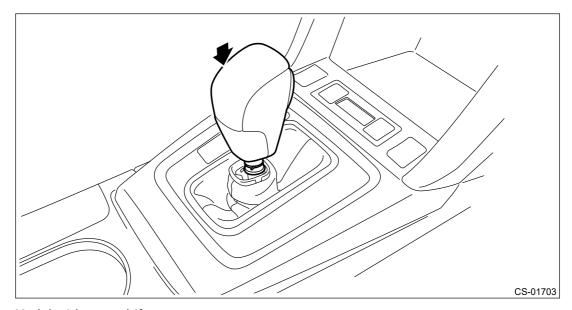
After installation, check that the cover grip AT cannot be detached.



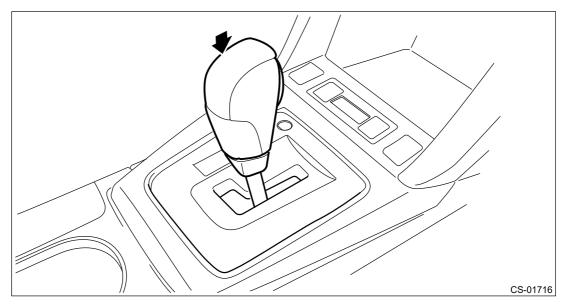
- 17. Insert the grip assembly to the select lever and press it down until a click is heard.
 - Model with boot shifter

Note:

While pressing the clamp grip pin with a finger in order to prevent it from popping out, insert the grip assembly.



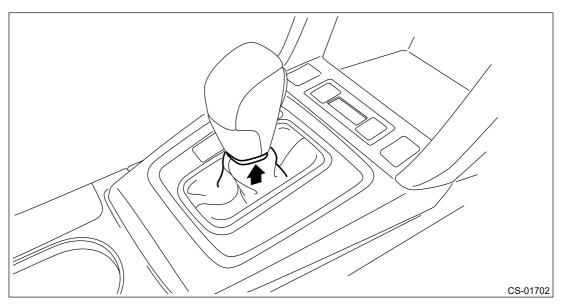
• Model with gate shifter



18. Securely install the boot assembly. (Model with boot shifter)

Note:

After installation, check that the boot assembly does not come off.



- 19. After installation of grip, check the following points.
 - The grip will not come off.
 - The button on the grip operates normally.
- **20.** Shift the select lever to "N" range.
- 21. Lift up the vehicle.
- 22. Secure the cable to the bracket. Ref. to CONTROL SYSTEMS>Select Cable>INSTALLATION.
- **23.** Adjust the select cable position. Ref. to CONTROL SYSTEMS>Select Cable>ADJUSTMENT.
- **24.** After adjustment, confirm that the select lever operates properly at all range positions using the shift lock release button.

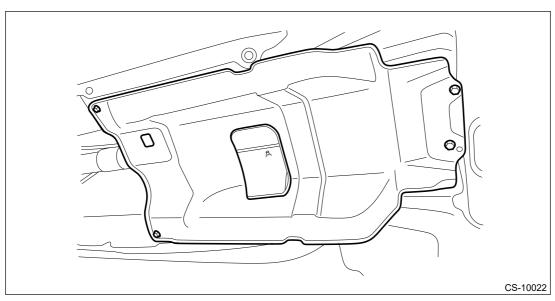
Note:

According to the select lever operation, confirm that the indicator positions are shown correctly.

25. Install the center exhaust cover.

Tightening torque:

18 N·m (1.8 kgf-m, 13.3 ft-lb)



26. Install the center exhaust pipe. (Non-turbo model) Ref. to EXHAUST(H4DO)>Center Exhaust Pipe>INSTALLATION.

- **27.** Install the center exhaust pipe (rear). (Turbo model) Ref. to EXHAUST(H4DOTC)>Center Exhaust Pipe>INSTALLATION.
- 28. Lower the vehicle.
- **29.** Connect the battery ground terminal.
- **30.** Inspect the following items. If a malfunction is found in the inspection, adjust the select cable or inhibitor switch.
 - (1) The shift lock operates normally. Ref. to CONTROL SYSTEMS>AT Shift Lock Control System>INSPECTION > SHIFT LOCK OPERATION.
 - (2) Engine starts when the select lever is in "P" or "N" range, but not in other ranges.
 - (3) Back-up light illuminates when the select lever is in the "R" range, but not in other ranges.
 - (4) Select lever and indicator positions are matched.

CONTROL SYSTEMS > Select Lever

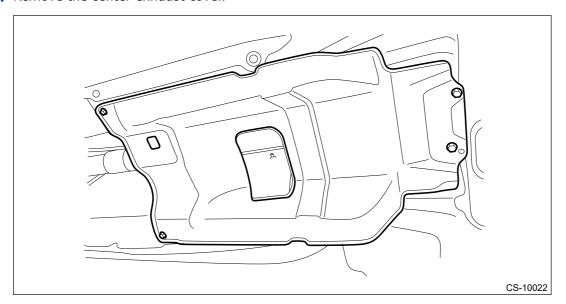
REMOVAL

- 1. Shift the select lever to "N" range.
- **2.** Disconnect the ground cable from battery. <a> Ref. to NOTE > BATTERY.

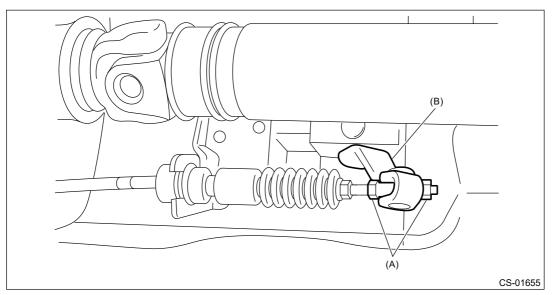
Note:

For model with battery sensor, disconnect the ground terminal from battery sensor.

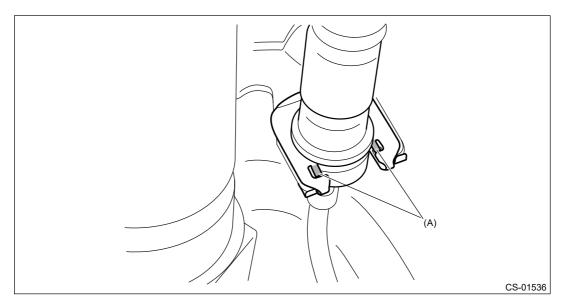
- **3.** Lift up the vehicle.
- **4.** Remove the center exhaust pipe. (Non-turbo model) Ref. to EXHAUST(H4DO)>Center Exhaust Pipe>REMOVAL.
- **5.** Remove the center exhaust pipe (rear). (Turbo model) Ref. to EXHAUST(H4DOTC)>Center Exhaust Pipe>REMOVAL.
- 6. Remove the center exhaust cover.



7. Disconnect the cable from the arm COMPL.

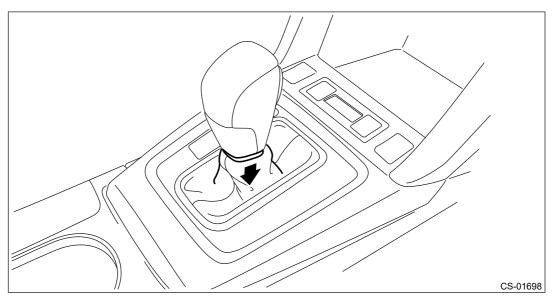


- (A) Adjusting nut
- (B) Arm COMPL
- **8.** Raise the claw of clamp and remove the cable.

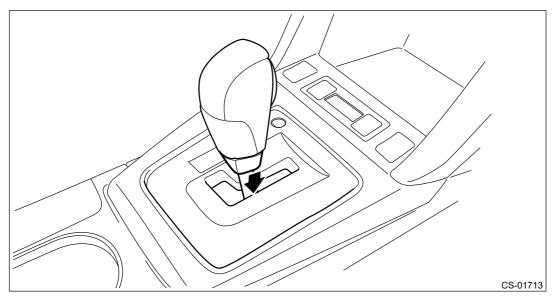


(A) Claw

- **9.** Lower the vehicle.
- 10. Shift the select lever to "N" range.
- 11. Lower the boot assembly vertically toward the lever. (Model with boot shifter)

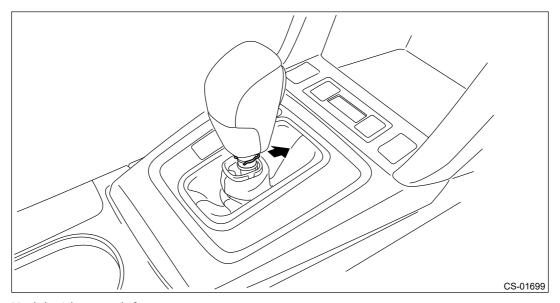


12. Lower the cover grip AT vertically toward the lever. (Model with gate shifter)

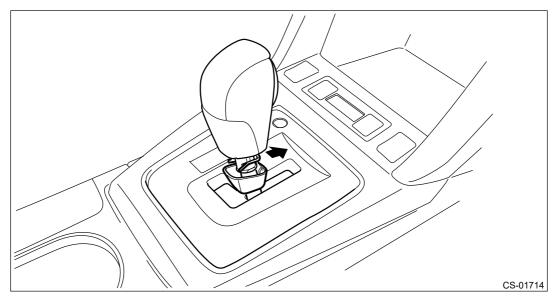


13. Remove the clamp grip pin.

• Model with boot shifter

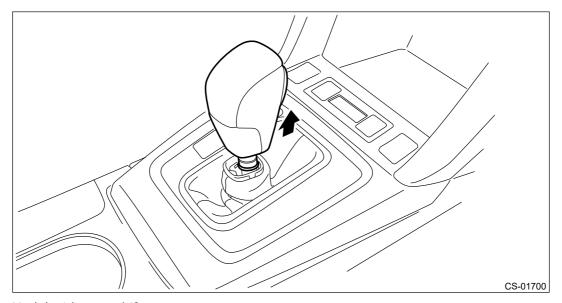


• Model with gate shifter

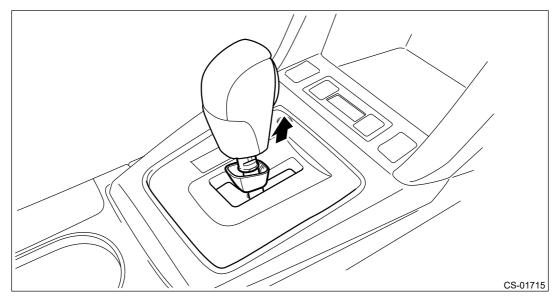


14. Remove the grip assembly.

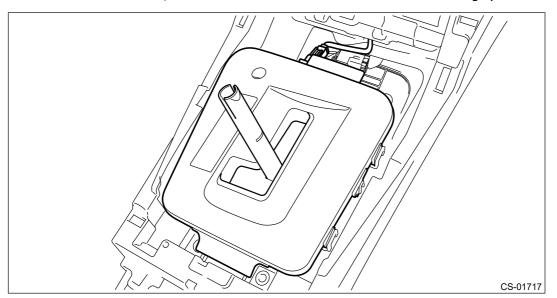
• Model with boot shifter



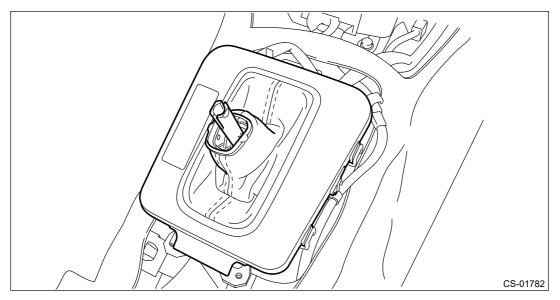
• Model with gate shifter



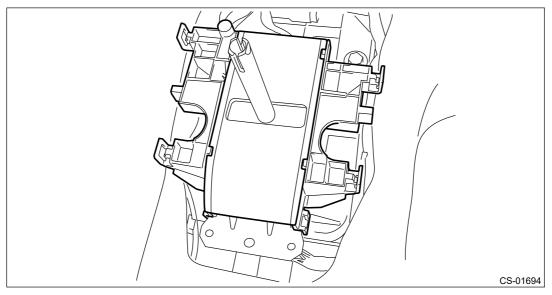
- **15.** Remove the ornament panel consoles LH and RH. <u>Ref. to EXTERIOR/INTERIOR TRIM>Console Box>REMOVAL.</u>
- **16.** Remove the cover shift lever. Ref. to EXTERIOR/INTERIOR TRIM>Console Box>REMOVAL.
- 17. Remove the console box assembly. Ref. to EXTERIOR/INTERIOR TRIM>Console Box>REMOVAL.
- **18.** Disconnect the connector, and remove the indicator cover from the housing. (Model with gate shifter)



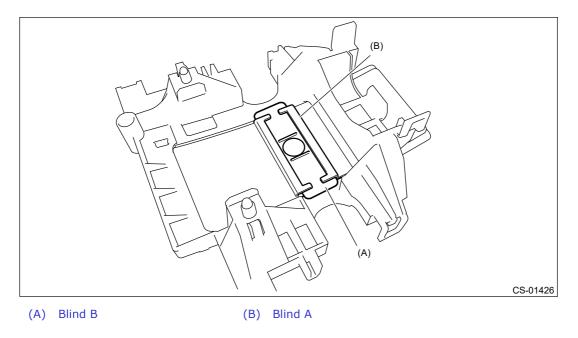
- **19.** Remove the panel center LWR LH and RH. Ref. to EXTERIOR/INTERIOR TRIM>Console Box>REMOVAL.
- **20.** Disconnect the connector, and remove the indicator assembly. (Model with boot shifter)



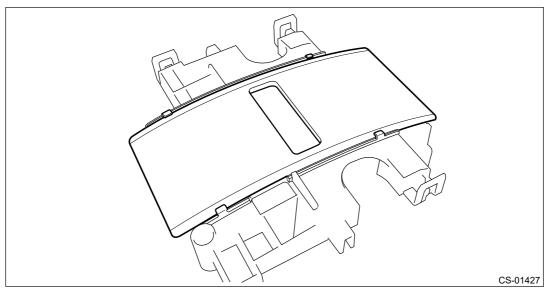
21. Remove the housing with the blind A and blind B. (Model with gate shifter)



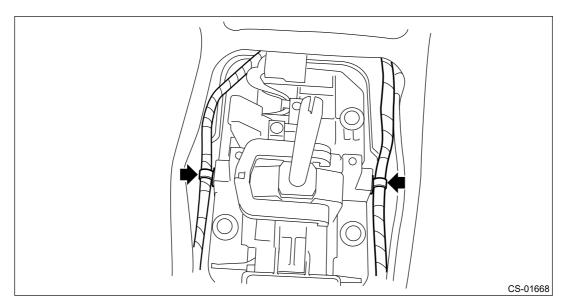
22. Remove the blind B. (Model with gate shifter)



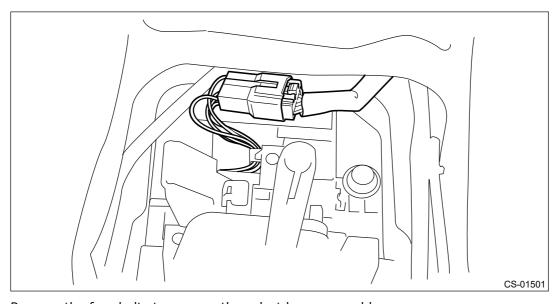
23. Remove the blind A from the housing. (Model with gate shifter)



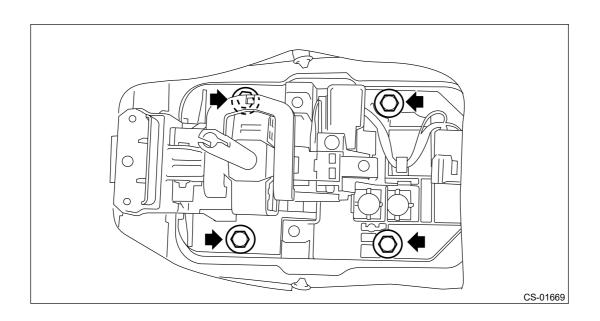
24. Remove the harness clip from the select lever assembly.



25. Disconnect the harness connector.



26. Remove the four bolts to remove the select lever assembly.



MANUAL TRANSMISSION AND DIFFERENTIAL(6MT) > Air Breather Hose

INSPECTION

Check the hose for peeling, crack or clogging.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT) > Air Breather Hose

INSTALLATION

Install in the reverse order of removal.

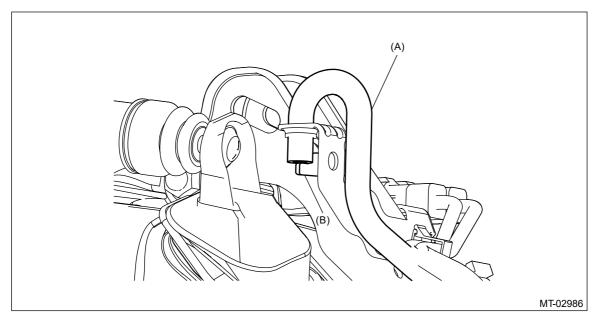
Note:

- When installing the air breather hose, pay attention to the positions of the two
 markings on the hose and make sure the markings come to the same position as
 when removed.
- Securely insert the air breather hose until the hose end contacts the catch of the pitching stopper bracket.

Tightening torque:

Air intake boot

3 N·m (0.3 kgf-m, 2.2 ft-lb)



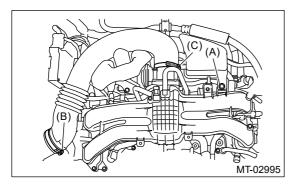
(A) Air breather hose

(B) Catch

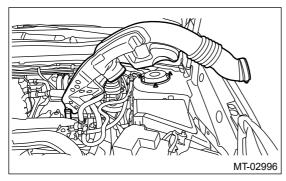
MANUAL TRANSMISSION AND DIFFERENTIAL(6MT) > Air Breather Hose

REMOVAL

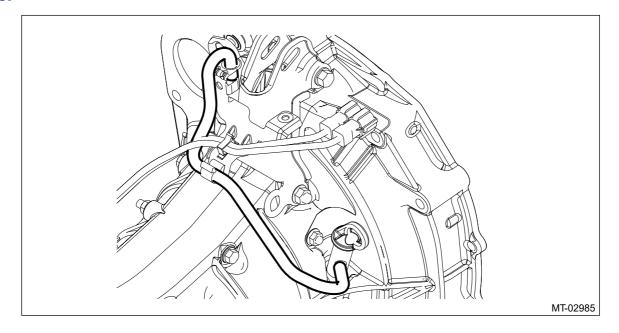
- 1. Disconnect the ground cable from battery.
- **2.** Remove the clip (A) from the air intake boot.
- **3.** Loosen the clamp (B) connecting the air intake boot and air cleaner case (rear).
- 4. Loosen the clamp (C) which connects the air intake boot and throttle body.



5. Remove the air intake boot from the throttle body, and move it to the left side wheel apron.



6. Remove the air breather hose.



ASSEMBLY

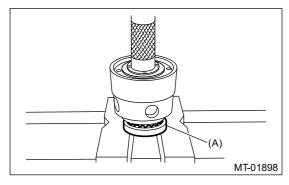
Install the ball bearings.

Caution:

Do not apply a load in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

Note:

Use a new ball bearing.



(A) Ball bearing

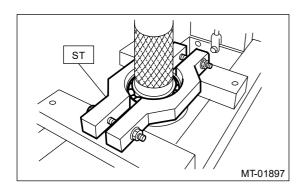
DISASSEMBLY

Remove the ball bearing using ST.

Note:

Center differential is a non-disassembled part which should not be disassembled.

ST 498077600 REMOVER



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.

INSTALLATION

- 1. Install the center differential and transfer driven gear into the transfer case as a unit. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Transfer Driven Gear>INSTALLATION.
- 2. Select the adjusting washer. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Transfer Case and Extension Case Assembly>INSTALLATION.
- 3. Install the transfer driven gear. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Transfer Driven Gear>INSTALLATION.
- **4.** Install the transfer case together with the extension case assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Transfer Case and Extension Case Assembly>INSTALLATION.
- **5.** Install the back-up light switch and the neutral position switch. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Switches and Harness>INSTALLATION.
- **6.** Install the manual transmission assembly to the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Manual Transmission Assembly>INSTALLATION.

REMOVAL

- 1. Remove the manual transmission assembly from the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Manual Transmission Assembly>REMOVAL.
- **2.** Remove the back-up light switch and the neutral position switch. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Switches and Harness>REMOVAL.
- **3.** Remove the transfer case together with the extension case assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Transfer Case and Extension Case Assembly>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(6MT)>Transfer Driven Gear>REMOVAL.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT) > Differential Side Retainer Oil Seal

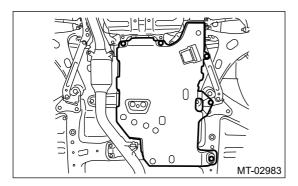
INSPECTION

Check for transmission gear oil leaks at differential side retainer oil seal. If there is oil leakage, replace the oil seal with the new part and check the drive shaft.

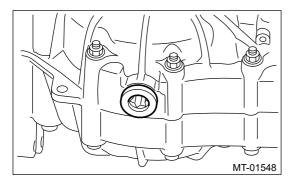
MANUAL TRANSMISSION AND DIFFERENTIAL(6MT) > Differential Side Retainer Oil Seal

REPLACEMENT

- 1. Disconnect the ground cable from battery.
- 2. Remove the front tires.
- 3. Lift up the vehicle.
- 4. Remove the transmission under cover.



5. Using the TORX[®] bit T70, remove the drain plug, and drain the transmission gear oil completely.



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.
- **6.** Attach the drain plug using TORX[®] bit T70.

Note:

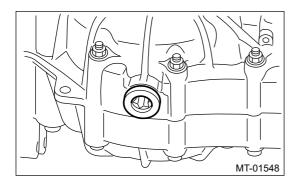
Use a new gasket.

Tightening torque:

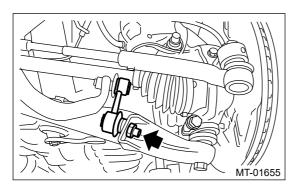
44 N·m (4.5 kgf-m, 32.5 ft-lb) (aluminum gasket, silver)

70 N·m (7.1 kgf-m, 51.6 ft-lb) (copper gasket, brown)

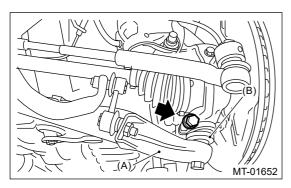
70 N·m (7.1 kgf-m, 51.6 ft-lb) (metal gasket, black)



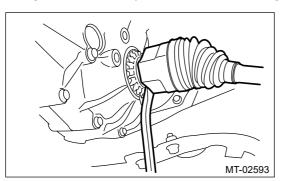
- 7. Remove the center exhaust pipe. Ref. to EXHAUST(H4DO)>Center Exhaust Pipe>REMOVAL.
- 8. Disconnect the stabilizer link.



9. Remove the bolt securing the ball joint of the front arm to the housing, then separate the front arms and the housing.



- (A) Front arm
- (B) Ball joint
- 10. Using a crowbar, separate the left and right front drive shafts.



11. Remove the differential side retainer oil seal.

Note:

- Be sure to replace the oil seal after removing the front drive shaft from the transmission.
- Use the ST 398527700 PULLER ASSY to remove the oil seal. If removing the oil seal with a flat tip screwdriver, be careful not to scratch the differential side retainer.
- **12.** Using the ST, install the differential side retainer oil seal by lightly tapping with a plastic hammer.

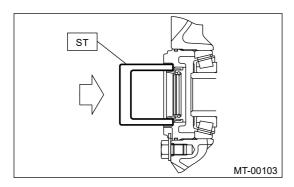
Caution:

- 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.

Note:

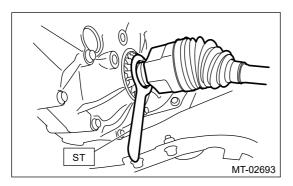
Use a new oil seal.

ST 18675AA000 DIFFERENTIAL SIDE OIL SEAL INSTALLER



13. Install the ST to the transmission, and then install the front drive shaft.

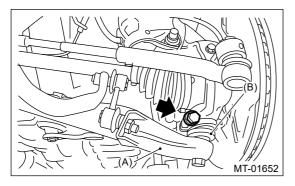
ST 28399SA010 OIL SEAL PROTECTOR



14. Insert the front arm ball joint and tighten the mounting bolt.

Tightening torque:

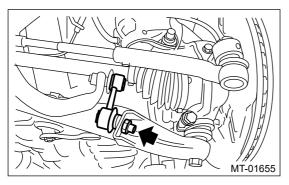
50 N·m (5.1 kgf-m, 36.9 ft-lb)



- (A) Front arm
- (B) Ball joint
- 15. Install the stabilizer link.

Tightening torque:

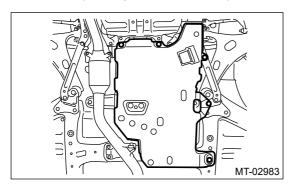
60 N·m (6.1 kgf-m, 44.3 ft-lb)



- **16.** Install the center exhaust pipe. Ref. to EXHAUST(H4DO)>Center Exhaust Pipe>INSTALLATION.
- 17. Install the transmission under cover.

Tightening torque:

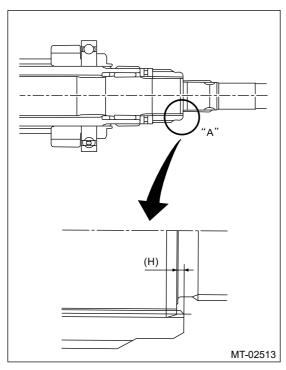
18 N·m (1.8 kgf-m, 13.3 ft-lb)



- 18. Lower the vehicle.
- **19.** Pour in transmission gear oil and check the oil level. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Transmission Gear Oil.
- **20.** Install the front tires.
- **21.** Connect the battery ground terminal.

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 ($20 \times 31 \times 4$) and lock washer ($20 \times 31 \times 2.3$) and attach the lock nut (20×11).



2. Install the lock nut with ST1, ST2 and ST3.

Note:

- Use new lock nuts and lock washers.
- Install the lock washer in the correct direction.

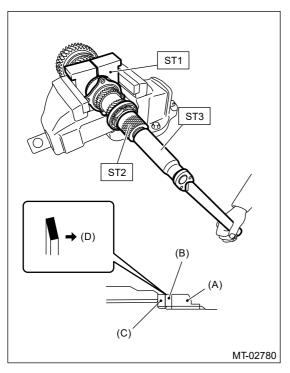
Tightening torque:

126 N·m (12.8 kgf-m, 92.9 ft-lb)

ST1 18680AA020 HOLDER

ST2 18667AA020 HOLDER

ST3 18662AA010 SOCKET (27)

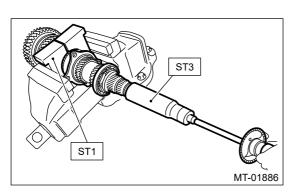


- (A) Lock nut
- (B) Lock washer
- (C) Washer
- (D) Lock nut side
- **3.** After removing the ST2 used in step 2), measure the starting torque using torque driver. **Starting torque:**

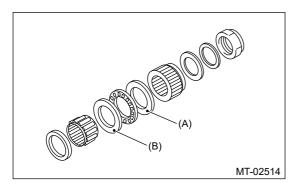
0.3-0.8 N·m (0.03-0.08 kgf-m, 0.2-0.6 ft-lb)

ST1 18680AA020 HOLDER

ST3 18662AA010 SOCKET (27)



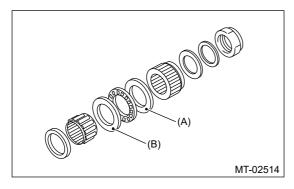
4. If the starting torque is not within the specified limit, select new adjusting washer No. 1 and recheck starting torque.



- (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 specified 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

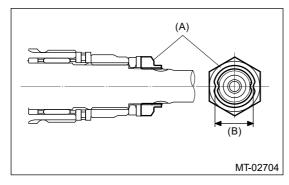
Starting torque	Dimension	Adjusting washer No. 2
torque	••	Select thicker
Low	[Small]	one.
∐iah	Largo	Select thinner
High	Large	one.

Adjusting washer No. 2			
Part No. Thickness mn			
803025070	2.850 (0.1122)		
803025074	3.000 (0.1181)		
803025078	3.150 (0.1240)		

6. Recheck that the starting torque is within the specified range, 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.



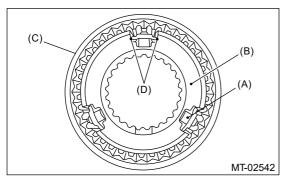
- (A) Lock nut
- (B) Outer dimension after crimping

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT) > Drive Pinion Shaft Assembly

ASSEMBLY

Note:

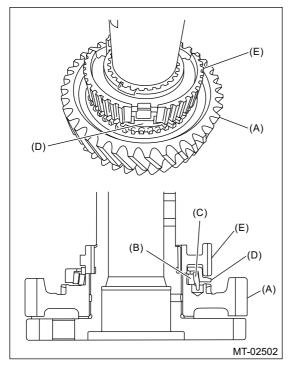
- Match the alignment marks, and install the coupling sleeve and then install the shifting insert.
- Make sure that there is no large clearance at both sides of the shifting insert after assembly.



- (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.

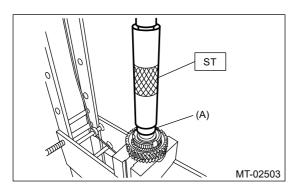
Caution:

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.

ST 18654AA000 INSTALLER

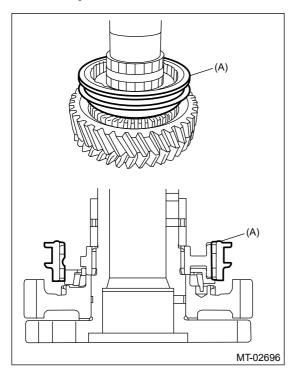


(A) 2nd driven gear bushing

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.

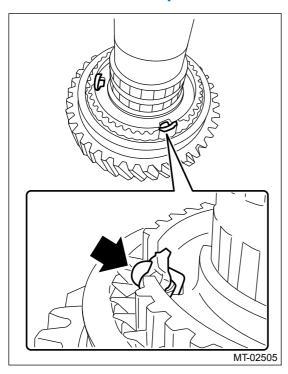


(A) 1st-2nd coupling sleeve

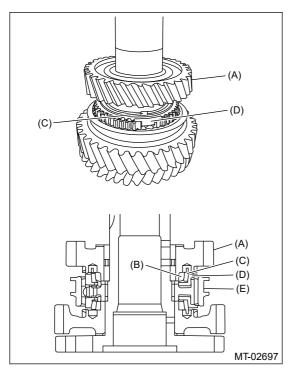
4. Install the 1st-2nd shifting insert.

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.

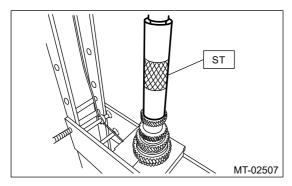
Caution:

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.

ST 499277200 INSTALLER



8. Using the ST and a press, install the double ball bearing.

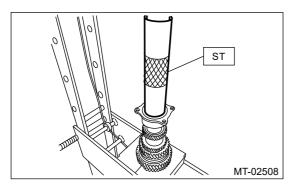
Caution:

Do not apply a load in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

Note:

Use a new double ball bearing.

ST 499277200 INSTALLER



9. Install the 5th driven gear using ST and press.

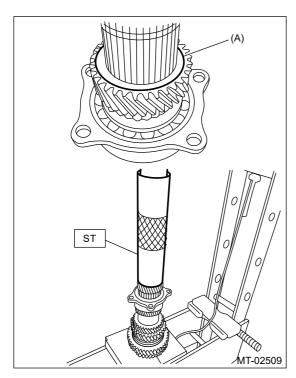
Caution:

Do not apply a load in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

Note:

Install the 5th driven gear with the groove side facing the 6th driven gear.

ST 499277200 INSTALLER



(A) Install with the groove side facing the 6th driven gear.

- **10.** Install the drive pinion spacer to the driven shaft.
- 11. Install the 6th driven gear using ST and press.

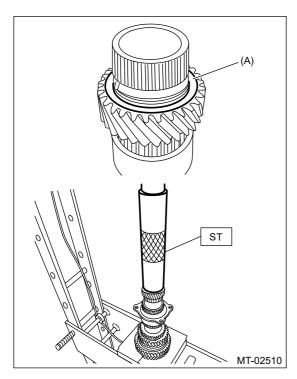
Caution:

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.

ST 499277200 INSTALLER



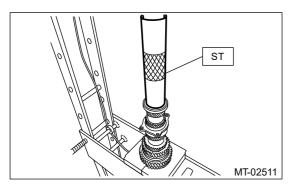
(A) Install with the stepped side facing the rear ball bearing.

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).

ST 499277200 INSTALLER



13. Install the lock nut using ST1 and ST2.

Note:

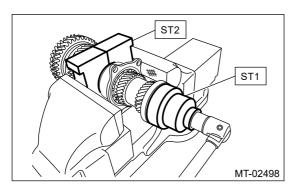
Use a new lock nut.

Tightening torque:

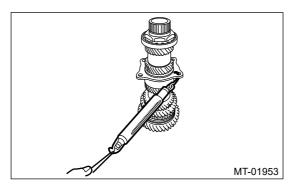
440 N·m (44.9 kgf-m, 324.5 ft-lb)

ST1 499987300 SOCKET WRENCH (50)

ST2 18680AA020 HOLDER



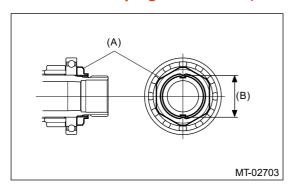
14. Using a spring scale, check that the initial load of the ball bearings is 0.1-1.5 N (0.01-0.15 kgf, 0.02-0.34 Ibf).



15. Crimp the lock nut at two locations so that the dimension (B) becomes 39.1 mm (1.54 in) or less.

Caution:

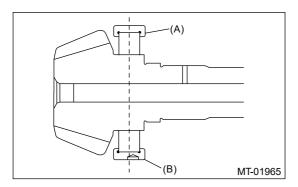
When crimping the lock nut, be careful not to crack it.



- (A) Lock nut
- (B) Outer dimension after crimping
- **16.** Install the roller bearing.

Note:

- Use a new roller bearing.
- Install the knock pin hole of the roller bearing outer race, facing the rear side.



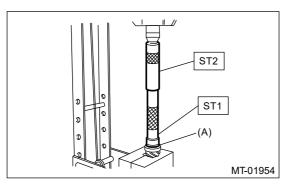
- (A) Roller bearing
- (B) Knock pin hole
- 17. Install the washer using ST1, ST2 and a press.

Caution:

Do not apply a load in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

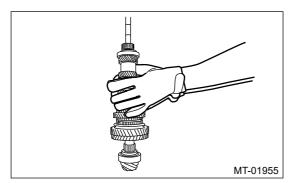
ST1 499277100 BUSHING 1-2 INSTALLER

ST2 499277200 INSTALLER

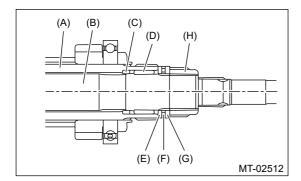


(A) Washer

18. Install the thrust bearing and needle bearing and install the driven shaft assembly.



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 $(25 \times 30 \times 20)$
- (E) Adjusting washer No. 2 (25 \times 36 \times t)
- (F) Thrust bearing $(25 \times 36 \times 2)$
- (G) Adjusting washer No. 1 (25 \times 36 \times t)
- (H) Differential bevel gear sleeve
- **20.** Adjust the thrust bearing preload. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Drive Pinion Shaft Assembly>ADJUSTMENT > THRUST BEARING PRELOAD.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT) > Drive Pinion Shaft Assembly

DISASSEMBLY

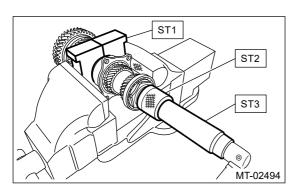
Note:

- 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. Flatten the tab of the lock nut.
- 2. Remove the lock nut using ST1, ST2 and ST3.

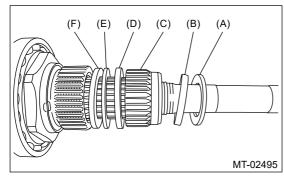
ST1 18680AA020 HOLDER

ST2 18667AA020 HOLDER

ST3 18662AA010 SOCKET WRENCH (27)

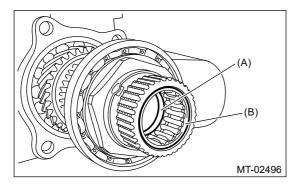


3. Remove the lock washer, washer, differential bevel gear sleeve, adjusting washer No. 1, thrust bearing and adjusting washer No. 2.

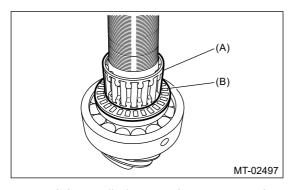


- (A) Lock washer
- (B) Washer
- (C) Differential bevel gear sleeve
- (D) Adjusting washer No. 1 (25 \times 36 \times t)
- (E) Thrust bearing $(25 \times 36 \times 2)$
- (F) Adjusting washer No. 2 (25 \times 36 \times t)

- 4. Draw out the drive pinion shaft from driven shaft.
- 5. Remove the needle bearing and drive pinion collar.

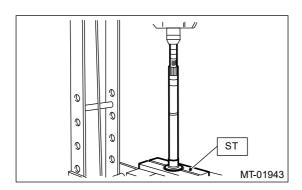


- (A) Drive pinion collar
- (B) Needle bearing $(25 \times 30 \times 20)$
- 6. Remove the needle bearing and thrust bearing.



- (A) Needle bearing $(30 \times 37 \times 23)$
- (B) Thrust bearing $(33 \times 50 \times 3)$
- 7. Remove the roller bearing and washer using ST and a press.

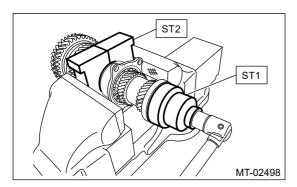
ST 498077000 REMOVER



- 8. Flatten the tab of the lock nut.
- 9. Remove the lock nut using ST1 and ST2.

ST1 499987300 SOCKET WRENCH (50)

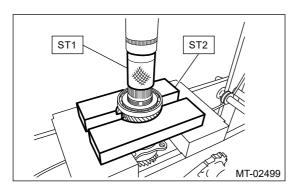
ST2 18680AA020 HOLDER



10. Remove the ball bearing, 6th driven gear and drive pinion spacer using the ST1, ST2 and a press.

ST1 899754112 PRESS

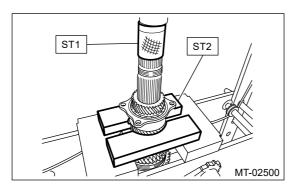
ST2 899714110 REMOVER



11. Remove the 5th driven gear, double ball bearing and 3rd-4th driven gear using ST1, ST2 and a press.

ST1 899754112 PRESS

ST2 899714110 REMOVER



- 12. Remove the key.
- 13. 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.

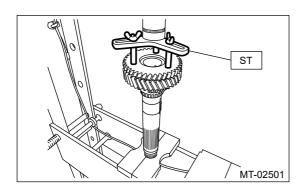
Caution:

When removing 1st-2nd coupling sleeve, be careful not to lose the 1st-2nd shifting insert.

14. 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.

ST 18762AA001 COMPRESSOR SPECIAL TOOL



MANUAL TRANSMISSION AND DIFFERENTIAL(6MT) > Drive Pinion Shaft Assembly

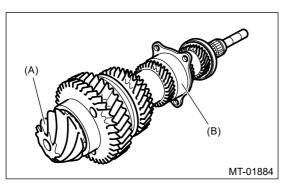
INSPECTION

Disassembled parts should be washed with cleaning solvent first, then inspected carefully.

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.

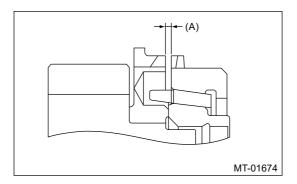
4. Baulk ring, synchro cone

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.

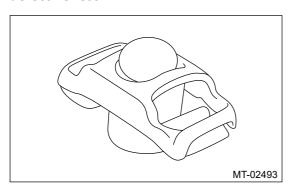
Clearance (A):

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.

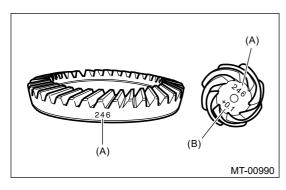


MANUAL TRANSMISSION AND DIFFERENTIAL(6MT) > Drive Pinion Shaft Assembly

INSTALLATION

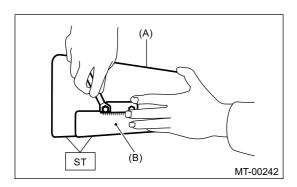
- 1. Remove the front differential assembly.
- 2. Hypoid gear set match mark/No.: The number (A) on top of the drive pinion, and the number on the hypoid driven gear are set numbers for the two gears. Use a pair having the same numbers.

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.

ST 499917500 DRIVE PINION GAUGE ASSY



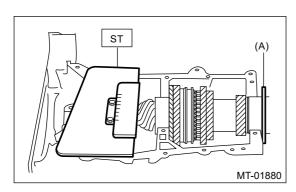
- (A) Plate
- (B) Scale
- (2) Tighten the two bolts.
- **5.** Position the ST by inserting the knock pin of ST into the knock hole of transmission case.

ST 499917500 DRIVE PINION GAUGE ASSY

6. Slide the drive pinion gauge scale with finger tip and read the value at the point where it

matches with the end face of drive pinion.

ST 499917500 DRIVE PINION GAUGE ASSY



- (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. (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(6MT)>Front Differential Assembly>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(6MT)>Main Shaft Assembly>INSTALLATION.
- **12.** Check each shifter fork. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Shifter Fork and Rod>INSPECTION.
- 13. Install the transmission case. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Transmission Case>INSTALLATION.
- 14. Install the transfer case together with the extension case assembly. Pef. to MANUAL

TRANSMISSION AND DIFFERENTIAL(6MT)>Transfer Case and Extension Case Assembly>INSTALLATION.

15. Install the manual transmission assembly to the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Manual Transmission Assembly>INSTALLATION.

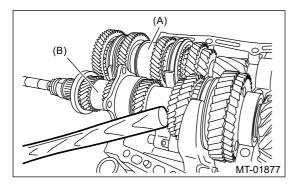
MANUAL TRANSMISSION AND DIFFERENTIAL(6MT) > Drive Pinion Shaft Assembly

REMOVAL

- 1. Remove the manual transmission assembly from the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Manual Transmission Assembly>REMOVAL.
- 2. Remove the transfer case together with the extension case assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Transfer Case and Extension Case Assembly>REMOVAL.
- **3.** Remove the transmission case. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>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.

1. DIFFERENTIAL BEVEL PINION GEAR BACKLASH

- 1. Disassemble the front differential assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Front Differential Assembly>DISASSEMBLY.
- 2. Select the adjusting washer from the table and install.

Adjusting washer				
Part No.	Thickness mm (in)			
803038021	0.925 — 0.950			
603036021	(0.0364 - 0.0374)			
902029022	0.975 — 1.000			
803038022	(0.0384 - 0.0394)			
803038023	1.025 — 1.050			
003030023	(0.0404 - 0.0413)			

3. Adjust until the standard value is obtained.

Backlash:

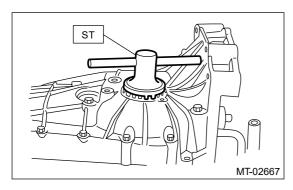
Standard

0.13 - 0.18 mm (0.0051 - 0.0071 in)

2. HYPOID DRIVEN GEAR BACKLASH

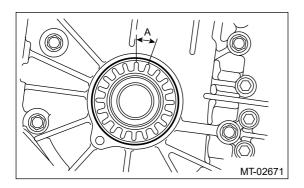
Adjust the backlash by turning the differential side retainers on the left and right side.

ST 18630AA010 WRENCH COMPL RETAINER



Note:

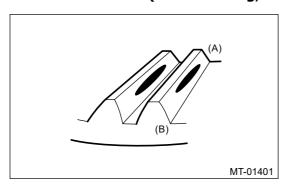
Each time the side retainer rotates by one notch (A), the backlash changes by 0.05 mm (0.0020 in).



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

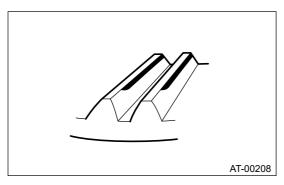
Check item: Tooth contact surface is slightly shifted toward the toe side under a no-load condition. (When driving, it moves towards the heel side.)



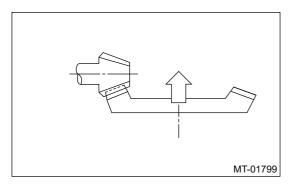
- (A) Toe side
- (B) Heel side
- Face contact

Check item: Backlash is too large.

Contact pattern



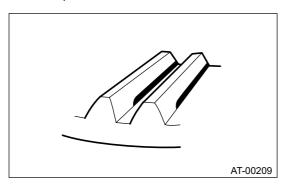
Corrective action: Tighten the differential side retainer to move the driven gear closer to the drive pinion shaft.



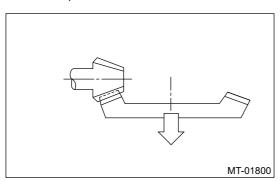
• Flank contact

Check item: Backlash is too small.

Contact pattern



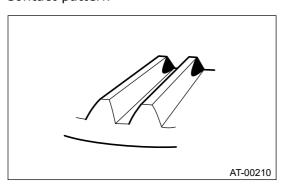
Corrective action: Loosen the differential side retainer to move the driven gear away from the drive pinion shaft.



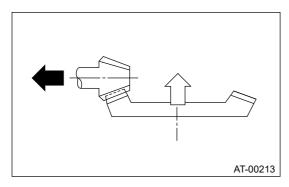
• Toe contact (inside contact)

Check item: Teeth contact area is too small.

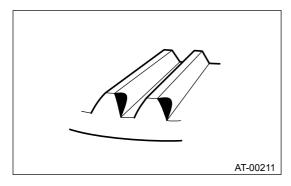
Contact pattern



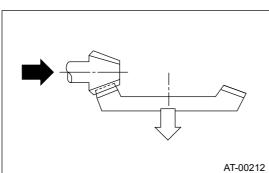
Corrective action: Increase the thickness of drive pinion shim and tighten the differential side retainer to move the driven gear closer to the drive pinion shaft according to the procedure for bringing drive pinion shaft away from driven gear.



Heel contact (outside end contact)
 Check item: Teeth contact area is too small.
 Contact pattern



Corrective action: Reduce thickness of the drive pinion shim according to the procedures for moving the drive pinion shaft closer to driven gear. Also loosen the differential side retainer to move the driven gear away from the drive pinion shaft.

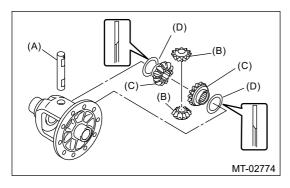


1. DIFFERENTIAL CASE ASSEMBLY

1. Install the differential bevel gear and differential bevel pinion together with adjusting washer, and insert the pinion shaft.

Note:

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. 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(6MT)>Front Differential Assembly>INSPECTION > DIFFERENTIAL BEVEL PINION GEAR BACKLASH.

Note:

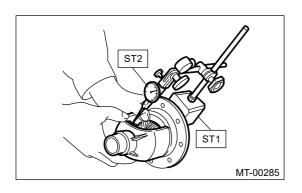
Be sure the pinion gear teeth contacts adjacent gear teeth during measurement.

Standard backlash

0.13-0.18 mm (0.0051-0.0071 in)

ST1 498247001 MAGNET BASE

ST2 498247100 DIAL GAUGE

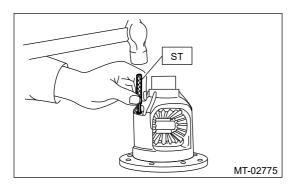


3. Align the pinion shaft pin hole with the differential case pin hole, and drive the straight pin into the holes from the hypoid driven gear side using the ST.

Note:

- Use a new straight pin.
- After driving the straight pin, crimp the area around the hole, and make sure that the straight pin will not come out.

ST 899904100 STRAIGHT PIN REMOVER



4. Install the taper roller bearing.

Caution:

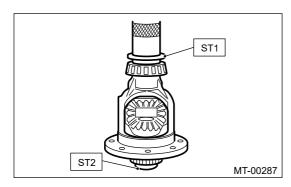
Do not apply a load in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

Note:

Be careful when handling because the taper roller bearing and the outer race are used as a set.

ST1 499277100 BUSHING 1-2 INSTALLER

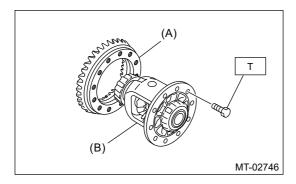
ST2 398497701 SEAT



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

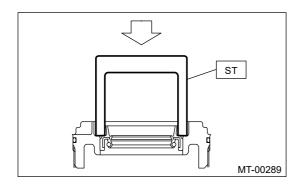
2. DIFFERENTIAL SIDE RETAINER

1. Using the ST, install the oil seal by lightly tapping with a plastic hammer.

Note:

- Use a new oil seal.
- 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.

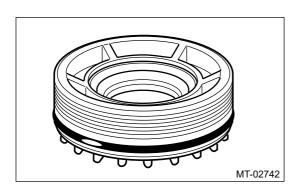
ST 18675AA000 DIFFERENTIAL SIDE OIL SEAL INSTALLER



2. Install the O-rings.

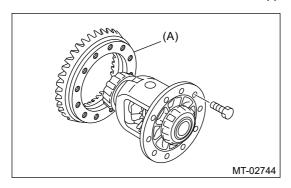
Note:

- Use new O-rings.
- 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.



1. DIFFERENTIAL CASE ASSEMBLY

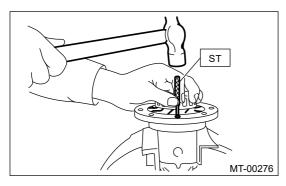
1. Loosen the twelve bolts and remove hypoid driven gear.



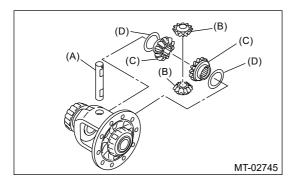
(A) Hypoid driven gear

2. Drive out the straight pin from differential assembly toward hypoid driven gear side.

ST 899904100 STRAIGHT PIN REMOVER



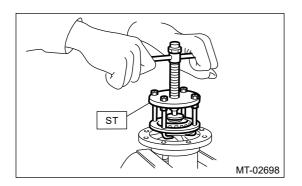
3. Pull out the pinion shaft, and remove the differential bevel pinion, differential bevel gear and adjusting washer.



- (A) Pinion shaft
- (B) Differential bevel pinion
- (C) Differential bevel gear
- (D) Adjusting washer

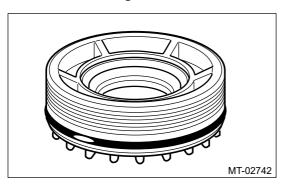
4. Using the ST, remove the taper roller bearing.

ST 899524100 PULLER SET



2. DIFFERENTIAL SIDE RETAINER

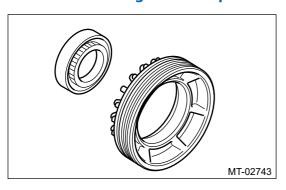
1. Remove the O-rings.



2. Remove the oil seal.

Note:

Remove using the flat tip screwdriver.

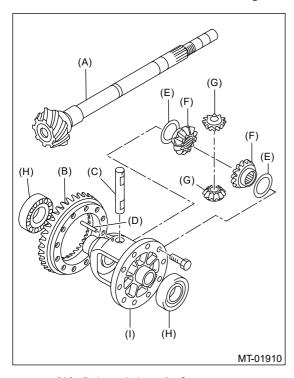


MANUAL TRANSMISSION AND DIFFERENTIAL(6MT) > Front Differential Assembly

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

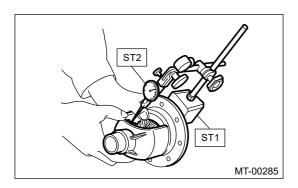
Measure the backlash between the differential bevel gear and differential bevel pinion. Adjust the backlash if not within specified limit. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Front Differential Assembly>ADJUSTMENT.

Standard backlash

0.13-0.18 mm (0.0051-0.0071 in)

ST1 498247001 MAGNET BASE

ST2 498247100 DIAL GAUGE



2. HYPOID DRIVEN GEAR BACKLASH

1. Set the ST1, ST2 and ST3. Insert the dial gauge probe through drain plug hole so that the probe comes in contact with the tooth surface on the right corner, and check the backlash.

ST1 498247001 MAGNET BASE

ST2 498247100 DIAL GAUGE

ST3 498255400 PLATE

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.

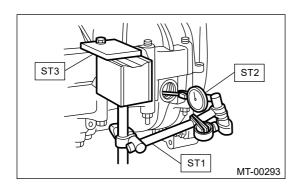
Note:

If the backlash is outside the specified range, adjust it by turning the differential side retainers on the left and right side.

Backlash

0.13-0.18 mm (0.0051-0.0071 in)

Part No. 38415AA100 Axle shaft

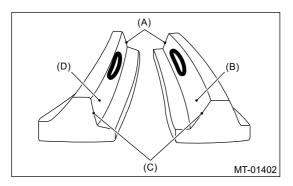


3. TOOTH CONTACT OF HYPOID DRIVEN GEAR

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 transmission 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(6MT)>Front Differential Assembly>ADJUSTMENT.

• Tooth contact is correct.



- (A) Toe
- (B) Coast side
- (C) Heel
- (D) Drive side

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT) > Front Differential Assembly

INSTALLATION

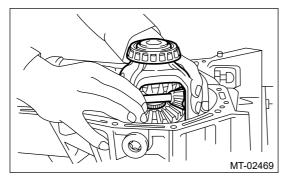
1. Install the differential side retainers using ST.

ST 18630AA010 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(6MT)>Main Shaft Assembly>INSTALLATION.
- **5.** Install the drive pinion shaft assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Drive Pinion Shaft Assembly>INSTALLATION.
- **6.** Install the transmission case. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Transmission Case>INSTALLATION.
- 7. Install the transfer case together with the extension case assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Transfer Case and Extension Case Assembly>INSTALLATION.
- 8. Install the manual transmission assembly to the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Manual Transmission Assembly>INSTALLATION.

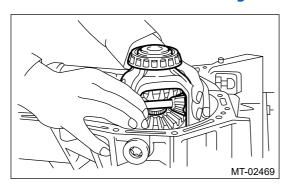
MANUAL TRANSMISSION AND DIFFERENTIAL(6MT) > Front Differential Assembly

REMOVAL

- 1. Remove the manual transmission assembly from the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Manual Transmission Assembly>REMOVAL.
- 2. Remove the transfer case together with the extension case assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Transfer Case and Extension Case Assembly>REMOVAL.
- **3.** Remove the transmission case. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Transmission Case>REMOVAL.
- **4.** Remove the drive pinion shaft assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Drive Pinion Shaft Assembly>REMOVAL.
- **5.** Remove the main shaft assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Main Shaft Assembly>REMOVAL.
- 6. Remove the front differential assembly.

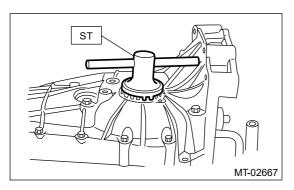
Note:

- 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 ST.

ST 18630AA010 WRENCH COMPL RETAINER



8. Remove the taper roller bearing outer race from the transmission case.

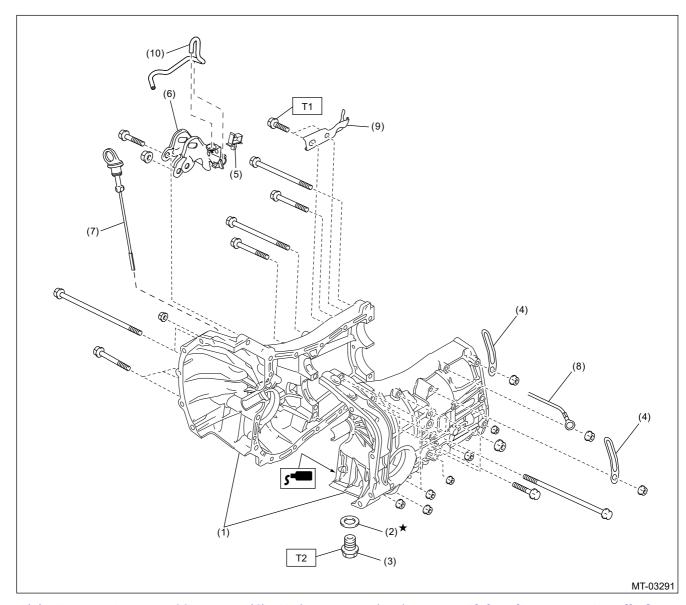
ST 398527700 PULLER ASSY

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT) > General Description

CAUTION

- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust and dirt.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
- When disassembling the case and other light alloy parts, disassemble by using a plastic hammer. Do not pry apart with screwdrivers or other tools.
- Vehicle components are extremely hot after driving. Be wary of receiving burns from heated parts.
- Use SUBARU genuine gear oil, grease or equivalent. Do not mix gear oil, grease, etc. of different grades or manufacturers.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or rigid racks at the specified points.
- Apply gear oil onto sliding or revolving surfaces before installation.
- Replace deformed or damaged snap rings with new parts.
- Before installing O-rings or oil seals, apply sufficient amount of gear oil to avoid damage and deformation.
- Be careful not to incorrectly install or fail to install O-rings, snap rings and other such parts.
- Before securing a part on a vise, place cushioning material such as wood blocks, aluminum plate, or cloth between the part and the vise.
- Avoid damaging the mating surface of the case.
- Before applying liquid gasket, completely remove and clean the old liquid gasket.
- Be careful of handling the oil seal, O-ring and gasket. If the contact surface of them is damaged, oil leakage may occur.
- When pressing-in the oil seal, make sure that the oil seal lip portion and outer surface are not damaged or tilted.
- When replacing the taper roller bearing, replace the outer race and inner race as a set.
- When replacing the hypoid gear, replace the hypoid driven gear and drive pinion shaft as a set.
- Replace the bolts if the seating surface or the thread surface is excessively rusted.

1. TRANSMISSION CASE



(1)	Transm	ission	case i	ASSY
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(6) Pitching stopper bracket

- (2) Gasket
- (3) Drain plug
- (4) Harness clip
- (5) Clamp

- (7) Oil level gauge
- (8) Transmission radio ground cord
- (9) Select bracket
- (10) Air breather hose

Tightening torque: N·m (kgf-m, ft-lb)

T1: 18 (1.8, 13.3)

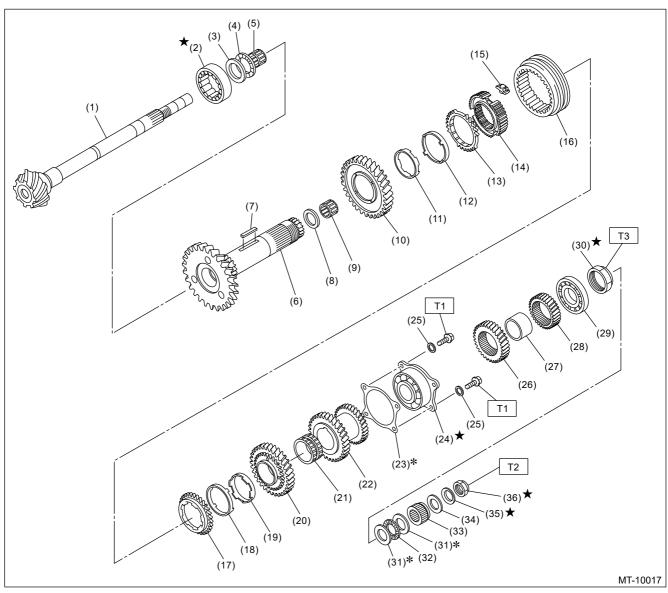
T2: 44 (4.5, 32.5) (aluminum gasket, silver)
70 (7.1, 51.6) (copper gasket, brown)

70 (7.1, 51.6) (metal gasket, black)

Transmission case tightening torque

(9) (5) (7) (16)	Bolt No.	Bolt size mm	Tightening torque: N·m (kgf-m, ft-lb)
(13)	(5) - (15)	8	25 (2.5, 18.4)
(13) (11) (11) (15) (3) (4) (14) (10) (6) (8) (12) MT-00003	(1) — (4) (16), (17)	10	40 (4.1, 29.5)

2. DRIVE PINION SHAFT ASSEMBLY

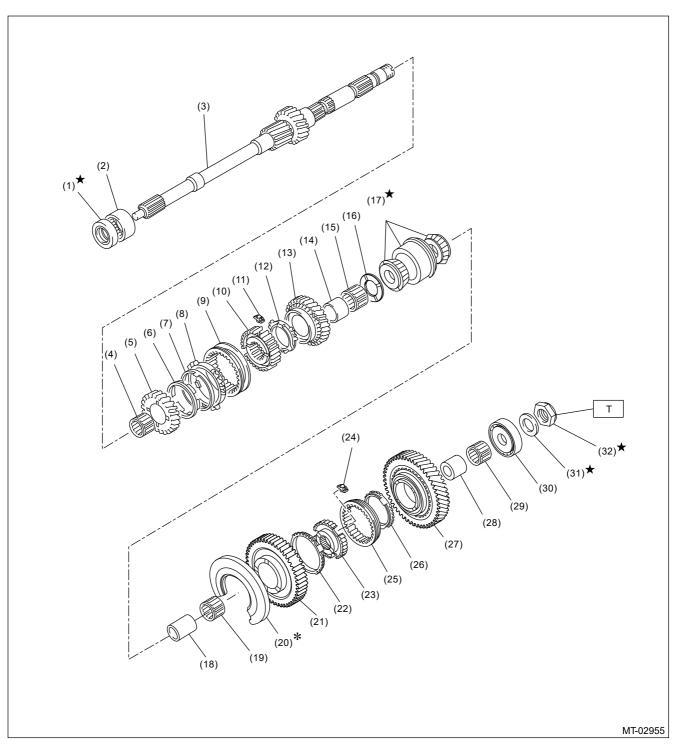


- (1) Drive pinion shaft
- (2) Roller bearing
- (3) Washer
- (4) Thrust bearing
- (5) Needle bearing

- (15) 1st-2nd shifting insert
- (16) 1st-2nd coupling sleeve
- (17) 2nd outer baulk ring
- (18) 2nd synchro cone
- (19) 2nd inner baulk ring
- (29) Ball bearing
- (30) Lock nut
- (31) Adjusting washer
- (32) Thrust bearing
- (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	Tightening torque: N·m (kgf-m,
				ft-lb)
(11)	1st inner baulk ring	(25)	Spring washer	T1: 30 (3.1, 22.1)
	3	(-)	Spring Washer	111 50 (511) 2211)
(12)	1st synchro cone	,	5th driven gear	T2: 126 (12.8, 92.9)
		(26)		
(13)	1st synchro cone	(26) (27)	5th driven gear	T2: 126 (12.8, 92.9)

3. MAIN SHAFT ASSEMBLY



-				
-	1	١.	\sim :	l seal
- (1	U	ii seai

- (2) Needle bearing
- (3) Main shaft
- (4) 3rd needle bearing
- (5) 3rd drive gear
- (6) 3rd inner baulk ring
- (7) 3rd synchro cone
- (8) 3rd outer baulk ring

- (13) 4th drive gear
- (14) 4th needle bearing race
- (15) 4th needle bearing
- (16) 4th gear thrust washer
- (17) Double taper roller bearing
- (18) 5th needle bearing race
- (19) 5th needle bearing
- (20) Main shaft rear plate

- (25) 5th-6th coupling sleeve
- (26) 6th baulk ring
- (27) 6th drive gear
- (28) 6th needle bearing race
- (29) 6th needle bearing
- (30) Ball bearing
- (31) Lock washer
- (32) Lock nut

- (9) 3rd-4th coupling sleeve
- (10) 3rd-4th synchronizer hub
- (21) 5th drive gear
- (22) 5th baulk ring

Tightening torque: N·m (kgf-m,

ft-lb)

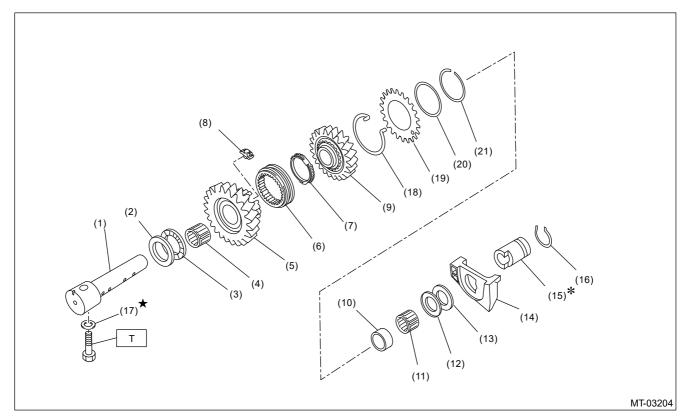
(11) 3rd-4th shifting insert

(12) 4th baulk ring

- (23) 5th-6th synchronizer hub
- (24) 5th-6th shifting insert

T: 160 (16.3, 118.0)

4. REVERSE IDLER GEAR ASSEMBLY



- (1) Reverse idler gear shaft
- (2) Reverse idler gear washer
- (3) Thrust bearing
- (4) Needle bearing
- (5) Reverse idler gear No. 2
- (6) Reverse coupling sleeve
- (7) Reverse baulk ring
- (8) Reverse shifting insert

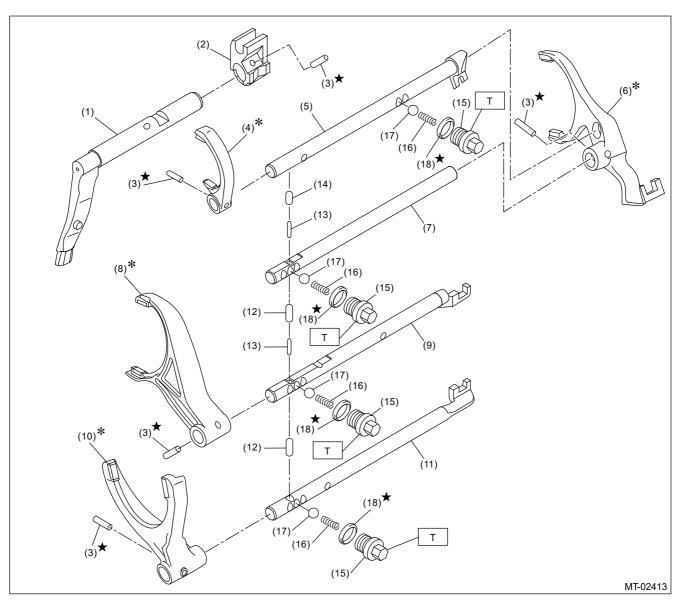
- (9) Reverse idler gear
- (10) Reverse idler gear collar
- (11) Needle bearing
- (12) Thrust bearing
- (13) Reverse idler gear washer
- (14) Oil case guide
- (15) Reverse idler gear bushing
- (16) Snap ring

- (17) Gasket
- (18) Reverse idler spring
- (19) Reverse idler sub gear
- (20) Friction plate
- (21) 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
- (2) Selector arm
- (3) Straight pin
- (4) Reverse shifter fork
- (5) Reverse fork rod
- (6) 5th-6th shifter fork
- (7) 5th-6th fork rod

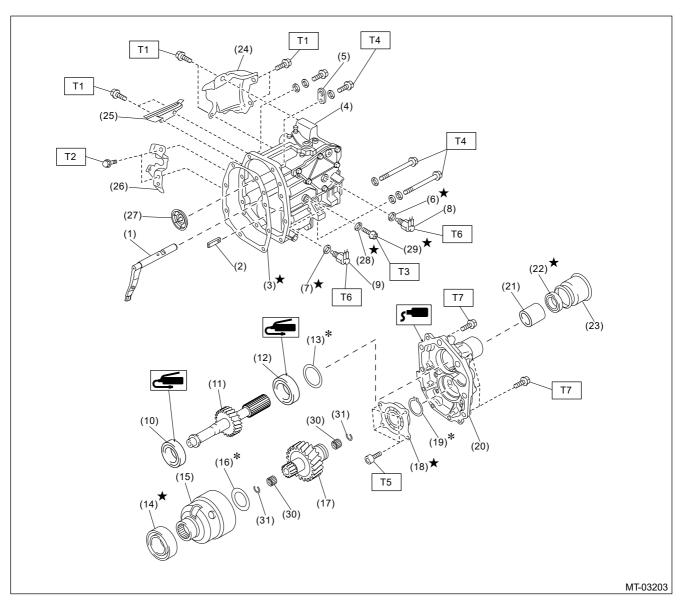
- (8) 3rd-4th shifter fork
- (9) 3rd-4th fork rod
- (10) 1st-2nd shifter fork
- (11) 1st-2nd fork rod
- (12) Interlock plunger
- (13) Interlock plunger
- (14) Interlock plunger

- (15) Checking ball plug
- (16) Checking ball spring
- (17) Check ball
- (18) Gasket

Tightening torque: N·m (kgf-m, ft-lb)

T: 20 (2.0, 14.8)

6. TRANSFER CASE AND EXTENSION



- (1) Shifter arm
- (2) Interlock plate
- (3) Gasket
- (4) Transfer case
- (5) Transmission hanger
- (6) Gasket
- (7) Gasket
- (8) Neutral position switch
- (9) Back-up light switch
- (10) Taper roller bearing (transfer case side)
- (11) Transfer driven gear
- (12) Taper roller bearing (extension case side)

- (16) Adjusting washer
- (17) Transfer drive gear
- (18) Ball bearing
- (19) Snap ring
- (20) Extension case
- (21) Bushing
- (22) Oil seal
- (23) Dust cover
- (24) Transfer cover
- (25) Dust cover
- (26) Shift bracket
- (27) Oil guide

(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)

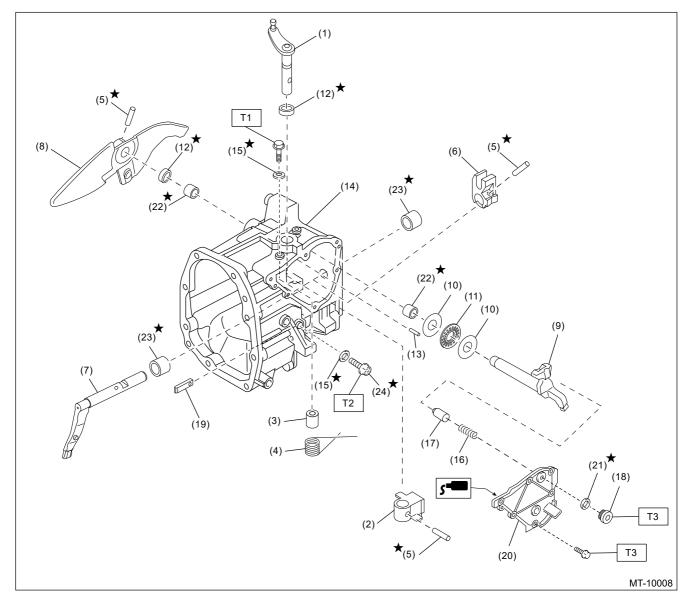
T5: 26 (2.7, 19.2)

T6: 32.3 (3.3, 23.8)

T7: 40 (4.1, 29.5)

- (13) Adjusting washer
- (14) Ball bearing
- (15) Center differential
- (28) Gasket
- (29) Precoat bolt
- (30) Needle bearing

7. SHIFT LINK ASSEMBLY



- (1) Selector lever COMPL
- (2) Selector arm No. 2
- (3) Shifter arm collar
- (4) Neutral set spring
- (5) Straight pin
- (6) Selector arm
- (7) Shifter arm
- (8) Shift lever COMPL
- (9) Shifter arm No. 2

- (11) Thrust bearing
- (12) Oil seal
- (13) Straight pin
- (14) Transfer case
- (15) Gasket
- (16) Checking ball spring
- (17) Shift accent plunger
- (18) Seal bolt
- (19) Interlock plate

- (21) Seal ring
- (22) Needle bearing
- (23) Roller bearing
- (24) Precoat bolt

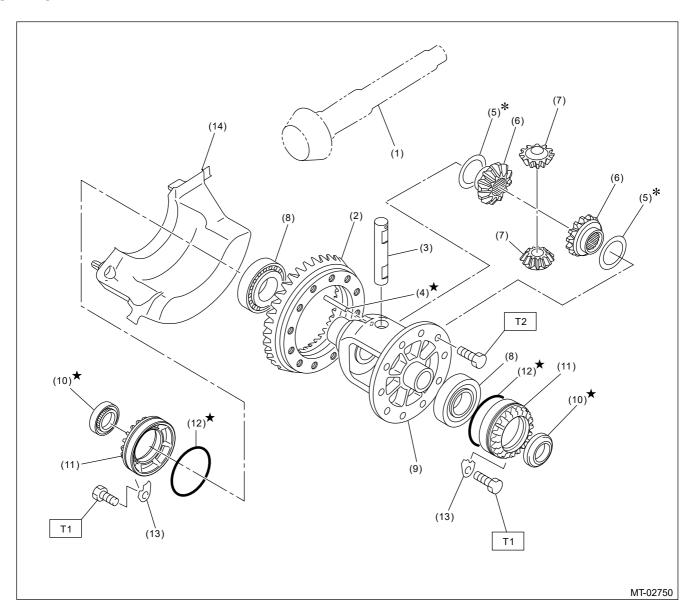
Tightening torque: N·m (kgf-m, ft-lb)

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
- (2) Hypoid driven gear
- (3) Pinion shaft
- (4) Straight pin
- (5) Adjusting washer
- (6) Differential bevel gear

- (7) Differential bevel pinion
- (8) Taper roller bearing
- (9) Differential case
- (10) Oil seal
- (11) Differential side retainer
- (12) O-ring

- (13) Retainer lock plate
- (14) Front oil guide

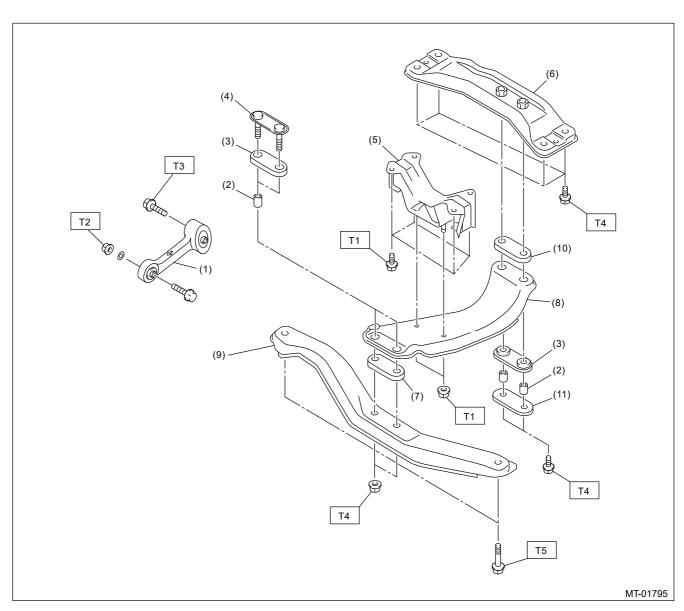
Tightening torque: N·m (kgf-m,

ft-lb)

T1: 25 (2.5, 18.4)

T2: 62 (6.3, 45.7)

9. TRANSMISSION MOUNTING



(1)	Pitching stopper	(7)	Upper cushion rubber	Tightening torque: N·m (kgf-m, ft-lb)
(2)	Spacer	(8)	Center crossmember	T1: 35 (3.6, 25.8)
(3)	Lower cushion rubber	(9)	Front crossmember	T2: 50 (5.1, 36.9)
(4)	Front plate	(10)	Rear cushion rubber	T3: 58 (5.9, 42.8)
(5)	Transmission cushion rubber	(11)	Rear plate	T4: 70 (7.1, 51.6)
(6)	Rear crossmember			T5: 140 (14.3, 103.3)

PREPARATION TOOL

1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
(1) (2) ST-899524100	899524100	PULLER SET	Used for removing the front differential taper roller bearing. (1) Puller (2) Cap
ST-399780104	399780104	WEIGHT	Used for adjusting preload on the front differential taper roller bearing.
ST-498077000	498077000	REMOVER	 Used for removing the roller bearing and washer of the drive pinion shaft assembly. Used for removing the transfer driven gear taper roller bearing.
ST-498077600	498077600	REMOVER	Used for removing the center differential ball bearing.
	498247001	MAGNET BASE	Used for measuring the backlash of differential bevel pinion gear and hypoid driven gear.

ST-498247001			Used together with DIAL GAUGE (498247100).
ST-498247100	498247100	DIAL GAUGE	 Used for measuring the backlash of differential bevel pinion gear and hypoid driven gear. Used together with MAGNET BASE (498247001).
ST18667AA020	18667AA020	HOLDER	 Used for removing and installing the drive pinion shaft assembly lock nut. Used for measuring the backlash of hypoid driven gear. Used for adjusting preload on the front differential taper roller bearing.
ST-498937000	498937000	TRANSMISSION HOLDER	Used for removing and installing the main shaft assembly lock nut.
	499277100	BUSHING 1-2 INSTALLER	 Used for installing the drive pinion shaft assembly washer. Used for installing the front differential taper roller bearing inner race.
ST-499277100			

ST-499277200	499277200	INSTALLER	 Used for installing the 3rd-4th driven gear, 5th driven gear, ball bearing and 6th driven gear. Used for installing the drive pinion shaft assembly washer.
ST-927640000	927640000	INSTALLER	Used for installing the taper roller bearing (transfer case side) of transfer driven gear.
ST18630AA010	18630AA010	WRENCH COMPL RETAINER	 Used for removing and installing the differential side retainer. Used for adjusting preload on the front differential taper roller bearing. Used for adjusting the backlash of hypoid driven gear. WRENCH COMPL RETAINER (499787000) can also be used.
ST18722AA010	18722AA010	REMOVER	Used for removing the 5th drive gear and 6th drive gear.
ST-499877000	499877000	RACE 4-5 INSTALLER	 Used for installing the 4th, 5th and 6th drive gear needle bearing races and the main shaft assembly double taper roller bearings. Used together with REMOVER (899714110).

ST-499917500	499917500	DRIVE PINION GAUGE ASSY	Used for adjusting the drive pinion shaft assembly shim.
ST-499927100	499927100	HANDLE	Used for backlash measurement of the hypoid driven gear and preload adjustment of the front differential taper roller bearing.
ST-499937100	499937100	TRANSMISSION STAND	Used for disassembling and assembling the transmission.
ST-499987003	499987003	SOCKET WRENCH (35)	Used for removing and installing the main shaft assembly lock nut.
ST-499987300	499987300	SOCKET WRENCH (50)	Used for removing and installing the driven shaft lock nut.

ST-899714110	899714110	REMOVER	Used for removing and installing the parts of main shaft assembly and driven shaft.
ST-899864100	899864100	REMOVER	 Used for removing the parts of the main shaft assembly. Used for removing the transfer driven gear taper roller bearing (transfer case side) and for installing it (extension case side). Used for removing the transfer drive gear ball bearing. Used for installing the transfer case taper roller bearing.
ST18680AA020	18680AA020	HOLDER	 Used for removing and installing the drive pinion shaft assembly lock nut. Used for removing and installing the driven shaft lock nut.
ST-899904100	899904100	STRAIGHT PIN REMOVER	Used for removing and installing the straight pin.
	398497701	SEAT	 Used for installing the front differential taper roller bearing. Used together with BUSHING 1-2 INSTALLER (499277100).

ST-398497701			
ST-498057300	498057300	INSTALLER	Used for installing the extension case oil seal.
ST-498255400	498255400	PLATE	Used for measuring the hypoid driven gear backlash.
ST41099AA020	41099AA020	ENGINE SUPPORT	Used for supporting engine. Used together with ENGINE SUPPORT BRACKET (41099AA012).
ST41099AA012	41099AA012	ENGINE SUPPORT BRACKET	 Used for supporting engine. Used together with ENGINE SUPPORT (41099AA020). ENGINE SUPPORT BRACKET (41099AA010 or 41099AA011) can also be used.

ST-398527700	398527700	PULLER ASSY	 Used for removing the extension case oil seal. Used for removing the front differential taper roller bearing outer race. Used for removing the differential side retainer oil seal.
ST-398643600	398643600	GAUGE	Used for adjusting the extension end play.
ST-398177700	398177700	INSTALLER	 Used for installing the transfer drive gear ball bearing. Used for installing the 4th drive gear needle bearing race.
ST-498175500	498175500	INSTALLER	Used for installing the taper roller bearing of transfer driven gear (extension case side).
ST28399SA010	28399SA010	OIL SEAL PROTECTOR	Used for protecting the oil seal from damage when inserting the front drive shaft.

	18675AA000	DIFFERENTIAL SIDE OIL SEAL INSTALLER	Used for installing the differential side retainer oil seal.
ST18675AA000			
	398791700	REMOVER	Used for removing and installing the straight pin.
ST-398791700			
	18662AA010	SOCKET (27)	 Used for removing and installing the drive pinion shaft assembly lock nut. Used for measuring the starting torque of the drive pinion shaft assembly.
ST18662AA010			
ST-899754112	899754112	PRESS	 Used for removing driven shaft parts. Used to install the main shaft assembly ball bearing.
	18631AA000	HANDLE	Used for installing transfer case assembly and extension case assembly.
ST18631AA000			
		1	,

ST18762AA001	18762AA001	COMPRESSOR SPECIAL TOOL	 Used for removing the 1st driven gear. COMPRESSOR SPECIAL TOOL (18762AA000) can also be used.
ST18654AA000	18654AA000	INSTALLER	Used for installing the 2nd driven gear bushing.
ST18657AA000	18657AA000	INSTALLER	Used for installing the transfer case oil seal.
ST-498267200	498267200	CYLINDER HEAD TABLE	Used for removing and installing the roller bearing of the transfer case.
ST-498267300	498267300	CYLINDER HEAD TABLE	Used for removing and installing the roller bearing of the transfer case.

	18763AA000	COMPRESSOR SHAFT	Used for removing and installing the needle bearing of the transfer case.
ST18763AA000			
	498277200	STOPPER SET	 Used for installing the needle bearing of the transfer case. Use only the spacer.
ST-498277200			

2. GENERAL TOOL

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance, voltage and current.
TORX [®] bit T70	Used for removing and installing the drain plug.
Spring pin remover	Used for removing and installing the straight pin. $(3-3.3 \text{ mm})$
Socket driver (TORX $^{\mbox{\scriptsize 8}}$ 45 size, tamper resistant type)	Used for removing and installing interlock plate.

1. MANUAL TRANSMISSION AND DIFFERENTIAL

Туре			6-forward speeds and 1-reverse	
15		1st	3.454	
	2nd		1.888	
		3rd	1.296	
Transmission go	ear ratio	4th	0.972	
		5th	0.780	
	6		0.695	
		Rev.	3.636	
Front Final	Type of gear	Hypoid		
reduction gear		Gear ratio	4.444	
Rear reduction	Transfer	Type of gear	Helical	
gear		Gear ratio	1.000	
Front differential	Type and number of gear		Straight bevel gear (bevel pinion: 2, bevel gear: 2)	
Center differential	Type and number of gear		Straight bevel gear (bevel pinion: 2, bevel gear: 2, viscous coupling)	
Transmission ge	ear oil		SUBARU GEAR OIL EXTRA MT or equivalent	
Transmission gear oil capacity		acity	3.3 L (3.5 US qt, 2.9 Imp qt)	

2. TRANSMISSION GEAR OIL

Caution:

If an alternative transmission gear oil is used, you may not have expected functionality and performance.

Recommended oil:

SUBARU GEAR OIL EXTRA MT

Alternative:

GL-5 (75W-90)

1. MANUAL TRANSMISSION

Symptoms	Possible cause	Corrective action
Gears are difficult to intermesh. Note: The cause for difficulty in shifting gears can be classified into two types: One is a defective gear	(a) Worn, damaged or burred chamfer at internal spline of the sleeve	Replace.
shift system and the other is defective transmission. However, if the operation is heavy and engagement of the	(b) Worn, damaged or burred chamfer of gear spline	Replace.
gears is difficult, a defective clutch	(c) Worn or scratched bushings	Replace.
disengagement may also be responsible. Check whether the clutch is correctly functioning, before checking the gear shift system and transmission.	(d) Incorrect contact or wear between baulk ring and gear cone	Repair or replace.
Gear slip-out Gear slips out when coasting	(a) Defective pitching stopper adjustment	Replace.
on rough road.	(b) Loose engine mounting bolts	Tighten or replace.
Gear slips out during acceleration.	(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.
	(I) Worn 6th drive gear and needle bearing	Replace.
	(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.
Note: If a noise is heard when the vehicle is parked with its engine idling and if a noise ceases when the clutch is	(b) Worn or damaged gears and bearings Note: If the trouble is only wear of the gear teeth surfaces, only a high	Replace.
disengaged, it may be considered that the noise is coming from the transmission.	whirring noise will occur at high speeds, but if any part is broken, rhythmical clicking sounds will be heard even at low speeds.	

2. DIFFERENTIAL

Symptoms	Possible cause	Corrective action
1. Broken differential (case, gear, bearing, etc.) Note: Noise will occur, and eventually the differential will not be	(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.
able to operate due to broken pieces obstructing the gear revolution.	(b) Use of vehicle under severe conditions such as excessive load or improper use of the clutch (c) Improper adjustment of	Readjust the preload and backlash of the bearing, and the contact surface of gear. Adjust.
	taper roller bearing	
	(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	Add recommended oil to the specified level. Do not use vehicle under severe operating conditions.

	(f) Loose hypoid driven gear clamping bolts	Tighten.
 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. There are the following four kinds of noises. 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. Gear noise when coasting: Damaged gears due to misadjusted bearings and incorrect shim adjustment Bearing noise when driving or coasting: Cracked, broken or damaged bearings Noise mainly when turning: Noise main	(a) Insufficient oil	Replenish 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.
	(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.

ADJUSTMENT

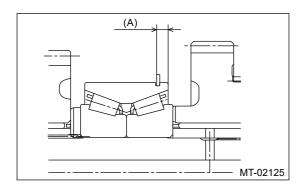
Selection of main shaft rear plate:

Measure the protrusion amount (A) of 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.

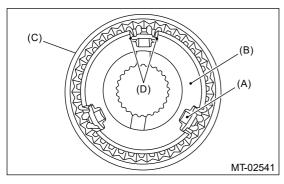
Dimension (A) mm (in)	Part No.	Mark
4.00 — 4.13 (0.1575 — 0.1626)	32294AA041	1
3.87 — 4.00 (0.1524 — 0.1575)	32294AA051	2



ASSEMBLY

Note:

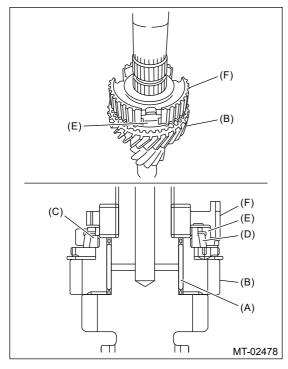
- Match the alignment marks, and install the coupling sleeve and then install the shifting insert.
- Make sure that there is no large clearance at both sides of the shifting insert after assembly.



- (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.

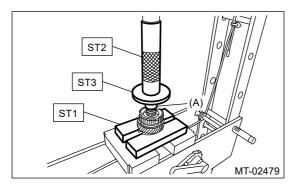
Caution:

Do not apply a load in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

ST1 899714110 REMOVER

ST2 499877000 RACE 4-5 INSTALLER

ST3 398177700 INSTALLER

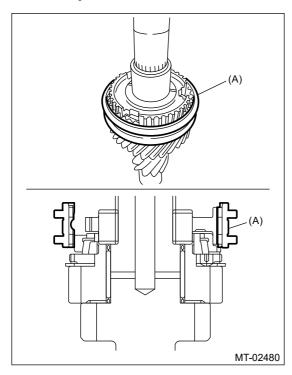


(A) 4th needle bearing race

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.

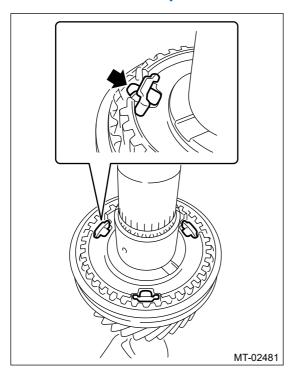


(A) 3rd-4th coupling sleeve

4. Install the 3rd-4th shifting insert.

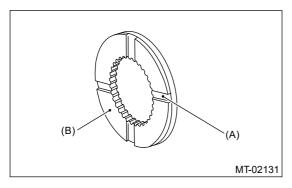
Note:

Press in the ball part to install.

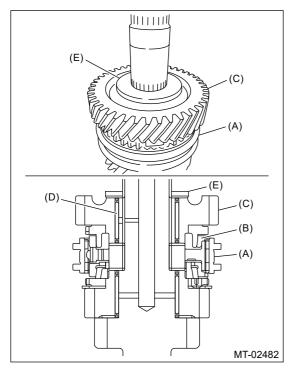


- 5. Install the 4th baulk ring, 4th needle bearing, 4th drive gear and 4th gear thrust washer.

 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 the double taper roller bearing using ST1, ST2 and a press.

Caution:

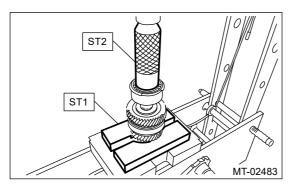
Do not apply a load in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

Note:

- Use a new double taper roller bearing.
- Install the double taper roller bearing with snap ring side facing the 5th drive gear side.

ST1 899714110 REMOVER

ST2 499877000 RACE 4-5 INSTALLER



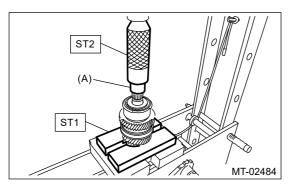
- **7.** Make sure that the double taper roller bearing turns smoothly.
- 8. Install the 5th needle bearing race using ST1, ST2 and press.

Caution:

Do not apply a load in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

ST1 899714110 REMOVER

ST2 499877000 RACE 4-5 INSTALLER

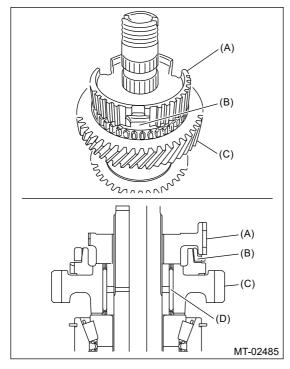


(A) 5th needle bearing race

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.



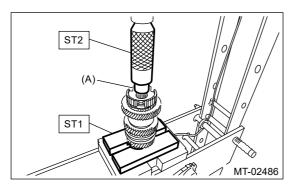
- (A) 5th-6th synchronizer hub
- (B) 5th baulk ring
- (C) 5th drive gear
- (D) 5th needle bearing (cage: black)
- 10. Install the 6th needle bearing race using ST1, ST2 and press.

Caution:

Do not apply a load in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

ST1 899714110 REMOVER

ST2 499877000 RACE 4-5 INSTALLER

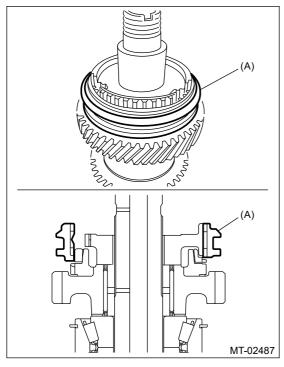


(A) 6th needle bearing race

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.

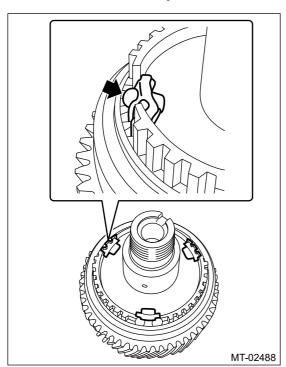


(A) 5th-6th coupling sleeve

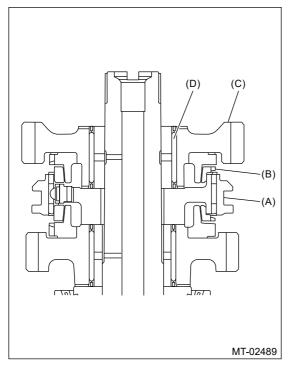
12. Install the 5th-6th shifting insert.

Note:

Press in the ball part to install.



13. Install the 6th baulk ring, 6th drive gear and 6th needle bearing.



- (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 ST2 and a press.

Caution:

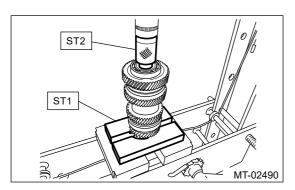
Do not apply a load in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

Note:

Install the ball bearing with the side which does not have lock nut mounting dent facing 6th drive gear.

ST1 899714110 REMOVER

ST2 899754112 PRESS

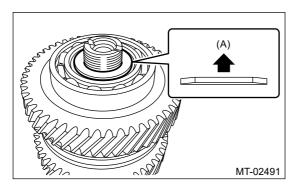


15. Install the lock washer.

Note:

• Use a new lock washer.

• Install the lock washer in the correct direction.



(A) Lock nut side

16. Install the lock nut using ST1 and ST2.

Note:

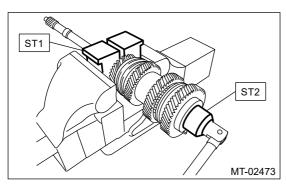
Use a new lock nut.

Tightening torque:

160 N·m (16.3 kgf-m, 118.0 ft-lb)

ST1 498937000 TRANSMISSION HOLDER

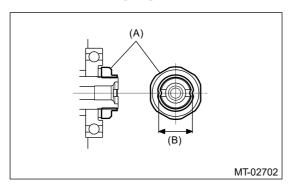
ST2 499987003 SOCKET WRENCH (35)



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

DISASSEMBLY

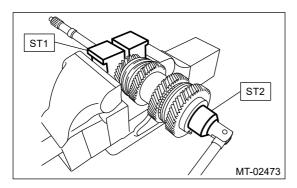
Note:

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. Flatten the tab of the lock nut.
- 3. Remove the lock nut and lock washer using ST1 and ST2.

ST1 498937000 TRANSMISSION HOLDER

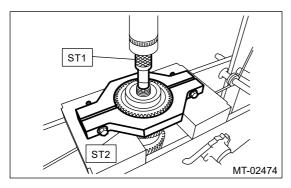
ST2 499987003 SOCKET WRENCH (35)



4. Remove the 6th drive gear and ball bearing using the ST1, ST2 and a press.

ST1 899864100 REMOVER

ST2 18722AA010 REMOVER



5. Remove the 6th needle bearing, 6th baulk ring, 5th-6th shifting insert and 5th-6th coupling sleeve.

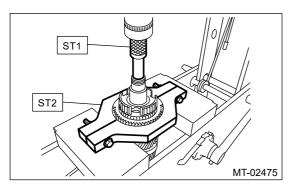
Caution:

When removing the 5th-6th coupling sleeve, be careful not to lose the 5th-6th shifting insert.

6. Remove the 5th drive gear, 6th needle bearing race, 5th baulk ring, 5th-6th synchronizer hub

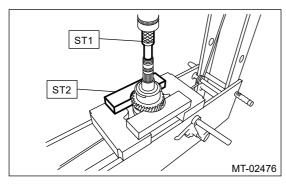
and 5th needle bearing using the ST1, ST2 and a press.

ST1 899864100 REMOVER
ST2 18722AA010 REMOVER



- 7. Shift the 3rd-4th coupling sleeve to the 3rd side.
- **8.** 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.

ST1 899864100 REMOVER ST2 899714110 REMOVER



9. Remove the 4th baulk ring, 4th needle bearing, 3rd-4th shifting insert and 3rd-4th coupling sleeve.

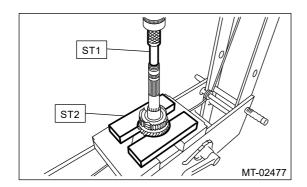
Caution:

When removing the 3rd-4th coupling sleeve, be careful not to lose the 3rd-4th shifting insert.

10. 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.

ST1 899864100 REMOVER

ST2 899714110 REMOVER



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

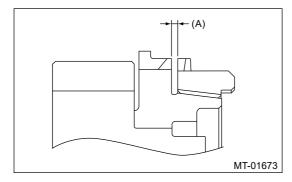
Replace the baulk ring and synchro cone in the following cases.

- 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.

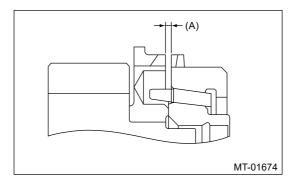
Clearance (A):

0.5 mm (0.020 in) or more

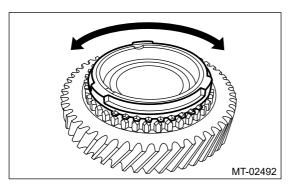
· Single cone



· Double cone

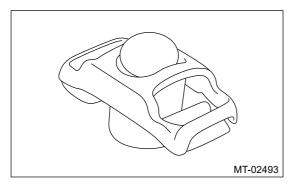


• Apply transmission gear oil to the cone of the gear and while press-fitting the baulk ring, check there is no rotation in the circumferential direction.



- 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

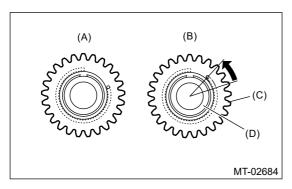
Repair or replace the gearshift mechanism if excessively worn, bent or defective in any way.

INSTALLATION

1. Attach the needle bearing and oil seal to the front of the main shaft assembly.

Note:

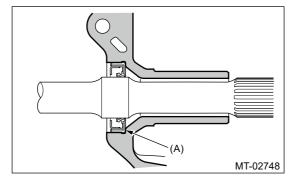
- Wrap the clutch splined section with vinyl tape to prevent damage to the oil
- Apply NICHIMOLY N-130 or the equivalent to the sealing lip of the oil seal.
- Use a new oil seal.
- 2. Rotate the reverse idler sub gear by two teeth from free status in the direction of the arrow to make it engage with 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.



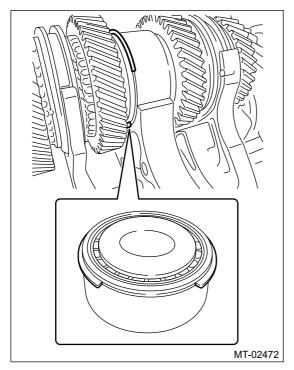
- (A) Free status
- (B) Set status
- (C) Reverse idler sub gear
- (D) Reverse idler gear
- **3.** Fit the transmission case knock pin to the knock pin hole of the needle bearing outer race and install the main shaft assembly.

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(6MT)>Drive Pinion Shaft Assembly>INSTALLATION.
- **6.** Check each shifter fork. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Shifter Fork and Rod>INSPECTION.
- 7. Select a main shaft rear plate. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Main Shaft Assembly>ADJUSTMENT.
- 8. Install the transmission case. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Transmission Case>INSTALLATION.
- **9.** Install the transfer case together with the extension case assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Transfer Case and Extension Case Assembly>INSTALLATION.
- **10.** Install the manual transmission assembly to the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Manual Transmission Assembly>INSTALLATION.

REMOVAL

- 1. Remove the manual transmission assembly from the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Manual Transmission Assembly>REMOVAL.
- 2. Remove the transfer case together with the extension case assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Transfer Case and Extension Case Assembly>REMOVAL.
- **3.** Remove the transmission case. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Transmission Case>REMOVAL.
- **4.** Remove the drive pinion shaft assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Drive Pinion Shaft Assembly>REMOVAL.
- 5. Remove the main shaft assembly.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT) > Manual Transmission Assembly

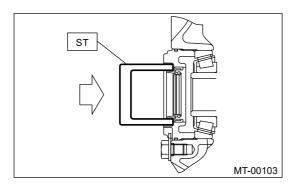
INSTALLATION

1. Replace the differential side retainer oil seal. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Differential Side Retainer Oil Seal>REPLACEMENT.

Note:

- Be sure to replace the oil seal after removing the front drive shaft.
- When a new oil seal has been installed, replacement is not required.

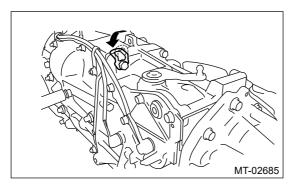
ST 18675AA000 DIFFERENTIAL SIDE OIL SEAL INSTALLER



2. 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.

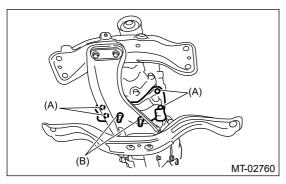


- 3. Install the transmission cushion rubber to the transmission, and tighten the bolt (A).
- **4.** Install the transmission cushion rubber to the center crossmember, and temporarily tighten the nut (B).

Tightening torque:

Bolt (A)

35 N·m (3.6 kgf-m, 25.8 ft-lb)



- 5. Install the transmission assembly onto the engine.
 - (1) Lift up the transmission gradually using a transmission jack.
 - (2) Engage at the spline section.

Note:

Be careful not to hit the main shaft against the clutch cover.

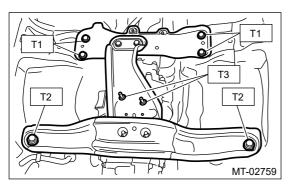
- **6.** While raising the transmission jack, loosen the turnbuckle of the ST, and set the engine unit to the original position.
- 7. Install the front crossmember and rear crossmember.
- **8.** Tighten the transmission cushion rubber mounting nut.

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)

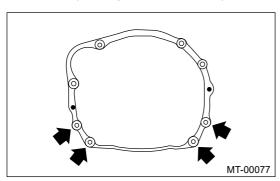
T3: 35 N·m (3.6 kgf-m, 25.8 ft-lb)



- **9.** Take out the transmission jack.
- 10. 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)



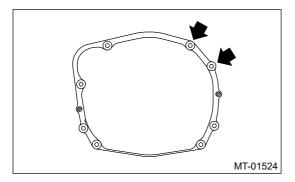
11. Lower the vehicle.

12. Install the starter. Ref. to STARTING/CHARGING SYSTEMS(H4DO)>Starter>INSTALLATION.

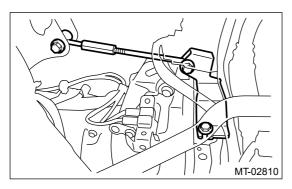
13. Tighten the bolts which hold the upper side of the transmission to the engine.

Tightening torque:

50 N·m (5.1 kgf-m, 36.9 ft-lb)



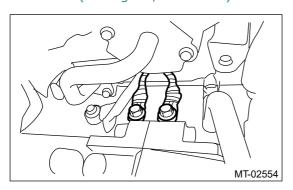
14. Remove the ST.



15. Install the ground cable.

Tightening torque:

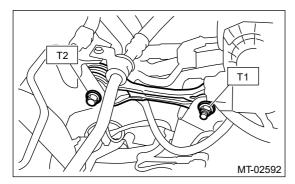
19 N·m (1.9 kgf-m, 14.0 ft-lb)



16. Install the pitching stopper.

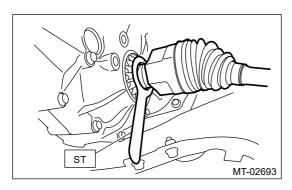
Tightening torque:

T1: 50 N·m (5.1 kgf-m, 36.9 ft-lb) T2: 58 N·m (5.9 kgf-m, 42.8 ft-lb)



- 17. Lift up the vehicle.
- 18. Install the ST to the transmission, and then install the front drive shaft.

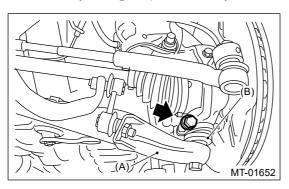
ST 28399SA010 OIL SEAL PROTECTOR



19. Insert the front arm ball joint and tighten the mounting bolt.

Tightening torque:

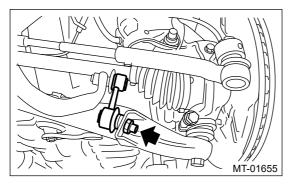
50 N·m (5.1 kgf-m, 36.9 ft-lb)



- (A) Front arm
- (B) Ball joint
- **20.** Install the stabilizer link.

Tightening torque:

60 N·m (6.1 kgf-m, 44.3 ft-lb)



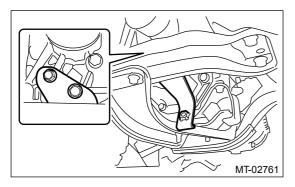
21. Install the MT gear shift cable and MT gear select cable to MT gear shift lever. Ref. to CONTROL SYSTEMS>MT Gear Shift Lever>INSTALLATION.

Caution:

- Do not bend MT gear shift cable and MT gear select cable at a sharp angle.
- If the MT gear select cable is removed from the selector lever COMPL on the transmission side, replace with new MT gear select cable.
- **22.** Install the propeller shaft. Ref. to DRIVE SHAFT SYSTEM>Propeller Shaft>INSTALLATION.
- 23. Install the hanger bracket.

Tightening torque:

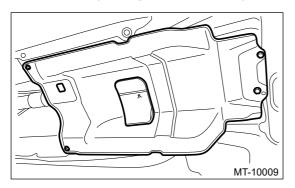
23 N·m (2.3 kgf-m, 17.0 ft-lb)



24. Install the center exhaust cover.

Tightening torque:

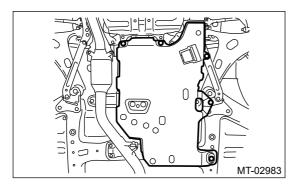
18 N·m (1.8 kgf-m, 13.3 ft-lb)



25. Install the transmission under cover.

Tightening torque:

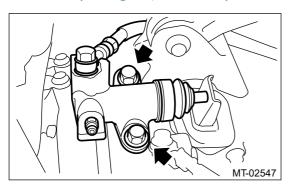
18 N·m (1.8 kgf-m, 13.3 ft-lb)



- **26.** Install the center exhaust pipe. Ref. to EXHAUST(H4DO)>Center Exhaust Pipe>INSTALLATION.
- **27.** Install the front under cover. Ref. to EXTERIOR/INTERIOR TRIM>Front Under Cover>INSTALLATION.
- 28. Lower the vehicle.
- **29.** Install the operating cylinder.

Tightening torque:

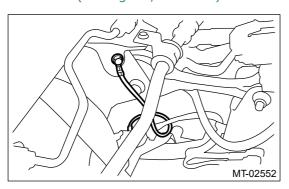
37 N·m (3.8 kgf-m, 27.3 ft-lb)



30. Install the transmission radio ground cord terminal.

Tightening torque:

13 N·m (1.3 kgf-m, 9.6 ft-lb)



31. Install the engine hanger rear.

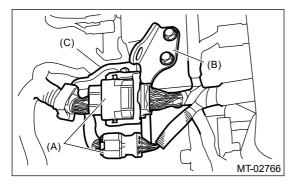
Tightening torque:

21 N·m (2.1 kgf-m, 15.5 ft-lb)

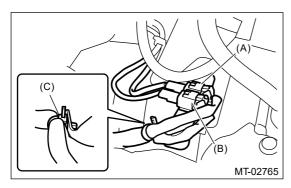
32. Connect the engine harness connector, then attach the harness bracket.

Tightening torque:

7.5 N·m (0.8 kgf-m, 5.5 ft-lb)



- (A) Engine harness connectors
- (B) Engine hanger rear
- (C) Harness bracket
- **33.** Connect the following connectors and secure the clip.

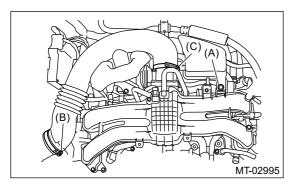


- (A) Neutral position switch connector (2P, brown)
- (B) Back-up light switch connector (2P, gray)
- (C) Clip
- **34.** Pour in transmission gear oil and check the oil level. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Transmission Gear Oil.
- **35.** Install the air intake boot. Ref. to INTAKE (INDUCTION)(H4DO)>Air Intake Boot>INSTALLATION.
- **36.** Install the front tires.
- **37.** Connect the battery ground terminal.

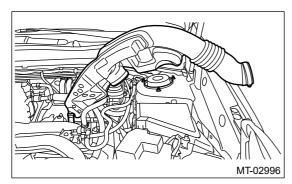
MANUAL TRANSMISSION AND DIFFERENTIAL(6MT) > Manual Transmission Assembly

REMOVAL

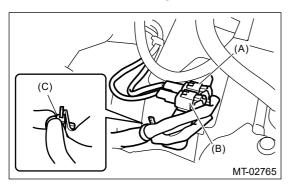
- 1. Disconnect the ground cable from battery.
- **2.** Remove the clip (A) from the air intake boot.
- **3.** Loosen the clamp (B) connecting the air intake boot and air cleaner case (rear).
- 4. Loosen the clamp (C) which connects the air intake boot and throttle body.



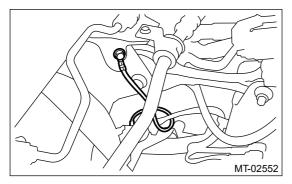
5. Remove the air intake boot from the throttle body, and move it to the left side wheel apron.



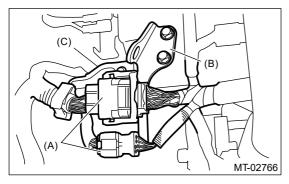
6. Disconnect the following connectors and remove the clip.



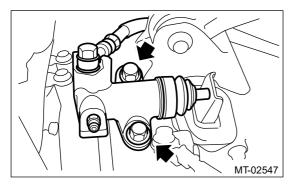
- (A) Neutral position switch connector (2P, brown)
- (B) Back-up light switch connector (2P, gray)
- (C) Clip
- **7.** Disconnect the transmission radio ground cord terminal.



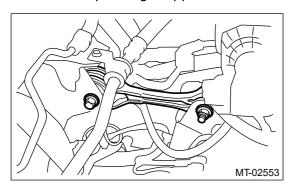
8. Remove the harness bracket and disconnect the engine harness connectors, and then remove the engine hanger rear.



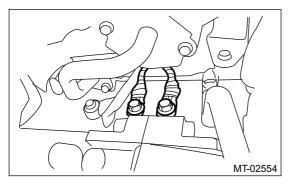
- (A) Engine harness connectors
- (B) Engine hanger rear
- (C) Harness bracket
- **9.** Remove the starter. <a> Ref. to STARTING/CHARGING SYSTEMS(H4DO)>Starter>REMOVAL.
- **10.** Remove the operating cylinder and suspend on a wire.



11. Remove the pitching stopper.



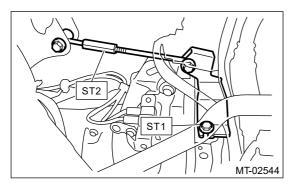
12. Disconnect two ground cables from rear end of the engine.



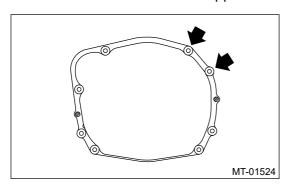
13. Set the ST.

ST1 41099AA012 ENGINE SUPPORT BRACKET

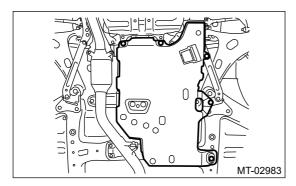
ST2 41099AA020 ENGINE SUPPORT



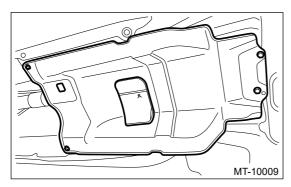
14. Remove the bolts which hold upper side of transmission to engine.



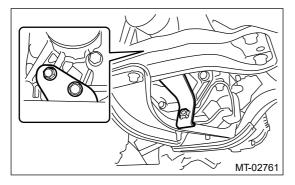
- **15.** Remove the front tires.
- **16.** Lift up the vehicle.
- **17.** Remove the front under cover. Ref. to EXTERIOR/INTERIOR TRIM>Front Under Cover>REMOVAL.
- **18.** Remove the center exhaust pipe. Ref. to EXHAUST(H4DO)>Center Exhaust Pipe>REMOVAL.
- **19.** Remove the transmission under cover.



- **20.** Drain transmission gear oil completely. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Transmission Gear Oil>REPLACEMENT.
- **21.** Remove the center exhaust cover.



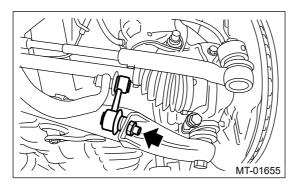
22. Remove the hanger bracket.



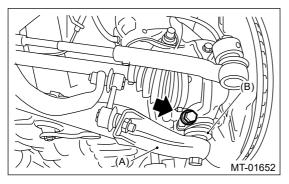
- 23. Remove the propeller shaft. Remove the propeller shaft. Removal.
- **24.** Remove the MT gear shift cable and MT gear select cable from MT gear shift lever. Ref. to CONTROL SYSTEMS>MT Gear Shift Lever>REMOVAL.

Caution:

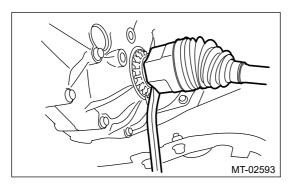
- Do not bend MT gear shift cable and MT gear select cable at a sharp angle.
- If the MT gear select cable is removed from the selector lever COMPL on the transmission side, replace with new MT gear select cable.
- **25.** Disconnect the stabilizer link.



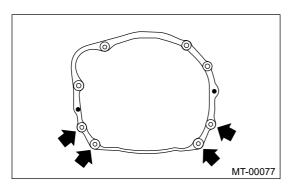
26. Remove the bolt securing the ball joint of the front arm to the housing, then separate the front arms and the housing.



- (A) Front arm
- (B) Ball joint
- **27.** Using a crowbar, separate the left and right front drive shafts.



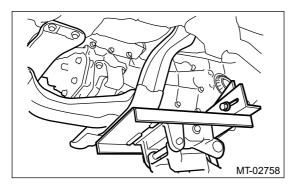
28. Remove the bolts and nuts which hold lower side of transmission to engine.



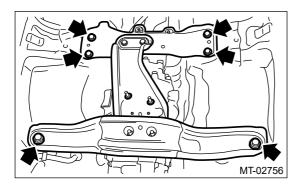
29. Place the transmission jack under the transmission.

Caution:

Always support the transmission case with a transmission jack.



30. Remove the front crossmember and the rear crossmember.



- **31.** While lowering the transmission jack, tighten the turnbuckle of the ST, and incline the engine unit rearward.
- **32.** Remove the transmission assembly.

Note:

Move the transmission jack towards the rear until the main shaft is withdrawn from the clutch cover.

33. Remove the transmission cushion rubber.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT) > Oil Seal

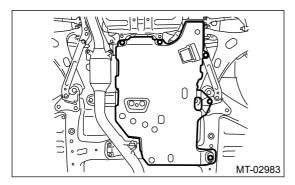
INSPECTION

Check for transmission gear oil leaks at oil seal area. If there is an oil leak, replace the oil seal with new one and check the propeller shaft.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT) > Oil Seal

REPLACEMENT

- 1. Disconnect the ground cable from battery.
- 2. Lift up the vehicle.
- 3. Remove the transmission under cover.



- 4. Clean the transmission exterior.
- 5. Using the TORX[®] bit T70, remove the drain plug, and drain the transmission gear oil completely.

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.
- **6.** Attach the drain plug using TORX[®] bit T70.

Note:

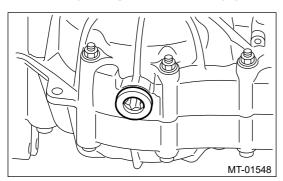
Use a new gasket.

Tightening torque:

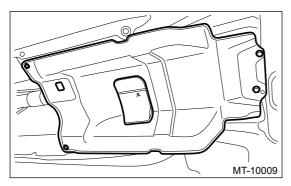
44 N·m (4.5 kgf-m, 32.5 ft-lb) (aluminum gasket, silver)

70 N·m (7.1 kgf-m, 51.6 ft-lb) (copper gasket, brown)

70 N·m (7.1 kgf-m, 51.6 ft-lb) (metal gasket, black)

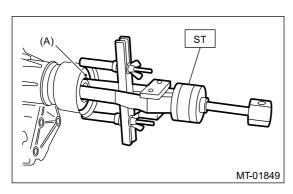


- 7. Remove the rear exhaust pipe. Ref. to EXHAUST(H4DO)>Rear Exhaust Pipe>REMOVAL.
- 8. Remove the center exhaust cover.



- **9.** Remove the propeller shaft. <a> Ref. to DRIVE SHAFT SYSTEM>Propeller Shaft>REMOVAL.
- **10.** Using the ST, remove the oil seal.

ST 398527700 PULLER ASSY



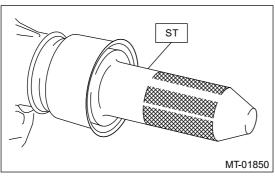
(A) Oil seal

11. Using the ST, install the oil seal.

Note:

- When grease is not applied to the oil seal lips, apply the transmission gear oil to the oil seal lips.
- Use a new oil seal.

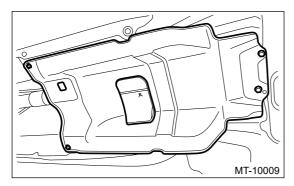
ST 498057300 INSTALLER



- **12.** Install the propeller shaft. Ref. to DRIVE SHAFT SYSTEM>Propeller Shaft>INSTALLATION.
- **13.** Install the center exhaust cover.

Tightening torque:

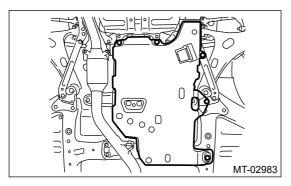
18 N·m (1.8 kgf-m, 13.3 ft-lb)



- **14.** Install the rear exhaust pipe. Ref. to EXHAUST(H4DO)>Rear Exhaust Pipe>INSTALLATION.
- **15.** Install the transmission under cover.

Tightening torque:

18 N·m (1.8 kgf-m, 13.3 ft-lb)



- 16. Lower the vehicle.
- 17. Pour in transmission gear oil and check the oil level. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Transmission Gear Oil.
- **18.** Connect the battery ground terminal.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT) > Preparation for Overhaul

PROCEDURE

- 1. Clean oil, grease, dirt and dust from the transmission.
- 2. When transmission gear oil remains in the transmission, using the TORX[®] bit T70, remove the drain plug, and drain the gear oil completely.
- **3.** Attach the drain plug using TORX[®] bit T70.

Note:

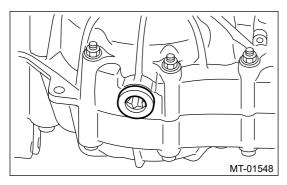
Use a new gasket.

Tightening torque:

44 N·m (4.5 kgf-m, 32.5 ft-lb) (aluminum gasket, silver)

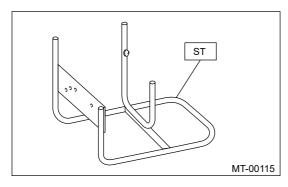
70 N·m (7.1 kgf-m, 51.6 ft-lb) (copper gasket, brown)

70 N·m (7.1 kgf-m, 51.6 ft-lb) (metal gasket, black)



4. Attach the transmission to the ST.

ST 499937100 TRANSMISSION STAND



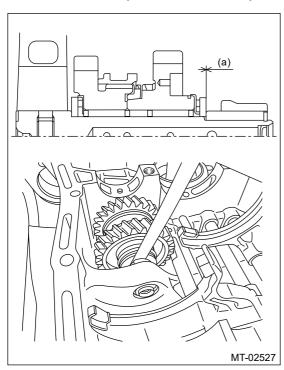
- 5. Apply transmission gear oil to rotating parts before assembly.
- **6.** All disassembled parts, if to be reused, should be reinstalled in the original positions.
- **7.** Gaskets, lock washers and lock nuts must be replaced with new ones.
- **8.** Apply liquid gasket to the specified areas to prevent leakage.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT) > Reverse Idler Gear

ADJUSTMENT

 Select the appropriate reverse idler gear bushing from the table below, and adjust until the clearance between the reverse idler gear and reverse idler gear washer is within specification.
 Clearance (a):

$$0.1 - 0.3 \text{ mm} (0.004 - 0.012 \text{ in})$$



Reverse idler gear bushing					
Part No.	Length mm (in)	Groove for identification			
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			

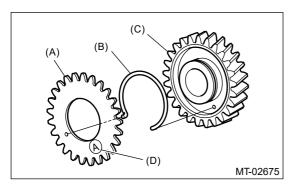
ASSEMBLY

1. REVERSE IDLER GEAR ASSY

1. Attach the reverse idler sub gear and reverse idler spring.

Note:

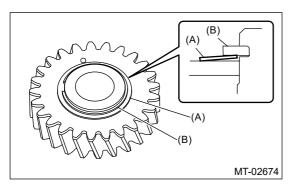
Point the stamp (marking A) towards the outside, and install the reverse idler sub gear.



- (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.

Note:

Make sure the friction plate is installed in the proper direction.

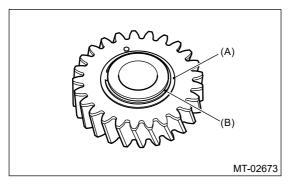


- (A) Friction plate
- (B) Snap ring

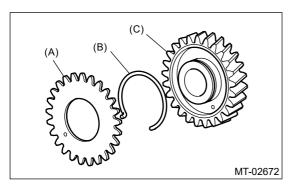
DISASSEMBLY

1. REVERSE IDLER GEAR ASSY

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.



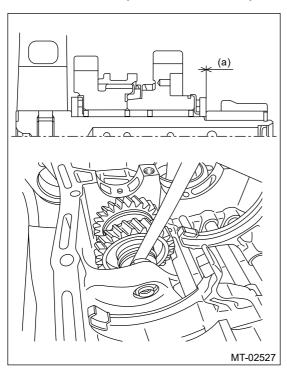
- (A) Reverse idler sub gear
- (B) Reverse idler spring
- (C) Reverse idler gear

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT) > Reverse Idler Gear

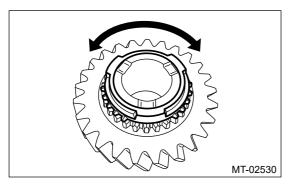
INSPECTION

1. Check the clearance between the reverse idler gear bushing and reverse idler gear washer. If the value is out of specification, select the appropriate reverse idler gear bushing and adjust. Clearance (a):

$$0.1 - 0.3 \text{ mm} (0.004 - 0.012 \text{ in})$$

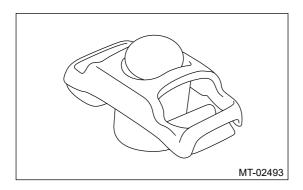


- 2. Check the reverse idler gear and reverse idler gear shaft for damage. Replace if it is damaged.
- **3.** Apply transmission gear oil to the cone of the reverse idler gear and while press-fitting the reverse baulk ring, check there is no rotation in the circumferential direction.



- **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.

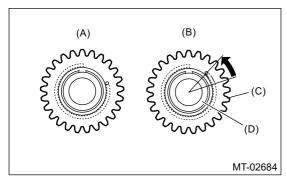


MANUAL TRANSMISSION AND DIFFERENTIAL(6MT) > Reverse Idler Gear

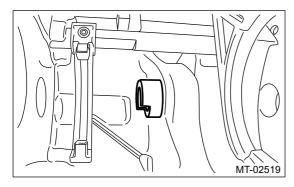
INSTALLATION

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.



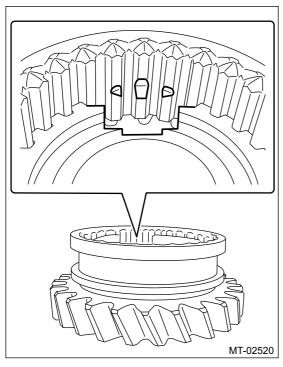
- (A) Free status
- (B) Set status
- (C) Reverse idler sub gear
- (D) Reverse idler gear
- 1. Install the reverse idler gear bushing with the cutout portion of the reverse idler gear bushing facing the front of the transmission.



- 2. Assembling reverse idler gear assembly
 - (1) Install the reverse coupling sleeve to the reverse idler gear No. 2.

Note:

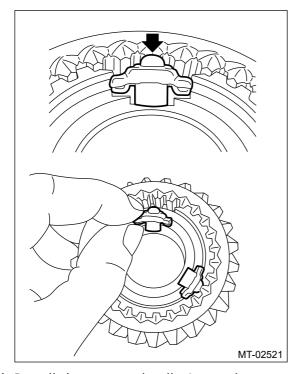
- Install the reverse coupling sleeve in the correct direction.
- Make sure that the oval-shaped cutout portion inside the reverse coupling sleeve matches the center of the reverse idler gear No. 2 groove.



(2) Install the reverse shifting insert.

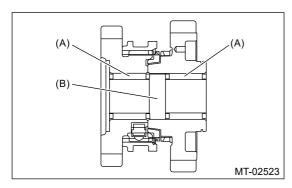
Note:

Press in the ball part to install.



(3) Install the reverse baulk ring and reverse idler gear.

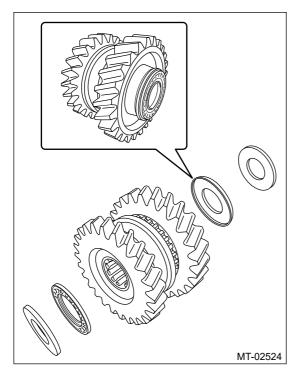
- (A) Reverse idler gear
- (B) Reverse baulk ring
- (4) Install the needle bearing and reverse idler gear collar.



- (A) Needle bearing
- (B) Reverse idler gear collar
- (5) Install the thrust bearing and reverse idler gear washer.

Note:

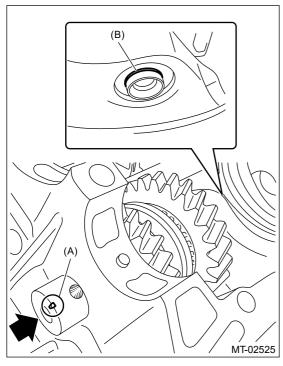
Install the thrust bearing in the correct direction.



- **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

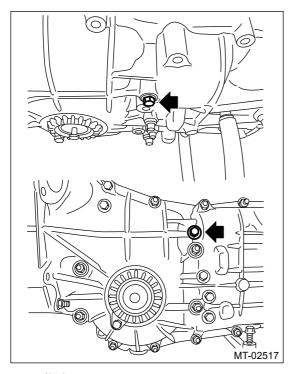
shaft

(B) Snap ring installation groove

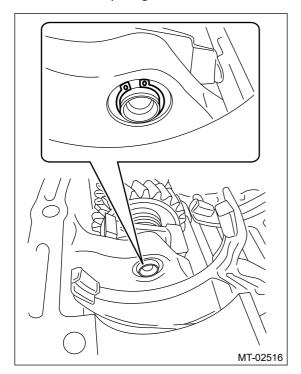
5. Install the reverse idler gear shaft securing bolt.

Tightening torque:

25 N·m (2.5 kgf-m, 18.4 ft-lb)



6. Install the snap ring.

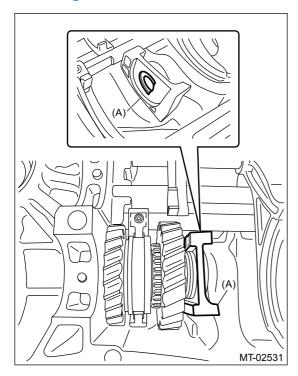


7. Select the reverse idler gear bushing. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Reverse Idler Gear>ADJUSTMENT.

- **8.** Remove the reverse idler gear assembly and replace with the selected bushing. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>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

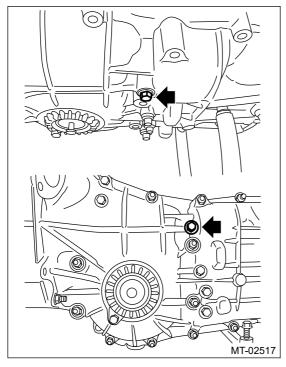
10. Install the reverse idler gear shaft securing bolt.

Note:

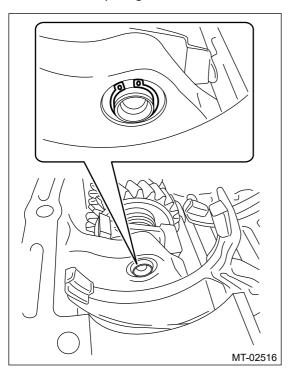
Use a new gasket.

Tightening torque:

25 N·m (2.5 kgf-m, 18.4 ft-lb)



11. Install the snap ring.



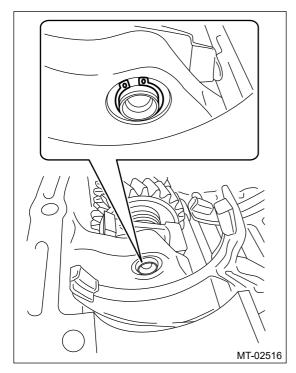
- **12.** Check the reverse shifter fork. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Shifter Fork and Rod>INSPECTION.
- 13. Install the front differential assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Front Differential Assembly>INSTALLATION.
- **14.** Install the main shaft assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Main Shaft Assembly>INSTALLATION.
- **15.** Install the drive pinion shaft assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Drive Pinion Shaft Assembly>INSTALLATION.

- **16.** Install the transmission case. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Transmission Case>INSTALLATION.
- 17. Install the transfer case together with the extension case assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Transfer Case and Extension Case Assembly>INSTALLATION.
- **18.** Install the back-up light switch and the neutral position switch. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Switches and Harness>INSTALLATION.
- 19. Install the manual transmission assembly to the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Manual Transmission Assembly>INSTALLATION.

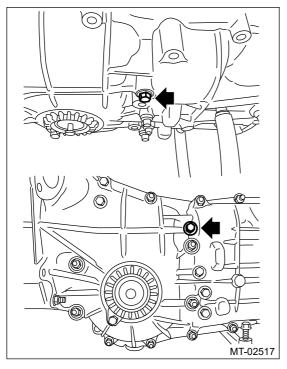
MANUAL TRANSMISSION AND DIFFERENTIAL(6MT) > Reverse Idler Gear

REMOVAL

- 1. Remove the manual transmission assembly from the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Manual Transmission Assembly>REMOVAL.
- **2.** Remove the back-up light switch and the neutral position switch. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Switches and Harness>REMOVAL.
- **3.** Remove the transfer case together with the extension case assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Transfer Case and Extension Case Assembly>REMOVAL.
- **4.** Remove the transmission case. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Transmission Case>REMOVAL.
- **5.** Remove the drive pinion shaft assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Drive Pinion Shaft Assembly>REMOVAL.
- **6.** Remove the main shaft assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Main Shaft Assembly>REMOVAL.
- 7. Remove the front differential assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Front Differential Assembly>REMOVAL.
- 8. Shift into 4th.
- 9. Remove the snap ring.



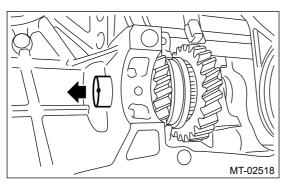
10. Remove the reverse idler gear shaft securing bolt.



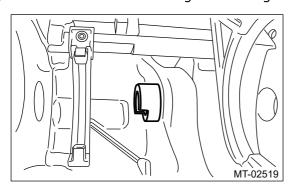
11. Remove the reverse idler gear shaft by pushing it out.

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(6MT) > Shift Link Assembly

INSTALLATION

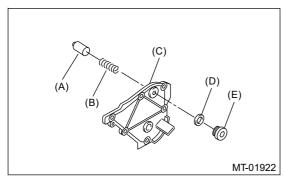
- 1. Clean the mating surface of the transmission cover and transfer case.
- 2. Install the shift accent plunger and the check ball spring.

Note:

Use new seal rings.

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. Using the ST, install the needle bearing.

Note:

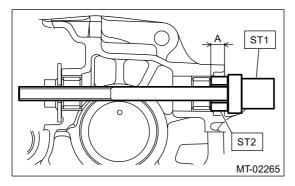
- Use a new needle bearing.
- If the press-fit depth exceeds the service limit, replace with a new needle bearing.

ST1 18763AA000 COMPRESSOR SHAFT

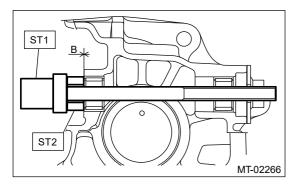
ST2 498277200 STOPPER SET

Press-fit depth of needle bearing:

A: 8.5 ± 0.2 mm (0.33 ± 0.01 in) from the end of transfer case



B: 0.2±0.2 mm (0.01±0.01 in) from the end of transfer case



4. Set ST1, ST2 and transfer case to a press.

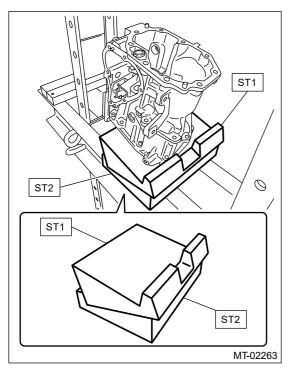
Note:

Set the ST2 under ST1.

• Set the transfer case so that the hole for shifter arm is positioned vertically.

ST1 498267300 CYLINDER HEAD TABLE

ST2 498267200 CYLINDER HEAD TABLE



5. Using the ST, install the roller bearing.

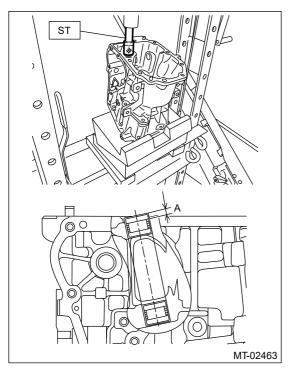
Note:

- Use a new roller bearing.
- Gradually perform the press-fit operation while measuring the press-fit depth.
- If the press-fit depth exceeds the service limit, replace with a new bearing.

ST 899864100 REMOVER

Press-fit depth of roller bearing:

A: 5.1 ± 0.2 mm (0.20 ± 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.

Note

- Insert the iron plate which is thicker than the exposed length of the transfer case knock pin between the ST 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 the roller bearing.

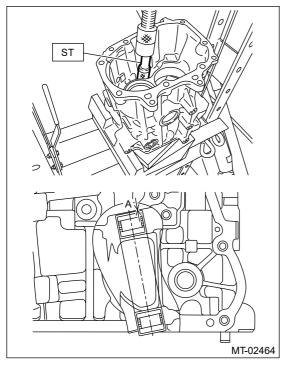
Note:

- Use a new roller bearing.
- Gradually perform the press-fit operation while measuring the press-fit depth.
- If the press-fit depth exceeds the service limit, replace with a new bearing.

ST 899864100 REMOVER

Press-fit depth of roller bearing:

A: 0 ± 0.2 mm $(0\pm0.01$ in) from the end of transfer case



8. Using the ST, install the oil seal.

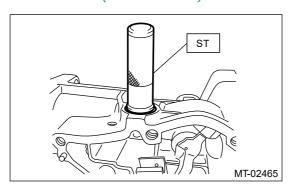
Note:

- Use a new oil seal.
- 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.

ST 18657AA000 INSTALLER

Press-fit depth of oil seal:

 1 ± 0.2 mm (0.04 ±0.01 in) from the end of transfer case

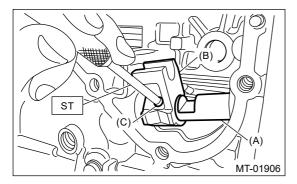


9. Insert the shifter arm and fix with a straight pin.

Note:

Use a new straight pin.

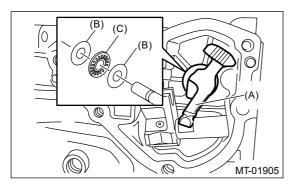
ST 398791700 REMOVER



- (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.



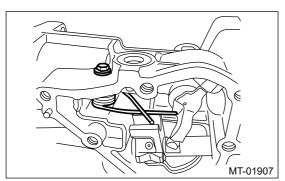
- (A) Shifter arm No. 2
- (B) Adjusting washer
- (C) Thrust bearing
- 11. Install the shifter arm collar and neutral set spring.

Note:

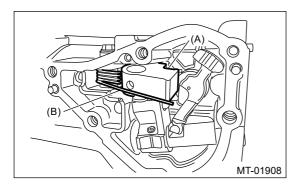
Use a new gasket.

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 straight pin.

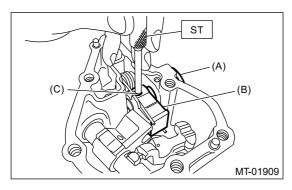
Caution:

Be careful not to damage the oil seal.

Note:

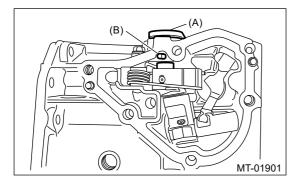
Use a new straight pin.

ST 398791700 REMOVER



- (A) Selector lever COMPL
- (B) Selector arm No. 2
- (C) Straight pin

14. Insert a new straight pin.

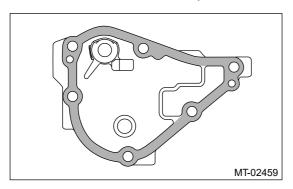


- (A) Selector lever COMPL
- (B) Straight pin

- 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(6MT)>Transfer Case and Extension Case Assembly>INSTALLATION.
- **17.** Apply liquid gasket seamlessly.

Liquid gasket:

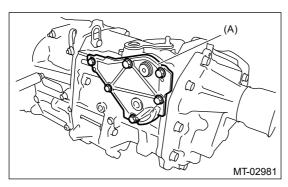
THREE BOND 1215B or equivalent



18. Install the transmission cover.

Tightening torque:

25 N·m (2.5 kgf-m, 18.4 ft-lb)



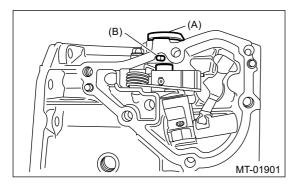
(A) Transmission cover

- 19. Install the back-up light switch and the neutral position switch. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Switches and Harness>INSTALLATION.
- **20.** Install the manual transmission assembly to the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Manual Transmission Assembly>INSTALLATION.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT) > Shift Link Assembly

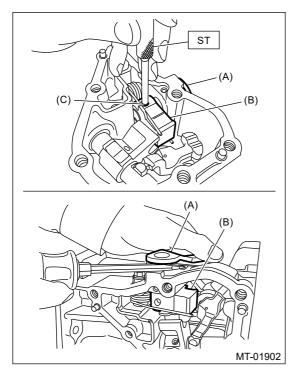
REMOVAL

- 1. Remove the manual transmission assembly from the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Manual Transmission Assembly>REMOVAL.
- **2.** Remove the back-up light switch and the neutral position switch. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Switches and Harness>REMOVAL.
- **3.** Remove the transfer case together with the extension case assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Transfer Case and Extension Case Assembly>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(6MT)>Transfer Driven Gear>REMOVAL.
- **6.** Pull out the straight pin.

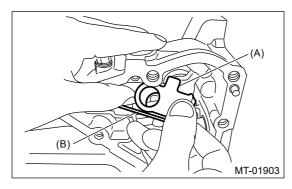


- (A) Selector lever COMPL
- (B) Straight pin
- 7. Use the ST to remove the straight pin, and remove the selector lever COMPL.

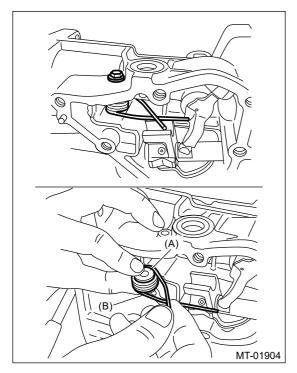
ST 398791700 REMOVER



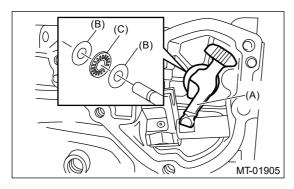
- (A) Selector lever COMPL
- (B) Selector arm No. 2
- (C) Straight pin
- 8. Pull out the selector arm No. 2.



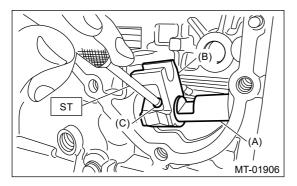
- (A) Selector arm No. 2
- (B) Neutral set spring
- **9.** Remove the bolts and remove the shifter arm collar and neutral set spring.



- (A) Shifter arm collar
- (B) Neutral set spring
- 10. Remove the shifter arm No. 2, adjusting washers and thrust bearing.



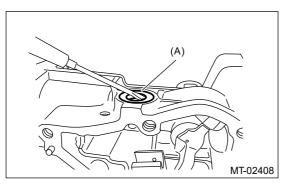
- (A) Shifter arm No. 2
- (B) Adjusting washer
- (C) Thrust bearing
- **11.** Use the ST to remove the straight pin, and remove the shifter arm and selector arm.
 - ST 398791700 REMOVER



- (A) Shifter arm
- (B) Selector arm
- (C) Straight pin
- 12. Remove the oil seal using a screwdriver wrapped with tape, etc.

Note:

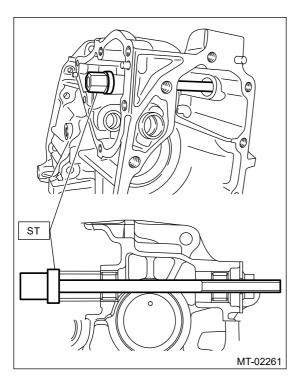
The illustration shows the oil seal of selector lever COMPL. Perform the same procedures for removing the shifter arm No. 2.

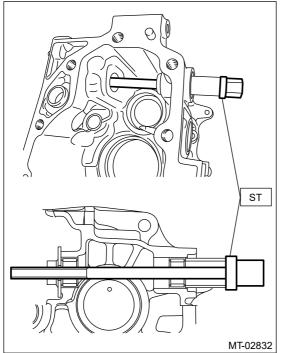


(A) Oil seal

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.

ST 18763AA000 COMPRESSOR SHAFT





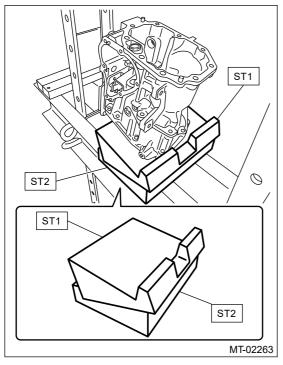
14. Set ST1, ST2 and transfer case to a press.

Note:

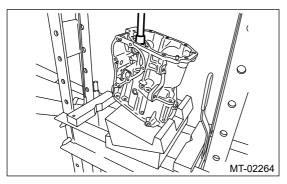
- Set the ST2 under ST1.
- Set the transfer case so that the hole for shifter arm is positioned vertically.

ST1 498267300 CYLINDER HEAD TABLE

ST2 498267200 CYLINDER HEAD TABLE

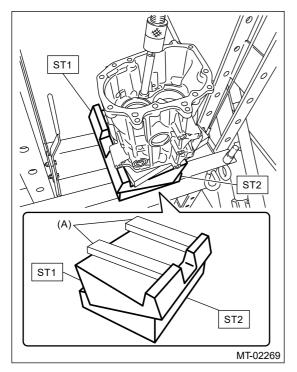


15. Remove the roller bearing by using a round bar with the diameter of 22 mm (0.87 in) or 23 mm (0.91 in).



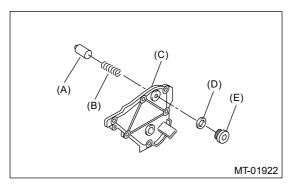
16. Flip over the transfer case, and set an iron plate between transfer case and ST. **Note:**

- Insert the iron plate which is thicker than the exposed length of the transfer case knock pin between the ST 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

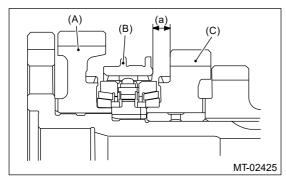
MANUAL TRANSMISSION AND DIFFERENTIAL(6MT) > Shifter Fork and Rod

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 between 2nd driven gear and coupling sleeve. If any clearance is not within specifications, replace the shifter fork as required.

Clearance (a):

$$7.4 - 7.8 \text{ mm} (0.291 - 0.307 \text{ in})$$



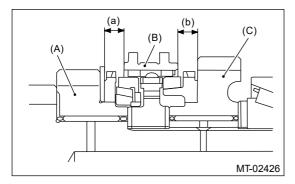
- (A) 1st driven gear
- (B) Coupling sleeve
- (C) 2nd driven gear

1st-2nd shifter fork			
Part No.	Content		
32804AA120	1	Approaches 2nd gear by 0.2 mm (0.008 in).	
32804AA130	No mark	Standard	
32804AA140	2	Approaches 1st gear by 0.2 mm (0.008 in).	

4. Inspect the clearance between the 3rd, 4th drive gear and the coupling sleeve. If any clearance is not within specifications, replace the shifter fork as required.

Clearance (a), (b):

7.5 mm (0.295 in)



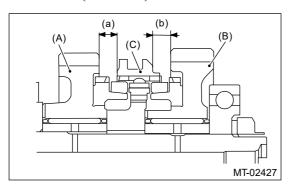
- (A) 3rd drive gear
- (B) Coupling sleeve
- (C) 4th drive gear

3rd-4th shifter fork			
Part No. Mark		Content	
32810AA061	1	Approaches 4th gear by 0.2 mm (0.008 in).	
32810AA071	No mark	Standard	
32810AA101	3	Approaches 3rd gear by 0.2 mm (0.008 in).	

5. Inspect the clearance between 5th, 6th drive gear and coupling sleeve. If any clearance is not within specifications, replace the shifter fork as required.

Clearance (a), (b):

7.5 mm (0.295 in)



- (A) 5th drive gear
- (B) 6th drive gear
- (C) Coupling sleeve

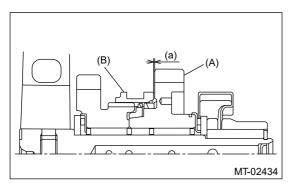
5th-6th shifter fork			
Part No.	Mark	Content	
32940AA050	1	Approaches 5th gear by 0.2 mm	

		(0.008 in).
32940AA060	No mark	Standard
32940AA070	2	Approaches 6th gear by 0.2 mm (0.008 in).

6. Check the clearance between the reverse idler gear and reverse coupling sleeve. If any clearance is not within specifications, replace the shifter fork as required.

Clearance (a):

0.50 mm (0.020 in) or less



- (A) Reverse idler gear
- (B) Reverse coupling sleeve

Reverse shifter fork			
Part No.	Mark	Content	
32941AA070	2	Approaches reverse idler gear by 0.3 mm (0.012 in).	
32941AA060	No mark	Standard	
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 not within specifications, replace the rod or fork as required.

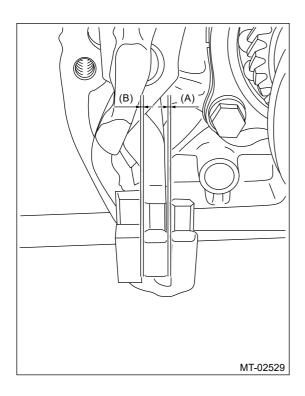
Clearance (A):

$$1st-2nd - 3rd-4th$$

0.1 - 0.9 mm (0.004 - 0.035 in)

Clearance (B):

0.2 - 1.0 mm (0.008 - 0.039 in)



MANUAL TRANSMISSION AND DIFFERENTIAL(6MT) > Shifter Fork and Rod

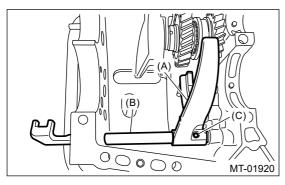
INSTALLATION

- 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 the straight pin into these holes using the ST to fix.

Note:

Use a new straight pin.

ST 398791700 REMOVER

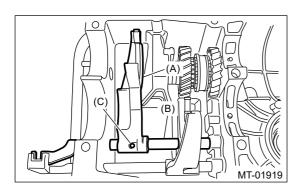


- (A) 1st-2nd shifter fork
- (B) 1st-2nd fork rod
- (C) Straight pin
- **3.** Install the 3rd-4th fork rod to the 3rd-4th shifter fork through the hole on the rear of the transmission case.
- **4.** Align the holes on the 3rd-4th fork rod and 3rd-4th shifter fork, and drive the straight pin into these holes using the ST to fix.

Note:

- Use a new straight pin.
- · Set other fork rods to neutral.
- Check that the positions of interlock plunger is correct.

ST 398791700 REMOVER



- (A) 3rd-4th shifter fork
- (B) 3rd-4th fork rod

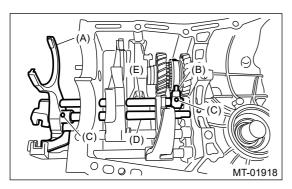
(C) Straight pin

- **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 the straight pin into these holes using the ST to fix.

Note:

- Use a new straight pin.
- Set other fork rods to neutral.
- Check that the positions of interlock plunger is correct.

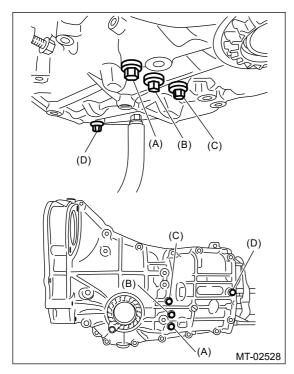
ST 398791700 REMOVER



- (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)

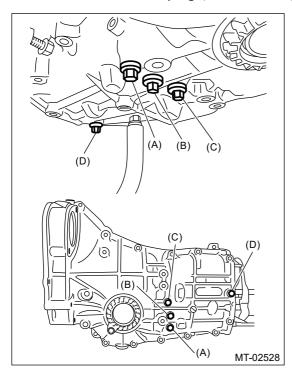


- (A) 1st-2nd
- (B) 3rd-4th
- (C) 5th-6th
- (D) Rev.
- 8. Install the reverse idler gear assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Reverse Idler Gear>INSTALLATION.
- **9.** Install the front differential assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Front Differential Assembly>INSTALLATION.
- **10.** Install the main shaft assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Main Shaft Assembly>INSTALLATION.
- **11.** Install the drive pinion shaft assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Drive Pinion Shaft Assembly>INSTALLATION.
- **12.** Install the transmission case. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Transmission Case>INSTALLATION.
- 13. Install the transfer case together with the extension case assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Transfer Case and Extension Case Assembly>INSTALLATION.
- **14.** Install the back-up light switch and the neutral position switch. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Switches and Harness>INSTALLATION.
- **15.** Install the manual transmission assembly to the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Manual Transmission Assembly>INSTALLATION.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT) > Shifter Fork and Rod

REMOVAL

- 1. Remove the manual transmission assembly from the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Manual Transmission Assembly>REMOVAL.
- **2.** Remove the back-up light switch and the neutral position switch. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Switches and Harness>REMOVAL.
- **3.** Remove the transfer case together with the extension case assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Transfer Case and Extension Case Assembly>REMOVAL.
- **4.** Remove the transmission case. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Transmission Case>REMOVAL.
- **5.** Remove the drive pinion shaft assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Drive Pinion Shaft Assembly>REMOVAL.
- **6.** Remove the main shaft assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Main Shaft Assembly>REMOVAL.
- 7. Remove the front differential assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Front Differential Assembly>REMOVAL.
- **8.** Remove the reverse idler gear assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Reverse Idler Gear>REMOVAL.
- **9.** Remove the check ball plugs, check ball springs and check balls.



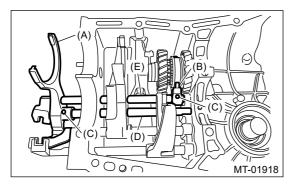
- (A) 1st-2nd
- (B) 3rd-4th
- (C) 5th-6th
- (D) Rev.

10. Use the ST 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.

Note:

Tap out the reverse shifter fork straight pin, after setting the gear into reverse position. In the neutral position, removing is impossible because the clearance between transmission case is narrow.

ST 398791700 REMOVER

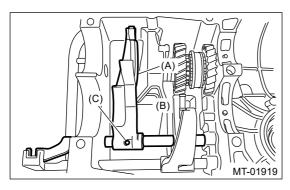


- (A) 5th-6th shifter fork
- (B) Reverse shifter fork
- (C) Straight pin
- (D) 5th-6th fork rod
- (E) Reverse fork rod
- **11.** Drive out the straight pin by tapping with the ST, and remove the 3rd-4th shifter fork and 3rd-4th fork rod.

Note:

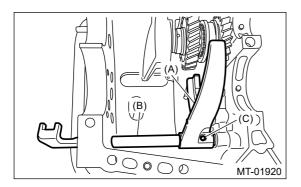
When removing the 3rd-4th fork rod, keep other fork rods in neutral.

ST 398791700 REMOVER



- (A) 3rd-4th shifter fork
- (B) 3rd-4th fork rod
- (C) Straight pin
- **12.** Drive out the straight pin by tapping with the ST, and remove the 1st-2nd shifter fork and 1st-2nd fork rod.

ST 398791700 REMOVER

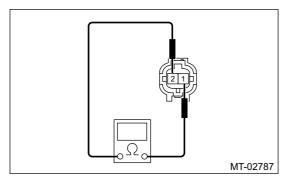


- (A) 1st-2nd shifter fork
- (B) 1st-2nd fork rod
- (C) Straight pin

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.

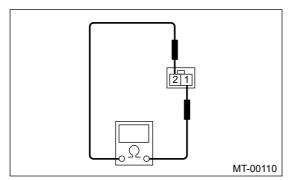


Gear shift position	Terminal No.	Specified resistance
Reverse position	1 and 2	Less than 1 Ω
Other positions	I allu Z	1 M Ω or more

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 allu 2	1 M Ω or more

4. Replace faulty parts.

INSTALLATION

1. BACK-UP LIGHT AND NEUTRAL POSITION SWITCH

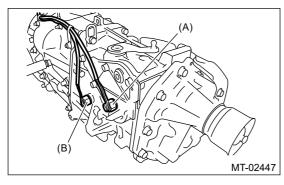
1. Install the back-up light switch & neutral position switch with the harness.

Note:

Use a new gasket.

Tightening torque:

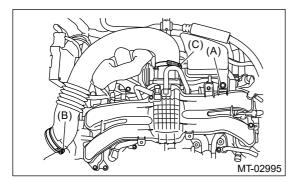
32.3 N•m (3.3 kgf-m, 23.8 ft-lb)



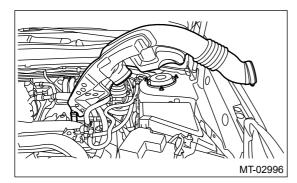
- (A) Neutral position switch
- (B) Back-up light switch
- 2. Secure the harness on each clip.
- 3. Lower the vehicle.
- 4. Install the harness connector to the bracket.
- 5. Connect the connectors of back-up light switch & neutral position switch.
- **6.** Install the air intake boot. Ref. to INTAKE (INDUCTION)(H4DO)>Air Intake Boot>INSTALLATION.
- **7.** Connect the battery ground terminal.

1. BACK-UP LIGHT AND NEUTRAL POSITION SWITCH

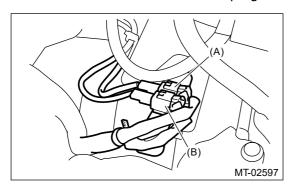
- 1. Disconnect the ground cable from battery.
- 2. Remove the clip (A) from the air intake boot.
- 3. Loosen the clamp (B) connecting the air intake boot and air cleaner case (rear).
- 4. Loosen the clamp (C) which connects the air intake boot and throttle body.



5. Remove the air intake boot from the throttle body, and move it to the left side wheel apron.

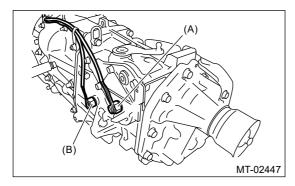


6. Disconnect the connector back-up light switch & neutral position switch.



- (A) Neutral position switch connector (2P, brown)
- (B) Back-up light switch connector (2P, gray)
- **7.** Remove the harness connector from bracket.
- 8. Lift up the vehicle.
- 9. Remove the harness from each clip.

10. Remove the back-up light switch & neutral position switch with the harness.



- (A) Neutral position switch
- (B) Back-up light switch

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT) > Transfer Case and Extension Case Assembly

ASSEMBLY

1. TRANSFER CASE

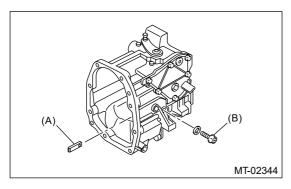
- 1. Install the shift link assembly to the transfer case. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Shift Link Assembly>INSTALLATION.
- **2.** Install the interlock plate.

Note:

- · Use a new bolt and gasket.
- · 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, install the oil seal to the extension case. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Oil Seal>REPLACEMENT.

Note:

Use a new oil seal.

- 2. Install the dust cover.
- 3. Install the transfer drive gear to the extension case. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Transfer Drive Gear>INSTALLATION.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT) > Transfer Case and Extension Case Assembly

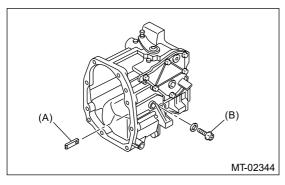
DISASSEMBLY

1. TRANSFER CASE

1. Remove the interlock plate.

Note:

Do not remove the precoat bolt (B) if the parts are assembled as a transmission assembly.



- (A) Interlock plate
- (B) Precoat bolt
- **2.** Remove the shift link assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Shift Link Assembly>REMOVAL.

2. EXTENSION CASE

- 1. Remove the transfer drive gear assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Transfer Drive Gear>REMOVAL.
- 2. Remove the oil seal from the extension case. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Oil Seal>REPLACEMENT.
- **3.** Remove the dust cover.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT) > Transfer Case and Extension Case Assembly

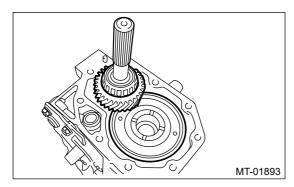
INSTALLATION

- 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).

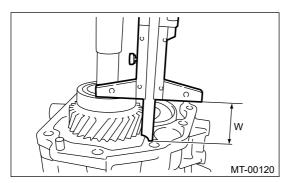
Grease:

NICHIMOLY N-130 or equivalent

3. Install the center differential and the transfer driven gear.



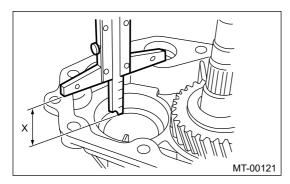
- 4. Install the taper roller bearing (extension case side) outer race to the transfer driven gear.
- **5.** While pressing the taper roller bearing (extension case side) outer race horizontally, rotate the transfer driven gear for ten turns.
- **6.** Measure the height "W" between transfer case and 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 mm (0.006 - 0.008 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.

Note:

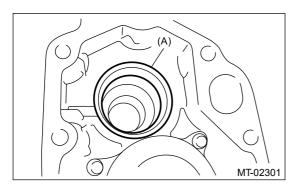
Be sure that it is always within the preload.

Preload of taper roller bearing (extension case side) (amount of standard protrusion):

0.15 - 0.20 mm (0.006 - 0.008 in)

Adjusting washer (50 \times 61 \times t)		
Part No.	Thickness mm (in)	
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)	

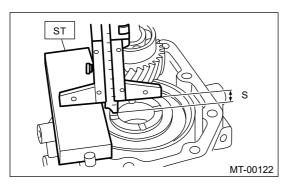
10. Install the selected adjusting washer and taper roller bearing (extension case side) outer race.



(A) Taper roller bearing (extension case side) outer race

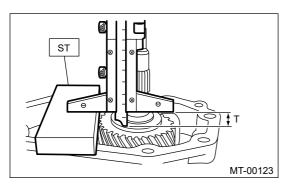
11. Measure the depth "S" between the transfer case + ST and the center differential.

ST 398643600 GAUGE



12. Measure the height "T" between the extension case + ST and the transfer drive gear.

ST 398643600 GAUGE



13. Calculate the adjusting washer thickness "U" using the following calculation.

U = S + T - 30 mm (1.18 in) - (0.15 - 0.35 mm (0.0059 - 0.0138 in))

S: Depth between the transfer case + ST and the center differential

T: Height between the extension case + ST and the transfer drive gear

30 mm (1.18 in): Thickness of ST 15 mm (0.59 in) \times 2

0.15 - 0.35 mm (0.0059 - 0.0138 in): Clearance

14. Select a suitable adjusting washer in the following table.

Clearance:

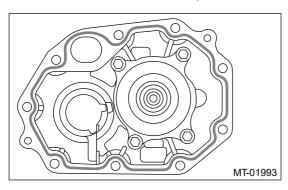
0.15 - 0.35 mm (0.0059 - 0.0138 in)

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)		
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.

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)



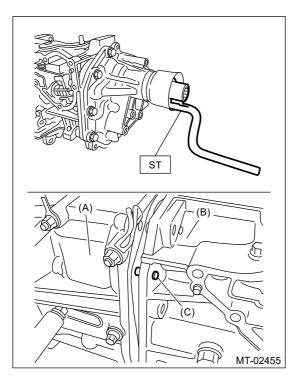
18. Temporarily install the gasket to the transmission case side.

Note:

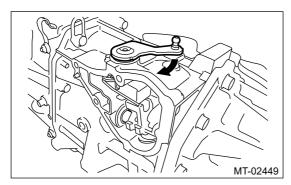
Use a new gasket.

- **19.** Install the transfer case together with the extension case assembly.
 - (1) While moving the HANDLE to align the spline position, press in the transfer case assembly until the knock pin comes slightly out of transfer case.

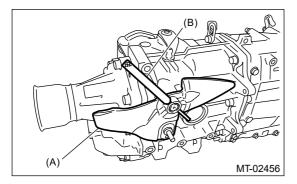
ST 18631AA000 HANDLE



- (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.



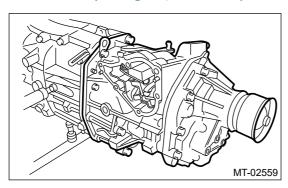
- **20.** Temporarily install the transfer case assembly.
- **21.** Install the shift lever COMPL, then insert the remover or similar tool instead of straight pin.



- (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:

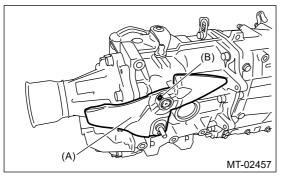
24.5 N·m (2.5 kgf-m, 18.1 ft-lb)



24. Install the shift lever COMPL and secure it with the straight pin.

Note:

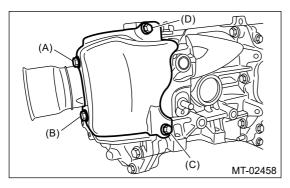
Use a new straight pin.



- (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:

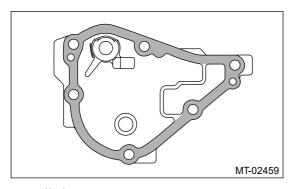
15 N·m (1.5 kgf-m, 11.1 ft-lb)



26. Apply liquid gasket seamlessly.

Liquid gasket:

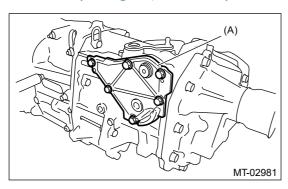
THREE BOND 1215B or equivalent



27. Install the transmission cover.

Tightening torque:

25 N·m (2.5 kgf-m, 18.4 ft-lb)



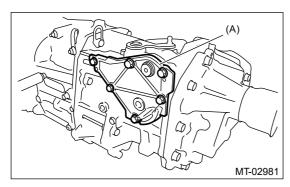
(A) Transmission cover

- **28.** Install the back-up light switch and the neutral position switch. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Switches and Harness>INSTALLATION.
- **29.** Install the manual transmission assembly to the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Manual Transmission Assembly>INSTALLATION.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT) > Transfer Case and Extension Case Assembly

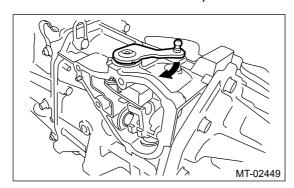
REMOVAL

- 1. Remove the manual transmission assembly from the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Manual Transmission Assembly>REMOVAL.
- **2.** Remove the back-up light switch and the neutral position switch. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Switches and Harness>REMOVAL.
- **3.** Remove the transfer case together with the extension case assembly.
 - (1) Remove the transmission cover.

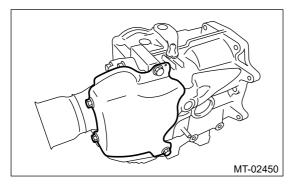


(A) Transmission cover

(2) Set and hold the selector lever COMPL to the 1st-2nd side, and remove the transfer case and extension case assembly as a unit.

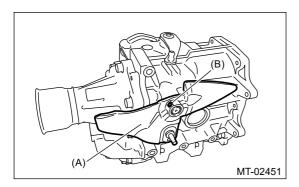


4. Remove the transfer cover.

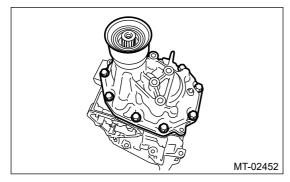


5. Use the ST to push out the spring pin, and remove the shift lever COMPL.

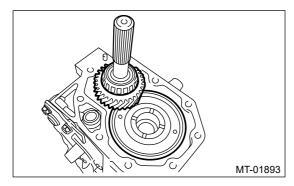
ST 398791700 REMOVER



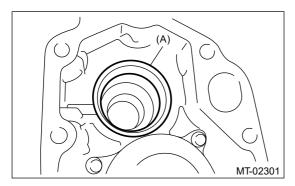
- (A) Shift lever COMPL
- (B) Straight pin
- **6.** Remove the extension case assembly.



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

ASSEMBLY

- 1. Install the needle bearing and snap ring to the transfer drive gear.
- 2. Set the ST to the ball bearing inner race, then install the transfer drive gear.

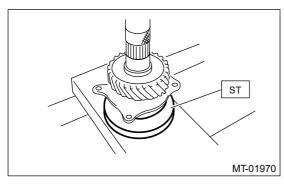
Caution:

Do not apply a load in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

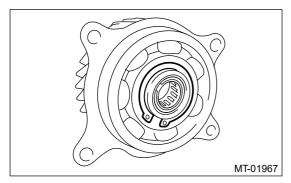
Note:

Use a new ball bearing.

ST 398177700 INSTALLER



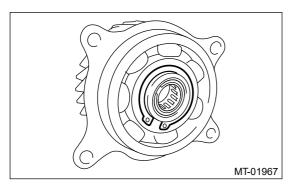
3. Install the snap ring.



4. Inspect the clearance between the snap ring and the ball bearing. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Transfer Drive Gear>INSPECTION.

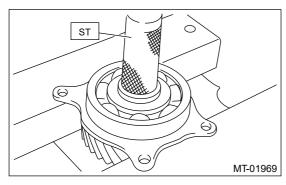
DISASSEMBLY

1. Remove the snap ring.



2. Remove the ball bearing.

ST 899864110 REMOVER



3. Remove the snap ring from transfer drive gear, and remove the needle bearing.

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.

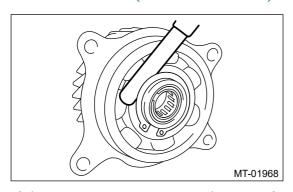
2. Transfer drive gear

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.

Clearance:

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.

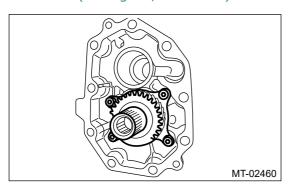
Snap ring (outer-30)			
Part No.	Thickness mm (in)		
805030041	1.53 (0.0602)		
805030042	1.65 (0.0650)		
805030043	1.77 (0.0697)		

INSTALLATION

1. Install the transfer drive gear.

Tightening torque:

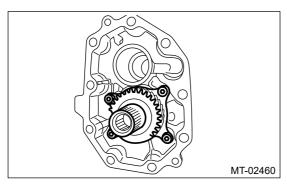
26 N·m (2.7 kgf-m, 19.2 ft-lb)



- 2. Install the transfer driven gear. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Transfer Driven Gear>INSTALLATION.
- 3. Select the adjusting washer. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Transfer Case and Extension Case Assembly>INSTALLATION.
- **4.** Install the transfer case and the extension case assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Transfer Case and Extension Case Assembly>INSTALLATION.
- **5.** Install the back-up light switch and the neutral position switch. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Switches and Harness>INSTALLATION.
- **6.** Install the manual transmission assembly to the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Manual Transmission Assembly>INSTALLATION.

REMOVAL

- 1. Remove the manual transmission assembly from the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Manual Transmission Assembly>REMOVAL.
- **2.** Remove the back-up light switch and the neutral position switch. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Switches and Harness>REMOVAL.
- **3.** Remove the transfer case together with the extension case assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Transfer Case and Extension Case Assembly>REMOVAL.
- 4. Remove the extension case assembly.
- **5.** Remove the transfer driven gear. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Transfer Driven Gear>REMOVAL.
- **6.** Remove the transfer drive gear.



ASSEMBLY

1. Using the ST, install the taper roller bearing (transfer case side).

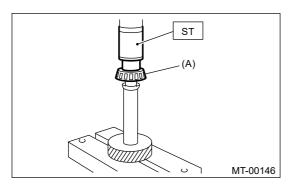
Caution:

Do not apply a load in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

Note:

Be careful when handling because the taper roller bearing and the outer race are used as a set.

ST 927640000 INSTALLER



- (A) Taper roller bearing (transfer case side)
- 2. Using the ST, install the taper roller bearing (extension case side).

Caution:

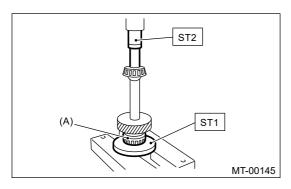
Do not apply a load in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

Note

Be careful when handling because the taper roller bearing and the outer race are used as a set.

ST1 498175500 INSTALLER

ST2 899864100 REMOVER

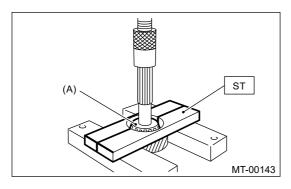


(A) Taper roller bearing (extension case side)

DISASSEMBLY

1. Using the ST, remove the taper roller bearing (extension case side).

ST 498077000 REMOVER

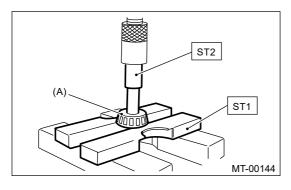


(A) Taper roller bearing (extension case side)

2. Using ST1 and ST2, remove the taper roller bearing (transfer case side).

ST1 498077000 REMOVER

ST2 899864100 REMOVER



(A) Taper roller bearing (transfer case side)

INSPECTION

1. Taper roller bearing

Replace the bearings in the following cases.

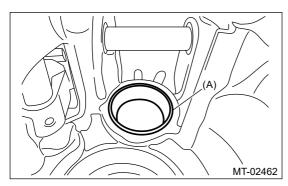
- In case of broken or rusty bearings
- In case of worn or damaged bearings
- When the bearings fail to turn smoothly or emit noise in rotation after transmission gear oil has been applied.

2. Transfer driven gear

If the tooth face of driven gear and the shaft are excessively broken or damaged, replace the driven gear.

INSTALLATION

1. Install the taper roller bearing (transfer case side) outer race.



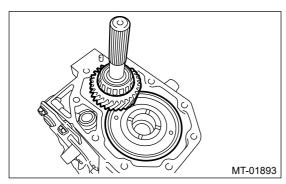
(A) Taper roller bearing (transfer case side) outer race

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).

Grease:

NICHIMOLY N-130 or equivalent

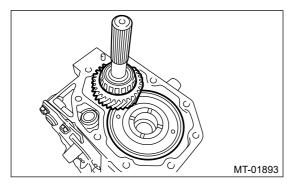
3. Install the transfer driven gear and center differential as a unit.



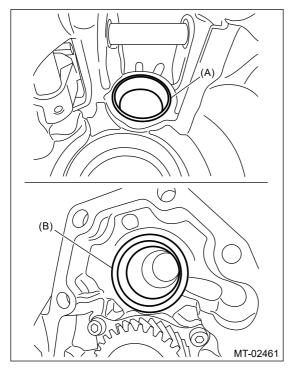
- **4.** Select the adjusting washer. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Transfer Case and Extension Case Assembly>INSTALLATION.
- **5.** Install the selected adjusting washer and taper roller bearing (extension case side) outer race to the extension case.
- 6. Install the transfer case and the extension case assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Transfer Case and Extension Case Assembly>INSTALLATION.
- 7. Install the back-up light switch and the neutral position switch. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Switches and Harness>INSTALLATION.
- **8.** Install the manual transmission assembly to the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Manual Transmission Assembly>INSTALLATION.

REMOVAL

- 1. Remove the manual transmission assembly from the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Manual Transmission Assembly>REMOVAL.
- **2.** Remove the back-up light switch and the neutral position switch. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Switches and Harness>REMOVAL.
- **3.** Remove the transfer case together with the extension case assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Transfer Case and Extension Case Assembly>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(6MT) > Transmission Case

INSPECTION

Check the transmission case for cracks, damage, or oil leaks.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT) > 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(6MT)>Shifter Fork and Rod>INSTALLATION.
- 3. Install the reverse idler gear. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Reverse Idler Gear>INSTALLATION.
- **4.** Select the drive pinion shim. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Drive Pinion Shaft Assembly>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. Tighten the left and right side of the transmission case with the 17 mounting bolts.

Note:

- 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.

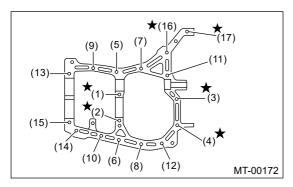
Tightening torque:

8 mm bolt

25 N·m (2.5 kgf-m, 18.4 ft-lb)

★10 mm bolt

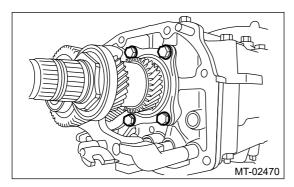
40 N·m (4.1 kgf-m, 29.5 ft-lb)



- **10.** Install the taper roller bearing outer race to the RH side of the transmission case.
- **11.** Tighten the bearing mounting bolts.

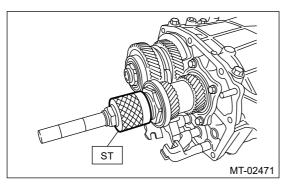
Tightening torque:

30 N·m (3.1 kgf-m, 22.1 ft-lb)



- **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.

ST 18667AA020 HOLDER



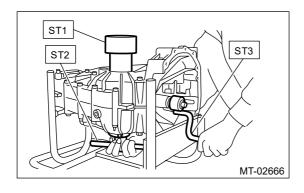
- (2) Place the transmission case with the LH side facing downward, and put ST1 on the taper roller bearing outer race.
- (3) Screw in the differential side retainer from the bottom into LH side case using ST2. Fit the ST3 on the main shaft. Shift the gear into 4th or 5th, and turn the shaft several 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.

ST1 399780104 WEIGHT

ST2 18630AA010 WRENCH COMPL RETAINER

ST3 499927100 HANDLE

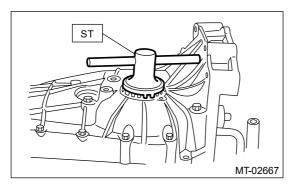


(4) Remove the WEIGHT, and screw in the differential side retainer without the O-ring into the RH side of the transmission case, and stop at the point where a slight resistance is felt.

Note:

In this condition, the backlash between hypoid driven gear and drive pinion shaft is zero.

ST 18630AA010 WRENCH COMPL RETAINER



- (5) Loosen the differential side retainer on the LH side of the transmission case by 3 notches, and turn 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.

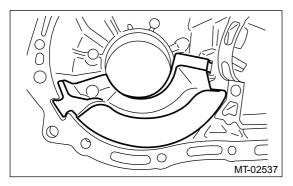
Note:

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(6MT)>Front Differential Assembly>INSPECTION.
- **14.** Separate the transmission case into left and right parts. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Transmission Case>REMOVAL.
- **15.** Check each shifter fork. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Shifter Fork and Rod>INSPECTION.
- **16.** Select a main shaft rear plate. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Main Shaft Assembly>ADJUSTMENT.
- **17.** Install the front oil guide.

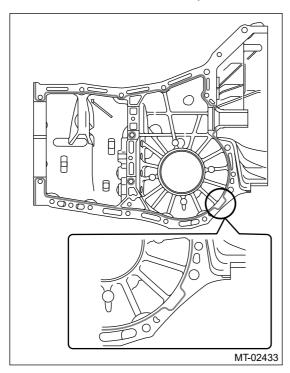
Note:

Fit in all the way.



18. Apply liquid gasket, then join the right side and left side of the case together. Liquid gasket:

THREE BOND 1215B or equivalent



19. Tighten 17 bolts with brackets and clips as shown in the figure.

Note:

- 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.

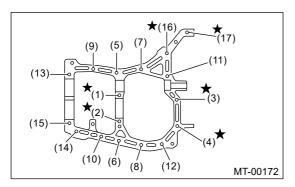
Tightening torque:

8 mm bolt

25 N·m (2.5 kgf-m, 18.4 ft-lb)

★10 mm bolt

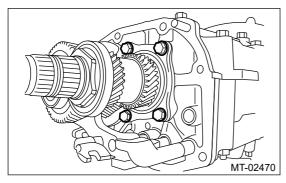
40 N·m (4.1 kgf-m, 29.5 ft-lb)



20. Tighten the bearing mounting bolts.

Tightening torque:

30 N·m (3.1 kgf-m, 22.1 ft-lb)



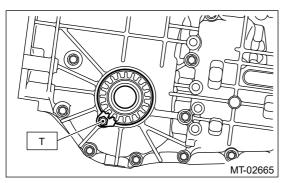
21. Remove the retainer lock plate, and loosen the differential side retainer until the groove of the O-ring appears. Fit the O-ring into the groove and tighten the side retainer into the position where it was not loosened.

Note:

- When loosening the side retainer, record the number of the turns made.
- Perform this for both left and right side retainers.
- Use new O-rings.
- 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(6MT)>Transfer Case and Extension Case Assembly>INSTALLATION.
- **24.** Install the clutch release lever and release bearing. <a>Ref. to CLUTCH SYSTEM>Release

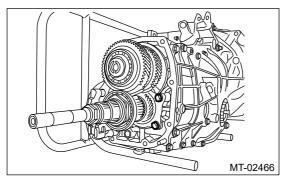
Bearing and Lever>INSTALLATION.

25. Install the manual transmission assembly to the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Manual Transmission Assembly>INSTALLATION.

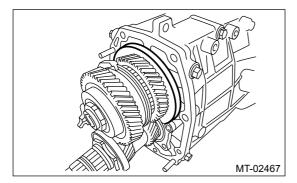
MANUAL TRANSMISSION AND DIFFERENTIAL(6MT) > Transmission Case

REMOVAL

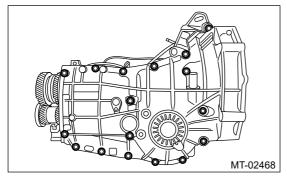
- 1. Remove the manual transmission assembly from the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Manual Transmission Assembly>REMOVAL.
- **2.** Remove the clutch release lever and the release bearing. Ref. to CLUTCH SYSTEM>Release Bearing and Lever>REMOVAL.
- **3.** Remove the transfer case together with the extension case assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Transfer Case and Extension Case Assembly>REMOVAL.
- 4. Remove the bearing mounting bolt.



5. Remove the main shaft rear plate.



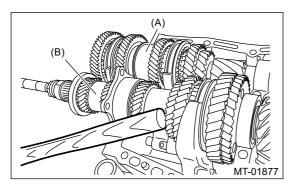
6. Remove the bolts and nuts, and separate the transmission case into the right and left cases.



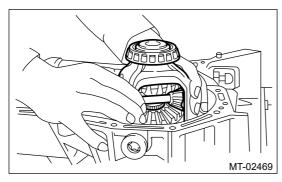
7. Remove the drive pinion shaft assembly.

Note:

Use a hammer handle, etc. to remove if too tight.



- (A) Main shaft ASSY
- (B) Drive pinion shaft ASSY
- 8. Remove the main shaft assembly.
- 9. Remove the front differential assembly.

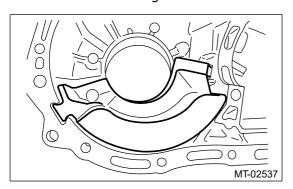


10. Remove the differential side retainers and taper roller bearing outer races on the left and right sides. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Front Differential Assembly>REMOVAL.

Note:

Do not confuse the right and left taper roller bearing outer races.

- **11.** Remove the reverse idler gear. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Reverse Idler Gear>REMOVAL.
- **12.** Remove the shifter fork and rod. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)>Shifter Fork and Rod>REMOVAL.
- 13. Remove the front oil guide.



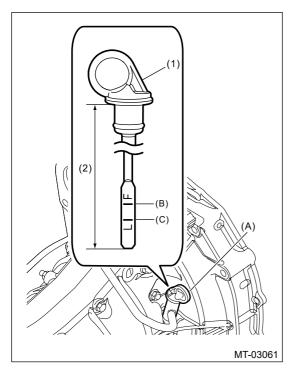
MANUAL TRANSMISSION AND DIFFERENTIAL(6MT) > Transmission Gear Oil

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 add 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.

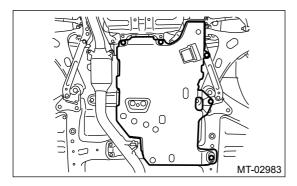


- (A) Oil level gauge
- (B) Upper level
- (C) Lower level
- (1) Gray
- (2) 195.9 mm (7.71 in)

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT) > Transmission Gear Oil

REPLACEMENT

- 1. Pull out the oil level gauge.
- 2. Lift up the vehicle.
- 3. Remove the transmission under cover.



4. Using the TORX[®] bit T70, remove the drain plug, and drain the transmission gear oil completely.

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 spilt, wipe it off completely.
- **5.** Attach the drain plug using TORX[®] bit T70.

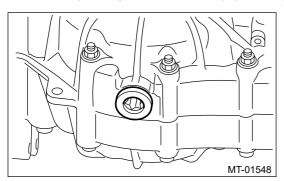
Note:

- Install the drain plug after draining transmission gear oil.
- Use a new gasket.

Tightening torque:

44 N·m (4.5 kgf-m, 32.5 ft-lb) (aluminum gasket, silver) 70 N·m (7.1 kgf-m, 51.6 ft-lb) (copper gasket, brown)

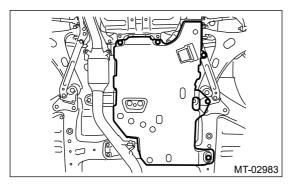
70 N·m (7.1 kgf-m, 51.6 ft-lb) (metal gasket, black)



6. Install the transmission under cover.

Tightening torque:

18 N·m (1.8 kgf-m, 13.3 ft-lb)



- **7.** Lower the vehicle.
- **8.** Fill with transmission gear oil through the oil level gauge hole.

Caution:

If an alternative gear oil is used, you may not have expected functionality and performance.

Recommended gear oil:

SUBARU GEAR OIL EXTRA MT

Alternative:

GL-5 (75W-90)

Gear oil capacity:

3.3 L (3.5 US qt, 2.9 Imp qt)

9. Check the transmission gear oil amount, and confirm that it is within the specification.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT) > 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 bends or damage. Check that the cushion rubber is not stiff, cracked or otherwise damaged.

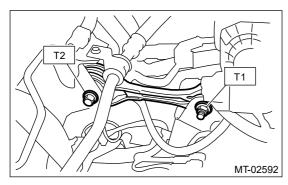
INSTALLATION

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 air intake boot. Ref. to INTAKE (INDUCTION)(H4DO)>Air Intake Boot>INSTALLATION.
- 3. Connect the battery ground terminal.

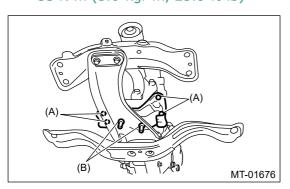
2. CROSSMEMBER AND CUSHION RUBBER

- 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)



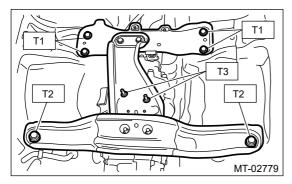
- **3.** Install the front crossmember and rear crossmember.
- 4. Tighten the transmission cushion rubber mounting nut.

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)

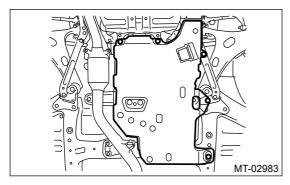
T3: 35 N·m (3.6 kgf-m, 25.8 ft-lb)



- **5.** Remove the transmission jack.
- **6.** Install the transmission under cover.

Tightening torque:

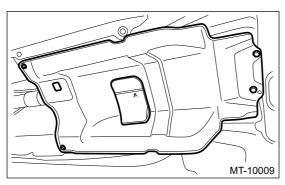
18 N·m (1.8 kgf-m, 13.3 ft-lb)



7. Install the center exhaust cover.

Tightening torque:

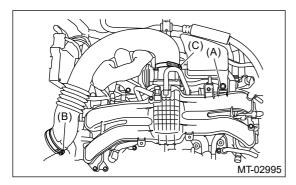
18 N·m (1.8 kgf-m, 13.3 ft-lb)



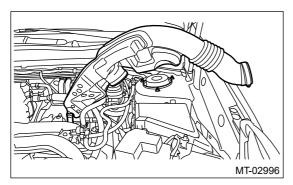
- **8.** Install the center exhaust pipe. Ref. to EXHAUST(H4DO)>Center Exhaust Pipe>INSTALLATION.
- **9.** Lower the vehicle.
- 10. Connect the battery ground terminal.

1. PITCHING STOPPER

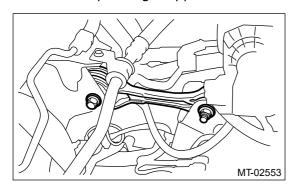
- 1. Disconnect the ground cable from battery.
- 2. Remove the clip (A) from the air intake boot.
- 3. Loosen the clamp (B) connecting the air intake boot and air cleaner case (rear).
- 4. Loosen the clamp (C) which connects the air intake boot and throttle body.



5. Remove the air intake boot from the throttle body, and move it to the left side wheel apron.

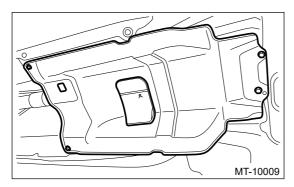


6. Remove the pitching stopper.

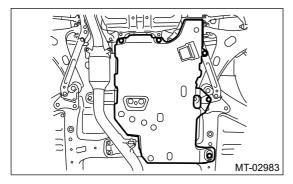


2. CROSSMEMBER AND CUSHION RUBBER

- 1. Disconnect the ground cable from battery.
- **2.** Lift up the vehicle.
- **3.** Remove the center exhaust pipe. Ref. to EXHAUST(H4DO)>Center Exhaust Pipe>REMOVAL.
- **4.** Remove the center exhaust cover.



5. Remove the transmission under cover.

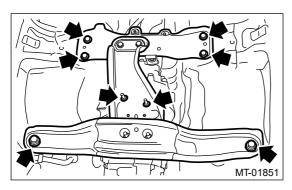


6. Set the transmission jack.

Caution:

Always support the transmission case with a transmission jack.

7. Remove the front crossmember and the rear crossmember.



8. Remove the transmission cushion rubber.