CONTROL SYSTEMS

CS

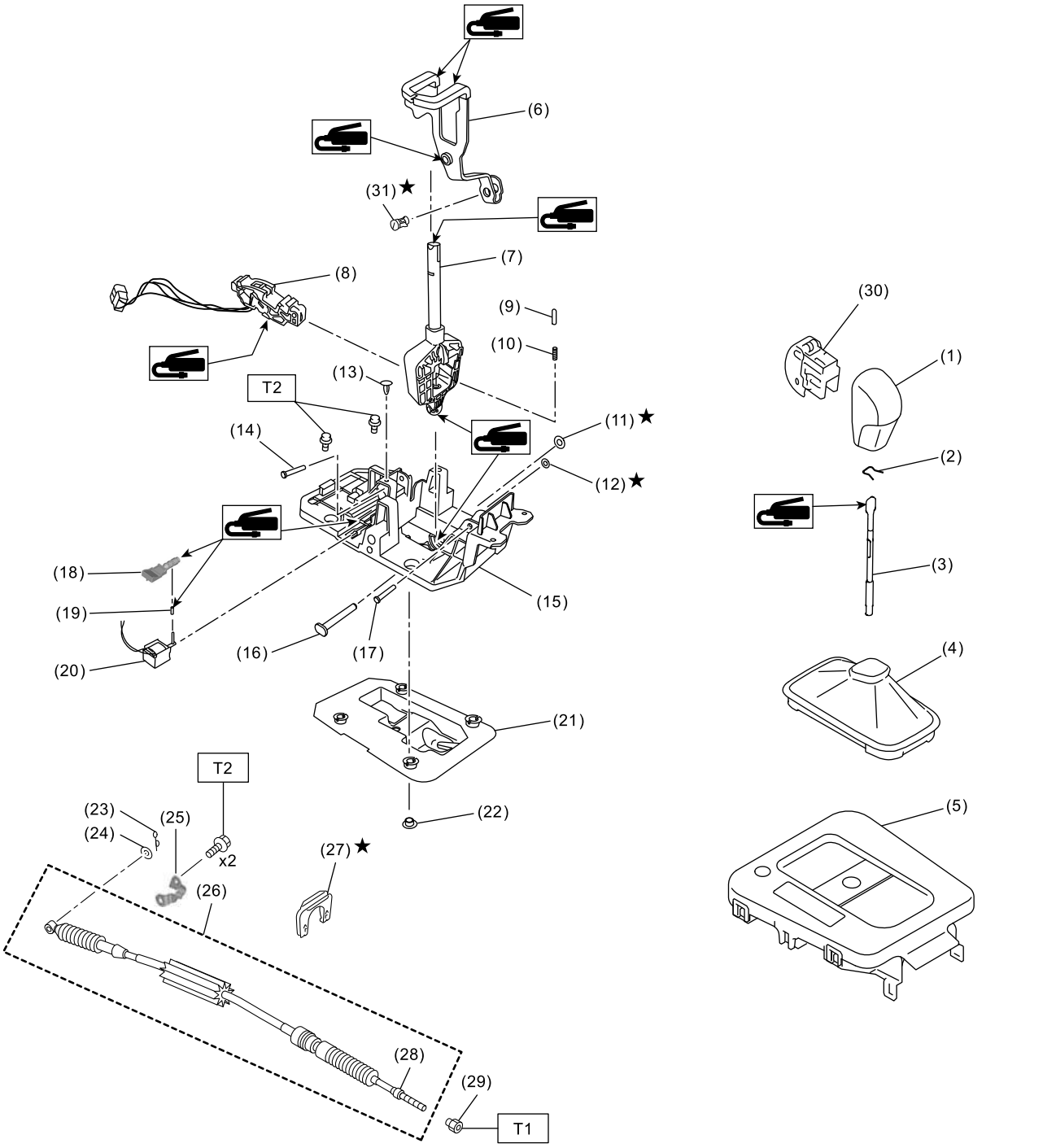
1. General Description
2. AT Shift Lock Control System
3. Select Lever
4. Select Cable
5. AT Shift Lock Solenoid and “P” Range Switch
6. Body Integrated Unit
7. MT Gear Shift Lever
8. MT Gear Shift Cable
9. MT Gear Select Cable
10. Reverse Check Cable
11. General Diagnostic Table

SPECIFICATION

Item		Specifications
Swing torque of rod against lever	N (kgf, lbf)	3.7 (0.38, 0.83) or less

COMPONENT

1. AT SELECT LEVER



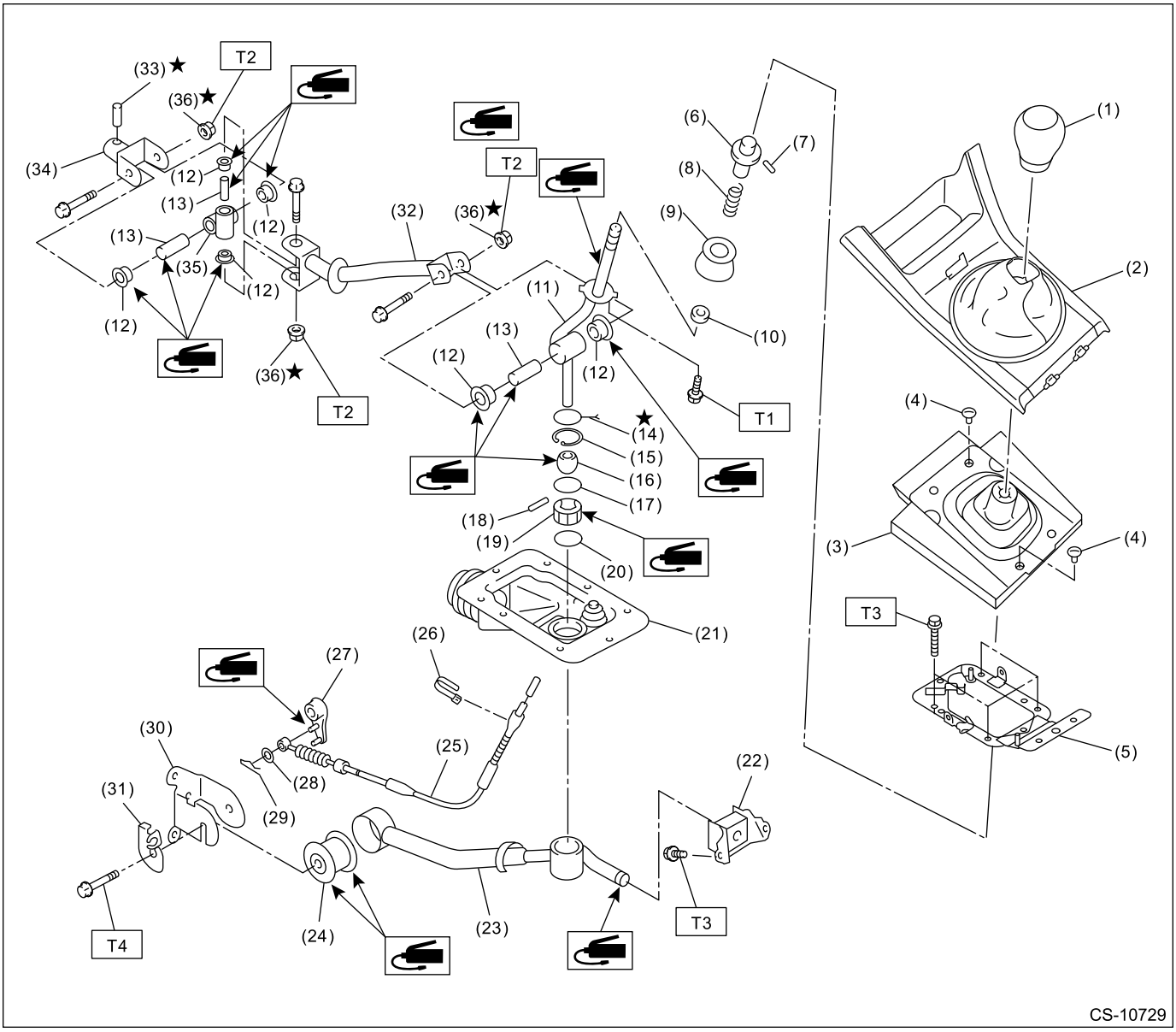
(1) Grip sub ASSY
(2) Clamp grip pin
(3) Rod COMPL
(4) Boot ASSY
(5) Indicator ASSY
(6) Arm COMPL
(13) Clamp pin
(14) Spacer pin guide
(15) Plate COMPL
(16) Shaft control
(17) Spacer pin guide
(18) Rod shift lock
(25) Cable bracket
(26) Select cable
(27) Clamp
(28) Adjusting nut (front)
(29) Adjusting nut (rear)
(30) Button ASSY-AT

(7) Selector lever COMPL
(8) Plate guide
(9) Rod detent
(10) Detent spring
(11) Clamp push nut
(12) Clamp push nut
(19) Cushion solenoid
(20) Solenoid unit
(21) Gasket
(22) Spacer plate
(23) Snap pin
(24) Washer
(31) Connector pin

Tightening torque: N·m (kgf-m, ft-lb)

T1: 7.5 (0.8, 5.5)
T2: 18 (1.8, 13.3)

2. 6MT GEAR SHIFT LEVER (STI MODEL)



(1) Gear shift knob
(2) Cover - shift lever
(3) Boot and insulator ASSY
(4) Clamp
(5) Plate COMPL
(6) Slider
(7) Spring pin
(8) Spring
(9) Holder
(10) Seat cushion
(11) Lever
(12) Bushing
(15) Snap ring
(16) Bushing
(17) O-ring
(18) Spring pin
(19) Bushing
(20) O-ring
(21) Boot
(22) Cushion rubber
(23) Stay
(24) Bushing
(25) Reverse check cable
(26) Band clip
(29) Snap pin
(30) Bracket
(31) Cable plate
(32) Rod
(33) Spring pin
(34) Joint
(35) Boss
(36) Self-locking nut

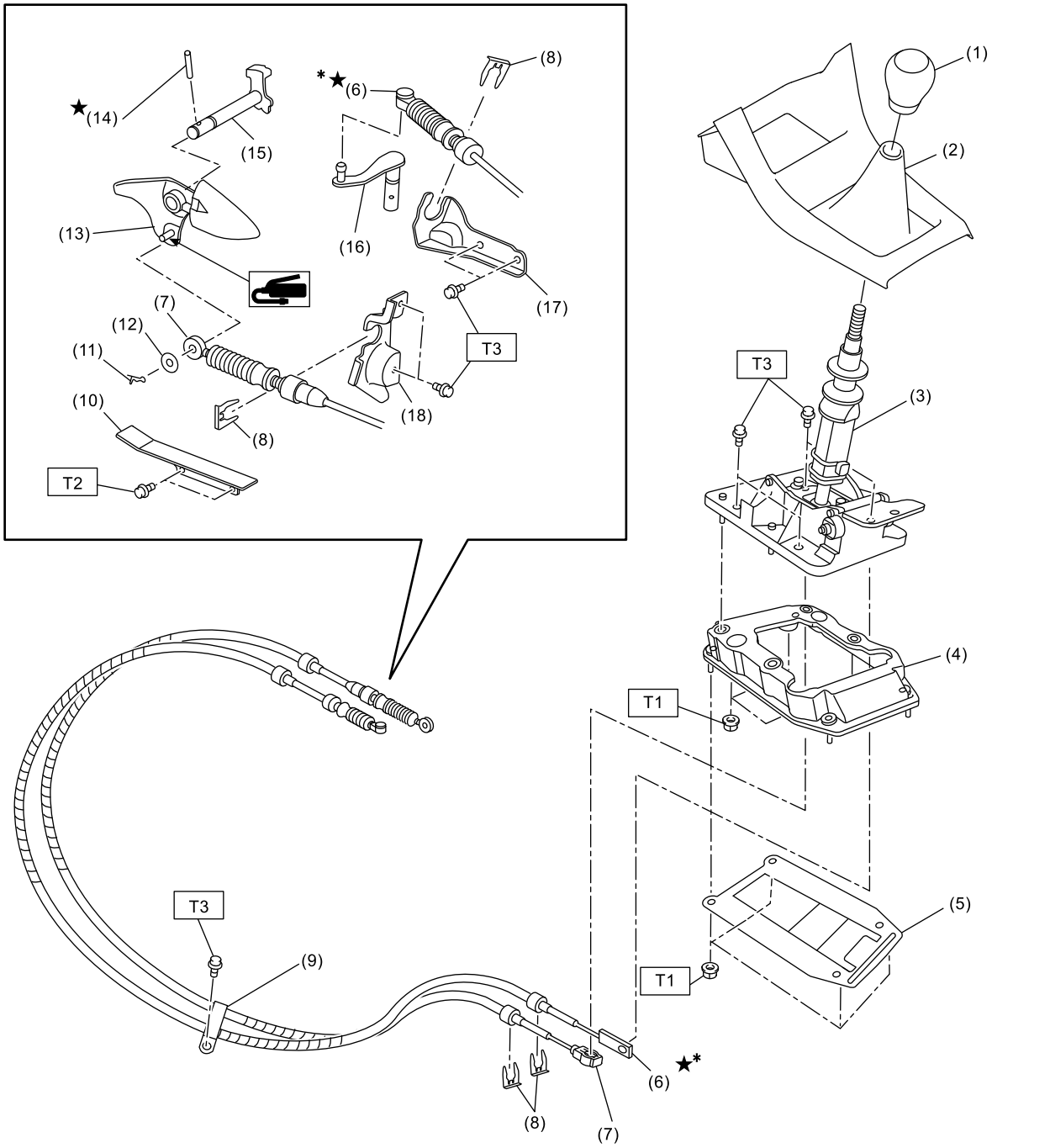
Tightening torque: N·m (kgf-m, ft-lb)

T1: 1.3 (0.1, 1.0)
T2: 12 (1.2, 8.9)

(13) Spacer
(14) Lock wire
(27) Reverse check lever
(28) Washer

T3: 18 (1.8, 13.3)
T4: 32 (3.3, 23.6)

3. 6MT GEAR SHIFT LEVER (EXCEPT FOR STI MODEL)



CS-10039

(1) Shift knob
(2) Cover - shift lever
(3) Gear shift lever ASSY
(4) Cable cover ASSY
(5) Cable cover plate
(9) Cable clamp
(10) Dust cover
(11) Snap pin
(12) Washer
(13) Shift lever COMPL
(17) Select bracket
(18) Shift bracket

Tightening torque: N·m (kgf-m, ft-lb)

T1: 7.5 (0.8, 5.5)

(6) MT gear select cable
(7) MT gear shift cable
(8) Clamp
(14) Spring pin
(15) Shifter arm No. 2
(16) Selector lever COMPL

T2: 15 (1.5, 11.1)
T3: 18 (1.8, 13.3)

∗: Always use new MT gear select cable if the cable is removed from select lever COMPL of transmission side.

CONTROL SYSTEMS > General Description

PREPARATION TOOL

1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 STSSM4	—	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.
DST-i	Used together with Subaru Select Monitor 4.

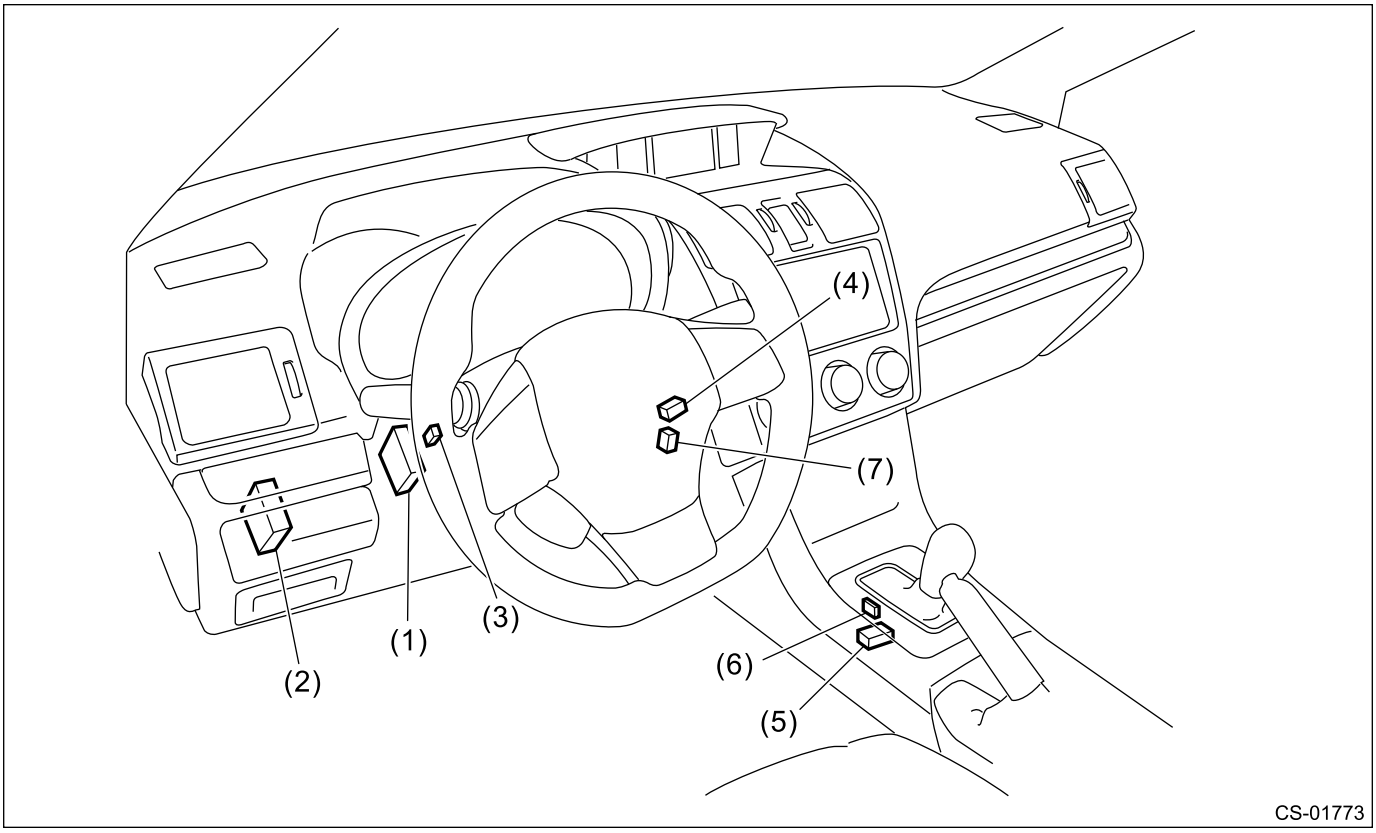
CONTROL SYSTEMS > General Description

CAUTION

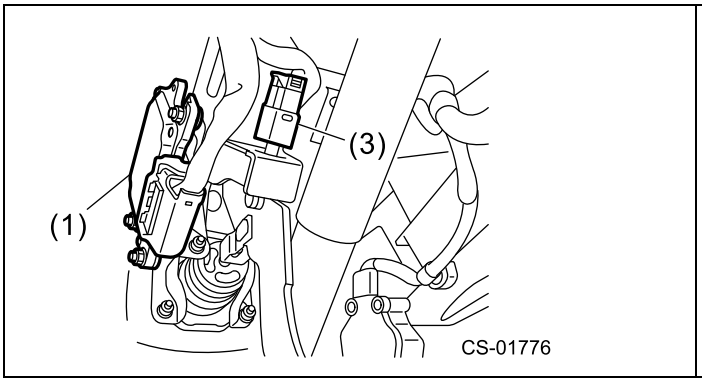
- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust and dirt.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
- 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 a proper amount of grease 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.

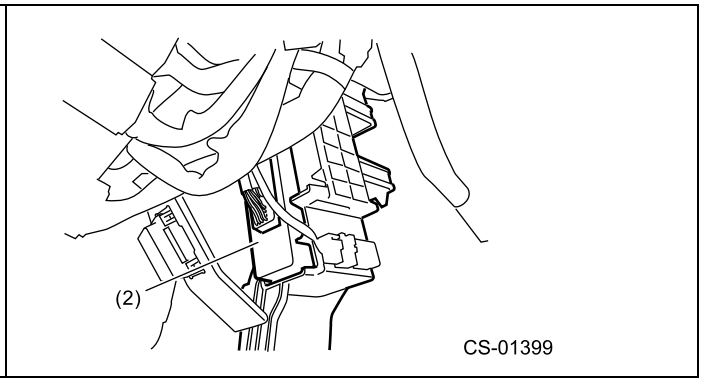
LOCATION

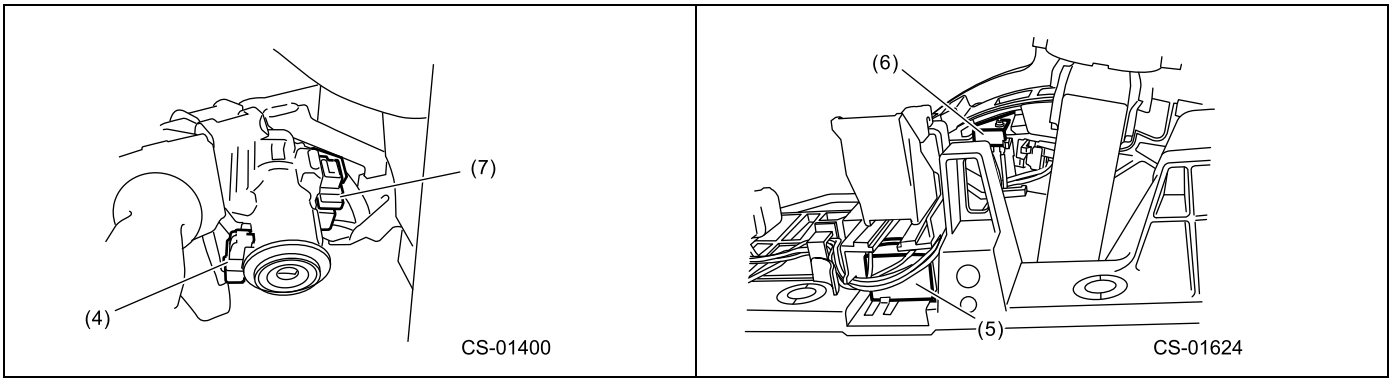
1. MODEL WITHOUT PUSH BUTTON IGNITION SWITCH



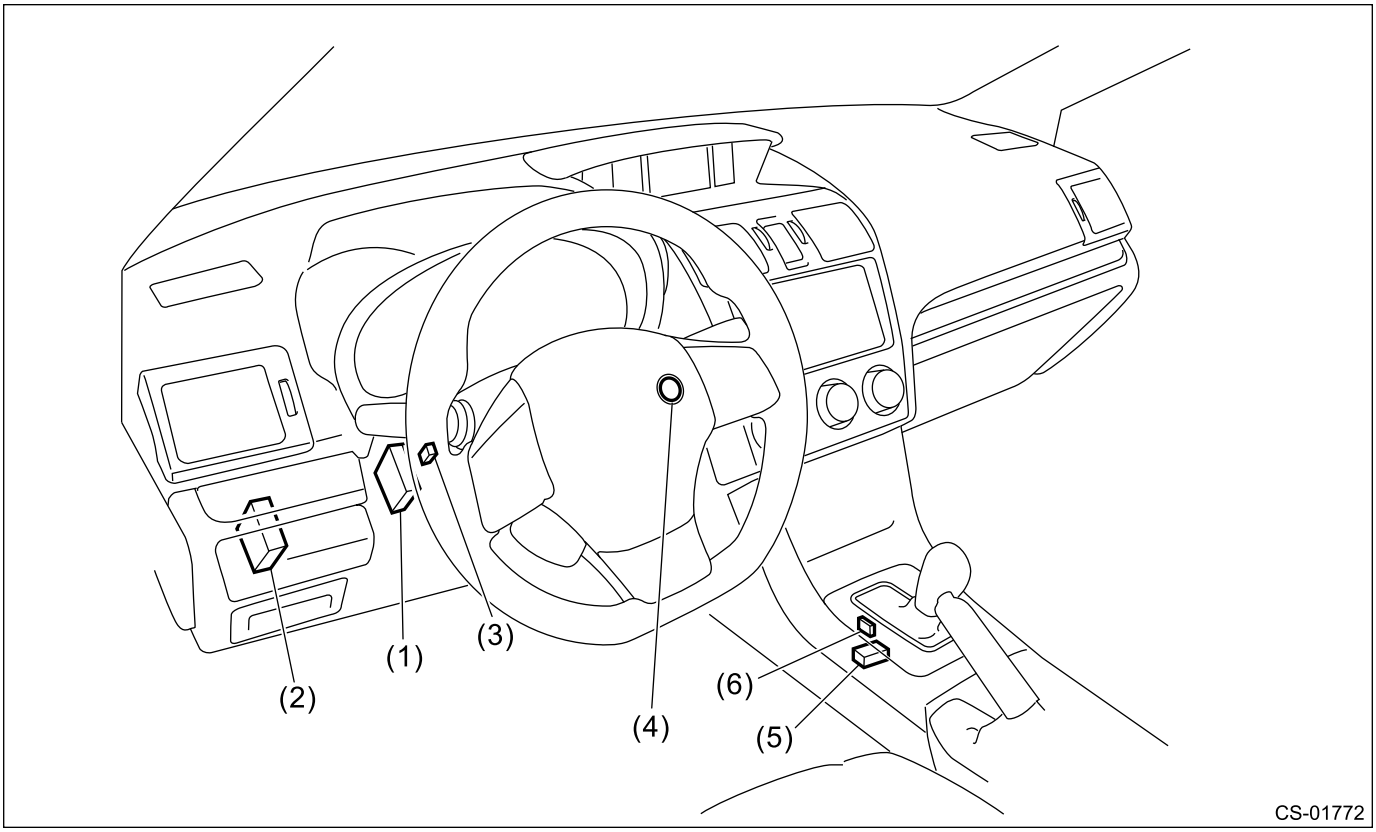
(1) TCM (“P” range)
(2) Body integrated unit
(3) Stop light and brake switch
(4) Key cylinder (with built-in key warning switch)
(5) Solenoid unit
(6) “P” range switch
(7) Key lock solenoid



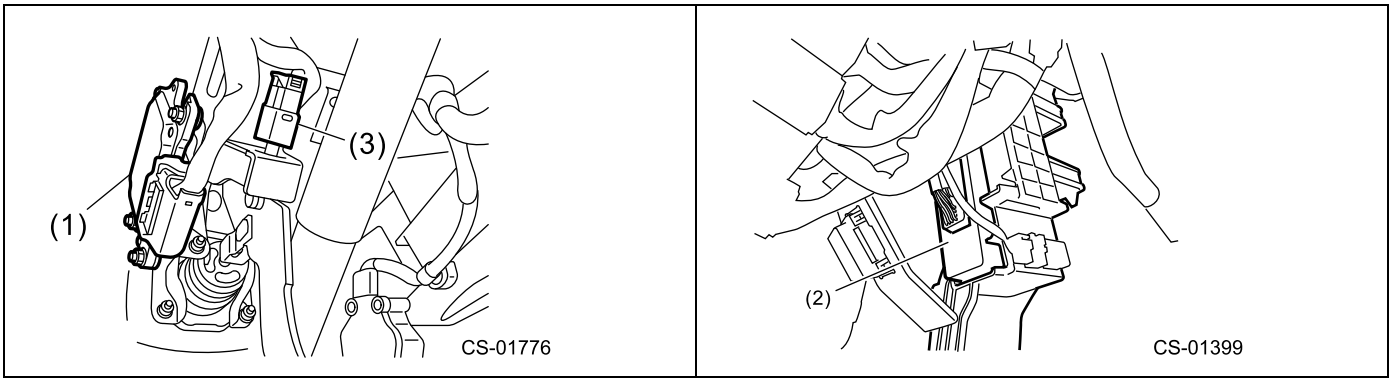


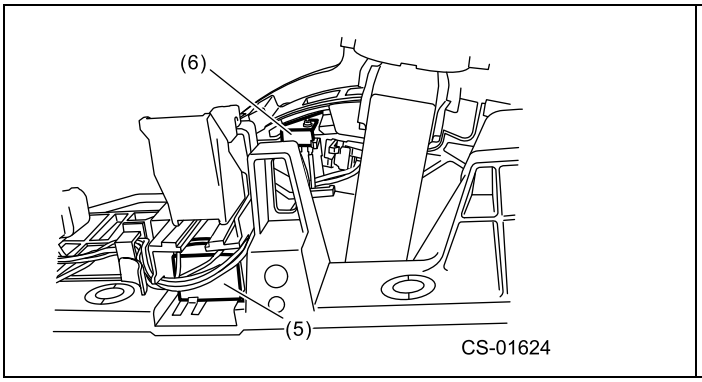


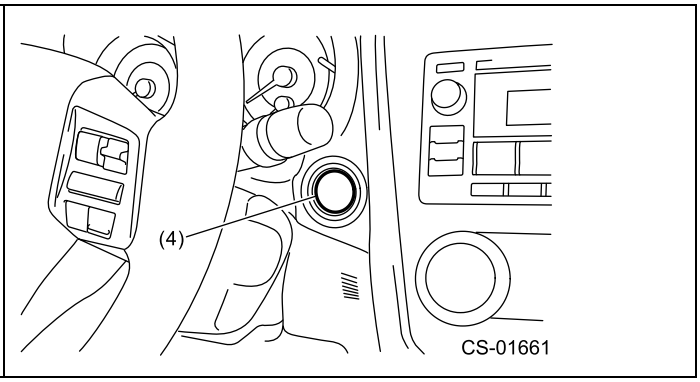
2. MODEL WITH PUSH BUTTON IGNITION SWITCH



(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

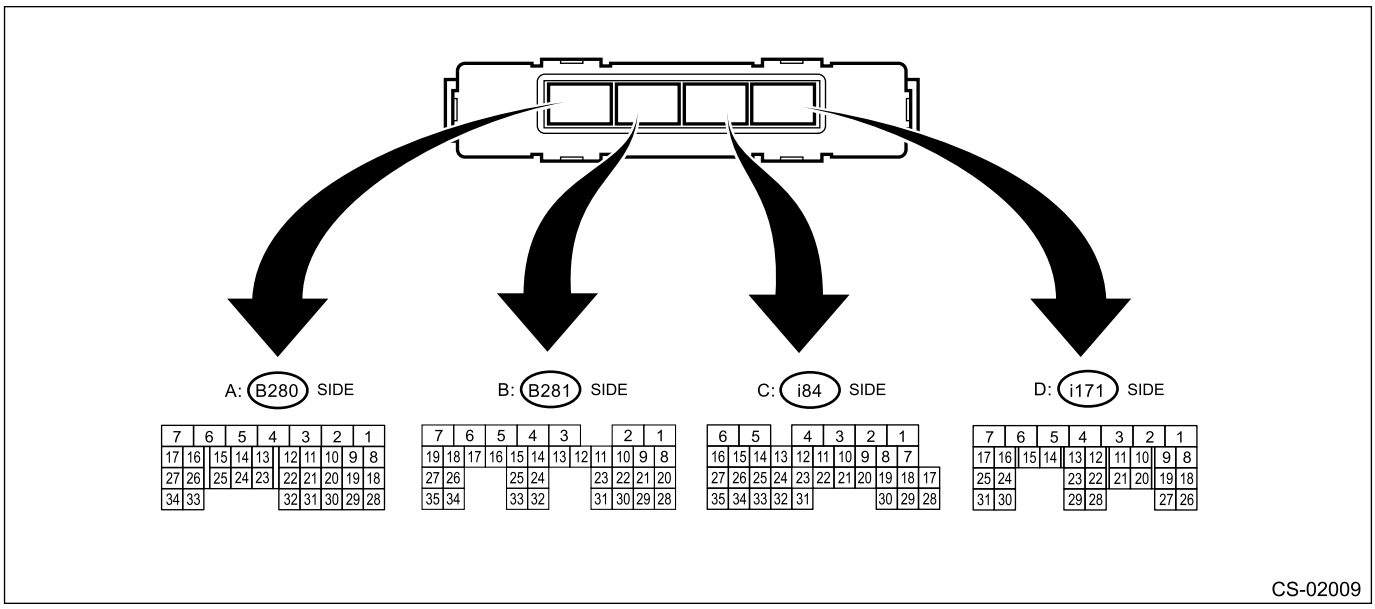






CONTROL SYSTEMS > AT Shift Lock Control System

ELECTRICAL SPECIFICATION

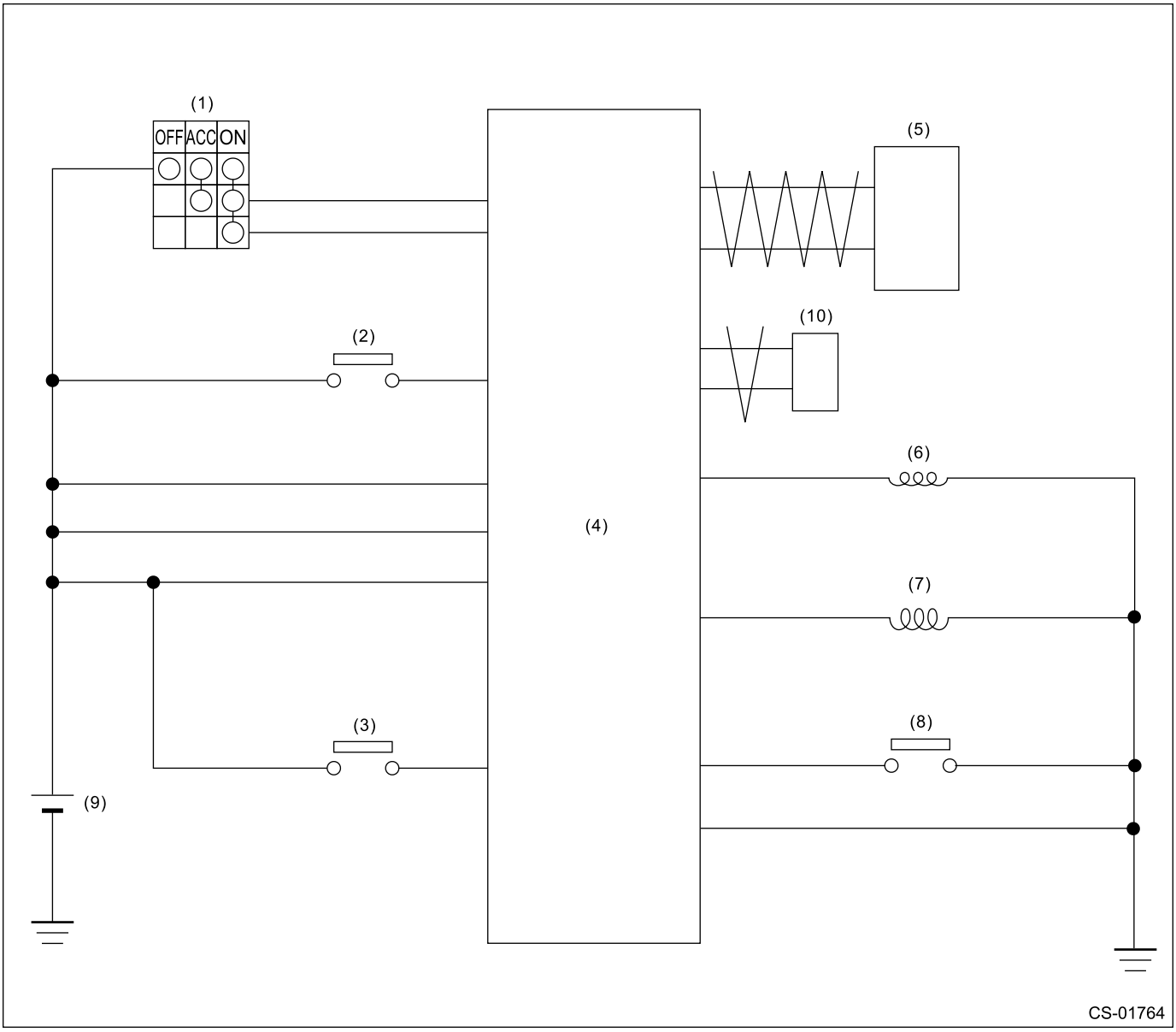


Item	Connector No.	Terminal No.	Input/Output signal Measured value and measuring conditions
Battery power supply	B281	6	9 — 16 V
		7	
	i84	6	
Ignition power supply	B280	32	10 — 15 V when ignition switch is at ACC
	B281	3	10 — 15 V when ignition switch is at ON or START
TCM (“P” range)	i84	27	Can not be measured because of digital communication
		35	
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	0 V when select lever is in “P” range

Item	Connector No.	Terminal No.	Input/Output signal
			Measured value and measuring conditions
			9 — 16 V when select lever is in other positions than “P” range
Solenoid unit signal	B281	5	9 — 16 V when shift lock is released 0 V when shift lock is operating
Key warning switch signal (Model without push button ignition switch)	B280	4	9 — 16 V when key is inserted 0 V when key is removed
Key lock solenoid signal (Model without push button ignition switch)	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	—
	i84	1	

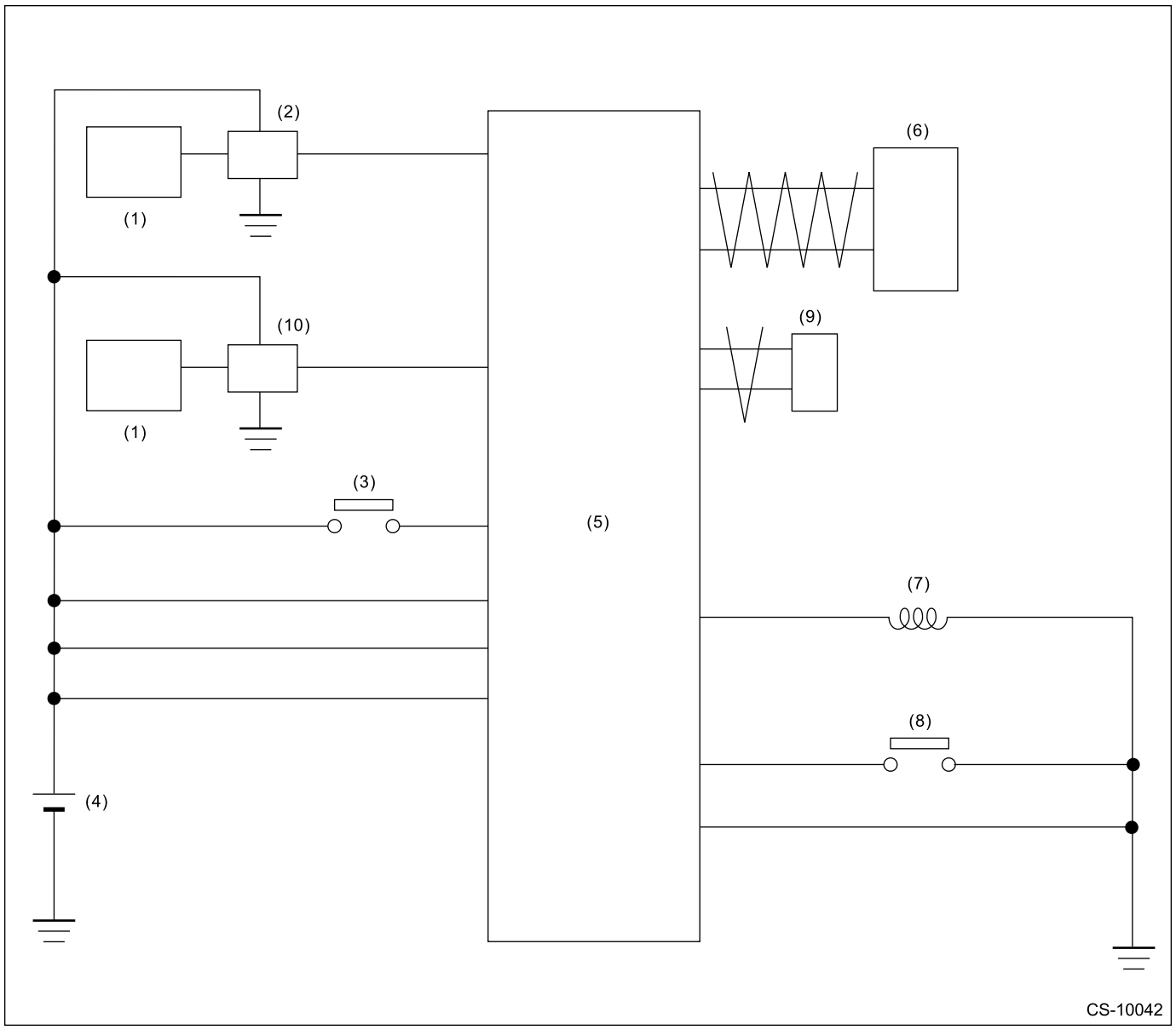
WIRING DIAGRAM

1. MODEL WITHOUT PUSH BUTTON IGNITION SWITCH



(1) Ignition switch
(2) Stop light and brake switch
(3) Key warning switch
(4) Body integrated unit
(5) TCM (shift range information)
(6) Key lock solenoid
(7) Shift lock solenoid
(8) "P" range switch
(9) Battery
(10) VDC CM (vehicle speed information)

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)
(10) Accessory relay (push button start)

INSPECTION

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?

Yes	Go to 2.
No	Perform the inspection following the diagnostic procedure in BODY CONTROL SYSTEM (DIAGNOSTICS) section. Ref. to BODY CONTROL SYSTEM (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?

Yes	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?

Yes	Go to 5.
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.

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?

Yes	Go to 6.
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.

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?

Yes	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?

Yes	AT shift lock system is normal.
No	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?

Yes	Go to 2.
No	Perform the inspection following the diagnostic procedure in BODY CONTROL SYSTEM (DIAGNOSTICS) section. Ref. to BODY CONTROL SYSTEM (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?

Yes	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?

Yes	Go to 5.
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.

5. CHECK SHIFT LOCK.

1. Shift the select lever to “N” range.
2. Turn the ignition switch to ACC.

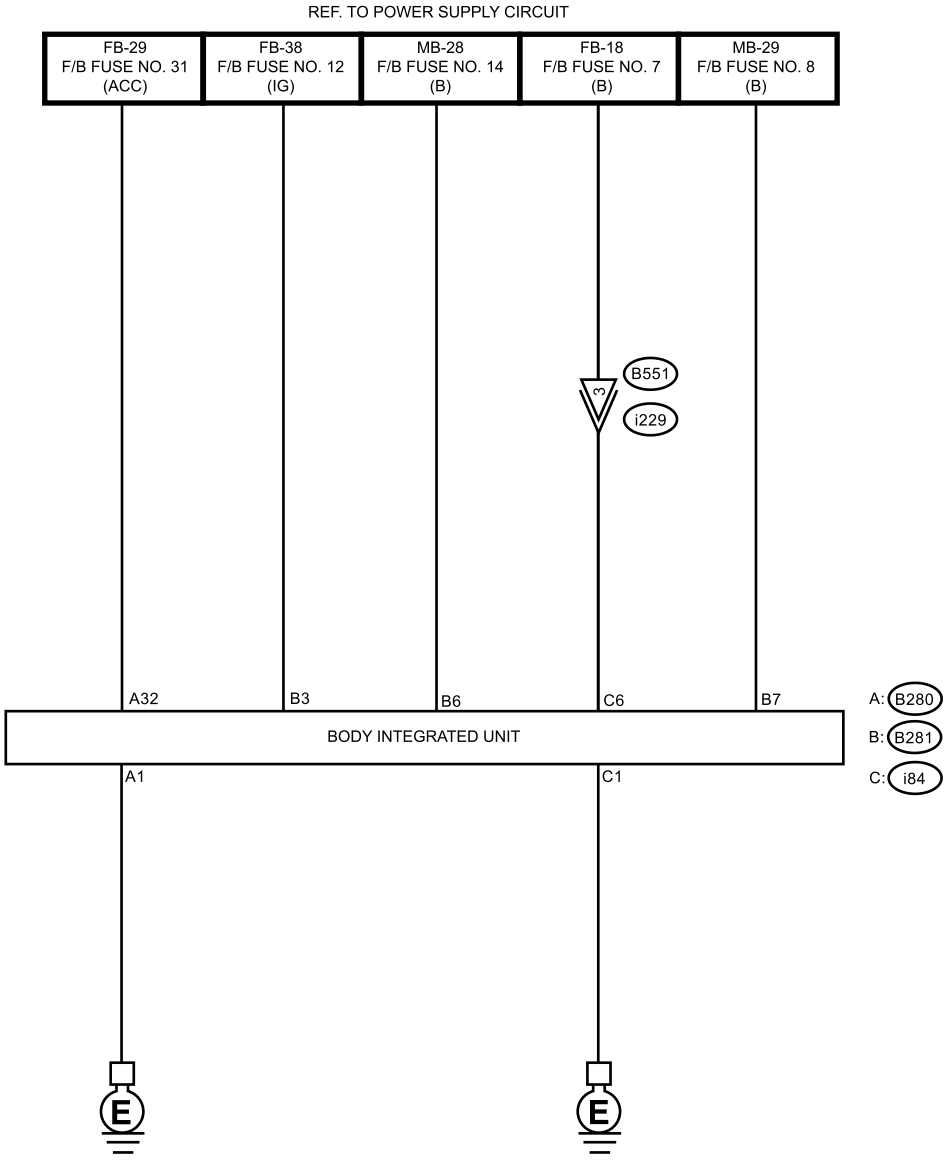
While brake pedal is depressed, is it possible to move the select lever from the “N” range to the “P” range?

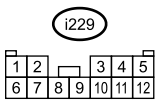
Yes	AT shift lock system is normal.
No	Perform the inspection of “SELECT LEVER CANNOT BE LOCKED OR RELEASED”. Ref. to CONTROL SYSTEMS>AT Shift Lock Control System>INSPECTION > SELECT LEVER CANNOT BE LOCKED OR RELEASED.

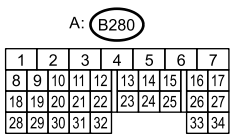
2. BODY INTEGRATED UNIT POWER SUPPLY AND GROUND CIRCUIT

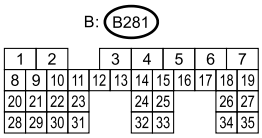
Note:

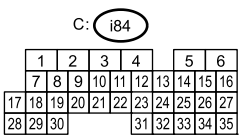
For the DC power supply circuit, refer to "WIRING DIAGRAMS". Ref. to WIRING SYSTEM>Power Supply Circuit.











1. CHECK DTC OF BODY INTEGRATED UNIT.

Check DTC of body integrated unit.
Ref. to BODY CONTROL SYSTEM (DIAGNOSTICS)>Read Diagnostic Trouble Code (DTC).

Is the DTC of power line displayed on body integrated unit?

Yes	Repair or replace it according to the DTC.
No	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?

Yes	Go to 3.
No	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:
   (i84) No. 1 — Chassis ground:

Is the resistance less than 1 Ω?

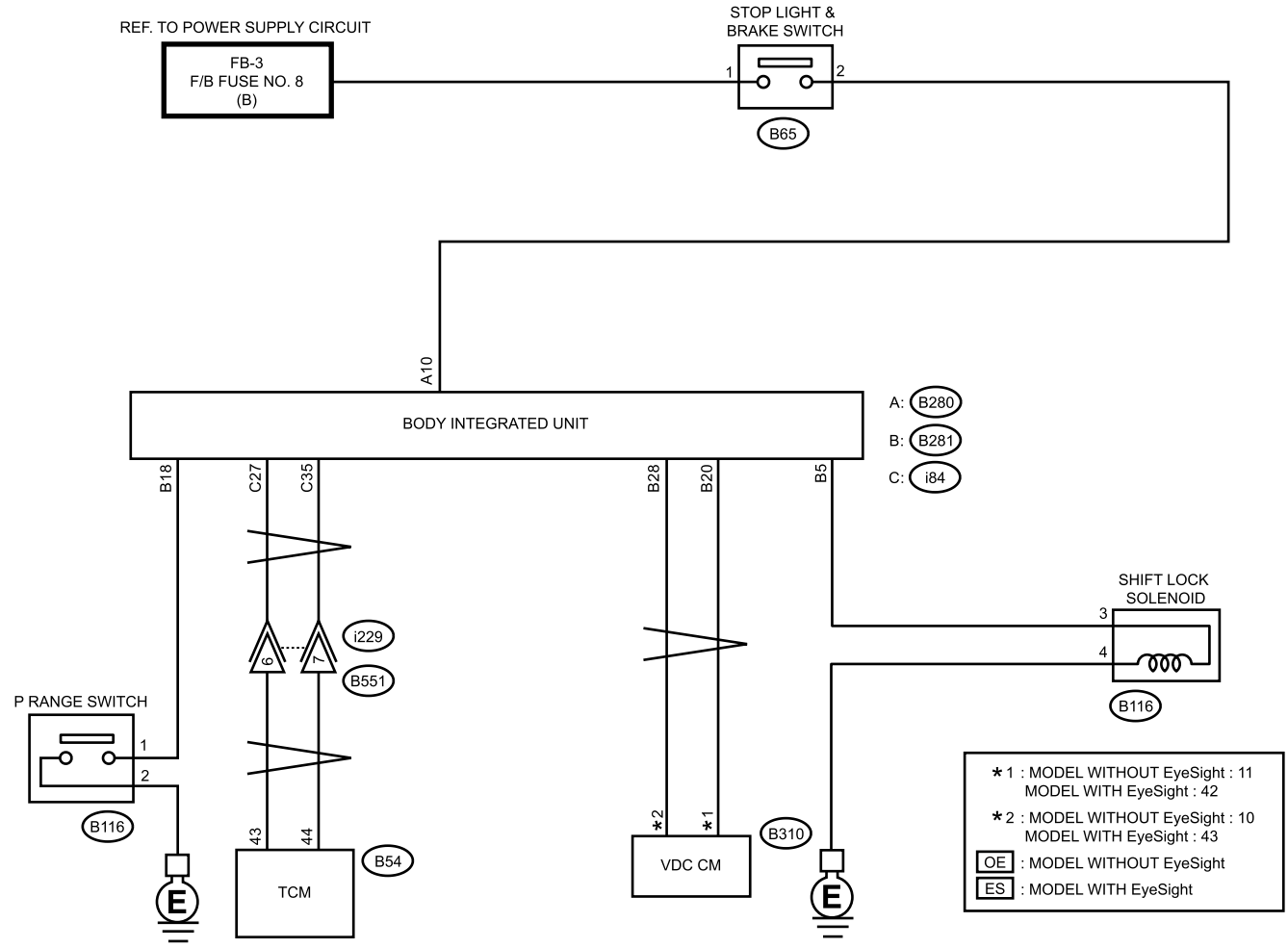
Yes	Go to 4.
No	Repair the open circuit of harness between the body integrated unit and chassis ground.

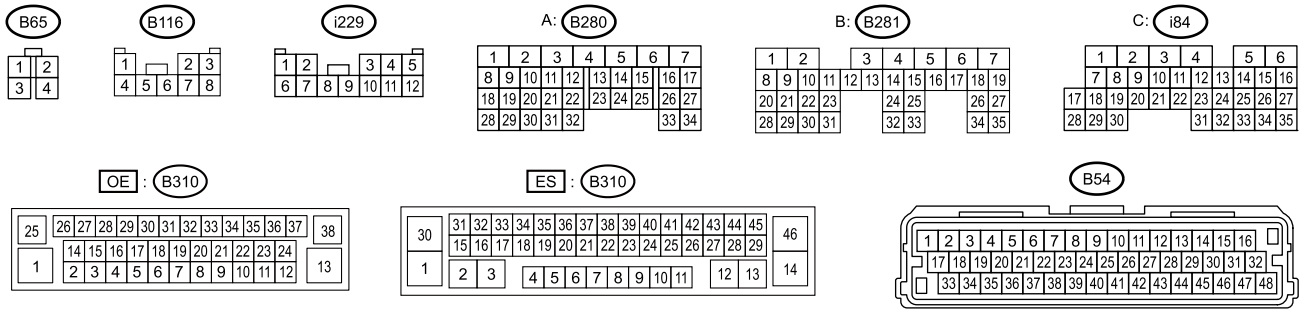
4. CHECK FOR POOR CONTACT.

Is there poor contact of connector?

Yes	Repair the poor contact.
No	Check body integrated unit.

3. SELECT LEVER CANNOT BE LOCKED OR RELEASED





CS-10236

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.

Is there any fault?

Yes	Follow the procedures to perform inspection and repair.
No	Go to 2.

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 SYSTEM (DIAGNOSTICS)>Read Current Data.

Is the display "ON" in the P range and "OFF" in ranges other than P?

Yes	Go to 3.
No	Go to 8.

3. CHECK CURRENT DATA.

Select the current data display and display «Stop Light Switch». Ref. to BODY CONTROL SYSTEM (DIAGNOSTICS)>Read Current Data.

Is "ON" displayed when the brake pedal is depressed and "OFF" displayed when the brake pedal is released?

Yes	Go to 4.
No	Go to 11.

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?

Yes	Follow the DTC to perform inspection and repair.
No	Go to 5.

5. CHECK CURRENT DATA.

Select the current data display and display «Shift lock solenoid output». Ref. to BODY CONTROL SYSTEM (DIAGNOSTICS)>Read Current Data.

Is “ON” displayed when the brake pedal is depressed and “OFF” displayed when the brake pedal is released?

Yes	Go to 6.
No	Replace the body integrated unit.

6. CHECK CURRENT DATA.

Select the current data display and display «Shift Position». Ref. to BODY CONTROL SYSTEM (DIAGNOSTICS)>Read Current Data.

Is the display “P” in the P range and other than “P” in ranges other than P?

Yes	Go to 7.
No	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 SYSTEM (DIAGNOSTICS)>Read Current Data.
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?

Yes — Go to 12.

No — 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?

Yes — Repair or replace the harness between the body integrated unit and the "P" range switch.

No — Go 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?

Yes	Go to 10.
No	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 1 Ω in the "P" range, and 1 MΩ or more in ranges other than "P"?

Yes	Replace the body integrated unit.
No	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?

Yes	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 (−):

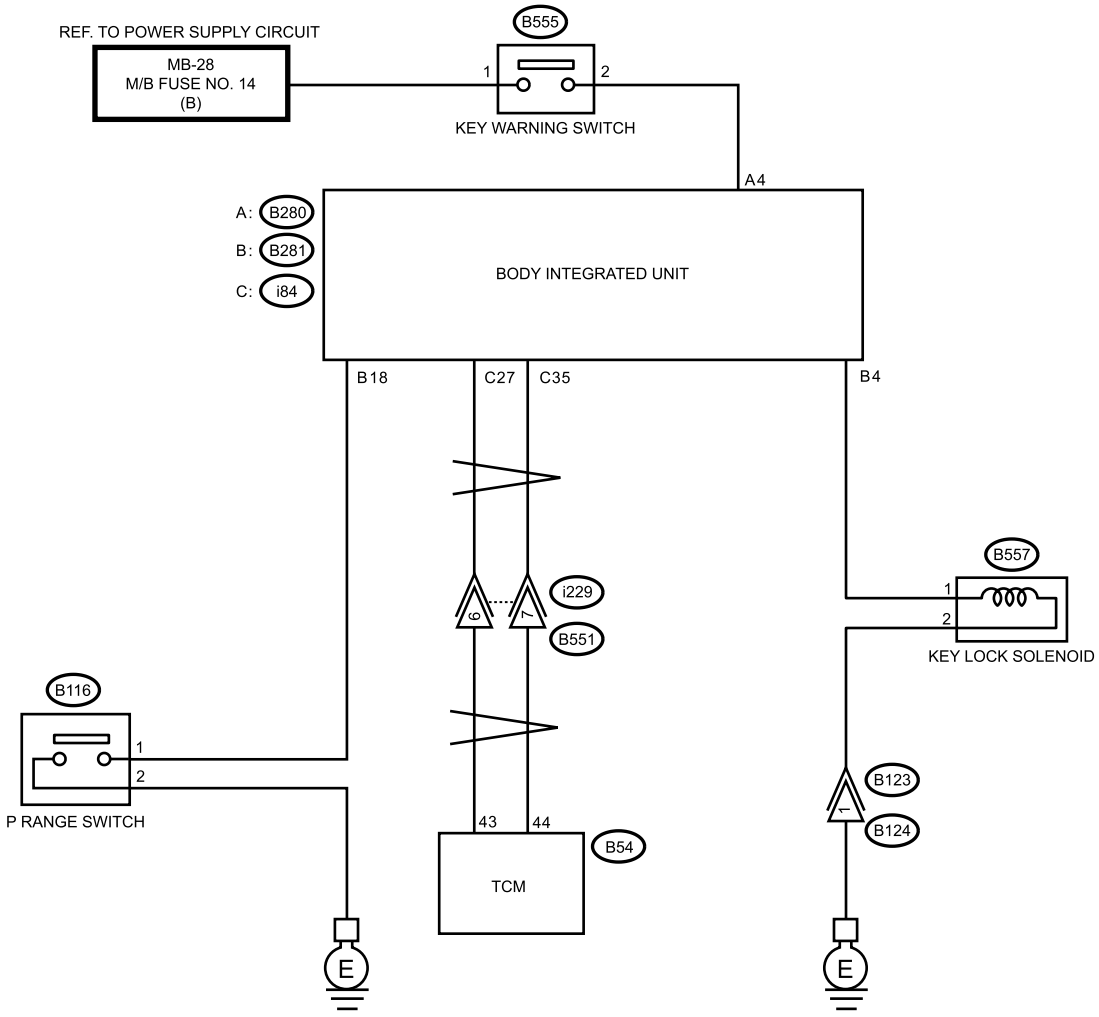
Does the solenoid unit operate normally?

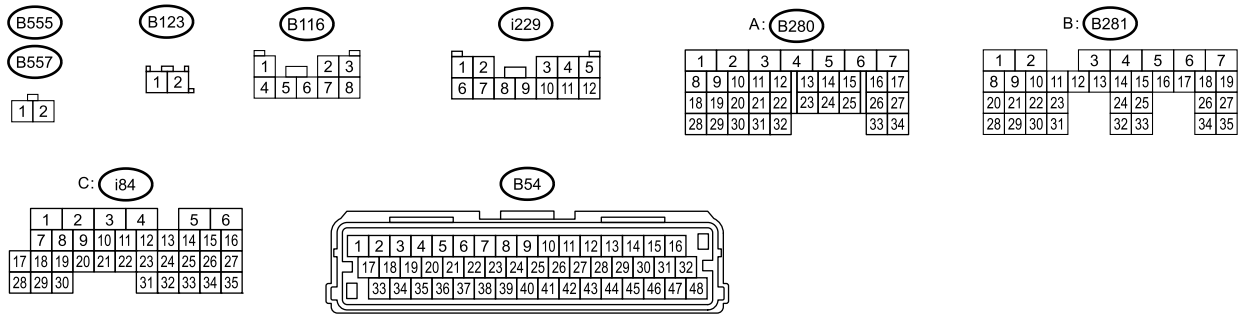
Yes	Check the lock mechanism of the select lever body.
No	Replace the solenoid unit.

4. KEY INTERLOCK CANNOT BE LOCKED OR RELEASED

Note:

Check of this item only applies to models without a push button ignition switch.





CS-10044

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.

Is there any fault?

Yes	Follow the procedures to inspect and repair.
No	Go to 2.

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 SYSTEM (DIAGNOSTICS)>Read Current Data.

Is the display "ON" in the P range and "OFF" in ranges other than P?

Yes	Go to 3.
No	Go to 6.

3. CHECK CURRENT DATA.

1. Select the current data display and display the «key-lock warning SW». Ref. to BODY CONTROL SYSTEM (DIAGNOSTICS)>Read Current Data.
2. Turn the ignition switch to OFF.

Does the display change from "ON" ←→ "OFF" when the key is inserted and removed?

Yes	Go to 4.
No	Go to 9.

4. 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 SYSTEM (DIAGNOSTICS)>Read Current Data.

Is the display "OFF" in the P range and "ON" in ranges other than P?

Yes	Go to 10.
No	Go to 5.

5. 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?

Yes	Follow the DTC to perform inspection and repair.
No	Go to 10.

6. 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?

Yes	Repair or replace the harness between the body integrated unit and the "P" range switch.
No	Go to 7.

7. 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?

Yes	Go to 8.
No	Repair or replace the harness between the “P” range switch and chassis ground.

8. CHECK “P” RANGE SWITCH.

Measure the resistance between “P” range switch connector terminals.

Terminals

No. 2 — No. 1:

Is it less than 1 Ω in the “P” range, and 1 MΩ or more in ranges other than “P”?

Yes	Replace the body integrated unit.
No	Replace the “P” range switch.

9. 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?

Yes	Replace the body integrated unit.
No	Check the following items. • Key warning switch • Harness/fuse • Ignition circuit

10. 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?

Yes	Repair or replace the harness between the body integrated unit and the key lock solenoid.
No	Go to 11.

11. 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?

Yes	Go to 12.
No	Repair or replace the harness between the key lock solenoid and chassis ground.

12. 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?

Yes	Go to 13.
No	Replace the key lock solenoid.

13. 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

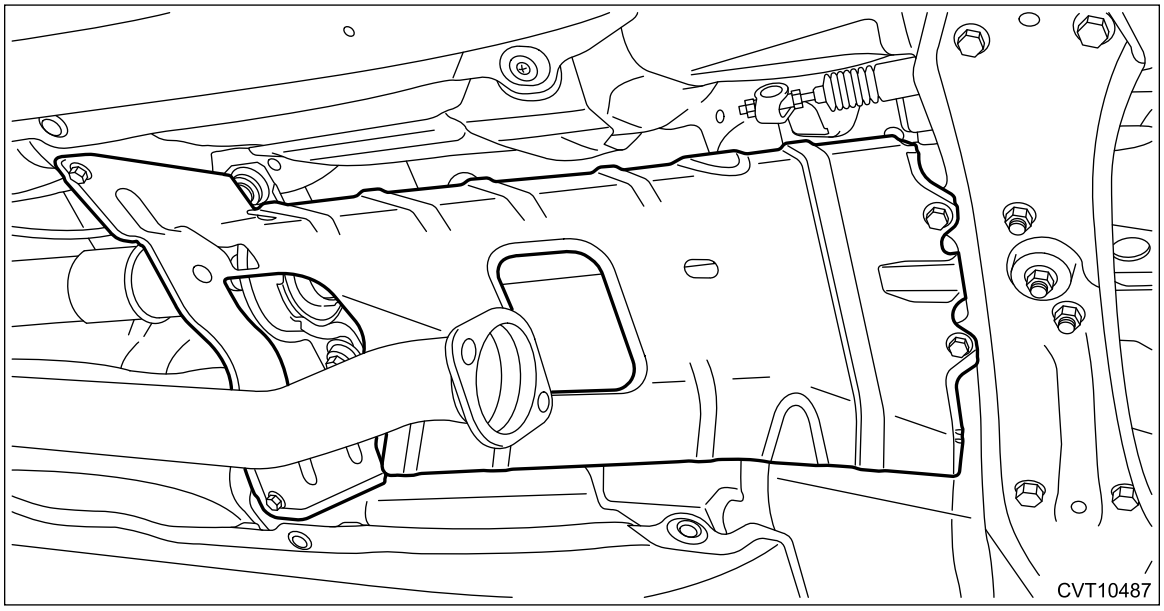
   (B281) No. 4 — Chassis ground:

Is it 7.5 V to 16 V in ranges other than “P”, and approx. 0 V in the “P” range?

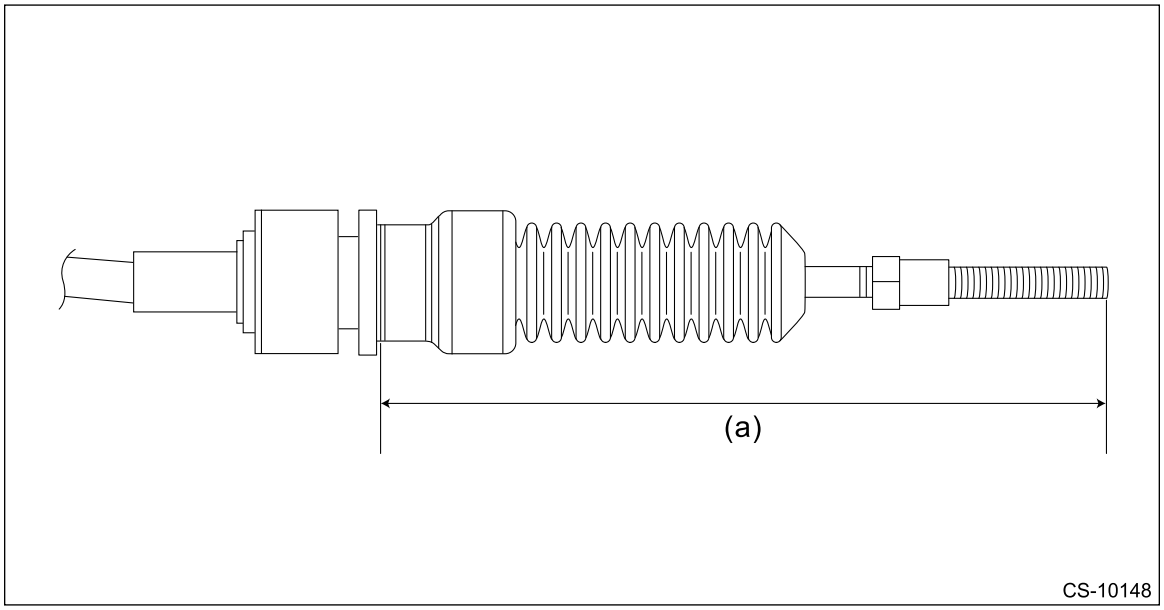
Yes	Check the lock mechanism of the steering lock body.
No	Replace the body integrated unit.

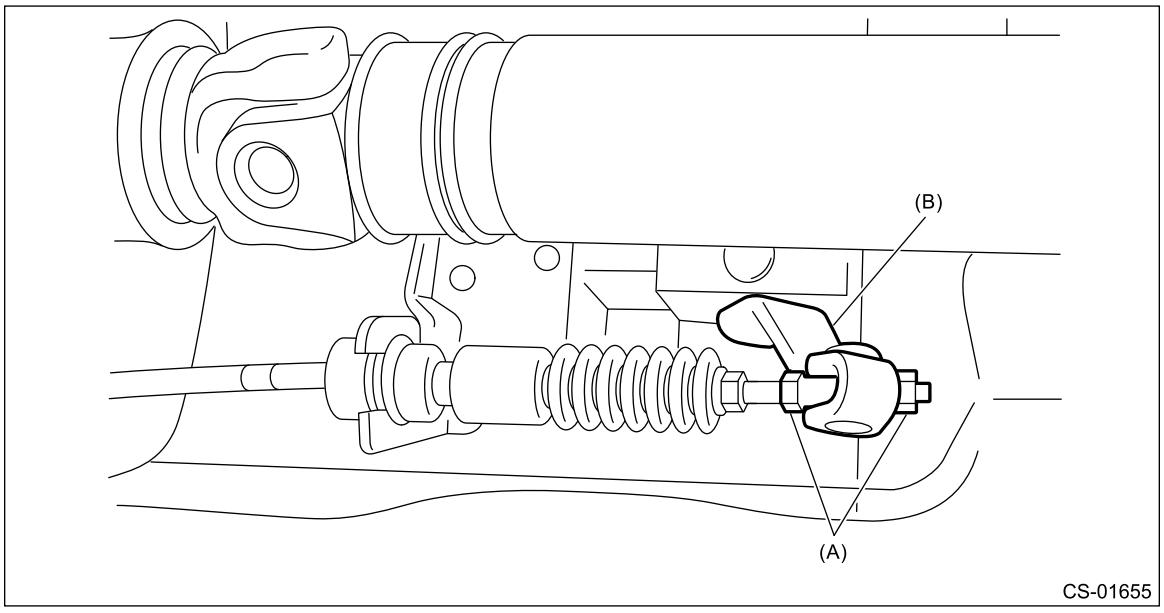
REMOVAL

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 (rear). Ref. to EXHAUST(w/o STI)>Center Exhaust Pipe>REMOVAL.
5. Remove the center exhaust cover.



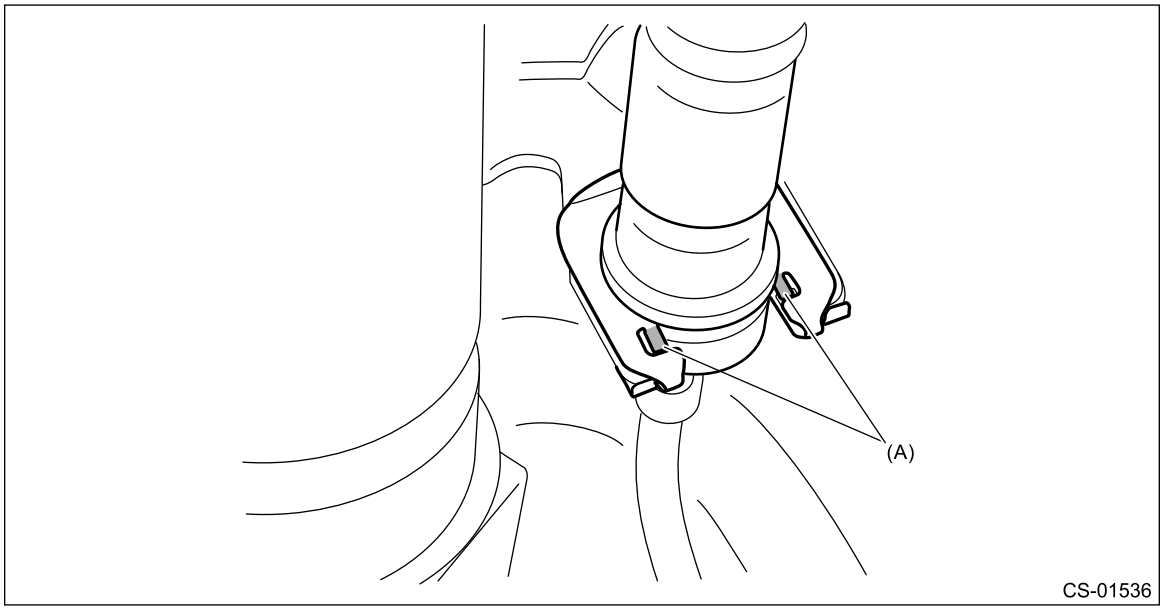
6. Disconnect the cable from the arm COMPL.
   Caution:
   Do not apply extra overload while holding the part (a).





(A) Adjusting nut (B) Arm COMPL

7. Raise the claw of clamp and remove the cable.

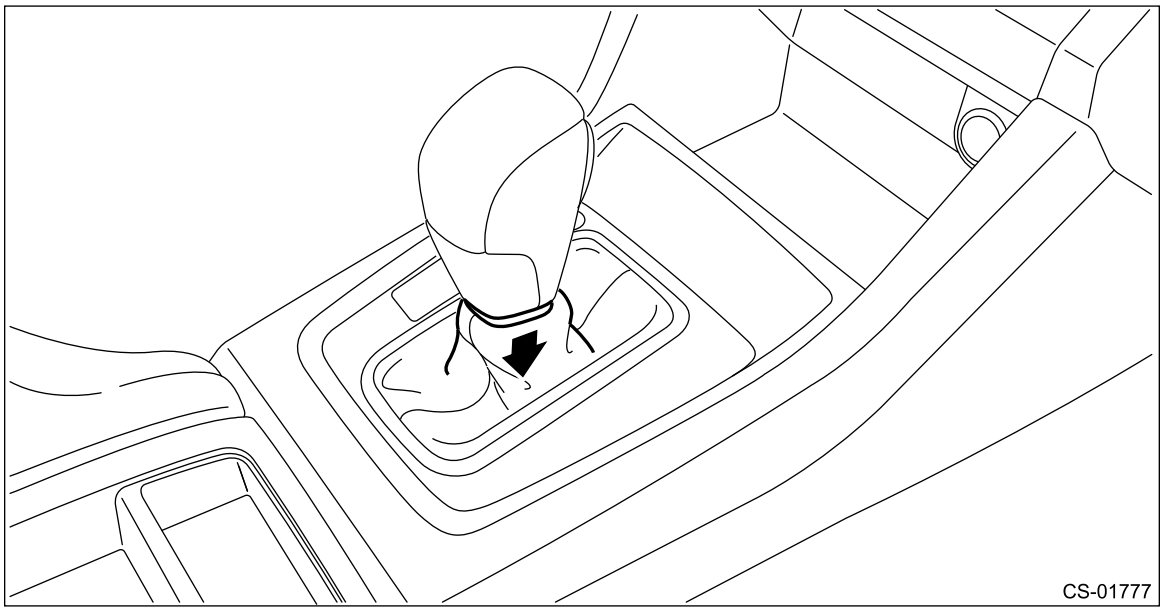


(A) Claw

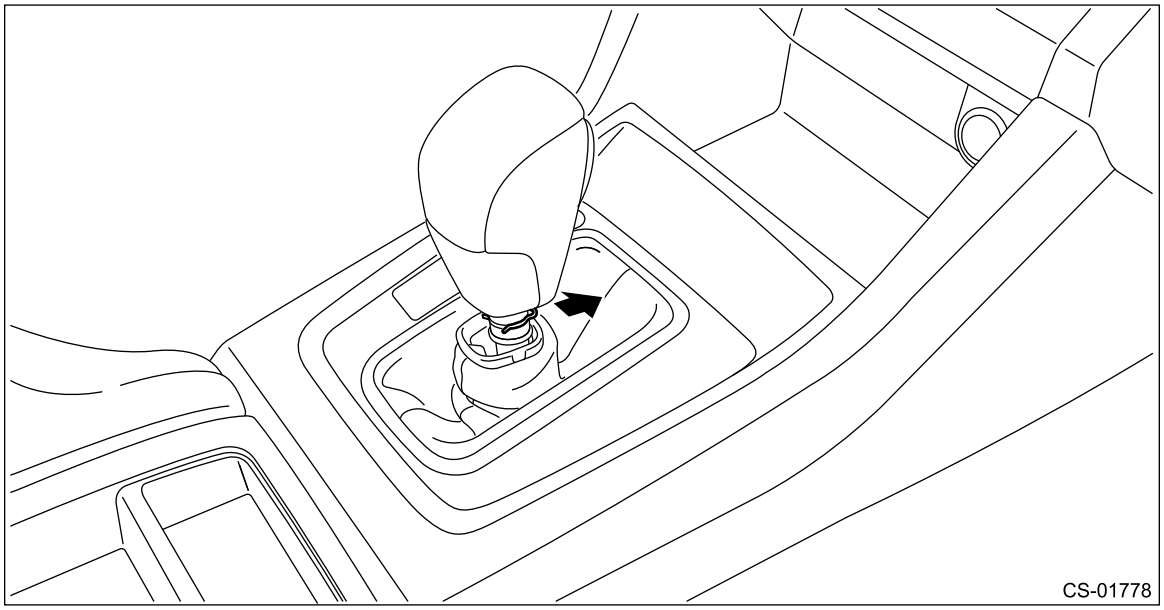
8. Lower the vehicle.

9. Shift the select lever to “N” range.

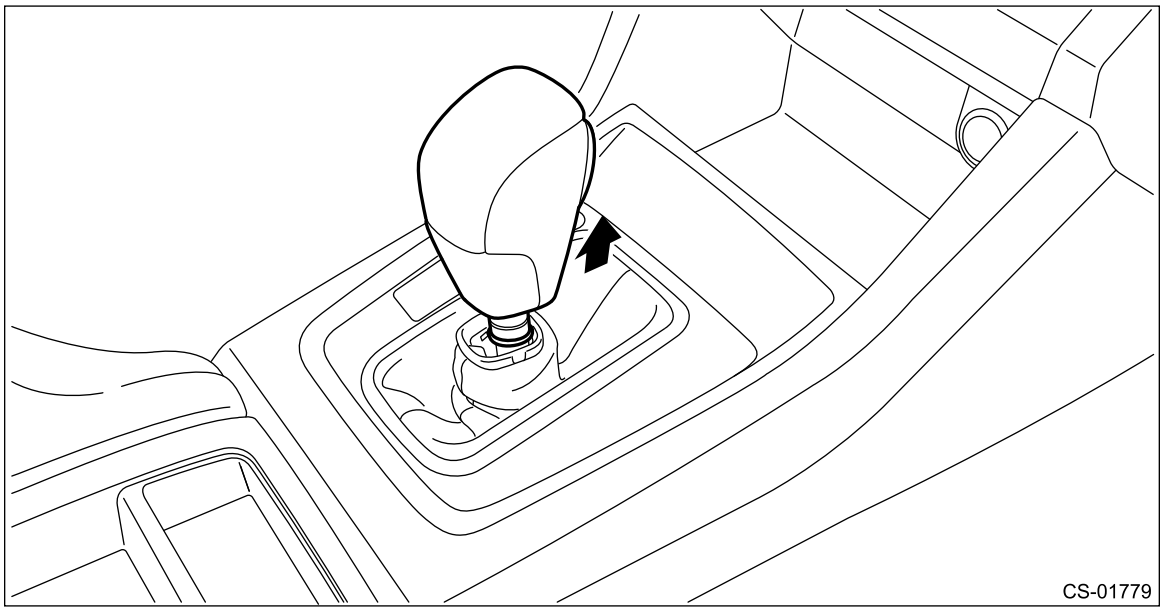
10. Lower the boot assembly vertically toward the lever.



11. Remove the clamp grip pin.



12. Remove the grip assembly.

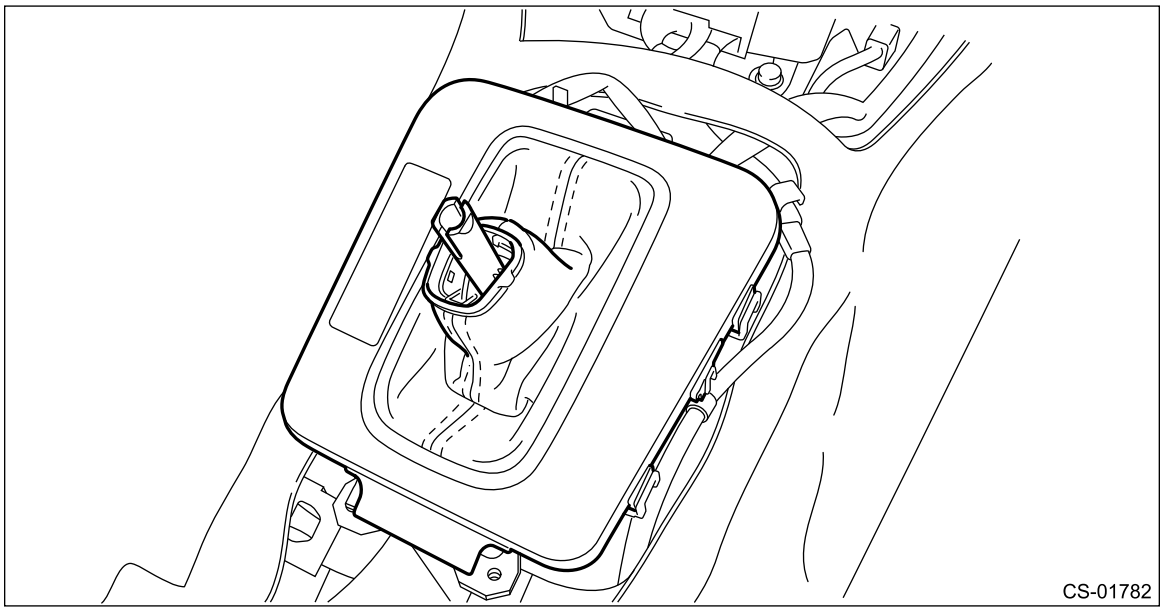


13. Remove the console box assembly. Ref. to EXTERIOR/INTERIOR TRIM>Console Box>REMOVAL.

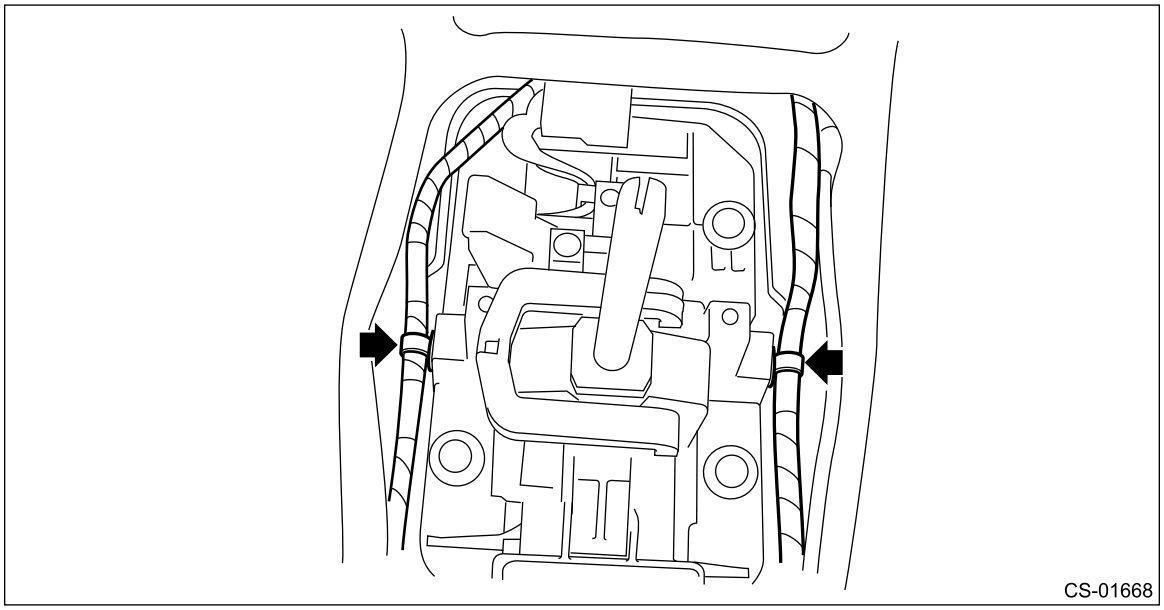
14. Remove the cover - shift lever. Ref. to EXTERIOR/INTERIOR TRIM>Console Box>REMOVAL.

15. Remove the panel center LWR LH and RH. Ref. to EXTERIOR/INTERIOR TRIM>Console Box>REMOVAL.

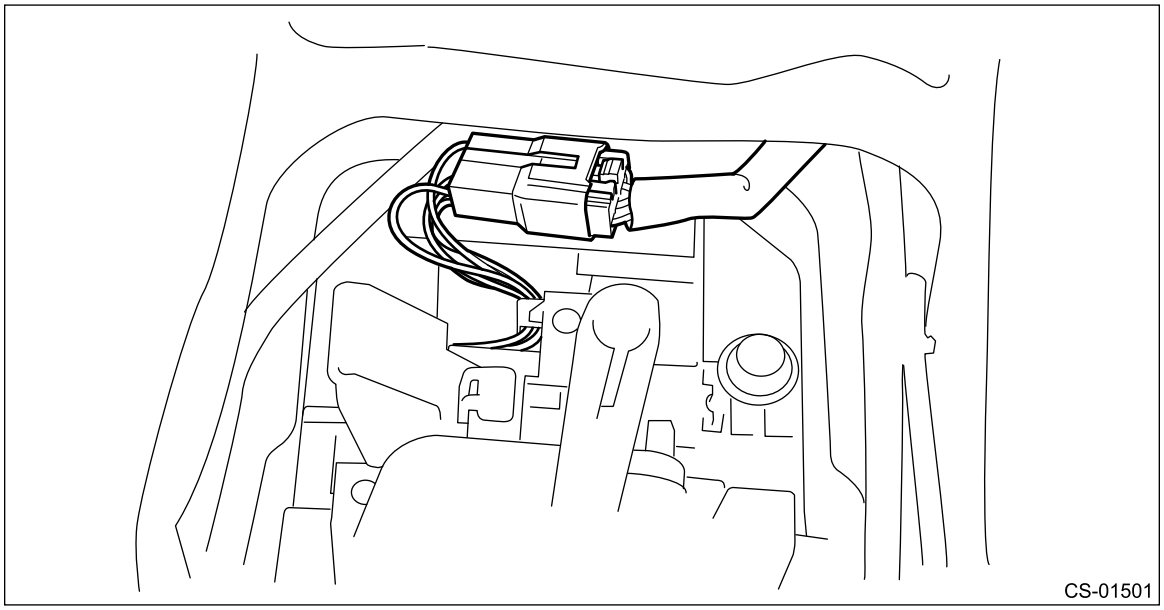
16. Disconnect the connector, and remove the indicator assembly.



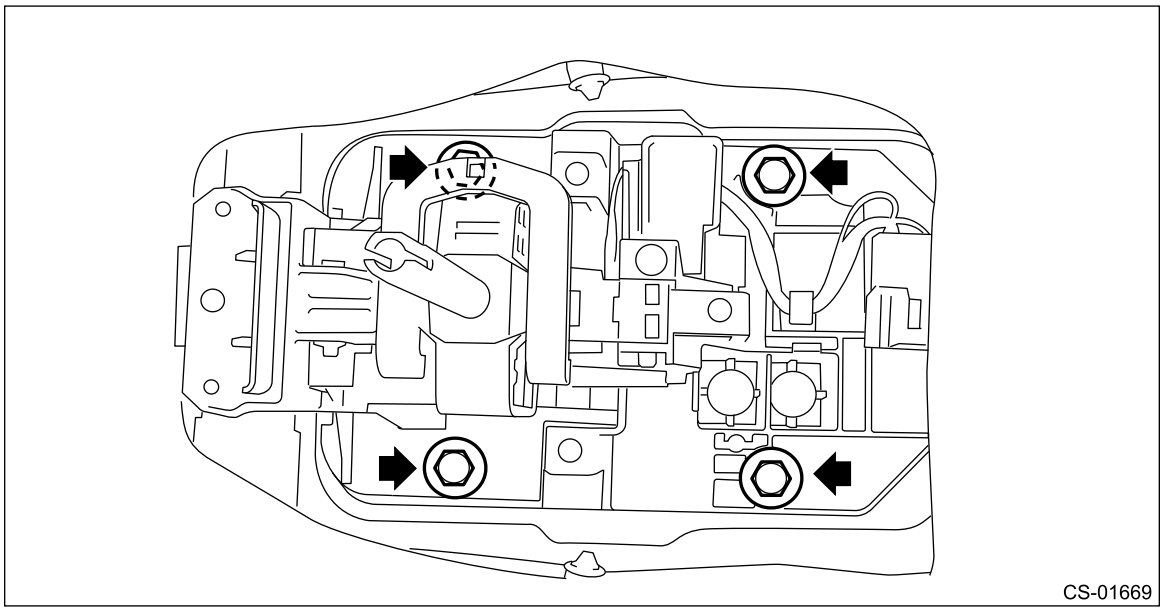
17. Remove the harness clips.



18. Disconnect the harness connector.

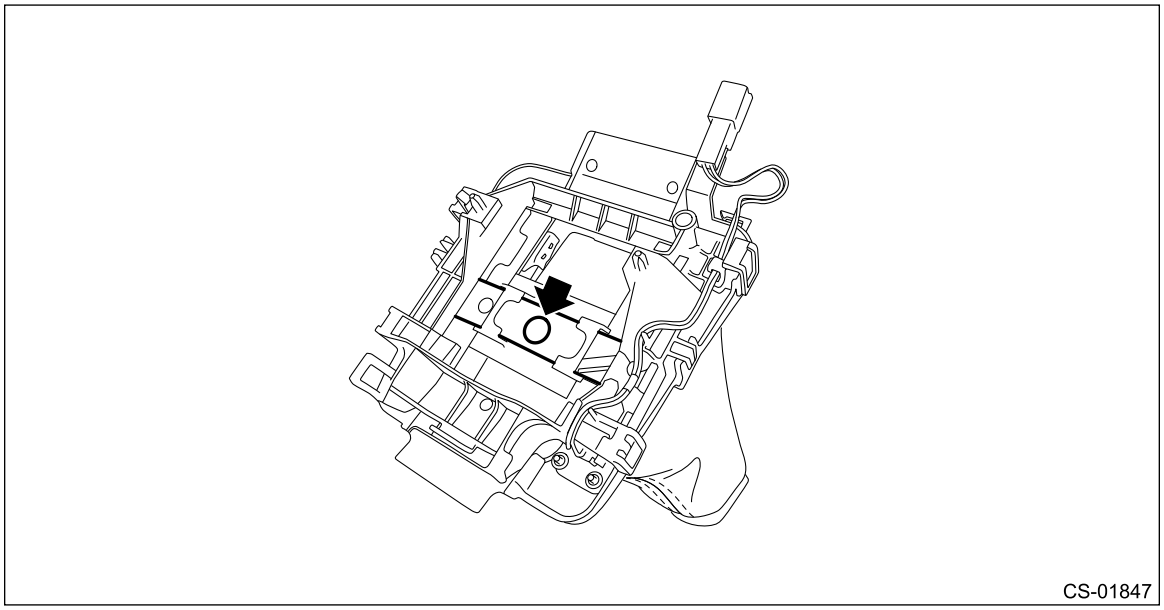


19. Remove the select lever assembly.

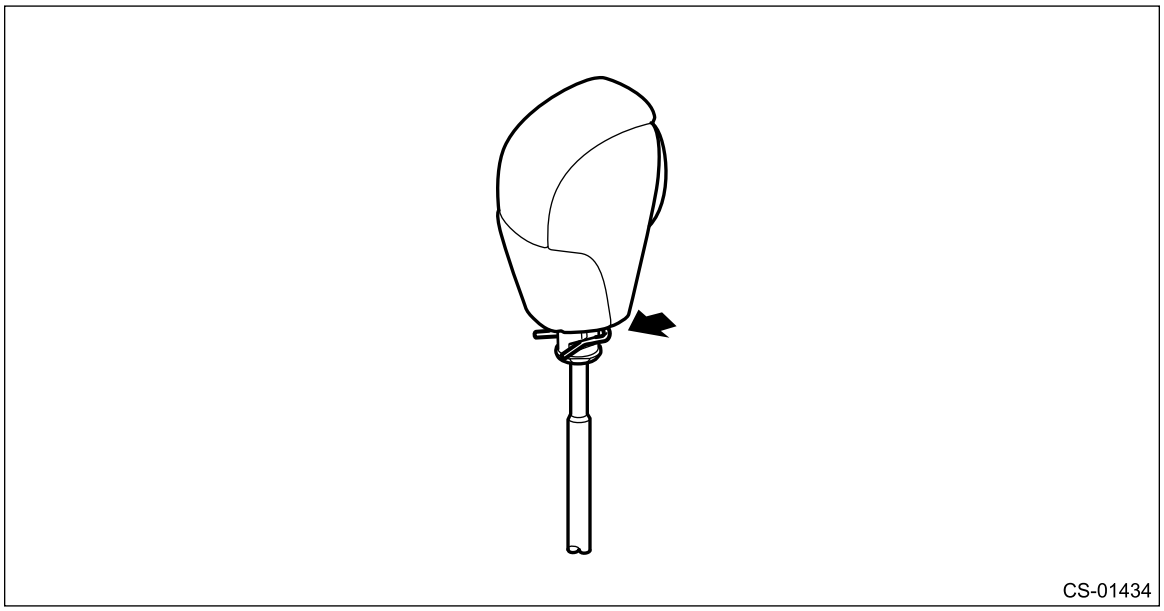


INSTALLATION

1. Install the select lever assembly after setting it to the vehicle body.
   Tightening torque:
   18 N·m (1.8 kgf-m, 13.3 ft-lb)
2. Connect the harness connector.
3. Install the harness clip to the select lever assembly.
4. Shift the select lever to “N” range.
5. Install the indicator assembly, then connect the connector.
   Note:
   Insert the select lever through the blind hole sufficiently.

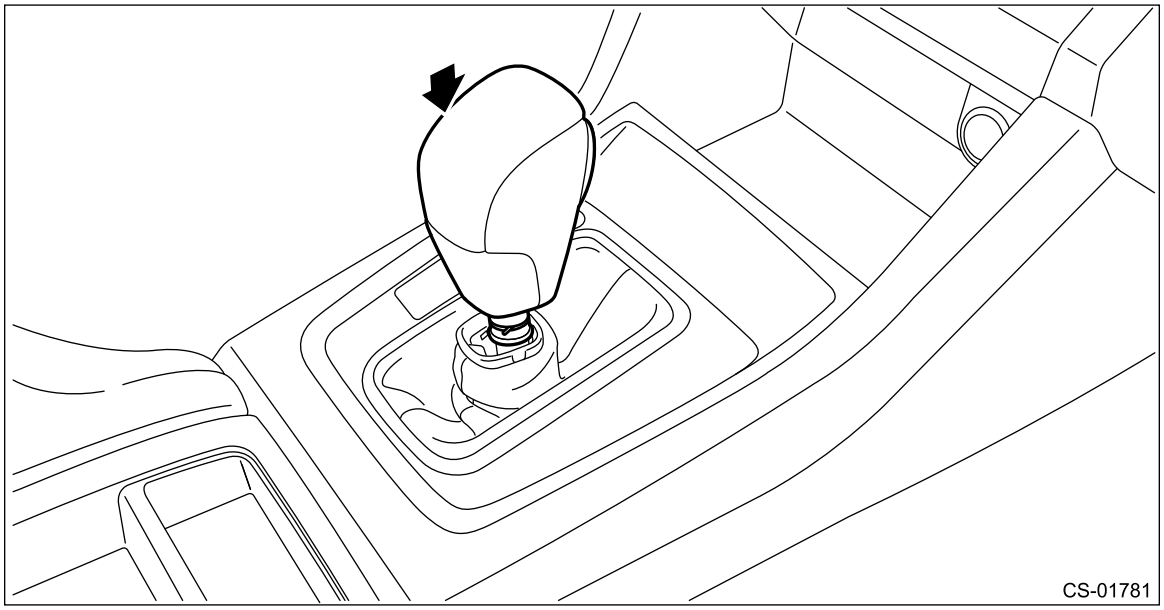


6. Install the panel center LWR LH and RH. Ref. to EXTERIOR/INTERIOR TRIM>Console Box>INSTALLATION.
7. Install the cover - shift lever. Ref. to EXTERIOR/INTERIOR TRIM>Console Box>INSTALLATION.
8. Install the console box assembly. Ref. to EXTERIOR/INTERIOR TRIM>Console Box>INSTALLATION.
9. Accessing from the button side of the grip, attach the clamp grip pin.



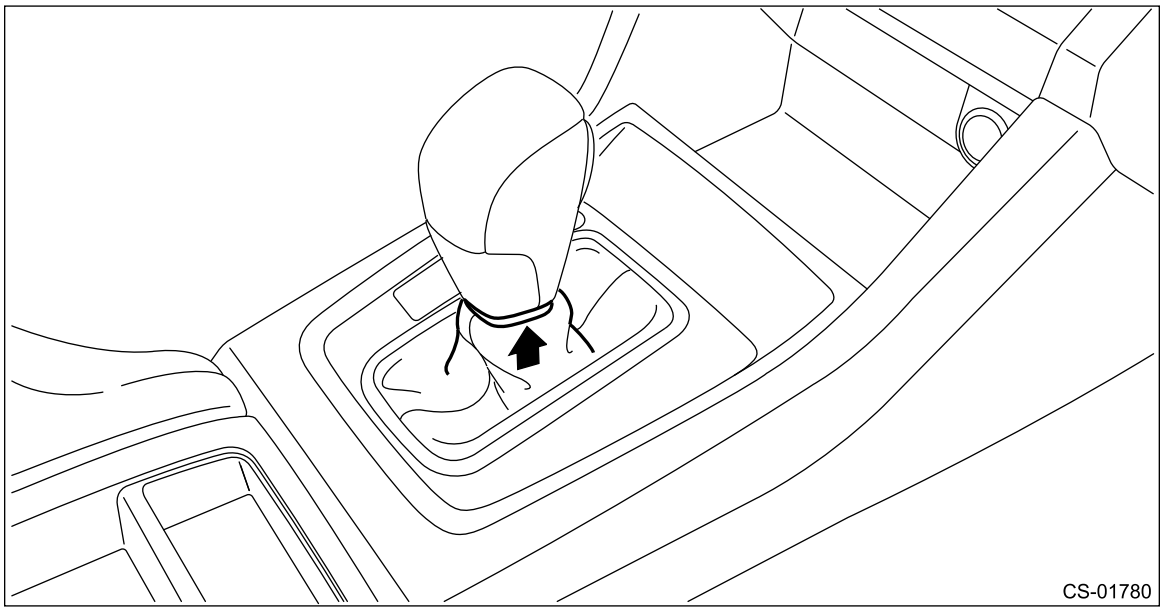
10. Insert the grip assembly to the select lever and press it down until a click is heard.

Note:
While pressing the clamp grip with a finger in order to prevent it from popping out, insert the grip assembly.



11. Securely install the boot assembly.

Note:
After installation, check that the boot assembly does not come off.



12. After installation of grip, check the following points.
- The grip will not come off.
- The button on the grip operates normally.

13. Shift the select lever to “N” range.

14. Lift up the vehicle.

15. Secure the cable to the bracket. Ref. to CONTROL SYSTEMS>Select Cable>INSTALLATION.

16. Adjust the select cable position. Ref. to CONTROL SYSTEMS>Select Cable>ADJUSTMENT.

17. 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.

18. Install the center exhaust cover.

Tightening torque:

18 N·m (1.8 kgf-m, 13.3 ft-lb)

19. Install the center exhaust pipe (rear). Ref. to EXHAUST(w/o STI)>Center Exhaust Pipe>INSTALLATION.

20. Lower the vehicle.

21. Connect the battery ground terminal. Ref. to NOTE>NOTE > BATTERY.

22. 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.

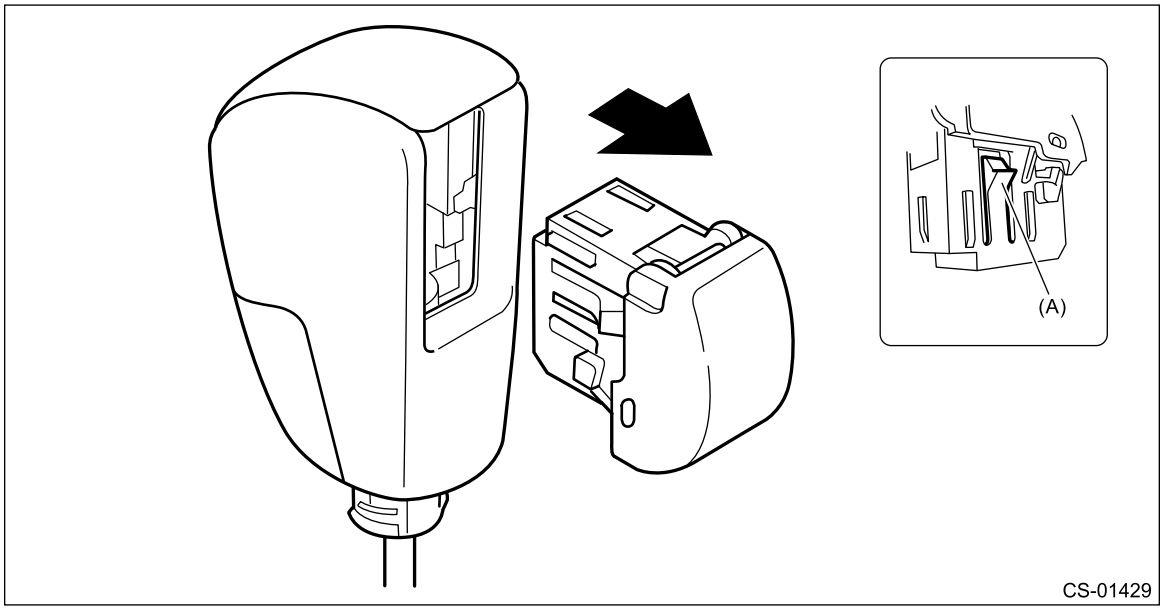
(4) Select lever and indicator positions are matched.

CONTROL SYSTEMS > Select Lever

DISASSEMBLY

1. GRIP ASSY

1. Remove the button assembly_AT.

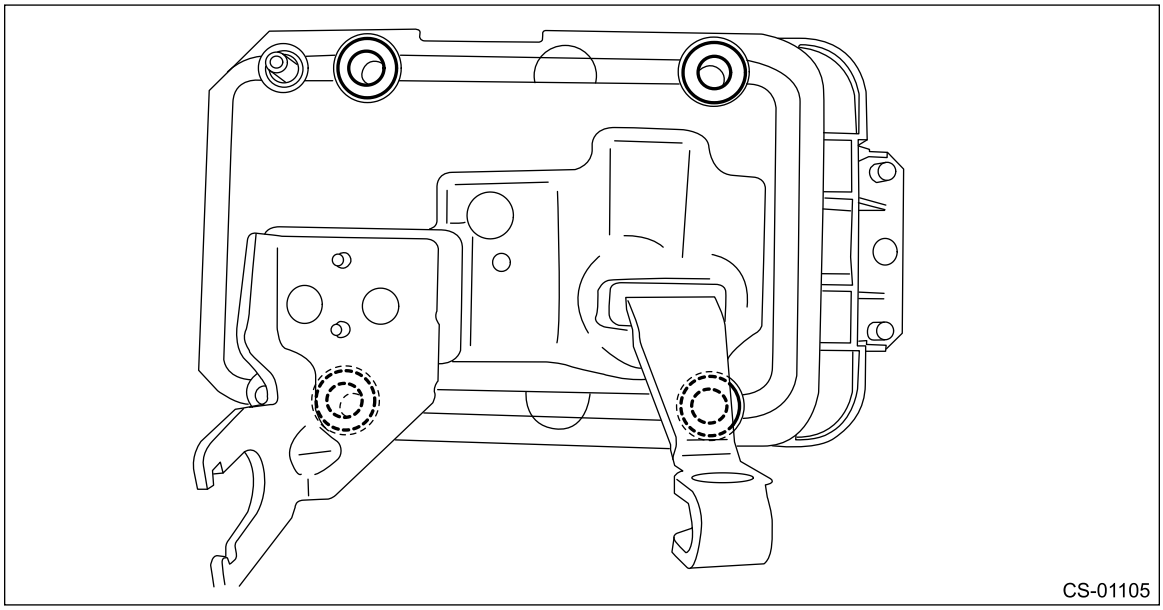


(A) Claw

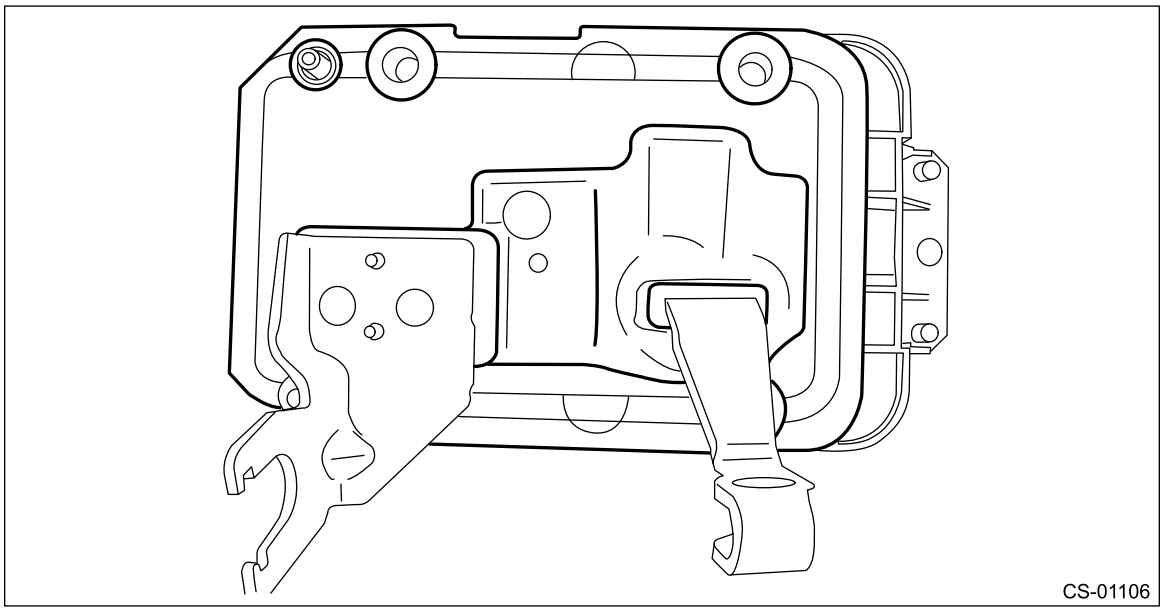
2. Remove the rod COMPL.

2. AT SELECT LEVER ASSEMBLY

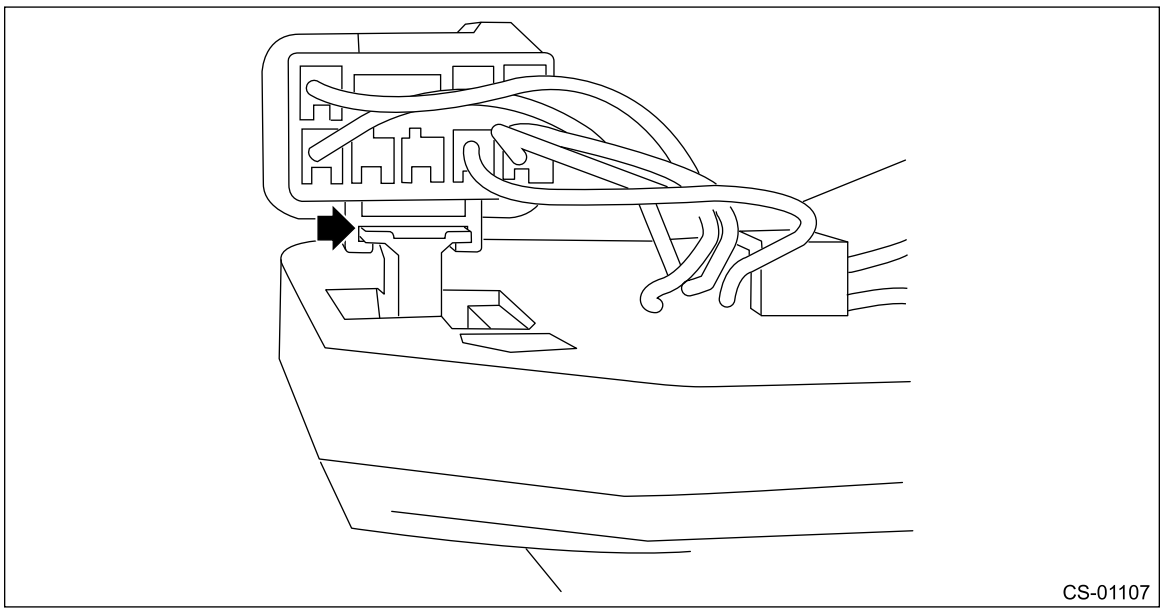
1. Remove the spacer plate.



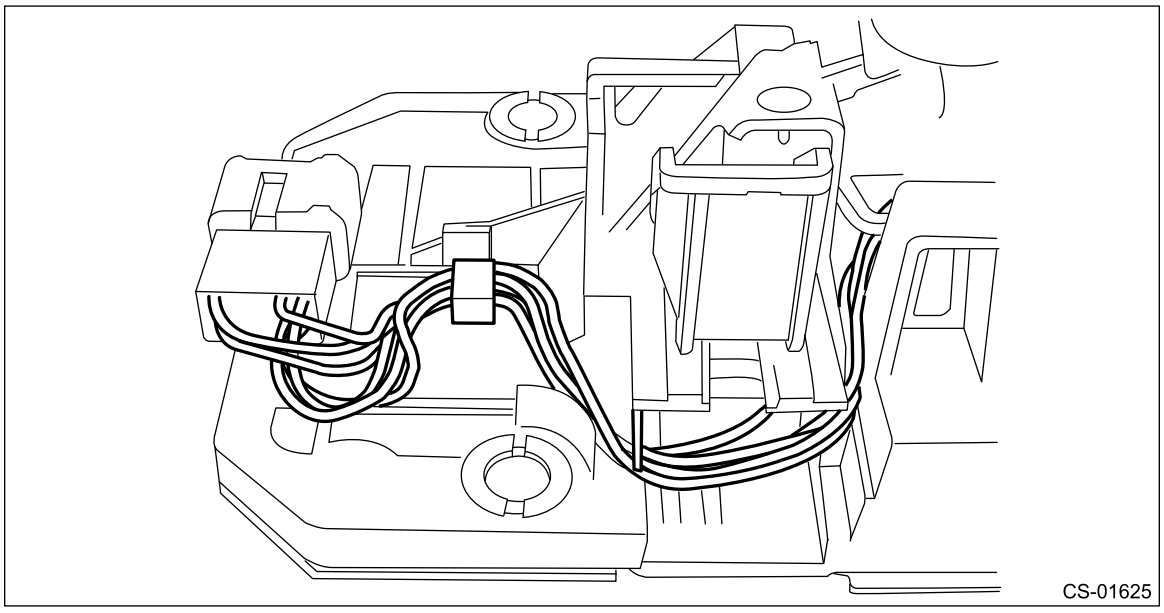
2. Remove the gasket.



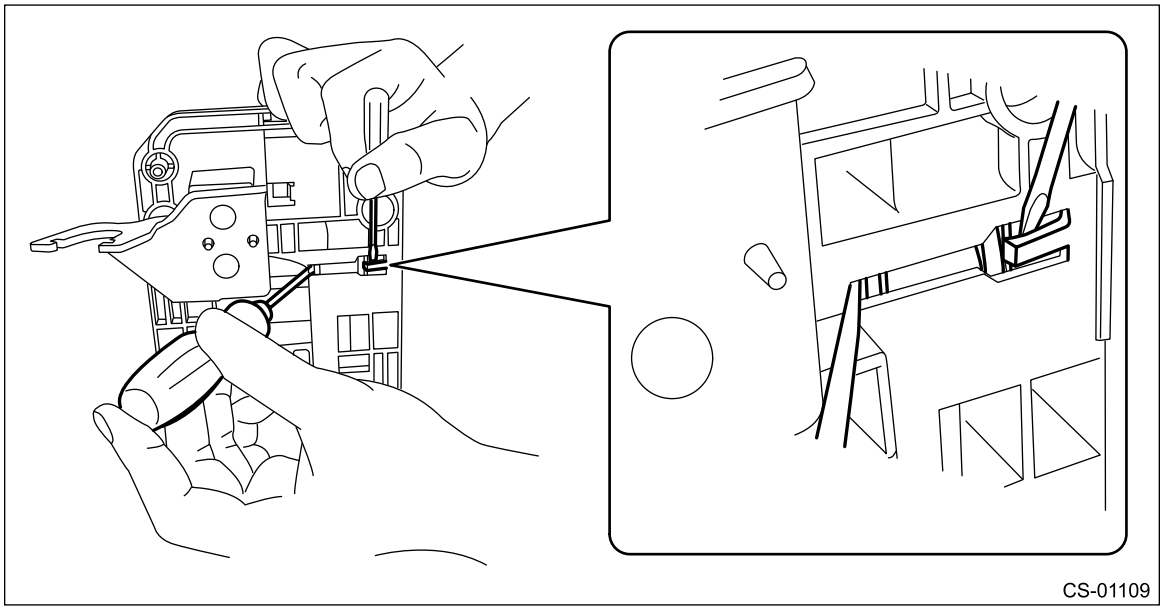
3. Insert a flat tip screwdriver with a thin tip under the connector and disconnect the harness connector.



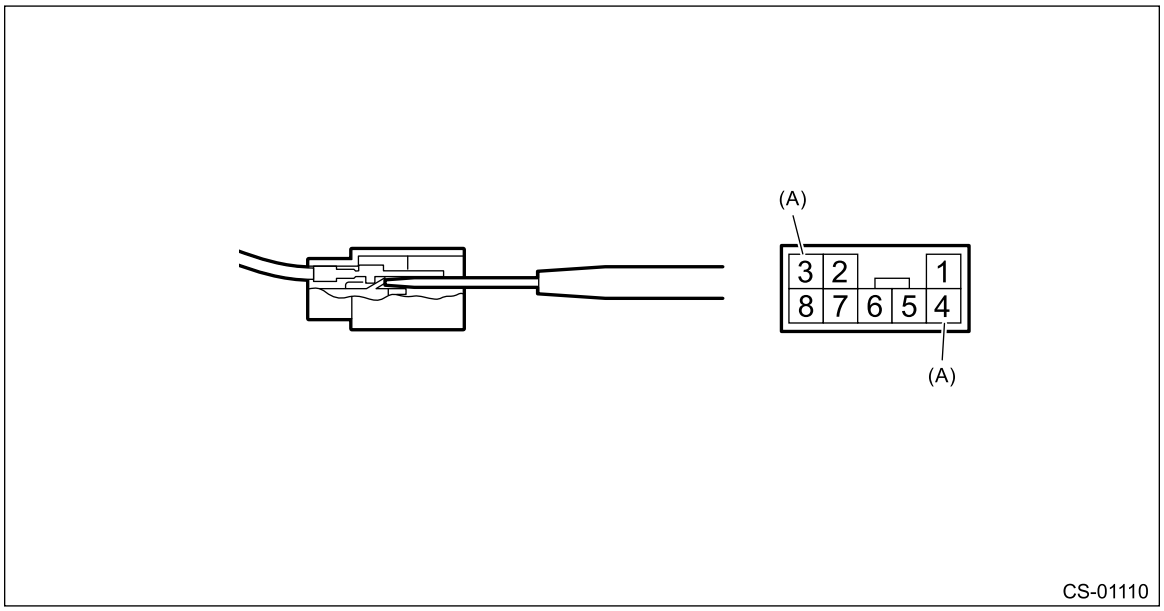
4. Remove the harness.



5. Raise the claw with a flat tip screwdriver with a thin tip and remove the solenoid unit.



6. Remove the terminal of the solenoid unit using a flat tip precision screwdriver with a tip width of 1.3 mm (0.05 in) or less, KTC connector terminal tool ECC-1T or equivalent.

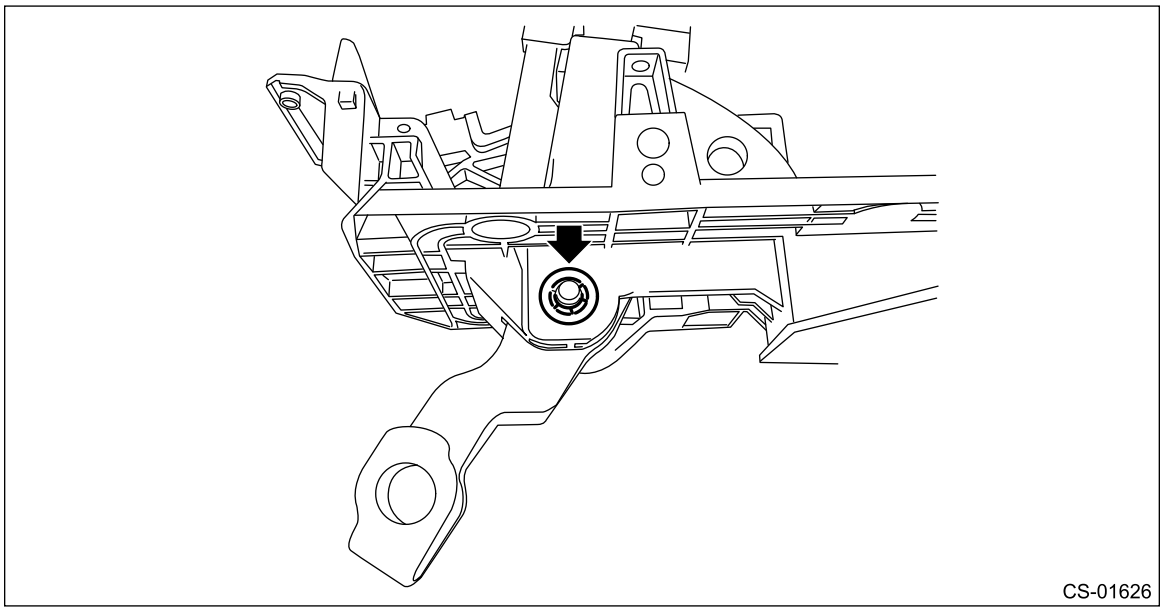


(A) Solenoid unit terminals

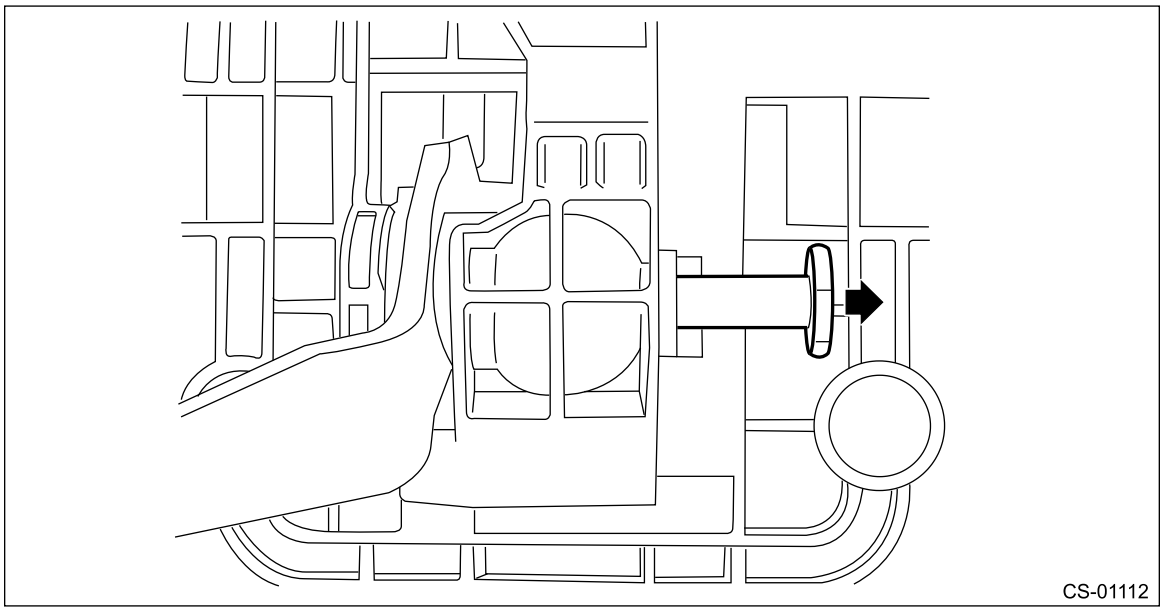
7. Remove the clamp push nut.

Note:

Replace the clamp push nut with a new part.



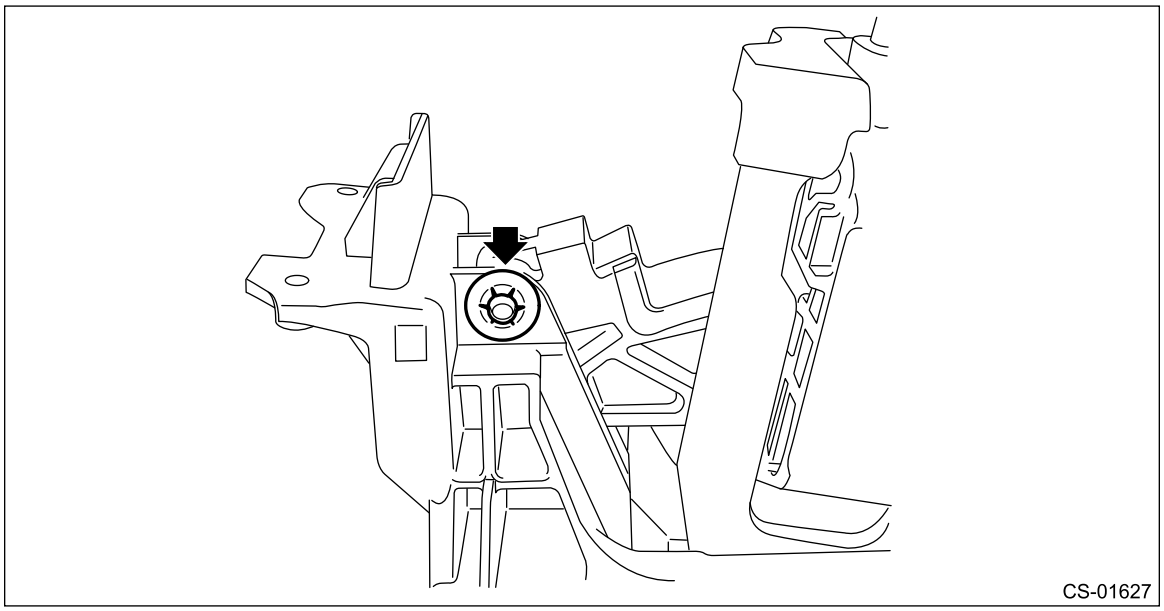
8. Pull out shaft control.



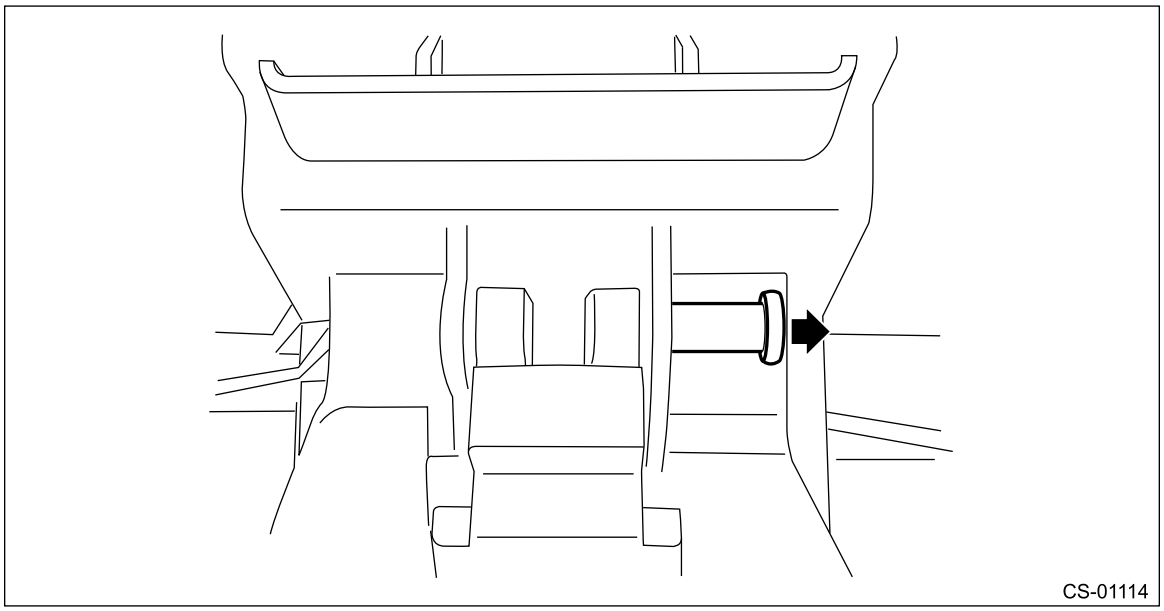
9. Remove the clamp push nut.

Note:

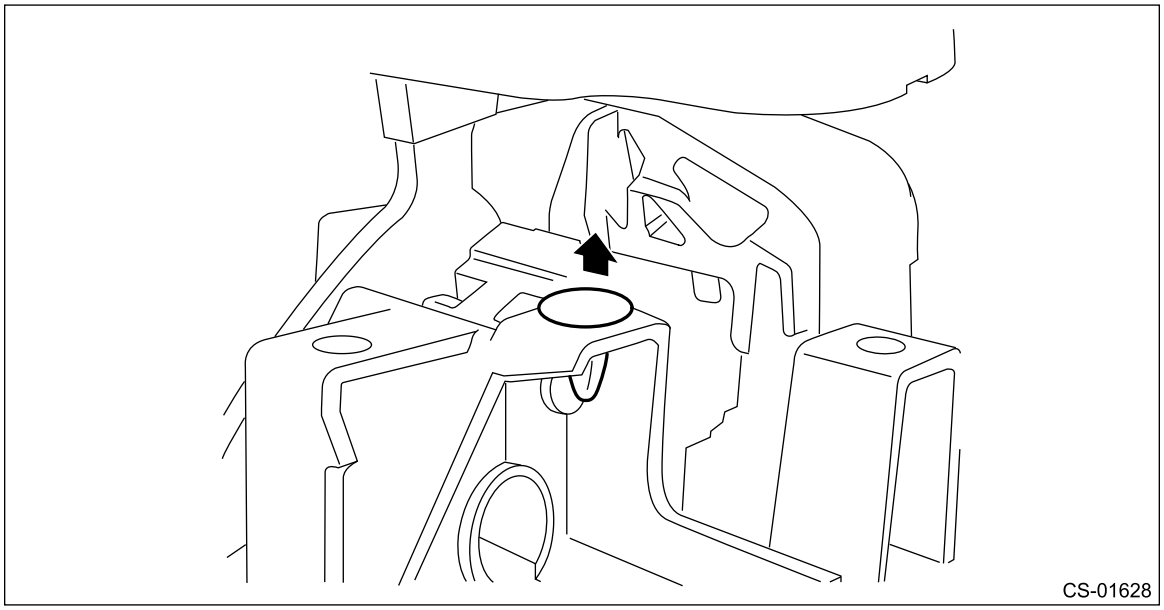
Replace the clamp push nut with a new part.



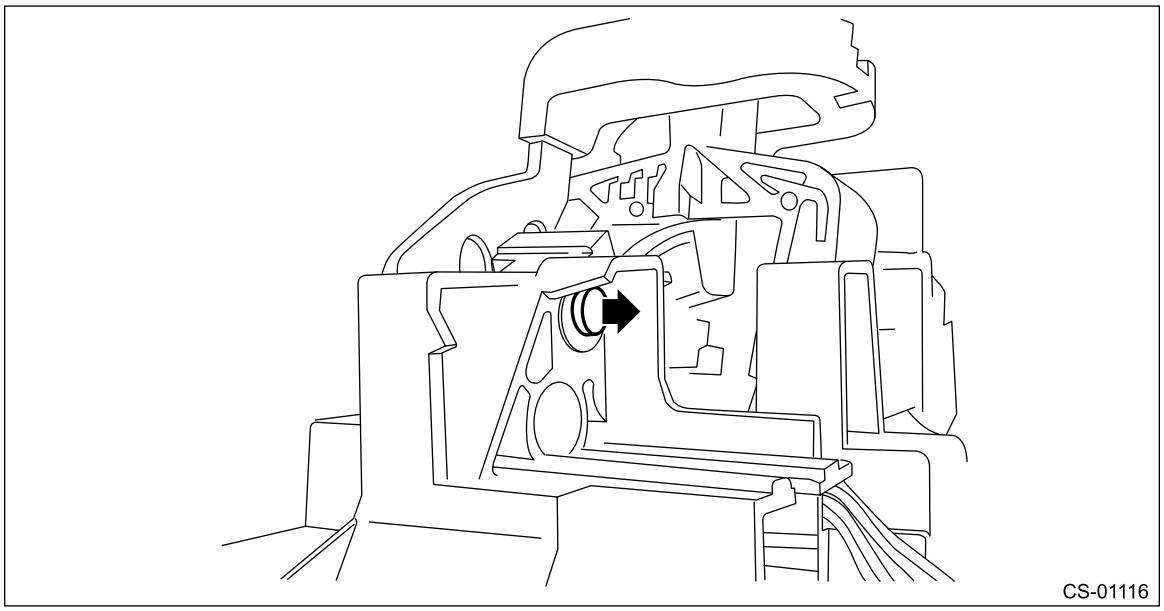
10. Pull out spacer pin guide.



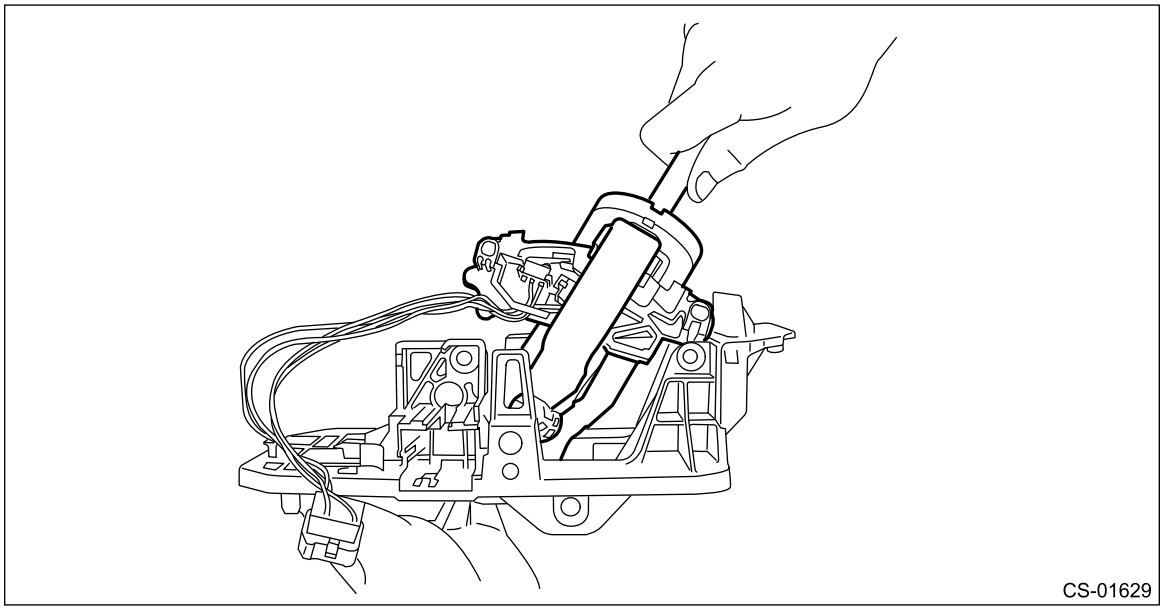
11. Remove the clamp pin.



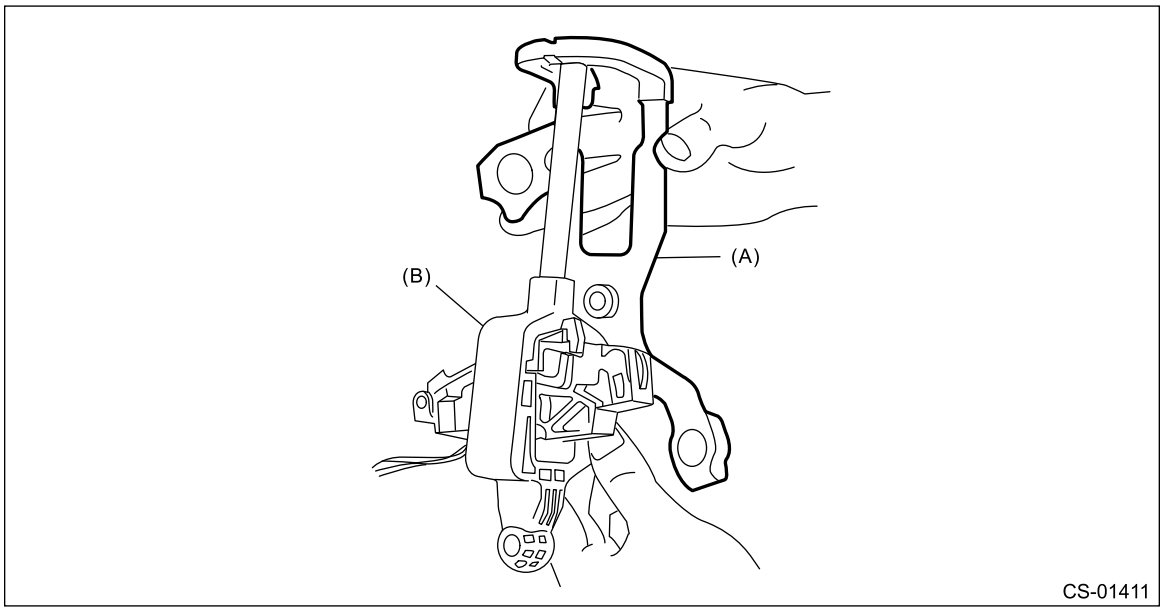
12. Remove the spacer pin guide.



13. Remove the select lever COMPL.

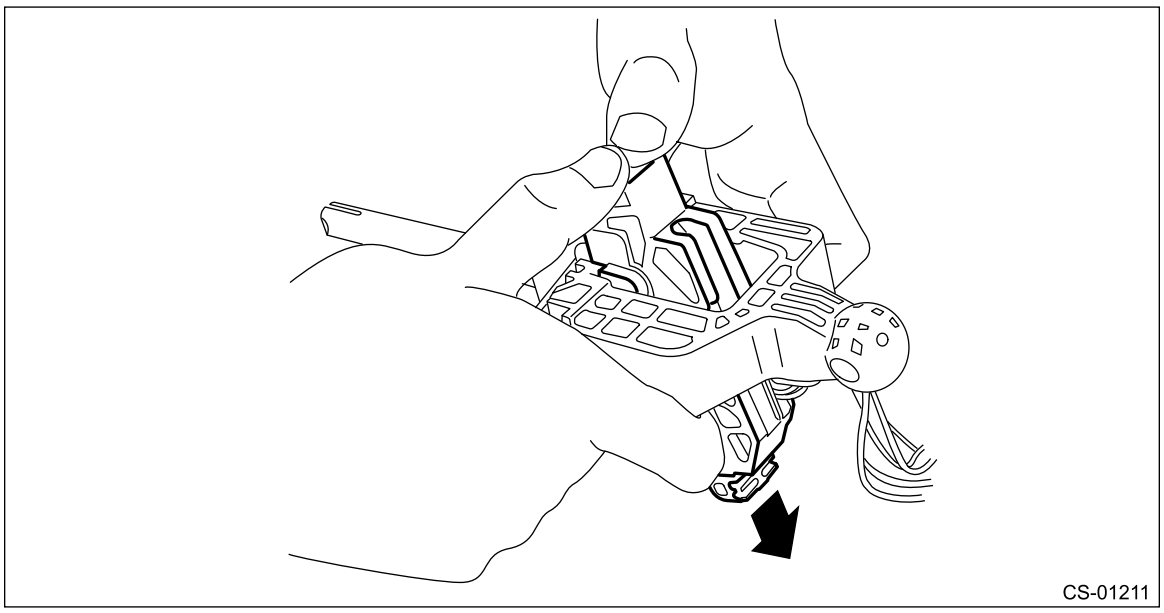


14. Remove the arm COMPL.

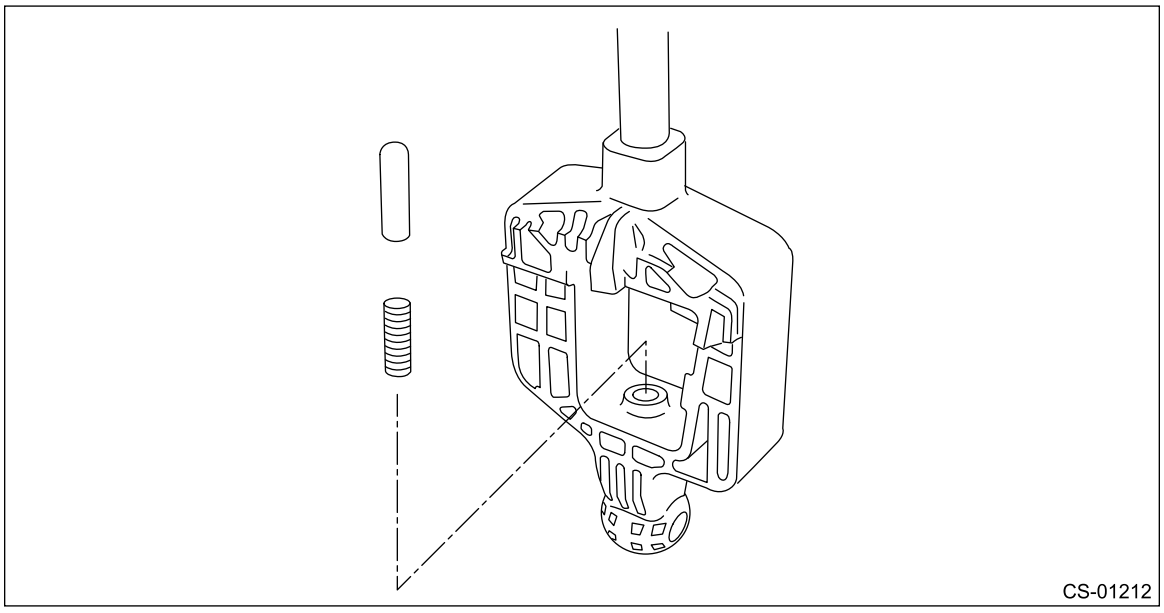


(A) Arm COMPL (B) Selector lever COMPL

15. Remove the plate guide.

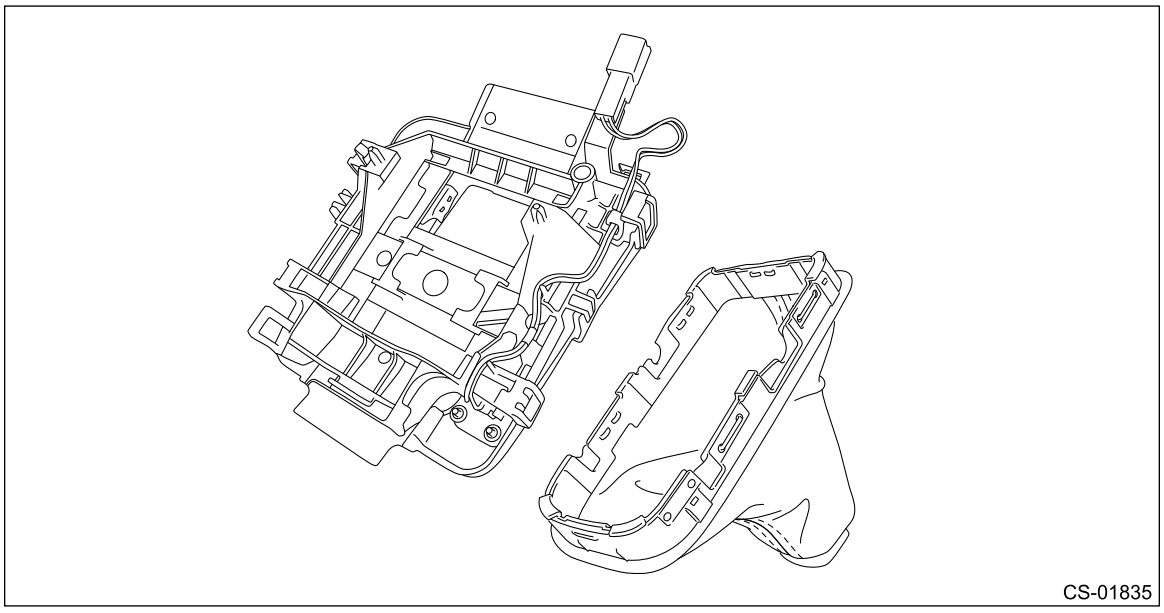


16. Remove the rod detent and the detent spring.



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.

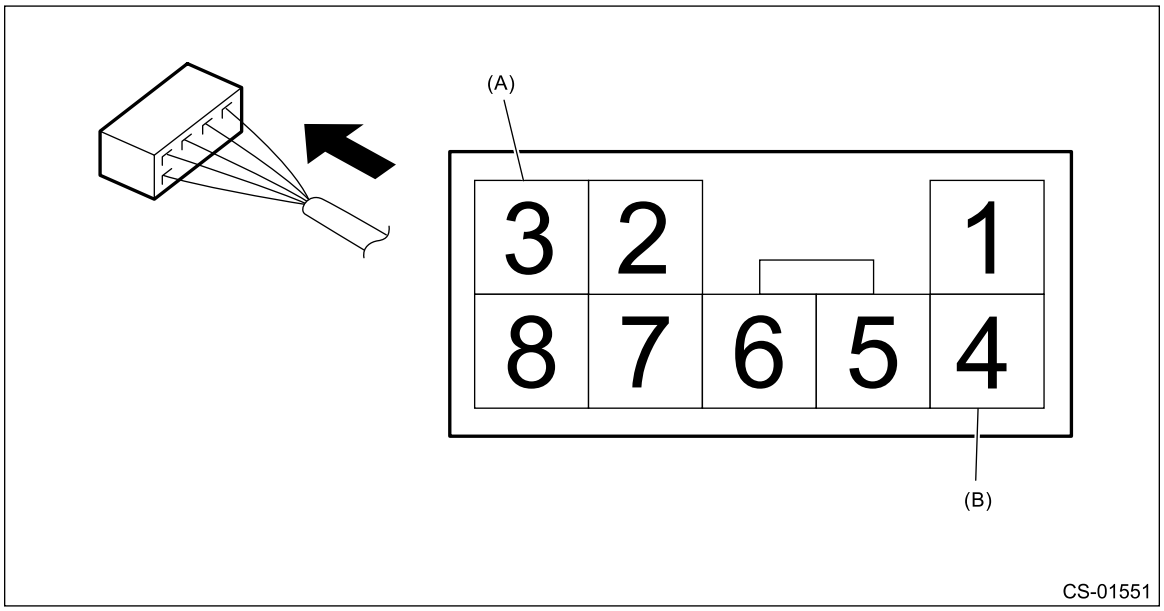


CONTROL SYSTEMS > Select Lever

ASSEMBLY

1. Clean all the parts before assembly.
2. Apply Multemp D No. 2 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

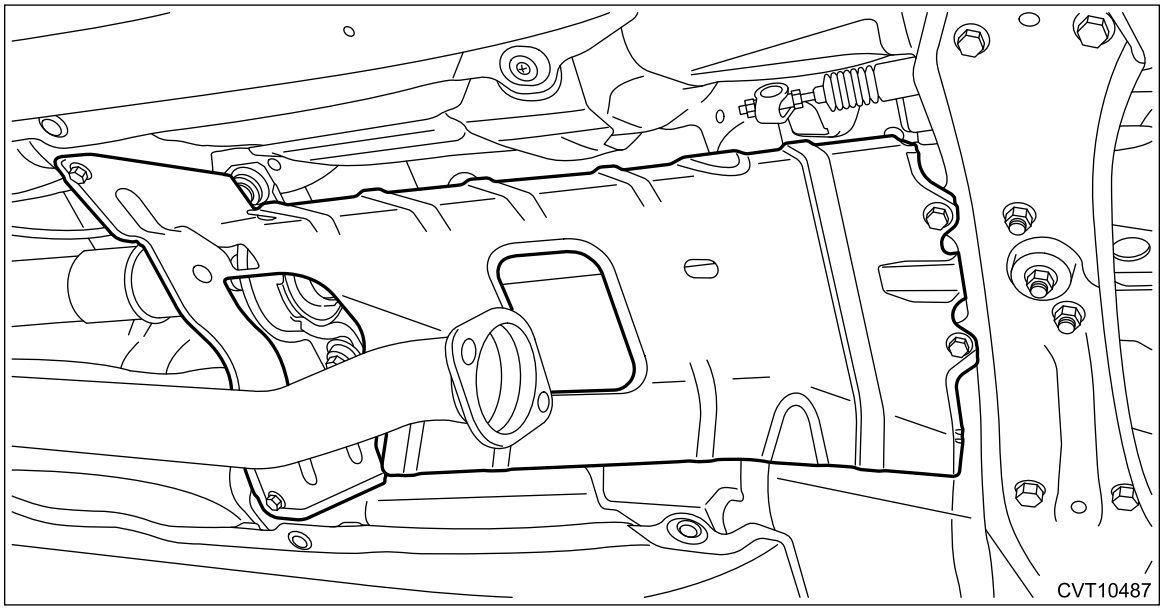
CONTROL SYSTEMS > Select Lever

INSPECTION

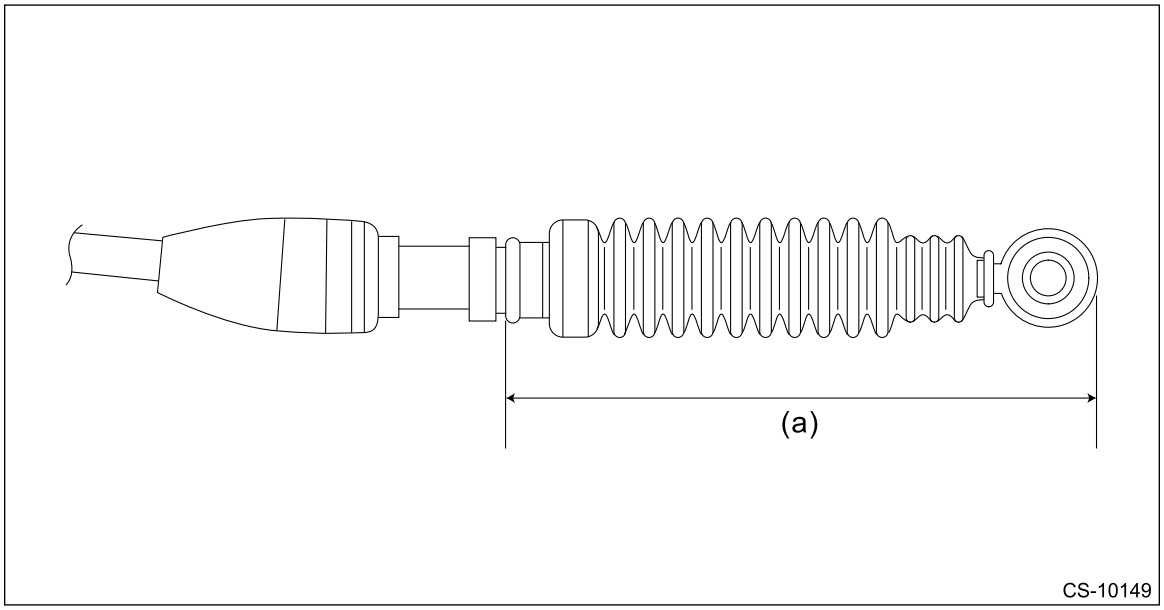
1. Inspect the removed parts by comparing with new parts for deformation, damage and wear. Repair or replace if defective.
2. Inspect the select lever assembly operating condition before assembly. Normal if it operates smoothly.

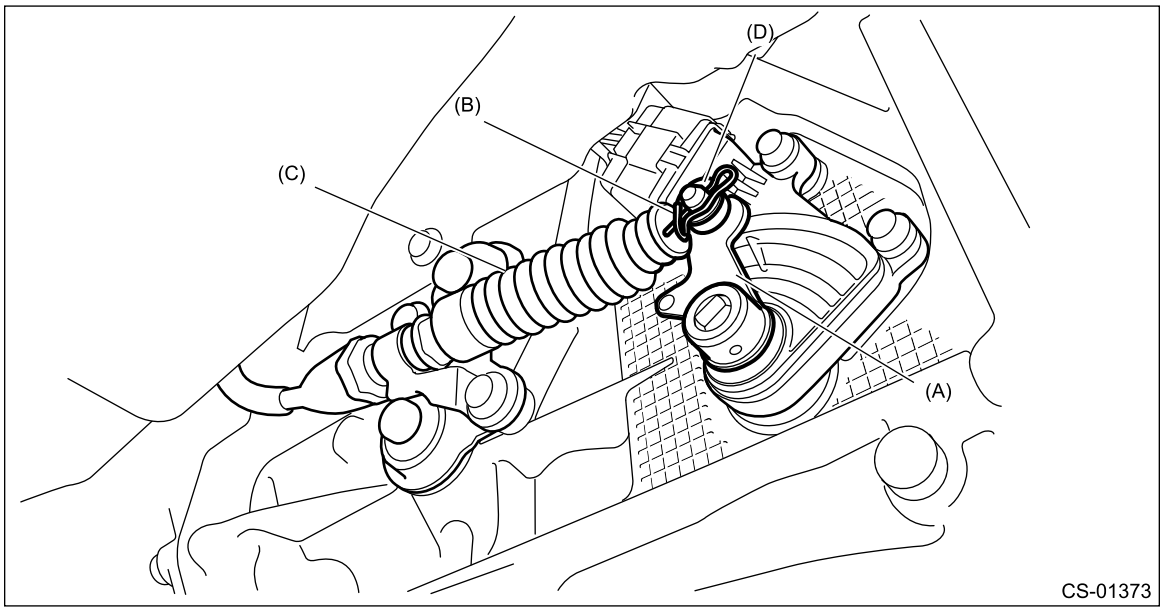
REMOVAL

1. Shift the select lever to “N” range.
2. Disconnect the ground terminal 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 (rear). Ref. to EXHAUST(w/o STI)>Center Exhaust Pipe>REMOVAL.
5. Remove the center exhaust cover.



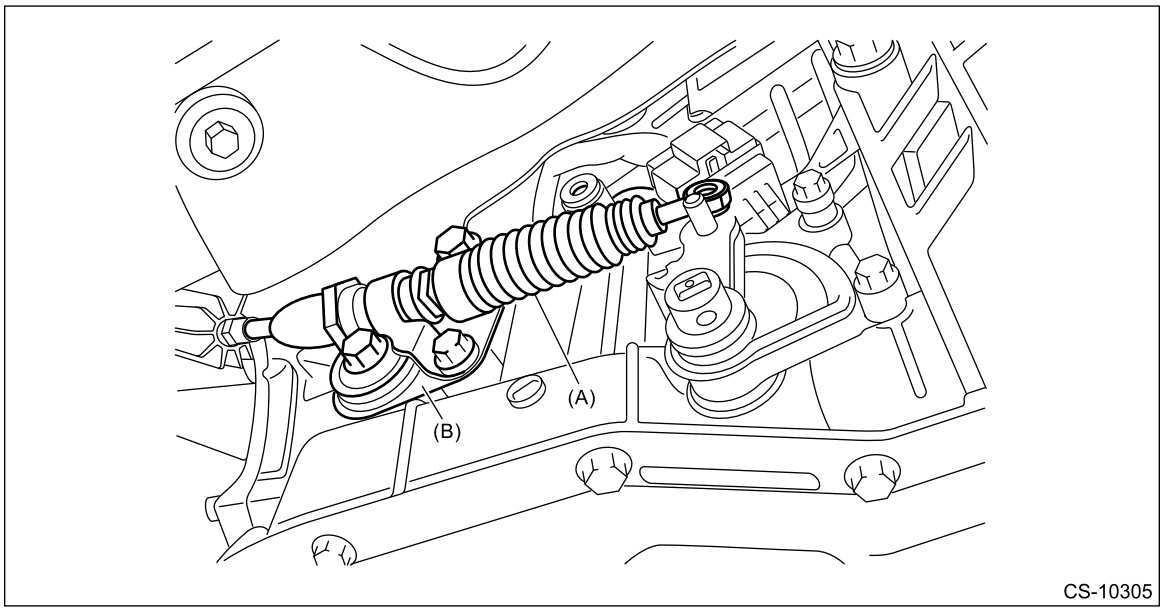
6. Remove the snap pin and washer from the shifter arm.
   Caution:
   Do not apply extra overload while holding the part (a).





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

7. Remove the plate assembly.

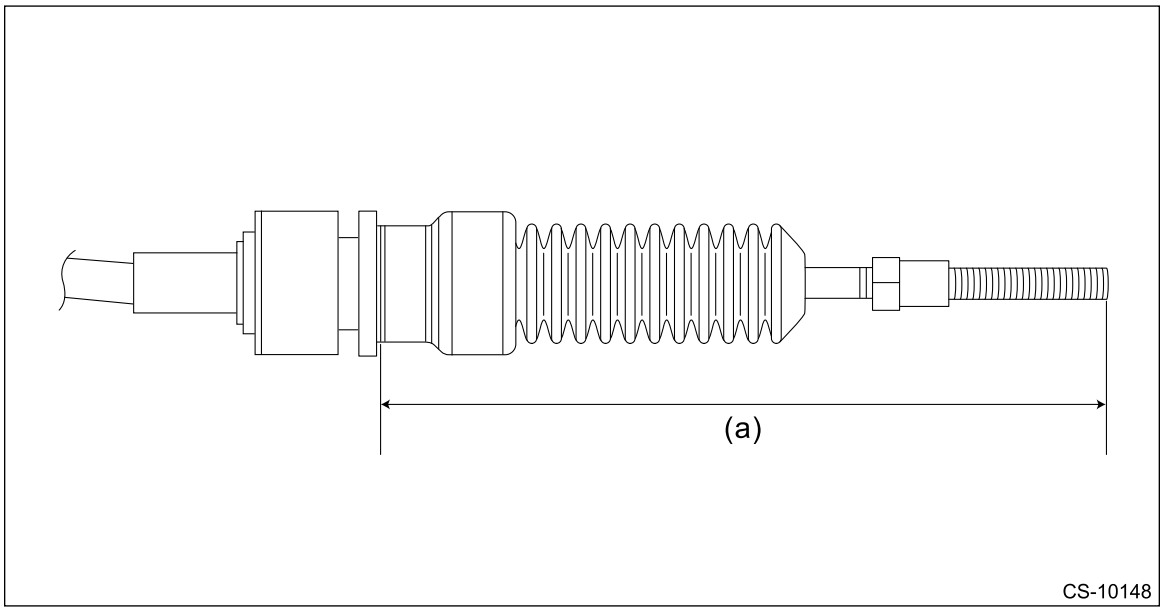


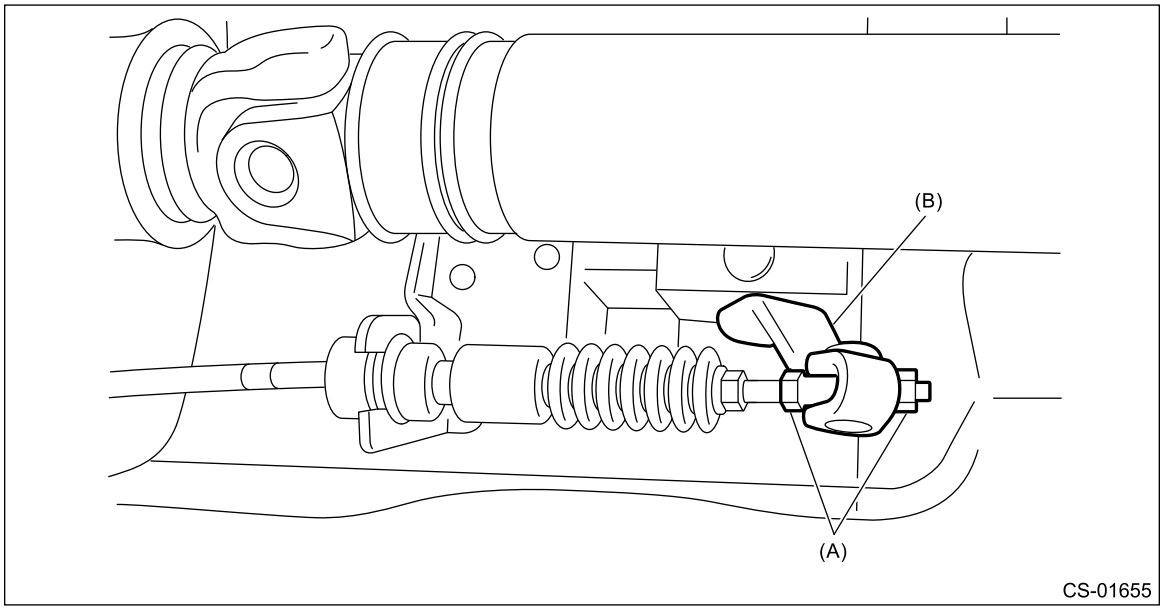
(A) Select cable
(B) Plate ASSY

8. Disconnect the cable from arm COMPL.

Caution:

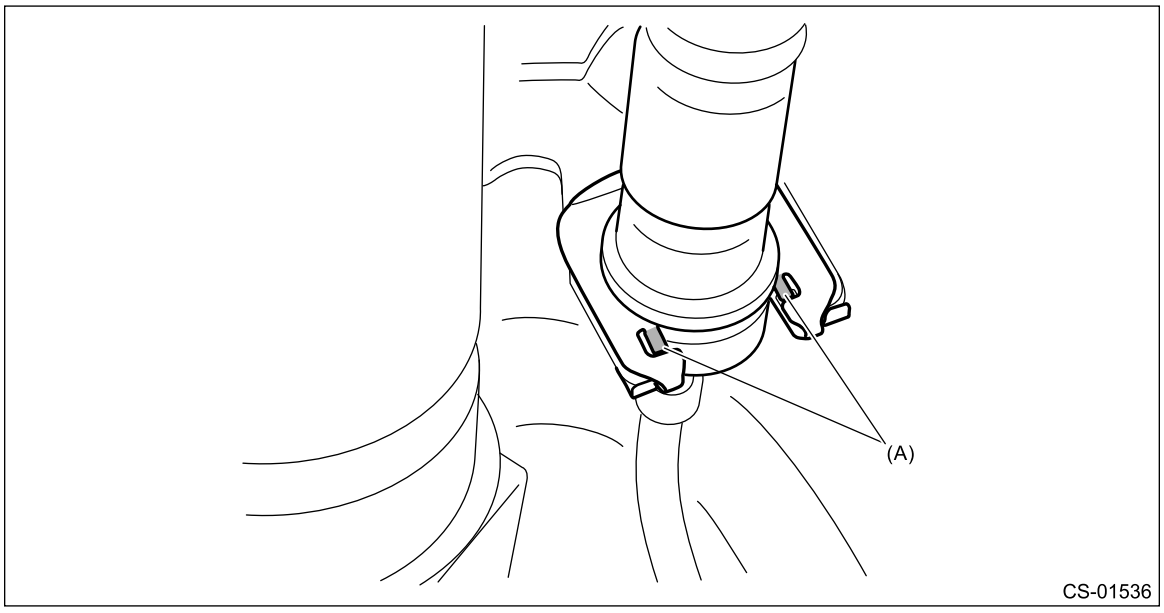
Do not apply extra overload while holding the part (a).





(A) Adjusting nut (B) Arm COMPL

9. Raise the claw of clamp and remove the cable.



(A) Claw

10. Remove the select cable from plate assembly.

CONTROL SYSTEMS > Select Cable

INSTALLATION

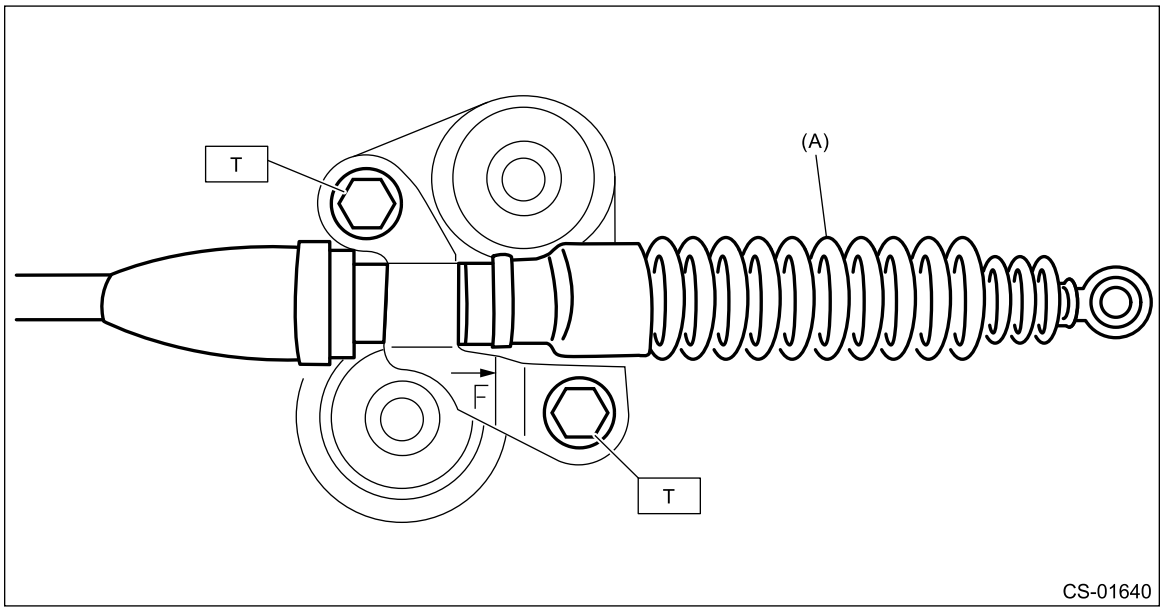
1. Position the select cable as shown in the figure, and install it to the plate assembly.

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)

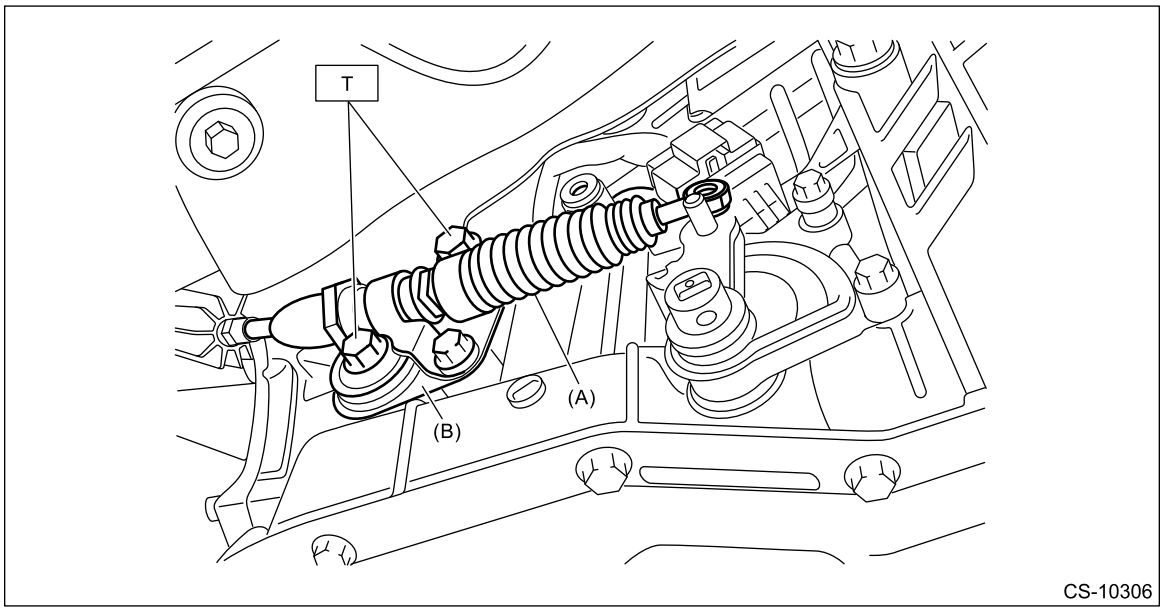


(A) Select cable

2. Install the select cable to the shifter arm.
3. Install the plate assembly.

Tightening torque:

T: 25 N·m (2.5 kgf-m, 18.4 ft-lb)

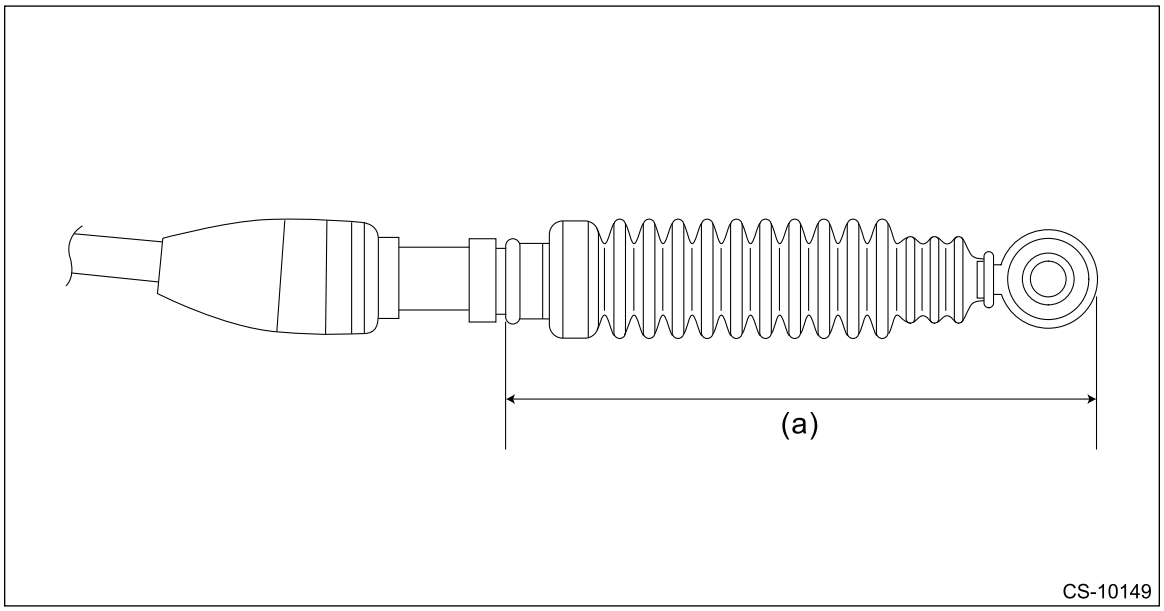


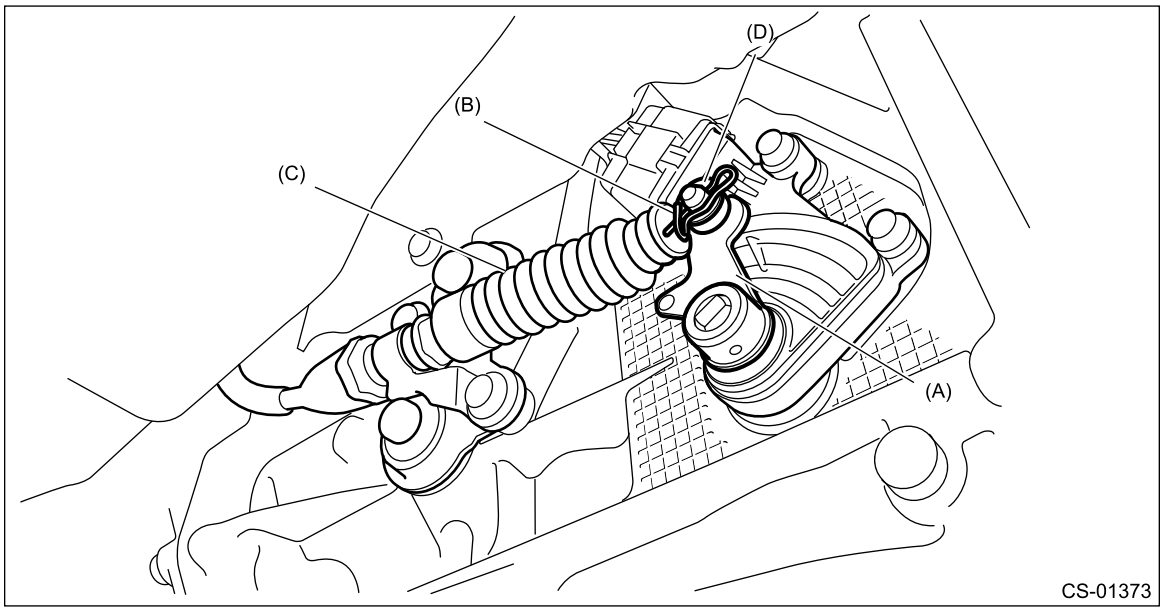
(A) Select cable (B) Plate ASSY

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

Caution:

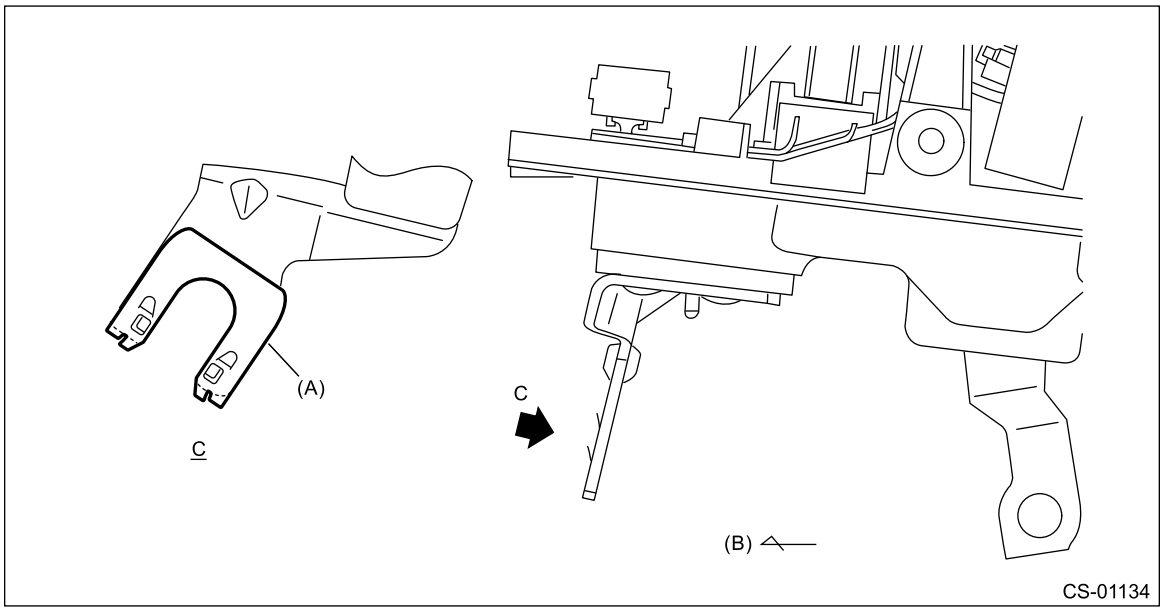
Do not apply extra overload while holding the part (a).





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

5. Install new clamp paying attention to the installing direction.

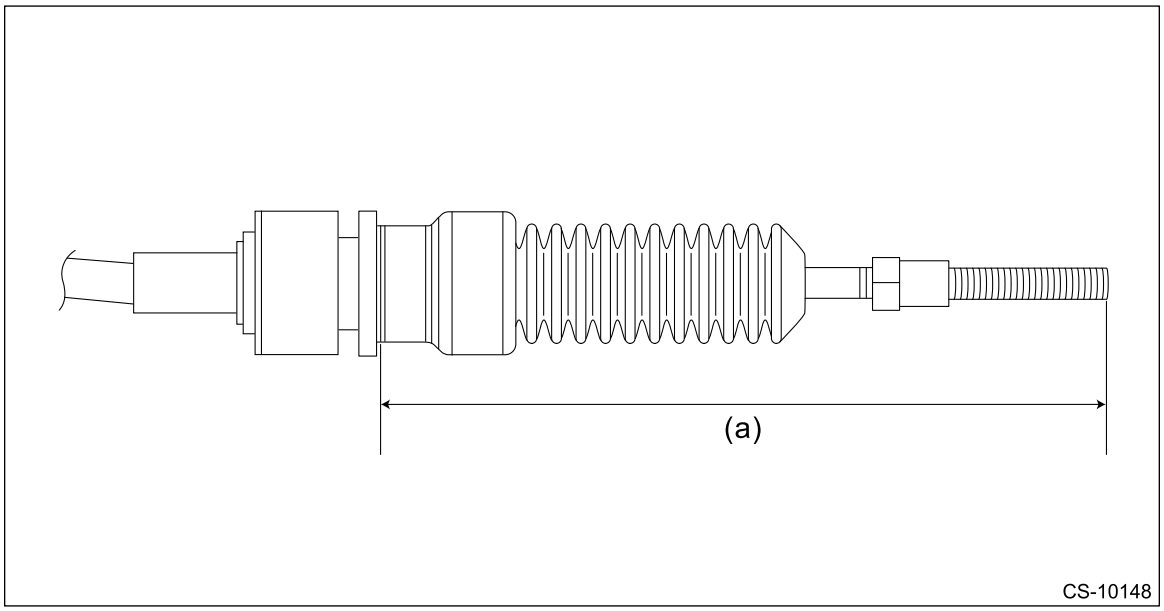


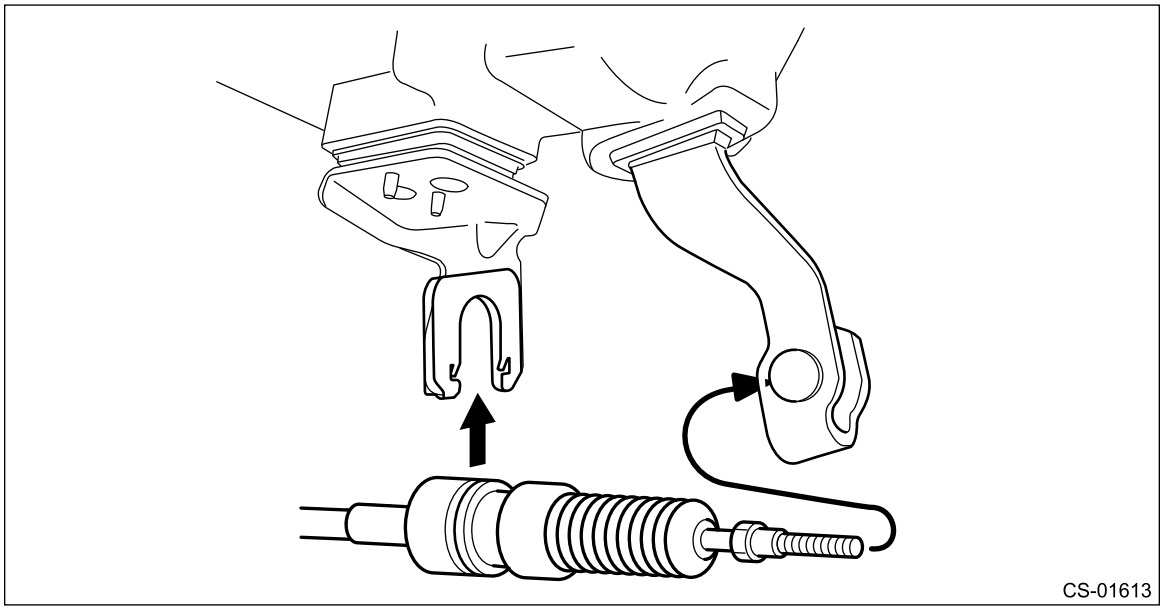
(A) Clamp
(B) Forward

6. Insert the tip of inner cable into connector hole of select lever, and fix the cable to bracket.

Caution:

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





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 (rear). Ref. to EXHAUST(w/o STI)>Center Exhaust Pipe>INSTALLATION.
10. Lower the vehicle.
11. Connect the battery ground terminal. Ref. to NOTE>NOTE > BATTERY.

CONTROL SYSTEMS > Select Cable

INSPECTION

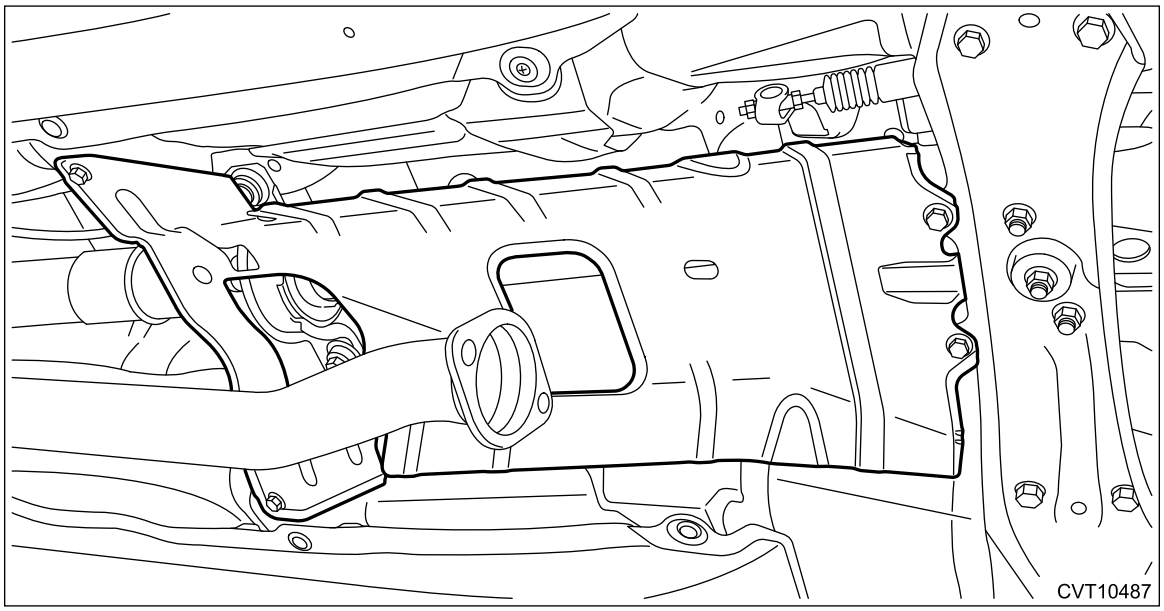
Check the removed cable and replace or adjust if damaged, rusty or malfunctioning.

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.

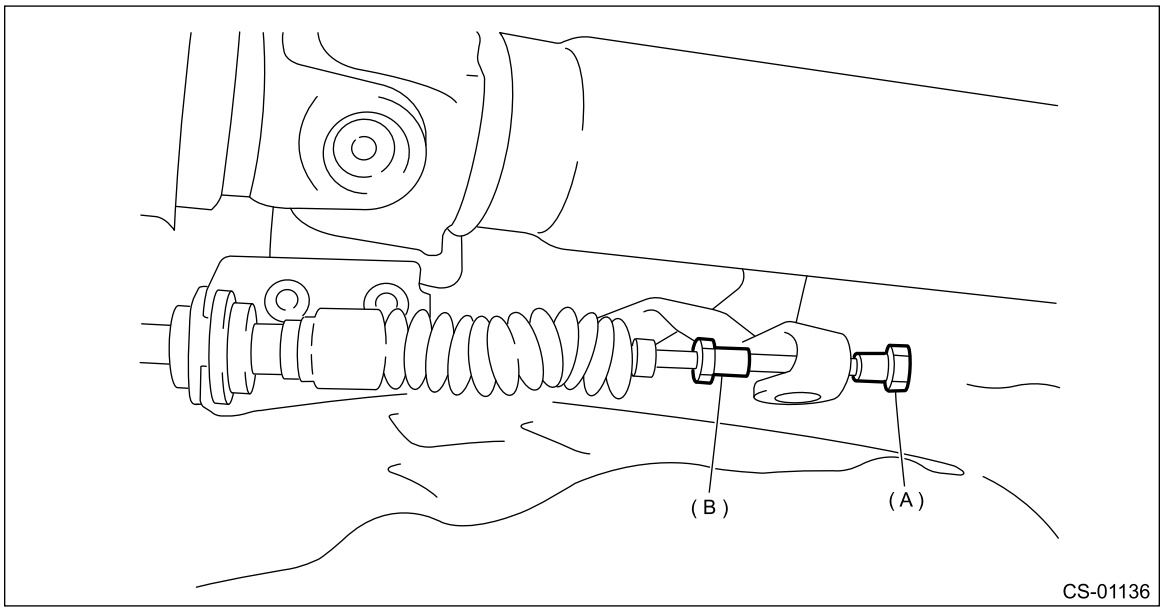
CONTROL SYSTEMS > Select Cable

ADJUSTMENT

1. Shift the select lever to “N” range.
2. Lift up the vehicle.
3. Remove the center exhaust pipe (rear). Ref. to EXHAUST(w/o STI)>Center Exhaust Pipe>REMOVAL.
4. Remove the center exhaust cover.

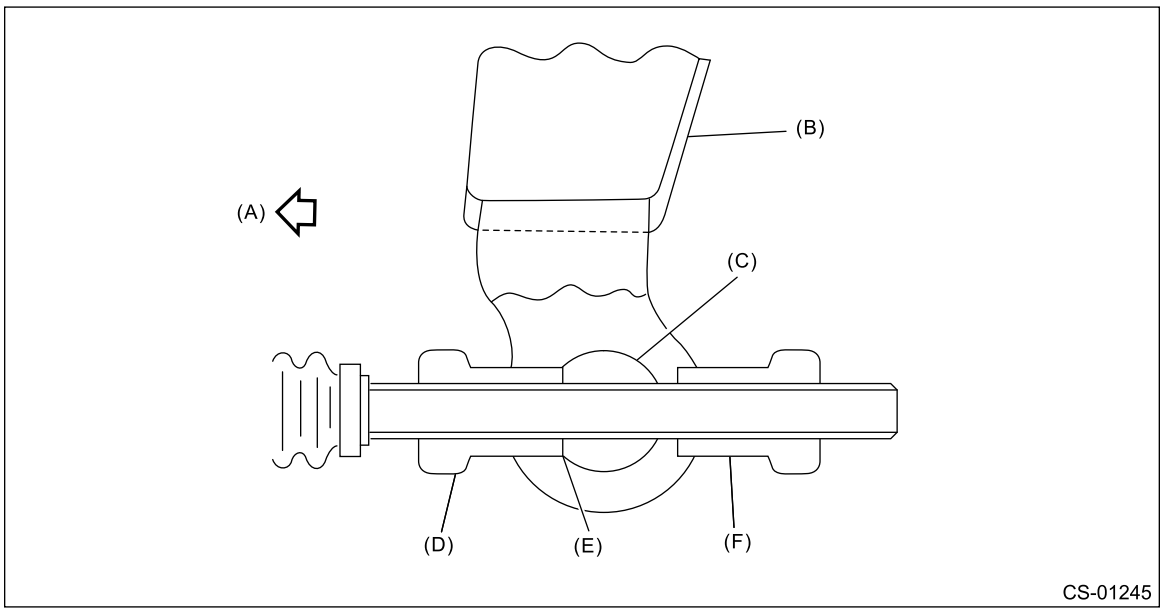


5. Loosen the adjusting nuts on both sides.



(A) Adjusting nut A (B) Adjusting nut B

6. Turn adjusting nut B until it lightly touches the connector.

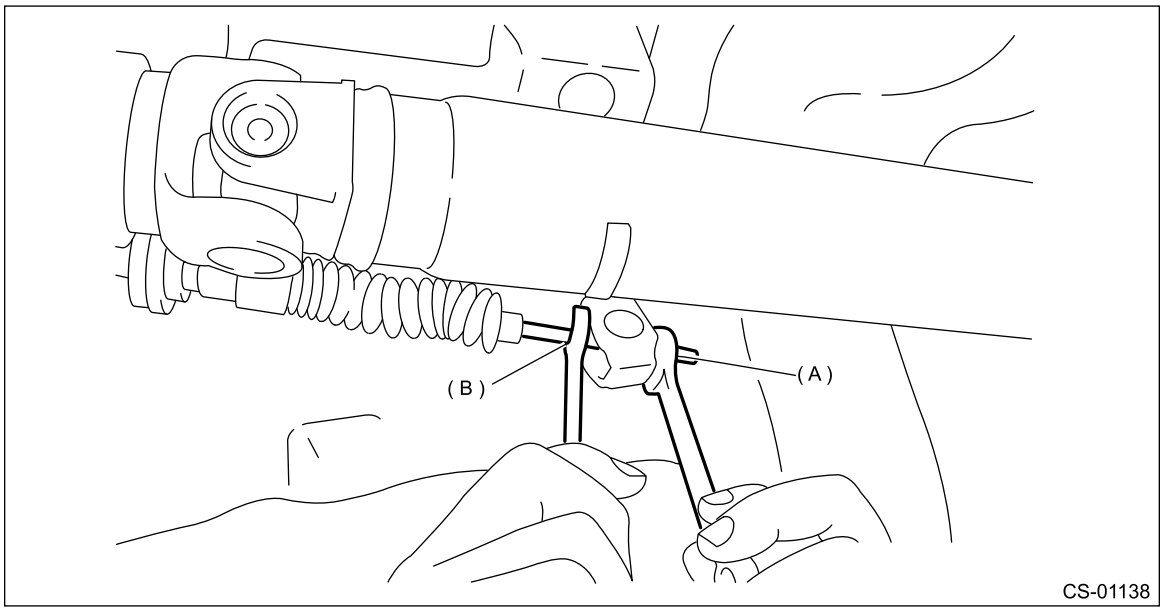


(A) Forward side (C) Connector (E) Contact point
(B) Select lever (D) Adjusting nut B (F) Adjusting nut A

7. 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 (0.76 kgf-m, 5.5 ft-lb)



(A) Adjusting nut A (B) Adjusting nut B

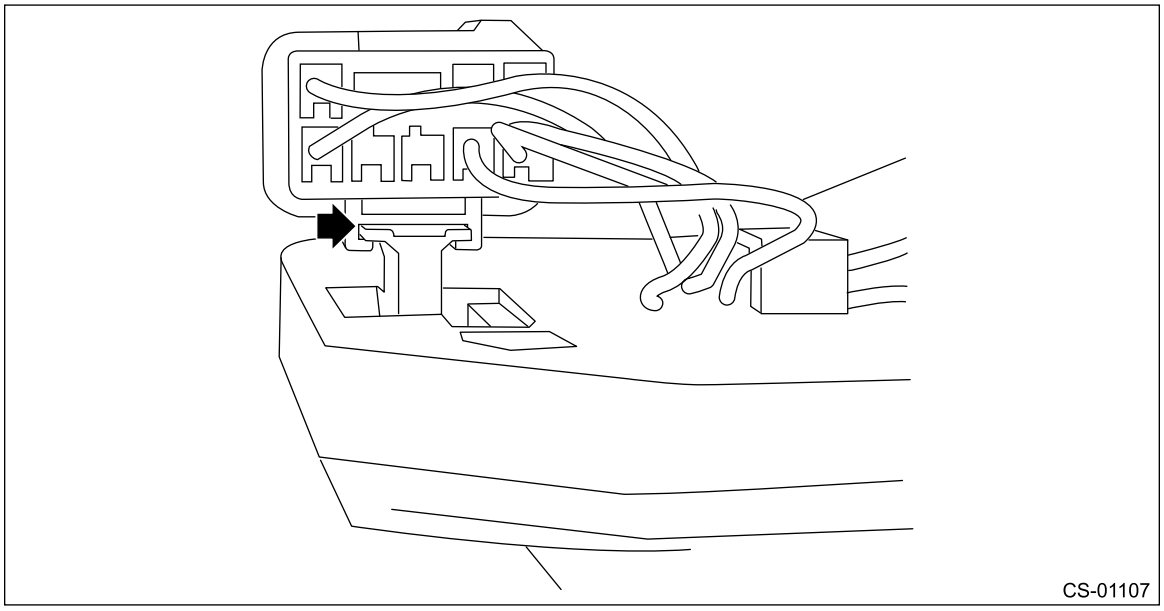
8. After the completion of adjustment, confirm that the select lever operates normally at all ranges.

9. Installing procedure hereafter is in the reverse order of removal.

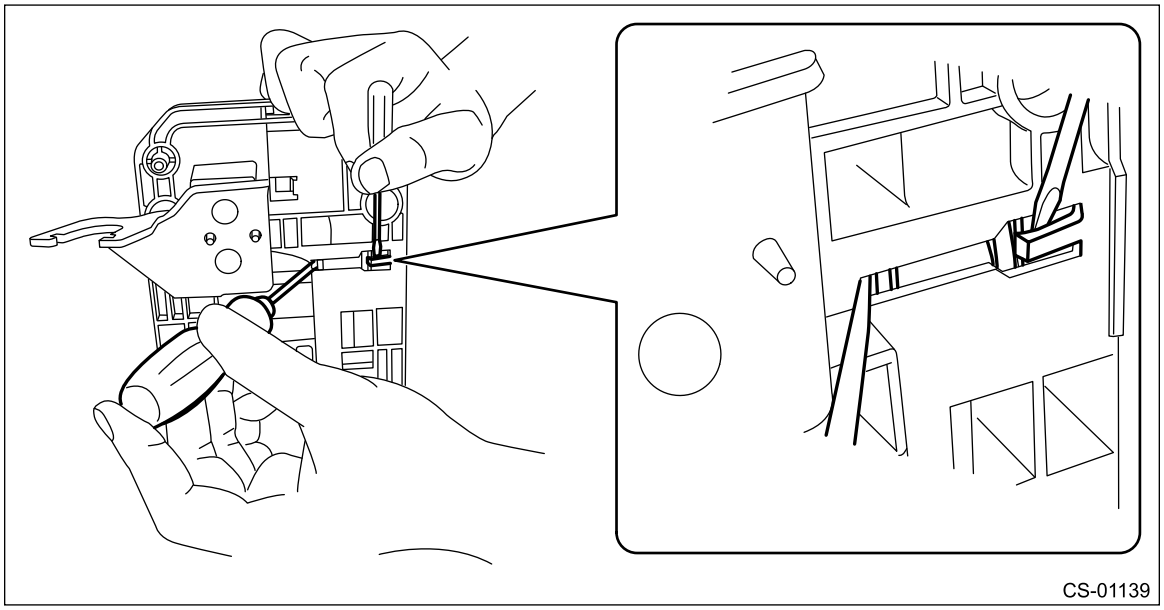
REMOVAL

1. SOLENOID UNIT

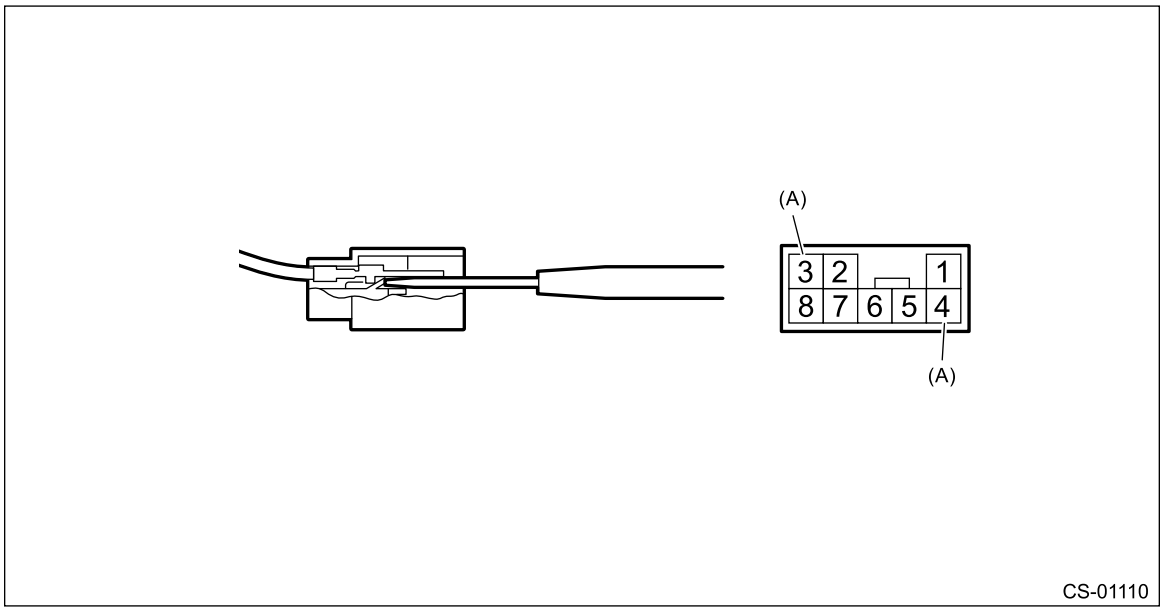
1. Remove the AT select lever. Ref. to CONTROL SYSTEMS>Select Lever>REMOVAL.
2. Remove the spacer and gasket. Ref. to CONTROL SYSTEMS>Select Lever>DISASSEMBLY.
3. Using a flat tip screwdriver with a thin tip, remove the harness connector.



4. Raise the claw with a flat tip screwdriver with a thin tip and remove the solenoid unit.



5. Remove the terminal of the solenoid unit using a flat tip precision screwdriver with a tip width of 1.3 mm (0.05 in) or less, KTC connector terminal tool ECC-1T or equivalent.



(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.

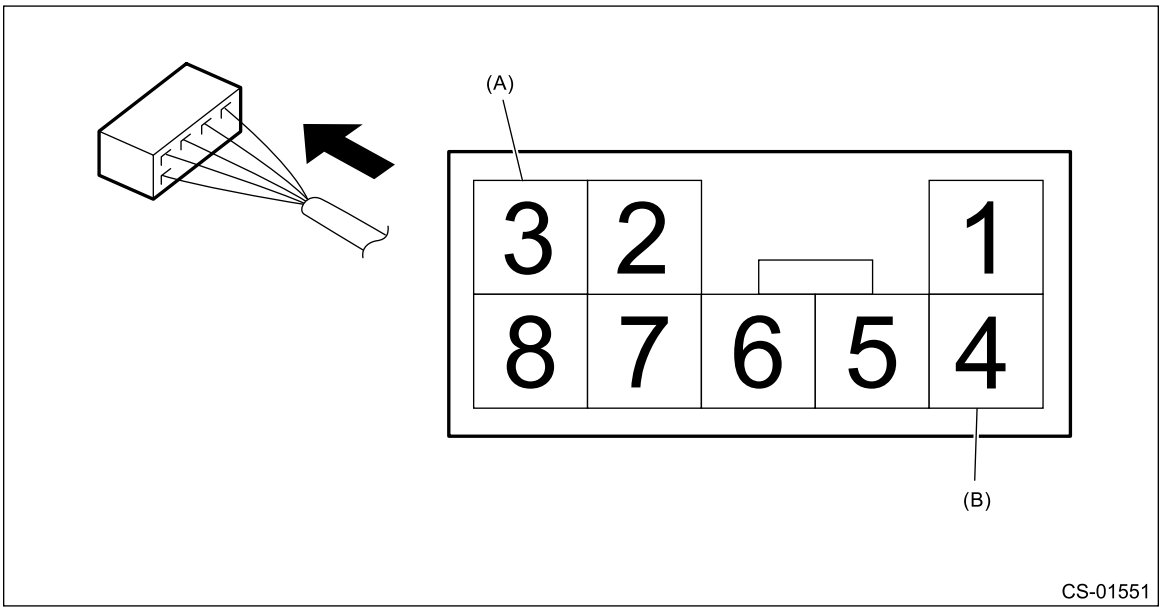
CONTROL SYSTEMS > AT Shift Lock Solenoid and “P” Range Switch

INSTALLATION

Install in the reverse order of removal.

Note:

Connect the solenoid unit terminals.



(A) Solenoid unit (color code: blue)

(B) Solenoid unit (color code: black)

INSPECTION

1. CHECK SOLENOID UNIT.

Measure the resistance of solenoid unit connector terminals.

Terminals

No. 4 — No. 3:

Is the resistance 27.6 — 30.5 Ω?

Yes	Go to 2.
No	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?

Yes	Go to 3.
No	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?

Yes	Go to 4.
No	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 MΩ or more?

Yes	Normal.
No	Replace the “P” range switch. Ref. to CONTROL SYSTEMS>AT Shift Lock Solenoid and “P” Range Switch.

CONTROL SYSTEMS > Body Integrated Unit

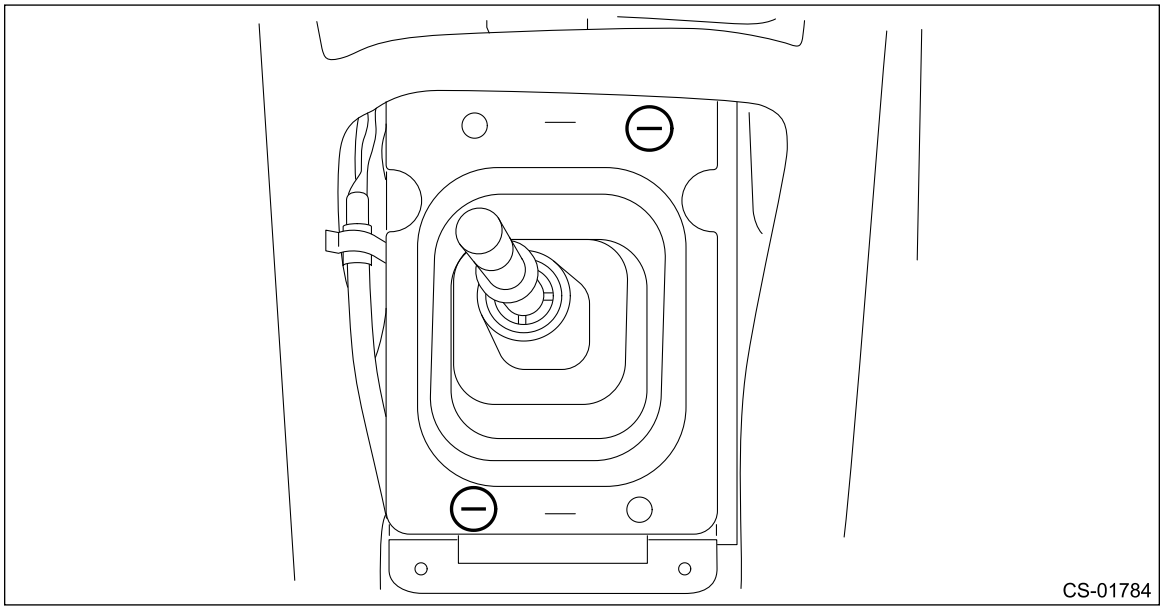
NOTE

Refer to “Body Integrated Unit” for removal and installation procedure. Ref. to SECURITY AND LOCKS>Body Integrated Unit.

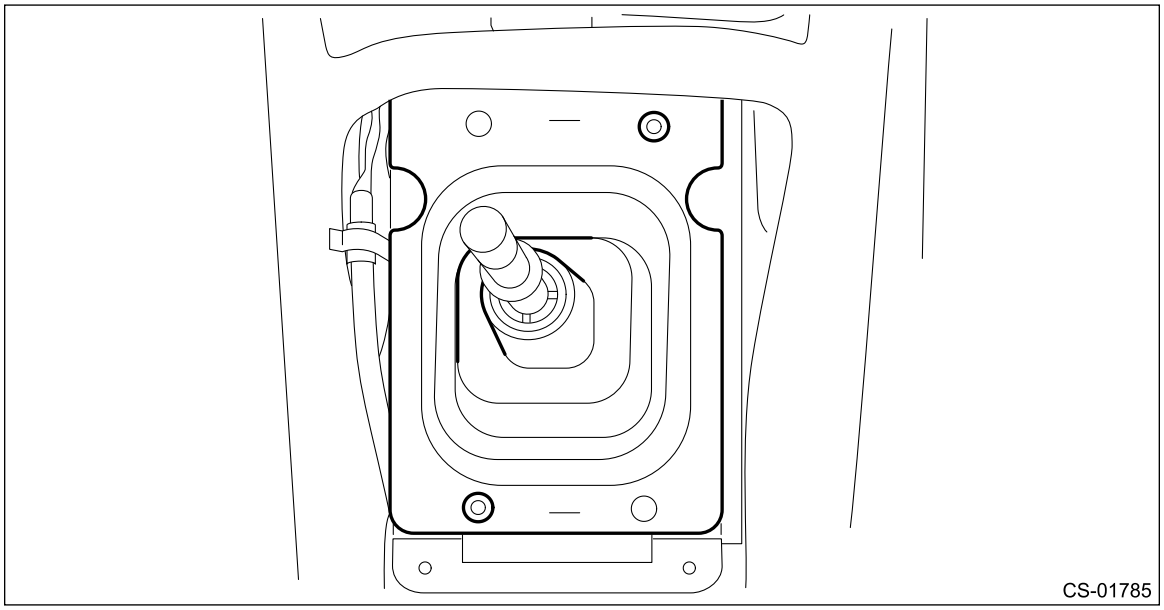
REMOVAL

1. STI MODEL

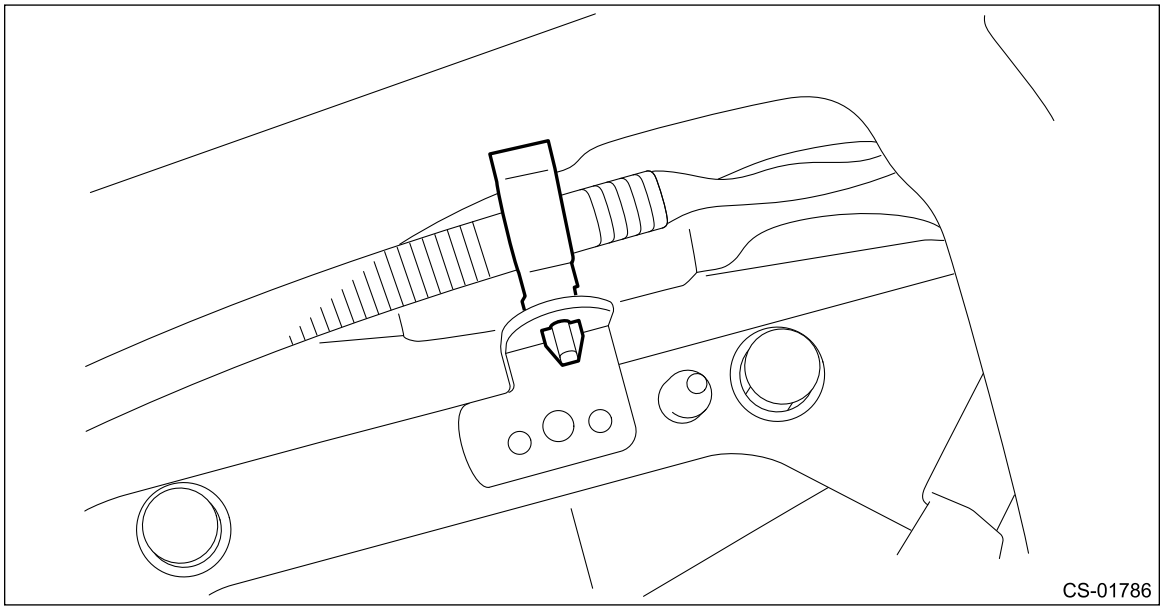
1. Disconnect the ground cable from battery. Ref. to NOTE>NOTE > BATTERY.
   Note:
   For model with battery sensor, disconnect the ground terminal from battery sensor.
2. Remove the gear shift knob by turning it counterclockwise.
3. Remove the console box assembly. Ref. to EXTERIOR/INTERIOR TRIM>Console Box>REMOVAL.
4. Remove the cover - shift lever. Ref. to EXTERIOR/INTERIOR TRIM>Console Box>REMOVAL.
5. Remove the panel center LWR LH and RH. Ref. to EXTERIOR/INTERIOR TRIM>Console Box>REMOVAL.
6. Remove the clamp.



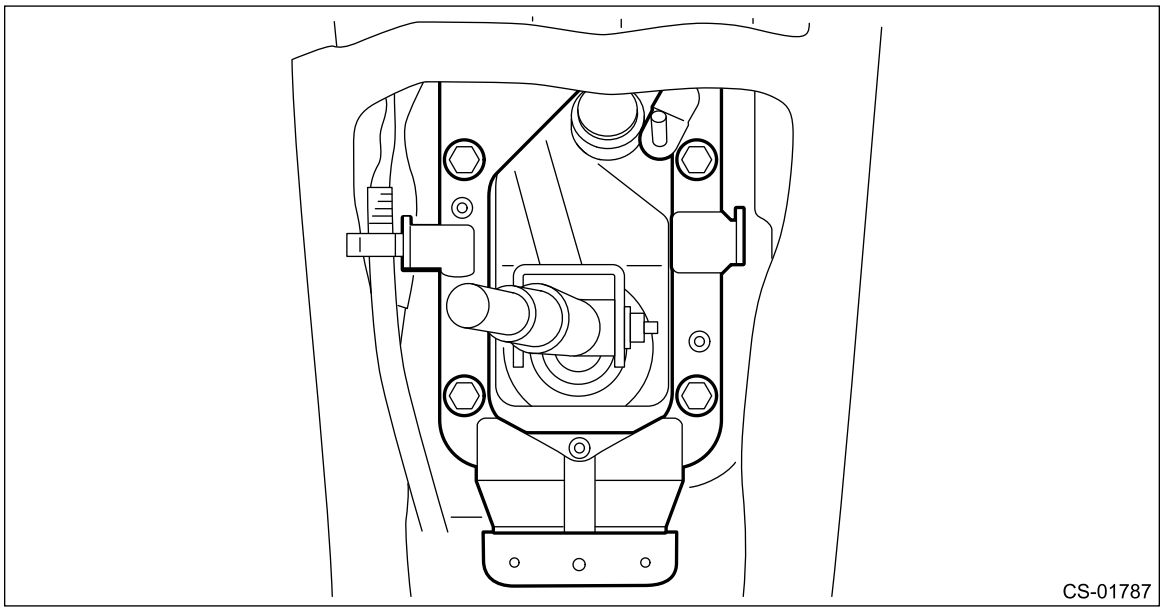
7. Remove the boot and insulator assembly.



8. Remove the harness clamp.



9. Remove the plate COMPL.



10. Lift up the vehicle.

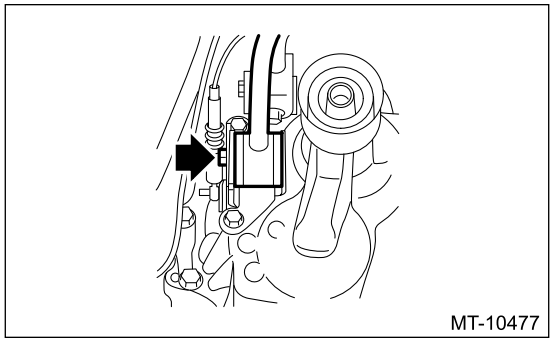
11. Remove the center exhaust pipe (rear). Ref. to EXHAUST(STI)>Center Exhaust Pipe>REMOVAL.

12. Remove the center exhaust cover.

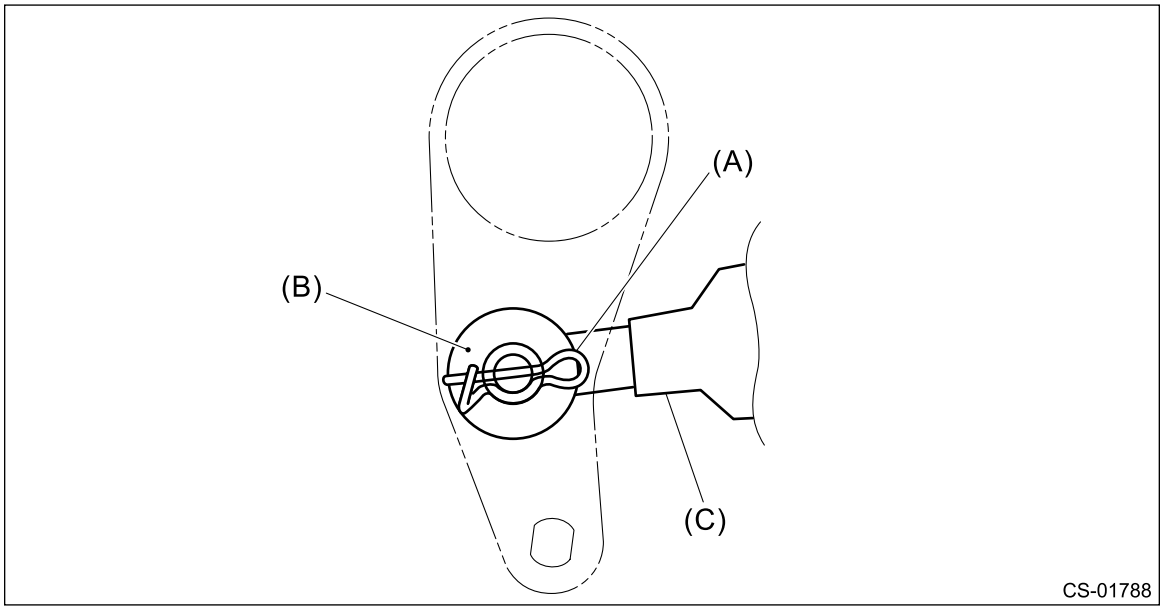


13. Remove the crossmember. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Transmission Mounting System>REMOVAL.

14. Disconnect the stay.

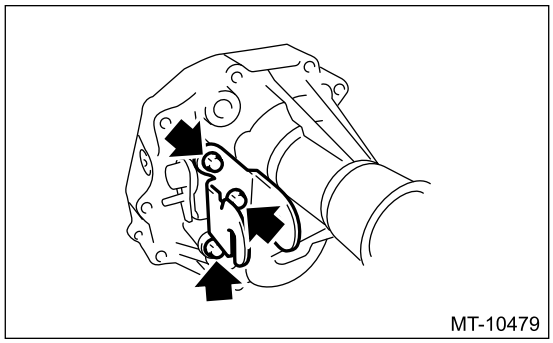


15. Remove the snap pin and washer, and disconnect the reverse check cable.



(A) Snap pin (B) Washer (C) Reverse check cable

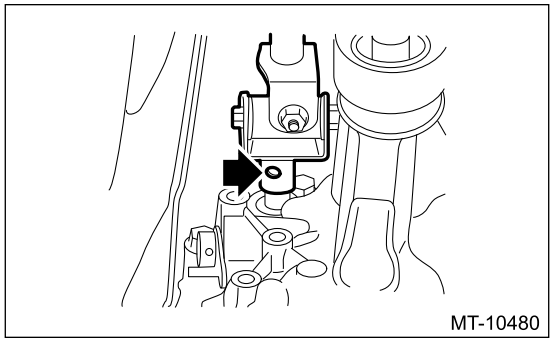
16. Remove the bracket.



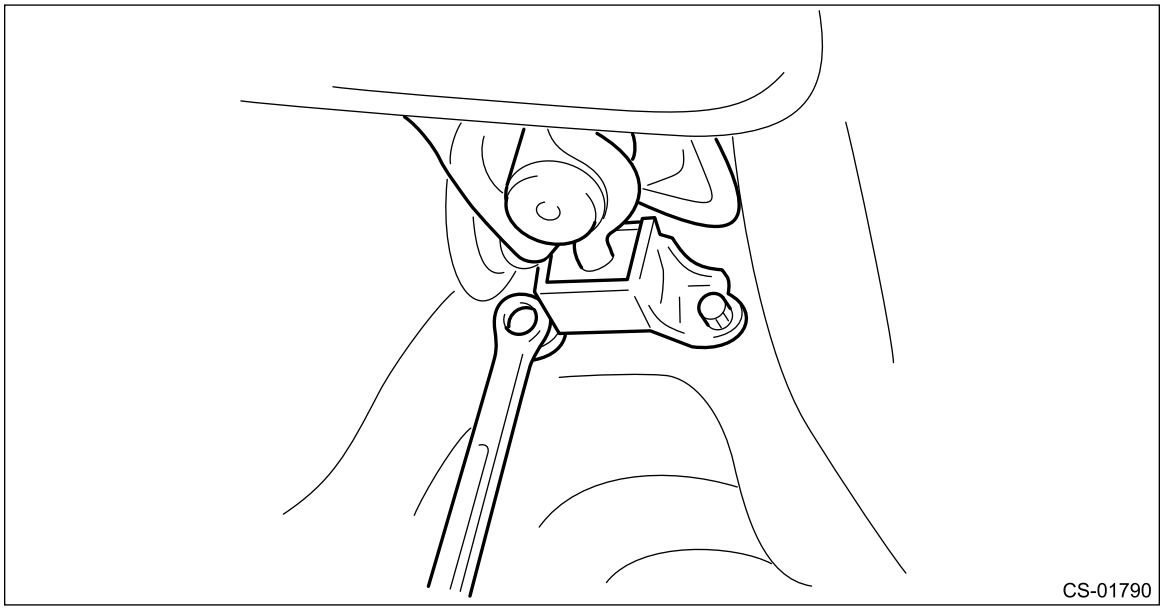
17. Remove the spring pin, and separate the transmission body and the joint.

Note:

- **Setting the gear shift position to 4th facilitates the operation when removing the spring pin.**
- **Setting the gear shift position to 3rd facilitates the operation when separating the transmission body and the joint.**



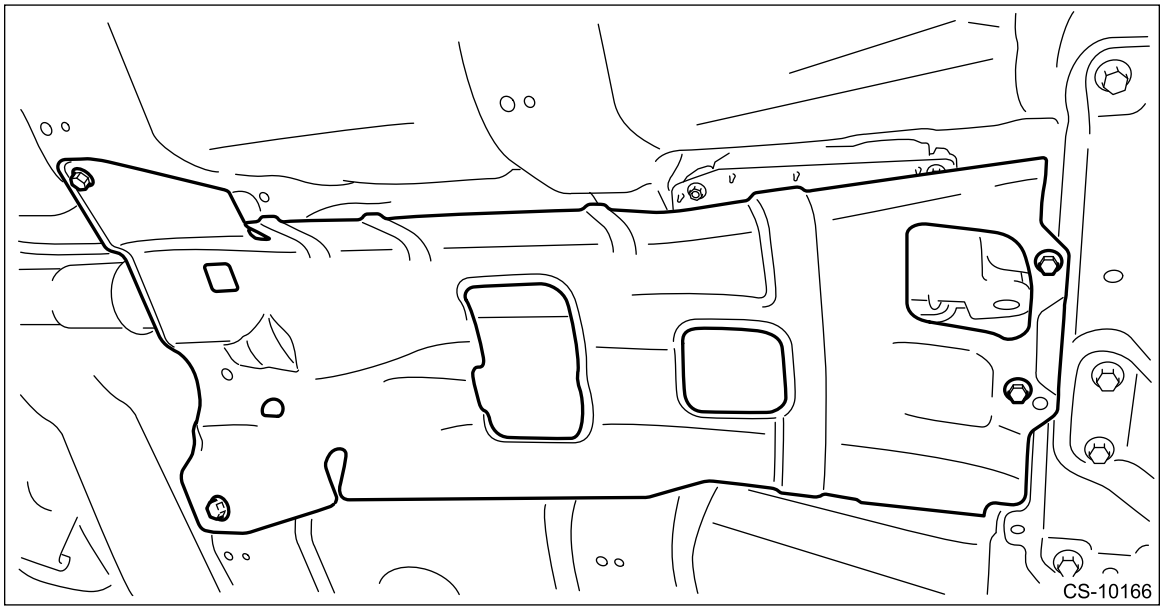
18. Remove the cushion rubber.



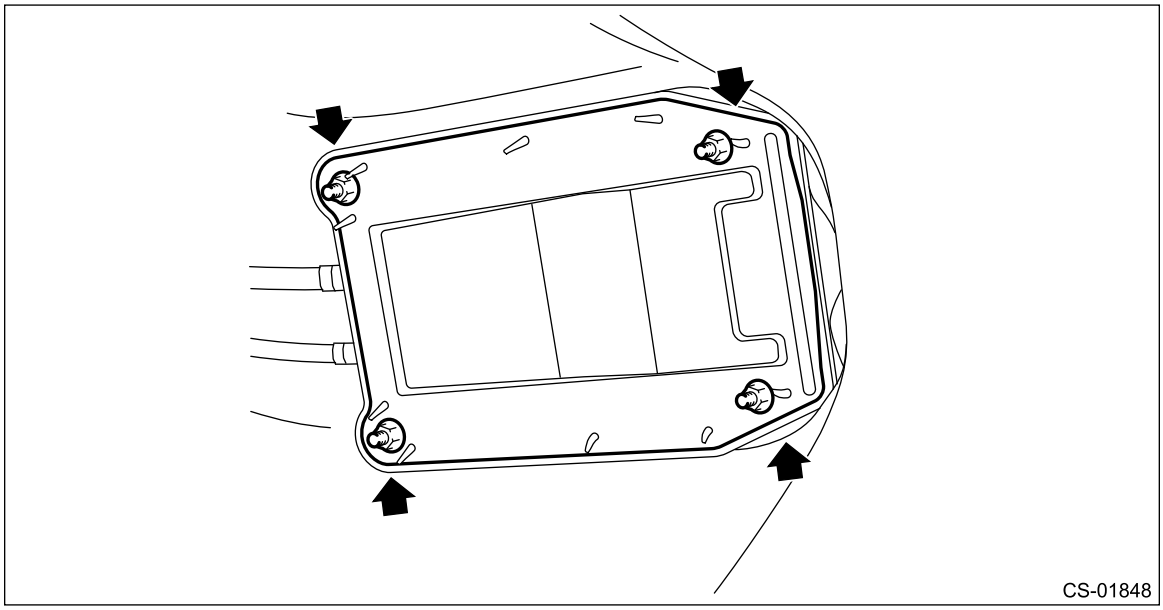
19. Remove the gear shift lever.

2. EXCEPT FOR STI MODEL

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 (rear). Ref. to EXHAUST(w/o STI)>Center Exhaust Pipe>REMOVAL.
4. Remove the center exhaust cover.



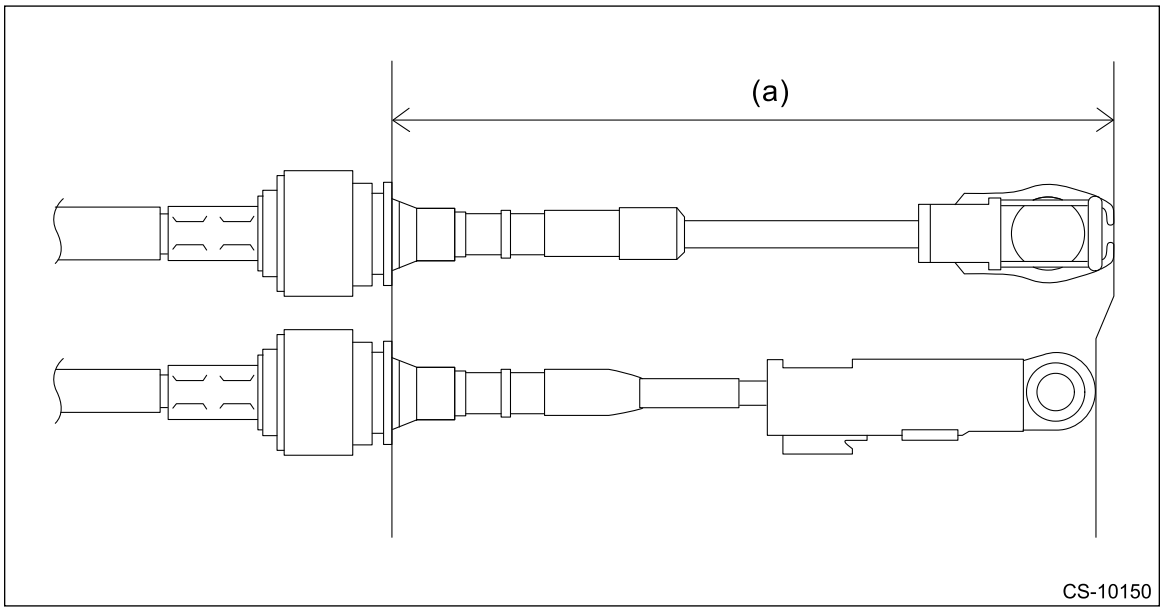
5. Remove the cable cover plate.



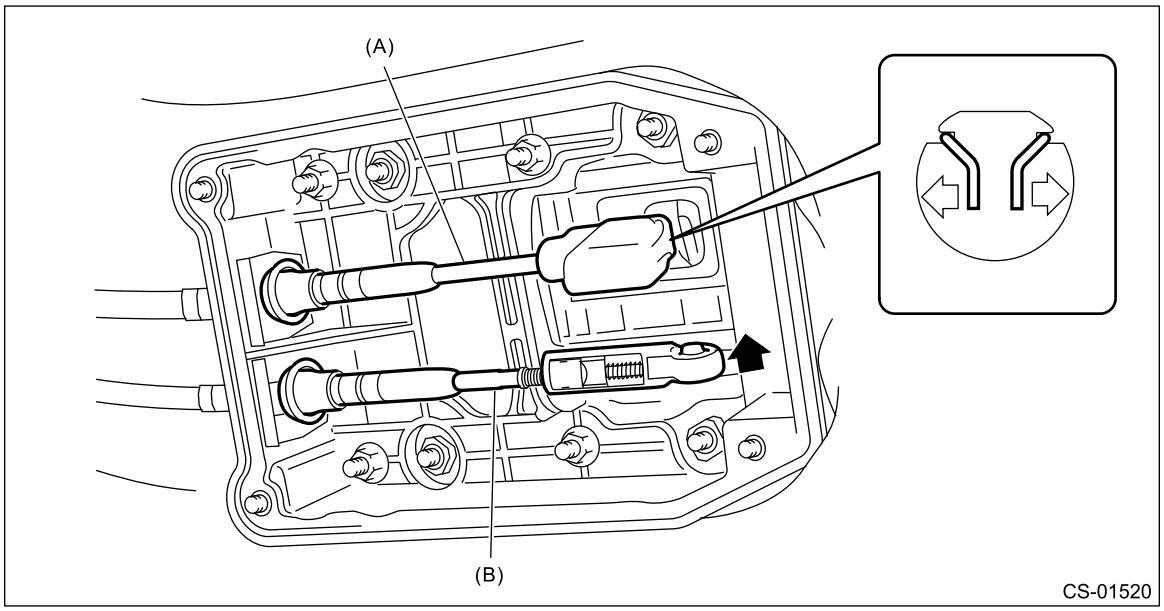
6. Disconnect the MT gear shift cable and MT gear select cable.

Caution:

- **Be careful not to deform the cable inner.**
- **Do not twist the cable inner excessively.**
- **Do not apply extra overload while holding the part (a).**

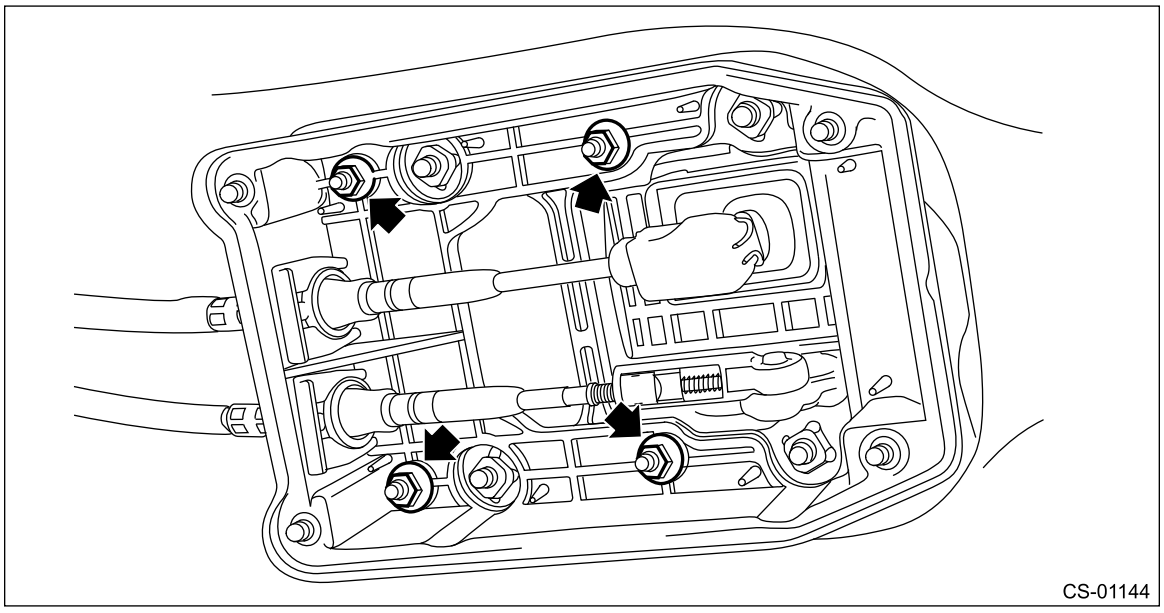


(1) Pull out down the MT gear shift cable to spread the spring.
(2) Push the MT gear select cable in the direction of arrow, and remove it.



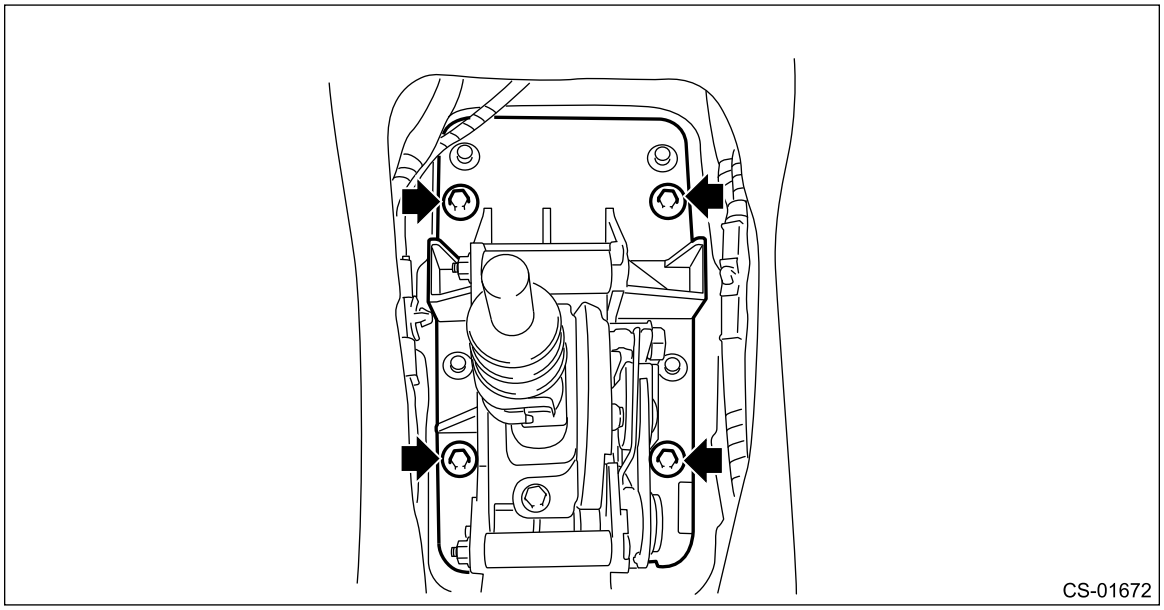
(A) MT gear shift cable (B) MT gear select cable

7. Remove the cable cover assembly.



8. Lower the vehicle.
9. Remove the console box assembly. 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 panel center LWR LH and RH. Ref. to EXTERIOR/INTERIOR TRIM>Console Box>REMOVAL.
12. Remove the harness clamp.
13. Remove the gear shift lever assembly.

Note:
The MT gear shift lever cannot be disassembled.



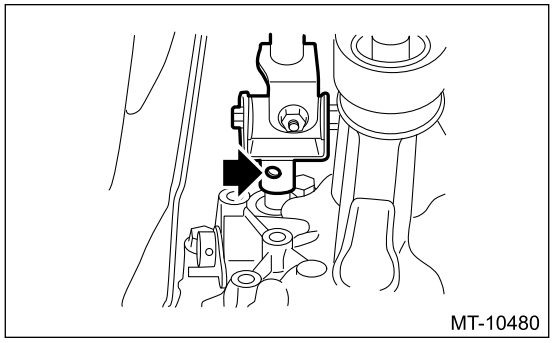
CONTROL SYSTEMS > MT Gear Shift Lever

INSTALLATION

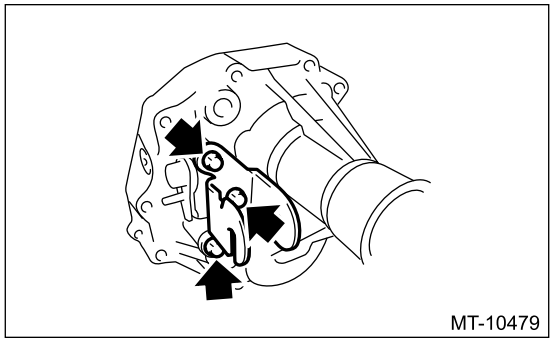
1. STI MODEL

1. Insert the gear shift lever from the bottom of the vehicle.
   Note:
   After inserting the rod and stay, temporarily put them onto transmission mount.
2. Install the cushion rubber.
   Tightening torque:
   18 N·m (1.8 kgf-m, 13.3 ft-lb)
3. Connect the transmission body and the joint, and install the spring pin.
   Note:
   - **Use new spring pin.**
   - **Setting the gear shift position to 3rd facilitates the operation when connecting the transmission body and the joint.**
   - **Setting the gear shift position to 4th facilitates the operation when installing the spring pin.**

   Spring pin exposed length:
   0 — 5 mm (0 — 0.2 in)

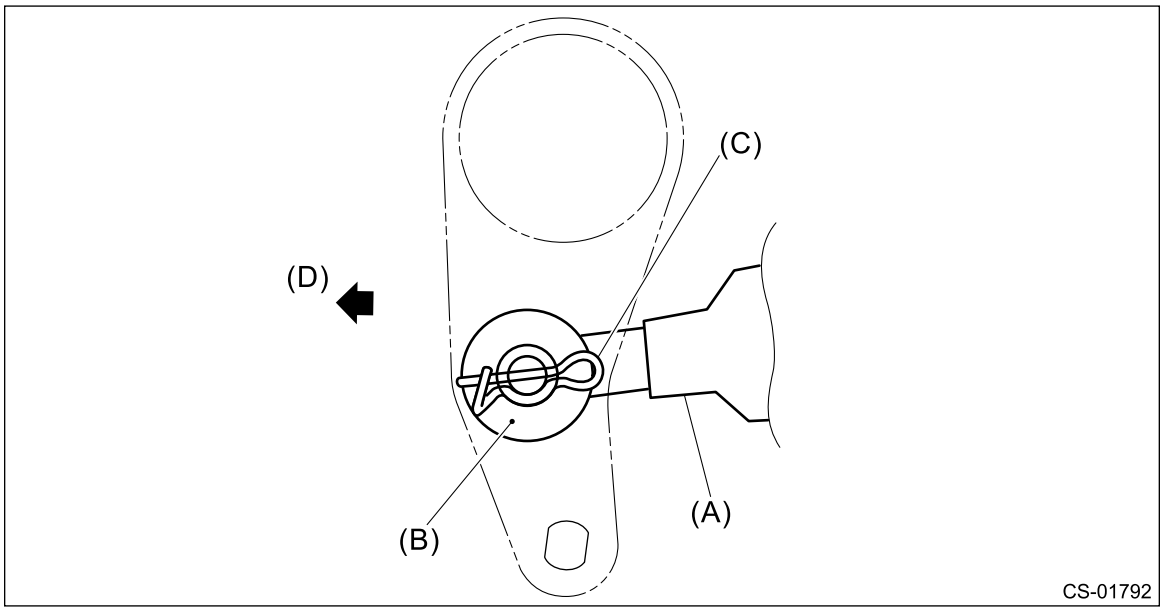


4. Attach the bracket.
   Tightening torque:
   25 N·m (2.5 kgf-m, 18.4 ft-lb)



5. Connect the reverse check cable, and install the washer and snap pin.
   Note:
   - **Apply grease to the sliding section.**
   - **Pay attention to the installing direction of the snap pin.**

   Grease:
   NIGTIGHT LTS No. 2 grease or equivalent



(A) Reverse check cable
(C) Snap pin
(D) Front side
(B) Washer

6. Connect the stay.

Note:

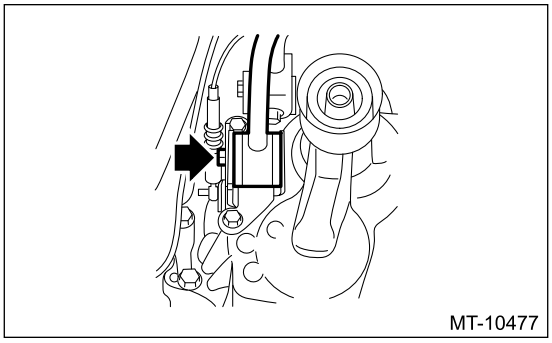
Apply grease to the sliding section.

Grease:

NIGTIGHT LTS No. 2 grease or equivalent

Tightening torque:

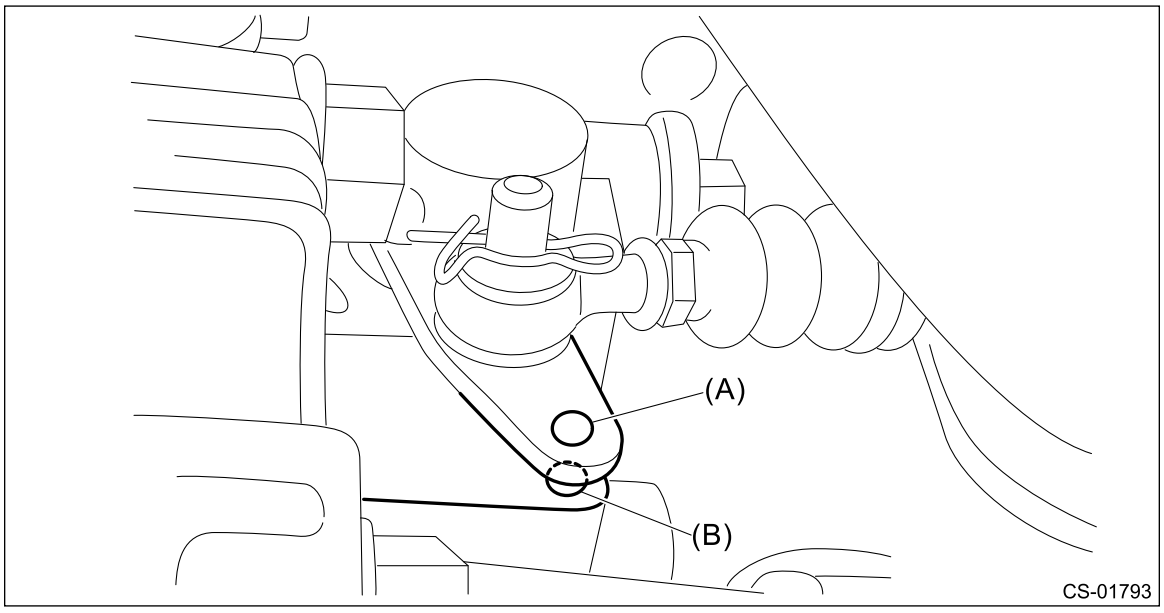
32 N·m (3.3 kgf-m, 23.6 ft-lb)



7. Make sure the hole of extension case is aligned with that of reverse check lever. If the hole positions are not aligned, adjust the reverse check cable. Ref. to CONTROL SYSTEMS>Reverse Check Cable>ADJUSTMENT.

Note:

- **Check that the M3 bolt goes through the hole of reverse check lever and can be inserted into the hole of extension case.**
- **When checking visually, confirm that the gap of hole positions is 0.5 mm (0.02 in) or less.**



(A) Hole of reverse check lever (B) Hole of extension case

8. Install the crossmember. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Transmission Mounting System>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 (rear). Ref. to EXHAUST(STI)>Center Exhaust Pipe>INSTALLATION.

11. Install the plate COMPL.

Note:

Be careful not to twist the inner boot when installing.

Tightening torque:

18 N·m (1.8 kgf-m, 13.3 ft-lb)

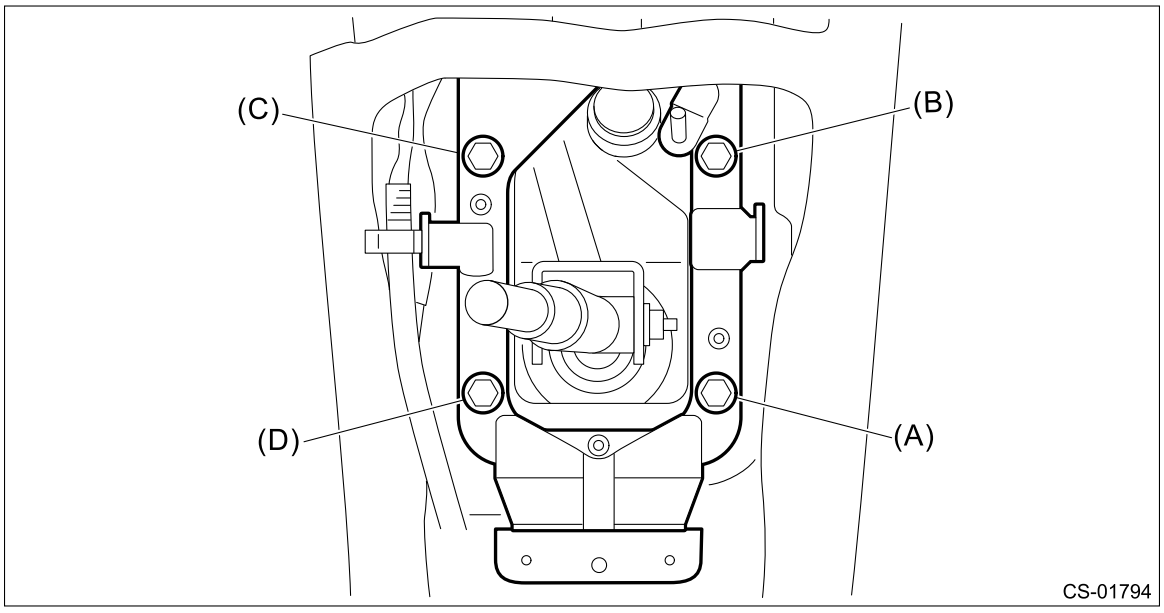
(1) Set the plate COMPL to the vehicle.

(2) Temporarily tighten the bolt (A).

(3) Tighten the bolt (B).

(4) Tighten the bolt (A).

(5) Tighten the bolts (C) and (D).



12. Install the harness clamp to the plate COMPL.

13. Install the boot and insulator assembly, and secure with a clamp.

14. Install the panel center LWR LH and RH. Ref. to EXTERIOR/INTERIOR TRIM>Console Box>INSTALLATION.

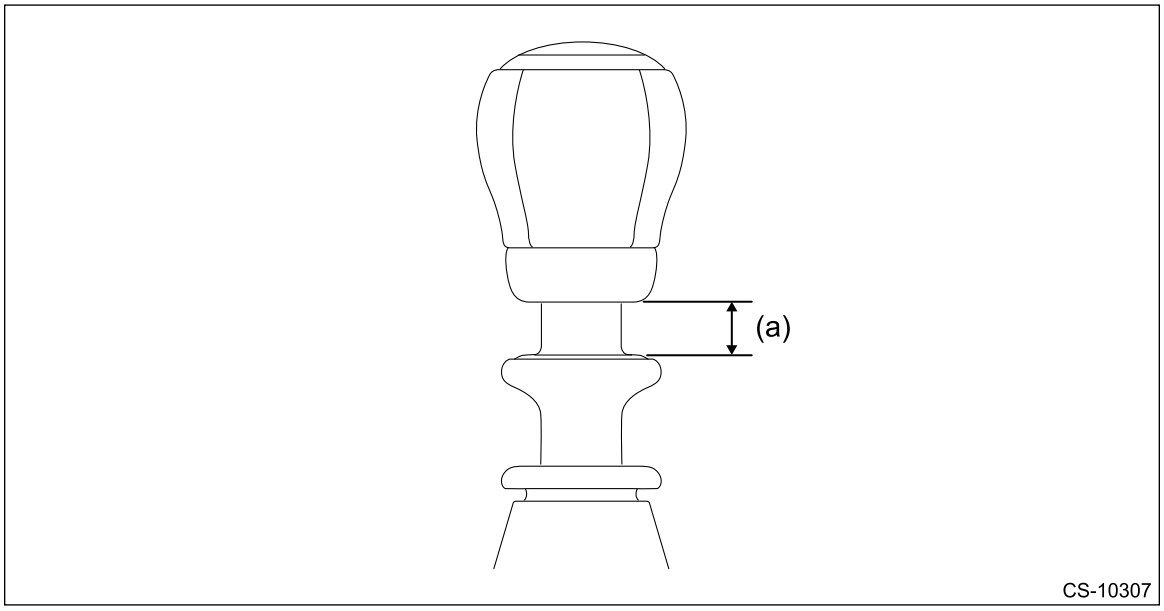
15. Install the cover - shift lever. Ref. to EXTERIOR/INTERIOR TRIM>Console Box>INSTALLATION.

16. Install the console box assembly. Ref. to EXTERIOR/INTERIOR TRIM>Console Box>INSTALLATION.

17. Install the gear shift knob by turning it clockwise.

Caution:

- **Do not tighten the gear shift knob excessively to prevent it from being damaged.**
- **Be sure that the gap (a) between the gear shift knob bottom surface and the holder top surface is 10.0 mm (0.394 in) or more.**



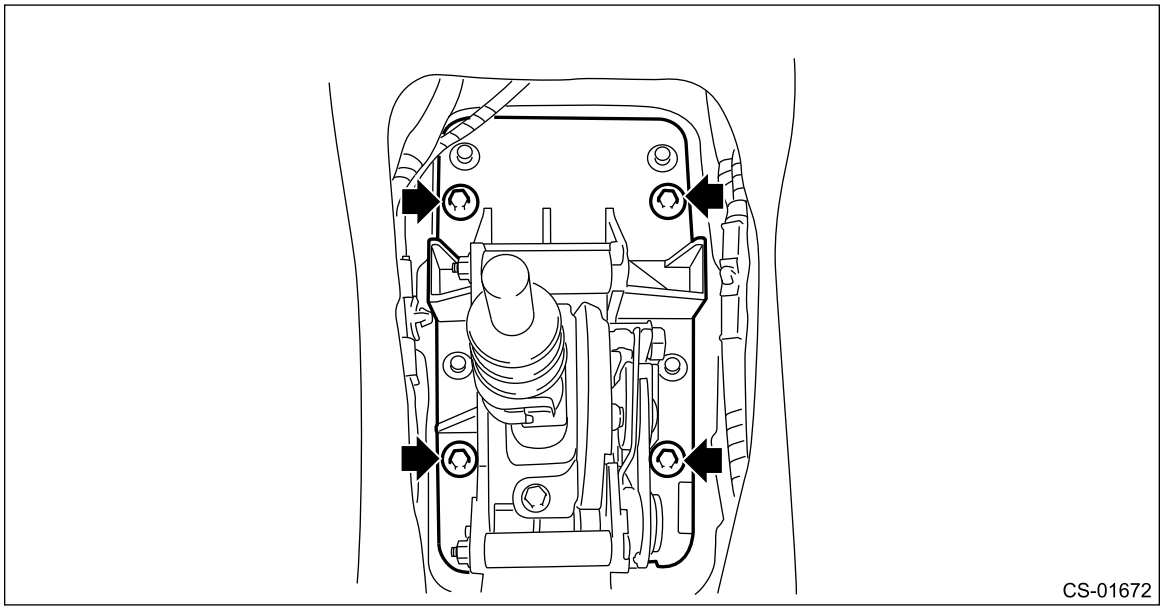
(a) 10.0 mm (0.394 in)

Note:
When adjusting the shift pattern direction after installing the gear shift knob, rotate in the tightening direction.

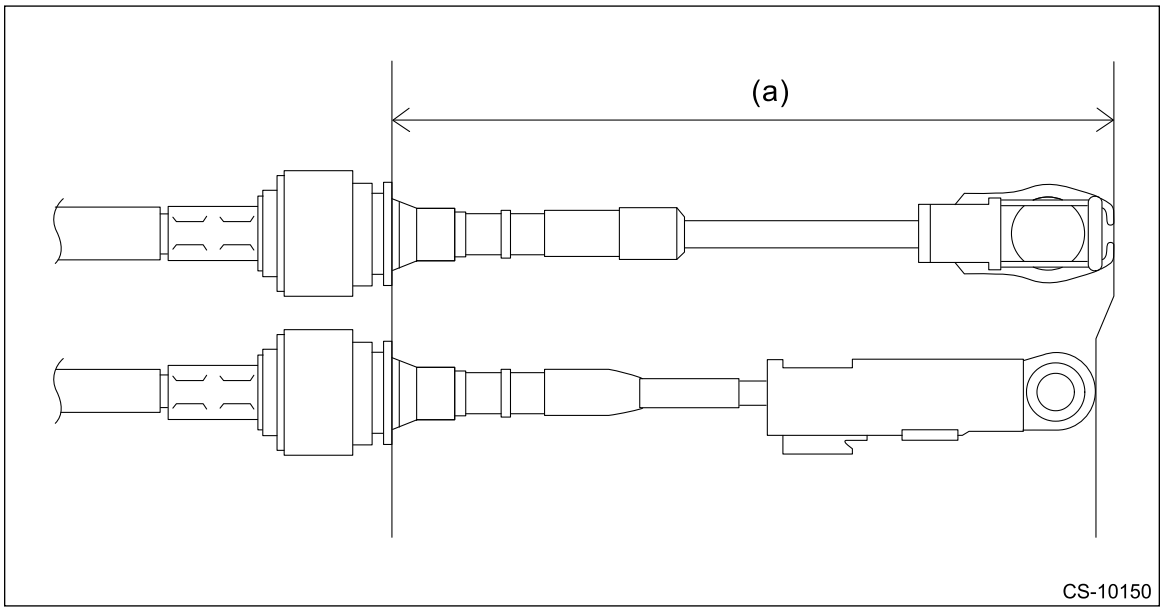
18. Make sure the gears can be shifted accurately into each gear.
19. Connect the battery ground terminal. Ref. to NOTE>NOTE > BATTERY.

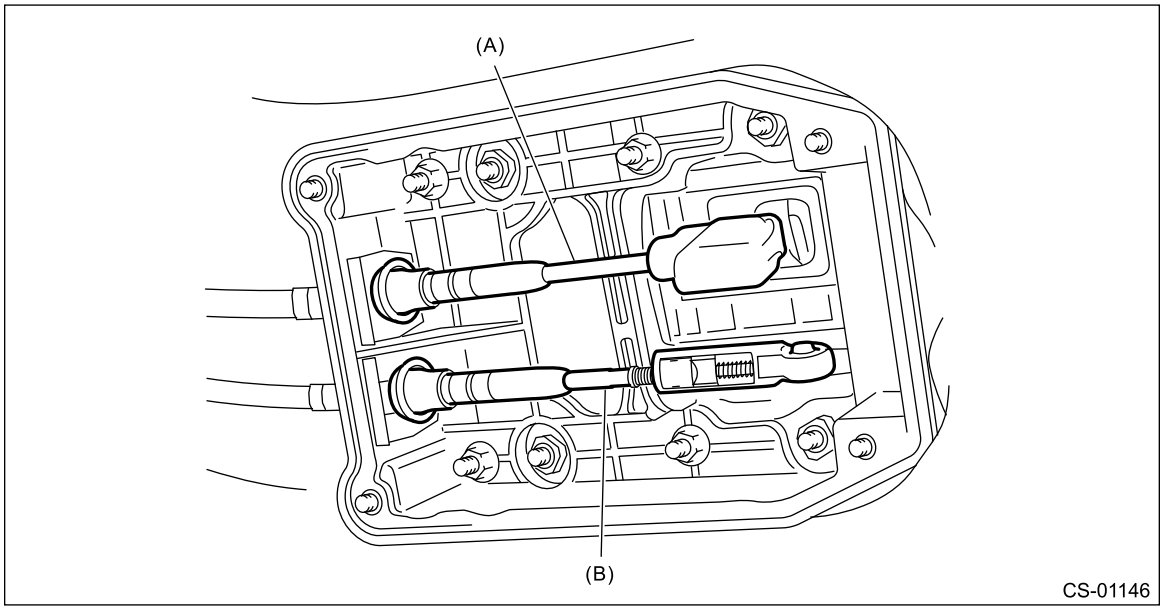
2. EXCEPT FOR STI MODEL

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.**
   - **Do not twist the cable inner excessively.**
   - **Do not apply extra overload while holding the part (a).**





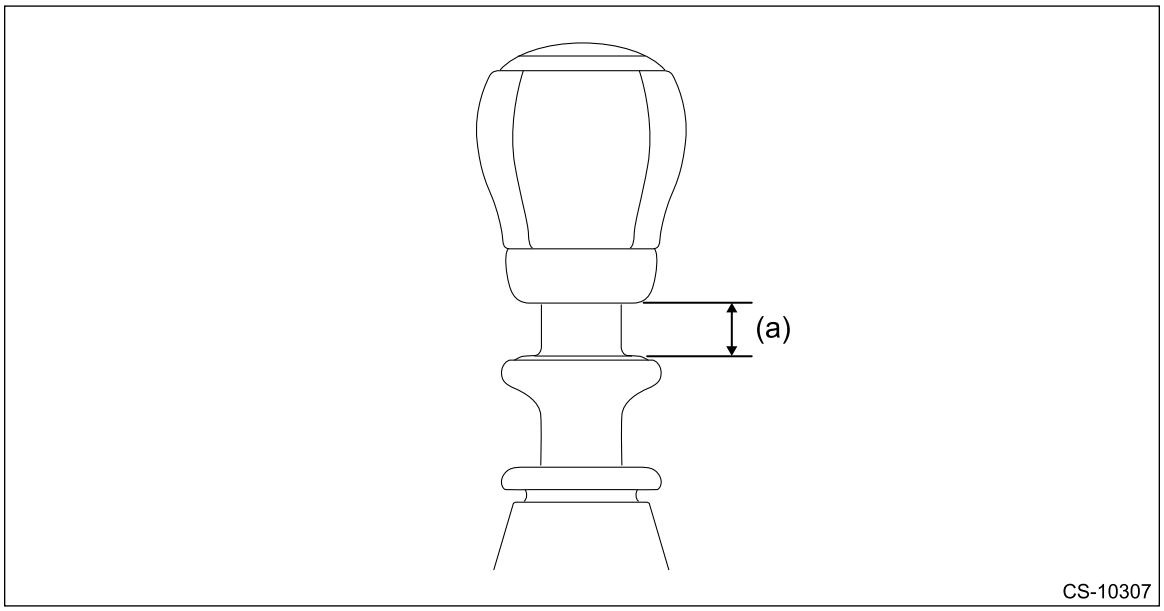
(A) MT gear shift cable (B) MT gear select cable

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 (rear). Ref. to EXHAUST(w/o STI)>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 cover - shift lever. Ref. to EXTERIOR/INTERIOR TRIM>Console Box>INSTALLATION.

12. Install the console box assembly. Ref. to EXTERIOR/INTERIOR TRIM>Console Box>INSTALLATION.
13. Install the gear shift knob by turning it clockwise.

Caution:

- **Do not tighten the gear shift knob excessively to prevent it from being damaged.**
- **Be sure that the gap (a) between the gear shift knob bottom surface and the holder top surface is 11.5 mm (0.453 in) or more.**



(a) 11.5 mm (0.453 in)

Note:
When adjusting the shift pattern direction after installing the gear shift knob, rotate in the tightening direction.

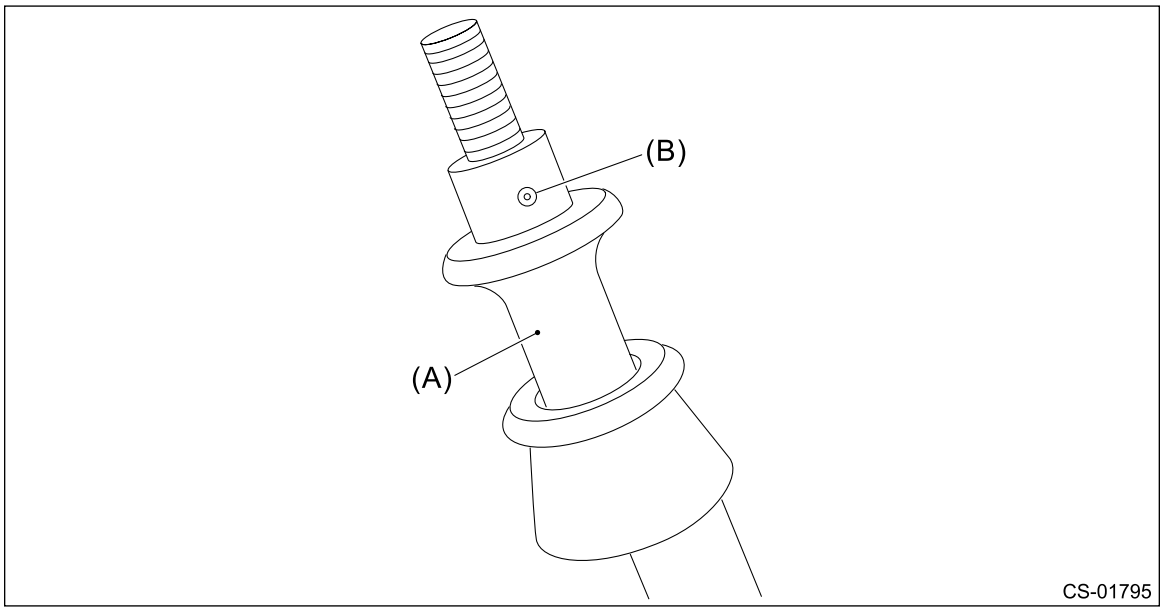
14. Make sure the gears can be shifted accurately into each gear. Adjust the MT gear select lever, if the gears cannot be shifted correctly. Ref. to CONTROL SYSTEMS>MT Gear Select Cable>ADJUSTMENT.
15. Connect the battery ground terminal. Ref. to NOTE>NOTE > BATTERY.

CONTROL SYSTEMS > MT Gear Shift Lever

DISASSEMBLY

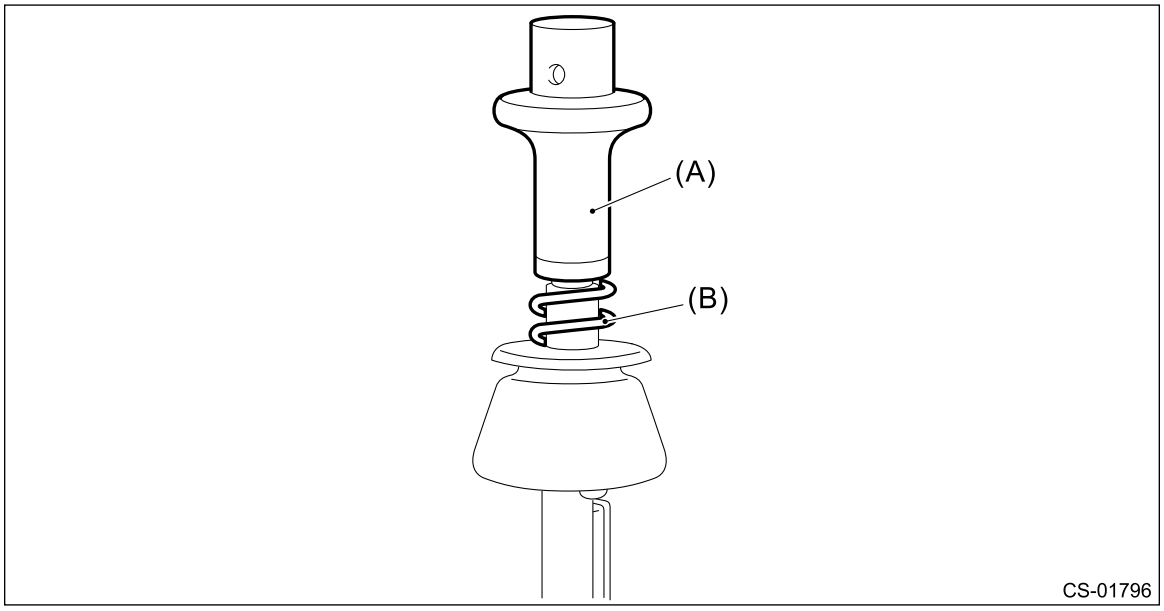
Note:
Disassemble procedures are only for STI model.

1. Remove the spring pin from the slider.



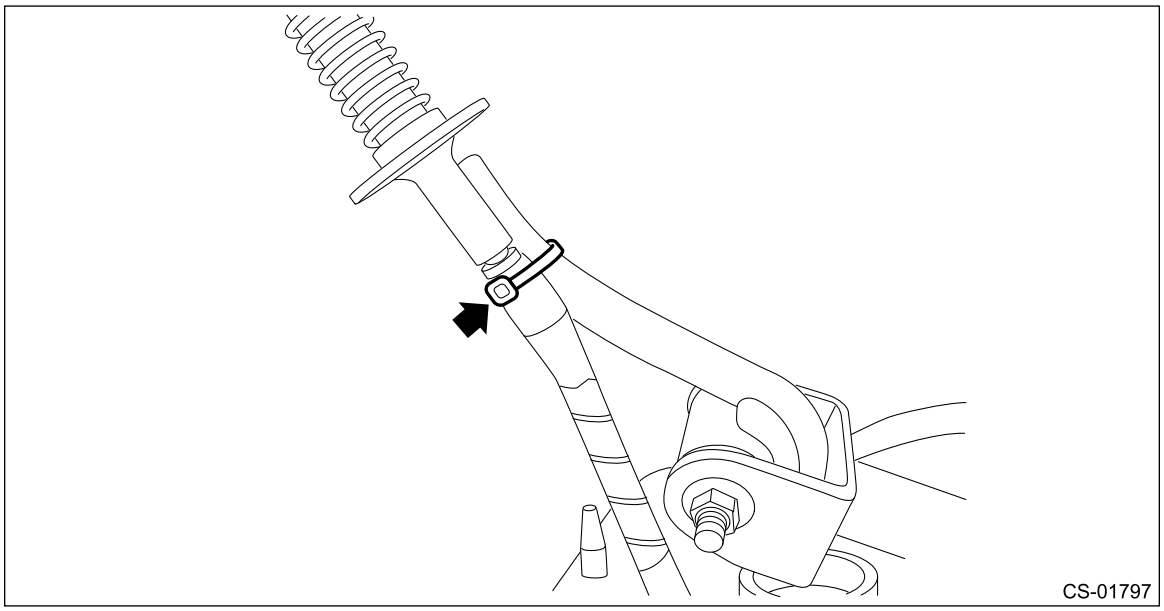
(A) Slider (B) Spring pin

2. Remove the slider and spring.

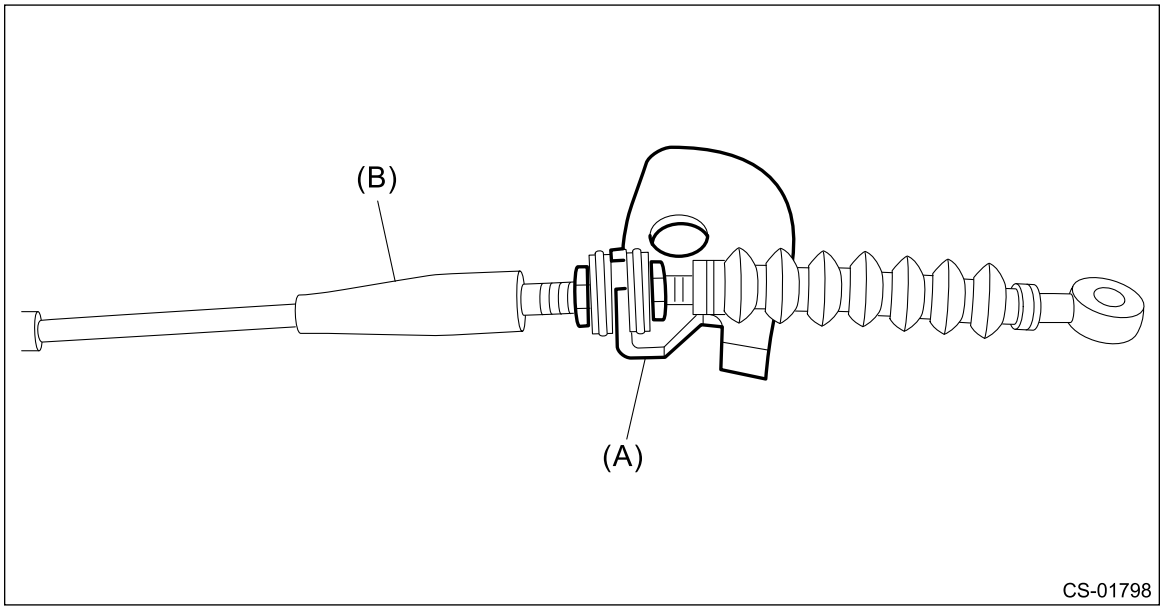


(A) Slider (B) Spring

3. Cut off the band clip.

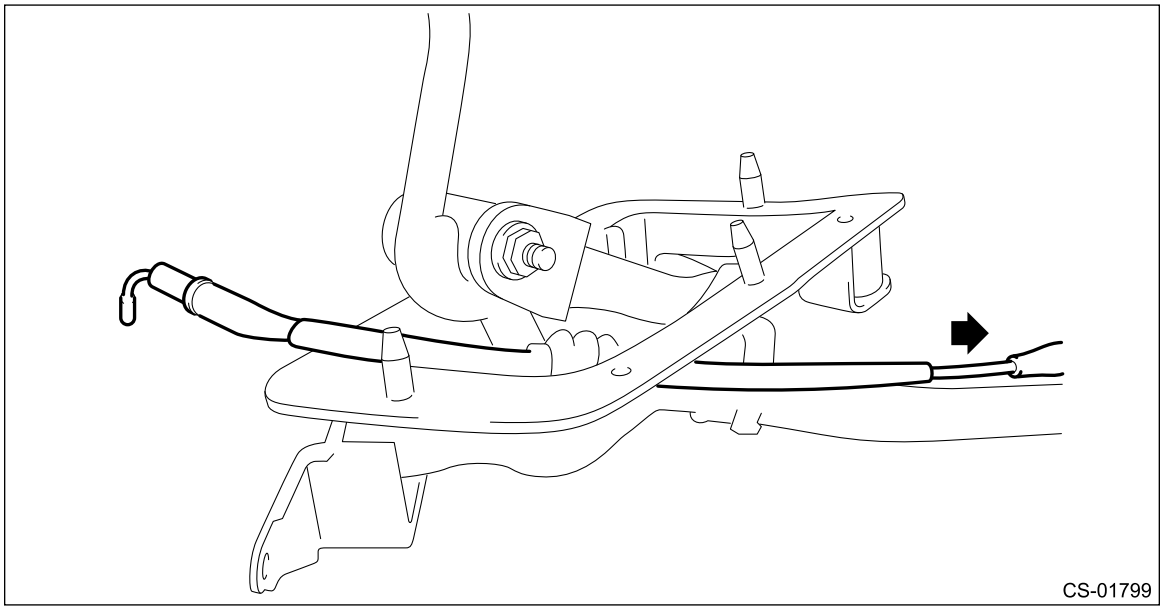


4. Remove the reverse check cable from the cable plate.

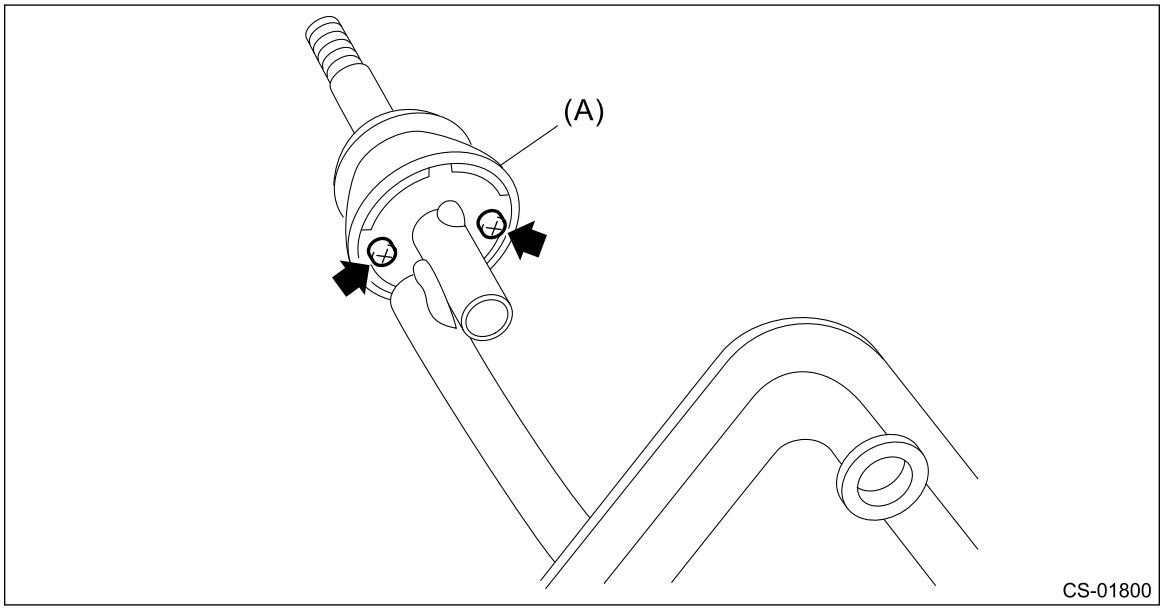


(A) Cable plate (B) Reverse check cable

5. Remove the reverse check cable.



6. Remove the holder and spring.

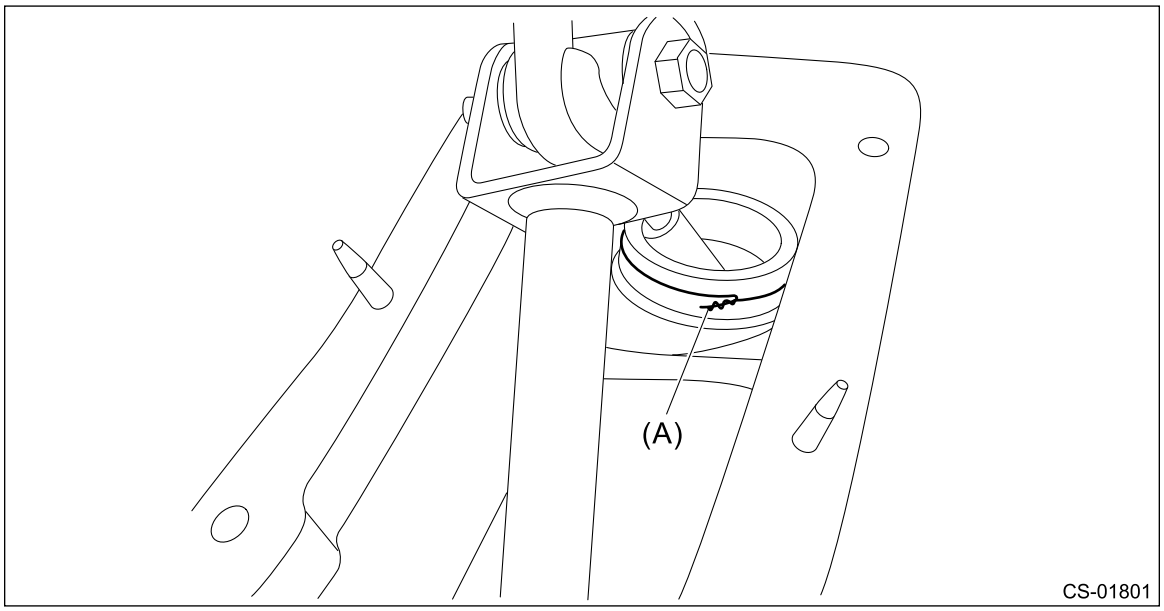


(A) Holder

7. Disassemble the lock wire.

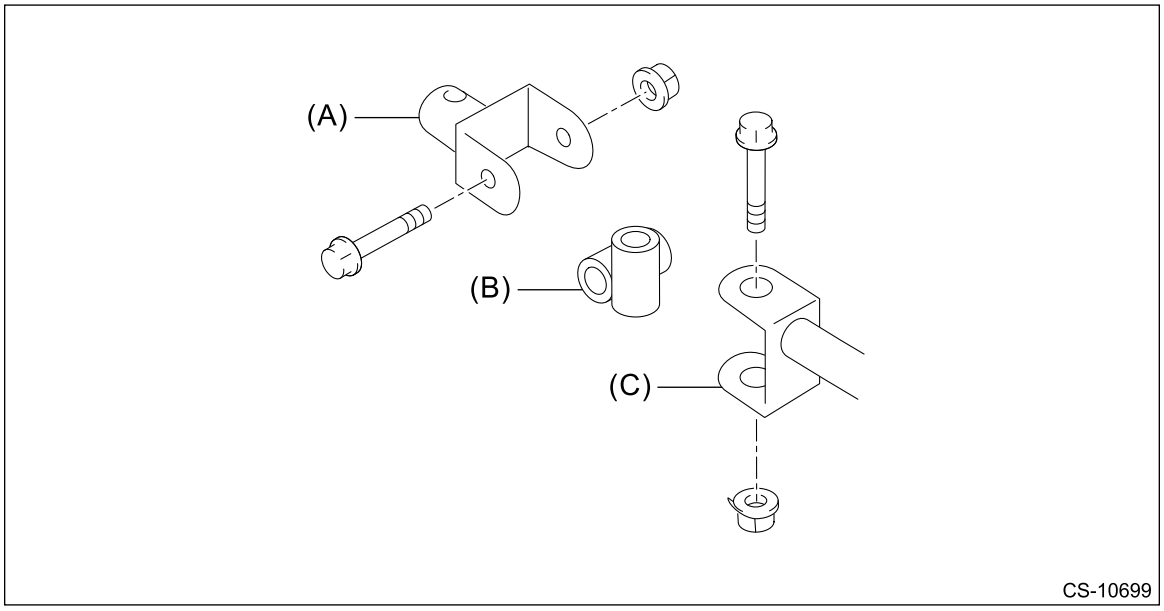
Note:

Do not reuse the lock wire.



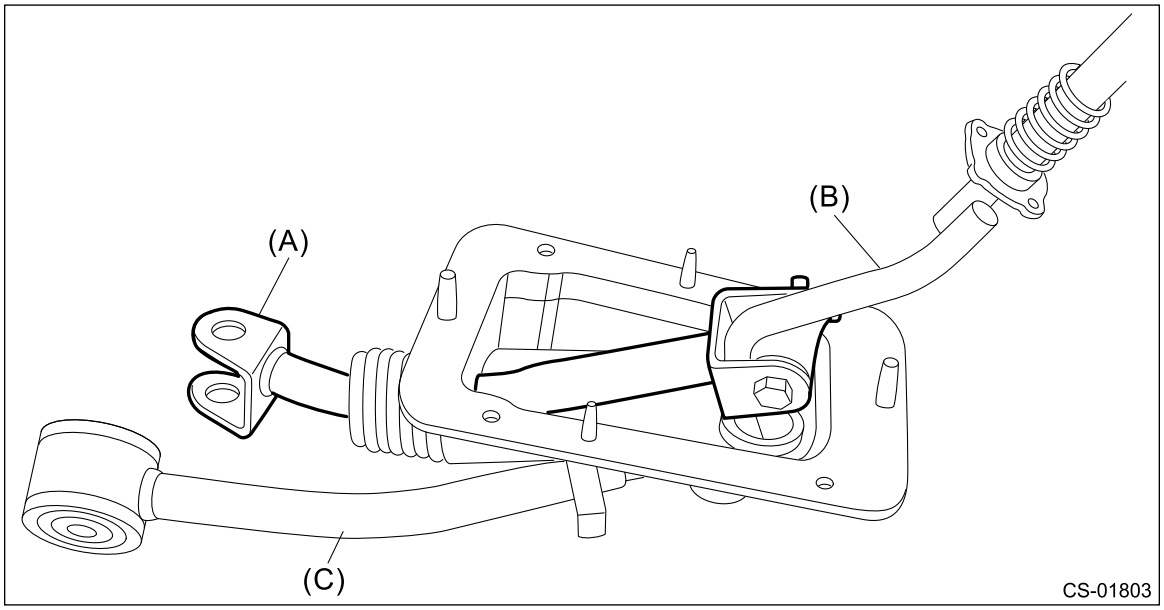
(A) Lock wire

8. Disconnect the joint, boss and rod.



(A) Joint (B) Boss (C) Rod

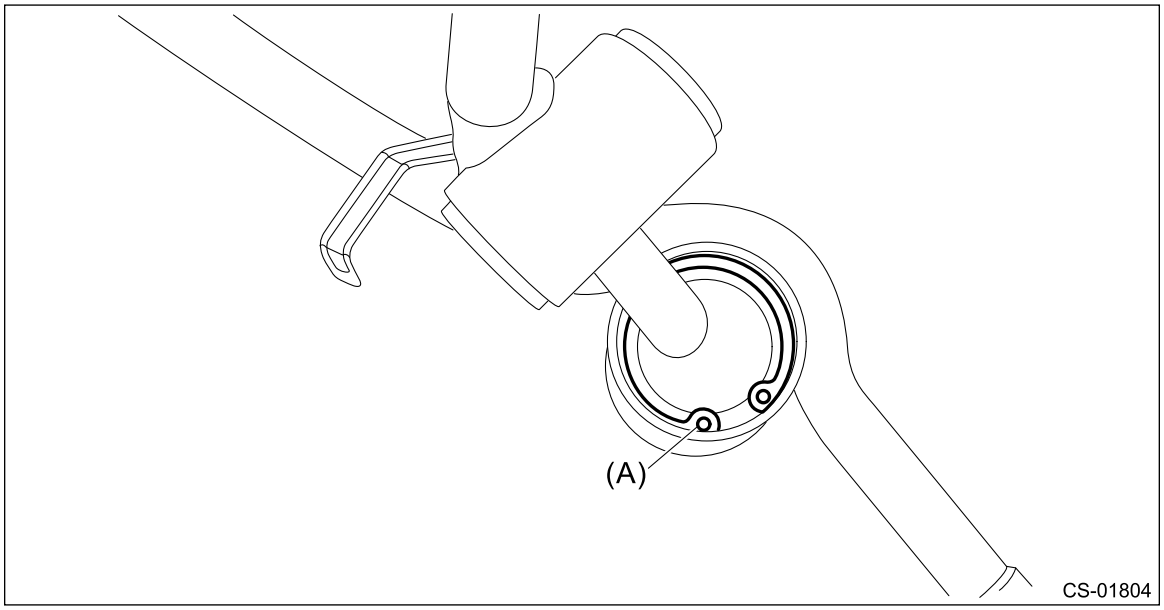
9. Remove the rod from lever.



(A) Rod (B) Lever (C) Stay

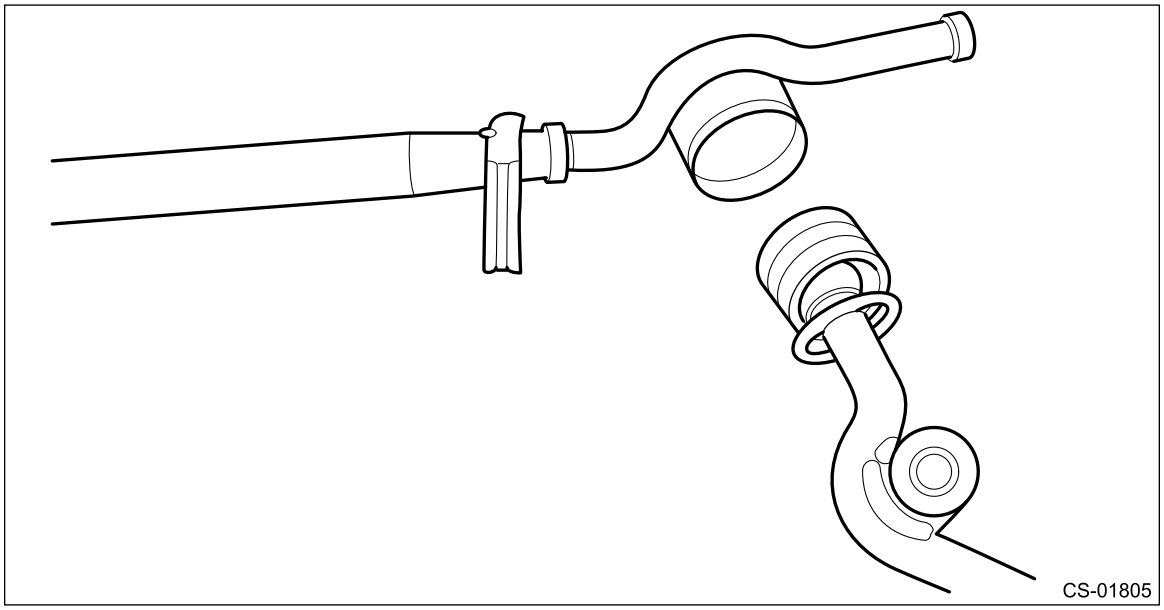
10. Separate the rod and inner boot.

11. Remove the snap ring.

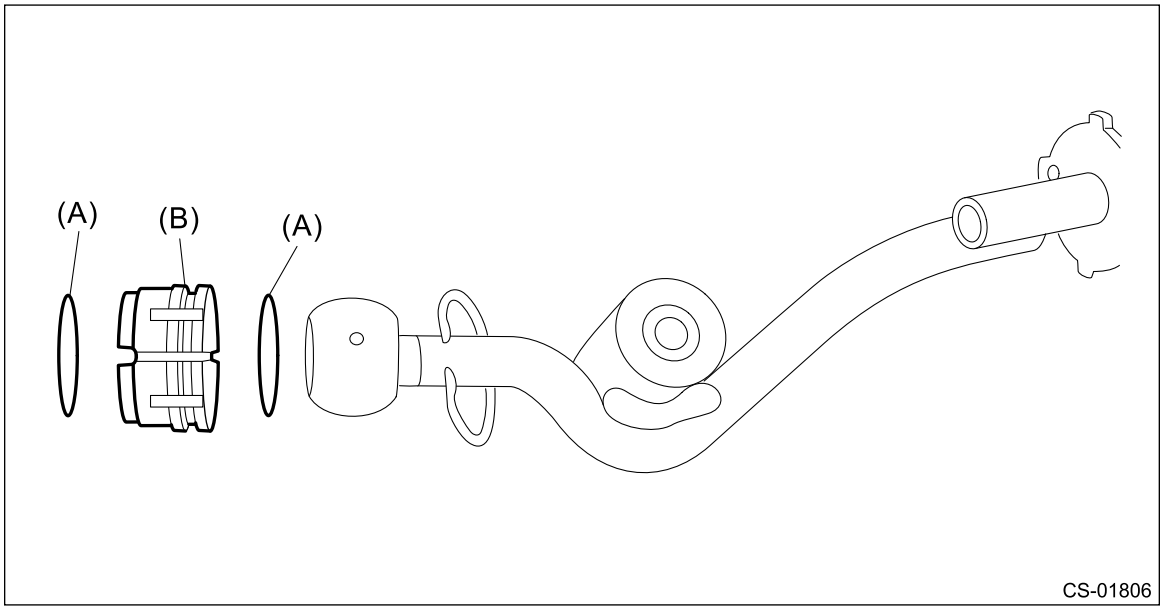


(A) Snap ring

12. Separate the gear shift lever and the stay.

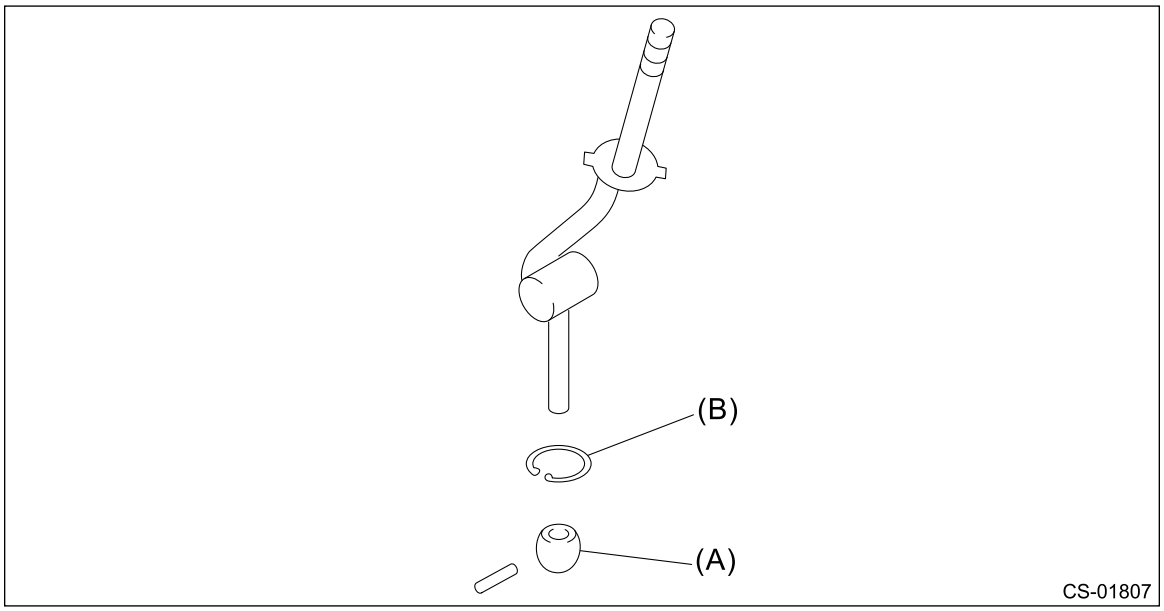


13. Remove the O-ring and bushing.



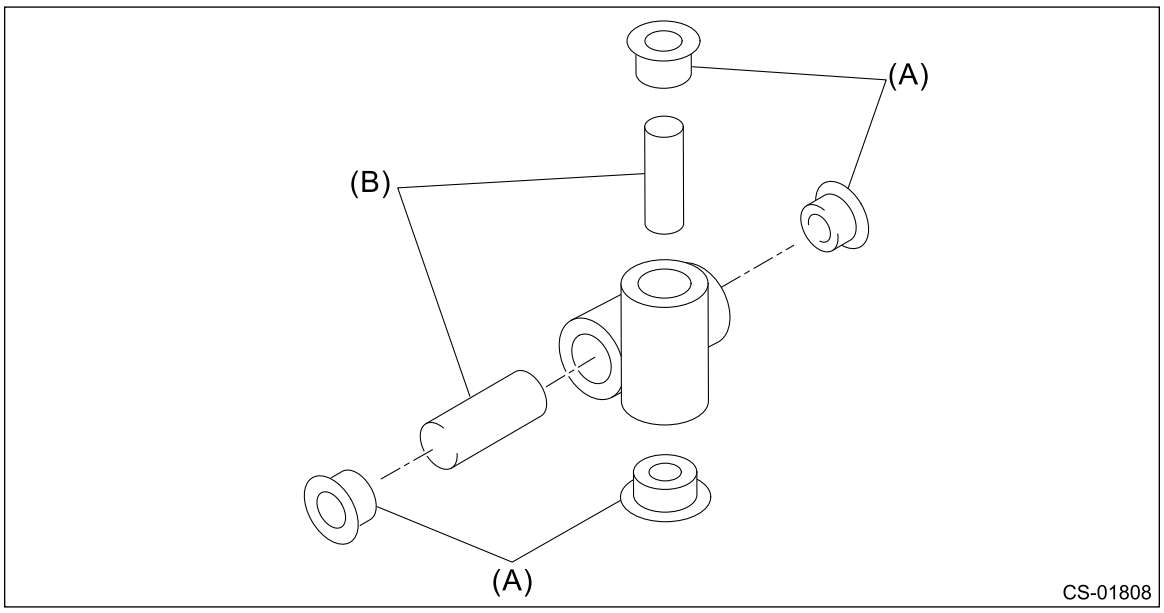
(A) O-ring (B) Bushing

14. Remove the spring pin, and then remove the bushing and snap ring.



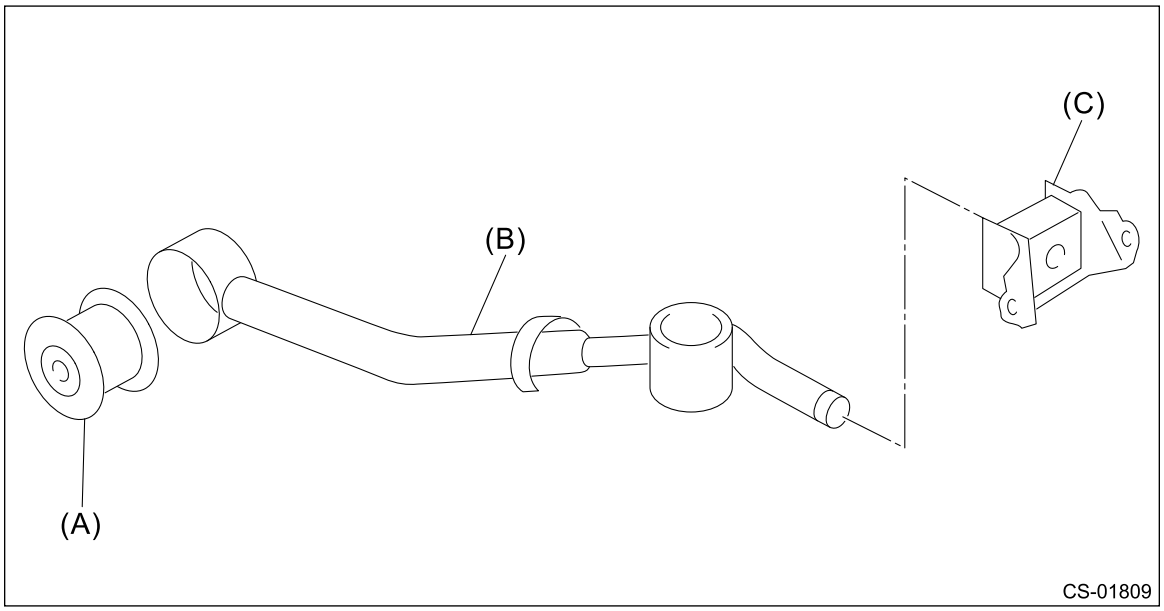
(A) Bushing (B) Snap ring

15. Remove the bushing and spacer from the boss.



(A) Bushing (B) Spacer

16. Remove the bushing and cushion rubber from the stay.



(A) Bushing (B) Stay (C) Cushion rubber

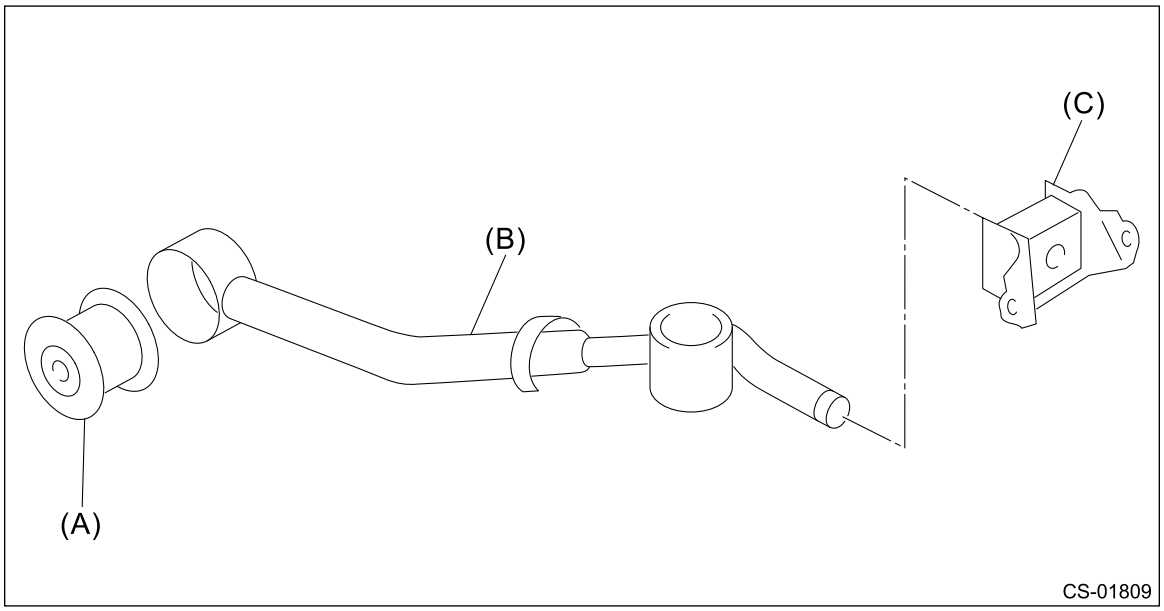
CONTROL SYSTEMS > MT Gear Shift Lever

ASSEMBLY

Note:

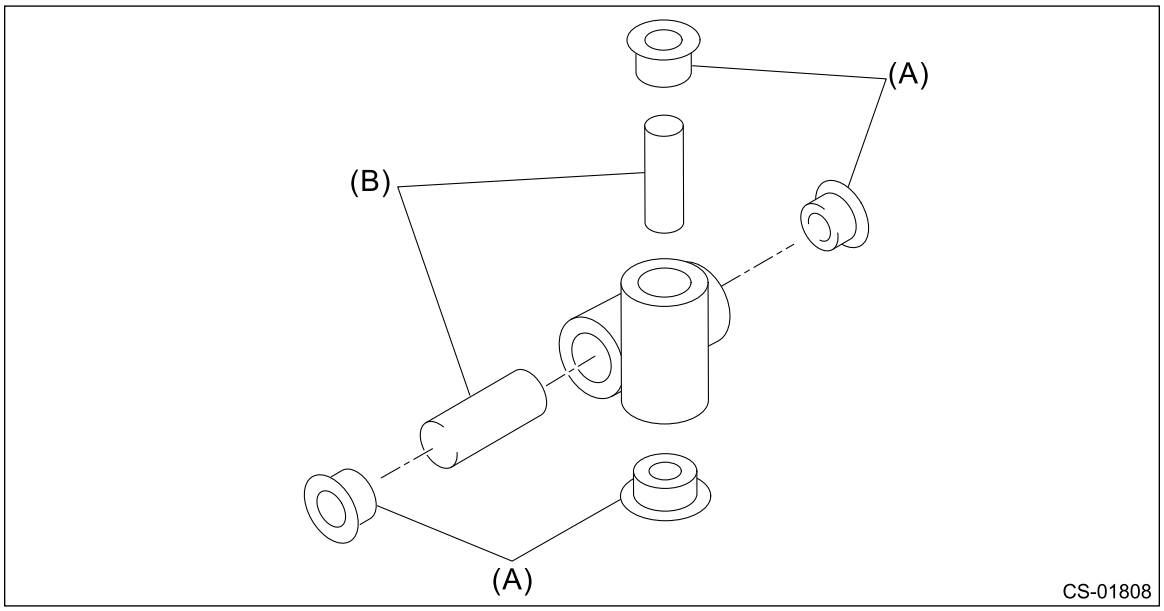
- **Clean all the parts before assembly.**
- **Apply NIGTIGHT LTS No. 2 grease or equivalent to each part. Ref. to CONTROL SYSTEMS>General Description>COMPONENT > 6MT GEAR SHIFT LEVER (STI MODEL).**

1. Mount the bushing and cushion rubber to the stay.



(A) Bushing (B) Stay (C) Cushion rubber

2. Install the bushing and spacer to boss.

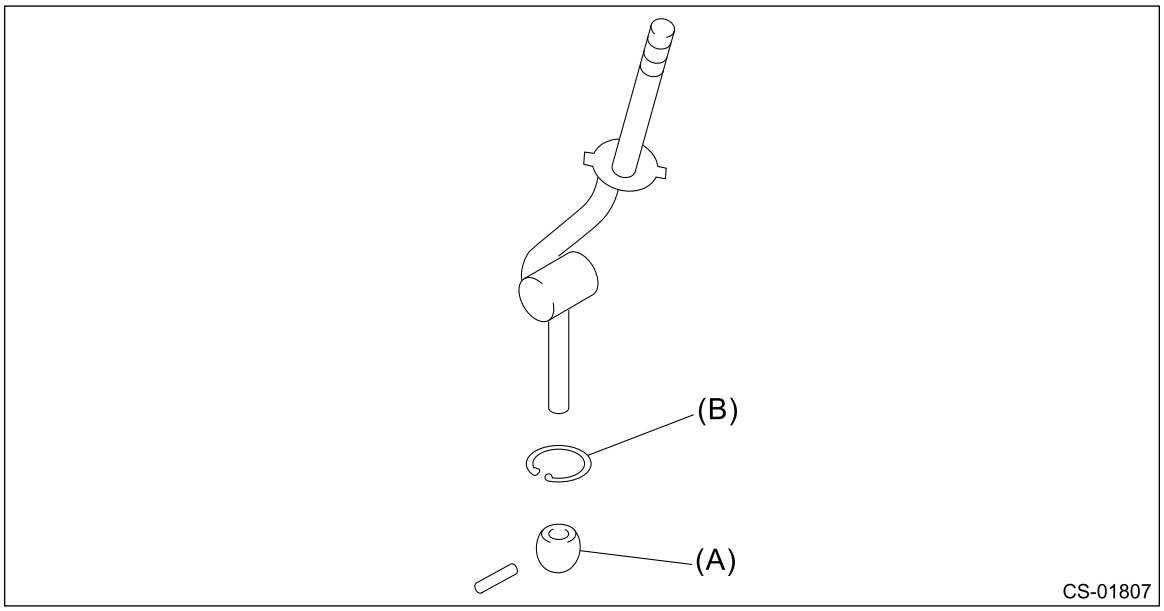


(A) Bushing (B) Spacer

3. Install the snap ring and install the bushing.

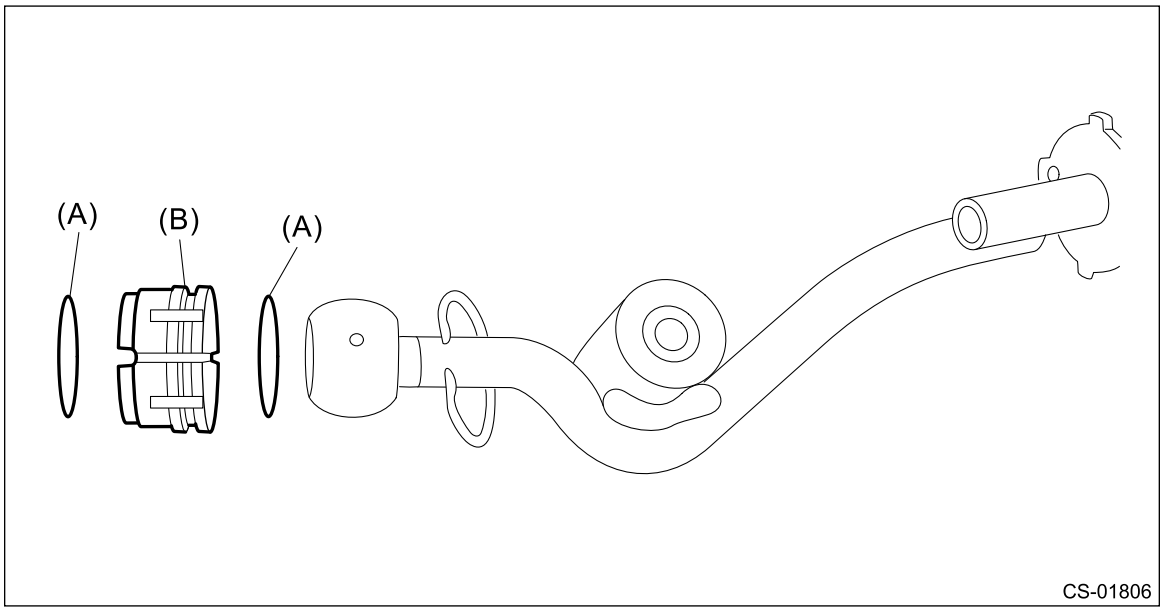
Note:

Apply grease to the bushing.



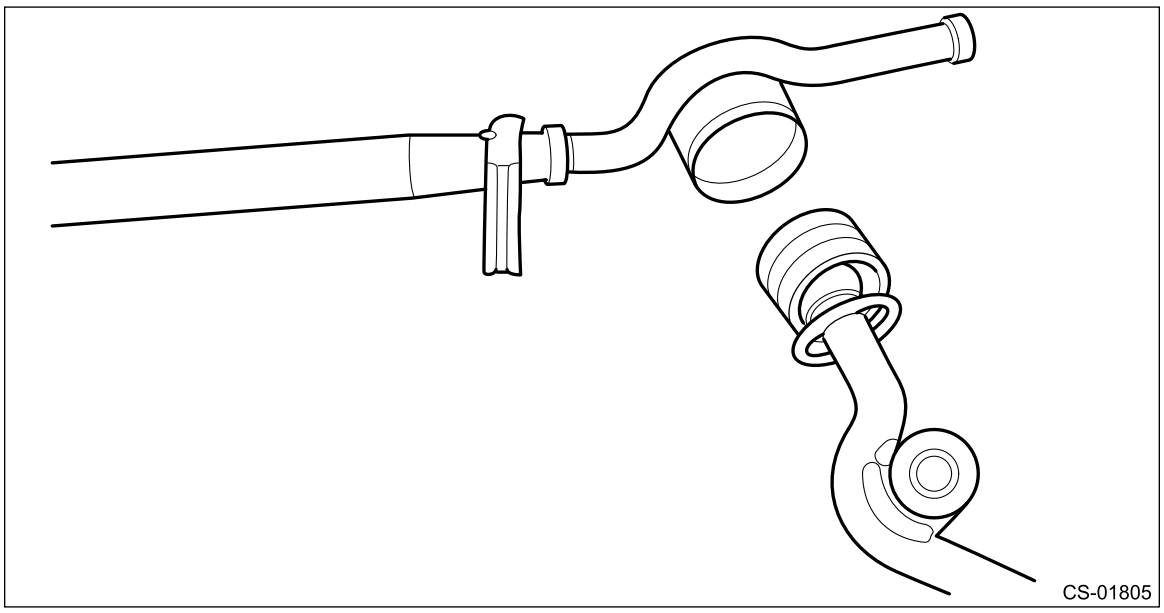
(A) Bushing (B) Snap ring

4. Apply grease to the bushing and O-ring, and then install to gear shift lever.

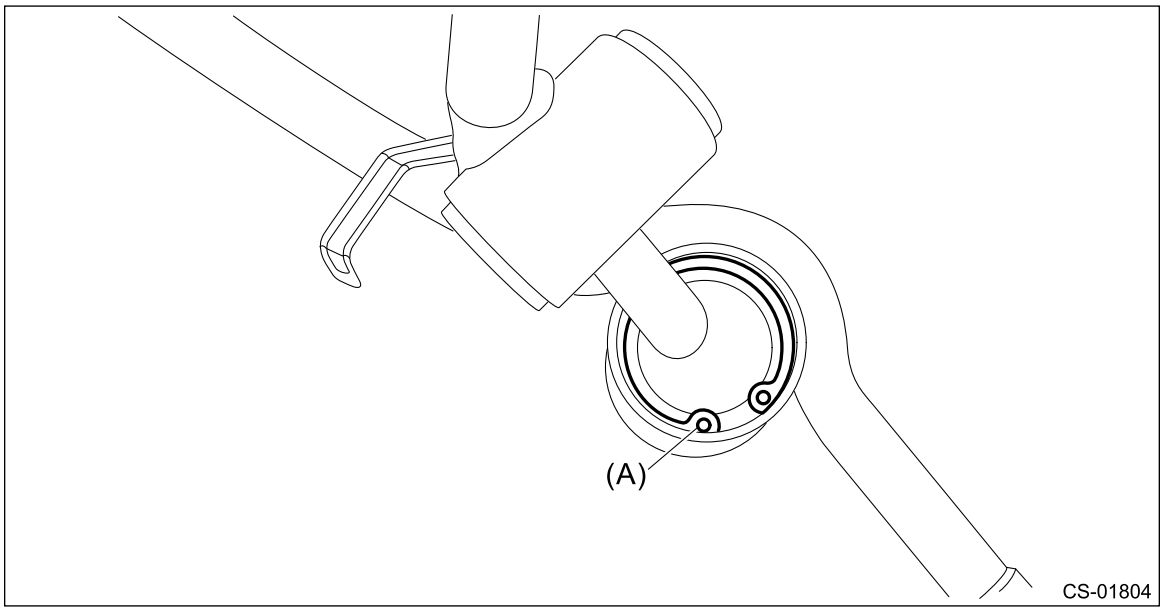


(A) O-ring (B) Bushing

5. Apply sufficient grease into boss, and then install the gear shift lever to the stay.



6. Install the snap ring.



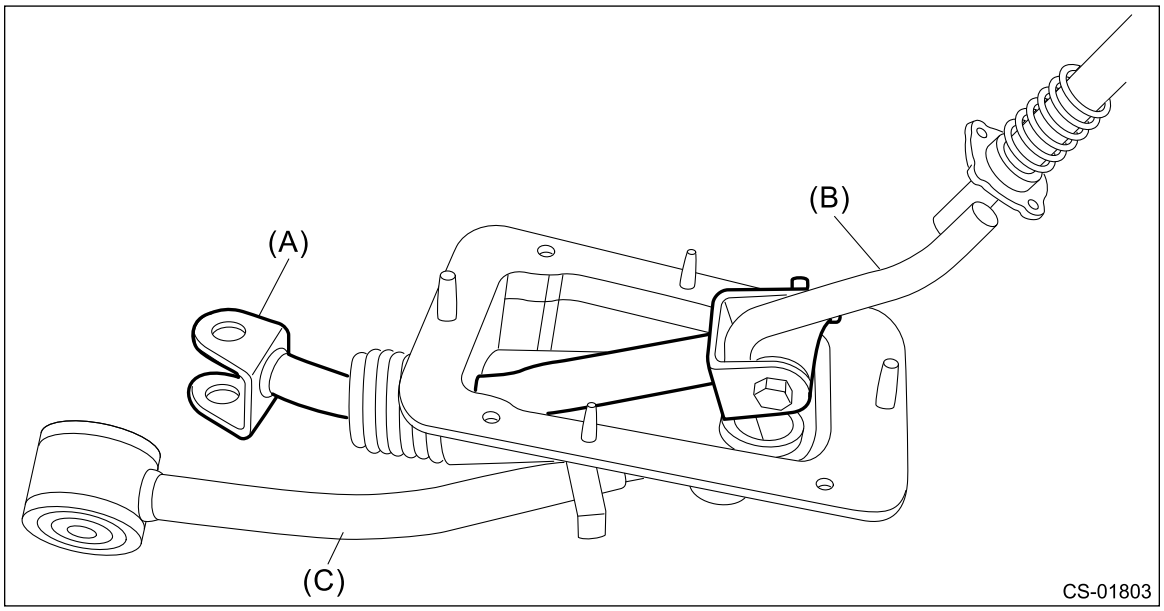
(A) Snap ring

7. Insert the gear shift lever and rod into boot hole.

8. Install the rod.

Tightening torque:

12 N·m (1.2 kgf-m, 8.9 ft-lb)

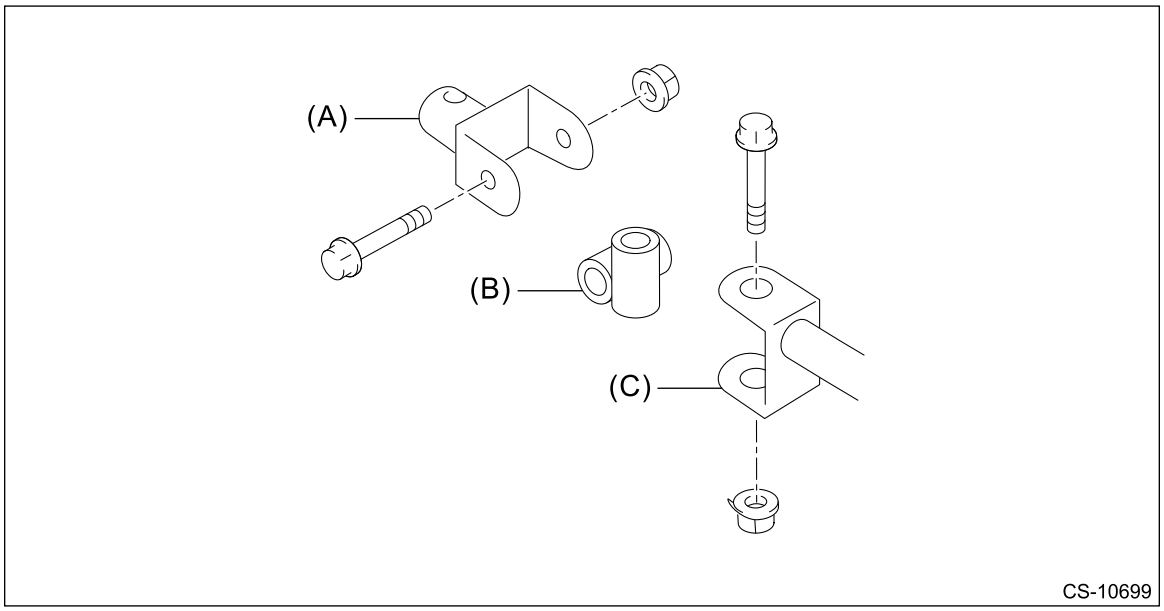


(A) Rod (B) Lever (C) Stay

9. Connect the joint, boss and rod.

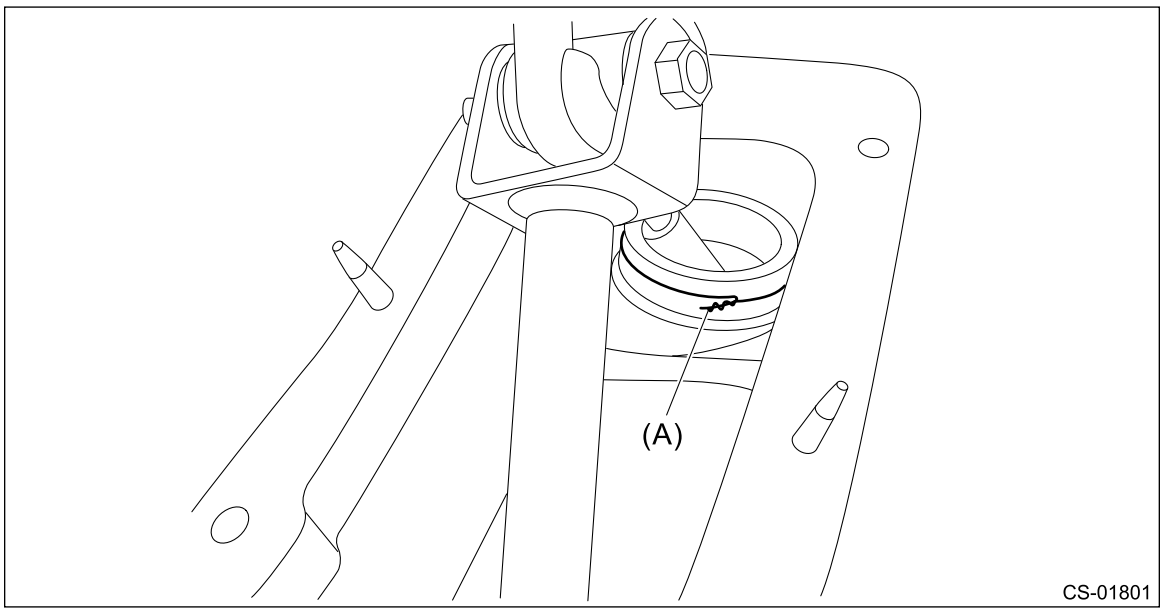
Tightening torque:

12 N·m (1.2 kgf-m, 8.9 ft-lb)



(A) Joint (B) Boss (C) Rod

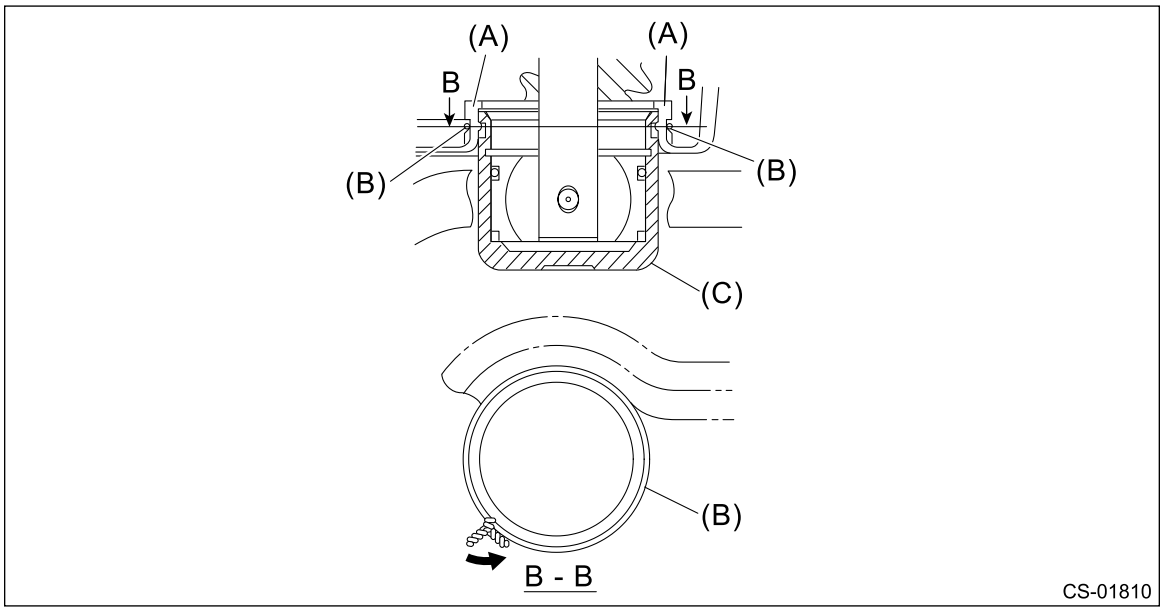
10. Install a new lock wire.



(A) Lock wire

Note:

- **Install the lock wire to the stay groove.**
- **Bend the extra wire to the same direction of lock wire winding.**

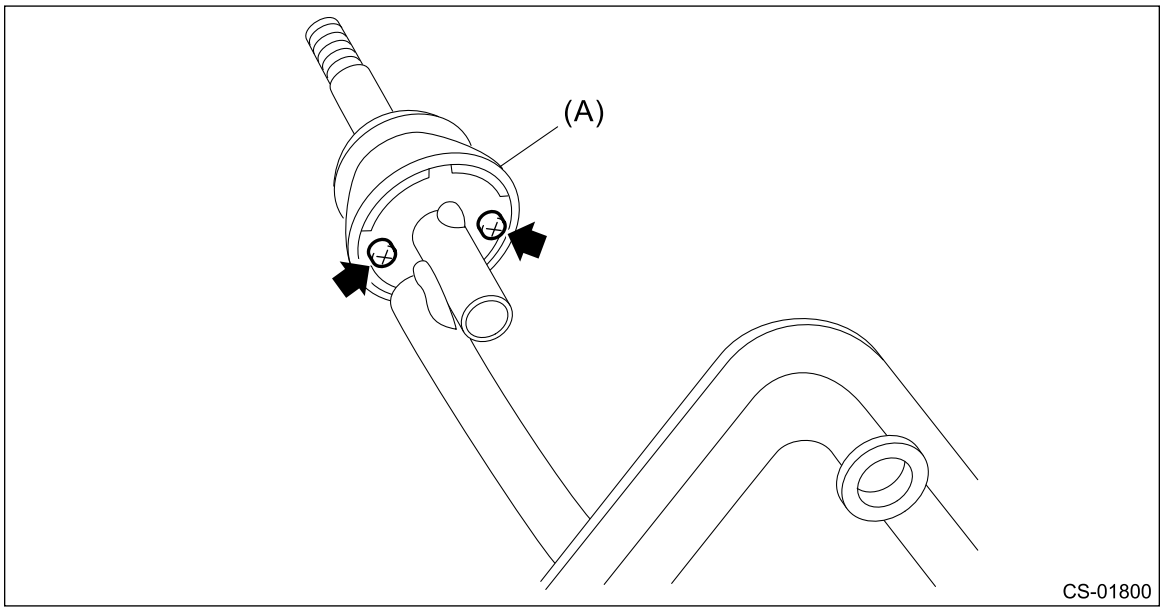


(A) Inner boot (B) Lock wire (C) Stay

11. Install the holder.

Tightening torque:

1.3 N·m (0.1 kgf-m, 1.0 ft-lb)



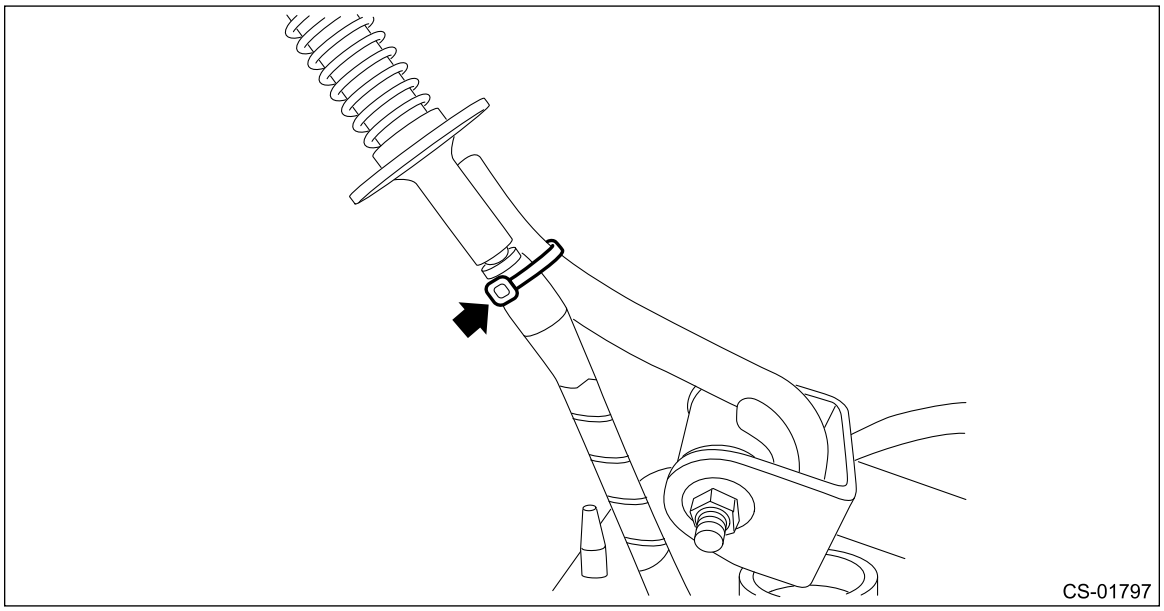
(A) Holder

12. Insert the reverse check cable into the boot hole.

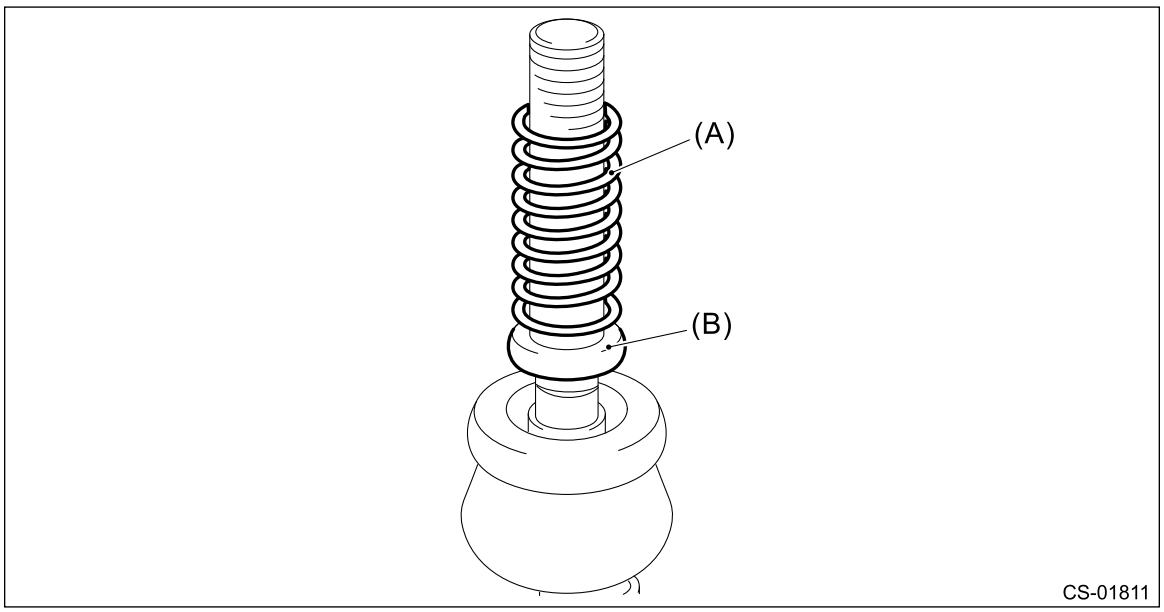
13. Insert the reverse check cable into the gear shift assembly, and fix in place with a band clip.

Note:

- **Cut the excess band clip.**
- **Make sure that the reverse check cable is inserted into the gearshift lever assembly with no gaps.**



14. Install the seat cushion and spring.

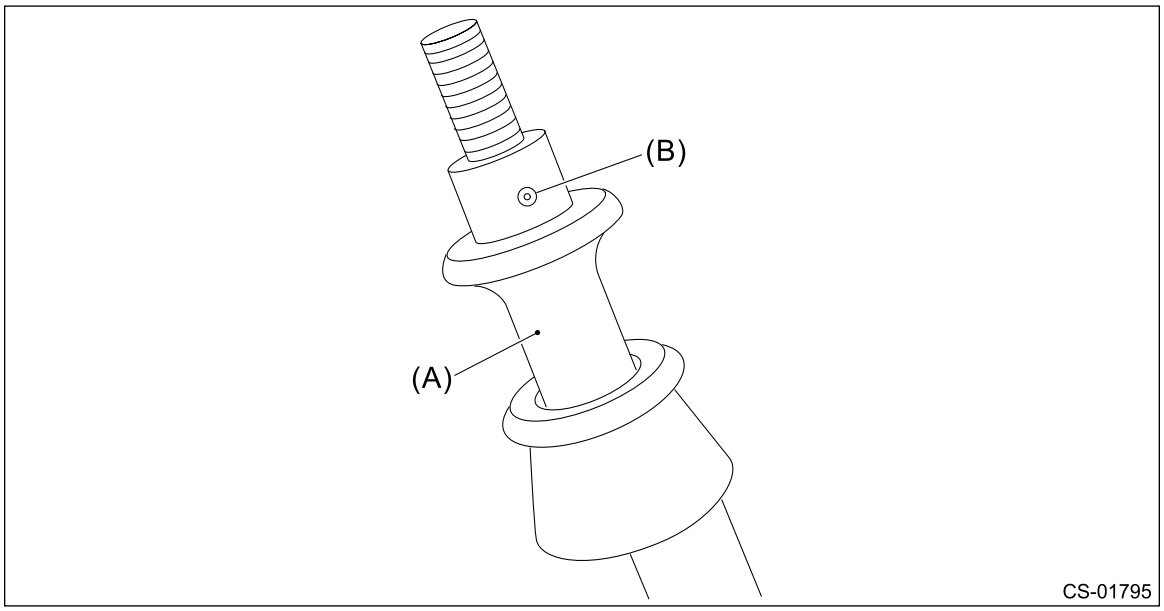


(A) Spring (B) Seat cushion

15. Use the spring pin to secure the end of the slider and reverse check cable.

Note:

Apply grease to the moving part of slider.

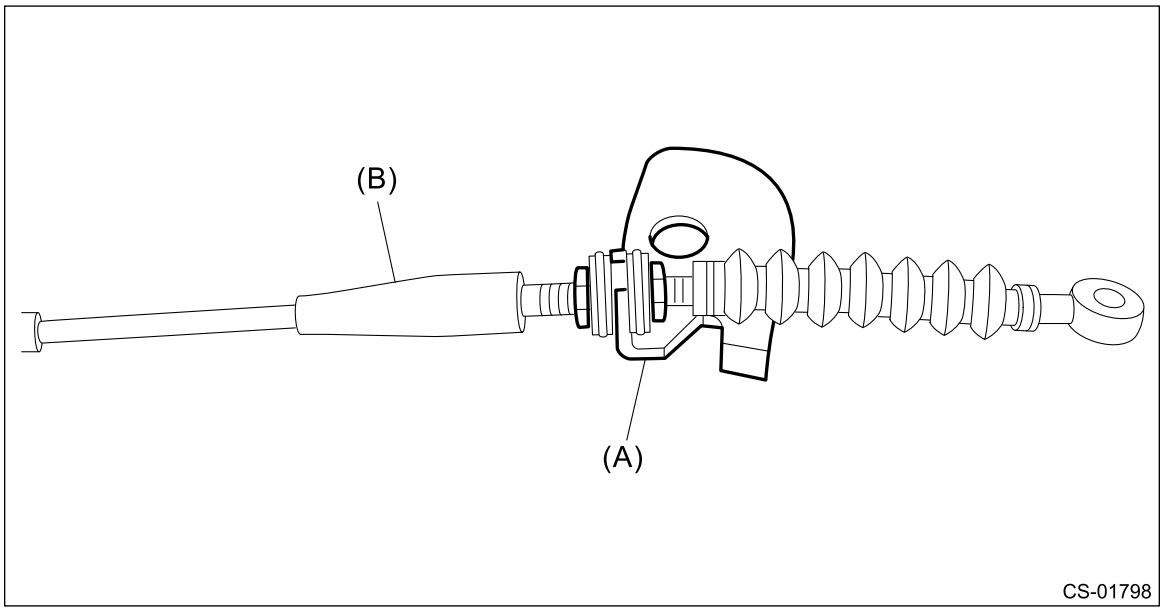


(A) Slider (B) Spring pin

16. Install the reverse check cable to the cable plate, and tighten the lock nut.

Tightening torque:

6 N·m (0.6 kgf-m, 4.4 ft-lb)

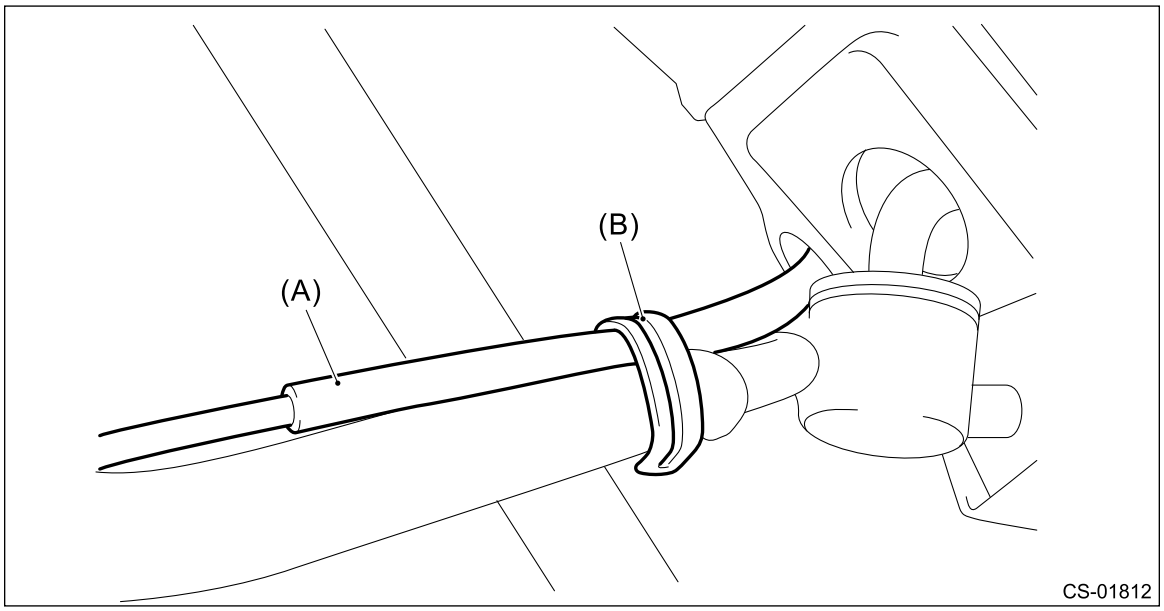


(A) Cable plate (B) Reverse check cable

17. Secure the reverse check cable to the stay clip.

Note:

Install the reverse check cable on top of the stay.



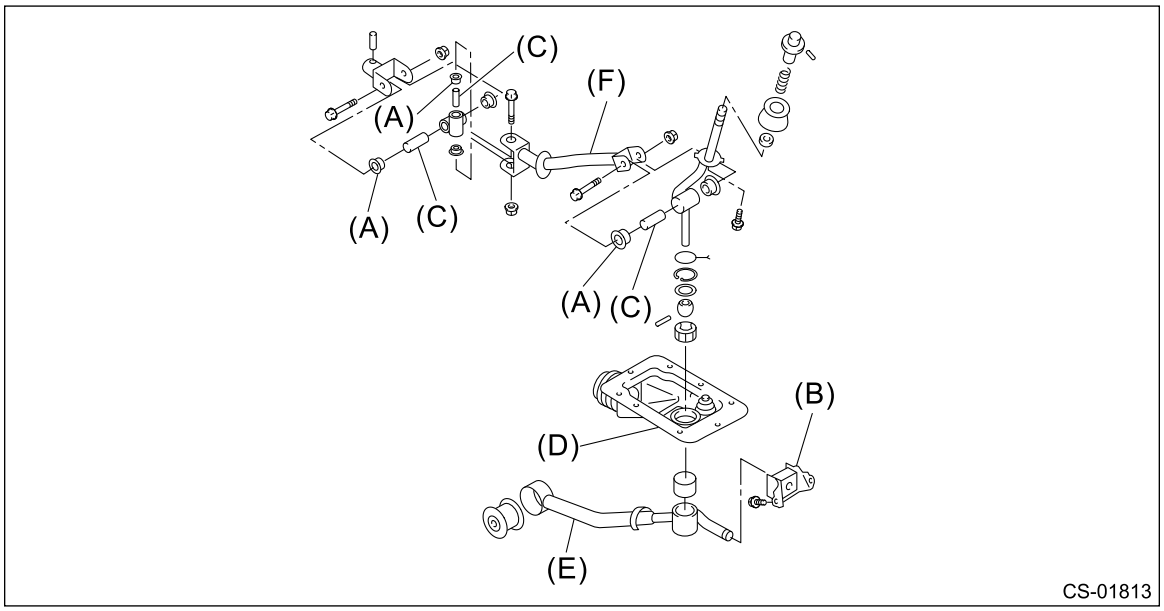
(A) Reverse check cable (B) Clip

CONTROL SYSTEMS > MT Gear Shift Lever

INSPECTION

1. STI MODEL

1. Check the parts (bushing, cushion rubber, spacer, boot, stay and rod, etc.) for deformation, damage and wear. If necessary, correct or replace faulty parts. Compare the removed parts with new parts to judge if there are damages or not.



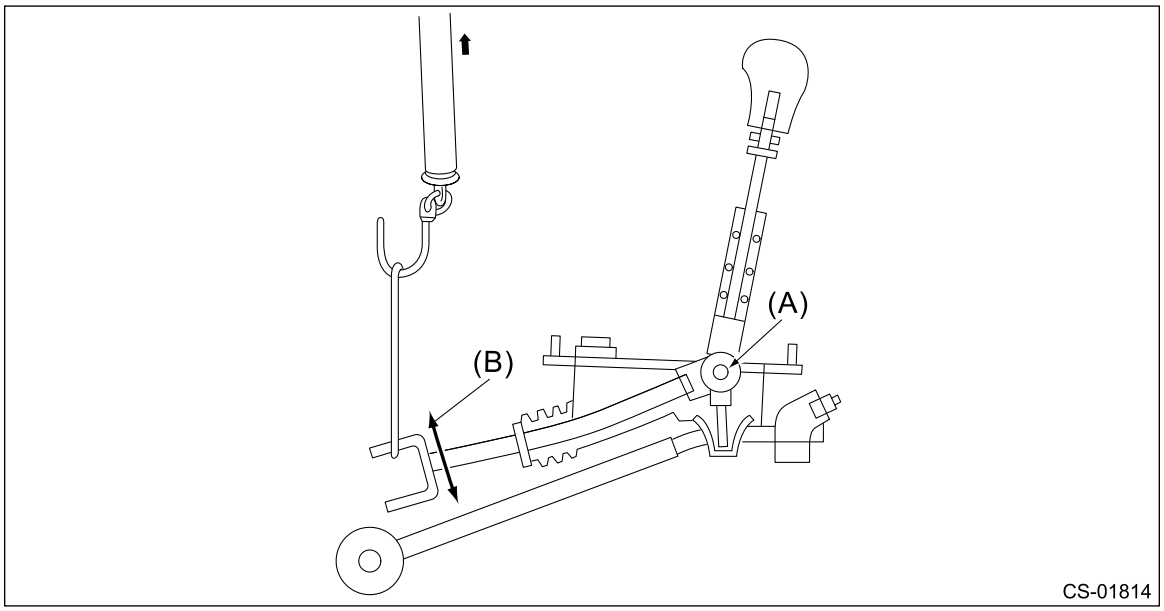
(A) Bushing (C) Spacer (E) Stay
(B) Cushion rubber (D) Boot (F) Rod

2. Check the swing torque of rod linked with the gear shift lever.

If the torque exceeds the specifications, replace the bushing or retighten nuts.

Swing torque:

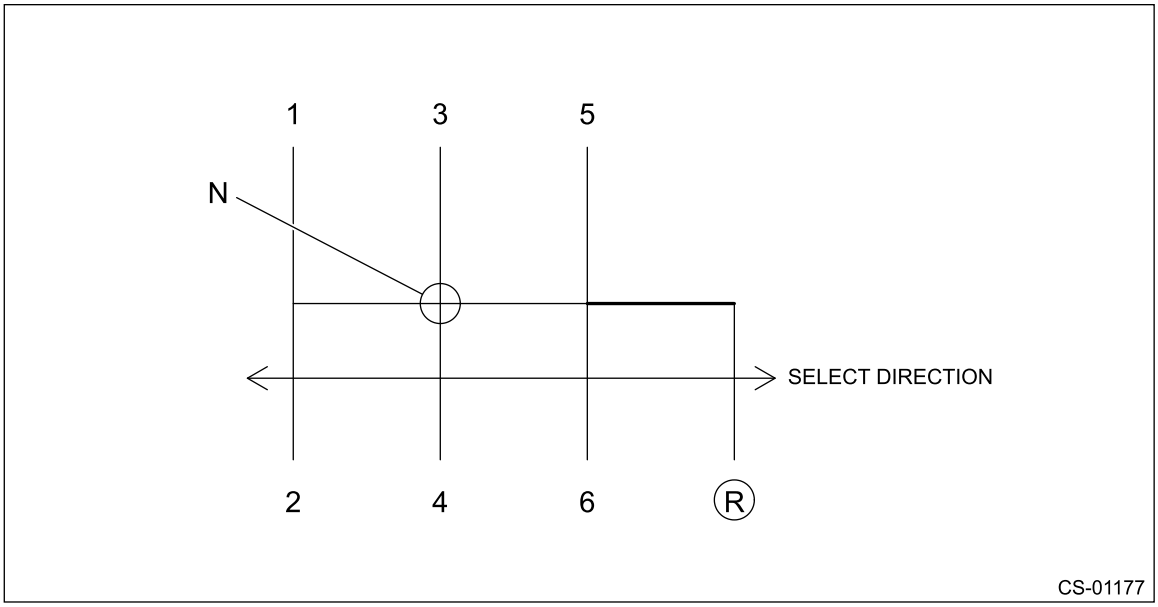
3.7 N (0.38 kgf, 0.83 lbf) or less



(A) Pivot (B) Swing torque

2. EXCEPT FOR STI MODEL

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).



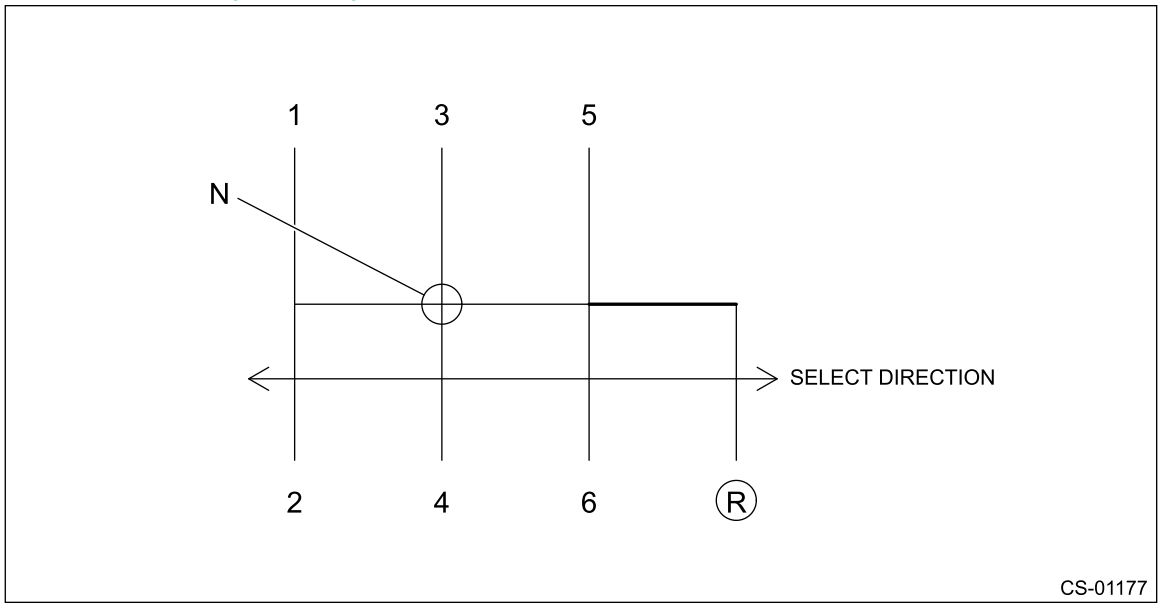
5. Move the shift lever to the neutral position, and check that the play in the select direction above the shift knob is within the reference standard. If not within the reference standard values, replace the

MT gear shift lever. Ref. to CONTROL SYSTEMS>MT Gear Shift Lever>REMOVAL > EXCEPT FOR STI MODEL.

Play in neutral position:

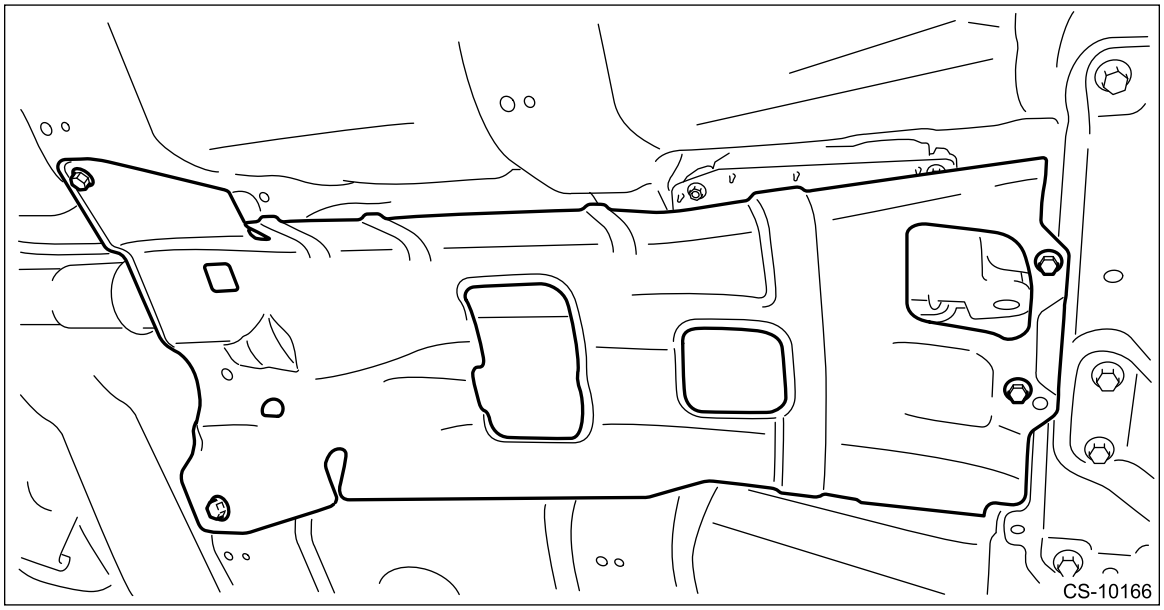
Reference standard

1.5 mm (0.059 in) or less

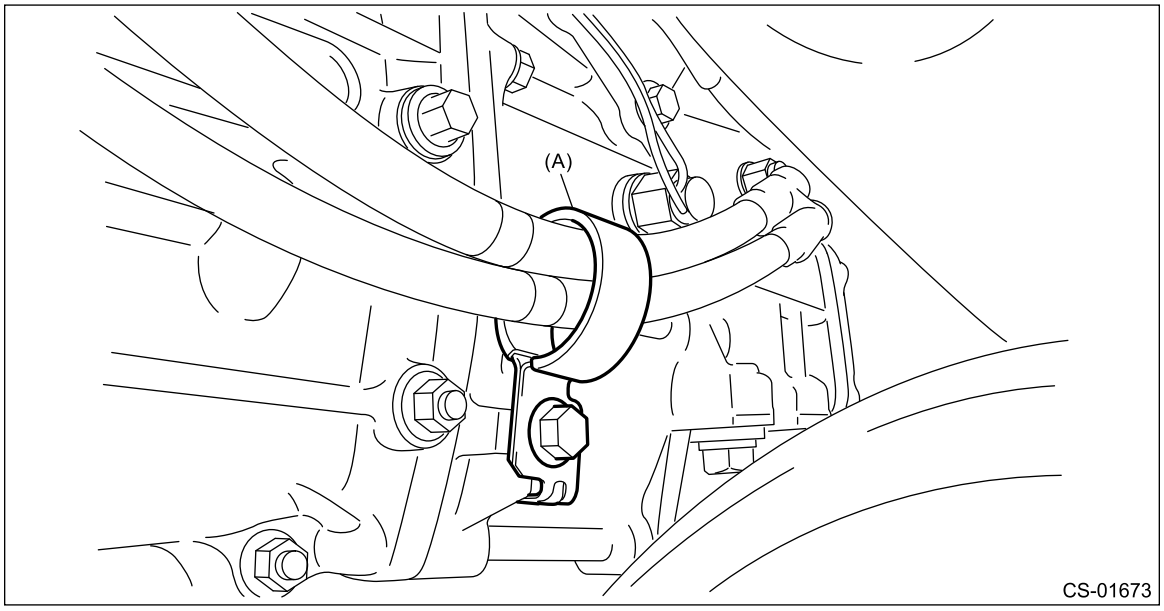


REMOVAL

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 (rear). Ref. to EXHAUST(w/o STI)>Center Exhaust Pipe>REMOVAL.
4. Remove the center exhaust cover.

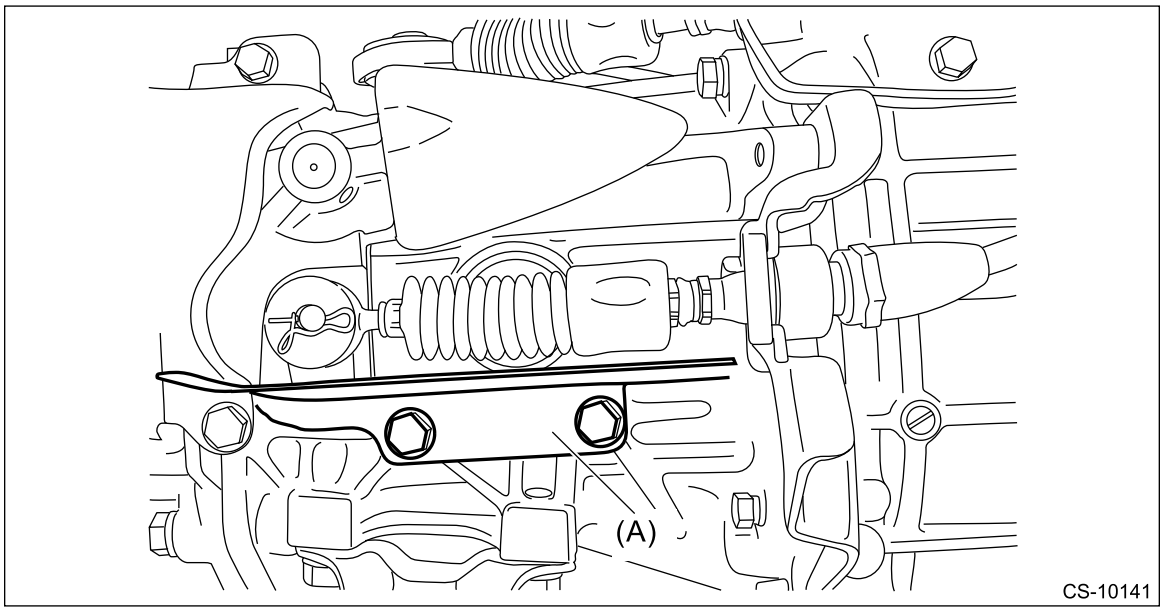


5. Remove the cable clamp.



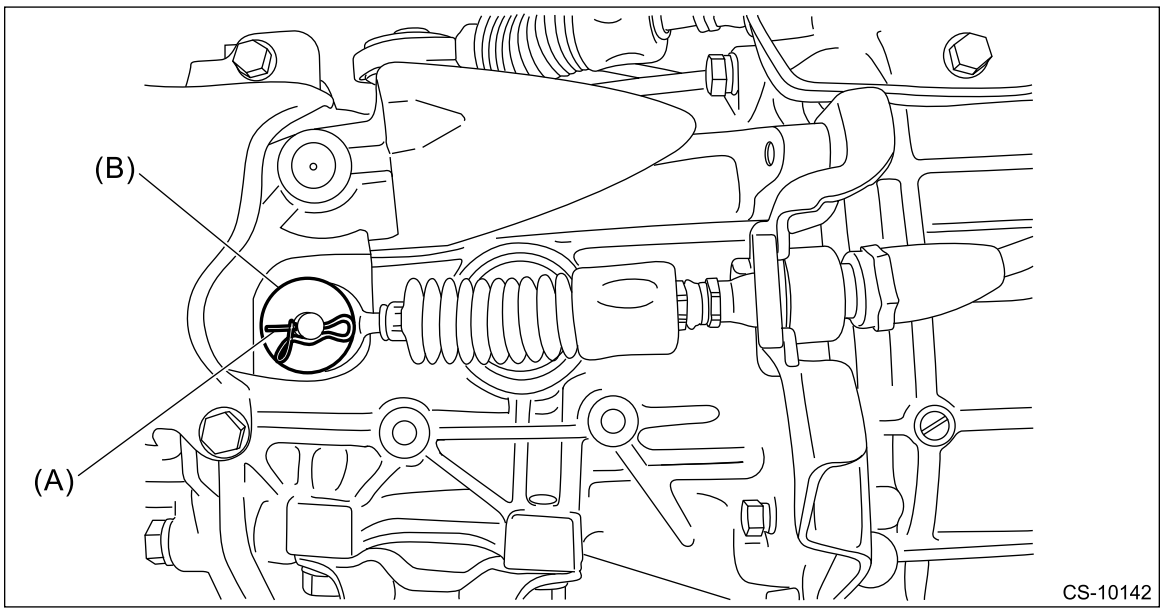
(A) Cable clamp

6. Remove the dust cover.



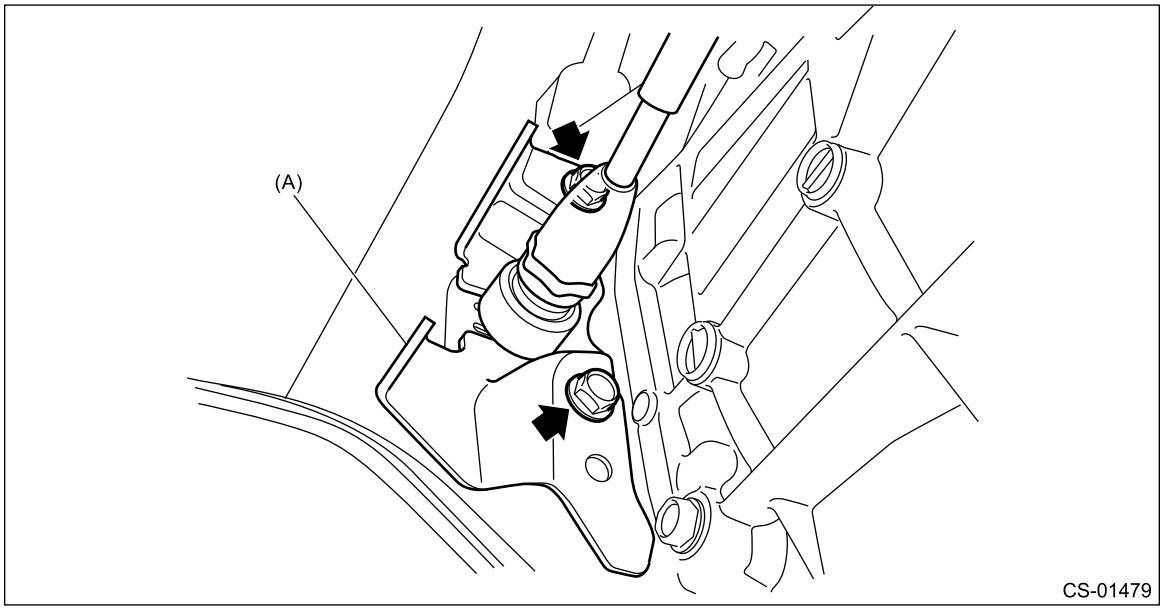
(A) Dust cover

7. Remove the snap pin and washer.



(A) Snap pin (B) Washer

8. Remove the bolts holding the shift bracket.

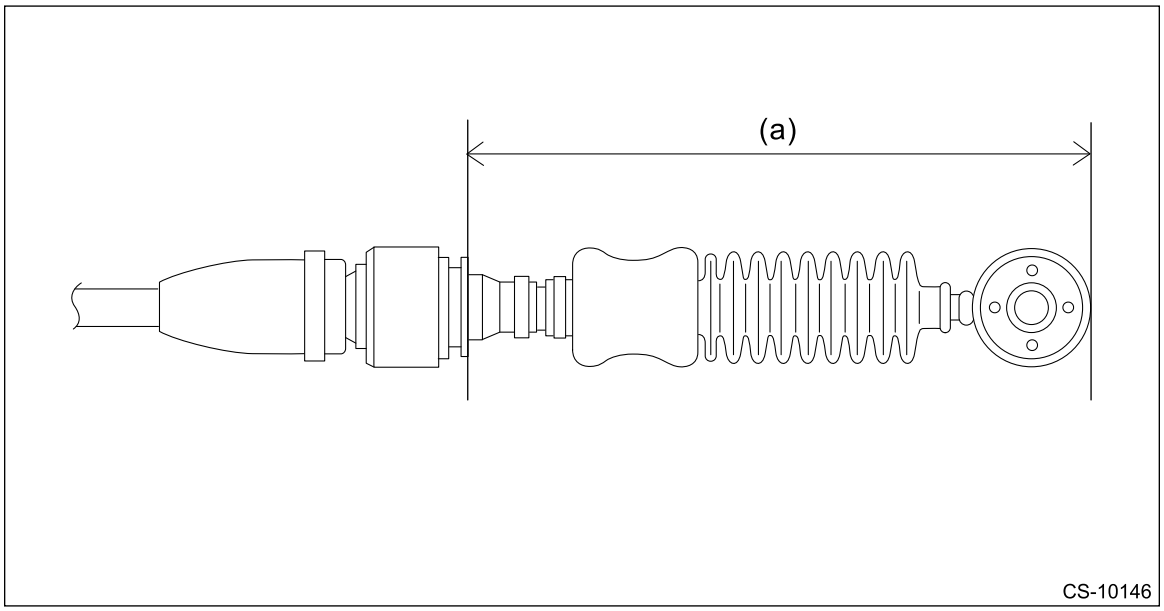


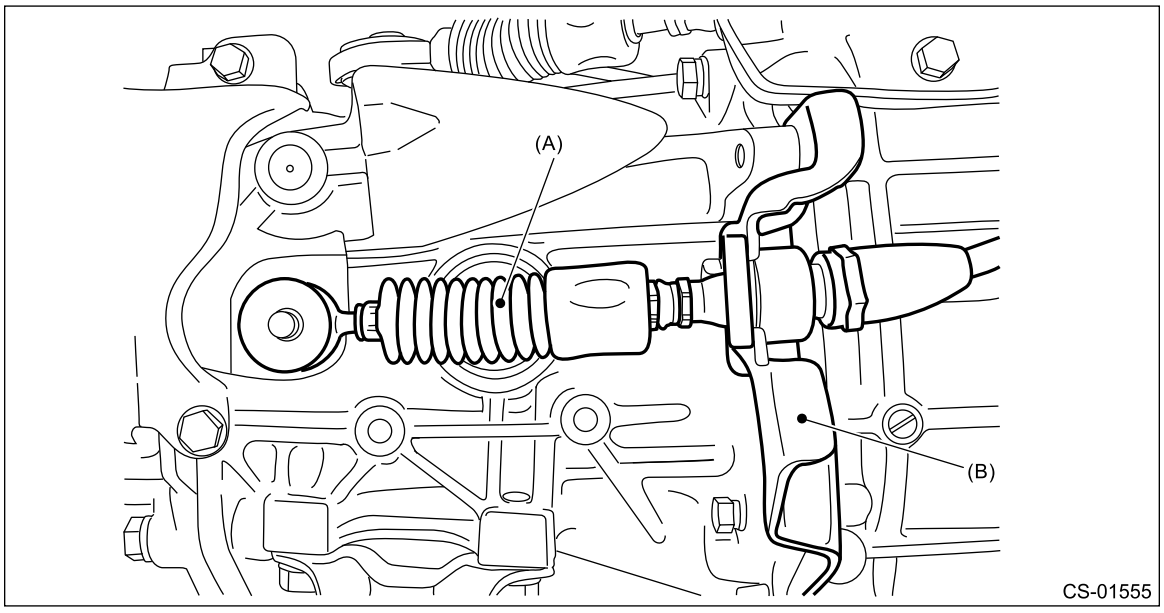
(A) Shift bracket

9. Remove the shift bracket together with the MT gear shift cable.

Caution:

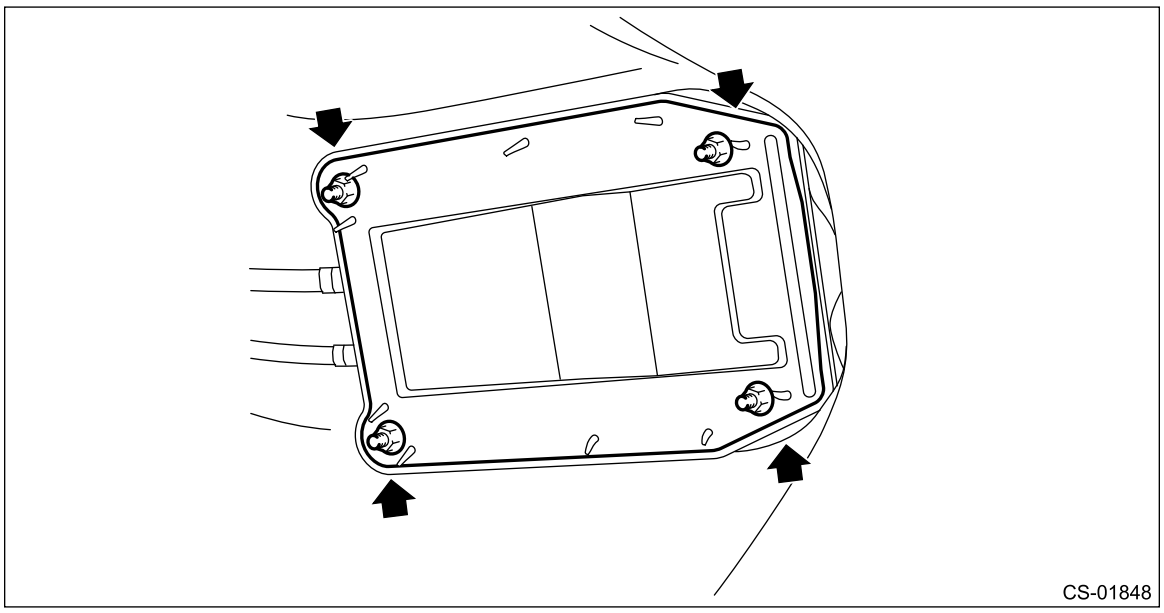
Do not apply extra overload while holding the part (a).





(A) MT gear shift cable (B) Shift bracket

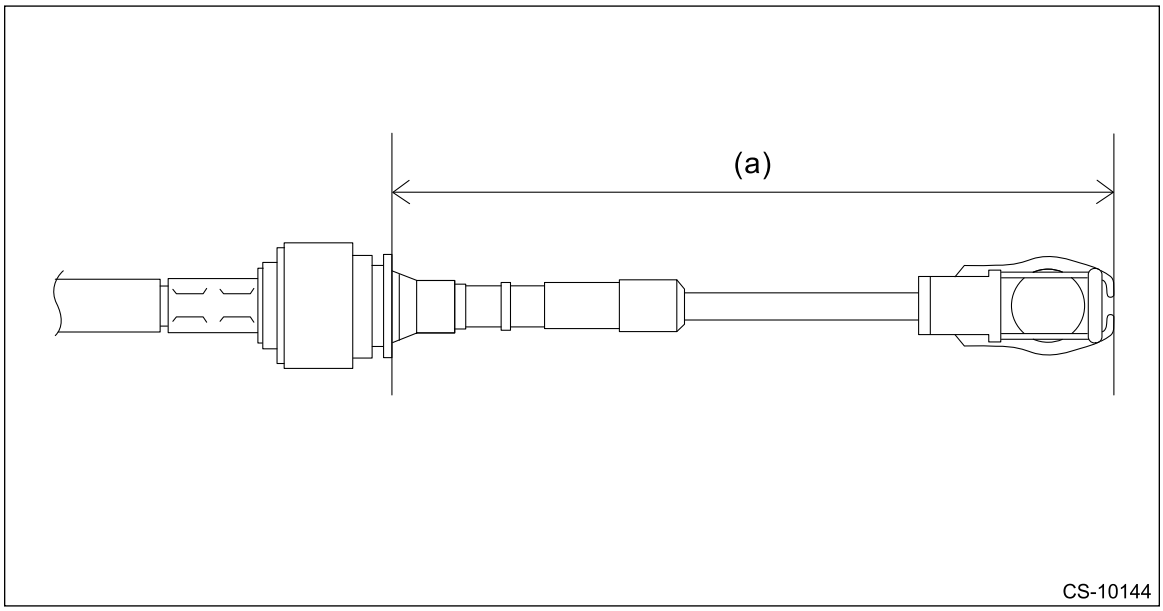
10. Remove the cable cover plate.



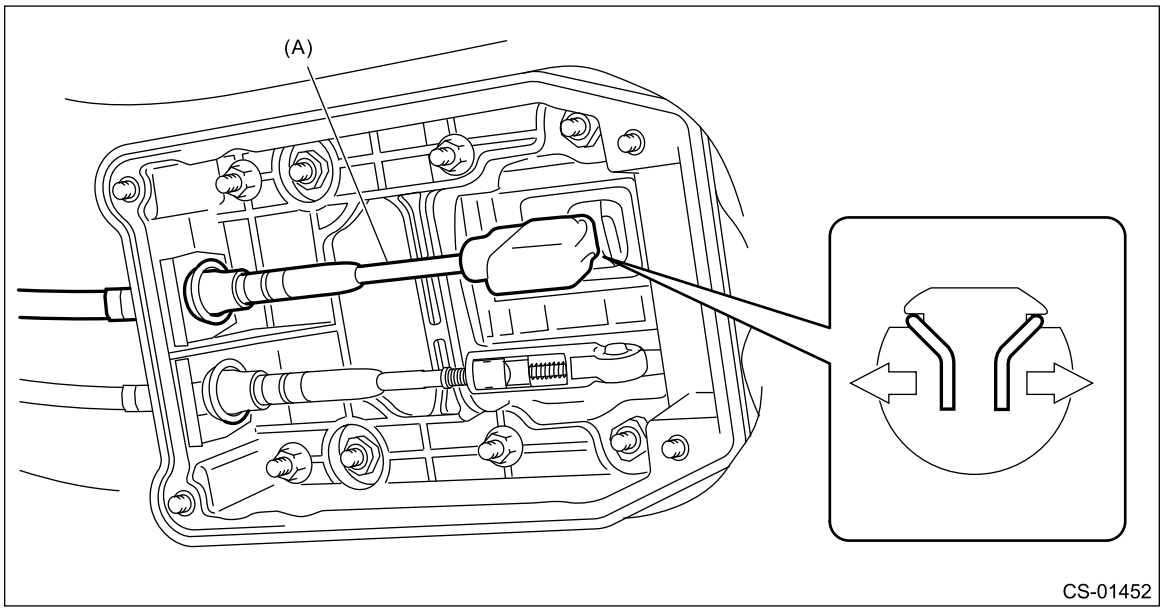
11. Disconnect the MT gear shift cable.

Caution:

- **Be careful not to deform the cable inner.**
- **Do not apply extra overload while holding the part (a).**

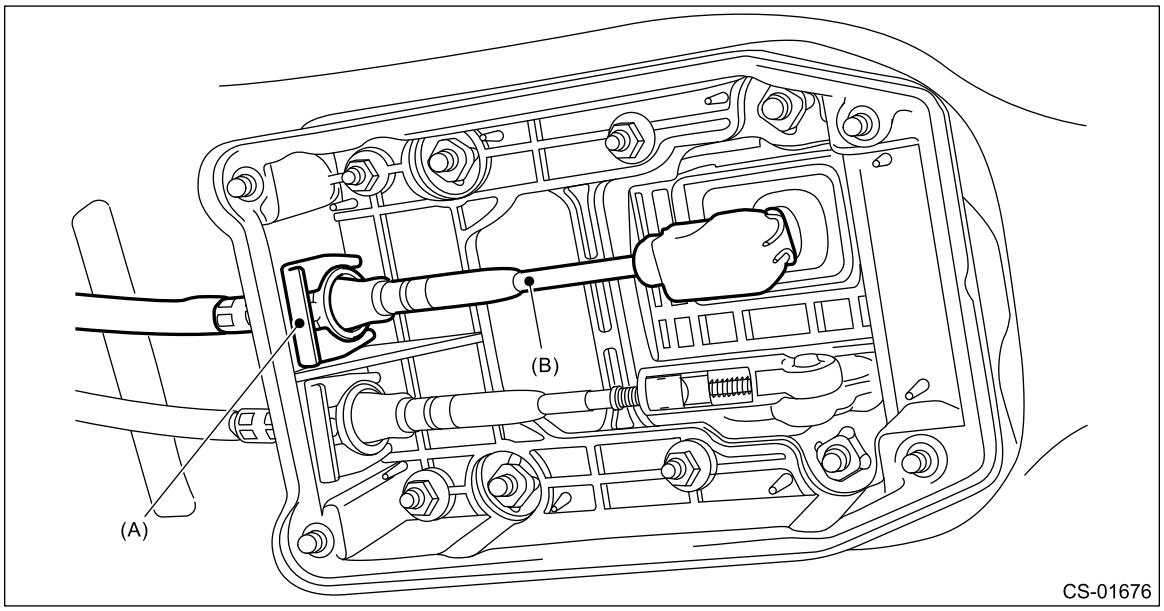


Note:
Pull out down the MT gear shift cable to spread the spring.



(A) MT gear shift cable

12. Remove the clamp.

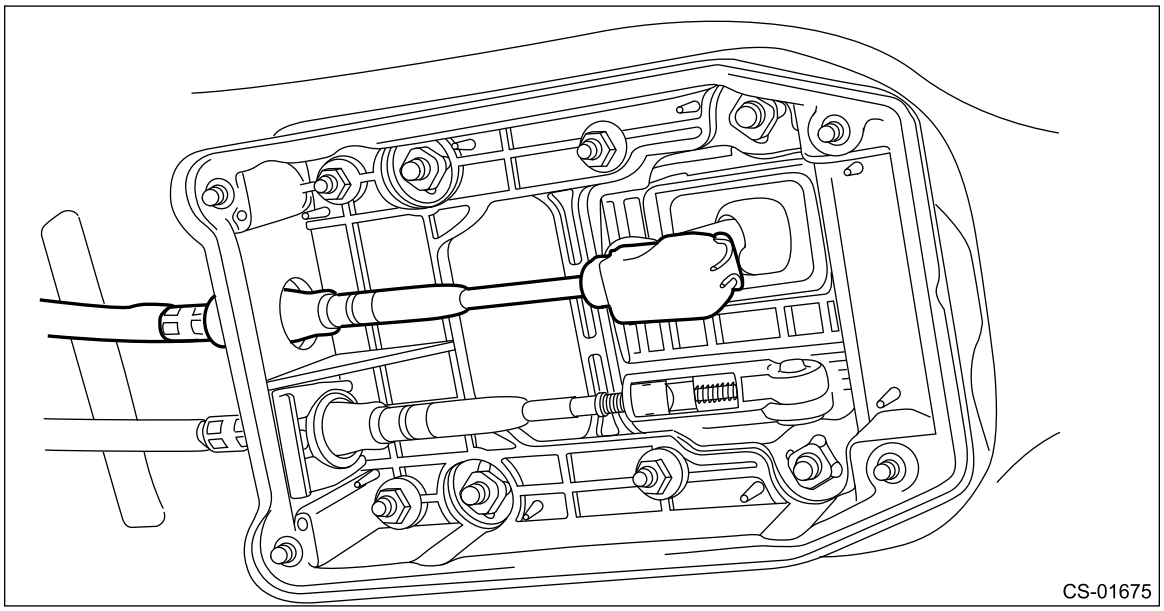


(A) Clamp (B) MT gear shift cable

13. Pull out the MT gear shift cable.

Caution:

- **Do not bend MT gear shift cable at a sharp angle.**
- **Do not twist the cable inner excessively.**

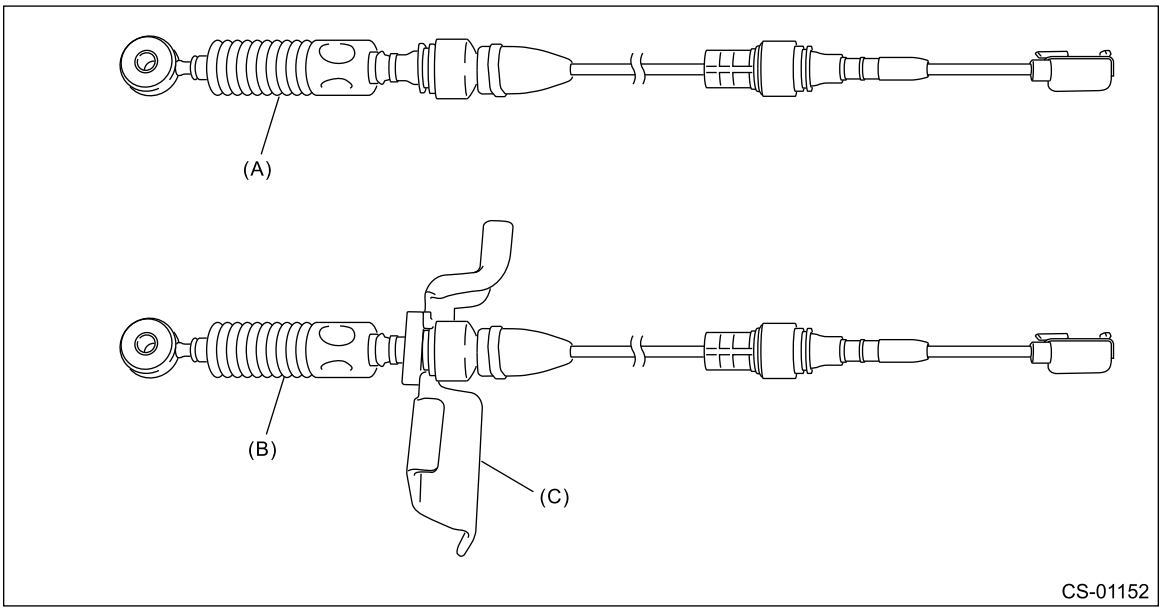


CONTROL SYSTEMS > MT Gear Shift Cable

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.**

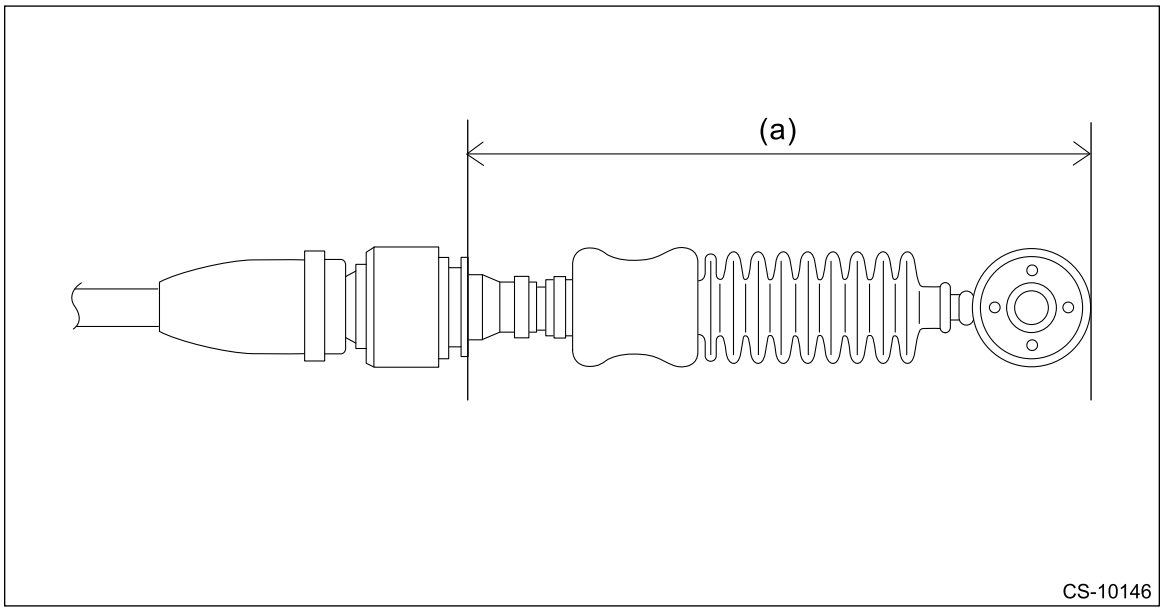


(A) Old MT gear shift cable (B) New MT gear shift cable (C) Shift bracket

1. Install the shift bracket together with the MT gear shift cable.

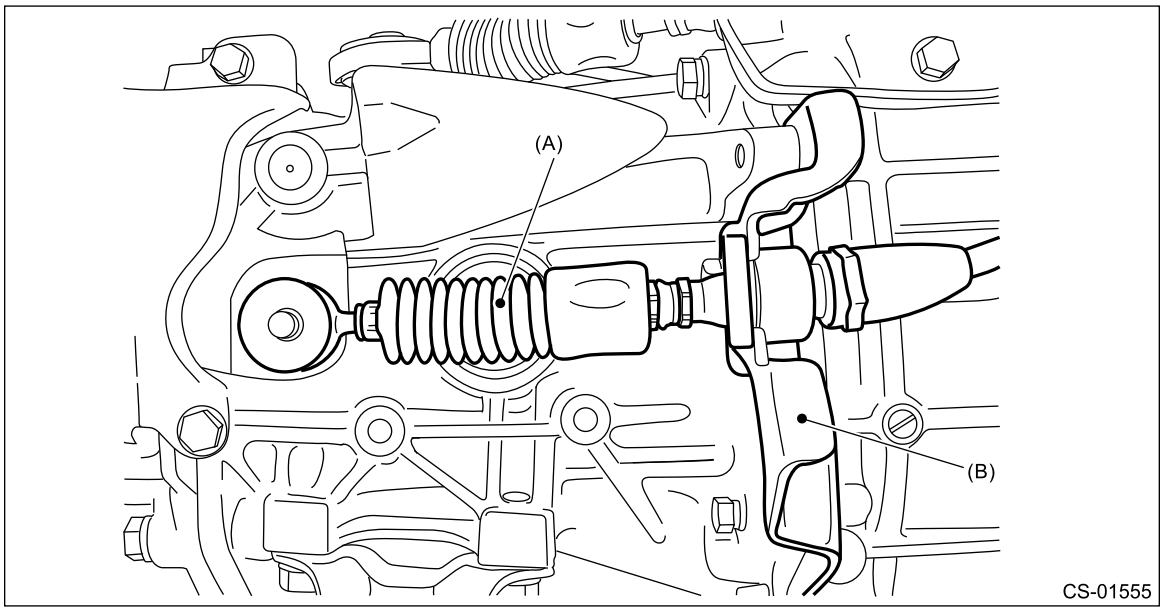
Caution:

- **Do not twist the cable inner excessively.**
- **Do not apply extra overload while holding the part (a).**

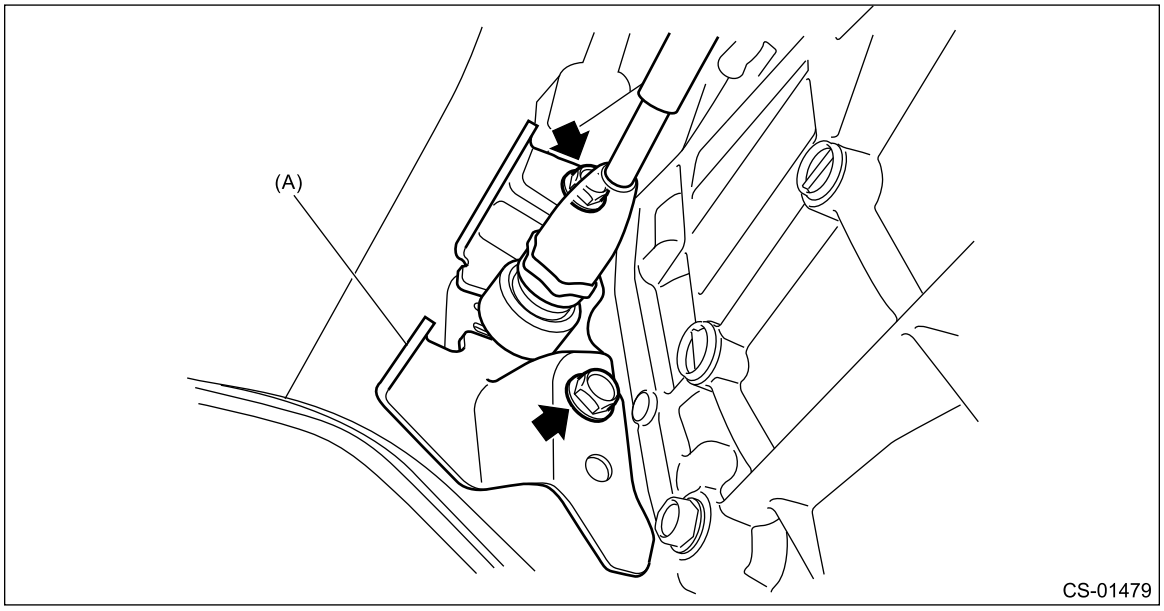


Tightening torque:

18 N·m (1.8 kgf-m, 13.3 ft-lb)

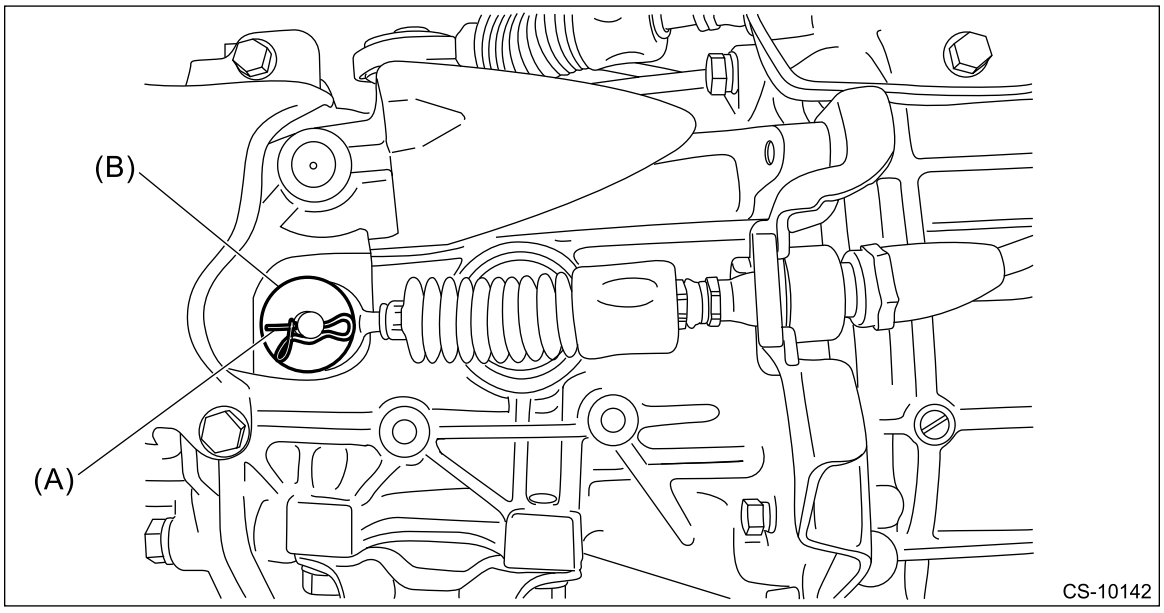


(A) MT gear shift cable (B) Shift bracket



(A) Shift bracket

2. Install the snap pin and washer.



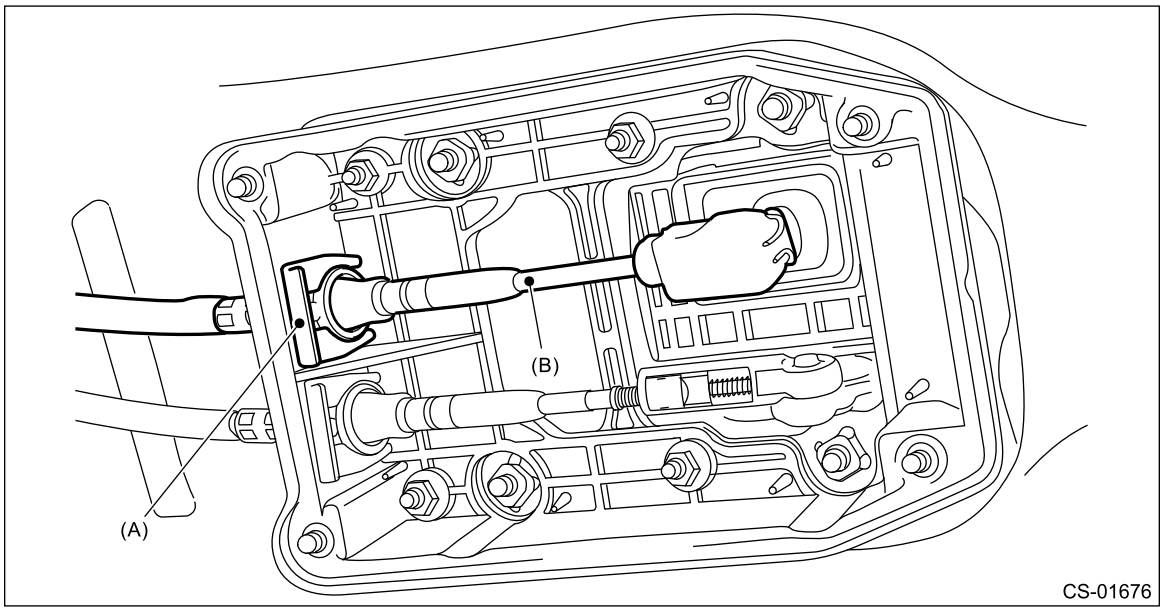
(A) Snap pin (B) Washer

3. Install the dust cover.

Tightening torque:

15 N·m (1.5 kgf-m, 11.1 ft-lb)

4. Insert the MT gear shift cable into cable cover assembly, and install the clamp.

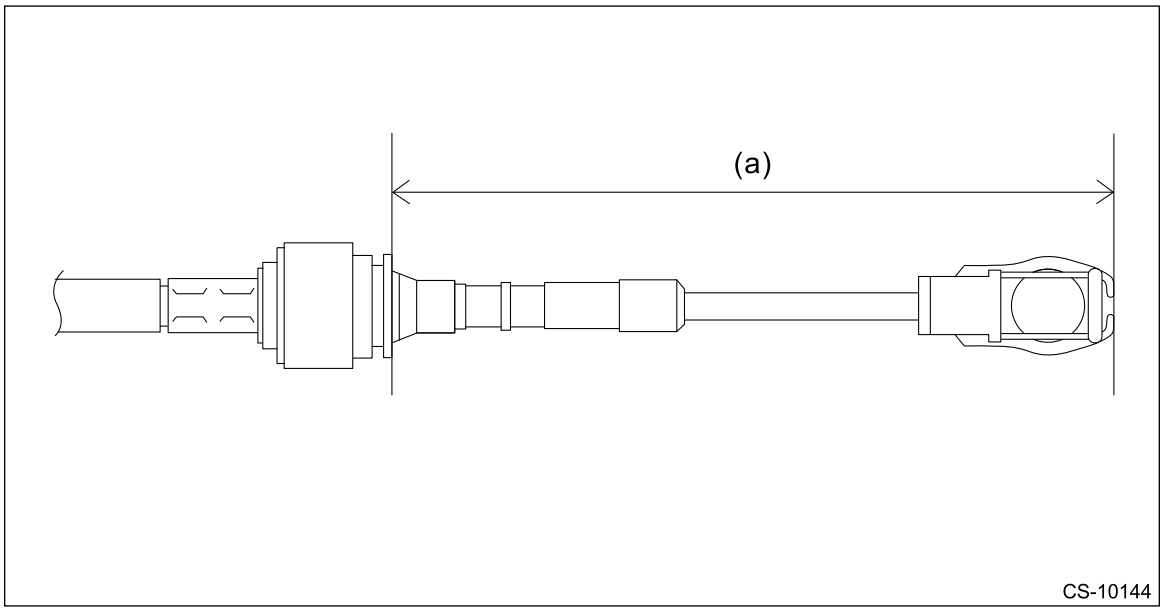


(A) Clamp (B) MT gear shift cable

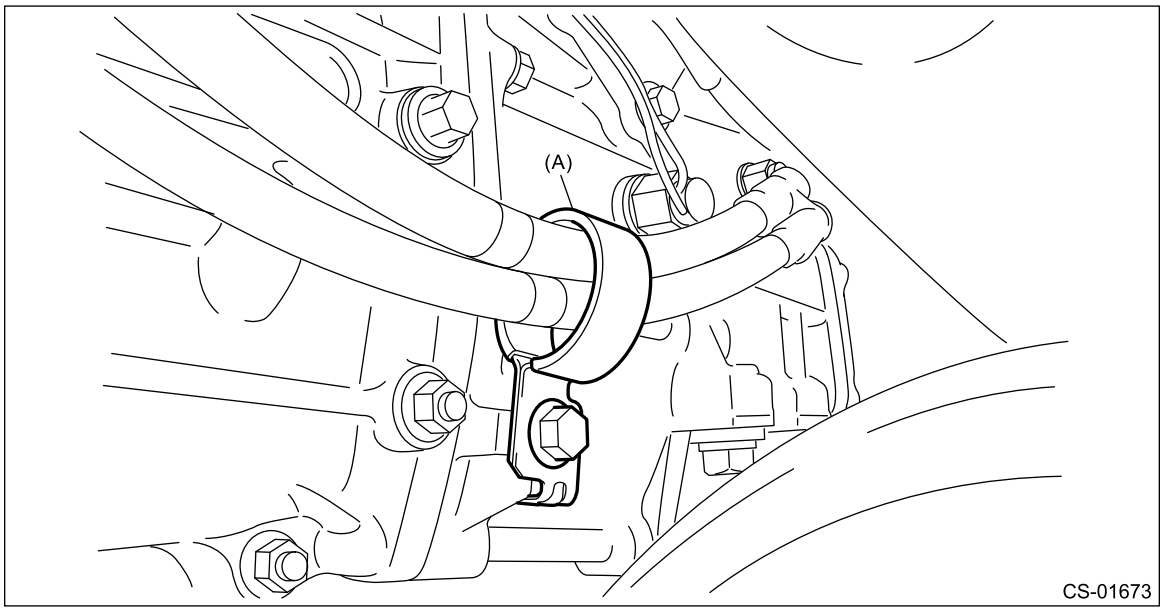
5. Connect the MT gear shift cable.

Caution:

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



6. Attach the cable cover plate.
   Tightening torque:
   7.5 N·m (0.8 kgf-m, 5.5 ft-lb)
7. 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

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 (rear). Ref. to EXHAUST(w/o STI)>Center Exhaust Pipe>INSTALLATION.
10. Lower the vehicle.

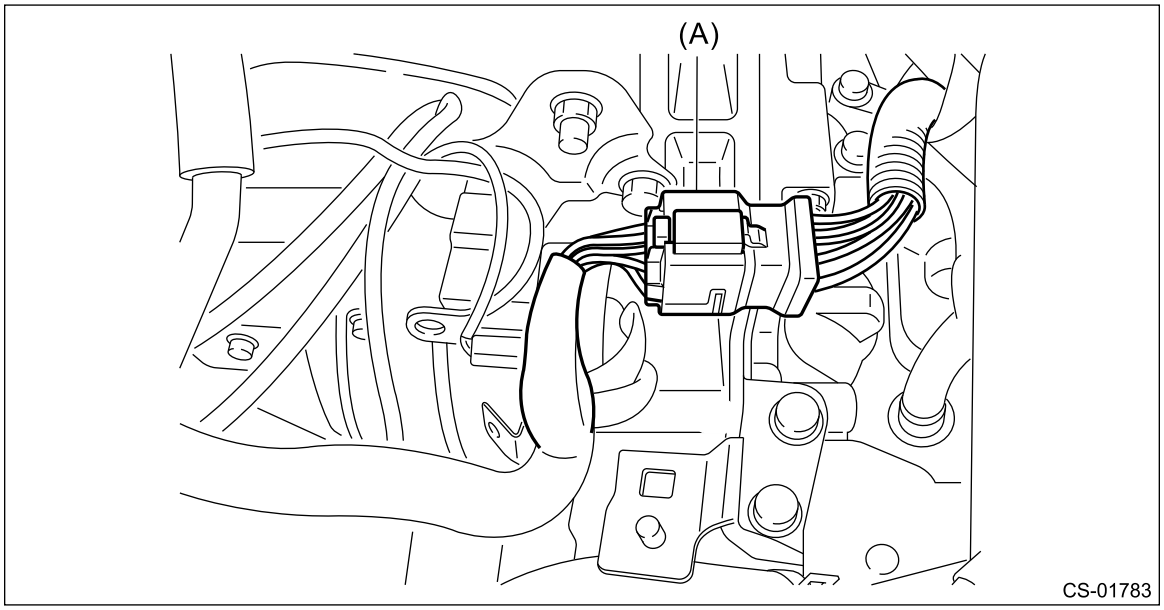
11. Connect the battery ground terminal. Ref. to NOTE>NOTE > BATTERY.

12. Make sure the gears can be shifted accurately into each gear.

REMOVAL

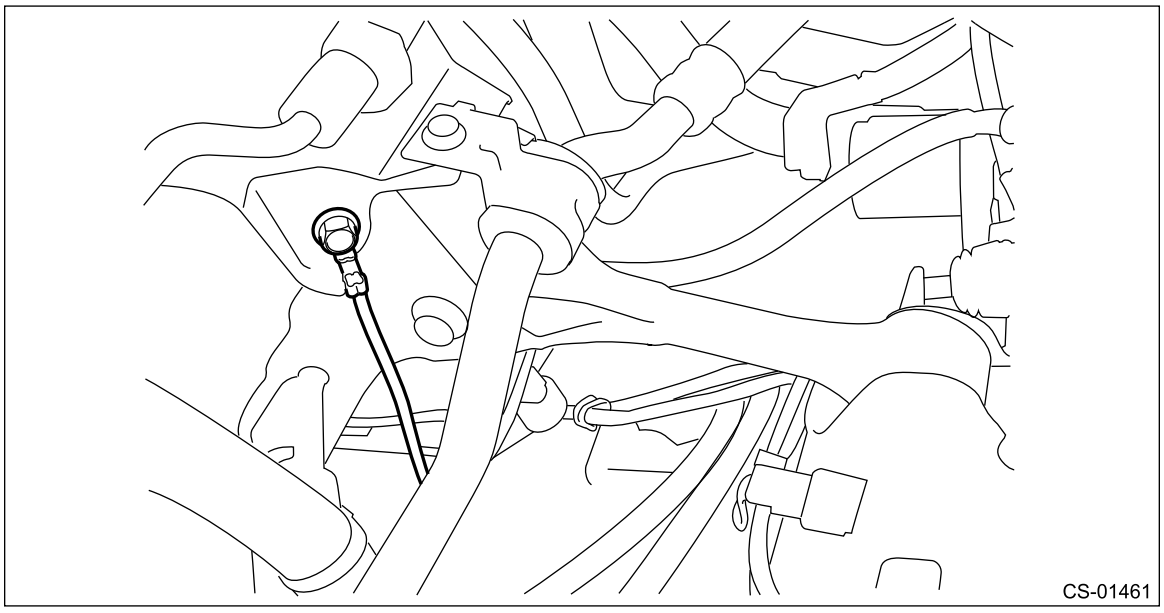
Caution:
Always use new MT gear select cable if the cable is removed from selector lever COMPL of transmission side.

1. Disconnect the ground cable from battery. Ref. to NOTE>NOTE > BATTERY.
   Note:
   For model with battery sensor, disconnect the ground terminal from battery sensor.
2. Remove the air intake duct. Ref. to INTAKE (INDUCTION)(w/o STI)>Air Intake Duct>REMOVAL.
3. Remove the intercooler and the intercooler stay. Ref. to INTAKE (INDUCTION)(w/o STI)>Intercooler>REMOVAL.
4. Disconnect the engine harness connector.

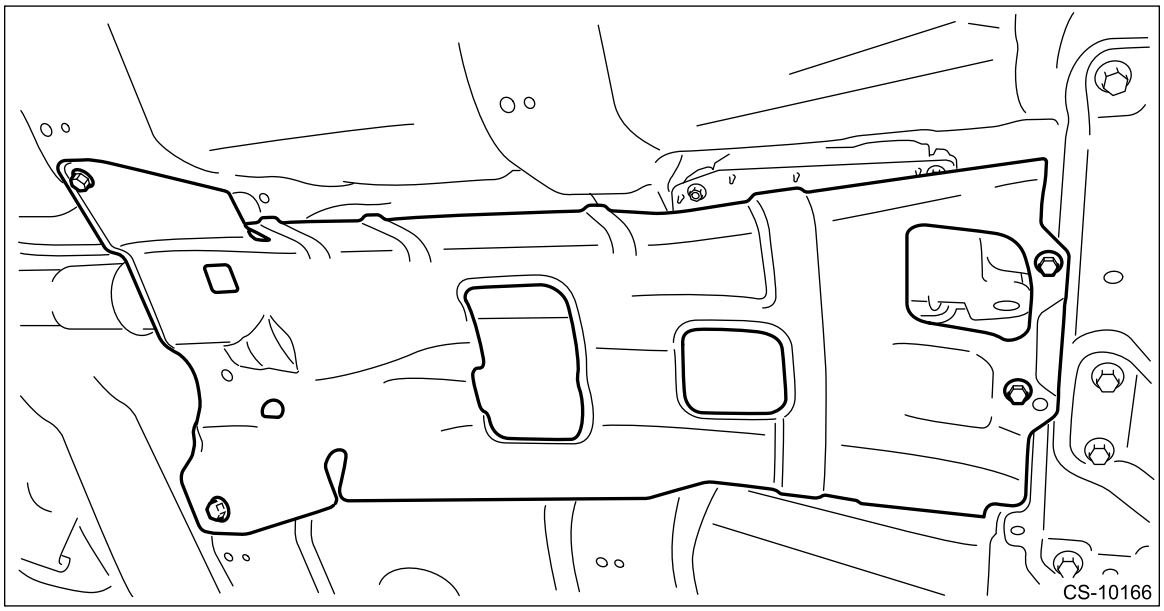


(A) Engine harness connectors

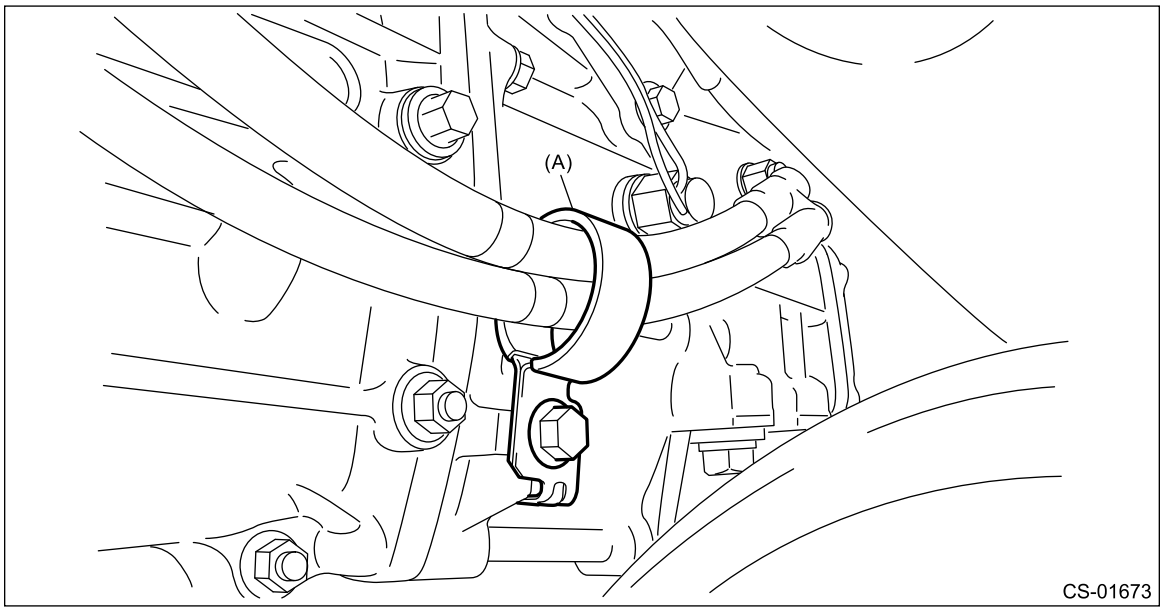
5. Disconnect the transmission radio ground cord terminal.



6. Remove the pitching stopper. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Transmission Mounting System>REMOVAL > PITCHING STOPPER.
7. Lift up the vehicle.
8. Remove the center exhaust pipe (rear). Ref. to EXHAUST(w/o STI)>Center Exhaust Pipe>REMOVAL.
9. Remove the center exhaust cover.



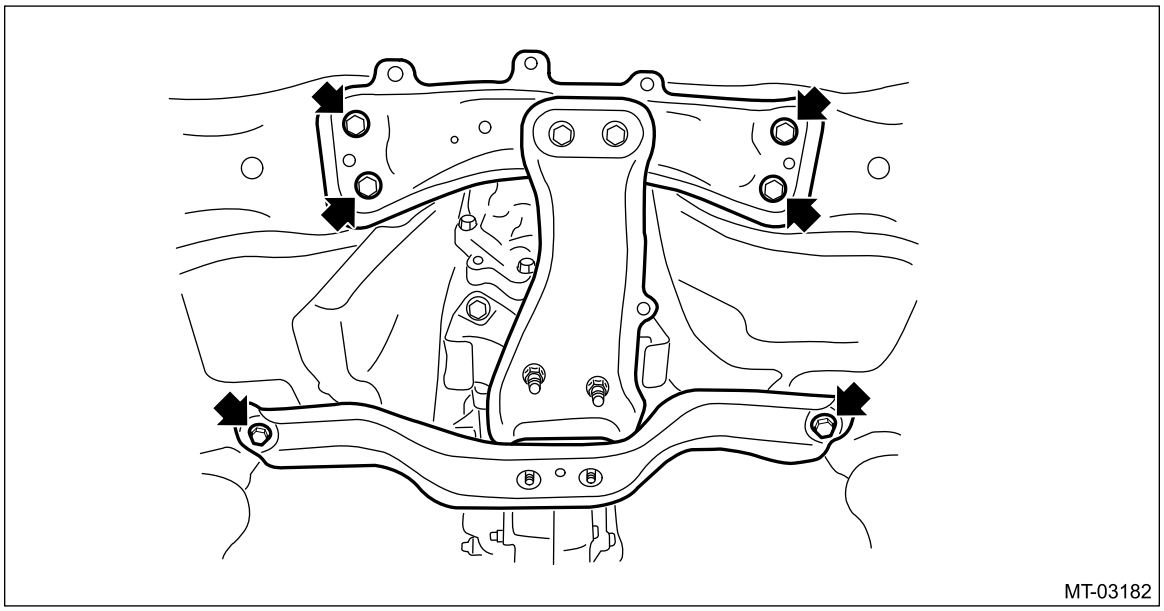
10. Remove the propeller shaft. Ref. to DRIVE SHAFT SYSTEM>Propeller Shaft>REMOVAL.
11. Remove the cable clamp.



(A) Cable clamp

12. Place the transmission jack under the transmission.

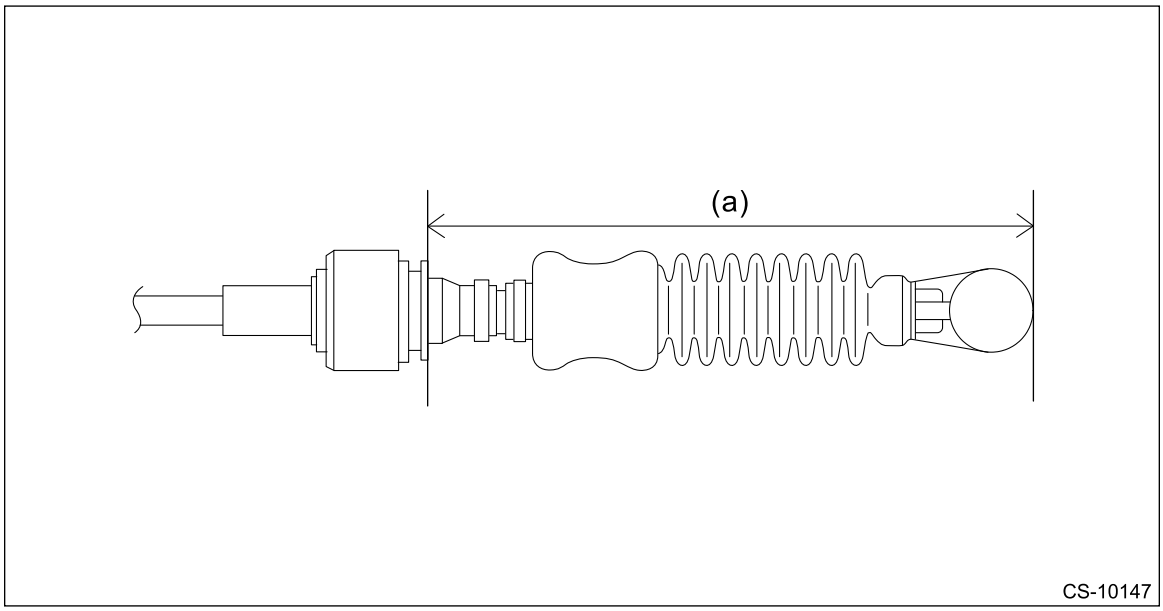
13. Remove the mounting bolt of front crossmember and rear crossmember, and lower the transmission approx. 100 mm (4 in).



14. 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.

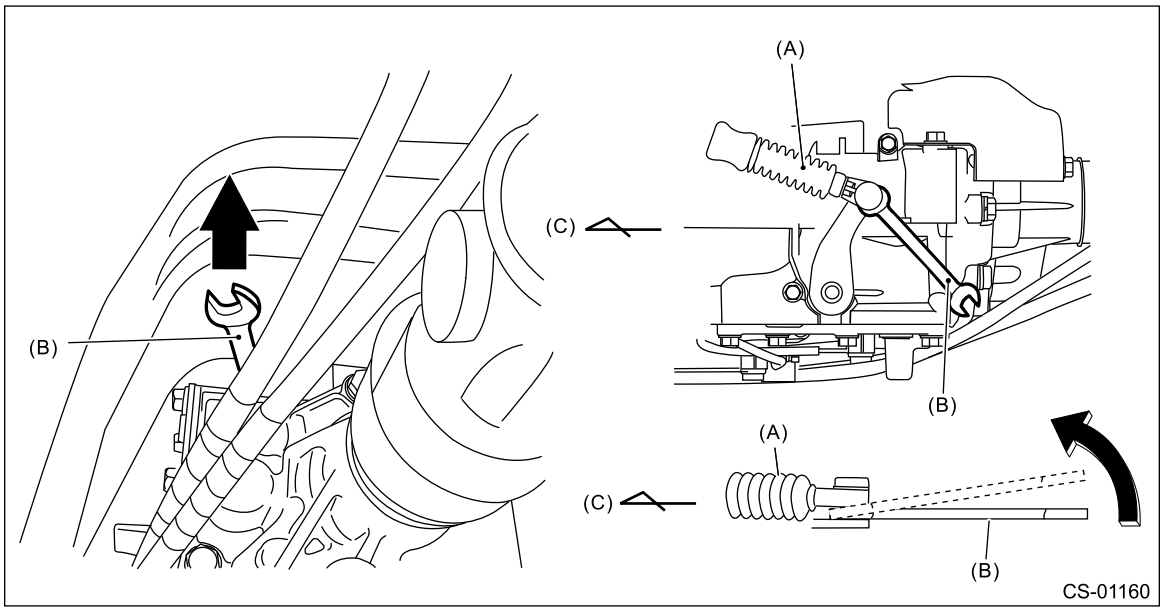
Caution:

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



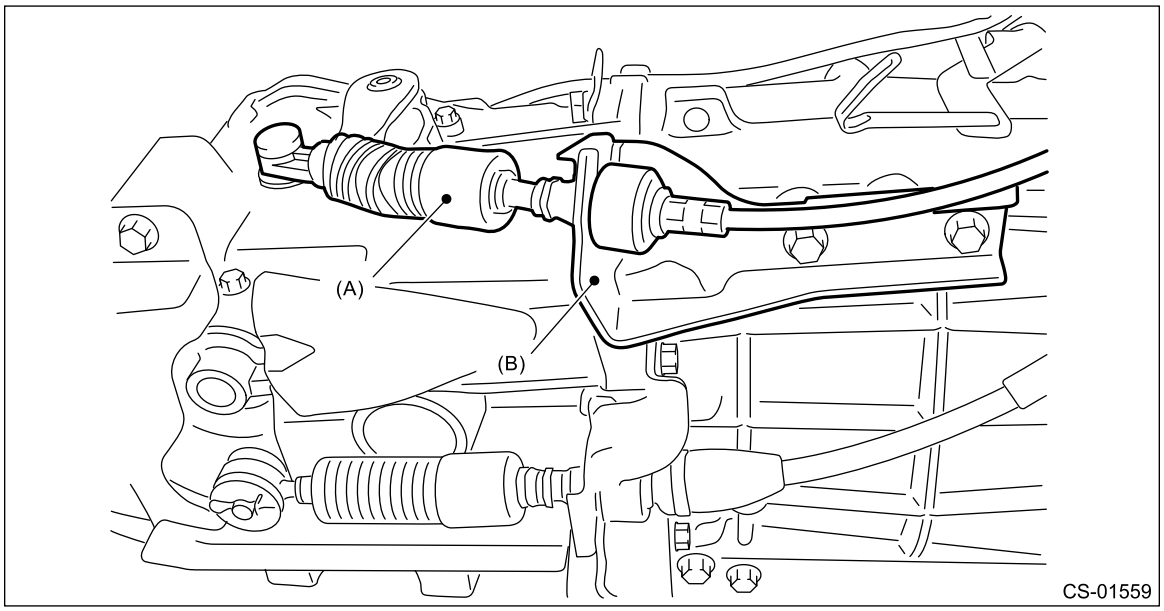
Note:

- **Use a spanner with 11 to 13 in size.**
- **The thickness of the spanner must not exceed 6 mm (0.2 in).**



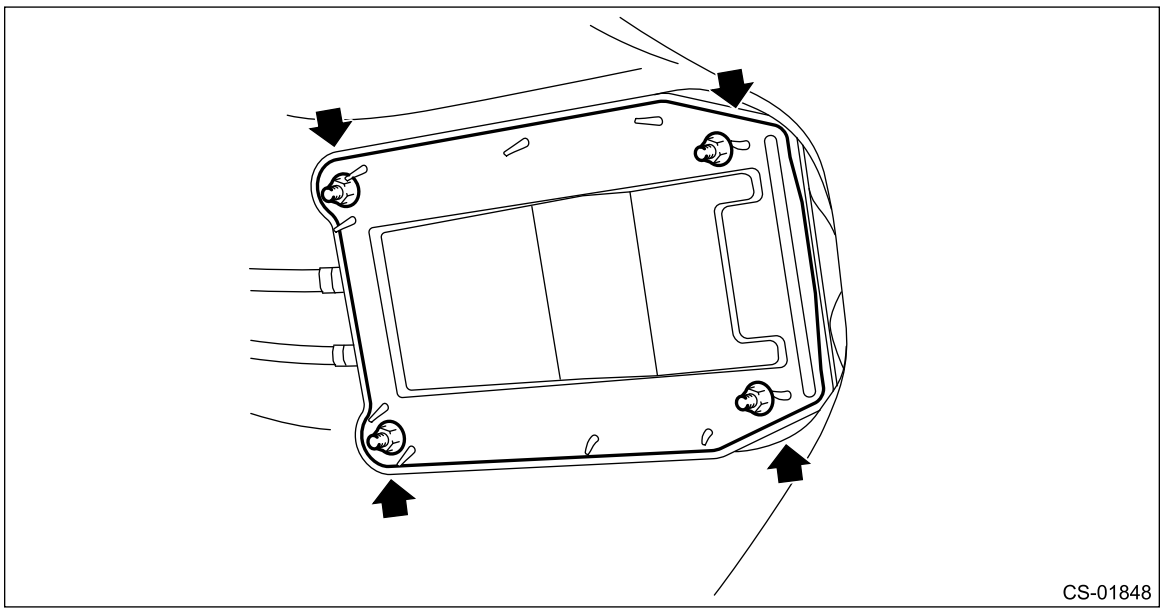
(A) MT gear select cable (B) Spanner (C) Forward

15. Remove the MT gear select cable and select bracket as a single unit.



(A) MT gear select cable (B) Select bracket

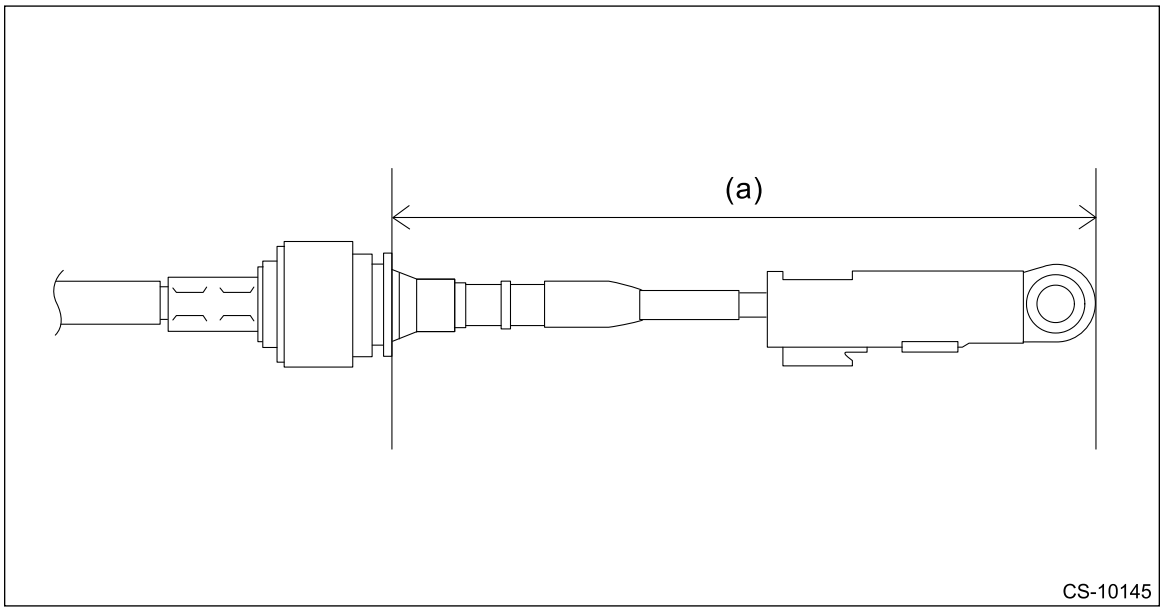
16. Remove the cable cover plate.



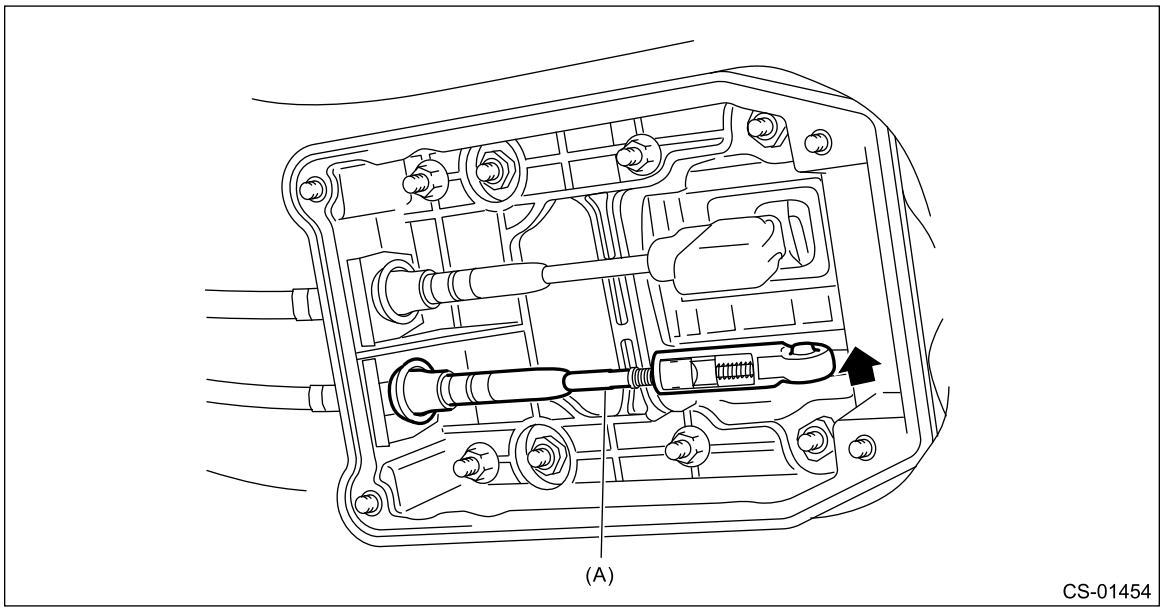
17. Disconnect the MT gear select cable.

Caution:

- **Be careful not to deform the cable inner.**
- **Do not apply extra overload while holding the part (a).**

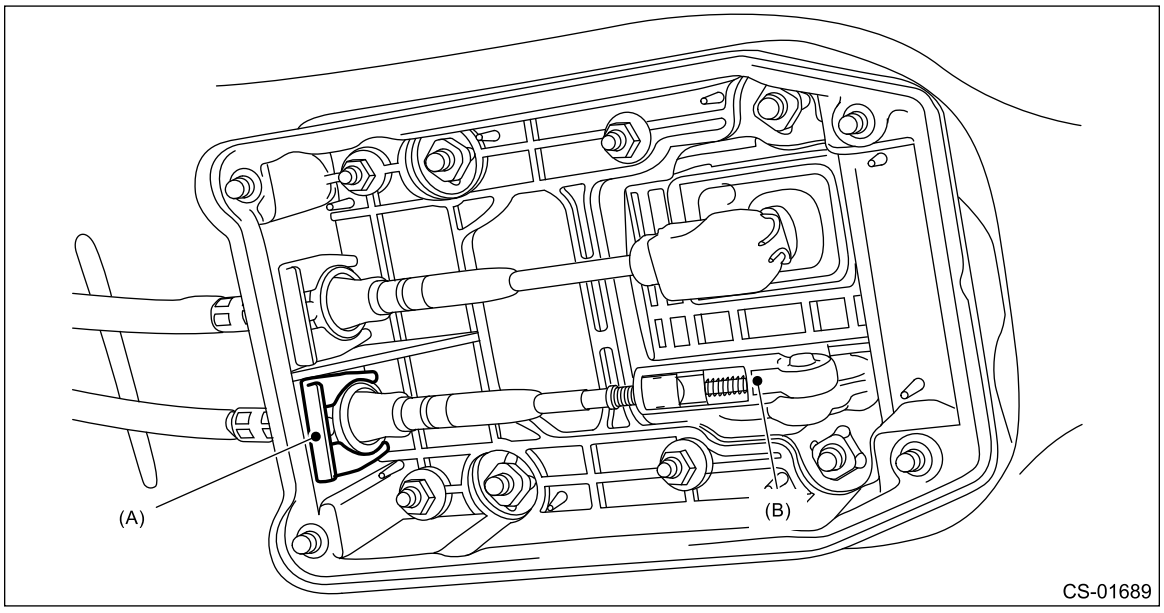


Note:
Push the MT gear select cable in the direction of arrow, and remove it.



(A) MT gear select cable

18. Remove the clamp.

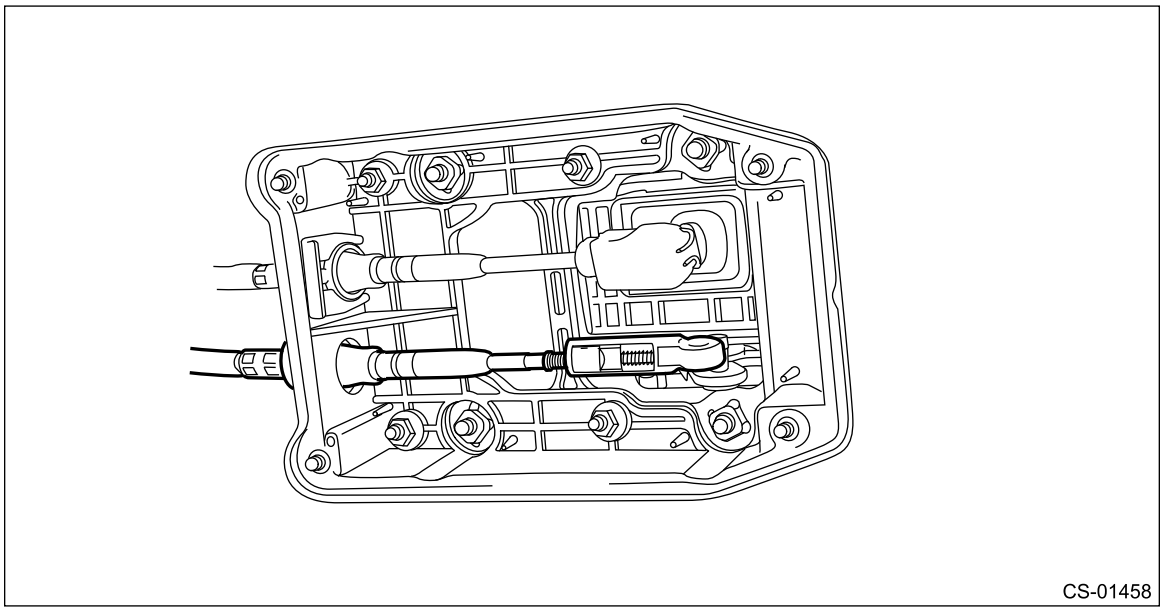


(A) Clamp (B) MT gear select cable

19. Pull out the MT gear select cable.

Caution:

Do not bend the MT gear select cable sharply.

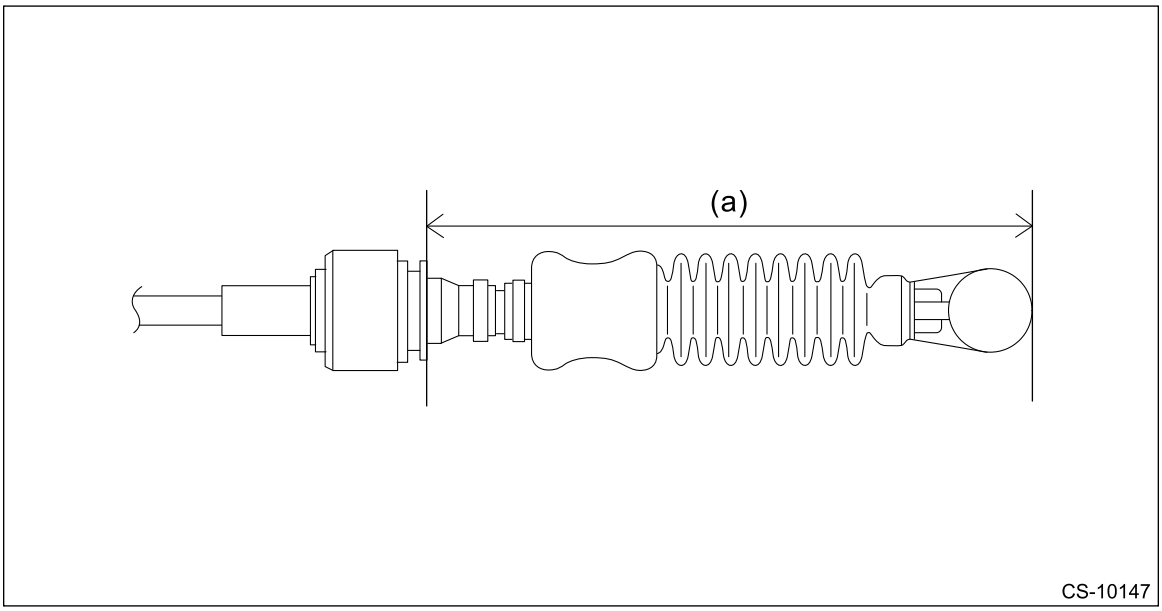


CONTROL SYSTEMS > MT Gear Select Cable

INSTALLATION

Caution:

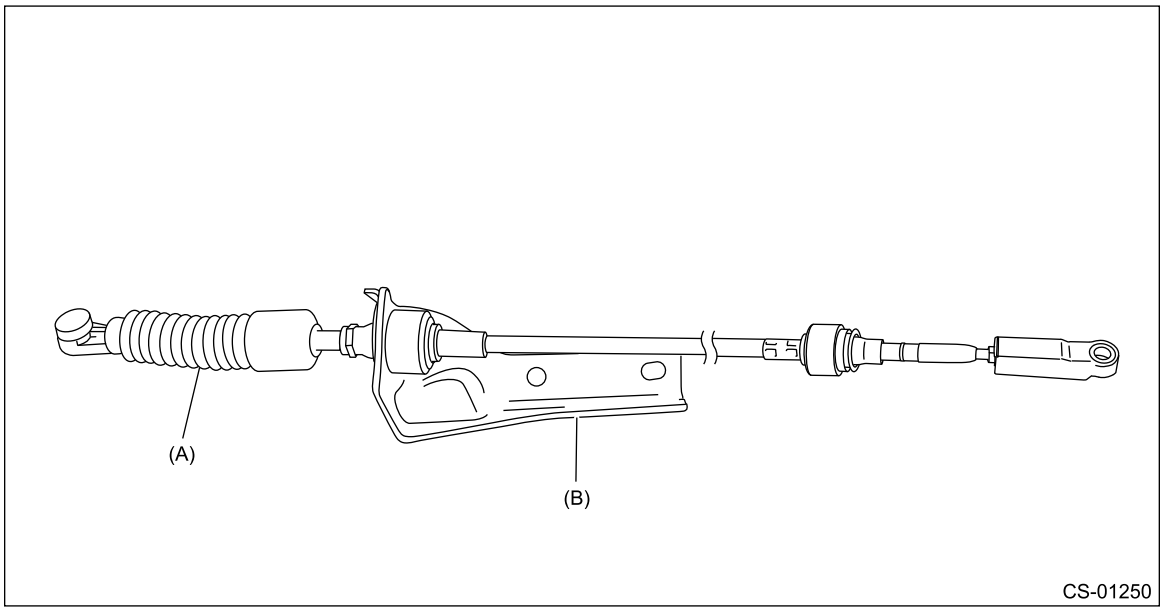
- **Always use new MT gear select cable if the cable is removed from selector lever COMPL of transmission side.**
- **Do not bend the MT gear select cable sharply.**
- **Do not twist the inner cable excessively.**
- **Do not apply extra overload while holding the part (a).**



1. Remove the MT gear select cable from the select bracket.

Caution:

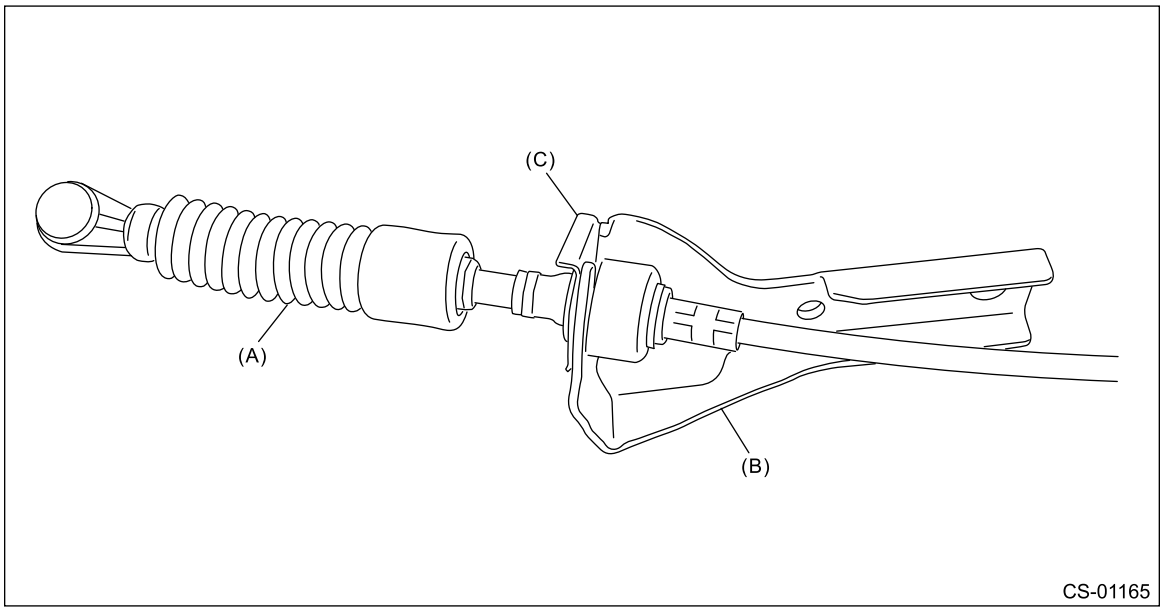
Check for assembling position before removing the MT gear select cable from the select bracket.



(A) MT gear select cable (B) Select bracket

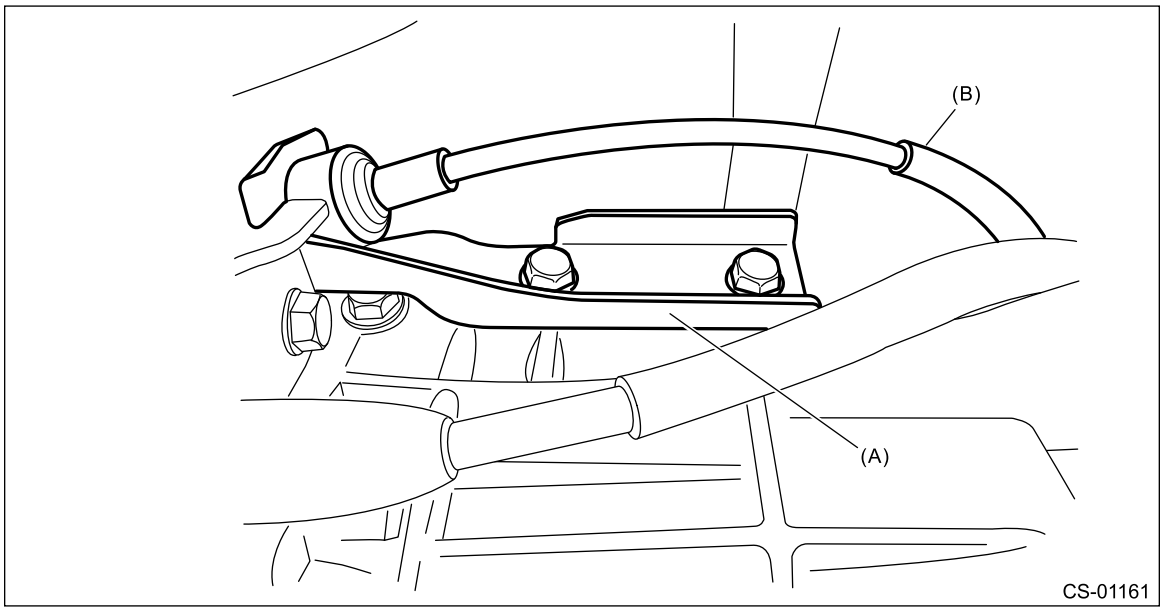
2. Set to the new MT gear select cable to the select bracket and secure it with the clamp.

Caution:
Be careful not to mistake the MT gear select cable installing direction.



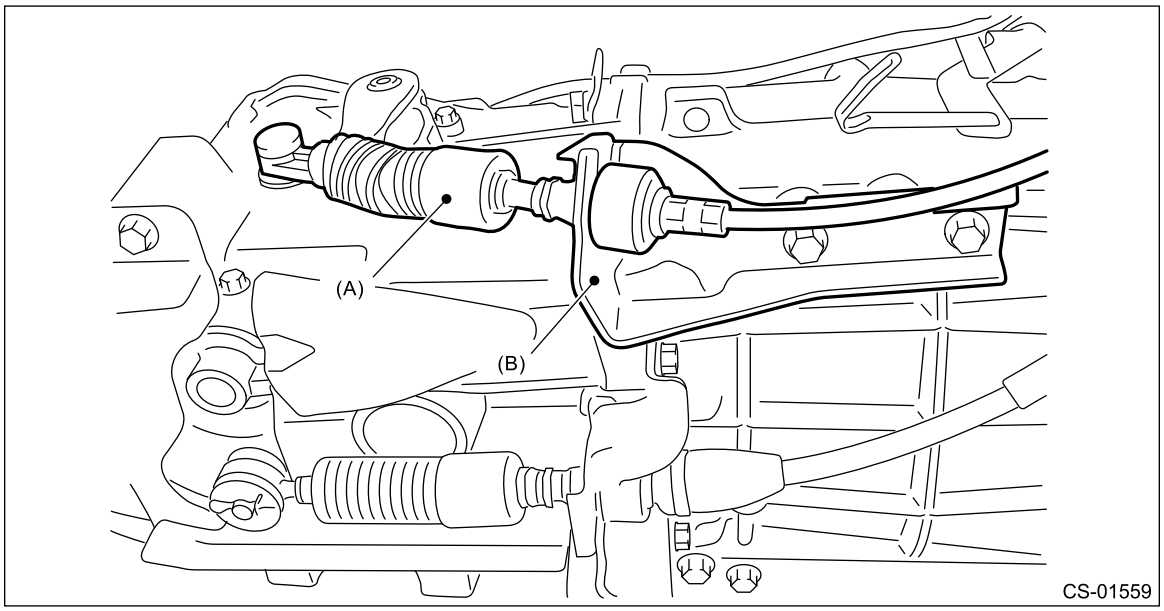
(A) MT gear select cable (B) Select bracket (C) Clamp

3. Install the MT gear select cable and select bracket as a single unit.
Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)



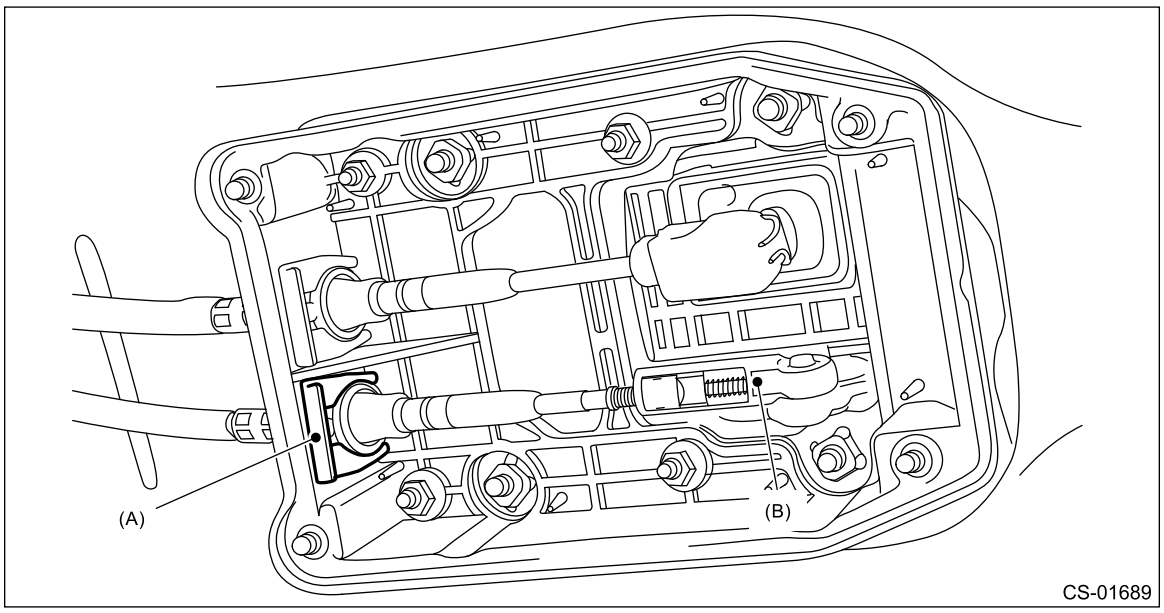
(A) Select bracket (B) MT gear select cable

4. Install the MT gear select cable to the select lever COMPL.



(A) MT gear select cable (B) Select bracket

5. Insert the MT gear select cable into cable cover assembly, and install the clamp.

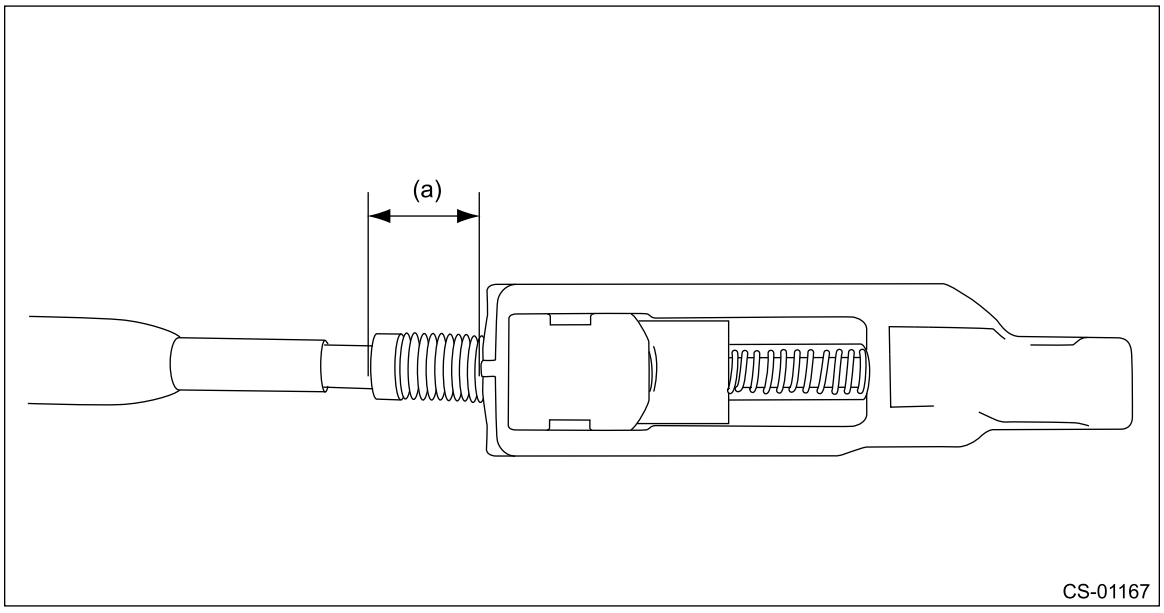


(A) Clamp (B) MT gear select cable

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:

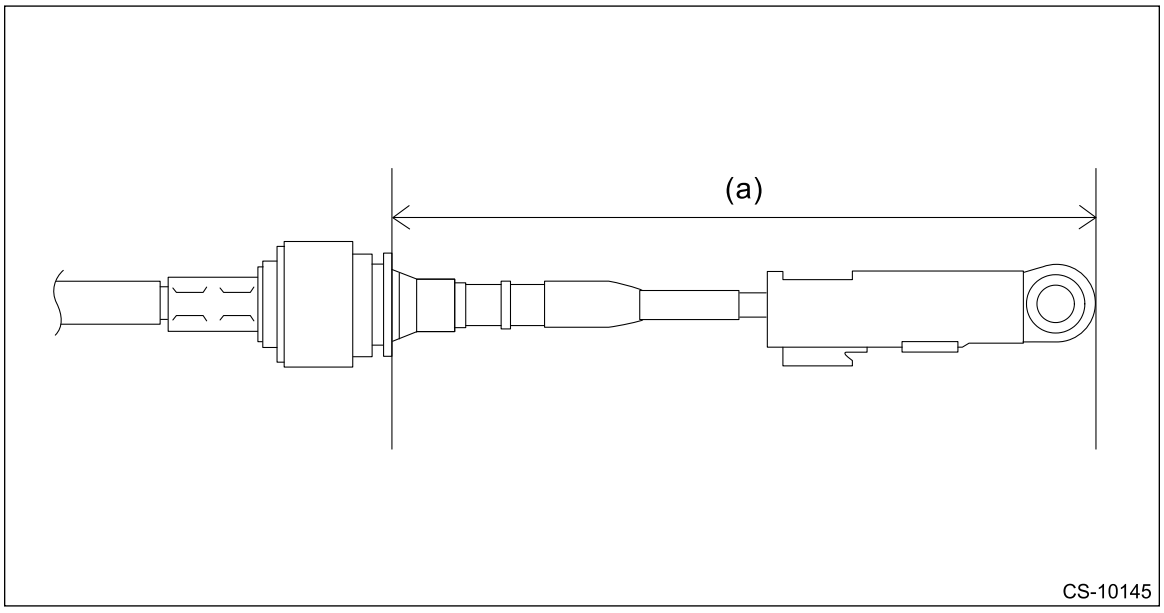
Specification: 11 mm (0.4 in)



7. Connect the MT gear select cable.

Caution:

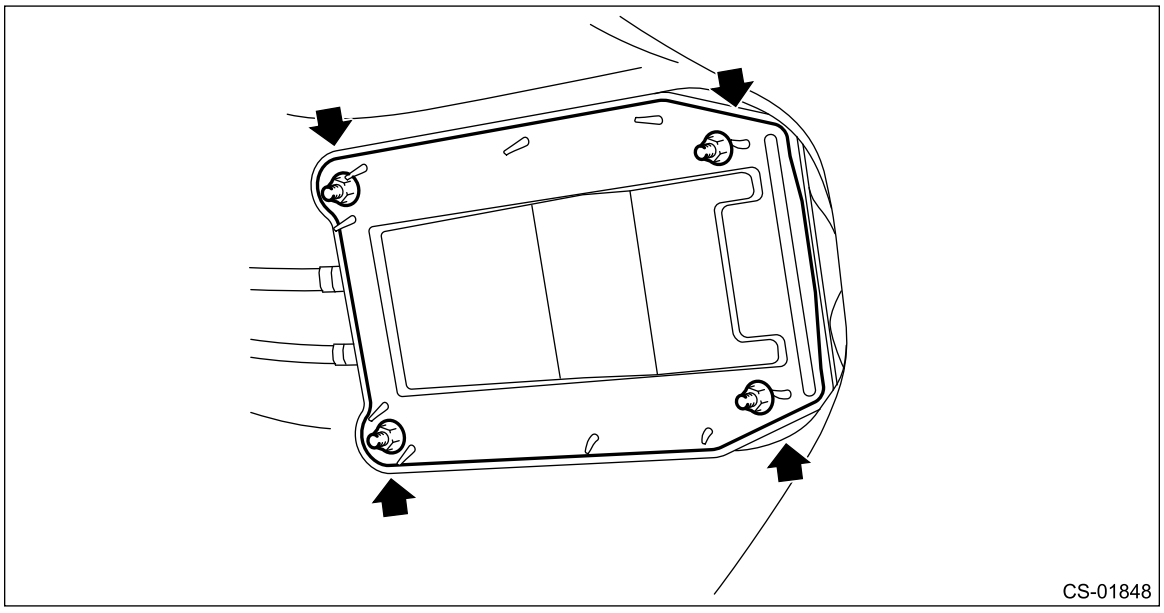
Do not apply extra overload while holding the part (a).



8. Attach the cable cover plate.

Tightening torque:

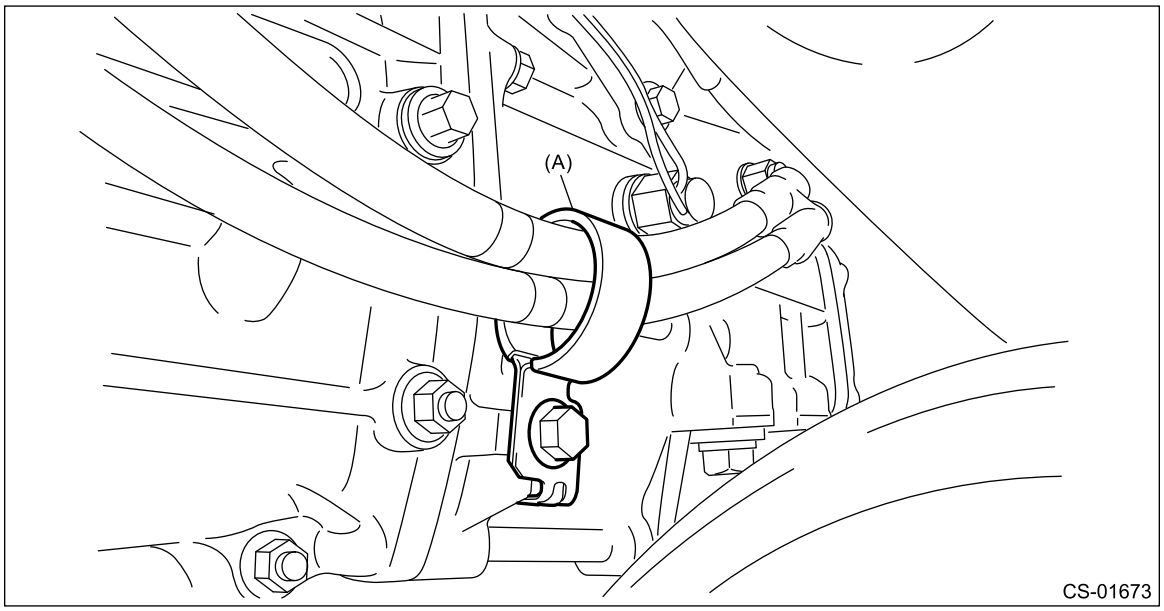
7.5 N·m (0.8 kgf-m, 5.5 ft-lb)



9. 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)



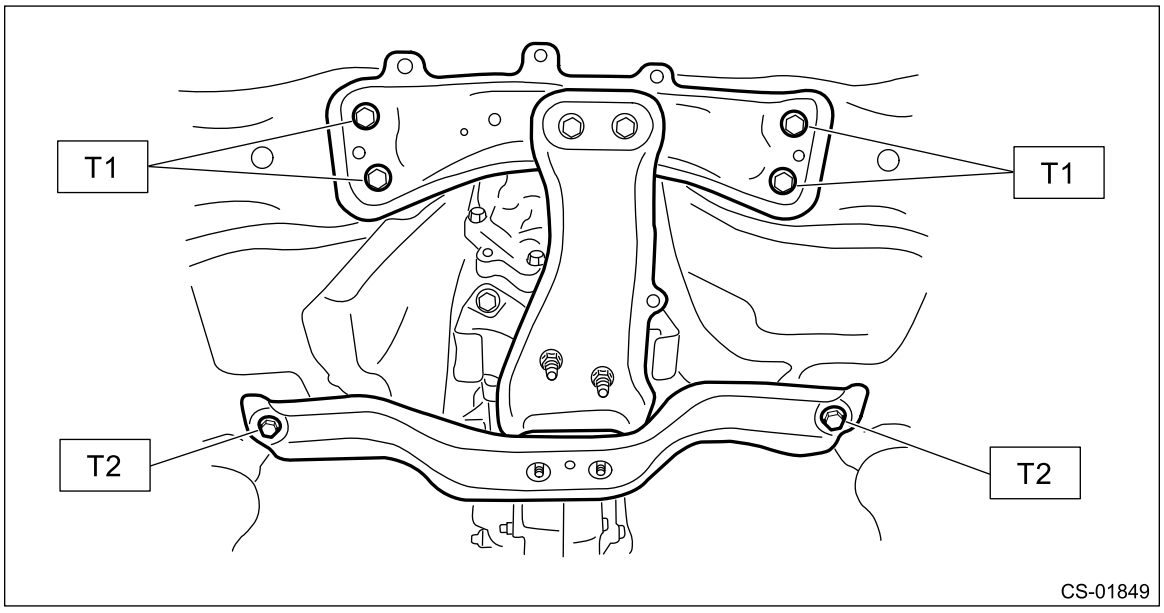
(A) Cable clamp

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 (rear). Ref. to EXHAUST(w/o STI)>Center Exhaust Pipe>INSTALLATION.

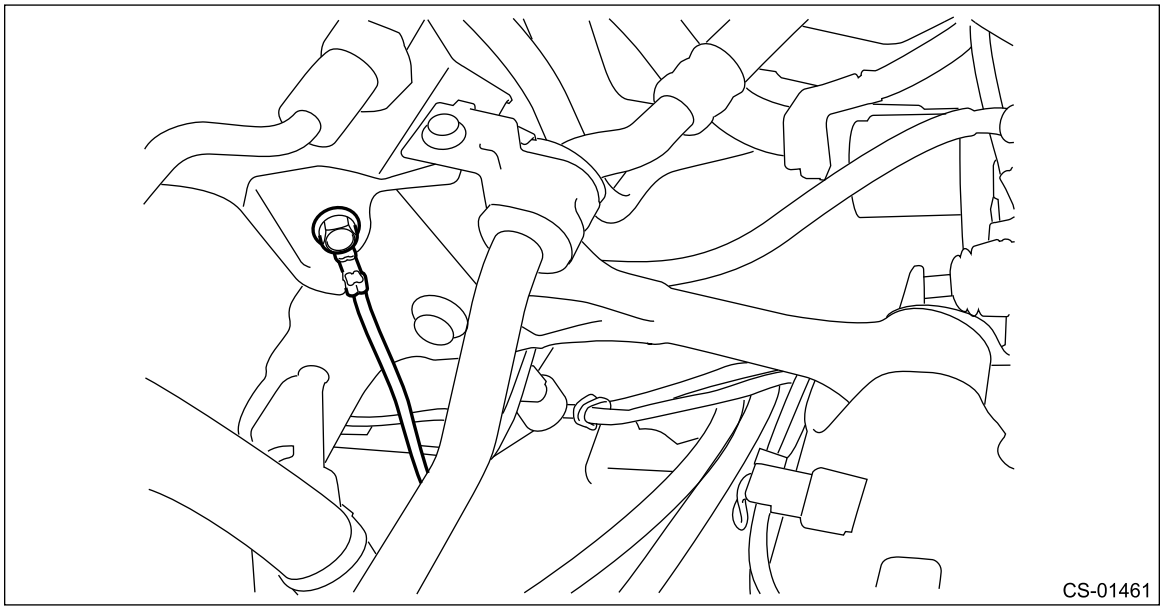
15. Lower the vehicle.

16. Install the pitching stopper. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Transmission Mounting System>INSTALLATION > PITCHING STOPPER.

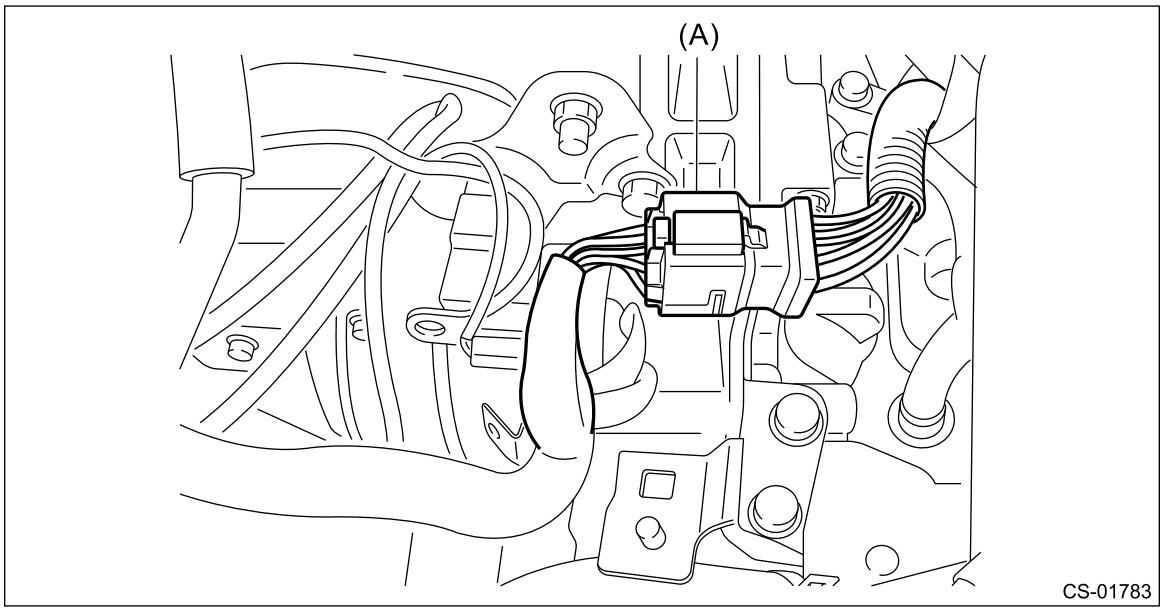
17. Install the transmission radio ground cord terminal.

Tightening torque:

13 N·m (1.3 kgf-m, 9.6 ft-lb)



18. Connect the engine harness connector.



(A) Engine harness connectors

19. Install the intercooler stay and the intercooler. Ref. to INTAKE (INDUCTION)(w/o STI)>Intercooler>INSTALLATION.

20. Install the air intake duct. Ref. to INTAKE (INDUCTION)(w/o STI)>Air Intake Duct>INSTALLATION.

21. Connect the battery ground terminal. Ref. to NOTE>NOTE > BATTERY.

22. Make sure the gears can be shifted accurately into each gear.

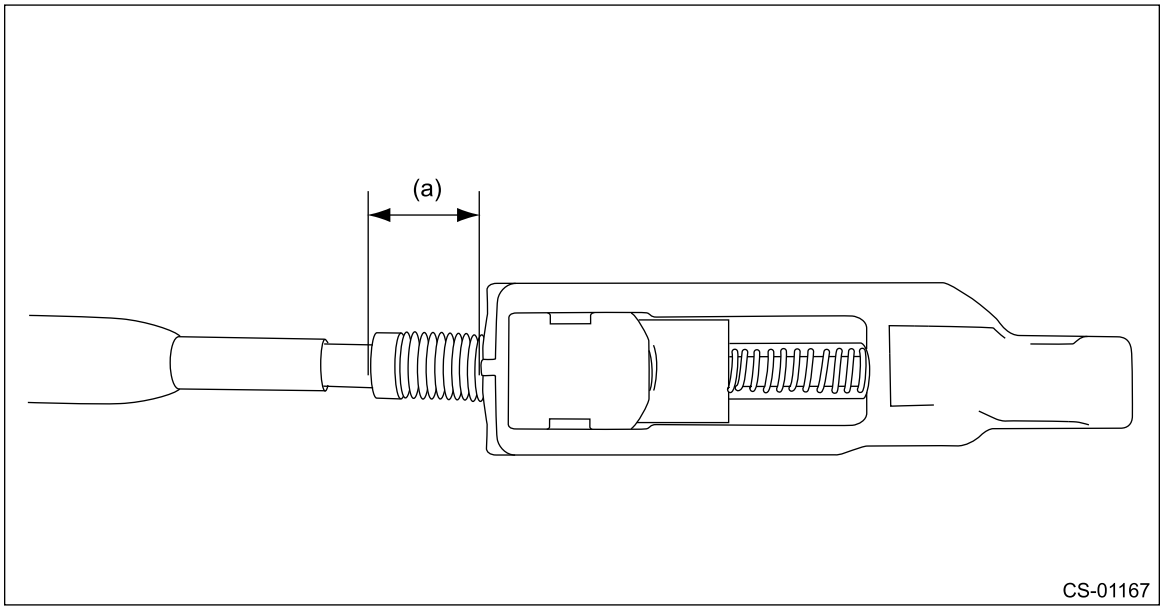
CONTROL SYSTEMS > MT Gear Select Cable

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)



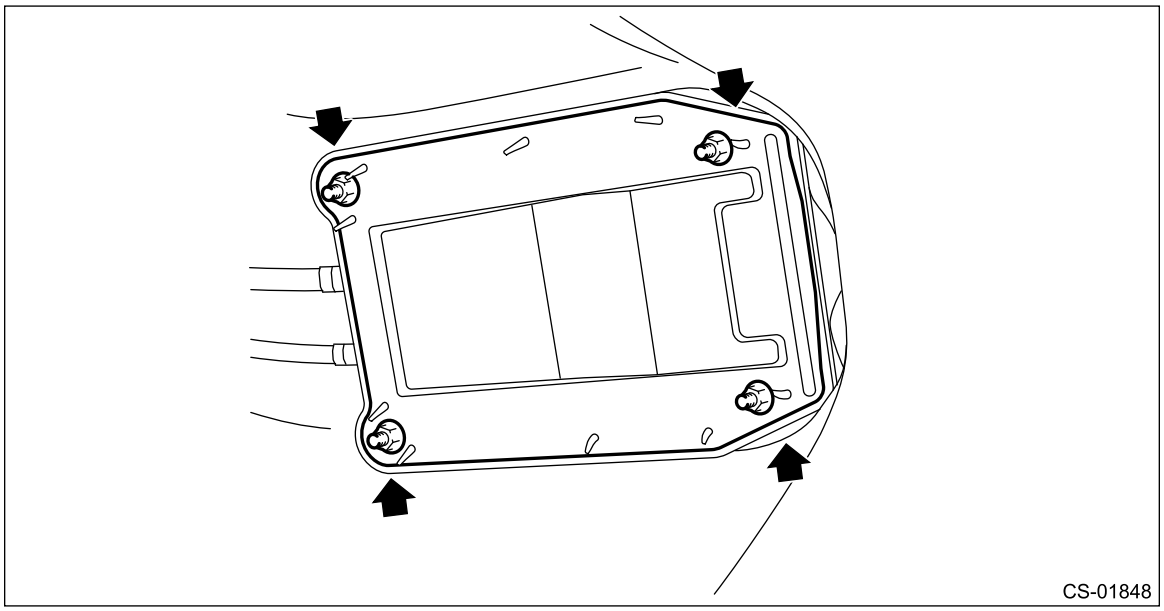
2. If it is not within the specification, perform the adjustment. Ref. to CONTROL SYSTEMS>MT Gear Select Cable>ADJUSTMENT.

CONTROL SYSTEMS > MT Gear Select Cable

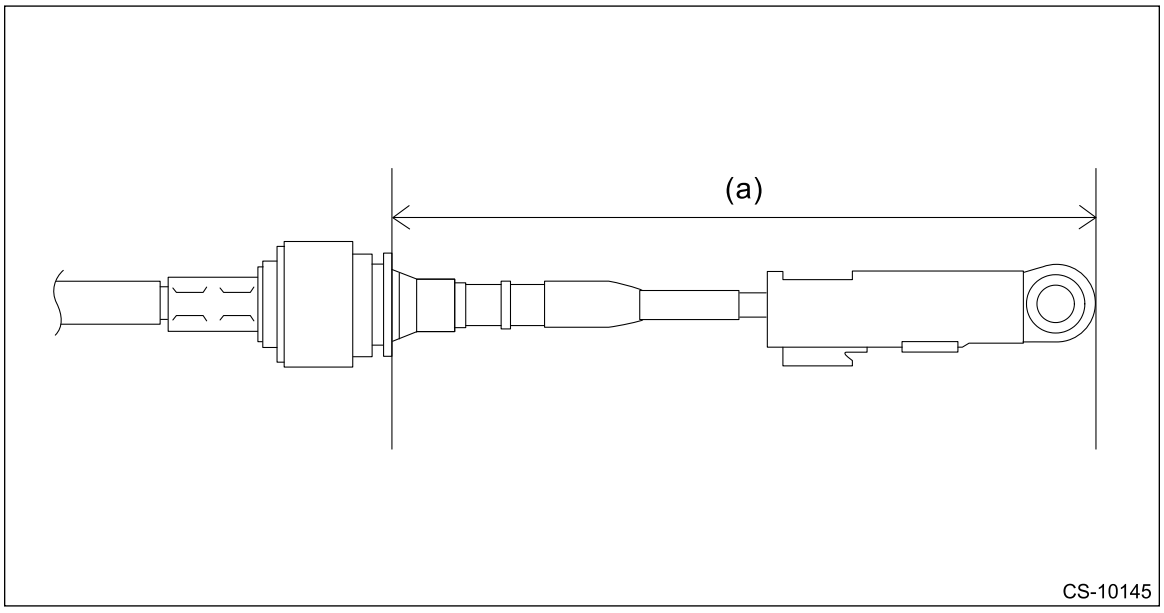
ADJUSTMENT

Note:
Two persons are required to perform the MT gear select cable adjustment. (Only the step 7) requires two workers.)

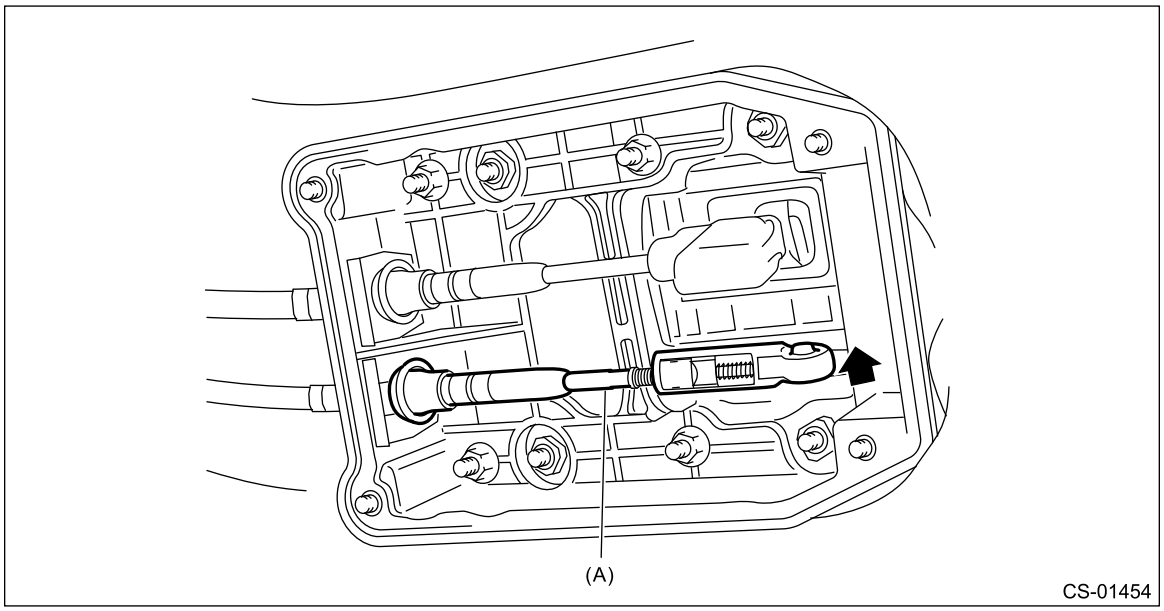
1. Move the shift lever to the 6th.
2. Remove the cable cover plate.



3. Disconnect the MT gear select cable.
   Caution:
   Do not apply extra overload while holding the part (a).

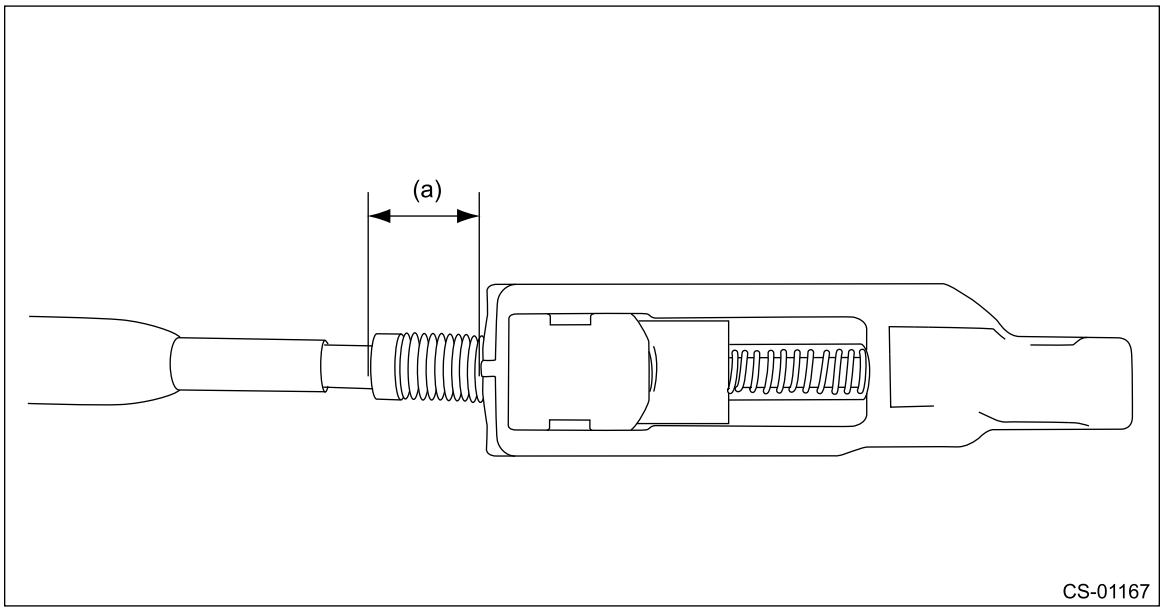


Note:
Push the MT gear select cable in the direction of arrow, and remove it.



(A) MT gear select cable

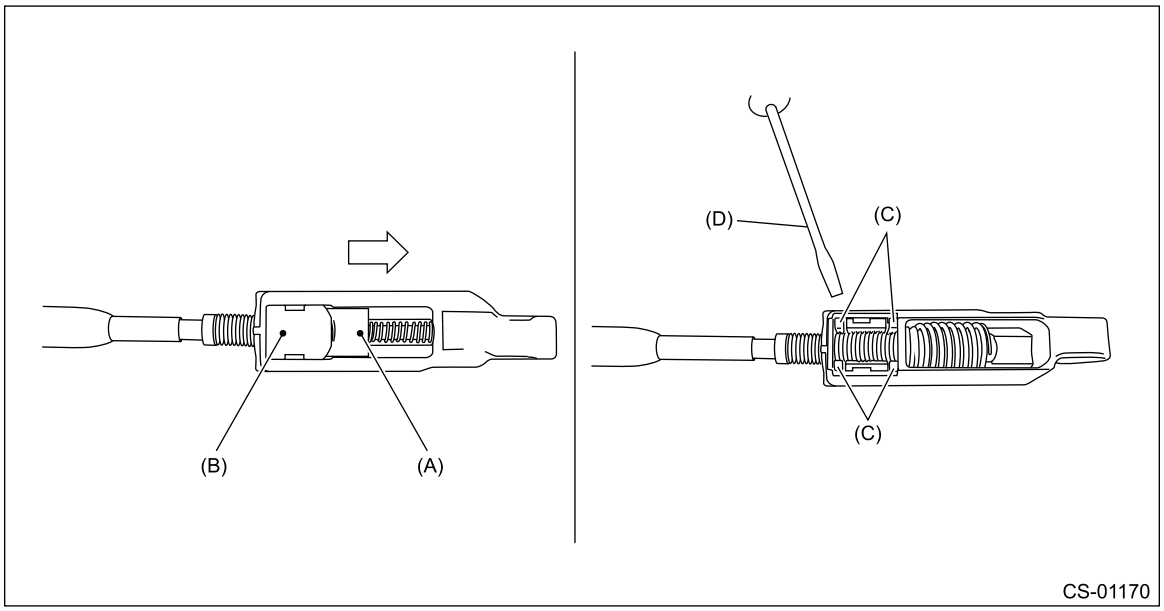
4. Measure the exposed length (a) of MT gear select cable.



(a) Measurement value

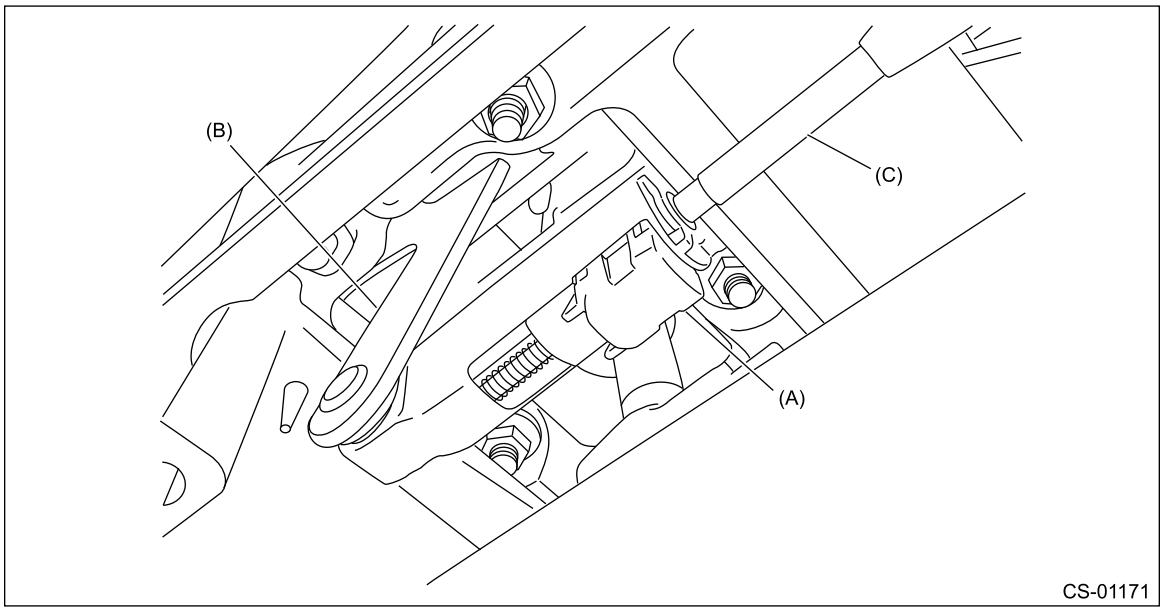
5. Slide the slider (green) in the direction of the arrow and release the lock piece (pink) by using flat tip screwdriver etc.
Caution:
Lock piece is easily damaged for the resin. When the lock piece is broken, replace the new MT gear select cable.

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.



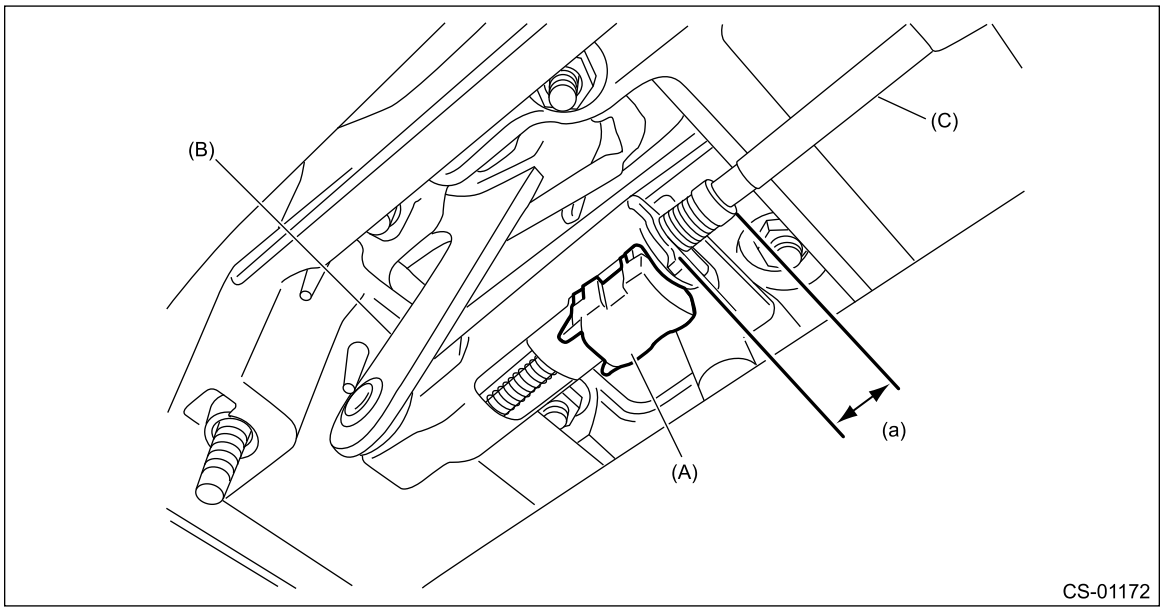
(A) Slider
(B) Lock piece
(C) Claw
(D) Flat tip screwdriver

6. Connect the MT gear select cable to the select lever, with the lock piece released.



(A) Lock piece
(B) Select lever
(C) MT gear select cable

7. Move the shift lever to the reverse 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.

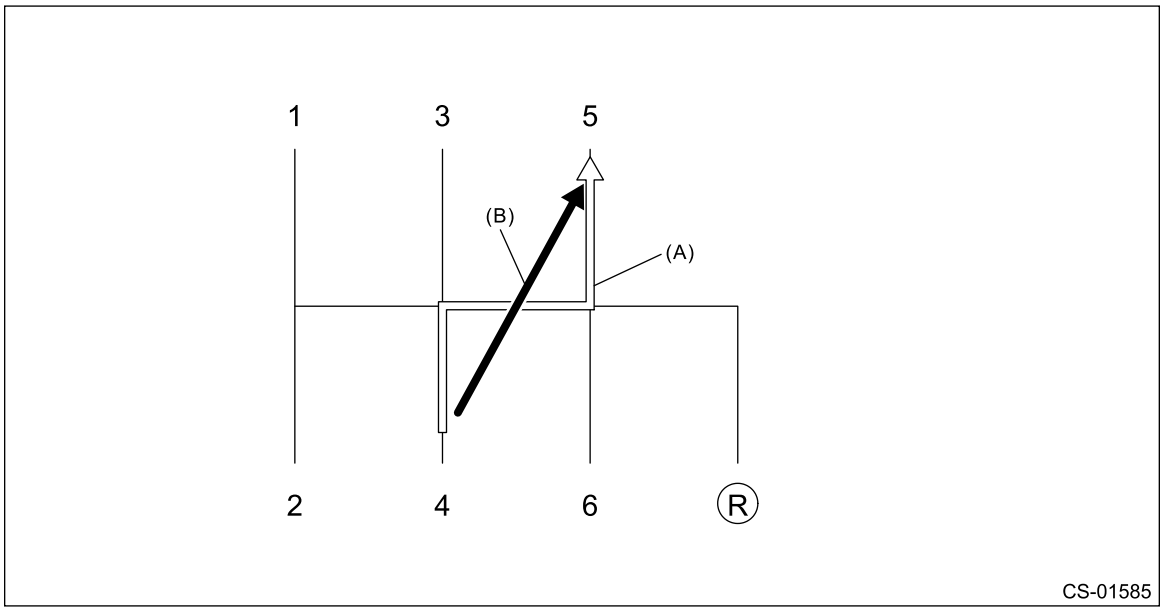


(a) Exposed length 11 mm (0.4 in)

(A) Lock piece (B) Select lever (C) MT gear select cable

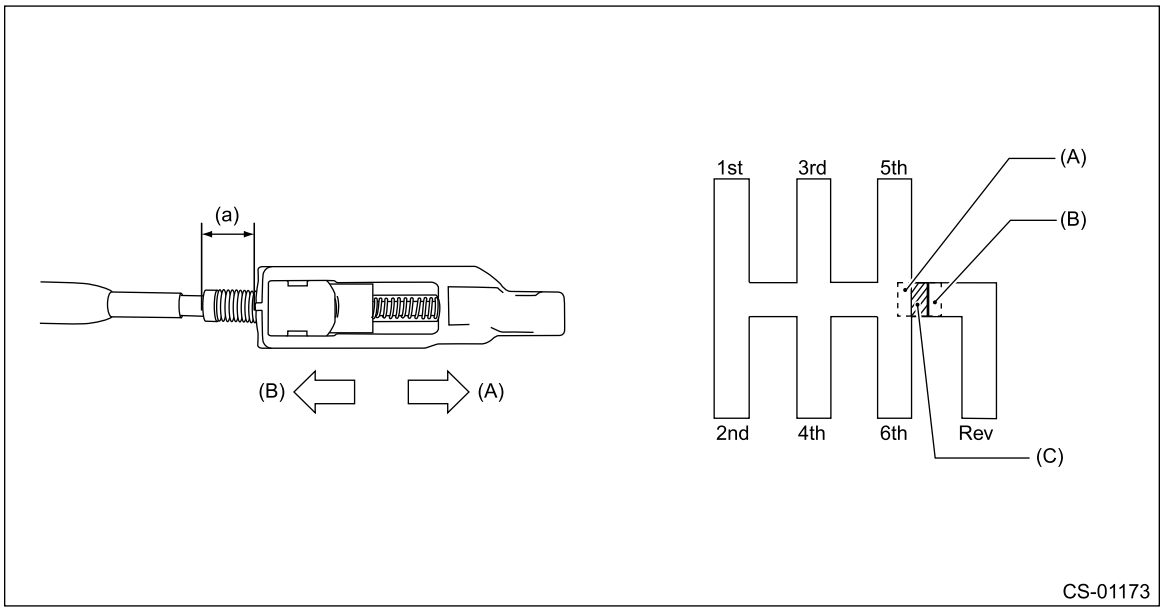
8. Shift to 5th ⟷ 6th and Rev, and check for stuck.

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



(A) Cranking operation (B) Load direction

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 → 5th, it cannot be operated at select lever crank line.

⇨ Shorten the exposed length (a) of MT gear select cable.

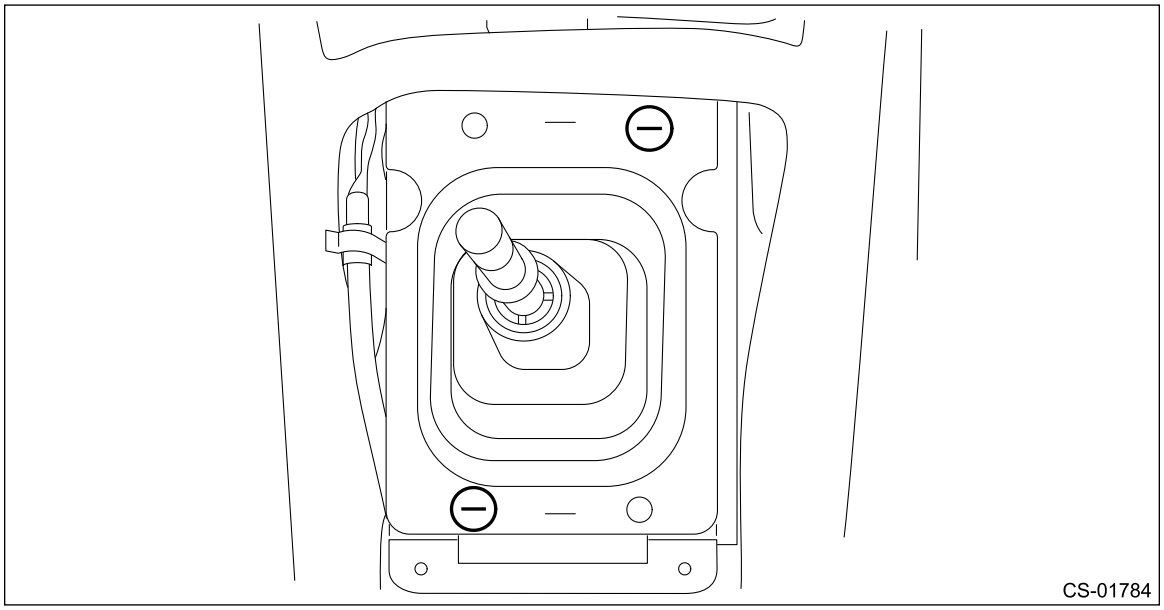
Note:

If it cannot adjust, replace the MT gear select cable.

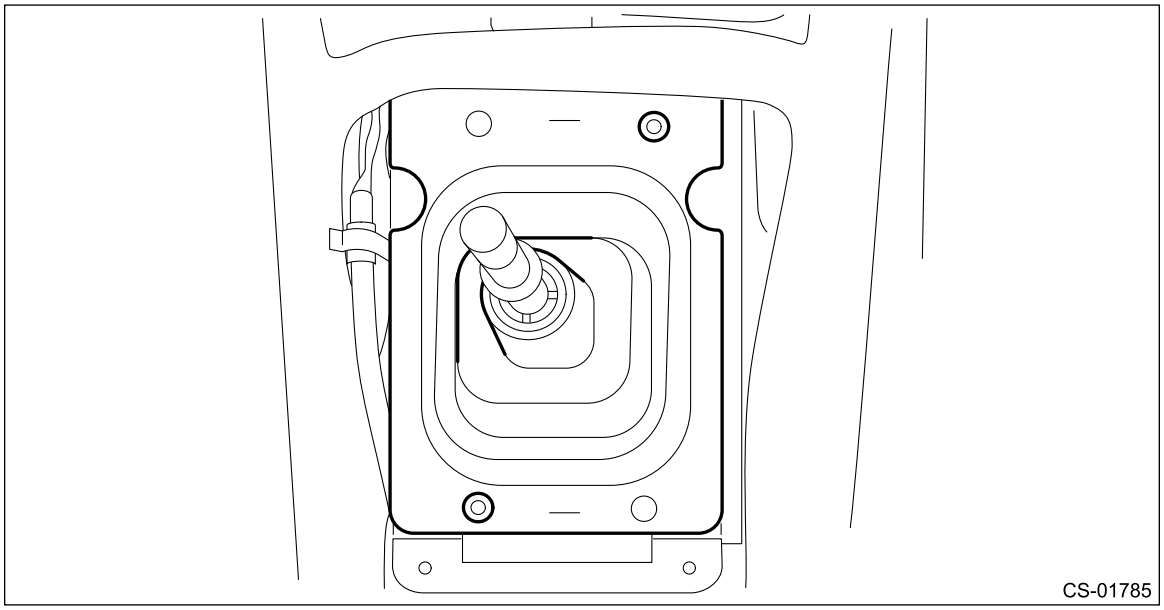
11. If no fault is found in the shift and select operation, restore the vehicle.

REMOVAL

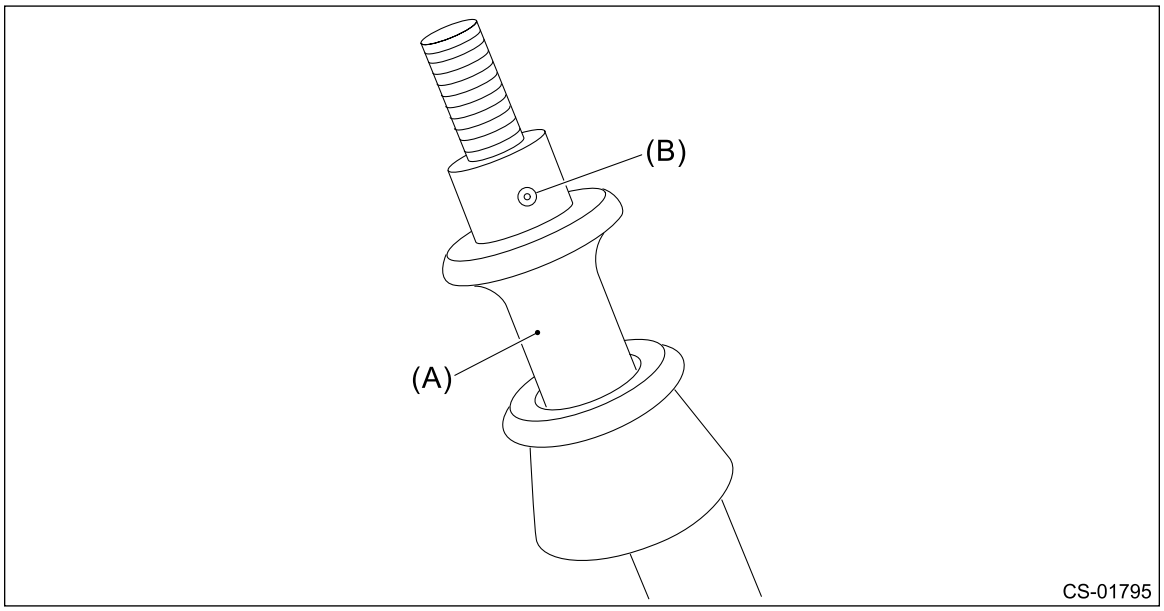
1. Disconnect the ground cable from battery. Ref. to NOTE>NOTE > BATTERY.
   Note:
   For model with battery sensor, disconnect the ground terminal from battery sensor.
2. Remove the gear shift knob by turning it counterclockwise.
3. Remove the console box assembly. Ref. to EXTERIOR/INTERIOR TRIM>Console Box>REMOVAL.
4. Remove the cover - shift lever. Ref. to EXTERIOR/INTERIOR TRIM>Console Box>REMOVAL.
5. Remove the panel center LWR LH and RH. Ref. to EXTERIOR/INTERIOR TRIM>Console Box>REMOVAL.
6. Remove the clamp.



7. Remove the boot and insulator assembly.

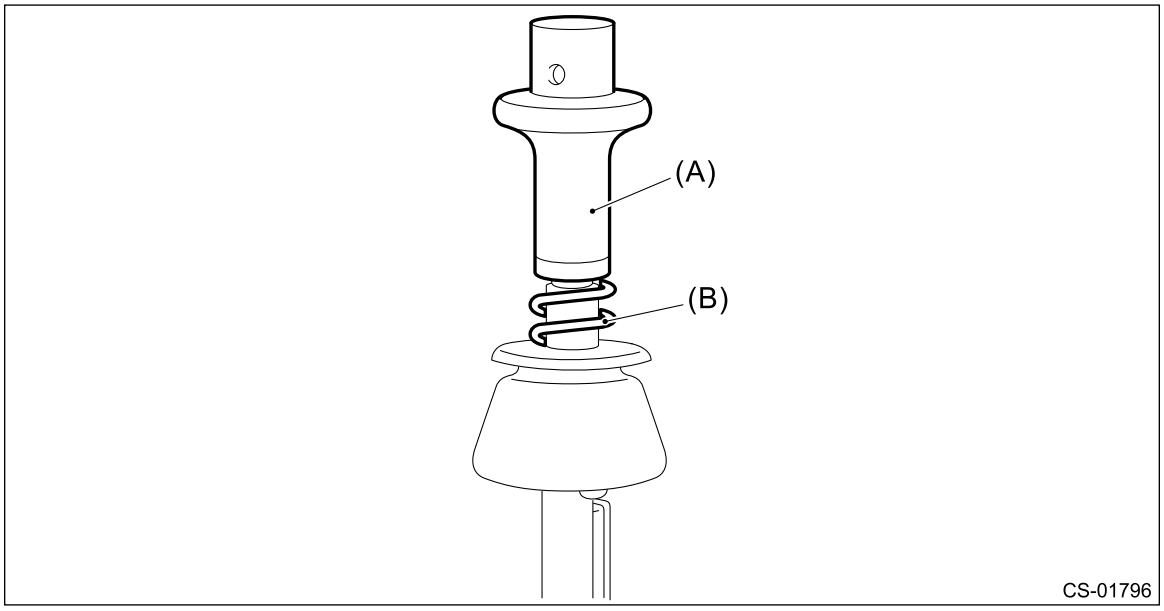


8. Remove the spring pin from the slider.



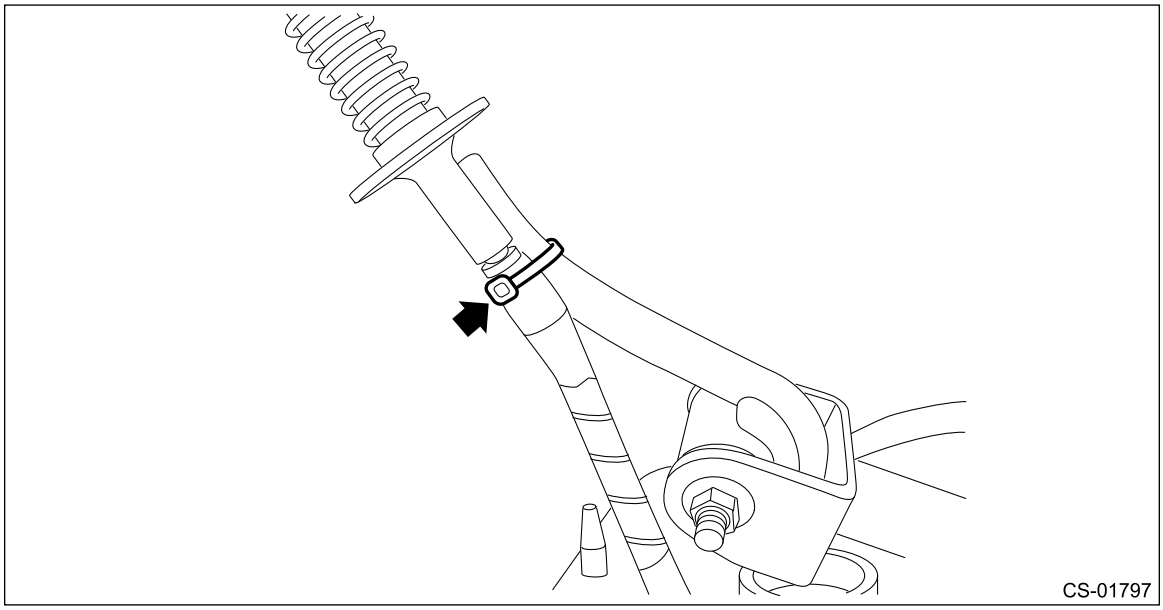
(A) Slider (B) Spring pin

9. Remove the slider and spring.



(A) Slider (B) Spring

10. Cut the band clip, and separate the reverse check cable from the gear shift lever.



11. Lift up the vehicle.

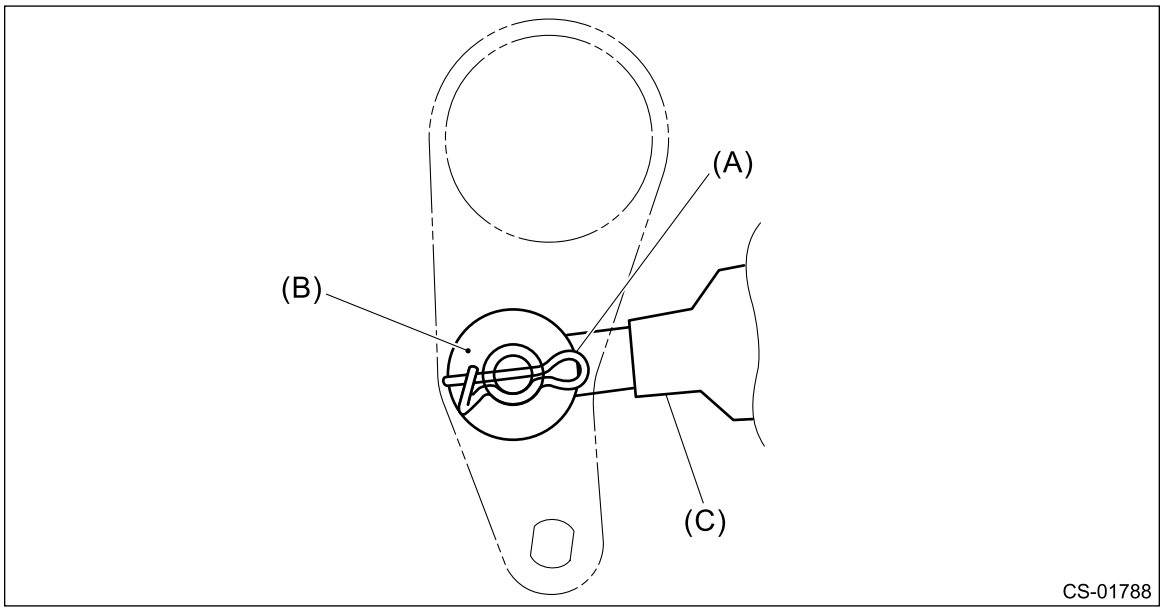
12. Remove the center exhaust pipe (rear). Ref. to EXHAUST(STI)>Center Exhaust Pipe>REMOVAL.

13. Remove the center exhaust cover.



14. Remove the crossmember. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Transmission Mounting System>REMOVAL.

15. Remove the snap pin and washer, and separate the reverse check cable.

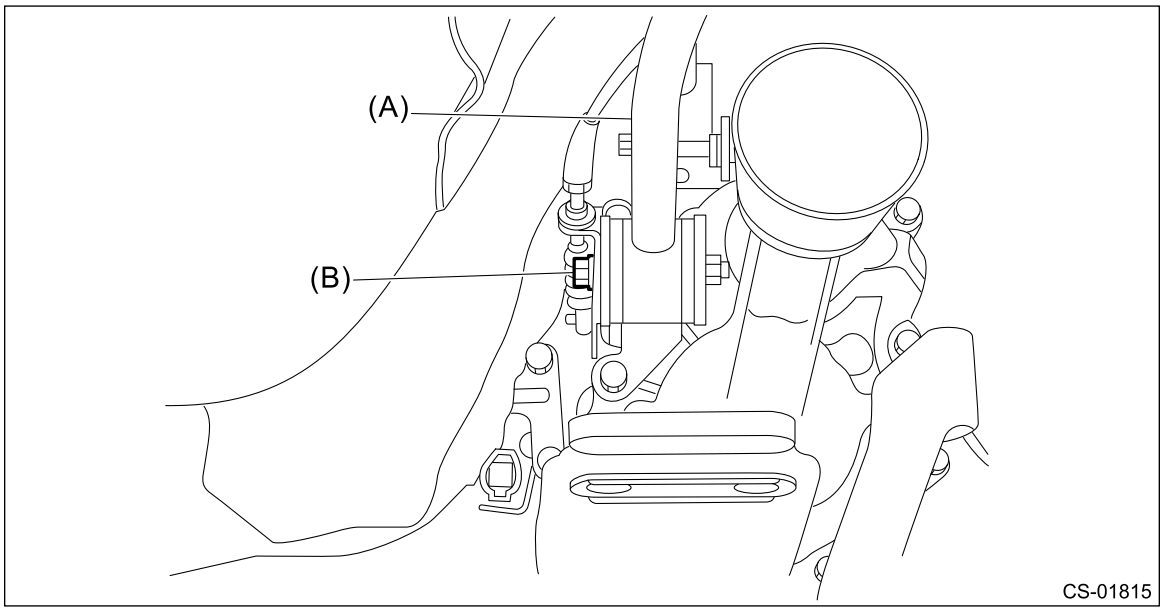


(A) Snap pin (B) Washer (C) Reverse check cable

16. Move the transmission to the right side, and remove the stay bolts and the reverse check cable.

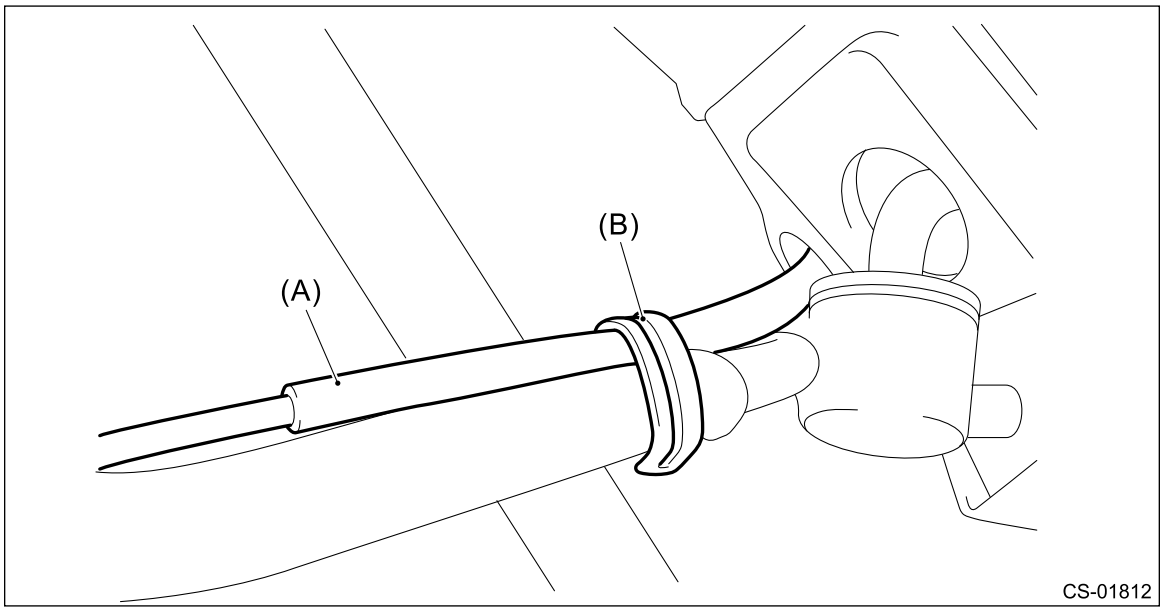
Note:

If the transmission is not moved aside, the stay bolts may contact the body and cause damage.



(A) Stay (B) Stay bolt

17. Lift up the stay clip, and separate the stay from the reverse check cable.



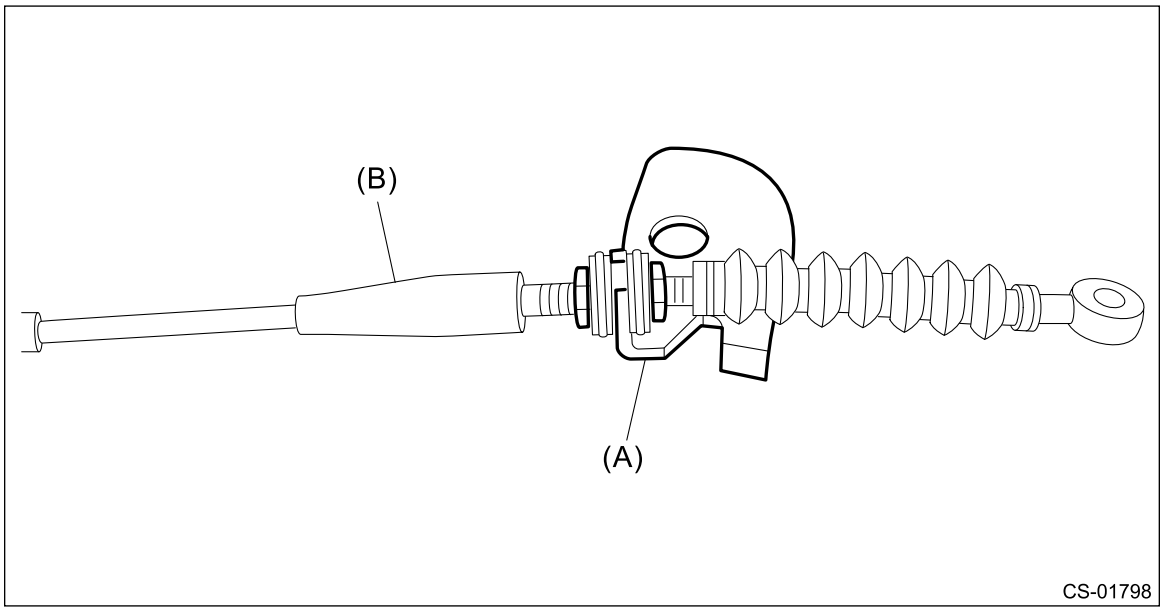
(A) Reverse check cable (B) Clip

18. Pull out the reverse check cable from underside of the vehicle to remove it.

Note:

Be careful not to damage the inner boot.

19. Loosen the lock nut, and remove the reverse check cable from the cable plate.



(A) Cable plate (B) Reverse check cable

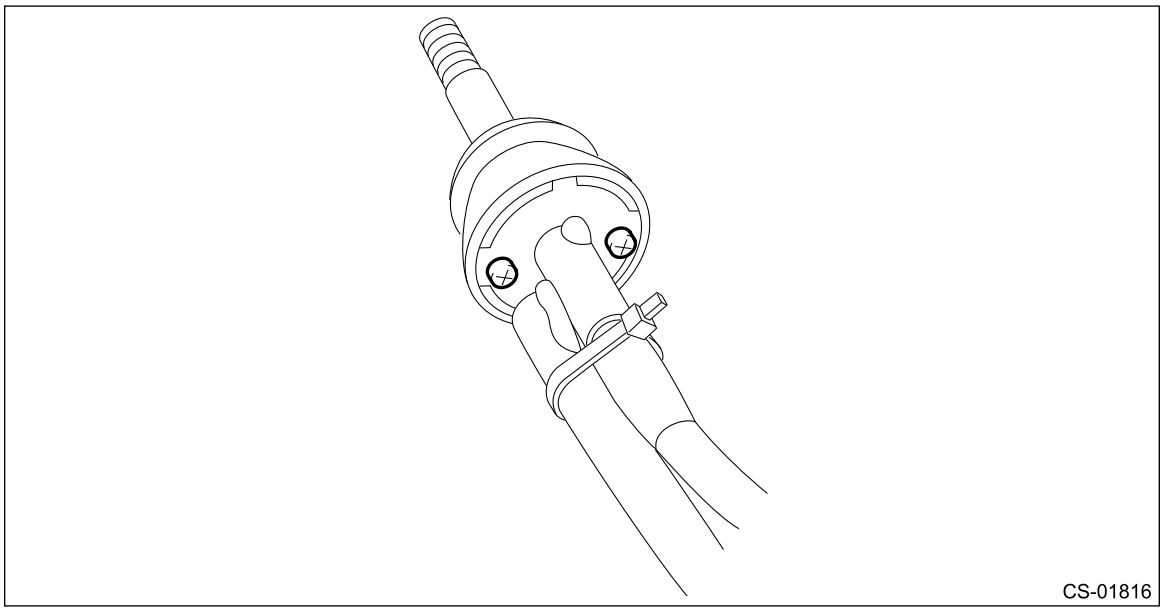
CONTROL SYSTEMS > Reverse Check Cable

INSTALLATION

1. Insert the reverse check cable into the inner boot hole from underside of the vehicle.
2. Insert the reverse check cable into the gear shift lever assembly, and secure it with the band clip.

Note:

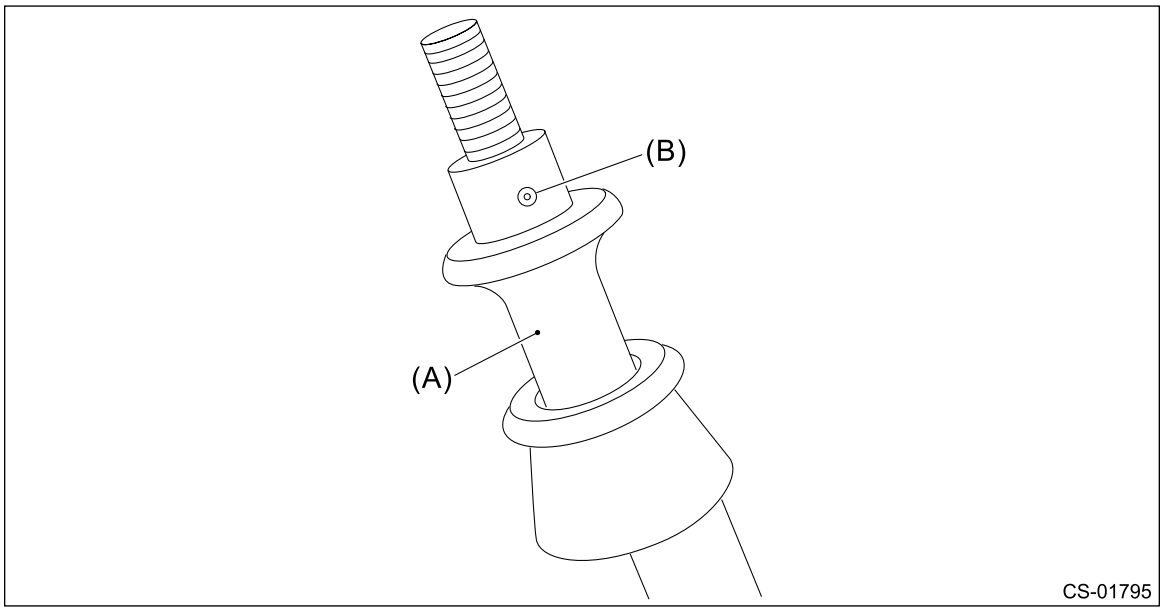
- **Cut the excess band clip.**
- **Make sure that the reverse check cable is inserted into the gearshift lever assembly with no gaps.**



3. Use the spring pin to secure the end of the slider and reverse check cable.

Note:

Apply grease to the moving part of slider.

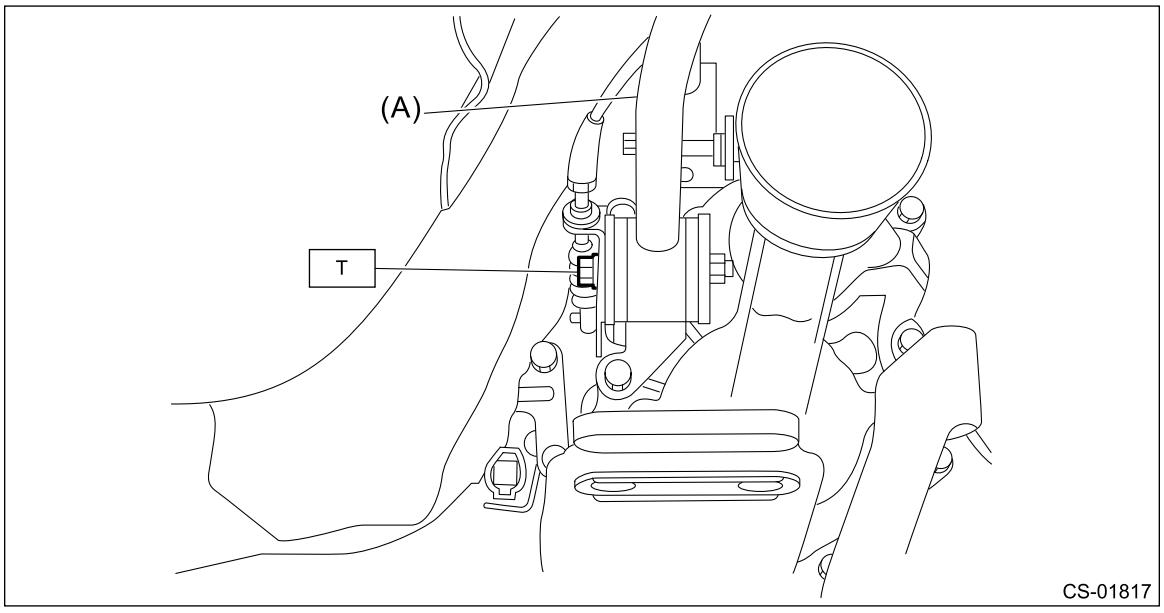


(A) Slider (B) Spring pin

4. Move the transmission to the right side, and install the stay.

Tightening torque:

T: 32 N·m (3.3 kgf-m, 23.6 ft-lb)

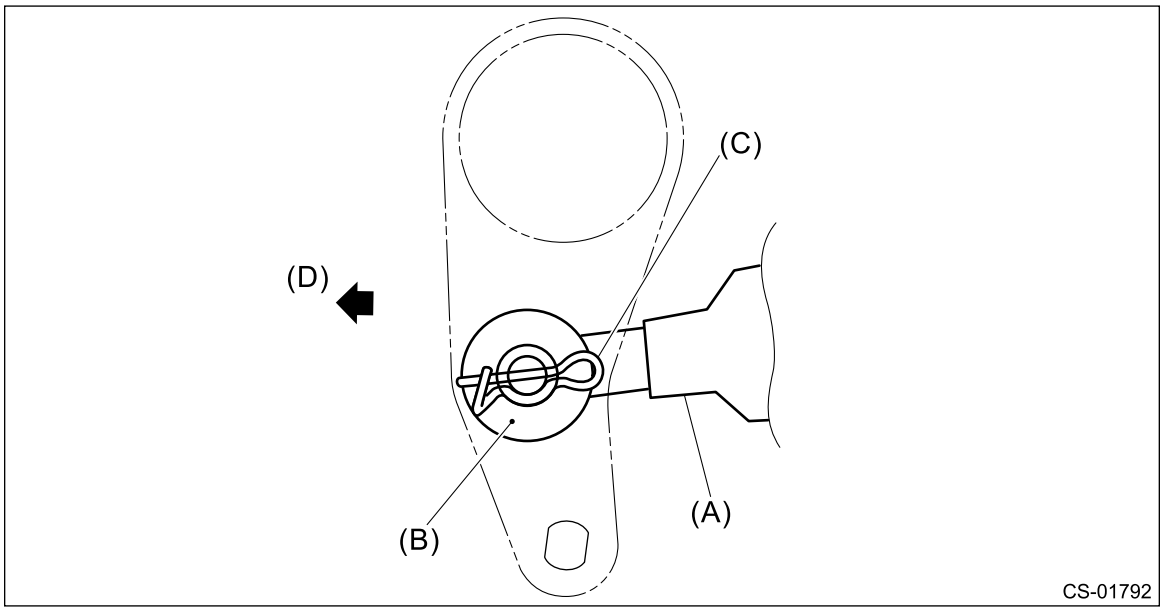


(A) Stay

5. Install the reverse check cable, washer and snap pin.

Note:

Make sure to point the snap pin in an appropriate direction.



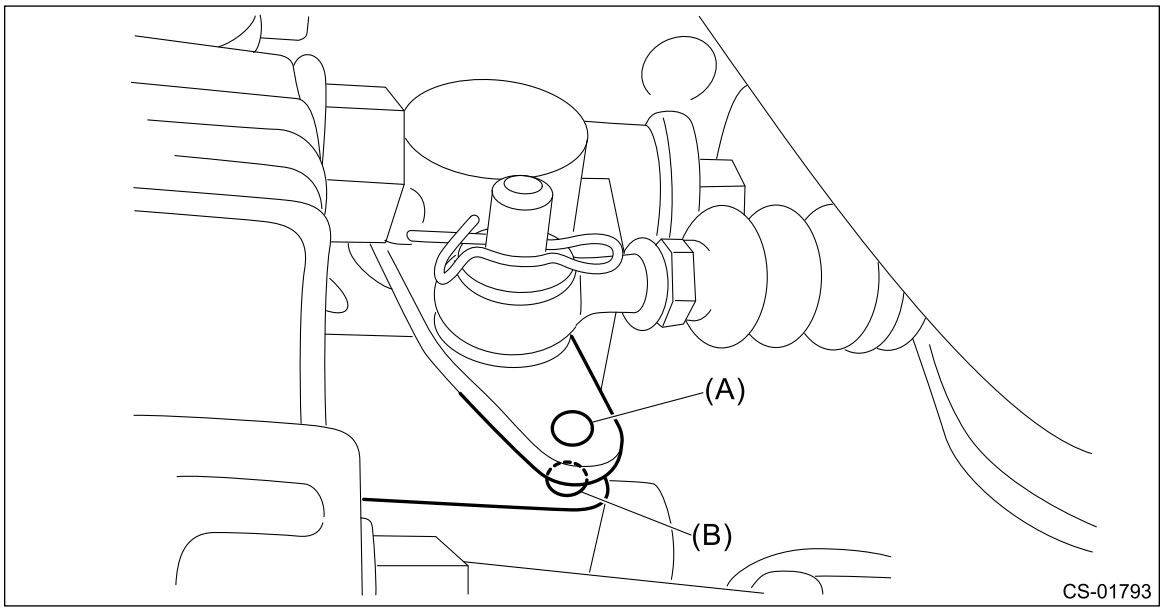
(A) Reverse check cable (C) Snap pin (D) Front side

(B) Washer

6. Make sure the hole of extension case is aligned with that of reverse check lever. If the hole positions are not aligned, adjust the reverse check cable. Ref. to CONTROL SYSTEMS>Reverse Check Cable>ADJUSTMENT.

Note:

- **Check that the M3 bolt goes through the hole of reverse check lever and can be inserted into the hole of extension case.**
- **When checking visually, confirm that the gap of hole positions is 0.5 mm (0.02 in) or less.**

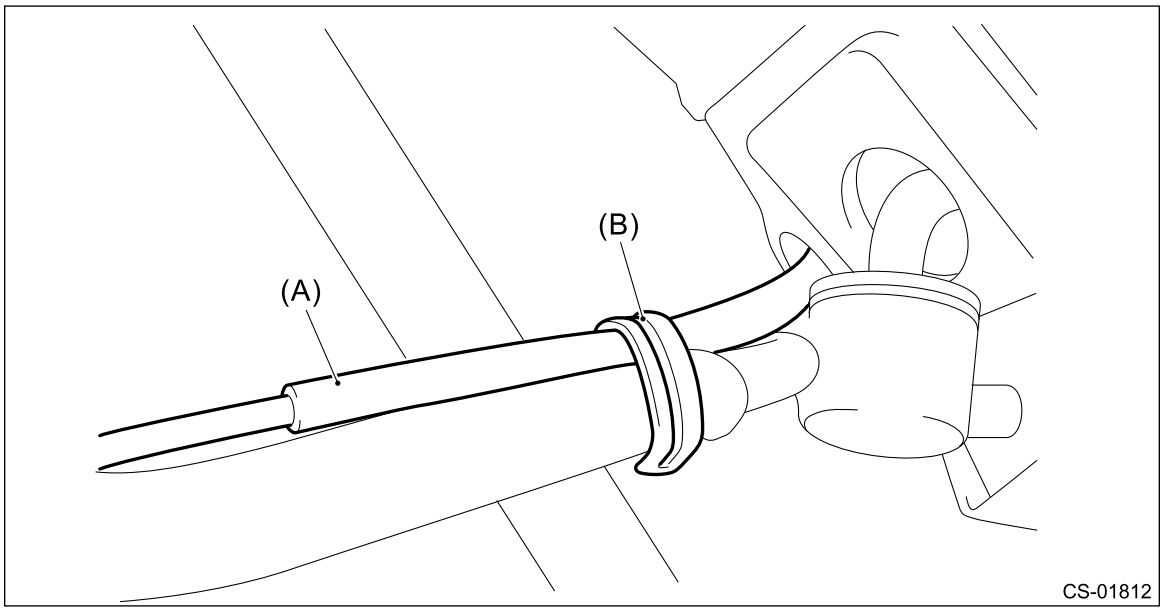


(A) Hole of reverse check lever (B) Hole of extension case

7. Secure the reverse check cable to the stay clip.

Note:

Install the reverse check cable on top of the stay.



(A) Reverse check cable (B) Clip

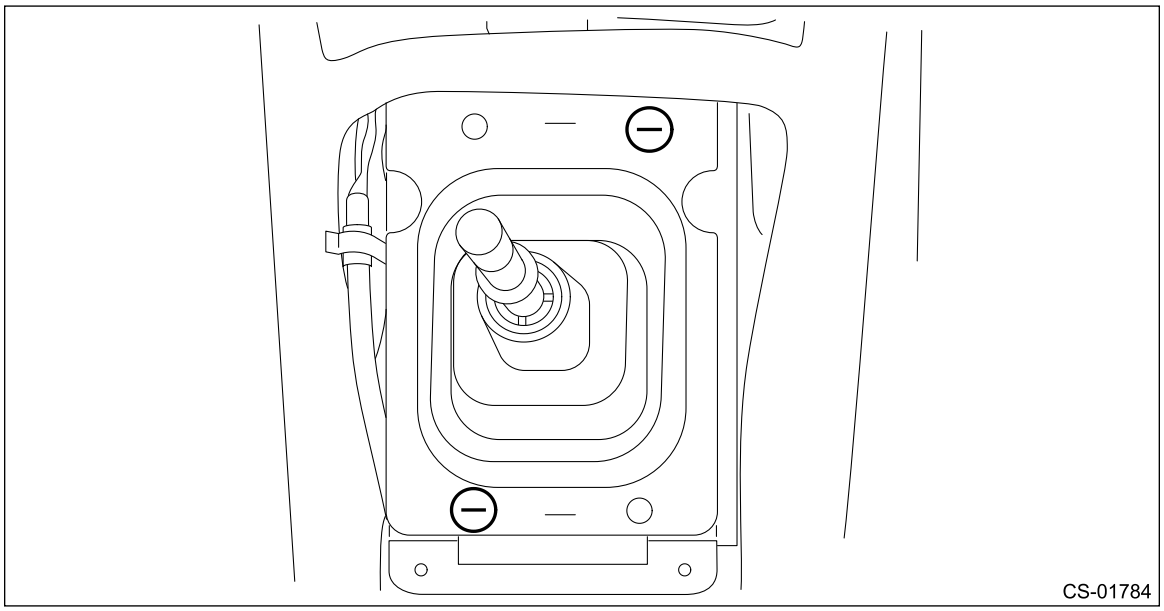
8. Install the crossmember. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Transmission Mounting System>INSTALLATION.

9. Install the center exhaust cover.

Tightening torque:

18 N·m (1.8 kgf-m, 13.3 ft-lb)

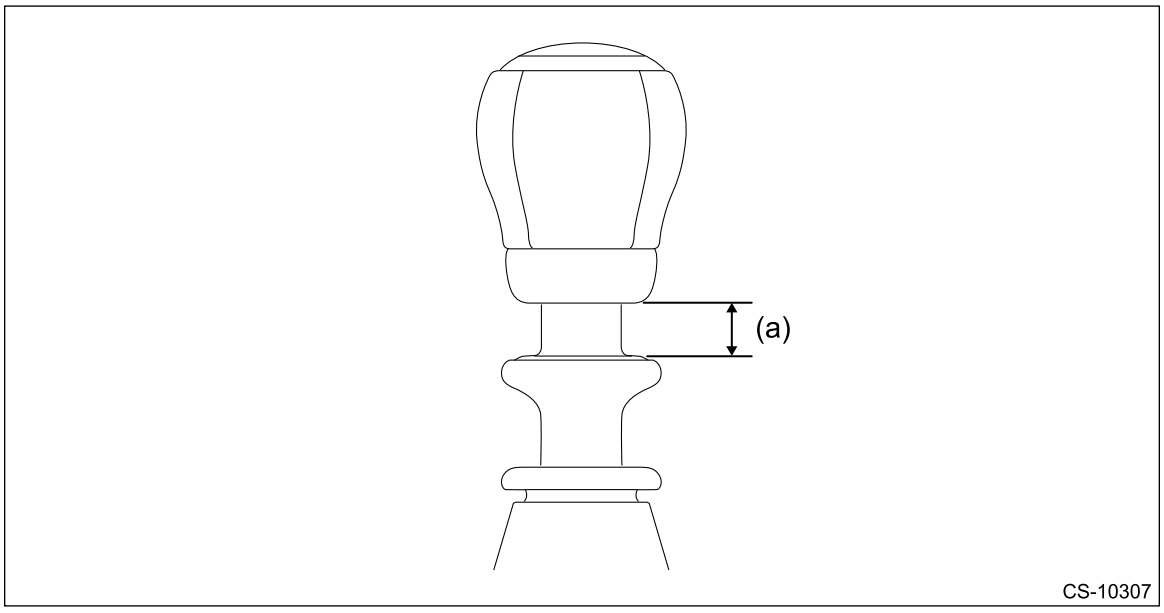
10. Install the center exhaust pipe (rear). Ref. to EXHAUST(STI)>Center Exhaust Pipe>INSTALLATION.
11. Install the boot and insulator assembly, and secure with a clamp.



12. Install the panel center LWR LH and RH. Ref. to EXTERIOR/INTERIOR TRIM>Console Box>INSTALLATION.
13. Install the cover - shift lever. Ref. to EXTERIOR/INTERIOR TRIM>Console Box>INSTALLATION.
14. Install the console box assembly. Ref. to EXTERIOR/INTERIOR TRIM>Console Box>INSTALLATION.
15. Install the gear shift knob by turning it clockwise.

Caution:

- **Do not tighten the gear shift knob excessively to prevent it from being damaged.**
- **Be sure that the gap (a) between the gear shift knob bottom surface and the holder top surface is 10.0 mm (0.394 in) or more.**



(a) 10.0 mm (0.394 in)

Note:
When adjusting the shift pattern direction after installing the gear shift knob, rotate in the tightening direction.

16. Connect the battery ground terminal. Ref. to NOTE>NOTE > BATTERY.

CONTROL SYSTEMS > Reverse Check Cable

INSPECTION

1. Make sure the slider moves smoothly. If it does not move, adjust the reverse check cable, or check the slider for damage. Ref. to CONTROL SYSTEMS>Reverse Check Cable>ADJUSTMENT.

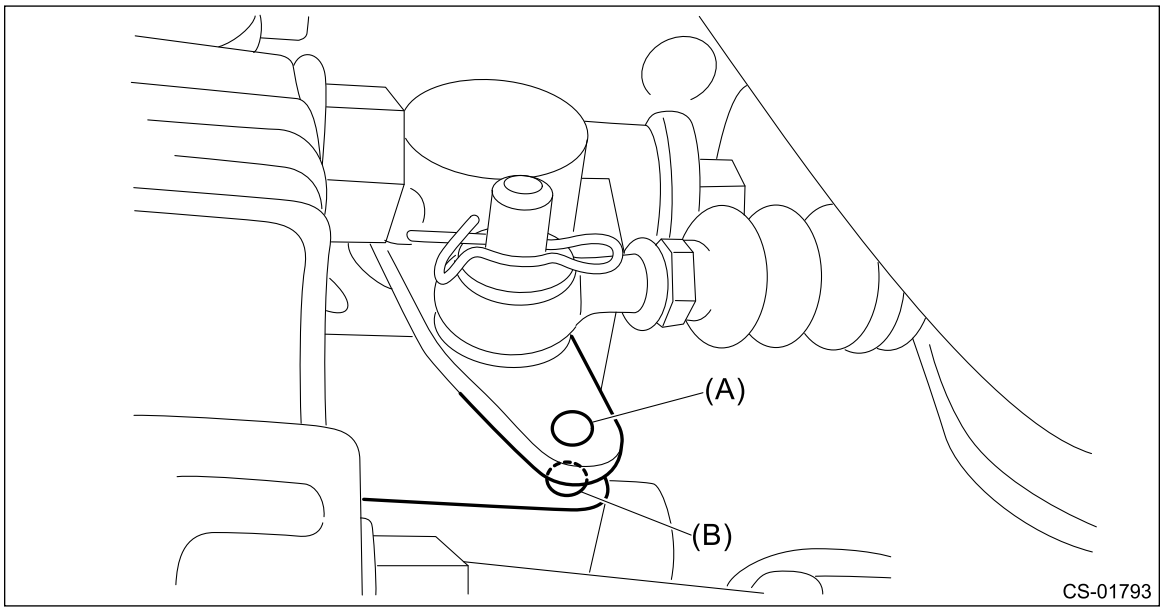
2. Check if the gear shifts into reverse when pulling up the slider. If the gear cannot shift into reverse, adjust the reverse check cable. Ref. to CONTROL SYSTEMS>Reverse Check Cable>ADJUSTMENT.

3. Check that the gear does not shift into reverse when the slider is not pulled up. If the gear shifts into reverse, adjust or replace the reverse check cable. Ref. to CONTROL SYSTEMS>Reverse Check Cable>ADJUSTMENT.

4. Make sure the hole of extension case is aligned with that of reverse check lever. If the hole positions are not aligned, adjust the reverse check cable. Ref. to CONTROL SYSTEMS>Reverse Check Cable>ADJUSTMENT.

Note:

- **Check that the M3 bolt goes through the hole of reverse check lever and can be inserted into the hole of extension case.**
- **When checking visually, confirm that the gap of hole positions is 0.5 mm (0.02 in) or less.**



(A) Hole of reverse check lever (B) Hole of extension case

CONTROL SYSTEMS > Reverse Check Cable

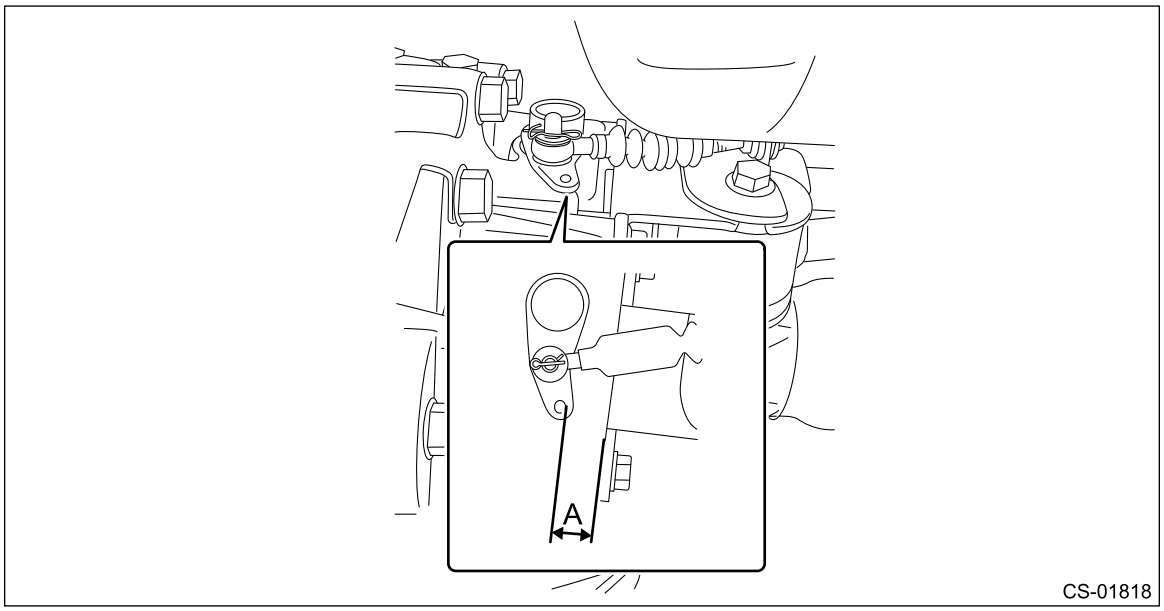
ADJUSTMENT

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 (rear). Ref. to EXHAUST(STI)>Center Exhaust Pipe>REMOVAL.
4. Remove the center exhaust cover.

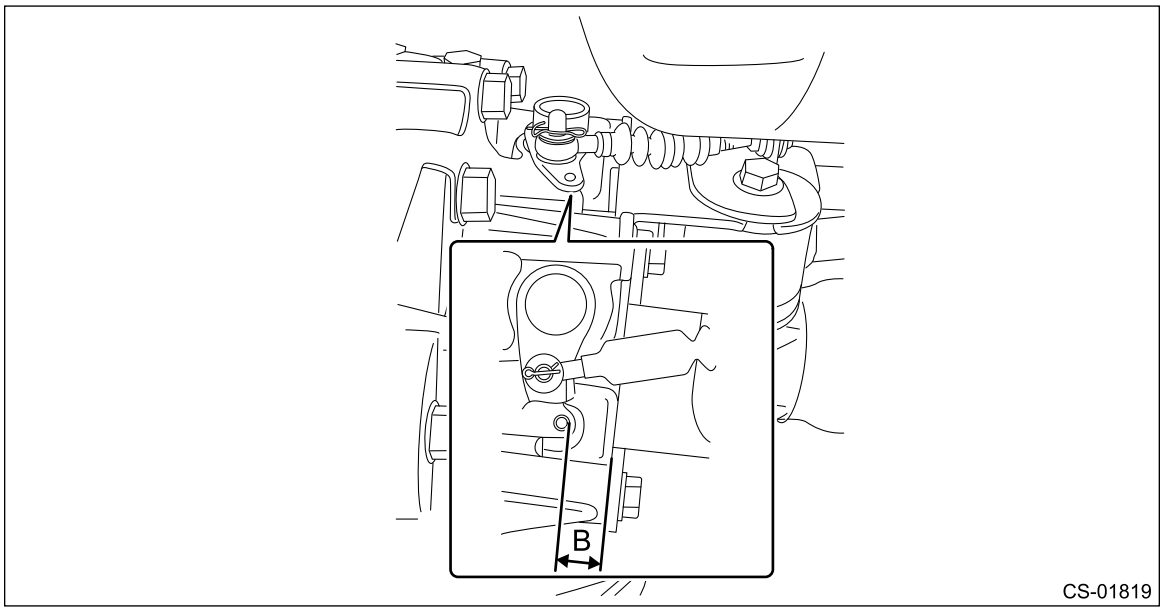


5. Remove the crossmember. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Transmission Mounting System>REMOVAL.

6. Measure the distance “A” from the shift bracket seating face on transmission side to the hole edge of the reverse check lever.



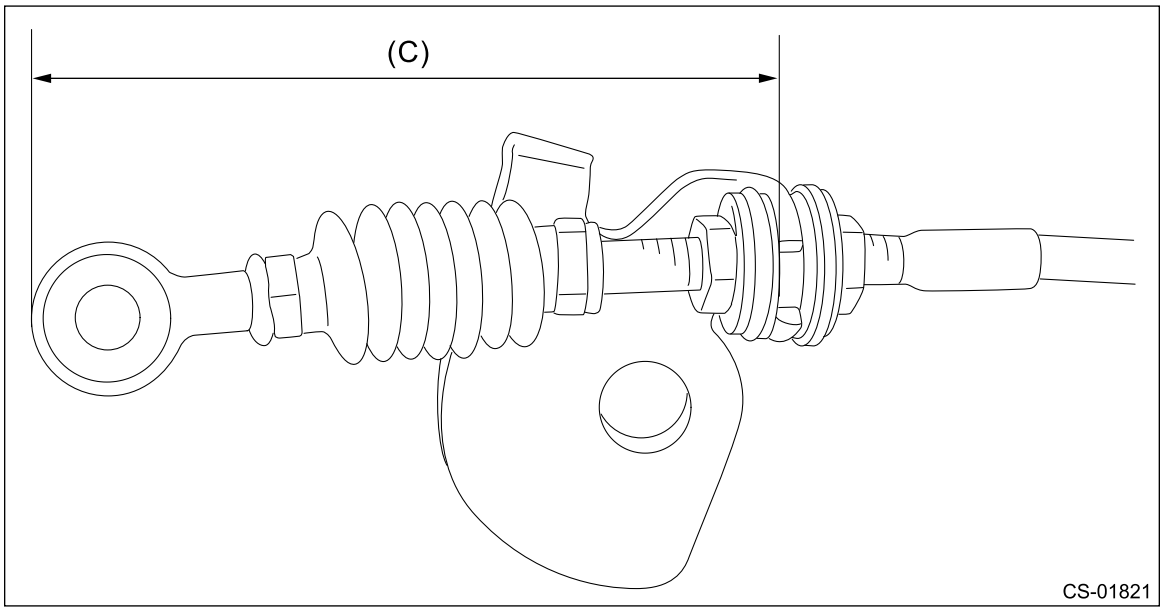
7. Measure the distance “B” from the shift bracket seating face on transmission side to the hole edge of the extension case.



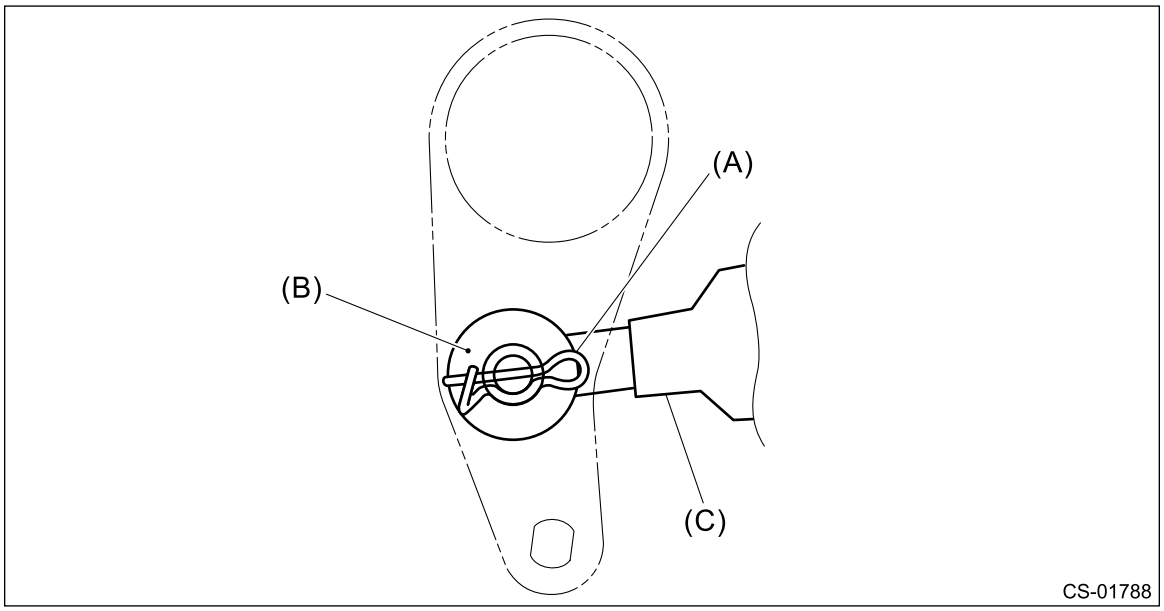
8. Calculate the following formula and determine the amount of cable adjustment.
T mm = (A − B) × 0.56
[T in = (A − B) × 0.56]
T: Amount of cable adjustment
A: Distance from the shift bracket seating face on transmission side to the hole edge of the reverse check lever
B: Distance from the shift bracket seating face on transmission side to the hole edge of the extension case

Note:

- **If the value "T" (amount of cable adjustment) is positive (+), shorten the length "C" (from cable plate edge to reverse check cable) by using adjustment procedures.**
- **If the value "T" (amount of cable adjustment) is negative (−), lengthen the length "C" (from cable plate edge to reverse check cable) by using adjustment procedures.**



9. Remove the snap pin and washer, and separate the reverse check cable.

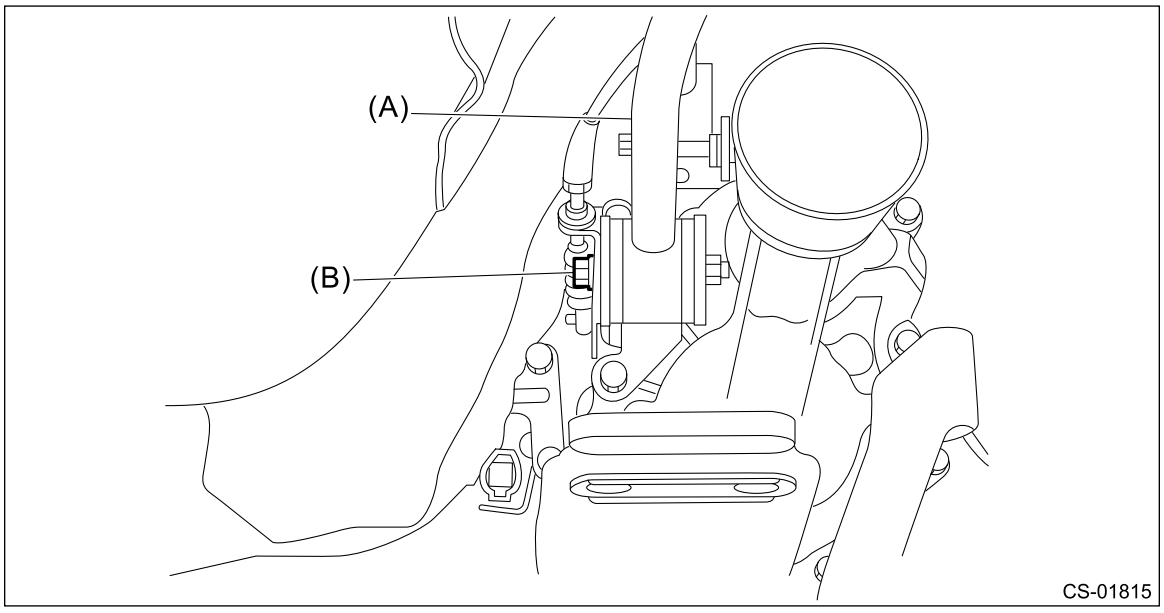


(A) Snap pin (B) Washer (C) Reverse check cable

10. Move the transmission to the right side, and remove the stay bolts and the reverse check cable.

Note:

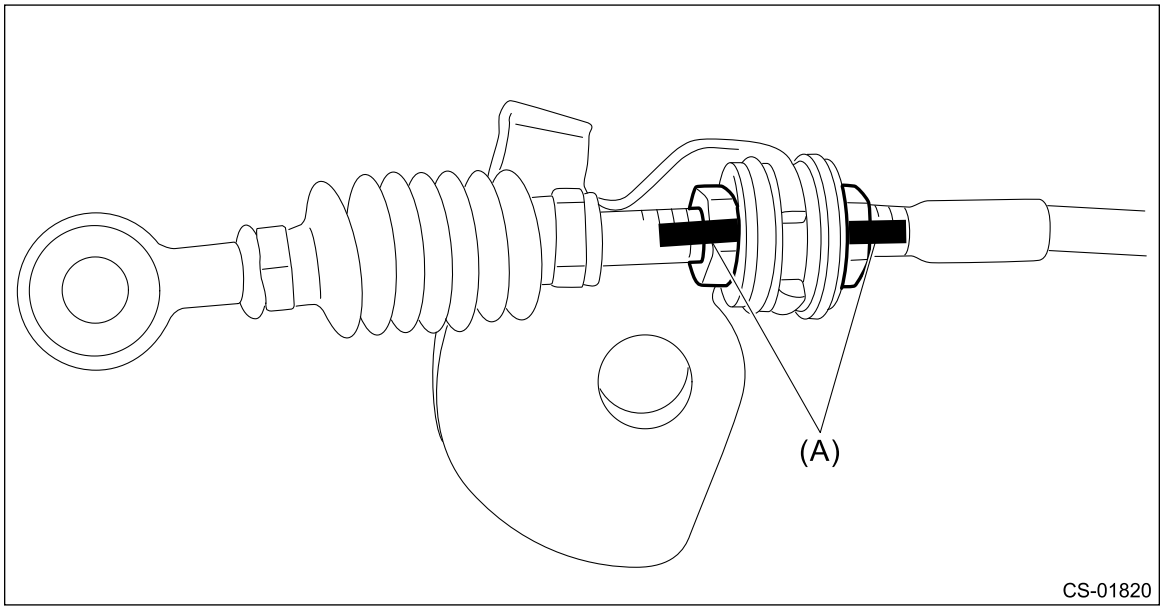
If the transmission is not moved aside, the stay bolts may contact the body and cause damage.



(A) Stay (B) Stay bolt

11. Check the adjustment of the reverse check cable.

(1) Add a marking on the reverse check cable.

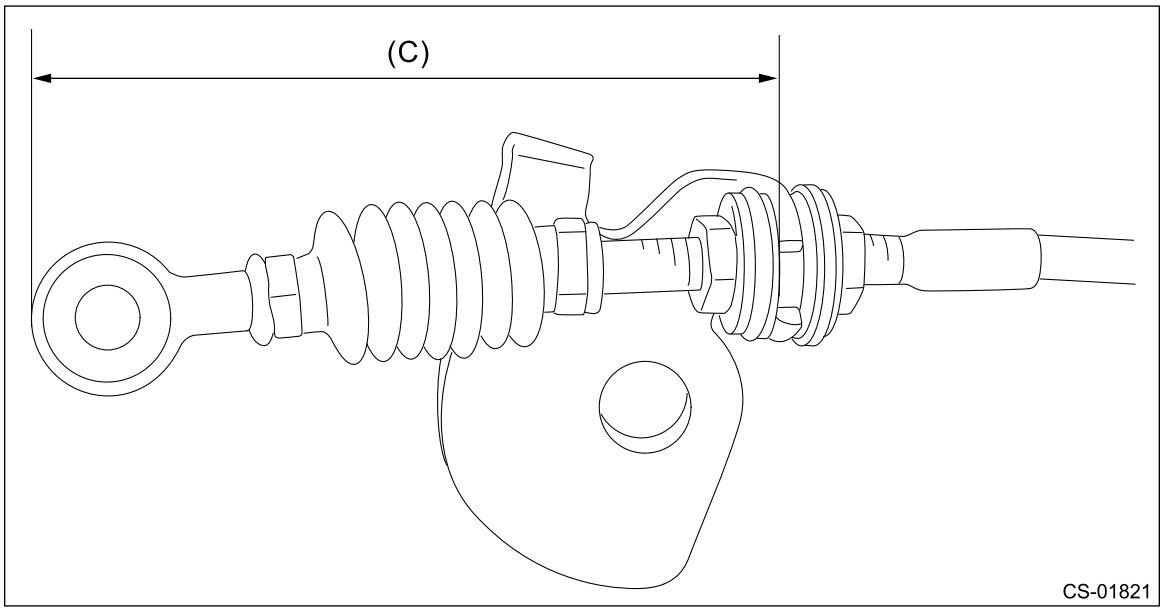


(A) Marking

(2) According to the value “T” (amount of cable adjustment) calculated in the step 8), turn the lock nut of reverse check cable back and forth, then adjust the length “C” (from cable plate edge to reverse check cable).

Note:

- **Turning the lock nut toward front of the vehicle makes the cable length shorter and toward the rear of the vehicle the cable length longer.**
- **The amount of the cable adjustment by one lock nut rotation is 1 mm (0.04 in).**
- **Turn the lock nuts on both sides by the same adjustment amount.**



(3) Tighten the lock nut.

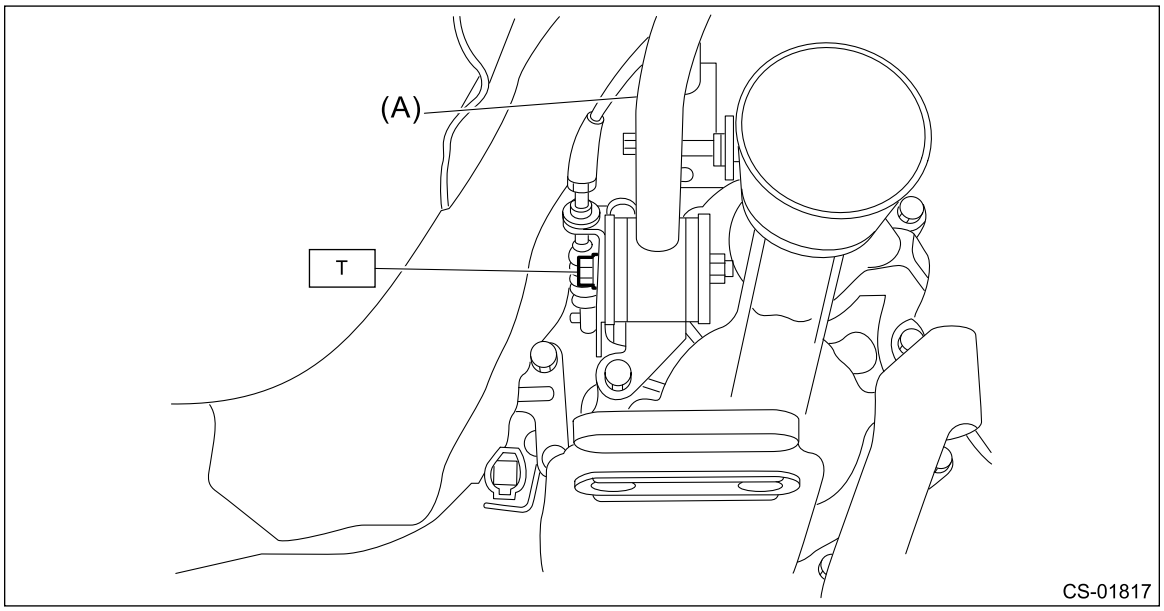
Tightening torque:

6 N·m (0.6 kgf-m, 4.4 ft-lb)

12. Move the transmission to the right side, and install the stay.

Tightening torque:

T: 32 N·m (3.3 kgf-m, 23.6 ft-lb)

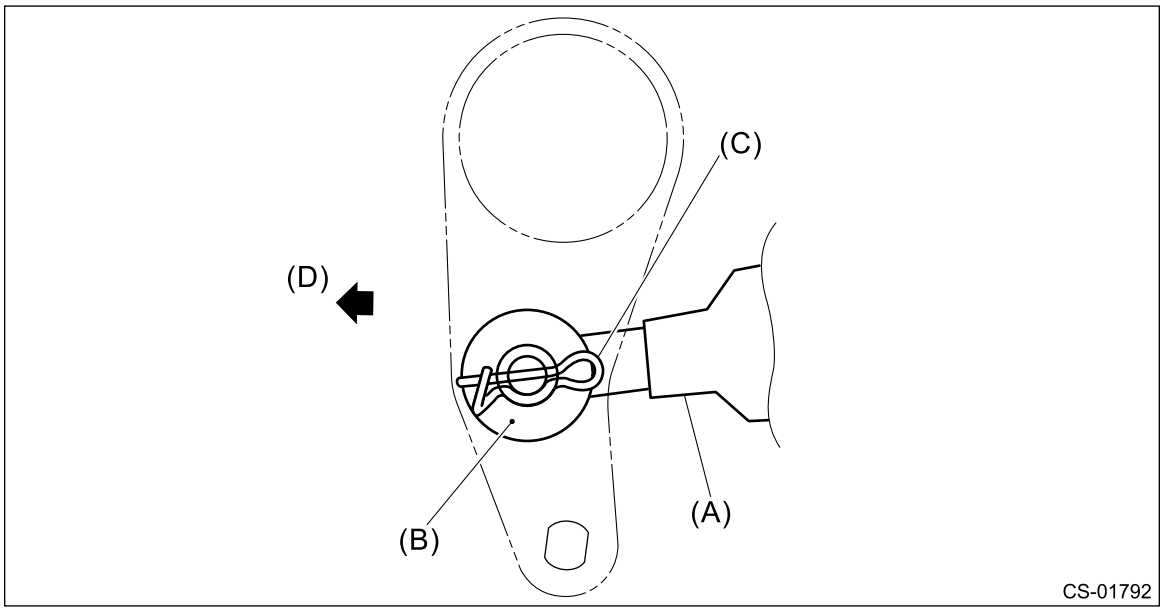


(A) Stay

13. Install the reverse check cable, washer and snap pin.

Note:

Make sure to point the snap pin in an appropriate direction.

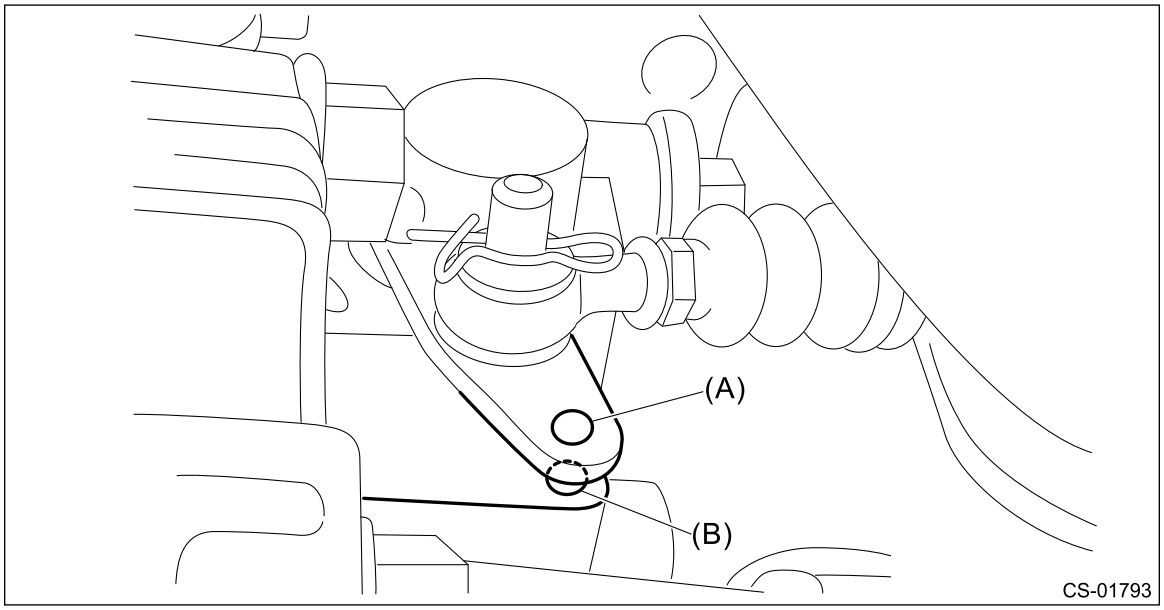


(A) Reverse check cable (C) Snap pin (D) Front side
(B) Washer

14. Make sure the hole of extension case is aligned with that of reverse check lever. If the hole positions are not aligned, return to the step 6) and repeat the adjustment procedures of the reverse check cable.

Note:

- **Check that the M3 bolt goes through the hole of reverse check lever and can be inserted into the hole of extension case.**
- **When checking visually, confirm that the gap of hole positions is 0.5 mm (0.02 in) or less.**

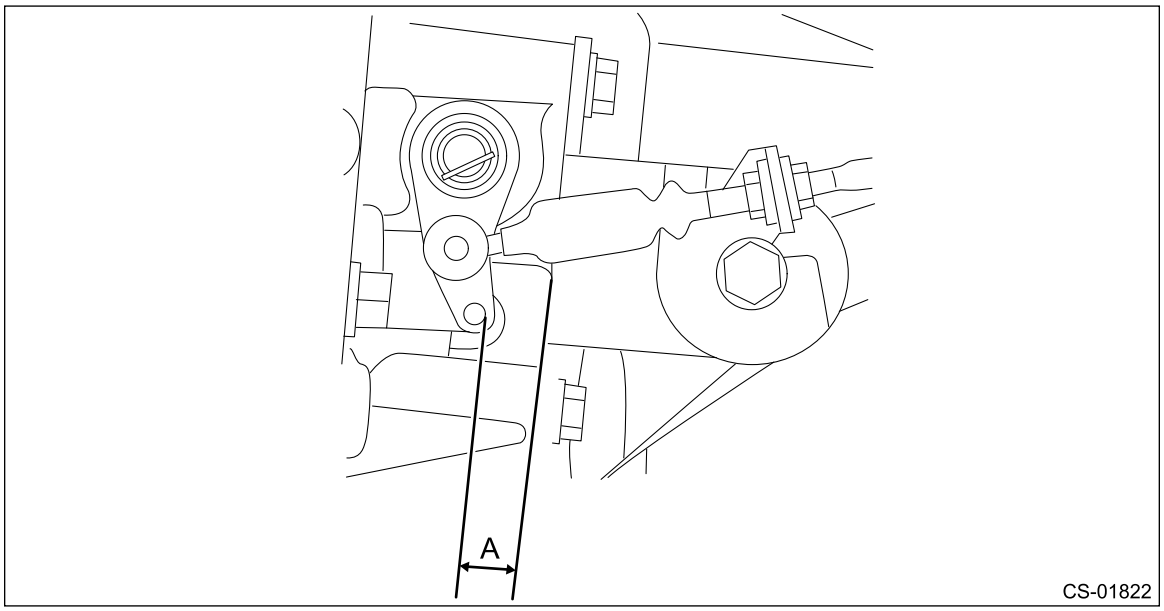


(A) Hole of reverse check lever (B) Hole of extension case

Note:
If the hole positions are not aligned after repeating the reverse check cable adjustment, adjust the cable hole position to the reference standard.
Distance from the shift bracket seating face on transmission side to the hole edge of the reverse check lever "A":

Reference standard

16 mm (0.63 in)



15. Install the crossmember. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Transmission Mounting System>INSTALLATION.

16. Install the center exhaust cover.

Tightening torque:

18 N·m (1.8 kgf-m, 13.3 ft-lb)

17. Install the center exhaust pipe (rear). Ref. to EXHAUST(STI)>Center Exhaust Pipe>INSTALLATION.

18. Connect the battery ground terminal. Ref. to NOTE>NOTE > BATTERY.

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.
	Manual mode can not be set.	Inspect the mode switch and select lever, or inspect the circuit.
MT gear shift lever (STI model)	Cannot shift into reverse.	Adjust the reverse check cable.
	Can shift into reverse when the slider is not pulled up.	Adjust or replace the reverse check cable.
	Slider cannot be pulled up or sticks in the pulled-up position.	• Check the reverse check system of the transmission. • Adjust or replace the reverse check cable.
MT gear shift lever (Except for STI model)	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.

CLUTCH SYSTEM

CL

1. General Description
2. Clutch Disc and Cover
3. Flywheel
4. Release Bearing and Lever
5. Operating Cylinder
6. Master Cylinder
7. Clutch Pipe and Hose
8. Clutch Fluid
9. Clutch Fluid Air Bleeding
10. Clutch Pedal
11. Clutch Switch
12. General Diagnostic Table

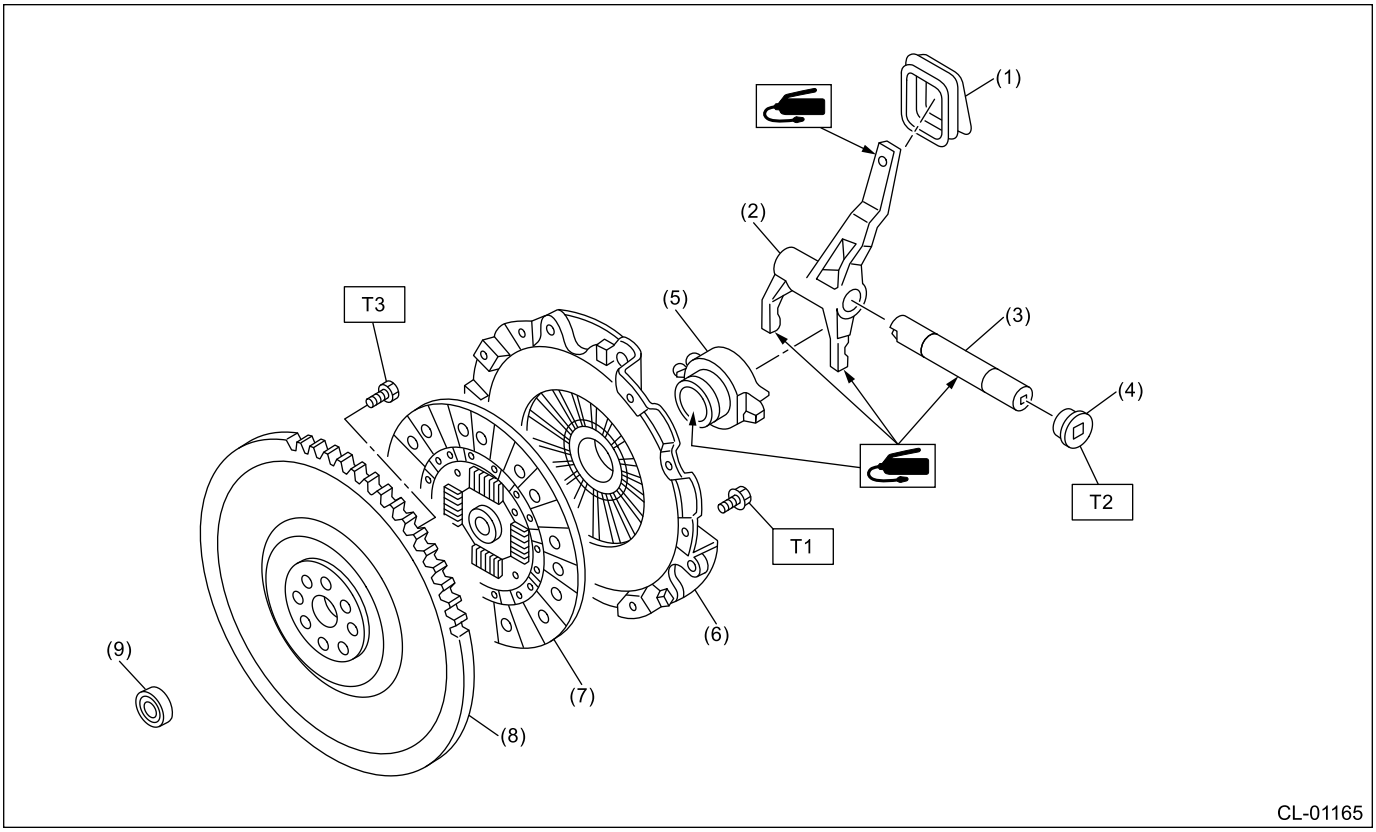
SPECIFICATION

Model			STI	Except for STI
Transmission type			6MT	
Clutch cover	Type		Pull type	Push type
	Diaphragm set load N (kgf, lbf)		9,120 (930, 2051)	8,400 (857, 1889)
Clutch disc	Facing material		Woven (non-asbestos)	
	O.D. × I.D. × Thickness mm (in)	Clutch cover side	240 × 160 × 3.5 (9.45 × 6.30 × 0.138)	
		Flywheel side	240 × 160 × 3.2 (9.45 × 6.30 × 0.126)	
	Spline outer diameter mm (in)		25.2 (0.992), (number of teeth: 24)	
	Depth of rivet head mm (in)	Clutch cover side	1.65 — 2.25 (0.065 — 0.089)	
		Flywheel side	1.35 — 1.95 (0.053 — 0.077)	
		Limit of sinking	0.8 (0.031)	
	Deflection limit mm (in)		0.7 (0.028) at R = 115 (4.53)	
Clutch release lever ratio			1.7	1.6
Release bearing			Grease-packed self-aligning	
Clutch pedal	Full stroke mm (in)		130 — 135 (5.12 — 5.31)	135 — 140 (5.31 — 5.51)
	Free play mm (in)		4 — 11 (0.16 — 0.43)	
Flywheel	Type		Conventional	Flexible

COMPONENT

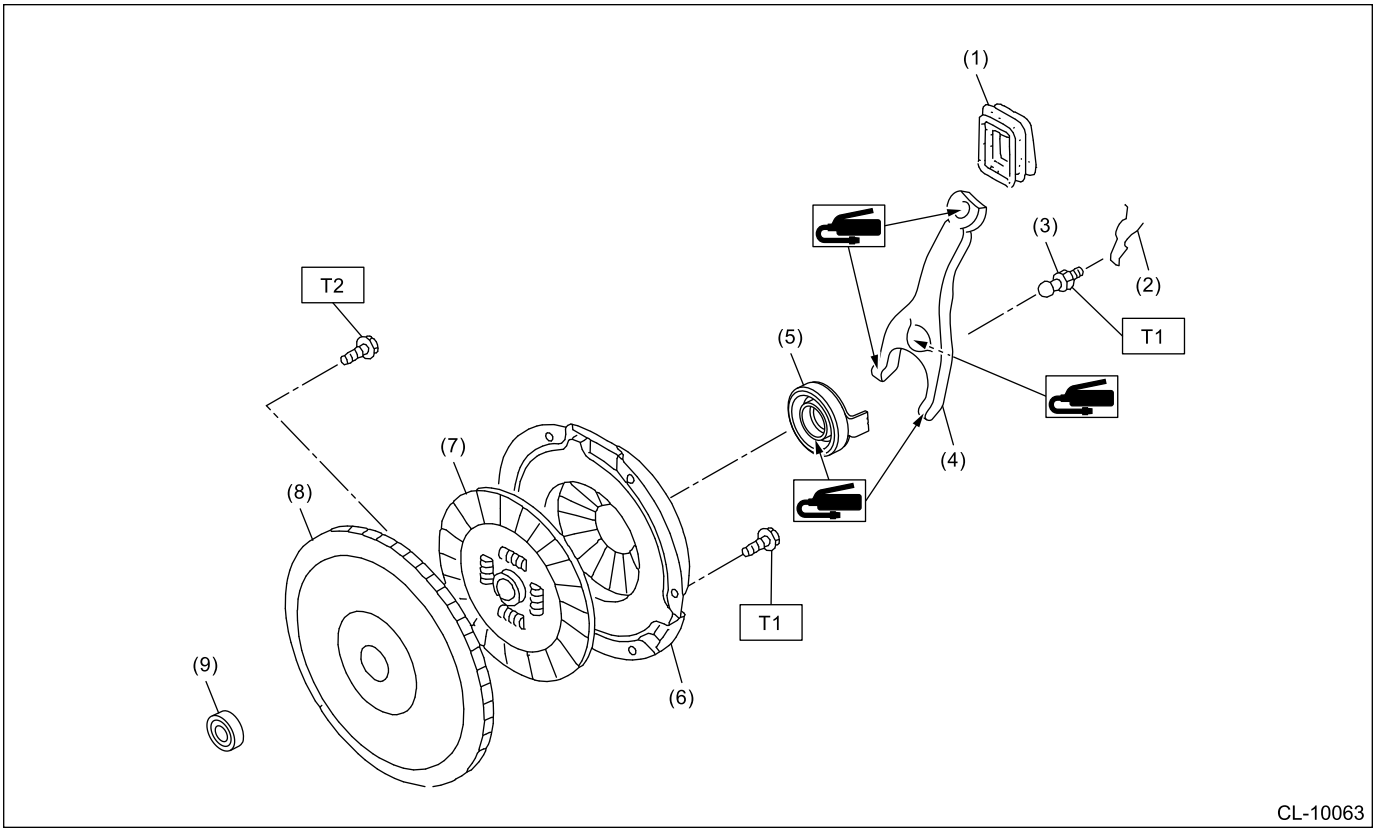
1. CLUTCH ASSEMBLY

- STI model



(1) Dust cover	(6) Clutch cover	***Tightening torque: N·m (kgf-m, ft-lb)***
(2) Release lever	(7) Clutch disc	***T1: 16 (1.6, 11.8)***
(3) Clutch release lever shaft	(8) Conventional flywheel	***T2: 48 (4.9, 35.4)***
(4) Plug	(9) Pilot bearing	***T3: 75 (7.6, 55.3)***
(5) Release bearing		

- Except for STI model



(1) Dust cover
(2) Lever spring
(3) Pivot
(4) Release lever
(5) Release bearing
(6) Clutch cover
(7) Clutch disc
(8) Flexible flywheel
(9) Pilot bearing

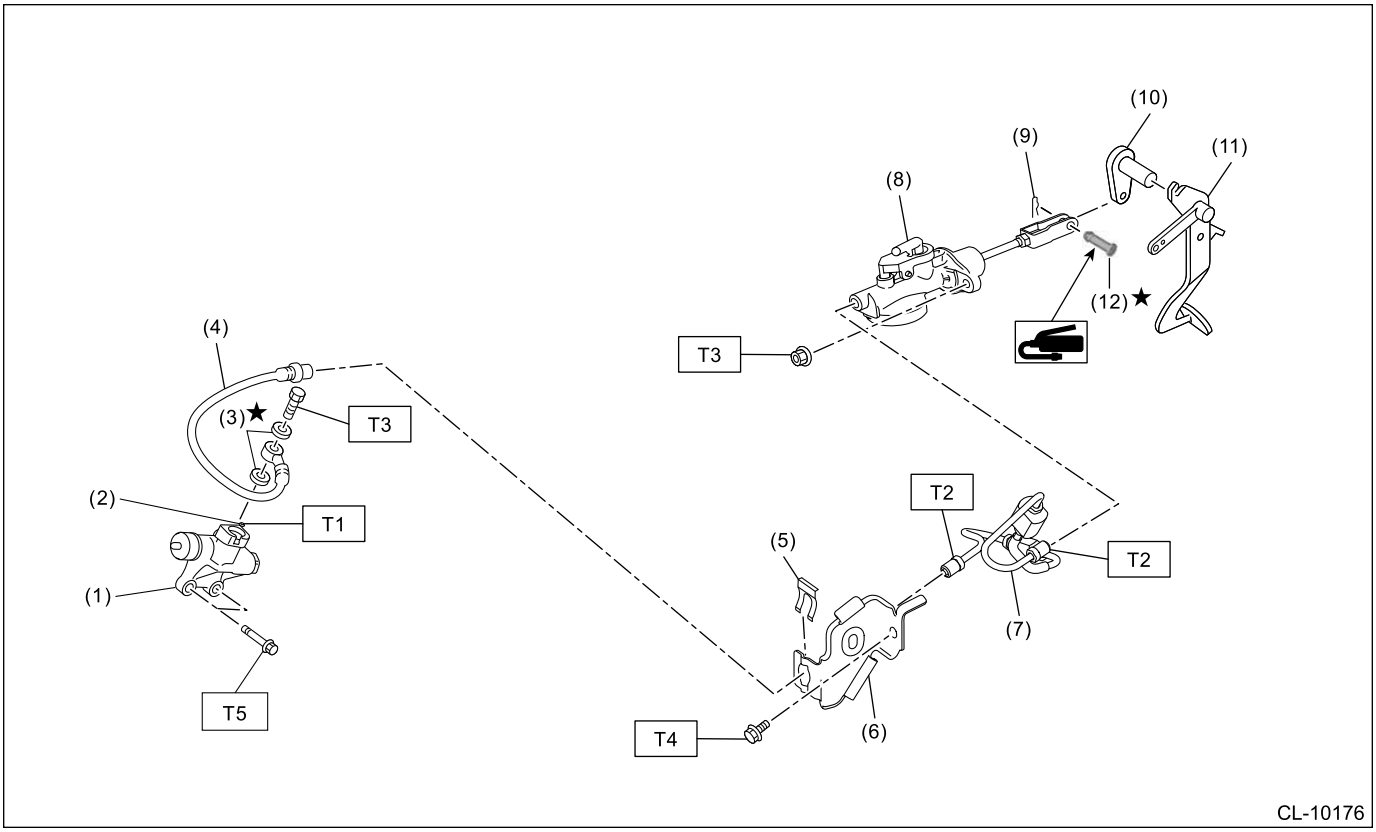
Tightening torque: N·m (kgf-m, ft-lb)

T1: 16 (1.6, 11.8)

T2: Ref. to CLUTCH SYSTEM>Flywheel>INSTALLATION > EXCEPT FOR STI MODEL.

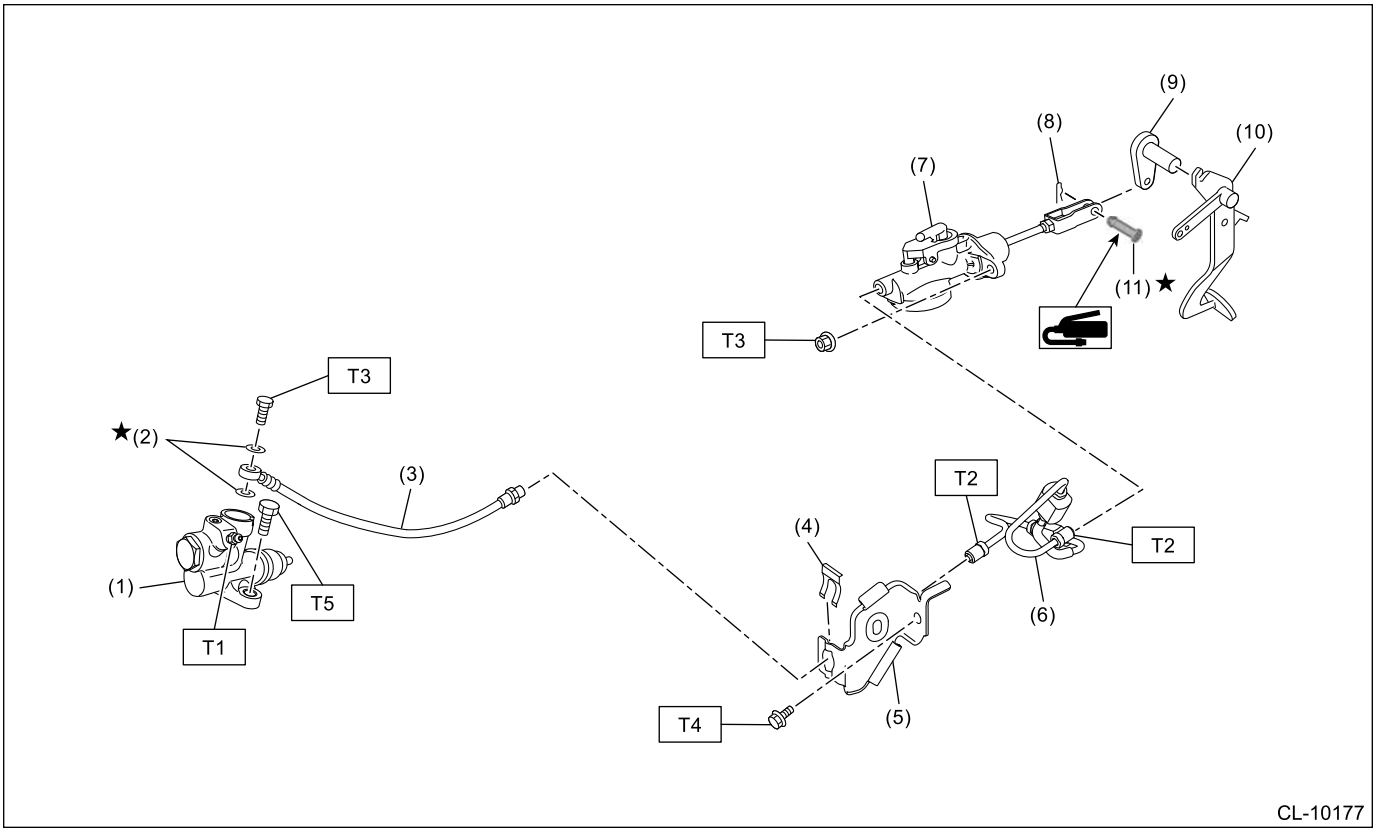
2. CLUTCH PIPE AND HOSE

- STI model



(1) Operating cylinder	(7) Clutch pipe	***Tightening torque: N·m (kgf-m, ft-lb)***
(2) Bleeder screw	(8) Master cylinder ASSY	***T1: 7.8 (0.8, 5.8)***
(3) Gasket	(9) Snap pin	***T2: 15 (1.5, 11.1)***
(4) Clutch hose	(10) Lever	***T3: 18 (1.8, 13.3)***
(5) Clamp	(11) Pedal	***T4: 25 (2.5, 18.4)***
(6) Clutch hose bracket	(12) Clevis pin	***T5: 41 (4.2, 30.2)***

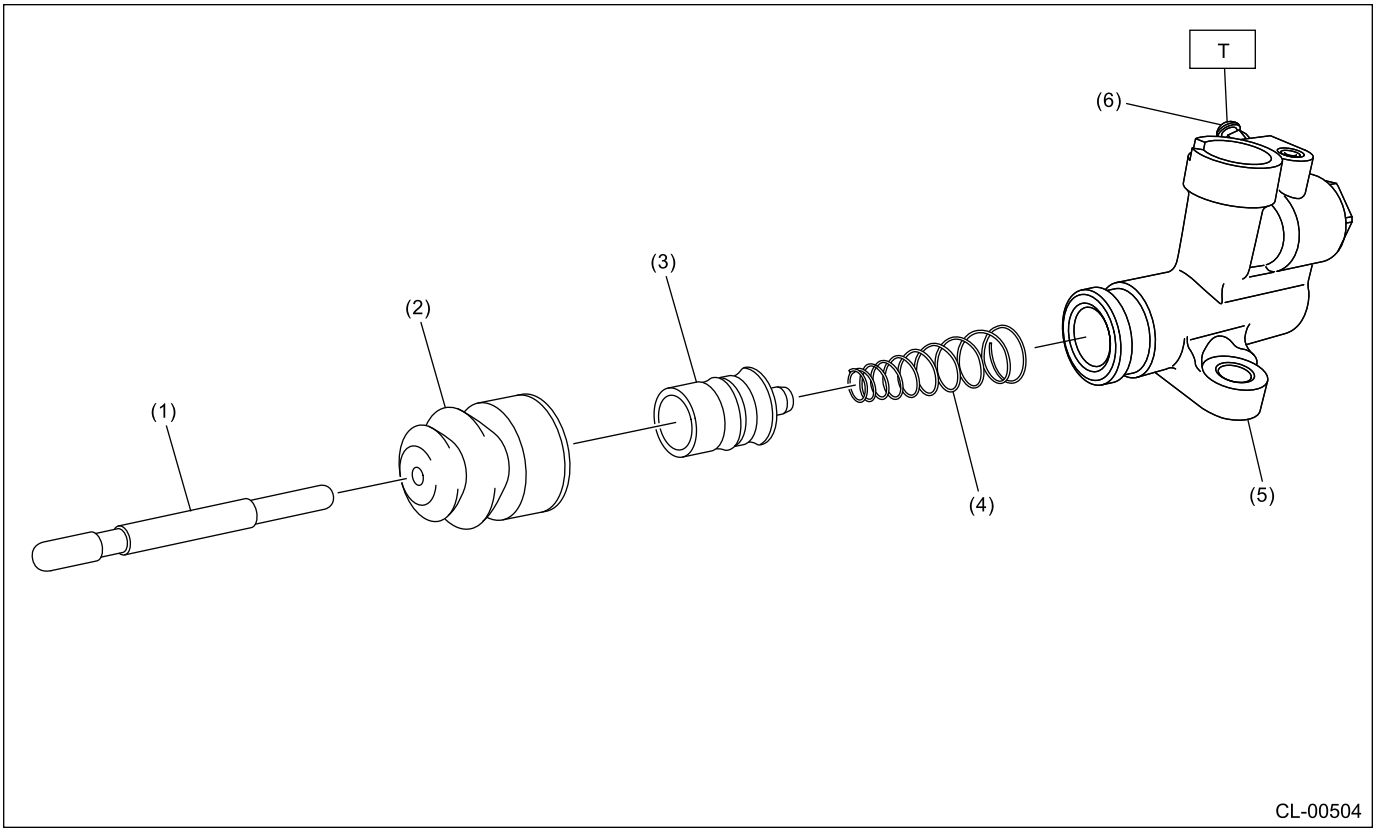
- Except for STI model



(1)	Operating cylinder	(7)	Master cylinder ASSY	***Tightening torque: N·m (kgf-m, ft-lb)***
(2)	Gasket	(8)	Snap pin	***T1: 7.8 (0.8, 5.8)***
(3)	Clutch hose	(9)	Lever	***T2: 15 (1.5, 11.1)***
(4)	Clamp	(10)	Pedal	***T3: 18 (1.8, 13.3)***
(5)	Clutch hose bracket	(11)	Clevis pin	***T4: 25 (2.5, 18.4)***
(6)	Clutch pipe			***T5: 37 (3.8, 27.3)***

3. OPERATING CYLINDER

- Except for STI model

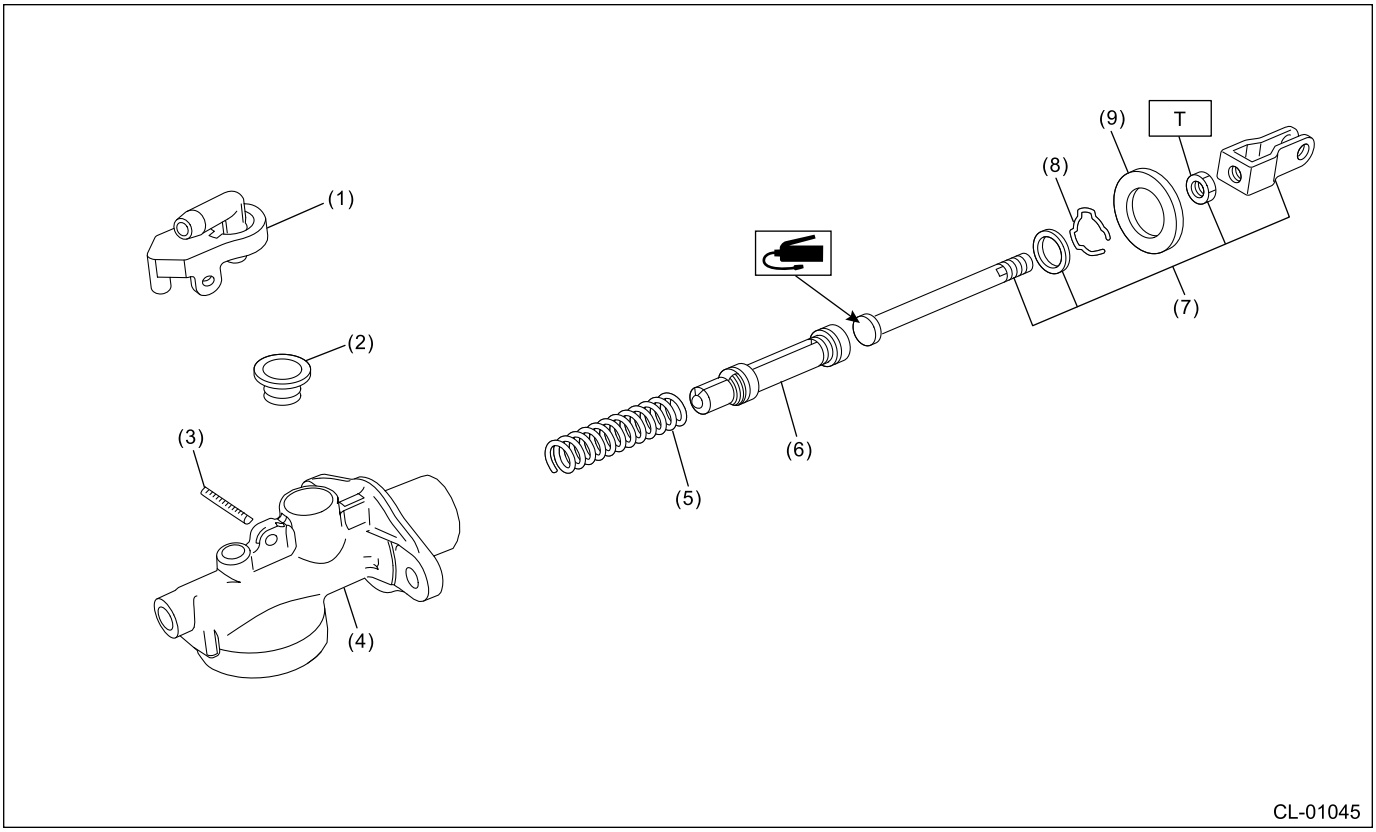


(1) Push rod
(2) Boot
(3) Piston
(4) Piston spring
(5) Operating cylinder
(6) Bleeder screw

Tightening torque: N·m (kgf-m, ft-lb)

T: 7.8 (0.8, 5.8)

4. MASTER CYLINDER

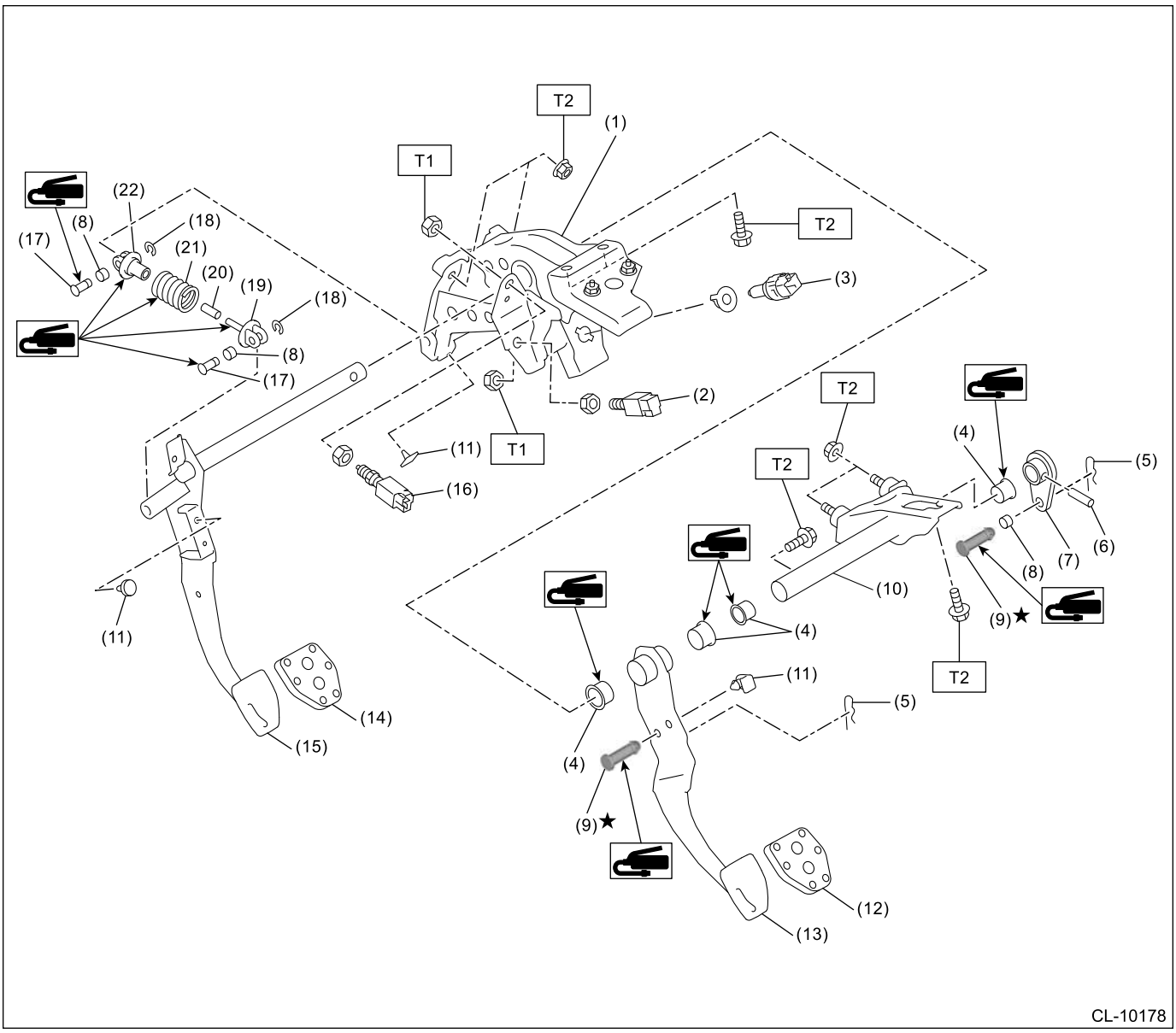


(1) Nipple
(2) Oil seal
(3) Straight pin
(4) Master cylinder
(5) Return spring
(6) Piston
(7) Push rod ASSY
(8) Piston stop ring
(9) Seat

Tightening torque: N·m (kgf-m, ft-lb)

T: 10 (1.0, 7.4)

5. CLUTCH PEDAL



(1) Pedal bracket	(10) Clutch master cylinder bracket	(19) Assist rod A
(2) Clutch switch	(11) Stopper	(20) Assist bushing
(3) Stop light switch	(12) Brake pedal pad (sport type)	(21) Assist spring
(4) Pedal bushing	(13) Brake pedal	(22) Assist rod B
(5) Snap pin	(14) Clutch pedal pad (sport type)	
(6) Spring pin	(15) Clutch pedal	***Tightening torque: N·m (kgf-m, ft-lb)***
(7) Lever	(16) Clutch start switch	***T1: 8 (0.8, 5.9)***
(8) Bushing C	(17) Assist pin	***T2: 18 (1.8, 13.3)***
(9) Clevis pin	(18) Clip	

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.

PREPARATION TOOL

1. SPECIAL TOOL

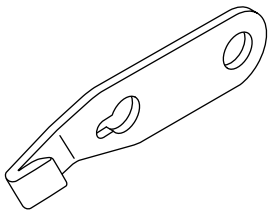
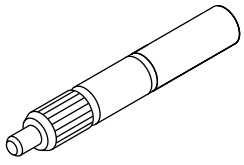
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498497100	498497100	CRANKSHAFT STOPPER	Used for stopping rotation of the flywheel.
 ST-499747100	499747100	CLUTCH DISC GUIDE	Used for installing the clutch disc to the flywheel.

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 STSSM4	—	SUBARU SELECT MONITOR 4	Used for setting of each function and troubleshooting for electrical system. **Note:** **For detailed operation procedures, refer to "Help" for the application.**

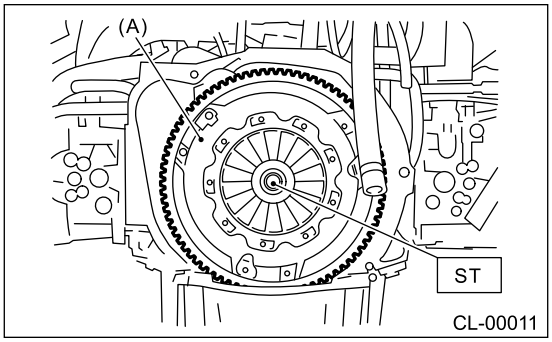
2. GENERAL TOOL

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 installing the flywheel.
DST-i	Used together with Subaru Select Monitor 4.

REMOVAL

1. Remove the transmission assembly.
   6MT (TY75) model:
   Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Manual Transmission Assembly>REMOVAL.
   6MT (TY85) model:
   Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Manual Transmission Assembly>REMOVAL.
2. Attach the ST on the flywheel.

   ST 499747100 CLUTCH DISC GUIDE



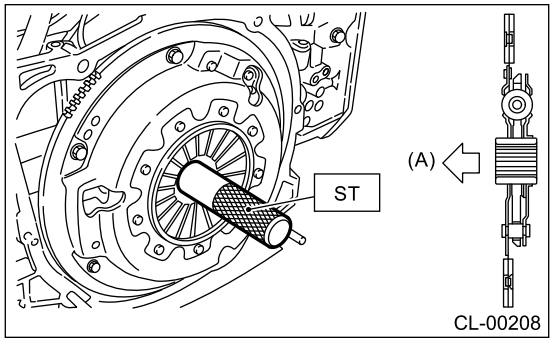
(A) Clutch cover

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.**
4. Remove the release bearing & lever. (Except for STI model) Ref. to CLUTCH SYSTEM>Release Bearing and Lever>REMOVAL > EXCEPT FOR STI MODEL.

INSTALLATION

1. Install the release bearing & lever. (Except for STI model) Ref. to CLUTCH SYSTEM>Release Bearing and Lever>INSTALLATION > EXCEPT FOR STI MODEL.
2. Insert the ST into the clutch disc and attach to the flywheel by inserting the ST end into pilot bearing.
   Note:
   When installing the clutch disc, be careful to attach in the correct direction.

   ST 499747100 CLUTCH DISC GUIDE



(A) Flywheel side

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

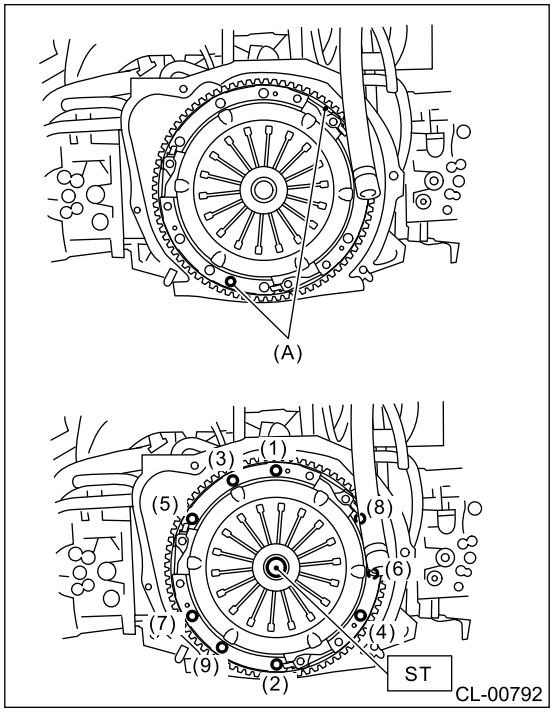
Note:

- **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:

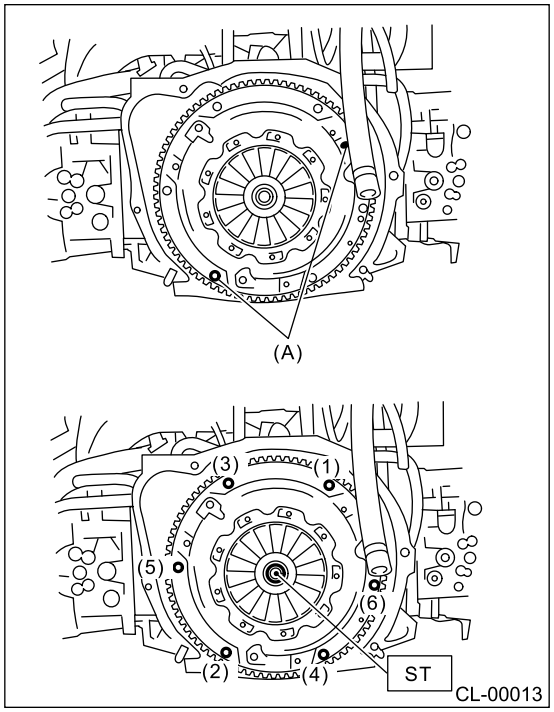
16 N·m (1.6 kgf-m, 11.8 ft-lb)

- STI model



(A) Unbalance mark (paint)

- Except for STI model



(A) Unbalance mark (paint)

4. Remove the ST.

ST 499747100 CLUTCH DISC GUIDE

5. Install the transmission assembly.

6MT (TY75) model:

Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Manual Transmission Assembly>INSTALLATION.

6MT (TY85) model:

Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Manual Transmission Assembly>INSTALLATION.

CLUTCH SYSTEM > Clutch Disc and Cover

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.

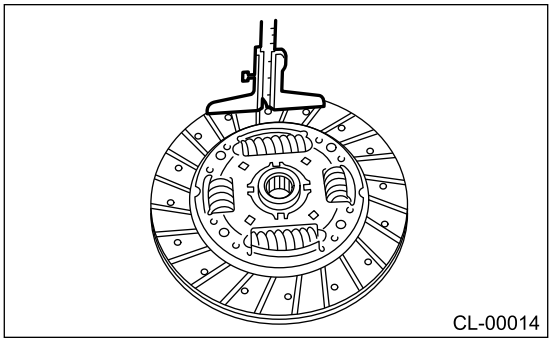
Depth to rivet head:

Limit of sinking

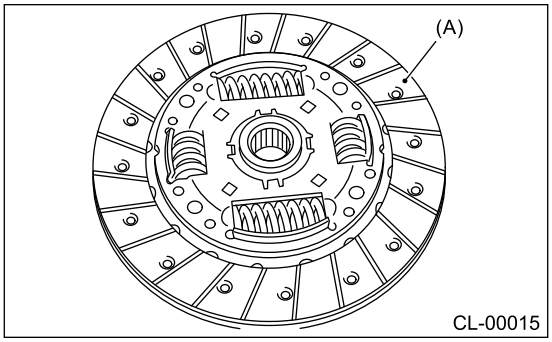
0.8 mm (0.031 in)

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.



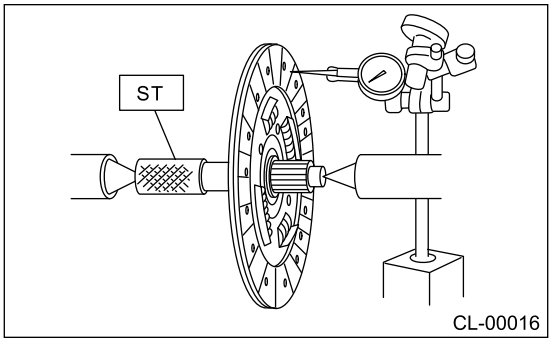
(A) Clutch facing

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

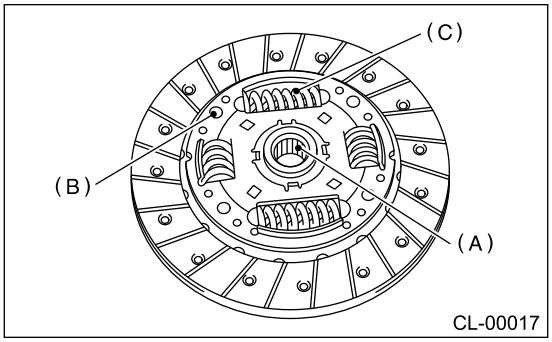
ST 499747100 CLUTCH DISC GUIDE

Limit for deflection:

0.7 mm (0.028 in) at R = 115 mm (4.53 in)



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



(A) Spline

(B) Rivet

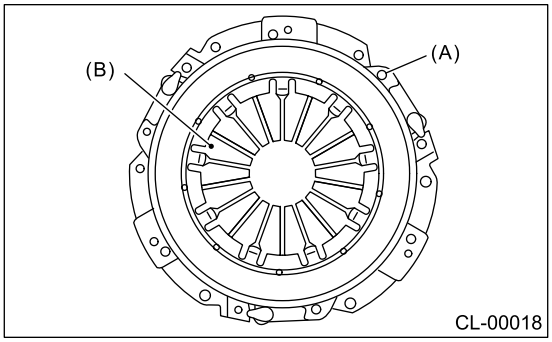
(C) Damper spring

2. CLUTCH COVER

Note:

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

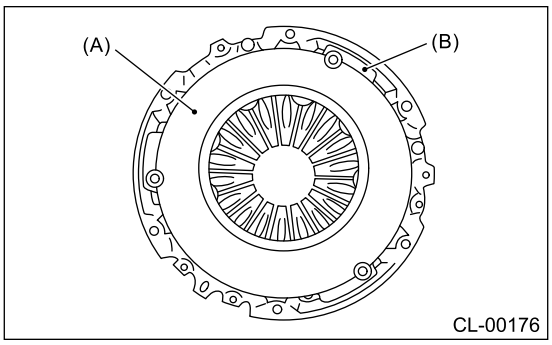
1. Loose thrust rivet
2. Damaged or worn bearing contact area at the center of diaphragm spring



(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

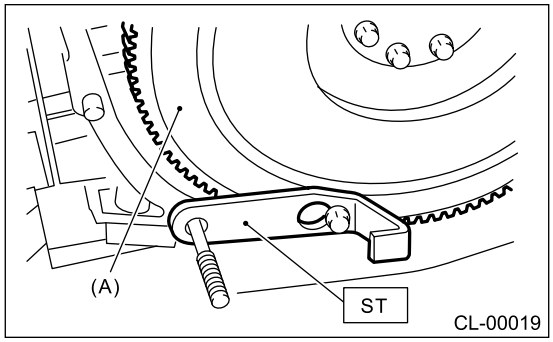
(B) Strap plate

CLUTCH SYSTEM > Flywheel

REMOVAL

1. Remove the transmission assembly.
   6MT (TY75) model:
   Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Manual Transmission Assembly>REMOVAL.
   6MT (TY85) model:
   Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Manual Transmission Assembly>REMOVAL.
2. Remove the clutch cover and clutch disc. Ref. to CLUTCH SYSTEM>Clutch Disc and Cover>REMOVAL.
3. Using the ST, remove the flywheel.

   ST 498497100 CRANKSHAFT STOPPER



(A) Flywheel

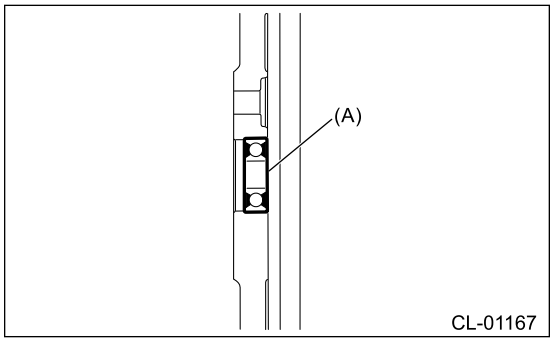
4. Drive out the pilot bearing from the flywheel.

CLUTCH SYSTEM > Flywheel

INSTALLATION

1. STI MODEL

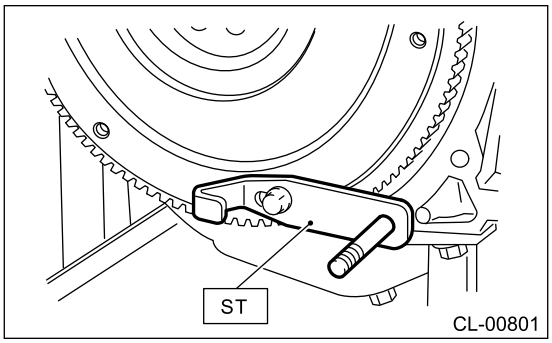
1. Press in a new pilot bearing to the position where it is flush with the flywheel surface or up to 0.4 mm (0.016 in) deeper than that.
   Caution:
   Do not press the bearing inner ring.



(A) Pilot bearing

2. Install the flywheel and ST.

ST 498497100 CRANKSHAFT STOPPER



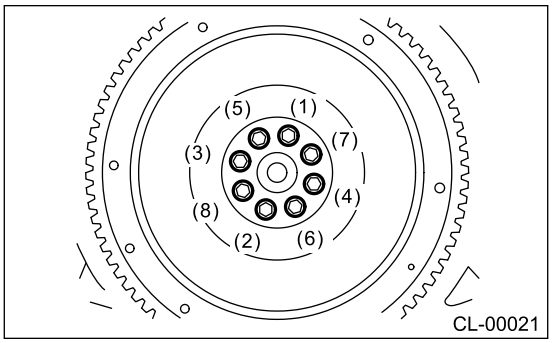
3. Tighten the flywheel mounting bolts to the specified torque.

Note:

Tighten the flywheel attachment bolts gradually. Each bolt should be tightened to the specified torque in a crisscross order.

Tightening torque:

75 N·m (7.6 kgf-m, 55.3 ft-lb)



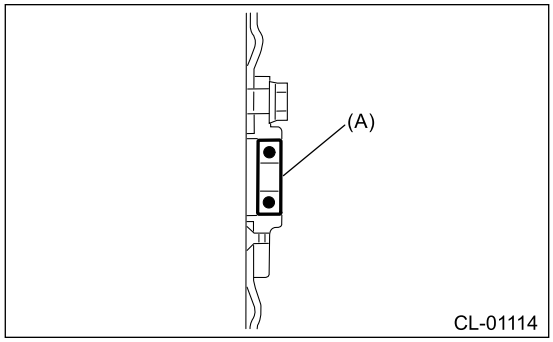
4. Install the clutch disc and clutch cover. Ref. to CLUTCH SYSTEM>Clutch Disc and Cover>INSTALLATION.
5. Install the transmission assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Manual Transmission Assembly>INSTALLATION.

2. EXCEPT FOR STI MODEL

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

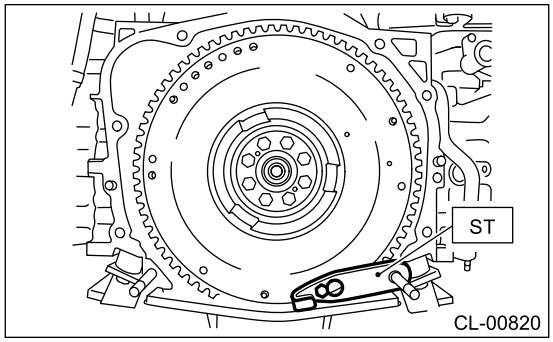
2. Temporarily install the crankshaft position sensor plate and flywheel.

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

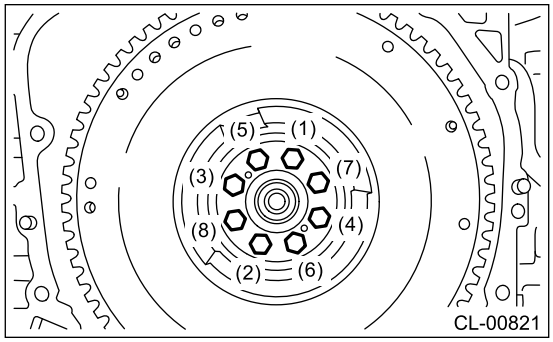


4. Tighten the flywheel mounting bolts in two stages.

(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:

30° — 35°

5. Install the clutch disc and clutch cover. Ref. to CLUTCH SYSTEM>Clutch Disc and Cover>INSTALLATION.

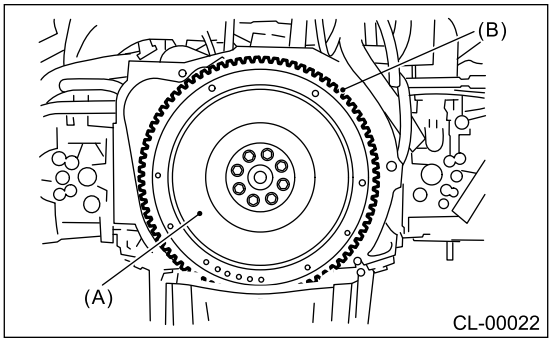
6. Install the transmission assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT) (TY75)>Manual Transmission Assembly>INSTALLATION.

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.



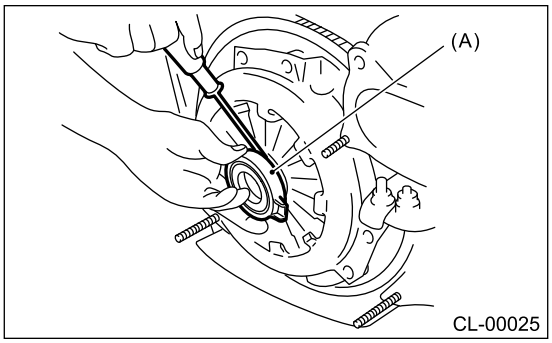
(A) Flywheel
(B) Ring gear

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.

REMOVAL

1. STI MODEL

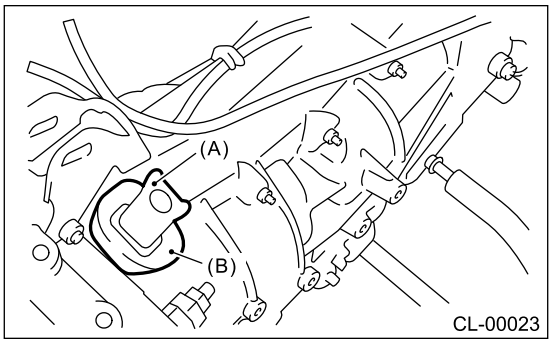
1. Remove the transmission assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT) (TY85)>Manual Transmission Assembly>REMOVAL.
2. Remove the release lever from the transmission.
3. Using a flat tip screwdriver, remove the release bearing from the clutch cover.



(A) Release bearing

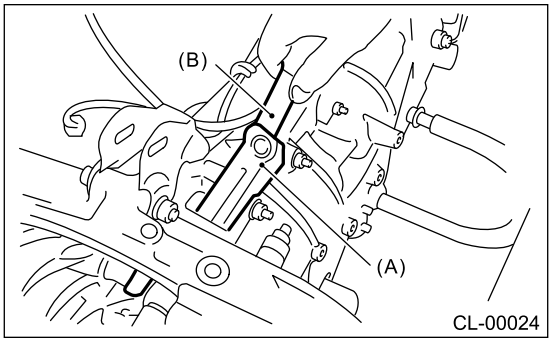
2. EXCEPT FOR STI MODEL

1. Remove the transmission assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT) (TY75)>Manual Transmission Assembly>REMOVAL.
2. Remove the dust cover.



(A) Release lever
(B) Dust cover

3. Remove the attachment point of lever spring by inserting a screwdriver through the clutch housing release lever hole. Then remove the release lever together with the release bearing.



(A) Release lever

(B) Screwdriver

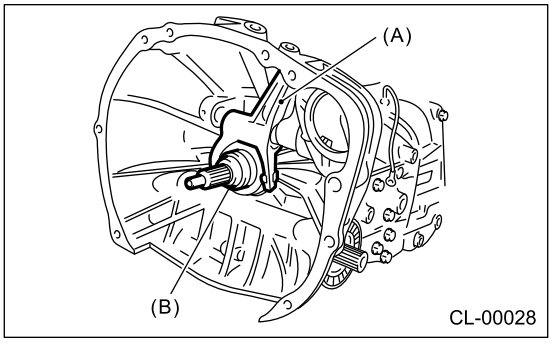
4. Separate the release lever and the release bearing.

CLUTCH SYSTEM > Release Bearing and Lever

INSTALLATION

1. STI MODEL

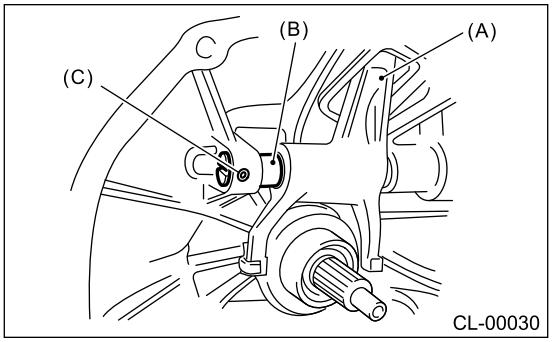
1. Apply grease to the release lever shaft, the contact surface of the release lever and release bearing, and the contact surface of the release bearing and release bearing guide.
   Grease:
   NICHIMOLY N-130 or equivalent
2. Attach the release bearing to the transmission.
3. Insert the release lever into the release bearing tab.



(A) Release lever

(B) Release bearing

4. Insert the release lever shaft into the release lever.
   Note:
   Make sure the cut portion of the release lever shaft comes into contact with the spring pin.



(A) Release lever

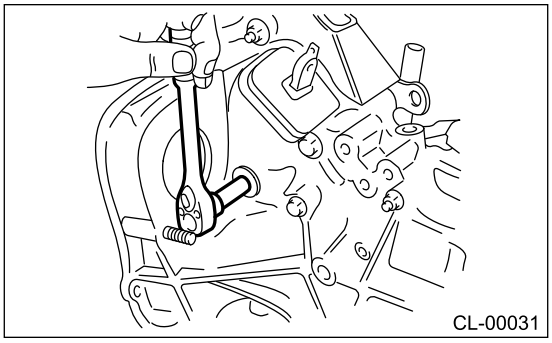
(B) Release lever shaft

(C) Spring pin

5. Tighten the plugs.

Tightening torque:

48 N·m (4.9 kgf-m, 35.4 ft-lb)



6. Operate the release lever and check if the release bearing moves smoothly.

7. Apply grease to the contact surface of the release lever and operating cylinder.

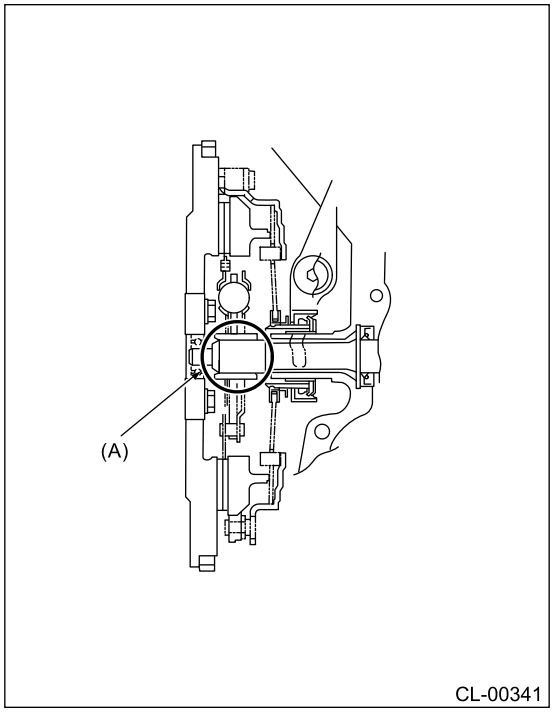
Grease:

NICHIMOLY N-130 or equivalent

8. Apply grease to the transmission main shaft spline.

Grease:

NICHIMOLY N-130 or equivalent

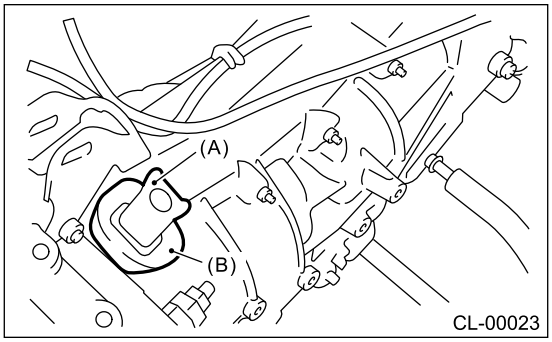


(A) Transmission main shaft spline

9. Install the transmission assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT) (TY85)>Manual Transmission Assembly>INSTALLATION.

2. EXCEPT FOR STI MODEL

1. Apply grease of 0.5 to 0.8 g (0.02 to 0.03 oz) to the contact surface (dented portion) of the release lever and pivot.
   Grease:
   NICHIMOLY N-130 or equivalent
2. Apply 0.2 g (0.01 oz) of grease to the contact surface (dented portion) of the release lever and operating cylinder.
   Grease:
   NICHIMOLY N-130 or equivalent
3. Apply grease to the transmission main shaft spline, the contact surface of the release lever and release bearing, and the contact surface of the release bearing and transmission case.
   Grease:
   NICHIMOLY N-130 or equivalent
4. Install the release bearing by inserting the release lever into the clutch housing release lever hole. Then, fit the lever spring onto the raised portion of the pivot by pushing the release lever to the pivot and twisting it to both sides.
5. Install the dust cover.



(A) Release lever

(B) Dust cover

6. Operate the release lever and check if the release bearing moves smoothly.
7. Install the transmission assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Manual Transmission Assembly>INSTALLATION.

CLUTCH SYSTEM > Release Bearing and Lever

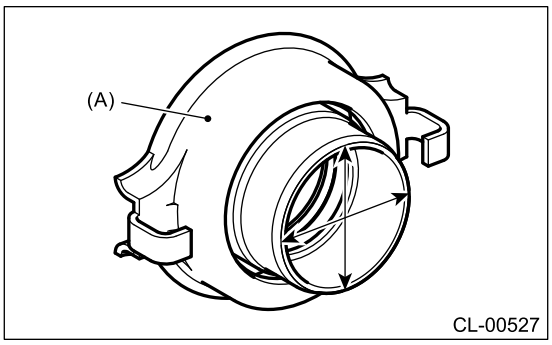
INSPECTION

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.

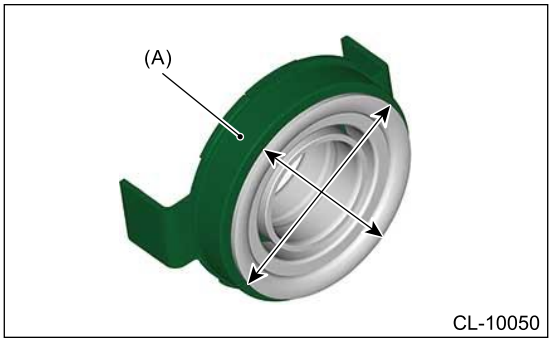
1. Check the bearing for smooth movement by applying force to the bearing in the radial direction.
   Radial direction stroke:
   1.6 mm (0.063 in) or more

- **STI model**



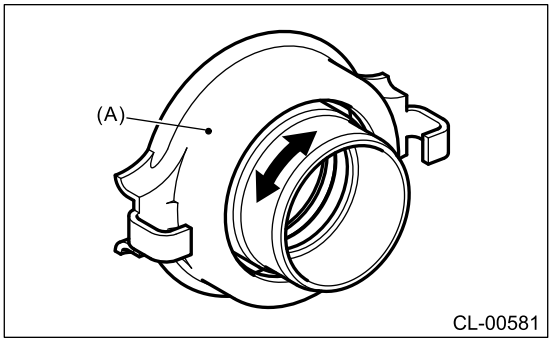
(A) Bearing case

- **Except for STI model**



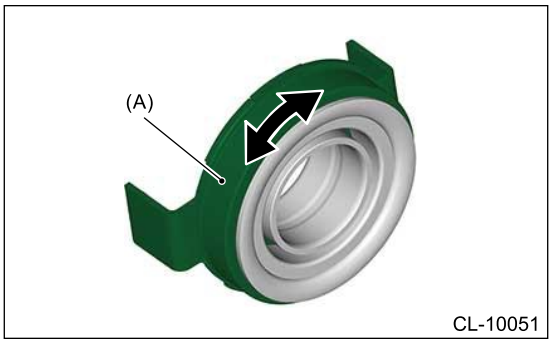
(A) Bearing case

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



(A) Bearing case

   - **Except for STI model**



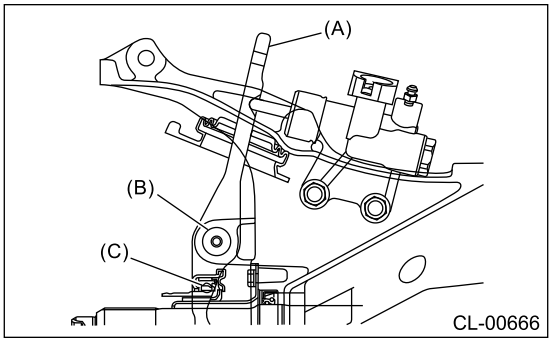
(A) Bearing case

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

2. RELEASE LEVER

Check for wear in release shaft contact area and release bearing case contact area of the lever.

- **STI model**

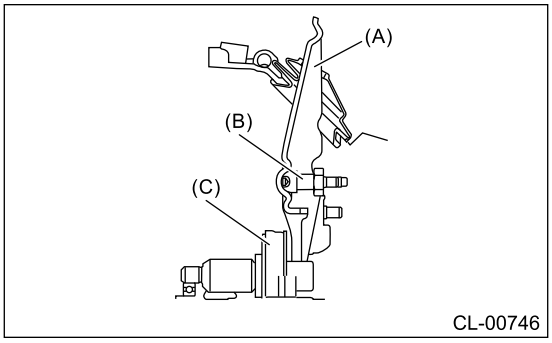


(A) Release lever

(B) Release shaft

(C) Release bearing

- **Except for STI model**



(A) Release lever

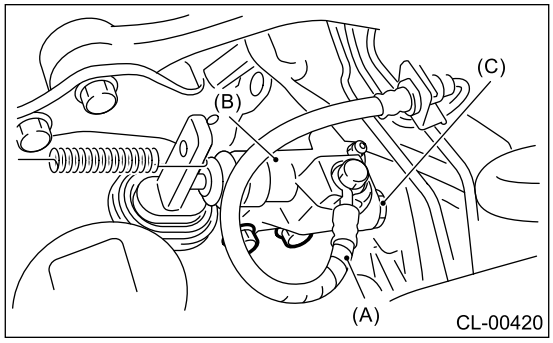
(B) Pivot

(C) Release bearing

REMOVAL

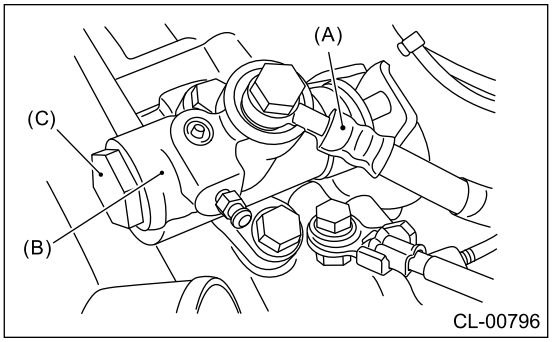
Caution:
Brake fluid spilled on the vehicle body will harm the paint surface; therefore, wash it off with water and wipe clean quickly if spilled.

1. Disconnect the ground terminal from battery. Ref. to NOTE>NOTE > BATTERY.
   Note:
   For models other than STI model, disconnect the ground terminal from battery sensor.
2. Remove the collector cover. (Except for STI model) Ref. to INTAKE (INDUCTION)(w/o STI)>Collector Cover>REMOVAL.
3. Remove the intercooler.
   STI model:
   Ref. to INTAKE (INDUCTION)(STI)>Intercooler>REMOVAL.
   Except for STI model:
   Ref. to INTAKE (INDUCTION)(w/o STI)>Intercooler>REMOVAL.
4. Remove the starter. (STI model) Ref. to STARTING/CHARGING SYSTEMS(STI)>Starter>REMOVAL.
5. Disconnect the clutch hose.
   Caution:
   - **Cover the hose joint to prevent the brake fluid from flowing out.**
   - **Do not loosen or remove the cap bolts.**
   - STI model



(A) Clutch hose
(B) Operating cylinder
(C) Cap bolt

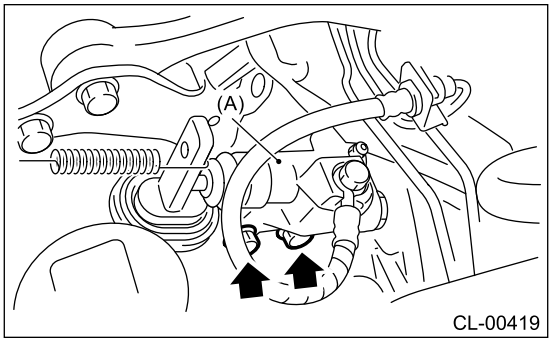
- Except for STI model



(A) Clutch hose
(B) Operating cylinder
(C) Cap bolt

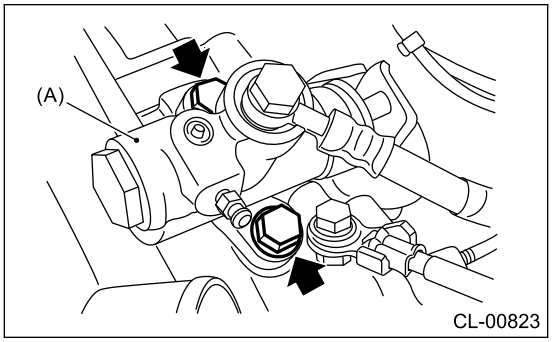
6. Remove the operating cylinder.

- STI model



(A) Operating cylinder

- Except for STI model



(A) Operating cylinder

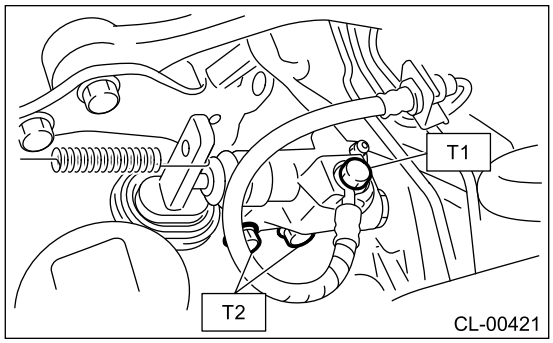
CLUTCH SYSTEM > Operating Cylinder

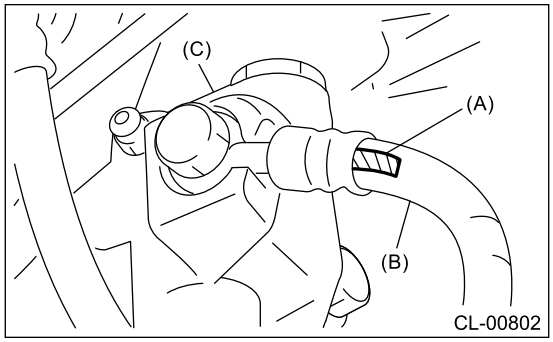
INSTALLATION

1. Install in the reverse order of removal.

Note:

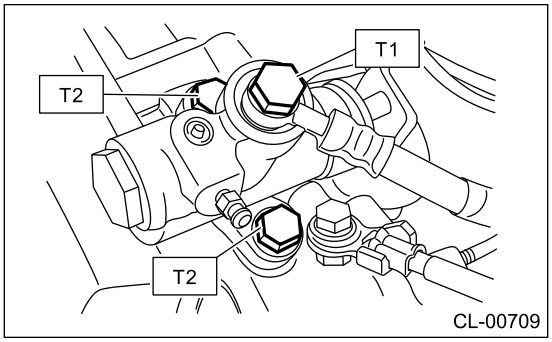
- **Use a new gasket.**
- **Before installing the operating cylinder, apply grease to the contact point of the release lever and operating cylinder.**
  Grease:
  NICHIMOLY N-130 or equivalent
- **Be sure to install the clutch hose with the mark side facing upward.**
- **Be careful not to twist the clutch hose during installation.**
- STI model
  Tightening torque:
  T1: 18 N·m (1.8 kgf-m, 13.3 ft-lb)
  T2: 41 N·m (4.2 kgf-m, 30.2 ft-lb)

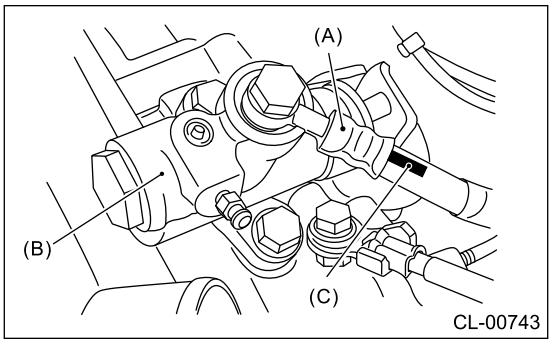




(A) Mark
(B) Clutch hose
(C) Operating cylinder

- Except for STI model
  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) Clutch hose
(B) Operating cylinder
(C) Mark

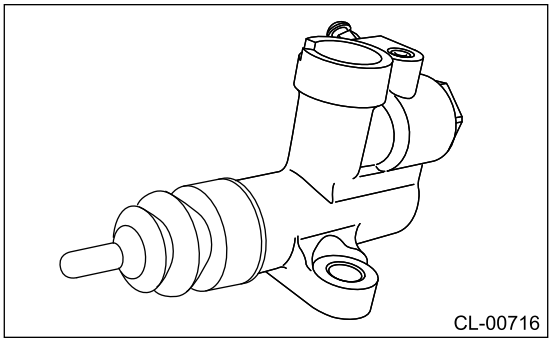
2. After bleeding air from the operating cylinder, ensure that the clutch operates properly.
Ref. to CLUTCH SYSTEM>Clutch Fluid Air Bleeding.

CLUTCH SYSTEM > Operating Cylinder

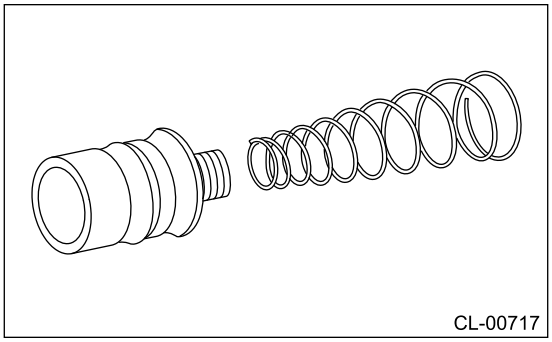
DISASSEMBLY

Caution:
Do not disassemble the STI model.

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.



CLUTCH SYSTEM > Operating Cylinder

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

CLUTCH SYSTEM > Operating Cylinder

INSPECTION

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

REMOVAL

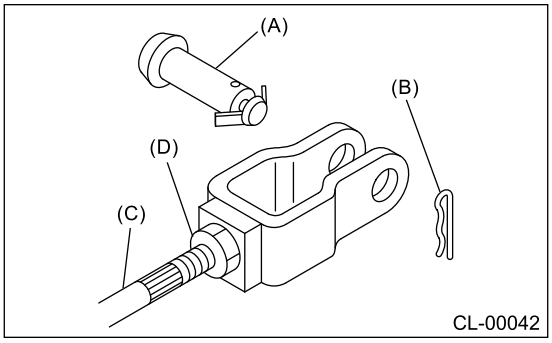
Caution:

- **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 terminal from battery and wait for at least 60 seconds before starting work. Ref. to NOTE>NOTE > BATTERY.

   Note:

   For models other than STI model, disconnect the ground terminal from battery sensor.
3. Remove the collector cover. (Except for STI model) Ref. to INTAKE (INDUCTION)(w/o STI)>Collector Cover>REMOVAL.
4. Drain the brake fluid. Ref. to CLUTCH SYSTEM>Clutch Fluid.
5. Remove the instrument panel lower cover. Ref. to EXTERIOR/INTERIOR TRIM>Instrument Panel Lower Cover>REMOVAL.
6. Remove the knee airbag module. Ref. to AIRBAG SYSTEM>Knee Airbag Module>REMOVAL.
7. Remove the snap pin and clevis pin, and then separate the push rod of the master cylinder.



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

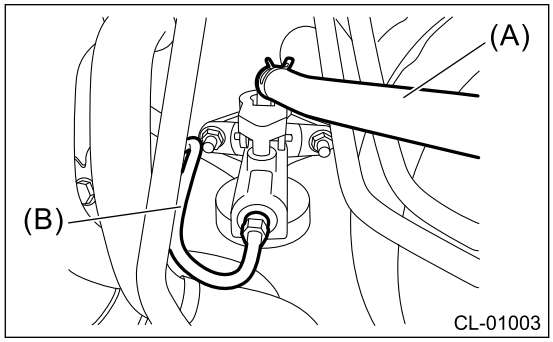
8. Remove the intercooler.

   STI model:

   Ref. to INTAKE (INDUCTION)(STI)>Intercooler>REMOVAL.

   Except for STI model:

   Ref. to INTAKE (INDUCTION)(w/o STI)>Intercooler>REMOVAL.
9. Disconnect the clutch pipe and reservoir hose.

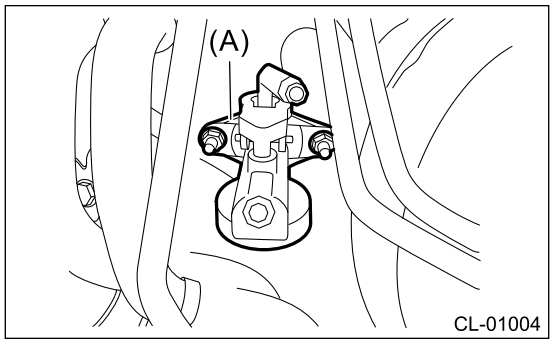


(A) Reservoir hose

(B) Clutch pipe

10. Remove the clutch hose bracket from the bulkhead.

11. Remove the master cylinder.



(A) Master cylinder

CLUTCH SYSTEM > Master Cylinder

INSTALLATION

1. Attach the clutch hose bracket to the bulkhead.

Tightening torque:

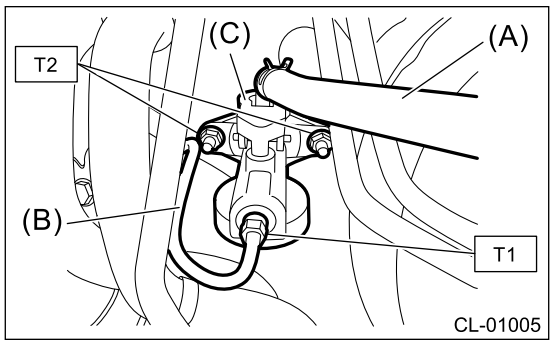
25 N·m (2.5 kgf-m, 18.4 ft-lb)

2. Install the master cylinder to the body, and connect the clutch pipe and the reservoir 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)

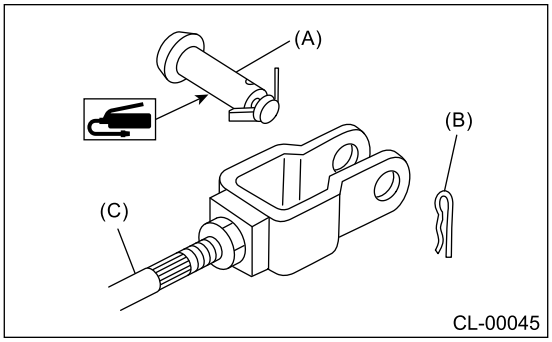


(A) Reservoir hose

(B) Clutch pipe

(C) Master cylinder

3. 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

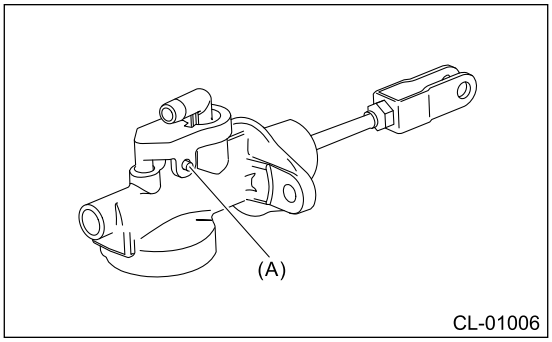
(C) Push rod

4. Install the knee airbag module. Ref. to AIRBAG SYSTEM>Knee Airbag Module>INSTALLATION.
5. Add recommended brake fluid. Ref. to CLUTCH SYSTEM>Clutch Fluid.
6. After bleeding air from the clutch system, ensure that the clutch operates properly. Ref. to CLUTCH SYSTEM>Clutch Fluid Air Bleeding.
7. Install the instrument panel lower cover. Ref. to EXTERIOR/INTERIOR TRIM>Instrument Panel Lower Cover>INSTALLATION.
8. Install the intercooler.
   STI model:
   Ref. to INTAKE (INDUCTION)(STI)>Intercooler>INSTALLATION.
   Except for STI model:
   Ref. to INTAKE (INDUCTION)(w/o STI)>Intercooler>INSTALLATION.
9. Install the collector cover. (Except for STI model) Ref. to INTAKE (INDUCTION)(w/o STI)>Collector Cover>INSTALLATION.
10. Connect the battery ground terminal. Ref. to NOTE>NOTE > BATTERY.
    Note:
    For models other than STI model, connect the ground terminal to battery sensor.

CLUTCH SYSTEM > Master Cylinder

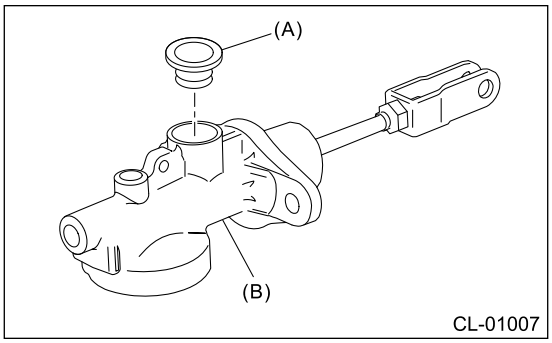
DISASSEMBLY

1. Remove the straight pin and nipple.



(A) Straight pin

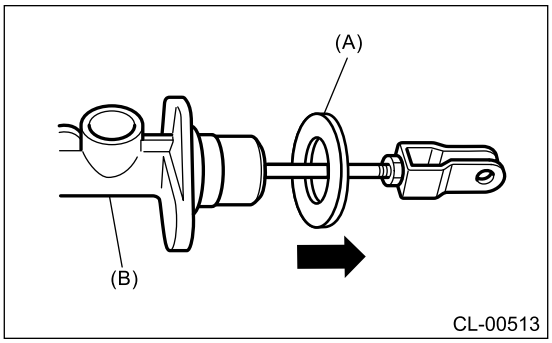
2. Remove the oil seal.



(A) Oil seal

(B) Master cylinder

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.

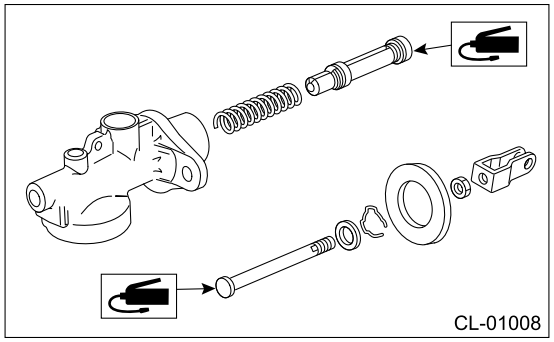
CLUTCH SYSTEM > Master Cylinder

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.

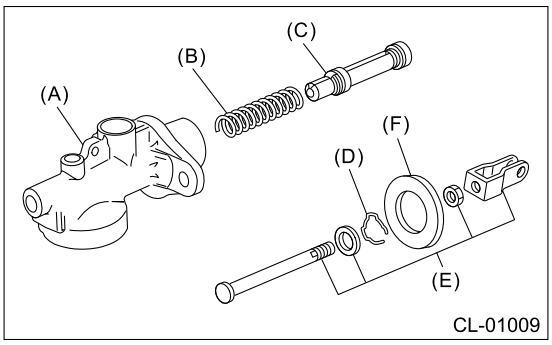
Tightening torque:

10 N·m (1.0 kgf-m, 7.4 ft-lb)

CLUTCH SYSTEM > Master Cylinder

INSPECTION

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



(A) Master cylinder body

(B) Return spring

(C) Piston

(D) Piston stop ring

(E) Push rod ASSY

(F) Seat

CLUTCH SYSTEM > Clutch Pipe and Hose

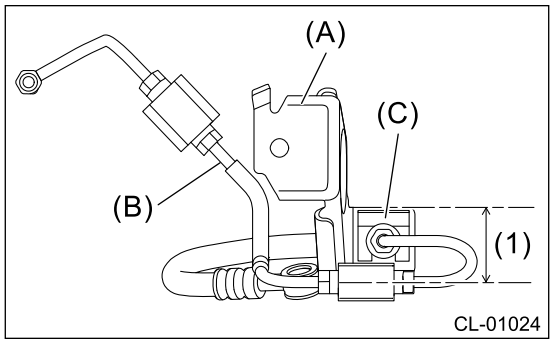
REMOVAL

1. Disconnect the ground terminal from battery. Ref. to NOTE>NOTE > BATTERY.
   Note:
   For models other than STI model, disconnect the ground terminal from battery sensor.
2. Remove the collector cover. (Except for STI model) Ref. to INTAKE (INDUCTION)(w/o STI)>Collector Cover>REMOVAL.
3. Remove the intercooler.
   STI model:
   Ref. to INTAKE (INDUCTION)(STI)>Intercooler>REMOVAL.
   Except for STI model:
   Ref. to INTAKE (INDUCTION)(w/o STI)>Intercooler>REMOVAL.
4. Drain the brake fluid. Ref. to CLUTCH SYSTEM>Clutch Fluid.
5. Remove the clutch pipe from the master cylinder.
6. Disconnect the hose from operating cylinder.
7. Remove the clutch hose bracket from the bulkhead.
8. Remove the clutch pipe from the clutch hose.
9. Remove the clutch pipe and clamp from the clutch hose bracket.

CLUTCH SYSTEM > Clutch Pipe and Hose

INSTALLATION

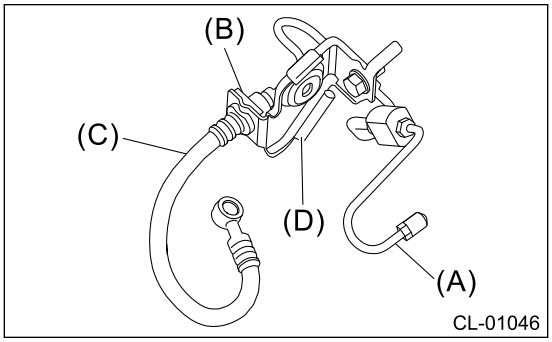
1. Install the clutch hose and clamp to the clutch hose bracket.
   Note:
   Be sure to install the clutch hose with the mark side facing towards vehicle top.
2. Connect the clutch pipe to the clutch hose.
   Tightening torque:
   15 N·m (1.5 kgf-m, 11.1 ft-lb)



(A) Clutch hose bracket
(B) Clutch pipe
(C) Clamp
(1) Attach the clutch pipe in parallel to the clutch hose bracket as shown in the figure.

3. Attach the clutch hose bracket to the bulkhead.

Tightening torque:
25 N·m (2.5 kgf-m, 18.4 ft-lb)



(A) Clutch pipe
(B) Clamp
(C) Clutch hose
(D) Clutch hose bracket

4. Connect the clutch hose to the operating cylinder.
Note:
- **Use a new gasket.**
- **Be sure to install the clutch hose with the mark side facing upward.**
- **Be careful not to twist the clutch hose during installation.**

Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)
5. Connect the clutch pipes to the master cylinder.
Tightening torque:
15 N·m (1.5 kgf-m, 11.1 ft-lb)
6. Bleed air from brake fluid. Ref. to CLUTCH SYSTEM>Clutch Fluid Air Bleeding.
7. Install the intercooler.
STI model:
Ref. to INTAKE (INDUCTION)(STI)>Intercooler>INSTALLATION.
Except for STI model:
Ref. to INTAKE (INDUCTION)(w/o STI)>Intercooler>INSTALLATION.
8. Install the collector cover. (Except for STI model) Ref. to INTAKE (INDUCTION)(w/o STI)>Collector Cover>INSTALLATION.
9. Connect the battery ground terminal. Ref. to NOTE>NOTE > BATTERY.
Note:
For models other than STI model, connect the ground terminal to battery sensor.

CLUTCH SYSTEM > Clutch Pipe and Hose

INSPECTION

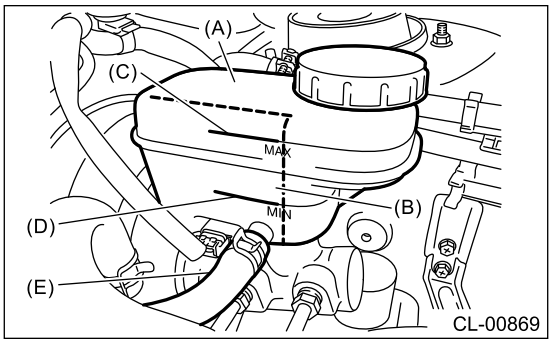
Check the pipes and hoses for breaks and damage. Check the joint for brake fluid leakage. If crack, breakage or damage is found, repair or replace the faulty pipe or hose.

CLUTCH SYSTEM > Clutch 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 reservoir 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) Reservoir hose

CLUTCH SYSTEM > Clutch Fluid

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 collector cover. (Except for STI model) Ref. to INTAKE (INDUCTION)(w/o STI)>Collector Cover>REMOVAL.
2. Remove the intercooler.
   STI model:
   Ref. to INTAKE (INDUCTION)(STI)>Intercooler>REMOVAL.
   Except for STI model:
   Ref. to INTAKE (INDUCTION)(w/o STI)>Intercooler>REMOVAL.
3. Drain the brake fluid from the air bleeder of the operating cylinder.
4. Refill the reservoir tank with recommended brake fluid.
   Recommended brake fluid:
   New FMVSS No. 116 DOT3 or DOT4
5. Bleed air from brake fluid. Ref. to CLUTCH SYSTEM>Clutch Fluid Air Bleeding.
6. Install the intercooler.
   STI model:
   Ref. to INTAKE (INDUCTION)(STI)>Intercooler>INSTALLATION.
   Except for STI model:
   Ref. to INTAKE (INDUCTION)(w/o STI)>Intercooler>INSTALLATION.
7. Install the collector cover. (Except for STI model) Ref. to INTAKE (INDUCTION)(w/o STI)>Collector Cover>INSTALLATION.

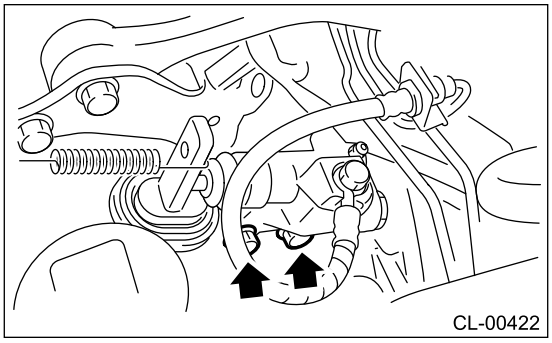
PROCEDURE

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.

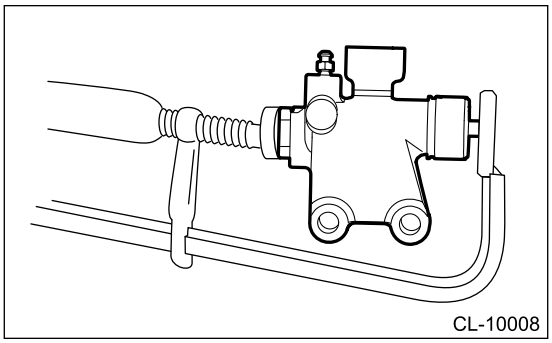
1. STI MODEL

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

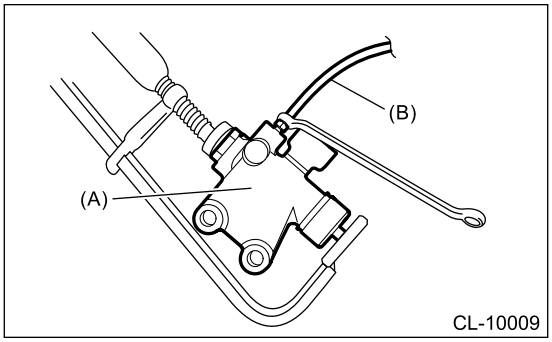
1. Disconnect the ground cable from battery. Ref. to NOTE>NOTE > BATTERY.
2. Remove the intercooler. Ref. to INTAKE (INDUCTION)(STI)>Intercooler>REMOVAL.
3. Remove the starter. Ref. to STARTING/CHARGING SYSTEMS(STI)>Starter>REMOVAL.
4. Remove the operating cylinder.
   Note:
   Do not remove the clutch hose.



5. Hold the piston with a clamp to prevent piston from popping out.



6. Fit one end of a vinyl tube into the air bleeder of the operating cylinder, and put the other end into a container.
7. 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.
   Note:
   When performing this procedure, place the screw portion of the air bleeder higher than the end of operating cylinder.



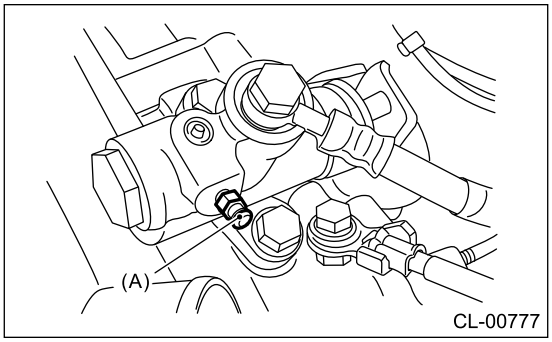
(A) Operating cylinder
(B) Vinyl tube

8. Repeat procedure 7), until there are no more air bubbles appearing from the air bleeder.
   Caution:
   Cover the air bleeder with cloth to prevent brake fluid from being splashed on surrounding parts when loosening the bleeder.
9. Tighten the air bleeder.
   Tightening torque:
   7.8 N·m (0.8 kgf-m, 5.8 ft-lb)
10. Install the operating cylinder.
    Tightening torque:
    41 N·m (4.2 kgf-m, 30.2 ft-lb)
11. After stepping on the clutch pedal, make sure that there are no leaks evident in the entire clutch system.
12. After bleeding the air from clutch system, ensure that the clutch operates properly.
13. Install the starter. Ref. to STARTING/CHARGING SYSTEMS(STI)>Starter>INSTALLATION.
14. Install the intercooler. Ref. to INTAKE (INDUCTION)(STI)>Intercooler>INSTALLATION.
15. Connect the battery ground terminal. Ref. to NOTE>NOTE > BATTERY.

2. EXCEPT FOR STI MODEL

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

1. Disconnect the ground terminal from battery sensor. Ref. to NOTE>NOTE > BATTERY.
2. Remove the collector cover. Ref. to INTAKE (INDUCTION)(w/o STI)>Collector Cover>REMOVAL.
3. Remove the intercooler. Ref. to INTAKE (INDUCTION)(w/o STI)>Intercooler>REMOVAL.
4. Fit one end of a vinyl tube into the air bleeder of the operating cylinder, and put the other end into a container.

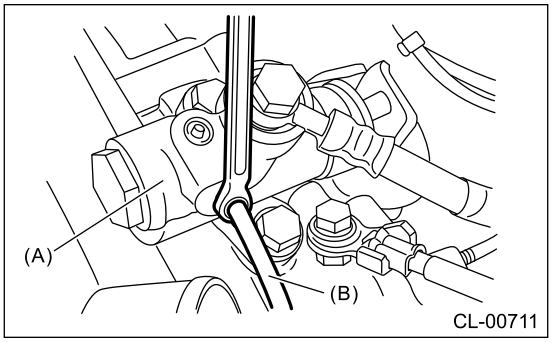


(A) Air bleeder

5. Slowly depress the clutch pedal several times 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

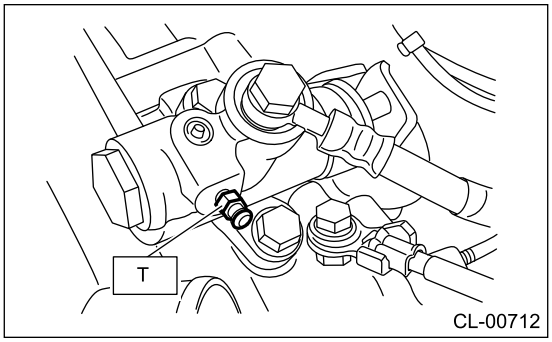
(B) Vinyl tube

6. Repeat procedure 5), until there are no more air bubbles appearing from the air bleeder.

7. Tighten the air bleeder.

Tightening torque:

T: 7.8 N·m (0.8 kgf-m, 5.8 ft-lb)



8. After stepping on the clutch pedal, make sure that there are no leaks evident in the entire clutch system.

9. After bleeding the air from clutch system, ensure that the clutch operates properly.

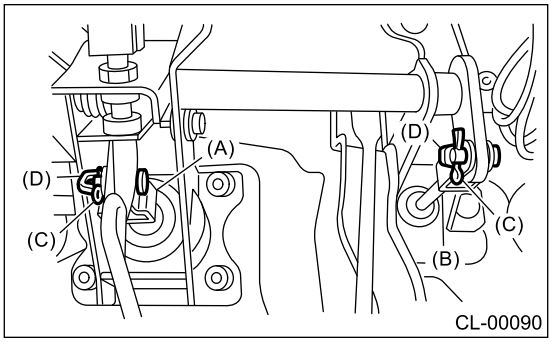
10. Install the intercooler. Ref. to INTAKE (INDUCTION)(w/o STI)>Intercooler>INSTALLATION.

11. Install the collector cover. Ref. to INTAKE (INDUCTION)(w/o STI)>Collector Cover>INSTALLATION.
12. Connect the ground terminal to battery sensor. Ref. to NOTE>NOTE > BATTERY.

REMOVAL

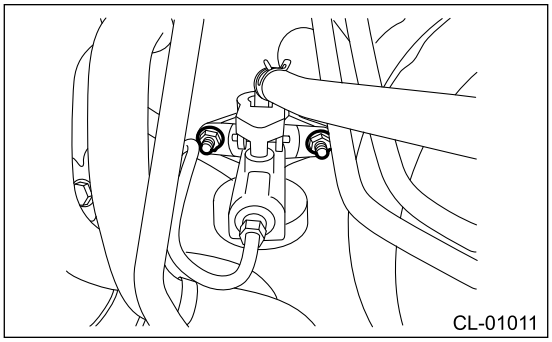
Caution:
Before handling the airbag system components, refer to "CAUTION" of "General Description" in "AIRBAG SYSTEM". Ref. to AIRBAG SYSTEM>General Description>CAUTION.

1. Turn the ignition switch to OFF.
2. Disconnect the ground terminal from battery and wait for at least 60 seconds before starting work. Ref. to NOTE>NOTE > BATTERY.
   Note:
   For models other than STI model, disconnect the ground terminal from battery sensor.
3. Remove the collector cover. (Except for STI model) Ref. to INTAKE (INDUCTION)(w/o STI)>Collector Cover>REMOVAL.
4. Remove the steering column. Ref. to POWER ASSISTED SYSTEM (POWER STEERING)>Steering Column>REMOVAL.
5. Disconnect the connector from the stop light switch and clutch switch.
6. Remove the snap pins from clevis pins which secure the lever to the push rod and operating rod.
7. 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

8. Remove the intercooler.
   STI model:
   Ref. to INTAKE (INDUCTION)(STI)>Intercooler>REMOVAL.
   Except for STI model:
   Ref. to INTAKE (INDUCTION)(w/o STI)>Intercooler>REMOVAL.
9. Remove the clutch hose bracket mounting bolt.
10. Remove the nut which secures the clutch master cylinder.
    Note:
    - **Remove the master cylinder from the stud bolt.**
    - **Hold the clutch pipe with a wire or a string to avoid the pipe from bending.**



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

CLUTCH SYSTEM > Clutch Pedal

INSTALLATION

1. Install in the reverse order of removal.

Caution:

Always use a new clevis pin.

Tightening torque:

Except for knee airbag module

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)

2. Adjust the clutch pedal after installation. Ref. to CLUTCH SYSTEM>Clutch Pedal>ADJUSTMENT.

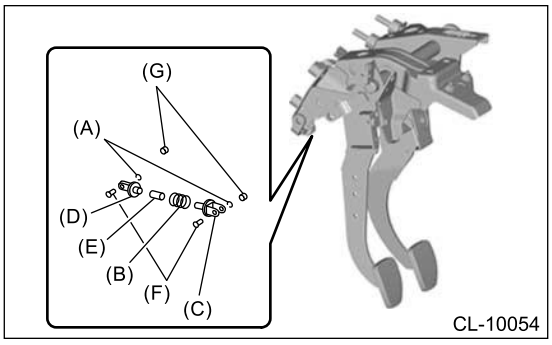
3. Check the clutch start system.

CLUTCH SYSTEM > Clutch Pedal

DISASSEMBLY

1. Remove the clutch switches.

2. Remove the clip, assist spring, assist rod A, assist rod B, assist bushing, assist pin and bushing.



(A) Clip

(B) Assist spring

(C) Assist rod A

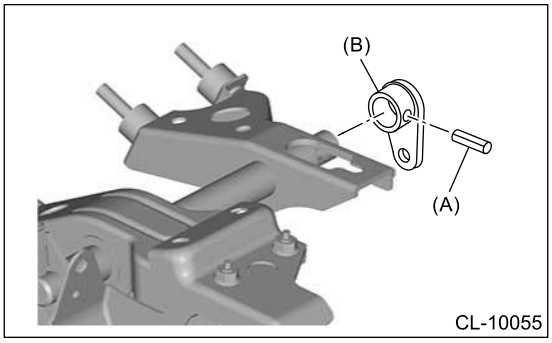
(D) Assist rod B

(E) Assist bushing

(F) Assist pin

(G) Bushing

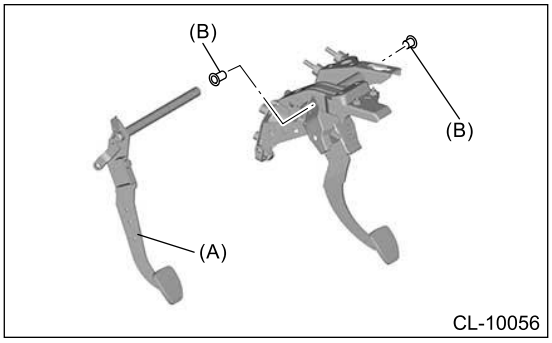
3. Remove the spring pin and lever.



(A) Spring pin

(B) Lever

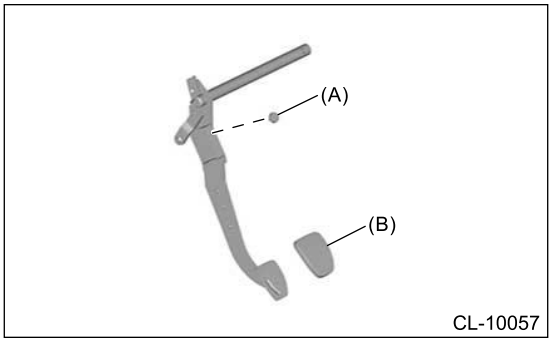
4. Remove the clutch pedal and pedal bushings.



(A) Clutch pedal

(B) Pedal bushing

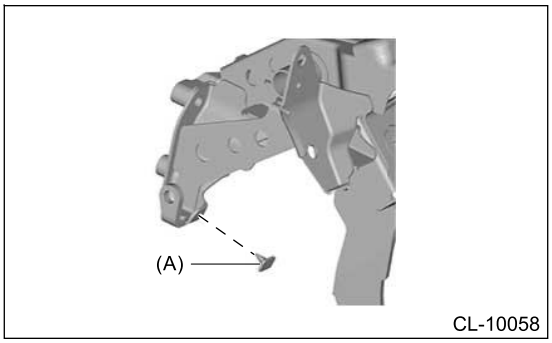
5. Remove the stopper and clutch pedal pad.



(A) Stopper

(B) Clutch pedal pad

6. Remove the stopper.



(A) Stopper

CLUTCH SYSTEM > Clutch Pedal

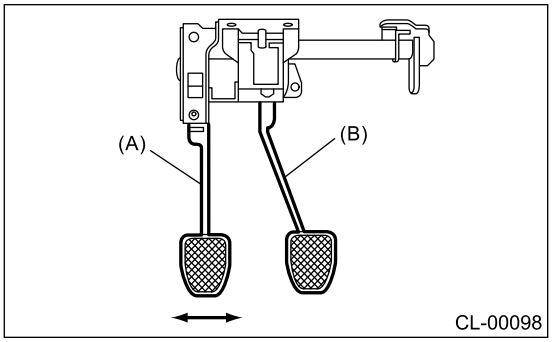
ASSEMBLY

1. Attach the stopper and clutch 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.
6. Insert the assist pin and install the clip.

CLUTCH SYSTEM > Clutch Pedal

INSPECTION

1. Check the free play of the clutch pedal.
   Note:
   Check by pressing the pedal.
   Clutch pedal free play:
   4 — 11 mm (0.16 — 0.43 in)
2. 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 the deflection 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



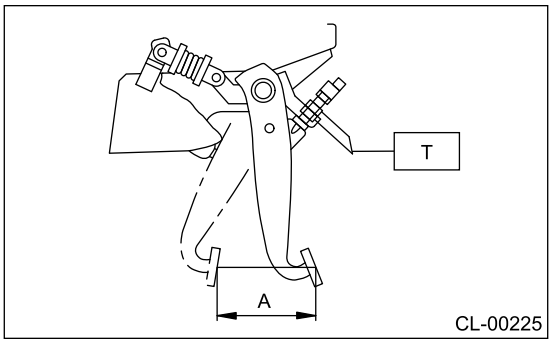
(A) Clutch pedal

(B) Brake pedal

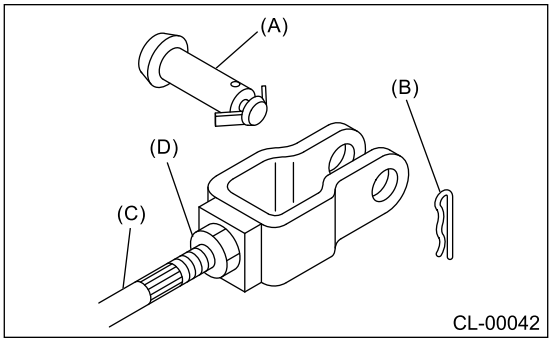
CLUTCH SYSTEM > Clutch Pedal

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:
   STI model
   130 — 135 mm (5.12 — 5.31 in)
   Except for STI model
   135 — 140 mm (5.31 — 5.51 in)
   Tightening torque (clutch switch lock nut):
   T: 8 N·m (0.8 kgf-m, 5.9 ft-lb)

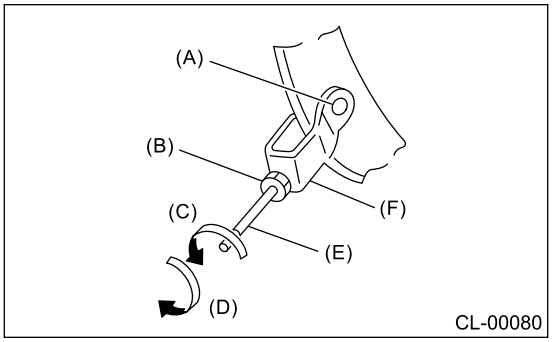


2. If the full stroke is not within the specified value, loosen the clutch switch lock nut to adjust.
   Tightening torque:
   8 N·m (0.8 kgf-m, 5.9 ft-lb)
3. Loosen the push rod lock nuts.



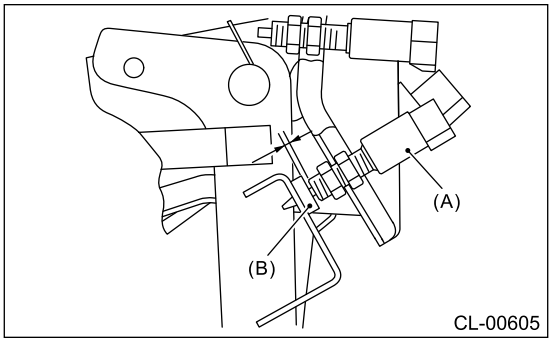
(A) Clevis pin
(B) Snap pin
(C) Push rod
(D) Push rod lock nut

4. Rotate the push rod to adjust.
(1) Make sure that the clutch pedal contacts the clutch switch side when the pedal is released.
(2) Make sure that the clutch pedal contacts the clutch pedal bracket stopper when the clutch pedal is at the maximum stroke position.



(A) Clevis hole
(B) Push rod lock nut
(C) In the shorter direction
(D) In the longer direction
(E) Push rod
(F) Clevis

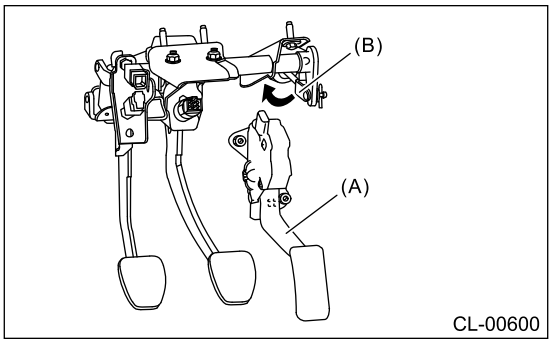
5. Turn the push rod to shorten until a clearance is gained on the clutch switch side.



(A) Clutch switch

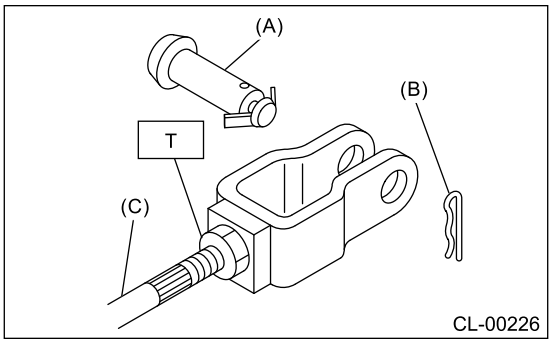
(B) Stopper

6. Turn the push rod to lengthen until clutch pedal contacts the clutch switch.
7. Turn further in the direction that will shorten the push rod (arrow direction shown in figure) by 270°.



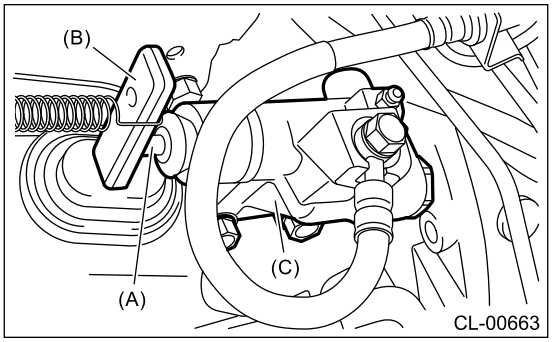
(A) Accelerator pedal
(B) Clevis

8. Check that the clevis pin moves smoothly by moving it in the left and right directions.
9. Tighten the push rod lock nut.
   Tightening torque (push rod lock nut):
   T: 10 N·m (1.0 kgf-m, 7.4 ft-lb)



(A) Clevis pin
(B) Snap pin
(C) Push rod

10. 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.
11. 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:
    STI model
    130 — 135 mm (5.12 — 5.31 in)
    Except for STI model
    135 — 140 mm (5.31 — 5.51 in)
12. Push the release lever until the operating cylinder push rod retracts. Check that the brake fluid level in the reservoir tank increases.



(A) Push rod
(B) Release lever
(C) Operating cylinder

13. If the brake fluid level increases, hydraulic clutch play is correct.
14. If the brake fluid level does not increase or push rod does not retract, readjust the clutch pedal.
15. Check the brake fluid level using the scale on the outside of reservoir tank. Ref. to CLUTCH SYSTEM>Clutch Fluid>INSPECTION.

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.

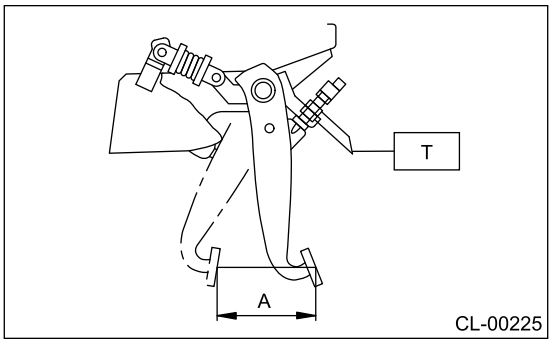
1. Turn the ignition switch to OFF.
2. Disconnect the ground cable from battery and wait for at least 60 seconds before starting work. Ref. to NOTE>NOTE > BATTERY.
   Note:
   For models other than STI model, disconnect the ground terminal from battery sensor.
3. Remove the instrument panel lower cover. 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 > 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:
   STI model
   130 — 135 mm (5.12 — 5.31 in)
   Except for STI model
   135 — 140 mm (5.31 — 5.51 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.

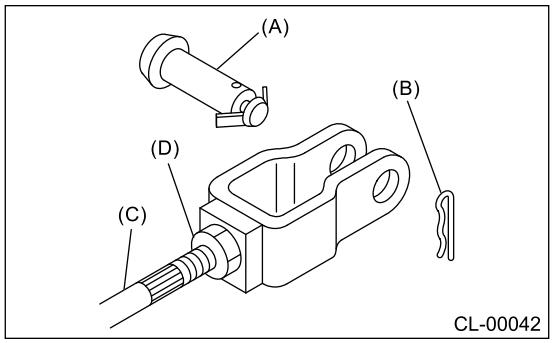
Tightening torque:

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

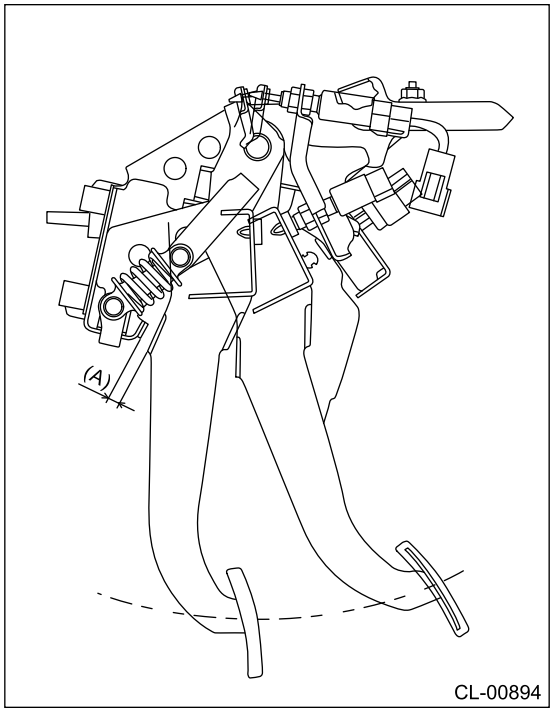
2. Install the clutch start switch so that the clutch switch turns on when the clearance between clutch pedal stopper and clutch pedal is within the specification described below.

Clearance A:

6.3 — 8.6 mm (0.25 — 0.34 in)

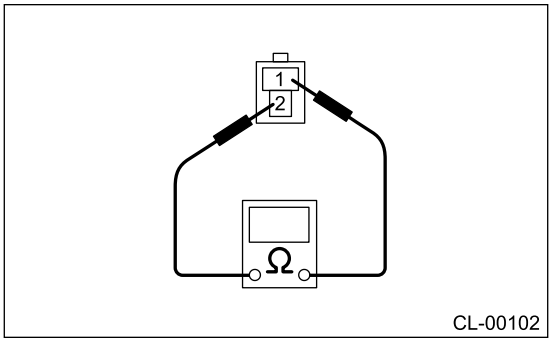
Tightening torque:

8 N·m (0.8 kgf-m, 5.9 ft-lb)

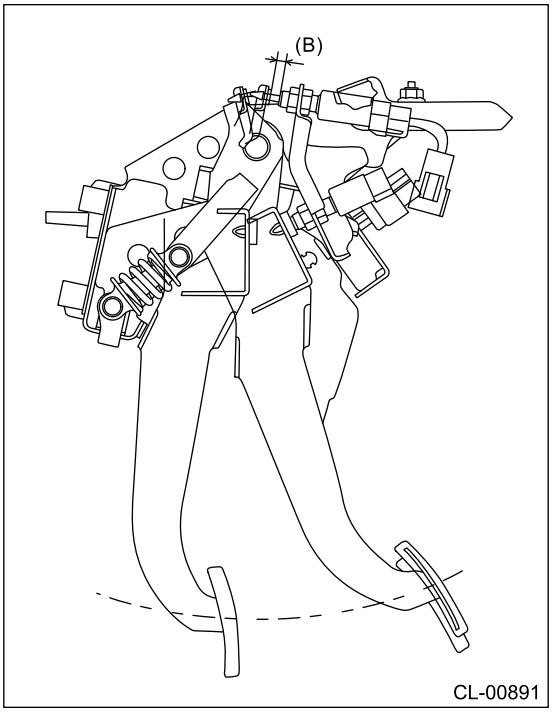


Note:

- **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)



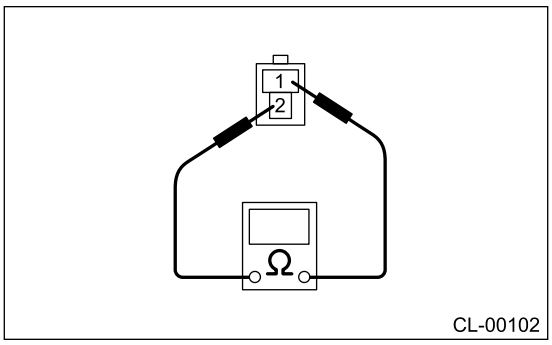
3. Connect the clutch start switch connector.
4. Make sure that engine does not start with clutch pedal not depressed.
5. Make sure that engine starts with clutch pedal depressed.
6. Thereafter, install in the reverse order of removal.
   Tightening torque:
   Knee airbag module
   7.5 N·m (0.76 kgf-m, 5.5 ft-lb)

INSPECTION

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.

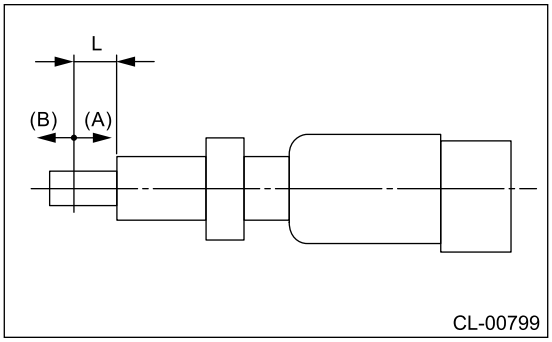
Condition	Terminal No.	Specified resistance
ON	No. 1 — No. 2	Less than 1 Ω
OFF	No. 1 — No. 2	1 MΩ or more



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

Dimension L:

9 — 10 mm (0.35 — 0.39 in)



(A) ON

(B) OFF

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

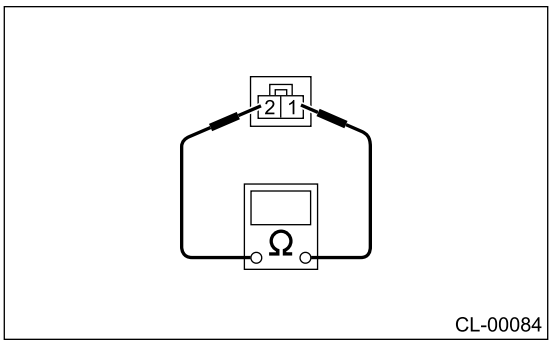
2. CLUTCH SWITCH

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 MΩ or more
When the clutch pedal is not depressed	No. 1 — No. 2	Less than 1 Ω

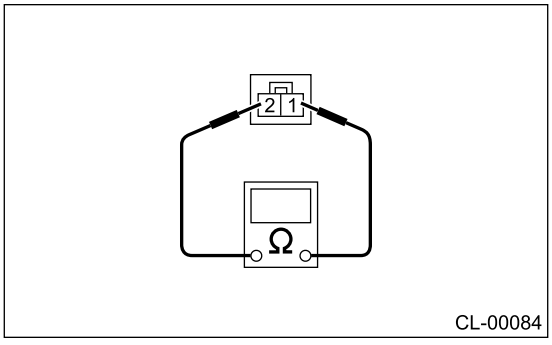


2. When the clutch switch does not operate normally even if the clutch stroke and installation condition are normal, check the clutch switch for continuity.

(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.

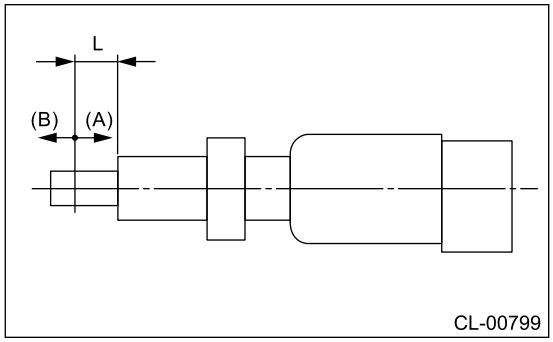
Condition	Terminal No.	Specified resistance
ON	No. 1 — No. 2	Less than 1 Ω
OFF	No. 1 — No. 2	1 MΩ or more



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

Dimension L:

5 — 6.5 mm (0.2 — 0.26 in)



(A) ON

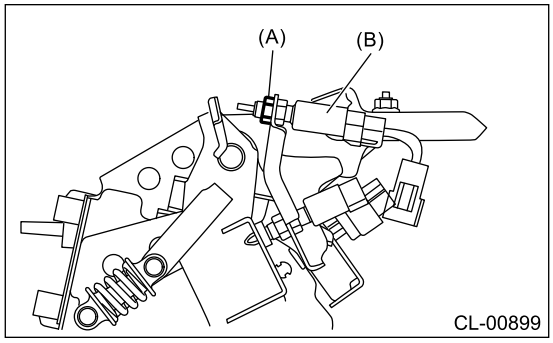
(B) OFF

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

CLUTCH SYSTEM > Clutch Switch

ADJUSTMENT

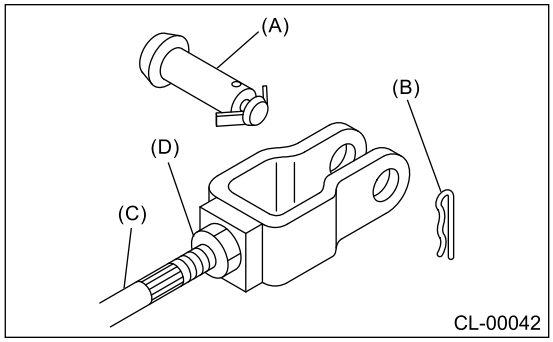
1. Loosen the lock nut of the clutch start switch.



(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

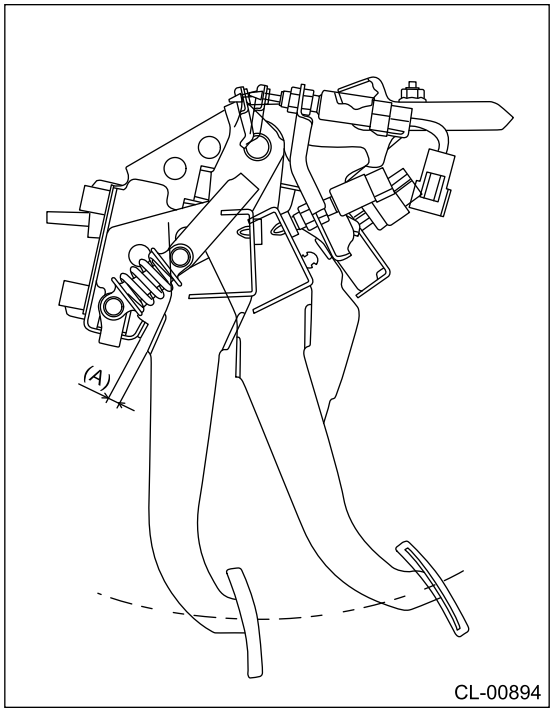
4. Adjust the clutch start switch so that the switch turns on when the clearance between clutch pedal stopper and clutch pedal is within the specification described below, and then tighten the lock nut.

Clearance A:

6.3 — 8.6 mm (0.25 — 0.34 in)

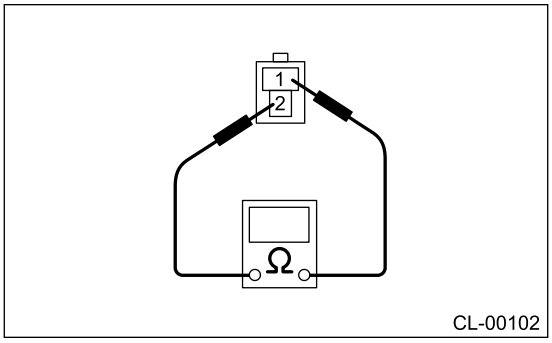
Tightening torque:

8 N·m (0.8 kgf-m, 5.9 ft-lb)

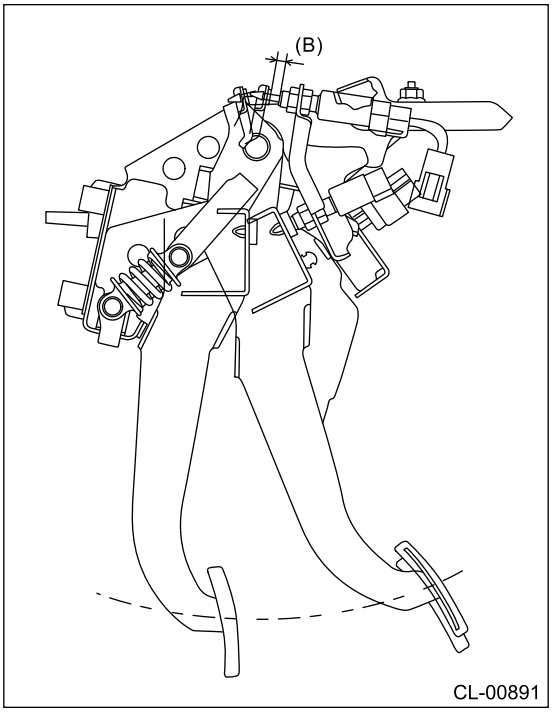


Note:

- **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.

INSPECTION

1. CLUTCH

Symptoms	Possible cause	Corrective action
1. Clutch slippage It is hard to perceive clutch slippage in the early stage, but pay attention to the following symptoms. • Engine temporarily speeds up when the accelerator ON immediately after shifting. • High-speed driving is not possible; especially rapid acceleration is not possible 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 the clutch plate. • Method of testing: Park the 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 allowing the clutch to 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.	(a) Oil on the clutch face	Replace.
	(b) Worn clutch face	Replace.
	(c) Deteriorated diaphragm spring	Replace.
	(d) Warped pressure plate or flywheel	Repair or replace.
	(e) Defective release bearing holder	Repair or replace.
2. Clutch drags. As a symptom of this trouble, a harsh scratching noise occurs and control becomes difficult when shifting gears. The symptom becomes more apparent when shifting into the 1st gear. However, because most trouble of this sort is due to a	(a) Worn or rusty clutch disc hub spline	Replace the clutch disc.
	(b) Excessive deflection of clutch disc face	Repair or replace.

Symptoms	Possible cause	Corrective action
defective synchronization mechanism, perform the following tests. • Method of testing: Ref. to CLUTCH SYSTEM>General Diagnostic Table>INSPECTION > DIAGNOSTIC DIAGRAM OF CLUTCH DRAG. The problem is caused by insufficient disengagement of the clutch if an abnormal noise occurs during this test.	(c) Crankshaft pilot needle bearing sticking	Replace.
	(d) Cracked clutch disc face	Replace.
	(e) Stuck clutch disc (smeared by oil or water)	Replace.
3. Clutch chatters. Clutch chattering is an unpleasant vibration to the whole vehicle when the vehicle is just started with clutch partially engaged.	(a) Adhesion of oil on the clutch face	Replace the clutch disc.
	(b) Weak or broken damper spring	Replace the clutch disc.
	(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 disengaged, engaged, or partially engaged.	(a) Broken, worn or insufficiently lubricated release bearing	Replace the release bearing.
	(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.
	(f) Insufficient lubrication at section of pivot and release lever	Apply grease.
5. Clutch grabs suddenly. When starting the vehicle with the clutch partially engaged, the clutch engages suddenly and the vehicle jumps instead of making a smooth start.	(a) Grease or oil on facing	Replace the clutch disc.
	(b) Deteriorated cushioning spring	Replace the clutch disc.
	(c) Worn or rusted spline of clutch disc or main shaft	Take off rust, apply grease or replace clutch disc or main shaft.

Symptoms	Possible cause	Corrective action
	(d) Deteriorated or broken damper spring	Replace the clutch disc.
	(e) Loose engine mounting	Retighten or replace mounting.
	(f) Deteriorated diaphragm spring	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 bushing	Replace the bushing or shaft with a new part.

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?

Yes — Go to 2.

No — 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?

Yes — Go to 3.

No — 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?

Yes	Inadequate clutch disengage. Inspect the clutch disc, clutch cover, clutch release, and clutch pedal free play.
No	Clutch and flywheel seizure. Inspect the clutch disc and the spline of the clutch disc hub.

CONTINUOUSLY VARIABLE TRANSMISSION(TR690)

CVT(TR690)

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

35. CVTF Filter
36. Reverse Brake Assembly
37. Forward Clutch Assembly
38. Reduction Driven Gear
39. Transmission Control Device
40. Transmission Case
41. Primary Pulley and Secondary Pulley
42. Variator Chain
43. Drive Pinion Shaft Assembly
44. Front Differential Assembly
45. Oil Pump
46. Oil Pump Chain
47. Converter Case Cover
48. Front Reduction Drive Gear
49. Front Reduction Driven Gear
50. Converter Case
51. Diagnostics with Phenomenon

SPECIFICATION

1. TORQUE CONVERTER

Model		2.0 L DOHC turbo
Type		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)	r/min	2,050 — 2,590 (D range) 2,130 — 2,680 (R range)
One-way clutch		Sprag type one-way clutch

2. OIL PUMP

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

3. TRANSMISSION CONTROL ELEMENT

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

4. TRANSMISSION GEAR RATIO (INCLUDING TRANSFER REDUCTION RATIO)

Forward	3.509 — 0.545
Rev	2.351

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 8 speed step change*1
M (Manual mode) (paddle shift +side)	Manual gear change 1st → 2nd → 3rd → 4th → 5th → 6th → 7th*1→ 8th*1
M (Manual mode) (paddle shift −side)	Manual gear change 1st ← 2nd ← 3rd ← 4th ← 5th ← 6th ← 7th*1← 8th*1

*1: Only when in S# mode

7. HYDRAULIC CONTROL AND LUBRICATION

Type	Electronic hydraulic control (speed changed by signals of vehicle speed and accelerator opening angle)
Fluid	Specified fluid: Subaru High Torque CVT Fluid **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	Variable torque distribution (VTD)
Number of transfer clutch drives & driven plates	3
Control method	Electronic hydraulic type
Reduction gear ratio	1.000 (37/37)

10. REDUCTION GEAR RATIO

Front final reduction gear ratio	3.900

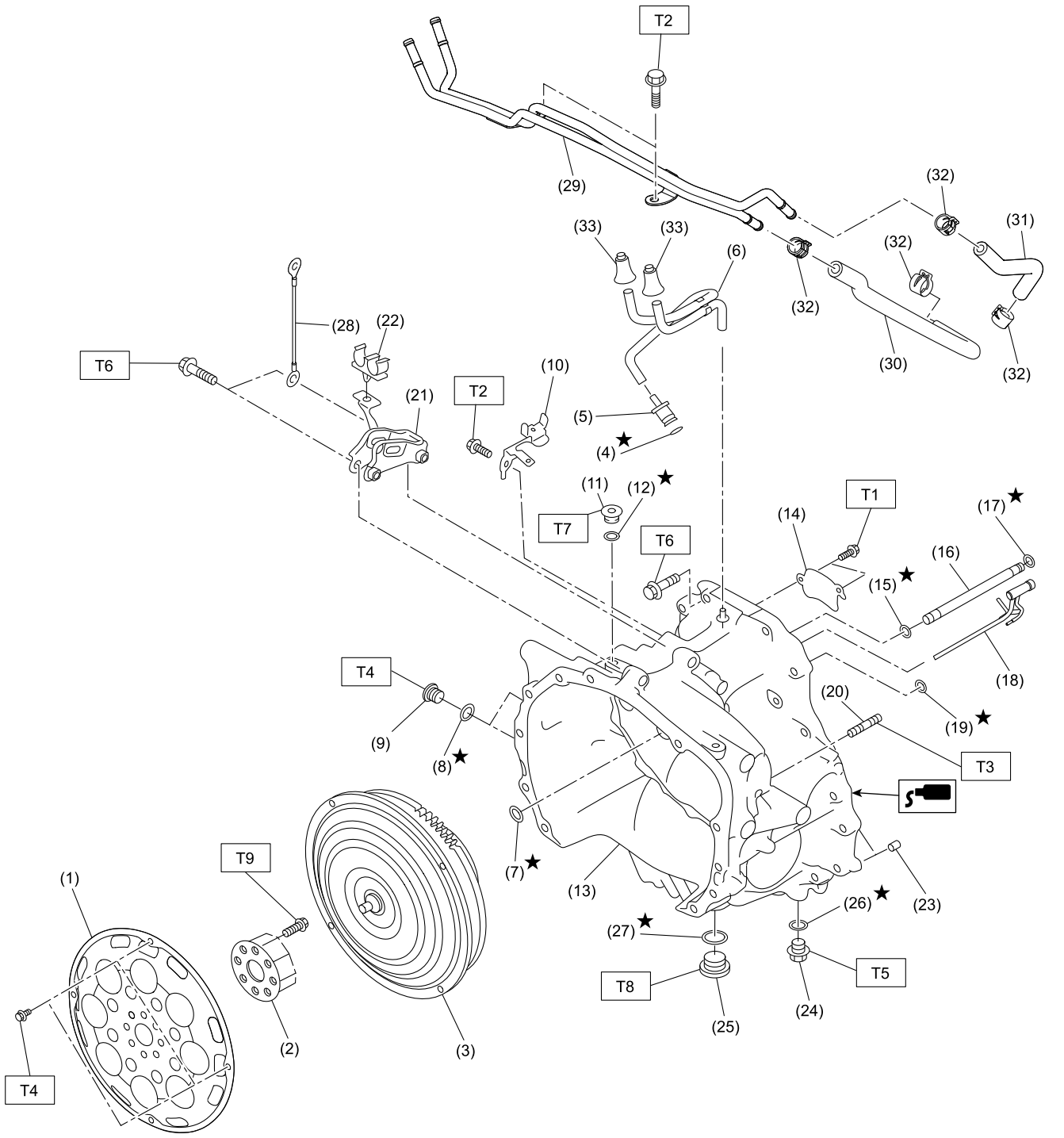
11. FRONT DIFFERENTIAL GEAR OIL

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)

COMPONENT

1. TORQUE CONVERTER ASSEMBLY AND CONVERTER CASE



CVT11855

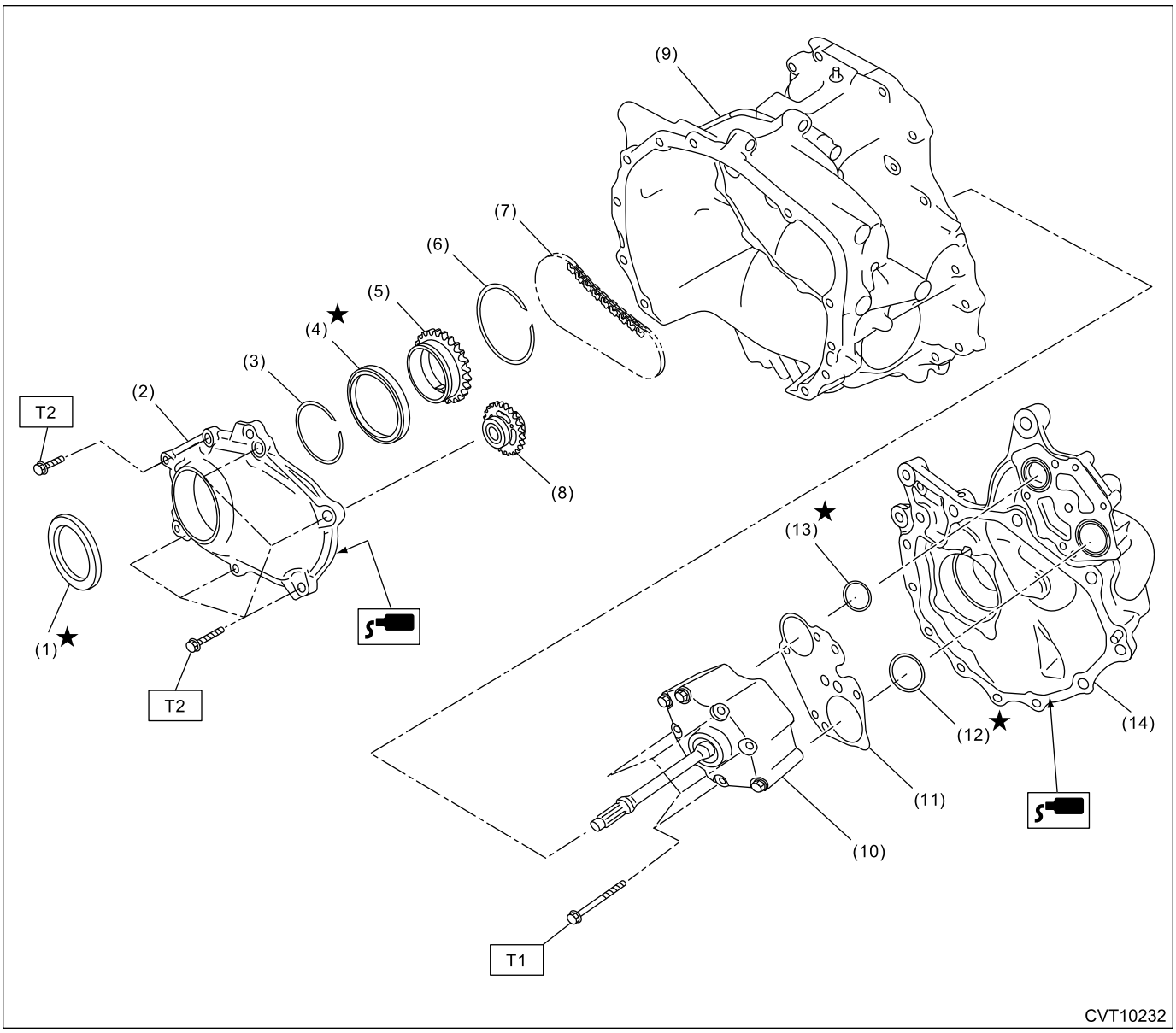
(1) Drive plate
(2) Reinforcement drive plate
(3) Torque converter ASSY
(4) O-ring
(5) Oil charge pipe cap
(16) Lubrication pipe
(17) O-ring
(18) Lubrication pipe
(19) O-ring
(20) Stud bolt
(31) CVTF hose
(32) Clamp
(33) Air breather cap

Tightening torque: N·m (kgf-m, ft-lb)

(6) Air breather hose
(7) O-ring
(8) O-ring
(9) Plug
(10) Transmission harness stay
(11) Plug
(12) O-ring
(13) Converter case
(14) Oil stopper plate
(15) O-ring
(21) Pitching stopper bracket
(22) Clip
(23) Straight pin
(24) Overflow drain plug
(25) Front differential gear oil drain plug
(26) Gasket
(27) Gasket
(28) Transmission radio ground cord
(29) CVTF cooler pipe COMPL
(30) CVTF hose

T1: 9 (0.9, 6.6)
T2: 16 (1.6, 11.8)
T3: 18 (1.8, 13.3)
T4: 25 (2.5, 18.4)
T5: 35 (3.6, 25.8)
T6: 41 (4.2, 30.2)
T7: 50 (5.1, 36.9)
T8: 70 (7.1, 51.6)
T9: Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Drive Plate>INSTALLATION.

2. OIL PUMP ASSY

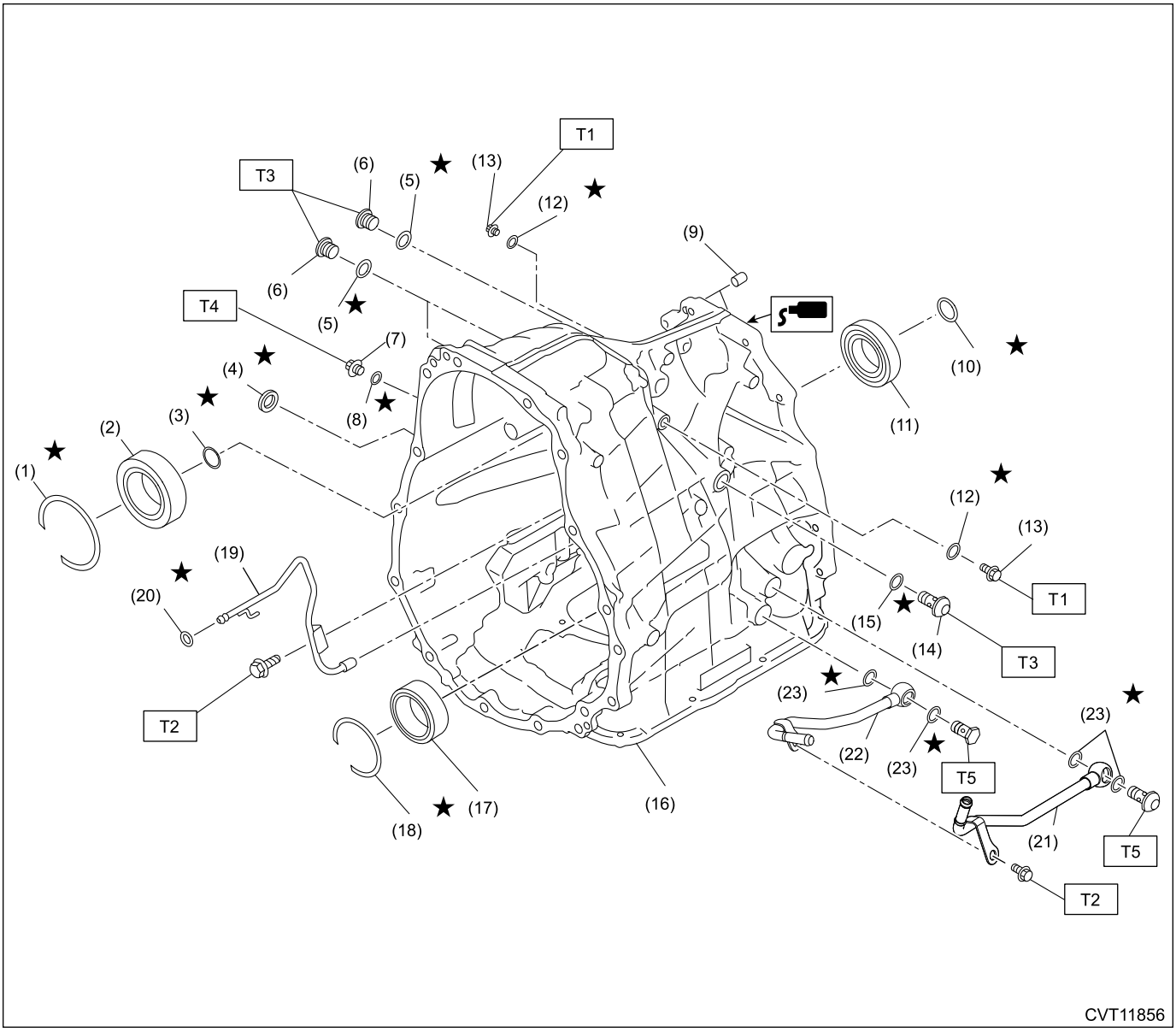


(1) Oil seal
(2) Oil pump chain cover
(3) Snap ring
(4) Ball bearing
(5) Drive sprocket
(6) Snap ring
(7) Oil pump chain
(8) Driven sprocket
(9) Converter case
(10) Oil pump ASSY
(11) Plate
(12) O-ring (large)
(13) O-ring (small)
(14) Drive pinion retainer

Tightening torque: N·m (kgf-m, ft-lb)

T1: 8.5 (0.9, 6.3)
T2: 24 (2.4, 17.7)

3. TRANSMISSION CASE

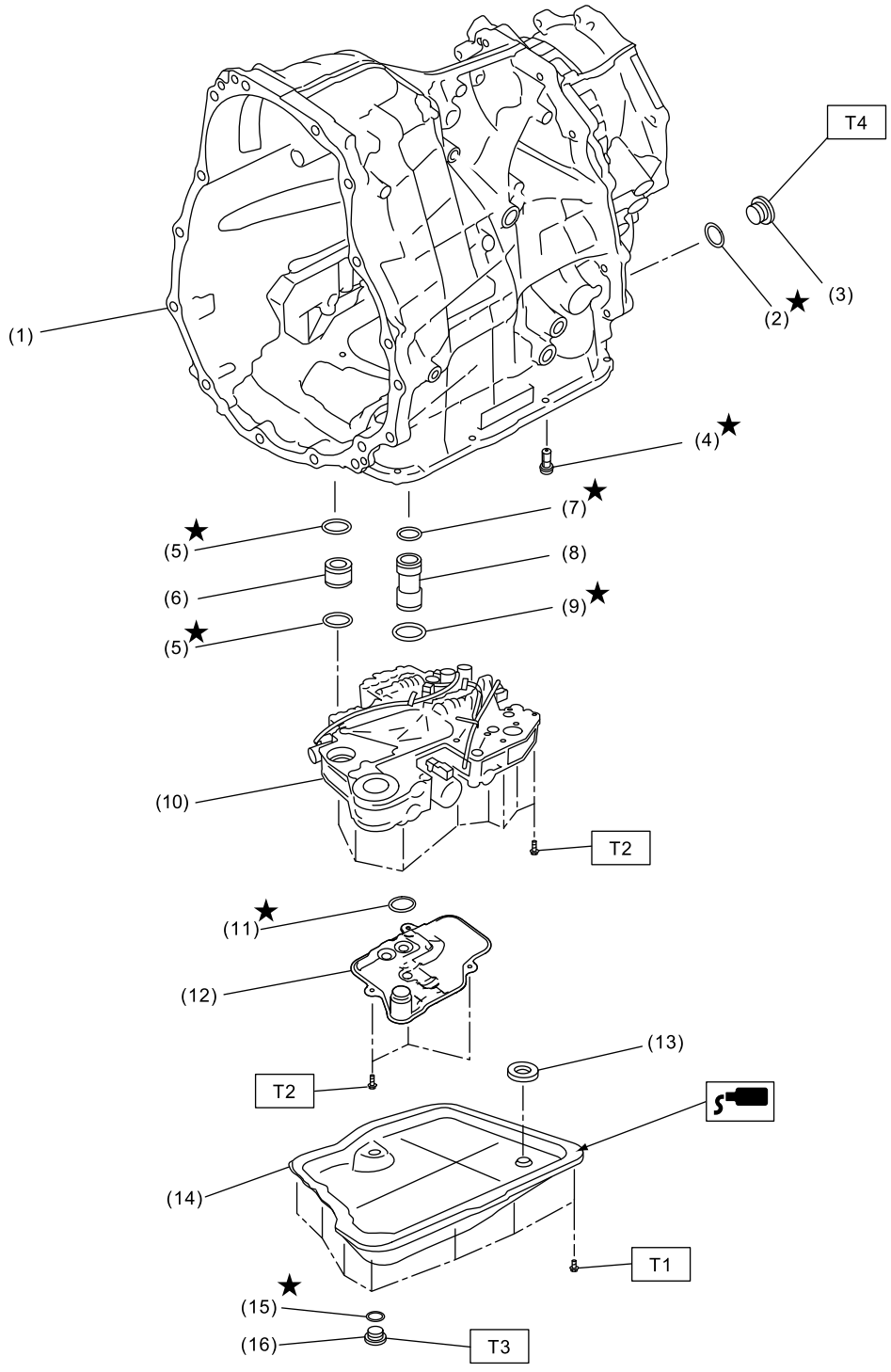


(1) Snap ring
(2) Roller bearing
(3) Seal ring
(4) Oil seal
(5) O-ring
(6) Plug
(7) Plug
(8) Gasket
(9) Straight pin
(10) Seal ring
(11) Ball bearing
(12) O-ring
(13) Plug
(14) Plug
(15) O-ring
(16) Transmission case
(17) Roller bearing
(18) Snap ring
(19) Lubrication pipe
(20) O-ring
(21) CVTF outlet 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)

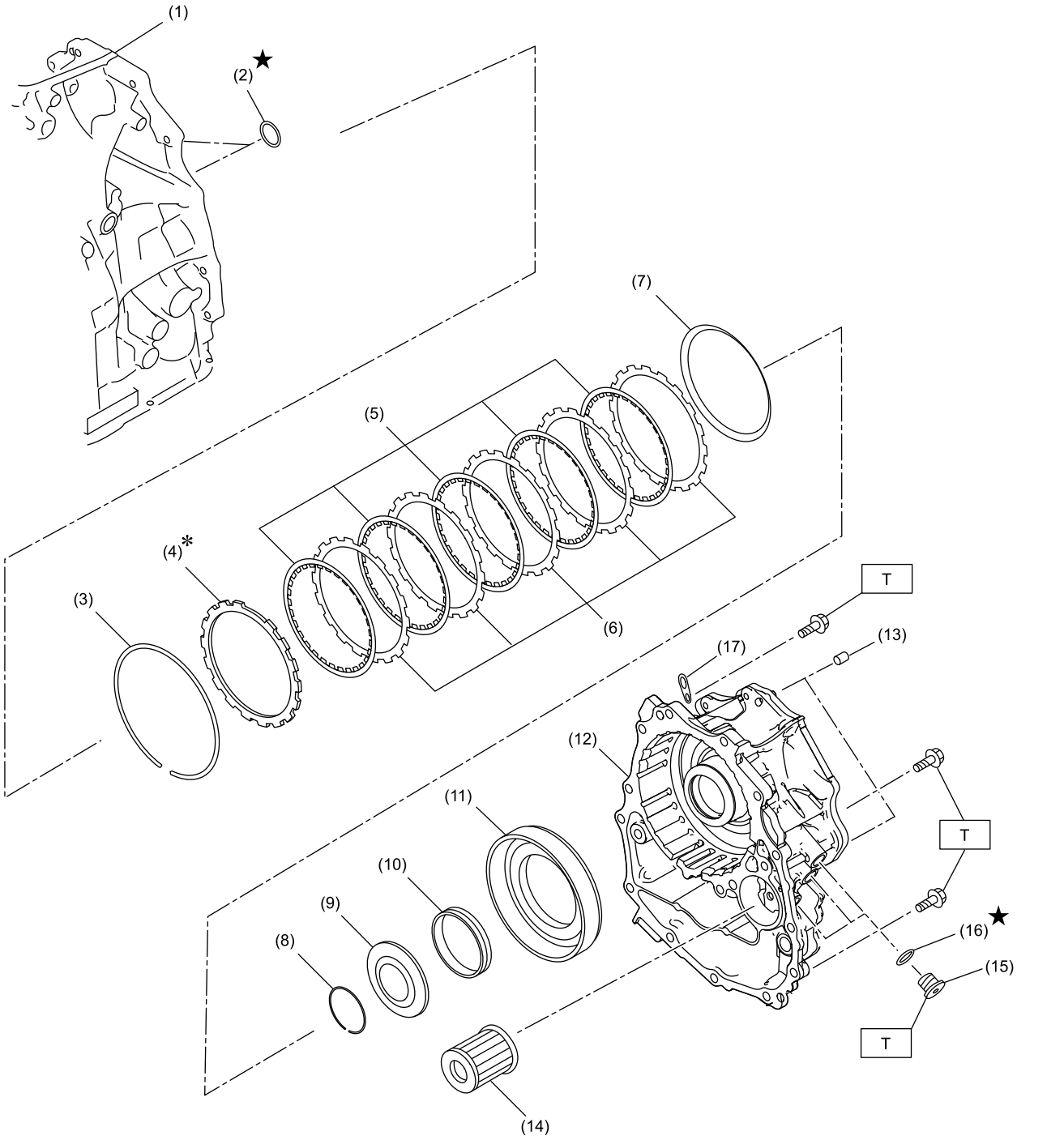
4. CONTROL VALVE BODY



(1) Transmission case	(9) O-ring (large)	***Tightening torque: N·m (kgf-m, ft-lb)***
(2) Gasket	(10) Control valve body	***T1: 5 (0.5, 3.7)***
(3) Filler plug	(11) O-ring	***T2: 9 (0.9, 6.6)***
(4) CVTF filter	(12) Oil strainer	***T3: 39.2 (4.0, 28.9)***
(5) O-ring	(13) Magnet	***T4: 50 (5.1, 36.9)***

(6) Pressure pipe
(7) O-ring (small)
(8) CVTF pipe
(14) Oil pan
(15) Gasket
(16) CVTF drain plug

5. REVERSE BRAKE ASSEMBLY AND INTERMEDIATE CASE



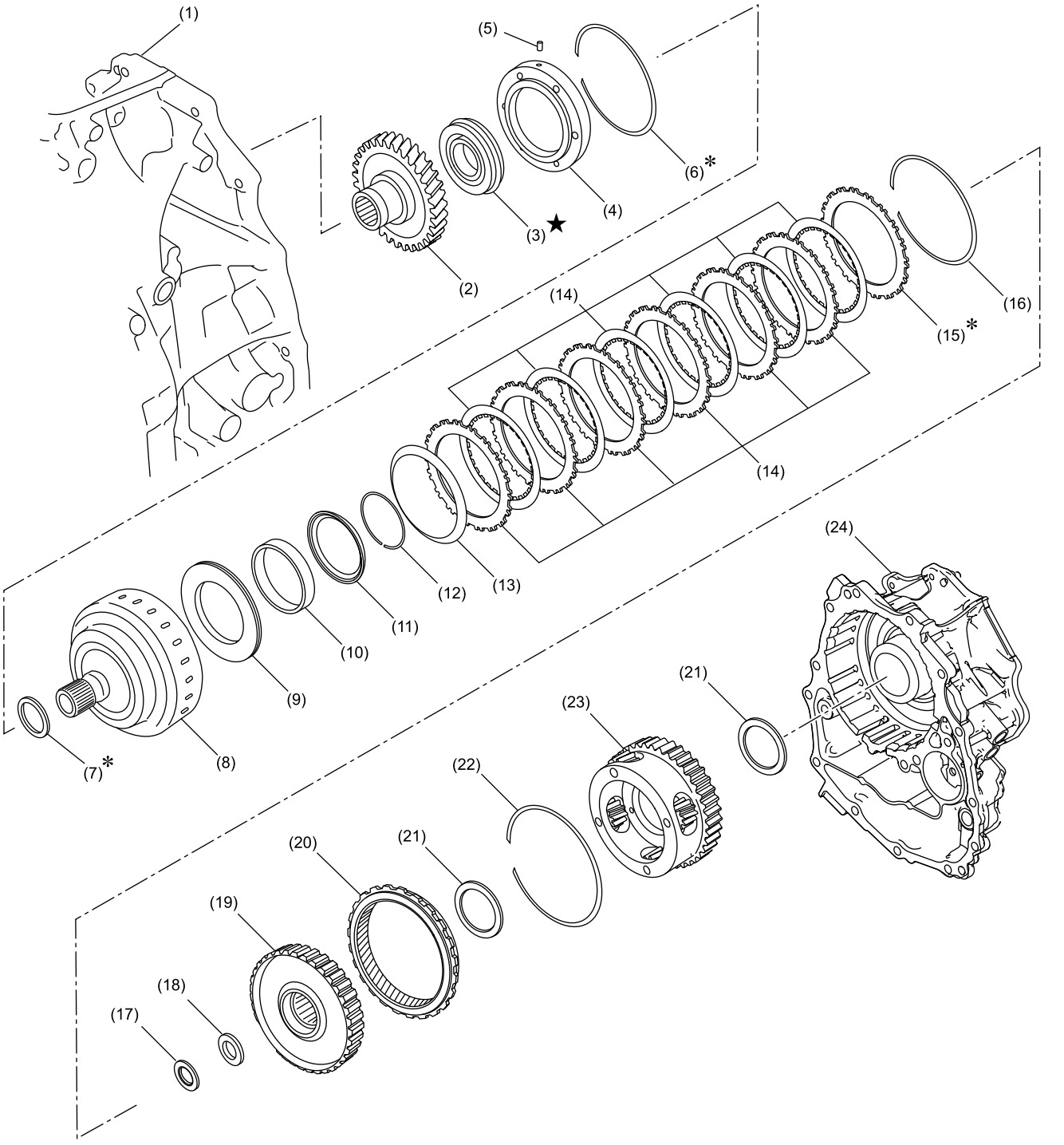
(1) Transmission case
(2) O-ring
(3) Snap ring
(4) Retaining plate
(5) Drive plate
(8) Snap ring
(9) Spring retainer
(10) Return spring
(11) Reverse brake piston
(12) Intermediate case
(15) Plug
(16) O-ring
(17) Transmission hanger

Tightening torque: N·m (kgf-m, ft-lb)

(6) Driven plate
(7) Dish plate
(13) Straight pin
(14) CVTF filter

T: 25 (2.5, 18.4)

6. FORWARD CLUTCH ASSEMBLY AND REDUCTION DRIVEN GEAR

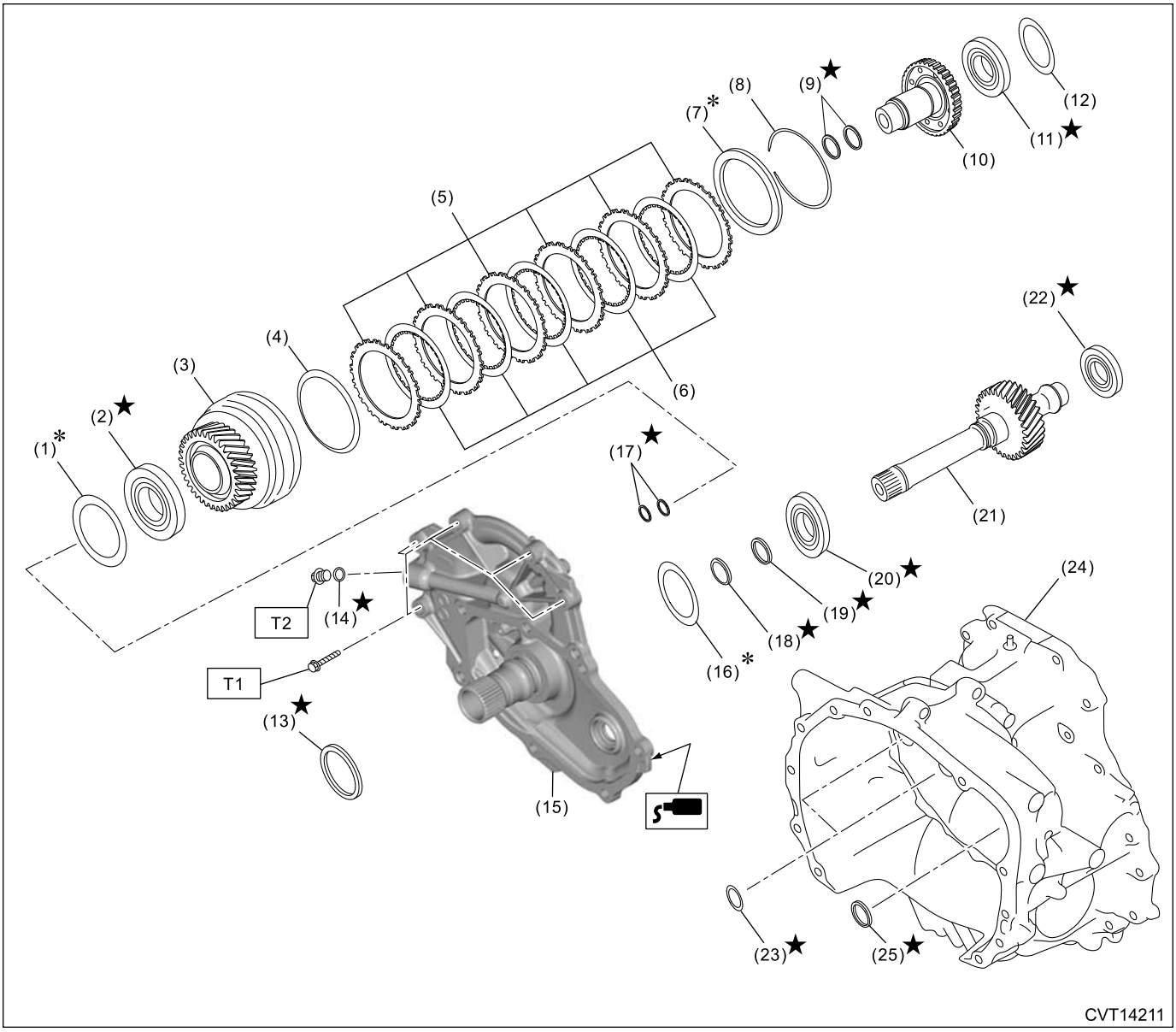


CVT11858

(1) Transmission case
(2) Reduction driven gear
(3) Ball bearing
(4) Reduction driven gear retainer
(5) Straight pin
(6) Snap ring
(9) Forward clutch piston
(10) Return spring
(11) Forward clutch piston retainer
(12) Snap ring
(13) Dish plate
(14) Forward clutch plate
(17) Thrust needle bearing
(18) Washer
(19) Sun gear ASSY
(20) Internal gear
(21) Thrust needle bearing
(22) Snap ring

(7) Washer
(8) Forward clutch drum
(15) Retaining plate
(16) Snap ring
(23) Planetary carrier ASSY
(24) Intermediate case

7. FRONT REDUCTION DRIVE GEAR AND FRONT REDUCTION DRIVEN GEAR

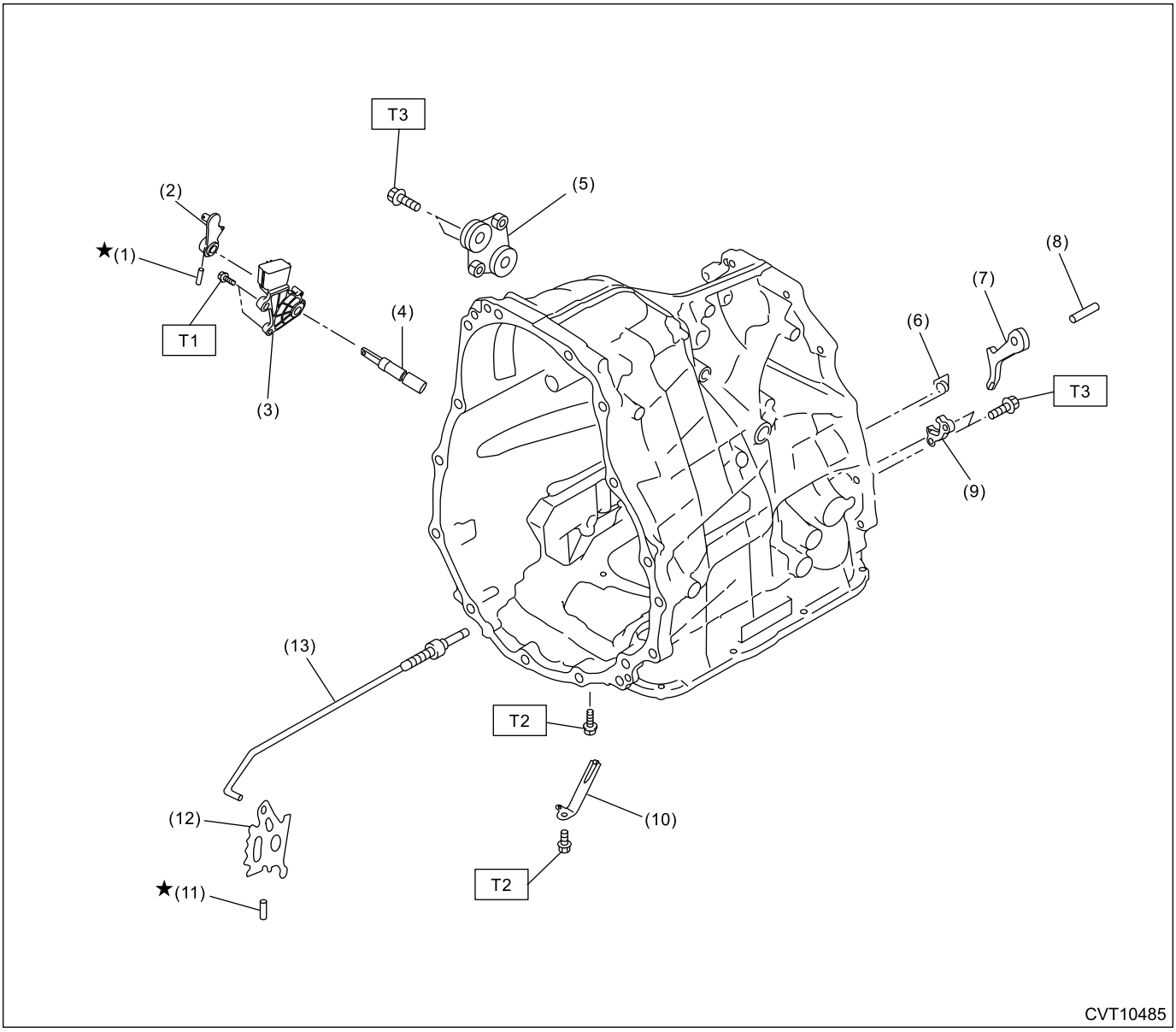


(1) Shim
(2) Ball bearing
(3) Front reduction driven gear
(4) Dish plate
(5) Driven plate
(6) Drive plate
(7) Retaining plate
(8) Snap ring
(9) Seal ring
(10) Front reduction driven shaft
(11) Ball bearing
(12) Shim
(13) Seal ring
(14) O-ring
(15) Converter case cover
(16) Shim
(17) Seal ring
(18) O-ring
(19) Seal ring
(20) Ball bearing
(21) Front reduction drive gear
(22) Ball bearing
(23) O-ring
(24) Converter case
(25) Seal ring

Tightening torque: N·m (kgf-m, ft-lb)

T1: 24 (2.4, 17.7)
T2: 25 (2.5, 18.4)

8. TRANSMISSION CONTROL DEVICE

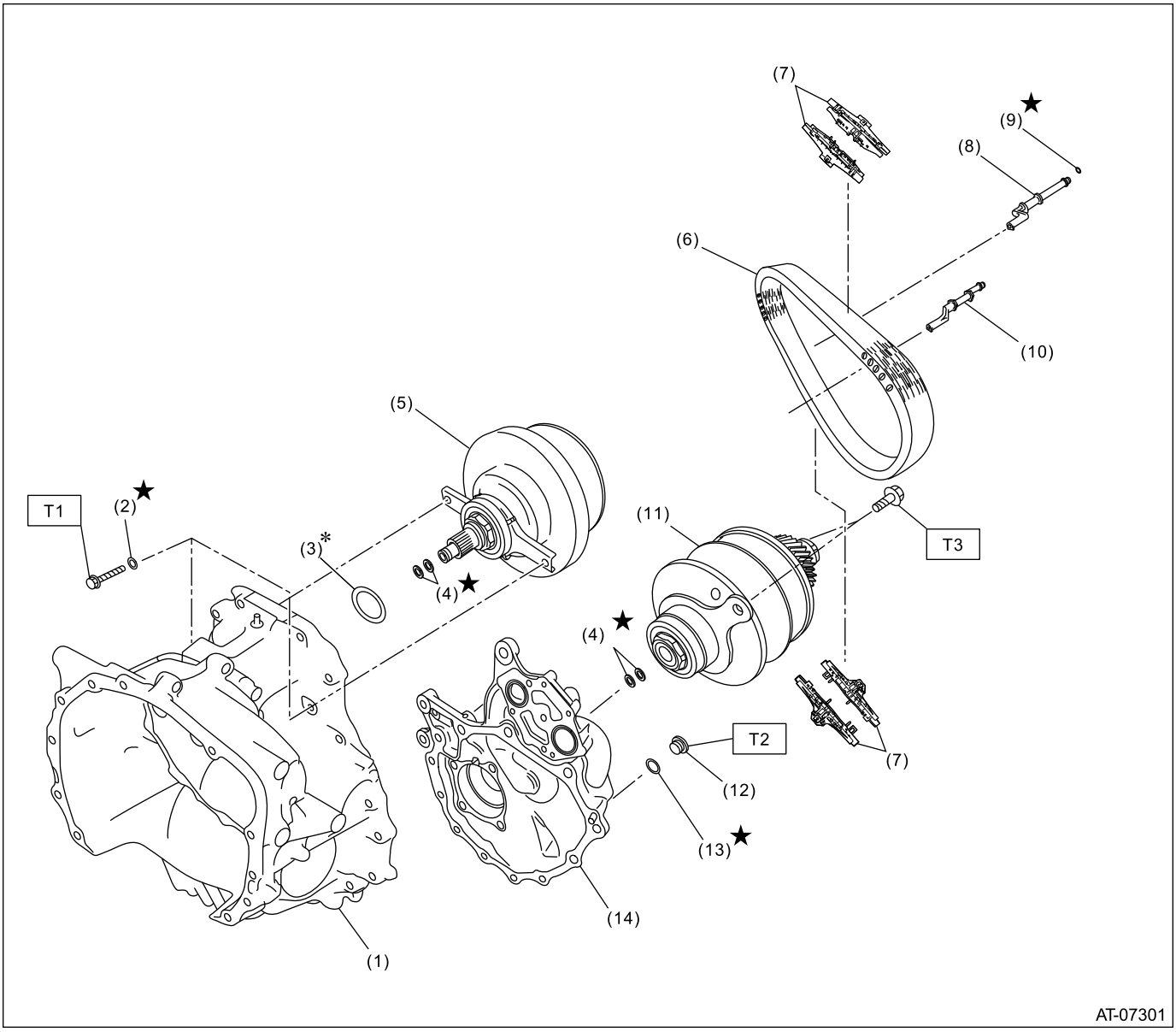


(1) Spring pin
(2) Shifter arm
(3) Inhibitor switch
(4) Shifter arm shaft
(5) Cable plate ASSY
(6) Return spring
(7) Parking pawl
(8) Shaft
(9) Parking support
(10) Detent spring
(11) Spring pin
(12) Manual plate
(13) Parking rod

Tightening torque: N·m (kgf-m, ft-lb)

T1: 5 (0.5, 3.7)
T2: 7 (0.7, 5.2)
T3: 25 (2.5, 18.4)

9. PRIMARY PULLEY, SECONDARY PULLEY AND VARIATOR CHAIN

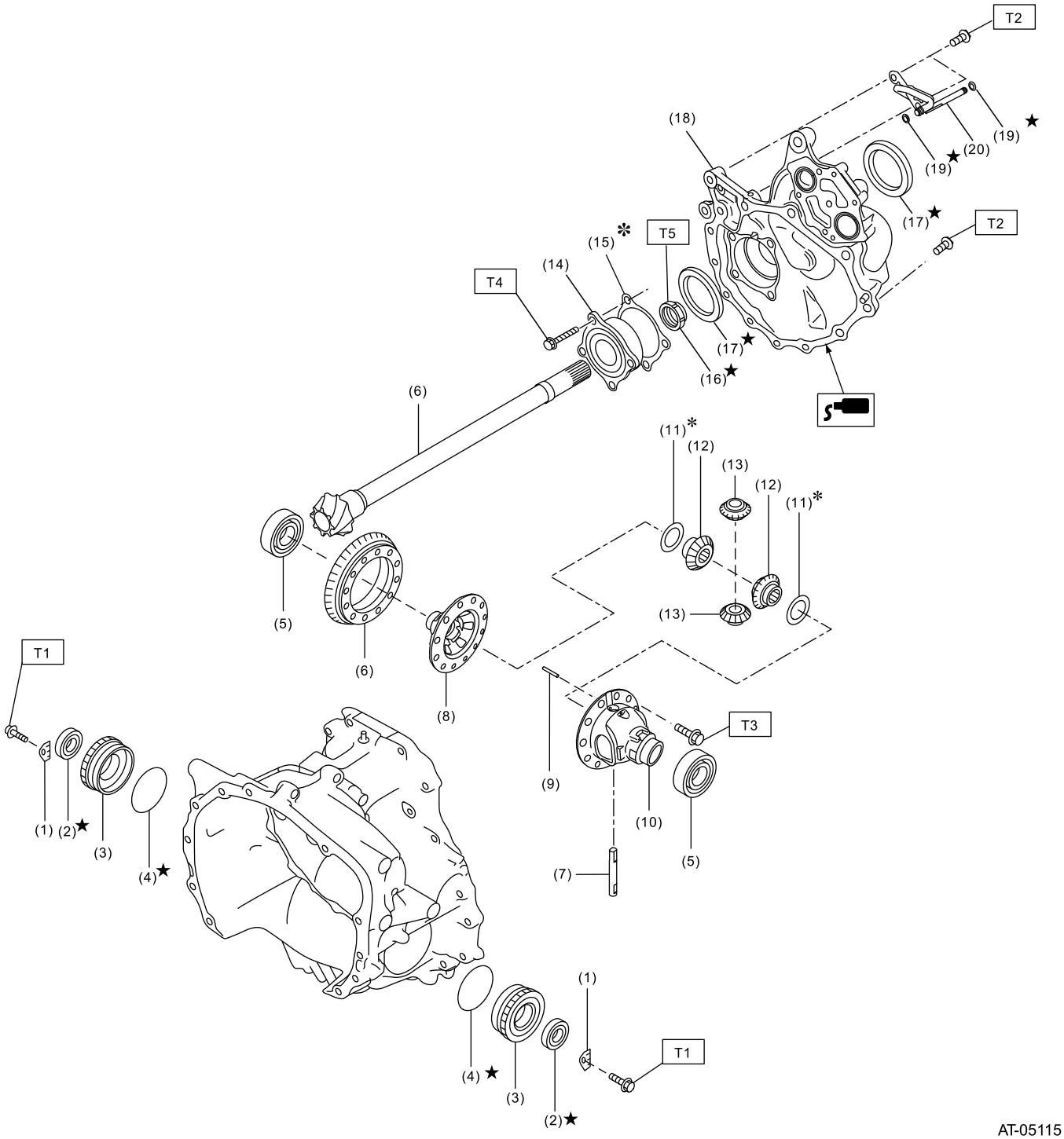


(1) Converter case
(2) Seal washer
(3) Shim
(4) Seal ring
(5) Primary pulley ASSY
(6) Variator chain
(7) Chain guide
(8) Lubrication pipe
(9) O-ring
(10) Support rod
(11) Secondary pulley ASSY
(12) Plug
(13) O-ring
(14) Drive pinion retainer

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



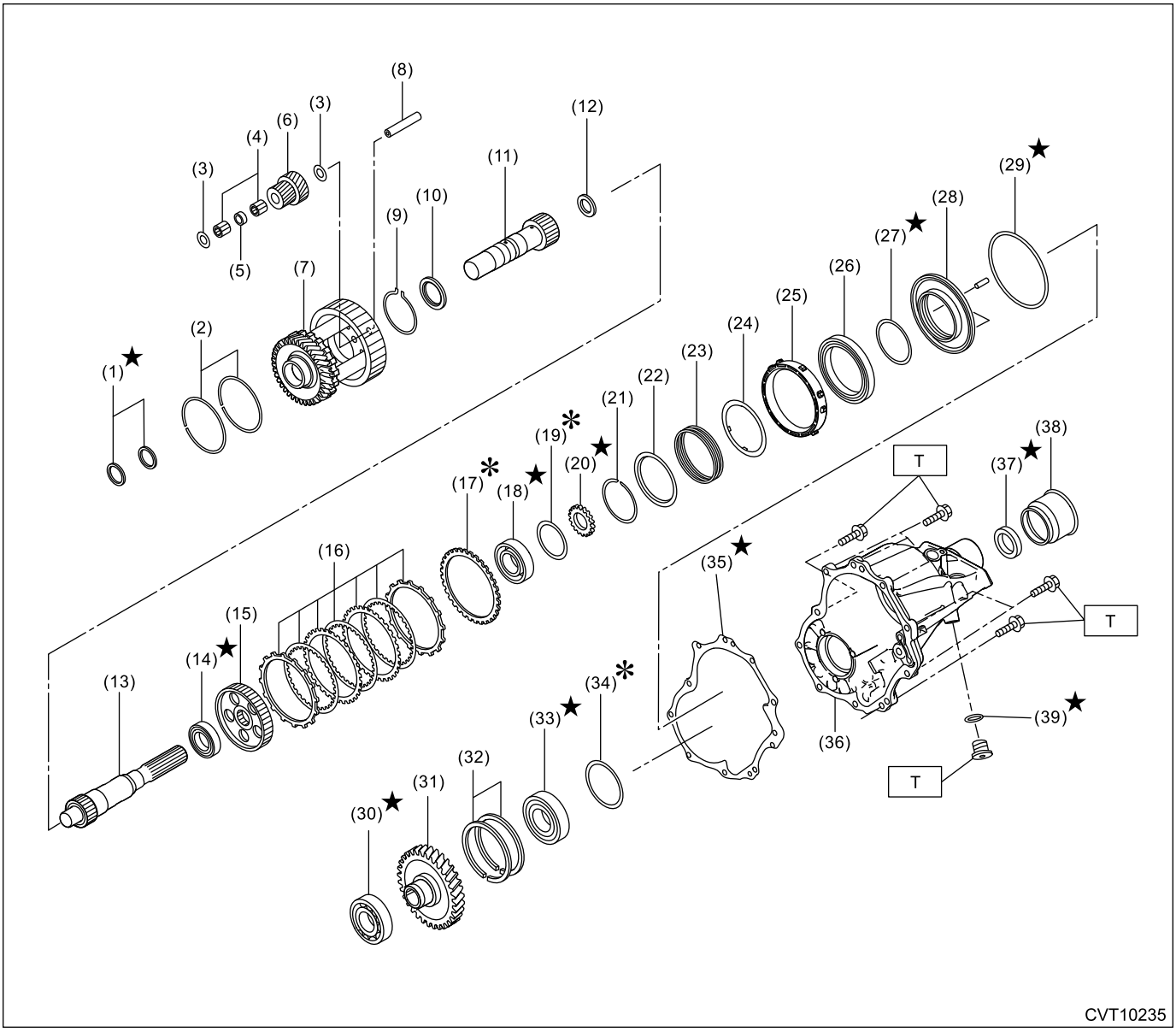
(1) Lock plate
(2) Oil seal
(3) Differential side retainer
(4) O-ring
(5) Taper roller bearing
(10) Differential case LH
(11) Washer
(12) Differential bevel gear
(13) Differential bevel pinion
(14) Taper roller bearing
(19) O-ring
(20) Lubrication pipe

Tightening torque: N·m (kgf-m, ft-lb)

T1: 25 (2.5, 18.4)

(6) Drive pinion gear set	(15) Shim	***T2: 43 (4.4, 31.7)***
(7) Pinion shaft	(16) Lock nut	***T3: Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Front Differential Assembly>ASSEMBLY > DIFFERENTIAL CASE ASSEMBLY.***
(8) Differential case RH	(17) Oil seal	***T4: 70 (7.1, 51.6)***
(9) Straight pin	(18) Drive pinion retainer	***T5: 130 (13.3, 95.9)***

11. TRANSFER AND EXTENSION CASE



(1) Seal ring
(2) Snap ring
(3) Planetary pinion washer
(4) Needle bearing
(5) Spacer
(6) Pinion gear
(7) Planetary carrier ASSY
(8) Planetary pinion shaft ASSY
(9) Snap ring
(10) Thrust bearing
(11) Intermediate shaft
(12) Thrust washer
(15) Transfer clutch hub
(16) Transfer clutch plate
(17) Driven plate No. 3
(18) Ball bearing
(19) Rear drive shaft shim
(20) Revolution gear
(21) Snap ring
(22) Clutch spring retainer
(23) Return spring
(24) Spring retainer
(25) Pressure plate
(26) Ball bearing
(29) D-ring
(30) Ball bearing
(31) Transfer reduction driven gear
(32) Snap ring
(33) Ball bearing
(34) Shim
(35) Gasket
(36) Extension case
(37) Oil seal
(38) Dust cover
(39) O-ring

(13) Rear drive shaft

(14) Ball bearing

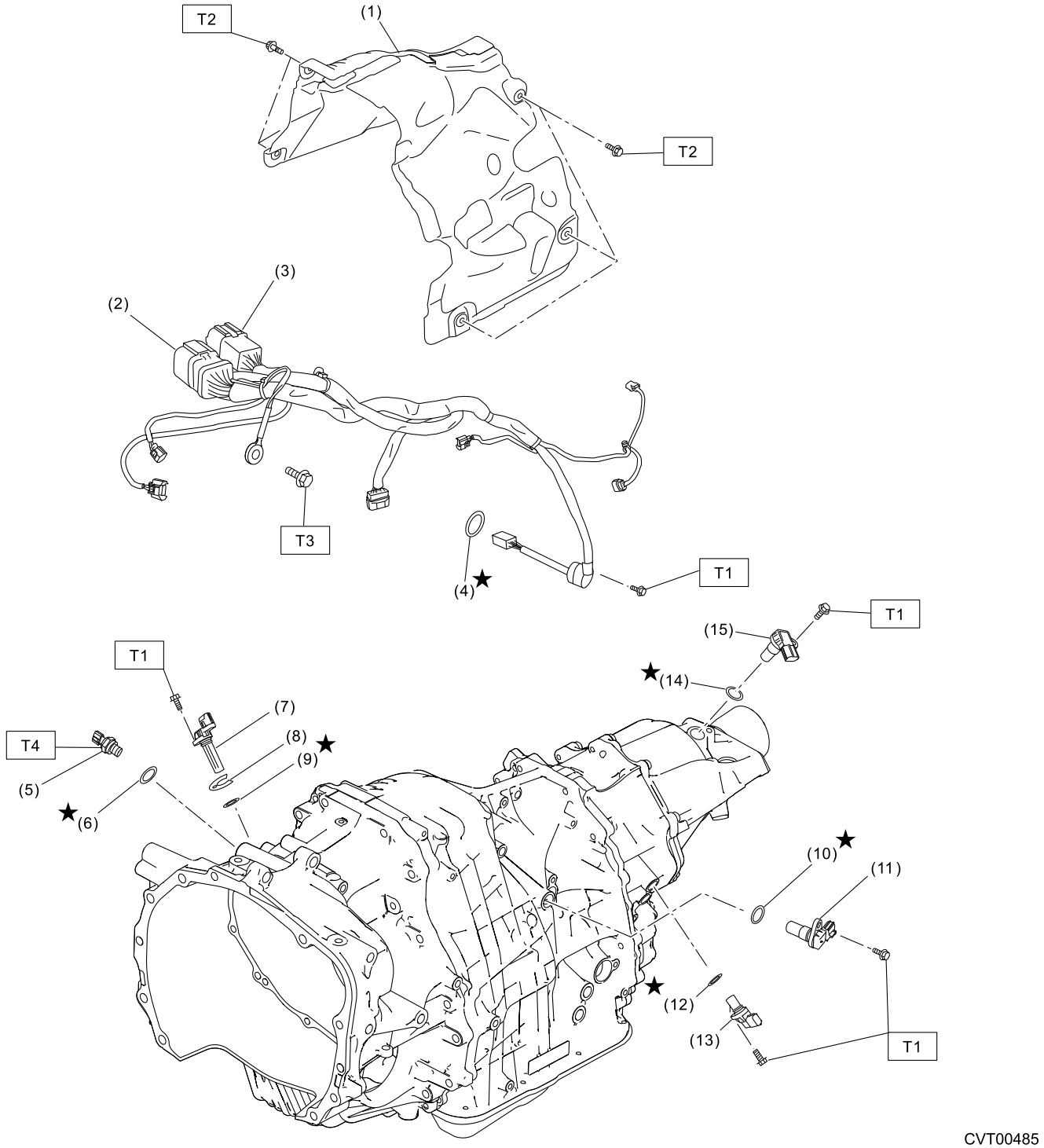
(27) O-ring

(28) Transfer clutch piston

Tightening torque: N·m (kgf-m, ft-lb)

T: 25 (2.5, 18.4)

12. TRANSMISSION HARNESS AND SENSOR



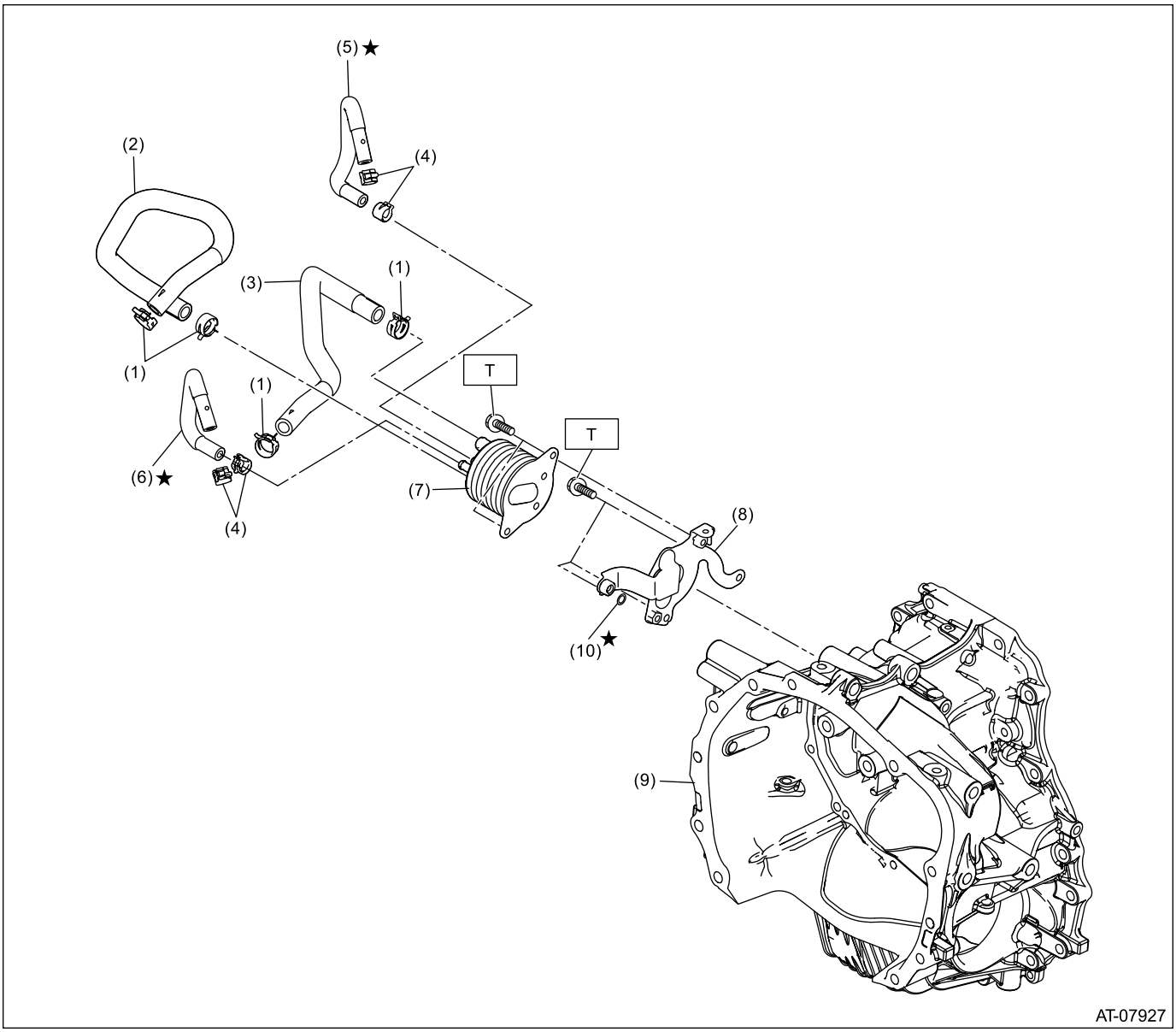
(1) Transmission cover
(2) Transmission harness
(3) Inhibitor harness
(4) O-ring
(5) Secondary pressure sensor
(8) Spacer
(9) O-ring
(10) O-ring
(11) Secondary speed sensor
(12) O-ring
(15) Rear wheel speed sensor

Tightening torque: N·m (kgf-m, ft-lb)

T1: 5 (0.5, 3.7)
T2: 8 (0.8, 5.9)

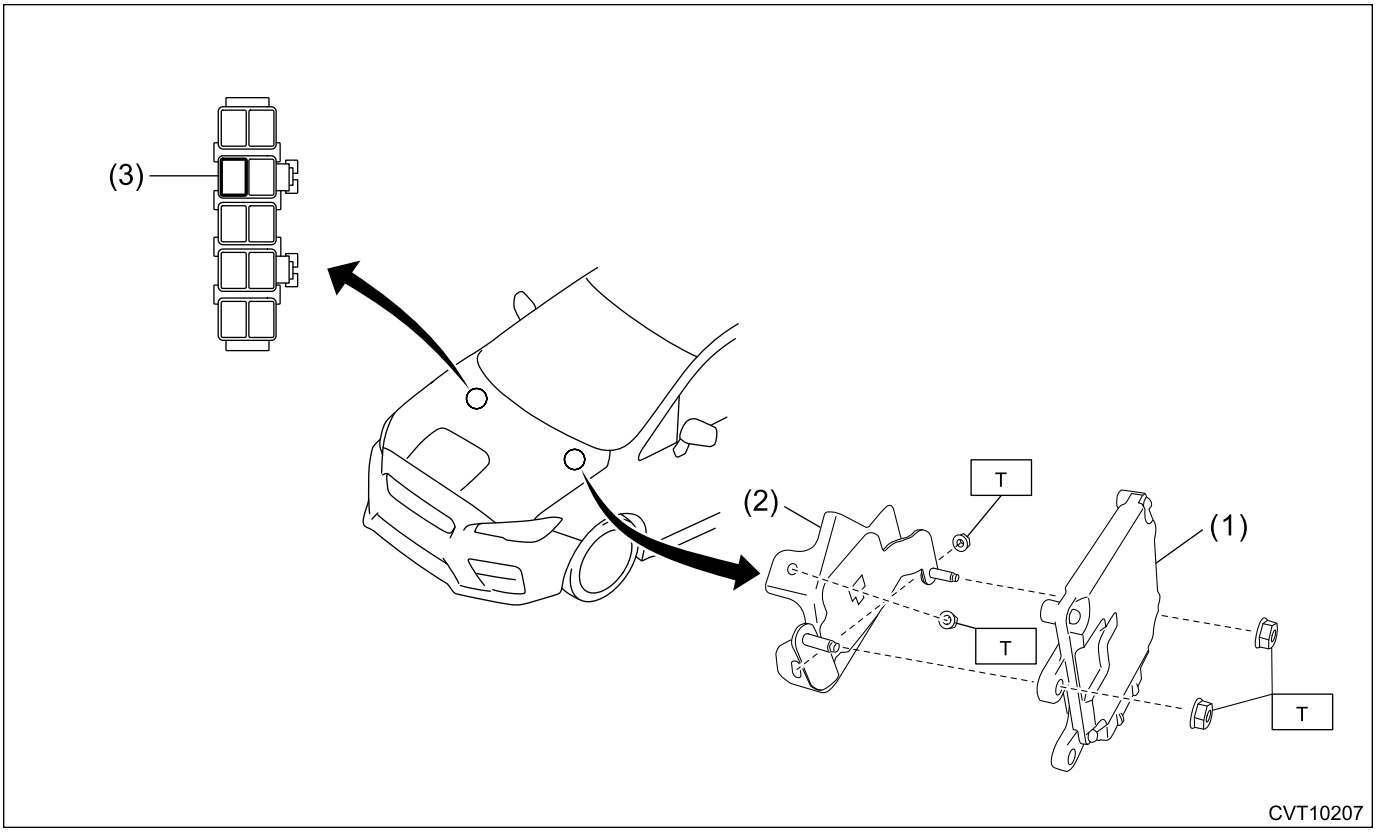
(6) O-ring
(7) Primary speed sensor
(13) Front wheel speed sensor
(14) O-ring
T3: 16 (1.6, 11.8)
T4: 39 (4.0, 28.8)

13. CVTF COOLER (WITH WARMER FEATURE)



(1) Hose clamp
(2) Engine coolant outlet hose
(3) Engine coolant inlet hose
(4) Hose clamp
(5) CVTF cooler inlet hose
(6) CVTF cooler outlet hose
(7) CVTF cooler (with warmer feature)
(8) CVTF cooler bracket
(9) Converter case
(10) O-ring
Tightening torque: N·m (kgf-m, ft-lb)
T: 23 (2.3, 17.0)

14. TRANSMISSION CONTROL MODULE

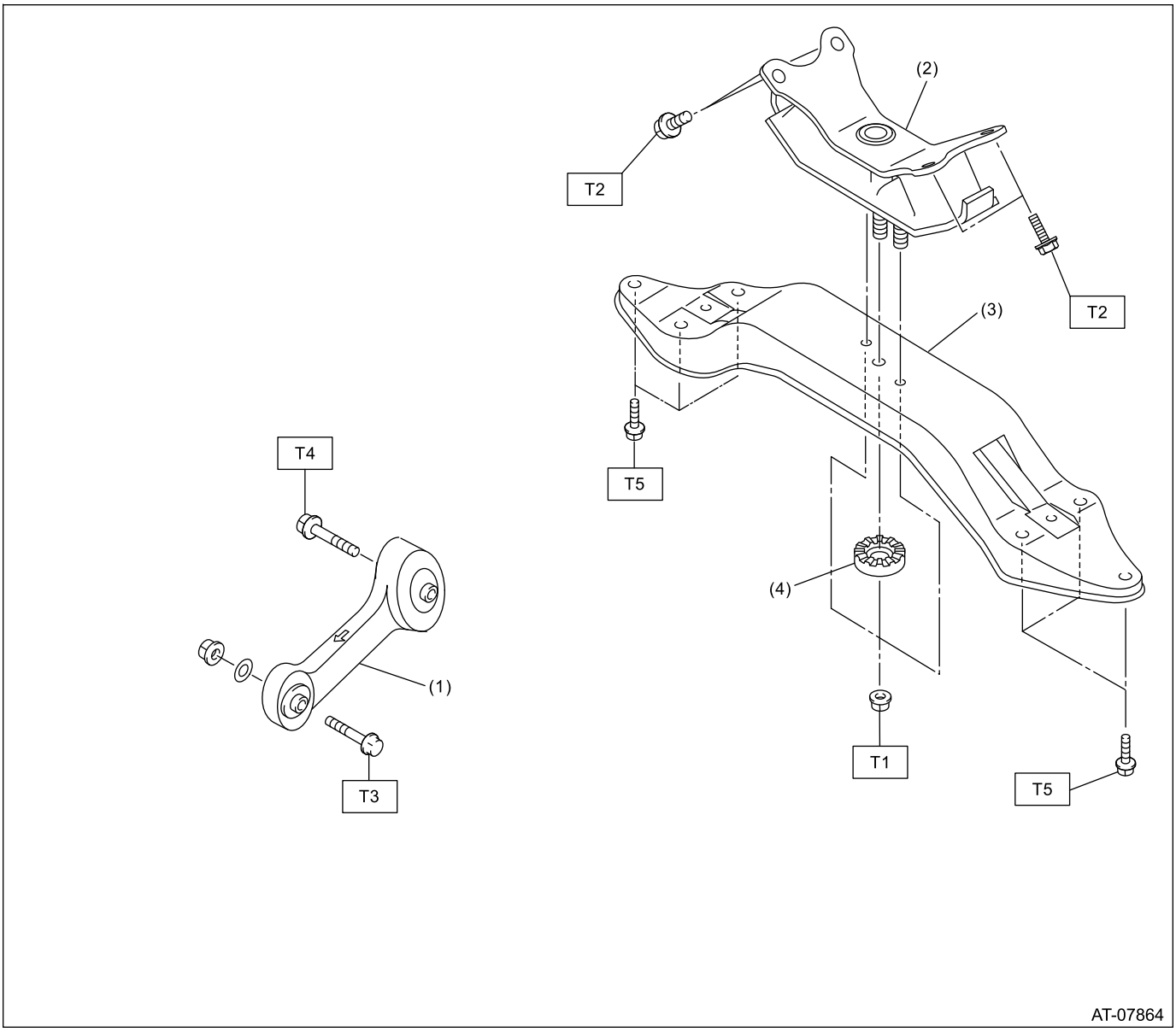


(1) Transmission control module (TCM)
(2) TCM bracket
(3) Relay

Tightening torque: N·m (kgf-m, ft-lb)

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)

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.

PREPARATION TOOL

1. SPECIAL TOOL

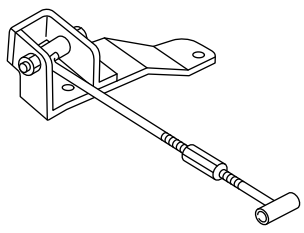
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST41099AC000	41099AC000	ENGINE SUPPORT ASSY	Used for supporting engine.

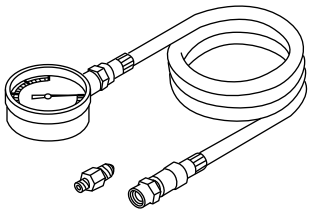
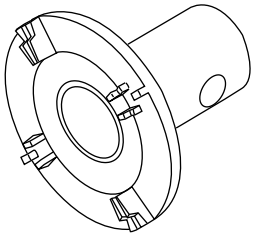
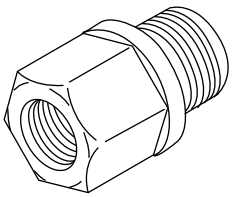
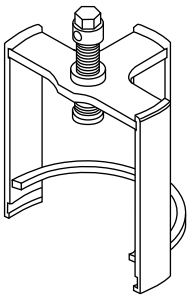
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18801AA000	18801AA000	OIL PRESSURE GAUGE ASSY	Used for measuring the secondary pressure (line pressure).
 ST18658AA021	18658AA021	WRENCH COMPL RETAINER	Used for removing and installing the differential side retainer.
 ST18681AA000	18681AA000	PRESSURE GAUGE 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).**
 ST18769AA000	18769AA000	EXPANDER PULLEY	Used for removing and installing the secondary pulley assembly.

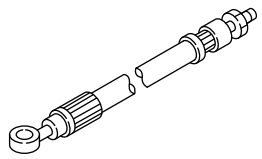
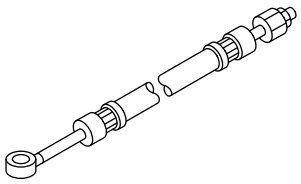
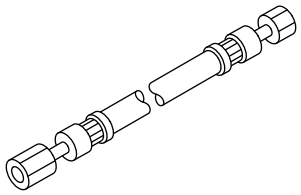
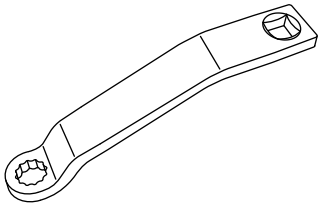
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498897700	498897700	OIL PRESSURE ADAPTER SET	Used for measuring the secondary pressure (line pressure) hydraulic pressure.
 ST34099AC020	34099AC020	ADAPTER HOSE B	Used for measuring the transfer clutch hydraulic pressure. **Note: Used with genuine union screw (Part No. 801914010) and gasket (Part No. 803914060).**
 ST34099AC010	34099AC010	ADAPTER HOSE A	Used for measuring the transfer clutch hydraulic pressure.
 ST73099SG000	73099SG000	SPECIAL TOOL CONDENSER	Used for installing the transfer clutch pressure test plug.

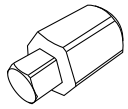
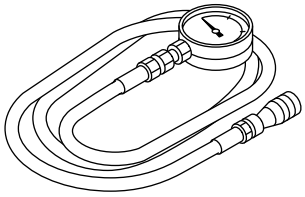
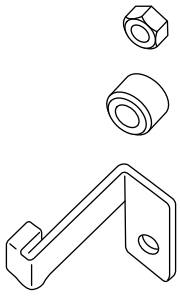
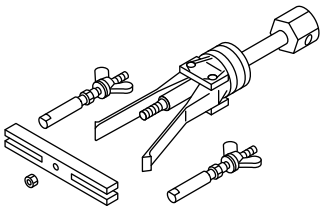
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18270AA040	18270AA040	SOCKET	Used for installing the transfer clutch pressure test plug.
 ST-498575400	498575400	OIL PRESSURE GAUGE ASSY	Used for measuring the transfer clutch hydraulic pressure.
 ST-498277200	498277200	STOPPER SET	• Used for removing and 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.

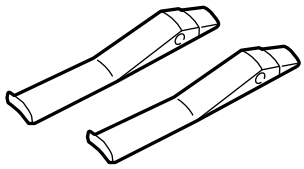
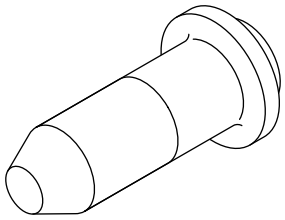
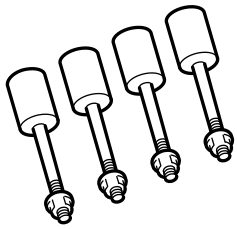
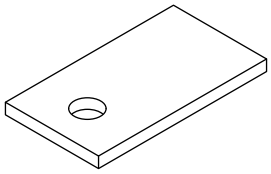
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18760AA000	18760AA000	CLAW	• Used for removing ball bearing of front reduction driven gear. • Used together with PULLER ASSY (398527700).
 ST-498057300	498057300	INSTALLER	Used for installing the extension case oil seal.
 ST18632AA000	18632AA000	TRANSMISSION STAND	Used for disassembling and assembling the transmission.
 ST-498255400	498255400	PLATE	Used for measuring the backlash of hypoid gear.

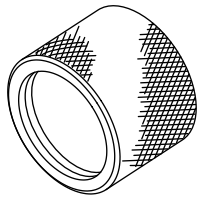
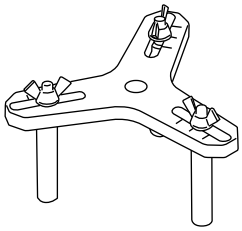
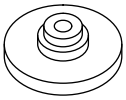
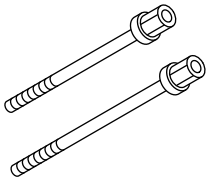
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18675AA000	18675AA000	DIFFERENTIAL SIDE OIL SEAL INSTALLER	Used for installing the differential side retainer oil seal.
 ST18762AA001	18762AA001	COMPRESSOR SPECIAL TOOL	• Used for disassembling and installing the multi-plate clutch piston for shifting. • COMPRESSOR SPECIAL TOOL (18762AA000) can also be used. (Except for transfer clutch piston)
 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.

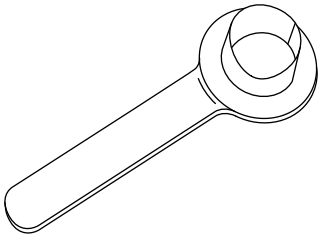
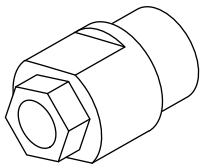
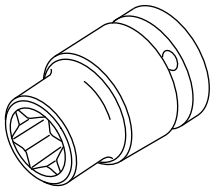
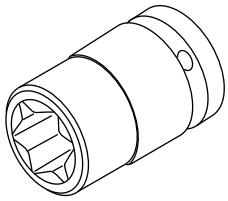
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST28399SA010	28399SA010	OIL SEAL PROTECTOR	Used for protecting oil seal when installing front drive shaft.
 ST18667AA010	18667AA010	HOLDER	• Used for removing and installing the drive pinion lock nut. • Used as a holder to rotate gear when checking tooth contact.
 ST18270KA010	18270KA010	SOCKET (E16)	Used for removing and installing the center support COMPL.
 ST18270KA020	18270KA020	SOCKET (E20)	• Used for removing and installing the hypoid driven gear. • Used for removing and installing the drive pinion shaft retainer.

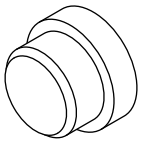
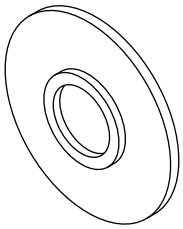
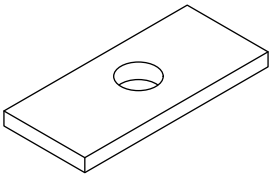
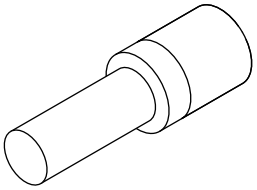
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-398497701	398497701	SEAT	Used for removing and installing the ball bearing.
 ST-398177700	398177700	INSTALLER	• Used for removing and installing the ball bearing and tapered roller bearing. • Used for installing the parking gear.
 ST-398643600	398643600	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.

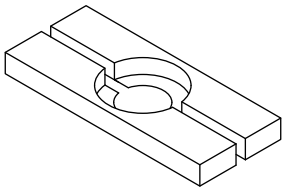
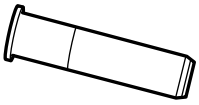
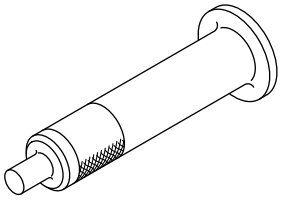
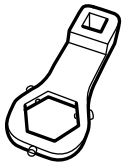
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498077000	498077000	REMOVER	• Used for removing ball bearing of front reduction drive gear. • Used for removing the inner bearing inner race of the drive pinion shaft. • Used for removing the differential taper roller bearing.
 ST18657AA010	18657AA010	INSTALLER	Used for installing the oil seal of inhibitor switch.
 ST18657AA020	18657AA020	OIL SEAL INSTALLER	Used for installing the oil seal.
 ST18621AA000	18621AA000	ADAPTER WRENCH	Used for removing and installing the drive pinion shaft lock nut.

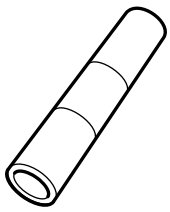
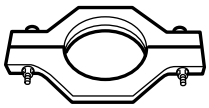
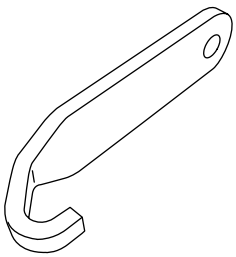
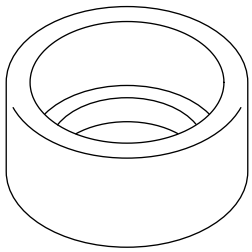
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18651AA000	18651AA000	INSTALLER	Used for installing the bearing of front reduction drive gear.
 ST18720AA000	18720AA000	REMOVER	Used for removing ball bearing of reduction driven gear.
 ST-498497300	498497300	CRANKSHAFT STOPPER	Used for stopping the drive plate rotation when removing and installing the drive plate.
 ST20299AG010	20299AG010	BASE	Used for installing the bearing on primary pulley side.

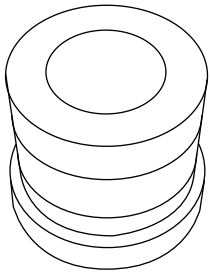
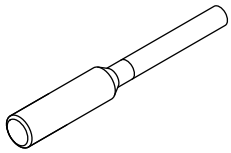
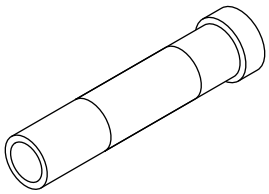
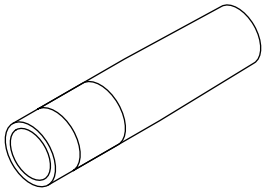
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-399513600	399513600	INSTALLER	• Used to install the rear drive shaft ball bearing. • Used for removing the bearing of the oil pump chain sprocket.
 ST-499267300	499267300	STOPPER PIN	Used for adjusting the inhibitor switch.
 ST-499277100	499277100	BUSHING 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.
 ST-499277200	499277200	INSTALLER	• Used for installing the inner bearing inner race of drive pinion shaft. • Used for installing the reduction driven gear.

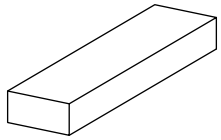
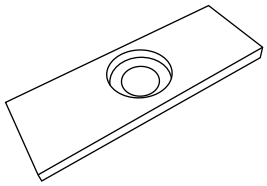
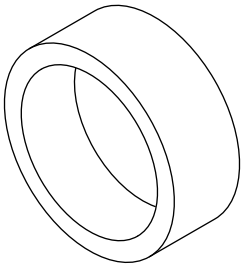
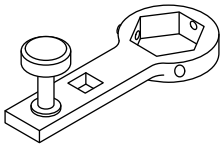
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499575400	499575400	GAUGE	Used for measuring height of end play.
 ST-499575600	499575600	GAUGE	Used for measuring height of end play.
 ST-398744300	398744300	PISTON GUIDE	Used for measuring height of end play.
 ST-499787700	499787700	WRENCH	Used for measuring the differential pinion shaft backlash.

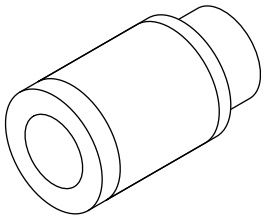
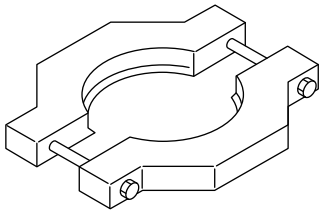
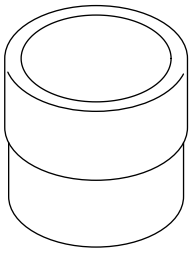
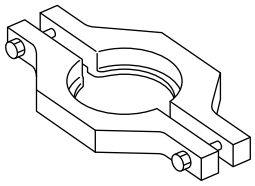
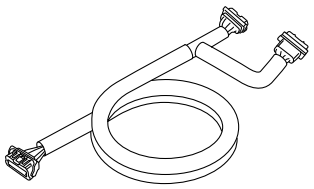
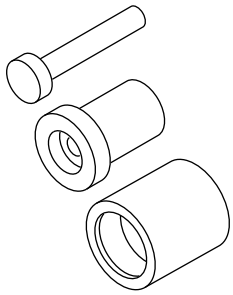
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499757002	499757002	INSTALLER	Used for installing the bearing of front reduction driven gear.
 ST18767AA000	18767AA000	BEARING REMOVER	Used for removing the reduction driven gear bearing retainer.
 ST-499755602	499755602	PRESS SNAP RING	Used for installing 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.

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18460AA040	18460AA040	CHECK BOARD	Used for measuring voltage and resistance of TCM terminals.
 ST-927720000	927720000	HOUSING BUSHING INSTALLER AND REMOVER	• Used for installing the oil seal of oil pump chain cover. • Use BASE TUBE LATERAL LINK (927890000) and BUSHING SHAFT (927880000).
 STSSM4	—	SUBARU SELECT MONITOR 4	Used for setting of each function and troubleshooting for electrical system. **Note:** **For detailed operation procedures, refer to "Help" for the application.**

2. GENERAL TOOL

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

TOOL NAME	REMARKS
	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. • Used for installing the drive plate.
Dial gauge	• Used for measuring backlash. (Lever type) • Used with magnet stand.
Magnet stand	• Used for measuring backlash. • Used with dial gauge (lever type).
DST-i	Used together with Subaru Select Monitor 4.

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > CVTF

INSPECTION

Check for leakage of CVTF from transmission.

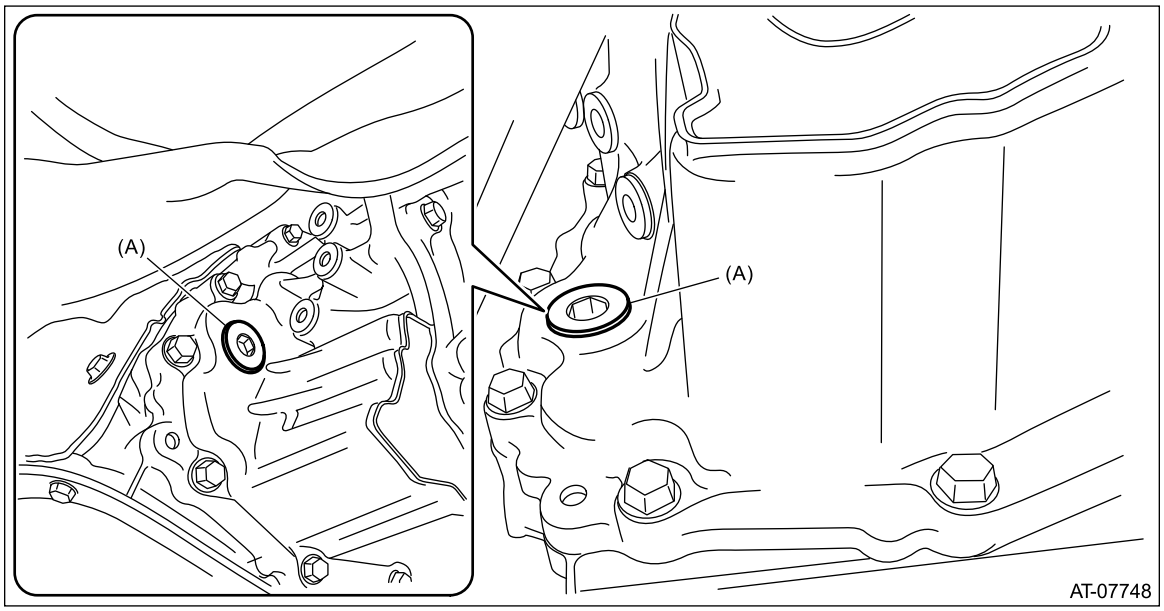
CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > CVTF

ADJUSTMENT

Caution:

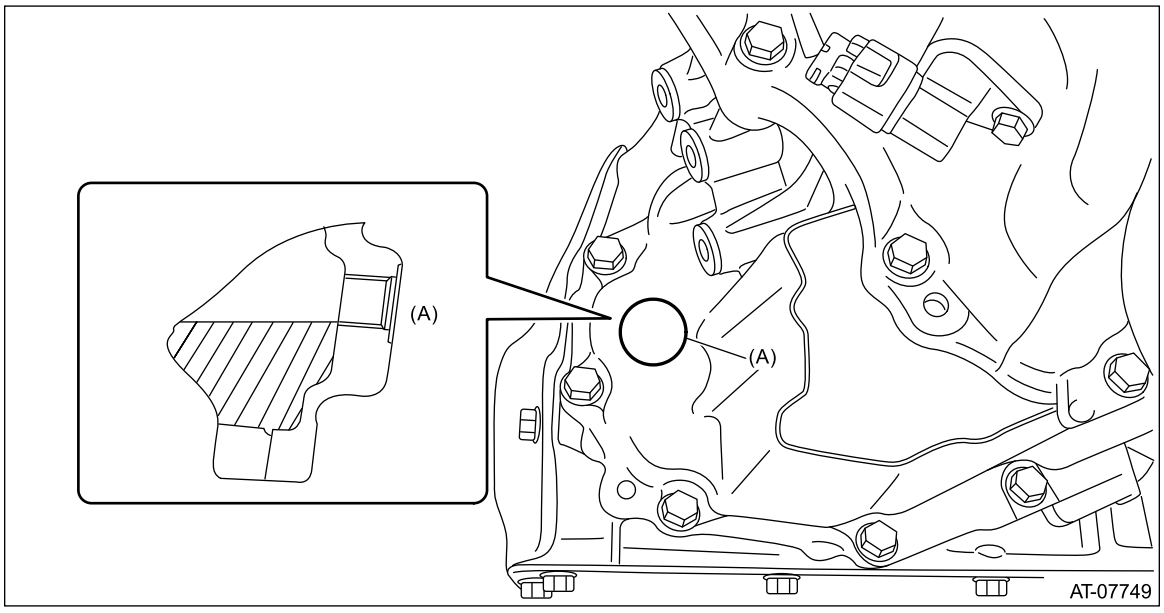
- **CVTF level changes along with CVTF temperature. When inspecting CVTF level, observe the specified CVTF temperature.**
- **Always use specified CVTF. Using other fluid will cause malfunction.**

1. Idle the engine to raise CVTF temperature to 35 — 45°C (95 — 113°F) on Subaru Select Monitor.
2. Operate the select lever in P → R → N → D and D → N → R → P to circulate CVTF with the engine idling.
3. With the engine running, lift up the vehicle and remove the filler plug.
   Caution:
   Pay special attention to the following operations as the engine is at idle.
   Note:
   CVTF is at the specified level when it is up to the filler plug hole lower section.



(A) Filler plug

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

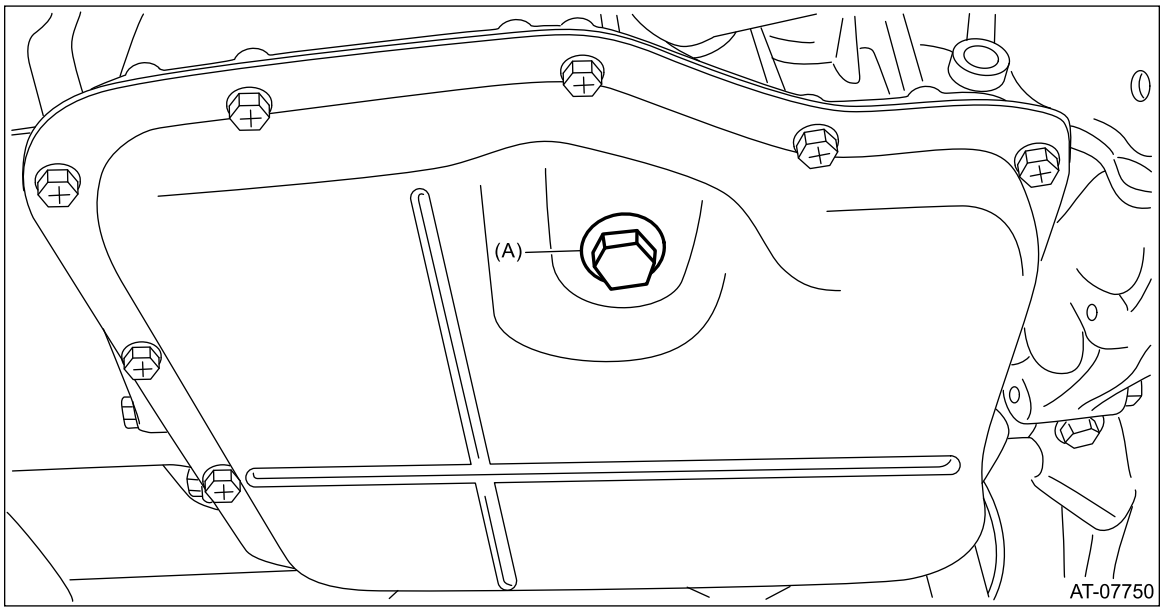
CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > CVTF

REPLACEMENT

Caution:

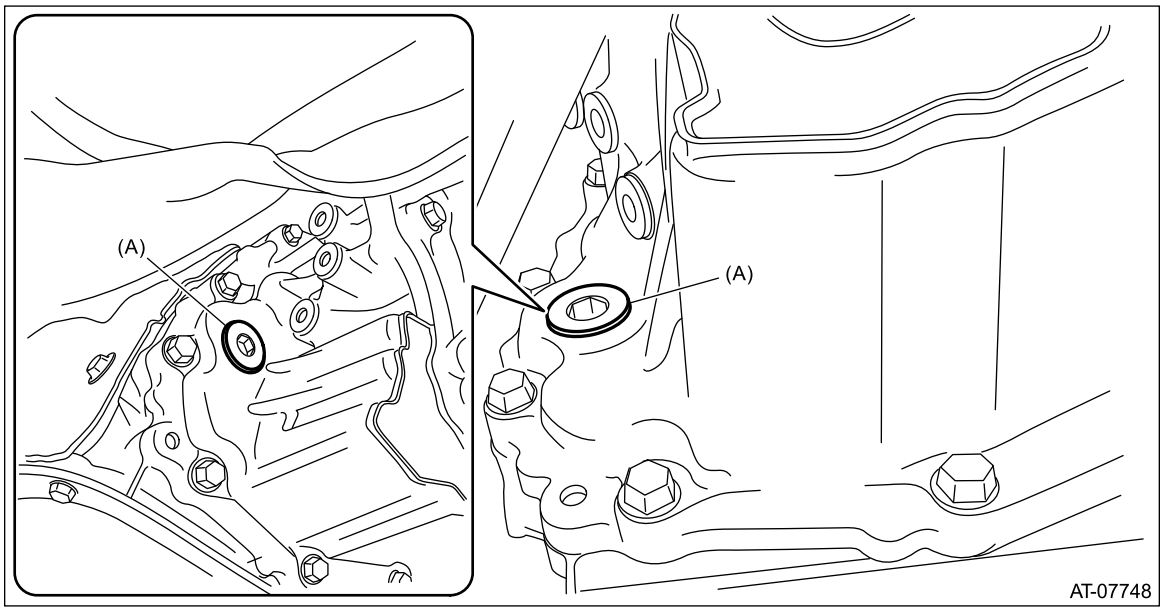
- **Directly after the vehicle has been running or the engine has been idling for a long time, the CVTF is hot. Be careful not to burn yourself.**
- **Be careful not to spill the CVTF on exhaust pipe to prevent it from emitting smoke or causing fires. If CVTF adheres, wipe it off completely.**
- **Always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

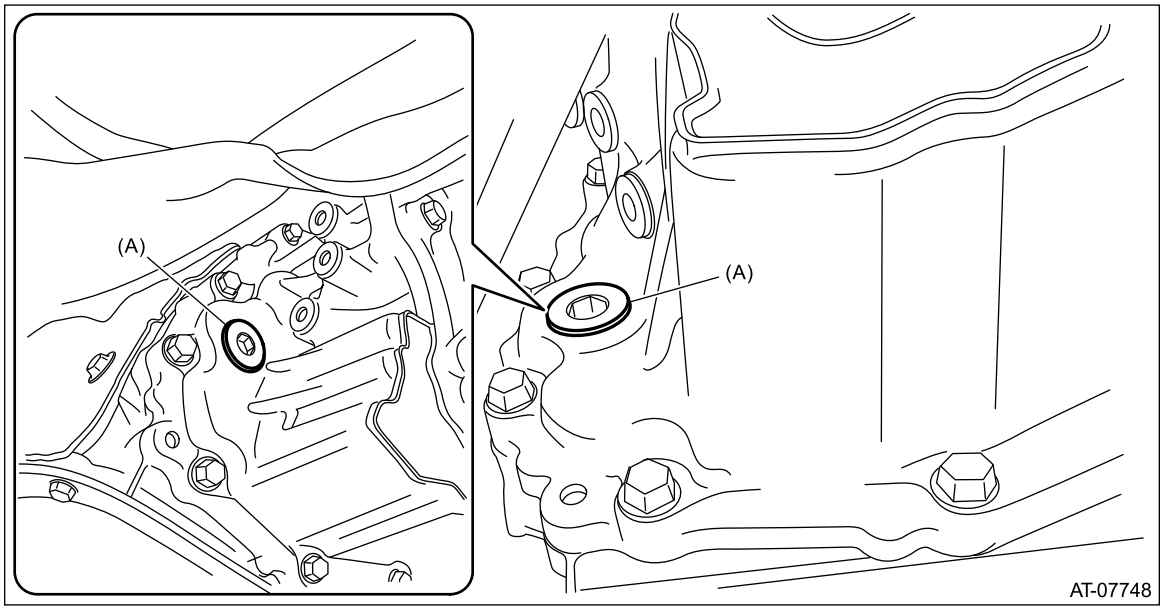
6. Temporarily tighten the filler plug.
7. Idle the engine to raise CVTF temperature to 35 — 45°C (95 — 113°F) on Subaru Select Monitor.
8. Operate the select lever in P → R → N → D and D → N → R → P to circulate CVTF with the engine idling.

   Caution:

   Pay special attention to the following operations as the engine is at idle.
9. Place the select lever in "P" range. Then lift up the vehicle with the engine at idle to adjust the CVTF level and check for leakage. Ref. to 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) > CVTF

CONDITION CHECK

Note:

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

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

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Differential Gear Oil

INSPECTION

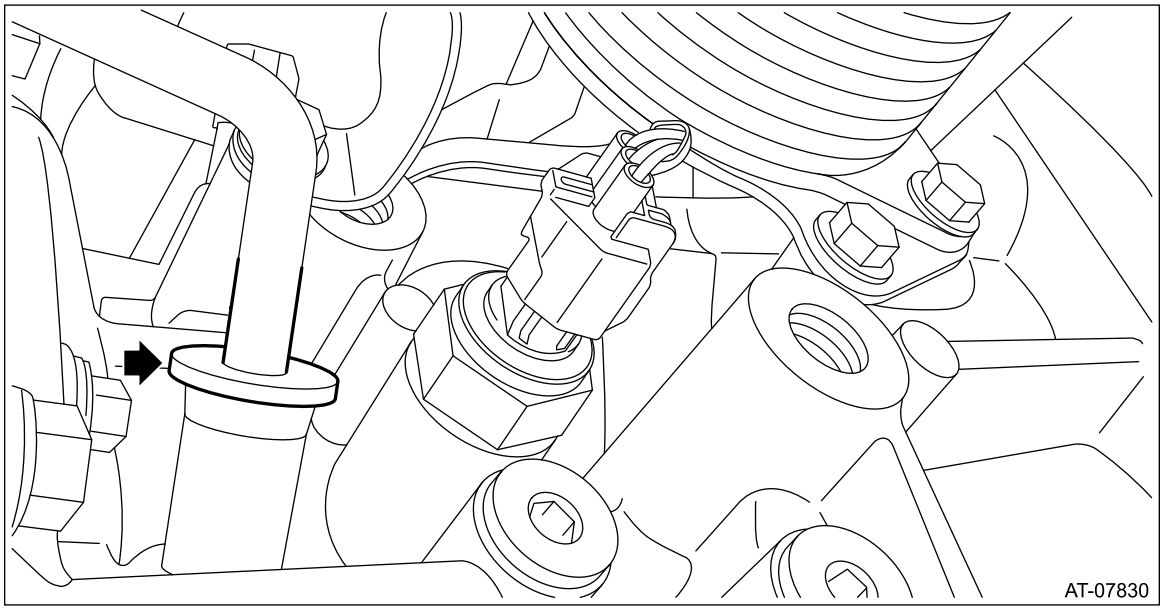
Check that there is no leakage of differential gear oil from the converter case.

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Differential Gear Oil

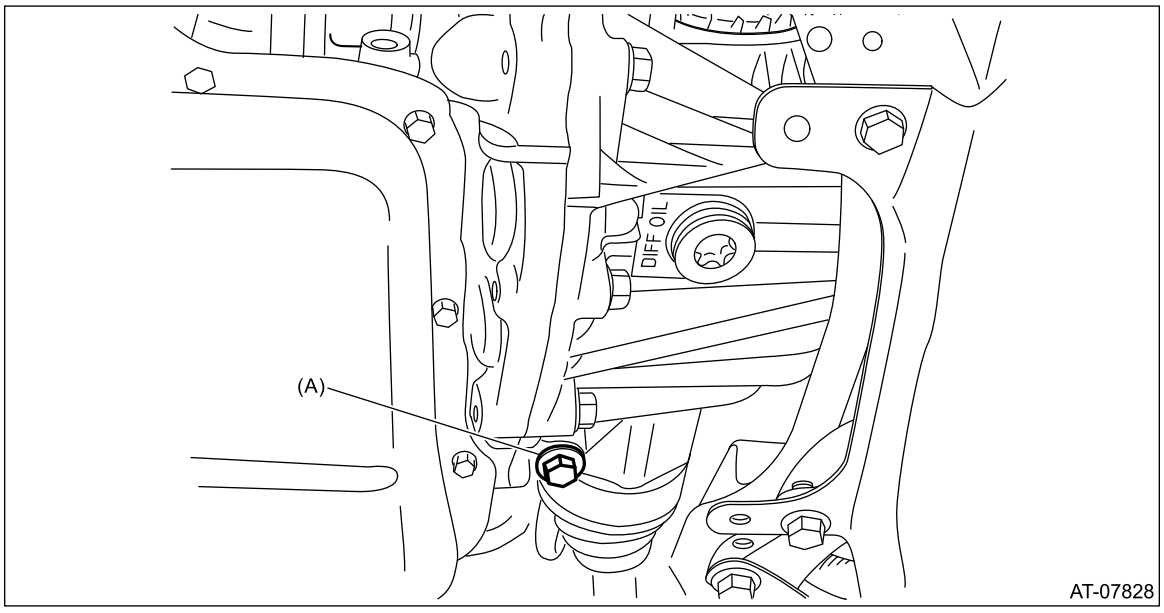
ADJUSTMENT

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.

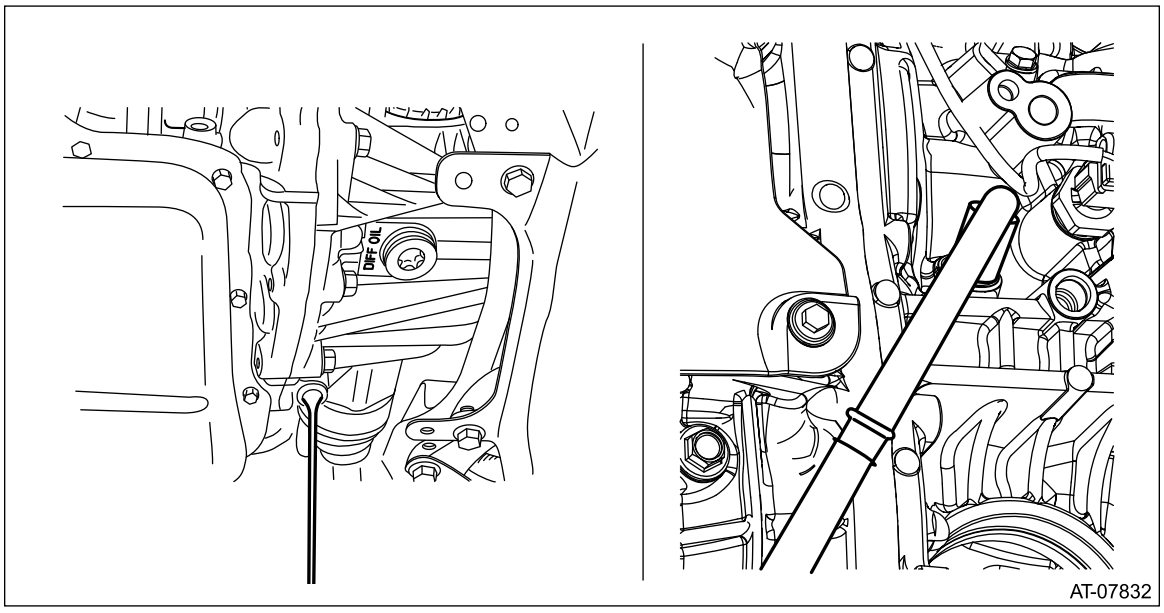
5. When the flow of the differential gear oil turns into a narrow stream, install the overflow drain plug.

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

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.**

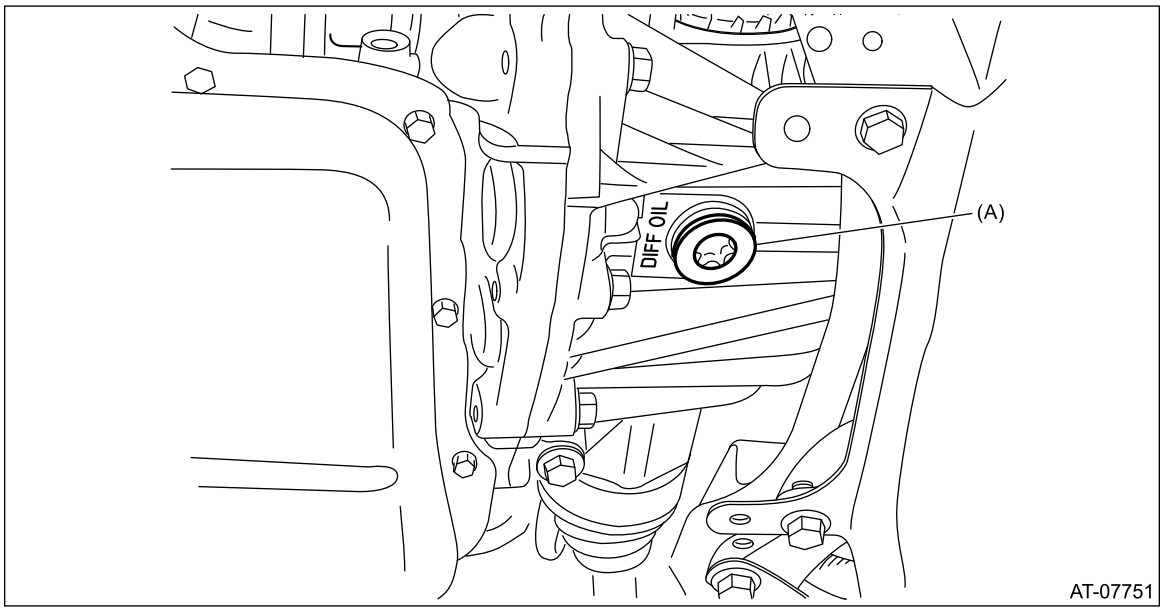
1. Lift up the vehicle.
2. Remove the differential gear oil drain plug using TORX® bit T70. Drain differential gear oil.
3. Install the differential gear oil drain plug using TORX® bit T70.

   Note:

   Use a new gasket.

   Tightening torque:

   70 N·m (7.1 kgf-m, 51.6 ft-lb)



(A) Differential gear oil drain plug

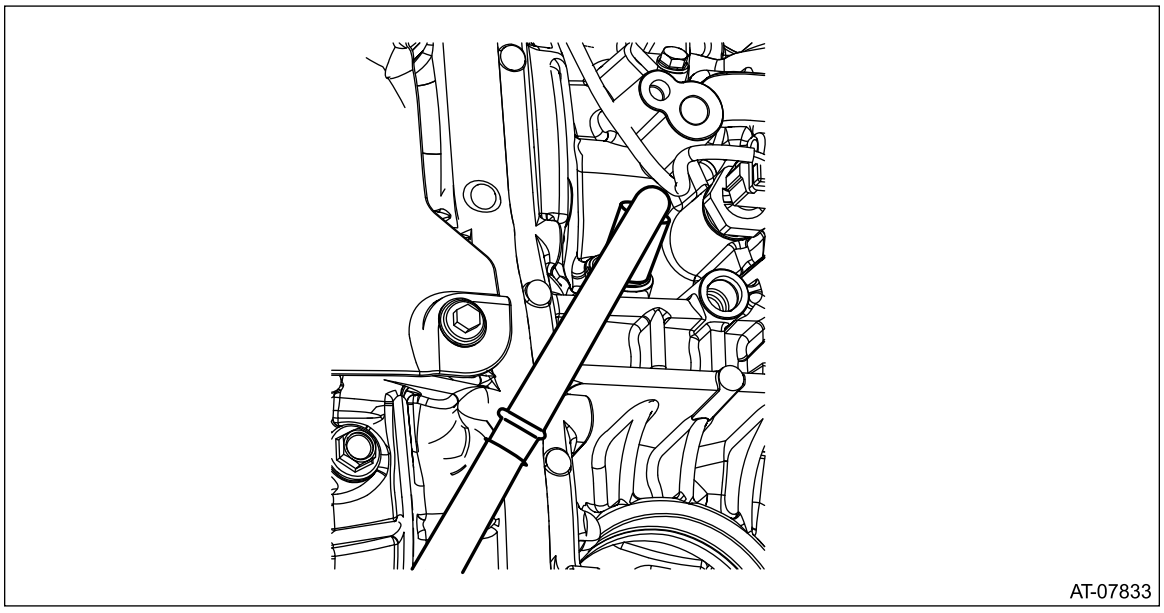
4. Pour gear oil from the charge pipe.

   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) > 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 VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)>Clear Memory Mode.
- **If the above malfunction code is detected during variator chain break-in, the system enters into fail mode, and the vehicle shows symptom such as engine speed rapid increases even if the accelerator pedal is gradually depressed.**

1. Lift up the vehicle.
   Caution:
   Lift up the vehicle until the tire bottom is 0.3 m (0.98 ft) or more above the ground.
2. Shift the select lever to "P" or "N" range.
3. Apply the parking brake.
4. Connect the Subaru Select Monitor to data link connector.
5. Idle the engine to raise the CVTF temperature to 40 — 50°C (104 — 122°F) displayed on the Subaru Select Monitor.
   Note:
   When CVTF temperature does not rise easily or if you want to rise CVTF temperature faster, maintain the engine speed within 2,000 — 2,500 r/min at "P" or "N" range to raise the CVTF temperature.
6. With the select lever in "P" or "N" range, increase the engine speed to 3,000 — 3,500 r/min from the idling condition, and maintain the speed for approximately five seconds, then release the accelerator pedal.
7. Depress the accelerator pedal gradually again from idling condition to increase the engine speed to 3,000 — 3,500 r/min, maintain the speed for approximately five seconds, then release the accelerator pedal.
8. Release the 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.

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

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” → “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.

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)(w/o STI)>Subaru Select Monitor>OPERATION > DISPLAY CURRENT ENGINE DATA.
4. Check the engine oil level. Ref. to LUBRICATION(w/o STI)>Engine Oil>INSPECTION.
5. Check the coolant level. Ref. to COOLING(w/o STI)>Engine Coolant>INSPECTION.
6. Adjust the CVTF level. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>CVTF>ADJUSTMENT.
7. Increase the CVTF temperature to 60 — 80°C (140 — 176°F) by idling the engine with the select lever shifted to "N" or "P" range.
8. Hold down the pre-collision brake OFF switch to turn OFF the pre-collision brake. (With EyeSight)
9. Shift the select lever to "D" range.
10. Depress the accelerator pedal to the full while fully depressing the foot brake pedal with your left foot.
11. When the engine speed stabilizes, quickly record the engine speed and release accelerator pedal. Shift the select lever to "N" range. Let the engine idle for one minute or more to cool it down.
12. Shift to "R" range and perform the same stall test.
    Note:
    - **Do not perform a stall test for over 5 seconds at a time. (From closed throttle, fully open throttle to stall speed reading.) Failure to follow this instruction will cause the engine oil and CVTF to deteriorate and the clutch and brake to be adversely affected.**
    - **Be sure to cool down the engine for at least one minute after each stall test with the select lever set in the "P" or "N" range and with the idle speed of 1,200 r/min or less.**
    - **If the stall speed is higher than the specified range, attempt to finish the stall test in as short a time as possible, in order to prevent the CVT from sustaining damage.**

    Stall speed standard:
    2,050 — 2,590 r/min (D range)
    2,130 — 2,680 r/min (R range)

Stall test judgment

Range	Range	Probable cause
Lower than standard value	D, R	• Throttle valve is not fully open. • Insufficient engine output • Torque converter malfunction
Higher than standard value	D	• Forward clutch slippage • 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

INSPECTION

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

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

1. Apply the parking brake.
2. Start the engine. Check the idle speed. (A/C OFF)
3. Shift the select lever from "N" to "D" range. Using a stop watch, measure the time elapsed from shifting the lever until the shock is felt.

   Time lag standard:

   1.2 seconds or less

   If "N" → "D" time lag is longer than specified:
   - Secondary pressure (line pressure) is too low.
   - Forward clutch worn
   - Piston malfunction
   - Control valve body malfunction
   - Learning incomplete
4. In the same manner, measure the time lag when shifting from "N" range to "R" range.

   Time lag standard:

   1.5 seconds or less

   If "N" → "R" time lag is longer than specified:
   - Secondary pressure (line pressure) is too low.
   - Reverse brake worn
   - Piston malfunction
   - Control valve body malfunction
   - Learning incomplete

INSPECTION

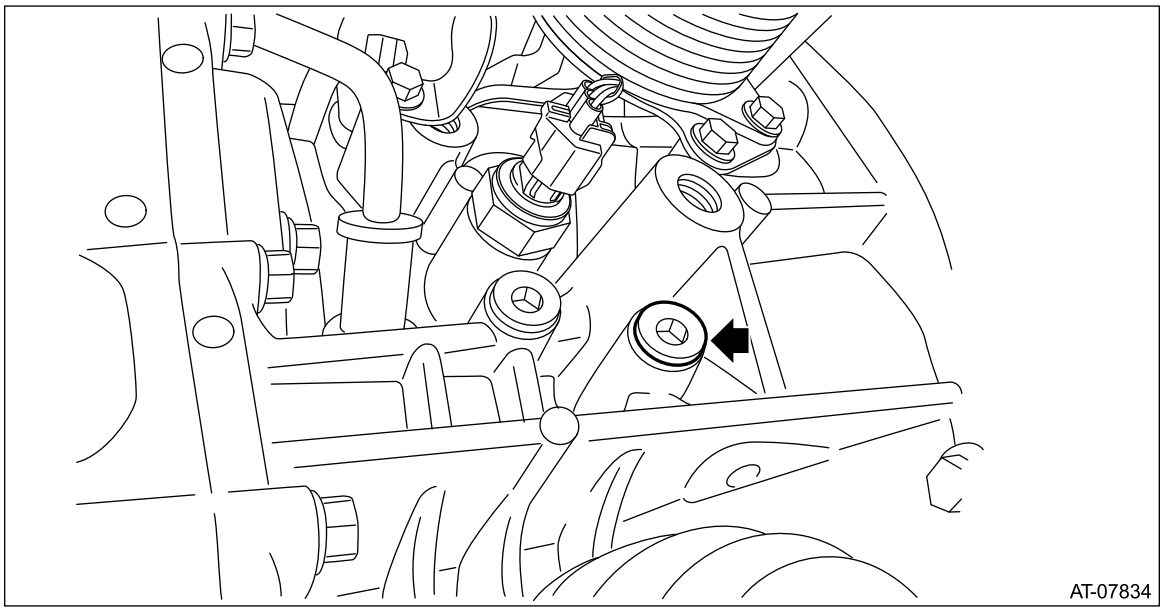
Caution:

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

Note:

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

1. Remove the front wheel RH. Ref. to WHEEL AND TIRE SYSTEM>Tire and Wheel>REMOVAL.
2. Lift up the vehicle.
3. Remove the test plug for secondary pressure (line pressure).



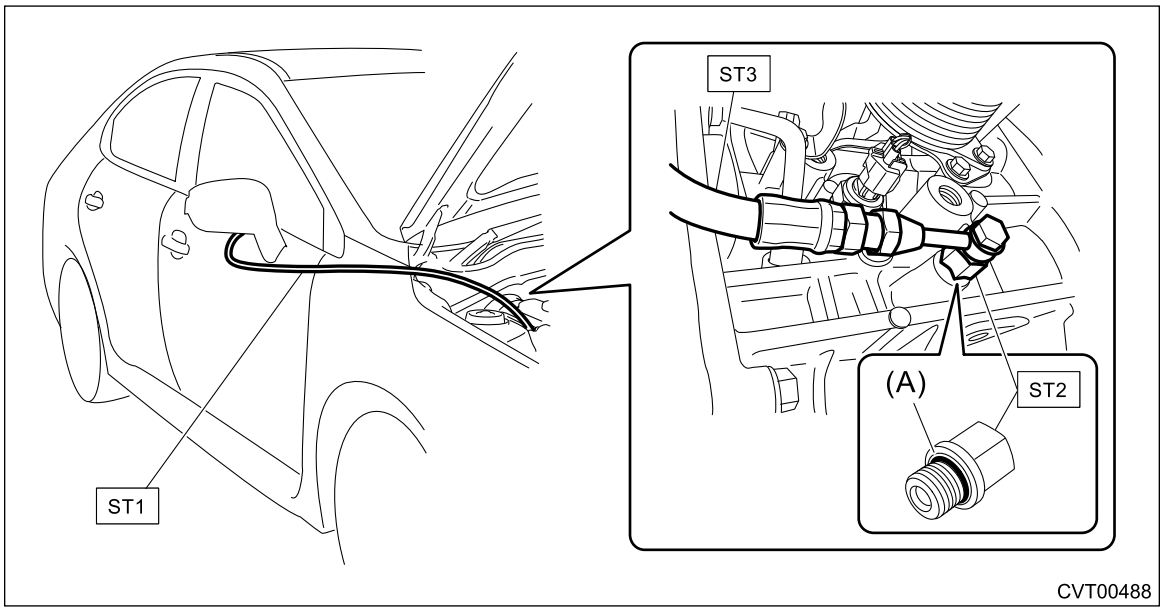
4. Attach ST1, ST2 and ST3 to transmission.

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. 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)(w/o STI)>Subaru Select Monitor>OPERATION > DISPLAY CURRENT ENGINE DATA.
9. Check the engine oil level. Ref. to LUBRICATION(w/o STI)>Engine Oil>INSPECTION.
10. Check the coolant level. Ref. to COOLING(w/o STI)>Engine Coolant>INSPECTION.
11. Adjust the CVTF level. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>CVTF>ADJUSTMENT.
12. Increase the CVTF temperature to 60 — 80°C (140 — 176°F) by idling the engine with the select lever shifted to "N" or "P" range.
13. Hold down the pre-collision brake OFF switch to turn OFF the pre-collision brake. (With EyeSight)
14. Shift the select lever to "D" range.
15. Depress the accelerator pedal to the full while fully depressing the foot brake pedal with your left foot.
16. Immediately after the engine speed becomes steady, record the reading of the secondary pressure (line pressure), engine speed and actual secondary pressure on Subaru Select Monitor. And then release the accelerator pedal. Shift the select lever to "N" range. Let the engine idle for one minute or more to cool it down.

Note:

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

Secondary pressure (line pressure) standard				
	Range	**Throttle**	**Brake**	**Secondary pressure (line pressure) (MPa (kgf/cm^2, 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:

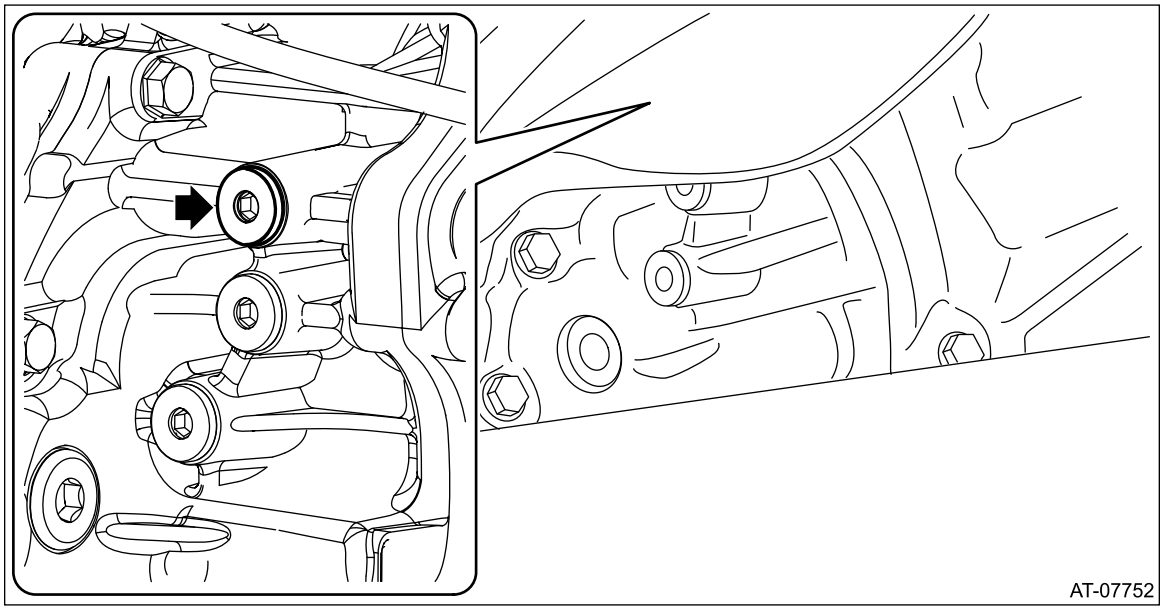
- **Use new O-rings.**
- **Apply CVTF to the O-rings.**

Tightening torque:

25 N·m (2.5 kgf-m, 18.4 ft-lb)

INSPECTION

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



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

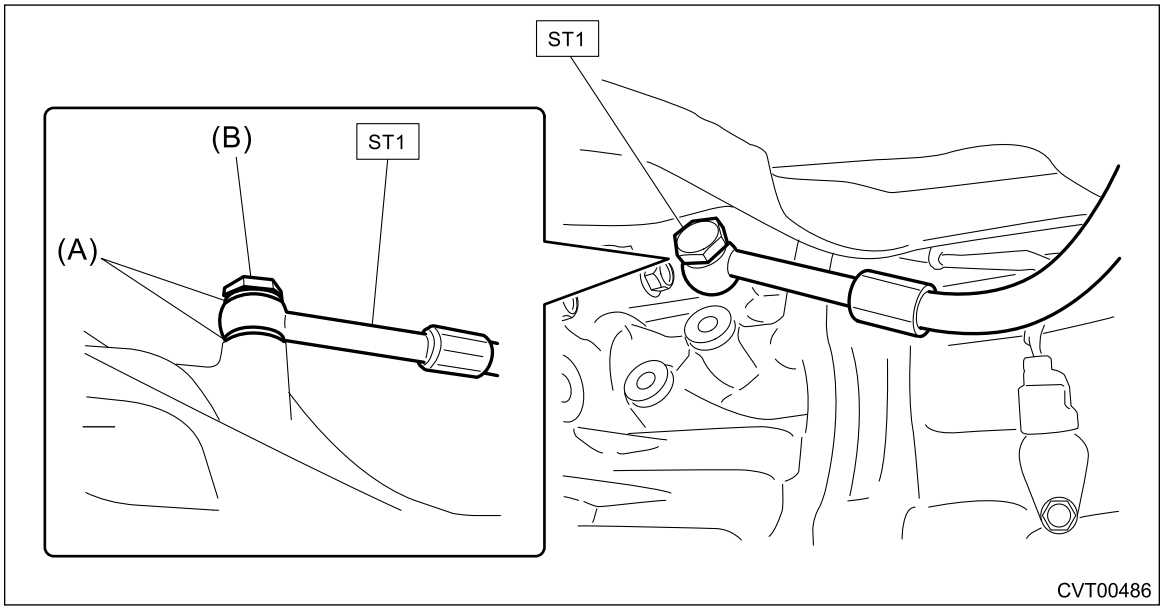
Caution:

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

Note:

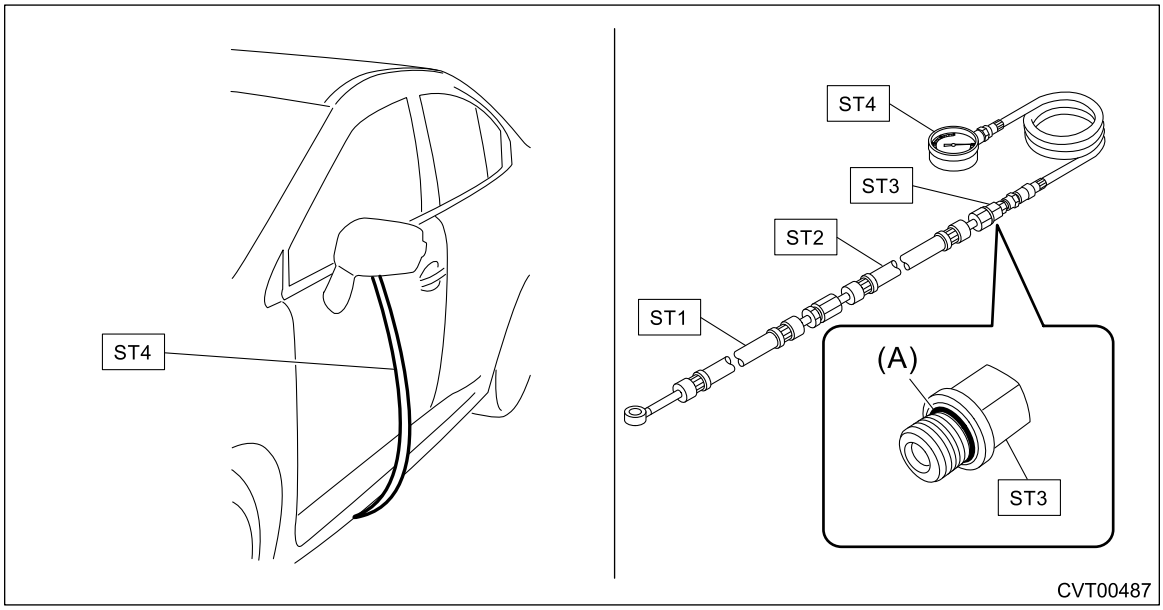
- **Use ST1 ADAPTER HOSE B with genuine union screw (Part No. 801914010) and gasket (Part No. 803914060) attached.**
- **Use ST3 PRESSURE GAUGE ADAPTER with genuine O-ring (Part No. 806911080) attached.**

ST1	**34099AC020**	**ADAPTER HOSE B**
ST2	**34099AC010**	**ADAPTER HOSE A**
ST3	**18681AA000**	**PRESSURE GAUGE ADAPTER**
ST4	**498575400**	**OIL PRESSURE GAUGE ASSY**



(A) Gasket (genuine part)

(B) Union screw (genuine part)



(A) O-ring (genuine part)

4. Lower the vehicle.
5. Connect the Subaru Select Monitor to the data link connector and read the current data.
6. Check the transfer clutch pressure as in secondary pressure (line pressure) test. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Secondary Pressure (Line Pressure) Test.

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

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

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

Note:

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

ST1 18270AA040 SOCKET

ST2 73099SG000 SPECIAL TOOL CONDENSER

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

T2 = L2/(L1 + L2) × T1

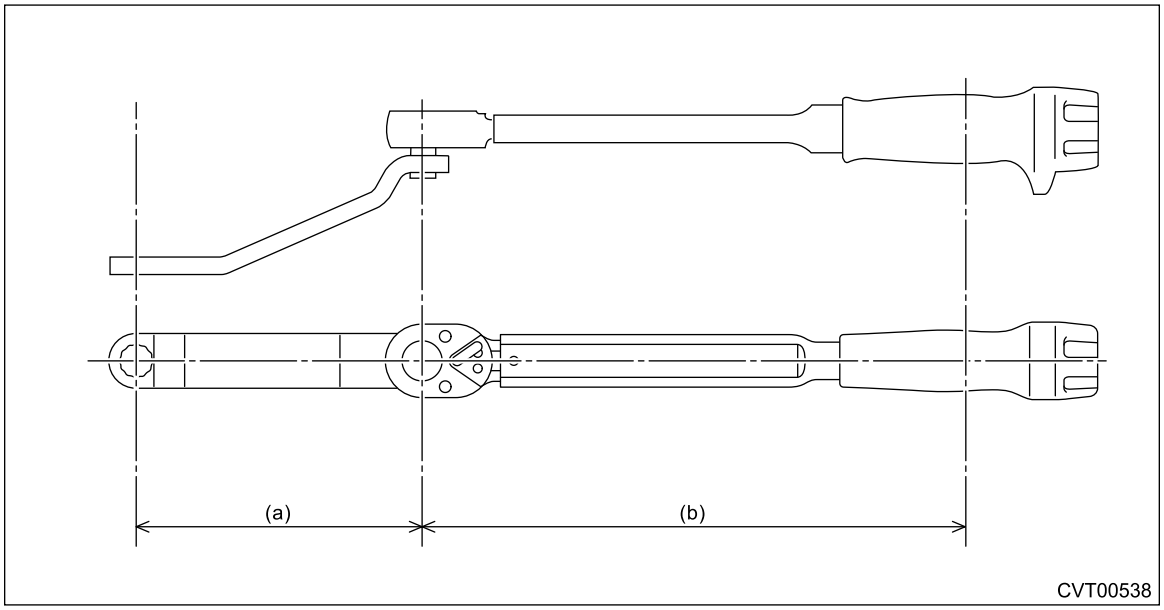
T1: 25 N·m (2.5 kgf-m, 18.4 ft-lb)

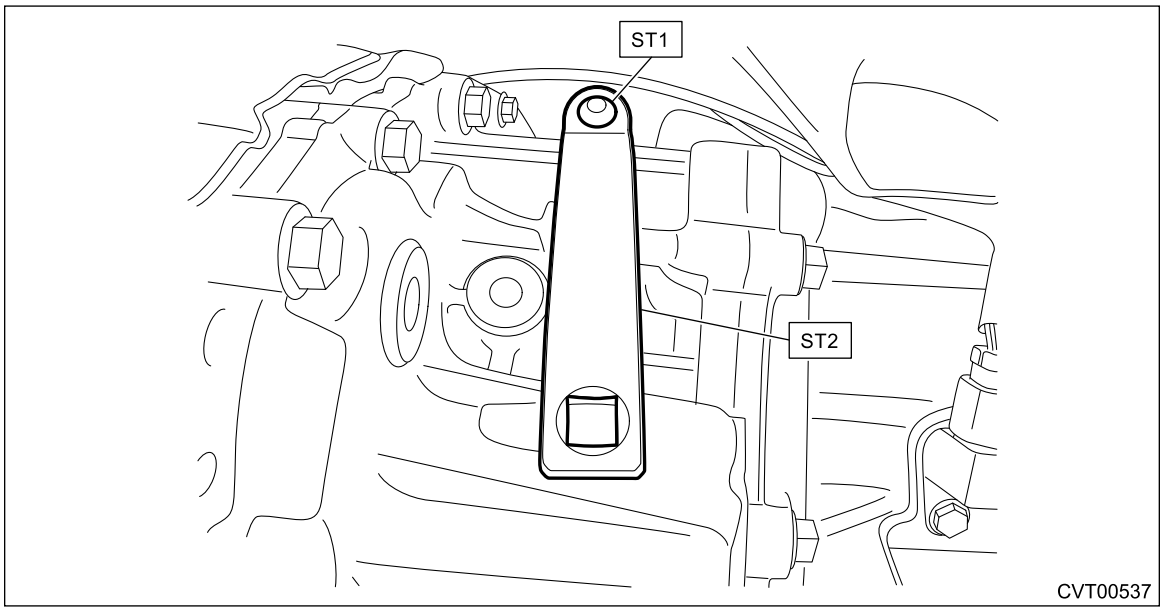
L1: ST2 length 0.1 m (3.94 in) (a)

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

[Required torque setting]

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

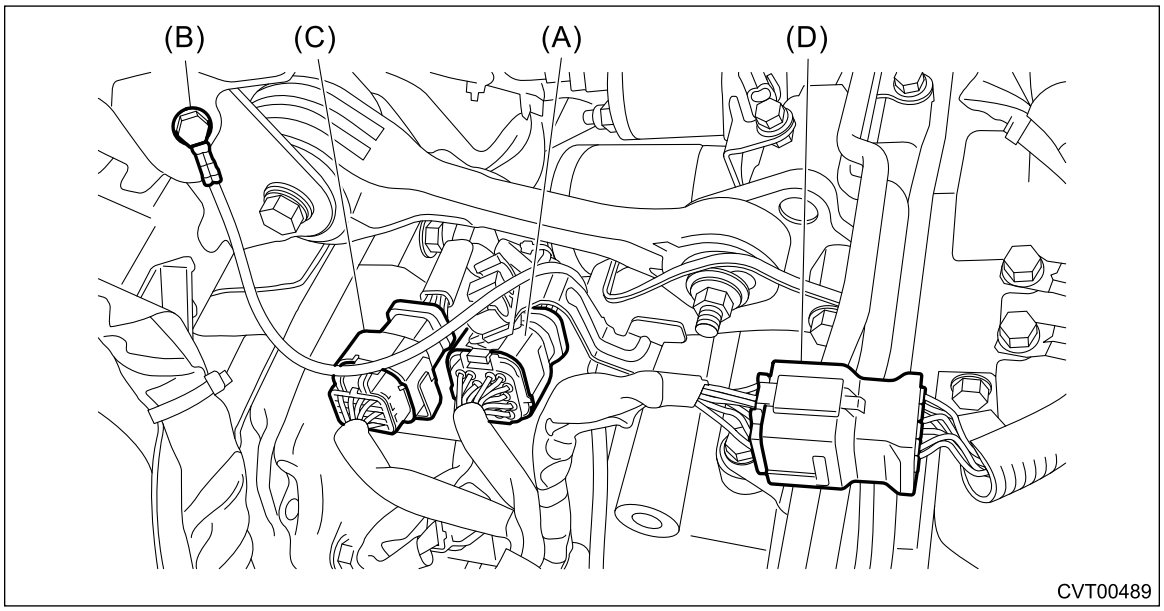




10. Lower the vehicle.

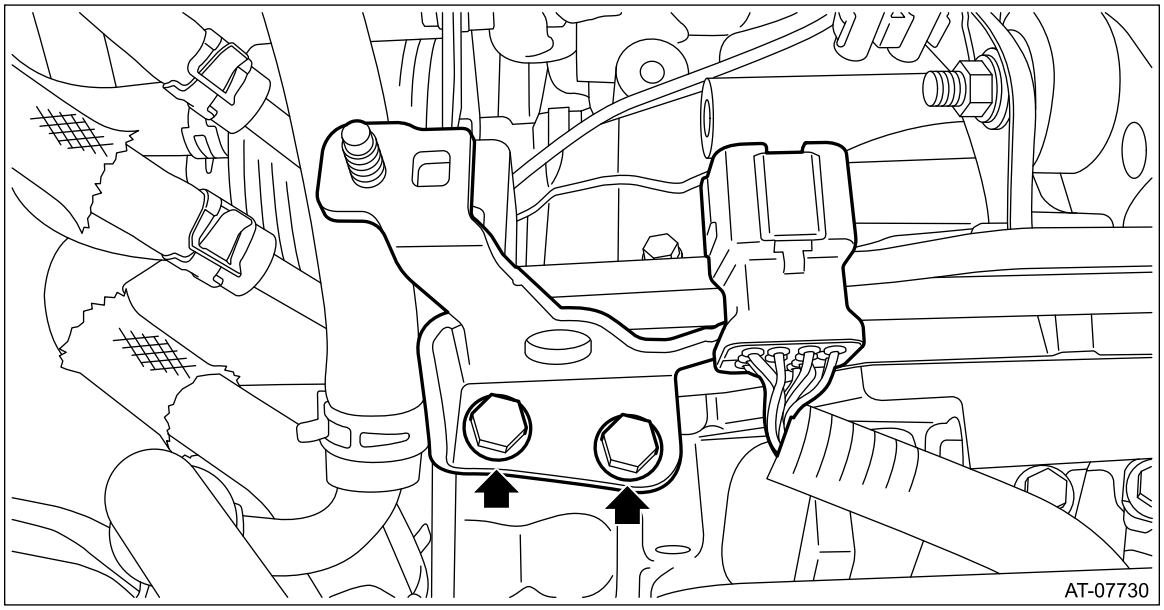
REMOVAL

1. Remove the front tires.
2. Disconnect the ground terminal from battery sensor. Ref. to NOTE>NOTE > BATTERY.
3. Remove the collector cover. Ref. to INTAKE (INDUCTION)(w/o STI)>Collector Cover>REMOVAL.
4. Remove the air intake duct. Ref. to INTAKE (INDUCTION)(w/o STI)>Air Intake Duct>REMOVAL.
5. Remove the intercooler and the intercooler stay. Ref. to INTAKE (INDUCTION)(w/o STI)>Intercooler>REMOVAL.
6. Remove the air breather hose. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Air Breather Hose>REMOVAL.
7. Disconnect the following connectors.
   - Transmission harness connectors
   - Transmission radio ground terminal
   - Inhibitor harness connector
   - Engine harness connectors

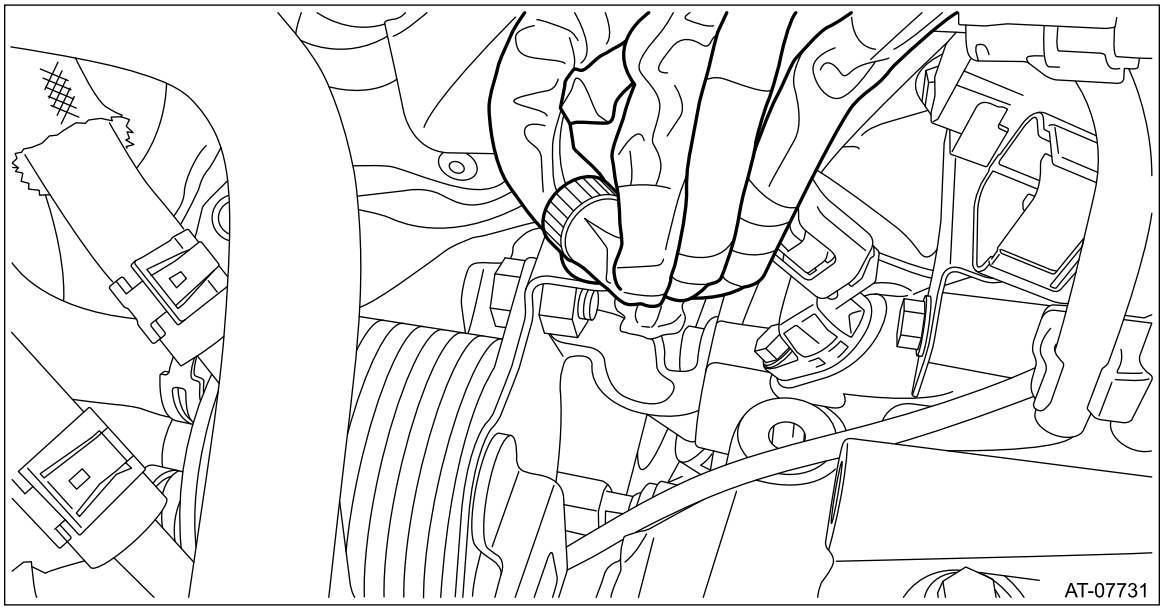


(A) Transmission harness connectors
(B) Transmission radio ground terminal
(C) Inhibitor harness connector
(D) Engine harness connectors

8. Remove the engine hanger rear.

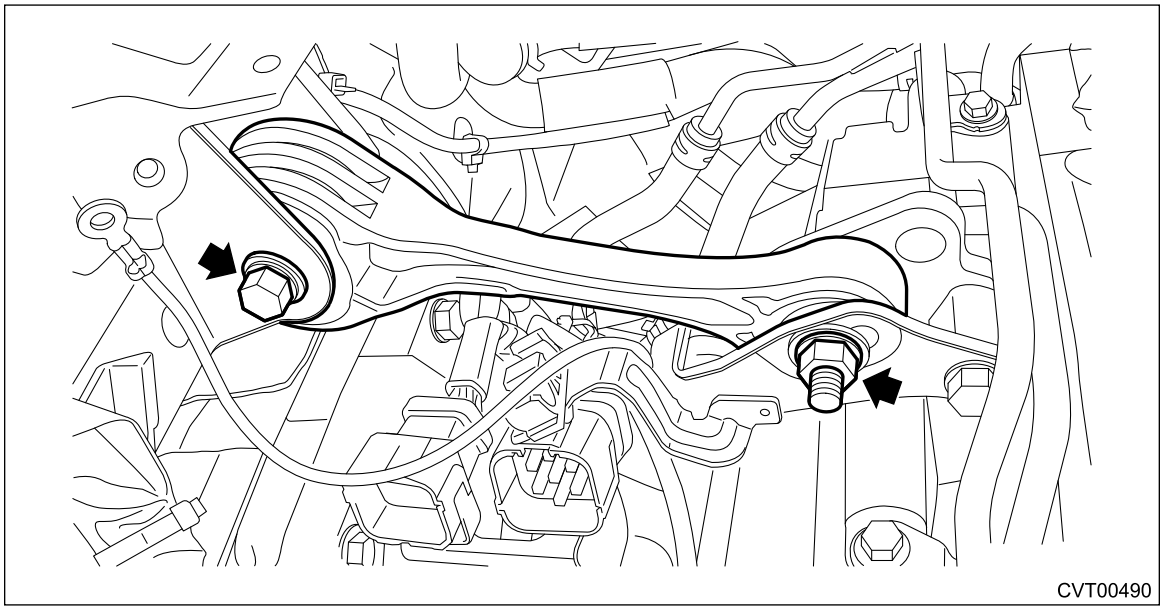


9. Remove the harness clip.

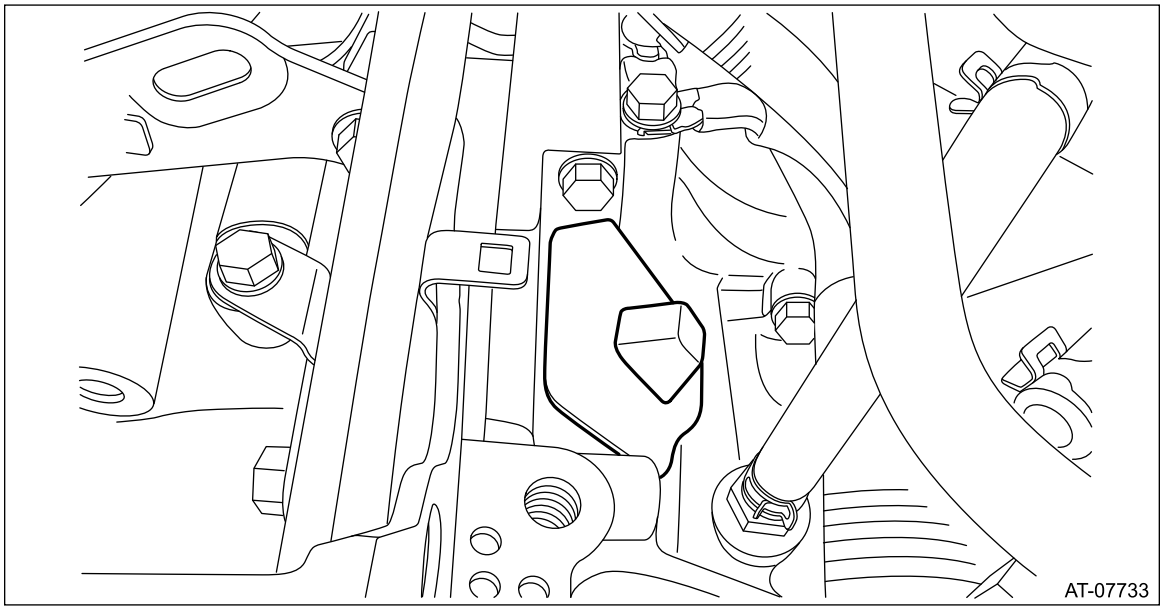


10. Remove the starter. Ref. to STARTING/CHARGING SYSTEMS(w/o STI)>Starter>REMOVAL.

11. Remove the pitching stopper.



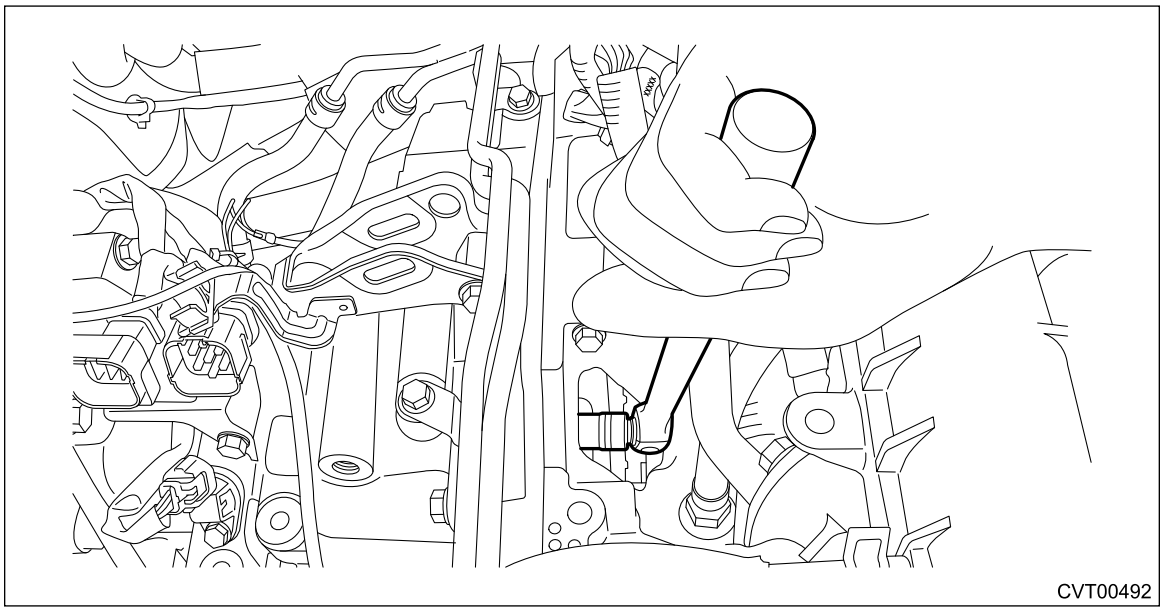
12. Remove the service hole plug.



13. 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:

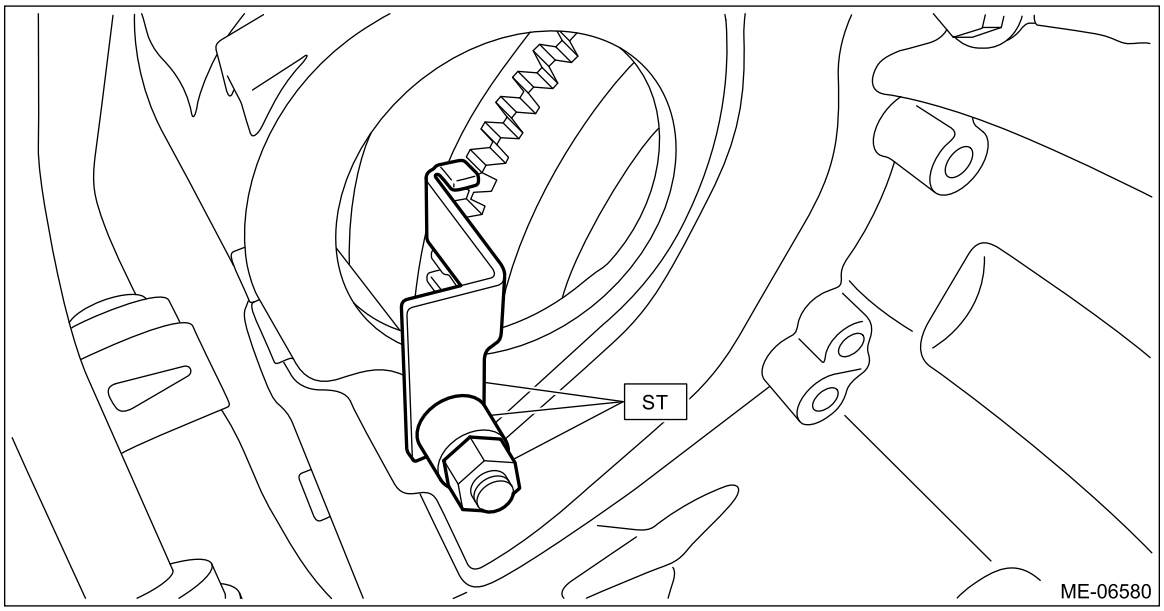
- **Be careful not to drop bolts into the converter housing.**
- **Be careful not to damage the mounting bolts.**



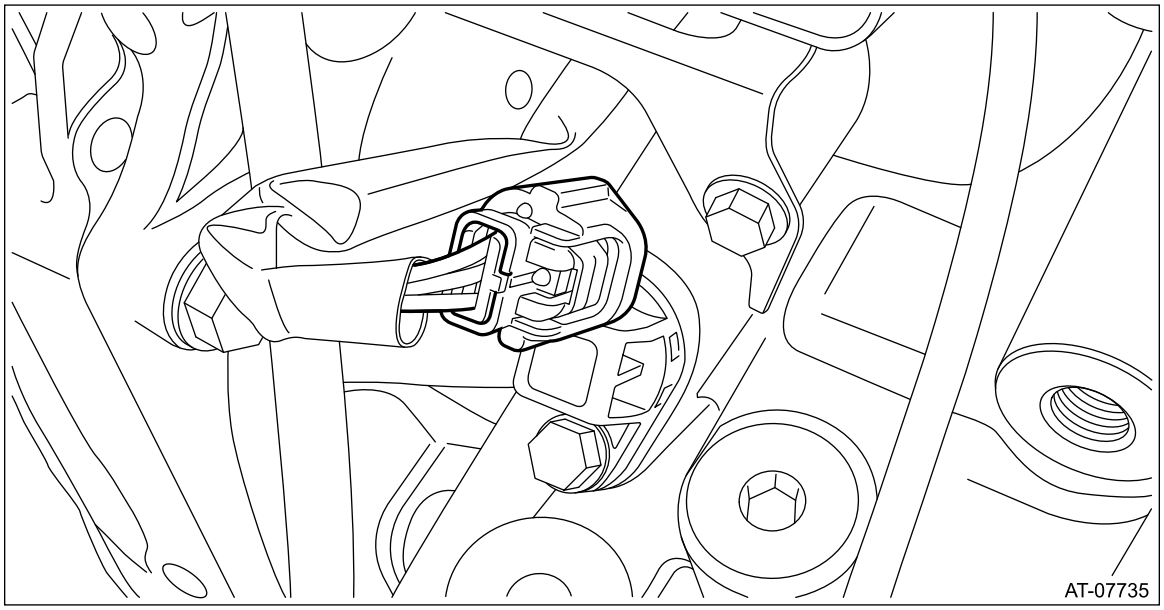
14. Make sure the torque converter moves freely by rotating with finger through the starter installation hole.

15. Attach the ST to the converter case.

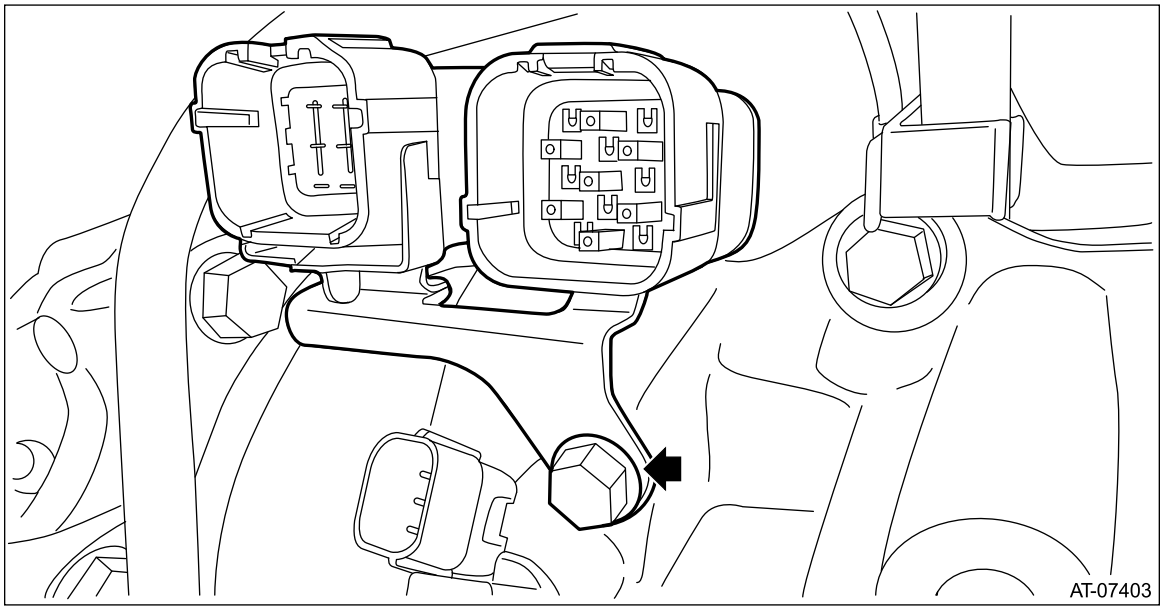
ST 498277200 STOPPER SET



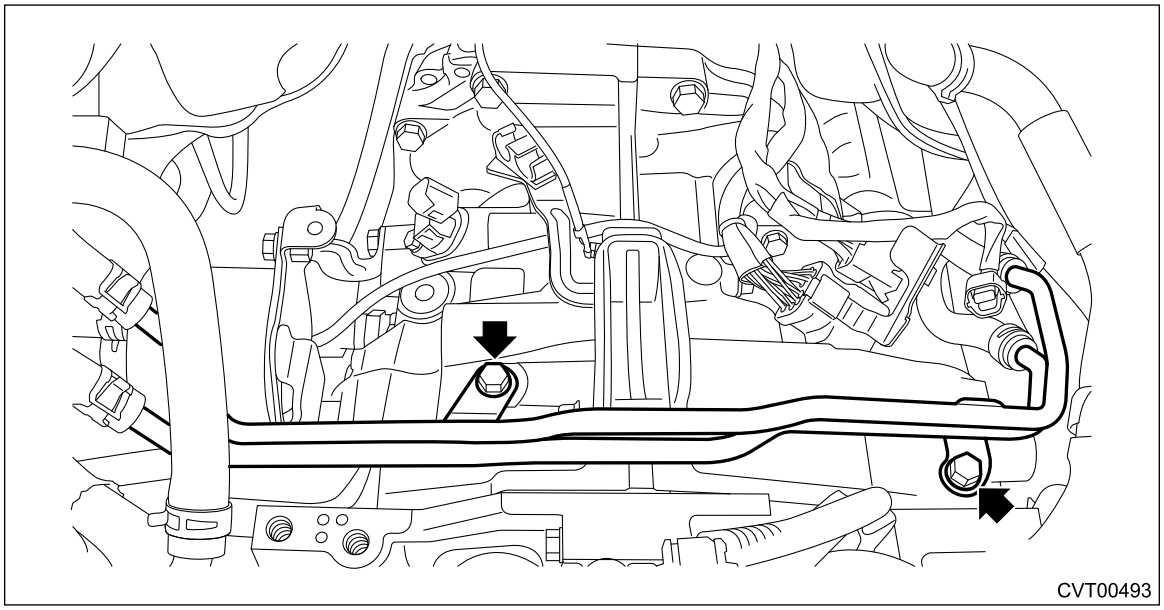
16. Remove the primary speed sensor harness connector.



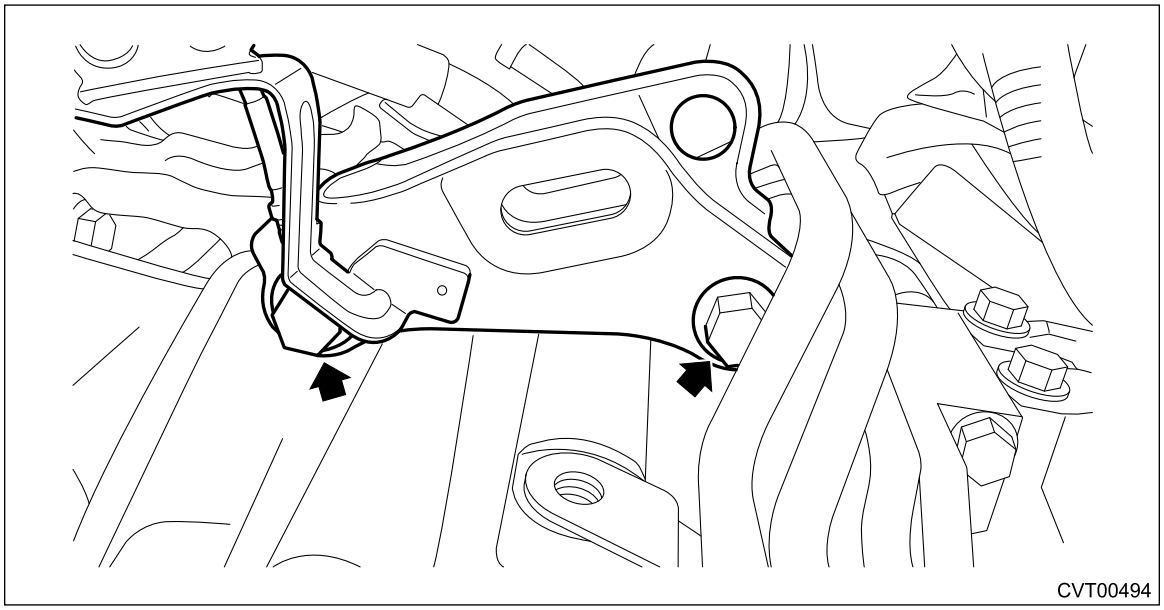
17. Remove the transmission harness stay.



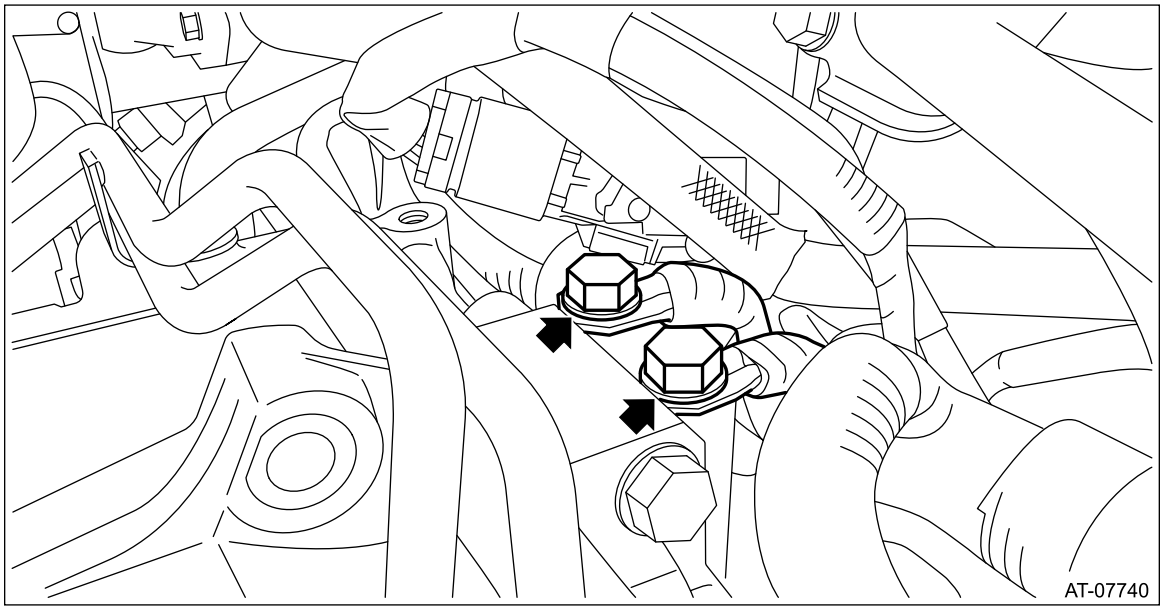
18. Remove the CVTF cooler pipe COMPL mounting bolt.



19. Remove the pitching stopper bracket and transmission radio ground cord.



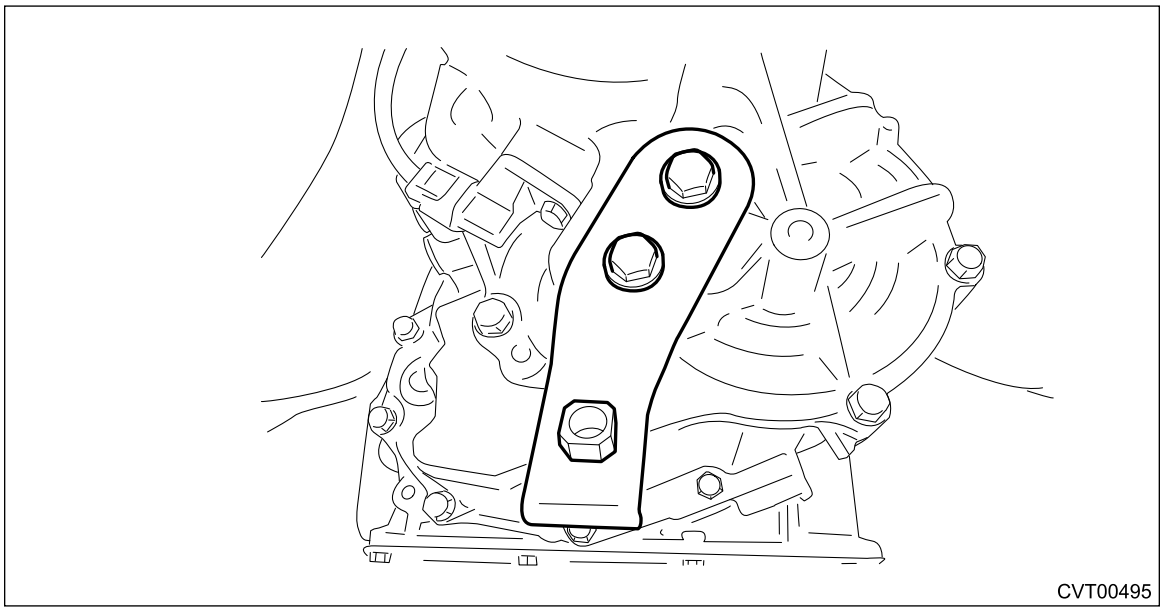
20. Remove the engine ground terminal.



21. Lift up the vehicle.

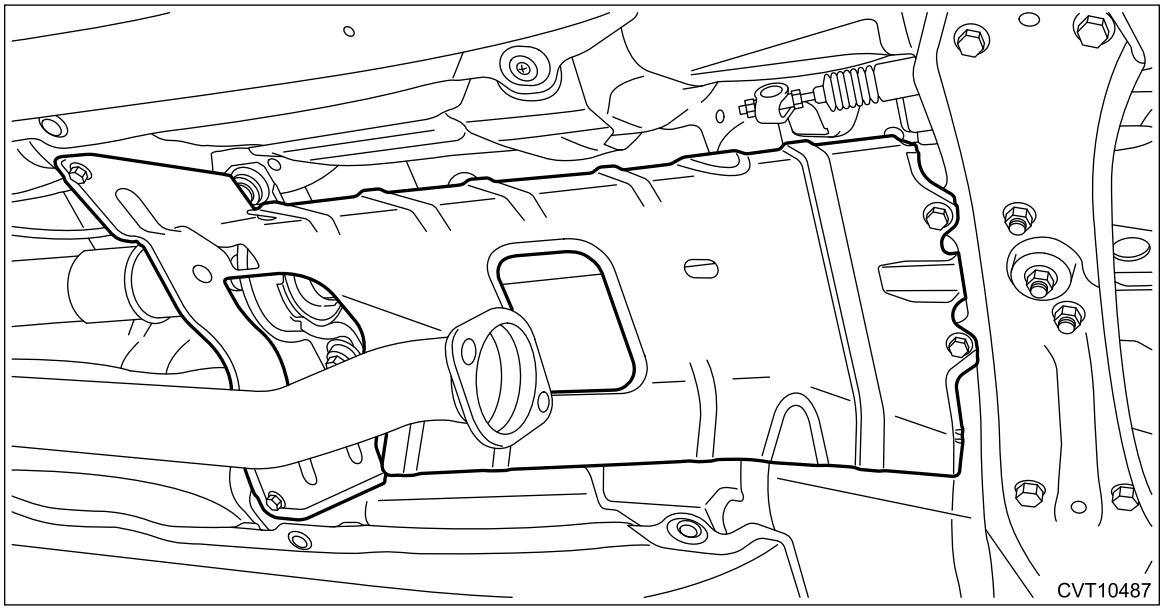
22. Remove the center exhaust pipe (rear). Ref. to EXHAUST(w/o STI)>Center Exhaust Pipe>REMOVAL.

23. Remove the exhaust hanger bracket.

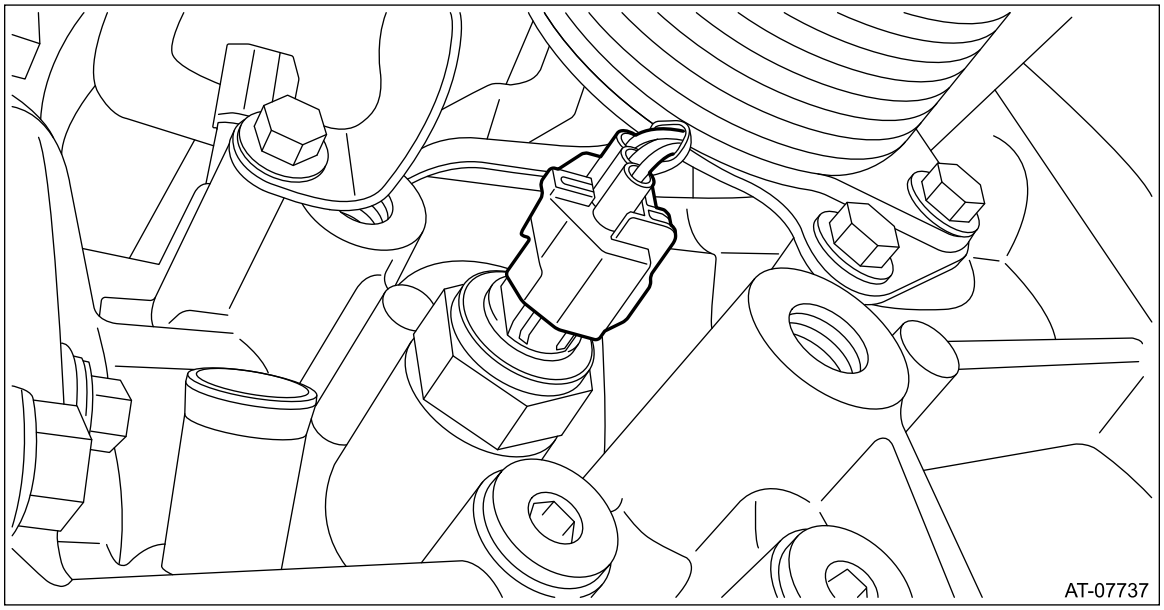


24. Remove the CVTF drain plug to drain CVTF. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>CVTF>REPLACEMENT.

25. Remove the center exhaust cover.

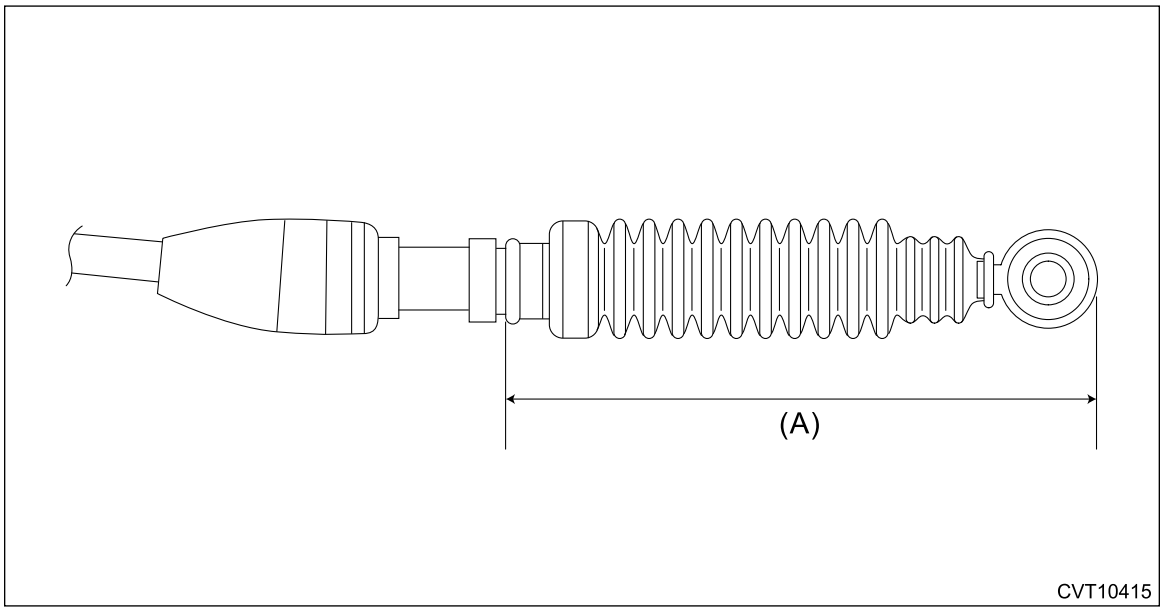


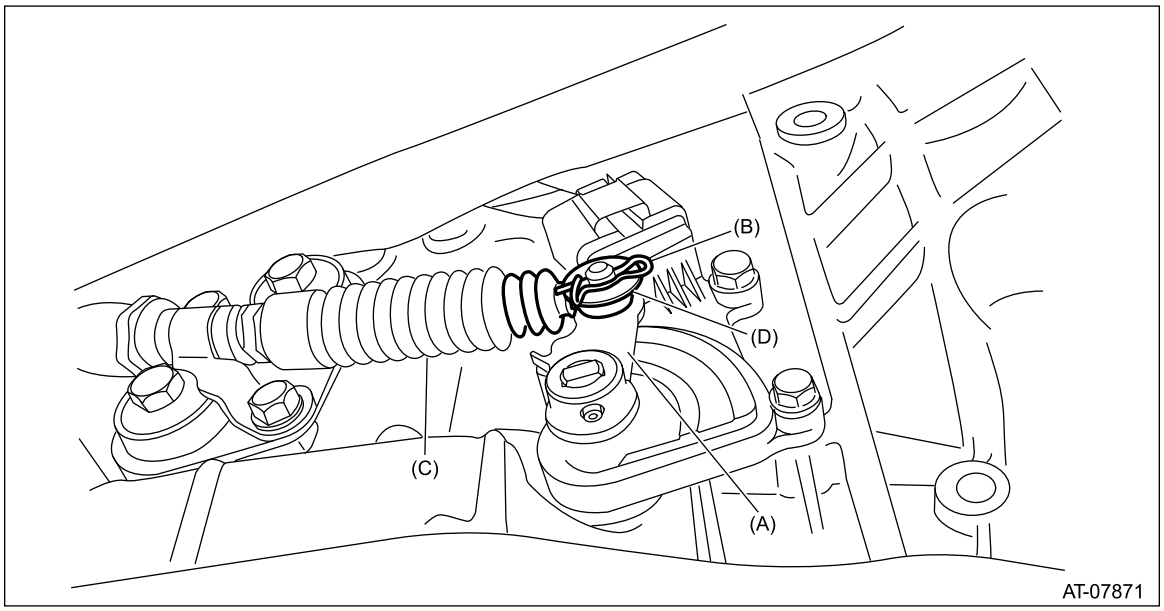
26. Remove the secondary pressure sensor harness connector.



27. Remove the snap pin and washer, and disconnect the select cable.

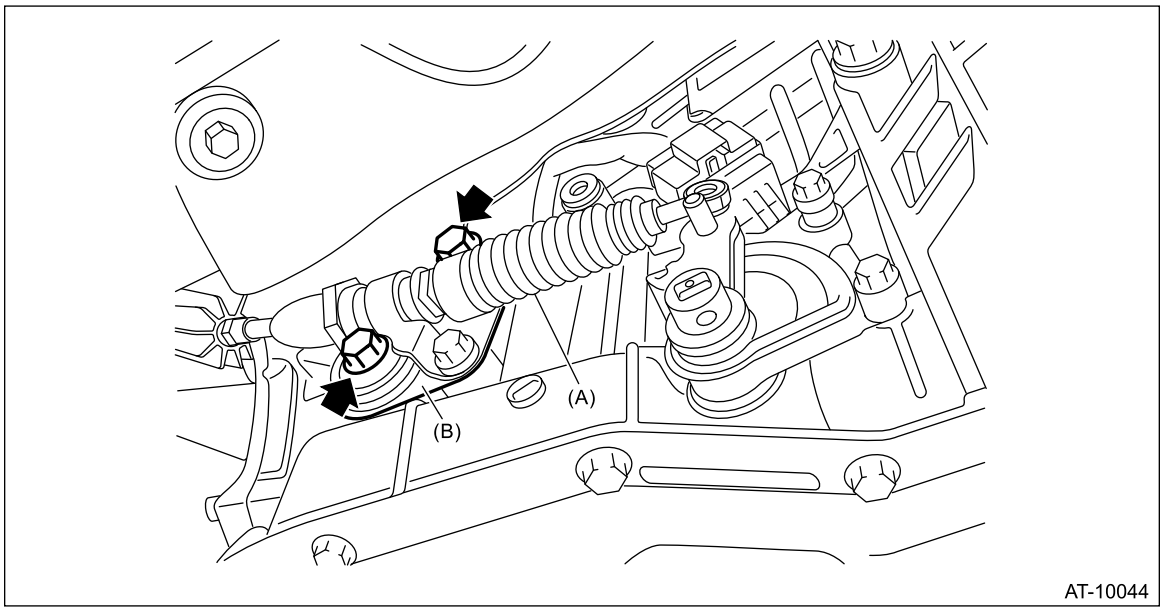
Caution:
Do not apply extra overload while holding the part (A).





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

28. Remove the cable plate assembly.

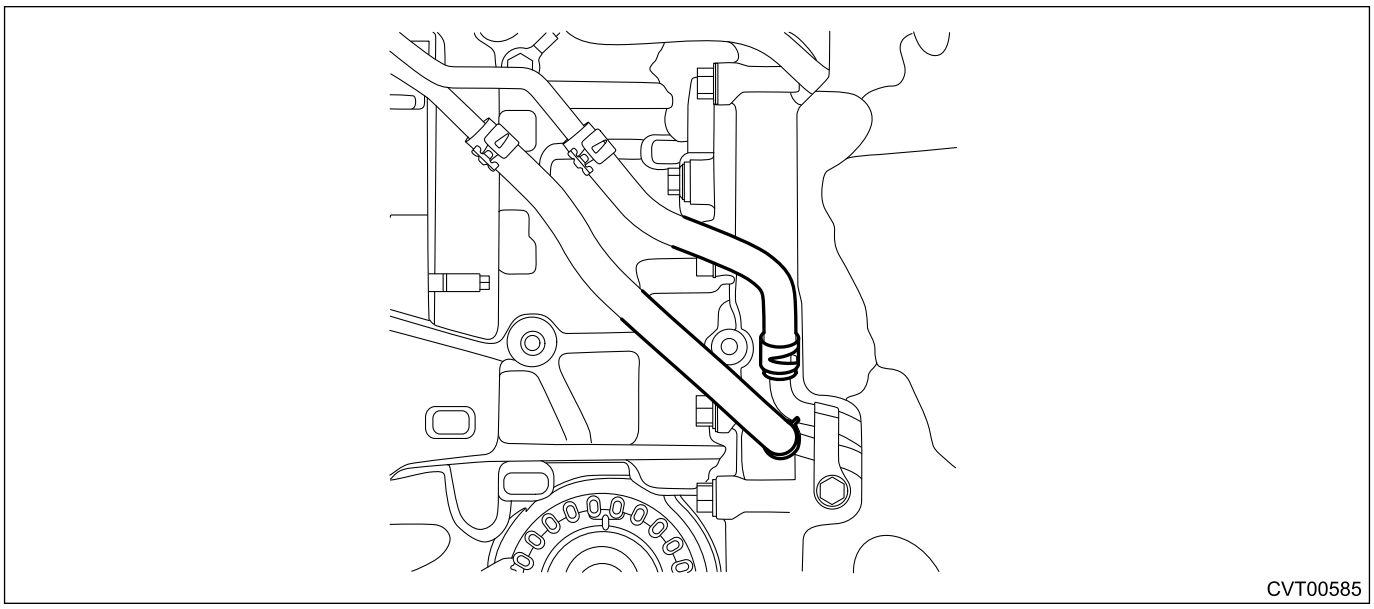


(A) Select cable

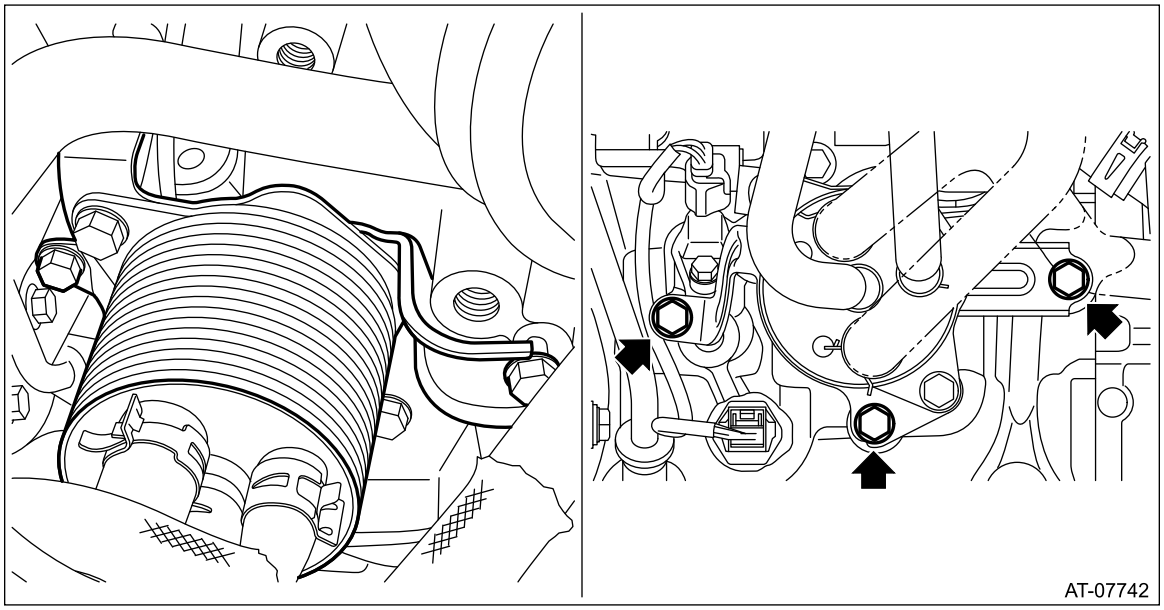
(B) Cable plate ASSY

29. Drain differential gear oil. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Differential Gear Oil>REPLACEMENT.

30. Remove the CVTF inlet hose and outlet hose.



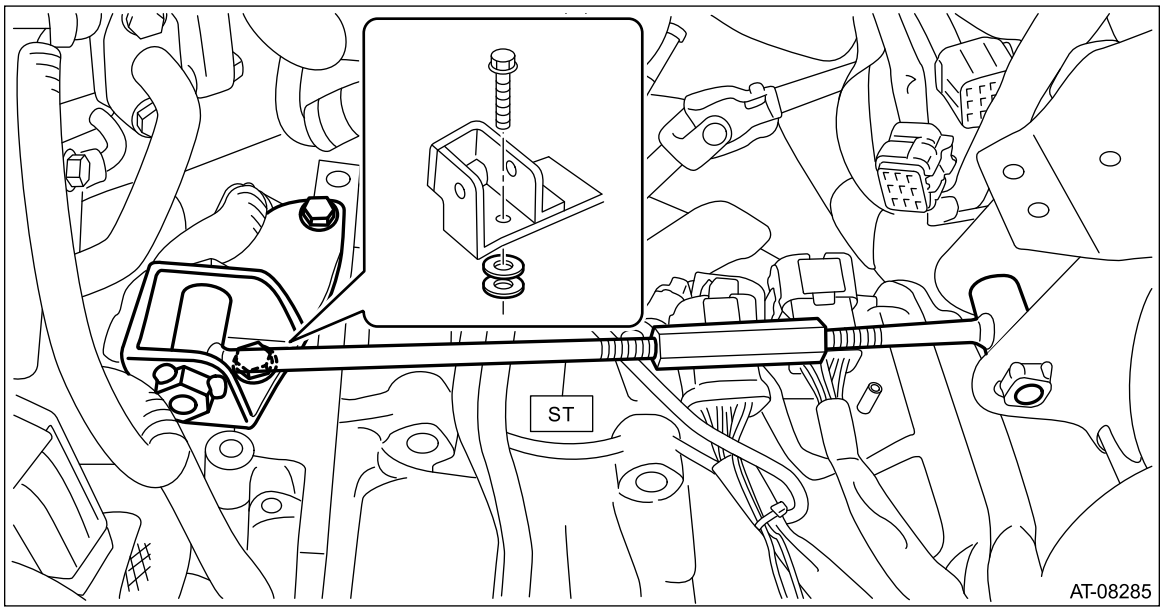
31. Remove the CVTF cooler (with warmer feature), and using a piece of wire, affix to a location where it will not interfere with the operation.



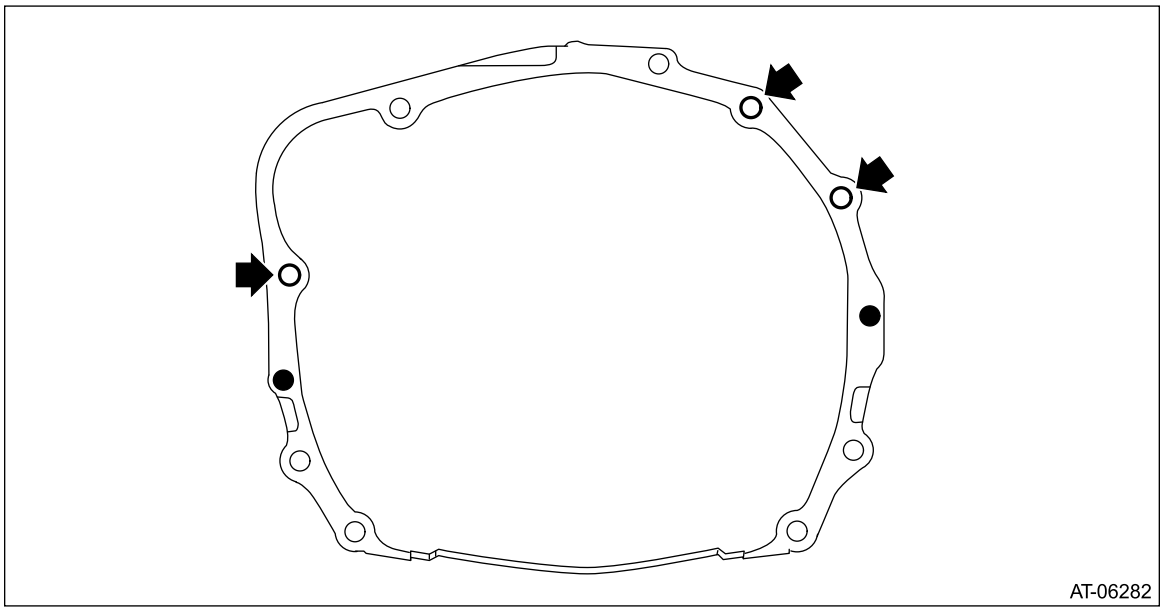
32. Set the ST.

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.



33. Remove the three transmission connecting bolts.



34. Lift up the vehicle.

35. Remove the propeller shaft. Ref. to DRIVE SHAFT SYSTEM>Propeller Shaft>REMOVAL.

36. Remove the stabilizer link. Ref. to FRONT SUSPENSION>Front Stabilizer>REMOVAL.

37. Disconnect the lower arm ball joint and housing.

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

Note:

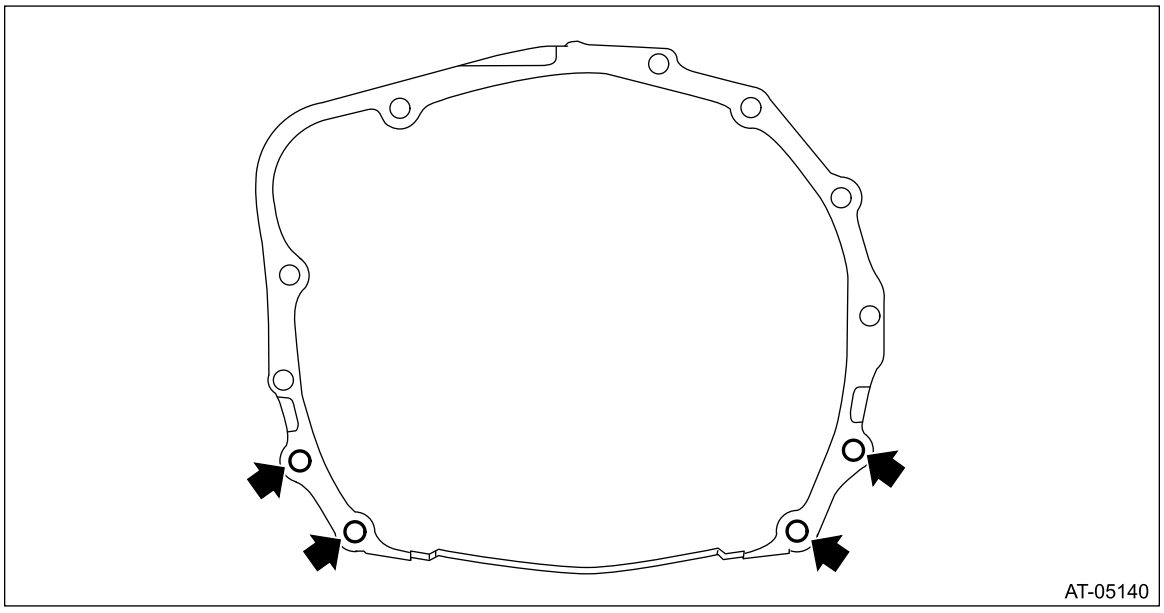
Place cloth between the tire lever or bar and the transmission in order to avoid damaging the transmission side retainer.

39. 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.**

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

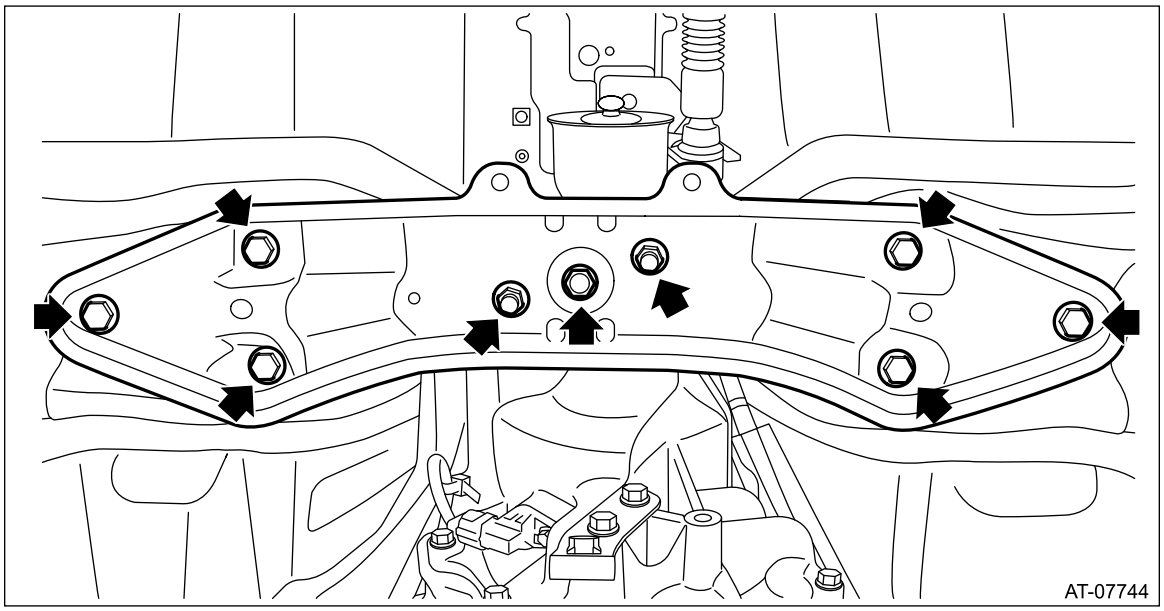


41. Set the transmission jack under the transmission.

Note:

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

42. Remove the transmission rear crossmember.

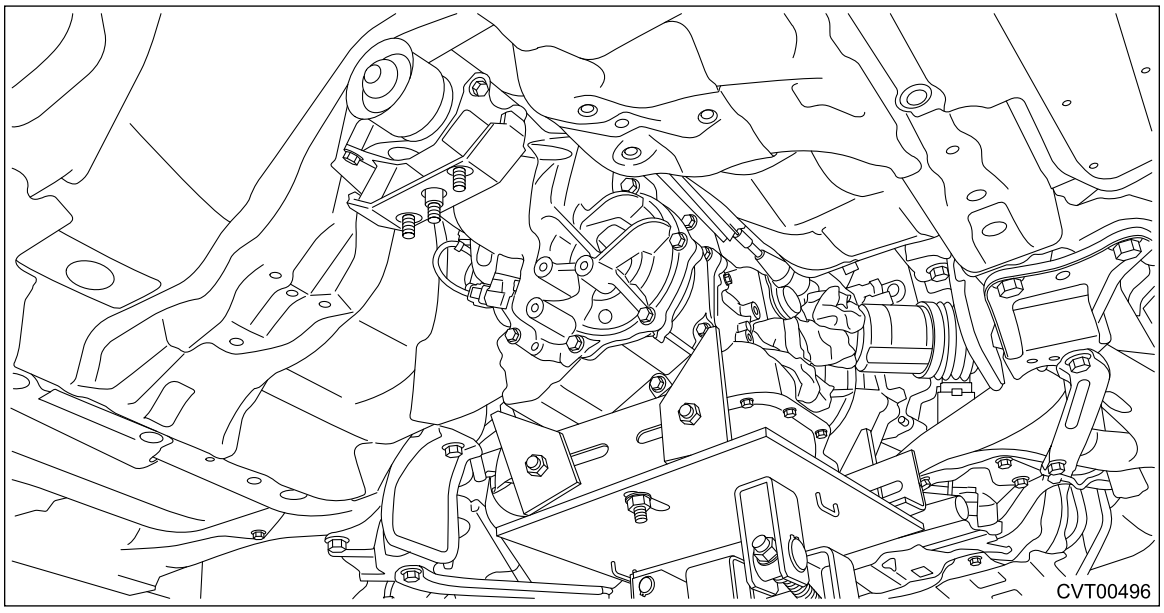


43. While lowering the transmission jack gradually, fully retract the engine support, and then tilt the engine rearward.

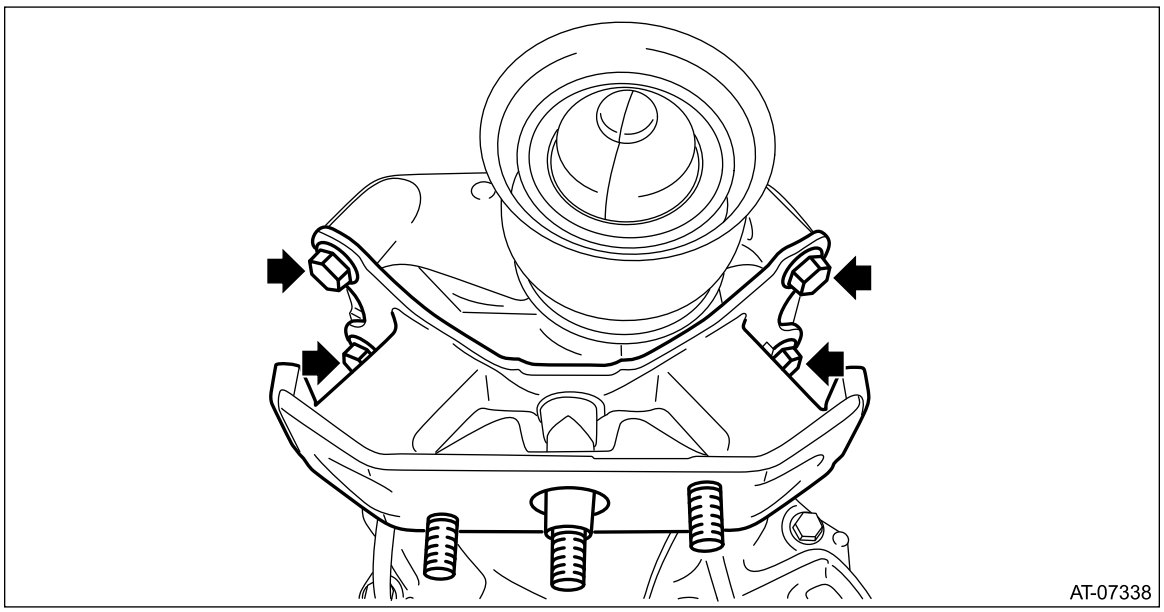
44. Remove the transmission assembly.

Note:

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



45. Remove the rear cushion rubber.

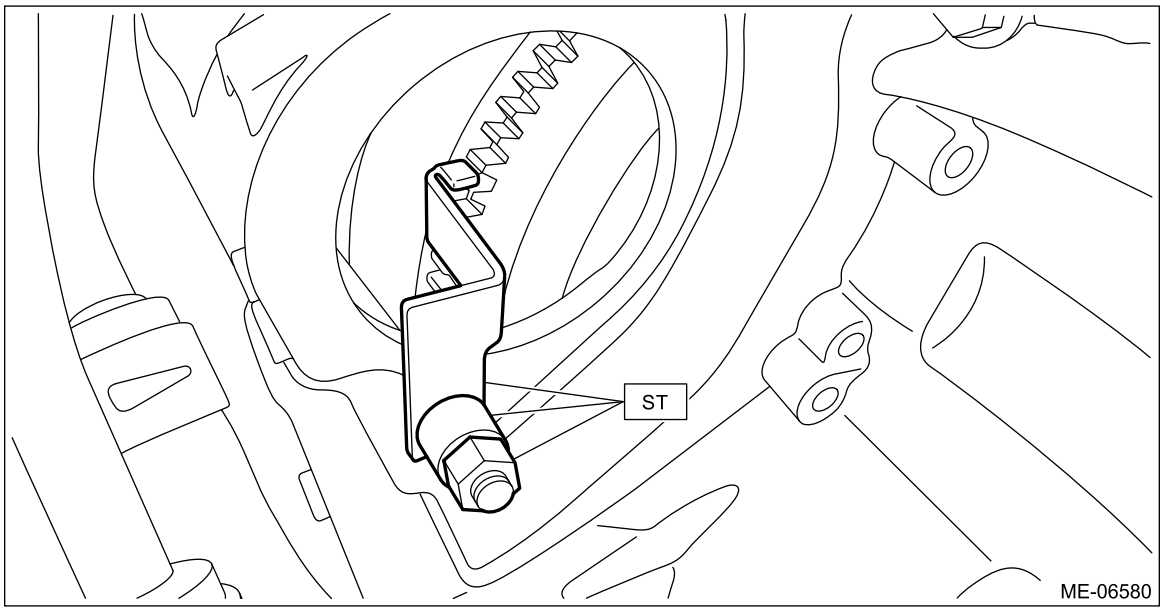


CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Automatic Transmission Assembly

INSTALLATION

1. Attach the ST to converter case.

ST 498277200 STOPPER SET



2. When completely overhauling the transmission, refill approx. 10 L (10.6 US qt, 8.8 Imp qt) of CVTF through the transmission right side plug, and install the plug.

Caution:

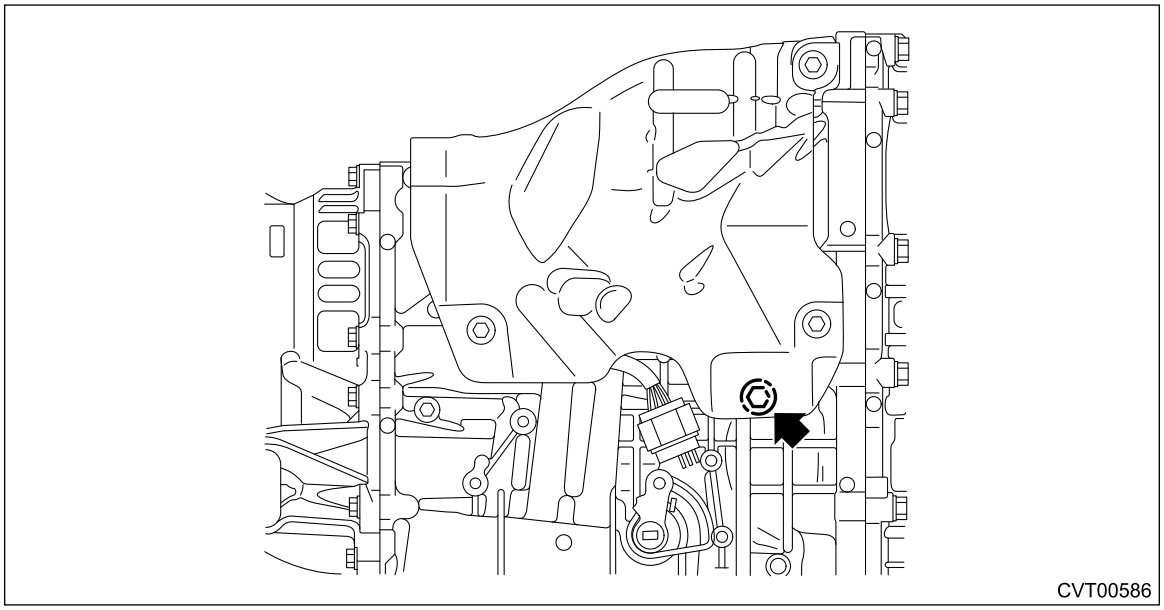
Always use specified CVTF. Using other fluid will cause malfunction. **Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>General Description>SPECIFICATION > HYDRAULIC CONTROL AND LUBRICATION.**

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.

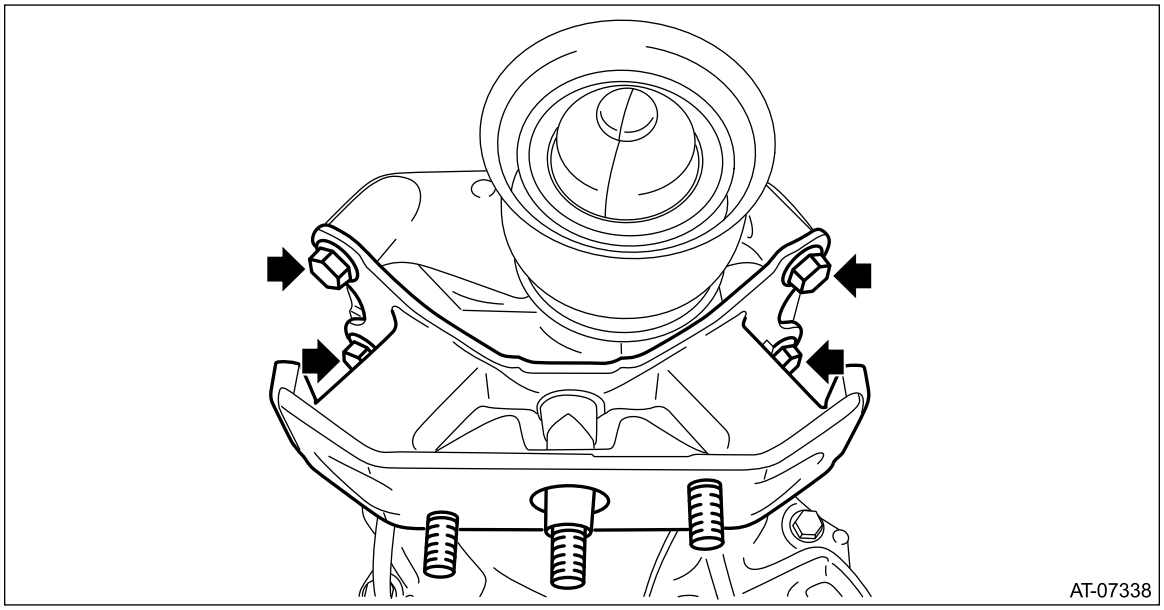
Note:

- **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)

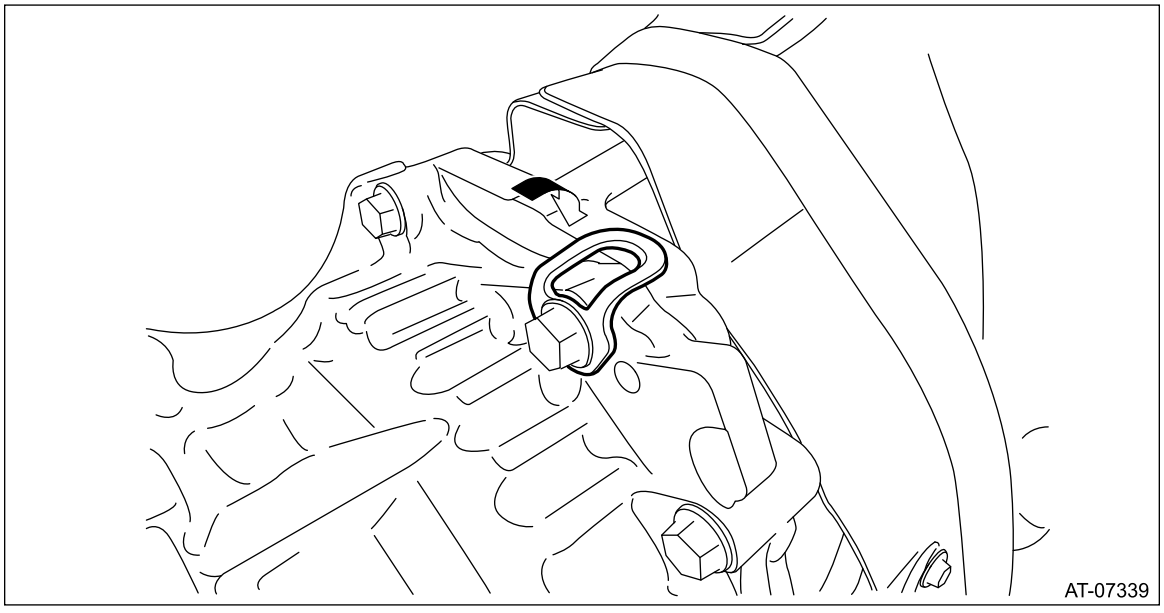


5. Mount the transmission onto the transmission jack.

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 excessive load or impact to the transmission case.



7. Remove the pitching stopper bracket, if mounted.

8. Install the transmission onto the engine.

Note:

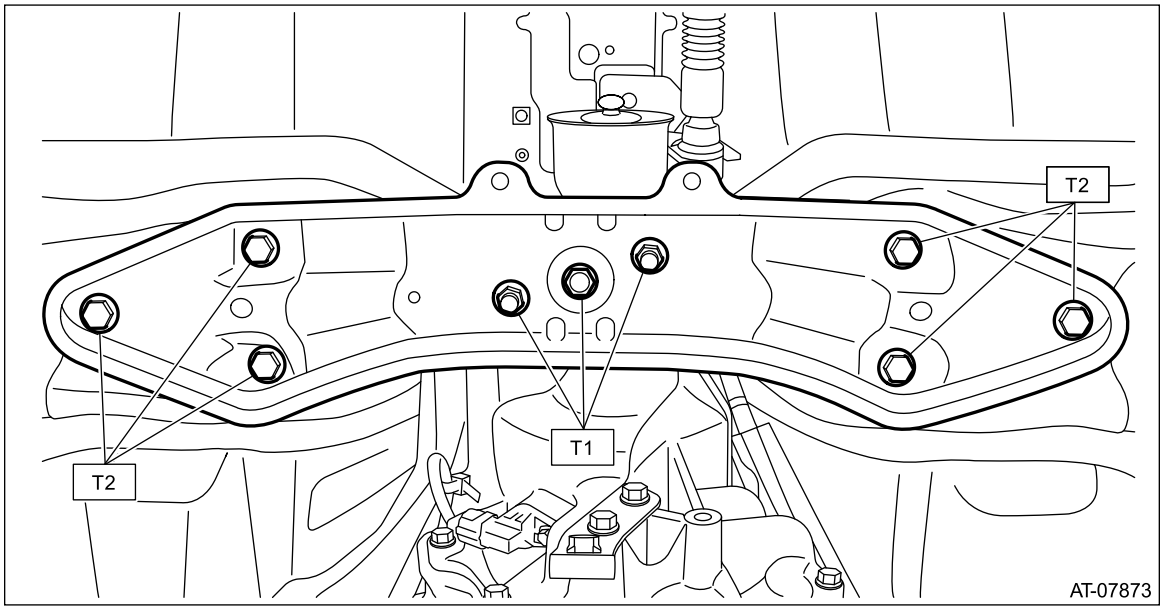
- **While raising the transmission jack gradually, turn the screw of engine support, then tilt the engine forward.**
- **Temporarily attach the two engine connecting bolts and two nuts (lower side).**

9. Install the transmission rear crossmember.

Tightening torque:

T1: 35 N·m (3.6 kgf-m, 25.8 ft-lb)

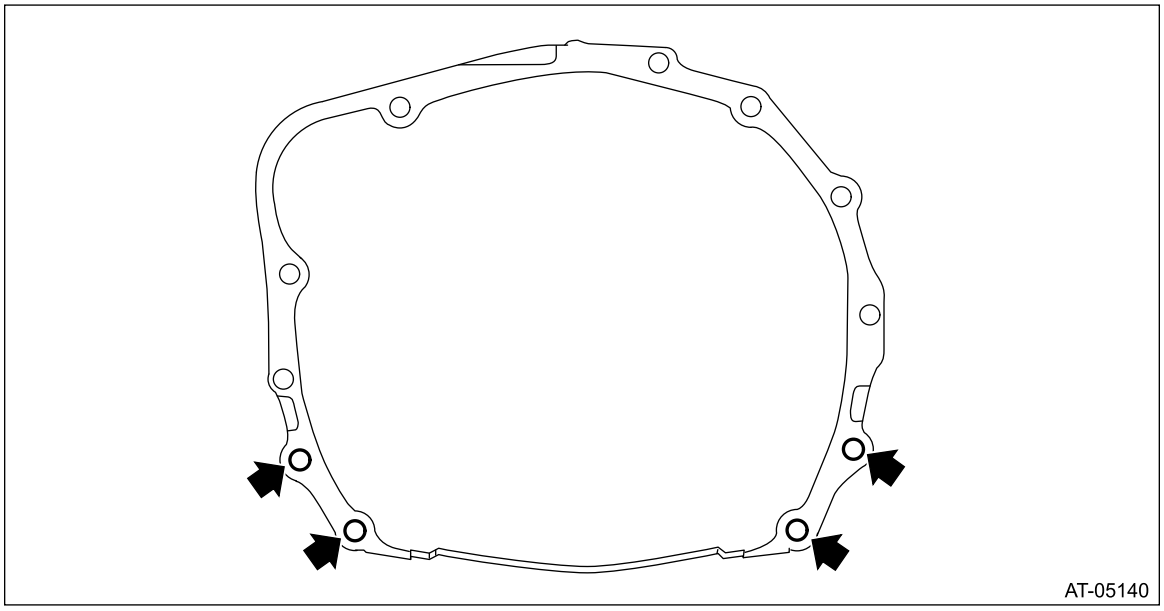
T2: 70 N·m (7.1 kgf-m, 51.6 ft-lb)



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)



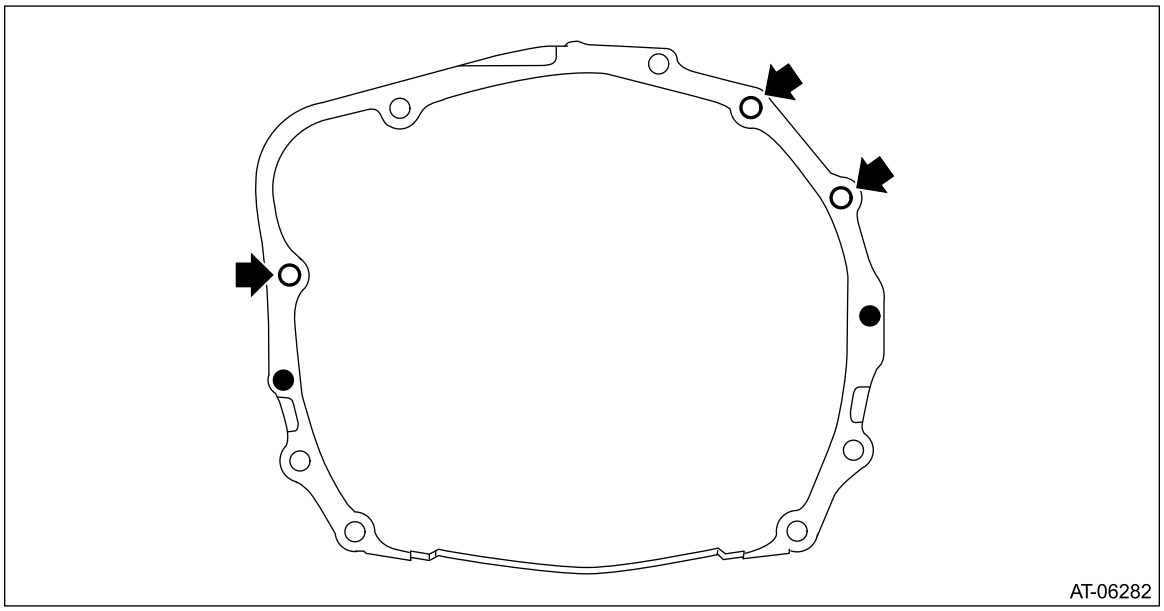
11. Remove the transmission jack.

12. Lower the vehicle.

13. Install the three engine mounting bolts (upper side).

Tightening torque:

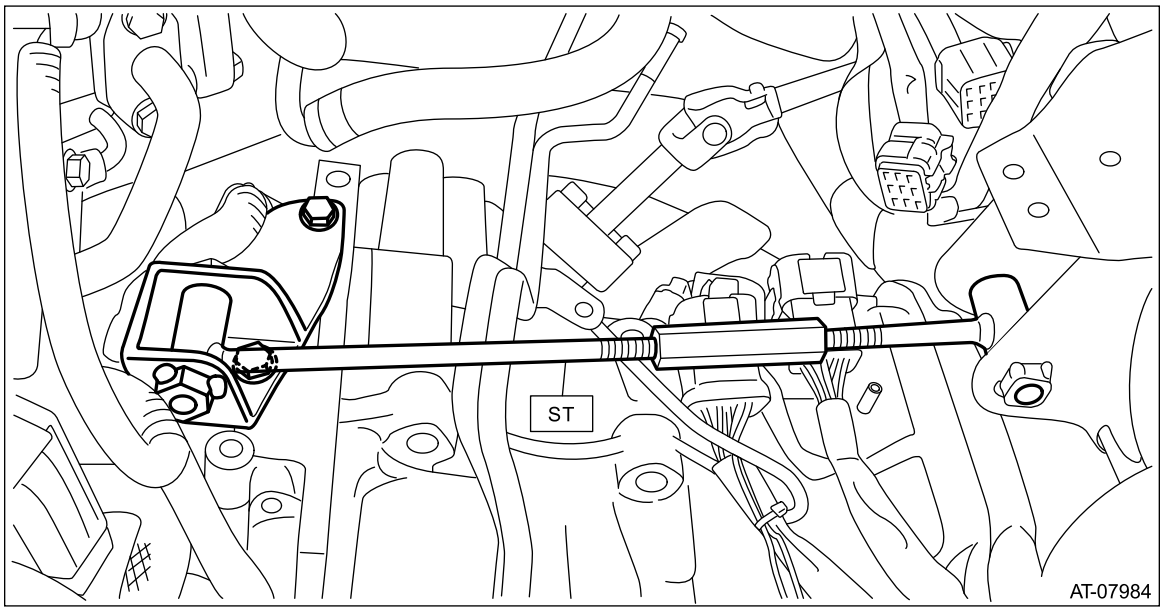
50 N·m (5.1 kgf-m, 36.9 ft-lb)



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:

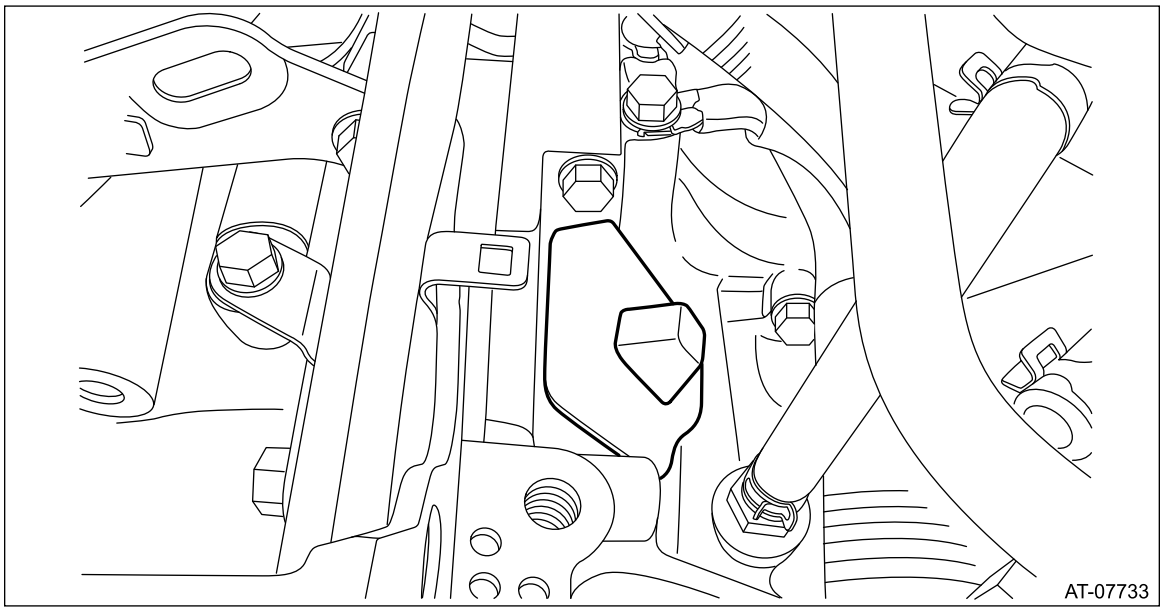
25 N·m (2.5 kgf-m, 18.4 ft-lb)

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)

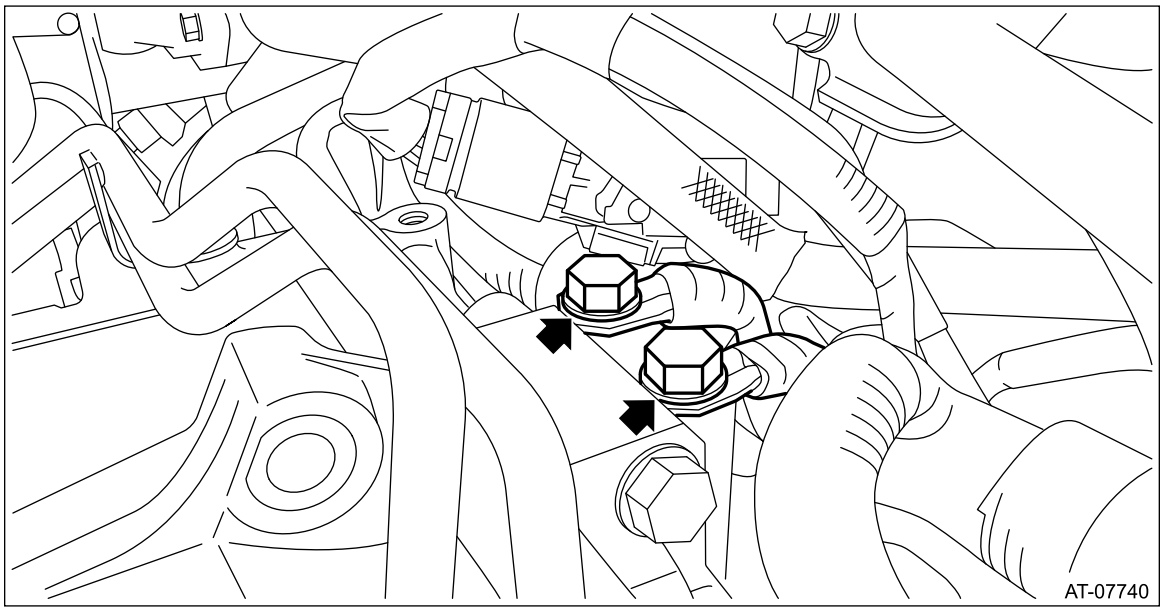
18. Install the service hole plug.



19. Install the engine ground terminals.

Tightening torque:

19 N·m (1.9 kgf-m, 14.0 ft-lb)



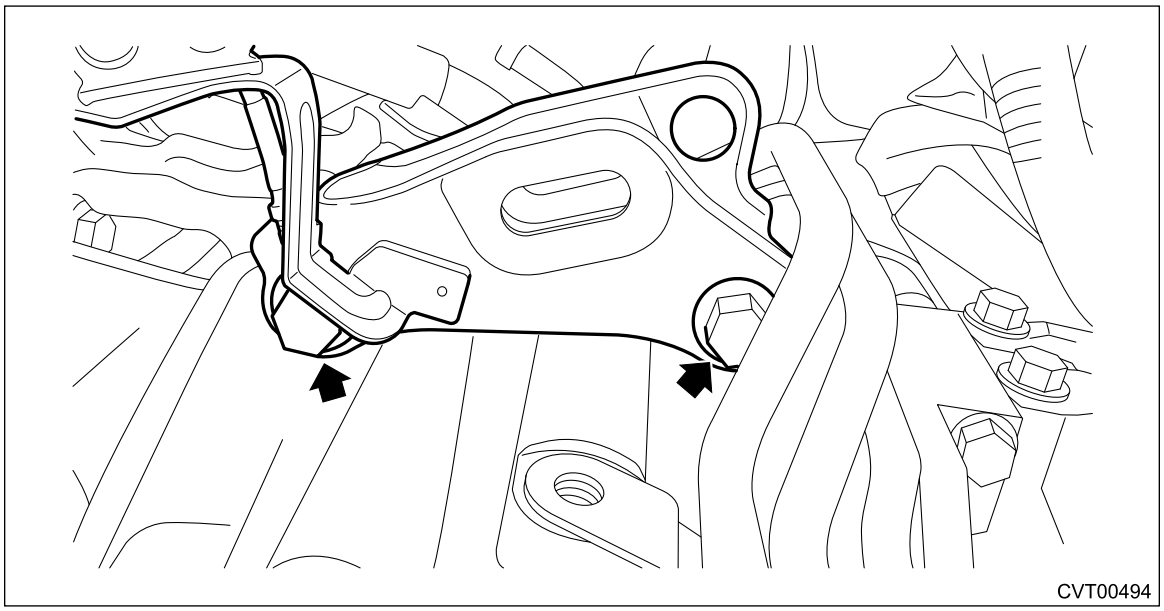
20. Install the pitching stopper bracket and transmission radio ground cord.

Caution:

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

Tightening torque:

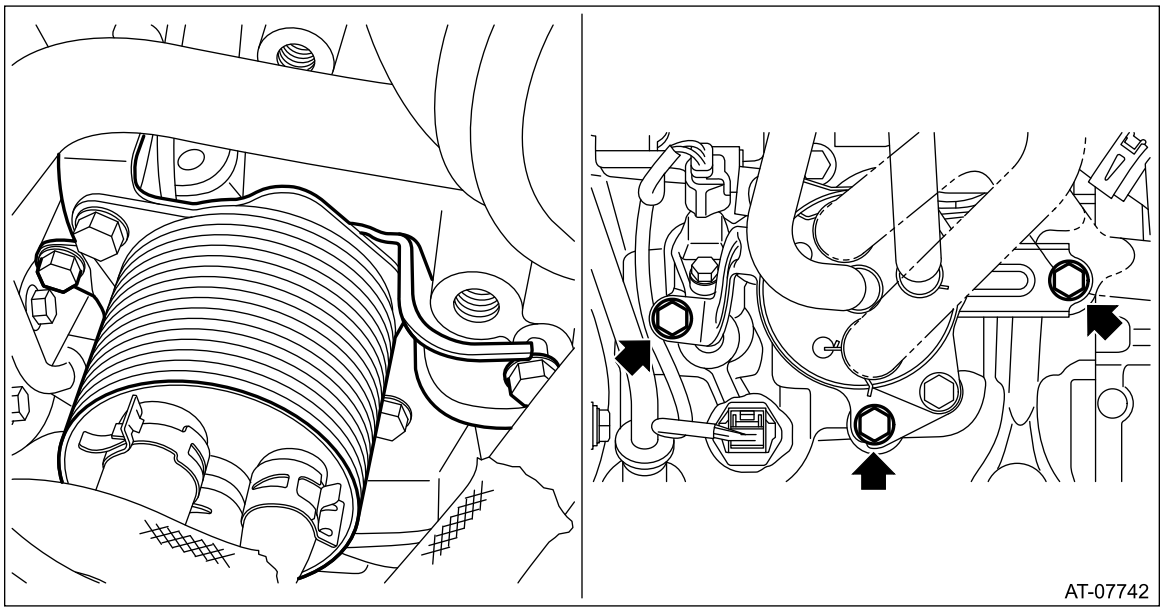
41 N·m (4.2 kgf-m, 30.2 ft-lb)



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

Tightening torque:

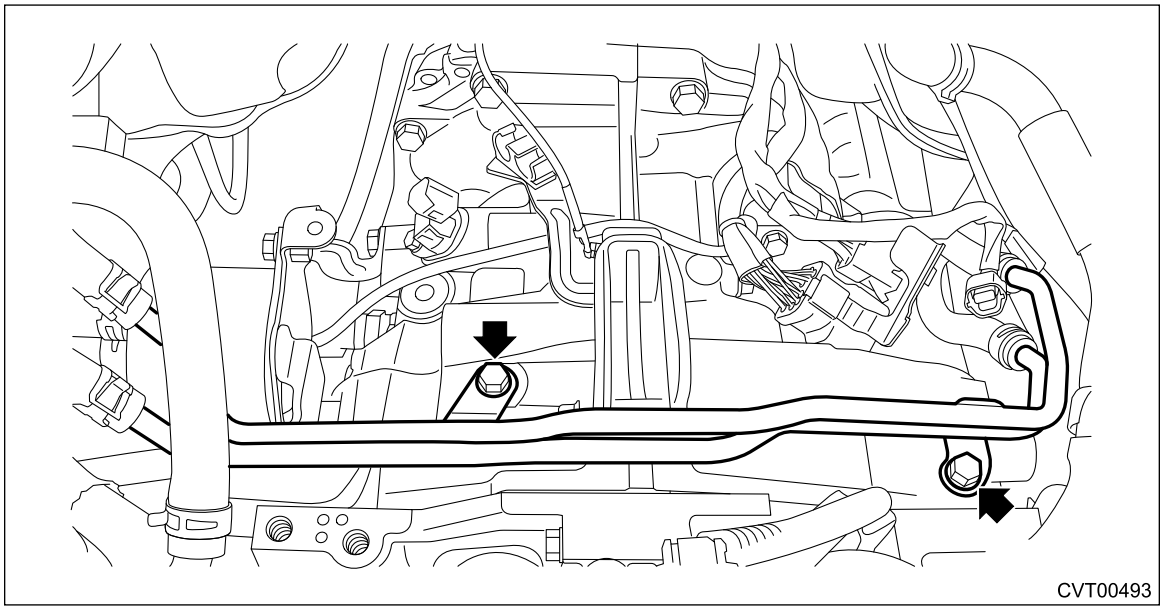
23 N·m (2.3 kgf-m, 17.0 ft-lb)



22. Install the CVTF cooler pipe COMPL.

Tightening torque:

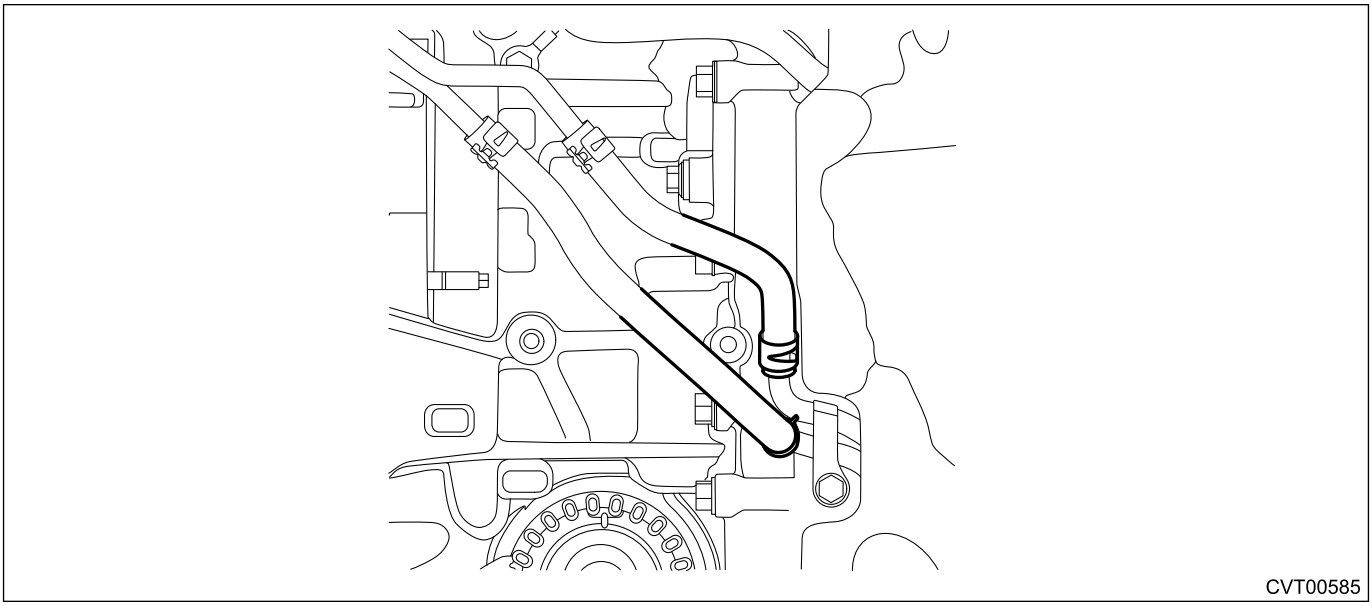
16 N·m (1.6 kgf-m, 11.8 ft-lb)



23. Install the CVTF inlet hose and outlet hose.

Note:

- **Use new CVTF hoses.**
- **Install the CVTF hose with the painted position facing the rear side of transmission.**

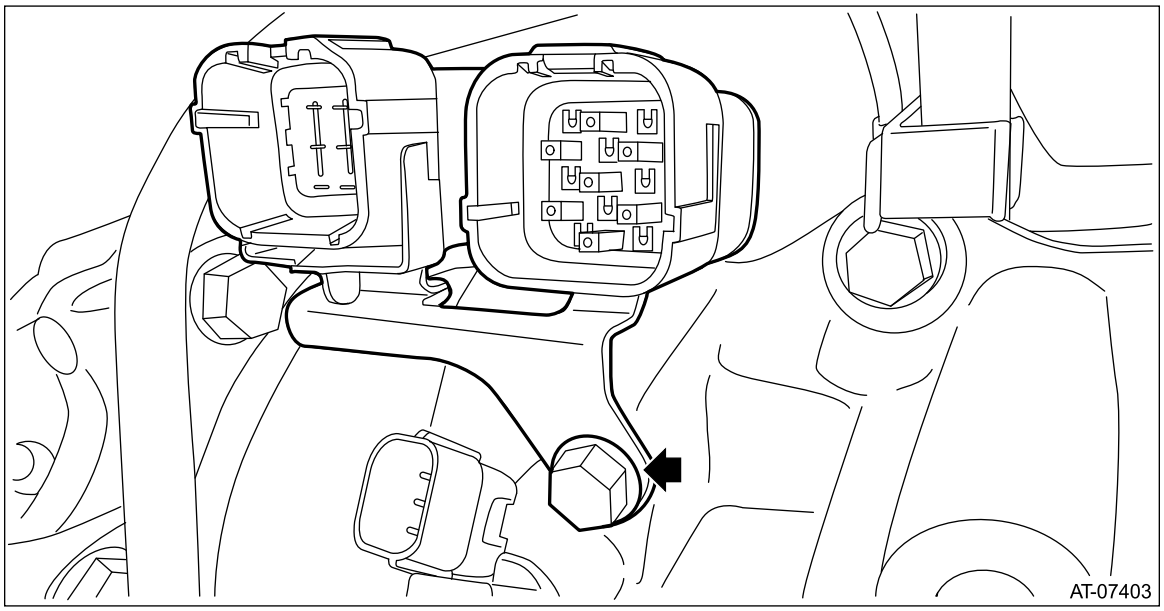


24. Install the starter. Ref. to STARTING/CHARGING SYSTEMS(w/o STI)>Starter>INSTALLATION.

25. Install the transmission harness stay.

Tightening torque:

16 N·m (1.6 kgf-m, 11.8 ft-lb)

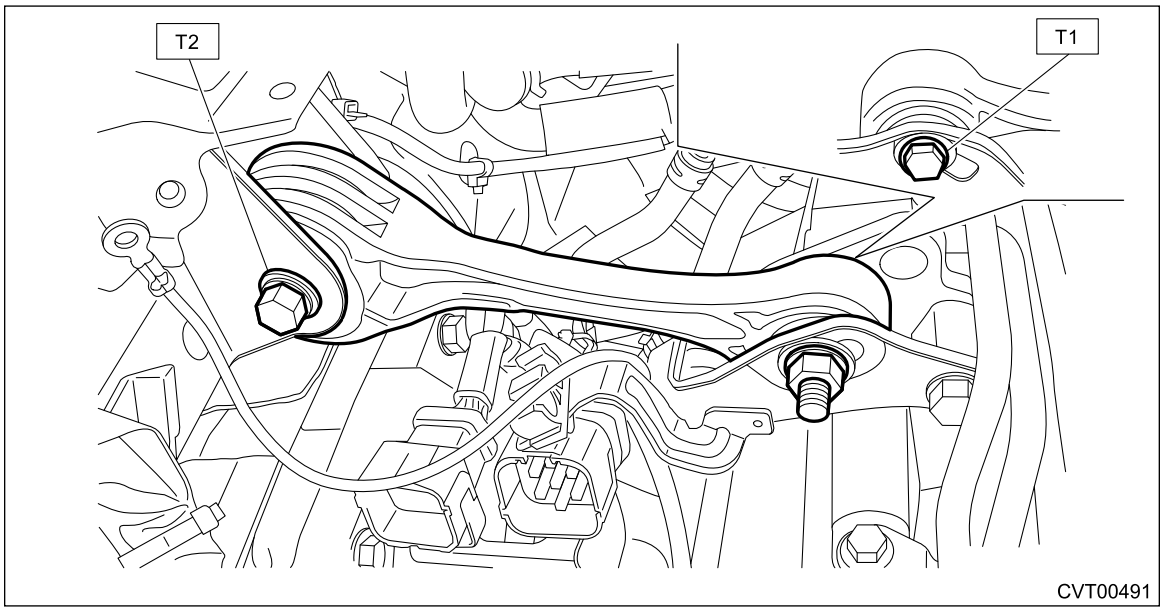


26. Install the pitching stopper.

Tightening torque:

T1: 50 N·m (5.1 kgf-m, 36.9 ft-lb)

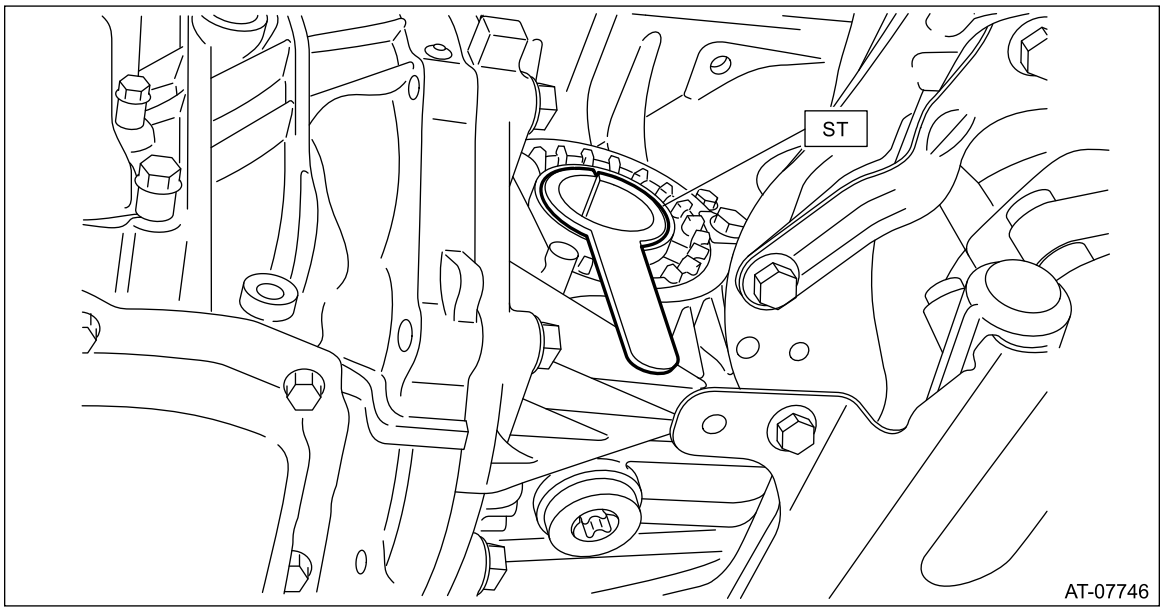
T2: 58 N·m (5.9 kgf-m, 42.8 ft-lb)



27. Lift up the vehicle.

28. Set the ST to differential side retainer.

ST 28399SA010 OIL SEAL PROTECTOR



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

30. 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.**

31. Insert the drive shaft into the transmission securely by pressing the housing from outside of the vehicle.

32. 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.**

33. Replace the flange nut with a new part and install the stabilizer link.

Tightening torque:

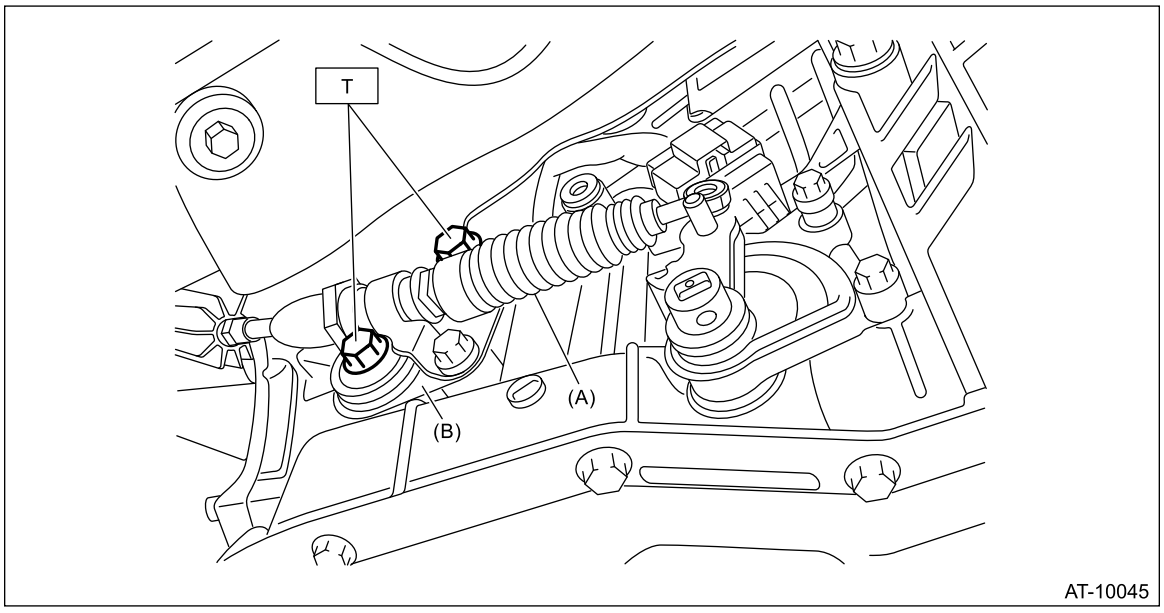
60 N·m (6.1 kgf-m, 44.3 ft-lb)

34. Install the propeller shaft. Ref. to DRIVE SHAFT SYSTEM>Propeller Shaft>INSTALLATION.

35. Install the cable plate assembly.

Tightening torque:

T: 25 N·m (2.5 kgf-m, 18.4 ft-lb)



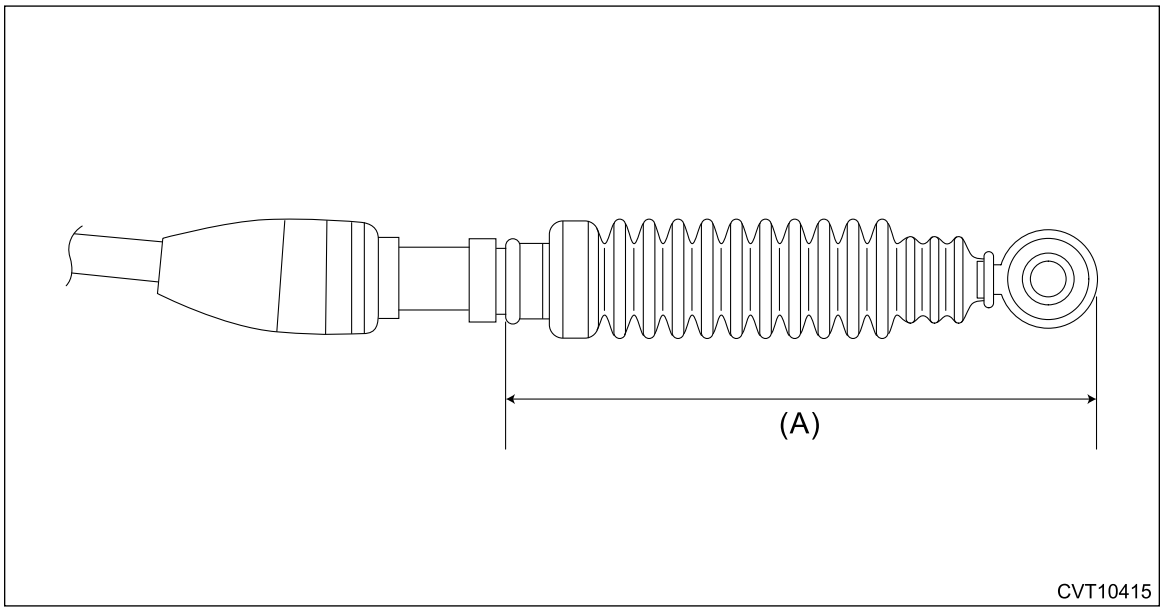
(A) Select cable

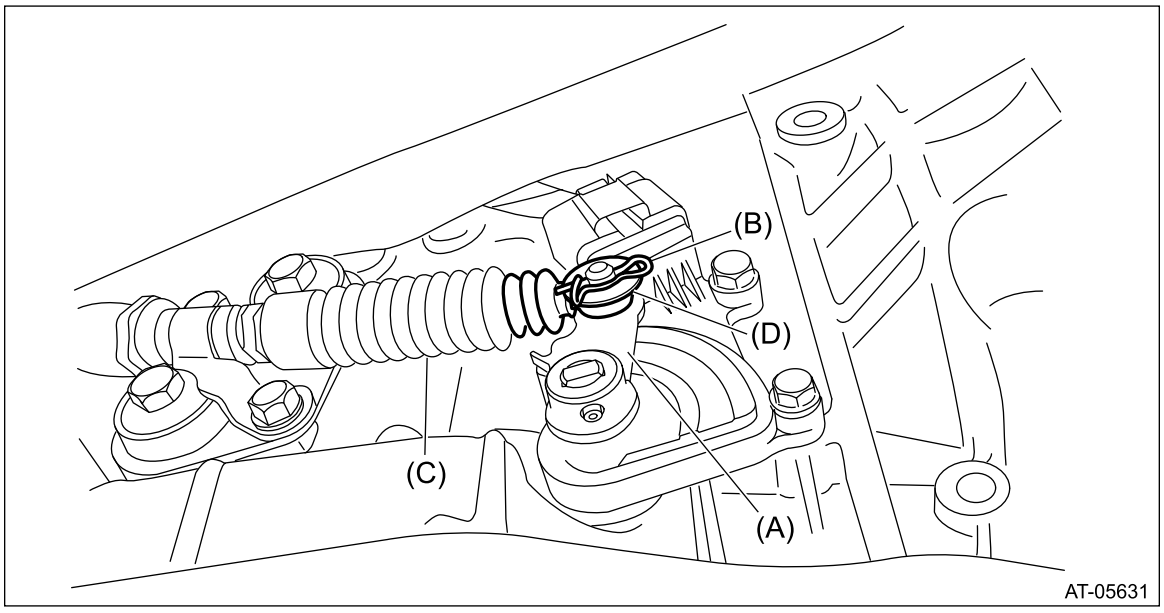
(B) Cable plate ASSY

36. Connect the select cable and install the washer and snap pin.

Caution:

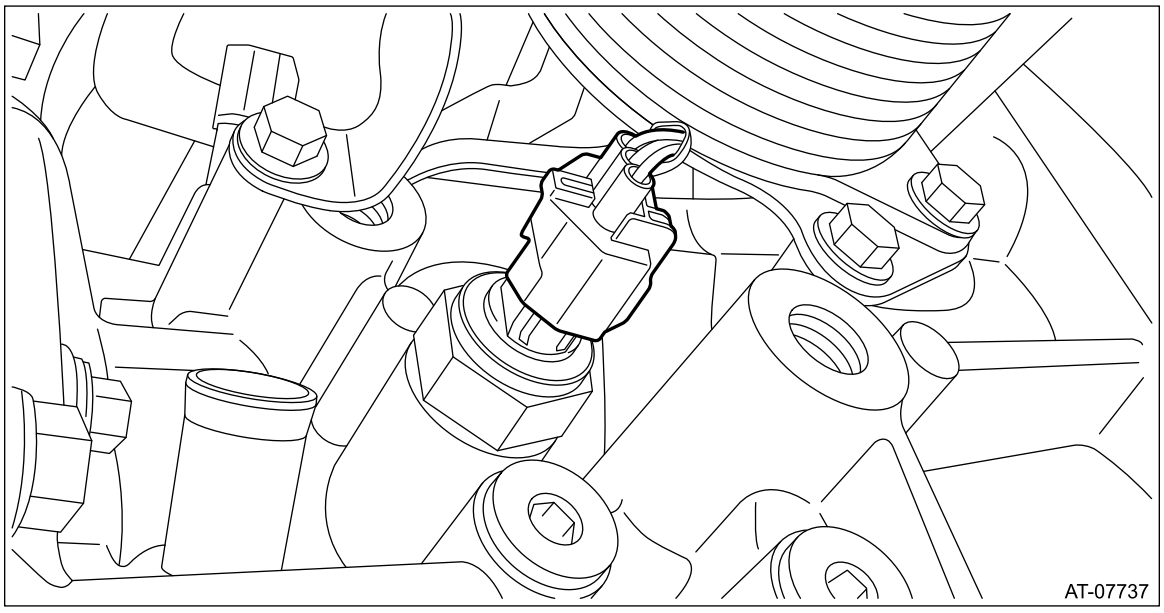
Do not apply extra overload while holding the part (A).





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

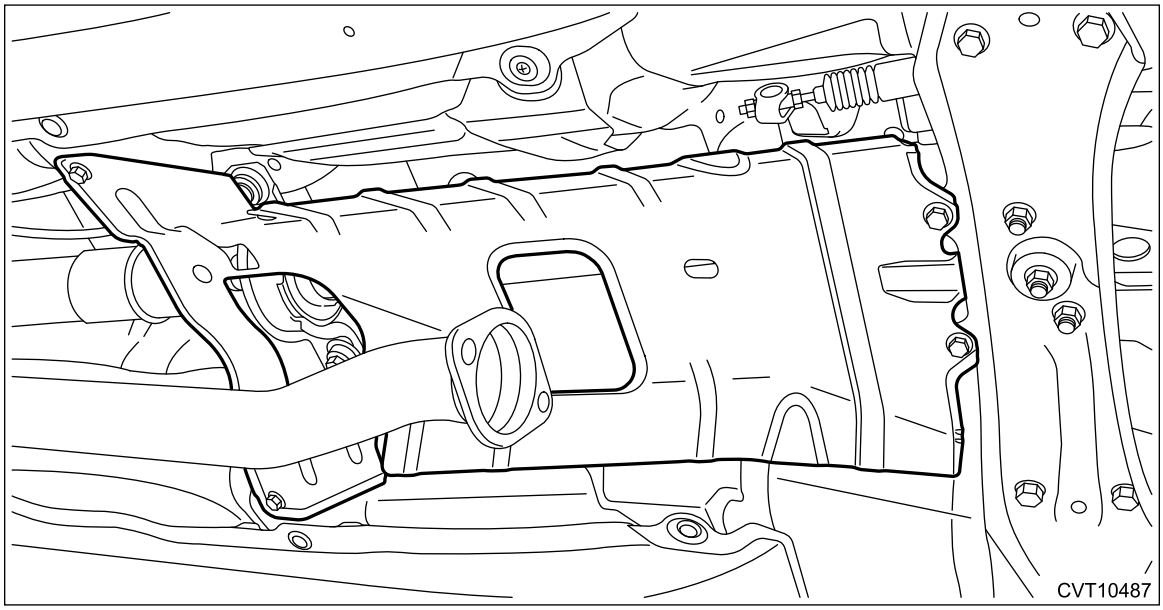
37. Connect the secondary pressure sensor harness connector.



38. Install the center exhaust cover.

Tightening torque:

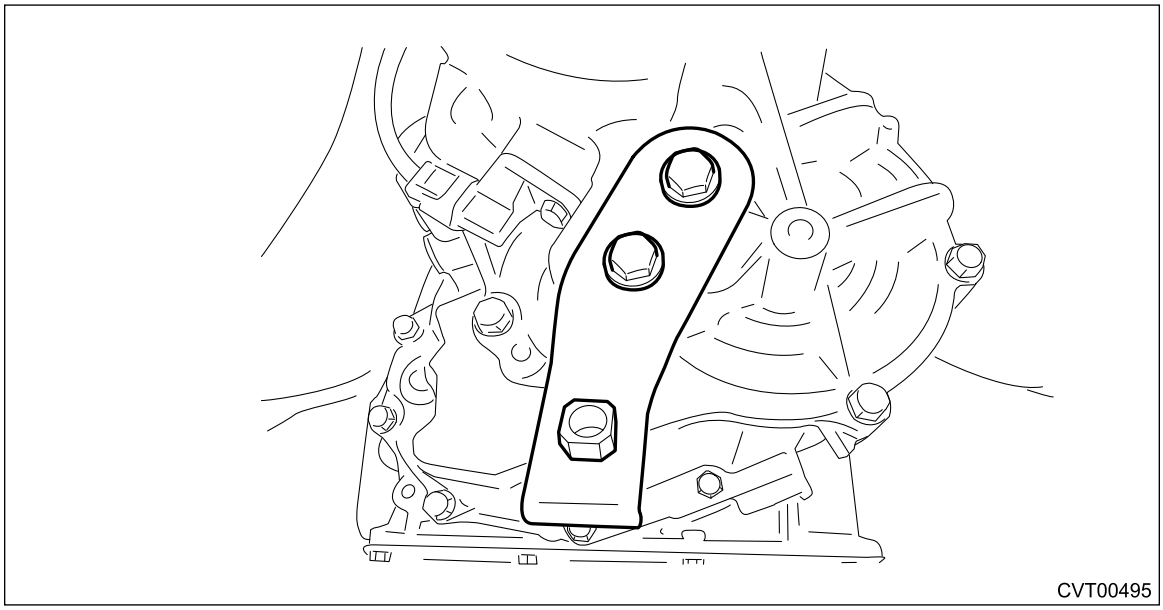
18 N·m (1.8 kgf-m, 13.3 ft-lb)



39. Install the exhaust hanger bracket.

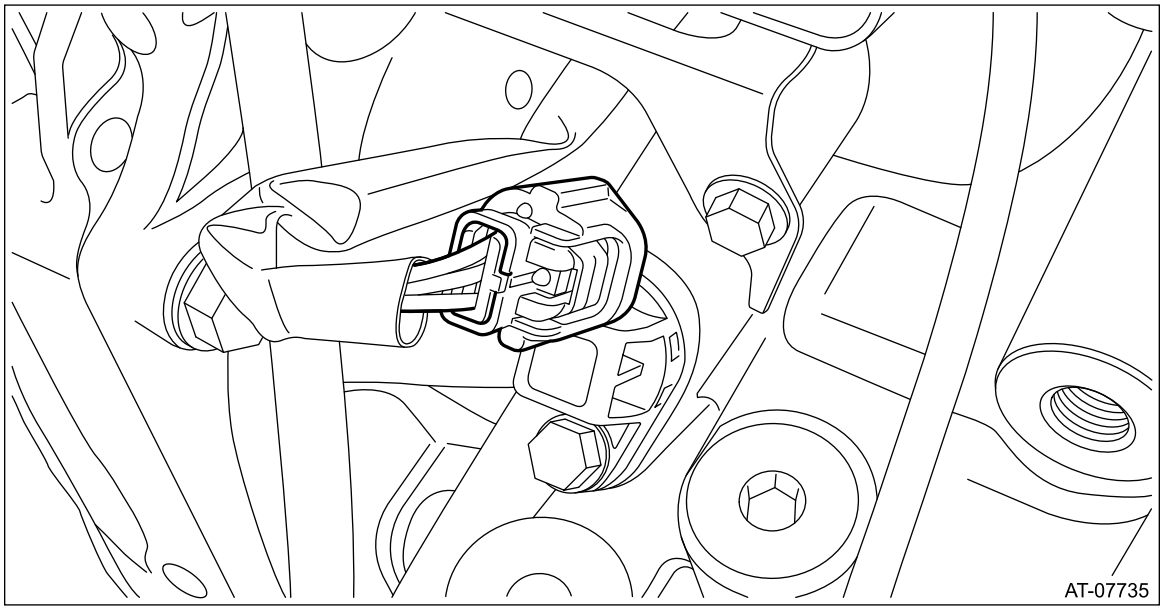
Tightening torque:

23 N·m (2.3 kgf-m, 17.0 ft-lb)



40. Install the center exhaust pipe (rear). Ref. to EXHAUST(w/o STI)>Center Exhaust Pipe>INSTALLATION.

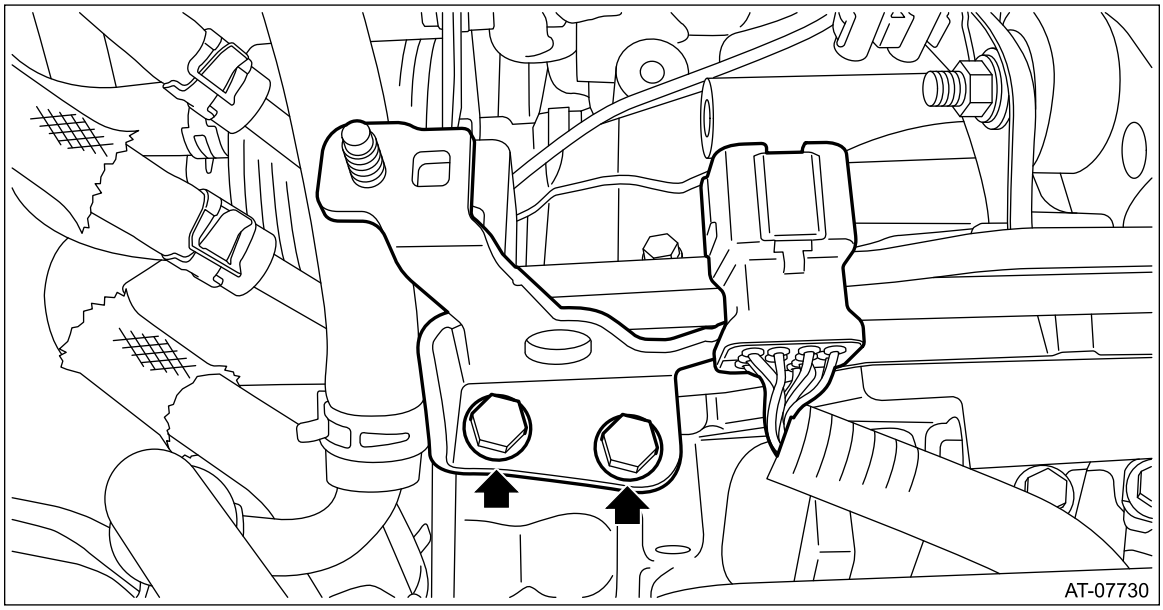
41. Connect the primary pressure sensor harness connector.



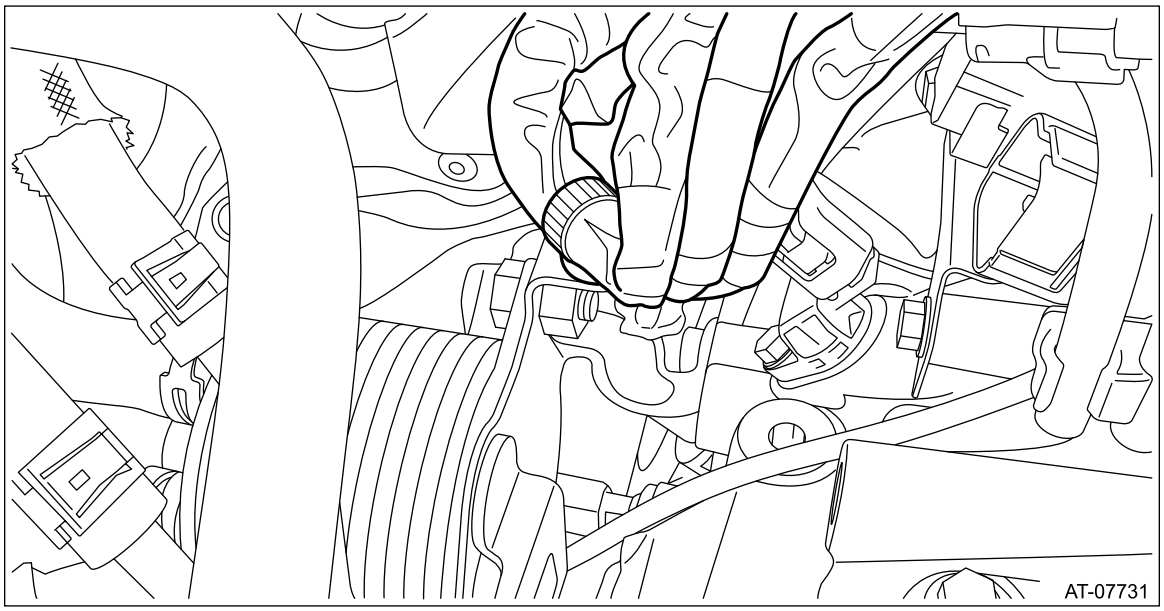
42. Install the engine hanger rear.

Tightening torque:

21 N·m (2.1 kgf-m, 15.5 ft-lb)



43. Install the harness clip.

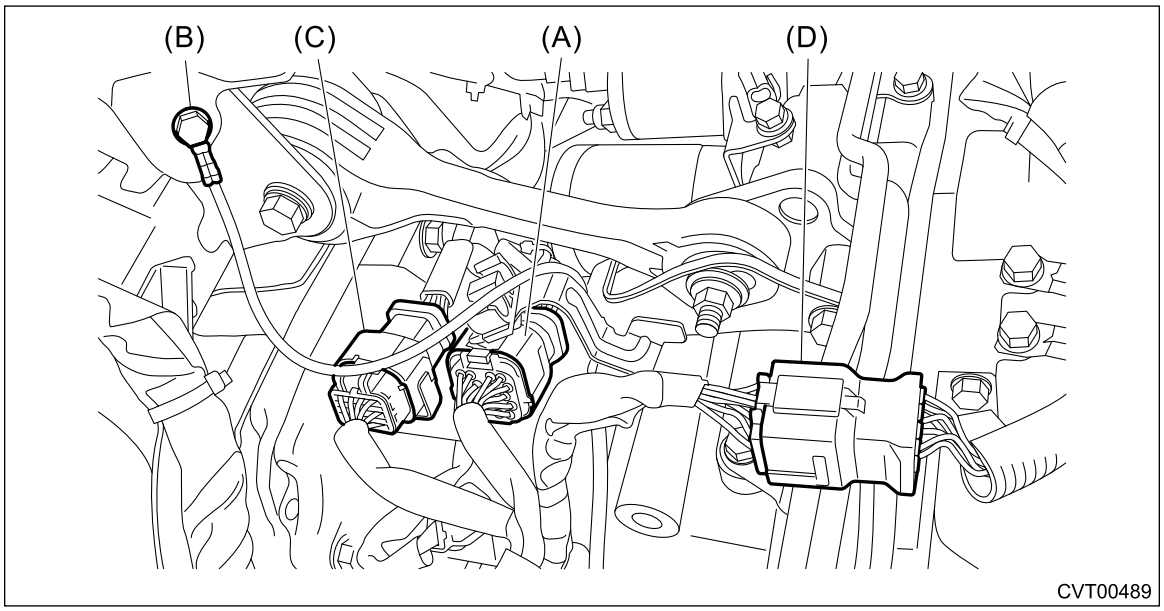


44. Connect the following harness connectors.

- 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

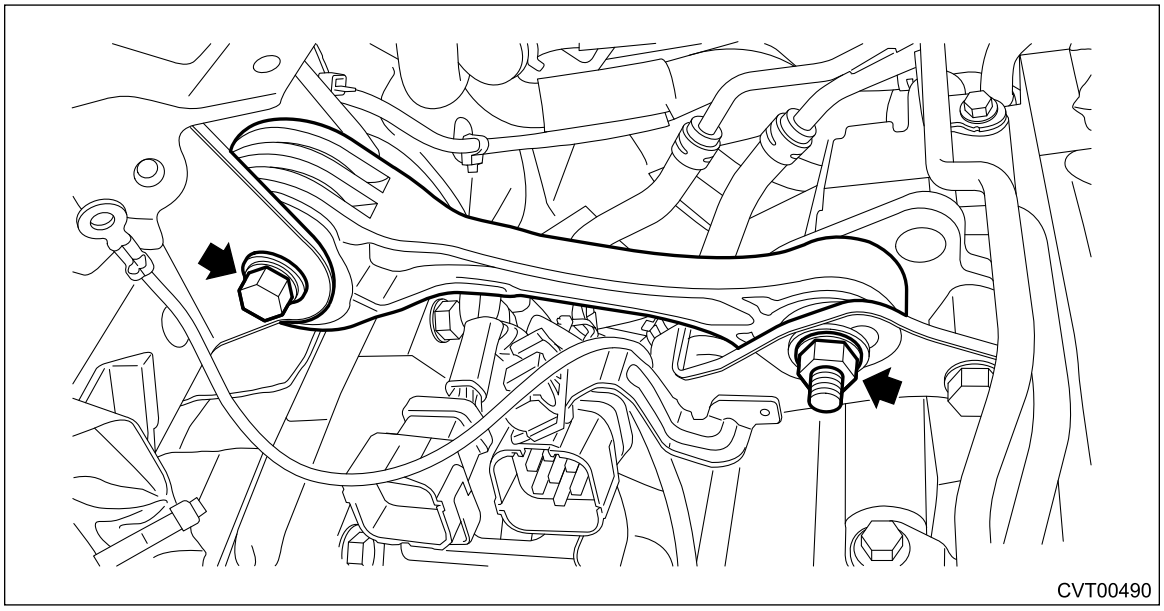
45. Install the air breather hose. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Air Breather Hose>INSTALLATION.

46. Install the intercooler and the intercooler stay. Ref. to INTAKE (INDUCTION)(w/o STI)>Intercooler>INSTALLATION.
47. Install the air intake duct. Ref. to INTAKE (INDUCTION)(w/o STI)>Air Intake Duct>INSTALLATION.
48. Install the front tires.
49. Install the collector cover. Ref. to INTAKE (INDUCTION)(w/o STI)>Collector Cover>INSTALLATION.
50. Connect the ground terminal to battery sensor. Ref. to NOTE>NOTE > BATTERY.
51. Refill differential gear oil to adjust the differential gear oil amount. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Differential Gear Oil>ADJUSTMENT.
52. Refill CVTF to adjust the CVTF amount. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>CVTF>ADJUSTMENT.
53. 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**
54. Perform the operation for clearing AT learning value. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION (DIAGNOSTICS)>Clear Memory Mode>OPERATION.
55. Perform the operation of AT learning mode. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION (DIAGNOSTICS)>Learning Control.
56. Perform the road test to make sure there is no fault. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Road Test>INSPECTION.

REMOVAL

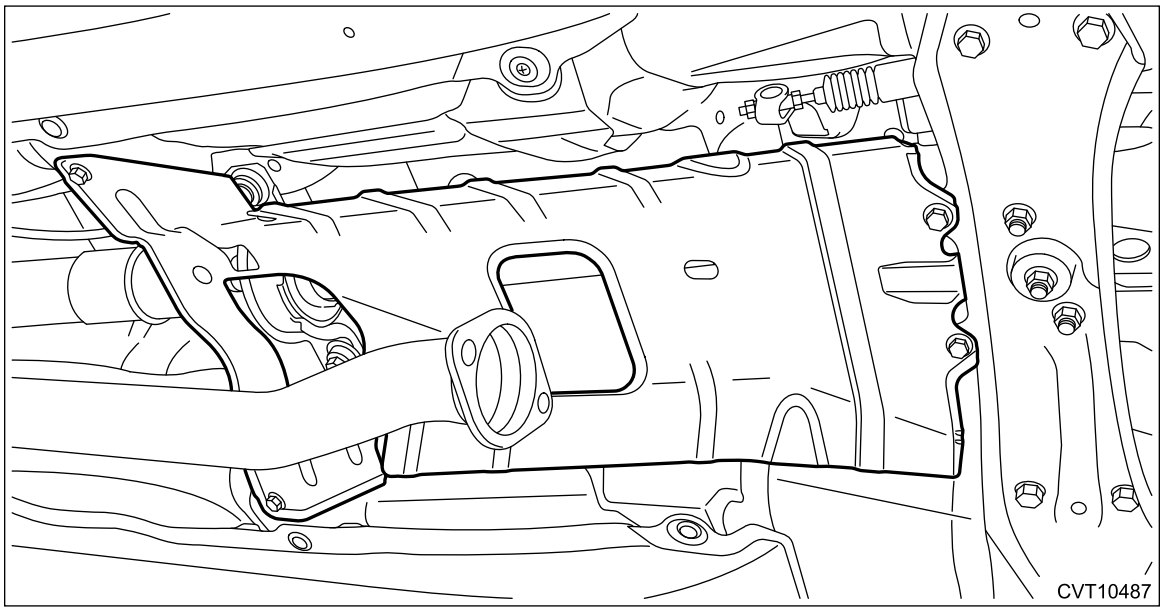
1. PITCHING STOPPER

1. Disconnect the ground terminal from battery sensor. Ref. to NOTE>NOTE > BATTERY.
2. Remove the collector cover. Ref. to INTAKE (INDUCTION)(w/o STI)>Collector Cover>REMOVAL.
3. Remove the intercooler. Ref. to INTAKE (INDUCTION)(w/o STI)>Intercooler>REMOVAL.
4. Remove the pitching stopper.

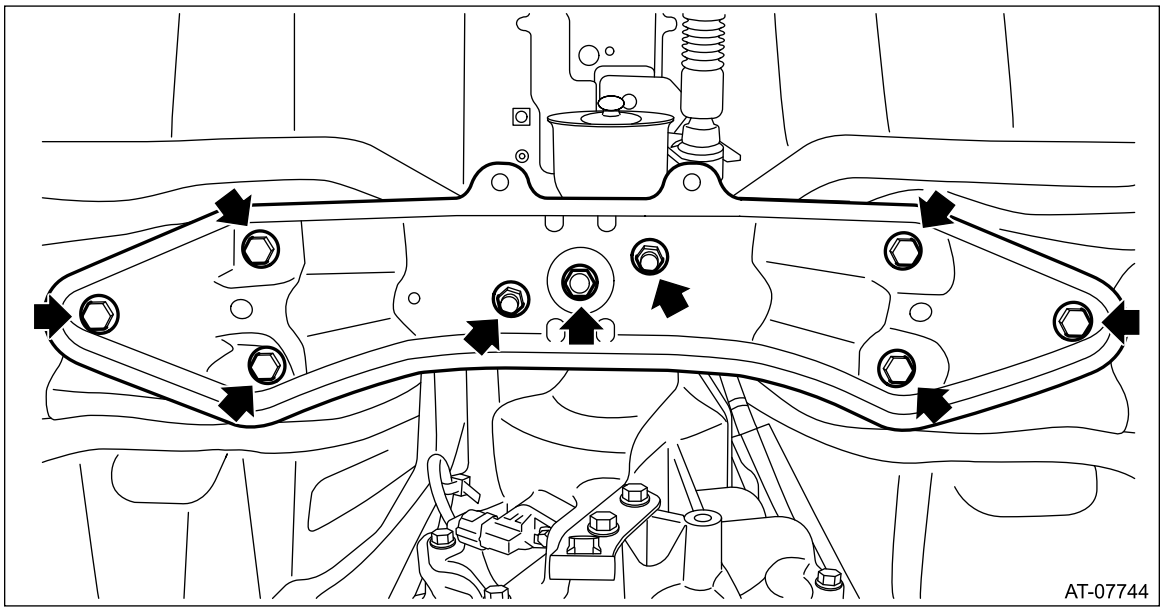


2. TRANSMISSION REAR CROSSMEMBER AND REAR CUSHION RUBBER

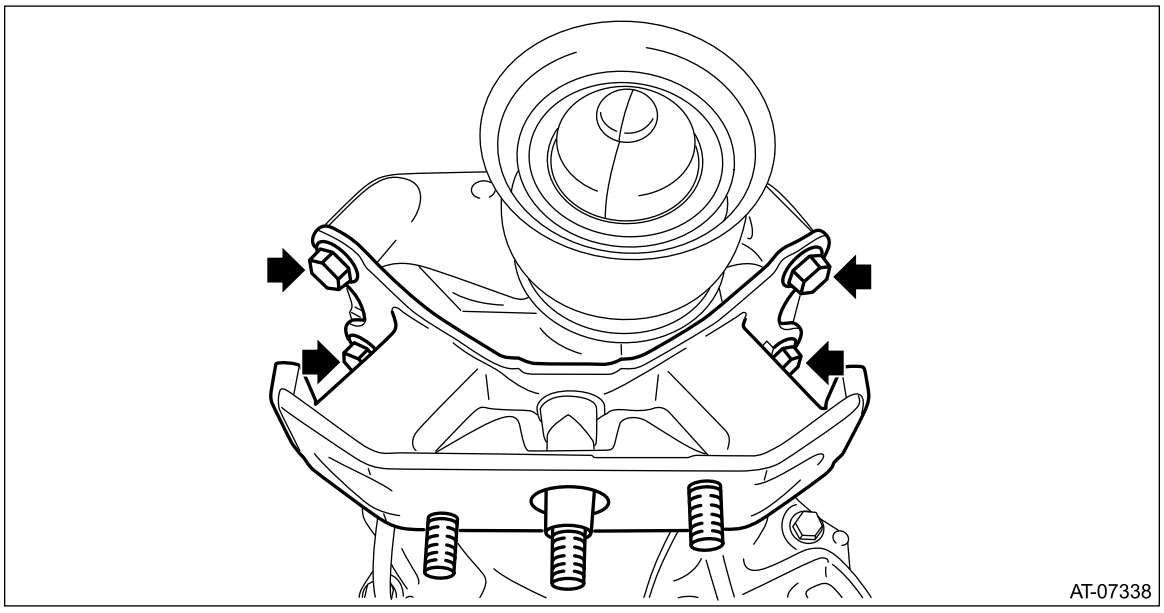
1. Disconnect the ground terminal from battery sensor. Ref. to NOTE>NOTE > BATTERY.
2. Lift up the vehicle.
3. Remove the center exhaust pipe (rear). Ref. to EXHAUST(w/o STI)>Center Exhaust Pipe>REMOVAL.
4. Remove the center exhaust cover.



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.



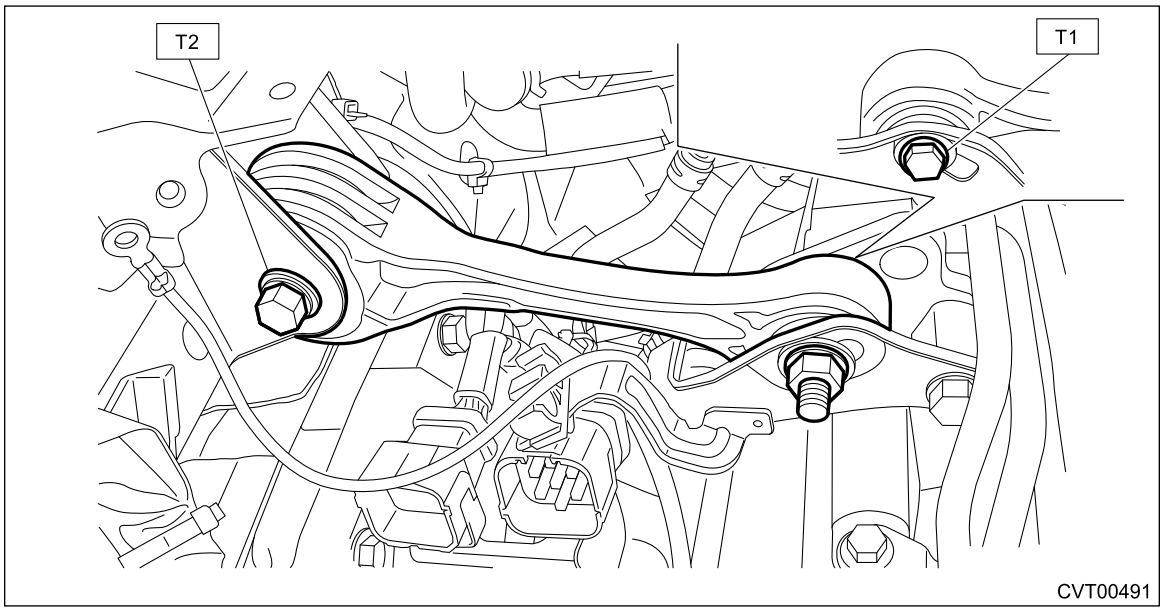
7. Remove the rear cushion rubber.



INSTALLATION

1. PITCHING STOPPER

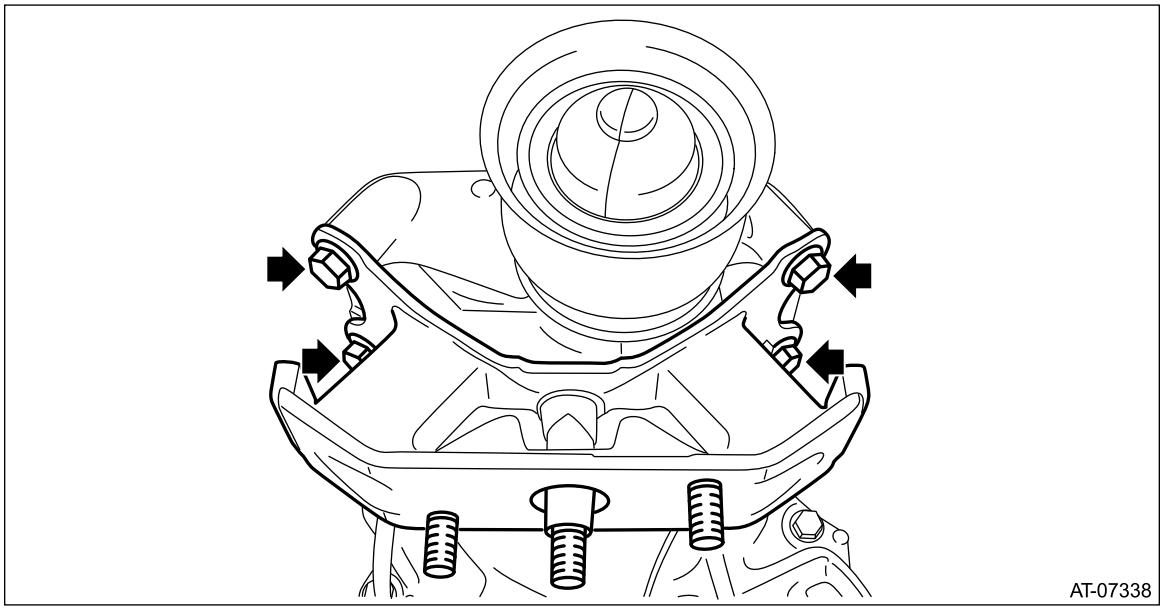
1. Install the pitching stopper.
   Tightening torque:
   T1: 50 N·m (5.1 kgf-m, 36.9 ft-lb)
   T2: 58 N·m (5.9 kgf-m, 42.8 ft-lb)



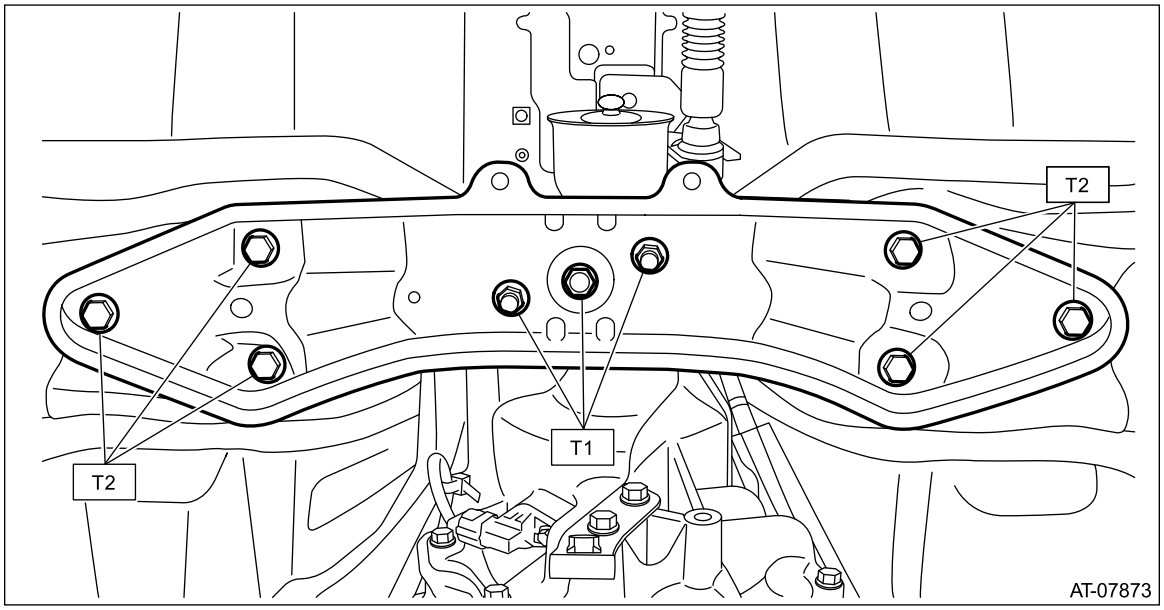
2. Install the intercooler. Ref. to INTAKE (INDUCTION)(w/o STI)>Intercooler>INSTALLATION.
3. Install the collector cover. Ref. to INTAKE (INDUCTION)(w/o STI)>Collector Cover>INSTALLATION.
4. Connect the ground terminal to battery sensor. Ref. to NOTE>NOTE > BATTERY.

2. TRANSMISSION REAR CROSSMEMBER AND REAR CUSHION RUBBER

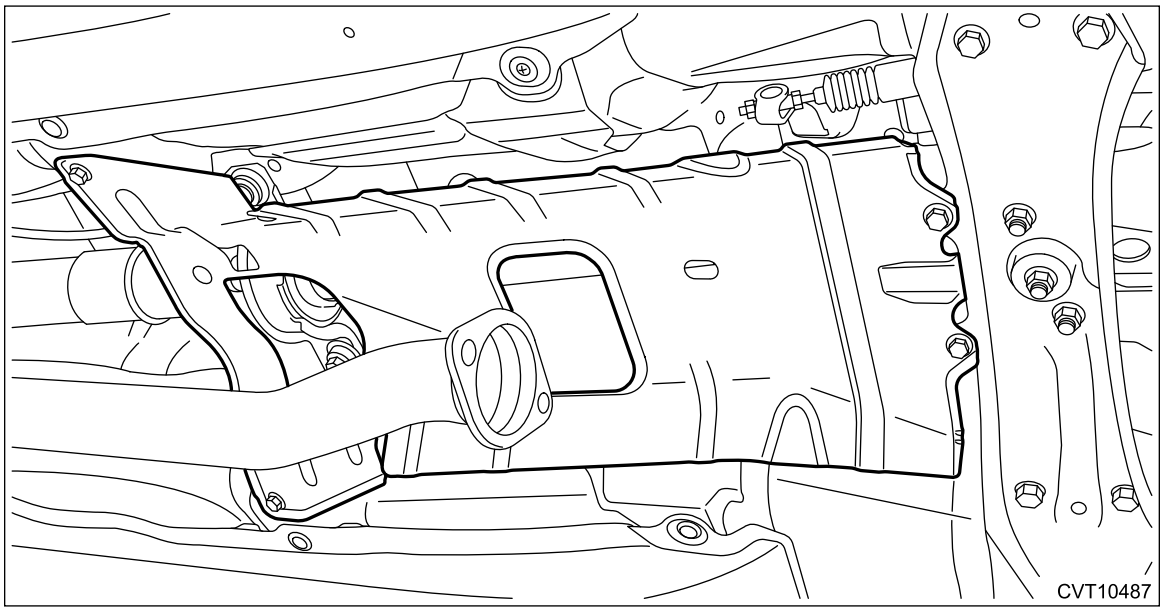
1. Install the rear cushion rubber.
   Tightening torque:
   40 N·m (4.1 kgf-m, 29.5 ft-lb)



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 (rear). Ref. to EXHAUST(w/o STI)>Center Exhaust Pipe>INSTALLATION.
6. Connect the ground terminal to battery sensor. Ref. to NOTE>NOTE > BATTERY.

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) > Extension Case Oil Seal

INSPECTION

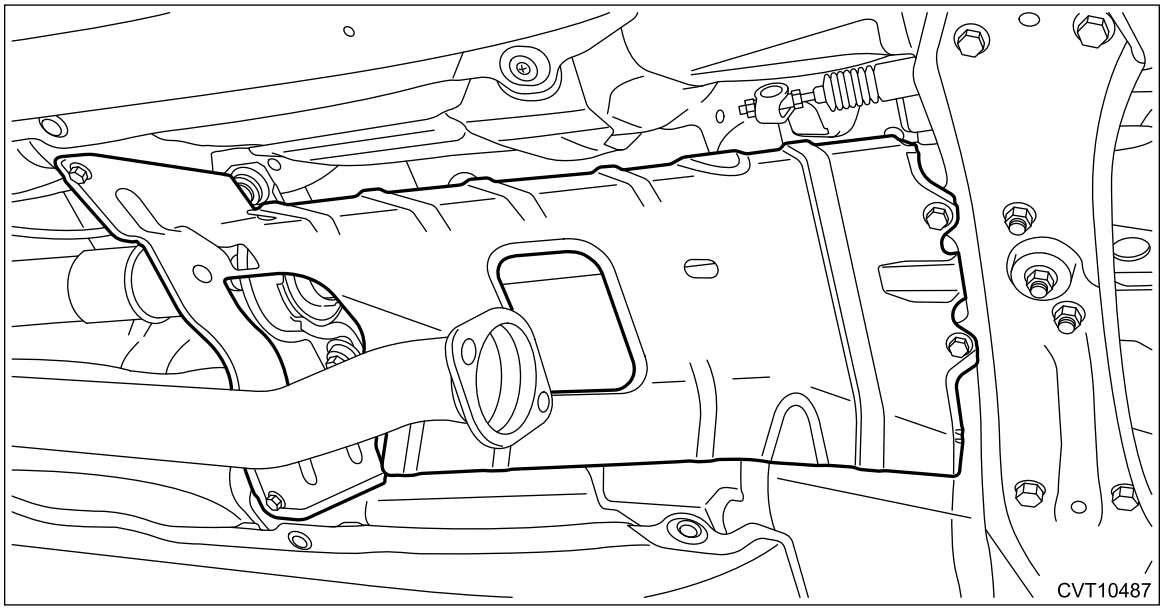
Check for leakage of CVTF from the joint section of transmission and propeller shaft. If a leak is found, inspect the propeller shaft and replace the oil seal.

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Extension Case 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 (rear). Ref. to EXHAUST(w/o STI)>Center Exhaust Pipe>REMOVAL.
3. Remove the center exhaust cover.



4. Clean the transmission exterior.
5. Remove the propeller shaft. Ref. to DRIVE SHAFT SYSTEM>Propeller Shaft>REMOVAL.
6. Using a screwdriver or ST, remove the oil seal trying not to damage the extension case.

ST 398527700 PULLER ASSY

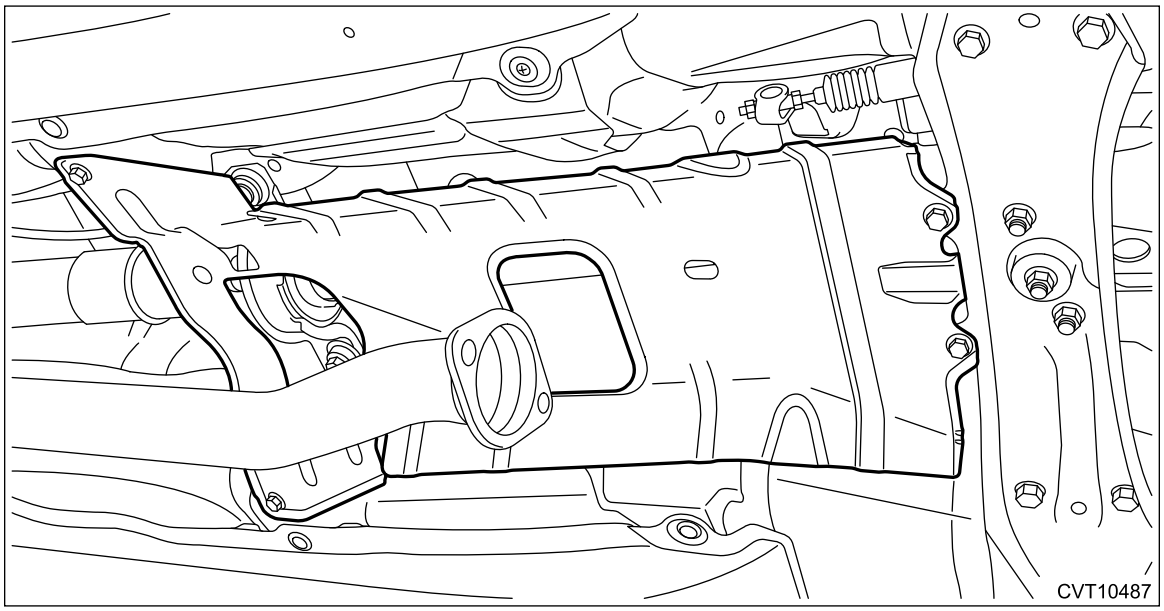
7. Using the ST, install the oil seal.
   Note:
   - **Use a new oil seal.**
   - **Apply CVTF to the oil seal lip and press-fitting surface.**

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 (rear). Ref. to EXHAUST(w/o STI)>Center Exhaust Pipe>INSTALLATION.

11. Adjust the CVTF level and check there is no leakage. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>CVTF>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.

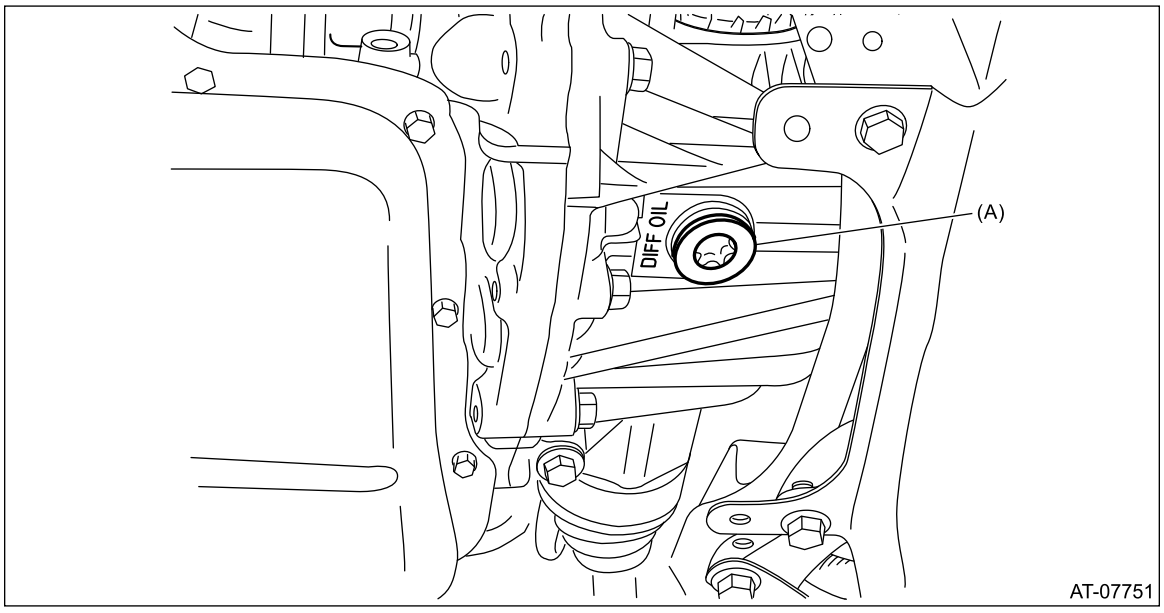
CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Differential Side Retainer Oil Seal

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 (rear). Ref. to EXHAUST(w/o STI)>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

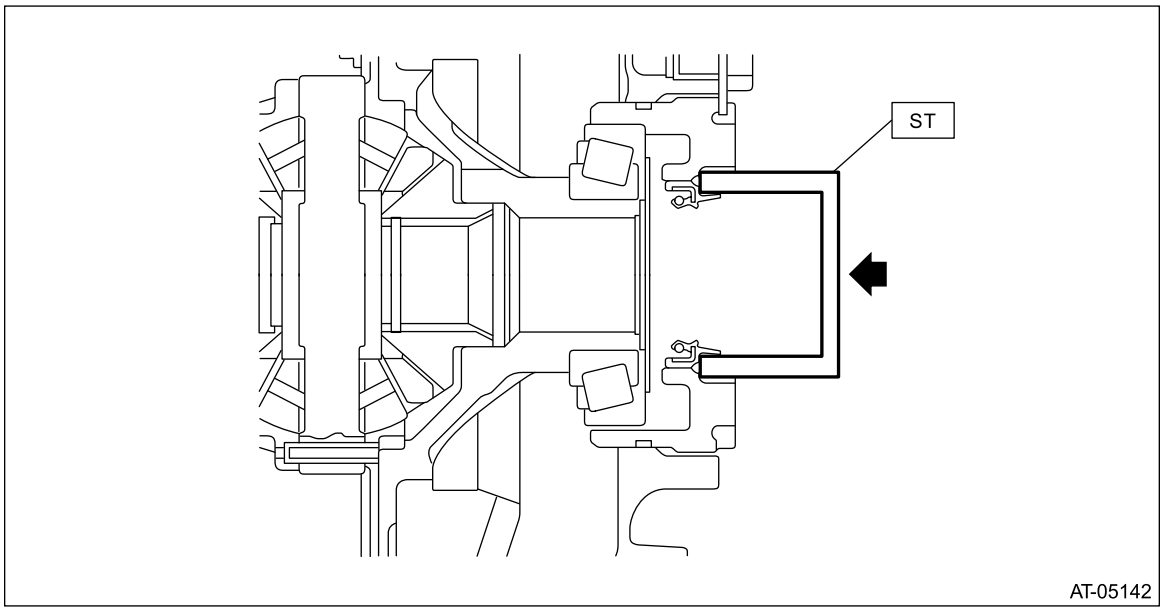
4. Tighten the differential gear oil drain plug.
   Note:
   Use a new gasket.
   Tightening torque:
   70 N·m (7.1 kgf-m, 51.6 ft-lb)
5. Remove the stabilizer link. Ref. to FRONT SUSPENSION>Front Stabilizer>REMOVAL.
6. Disconnect the lower arm ball joint and housing.
7. Pull out the front drive shaft 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.

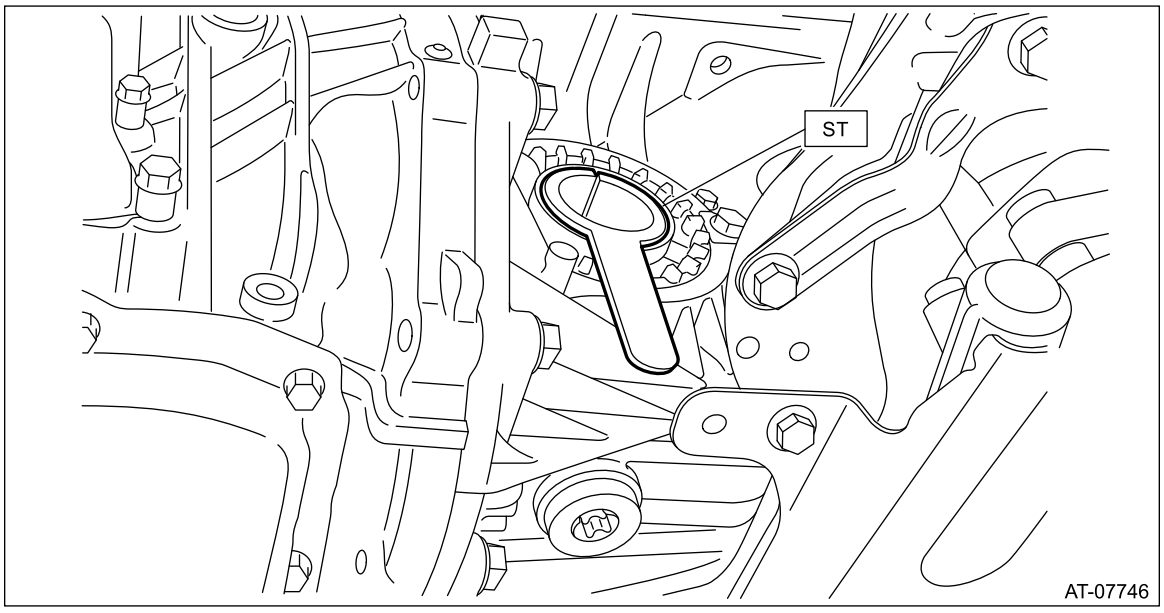
    ST 18675AA000 DIFFERENTIAL SIDE OIL SEAL INSTALLER

    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. Replace the flange nut with a new part and install the stabilizer link.

Tightening torque:

60 N·m (6.1 kgf-m, 44.3 ft-lb)

17. Install the center exhaust pipe (rear). Ref. to EXHAUST(w/o STI)>Center Exhaust Pipe>INSTALLATION.

18. Lower the vehicle.

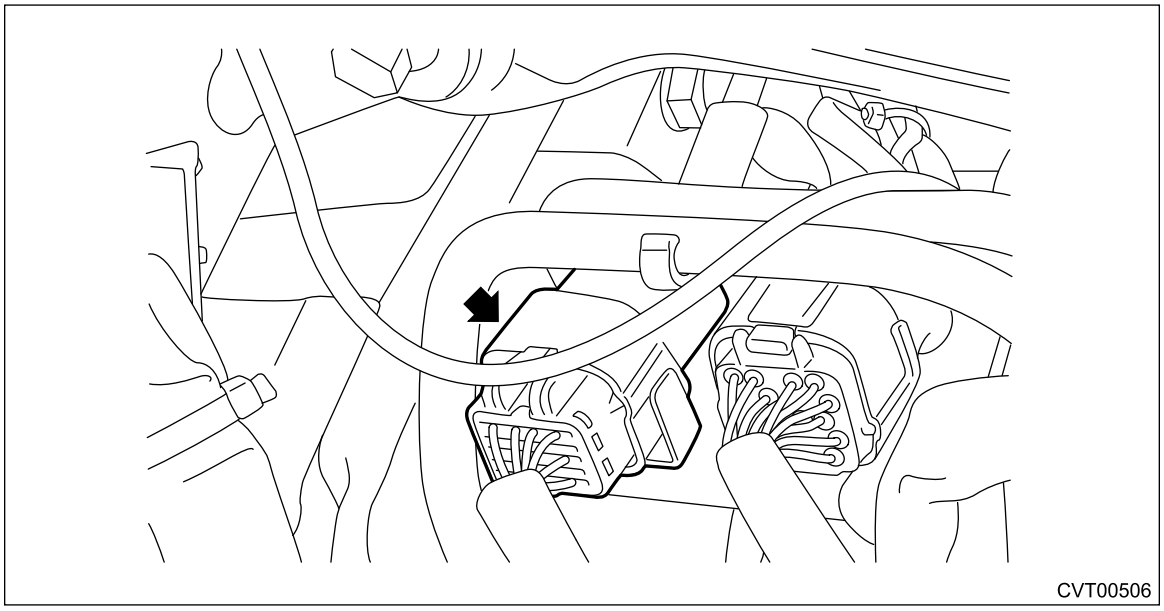
19. Refill differential gear oil to adjust the differential gear oil amount. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Differential Gear Oil>ADJUSTMENT.

20. Install the front tires.

INSPECTION

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

1. Remove the collector cover. Ref. to INTAKE (INDUCTION)(w/o STI)>Collector Cover>REMOVAL.
2. Remove the intercooler. Ref. to INTAKE (INDUCTION)(w/o STI)>Intercooler>REMOVAL.
3. Disconnect the inhibitor harness connector.

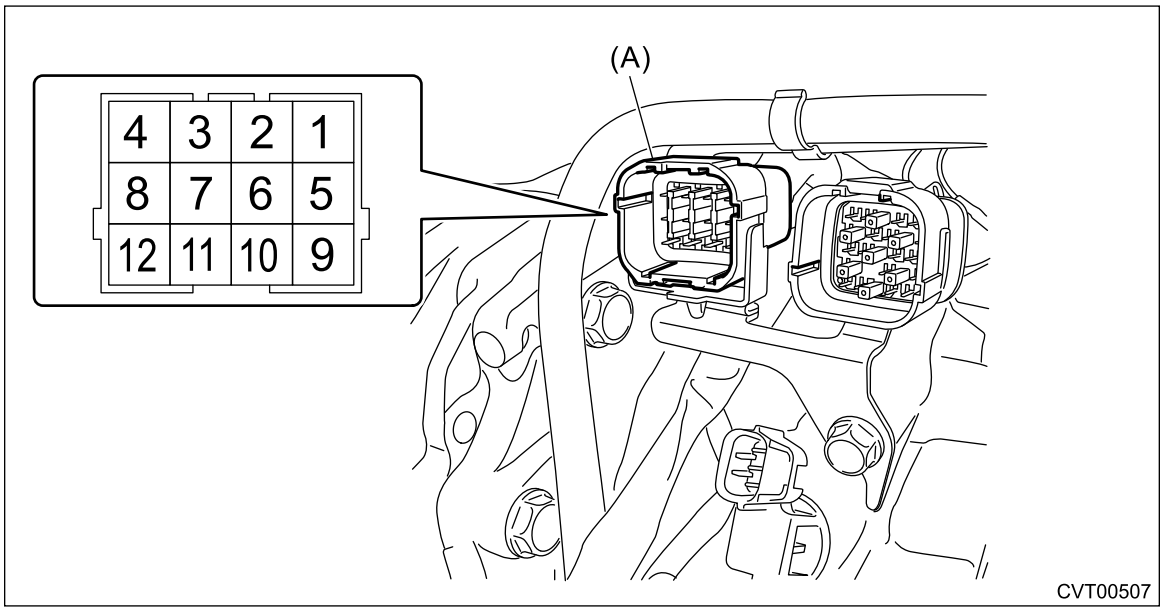


4. Check for continuity in inhibitor switch circuit by shifting the select lever in "P", "R", "N" and "D" respectively.

Note:

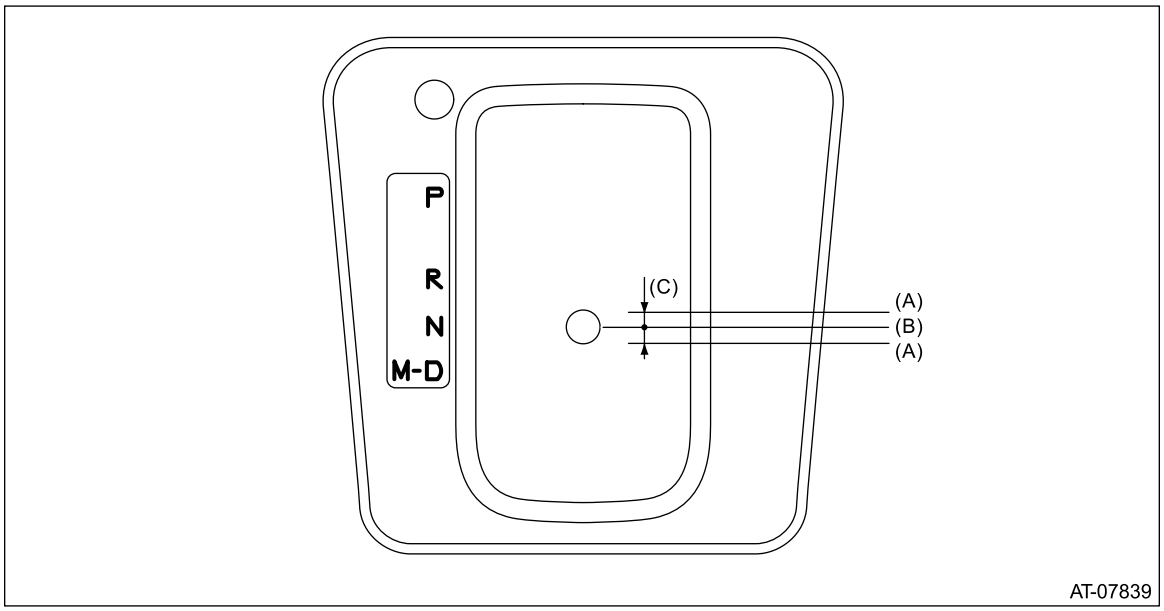
- **Check that there is no continuity in the starter circuit when the select lever is in the "R" and "D" ranges.**
- **When inhibitor switch is normal, check there is no poor contact in vehicle side connector and no open circuit in harness.**

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



(A) Inhibitor harness connector

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(TR690)>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.

Inhibitor switch:

Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Inhibitor Switch>ADJUSTMENT.

Select cable:

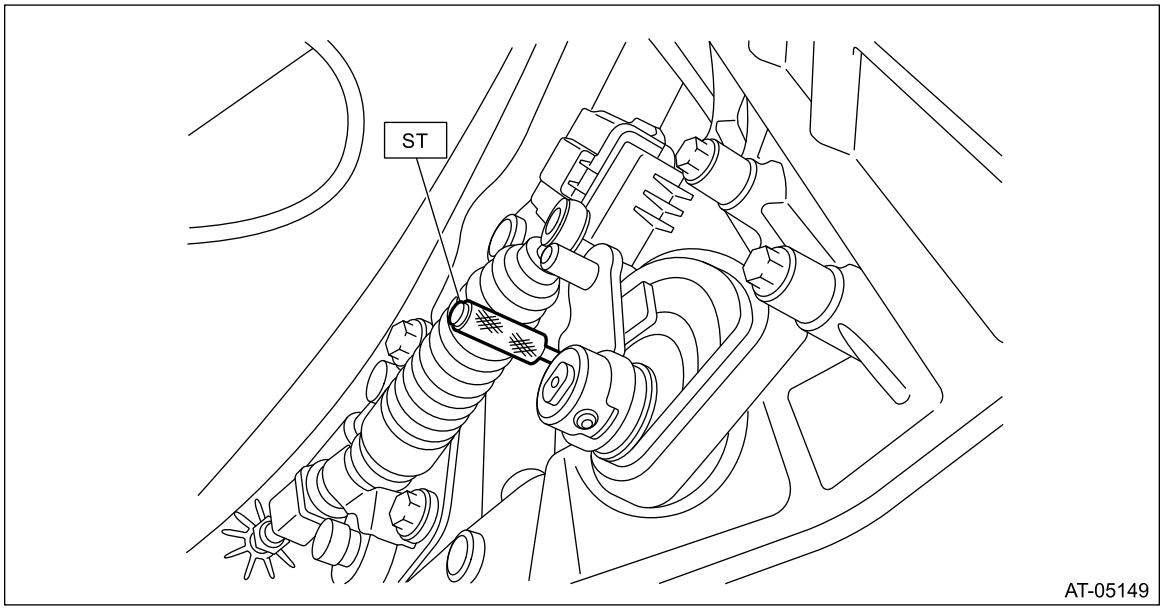
Ref. to CONTROL SYSTEMS>Select Cable>ADJUSTMENT.

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:

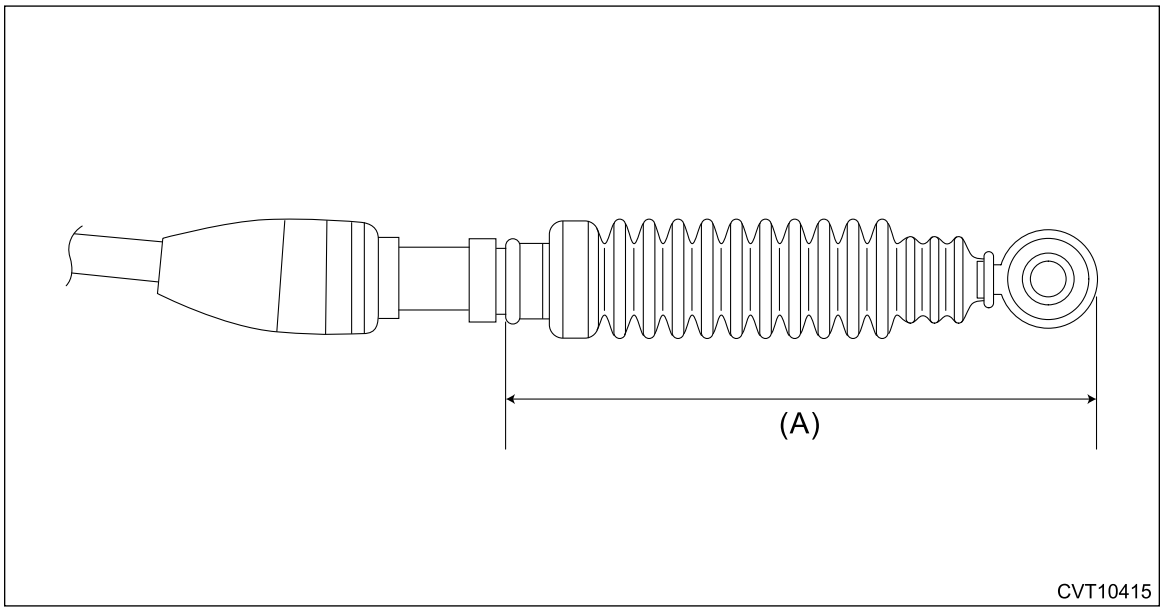
   5 N·m (0.5 kgf-m, 3.7 ft-lb)
5. Repeat the inspection of the inhibitor switch. If the inhibitor switch is determined to be “faulty”, replace it.

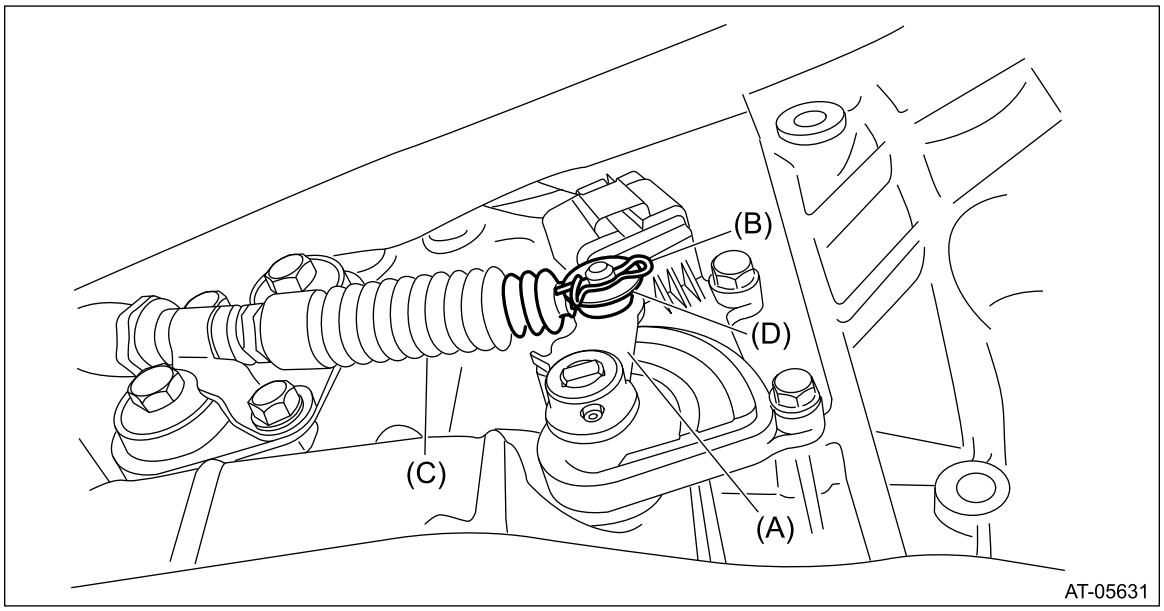
CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Inhibitor Switch

REMOVAL

1. Shift the select lever to “N” range.
2. Disconnect the ground terminal from battery sensor. Ref. to NOTE>NOTE > BATTERY.
3. Lift up the vehicle.
4. Remove the snap pin and washer, and disconnect the select cable.

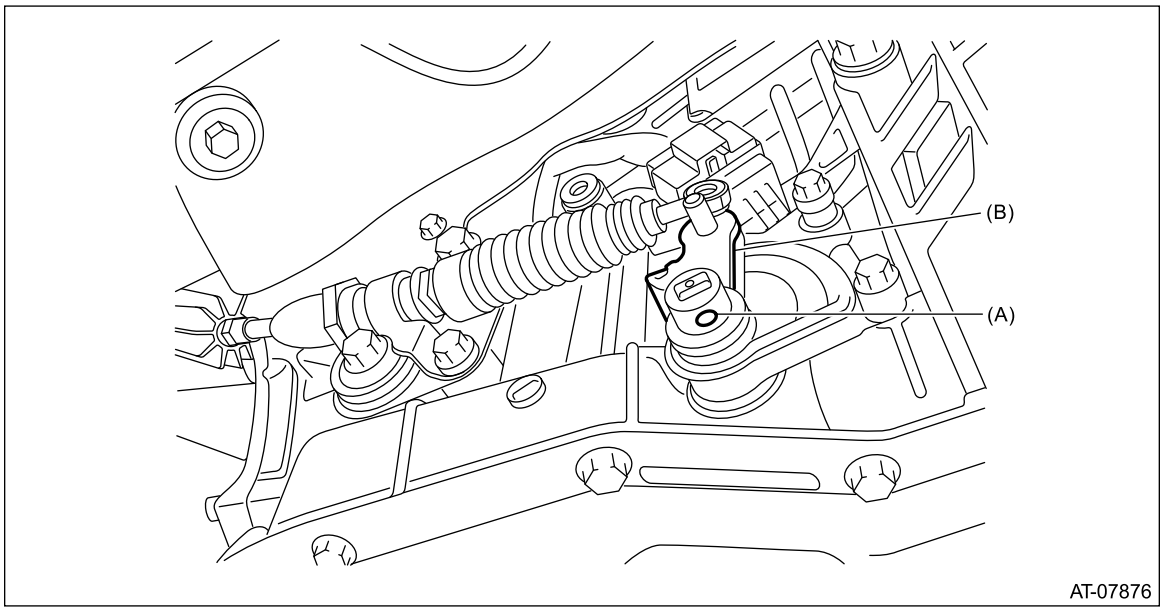
Caution:
Do not apply extra overload while holding the part (A).





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

5. Remove the spring pin and shifter arm.

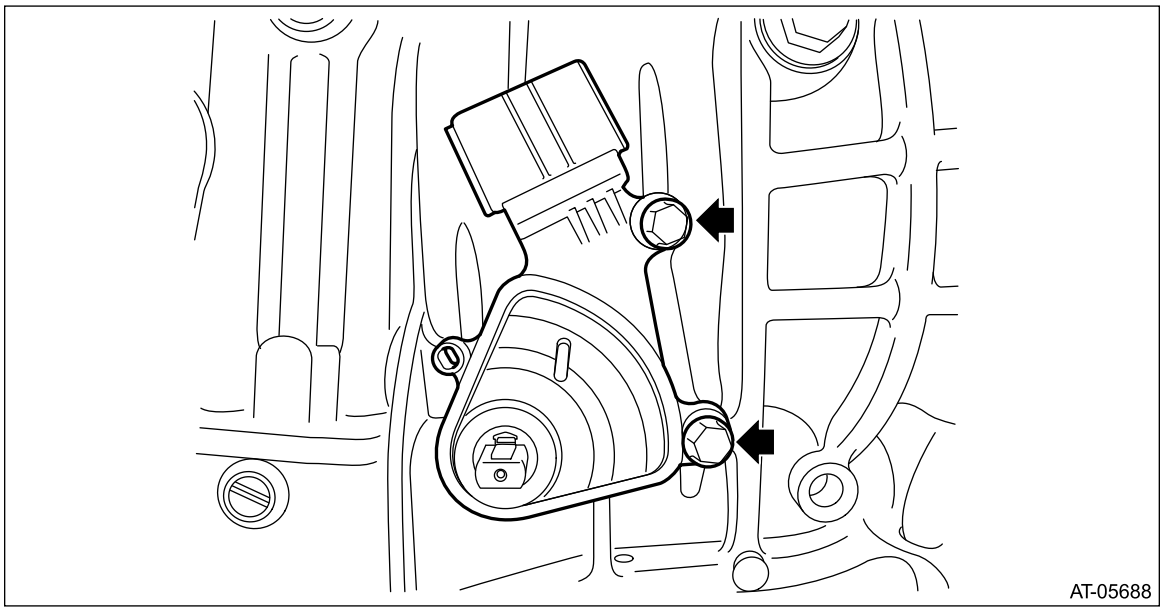


(A) Spring pin

(B) Shifter arm

6. Remove the inhibitor harness connector from inhibitor switch.

7. Remove the two inhibitor switch securing bolts.

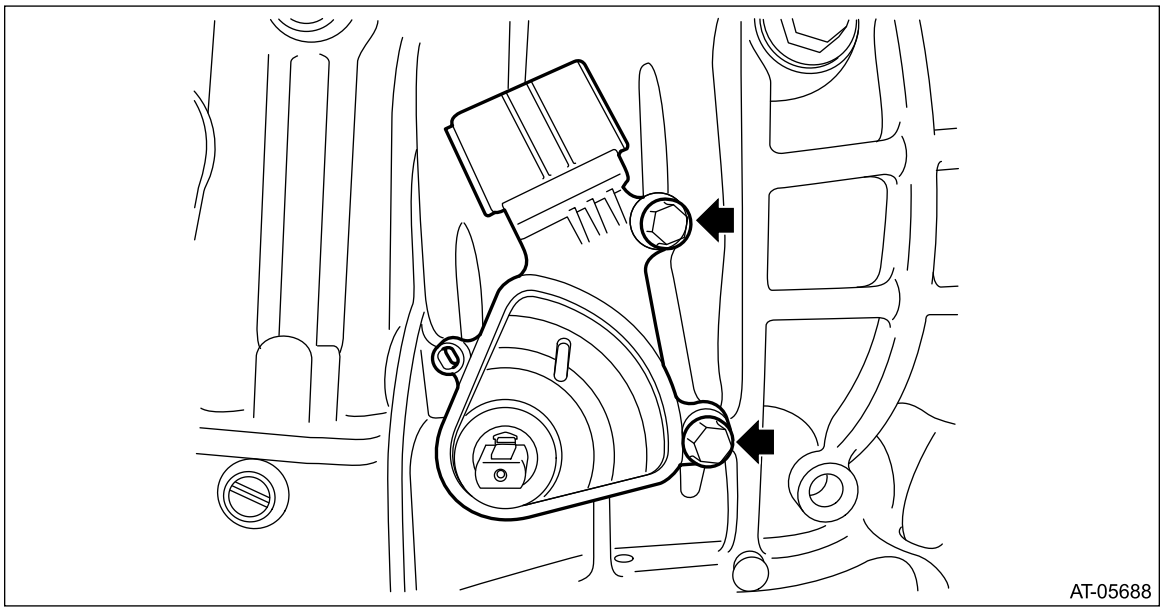


8. Remove the inhibitor switch.

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Inhibitor Switch

INSTALLATION

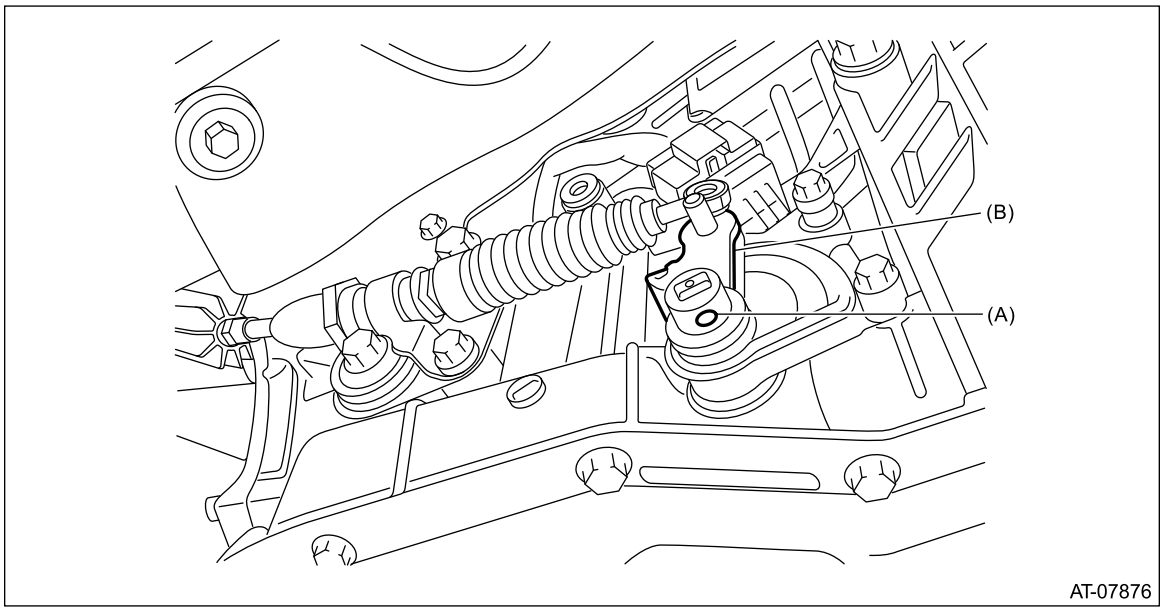
1. Temporarily install the inhibitor switch.



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.

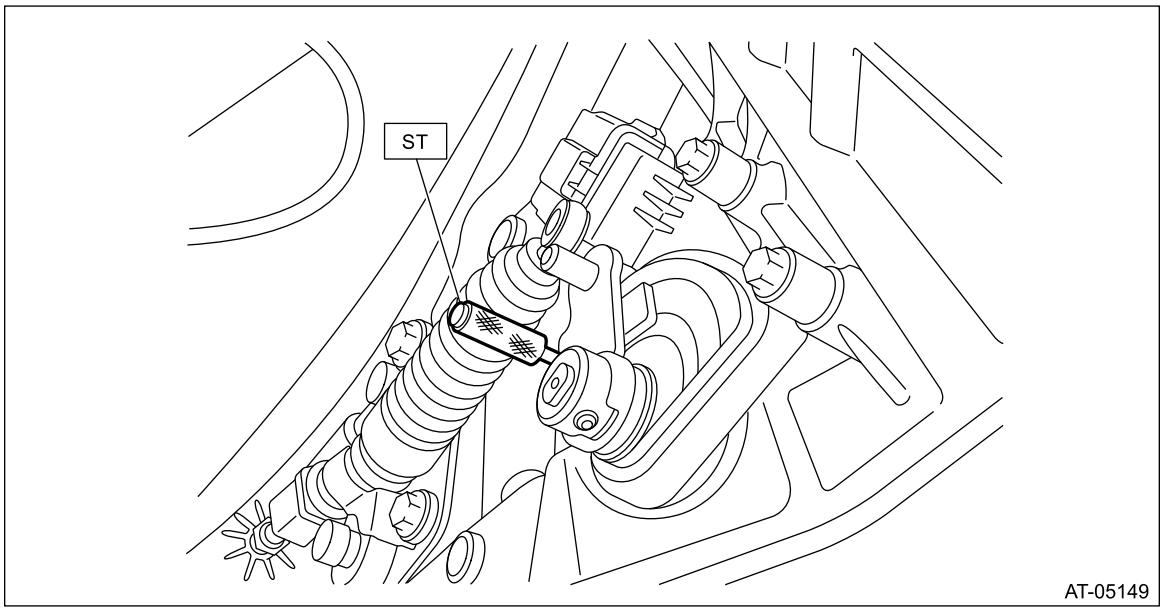


(A) Spring pin

(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.

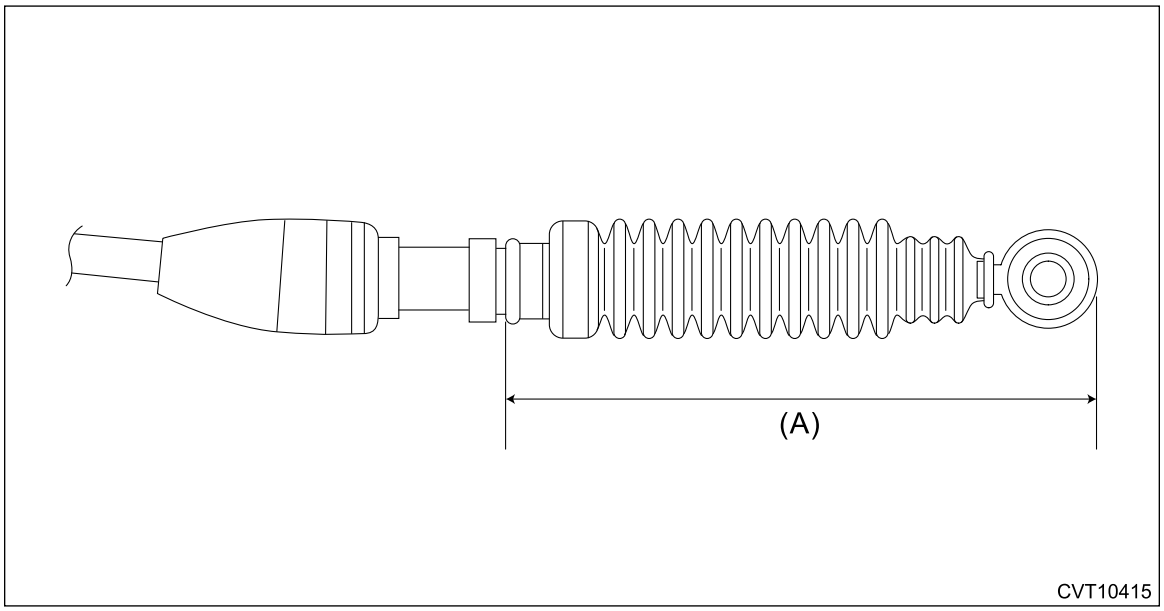
Tightening torque:

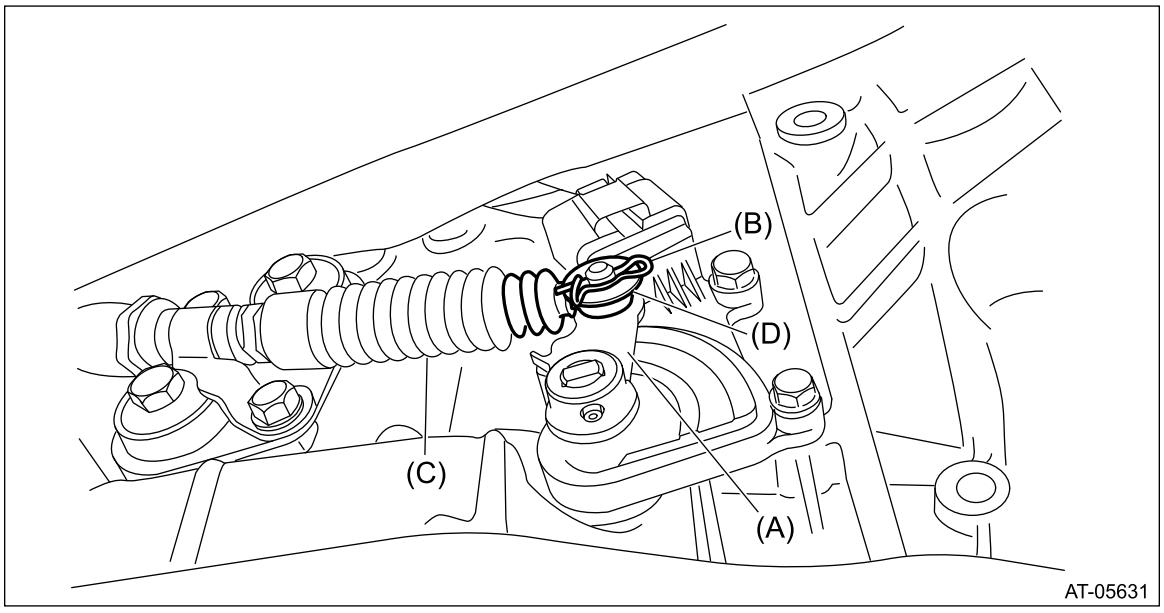
5 N·m (0.5 kgf-m, 3.7 ft-lb)

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

Caution:

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





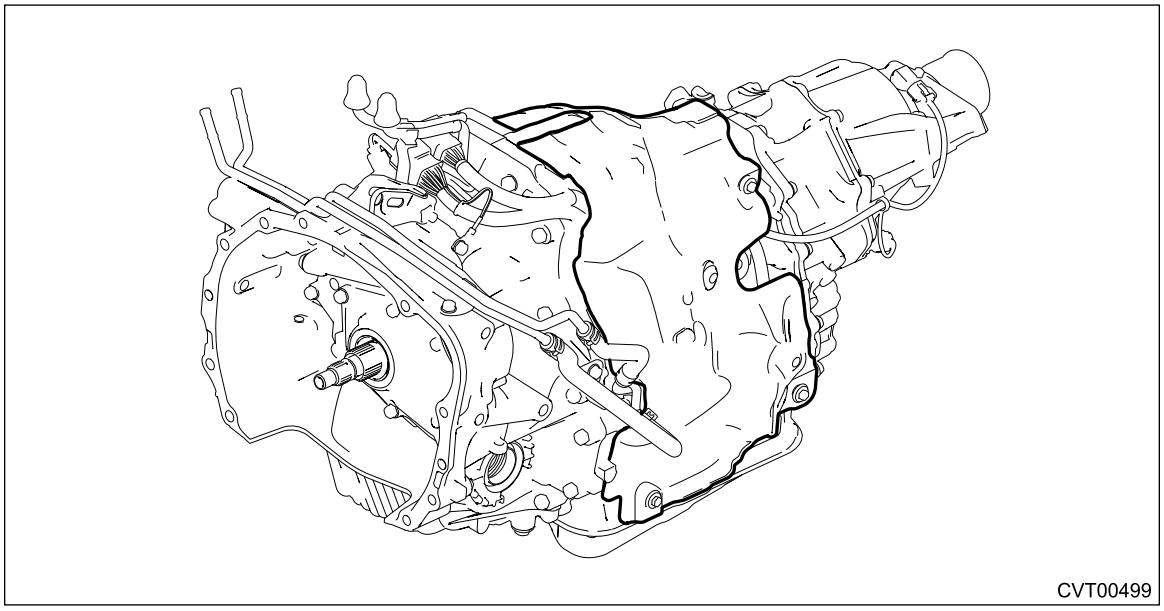
(A) Shifter arm
(B) Snap pin
(C) Select cable
(D) Washer

8. Lower the vehicle.
9. Connect the ground terminal to battery sensor. Ref. to NOTE>NOTE > BATTERY.
10. Check the inhibitor switch. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Inhibitor Switch>INSPECTION.

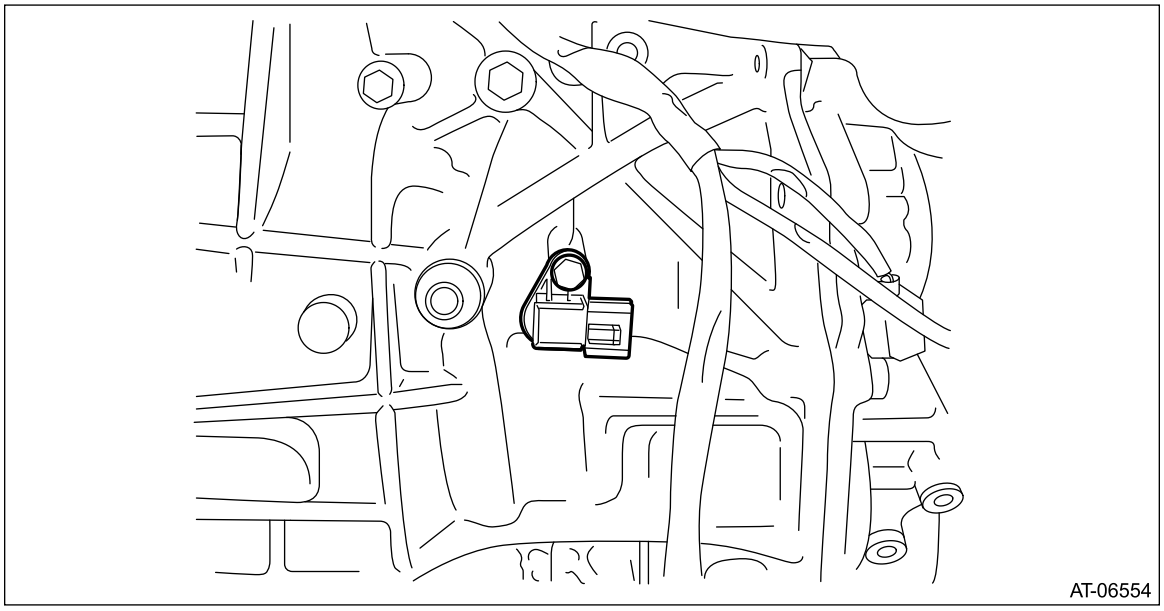
REMOVAL

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.



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-rings.**

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)

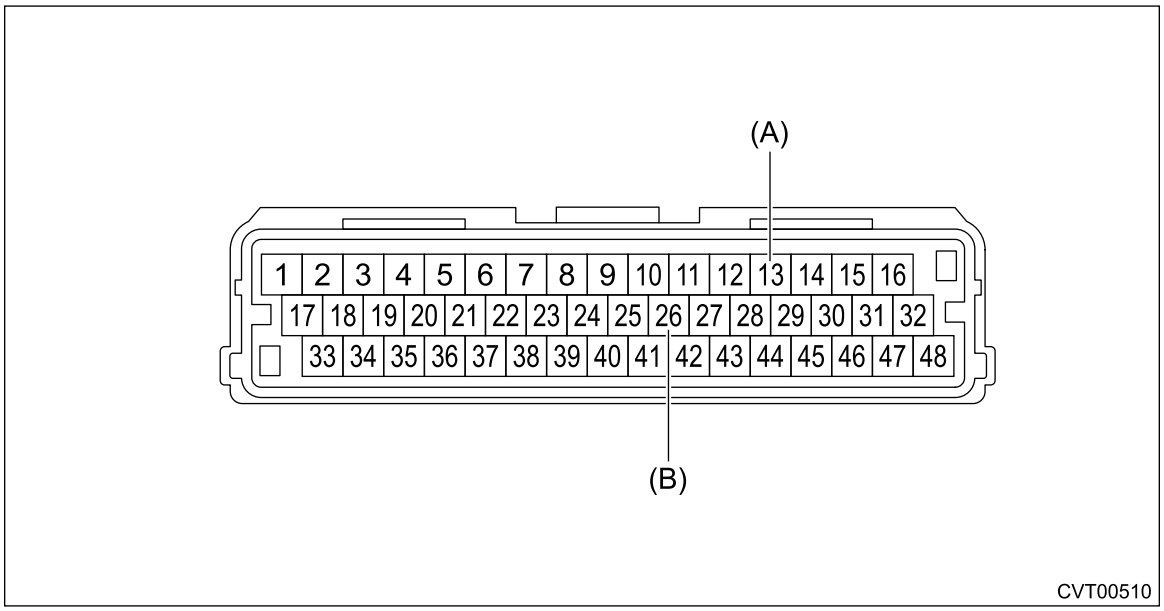
CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Secondary Speed Sensor

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. 13 (+) — No. 26 (−)



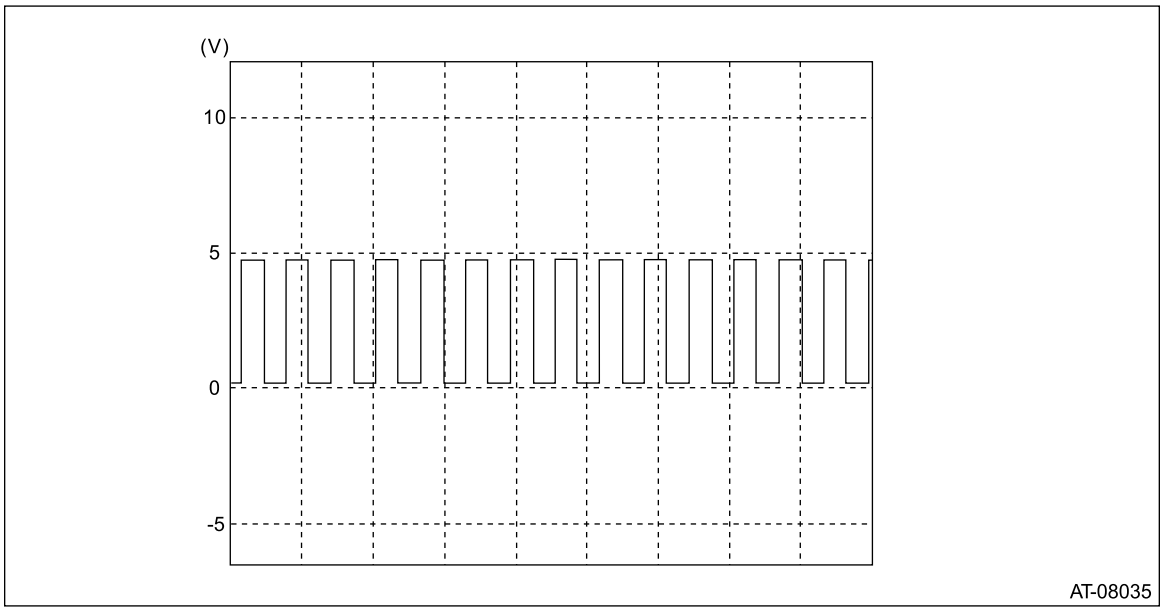
(A) + probe
(B) − probe

4. Start and warm up the engine.

5. Check the waveform of secondary speed sensor with engine idling.

Note:

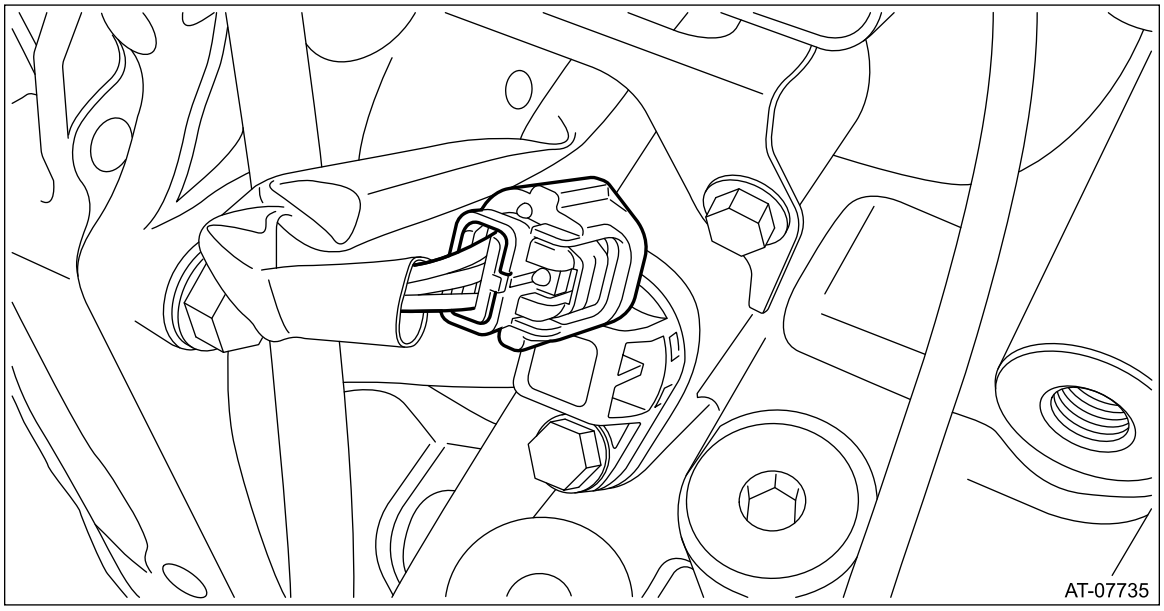
The waveform cycle changes as the speed changes.



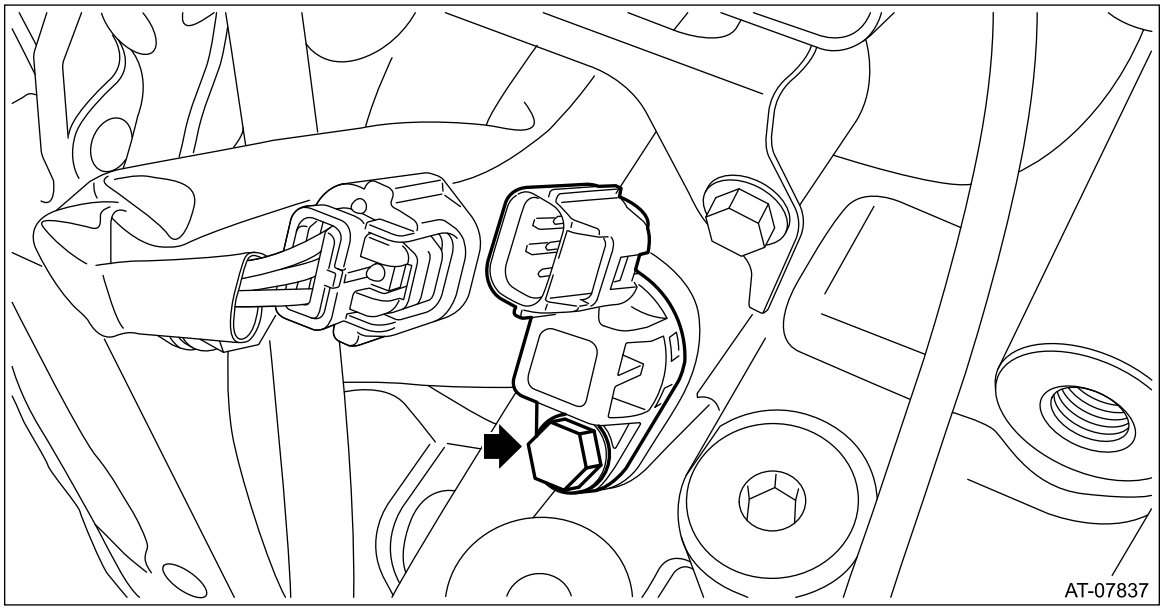
REMOVAL

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 terminal from battery sensor. Ref. to NOTE>NOTE > BATTERY.
2. Remove the collector cover. Ref. to INTAKE (INDUCTION)(w/o STI)>Collector Cover>REMOVAL.
3. Remove the intercooler. Ref. to INTAKE (INDUCTION)(w/o STI)>Intercooler>REMOVAL.
4. Clean the transmission exterior.
5. Remove the primary speed sensor harness connector.



6. Remove the primary speed sensor and the spacer.



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)

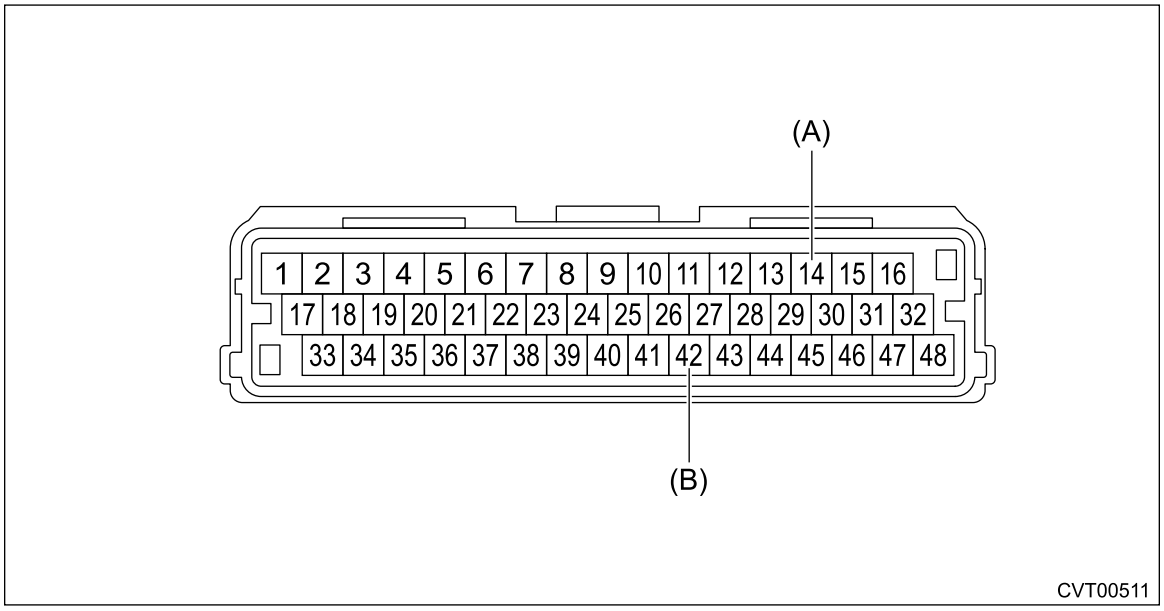
CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Primary Speed Sensor

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 (−)

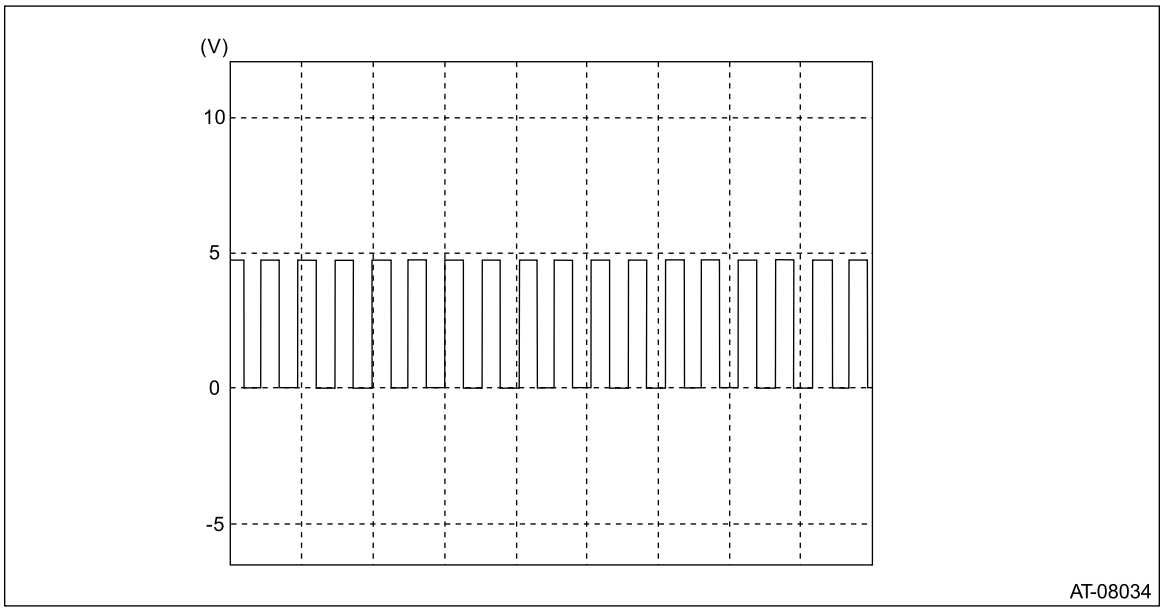


(A) + probe
(B) − probe

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.



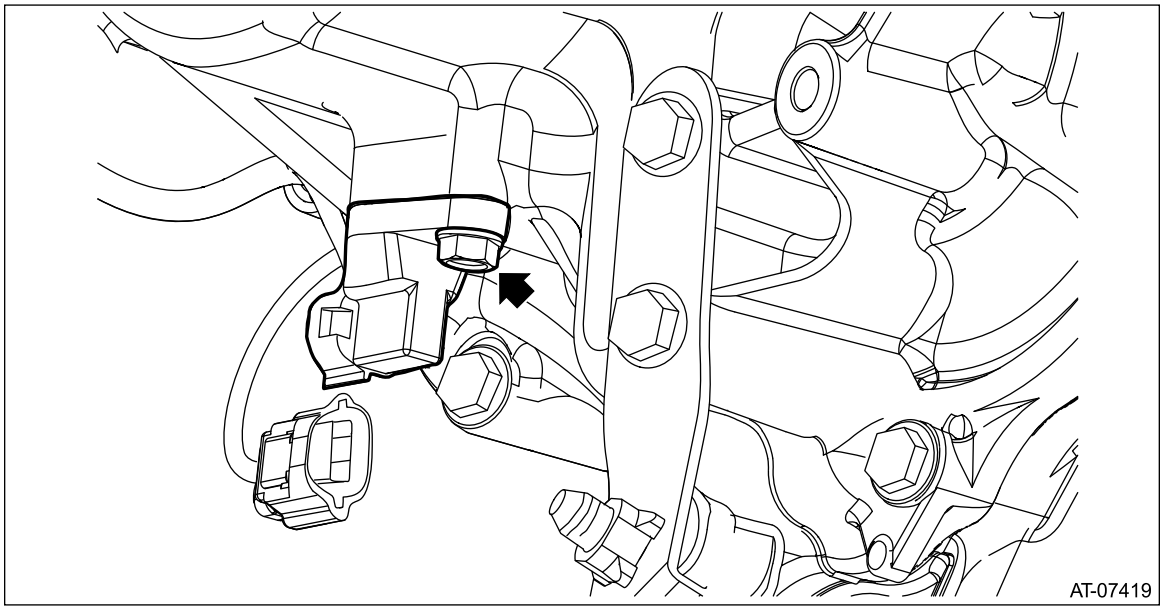
CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Front Wheel Speed Sensor

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 terminal from battery sensor. Ref. to NOTE>NOTE > 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) > Front Wheel Speed Sensor

INSTALLATION

Caution:

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

Install in the reverse order of removal.

Note:

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

Tightening torque:

5 N·m (0.5 kgf-m, 3.7 ft-lb)

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Front Wheel Speed Sensor

INSPECTION

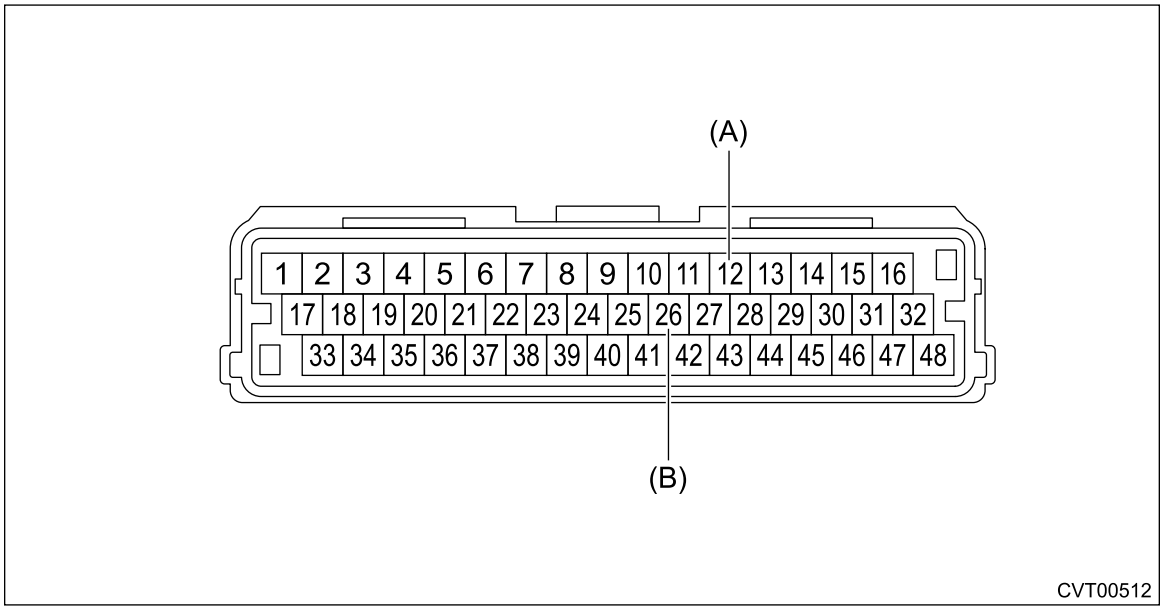
1. Remove the bulkhead harness connector from TCM. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transmission Control Module (TCM)>REMOVAL.
2. Set the ST between the TCM and bulkhead harness.

ST 18460AA040 CHECK BOARD

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

Terminals:

No. 12 (+) — No. 26 (−)



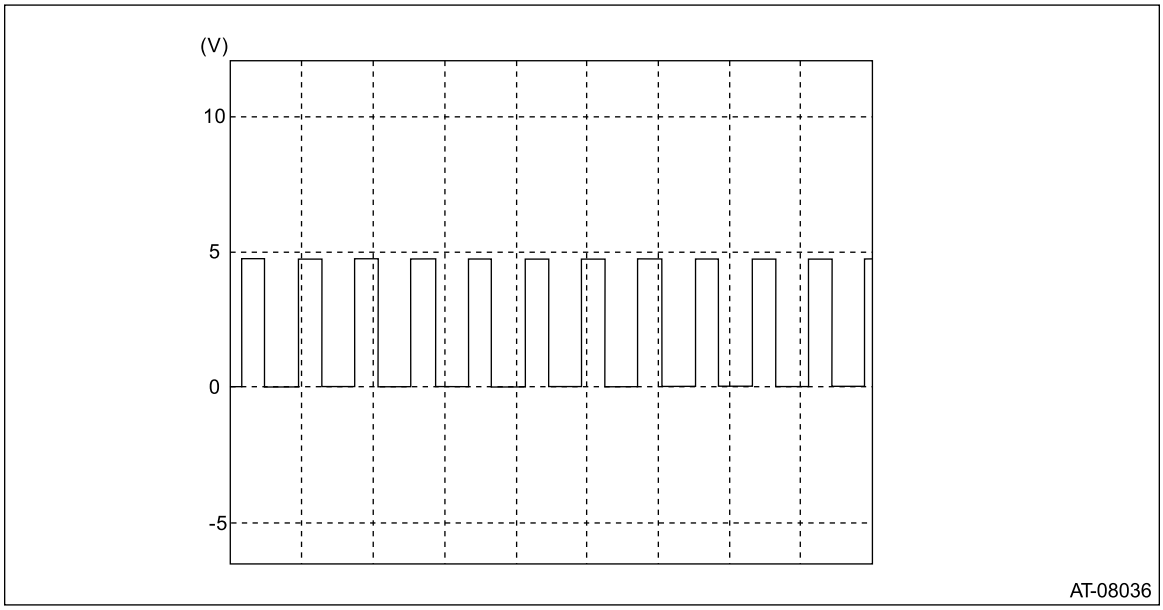
(A) + probe

(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:

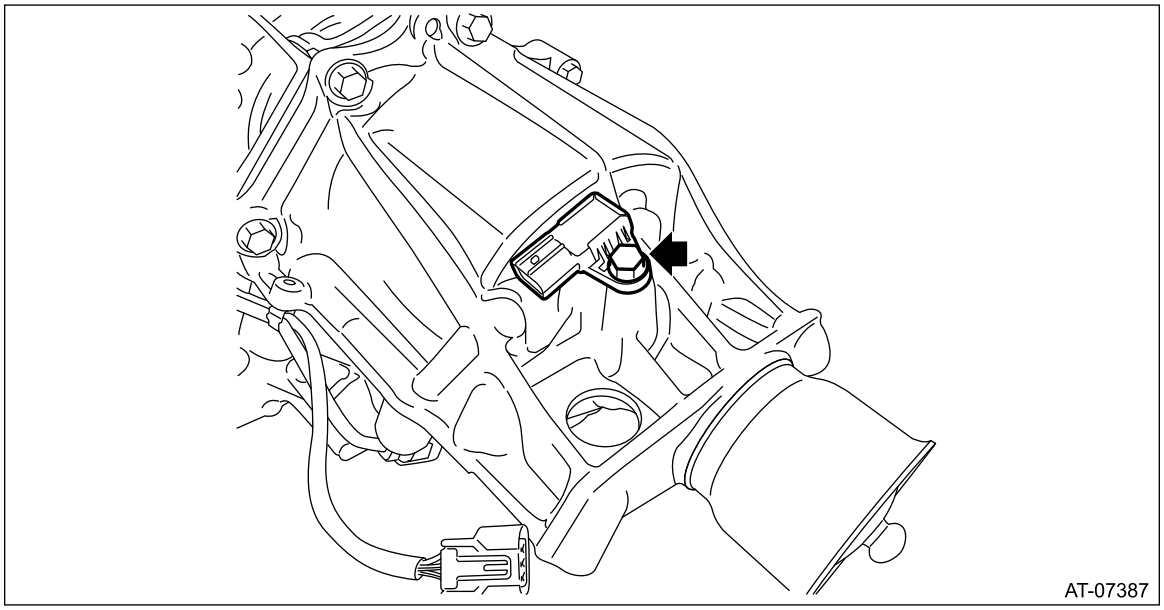
The waveform cycle changes as the speed changes.


(V)
10
5
0
-5
AT-08036

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Rear Wheel Speed Sensor

REMOVAL

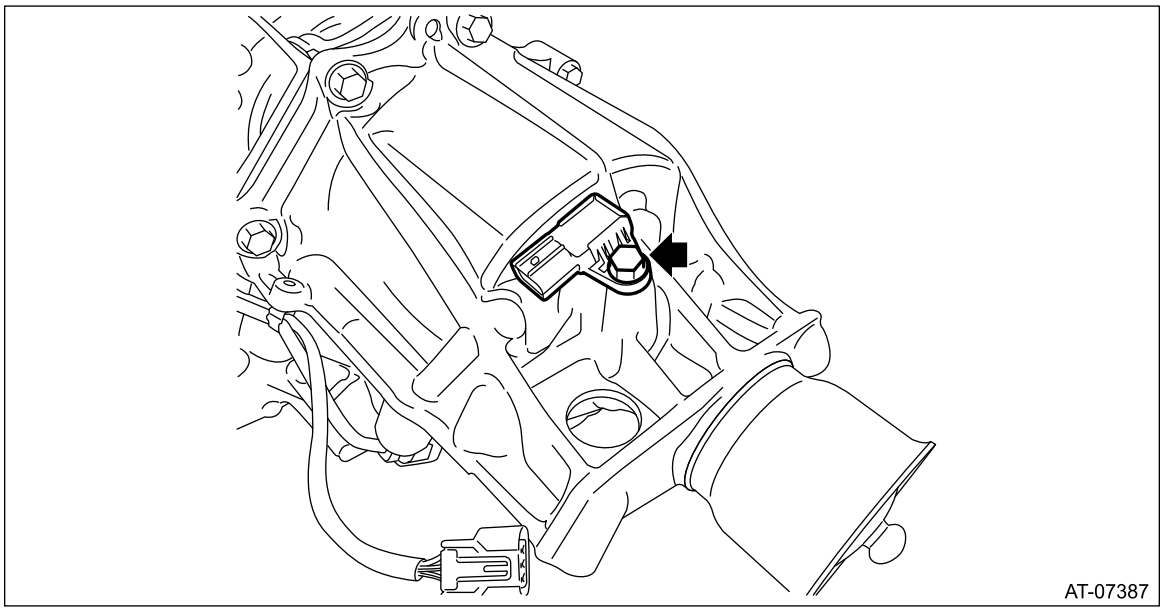
1. Disconnect the ground terminal from battery sensor. Ref. to NOTE>NOTE > BATTERY.
2. Lift up the vehicle.
3. Clean the transmission exterior.
4. Remove the bolts which connect the center exhaust pipe (rear) and rear exhaust pipe.
5. Remove the bolts holding the center exhaust cover, and move the center exhaust cover to the rear.
6. Disconnect the rear wheel speed sensor connector.
7. Remove the rear wheel speed sensor.



CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Rear Wheel Speed Sensor

INSTALLATION

1. Install the rear wheel speed sensor.
   Note:
   Use new O-rings.
   Tightening torque:
   5 N·m (0.5 kgf-m, 3.7 ft-lb)



2. Connect the rear wheel speed sensor connector.
3. Install the center exhaust cover.
   Tightening torque:
   18 N·m (1.8 kgf-m, 13.3 ft-lb)
4. Tighten the bolts which connect the center exhaust pipe (rear) and rear exhaust pipe.
   Note:
   Use a new gasket.
   Tightening torque:
   18 N·m (1.8 kgf-m, 13.3 ft-lb)
5. Lower the vehicle.
6. Connect the ground terminal to battery sensor. Ref. to NOTE>NOTE > BATTERY.

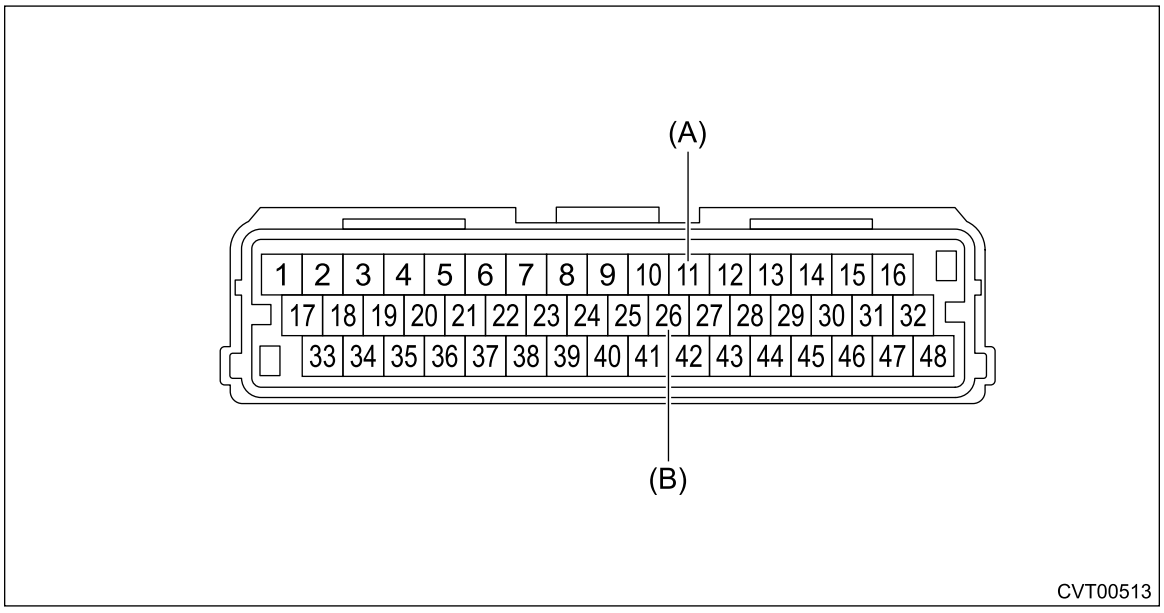
CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Rear Wheel Speed Sensor

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:
   No. 11 (+) — No. 26 (−)



(A) + probe

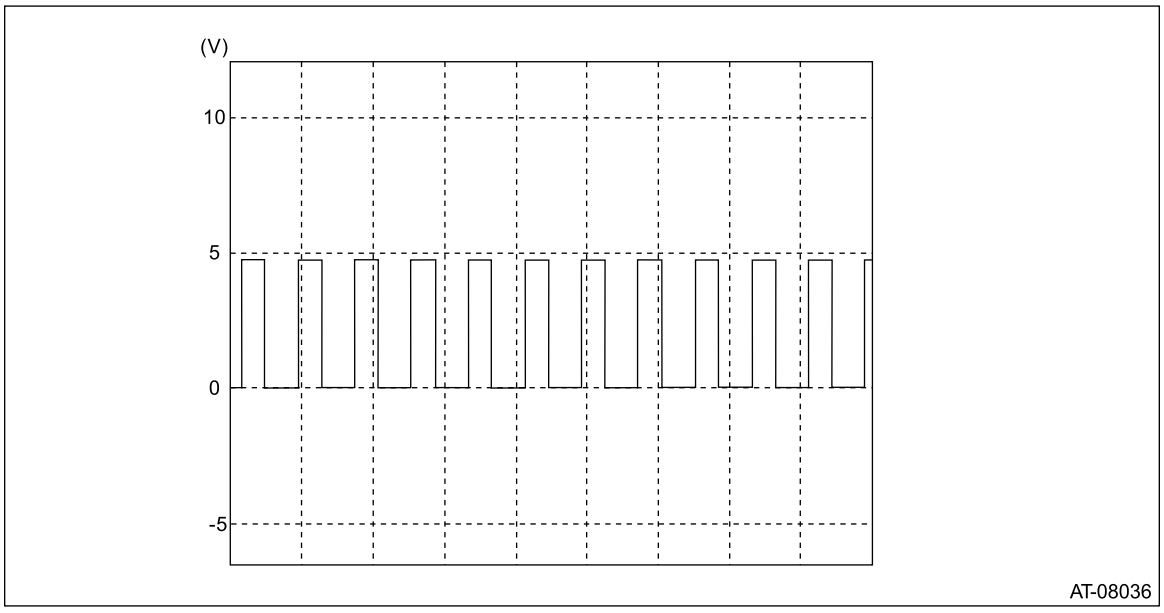
(B) – probe

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

5. Check the waveform of rear 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) > Secondary Pressure Sensor

REMOVAL

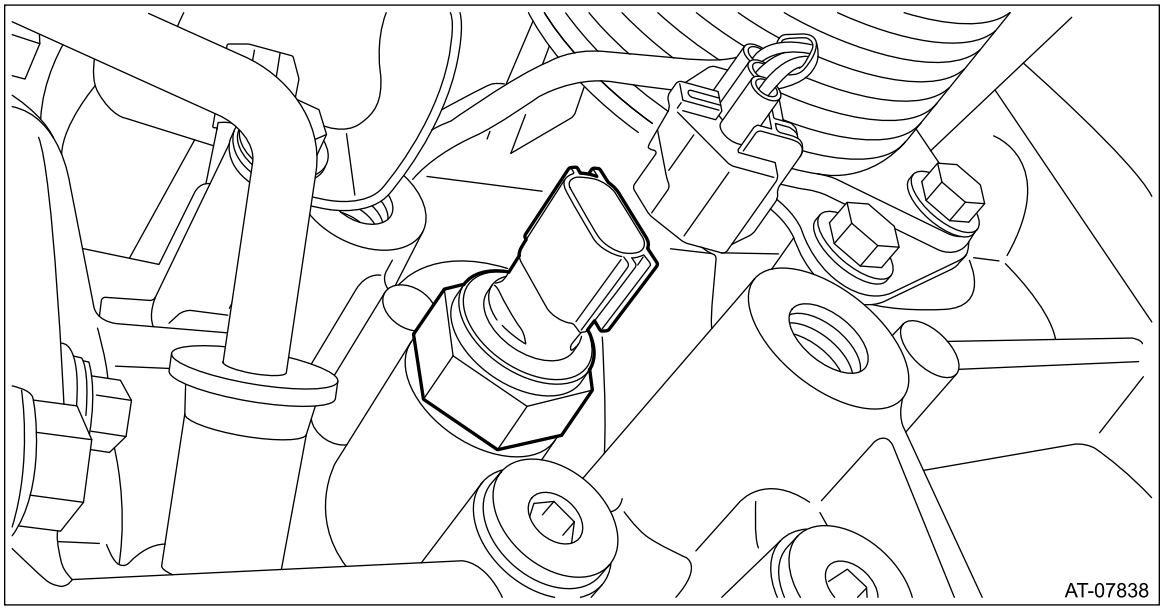
Caution:

- **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 terminal from battery sensor. Ref. to NOTE>NOTE > 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 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)

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 CONTINUOUSLY VARIABLE TRANSMISSION (DIAGNOSTICS)>Subaru Select Monitor>OPERATION.
   Specification:
   Approx. 0.8 V
5. Check “secondary pressure sensor voltage” by using Subaru Select Monitor while the engine is stopped and the ignition switch is turned on. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION (DIAGNOSTICS)>Subaru Select Monitor>OPERATION.
   Specification:
   Approx. 0.5 V

REMOVAL

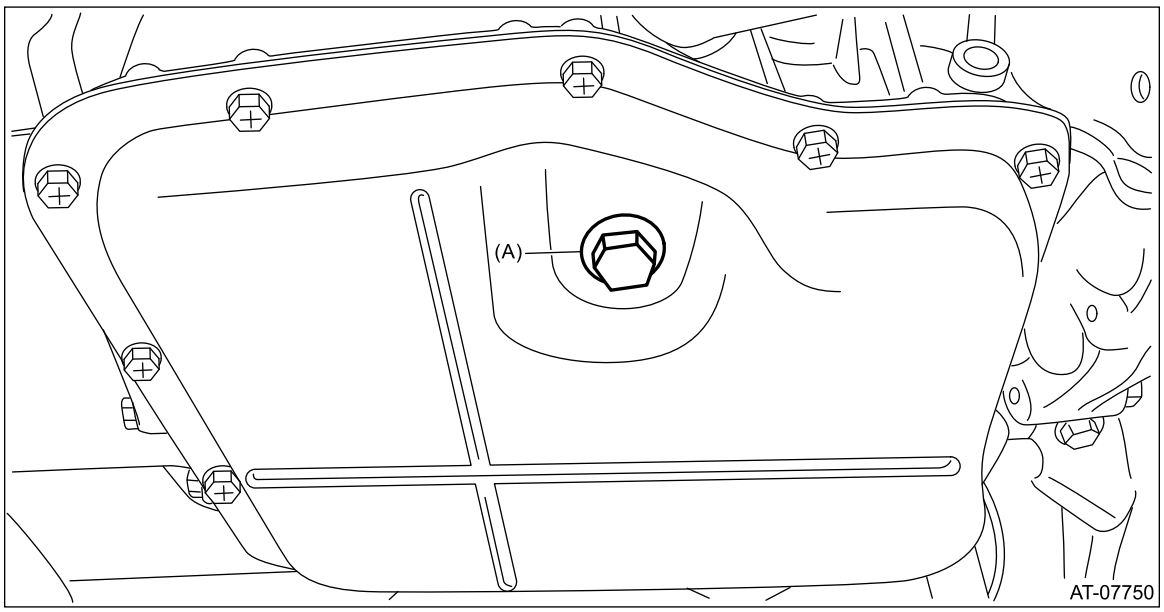
Caution:

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

Note:

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

1. Disconnect the ground terminal from battery sensor. Ref. to NOTE>NOTE > 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:

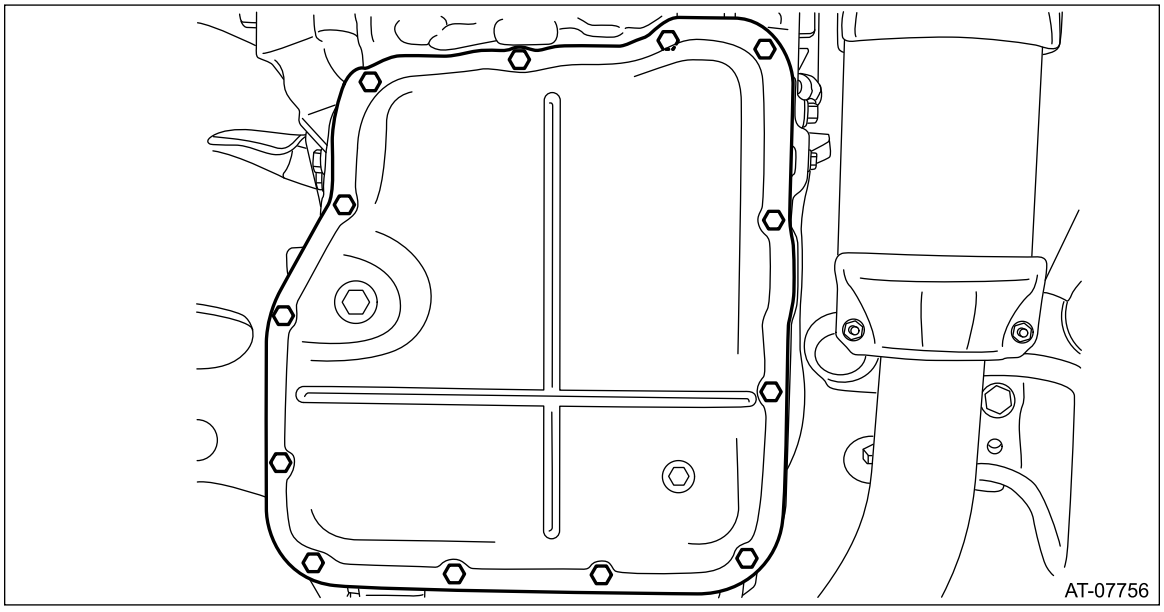
   Use a new gasket.

   Tightening torque:

   39.2 N·m (4.0 kgf-m, 28.9 ft-lb)
6. Remove the oil pan.

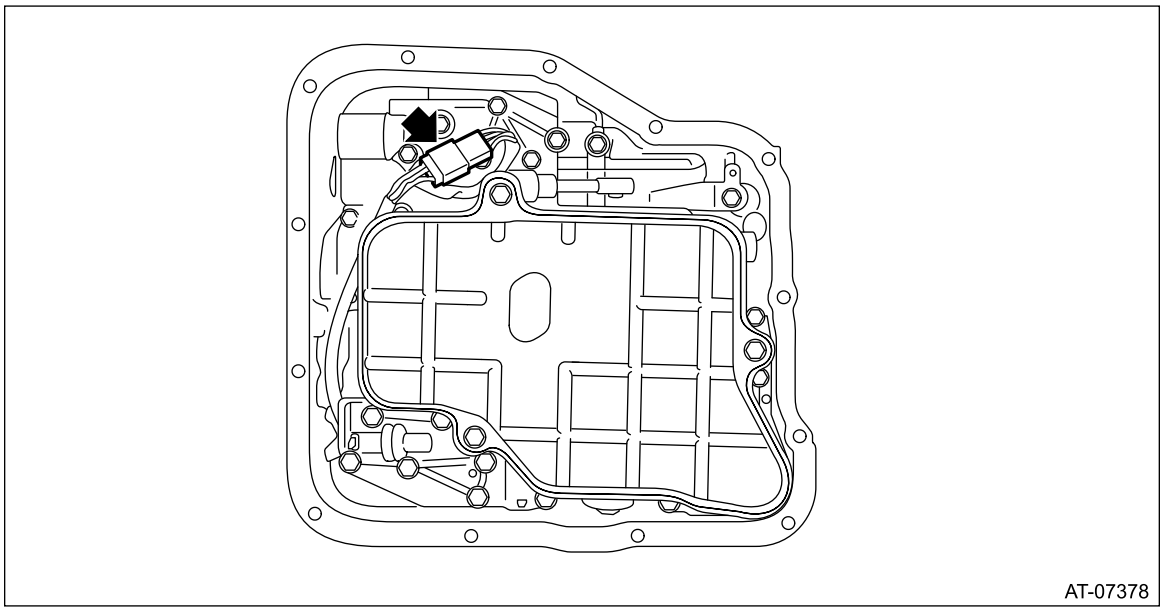
   Caution:

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

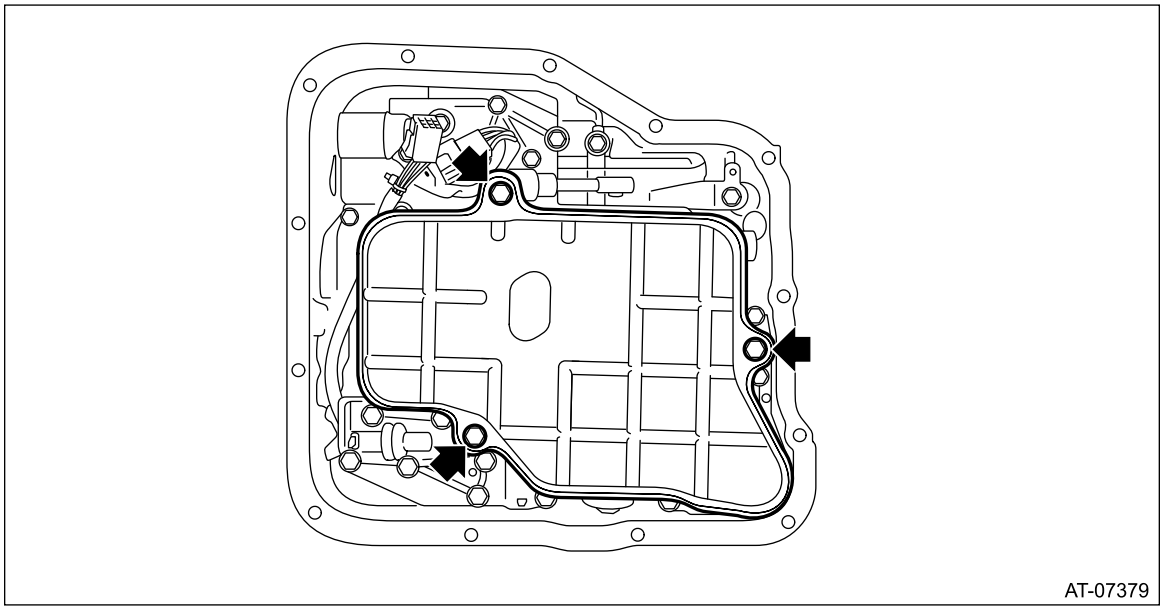


7. Remove the magnet.

8. Disconnect the control valve harness connector.



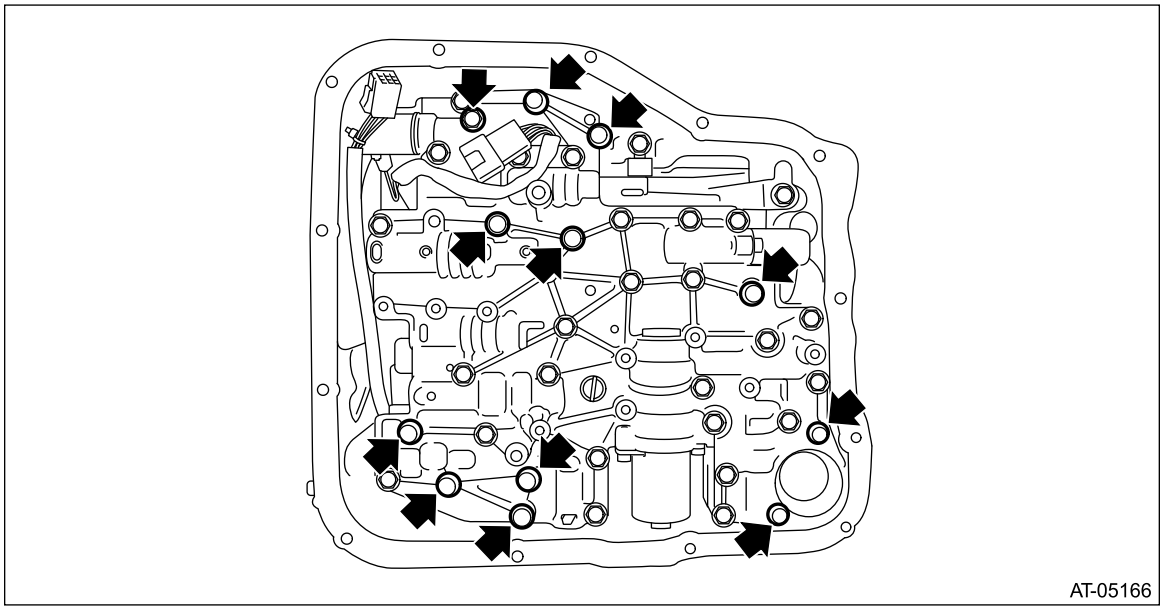
9. Remove the oil strainer.



10. Remove the control valve body.

Caution:

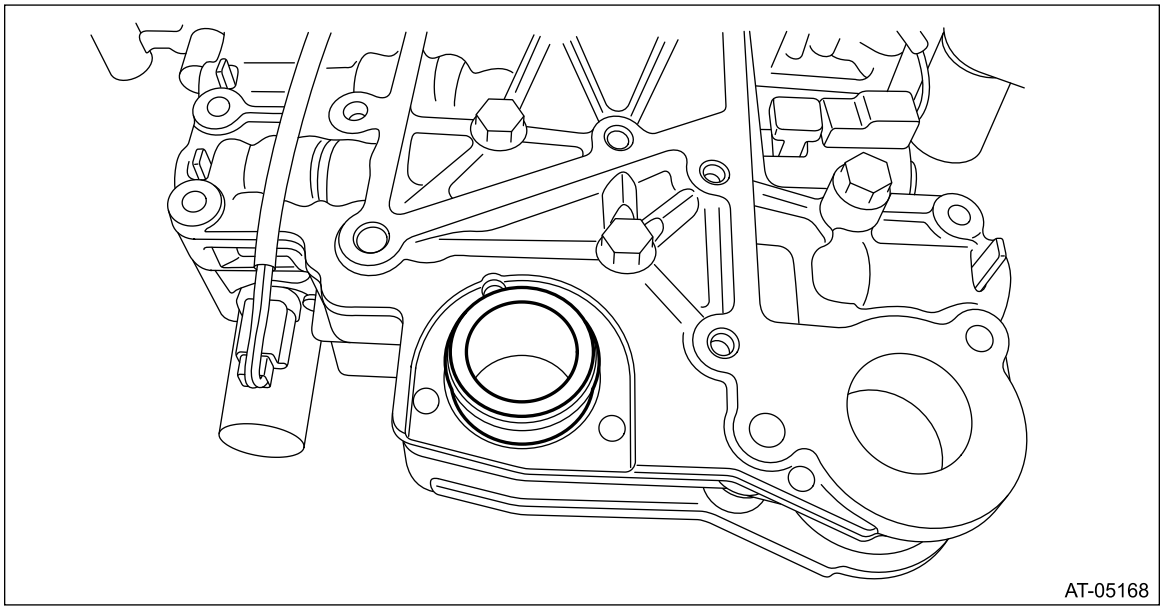
Do not let the manual valve drop off.



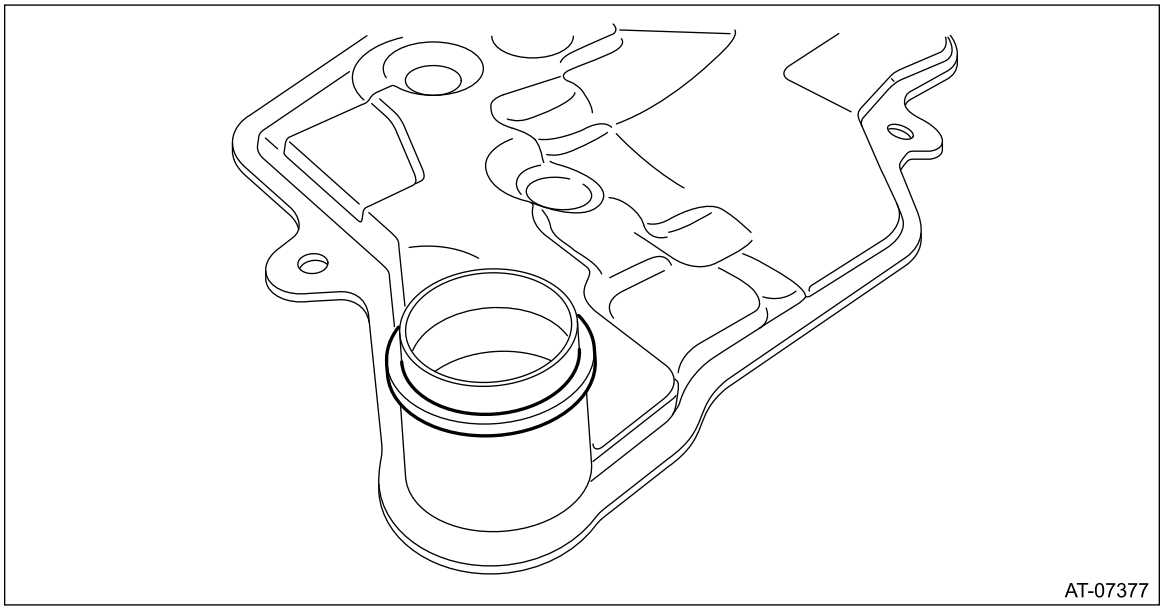
11. Remove the pressure pipe.

Note:

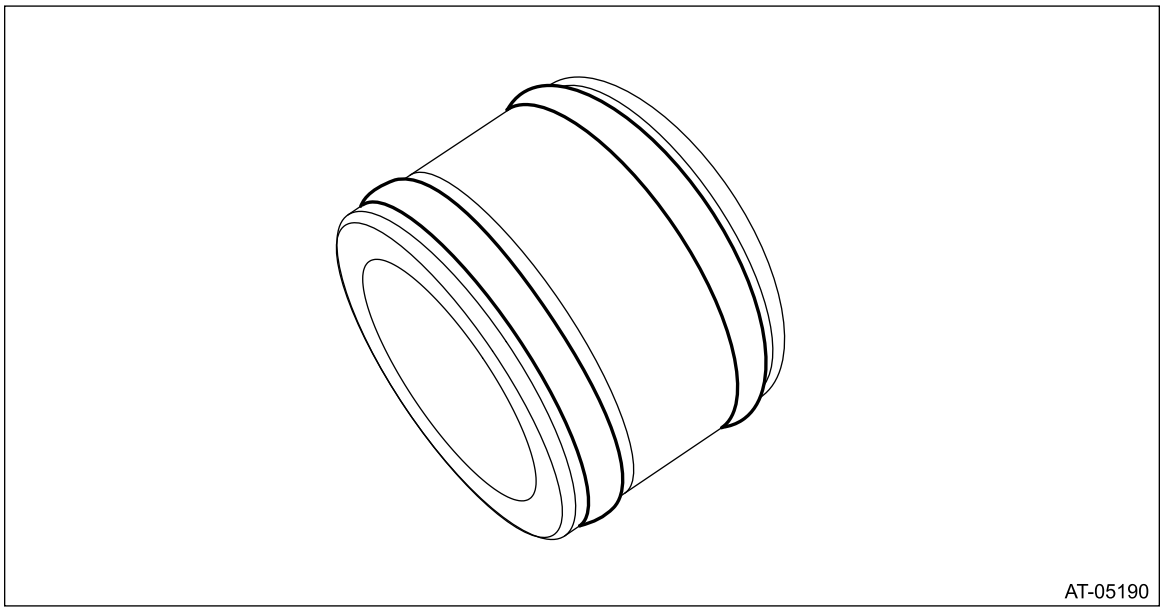
It may be located in transmission case side.



12. Remove the O-ring from oil strainer.



13. Remove the O-ring from pressure pipe.

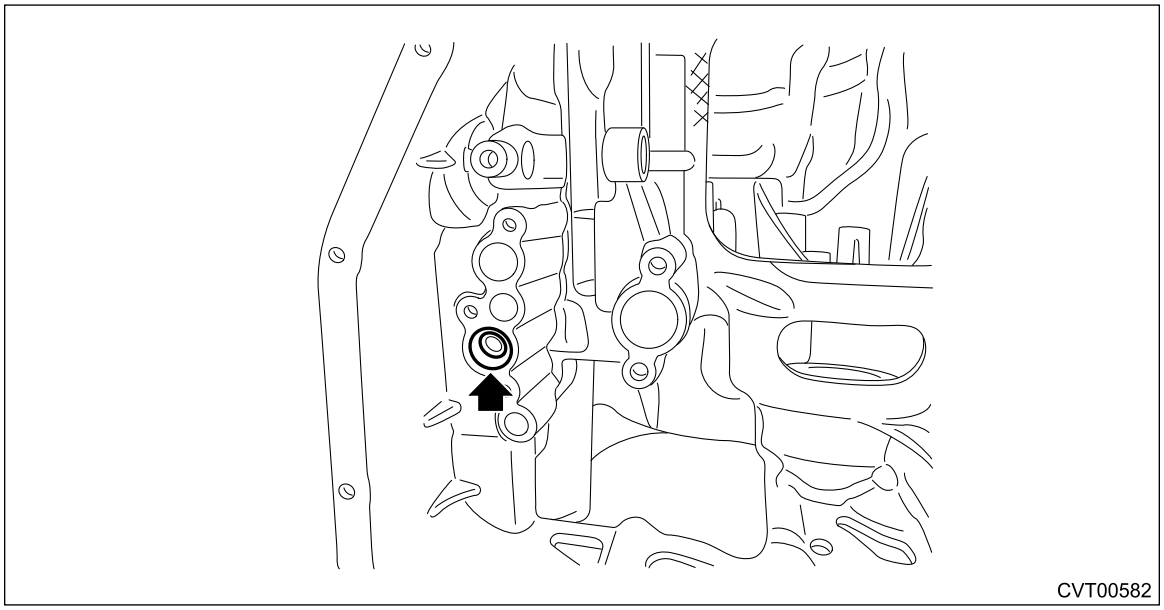


INSTALLATION

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:

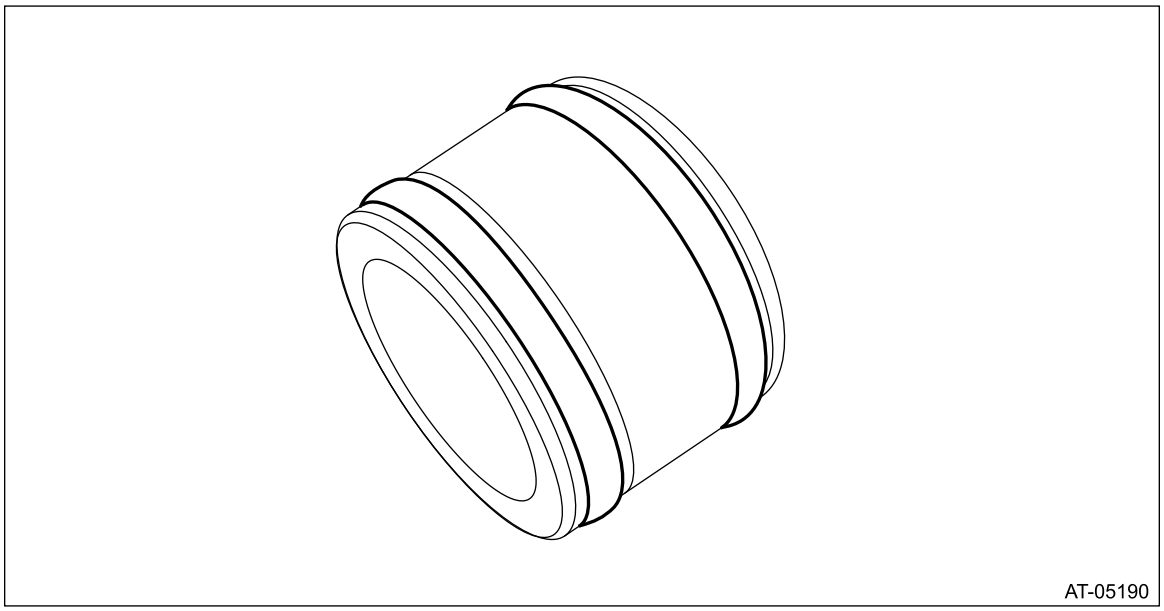
   Make sure that the CVTF filter does not protrude from the transmission case.



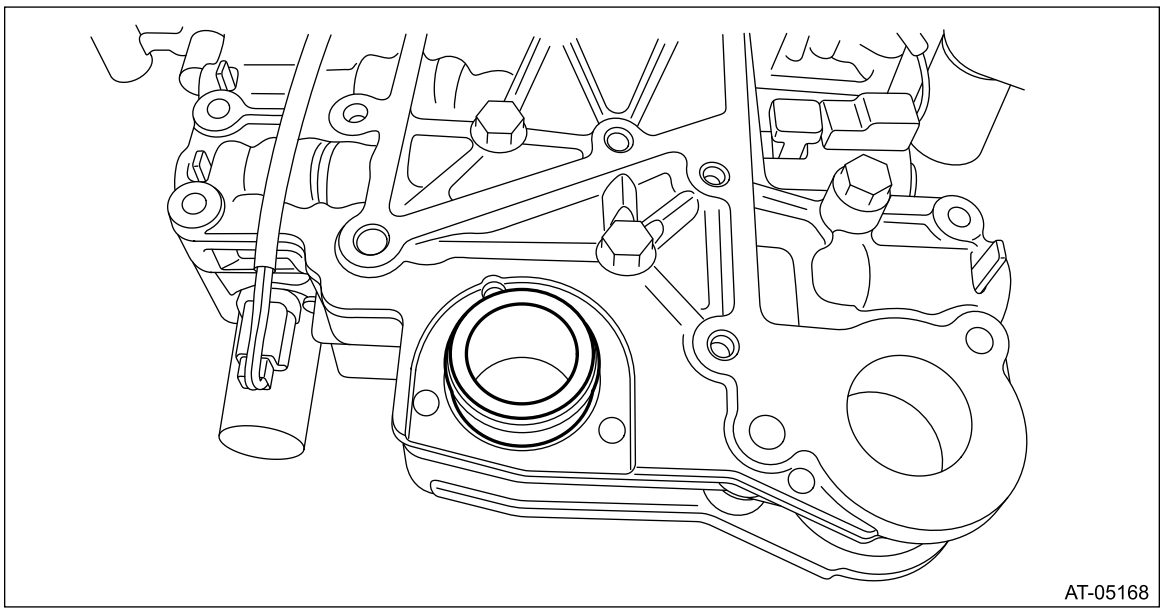
3. Check the control valve body for dust and other foreign matter.
4. Install the O-ring to the pressure pipe.

   Note:

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



5. Install the pressure pipe.



6. Install the control valve body.

Caution:

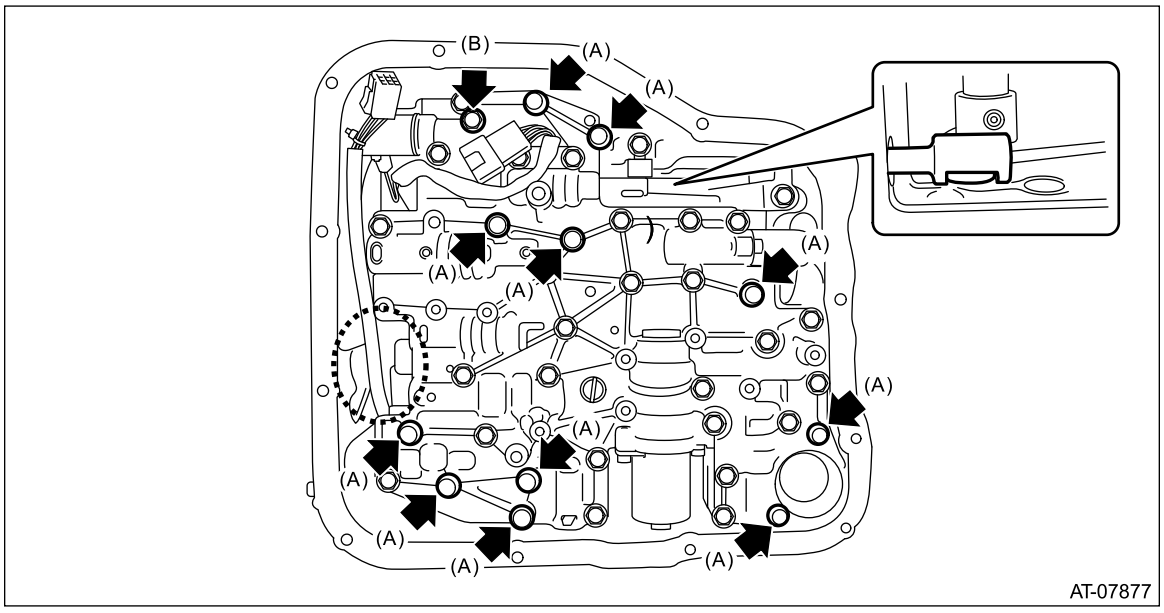
- **Beware of the transmission harness getting caught in between.**
- **Do not impact or bend the transmission harness because it has the oil temperature sensor inside.**

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)

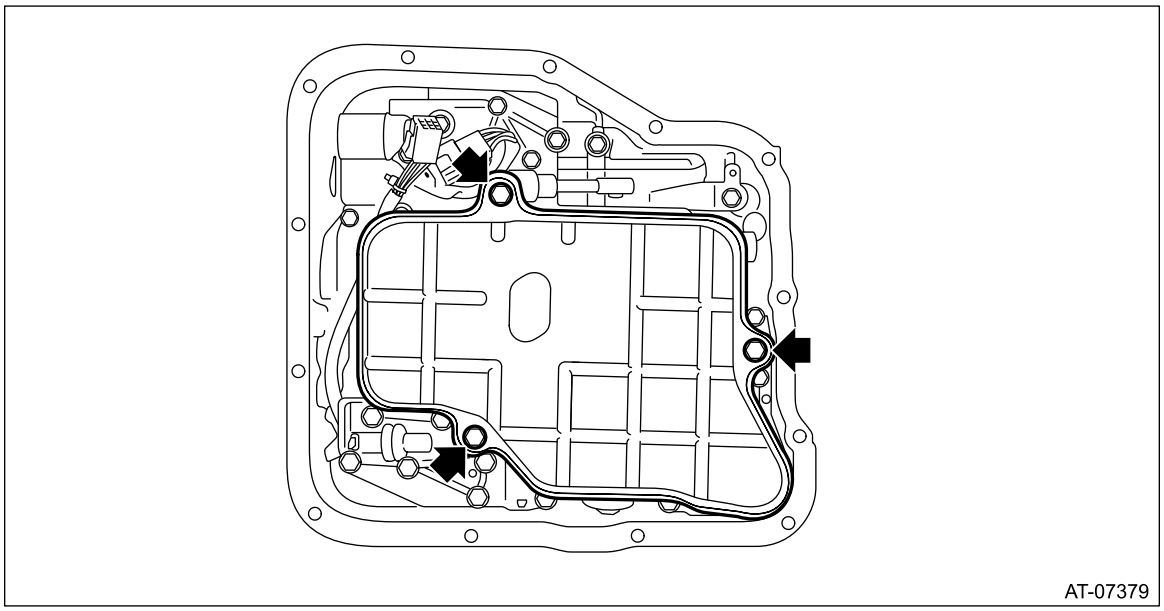
7. Install the O-ring to oil strainer and install the oil strainer.

Note:

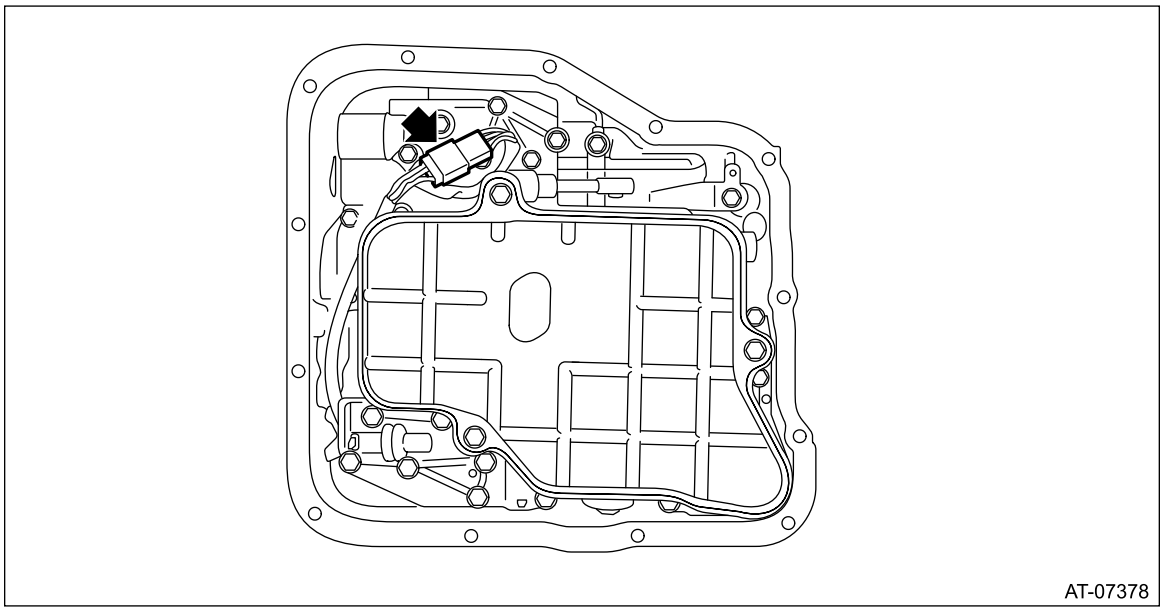
- **Use new O-rings.**
- **Apply CVTF to the O-rings.**
- **Let the transmission harness run between control valve body and oil strainer.**

Tightening torque:

9 N·m (0.9 kgf-m, 6.6 ft-lb)

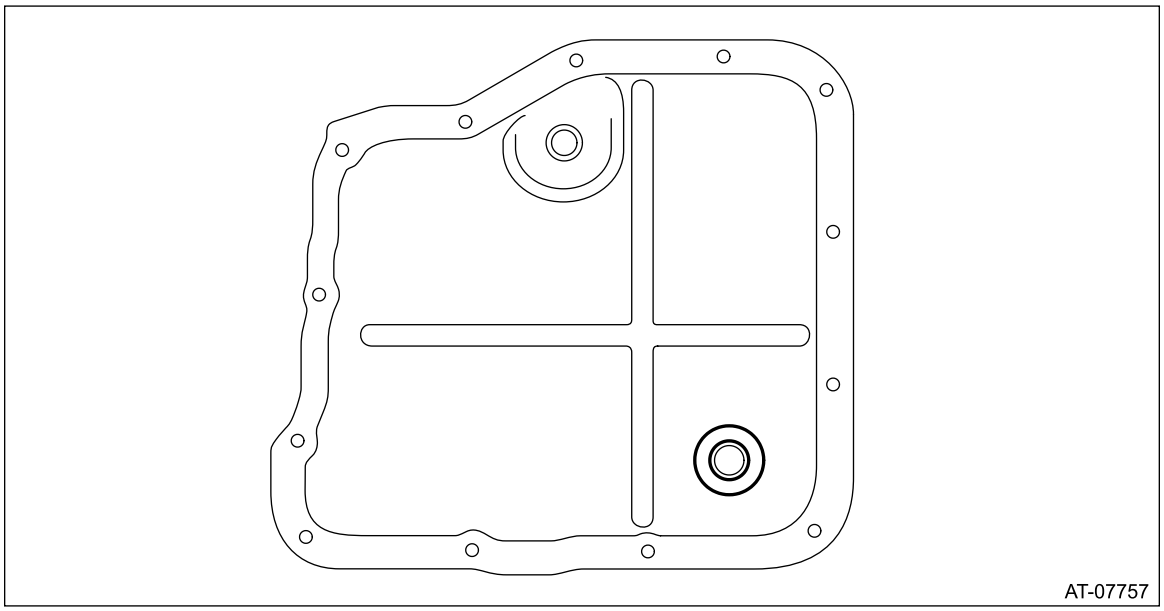


8. Connect the control valve harness connector.



9. Clean the magnet.

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



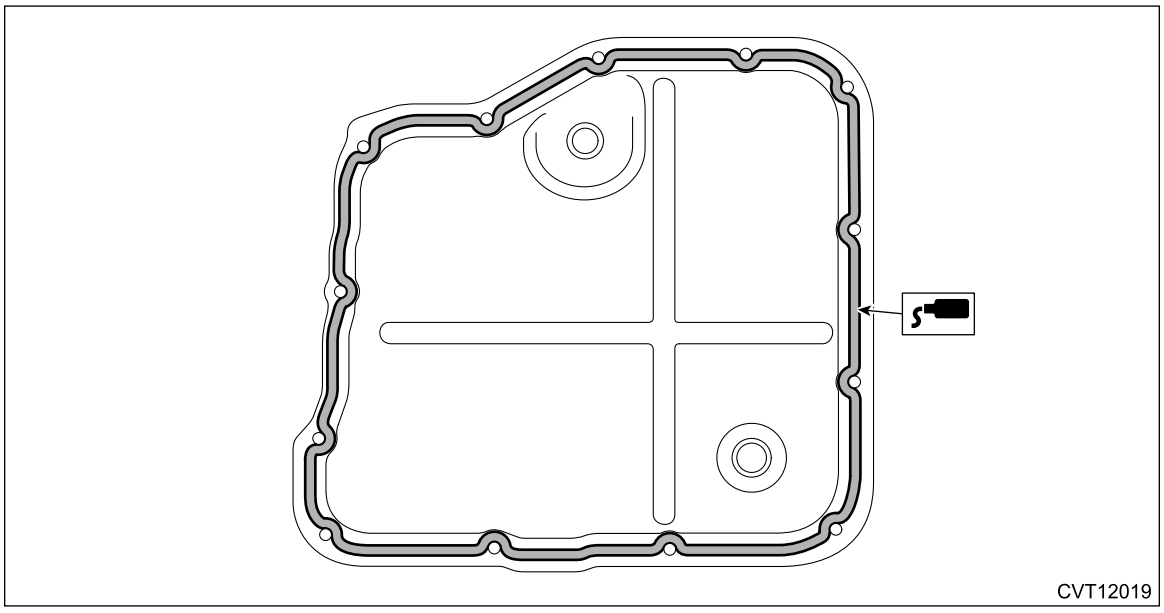
11. Apply liquid gasket to the mating surface of the oil pan as shown in the figure, and temporarily install the oil pan.

Note:

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

Liquid gasket:

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



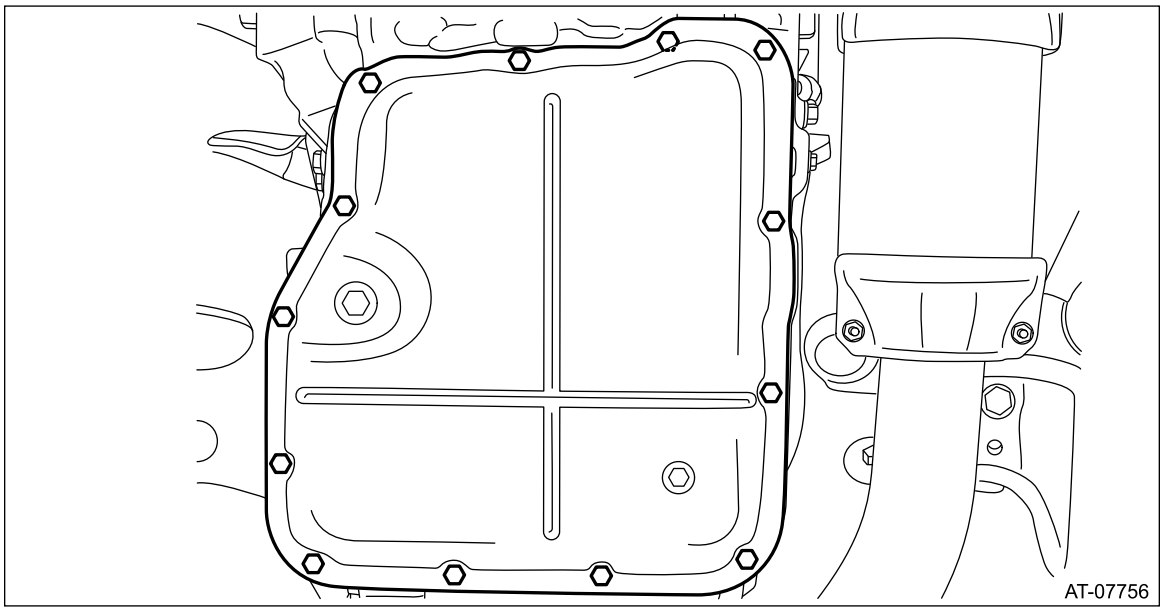
12. Install the oil pan by equally tightening the bolts.

Caution:

Beware of the transmission harness getting caught in between.

Tightening torque:

5 N·m (0.5 kgf-m, 3.7 ft-lb)



13. Connect the ground terminal to battery sensor. Ref. to NOTE>NOTE > BATTERY.

14. Refill CVTF to adjust the CVTF amount. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>CVTF>ADJUSTMENT.

15. Perform the operation of AT learning mode. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION (DIAGNOSTICS)>Learning Control.

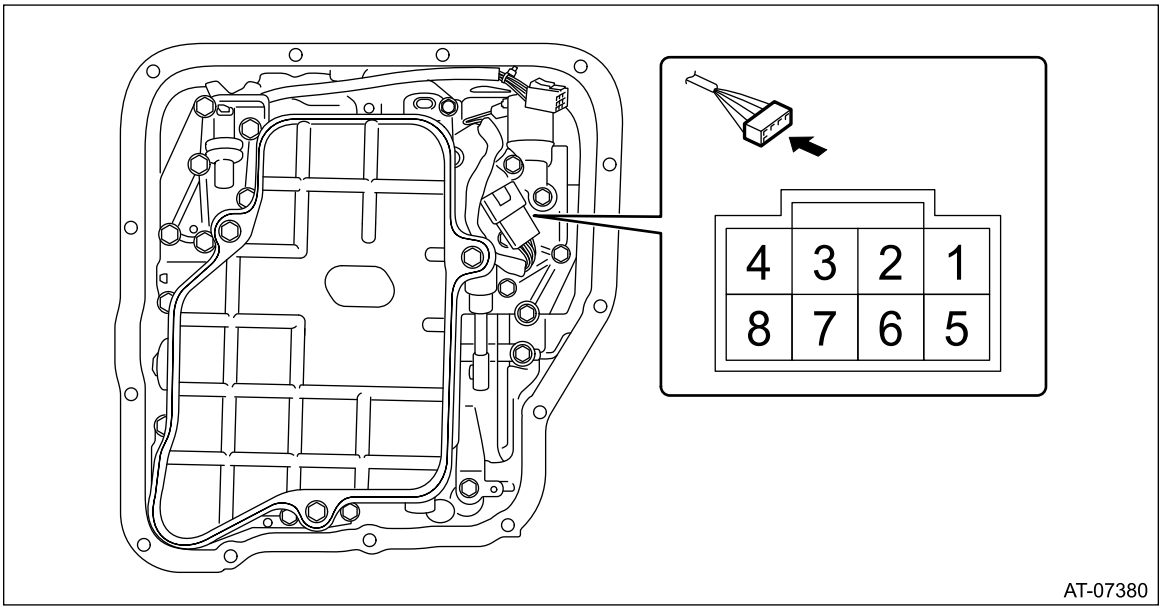
CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Control Valve Body

INSPECTION

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

  Note:

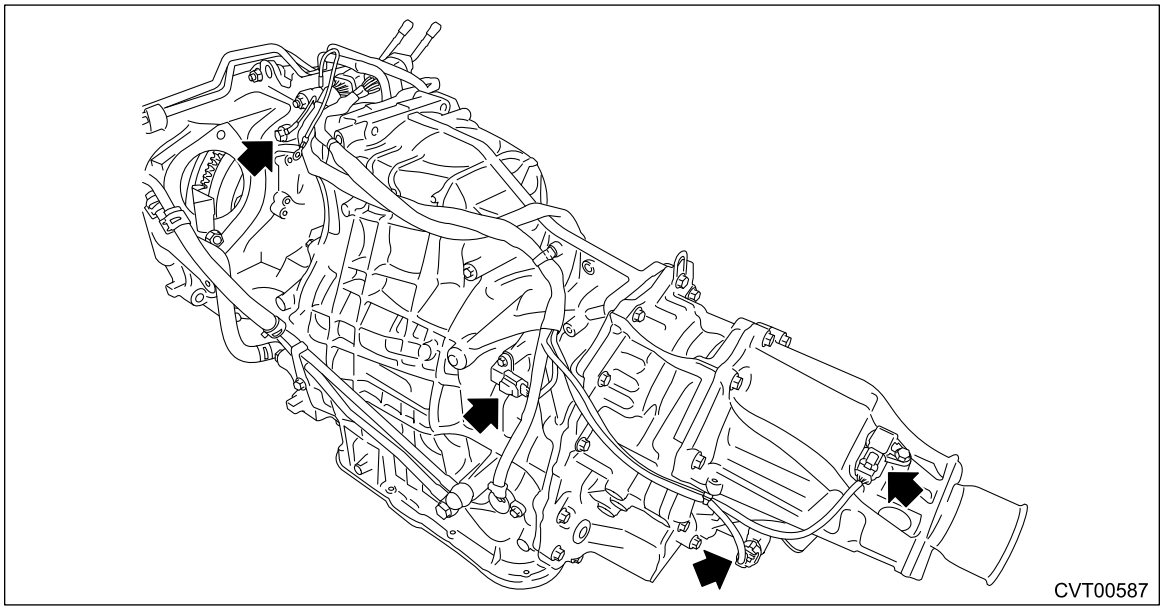
  Measurement should be performed at a temperature of 20°C (68°F).



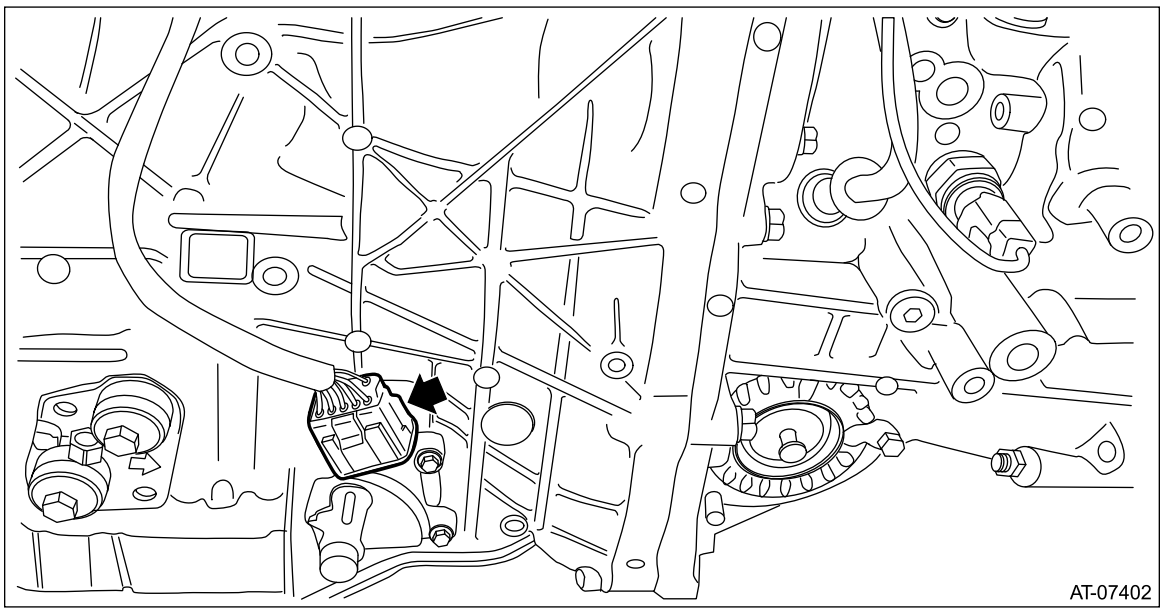
Solenoid	Terminal No.	Standard (Ω)
Secondary solenoid	No. 1 — control valve body	Approx. 6.6 Ω
Lock-up duty solenoid	No. 2 — control valve body	Approx. 12 Ω
F&R solenoid	No. 3 — control valve body	Approx. 5.3 Ω
Lock-up ON/OFF solenoid	No. 5 — control valve body	Approx. 16 Ω
Primary DOWN solenoid	No.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

REMOVAL

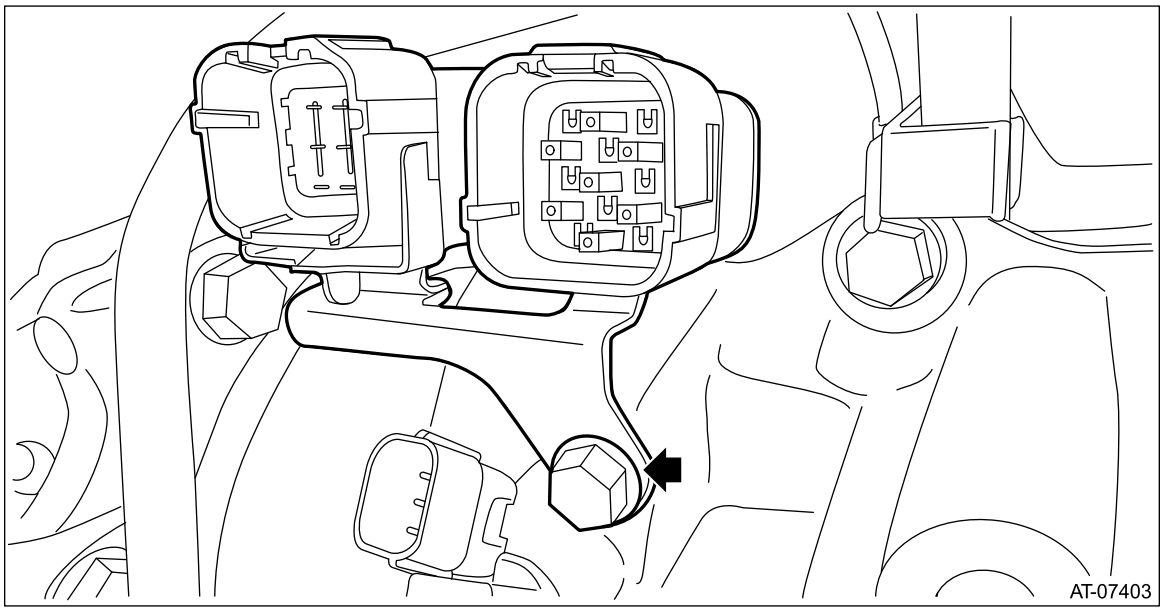
1. Remove the transmission from the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Automatic Transmission Assembly>REMOVAL.
2. Prepare for overhaul. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Preparation for Overhaul.
3. Remove the transmission harness ground terminal and remove the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



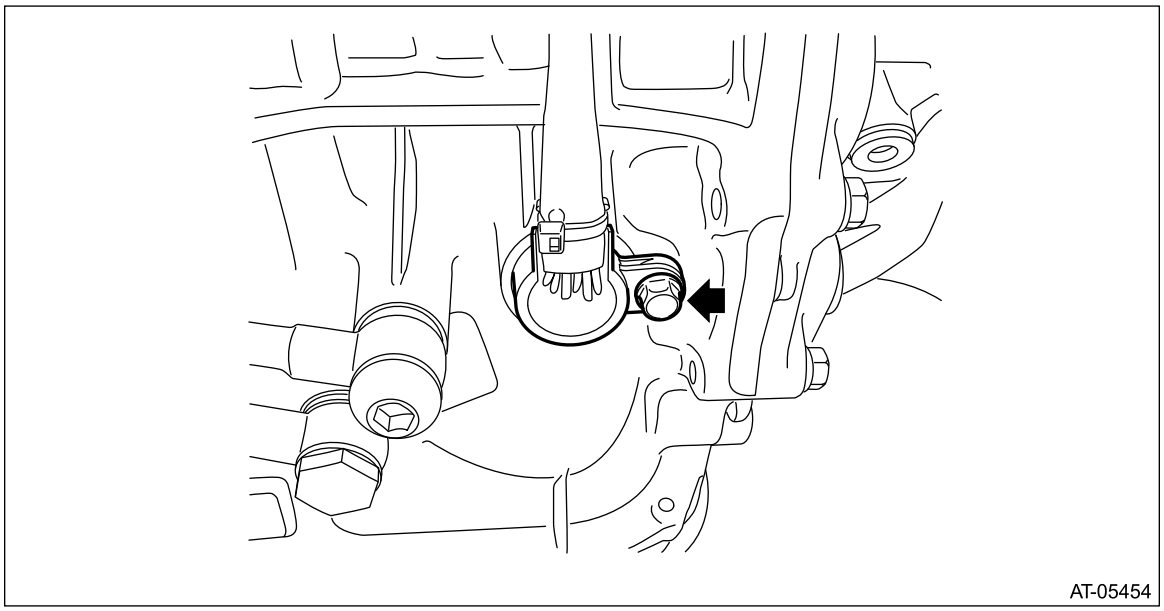
4. Remove the harness connectors from inhibitor switch, primary speed sensor and secondary pressure sensor.



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 Harness

INSTALLATION

Install in the reverse order of removal.

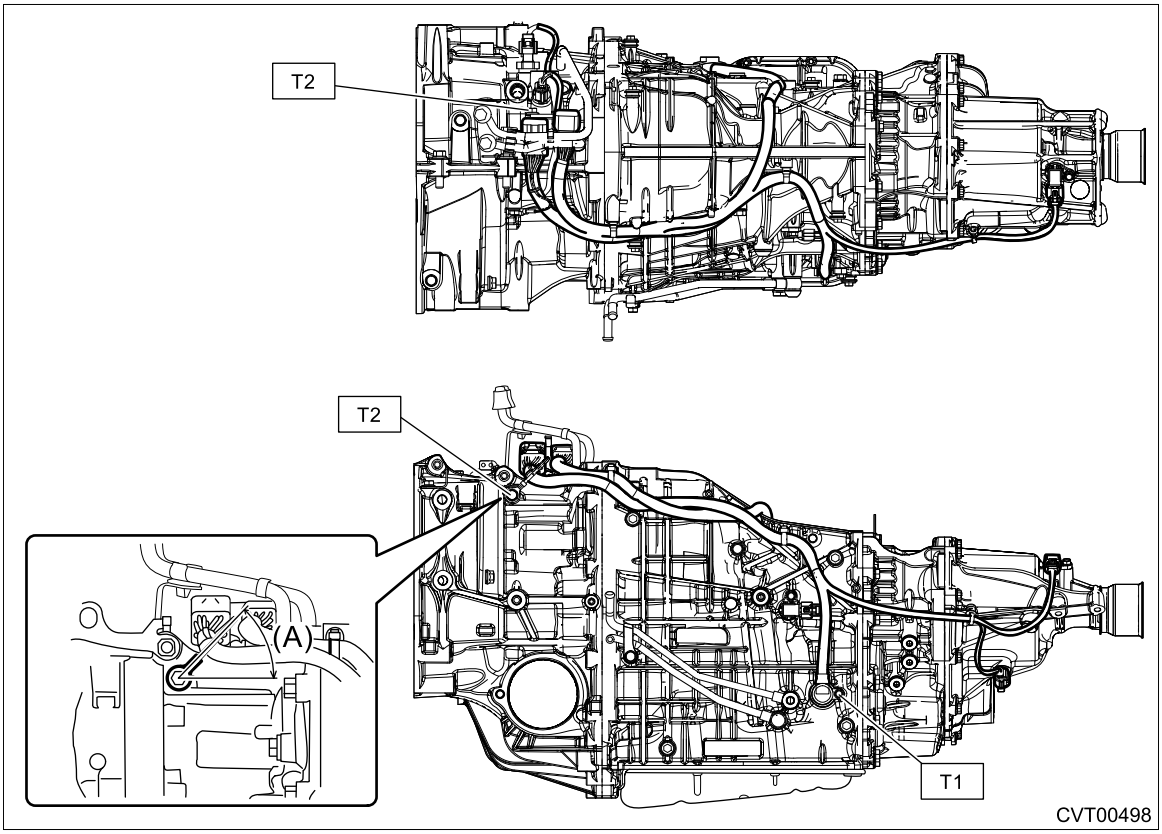
Note:

- **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

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

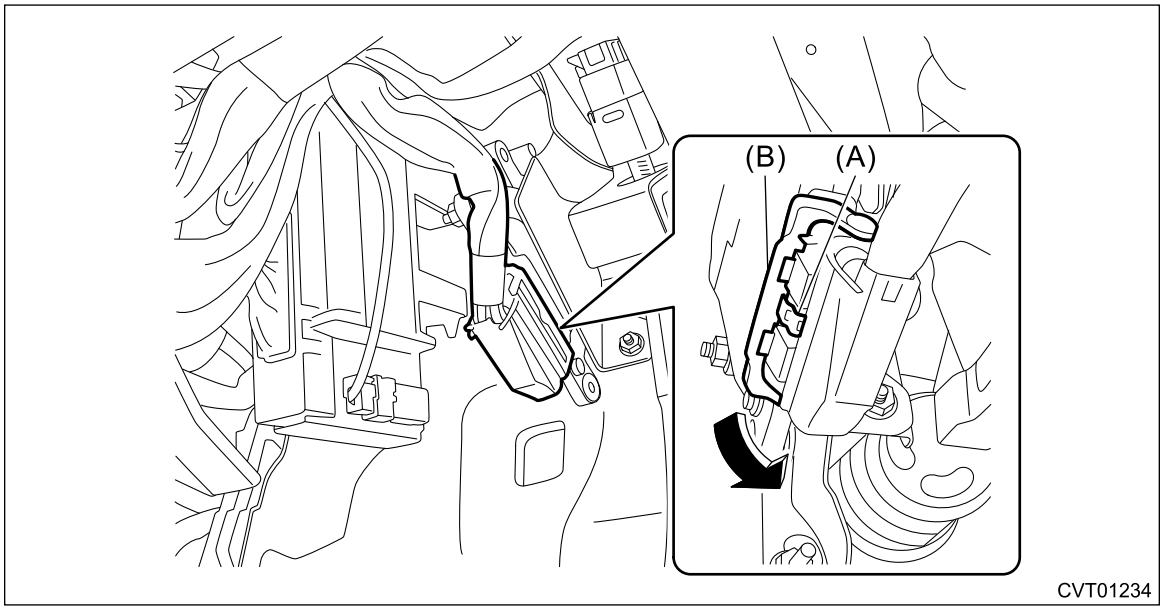
   Less than 1 Ω

   Oil temperature sensor standard

   Approx. 2.6 kΩ (at 20°C)

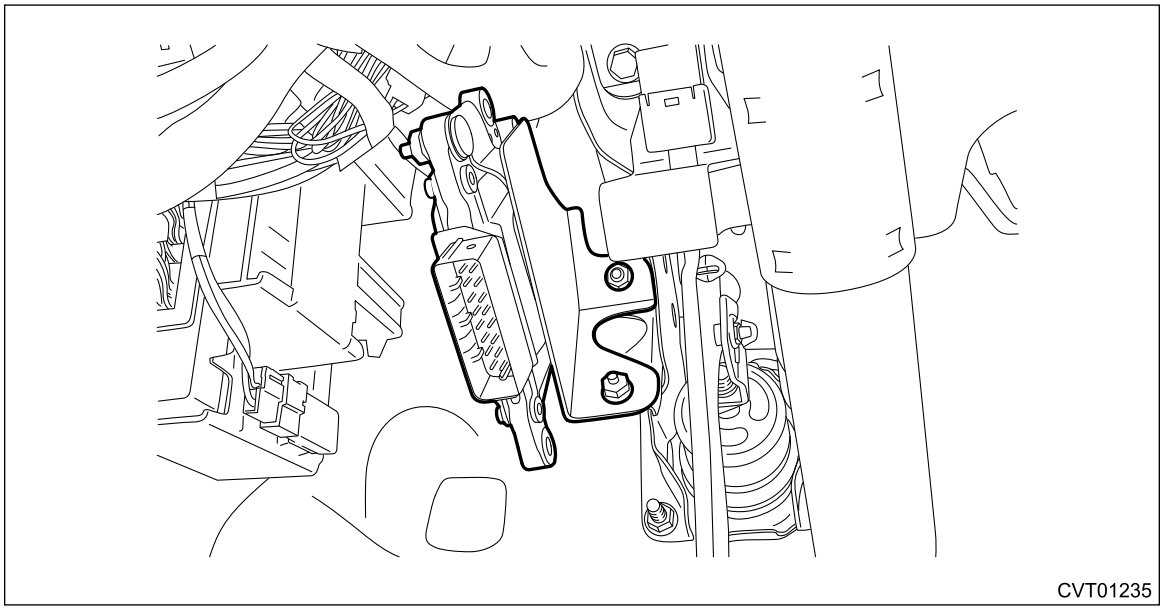
REMOVAL

1. Disconnect the ground terminal from battery sensor. Ref. to NOTE>NOTE > BATTERY.
2. Move the lock lever in the arrow direction while pressing the lock button, and disconnect the connector.

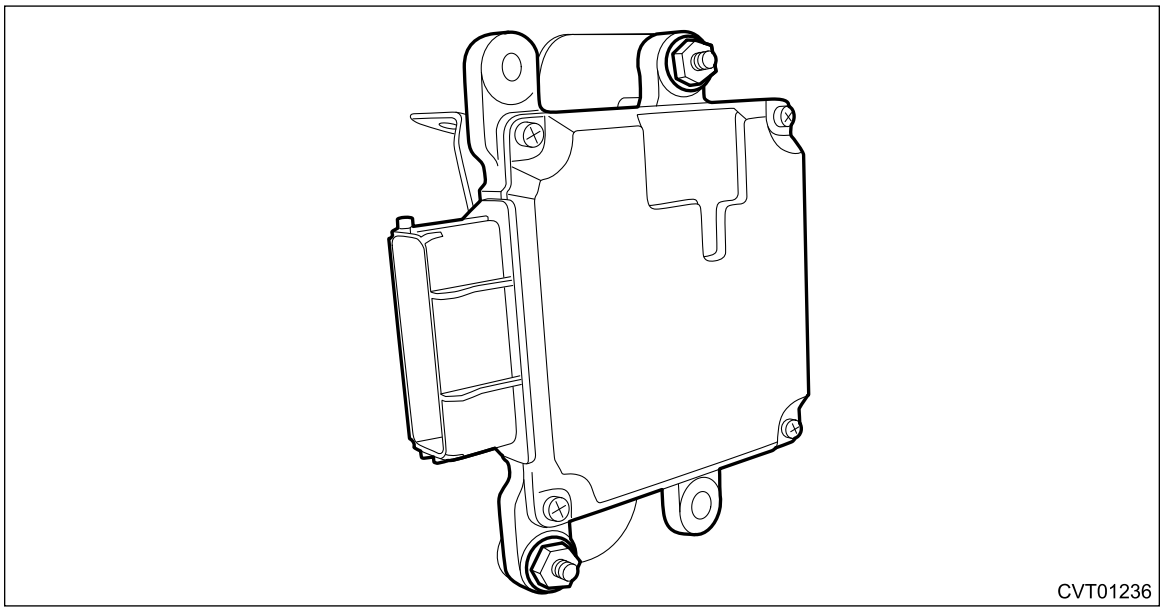


(A) Lock button
(B) Lock lever

3. Remove the TCM.

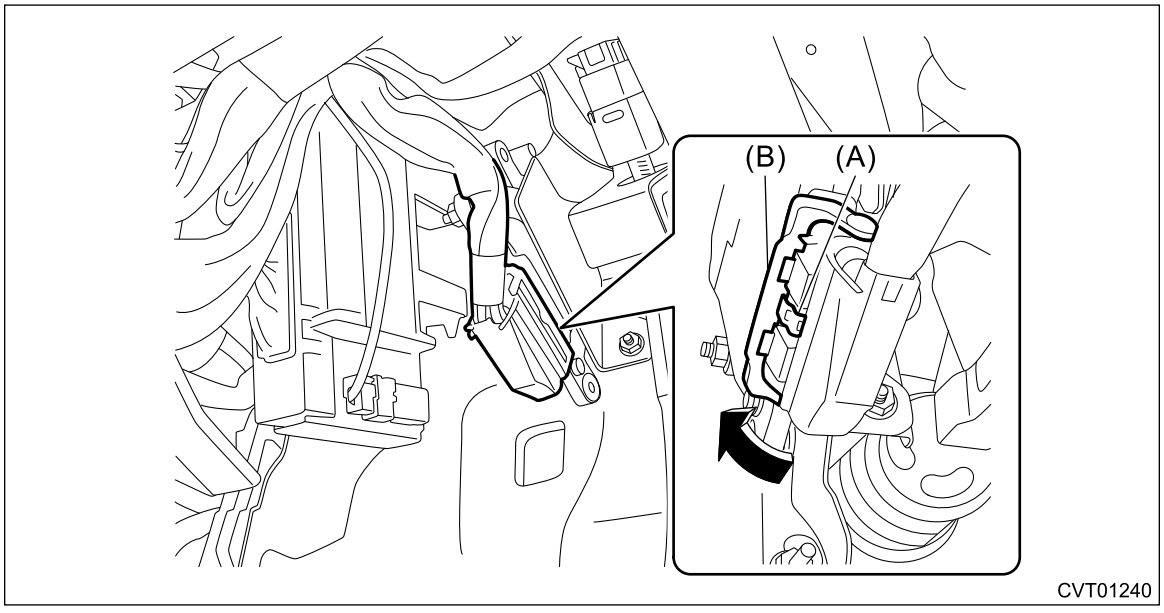


4. Remove the TCM from the bracket.



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

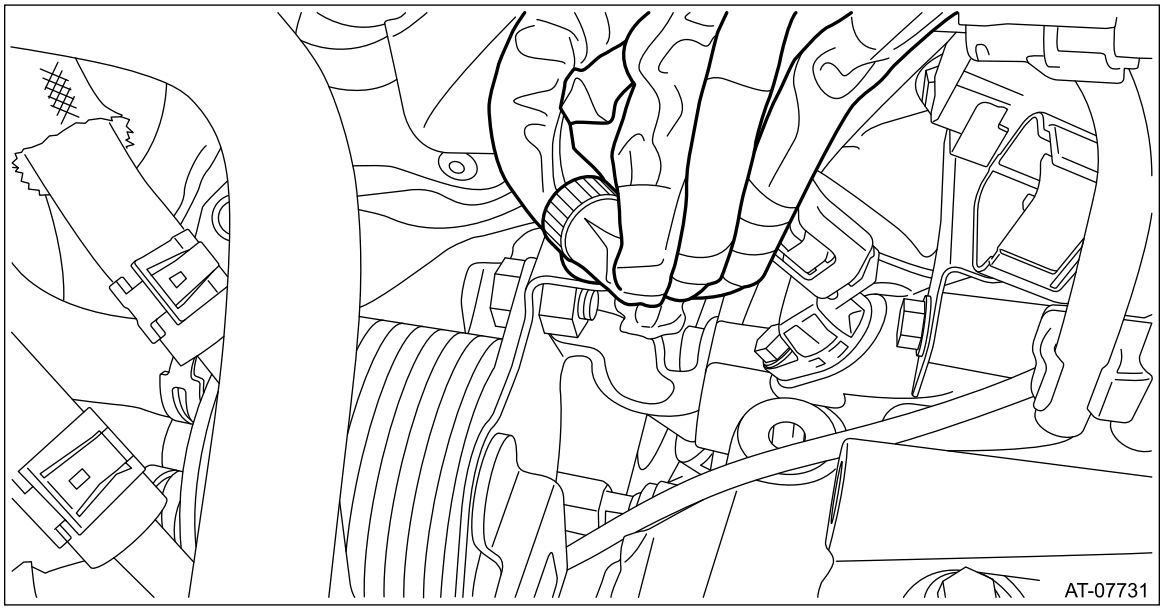
(B) Lock lever

4. Connect the ground terminal to battery sensor. Ref. to NOTE>NOTE > BATTERY.
5. Using the Subaru Select Monitor, perform «Clear AT learning value» in «Work Support», and perform «AT learning mode». Ref. to CONTINUOUSLY VARIABLE TRANSMISSION (DIAGNOSTICS)>Learning Control>PROCEDURE.

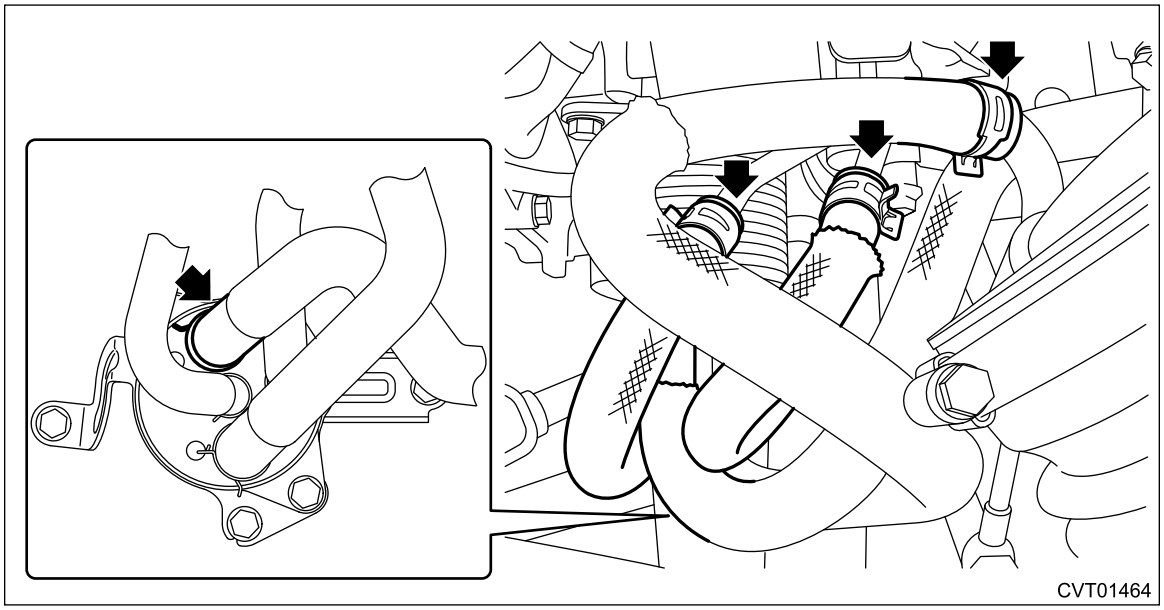
REMOVAL

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.

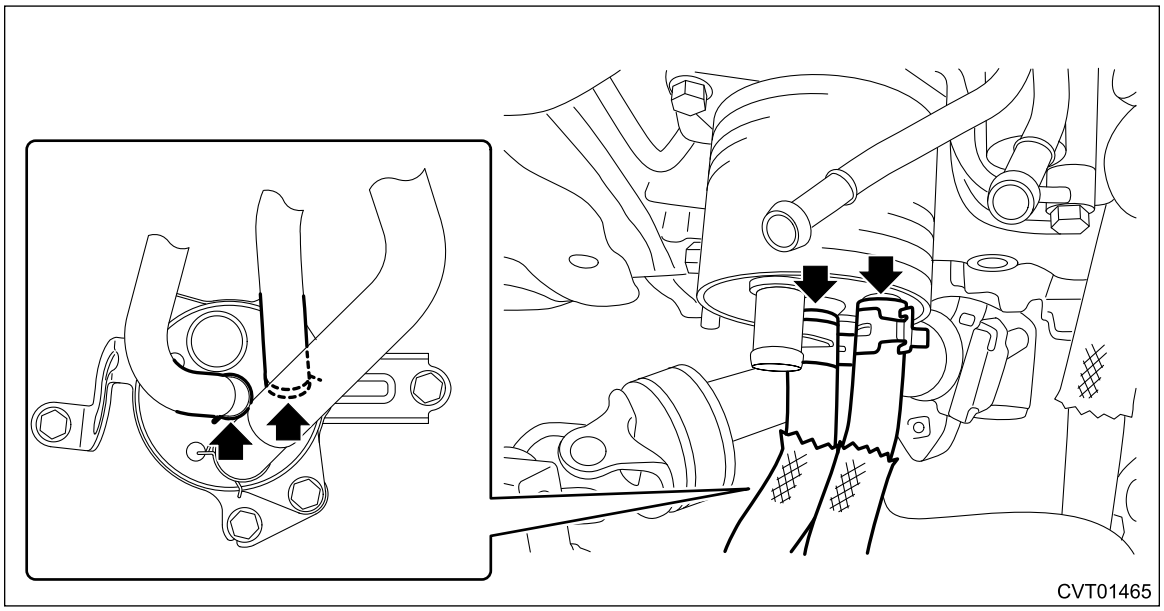
1. Disconnect the ground terminal from battery sensor. Ref. to NOTE>NOTE > BATTERY.
2. Remove the collector cover. Ref. to INTAKE (INDUCTION)(w/o STI)>Collector Cover>REMOVAL.
3. Drain engine coolant. Ref. to COOLING(w/o STI)>Engine Coolant>REPLACEMENT.
4. Remove the intercooler. Ref. to INTAKE (INDUCTION)(w/o STI)>Intercooler>REMOVAL.
5. Remove the harness clip.



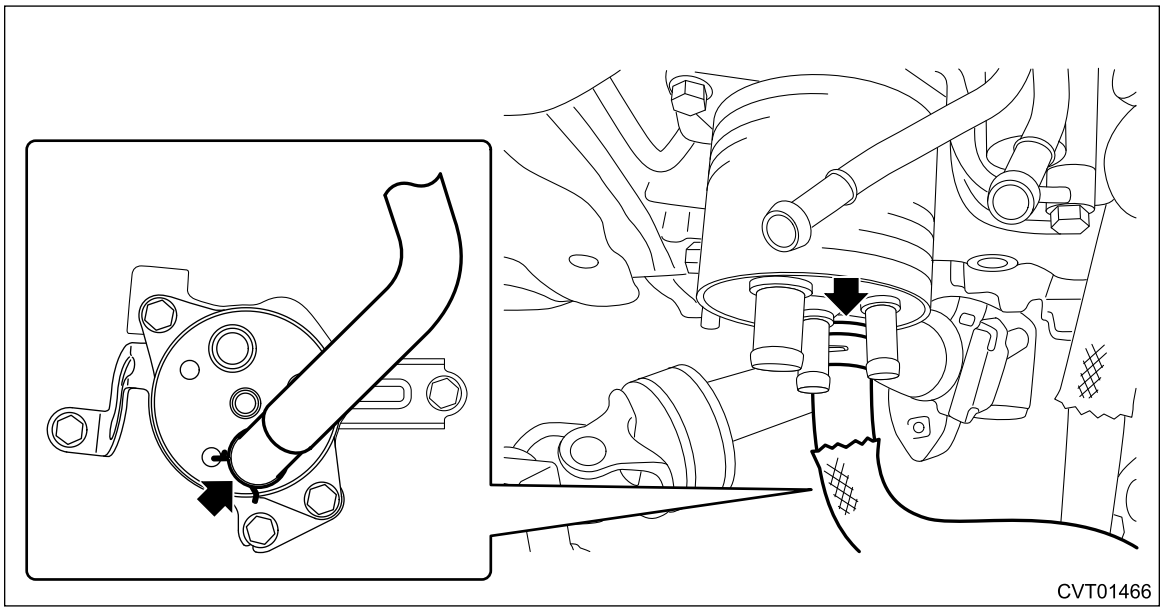
6. Disconnect the engine coolant outlet hose, engine coolant inlet hose, CVTF inlet hose and CVTF outlet hose.



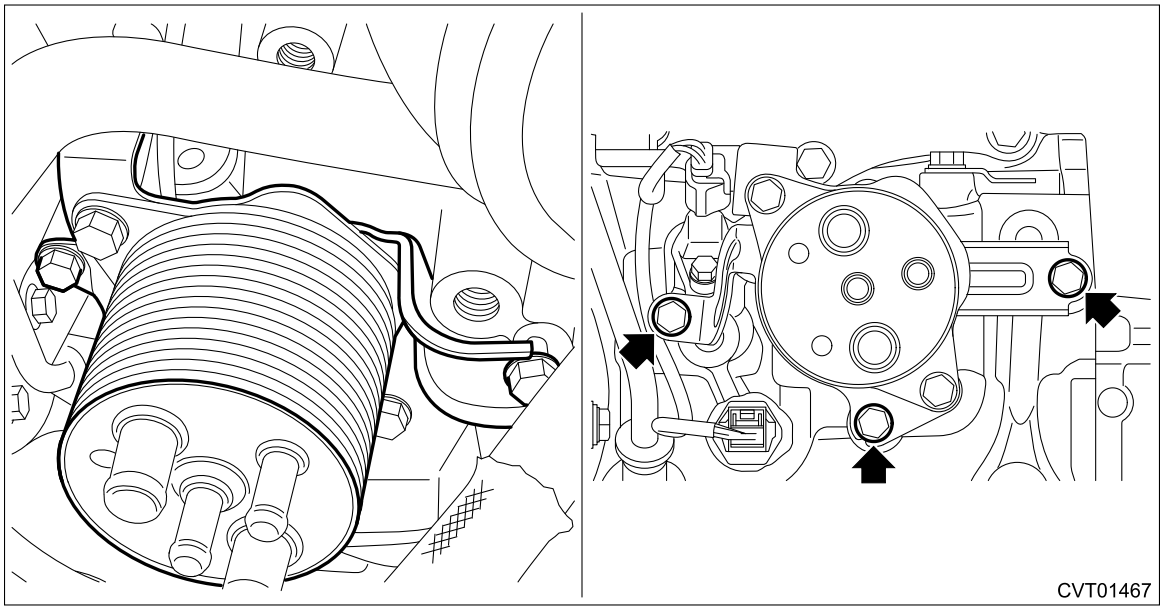
7. Remove the CVTF inlet hose and CVTF outlet hose.



8. Remove the engine coolant outlet hose.

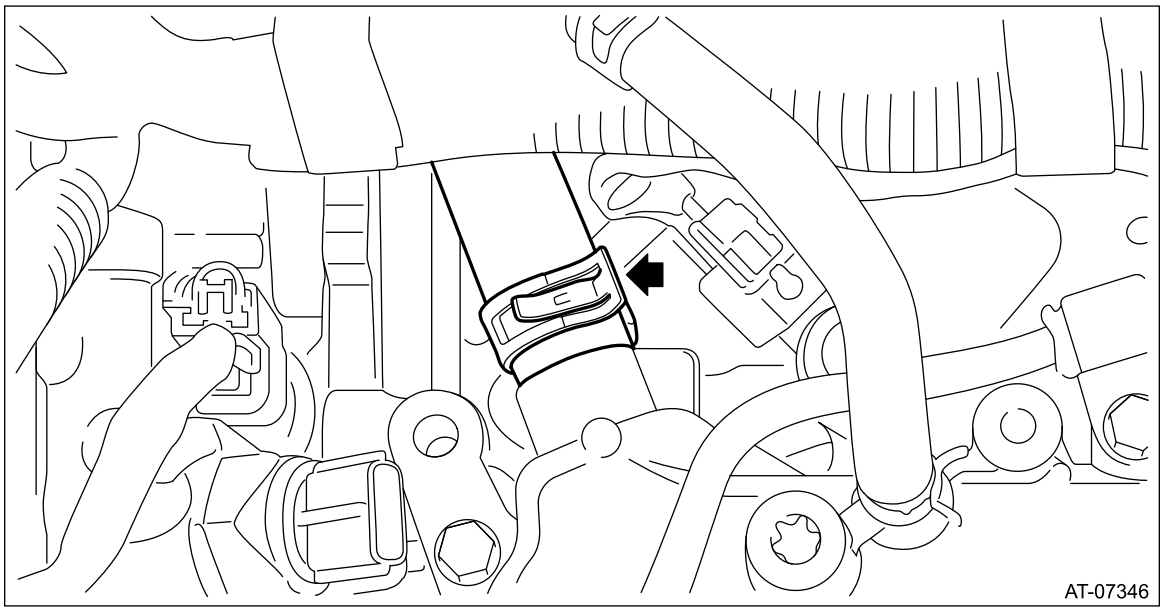


9. Remove the CVTF cooler (with warmer feature).



10. Remove the fuel pipe insulator No. 3. Ref. to FUEL INJECTION (FUEL SYSTEMS)(w/o STI)>Fuel Insulator>REMOVAL > FUEL PIPE INSULATOR NO. 3.

11. Remove the engine coolant inlet hose.



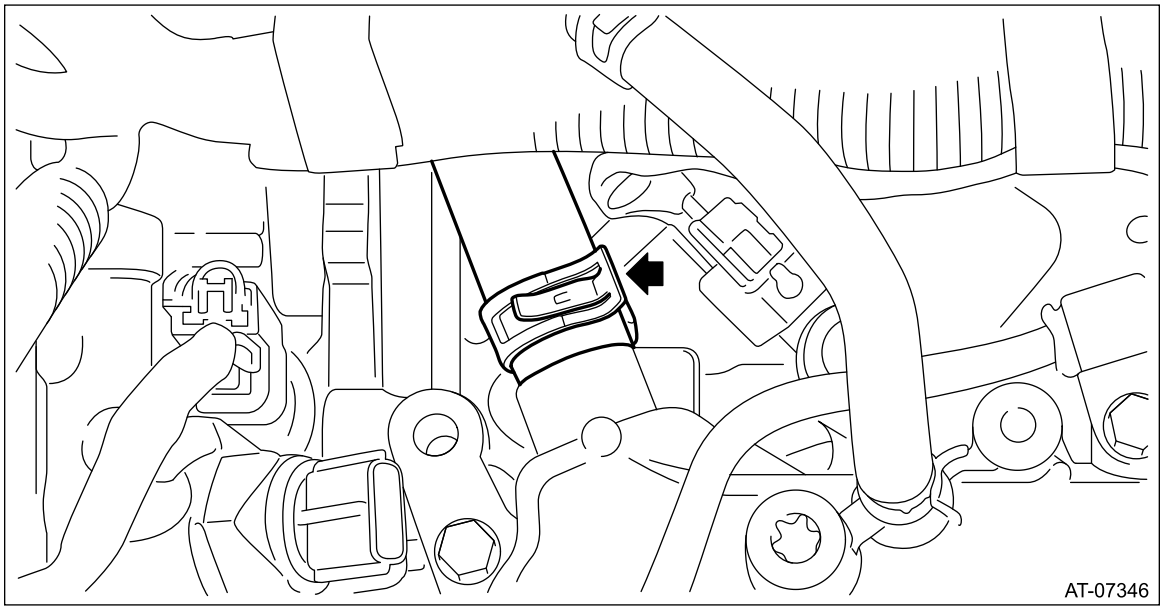
CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > CVTF Cooler (With Warmer Function)

INSTALLATION

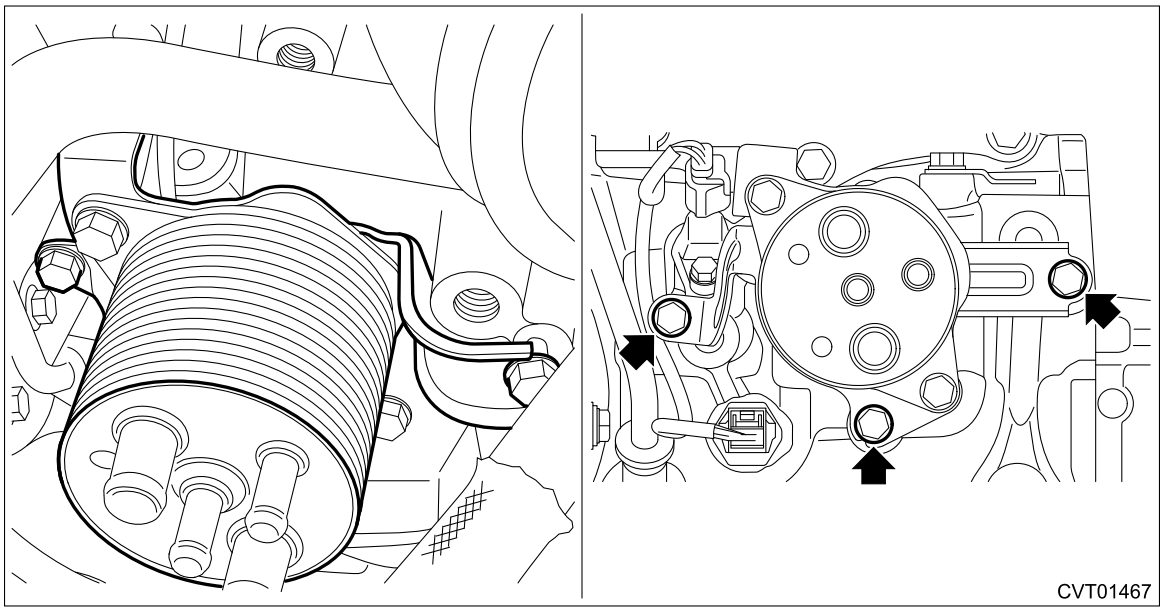
1. Connect the engine coolant inlet hose.

Note:

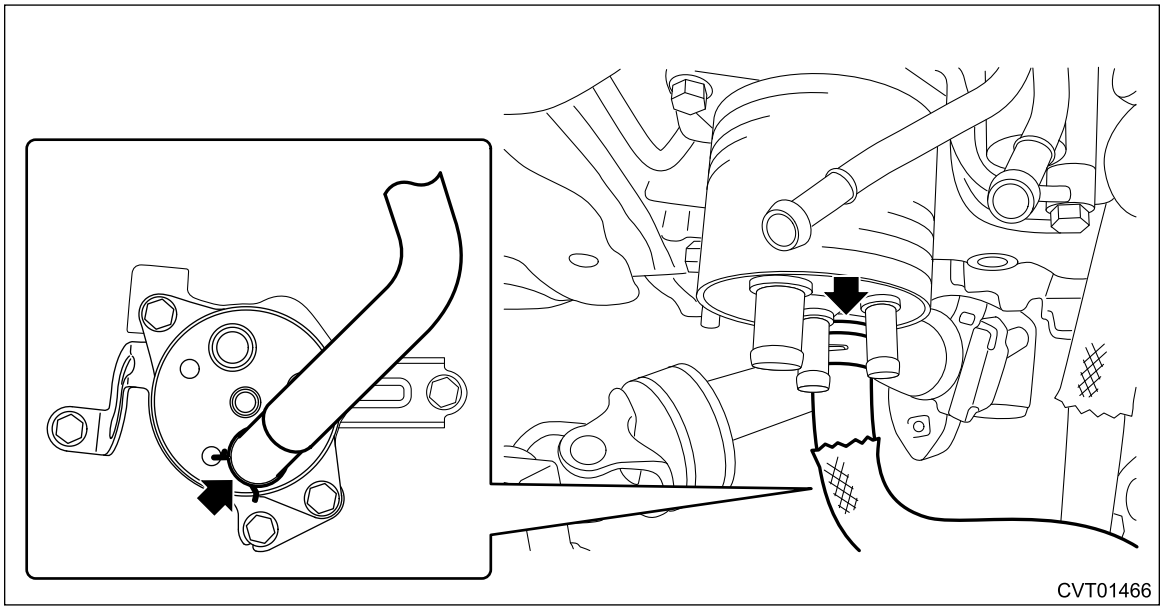
When installing the engine coolant inlet hose, the triangle marking should face upward.



2. Install the fuel pipe insulator No. 3. Ref. to FUEL INJECTION (FUEL SYSTEMS)(w/o STI)>Fuel Insulator>INSTALLATION > FUEL PIPE INSULATOR NO. 3.
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)



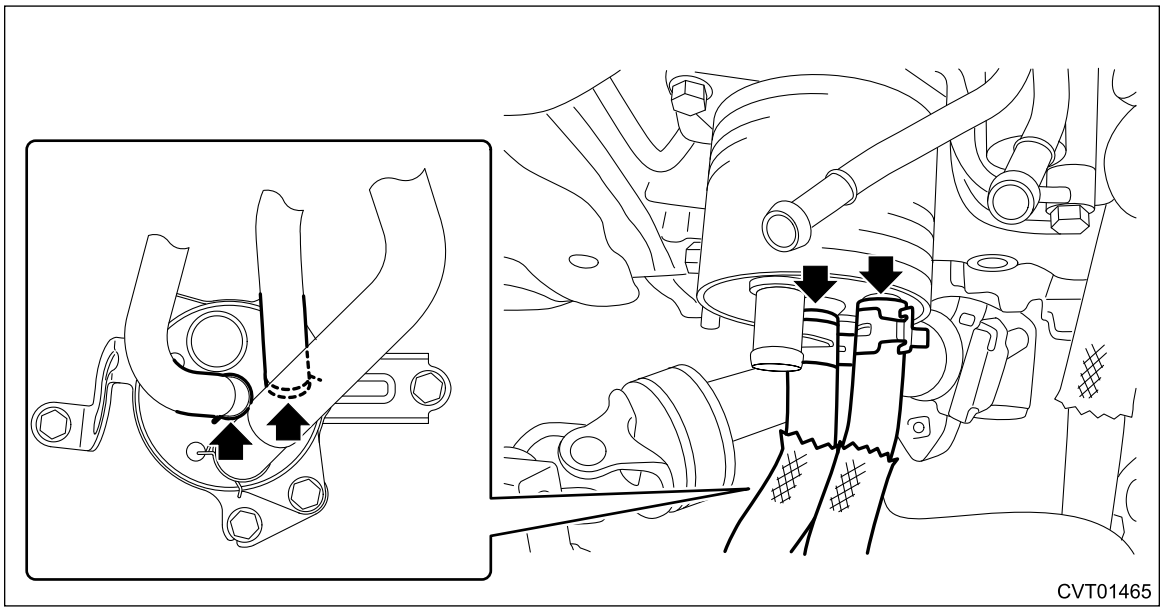
5. Connect the engine coolant outlet hose.



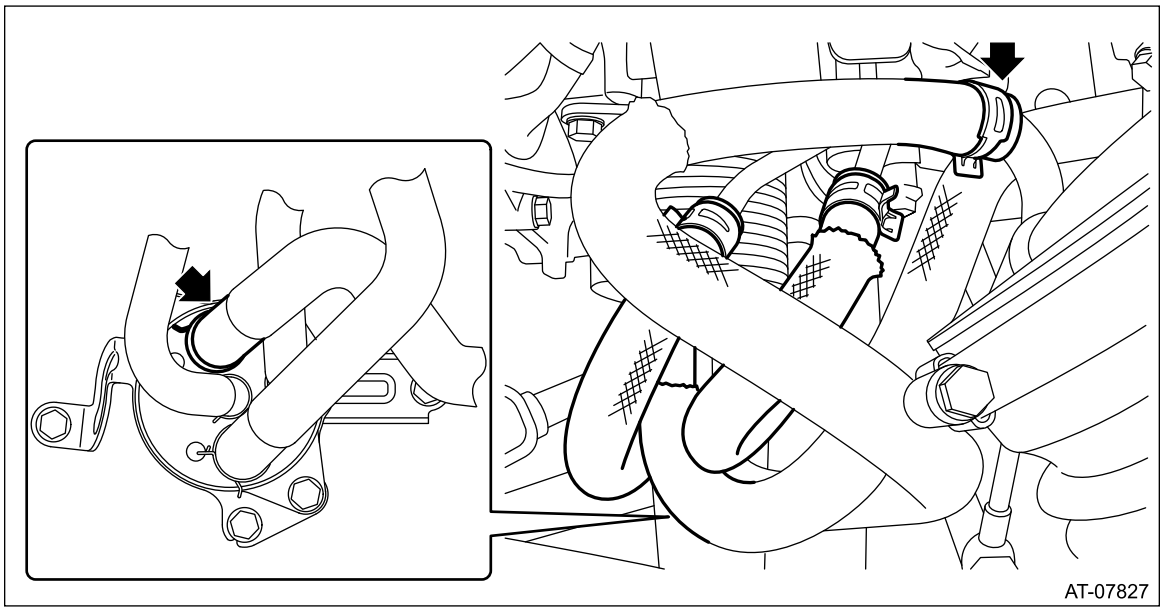
6. Connect the CVTF inlet hose and CVTF outlet hose.

Note:

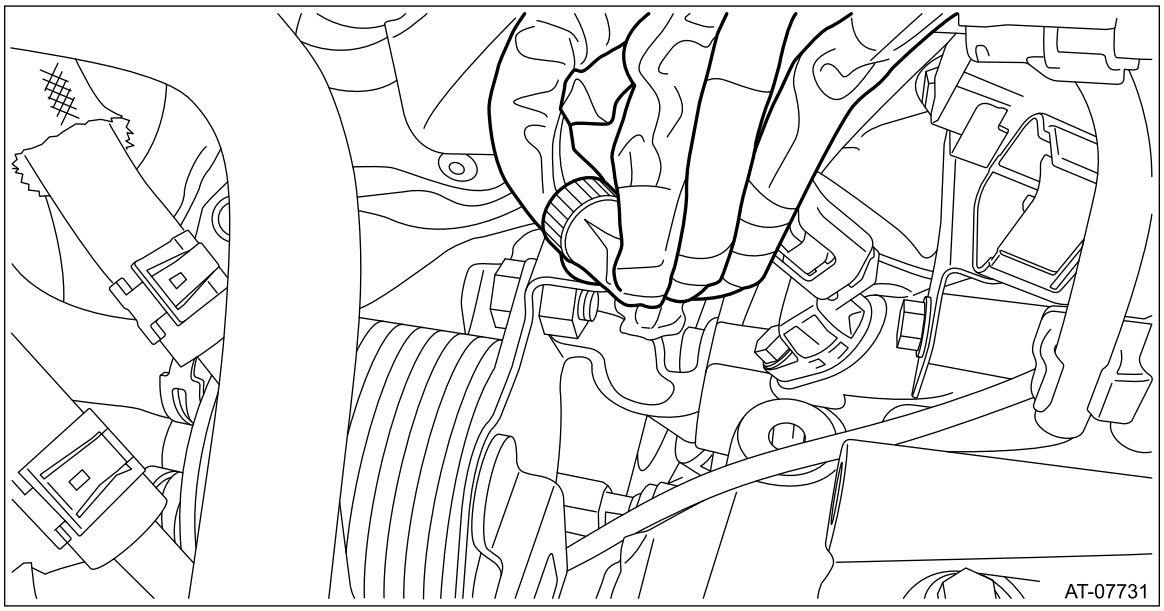
Use new CVTF hoses.



7. Install the engine coolant outlet hose, engine coolant inlet hose, CVTF inlet hose and CVTF outlet hose.



8. 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.
9. Install the harness clip.

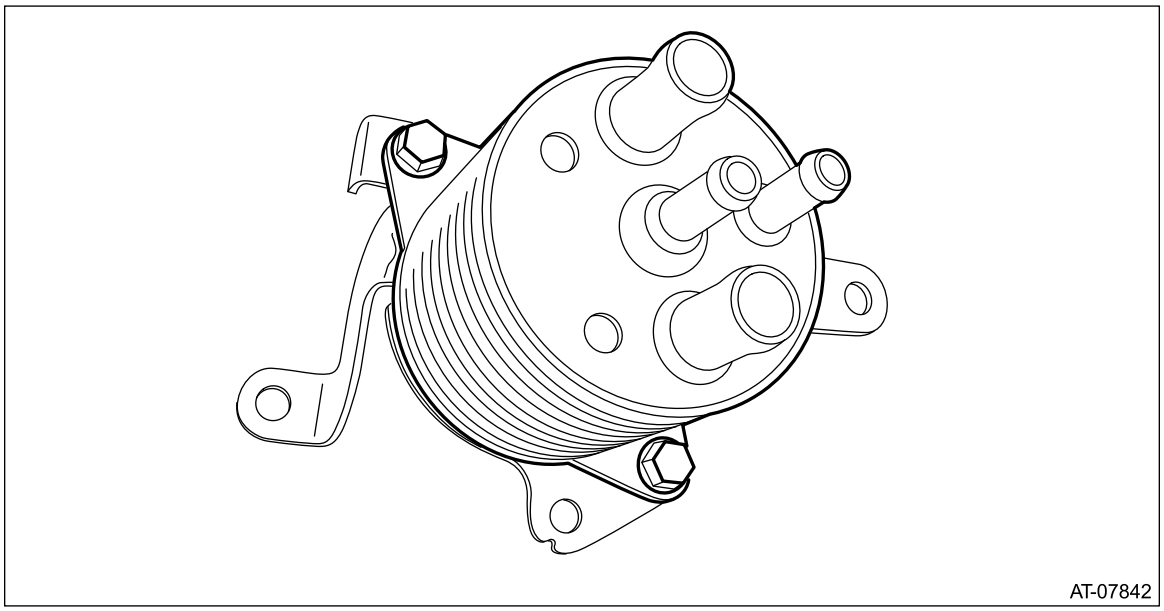


10. Install the intercooler. Ref. to INTAKE (INDUCTION)(w/o STI)>Intercooler>INSTALLATION.
11. Install the collector cover. Ref. to INTAKE (INDUCTION)(w/o STI)>Collector Cover>INSTALLATION.
12. Connect the ground terminal to battery sensor. Ref. to NOTE>NOTE > BATTERY.
13. Fill engine coolant. Ref. to COOLING(w/o STI)>Engine Coolant>REPLACEMENT.
14. Adjust the CVTF level. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>CVTF>ADJUSTMENT.

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

DISASSEMBLY

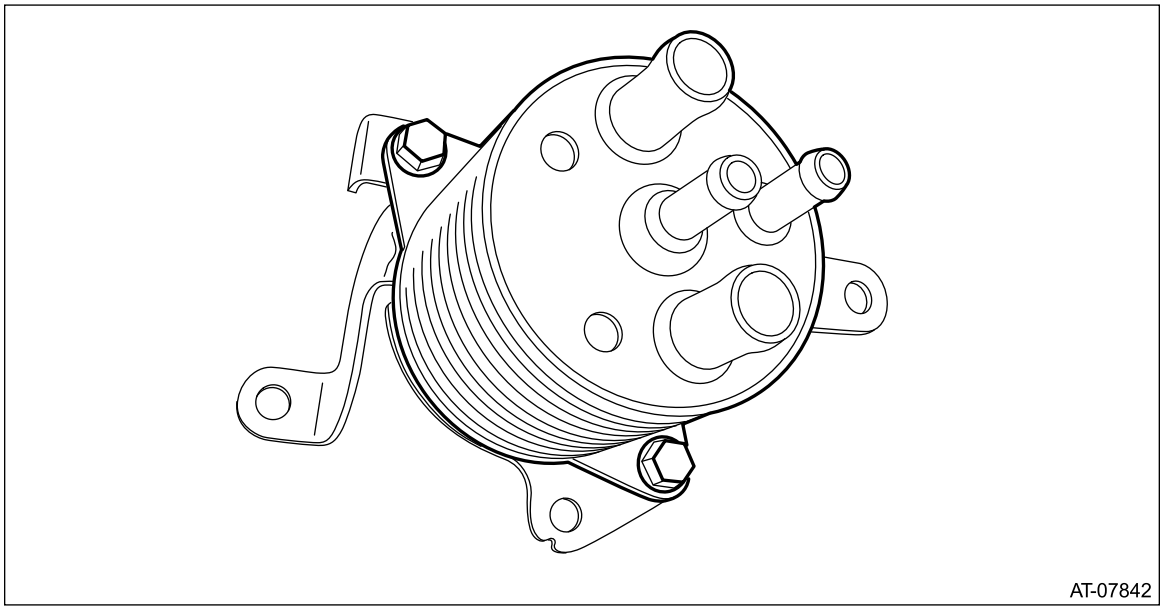
1. Remove the bracket.



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

ASSEMBLY

1. Attach the bracket.
   Tightening torque:
   23 N·m (2.3 kgf-m, 17.0 ft-lb)



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

INSPECTION

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

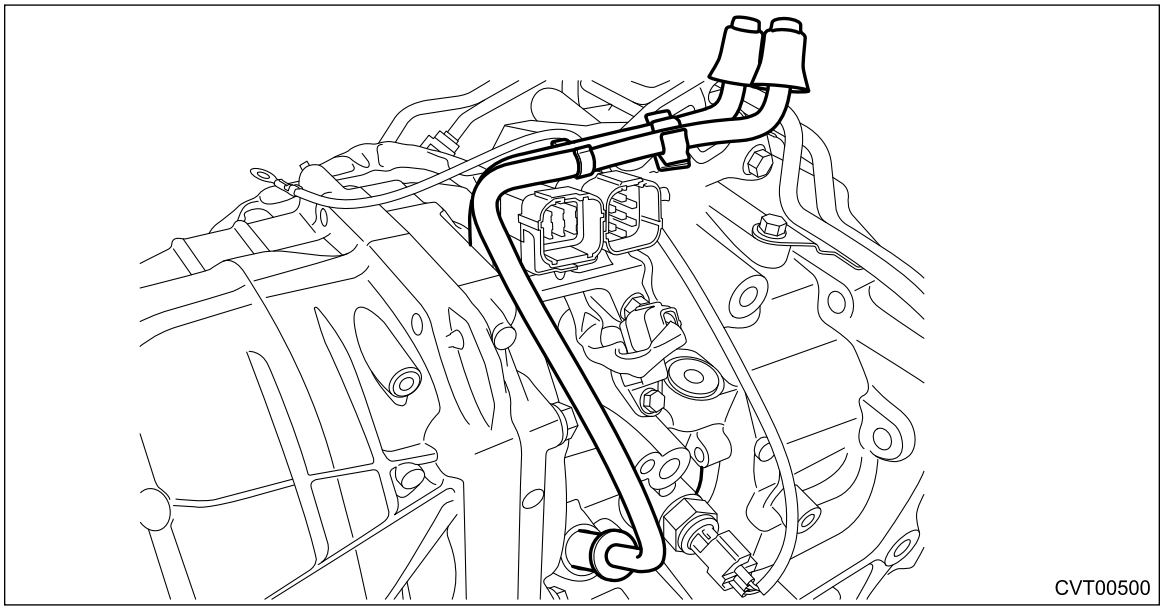
1. Check that there are no CVTF or engine coolant leaks from the connections.
2. Check the clamp for deformation.

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.

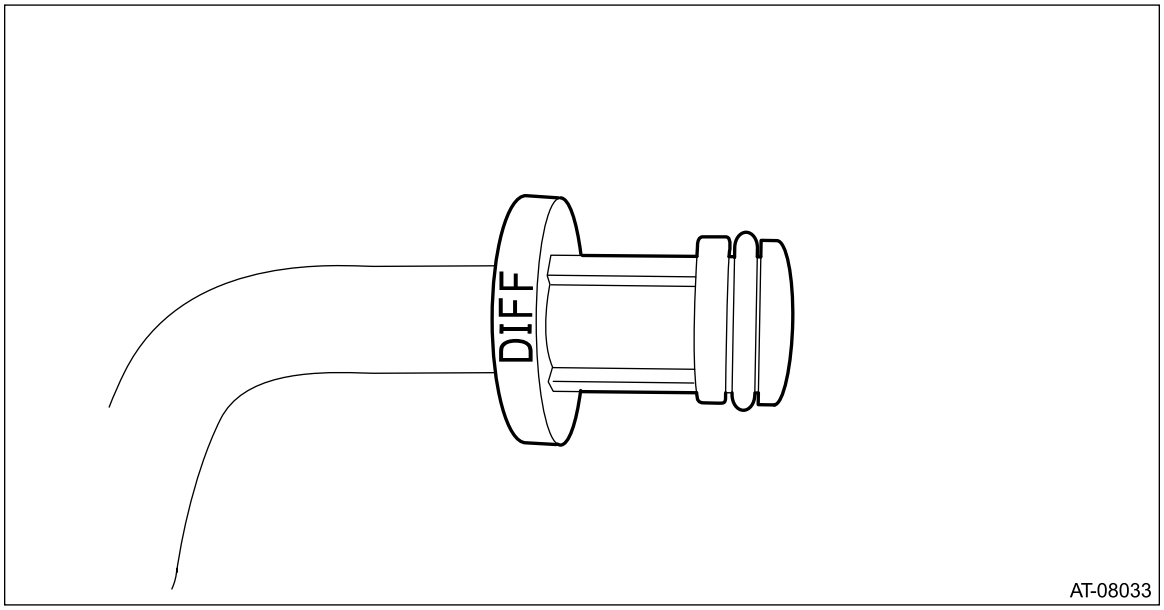
CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Air Breather Hose

REMOVAL

1. Disconnect the ground terminal from battery sensor. Ref. to NOTE>NOTE > BATTERY.
2. Remove the collector cover. Ref. to INTAKE (INDUCTION)(w/o STI)>Collector Cover>REMOVAL.
3. Remove the intercooler. Ref. to INTAKE (INDUCTION)(w/o STI)>Intercooler>REMOVAL.
4. Remove the two air breather hoses.



5. Remove the air breather cap.
6. Remove the oil cap.



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

INSPECTION

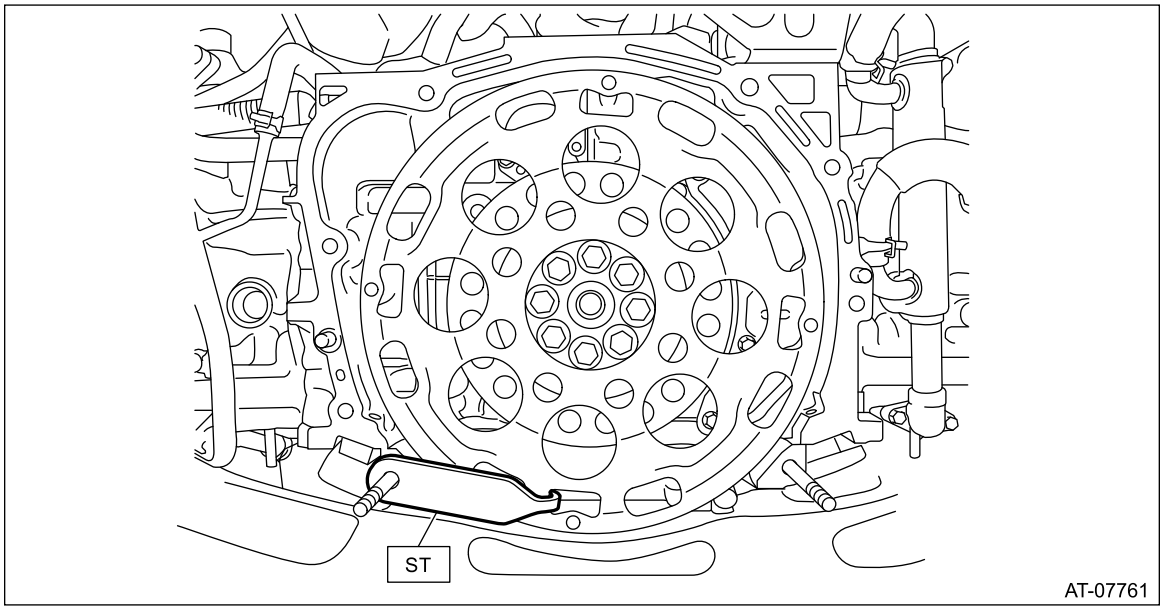
- Check the hose for peeling, crack or clogging.
- Check the oil cap is not cracked or clogged.
- Check O-ring of oil cap is not damaged.

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > 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



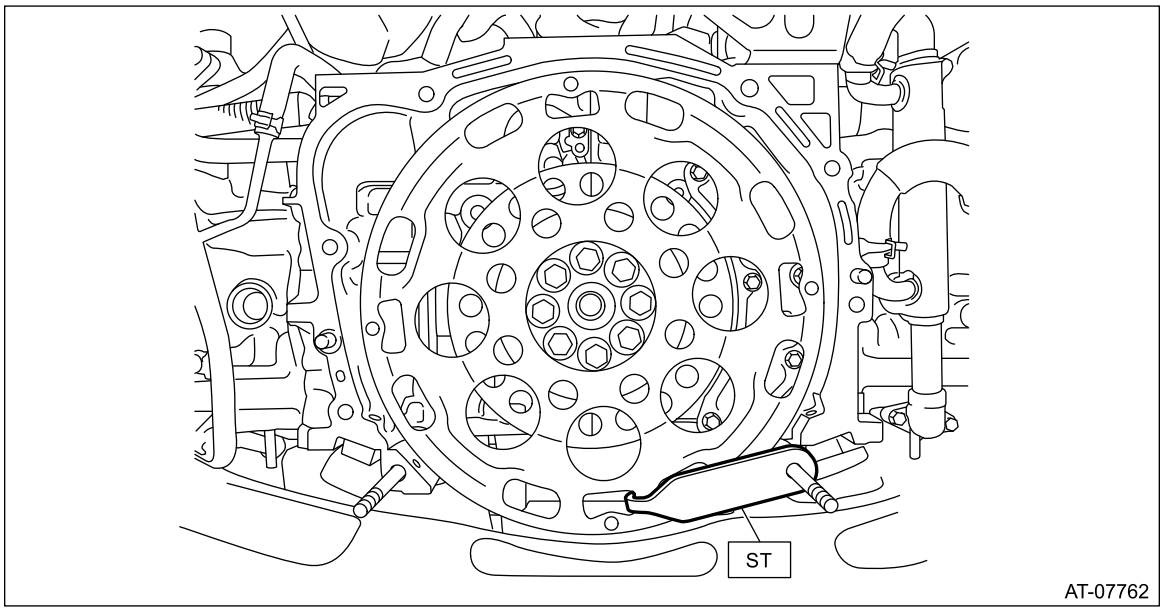
3. Remove the drive plate and reinforcement drive plate.

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.

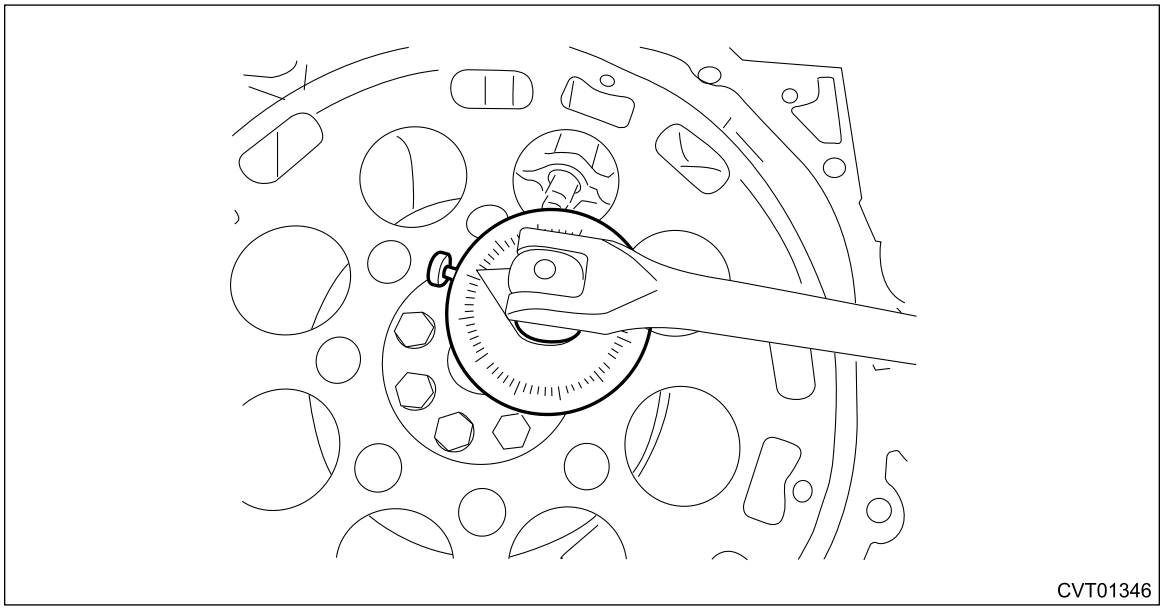
Tightening torque:

30 N·m (3.1 kgf-m, 22.1 ft-lb)

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

Tightening angle:

30° — 35°



4. Install the transmission assembly to the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Automatic Transmission Assembly>INSTALLATION.

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Drive Plate

INSPECTION

Check the drive cable for damage.

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Preparation for Overhaul

GENERAL DESCRIPTION

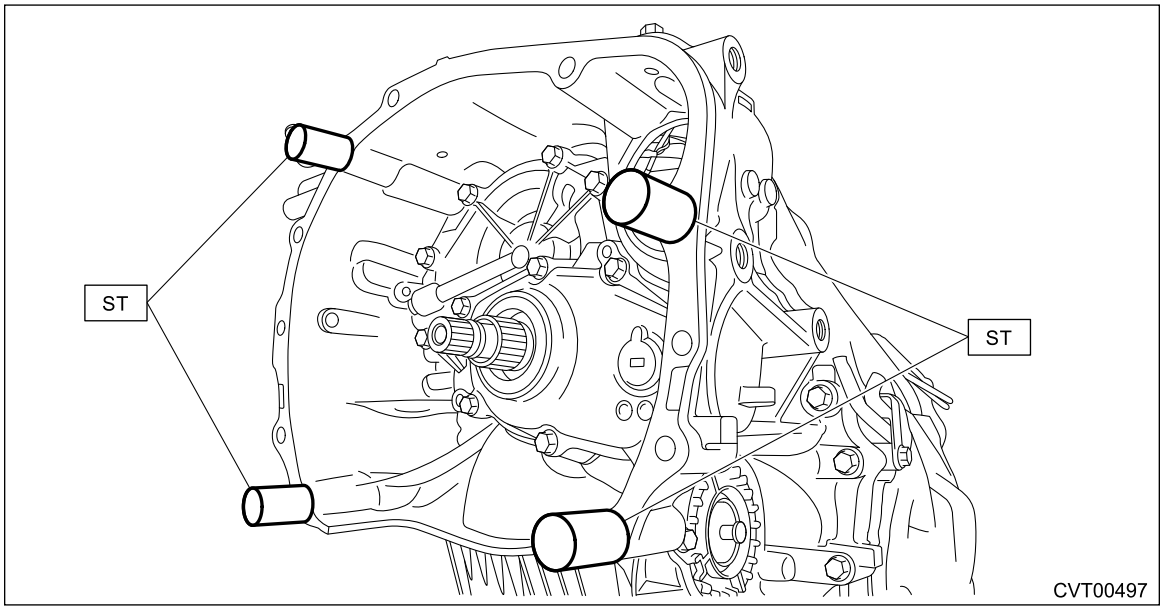
Before disassembling and assembling the transmission, follow the following procedures to prepare.

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Preparation for Overhaul

PROCEDURE

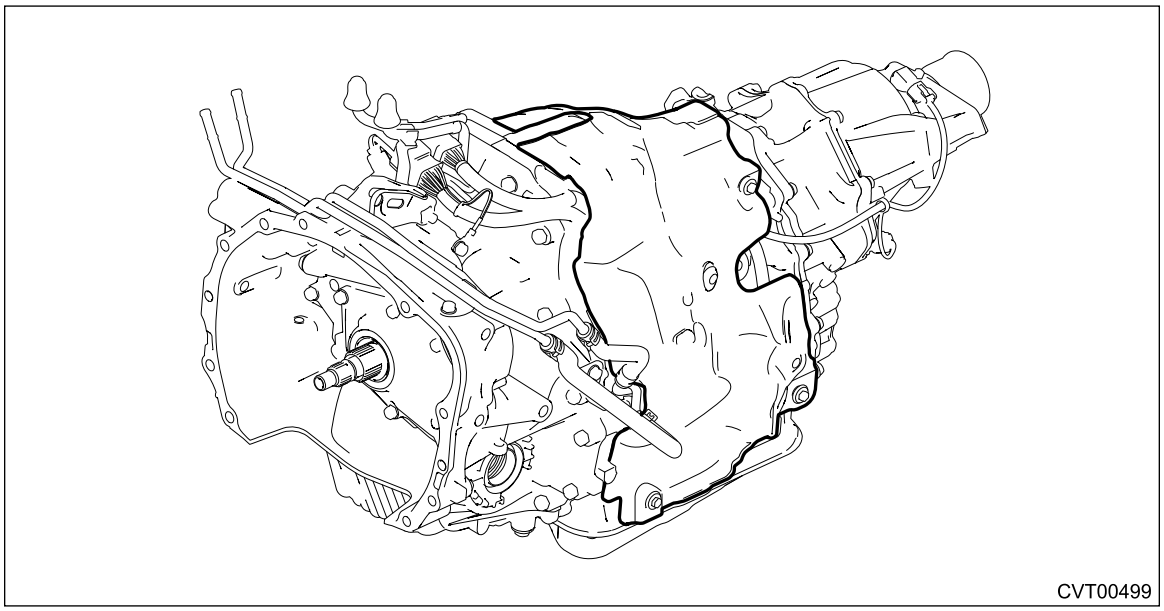
1. Clean the transmission exterior.
2. Remove the torque converter assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Torque Converter Assembly>REMOVAL.
3. Attach the ST on the transmission.

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)

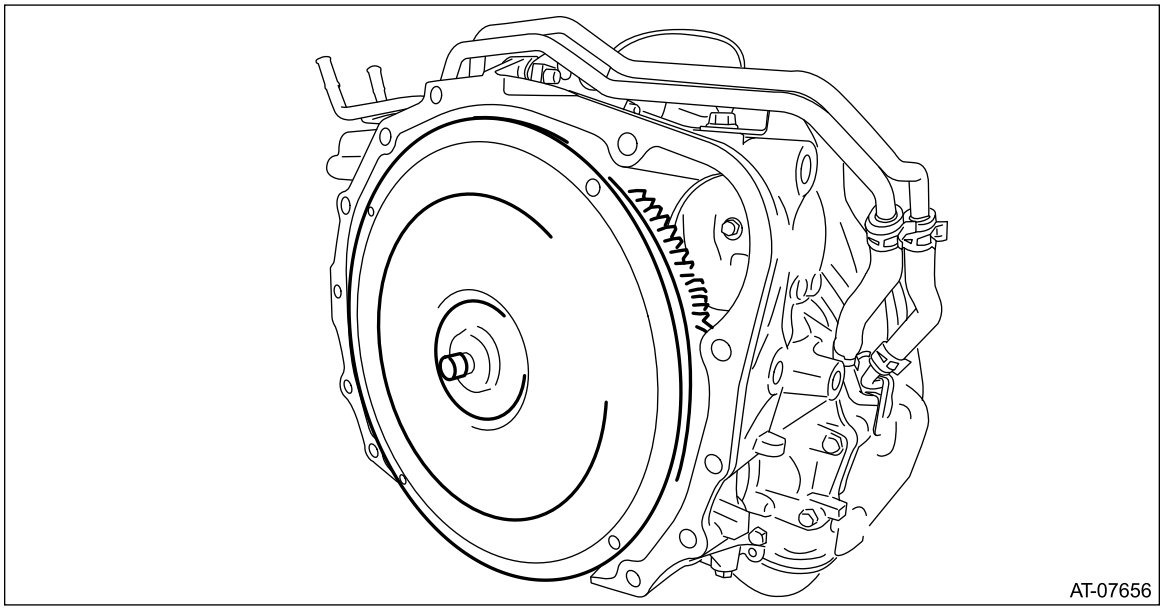


5. Place the transmission assembly on end.

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.

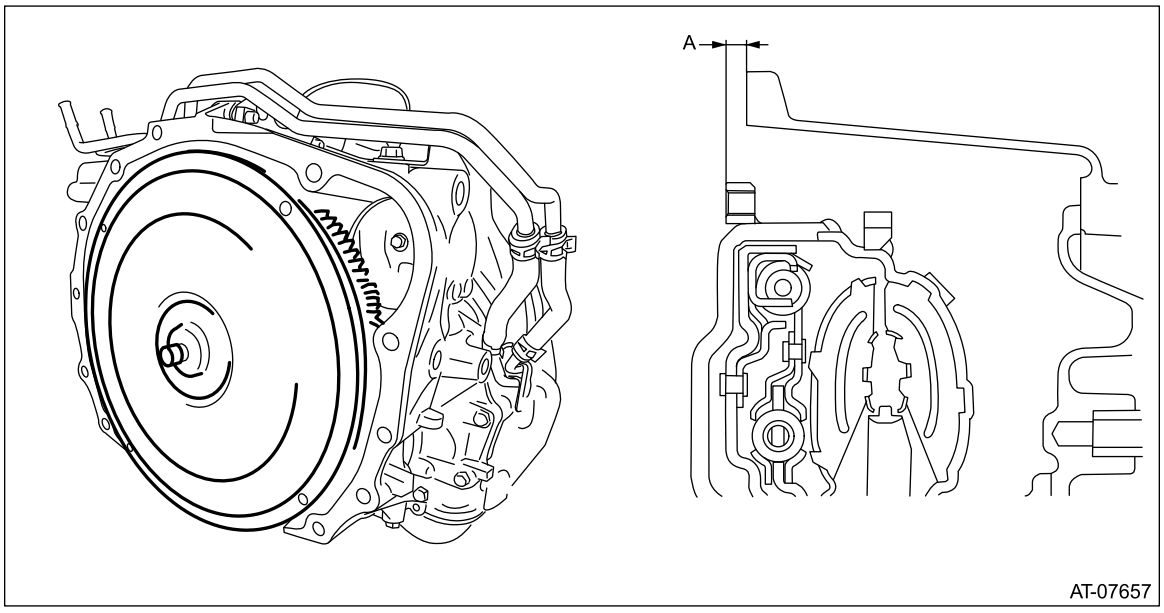


3. Remove the O-ring from the front reduction drive gear.

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Torque Converter Assembly

INSTALLATION

1. Install the O-ring to front reduction drive gear.
   Note:
   - **Use new O-rings.**
   - **Apply CVTF to the O-rings.**
2. While holding the torque converter assembly by hand, carefully install it into the torque converter case.
   Note:
   - **Apply CVTF to the oil seal lip.**
   - **Do not damage the oil seal and O-ring.**
3. Engage the splines while gently rotating the torque converter assembly by hand, and securely insert the assembly.
4. Measure depth “A”, from converter case end surface to drive plate contacting surface.
   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

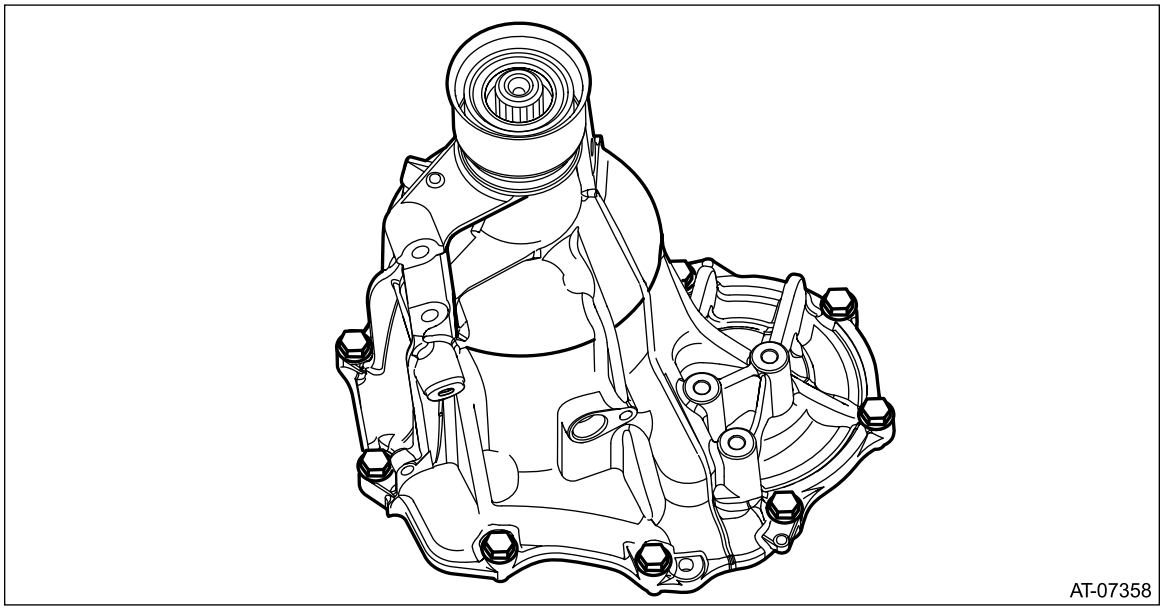
INSPECTION

- 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) > Extension Case

REMOVAL

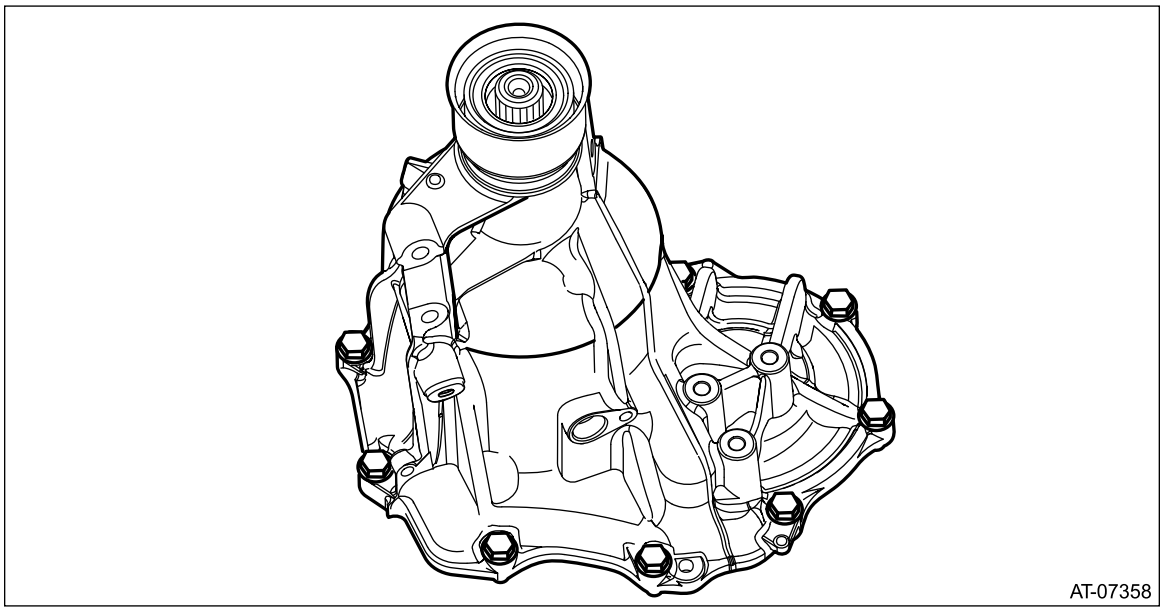
1. Remove the transmission assembly from the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Automatic Transmission Assembly>REMOVAL.
2. Remove the front wheel speed sensor. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Front Wheel Speed Sensor>REMOVAL.
3. Remove the rear wheel speed sensor. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Rear Wheel Speed Sensor>REMOVAL.
4. Remove the harness clip, and remove the extension case.
   Note:
   The total number of extension case mounting bolts is 10.



CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Extension Case

INSTALLATION

1. Clean the mating surface of the extension case and intermediate case.
2. Select the rear drive shaft shim. 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 rear drive shaft shims to the rear drive shaft.
5. Attach the selected shim to transfer reduction driven gear assembly.
6. Install the gasket and the extension case.
   Note:
   Use a new gasket.
   Tightening torque:
   25 N·m (2.5 kgf-m, 18.4 ft-lb)



7. Install the rear wheel speed sensor. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Rear Wheel Speed Sensor>INSTALLATION.
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.

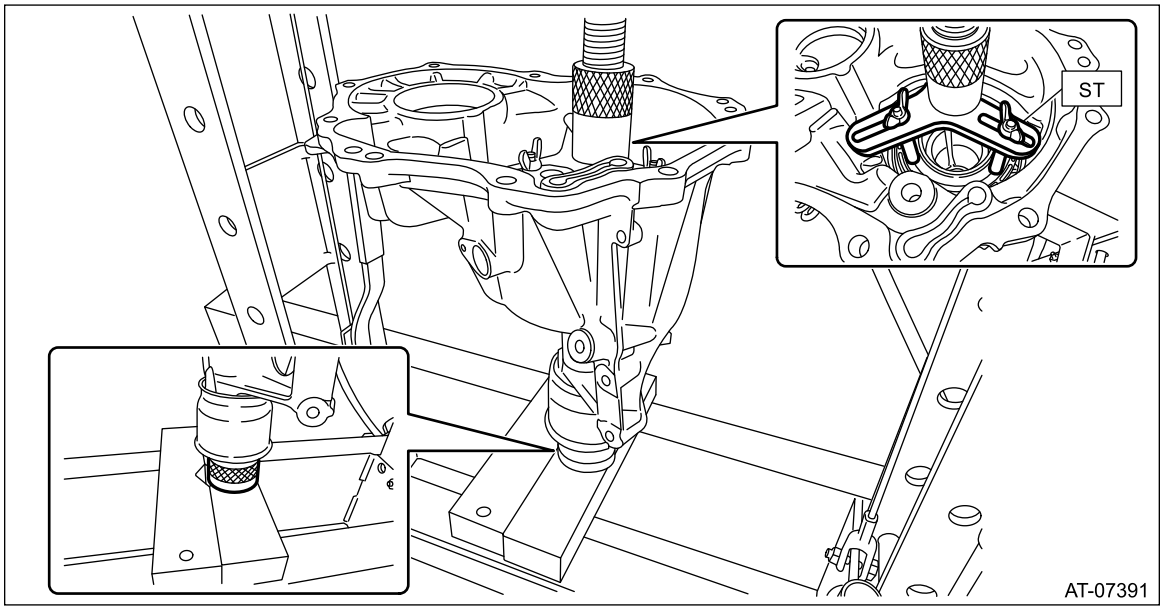
CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Extension Case

DISASSEMBLY

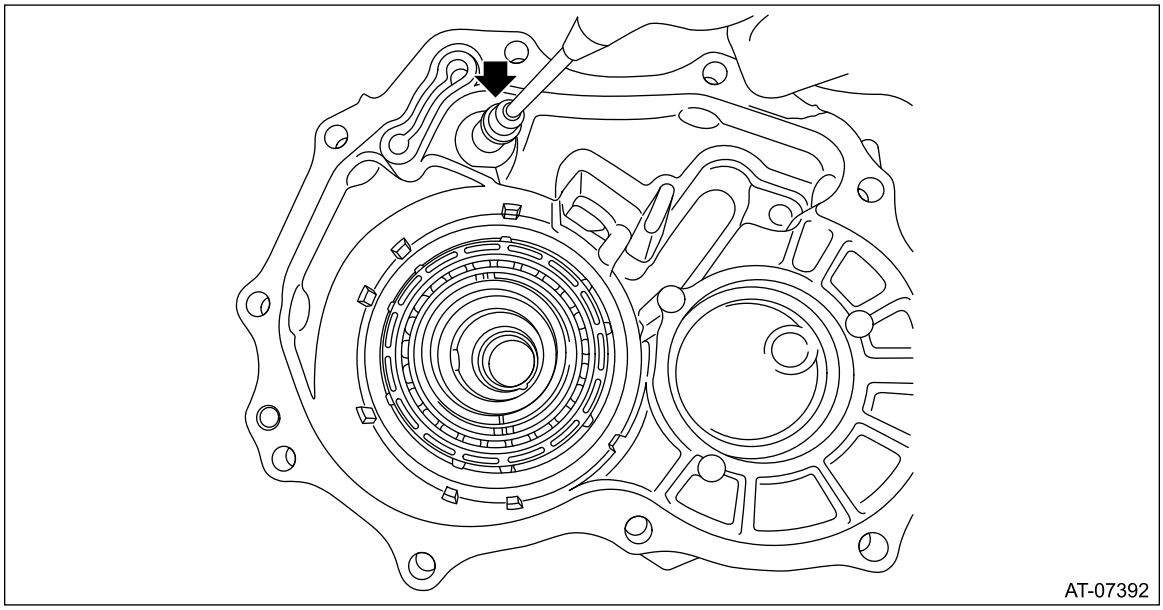
1. Remove the dust cover from extension case.
2. Remove the snap ring using the ST and press.

Caution:
If the operation is performed with the dust cover installed, place a table between the extension case and the press table.

ST 18762AA001 COMPRESSOR SPECIAL TOOL



3. Supply compressed air to remove the transfer clutch piston.



4. Remove the D-ring and O-ring from the transfer clutch piston.
5. Remove the extension case oil seal from the extension case.
6. Remove the plug from the extension case.

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Extension Case

ASSEMBLY

1. Install the O-ring and plug.
   Note:
   Use new O-rings.
   Tightening torque:
   25 N·m (2.5 kgf-m, 18.4 ft-lb)
2. Install the D-ring and O-ring to the transfer clutch piston.

Note:

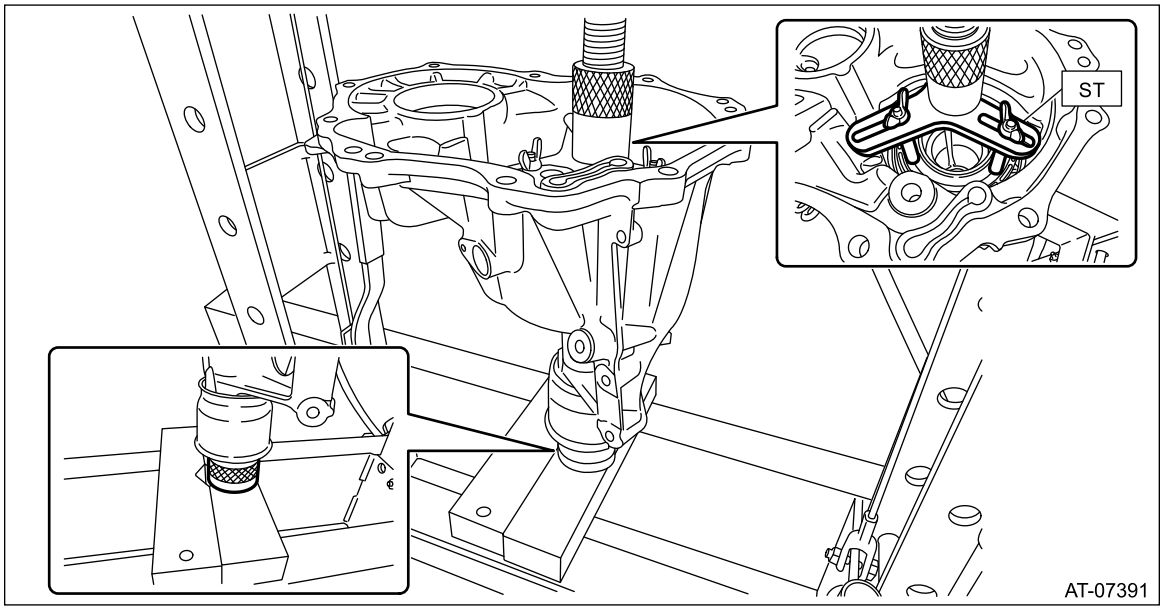
- **Use new D-rings and O-rings.**
- **Apply CVTF to the D-rings and O-rings of the transfer clutch piston assembly.**

3. Insert the transfer clutch piston, spring retainer, return spring and clutch spring retainer.
4. Using the ST and a press, install the snap ring.

Caution:

If the operation is performed with the dust cover installed, place a table between the extension case and the press table.

ST 18762AA001 COMPRESSOR SPECIAL TOOL



5. Press-fit the dust cover into extension case.
6. Install the extension case oil seal to extension case.

ST 498057300 INSTALLER

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Extension Case

INSPECTION

- Use compressed air to make sure the extension case routes are not clogged or leaking.
- Check the D-rings and O-rings for damage.
- Make sure the snap ring is not worn and the return spring has no permanent distortion, damage, or deformation.
- Check the ball bearing for smooth rotation.
- Check the ball bearing for excessive looseness.
- 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.

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Extension Case

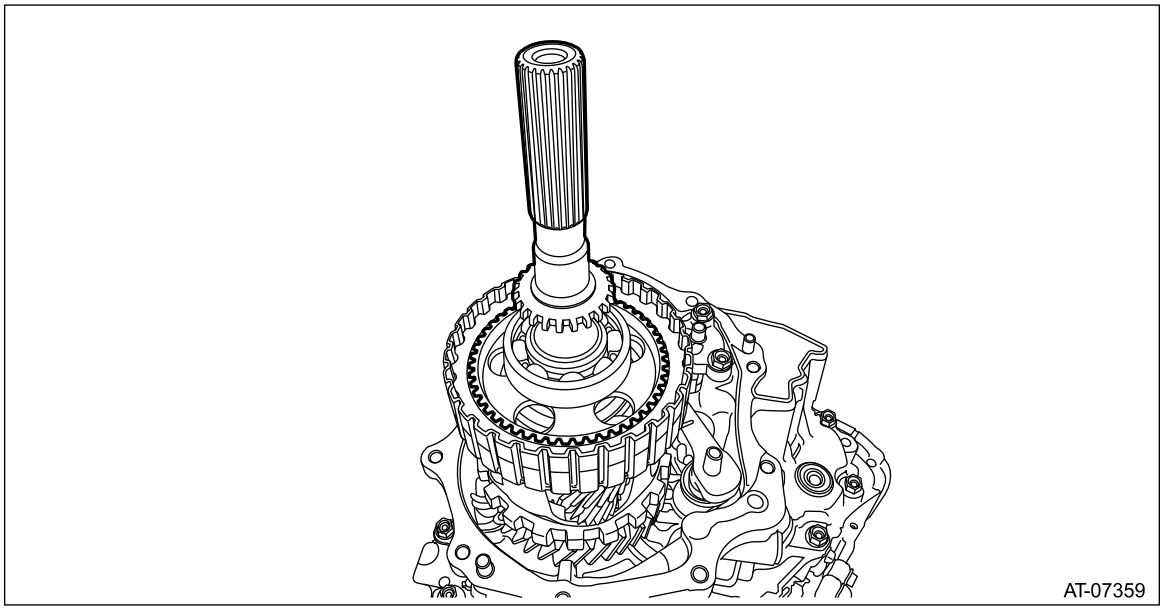
ADJUSTMENT

Note:
When replacing the extension case, select the rear drive shaft shim and transfer reduction driven gear shim. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Rear Drive Shaft>ADJUSTMENT. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transfer Reduction Driven Gear>ADJUSTMENT.

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Rear Drive Shaft

REMOVAL

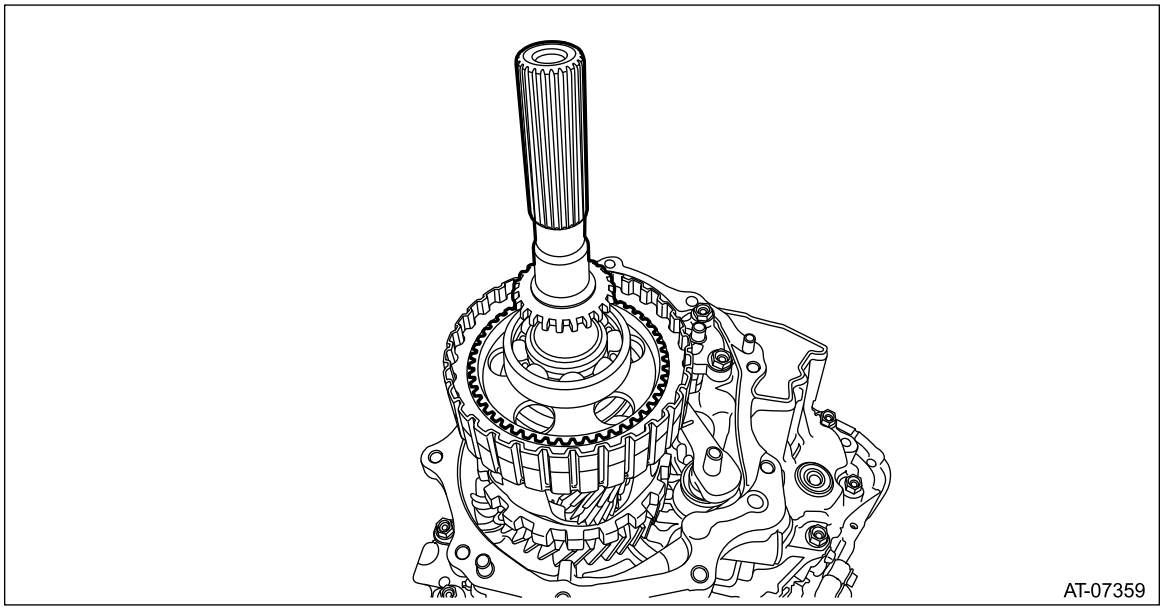
1. Remove the transmission assembly from the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Automatic Transmission Assembly>REMOVAL.
2. Remove the extension case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Extension Case>REMOVAL.
3. Remove the rear drive shaft.



CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Rear Drive Shaft

INSTALLATION

1. Install the rear drive shaft.

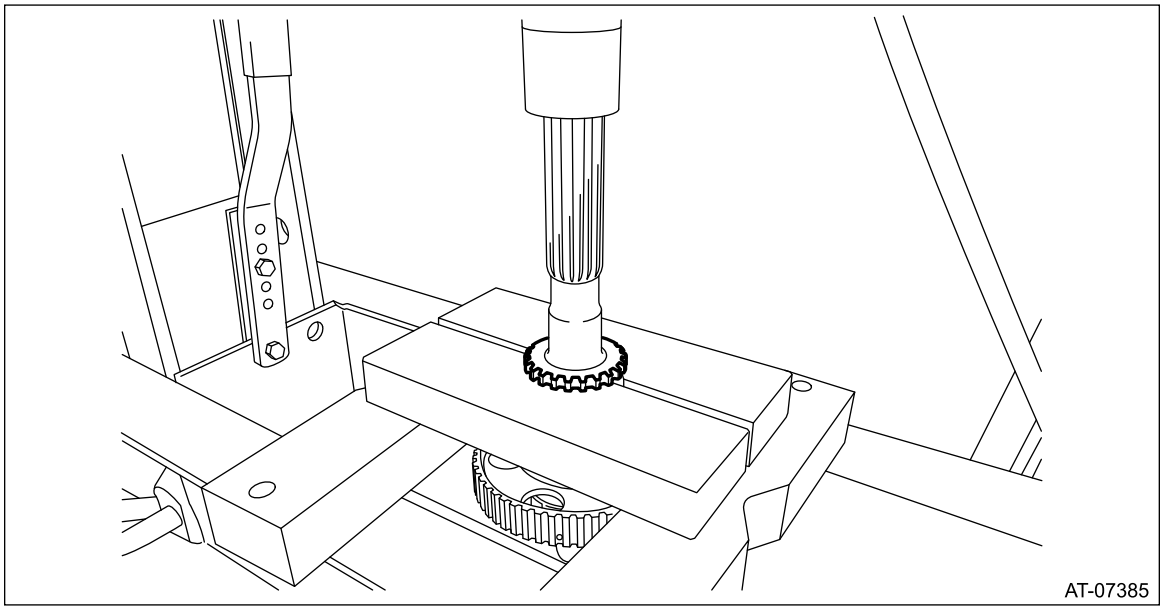


2. Select the rear drive shaft shim. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Rear Drive Shaft>ADJUSTMENT.
3. Install the selected rear drive shaft shims to the rear drive shaft.
4. Install the extension case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Extension Case>INSTALLATION.
5. Install the transmission assembly to the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Automatic Transmission Assembly>INSTALLATION.

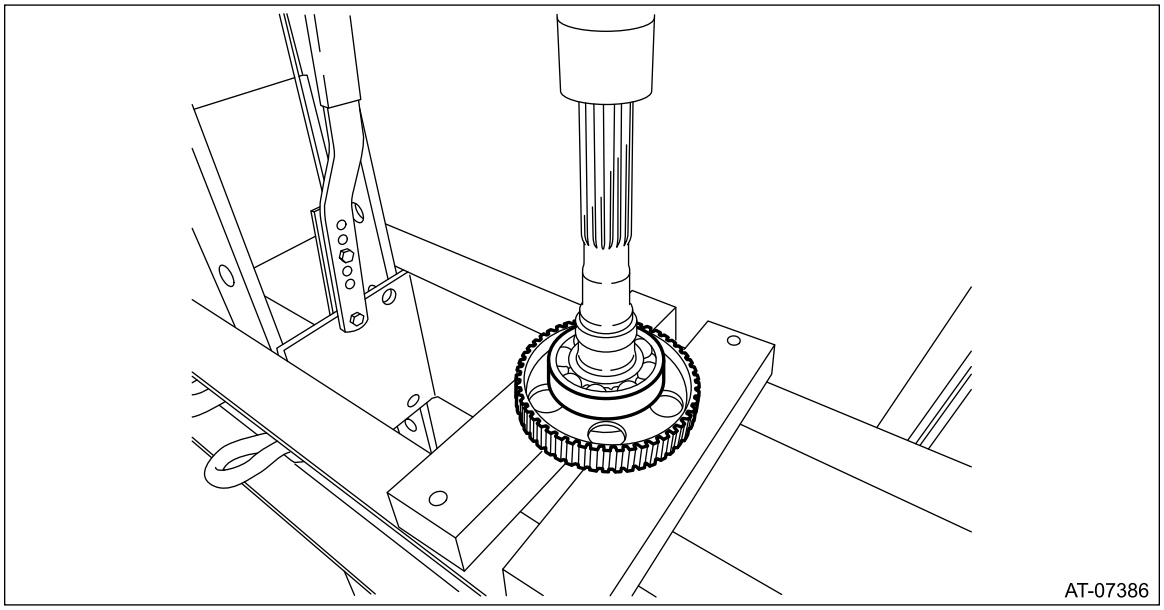
CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Rear Drive Shaft

DISASSEMBLY

1. Using a press, remove the revolution gear.



2. Using a press, remove the front and rear ball bearings and clutch hub.



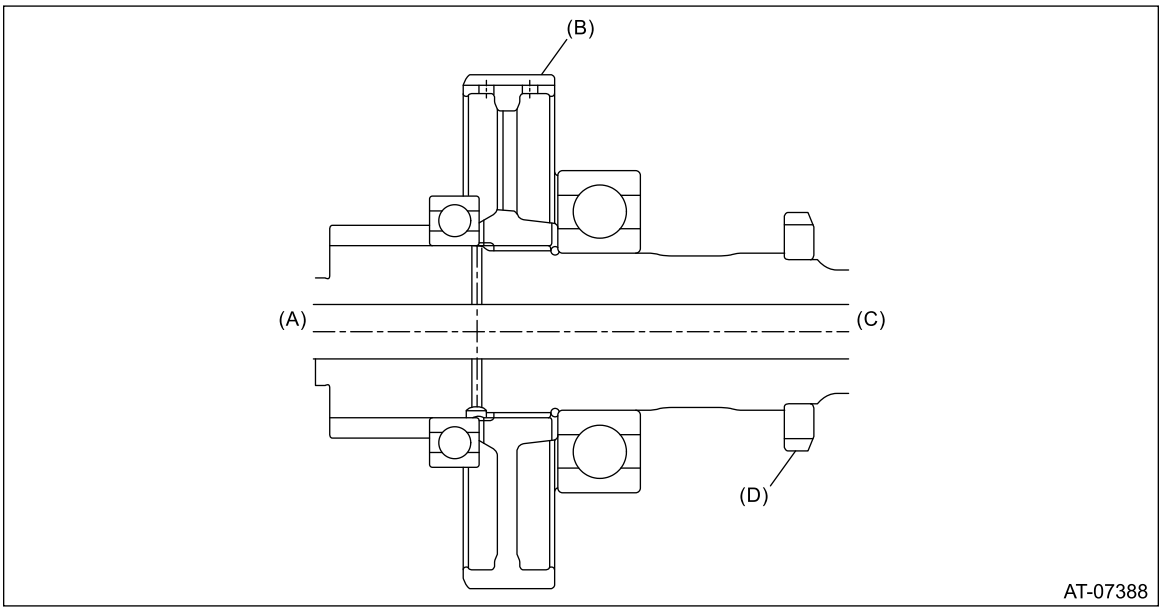
CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Rear Drive Shaft

ASSEMBLY

Assemble in the reverse order of disassembly.

Note:

- **Use new ball bearings and revolution gear.**
- **Apply CVTF to press-fitting surface of ball bearing.**
- **Make sure of the direction of clutch hub.**



(A) Front side
(B) Clutch hub
(C) Rear side
(D) Revolution gear

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Rear Drive Shaft

INSPECTION

- Check each part for crack, damage or dust.
- Check the ball bearing for smooth rotation.
- Check the ball bearing for excessive looseness.
- Inspect axial play of the rear drive shaft.

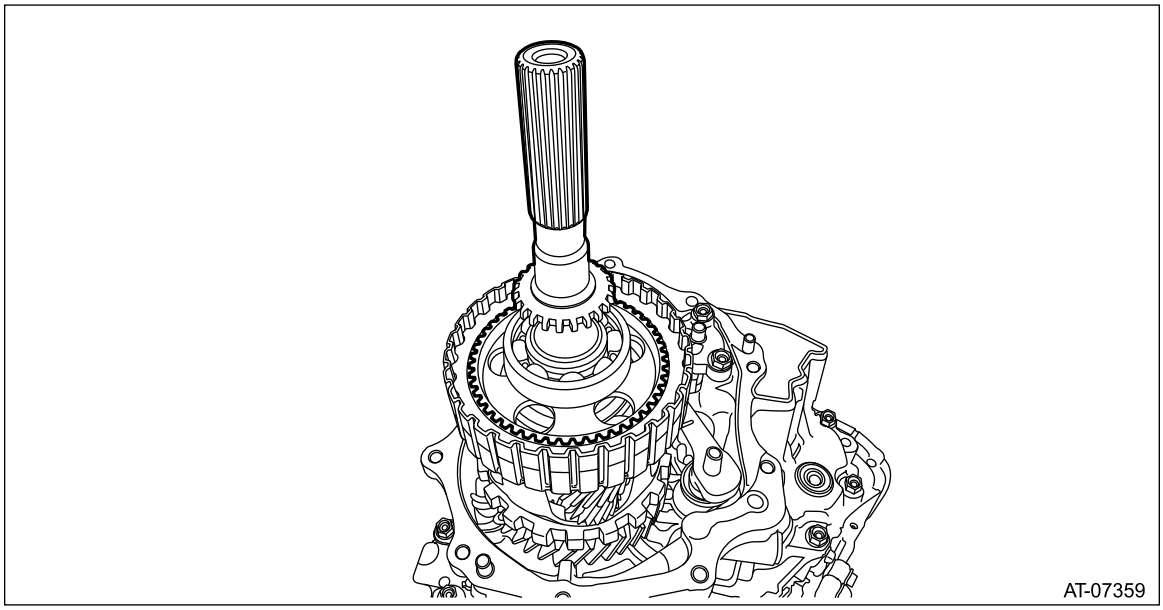
CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Rear Drive Shaft

ADJUSTMENT

Note:

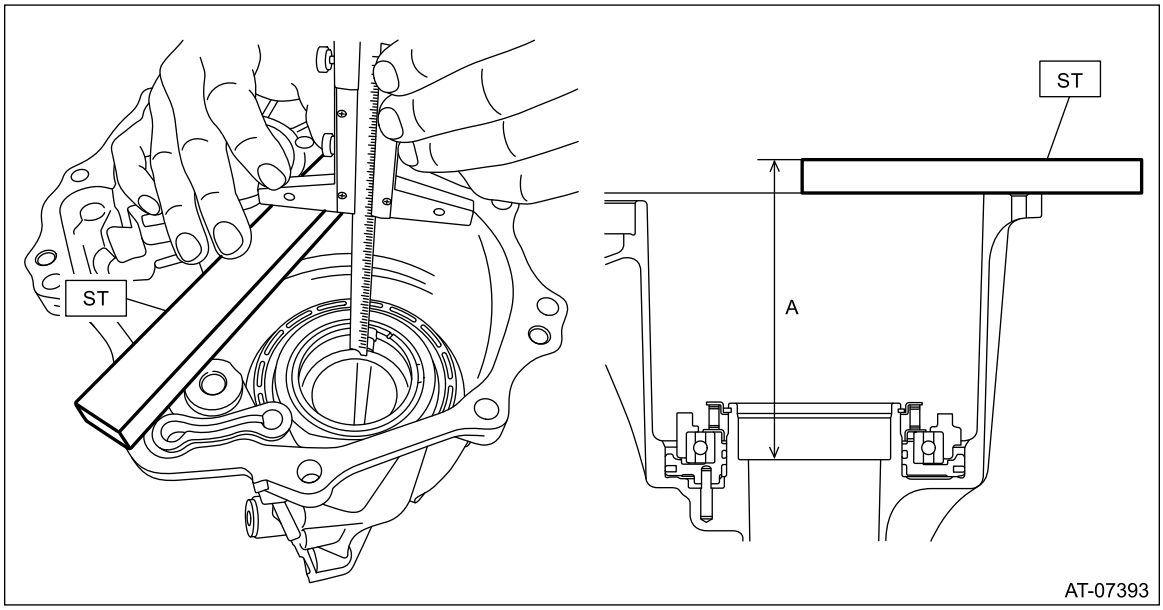
When replacing the rear drive shaft or bearing, select the rear drive shaft shim.

1. Install the rear drive shaft.



2. Using the ST, measure the depth “A” from the end surface of ST to the contact surface of ball bearing.

ST 499575400 GAUGE

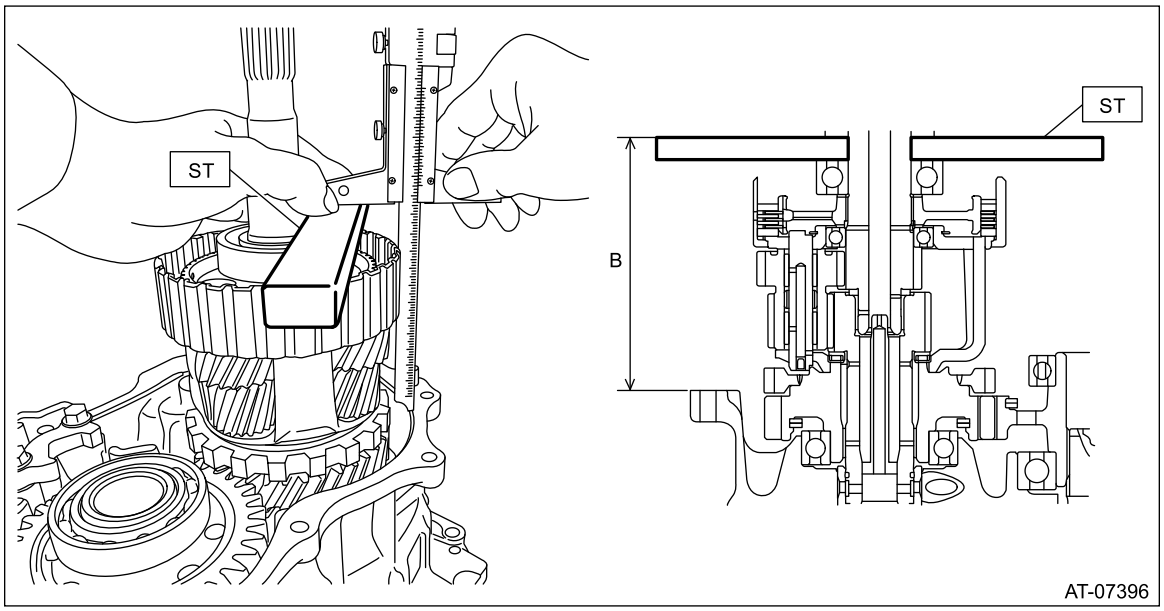


3. Using the ST, measure the height “B” from the mating surface of intermediate case to the end surface of ST.

Note:

Set the ST so that it does not ride on the bearing inner race.

ST 499575400 GAUGE



4. Obtain the thickness of rear drive shaft shim using the following formula to select none to four rear drive shaft shims.

T (mm) = A − B + 0.38 − (0.05 — 0.25)

[T (in) = A − B + 0.0149 − (0.002 — 0.01)]

T: Rear drive shaft shim thickness

A: Depth from the ST end surface to the ball bearing contact surface

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

0.38 mm (0.0149 in): Thickness of gasket

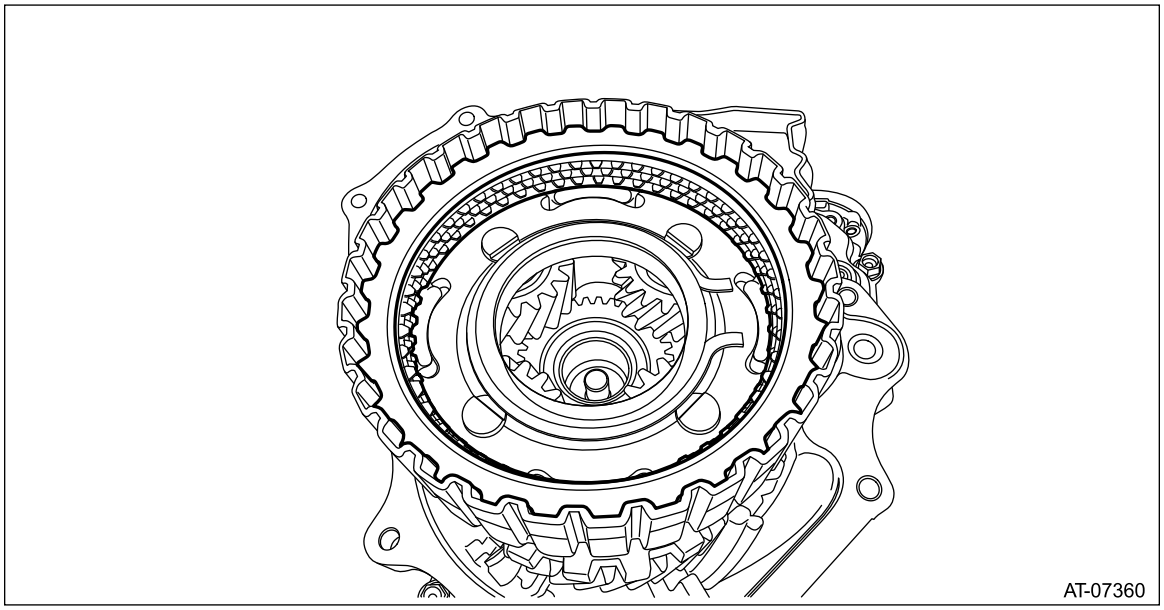
0.05 — 0.25 mm (0.002 — 0.01 in): Clearance

Rear drive shaft shim	
Part No.	**Thickness mm (in)**
33281AA040	0.2 (0.008)
33281AA050	0.5 (0.020)
33281AA060	0.3 (0.012)

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Transfer Clutch

REMOVAL

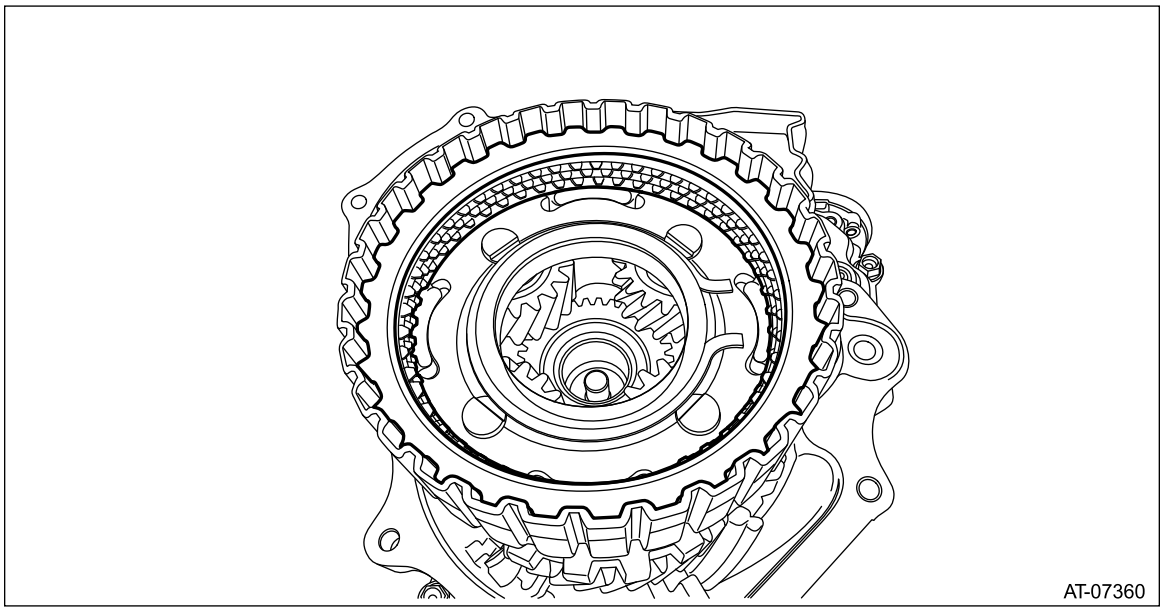
1. Remove the transmission assembly from the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Automatic Transmission Assembly>REMOVAL.
2. Remove the extension case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Extension Case>REMOVAL.
3. Remove the rear drive shaft. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Rear Drive Shaft>REMOVAL.
4. Remove the transfer clutch assembly.



CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Transfer Clutch

INSTALLATION

1. Install the transfer clutch assembly.



2. Select driven plate No. 3. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transfer Clutch>ADJUSTMENT.
3. Attach the selected driven plate No. 3 to the center differential assembly.
4. Install the rear drive shaft. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Rear Drive Shaft>INSTALLATION.
5. Install the extension case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Extension Case>INSTALLATION.
6. Install the transmission assembly to the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Automatic Transmission Assembly>INSTALLATION.

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Transfer Clutch

INSPECTION

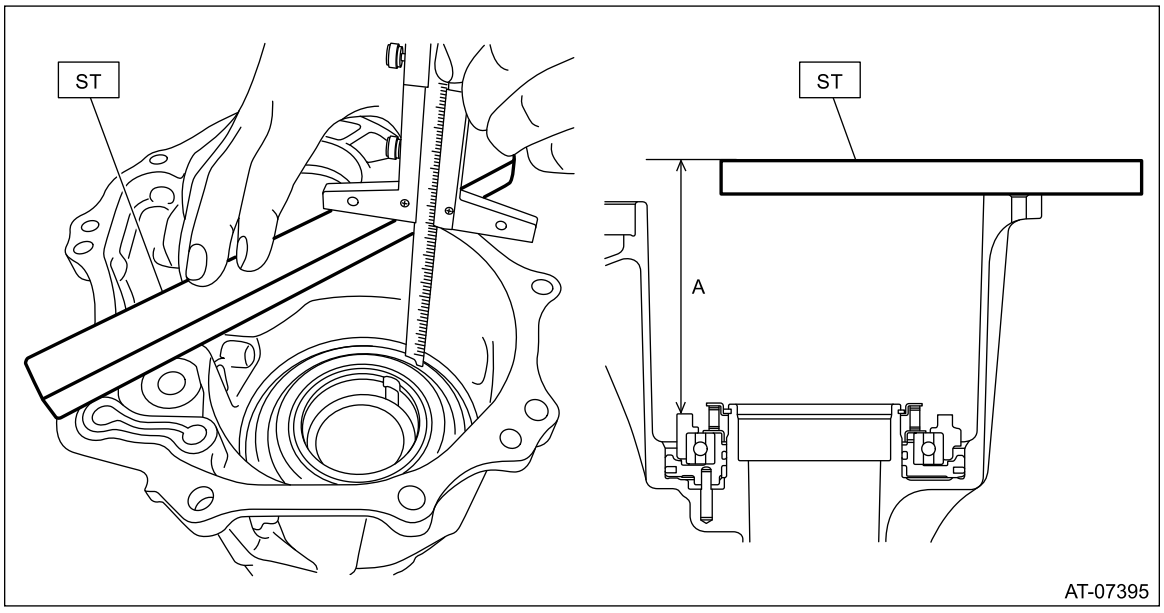
- Inspect the drive plate facing for wear and damage.
- Check the driven plate for discoloration (burnt color).
- Make sure the snap ring is not worn and the return spring has no permanent distortion, damage, or deformation.
- Check the lip seal for damage.
- Inspect the extension end play, and adjust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

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Transfer Clutch

ADJUSTMENT

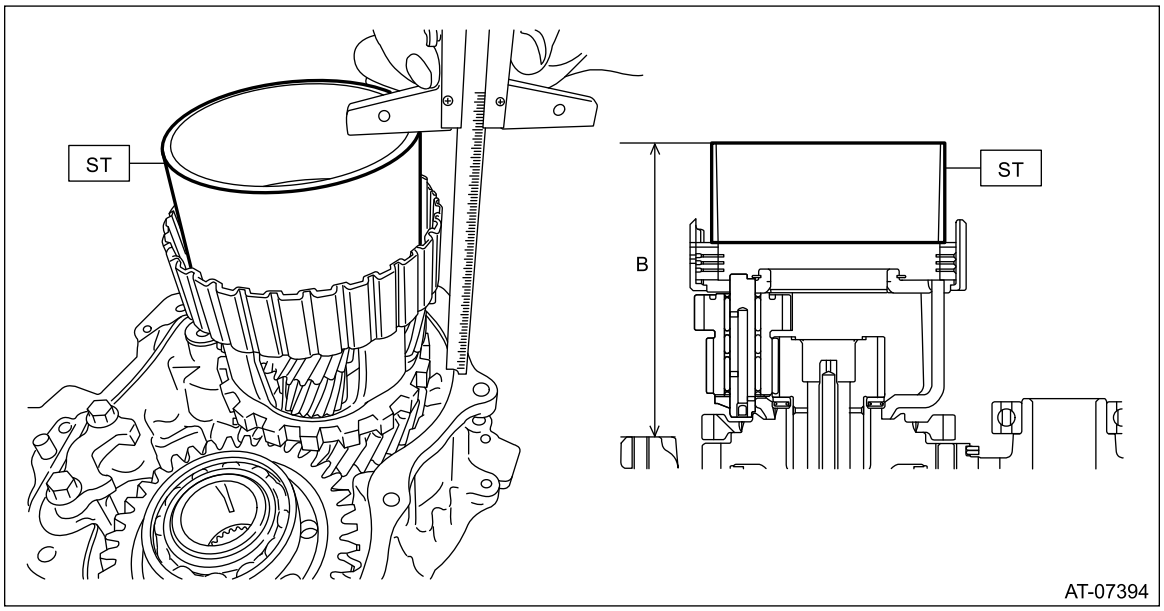
1. Install the drive plate and driven plate to the center differential carrier.
2. Using the ST, measure depth “A” from the end surface of ST to the transfer clutch piston.

ST 499575400 GAUGE



3. Using the ST, measure the height "B" from the mating surface of intermediate case to the end surface of ST.

ST 398744300 PISTON GUIDE



4. Obtain the thickness of driven plate No. 3 using the following formula to select one driven plate No. 3.

T mm = (A − 15) − (B − 50) + 0.38 − (0.2 — 0.6)

[T in = (A − 0.591) − (B − 1.97) + 0.0149 − (0.008 — 0.024)]

T: Rear drive shaft shim thickness

A: Depth from the ST end surface to the transfer clutch piston

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

0.38 mm (0.0149 in): Thickness of gasket

15 mm (0.591 in): Thickness of ST

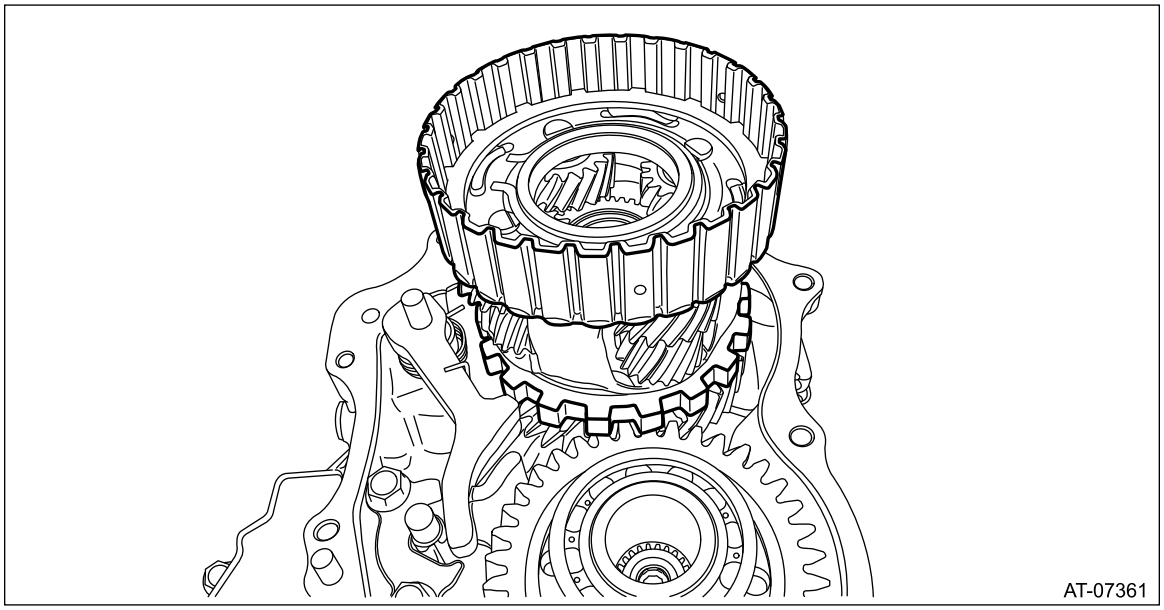
50 mm (1.97 in): Thickness of ST

0.2 — 0.6 mm (0.008 — 0.024 in): Clearance

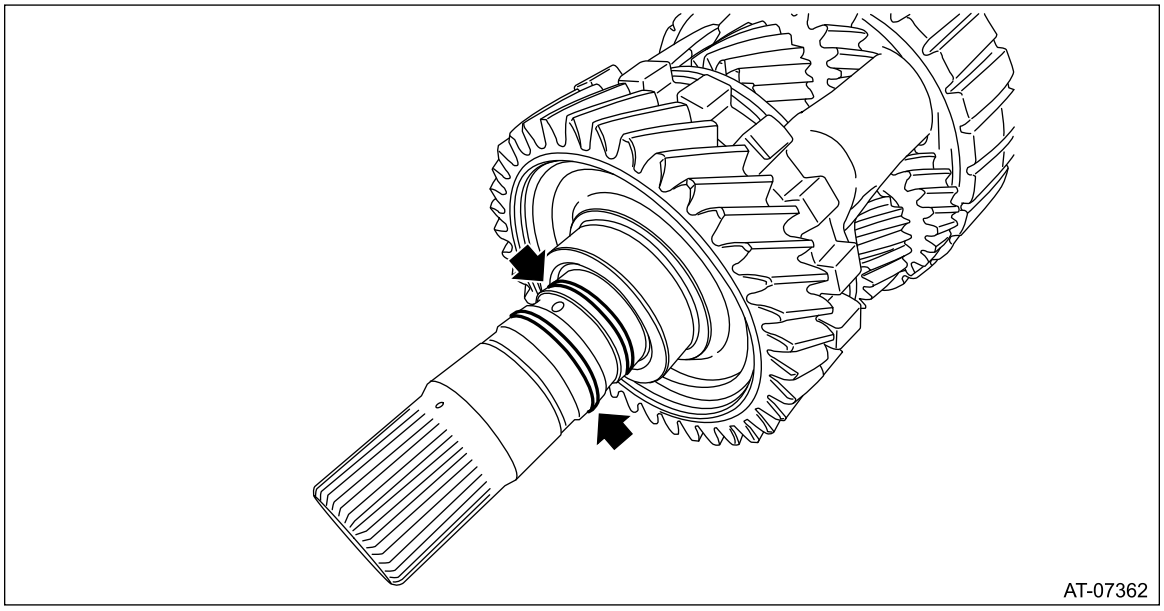
Driven plate No. 3	
Part No.	**Thickness mm (in)**
31589AA150	1.6 (0.063)
31589AA160	2.0 (0.079)
31589AA170	2.4 (0.094)
31589AA180	2.8 (0.110)

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. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transfer Clutch>REMOVAL.
5. Remove the center differential carrier assembly.



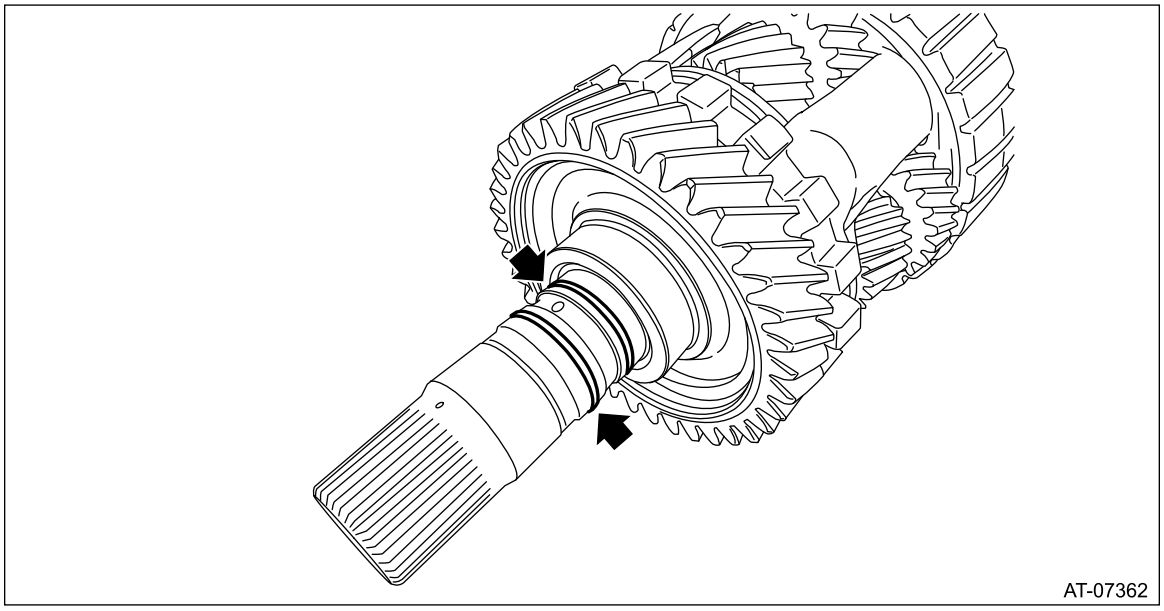
6. Remove the seal rings.



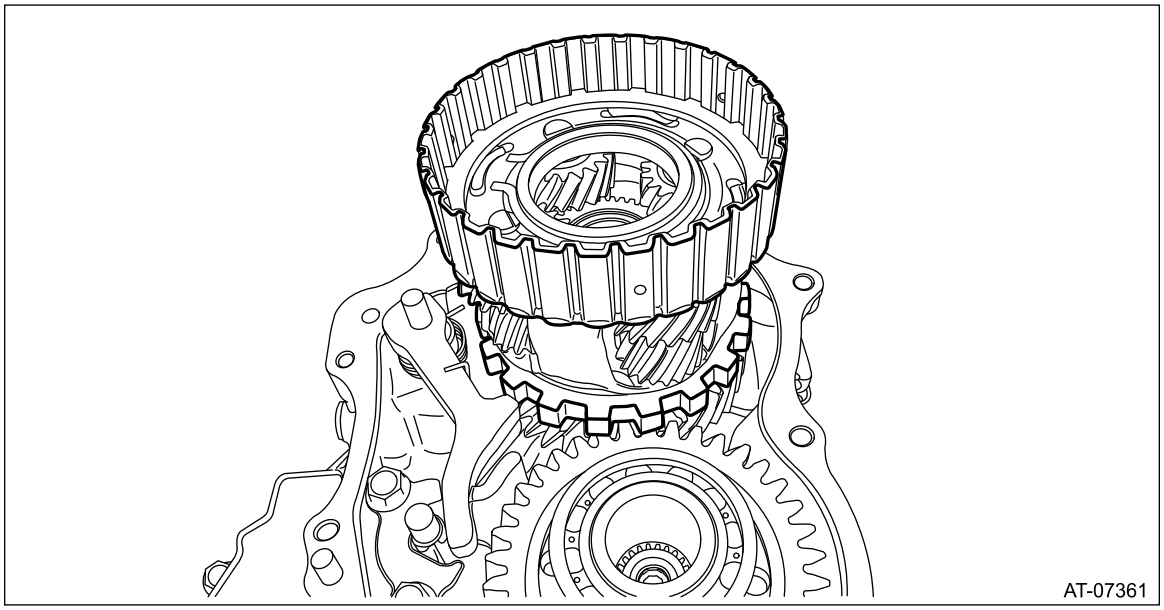
INSTALLATION

1. Install the seal rings.

   Note:
   - **Use new seal rings.**
   - **Do not stretch the seal ring excessively.**
   - **Apply CVTF after installation.**



2. Install the center differential assembly.



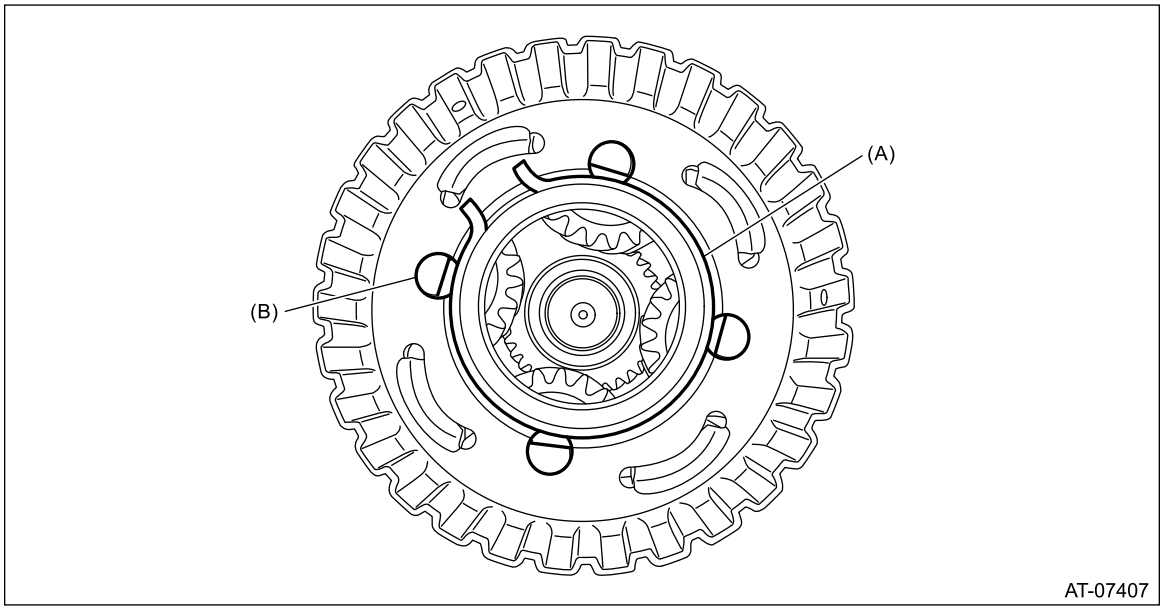
3. Install the transfer clutch. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transfer Clutch>INSTALLATION.
4. Select driven plate No. 3 to replace. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transfer Clutch>ADJUSTMENT.

5. Install the rear drive shaft. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Rear Drive Shaft>INSTALLATION.
6. Select the rear drive shaft shim. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Rear Drive Shaft>ADJUSTMENT.
7. Install the extension case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Extension Case>INSTALLATION.
8. Install the transmission assembly to the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Automatic Transmission Assembly>INSTALLATION.

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Center Differential Carrier

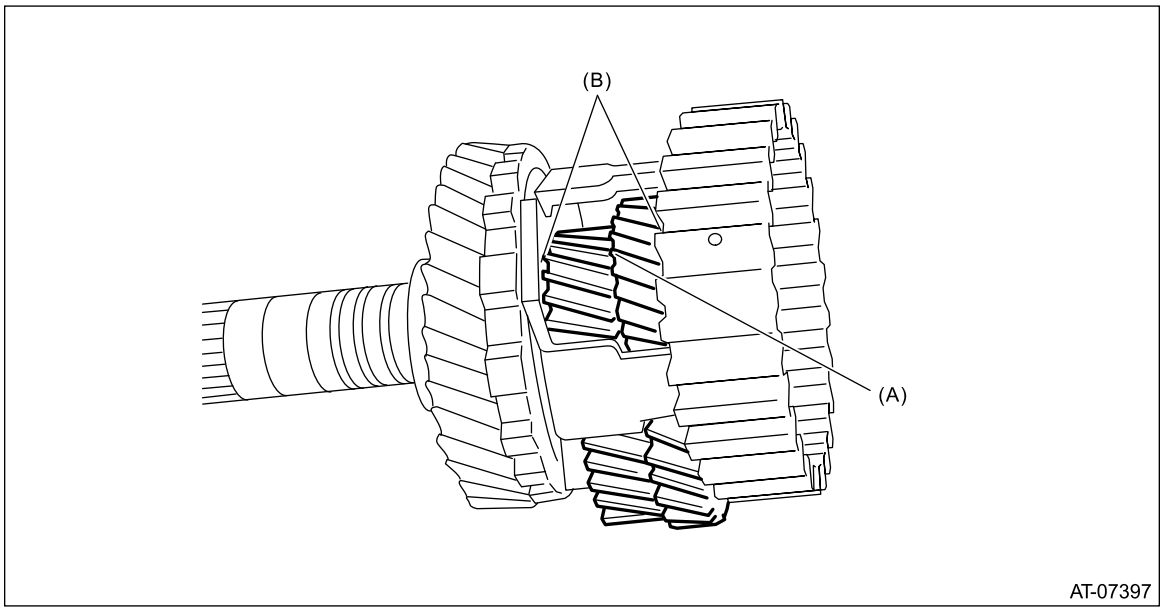
DISASSEMBLY

1. Remove the snap ring, and pull out the pinion shaft from center differential assembly.



(A) Snap ring
(B) Pinion shaft

2. Remove the pinion gear and washers from center differential assembly.



(A) Pinion gear

(B) Washer

3. Remove the intermediate shaft and thrust bearing.

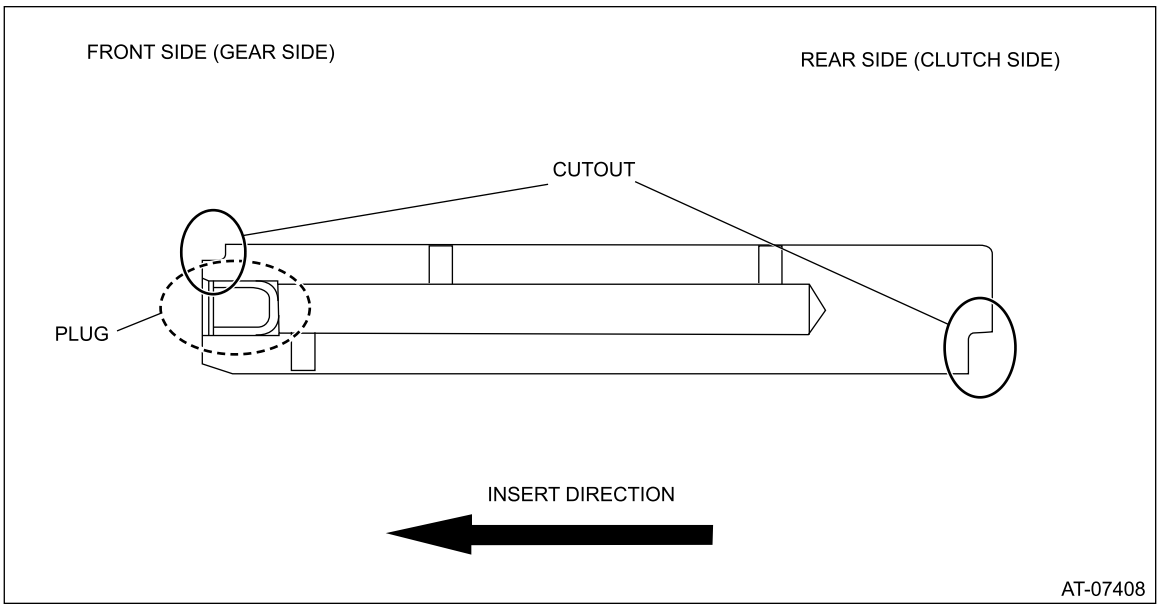
CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Center Differential Carrier

ASSEMBLY

1. Install the thrust bearing onto intermediate shaft.
2. Insert the intermediate shaft into the center differential assembly.
3. Install the pinion gears and washers.
4. Insert the pinion shaft into the center differential assembly.

Note:

- **Insert the pinion shaft with the side with the plug side facing the front side (gear side).**
- **After inserting the pinion shaft, adjust its position so that the cutout portion on the front side is on the inner side.**



5. Install the snap ring.

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Center Differential Carrier

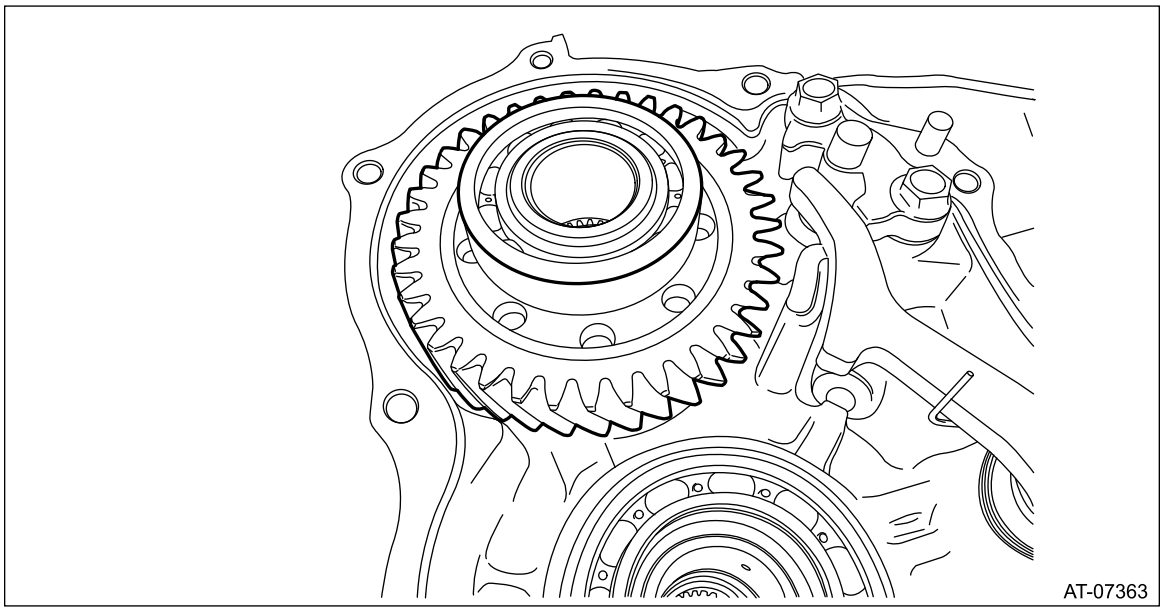
INSPECTION

- Check each part for crack, damage, wear or dust.
- Inspect the extension end play, and adjust it to within the standard value. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transfer Clutch>ADJUSTMENT.

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Transfer Reduction Driven Gear

REMOVAL

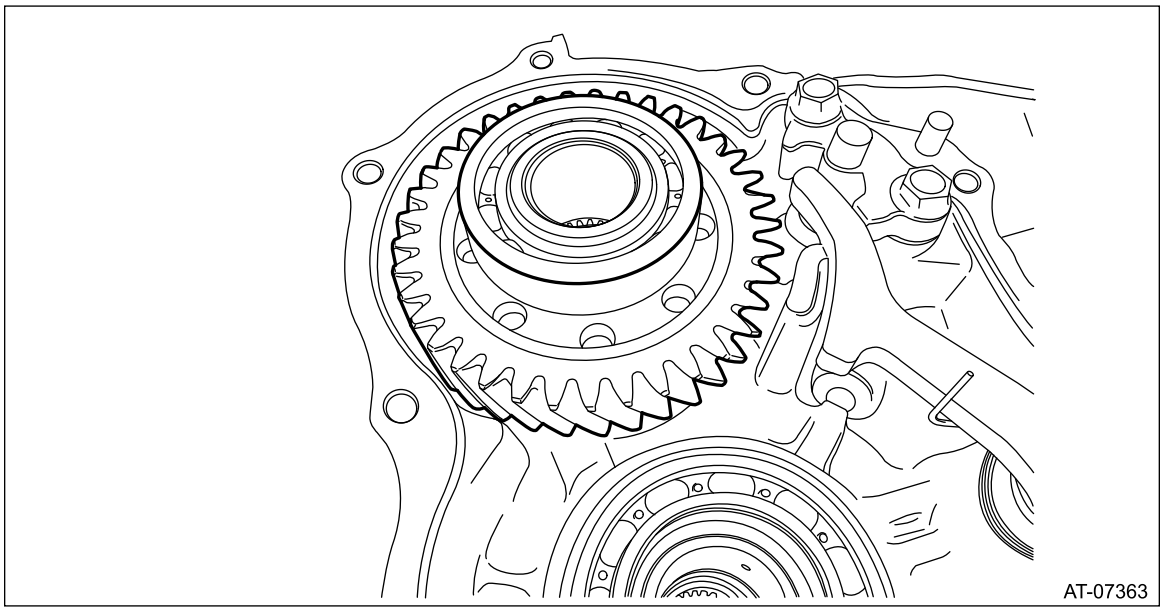
1. Remove the transmission assembly from the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Automatic Transmission Assembly>REMOVAL.
2. Remove the extension case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Extension Case>REMOVAL.
3. Remove the rear drive shaft. Ref. to CONTINUOUSLY 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 center differential carrier. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Center Differential Carrier>REMOVAL.
6. Remove the transfer reduction driven gear assembly.



CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Transfer Reduction Driven Gear

INSTALLATION

1. Install the reduction driven gear assembly.



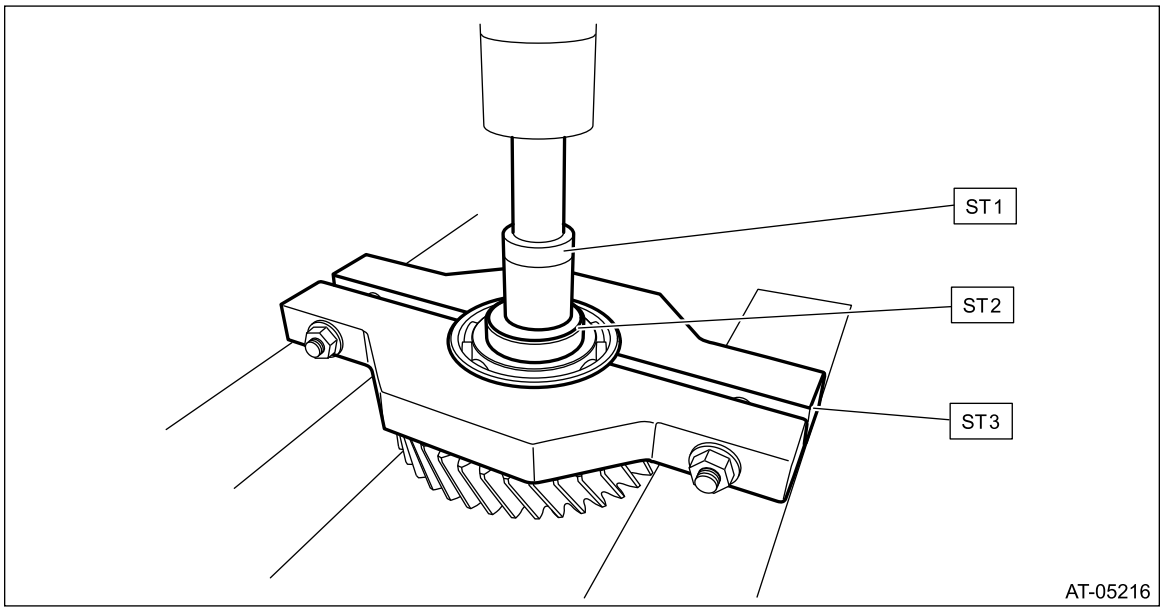
2. Select shims. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transfer Reduction Driven Gear>ADJUSTMENT.
3. Install the center differential carrier. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Center Differential Carrier>INSTALLATION.
4. Install the transfer clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transfer Clutch>INSTALLATION.
5. Install the rear drive shaft. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Rear Drive Shaft>INSTALLATION.
6. Mount the selected shim onto ball bearing.
7. Install the extension case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Extension Case>INSTALLATION.
8. Install the transmission assembly to the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Automatic Transmission Assembly>INSTALLATION.

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Transfer Reduction Driven Gear

DISASSEMBLY

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

ST1	**899864100**	**REMOVER**
ST2	**398497701**	**SEAT**
ST3	**498077600**	**REMOVER**

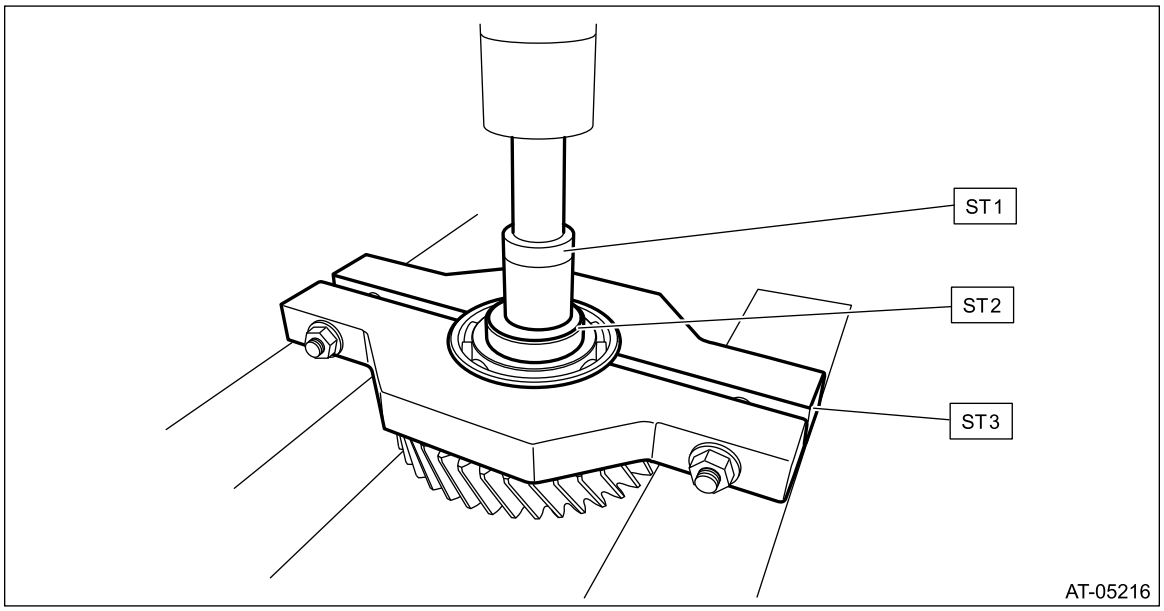


3. Using the ST, remove the ball bearing (small) from transfer reduction driven gear.

ST1 899864100 REMOVER

ST2 398497701 SEAT

ST3 18720AA000 REMOVER



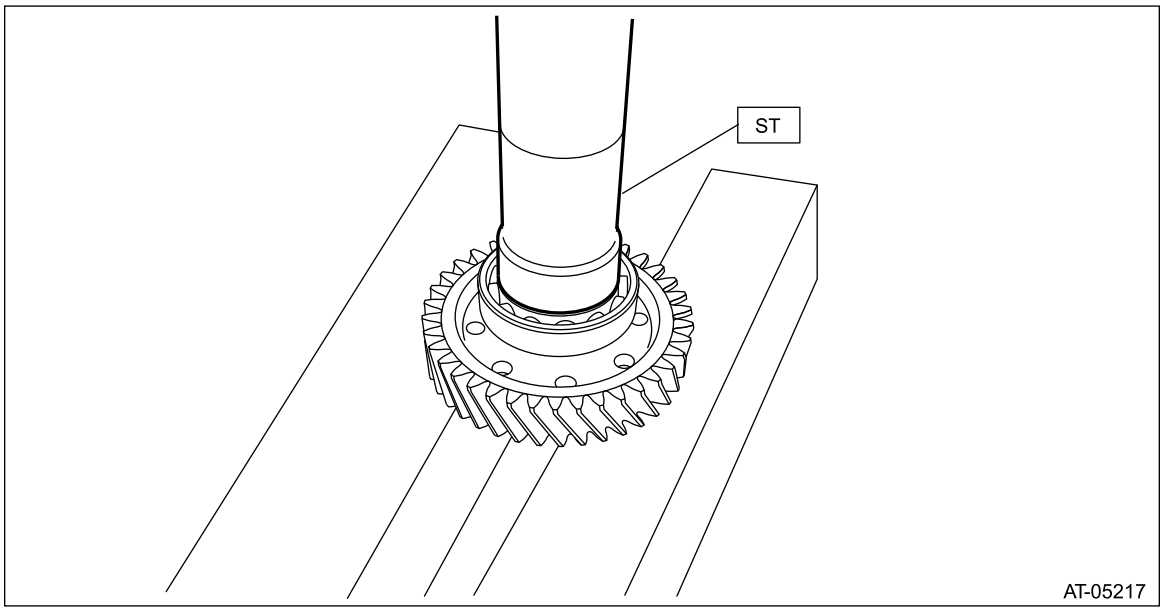
CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Transfer Reduction Driven Gear ASSEMBLY

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.**

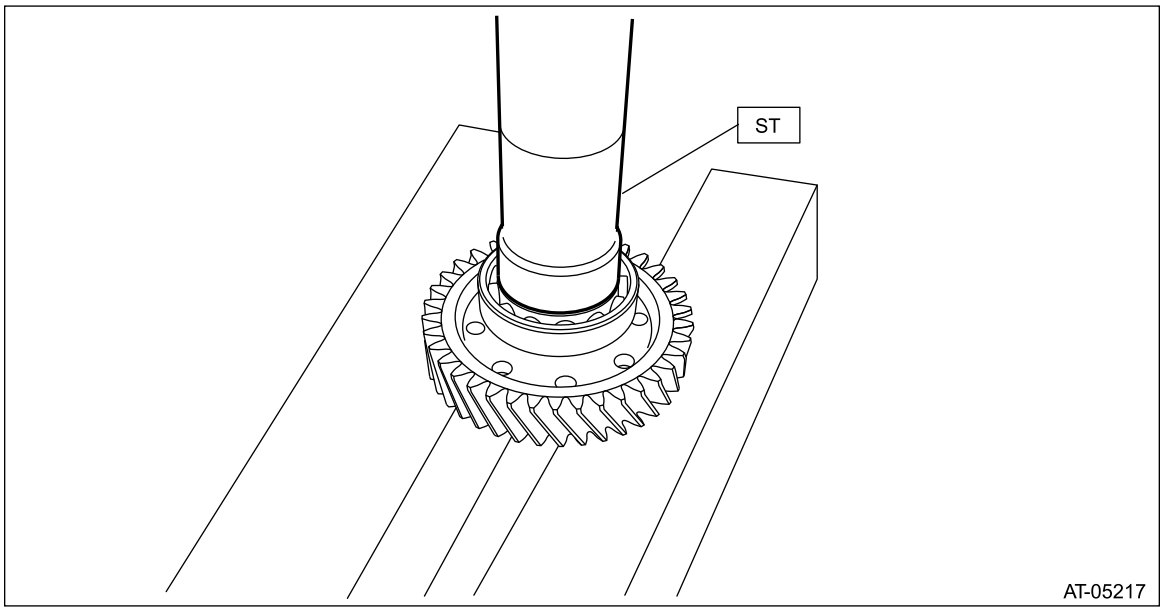


2. Install the new ball bearing (small) to reduction driven gear.

Note:

Use a new ball bearing.

ST 499277100 BUSHING 1-2 INSTALLER



3. Install the snap ring to the transfer reduction driven gear.

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Transfer Reduction Driven Gear

INSPECTION

- Check the ball bearing for smooth rotation.

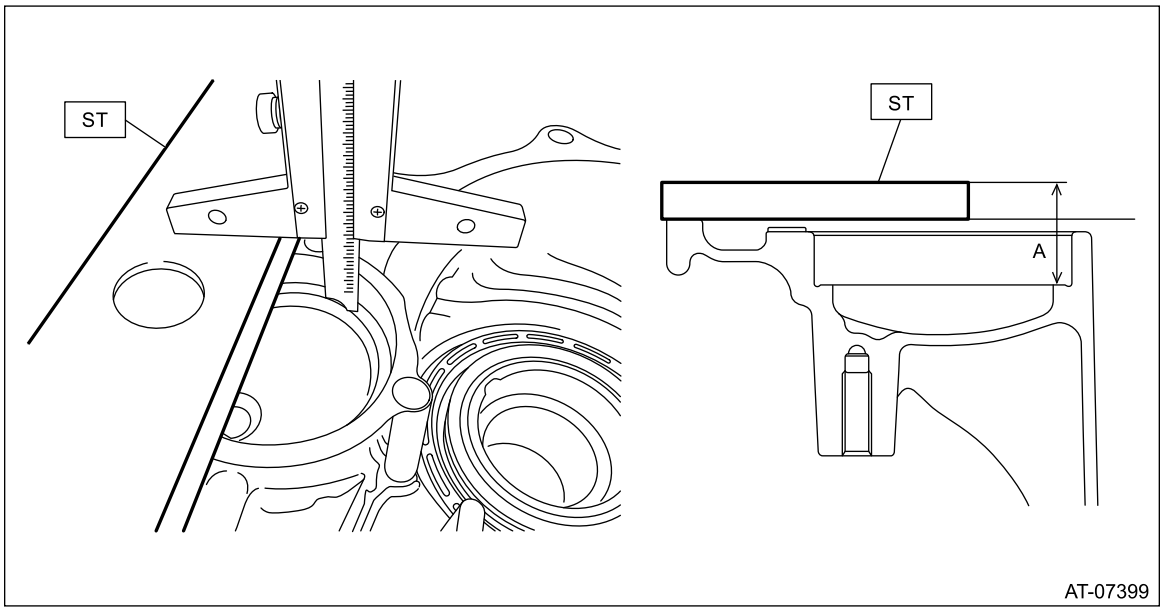
- Check the ball bearing for excessive looseness.
- Make sure the gear is not broken or damaged.

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Transfer Reduction Driven Gear

ADJUSTMENT

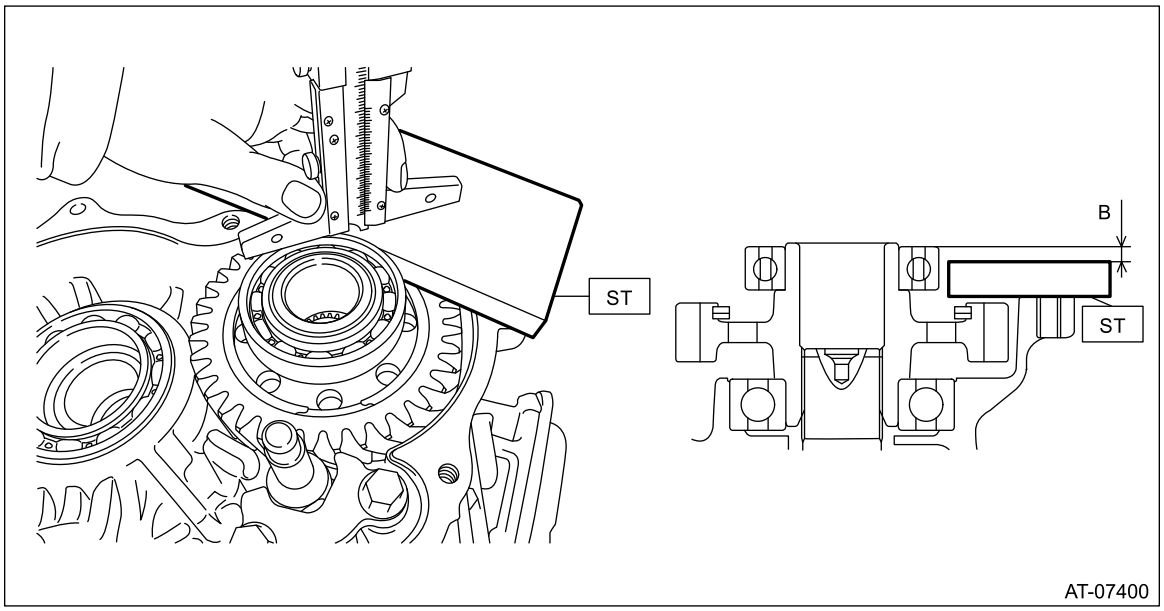
1. Measure depth "A" from the ST upper face to the ball bearing catch surface.

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 one to three shims.
T mm = (A − 15) − (B + 15) + 0.38 − (0.05 — 0.25)

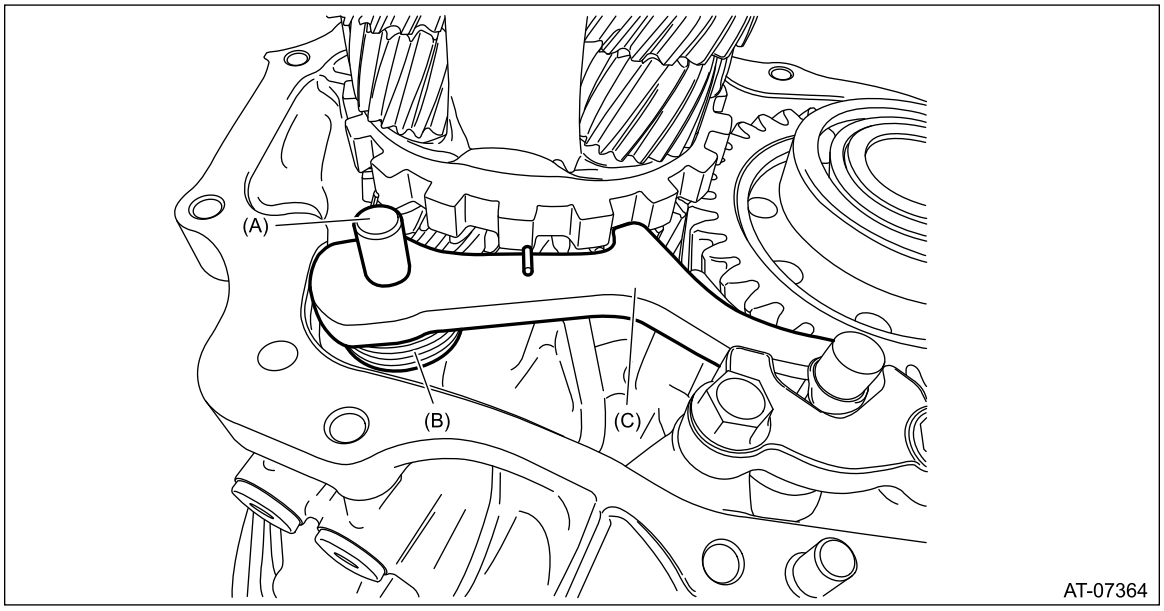
[T in = (A − 0.591) − (B + 0.591) + 0.0149 − (0.002 — 0.01)]
T: Shim thickness
A: Depth from the ST upper face to the ball bearing catch surface
B: Height from the ST to the end of the ball bearing outer ring
0.38 mm (0.0149 in): Thickness of gasket
15 mm (0.591 in): Thickness of ST
0.05 — 0.25 mm (0.002 — 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)

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.

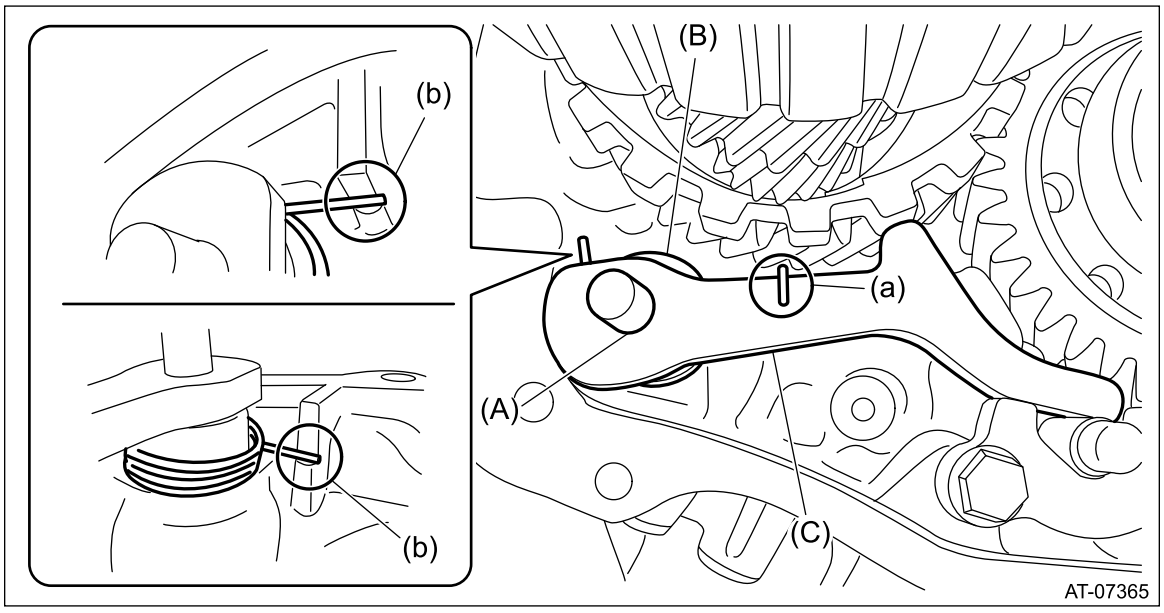


(A) Parking pawl shaft
(B) Return spring
(C) Parking pawl

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > 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.

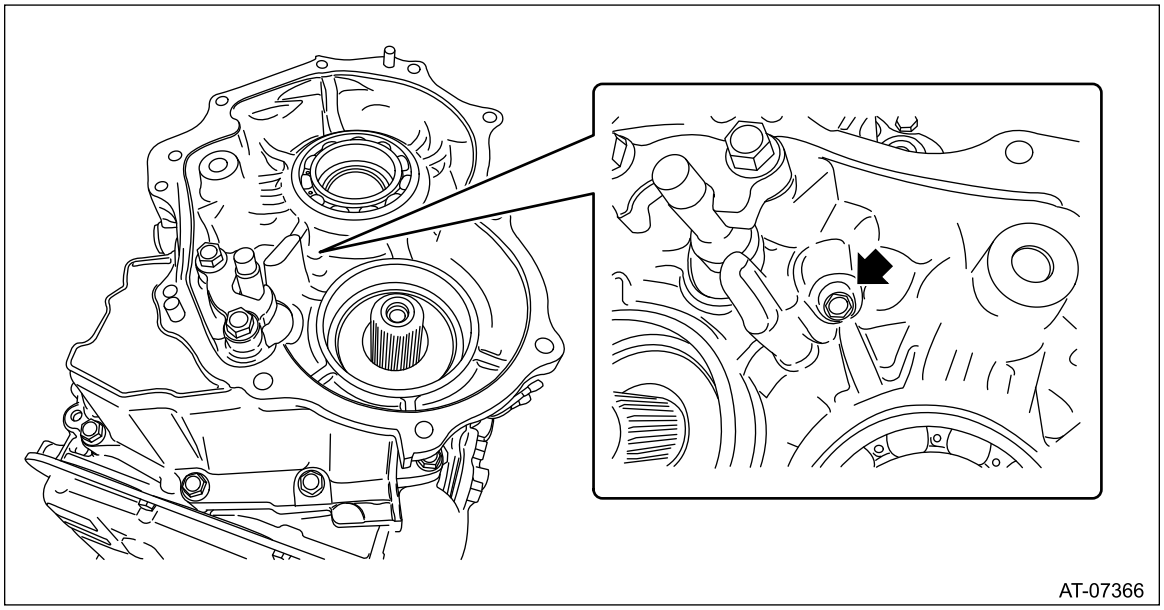
CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Parking Pawl

INSPECTION

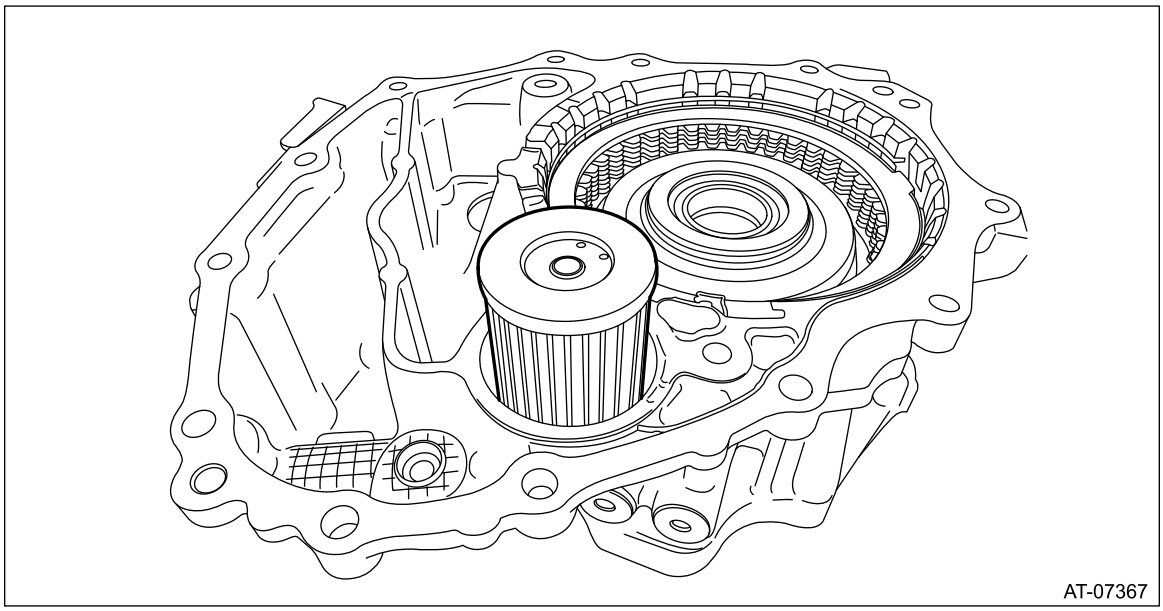
- Check the parking pawl for breakage or damage.
- Check the return spring for fatigue.

REMOVAL

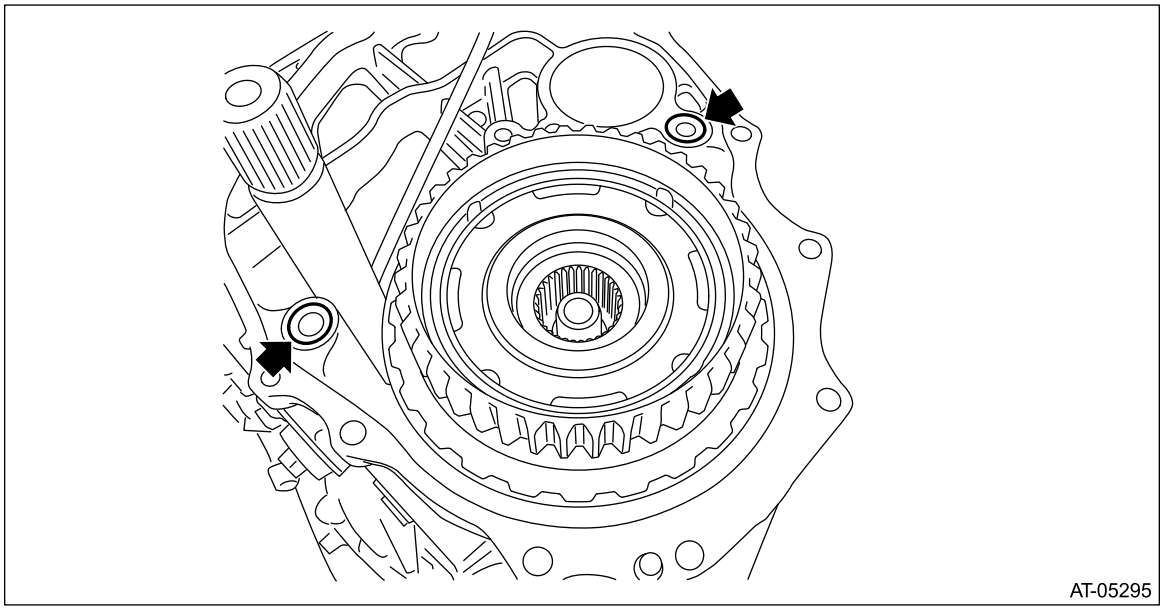
1. Remove the transmission assembly from vehicle body. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Automatic Transmission Assembly>REMOVAL.
2. Remove the extension case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Extension Case>REMOVAL.
3. Remove the parking pawl. Ref. to CONTINUOUSLY VARIABLE 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 center differential carrier. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Center Differential Carrier>REMOVAL.
7. Remove the transfer reduction driven gear assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transfer Reduction Driven Gear>REMOVAL.
8. Remove the intermediate case.
   Note:
   - **The total number of intermediate case mounting bolts is 14.**
   - **Inside the transmission is a single bolt (arrowed).**



9. Remove the CVTF filter.



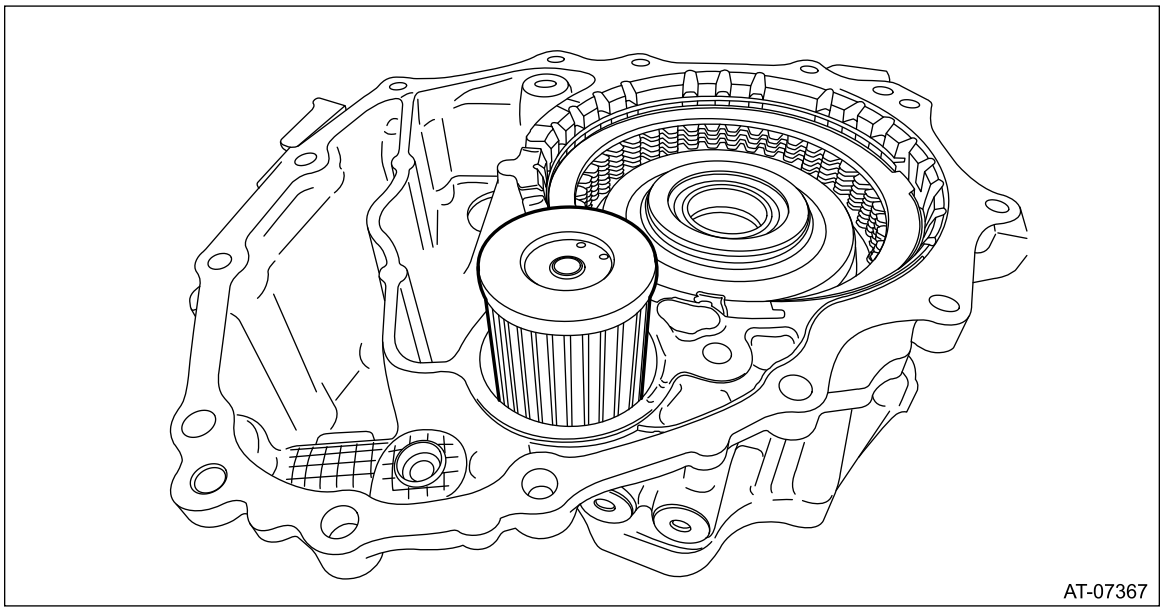
10. Remove the O-ring from the transmission case.



CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Intermediate Case

INSTALLATION

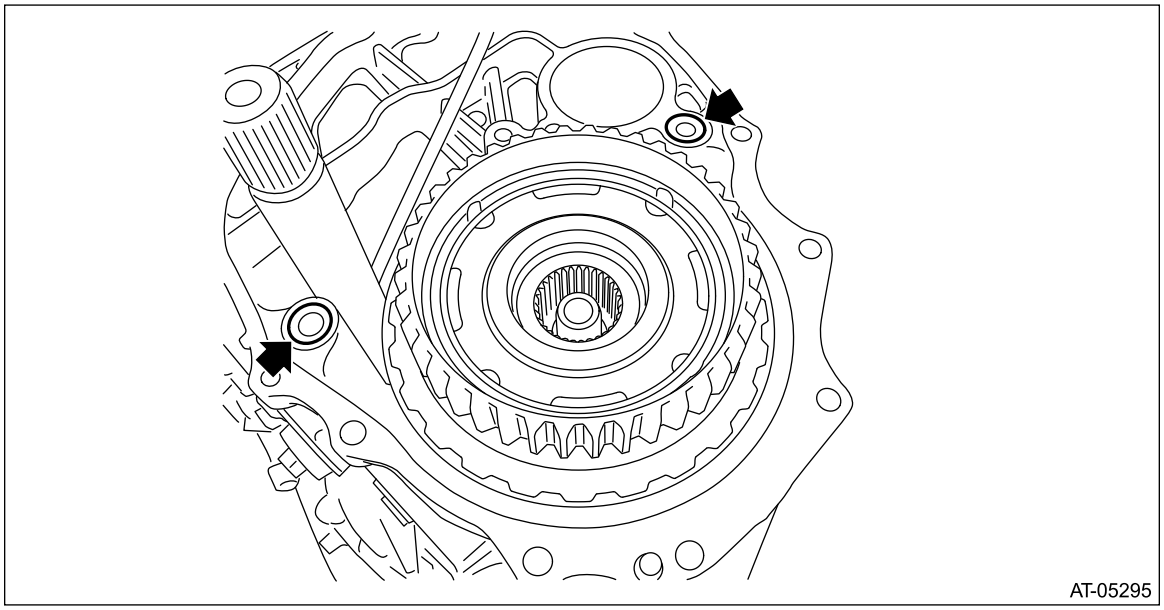
1. Clean the mating surface of intermediate case and transmission case.
2. Face the O-ring side of the CVTF filter to the intermediate case side, and install the CVTF filter.
   Note:
   Apply CVTF to the O-rings.



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

Note:

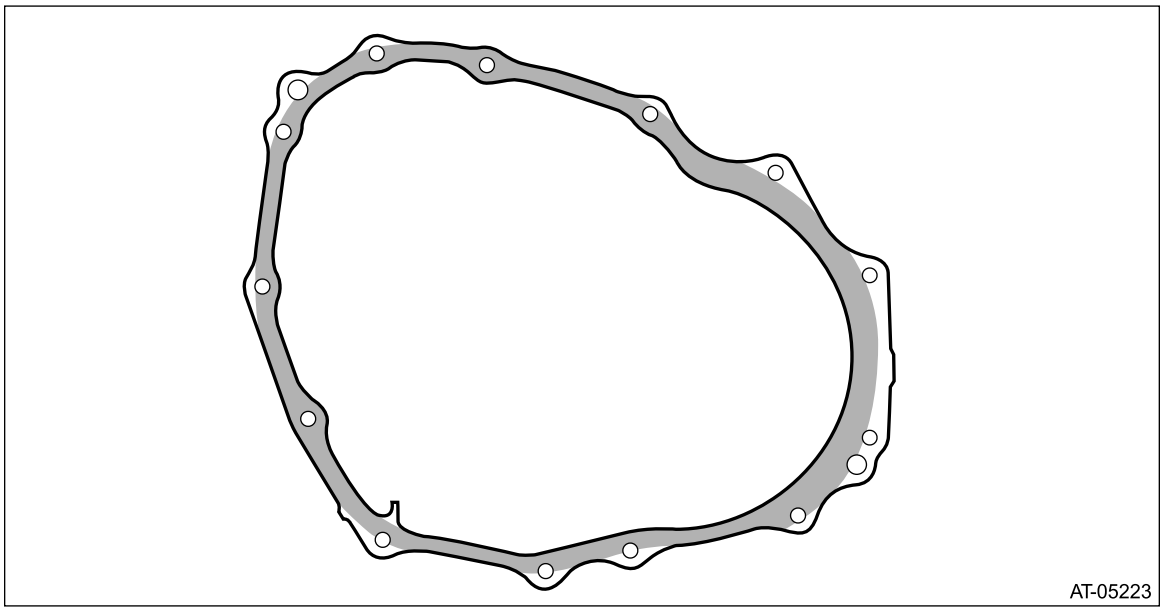
- **Use new O-rings.**
- **Apply CVTF to the O-rings.**



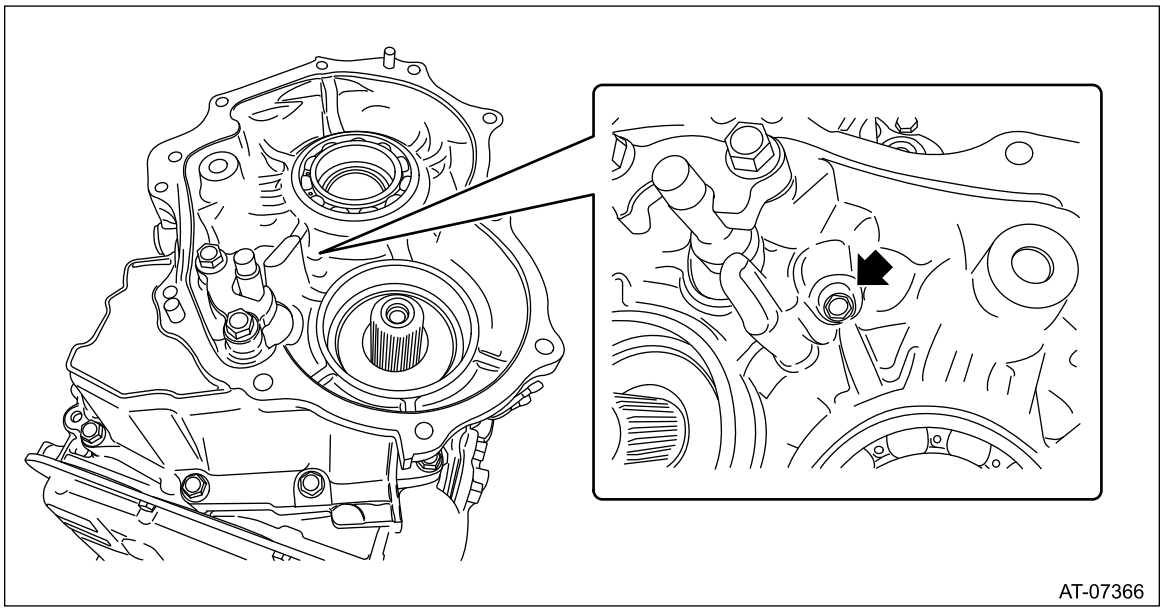
4. Apply liquid gasket seamlessly to the mating surface of transmission case.

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)



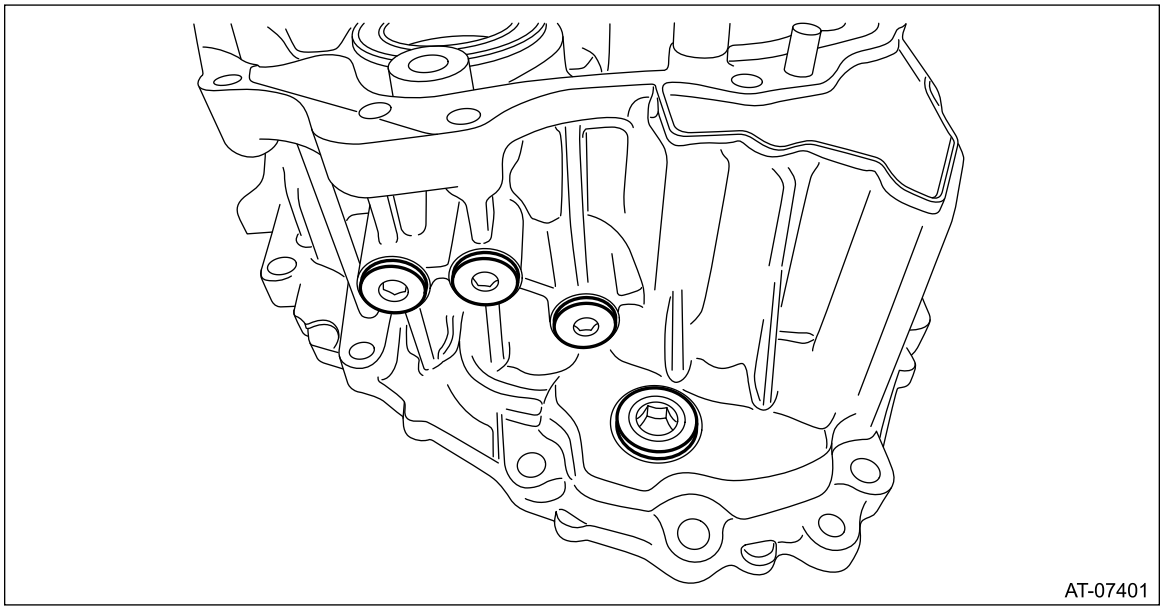
6. Install the transfer reduction driven gear assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transfer Reduction Driven Gear>INSTALLATION.
7. Install the center differential carrier. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Center Differential Carrier>INSTALLATION.
8. Install the 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 parking pawl. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Parking Pawl>INSTALLATION.
11. Install the extension case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Extension Case>INSTALLATION.
12. Install the transmission to vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Automatic Transmission Assembly>INSTALLATION.

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Intermediate Case

DISASSEMBLY

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

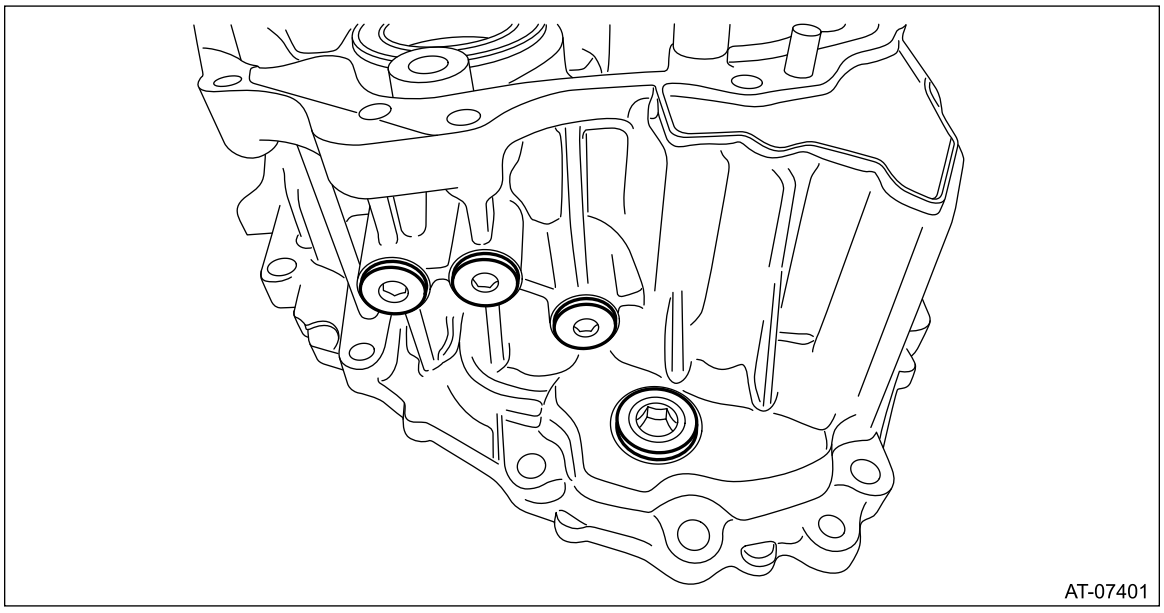


4. Remove the reverse brake assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Reverse Brake Assembly>DISASSEMBLY.

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Intermediate Case

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.

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Intermediate Case

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.

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > CVTF Filter

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.**

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > CVTF Filter

INSTALLATION

Note:
For installation of CVTF filter, refer to "Intermediate Case". Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Intermediate Case>INSTALLATION.

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.

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.

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Reverse Brake Assembly

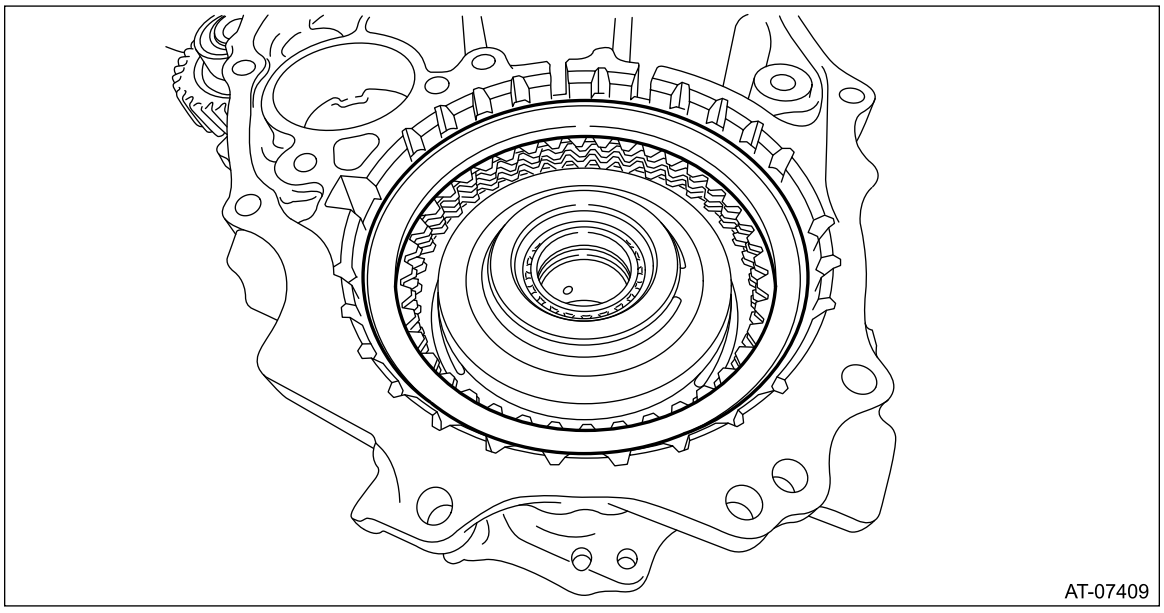
INSTALLATION

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

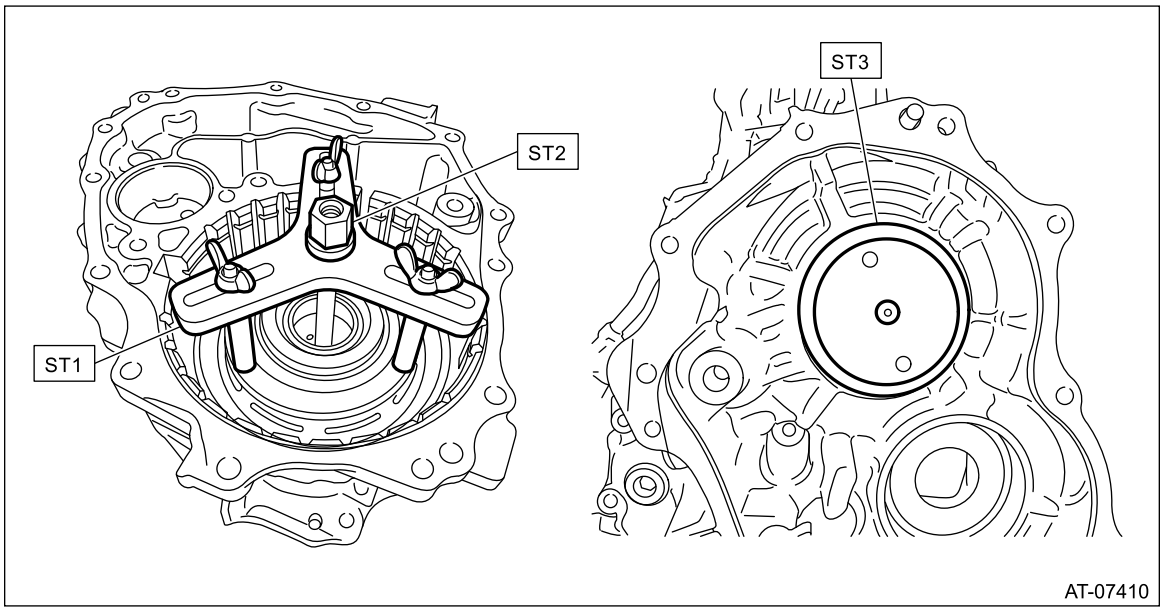
DISASSEMBLY

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

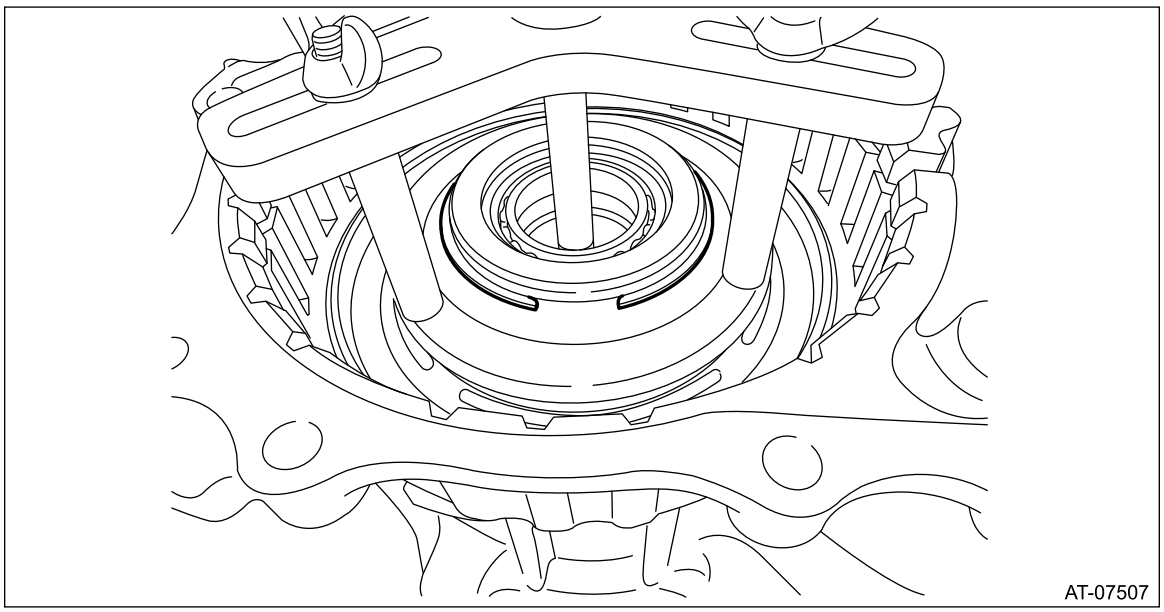


3. Set the ST1, ST2 and ST3 to intermediate case.

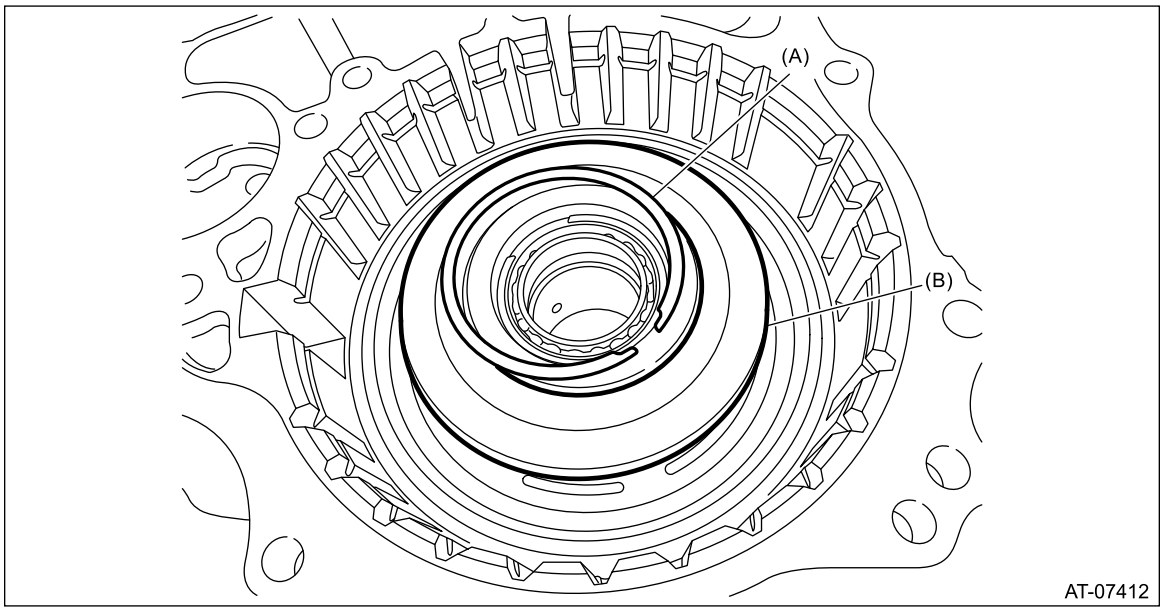
ST1	18762AA001	COMPRESSOR SPECIAL TOOL
ST2	18763AA000	COMPRESSOR SHAFT
ST3	18765AA000	COMPRESSOR SUPPORT



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



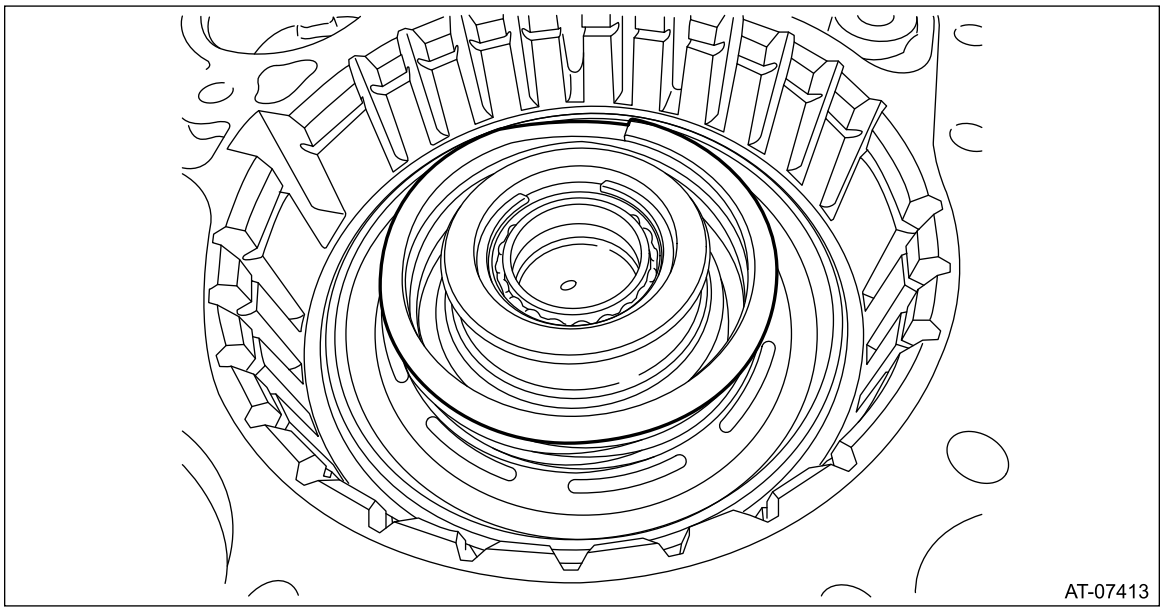
5. Using the ST, remove the snap ring and spring retainer.



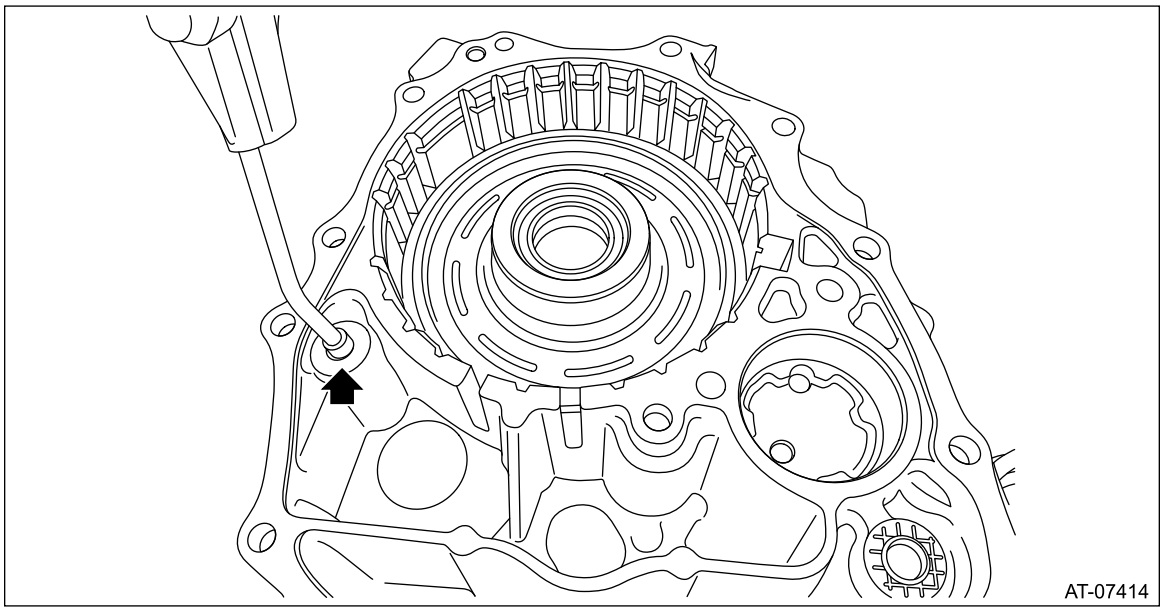
(A) Snap ring

(B) Spring retainer

6. Remove the return spring.



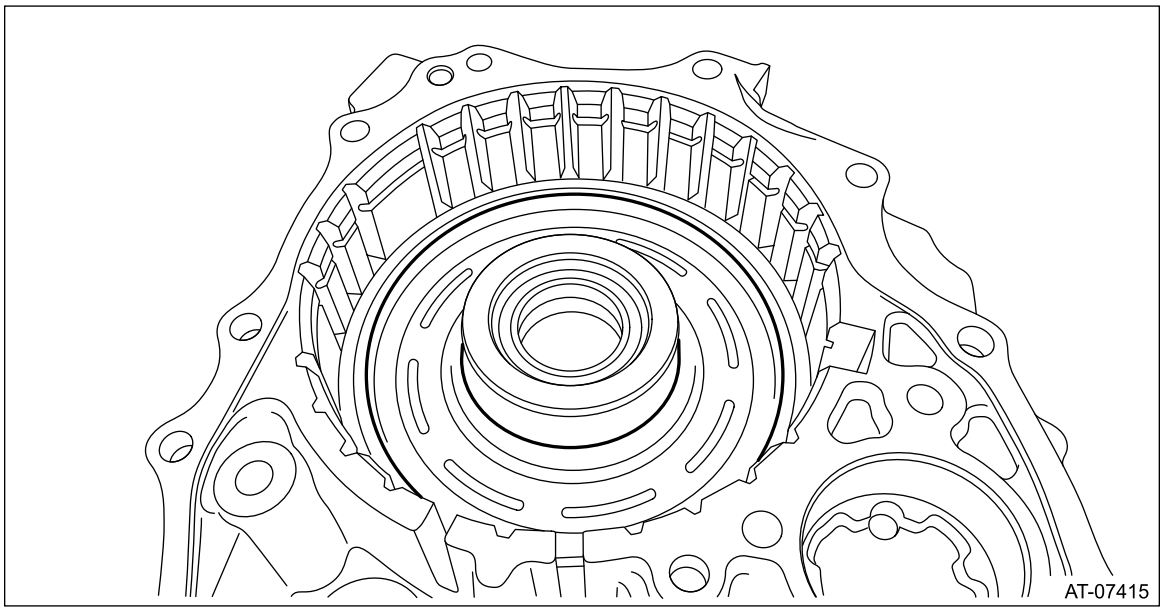
7. Remove the reverse brake piston by blowing compressed air intermittently from intermediate case hole.



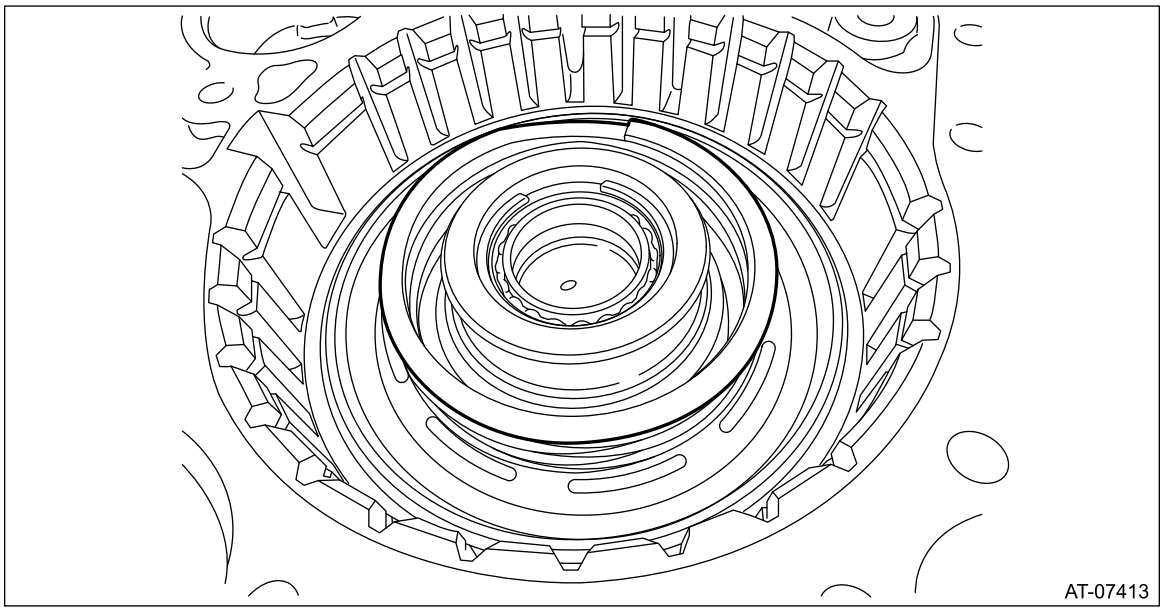
CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Reverse Brake Assembly

ASSEMBLY

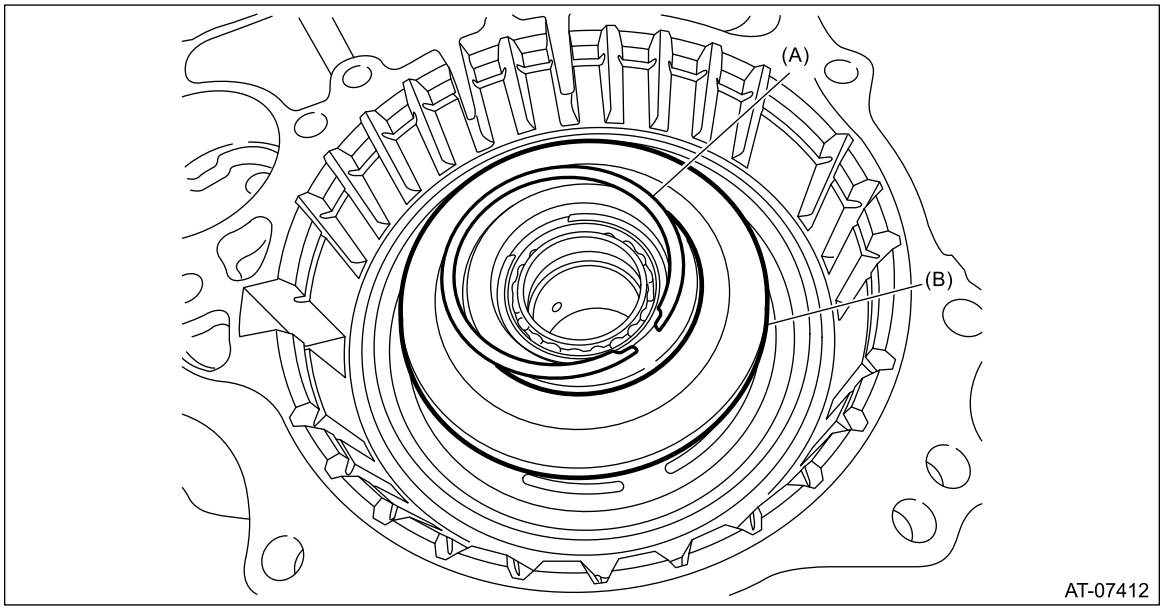
1. Apply CVTF to the seal of reverse brake piston and install it to intermediate case.



2. Install the return spring.



3. Set the spring retainer and snap ring.

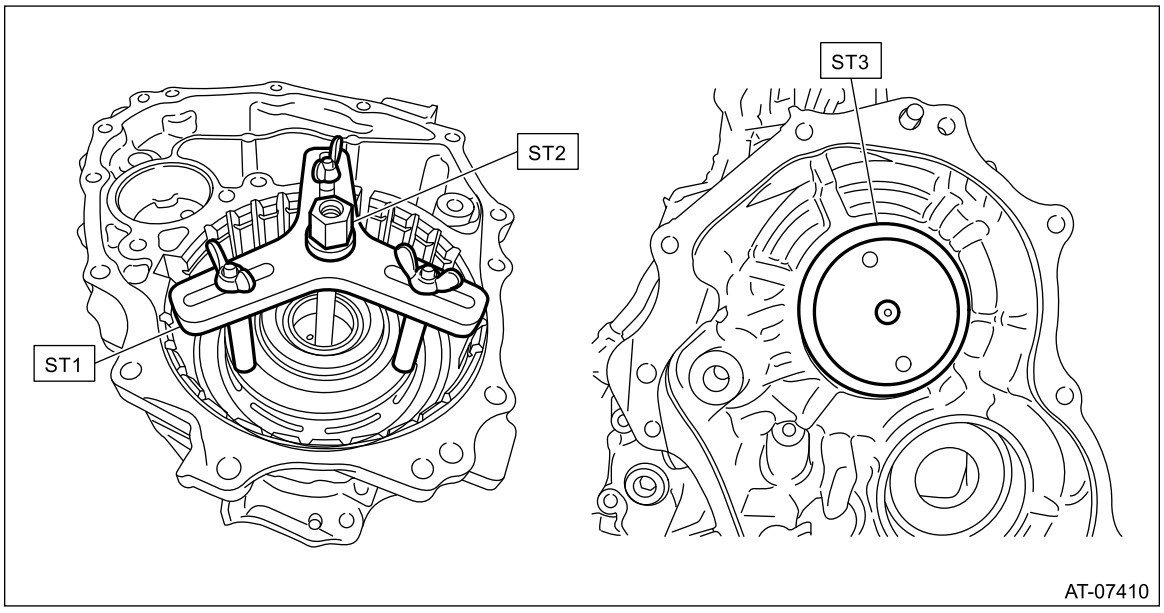


(A) Snap ring

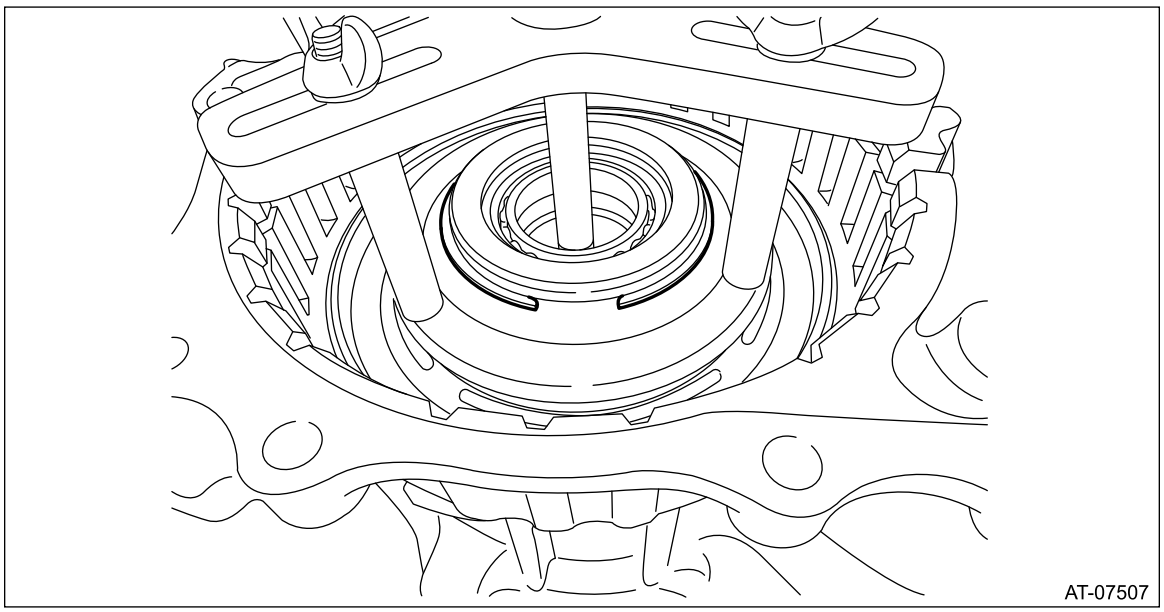
(B) Spring retainer

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

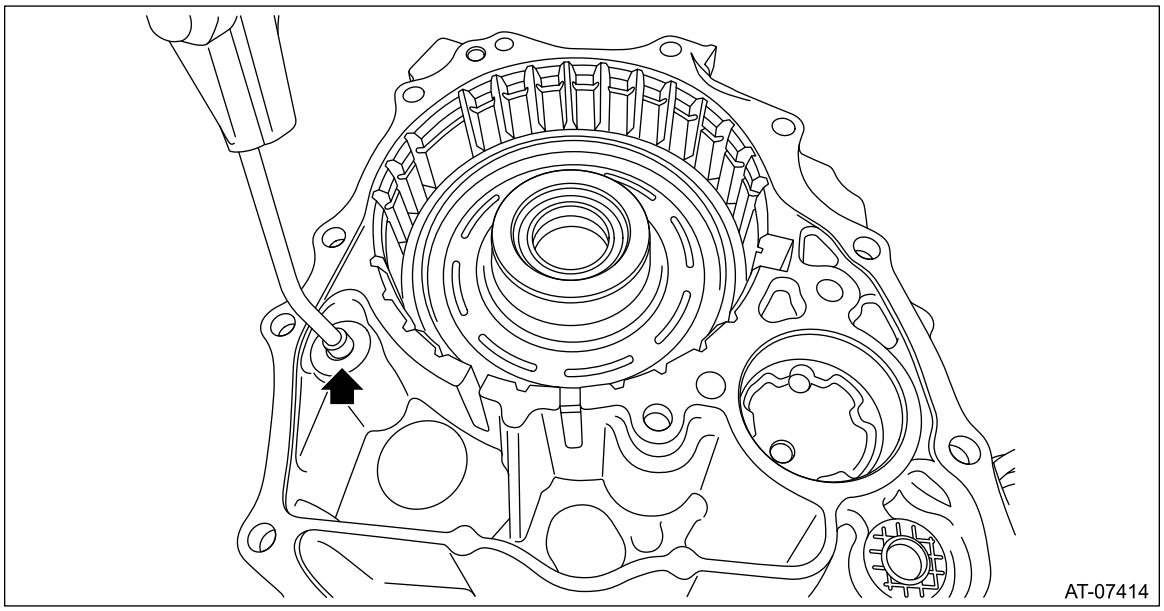
ST1	**18762AA001**	**COMPRESSOR SPECIAL TOOL**
ST2	**18763AA000**	**COMPRESSOR SHAFT**
ST3	**18765AA000**	**COMPRESSOR SUPPORT**



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:

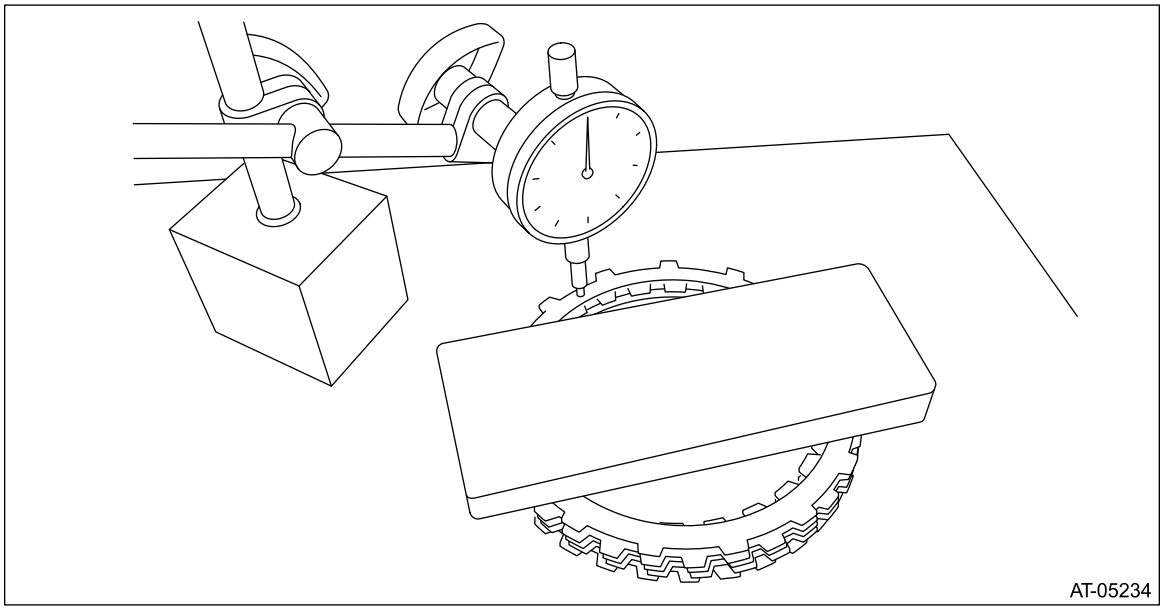
The value, which is read in the gauge at this time, is zero point.

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

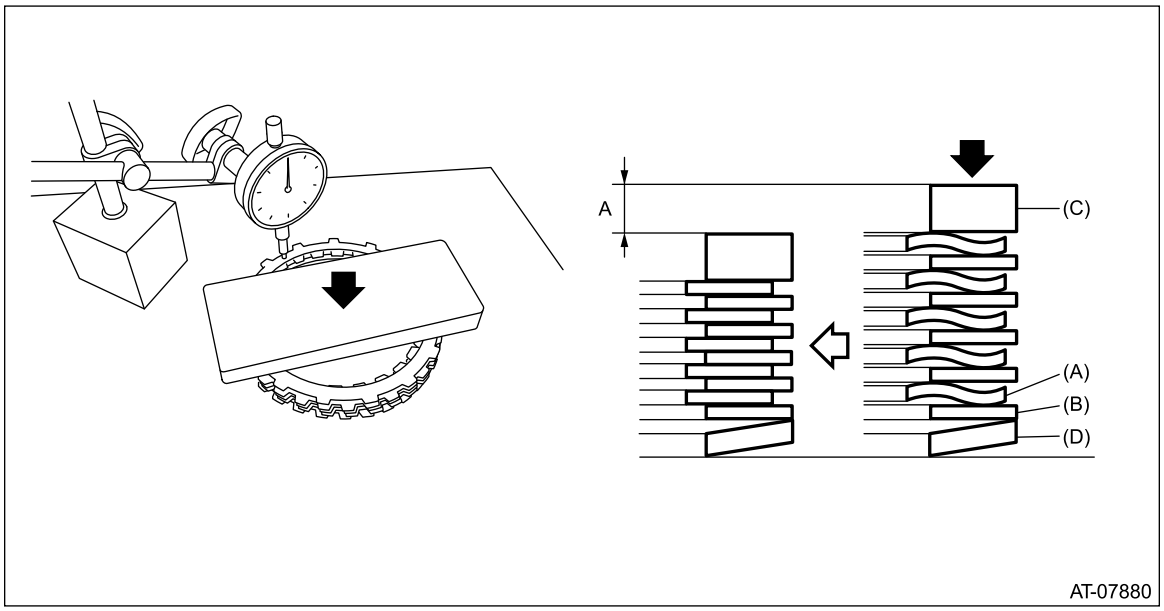
84 N (8.6 kgf, 18.9 lb): Load applied to clutch plate

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

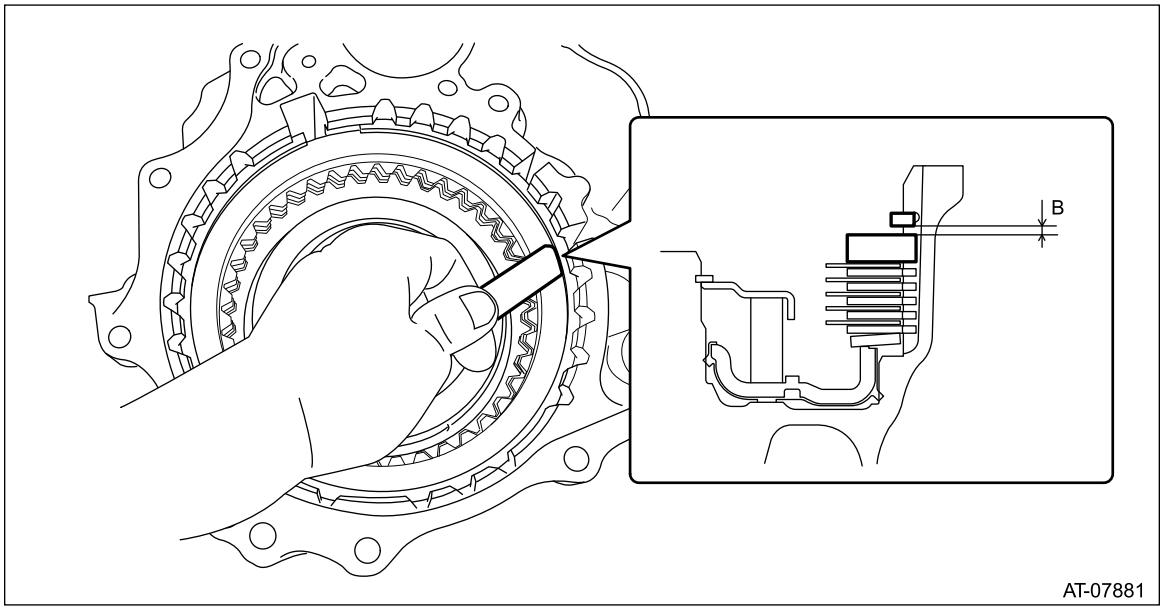
(D) Dish plate

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 mm (0.113 — 0.125 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)
31567AB710	6.2 (0.244)

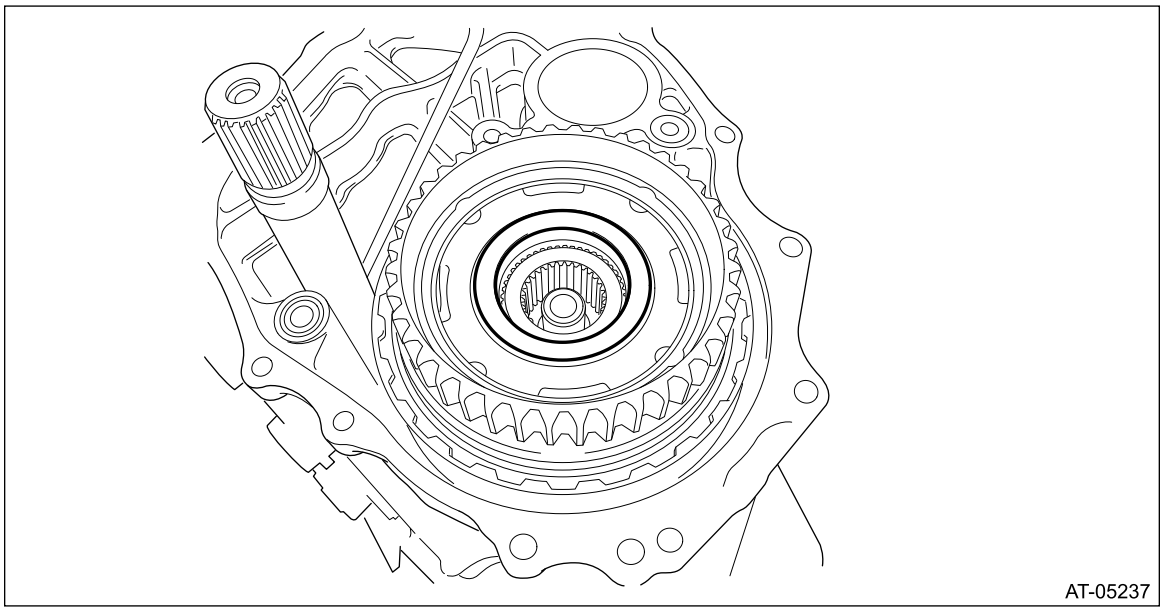
CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Reverse Brake Assembly

INSPECTION

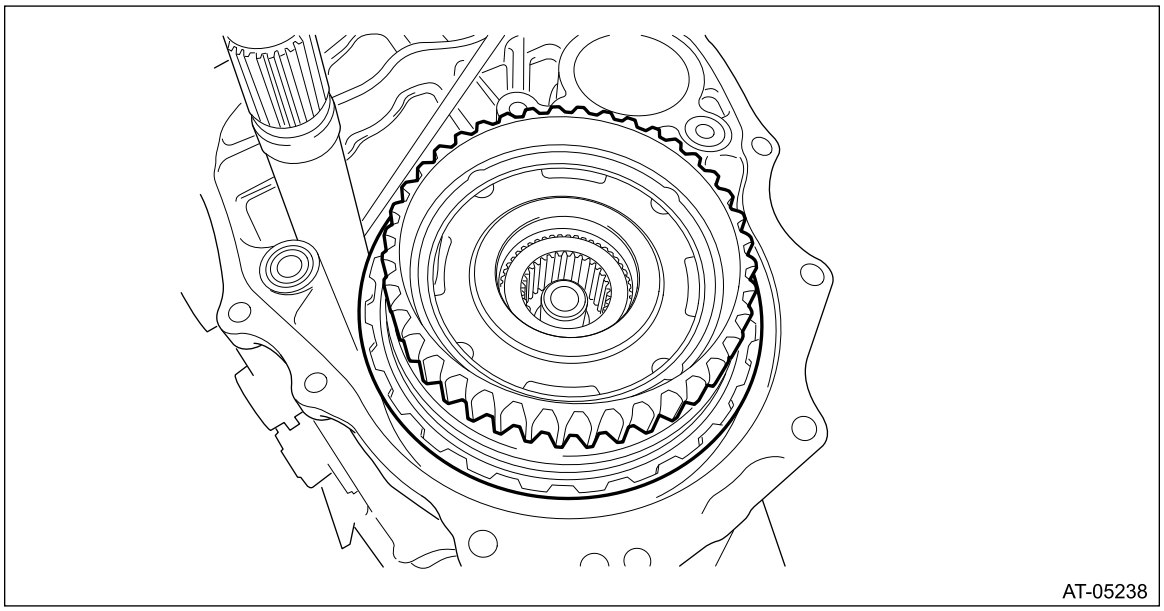
- Inspect the drive plate facing for wear and damage.
- Check the driven plate for discoloration (burnt color).
- Check for worn snap ring, fatigue or damaged return spring or deformed spring retainer.
- Make sure the clearance between retaining plate and snap ring of reverse brake is within the limit. 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.

REMOVAL

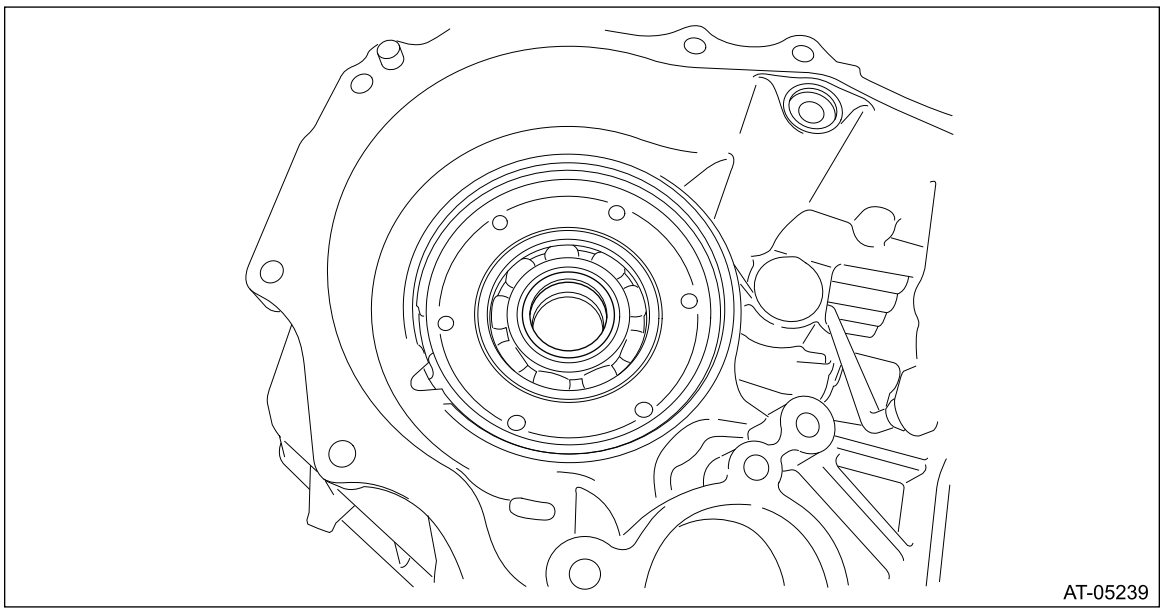
1. Remove the transmission from the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Automatic Transmission Assembly>REMOVAL.
2. Remove the extension case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Extension Case>REMOVAL.
3. Remove the rear drive shaft. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Rear Drive Shaft>REMOVAL.
4. Remove the transfer clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transfer Clutch>REMOVAL.
5. Remove the center differential carrier. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Center Differential Carrier>REMOVAL.
6. Remove the transfer reduction driven gear. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transfer Reduction Driven Gear>REMOVAL.
7. Remove the intermediate case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Intermediate Case>REMOVAL.
8. Remove the thrust needle bearing.



9. Remove the forward clutch assembly.



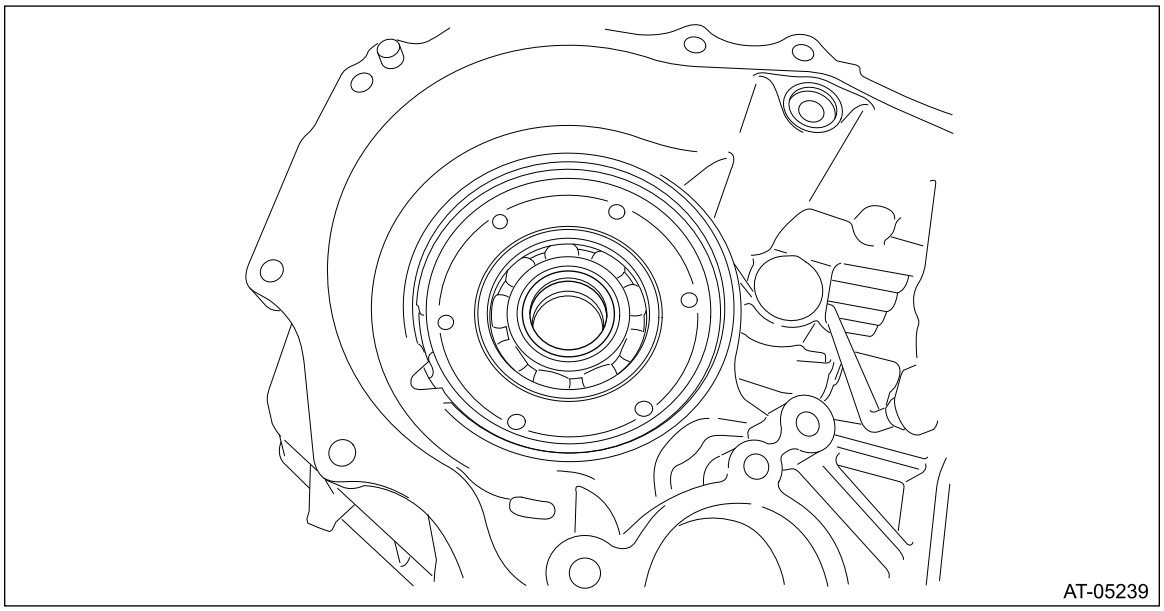
10. Remove the washer.



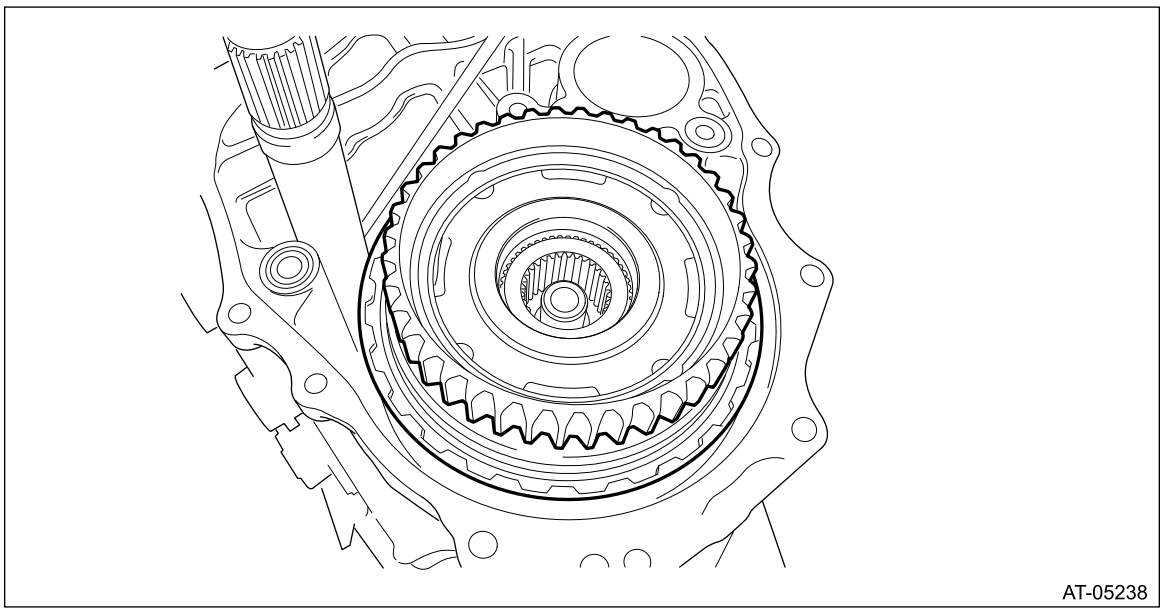
CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Forward Clutch Assembly

INSTALLATION

1. Select a washer. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Forward Clutch Assembly>ADJUSTMENT.
2. Install the selected washer.



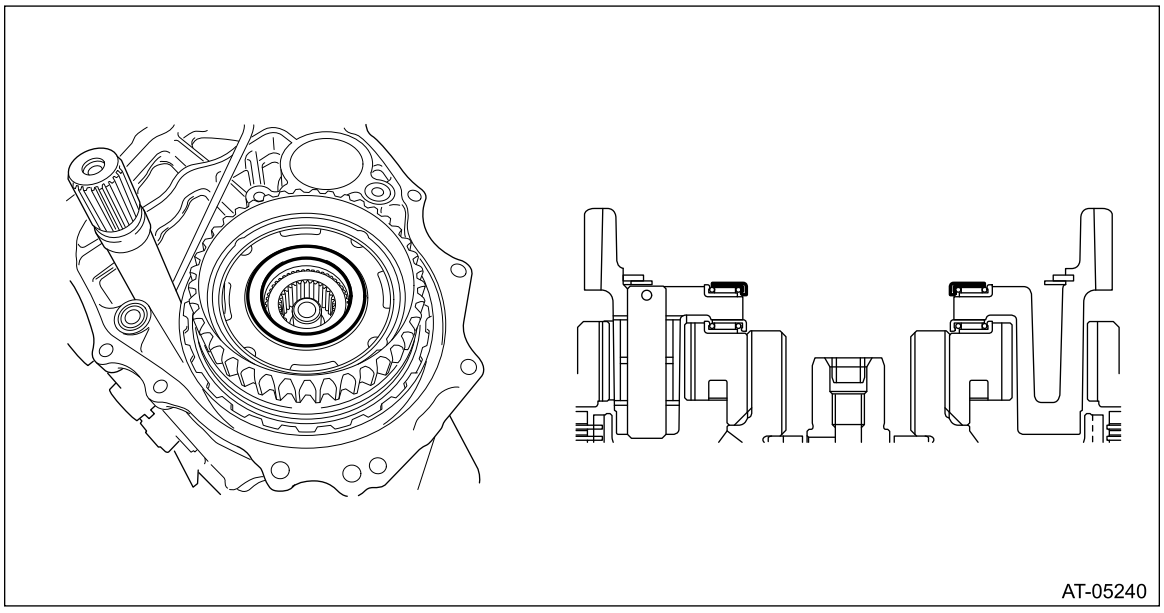
3. Install the forward clutch assembly.



4. Install the thrust needle bearing.

Note:

Install the thrust needle bearing in the correct direction.

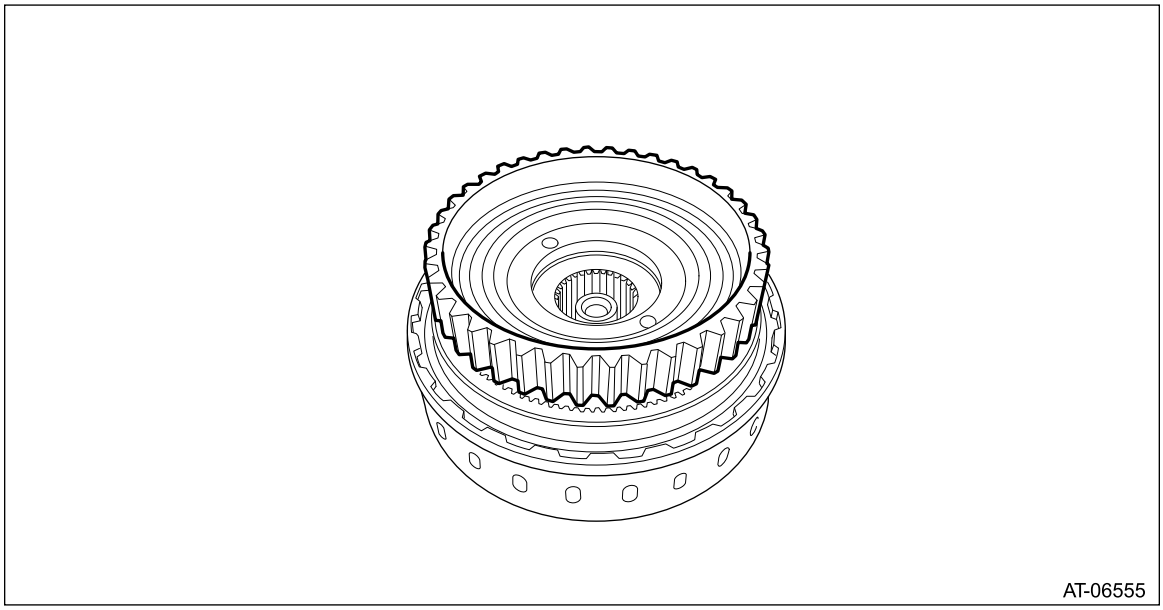


5. Install the intermediate case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Intermediate Case>INSTALLATION.
6. Install the transfer reduction driven gear assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transfer Reduction Driven Gear>INSTALLATION.
7. Install the center differential carrier. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Center Differential Carrier>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.

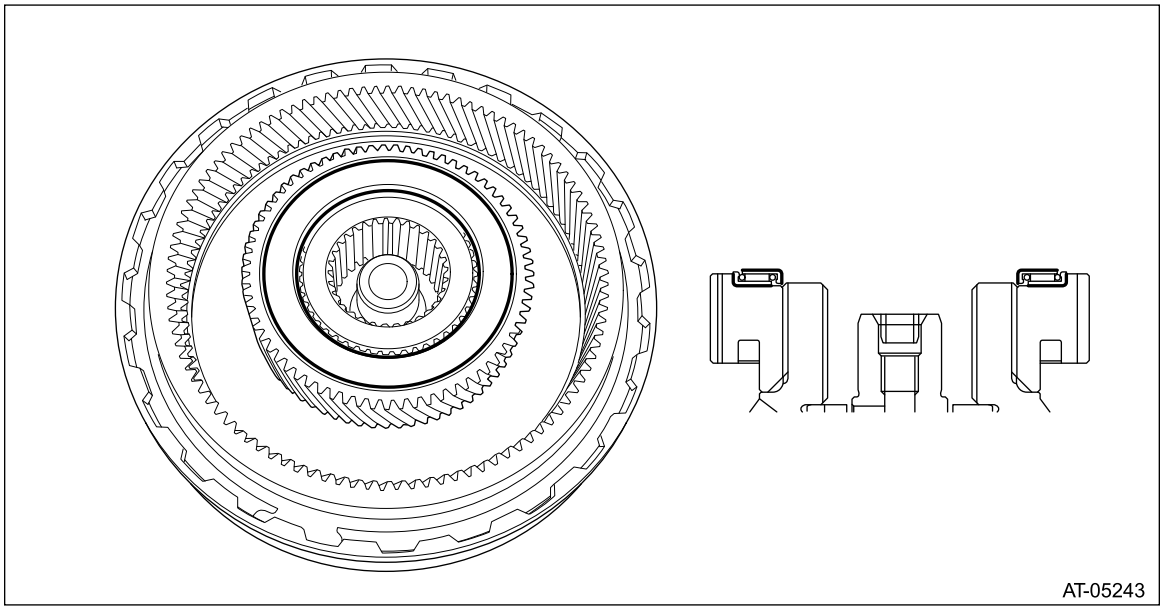
CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Forward Clutch Assembly

DISASSEMBLY

1. Remove the planetary carrier assembly.



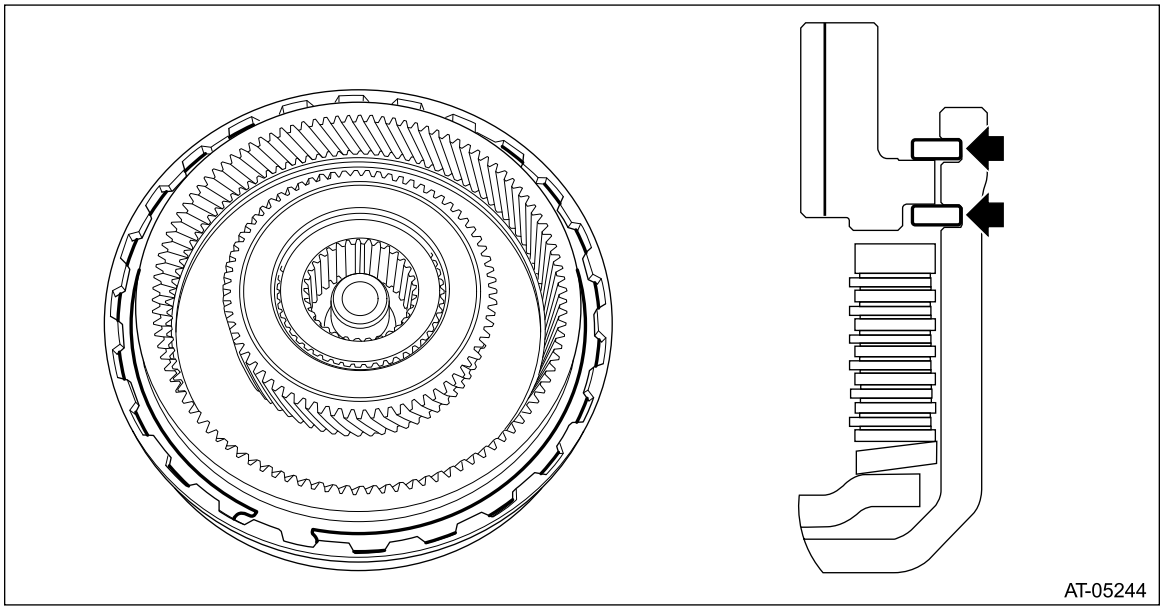
2. Remove the thrust needle bearing.



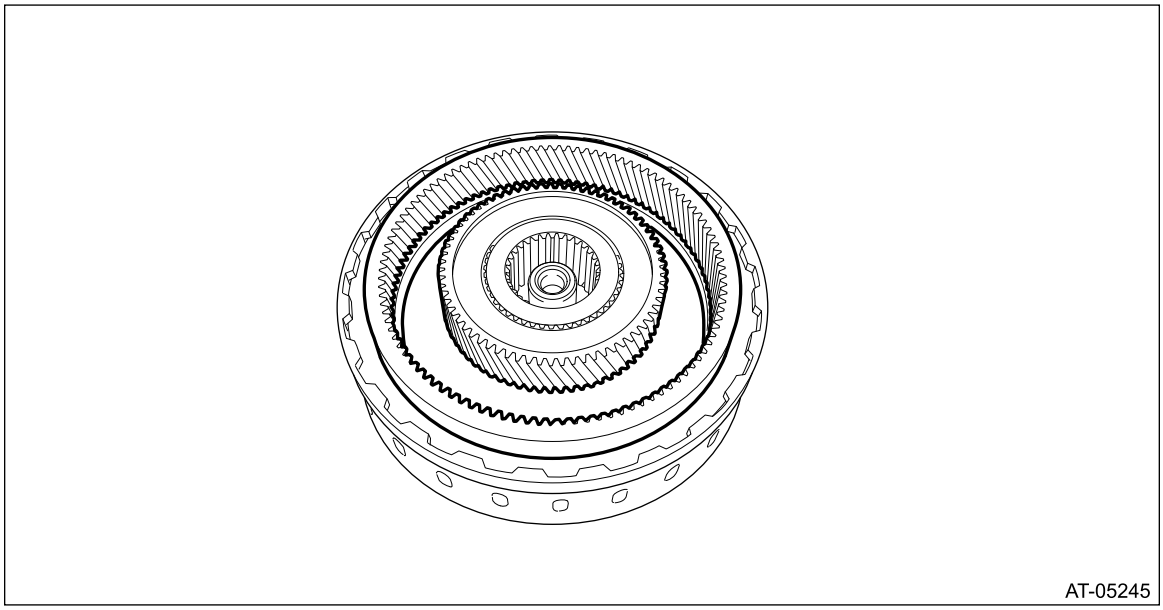
3. Remove the snap ring.

Note:

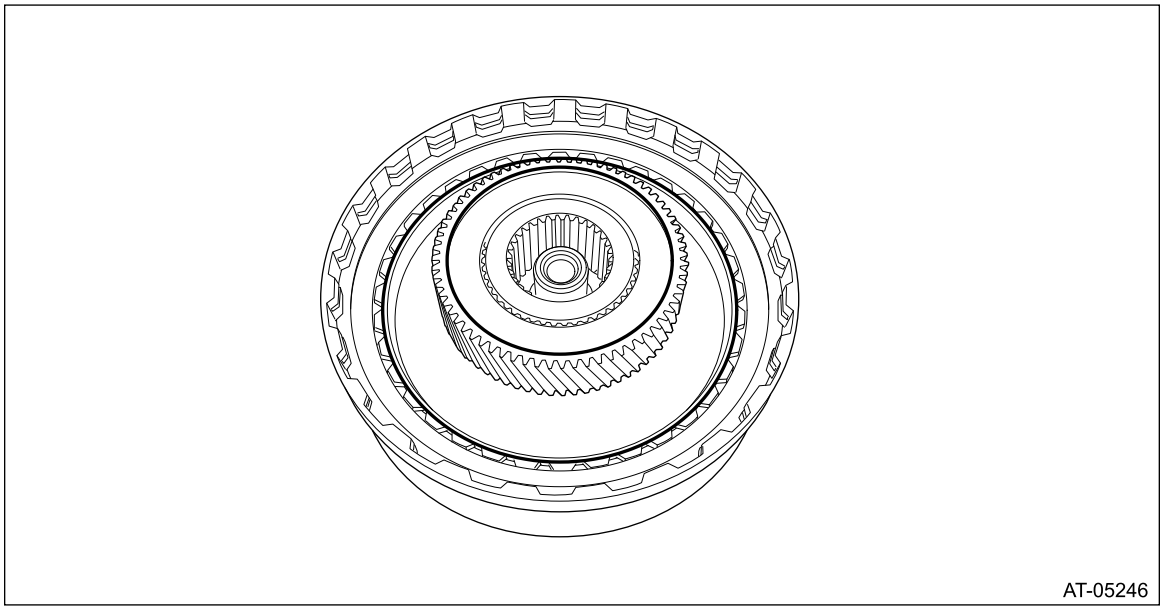
Use marking or labeling to the upper snap ring for measurement of the snap ring thickness when selecting the retaining plate.



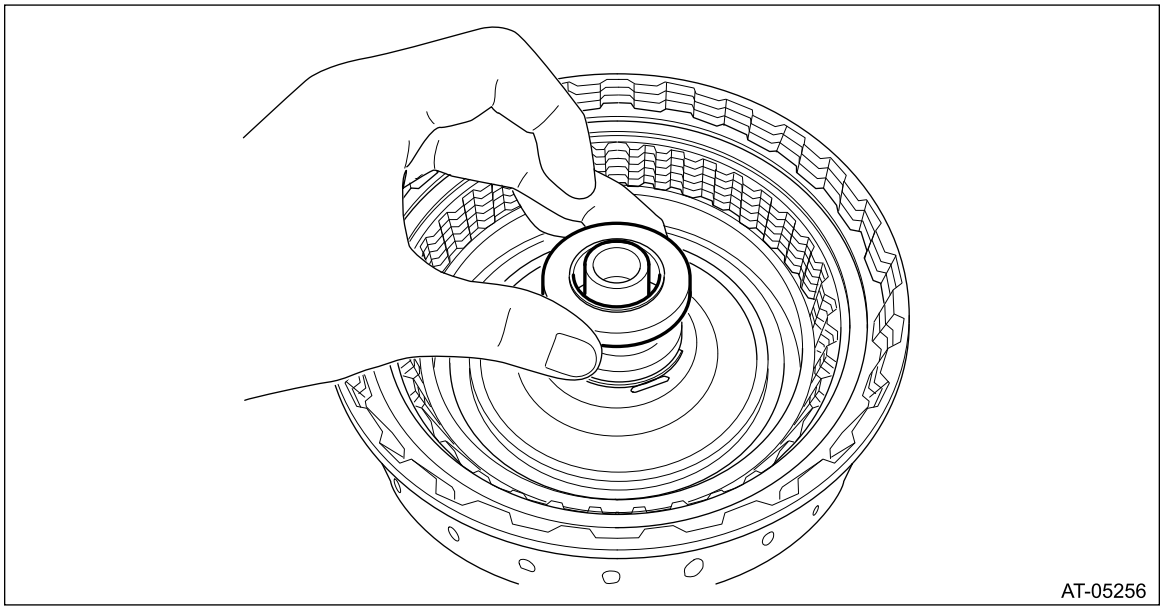
4. Remove the internal gear.



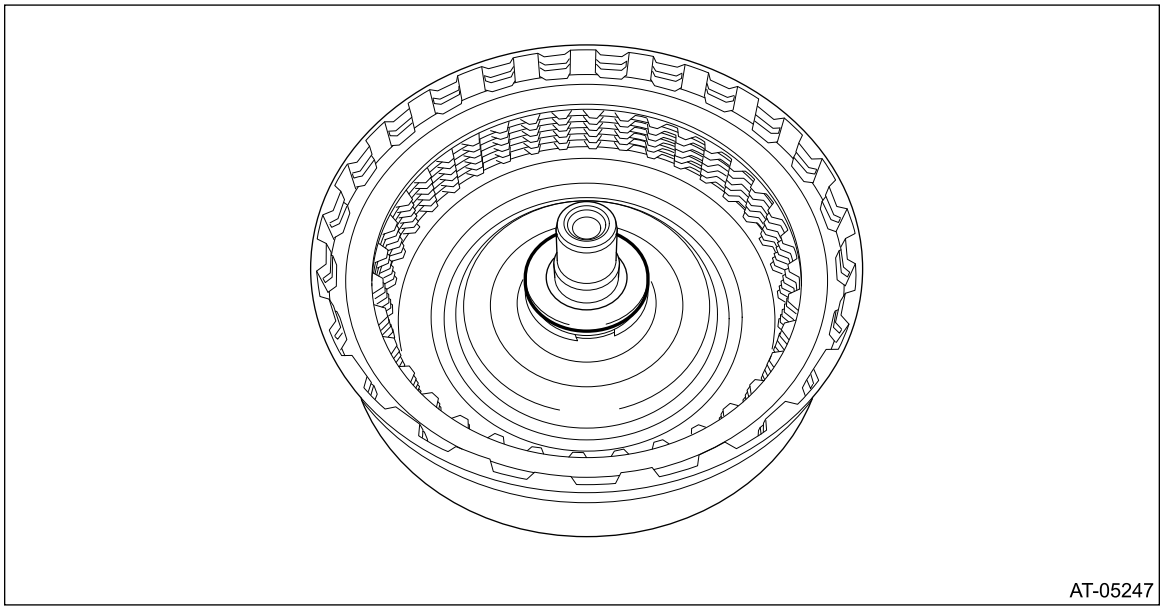
5. Remove the sun gear.



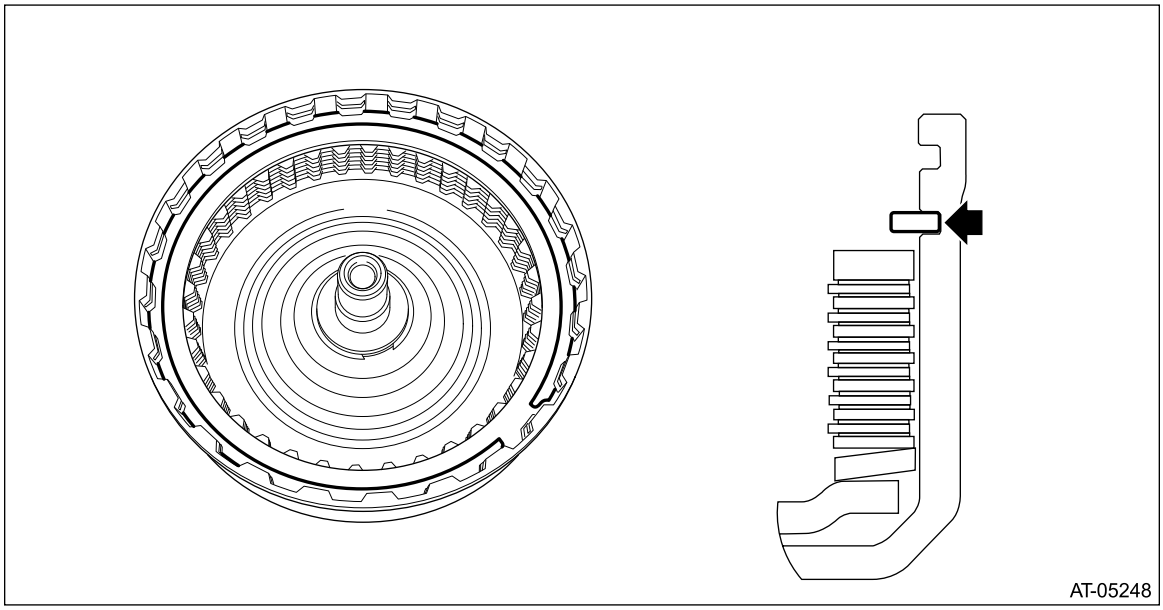
6. Remove the washer.



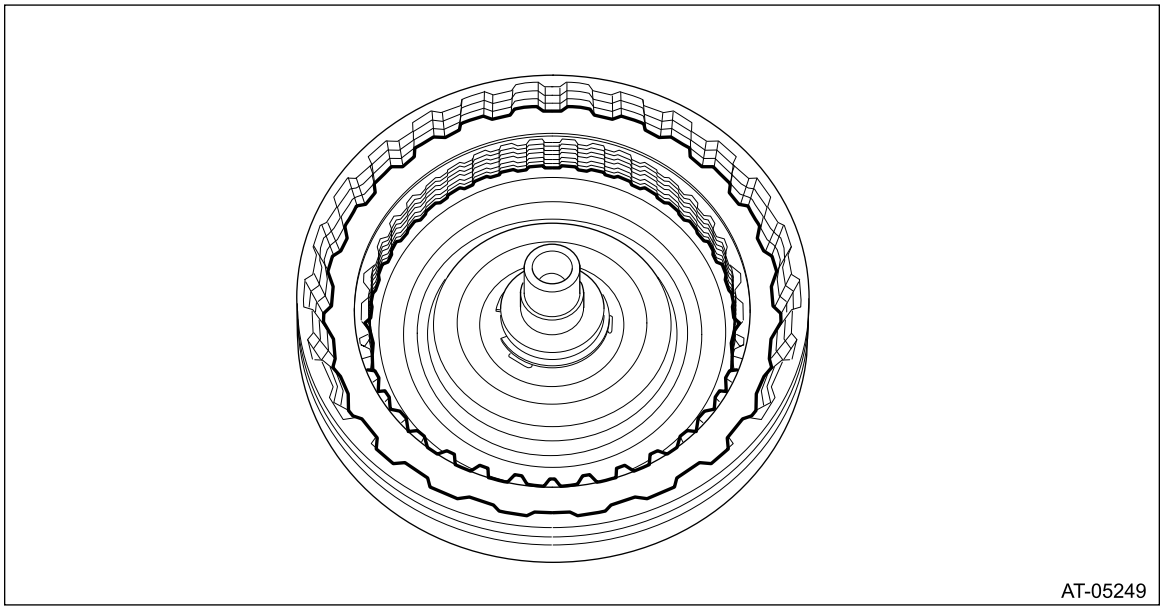
7. Remove the thrust needle bearing.



8. Remove the snap ring.

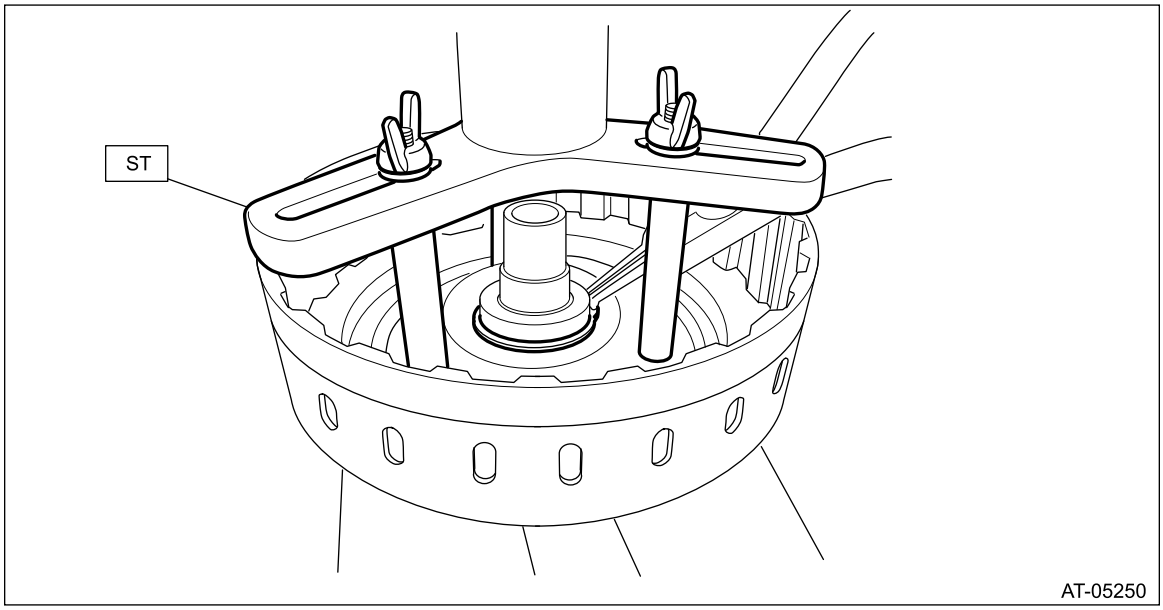


9. Remove the retaining plate, drive plate, driven plate and dish plate.

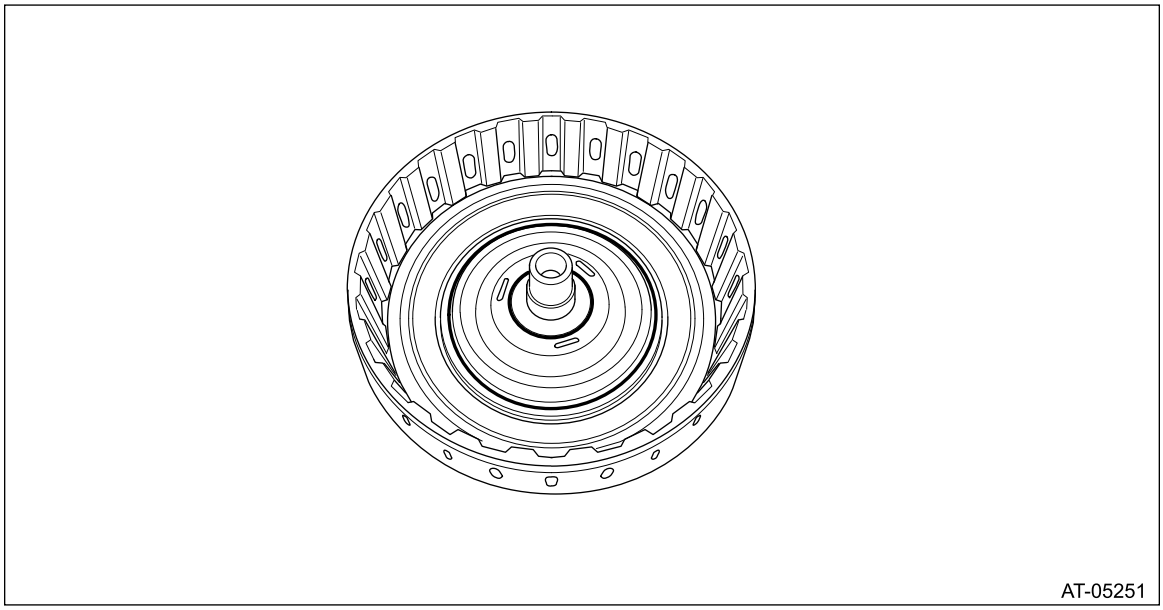


10. Using the ST, remove the snap ring.

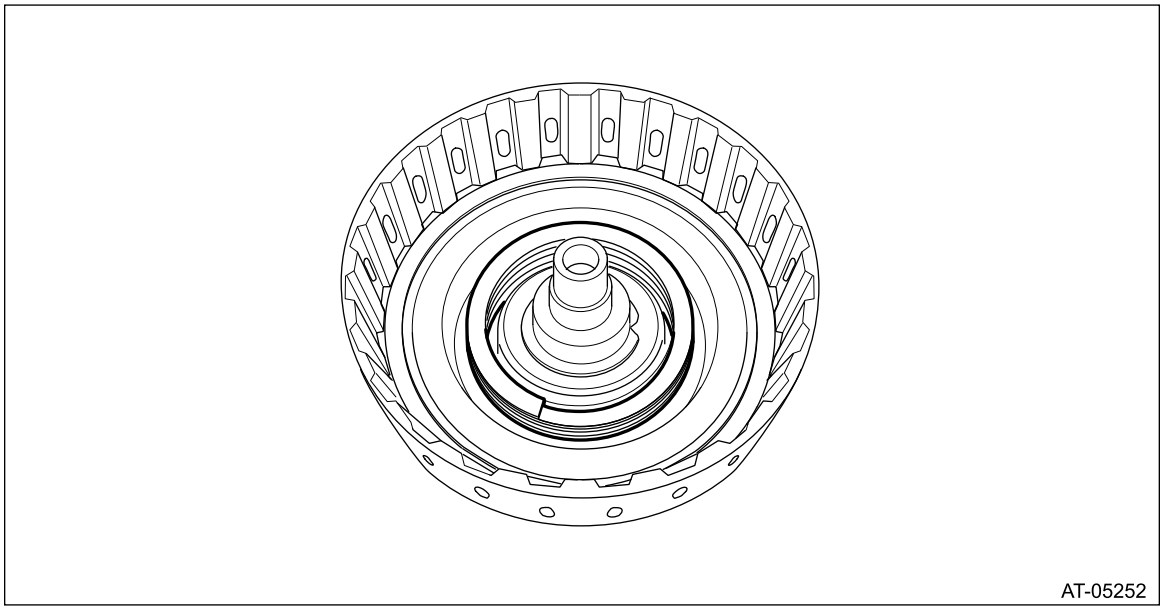
ST 18762AA001 COMPRESSOR SPECIAL TOOL



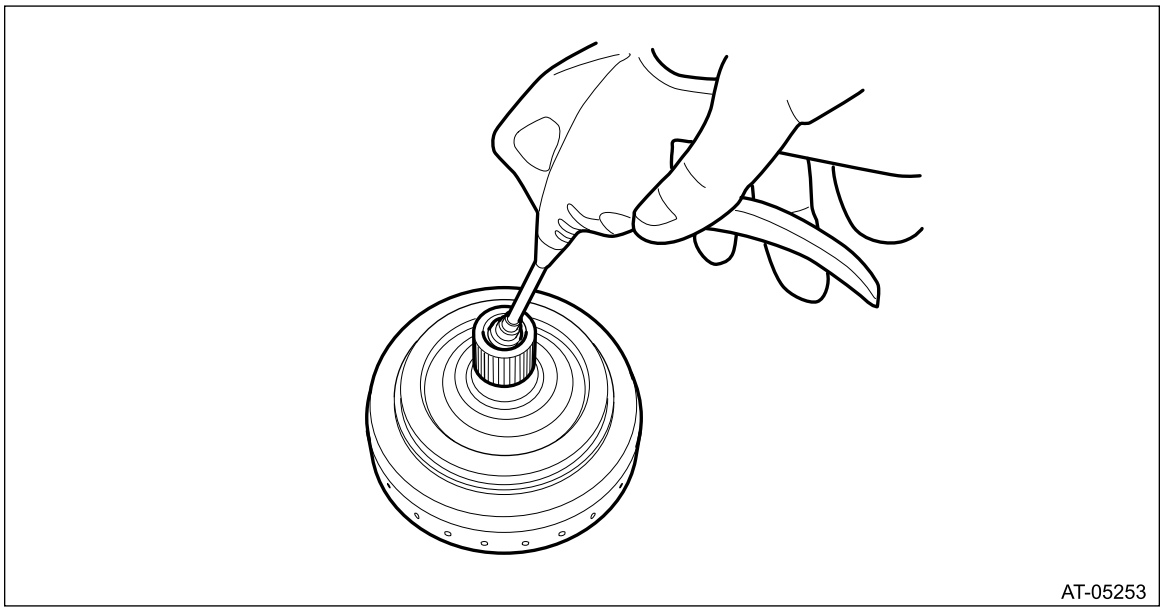
11. Remove the forward clutch piston retainer.



12. Remove the return spring.

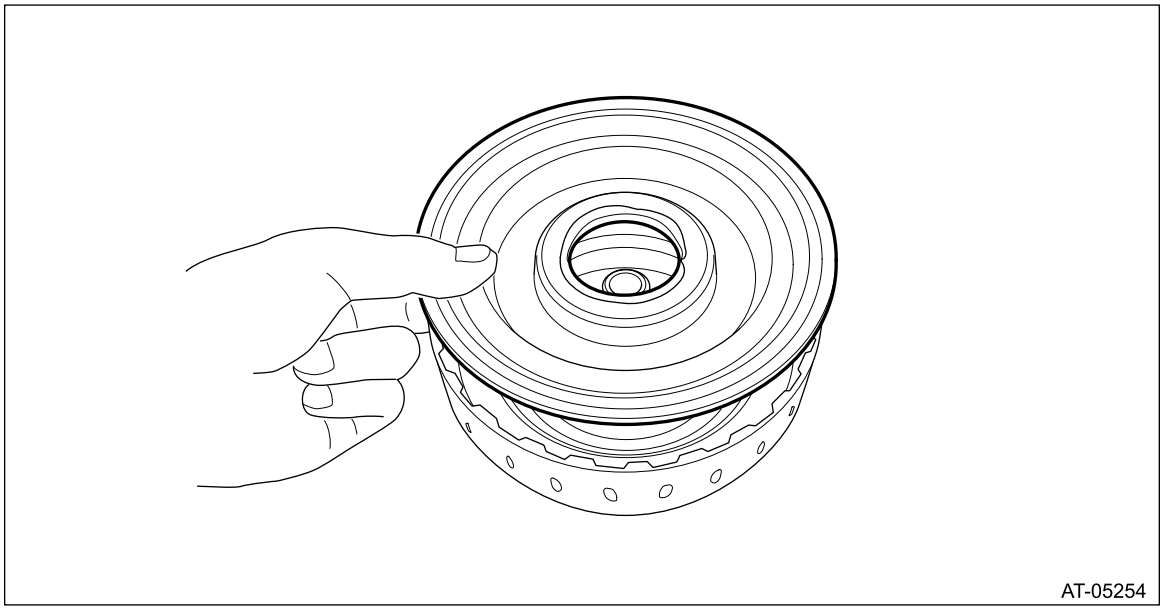


13. Remove the forward clutch piston by blowing compressed air intermittently from end of forward clutch drum.

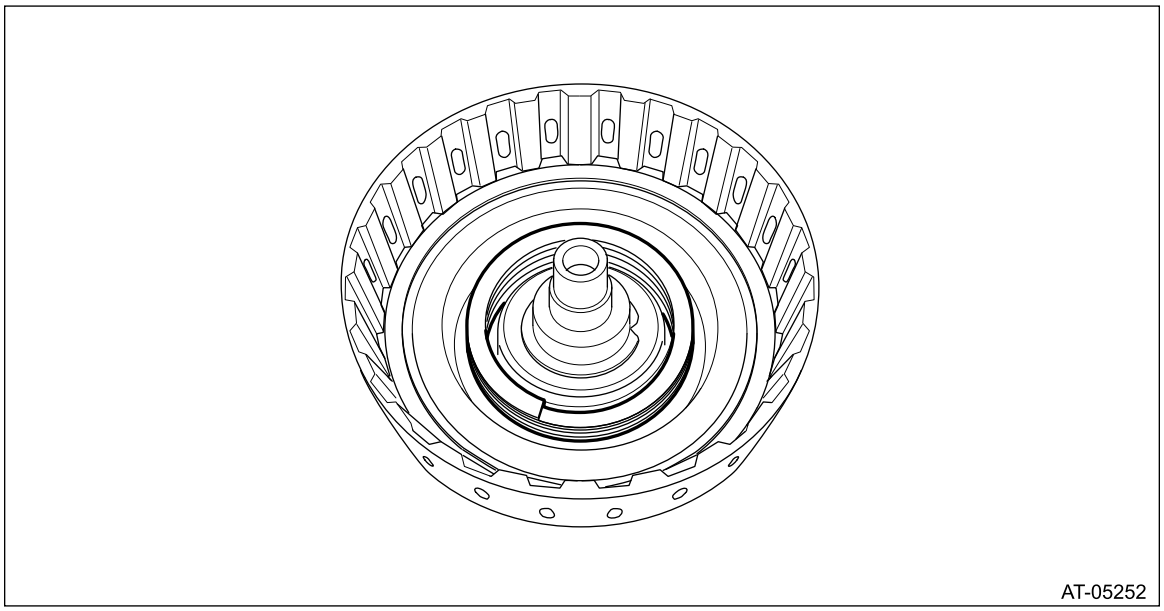


ASSEMBLY

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.**



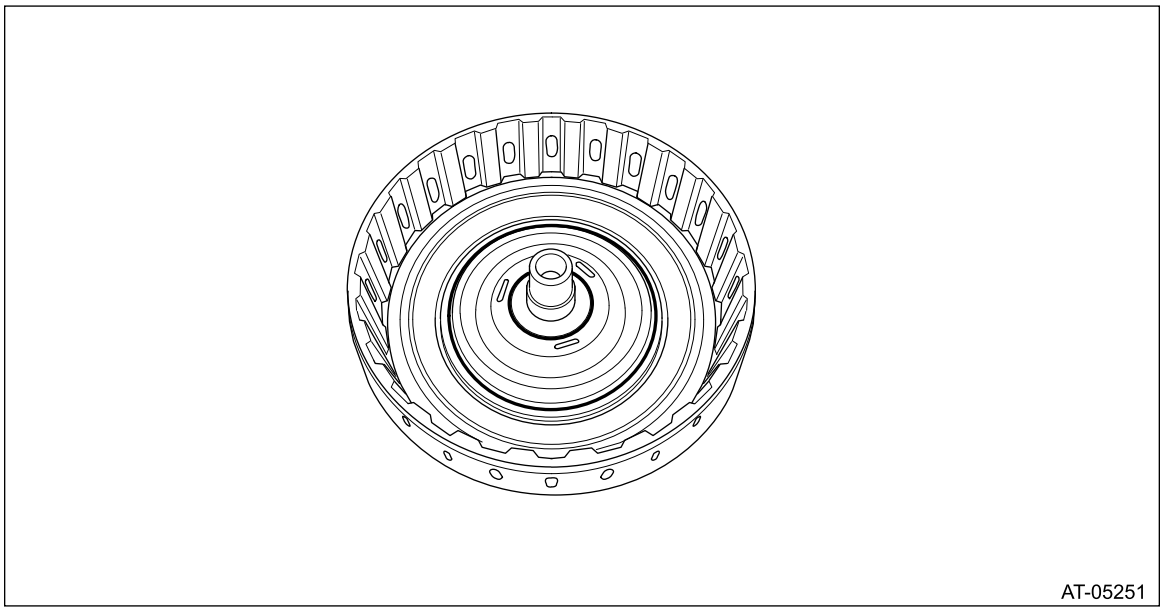
2. Install the return spring.



3. Install the forward clutch piston retainer.

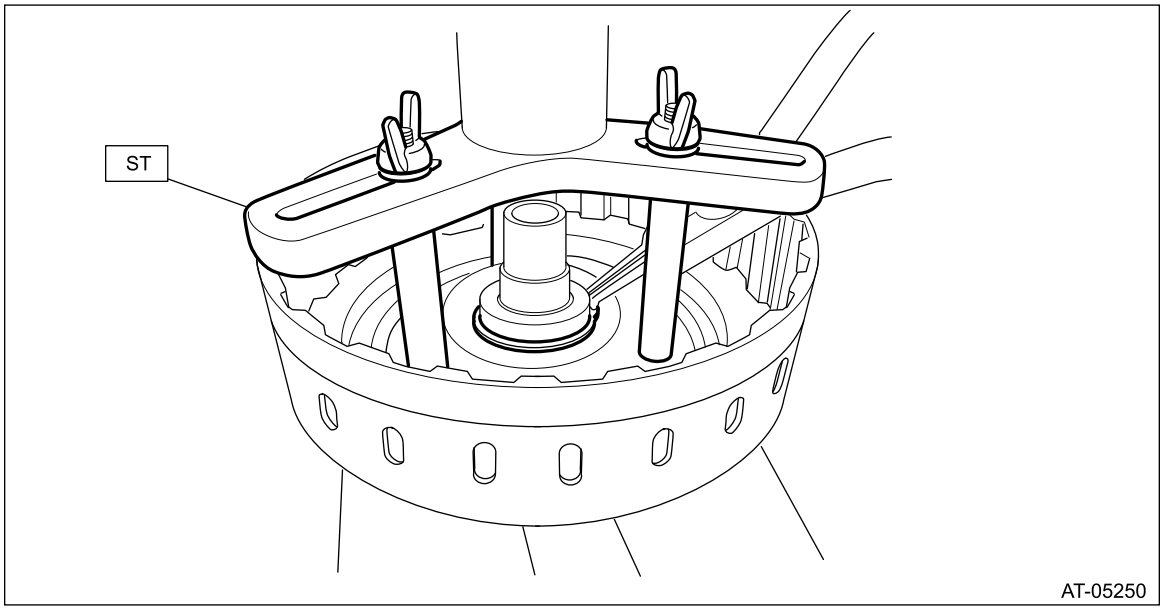
Note:

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

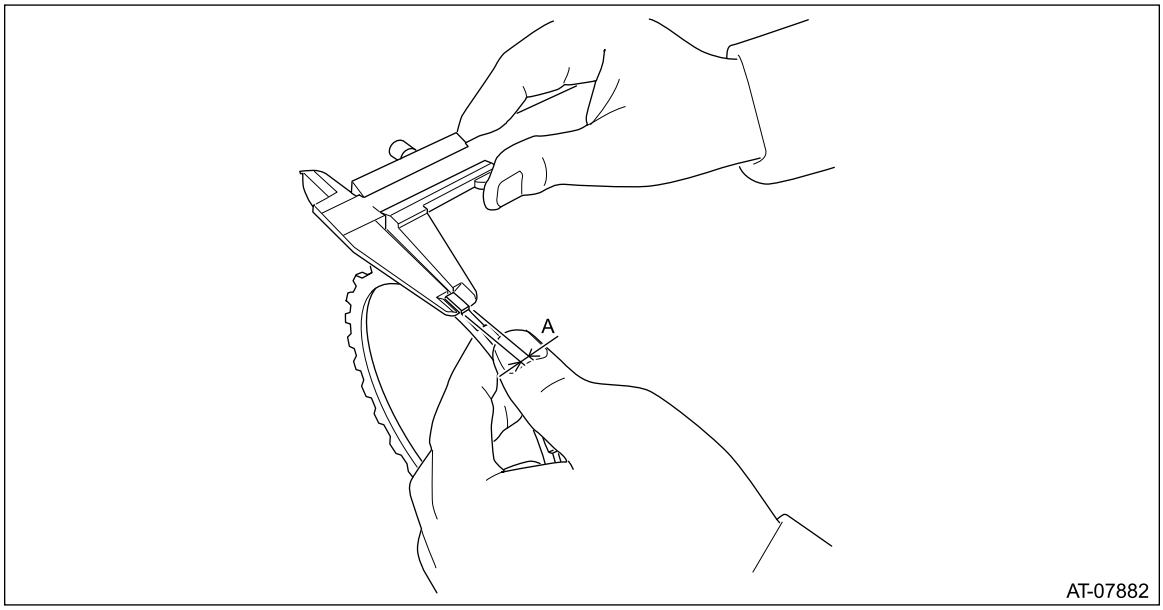


4. Compress the return spring using the ST to install the snap ring.

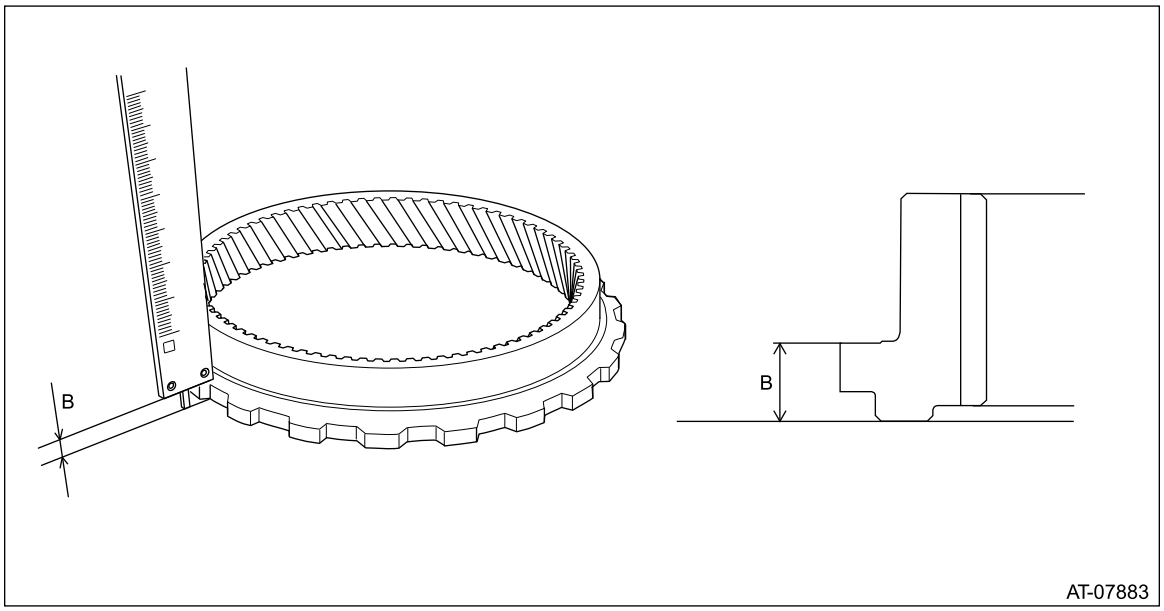
ST 18762AA001 COMPRESSOR SPECIAL TOOL



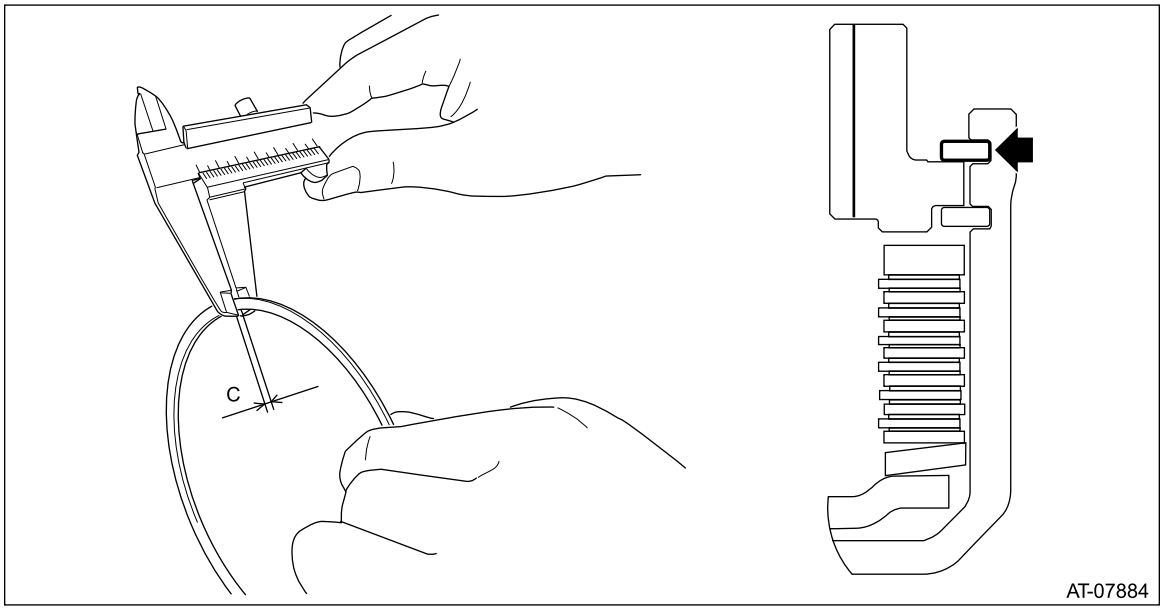
5. Measure thickness “A” of the retaining plate installed.



6. Measure thickness “B” of the internal gear on a surface plate.

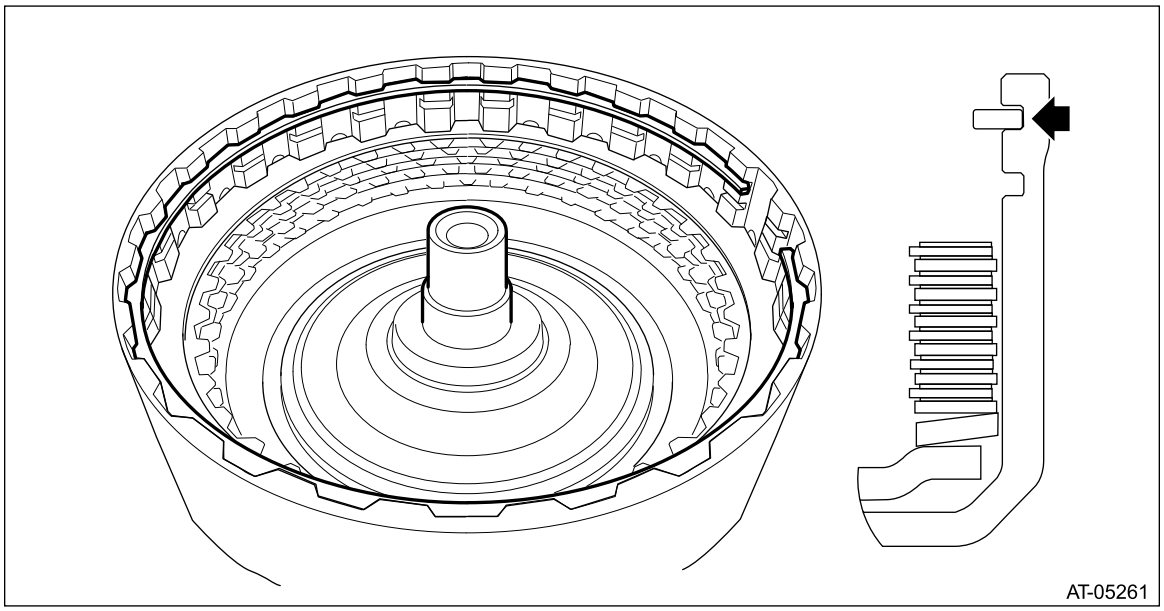


7. Measure thickness “C” of labelled or marked snap ring.

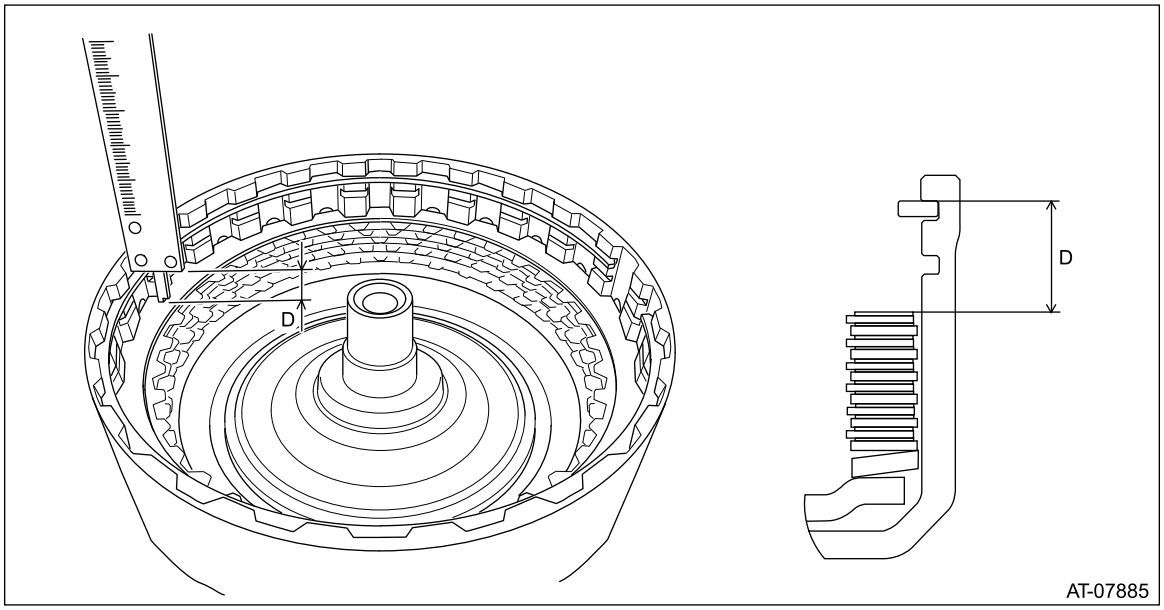


8. Install the dish plate, drive plate and driven plate.

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

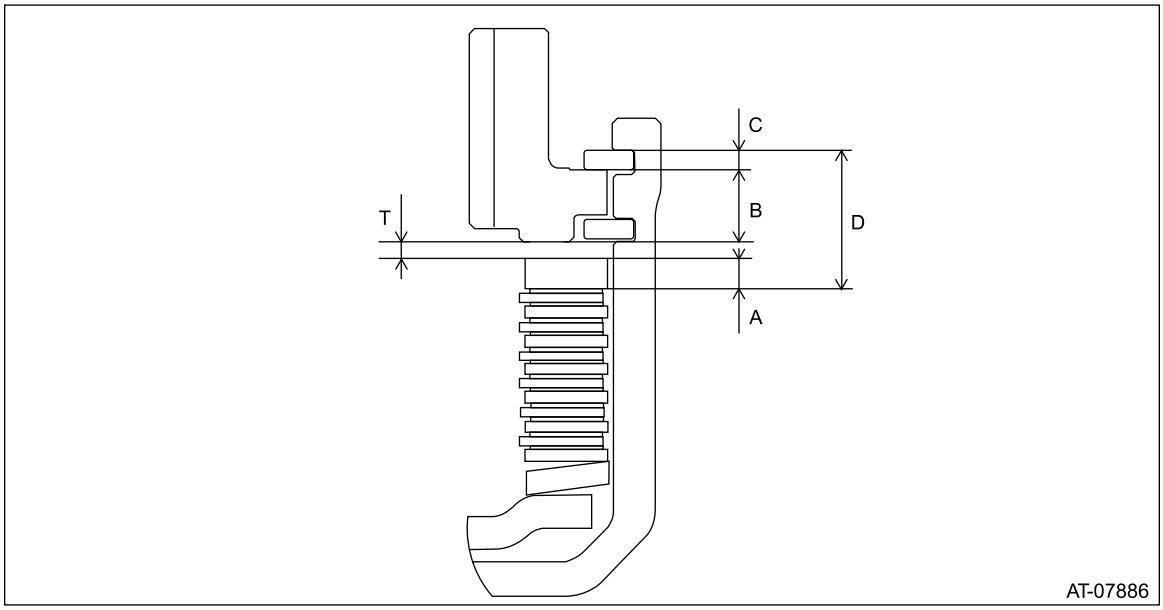
T: Clearance from internal gear to retaining plate

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.

Initial standard:

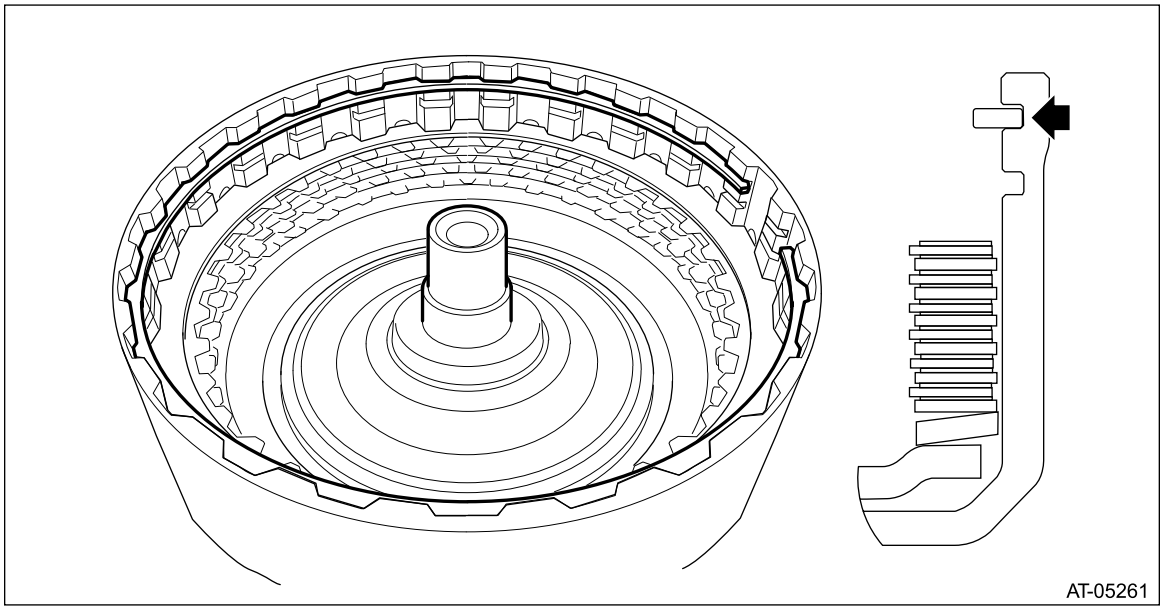
1.2 — 1.6 mm (0.047 — 0.063 in)

Limit thickness:

2.4 mm (0.09 in)

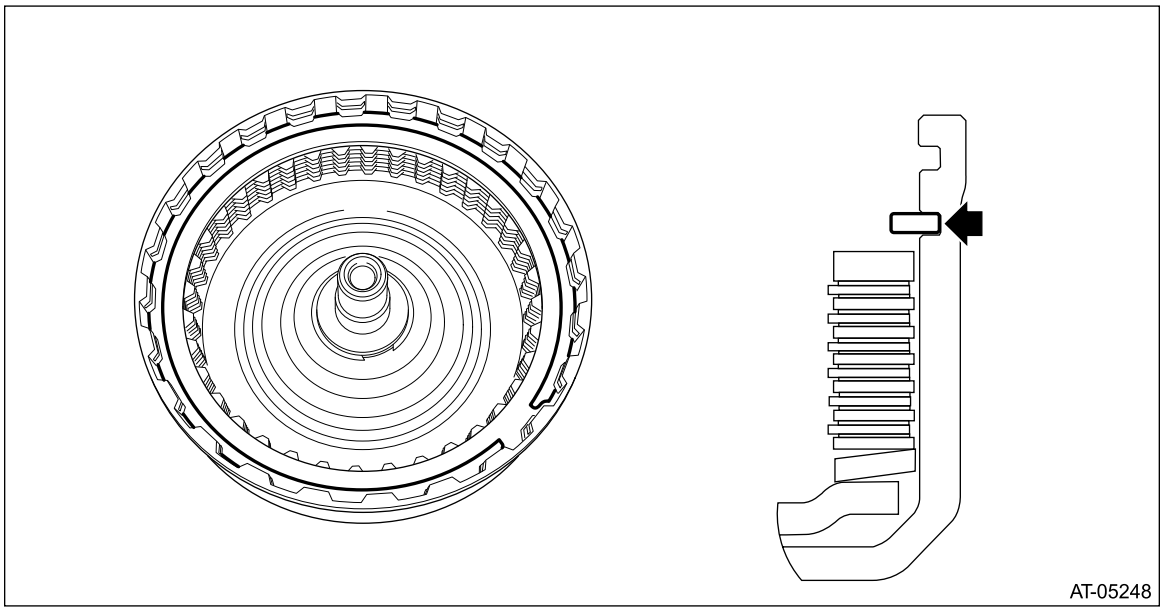
Retaining plate	
Item number	**Thickness mm (in)**
31567AB670	3.2 (0.126)
31567AB660	3.0 (0.118)
31567AB650	2.8 (0.110)
31567AB640	2.6 (0.102)

13. Remove the snap ring.



14. Replace with the selected retaining plate to install.

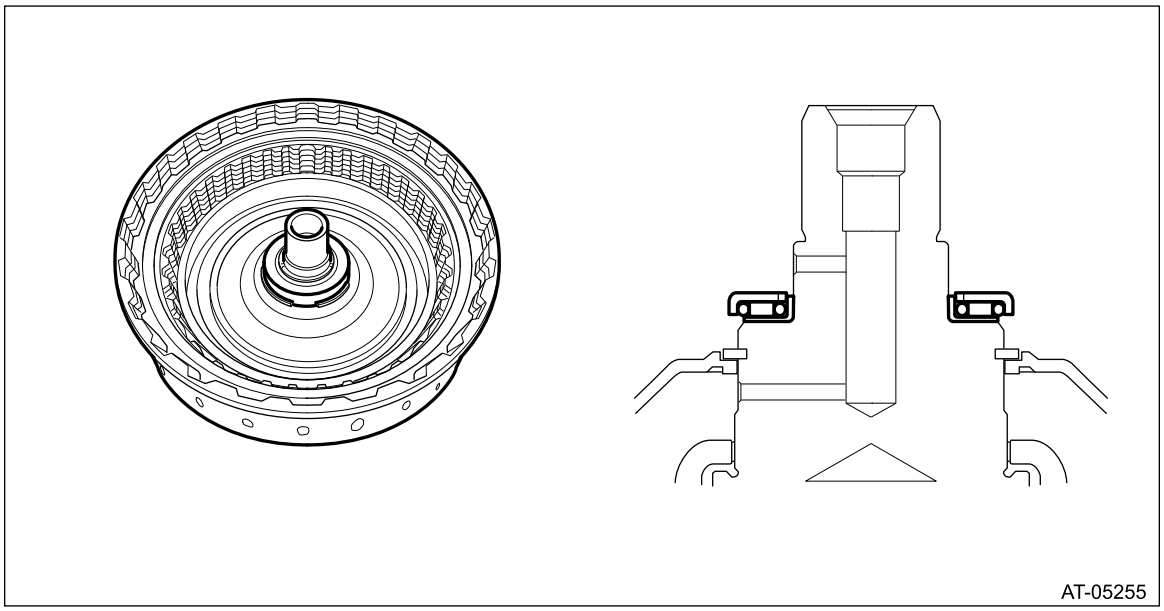
15. Install the snap ring to the lower groove.



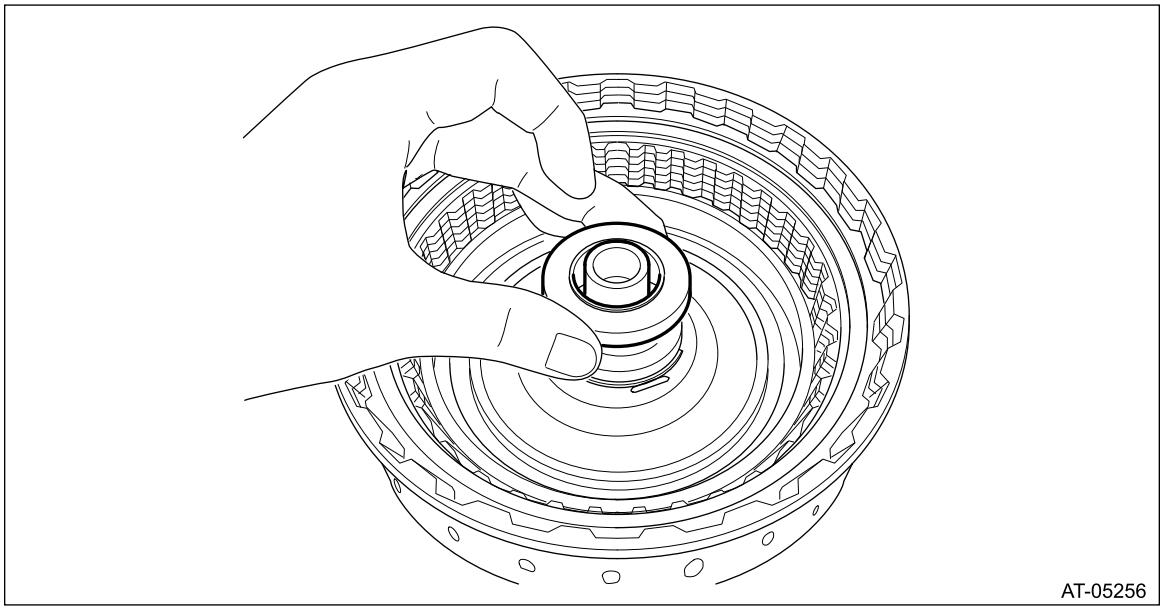
16. Install the thrust needle bearing.

Note:

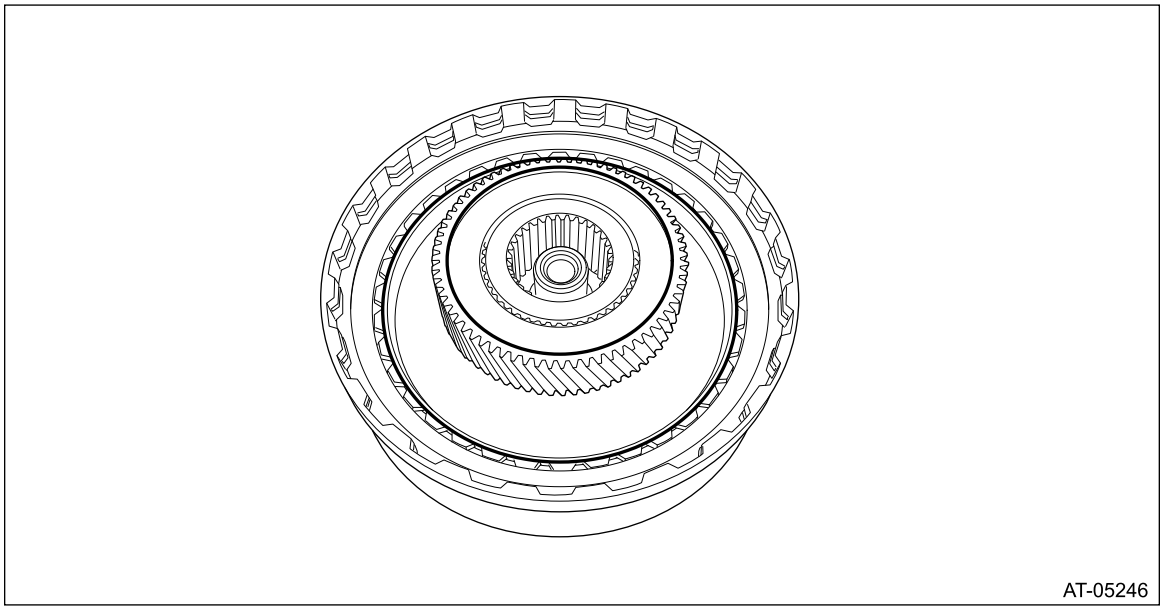
Install the thrust needle bearing in the correct direction.



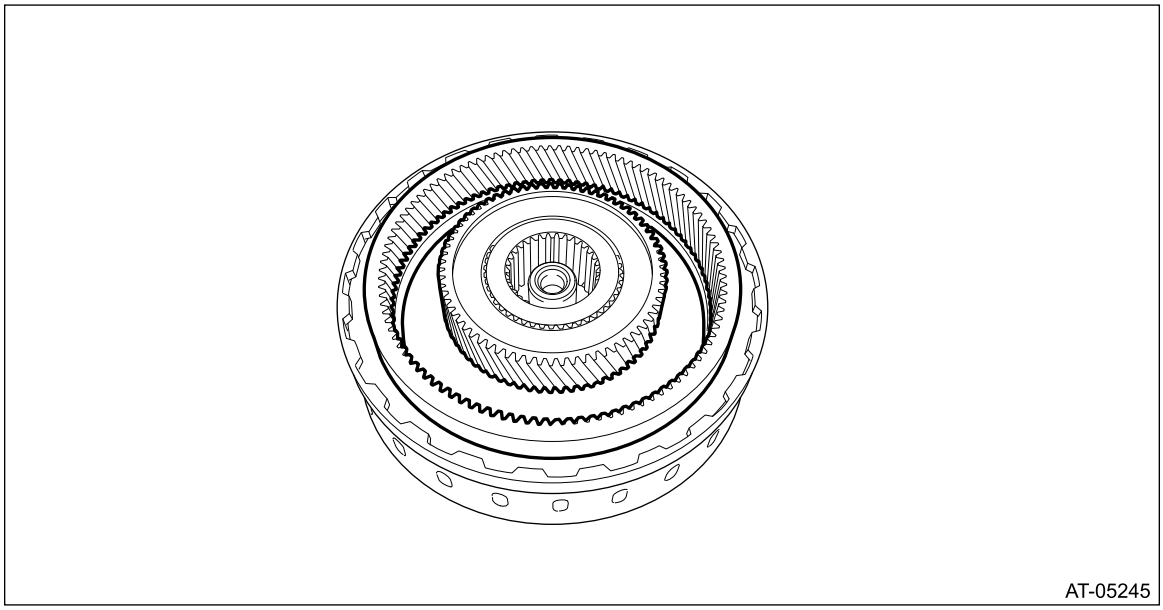
17. Install the washer.



18. Install the sun gear.



19. Install the internal gear.

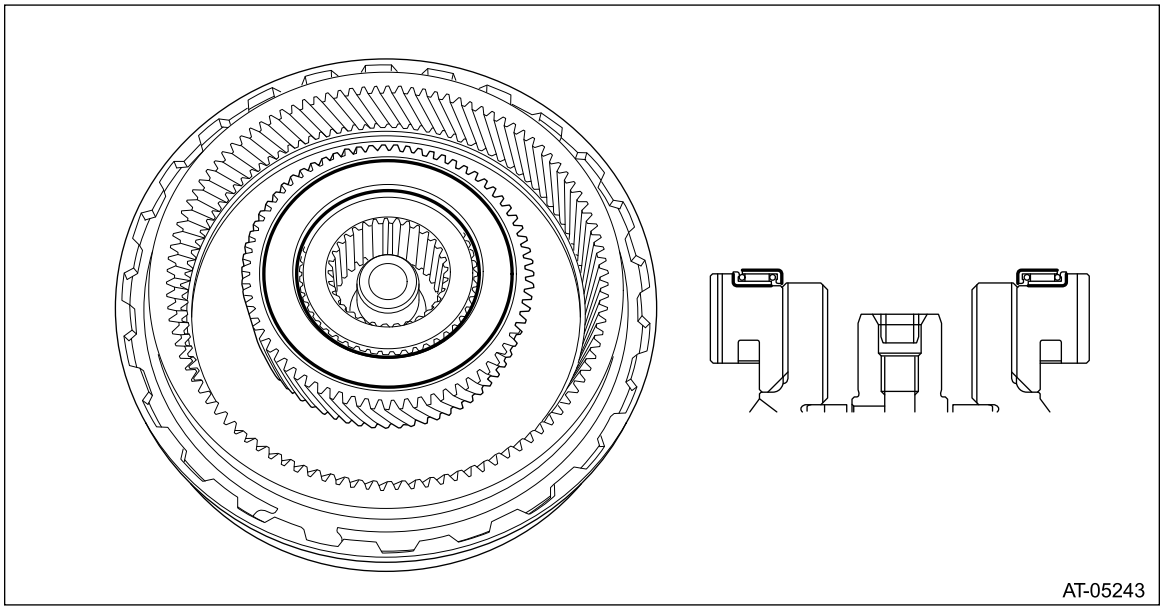


20. Install the snap ring.

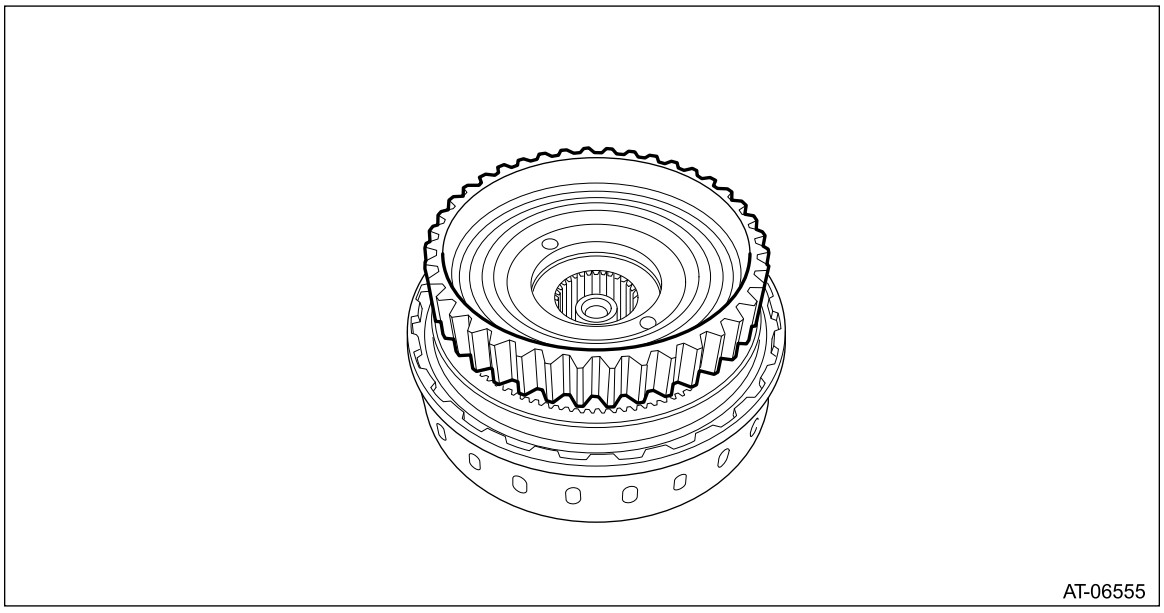
21. Install the thrust needle bearing.

Note:

Make sure to install in the right direction.



22. Install the planetary carrier assembly.



CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Forward Clutch Assembly

INSPECTION

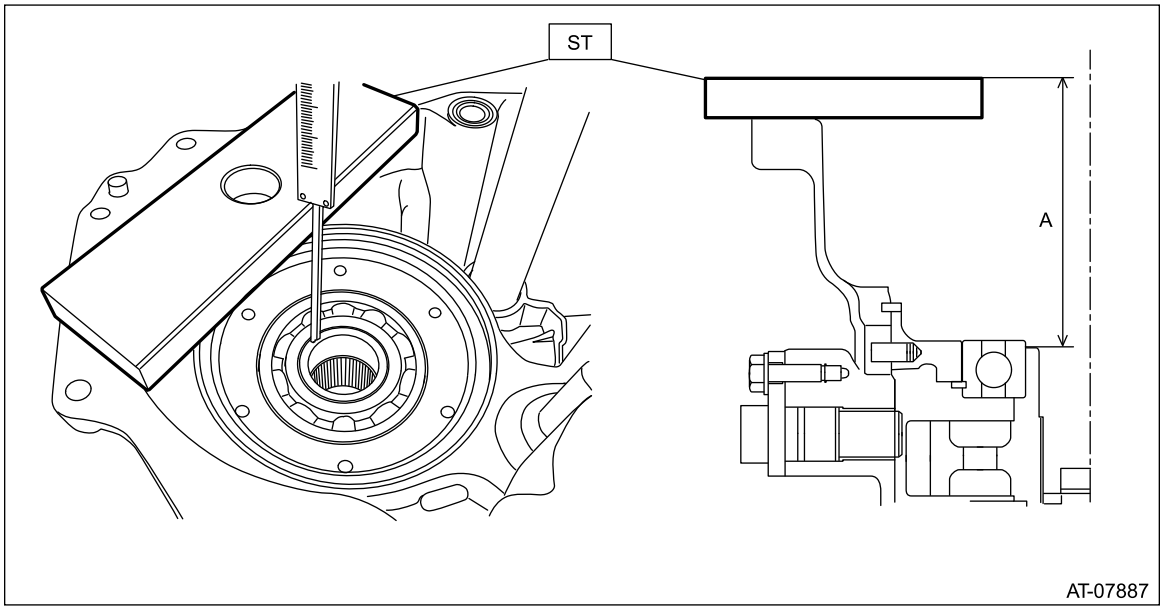
- Check the forward clutch drum, internal gear, sun gear and forward clutch piston lip for wear or damage.
- Inspect the drive plate facing for wear and damage.
- Check the driven plate for discoloration (burnt color).
- Check for worn snap ring, fatigue or damaged return spring or deformed spring retainer.
- 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 assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Forward Clutch Assembly>ASSEMBLY.

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Forward Clutch Assembly

ADJUSTMENT

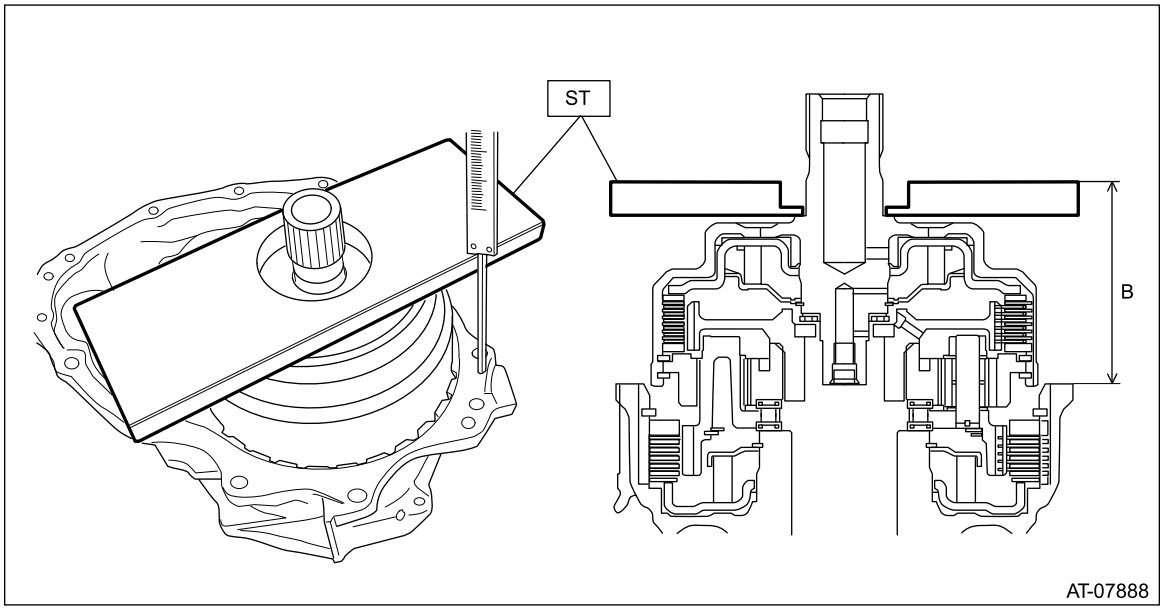
1. Measure depth “A” from the ST upper face to the washer catch surface.

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

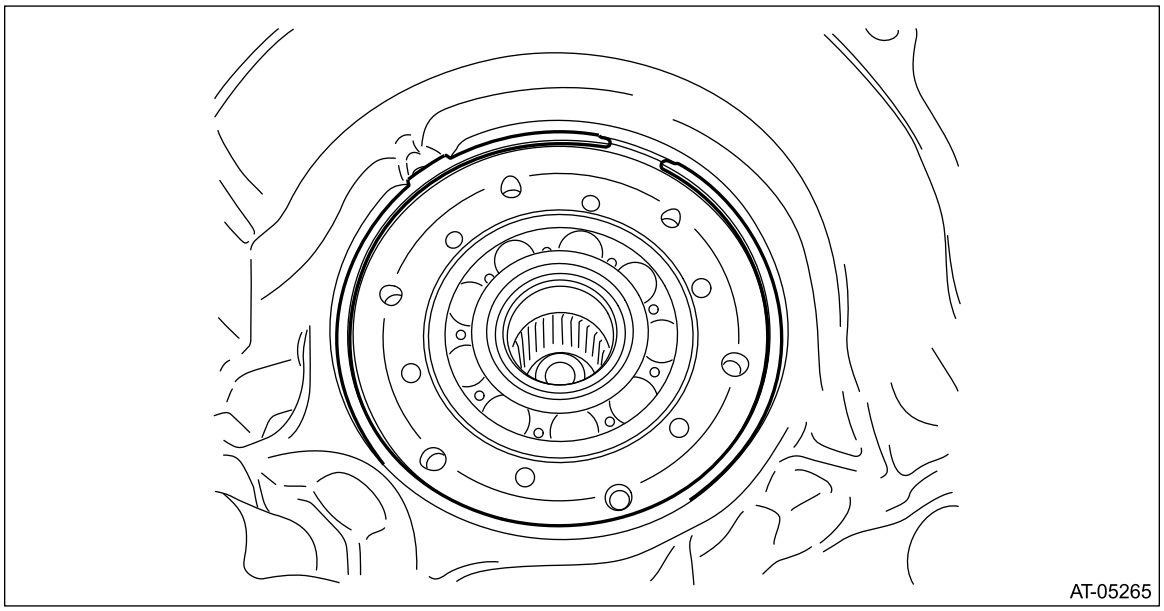


4. Obtain the thickness of washer using the following formula.
   Calculation formula:
   T (mm) = (A − 15) − (B − 15) − (0.35 — 0.70)
   [T (in) = (A − 0.591) − (B − 0.591) − (0.014 — 0.028)]
   T: Washer thickness
   A: Depth from the ST upper face to the washer catch surface
   B: Height from the 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).

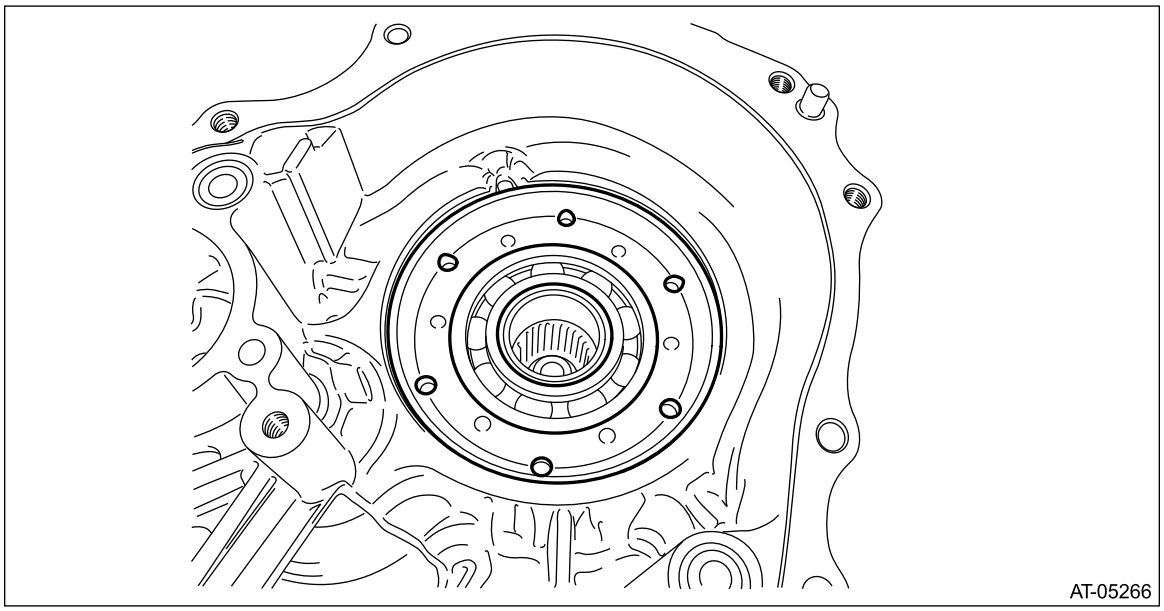
Washer	
Part No.	**Washer thickness mm (in)**
803034040	1.0 (0.039)
803034041	1.2 (0.047)
803034042	1.4 (0.055)
803034043	1.6 (0.063)

REMOVAL

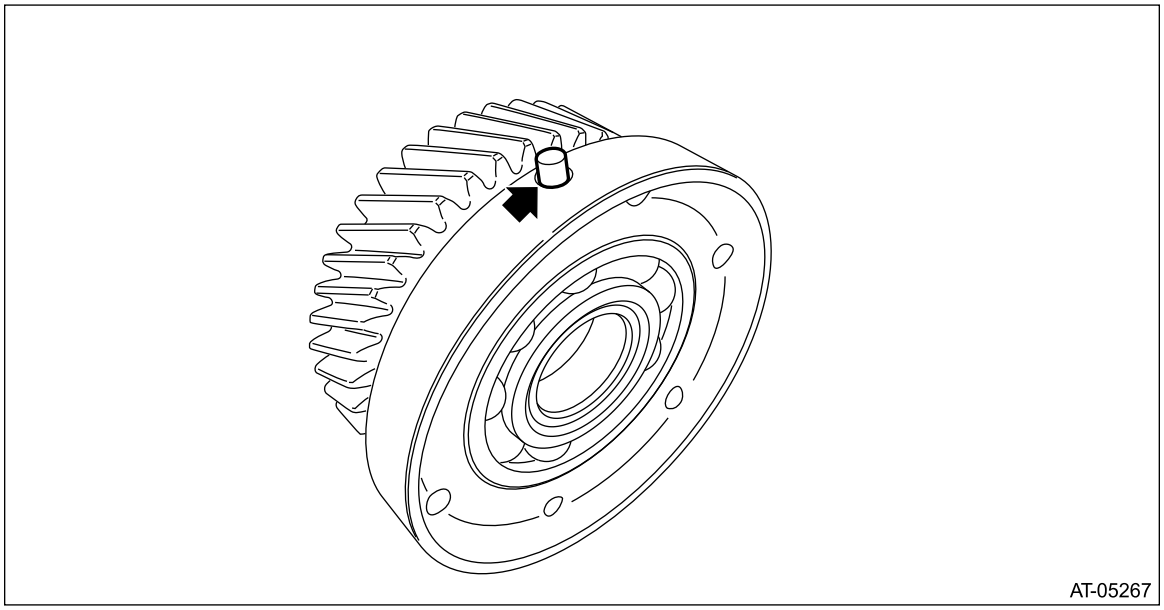
1. Remove the transmission from the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Automatic Transmission Assembly>REMOVAL.
2. Remove the extension case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Extension Case>REMOVAL.
3. Remove the rear drive shaft. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Rear Drive Shaft>REMOVAL.
4. Remove the transfer clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transfer Clutch>REMOVAL.
5. Remove the center differential carrier. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Center Differential Carrier>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. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Intermediate Case>REMOVAL.
8. Remove the forward clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Forward Clutch Assembly>REMOVAL.
9. Remove the snap ring.



10. Remove the reduction driven gear assembly.



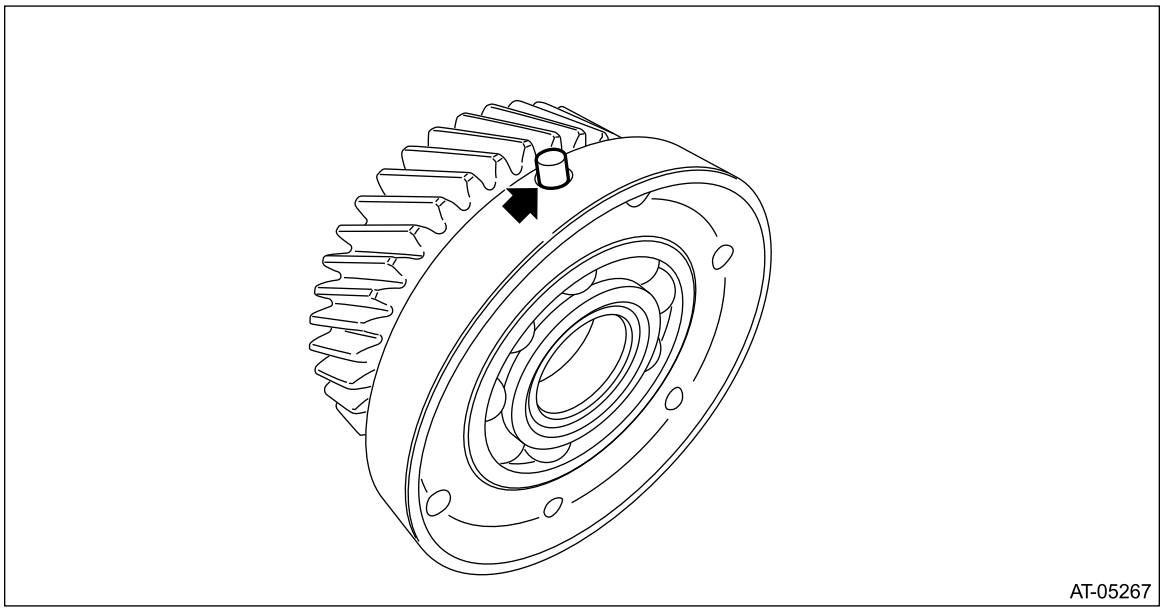
11. Remove the straight pin.



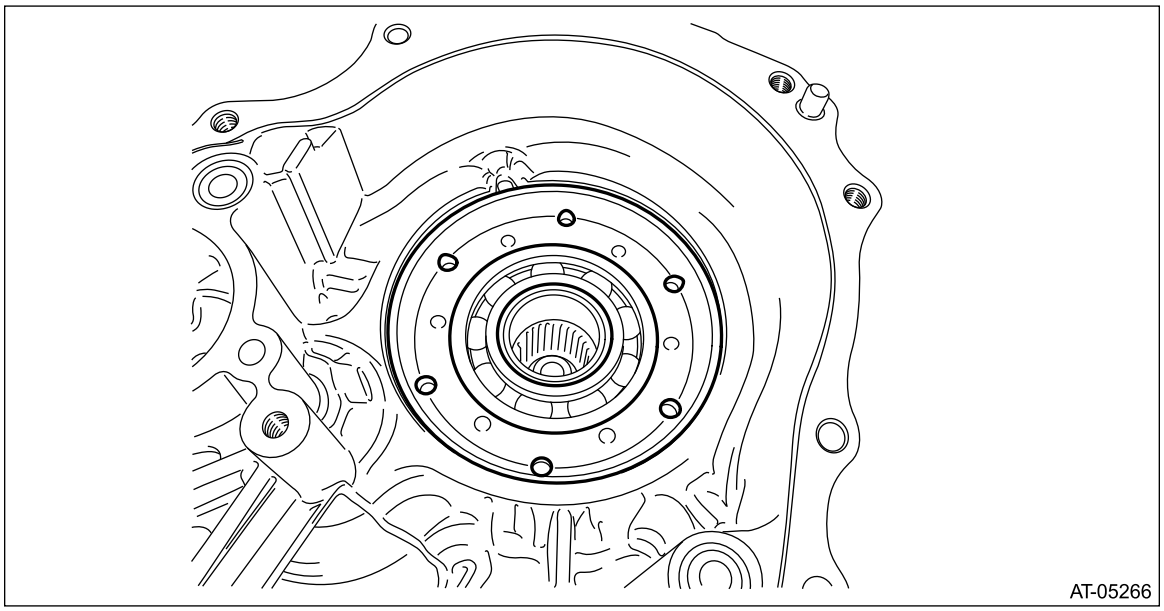
CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Reduction Driven Gear

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. 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 center differential carrier. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Center Differential Carrier>INSTALLATION.
9. Install the transfer clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transfer Clutch>INSTALLATION.
10. Install the rear drive shaft. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Rear Drive Shaft>INSTALLATION.
11. Install the extension case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Extension Case>INSTALLATION.
12. Install the transmission to vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Automatic Transmission Assembly>INSTALLATION.

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Reduction Driven Gear

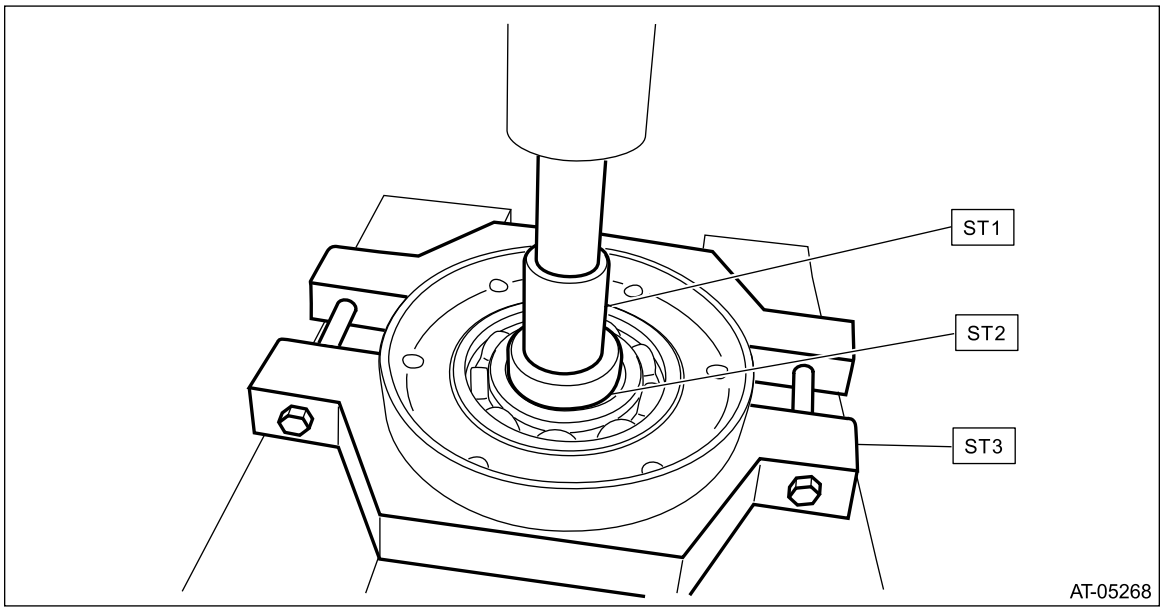
DISASSEMBLY

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

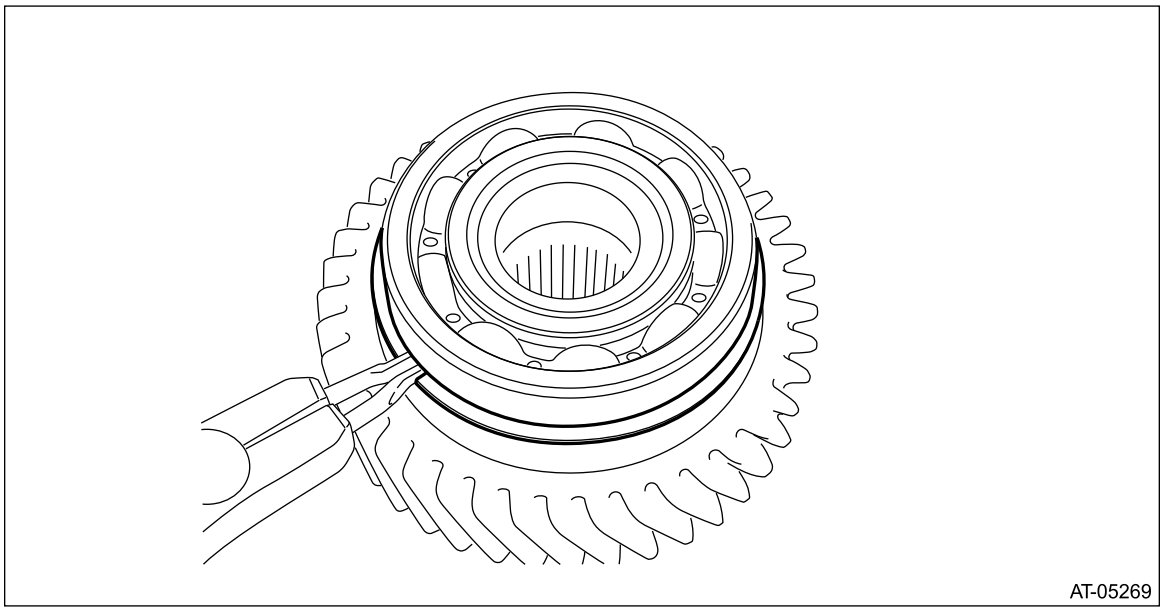
ST1 899864100 REMOVER

ST2 398497701 SEAT

ST3 18767AA000 BEARING REMOVER



2. Remove the snap ring.

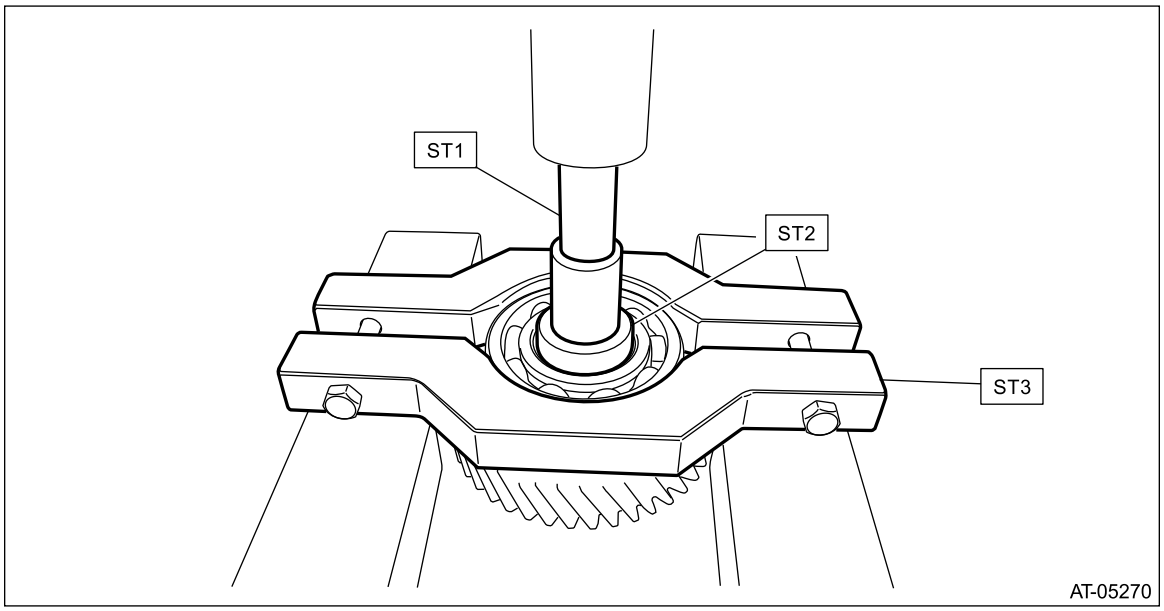


3. Remove the ball bearing using ST1, ST2 and ST3.

ST1 899864100 REMOVER

ST2 398497701 SEAT

ST3 498077600 REMOVER



CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Reduction Driven Gear

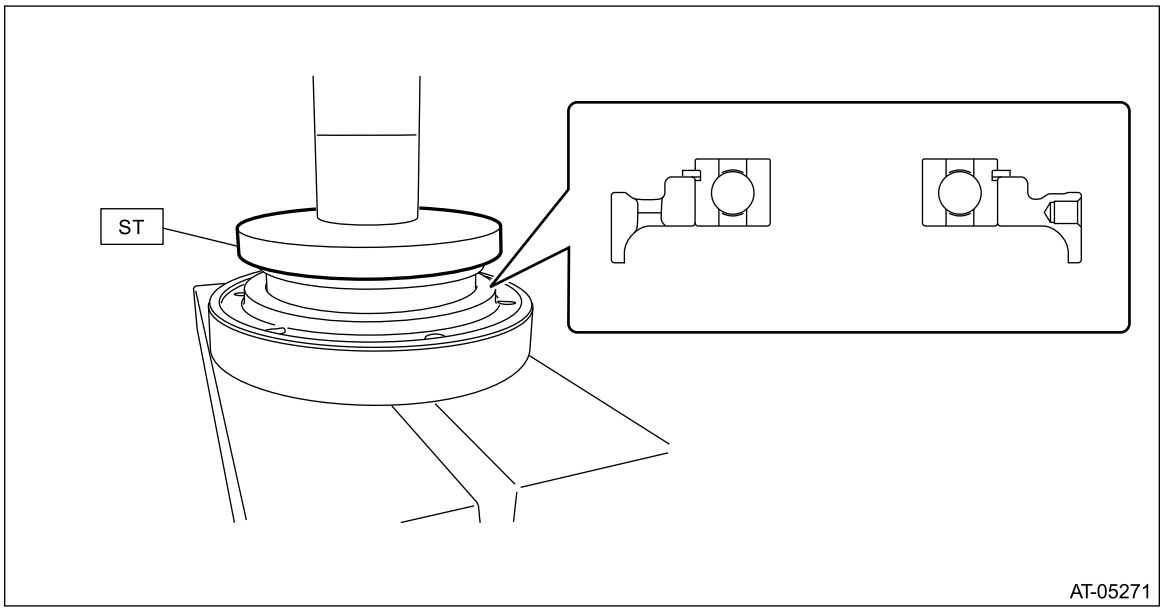
ASSEMBLY

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

ST 398177700 INSTALLER

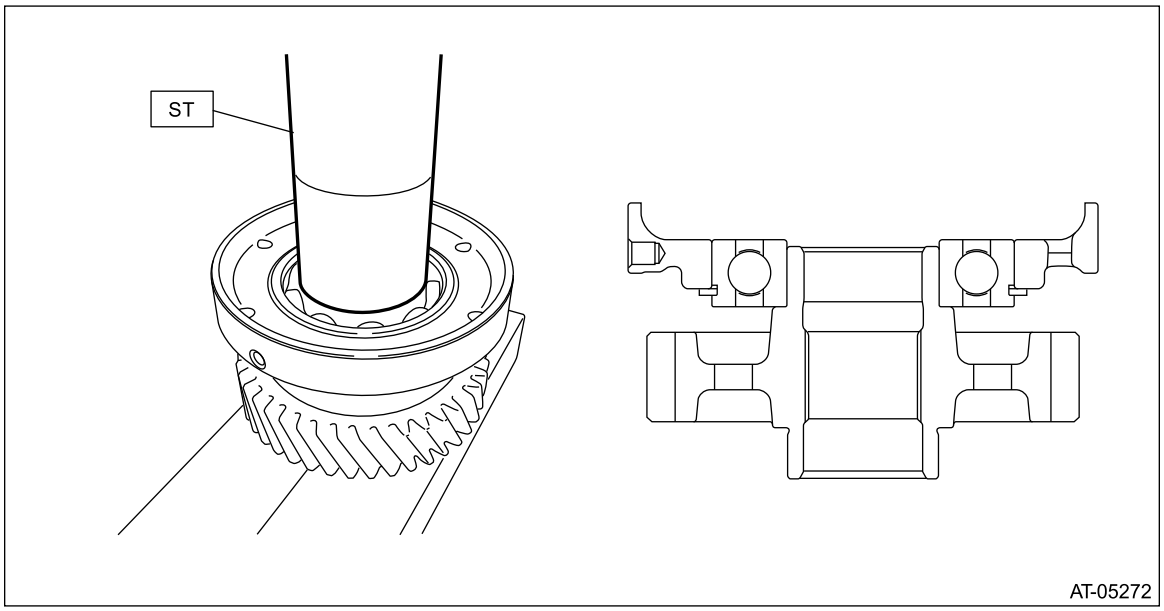
Note:

- **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



CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Reduction Driven Gear

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.

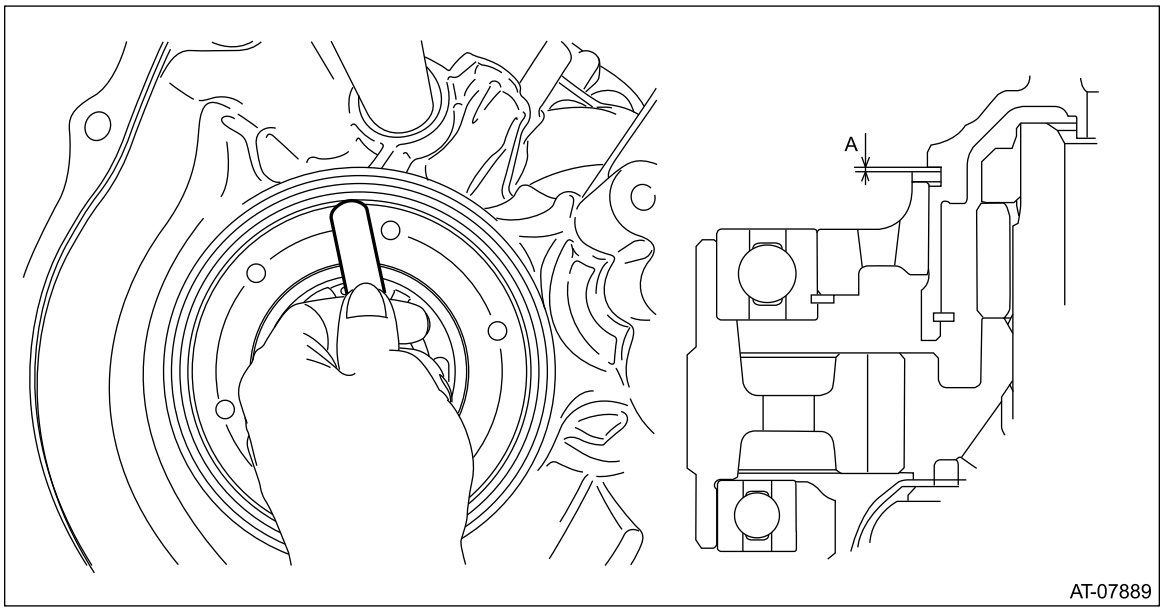
CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Reduction Driven Gear

ADJUSTMENT

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

Specification:

0.05 — 0.25 mm (0.002 — 0.01 in)

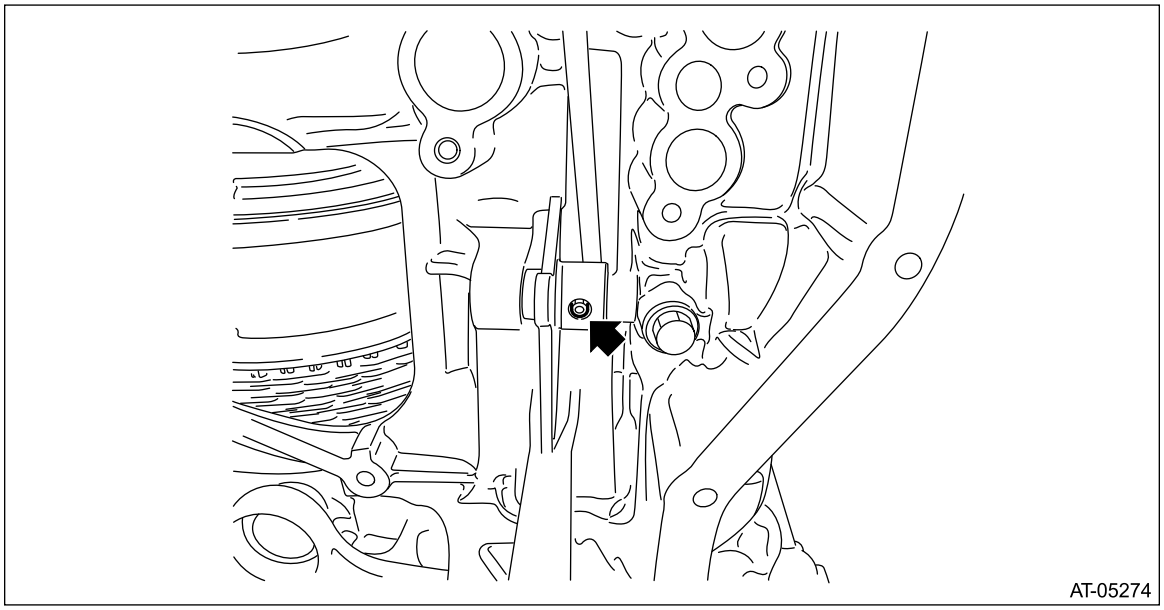


2. If clearance "A" is out of standard, select the snap ring within standard.

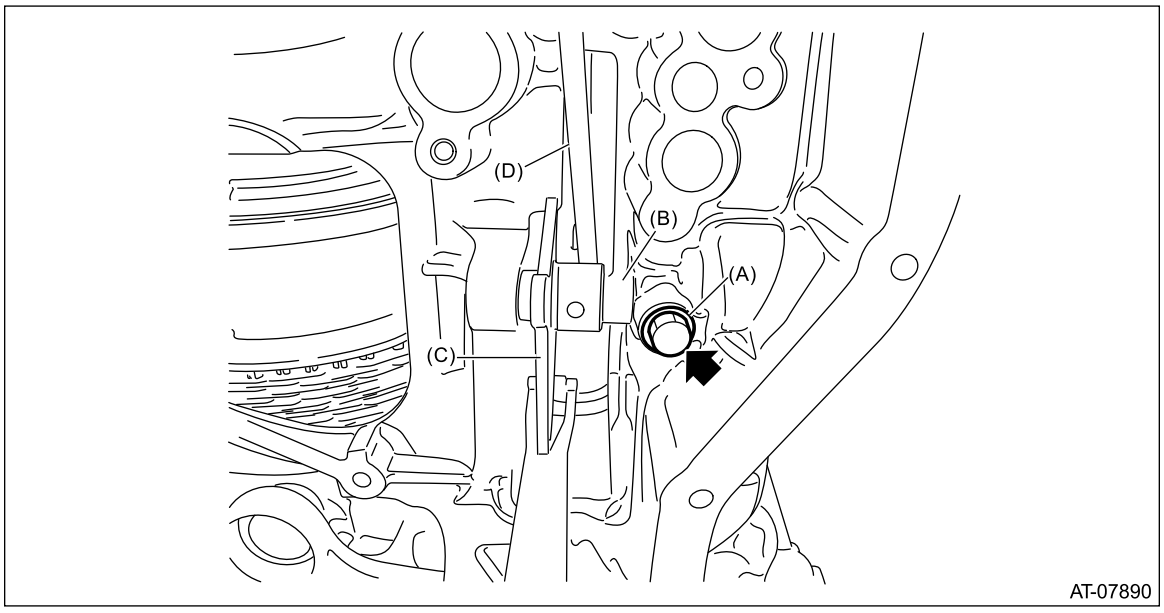
Snap ring	
Part No.	**Thickness mm (in)**
805100460	2.0 (0.079)
805100461	2.1 (0.083)
805100462	2.2 (0.087)
805100463	2.3 (0.091)
805100464	2.4 (0.094)

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.

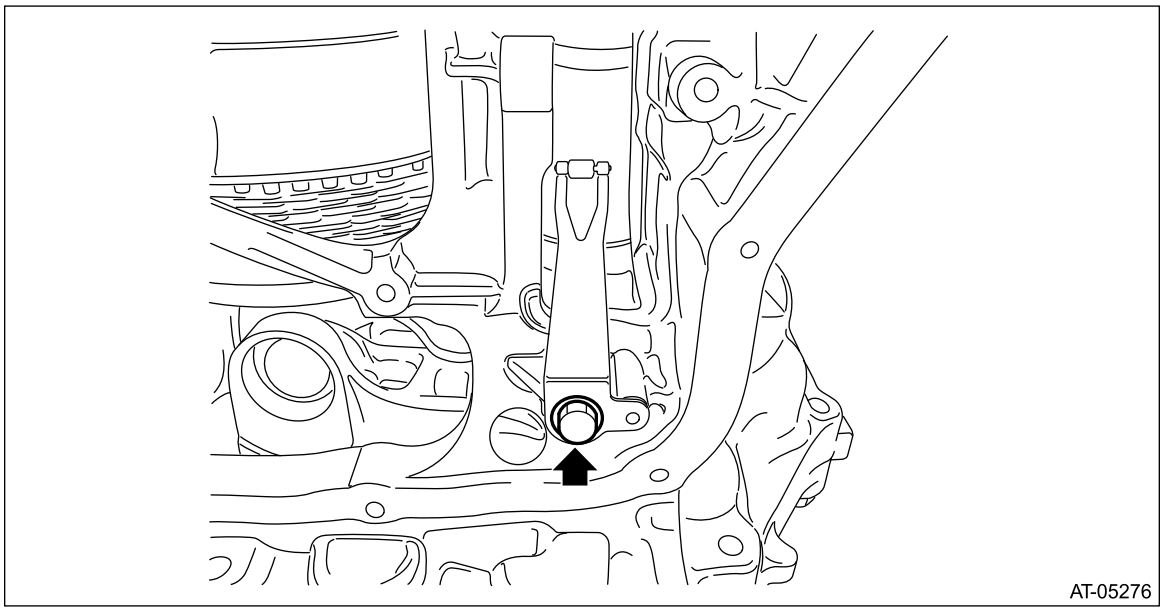


5. Remove the bolt and remove the range select lever, manual plate and parking rod.
   Note:
   Do not damage the lip of oil seal press-fitted in the case.



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

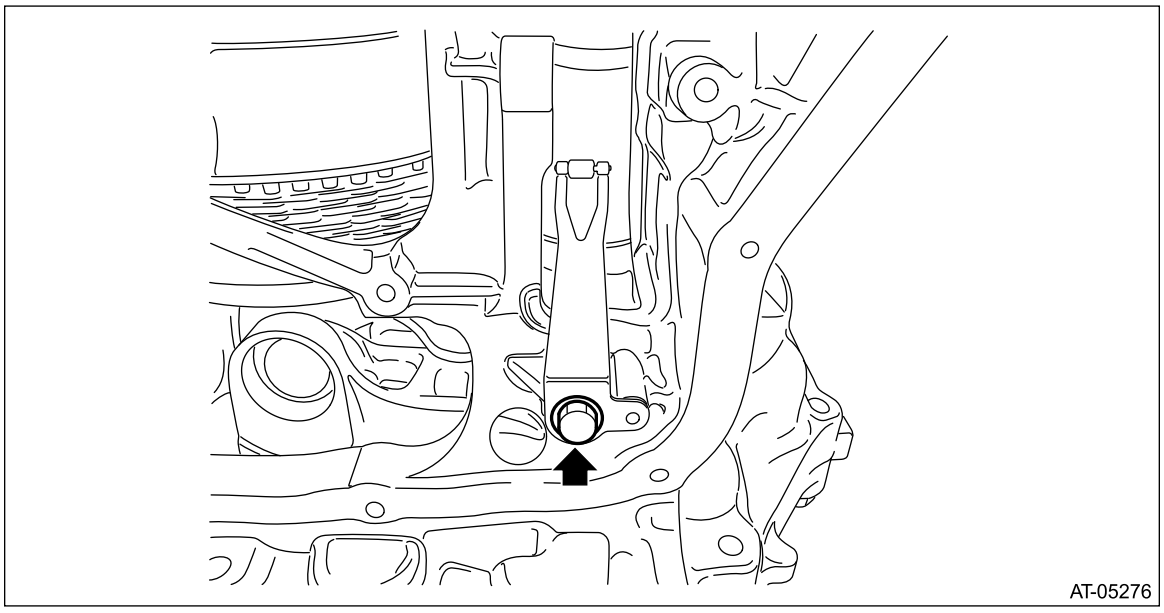
6. Remove the detent spring.



CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Transmission Control Device

INSTALLATION

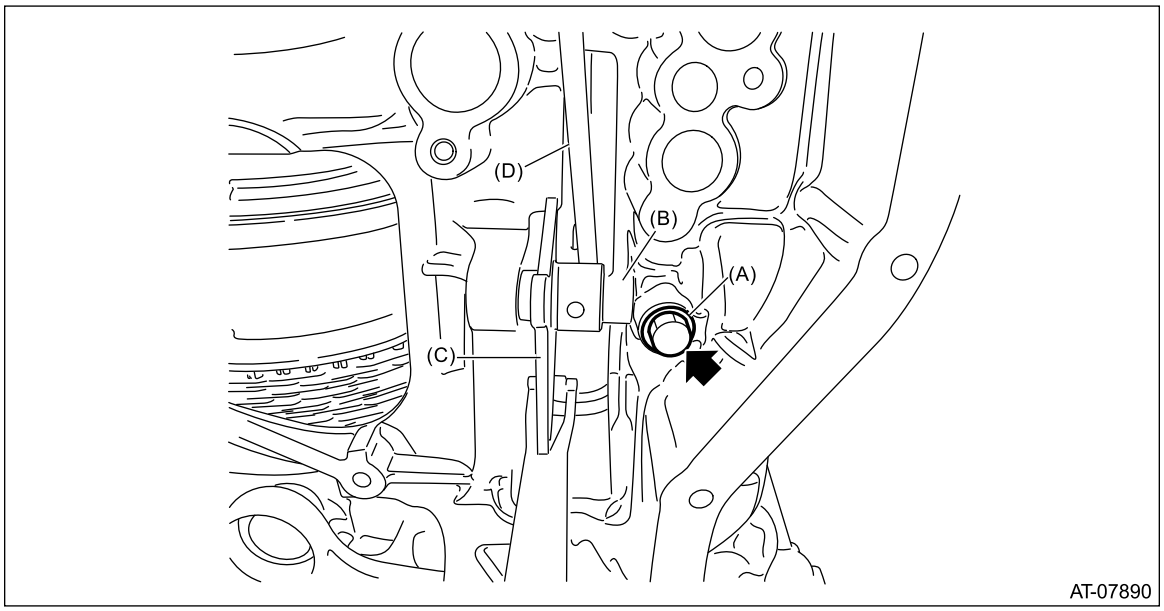
1. Install the detent spring.
Tightening torque:
7 N·m (0.7 kgf-m, 5.2 ft-lb)



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

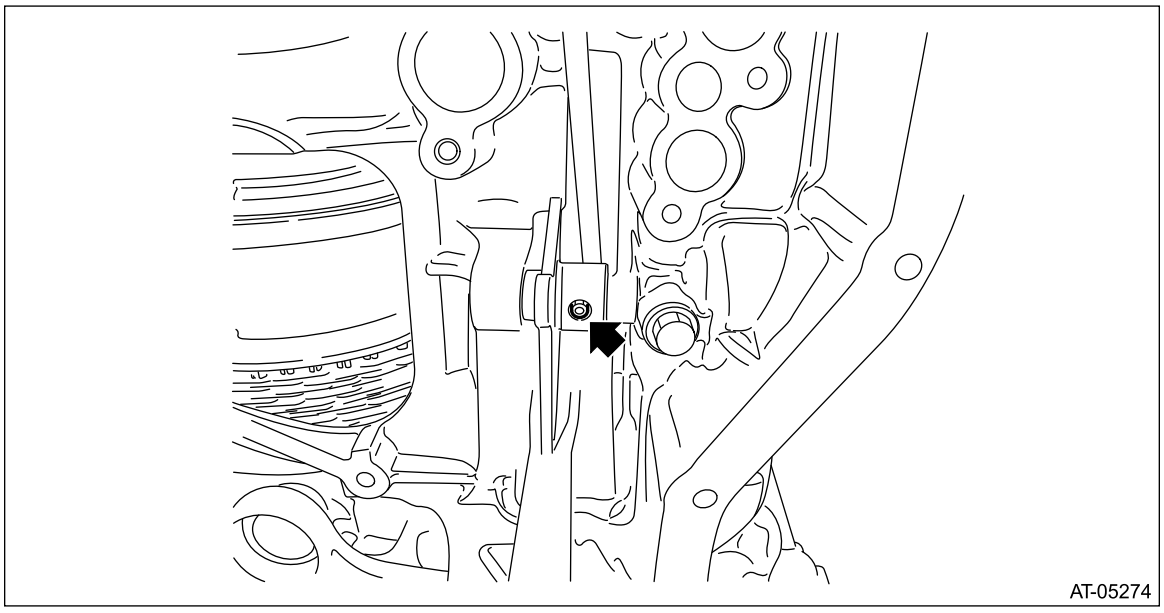
(C) Manual plate

(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>INSTALLATION.
5. Adjust the inhibitor switch. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Inhibitor Switch>ADJUSTMENT.
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

INSPECTION

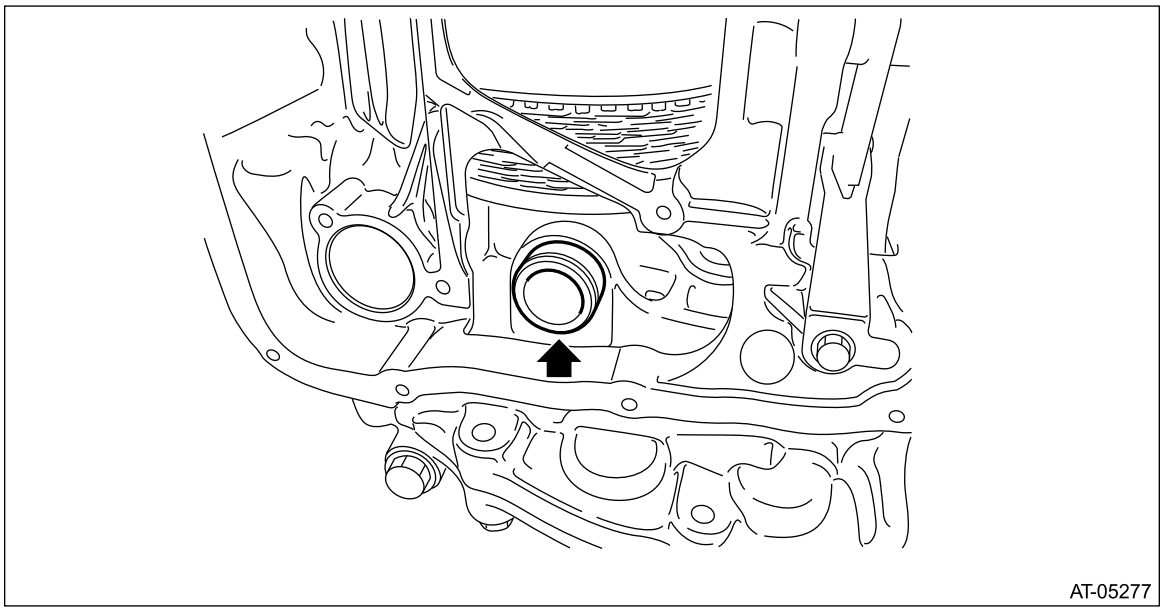
Make sure that the manual lever and detent spring are not worn or otherwise damaged.

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 center differential carrier. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Center Differential Carrier>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 reduction driven gear. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Reduction Driven Gear>REMOVAL.
14. Remove the oil pan and control valve body. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Control Valve Body>REMOVAL.

Note:

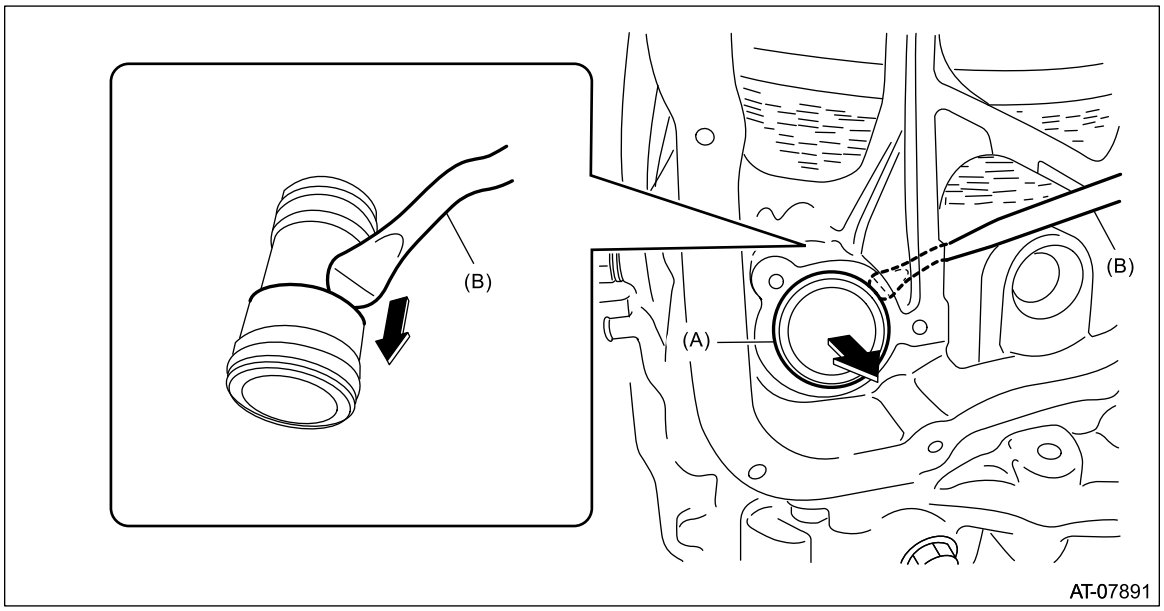
When removing the control valve body, also remove the pressure pipe if it is attached on the case.



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

Note:

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



(A) CVTF pipe

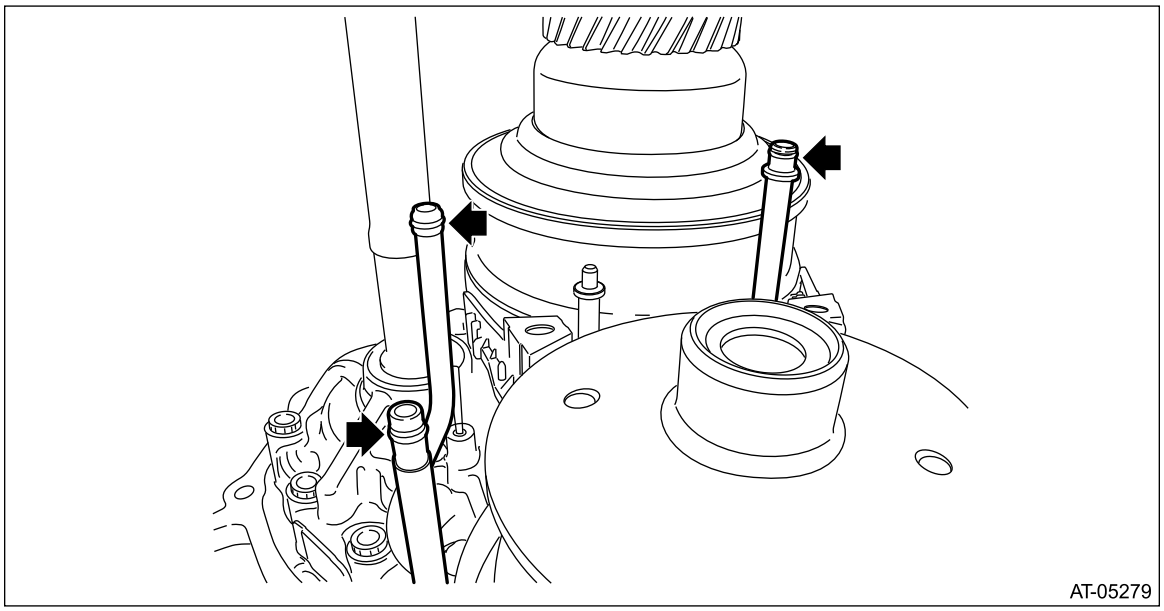
(B) Tire lever

16. Remove the transmission case.

Note:

The total number of transmission case mounting bolts is 15.

17. Remove the O-ring of lubrication pipe.



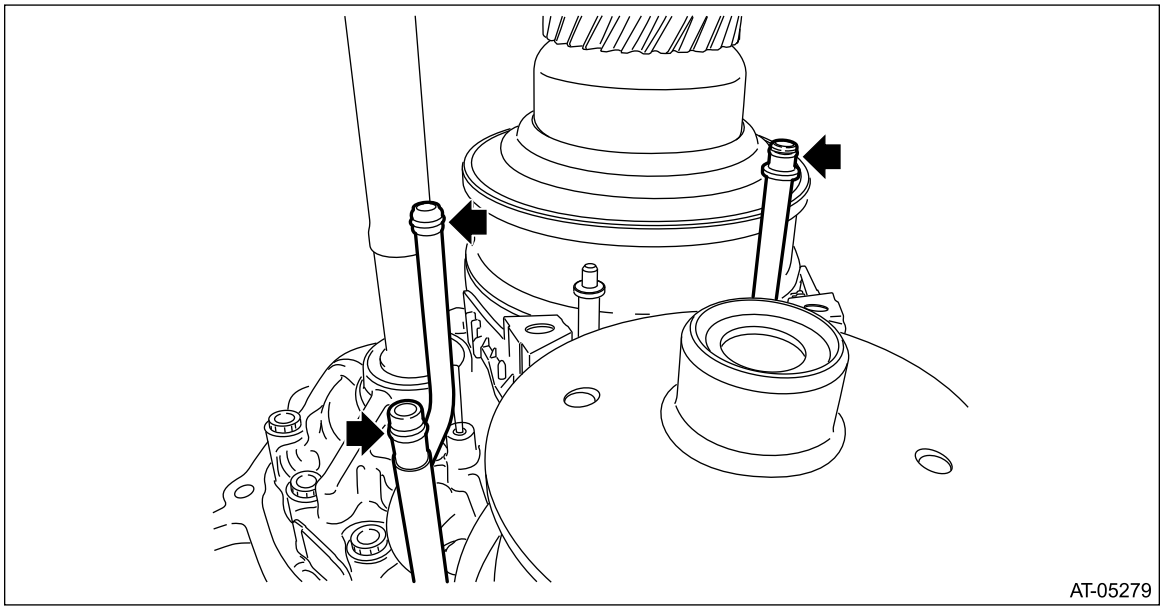
18. Remove the control device system. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transmission Control Device>REMOVAL.

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Transmission Case

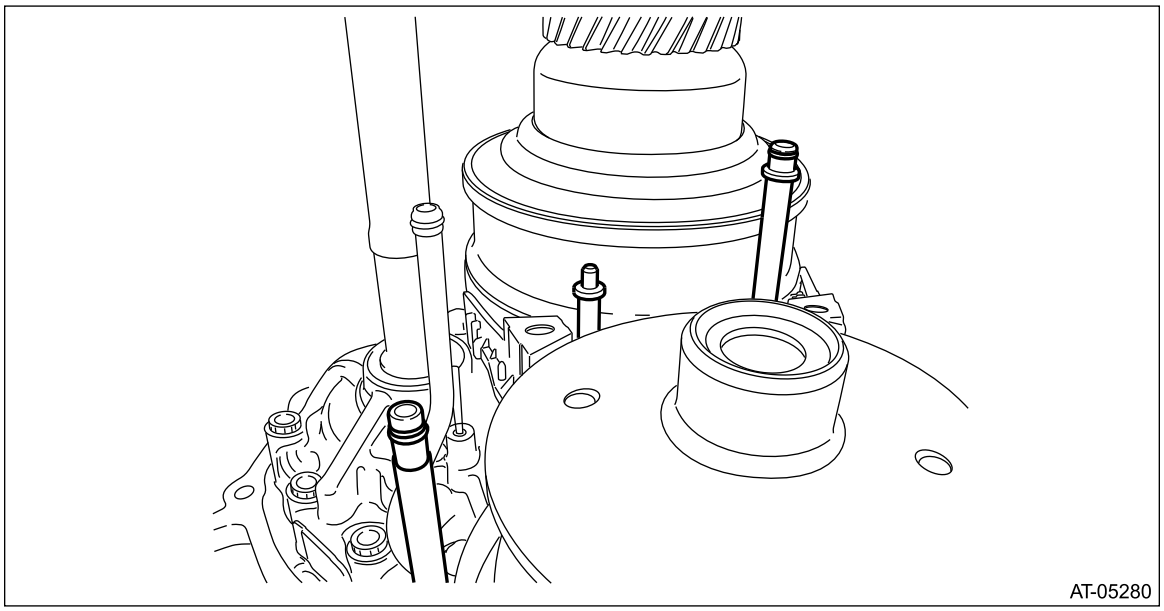
INSTALLATION

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.**



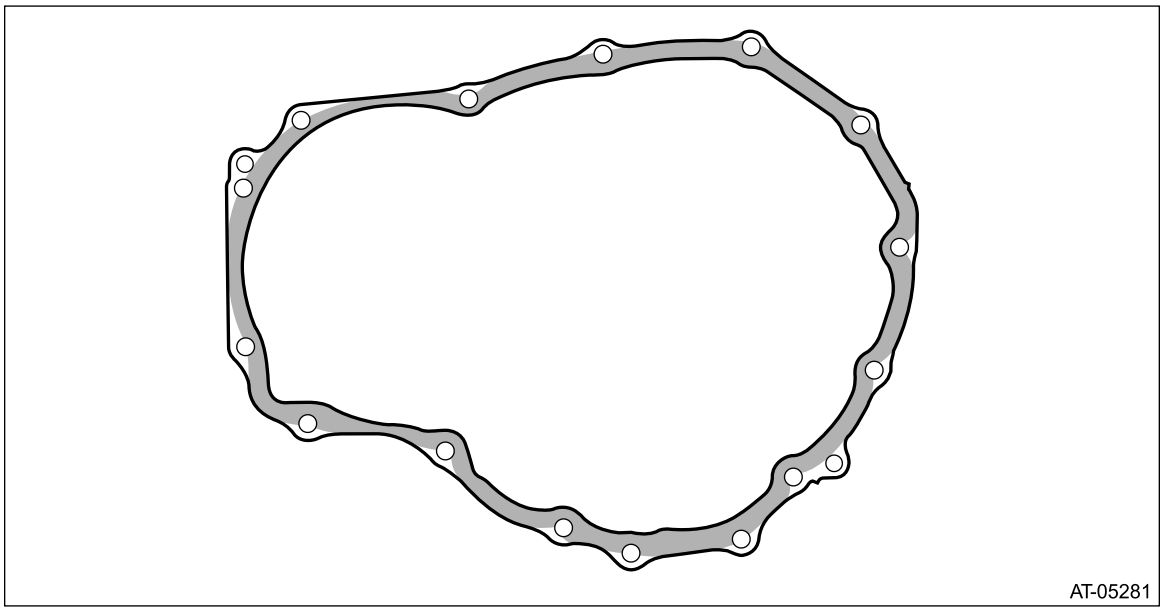
4. Make sure the lubrication pipe and support rod are in vertical position.



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.

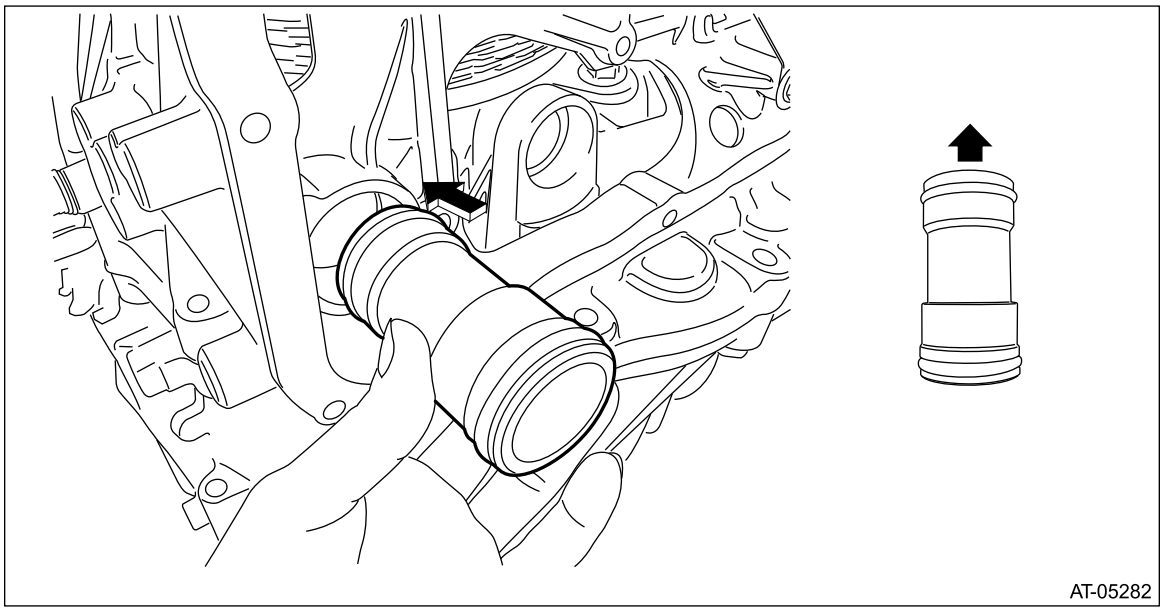
Note:

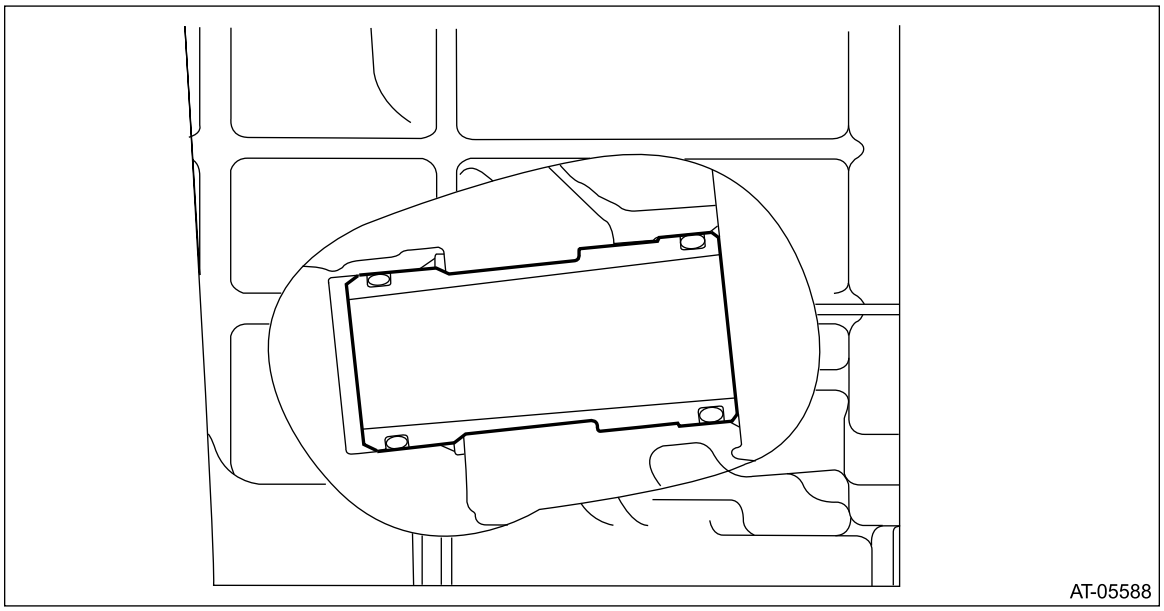
- **Install while checking the lubrication pipe and support rod is being inserted properly into transmission case.**
- **If installing the transmission case is difficult, check if the lubrication pipe and support rod are bent.**
- **The total number of transmission case mounting bolts is 15.**

Tightening torque:

41 N·m (4.2 kgf-m, 30.2 ft-lb)

7. Install the O-ring to CVTF pipe.
   Note:
   Use new O-rings.
8. The smaller opening of CVTF pipe should be inserted to transmission.
   Note:
   After installing, make sure the CVTF pipe does not stick out of transmission case.





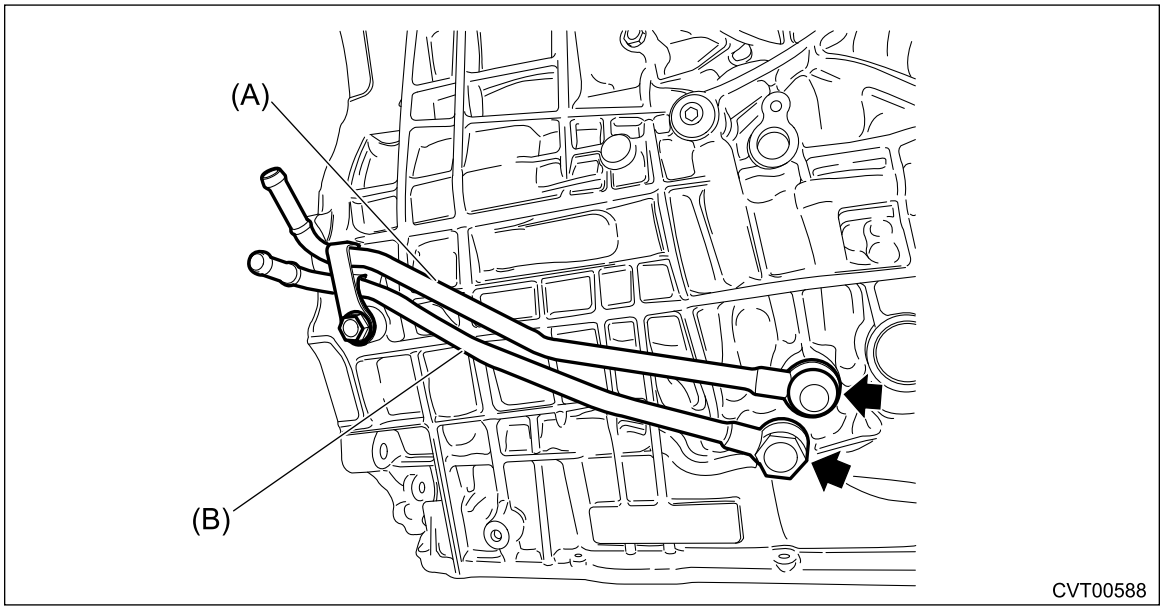
9. Install the reduction driven gear. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Reduction Driven Gear>INSTALLATION.
10. Install the forward clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Forward Clutch Assembly>INSTALLATION.
11. Install the intermediate case. Ref. to CONTINUOUSLY 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 center differential carrier. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Center Differential Carrier>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

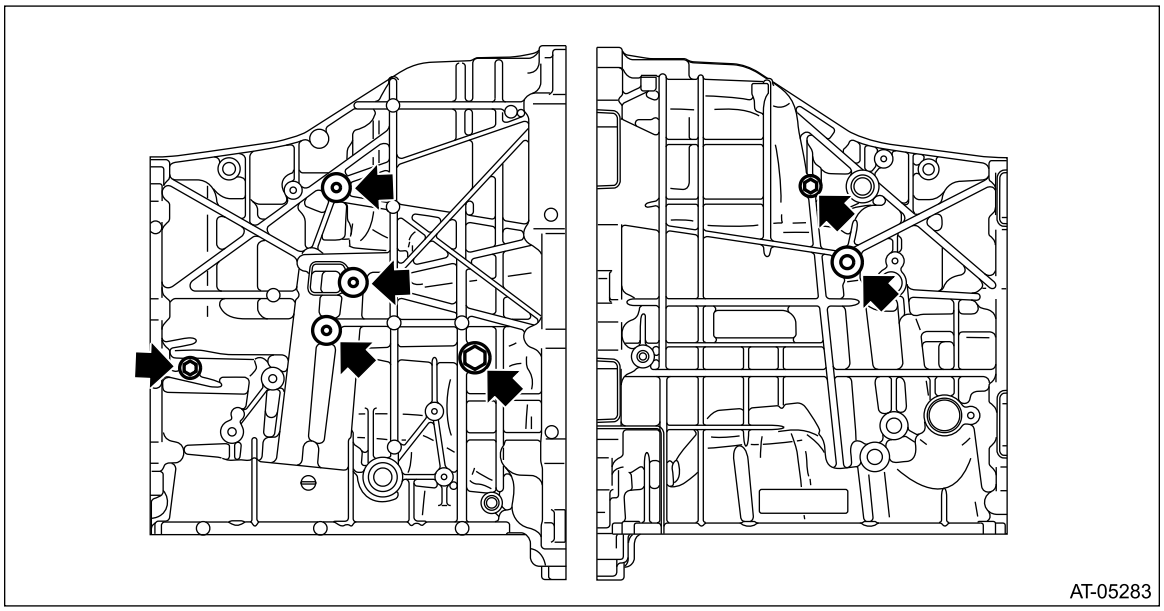
DISASSEMBLY

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

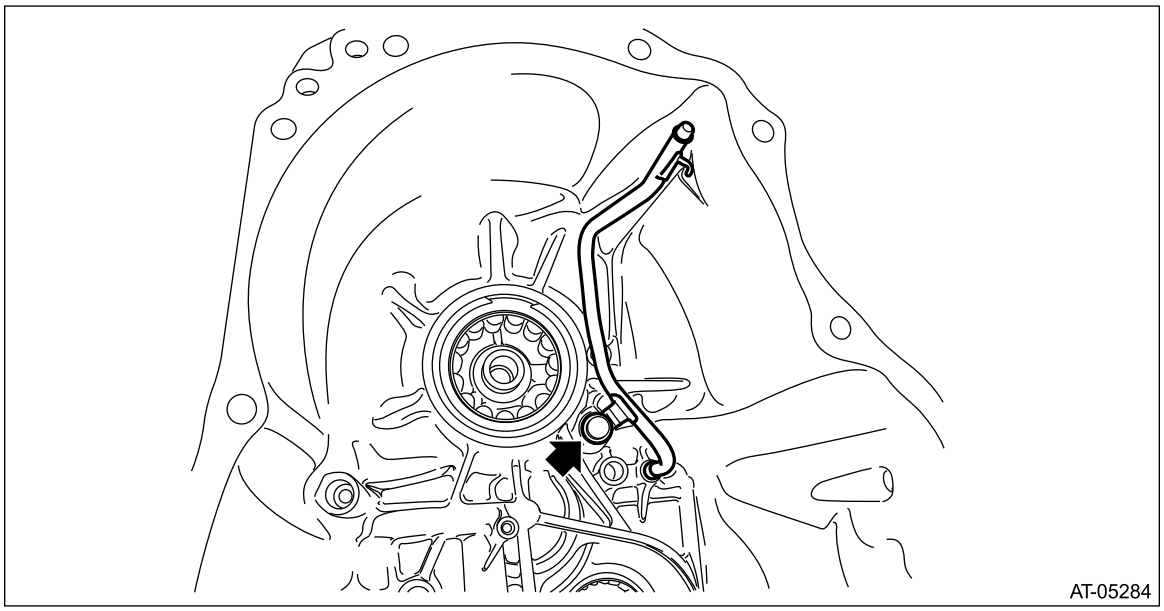


(A) CVTF outlet pipe
(B) CVTF inlet pipe

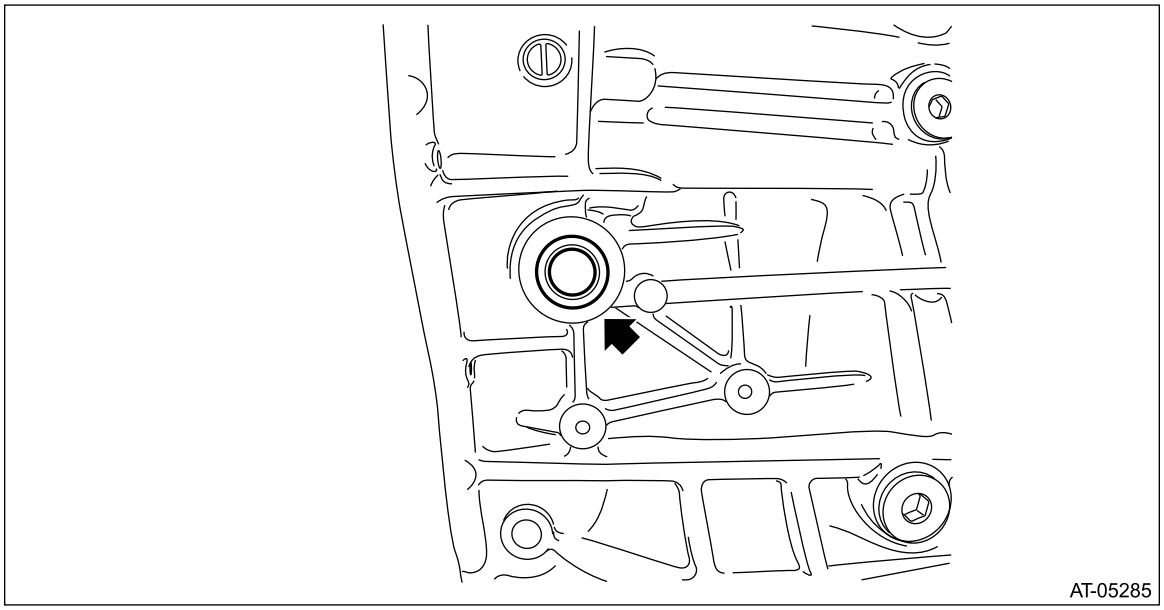
2. Remove all plugs from the transmission case.



3. Remove the lubrication pipe.

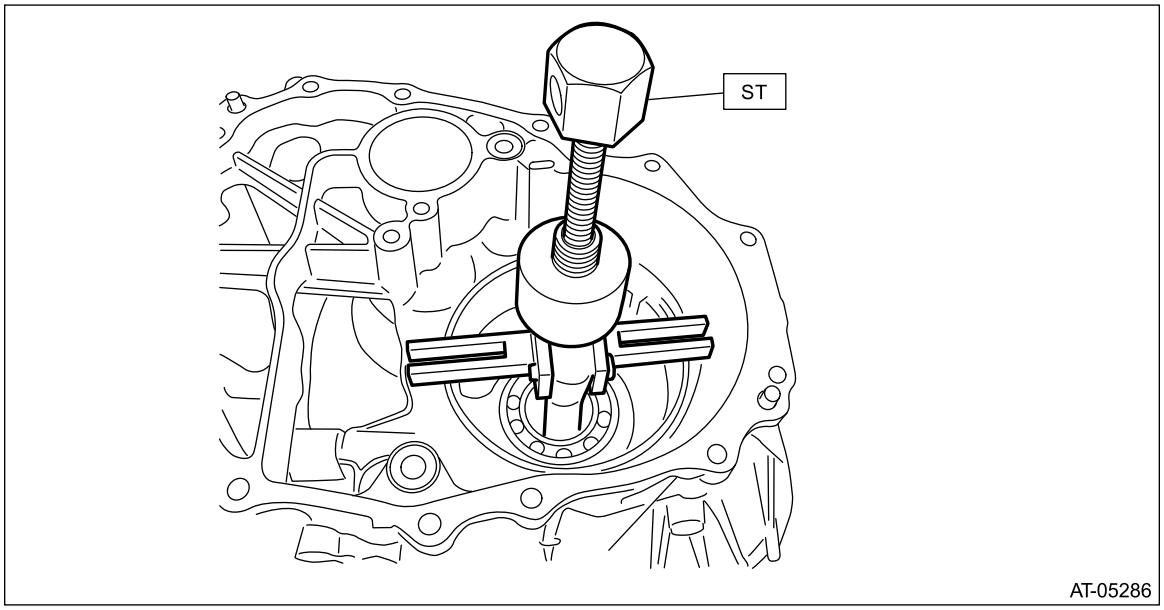


4. Remove the oil seal using a screwdriver wrapped with cloth etc.

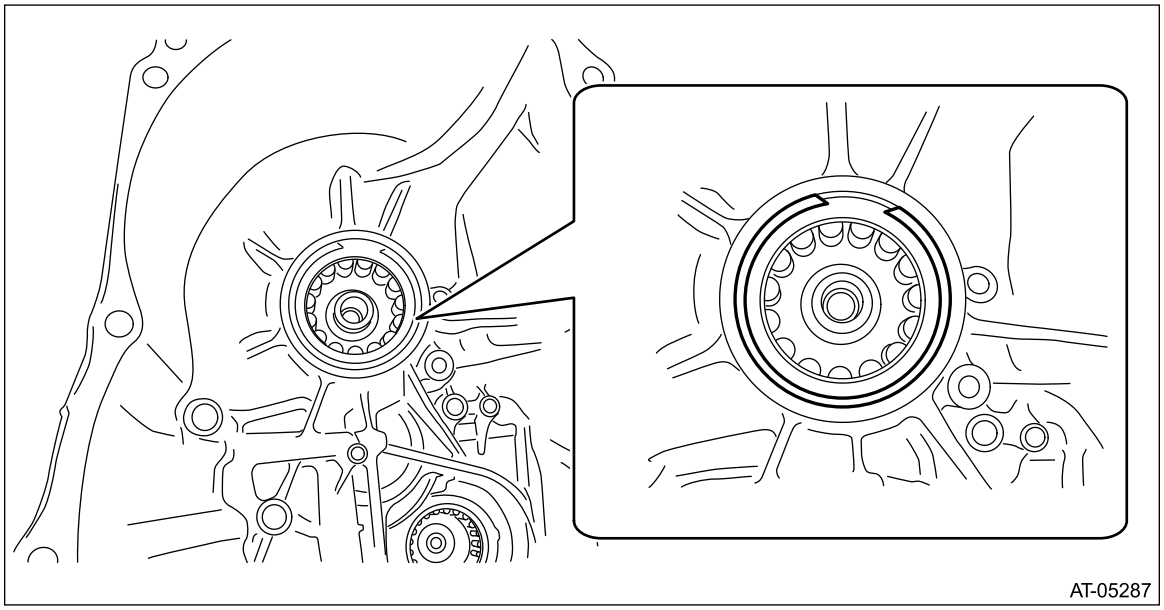


5. Remove the ball bearing from reduction driven gear using ST.

ST 398527700 PULLER ASSY



6. Remove the snap ring on primary pulley side.

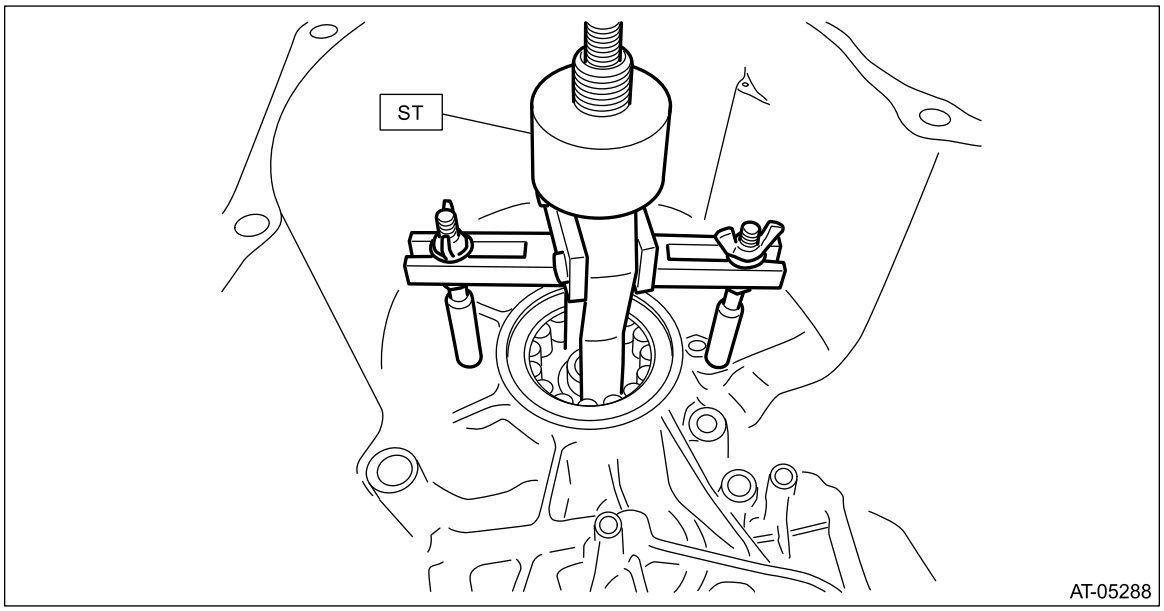


7. Using the ST, remove the roller bearing on primary pulley side.

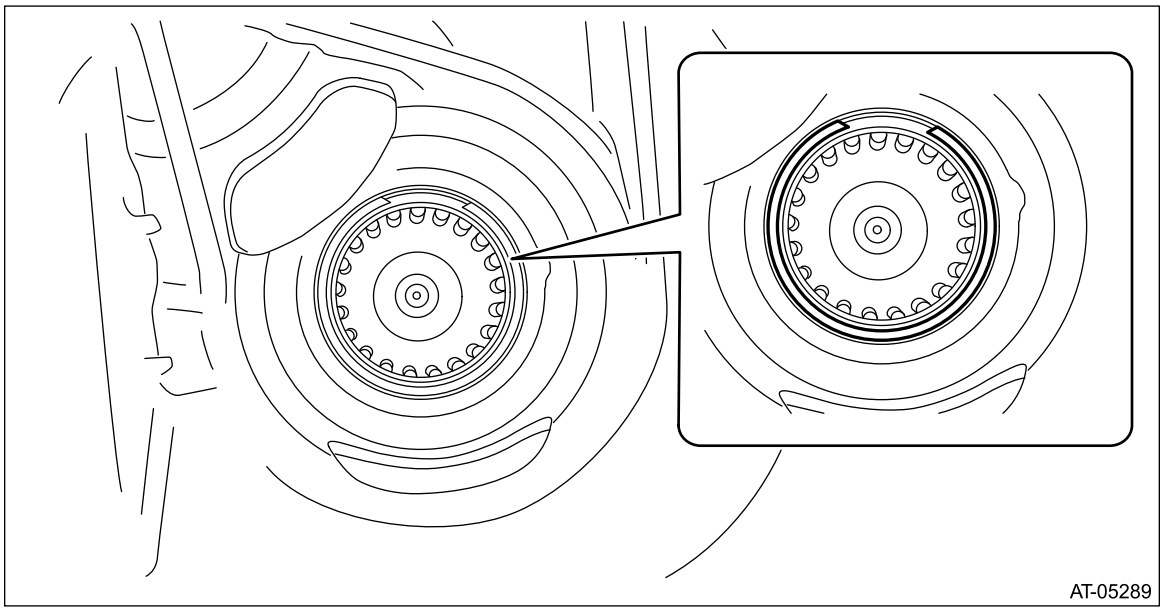
Note:

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.

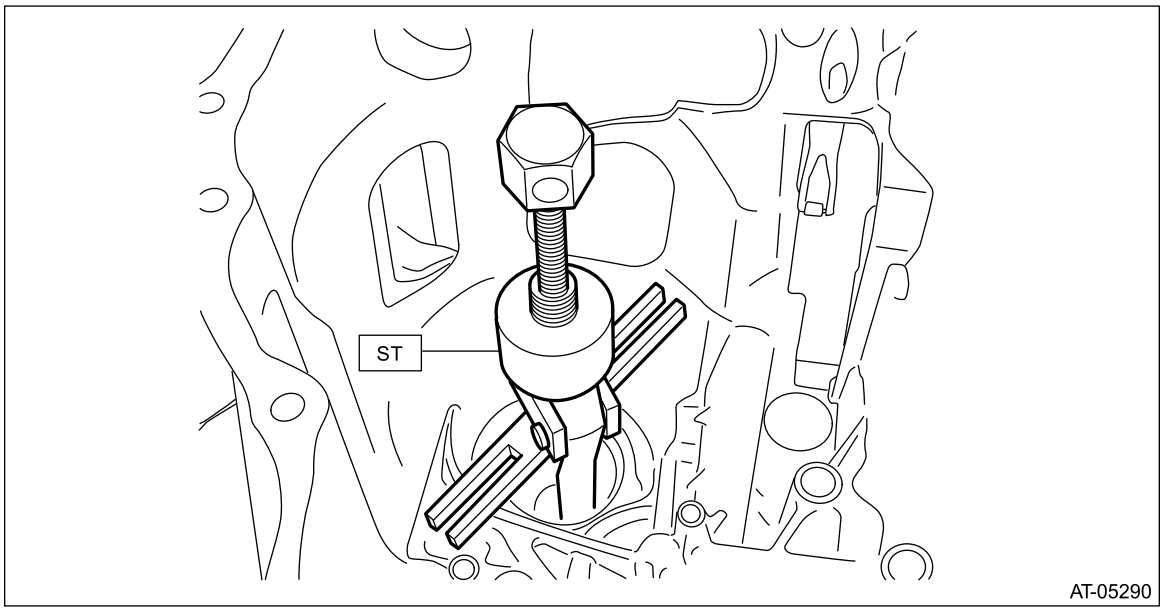


9. Using the ST, remove the roller bearing on secondary pulley side.

Note:

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

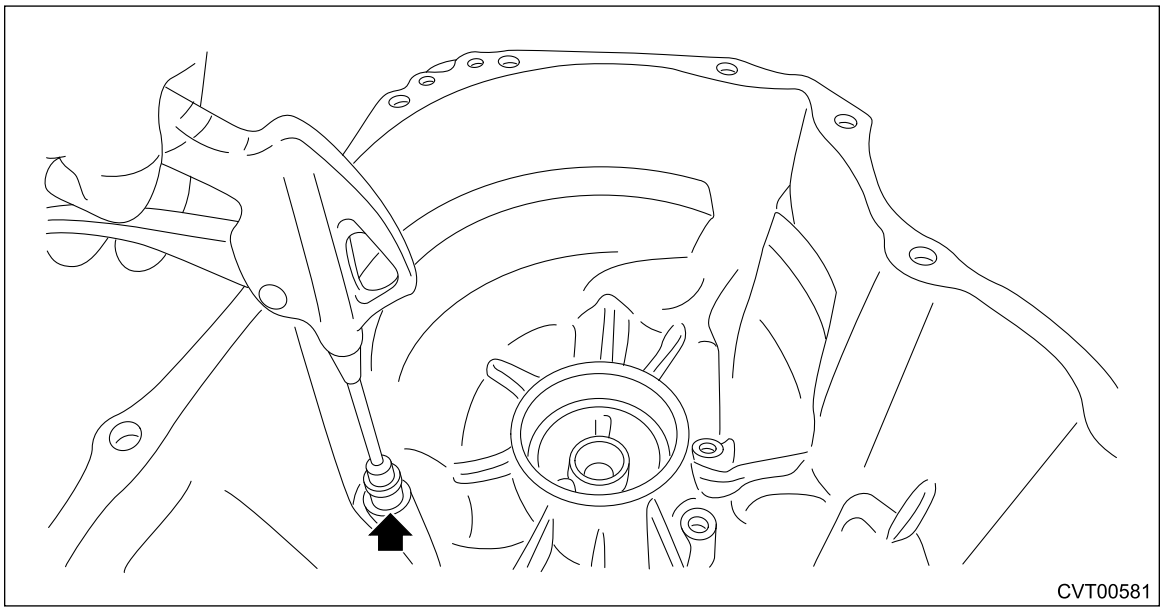
ST 398527700 PULLER ASSY

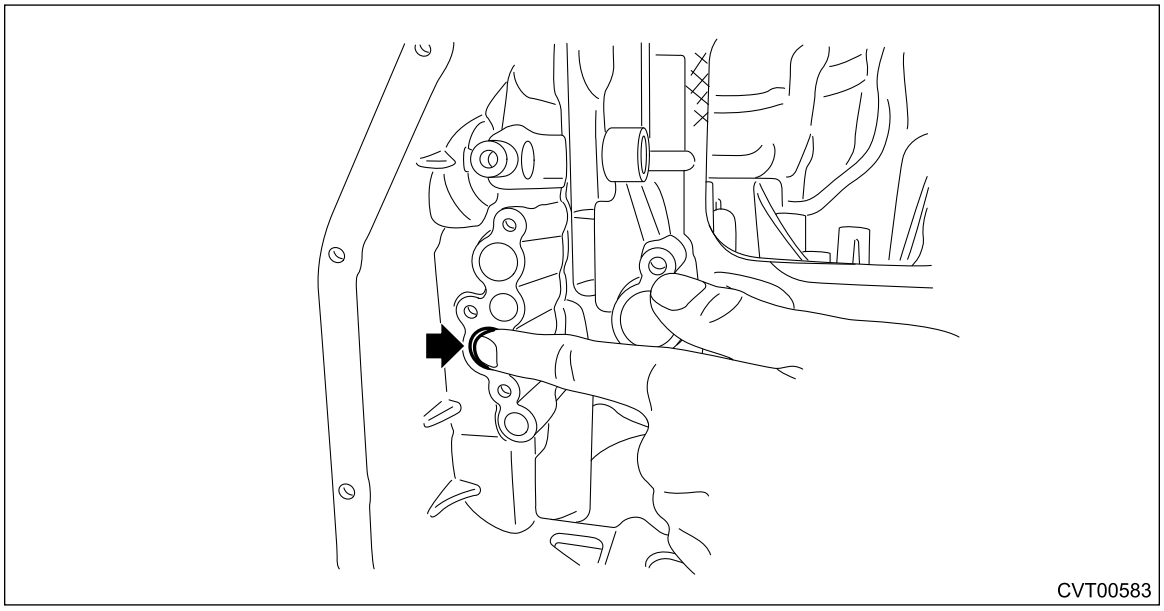


10. Remove the CVTF filter by blowing compressed air through the transmission case hole.

Note:

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



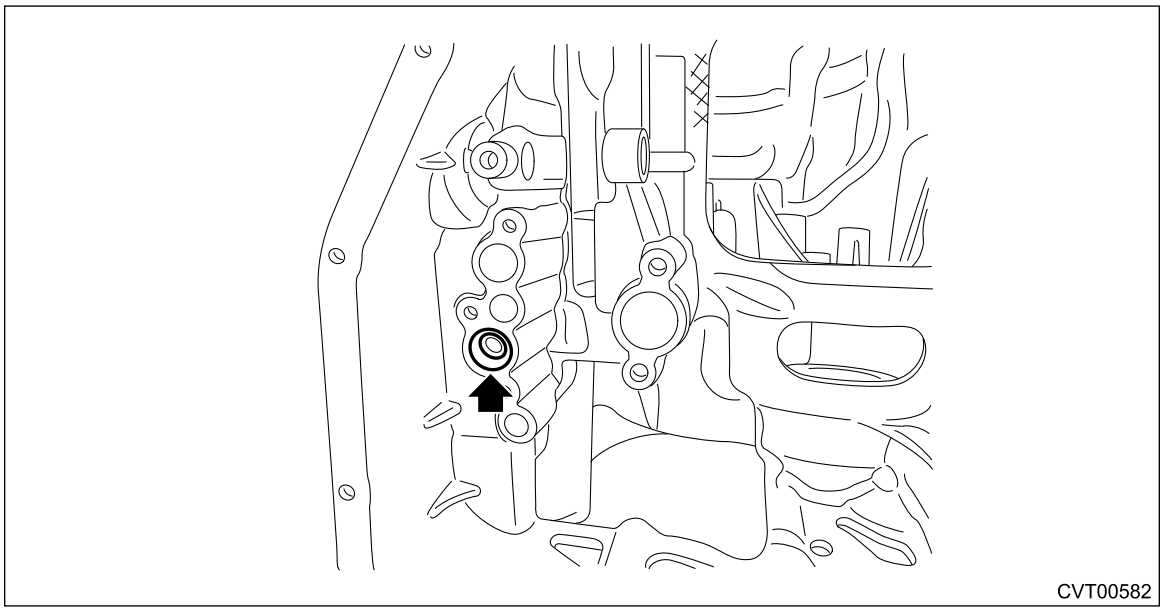


ASSEMBLY

1. Install the CVTF filter.

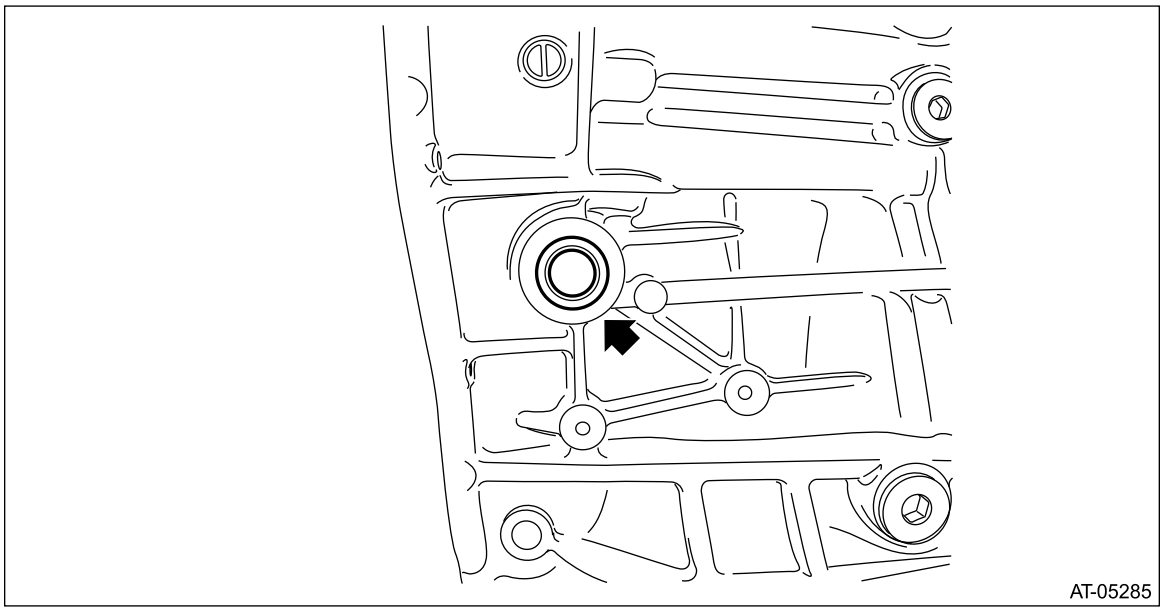
   Note:

   - **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



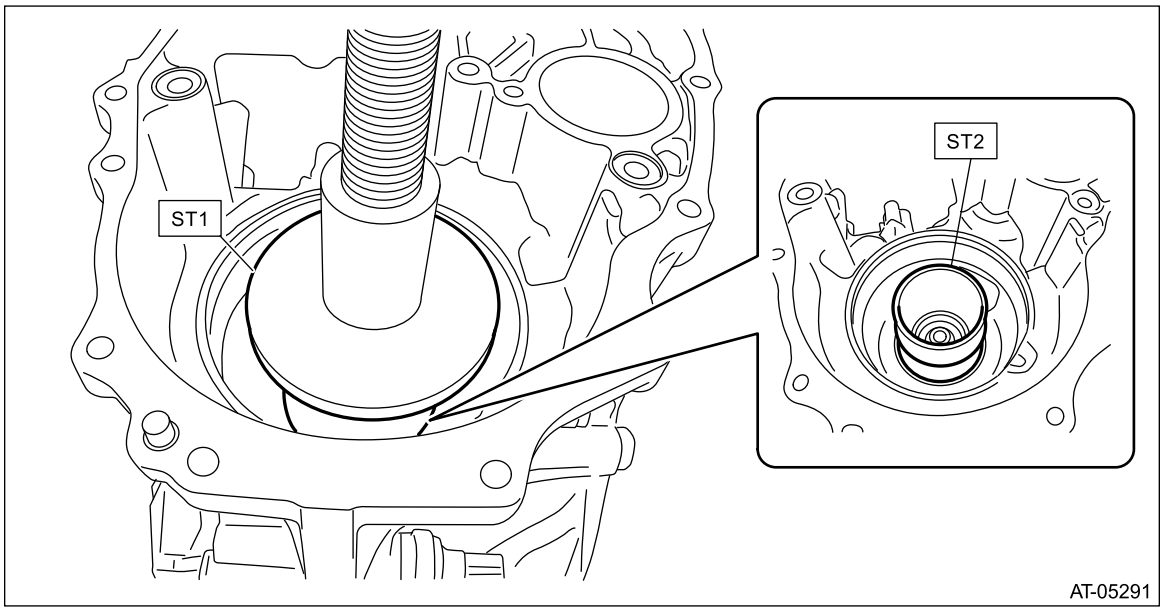
3. Using ST1 and ST2, install the ball bearing on the reduction gear side.

Note:

Use a new ball bearing.

ST1 398177700 INSTALLER

ST2 499755602 PRESS SNAP RING



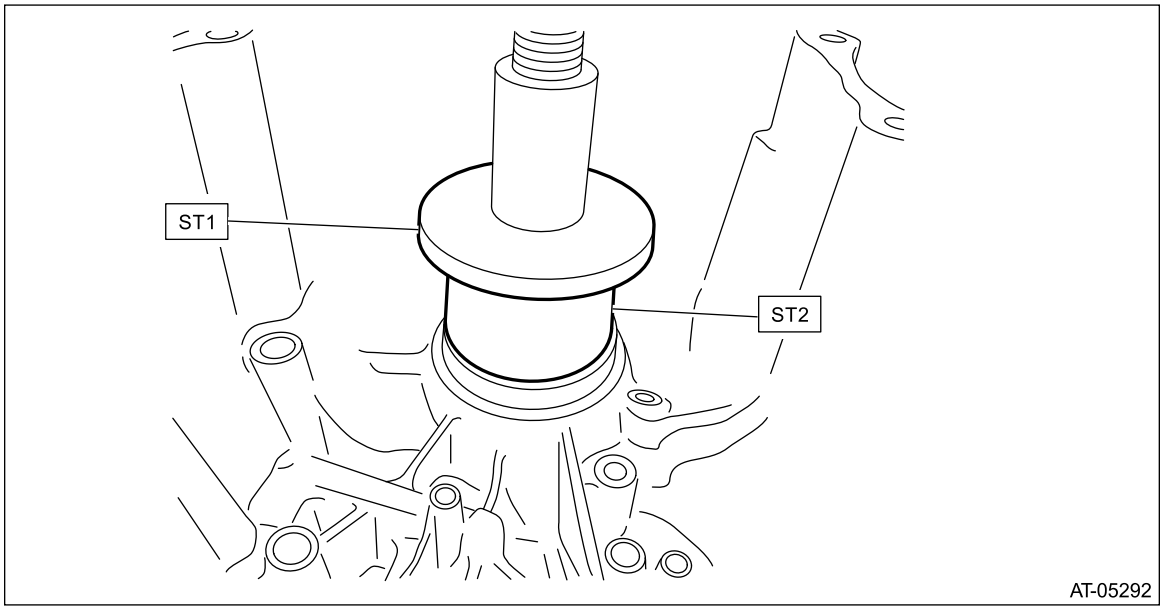
4. Using ST1 and ST2, install the roller bearing on primary pulley side.

Note:

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

ST1 398177700 INSTALLER

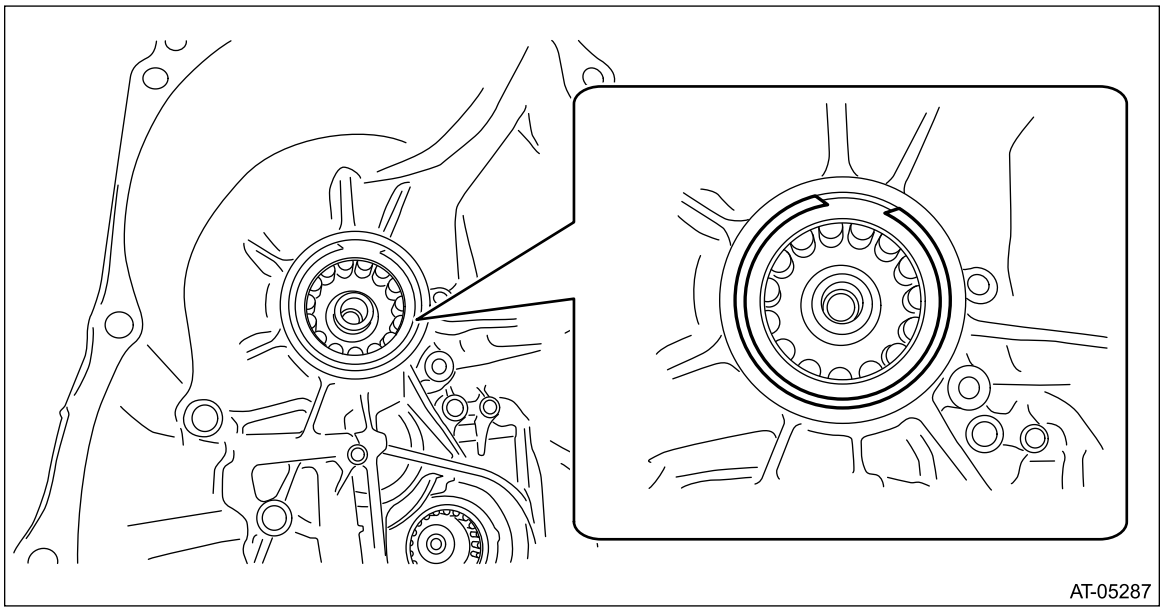
ST2 20299AG010 BASE



5. Install the snap ring on primary pulley side.

Note:

Use new snap rings.

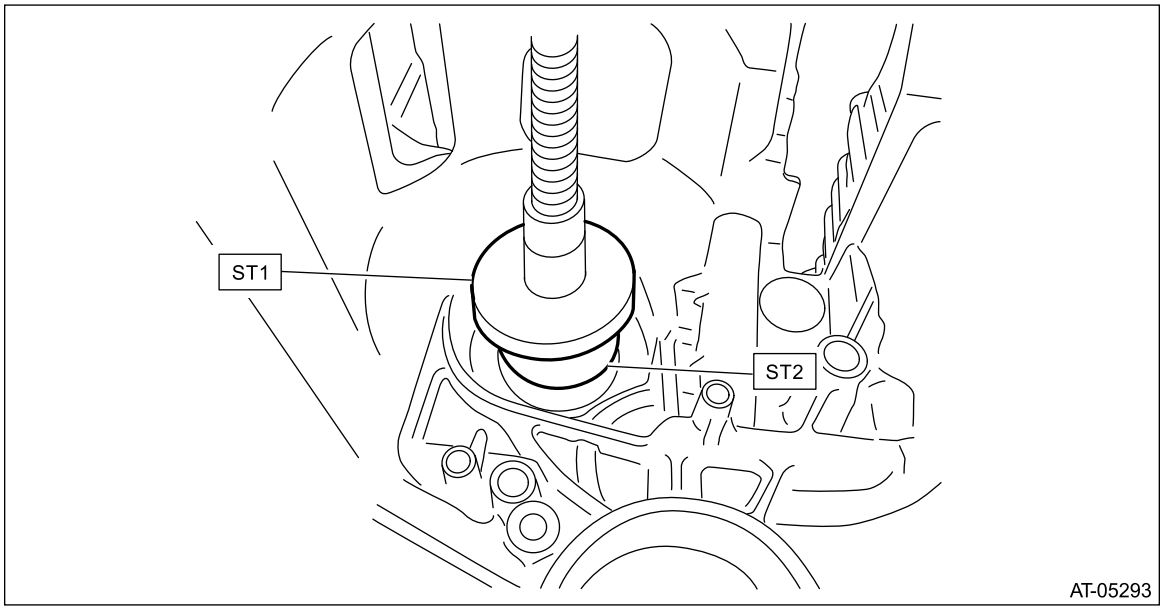


6. Using ST1 and ST2, install the roller bearing on secondary pulley side.

Note:

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

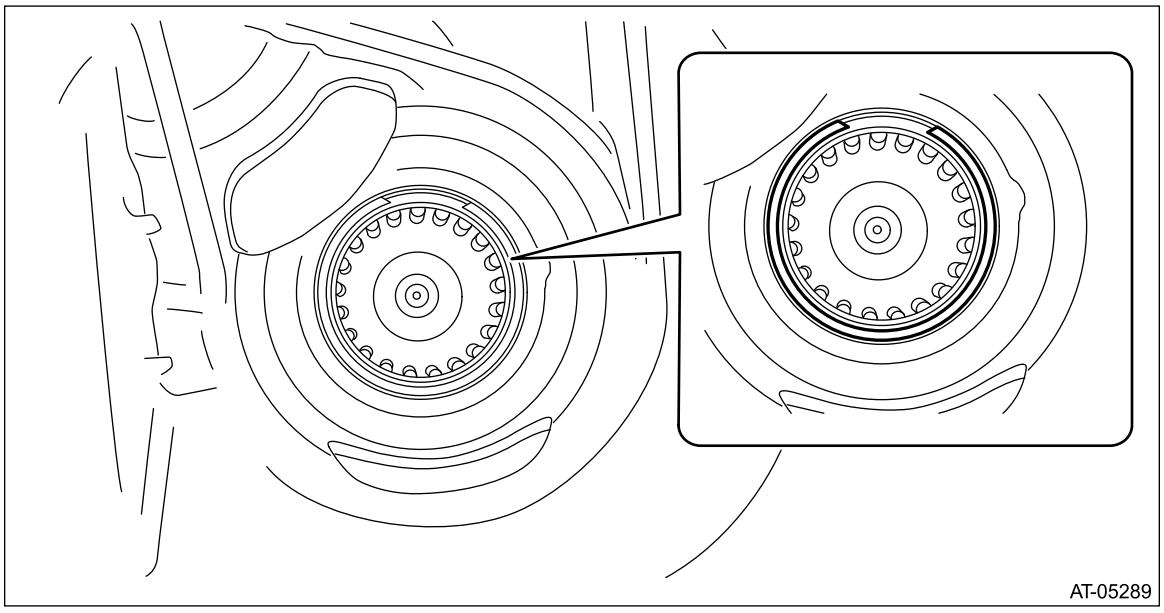
ST1	**398177700**	**INSTALLER**
ST2	**499755602**	**PRESS SNAP RING**



7. Install the snap ring on secondary pulley side.

Note:

Use new snap rings.



8. Install all plugs.

Note:

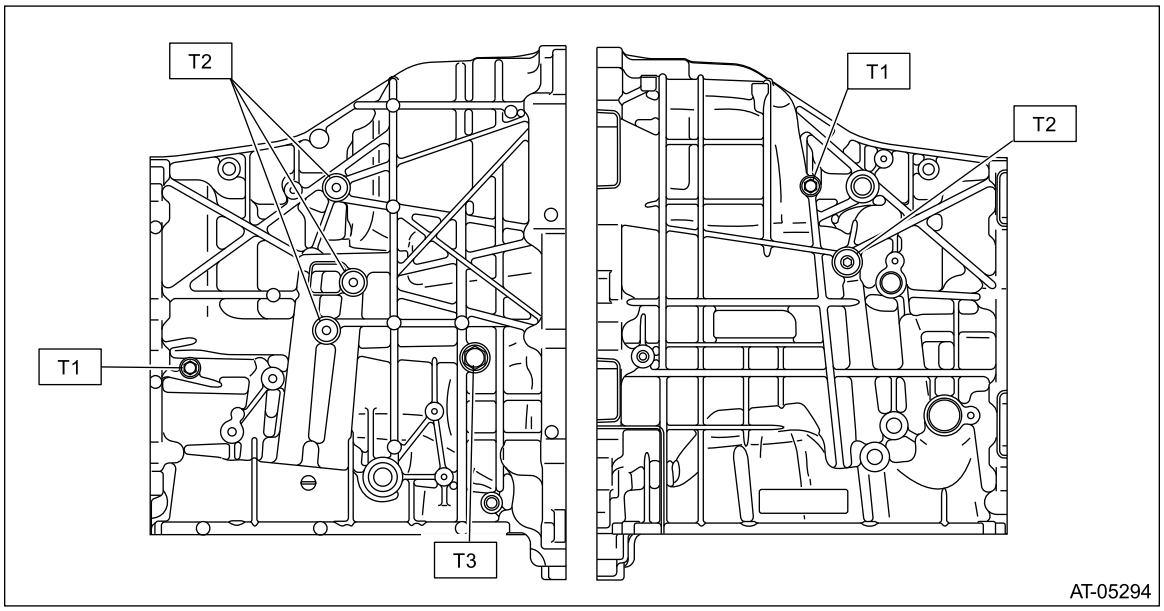
Use new gaskets and O-rings.

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)

T3: 35 N·m (3.5 kgf-m, 25.8 ft-lb)



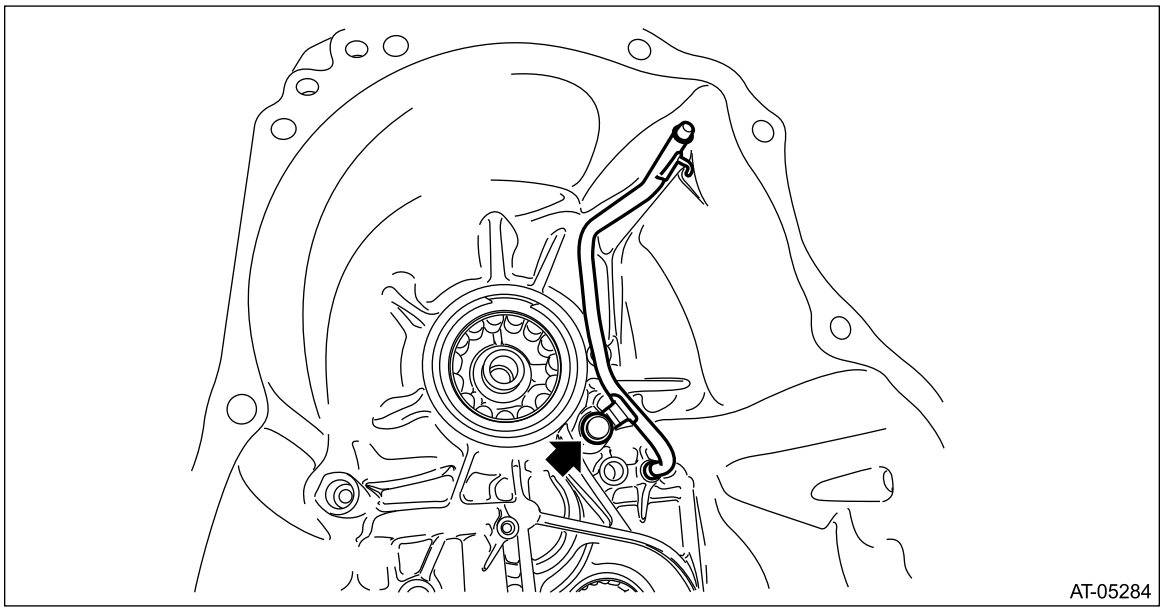
9. Install the lubrication pipe and O-ring.

Note:

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

Tightening torque:

16 N·m (1.6 kgf-m, 11.8 ft-lb)



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

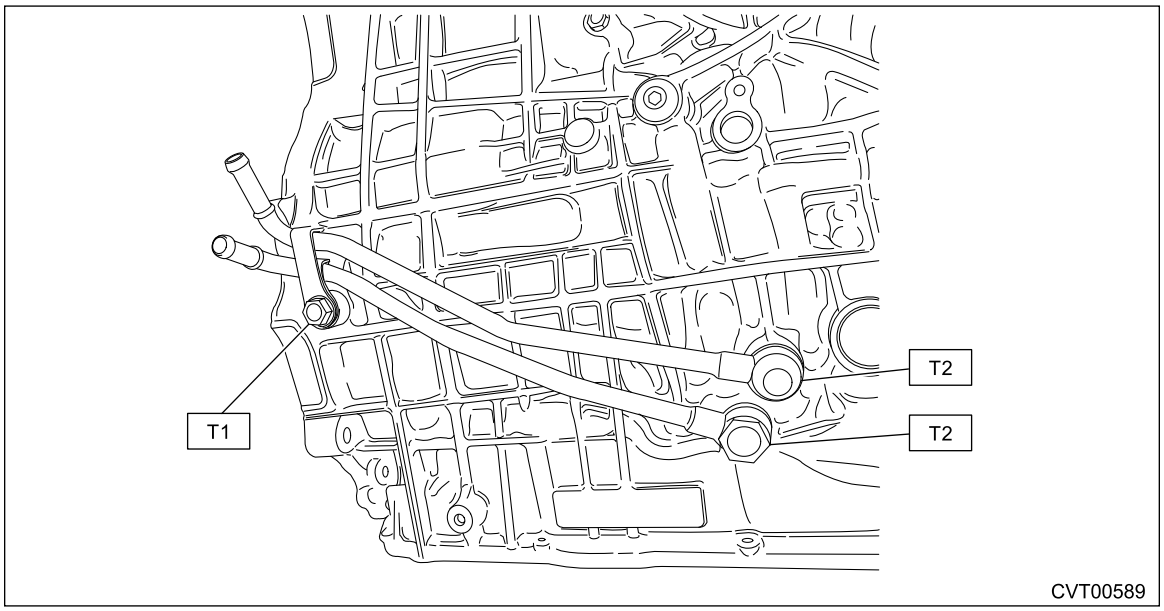
Note:

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

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

ADJUSTMENT

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

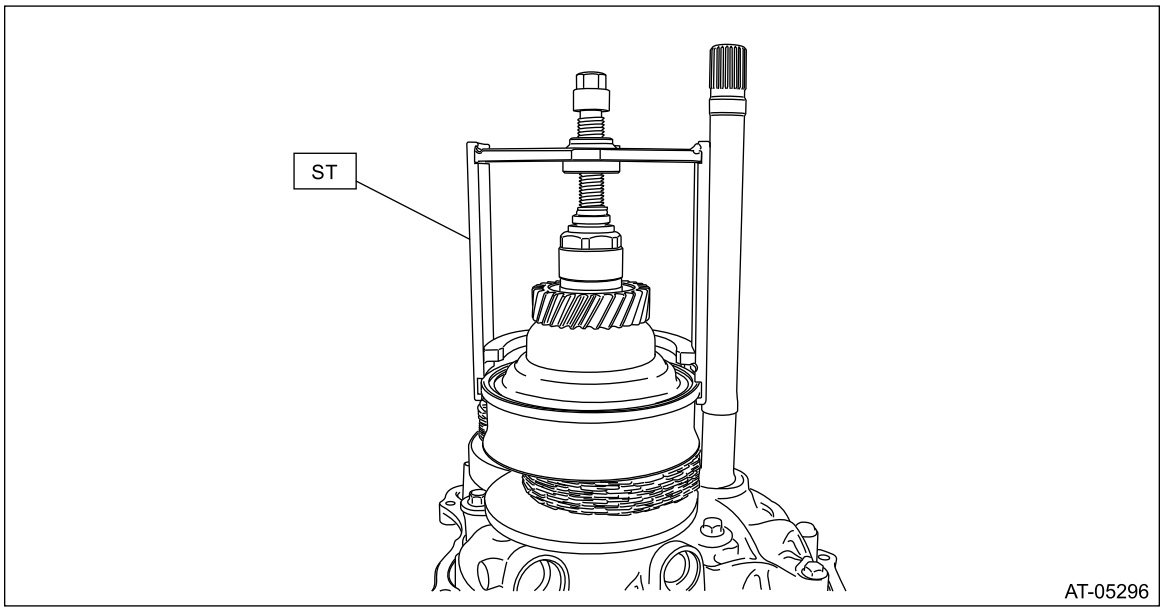
- Select the thrust bearing for the forward clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Forward Clutch Assembly>ADJUSTMENT.
- Select the snap ring for the reduction gear. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Reduction Driven Gear>ADJUSTMENT.

REMOVAL

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

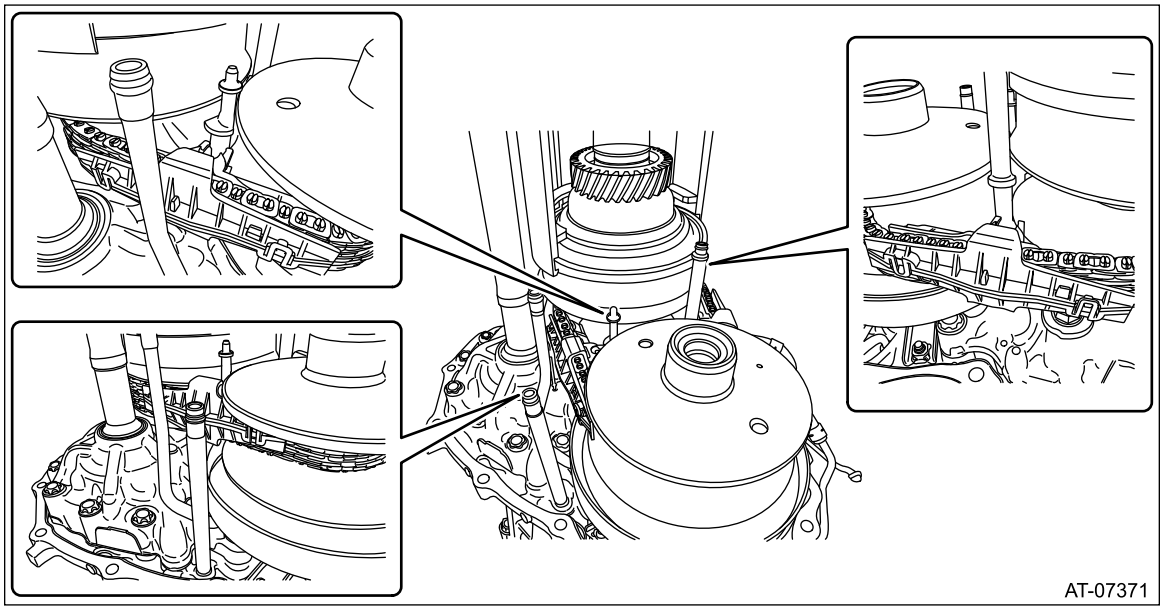
1. Remove the transmission assembly from the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Automatic Transmission Assembly>REMOVAL.
2. Remove the air breather hose. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Air Breather Hose>REMOVAL.
3. Remove the oil pan and control valve body. 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 center differential carrier. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Center Differential Carrier>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. 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

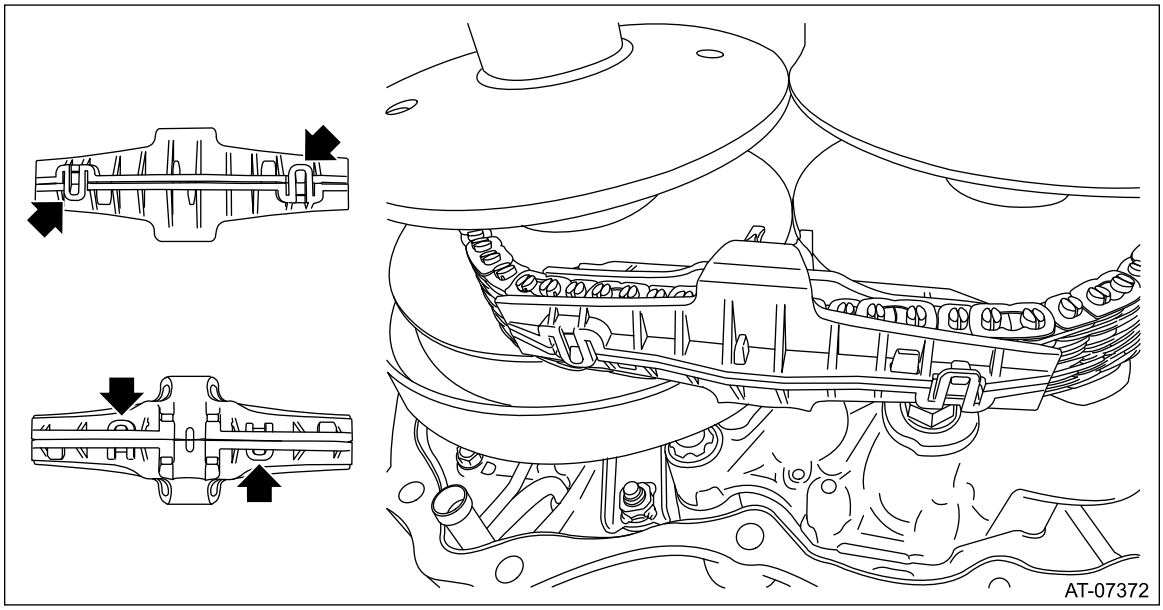


14. Remove the chain guide from lubrication pipe and support rod.

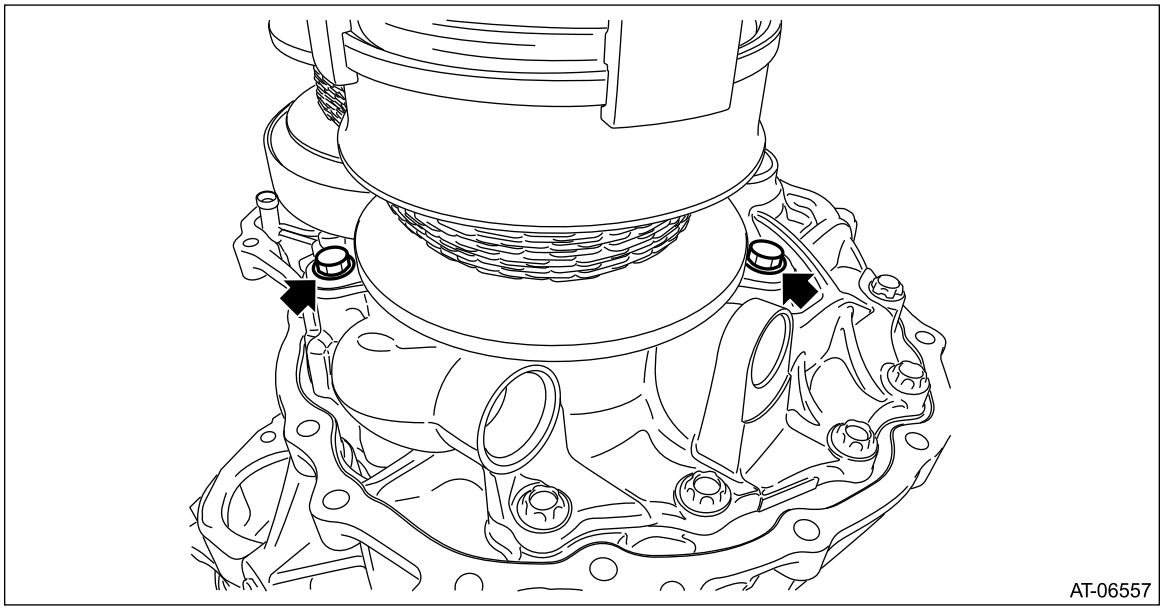
15. Remove the lubrication pipe and support rod.



16. Detach the four claws to remove the two chain guides.



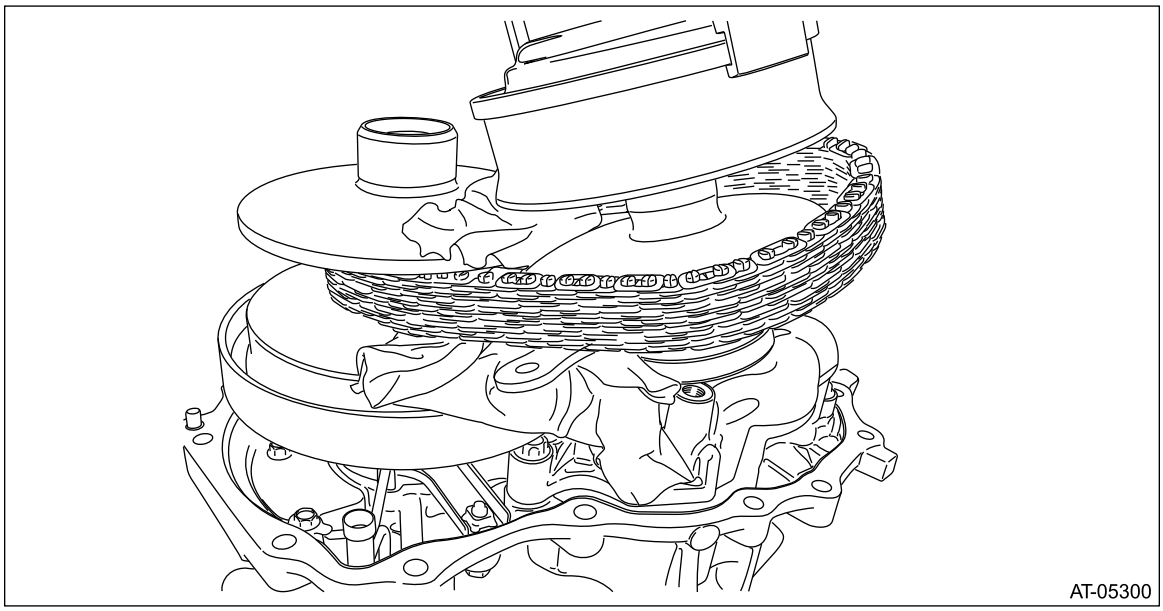
17. Remove the secondary pulley mounting bolt.



18. 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.

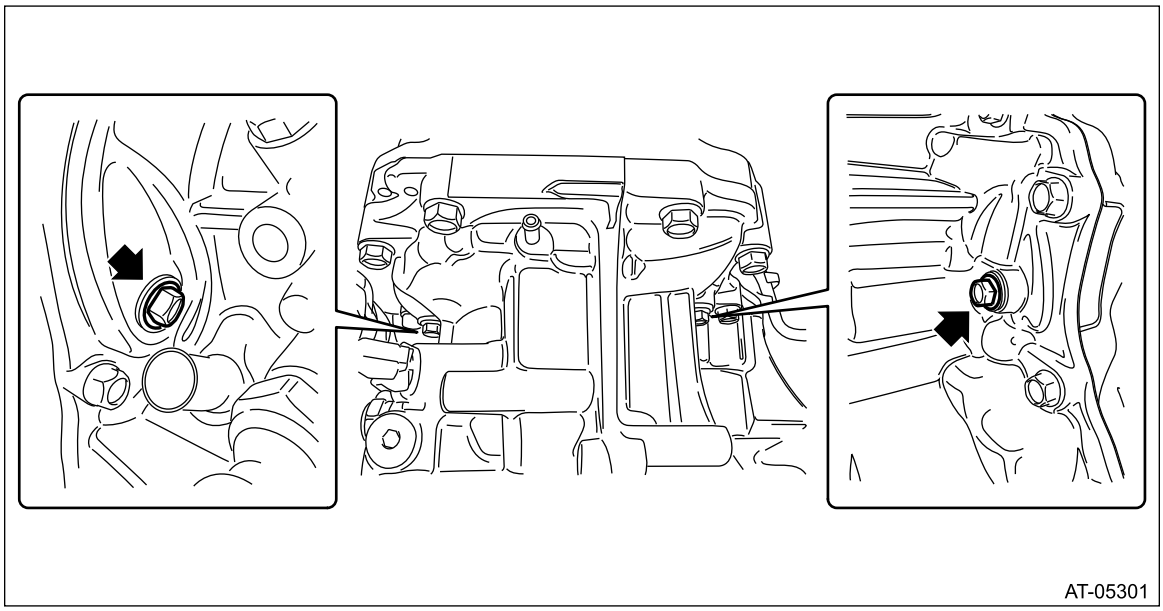
Caution:

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



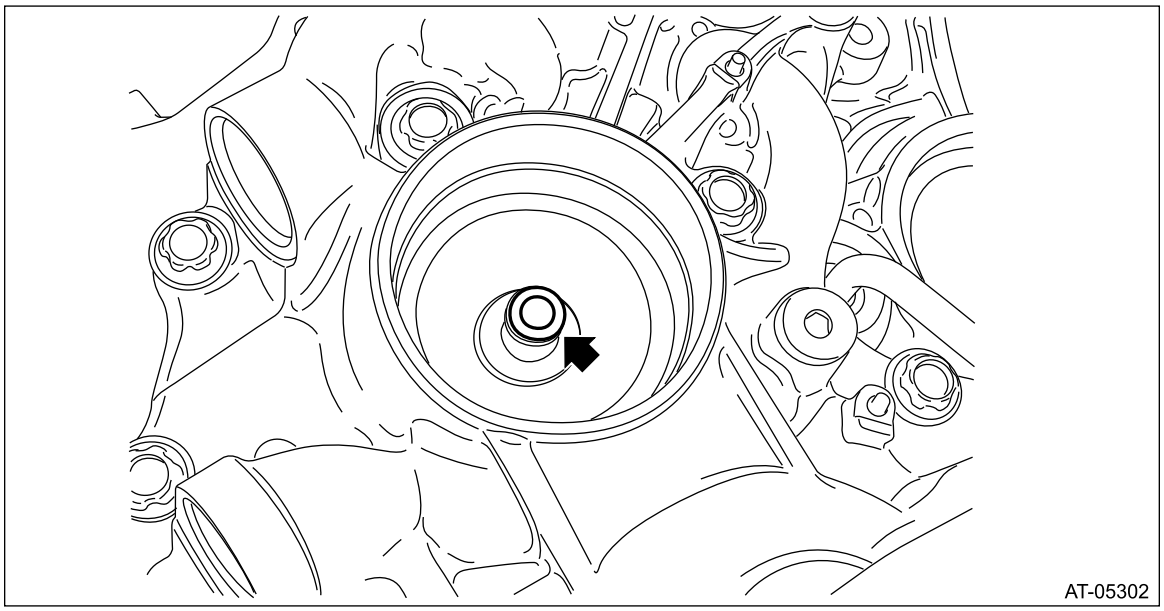
19. Remove the variator chain from primary pulley.

20. Remove the primary pulley mounting bolt.

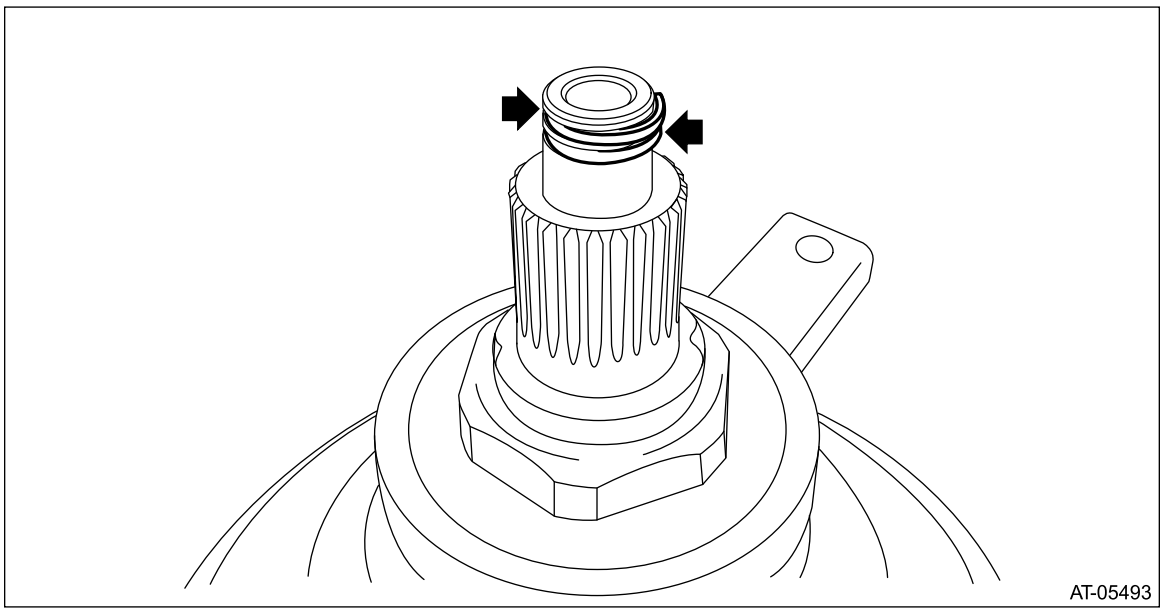


21. Remove the primary pulley.

22. Remove the two seal rings from drive pinion retainer.



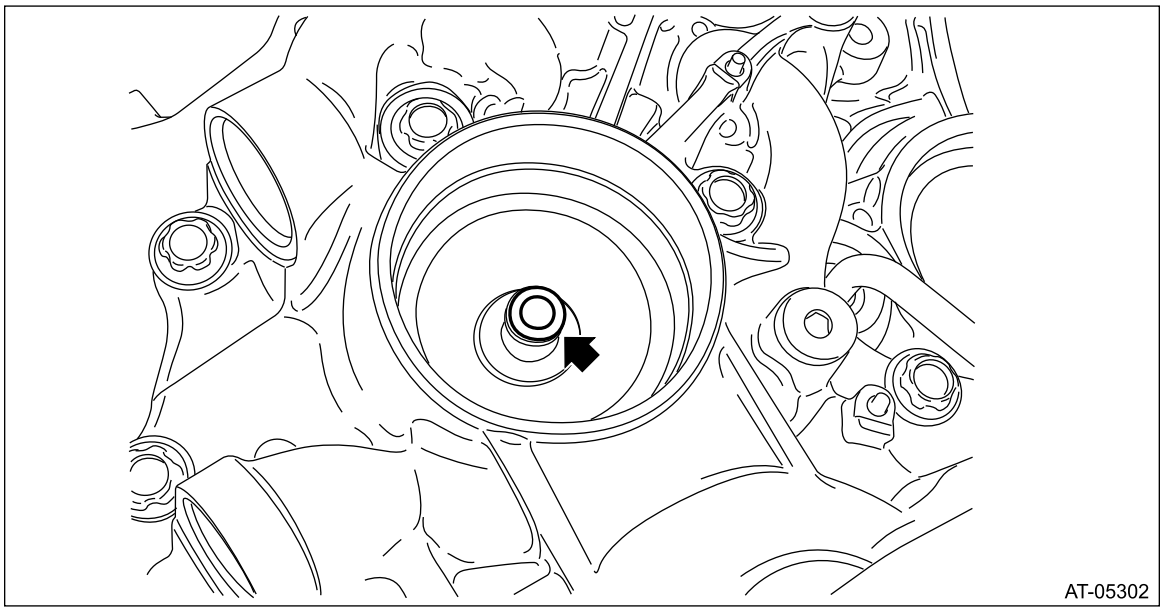
23. Remove the two seal rings from primary pulley.



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

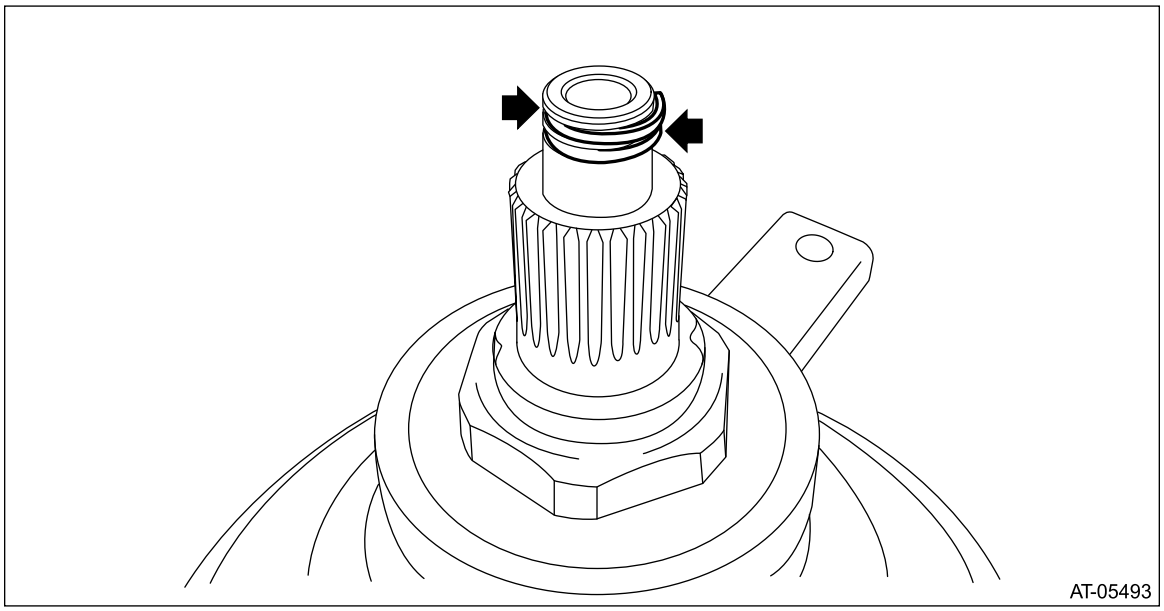


3. Install the selected shims to the primary pulley bearing catch surface.

4. Install the two seal rings to primary pulley.

Note:

- **Use new seal rings.**
- **Apply CVTF to the seal rings.**



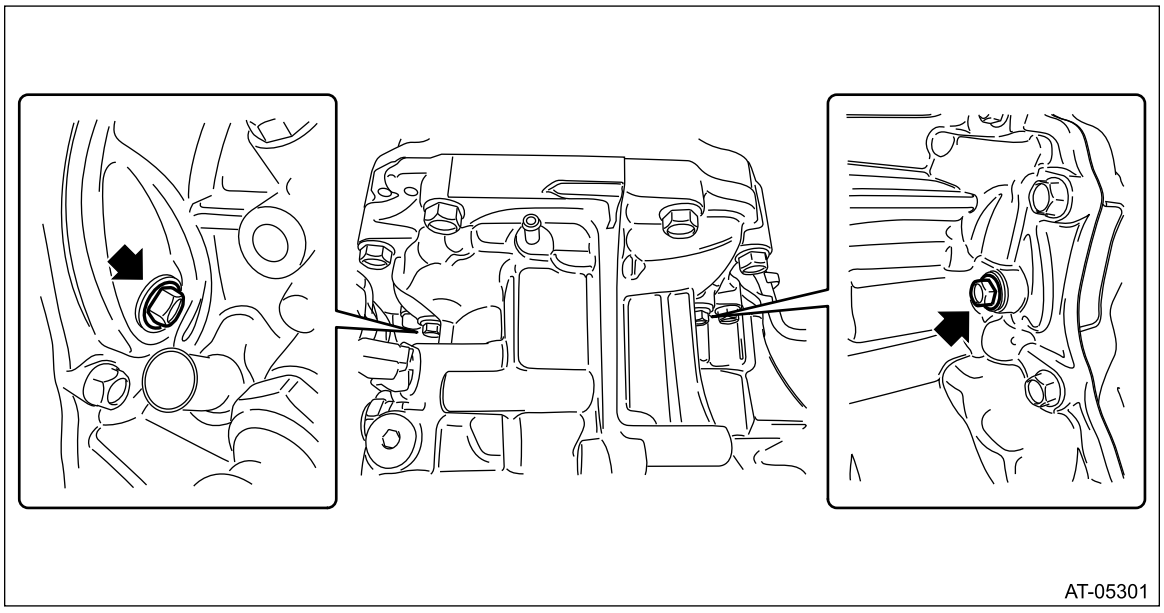
5. Install the primary pulley and adjust the position of bolt holes of primary bearing retainer and converter case to tighten the primary pulley bolt.

Note:

Use a new seal washer.

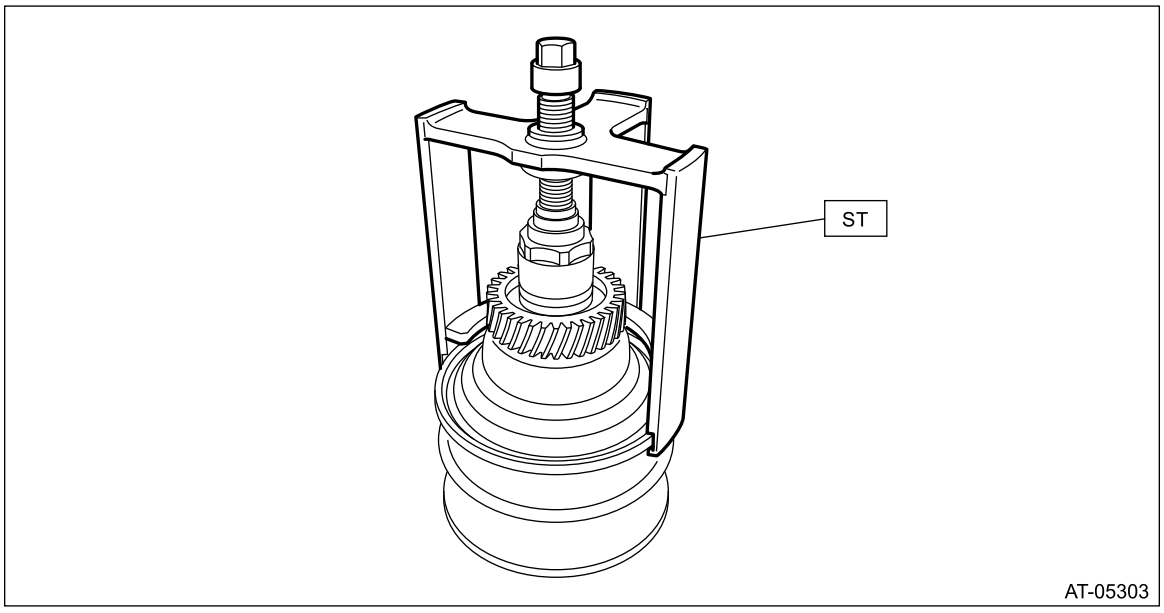
Tightening torque:

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



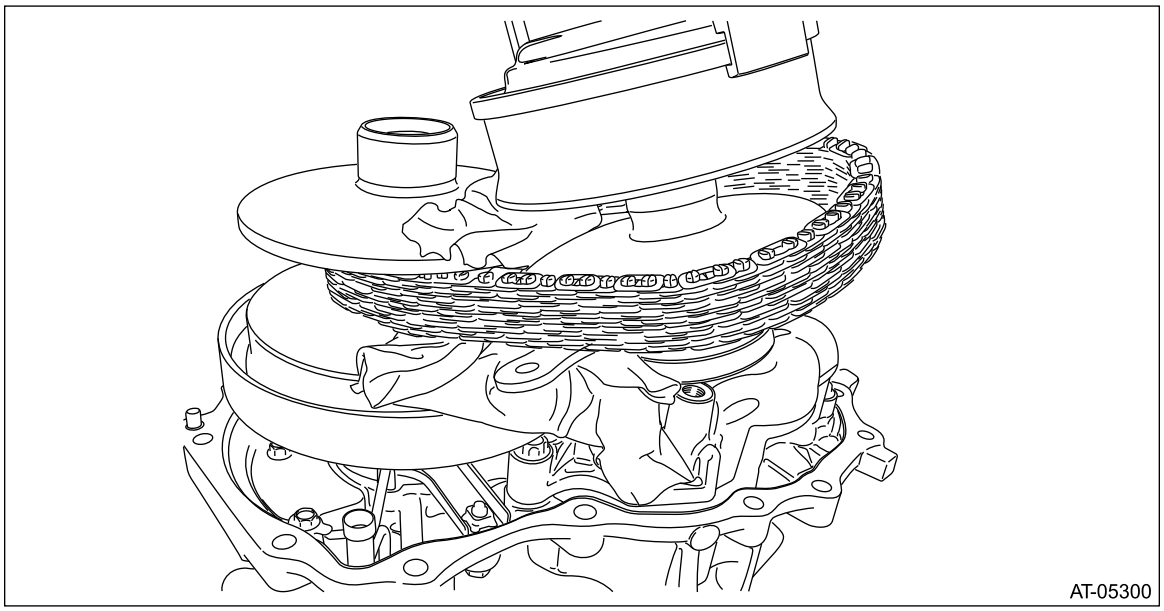
7. Place the variator chain on the primary pulley groove and attach the secondary pulley and variator chain together to the drive pinion retainer.

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.

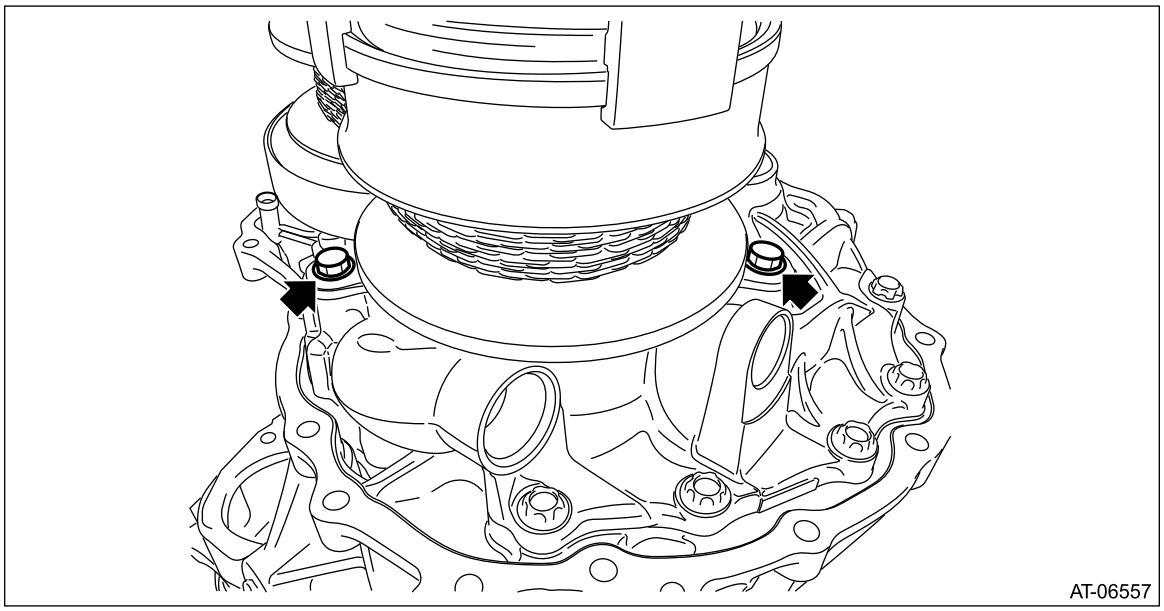
8. Install the secondary pulley bolt.

Note:

Apply CVTF to the bolt.

Tightening torque:

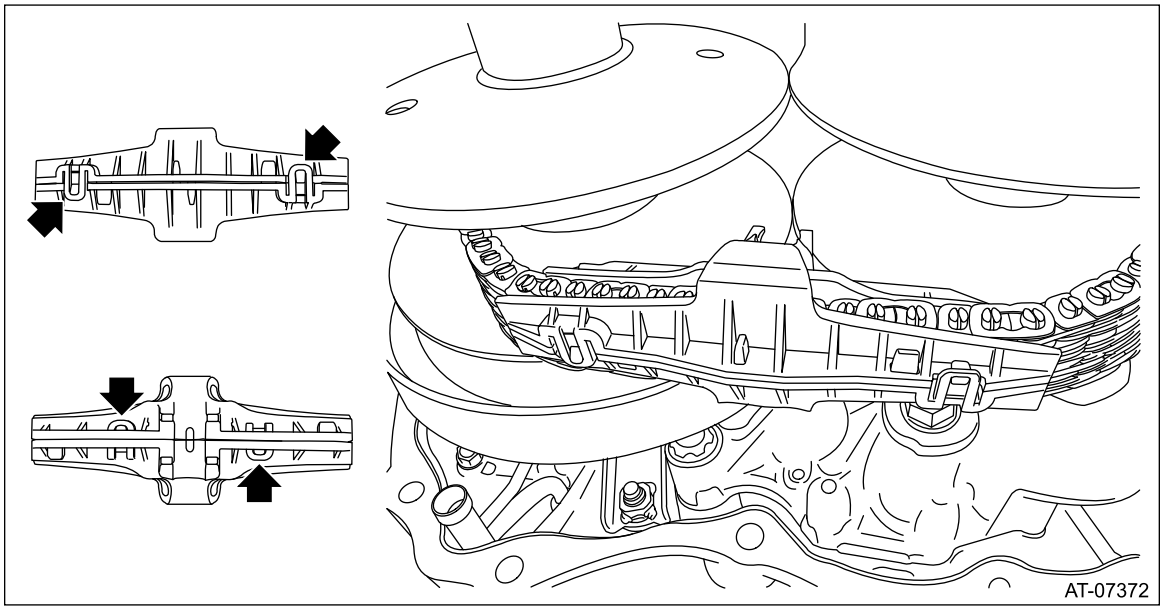
33 N·m (3.4 kgf-m, 24.3 ft-lb)



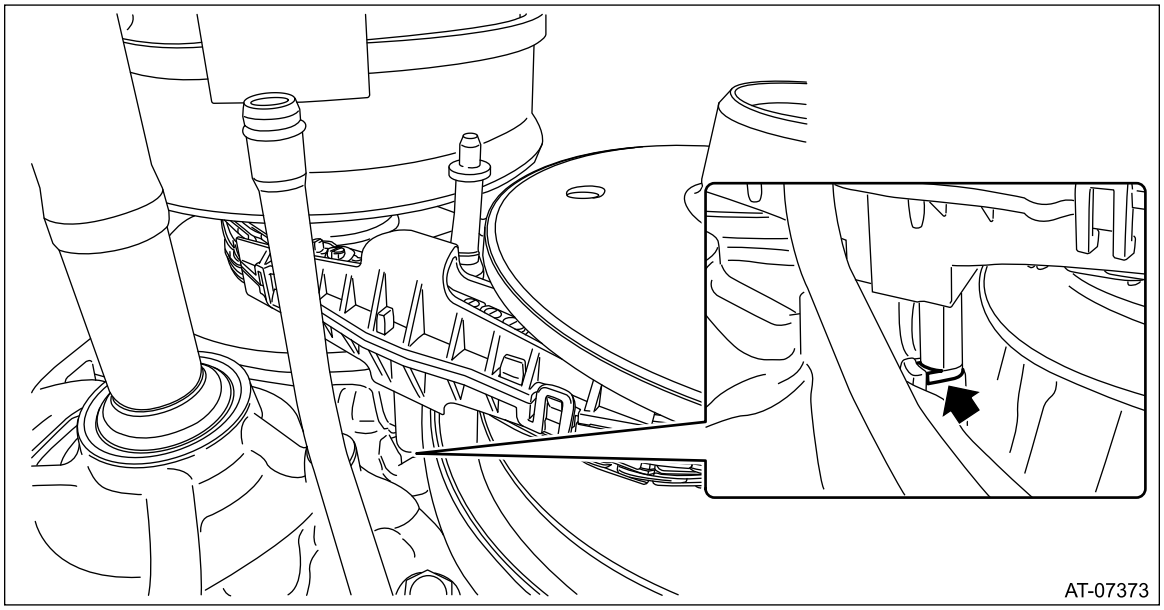
9. Install the chain guide.

Note:

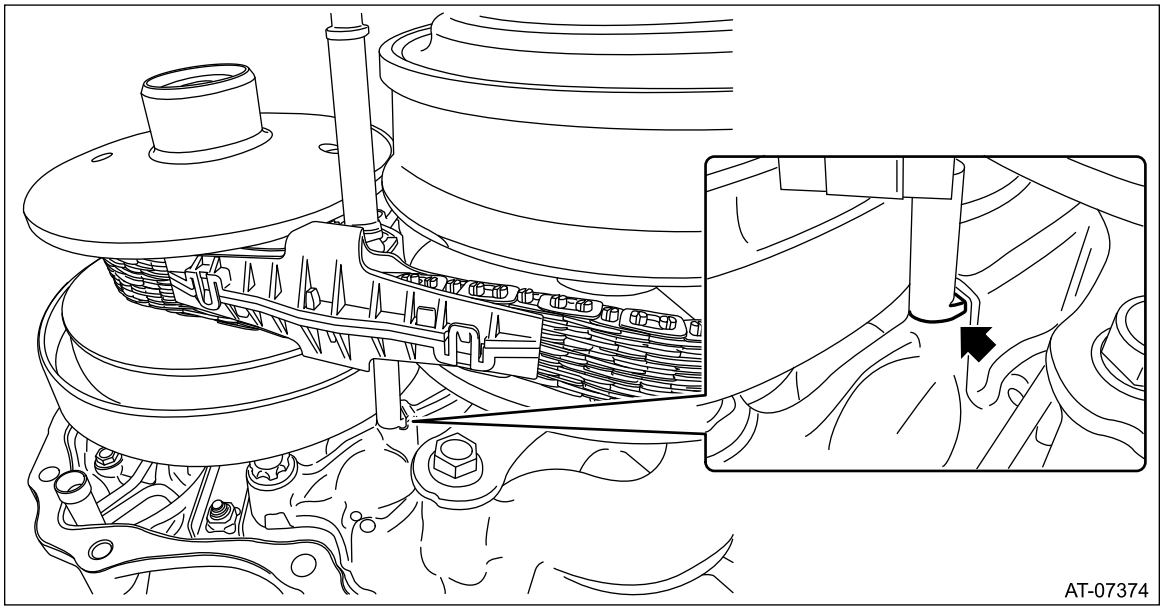
Install it with two claws facing outward and with two claws facing inward.



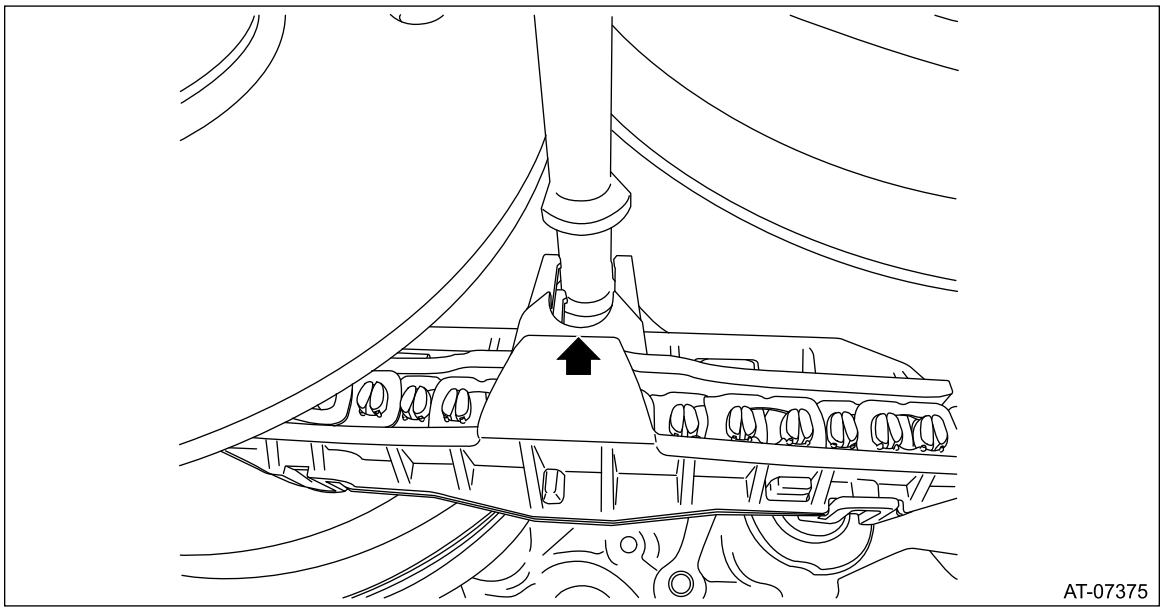
10. Engage the cutout portions of support rod and drive pinion retainer and install the support rod.



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).

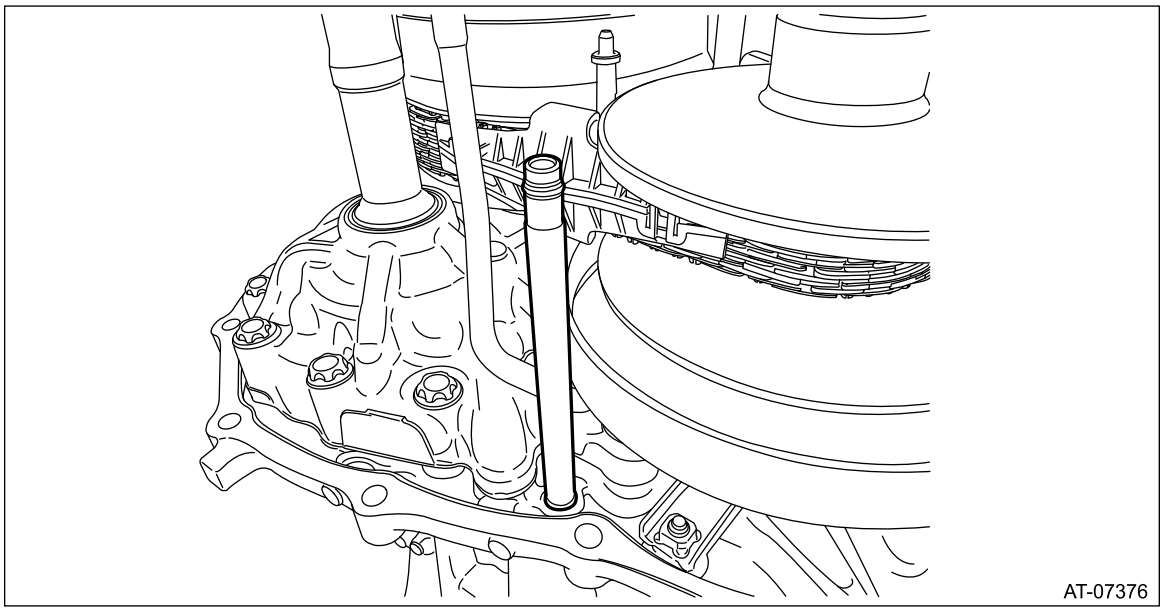


13. Install the O-ring to the lubrication pipe.

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 center differential carrier. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Center Differential Carrier>INSTALLATION.
20. Install the transfer clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transfer Clutch>INSTALLATION.
21. Install the rear drive shaft. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Rear Drive Shaft>INSTALLATION.
22. Install the extension case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Extension Case>INSTALLATION.
23. Install the transmission harness. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transmission Harness>INSTALLATION.
24. Install the control valve body and oil pan. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Control Valve Body>INSTALLATION.
25. Install the air breather hose. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Air Breather Hose>INSTALLATION.
26. 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

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.

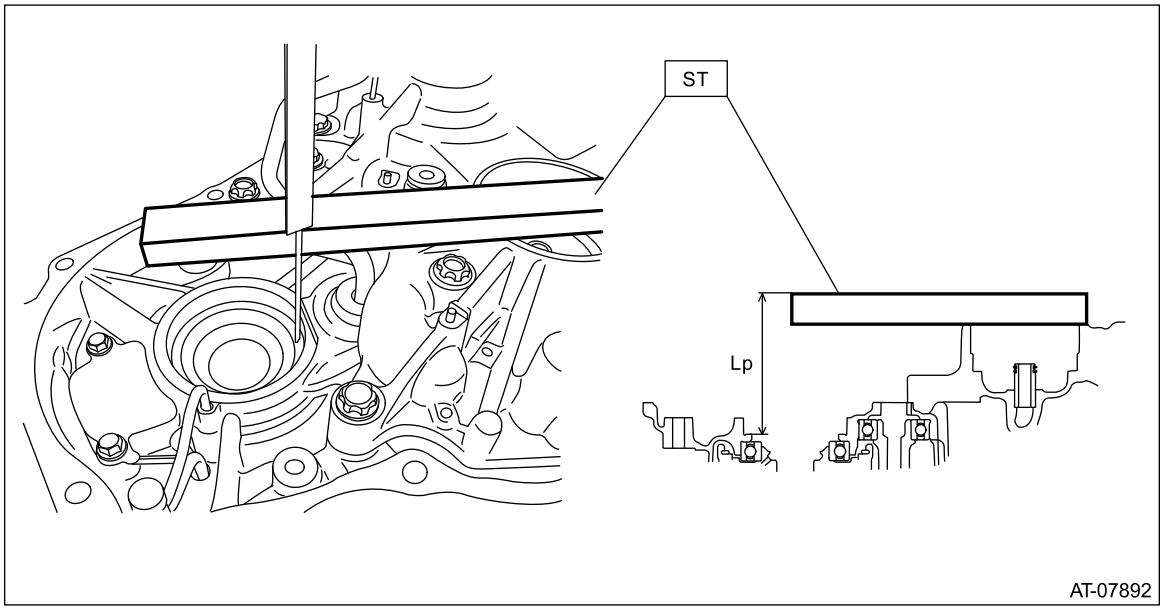
CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Primary Pulley and Secondary Pulley

ADJUSTMENT

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

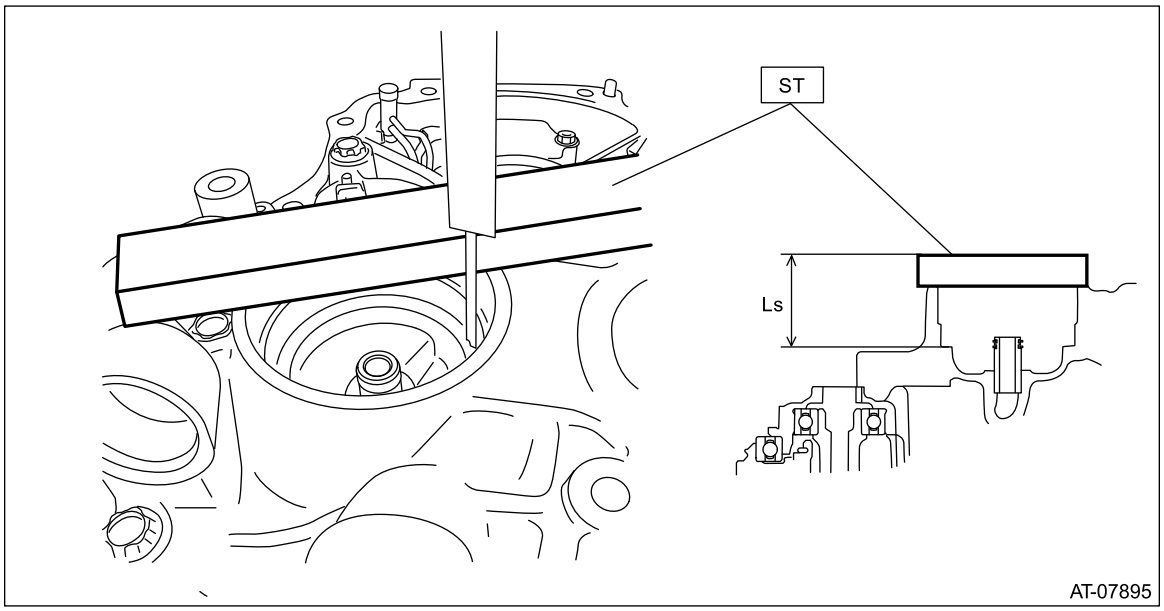
1. Measure depth “Lp” from the ST upper face to the primary pulley bearing catch surface at several points and calculate the average.

ST 499575400 GAUGE



2. Measure 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).

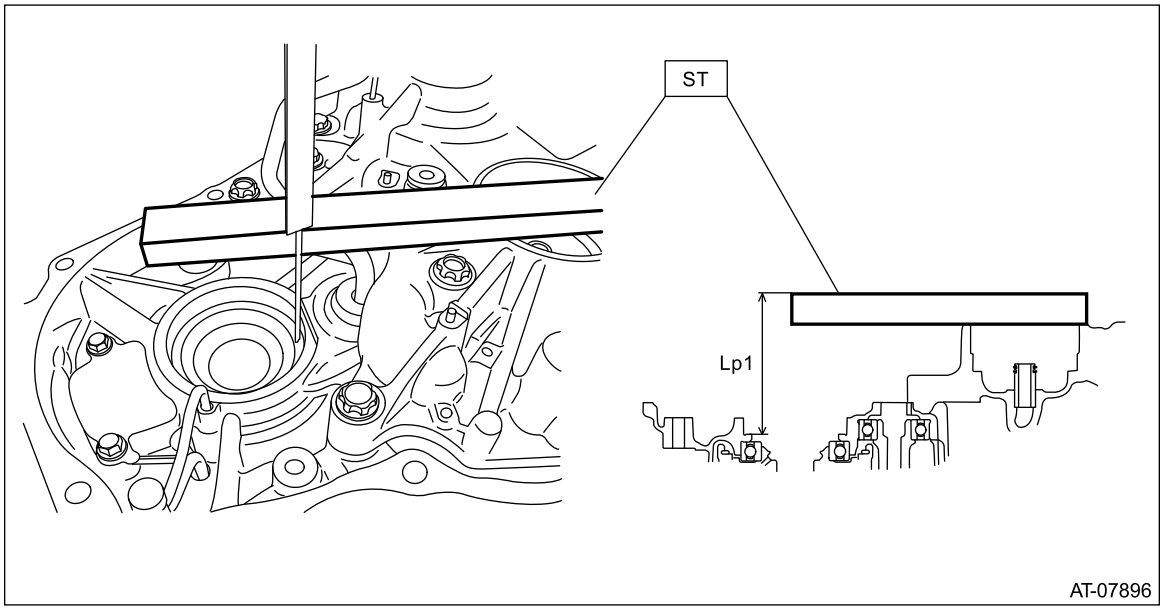
Part No.	Shim thickness mm (in)
32451AA000	0.1 (0.004)
32451AA010	0.2 (0.008)
32451AA020	0.3 (0.012)
32451AA030	0.4 (0.016)

Part No.	Shim thickness mm (in)
32451AA040	0.5 (0.020)

2. PROCEDURE WHEN REPLACING ONLY DRIVE PINION RETAINER OR CONVERTER CASE

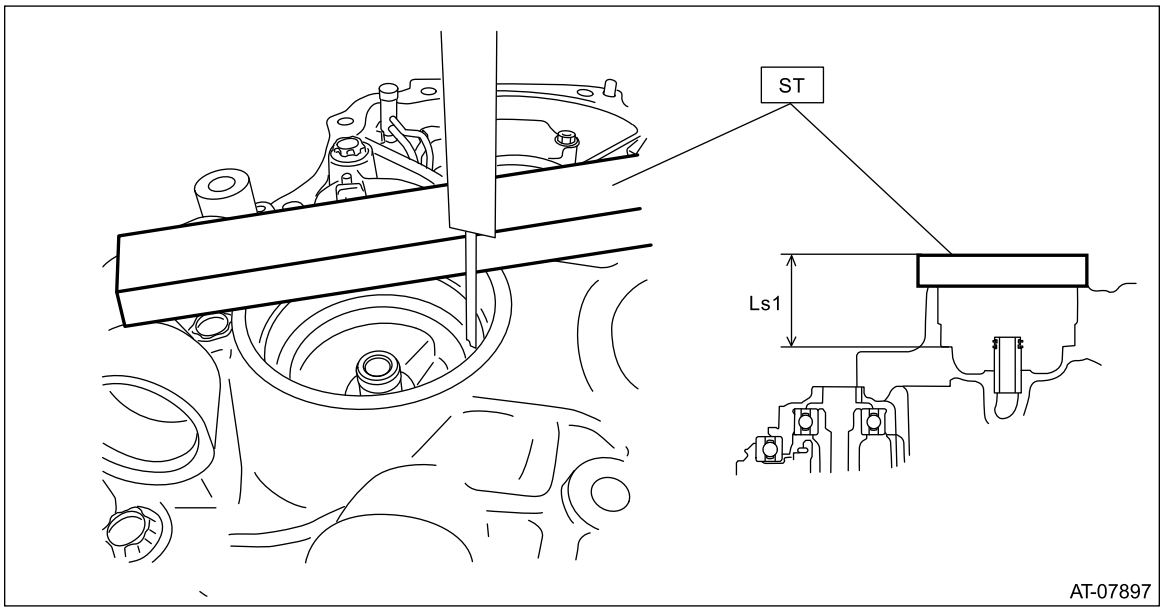
1. Clean the mating surface of current drive pinion retainer and converter case.
2. Measure and record the shim thickness that is attached on the current converter case.
3. Using the current drive pinion retainer, measure depth "Lp1" from the ST upper face to the primary pulley bearing catch surface 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.

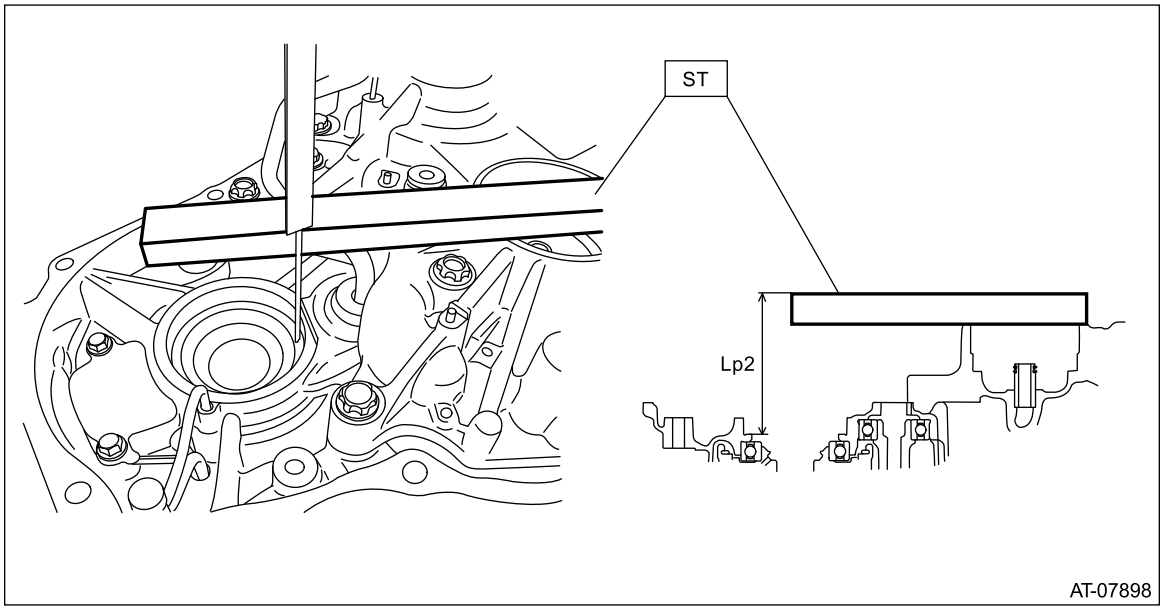
ST 499575400 GAUGE



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

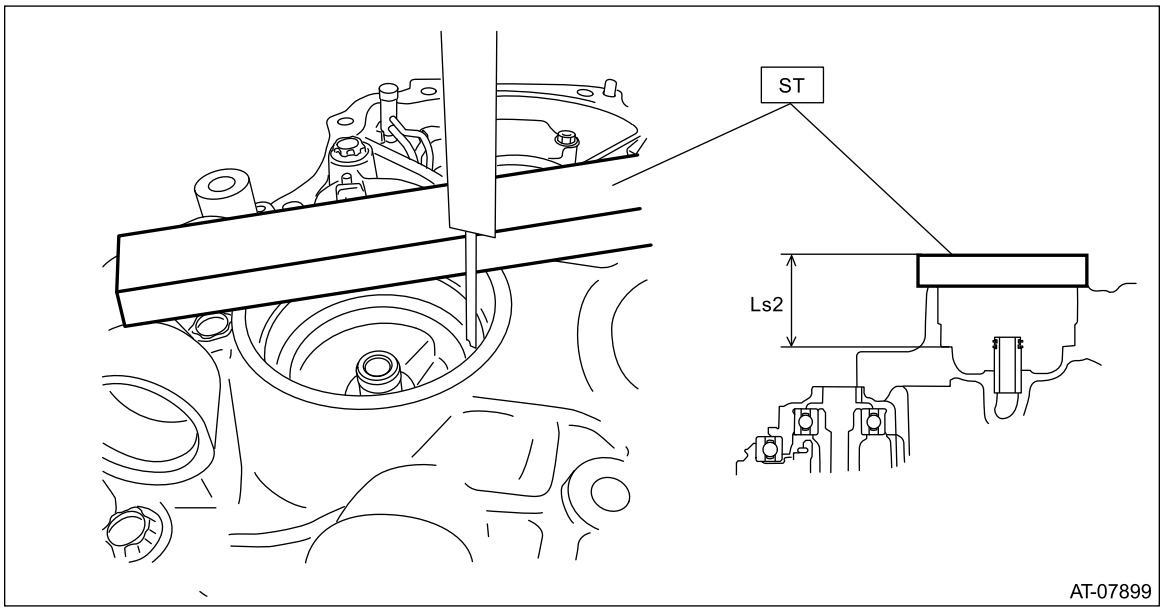
6. Using the new drive pinion retainer or new converter case, measure depth "Lp2" from the ST upper face to the primary pulley bearing catch surface at several points and calculate the average.

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 (T1) mm (in)	Shim selection procedure
0 — 0.020 (0 — 0.00078)	Select new shim of same thickness with the shim that is used on primary pulley side of the current converter case.
0.021 — 0.070 (0.000827 — 0.00275)	Select new shim of same thickness with the shim that is used on primary pulley side of the current converter case.
0.071 — 0.125 (0.00279 — 0.00492)	Select the shim 0.1 mm thinner than the shim that is used on primary pulley side of the current converter case.
0.126 — 0.170 (0.00496 — 0.00669)	Select the shim 0.1 mm thinner than the shim that is used on primary pulley side of the current converter case.
0.171 — 0.230 (0.00673 — 0.00905)	Select the shim 0.2 mm thinner than the shim that is used on primary pulley side of the current converter case.
0.231 — 0.250 (0.00909 — 0.00984)	Select the shim 0.3 mm thinner than the shim that is used on primary pulley side of the current converter case.
0.251 — 0.300 (0.00988 — 0.01181)	Select the shim 0.3 mm thinner than the shim that is used on primary pulley side of the current converter case.

Difference of the case (T2) mm (in)	Shim selection procedure
0 — 0.020 (0 — 0.00078)	Select new shim of same thickness with the shim that is used on primary pulley side of the current converter case.
0.021 — 0.080 (0.000827 — 0.00315)	Select new shim of same thickness with the shim that is used on primary pulley side of the current converter case.
0.081 — 0.100 (0.00318 — 0.00393)	Select the shim 0.1 mm thicker than the shim that is used on primary pulley side of the current converter case.
0.101 — 0.120 (0.00397 — 0.00472)	Select the shim 0.1 mm thicker than the shim that is used on primary pulley side of the current converter case.
0.121 — 0.180 (0.00476 — 0.00708)	Select the shim 0.1 mm thicker than the shim that is used on primary pulley side of the current converter case.
0.181 — 0.220 (0.00712 — 0.00866)	Select the shim 0.2 mm thicker than the shim that is used on primary pulley side of the current converter case.
0.221 — 0.280 (0.00870 — 0.01102)	Select the shim 0.2 mm thicker than the shim that is used on primary pulley side of the current converter case.
0.281 — 0.300 (0.01106 — 0.01181)	Select the shim 0.3 mm thicker than the shim that is used on primary pulley side of the current converter case.

Part No.	Shim thickness mm (in)
32451AA000	0.1 (0.004)
32451AA010	0.2 (0.008)
32451AA020	0.3 (0.012)
32451AA030	0.4 (0.016)
32451AA040	0.5 (0.020)

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) > 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

INSPECTION

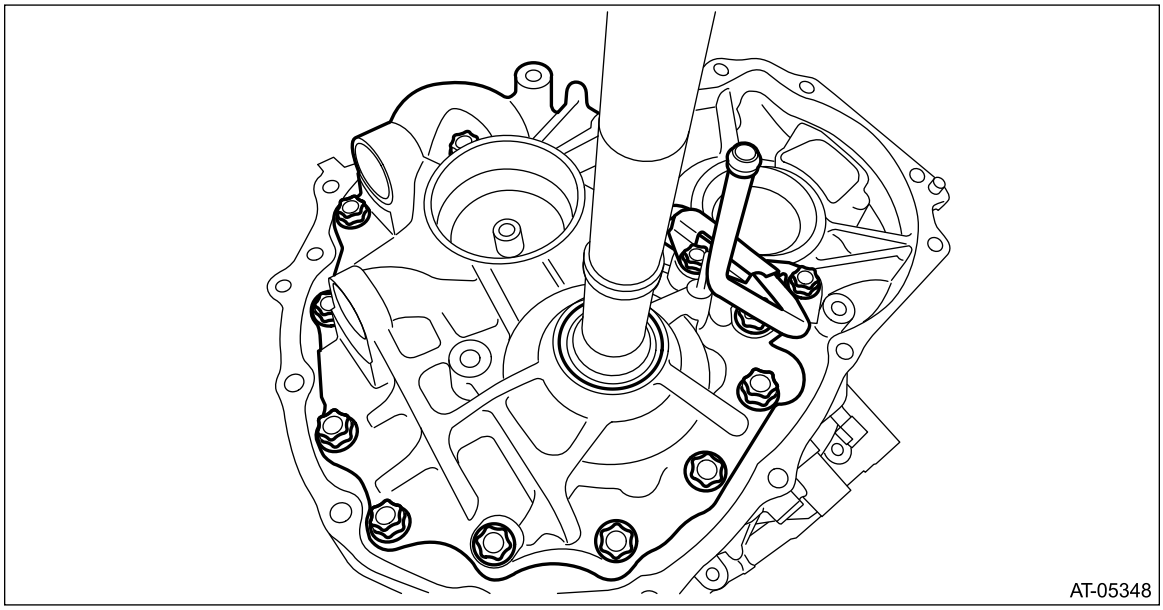
Check the variator chain for damage and wear.

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Drive Pinion Shaft Assembly

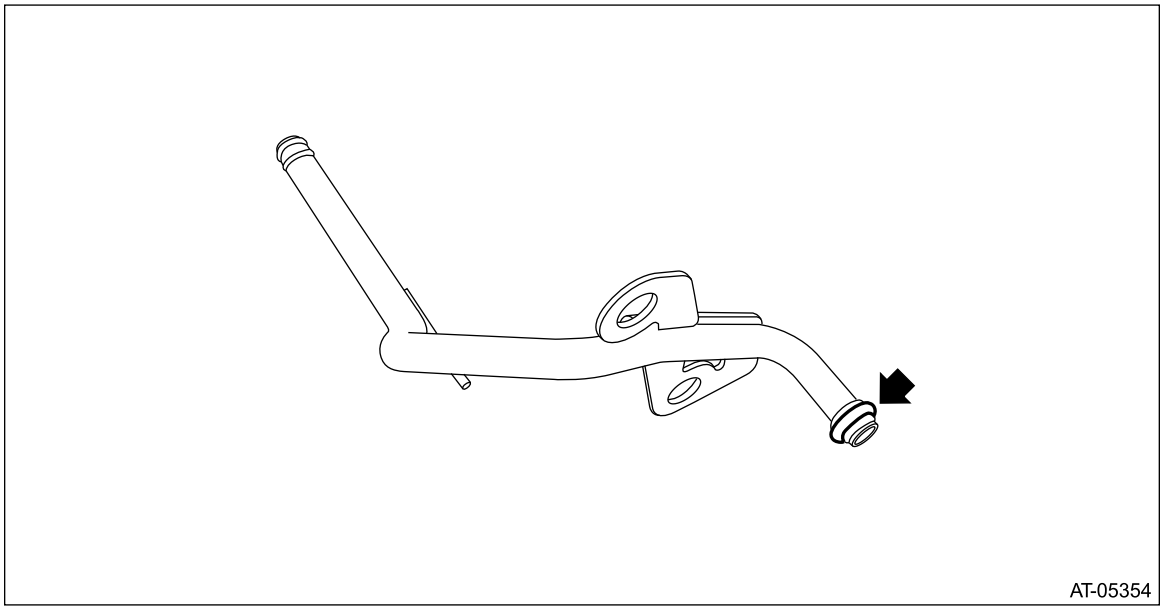
REMOVAL

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 center differential carrier. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Center Differential Carrier>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. Using the ST, remove the drive pinion retainer and lubrication pipe.

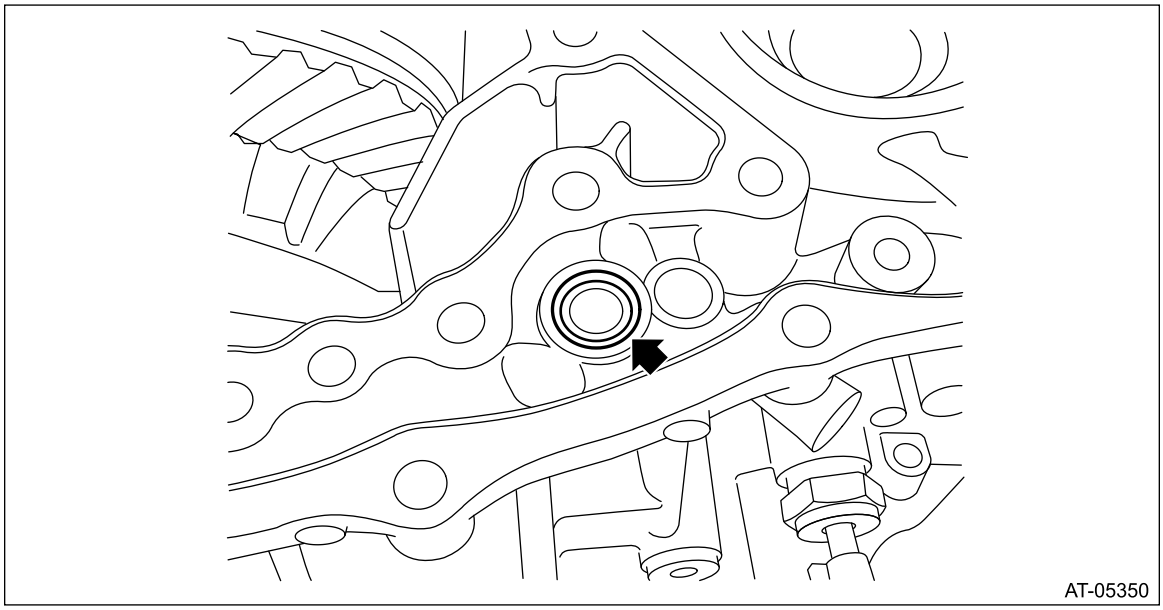
ST 18270KA020 SOCKET (E20)



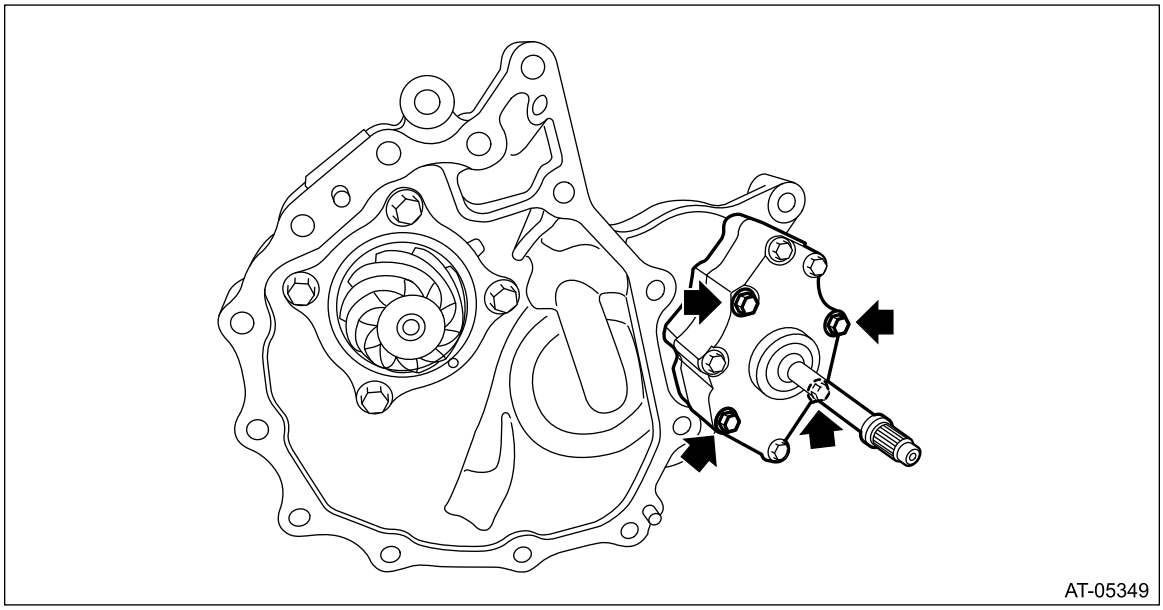
15. Remove the O-ring from lubrication pipe.



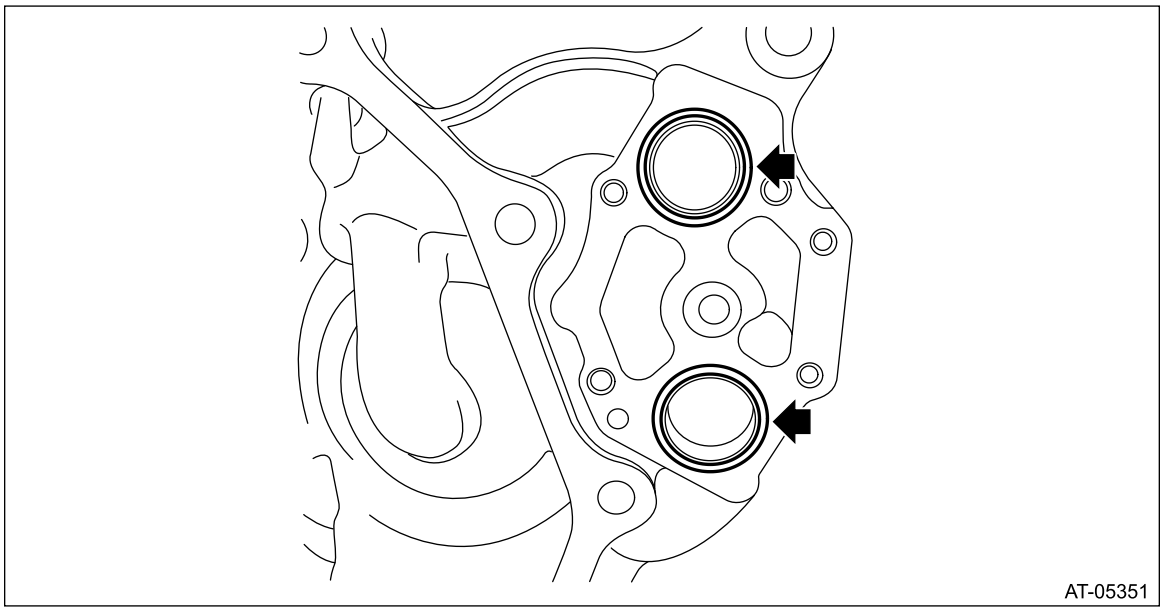
16. Remove the O-rings.



17. Remove the oil pump and the plate.



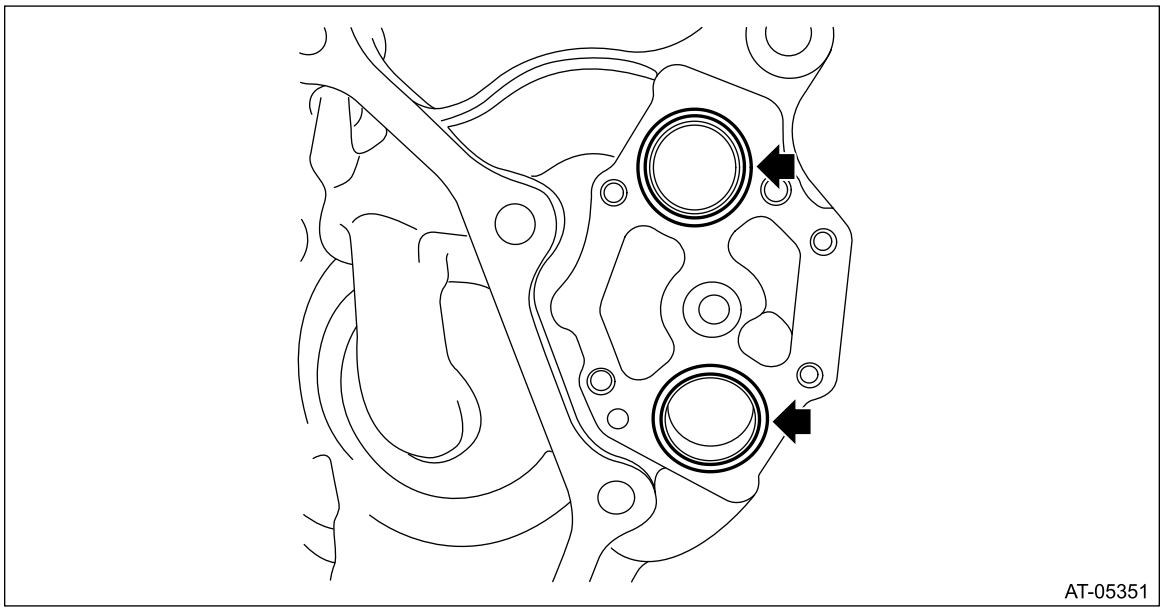
18. Remove the O-rings.



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.**



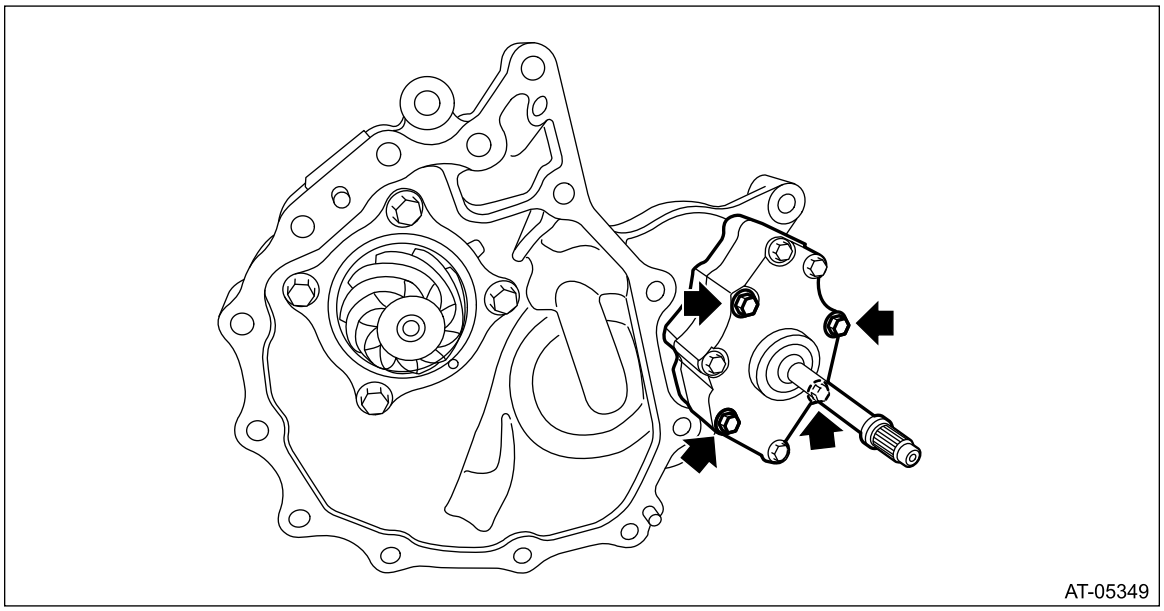
4. Install the plate and the oil pump.

Note:

Apply CVTF to the bolt.

Tightening torque:

8.5 N·m (0.9 kgf-m, 6.3 ft-lb)



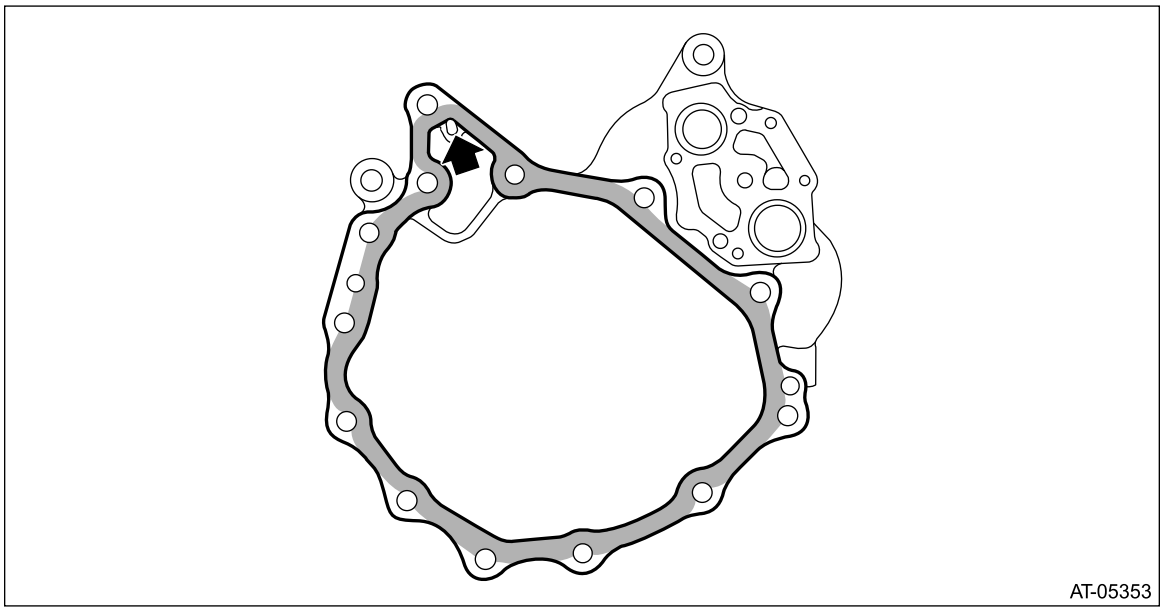
5. Apply liquid gasket seamlessly to the mating surface of drive pinion retainer.

Note:

Be careful not to block the arrowed hole when applying liquid gasket.

Liquid gasket:

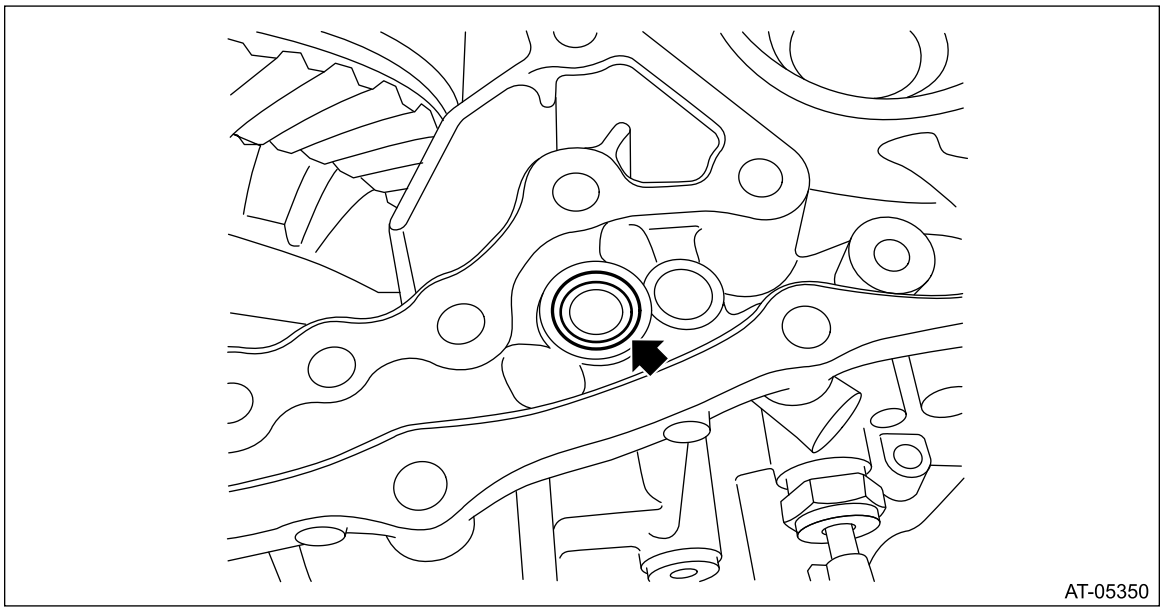
THREE BOND 1215B or equivalent



6. Install the O-rings.

Note:

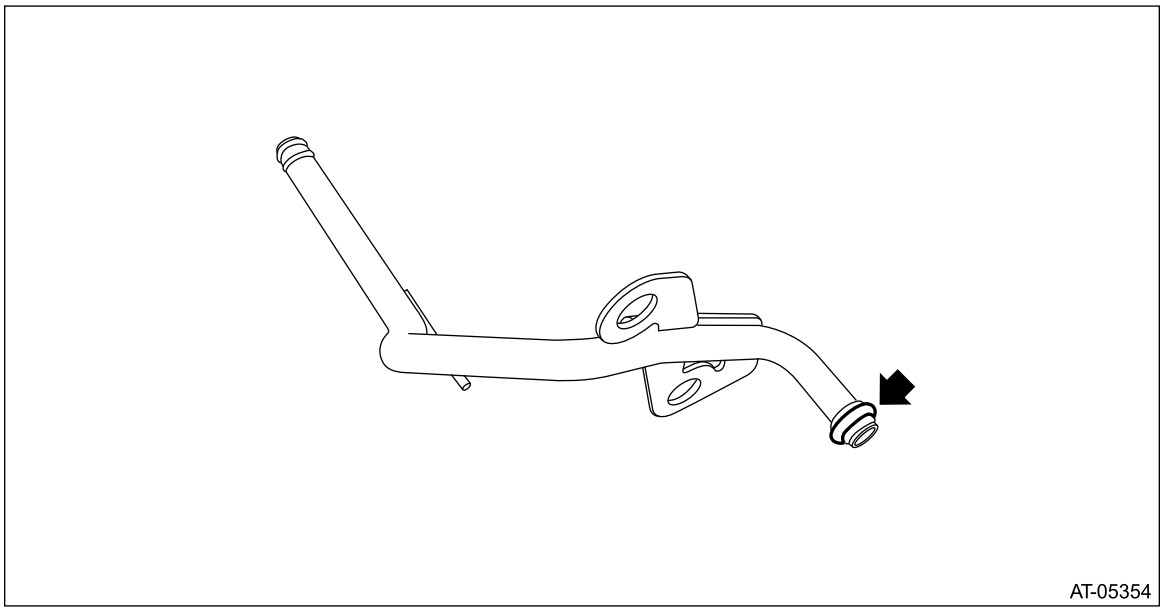
- **Use new O-rings.**
- **Apply CVTF to the O-rings.**



7. Install the O-ring to the lubrication pipe.

Note:

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



8. Install the drive pinion retainer and lubrication pipe to converter case and tighten the bolt using the ST.

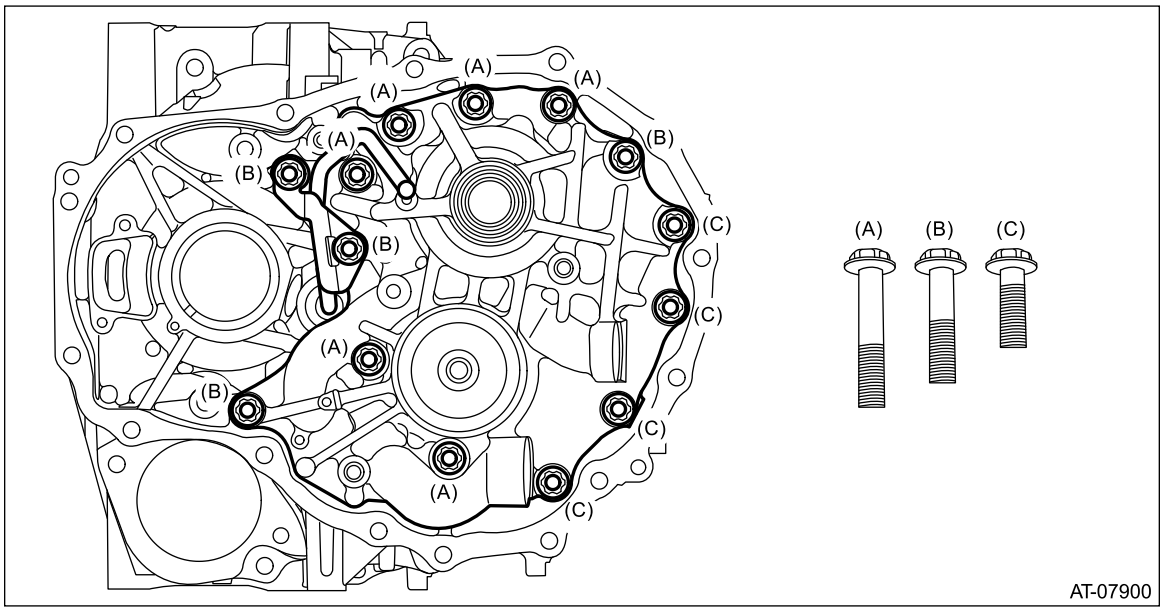
ST 18270KA020 SOCKET (E20)

Note:

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

Tightening torque:

43 N·m (4.4 kgf-m, 31.7 ft-lb)

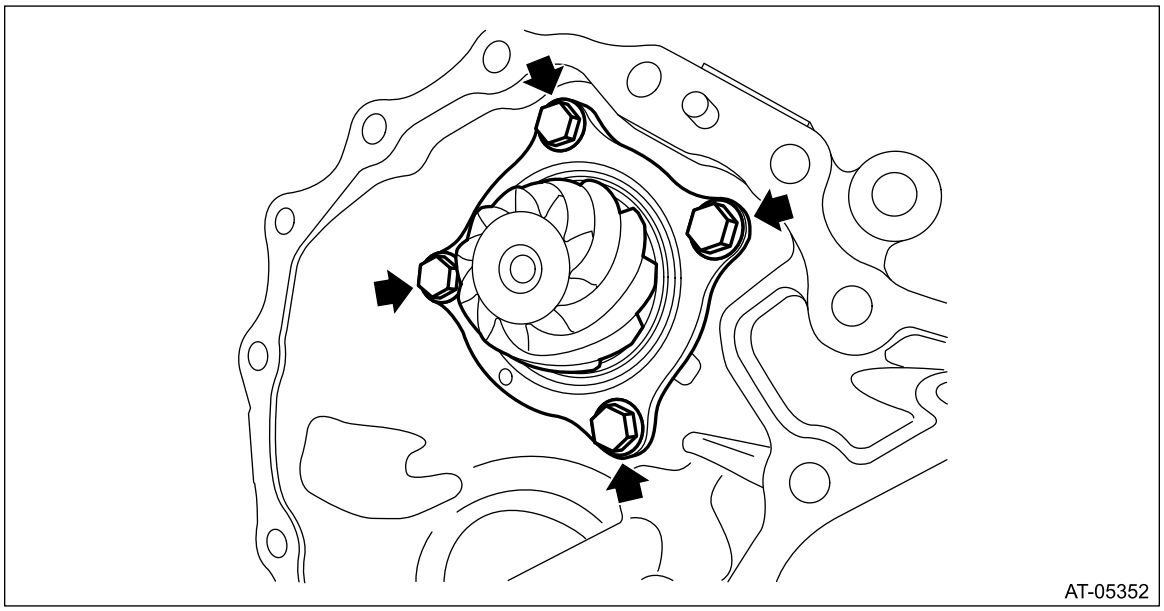


9. Install the primary pulley, secondary pulley and variator chain. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Primary Pulley and Secondary Pulley>INSTALLATION.
10. Install the transmission case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transmission Case>INSTALLATION.
11. Install the 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 center differential carrier. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Center Differential Carrier>INSTALLATION.
15. Install the transfer clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transfer Clutch>INSTALLATION.
16. Install the rear drive shaft. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Rear Drive Shaft>INSTALLATION.
17. Install the extension case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Extension Case>INSTALLATION.
18. Install the transmission harness. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transmission Harness>INSTALLATION.
19. Install the oil pan and control valve body. 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.

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Drive Pinion Shaft Assembly

DISASSEMBLY

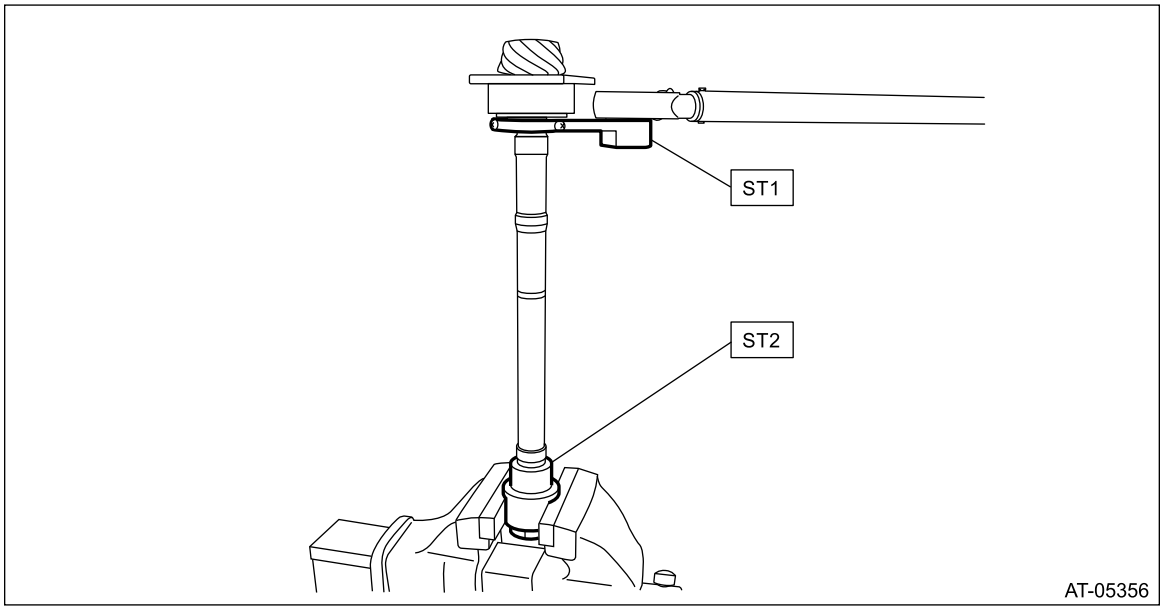
1. Remove the drive pinion assembly.



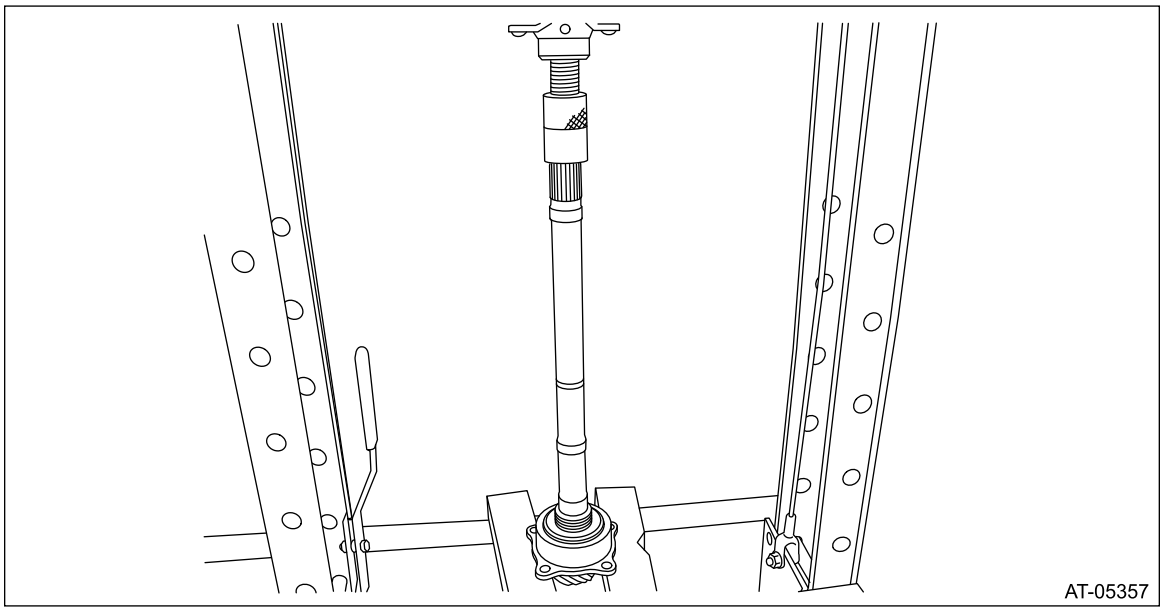
2. Flatten the tab of the lock nut.
3. Using ST1 and ST2, fix at the spline portion of drive pinion shaft to remove the lock nut.

ST1 18621AA000 ADAPTER WRENCH

ST2 18667AA010 HOLDER

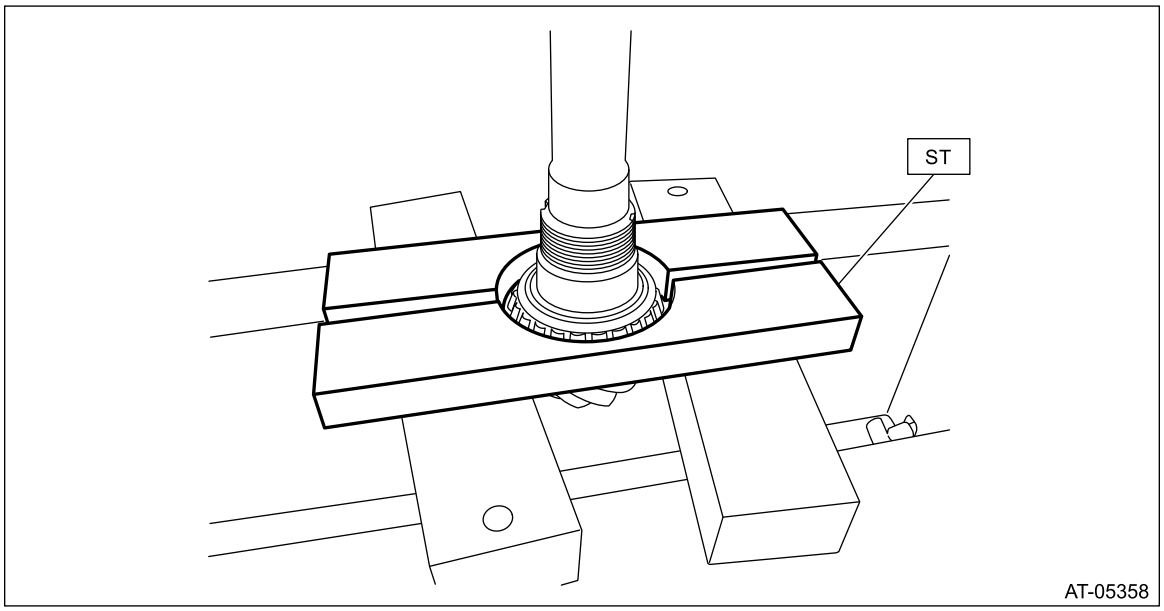


4. Remove the taper roller bearing and outer race from drive pinion shaft.



5. Remove the inner bearing inner race from the drive pinion shaft using ST.

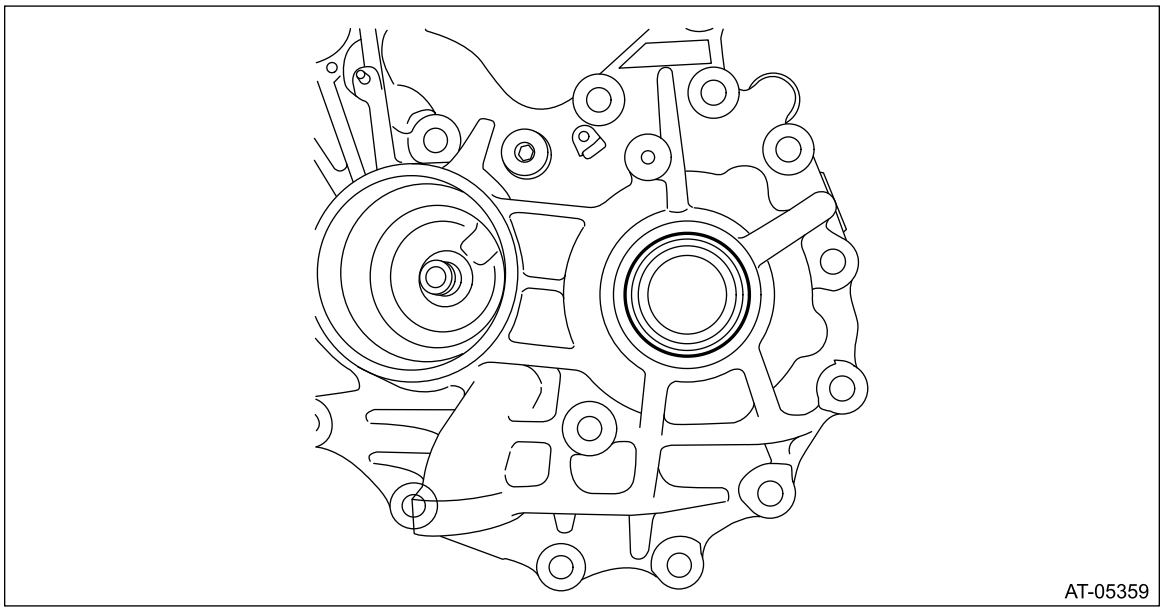
ST 498077000 REMOVER



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

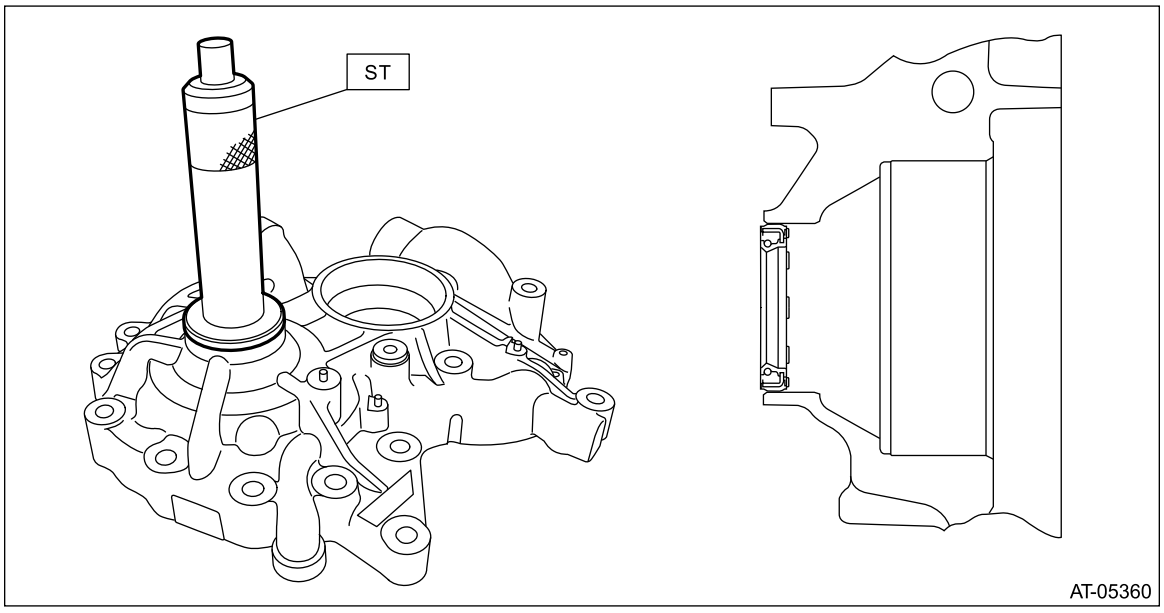
ASSEMBLY

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.**

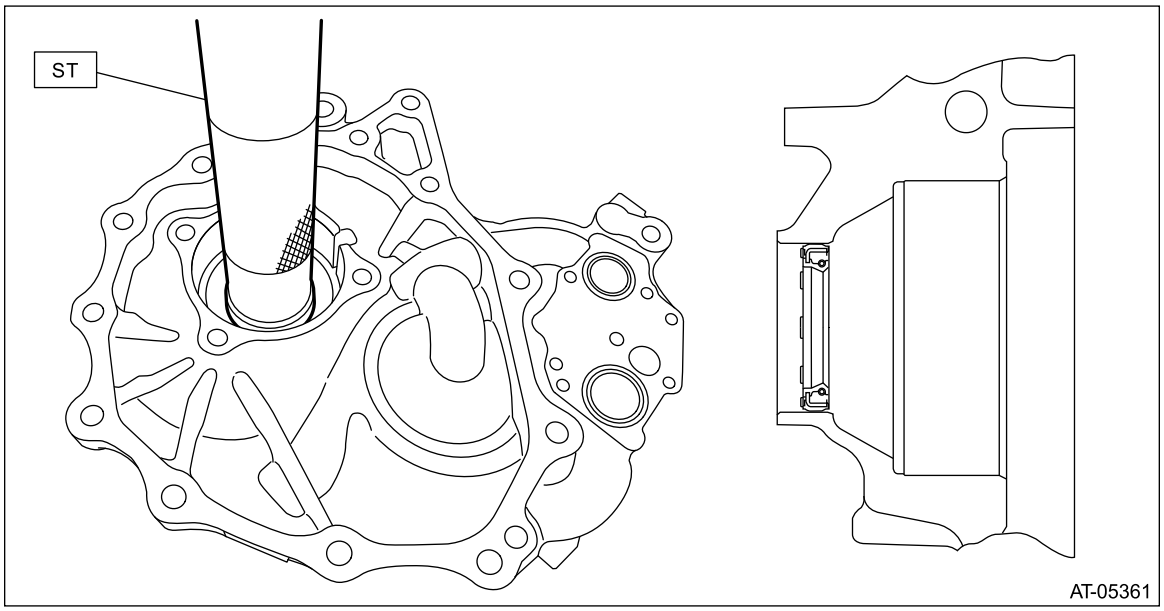
   Pulley side

   ST 18657AA020 OIL SEAL INSTALLER



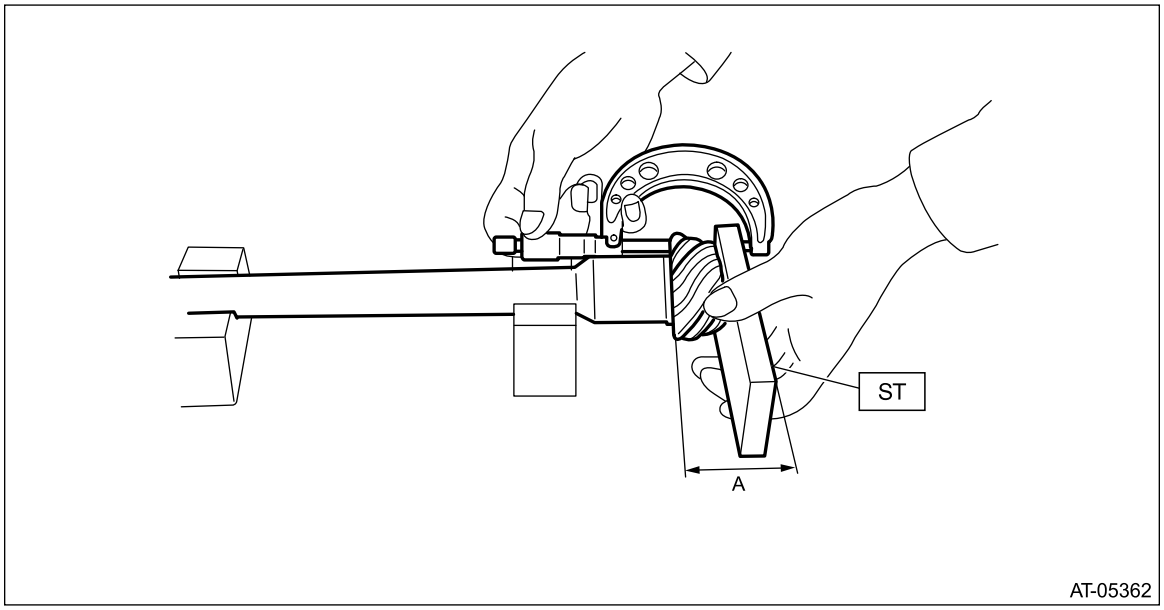
Front differential side

ST 499277100 BUSHING 1-2 INSTALLER



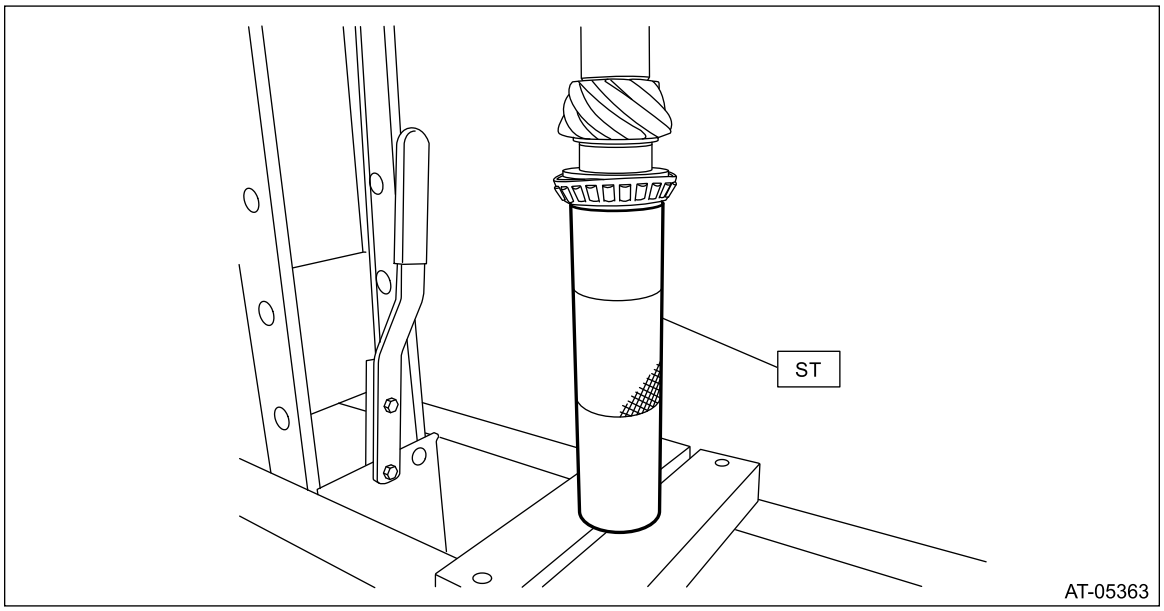
3. Measure the dimension “A” of drive pinion shaft.

ST 398643600 GAUGE



4. Press-fit the new taper roller bearing front side inner race using the ST.

ST 499277200 INSTALLER



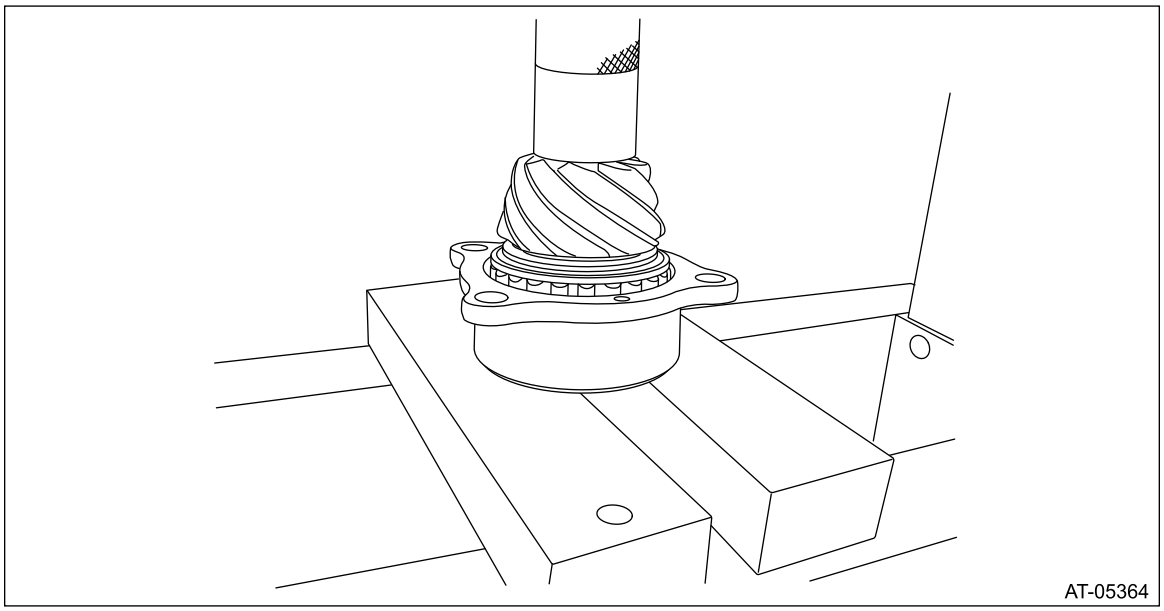
5. Press-fit the new taper roller bearing rear side inner race and outer race together.

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) × 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:

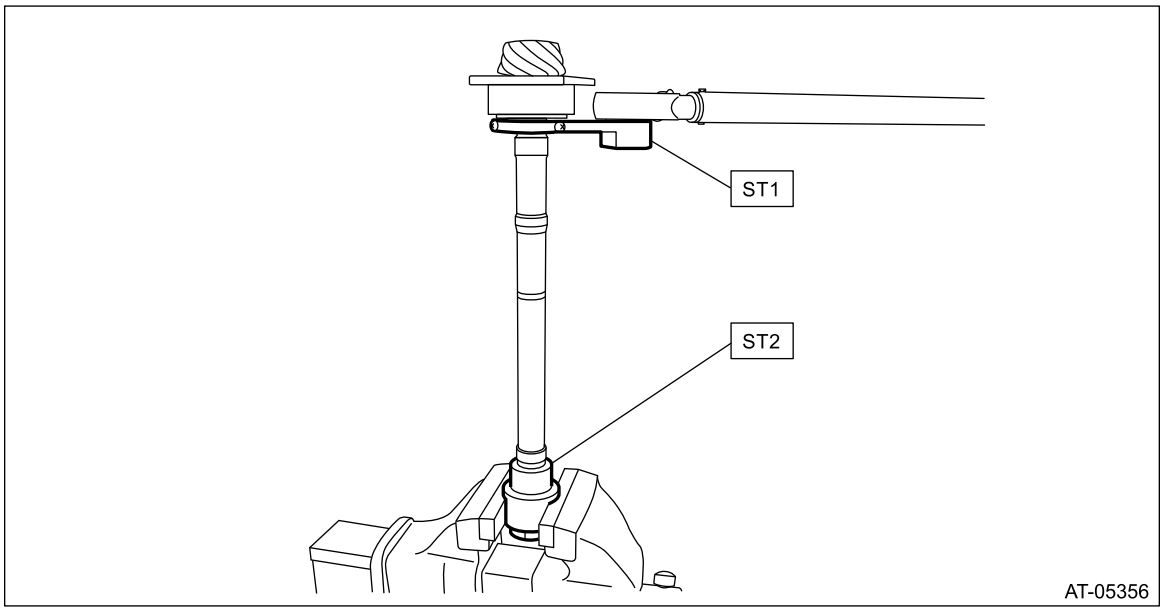
Torque wrench length m (in)	Tightening torque N·m (kgf-m, ft-lb)
0.4 (15.75)	104 (10.6, 76.7)
0.45 (17.72)	106 (10.8, 78.2)
0.5 (19.69)	108 (11.0, 79.7)
0.55 (21.65)	110 (11.2, 81.1)

ST1 18621AA000 ADAPTER WRENCH

ST2 18667AA010 HOLDER

Note:

Tighten the lock nut while directly aligning ST1 and torque wrench.

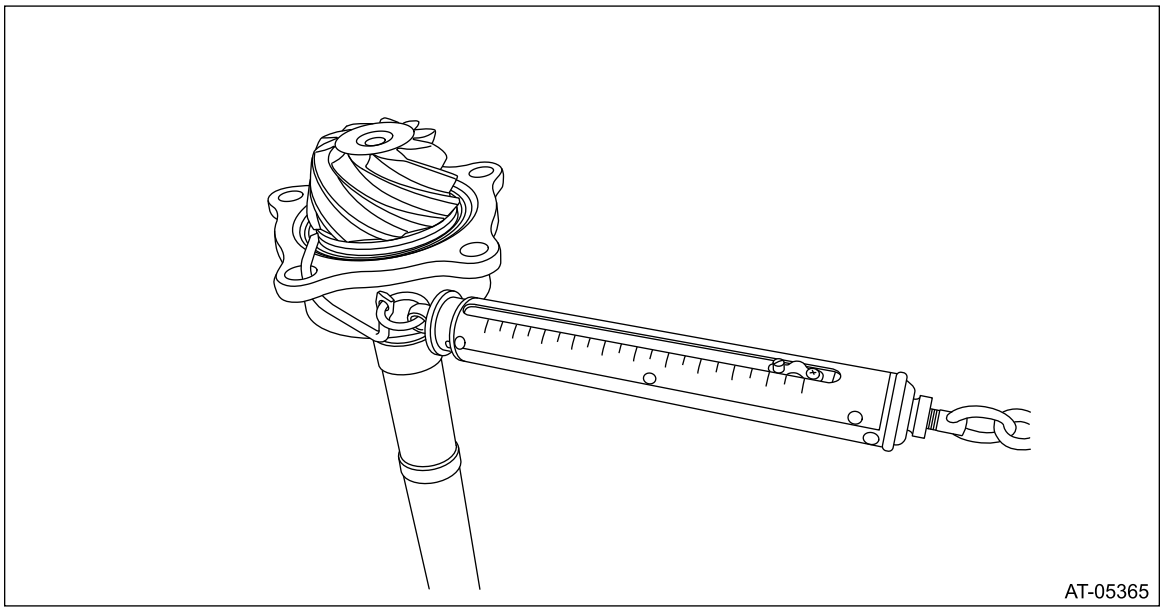


7. Apply differential gear oil to roller of bearing and rotate the bearing several times.

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:

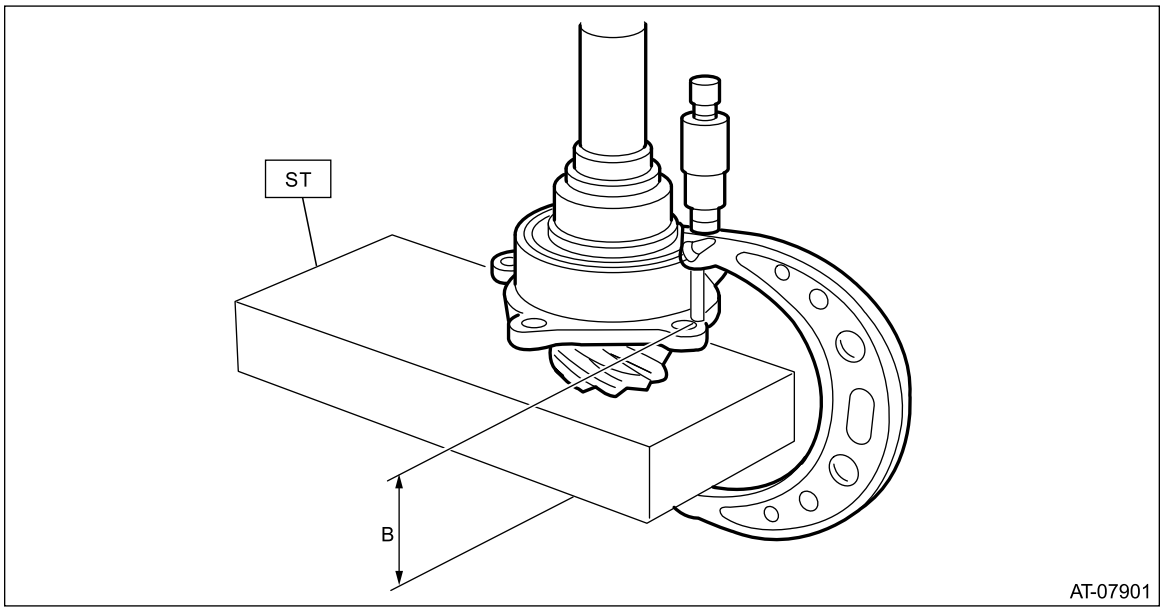
16.3 — 42.7 N (1.7 — 4.4 kgf, 4.4 — 9.6 lbf)



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±0.1225 − (B − A)

[T in = 0.258±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)

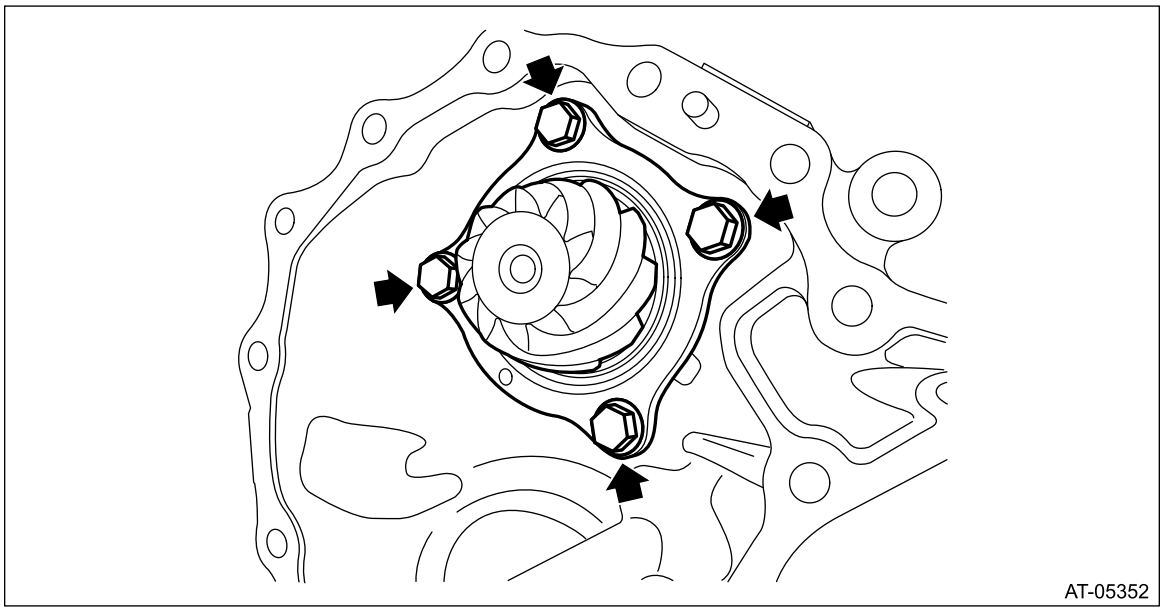
13. Install the shims selected for drive pinion retainer and drive pinion shaft assembly.

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

INSPECTION

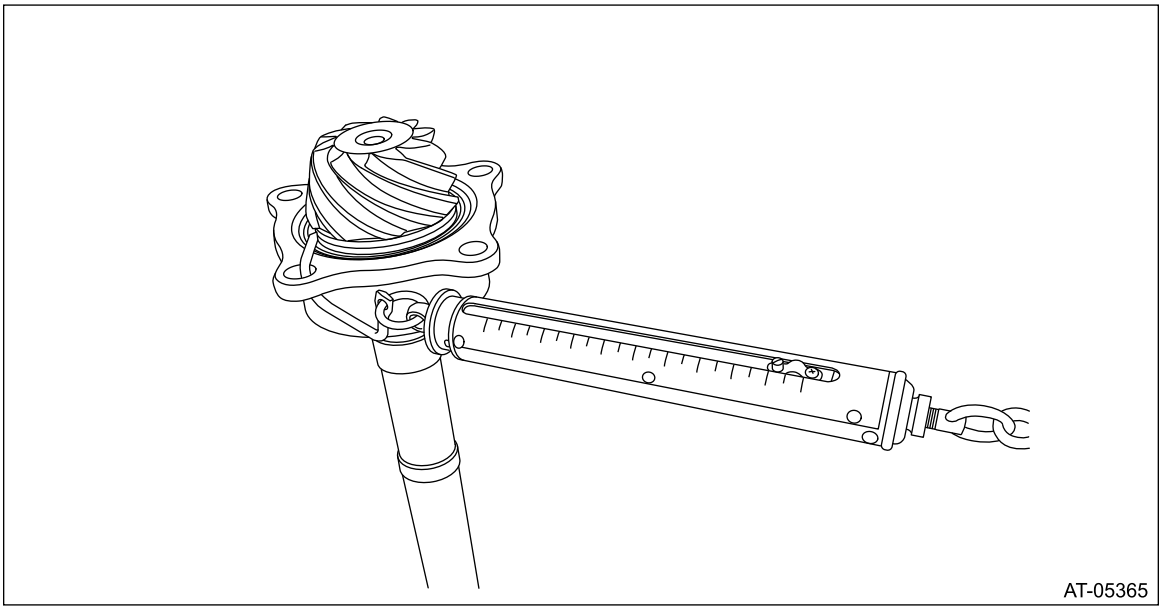
- Make sure that all component parts are free of scratches, holes and other faults.
- Check the tooth contact. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Drive Pinion Shaft Assembly>ADJUSTMENT.
- Apply CVTF to bearing and rotate the bearing to check for noise or dragging etc.
- Check the bearing 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)

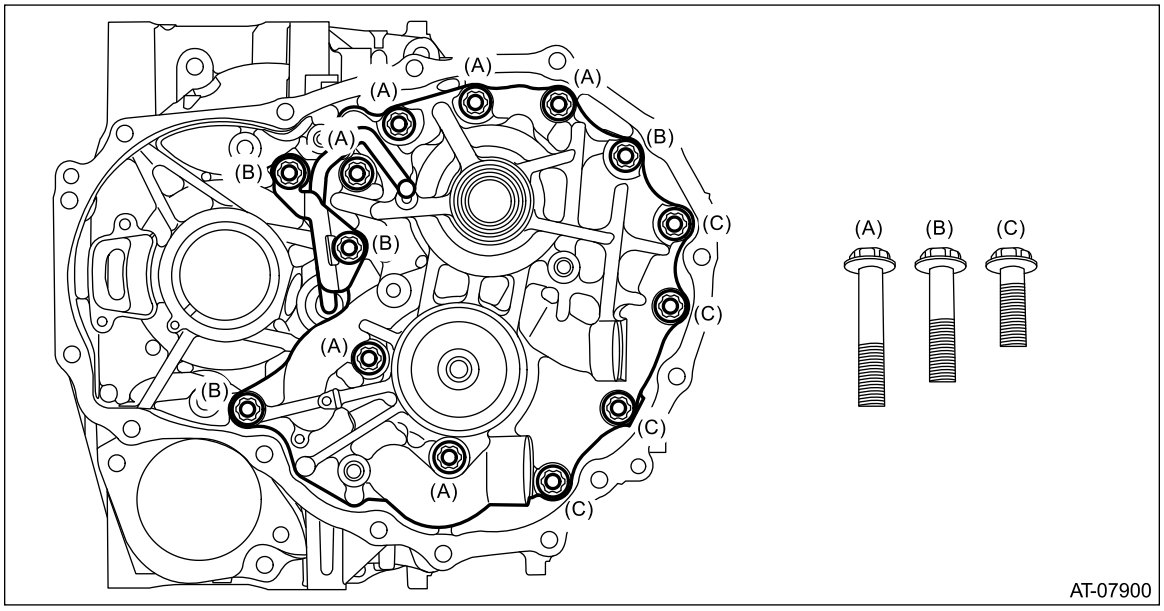


ADJUSTMENT

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)

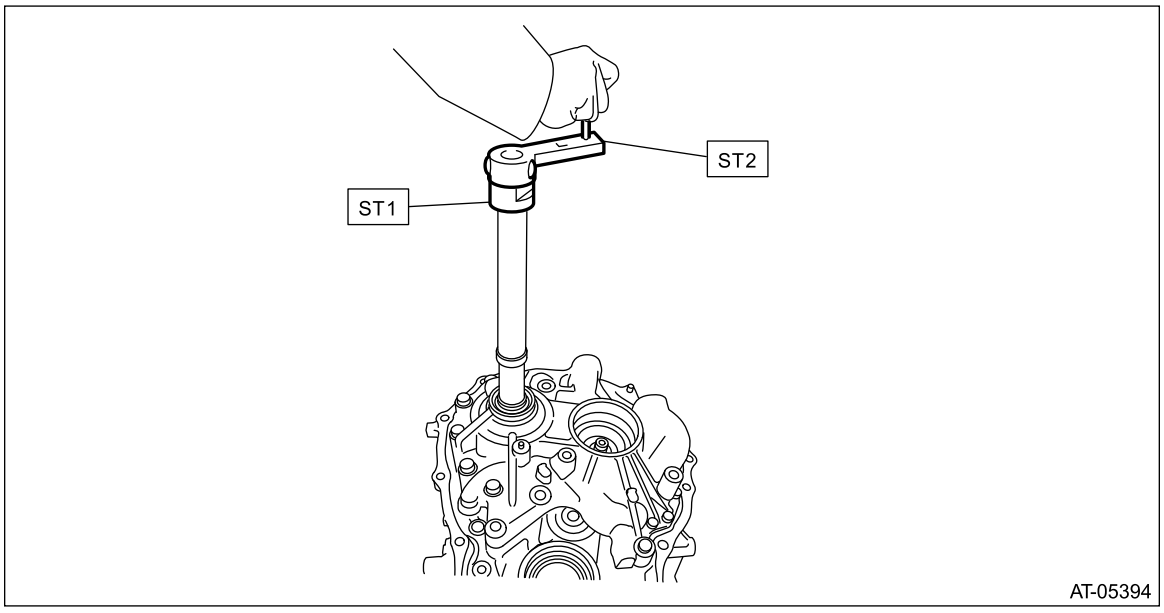
Note:
Do not confuse the three different-length bolts when installing.
Tightening torque:
43 N·m (4.4 kgf-m, 31.7 ft-lb)



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

ST1 18667AA010 HOLDER

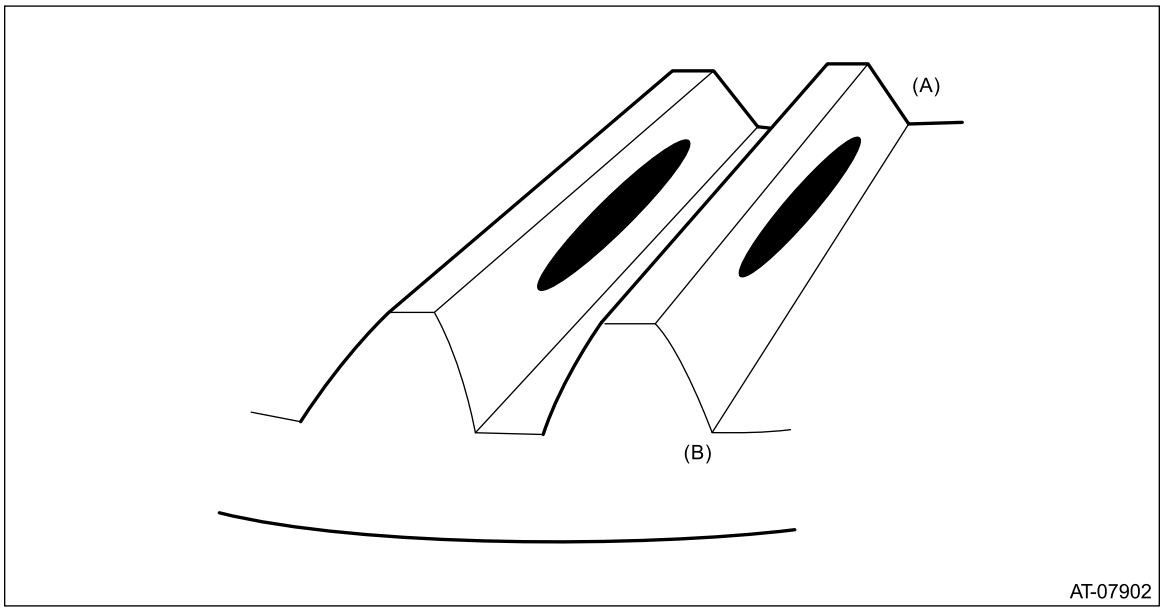
ST2 499787700 WRENCH



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)

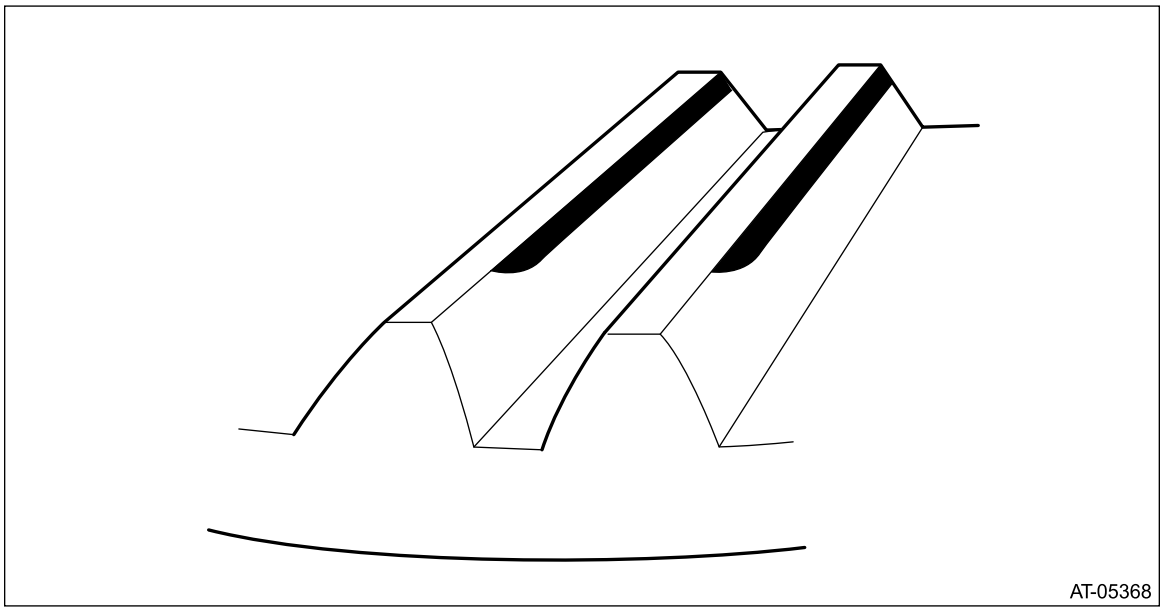
6. Apply lead-free red dye evenly on the both sides of three to four teeth of the hypoid driven gear. Then install the drive pinion retainer and rotate the drive pinion in both directions several times. Remove the drive pinion retainer and check the tooth contact pattern.
   If the teeth contact is inappropriate,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



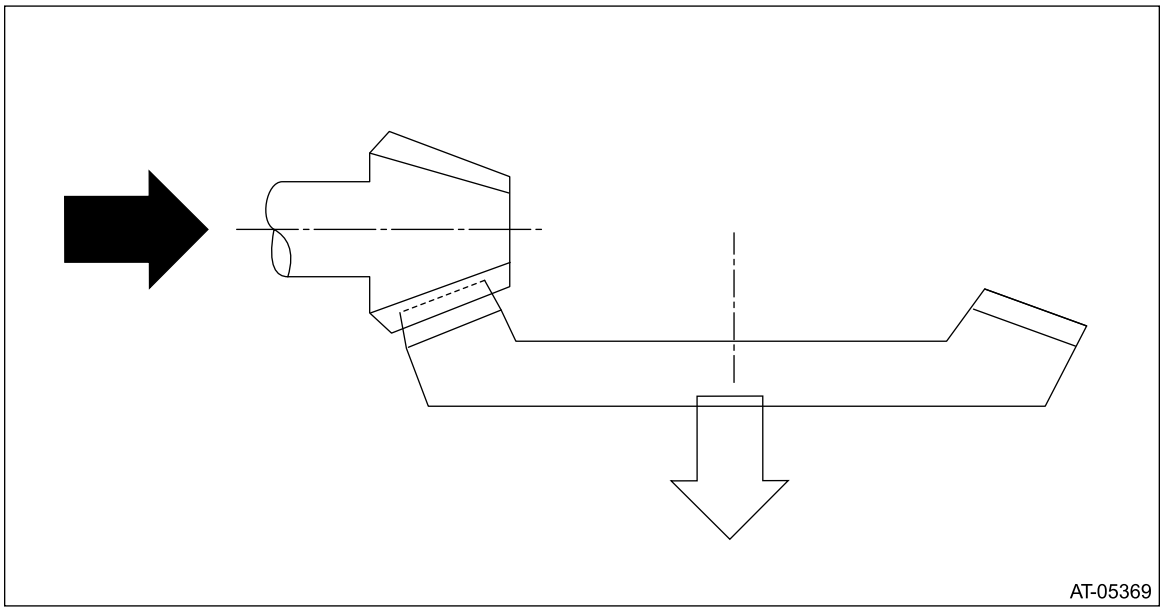
(A) Toe side

(B) Heel side

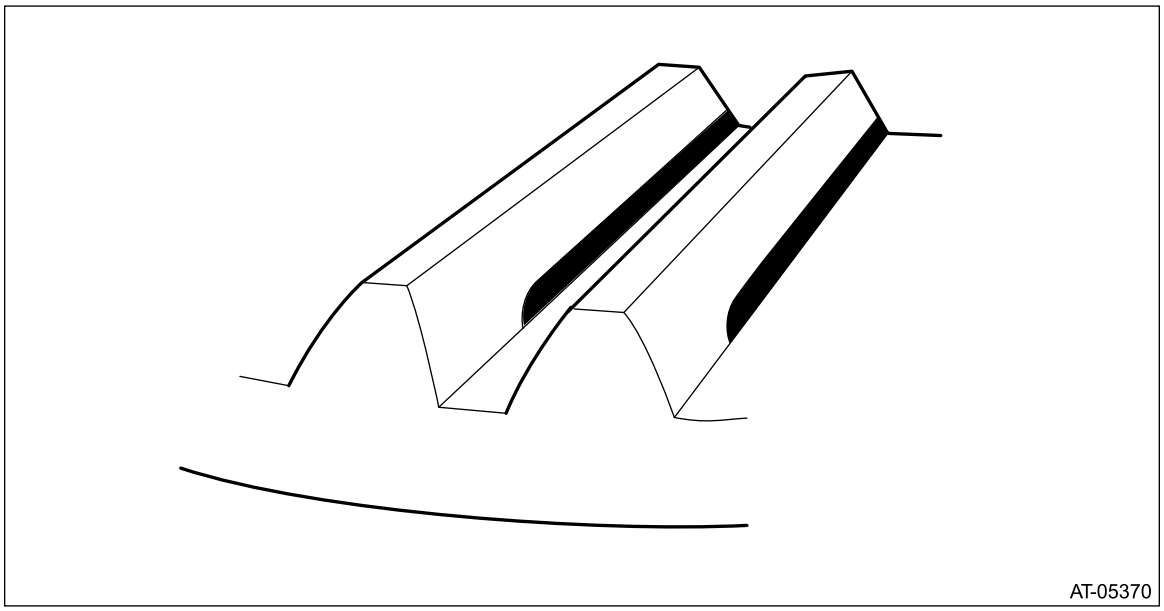
- Face contact
  Check item: Backlash is too large.
  Contact pattern



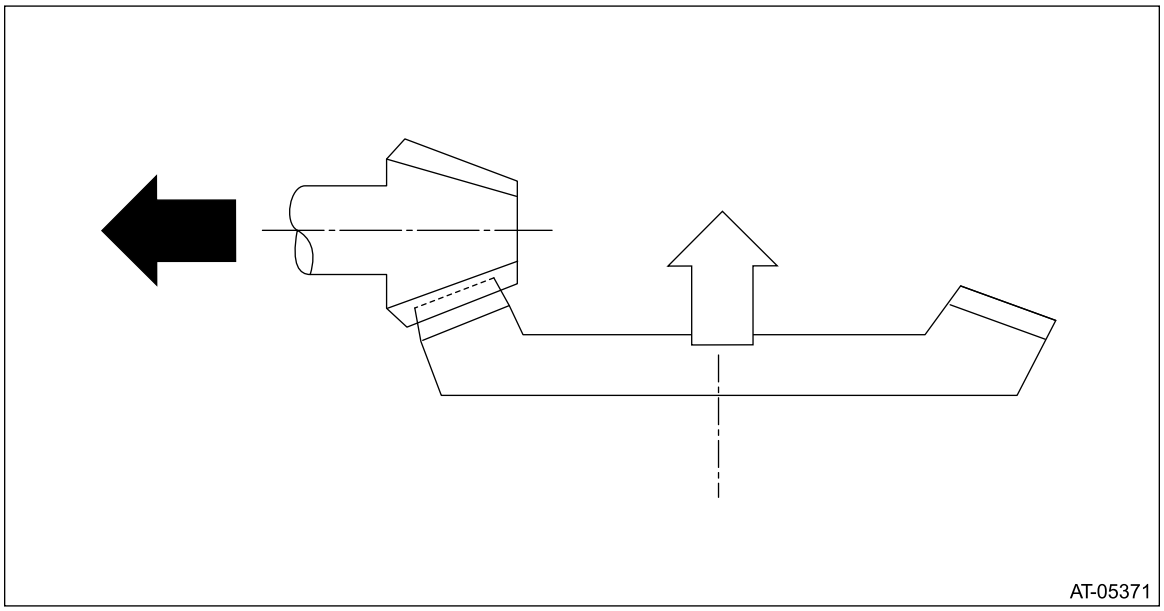
Corrective action: Increase thickness of pinion height adjusting washer according to the procedure for bringing drive pinion close to hypoid driven gear side.



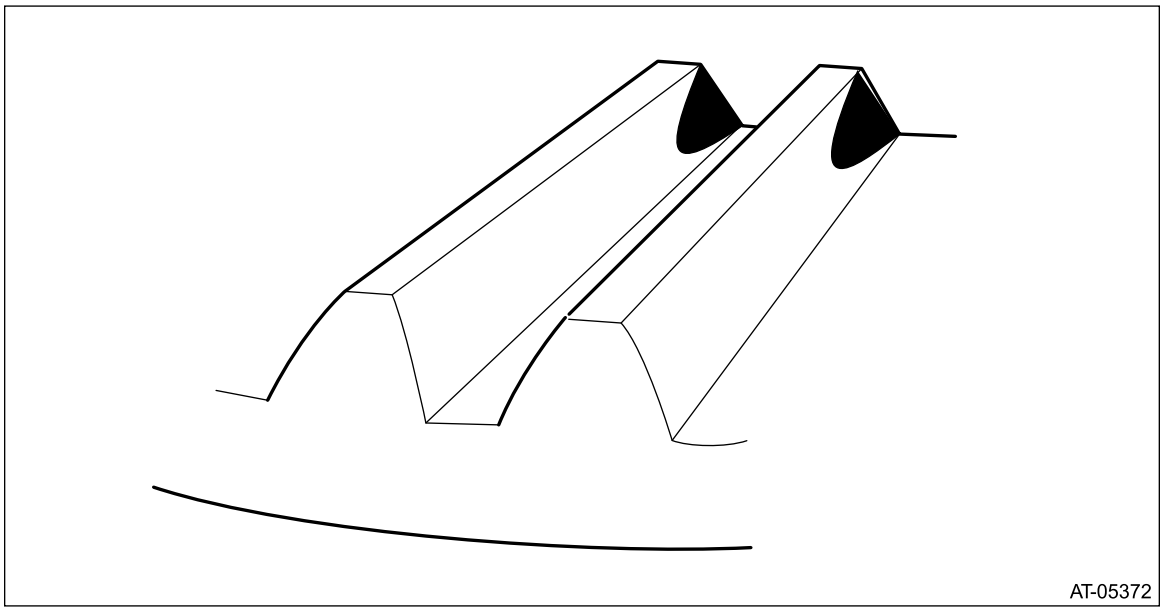
- Flank contact
  Check item: Backlash is too small.
  Contact pattern



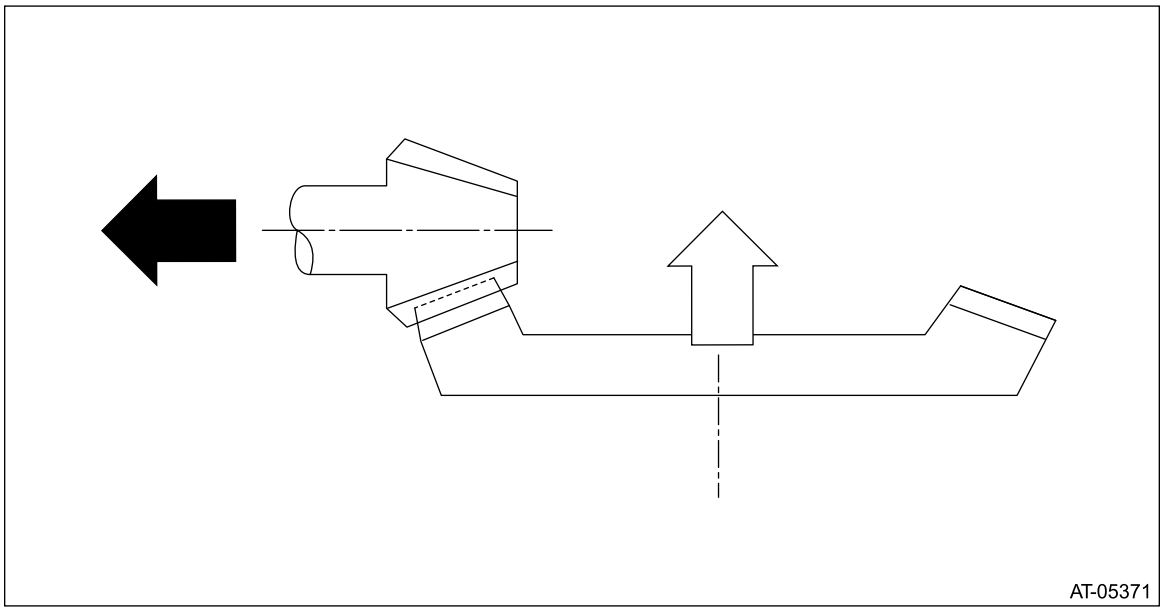
Corrective action: Reduce the thickness of pinion height adjusting washer according to the procedure for bringing drive pinion away from hypoid driven gear.



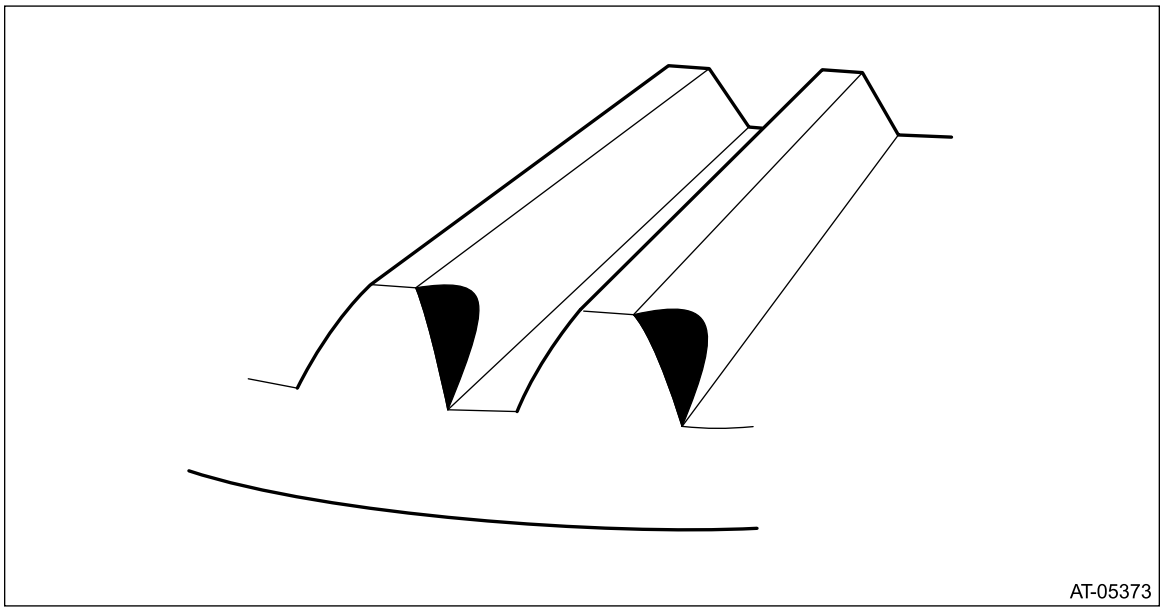
- Toe contact (inside contact)
  Check item: Teeth contact area is too small.
  Contact pattern



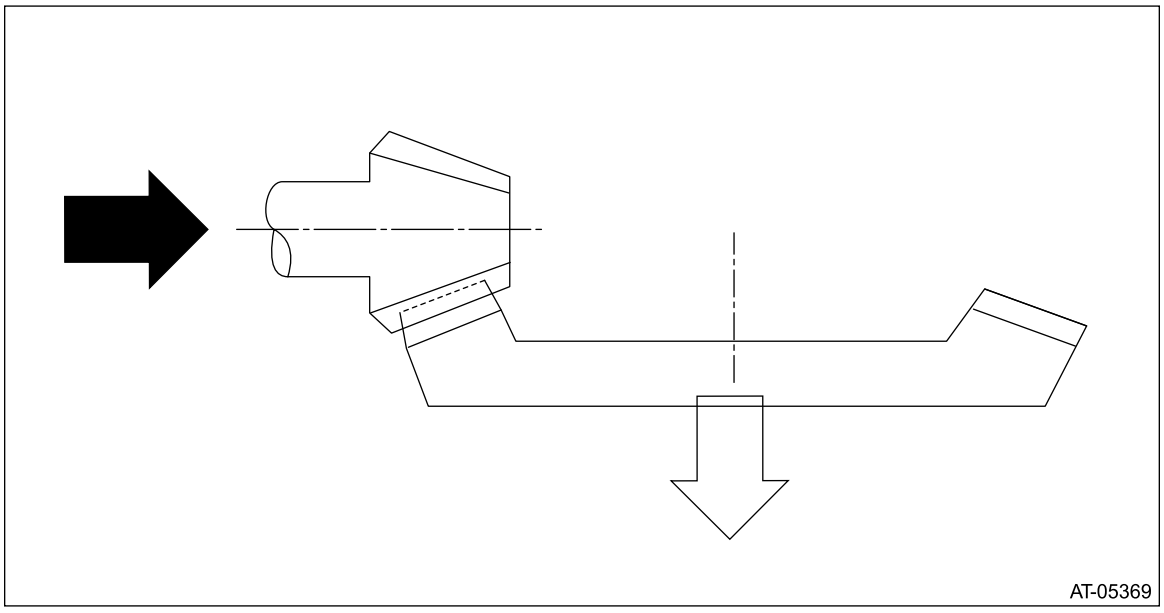
Corrective action: Reduce the thickness of pinion height adjusting washer according to the procedure for bringing drive pinion away from hypoid driven gear side.



- 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.

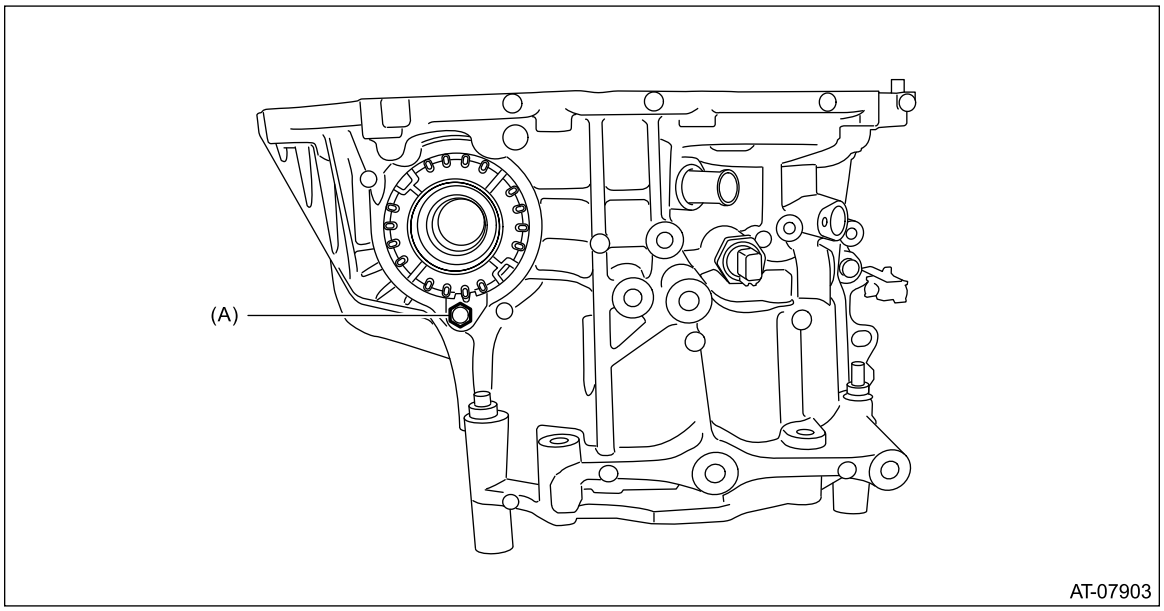


7. If tooth contact is correct, mark the differential side retainer position and loosen. After fitting a new O-ring and oil seal, screw in the differential side retainer to the marked position.

8. Tighten the lock plate with specified torque.

Tightening torque:

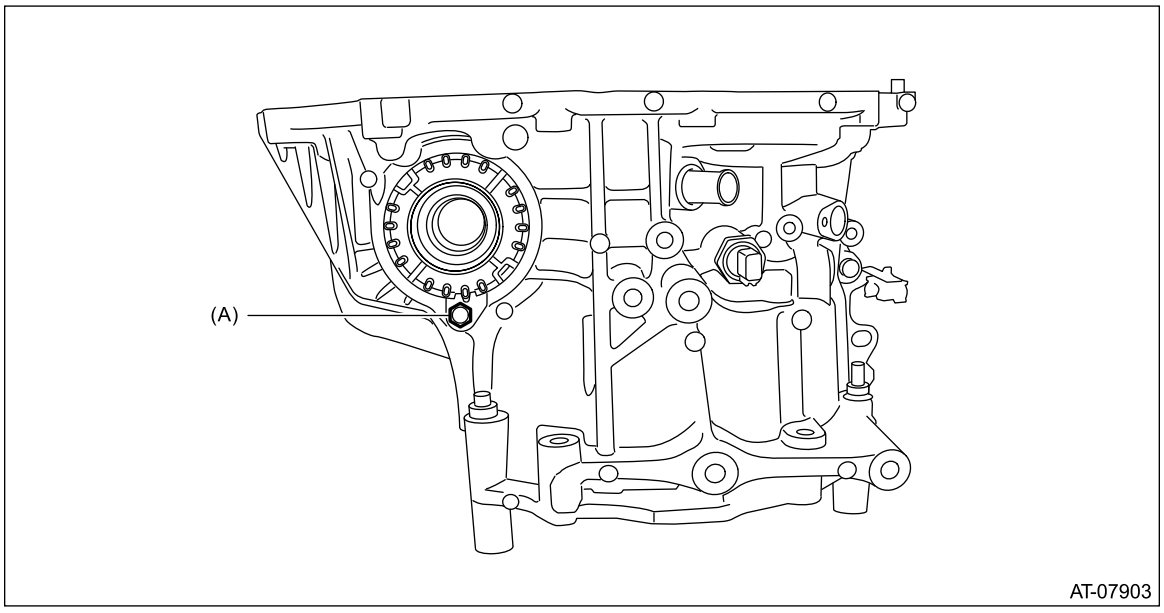
25 N·m (2.5 kgf-m, 18.4 ft-lb)



(A) Lock plate

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 center differential carrier. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Center Differential Carrier>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 lock plates on both sides.



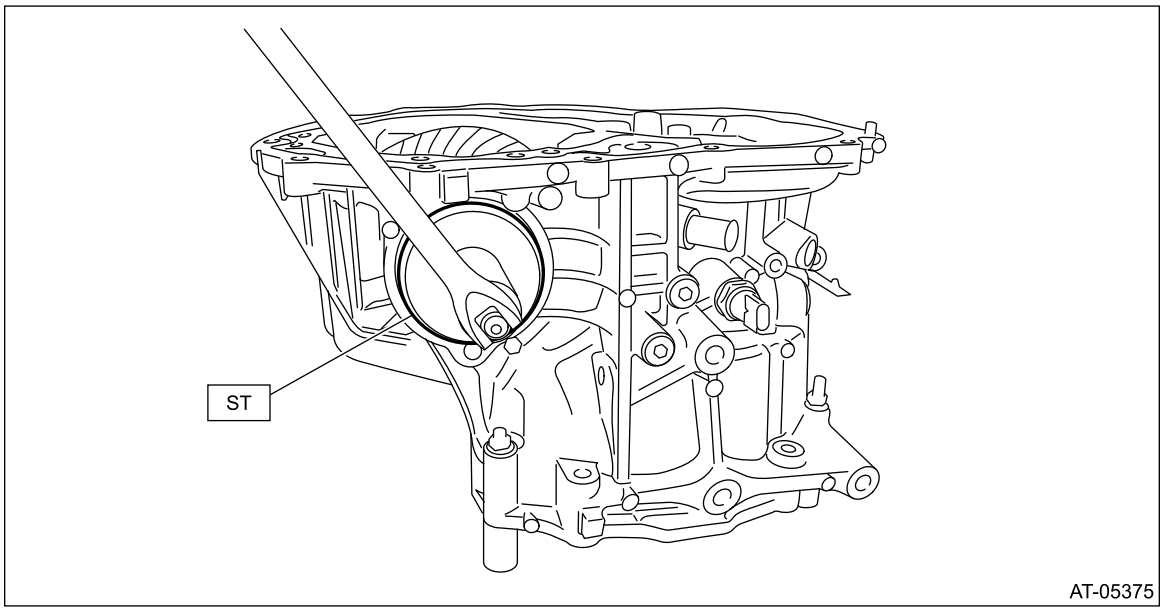
(A) Lock plate

16. Remove the differential side retainers using ST.

ST 18658AA021 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.**



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

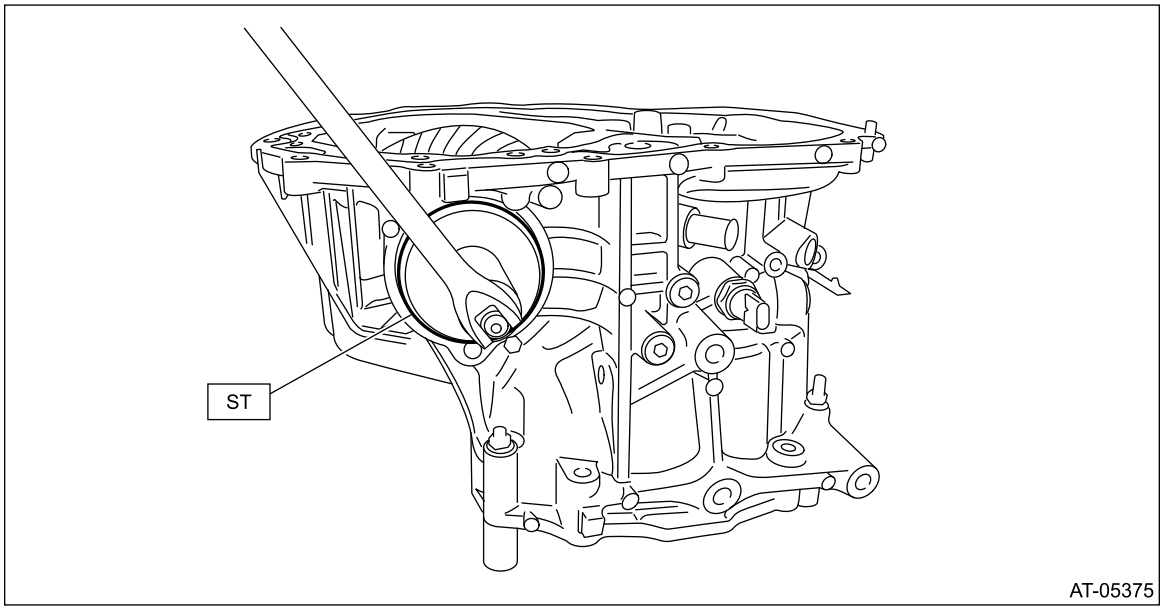
18. Remove the oil seals and O-rings from both differential side retainers. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Front Differential Assembly>DISASSEMBLY > SIDE RETAINER.

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.

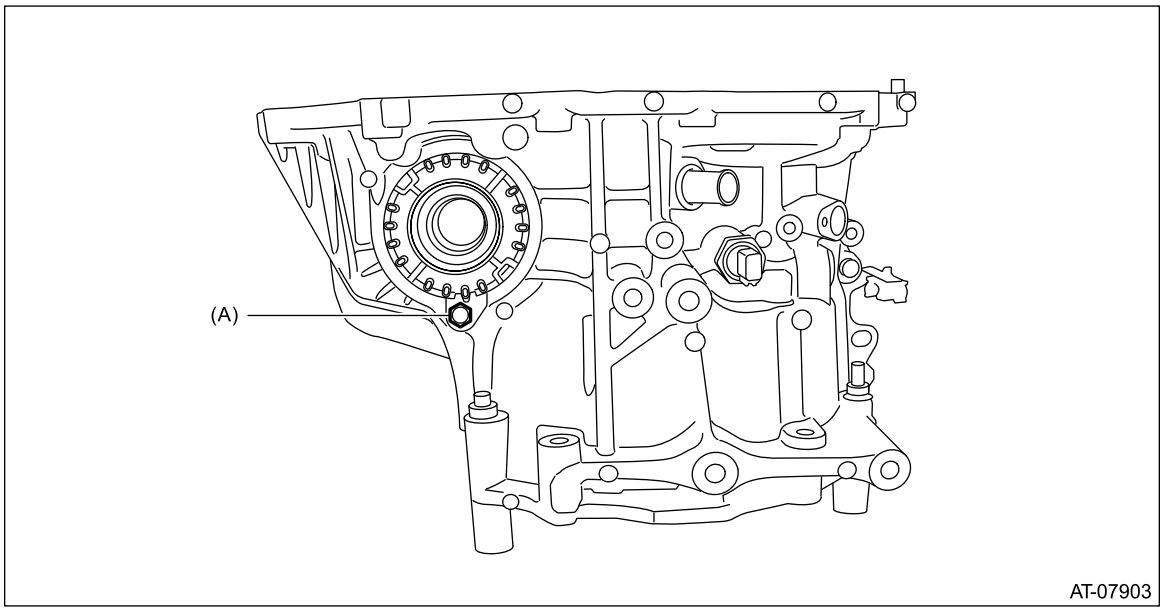
   ST 18658AA021 WRENCH COMPL RETAINER



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 18658AA021 WRENCH COMPL RETAINER

7. Install the lock plate.
   Tightening torque:
   25 N·m (2.5 kgf-m, 18.4 ft-lb)



(A) Lock plate

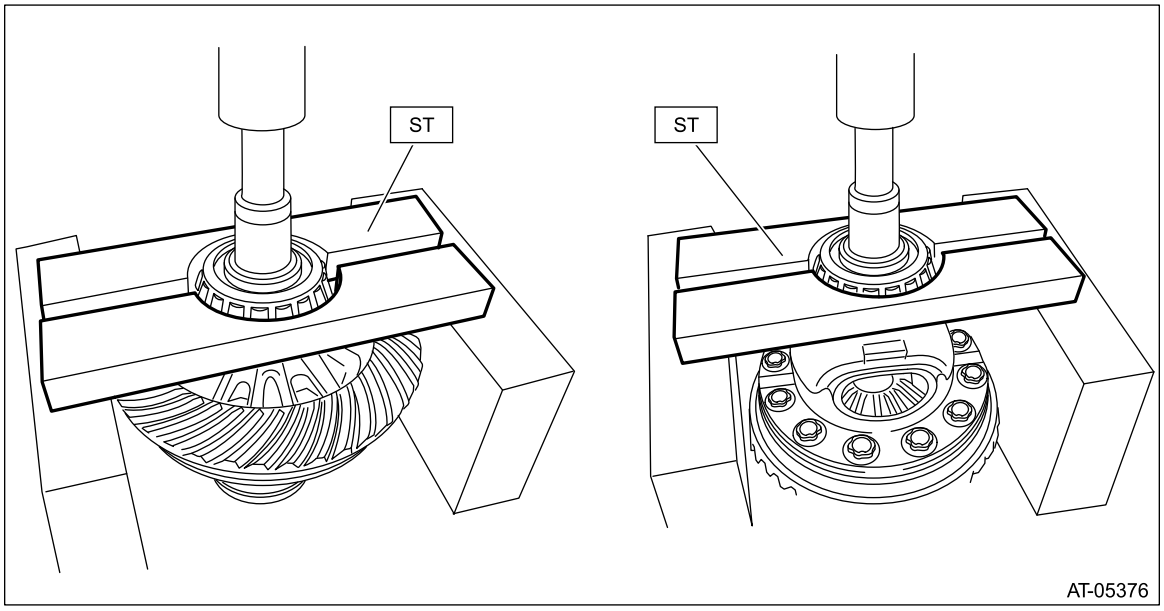
8. Install the drive pinion shaft assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Drive Pinion Shaft Assembly>INSTALLATION.
9. Install the primary pulley, secondary pulley and variator chain. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Primary Pulley and Secondary Pulley>INSTALLATION.
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 center differential carrier. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Center Differential Carrier>INSTALLATION.
15. Install the transfer clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transfer Clutch>INSTALLATION.
16. Install the rear drive shaft. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Rear Drive Shaft>INSTALLATION.
17. Install the extension case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Extension Case>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.

DISASSEMBLY

1. DIFFERENTIAL CASE ASSEMBLY

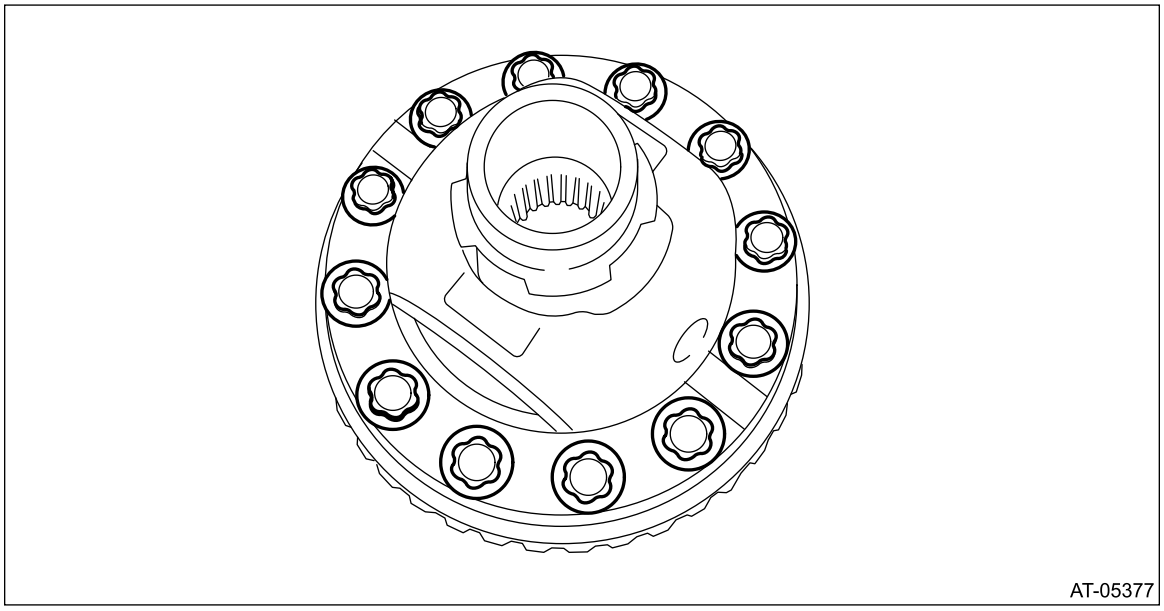
1. Remove the taper roller bearing using the ST.

ST 498077000 REMOVER

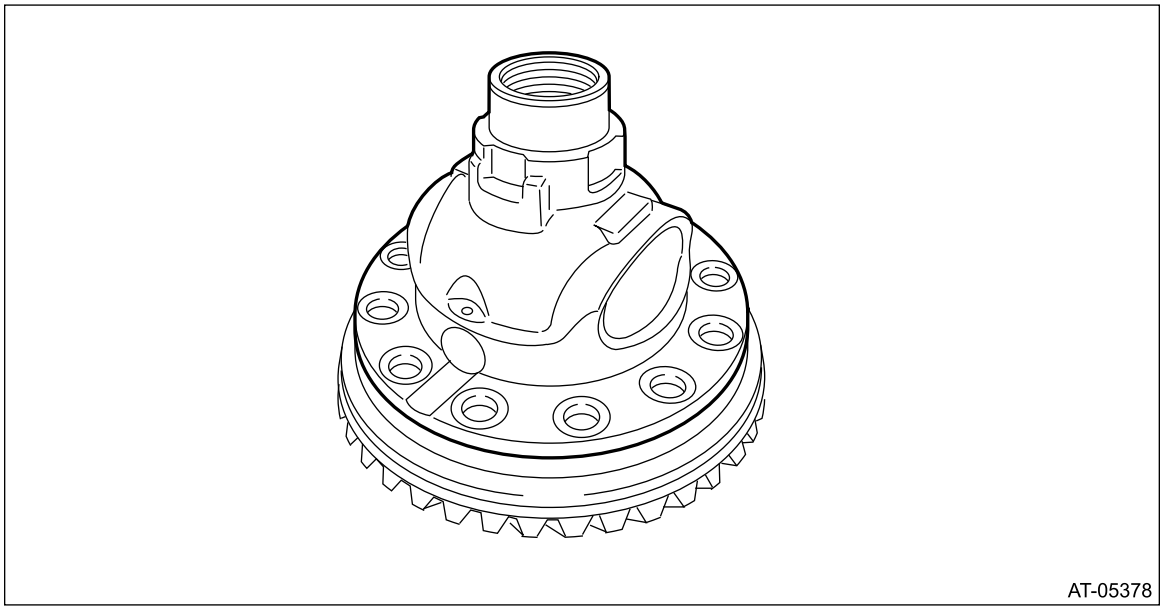


2. Remove the hypoid driven gear mounting bolt using the ST.

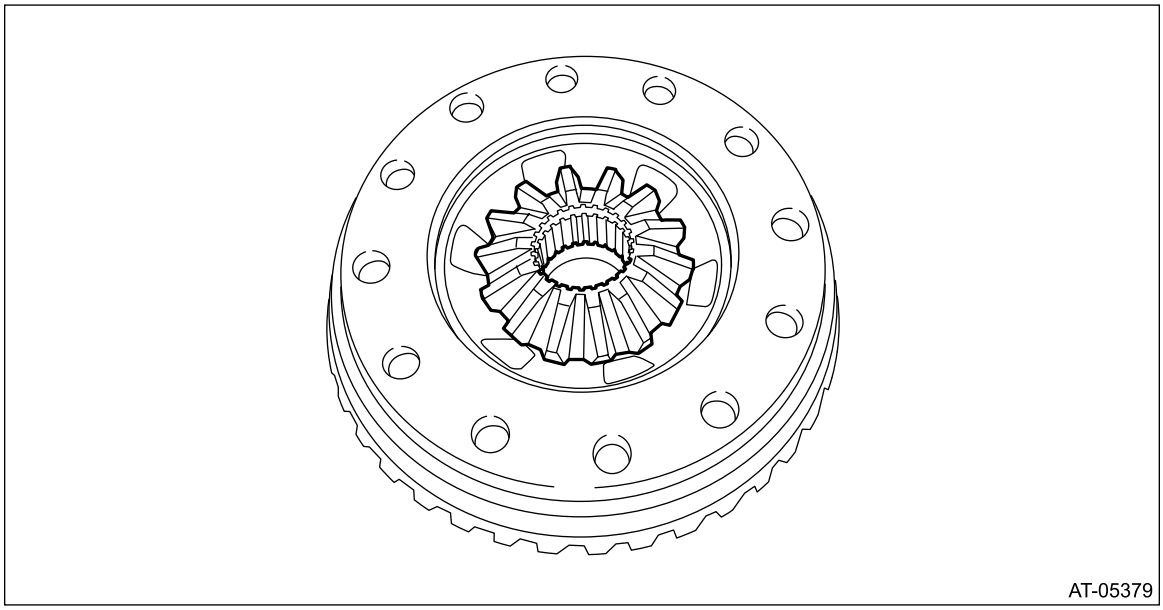
ST 18270KA020 SOCKET (E20)



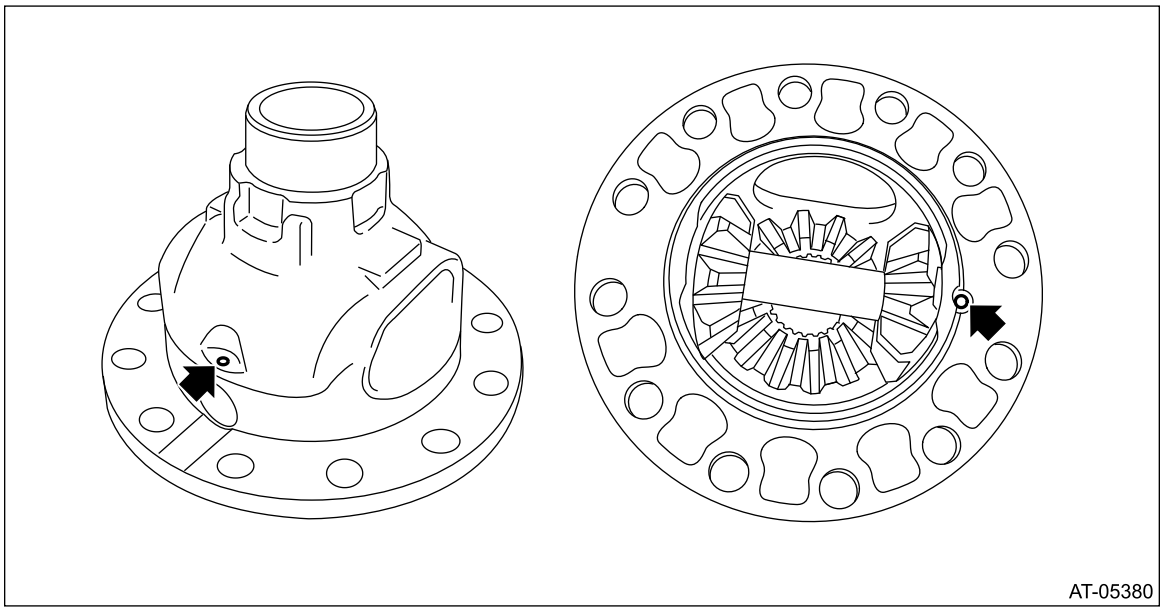
3. Remove the differential case (LH).



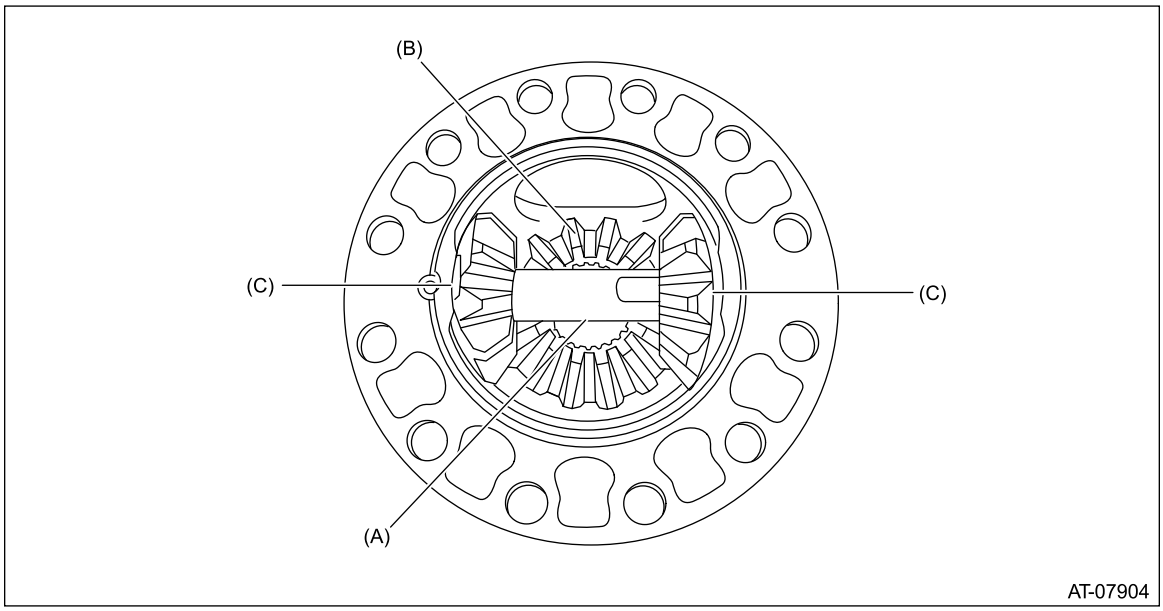
4. Remove the differential bevel gear and washer from differential case.



5. Remove the straight pin.



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

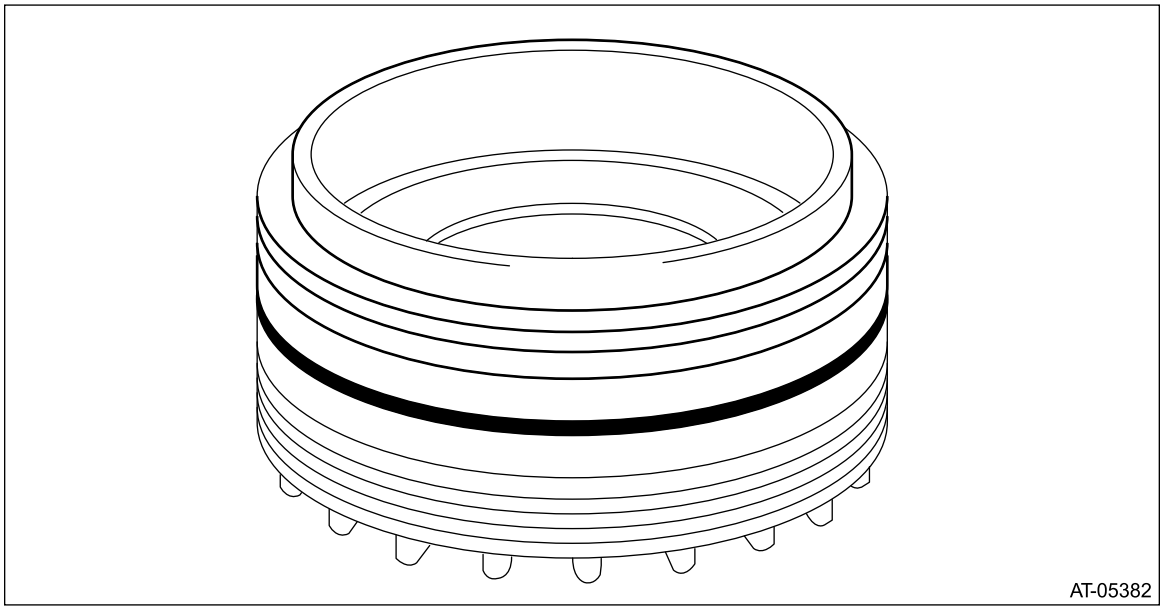


(A) Pinion shaft
(B) Differential bevel gear
(C) Differential bevel pinion

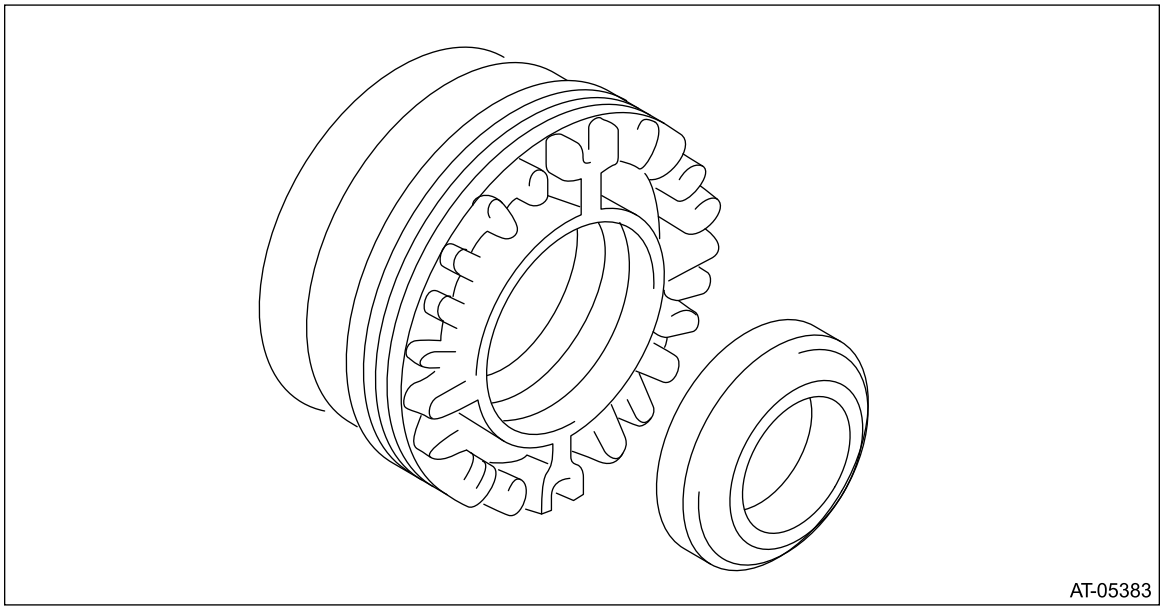
2. SIDE RETAINER

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.

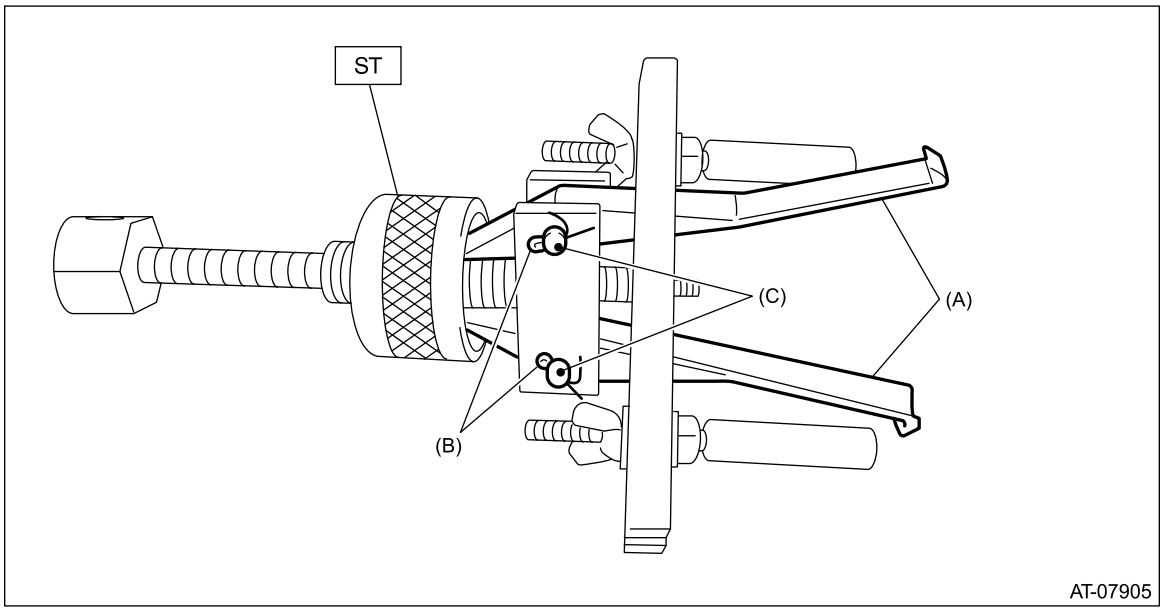


2. Remove the oil seal.



3. Remove the SPLIT PIN (ST), and then remove the claw.

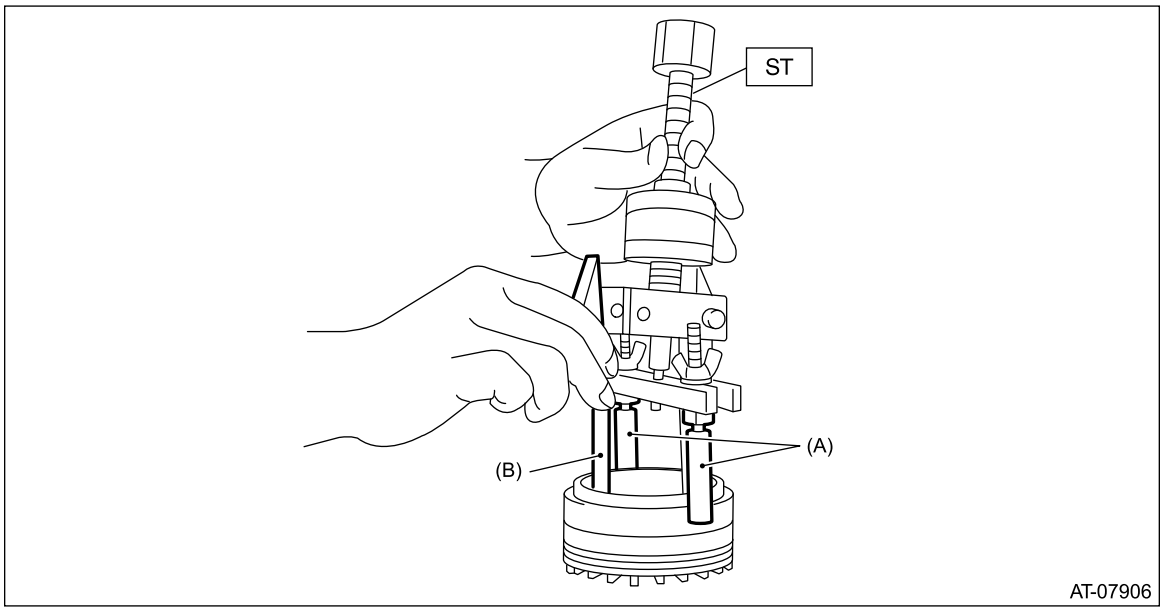
ST 398527700 PULLER ASSY



(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



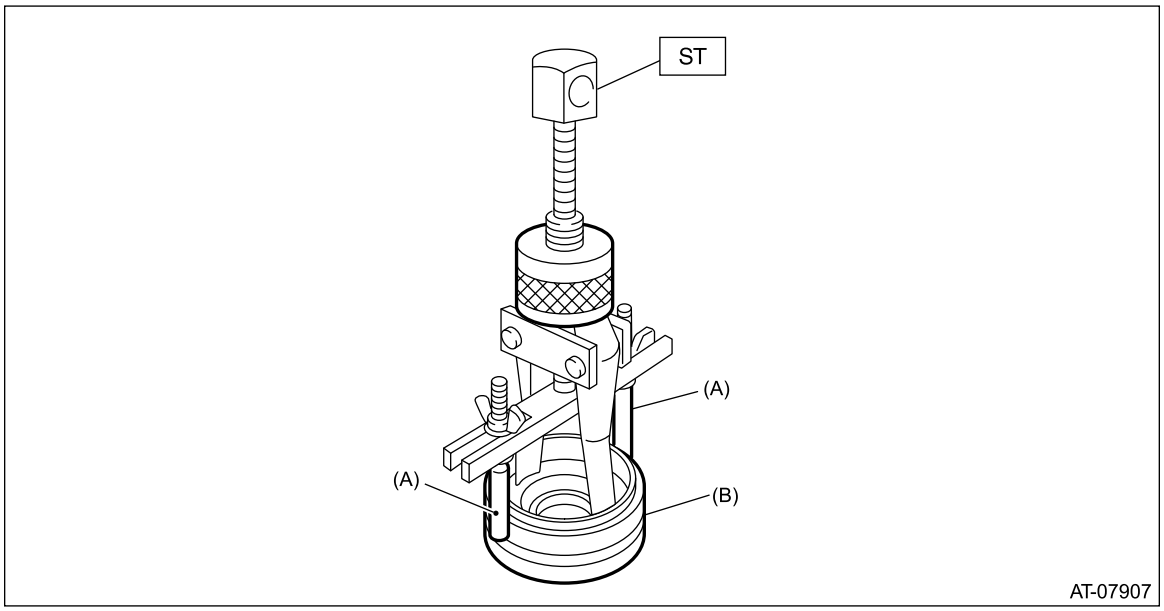
(A) Shaft
(B) Claw

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.



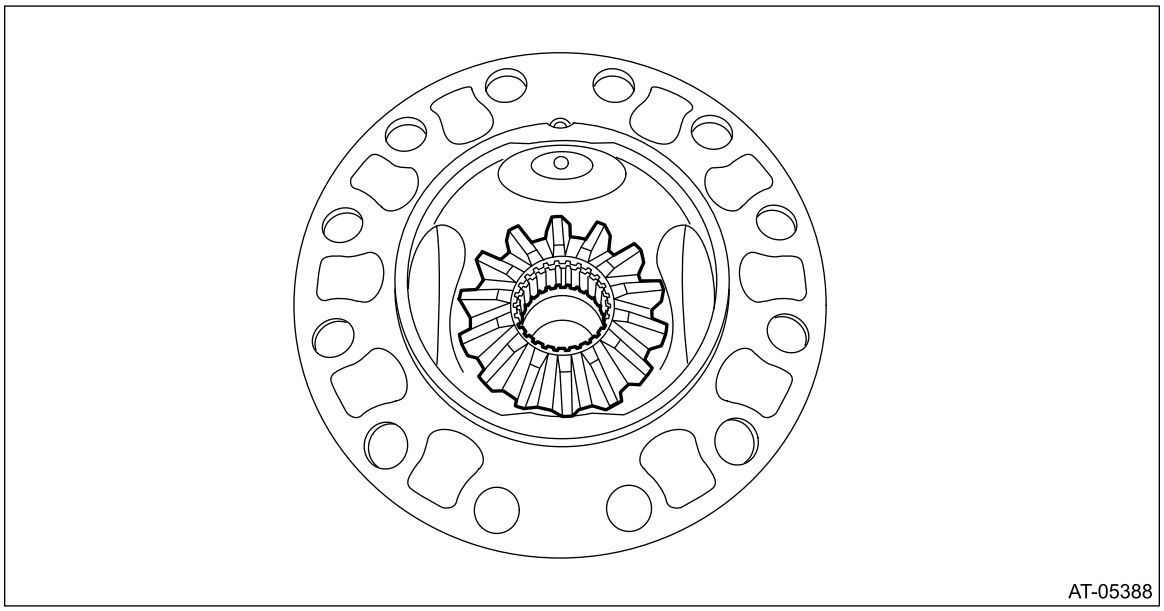
(A) Shaft
(B) Side retainer

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Front Differential Assembly

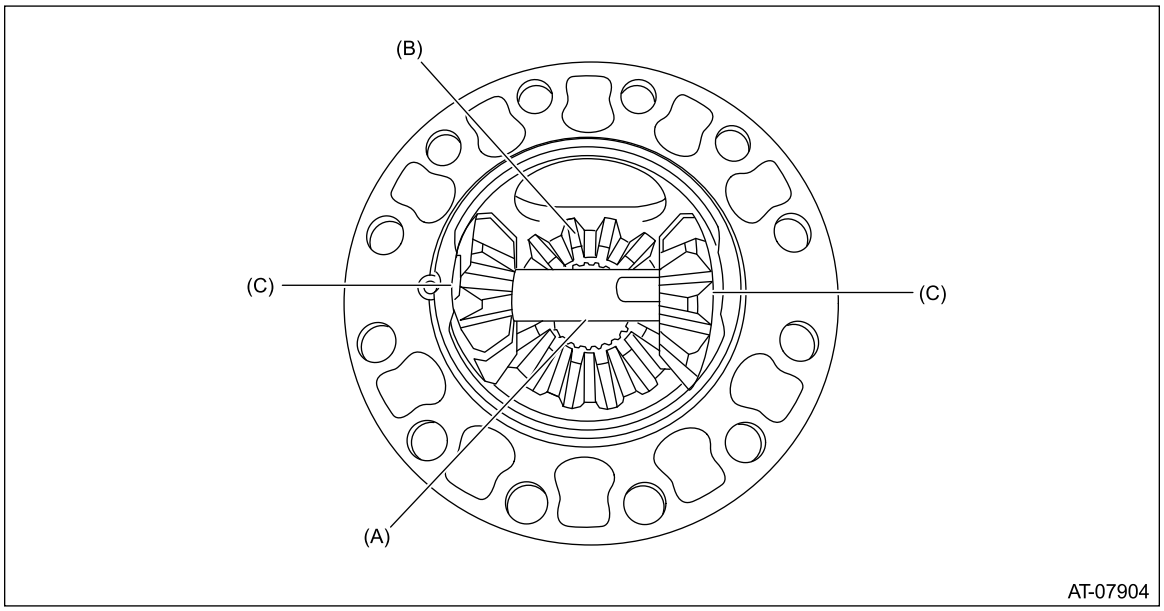
ASSEMBLY

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.

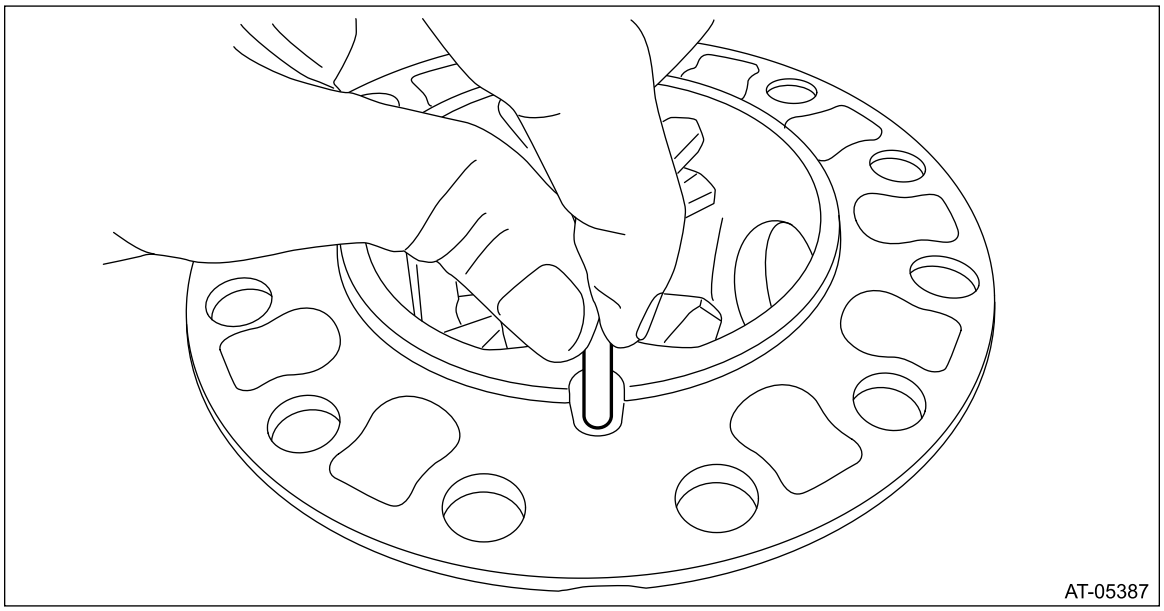


(A) Pinion shaft

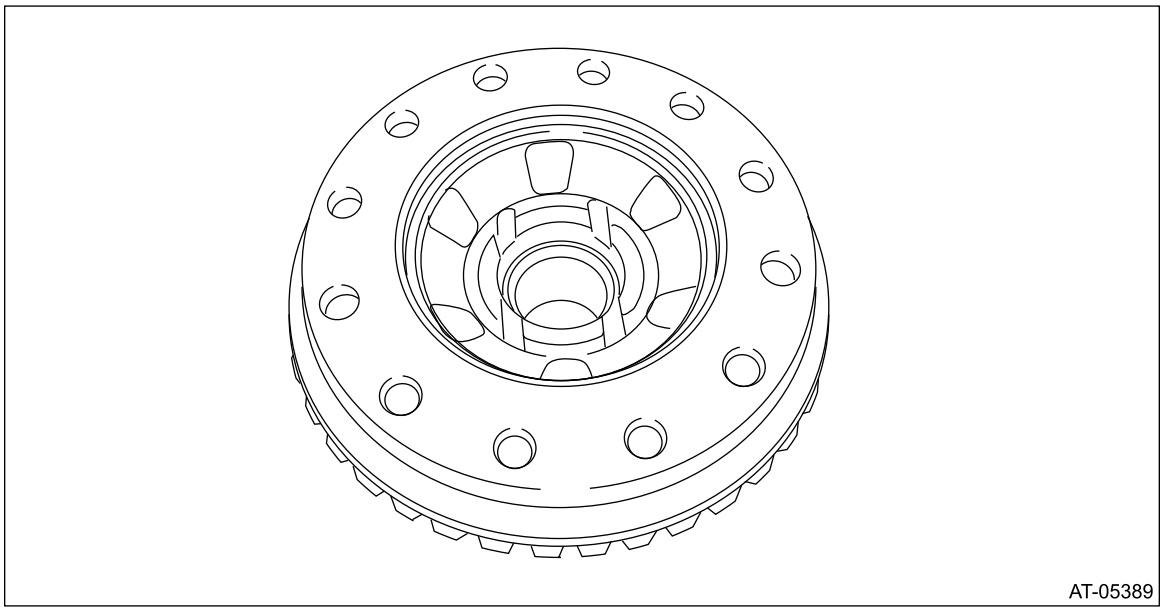
(B) Differential bevel gear

(C) Differential bevel pinion

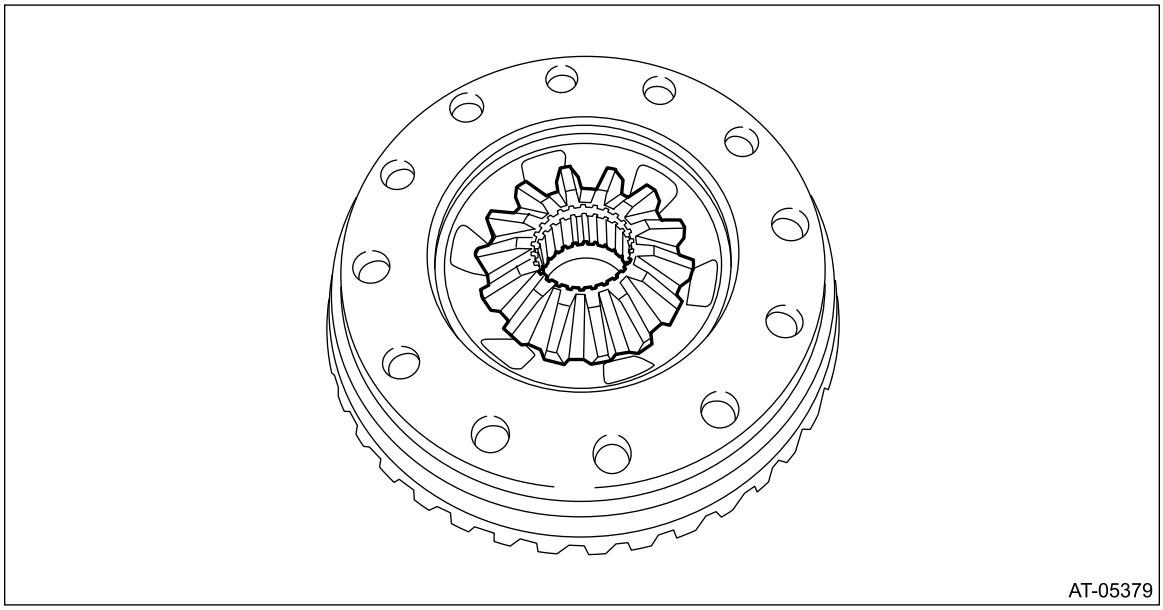
3. Install the straight pin.



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).

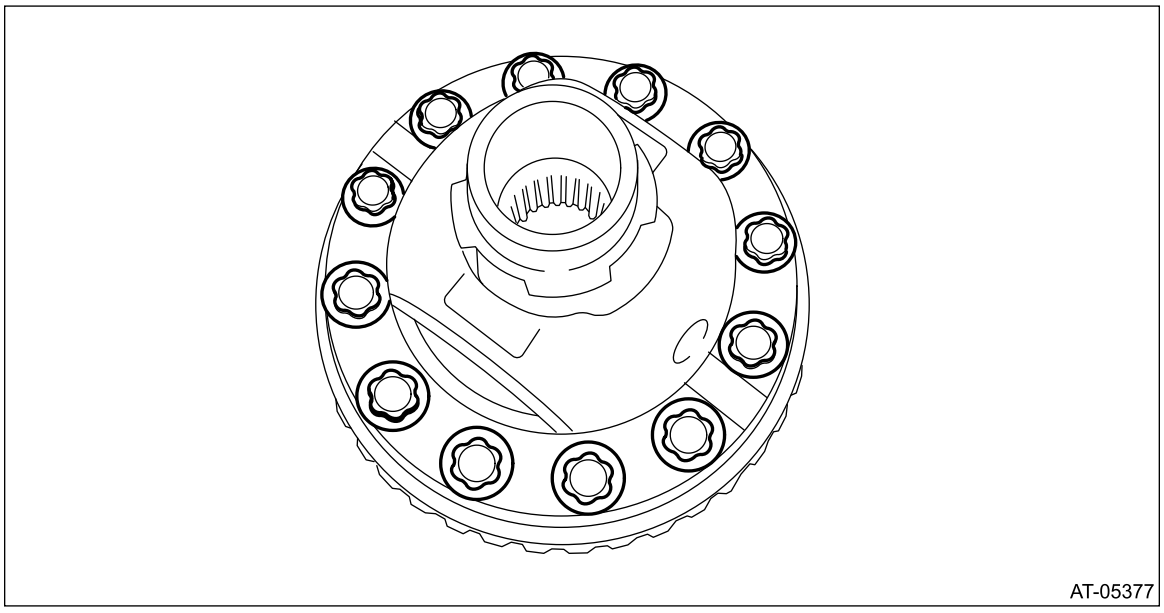


6. Using the ST, install the hypoid driven gear by tightening the installation bolt.

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

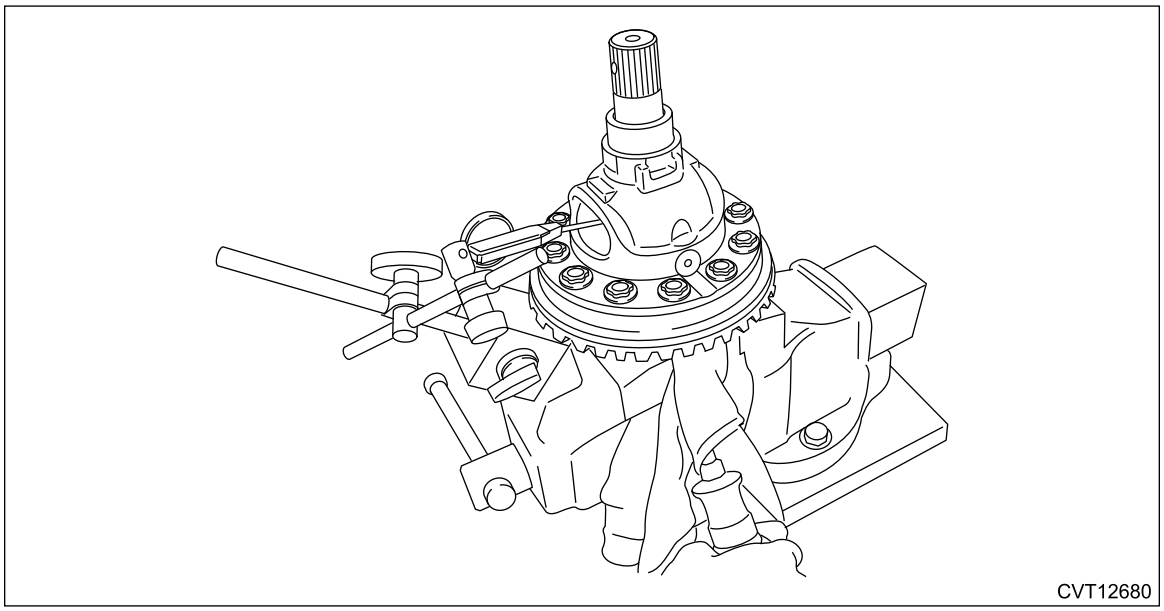
(2) Measure the gear backlash using dial gauge and magnet stand, and insert the dial gauge through the window of differential case.

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)



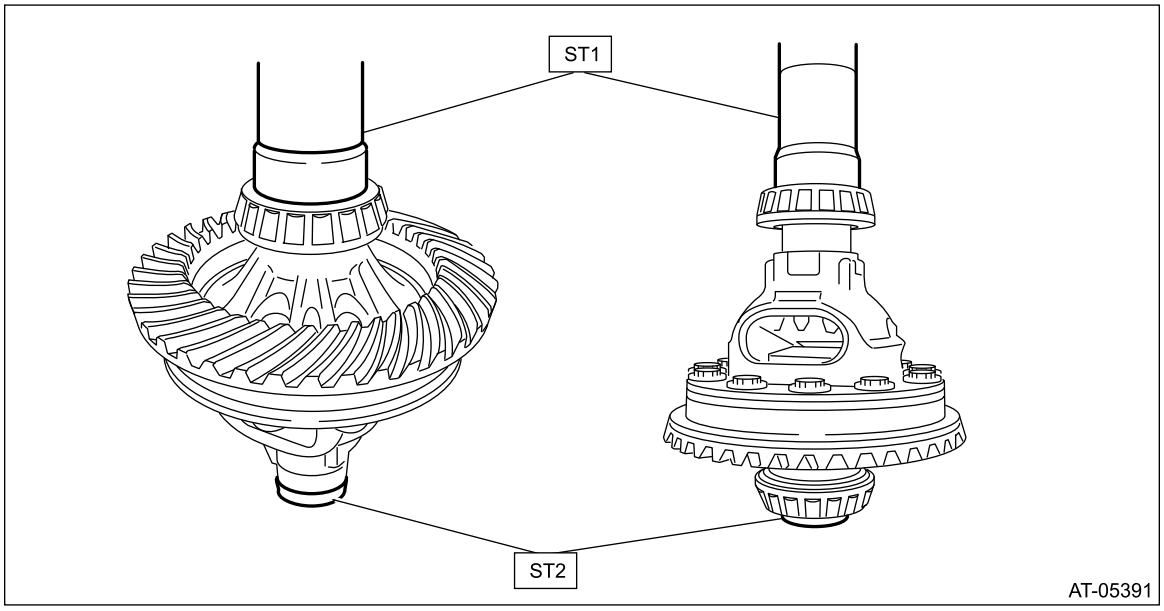
(3) If the backlash is not within specification, select a washer from the table below and replace.

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

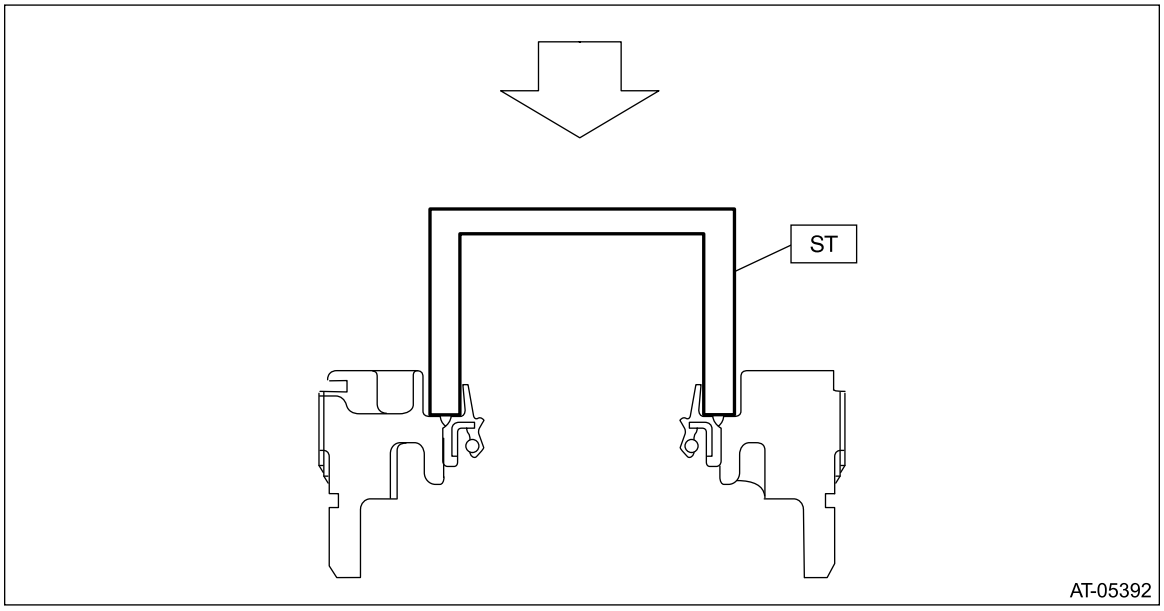


2. SIDE RETAINER

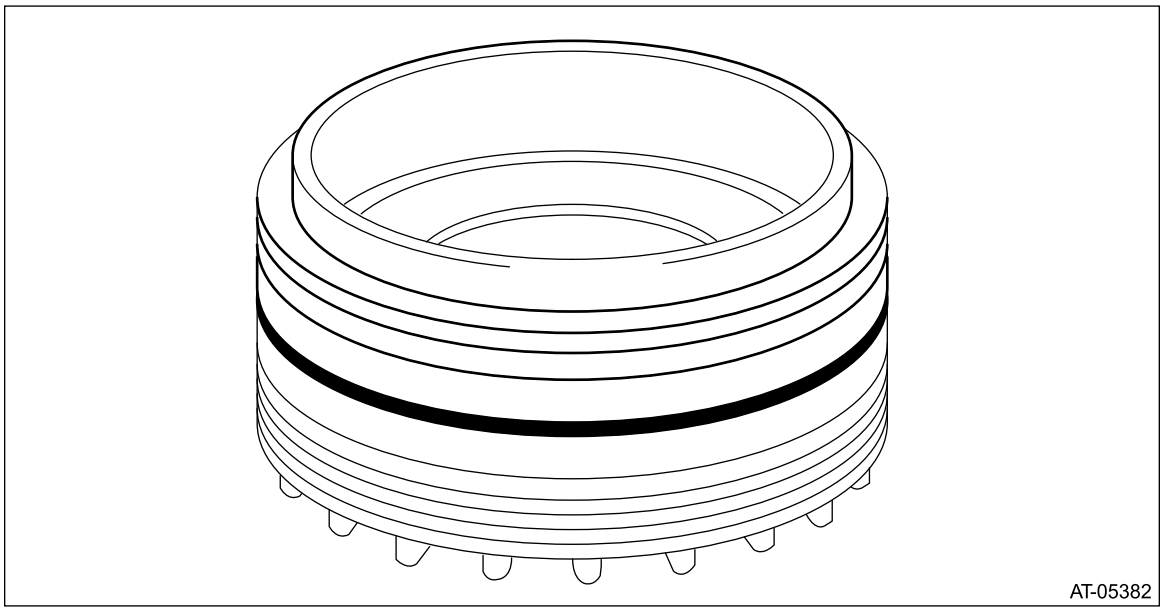
Note:
After adjusting the backlash and tooth contact, replace the oil seal and O-ring of side retainer with new parts.

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



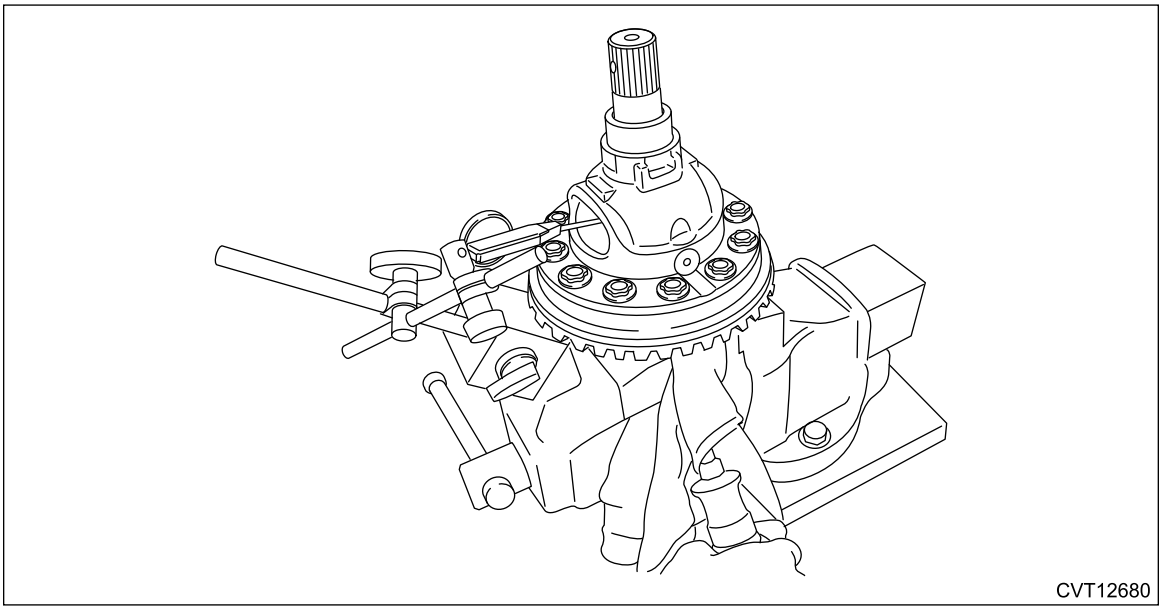
3. Install the O-rings.
   Note:
   - **Use new O-rings.**
   - **Apply gear oil to O-ring.**



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.

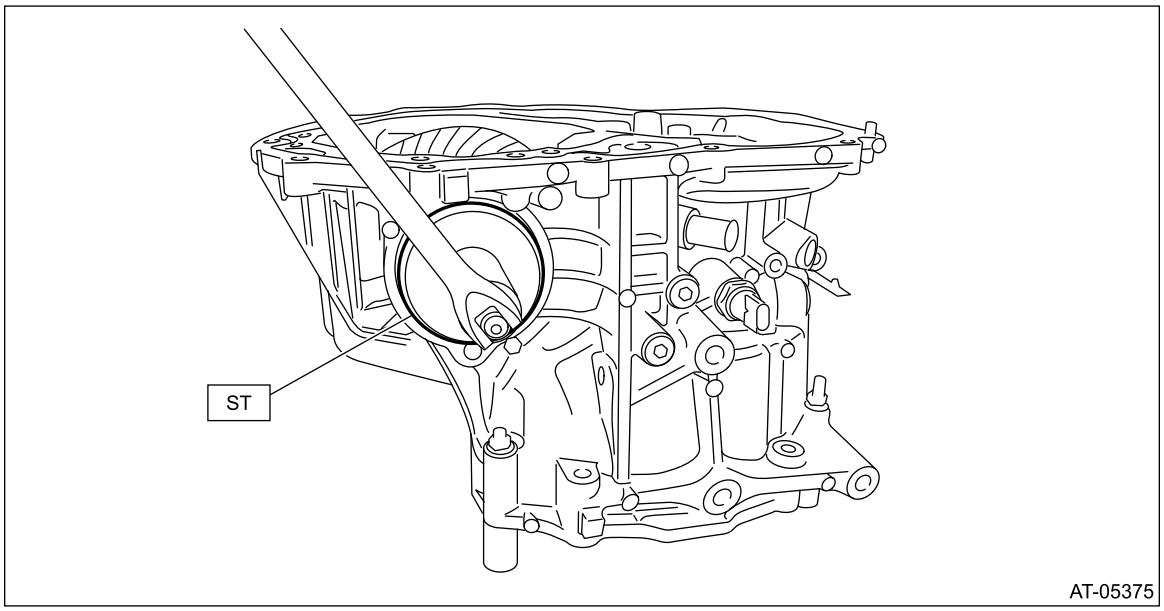
CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Front Differential Assembly

ADJUSTMENT

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

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

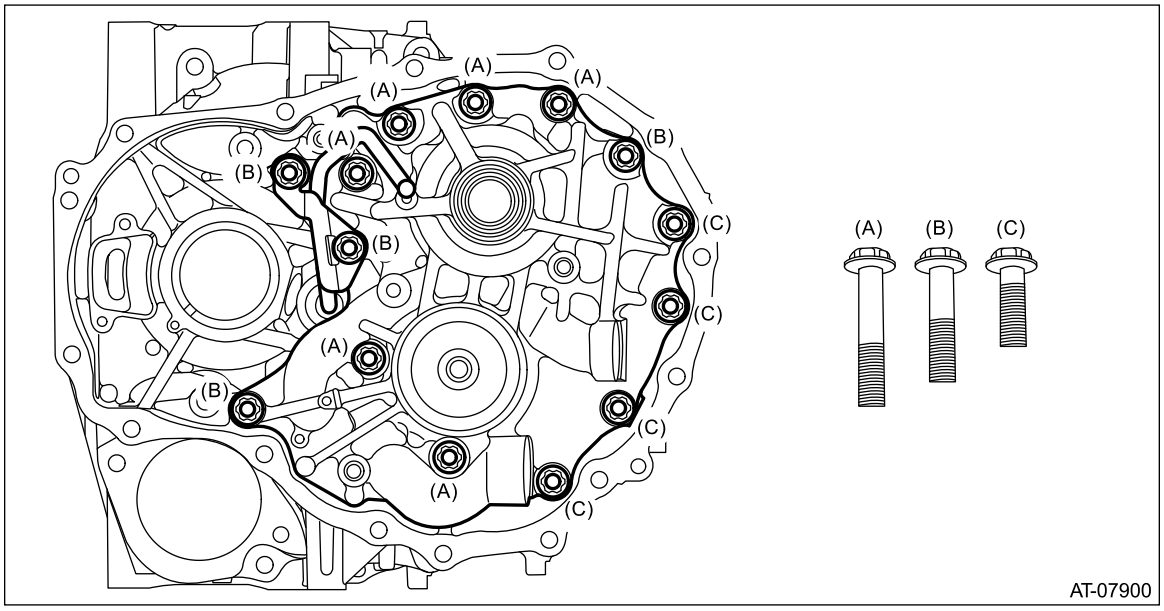
ST 18658AA021 WRENCH COMPL RETAINER



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)

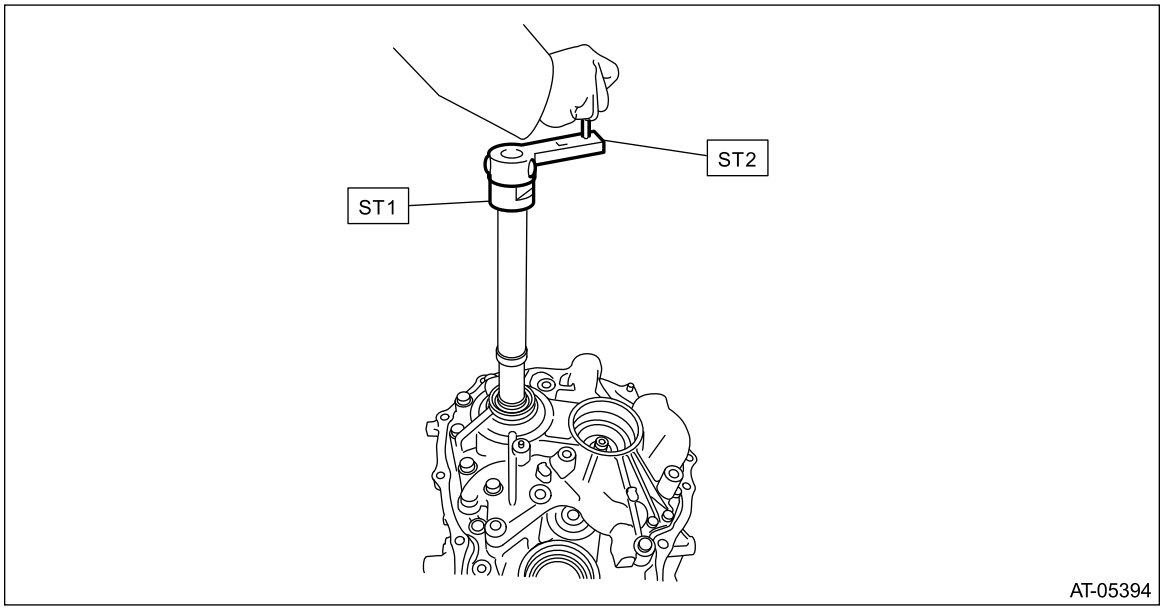
Note:
Do not confuse the three different-length bolts when installing.
Tightening torque:
43 N·m (4.4 kgf-m, 31.7 ft-lb)



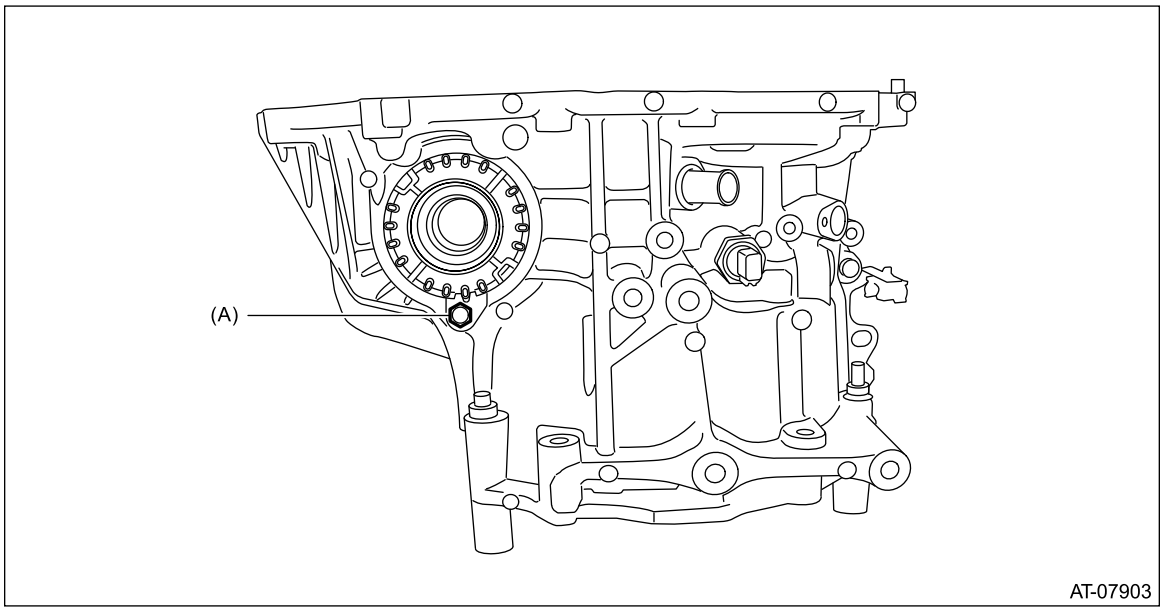
4. Rotate the drive pinion shaft ten times or more using ST1 and ST2.

ST1 18667AA010 HOLDER

ST2 499787700 WRENCH

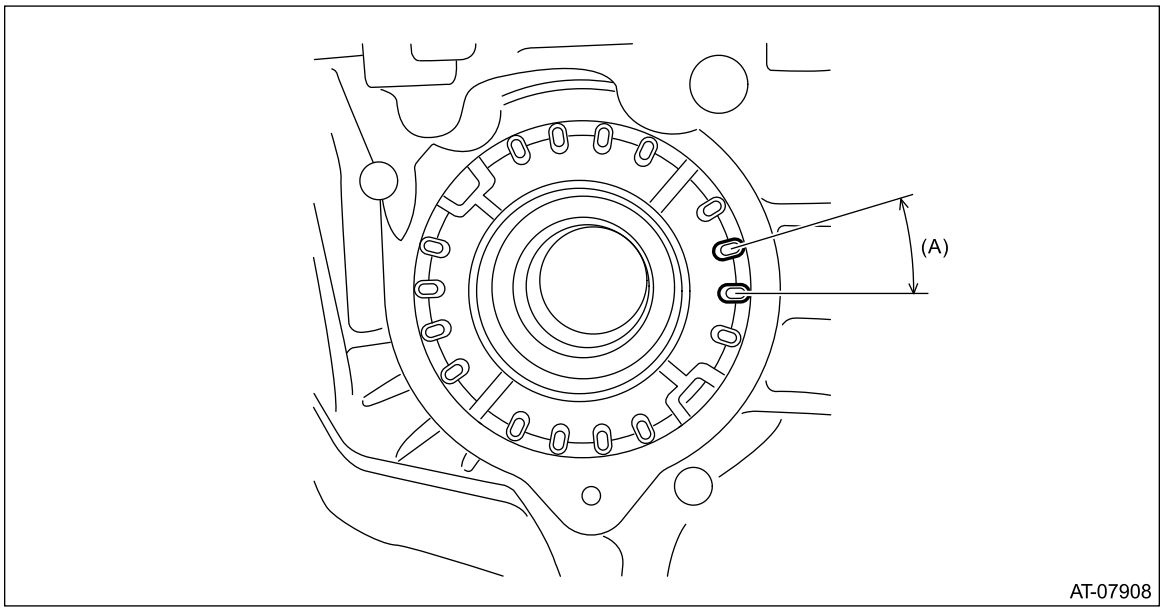


5. While rotating the pinion shaft, tighten the retainer LH and loosen the retainer RH until the shaft can't be turned anymore. The backlash is “zero” when the pinion shaft comes to the point where it doesn't rotate.
6. After the “zero” state is established, loosen the retainer LH by 3 notches and secure 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).

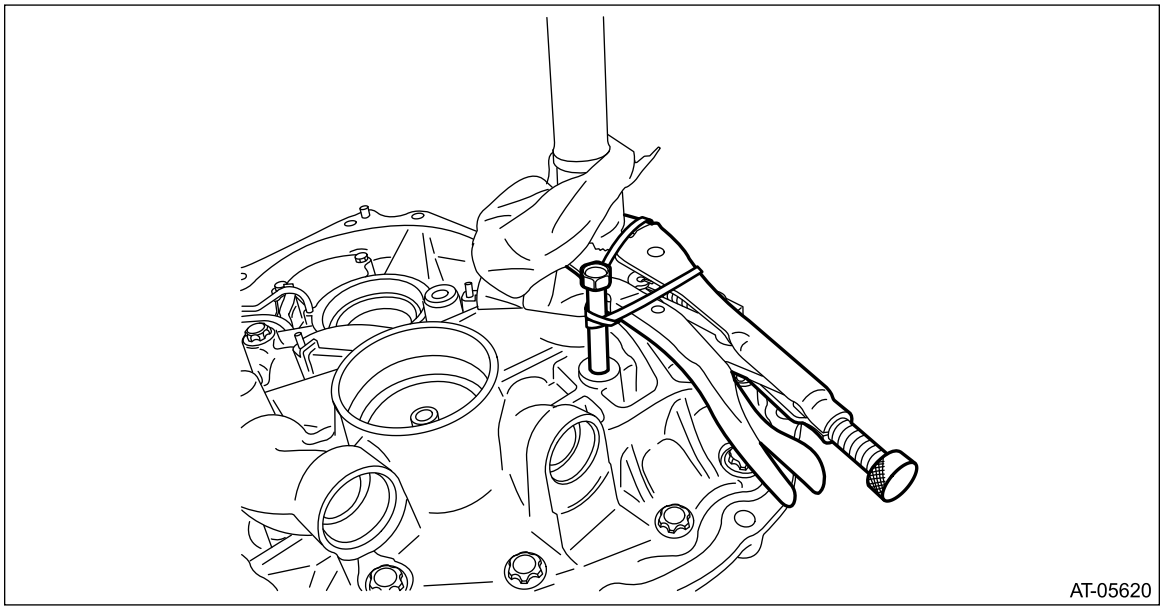


(A) 1 tooth

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

Part No. 38415AA070 Axle shaft

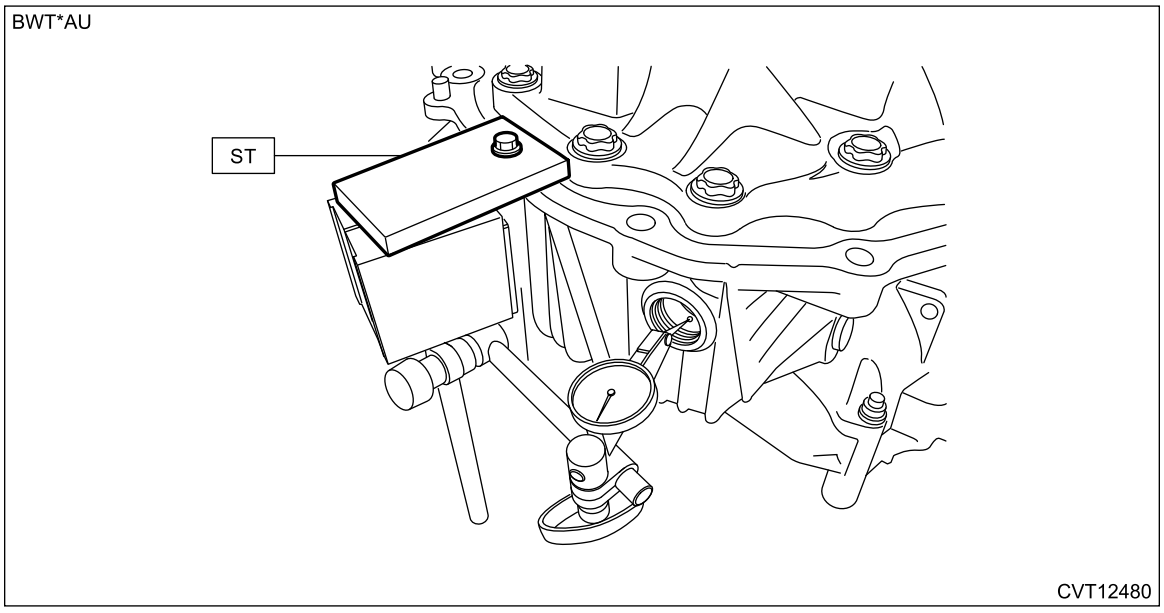
8. Wrap the drive shaft pinion shaft with cloth and pinch with vise pliers. Install the installation bolt into the bolt hole of secondary pulley and secure the bolt and vise pliers using a band or wire.
Make sure the drive pinion shaft does not move.



9. Check if the backlash is within specification, by using ST, dial gauge and magnet stand.

ST 498255400 PLATE

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.

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) > 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

INSPECTION

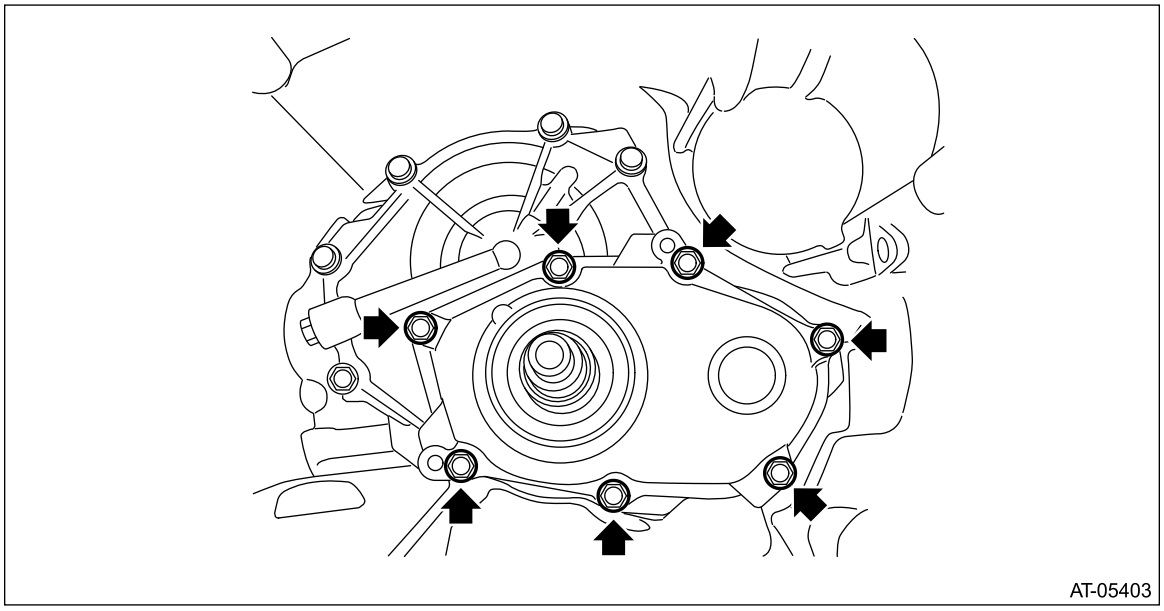
Check the following items.

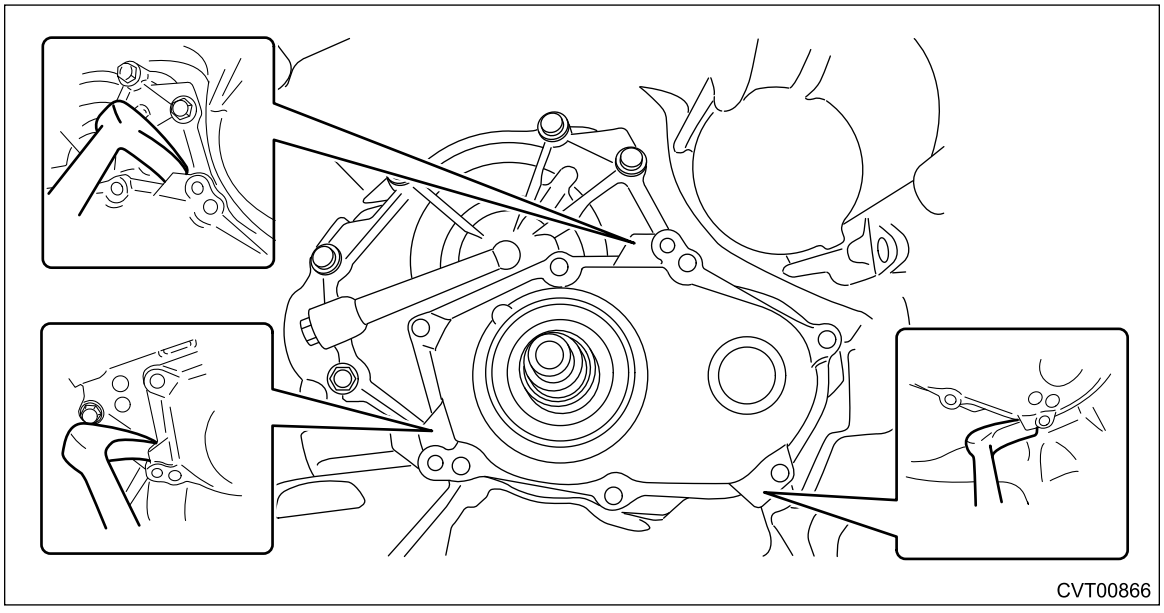
- Check the oil pump for damage and wear.
- Rotate the oil pump by hand, and check that it rotates smoothly.

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.

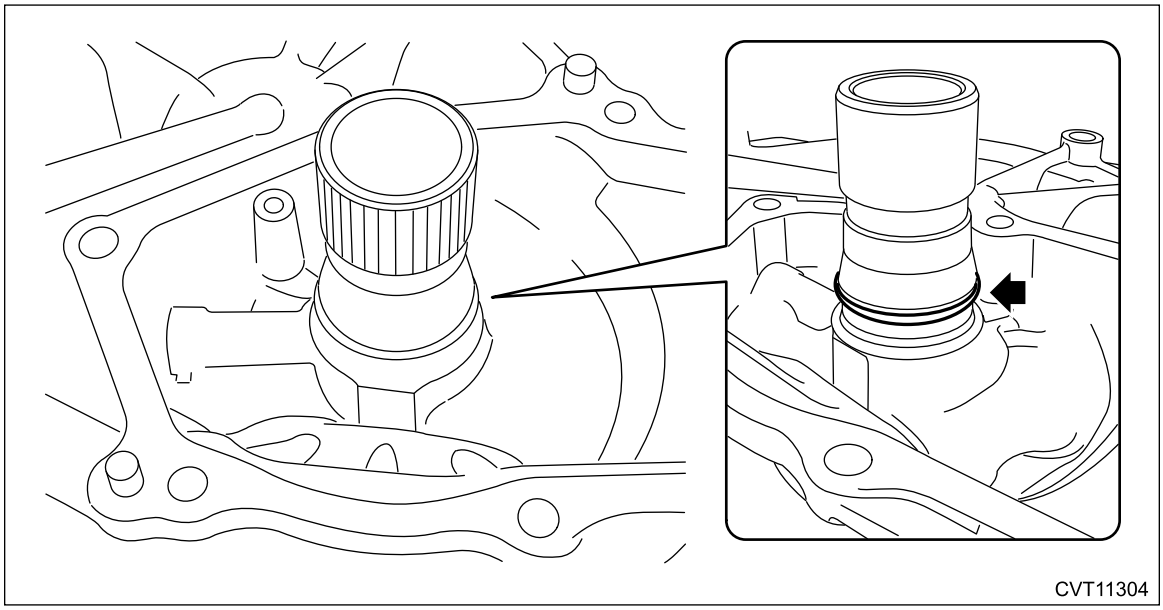
REMOVAL

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.





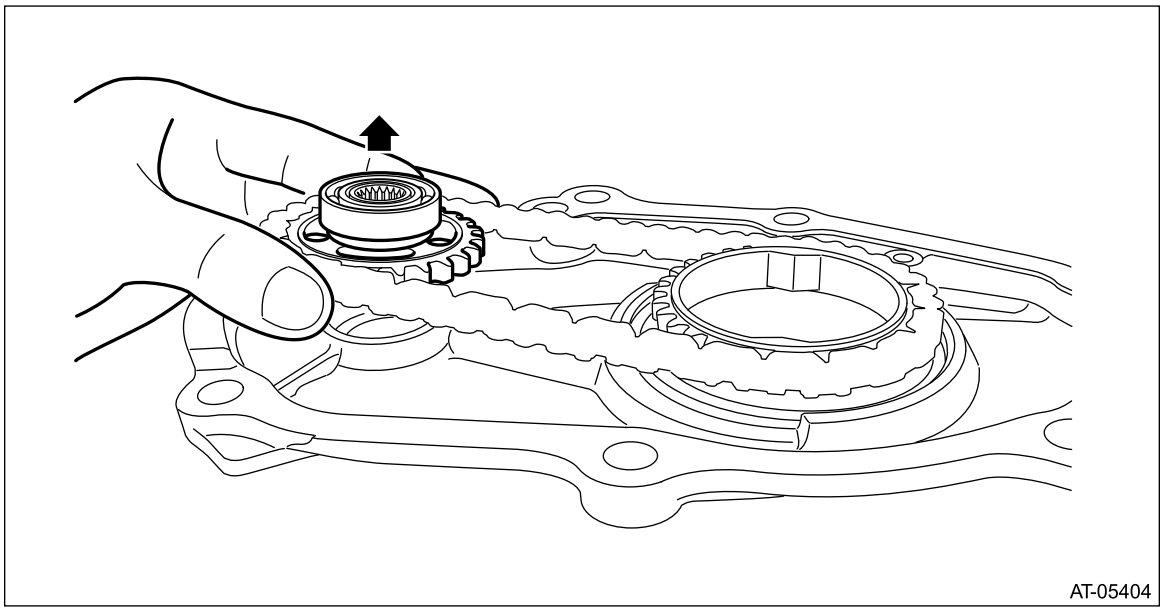
4. Remove the seal ring from center support COMPL.



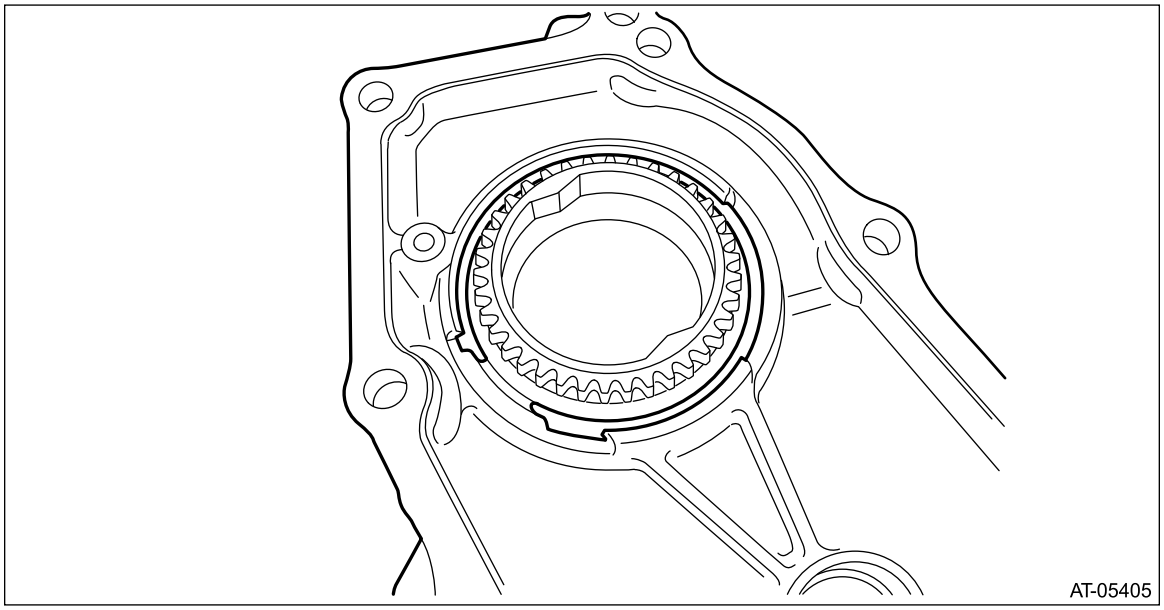
5. Remove the driven sprocket from oil pump chain cover to remove the oil pump chain.

Note:

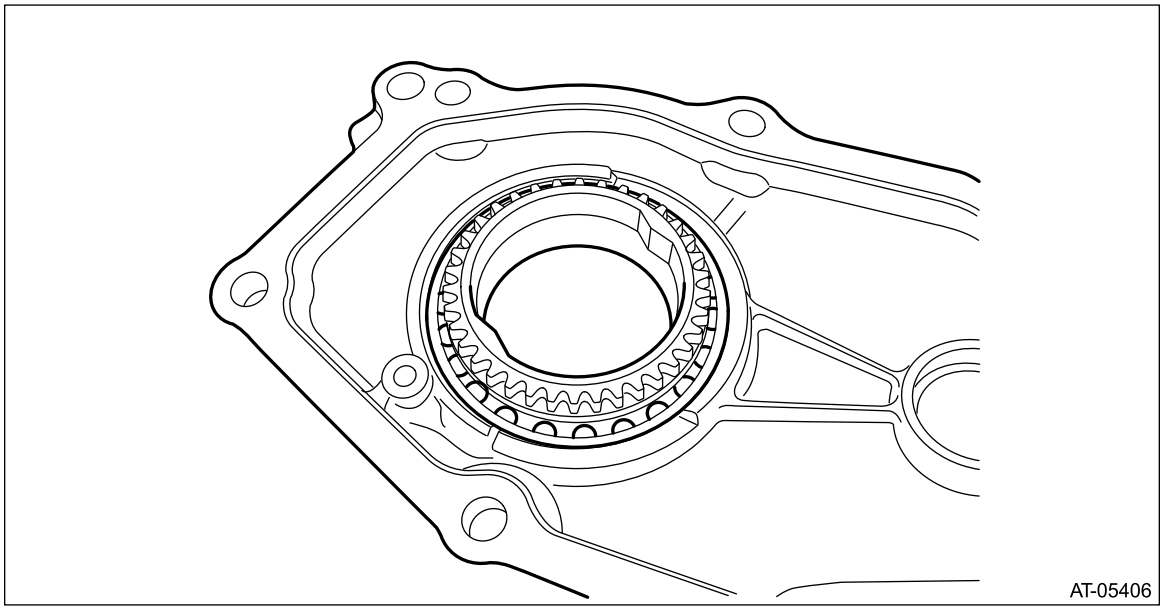
The driven sprocket is replaced as an assembly only, because it is a non-disassembly part.



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 Chain

INSTALLATION

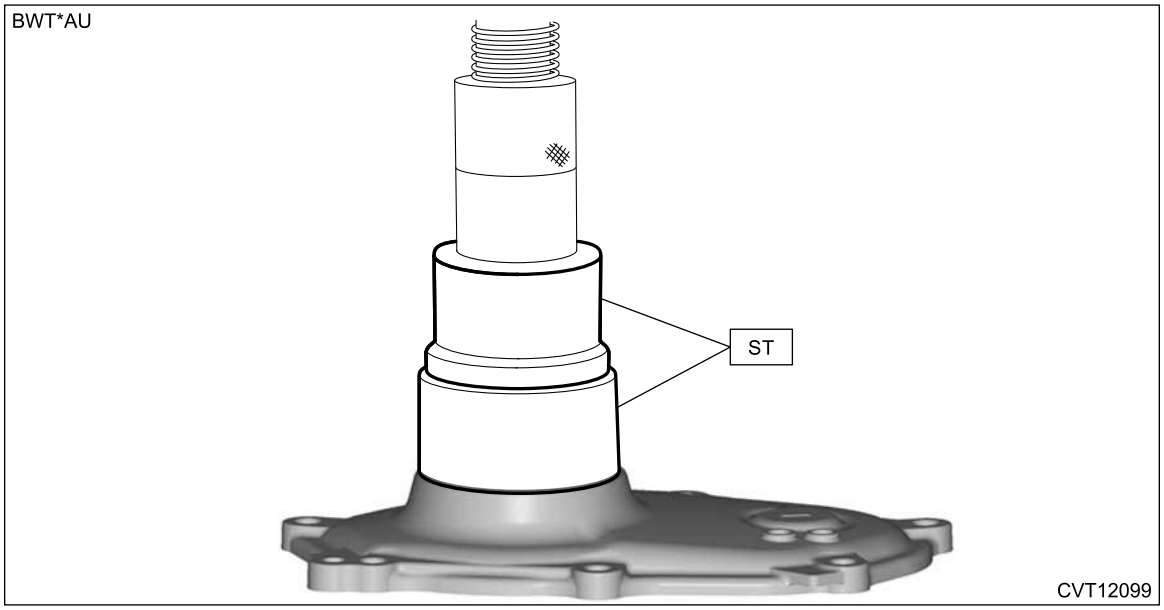
1. Clean the mating surface of oil pump chain cover and converter case cover.

2. Using the ST, install the oil seal.

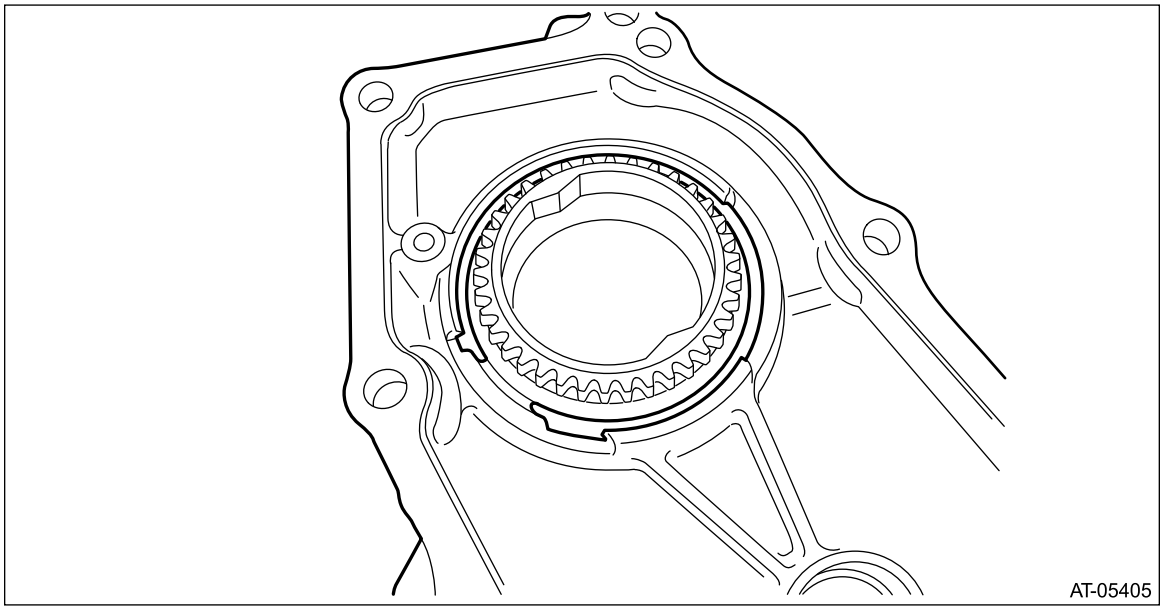
Note:

Apply CVTF to the press-fitting area.

ST 927720000 HOUSING BUSHING INSTALLER AND REMOVER

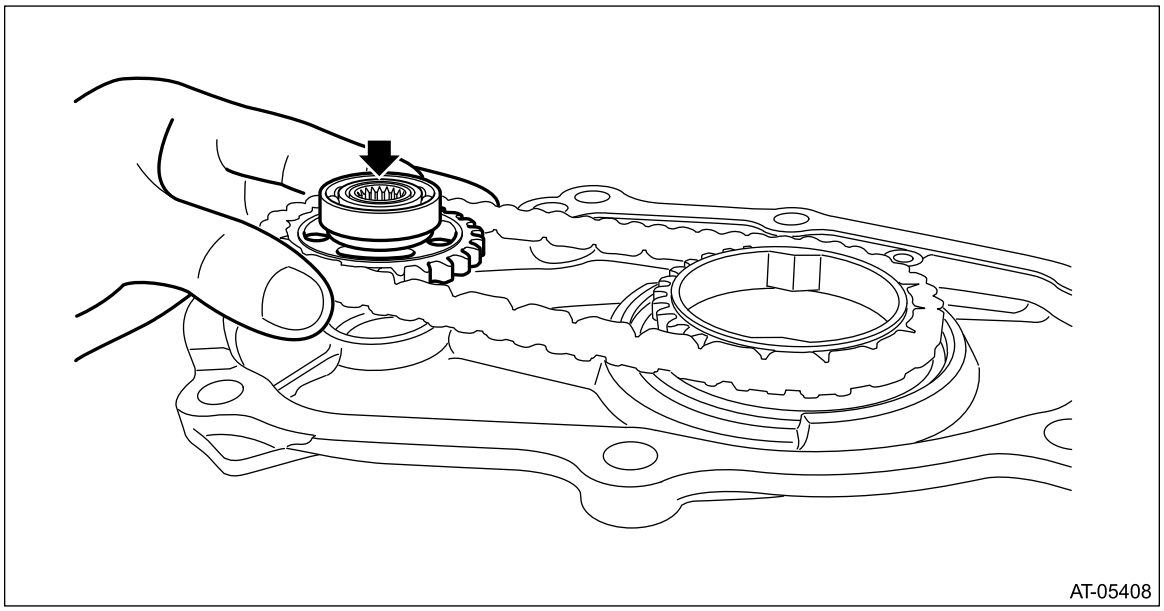


3. Install the drive sprocket and install the snap ring.



4. Place the oil pump chain on drive sprocket.

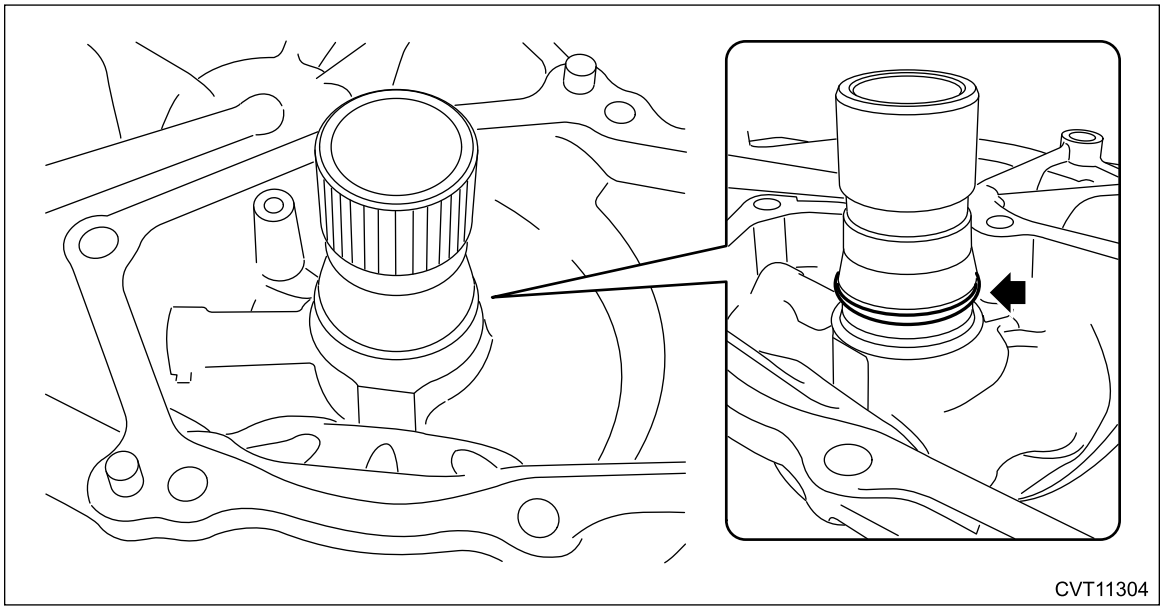
5. Place the oil pump chain on driven sprocket and install the driven sprocket to oil pump chain cover.



6. Install the seal ring to center support COMPL.

Note:

- **Use new seal rings.**
- **Apply CVTF to the seal rings.**



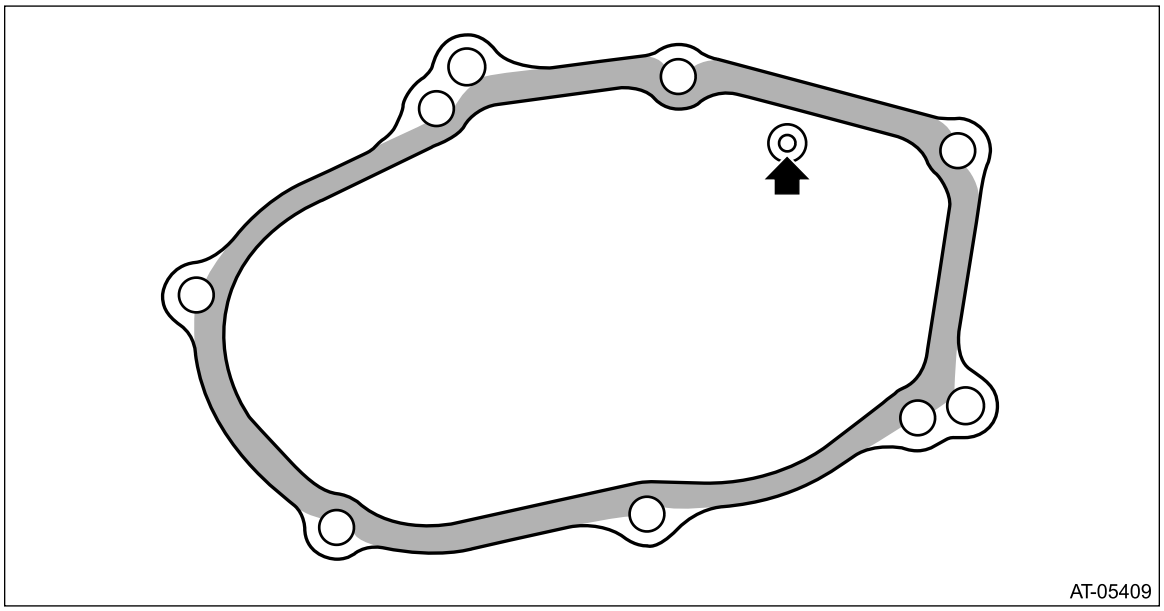
7. Apply liquid gasket seamlessly to the mating surface of oil pump chain cover.

Caution:

Do not apply liquid gasket at the arrowed hole.

Liquid gasket:

THREE BOND 1215B or equivalent



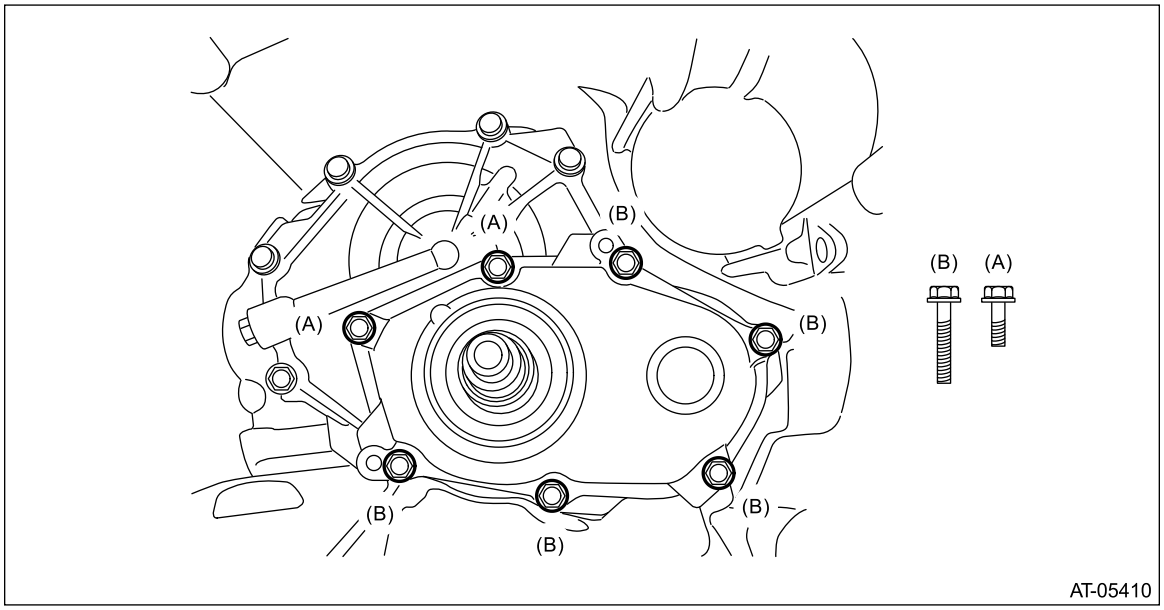
8. Install the oil pump chain cover.

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.

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Oil Pump Chain

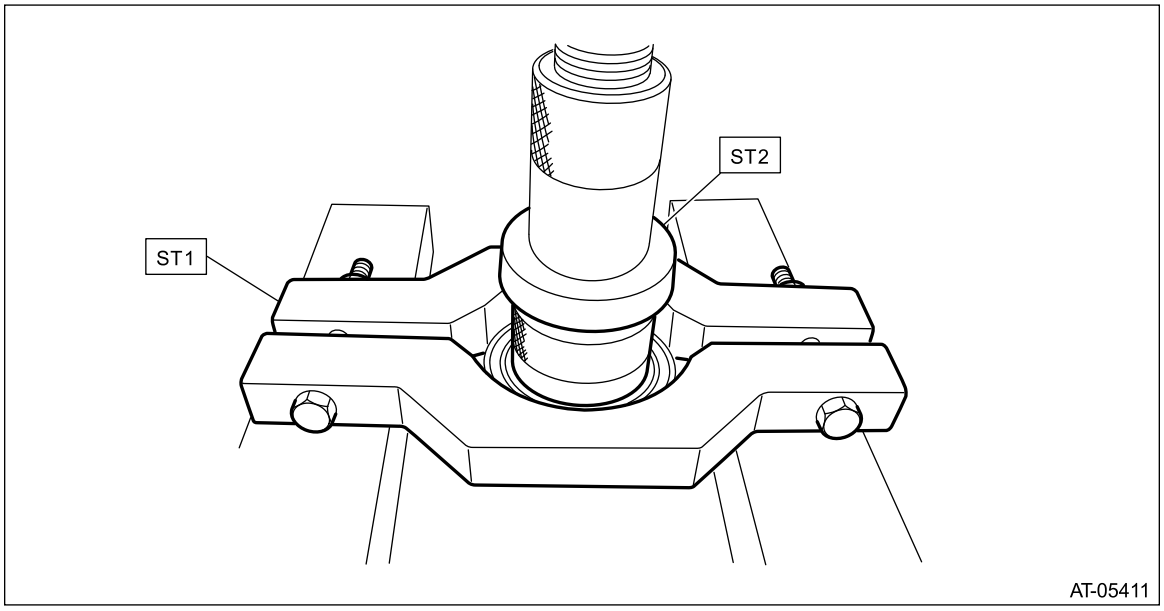
DISASSEMBLY

1. DRIVE SPROCKET

1. Remove the ball bearing using ST.

ST1 498077600 REMOVER

ST2 399513600 INSTALLER



CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Oil Pump Chain

ASSEMBLY

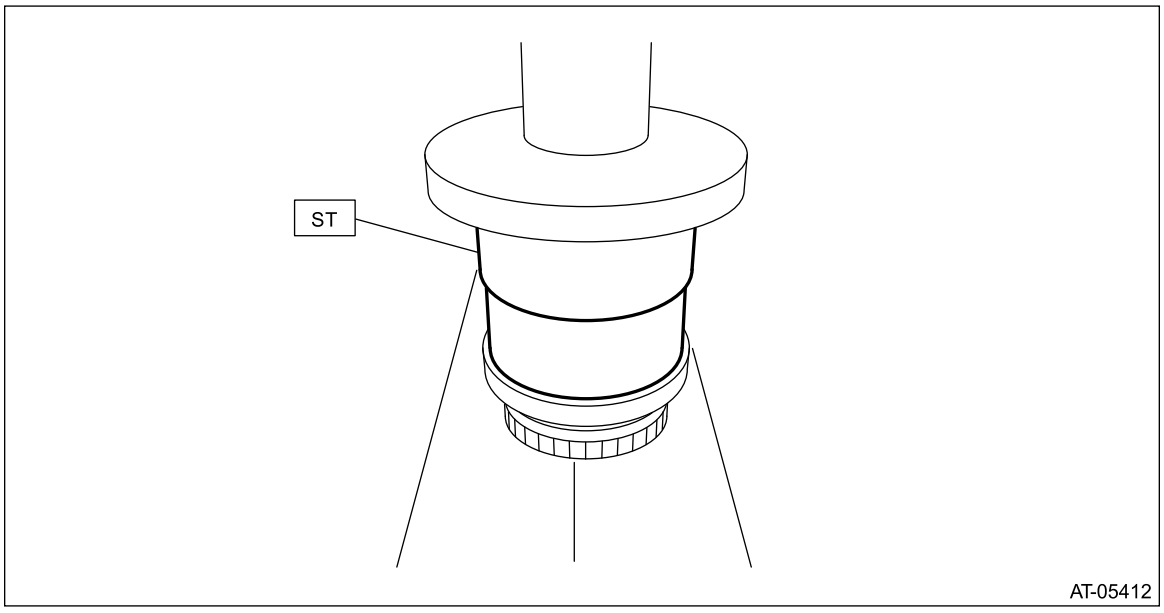
1. DRIVE SPROCKET

1. Using the ST, install the ball bearing.

Note:

Use a new ball bearing.

ST 499755602 PRESS SNAP RING



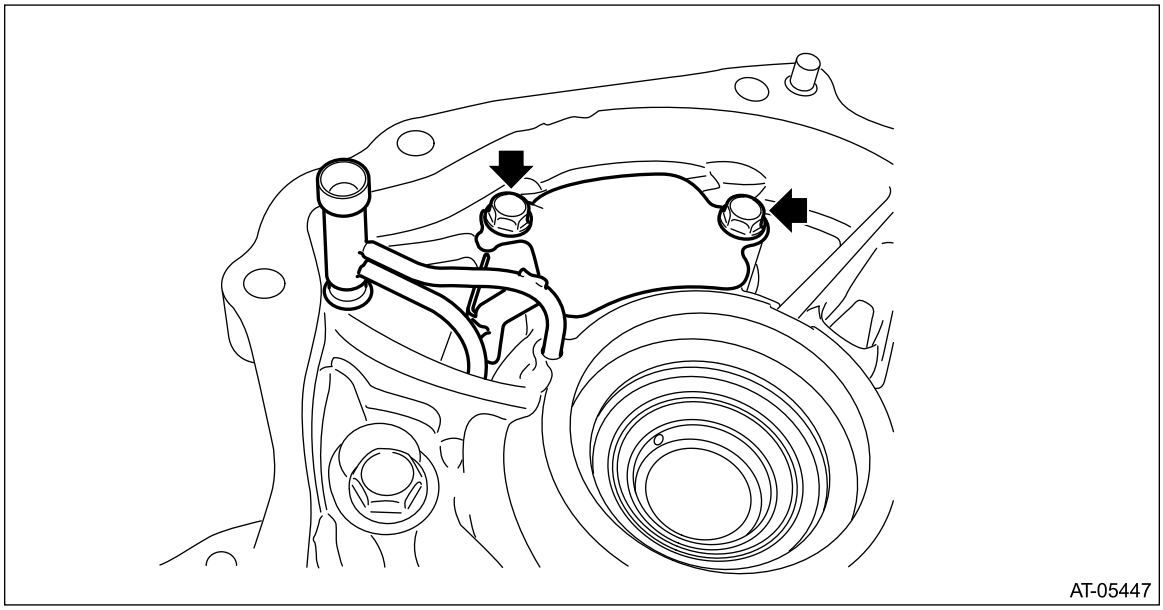
CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Oil Pump Chain

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.

REMOVAL

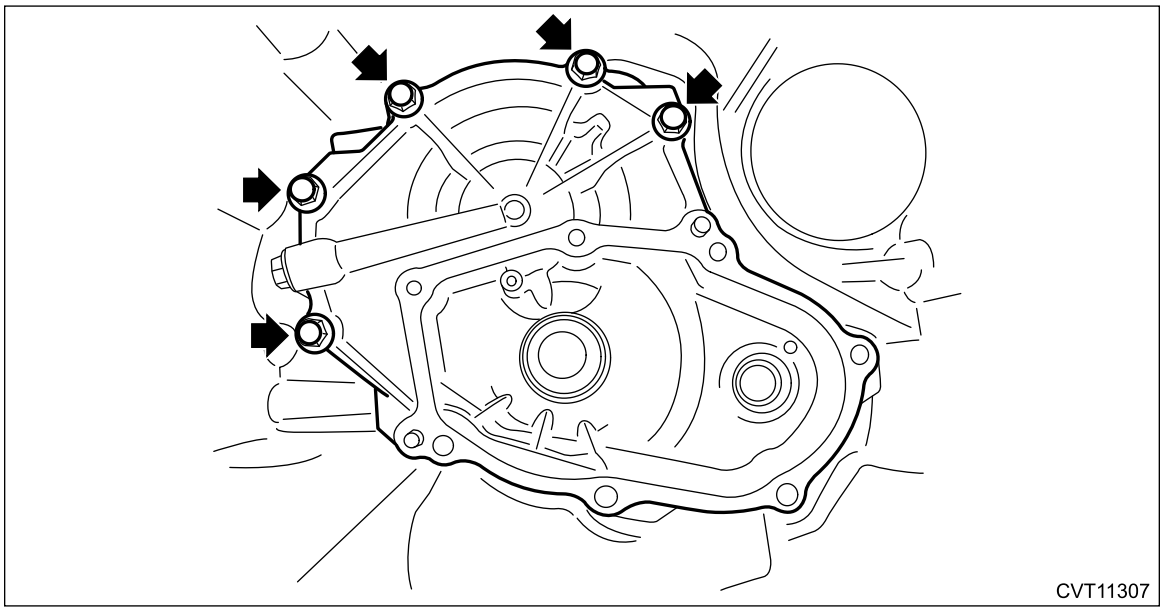
1. Remove the transmission assembly from the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Automatic Transmission Assembly>REMOVAL.
2. Remove the air breather hose. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Air Breather Hose>REMOVAL.
3. Remove the oil pan and control valve body. 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 center differential carrier. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Center Differential Carrier>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 stopper plate and lubrication pipe.

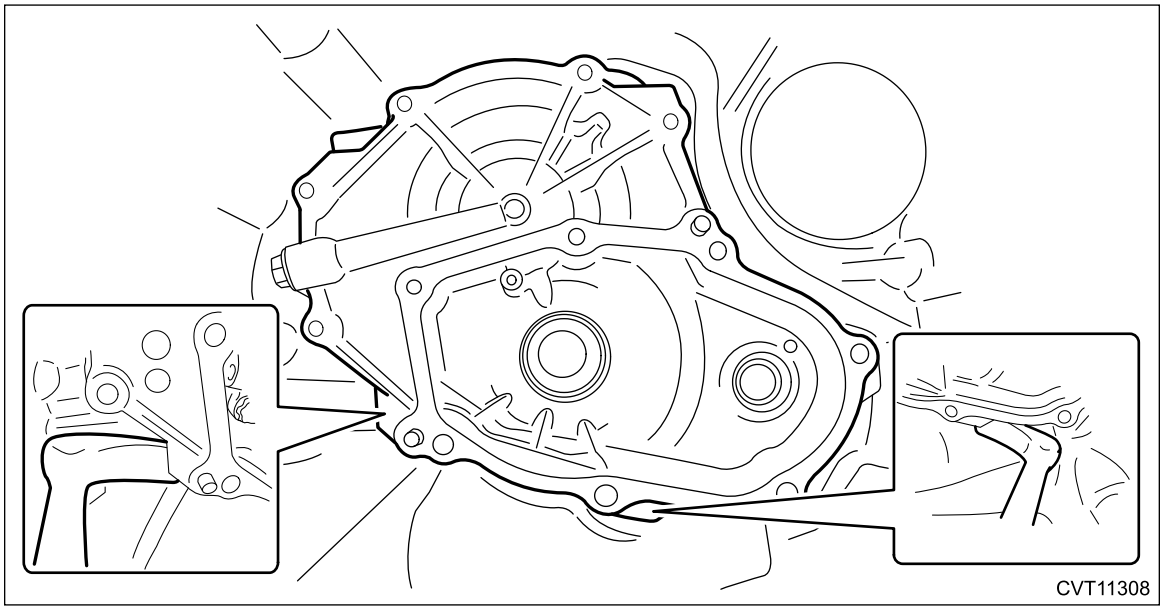


16. Flip over the converter case.

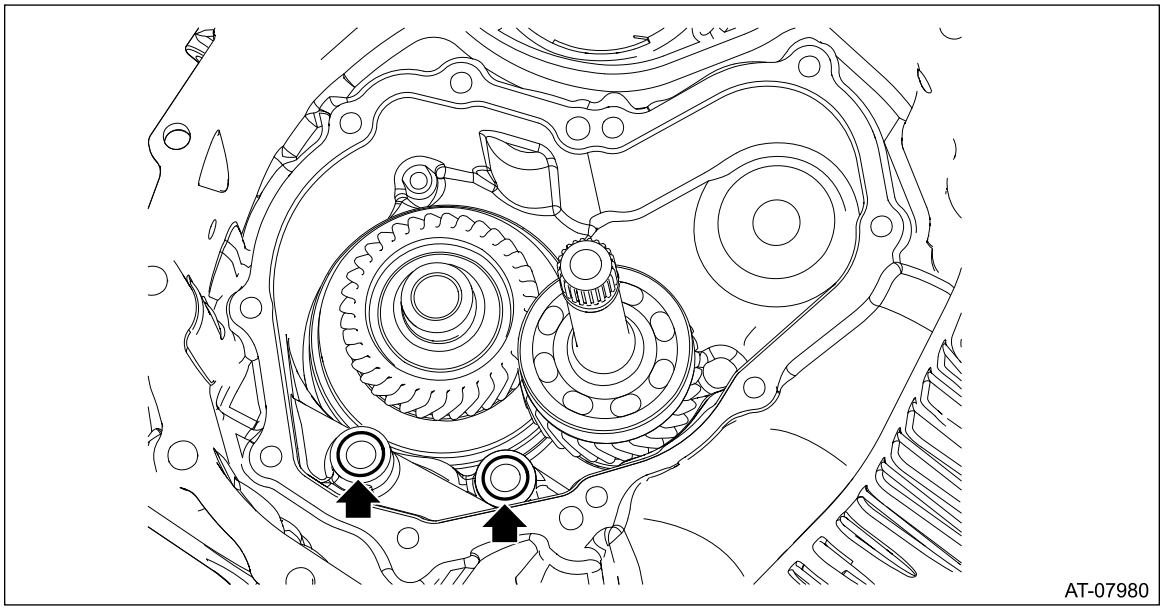
17. Remove the oil pump chain cover and the oil pump chain. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Oil Pump Chain>REMOVAL.

18. Remove the converter case cover.

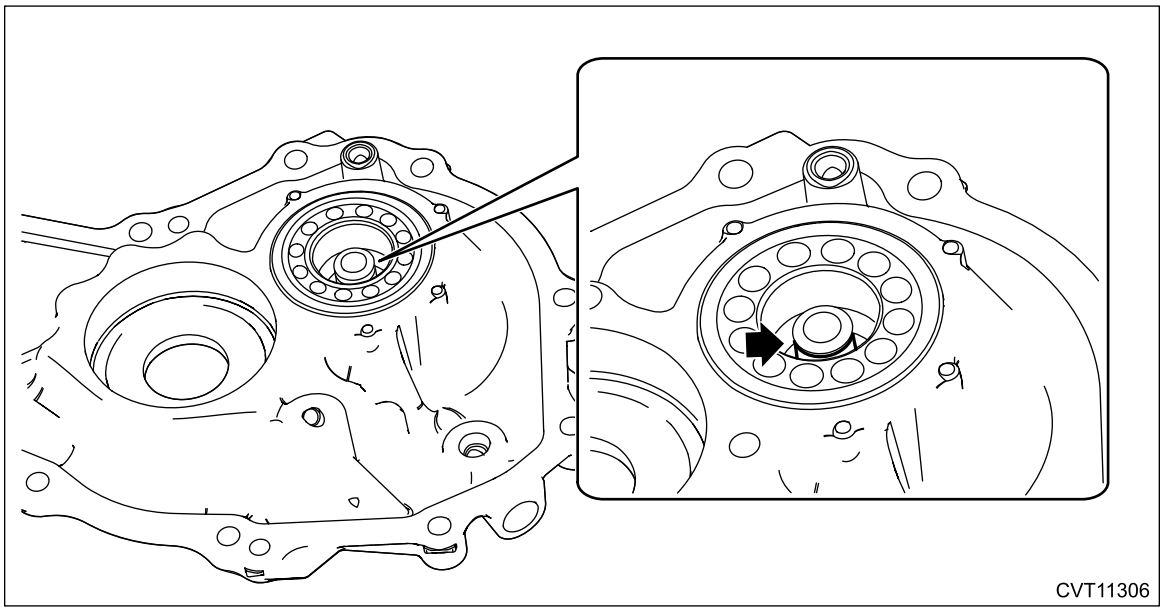




19. Remove the O-rings.



20. Remove the seal ring from converter case cover.

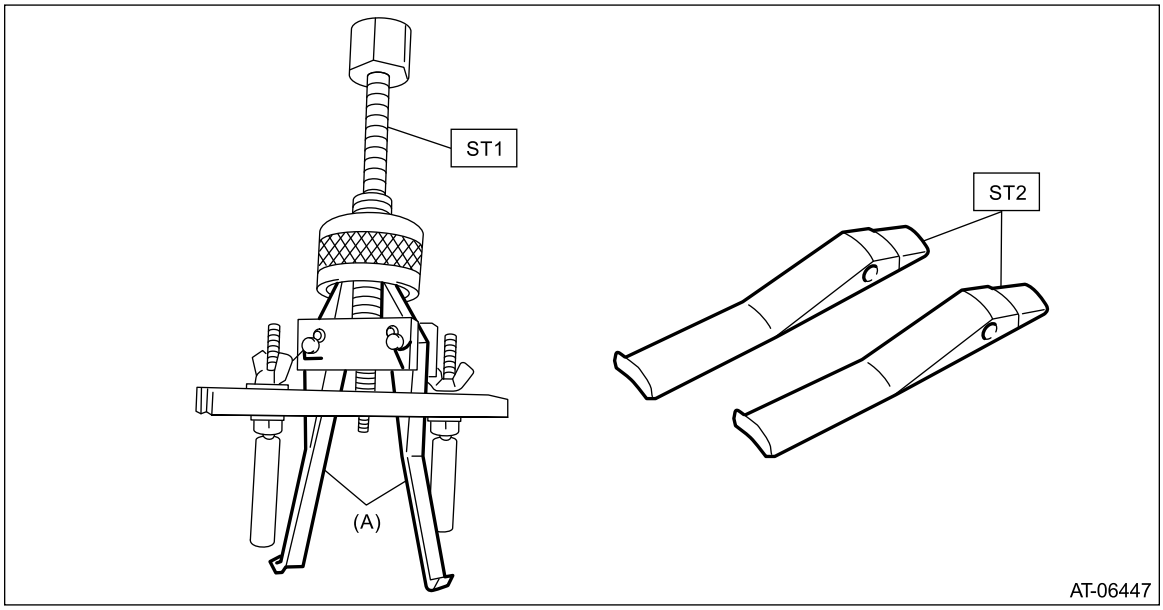


21. Using the ST, remove the ball bearing from the converter case cover.

(1) Remove the claw of ST1, and attach the claw of ST2.

ST1 398527700 PULLER ASSY

ST2 18760AA000 CLAW

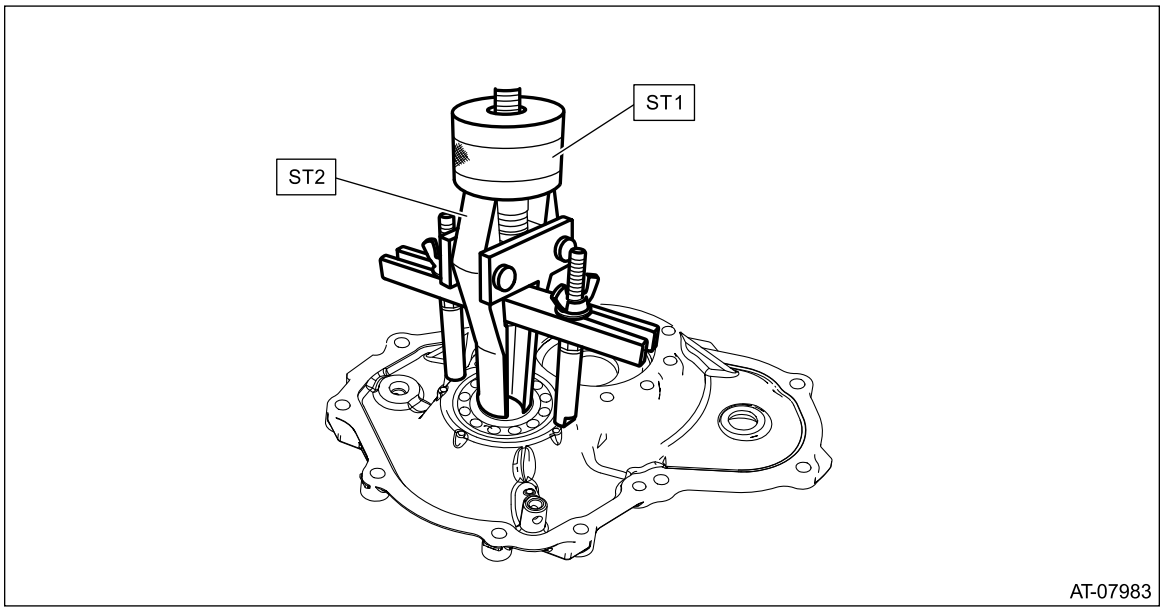


(A) Claw

(2) Using the ST, remove the ball bearing from the converter case cover.

ST1 398527700 PULLER ASSY

ST2 18760AA000 CLAW

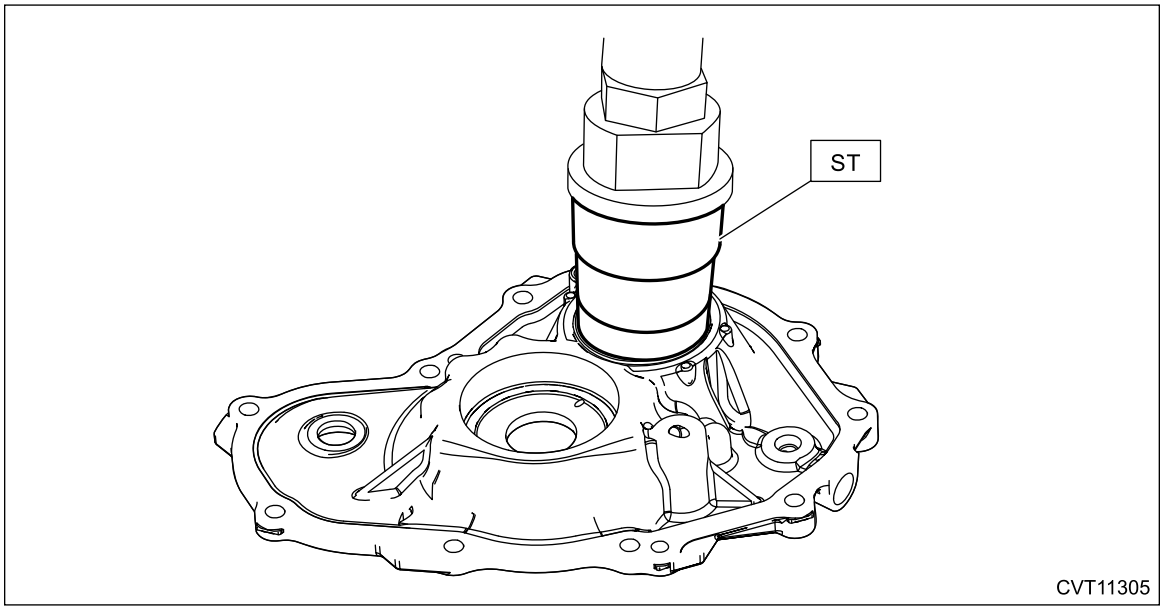


CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Converter Case Cover

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.

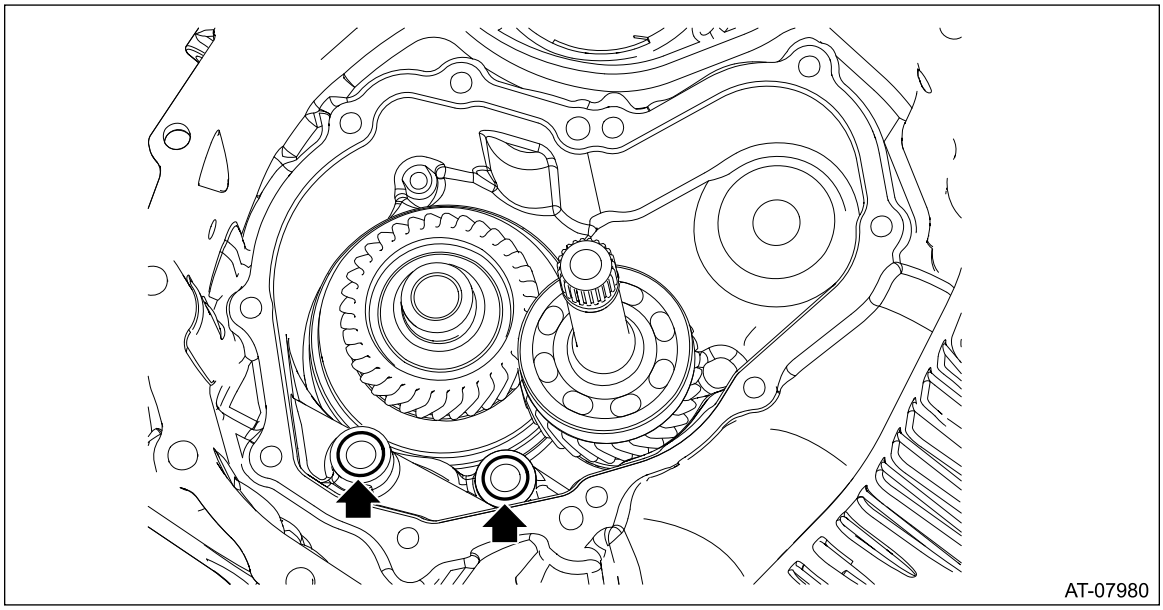
   ST 499755602 PRESS SNAP RING



5. Install the O-rings.

Note:

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

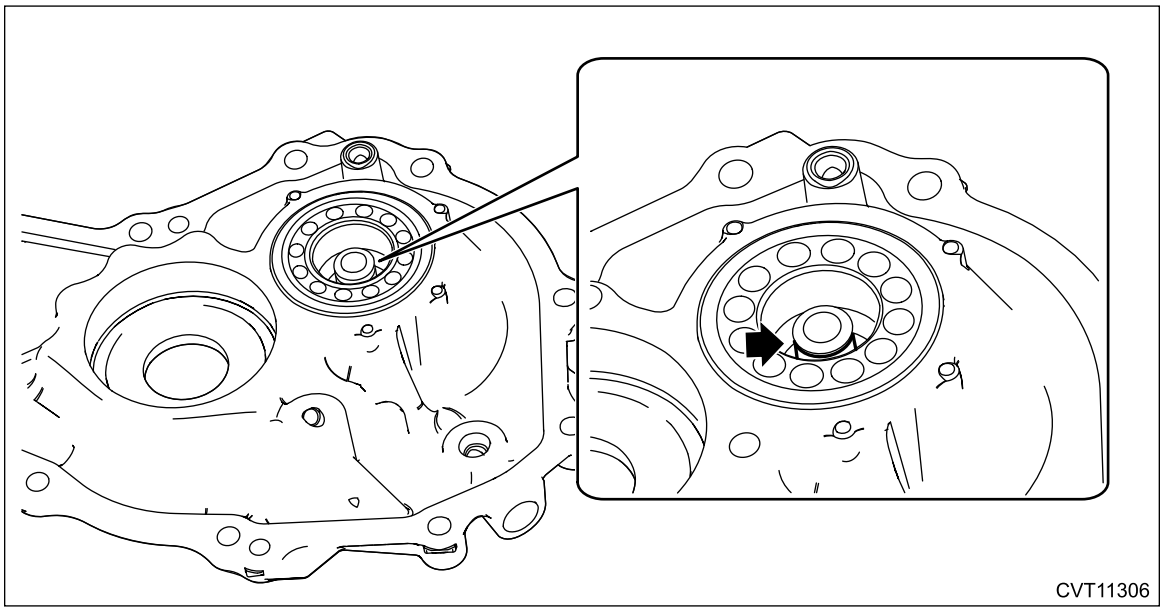


6. Apply CVTF to the selected shims and install on the bearing catch surface of the front reduction drive gear.

7. Install the seal ring to converter case cover.

Note:

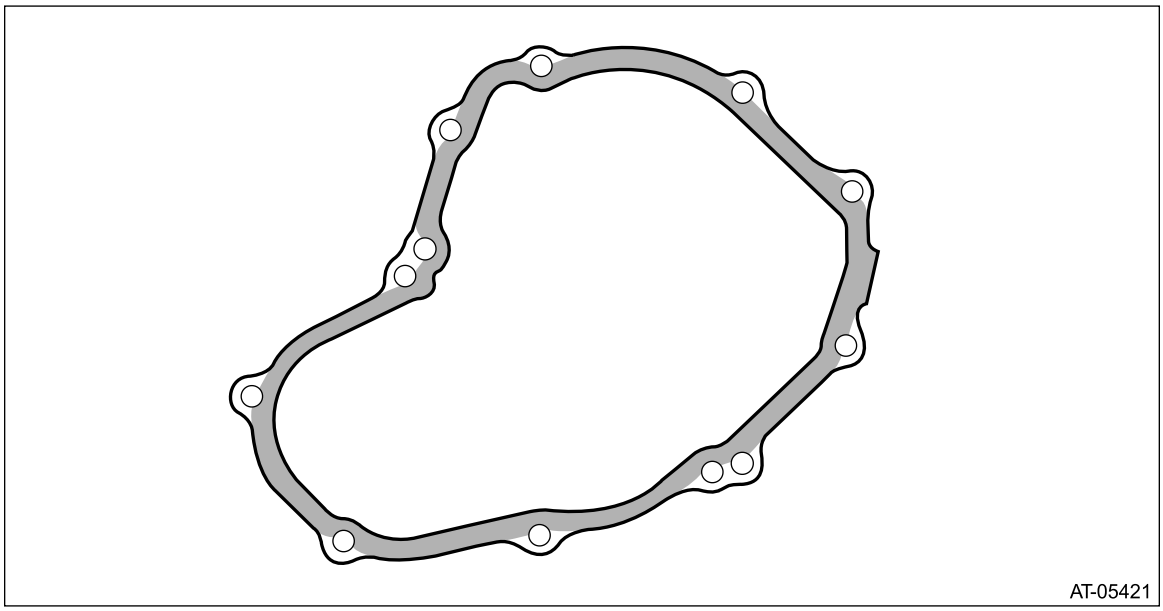
- **Use new seal rings.**
- **When installing the seal rings, do not expand the seal rings too much.**



8. Apply liquid gasket seamlessly to the mating surface of converter case cover.

Liquid gasket:

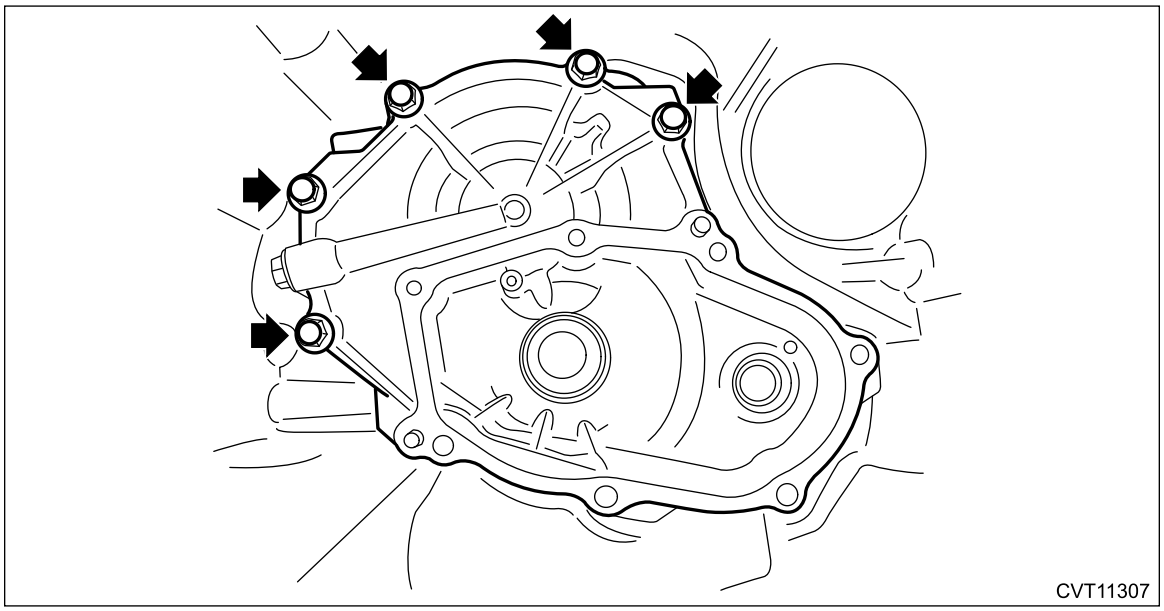
THREE BOND 1215B or equivalent



9. Install the converter case cover.

Tightening torque:

24 N·m (2.4 kgf-m, 17.7 ft-lb)



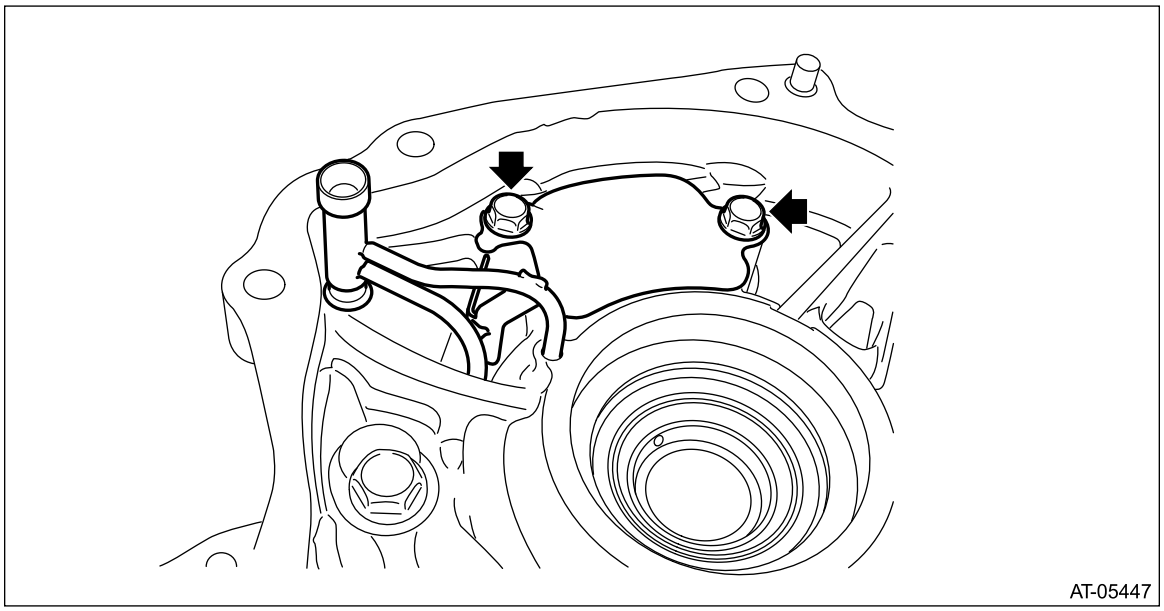
10. Install the oil pump chain cover and the oil pump chain. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Oil Pump Chain>INSTALLATION.

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.

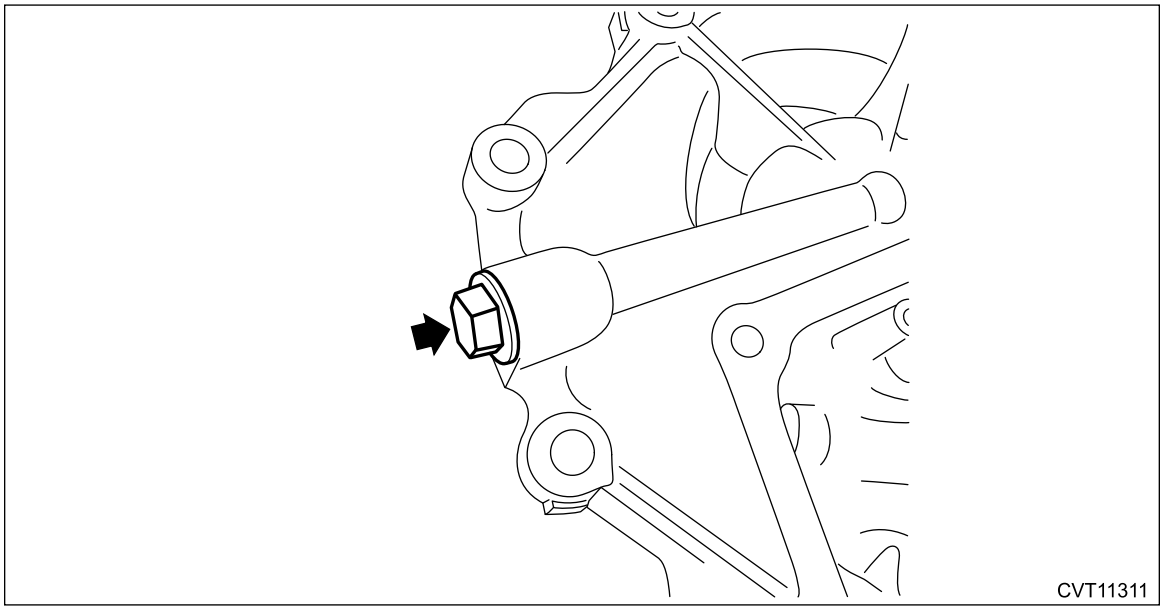
16. Install the forward clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Forward Clutch Assembly>INSTALLATION.

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 center differential carrier. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Center Differential Carrier>INSTALLATION.
20. Install the transfer clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transfer Clutch>INSTALLATION.
21. Install the rear drive shaft. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Rear Drive Shaft>INSTALLATION.
22. Install the extension case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Extension Case>INSTALLATION.
23. Install the transmission harness. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transmission Harness>INSTALLATION.
24. Install the control valve body and oil pan. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Control Valve Body>INSTALLATION.
25. Install the air breather hose. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Air Breather Hose>INSTALLATION.
26. Install the transmission assembly to the vehicle. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Automatic Transmission Assembly>INSTALLATION.

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Converter Case Cover

DISASSEMBLY

1. Remove the plug and O-ring.



CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Converter Case Cover

ASSEMBLY

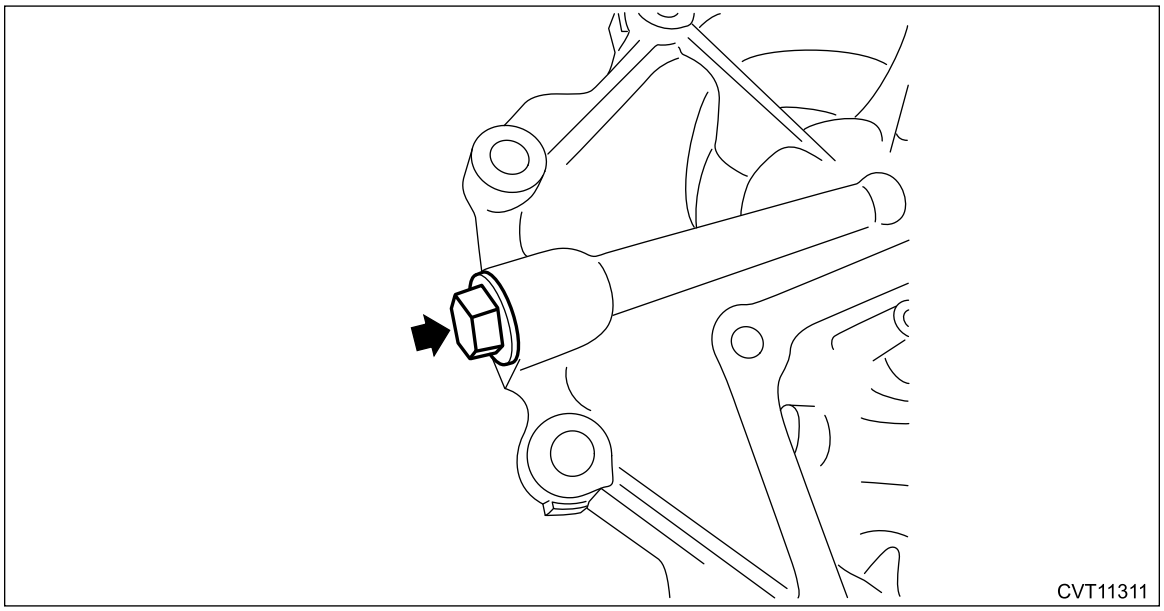
1. Install the plugs.

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) > Converter Case Cover

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.

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Converter Case Cover

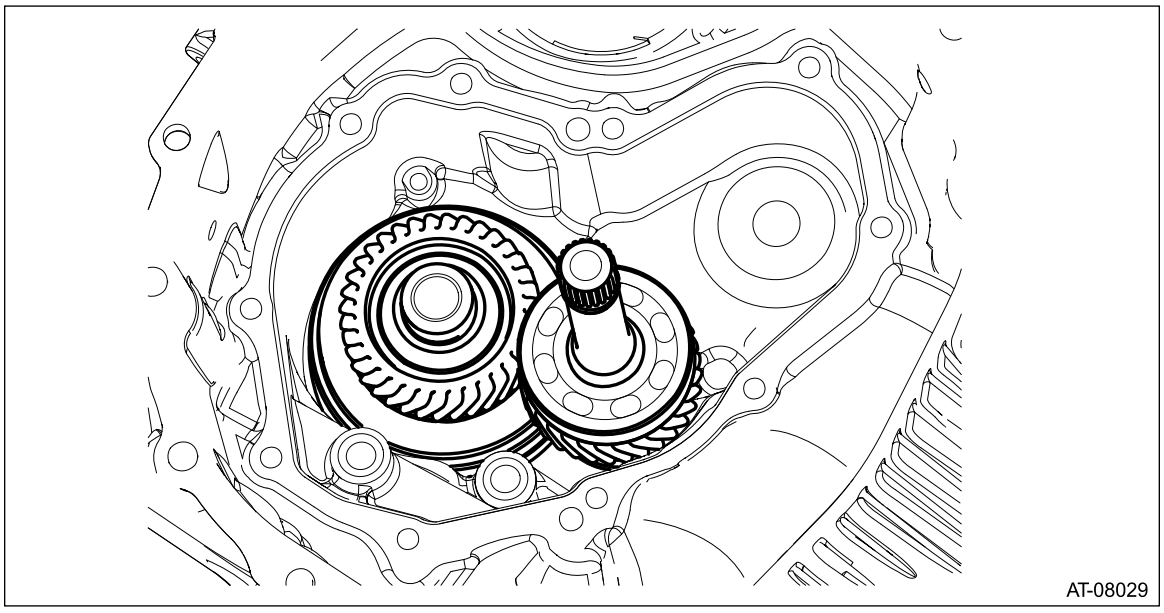
ADJUSTMENT

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.

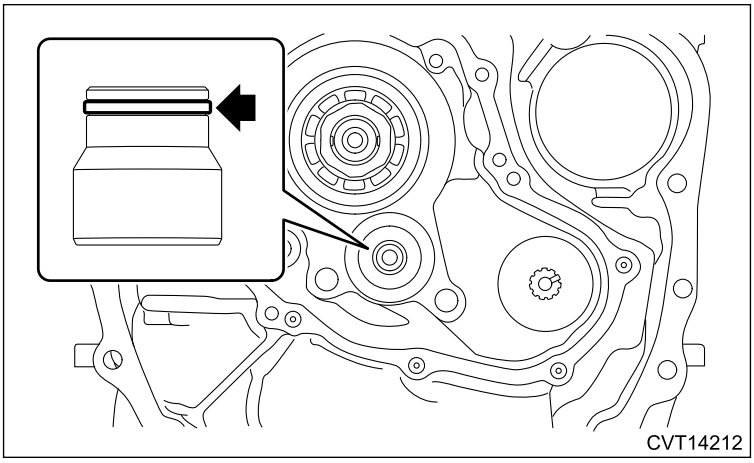
REMOVAL

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 center differential carrier. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Center Differential Carrier>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 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. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Converter Case Cover>REMOVAL.
18. Remove the front reduction drive gear and front reduction driven gear together.
    Note:
    Remove the front reduction driven shaft while holding it.



19. Remove the shims of the front reduction driven gear from the converter case.

20. Remove the seal rings.



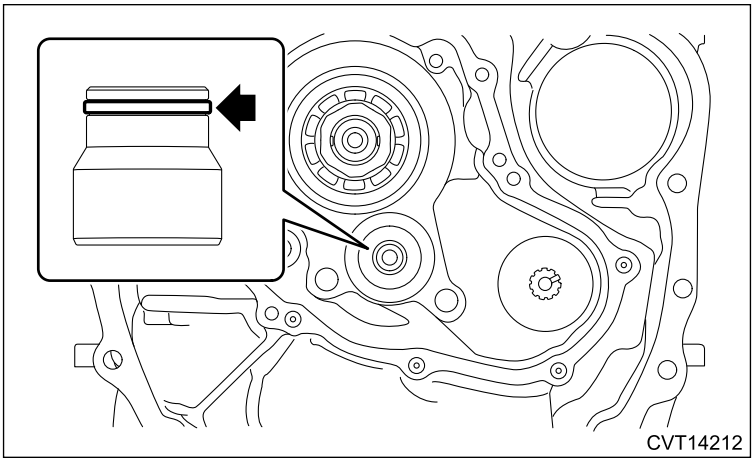
CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Front Reduction Drive Gear

INSTALLATION

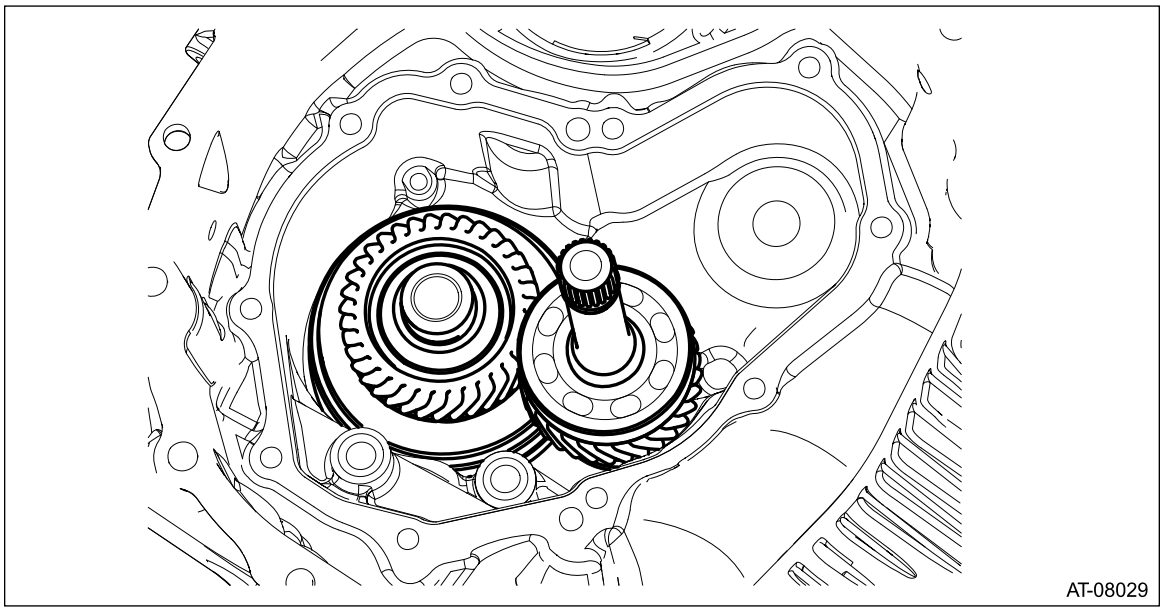
1. Clean the mating surface of converter case cover and converter case.
2. Select the shim for front reduction drive gear. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Front Reduction Drive Gear>ADJUSTMENT.
3. Apply CVTF to the shims and install on the bearing catch surface of the front reduction drive gear.
4. 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.**



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.



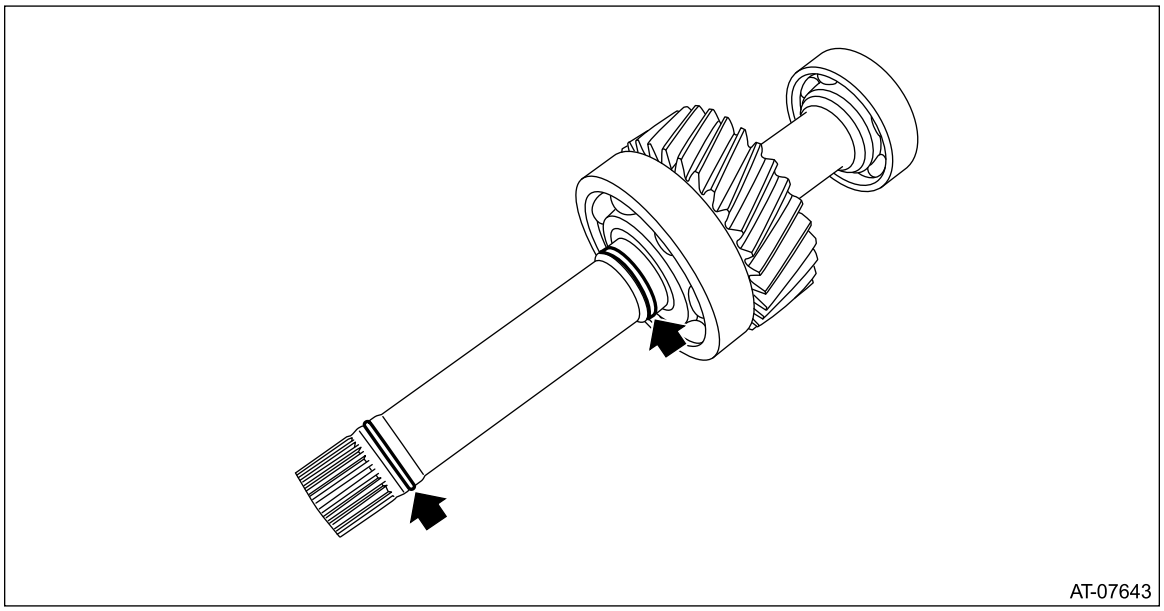
6. Install the converter case cover. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Converter Case Cover>INSTALLATION.
7. Install the oil pump chain cover and the oil pump chain. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Oil Pump Chain>INSTALLATION.
8. Install the drive pinion shaft assembly. 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 center differential carrier. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Center Differential Carrier>INSTALLATION.
15. Install the transfer clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transfer Clutch>INSTALLATION.
16. Install the rear drive shaft. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Rear Drive Shaft>INSTALLATION.
17. Install the extension case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Extension Case>INSTALLATION.
18. Install the primary speed sensor. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Primary 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) > Front Reduction Drive Gear

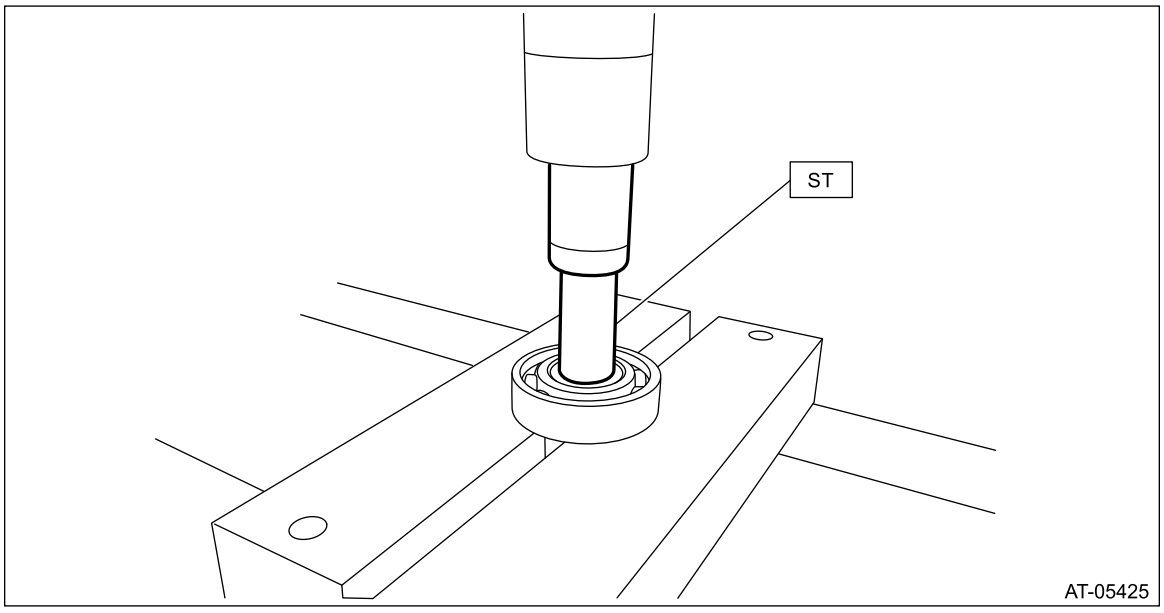
DISASSEMBLY

1. Remove the seal ring and O-ring.



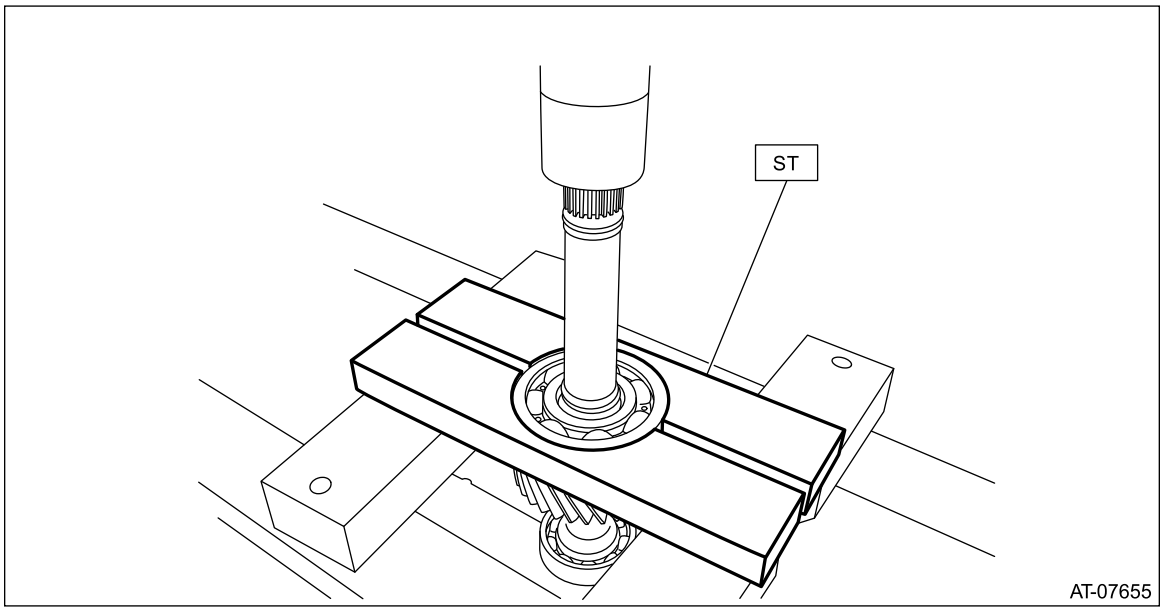
2. Using the ST, remove the ball bearing from front reduction drive gear.

ST 899864100 REMOVER



3. Using the ST, remove the ball bearing from front reduction drive gear.

ST 498077000 REMOVER



CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Front Reduction Drive Gear

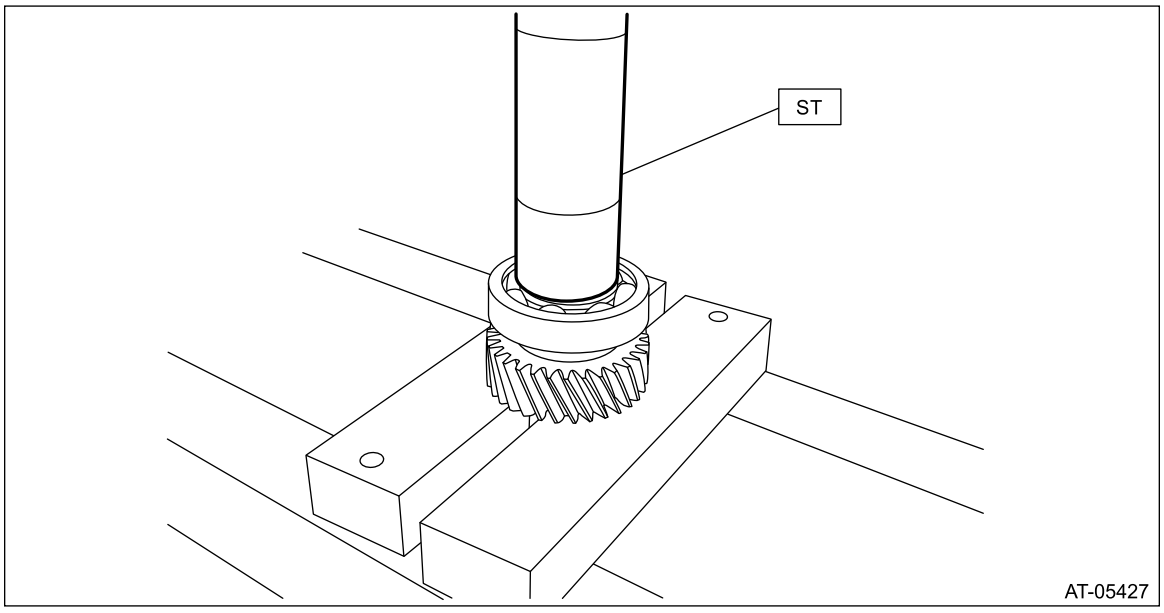
ASSEMBLY

1. Using the ST, install the ball bearing to front reduction drive gear.

Note:

Use a new ball bearing.

ST 18651AA000 INSTALLER

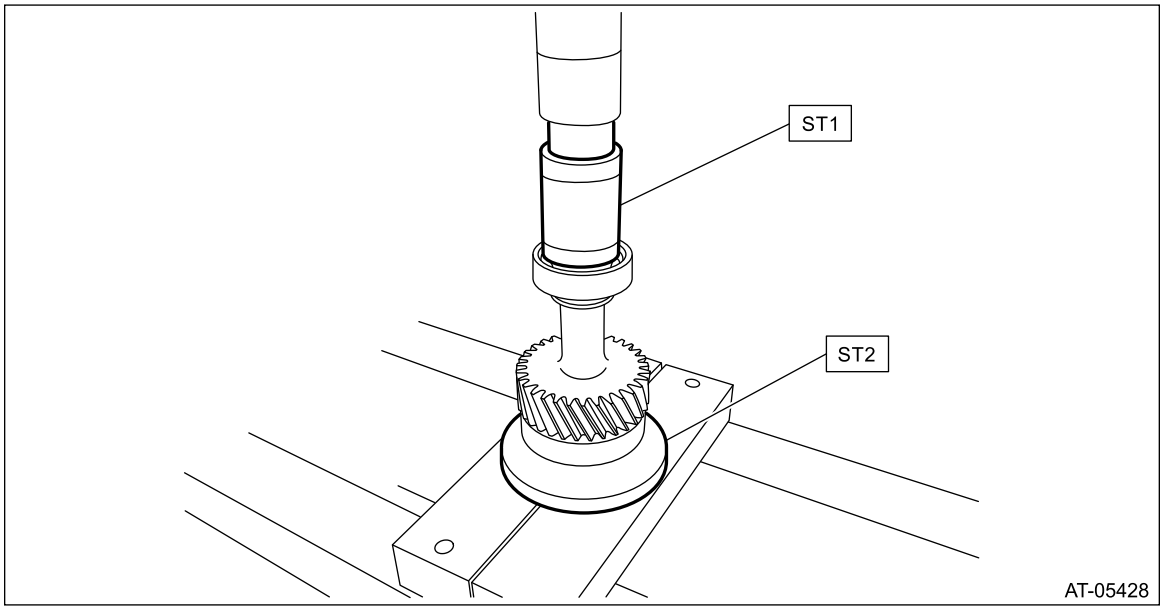


2. Using ST1 and ST2, install the ball bearing to front reduction drive gear.

Note:

Use a new ball bearing.

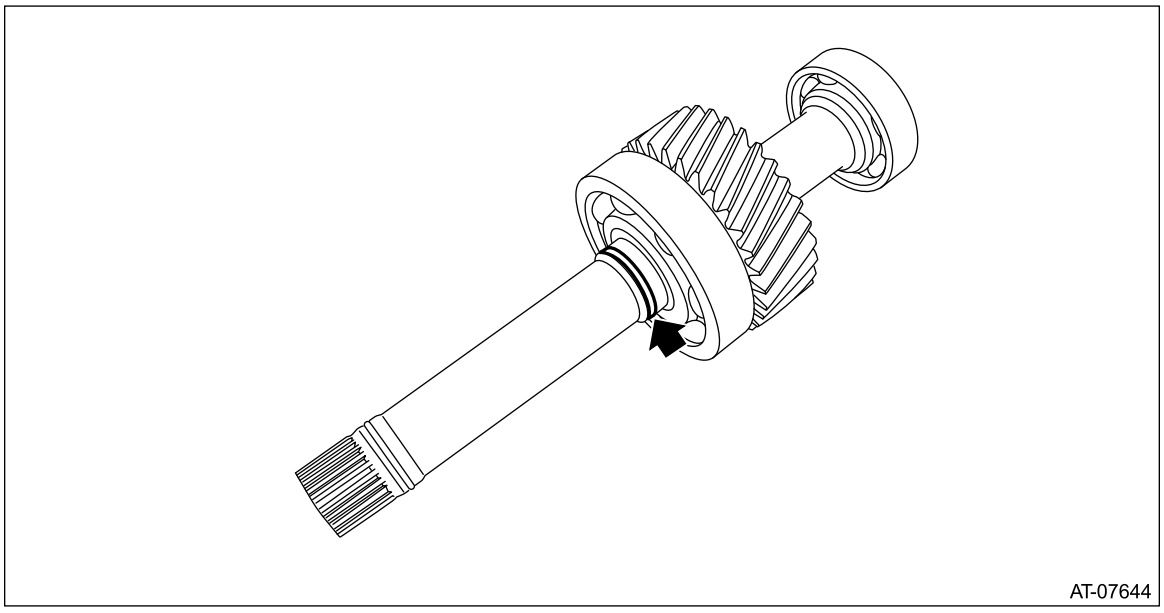
ST1	**499757002**	**INSTALLER**
ST2	**398177700**	**INSTALLER**



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.**



CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Front Reduction Drive Gear

INSPECTION

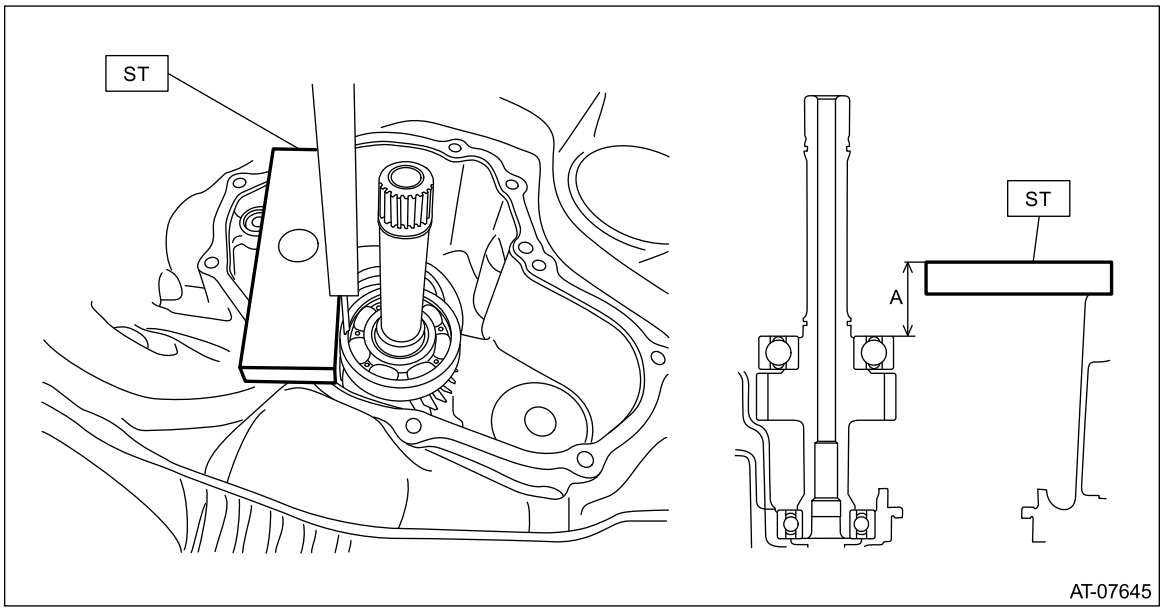
- Replace if its tooth surfaces are broken, damaged or excessively worn.
- Check the bearing for seizure or wear.
- Apply CVTF to bearing and rotate the bearing to check for noise or dragging etc.

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Front Reduction Drive Gear

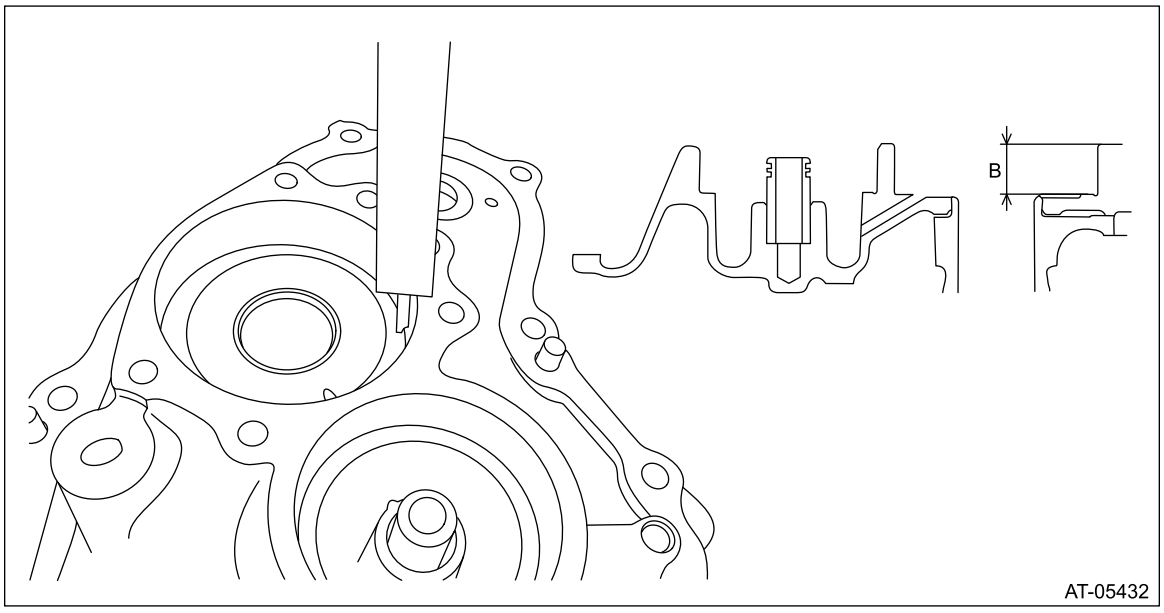
ADJUSTMENT

1. Measure height “A” from the ST upper face to the bearing end face using the ST.

ST 398643600 GAUGE

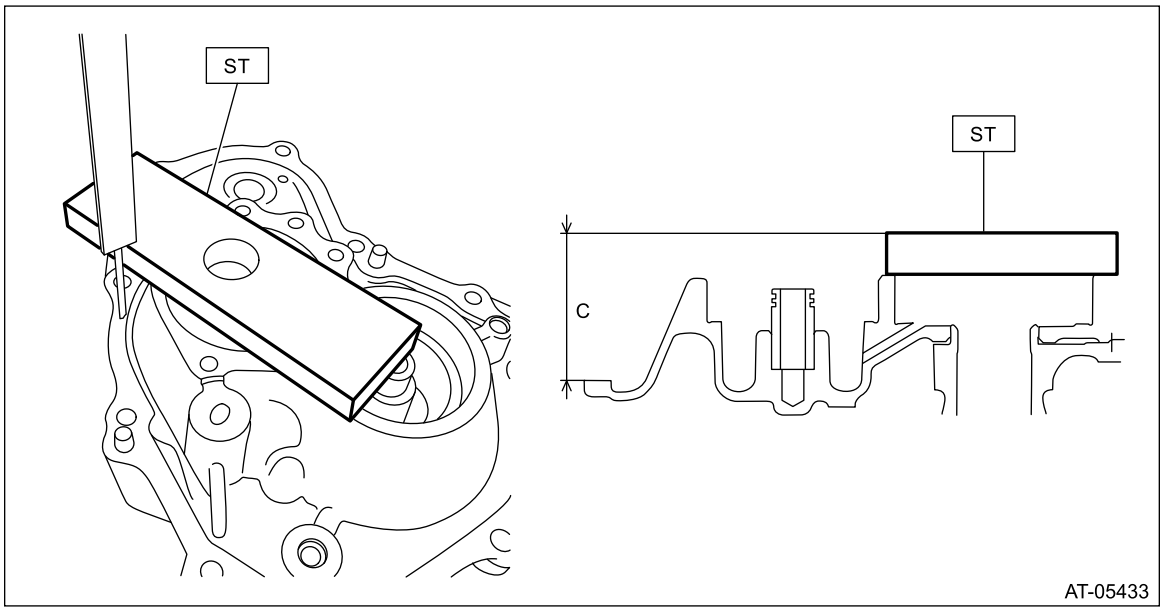


2. Measure depth “B” from the converter case cover upper face to the bearing catch surface.



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

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 Reduction Driven Gear

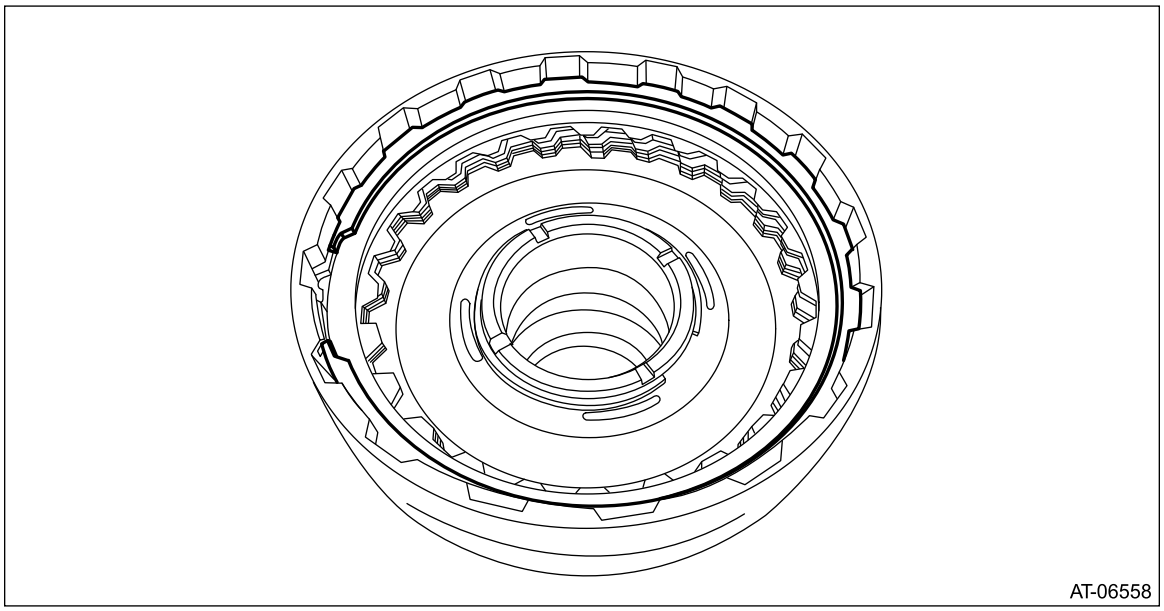
INSTALLATION

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.

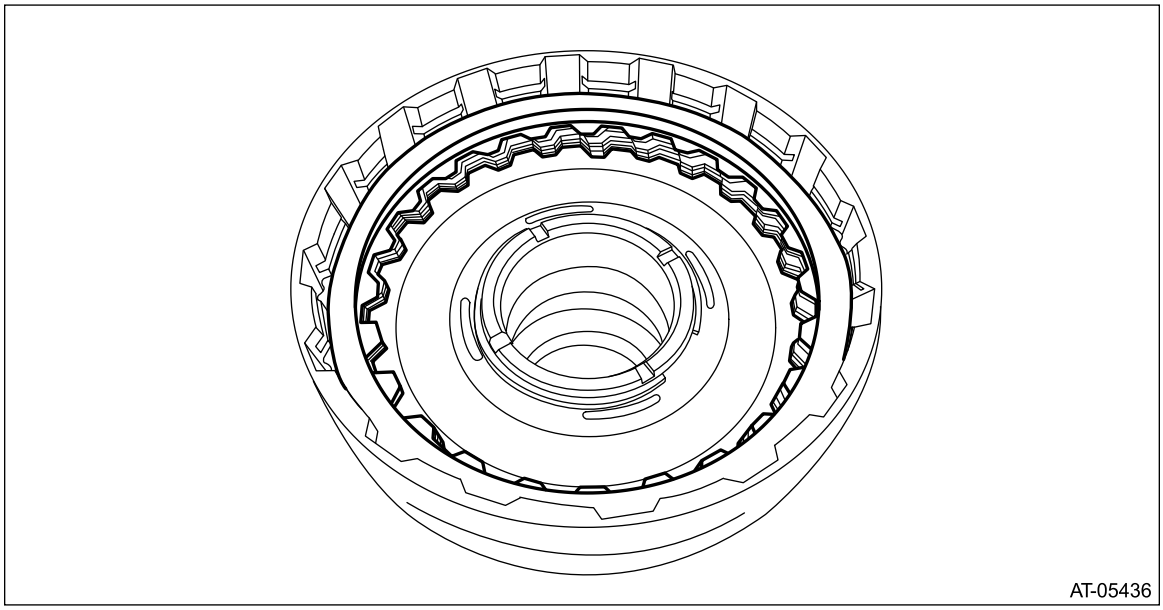
CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Front Reduction Driven Gear

DISASSEMBLY

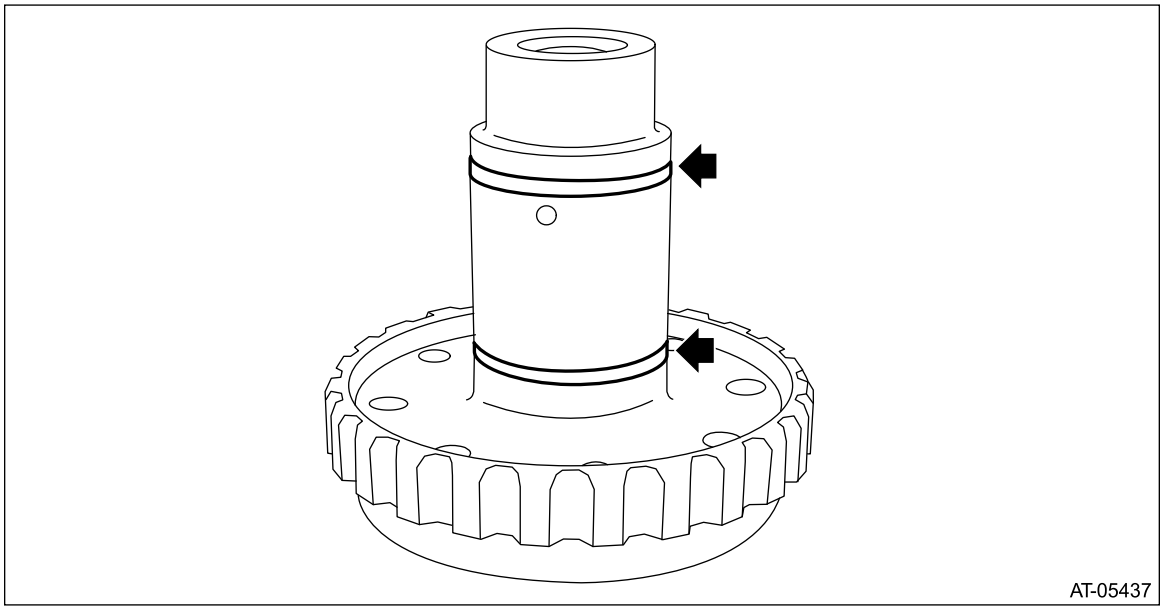
1. Remove the front reduction driven shaft from the front reduction driven gear.
2. Remove the snap ring.



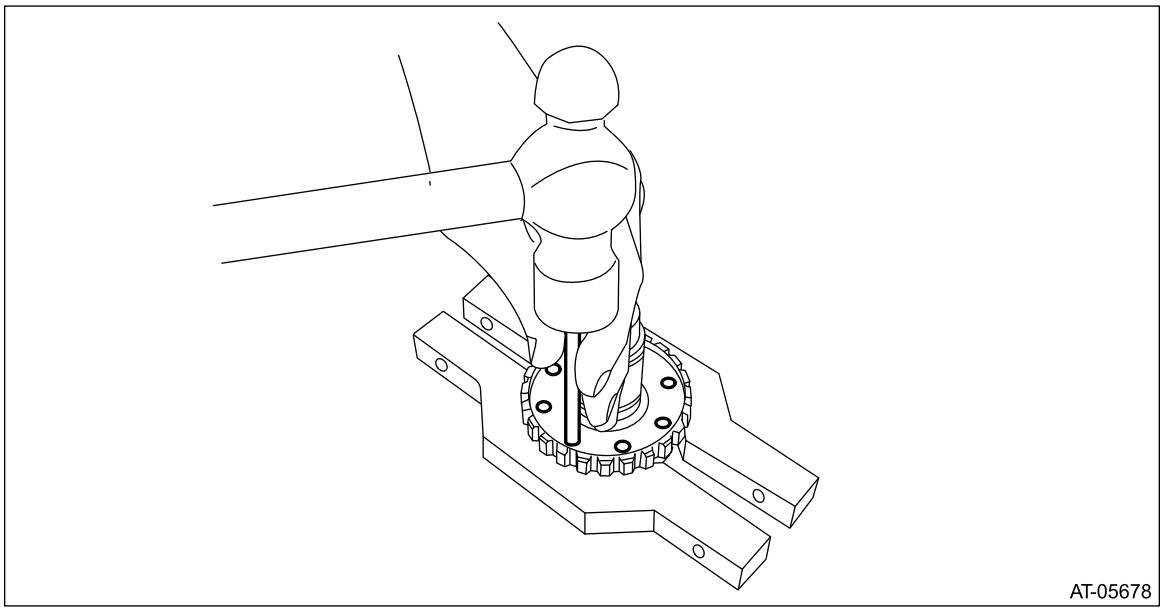
3. Remove the retaining plate, drive plate, driven plate and dish plate.



4. Remove the seal ring from front reduction driven shaft.

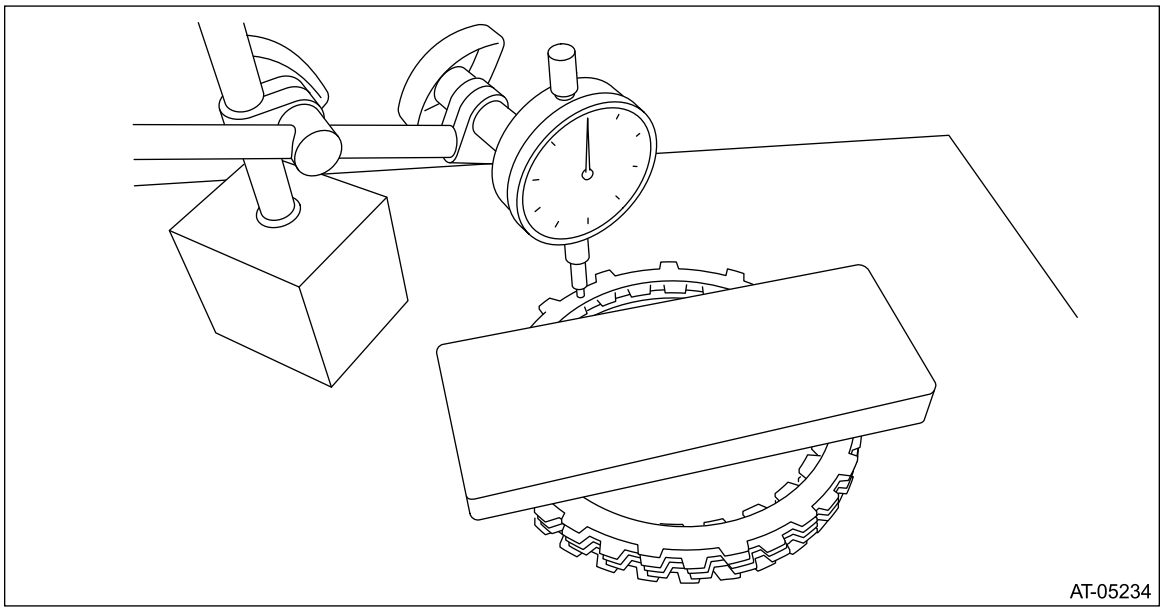


5. Remove the ball bearing, while tapping the entire circumference around the ball bearing outer race a little at a time through the front reduction driven shaft hole using the round bar with diameter of 7 mm (0.28 in).



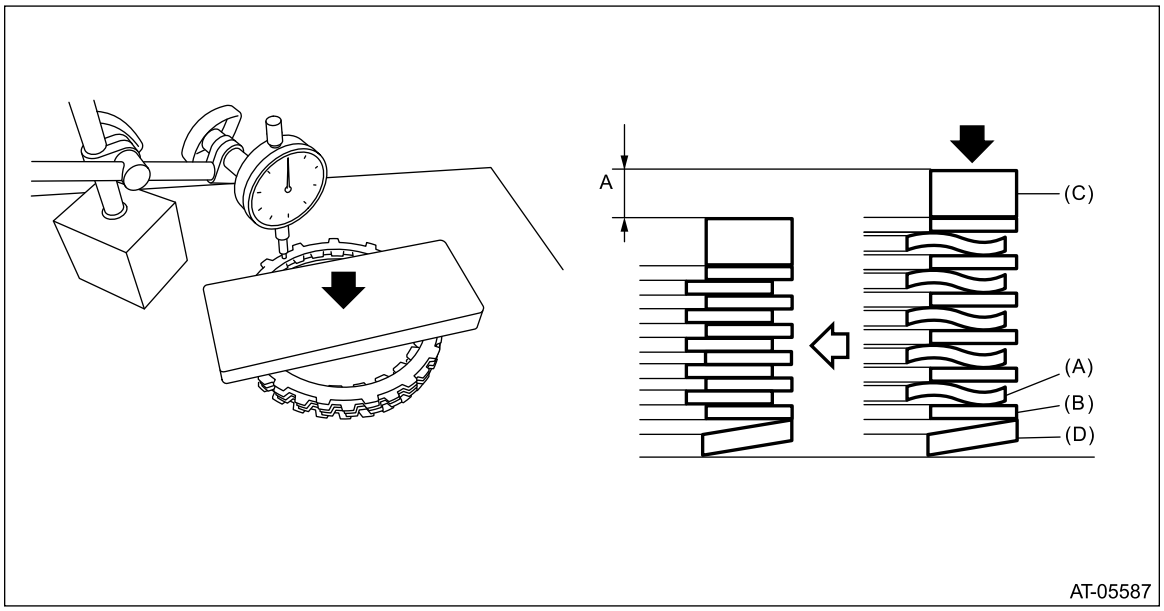
ASSEMBLY

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 = 130N (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.



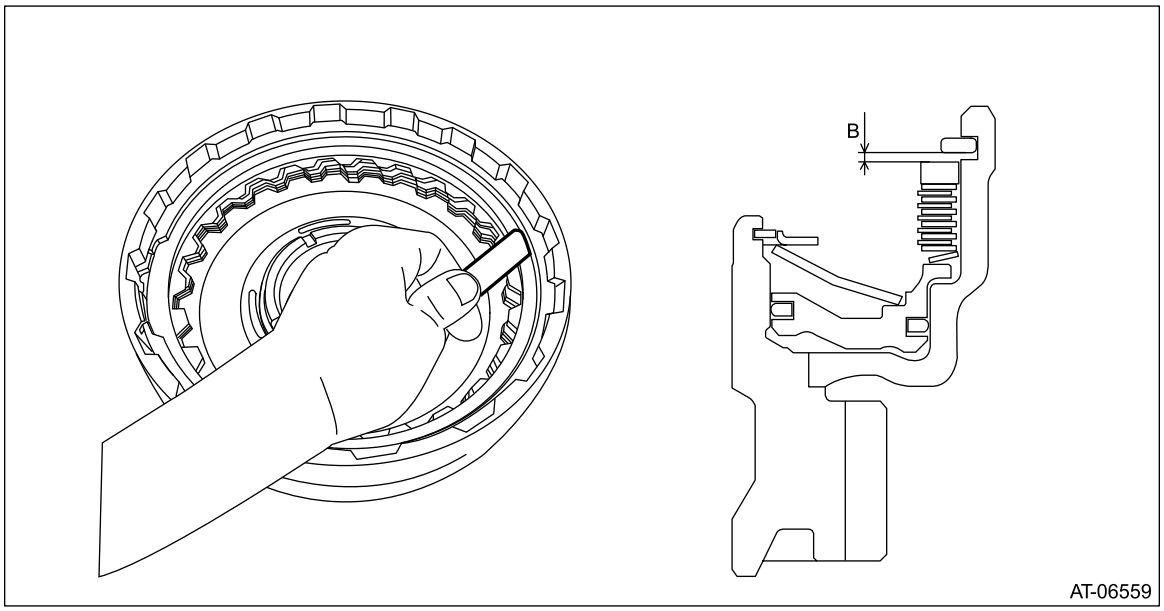
(A) Drive plate
(B) Driven plate
(C) Retaining plate
(D) Dish plate

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

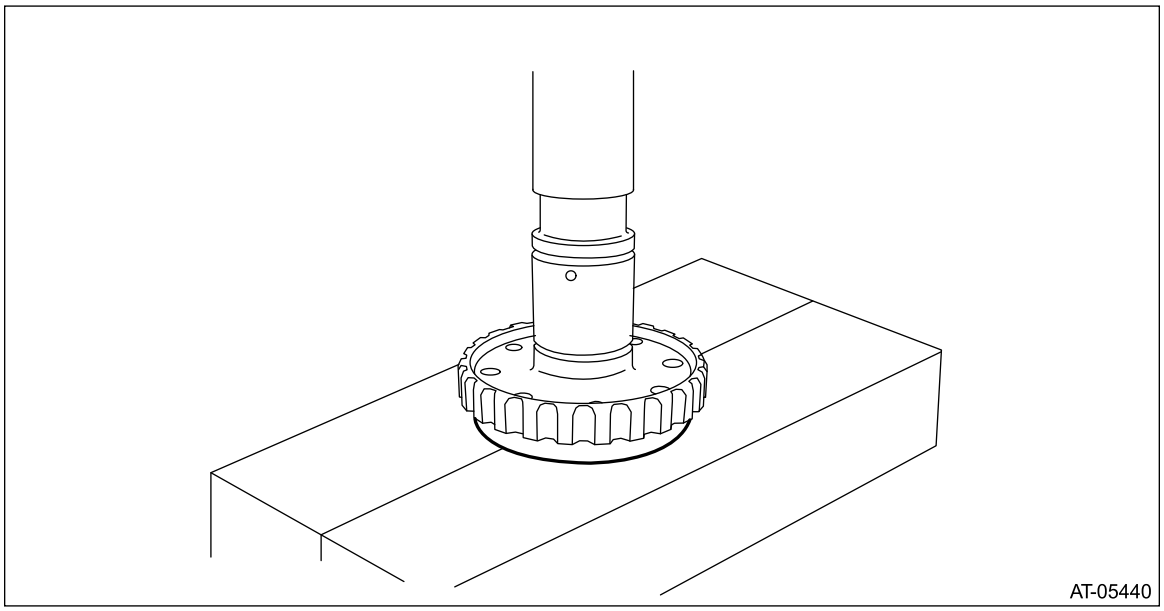
Specification:

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.

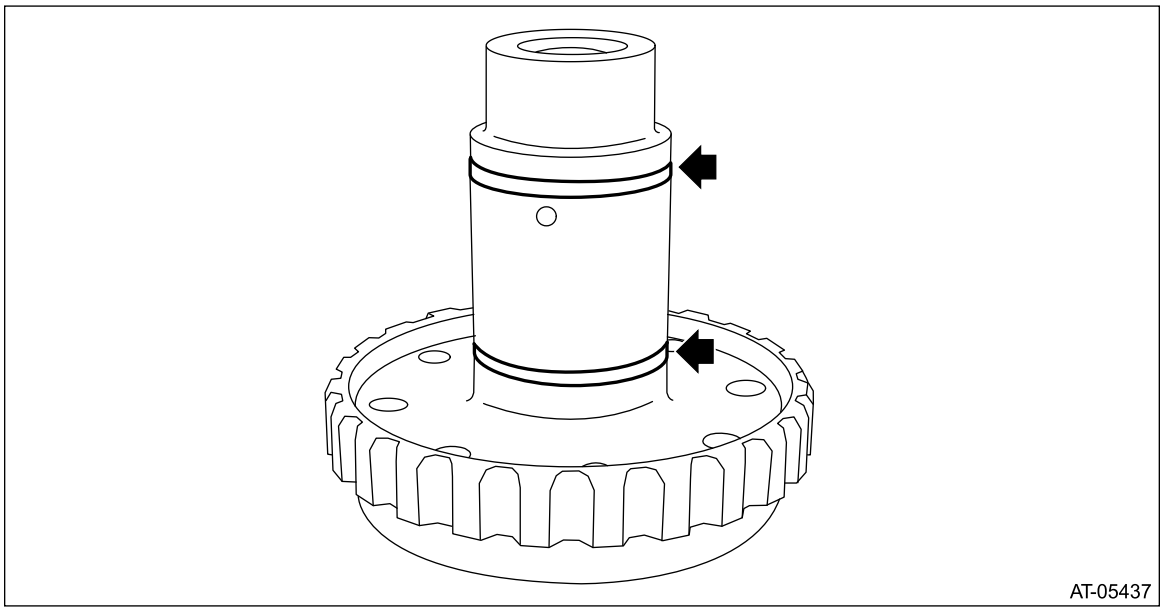
Note:
Use a new ball bearing.



11. Install the seal ring to the front driven shaft.

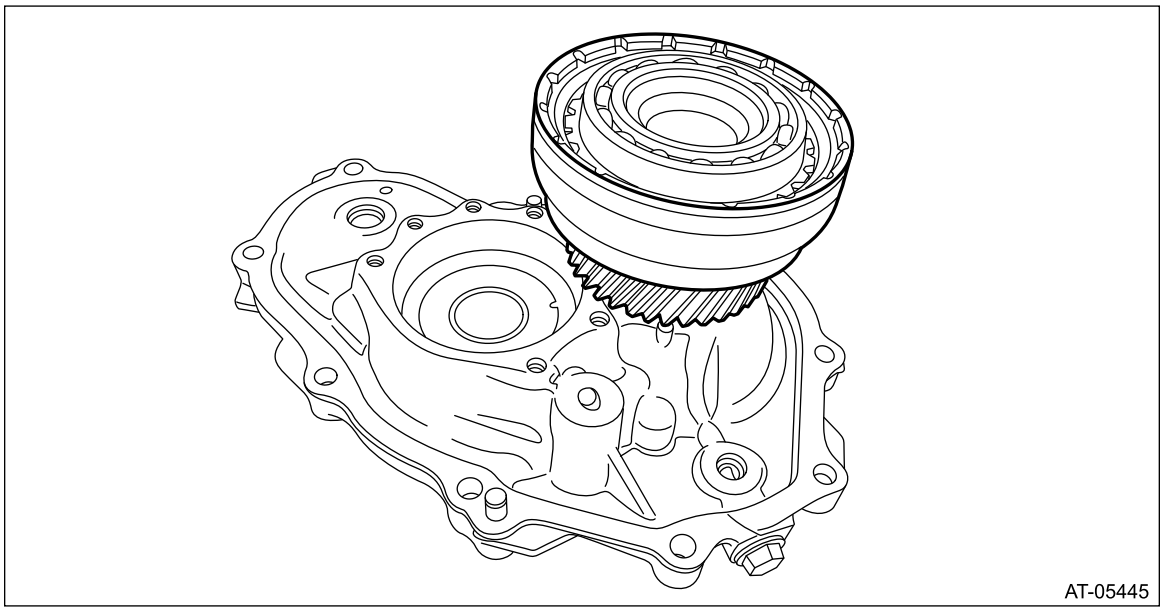
Note:

- **Install a new seal ring.**
- **Apply CVTF to the seal rings.**



12. Install the front reduction driven shaft to the front reduction driven gear.

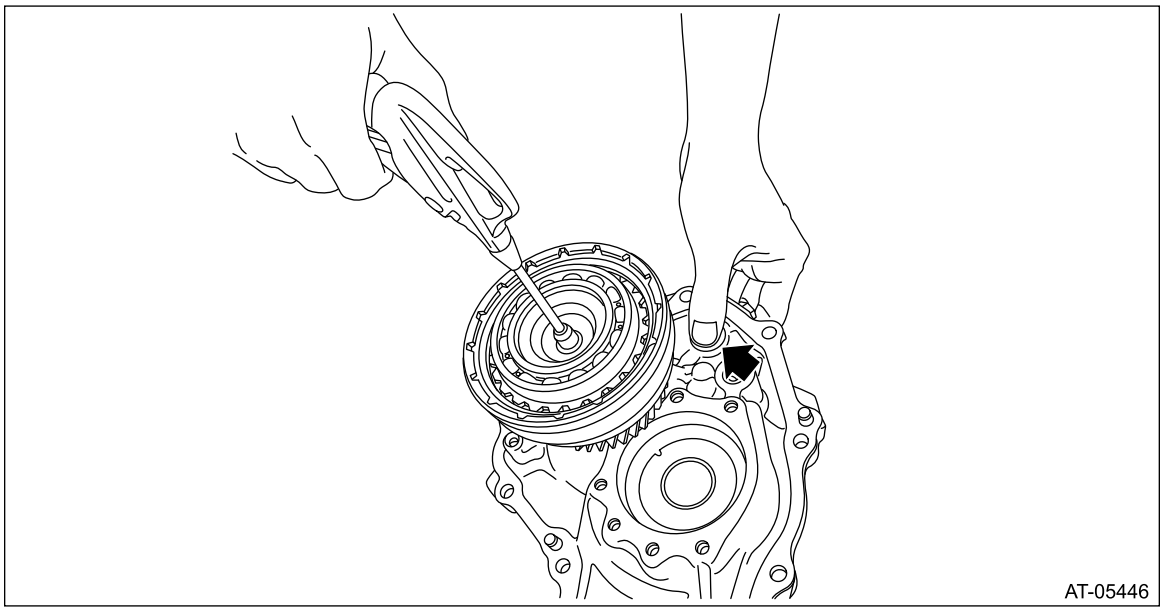
13. Install the front reduction driven gear assembly to converter case cover.



14. Apply compressed air intermittently to check the piston operation.

Note:

Hold the arrowed area with a finger.



CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Front Reduction Driven Gear

INSPECTION

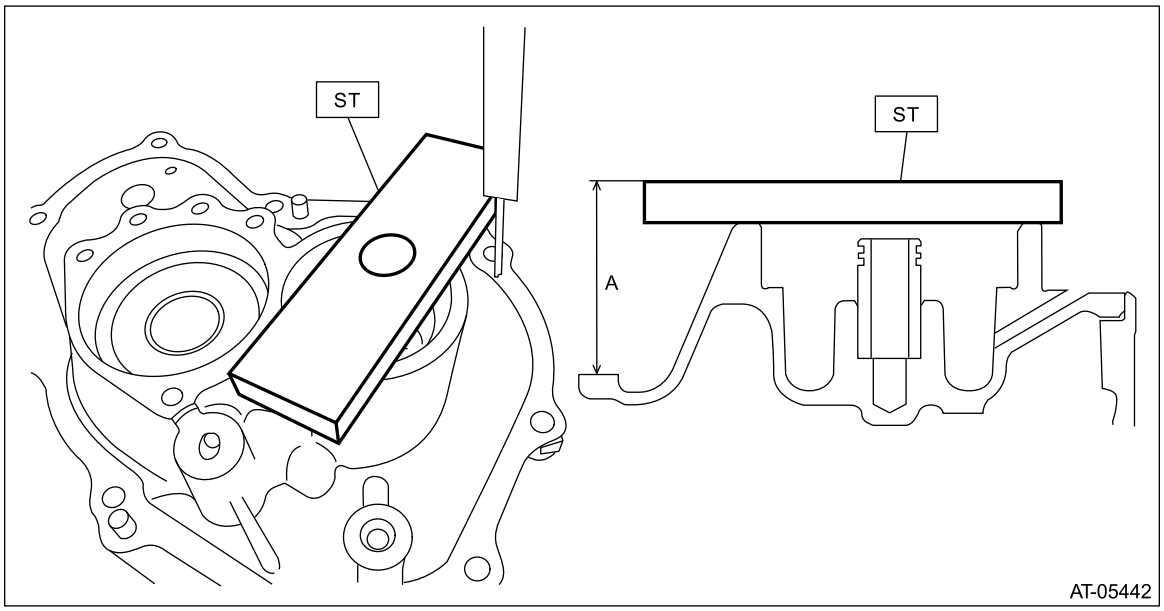
- Check the drive plate for wear and damage.
- Check the driven plate for discoloration (burnt color).
- Check for worn snap ring, fatigue or damaged return spring or deformed piston retainer.
- Replace if its tooth surfaces are broken, damaged or excessively worn.
- Check the bearing for seizure or wear.
- Apply CVTF to bearing and rotate the bearing to check for noise or dragging etc.

CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Front Reduction Driven Gear

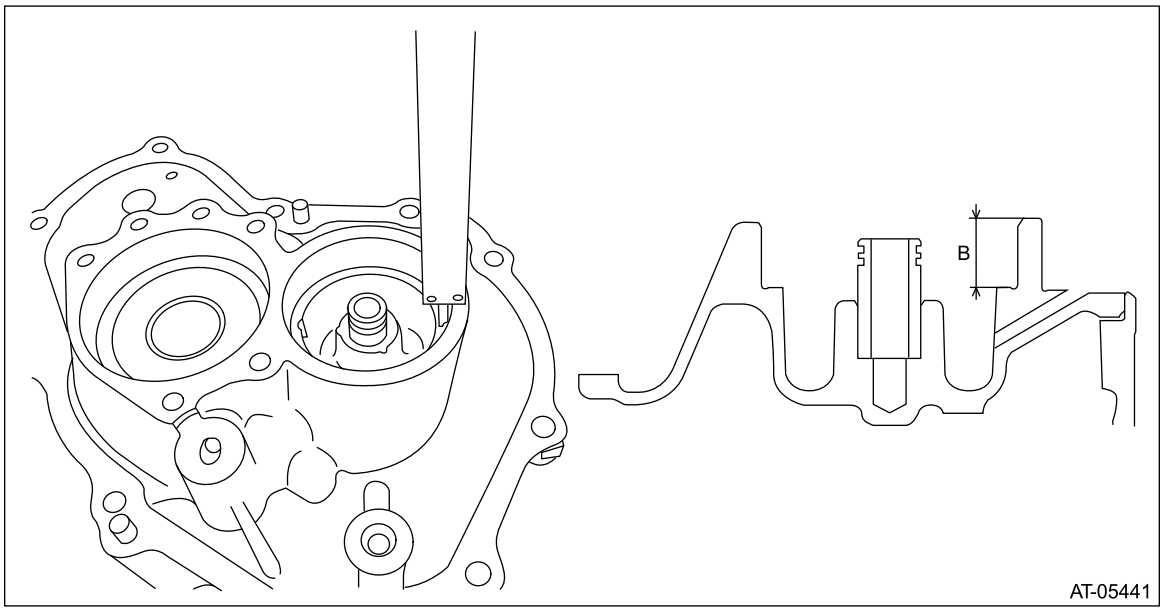
ADJUSTMENT

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.



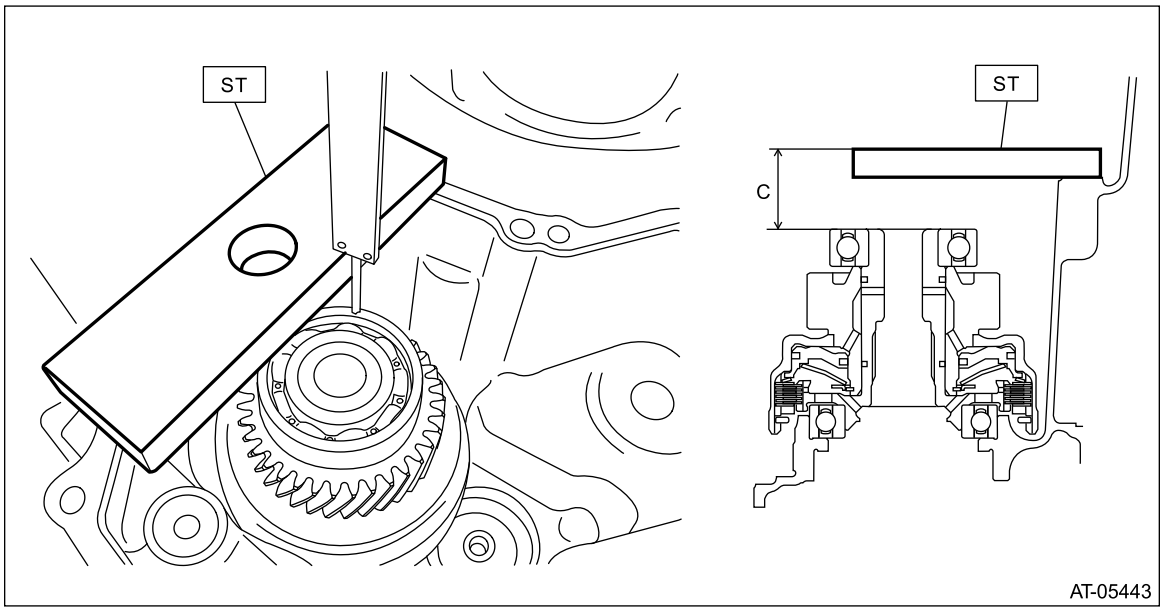
4. Install the ball bearing to the reduction driven gear.

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" mm (in)	**Thickness of shim mm (in)**
0.470 — 0.569 (0.019 — 0.021)	0.4 (0.016)
0.570 — 0.669 (0.022 — 0.025)	0.5 (0.020)
0.670 — 0.769 (0.026 — 0.029)	0.6 (0.024)
0.770 — 0.869 (0.030 — 0.033)	0.7 (0.028)
0.870 — 0.980 (0.034 — 0.039)	0.8 (0.031)

7. Select one to two shims so that the total thickness meets the value obtained from above.

Part No.	**Thickness of shim mm (in)**
31288AA130	0.2 (0.008)
31288AA140	0.3 (0.012)
31288AA150	0.5 (0.020)

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 center differential carrier. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Center Differential Carrier>REMOVAL.
11. Remove the transfer reduction driven gear assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transfer Reduction Driven Gear>REMOVAL.
12. Remove the intermediate case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Intermediate Case>REMOVAL.
13. Remove the forward clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Forward Clutch Assembly>REMOVAL.
14. Remove the transmission case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transmission Case>REMOVAL.
15. Remove the primary pulley, secondary pulley and variator chain. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Primary Pulley and Secondary Pulley>REMOVAL.
16. Remove the drive pinion shaft assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Drive Pinion Shaft Assembly>REMOVAL.
17. Remove the front differential assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Front Differential Assembly>REMOVAL.
18. Remove the oil pump chain cover and the oil pump chain. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Oil Pump Chain>REMOVAL.
19. Remove the converter case cover. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Converter Case Cover>REMOVAL.
20. Remove the front reduction drive gear and front reduction driven gear. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Front Reduction Drive Gear>REMOVAL.

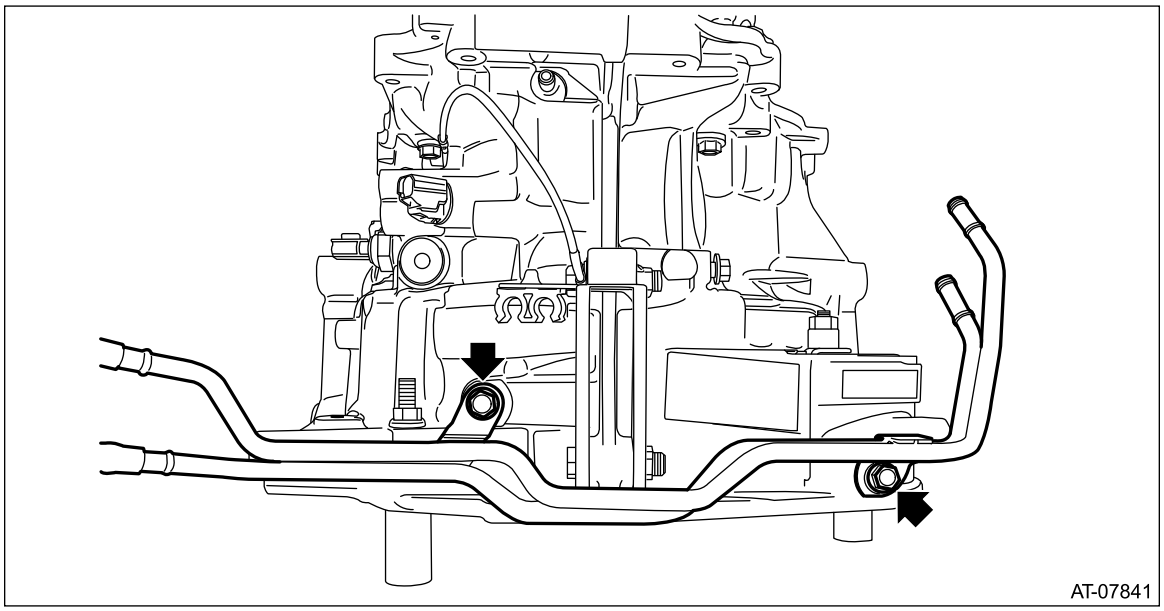
INSTALLATION

1. Install the front reduction drive gear and front reduction driven gear. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Front Reduction Drive Gear>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 center differential carrier. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Center Differential Carrier>INSTALLATION.
12. Install the transfer clutch assembly. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Transfer Clutch>INSTALLATION.
13. Install the rear drive shaft. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Rear Drive Shaft>INSTALLATION.
14. Install the extension case. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Extension Case>INSTALLATION.
15. Install the primary speed sensor. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Primary Speed Sensor>INSTALLATION.
16. Install the secondary pressure sensor. Ref. to CONTINUOUSLY VARIABLE TRANSMISSION(TR690)>Secondary Pressure Sensor>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.

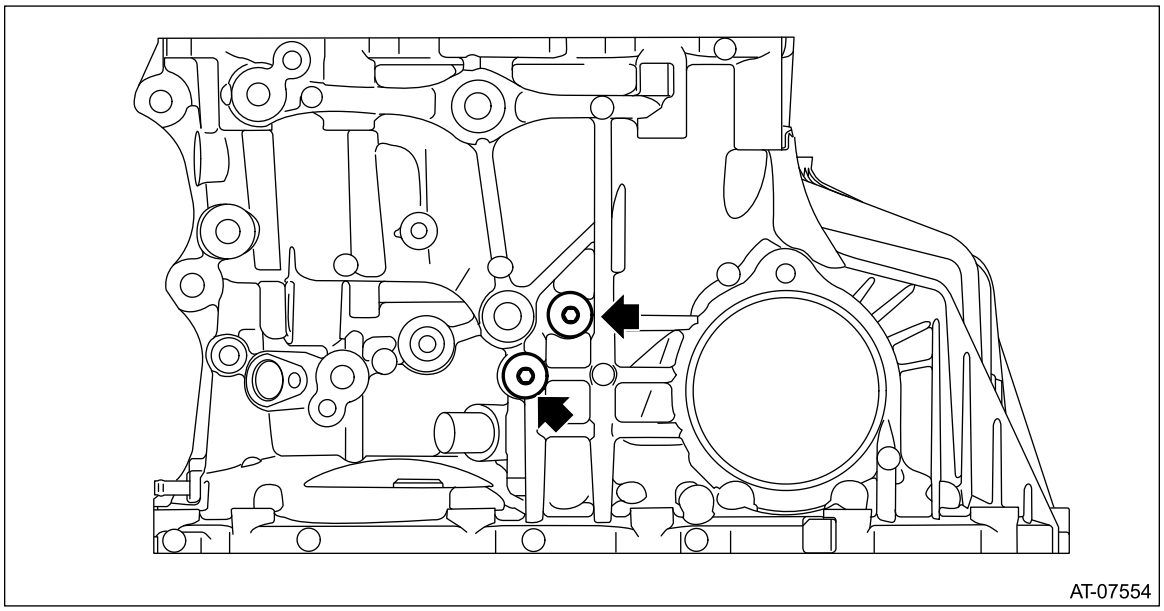
CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Converter Case

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.



CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > Converter Case

ASSEMBLY

1. Install the oil drain plug.

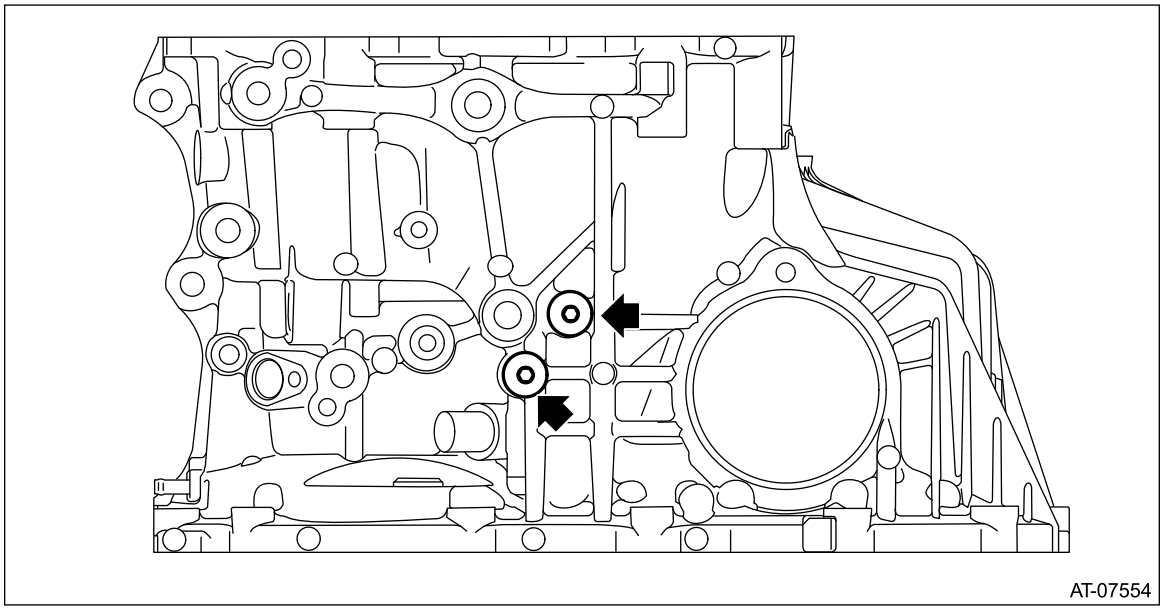
Note:

Use a new gasket.

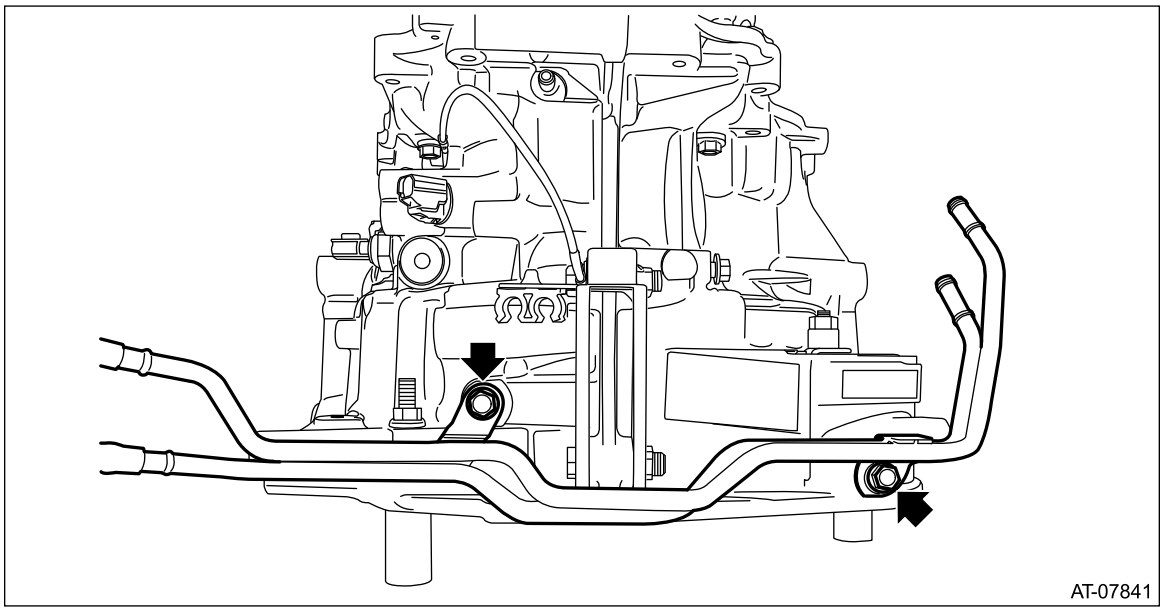
Tightening torque:

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)



CONTINUOUSLY VARIABLE TRANSMISSION(TR690) > 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(TR690) > Converter Case

ADJUSTMENT

When replacing the converter case, 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.

INSPECTION

Symptoms	Faulty parts
Stall speed is low after warming-up, with select lever in "D" or "R" range.	Engine control system
Vehicle does not move despite engine speed rising up, with select lever in "D" or "R" range.	• 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 mechanism • Select cable • Bearing • Forward/reverse changeover section
Excessive shock occurs at starting, with select lever in "D" or "R" range.	• Secondary pressure circuit • Pulley, gear and variator chain
Acceleration speed from standstill is insufficient, with select lever in "D" or "R" range.	• Control valve body • Forward/reverse changeover section
Engine speed suddenly rises up during driving, with select lever in "D" or "R" range.	• Control valve body • Secondary pressure circuit • Primary 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 circuit • Primary pressure circuit • Control valve body
During deceleration, lockup clutch does not disengage until just before halting, with select lever in "D" or "R" range.	• Control valve body • Torque converter assembly
Engine stalls with vehicle at a standstill, with select lever in "D" or "R" range.	• Engine control system • Control valve body
Excessive lockup shock occurs during driving, with select lever in "D" range.	Control valve body

Symptoms	Faulty parts
Slipping occurs at lockup, or lockup does not occur during driving, with select lever in “D” range.	• Control valve body • Lockup hydraulic line • Torque 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 switch • Control valve body • Forward/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 cable • Inhibitor switch • Detent spring • Manual plate

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)

6MT(TY75)

1. General Description
2. Transmission Gear Oil
3. Manual Transmission Assembly
4. Transmission Mounting System
5. Oil Seal
6. Differential Side Retainer Oil Seal
7. Switches and Harness
8. Air Breather Hose
9. Preparation for Overhaul
10. Transfer Case and Extension Case Assembly
11. Transfer Drive Gear
12. Transfer Driven Gear
13. Center Differential
14. Shift Link Assembly
15. Transmission Case
16. Main Shaft Assembly
17. Drive Pinion Shaft Assembly
18. Front Differential Assembly
19. Reverse Idler Gear
20. Shifter Fork and Rod
21. General Diagnostic Table

SPECIFICATION

1. MANUAL TRANSMISSION AND DIFFERENTIAL

Type			**6-forward speeds and 1-reverse (all stage with synchromesh)**
Transmission gear ratio		1st	3.455
		2nd	1.947
		3rd	1.296
		4th	0.972
		5th	0.780
		6th	0.667
		Rev.	3.636
Front reduction gear	Final	Type of gear	Hypoid
		Gear ratio	4.111
Rear reduction gear	Transfer	Type of gear	Helical
		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 gear oil capacity			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)

COMPONENT

1. TRANSMISSION CASE

(1) Air breather hose
(2) Clamp
(3) Hose clamp
(4) Pitching stopper bracket
(5) Select bracket
(6) Harness clip
(7) Transmission radio ground cord
(8) Gasket
(9) Drain plug
(10) Transmission case ASSY
(11) Oil level gauge

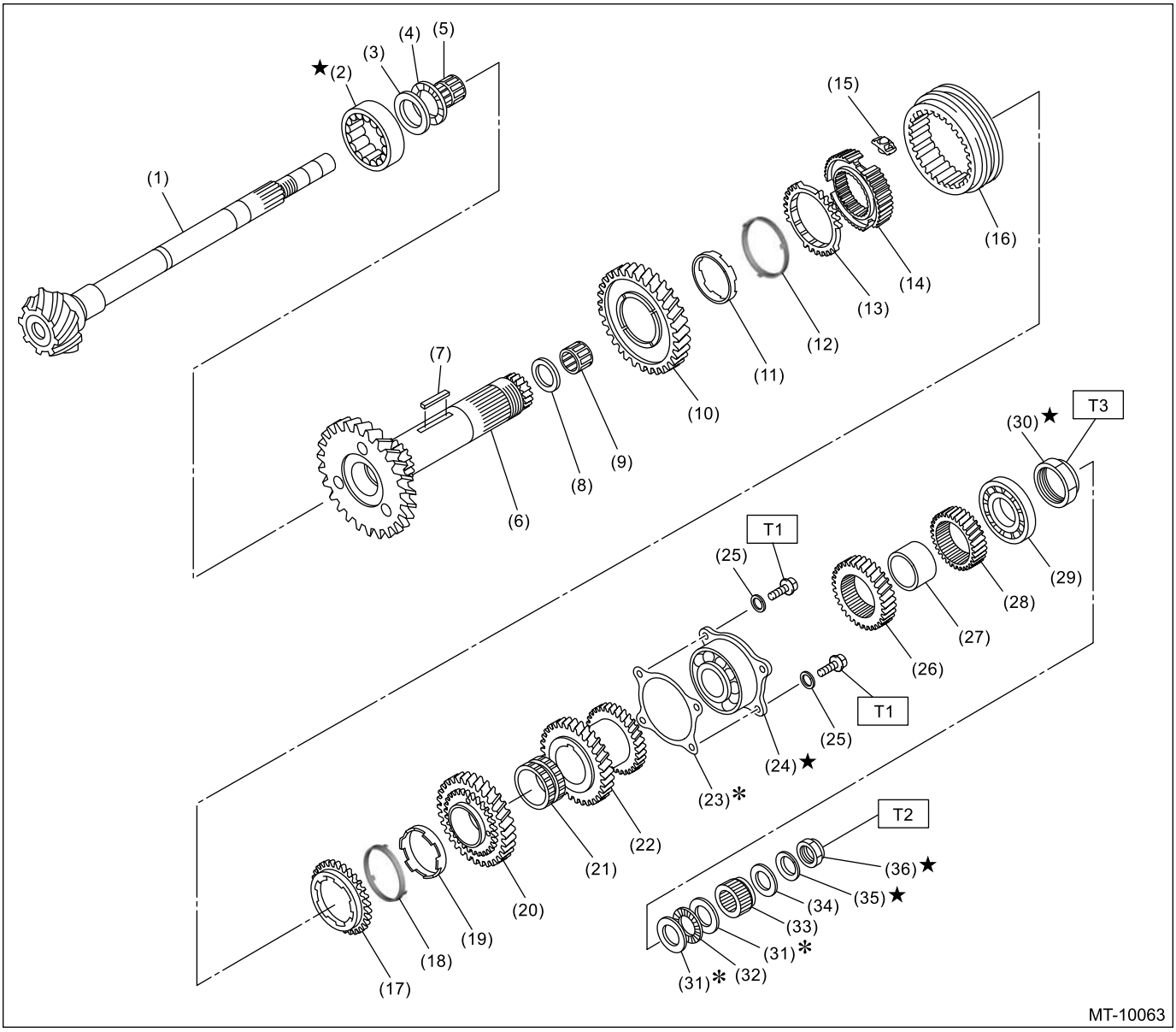
Tightening torque: N·m (kgf-m, ft-lb)

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

	Bolt No.	Bolt size mm	Tightening torque: N·m (kgf-m, ft-lb)
	(5) — (15)	8	25 (2.5, 18.4)
	(1) — (4) (16), (17)	10	40 (4.1, 29.5)

2. DRIVE PINION SHAFT ASSEMBLY



(1) Drive pinion shaft
(2) Roller bearing
(3) Washer
(4) Thrust bearing
(5) Needle bearing
(6) Driven shaft
(7) Key
(8) Drive pinion collar
(9) Needle bearing
(10) 1st driven gear
(11) 1st inner baulk ring
(12) 1st synchro cone
(15) 1st-2nd shifting insert
(16) 1st-2nd coupling sleeve
(17) 2nd outer baulk ring
(18) 2nd synchro cone
(19) 2nd inner baulk ring
(20) 2nd driven gear
(21) 2nd driven gear bushing
(22) 3rd-4th driven gear
(23) Drive pinion shim
(24) Double ball bearing
(25) Spring washer
(26) 5th driven gear
(29) Ball bearing
(30) Lock nut
(31) Adjusting washer
(32) Thrust bearing
(33) Differential bevel gear sleeve
(34) Washer
(35) Lock washer
(36) Lock nut

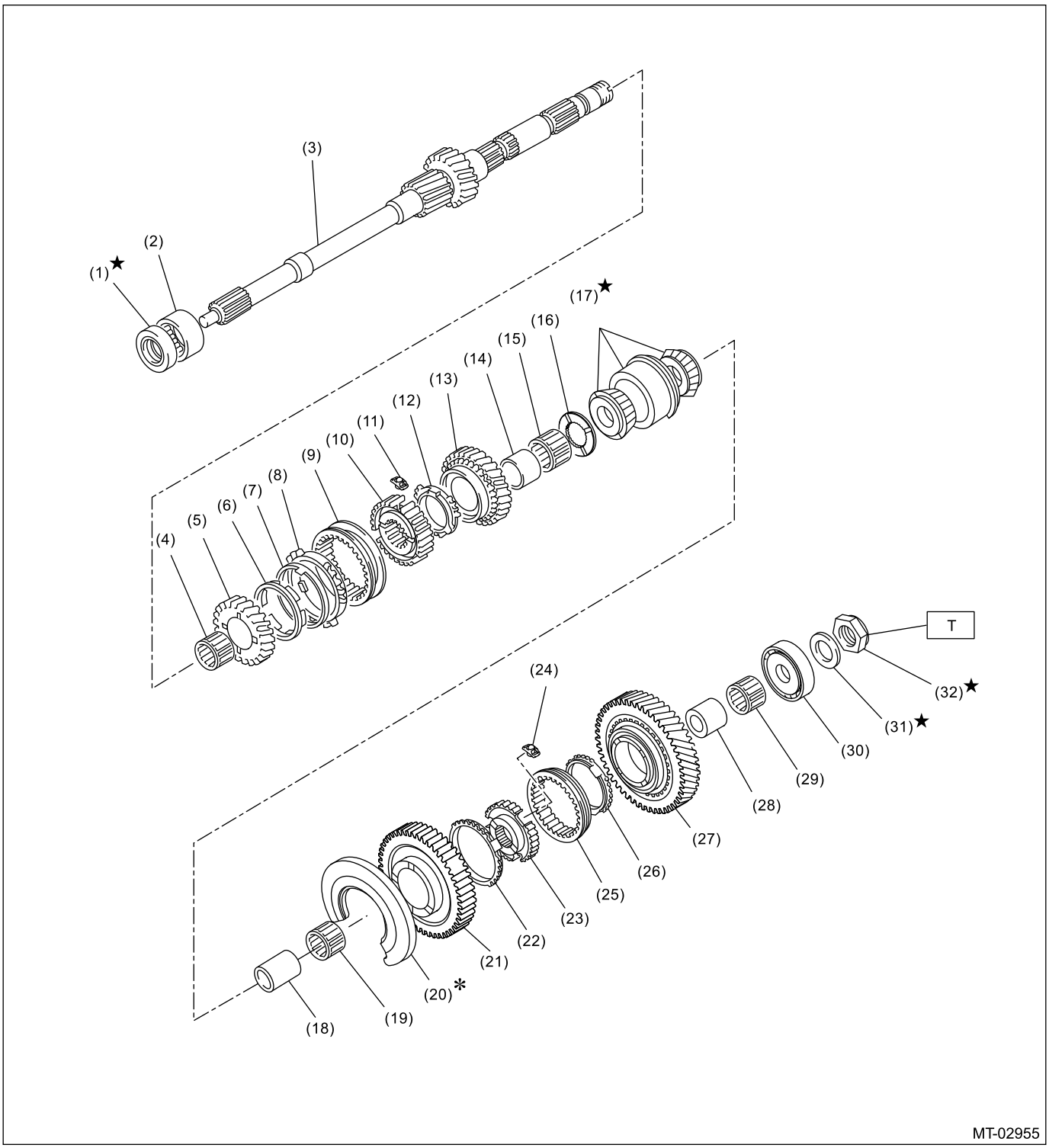
Tightening torque: N·m (kgf-m, ft-lb)

T1: 30 (3.1, 22.1)
T2: 126 (12.8, 92.9)

(13) 1st outer baulk ring
(14) 1st-2nd synchronizer hub
(27) Drive pinion spacer
(28) 6th driven gear

T3: 440 (44.9, 324.5)

3. MAIN SHAFT ASSEMBLY



(1) Oil seal
(2) Needle bearing
(3) Main shaft
(4) 3rd needle bearing
(5) 3rd drive gear
(6) 3rd inner 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
(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

(7) 3rd synchro cone
(8) 3rd outer baulk ring
(9) 3rd-4th coupling sleeve
(10) 3rd-4th synchronizer hub
(11) 3rd-4th shifting insert
(12) 4th baulk ring
(19) 5th needle bearing
(20) Main shaft rear plate
(21) 5th drive gear
(22) 5th baulk ring
(23) 5th-6th synchronizer hub
(24) 5th-6th shifting insert
(31) Lock washer
(32) Lock nut

Tightening torque: N·m (kgf-m, ft-lb)

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)

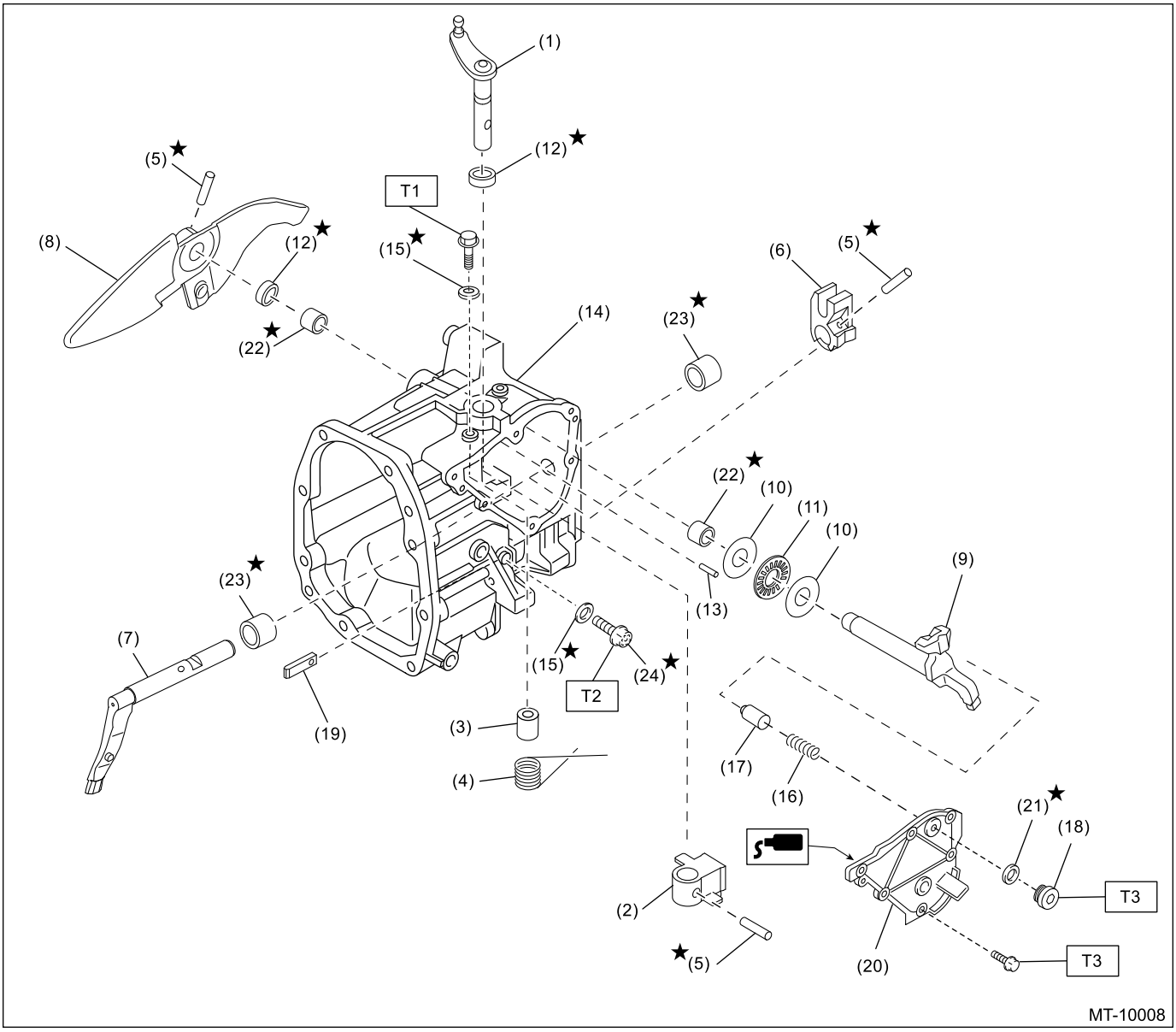
6. TRANSFER CASE AND EXTENSION

(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)
(13) Adjusting washer
(14) Ball bearing
(15) Center differential
(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
(28) Gasket
(29) Precoat bolt
(30) Needle bearing
(31) Snap ring

Tightening torque: N·m (kgf-m, ft-lb)

T1: 15 (1.5, 11.1)
T2: 18 (1.8, 13.3)
T3: 20 (2.0, 14.8)
T4: 24.5 (2.5, 18.1)
T5: 26 (2.7, 19.2)
T6: 32.3 (3.3, 23.8)
T7: 40 (4.1, 29.5)

7. SHIFT LINK 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
(10) Adjusting washer
(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
(20) Transmission cover
(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
(2) Spacer
(3) Lower cushion rubber
(4) Front plate
(5) Transmission cushion rubber
(6) Rear crossmember
(7) Upper cushion rubber
(8) Center crossmember
(9) Front crossmember
(10) Rear cushion rubber
(11) Rear plate

Tightening torque: N·m (kgf-m, ft-lb)

T1: 35 (3.6, 25.8)
T2: 50 (5.1, 36.9)
T3: 58 (5.9, 42.8)
T4: 70 (7.1, 51.6)
T5: 140 (14.3, 103.3)

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.

PREPARATION TOOL

1. SPECIAL TOOL

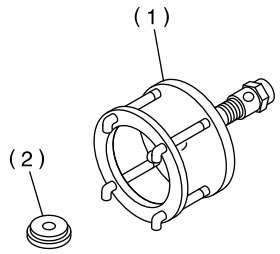
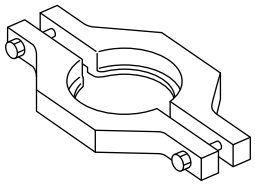
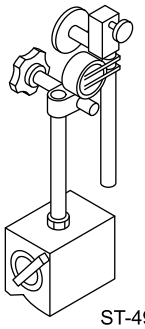
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-899524100	899524100	PULLER SET	Used for removing the front differential taper roller bearing. (1) Puller (2) Cap
	399780104	WEIGHT	Used for adjusting preload on the front differential taper roller bearing.
	498077000	REMOVER	• Used for removing the roller 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.
 ST-498247001	498247001	MAGNET BASE	• Used for measuring the backlash of differential bevel pinion gear and hypoid driven gear. • Used together with DIAL GAUGE (498247100).

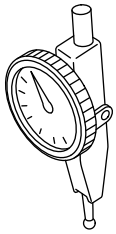
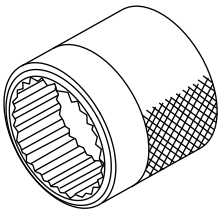
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498247100	498247100	DIAL GAUGE	• Used for measuring the backlash of differential bevel pinion gear and hypoid driven gear. • Used together with MAGNET BASE (498247001).
 ST18667AA020	18667AA020	HOLDER	• Used for removing and installing the drive pinion shaft assembly lock nut. • Used for measuring the backlash of hypoid driven gear. • Used for adjusting preload on the front differential taper roller bearing.
	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.
	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.
	927640000	INSTALLER	Used for installing the taper roller bearing (transfer case side) of transfer driven gear.
	18658AA021	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.
	18722AA010	REMOVER	Used for removing the 5th drive gear and 6th drive gear.

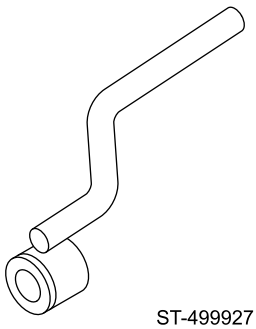
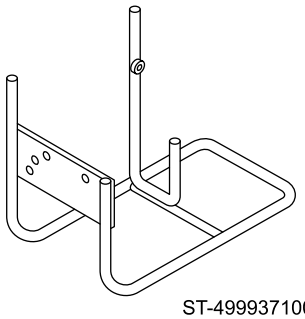
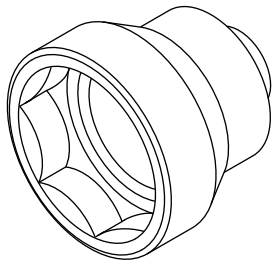
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
	499877000	RACE 4-5 INSTALLER	• Used for installing the 4th, 5th and 6th drive gear needle bearing races and the main shaft assembly double taper roller bearings. • Used together with REMOVER (899714110).
	499917500	DRIVE PINION GAUGE ASSY	Used for adjusting 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.
	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.
	899714110	REMOVER	Used for removing and installing the parts of main shaft assembly and driven shaft.
	899864100	REMOVER	• Used for removing the parts of the main shaft assembly.

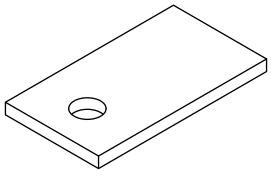
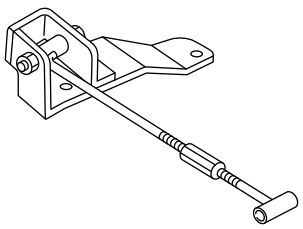
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
			• Used for removing the transfer driven gear taper roller bearing (transfer case side) and for installing it (extension case side). • Used for removing the transfer drive gear ball bearing. • Used for installing the transfer case taper roller bearing.
	18680AA020	HOLDER	• Used for removing and installing the drive pinion shaft assembly lock nut. • Used for removing and installing the driven shaft lock nut.
	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).
	498057300	INSTALLER	Used for installing the extension case oil seal.
 ST-498255400	498255400	PLATE	Used for measuring the hypoid driven gear backlash.
 ST41099AC000	41099AC000	ENGINE SUPPORT ASSY	Used for supporting engine.
	398527700	PULLER ASSY	• Used for removing the extension case oil seal. • Used for removing the front differential taper roller bearing outer

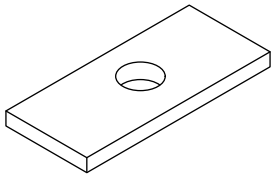
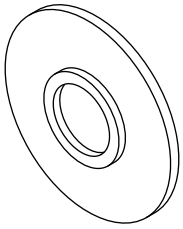
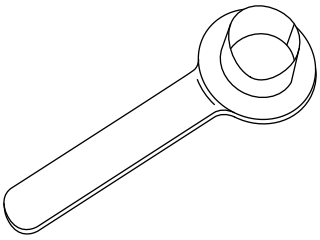
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
			race. • Used for removing the differential side retainer oil seal.
 ST-398643600	398643600	GAUGE	Used for adjusting the extension end play.
 ST-398177700	398177700	INSTALLER	• Used for installing the transfer drive gear ball bearing. • Used for installing the 4th drive gear needle bearing race.
	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.
	398791700	REMOVER	Used for removing and installing the straight pin.

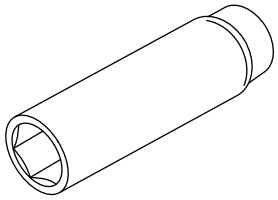
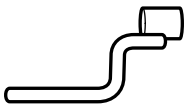
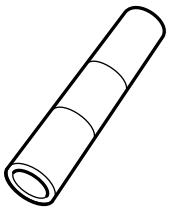
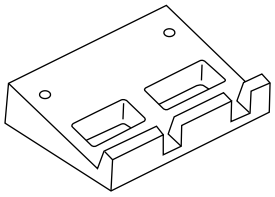
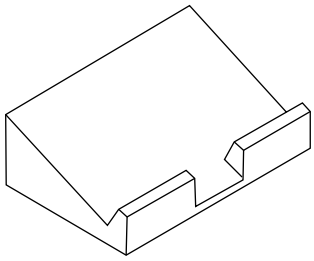
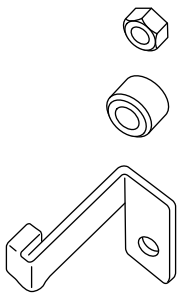
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18662AA010	18662AA010	SOCKET (27)	• Used for removing and installing the drive pinion shaft assembly lock nut. • Used for measuring the starting torque of the drive pinion shaft assembly.
	899754112	PRESS	• Used for removing driven shaft parts. • Used to install the main shaft assembly ball bearing.
 ST18631AA000	18631AA000	HANDLE	Used for installing transfer case assembly and extension case assembly.
	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.
	18657AA000	INSTALLER	Used for installing the transfer case oil seal.

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 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.
 ST-498277200	498277200	STOPPER SET	• Used for installing the needle bearing of the transfer case. • Use only the spacer.

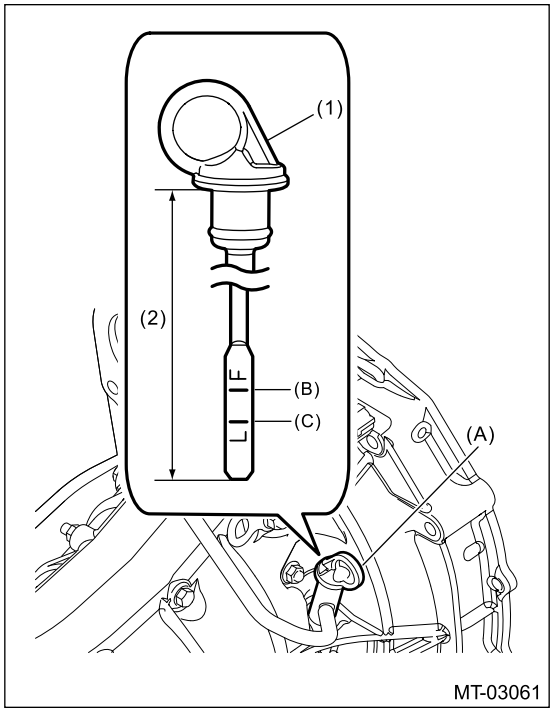
2. GENERAL TOOL

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 mm)
Socket driver (TORX® 45 size, tamper resistant type)	Used for removing and installing interlock plate.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75) > Transmission Gear Oil

INSPECTION

1. Park the vehicle on a level surface.
2. Turn the ignition switch to OFF, and wait until the engine cools.
3. Remove the oil level gauge and wipe it clean.
4. Reinsert the oil level gauge all the way. Be sure that the oil level gauge is correctly inserted in the proper direction.
5. Pull out the oil level gauge again, and check the oil level. If it is below the lower level, check for oil leakage and 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)(TY75) > Transmission Gear Oil

REPLACEMENT

1. Pull out the oil level gauge.
2. Lift up the vehicle.
3. 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.**

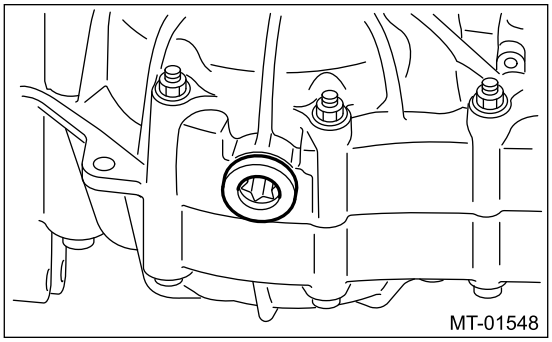
4. Attach the drain plug using TORX® bit T70.

   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)



5. Lower the vehicle.
6. 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)

7. Check the transmission gear oil amount, and confirm that it is within the specification.

REMOVAL

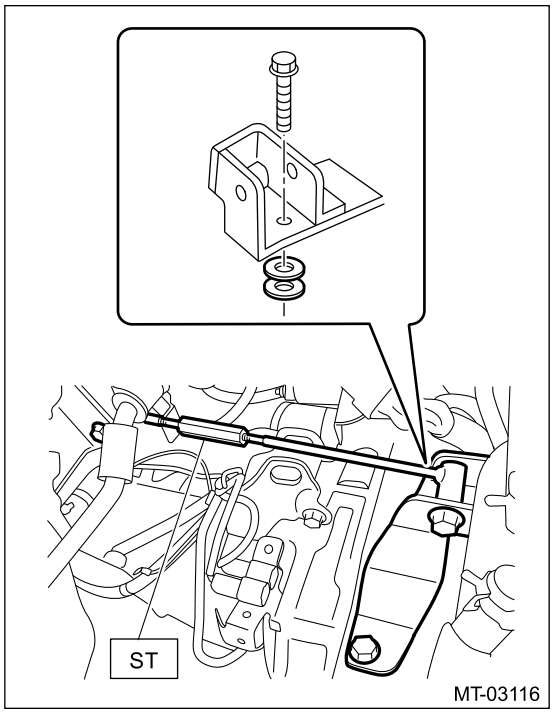
1. Open the front hood completely.
2. Disconnect the ground terminal from battery sensor. Ref. to NOTE>NOTE > BATTERY.
3. Remove the collector cover. Ref. to INTAKE (INDUCTION)(w/o STI)>Collector Cover>REMOVAL.
4. Remove the intercooler and the intercooler stay. Ref. to INTAKE (INDUCTION)(w/o STI)>Intercooler>REMOVAL.
5. Disconnect the clips and the following connectors, then remove the transmission radio ground cord terminal and the engine rear hanger.

(A)	Neutral position switch connector (2P, brown)	(B)	Back-up light switch connector (2P, gray)	(C)	Engine harness connector (16P, brown)
(D)	Clip	(E)	Transmission radio ground cord terminal	(F)	Engine rear hanger

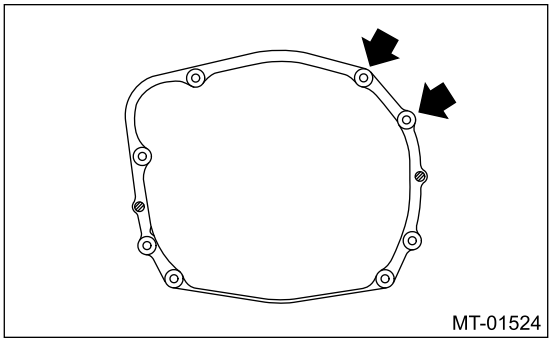
6. Remove the operating cylinder and suspend on a wire.
7. Remove the pitching stopper. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Transmission Mounting System>REMOVAL > PITCHING STOPPER.
8. Disconnect the engine ground terminal.
9. Set the ST.

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.

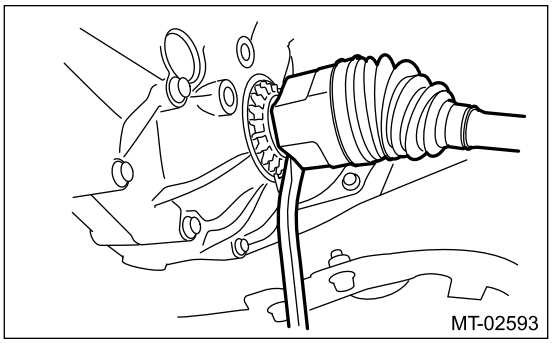


10. Remove the starter. Ref. to STARTING/CHARGING SYSTEMS(w/o STI)>Starter>REMOVAL.
11. Remove the bolts which hold upper side of transmission to engine.



12. Remove the front tires.
13. Lift up the vehicle.
14. Remove the center exhaust pipe (rear). Ref. to EXHAUST(w/o STI)>Center Exhaust Pipe>REMOVAL.
15. Drain transmission gear oil completely. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Transmission Gear Oil>REPLACEMENT.
16. Remove the center exhaust cover.
17. Remove the hanger bracket.
18. Remove the propeller shaft. Ref. to DRIVE SHAFT SYSTEM>Propeller Shaft>REMOVAL.
19. 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 > EXCEPT FOR STI MODEL.

    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.**
    - **Do not apply extra overload while holding the part (A).**
20. Remove the stabilizer link.
21. Remove the bolt securing the ball joint of the front arm to the housing, then separate the front arms and the housing.
22. Using a crowbar, separate the left and right front drive shafts.



23. Remove the bolts and nuts which hold lower side of transmission to engine.
24. Place the transmission jack under the transmission.

    Caution:

    Always support the transmission case with a transmission jack.
25. Remove the front crossmember and the rear crossmember.
26. While lowering the transmission jack, tighten the turnbuckle of the ST, and incline the engine unit rearward.
27. Remove the transmission assembly.

Note:
Move the transmission jack towards the rear until the main shaft is withdrawn from the clutch cover.

28. Remove the transmission cushion rubber.
29. Remove the release bearing & lever. Ref. to CLUTCH SYSTEM>Release Bearing and Lever>REMOVAL > EXCEPT FOR STI MODEL.

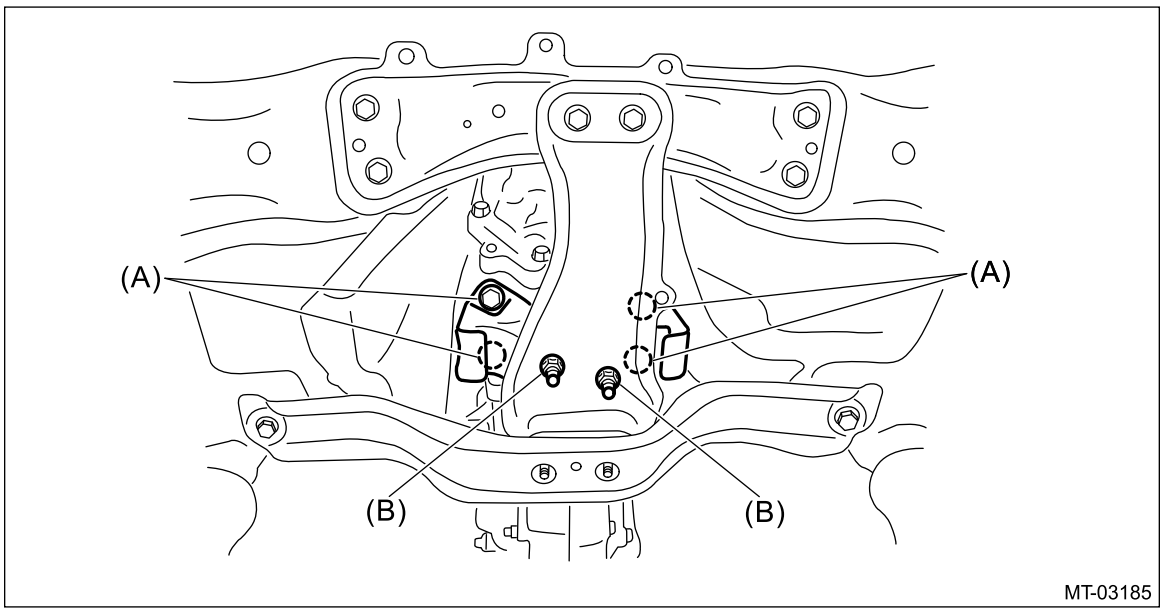
MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75) > Manual Transmission Assembly

INSTALLATION

1. Install the release bearing & lever. Ref. to CLUTCH SYSTEM>Release Bearing and Lever>INSTALLATION > EXCEPT FOR STI MODEL.
2. Replace the differential side retainer oil seal. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>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

3. 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.
4. Install the transmission cushion rubber to the transmission, and tighten the bolt (A).
5. 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)



6. 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.

7. While raising the transmission jack, loosen the turnbuckle of the ST, and set the engine unit to the original position.

8. Install the front crossmember and rear crossmember.

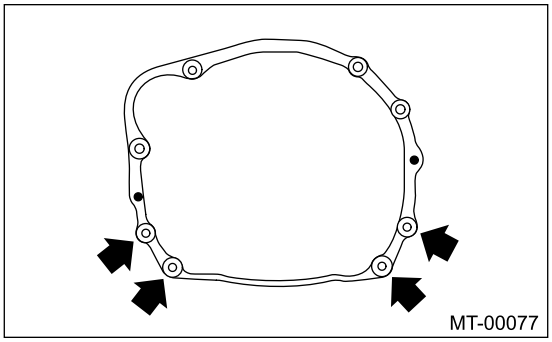
9. Tighten the transmission cushion rubber mounting nut.

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)

10. Take out the transmission jack.

11. 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)



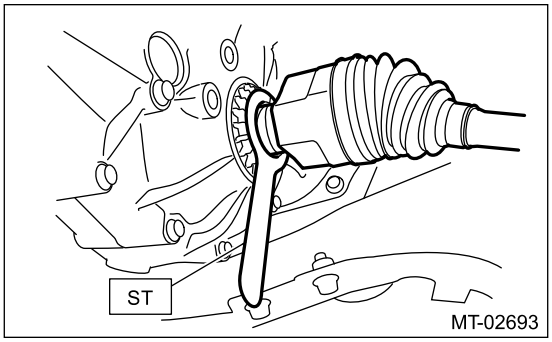
12. Set the ST to differential side retainer.

ST 28399SA010 OIL SEAL PROTECTOR

13. Replace the circlip of the front drive shaft with a new part.

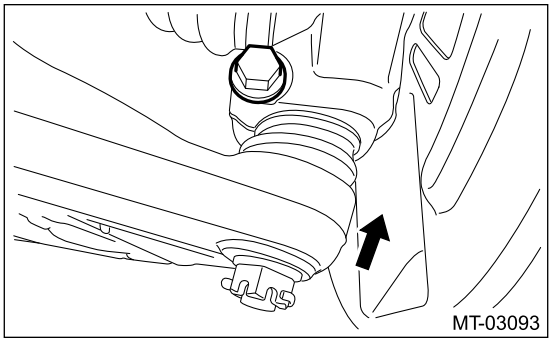
14. Install the front drive shaft and remove ST.

ST 28399SA010 OIL SEAL PROTECTOR



15. Insert the front arm ball joint and tighten the mounting bolt.

Tightening torque:
50 N·m (5.1 kgf-m, 36.9 ft-lb)



16. Replace the flange nut with a new part and install the stabilizer link.

Tightening torque:

60 N·m (6.1 kgf-m, 44.3 ft-lb)

17. 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 > EXCEPT FOR STI MODEL.

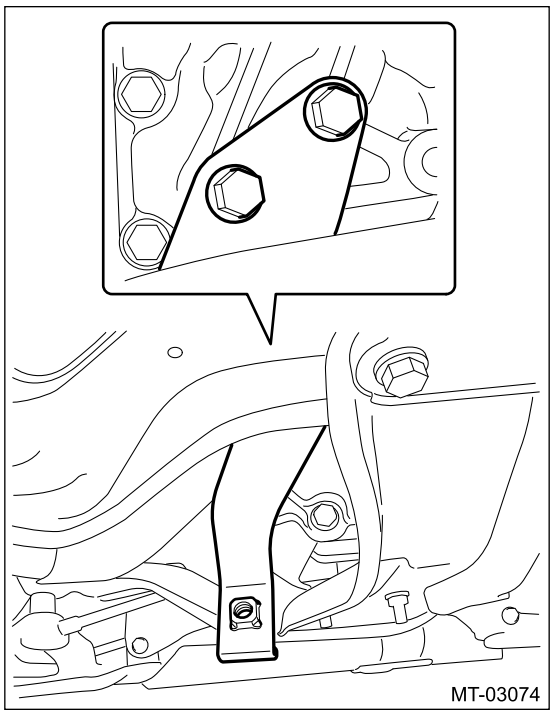
Caution:

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

18. Install the hanger bracket.

Tightening torque:

23 N·m (2.3 kgf-m, 17.0 ft-lb)



19. Install the propeller shaft. Ref. to DRIVE SHAFT SYSTEM>Propeller Shaft>INSTALLATION.

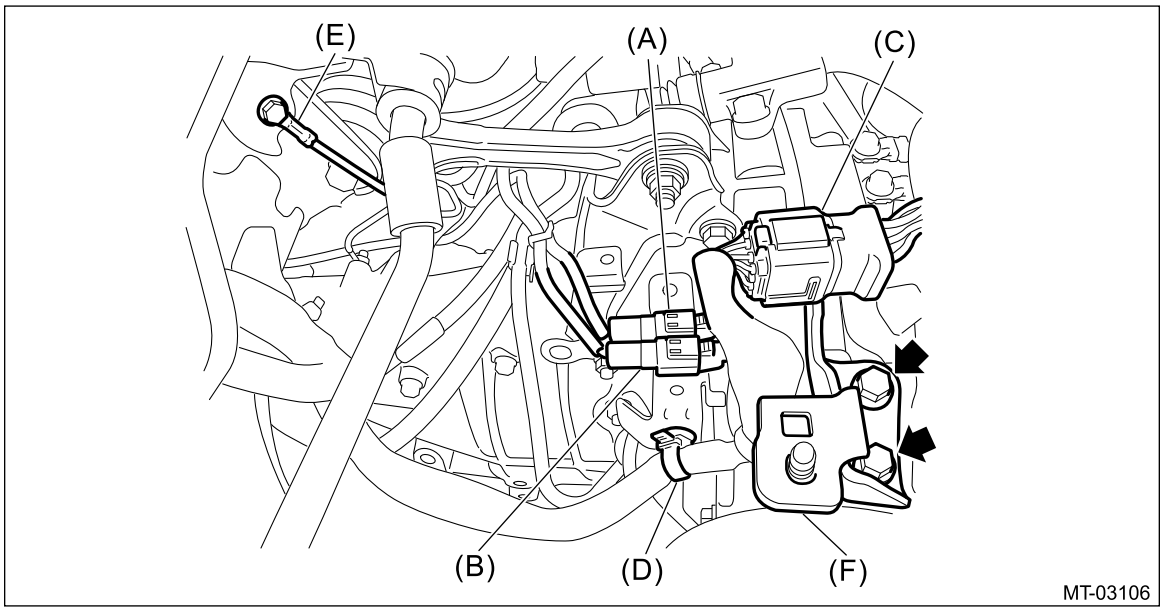
20. Install the center exhaust cover.

Tightening torque:

18 N·m (1.8 kgf-m, 13.3 ft-lb)

21. Install the center exhaust pipe (rear). Ref. to EXHAUST(w/o STI)>Center Exhaust Pipe>INSTALLATION.

22. Lower the vehicle.
23. Install the starter. Ref. to STARTING/CHARGING SYSTEMS(w/o STI)>Starter>INSTALLATION.
24. 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)
25. Remove the ST.
26. Install the pitching stopper. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Transmission Mounting System>INSTALLATION > PITCHING STOPPER.
27. Install the engine ground terminals.
Tightening torque:
19 N·m (1.9 kgf-m, 14.0 ft-lb)
28. Install the operating cylinder.
Tightening torque:
37 N·m (3.8 kgf-m, 27.3 ft-lb)
29. Install the transmission radio ground cord terminal and the engine rear hanger, connect the following connectors, and then secure the clip on the bracket.
Tightening torque:
Transmission radio ground cord terminal
13 N·m (1.3 kgf-m, 9.6 ft-lb)
Engine rear hanger
21 N·m (2.1 kgf-m, 15.5 ft-lb)



(A) Neutral position switch connector (2P, brown)
(B) Back-up light switch connector (2P, gray)
(C) Engine harness connector (16P, brown)
(D) Clip
(E) Transmission radio ground cord terminal
(F) Engine rear hanger

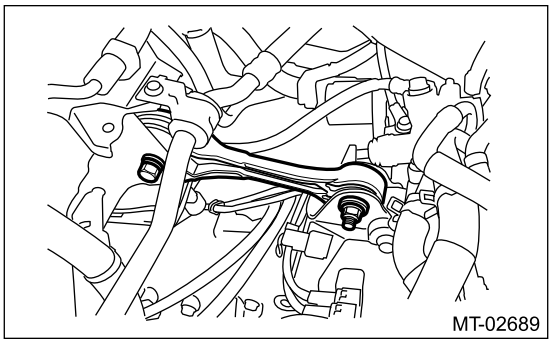
30. Pour in transmission gear oil and check the oil level. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Transmission Gear Oil.
31. Install the intercooler stay and the intercooler. Ref. to INTAKE (INDUCTION)(w/o STI)>Intercooler>INSTALLATION.

32. Install the front tires.
33. Install the collector cover. Ref. to INTAKE (INDUCTION)(w/o STI)>Collector Cover>INSTALLATION.
34. Connect the ground terminal to battery sensor. Ref. to NOTE>NOTE > BATTERY.

REMOVAL

1. PITCHING STOPPER

1. Disconnect the ground terminal from battery sensor. Ref. to NOTE>NOTE > BATTERY.
2. Remove the collector cover. Ref. to INTAKE (INDUCTION)(w/o STI)>Collector Cover>REMOVAL.
3. Remove the intercooler. Ref. to INTAKE (INDUCTION)(w/o STI)>Intercooler>REMOVAL.
4. Remove the pitching stopper.



2. CROSSMEMBER AND CUSHION RUBBER

1. Disconnect the ground terminal from battery sensor. Ref. to NOTE>NOTE > BATTERY.
2. Lift up the vehicle.
3. Remove the center exhaust pipe (rear). Ref. to EXHAUST(w/o STI)>Center Exhaust Pipe>REMOVAL.
4. Remove the center exhaust cover.
5. Set the transmission jack.
   Caution:
   Always support the transmission case with a transmission jack.
6. Remove the front crossmember and the rear crossmember.
7. Remove the transmission cushion rubber.

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)(w/o STI)>Intercooler>INSTALLATION.
3. Install the collector cover. Ref. to INTAKE (INDUCTION)(w/o STI)>Collector Cover>INSTALLATION.
4. Connect the ground terminal to battery sensor. Ref. to NOTE>NOTE > BATTERY.

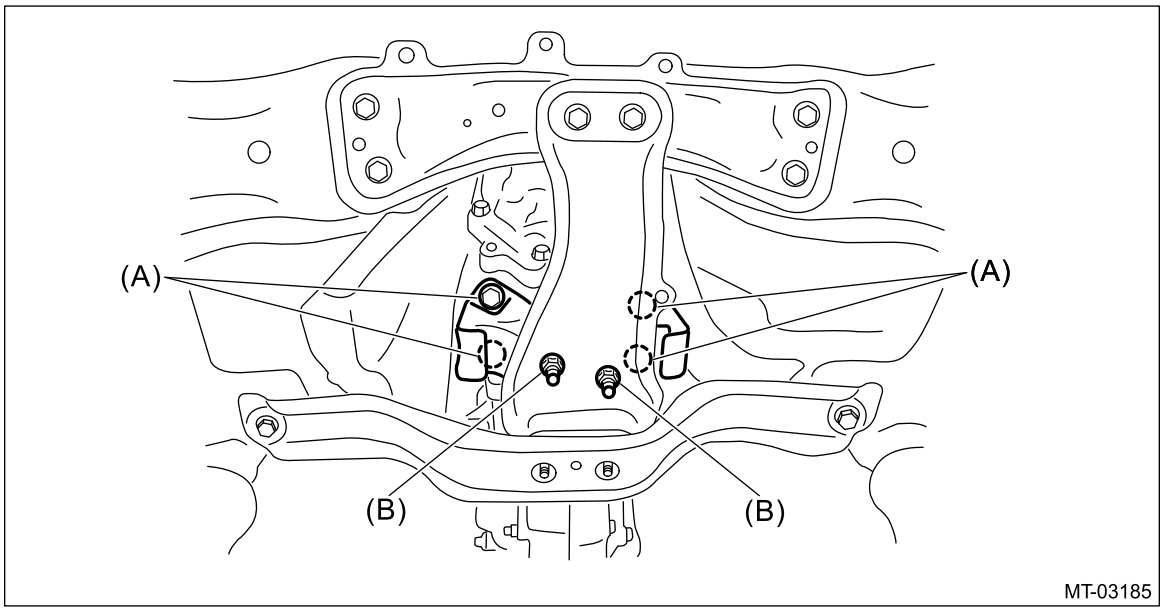
2. CROSSMEMBER AND CUSHION RUBBER

1. Install the transmission cushion rubber to the transmission, and tighten the bolt (A).
2. Install the transmission cushion rubber to the center crossmember, and temporarily tighten the nut (B).

Tightening torque:

Bolt (A)

35 N·m (3.6 kgf-m, 25.8 ft-lb)



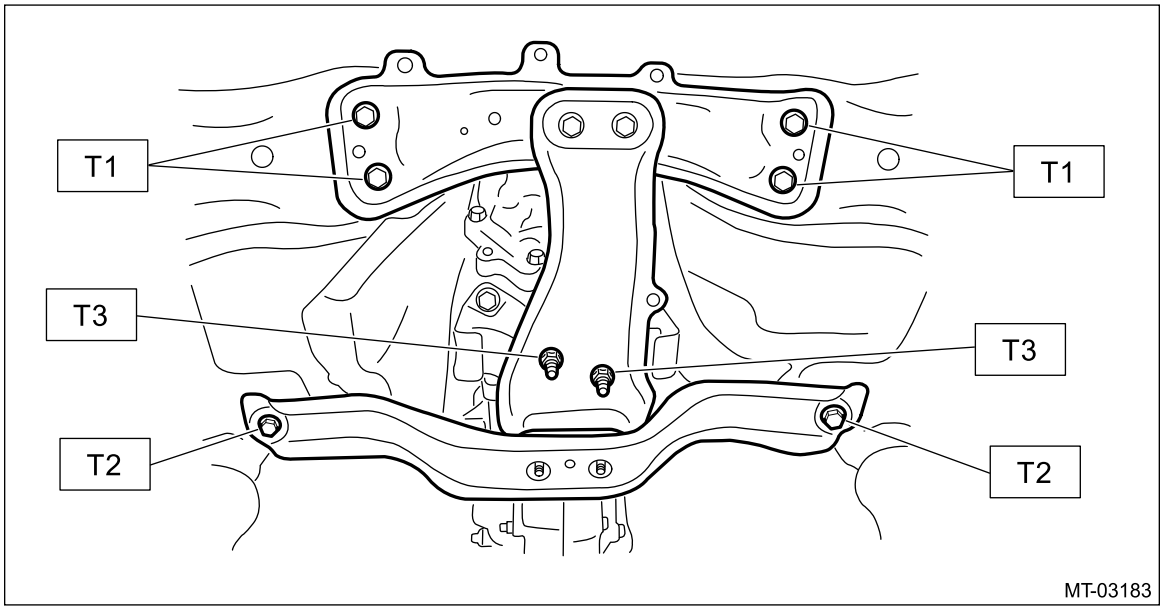
3. Install the front crossmember and rear crossmember.
4. Tighten the transmission cushion rubber mounting nut.

Tightening torque:

T1: 70 N·m (7.1 kgf-m, 51.6 ft-lb)

T2: 140 N·m (14.3 kgf-m, 103.3 ft-lb)

T3: 35 N·m (3.6 kgf-m, 25.8 ft-lb)



5. Remove the transmission jack.
6. Install the center exhaust cover.

Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)

7. Install the center exhaust pipe (rear). Ref. to EXHAUST(w/o STI)>Center Exhaust Pipe>INSTALLATION.
8. Lower the vehicle.
9. Connect the ground terminal to battery sensor. Ref. to NOTE>NOTE > BATTERY.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75) > Transmission Mounting System

INSPECTION

Check the following; repair or replace the faulty parts.

1. PITCHING STOPPER

Check the pitching stopper for bends or damage. Check that the rubber is not stiff, cracked or otherwise damaged.

2. CROSSMEMBER AND CUSHION RUBBER

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

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75) > Oil Seal

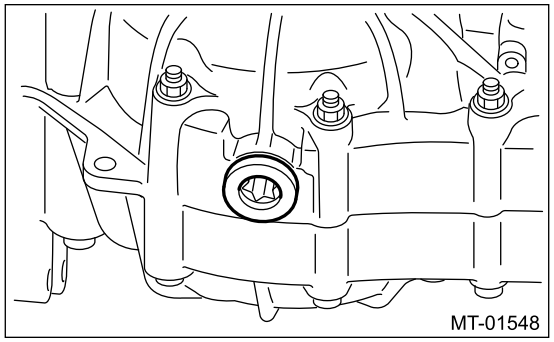
INSPECTION

Check for leakage of transmission gear oil from the oil seal. If there is oil leakage, replace the oil seal with the new part and check the propeller shaft.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75) > Oil Seal

REPLACEMENT

1. Disconnect the ground terminal from battery sensor. Ref. to NOTE>NOTE > BATTERY.
2. Lift up the vehicle.
3. Clean the transmission exterior.
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 spilled, wipe it off completely.**
5. 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)



6. Remove the rear exhaust pipe. Ref. to EXHAUST(w/o STI)>Rear Exhaust Pipe>REMOVAL.
7. Remove the center exhaust cover.
8. Remove the propeller shaft. Ref. to DRIVE SHAFT SYSTEM>Propeller Shaft>REMOVAL.
9. Using the ST, remove the oil seal.

   ST 398527700 PULLER ASSY

   (A) Oil seal

10. 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

11. Install the propeller shaft. Ref. to DRIVE SHAFT SYSTEM>Propeller Shaft>INSTALLATION.

12. Install the center exhaust cover.

Tightening torque:

18 N·m (1.8 kgf-m, 13.3 ft-lb)

13. Install the rear exhaust pipe. Ref. to EXHAUST(w/o STI)>Rear Exhaust Pipe>INSTALLATION.

14. Lower the vehicle.

15. Pour in transmission gear oil and check the oil level. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Transmission Gear Oil.

16. Connect the ground terminal to battery sensor. Ref. to NOTE>NOTE > BATTERY.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75) > Differential Side Retainer Oil Seal

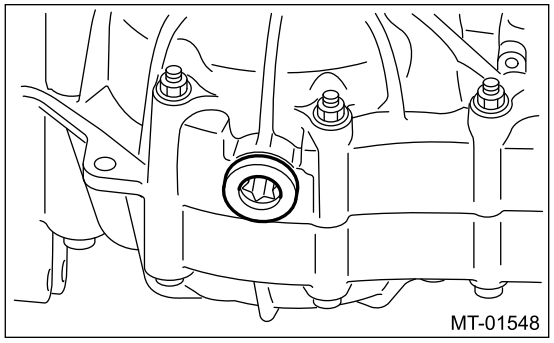
INSPECTION

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.

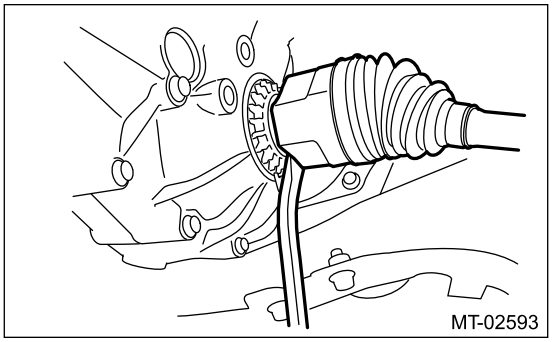
MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75) > Differential Side Retainer Oil Seal

REPLACEMENT

1. Disconnect the ground terminal from battery sensor. Ref. to NOTE>NOTE > BATTERY.
2. Remove the front tires.
3. Lift up the vehicle.
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 spilled, wipe it off completely.**
5. 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)



6. Remove the center exhaust pipe (rear). Ref. to EXHAUST(w/o STI)>Center Exhaust Pipe>REMOVAL.
7. Remove the stabilizer link.
8. Remove the bolt securing the ball joint of the front arm to the housing, then separate the front arms and the housing.
9. Using a crowbar, separate the left and right front drive shafts.



10. 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.**

11. Using the ST, install the differential side retainer oil seal by lightly tapping with a plastic hammer.

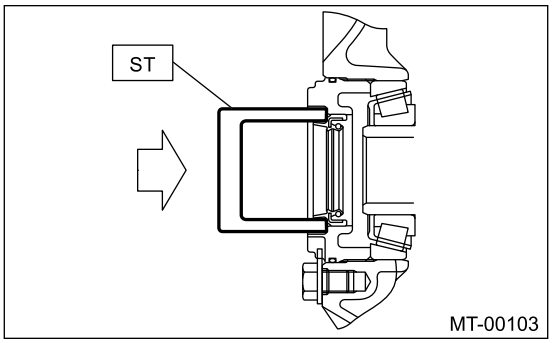
Caution:

- **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



12. Set the ST to differential side retainer.

ST 28399SA010 OIL SEAL PROTECTOR

13. Replace the circlip of the front drive shaft with a new part.

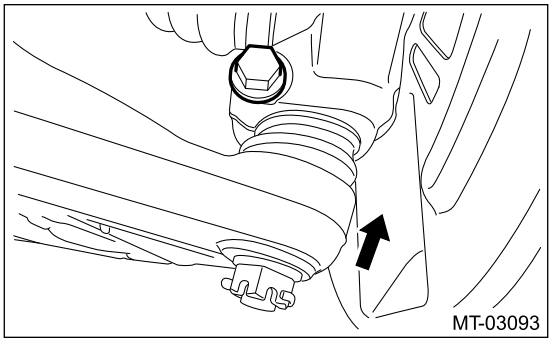
14. Install the front drive shaft and remove ST.

ST 28399SA010 OIL SEAL PROTECTOR

15. Insert the front arm ball joint and tighten the mounting bolt.

Tightening torque:

50 N·m (5.1 kgf-m, 36.9 ft-lb)



16. Replace the flange nut with a new part and install the stabilizer link.
    Tightening torque:
    60 N·m (6.1 kgf-m, 44.3 ft-lb)
17. Install the center exhaust pipe (rear). Ref. to EXHAUST(w/o STI)>Center Exhaust Pipe>INSTALLATION.
18. Lower the vehicle.
19. Pour in transmission gear oil and check the oil level. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Transmission Gear Oil.
20. Install the front tires.
21. Connect the ground terminal to battery sensor. Ref. to NOTE>NOTE > BATTERY.

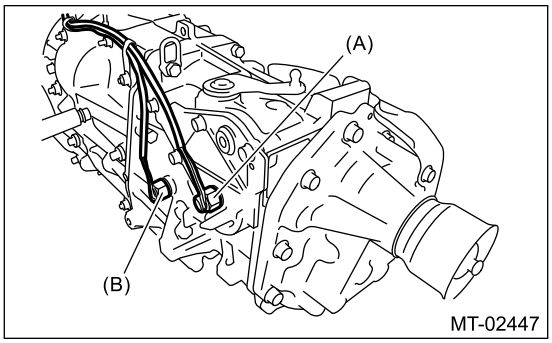
REMOVAL

1. BACK-UP LIGHT AND NEUTRAL POSITION SWITCH

1. Disconnect the ground terminal from battery sensor. Ref. to NOTE>NOTE > BATTERY.
2. Remove the collector cover. Ref. to INTAKE (INDUCTION)(w/o STI)>Collector Cover>REMOVAL.
3. Remove the intercooler. Ref. to INTAKE (INDUCTION)(w/o STI)>Intercooler>REMOVAL.
4. 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)

5. Remove the harness connector from bracket.
6. Lift up the vehicle.
7. Remove the harness from each clip.
8. Remove the back-up light switch & neutral position switch with the harness.



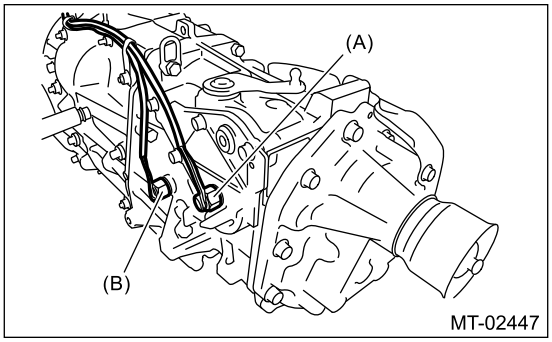
(A) Neutral position switch
(B) Back-up light switch

INSTALLATION

1. BACK-UP LIGHT AND NEUTRAL POSITION SWITCH

1. 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 intercooler. Ref. to INTAKE (INDUCTION)(w/o STI)>Intercooler>INSTALLATION.
7. Install the collector cover. Ref. to INTAKE (INDUCTION)(w/o STI)>Collector Cover>INSTALLATION.
8. Connect the ground terminal to battery sensor. Ref. to NOTE>NOTE > BATTERY.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75) > Switches and Harness

INSPECTION

1. BACK-UP LIGHT SWITCH

1. Turn the ignition switch to OFF.
2. Disconnect the back light switch connector.
3. Measure the resistance between the back-up light switch terminals.

Gear shift position	Terminal No.	Specified resistance
Reverse position	1 and 2	Less than 1 Ω
Other positions		1 MΩ or more

4. Replace faulty parts.

2. NEUTRAL POSITION SWITCH

1. Turn the ignition switch to OFF.
2. Disconnect the connector of neutral position switch.
3. Measure the resistance between neutral position switch terminals.

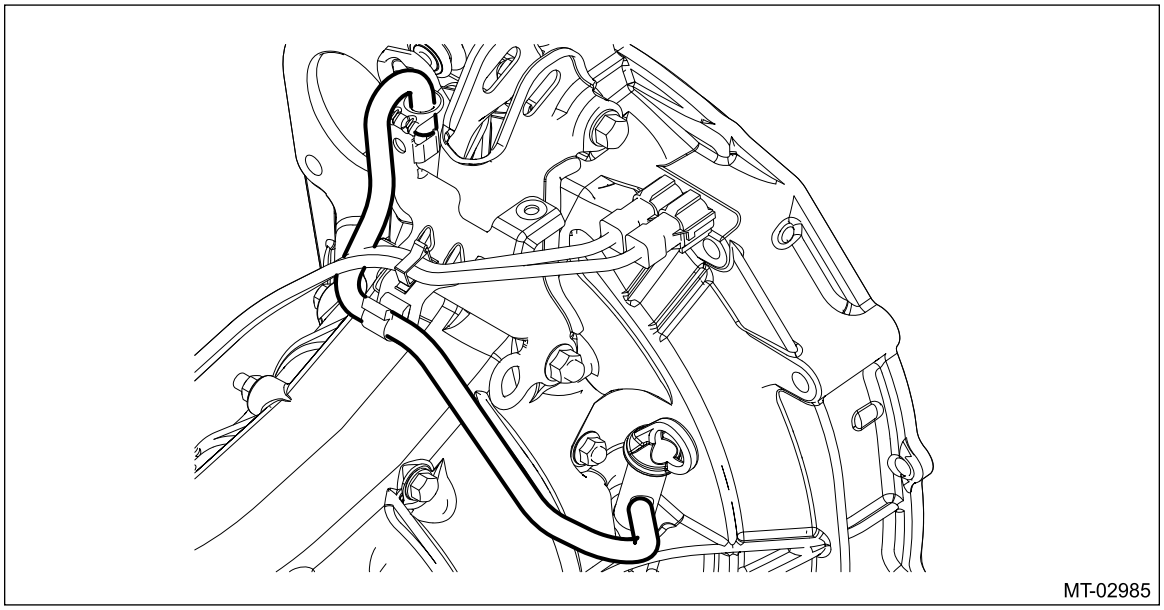
Gear shift position	Terminal No.	Specified resistance
Neutral position	1 and 2	Less than 1 Ω
Other positions		1 MΩ or more

4. Replace faulty parts.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75) > Air Breather Hose

REMOVAL

1. Disconnect the ground terminal from battery sensor. Ref. to NOTE>NOTE > BATTERY.
2. Remove the collector cover. Ref. to INTAKE (INDUCTION)(w/o STI)>Collector Cover>REMOVAL.
3. Remove the intercooler. Ref. to INTAKE (INDUCTION)(w/o STI)>Intercooler>REMOVAL.
4. Remove the air breather hose.



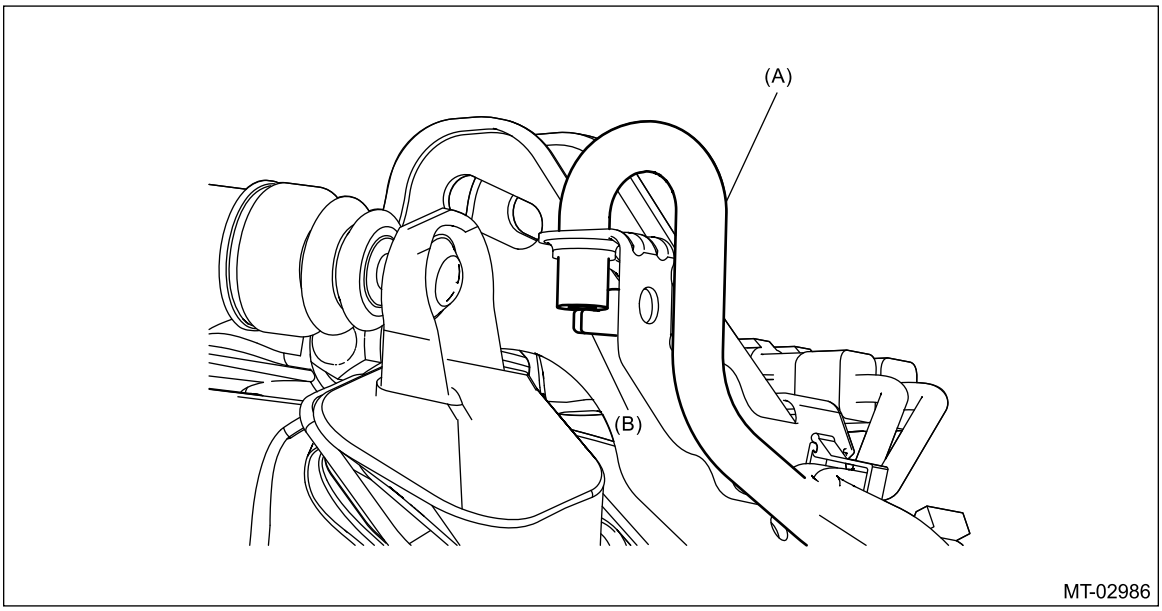
MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75) > Air Breather Hose

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.**



(A) Air breather hose (B) Catch

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75) > Air Breather Hose

INSPECTION

Check the hose for peeling, crack or clogging.

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.

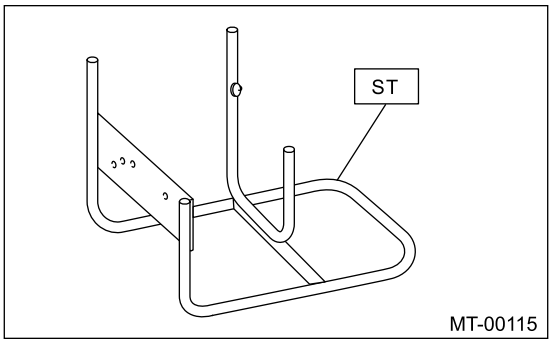
   Tightening torque:

   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



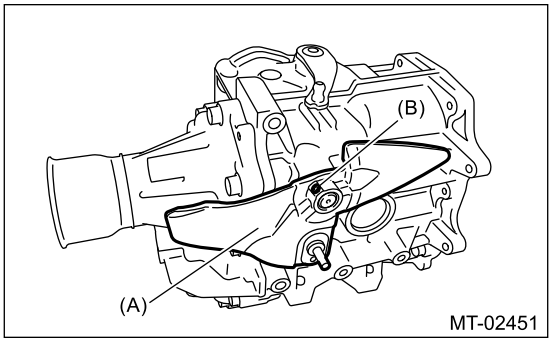
5. Apply transmission gear oil to rotating parts before assembly.
6. All disassembled parts, if to be reused, should be reinstalled in the original positions.
7. Gaskets, lock washers and lock nuts must be replaced with new ones.
8. Apply liquid gasket to the specified areas to prevent leakage.

REMOVAL

1. Remove the manual transmission assembly from the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Manual Transmission Assembly>REMOVAL.
2. Remove the back-up light switch and the neutral position switch. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Switches and Harness>REMOVAL.
3. Remove the transfer case together with the extension case assembly.
   (1) Remove the transmission cover.
   (A) Transmission cover

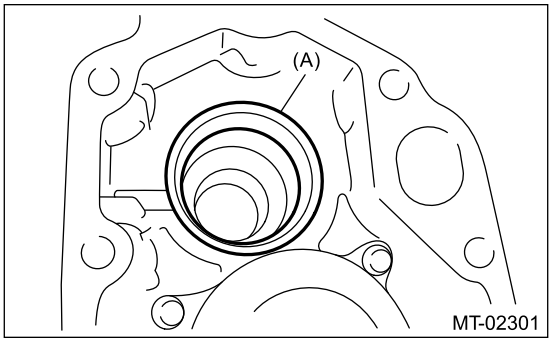
   (2) Set and hold the selector lever COMPL to the 1st-2nd side, and remove the transfer case and extension case assembly as a unit.
4. Remove the transfer cover.
5. Use the ST to push out the spring pin, and remove the shift lever COMPL.

ST 398791700 REMOVER



(A) Shift lever COMPL
(B) Straight pin

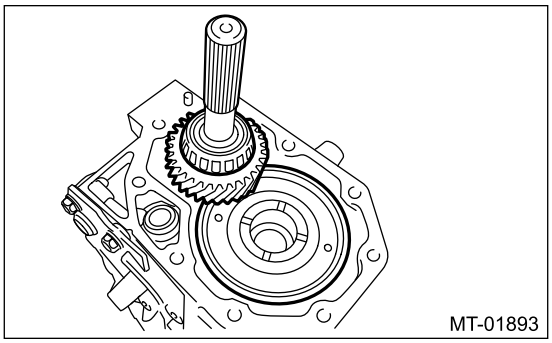
6. Remove the extension case assembly.
7. Remove the transfer driven gear and center differential as a unit.
8. Remove the taper roller bearing (extension case side) outer race and the adjusting washer.



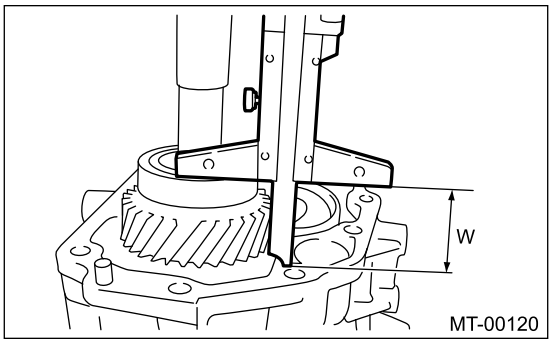
(A) Taper roller bearing (extension case side) outer race

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.

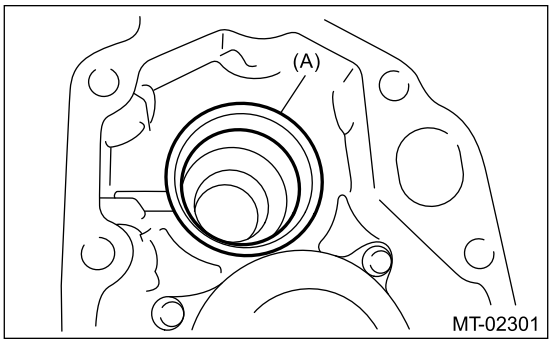


7. Measure the depth “X” of taper roller bearing insertion part of the extension case.
   Note:
   Measure while the taper roller bearing (extension case side) outer race and the adjusting washer are removed.
8. Calculate the adjusting washer thickness “t” using the following calculation.
   t = X − 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 × 61 × 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)
803050079	1.45 (0.0571)

10. Install the selected adjusting washer and taper roller bearing (extension case side) outer race.



(A) Taper roller bearing (extension case side) outer race

11. Measure the depth “S” between the transfer case + ST and the center differential.

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) × 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.

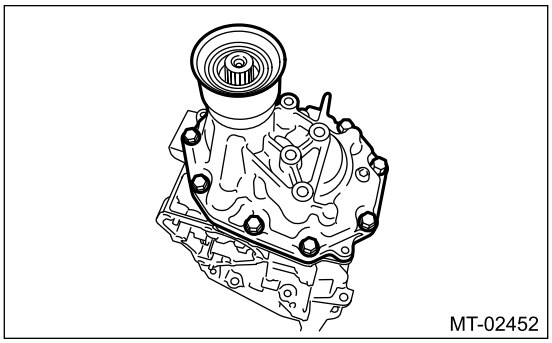
Liquid gasket:

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.

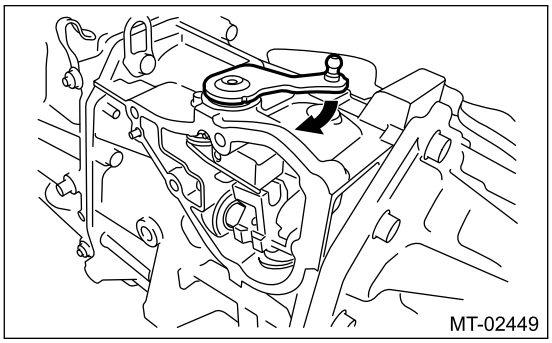
19. Install the transfer case together with the extension case assembly.

(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

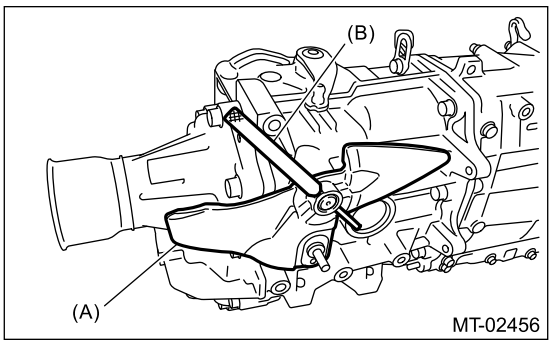
(A) Transmission case
(B) Transfer case
(C) Knock pin

(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.

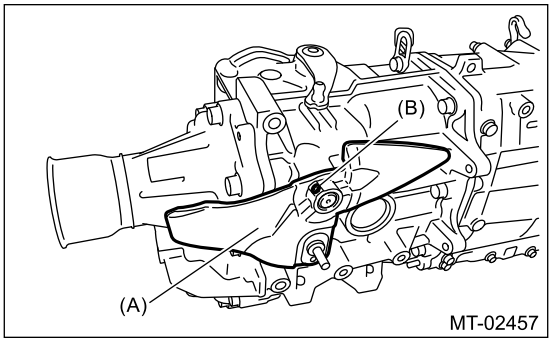
Tightening torque:

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 install the transfer cover mounting bolts.

(2) Tighten bolts in order of (B), (A), (C), (D).

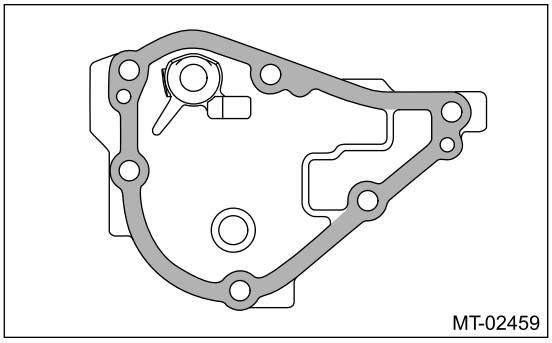
Tightening torque:

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)(TY75)>Switches and Harness>INSTALLATION.

29. Install the manual transmission assembly to the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Manual Transmission Assembly>INSTALLATION.

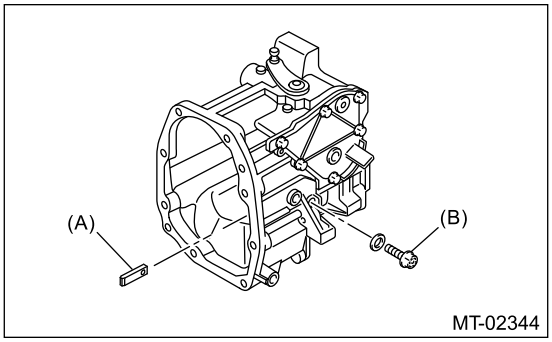
MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75) > Transfer Case and Extension Case Assembly

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)(TY75)>Shift Link Assembly>REMOVAL.

2. EXTENSION CASE

1. Remove the transfer drive gear assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Transfer Drive Gear>REMOVAL.
2. Remove the oil seal from the extension case. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Oil Seal>REPLACEMENT.
3. Remove the dust cover.

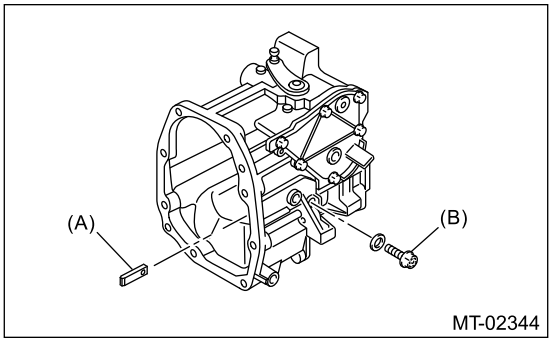
MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75) > Transfer Case and Extension Case Assembly

ASSEMBLY

1. TRANSFER CASE

1. Install the shift link assembly to the transfer case. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>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

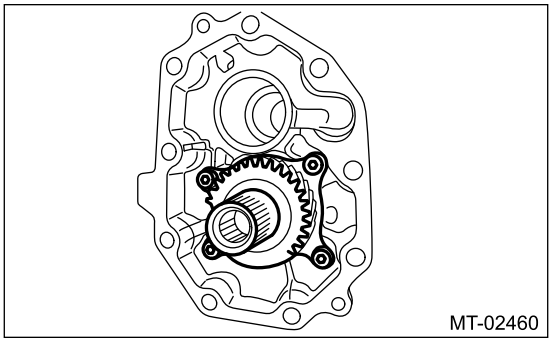
2. EXTENSION CASE

1. Using the ST, install the oil seal to the extension case. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>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)(TY75)>Transfer Drive Gear>INSTALLATION.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75) > Transfer Drive Gear

REMOVAL

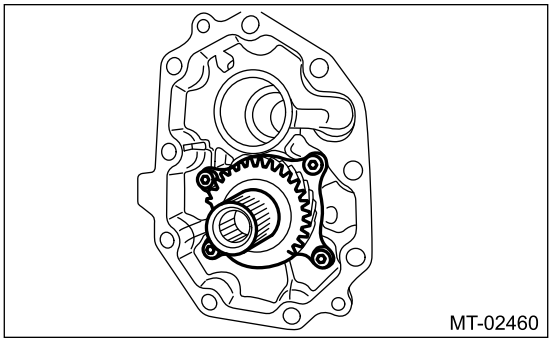
1. Remove the manual transmission assembly from the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Manual Transmission Assembly>REMOVAL.
2. Remove the back-up light switch and the neutral position switch. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Switches and Harness>REMOVAL.
3. Remove the transfer case together with the extension case assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>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)(TY75)>Transfer Driven Gear>REMOVAL.
6. Remove the transfer drive gear.



MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75) > Transfer Drive Gear

INSTALLATION

1. Install the transfer drive gear.
   Tightening torque:
   26 N·m (2.7 kgf-m, 19.2 ft-lb)



2. Install the transfer driven gear. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Transfer Driven Gear>INSTALLATION.
3. Select the adjusting washer. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Transfer Case and Extension Case Assembly>INSTALLATION.
4. Install the transfer case and the extension case assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>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)(TY75)>Switches and Harness>INSTALLATION.
6. Install the manual transmission assembly to the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Manual Transmission Assembly>INSTALLATION.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75) > Transfer Drive Gear

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.

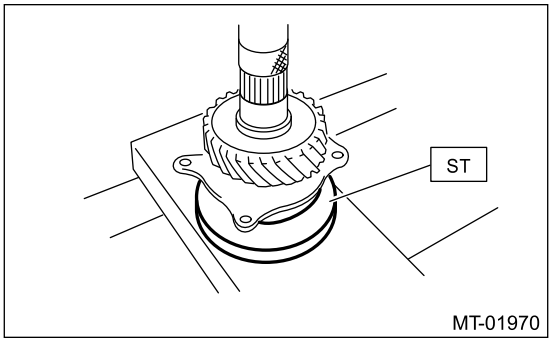
MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75) > Transfer Drive Gear

ASSEMBLY

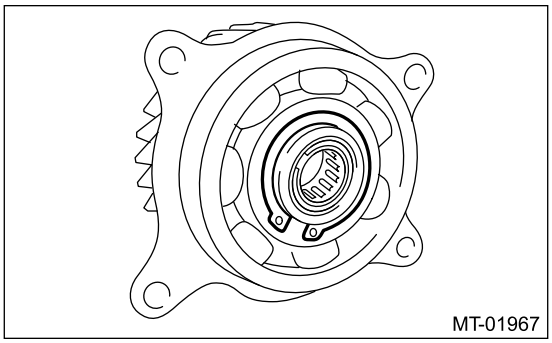
1. Install the needle bearing and snap ring to the transfer drive gear.
2. Set the ST to the ball bearing inner race, then install the transfer drive gear.

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)(TY75)>Transfer Drive Gear>INSPECTION.

INSPECTION

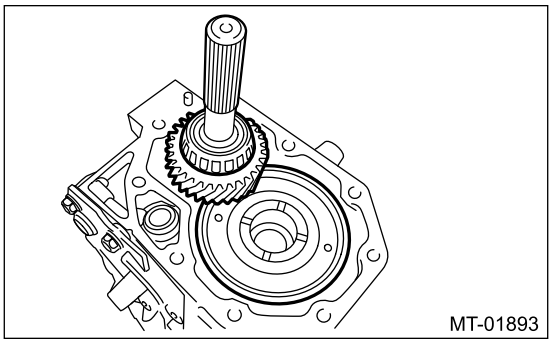
1. Ball bearing
   Replace the ball bearing in following cases.
   - In case of broken or rusty ball bearings
   - In case of worn or damaged ball bearings
   - When the ball bearings fail to turn smoothly or emit noise in rotation after transmission gear oil has been applied.
2. Transfer drive gear
   If the tooth face of transfer drive gear and the shaft are excessively broken or damaged, replace the transfer 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)

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75) > Transfer Driven Gear

REMOVAL

1. Remove the manual transmission assembly from the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Manual Transmission Assembly>REMOVAL.
2. Remove the back-up light switch and the neutral position switch. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Switches and Harness>REMOVAL.
3. Remove the transfer case together with the extension case assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>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.

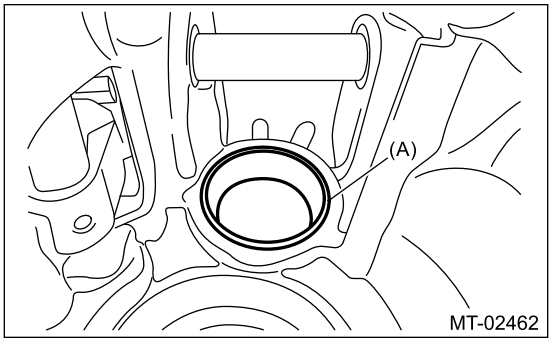


6. Remove the taper roller bearing outer race.
   (A) Taper roller bearing (transfer case side) outer race
   (B) Taper roller bearing (extension case side) outer race

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75) > Transfer Driven Gear

INSTALLATION

1. Install the taper roller bearing (transfer case side) outer race.



   (A) Taper roller bearing (transfer case side) outer race

2. Apply a coat of grease to the taper roller bearing (transfer case side) of transfer driven gear and the roller rolling surface of the taper roller bearing (extension case side).

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)(TY75)>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)(TY75)>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)(TY75)>Switches and Harness>INSTALLATION.
8. Install the manual transmission assembly to the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Manual Transmission Assembly>INSTALLATION.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75) > Transfer Driven Gear

DISASSEMBLY

1. Using the ST, remove the taper roller bearing (extension case side).

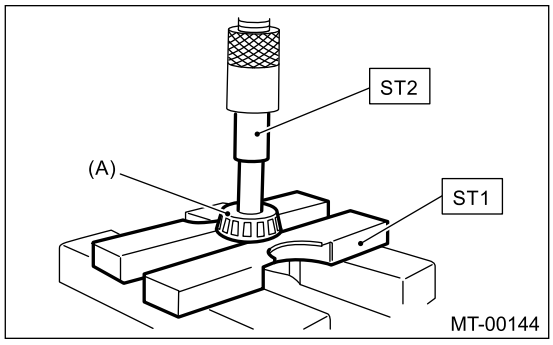
ST 498077000 REMOVER

(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)

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75) > Transfer Driven Gear

ASSEMBLY

1. Using the ST, install the taper roller bearing (transfer case side).

Caution:

Do not apply a load in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

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)

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75) > Transfer Driven Gear

INSPECTION

1. Taper roller bearing
Replace the taper roller bearing in the following cases.
   - In case of broken or rusty taper roller bearings
   - In case of worn or damaged taper roller bearings
   - When the taper roller 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 transfer driven gear and the shaft are excessively broken or damaged, replace the transfer driven gear.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75) > Center Differential

REMOVAL

1. Remove the manual transmission assembly from the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Manual Transmission Assembly>REMOVAL.
2. Remove the back-up light switch and the neutral position switch. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Switches and Harness>REMOVAL.
3. Remove the transfer case together with the extension case assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>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)(TY75)>Transfer Driven Gear>REMOVAL.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75) > Center Differential

INSTALLATION

1. Install the center differential and transfer driven gear into the transfer case as a unit. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Transfer Driven Gear>INSTALLATION.
2. Select the adjusting washer. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Transfer Case and Extension Case Assembly>INSTALLATION.
3. Install the transfer driven gear. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Transfer Driven Gear>INSTALLATION.
4. Install the transfer case together with the extension case assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>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)(TY75)>Switches and Harness>INSTALLATION.
6. Install the manual transmission assembly to the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Manual Transmission Assembly>INSTALLATION.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75) > Center Differential

DISASSEMBLY

Remove the ball bearing using ST.

Note:

Center differential is a non-disassembled part which should not be disassembled.

ST	**498077600**	**REMOVER**

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75) > Center Differential

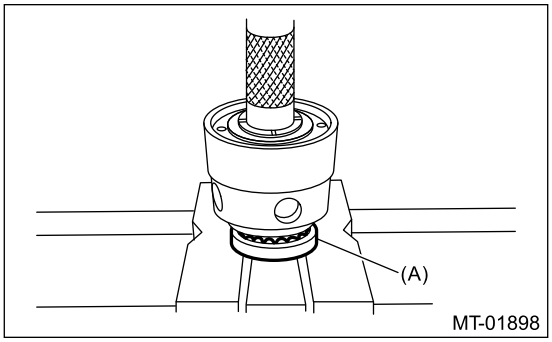
ASSEMBLY

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

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75) > Center Differential

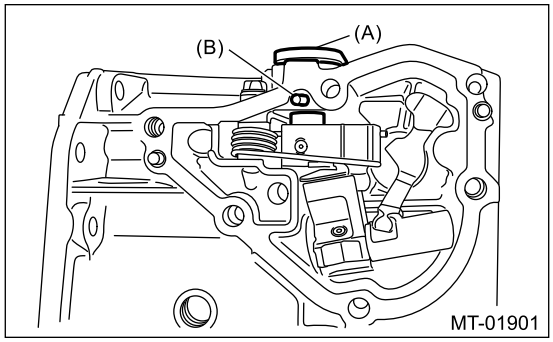
INSPECTION

1. Ball bearing
   Replace the ball bearing in following cases.
   - In case of broken or rusty ball bearings
   - In case of worn or damaged ball bearings
   - When the ball bearings fail to turn smoothly or emit noise in rotation after transmission gear oil has been applied.
   - When the ball bearing has other defects.
2. Center differential
   If there is wear or damage, replace the center differential assembly.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75) > Shift Link Assembly

REMOVAL

1. Remove the manual transmission assembly from the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Manual Transmission Assembly>REMOVAL.
2. Remove the back-up light switch and the neutral position switch. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Switches and Harness>REMOVAL.
3. Remove the transfer case together with the extension case assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>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)(TY75)>Transfer Driven Gear>REMOVAL.
6. Pull out the straight pin.



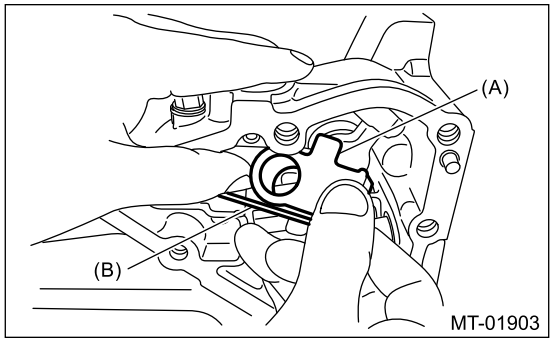
(A) Selector lever COMPL
(B) Straight pin

7. Use the ST to remove the straight pin, and remove the selector lever COMPL.

ST 398791700 REMOVER

(A) Selector lever COMPL
(B) Selector arm No. 2
(C) Straight pin

8. Remove the selector arm No. 2.



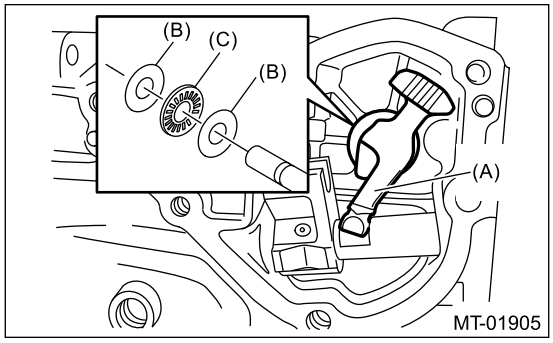
(A) Selector arm No. 2
(B) Neutral set spring

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.



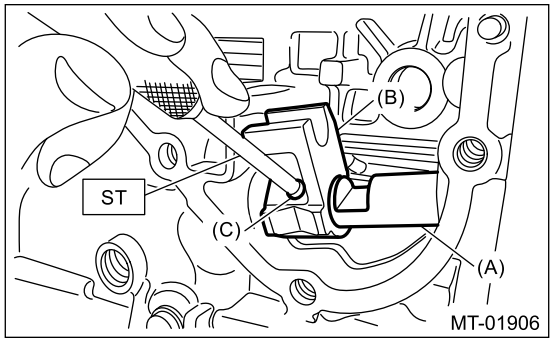
(A) Shifter arm No. 2

(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

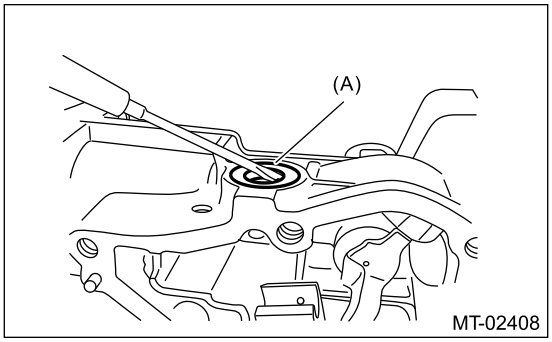
(B) Selector arm

(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

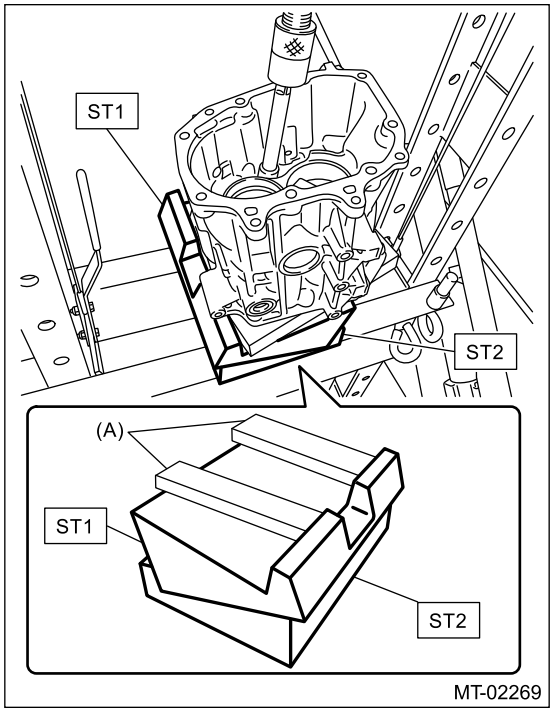
15. Remove the roller bearing by using a round bar with the diameter of 22 mm (0.87 in) or 23 mm (0.91 in).

16. Flip over the transfer case, and set an iron plate between transfer case and ST.

Note:

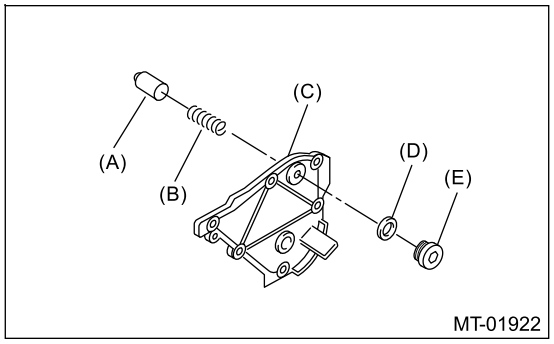
- **Insert the iron plate which is thicker than the exposed length of the transfer case knock pin between the ST and transfer case.**
- **Set the iron plate so that the transfer case knock pin does not ride on the iron plate.**

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)(TY75) > 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

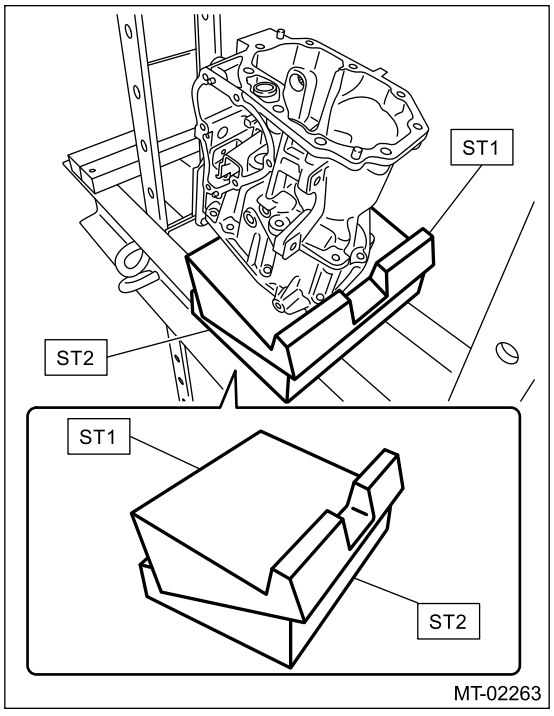
4. Set ST1, ST2 and transfer case to a press.

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.

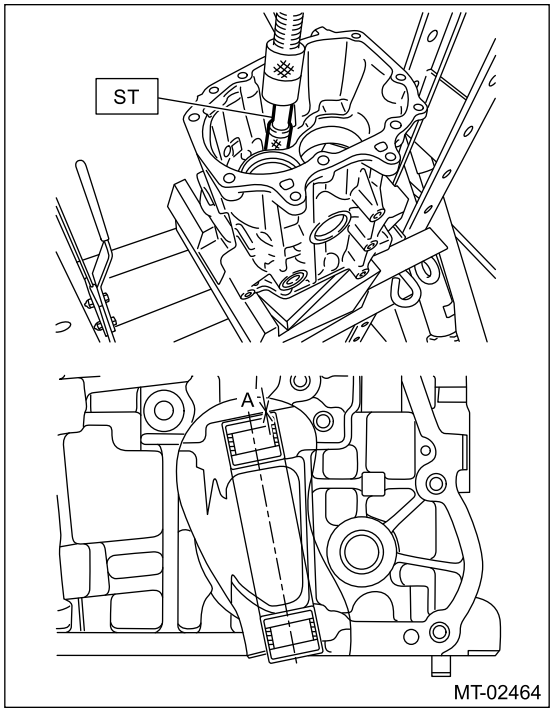
Note:

- **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±0.01 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

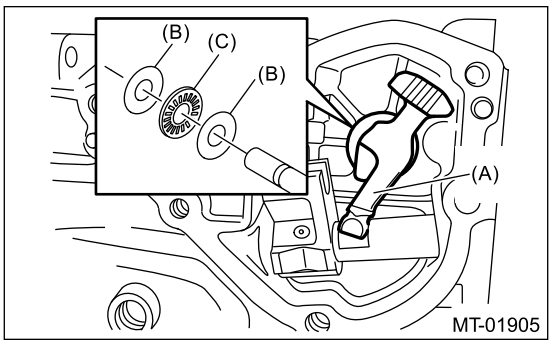
(B) Selector arm

(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:

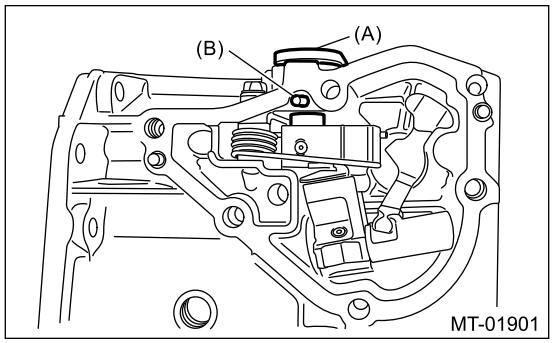
Be careful not to damage the oil seal.

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

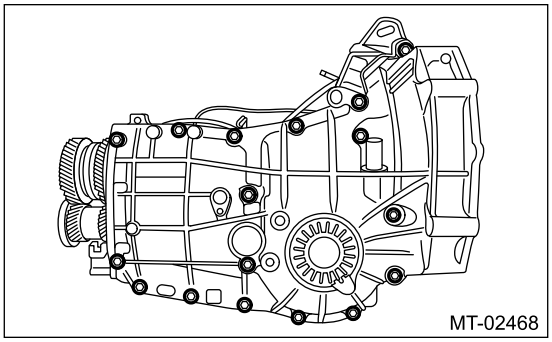
15. Install the center differential and transfer driven gear as a unit.
16. Install the transfer case and the extension case assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Transfer Case and Extension Case Assembly>INSTALLATION.
17. Apply liquid gasket seamlessly.
Liquid gasket:
THREE 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)(TY75)>Switches and Harness>INSTALLATION.
20. Install the manual transmission assembly to the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Manual Transmission Assembly>INSTALLATION.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75) > Transmission Case

REMOVAL

1. Remove the manual transmission assembly from the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>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)(TY75)>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)(TY75)>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)(TY75)>Reverse Idler Gear>REMOVAL.
12. Remove the shifter fork and rod. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Shifter Fork and Rod>REMOVAL.
13. Remove the front oil guide.

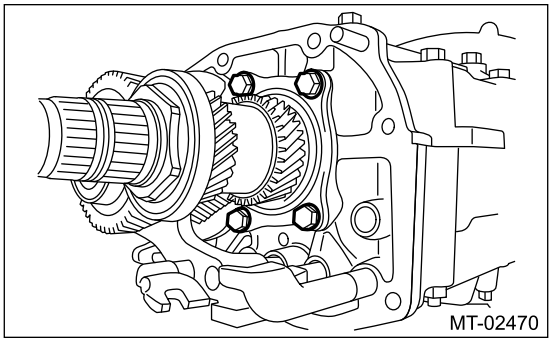
MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75) > Transmission Case

INSTALLATION

1. Wipe off grease, oil and dust on the mating surfaces of transmission cases with cleaning solvent.

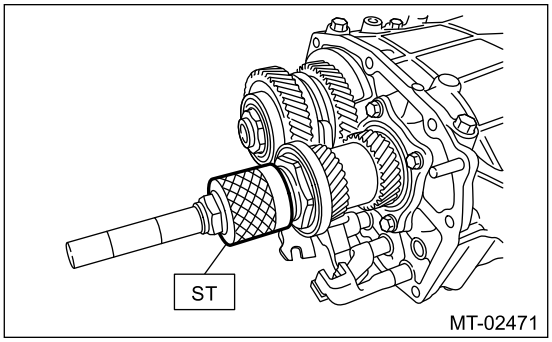
2. Install the shifter fork and rod. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT) (TY75)>Shifter Fork and Rod>INSTALLATION.
3. Install the reverse idler gear. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT) (TY75)>Reverse Idler Gear>INSTALLATION.
4. Select the drive pinion shim. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT) (TY75)>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. Align the left and right side of the transmission case, and tighten it with 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 differential 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.

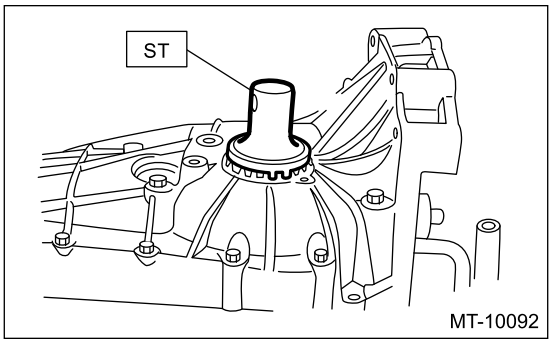
ST1 399780104 WEIGHT

ST2 18658AA021 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 18658AA021 WRENCH COMPL RETAINER



(5) Loosen the differential side retainer on the LH side of the transmission case by 3 notches, and turn the differential 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) Tighten temporarily both the retainer lock plates LH and RH, and put marks on both the differential side retainer and retainer lock plate for later readjustment.

Note:
When it is difficult to attach the retainer lock plate, turn over the retainer lock plate and attach.

(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)(TY75)>Front Differential Assembly>INSPECTION.

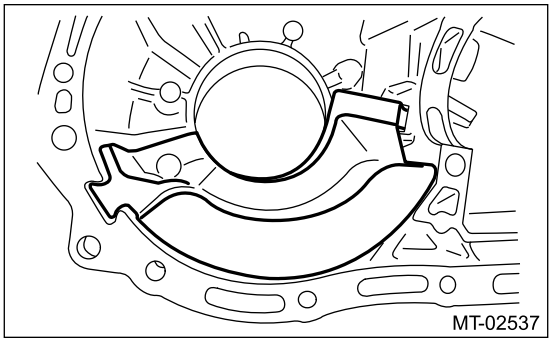
14. Separate the transmission case into left and right parts. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Transmission Case>REMOVAL.

15. Check each shifter fork. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Shifter Fork and Rod>INSPECTION.

16. Select a main shaft rear plate. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Main Shaft Assembly>ADJUSTMENT.

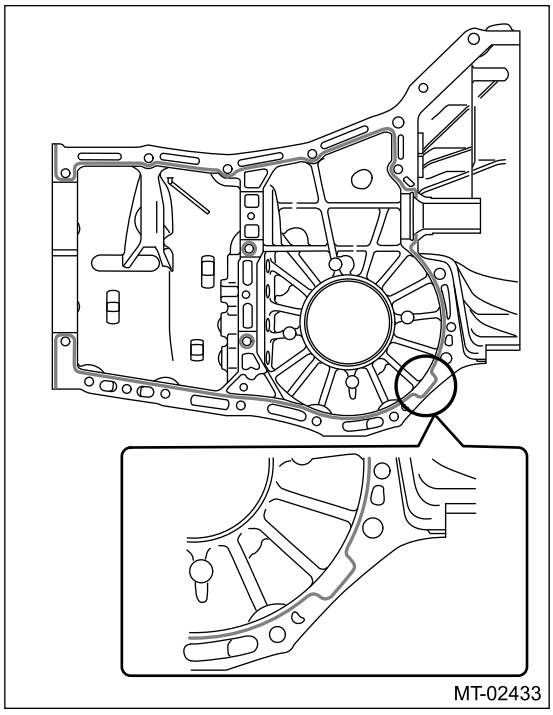
17. Install the front oil guide.

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.**

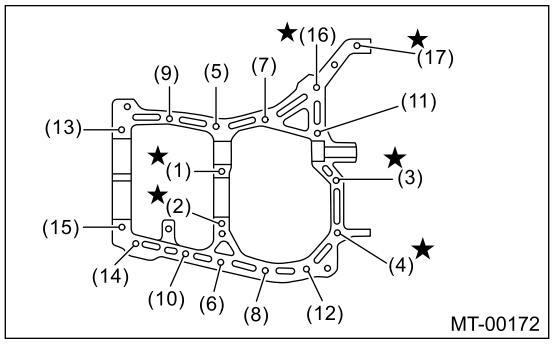
Tightening torque:

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 differential side retainer into the position where it was not loosened.

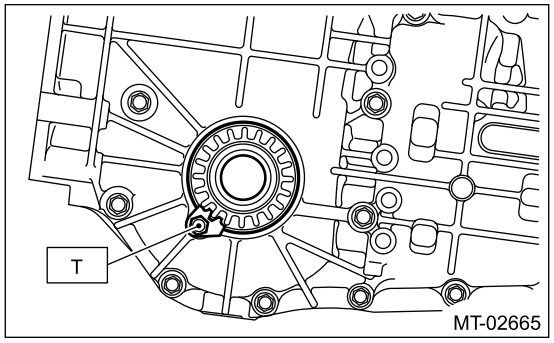
Note:

- **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 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)(TY75)>Transfer Case and Extension Case Assembly>INSTALLATION.

24. Install the clutch release lever and release bearing. Ref. to CLUTCH SYSTEM>Release Bearing and Lever>INSTALLATION.
25. Install the manual transmission assembly to the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Manual Transmission Assembly>INSTALLATION.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75) > Transmission Case

INSPECTION

Check the transmission case for cracks, damage, or oil leaks.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75) > Main Shaft Assembly

REMOVAL

1. Remove the manual transmission assembly from the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Manual Transmission Assembly>REMOVAL.
2. Remove the transfer case together with the extension case assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Transfer Case and Extension Case Assembly>REMOVAL.
3. Remove the transmission case. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Transmission Case>REMOVAL.
4. Remove the drive pinion shaft assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Drive Pinion Shaft Assembly>REMOVAL.
5. Remove the main shaft assembly.

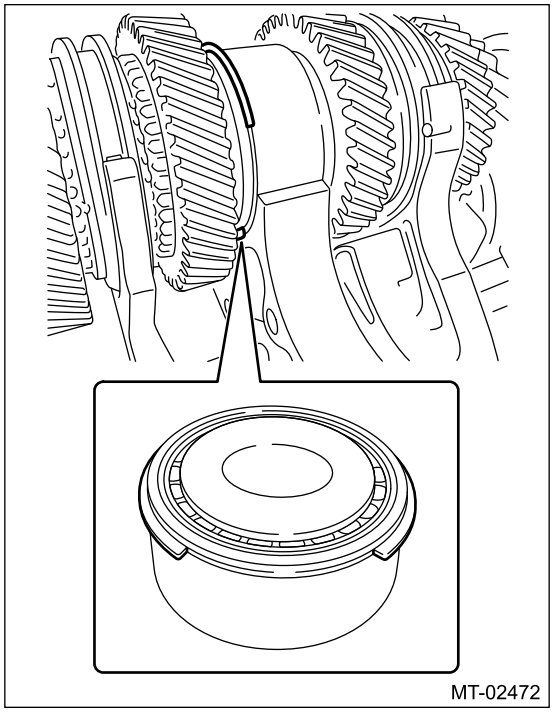
MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75) > Main Shaft Assembly

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 seal.**
   - **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)(TY75)>Drive Pinion Shaft Assembly>INSTALLATION.
6. Check each shifter fork. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Shifter Fork and Rod>INSPECTION.
7. Select a main shaft rear plate. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Main Shaft Assembly>ADJUSTMENT.
8. Install the transmission case. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Transmission Case>INSTALLATION.
9. Install the transfer case together with the extension case assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Transfer Case and Extension Case Assembly>INSTALLATION.
10. Install the manual transmission assembly to the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Manual Transmission Assembly>INSTALLATION.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75) > Main Shaft Assembly

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.

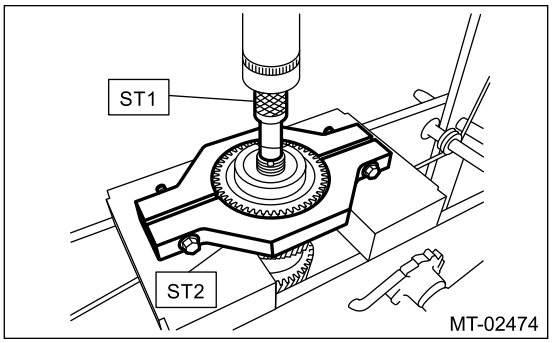
   ST1 498937000 TRANSMISSION HOLDER

   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.

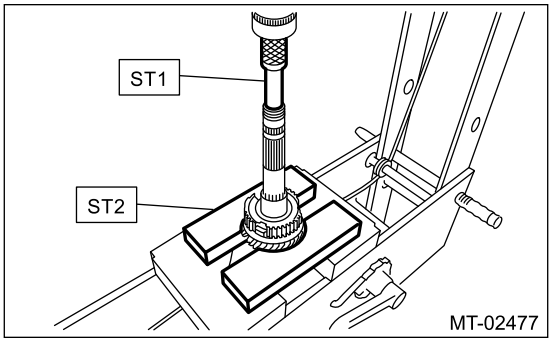
   ST1 899864100 REMOVER

   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

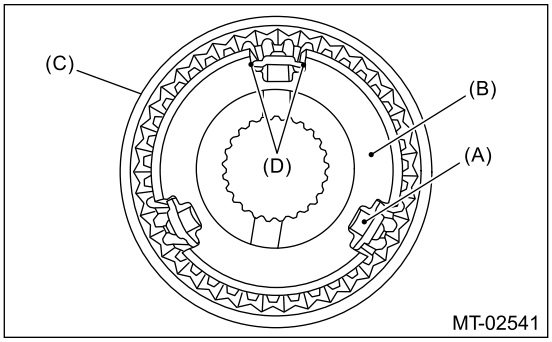
    ST2 899714110 REMOVER



ASSEMBLY

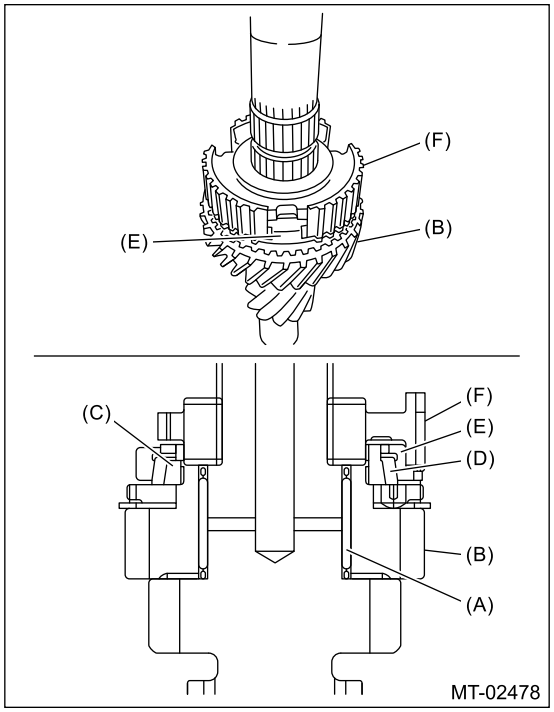
Note:

- **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.**

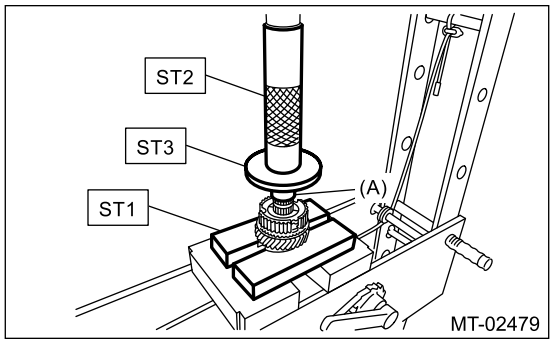


(A) 3rd needle bearing
(B) 3rd drive gear
(C) 3rd inner baulk ring
(D) 3rd synchro cone
(E) 3rd outer baulk ring
(F) 3rd-4th synchronizer hub

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.

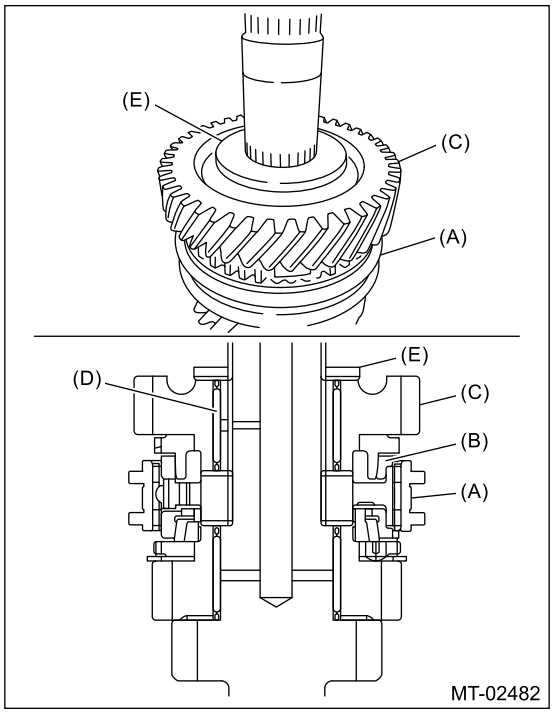
5. Install the 4th baulk ring, 4th needle bearing, 4th drive gear and 4th gear thrust washer.

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

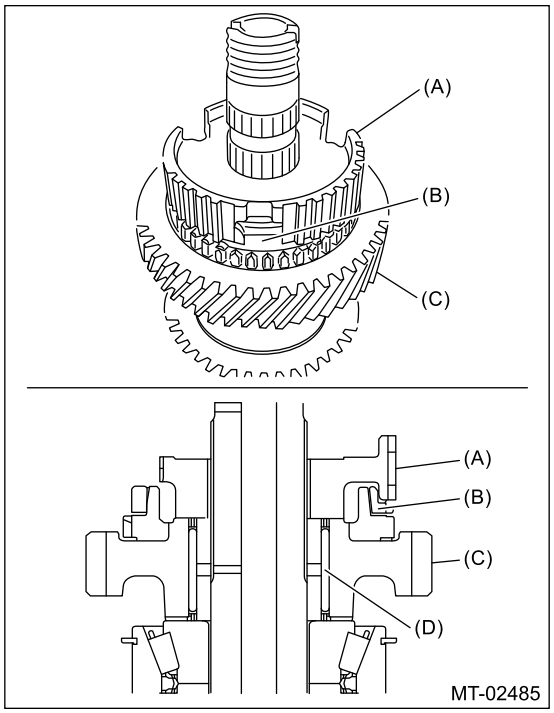
ST2 499877000 RACE 4-5 INSTALLER

(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

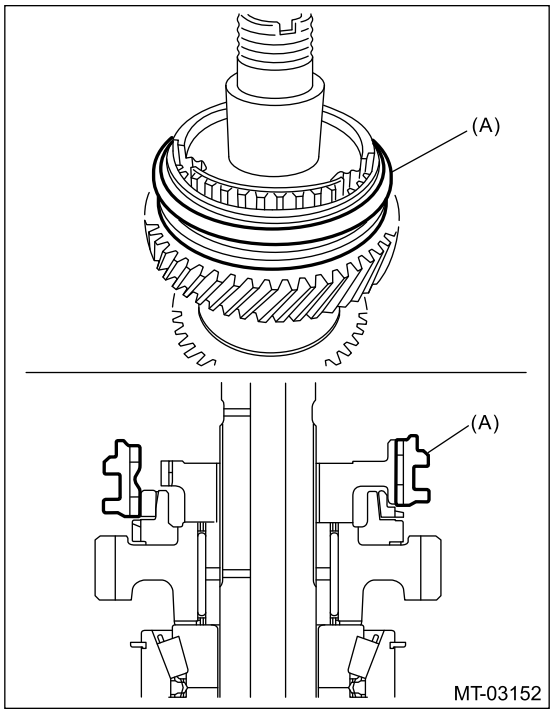
ST2 499877000 RACE 4-5 INSTALLER

(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.**



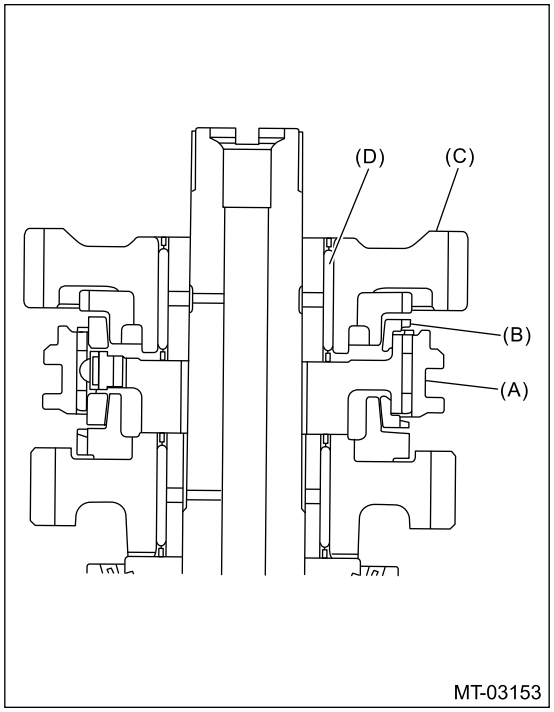
(A) 5th-6th coupling sleeve

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

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75) > Main Shaft Assembly

INSPECTION

Disassembled parts should be washed with cleaning solvent first, then inspected.

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

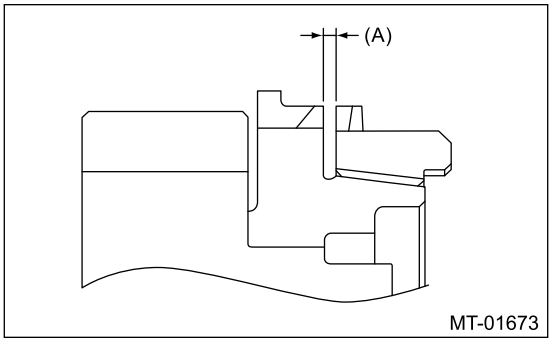
Replace the baulk ring and synchro cone in the following cases.

- 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.

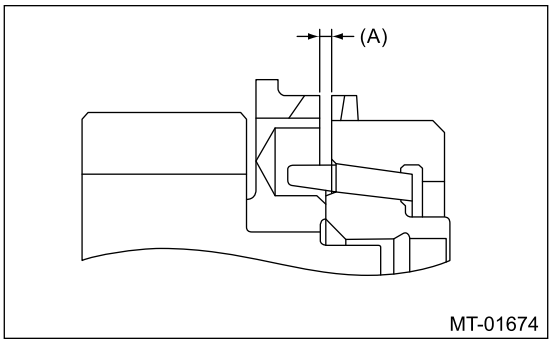
  Clearance (A):

  0.5 mm (0.020 in) or more

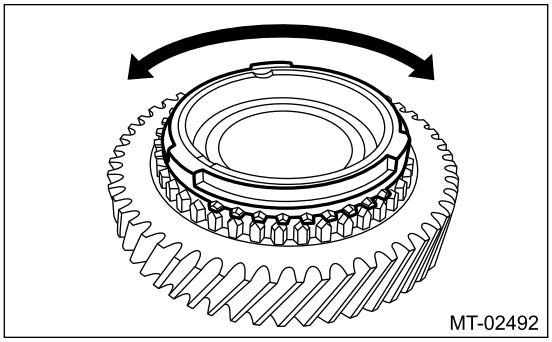
- Single cone



- 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.

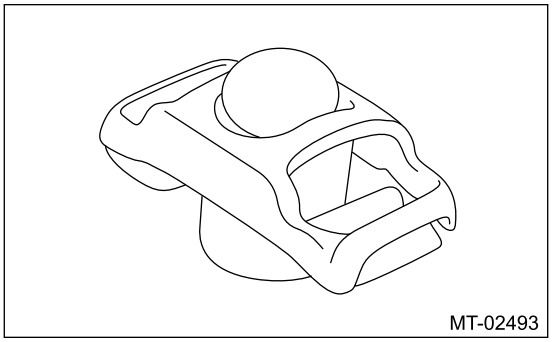


5. Coupling sleeve and synchronizer hub

- 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.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75) > Main Shaft Assembly

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

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75) > Drive Pinion Shaft Assembly

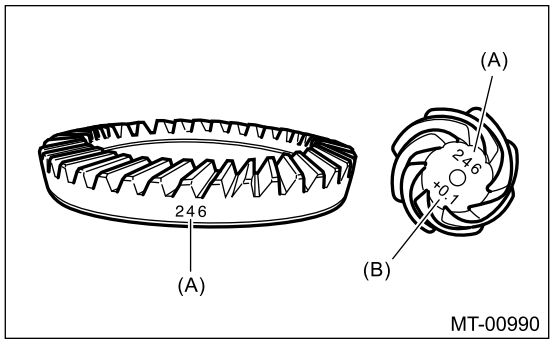
REMOVAL

1. Remove the manual transmission assembly from the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Manual Transmission Assembly>REMOVAL.
2. Remove the transfer case together with the extension case assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Transfer Case and Extension Case Assembly>REMOVAL.
3. Remove the transmission case. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Transmission Case>REMOVAL.
4. Remove the drive pinion shaft assembly.
   Note:
   Use a hammer handle, etc. to remove if too tight.
   (A) Main shaft ASSY
   (B) Drive pinion shaft ASSY
5. Remove the main shaft assembly.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75) > 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

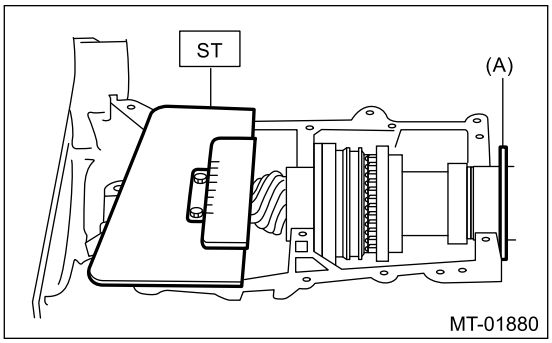
(2) Tighten the two bolts.

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)(TY75)>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)(TY75)>Main Shaft Assembly>INSTALLATION.

12. Check each shifter fork. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Shifter Fork and Rod>INSPECTION.
13. Install the transmission case. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Transmission Case>INSTALLATION.
14. Install the transfer case together with the extension case assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Transfer Case and Extension Case Assembly>INSTALLATION.
15. Install the manual transmission assembly to the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Manual Transmission Assembly>INSTALLATION.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75) > Drive Pinion Shaft Assembly

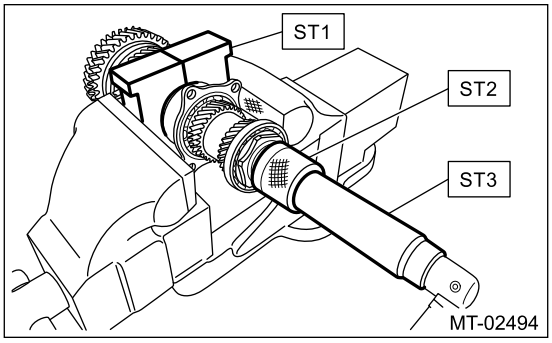
DISASSEMBLY

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)**



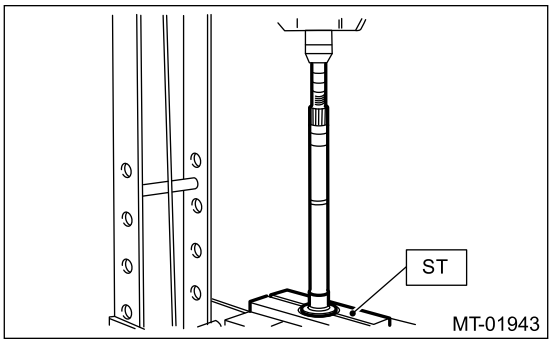
3. Remove the lock washer, washer, differential bevel gear sleeve, adjusting washer No. 1, thrust bearing and adjusting washer No. 2.
   (A) Lock washer
   (B) Washer
   (C) Differential bevel gear sleeve
   (D) Adjusting washer No. 1 (25 × 36 × t)
   (E) Thrust bearing (25 × 36 × 2)
   (F) Adjusting washer No. 2 (25 × 36 × 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 × 30 × 20)

6. Remove the needle bearing and thrust bearing.
   (A) Needle bearing (30 × 37 × 23)
   (B) Thrust bearing (33 × 50 × 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.

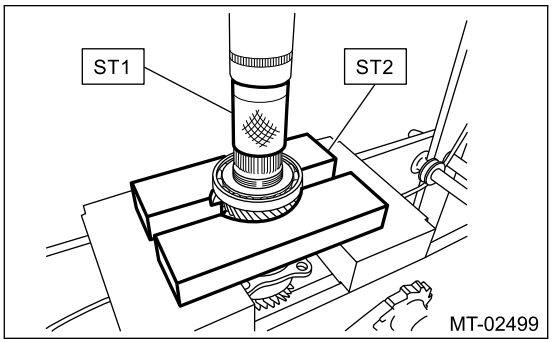
ST1 499987300 SOCKET WRENCH (50)

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

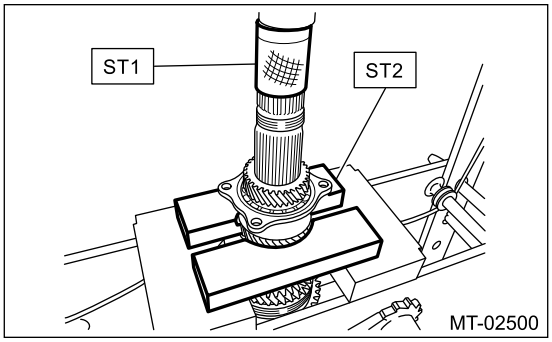
ST2 899714110 REMOVER



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.

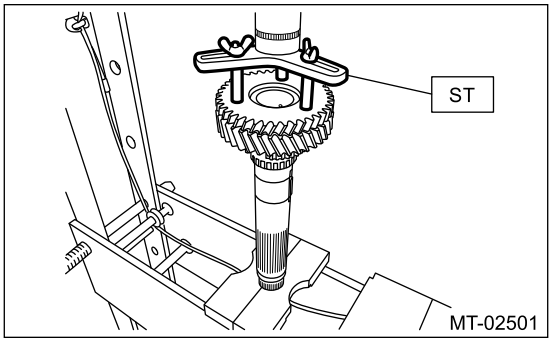
13. Remove the 2nd driven gear, 2nd inner baulk ring, 2nd synchro cone, 2nd outer baulk ring, 1st-2nd shifting insert and 1st-2nd coupling sleeve.

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

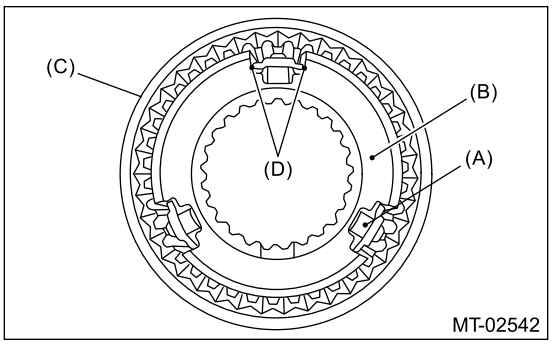


MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75) > Drive Pinion Shaft Assembly

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.**

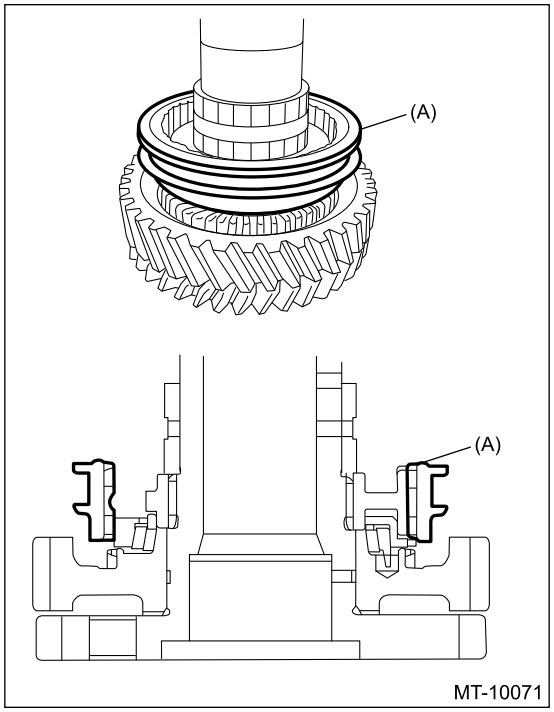
   ST 18654AA000 INSTALLER

   (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.**

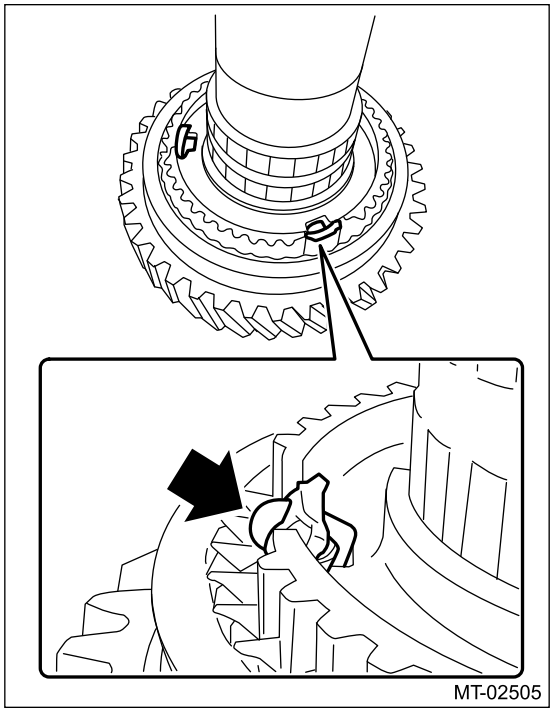


(A) 1st-2nd coupling sleeve

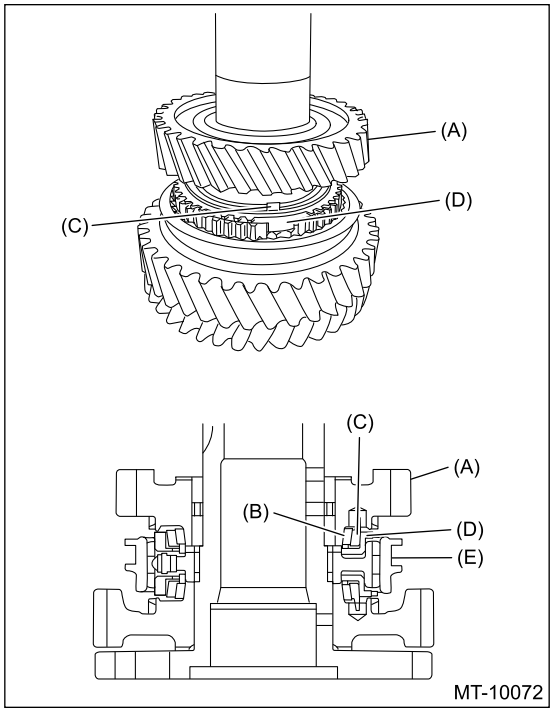
4. Install the 1st-2nd shifting insert.

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 to 1.5 N (0.01 to 0.15 kgf, 0.02 to 0.34 lbf).

15. Crimp the lock nut at two locations so that the dimension (B) becomes 39.1 mm (1.54 in) or less.

Caution:

When crimping the lock nut, be careful not to crack it.

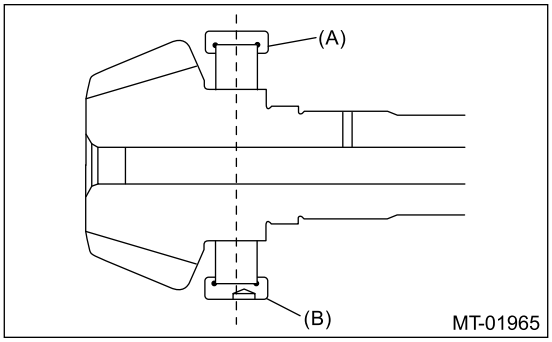
(A) Lock nut

(B) Outer dimension after crimping

16. Install the roller bearing.

Note:

- **Use a new roller bearing.**
- **Install with 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 × 30 × 20)
(E) Adjusting washer No. 2 (25 × 36 × t)
(F) Thrust bearing (25 × 36 × 2)
(G) Adjusting washer No. 1 (25 × 36 × t)
(H) Differential bevel gear sleeve

20. Adjust the thrust bearing preload. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Drive Pinion Shaft Assembly>ADJUSTMENT > THRUST BEARING PRELOAD.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75) > Drive Pinion Shaft Assembly

INSPECTION

Disassembled parts should be washed with cleaning solvent first, then inspected.

1. Bearing

Replace the bearings in the following cases.

- When the bearing balls, outer races and inner races are broken or rusty.
- When the bearing is worn.
- When the bearings fail to turn smoothly or emit noise in rotation after transmission gear oil has been applied.

- The double ball bearing of the drive pinion shaft should be checked for smooth rotation before the drive pinion shaft assembly is disassembled. In this case, because a preload is working on the bearing, its rotation feels like it is slightly dragging unlike other bearings.
  (A) Drive pinion shaft
  (B) Double ball bearing

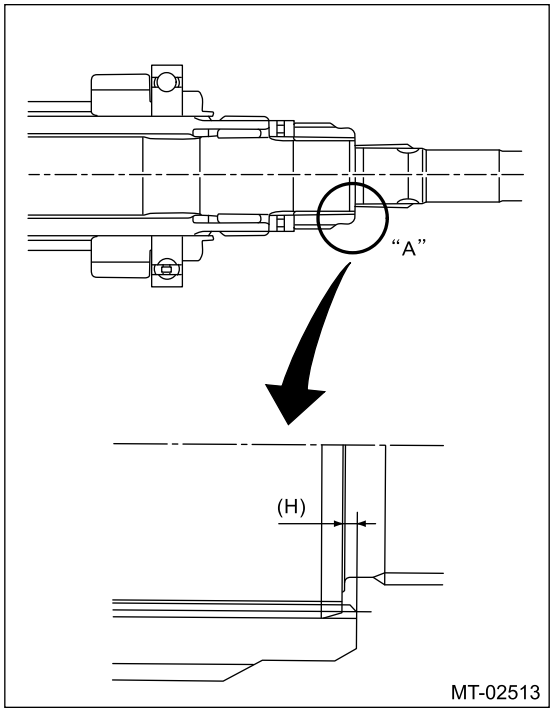
- When bearing has other defects.

2. Bushing (each gear)
   Replace the bushing in following cases.
   - When the sliding surface is damaged or abnormally worn.
   - When the inner wall is abnormally worn.
3. Gear
   Replace gears in the following cases.
   - Replace the gear with new part if its tooth surfaces are broken, damaged or excessively worn.
   - Correct or replace if the cone that contacts the baulk ring is rough or damaged.
   - Correct or replace if the inner surface or end face is damaged.
4. Baulk ring, synchro cone
   Replace the baulk ring and synchro cone in the following cases.
   - When the inner surface and end face are damaged.
   - When the baulk ring inner surface is abnormally or partially worn down.
   - If the gap between the end faces of the baulk ring and the gear splined part is excessively small, check the clearance (A) while pressing the ring against the cone.
     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.

ADJUSTMENT

1. THRUST BEARING PRELOAD

1. Select a suitable adjusting washer No. 1 so that dimension (H) will be zero in a visual check. Position the washer (20 × 31 × 4) and lock washer (20 × 31 × 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)**

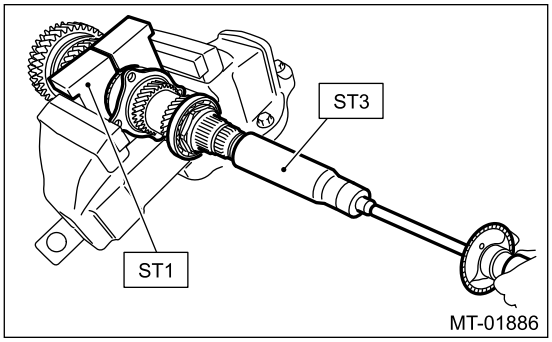
(A) Lock nut
(B) Lock washer
(C) Washer
(D) Lock nut side

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

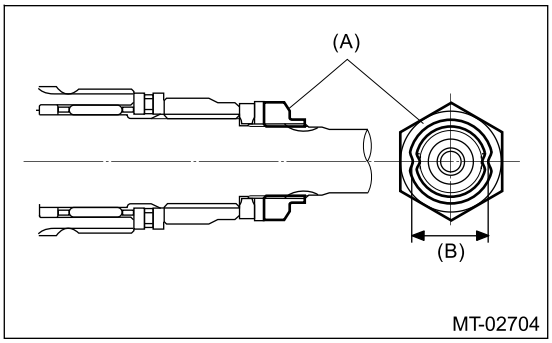
Starting torque	Dimension H	Adjusting washer No. 2
Low	Small	Select thicker one.
High	Large	Select thinner one.

Adjusting washer No. 2	
Part No.	**Thickness mm (in)**
803025070	2.850 (0.1122)
803025074	3.000 (0.1181)
803025078	3.150 (0.1240)

6. Recheck that the starting torque is within the 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.



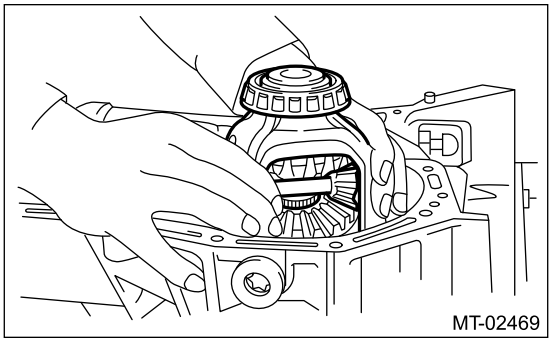
(A) Lock nut

(B) Outer dimension after crimping

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75) > Front Differential Assembly

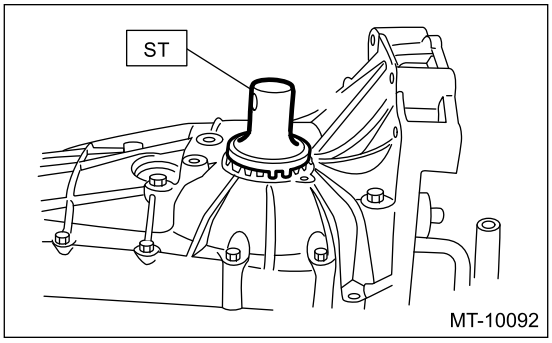
REMOVAL

1. Remove the manual transmission assembly from the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Manual Transmission Assembly>REMOVAL.
2. Remove the transfer case together with the extension case assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Transfer Case and Extension Case Assembly>REMOVAL.
3. Remove the transmission case. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Transmission Case>REMOVAL.
4. Remove the drive pinion shaft assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Drive Pinion Shaft Assembly>REMOVAL.
5. Remove the main shaft assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>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 18658AA021 WRENCH COMPL RETAINER



8. Remove the taper roller bearing outer race from the transmission case.

   ST 398527700 PULLER ASSY

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75) > Front Differential Assembly

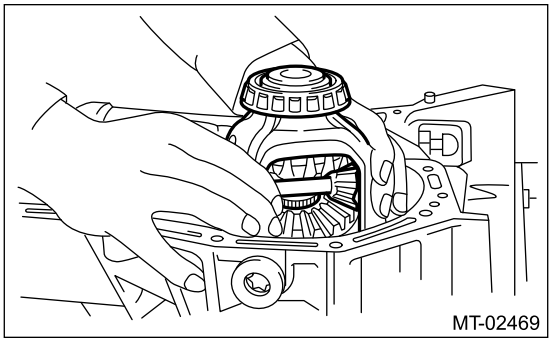
INSTALLATION

1. Install the differential side retainers using ST.

ST 18658AA021 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)(TY75)>Main Shaft Assembly>INSTALLATION.
5. Install the drive pinion shaft assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Drive Pinion Shaft Assembly>INSTALLATION.
6. Install the transmission case. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Transmission Case>INSTALLATION.
7. Install the transfer case together with the extension case assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Transfer Case and Extension Case Assembly>INSTALLATION.
8. Install the manual transmission assembly to the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Manual Transmission Assembly>INSTALLATION.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75) > Front Differential Assembly

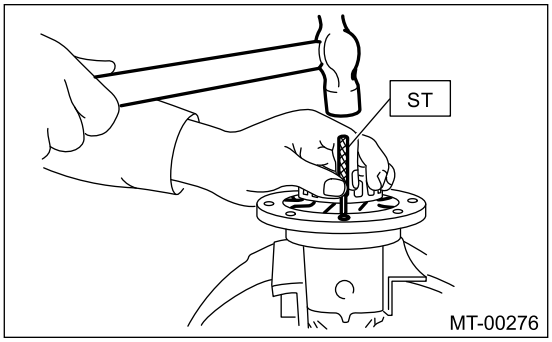
DISASSEMBLY

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

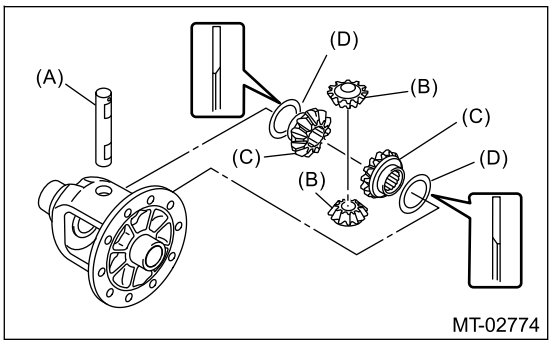
1. Remove the O-rings.
2. Remove the oil seal.
   Note:
   Remove using the flat tip screwdriver.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75) > Front Differential Assembly

ASSEMBLY

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 differential 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)(TY75)>Front Differential Assembly>INSPECTION > DIFFERENTIAL BEVEL PINION GEAR BACKLASH.

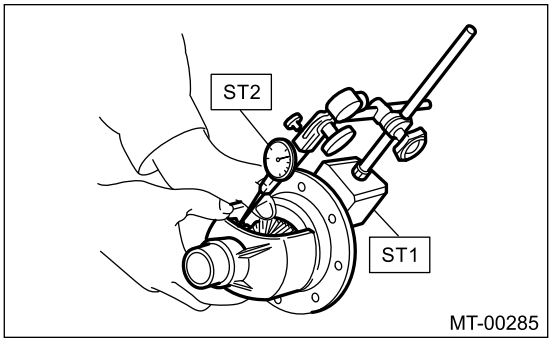
Note:

Be sure the differential bevel pinion gear teeth contact 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**

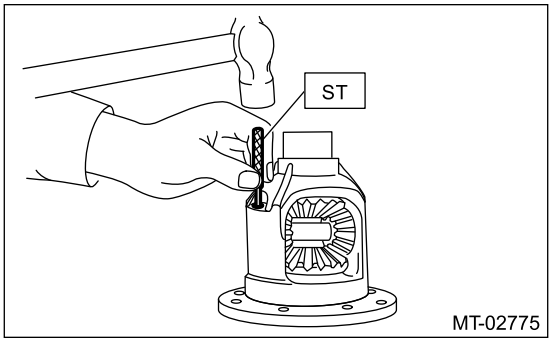


3. Align the pinion shaft pin hole with the differential case pin hole, and drive the straight pin into the holes from the hypoid driven gear side using the ST.

Note:

Use a new straight pin. After driving, 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.

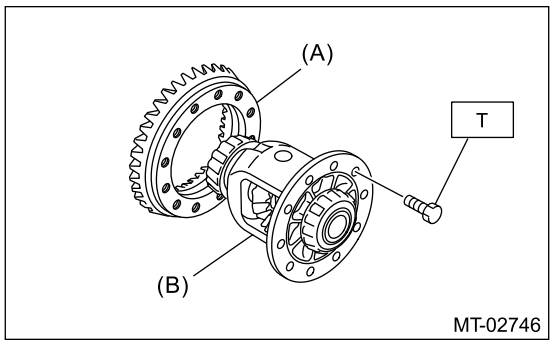
ST1 499277100 BUSHING 1-2 INSTALLER

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.

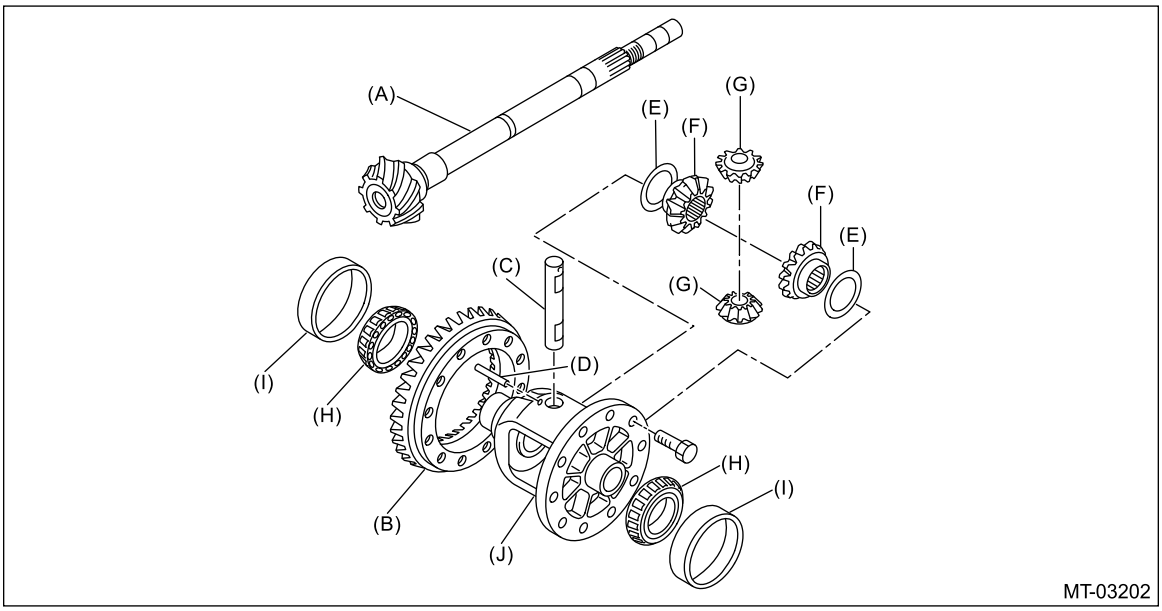
Note:

- **Use new O-rings.**
- **Apply transmission gear oil to O-ring.**
- **Do not stretch or damage the O-ring.**
- **Install the O-ring after hypoid driven gear backlash adjustment and completion of tooth contact inspection.**

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 inner race
(I) Taper roller bearing outer race
(J) 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)(TY75)>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**

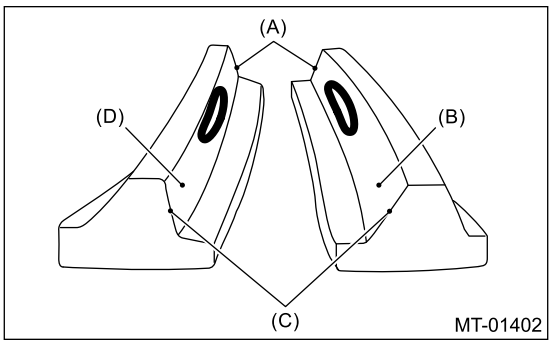
2. Install SUBARU genuine axle shafts to both sides, rotate in the inversion direction so that the gauge contacts the tooth surface, and read the dial gauge.
Note:
If the backlash is outside the specified range, adjust it by turning the differential side retainers on the left and right side.
Backlash
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 hypoid driven gear. Move the hypoid driven gear back and forth by turning the transmission main shaft until a definite contact pattern is developed on the hypoid driven gear, and judge whether face contact is correct. When the contact pattern is not correct, adjust. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Front Differential Assembly>ADJUSTMENT.

- Tooth contact is correct.



(A) Toe
(B) Coast side
(C) Heel
(D) Drive side

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75) > Front Differential Assembly

ADJUSTMENT

1. DIFFERENTIAL BEVEL PINION GEAR BACKLASH

1. Disassemble the front differential assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>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 (0.0364 — 0.0374)
803038022	0.975 — 1.000 (0.0384 — 0.0394)

Adjusting washer	
Part No.	**Thickness mm (in)**
803038023	1.025 — 1.050 (0.0404 — 0.0413)

3. Adjust until the standard value is obtained.

Backlash:

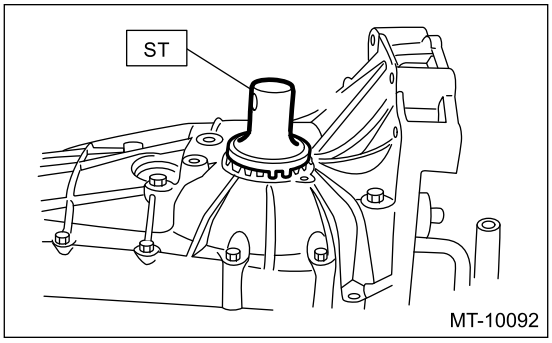
Standard

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 18658AA021 WRENCH COMPL RETAINER



Note:

Each time the differential side retainer rotates by one notch (A), the backlash changes by 0.05 mm (0.0020 in).

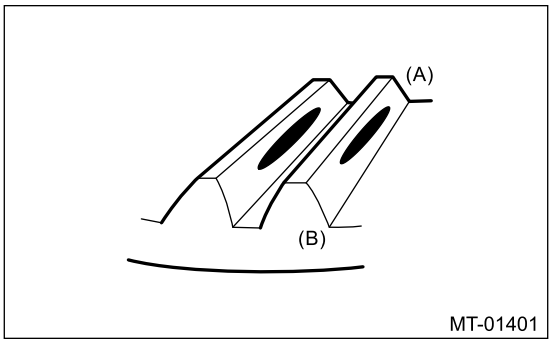
3. TOOTH CONTACT OF HYPOID DRIVEN GEAR

1. Adjust until correct teeth contact is obtained.

2. Check tooth contact, and perform the adjustment as follows.

- Correct tooth contact

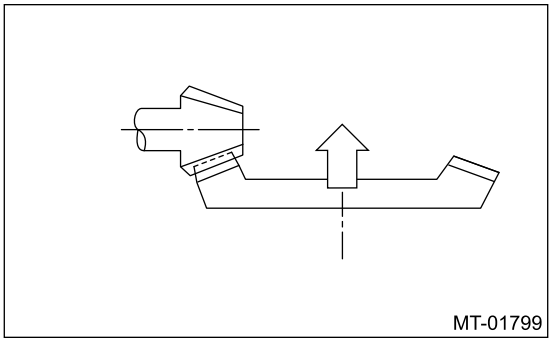
  Check item: Tooth contact surface is slightly shifted toward the toe side under a no-load condition. (When driving, it moves towards the heel side.)



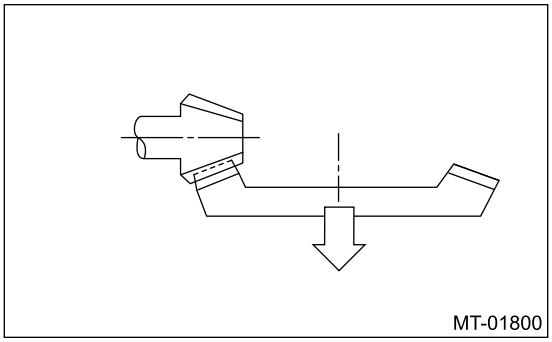
(A) Toe side

(B) Heel side

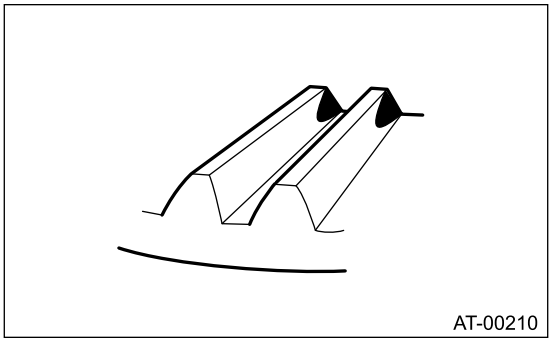
- Face contact
  Check item: Backlash is too large.
  Contact pattern
  Corrective action: Tighten the differential side retainer to move the hypoid driven gear closer to the drive pinion shaft.



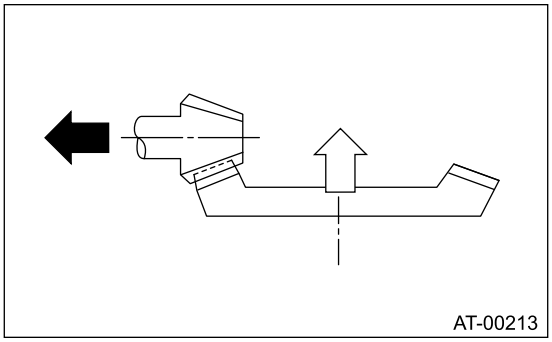
- Flank contact
  Check item: Backlash is too small.
  Contact pattern
  Corrective action: Loosen the differential side retainer to move the hypoid driven gear away from the drive pinion shaft.



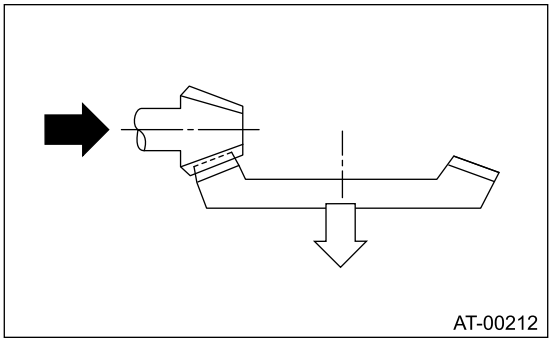
- Toe contact (inside contact)
  Check item: Teeth contact area is too small.
  Contact pattern



  Corrective action: Increase the thickness of drive pinion shim and tighten the differential side retainer to move the hypoid driven gear closer to the drive pinion shaft according to the procedure for bringing drive pinion shaft away from hypoid driven gear.

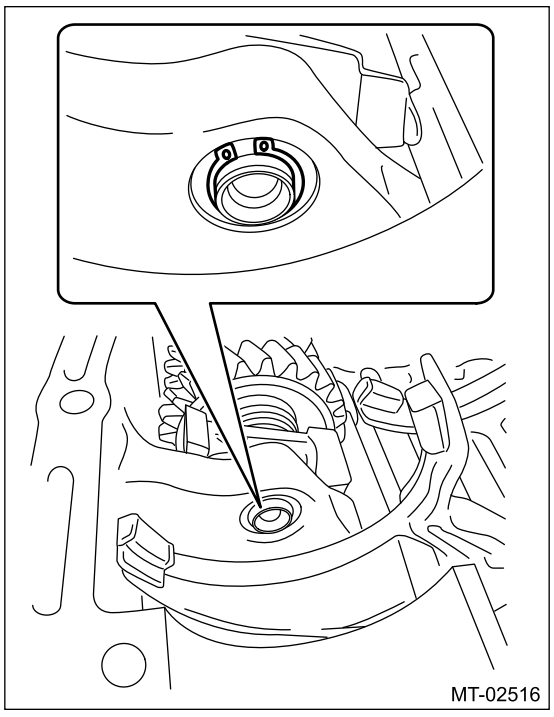


- Heel contact (outside end contact)
  Check item: Teeth contact area is too small.
  Contact pattern
  Corrective action: Reduce thickness of the drive pinion shim according to the procedures for moving the drive pinion shaft closer to hypoid driven gear. Also loosen the differential side retainer to move the hypoid driven gear away from the drive pinion shaft.



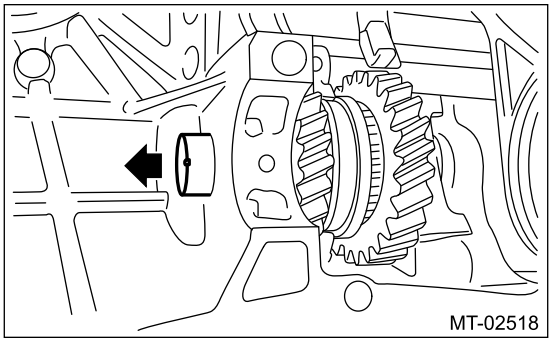
REMOVAL

1. Remove the manual transmission assembly from the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Manual Transmission Assembly>REMOVAL.
2. Remove the back-up light switch and the neutral position switch. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Switches and Harness>REMOVAL.
3. Remove the transfer case together with the extension case assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Transfer Case and Extension Case Assembly>REMOVAL.
4. Remove the transmission case. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Transmission Case>REMOVAL.
5. Remove the drive pinion shaft assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Drive Pinion Shaft Assembly>REMOVAL.
6. Remove the main shaft assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Main Shaft Assembly>REMOVAL.
7. Remove the front differential assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>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.

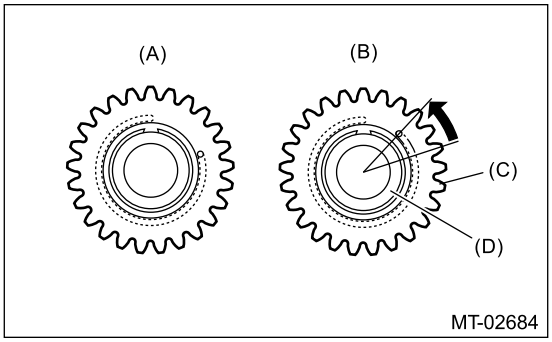
13. Remove the reverse idler gear bushing.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75) > Reverse Idler Gear

INSTALLATION

Note:

Rotate the reverse idler sub gear by two teeth from free status in the direction of the arrow to make it engage with the reverse gear of the main shaft and install the main shaft assembly.



(A) Free status

(B) Set status

(C) Reverse idler sub gear

(D) Reverse idler gear

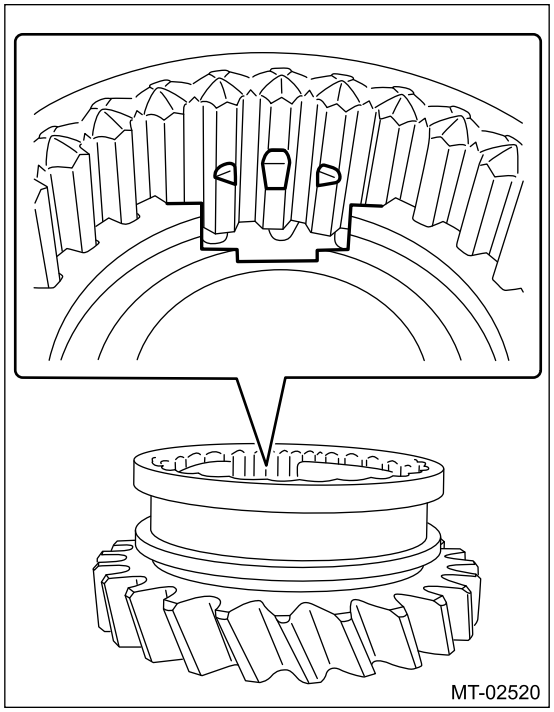
1. Install the reverse idler gear bushing with the cutout portion of the reverse idler gear bushing facing the front of the transmission.

2. Assembling reverse idler gear assembly

(1) Install the reverse coupling sleeve to the reverse idler gear No. 2.

Note:

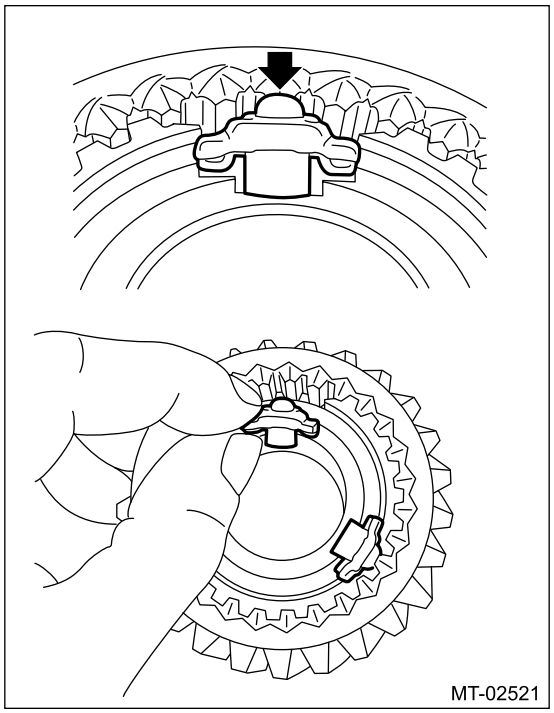
- **Install the reverse coupling sleeve in the correct direction.**
- **Make sure that the oval-shaped cutout portion inside the reverse coupling sleeve matches the center of the reverse idler gear No. 2 groove.**



(2) Install the reverse shifting insert.

Note:

Press in the ball part to install.

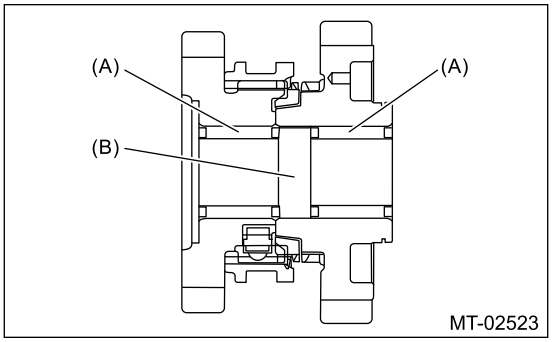


(3) Install the reverse baulk ring and reverse idler gear.

(A) Reverse idler gear

(B) Reverse baulk ring

(4) Install the needle bearing and reverse idler gear collar.



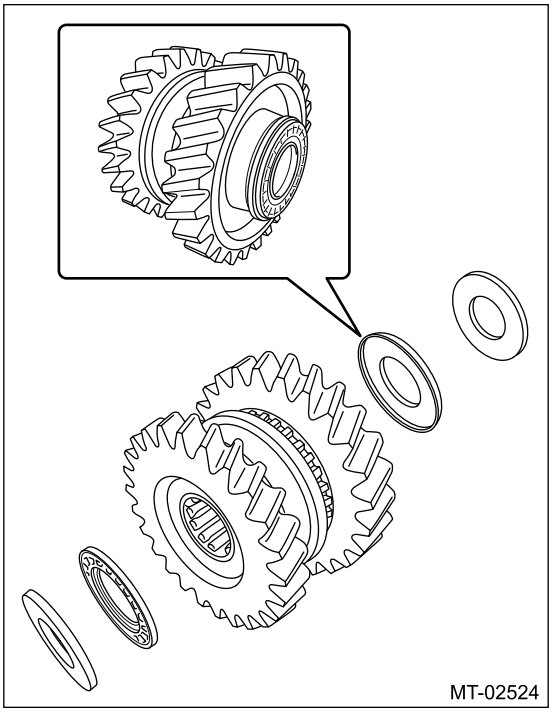
(A) Needle bearing

(B) Reverse idler gear collar

(5) Install the thrust bearing and reverse idler gear washer.

Note:

Install the thrust bearing in the correct direction.



3. Install the assembled reverse idler gear assembly to the transmission case and hold it with hands.

4. Install the reverse idler gear shaft.

Note:

- **Install with the cutout portion of the reverse idler gear shaft facing the RH side of the transmission case.**
- **Make sure that the groove of the reverse idler gear shaft comes out of the reverse idler gear bushing.**

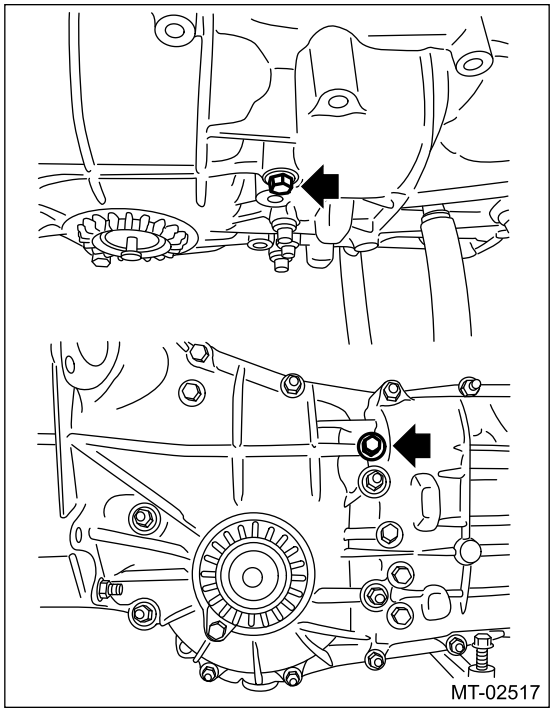
(A) Cutout portion of the reverse idler gear shaft

(B) Snap ring installation groove

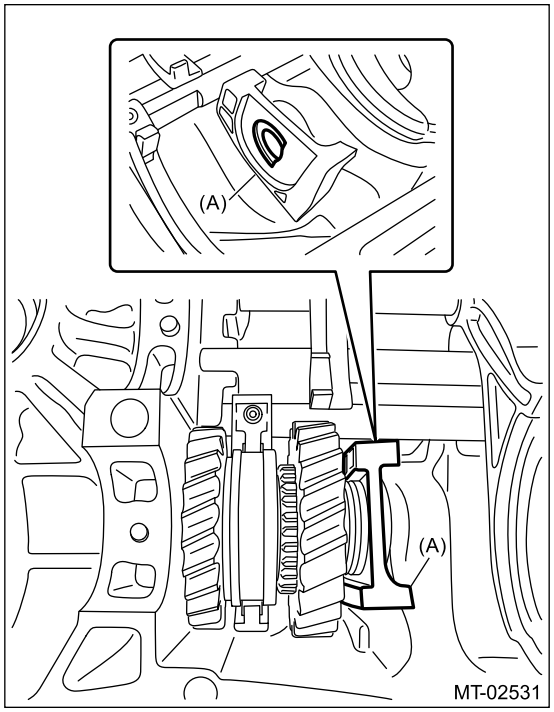
5. Install the reverse idler gear shaft securing bolt.

Tightening torque:

25 N·m (2.5 kgf-m, 18.4 ft-lb)



6. Install the snap ring.
7. Select the reverse idler gear bushing. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Reverse Idler Gear>ADJUSTMENT.
8. Remove the reverse idler gear assembly and replace with the selected bushing. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Reverse Idler Gear>REMOVAL.
9. Install the reverse idler gear assembly, oil case guide and reverse idler gear shaft.
   Note:
   - **Install with the cutout portion of the reverse idler gear shaft facing the RH side of the transmission case.**
   - **Make sure that the groove of the reverse idler gear shaft comes out of the reverse idler gear bushing.**
   - **Insert the cutout portion of the reverse idler gear bushing into the oil case guide.**



(A) Oil case guide

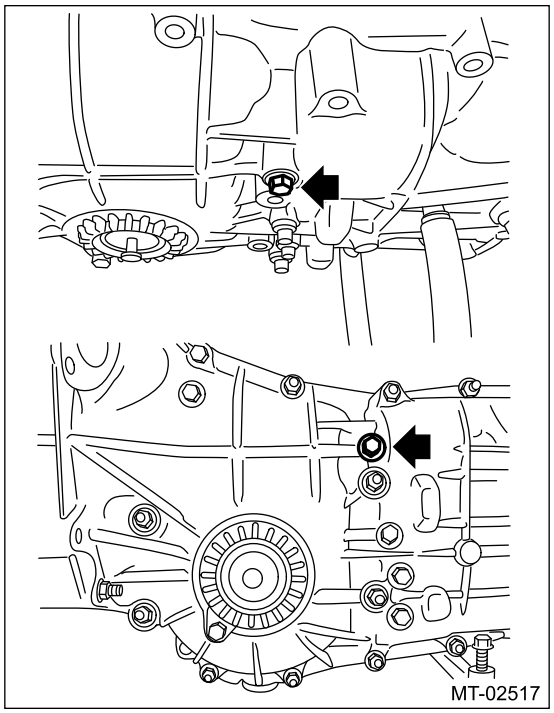
10. Install the reverse idler gear shaft securing bolt.

Note:

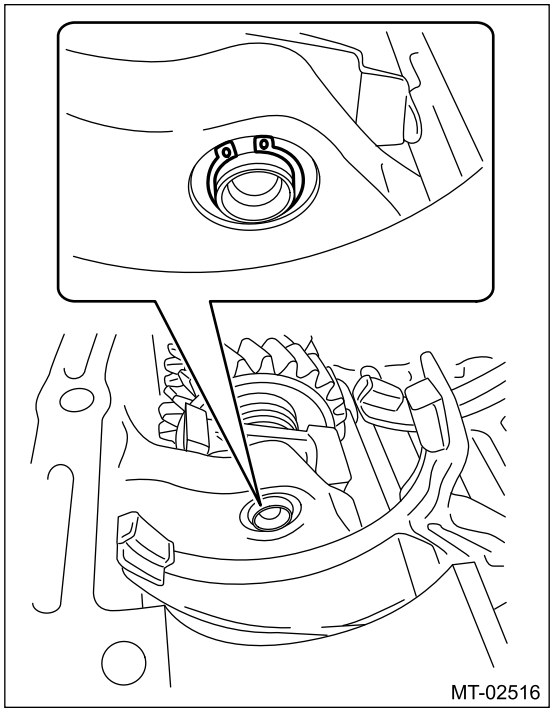
Use a new gasket.

Tightening torque:

25 N·m (2.5 kgf-m, 18.4 ft-lb)



11. Install the snap ring.



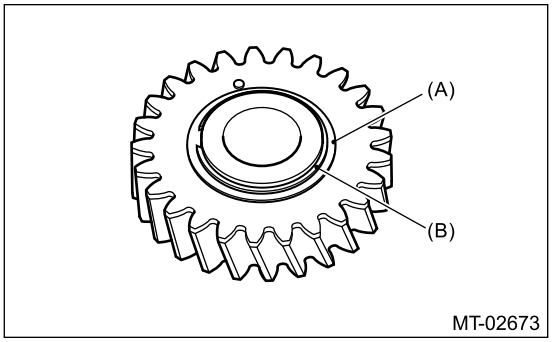
12. Check the reverse shifter fork. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Shifter Fork and Rod>INSPECTION.
13. Install the front differential assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Front Differential Assembly>INSTALLATION.
14. Install the main shaft assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Main Shaft Assembly>INSTALLATION.
15. Install the drive pinion shaft assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Drive Pinion Shaft Assembly>INSTALLATION.
16. Install the transmission case. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Transmission Case>INSTALLATION.
17. Install the transfer case together with the extension case assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>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)(TY75)>Switches and Harness>INSTALLATION.
19. Install the manual transmission assembly to the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Manual Transmission Assembly>INSTALLATION.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75) > Reverse Idler Gear

DISASSEMBLY

1. REVERSE IDLER GEAR ASSEMBLY

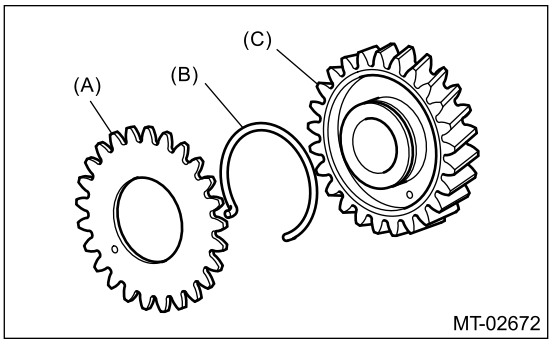
1. Remove the snap ring and friction plate.



(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)(TY75) > Reverse Idler Gear

ASSEMBLY

1. REVERSE IDLER GEAR ASSEMBLY

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.

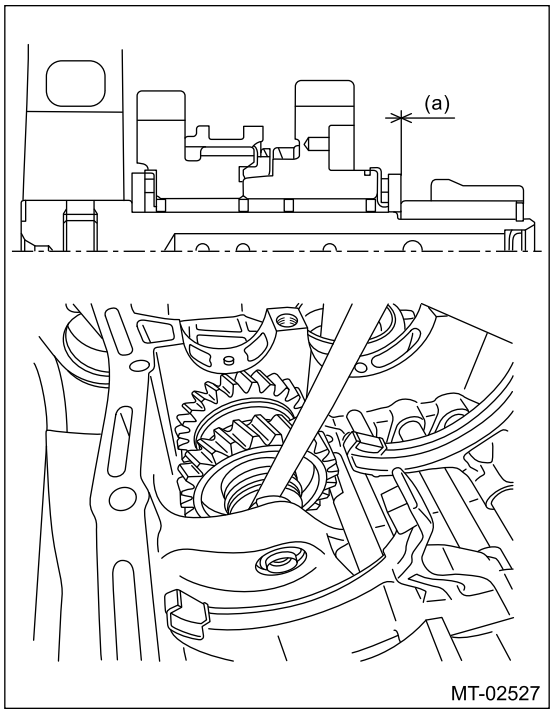
(A) Friction plate

(B) Snap ring

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75) > 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 mm (0.004 — 0.012 in)

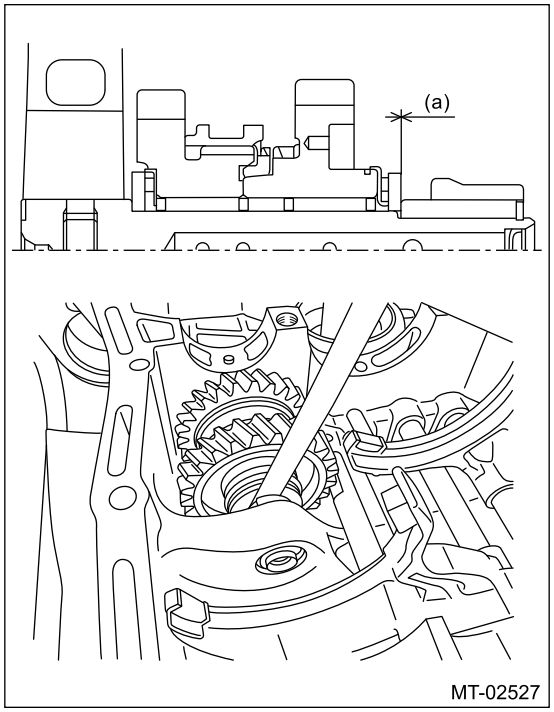


2. Check the reverse idler gear and reverse idler gear shaft for damage. Replace if it is damaged.
3. Apply transmission gear oil to the cone of the reverse idler gear and while press-fitting the reverse baulk ring, check there is no rotation in the circumferential direction.
4. Reverse coupling sleeve
   - Check the sliding condition of the reverse coupling sleeve.
   - Check the splines on the reverse coupling sleeve and reverse idler gear for wear.
5. Reverse shifting insert
   Replace the reverse shifting insert if there is deformation, excessive wear on the ball section or any defectiveness.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75) > Reverse Idler Gear

ADJUSTMENT

1. 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 mm (0.004 — 0.012 in)

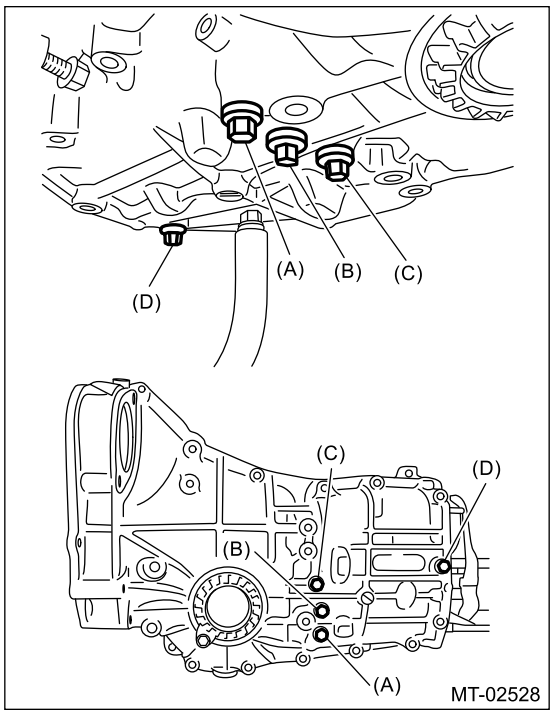


Reverse idler gear bushing		
Part No.	**Length mm (in)**	**Groove for identification**
32289AA080	27.75 (1.093)	None
32289AA090	27.90 (1.098)	1
32289AA100	28.05 (1.104)	2
32289AA110	28.20 (1.110)	3
32289AA120	28.35 (1.116)	4

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75) > Shifter Fork and Rod

REMOVAL

1. Remove the manual transmission assembly from the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Manual Transmission Assembly>REMOVAL.
2. Remove the back-up light switch and the neutral position switch. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Switches and Harness>REMOVAL.
3. Remove the transfer case together with the extension case assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Transfer Case and Extension Case Assembly>REMOVAL.
4. Remove the transmission case. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Transmission Case>REMOVAL.
5. Remove the drive pinion shaft assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Drive Pinion Shaft Assembly>REMOVAL.
6. Remove the main shaft assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Main Shaft Assembly>REMOVAL.
7. Remove the front differential assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Front Differential Assembly>REMOVAL.
8. Remove the reverse idler gear assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Reverse Idler Gear>REMOVAL.
9. Remove the check ball plugs, check ball springs and check balls.



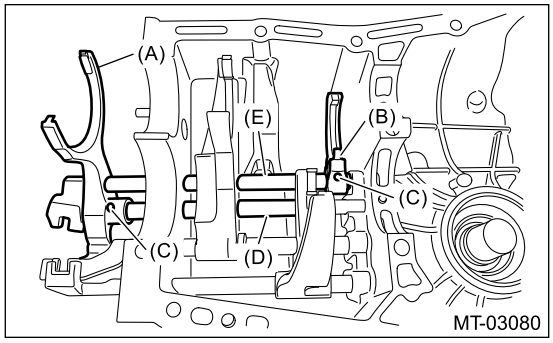
(A) 1st-2nd
(B) 3rd-4th
(C) 5th-6th
(D) Rev.

10. Use the ST 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:

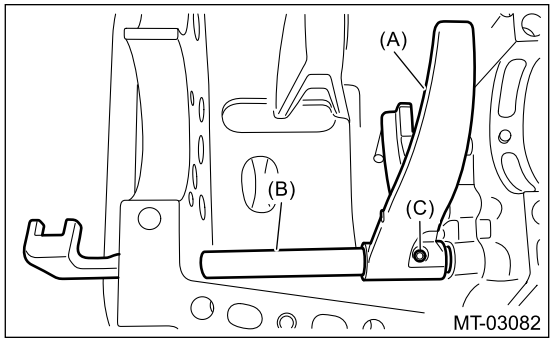
When removing the 3rd-4th fork rod, keep other fork rods in neutral.

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



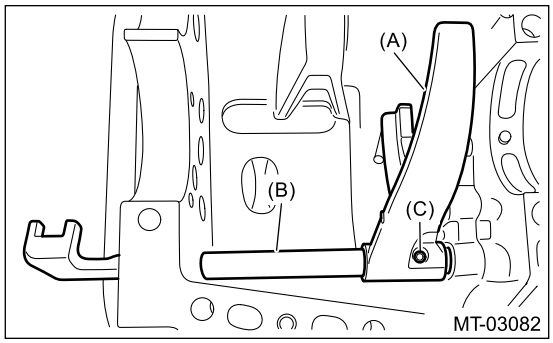
(A) 1st-2nd shifter fork
(B) 1st-2nd fork rod
(C) Straight pin

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75) > Shifter Fork and Rod

INSTALLATION

1. Install the 1st-2nd fork rod to the 1st-2nd shifter fork through the hole on the rear of the transmission case.
2. Align the holes on the 1st-2nd fork rod and 1st-2nd shifter fork, and drive 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 the holes on the reverse fork rod and reverse 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.**

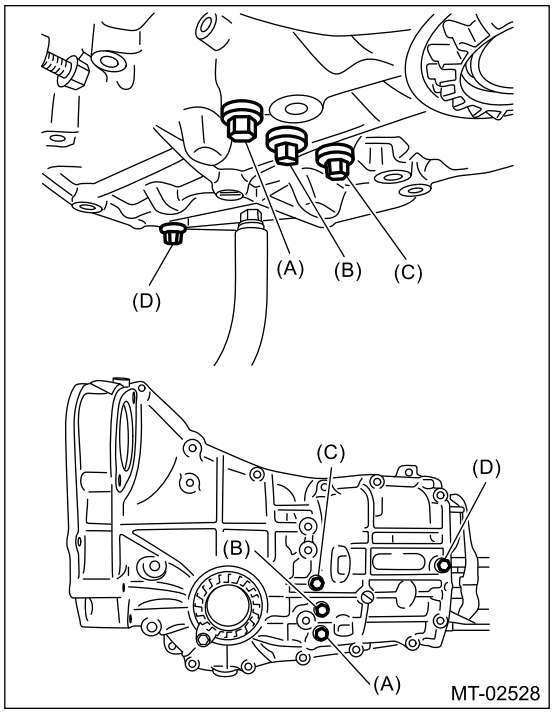
ST 398791700 REMOVER

(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)(TY75)>Reverse Idler Gear>INSTALLATION.
9. Install the front differential assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Front Differential Assembly>INSTALLATION.
10. Install the main shaft assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Main Shaft Assembly>INSTALLATION.
11. Install the drive pinion shaft assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Drive Pinion Shaft Assembly>INSTALLATION.
12. Install the transmission case. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Transmission Case>INSTALLATION.
13. Install the transfer case together with the extension case assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>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)(TY75)>Switches and Harness>INSTALLATION.
15. Install the manual transmission assembly to the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75)>Manual Transmission Assembly>INSTALLATION.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY75) > Shifter Fork and Rod

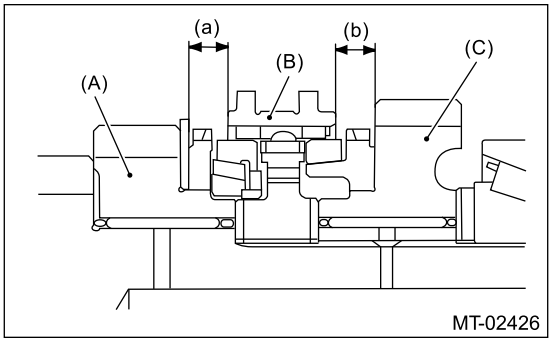
INSPECTION

1. Check the shifter fork and fork rod for damage. Replace if it is damaged.
2. Gearshift mechanism
   Repair or replace the gearshift mechanism if excessively worn, bent or defective in any way.
3. Inspect the clearance 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 mm (0.291 — 0.307 in)
   (A) 1st driven gear
   (B) Coupling sleeve
   (C) 2nd driven gear

1st-2nd shifter fork		
Part No.	**Mark**	**Contents**
32804AA120	1	Approaches 2nd gear by 0.2 mm (0.008 in).
32804AA130	No mark	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 — 7.8 mm (0.295 — 0.307 in)



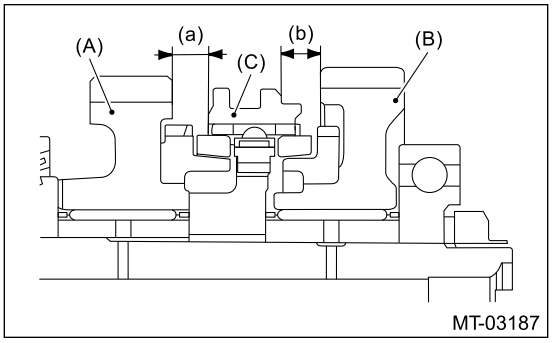
(A) 3rd drive gear
(B) Coupling sleeve
(C) 4th drive gear

3rd-4th shifter fork		
Part No.	**Mark**	**Contents**
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 — 7.8 mm (0.295 — 0.307 in)



(A) 5th drive gear
(B) 6th drive gear
(C) Coupling sleeve

5th-6th shifter fork		
Part No.	**Mark**	**Contents**
32940AA050	1	Approaches 5th gear by 0.2 mm (0.008 in).
32940AA060	No mark	Standard

5th-6th shifter fork		
Part No.	**Mark**	**Contents**
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**	**Contents**
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):

3rd-4th — 5th-6th

0.2 — 1.0 mm (0.008 — 0.039 in)

INSPECTION

1. MANUAL TRANSMISSION

Symptoms	Possible cause	Corrective action
1. Gears are difficult to intermesh. **Note:** **The cause for difficulty in shifting gears can be classified into two types: One is a defective gear shift system and the other is defective transmission. However, if the operation is heavy and engagement of the gears is difficult, a defective clutch disengagement may also be responsible. Check whether the clutch is correctly functioning, before checking the gear shift system and transmission.**	(a) Worn, damaged or burred chamfer at internal spline of the sleeve	Replace.
	(b) Worn, damaged or burred chamfer of gear spline	Replace.
	(c) Worn or scratched bushings	Replace.
	(d) Incorrect contact or wear between baulk ring and gear cone	Repair or replace.
2. Gear slip-out • Gear slips out when coasting on rough road. • Gear slips out during acceleration.	(a) Defective pitching stopper adjustment	Replace.
	(b) Loose engine mounting bolts	Tighten or replace.
	(c) Worn shifter fork or broken check ball spring	Replace.
	(d) Worn or damaged ball bearing	Replace.
	(e) Excessive clearance between splines of synchronizer hub and synchronizer sleeve	Replace.
	(f) Synchronizer hub tooth step wear	Replace.
	(g) Worn 1st driven gear and driven shaft	Replace.
	(h) Worn 2nd driven gear and bushing	Replace.
	(i) Worn 3rd drive gear and needle bearing	Replace.

Symptoms	Possible cause	Corrective action
	(j) Worn 4th drive gear and needle bearing	Replace.
	(k) Worn 5th drive gear and needle bearing	Replace.
	(l) Worn 6th drive gear and needle bearing	Replace.
	(m) Worn reverse idler gear and needle bearing	Replace.
3. Noise emitted from transmission **Note:** **If a noise is heard when the vehicle is parked with its engine idling and if a noise ceases when the clutch is disengaged, it may be considered that the noise is coming from the transmission.**	(a) Insufficient or improper lubrication	Lubricate with specified oil or replace.
	(b) Worn or damaged gears and bearings **Note:** **If the trouble is only wear of the gear teeth surfaces, only a high whirring noise will occur at high speeds, but if any part is broken, rhythmical clicking sounds will be heard even at low speeds.**	Replace.

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 able to operate due to broken pieces obstructing the gear revolution.**	(a) Insufficient or improper oil	Disassemble the differential and replace the broken component parts. At the same time, check other component parts for any trouble, and replace if necessary.
	(b) Use of vehicle under severe conditions such as excessive load or improper use of the clutch	Readjust the preload and backlash of the bearing, and the contact surface of gear.
	(c) Improper adjustment of taper roller bearing	Adjust.
	(d) Improper adjustment of the drive pinion and the hypoid driven gear	Adjust.
	(e) Excessive backlash of a vehicle under severe operating conditions due to worn	Add recommended oil to the specified level. Do not use vehicle under severe operating conditions.

Symptoms	Possible cause	Corrective action
	differential side gear, adjusting washer or differential pinion	
	(f) Loose hypoid driven gear clamping bolts	Tighten.
2. Differential and hypoid gear noises Troubles of the differential and hypoid gear always appear as noise problems. Therefore noise is the first indication of trouble. However, noises from the engine, muffler, tire, exhaust gas, bearing, body, etc. are easily mistaken for the differential noise. Pay special attention to the hypoid gear noise because it is easily confused with other gear noises. 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 from differential side gear, differential pinion or differential pinion shaft, etc.	(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.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)

6MT(TY85)

1. General Description
2. Transmission Gear Oil
3. Oil Seal
4. Differential Side Retainer Oil Seal
5. Transmission Mounting System
6. Manual Transmission Assembly
7. Driver’s Control Center Differential Control Module
8. DCCD Multi Select Switch
9. Preparation for Overhaul
10. Air Breather Hose
11. Back-up Light Switch
12. Neutral Position Switch
13. Extension Case
14. Reverse Check System
15. Transfer Drive Gear
16. Transfer Driven Gear
17. Center Differential
18. Transmission Case
19. Main Shaft Assembly
20. Driven Gear Assembly
21. Reverse Idler Gear Assembly
22. Drive Pinion Shaft Assembly
23. Front Differential Assembly
24. Shifter Fork and Rod
25. Clutch Housing
26. General Diagnostic Table

SPECIFICATION

1. MANUAL TRANSMISSION AND DIFFERENTIAL

Type			6-forward speeds and 1-reverse (all stage with synchromesh)
Transmission gear ratio		1st	3.636
		2nd	2.235
		3rd	1.590
		4th	1.137
		5th	0.971
		6th	0.756
		Rev.	3.545
Front reduction gear	Final	Type of gear	Hypoid
		Gear ratio	3.900
Rear reduction gear	Transfer	Type of gear	Helical
		Gear ratio	1.103
Front differential	Type and number of gear		Planetary gear (pinion gear: 8, gear: 2)
	LSD type		Helical
Center differential	Type and number of gear		Planetary gear (Internal gear: 1, pinion gear: 6, sun gear: 1, and solenoid compression variable control multiplate clutch)
Transmission gear oil capacity			4.1 L (4.3 US qt, 3.6 Imp qt)

2. TRANSMISSION GEAR OIL

Recommended oil:

GL-5 (75W-90) or equivalent

COMPONENT

1. CLUTCH HOUSING

(1)	Gasket	(7)	Oil seal	***Tightening torque: N·m (kgf-m, ft-lb)***
(2)	Plug	(8)	Clutch release bearing guide	***T1: 6.4 (0.7, 4.7)***
(3)	Pitching stopper bracket	(9)	Clutch return spring bracket	***T2: 41 (4.2, 30.2)***
(4)	Clip	(10)	Plug	***T3: 50 (5.1, 36.9)***
(5)	Clutch housing	(11)	Drain plug	***T4: 70 (7.1, 51.6)***
(6)	Gasket	(12)	Transmission radio ground cord	***T5: 46 (4.7, 33.9)***

2. ADAPTER PLATE

(1) Air breather hose
(2) Check plug
(3) O-ring
(4) Checking ball spring
(5) Shift accent plunger
(6) Check plug
(7) O-ring
(8) Checking ball spring
(9) Check ball
(10) Oil guide A
(11) Oil guide B
(12) Adapter plate

Tightening torque: N·m (kgf-m, ft-lb)

T1: 18 (1.8, 13.3)
T2: 25 (2.5, 18.4)
T3: 50 (5.1, 36.9)

3. TRANSMISSION CASE

(1) Pilot bolt
(2) Gasket
(3) Transmission harness stay
(4) Transmission case
(5) Selector plunger
(6) Neutral position switch
(7) Back-up light switch
(8) Plug
(9) Return spring
(10) Plug
(11) O-ring
(12) Checking ball spring
(13) Shift accent plunger
(14) Harness bracket
(15) Band clip

Tightening torque: N·m (kgf-m, ft-lb)

T1: 16 (1.6, 11.8)
T2: 25 (2.5, 18.4)
T3: 32 (3.3, 23.6)
T4: 34 (3.5, 25.1)
T5: 41 (4.2, 30.2)
T6: 50 (5.1, 36.9)

4. OIL PAN & OIL GUIDE

(1) Transmission case
(2) Transfer bearing holder
(3) Oil guide G
(4) Oil guide H
(5) Oil pan
(6) Gasket
(7) Oil guide F
(8) Oil guide D
(9) Oil guide E
(10) Oil guide C
(11) Filler plug
(12) Drain plug

Tightening torque: N·m (kgf-m, ft-lb)

T1: 6.4 (0.7, 4.7)
T2: 18 (1.8, 13.3)
T3: 25 (2.5, 18.4)
T4: 50 (5.1, 36.9)

5. EXTENSION CASE AND CENTER DIFFERENTIAL

(1) Taper roller bearing (transmission case side)
(2) Transfer driven gear
(3) Taper roller bearing (extension case side)
(4) Adjusting washer
(5) Oil plate
(6) Snap ring
(7) Collar
(8) Center differential
(9) Adjusting washer
(10) Needle bearing
(14) Snap ring
(15) Oil guide
(16) Extension case
(17) Oil seal
(18) Oil seal
(19) Dust cover
(20) Snap ring
(21) Washer
(22) Bushing
(23) Return spring
(27) Reverse check lever
(28) Straight pin
(29) Reverse check plunger
(30) Reverse check spring
(31) Gasket
(32) Plug
(33) Reverse lock plunger

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

(11) Needle bearing
(12) Transfer drive gear
(13) Ball bearing (with flange)
(24) Reverse check shaft
(25) Ball bearing
(26) Oil seal

T2: 41 (4.2, 30.2)
T3: 48 (4.9, 35.4)

6. SHIFTER FORK AND FORK ROD

(1) Straight pin
(2) Interlock arm
(3) Interlock block
(4) Reverse interlock block
(5) Interlock arm
(6) Striking rod
(7) Selector arm No. 2
(8) Neutral set spring
(9) Washer
(10) Snap ring
(11) Reverse shifter fork
(12) Reverse shifter arm
(13) Reverse fork rod
(14) Selector arm
(15) Shifter arm shaft
(16) 5th-6th fork rod
(17) 5th-6th shifter arm
(18) 5th-6th shifter fork
(19) 3rd-4th fork rod
(20) 3rd-4th shifter arm
(21) 1st-2nd shifter arm
(22) 3rd-4th shifter fork
(23) 1st-2nd fork rod
(24) 1st-2nd shifter fork

7. MAIN SHAFT ASSEMBLY

(1) Main shaft
(2) 3rd needle bearing
(3) 3rd drive gear
(4) 3rd inner baulk ring
(5) 3rd synchro cone
(6) 3rd outer baulk ring
(7) 3rd-4th coupling sleeve
(8) 3rd-4th synchronizer hub
(9) 3rd-4th shifting insert
(10) 4th baulk ring
(11) 4th drive gear
(12) 4th needle bearing race
(13) 4th needle bearing
(14) 5th drive gear bushing
(15) 5th needle bearing
(16) 5th drive gear
(17) 5th baulk ring
(18) 5th-6th coupling sleeve
(19) 5th-6th synchronizer hub
(20) 5th-6th shifting insert
(21) 6th baulk ring
(22) 6th drive gear
(23) 6th needle bearing
(24) 6th drive gear bushing
(25) Double taper roller bearing
(26) Snap ring
(27) Adjusting washer
(28) Lock washer
(29) Lock nut

Tightening torque: N·m (kgf-m, ft-lb)

T: 392 (40.0, 289.1)

8. DRIVE PINION SHAFT ASSY & DRIVEN GEAR ASSY

(1) Drive pinion shaft
(2) Double taper roller bearing
(3) Drive pinion shim
(4) Lock washer
(5) Lock nut
(6) Thrust bearing
(7) Needle bearing
(8) Driven shaft
(9) Key
(10) 1st needle bearing
(11) 1st driven gear
(14) 1st outer baulk ring
(15) 1st-2nd coupling sleeve
(16) 1st-2nd shifting insert
(17) 1st-2nd synchronizer hub
(18) 2nd outer baulk ring
(19) 2nd synchro cone
(20) 2nd inner baulk ring
(21) 2nd driven gear
(22) 2nd needle bearing
(23) 2nd driven gear bushing
(24) 3rd-4th driven gear
(27) Lock nut
(28) Adjusting washer
(29) Collar

Tightening torque: N·m (kgf-m, ft-lb)

T1: 285 (29.1, 210.2)
∗***265 (27.0, 195.4)***
T2: 570 (58.1, 420.4)
∗***530 (54.0, 390.9)***
T3: 54 (5.5, 39.8)

∗ Tightening torque when using the ST

(12) 1st inner baulk ring
(13) 1st synchro cone
(25) 5th-6th driven gear
(26) Ball bearing

9. REVERSE IDLER GEAR ASSEMBLY

(1) Reverse idler gear shaft
(2) Gasket
(3) Knock pin
(4) Straight pin
(5) Counter high and low washer
(6) Reverse idler gear No. 2
(7) Needle bearing
(8) Reverse outer baulk ring
(9) Reverse synchro cone
(10) Reverse inner baulk ring
(11) Reverse idler gear bushing
(12) Needle bearing
(13) Shifting insert
(14) Reverse coupling sleeve
(15) Reverse idler gear
(16) Reverse idler spring
(17) Reverse idler sub gear
(18) Friction plate
(19) Snap ring
(20) Counter high and low washer
(21) Washer
(22) Snap ring
(23) Reverse idler holder

Tightening torque: N·m (kgf-m, ft-lb)

T: 25 (2.5, 18.4)

10. FRONT DIFFERENTIAL ASSEMBLY

(1) Drive pinion shaft
(2) Hypoid driven gear
(3) Taper roller bearing
(4) Differential ASSY
(5) Oil seal
(6) Differential side retainer
(7) O-ring
(8) Retainer lock plate

Tightening torque: N·m (kgf-m, ft-lb)

T1: 25 (2.5, 18.4)
T2: 69 (7.0, 50.9)

11. TRANSMISSION MOUNTING

(1) Pitching stopper
(2) Spacer
(3) Lower cushion rubber
(4) Front plate
(5) Transmission cushion rubber
(6) Rear crossmember
(7) Upper cushion rubber
(8) Center crossmember
(9) Rear plate
(10) Front crossmember
(11) Rear cushion rubber

Tightening torque: N·m (kgf-m, ft-lb)

T1: 35 (3.6, 25.8)
T2: 50 (5.1, 36.9)
T3: 58 (5.9, 42.8)
T4: 70 (7.1, 51.6)
T5: 140 (14.3, 103.3)

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 transmission gear oil, grease or equivalent. Do not mix transmission 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 transmission gear oil onto sliding or revolving surfaces before installation.
- Always replace deformed or damaged snap rings.
- Before installing O-rings or oil seals, apply sufficient amount of transmission 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 materials such as wood blocks, aluminum plates, or waste 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 ring gear and pinion gear as a set.
- Replace the bolts if the seating surface or the thread surface is excessively rusted.

PREPARATION TOOL

1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
	398791700	REMOVER	Used for removing and installing the straight pin.
	399527700	PULLER SET	Used for removing the taper roller bearing (differential). (1) BOLT (899521412) (2) PULLER (399527702) (3) HOLDER (399527703) (4) SEAT (398497701) (5) BOLT (899520107) (6) NUT (021008000)
	498515700	REMOVER	Used for removing the taper roller bearing of transfer driven gear.
	498247001	MAGNET BASE	• Used for measuring the backlash between hypoid driven gears. • Used with DIAL GAUGE (498247100).

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
	498247100	DIAL GAUGE	• Used for measuring the backlash between hypoid driven gears. • Used with MAGNET BASE (498247001).
	899858600	REMOVER	Used for removing the taper roller bearing.
	499757002	INSTALLER	Used for installing the taper roller bearing of transfer driven gear (transmission case side).
	18658AA021	WRENCH COMPL RETAINER	• Used for removing and installing the differential side retainer RH. • Used for adjusting the backlash of hypoid driven gear.

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
	499877000	RACE 4-5 INSTALLER	Used for disassembling the driven shaft and transfer driven gear.
	899864100	REMOVER	• Used for removing the parts of the main shaft assembly and drive pinion shaft assembly. • Used for removing and installing the transfer driven gear taper roller bearing.
	498057300	INSTALLER	Used for installing the extension case oil seal.
	498255400	PLATE	Used for measuring the hypoid driven gear backlash.

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
	41099AA012	ENGINE SUPPORT BRACKET	• Used for supporting engine. • ENGINE SUPPORT BRACKET (41099AA010 or 41099AA011) can also be used.
	41099AA020	ENGINE SUPPORT	• Used for supporting engine. • Used together with ENGINE SUPPORT BRACKET (41099AA012).
	398527700	PULLER ASSY	• Used for removing the extension case oil seal. • Used for removing the front differential taper roller bearing outer race. (Used together with 18760AA000 (CLAW).)
	398643600	GAUGE	Used for adjusting total end play, extension end play and drive pinion shim.

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
	398177700	INSTALLER	• Used for assembling the main shaft assembly. • Used for installing the transfer driven gear taper roller bearing (extension case side).
	399893600	PLIER	• Used for removing and installing the neutral set spring. • Used together with CLAW (18756AA000).
	18756AA000	CLAW	• Used for removing and installing the neutral set spring. • Used together with PLIER (399893600).
	499247400	INSTALLER	Used for installing the ball bearing of the transfer drive gear.

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
	398497701	SEAT	• Used for installing the ball bearing of the transfer drive gear. • Used for installing the front differential taper roller bearing.
	398437700	INSTALLER	Used for installing the front differential taper roller bearing.
	18632AA000	STAND ASSY	Used for disassembling and assembling the transmission.
	18671AA000	OIL SEAL GUIDE	• Used for installing the reverse check shaft oil seal. • Used for installing the shifter arm shaft oil seal. • Used together with INSTALLER (18657AA010).

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
	18657AA010	INSTALLER	• Used for installing the reverse check shaft oil seal. • Used together with OIL SEAL GUIDE (18671AA000).
	18657AA000	INSTALLER	• Used for installing the shifter arm shaft oil seal. • Used together with OIL SEAL GUIDE (18671AA000).
	18758AA000	PULLER	Used for removing the transfer driven gear taper roller bearing outer race.
	18831AA000	GAUGE	Used for selecting the transfer driven gear adjusting washer.

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
	18631AA000	HANDLE	Used for measuring the front differential backlash.
	18754AA000	REMOVER	Used to remove parts of the driven gear.
	18665AA000	HOLDER	• Used for removing and installing the main shaft assembly lock nut. • Used together with BASE (18664AA000).
	18666AA000	HOLDER	• Used for removing and installing the driven shaft lock nut. • Used together with BASE (18664AA000).

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
	18667AA000	HOLDER	• Used for removing and installing the drive pinion shaft assembly lock nut. • Used together with BASE (18664AA000).
	18664AA000	BASE	• Used for removing and installing the main shaft assembly lock nut. • Used for removing and installing the drive pinion shaft assembly lock nut. • Used for removing and installing the driven shaft lock nut.
	18722AA010	REMOVER	Used for disassembling the main shaft assembly.
	18651AA000	INSTALLER	Used for assembling the main shaft assembly.

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
	18852AA000	TORQUE WRENCH	• Used to tighten the main shaft assembly lock nut. • Used to tighten the drive pinion shaft assembly lock nut. • Used to tighten the driven shaft lock nut.
	18668AA000	PUNCH	Used to crimp the main shaft assembly lock nut.
	18669AA000	PUNCH	Used to crimp the driven shaft lock nut.
	18670AA000	PUNCH	Used to crimp the drive pinion shaft assembly lock nut.

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
	18620AA000	ADAPTER WRENCH	Used for removing and installing the driven shaft lock nut.
	18621AA000	ADAPTER WRENCH	Used for removing and installing the drive pinion shaft assembly lock nut.
	18723AA000	REMOVER	Used for disassembling the driven shaft.
	18630AA000	WRENCH ASSY	Used for removing and installing the differential side retainer LH.

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
	18672AA000	GUIDE CLIP	Used for installing the reverse idler gear snap ring.
	18720AA000	REMOVER	Used for disassembling the main shaft assembly.
	18654AA000	INSTALLER	Used for assembling the driven shaft.
	18663AA000	SOCKET	Used for removing and installing the transfer bearing holder.

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
	18853AA000	HEIGHT GAUGE	• Used for selecting the fork rod. • Used for selecting the snap ring and washer of the main shaft assembly.
	18760AA000	CLAW	• Used for removing the front differential taper roller bearing outer race. • Used together with PULLER ASSY (398527700).
	18675AA000	DIFFERENTIAL SIDE OIL SEAL INSTALLER	Used for installing the differential side retainer oil seal.
	28399SA010	OIL SEAL PROTECTOR	Used for protecting oil seal when installing front drive shaft.

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
	18657AA020	OIL SEAL INSTALLER	Used for installing the oil seal.
	18270KA020	SOCKET (E20)	Used for removing and installing the hypoid driven gear.

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.
Depth gauge	Used for measuring the transmission end play.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Transmission Gear Oil

INSPECTION

1. Lift up the vehicle.
2. Remove the filler plug.



(A) Filler plug

3. Check that the transmission gear oil level is up to the bottom of the filler plug. If the transmission gear oil level is low, confirm that there is no oil leakage and refill up to the bottom of filler plug.
4. Using a new gasket, and tighten the filler plug.
   Tightening torque:
   50 N·m (5.1 kgf-m, 36.9 ft-lb)

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Transmission Gear Oil

REPLACEMENT

1. Lift up the vehicle.
2. Remove the filler plug.



(A) Filler plug

3. Remove the two drain plugs (oil pan side, clutch housing side), and then drain the transmission gear oil completely.
   Caution:
   - **Immediately after running the vehicle or after idling for a long time, the transmission gear oil will be hot. Be careful not to receive burns.**
   - **Be careful not to spill the transmission gear oil on exhaust pipe to prevent it from emitting smoke or causing fires. If transmission gear oil is spilled on the exhaust pipe, wipe it off completely.**

Note:

- **Tighten the drain plug of the transmission gear oil after draining the transmission gear oil.**
- **Always use a new gasket.**
- **Use TORX® bit T70 to remove and install the drain plug on clutch housing side.**

Tightening torque:

Oil pan side

50 N·m (5.1 kgf-m, 36.9 ft-lb)

Clutch housing side

70 N·m (7.1 kgf-m, 51.6 ft-lb)

(A) Drain plug (oil pan side)

(B) Drain plug (clutch housing side)

4. Pour transmission gear oil to the bottom end of filler plug.

Note:

Carefully refill transmission gear oil while checking the level. Excessive or insufficient oil must be avoided.

Recommended gear oil:

GL-5 (75W-90) or equivalent

Transmission gear oil capacity

4.1 L (4.3 US qt, 3.6 Imp qt)

5. Check the level of the transmission gear oil.
6. Using a new gasket, and tighten the filler plug.

Tightening torque:

50 N·m (5.1 kgf-m, 36.9 ft-lb)

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Oil Seal

INSPECTION

Check that there is no oil leaking from the oil seal. If there is any deformation, hardening, wear or other malfunctions of the oil seal, perform the following:

- Replace the oil seal.
- Inspect the propeller shaft.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Oil Seal

REPLACEMENT

1. Disconnect the ground cable from battery.
2. Lift up the vehicle.
3. Clean the transmission exterior.
4. Drain transmission gear oil completely. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Transmission Gear Oil>REPLACEMENT.
5. Remove the rear exhaust pipe and muffler. Ref. to EXHAUST(STI)>Rear Exhaust Pipe>REMOVAL. Ref. to EXHAUST(STI)>Muffler>REMOVAL.
6. Remove the center exhaust cover.
7. Remove the propeller shaft. Ref. to DRIVE SHAFT SYSTEM>Propeller Shaft>REMOVAL.
8. Using the ST, remove the oil seal.

ST 398527700 PULLER ASSY

(A) Oil seal

9. 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

10. Install the propeller shaft. Ref. to DRIVE SHAFT SYSTEM>Propeller Shaft>INSTALLATION.
11. Install the center exhaust cover.
    Tightening torque:
    18 N·m (1.8 kgf-m, 13.3 ft-lb)
12. Install the rear exhaust pipe and muffler. Ref. to EXHAUST(STI)>Rear Exhaust Pipe>INSTALLATION. Ref. to EXHAUST(STI)>Muffler>INSTALLATION.
13. Pour in transmission gear oil and check the oil level. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Transmission Gear Oil>REPLACEMENT.
14. Lower the vehicle.
15. Connect the battery ground terminal.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Differential Side Retainer Oil Seal

INSPECTION

Check that there is no oil leaking from the differential side retainer oil seal. If there is oil leakage, perform the following procedures.

- Replace the oil seal.
- Check the front drive shaft.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > 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 front exhaust pipe and center exhaust pipe. Ref. to EXHAUST(STI)>Front Exhaust Pipe>REMOVAL.
5. Drain transmission gear oil completely. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Transmission Gear Oil>REPLACEMENT.
6. Separate the front drive shaft from the transmission. Ref. to DRIVE SHAFT SYSTEM>Front Drive Shaft>REMOVAL.
7. Remove the differential side retainer oil seal by using a flat tip screwdriver or similar tools.
8. Using the ST, install the differential side retainer oil seal by lightly tapping with a hammer.

   ST 18675AA000 DIFFERENTIAL SIDE OIL SEAL INSTALLER

9. Apply transmission gear oil to the oil seal lips.
10. Set the ST to the differential side retainer.

    ST 28399SA010 OIL SEAL PROTECTOR

11. Install the front drive shaft into the transmission.
    Note:
    Replace the circlip of drive shaft with a new part.
12. Install the front drive shaft into transmission, remove the ST and insert the drive shaft securely.

    ST 28399SA010 OIL SEAL PROTECTOR

13. Install the front exhaust pipe and the center exhaust pipe. Ref. to EXHAUST(STI)>Front Exhaust Pipe>INSTALLATION.
14. Pour transmission gear oil to the bottom end of filler plug. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Transmission Gear Oil>REPLACEMENT.
15. Lower the vehicle.
16. Install the front tires.
17. Connect the battery ground terminal.

REMOVAL

1. PITCHING STOPPER

1. Disconnect the ground cable from battery.
2. Remove the intercooler. Ref. to INTAKE (INDUCTION)(STI)>Intercooler>REMOVAL.
3. 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(STI)>Center Exhaust Pipe>REMOVAL.
4. Remove the rear exhaust pipe and muffler. Ref. to EXHAUST(STI)>Rear Exhaust Pipe>REMOVAL.
Ref. to EXHAUST(STI)>Muffler>REMOVAL.
5. Remove the center exhaust 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.

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)(STI)>Intercooler>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: 35 N·m (3.6 kgf-m, 25.8 ft-lb)
T2: 70 N·m (7.1 kgf-m, 51.6 ft-lb)
T3: 140 N·m (14.3 kgf-m, 103 ft-lb)

5. Remove the transmission jack.
6. Install the center exhaust cover.
   Tightening torque:
   18 N·m (1.8 kgf-m, 13.3 ft-lb)
7. Install the rear exhaust pipe and muffler. Ref. to EXHAUST(STI)>Rear Exhaust Pipe>INSTALLATION. Ref. to EXHAUST(STI)>Muffler>INSTALLATION.
8. Install the center exhaust pipe. Ref. to EXHAUST(STI)>Center Exhaust Pipe>INSTALLATION.
9. Lower the vehicle.
10. Connect the battery ground terminal.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Transmission Mounting System

INSPECTION

Perform the following inspection procedures and repair or replace faulty parts.

1. PITCHING STOPPER

Check the pitching stopper for bends or damage. Check that the rubber is not stiff, cracked or otherwise damaged.

2. CROSSMEMBER AND CUSHION RUBBER

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

REMOVAL

1. Disconnect the ground cable from battery.
2. Remove the intercooler. Ref. to INTAKE (INDUCTION)(STI)>Intercooler>REMOVAL.
3. Disconnect the following harness connectors, and then remove the intercooler stay RH No. 2.

(A) Rear oxygen sensor connector
(B) Neutral position switch backup light switch connector

4. Remove the secondary air combination valve. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>Secondary Air Combination Valve>REMOVAL > SECONDARY AIR COMBINATION VALVE LH.
5. Disconnect the transmission radio ground cord terminal.
6. Remove the starter assembly. Ref. to STARTING/CHARGING SYSTEMS(STI)>Starter>REMOVAL.
7. Remove the operating cylinder.

Note:
Hang the removed operating cylinder with a piece of wire.

8. Remove the return spring.

9. Remove the pitching stopper. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Transmission Mounting System>REMOVAL > PITCHING STOPPER.
10. Remove the pitching stopper bracket, clutch return spring bracket, and transmission radio ground cable.
11. Set the ST.

ST1	**41099AA012**	**ENGINE SUPPORT BRACKET**
ST2	**41099AA020**	**ENGINE SUPPORT**

12. Remove the clutch release lever shaft.
    (1) Remove the plug using a hexagon wrench.
    (2) Attach a 6 mm (0.24 in) bolt to the release lever shaft, and pull out the release lever shaft.
    (3) Lift the release fork, and remove from the claw of the release bearing. Pull the release fork to the engine side, and make it so that it moves freely.
13. Remove the center exhaust pipe. Ref. to EXHAUST(STI)>Center Exhaust Pipe>REMOVAL.
14. Remove the bolts which hold upper side of transmission to engine.

15. Remove the front wheels.
16. Lift up the vehicle.
17. Drain transmission gear oil completely. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Transmission Gear Oil>REPLACEMENT.
18. Remove the center exhaust cover.
19. Remove the propeller shaft. Ref. to DRIVE SHAFT SYSTEM>Propeller Shaft>REMOVAL.
20. Remove the stabilizer link.

21. Remove the ball joint of front arm from the housing.

22. Remove the front drive shaft. Ref. to DRIVE SHAFT SYSTEM>Front Drive Shaft>REMOVAL.
23. Place the transmission jack under the transmission.

Caution:

Always support the transmission case with a transmission jack.

24. Remove the front crossmember and the rear crossmember.

25. Disconnect the stay.

26. Remove the snap pin and washer, and disconnect the reverse check cable.

(A) Snap pin
(B) Washer
(C) Reverse check cable

27. Remove the bracket.

28. Remove the spring pin, and separate the transmission body and the joint.

Note:

- **Setting the gear shift position to 4th facilitates the operation when removing the spring pin.**
- **Setting the gear shift position to 3rd facilitates the operation when separating the transmission body and the joint.**

29. Tighten the turnbuckle of the ST to tilt the engine assembly towards the back.

30. Remove the bolts and nuts holding the bottom of transmission to the engine, and remove the transmission assembly.

Note:

- **During removal, be careful not to hit the transmission against the body when pulling towards the rear.**
- **The clutch pipe and breather pipe may interfere with each other. Remove carefully.**

31. Remove the transmission cushion rubber.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Manual Transmission Assembly

INSTALLATION

1. Set the release fork, release bearing and release lever shaft to the transmission. Ref. to CLUTCH SYSTEM>Release Bearing and Lever>INSTALLATION > STI MODEL.
2. Replace the differential side retainer oil seal. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Differential Side Retainer Oil Seal>REPLACEMENT.
   Note:
   Be sure to replace the oil seal after removing the front drive shaft.
3. 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.

4. Install the transmission cushion rubber to the transmission, and tighten the bolt (A).
5. 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)

6. Install the transmission assembly onto the engine.
7. Tighten the bolts and nuts which hold the lower side of transmission to the engine.

   Note:
   - **Make sure that the main shaft spline is completely inserted.**
   - **Make sure that the rear end of the engine is set low.**

   Tightening torque:

   50 N·m (5.1 kgf-m, 36.9 ft-lb)

8. Loosen the turnbuckle of ST to return the engine to its original position.

9. Connect the transmission body and the joint, and install the spring pin.

   Note:
   - **Use new spring pin.**
   - **Setting the gear shift position to 3rd facilitates the operation when connecting the transmission body and the joint.**
   - **Setting the gear shift position to 4th facilitates the operation when installing the spring pin.**

   Spring pin exposed length:

   0 — 5 mm (0 — 0.2 in)

10. Attach the bracket.

Tightening torque:

25 N·m (2.5 kgf-m, 18.4 ft-lb)

11. Connect the reverse check cable, and install the washer and snap pin.

Note:

- **Apply grease to the sliding section.**
- **Pay attention to the installing direction of the snap pin.**

Grease:

NIGTIGHT LTS No. 2 grease or equivalent

(A) Reverse check cable
(B) Washer
(C) Snap pin
(D) Front side

12. Connect the stay.

Note:

Apply grease to the sliding section.

Grease:

NIGTIGHT LTS No. 2 grease or equivalent

Tightening torque:

32 N·m (3.3 kgf-m, 23.6 ft-lb)

13. Install the front crossmember and rear crossmember.

14. Tighten the transmission cushion rubber mounting nut.

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)

T3: 140 N·m (14.3 kgf-m, 103 ft-lb)

15. Lower the vehicle.

16. Install the starter. Ref. to STARTING/CHARGING SYSTEMS(STI)>Starter>INSTALLATION.

17. 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)

18. Make sure that the release bearing is completely inserted.

Note:

- **Push the release fork towards the operating cylinder side until a clicking sound is heard. Pull the release fork towards the engine side. If the release fork is not in contact with the case, the setting is complete.**
- **Confirm that the boot cover is set securely.**

19. Install the pitching stopper bracket, clutch return spring bracket, and transmission radio ground cable.
    Tightening torque:
    41 N·m (4.2 kgf-m, 30.2 ft-lb)
20. Install the pitching stopper. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Transmission Mounting System>INSTALLATION > PITCHING STOPPER.
21. Install the return spring.
22. Install the operating cylinder.
    Tightening torque:
    41 N·m (4.2 kgf-m, 30.2 ft-lb)
    Note:
    Check that the clutch hose is routed properly.
23. Install the starter assembly. Ref. to STARTING/CHARGING SYSTEMS(STI)>Starter>INSTALLATION.
24. Install the transmission radio ground terminal.
    Tightening torque:
    13 N·m (1.3 kgf-m, 9.6 ft-lb)
25. Install the secondary air combination valve. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>Secondary Air Combination Valve>INSTALLATION > SECONDARY AIR COMBINATION VALVE LH.
26. Connect the following harness connectors, and then install the intercooler stay RH No. 2.

(A) Rear oxygen sensor connector
(B) Neutral position switch backup light switch connector

27. Lift up the vehicle.

28. Set the ST to differential side retainer.

ST 28399SA010 OIL SEAL PROTECTOR

29. Install the front drive shaft into the transmission.

Note:
Replace the circlip of drive shaft with a new part.

30. Install the front drive shaft into transmission, remove the ST and insert the drive shaft securely.

ST 28399SA010 OIL SEAL PROTECTOR

31. Install the ball joint of the front arm.

Tightening torque:
50 N·m (5.1 kgf-m, 36.9 ft-lb)

32. Install the stabilizer link.

Tightening torque:
60 N·m (6.1 kgf-m, 44.3 ft-lb)

Note:
Use a new self-locking nut.

33. Install the propeller shaft. Ref. to DRIVE SHAFT SYSTEM>Propeller Shaft>INSTALLATION.

34. Install the center exhaust cover.

Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)

35. Install the center exhaust pipe. Ref. to EXHAUST(STI)>Center Exhaust Pipe>INSTALLATION.

36. Fill the transmission gear oil. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Transmission Gear Oil>REPLACEMENT.
37. Lower the vehicle.
38. Install the intercooler. Ref. to INTAKE (INDUCTION)(STI)>Intercooler>INSTALLATION.
39. Connect the battery ground terminal.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Driver's Control Center Differential Control Module

REMOVAL

For removal of driver's control center differential control module, refer to the "FU(STI)" section. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Engine Control Module (ECM)>REMOVAL.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Driver's Control Center Differential Control Module

INSTALLATION

For installation of driver's control center differential control module, refer to the "FU(STI)" section. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Engine Control Module (ECM)>INSTALLATION.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > DCCD Multi Select Switch

REMOVAL

For removal of DCCD multi select switch, refer to the "FU(STI)" section. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>SI-DRIVE (SUBARU Intelligent Drive) Selector>REMOVAL.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > DCCD Multi Select Switch

INSTALLATION

For installation of DCCD multi select switch, refer to the "FU(STI)" section. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>SI-DRIVE (SUBARU Intelligent Drive) Selector>INSTALLATION.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > DCCD Multi Select Switch

INSPECTION

1. Check that the DCCD multi select switch does not have deformation, cracks, or other damages.
2. Measure the resistance between DCCD multi select switch selector terminals.

Switch position	Terminal No.	Standard
AUTO / MANU (when the AUTO / MANU switch is pushed in)	1 and 9	Less than 1 Ω
C.DIFF + (when the C.DIFF switch knob is pressed in the C.DIFF + direction)	2 and 9	Less than 1 Ω
C.DIFF − (when the C.DIFF switch knob is pressed in the	3 and 9	Less than 1 Ω

Switch position	Terminal No.	Standard
C.DIFF – direction)		

PROCEDURE

1. Clean oil, grease, dirt and dust from the transmission.
2. Attach the ST on the transmission.

ST 18632AA000 STAND ASSY

3. Apply transmission gear oil to rotating parts before assembly.
4. When reusing disassembled parts, reinstall in the original positions.
5. Gaskets, lock washers and lock nuts must be replaced with new parts.
6. Apply liquid gasket to the specified areas to prevent leakage.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Air Breather Hose

REMOVAL

1. Disconnect the ground cable from battery.
2. Remove the intercooler. Ref. to INTAKE (INDUCTION)(STI)>Intercooler>REMOVAL.
3. Remove the air breather hose.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Air Breather Hose

INSTALLATION

1. Install the air breather hose.
2. Install the intercooler. Ref. to INTAKE (INDUCTION)(STI)>Intercooler>INSTALLATION.
3. Connect the battery ground terminal.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Air Breather Hose

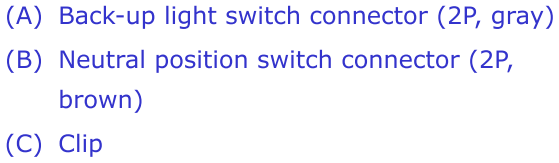
INSPECTION

Make sure the hose is not cracked or clogged.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Back-up Light Switch

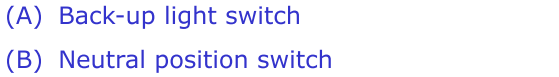
REMOVAL

1. Remove the manual transmission assembly from the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Manual Transmission Assembly>REMOVAL.
2. Disconnect the back-up light switch connector.



(A) Back-up light switch connector (2P, gray)
(B) Neutral position switch connector (2P, brown)
(C) Clip

3. Disconnect the back-up light switch.



(A) Back-up light switch
(B) Neutral position switch

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Back-up Light Switch

INSTALLATION

1. Install the back-up light switch.
   Note:
   Use a new gasket.
   Tightening torque:
   32 N·m (3.3 kgf-m, 23.6 ft-lb)
2. Connect the back-up light switch connector.
3. Install the manual transmission assembly to the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Manual Transmission Assembly>INSTALLATION.

INSPECTION

1. Disconnect the ground cable from battery.
2. Remove the intercooler. Ref. to INTAKE (INDUCTION)(STI)>Intercooler>REMOVAL.
3. Disconnect the transmission harness and chassis harness.

(A) Transmission harness connectors
(B) Pitching stopper

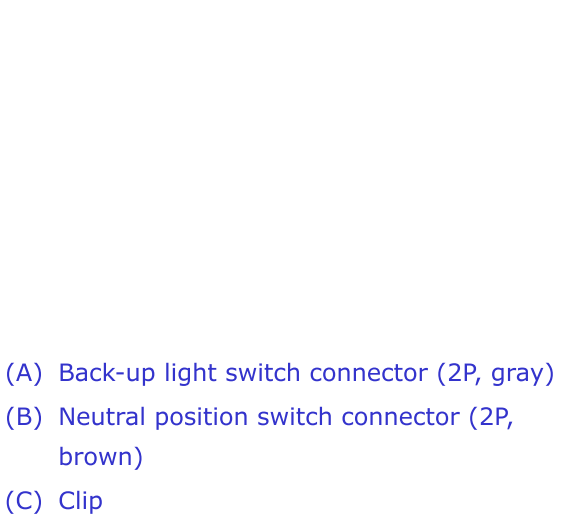
4. Measure the resistance between the back-up light switch terminals. If it is not within the specification, replace the back-up light switch.

Gear shift position	Terminal No.	Standard
Back position	3 and 6	Less than 1 Ω
Other positions		1 MΩ or more

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Neutral Position Switch

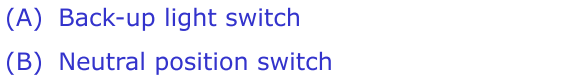
REMOVAL

1. Remove the manual transmission assembly from the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Manual Transmission Assembly>REMOVAL.
2. Disconnect the connector and clip of the neutral position switch.



(A) Back-up light switch connector (2P, gray)
(B) Neutral position switch connector (2P, brown)
(C) Clip

3. Remove the neutral position switch.



(A) Back-up light switch
(B) Neutral position switch

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Neutral Position Switch

INSTALLATION

1. Install the neutral position switch.
   Note:
   Use a new gasket.
   Tightening torque:
   32 N·m (3.3 kgf-m, 23.6 ft-lb)
2. Connect the connector and clip of the neutral position switch.
3. Install the manual transmission assembly to the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Manual Transmission Assembly>INSTALLATION.

INSPECTION

1. Disconnect the ground cable from battery.
2. Remove the intercooler. Ref. to INTAKE (INDUCTION)(STI)>Intercooler>REMOVAL.
3. Disconnect the transmission harness and chassis harness.

(A) Transmission harness connectors
(B) Pitching stopper

4. Measure the resistance between neutral position switch terminals. If not within the standard values, replace the neutral position switch.

Gear shift position	Terminal No.	Standard
Neutral position	2 and 5	Less than 1 Ω
Other positions		1 MΩ or more

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Extension Case

REMOVAL

1. Remove the manual transmission assembly from the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Manual Transmission Assembly>REMOVAL.
2. Prepare the transmission for overhaul. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Preparation for Overhaul.
3. Remove the extension case.

4. Remove any remaining liquid gasket from the extension case and transmission case.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Extension Case

INSTALLATION

1. Select the adjusting washer of the transfer driven gear, and attach it to the extension case. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Extension Case>ADJUSTMENT.
2. Install the taper roller bearing (extension case side) outer race to the extension case.
   Caution:
   Apply transmission gear oil onto sliding or revolving surfaces before installation.
3. Select the adjusting washer of the transfer drive gear, and attach it to the center differential.
4. Apply liquid gasket to the transmission case.
   Liquid gasket:
   THREE BOND 1215B or equivalent

5. Install the extension case.
   Tightening torque:
   48 N·m (4.9 kgf-m, 35.4 ft-lb)

Note:
Insert the stopper section of the center differential between the oil guide.

(A) Oil guide
(B) Stopper
(C) Center differential
(D) Extension case

6. Install the manual transmission assembly to the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Manual Transmission Assembly>INSTALLATION.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Extension Case

DISASSEMBLY

1. Remove the transfer drive gear. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Transfer Drive Gear>REMOVAL.
2. Remove the oil guide.

3. Remove the shift bracket.

4. Using the ST, remove the taper roller bearing (extension case side) outer race.

ST 18758AA000 PULLER

(A) Taper roller bearing (extension case side) outer race

5. Remove the adjusting washer and oil plate.

(A) Adjusting washer

(B) Oil plate

6. Remove the shifter arm oil seal.



(A) Oil seal

7. Remove the reverse check system. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Reverse Check System>REMOVAL.
8. Remove the extension case oil seal. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Oil Seal>REPLACEMENT.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Extension Case

ASSEMBLY

1. Install the reverse check system. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Reverse Check System>INSTALLATION.
2. Install the extension case oil seal. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Oil Seal>REPLACEMENT.
3. Using the ST, install the shifter arm shaft oil seal.

ST1 18657AA000 INSTALLER

ST2 18671AA000 OIL SEAL GUIDE

(A) Oil seal

4. Install the oil plate.

5. Select the adjusting washer, and attach to the extension case. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Extension Case>ADJUSTMENT.
6. Install the taper roller bearing (extension case side) outer race to the extension case.
   Caution:
   Apply transmission gear oil onto sliding or revolving surfaces before installation.
7. Install the shift bracket.
   Tightening torque:
   25 N·m (2.5 kgf-m, 18.4 ft-lb)

8. Attach the oil guide and the transfer drive gear. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Transfer Drive Gear>INSTALLATION.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Extension Case

INSPECTION

1. Check to make sure there is no damage or cracks on the extension case. If damage or cracking is found, replace the extension case.
2. Inspect for oil leaks at the extension case and transmission case oil seals and mating surfaces. If there are oil leaks, replace the oil seal and liquid gasket.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Extension Case

ADJUSTMENT

1. TRANSFER DRIVEN GEAR ADJUSTING WASHER ADJUSTMENT

1. Using the ST, remove the taper roller bearing (extension case side) outer race.

   ST 18758AA000 PULLER

(A) Taper roller bearing (extension case side) outer race

2. Remove the adjusting washer.
3. Measure depth "Z" between the extension case end area and the taper roller bearing (extension case side) contact area.

ST 398643600 GAUGE

Note:
When measuring depth "Z", subtract the thickness of the ST [15 mm (0.59 in)] from the measured value.

(A) 15 mm (0.59 in)

4. Remove the transfer driven gear. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT) (TY85)>Transfer Driven Gear>REMOVAL.
5. Remove the center differential. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT) (TY85)>Center Differential>REMOVAL.
6. Remove the oil guides G and H.

(A) Oil guide G
(B) Oil guide H

7. Remove the snap ring and washer from the selector arm area.

(A) Snap ring
(B) Washer

8. Using an ST, remove the neutral set spring and support.

ST1 18756AA000 CLAW

ST2 399893600 PLIER

9. Lift the striking rod, and remove the straight pin.

(A) Striking rod

(B) Straight pin

10. Remove the selector arm No. 2, shifter arm shaft, selector plunger, shift accent plunger and spring.

(A) Selector arm No. 2

(B) Shifter arm shaft

(C) Selector plunger

(D) Shift accent plunger

11. Attach the taper roller bearing (extension case side) to the transfer driven gear.

12. Set the ST.

ST 18831AA000 GAUGE

13. Turn the transfer driven gear 10 or more times to seat the taper roller bearing properly.

14. Measure depth "Y" between the end of the ST and the taper roller bearing (extension case side).

ST 18831AA000 GAUGE

15. Using the following calculation, calculate the transfer driven gear adjusting washer value "t".

t = Z − (100 − Y) − {0.02 — 0.11 mm (0.0008 — 0.0043 in)}

t mm (in)	Transfer driven gear adjusting washer thickness
Y mm (in)	Depth between the end of the ST and the taper roller bearing (extension case side)
Z mm (in)	Depth between the end of the extension case and the taper roller bearing (extension case side) contact area

0.02 — 0.11 mm (0.0008 — 0.0043 in)	Standard clearance between the adjusting washer and the taper roller bearing (extension case side)
100 mm (3.94 in)	Height of ST

16. Refer to the calculated value "t" to select the closest adjusting washer from the following table.

Standard clearance between the adjusting washer and the taper roller bearing (extension case side)

0.02 — 0.11 mm (0.0008 — 0.0043 in)

Note:

Match to be within the standard clearance range.

Adjusting washer (50 × 61 × t)	
Part No.	**Thickness t 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)
803050079	1.45 (0.0570)

17. Install the selector arm No. 2, shifter arm shaft, selector plunger, shift accent plunger and spring.

(A) Selector arm No. 2
(B) Shifter arm shaft
(C) Selector plunger
(D) Shift accent plunger

18. Install a new straight pin.

19. Using the ST, install the neutral set spring and support.

ST1 18756AA000 CLAW

ST2 399893600 PLIER

20. Install the washer and snap ring to the selector arm area.

(A) Snap ring

(B) Washer

21. Install the center differential. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Center Differential>INSTALLATION.

2. TRANSFER DRIVE GEAR ADJUSTING WASHER SELECTION

1. Measure height “Z” between the transmission case end area and ST.

ST 398643600 GAUGE

2. Measure depth “Y” between the end of the ST and the transfer drive gear.

ST 398643600 GAUGE

3. Using the following calculation, calculate the transfer drive gear adjusting washer value "t".
   t = {Y − 15 mm (0.59 in)} − {Z − 15 mm (0.59 in)} − 0.75 — 0.95 mm (0.030 — 0.037 in)

t mm (in)	Transfer drive gear adjusting washer thickness
Y mm (in)	Depth between the end of the ST and the transfer drive gear
Z mm (in)	Height from the end of the transmission case to the end of the ST
0.75 — 0.95 mm (0.030 — 0.037 in)	Standard clearance between the adjusting washer and transfer drive gear
15 mm (0.591 in)	Thickness of ST

4. Refer to the calculated value "t" to select the closest adjusting washer from the following table.
   Standard clearance between the adjusting washer and transfer drive gear
   0.75 — 0.95 mm (0.030 — 0.037 in)
   Note:
   Match to be within the standard clearance range.

Adjusting washer (36.3 × 52 × t)	
Part No.	**Thickness mm (in)**
803036070	0.80 (0.0315)
803036071	0.95 (0.0374)
803036072	1.10 (0.0433)

Adjusting washer (36.3 × 52 × t)	
Part No.	**Thickness mm (in)**
803036073	1.25 (0.0492)
803036074	1.40 (0.0551)
803036075	0.65 (0.0256)

5. Install the selected adjusting washer.

REMOVAL

1. Remove the manual transmission assembly from the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Manual Transmission Assembly>REMOVAL.
2. Prepare the transmission for overhaul. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Preparation for Overhaul.
3. Remove the extension case. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Extension Case>REMOVAL.
4. Remove the snap ring and washer.

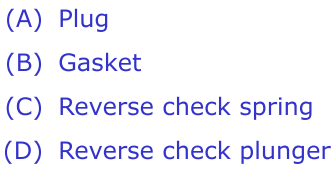
(A) Snap ring
(B) Washer

5. Remove the reverse check shaft and return spring.

6. Remove the straight pin, and remove the reverse check lever and oil seal.

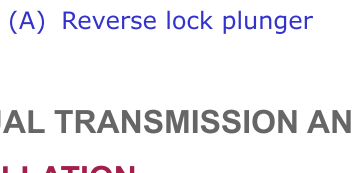
(A) Straight pin
(B) Reverse check lever
(C) Oil seal

7. Remove the plug, then remove the gasket, reverse check spring and reverse check plunger.



(A) Plug
(B) Gasket
(C) Reverse check spring
(D) Reverse check plunger

8. Remove the reverse lock plunger.



(A) Reverse lock plunger

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Reverse Check System

INSTALLATION

1. Insert the reverse lock plunger.
2. Install the reverse check plunger, reverse check spring, gasket and plug in order.
   Note:
   Use a new gasket.
   Tightening torque:
   41 N·m (4.2 kgf-m, 30.2 ft-lb)
3. Install the return spring and reverse check shaft.
   Note:
   Confirm that the end of the spring matches the hole of the reverse check shaft and the cut out of the extension case.

(A) Reverse check shaft
(B) Return spring
(C) Hole
(D) Cut out

4. Install the washer and snap ring.
5. Attach ST1 to the reverse check shaft. Install the new oil seal, and push it in using ST2.

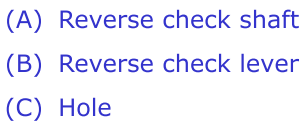
ST1	**18671AA000**	**OIL SEAL GUIDE**
ST2	**18657AA010**	**INSTALLER**

(A) Oil seal

6. Insert the reverse check lever, and turn the reverse check shaft until the reverse check plunger is first pushed in.

(A) Reverse check plunger
(B) Reverse check shaft

7. Match the hole of the reverse check lever and the reverse check shaft, and attach the straight pin.
Note:
Use a new straight pin.



(A) Reverse check shaft
(B) Reverse check lever
(C) Hole

8. Check that the reverse check is operating correctly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Reverse Check System>INSPECTION.
9. Install the extension case. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Extension Case>INSTALLATION.
10. Install the manual transmission assembly to the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Manual Transmission Assembly>INSTALLATION.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Reverse Check System

INSPECTION

1. Check that there is no damage on any parts.
2. Check that the reverse check lever is operating smoothly.
3. Inspect that there is no oil leak at the oil seal section of the reverse check shaft. If there is oil leakage, replace the oil seal.
4. Check the operation of the reverse check.
(1) When the reverse check lever is in the following position, the reverse check plunger is pressed, or the gear can shift into reverse.

(2) When the reverse check lever is in the following position, the reverse check plunger is not pressed, or the gear cannot shift into reverse.

5. If it is not as specified, reassemble the reverse check system.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Transfer Drive Gear

REMOVAL

1. Remove the manual transmission assembly from the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Manual Transmission Assembly>REMOVAL.
2. Prepare the transmission for overhaul. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Preparation for Overhaul.
3. Remove the extension case. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Extension Case>REMOVAL.
4. Remove the transfer drive gear.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Transfer Drive Gear

INSTALLATION

1. Install the transfer drive gear.
   Tightening torque:
   25 N·m (2.5 kgf-m, 18.4 ft-lb)
2. When the ball bearing, transfer drive gear or snap ring are replaced, select an appropriate adjusting washer for the transfer drive gear. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Extension Case>ASSEMBLY.
3. Install the extension case. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Extension Case>INSTALLATION.
4. Install the manual transmission assembly to the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Manual Transmission Assembly>INSTALLATION.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Transfer Drive Gear

DISASSEMBLY

1. Remove the snap ring.

2. Remove the ball bearing using ST.

ST 499877000 RACE 4-5 INSTALLER

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Transfer Drive Gear

ASSEMBLY

1. Using the ST, install the ball bearing.
Note:
Use a new ball bearing.

ST1 499247400 INSTALLER

ST2 398497701 SEAT

2. Install the snap ring.

3. Inspect the clearance between the snap ring and the ball bearing. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Transfer Drive Gear>INSPECTION.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Transfer Drive Gear

INSPECTION

1. Ball bearing
   Replace the bearings in the following cases.
   - Damage or rust on the bearings
   - Wear, or damage
   - The bearing does not rotate smoothly or an abnormal noise is emitted.
2. Transfer drive gear
   Replace the drive gear in following case:
   - If the drive gear tooth surface and shaft are excessively damaged or broken.
3. Measure the clearance between the snap ring and ball bearing inner race with a thickness gauge.
   Standard clearance between the snap ring and inner race:
   0 — 0.15 mm (0 — 0.0059 in)

4. If the measurement is out of specifications, reselect an appropriate snap ring.

Snap ring	
Part No.	**Thickness mm (in)**
805045050	1.76 (0.069)
805045060	1.88 (0.074)
805045070	2.00 (0.079)

After replacing the snap ring, reinspect the clearance.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Transfer Driven Gear

REMOVAL

1. Remove the manual transmission assembly from the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Manual Transmission Assembly>REMOVAL.
2. Prepare the transmission for overhaul. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Preparation for Overhaul.
3. Remove the extension case. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Extension Case>REMOVAL.
4. Remove the transfer driven gear.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Transfer Driven Gear

INSTALLATION

1. Install the transfer driven gear.
   Caution:
   Apply transmission gear oil onto sliding or revolving surfaces before installation.
2. When the taper roller bearing or the transfer driven gear is replaced, select an appropriate adjusting washer for the transfer driven gear. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Extension Case>ADJUSTMENT.
3. Install the extension case. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Extension Case>INSTALLATION.
4. Install the manual transmission assembly to the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Manual Transmission Assembly>INSTALLATION.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Transfer Driven Gear

DISASSEMBLY

1. Using the ST, remove the taper roller bearing (extension case side).

   ST 498515700 REMOVER

2. Using the ST, remove the taper roller bearing (transmission case side).

ST1 899858600 REMOVER

ST2 899864100 REMOVER

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Transfer Driven Gear

ASSEMBLY

1. Using the ST, install the taper roller bearing (transmission case side).

ST 499757002 INSTALLER

Caution:

- **Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).**
- **Apply transmission gear oil onto sliding or revolving surfaces before installation.**

Note:

Be careful when handling because the taper roller bearing and the outer race are used as a set.

(A) Taper roller bearing (transmission case side)

2. Using the ST, install the taper roller bearing (extension case side).

ST1 398177700 INSTALLER

ST2 899864100 REMOVER

Caution:

- **Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).**
- **Apply transmission gear oil onto sliding or revolving surfaces before installation.**

Note:

Be careful when handling because the taper roller bearing and the outer race are used as a set.



(A) Taper roller bearing (extension case side)

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Transfer Driven Gear

INSPECTION

1. Taper roller bearing
   Replace the bearings in the following cases.
   - Damage or rust on the bearings
   - Wear, or damage
   - After applying transmission gear oil, bearing does not rotate smoothly or an abnormal noise is emitted.
2. Transfer driven gear
   Replace the driven gear in the following cases.
   - If the driven gear tooth surface and shaft are excessively damaged or broken.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Center Differential

REMOVAL

1. Remove the manual transmission assembly from the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Manual Transmission Assembly>REMOVAL.
2. Prepare the transmission for overhaul. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Preparation for Overhaul.
3. Remove the extension case. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Extension Case>REMOVAL.
4. Remove the transfer driven gear. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Transfer Driven Gear>REMOVAL.
5. Disconnect the center differential connector.
6. Remove the adjusting washer and center differential.

(A) Adjusting washer
(B) Center differential

7. Remove the needle bearing.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Center Differential

INSTALLATION

1. Install the needle bearing.
   Caution:
   Apply transmission gear oil onto sliding or revolving surfaces before installation.
2. Install the adjusting washer and center differential.
3. When replacing the center differential, select and install the appropriate transfer drive gear and adjusting washer. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Extension Case>ADJUSTMENT.

4. Connect the center differential connector, and affix to the oil guide.
5. Install the transfer driven gear. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Transfer Driven Gear>INSTALLATION.
6. Install the extension case. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Extension Case>INSTALLATION.
7. Install the manual transmission assembly to the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Manual Transmission Assembly>INSTALLATION.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Center Differential

INSPECTION

Check that there is no damage on the center differential. Replace if damaged.

REMOVAL

1. Remove the manual transmission assembly from the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Manual Transmission Assembly>REMOVAL.
2. Prepare the transmission for overhaul. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Preparation for Overhaul.
3. Remove the neutral position switch, back-up light switch and harness. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Neutral Position Switch>REMOVAL. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Back-up Light Switch>REMOVAL.
4. Remove the extension case. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Extension Case>REMOVAL.
5. Remove the transfer driven gear. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Transfer Driven Gear>REMOVAL.
6. Remove the center differential. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Center Differential>REMOVAL.
7. Remove the oil guides G and H.

(A) Oil guide G
(B) Oil guide H

8. Remove the snap ring and washer from the selector arm area.

(A) Snap ring
(B) Washer

9. Using an ST, remove the neutral set spring and support.

ST1 18756AA000 CLAW

ST2 399893600 PLIER

10. Lift the striking rod, and remove the straight pin.

(A) Striking rod
(B) Straight pin

11. Remove the selector arm No. 2, shifter arm shaft, selector plunger, shift accent plunger and spring.

(A) Selector arm No. 2
(B) Shifter arm shaft
(C) Selector plunger
(D) Shift accent plunger

12. Remove the transfer bearing holder.

Note:

Using a general tool may cause damage. Remove the bolt using the ST.

ST 18663AA000 SOCKET

13. Remove the washer on the main shaft section.

14. Remove the driven gear assembly shim and spacer.

(A) Driven gear ASSY

15. Remove the snap ring.

16. Remove the pilot bolt.

17. Remove the holder reverse bolt.

18. Remove the transmission case.

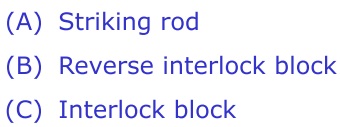
Note:

If the oil guide is caught between the shift fork, it may be difficult to remove the transmission case. Move the oil guide, then remove. Do not pull on the transmission case with excessive force.

19. Remove any remaining liquid gasket from the transmission case and adapter plate.

INSTALLATION

1. Check that the shifter fork and the interlock block are both shifted into the neutral position. If they are not, shift into the neutral position.



(A) Striking rod
(B) Reverse interlock block
(C) Interlock block

2. Apply liquid gasket to the adapter plate.
   Liquid gasket:
   THREE BOND 1215B or equivalent

3. Install the transmission case.
4. By inspecting from the pilot bolt attachment hole, check that the interlock block and the reverse interlock block are aligned to the neutral position. If not aligned, remove the transmission case, and shift the shifter fork and interlock block to the neutral position.

(A) Interlock block
(B) Reverse interlock block

5. Use a new gasket to temporarily attach the pilot bolt.
6. Install the transmission case with the bolts and nuts.
   Tightening torque:
   50 N·m (5.1 kgf-m, 36.9 ft-lb)
7. Tighten the pilot bolt.
   Tightening torque:
   34 N·m (3.5 kgf-m, 25.1 ft-lb)
8. Tighten the holder reverse bolt.
   Tightening torque:
   25 N·m (2.5 kgf-m, 18.4 ft-lb)
9. Install the snap ring and washer for the main shaft assembly, and washer and collar for the driven gear assembly.

(A) Washer
(B) Snap ring
(C) Collar

(D) Washer

10. Install the transfer bearing holder.
Tightening torque:
25 N·m (2.5 kgf-m, 18.4 ft-lb)

ST 18663AA000 SOCKET

11. When replacing the transfer bearing holder, select the appropriate transfer driven gear and adjusting washer, and install to the extension case. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Extension Case>ADJUSTMENT.
12. Install the selector arm No. 2, shifter arm shaft, selector plunger, shift accent plunger and spring.
13. Install a new straight pin.
14. Using the ST, install the neutral set spring.

ST1 18756AA000 CLAW

ST2 399893600 PLIER

15. Install the snap ring and washer to the selector arm area.
16. Install the oil guides G and H.
17. Install the center differential. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Center Differential>INSTALLATION.
18. Install the transfer driven gear. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Transfer Driven Gear>INSTALLATION.
19. Install the extension case. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Extension Case>INSTALLATION.
20. Install the neutral position switch, back-up light switch and harness. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Neutral Position Switch>INSTALLATION. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Back-up Light Switch>INSTALLATION.
21. Install the manual transmission assembly to the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Manual Transmission Assembly>INSTALLATION.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Transmission Case

DISASSEMBLY

1. Remove the transmission harness from the transmission case.
Note:
Remove the connector by disengaging the connector claw from the inside of the transmission case.
2. Remove the oil guides C, D, E, F and harness bracket.

(A) Oil guide C
(B) Oil guide D
(C) Oil guide E
(D) Oil guide F
(E) Harness bracket

3. Remove the oil pan.

4. Remove any remaining liquid gasket from the transmission case and oil pan.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Transmission Case

ASSEMBLY

1. Apply liquid gasket to the oil pan.
Liquid gasket:
THREE BOND 1215B or equivalent

2. Install the oil pan.
   Tightening torque:
   6.4 N·m (0.7 kgf-m, 4.7 ft-lb)
3. Install the oil guides C, D, E, F and harness bracket.
   Tightening torque:
   T1: 16 N·m (1.6 kgf-m, 11.8 ft-lb)
   T2: 18 N·m (1.8 kgf-m, 13.3 ft-lb)

(A) Oil guide C
(B) Oil guide D
(C) Oil guide E
(D) Oil guide F
(E) Harness bracket

4. Install the transmission harness to the transmission.
   Note:
   Install the transmission harness connector by aligning the protrusions of the transmission and transmission harness connector.

(A) Protrusion

(B) Transmission harness connectors

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Transmission Case

INSPECTION

1. If the sludge is accumulated in the oil pan, use a waste cloth to wipe it off completely.
2. Check that there is no damage on any parts. Replace damaged parts with new parts.

REMOVAL

1. Remove the manual transmission assembly from the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Manual Transmission Assembly>REMOVAL.
2. Prepare the transmission for overhaul. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Preparation for Overhaul.
3. Remove the neutral position switch, back-up light switch and harness. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Neutral Position Switch>REMOVAL. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Back-up Light Switch>REMOVAL.
4. Remove the extension case. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Extension Case>REMOVAL.
5. Remove the transfer driven gear. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Transfer Driven Gear>REMOVAL.
6. Remove the center differential. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Center Differential>REMOVAL.
7. Remove the transmission case. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Transmission Case>REMOVAL.
8. Remove the striking rod.
9. Remove the oil guide B.

10. Use a screwdriver to shift to the 4th gear position.

(A) 3rd-4th fork rod

11. Remove the reverse idler holder.

(A) Reverse idler holder

12. Remove the check plug, O-ring, check ball spring, shift accent plunger and check ball from the adapter plate.

Note:

Do not reuse the O-ring.

(A) Check plug
(B) O-ring
(C) Checking ball spring
(D) Shift accent plunger
(E) Check ball

13. Remove the bolt and gasket holding the reverse idler gear shaft.

14. Push the main shaft assembly, driven gear assembly, reverse idler gear and shifter forks to remove from the adapter plate all at once.
Note:
A helper is required to perform this work.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Main Shaft Assembly

INSTALLATION

1. Adjust the 3rd-4th and 5th-6th fork rods. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Shifter Fork and Rod>ADJUSTMENT.
2. Rotate the reverse idler sub gear 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. Attach the driven gear assembly to the 1st-2nd shifter fork assembly.

(A) 1st-2nd shifter fork

(B) Driven gear ASSY

(C) 1st-2nd coupling sleeve

4. Attach the main shaft assembly to the 3rd-4th shifter fork, and assemble to the driven gear assembly.

(A) 3rd-4th shifter fork

(B) 3rd-4th coupling sleeve

(C) Driven gear ASSY

(D) Main shaft ASSY

5. Attach the 5th-6th shifter fork assembly to the main shaft assembly.

(A) 5th-6th shifter fork

(B) 5th-6th coupling sleeve

(C) Main shaft ASSY

6. Attach the reverse shifter fork assembly to the reverse idler gear assembly.

(A) Reverse idler gear ASSY
(B) Reverse shifter fork
(C) Reverse coupling sleeve

7. Install the reverse idler gear assembly.

(A) Reverse idler gear ASSY
(B) 1st drive gear
(C) Reverse gear (driven shaft)

8. Install the thrust bearing of the driven gear assembly.
9. Push on the shifter forks, main shaft assembly, driven gear assembly and reverse idler gear assemblies, to attach to the adapter plate all at once.
   Note:
   A helper is required to perform this work.
10. As necessary, remove the wire used to secure from the reverse idler gear.
11. Install the shift accent plunger, check ball spring, new O-ring and check plugs.
    Tightening torque:
    25 N·m (2.5 kgf-m, 18.4 ft-lb)

(A) Check plug
(B) O-ring
(C) Checking ball spring
(D) Shift accent plunger

12. Install the check ball, check ball spring, new O-ring and check plugs.

Tightening torque:

25 N·m (2.5 kgf-m, 18.4 ft-lb)

(A) Check plug

(B) O-ring

(C) Checking ball spring

(D) Check ball

13. Install the bolt and a new gasket holding the reverse idler shaft.
Tightening torque:
25 N·m (2.5 kgf-m, 18.4 ft-lb)
14. Use a screwdriver to shift to the 4th gear position.
15. Install the reverse idler holder.
16. Install the oil guide B.
Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)
17. Install the striking rod.
18. Install the transmission case. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Transmission Case>INSTALLATION.
19. Install the selected main shaft snap ring and washers.
20. Install the center differential. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Center Differential>INSTALLATION.
21. Install the transfer driven gear. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Transfer Driven Gear>INSTALLATION.
22. Install the extension case. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Extension Case>INSTALLATION.
23. Install the neutral position switch, back-up light switch and harness. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Neutral Position Switch>INSTALLATION. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Back-up Light Switch>INSTALLATION.
24. Install the manual transmission assembly to the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Manual Transmission Assembly>INSTALLATION.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Main Shaft Assembly

DISASSEMBLY

Note:
Individual coupling sleeves and synchronizer hubs meet at a specified position. Before disassembly, mark the meeting position of the coupling sleeve and synchronizer hub.

1. Affix the ST to the work table.

ST 18664AA000 BASE

2. Flatten the tab of the lock nut.
3. Set the main shaft assembly to the ST, and remove the lock nut and lock washer.

ST1 18665AA000 HOLDER

ST2 18664AA000 BASE

Note:
Use a 38 mm socket wrench.

4. Remove the main shaft assembly from the ST.
5. Set the ST1 to the 6th drive gear, and use a press to remove the double taper roller bearing and outer race, 6th drive gear bushing and 6th drive gear.

ST1 18722AA010 REMOVER

ST2 899864100 REMOVER

(A) Double taper roller bearing
(B) 6th drive gear bushing
(C) 6th drive gear

6. Remove the 5th-6th coupling sleeve, 6th needle bearing and 6th baulk ring.

(A) 6th needle bearing
(B) 6th baulk ring
(C) 5th-6th coupling sleeve

7. Set the ST to the 3rd drive gear, and use a press to remove individual parts.

ST 18720AA000 REMOVER

(A) 3rd drive gear
(B) 3rd-4th coupling sleeve

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Main Shaft Assembly

ASSEMBLY

Note:
When replacing the following parts, replace as a set.

- **Coupling sleeve and synchronizer hub**
- **3rd outer baulk ring, 3rd synchro cone and 3rd inner baulk ring**
- **Double taper roller bearing**

1. Apply adequate transmission gear oil to the main shaft, 3rd needle bearing and 3rd drive gear inner surface.
2. Install the 3rd needle bearing and 3rd drive gear to the main shaft.

(A) 3rd drive gear
(B) 3rd needle bearing

3. Install the 3rd inner baulk ring, 3rd synchro cone and 3rd outer baulk ring.

(A) 3rd inner baulk ring
(B) 3rd outer baulk ring

Note:
Install the 3rd synchro cone by aligning the protrusion of the 3rd synchro cone with the hole on the 3rd drive gear.

4. Install the 3rd-4th synchronizer hub and 4th needle bearing race.
Caution:
Apply transmission gear oil onto sliding or revolving surfaces before installation.
(1) Being careful of the install direction of the 3rd-4th synchronizer hub, set to the main shaft.

(A) Main shaft
(B) 3rd-4th synchronizer hub
(C) 3rd drive gear

(2) With the main shaft oil hole and 4th needle bearing race oil hole out of alignment, attach to the main shaft.

(A) 4th needle bearing race
(B) 3rd-4th synchronizer hub
(C) 4th needle bearing race oil hole
(D) Main shaft oil hole

(3) Using the ST, push in to the 3rd-4th synchronizer hub and 4th needle bearing race all at once.

ST1 18651AA000 INSTALLER

ST2 398177700 INSTALLER

Caution:
Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 Imp ton).

Note:
When pushing into the 3rd-4th synchronizer hub and 4th needle bearing race, move the 3rd outer baulk ring to match the protrusion of the 3rd outer baulk ring and the cut out of the 3rd-4th synchronizer hub.

(A) 3rd-4th synchronizer hub
(B) 3rd outer baulk ring
(C) Cut out of the 3rd-4th synchronizer hub
(D) Protrusion of the 3rd outer baulk ring
(E) 4th needle bearing race

5. Make sure that the 3rd drive gear can be turned smoothly by hand. If it does not turn smoothly, reassemble.

6. Attach the 3rd-4th shifting insert at the appropriate position of the 3rd-4th coupling sleeve.
Note:
- **The location angle of each shifting insert is 120°.**
- **Refer to the following figure to install the shifting insert.**

(A) Attach the straight part of the shifting insert to the sleeve convex portion.
(B) 3rd-4th shifting insert
(C) 3rd-4th coupling sleeve

7. Attach the 3rd-4th coupling sleeve to the 3rd-4th synchronizer hub.

Caution:

Apply transmission gear oil onto sliding or revolving surfaces before installation.

Note:

- **There is an identification groove on the 3rd-4th coupling sleeve.**
- **Place the groove towards the 3rd drive gear, and attach the 3rd-4th coupling sleeve.**

(A) 3rd drive gear
(B) 3rd-4th sleeve identification groove (1)

8. Install the 4th baulk ring.

9. Apply adequate transmission gear oil to the main shaft, 4th needle bearing and 4th drive gear inner surface.

10. Install the 4th needle bearing and 4th drive gear.

(A) 4th needle bearing

(B) 4th drive gear

11. Install the 5th drive gear bushing.

(1) With the main shaft oil hole and 5th drive gear bushing oil hole out of alignment, attach to the main shaft.

(A) 5th drive gear bushing
(B) Main shaft oil hole
(C) Main shaft
(D) 5th drive gear bushing oil hole
(E) 4th drive gear

(2) Using the ST, push into the 5th drive gear bushing.

ST1 18651AA000 INSTALLER

ST2 398177700 INSTALLER

Caution:
Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 Imp ton).

12. Make sure that the 4th drive gear can be turned smoothly by hand. If it does not turn smoothly, reassemble.

13. Apply adequate transmission gear oil to the main shaft, 5th needle bearing and 5th drive gear inner surface.

14. Install the 5th needle bearing and 5th drive gear.

(A) 5th needle bearing
(B) 5th drive gear

15. Install the 5th baulk ring.

16. Install the 5th-6th synchronizer hub.

Caution:

Apply transmission gear oil onto sliding or revolving surfaces before installation.

(1) Being careful of the install direction of the 5th-6th synchronizer hub, set to the main shaft.

(A) Main shaft

(B) 5th-6th synchronizer hub

(C) 5th drive gear

(2) Using the ST, push into the 5th-6th synchronizer hub.

ST1 18651AA000 INSTALLER

ST2 398177700 INSTALLER

Caution:

Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 Imp ton).

Note:

When pushing into the 5th-6th synchronizer hub, move the 5th outer baulk ring to match the protrusion of the 5th outer baulk ring and the cut out of the 5th-6th drive gear bushing.

(A) 5th-6th synchronizer hub

(B) 5th outer baulk ring

(C) Cut out of the 5th-6th synchronizer hub

(D) Protrusion of the 5th outer baulk ring

17. Make sure that the 5th drive gear can be turned smoothly by hand. If it does not turn smoothly, reassemble.

18. Attach the 5th-6th shifting insert at the appropriate position of the 5th-6th coupling sleeve.

Note:

- **The location angle of each shifting insert is 120°.**
- **Refer to the following figure to install the shifting insert key.**

(A) Attach the straight part of the shifting insert to the sleeve convex portion.

(B) 5th-6th shifting insert

(C) 5th-6th coupling sleeve

19. Attach the 5th-6th coupling sleeve to the 5th-6th synchronizer hub.

Caution:

Apply transmission gear oil onto sliding or revolving surfaces before installation.

Note:

- **There are two identification grooves on the 5th-6th coupling sleeve.**
- **Place the grooves towards the 5th drive gear, and attach the 5th-6th coupling sleeve.**

(A) 5th drive gear

(B) 5th-6th coupling sleeve identification groove (2)

20. Install the 6th baulk ring.

21. Apply adequate transmission gear oil to the main shaft, 6th needle bearing and 6th drive gear inner surface.

22. Install the 6th drive gear.

23. Install the 6th needle bearing.

24. With 6th drive gear bushing oil hole and the main shaft oil hole out of alignment, attach to the main shaft.

(A) 6th drive gear bushing oil hole

(B) Main shaft oil hole

25. Using the ST, install the 6th drive gear bushing.

ST1 18651AA000 INSTALLER

ST2 398177700 INSTALLER

Caution:
Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 Imp ton).

26. Make sure that the 6th drive gear can be turned smoothly by hand. If it does not turn smoothly, reassemble.

27. Using the ST, install the double taper roller bearing inner race (front side).

ST1 18651AA000 INSTALLER

ST2 398177700 INSTALLER

Caution:
Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 Imp ton).
Note:
Use a new double taper roller bearing.

28. Using the ST, install the outer race and inner race (rear side) of the double taper roller bearing.

ST1 18651AA000 INSTALLER

ST2 398177700 INSTALLER

Caution:
Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 Imp ton).
Note:

- **Confirm that the outer race and inner race are installed in the proper direction.**
- **Push in until there is no backlash on the double taper roller bearing outer race and the bearing turns smoothly by hand.**

(A) Double taper roller bearing outer race
(B) Double taper roller bearing inner race (rear side)

29. Make sure that the double taper roller bearing turns smoothly by hand. If it does not turn smoothly, replace the double taper roller bearing as a set, and reassemble.

30. Attach a new lock washer and a new lock nut.

Caution:
Apply transmission gear oil to the lock washer and lock nut before installation.

31. Set the main shaft assembly to the ST, and tighten the lock nut.

ST1	**18665AA000**	**HOLDER**
ST2	**18664AA000**	**BASE**

Note:
Make sure the lock washer is installed in the proper direction.
Tightening torque:
392 N·m (40.0 kgf-m, 289.1 ft-lb)

(A) Lock washer

(B) Lock nut

(C) Nut side

32. Using the ST, crimp the lock nut in 4 locations, with dimensions within A 27±0.3 mm (1.06±0.01 in).

ST 18668AA000 PUNCH

Note:
Do not damage the crimp area of the lock nut.

INSPECTION

Disassembled parts should be washed with cleaning solvent first, then inspected carefully.

1. Bearing
   Replace the bearings in the following cases.
   - Wear, rusting or damage of the bearings
   - The bearing does not rotate smoothly or an abnormal noise is emitted when turning.
   - The bearing has other defects.
2. Bushing (each gear)
   Replace the bushing in following cases.
   - The sliding surface is damaged or abnormally worn.
3. Gear
   Replace gears in the following cases.
   - The gear teeth surface is damaged or excessively worn.
   - The contact area of the baulk ring is damaged.
   - The inner face of the gear is worn.
4. Baulk ring, synchro cone
   Replace the baulk ring and synchro cone in the following cases.
   - Wear, rusting or damage of the baulk ring
5. Shifting insert
   Replace the shifting insert if deformed, excessively worn or defective in any way.

ADJUSTMENT

1. MAIN SHAFT SNAP RING & ADJUSTING WASHER SELECTION

Note:
In the following conditions, perform the procedures below.

- **1st to 6th driven gear replacement**
- **1st and 2nd synchro ring assembly replacement**
- **Ball bearing replacement**
- **Adapter plate replacement**
- **Driven shaft replacement**

1. Insert the drive pinion shaft assembly into the adapter plate.

Note:
Confirm that the thrust bearing outer race has not been removed and the drive pinion is not lifted.

2. Set the height gauge to the adapter plate. Lower the height gauge indicator to the mating surface of the adapter plate and case, and set to zero points.

ST 18853AA000 HEIGHT GAUGE

Note:
- **The adapter plate will be the base point for the measurement. Use a scraper to remove any gasket material remaining on the end face.**
- **During measurement, do not place the height gauge in the shaded area shown in the figure.**

3. Measure the height to the ball bearing end face. (Height H)

(A) Ball bearing

Note:
Set the height gauge indicator near the measurement target, and lock dial (1) as shown in the figure. Turn dial (2), and set the indicator to the end face of the bearing.

Turn approximately 120° at a time, and measure the ball bearing in 5 locations. Round down the 2 highest and 2 lowest measurement values. The remaining center value is used as the measurement value.

4. According to the measurement value, select the snap ring and adjusting washer from the following table.

Snap ring		
H: mm (in)	**Part No.**	**Thickness: mm (in)**
270.83 — 271.40 (10.66 — 10.69)	805072010	1.65 (0.065)

Snap ring		
H: mm (in)	**Part No.**	**Thickness: mm (in)**
271.41 — 271.98 (10.69 — 10.71)	805072011	1.95 (0.077)
271.99 — 272.56 (10.71 — 10.73)	805072012	2.25 (0.089)
Adjusting washer		
H: mm (in)	**Part No.**	**Thickness: mm (in)**
270.83 — 271.40 (10.66 — 10.69)	803067012	1.6 (0.063)
271.41 — 271.98 (10.69 — 10.71)	803067011	1.3 (0.051)
271.99 — 272.56 (10.71 — 10.73)	803067010	1.0 (0.039)

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Driven Gear Assembly

REMOVAL

1. Remove the manual transmission assembly from the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Manual Transmission Assembly>REMOVAL.
2. Prepare the transmission for overhaul. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Preparation for Overhaul.
3. Remove the neutral position switch, back-up light switch and harness. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Neutral Position Switch>REMOVAL. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Back-up Light Switch>REMOVAL.
4. Remove the extension case. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Extension Case>REMOVAL.
5. Remove the transfer driven gear. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Transfer Driven Gear>REMOVAL.
6. Remove the center differential. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Center Differential>REMOVAL.
7. Remove the transmission case. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Transmission Case>REMOVAL.
8. Remove the driven gear assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Main Shaft Assembly>REMOVAL.
9. Remove the 1st needle bearing.

10. Remove the thrust needle bearing.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Driven Gear Assembly

INSTALLATION

1. Adjust the main shaft snap ring. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Main Shaft Assembly>ADJUSTMENT.
2. Adjust the 1st-2nd fork rod. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Shifter Fork and Rod>ADJUSTMENT.
3. Install the thrust needle bearing.
   Note:
   Confirm that the thrust needle bearing is installed in the proper direction.

4. Install the 1st needle bearing.
5. Install the driven gear assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Main Shaft Assembly>INSTALLATION.
6. Install the transmission case. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Transmission Case>INSTALLATION.
7. Adjust the backlash of the driven gear assembly in the axial direction. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Driven Gear Assembly>ADJUSTMENT.
8. Install the center differential. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Center Differential>INSTALLATION.
9. Install the transfer driven gear. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Transfer Driven Gear>INSTALLATION.
10. Install the extension case. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Extension Case>INSTALLATION.
11. Install the neutral position switch, back-up light switch and harness. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Neutral Position Switch>INSTALLATION. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Back-up Light Switch>INSTALLATION.
12. Install the manual transmission assembly to the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Manual Transmission Assembly>INSTALLATION.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Driven Gear Assembly

DISASSEMBLY

Note:
Individual coupling sleeves and synchronizer hubs meet at a specified position. Before disassembly, mark the meeting position of the coupling sleeve and synchronizer hub.

1. Affix the ST to the work table.

   ST 18664AA000 BASE

2. Flatten the tab of the lock nut.
3. Attach ST3 to the lock nut, set the driven gear assembly to the ST, and remove the lock nut.

   ST1 18666AA000 HOLDER

   ST2 18664AA000 BASE

   ST3 18620AA000 ADAPTER WRENCH

4. Attach ST1 to the 6th driven gear, then remove the ball bearing and 5th-6th driven gear.

ST1 18723AA000 REMOVER

ST2 499877000 RACE 4-5 INSTALLER

(A) Ball bearing
(B) 5th-6th driven gear

5. Attach ST1 to the 4th driven gear, then remove the 3rd-4th driven gear.

ST1 18723AA000 REMOVER

ST2 499877000 RACE 4-5 INSTALLER

(A) 3rd-4th driven gear

6. Remove the key.

7. Remove the 2nd driven gear.

8. Remove the 2nd needle bearing and 1st-2nd coupling sleeve.

(A) 2nd needle bearing
(B) 1st-2nd coupling sleeve

9. Remove the 2nd outer baulk ring, 2nd synchro cone and 2nd inner baulk ring.

(A) 2nd outer baulk ring
(B) 2nd synchro cone
(C) 2nd inner baulk ring

10. Using the ST, remove individual parts.

ST 18754AA000 REMOVER

(A) 2nd drive gear bushing
(B) 1st-2nd synchronizer hub
(C) 1st outer baulk ring
(D) 1st synchro cone
(E) 1st inner baulk ring
(F) 1st driven gear
(G) 1st needle bearing

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Driven Gear Assembly

ASSEMBLY

Note:
When replacing the following parts, replace as a set.

- **Coupling sleeve and synchronizer hub**
- **1st outer baulk ring, 1st synchro cone and 1st inner baulk ring**
- **2nd outer baulk ring, 2nd synchro cone and 2nd inner baulk ring**

1. Apply adequate transmission gear oil to the main shaft, 1st needle bearing and 1st driven gear inner surface.
2. Install the 1st needle bearing.

3. Attach the 1st driven gear to the driven shaft.

4. Install the 1st inner baulk ring.

5. Match the protrusion of the 1st synchro cone to the hole of the 1st driven gear, then install.

6. Install the 1st outer baulk ring.

7. Install the 1st-2nd synchronizer hub.

Caution:

Apply transmission gear oil onto sliding or revolving surfaces before installation.

Note:

- **Match the cut out of the 1st-2nd synchronizer hub with the protrusion on the outer baulk ring, then install.**
- **Make sure that the 1st-2nd synchronizer hub is installed in the correct direction.**

(A) 1st-2nd synchronizer hub
(B) 1st outer baulk ring
(C) Cut out of the 1st-2nd synchronizer hub
(D) Protrusion of the 1st outer baulk ring
(E) 1st driven gear

8. Using the ST, install the 1st-2nd synchronizer hub and 2nd driven gear bushing.

ST 18654AA000 INSTALLER

Caution:

Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 Imp ton).

(A) 2nd driven gear bushing

(B) 1st-2nd synchronizer hub

9. Make sure that the 1st driven gear can be turned smoothly by hand. If it does not turn smoothly, reassemble.

10. Attach the 1st-2nd coupling sleeve to the 1st-2nd synchronizer hub.

Note:

- **Make sure that the 1st-2nd coupling sleeve is installed in the correct direction.**
- **Align the 1st-2nd synchronizer hub cut out section (three places) and the key grooves (three places) of shifting insert that are located inside the 1st-2nd coupling sleeve.**
- **Set the 1st-2nd coupling sleeve and 1st driven gear so that they contact each other.**

(A) 1st driven gear

(B) 1st-2nd coupling sleeve

(C) 1st driven gear side

(A) 1st-2nd synchronizer hub

(B) 1st-2nd coupling sleeve

11. Attach the 1st-2nd shifting insert to the appropriate position of the 1st-2nd coupling sleeve.

Note:

- **The location angle of each shifting insert is 120°.**
- **Install the 1st-2nd shifting insert to the key grooves (three places) of shifting insert that are located inside the 1st-2nd coupling sleeve.**

(A) 1st-2nd shifting insert

(B) 1st-2nd synchronizer hub

(C) 1st-2nd coupling sleeve

12. Install the 2nd outer baulk ring.

13. Install the 2nd synchro cone.

14. Install the 2nd inner baulk ring.

15. Apply adequate transmission gear oil to the 2nd driven gear bushing, 2nd needle bearing and 2nd driven gear inner surface.

16. Install the 2nd needle bearing and 2nd driven gear.

Note:

Match the protrusion of the 2nd synchro cone to the hole of the 2nd driven gear, then install.

(A) 2nd needle bearing

(B) 2nd driven gear

(C) Protrusion of the 2nd synchro cone

17. Attach the key.

18. Using the ST, install the 3rd-4th driven gear.

ST 18654AA000 INSTALLER

Caution:

- **Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 Imp ton).**
- **Apply transmission gear oil onto sliding or revolving surfaces before installation.**

Note:

- **Make sure that the 3rd-4th driven gear is installed in the correct direction.**
- **Match the groove on the 3rd-4th driven gear to the key.**

(A) 4th gear
(B) 3rd gear
(C) 2nd gear

19. Make sure that the 2nd driven gear can be turned smoothly by hand. If it does not turn smoothly, reassemble.

20. Attach the key.

21. Using the ST, install the 5th-6th driven gear.

ST 18654AA000 INSTALLER

Caution:
Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 Imp ton).
Note:

- **Make sure that the 5th-6th driven gear is installed in the correct direction.**
- **Match the groove on the 5th-6th driven gear to the key.**

(A) 6th gear
(B) 5th gear
(C) 4th gear

22. Using the ST, install the ball bearing.

ST 18654AA000 INSTALLER

Caution:
Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 Imp ton).
Note:
Face the sealing section of the ball bearing to the lock nut side, and install the ball bearing.

(A) Sealing

23. Make sure that the ball bearing turns smoothly by hand. If it does not turn smoothly, reassemble.

24. Install a new lock nut.

25. Attach ST3 to the lock nut, attach ST to the driven gear assembly, and tighten the lock nut.

ST1 18666AA000 HOLDER

ST2 18664AA000 BASE

ST3 18620AA000 ADAPTER WRENCH

ST4 18852AA000 TORQUE WRENCH

Tightening torque:
530 N·m (54.0 kgf-m, 390.9 ft-lb)

Note:
When using a torque wrench other than ST4, use the calculation below to calculate and tighten the lock nut.
T = L1/(0.1 + L1) × 570

T	N·m (kgf-m, ft-lb)	Torque wrench setting
L1	m (in)	Torque wrench length
0.1 m (3.94 in)		Length of ST
570 N·m (58.1 kgf-m, 420 ft-lb)		Tightening torque (lock nut)

(A) 0.1 m (3.94 in)

26. Using the ST, crimp the lock nut in 4 locations, with dimensions within A 44±0.5 mm (1.73±0.02 in).

ST 18669AA000 PUNCH DRIVEN SHAFT

Note:
Do not damage the crimp area of the lock nut.

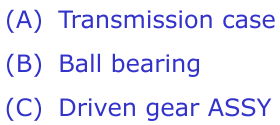
INSPECTION

Disassembled parts should be washed with cleaning solvent first, then inspected carefully.

1. Bearing
   Replace the bearings in the following cases.
   - Wear, rusting or damage of the bearings
   - The bearing does not rotate smoothly or an abnormal noise is emitted when turning.
   - The bearing has other defects.
2. Bushing (each gear)
   Replace the bushing in following cases.
   - The sliding surface is damaged or abnormally worn.
3. Gear
   Replace gears in the following cases.
   - The gear teeth surface is damaged or excessively worn.
   - The contact area of the baulk ring is damaged.
   - The inner face of the gear is worn.
4. Baulk ring, synchro cone
   Replace the baulk ring and synchro cone in the following cases.
   - Wear, rusting or damage of the baulk ring
5. Shifting insert
   Replace the shifting insert key if deformed, excessively worn or defective in any way.

ADJUSTMENT

1. Measure the length "H" from the transmission case and transfer bearing holder mating surface, to the end face of the ball bearing.



(A) Transmission case
(B) Ball bearing
(C) Driven gear ASSY

2. Using the following calculation, calculate the thickness of the driven gear assembly adjusting washer.
   T = H − {5.8±0.05 mm (0.23±0.002 in)} − {0.1 — 0.3 mm (0.0039 — 0.0118 in)}

T	Adjusting washer thickness
H	Length from the transmission case and transfer bearing holder mating surface to the end face of the ball bearing
5.8±0.05 mm (0.23±0.002 in)	Collar thickness
0.1 — 0.3 mm (0.0039 — 0.0118 in)	Driven gear assembly axial direction backlash standard

3. Select 0 to 3 adjusting washers from the following table, and adjust to the backlash that is closest to the standard value.
   Driven gear assembly axial direction backlash standard:

0.1 — 0.3 mm (0.0039 — 0.0118 in)

Adjusting washer	
Part No.	**Thickness T mm (in)**
803072030	0.15 (0.0059)
803072031	0.30 (0.0118)
803072032	0.45 (0.0177)
803072033	0.60 (0.0236)

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Reverse Idler Gear Assembly

REMOVAL

1. Remove the manual transmission assembly from the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Manual Transmission Assembly>REMOVAL.
2. Prepare the transmission for overhaul. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Preparation for Overhaul.
3. Remove the neutral position switch, back-up light switch and harness. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Neutral Position Switch>REMOVAL. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Back-up Light Switch>REMOVAL.
4. Remove the extension case. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Extension Case>REMOVAL.
5. Remove the transfer driven gear. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Transfer Driven Gear>REMOVAL.
6. Remove the center differential. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Center Differential>REMOVAL.
7. Remove the transmission case. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Transmission Case>REMOVAL.
8. Remove the reverse idler gear assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Main Shaft Assembly>REMOVAL.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Reverse Idler Gear Assembly

INSTALLATION

1. Select the reverse fork rod. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Shifter Fork and Rod>ADJUSTMENT.
2. Install the reverse idler gear assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Main Shaft Assembly>INSTALLATION.
3. Install the transmission case. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Transmission Case>INSTALLATION.
4. Install the center differential. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Center Differential>INSTALLATION.
5. Install the transfer driven gear. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Transfer Driven Gear>INSTALLATION.
6. Install the extension case. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Extension Case>INSTALLATION.
7. Install the neutral position switch, back-up light switch and harness. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Neutral Position Switch>INSTALLATION. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Back-up Light Switch>INSTALLATION.
8. Install the manual transmission assembly to the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Manual Transmission Assembly>INSTALLATION.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Reverse Idler Gear Assembly

DISASSEMBLY

Note:
Reverse coupling sleeves and reverse gears meet at a specified position. Before disassembly, mark the meeting position of the reverse coupling sleeve and synchronizer hub.

1. Remove the straight pin.

2. Remove the snap ring and washer.

3. Remove the counter high & low washer and reverse idler gear.

(A) Counter high and low washer
(B) Reverse idler gear

4. Remove the knock pin and reverse idler gear needle bearing.

(A) Knock pin

(B) Reverse idler gear needle bearing

5. Remove the collar.
6. Remove the reverse coupling sleeve.

7. Remove the reverse outer baulk ring, reverse synchro cone and reverse inner baulk ring from the reverse coupling sleeve.

(A) Reverse coupling sleeve

(B) Reverse outer baulk ring

(C) Reverse synchro cone

(D) Reverse inner baulk ring

8. Remove reverse idler gear No. 2.

9. Remove the counter high & low washer and needle bearing.

(A) Needle bearing
(B) Counter high and low washer

10. Remove the knock pin.

11. Remove the snap ring and friction plate.

(A) Snap ring
(B) Friction plate

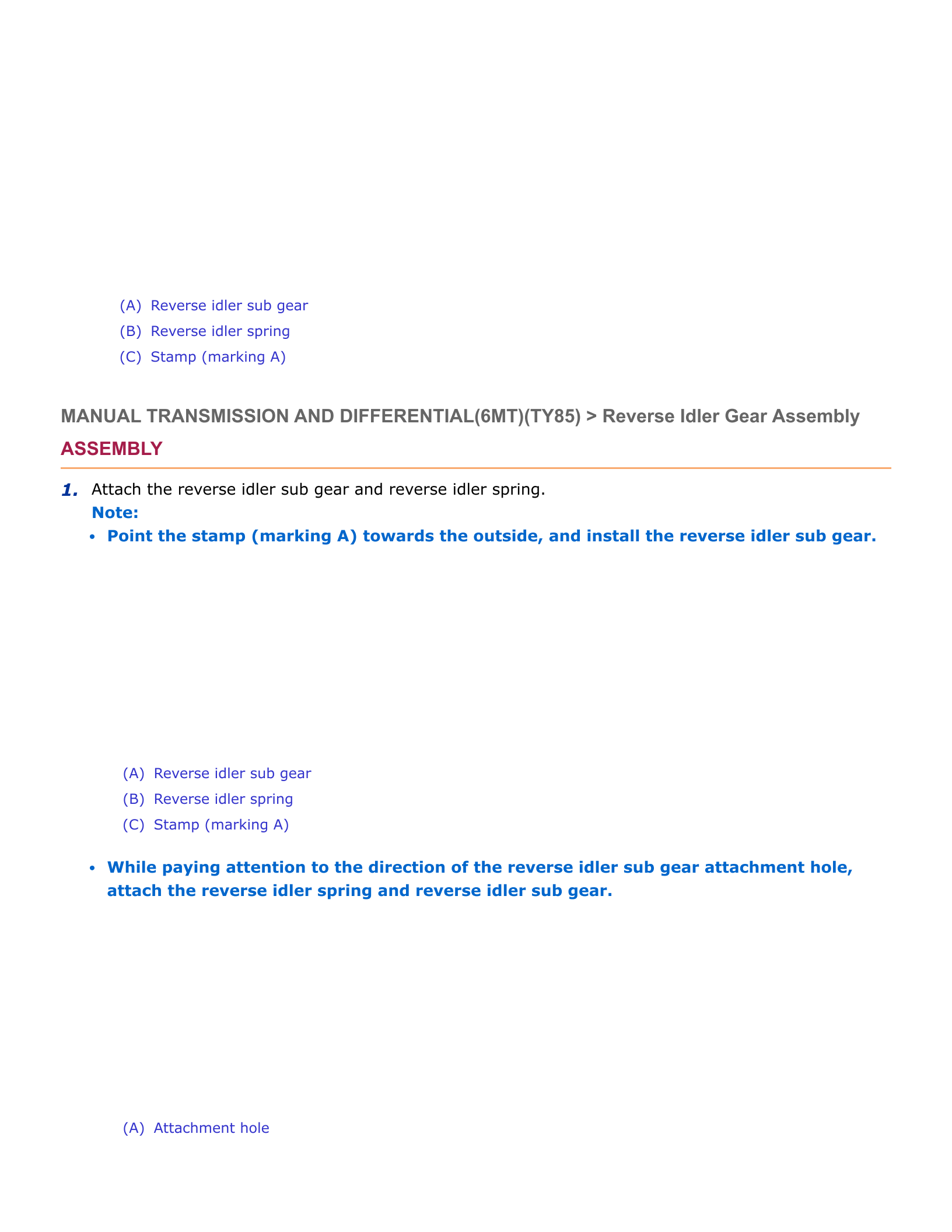
12. Remove the reverse idler sub gear and reverse idler spring.

(A) Reverse idler sub gear
(B) Reverse idler spring
(C) Stamp (marking A)

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Reverse Idler Gear Assembly

ASSEMBLY

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) Stamp (marking A)

   - **While paying attention to the direction of the reverse idler sub gear attachment hole, attach the reverse idler spring and reverse idler sub gear.**

(A) Attachment hole

2. Install the friction plate and snap ring.
   Note:
   Confirm that the friction plate is installed in the proper direction.

(A) Friction plate
(B) Snap ring
(C) Snap ring side
(D) Reverse idler sub gear side

3. Apply adequate transmission gear oil to the reverse idler gear shaft, needle bearing and reverse drive gear inner surface.
4. Install the knock pin.

5. Install the counter high & low washer and needle bearing.
   Note:
   Point the groove towards the reverse idler gear, and attach the washer.

(A) Groove
(B) Counter high and low washer
(C) Needle bearing

6. Install the reverse idler gear No. 2.

7. Attach the shifting insert to the appropriate location of the reverse coupling sleeve.

Note:

- **The location angle of each shifting insert is 120°.**
- **Refer to the following figure to install the shifting insert.**

(A) Reverse sleeve

(B) Shifting insert

8. Install the reverse coupling sleeve to the reverse idler gear No. 2.

Note:

Confirm that the reverse coupling sleeve is installed in the proper direction.

9. Apply adequate transmission gear oil to the collar, needle bearing and reverse drive gear inner surface.
10. Install the reverse outer baulk ring, reverse synchro cone and reverse inner baulk ring.

(A) Reverse outer baulk ring
(B) Reverse synchro cone
(C) Reverse inner baulk ring

11. Install the collar and needle bearing, then the knock pin.

(A) Collar
(B) Needle bearing
(C) Knock pin

12. Match the protrusion of the reverse synchro cone to the hole on the reverse idler gear, and install the reverse idler gear.

(A) Protrusion on the reverse synchro cone

(B) Hole of the reverse idler gear

13. Point the groove towards the reverse idler gear, and attach the counter high & low washer and the washer.
14. Using the ST, install the snap ring.

ST 18672AA000 GUIDE CLIP

15. Inspect and adjust the clearance between the snap ring and the washer. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Reverse Idler Gear Assembly>INSPECTION.
16. Install a new straight pin.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Reverse Idler Gear Assembly

INSPECTION

Disassembled parts should be washed with cleaning solvent first, then inspected carefully.

1. Bearing
   Replace the bearings in the following cases.
   - Wear, rusting or damage of the bearings
   - The bearing does not rotate smoothly or an abnormal noise is emitted when turning.
   - The bearing has other defects.
2. Bushing (each gear)
   Replace the bushing in following cases.
   - The sliding surface is damaged or abnormally worn.
3. Gear
   Replace gears in the following cases.
   - The gear teeth surface is damaged or excessively worn.
   - The contact area of the baulk ring is damaged.

- The inner face of the gear is worn.

4. Baulk ring, synchro cone
   Replace the baulk ring and synchro cone in the following cases.
   - Wear, rusting or damage of the baulk ring
5. Shifting insert
   Replace the shifting insert if deformed, excessively worn or defective in any way.

6. Check clearance between the snap ring and washer.
   Clearance specification:
   0.1 — 0.3 mm (0.0039 — 0.0118 in)

If the clearance is out of the specification, select a snap ring from the following table and replace it.

Snap ring	
Part No.	**Thickness mm (in)**
031319000	1.50 (0.059)
805019030	1.60 (0.062)
805019010	1.72 (0.068)

After replacing the snap ring, inspect the clearance.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Drive Pinion Shaft Assembly

REMOVAL

1. Remove the manual transmission assembly from the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Manual Transmission Assembly>REMOVAL.
2. Prepare the transmission for overhaul. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Preparation for Overhaul.
3. Remove the neutral position switch, back-up light switch and harness. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Neutral Position Switch>REMOVAL. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Back-up Light Switch>REMOVAL.
4. Remove the extension case. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Extension Case>REMOVAL.
5. Remove the transfer driven gear. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Transfer Driven Gear>REMOVAL.
6. Remove the center differential. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Center Differential>REMOVAL.
7. Remove the transmission case. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Transmission Case>REMOVAL.
8. Remove the individual gear assemblies. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Main Shaft Assembly>REMOVAL.
9. Remove the drive pinion shaft assembly.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Drive Pinion Shaft Assembly

INSTALLATION

1. Remove any remaining gasket material from the drive plate and clutch housing.
2. Apply liquid gasket to the clutch housing.

   Liquid gasket:

   THREE BOND 1215B or equivalent

3. Install the individual gear assemblies. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Main Shaft Assembly>INSTALLATION.
4. Install the transmission case. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Transmission Case>INSTALLATION.
5. Install the center differential. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Center Differential>INSTALLATION.
6. Install the transfer driven gear. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Transfer Driven Gear>INSTALLATION.
7. Install the extension case. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Extension Case>INSTALLATION.
8. Install the neutral position switch, back-up light switch and harness. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Neutral Position Switch>INSTALLATION. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Back-up Light Switch>INSTALLATION.
9. Install the manual transmission assembly to the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Manual Transmission Assembly>INSTALLATION.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Drive Pinion Shaft Assembly

DISASSEMBLY

Note:
Replace the drive pinion shaft and hypoid driven gear as a set.

1. Remove the oil guide A.

(A) Oil guide A

2. Remove the drive pinion shaft and shim from the adapter plate.

3. Affix the ST to the work table.

ST 18664AA000 BASE

4. Flatten the tab of the lock nut.
5. Attach ST3 to the lock nut, and set the drive pinion shaft to ST. Remove the lock nut and lock washer.

ST1 18667AA000 HOLDER

ST2 18664AA000 BASE

ST3 18621AA000 ADAPTER WRENCH

6. Using the ST, remove the double taper roller bearing assembly.

ST 18723AA000 REMOVER

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Drive Pinion Shaft Assembly

ASSEMBLY

1. Using the ST, measure drive pinion measurement A.

Note:
When selecting the drive pinion shim, refer to measurement A.

ST 398643600 GAUGE

2. Using the ST and a press, attach the double taper roller bearing inner race (front side) to the drive pinion shaft.

ST 18723AA000 REMOVER

Caution:
Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 Imp ton).
Note:
Use a new double taper roller bearing.

3. Using the ST and a press, attach the double taper roller bearing outer race and the double taper roller bearing to the drive pinion shaft.

ST 18723AA000 REMOVER

Note:
- **Use a new double taper roller bearing.**
- **Push in to a position where the bearing rotates smoothly.**

(A) Double taper roller bearing outer race

4. Attach a new lock washer and a new lock nut.
5. Set the ST to the drive pinion, and tighten the lock nut.

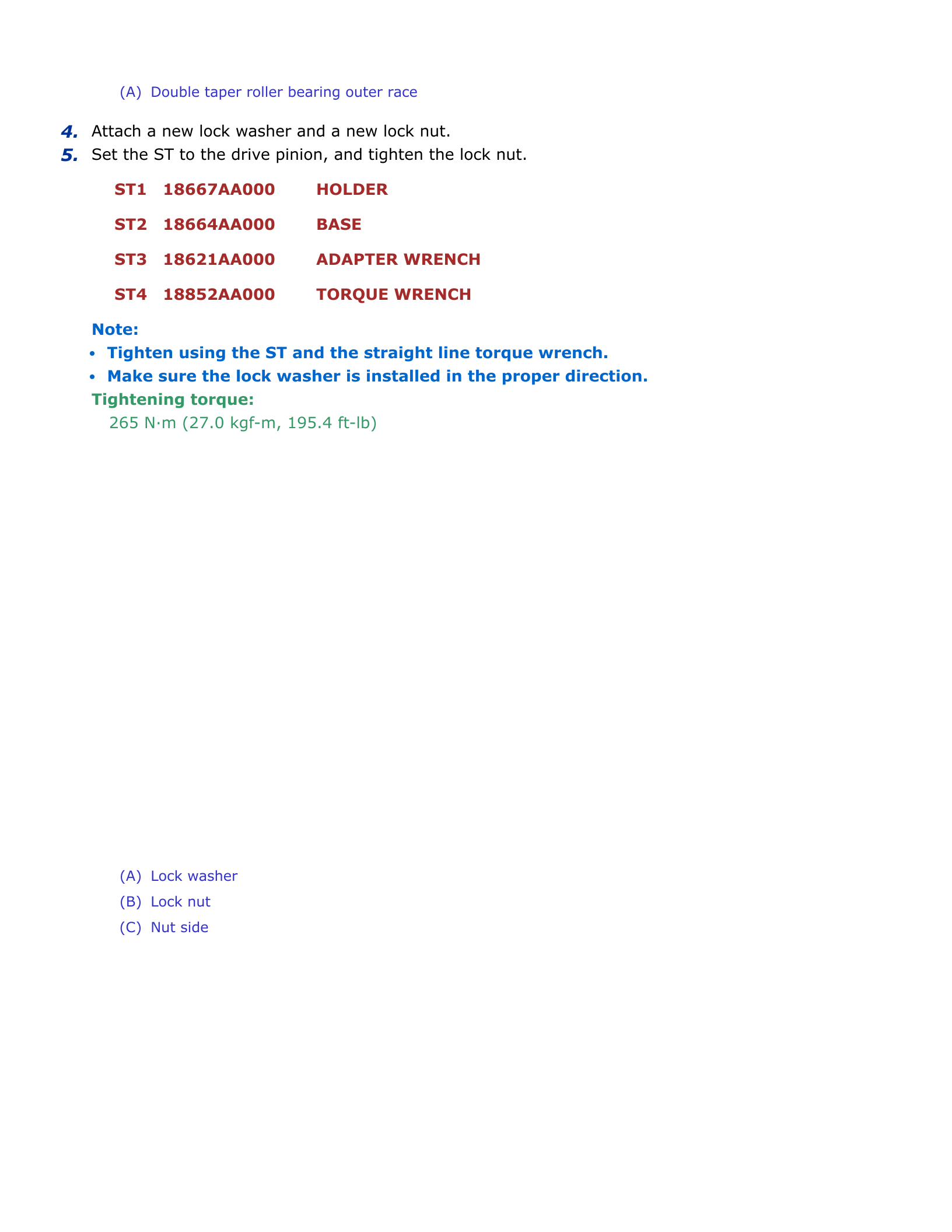
ST1	**18667AA000**	**HOLDER**
ST2	**18664AA000**	**BASE**
ST3	**18621AA000**	**ADAPTER WRENCH**
ST4	**18852AA000**	**TORQUE WRENCH**

Note:

- **Tighten using the ST and the straight line torque wrench.**
- **Make sure the lock washer is installed in the proper direction.**

Tightening torque:

265 N·m (27.0 kgf-m, 195.4 ft-lb)



(A) Lock washer
(B) Lock nut
(C) Nut side

Note:
When using a torque wrench other than ST4, use the calculation below to calculate and tighten the lock nut.
Tighten using the ST and the straight line torque wrench.
T = L1/(0.1 + L1) × 285

T	N·m (kgf-m, ft-lb)	Torque wrench setting
L1	m (in)	Torque wrench length
0.1 m (3.94 in)		Length of ST
285 N·m (29.0 kgf-m, 210 ft-lb)		Tightening torque (lock nut)

(A) 0.1 m (3.94 in)

6. Measure the starting torque. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT) (TY85)>Drive Pinion Shaft Assembly>INSPECTION.

7. Using the ST, crimp the lock nut in 2 locations, with dimensions within A 37±0.5 mm (1.46±0.02 in).

ST 18670AA000 PUNCH

Note:
Do not damage the crimp area of the lock nut.

8. Using the ST, measure drive pinion measurement B.

ST 398643600 GAUGE

9. Calculate from the calculation below to select 1 or 2 drive pinion shims from the following table.
6.5±0.0625 mm − (B − A) [0.26±0.0025 in − (B − A)]

Note:
A: Measurement value in step 1)
B: Measurement value in step 8)

Drive pinion shim	
Part No.	**Thickness mm (in)**
32295AA270	0.15 (0.0059)
32295AA280	0.175 (0.0069)
32295AA290	0.20 (0.0079)
32295AA300	0.225 (0.0089)
32295AA310	0.25 (0.0098)
32295AA320	0.275 (0.0108)

10. Apply transmission gear oil to the side face of the double taper roller bearing, and attach the drive pinion shaft and the selected shims to the adapter plate.
    Tightening torque:
    54 N·m (5.5 kgf-m, 39.8 ft-lb)
11. Install the oil guide A.
    Tightening torque:
    18 N·m (1.8 kgf-m, 13.3 ft-lb)

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Drive Pinion Shaft Assembly

INSPECTION

1. Using a spring scale, measure the starting torque. If the starting torque is outside the specification range, replace the double taper roller bearing.
   Starting torque:
   0 — 0.95 N (0 — 0.097 kgf, 0 — 0.21 lbf)

2. Gear
   Replace gears in the following cases.
   - The gear teeth surface is damaged or excessively worn.
3. Bearing
   Replace the bearings in the following cases.
   - Wear, rusting or damage of the bearings
   - The bearing does not rotate smoothly or an abnormal noise is emitted when turning.
4. Adapter plate
   Replace the adapter plate in the following cases:
   - Wear, rusting or damage of the bearings
   - Damage of the adapter plate
5. Check that the pipes and pipe chambers are not damaged or clogged. Repair or replace if damaged or clogged.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Drive Pinion Shaft Assembly

ADJUSTMENT

1. Inspect and adjust the hypoid driven gear-to-drive pinion backlash. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Front Differential Assembly>ADJUSTMENT > HYPOID DRIVEN GEAR BACKLASH.
2. Apply a thin uniform coat of lead-free red dye on the surfaces of 3 or 4 hypoid driven gear teeth.

3. Install the drive pinion shaft assembly to the clutch housing, and tighten at least 4 bolts.
   Note:
   Install with the remaining liquid gasket, so that the clutch housing and the adapter plate will not be damaged.
   Tightening torque:
   50 N·m (5.1 kgf-m, 36.9 ft-lb)
4. Turn a few times using the ST.

   ST 18631AA000 HANDLE

5. Remove the drive pinion shaft assembly, and inspect the mating condition of the teeth. If the tooth contact is not correct, adjust the backlash or shim thickness.
   - 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 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 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

Adjustment: Reduce the thickness of the drive pinion shim according to the procedure for moving the drive pinion away from the driven gear.

- Heel contact (outside end contact)
  Check item: Teeth contact area is too small.
  Contact pattern

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

REMOVAL

1. Remove the manual transmission assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Manual Transmission Assembly>REMOVAL.
2. Prepare the transmission for overhaul. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Preparation for Overhaul.
3. Remove the neutral position switch, back-up light switch and harness. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Neutral Position Switch>REMOVAL. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Back-up Light Switch>REMOVAL.
4. Remove the extension case. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Extension Case>REMOVAL.
5. Remove the transfer driven gear. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Transfer Driven Gear>REMOVAL.
6. Remove the center differential. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Center Differential>REMOVAL.
7. Remove the transmission case. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Transmission Case>REMOVAL.
8. Remove the individual gear assemblies. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Main Shaft Assembly>REMOVAL.
9. Remove the drive pinion shaft assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Drive Pinion Shaft Assembly>REMOVAL.
10. Remove the retainer lock plates on both sides.

(A) Retainer lock plate

11. Remove the differential side retainers on both sides using the ST.

ST1 18658AA021 WRENCH COMPL RETAINER (RH SIDE)

ST2 18630AA000 WRENCH ASSY (LH SIDE)

Note:
Be careful not to damage the section where the clutch case retainer will be attached.

(A) LH side

(B) RH side

12. Remove the front differential.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Front Differential Assembly

INSTALLATION

1. Install the differential assembly to the clutch housing.
2. Apply oil to the screw threads of the differential side retainer.
3. Remove the O-rings on both sides of the differential side retainer.
4. Install the differential side retainers to both sides, using the ST.

ST1	18658AA021	WRENCH COMPL RETAINER (RH SIDE)
ST2	18630AA000	WRENCH ASSY (LH SIDE)

Note:
Be careful not to damage the oil seal.

5. Inspect and adjust the hypoid driven gear backlash. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Front Differential Assembly>INSPECTION > HYPOID DRIVEN GEAR BACKLASH.
6. Inspect and adjust the tooth contact. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Drive Pinion Shaft Assembly>ADJUSTMENT.
7. Mark the mating positions of the left and right differential side retainers and the clutch housing.

8. Remove the differential side retainers from both sides.
   Note:
   When removing the side retainer, record how many times it was turned to remove.
9. Install new O-rings to the differential side retainers on both sides.
10. Attach the differential side retainers to both sides.
    Note:
    When attaching, turn the side retainer the same number of turns it took to remove, and align the marks.
11. Install the retainer lock plate.
    Tightening torque:
    25 N·m (2.5 kgf-m, 18.4 ft-lb)
    Note:
    Be careful not to confuse the left and right side retainer lock plates.

(A) LH
(B) RH

12. Remove any remaining liquid gasket from the clutch housing and adapter plate.
13. Apply liquid gasket to the clutch housing.
    Liquid gasket:
    THREE BOND 1215B or equivalent

14. Install the drive pinion shaft assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Drive Pinion Shaft Assembly>INSTALLATION.
15. Install the individual gear assemblies all at once. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Main Shaft Assembly>INSTALLATION.
16. Install the transmission case. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Transmission Case>INSTALLATION.
17. Install the center differential. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Center Differential>INSTALLATION.
18. Install the transfer driven gear. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Transfer Driven Gear>INSTALLATION.
19. Install the extension case. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Extension Case>INSTALLATION.
20. Install the neutral position switch, back-up light switch and harness. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Neutral Position Switch>INSTALLATION. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Back-up Light Switch>INSTALLATION.
21. Install the manual transmission assembly to the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Manual Transmission Assembly>INSTALLATION.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Front Differential Assembly

DISASSEMBLY

1. DIFFERENTIAL CASE

1. Fix the differential assembly on a vice, and remove the hypoid driven gear.

ST 18270KA020 SOCKET (E20)

2. Remove the taper roller bearing of the hypoid driven gear using the ST.

ST 399527700 PULLER SET

2. DIFFERENTIAL SIDE RETAINER

1. Remove the O-rings.

2. Remove the oil seal.

3. Remove the claw of ST1, and attach the claw of ST2.

ST1 398527700 PULLER ASSY

ST2 18760AA000 CLAW

(A) Claw

4. Using the ST, remove the taper roller bearing outer race.

ST1 398527700 PULLER ASSY

ST2 18760AA000 CLAW

(A) Differential side retainer

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Front Differential Assembly

ASSEMBLY

1. DIFFERENTIAL CASE

1. Using the ST, attach the RH and LH taper roller bearing inner races to the differential case.

ST1 398437700 INSTALLER

ST2 398497701 SEAT

Caution:
Do not apply pressure in excess of 20 kN (2.0 ton, 2.2 US ton, 2.0 Imp ton).
Note:
Always replace the taper roller bearing inner race and outer race as a set.

2. Install the hypoid driven gear to differential case.

ST 18270KA020 SOCKET (E20)

Tightening torque:
69 N·m (7.0 kgf-m, 50.9 ft-lb)

2. DIFFERENTIAL SIDE RETAINER

Note:
Install the oil seal and O-ring of side retainer after the adjustment of backlash and tooth contact.

1. Attach the taper roller bearing outer race to the differential side retainer.
2. Using the ST, install the oil seal.

ST 18675AA000 DIFFERENTIAL SIDE OIL SEAL INSTALLER

Note:
- **Use a new oil seal.**
- **Apply oil to the oil seal lips.**

3. Install the O-rings.
Note:
Use new O-rings.

INSPECTION

Repair or replace the front differential in the following cases:

- If gears are damaged, seized, or are excessively worn.
- If differential case sliding surfaces are damaged, seized, or are excessively worn.
- If there is damage, rust or wear in the bearings or bearing locations.
- If the bearing does not rotate smoothly or an abnormal noise is emitted when turning.

1. HYPOID DRIVEN GEAR BACKLASH

Inspect the hypoid driven gear backlash. Adjust if out of standard. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Front Differential Assembly>ADJUSTMENT > HYPOID DRIVEN GEAR BACKLASH.

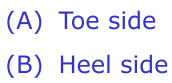
2. TOOTH CONTACT OF HYPOID DRIVEN GEAR

1. Check that the hypoid driven gear backlash is within the standard value. Adjust if out of standard. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Front Differential Assembly>ADJUSTMENT > HYPOID DRIVEN GEAR BACKLASH.
2. Apply a thin uniform coat of lead-free red dye on the surfaces of 3 or 4 hypoid driven gear teeth.

3. Attach the drive pinion shaft assembly, and affix with at least 4 bolts.
   Note:
   Use old gaskets and washers to prevent the mating surfaces of the housing from becoming damaged.
   Tightening torque:
   50 N·m (5.1 kgf-m, 36.9 ft-lb)
4. Turn the drive pinion shaft to the left and right for several turns.

5. Remove the drive pinion shaft assembly, and inspect the mating condition of the teeth. If tooth contact is not correct, perform adjustment. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Drive Pinion Shaft Assembly>ADJUSTMENT.
   - Correct tooth contact

     Note:
     In a no load condition, the tooth contact from the center to the toe side is 50-60%. (While driving, the tooth contact will shift towards the heel side.)



(A) Toe side
(B) Heel side

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Front Differential Assembly

ADJUSTMENT

1. HYPOID DRIVEN GEAR BACKLASH

1. Attach the RH and LH differential side retainers.

   ST1 18658AA021 WRENCH COMPL RETAINER (RH SIDE)

   ST2 18630AA000 WRENCH ASSY (LH SIDE)

   Note:
   Tighten the side retainer on the RH side a little further than that of the LH side.
2. Attach the drive pinion shaft assembly, and affix with 5 bolts.
   Note:
   Use old gaskets and washers to prevent the mating surfaces of the housing from becoming damaged.
   Tightening torque:
   50 N·m (5.1 kgf-m, 36.9 ft-lb)
3. Using the ST, loosen the differential side retainer RH, and tighten the differential side retainer LH until the hypoid driven gear just contacts the drive pinion.

   ST1 18658AA021 WRENCH COMPL RETAINER (RH SIDE)

   ST2 18630AA000 WRENCH ASSY (LH SIDE)
4. Use the ST to turn the drive pinion shaft a few times.

   ST 18631AA000 HANDLE

5. Repeat steps 3) and 4) until differential side retainer LH does not turn anymore. For differential side retainer RH, tighten until the inner race and outer race just comes into contact. This is the “zero” backlash state.
6. Mark the mating positions of the left and right differential side retainers and the clutch housing.

7. Return the differential side retainer LH by 3 notches, and tighten the differential side retainer RH by 3 notches.
8. Temporarily attach the LH side retainer lock plate.
9. Tighten the differential side retainer RH by 1.25 notches.
10. Temporarily attach the RH side retainer lock plate.

Note:

- **If the lock plate cannot be aligned, adjust the position toward the tightened side.**
- **The notch on the lock plate moves by 0.5 notch if the lock plate is turned upside down when installed.**

11. Use the ST to fix the drive pinion shaft in place.

ST 18621AA000 ADAPTER WRENCH

12. Install the SUBARU genuine axle shaft to the front differential left and right sides.

Part No. 38415AA000 Axle shaft

13. Move the axle shaft, and measure the hypoid driven gear backlash.

ST1	**498255400**	**PLATE**
ST2	**498247001**	**MAGNET BASE**
ST3	**498247100**	**DIAL GAUGE**

Hypoid driven gear backlash:
0.13 — 0.18 mm (0.0051 — 0.0071 in)

14. If the backlash is out of specified range, remove the left and right retainer lock plates and loosen RH side differential side retainer. Then, adjust the LH side differential side retainer by turning it, and attach the LH side retainer lock plate.
15. Tighten the RH side differential side retainer until the inner race and outer race just come into contact.

2. TOOTH CONTACT OF HYPOID DRIVEN GEAR

Regarding teeth contact conditions, refer to the drive pinion section. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Front Differential Assembly>INSPECTION > TOOTH CONTACT OF HYPOID DRIVEN GEAR.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Shifter Fork and Rod

REMOVAL

1. Remove the manual transmission assembly from the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Manual Transmission Assembly>REMOVAL.
2. Prepare the transmission for overhaul. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Preparation for Overhaul.
3. Remove the neutral position switch, back-up light switch and harness. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Neutral Position Switch>REMOVAL. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Back-up Light Switch>REMOVAL.
4. Remove the extension case. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Extension Case>REMOVAL.
5. Remove the transfer driven gear. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Transfer Driven Gear>REMOVAL.
6. Remove the center differential. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Center Differential>REMOVAL.
7. Remove the transmission case. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Transmission Case>REMOVAL.
8. Remove the individual gear assemblies. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Main Shaft Assembly>REMOVAL.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Shifter Fork and Rod

INSTALLATION

1. Install the individual gear assemblies all at once. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Main Shaft Assembly>INSTALLATION.
2. Install the transmission case. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Transmission Case>INSTALLATION.
3. Install the center differential. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Center Differential>INSTALLATION.
4. Install the transfer driven gear. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Transfer Driven Gear>INSTALLATION.
5. Install the extension case. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Extension Case>INSTALLATION.
6. Install the neutral position switch, back-up light switch and harness. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Neutral Position Switch>INSTALLATION. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Back-up Light Switch>INSTALLATION.
7. Install the manual transmission assembly to the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Manual Transmission Assembly>INSTALLATION.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Shifter Fork and Rod

DISASSEMBLY

1. REVERSE SHIFTER FORK

1. Remove the reverse shifter fork using the ST.

ST 398791700 REMOVER

2. Remove the reverse shifter arm using the ST.

ST 398791700 REMOVER

2. 1ST-2ND, 3RD-4TH SHIFTER FORK

1. Using the ST, remove the 3rd-4th shifter fork.

ST 398791700 REMOVER

2. Using the ST, remove the 3rd-4th shifter arm.

ST 398791700 REMOVER

3. Using the ST, remove the 1st-2nd shifter arm and 1st-2nd shifter fork.

ST 398791700 REMOVER

(A) 1st-2nd shifter arm
(B) 1st-2nd shifter fork

3. 5TH-6TH SHIFTER FORK

1. Using the ST, remove the 5th-6th shifter fork.

ST 398791700 REMOVER

2. Using the ST, remove the 5th-6th shifter arm.

ST 398791700 REMOVER

4. SHIFTER ARM SHAFT

Remove the selector arm using the ST.

1. **ST 398791700 REMOVER**

5. STRIKING ROD

1. Remove the reverse interlock block and the interlock block from the striking rod.

(A) Reverse interlock block
(B) Interlock block

2. Remove the reverse interlock arm using the ST.

ST 398791700 REMOVER

(A) Reverse interlock arm

(B) Interlock arm

3. Remove the interlock arm using the ST.

ST 398791700 REMOVER



(A) Interlock arm

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Shifter Fork and Rod

ASSEMBLY

1. REVERSE SHIFTER FORK

1. Using the ST, install the reverse shifter fork.

ST 398791700 REMOVER

Note:

- **Confirm that the reverse shifter fork and rod are installed in the proper direction.**
- **Use a new straight pin.**

(A) Reverse shifter fork

(B) Reverse fork rod

(C) Straight pin

2. Using the ST, install the reverse shifter arm.

ST 398791700 REMOVER

Note:

- **Confirm that the reverse shifter arm and rod are installed in the proper direction.**
- **Use a new straight pin.**

(A) Reverse shifter fork

(B) Reverse shifter arm

(C) Straight pin

2. 1ST-2ND, 3RD-4TH SHIFTER FORK

1. Using the ST, install the 1st-2nd shifter fork.

ST 398791700 REMOVER

Note:

- **Make sure that the 1st-2nd shifter fork and rod are installed in the correct direction.**
- **Use a new straight pin.**

(A) 1st-2nd shifter fork

(B) 1st-2nd fork rod

(C) Straight pin

2. Using the ST, install the 1st-2nd shifter arm.

ST 398791700 REMOVER

Note:

- **Make sure that the 1st-2nd shifter arm and fork are installed in the correct direction.**
- **Use a new straight pin.**

(A) 1st-2nd shifter fork

(B) 1st-2nd shifter arm

(C) Straight pin

3. Using the ST, install the 3rd-4th shifter arm.

ST 398791700 REMOVER

Note:

- **Make sure that the 3rd-4th shifter arm and rod are installed in the correct direction.**
- **Use a new straight pin.**

(A) 3rd-4th shifter rod
(B) 3rd-4th shifter arm
(C) Straight pin

4. Attach the 3rd-4th fork rod to the 1st-2nd shifter arm.

5. Using the ST, install the 3rd-4th shifter fork.

ST 398791700 REMOVER

Note:
- **Make sure that the 3rd-4th shifter fork is installed in the correct direction.**
- **Use a new straight pin.**

(A) 3rd-4th shifter fork
(B) Straight pin

3. 5TH-6TH SHIFTER FORK

1. Using the ST, install the 5th-6th shifter arm.

ST 398791700 REMOVER

Note:

- **Make sure that the 5th-6th shifter arm and rod are installed in the correct direction.**
- **Use a new straight pin.**

(A) 5th-6th shifter arm
(B) 5th-6th fork rod
(C) Straight pin

2. Using the ST, install the 5th-6th shifter fork.

ST 398791700 REMOVER

Note:

- **Make sure that the 5th-6th shifter fork and arm are installed in the correct direction.**
- **Use a new straight pin.**

(A) 5th-6th shifter fork
(B) 5th-6th shifter arm
(C) Straight pin

4. SHIFTER ARM SHAFT

Using the ST, install the selector arm.

1.

ST 398791700 REMOVER

Note:

- **Confirm that the selector arm and shaft are installed in the proper direction.**
- **Use a new straight pin.**

(A) Shifter arm shaft

(B) Selector arm

(C) Straight pin

5. STRIKING ROD

1. Using the ST, install the reverse interlock arm and interlock arm.

ST 398791700 REMOVER

Note:

- **Confirm that the reverse interlock arm and rod are installed in the proper direction.**
- **Confirm that the interlock arm and rod are installed in the proper direction.**
- **Use a new straight pin.**

(A) Reverse interlock arm

(B) Interlock arm

(C) Straight pin

2. Attach the reverse interlock block and interlock block to the striking rod.

Note:

Confirm that the reverse interlock block and interlock block are installed in the proper direction.

(A) Reverse interlock block

(B) Interlock block

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Shifter Fork and Rod

INSPECTION

1. Check the shift shaft and shift rod for damage. Replace if damaged.
2. Repair or replace the gearshift mechanism if excessively worn, bent or defective in any way.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Shifter Fork and Rod

ADJUSTMENT

1. 1ST-2ND FORK ROD SELECTION

Note:
In the following conditions, perform the procedures below.

- **Replacement of the 1st and 2nd driven gear**
- **1st and 2nd synchro ring assembly replacement**
- **Adapter plate replacement**
- **Driven shaft replacement**
- **1st-2nd synchronizer hub and coupling sleeve assembly replacement**

1. Insert the drive pinion shaft assembly into the adapter plate.
   Note:
   Confirm that the thrust bearing outer race has not been removed and the drive pinion is not lifted.
2. Set the height gauge to the adapter plate. Lower the height gauge indicator to the mating surface of the adapter plate and case, and set to zero points.

ST 18853AA000 HEIGHT GAUGE

Note:

- **The adapter plate will be the base point for the measurement. Use a scraper to remove any gasket material remaining on the end face.**
- **During measurement, do not place the height gauge in the shaded area shown in the figure.**

3. Select the main shaft snap ring. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT) (TY85)>Main Shaft Assembly>ADJUSTMENT.
4. Measure “B1” and “B2” as shown in the figure.

5. Shift down the 1st-2nd coupling sleeve all the way to the 1st driven gear side, and measure “B1”.

(A) 1st driven gear

(B) 1st-2nd coupling sleeve

Note:

- **Set the height gauge indicator near the measurement target, and lock dial (1) as shown in the figure. Turn dial (2), and set the indicator to the 1st side end surface of the coupling sleeve.**
- **Turn approximately 72° at a time, and measure the coupling sleeve in 5 locations. Round down the 2 highest and 2 lowest measurement values. The remaining center value is used as the measurement value.**

6. Set the height gauge indicator upside down.

(A) Indicator

7. Shift up the 1st-2nd coupling sleeve all the way to the 2nd driven gear side, and measure “B2”.

(A) 2nd driven gear

(B) 1st-2nd coupling sleeve

Note:

- **Set the height gauge indicator near the measurement target, and lock dial (1) as shown in the figure. Turn dial (2), and set the indicator to the 2nd side end surface of the coupling sleeve.**
- **The measurement is to be performed with two persons, while holding the coupling sleeve straight.**
- **Turn approximately 72° at a time, and measure the coupling sleeve in 5 locations. Round down the 2 highest and 2 lowest measurement values. The remaining center value is used as the measurement value.**

8. According to both of the measurements, calculate the neutral position of the 1st-2nd coupling sleeve. From the following calculation, select a fork rod which matches the calculated value.
Calculation: T = (B1 + B2) / 2
T: 1st-2nd coupling sleeve center position
B1: Height from the adapter plate end to the coupling sleeve end, when shifted to 1st gear
B2: Measured height from the adapter plate end to the coupling sleeve end, when shifted to 2nd gear: +55 mm (2.17 in)
Note:
Attach the indicator upside down in comparison to the setting procedures for the zero point. Add "d1" [Value: 55 mm (2.17 in)] from the figure below to "B2", and measure "B2".

T mm (in)	Lot No. (marking)
62.58 — 62.78 (2.4638 — 2.4717)	32801AA370 (5)
62.78 — 62.98 (2.4717 — 2.4795)	32801AA380 (4)
62.98 — 63.18 (2.4795 — 2.4874)	32801AA390 (2)

T mm (in)	Lot No. (marking)
63.18 — 63.38 (2.4874 — 2.4953)	32801AA400 (1)
63.38 — 63.58 (2.4953 — 2.5031)	32801AA410 (3)

2. 3RD-4TH FORK ROD SELECTION

Note:
In the following conditions, perform the procedures below.

- **Main shaft replacement**
- **3rd, and 3rd to 6th drive gear and bushing replacement**
- **3rd, and 3rd to 6th synchro assembly replacement**
- **3rd-4th synchronizer hub and coupling sleeve assembly replacement**

1. Insert the main shaft assembly into the adapter plate.
2. Set the height gauge to the adapter plate. Lower the height gauge indicator to the top surface of the snap ring groove, and set to the zero point on the upper side of the double taper roller bearing.

ST 18853AA000 HEIGHT GAUGE

(A) Double taper roller bearing

Note:

- **The height gauge will be set on the adapter plate during the measurement. Use a scraper to remove any gasket material remaining on the end face.**
- **During measurement, do not place the height gauge in the shaded area shown in the figure.**

3. Use a height gauge to measure “C1” and “C2” as shown in the figure.

(A) 3rd drive gear
(B) 4th drive gear

(1) Shift up the 3rd-4th coupling sleeve all the way to the 4th drive gear side, and measure “C2”.

(A) 4th drive gear

Note:

- **Set the height gauge indicator near the measurement target, and lock dial (1) as shown in the figure.**
- **Turn dial (2), and set the indicator to the 4th side end surface of the coupling sleeve.**
- **The measurement is to be performed with two persons, while holding the coupling sleeve straight.**
- **Turn approximately 72° at a time, and measure the coupling sleeve in 5 locations. Round down the 2 highest and 2 lowest measurement values. The remaining center value is used as the measurement value.**

(2) Set the height gauge indicator upside down.



(A) Indicator

(3) Shift down the 3rd-4th coupling sleeve all the way to the 3rd drive gear side, and measure “C1”.



(A) 3rd drive gear

Note:

- **Set the height gauge indicator near the measurement target, and lock dial (1) as shown in the figure. Turn dial (2), and set the indicator to the 3rd side end surface of the coupling sleeve.**
- **Turn approximately 72° at a time, and measure the coupling sleeve in 5 locations. Round down the 2 highest and 2 lowest measurement values. The remaining center value is used as the measurement value.**

4. According to both of the measurements, calculate the neutral position of the 3rd-4th coupling sleeve. From the following calculation, select a fork rod which matches the calculated value.
   Calculation: T = (C1 + C2) / 2
   T: 3rd-4th coupling sleeve center position
   C1: Measured depth from the double taper roller bearing snap ring groove to the coupling sleeve end, when shifted to 3rd gear: +55 mm (2.17 in)
   C2: Measured depth from the double taper roller bearing snap ring groove to the coupling sleeve end, when shifted to 4th gear
   Note:
   Attach the indicator upside down in comparison to the setting procedures for the zero point. Add "d1" [Value: 55 mm (2.17 in)] from the figure below to "C1", and measure "C1".

T mm (in)	Lot No. (marking)		
	M.SFT Snap ring 8050720 10 [t = 1.65 mm (0.065 in)]	**M.SFT Snap ring 8050720 11 [t = 1.95 mm (0.077 in)]**	**M.SFT Snap ring 8050720 12 [t = 2.25 mm (0.089 in)]**
137.22 — 137.52 (5.4024 — 5.4142)	32809AA240 (none)	32809AA250 (2)	32809AA260 (4)
137.52 — 137.82	32809AA230 (1)	32809AA240 (none)	32809AA250 (2)

T mm (in)	Lot No. (marking)		
	M.SFT Snap ring 8050720 10 [t = 1.65 mm (0.065 in)]	**M.SFT Snap ring 8050720 11 [t = 1.95 mm (0.077 in)]**	**M.SFT Snap ring 8050720 12 [t = 2.25 mm (0.089 in)]**
(5.4142 — 5.4260)			
137.82 — 138.12 (5.4260 — 5.4379)	32809AA220 (3)	32809AA230 (1)	32809AA240 (none)
T = Thickness			

3. 5TH-6TH FORK ROD SELECTION

Note:
In the following conditions, perform the procedures below.

- **Main shaft replacement**
- **3rd to 6th drive gear and bushing replacement**
- **3rd to 6th synchro ring assembly replacement**
- **3rd-4th synchronizer hub and coupling sleeve assembly replacement**
- **5th-6th synchronizer hub and coupling sleeve assembly replacement**

1. Insert the main shaft assembly into the adapter plate.
2. Set the height gauge to the adapter plate. Lower the height gauge indicator to the upper face of the snap ring groove or the upper side of the double taper roller bearing. Set to zero point.

ST 18853AA000 HEIGHT GAUGE

(A) Double taper roller bearing

Note:

- **The height gauge will be set on the adapter plate during the measurement. Use a scraper to remove any gasket material remaining on the end face.**
- **During measurement, do not place the height gauge in the shaded area shown in the figure.**

3. Use a height gauge to measure “D1” and “D2” as shown in the figure.

(A) 5th drive gear
(B) 6th drive gear

(1) Shift up the 5th-6th coupling sleeve all the way to the 6th drive gear side, and measure “D2”.

(A) 6th drive gear

Note:

- **Set the height gauge indicator near the measurement target, and lock dial (1) as shown in the figure. Turn dial (2), and set the indicator to the 6th side end surface of the coupling sleeve.**
- **The measurement is to be performed with two persons, while holding the coupling sleeve straight.**
- **Turn approximately 72° at a time, and measure the coupling sleeve in 5 locations. Round down the 2 highest and 2 lowest measurement values. The remaining center value is used as the measurement value.**

(2) Set the height gauge indicator upside down.

(A) Indicator

(3) Shift down the 5th-6th coupling sleeve all the way to the 5th drive gear side, and measure “D1”.

(A) 5th drive gear

Note:

- **Set the height gauge indicator near the measurement target, and lock dial (1) as shown in the figure. Turn dial (2), and set the indicator to the 5th side end surface of the coupling sleeve.**
- **Turn approximately 72° at a time, and measure the coupling sleeve in 5 locations. Round down the 2 highest and 2 lowest measurement values. The remaining center value is used as the measurement value.**

4. According to both of the measurements, calculate the neutral position of the 5th-6th coupling sleeve. From the following calculation, select a fork rod which matches the calculated value.
Calculation: T = (D1 + D2) / 2
T: 5th-6th coupling sleeve center position
D1: Measured length from the double taper roller bearing snap ring groove to the coupling sleeve groove end, when shifted to 5th gear [Value: +55 mm (2.17 in)]
D2: Measured length from the double taper roller bearing snap ring groove to the coupling sleeve groove end, when shifted to 6th gear
Note:
Attach the indicator upside down in comparison to the setting procedures for the zero point. Add "d1" [Value: 55 mm (2.17 in)] from the figure below to "D1", and measure "D1".

T mm (in)	Lot No. (marking)		
	M.SFT Snap ring 8050720 10 [t = 1.65 mm (0.065 in)]	**M.SFT Snap ring 8050720 11 [t = 1.95 mm (0.077 in)]**	**M.SFT Snap ring 8050720 12 [t = 2.25 mm (0.089 in)]**
64.12 — 64.42 (2.5244 — 2.5362)	32945AA110 (none)	32945AA120 (2)	32945AA130 (4)
64.42 — 64.72 (2.5362 — 2.5480)	32945AA100 (1)	32945AA110 (none)	32945AA120 (2)
64.72 — 65.02 (2.5480 — 2.5598)	32945AA090 (3)	32945AA100 (1)	32945AA110 (none)
T = Thickness			

4. REVERSE FORK ROD SELECTION

Note:
In the following conditions, perform the procedures below.

- **Reverse idler gear replacement.**
- **Reverse idler gear No. 2 replacement.**
- **Adapter plate replacement.**
- **Base replacement.**

1. Insert the reverse idler gear assembly into the adapter plate.
2. Tighten the reverse idler gear shaft attachment bolts.
   Tightening torque:
   25 N·m (2.5 kgf-m, 18.4 ft-lb)

3. Set the height gauge to the adapter plate. Lower the height gauge indicator to the mating surface of the adapter plate and case, and set to zero points.

ST 18853AA000 HEIGHT GAUGE

Note:

- **The adapter plate will be the base point for the measurement. Use a scraper to remove any gasket material remaining on the end face.**
- **During measurement, do not place the height gauge in the shaded area shown in the figure.**

4. Shift the reverse coupling sleeve to the reverse idler gear No. 2, and measure “T”.

(A) Reverse idler gear No. 2

(A) Reverse idler gear No. 2

Note:

- **Set the height gauge indicator near the measurement target, and lock dial (1) as shown in the figure. Turn dial (2), and set the indicator to the end face of the reverse coupling sleeve side.**
- **Turn approximately 72° at a time, and measure the coupling sleeve in 5 locations. Round down the 2 highest and 2 lowest measurement values. The remaining center value is used as the measurement value.**

5. Calculate the neutral position of the reverse coupling sleeve according to the measurement. From the following calculation, select a fork rod which matches the calculated value.
Calculation: T + 4.8 mm (0.189 in)

T + 4.8 mm (0.189 in) mm (in)	Lot No. (marking)
33.50 — 33.80 (1.3189 — 1.3307)	32816AA190 (1)

T + 4.8 mm (0.189 in) mm (in)	Lot No. (marking)
33.80 — 34.10 (1.3307 — 1.3425)	32816AA200 (none)
34.10 — 34.40 (1.3425 — 1.3543)	32816AA210 (2)
T = Thickness	

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Clutch Housing

REMOVAL

1. Remove the manual transmission assembly from the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Manual Transmission Assembly>REMOVAL.
2. Prepare the transmission for overhaul. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Preparation for Overhaul.
3. Remove the neutral position switch, back-up light switch and harness. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Neutral Position Switch>REMOVAL. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Back-up Light Switch>REMOVAL.
4. Remove the extension case. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Extension Case>REMOVAL.
5. Remove the transfer driven gear. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Transfer Driven Gear>REMOVAL.
6. Remove the center differential. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Center Differential>REMOVAL.
7. Remove the transmission case. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Transmission Case>REMOVAL.
8. Remove the individual gear assemblies. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Main Shaft Assembly>REMOVAL.
9. Remove the drive pinion shaft assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Drive Pinion Shaft Assembly>REMOVAL.
10. Remove the front differential assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Front Differential Assembly>REMOVAL.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Clutch Housing

INSTALLATION

1. Install the pitching stopper bracket.
   Tightening torque:
   41 N·m (4.2 kgf-m, 30.2 ft-lb)
2. Install the front differential assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Front Differential Assembly>INSTALLATION.
3. Install the drive pinion shaft assembly. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Drive Pinion Shaft Assembly>INSTALLATION.
4. Install the individual gear assemblies all at once. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Main Shaft Assembly>INSTALLATION.
5. Install the transmission case. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Transmission Case>INSTALLATION.
6. Install the center differential. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Center Differential>INSTALLATION.
7. Install the transfer driven gear. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Transfer Driven Gear>INSTALLATION.
8. Install the extension case. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Extension Case>INSTALLATION.

9. Install the neutral position switch, back-up light switch and harness. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Neutral Position Switch>INSTALLATION. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Back-up Light Switch>INSTALLATION.
10. Install the manual transmission assembly to the vehicle. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Manual Transmission Assembly>INSTALLATION.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Clutch Housing

DISASSEMBLY

1. Remove the clutch release bearing guide.

2. Remove the oil seal.

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Clutch Housing

ASSEMBLY

1. Attach the oil seal to the clutch housing, being careful not to damage the seal.
   Note:
   Use a new oil seal.

   ST 18657AA020 OIL SEAL INSTALLER

2. Install the clutch release bearing guide.
   Tightening torque:
   6.4 N·m (0.7 kgf-m, 4.7 ft-lb)

MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85) > Clutch Housing

INSPECTION

1. Check to make sure there is no damage or cracks on the clutch housing. If there is excessive damage, replace the clutch housing.
2. Inspect the clutch housing for transmission gear oil leakage. If any oil leaks are found, repair or replace the applicable part.

INSPECTION

1. MANUAL TRANSMISSION

Symptoms	Possible cause	Corrective action
1. Gears are difficult to engage. **Note:** **If it is difficult to shift, there are two possible causes. One is a defective gear shift system and the other is defective transmission. However, if the operation is heavy and engagement of the gears is difficult, a defective clutch function may also be responsible. Check whether the clutch is correctly functioning, before checking the gear shift system and transmission.**	(a) Worn, damaged or burred chamfer at internal spline of the coupling sleeve	Replace.
	(b) Gear spline wear, damage, dents	Replace.
	(c) Worn or scratched bushings	Replace.
	(d) Incorrect contact or wear between synchronizer ring and gear cone	Repair or replace.
2. Gear slip-out • Gear slips out when coasting on rough road. • Gear slips out during acceleration.	(a) Defective pitching stopper adjustment	Replace.
	(b) Loose engine mounting bolts	Tighten or replace.
	(c) Worn shifter fork, broken shifter fork rail spring	Replace.
	(d) Worn or damaged ball bearing	Replace.
	(e) Excessive clearance between splines of synchronizer hub and synchronizer sleeve	Replace.
	(f) Worn in the synchronizer hub chamfer angle	Replace.
	(g) Worn 1st driven gear, needle bearing and race	Replace.
	(h) Worn 2nd driven gear, needle bearing and race	Replace.
	(i) Worn 3rd drive gear and bushing	Replace.
	(j) Worn 4th drive gear and bushing	Replace.
	(k) Worn 5th drive gear and bushing	Replace.

Symptoms	Possible cause	Corrective action
	(l) Worn 6th drive gear and bushing	Replace.
	(m) Worn reverse idler gear and bushing	Replace.
3. Noise emitted from transmission **Note:** **If a noise is heard when the vehicle is parked with its engine idling and ceases when the clutch is disengaged, it may be considered that the noise is coming from the transmission.**	(a) Insufficient or improper lubrication	Replenish or replace with the specified amount of recommended oil.
	(b) Worn or damaged gears and bearings **Note:** **If the trouble is only wear of the gear teeth surfaces, only a high whirring noise will occur at high speeds, but if any part is broken, rhythmical clicking sounds will be heard even at low speeds.**	Replace.

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 able to operate due to broken pieces obstructing the gear revolution.**	(a) Insufficient or improper oil	Disassemble the differential and replace broken components. At the same time check other components for any trouble, and replace if necessary.
	(b) Use of vehicle under severe conditions such as excessive load and improper use of the clutch	Readjust the preload and backlash of the bearing, and the contact surface of gear.
	(c) Improper adjustment of taper roller bearing	Adjust.
	(d) Improper adjustment of the drive pinion and the hypoid driven gear	Adjust.
	(e) Loose hypoid driven gear clamping bolts	Tighten.
2. Differential and hypoid gear noise Troubles of the differential and hypoid gear always appear as noise problems. Therefore noise is the first indication of trouble.	(a) Insufficient oil	Replenish or replace with the specified amount of recommended oil.

Symptoms	Possible cause	Corrective action
However, noise from the engine, muffler, tire, exhaust gas, bearing, body, etc. are easily mistaken for noise from the differential. Pay special attention to the hypoid gear noise because it is easily confused with other gear noises. There are the following three 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 during coasting: Damaged gears due to misadjusted bearings and incorrect shim adjustment. • Bearing noise when driving or coasting: Cracked, broken or damaged bearings.	(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.