1. General Description

A: SPECIFICATION

1. TORQUE CONVERTER CLUTCH

Model	3.6 L non-turbo
Type	Symmetric, 3-element, single stage, 2-phase torque converter
Stall torque ratio	1.8
Nominal diameter	246 mm (9.69 in)
Stall speed (at sea level)	2,100 — 2,600 rpm
One-way clutch	Sprague type one-way clutch

2. OIL PUMP

Type	Internal gear fixed displacement pump	
Driving method	Driven by engine	
Number of teeth	Inner rotor	9
	Outer rotor	10

3. TRANSMISSION CONTROL ELEMENT

Type	5-forward, 1-reverse, double-row planetary gears
Multi-plate clutch	3 sets
Multi-plate brake	3 sets
One-way clutch (sprague type)	2 sets

4. TRANSMISSION GEAR RATIO

1st	3.540
2nd	2.264
3rd	1.471
4th	1.000
5th	0.834
Rev.	2.370

5. PLANETARY GEAR AND PLATE

Model	3.6 L non-turbo
Number of front internal gear teeth	106
Number of front carrier teeth	28
Number of front sun gear teeth	50
Number of mid internal gear teeth	78
Number of mid carrier teeth	18
Number of mid sun gear teeth	42
Number of rear internal gear teeth	110
Number of rear carrier teeth	24
Number of rear sun gear teeth	62
Number of front brake drive plates	2
Number of input clutch drive plates	6
Number of high & low reverse clutch drive plates	4
Number of direct clutch drive plates	5
Number of reverse brake drive plates	5
Number of forward brake drive plates	5

6. SELECTOR POSITION

P (Park)	Transmission is in neutral, output member is immovable, engine start is possible
R (Reverse)	Transmission is in reverse.
N (Neutral)	Transmission is in neutral and engine start is possible
D (Drive)	Automatic gear change 1st ←→ 2nd ←→ 3rd ←→ 4th ←→ 5th
M (Manual mode), Paddle shift (+)	Manual gear change 1st → 2nd → 3rd → 4th → 5th
M (Manual mode), Paddle shift (–)	Manual gear change 1st ← 2nd ← 3rd ← 4th ← 5th
Control method	Wire cable type

7. HYDRAULIC CONTROL AND LUBRICATION

Type		Electronic/hydraulic control [5 forward gear changes made by electronic signals of vehicle speed and accelerator (throttle) opening]
Fluid	Recommended materials	SUBARU ATF
	Alternative	IDEMITSU “ATF HP” **CAUTION:** **Be sure to use the recommended or equivalent ATF. Using material except recommended one or substitute would cause trouble.**
Fluid capacity L (US qt, Imp qt)		9.6 — 10.0 (10.1 — 10.6, 8.4 — 8.8)
Lubrication system		Forced feed lubrication with oil pump

8. COOLING AND HARNESS

Cooling system	Liquid-cooler incorporated in radiator
Transmission harness	20 + 8 poles

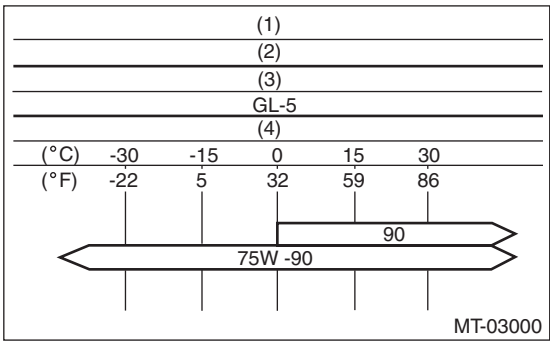
9. TRANSFER

Transfer type	Variable torque distribution (VTD)
Number of transfer clutch drives & driven plates	3
Reduction gear ratio	1.000 (41/41)

10.FINAL REDUCTION GEAR

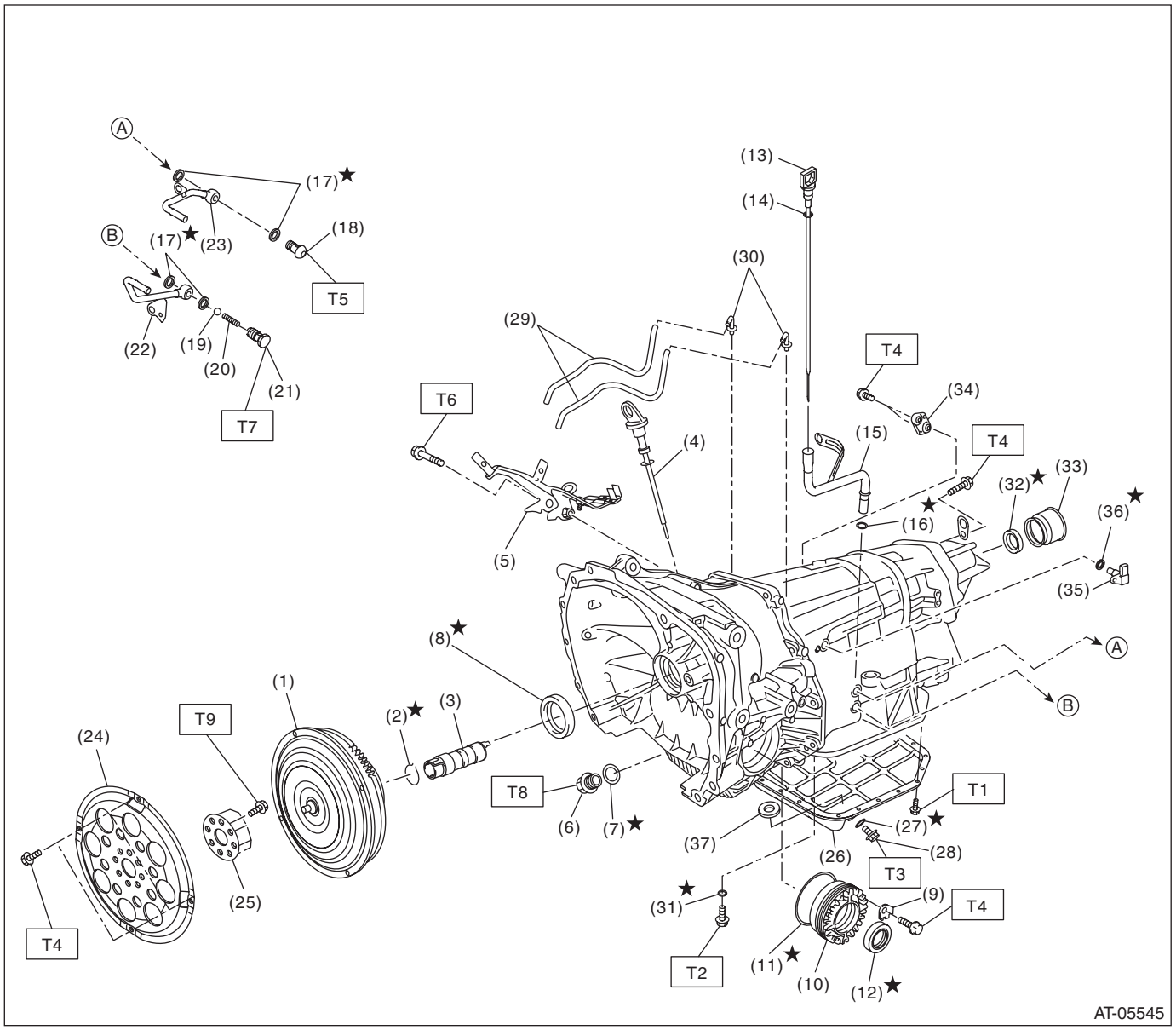
Model	3.6 L non-turbo
Front final reduction gear ratio	3.083

11.RECOMMENDED GEAR OIL

Lubrication oil		 (1) Item (2) Front differential gear oil (3) API standard (4) SAE viscosity No. and applicable temperature
Front differential oil capacity	L (US qt, Imp qt)	1.3 — 1.5 (1.4 — 1.6, 1.1 — 1.3)

B: COMPONENT

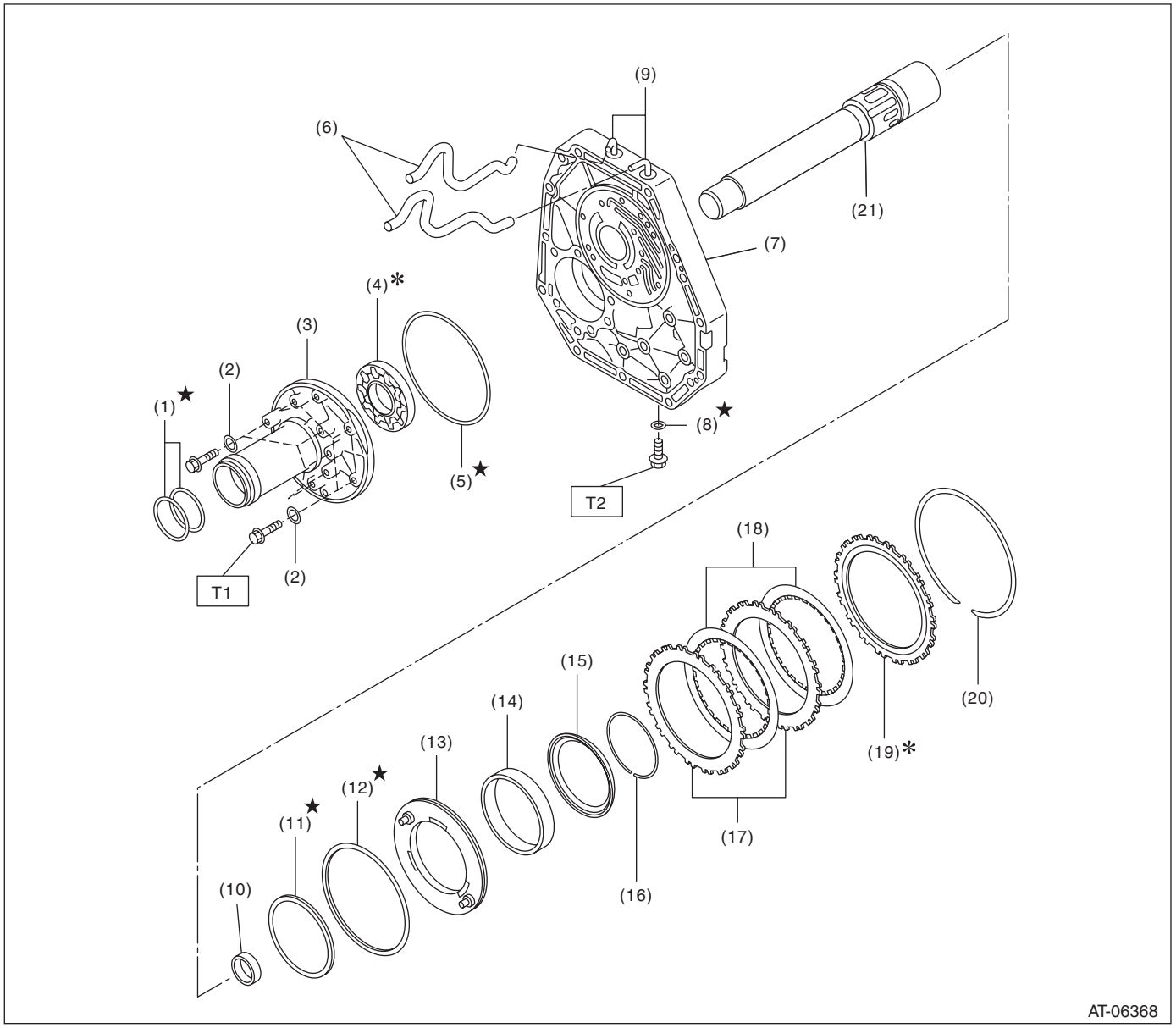
1. TORQUE CONVERTER CLUTCH & TRANSMISSION ASSEMBLY



(1) Torque converter ASSY
(2) Circlip
(3) Oil pump shaft
(4) Differential oil level gauge
(5) Transmission hanger COMPL
(6) Drain plug
(7) Gasket
(8) Oil seal
(9) Lock plate
(10) Side retainer
(11) O-ring
(12) Oil seal
(13) ATF level gauge
(14) O-ring
(15) Oil charge pipe
(16) O-ring
(17) Gasket
(18) Union screw
(19) Ball
(20) Spring
(21) Union screw
(22) ATF outlet pipe
(23) ATF inlet pipe
(24) Drive plate
(25) Reinforcement drive plate
(26) Oil pan
(27) Gasket
(28) ATF drain plug
(29) Breather hose
(30) Nipple
(31) O-ring
(32) Oil seal
(33) Dust cover
(34) Floating bracket
(35) Turbine speed sensor 1
(36) O-ring
(37) Magnet

Tightening torque: N·m (kgf-m, ft-lb)
T1: 5 (0.5, 3.7)
T2: 13 (1.3, 9.6)
T3: 20 (2.0, 14.8)
T4: 25 (2.5, 18.4)
T5: 40 (4.1, 29.5)
T6: 41 (4.2, 30.2)
T7: 45 (4.6, 33.2)
T8: 70 (7.1, 51.6)
T9: 90 (9.2, 66.4)

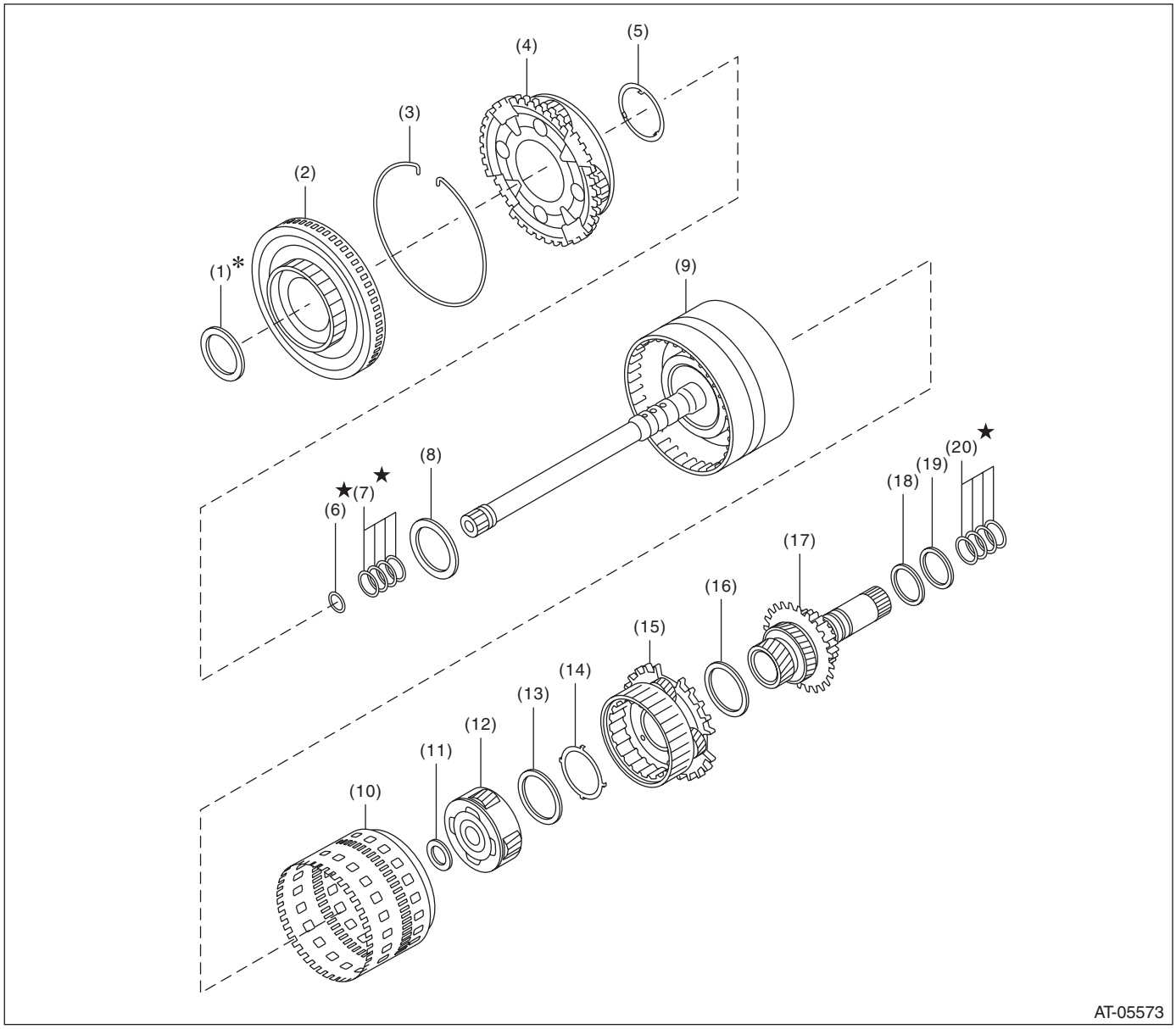
2. OIL PUMP & FRONT BRAKE



(1) O-ring
(2) Washer
(3) Oil pump housing
(4) Oil pump rotor
(5) O-ring
(6) Air breather hose
(7) Oil pump cover
(8) O-ring
(9) Nipple
(10) Needle bearing
(11) D-ring (inner)
(12) D-ring (outer)
(13) Front brake piston
(14) Return spring
(15) Retainer
(16) Snap ring
(17) Driven plate
(18) Drive plate
(19) Retaining plate
(20) Snap ring
(21) Stator shaft

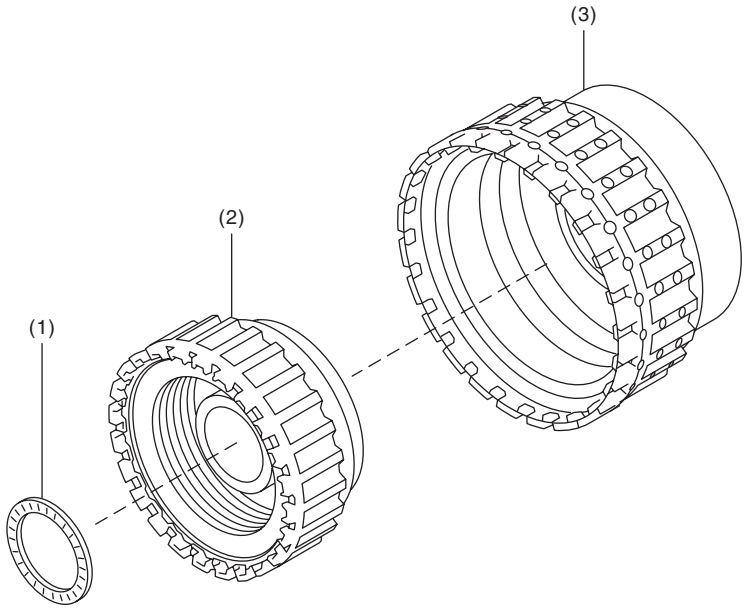
Tightening torque: N·m (kgf-m, ft-lb)
T1: 10 (1.0, 7.4)
T2: 13 (1.3, 9.6)

3. FRONT PLANETARY CARRIER AND MIDDLE & REAR PLANETARY CARRIER



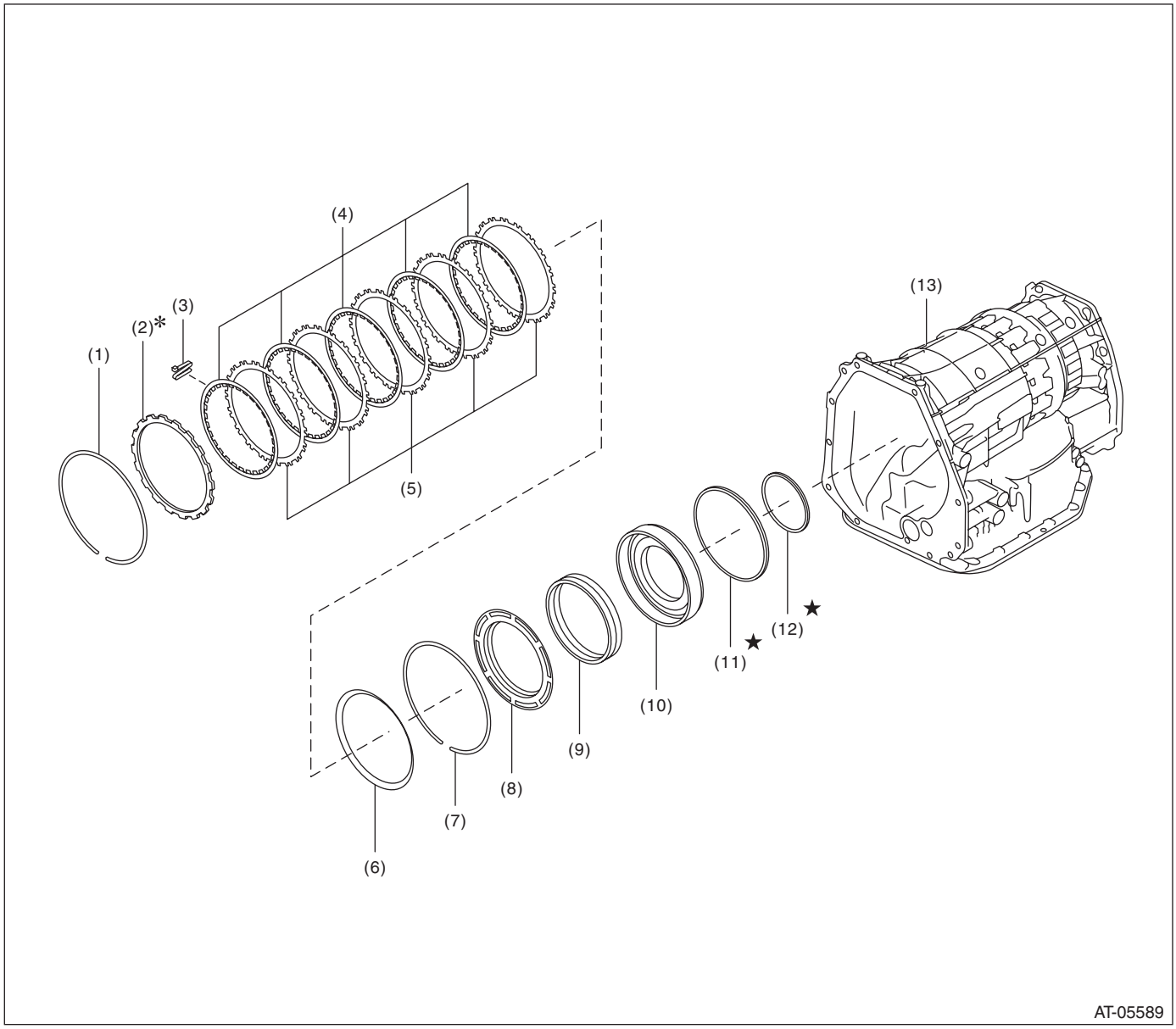
(1) Thrust bearing
(2) Front sun gear ASSY
(3) Snap ring
(4) Front carrier ASSY
(5) Race bearing
(6) O-ring
(7) Seal ring
(8) Thrust bearing
(9) Input clutch ASSY
(10) Rear internal gear ASSY
(11) Thrust bearing
(12) Middle carrier ASSY
(13) Thrust bearing
(14) Race bearing
(15) Rear carrier ASSY
(16) Thrust bearing
(17) Middle & rear sun gear ASSY
(18) Washer
(19) Thrust bearing
(20) Seal ring

4. DIRECT CLUTCH AND HIGH & LOW REVERSE CLUTCH



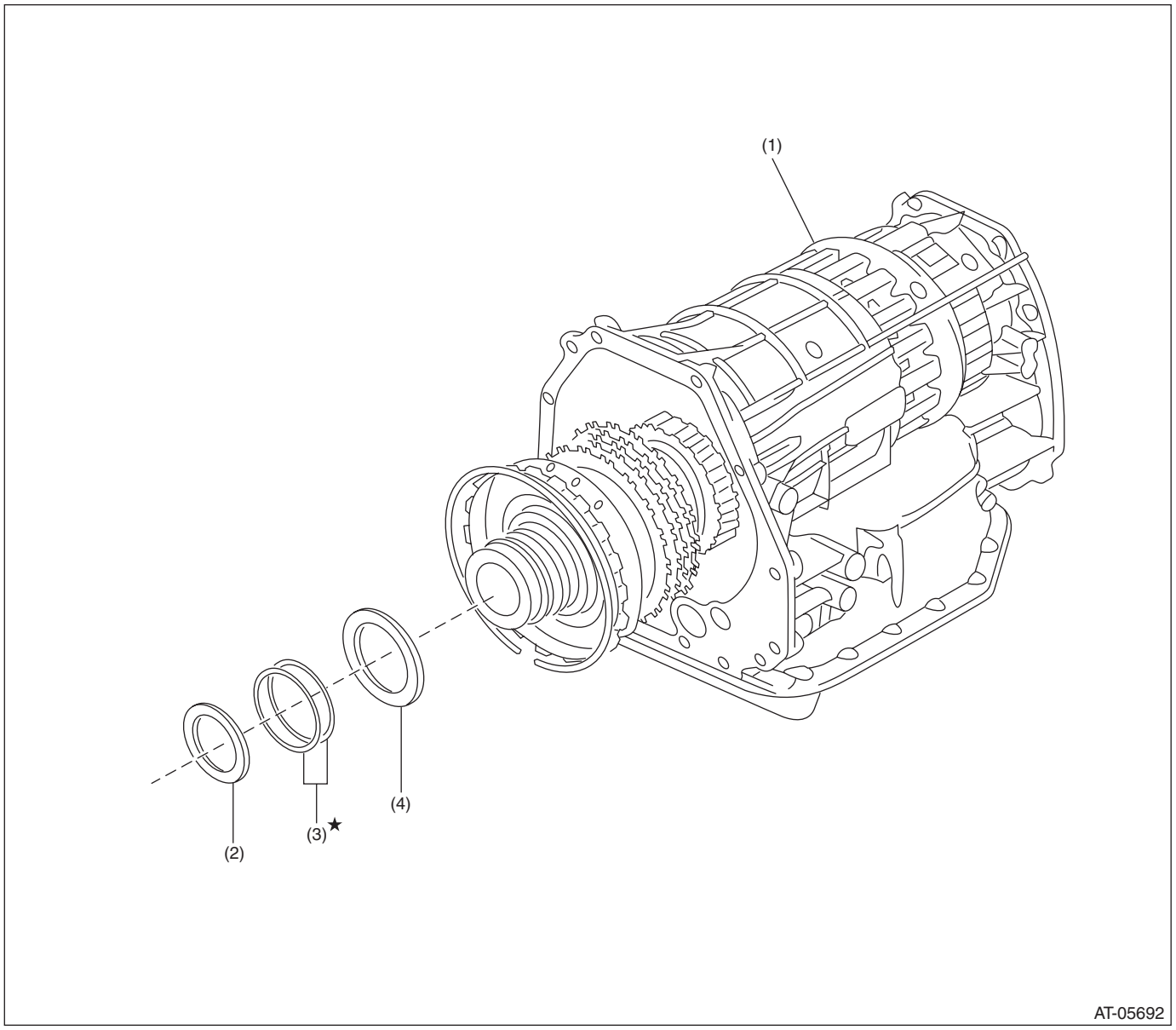
(1) Thrust bearing (2) High & low reverse clutch ASSY (3) Direct clutch ASSY

5. REVERSE BRAKE



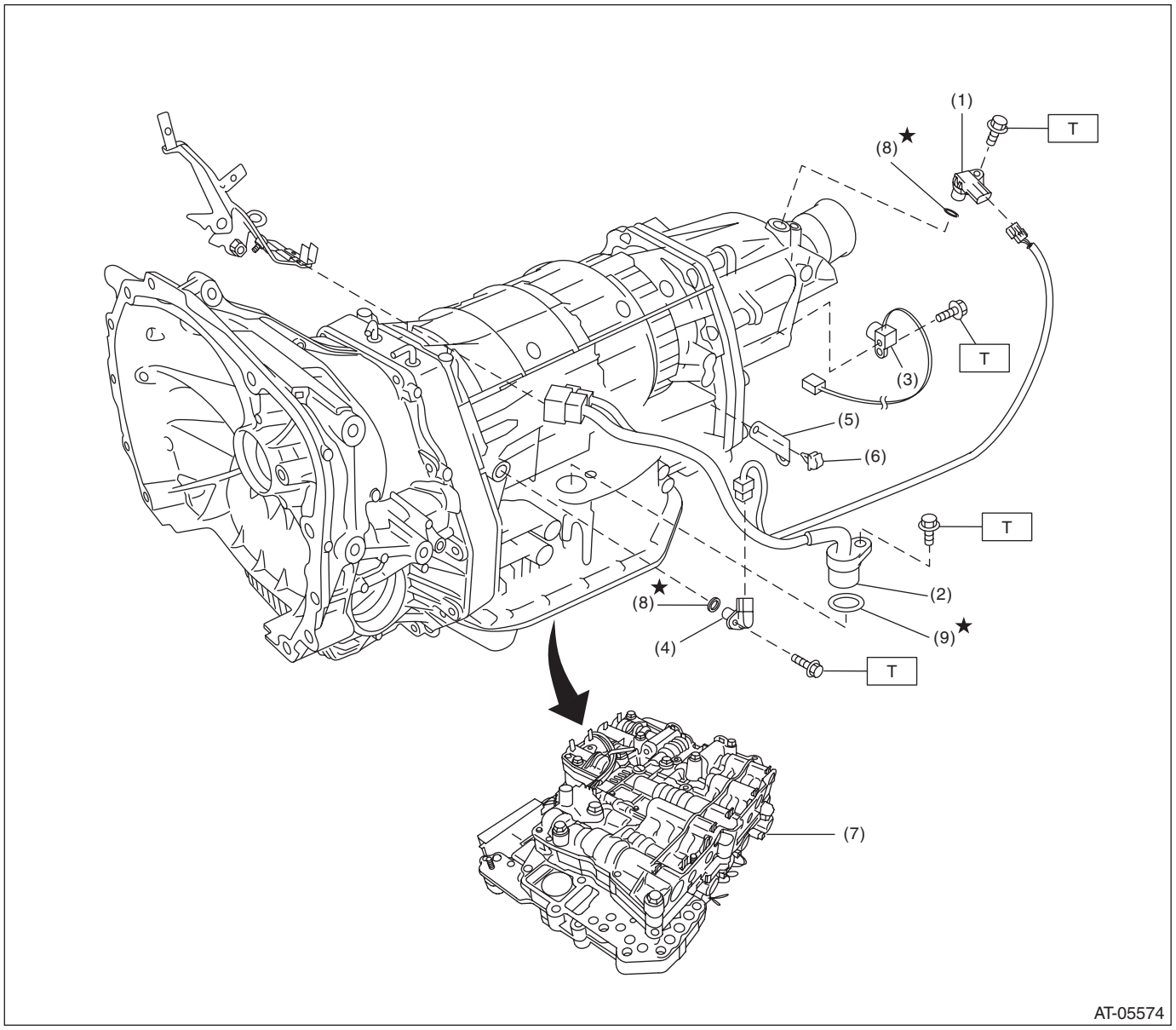
(1) Snap ring
(2) Retaining plate
(3) Leaf spring
(4) Drive plate
(5) Driven plate
(6) Dish plate
(7) Snap ring
(8) Retainer
(9) Return spring
(10) Reverse brake piston
(11) D-ring (outer)
(12) D-ring (inner)
(13) AT main case

6. SHORT AT ASSEMBLY



(1) Short AT ASSY (non-disassembly) (3) Seal ring (4) Thrust bearing
(2) Thrust bearing

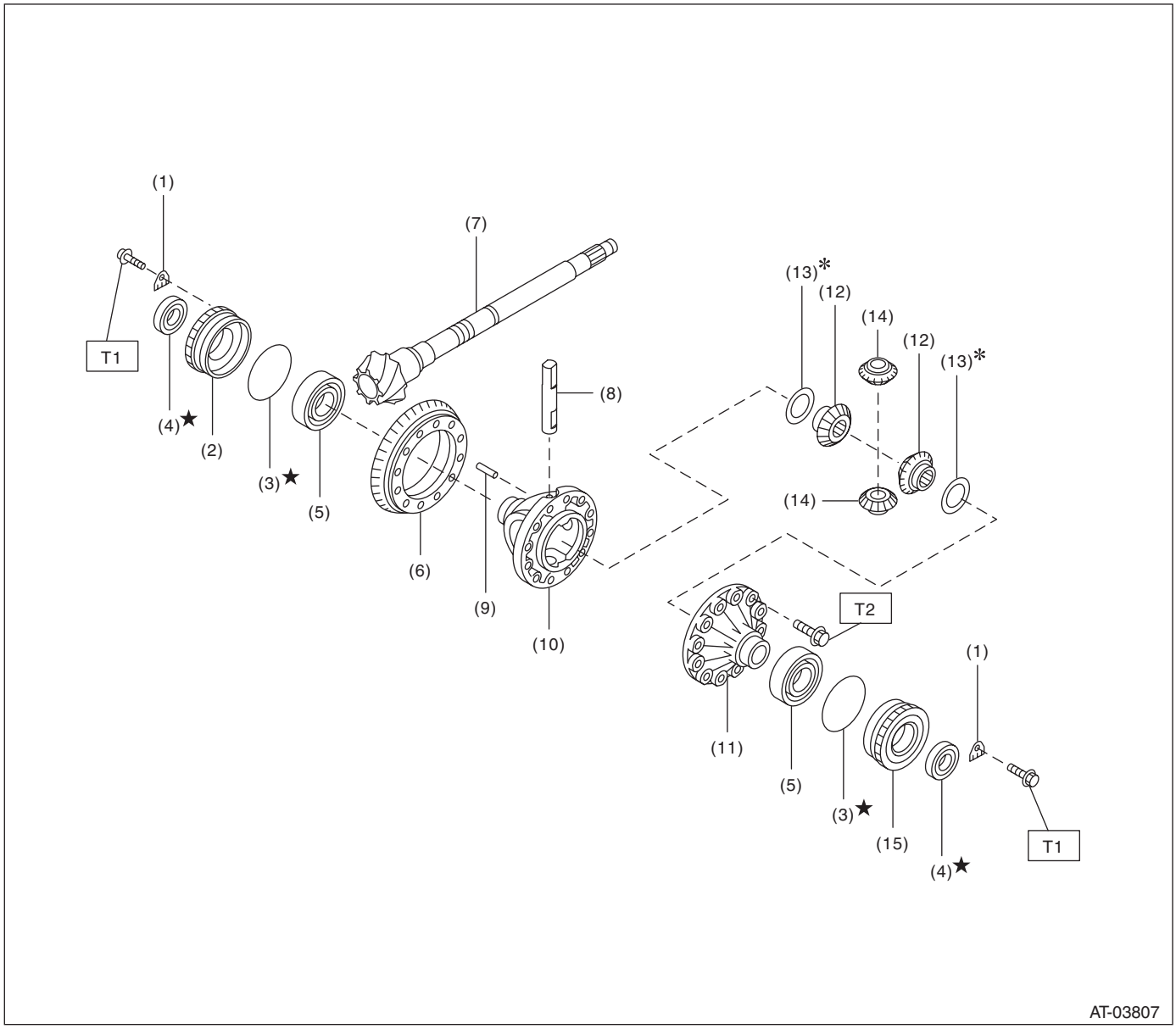
7. CONTROL VALVE & TRANSMISSION HARNESS



(1) Rear vehicle speed sensor
(2) Transmission harness ASSY
(3) Front vehicle speed sensor
(4) Turbine speed sensor 1
(5) Harness bracket
(6) Clip
(7) Control valve ASSY
(8) O-ring
(9) O-ring

Tightening torque: N·m (kgf-m, ft-lb)
T: 7 (0.7, 5.2)

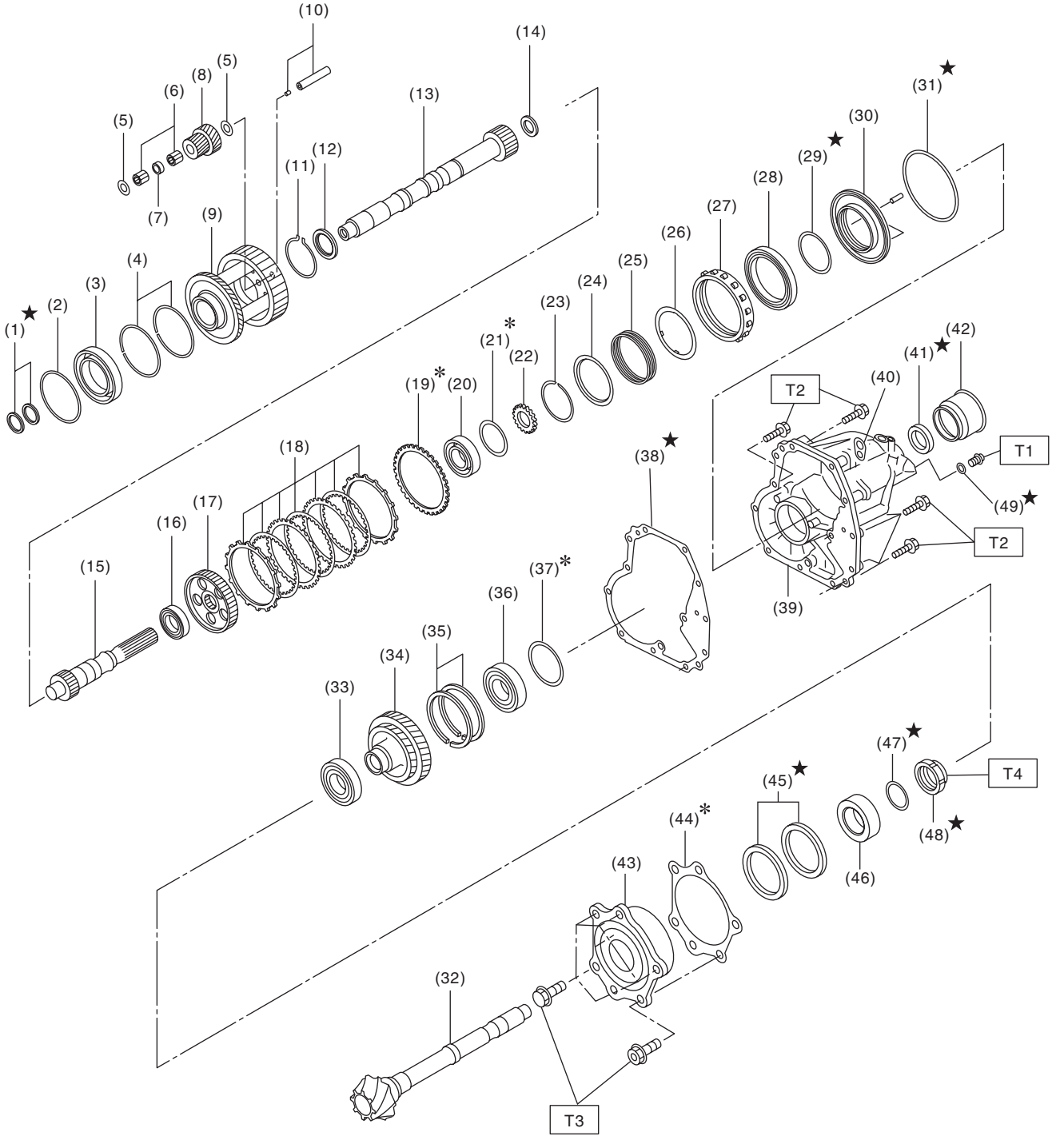
8. DIFFERENTIAL GEAR



(1) Retainer lock plate
(2) Differential side retainer RH
(3) O-ring
(4) Oil seal
(5) Taper roller bearing
(6) Hypoid driven gear
(7) Drive pinion shaft
(8) Pinion shaft
(9) Straight pin
(10) Differential case RH
(11) Differential case LH
(12) Differential bevel gear
(13) Washer
(14) Differential bevel pinion
(15) Differential side retainer LH

Tightening torque: N·m (kgf-m, ft-lb)
T1: 25 (2.5, 18.4)
T2: 70 (7.1, 51.6)

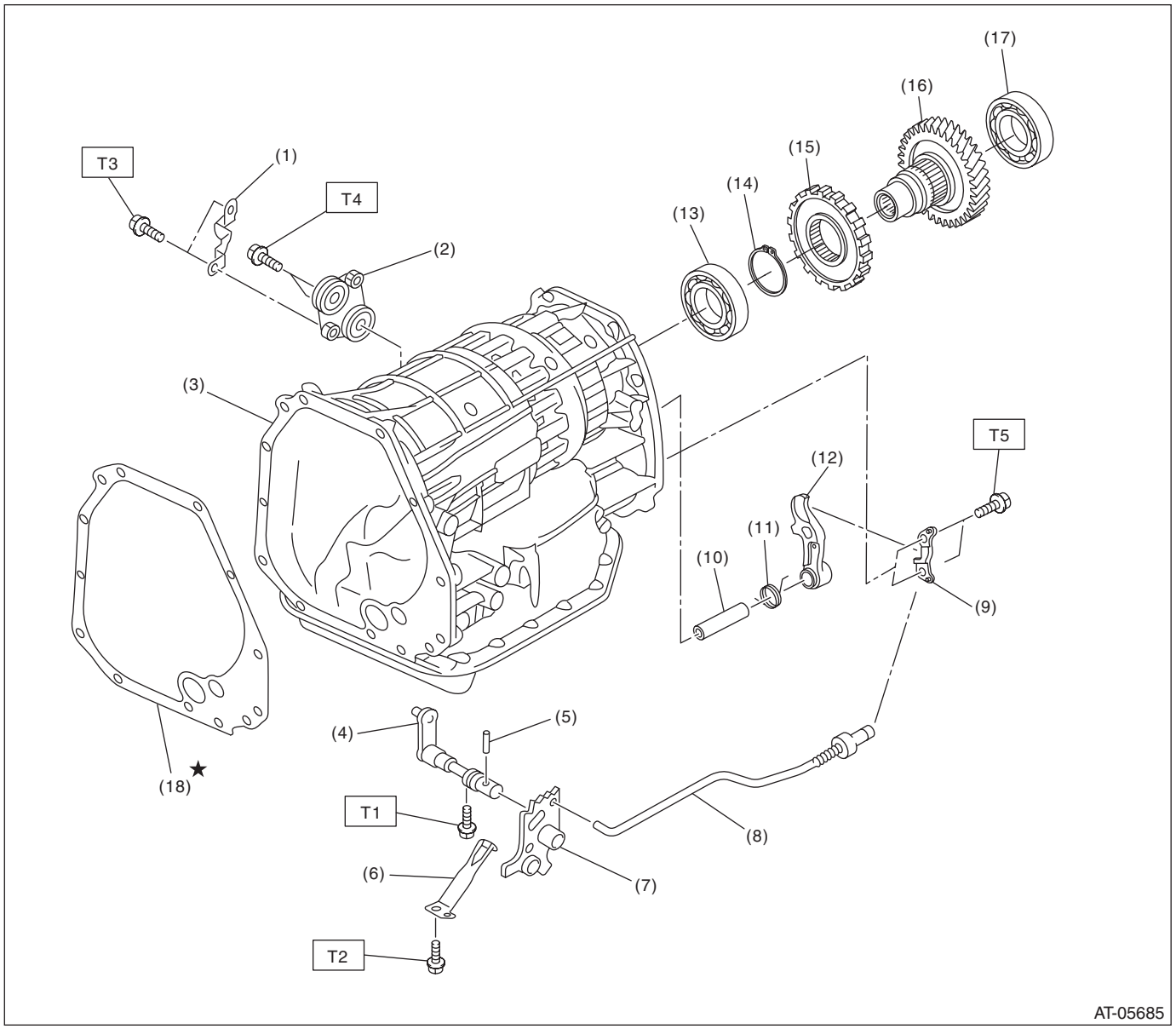
9. TRANSFER CASE, EXTENSION CASE & REDUCTION GEAR



(1) Seal ring
(2) Reduction gear shim
(3) Ball bearing
(4) Snap ring
(5) Planetary pinion washer
(6) Needle bearing
(7) Spacer
(8) Pinion gear
(9) Planetary carrier ASSY
(10) Planetary pinion shaft ASSY
(11) Snap ring
(12) Thrust bearing
(13) Intermediate shaft
(14) Thrust washer
(15) Rear drive shaft
(16) Ball bearing
(17) Transfer clutch hub
(18) Transfer clutch plate
(19) Driven plate No. 3
(20) Ball bearing
(21) Rear drive shaft shim
(22) Revolution gear
(23) Snap ring
(24) Clutch spring retainer
(25) Return spring
(26) Spring retainer
(27) Pressure plate
(28) Ball bearing
(29) O-ring
(30) Transfer clutch piston
(31) D-ring
(32) Drive pinion shaft
(33) Ball bearing
(34) Reduction driven gear
(35) Snap ring
(36) Ball bearing
(37) Shim
(38) Gasket
(39) Extension case
(40) Transmission hanger
(41) Oil seal
(42) Dust cover
(43) Taper roller bearing
(44) Drive pinion shim
(45) Oil seal
(46) Drive pinion collar
(47) O-ring
(48) Lock nut
(49) O-ring

Tightening torque: N·m (kgf-m, ft-lb)
T1: 13 (1.3, 9.6)
T2: 25 (2.5, 18.4)
T3: 70 (7.1, 51.6)
T4: 116 (11.8, 85.6)

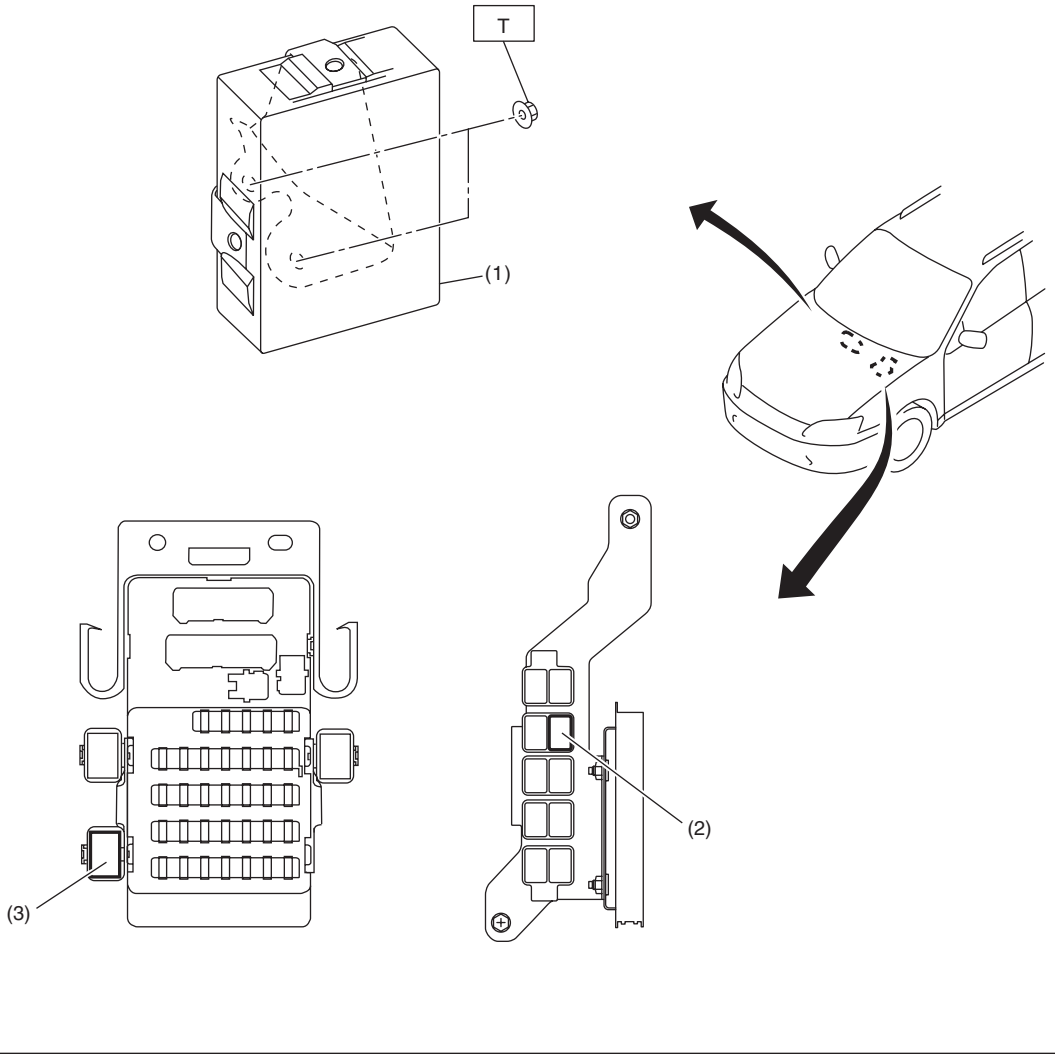
10.TRANSMISSION CONTROL DEVICE & PARKING SUPPORT



(1) Bracket
(2) Floating bracket
(3) AT main case
(4) Range select lever
(5) Straight pin
(6) Detent spring
(7) Manual plate
(8) Parking rod
(9) Parking support actuator
(10) Parking pawl shaft
(11) Return spring
(12) Parking pawl
(13) Ball bearing
(14) Snap ring
(15) Parking gear
(16) Reduction driven gear
(17) Ball bearing
(18) Gasket

Tightening torque: N·m (kgf-m, ft-lb)
T1: 6 (0.6, 4.4)
T2: 7 (0.7, 5.2)
T3: 18 (1.8, 13.3)
T4: 25 (2.5, 18.4)
T5: <Ref. to 5AT-75, Parking Pawl.>

11.TRANSMISSION CONTROL MODULE

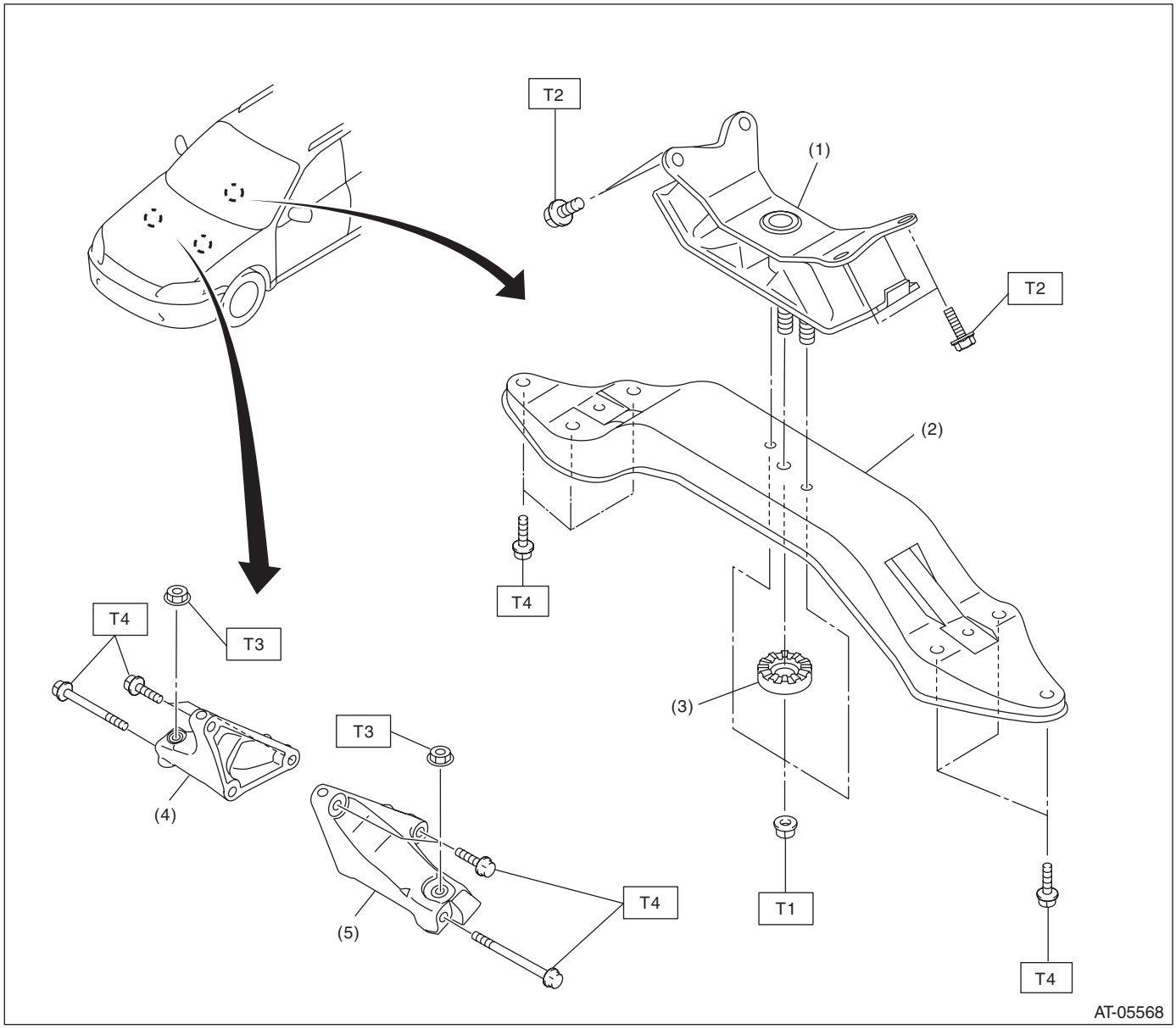


(1) Transmission control module (TCM)
(2) Buck-up light relay (model with push button ignition switch)
(3) Back-up light relay (model without push button ignition switch)

Tightening torque: N·m (kgf-m, ft-lb)

T: 7.5 (0.8, 5.5)

12.TRANSMISSION MOUNTING



(1)	Rear cushion rubber	(4)	Transmission main mounting bracket (RH)
(2)	Crossmember	(5)	Transmission main mounting bracket (LH)
(3)	Stopper		

Tightening torque: N·m (kgf-m, ft-lb)

T1: 35 (3.6, 25.8)

T2: 40 (4.1, 29.5)

T3: 45 (4.6, 33.2)

T4: 75 (7.6, 55.3)

C: CAUTION

• Wear appropriate work clothing, including a cap, protective goggles and protective shoes when performing any work.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust and dirt.
• Until the oil pan is removed, do not place with the oil pan side facing up to prevent foreign matter from entering the valve body.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, disassembly and replacement.
• When disassembling the case and other light alloy parts, disassemble them by slightly tapping with 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 them of different grades or manufacturers.
• Be sure to tighten 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 ATF fluid 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.
• During disassembly or assembly, be sure to use nylon gloves or paper towels. Do not use cloth gloves or waste cloth.

D: PREPARATION TOOL

1. SPECIAL TOOL

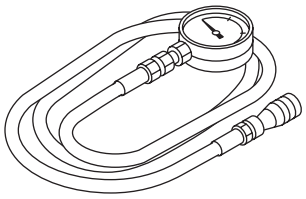
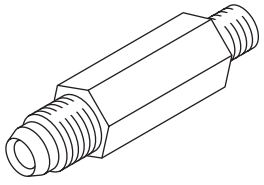
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498575400	498575400	OIL PRESSURE GAUGE ASSY	Used for measuring oil pressure.
 ST-498897200	498897200	OIL PRESSURE ADAPTER	Used together with oil pump cover installed on when measuring line pressure.

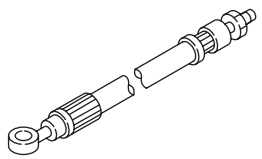
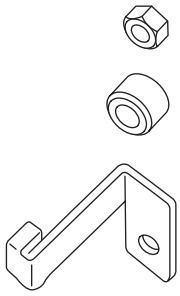
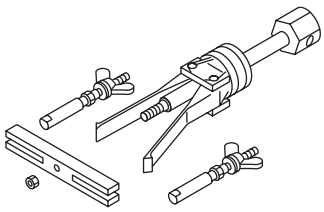
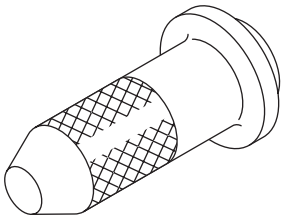
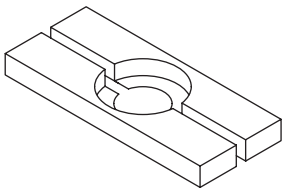
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498897800	498897800	OIL PRESSURE ADAPTER SET	Used for measuring the transfer clutch pressure.
 ST-498277200	498277200	STOPPER SET	• Used for removing and installing the automatic transmission assembly. • Used for preventing the torque converter from dropping off.
 ST-398527700	398527700	PULLER ASSY	• Used for removing the extension oil seal. • Used for removing the front differential side retainer bearing outer race.
 ST-498057300	498057300	INSTALLER	Used for installing the extension oil seal.
 ST-498077000	498077000	REMOVER	• Used for removing the front differential taper roller bearing. • Used for installing the center differential ball bearing.

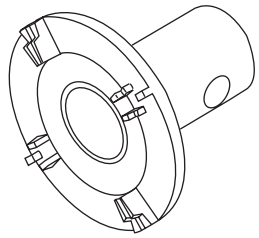
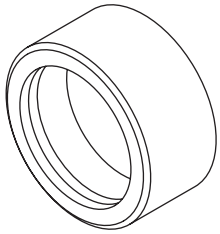
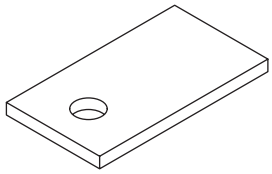
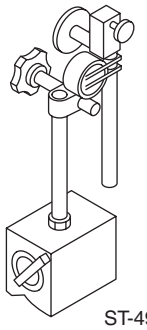
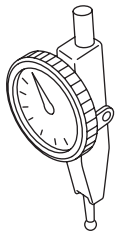
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18658AA020	18658AA020	WRENCH COMPL RETAINER	• Used for removing and installing the differential side retainer. • WRENCH COMPL RETAINER (18630AA010) can also be used.
 ST-398487700	398487700	DRIFT	Used for installing the front differential taper roller bearing.
 ST-498255400	498255400	PLATE	Used for measuring the backlash of hypoid gear.
 ST-498247001	498247001	MAGNET BASE	• Used for measuring the gear backlash. • Used together with DIAL GAUGE (498247100).
 ST-498247100	498247100	DIAL GAUGE	• Used for measuring the gear backlash. • Used together with MAGNET BASE (498247001).

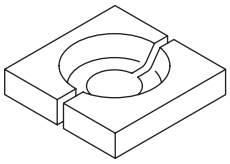
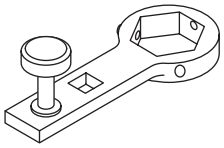
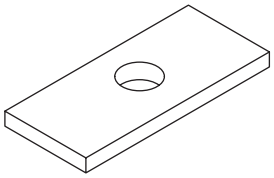
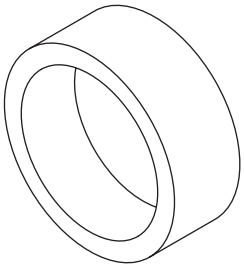
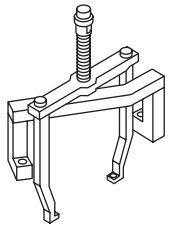
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498517000	498517000	REPLACER	Used for removing the drive pinion shaft front roller bearing.
 ST-499787700	499787700	WRENCH	• Used for removing and installing the drive pinion shaft lock nut. • Used for adjusting the front differential hypoid gear backlash.
 ST-398643600	398643600	GAUGE	Used for measuring total end play, extension end play and drive pinion height.
 ST-398744300	398744300	PISTON GUIDE	Used for measuring height from mating surface of the main case to pressure plate.
 ST-499737100	499737100	PULLER SET	• Used for removing the reduction driven gear assembly. • Used together with GEAR HOLDER (18680AA010) and SUPPORT PULLER (18766AA000).

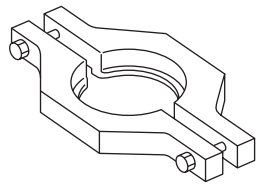
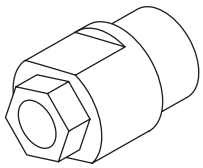
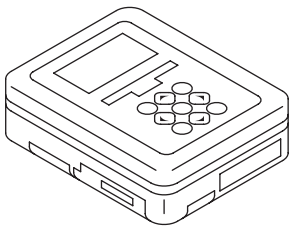
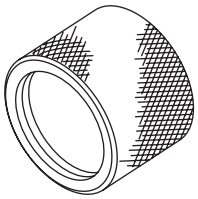
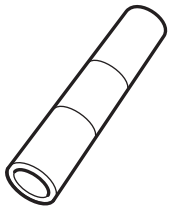
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498077600	498077600	REMOVER	Used for removing the center differential ball bearing.
 ST18667AA010	18667AA010	HOLDER	• Used for removing and installing the drive pinion lock nut. • Used as a handle to rotate gear when checking tooth contact. • Used for adjusting preload on the front differential side bearing.
 ST1B022XU0	1B022XU0	SUBARU SELECT MONITOR III KIT	Used for troubleshooting the electrical system.
 ST18675AA000	18675AA000	DIFFERENTIAL SIDE OIL SEAL INSTALLER	Used for installing the differential side retainer oil seal.
 ST18654AA000	18654AA000	INSTALLER	Used for installing the reduction driven gear ball bearing.

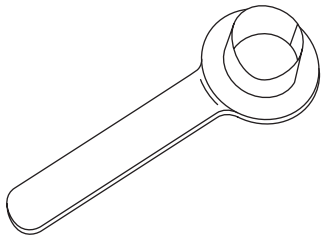
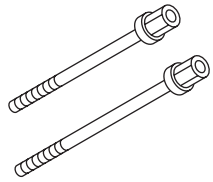
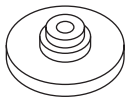
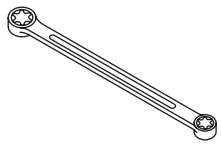
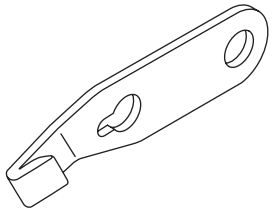
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST28399SA010	28399SA010	OIL SEAL PROTECTOR	Used for protecting oil seal when installing front drive shaft.
 ST18763AA000	18763AA000	COMPRESSOR SHAFT	Used for disassembling and assembling front brake clutch and reverse brake clutch.
 ST18765AA000	18765AA000	COMPRESSOR SUPPORT	Used for disassembling and assembling front brake clutch and reverse brake clutch.
 ST18676AA020	18676AA020	TORX® WRENCH	Used for removing and installing the torque converter case.
 ST-498497100	498497100	CRANKSHAFT STOPPER	Used for stopping the drive plate rotation when removing and installing the drive plate.

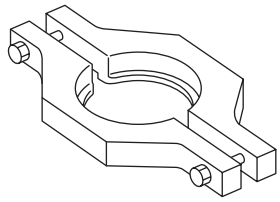
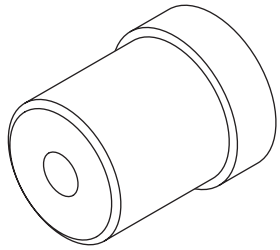
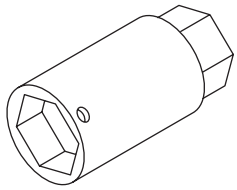
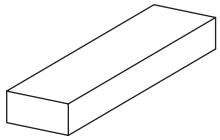
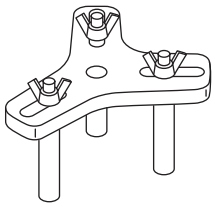
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498077300	498077300	REMOVER	Used for removing ball bearing of reduction driven gear.
 ST-499587100	499587100	OIL SEAL INSTALLER	Used for installing the converter case oil seal.
 ST-499787500	499787500	ADAPTER	• Used for installing and removing drive pinion shaft lock nut. • Used for adjusting preload on the front differential side bearing.
 ST-499575400	499575400	GAUGE	Used for adjusting the total end play (selecting the reduction driven gear shim).
 ST18762AA000	18762AA000	COMPRESSOR SPECIAL TOOL	• Used for disassembling and assembling front brake clutch and reverse brake clutch. • Used together with COMPRESSOR SHAFT (18763AA000) and COMPRESSOR SUPPORT (18765AA000).

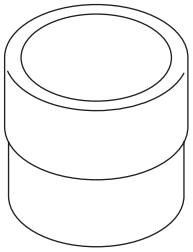
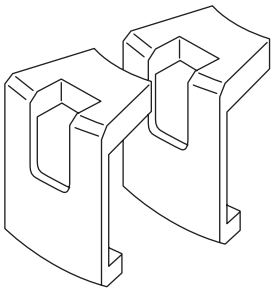
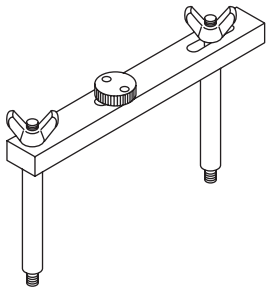
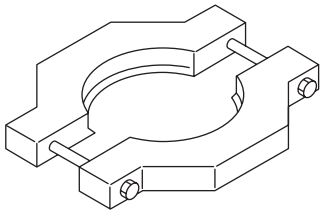
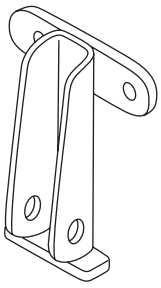
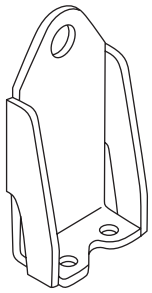
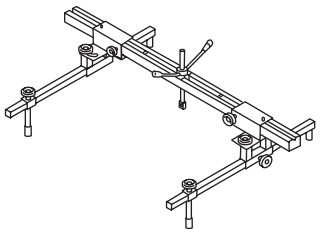
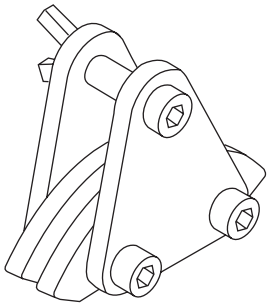
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499755602	499755602	PRESS	Used for installing the parking gear.
 ST18680AA010	18680AA010	GEAR HOLDER	Used for removing the reduction driven gear assembly. (2-piece set)
 ST18766AA000	18766AA000	SUPPORT PULLER	Used for removing the reduction driven gear assembly.
 ST18767AA000	18767AA000	REMOVER	Used for removing the parking gear.
 ST41099AJ010	41099AJ010	SPECIAL TOOL H6	• Used for removing and installing transmission. • For H6 engine.

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18360AA020	18360AA020	HANGER	• Used for removing and installing transmission. • For H6 engine.
 ST99099AJ000	99099AJ000	ENGINE HANGER	• Used for removing and installing transmission. • Used together with CHAIN BALANCER (99099AJ010) and sling chain (general tool).
 ST99099AJ010	99099AJ010	CHAIN BALANCER	• Used for removing and installing transmission. • Used together with ENGINE HANGER (99099AJ000) and sling chain (general tool). • Used to hang the engine while balancing it with the sling chain inserted in this tool.

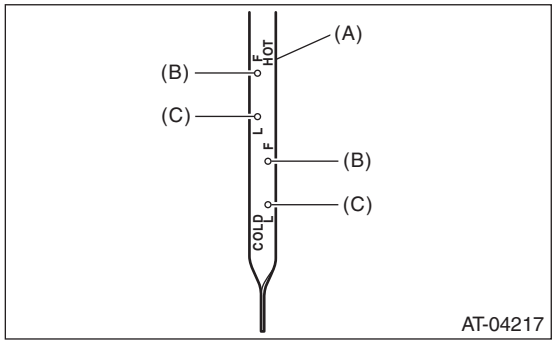
2. GENERAL TOOL

TOOL NAME	REMARKS
Depth gauge	Used for measuring the transmission end play.
Thickness gauge	Used for measuring clearance of the clutch, brake and oil pump.
Micrometer	Used for measuring thickness of the drive pinion.
Spring scale	Used for measuring the starting torque of the drive pinion.
Circuit tester	Used for measuring resistance and voltage.
TORX® T70	Used for removing and installing the differential gear oil drain plug.
Snap ring pliers	Used for removing and installing each snap ring.
Sling chain	Used for removing and installing transmission. • Length: 0.8 — 1 m (2.6 — 3.3 ft) • Load capacity: 1.2 t (2,646 lb) or more • Diameter: 6 mm (0.24 in) or 6.3 mm (0.25 in) • Chain external width: 23.5 mm (0.93 in) or less • Chain internal width: 8.5 mm (0.33 in) or more
Screw shackle	Used for removing and installing transmission. • Load capacity: 250 kg (551 lb) or more • Use two pieces.
Angle gauge	Used for tightening parking support.

2. Automatic Transmission Fluid

A: INSPECTION

NOTE:
The level of ATF varies with fluid temperature. Pay attention to the ATF temperature when checking ATF level.
1) Raise the ATF temperature by driving a distance of 5 to 10 km (3 to 6 miles). Otherwise, idle the engine to raise ATF temperature to 70 — 80°C (158 — 176°F) on Subaru Select Monitor. <Ref. to 5AT(diag)-18, Read Current Data.>
2) Park the vehicle on a level surface.
3) After selecting all positions (P, R, N, D), set the select lever in “P” range. Idle the engine for 1 to 2 minutes.
4) Remove the oil level gauge and wipe it clean.
5) Reinsert the level gauge all the way. Make sure the level gauge is inserted correctly and in the proper orientation.
6) Remove the oil level gauge again and make sure that the ATF level is between upper and lower marks of the HOT side.



(A) ATF level gauge
(B) Upper level
(C) Lower level

7) If the ATF level is below the lower mark, add recommended ATF until the fluid level is between upper and lower marks.

CAUTION:
• Be careful not to exceed the upper level.
• When the transmission is cold, be careful not to add ATF to the upper level on HOT side. Overfilling of ATF may cause oil splashing.
8) Check the ATF for leaks.
Visually check for leaks in the transmission. If there are leaks, replace the gasket, oil seal, plug or other parts.

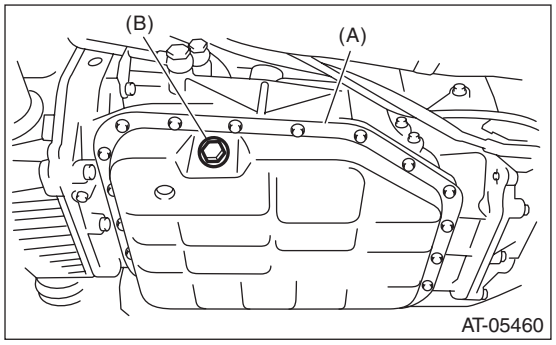
B: REPLACEMENT

1) Lift up the vehicle.
2) Remove the ATF drain plug to drain ATF.

CAUTION:
• Directly after the vehicle has been running or the engine has been idling for a long time, the ATF is hot. Be careful not to burn yourself.
• Be careful not to spill the ATF on the exhaust pipe to prevent it from emitting smoke or causing fire. If ATF is spilled on the exhaust pipe, wipe it off completely.
3) Check the ATF condition. <Ref. to 5AT-29, CONDITION CHECK, Automatic Transmission Fluid.>
4) Tighten the ATF drain plug.

NOTE:
Use a new gasket.

Tightening torque:
20 N·m (2.0 kgf-m, 14.8 ft-lb)



(A) Oil pan
(B) ATF drain plug

5) Lower the vehicle.
6) Pour ATF from the oil charge pipe.

Recommended fluid:
<Ref. to 5AT-3, HYDRAULIC CONTROL AND LUBRICATION, SPECIFICATION, General Description.>

CAUTION:
Be sure to use the recommended or equivalent ATF. Using material except recommended one or substitute would cause trouble.

Capacity:
Fill with the same amount of ATF as drained.

Capacity when transmission is overhauled:
9.6 — 10.0 L
(10.1 — 10.6 US qt, 8.4 — 8.8 Imp qt)
7) Check the level and leaks of ATF. <Ref. to 5AT-28, INSPECTION, Automatic Transmission Fluid.>

C: CONDITION CHECK

NOTE:
When replacing ATF, check the inside condition of transmission body by inspecting the drained ATF.

Fluid condition	Trouble and possible cause	Corrective action
Large amount of metallic pieces are found.	Internal metal parts of transmission body are excessively worn.	Replace ATF and check if AT operates correctly.
Is thick and is a varnish-form fluid.	Clutch etc. is burned.	Replace ATF and check the AT body or vehicle for faulty.
Clouded fluid or bubbles are found in fluid.	Water is mixed.	Replace ATF and check the water entering point.

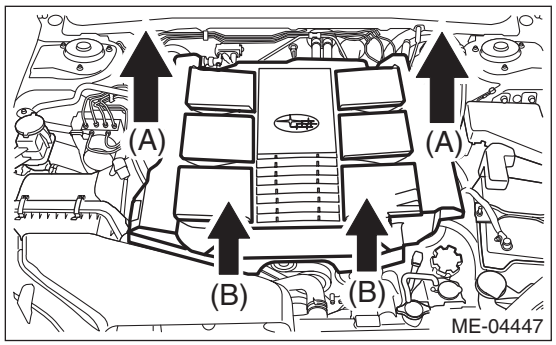
3. Differential Gear Oil

A: INSPECTION

1) Park the vehicle on a level surface.
2) Remove the collector cover.

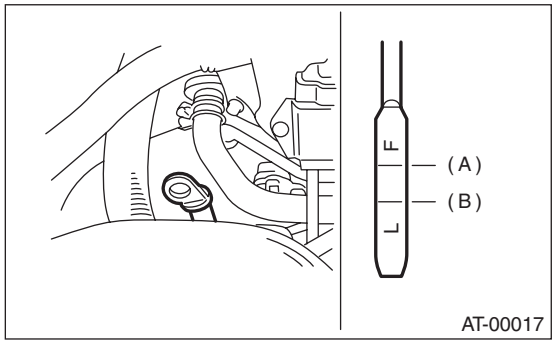
NOTE:
Follow the steps below when removing the collector cover.

(1) Pull up the two points at the rear (A).
(2) Pull up the two points at the front (B) while moving them forward.



3) Remove the oil level gauge and wipe it clean.
4) Reinsert the level gauge all the way. Make sure the level gauge is inserted correctly and in the proper orientation.
5) Remove the oil level gauge again, and check the level of differential gear oil. If the oil level is below “L” line, add oil to bring the level up to “F” line.

NOTE:
To prevent overfilling the differential gear oil, do not add oil above the “F” line.



(A) Upper level
(B) Lower level

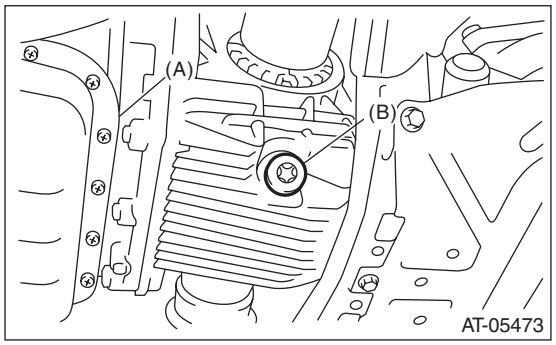
B: REPLACEMENT

1) Lift up the vehicle.
2) Drain the differential gear oil by removing drain plug using TORX® bit T70.

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 differential gear oil is spilled on the exhaust pipe, wipe it off completely.
3) Tighten the 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) Oil pan
(B) Drain plug

4) Lower the vehicle.
5) Pour gear oil into the level gauge hole.

Recommended gear oil:
<Ref. to 5AT-4, RECOMMENDED GEAR OIL, SPECIFICATION, General Description.>

Gear oil capacity:
1.3 — 1.5 L (1.4 — 1.6 US qt, 1.1 — 1.3 Imp qt)
6) Check the level of differential gear oil. <Ref. to 5AT-30, INSPECTION, Differential Gear Oil.>

4. Road Test

A: INSPECTION

1. GENERAL PRECAUTION

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

NOTE:
When performing the test, do not exceed posted speed limit.

2. D RANGE SHIFT FUNCTION

Check shifting between 1st ←→ 2nd ←→ 3rd ←→ 4th ←→ 5th while driving on normal city streets.

3. D RANGE SHIFT SHOCK

Check the shock level when shifting up during normal driving.

4. KICK-DOWN FUNCTION

Check kick-down for each gear. Check the shock level during kick-down at the same time.

5. ENGINE BRAKE OPERATION

- Check the 4th gear engine brake when shifting down from 5th to 4th range while driving in 5th gear of manual mode [50 — 60 km/h (31 — 37 MPH)].
- Check the 3rd gear engine brake when shifting down from 4th to 3rd range while driving in 4th gear of manual mode [50 — 60 km/h (31 — 37 MPH)].
- Check the 2nd gear engine brake when shifting down from 3rd to 2nd range while driving in 3rd gear of manual mode [40 — 50 km/h (25 — 31 MPH)].
- Check the 1st gear engine brake when shifting down from 2nd to 1st range while driving in 2nd gear of manual mode [20 — 30 km/h (12 — 19 MPH)].

6. LOCK-UP FUNCTION

When the accelerator is lightly depressed while driving on a flat road in lock-up range, check that rpm does not change abruptly.

7. P RANGE OPERATION

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

8. NOISE AND VIBRATION

Check for noise and vibration while driving and during shifting.

9. OIL LEAKAGE

After the driving test, inspect for oil leaks from the transmission body.

5. Stall Test

A: INSPECTION

NOTE:
The stall test is extremely important in diagnosing the condition of an automatic transmission and engine. The test is necessary to measure the engine stall speeds in “2nd gear of manual mode”.
Purposes of the stall test:
- Operational check of the automatic transmission clutch
- Operational check of the torque converter clutch
- Engine performance check

1) Check that the throttle valve fully opens.
2) Check that the engine oil level is correct.
3) Check that the coolant level is correct.
4) Check that the ATF level is correct.
5) Check that the differential gear oil level is correct.
6) Raise the ATF temperature to 70 to 80°C (158 to 176°F) by driving a distance of 5 to 10 km (3 to 6 miles). Confirm the ATF temperature on Subaru Select Monitor. <Ref. to 5AT(diag)-18, Read Current Data.>
7) Place the wheel chocks at the front and rear of all wheels and apply the parking brake.
8) Move the select lever to ensure it operates properly, then set to “2nd gear of manual mode”.
9) While stepping hard on the brake pedal, gradually step on the accelerator pedal.
10) When the engine speed is stabilized, quickly record the engine speed and release accelerator pedal.
11) Shift the select lever to “N” range, and cool down the engine by idling it for one minute or more.

NOTE:
- Do not perform a stall test for over 5 seconds at a time. (Perform with the throttle from fully closed to fully open to end up reading the stall speed.) Doing so will make the engine oil and ATF deteriorate and the clutch and brake to be adversely affected.
- After performing the stall test, be sure to cool down the engine for at least one minute with the select lever set in “P” or “N” range, and at an idle speed of 1,200 rpm 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 automatic transmission from sustaining damage.
- Perform the stall test in S mode.
- When depressing the accelerator pedal again after performing the stall test for 5 seconds or more, the electronic throttle control remains closed for approx. 60 seconds.
- When the stall test is performed for 15 seconds or more continuously, the test is completed forcibly to protect the transmission unit.

When depressing the accelerator pedal again, the electronic throttle control remains closed for approx. 60 seconds.

Stall speed (at sea level):
2,100 — 2,600 rpm

Stall speed (at sea level)	Range	Possible faulty parts
Over specified value	2nd gear of manual mode	• Line pressure too low • Forward brake • Direct clutch • 3rd one-way clutch

6. Time Lag Test

A: INSPECTION

NOTE:
When the select lever is shifted while the engine is idling, there will be a certain time elapse or lag before shock is felt. Using this, check the condition of forward brake, reverse brake, 1st one-way clutch and 3rd one-way clutch.

- Perform the test at normal operation fluid temperature of 70 — 80°C (158 — 176°F).
- Be sure to allow one minute or more interval between tests.
- Make three measurements and take the average value.

1) Fully 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-lag 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 specification:
- Line pressure too low
- Forward brake worn
- One-way clutch not operating properly

4) In the same manner, measure the time lag of “N” → “R”.

Time-lag
Standard: 1.5 seconds or less

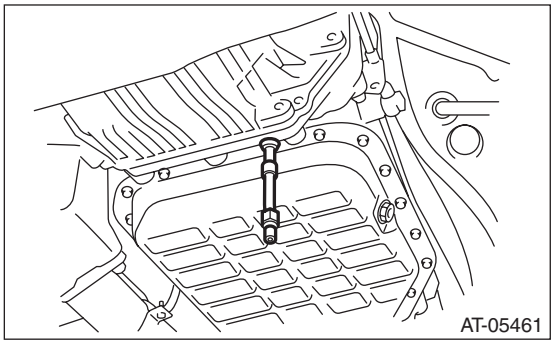
If “N” → “R” time lag is longer than specification:
- Line pressure too low
- Reverse brake worn

7. Line Pressure Test

A: MEASUREMENT

NOTE:
If the clutch or brake shows a sign of slippage, or shifting interval is not correct, check the line pressure.
- Excessive shock during up-shift may be due to the line pressure being too high.
- In many cases, slippage or inability to operate the vehicle may be due to insufficient oil pressure for the operation of clutch, brake or control valve.

1) Lift up the vehicle.
2) Remove the test plug and install the ST.
ST 498897200 OIL PRESSURE ADAPTER



3) Set the ST1 and ST2.
ST1 498897200 OIL PRESSURE ADAPTER
ST2 498575400 OIL PRESSURE GAUGE ASSY
4) Lower the vehicle, and pull ST2, which were set in step 3), into the vehicle.
5) Connect the Subaru Select Monitor to the data link connector and read the current data. <Ref. to 5AT(diag)-18, Read Current Data.>
6) Perform line pressure test in the same manner as the stall test.

NOTE:
- Do not perform the line pressure test for 5 seconds or more at a time. Doing so will make the engine oil and ATF deteriorate and the clutch and brake to be adversely affected.
- After performing the 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 rpm or less.

Range of the select lever	Accelerator pedal opening angle	ATF temperature condition	“P/L Solenoid Pressure” displayed on the Subaru Select Monitor kPa	Standard line pressure kPa (kg/cm^2, psi)
2nd gear of manual mode	Full closed	45 — 55°C (113 — 131°F)	350 — 500	Target pressure (displayed on Subaru Select Monitor) –10 — +190 (Target pressure –0.10 — +1.94, Target pressure –1.45 — +27.5)
	Full open		2,000 or more	1,320 — 1,520 (13.46 — 15.50, 191.4 — 220.4)
R	Full open		1,600 or more	1,660 — 1,860 (16.93 — 18.97, 240.7 — 269.7)

7) Remove the ST and install the test plug.

NOTE:
Use new O-rings.

Tightening torque:
13 N·m (1.3 kgf-m, 9.6 ft-lb)

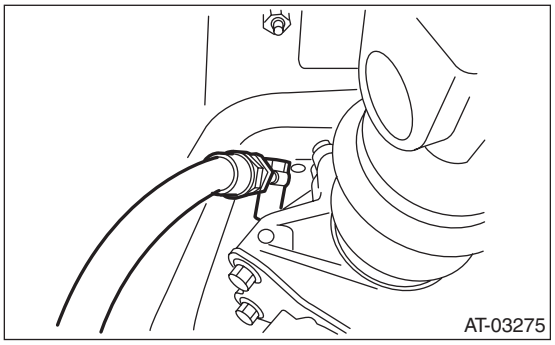
8. Transfer Clutch Pressure Test

A: INSPECTION

1) Lift up the vehicle.
2) Remove the bolts holding the heat shield cover, and move the heat shield cover to the rear.
3) Remove the test plug and install the ST.

CAUTION:
Be careful not to cut yourself on the heat shield cover when removing the test plugs and setting the ST.

ST 498897800 OIL PRESSURE ADAPTER SET



4) Set the ST.

ST 498575400 OIL PRESSURE GAUGE ASSY

5) Lower the vehicle, and pull ST, which were set in step 4), into the vehicle.
6) Connect the Subaru Select Monitor to the data link connector and read the current data. <Ref. to 5AT(diag)-18, Read Current Data.>
7) Perform the transfer clutch pressure test in the same manner as the line pressure test.

NOTE:
• Do not perform the transfer clutch pressure test for 5 seconds or more at a time. Doing so will make the engine oil and ATF deteriorate and the clutch and brake to be adversely affected.
• After performing the transfer clutch pressure test, be sure to cool down the engine for at least one minute with the select lever set in the “P” or “N” range, and at an idle speed of 1,200 rpm or less.
• Adjust the accelerator pedal opening angle in order to obtain the “T/F solenoid target pressure” displayed on the Subaru Select Monitor.

Range of the select lever	Accelerator pedal opening angle	ATF temperature condition	“T/F Solenoid Target Pressure” displayed on the Subaru Select Monitor kPa	Standard transfer clutch pressure kPa (kg/cm^2, psi)
2nd gear of manual mode	Partial throttle	45 — 55°C (113 — 131°F)	400	300 — 500 (3.06 — 5.10, 43.5 — 72.5)
N	Full closed		0	0 — 50 (0 — 0.51, 0 — 7.2)

8) Remove the ST and install the test plug.

NOTE:
Use new O-rings.

Tightening torque:
13 N·m (1.3 kgf-m, 9.6 ft-lb)

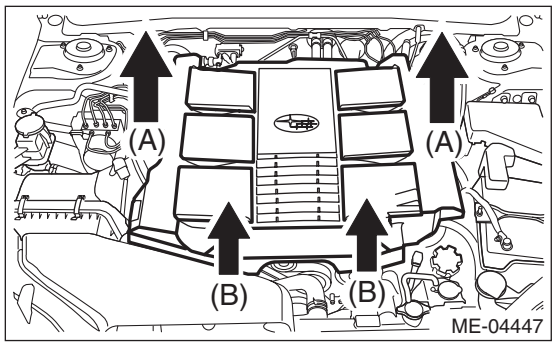
9) Install the heat shield cover. <Ref. to EI-174, INSTALLATION, Heat Shield Cover.>

9. Automatic Transmission Assembly

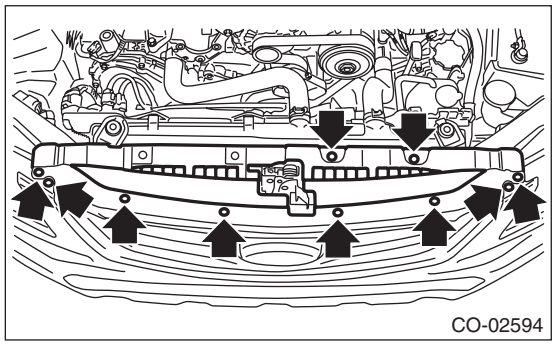
A: REMOVAL

1) Remove the front wheels.
2) Fully open the front hood.
3) Disconnect the ground cable from battery.
4) Remove the collector cover.

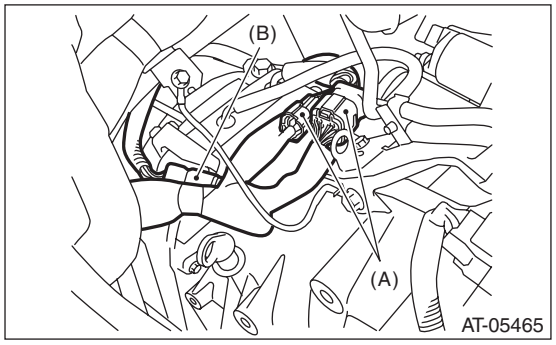
NOTE:
Follow the steps below when removing the collector cover.
(1) Pull up the two points at the rear (A).
(2) Pull up the two points at the front (B) while moving them forward.



5) Remove the air intake duct. <Ref. to IN(H6DO)-8, REMOVAL, Air Intake Duct.>
6) Remove the 10 clips and detach the grille bracket.

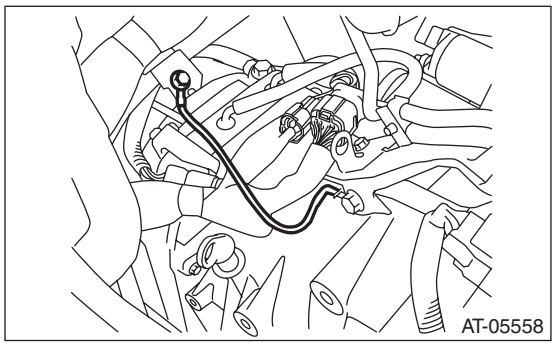


7) Remove the air intake boot. <Ref. to IN(H6DO)-7, REMOVAL, Air Intake Boot.>
8) Disconnect the following connectors.

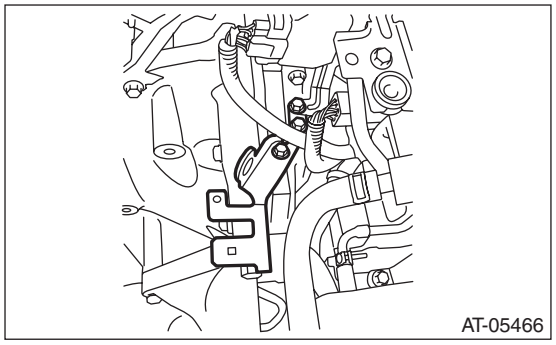


(A) Transmission harness connectors
(B) Front oxygen (A/F) sensor

9) Remove the transmission radio ground terminal.



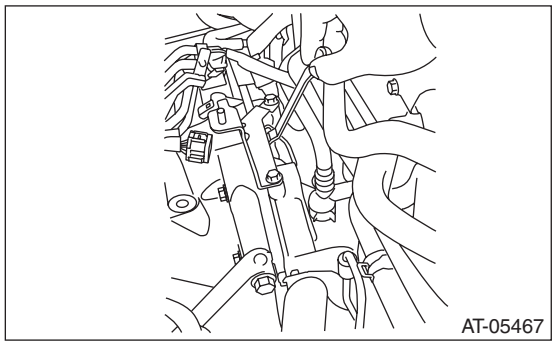
10) Remove the air breather hose. <Ref. to 5AT-60, REMOVAL, Air Breather Hose.>
11) Remove the starter. <Ref. to SC(H6DO)-7, REMOVAL, Starter.>
12) Remove the engine hanger rear.



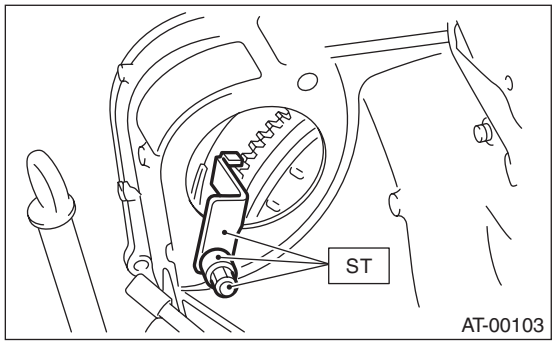
13) Separate the torque converter from drive plate.

CAUTION:
• Be careful not to drop bolts into converter housing.
• Be careful not to damage the mounting bolts.
(1) Remove the service hole plug.
(2) Remove the bolts which hold torque converter to drive plate.
(3) Remove the four bolts by rotating the crank pulley a little at a time.

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

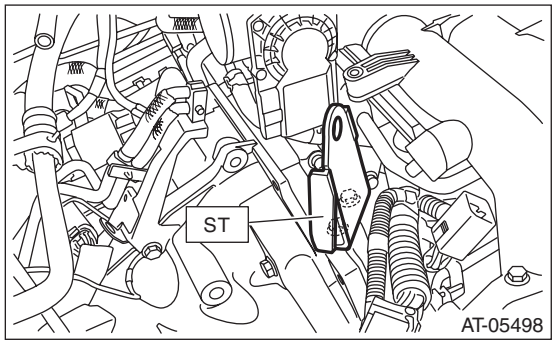


14) Attach the ST to the converter case.
ST 498277200 STOPPER SET



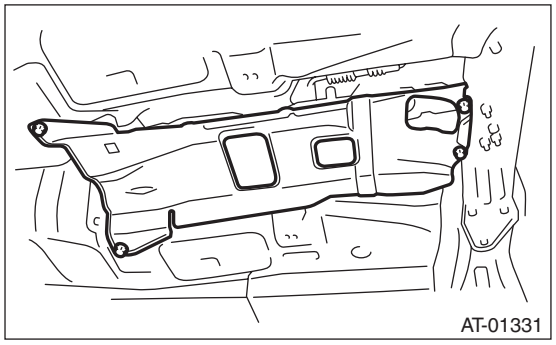
15) Attach the ST to the engine.

Tightening torque:
19 N·m (1.9 kgf-m, 14.0 ft-lb)
ST 18360AA020 HANGER

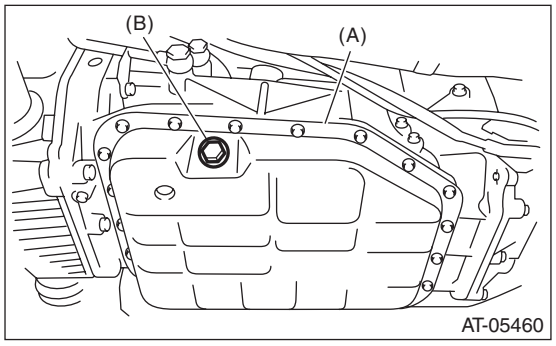


16) Lift up the vehicle.
17) Remove the under cover. <Ref. to EI-33, REMOVAL, Front Under Cover.>
18) Remove the front and rear exhaust pipes. <Ref. to EX(H6DO)-5, REMOVAL, Front Exhaust Pipe.> <Ref. to EX(H6DO)-8, REMOVAL, Rear Exhaust Pipe.>

19) Remove the heat shield cover.

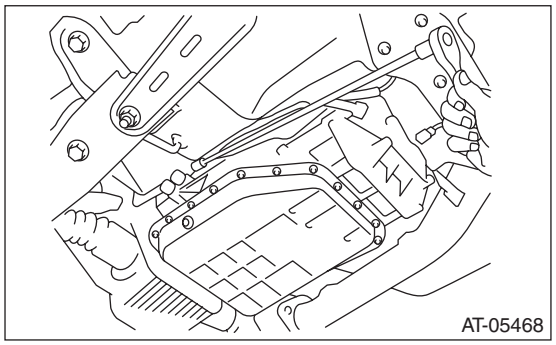


20) Remove the steering shaft universal joint. <Ref. to PS-20, REMOVAL, Universal Joint.>
21) Remove the ATF drain plug to drain ATF.

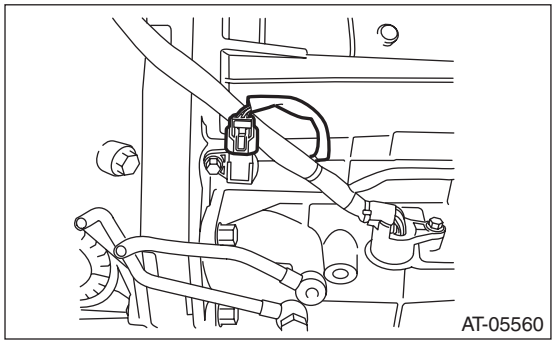


(A) Oil pan
(B) ATF drain plug

22) Remove the oil charge pipe.

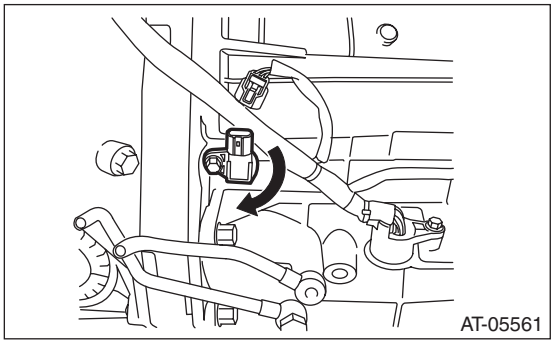


23) Disconnect the connector from turbine speed sensor 1.

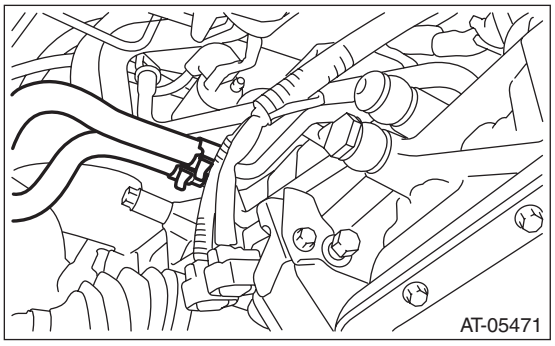


24) Remove the turbine speed sensor 1 mounting bolt and rotate the sensor by 180°.

CAUTION:
Failure to follow this procedure may cause the interference between vehicle body and sensor while removing/installing transmission, and resulting in damage.

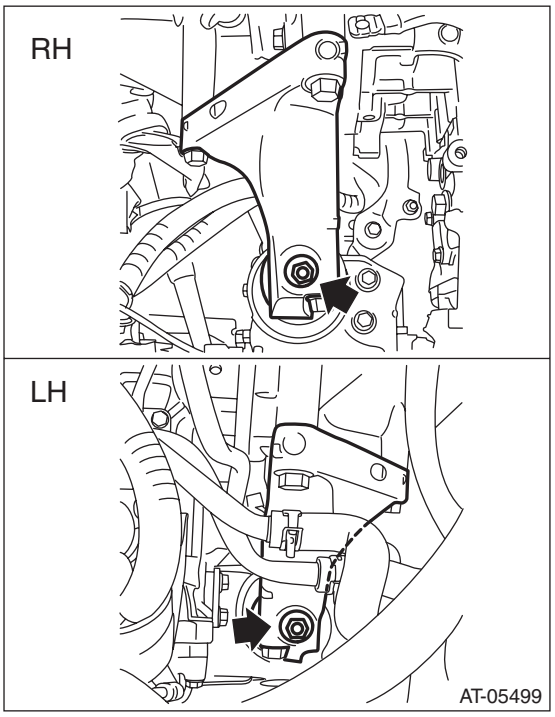


25) Remove the propeller shaft. <Ref. to DS-10, REMOVAL, Propeller Shaft.>
26) Remove the select cable. <Ref. to CS-46, REMOVAL, Select Cable.>
27) Disconnect the ATF AT inlet and outlet hoses from the ATF cooler inlet and outlet pipes.

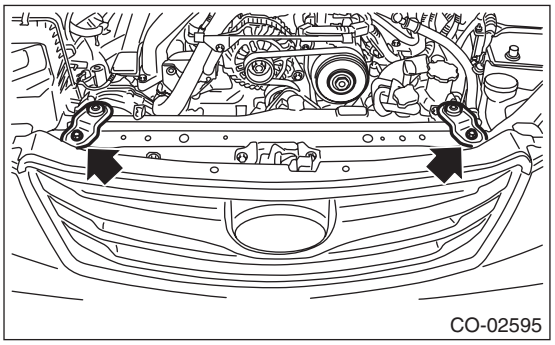


28) Remove the front stabilizer bracket. <Ref. to FS-29, REMOVAL, Front Stabilizer.>
29) Remove the bolts which secure front ball joint to the housing. <Ref. to FS-32, REMOVAL, Front Ball Joint.>
30) Pull out the drive shaft from transmission.
31) Lower the vehicle.

32) Remove the nuts connecting the engine mounting and the transmission main mounting bracket.

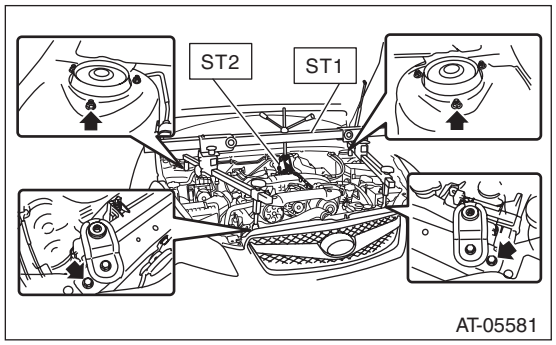


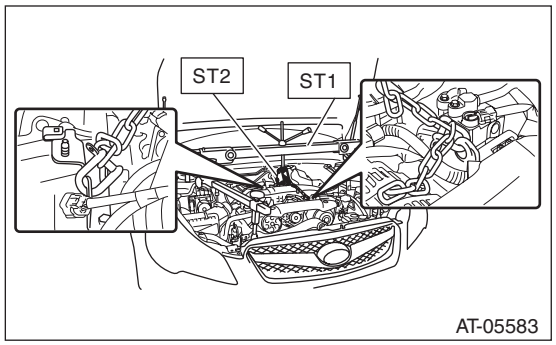
33) Remove the radiator upper brackets.



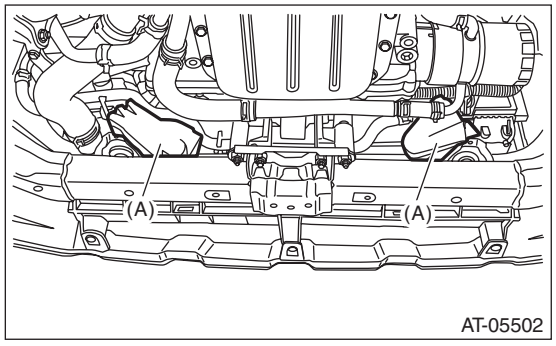
34) Set the ST on the vehicle.

CAUTION:
• Set the ST so that the chain does not contact the sensor and other parts while hanging the engine.
• Set the arms of ST (ENGINE HANGER) at the locations shown in the figure.
ST1 99099AJ000 ENGINE HANGER
ST2 99099AJ010 CHAIN BALANCER



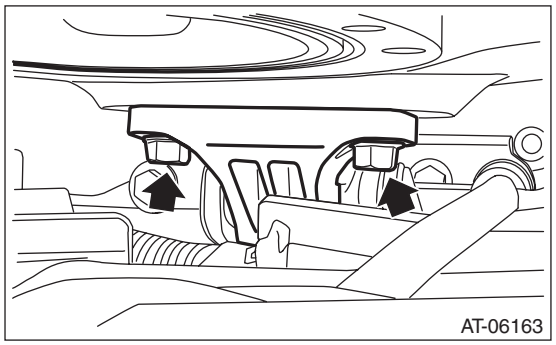


35) Lift up the radiator approximately by 30 mm (1.2 in) and keep the position with cloth or other material placed under the radiator.

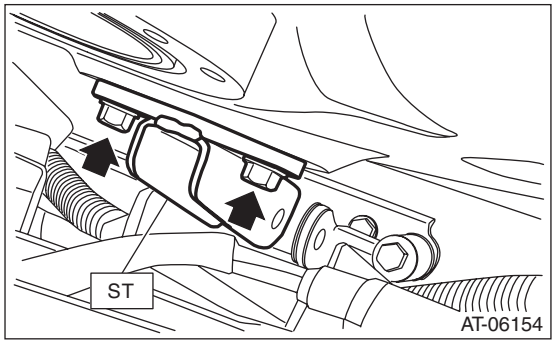


(A) Cloth

36) Lift the engine slightly and remove the engine mounting bolts.



37) Remove the engine mounting nut and bolt to remove the engine mounting.
38) Temporarily attach ST by using two bolts.
ST 41099AJ010 SPECIAL TOOL H6

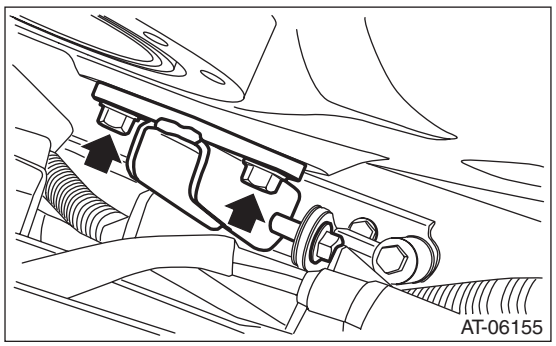


39) Lift up the engine unit high enough to install the bolt and nut to vehicle.

CAUTION:
• Do not lift up higher than enough level to install the ST to avoid damage to the hoses and pipes inside the engine room.
• Do not tighten the nuts excessively, or the engine mounting bracket may be deformed.

NOTE:
• If it is difficult to pull out the stud bolt from transmission mounting bracket, shake the engine unit slightly while lifting up.
40) Tighten the mounting bolts on the engine side.

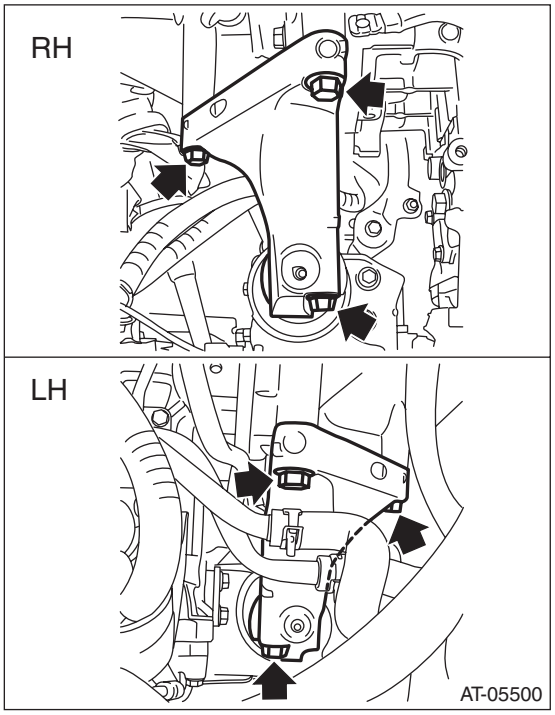
Tightening torque:
25 N·m (2.5 kgf-m, 18.4 ft-lb)



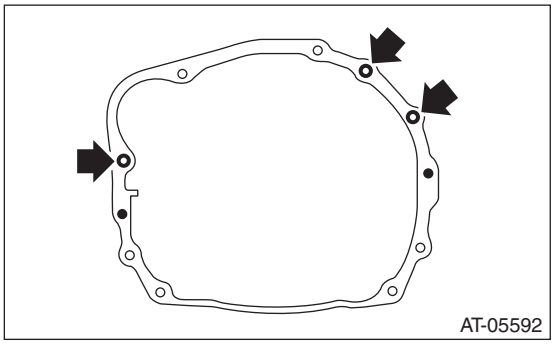
41) Remove the ST (ENGINE HANGER).

42) Remove the transmission main mounting bracket.

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

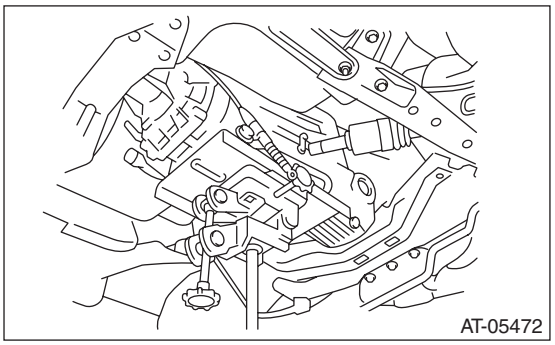


43) Remove the transmission mounting bolt (upper side).

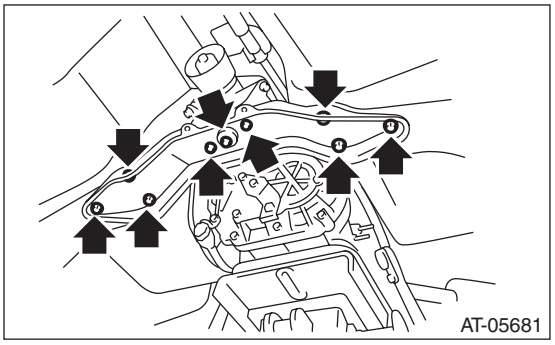


44) Set the ST (ENGINE HANGER) again to loosen the chain sling.
45) Lift up the vehicle.

46) Set the transmission jack under the transmission.



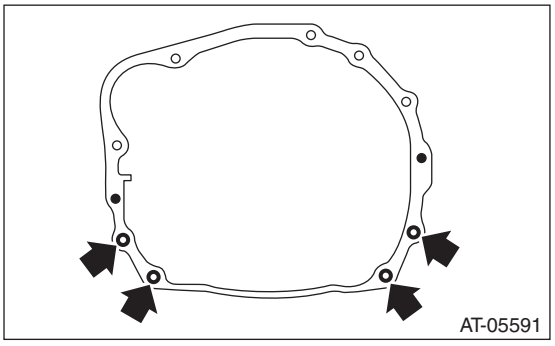
47) Remove the rear crossmember from the vehicle.



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

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

NOTE:
Lower the transmission rear end by approx. 80 mm (3.1 in) (reference).
49) Rotate the handle of ST (ENGINE HANGER) to apply tension to the chain sling.
50) Remove the transmission mounting bolt and nut (lower side).



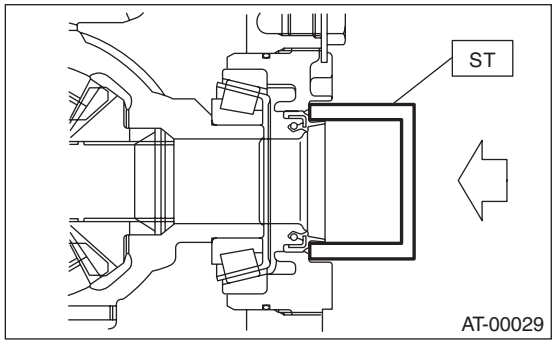
51) Remove the transmission.
52) Remove the cushion rubber from the transmission.

B: INSTALLATION

1) Replace the front differential side retainer oil seal.
   (1) Remove the oil seal by using flat tip screwdriver etc.
   (2) Using the ST, install the oil seal by lightly tapping with a plastic hammer.

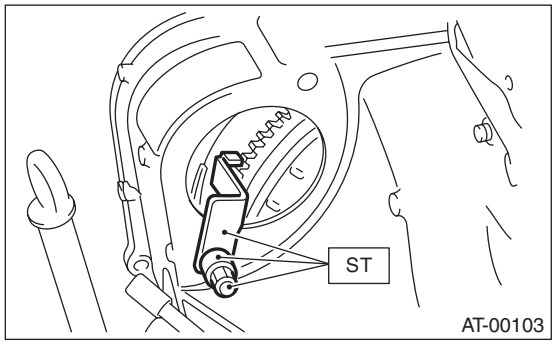
NOTE:
- Use a new oil seal.
- Check the identification marks (L, R) during installation not to mix up the oil seal RH and LH.
- Apply gear oil to the oil seal lips.
- Be sure to replace the differential side retainer oil seal whenever the front drive shaft is removed from the transmission.

ST 18675AA000 DIFFERENTIAL SIDE OIL SEAL INSTALLER



2) Attach the ST to converter case.

ST 498277200 STOPPER SET

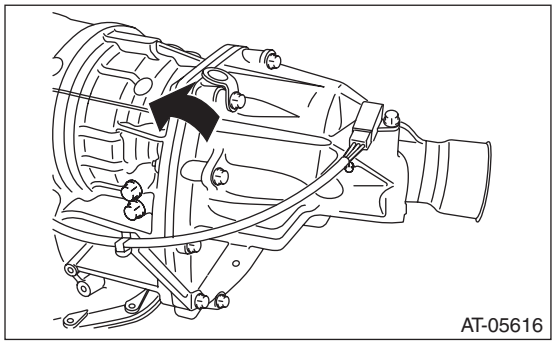


3) Install the cushion rubber on the transmission.

Tightening torque:
40 N·m (4.1 kgf-m, 29.5 ft-lb)

4) Tap the transmission hanger in the rear side of transmission with a rubber hammer to bend it until it is in close contact with the transmission case.

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



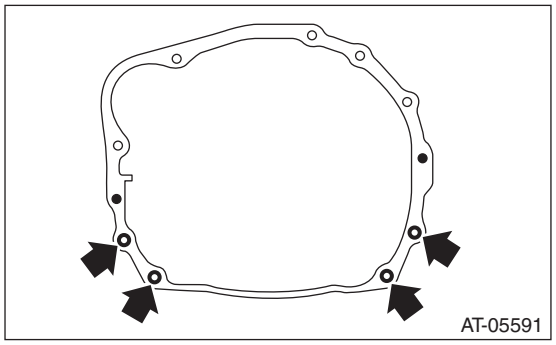
5) While lifting up the transmission gradually using transmission jack, install the transmission to the engine.

CAUTION:
This operation requires at least two persons.

NOTE:
Keep the engine level.

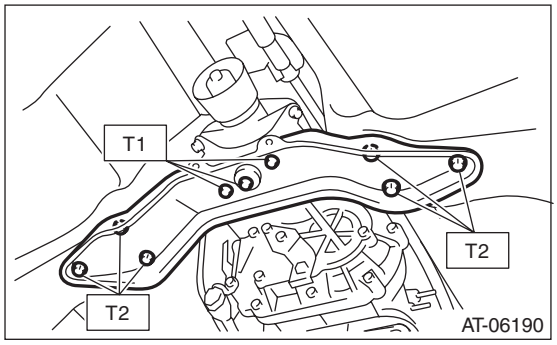
6) Install the engine mounting bolt and nut (lower side).

Tightening torque:
50 N·m (5.1 kgf-m, 36.9 ft-lb)



7) Install the transmission rear crossmember.

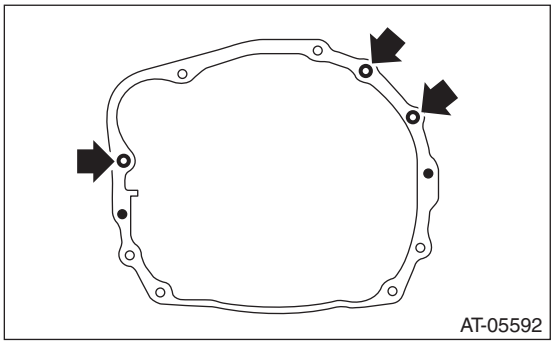
Tightening torque:
T1: 35 N·m (3.6 kgf-m, 25.8 ft-lb)
T2: 75 N·m (7.6 kgf-m, 55.3 ft-lb)



8) Remove the transmission jack.
9) Lower the vehicle.

10) Install the engine mounting bolt (upper side).

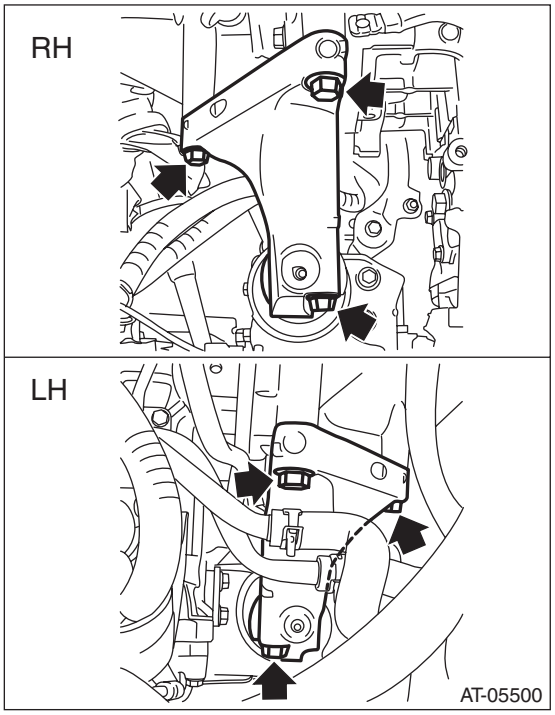
Tightening torque:
50 N·m (5.1 kgf-m, 36.9 ft-lb)



11) Remove the ST (ENGINE HANGER).
12) Install the transmission main mounting bracket.

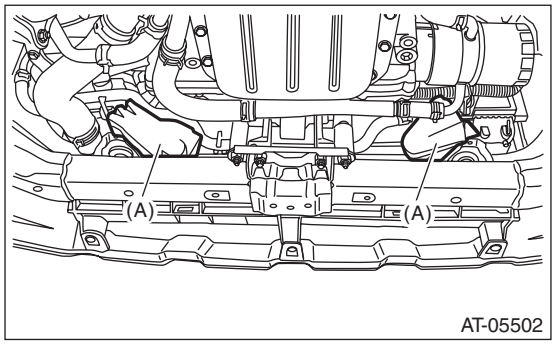
NOTE:
Install to the left side of vehicle first.

Tightening torque:
75 N·m (7.6 kgf-m, 55.3 ft-lb)



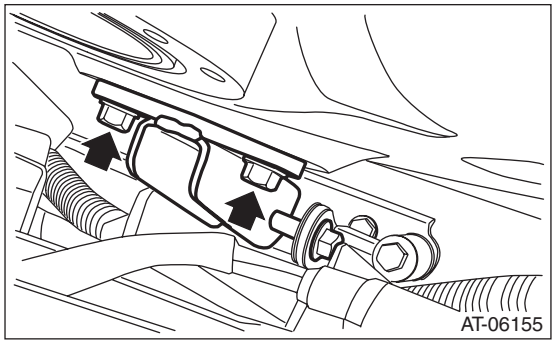
13) Attach the ST (ENGINE HANGER) again.

14) Remove the ST and install the front cushion rubber.
(1) Lift up the radiator approximately by 30 mm and keep the position with cloth or other material placed under the radiator.

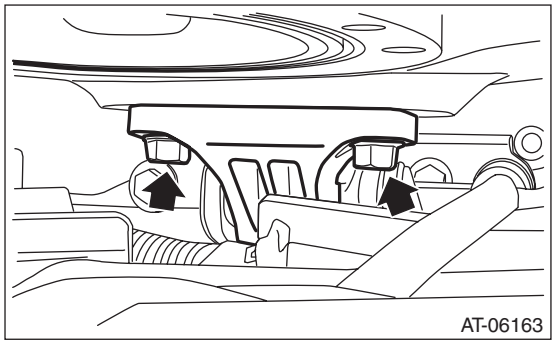


(A) Cloth

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



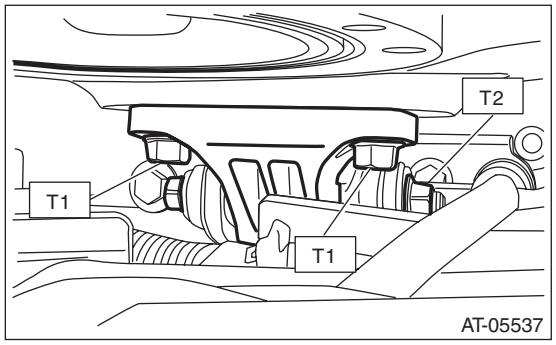
(3) Remove the bolt and nut to remove ST (SPECIAL TOOL H6).
(4) Temporarily attach the front cushion rubber with bolts.



(5) Install the bolt and nut to the front engine mounting.

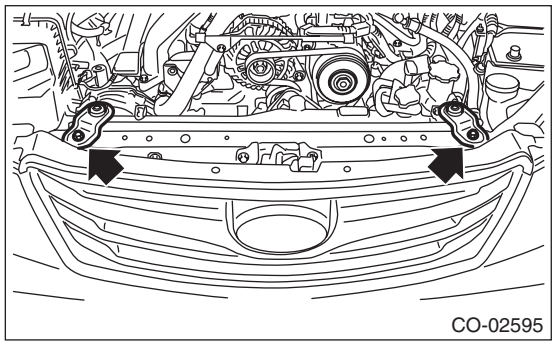
NOTE:
Always start tightening from the bolts on the engine side.

Tightening torque:
T1: 25 N·m (2.5 kgf-m, 18.4 ft-lb)
T2: 45 N·m (4.6 kgf-m, 33.2 ft-lb)



(6) Insert the lower radiator pin into the radiator lower cushion on the vehicle side, and install the radiator upper bracket.

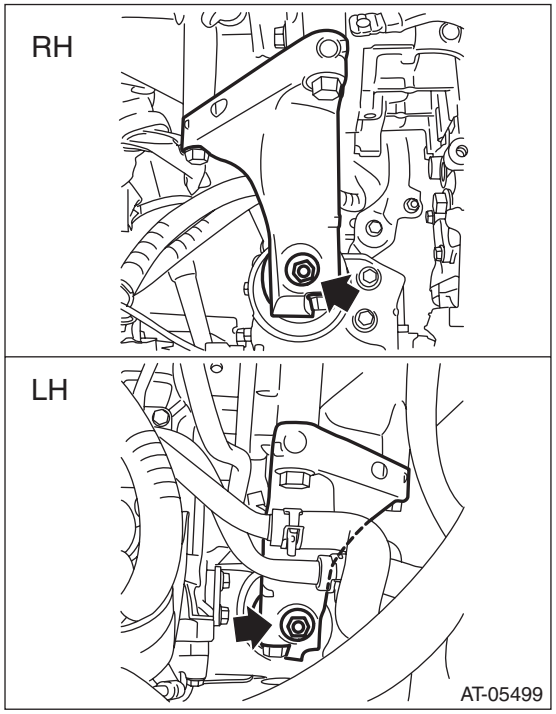
Tightening torque:
12 N·m (1.2 kgf-m, 8.9 ft-lb)



15) Remove the ST from the vehicle.

16) Tighten the nuts connecting the engine mounting and the transmission main mounting bracket.

Tightening torque:
45 N·m (4.6 kgf-m, 33.2 ft-lb)

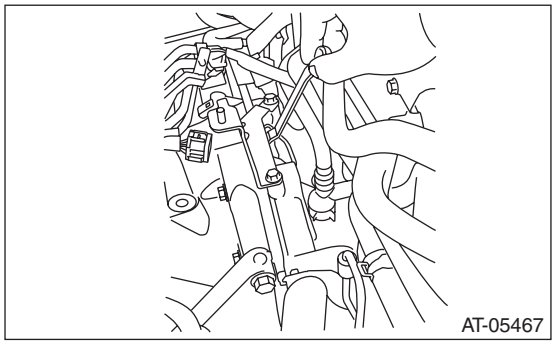


17) Remove the ST from converter case.
18) Install the torque converter to drive plate.

CAUTION:
• Be careful not to drop bolts into the converter housing.
• Be careful not to damage the mounting bolts.

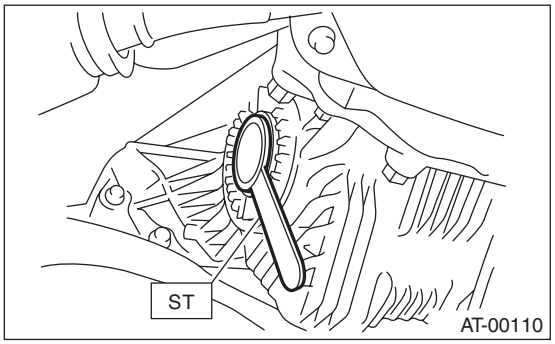
(1) Install the bolts which connect the torque converter and drive plate.
(2) Install all four bolts by rotating the crank pulley a little at a time.

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



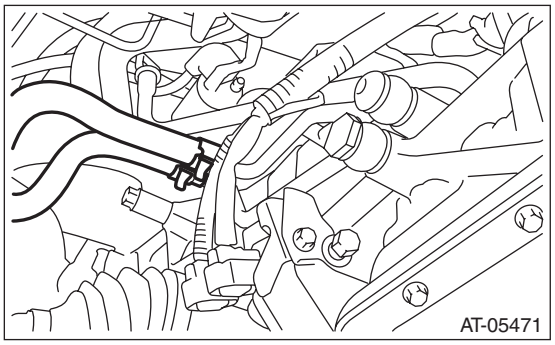
(3) Install the service hole plug.
19) Install the starter. <Ref. to SC(H6DO)-7, REMOVAL, Starter.>
20) Lift up the vehicle.

21) Set the ST to side retainer.
ST 28399SA010 OIL SEAL PROTECTOR



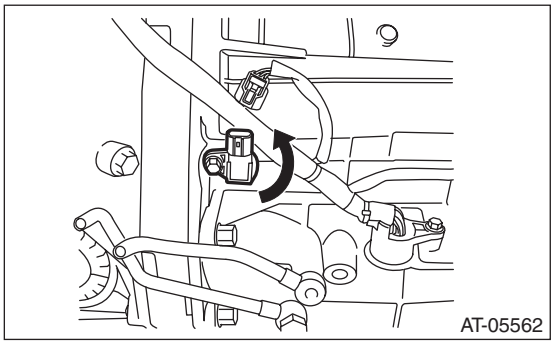
22) Install the front drive shaft into the transmission. <Ref. to DS-49, INSTALLATION, Front Drive Shaft.>
23) Connect the ATF AT inlet and outlet hoses to the ATF cooler inlet and outlet pipes.

NOTE:
Use a new ATF hose.



24) Insert the ball joint into housing. <Ref. to FS-33, INSTALLATION, Front Ball Joint.>
25) Install the front stabilizer bracket. <Ref. to FS-31, INSTALLATION, Front Stabilizer.>
26) Install the propeller shaft. <Ref. to DS-11, INSTALLATION, Propeller Shaft.>
27) Install the select cable. <Ref. to CS-50, INSTALLATION, Select Cable.>
28) Rotate the turbine speed sensor 1 by 180° and then restore it to the original position to install. Then, connect the connector.

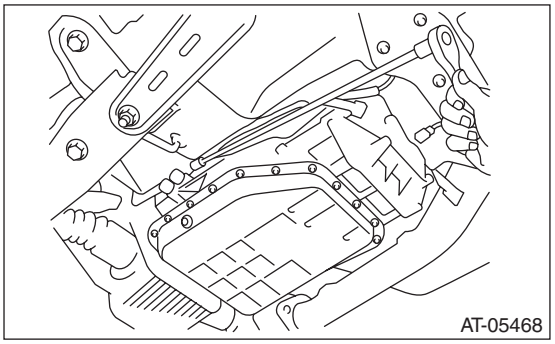
Tightening torque:
7 N·m (0.7 kgf-m, 5.2 ft-lb)



29) Install the oil charge pipe.

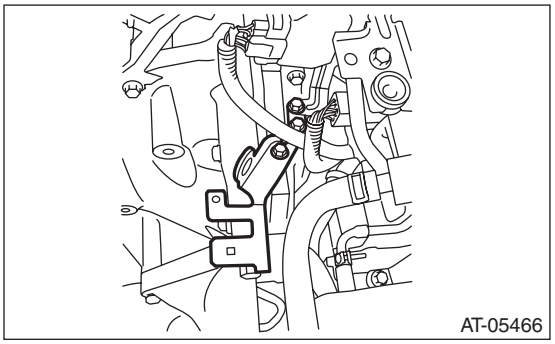
NOTE:
Use new bolts and O-rings.

Tightening torque:
38 N·m (3.9 kgf-m, 28.0 ft-lb)

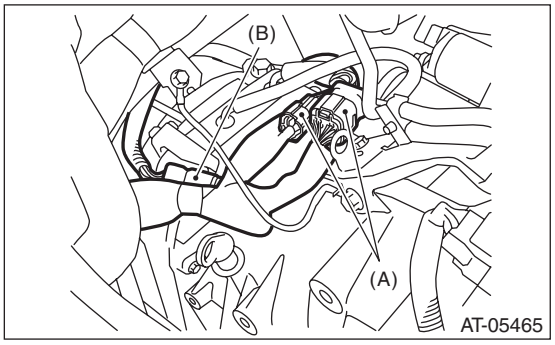


30) Install the steering shaft universal joint. <Ref. to PS-21, INSTALLATION, Universal Joint.>
31) Install the heat shield cover. <Ref. to EI-174, INSTALLATION, Heat Shield Cover.>
32) Install the front and rear exhaust pipe. <Ref. to EX(H6DO)-6, INSTALLATION, Front Exhaust Pipe.> <Ref. to EX(H6DO)-8, INSTALLATION, Rear Exhaust Pipe.>
33) Install the under cover. <Ref. to EI-33, INSTALLATION, Front Under Cover.>
34) Lower the vehicle.
35) Remove the ST and install the engine hanger rear.

Tightening torque:
19 N·m (1.9 kgf-m, 14.0 ft-lb)



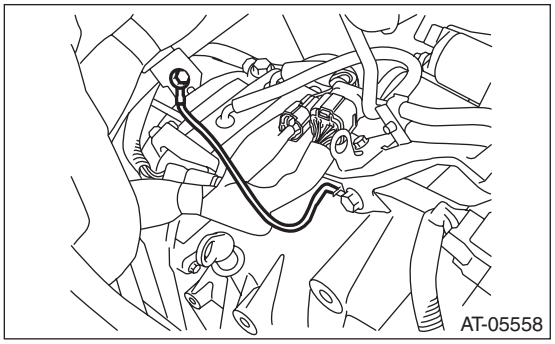
36) Connect the following connectors.



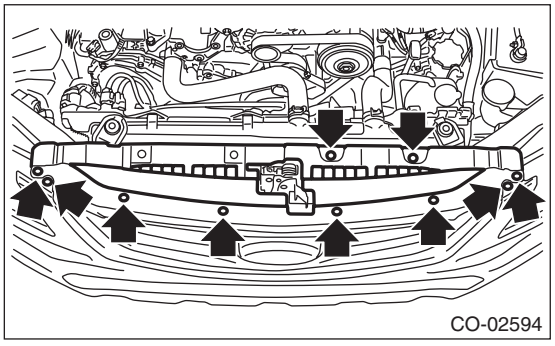
(A) Transmission harness connectors
(B) Front oxygen (A/F) sensor

37) Install the transmission radio ground terminal.

Tightening torque:
13 N·m (1.3 kgf-m, 9.6 ft-lb)



38) Pour ATF from the oil charge pipe. <Ref. to 5AT-28, Automatic Transmission Fluid.>
39) Install the air breather hose. <Ref. to 5AT-60, INSTALLATION, Air Breather Hose.>
40) Install the air intake boot. <Ref. to IN(H6DO)-7, INSTALLATION, Air Intake Boot.>
41) Attach the grille bracket.



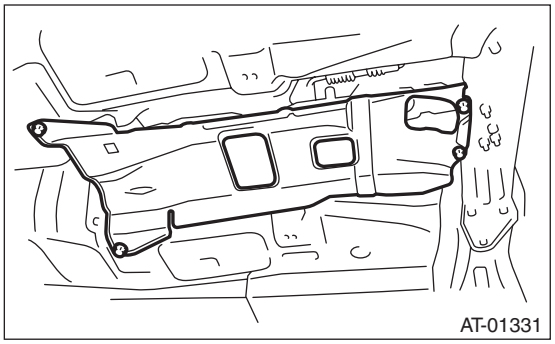
42) Install the air intake duct. <Ref. to IN(H6DO)-8, INSTALLATION, Air Intake Duct.>
43) Install the collector cover.
44) Connect the battery ground terminal.
45) Check the ATF level. <Ref. to 5AT-28, INSPECTION, Automatic Transmission Fluid.>
46) Perform Clear Memory 2 operation. <Ref. to 5AT(diag)-21, Clear Memory Mode.>
47) Perform the diagnosis again. <Ref. to 5AT(diag)-23, Learning Control.>
48) Perform the inspection at the end of repair work, and make sure there is no faulty as below;
- Excessive shift shock
- Oil leakage from the transmission body, etc.
- Occurrence of noise caused by interference etc.

10.Transmission Mounting System

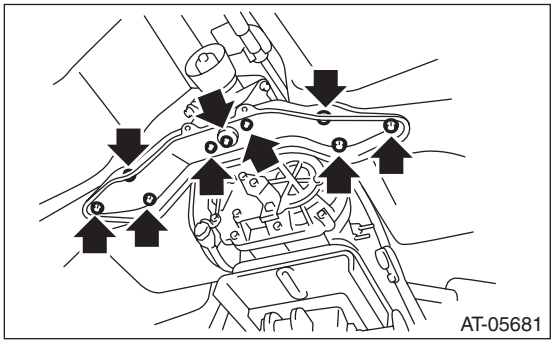
A: REMOVAL

1. TRANSMISSION REAR CROSSMEMBER & REAR CUSHION RUBBER

1) Disconnect the ground cable from battery.
2) Lift up the vehicle.
3) Remove the under cover. <Ref. to EI-33, REMOVAL, Front Under Cover.>
4) Remove the front exhaust pipe. <Ref. to EX(H6DO)-5, REMOVAL, Front Exhaust Pipe.>
5) Remove the heat shield cover.


AT-01331

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


AT-05681

8) Remove the rear cushion rubber.

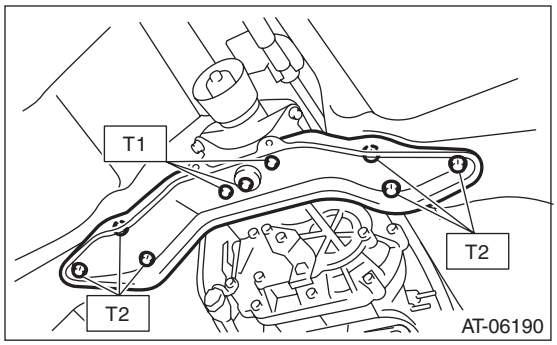
B: INSTALLATION

1. TRANSMISSION REAR CROSSMEMBER & 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 crossmember.

Tightening torque:
T1: 35 N·m (3.6 kgf-m, 25.8 ft-lb)
T2: 75 N·m (7.6 kgf-m, 55.3 ft-lb)



3) Remove the transmission jack.
4) Install the heat shield cover. <Ref. to EI-174, INSTALLATION, Heat Shield Cover.>
5) Install the front exhaust pipe. <Ref. to EX(H6DO)-6, INSTALLATION, Front Exhaust Pipe.>
6) Install the under cover. <Ref. to EI-33, INSTALLATION, Front Under Cover.>
7) Lower the vehicle.
8) Connect the battery ground terminal.

C: INSPECTION

Repair or replace parts if the results of the inspection below are not satisfied.

1. TRANSMISSION REAR CROSSMEMBER & REAR CUSHION RUBBER

Check crossmember for bends or damage. Check that there are no cracks, hardening, or damage on cushion rubbers.

11.Extension Case Oil Seal

A: INSPECTION

Inspect there is no ATF leakage from the joint of transmission and propeller shaft. If a leak is found, replace the oil seal. <Ref. to 5AT-47, REPLACEMENT, Extension Case Oil Seal.>

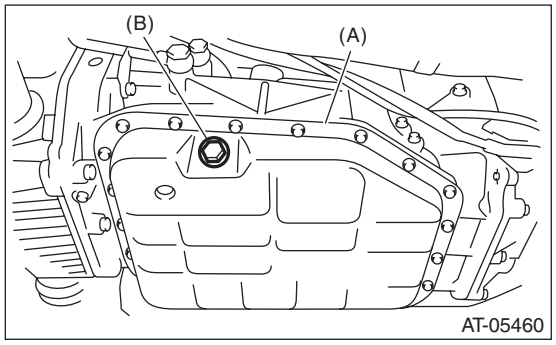
B: REPLACEMENT

1) Lift up the vehicle.
2) Clean the transmission exterior.
3) Remove the ATF drain plug to drain ATF.

CAUTION:
• Directly after the vehicle has been running or the engine has been long idle running, the ATF is hot. Be careful not to burn yourself.
• Be careful not to spill the ATF on the exhaust pipe to prevent it from emitting smoke or causing fire. If ATF is spilled on the exhaust pipe, wipe it off completely.
4) Tighten the ATF drain plug.

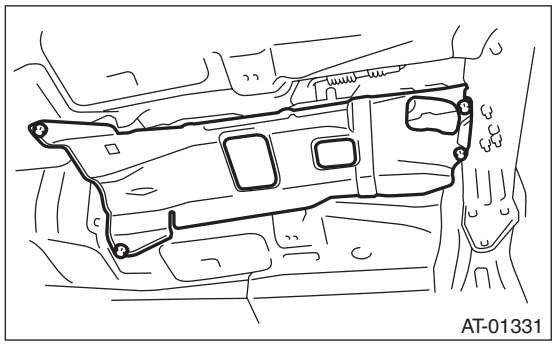
NOTE:
Use a new gasket.

Tightening torque:
20 N·m (2.0 kgf-m, 14.8 ft-lb)



(A) Oil pan
(B) ATF drain plug

5) Remove the rear exhaust pipe. <Ref. to EX(H6DO)-8, REMOVAL, Rear Exhaust Pipe.>
6) Remove the heat shield cover.



7) Remove the propeller shaft. <Ref. to DS-10, REMOVAL, Propeller Shaft.>
8) Using the ST, remove the oil seal.
ST 398527700 PULLER ASSY
9) Using the ST, install the oil seal.
ST 498057300 INSTALLER
10) Install the propeller shaft. <Ref. to DS-11, INSTALLATION, Propeller Shaft.>
11) Install the heat shield cover. <Ref. to EI-174, INSTALLATION, Heat Shield Cover.>
12) Install the rear exhaust pipe. <Ref. to EX(H6DO)-8, INSTALLATION, Rear Exhaust Pipe.>
13) Lower the vehicle.
14) Pour ATF from the oil charge pipe. <Ref. to 5AT-28, Automatic Transmission Fluid.>
15) Check the level and leaks of the ATF. <Ref. to 5AT-28, INSPECTION, Automatic Transmission Fluid.>

12. Differential Side Retainer Oil Seal

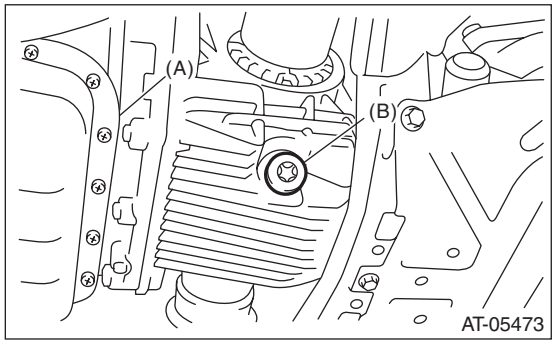
A: INSPECTION

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

B: REPLACEMENT

1) Disconnect the ground cable from battery.
2) Lift up the vehicle.
3) Remove the under cover. <Ref. to EI-33, REMOVAL, Front Under Cover.>
4) Remove the front exhaust pipe. <Ref. to EX(H6DO)-5, REMOVAL, Front Exhaust Pipe.>
5) Drain the differential gear oil by removing drain plug using TORX® bit T70.

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.



(A) Oil pan
(B) Drain plug

6) Tighten the drain plug.

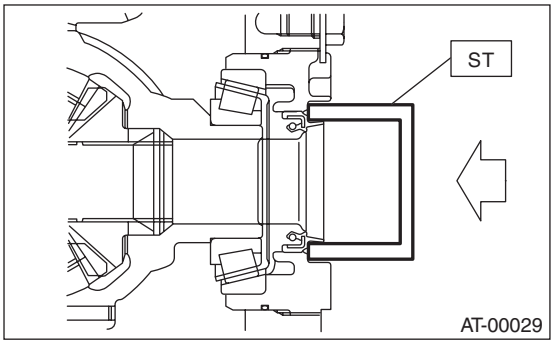
NOTE:
Use a new gasket.

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

7) Separate the front drive shaft from the transmission. <Ref. to DS-48, REMOVAL, Front Drive Shaft.>
8) Remove the differential side retainer oil seal using driver wrapped with vinyl tape etc.
9) Using the ST, install the differential side retainer oil seal by lightly tapping with a plastic hammer.

NOTE:
• Use a new oil seal.
• Apply differential gear oil to the oil seal lip.
• Check the identification marks (L, R) during installation not to mix up the oil seal RH and LH.

ST 18675AA000 DIFFERENTIAL SIDE OIL SEAL INSTALLER



10) Install the front drive shaft. <Ref. to DS-49, INSTALLATION, Front Drive Shaft.>
11) Install the front exhaust pipe. <Ref. to EX(H6DO)-6, INSTALLATION, Front Exhaust Pipe.>
12) Install the under cover. <Ref. to EI-33, INSTALLATION, Front Under Cover.>
13) Lower the vehicle.
14) Connect the battery ground terminal.
15) Pour differential gear oil into the level gauge hole. <Ref. to 5AT-30, Differential Gear Oil.>
16) Check the level of differential gear oil. <Ref. to 5AT-30, INSPECTION, Differential Gear Oil.>

13.Inhibitor Switch

A: INSPECTION

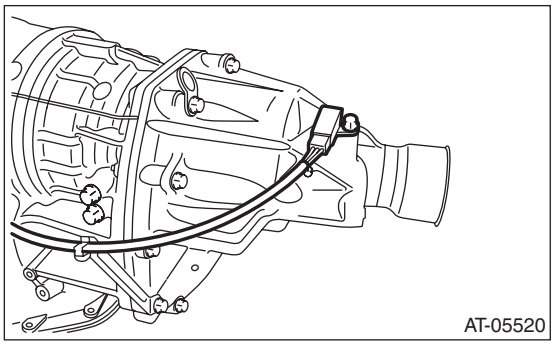
Inhibitor switch cannot be checked, because the inhibitor switch is installed on control valve assembly. When a malfunction occurs, refer to 5AT (diag) section. <Ref. to 5AT(diag)-36, DTC P0705 TRANSMISSION RANGE SENSOR CIRCUIT (PRNDL INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

14.Front Vehicle Speed Sensor

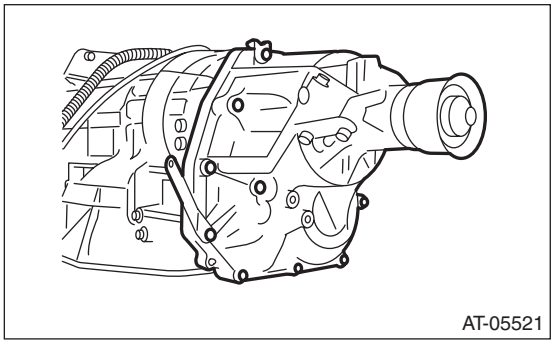
A: REMOVAL

1) Remove the transmission assembly from the vehicle. <Ref. to 5AT-36, REMOVAL, Automatic Transmission Assembly.>
2) Disconnect the rear vehicle speed sensor connector.

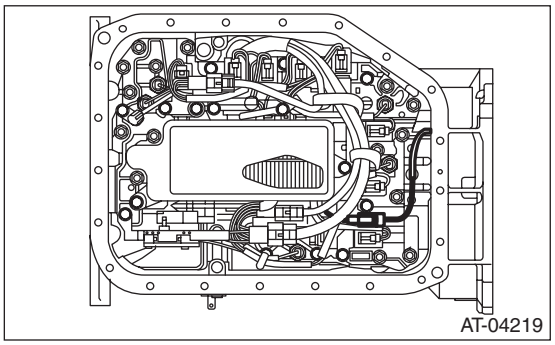
NOTE:
Secure the transmission harness to the transmission body using wire etc.


AT-05520

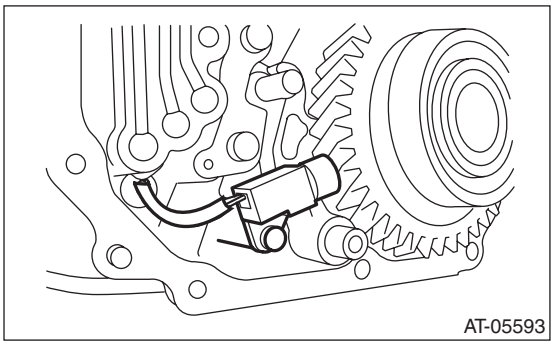
3) Remove the extension case.


AT-05521

4) Remove the center differential carrier. <Ref. to 5AT-73, REMOVAL, Center Differential Carrier.>
5) Lay along the transmission case, and then remove the oil pan.
6) Remove the old gasket on the oil pan and transmission case completely.
7) Disconnect the front vehicle speed sensor connector.


AT-04219

8) Remove the front vehicle speed sensor securing bolt.

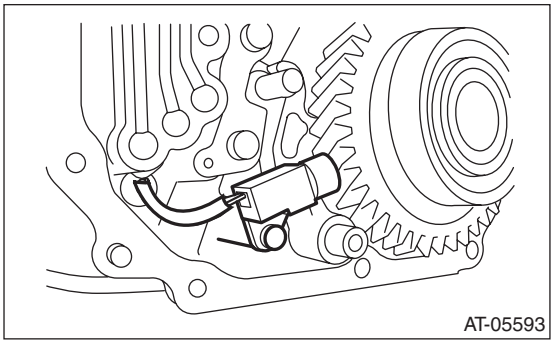

AT-05593

9) Remove the front vehicle speed sensor through the hole of AT transmission main case.

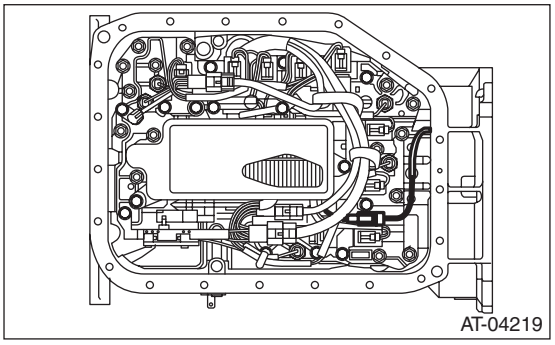
B: INSTALLATION

1) Install the front vehicle speed sensor.

Tightening torque:
7 N·m (0.7 kgf-m, 5.2 ft-lb)

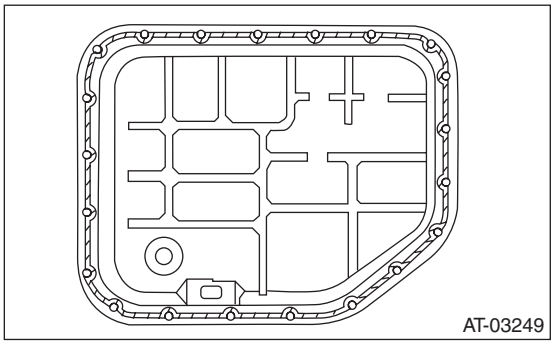

AT-05593

2) Connect the front vehicle speed sensor connector.


AT-04219

3) Apply proper amount of liquid gasket to the entire oil pan mating surface.

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



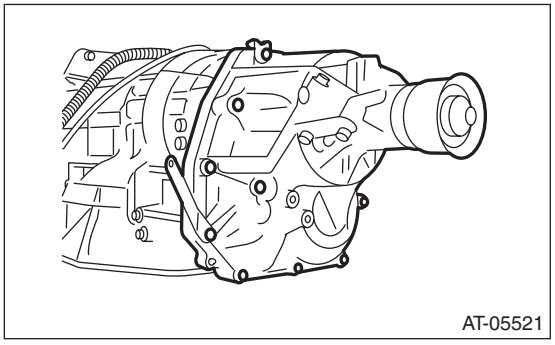
4) Install the oil pan by equally tightening the bolts.

Tightening torque:
5 N·m (0.5 kgf-m, 3.7 ft-lb)

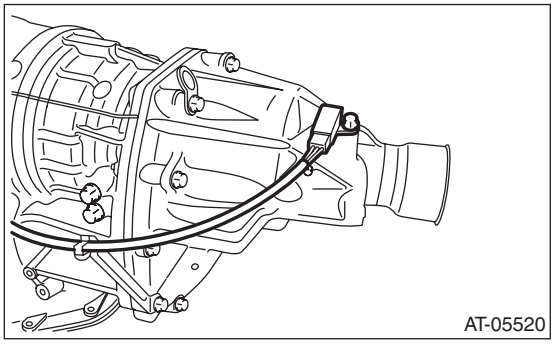
5) Install the center differential carrier. <Ref. to 5AT-73, INSTALLATION, Center Differential Carrier.>
6) Install the extension case.

NOTE:
Use a new gasket.

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



7) Connect the rear vehicle speed sensor connector.

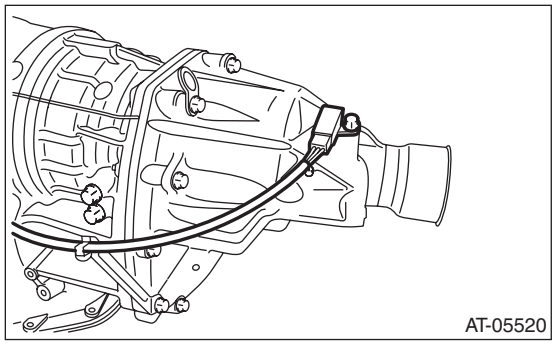


8) Install the transmission assembly to the vehicle. <Ref. to 5AT-41, INSTALLATION, Automatic Transmission Assembly.>
9) Pour ATF from the oil charge pipe. <Ref. to 5AT-28, Automatic Transmission Fluid.>
10) Check the level and leaks of ATF. <Ref. to 5AT-28, INSPECTION, Automatic Transmission Fluid.>

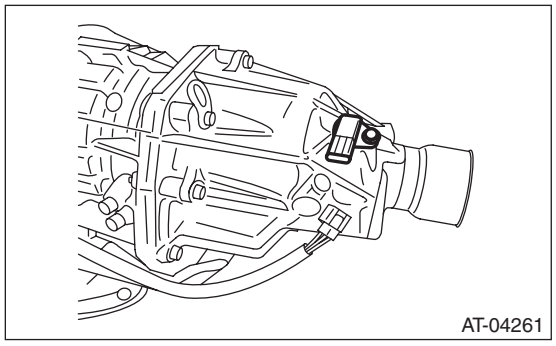
15.Rear Vehicle Speed Sensor

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Lift up the vehicle.
3) Clean the transmission exterior.
4) Remove the bolts which connect the front exhaust pipe and rear exhaust pipe.
5) Remove the bolts holding the heat shield cover, and move the heat shield cover to the rear.
6) Disconnect the rear vehicle speed sensor connector.



7) Remove the rear vehicle speed sensor.

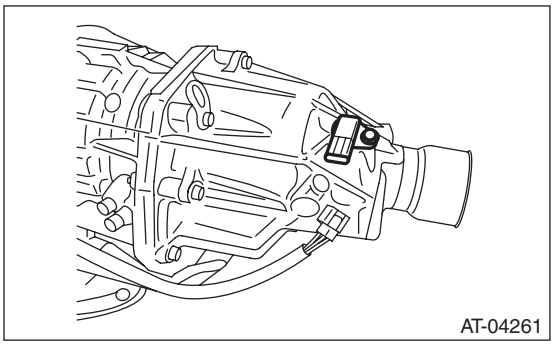


B: INSTALLATION

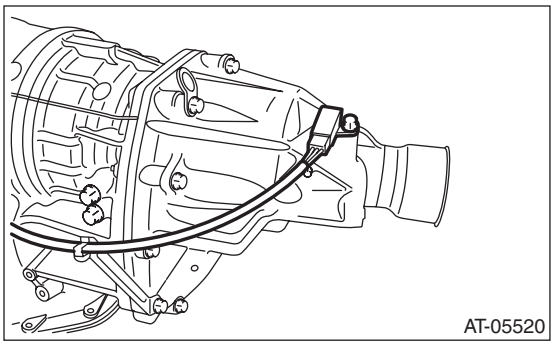
1) Install the rear vehicle speed sensor.

NOTE:
Use new O-rings.

Tightening torque:
7 N·m (0.7 kgf-m, 5.2 ft-lb)



2) Connect the rear vehicle speed sensor connector.



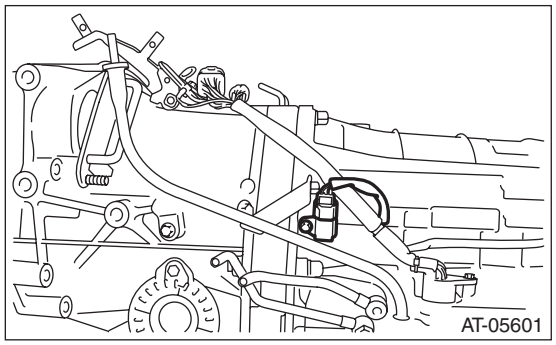
3) Install the heat shield cover. <Ref. to EI-174, INSTALLATION, Heat Shield Cover.>
4) Tighten the bolts which connect the front exhaust pipe and rear exhaust pipe.

Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)
5) Lower the vehicle.

16.Turbine Speed Sensor 1

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Lift up the vehicle.
3) Remove the front exhaust pipe. <Ref. to EX(H6DO)-5, REMOVAL, Front Exhaust Pipe.>
4) Disconnect the turbine speed sensor 1 connector.



5) Remove the turbine speed sensor 1.

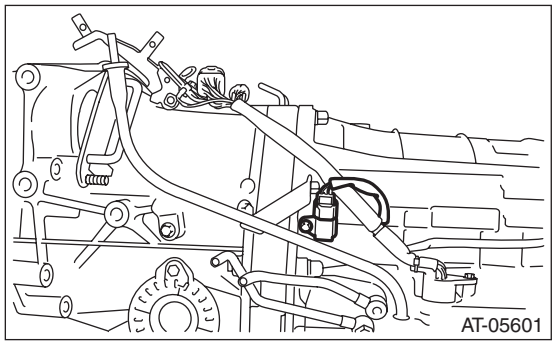
B: INSTALLATION

1) Install the turbine speed sensor 1.

NOTE:
Use new O-rings.

Tightening torque:
7 N·m (0.7 kgf-m, 5.2 ft-lb)

2) Connect the turbine speed sensor 1 connector.



3) Install the front exhaust pipe. <Ref. to EX(H6DO)-6, INSTALLATION, Front Exhaust Pipe.>
4) Lower the vehicle.
5) Connect the battery ground terminal.

17.Control Valve Body

A: REMOVAL

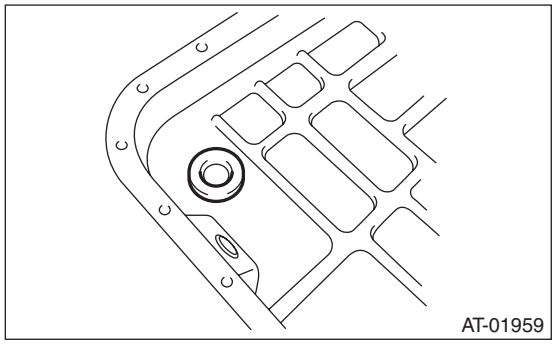
1) Disconnect the ground cable from battery.
2) Lift up the vehicle.
3) Clean the transmission exterior.
4) Remove the ATF drain plug to drain ATF.

CAUTION:
Directly after the vehicle has been running or the engine has been long idle running, the ATF is hot. Be careful not to burn yourself.
5) Tighten the ATF drain plug.

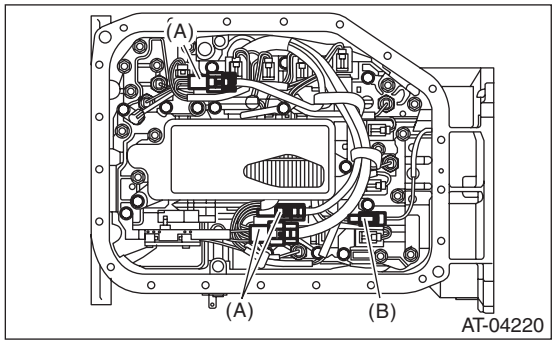
NOTE:
Use a new gasket.

Tightening torque:
20 N·m (2.0 kgf-m, 14.8 ft-lb)
6) Remove the oil pan.

CAUTION:
Be sure to prevent the entering of dust and other foreign matters into oil pan.
7) Remove the magnet.



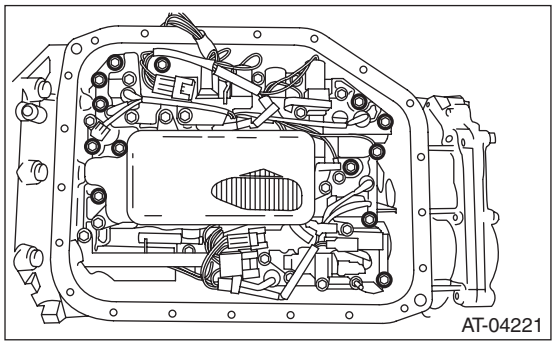
8) Clean the magnet.
9) Completely remove the remaining liquid gasket on the transmission case and oil pan.
10) Disconnect the control valve connector and front vehicle speed sensor connector.



(A) Control valve connector
(B) Front vehicle speed sensor connector

11) Remove the control valve body.

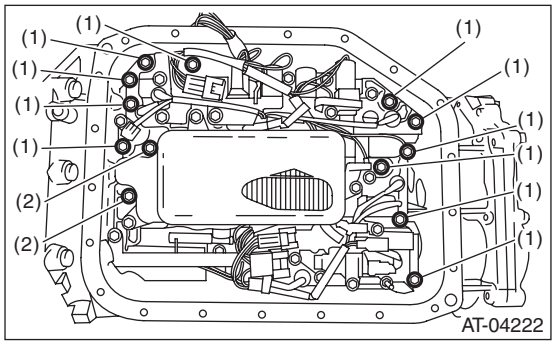
NOTE:
The control valve body is replaced as an assembly only, because it is a non-disassembly part.



B: INSTALLATION

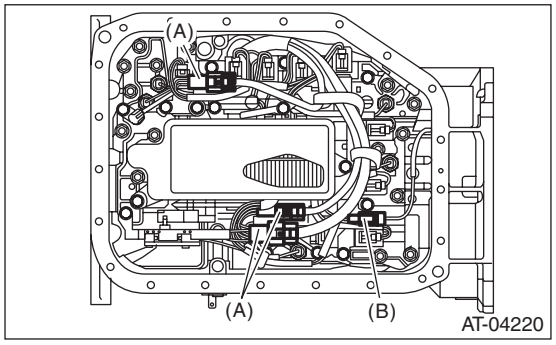
1) Check the control valve body for dust and other foreign matter.
2) Install the control valve body to transmission by equally tightening the bolts.

Tightening torque:
8 N·m (0.8 kgf-m, 5.9 ft-lb)



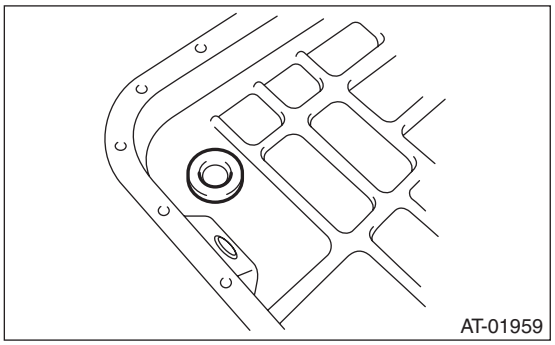
(1) 30 mm (1.18 in)
(2) 40 mm (1.57 in)

3) Connect the control valve connector and front vehicle speed sensor connector.



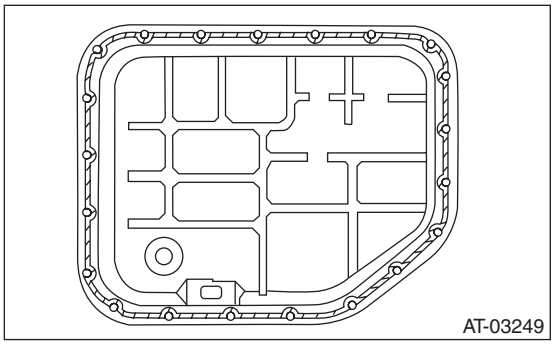
(A) Control valve connector
(B) Front vehicle speed sensor connector

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



5) Apply liquid gasket to the oil pan.

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



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

Tightening torque:
5 N·m (0.5 kgf-m, 3.7 ft-lb)

7) Lower the vehicle.
8) Connect the ground cable to battery.
9) Pour ATF through the oil charge pipe. <Ref. to 5AT-28, Automatic Transmission Fluid.>
10) Check the ATF level. <Ref. to 5AT-28, INSPECTION, Automatic Transmission Fluid.>
11) Perform Clear Memory 2 operation. <Ref. to 5AT(diag)-21, Clear Memory Mode.>
12) Perform learning operation. <Ref. to 5AT(diag)-23, Learning Control.>
13) Perform the inspection at the end of repair work, and make sure there is no faulty as below;

- Excessive shift shock
- Oil leakage from the transmission body, etc.
- Occurrence of noise caused by interference etc.

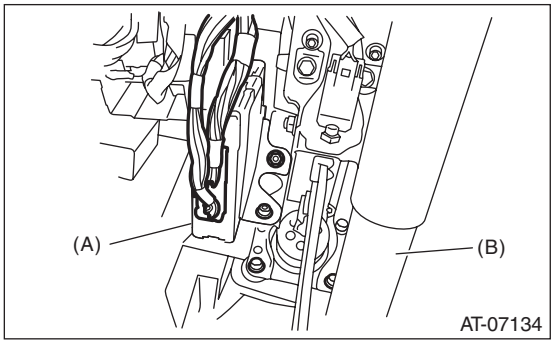
C: INSPECTION

Check each parts for holes, damages or other foreign matters.

18.Transmission Control Module (TCM)

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the instrument panel lower cover. <Ref. to EI-63, REMOVAL, Instrument Panel Lower Cover.>
3) Disconnect the connector from TCM.



(A) Transmission control module (TCM)
(B) Steering column

4) Remove the TCM.

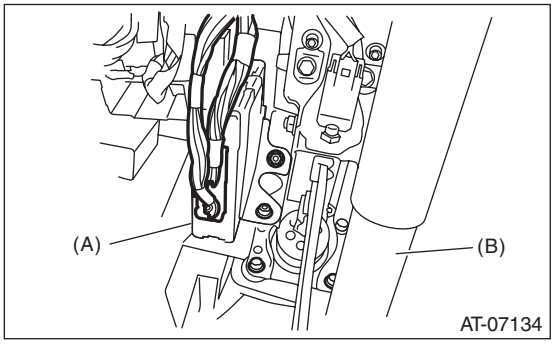
NOTE:
Replace the TCM and bracket as a set.

B: INSTALLATION

1) Install the TCM to the bracket.

CAUTION:
Do not remove the TCM after installed to the bracket, or the bracket and TCM may be damaged. If installed by mistake, the part must be replaced with a new part.
2) Install the TCM.

Tightening torque:
7.5 N·m (0.8 kgf-m, 5.5 ft-lb)



(A) Transmission control module (TCM)
(B) Steering column

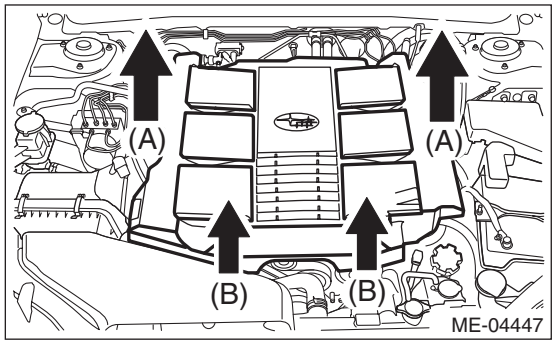
3) Connect the connector to TCM.
4) Install the instrument panel lower cover. <Ref. to EI-64, INSTALLATION, Instrument Panel Lower Cover.>
5) Perform Clear Memory 2 operation. <Ref. to 5AT(diag)-21, Clear Memory Mode.>
6) Perform the diagnosis again. <Ref. to 5AT(diag)-23, Learning Control.>

19.ATF Cooler Pipe and Hose

A: REMOVAL

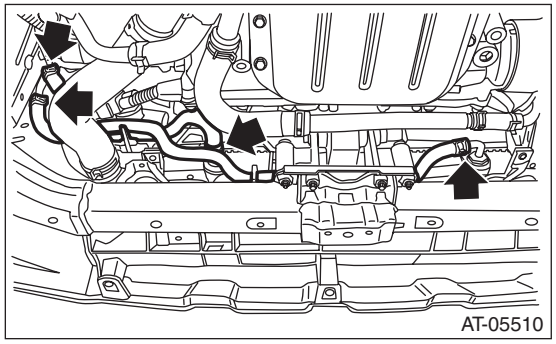
1) Remove the collector cover.

NOTE:
Follow the steps below when removing the collector cover.
(1) Pull up the two points at the rear (A).
(2) Pull up the two points at the front (B) while moving them forward.



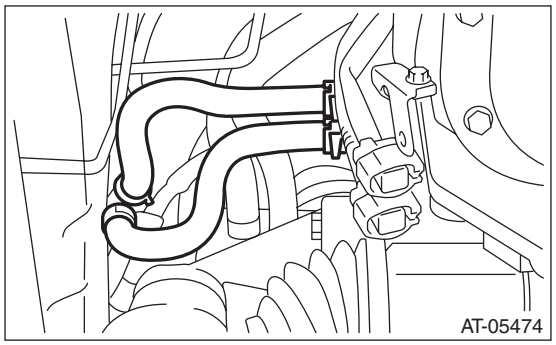
2) Remove the battery.
3) Lift up the vehicle.
4) Remove the under cover. <Ref. to EI-33, REMOVAL, Front Under Cover.>
5) Remove the front exhaust pipe. <Ref. to EX(H6DO)-5, REMOVAL, Front Exhaust Pipe.>
6) Disconnect the ATF radiator inlet and outlet hoses from the radiator.

NOTE:
• Do not use a screwdriver or other pointed tools.
• If it is hard to remove the ATF radiator hose, wrap the hose with cloth to protect it from damage, turn it with pliers, and pull it straight out by hand.



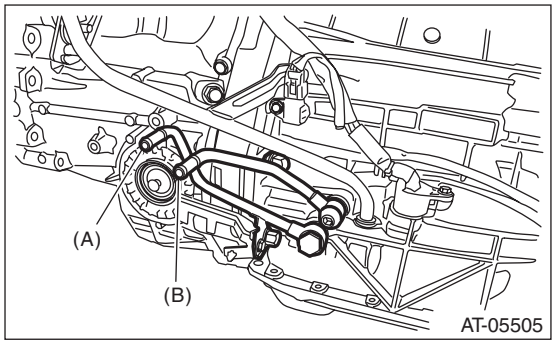
7) Disconnect the ATF AT inlet and outlet hoses from the ATF cooler pipe.

NOTE:
• Do not use a screwdriver or other pointed tools.
• If it is hard to remove the ATF AT hose, wrap the hose with cloth to protect it from damage, turn it with pliers, and pull it straight out by hand.



8) Remove the oil charge pipe. <Ref. to 5AT-61, REMOVAL, Oil Charge Pipe.>
9) Remove the ATF cooler inlet pipe and outlet pipe from the transmission.

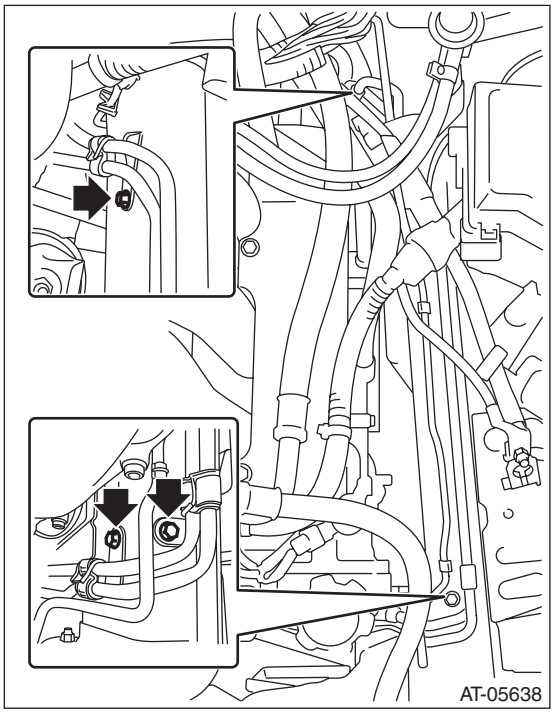
NOTE:
When disconnecting the ATF cooler outlet pipe, be careful not to lose the ball and spring used together with the retaining screw.



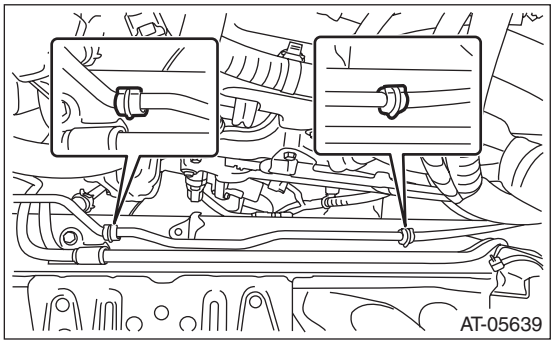
(A) ATF cooler outlet pipe
(B) ATF cooler inlet pipe

10) Lower the vehicle.

11) Remove the ATF cooler pipe assembly mounting bolt.



12) Remove the engine coolant reservoir tank. <Ref. to CO(H6DO)-25, REMOVAL, Reservoir Tank.>
13) Detach the A/C pipe from clip.



14) Remove the ATF cooler pipe from frame.

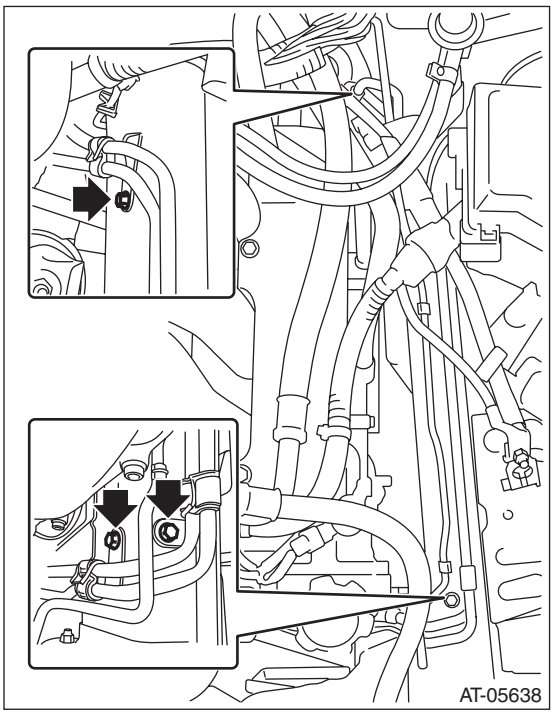
CAUTION:
Be careful not to bend A/C pipe.

B: INSTALLATION

1) Install the ATF cooler pipe to frame.

CAUTION:
Be careful not to bend the A/C pipe, when installing the ATF cooler pipe.

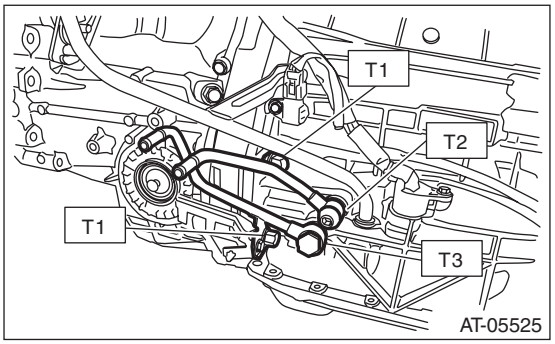
Tightening torque:
7.5 N·m (0.8 kgf-m, 5.5 ft-lb)



2) Install the A/C pipe to clip.
3) Install the engine coolant reservoir tank. <Ref. to CO(H6DO)-25, INSTALLATION, Reservoir Tank.>
4) Lift up the vehicle.
5) Install the ATF cooler inlet and outlet pipes with new gaskets.

NOTE:
Use a new bolt for the converter case joint.

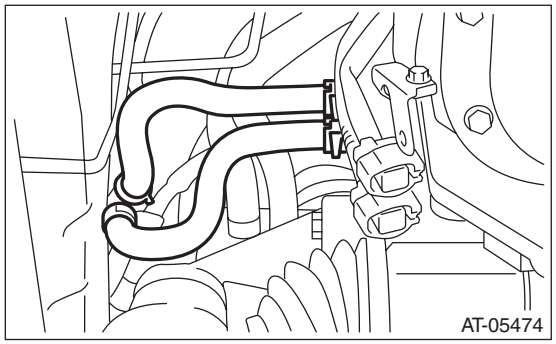
Tightening torque:
T1: 38 N·m (3.9 kgf-m, 28.0 ft-lb)
T2: 40 N·m (4.1 kgf-m, 29.5 ft-lb)
T3: 45 N·m (4.6 kgf-m, 33.2 ft-lb)



6) Install the oil charge pipe. <Ref. to 5AT-61, INSTALLATION, Oil Charge Pipe.>

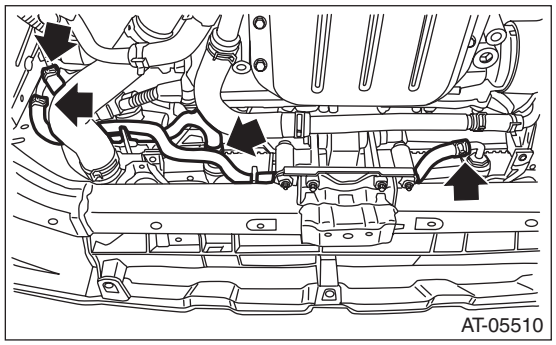
7) Connect the ATF AT inlet and outlet hoses to the ATF cooler pipe on the transmission side.

NOTE:
• Use a new ATF AT hose.
• Install so that the ATF AT hose is not folded over, excessively bent or twisted.
• Insert the ATF AT hose into the specified position.



8) Connect the ATF radiator inlet and outlet hoses to the ATF cooler pipe on radiator side.

NOTE:
• Use a new ATF radiator hose.
• Install so that the ATF radiator hose is not folded over, excessively bent or twisted.
• Insert the ATF radiator hose into the specified position.



9) Install the front exhaust pipe. <Ref. to EX(H6DO)-6, INSTALLATION, Front Exhaust Pipe.>
10) Install the under cover. <Ref. to EI-33, INSTALLATION, Front Under Cover.>
11) Lower the vehicle.
12) Install the battery.
13) Check the ATF level. <Ref. to 5AT-28, INSPECTION, Automatic Transmission Fluid.>

NOTE:
Make sure there are no ATF leaks in joints between the transmission, radiator, ATF cooler pipes, and ATF cooler hoses.

14) Install the collector cover.

C: INSPECTION

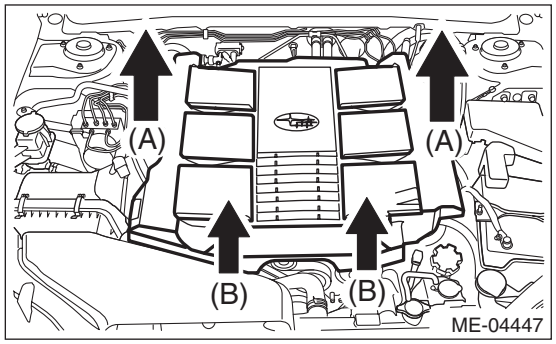
Repair or replace each faulty ATF hose, ATF cooler pipes, clamps, and washers found in the inspection below.
1) Check for ATF leaks in joints between the transmission, radiator, ATF cooler pipes, and ATF hoses.
2) Check the clamp for deformation.
3) Lightly bend the ATF hose and check for cracks on the surface or other damages.
4) Pinch the ATF hose with your fingers and check for poor elasticity.
5) Check for peeling, cracks, and deformation at the tip of the ATF hose.

20.Air Breather Hose

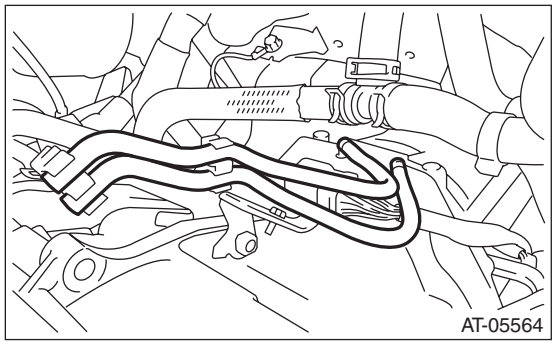
A: REMOVAL

1) Remove the collector cover.

NOTE:
Follow the steps below when removing the collector cover.
(1) Pull up the two points at the rear (A).
(2) Pull up the two points at the front (B) while moving them forward.

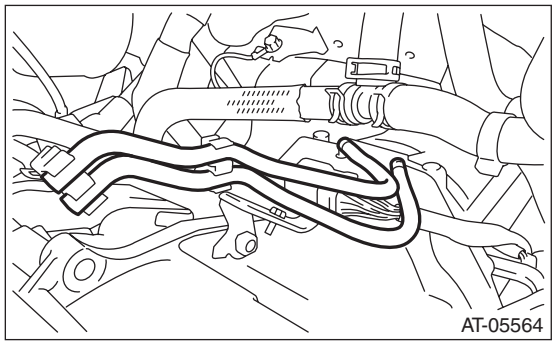


2) Remove the air intake boot. <Ref. to IN(H6DO)-7, REMOVAL, Air Intake Boot.>
3) Remove the air breather hose.



B: INSTALLATION

1) Install the air breather hose.



2) Install the air intake boot. <Ref. to IN(H6DO)-7, INSTALLATION, Air Intake Boot.>
3) Install the collector cover.

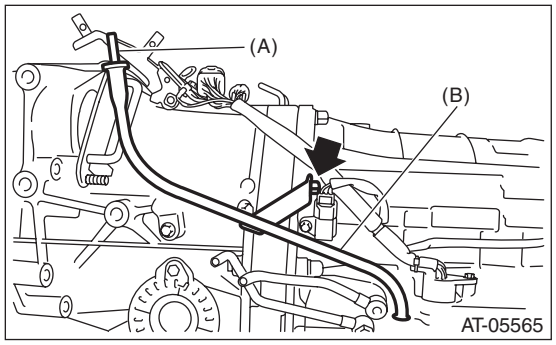
C: INSPECTION

Make sure the air breather hose is not cracked or clogged.

21.Oil Charge Pipe

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Lift up the vehicle.
3) Remove the under cover. <Ref. to EI-33, REMOVAL, Front Under Cover.>
4) Remove the front exhaust pipe. <Ref. to EX(H6DO)-5, REMOVAL, Front Exhaust Pipe.>
5) Disconnect the connector from turbine speed sensor 1.
6) Remove the oil charge pipe, and then remove the O-ring from flange side.



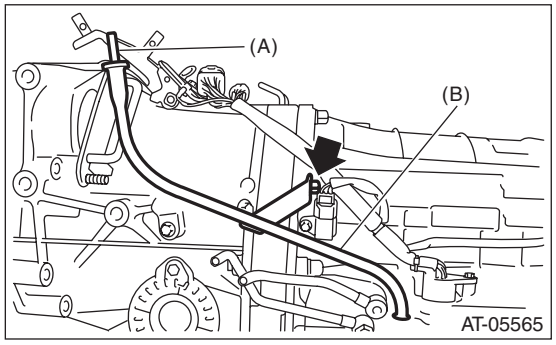
(A) ATF level gauge
(B) Oil charge pipe

B: INSTALLATION

1) Install the oil charge pipe.

NOTE:
Use new gaskets and O-rings.

Tightening torque:
38 N·m (3.9 kgf-m, 28.0 ft-lb)



(A) ATF level gauge
(B) Oil charge pipe

2) Connect the connector to the turbine speed sensor 1.
3) Install the front exhaust pipe. <Ref. to EX(H6DO)-6, INSTALLATION, Front Exhaust Pipe.>
4) Install the under cover. <Ref. to EI-33, INSTALLATION, Front Under Cover.>
5) Lower the vehicle.
6) Connect the ground cable to battery.

C: INSPECTION

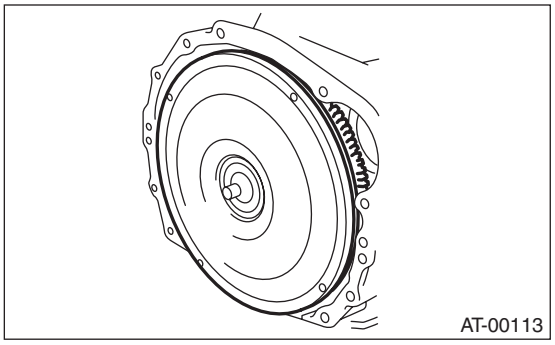
- Make sure the oil charge pipe is not deformed or damaged.
- Check that there are no ATF leaks from the O-ring.

22.Torque Converter Assembly

A: REMOVAL

1) Remove the transmission assembly from vehicle body. <Ref. to 5AT-36, REMOVAL, Automatic Transmission Assembly.>
2) Pull out the torque converter and oil pump shaft horizontally.

NOTE:
• Be sure not to scratch the inside of bushing in oil pump shaft.
• Be careful that the oil pump shaft may drawn out simultaneously.



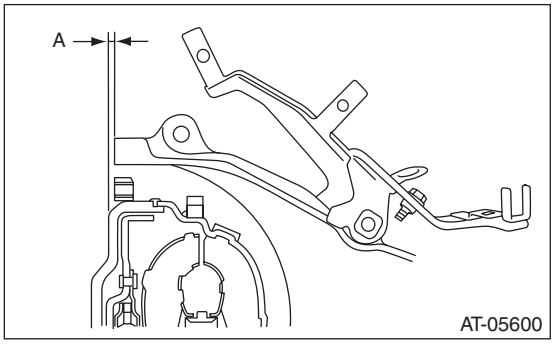
3) Remove the oil pump shaft from torque converter as necessary.

B: INSTALLATION

1) When the oil pump shaft is removed, install the shaft to torque converter.

NOTE:
• Use a new circlip.
• Make sure the circlip is firmly inserted.
2) Install the oil pump shaft to torque converter, and then make sure that the clip is secured on groove.
3) Apply ATF to the revolving and sliding surface of the oil pump shaft.
4) Holding the torque converter assembly by hand, lightly rotate it to engage with the oil pump rotor.
5) Check the protruding dimension of the torque converter assembly.

Dimension A:
8 mm (0.31 in) or less



6) Install the transmission assembly to the vehicle. <Ref. to 5AT-41, INSTALLATION, Automatic Transmission Assembly.>

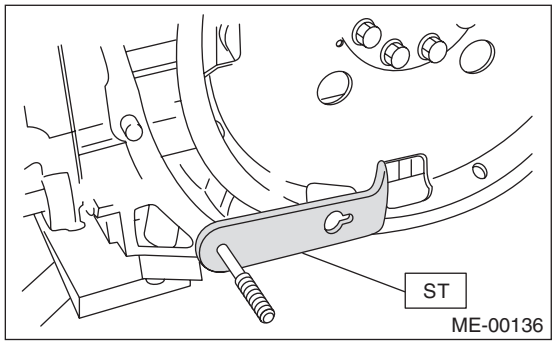
C: INSPECTION

Make sure the ring gear and protrusion of torque converter end are not deformed or damaged.

23.Drive Plate

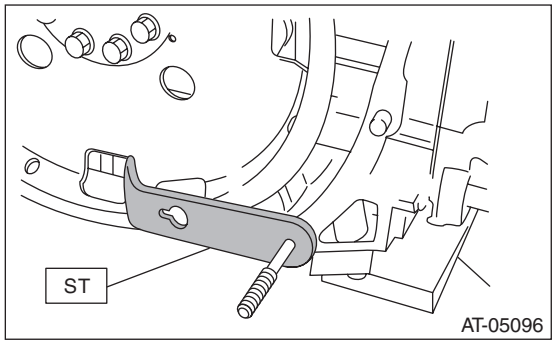
A: REMOVAL

1) Remove the transmission assembly from the vehicle. <Ref. to 5AT-36, REMOVAL, Automatic Transmission Assembly.>
2) Use the ST to lock the crankshaft, and remove the drive plate and reinforcement drive plate.
ST 498497100 CRANKSHAFT STOPPER



B: INSTALLATION

1) Temporarily install the drive plate and reinforcement drive plate.
2) Using the ST, lock the crankshaft.
ST 498497100 CRANKSHAFT STOPPER



3) Tighten the drive plate mounting bolt.

NOTE:
Tighten the drive plate mounting bolts gradually. Each bolt should be tightened in a crisscross order.

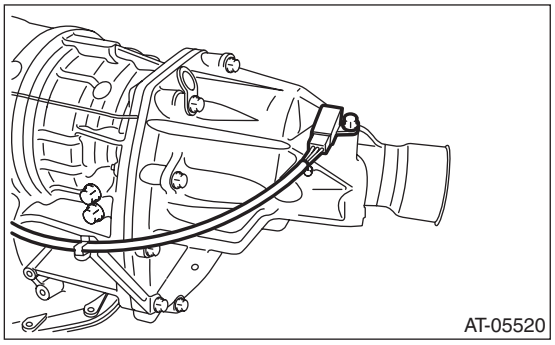
Tightening torque:
90 N·m (9.2 kgf-m, 66.4 ft-lb)

4) Install the transmission assembly to the vehicle. <Ref. to 5AT-41, INSTALLATION, Automatic Transmission Assembly.>

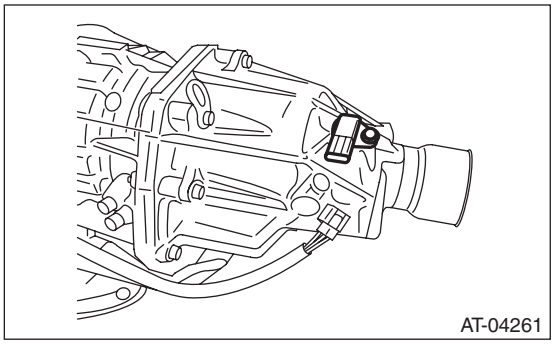
24.Extension Case

A: REMOVAL

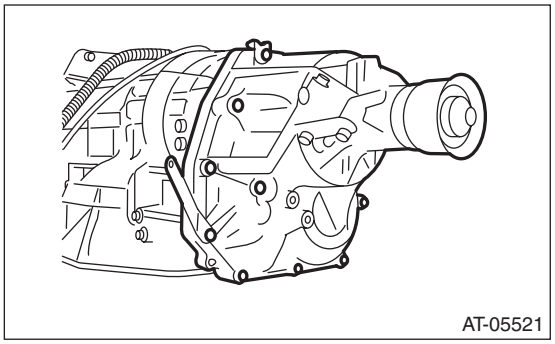
1) Remove the transmission assembly. <Ref. to 5AT-36, REMOVAL, Automatic Transmission Assembly.>
2) Disconnect the rear vehicle speed sensor connector.


AT-05520

3) Remove the rear vehicle speed sensor.


AT-04261

4) Remove the extension case.

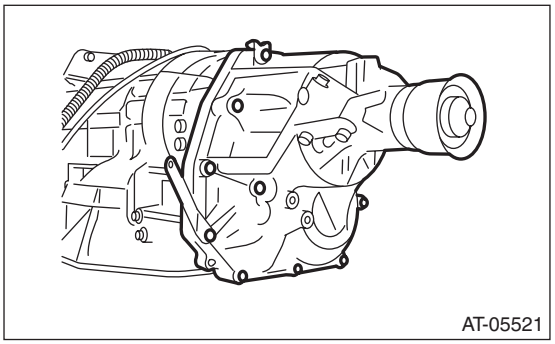

AT-05521

B: INSTALLATION

1) Attach the selected reduction driven gear shim to end surface of reduction driven gear with vaseline. <Ref. to 5AT-71, ADJUSTMENT, Reduction Driven Gear.>
2) Install the extension case.

NOTE:
Use a new gasket.

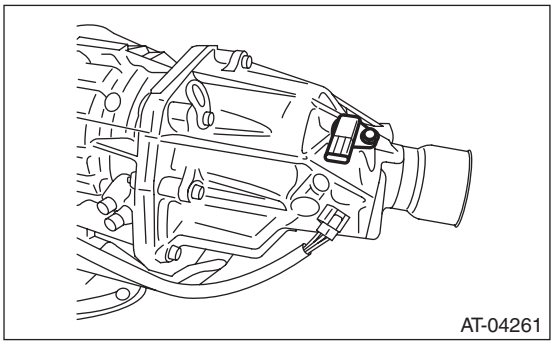
Tightening torque:
25 N·m (2.5 kgf-m, 18.4 ft-lb)


AT-05521

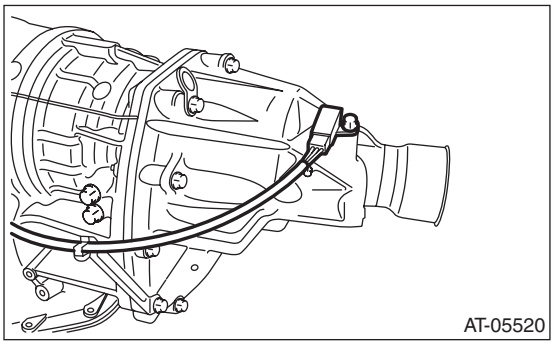
3) Install the rear vehicle speed sensor.

NOTE:
Use new O-rings.

Tightening torque:
7 N·m (0.7 kgf-m, 5.2 ft-lb)


AT-04261

4) Connect the rear vehicle speed sensor connector.


AT-05520

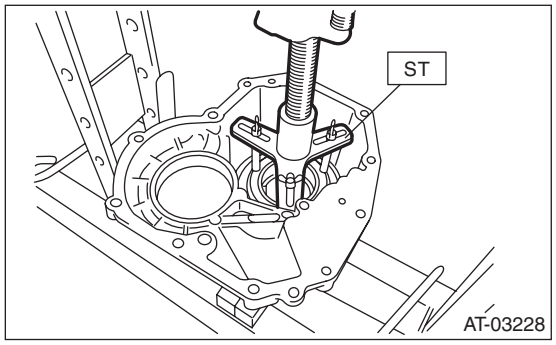
5) Install the transmission assembly. <Ref. to 5AT-41, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

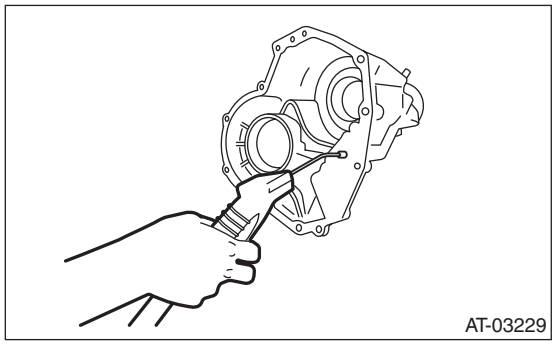
1) Take out the transfer clutch and rear drive shaft by lightly tapping the end of rear drive shaft.

NOTE:
Be careful not to damage the oil seal of the extension.

2) Remove the snap ring using the ST and press.
ST 18762AA000 COMPRESSOR SPECIAL TOOL



3) Supply compressed air to remove the clutch piston.



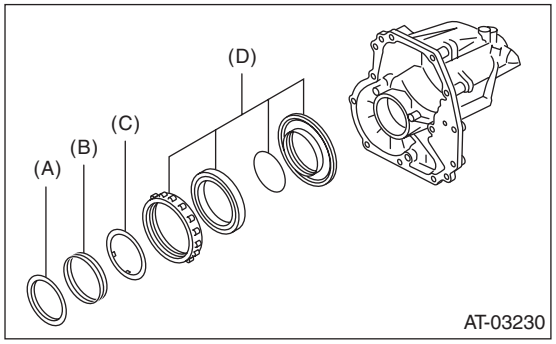
4) Remove the dust cover from extension case.
5) Remove the oil seal from the extension case.

D: ASSEMBLY

1) Press-fit the oil seal using the ST and press.

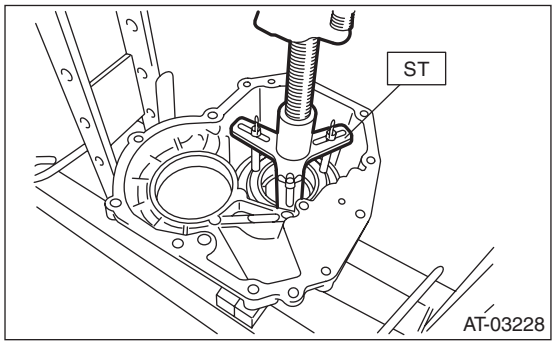
NOTE:
Use a new oil seal.
ST 498057300 INSTALLER

2) Press-fit the dust cover.
3) Insert the transfer clutch assembly, spring retainer, return spring and clutch spring retainer.



(A) Clutch spring retainer
(B) Return spring
(C) Spring retainer
(D) Transfer clutch piston ASSY

4) Using the ST and compressor, install the snap ring.
ST 18762AA000 COMPRESSOR SPECIAL TOOL



5) Install the transfer clutch. <Ref. to 5AT-66, INSTALLATION, Transfer Clutch.>
6) Install the rear drive shaft.

E: INSPECTION

- Use compressed air to make sure the extension case routes are not clogged or leaking.
- Inspect the extension end play, and adjust it to within the standard value. <Ref. to 5AT-66, ADJUSTMENT, Transfer Clutch.>

25.Transfer Clutch

A: REMOVAL

1) Remove the transmission assembly from vehicle body. <Ref. to 5AT-36, REMOVAL, Automatic Transmission Assembly.>
2) Remove the extension case, and then remove the transfer clutch. <Ref. to 5AT-64, REMOVAL, Extension Case.> <Ref. to 5AT-65, DISASSEMBLY, Extension Case.>

B: INSTALLATION

1) Select the rear drive shaft shim. <Ref. to 5AT-66, ADJUSTMENT, Transfer Clutch.>
2) Select driven plate No. 3 <Ref. to 5AT-66, ADJUSTMENT, Transfer Clutch.>
3) Install the extension case. <Ref. to 5AT-64, INSTALLATION, Extension Case.>
4) Install the transmission assembly to the vehicle. <Ref. to 5AT-41, INSTALLATION, Automatic Transmission Assembly.>

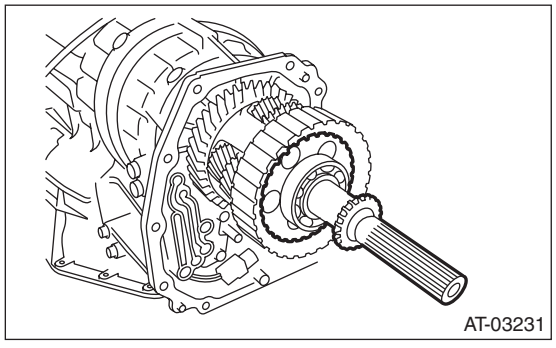
C: INSPECTION

- Inspect the drive plate facing for wear and damage.
- Make sure the snap ring is not worn and the return spring has no permanent distortion, damage, or deformation.
- Check that the D-ring is not damaged.
- Inspect the extension end play, and adjust it to within the standard value. <Ref. to 5AT-66, ADJUSTMENT, Transfer Clutch.>

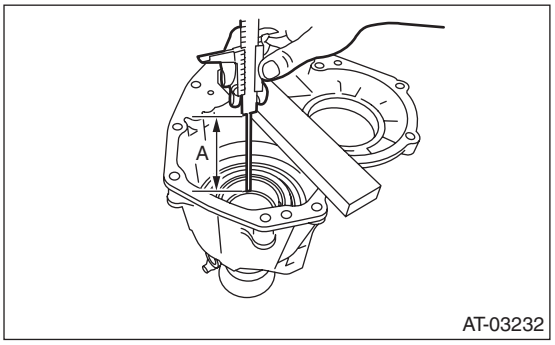
D: ADJUSTMENT

1. REAR DRIVE SHAFT SHIM SELECTION

1) Insert the rear drive shaft into the reduction drive gear and center differential assembly.

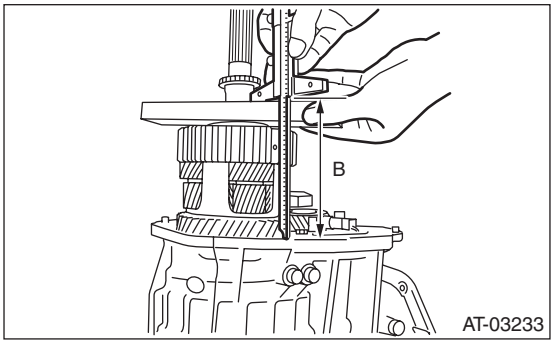

AT-03231

2) Using the ST, measure the depth “A”, which is from mating surface of extension case to ball bearing outer ring contact surface.
ST 398643600 GAUGE



AT-03232

3) Using the ST, measure the height “B” from the AT main case mating surface to the ball bearing outer ring contact surface.
ST 398643600 GAUGE



AT-03233

4) Calculation formula:
When clearances are 0.05 mm (0.0020 in):
T (mm) = A – B + 0.23
[T (in) = A – B + 0.0091]
When clearances are 0.25 mm (0.0098 in):
T (mm) = A – B + 0.03
[T (in) = A – B + 0.0012]
A: Depth from end of extension case to ball bearing outer ring contact surface
B: Height from end of AT main case contact surface to the ball bearing outer ring contact surface
T: Shim thickness

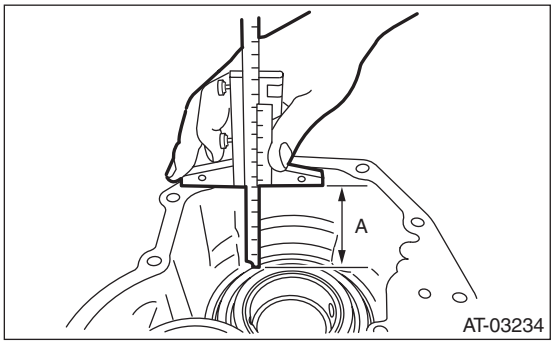
Specification:
0.05 — 0.25 mm (0.0020 — 0.0098 in)

NOTE:
Calculation formula for "T" above is applied when measuring with the ST (398643600 GAUGE). When not using the ST,
When clearances are 0.05 mm (0.0020 in):
T (mm) = (A – α) – ((B – β) – 0.28) – 0.05
[T (in) = (A – α) – ((B – β) – 0.011) – 0.0020]
When clearances are 0.25 mm (0.0098 in):
T (mm) = (A – α) – ((B – β) – 0.28) – 0.25
[T (in) = (A – α) – ((B – β) – 0.011) – 0.0098]
is applied.
T: Shim thickness
A: Depth from end of extension case to ball bearing outer ring contact surface
B: Height from end of AT main case contact surface to the ball bearing outer ring contact surface
α: Thickness of collar used when measuring "A"
β: Thickness of collar used when measuring "B"
0.28 (0.011): Gasket thickness (Unit mm (in))
5) Select the rear drive shaft shim so that the clearance is within the specified range.

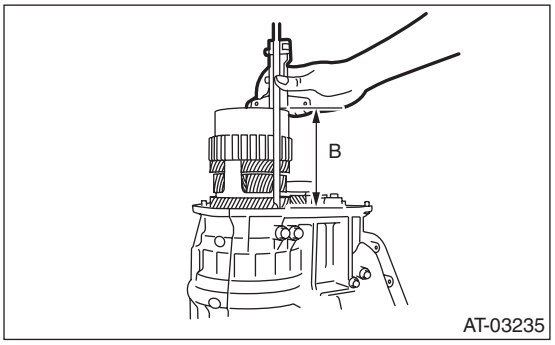
Rear drive shaft shim	
Part No.	Thickness mm (in)
33281AA040	0.2 (0.008)
33281AA050	0.5 (0.020)
33281AA060	0.3 (0.012)

2. SELECTION OF DRIVEN PLATE NO. 3

1) Install the drive plate and driven plate to the center differential carrier.
2) Measure the depth "A" from the mating surface of the extension case to the transfer clutch piston.



3) Using the ST, measure the height "B" from the AT main case mating surface to the end of ST.
ST 398744300 PISTON GUIDE



4) Calculation formula:
When clearances are 0.2 mm (0.008 in):
T (mm) = A – (B – 50) + 0.08
[T (in) = A – (B – 1.97) + 0.0031]
When clearances are 0.6 mm (0.024 in):
T (mm) = A – (B – 50) – 0.32
[T (in) = A – (B – 1.97) – 0.0126]
T: Thickness of driven plate No. 3
A: Depth from mating surface of the extension case to the transfer clutch piston.
B: Height from AT main case mating surface to end of ST
50 mm (1.97 in): Thickness of ST

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

NOTE:
Calculation formula for "T" above is applied when measuring with the ST (398744300 PISTON GUIDE). When not using the ST,
When clearances are 0.2 mm (0.008 in):
T (mm) = A – (B – α – 0.28) – 0.2
[T (in) = A – (B – α – 0.011) – 0.008]
When clearances are 0.6 mm (0.024 in):
T (mm) = A – (B – α – 0.28) – 0.6
[T (in) = A – (B – α – 0.011) – 0.024]
is applied.
T: Thickness of driven plate No. 3
A: Depth from mating surface of the extension case to the transfer clutch piston.
B: Height from the AT main case mating surface to the contact face of the tool that was used as the substitute of the ST.
α: Thickness of tool used when measuring "B"
0.28 (0.011): Gasket thickness (Unit mm (in))
If it is out of specification, select the driven plate No. 3 to adjust within the specification.

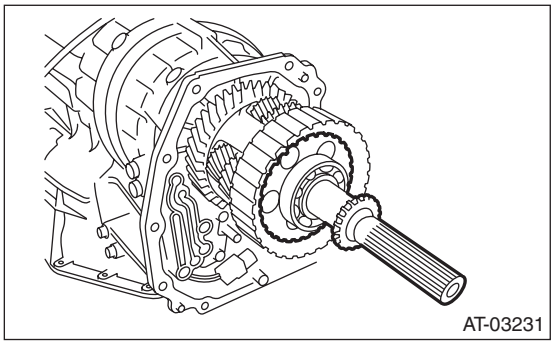
5) Select the driven plate No. 3 so that the clearance is within the specified range.

Driven plate No. 3	
Part No.	Thickness mm (in)
31589AA041 or 31589AA150	1.6 (0.063)
31589AA050 or 31589AA160	2.0 (0.079)
31589AA060 or 31589AA170	2.4 (0.094)
31589AA070 or 31589AA180	2.8 (0.110)

26.Rear Drive Shaft

A: REMOVAL

1) Remove the transmission assembly from the vehicle. <Ref. to 5AT-36, REMOVAL, Automatic Transmission Assembly.>
2) Remove the rear vehicle speed sensor, and then remove the extension case. <Ref. to 5AT-64, REMOVAL, Extension Case.>
3) Pull out the rear drive shaft from center differential assembly.



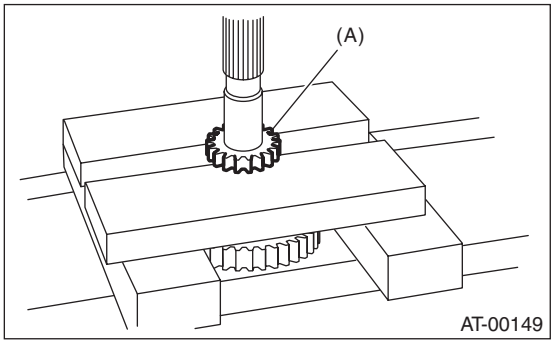
4) Remove the drive plate and driven plate.

B: INSTALLATION

1) Select shims. <Ref. to 5AT-66, ADJUSTMENT, Transfer Clutch.>
2) Install the drive plate and driven plate.
3) Insert the rear drive shaft into the center differential assembly.
4) Combine the extension case, and then install the rear vehicle speed sensor. <Ref. to 5AT-64, INSTALLATION, Extension Case.>
5) Install the transmission assembly to the vehicle. <Ref. to 5AT-41, INSTALLATION, Automatic Transmission Assembly.>

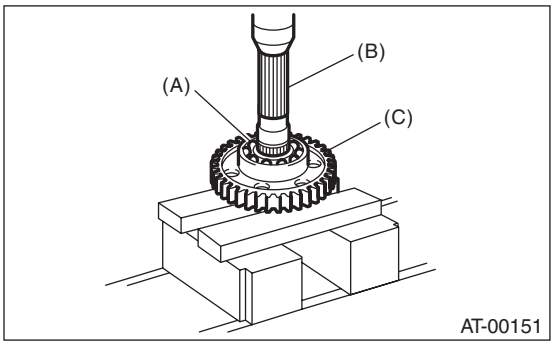
C: DISASSEMBLY

1) Using a press, remove the revolution gear.



(A) Revolution gear

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

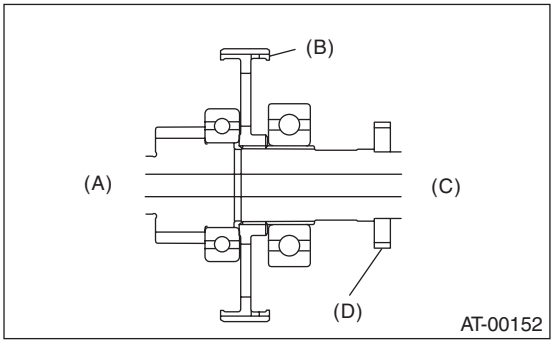


(A) Rear ball bearing
(B) Rear drive shaft
(C) Clutch hub

D: ASSEMBLY

Assemble in the reverse order of disassembly.

NOTE:
- Use new ball bearings and revolution gear.
- Make sure the clutch hub is facing the correct direction.



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

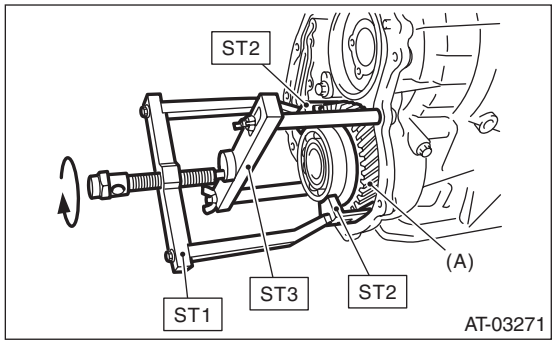
E: INSPECTION

- Check each parts for holes, damages or other foreign matters.
- Inspect the extension end play, and adjust it to within the standard value. <Ref. to 5AT-66, ADJUSTMENT, Transfer Clutch.>

27.Reduction Driven Gear

A: REMOVAL

1) Remove the transmission assembly from vehicle body. <Ref. to 5AT-36, REMOVAL, Automatic Transmission Assembly.>
2) Remove the rear vehicle speed sensor, and separate the extension case from transmission case. <Ref. to 5AT-64, REMOVAL, Extension Case.>
3) Remove the center differential carrier. <Ref. to 5AT-73, REMOVAL, Center Differential Carrier.>
4) Set the range select lever to the “P” range.
5) Using ST1, ST2 and ST3, pull out the reduction driven gear.
ST1 499737100 PULLER SET
ST2 18680AA010 GEAR HOLDER
ST3 18766AA000 SUPPORT PULLER



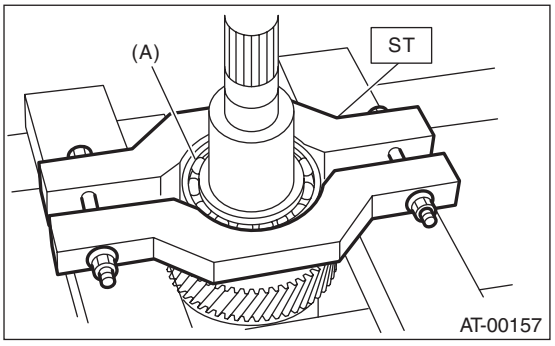
(A) Reduction driven gear

B: INSTALLATION

1) Set the range select lever to the “P” range.
2) Use a plastic hammer to install reduction driven gear assembly.
3) Select the reduction gear shims. <Ref. to 5AT-71, ADJUSTMENT, Reduction Driven Gear.>
4) Join the transmission case and the extension case, and then install the rear vehicle speed sensor. <Ref. to 5AT-64, INSTALLATION, Extension Case.>
5) Install the transmission assembly to the vehicle. <Ref. to 5AT-41, INSTALLATION, Automatic Transmission Assembly.>

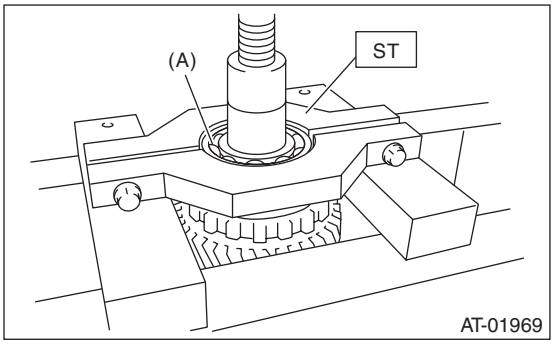
C: DISASSEMBLY

1) Remove the ball bearing from reduction driven gear using ST.
ST 498077300 REMOVER



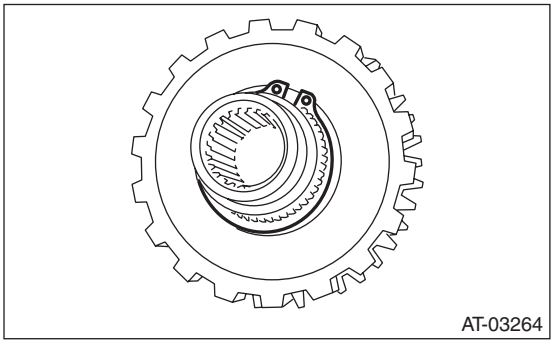
(A) Ball bearing

2) Remove the ball bearing on the reverse side with the same procedure as step 1).
ST 498077300 REMOVER

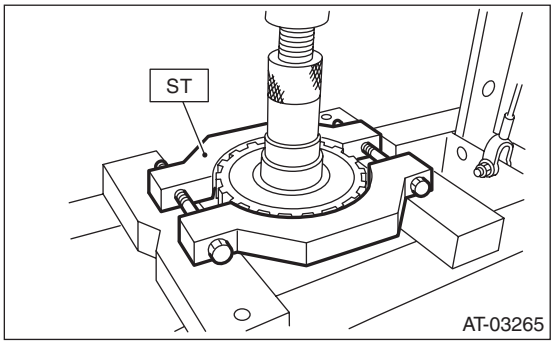


(A) Ball bearing

3) Remove the snap ring of the parking gear.

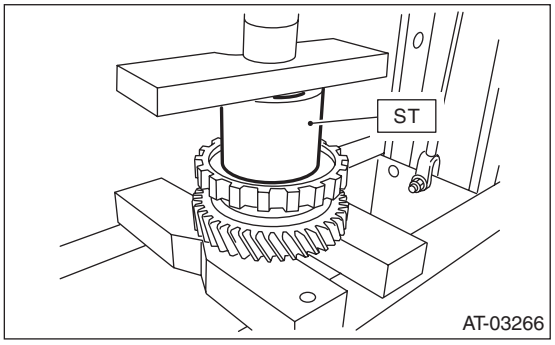


4) Using the ST, remove the parking gear.
ST 18767AA000 REMOVER

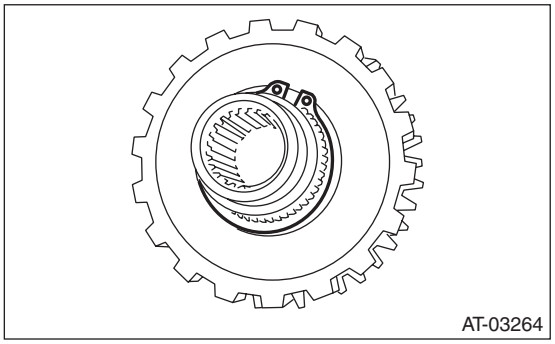


D: ASSEMBLY

1) Using the ST, install the parking gear.
ST 499755602 PRESS

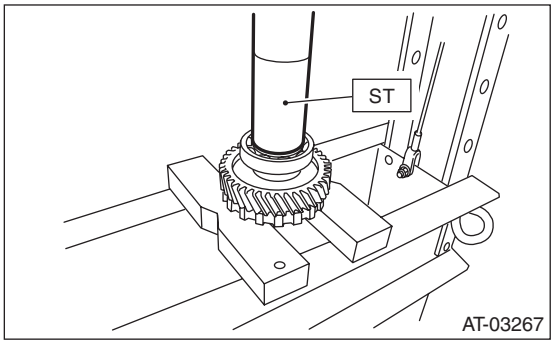


2) Install the snap ring.

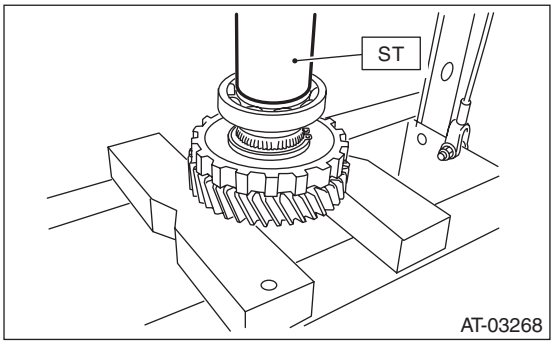


3) Install the ball bearing to the reduction driven gear using a press.

NOTE:
Use a new ball bearing.
ST 18654AA000 INSTALLER



4) Install the ball bearing on the reverse side with the same procedure as step 3).
ST 18654AA000 INSTALLER

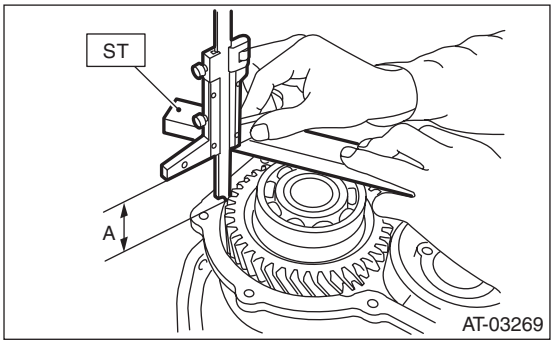


E: INSPECTION

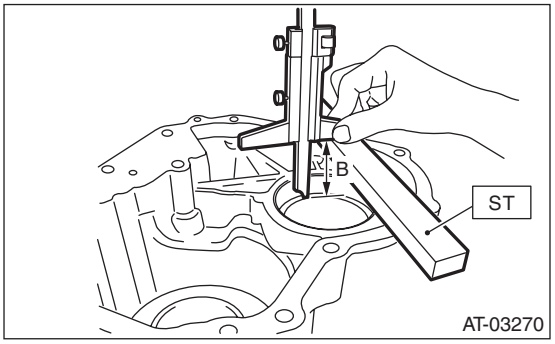
Check the ball bearing and gear for break or damage.

F: ADJUSTMENT

1) Using the ST, measure the height “A” from the AT main case mating surface to the ball bearing outer ring contact surface.
ST 499575400 GAUGE



2) Using the ST, measure the depth “B”, which is from mating surface of extension case to ball bearing outer ring contact surface.
ST 499575400 GAUGE



3) Calculation formula:
When clearances are 0.05 mm (0.0020 in):
T (mm) = B – A + 0.23
[T (in) = B – A + 0.0091]
When clearances are 0.25 mm (0.0098 in):
T (mm) = B – A + 0.03
[T (in) = B – A + 0.0012]
T: Shim clearance
A: Height from the mating surface of the AT main case to the ball bearing outer ring end surface
B: Depth from mating surface of extension case to ball bearing outer ring contact surface

Specification:
0.05 — 0.25 mm (0.0020 — 0.0098 in)

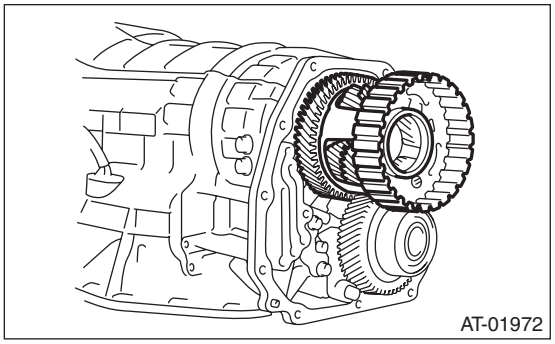
4) Select the reduction gear shim so that the clearance is within the specified range.

Reduction gear shim	
Part No.	Thickness mm (in)
31288AA030	0.2 (0.008)
31288AA050	0.5 (0.020)
31288AA060	0.3 (0.012)

28.Center Differential Carrier

A: REMOVAL

1) Remove the transmission assembly from the vehicle. <Ref. to 5AT-36, REMOVAL, Automatic Transmission Assembly.>
2) Remove the rear vehicle speed sensor, and separate the extension case from transmission case. <Ref. to 5AT-64, REMOVAL, Extension Case.>
3) Extract the rear drive shaft. <Ref. to 5AT-69, REMOVAL, Rear Drive Shaft.>
4) Pull out the center differential carrier assembly.

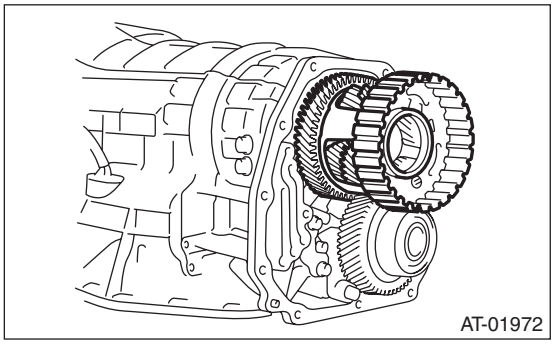


5) Remove the shim from the transmission case.

B: INSTALLATION

1) Install the center differential assembly with the shim(s).

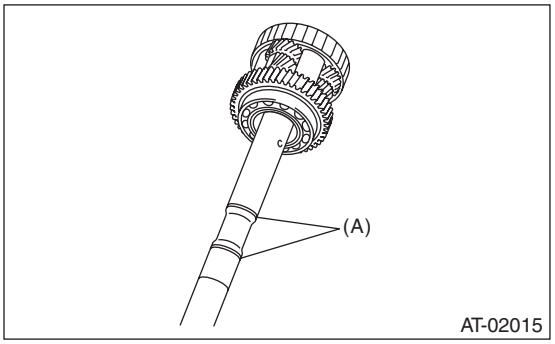
NOTE:
Press-fit it to the bottom of bearing shoulder completely.



2) Insert the rear drive shaft. <Ref. to 5AT-69, INSTALLATION, Rear Drive Shaft.>
3) Join the transmission case and the extension case, and then install the rear vehicle speed sensor. <Ref. to 5AT-64, INSTALLATION, Extension Case.>
4) Install the transmission assembly to the vehicle. <Ref. to 5AT-41, INSTALLATION, Automatic Transmission Assembly.>

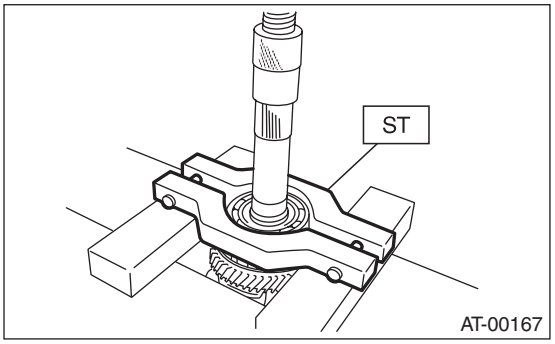
C: DISASSEMBLY

1) Remove the seal ring.

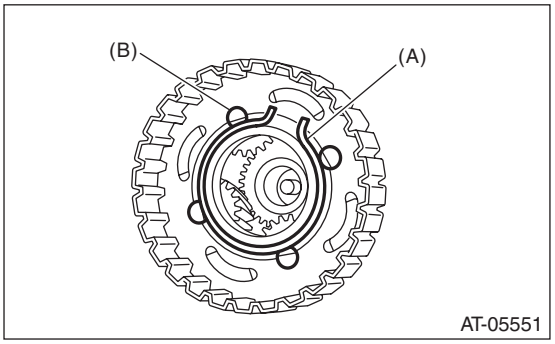


(A) Seal ring

2) Remove the ball bearing using the ST and the press.
ST 498077600 REMOVER

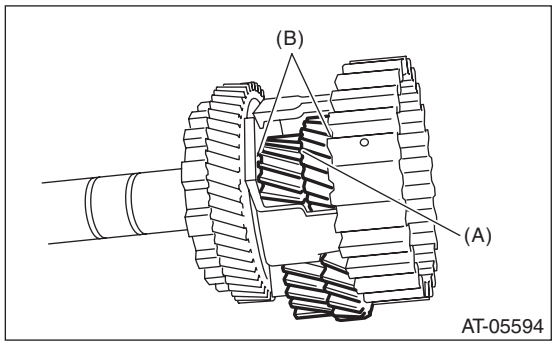


3) Remove the snap ring, and pull out the pinion shaft from center differential assembly.



(A) Snap ring
(B) Pinion shaft

4) Remove the pinion gear and washers from center differential assembly.



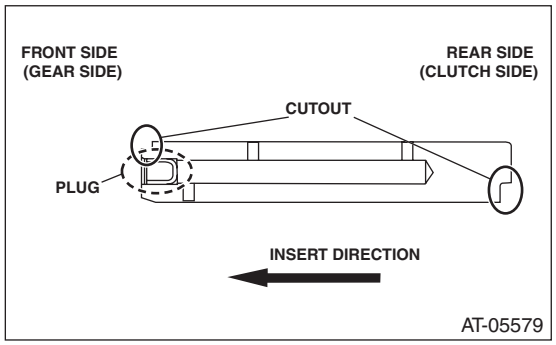
(A) Pinion gear
(B) Washer

5) Pull out the intermediate shaft and thrust bearing.

D: 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.

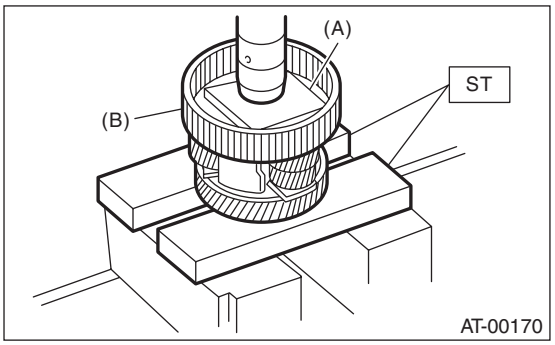
NOTE:
• Insert the pinion shaft with the side with the plug side facing the front side (gear side).
• After inserting the pinion shaft, adjust its position so that the cutout portion on the front side is on the inner side.



5) Install the snap ring.

6) Using a press, press-fit the ball bearing into the center differential assembly.

NOTE:
Use a new ball bearing.
ST 498077000 REMOVER



(A) Plate
(B) Center differential carrier

7) Apply vaseline onto the seal ring outer surface and shaft grooves.
8) Install a new seal ring.

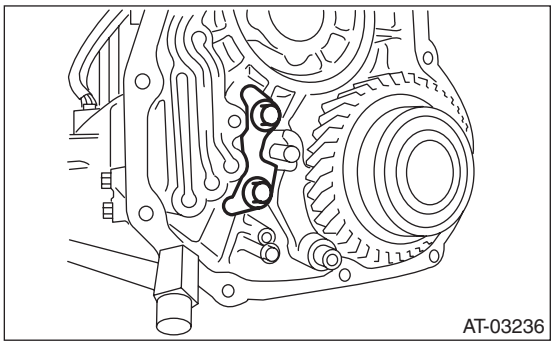
E: INSPECTION

• Check each parts for holes, damages or other foreign matters.
• Inspect the extension end play, and adjust it to within the standard value. <Ref. to 5AT-66, ADJUSTMENT, Transfer Clutch.>

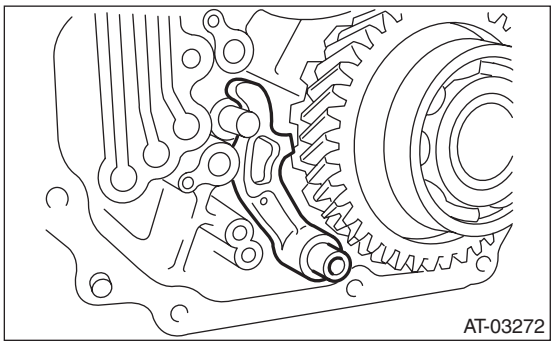
29.Parking Pawl

A: REMOVAL

1) Remove the transmission assembly from vehicle body. <Ref. to 5AT-36, REMOVAL, Automatic Transmission Assembly.>
2) Remove the extension case. <Ref. to 5AT-64, REMOVAL, Extension Case.>
3) Remove the center differential carrier. <Ref. to 5AT-73, REMOVAL, Center Differential Carrier.>
4) Remove the front vehicle speed sensor. <Ref. to 5AT-50, REMOVAL, Front Vehicle Speed Sensor.>
5) Remove the parking support actuator.

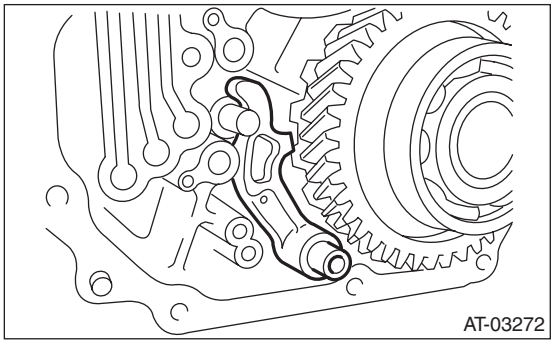


6) Remove the parking pawl, parking pawl shaft and return spring.



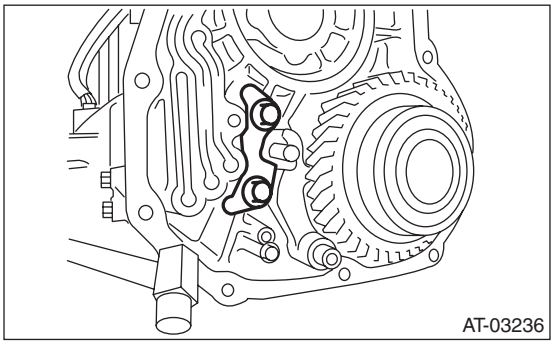
B: INSTALLATION

1) Set the transmission to the “N” range.
2) Install the parking pawl, parking pawl shaft and return spring.



3) Install the parking support actuator.

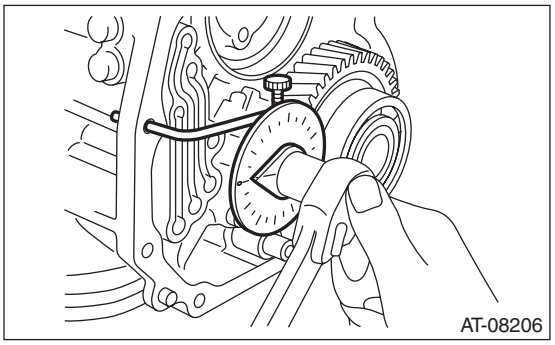
Tightening torque:
10 N·m (1.0 kgf-m, 7.4 ft-lb)

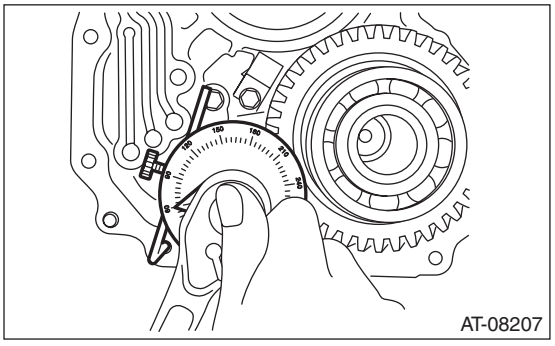


4) Using the angle gauge, perform the angle tightening to the bolts that were tightened in step 3).

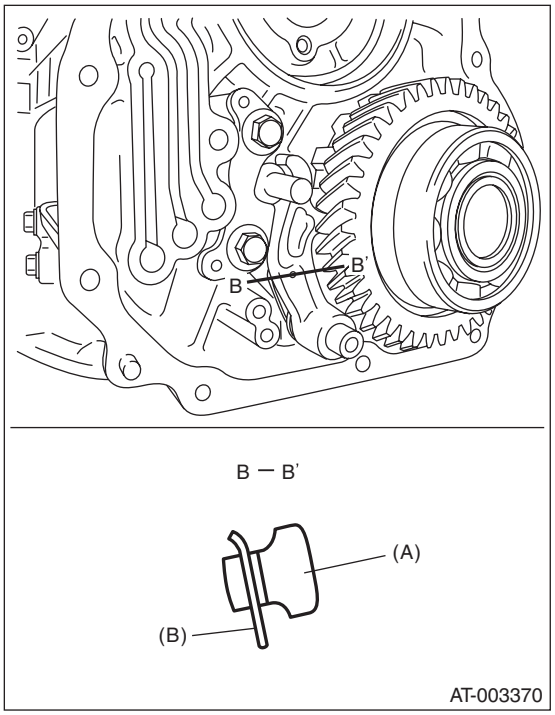
NOTE:
Do not use extension as much as possible.

Tightening angle:
17°±2°





5) Make sure that the return spring is sticking out of the parking pole hole.



(A) Parking pawl
(B) Return spring

6) Install the front vehicle speed sensor. <Ref. to 5AT-50, INSTALLATION, Front Vehicle Speed Sensor.>
7) Install the center differential carrier. <Ref. to 5AT-73, INSTALLATION, Center Differential Carrier.>
8) Install the extension case. <Ref. to 5AT-64, INSTALLATION, Extension Case.>
9) Install the transmission assembly to the vehicle. <Ref. to 5AT-41, INSTALLATION, Automatic Transmission Assembly.>

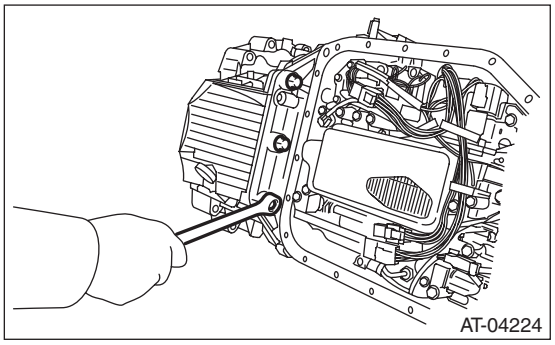
C: INSPECTION

Make sure that the tab of parking pawl on reduction driven gear is not worn or otherwise damaged.

30.Converter Case

A: REMOVAL

1) Remove the transmission assembly from the vehicle. <Ref. to 5AT-36, REMOVAL, Automatic Transmission Assembly.>
2) Remove the torque converter assembly. <Ref. to 5AT-62, REMOVAL, Torque Converter Assembly.>
3) Remove the transmission harness connector from stay.
4) Remove the turbine speed sensor 1. <Ref. to 5AT-53, REMOVAL, Turbine Speed Sensor 1.>
5) Remove the air breather hose. <Ref. to 5AT-60, REMOVAL, Air Breather Hose.>
6) Remove the transmission hanger COMPL.
7) Remove the ATF cooler inlet pipe and outlet pipe. <Ref. to 5AT-57, REMOVAL, ATF Cooler Pipe and Hose.>
8) Remove the converter case attachment bolts.
9) Lay along the transmission body, and then remove the oil pan.
10) Remove the three converter case mounting bolts (TORX®).
ST 18676AA020 TORX® WRENCH

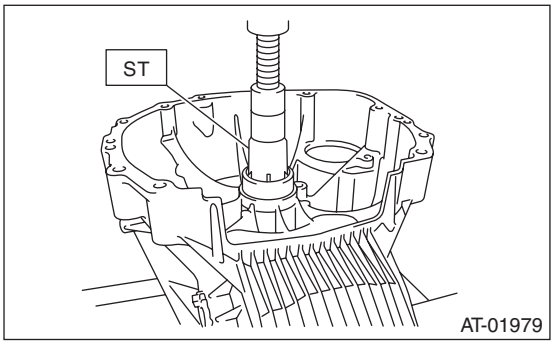


11) Separate the converter case by lightly tapping with plastic hammer.
12) Remove the front differential assembly. <Ref. to 5AT-88, REMOVAL, Front Differential Assembly.>
13) Remove the oil seal from converter case.

B: INSTALLATION

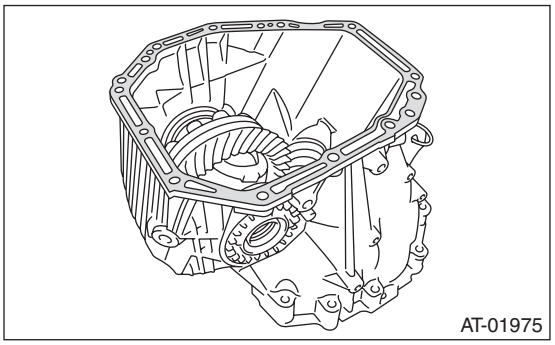
1) Check the appearance of each component and clean them.
2) Press-fit the oil seal to the converter case using ST.

NOTE:
Use a new oil seal.
ST 499587100 OIL SEAL INSTALLER



3) Install the front differential assembly and left and right side retainers to the case. <Ref. to 5AT-88, INSTALLATION, Front Differential Assembly.>
4) Remove the oil pump cover from the AT main case, and then adjust and check the backlash and tooth contact of the front differential. <Ref. to 5AT-79, REMOVAL, Oil Pump Cover.> <Ref. to 5AT-91, ADJUSTMENT, Front Differential Assembly.> <Ref. to 5AT-85, ADJUSTMENT, Drive Pinion Shaft Assembly.>
5) Apply proper amount of liquid gasket to the entire matching surface of converter case.

Liquid gasket:
THREE BOND 1215 (Part No. 004403007) or equivalent



6) Install the converter case assembly without damaging bushing and oil seal.

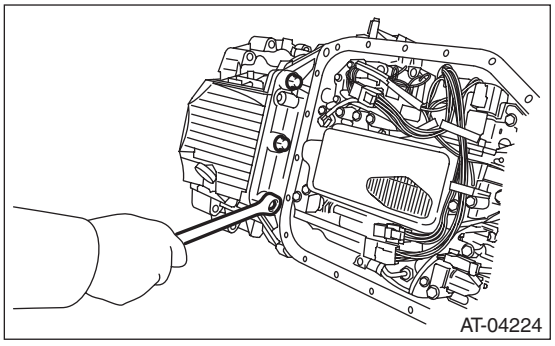
NOTE:
Use a new bolt for the oil charge pipe and ATF cooler pipe portions

Tightening torque:
Oil charge pipe and ATF cooler pipe portions
38 N·m (3.9 kgf-m, 28.0 ft-lb)
Other than above
41 N·m (4.2 kgf-m, 30.2 ft-lb)

7) Install the three converter case mounting bolts (TORX®).

Tightening torque:
41 N·m (4.2 kgf-m, 30.2 ft-lb)

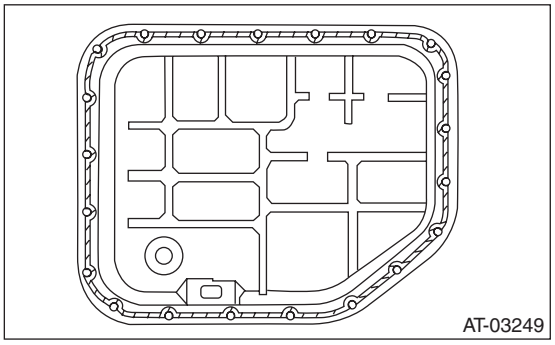
ST 18676AA020 TORX® WRENCH



8) Apply proper amount of liquid gasket to the entire oil pan mating surface, and then install it.

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

Tightening torque:
5 N·m (0.5 kgf-m, 3.7 ft-lb)



9) Install the turbine speed sensor 1. <Ref. to 5AT-53, INSTALLATION, Turbine Speed Sensor 1.>
10) Install the ATF cooler pipe. <Ref. to 5AT-58, INSTALLATION, ATF Cooler Pipe and Hose.>
11) Install the transmission hanger COMPL.

Tightening torque:
41 N·m (4.2 kgf-m, 30.2 ft-lb)

12) Install the transmission harness connector to the stay.
13) Install the air breather hose. <Ref. to 5AT-60, INSTALLATION, Air Breather Hose.>
14) Install the torque converter assembly. <Ref. to 5AT-62, INSTALLATION, Torque Converter Assembly.>
15) Install the transmission assembly to the vehicle. <Ref. to 5AT-41, INSTALLATION, Automatic Transmission Assembly.>

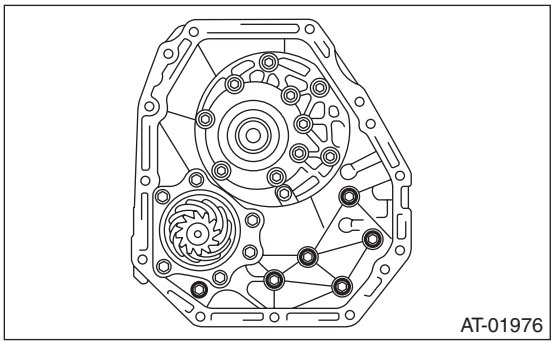
C: INSPECTION

Measure the backlash, and then adjust it to be within specification. <Ref. to 5AT-85, ADJUSTMENT, Drive Pinion Shaft Assembly.>

31.Oil Pump Cover

A: REMOVAL

1) Remove the transmission assembly from the vehicle. <Ref. to 5AT-36, REMOVAL, Automatic Transmission Assembly.>
2) Pull out the torque converter assembly. <Ref. to 5AT-62, REMOVAL, Torque Converter Assembly.>
3) Remove the transmission harness connector from stay.
4) Remove the ATF cooler inlet pipe and outlet pipe. <Ref. to 5AT-57, REMOVAL, ATF Cooler Pipe and Hose.>
5) Separate the converter case and transmission case. <Ref. to 5AT-77, REMOVAL, Converter Case.>
6) Remove the oil pump cover mounting bolt, and then separate the oil pump cover from the AT main case by lightly tapping with plastic hammer.

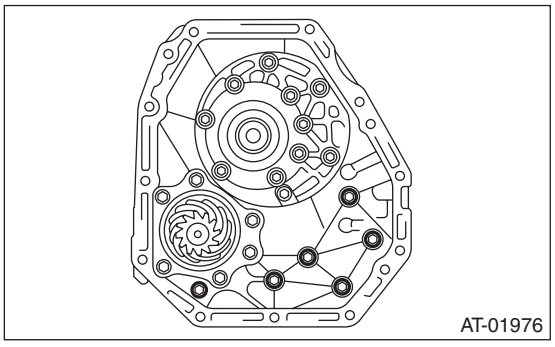


B: INSTALLATION

1) Secure the oil pump cover.

NOTE:
Use a new gasket.

Tightening torque:
41 N·m (4.2 kgf-m, 30.2 ft-lb)

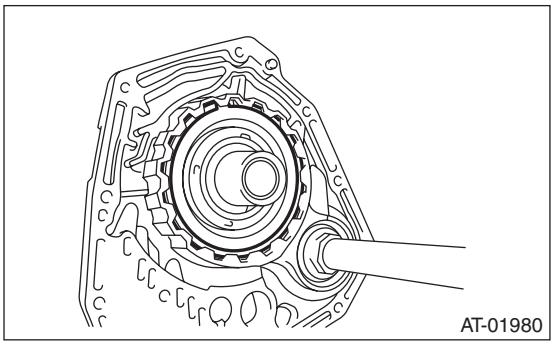


2) Install the converter case assembly to the transmission case assembly. <Ref. to 5AT-77, INSTALLATION, Converter Case.>
3) Install the transmission harness connector to the stay.
4) Install the ATF cooler pipe. <Ref. to 5AT-58, INSTALLATION, ATF Cooler Pipe and Hose.>
5) Install the torque converter assembly. <Ref. to 5AT-62, INSTALLATION, Torque Converter Assembly.>
6) Install the transmission assembly to the vehicle. <Ref. to 5AT-41, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

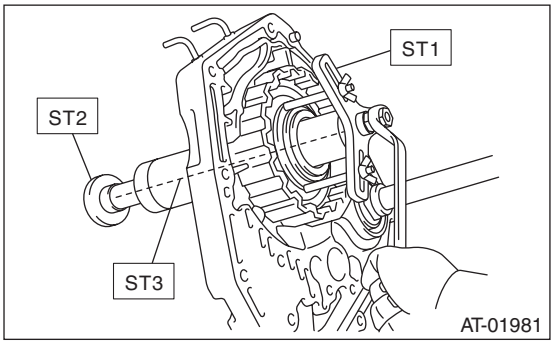
1. FRONT BRAKE

1) Remove the snap ring.

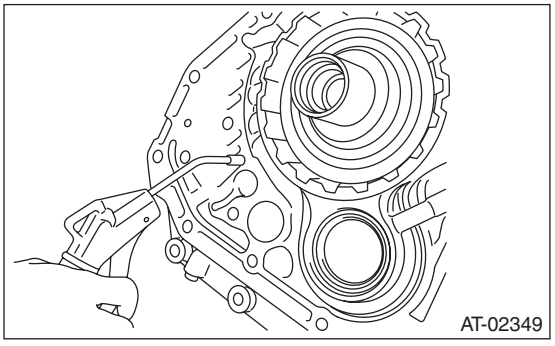


2) Remove the retaining plate, drive plate and driven plate.
3) Using the ST1, ST2 and ST3, remove the snap ring.

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



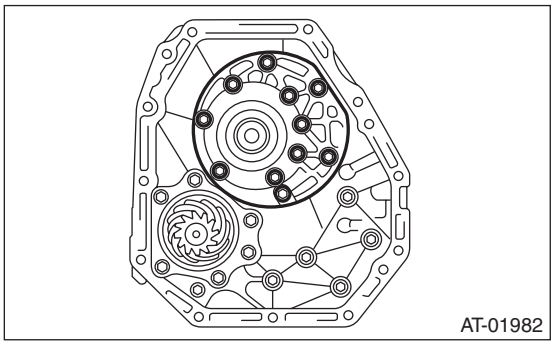
4) Remove the retainer and return spring.
5) Remove the front brake piston using compressed air.



6) Remove the D-ring from front brake piston.

2. OIL PUMP

1) Take out the oil pump housing.



2) Take out the oil pump body.

D: ASSEMBLY

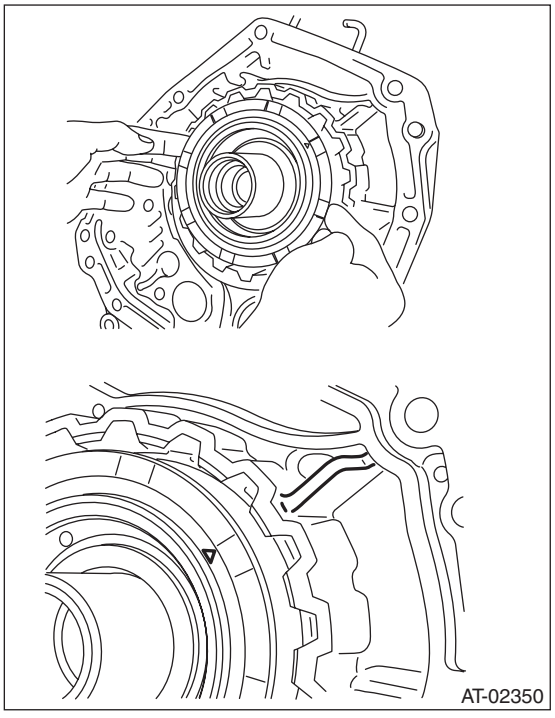
1. FRONT BRAKE

1) Apply ATF to D-ring, and then install it to the front brake piston.

NOTE:
Use a new D-ring.

2) Install the front brake piston to oil pump cover.

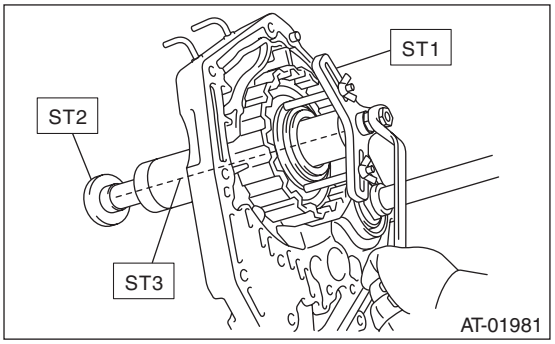
NOTE:
Install by aligning the "▲" mark on front brake piston surface with the oil pump cover rib.



3) Install the retainer and return spring.

4) Install the front brake piston assembly using ST1, ST2 and ST3.

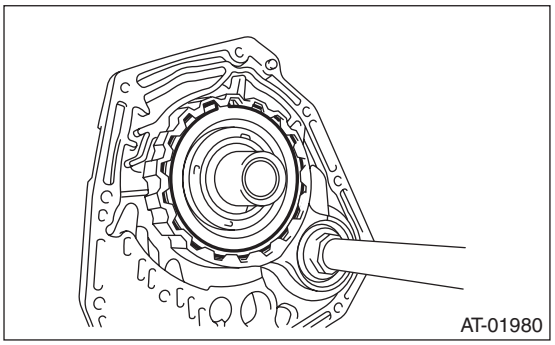
ST1	18762AA000	COMPRESSOR SPECIAL TOOL
ST2	18765AA000	COMPRESSOR SUPPORT
ST3	18763AA000	COMPRESSOR SHAFT



5) Install the genuine driven plate instead of retaining plate, and temporarily assemble the drive plate and driven plate.

Part No. 31536AA290 Driven plate

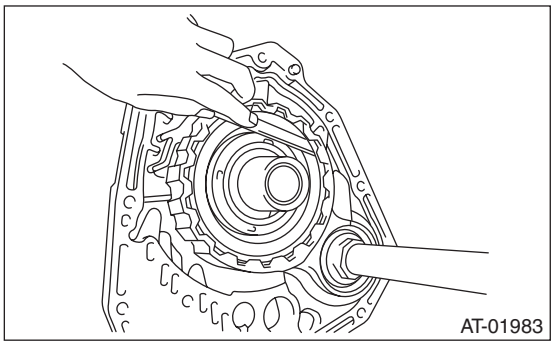
6) Install the snap ring.



7) Measure the clearance between the retaining plate and snap ring. If the value exceeds the specification, replace the drive plate and driven plate as a set and select the retaining plate so that the value is within the specification.

NOTE:
The thickness of the genuine drive plate is 2.8±0.05 mm (0.11±0.002 in).

Front brake clearance specification:
0.7 — 1.1 mm (0.028 — 0.043 in)



Front brake retaining plate	
Part No.	Thickness mm (in)
31567AB130	3.4 (0.134)
31567AB140	3.6 (0.142)
31567AB150	3.8 (0.150)
31567AB160	4.0 (0.157)

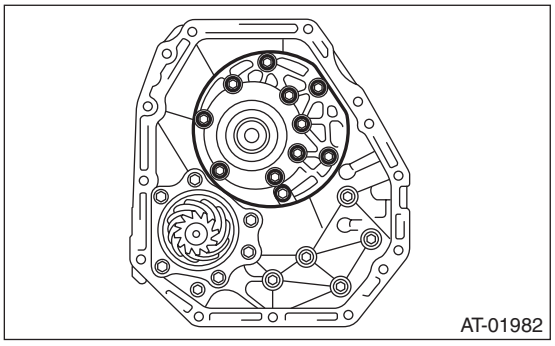
8) Remove the snap ring, replace the driven plate used in measurement of clearance with the retaining plate, and then reassemble.

2. OIL PUMP

1) Apply ATF to oil pump assembly, and then install it to oil pump housing.
2) Install the O-ring to oil pump cover.

NOTE:
Use new O-rings.
3) Install the oil pump housing to the oil pump cover.

Tightening torque:
10 N·m (1.0 kgf-m, 7.4 ft-lb)



E: INSPECTION

1. FRONT BRAKE

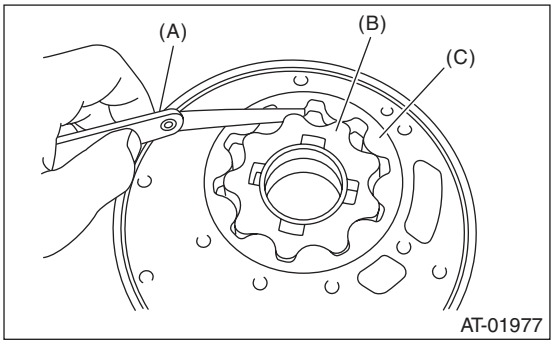
Check the following items.
- Drive plate facing for wear or damage
- Snap ring for wear, return spring for damage, and retainer for damage
- Piston for damage
- D-ring for damage

2. OIL PUMP

Check the following items.
- Oil pump cover and oil seal for breakage or damage
- Oil pump body for scratch or damage

1) Check the seal ring and oil seal for breaks and damage.
2) Check other parts for dents or faults.
3) Oil pump rotor assembly selection
   (1) Tip clearance
   Install the inner rotor and outer rotor to oil pump housing. With rotor gears facing each other, measure the crest-to-crest clearance.

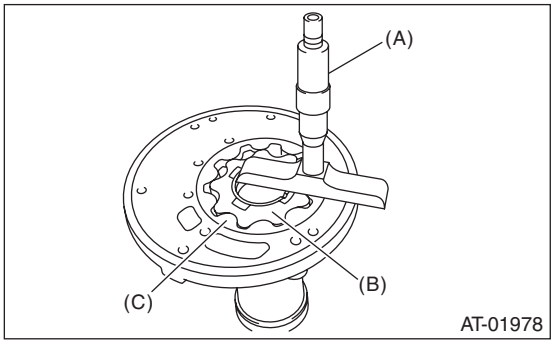
Tip clearance:
0.02 — 0.15 mm (0.0008 — 0.0059 in)



(A) Thickness gauge
(B) Inner rotor
(C) Outer rotor

(2) Side clearance
Set a depth gauge to oil pump housing, then measure the oil pump housing-to-rotor clearance.

Side clearance:
0.02 — 0.045 mm (0.0008 — 0.0018 in)



(A) Depth gauge
(B) Inner rotor
(C) Outer rotor

(3) If the tip and/or side clearance are not within the specification, replace the rotor assembly.

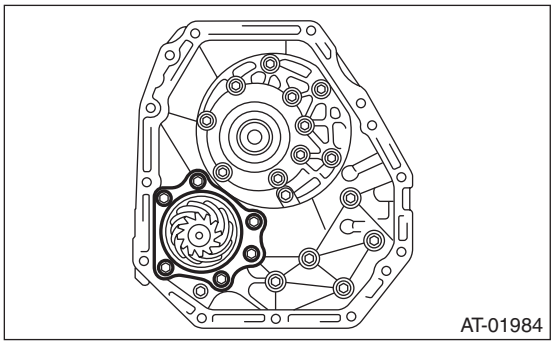
Oil pump rotor assembly	
Part No.	Thickness mm (in)
15008AA130	11.37 — 11.38 (0.4476 — 0.4480)
15008AA140	11.38 — 11.39 (0.4480 — 0.4484)
15008AA150	11.39 — 11.40 (0.4484 — 0.4488)

Check the total end play and adjust it to be within specifications. <Ref. to 5AT-102, ADJUSTMENT, AT Main Case.>

32.Drive Pinion Shaft Assembly

A: REMOVAL

1) Remove the transmission assembly from the vehicle. <Ref. to 5AT-36, REMOVAL, Automatic Transmission Assembly.>
2) Pull out the torque converter assembly. <Ref. to 5AT-62, REMOVAL, Torque Converter Assembly.>
3) Remove the transmission harness connector from stay.
4) Remove the ATF cooler inlet pipe and outlet pipe. <Ref. to 5AT-57, REMOVAL, ATF Cooler Pipe and Hose.>
5) Separate the converter case and transmission case. <Ref. to 5AT-77, REMOVAL, Converter Case.>
6) Remove the drive pinion shaft mounting bolts, and then remove the drive pinion shaft assembly from oil pump cover.



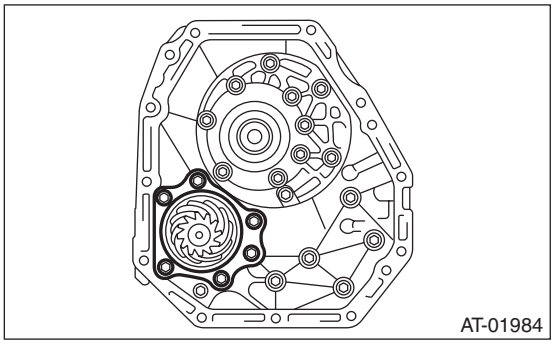
7) Remove the oil pump cover from AT main case. <Ref. to 5AT-79, Oil Pump Cover.>

B: INSTALLATION

1) Assemble the drive pinion assembly to oil pump cover.

NOTE:
Be careful not to bend the shim.

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

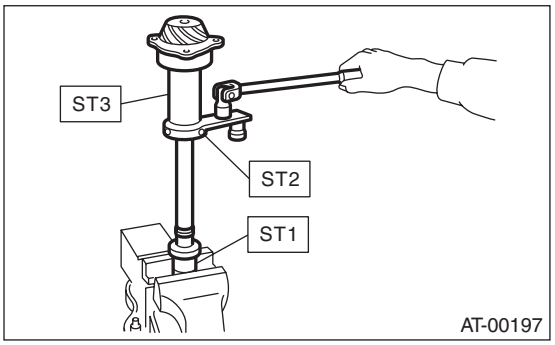


2) Adjust the tooth contact between drive pinion shaft assembly and the front differential side gear. <Ref. to 5AT-85, ADJUSTMENT, Drive Pinion Shaft Assembly.>
3) Join the converter case with the transmission case. <Ref. to 5AT-77, INSTALLATION, Converter Case.>
4) Install the transmission harness connector to the stay.
5) Install the ATF cooler pipe. <Ref. to 5AT-58, INSTALLATION, ATF Cooler Pipe and Hose.>
6) Install the torque converter assembly. <Ref. to 5AT-62, INSTALLATION, Torque Converter Assembly.>
7) Install the transmission assembly to the vehicle. <Ref. to 5AT-41, INSTALLATION, Automatic Transmission Assembly.>

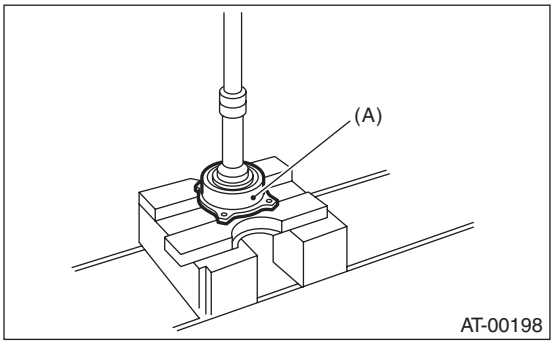
C: DISASSEMBLY

1) Flatten the lock nut tab, and then remove the lock nut while holding the rear spline part of the shaft using ST1 and ST2. Pull out the drive pinion collar.

ST1	18667AA010	HOLDER
ST2	499787700	WRENCH
ST3	499787500	ADAPTER

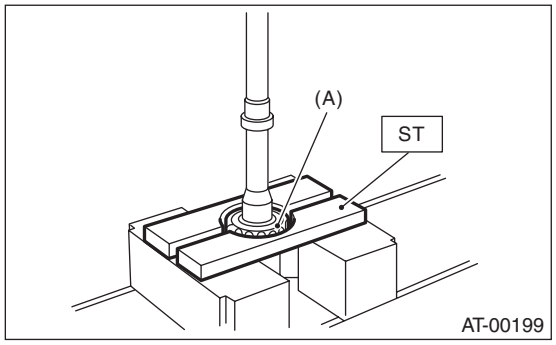


2) Remove the O-ring.
3) Separate the roller bearing and outer race from shaft using a press.



(A) Outer race

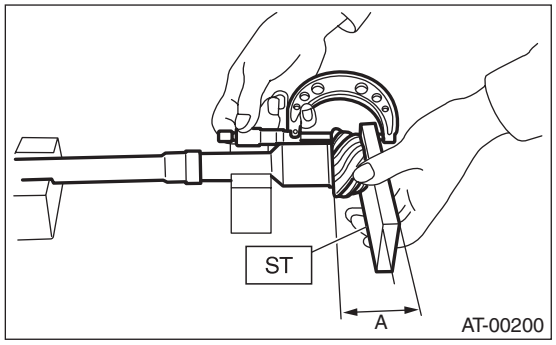
4) Separate the front roller bearing from the shaft using a press and the ST.
ST 498517000 REPLACER



(A) Front roller bearing

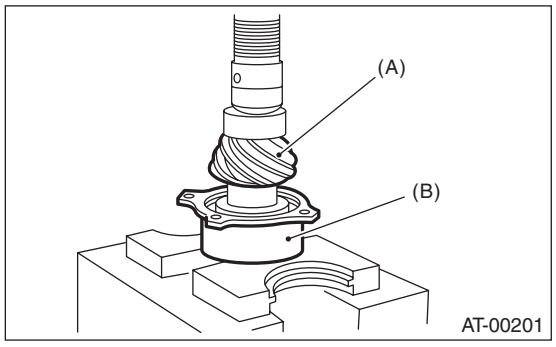
D: ASSEMBLY

1) Measure the dimension “A” of drive pinion shaft.
ST 398643600 GAUGE



2) Using a press, press-fit the new roller bearing into the specified position.

NOTE:
If excessive force is applied to roller bearing, the roller bearing will not turn easily.



(A) Drive pinion shaft
(B) Roller bearing

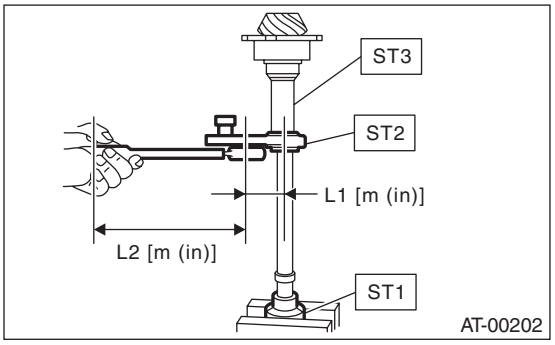
3) After fitting a new O-ring to the shaft, attach the drive pinion collar to the shaft.

4) Tighten the new lock nuts using ST1, ST2 and ST3.
Calculate the tightening torque using following formula.
T2 = L2/(L1 + L2) × T1
T1: 116 N·m (11.8 kgf-m, 85.6 ft-lb)
[Required torque setting]
T2: Tightening torque
L1: ST2 length 0.072 m (2.83 in)
L2: Torque wrench length
Example:

Torque wrench length m (in)	Tightening torque N·m (kgf-m, ft-lb)
0.4 (15.75)	98 (10.0, 72.3)
0.45 (17.72)	100 (10.2, 73.8)
0.5 (19.69)	101 (10.3, 74.5)
0.55 (21.65)	102 (10.4, 75.2)

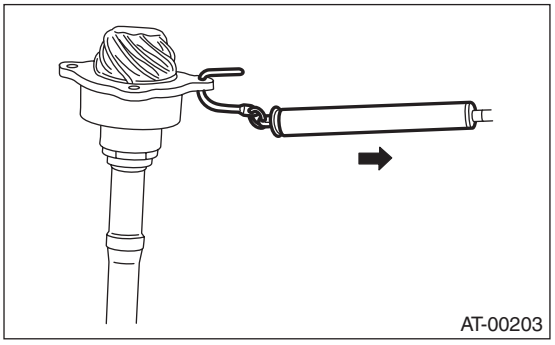
ST1 18667AA010 HOLDER
ST2 499787700 WRENCH
ST3 499787500 ADAPTER

NOTE:
Attach ST2 to torque wrench as straight as possible.



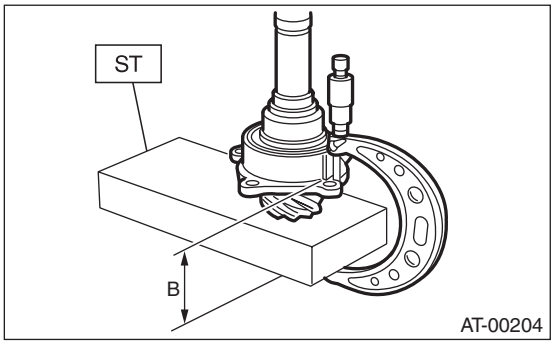
5) Measure the starting torque of the bearing. Make sure the starting torque is within the specified range. If the torque is not within specified range, replace the roller bearing.

Starting torque:
7.6 — 38.1 N (0.775 — 3.88 kgf, 1.7 — 8.6 lbf)



6) Crimp the locknut in 2 locations.

7) Measure the dimension “B” of the drive pinion shaft.
ST 398643600 GAUGE



8) Calculate the thickness “t” mm (in) of the drive pinion shim.
t = 6.5±0.0625 (0.256±0.0025) – (B – A)
9) Select three or less shims from following table.

Drive pinion shim	
Part No.	Thickness mm (in)
31451AA180	0.150 (0.0059)
31451AA190	0.175 (0.0069)
31451AA200	0.200 (0.0079)
31451AA210	0.225 (0.0089)
31451AA220	0.250 (0.0098)
31451AA230	0.275 (0.0108)

E: INSPECTION

• Make sure that all component parts are free of scratches, holes and other faults.
• Adjust the tooth alignment. <Ref. to 5AT-85, ADJUSTMENT, Drive Pinion Shaft Assembly.>

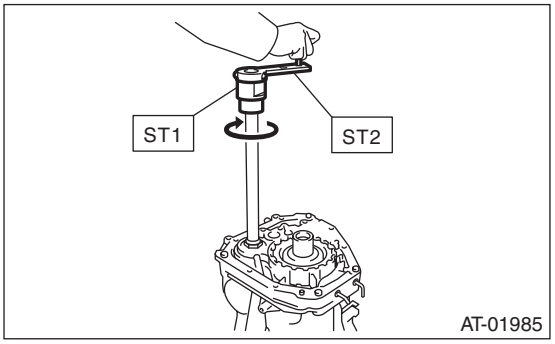
F: ADJUSTMENT

1) Assemble the drive pinion shaft assembly to oil pump cover.
2) Remove the liquid gasket from the mating surface completely.
3) Install the converter case to oil pump cover, and secure them with tightening four bolts evenly.

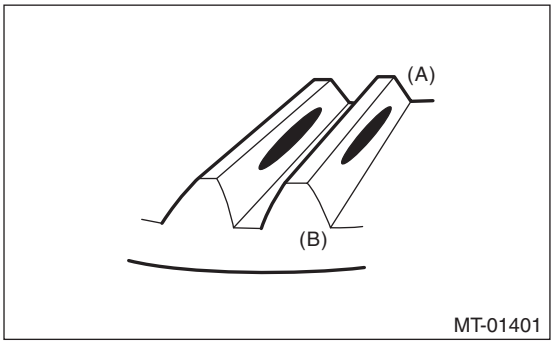
NOTE:
Use an old gasket or aluminum washer to prevent damaging the mating surface of the housing.

Tightening torque:
41 N·m (4.2 kgf-m, 30.2 ft-lb)

4) Rotate the drive pinion a few times using ST1 and ST2.
ST1 18667AA010 HOLDER
ST2 499787700 WRENCH



5) Adjust the drive pinion and hypoid driven gear backlash. <Ref. to 5AT-91, ADJUSTMENT, Front Differential Assembly.>
6) Apply lead-free red dye evenly on the surface of three to four teeth of the hypoid driven gear. Rotate the drive pinion in the leftward and rightward for several times. Remove the oil pump cover, and check the tooth contact pattern.
If the teeth contact is inappropriate, adjust the backlash or thickness of the shim. <Ref. to 5AT-91, ADJUSTMENT, Front Differential Assembly.>
• 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.

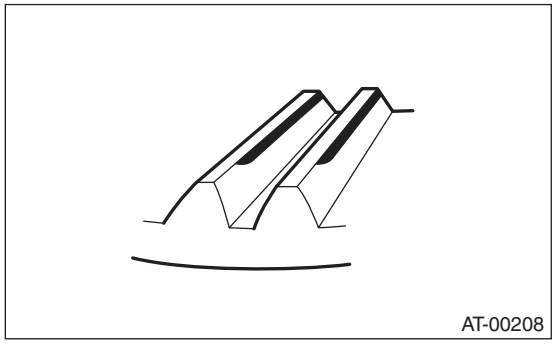


(A) Toe side
(B) Heel side

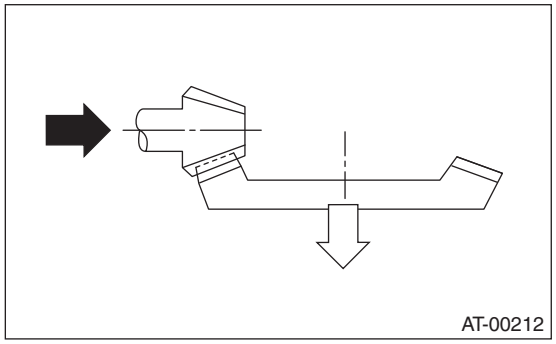
- Face contact

Check item: Backlash is too large.

Contact pattern



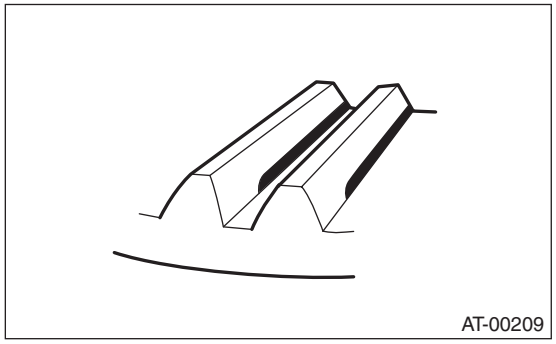
Adjustment: Increase the thickness of the shim according to the procedures for moving the drive pinion closer to the driven gear.



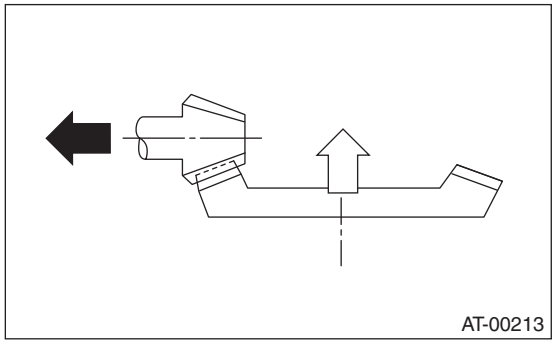
- Flank contact

Check item: Backlash is too small.

Contact pattern



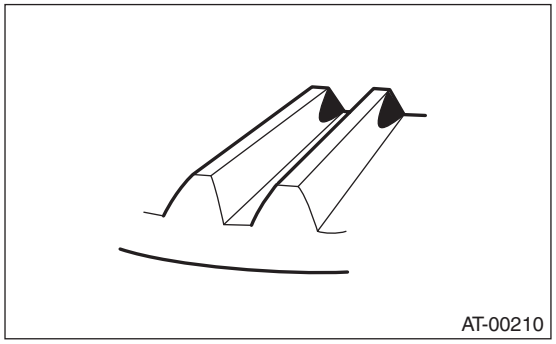
Adjustment: Reduce the thickness of the shim according to the procedure for moving the drive pinion away from the driven gear.



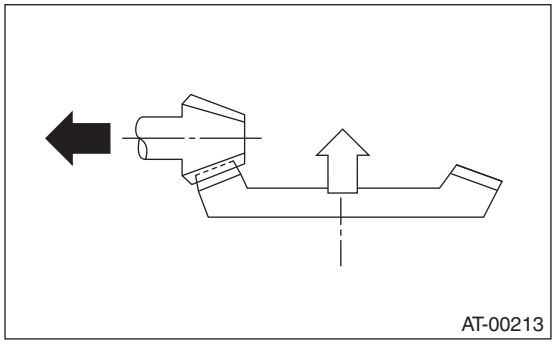
- Toe contact (inside contact)

Check item: Teeth contact area is too small.

Contact pattern



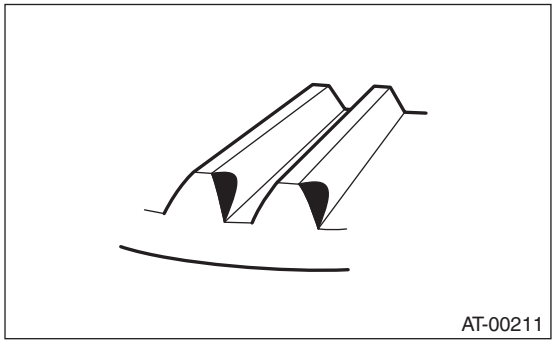
Adjustment: Reduce the thickness of the shim according to the procedure for moving the drive pinion away from the driven gear.



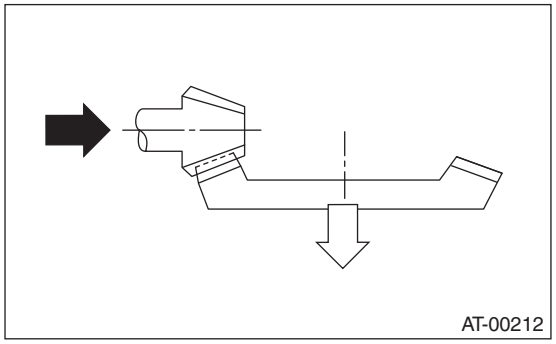
- Heel contact (outside end contact)

Check item: Teeth contact area is too small.

Contact pattern

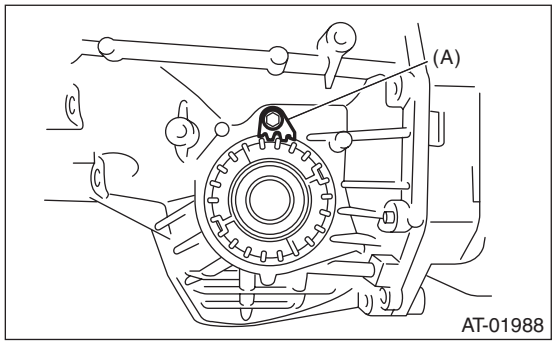


Adjustment: Increase the thickness of the shim according to the procedures for moving the drive pinion closer to the driven gear.



7) If tooth contact is correct, mark the retainer position and loosen it. After fitting a new O-ring and oil seal, screw in the retainer to the marked position. Tighten the lock plate with specified torque.

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



(A) Lock plate

33.Front Differential Assembly

A: REMOVAL

1) Remove the transmission assembly from the vehicle. <Ref. to 5AT-36, REMOVAL, Automatic Transmission Assembly.>
2) Pull out the torque converter assembly. <Ref. to 5AT-62, REMOVAL, Torque Converter Assembly.>
3) Remove the transmission harness connector from stay.
4) Remove the ATF cooler inlet pipe and outlet pipe. <Ref. to 5AT-57, REMOVAL, ATF Cooler Pipe and Hose.>
5) Separate the converter case from the transmission case. <Ref. to 5AT-77, REMOVAL, Converter Case.>
6) Remove the differential side retainers using ST.

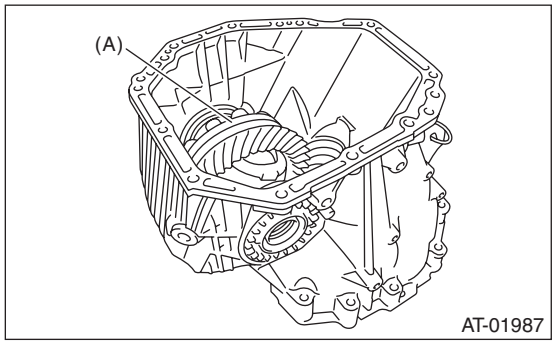
NOTE:
Hold the differential case assembly by hand to avoid damaging the differential side retainer mounting hole of the converter case.

ST 18630AA010 WRENCH COMPL RETAINER

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

B: INSTALLATION

1) When installing the front differential assembly to the case, be careful not to damage the inside of case (particularly, the differential side retainer mating surface).



(A) Front differential ASSY

2) Install the O-ring to left and right side retainers.

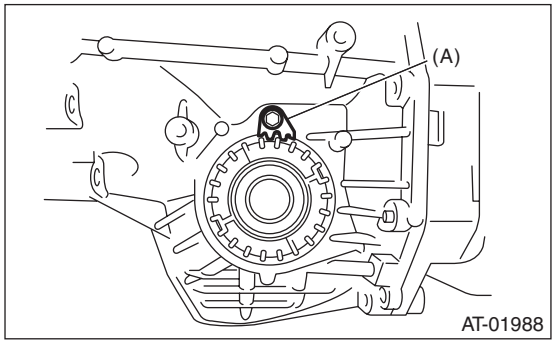
NOTE:
Use new O-rings.

3) Using the ST, install the side retainer. <Ref. to 5AT-91, ADJUSTMENT, Front Differential Assembly.>

ST 18630AA010 WRENCH COMPL RETAINER

4) Adjust the backlash of the front differential. <Ref. to 5AT-91, ADJUSTMENT, Front Differential Assembly.>
5) Install the lock plate.

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



(A) Lock plate

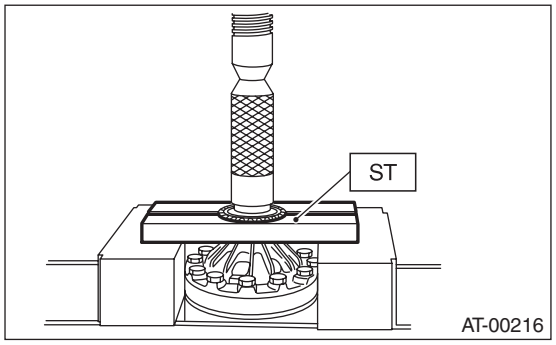
6) Install the converter case to the transmission case. <Ref. to 5AT-77, INSTALLATION, Converter Case.>
7) Install the transmission harness connector to the stay.
8) Install the ATF cooler pipe. <Ref. to 5AT-58, INSTALLATION, ATF Cooler Pipe and Hose.>
9) Install the torque converter assembly. <Ref. to 5AT-62, INSTALLATION, Torque Converter Assembly.>
10) Install the transmission assembly to the vehicle. <Ref. to 5AT-41, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

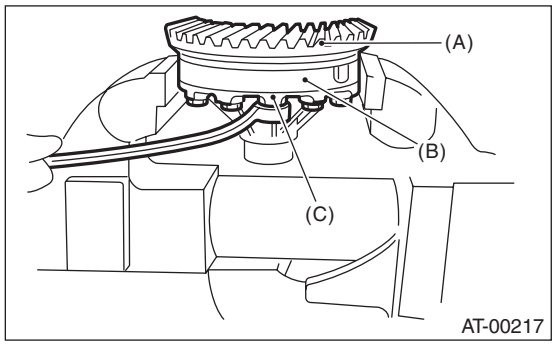
1. DIFFERENTIAL CASE ASSEMBLY

1) Remove the taper roller bearing using the ST and the press.

ST 498077000 REMOVER

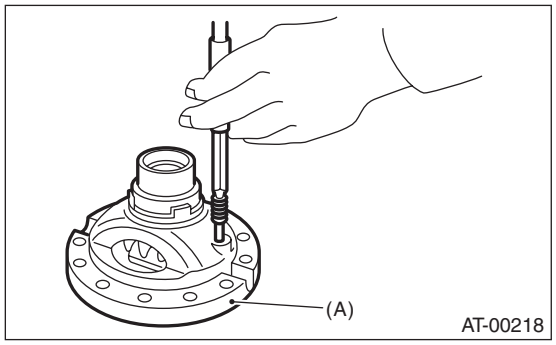


2) Secure the case in a vise, remove the hypoid driven gear tightening bolts, and then separate the hypoid driven gear into case (RH) and case (LH).



(A) Hypoid driven gear
(B) Differential case (RH)
(C) Differential case (LH)

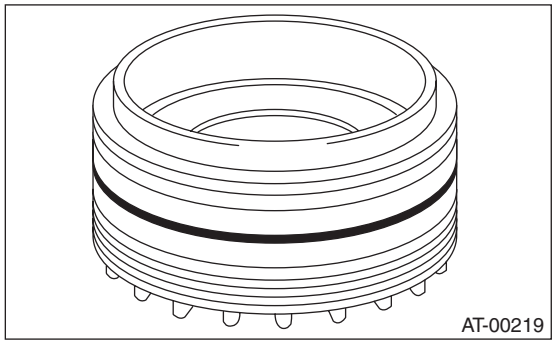
3) Pull out the straight pin and shaft, and then remove the differential bevel gear, washer and differential bevel pinion.



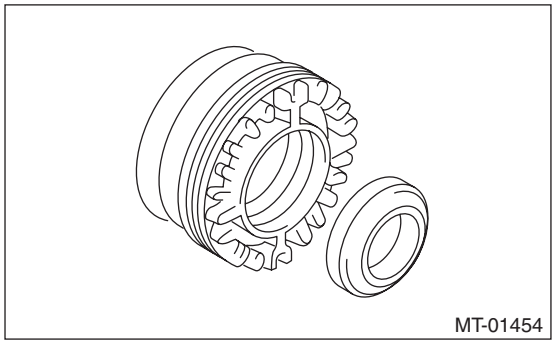
(A) Differential case (RH)

2. SIDE RETAINER

NOTE:
After adjusting the drive pinion backlash and tooth contact, remove and install the oil seal and O-ring.
1) Remove the O-ring.

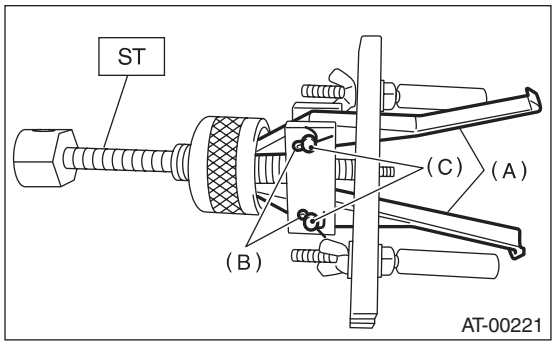


2) Remove the oil seal.



3) Remove the bearing outer race.
(1) Remove the split pin, and then remove the claw.

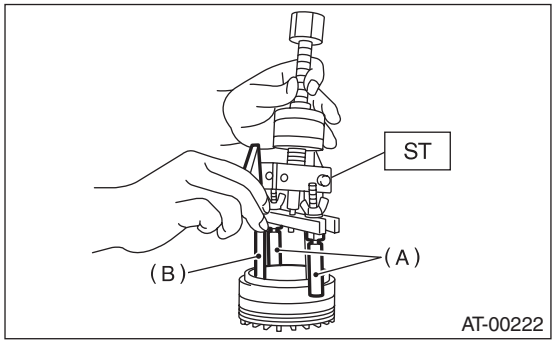
ST 398527700 PULLER ASSY



(A) Claw
(B) Split pin
(C) Pin

(2) Attach two claws to the outer race, and set the ST to side retainer.

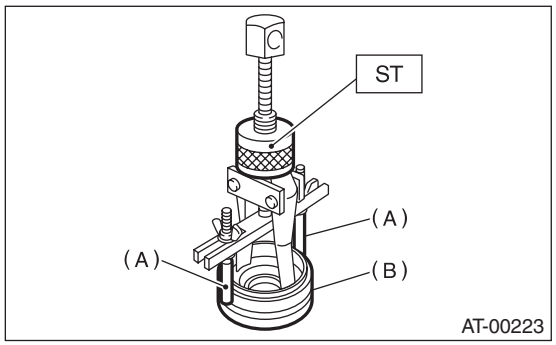
ST 398527700 PULLER ASSY



(A) Shaft
(B) Claw

(3) Restore the removed claws to original position, and install the pin and split pin.
(4) Hold the shaft of ST to avoid removing from side retainer, and then remove the bearing outer race.

NOTE:
Replace the bearing inner and outer races as a single unit.
ST 398527700 PULLER ASSY

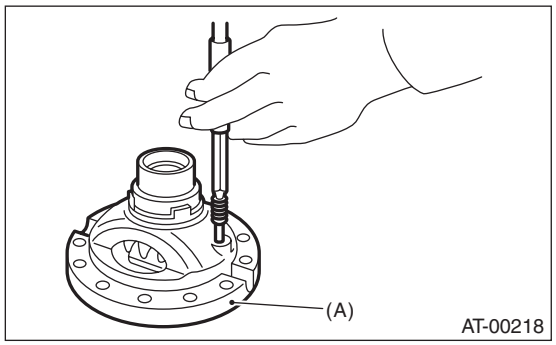


(A) Shaft
(B) Side retainer

D: ASSEMBLY

1. DIFFERENTIAL CASE ASSEMBLY

1) Install the washer, differential bevel gear and differential bevel pinion in the differential case (RH). Insert the pinion shaft.
2) Attach the straight pin in the reverse direction.

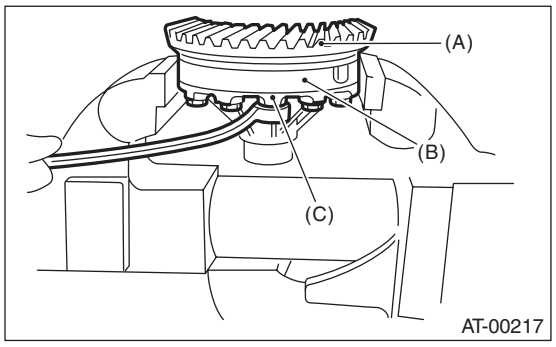


(A) Differential case (RH)

3) Install the washer and differential bevel gear to differential case (LH). Put the differential case (LH) on the differential case (RH), and assemble the two differential cases.

4) Install the hypoid driven gear and secure by tightening the bolt.

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

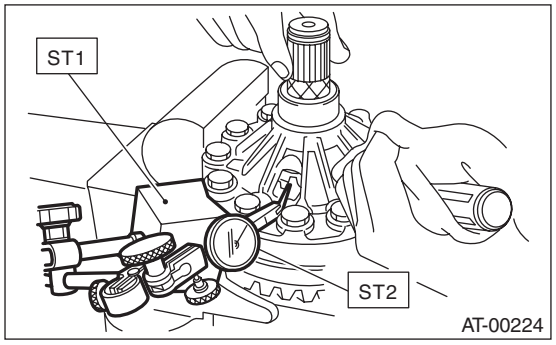


(A) Hypoid driven gear
(B) Differential case (RH)
(C) Differential case (LH)

5) Measurement of backlash (Selection of washer)
(1) Install the SUBARU genuine axle shaft to differential case.
Part No. 38415AA070 Axle shaft
(2) Measure the gear backlash using ST1 and ST2, and then insert the ST2 through the access 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 gear in place with a screwdriver covered with waste cloth, or a similar tool.

Standard:
0.13 — 0.18 mm (0.0051 — 0.0071 in)
ST1 498247001 MAGNET BASE
ST2 498247100 DIAL GAUGE



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

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

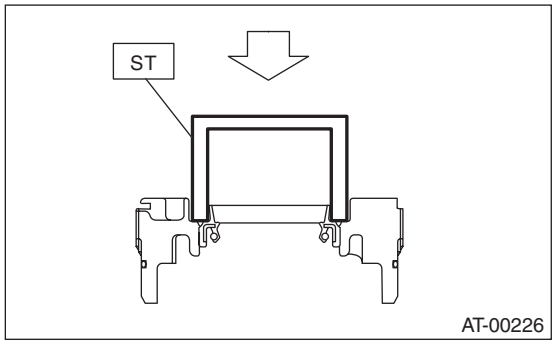
6) Using the ST, install the taper roller bearing.
ST 398487700 DRIFT

2. SIDE RETAINER

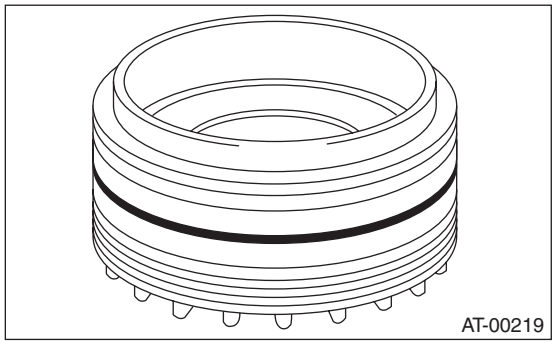
NOTE:
Install the oil seal and O-ring of side retainer after the adjustment of backlash and tooth contact.
1) Install the bearing outer race to side retainer.
2) Using the ST, install the oil seal.

NOTE:
- Use a new oil seal.
- Apply 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 seal RH and LH.

ST 18675AA000 DIFFERENTIAL SIDE OIL SEAL INSTALLER



3) Install a new O-ring.



E: INSPECTION

- Check each component for scratches, damage or other faults.
- Measure the backlash, and then adjust it to be within specification. <Ref. to 5AT-91, ADJUSTMENT, Front Differential Assembly.>

F: ADJUSTMENT

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

NOTE:
Screw-in the retainer RH side slightly deeper than the retainer LH.

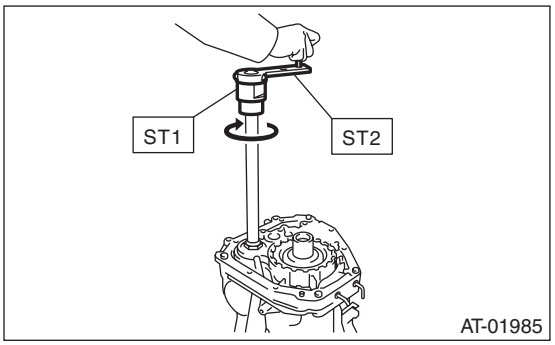
ST 18658AA020 WRENCH COMPL RETAINER

2) Remove the oil pump cover.
3) Remove the liquid gasket from the mating surface completely.
4) Install the oil pump cover to converter case, and secure them with tightening four bolts evenly.

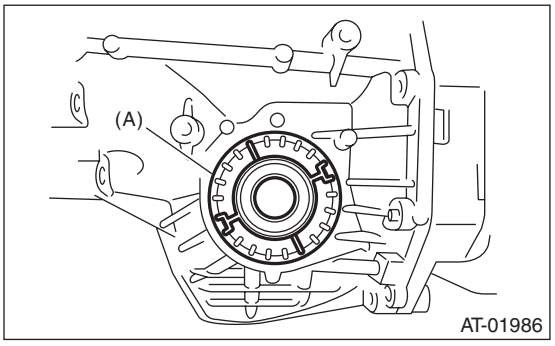
NOTE:
Use an old gasket or aluminum washer to prevent damaging the mating surface of the housing.

Tightening torque:
41 N·m (4.2 kgf-m, 30.2 ft-lb)

5) Rotate the drive pinion ten times or more using ST1 and ST2.
ST1 18667AA010 HOLDER
ST2 499787700 WRENCH

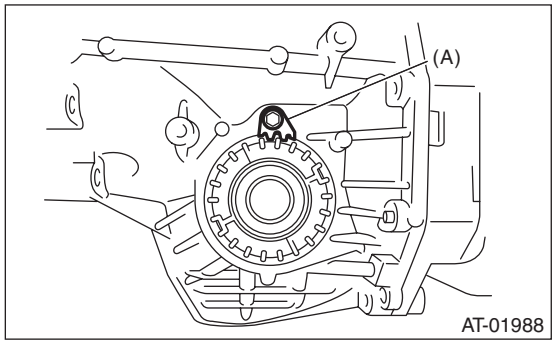


6) Tighten the LH retainer by rotating the shaft until resistance is felt. Then loosen the retainer RH. Keep tightening the retainer LH, and loosening the retainer RH until the pinion shaft no longer be turned. This is the “zero” state.



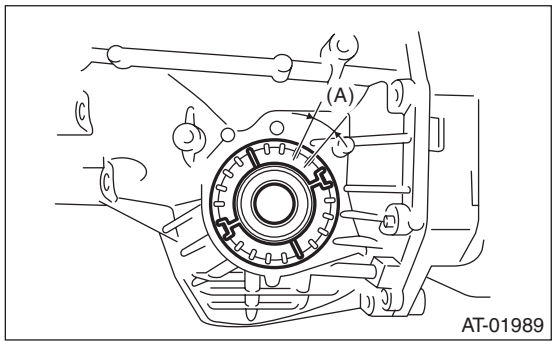
(A) Retainer

7) After the “zero” state is established, loosen the retainer LH by 3 notches and secure it with the lock plate. Then 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 one notch (A) changes the backlash approx. 0.05 mm (0.0020 in).



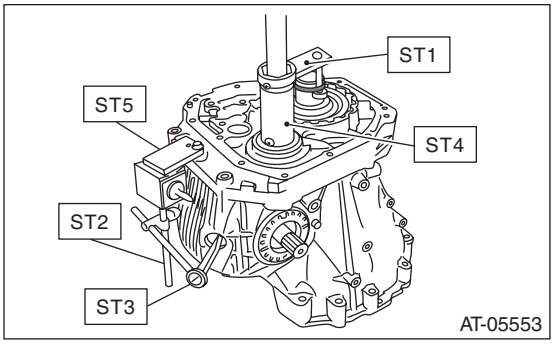
8) Install the SUBARU genuine axle shaft to the left and right sides of the front differential.

9) Turn the drive pinion a few times with ST1 and check to see if the backlash is within the specified value, using ST2, ST3, ST4 and ST5.

NOTE:
Secure the ST1 and stator shaft with the tie-wrap.

Backlash:
0.13 — 0.18 mm (0.0051 — 0.0071 in)

ST1	499787700	WRENCH
ST2	498247001	MAGNET BASE
ST3	498247100	DIAL GAUGE
ST4	499787500	ADAPTER
ST5	498255400	PLATE



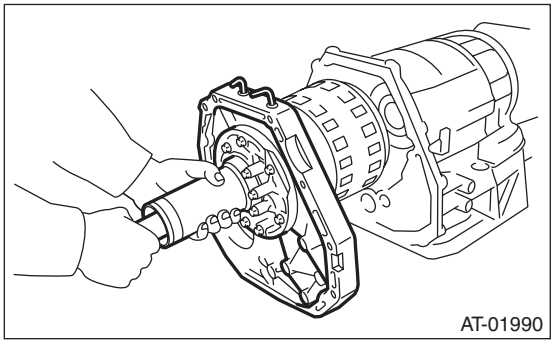
10) Adjust the teeth contact of the front differential and drive shaft. <Ref. to 5AT-85, ADJUSTMENT, Drive Pinion Shaft Assembly.>

34.AT Main Case

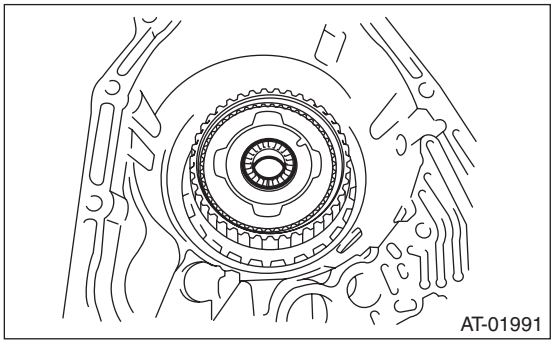
A: REMOVAL

1) Remove the transmission assembly from the vehicle. <Ref. to 5AT-36, REMOVAL, Automatic Transmission Assembly.>
2) Pull out the torque converter assembly. <Ref. to 5AT-62, REMOVAL, Torque Converter Assembly.>
3) Remove the transmission harness connector from stay.
4) Remove the ATF cooler inlet pipe and outlet pipe. <Ref. to 5AT-57, REMOVAL, ATF Cooler Pipe and Hose.>
5) Remove the extension case. <Ref. to 5AT-64, REMOVAL, Extension Case.>
6) Remove the center differential carrier. <Ref. to 5AT-73, REMOVAL, Center Differential Carrier.>
7) Remove the reduction driven gear. <Ref. to 5AT-70, REMOVAL, Reduction Driven Gear.>
8) Separate the converter case from the transmission case. <Ref. to 5AT-77, REMOVAL, Converter Case.>
9) Remove the control valve body. <Ref. to 5AT-54, REMOVAL, Control Valve Body.>
10) Remove the oil pump cover. <Ref. to 5AT-79, REMOVAL, Oil Pump Cover.>

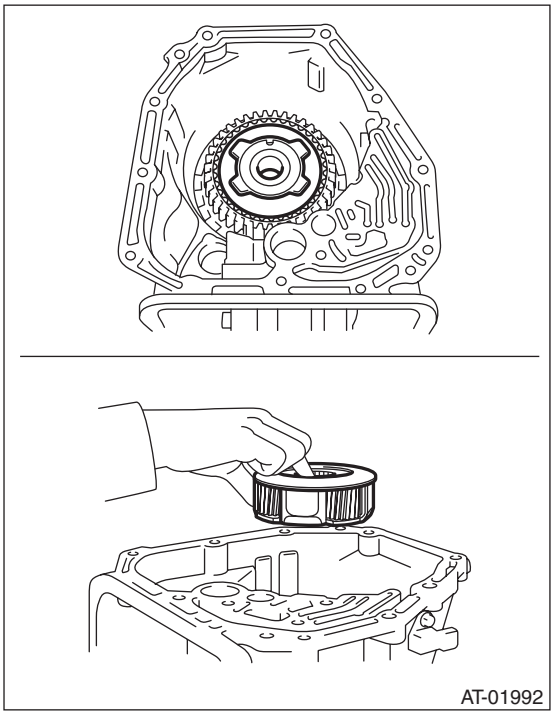
NOTE:
The input clutch pack assembly and front sun gear assembly are also removed together.


AT-01990

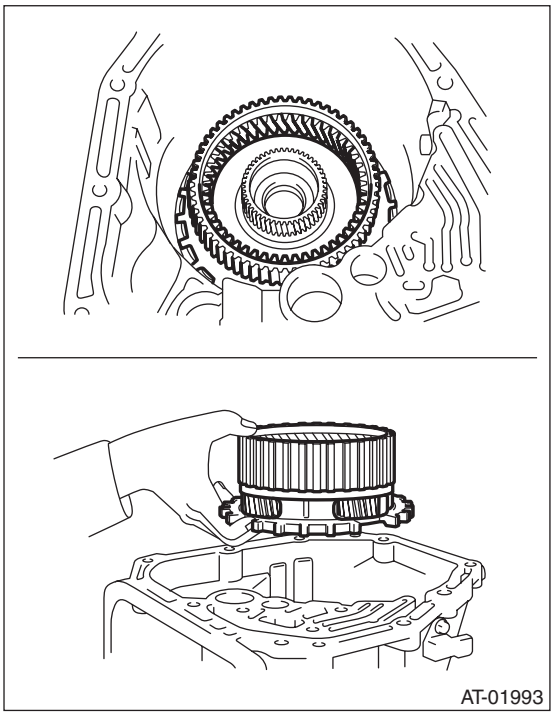
11) Remove the needle bearing of the middle carrier assembly.


AT-01991

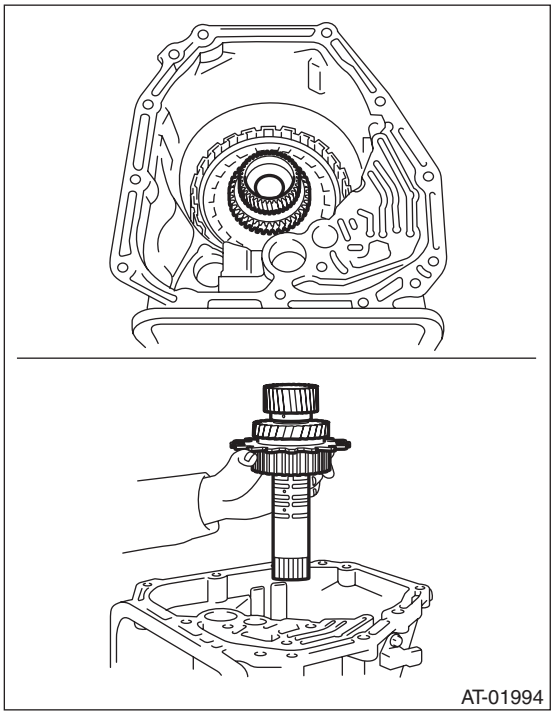
12) Remove the middle carrier assembly.


AT-01992

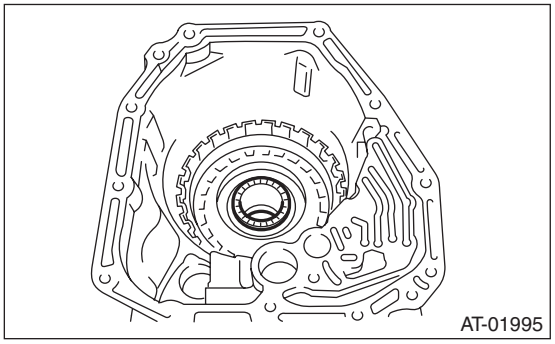
13) Remove the rear carrier assembly.


AT-01993

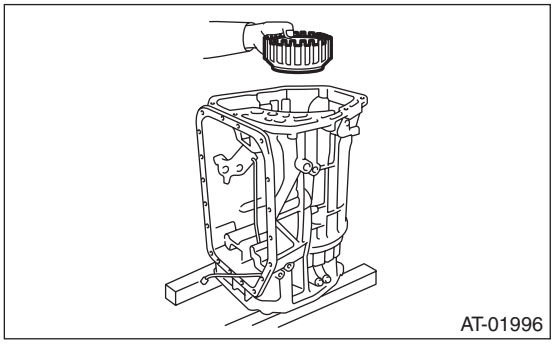
14) Remove the middle & rear sun gear assembly.



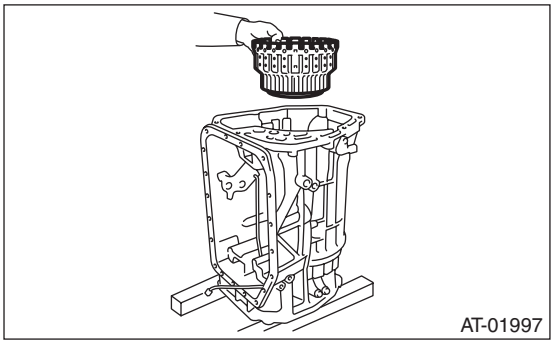
15) Remove the thrust needle bearing of high & low reverse clutch.



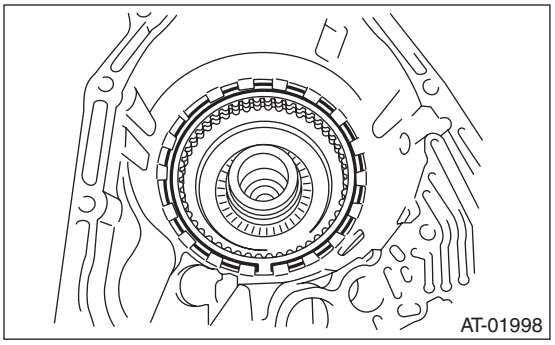
16) Remove the high & low reverse clutch assembly.



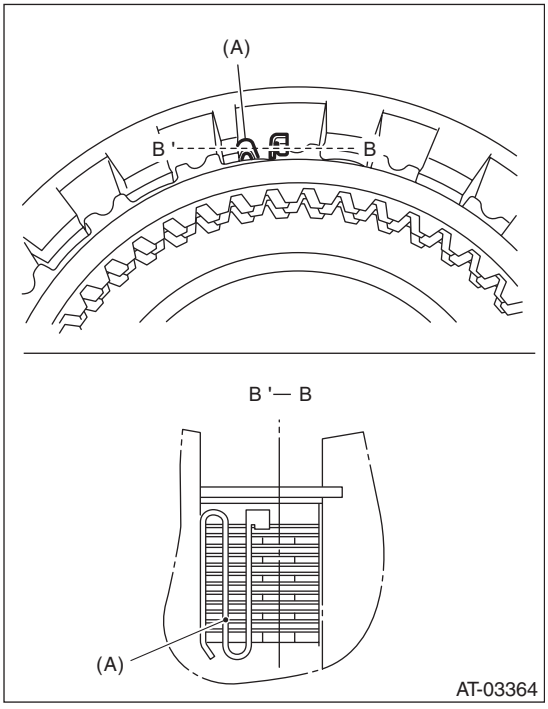
17) Remove the direct clutch assembly.



18) Remove the snap ring of reverse brake.



19) Remove the retaining plate.
20) Remove the leaf spring.

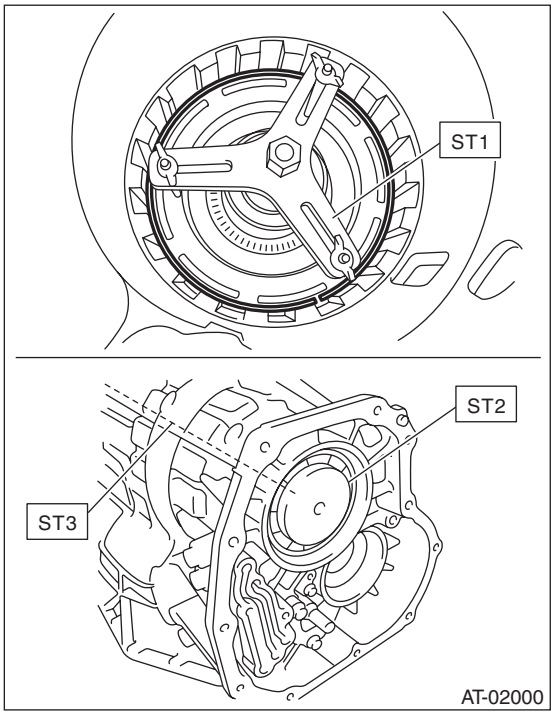


(A) Leaf spring

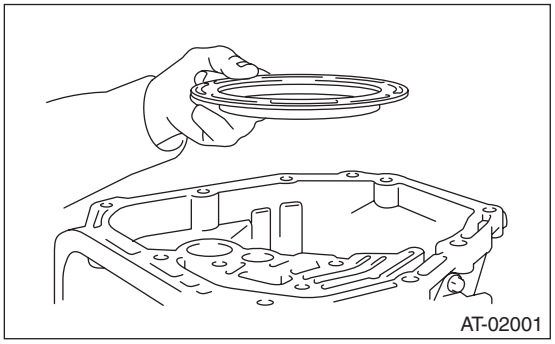
21) Take out the drive plate, driven plate and dish plate.

22) Remove the snap ring of the reverse brake spring retainer.

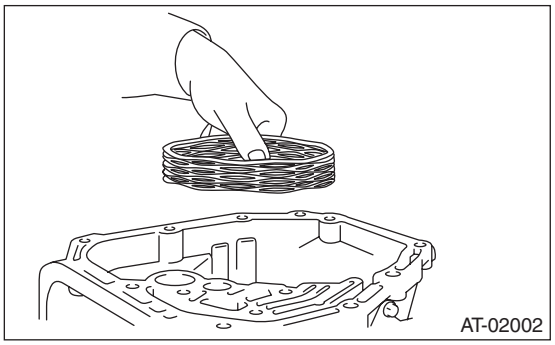
ST1	18762AA000	COMPRESSOR SPECIAL TOOL
ST2	18765AA000	COMPRESSOR SUPPORT
ST3	18763AA000	COMPRESSOR SHAFT



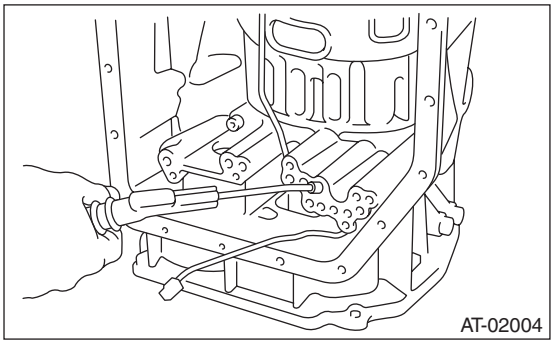
23) Remove the spring retainer.



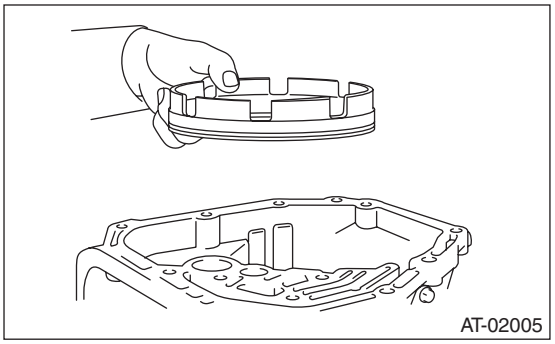
24) Remove the return spring.



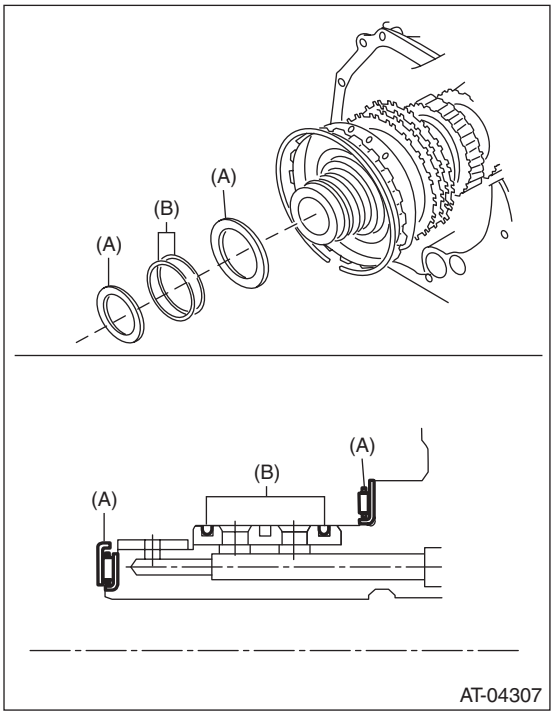
25) Apply compressed air.



26) Remove the reverse brake piston.



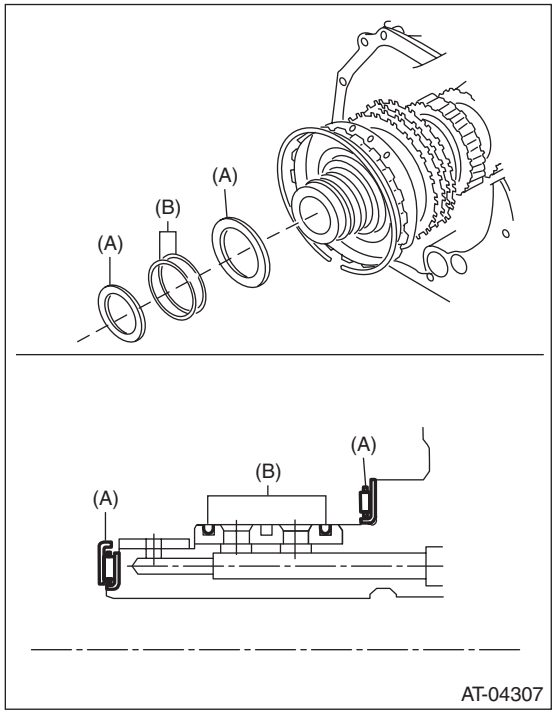
27) Remove the thrust bearing and seal ring.



(A) Thrust bearing
(B) Seal ring

B: INSTALLATION

1) Apply ATF to the new seal ring.
2) Install the thrust bearing and new seal ring to the drum support.



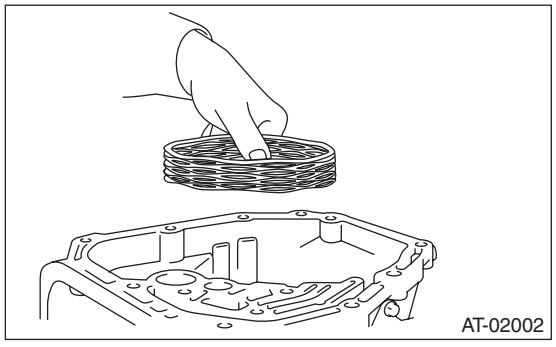
(A) Thrust bearing
(B) Seal ring

3) Install the reverse brake piston.

NOTE:
Apply ATF onto the piston sliding surface.

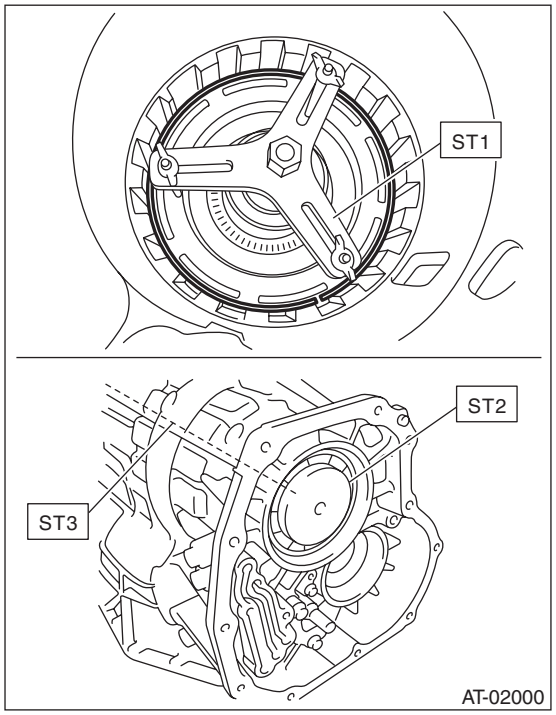
ST1	18762AA000	COMPRESSOR SPECIAL TOOL
ST2	18765AA000	COMPRESSOR SUPPORT
ST3	18763AA000	COMPRESSOR SHAFT

4) Install the return spring.



5) Install the spring retainer and snap ring.

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

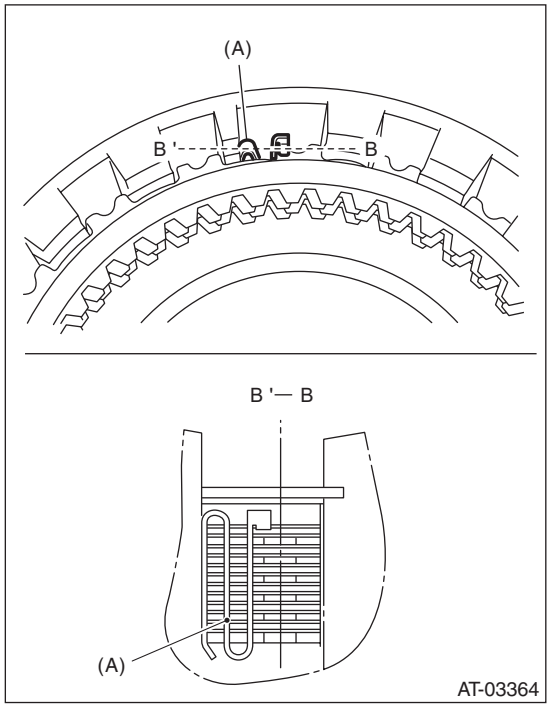


6) Install the dish plate.

NOTE:
When installing, make sure that the identification mark is facing the rear side of transmission.
7) Install the drive plate and driven plate.

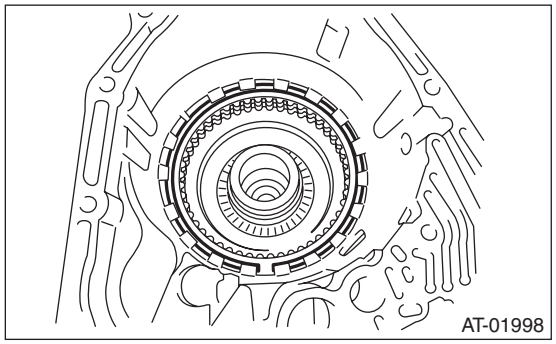
NOTE:
When the reverse brake is disassembled, use a new drive plate and driven plate set.

8) Install the leaf spring.

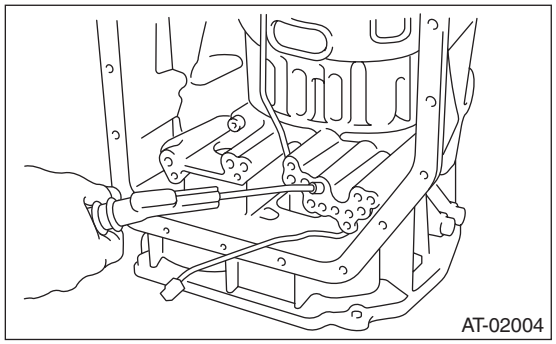


(A) Leaf spring

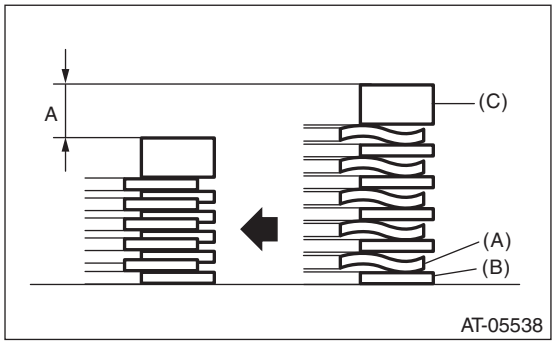
9) Install the retaining plate.
10) Install the snap ring of the reverse brake.



11) Apply compressed air intermittently to check for operation.



12) Check the piston stroke.
(1) Check the amount of drive plate compression "A" described in the wave clutch set of repair parts.

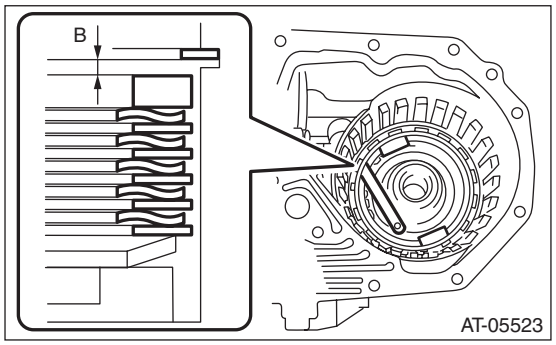


A Amount of drive plate compression

(A) Drive plate
(B) Driven plate
(C) Retaining plate

(2) Measure the clearance "B" between the retaining plate and snap ring using a thickness gauge.

NOTE:
• Set shims of the same thickness on both sides so that the retaining plate will not tilt.
• Do not push the shim down with force to a point where the waves on the drive plate will become crushed.



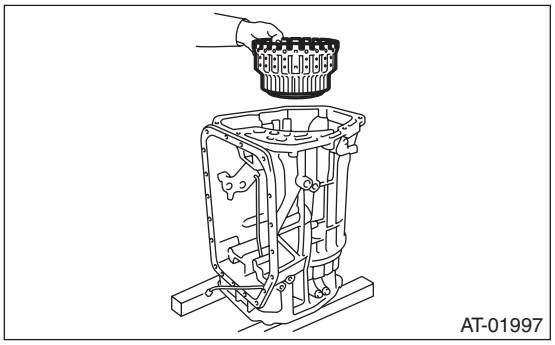
B Clearance between retaining plate and snap ring

(3) Select and install a retaining plate so that the value calculated from the dimensions A and B is within the standard.
T = A + B
T: Piston stroke
A: Amount of drive plate compression
B: Clearance between retaining plate and snap ring

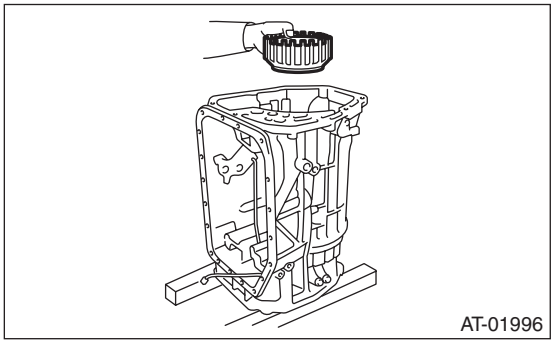
Initial standard:
2.0 — 2.4 mm (0.08 — 0.09 in)

Retaining plate	
Part No.	Thickness mm (in)
31567AB100	4.2 (0.165)
31567AB170	4.4 (0.173)
31567AB180	4.6 (0.181)
31567AB190	4.8 (0.189)
31567AB200	5.0 (0.197)

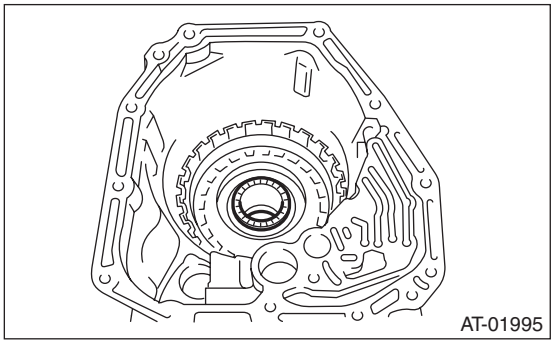
13) Install the direct clutch assembly.



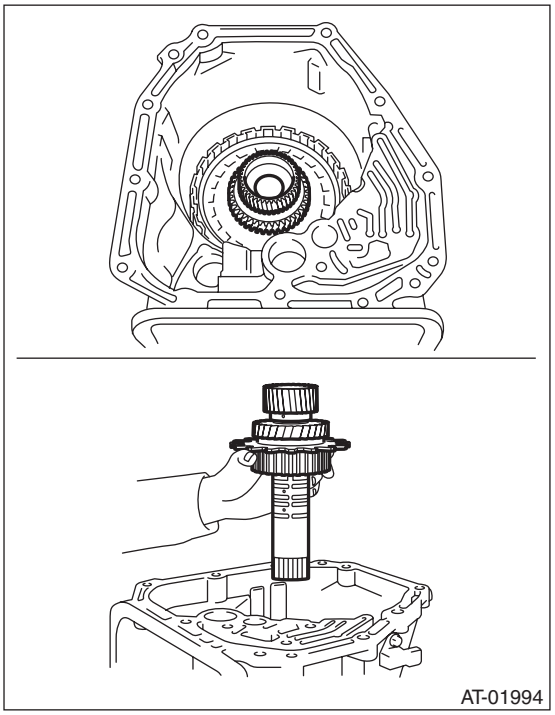
14) Install the high & low reverse clutch assembly.



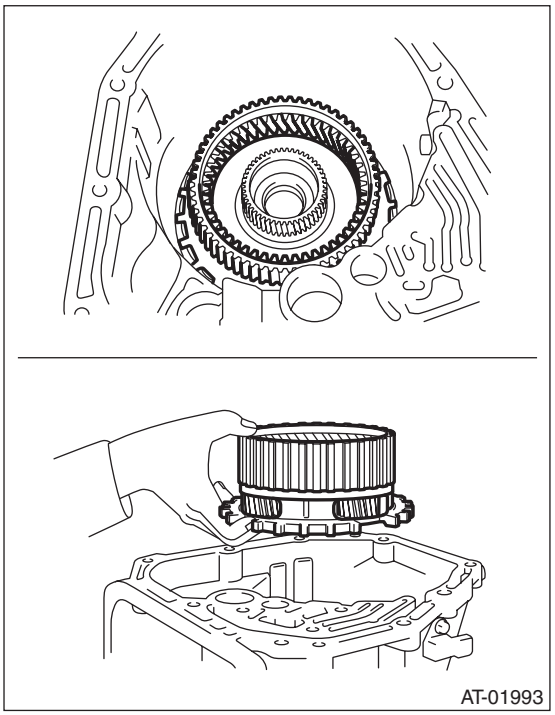
15) Install the thrust needle bearing of the high & low reverse clutch.



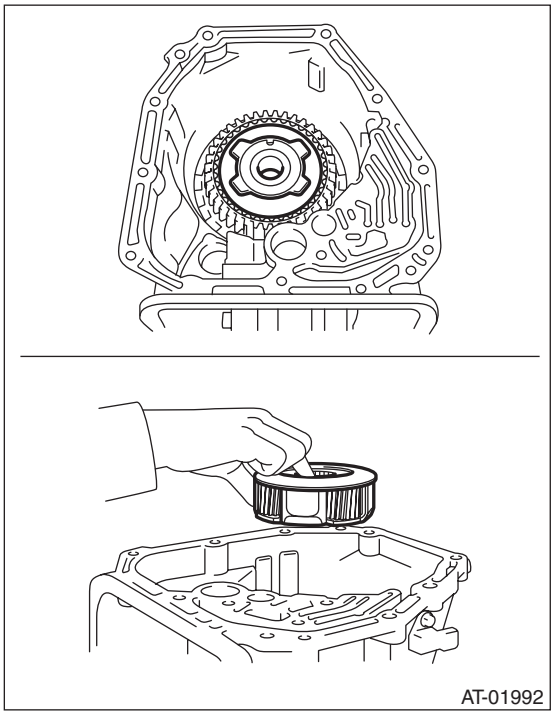
16) Install the middle & rear sun gear assembly.



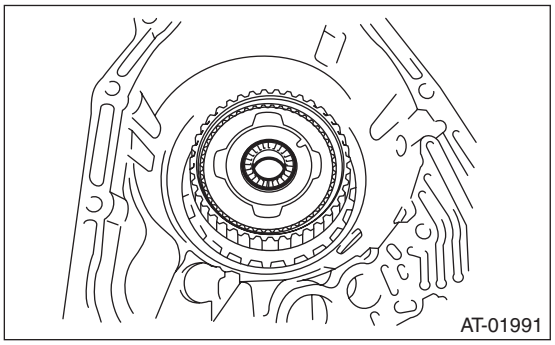
17) Install the rear carrier assembly.



18) Install the middle carrier assembly.

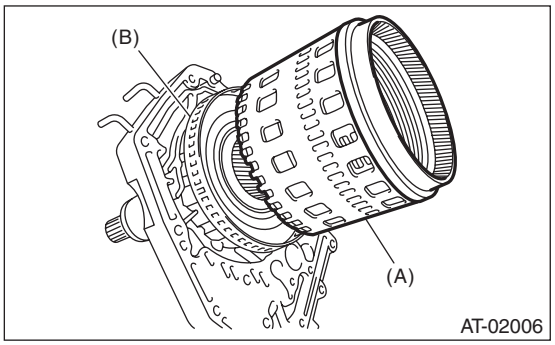


19) Install the thrust needle bearing of middle carrier assembly.



20) Measure the total end play, and select the bearing. <Ref. to 5AT-102, ADJUSTMENT, AT Main Case.>

21) Install the input clutch pack assembly to oil pump cover.

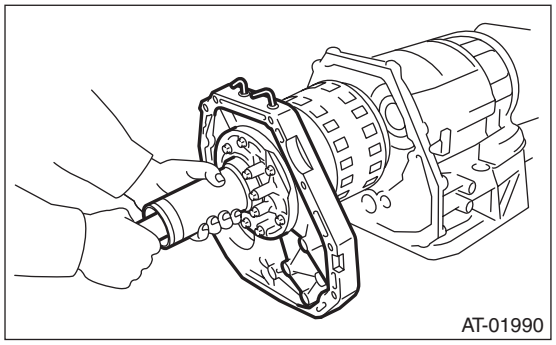


(A) Input clutch pack ASSY
(B) Front sun gear ASSY

22) Turn the transmission sideways.

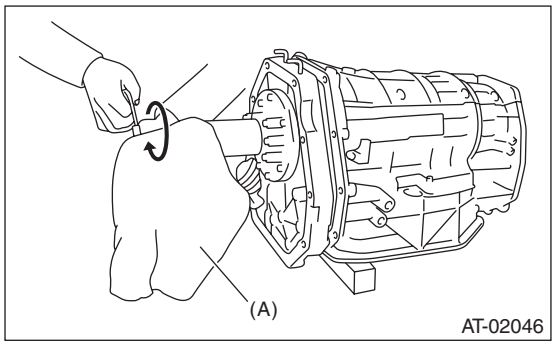
23) Install the oil pump cover.
(1) Apply ATF to the O-ring of input clutch shaft.
(2) Install the oil pump cover to AT main case while supporting the input clutch shaft and oil pump housing with your hand.

NOTE:
Use a new gasket.



(3) Protect the input clutch shaft with a cloth, and rotate to engage the spline of the input clutch and rear carrier using pliers.

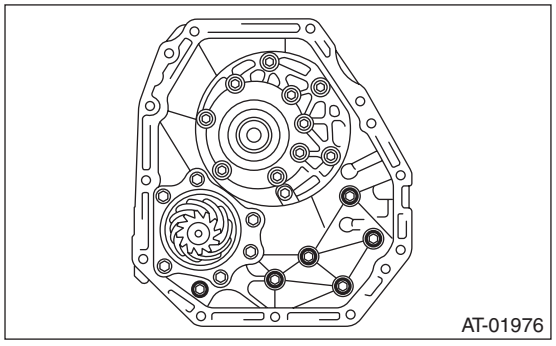
NOTE:
Work with pressing the oil pump cover.



(A) Cloth

(4) Combine the oil pump cover with transmission main case.

Tightening torque:
41 N·m (4.2 kgf-m, 30.2 ft-lb)



24) Install the center differential carrier. <Ref. to 5AT-73, INSTALLATION, Center Differential Carrier.>

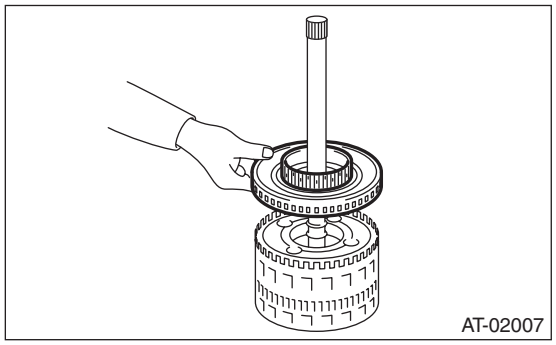
25) Install the reduction driven gear. <Ref. to 5AT-70, INSTALLATION, Reduction Driven Gear.>
26) Install the extension case. <Ref. to 5AT-64, INSTALLATION, Extension Case.>
27) Install the control valve body. <Ref. to 5AT-54, INSTALLATION, Control Valve Body.>
28) Install the converter case assembly to the transmission case assembly. <Ref. to 5AT-77, INSTALLATION, Converter Case.>
29) Install the ATF cooler pipe. <Ref. to 5AT-58, INSTALLATION, ATF Cooler Pipe and Hose.>
30) Install the torque converter assembly. <Ref. to 5AT-62, INSTALLATION, Torque Converter Assembly.>
31) Install the transmission assembly to the vehicle. <Ref. to 5AT-41, INSTALLATION, Automatic Transmission Assembly.>
32) Perform Clear Memory 2 operation. <Ref. to 5AT(diag)-21, Clear Memory Mode.>
33) Perform the diagnosis again. <Ref. to 5AT(diag)-23, Learning Control.>
34) Perform the inspection at the end of repair work, and make sure there is no faulty as below;

- Excessive shift shock
- Oil leakage from the transmission body, etc.
- Occurrence of noise caused by interference etc.

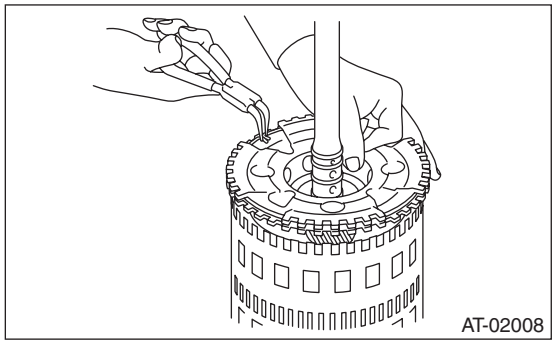
C: DISASSEMBLY

1. INPUT CLUTCH PACK ASSEMBLY

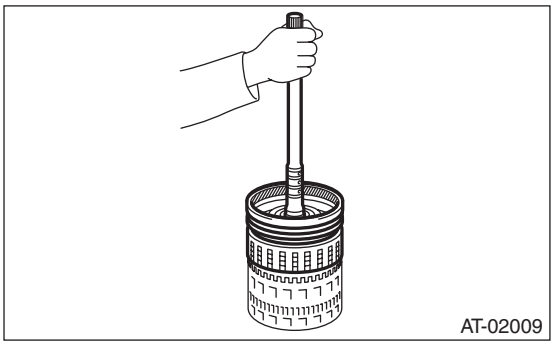
1) Remove the front sun gear.


AT-02007

2) Remove the thrust bearing.
3) Remove the snap ring, and then remove the front carrier.


AT-02008

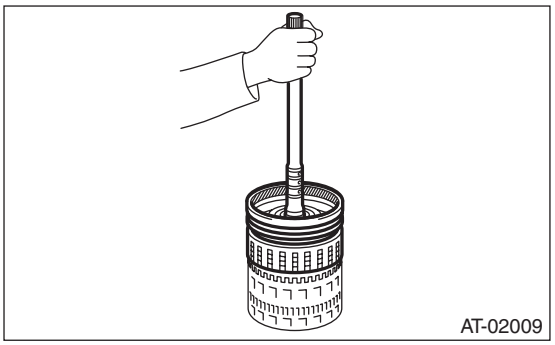
4) Remove the input clutch assembly from rear internal gear.


AT-02009

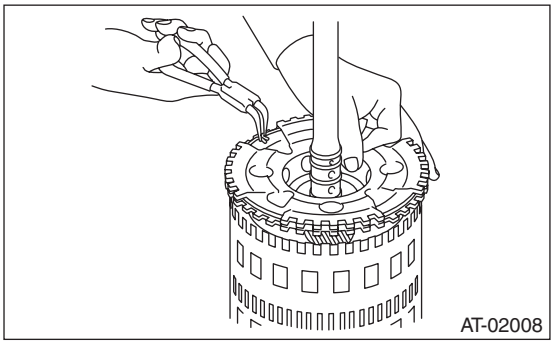
D: ASSEMBLY

1. INPUT CLUTCH PACK ASSEMBLY

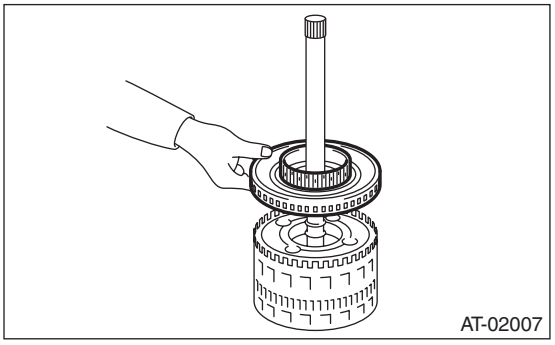
1) Assemble the input clutch assembly to rear internal gear.


AT-02009

2) Install the front carrier, and then install the snap ring.


AT-02008

3) Install the thrust bearing.
4) Install the front sun gear.


AT-02007

E: INSPECTION

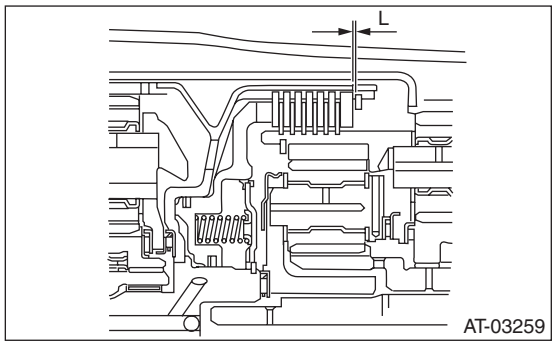
1. FRONT, MIDDLE & REAR PLANETARY CARRIER ASSEMBLY

Check the following items.
• Visually inspect the tooth surface of planetary gear, and replace with new part if damaged, broken or excessively worn.
• Inspect the planetary carrier body for damage or breakage.

2. INPUT CLUTCH

• Check the clearance of the input clutch. Measure the clearance “L” between snap ring and retaining plate using a thickness gauge. If it is out of specification, replace the entire input clutch assembly.
• Check for damage on the drive plate, driven plate and snap ring, and replace the entire input clutch assembly if damaged.

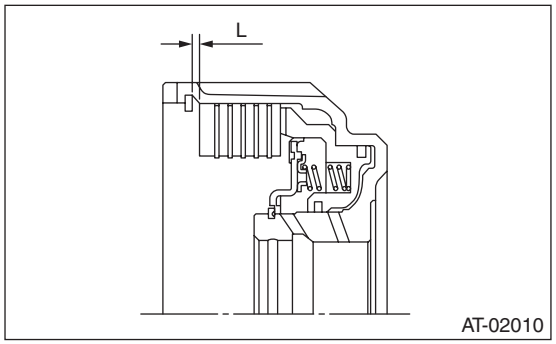
Standard:
0.7 — 1.1 mm (0.028 — 0.043 in)



3. HIGH & LOW REVERSE CLUTCH ASSEMBLY

• Check the clearance of the high & low reverse clutch.
Measure the clearance “L” between snap ring and retaining plate using a thickness gauge. If it is out of specification, replace the entire high & low reverse clutch assembly.
• Check for damage on the drive plate, driven plate and snap ring, and replace the entire high & low reverse clutch assembly if damaged.

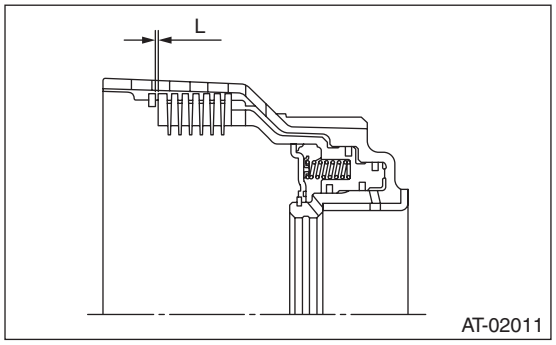
Standard:
1.8 — 2.2 mm (0.071 — 0.087 in)



4. DIRECT CLUTCH ASSEMBLY

• Check the clearance of direct clutch.
Measure the clearance “L” between snap ring and retaining plate using a thickness gauge. If it is out of specification, replace the entire direct clutch assembly.
• Check for damage on the drive plate, driven plate and snap ring, and replace the entire direct clutch assembly if damaged.

Standard:
0.6 — 1.0 mm (0.024 — 0.039 in)

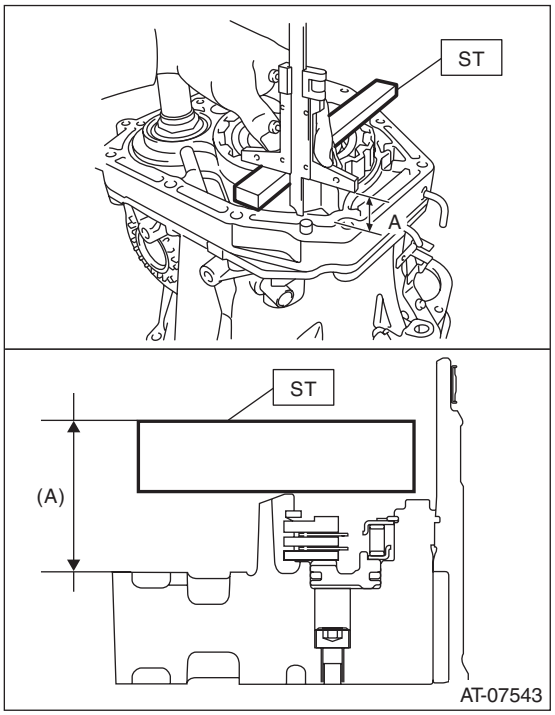


5. REVERSE BRAKE

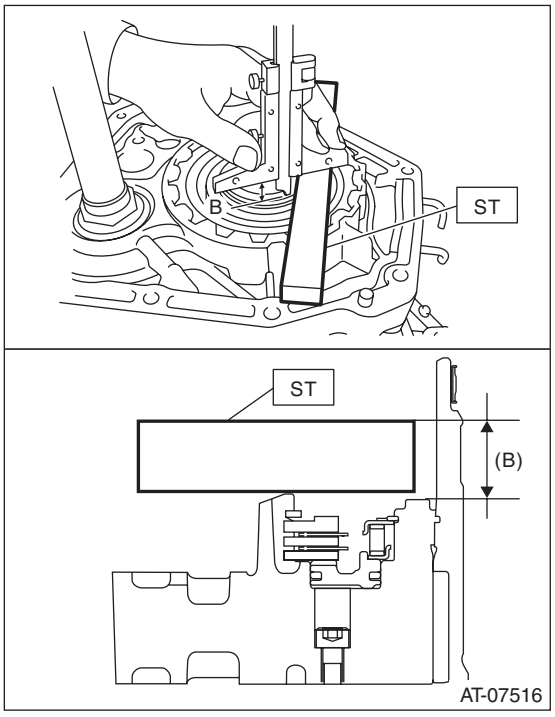
Check the following items.
• Snap ring for wear, return spring for breakage, and spring retainer for deformation
• Lip seal and D-ring for damage
• Piston operation
• Piston stroke

F: ADJUSTMENT

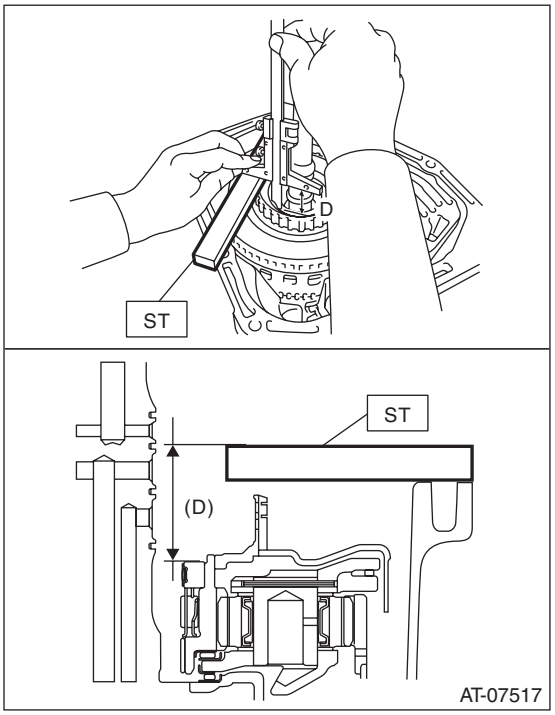
1) Using the ST, measure the height “A” from the AT main case mating surface to the convex surface of oil pump cover.
ST 499575400 GAUGE



2) Using the ST, measure the depth “B” from the convex surface of oil pump cover to thrust bearing transferring surface.
ST 499575400 GAUGE



3) Calculate the measured value from step 1) and 2), and then set the calculated value as “C”.
Calculation formula: C = A – B
4) Using the ST, measure the depth “D” from the AT main case mating surface to the thrust bearing transferring surface of front sun gear.
ST 499575400 GAUGE



5) Set the value as “E” which subtract the thickness of ST (499575400 GAUGE) from the measured value on step 4).
Calculation: E (mm) = D – 15
[E (in) = D – 0.59]
6) Calculation formula:
When clearances are 0.25 mm (0.0098 in):
T (mm) = E – C + 0.03
[T (in) = E – C + 0.0012]
When clearances are 0.55 mm (0.0217 in):
T (mm) = E – C – 0.27
[T (in) = E – C – 0.0106]
T: Thrust bearing thickness
C: Distance from oil pump cover mating surface to rear end of oil pump cover
E: Depth from mating surface of AT main case to bearing surface of front sun gear

Specification:
0.25 — 0.55 mm (0.0098 — 0.0217 in)

NOTE:
Calculation formula for “T” above is applied when measuring with the ST (499575400 GAUGE). In the calculation without using ST, substitute the thickness of collar used to calculate the value “E” on step 5).

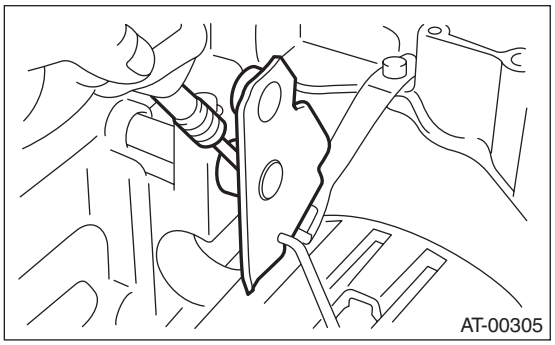
7) Select the thrust bearing so that the clearance is within the specified range.

Thrust bearing	
Part No.	Thickness mm (in)
806548020	3.2 (0.126)
806548030	3.4 (0.134)
806548040	3.6 (0.142)
806548050	3.8 (0.150)
806548060	4.0 (0.157)
806548070	4.2 (0.165)

35.Transmission Control Device

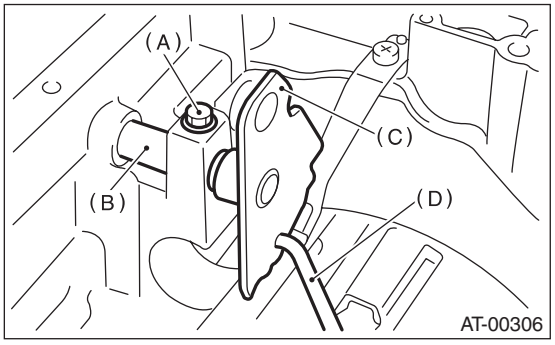
A: REMOVAL

1) Remove the transmission assembly from the vehicle. <Ref. to 5AT-36, REMOVAL, Automatic Transmission Assembly.>
2) Pull out the torque converter assembly. <Ref. to 5AT-62, REMOVAL, Torque Converter Assembly.>
3) Lift up the lever on the rear side of transmission harness connector, and then disconnect it from the stay.
4) Wrap vinyl tape around the nipple attached to the air breather hose.
5) Remove the transmission hanger COMPL.
6) Remove the control valve body assembly. <Ref. to 5AT-54, REMOVAL, Control Valve Body.>
7) Pull out the straight pin of manual plate.



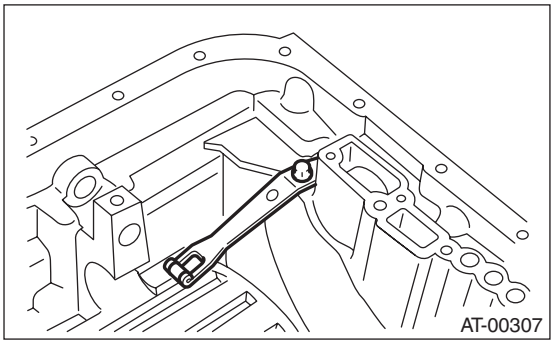
8) Remove the bolts securing range select lever, and then remove the select lever, manual plate and parking rod.

NOTE:
Be careful not to damage the lips of press-fitted oil seal in the case.



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

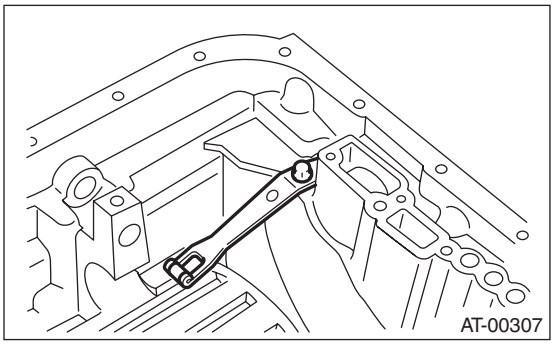
9) Remove the detent spring.



B: INSTALLATION

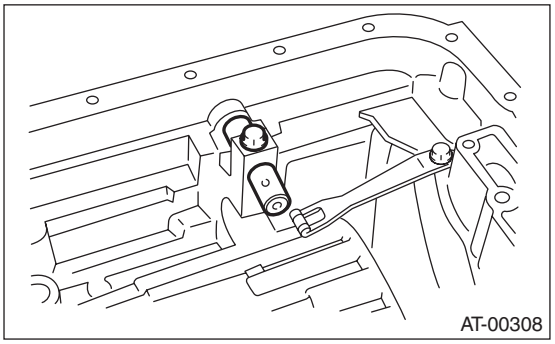
1) Install the detent spring to the transmission case.

Tightening torque:
7 N·m (0.7 kgf-m, 5.2 ft-lb)

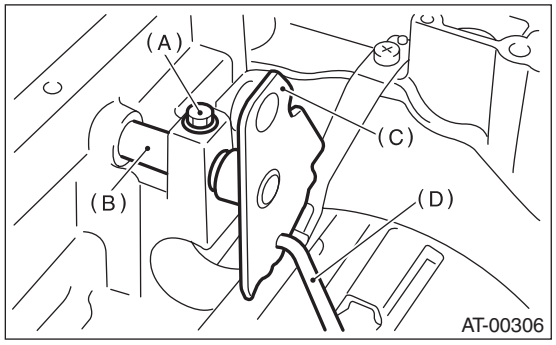


2) Insert the range select lever, and tighten the bolts.

Tightening torque:
6 N·m (0.6 kgf-m, 4.4 ft-lb)

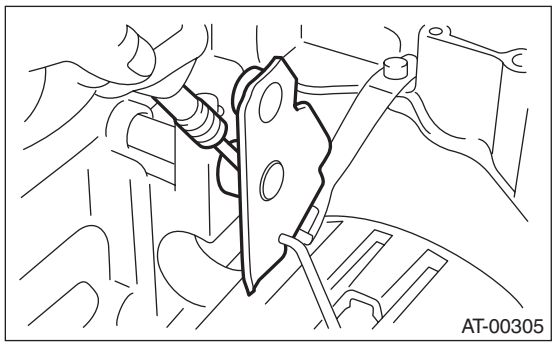


3) Insert the manual plate and parking rod.



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

4) Insert the straight pin to the manual plate.



5) Install the oil pan and the control valve body assembly. <Ref. to 5AT-54, INSTALLATION, Control Valve Body.>
6) Install the transmission hanger COMPL.

Tightening torque:
41 N·m (4.2 kgf-m, 30.2 ft-lb)

7) Insert the transmission connector to the stay.
8) Install the air breather hose. <Ref. to 5AT-60, INSTALLATION, Air Breather Hose.>
9) Install the torque converter assembly. <Ref. to 5AT-62, INSTALLATION, Torque Converter Assembly.>
10) Install the transmission assembly to the vehicle. <Ref. to 5AT-41, INSTALLATION, Automatic Transmission Assembly.>

C: INSPECTION

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

36.Diagnostics with Phenomenon

A: INSPECTION

Symptoms	Faulty parts
Engine does not start when the select lever is in “N” and “P” range.	• Select cable • Inhibitor switch • TCM
Engine starts when the select lever is in a range other than “N” or “P” range.	• Select cable • Inhibitor switch • TCM
The vehicle is not switched to parting mode when the select lever is in “P” range.	• Inhibitor switch • Select cable • Parking mechanism
Parking mode is not canceled even if the select lever is shifted from “P” range to another range.	• Inhibitor switch • Select cable • Parking mechanism
Excessive shock when the select lever is shifted from “N” range to “D” range or from “N” range to “R” range.	• ATF • Turbine speed sensor • Line pressure solenoid • Line pressure circuit
Engine stalls when the select lever is shifted from “N” range to “D” range or from “N” range to “R” range.	• ATF • Turbine speed sensor • Line pressure circuit • Lock-up solenoid • Lock-up pressure circuit • Engine speed signal • TCM
Excessive shift shock while driving with the select lever in “D” range.	• ATF • Vehicle speed sensor • Turbine speed sensor • Line pressure circuit • Engine speed signal • TCM
Excessive shock at lock-up or lock-up does not occur when the select lever is in “D” range.	• Vehicle speed sensor • Turbine speed sensor • Line pressure circuit • Lock-up solenoid • Lock-up pressure circuit • Engine speed signal • TCM
Cannot drive in all ranges.	• ATF • Select cable • Inhibitor switch • Line pressure solenoid • Line pressure circuit • Engine speed signal • TCM • Gear and clutch
The vehicle can run when the select lever is in “P” and “N” range.	• Inhibitor switch • Select cable
Excessively poor acceleration when the select lever is in “D” range.	• ATF • Line pressure solenoid • Line pressure circuit • Vehicle speed sensor • Engine speed signal • TCM • Gear and clutch

Symptoms	Faulty parts
Noise emitted from transmission	• ATF • Gear, clutch and bearing • Control valve

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

5AT(diag)

		Page
1.	Basic Diagnostic Procedure	2
2.	Check List for Interview	4
3.	General Description	5
4.	Electrical Component Location	7
5.	Transmission Control Module (TCM) I/O Signal	13
6.	Subaru Select Monitor	17
7.	Read Current Data	18
8.	Read Diagnostic Trouble Code (DTC)	20
9.	Clear Memory Mode	21
10.	Inspection Mode	22
11.	Learning Control	23
12.	AT OIL TEMP Warning Light Display	25
13.	AWD Warning Light Display	28
14.	Diagnostic Procedure for Subaru Select Monitor Communication	30
15.	List of Diagnostic Trouble Code (DTC)	33
16.	Diagnostic Procedure with Diagnostic Trouble Code (DTC)	36
17.	Diagnostic Procedure without Diagnostic Trouble Code (DTC)	100
18.	Diagnostics with Phenomenon	101

1. Basic Diagnostic Procedure

A: PROCEDURE

	Step	Check	Yes	No
1	**CHECK PRE-INSPECTION.** 1) Ask the customer when and how the trouble occurred using the interview check list. <Ref. to 5AT(diag)-4, Check List for Interview.> 2) Check the following items which may be affecting the AT trouble. • General inspection <Ref. to 5AT(diag)-5, INSPECTION, General Description.> • Oil leakage • Stall speed test <Ref. to 5AT-32, Stall Test.> • Line pressure test <Ref. to 5AT-34, Line Pressure Test.> • Transfer clutch pressure test <Ref. to 5AT-35, Transfer Clutch Pressure Test.> • Time lag test <Ref. to 5AT-33, Time Lag Test.> • Road test <Ref. to 5AT-31, Road Test.> • Inhibitor switch <Ref. to 5AT-49, Inhibitor Switch.>	Is the item that might influence the AT problem normal?	Go to step **2**.	Repair or replace items which might affect the AT problem.
2	**CHECK AT OIL TEMP LIGHT.** Turn the ignition switch to ON and wait for at least 2 seconds.	Does the AT OIL TEMP light illuminate?	Go to step **3**.	Check the AT OIL TEMP light.
3	**CHECK AT OIL TEMP LIGHT.** Start the engine and wait for 2 seconds or more.	Does the AT OIL TEMP light blink?	Go to step **4**.	Go to step **6**.
4	**CHECK DTC.** Read the DTC. <Ref. to 5AT(diag)-20, OPERATION, Read Diagnostic Trouble Code (DTC).> NOTE: If the communication function of Subaru Select Monitor cannot be executed normally, check the communication circuit. <Ref. to 5AT(diag)-30, COMMUNICATION FOR INITIALIZING IMPOSSIBLE, Diagnostic Procedure for Subaru Select Monitor Communication.>	Is DTC displayed on Subaru Select Monitor?	Record all DTC. Go to step **5**.	Go to step **6**. NOTE: When the AT OIL TEMP light blinks, check if the learning has completed.
5	**CHECK FREEZE FRAME DATA.** Using the Subaru Select Monitor, check the Freeze Frame Data.	Are freeze frame data recorded?	Record the freeze frame data. Go to step **7**.	Go to step **7**.
6	**PERFORM GENERAL DIAGNOSTICS.** 1) Inspect using “Diagnostic Procedure without Diagnostic Trouble Code (DTC)”. <Ref. to 5AT(diag)-100, Diagnostic Procedure without Diagnostic Trouble Code (DTC).> 2) Perform the Clear Memory Mode. 3) Perform the Inspection Mode. <Ref. to 5AT(diag)-22, Inspection Mode.> 4) Read the DTC.	Is DTC displayed on Subaru Select Monitor?	Go to step **7**.	Finish the diagnosis.

	Step	Check	Yes	No
7	**PERFORM DIAGNOSIS.** 1) Inspect by referring to “Diagnostic Procedure with Diagnostic Trouble Code (DTC)”. <Ref. to 5AT(diag)-36, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> NOTE: For the DTC table, refer to “List of Diagnostic Trouble Code (DTC)”. <Ref. to 5AT(diag)-33, List of Diagnostic Trouble Code (DTC).> 2) Repair the trouble cause. 3) Perform the Clear Memory Mode. 4) Perform the Inspection Mode. <Ref. to 5AT(diag)-22, Inspection Mode.> 5) Read the DTC.	Is DTC displayed on Subaru Select Monitor?	Inspect again using Diagnostic Procedure with Diagnostic Trouble Code (DTC). <Ref. to 5AT(diag)-36, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

2. Check List for Interview

A: CHECK

Check the following items when a problem has occurred.

NOTE:
Use copies of this page for interviewing customers.

Customer's name			
Date of purchase			
Date of repair			
Transmission model	Transmission	V.I.N.	
Odometer reading	km (miles)		
Symptoms	❑ No up-shift		
	❑ No down-shift		
	❑ No kick down		
	❑ Vehicle does not move (❑ Any position ❑ Particular position)		
	❑ Lock-up malfunction		
	❑ Noise or vibration		
	❑ Shift shock or slip		
	❑ Select lever does not move		
	❑ Others ( )		
Frequency	❑ Continuous ❑ Intermittent (times a day)		
Weather	❑ Fine ❑ Cloudy ❑ Rainy ❑ Snowy ❑ Others ( )		
Place	❑ Highland ❑ Suburbs ❑ Inner city ❑ Uphill ❑ Rough road ❑ Others ( )		
Ambient air temperature	❑ Hot ❑ Warm ❑ Cool ❑ Cold		
Vehicle speed	km/h (MPH)		
AT OIL TEMP light	❑ Blinks continuously	❑ Does not blink	
Select lever position	❑ P ❑ R ❑ N ❑ D ❑ Manual mode		
Driving condition	❑ Not affected ❑ At racing ❑ While decelerating	❑ At starting ❑ When accelerating ❑ While turning (❑ RH/❑ LH)	❑ While idling ❑ While cruising
Manual mode	❑ ON ❑ OFF		

3. General Description

A: CAUTION

1. SUPPLEMENTAL RESTRAINT SYSTEM "AIRBAG"

The airbag system wiring harness is routed near the TCM.

CAUTION:
• All the airbag system wiring harnesses and connectors are colored yellow. Do not use an electric test equipment to check these circuits.
• Be careful not to damage the airbag system wiring harness when performing diagnostics or servicing the TCM.

2. MEASUREMENT

When measuring the voltage and resistance of the ECM, TCM or each sensor, use a tapered pin with a diameter of less than 0.64 mm (0.025 in) in order to avoid poor contact. Do not insert a pin of more than 0.65 mm (0.026 in) diameter.

B: INSPECTION

1. BATTERY

Measure the battery voltage and specific gravity of the electrolyte.

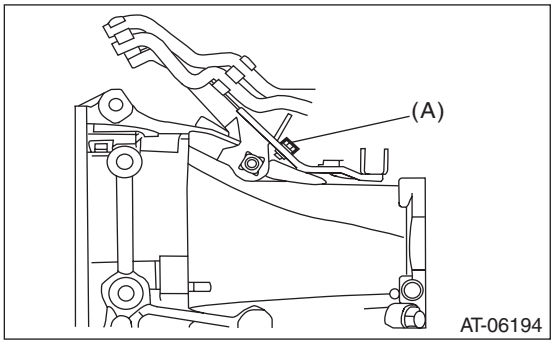
Standard voltage:
12 V or more

Specific gravity:
1.260 or more

2. TRANSMISSION GROUND

Make sure that the ground terminal bolt is tightened securely.

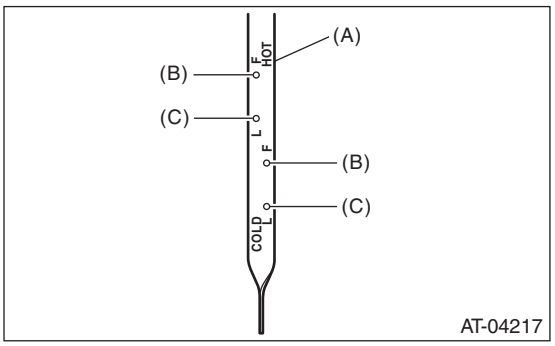
Tightening torque:
7 N·m (0.7 kgf-m, 5.2 ft-lb)



(A) Ground bolt

3. ATF LEVEL

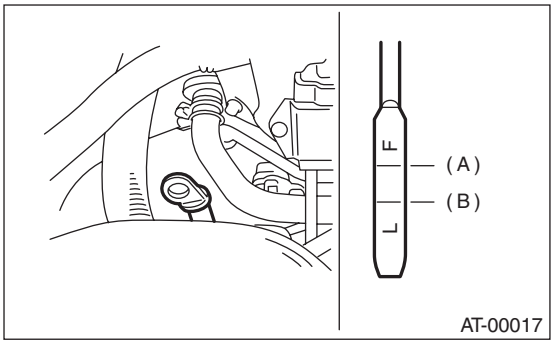
Make sure that ATF level is the specified amount. <Ref. to 5AT-28, INSPECTION, Automatic Transmission Fluid.>



(A) Oil level gauge
(B) Upper level
(C) Lower level

4. FRONT DIFFERENTIAL OIL LEVEL

Make sure the front differential oil level is the specified amount. <Ref. to 5AT-30, INSPECTION, Differential Gear Oil.>



(A) Upper level
(B) Lower level

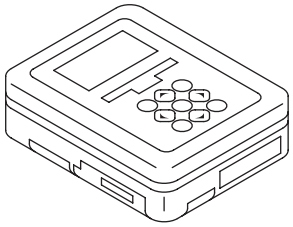
5. OPERATION OF SHIFT SELECT LEVER

Make sure there is no noise, dragging or contact pattern in each select lever range.

WARNING:
Stop the engine while checking operation of the select lever.

C: PREPARATION TOOL

1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST1B022XU0	1B022XU0	SUBARU SELECT MONITOR III KIT	Used for troubleshooting the electrical system.

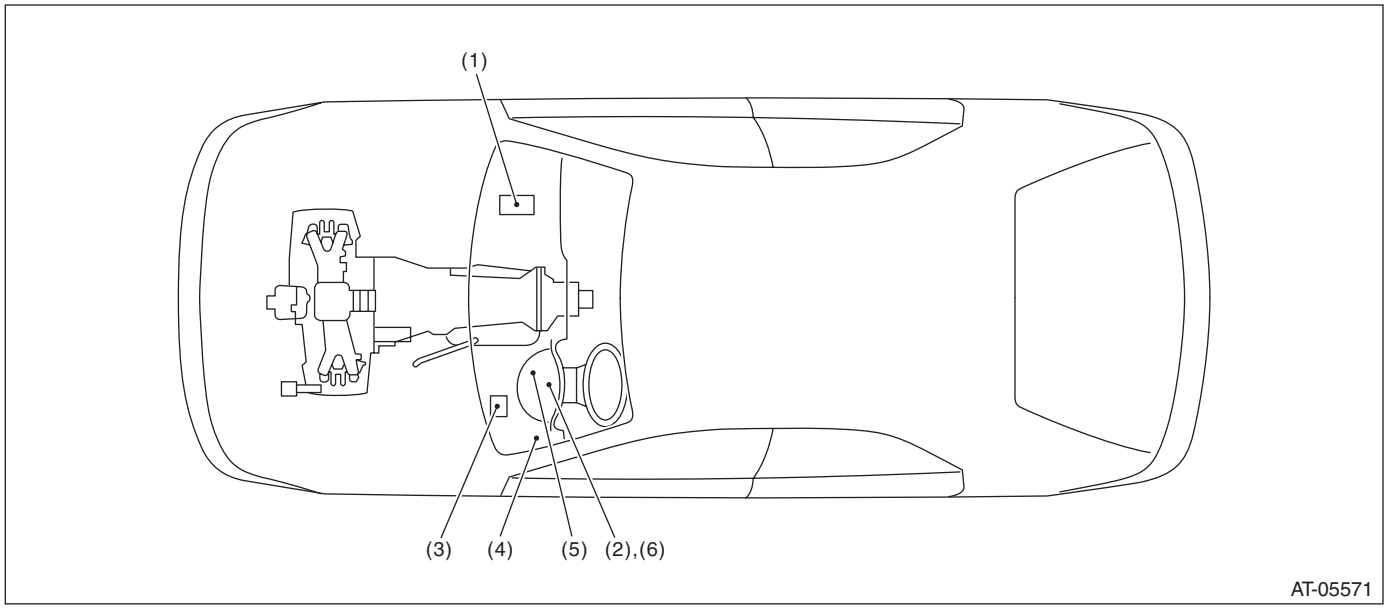
2. GENERAL TOOL

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance, voltage and current.
Oscilloscope	Used for measuring the sensor.

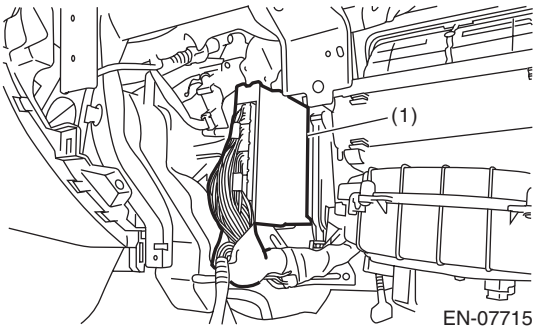
4. Electrical Component Location

A: LOCATION

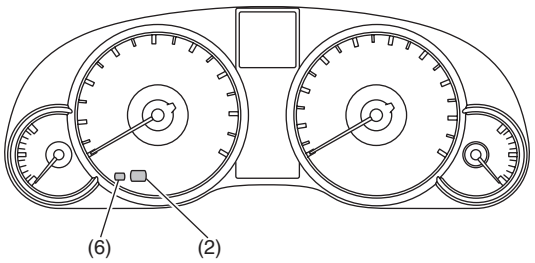
1. CONTROL MODULE



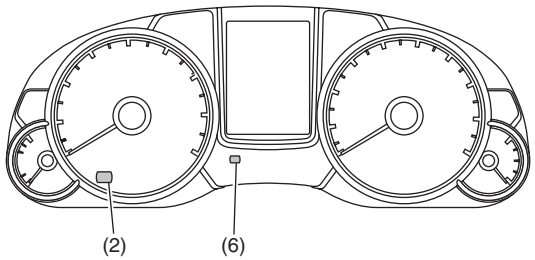
(1)	Engine control module (ECM)	(3)	Transmission control module (TCM)	(5)	Body integrated unit
(2)	AT OIL TEMP light	(4)	Data link connector	(6)	AWD light

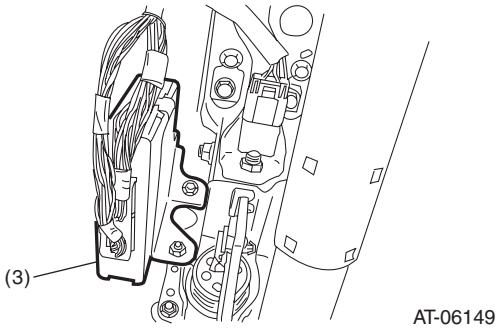


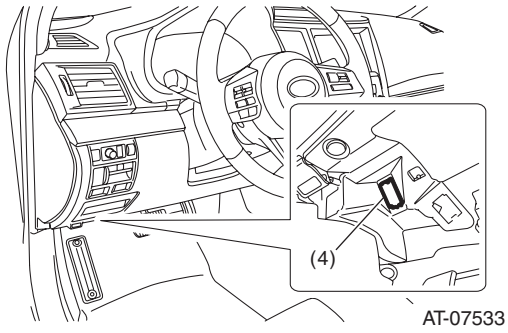
• Normal meter

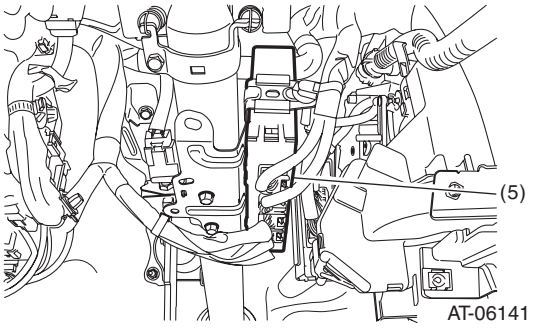


• Luminescent meter

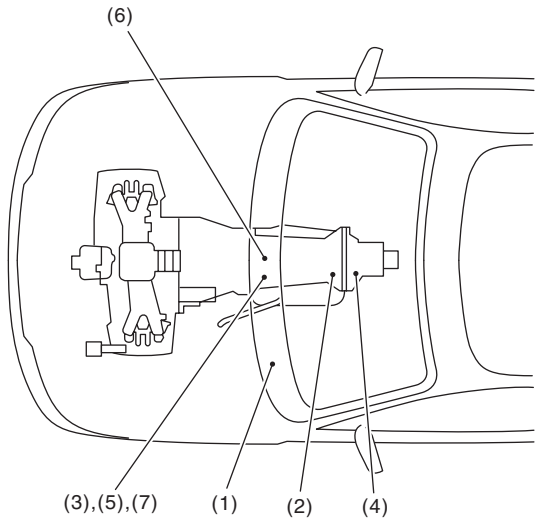






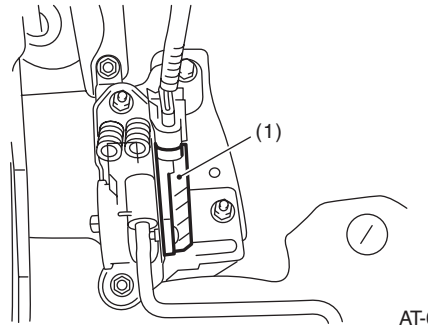


2. SENSOR

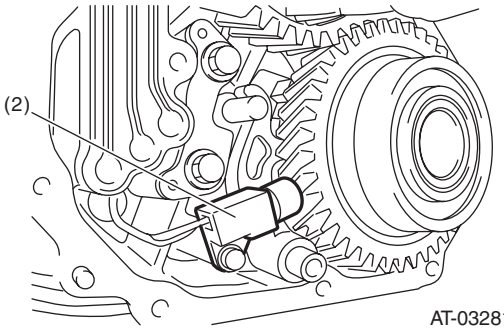


AT-05683

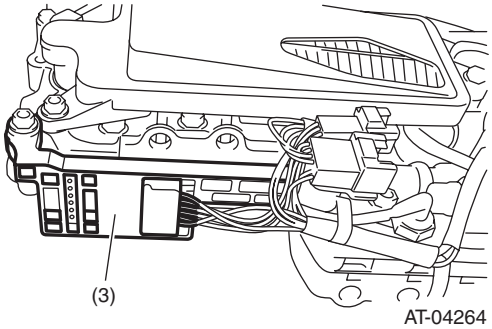
(1) Accelerator pedal position sensor
(2) Front vehicle speed sensor
(3) Inhibitor switch
(4) Rear vehicle speed sensor
(5) Turbine speed sensor 1
(6) ATF temperature sensor
(7) Turbine speed sensor 2



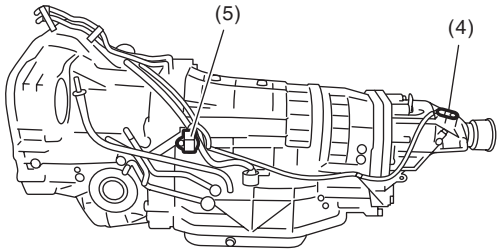
AT-00375



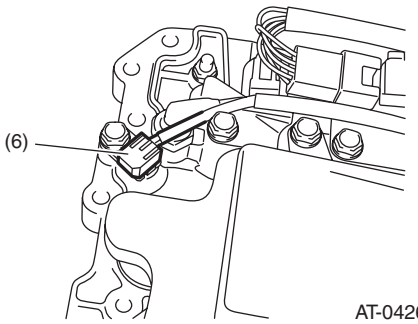
AT-03281



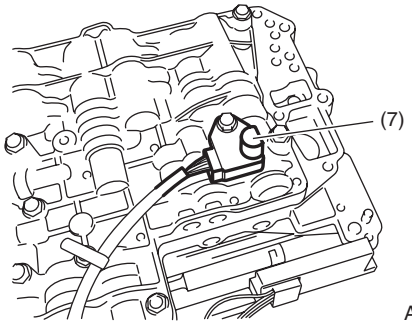
AT-04264



AT-03282

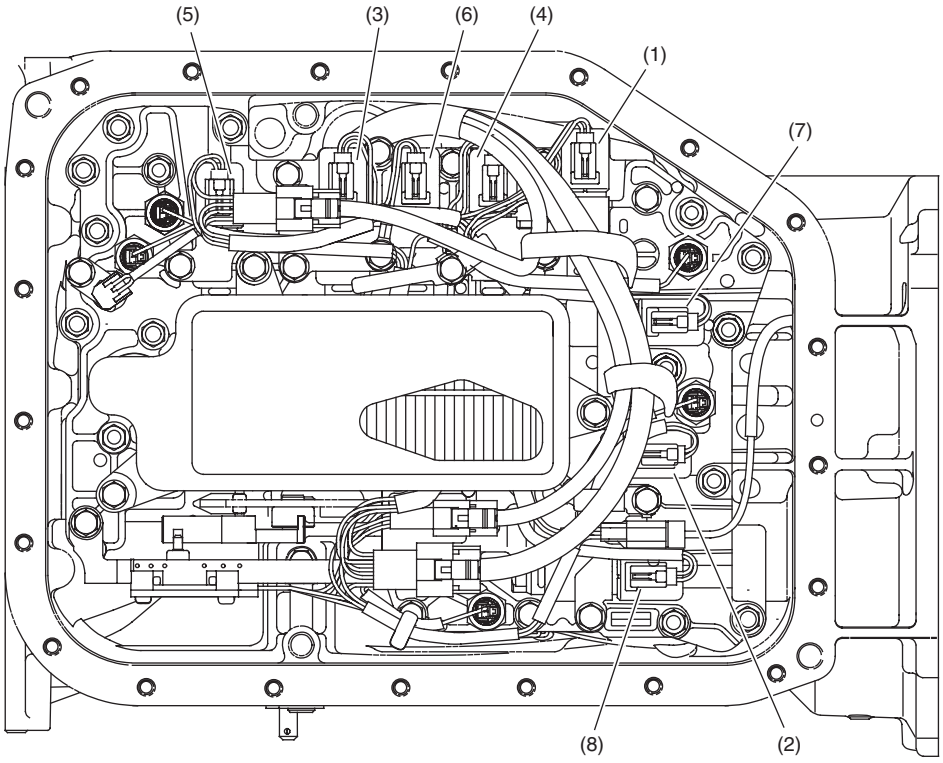


AT-04265



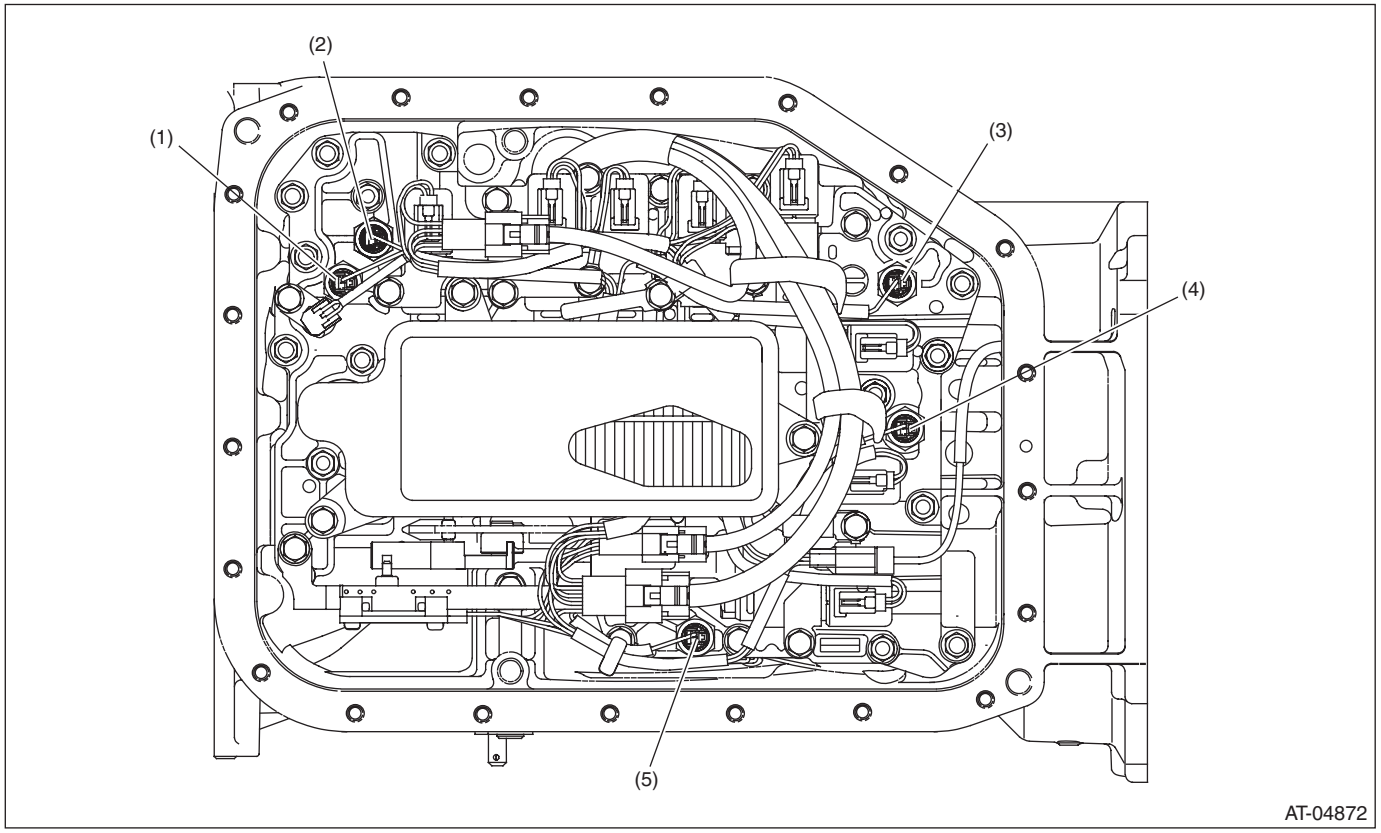
AT-04266

3. SOLENOID



(1) High & low reverse clutch solenoid
(2) Direct clutch solenoid
(3) Front brake solenoid
(4) Input clutch solenoid
(5) Line pressure solenoid
(6) Lock-up solenoid
(7) Transfer solenoid
(8) Forward brake solenoid

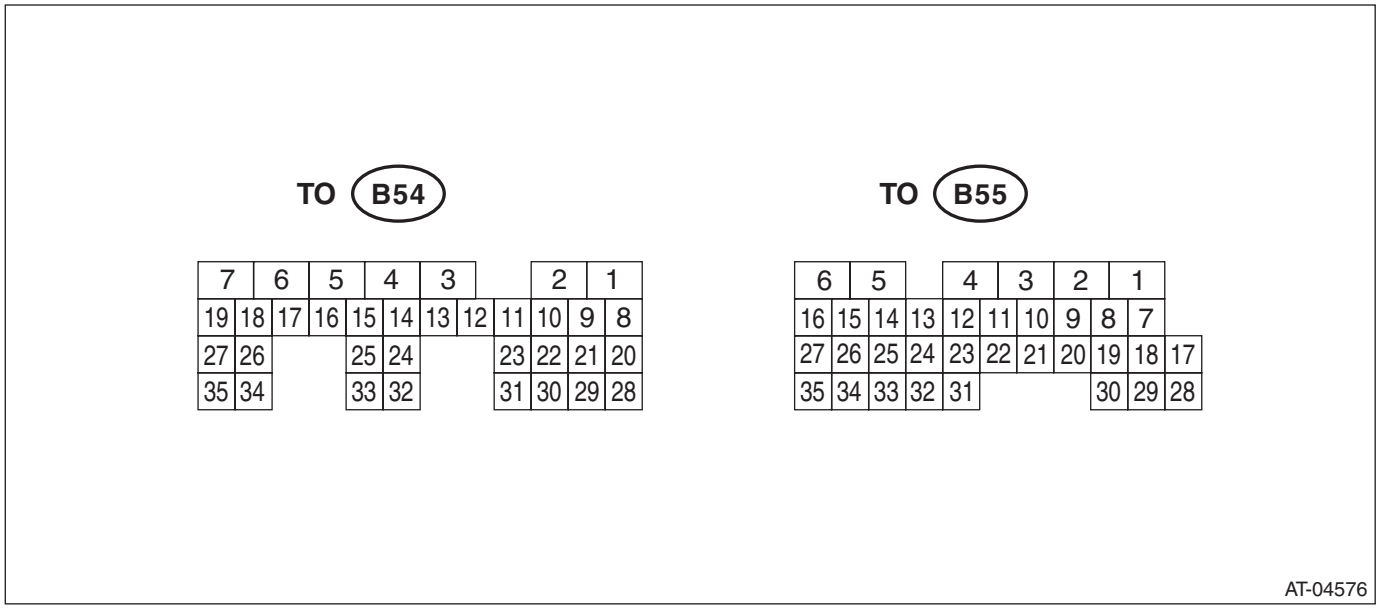
4. OIL PRESSURE SWITCH



(1) Front brake oil pressure switch
(2) Input clutch oil pressure switch
(3) High & low reverse clutch oil pressure switch
(4) Direct clutch oil pressure switch
(5) Forward brake oil pressure switch

5. Transmission Control Module (TCM) I/O Signal

A: ELECTRICAL SPECIFICATION



NOTE:
Measure after warming up.

Item	Connector No.	Terminal No.	Measuring conditions	Measured value	Resistance between terminal and chassis ground	Remarks
P/L solenoid output	B55	6	Engine ON, "P" range, accelerator OFF, brake ON	3.5 — 7.5 V	3 — 9 Ω (ATF temperature 20°C (68°F))	Drive frequency: 300 Hz
I/C oil pressure switch input	B55	20	While driving at 1st — 3rd of manual mode	6 V or more		
			While driving at 4th or 5th of manual mode	Less than 1.5 V		
Power GND1	B55	12	Always	Approx. 0 V	—	
CAN communication line (+)	B54	21	—	—	—	
CAN communication line (–)	B54	20	—	—	—	
ATF temperature sensor input	B55	17	Ignition switch ON ATF oil temperature 20°C (68°F)	3.5 — 4.3 V	2.5 — 7.0 kΩ	Measure the resistance with the connector disconnected.
			Ignition switch ON ATF oil temperature 80°C (176°F)	1 — 2.2 V	0.3 — 0.8 kΩ	
Backup power supply	B54	24	Ignition switch ON	8 V or more	—	
			Ignition switch OFF			
I/C solenoid output	B55	3	While driving at 1st — 3rd of manual mode	5 V or more	3 — 9 Ω (ATF temperature 20°C (68°F))	Drive frequency: 300 Hz
			While driving at 4th or 5th of manual mode	Less than 1.5 V		
H & LR/C solenoid output	B55	5	While driving at 2nd of manual mode	5 V or more	3 — 9 Ω (ATF temperature 20°C (68°F))	Drive frequency: 300 Hz
			While driving at 1st, 3rd — 5th of manual mode	Less than 1.5 V		

Item	Connector No.	Terminal No.	Measuring conditions	Measured value	Resistance between terminal and chassis ground	Remarks
Power GND2	B55	13	Always	Approx. 0 V	—	
Analog GND	B55	18	Always	Approx. 0 V	—	
Fr/B solenoid output	B55	4	While driving at other than 4th of manual mode	5 V or more	3 — 9 Ω (ATF temperature 20°C (68°F))	Drive frequency: 300 Hz
			While driving at 4th of manual mode	Less than 1.5 V		
L/U solenoid output	B55	7	When lock-up	3 V or more	3 — 9 Ω (ATF temperature 20°C (68°F))	Drive frequency: 300 Hz
			When not lock-up	Less than 1 V		
D/C solenoid output	B55	1	While driving at 1st or 5th of manual mode	5 V or more	3 — 9 Ω (ATF temperature 20°C (68°F))	Drive frequency: 300 Hz
			While driving at 2nd-4th of manual mode	Less than 1.5 V		
D/C oil pressure switch input	B55	22	While driving at 1st or 5th of manual mode	6 V or more		
			While driving at 2nd-4th of manual mode	Less than 1.5 V		
Data link signal (Subaru Select Monitor communication line)	B54	8	Ignition switch ON	8 V or more	—	
			Ignition switch OFF	Less than 1 V		
Sensor GND (analog)	B55	16	Always	Approx. 0 V	—	
H&LR/C oil pressure switch input	B55	14	While driving at 2nd of manual mode	6 V or more	—	
			While driving at 3rd-5th of manual mode	Less than 1.5 V		
Fwd/B solenoid output	B55	19	While driving at 1st or 2nd of manual mode	5 V or more		Drive frequency: 300 Hz
			While driving at 3rd-5th of manual mode	Less than 1.5 V		
Fwd/B oil pressure switch input	B55	21	While driving at 1st or 2nd of manual mode	Less than 1.5 V		
			While driving at 3rd-5th of manual mode	6 V or more		
Front vehicle speed sensor input	B55	24	While driving at 2nd and 20 km/h (12 MPH) of manual mode	Approx. 500 — 700 rpm	—	Use the Subaru Select Monitor.
			While driving at 4th and 80 km/h (50 MPH) of manual mode	Approx. 2,000 — 2,500 rpm		Use the Subaru Select Monitor.
Inhibitor switch 1 input	B55	8	Ignition switch ON, “P” range	Less than 0.5 V	—	
			Ignition switch ON, “N” range	5 V or more		
Inhibitor switch 2 input	B55	9	Ignition switch ON, “P” range	5 V or more	—	
			Ignition switch ON, “D” range	Less than 0.5 V		
Ignition power supply	B55	27	Ignition switch ON	8 V or more	—	
			Ignition switch OFF	Less than 1 V		
Rear vehicle speed sensor input	B55	23	While driving at 2nd and 20 km/h (12 MPH) of manual mode	Approx. 500 — 700 rpm	—	Use the Subaru Select Monitor.
			While driving at 4th and 80 km/h (50 MPH) of manual mode	Approx. 2,000 — 2,500 rpm		Use the Subaru Select Monitor.

Item	Connector No.	Terminal No.	Measuring conditions	Measured value	Resistance between terminal and chassis ground	Remarks
Fr/B oil pressure switch input	B55	15	While driving at other than 4th of manual mode	Less than 1.5 V	—	
			While driving at 4th of manual mode	6 V or more		
Turbine speed sensor 1 input	B55	26	2nd of manual mode, turbine speed sensor is 2,000 rpm (Read from Subaru Select Monitor)	Approx. 0 rpm	—	Use the Subaru Select Monitor.
			4th of manual mode, turbine speed sensor is 2,000 rpm (Read from Subaru Select Monitor)	Approx. 1,900 — 2,100 rpm		Use the Subaru Select Monitor.
Inhibitor switch 3 input	B55	10	Ignition switch ON, “R” range	5 V or more	—	
			Ignition switch ON, “D” range	Less than 0.5 V		
Control GND1	B54	23	Ignition switch ON	Approx. 0 V		
			Ignition switch OFF			
Control GND2	B54	22	Ignition switch ON	Approx. 0 V		
			Ignition switch OFF			
Inhibitor switch 4 input	B55	11	Ignition switch ON, “P” range	Less than 0.5 V	—	
			Ignition switch ON, “D” range	5 V or more		
Back-up light relay output	B54	13	Ignition switch ON, “R” range	Less than 1 V	90 — 110 Ω (ATF temperature 25°C (77°F))	
			Ignition switch ON, other than “R” range	8 V or more		
AWD solenoid output	B55	2	Engine ON, “P” range or “N” range, accelerator OFF	Less than 1 V	3 — 9 Ω (ATF temperature 20°C (68°F))	Drive frequency: 300 Hz
			Engine ON, “D” range, accelerator OFF, brake ON	2 V or more		
Turbine speed sensor 2 input	B55	25	2nd gear of manual mode, turbine speed sensor is 2,000 rpm (Read from Subaru Select Monitor)	Approx. 1,200 — 1,500 rpm	—	Use the Subaru Select Monitor.
			4th of manual mode, turbine speed sensor is 2,000 rpm (Read from Subaru Select Monitor)	Approx. 1,900 — 2,100 rpm	—	Use the Subaru Select Monitor.
PN signal output	B54	11	Ignition switch ON, Other than “P” range or “N” range	8 V or more	—	
			Ignition switch ON, “P” range or “N” range	Less than 1 V	—	
Ignition power supply 1	B54	26	Ignition switch ON	8 V or more	—	
			Ignition switch OFF	Less than 1 V	—	
Ignition power supply 2	B54	19	Ignition switch ON	8 V or more	—	
			Ignition switch OFF	Less than 1 V	—	
Ignition power supply 3	B54	18	Ignition switch ON	8 V or more	—	
			Ignition switch OFF	Less than 1 V	—	
Ignition power supply 4	B54	25	Ignition switch ON	8 V or more	—	
			Ignition switch OFF	Less than 1 V	—	
Paddle shift DOWN switch	B54	4	Ignition switch ON, Paddle shift DOWN switch ON	Less than 1 V	—	
			Ignition switch ON, Paddle shift DOWN switch OFF	8 V or more	—	

Item	Connector No.	Terminal No.	Measuring conditions	Measured value	Resistance between terminal and chassis ground	Remarks
Paddle shift UP switch	B54	5	Ignition switch ON, Paddle shift UP switch ON	Less than 1 V	—	
			Ignition switch ON, Paddle shift UP switch OFF	8 V or more	—	
Manual mode switch	B54	6	Ignition switch ON, Manual mode switch ON	Less than 1 V	—	
			Ignition switch ON, Manual mode switch OFF	8 V or more	—	

6. Subaru Select Monitor

A: OPERATION

For detailed operation procedures, refer to “PC application help for Subaru Select Monitor”.

7. Read Current Data

A: OPERATION

For detailed operation procedures, refer to “PC application help for Subaru Select Monitor”.

- The support data list is as follows.

Item	Display	Unit of measure
Engine speed signal	Engine Speed	rpm
Battery voltage	Battery Voltage	V
Accelerator position sensor	Accel. Opening Angle	%
Front vehicle speed sensor signal	Front Wheel Speed	km/h
Gear position	Gear Position	—
Turbine speed sensor signal	Turbine Revolution Speed	rpm
Rear vehicle speed sensor signal	Rear Wheel Speed	km/h
ATF temperature sensor signal	ATF Temp.	°C
Turbine speed sensor 1 signal	AT Turbine Speed 1	rpm
Turbine speed sensor 2 signal	AT Turbine Speed 2	rpm
High & low reverse clutch solenoid set current	H&LR/C Solenoid Current	A
Direct clutch solenoid set current	D/C Solenoid Current	A
Front brake solenoid set current	F/B Solenoid Current	A
Input clutch solenoid set current	I/C Solenoid Current	A
Line pressure solenoid set current	P/L Solenoid Current	A
Lock-up solenoid set current	L/U Solenoid Current	A
Transfer solenoid set current	AWD Sol. Current	A
High & low reverse clutch solenoid pressure	H&LR/C Solenoid Pressure	kPa
Direct clutch solenoid pressure	D/C Solenoid Pressure	kPa
Front brake solenoid pressure	F/B Solenoid Pressure	kPa
Input clutch solenoid pressure	I/C Solenoid Pressure	kPa
Line pressure solenoid pressure	P/L Solenoid Pressure	kPa
Lock-up solenoid pressure	L/U Solenoid Pressure	kPa
Transfer solenoid pressure	AWD Solenoid Pressure	kPa
Forward brake set current	Fwd/B solenoid current	A
Forward brake solenoid target hydraulic pressure	Fwd/B solenoid target pressure	kPa
Ignition switch	Ignition Switch	ON input or OFF input
Manual mode signal	Tiptronic Mode Switch	ON or OFF
Cruise control set signal	Cruise Control Signal	ON or OFF
Down shift signal	Down Switch	ON or OFF
Stop light switch signal	Stop Light Switch	ON or OFF
Up shift signal	Up Switch	ON or OFF
Drive range signal	D Range Signal	ON or OFF
Reverse range signal	R Range Signal	ON or OFF
Diagnosis light output signal	Diagnosis Lamp	ON or OFF
ATF temperature light signal	ATF Temperature Lamp	ON or OFF
Parking range signal	P Range	ON or OFF
P/N range output signal	P/N Signal	ON or OFF
Neutral range signal	N Range	ON or OFF
Inhibitor switch 1 input signal	Inhibitor SW 1	High or Low
Inhibitor switch 2 input signal	Inhibitor SW 2	High or Low
Inhibitor switch 3 input signal	Inhibitor SW 3	High or Low
Inhibitor switch 4 input signal	Inhibitor SW 4	High or Low
Back-up light relay output signal	Back Lamp Relay	ON or OFF
High & low reverse clutch fluid pressure switch input signal	H&LR/C Fluid Pressure	ON or OFF

Item	Display	Unit of measure
Direct clutch fluid pressure switch input signal	D/C Fluid Pressure	ON or OFF
Front brake fluid pressure switch input signal	F/B Fluid Pressure	ON or OFF
Input clutch fluid pressure switch input signal	I/C Fluid Pressure	ON or OFF
Forward brake fluid pressure switch input signal	Fwd/B hydraulic pressure SW	ON or OFF
AT learning mode	AT learning	Completed or not completed

8. Read Diagnostic Trouble Code (DTC)

A: OPERATION

For detailed operation procedures, refer to “PC application help for Subaru Select Monitor”.

NOTE:
For details concerning DTC, refer to List of Diagnostic Trouble Code (DTC). <Ref. to 5AT(diag)-33, List of Diagnostic Trouble Code (DTC).>

9. Clear Memory Mode

A: OPERATION

For detailed operation procedures, refer to “PC application help for Subaru Select Monitor”.

NOTE:
• If {Clear Memories 2} is executed, DTCs and learned control memory are cleared.
• If {Clear Memories 2} is executed, perform learning. <Ref. to 5AT(diag)-23, Learning Control.>

10.Inspection Mode

A: PROCEDURE

CAUTION:
Observe the traffic law when driving on public roads.

1) Shift the select lever to “D” range, and then drive the vehicle with changing the gear from 1st to 5th.
2) When driving the vehicle at 5th speed of “D” range, set the gear to manual mode and drive the vehicle by downshifting using “–” of the paddle shift switch from 5th → 4th, 4th → 3rd, 3rd → 2nd, and 2nd → 1st.

NOTE:
At shifting down, drive the vehicle at least 10 seconds in each speed.

3) Shift the select lever to “R” range and drive the vehicle for 2 seconds or more.

11.Learning Control

A: GENERAL DESCRIPTION

- Follow the messages displayed on the Subaru Select Monitor when working.
- When the following work is performed, perform learning for the transmission.

Replacement of TCM/Replacement or disassembly of transmission assembly/Replacement of control valve body/Performing “Clear Memories 2”.

B: PROCEDURE

1. PREPARATION FOR LEARNING

1) Warm up or cool down the vehicle until the ATF temperature displayed on the Subaru Select Monitor is 60 — 80°C (140 — 176°F).
2) Shift the select lever to “P” range.
3) Apply the electronic parking brake.
4) Lift up the vehicle.

CAUTION:
While working, be sure to keep the lower edge of the tires 30 cm or more above the ground as vehicle will vibrate.

5) Connect the Subaru Select Monitor to data link connector.
6) Turn the ignition switch to ON.
7) Turn off all switches causing an electrical load, such as headlights, A/C, seat heater and rear defogger, etc.

2. SIMPLE LEARNING

NOTE:
Simple learning is performed with the vehicle lifted, without actually running the vehicle.

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

1) Select {AT related learning & inspecting mode} in the «Transmission Diagnosis» display screen of the Subaru Select Monitor.
2) Select {AT learning mode} in the «AT related learning & inspecting mode» screen of the Subaru Select Monitor.
3) Follow the messages displayed on the Subaru Select Monitor screen when working.

NOTE:
For the messages “SHIFT control system learning in progress” and “AWD control system learning in progress”, AT OIL TEMP light in the combination meter blinks at a cycle of 2 Hz before learning operation starts. When AT OIL TEMP light in the combination meter goes off, the following message is displayed on the screen. When operation ends abnormally during the learning, AT OIL TEMP light blinks at a cycle of 4 Hz.
4) When «AT learning normally ended.» is displayed, simple AT learning is completed.

NOTE:
- If communication error occurs during learning, retry the “AT learning mode” from the beginning.
- If the message «Execute AT learning again after fixing troubles of the vehicle» is displayed during learning, select [OK] to display the List of Diagnostics Trouble Code. After repairing the locations indicated by the DTC, start the “AT learning mode” over from the beginning.
- If the message «AT learning ended abnormally.» is displayed, start the “AT learning mode” over from the beginning.

Display	Main reasons for abnormal termination
AT learning ended abnormally.	• Fault is detected during AT learning. • The accelerator pedal is depressed during AT learning. • An unspecified operation was performed during AT learning • Brake pedal is not fully depressed. • Electric parking brake not applied strongly enough • Abnormal idle speed increase, etc.

- For detailed operation procedures, refer to “PC application help for Subaru Select Monitor”.

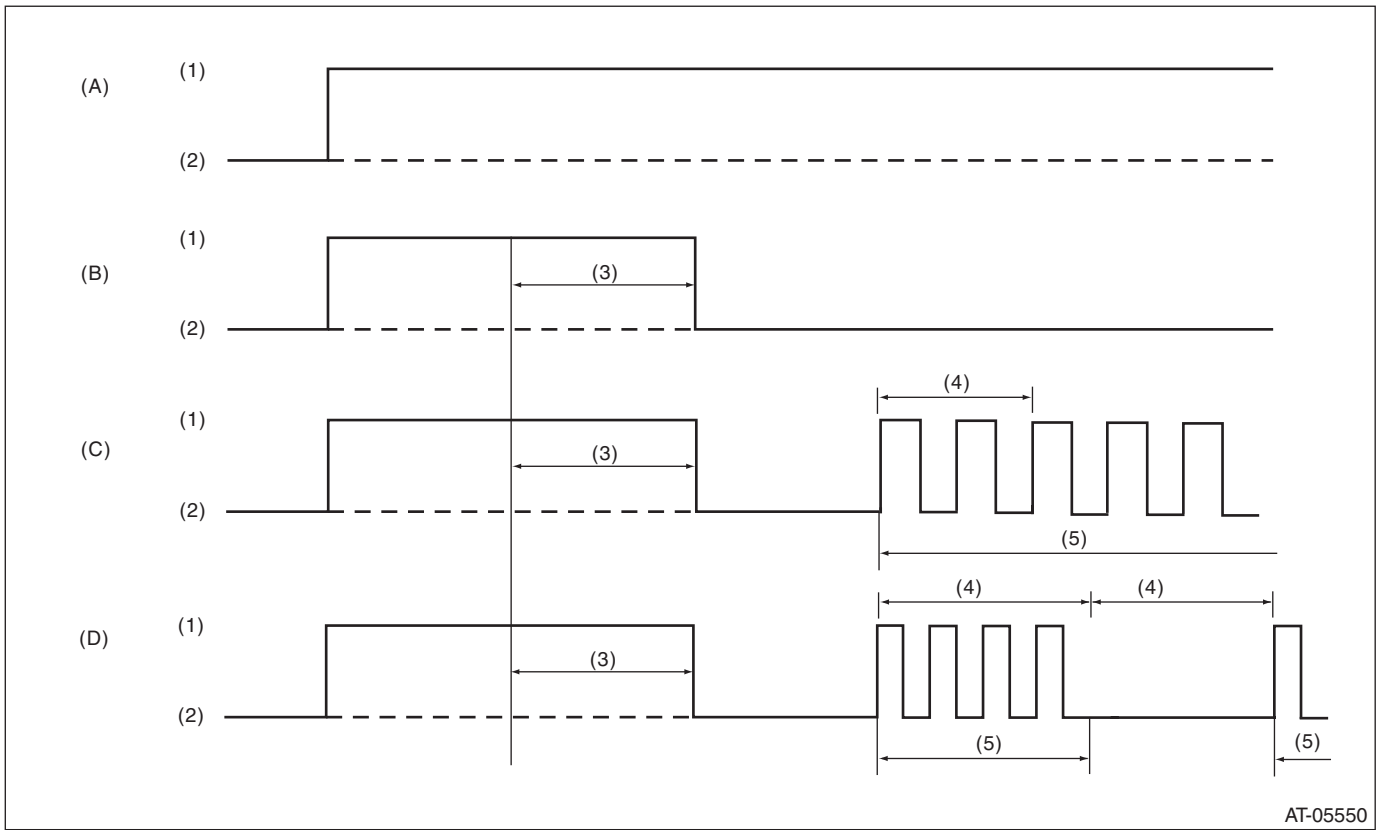
3. DRIVING CHECK

Drive the vehicle to check that there is no malfunction such as shifting shock.
When shifting shock is felt, perform learning again.
When reducing of shifting shock is not felt, check that other parts are normal.

12.AT OIL TEMP Warning Light Display

A: OPERATION

When any on-board diagnostics item is malfunctioning, or the learning has not yet completed, AT OIL TEMP light blinks. Blinking continues from the engine start to the ignition switch OFF. The faulty parts or unit can be identified by reading DTCs. Problems which occurred previously can also be identified through the memory function. If the AT OIL TEMP light does not blink although a problem is occurring, the problem can be determined by checking the performance characteristics of each sensor using the Subaru Select Monitor. If the learning has not yet completed, «Learning not completed» is displayed when the Subaru Select Monitor is connected while AT OIL TEMP light is blinking. The AT OIL TEMP light blinking will go off, when the learning is performed. Indicator light signal patterns are as shown in the figure.



(A)	Ignition switch (engine OFF)	(B)	Normal (engine ON)	(C)	Faulty (engine ON)
(D)	Learning not completed (engine ON)				
(1)	ON	(3)	2 seconds	(5)	Blink
(2)	OFF	(4)	1 second		

When the AT OIL TEMP light does not operate normally, check the AT OIL TEMP light circuit. <Ref. to 5AT(diag)-26, INSPECTION, AT OIL TEMP Warning Light Display.>

B: INSPECTION

DIAGNOSIS:
- AT OIL TEMP light circuit is open or shorted.
- Combination meter malfunction

TROUBLE SYMPTOM:
- When the ignition switch is turned to ON, the AT OIL TEMP light does not illuminate.
- AT OIL TEMP light remains lit after engine start.

	Step	Check	Yes	No
1	**CHECK AT OIL TEMP LIGHT.** Turn the ignition switch to ON.	Does the AT OIL TEMP light illuminate?	Go to step **2**.	Perform the self-diagnosis of combination meter. <Ref. to IDI-8, SELF-DIAGNOSIS DISPLAY MODE, OPERATION, Combination Meter System.>
2	**CHECK AT OIL TEMP LIGHT.** After the ignition switch is ON, wait for 2 seconds or more.	Does the AT OIL TEMP light illuminate?	Go to step **3**.	Go to step **4**.
3	**CHECK AT OIL TEMP LIGHT.** Start the engine.	Does the AT OIL TEMP light go off?	Current condition is normal. Go back to Basic Diagnostic Procedure. <Ref. to 5AT(diag)-2, Basic Diagnostic Procedure.>	Go to step **6**.
4	**CHECK SUBARU SELECT MONITOR COMMUNICATION.** Connect the Subaru Select Monitor to data link connector.	Is the communication between Subaru Select Monitor and TCM normal?	Go to step **5**.	Check the power supply ground circuit of TCM and Subaru Select Monitor communication. <Ref. to 5AT(diag)-30, Diagnostic Procedure for Subaru Select Monitor Communication.>
5	**CHECK DTC.** Read the DTC relating the TCM using the Subaru Select Monitor.	Is DTC displayed?	Perform the diagnosis according to DTC.	Go to step **6**.
6	**CHECK TCM.** Read the data of «ATF Temperature Lamp» using the Subaru Select Monitor.	Is “ON” displayed?	Go to step **7**.	Perform the self-diagnosis of combination meter. <Ref. to IDI-8, SELF-DIAGNOSIS DISPLAY MODE, OPERATION, Combination Meter System.>
7	**CHECK TCM.** Read the data of «ATF Temp.» using the Subaru Select Monitor.	Is the display 130°C or more?	Go to step **8**.	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>

	Step	Check	Yes	No
8	**CHECK ATF TEMPERATURE.** Check the real fluid temperature from the transmission case surface temperature.	Is the temperature lower than «ATF Temp.» displayed on Subaru Select Monitor?	Perform the diagnosis according to DTC P0713.	When ATF temperature can be judged as actually high, perform the diagnosis again after the ATF temperature lowers.

13.AWD Warning Light Display

A: OPERATION

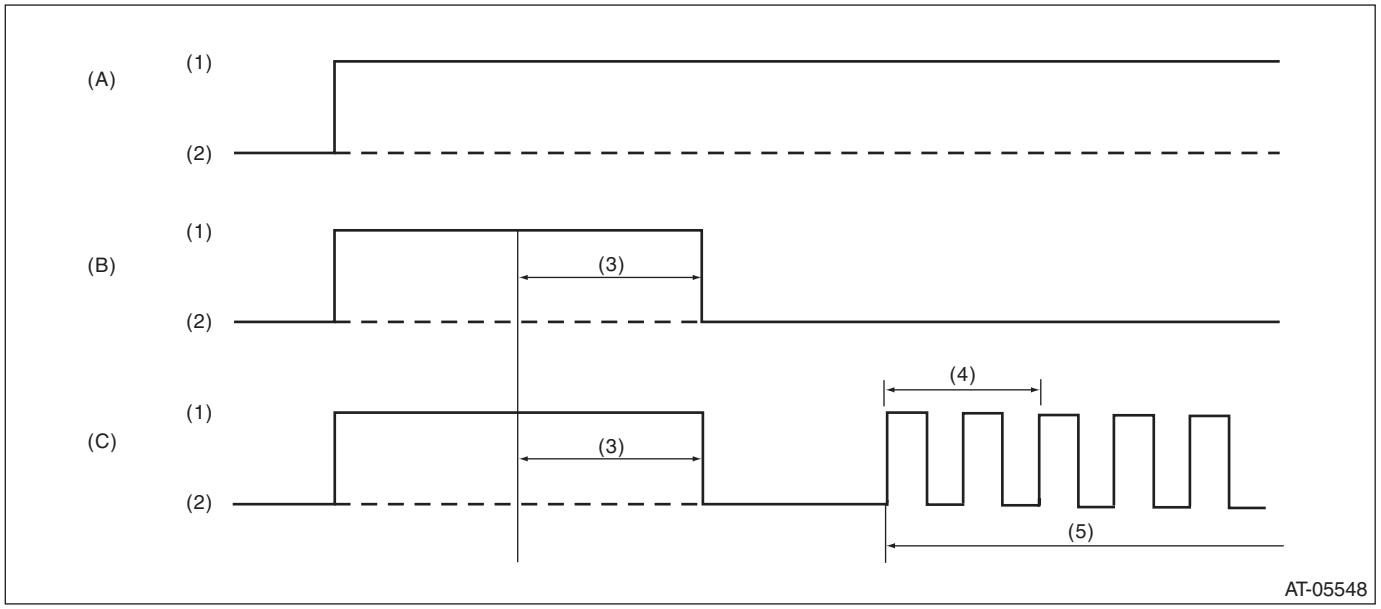
AWD warning light illuminates or blinks at start, or when AWD is faulty.

- Normal

AWD light always illuminates when the ignition switch is ON (engine OFF). Light goes off after two seconds from engine ON.

- Faulty

AWD warning light blinks at 2 Hz, when tires with different diameters are installed, or when the vehicle is driven with air pressure of any of the four tires significantly low.



(A)	Ignition switch (engine OFF)	(B)	Normal (engine ON)	(C)	Faulty (engine ON)
(1)	ON	(3)	2 sec.	(5)	Blink
(2)	OFF	(4)	1 sec.		

If the AWD light does not illuminate, or illumination patterns are not as above, check the AWD light circuit. <Ref. to 5AT(diag)-29, INSPECTION, AWD Warning Light Display.>

B: INSPECTION

DIAGNOSIS:

- AWD light circuit is open or shorted.
- Combination meter malfunction
- TCM malfunction

TROUBLE SYMPTOM:

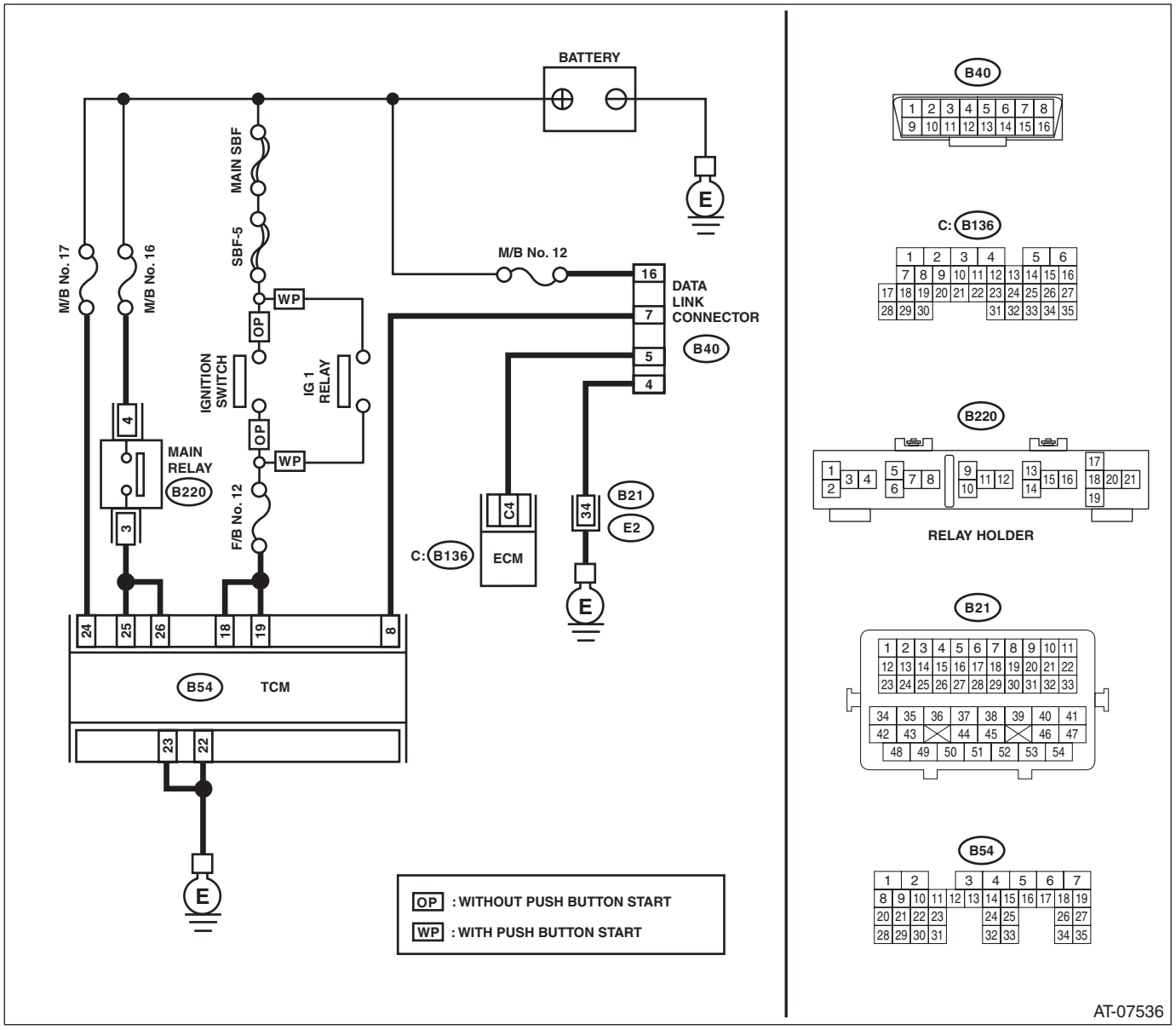
- When the ignition switch is turned to ON, the AWD light does not illuminate.
- AWD light remains lit after engine start.

	Step	Check	Yes	No
1	**CHECK AWD LIGHT.** Turn the ignition switch to ON.	Does the AWD light illuminate?	Go to step **2**.	Perform the self-diagnosis of combination meter. <Ref. to IDI-8, SELF-DIAGNOSIS DISPLAY MODE, OPERATION, Combination Meter System.>
2	**CHECK AWD LIGHT.** Start the engine.	Does AWD light go off after two seconds from engine start?	Current condition is normal. Go back to Basic Diagnostic Procedure. <Ref. to 5AT(diag)-2, Basic Diagnostic Procedure.>	Go to step **3**.
3	**CHECK COMBINATION METER.** Perform the self-diagnosis of combination meter. <Ref. to IDI-8, SELF-DIAGNOSIS DISPLAY MODE, OPERATION, Combination Meter System.>	Is there any trouble with the combination meter?	Repair the combination meter.	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>

14.Diagnostic Procedure for Subaru Select Monitor Communication

A: COMMUNICATION FOR INITIALIZING IMPOSSIBLE

DIAGNOSIS:
Defective harness connector
TROUBLE SYMPTOM:
Subaru Select Monitor communication failure
WIRING DIAGRAM:
AT Control System <Ref. to WI-60, AT Control System.>



Step		Check	Yes	No
1	**CHECK INSTALLATION OF TCM CONNECTOR.** Turn the ignition switch to OFF.	Is TCM connector connected to TCM?	Go to step **2**.	Connect the TCM connector to TCM.

	Step	Check	Yes	No
2	**CHECK SUBARU SELECT MONITOR POWER SUPPLY CIRCUIT.** Measure the voltage between data link connector and chassis ground. ***Connector & terminal*** ***(B40) No. 16 (+) — Chassis ground (–):***	Is the voltage 10 V or more?	Go to step **3**.	Repair harness connector between the battery and data link connector, and poor contact of the connector.
3	**CHECK SUBARU SELECT MONITOR GROUND CIRCUIT.** Measure the resistance of harness between data link connector and chassis ground. ***Connector & terminal*** ***(B40) No. 4 — Chassis ground:*** ***(B40) No. 5 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **4**.	Repair the open circuit of harness between data link connector and ground terminal, and poor contact of connector.
4	**CHECK COMMUNICATION OF SUBARU SELECT MONITOR.** 1) Turn the ignition switch to ON. 2) Check communication with the transmission system.	Is the name of system displayed on Subaru Select Monitor?	Go to step **9**.	Go to step **5**.
5	**CHECK COMMUNICATION OF SUBARU SELECT MONITOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the TCM connector. 3) Turn the ignition switch to ON. 4) Check communication with the engine system.	Is the name of system displayed on Subaru Select Monitor?	Go to step **7**.	Go to step **6**.
6	**CHECK COMMUNICATION OF SUBARU SELECT MONITOR.** 1) Turn the ignition switch to OFF. 2) Connect the TCM connector. 3) Disconnect the ECM connector. 4) Turn the ignition switch to ON. 5) Check communication with the transmission system.	Is the name of system displayed on Subaru Select Monitor?	Inspect the ECM.	Go to step **7**.
7	**CHECK HARNESS CONNECTOR BETWEEN EACH CONTROL MODULE AND DATA LINK CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the TCM and ECM connector. 3) Measure the resistance between TCM connector and chassis ground. ***Connector & terminal*** ***(B40) No. 7 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **8**.	Check harness and connector between each control module and data link connector.
8	**CHECK OUTPUT SIGNAL OF TCM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B40) No. 7 (+) — Chassis ground (–):***	Is the voltage 1 V or more?	Check harness and connector between each control module and data link connector.	Go to step **9**.
9	**CHECK HARNESS CONNECTOR BETWEEN TCM AND DATA LINK CONNECTOR.** Measure the resistance between TCM connector and data link connector. ***Connector & terminal*** ***(B54) No. 8 — (B40) No. 7:***	Is the resistance less than 1 Ω?	Go to step **10**.	Check the harness and connector between TCM and data link connector.

	Step	Check	Yes	No
10	**CHECK INSTALLATION OF TRANSMISSION HARNESS CONNECTOR.**	Is the transmission harness connector connected to bulkhead harness connector?	Go to step **11**.	Connect the bulkhead harness connector to transmission harness connector.
11	**CHECK POOR CONTACT OF CONNECTORS.**	Is there poor contact of control module power supply and data link connector?	Repair the poor contact.	Go to step **12**.
12	**CHECK POWER SUPPLY OF TCM.** 1) Disconnect the connector from TCM. 2) Turn the ignition switch to ON. 3) Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 24 (+) — Chassis ground (–):*** ***(B54) No. 25 (+) — Chassis ground (–):*** ***(B54) No. 26 (+) — Chassis ground (–):***	Is the voltage 10 — 13 V?	Go to step **15**.	Go to step **13**.
13	**CHECK M/B FUSE.** 1) Turn the ignition switch to OFF. 2) Remove the fuse (No. 16 and No. 17).	Is the fuse blown out?	Replace the fuse.	Go to step **14**.
14	**CHECK HARNESS.** Measure the resistance between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 24 — Chassis ground:*** ***(B54) No. 25 — Chassis ground:*** ***(B54) No. 26 — Chassis ground:***	Is the resistance 10 Ω or less?	Replace the fuse. If the replaced fuse has blown out easily, repair short circuit of harness between fuse and TCM.	Go to step **15**.
15	**CHECK IGNITION POWER SUPPLY CIRCUIT.** 1) Turn the ignition switch to ON. 2) Measure the ignition power supply voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 18 (+) — Chassis ground (–):*** ***(B54) No. 19 (+) — Chassis ground (–):***	Is the voltage 10 — 13 V?	Go to step **17**.	Go to step **16**.
16	**CHECK F/B FUSE.** Remove the fuse (No. 12).	Is the fuse blown out?	Replace the fuse. If the replaced fuse has blown out easily, repair short circuit of harness between fuse and TCM.	Go to step **17**.
17	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM. 3) Measure the resistance of the harness between TCM and transmission ground. ***Connector & terminal*** ***(B54) No. 22 — Transmission ground:*** ***(B54) No. 23 — Transmission ground:***	Is the resistance 1 MΩ or more?	Repair the short circuit of harness between TCM and transmission harness connector, and poor contact of connector.	Go to step **18**.
18	**CHECK POOR CONTACT OF CONNECTORS.**	Is there poor contact of TCM power supply, ground and data link connector?	Repair the connector.	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>

15.List of Diagnostic Trouble Code (DTC)

A: LIST

DTC	Item	Content of diagnosis	Reference
P0705	Transmission Range Sensor Circuit (PRNDL Input)	Inhibitor switch malfunction, open or short circuit	<Ref. to 5AT(diag)-36, DTC P0705 TRANSMISSION RANGE SENSOR CIRCUIT (PRNDL INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0711	ATF Temp. Sensor Circuit Range/Performance	ATF temperature sensor is faulty or input signal circuit is faulty.	<Ref. to 5AT(diag)-40, DTC P0711 ATF TEMP. SENSOR CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0712	Transmission Fluid Temperature Sensor Circuit Low Input	ATF temperature sensor is faulty or input signal circuit is shorted.	<Ref. to 5AT(diag)-42, DTC P0712 TRANSMISSION FLUID TEMPERATURE SENSOR CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0713	Transmission Fluid Temperature Sensor Circuit High Input	ATF temperature sensor is faulty or input signal circuit is open.	<Ref. to 5AT(diag)-44, DTC P0713 TRANSMISSION FLUID TEMPERATURE SENSOR CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0715	Input/Turbine Speed Sensor Circuit	Turbine speed sensor 1 malfunction, open or short in input signal circuit	<Ref. to 5AT(diag)-46, DTC P0715 INPUT/TURBINE SPEED SENSOR CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0719	Brake Switch Circuit Low	Brake switch malfunction, open circuit in input signal, body integrated unit malfunction, or CAN communication error	<Ref. to 5AT(diag)-49, DTC P0719 BRAKE SWITCH CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0720	Output Speed Sensor Circuit	Front vehicle speed sensor malfunction, open or short in input signal circuit, ground or power supply	<Ref. to 5AT(diag)-51, DTC P0720 OUTPUT SPEED SENSOR CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0724	Brake Switch Circuit High	Brake switch malfunction, short circuit in input signal, body integrated unit malfunction, or CAN communication error	<Ref. to 5AT(diag)-54, DTC P0724 BRAKE SWITCH CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0731	Gear 1 Incorrect Ratio	Vehicle speed sensor, turbine speed sensor, control valve, or gear shift clutch malfunction	<Ref. to 5AT(diag)-55, DTC P0731 GEAR 1 INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0732	Gear 2 Incorrect Ratio	Vehicle speed sensor, turbine speed sensor, control valve, or gear shift clutch malfunction	<Ref. to 5AT(diag)-55, DTC P0732 GEAR 2 INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0733	Gear 3 Incorrect Ratio	Vehicle speed sensor, turbine speed sensor or gear shift clutch malfunction	<Ref. to 5AT(diag)-55, DTC P0733 GEAR 3 INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0734	Gear 4 Incorrect Ratio	Vehicle speed sensor, turbine speed sensor or gear shift clutch malfunction	<Ref. to 5AT(diag)-55, DTC P0734 GEAR 4 INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0735	Gear 5 Incorrect Ratio	Vehicle speed sensor, turbine speed sensor or gear shift clutch malfunction	<Ref. to 5AT(diag)-55, DTC P0735 GEAR 5 INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0736	Reverse Incorrect Ratio	Vehicle speed sensor, turbine speed sensor or gear shift clutch malfunction	<Ref. to 5AT(diag)-56, DTC P0736 REVERSE INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0741	Torque Converter Clutch Circuit Performance or Stuck Off	Lock-up clutch is faulty or valve is stuck.	<Ref. to 5AT(diag)-57, DTC P0741 TORQUE CONVERTER CLUTCH CIRCUIT PERFORMANCE OR STUCK OFF, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Item	Content of diagnosis	Reference
P0743	Torque Converter Clutch Circuit Electrical	L/U solenoid circuit or L/U solenoid unit malfunction	<Ref. to 5AT(diag)-58, DTC P0743 TORQUE CONVERTER CLUTCH CIRCUIT ELECTRICAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0748	Pressure Control Solenoid “A” Electrical	Line pressure solenoid circuit or line pressure solenoid unit malfunction	<Ref. to 5AT(diag)-60, DTC P0748 PRESSURE CONTROL SOLENOID “A” ELECTRICAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0751	Shift Solenoid “A” Performance or Stuck Off	Fr/B solenoid malfunction	<Ref. to 5AT(diag)-62, DTC P0751 SHIFT SOLENOID “A” PERFORMANCE OR STUCK OFF, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0753	Shift Solenoid “A” Electrical	Fr/B solenoid circuit or Fr/B solenoid unit malfunction	<Ref. to 5AT(diag)-64, DTC P0753 SHIFT SOLENOID “A” ELECTRICAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0756	Shift Solenoid “B” Performance or Stuck Off	I/C solenoid malfunction	<Ref. to 5AT(diag)-66, DTC P0756 SHIFT SOLENOID “B” PERFORMANCE OR STUCK OFF, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0758	Shift Solenoid “B” Electrical	I/C solenoid circuit or I/C solenoid unit malfunction	<Ref. to 5AT(diag)-68, DTC P0758 SHIFT SOLENOID “B” ELECTRICAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0761	Shift Solenoid “C” Performance or Stuck Off	H&LR/C solenoid malfunction	<Ref. to 5AT(diag)-70, DTC P0761 SHIFT SOLENOID “C” PERFORMANCE OR STUCK OFF, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0763	Shift Solenoid “C” Electrical	H&LR/C solenoid circuit or H&LR/C solenoid unit malfunction	<Ref. to 5AT(diag)-72, DTC P0763 SHIFT SOLENOID “C” ELECTRICAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0766	Shift Solenoid “D” Performance or Stuck Off	D/C solenoid malfunction	<Ref. to 5AT(diag)-74, DTC P0766 SHIFT SOLENOID “D” PERFORMANCE OR STUCK OFF, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0768	Shift Solenoid “D” Electrical	D/C solenoid circuit or D/C solenoid unit malfunction	<Ref. to 5AT(diag)-76, DTC P0768 SHIFT SOLENOID “D” ELECTRICAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0771	Shift Solenoid “E” Performance or Stuck Off	Fwd/B solenoid malfunction	<Ref. to 5AT(diag)-78, DTC P0771 SHIFT SOLENOID “E” PERFORMANCE OR STUCK OFF, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0773	Shift Solenoid “E” Electrical	Fwd/B solenoid circuit or Fwd/B solenoid unit malfunction	<Ref. to 5AT(diag)-80, DTC P0773 SHIFT SOLENOID “E” ELECTRICAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0801	Reverse Inhibit Control Circuit	Shift lock solenoid is faulty or output signal circuit is open or shorted.	<Ref. to 5AT(diag)-82, DTC P0801 REVERSE INHIBIT CONTROL CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0817	Starter Disable Circuit	• Open or short in PN signal output circuit • ECM power supply malfunction • TCM+B fuse is blown.	<Ref. to 5AT(diag)-84, DTC P0817 STARTER DISABLE CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0957	Backup Light Relay Circuit Low	Open or short in back-up light relay output circuit, or relay OFF malfunction	<Ref. to 5AT(diag)-86, DTC P0957 BACKUP LIGHT RELAY CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0958	Backup Light Relay Circuit High	Short circuit in back-up light relay output, or relay ON malfunction	<Ref. to 5AT(diag)-88, DTC P0958 BACKUP LIGHT RELAY CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

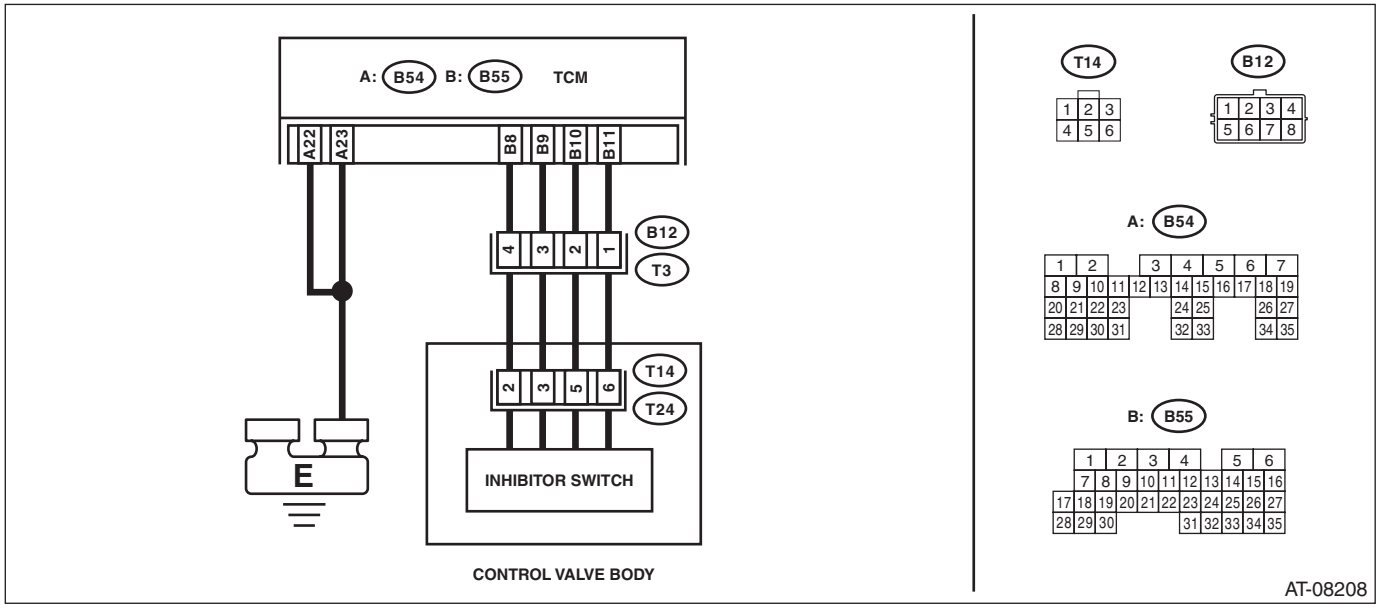
DTC	Item	Content of diagnosis	Reference
P1706	AT Vehicle Speed Sensor Circuit Malfunction (Rear Wheel)	Rear vehicle speed sensor malfunction, open or short in input circuit, ground or power supply	<Ref. to 5AT(diag)-90, DTC P1706 AT VEHICLE SPEED SENSOR CIRCUIT MALFUNCTION (REAR WHEEL), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1707	AT AWD Solenoid Valve Circuit Malfunction	AWD solenoid circuit or AWD solenoid unit malfunction	<Ref. to 5AT(diag)-92, DTC P1707 AT AWD SOLENOID VALVE CIRCUIT MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1710	Torque Converter Turbine 2 Speed Signal Circuit Malfunction	Turbine speed sensor 2 malfunction, open or short in input circuit, ground or power supply	<Ref. to 5AT(diag)-94, DTC P1710 TORQUE CONVERTER TURBINE 2 SPEED SIGNAL CIRCUIT MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1718	AT CAN Communication Circuit	Open circuit in CAN communication bus off, shorted ECM, ABS/VDCCM, body integrated unit malfunction	<Ref. to 5AT(diag)-96, DTC P1718 AT CAN COMMUNICATION CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1724	AT EEPROM Error	TCM EEPROM malfunction	<Ref. to 5AT(diag)-96, DTC P1724 AT EEPROM ERROR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1817	Sports Mode Switch Circuit (Manual Switch)	Open or short in manual mode switch circuit, or switch malfunction	<Ref. to 5AT(diag)-97, DTC P1817 SPORTS MODE SWITCH CIRCUIT (MANUAL SWITCH), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1840	Transmission Fluid Pressure Sensor Switch A Circuit	Open or short in Fr/B fluid pressure switch circuit, or switch malfunction	<Ref. to 5AT(diag)-99, DTC P1840 TRANSMISSION FLUID PRESSURE SENSOR SWITCH A CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1841	Transmission Fluid Pressure Sensor Switch B Circuit	Open or short in Fwd/B fluid pressure switch circuit, or switch malfunction	<Ref. to 5AT(diag)-99, DTC P1841 TRANSMISSION FLUID PRESSURE SENSOR SWITCH B CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1842	Transmission Fluid Pressure Sensor Switch C Circuit	Open or short in I/O fluid pressure switch circuit, or switch malfunction	<Ref. to 5AT(diag)-99, DTC P1842 TRANSMISSION FLUID PRESSURE SENSOR SWITCH C CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1843	Transmission Fluid Pressure Sensor Switch D Circuit	Open or short circuit in D/C fluid pressure switch circuit, or switch malfunction	<Ref. to 5AT(diag)-99, DTC P1843 TRANSMISSION FLUID PRESSURE SENSOR SWITCH D CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1844	Transmission Fluid Pressure Sensor Switch E Circuit	Open or short in H&LR/C fluid pressure switch circuit, or switch malfunction	<Ref. to 5AT(diag)-99, DTC P1844 TRANSMISSION FLUID PRESSURE SENSOR SWITCH E CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

16.Diagnostic Procedure with Diagnostic Trouble Code (DTC)

A: DTC P0705 TRANSMISSION RANGE SENSOR CIRCUIT (PRNDL INPUT)

DTC DETECTING CONDITION:
The inhibitor switch is open or short.
TROUBLE SYMPTOM:
- Shift characteristics are erroneous.
- Shift indicator does not match with select lever.
- Shift indicator does not illuminate.
- N-D, N-R shock occur.

WIRING DIAGRAM:
AT control system <Ref. to WI-60, AT Control System.>



Step		Check	Yes	No
1	**CHECK DTC OF TCM.**	Is DTC of AT CAN communication circuit displayed?	Perform the diagnosis according to DTC.	Go to step **2**.
2	**CHECK INHIBITOR SWITCH.** Using Subaru Select Monitor, read the data of «Inhibitor SW 1» — «Inhibitor SW 4» for each range. ○=High AT-05083	Is the display as in the table of step 2?	Go to step **9**.	Go to step **3**.
3	**CHECK INHIBITOR SWITCH.** Using Subaru Select Monitor, read the data of «Inhibitor SW 1» for “P” and “D” ranges.	Is the display “High” for both “P” and “D”?	Go to step **4**.	Go to step **7**.
4	**CHECK INHIBITOR SWITCH.** Using Subaru Select Monitor, read the data of «Inhibitor SW 2» for “R” and “D” ranges.	Is the display “High” for both “R” and “D”?	Go to step **5**.	Go to step **7**.

	SW1	SW2	SW3	SW4
P	○			○
R		○		
N			○	○
D	○	○	○	

	Step	Check	Yes	No
5	**CHECK INHIBITOR SWITCH.** Using Subaru Select Monitor, read the data of «Inhibitor SW 3» for “N” and “D” ranges.	Is the display “High” for both “N” and “D”?	Go to step **6**.	Go to step **7**.
6	**CHECK INHIBITOR SWITCH.** Using Subaru Select Monitor, read the data of «Inhibitor SW 4» for “P” and “N” ranges.	Is the display “High” for both “P” and “N”?	Go to step **8**.	Go to step **7**.
7	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM connector and transmission connector. ***Connector & terminal*** ***(B55) No. 8 — (B12) No. 4:*** ***(B55) No. 9 — (B12) No. 3:*** ***(B55) No. 10 — (B12) No. 2:*** ***(B55) No. 11 — (B12) No. 1:***	Is the resistance less than 1 Ω?	Go to step **8**.	Repair the open circuit of harness between TCM and transmission connector.
8	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 8 — Chassis ground:*** ***(B55) No. 9 — Chassis ground:*** ***(B55) No. 10 — Chassis ground:*** ***(B55) No. 11 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **9**.	Repair the short circuit of harness between TCM and transmission connector.
9	**CHECK INPUT SIGNAL CIRCUIT FOR TCM.** 1) Turn the ignition switch to OFF. 2) Disconnect the transmission connector (B12). 3) Connect the TCM connector. 4) Turn the ignition switch to ON. 5) Measure the voltage between TCM terminals. ***Connector & terminal*** ***(B55) No. 8 (+) — (B54) No. 23 (–):*** ***(B55) No. 9 (+) — (B54) No. 23 (–):*** ***(B55) No. 10 (+) — (B54) No. 23 (–):*** ***(B55) No. 11 (+) — (B54) No. 23 (–):***	Is the voltage of «Inhibitor SW 1» — «Inhibitor SW 4» 8 V or more?	Go to step **11**.	Go to step **10**.
10	**CHECK TCM I/O SIGNAL.** Check the power supply and ground I/O signals. <Ref. to 5AT(diag)-13, ELECTRICAL SPECIFICATION, Transmission Control Module (TCM) I/O Signal.>	Is TCM I/O signal OK?	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>	Repair the open or short circuit for power supply and ground.

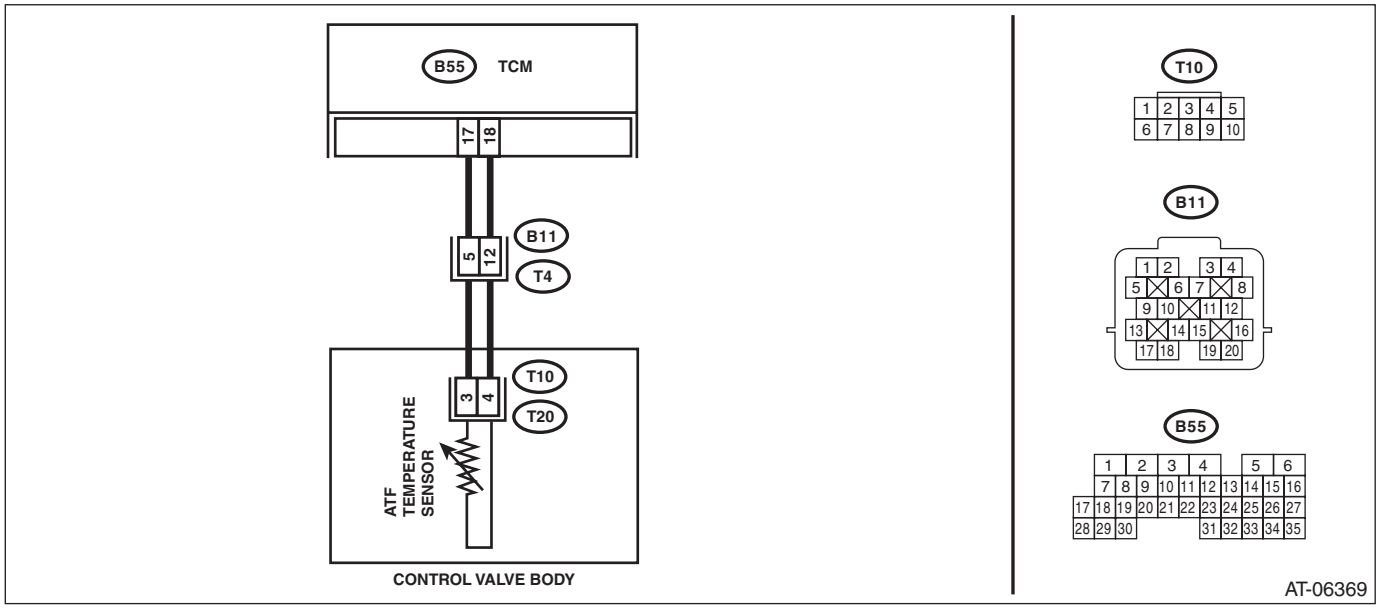
	Step	Check	Yes	No
11	**CHECK INPUT SIGNAL FOR TCM.** 1) Connect all connectors. 2) Lift up the vehicle. 3) Start the engine. 4) Read the data of «Front Wheel Speed» and «AT Turbine Speed 2» using Subaru Select Monitor. <Ref. to 5AT(diag)-18, Read Current Data.> NOTE: The speed difference between front and rear wheels lights the ABS warning light or the VDC warning light, but this does not indicate a malfunction. If the warning light is illuminated, clear the memory of ABS or VDC after completing AT control diagnosis. <Ref. to VDC(diag)-25, Clear Memory Mode.>	Does the speedometer indication increase as «Front Wheel Speed» and «AT Turbine Speed 2» values increase?	Go to step **12**.	Replace the control valve body. <Ref. to 5AT-54, Control Valve Body.>
12	**CHECK INPUT SIGNAL FOR TCM.** 1) Drive at 4th of manual mode. NOTE: Turbine speed sensor 1 signal can be measured only on 4th speed. 2) Read the data of «Rear Wheel Speed» and «AT Turbine Speed 1» using Subaru Select Monitor. <Ref. to 5AT(diag)-18, Read Current Data.> NOTE: The speed difference between front and rear wheels lights the ABS warning light or the VDC warning light, but this does not indicate a malfunction. If the warning light is illuminated, clear the memory of ABS or VDC after completing AT control diagnosis. <Ref. to VDC(diag)-25, Clear Memory Mode.>	Does the speedometer indication increase as «Rear Wheel Speed» and «AT Turbine Speed 1» values increase?	Go to step **13**.	Repair the open circuit of harness or poor contact of connector between TCM and rear vehicle speed sensor and turbine speed sensor 1.
13	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Remove the transmission connector from bracket. 4) Lift up the vehicle. 5) Drain the ATF. **CAUTION:** **Do not drain ATF until it cools down.** 6) Remove the oil pan. 7) Disconnect the connector from control valve body connector. 8) Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(T3) No. 4 — (T14) No. 2:*** ***(T3) No. 3 — (T14) No. 3:*** ***(T3) No. 2 — (T14) No. 5:*** ***(T3) No. 1 — (T14) No. 6:***	Is the resistance less than 1 Ω?	Go to step **14**.	Repair the open circuit of harness between control valve body connector and transmission connector.

	Step	Check	Yes	No
14	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** Measure the resistance between transmission ground and control valve body connector. ***Connector & terminal*** ***(T14) No. 2 — Transmission ground:*** ***(T14) No. 3 — Transmission ground:*** ***(T14) No. 5 — Transmission ground:*** ***(T14) No. 6 — Transmission ground:***	Is the resistance 1 MΩ or more?	Go to step **15**.	Repair the short circuit of harness between control valve body connector and transmission connector.
15	**CHECK FOR POOR CONTACT.**	Is there any poor contact of «Inhibitor SW 1» — «Inhibitor SW 4» monitor circuit?	Repair the poor contact.	Replace the control valve body. <Ref. to 5AT-54, Control Valve Body.>

B: DTC P0711 ATF TEMP. SENSOR CIRCUIT RANGE/PERFORMANCE

DTC DETECTING CONDITION:
ATF temperature does not reach 20°C (68°F). (ATF temperature does not increase.)
TROUBLE SYMPTOM:
Excessive shift shock

CAUTION:
After completion of the diagnosis, perform the Clear Memory Mode. <Ref. to 5AT(diag)-21, Clear Memory Mode.>
WIRING DIAGRAM:
AT control system <Ref. to WI-60, AT Control System.>

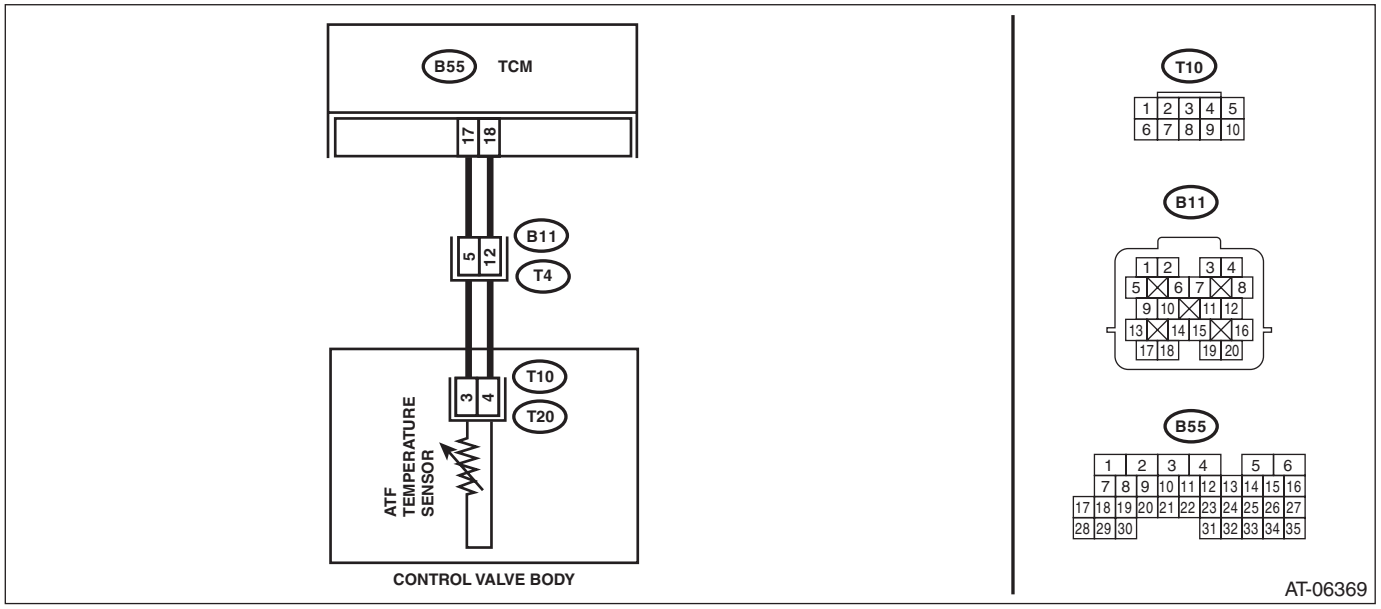


Step		Check	Yes	No
1	**CHECK DTC.** Check the DTC using Subaru Select Monitor.	Is DTC P0712 or P0713 displayed?	Perform the diagnosis according to DTC.	Go to step **2**.
2	**CHECK TRANSMISSION FLUID.** Check the amount of ATF. <Ref. to 5AT-28, INSPECTION, Automatic Transmission Fluid.>	Is the ATF amount correct?	Go to step **3**.	Adjust the amount of ATF. <Ref. to 5AT-28, INSPECTION, Automatic Transmission Fluid.>
3	**CHECK INPUT SIGNAL FOR TCM.** Check «ATF Temp.» using the Subaru Select Monitor.	Is «ATF Temp.» less than 20°C (68°F)?	Go to step **4**.	After the ATF temperature drops below 20°C (68°F), reconfirm «ATF Temp.».
4	**CHECK INPUT SIGNAL FOR TCM.** 1) Lift up the vehicle. 2) Apply the electronic parking brake. 3) Start the engine. 4) Set the select lever to “D” range. 5) Warm up the engine until the ATF temperature reaches 20°C (68°F). 6) Read the data of «ATF Temp.» using the Subaru Select Monitor.	Does «ATF Temp.» increase by 1°C (1.8°F) within 3 minutes?	Current condition is normal.	Go to step **5**.

	Step	Check	Yes	No
5	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the TCM and transmission connectors. 3) Measure the resistance between TCM connector and transmission connectors. ***Connector & terminal*** ***(B55) No. 17 — (B11) No. 5:*** ***(B55) No. 18 — (B11) No. 12:***	Is the resistance less than 1 Ω?	Go to step **6**.	Check for poor contact of the harness between the ATF temperature sensor and transmission connector, and repair the defective part.
6	**CHECK INPUT SIGNAL FOR TCM.** 1) Connect the connector to TCM. (with the transmission connector disconnected) 2) Turn the ignition switch to ON. 3) Read the data of «ATF Temp.» using the Subaru Select Monitor.	Is –40°C (–40°F) displayed in «ATF Temp.»?	Replace the control valve body. <Ref. to 5AT-54, Control Valve Body.>	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>

C: DTC P0712 TRANSMISSION FLUID TEMPERATURE SENSOR CIRCUIT LOW INPUT

DTC DETECTING CONDITION:
Input signal circuit to ATF temperature sensor is shorted.
TROUBLE SYMPTOM:
Excessive shift shock
WIRING DIAGRAM:
AT control system <Ref. to WI-60, AT Control System.>

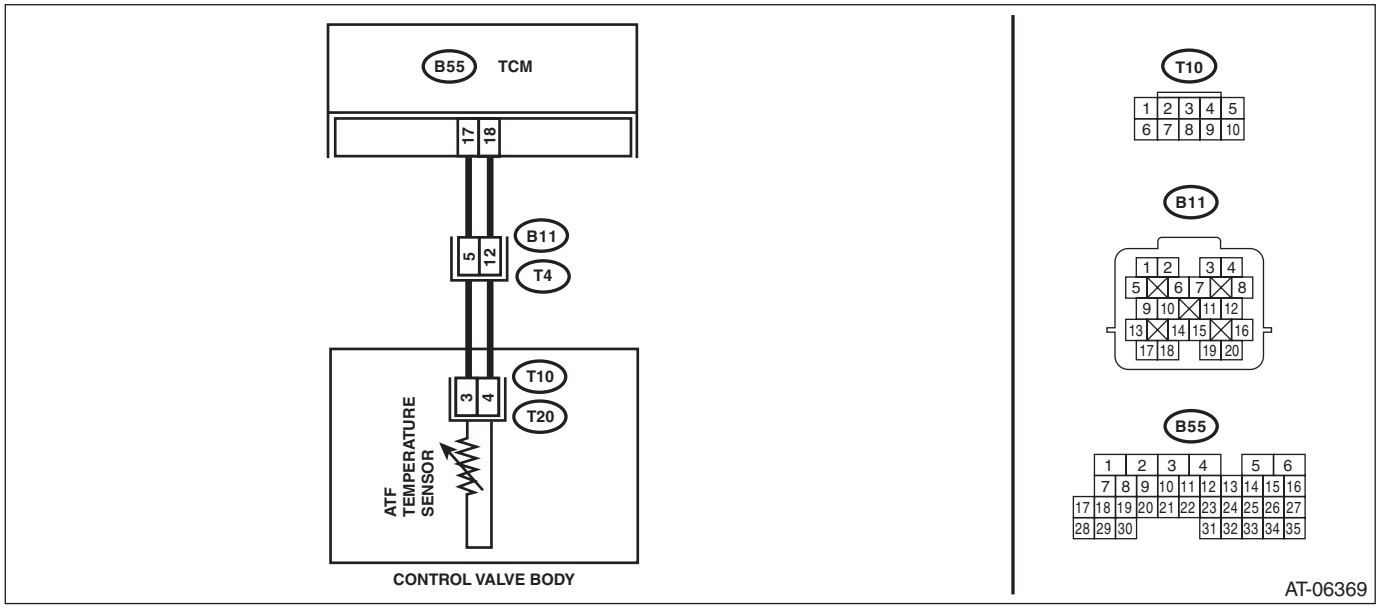


Step		Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 17 — Chassis ground:*** ***(B55) No. 18 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **2**.	Repair the short circuit of harness between TCM and transmission connector.
2	**CHECK ATF TEMPERATURE SENSOR.** 1) Turn the ignition switch to OFF. 2) Connect the connectors to transmission and TCM. 3) Start the engine. 4) Warm up the transmission until the ATF temperature exceeds 80°C (176°F). 5) Disconnect the connector from transmission. 6) Measure the resistance between transmission connector terminals. ***Connector & terminal*** ***(T4) No. 5 — (T4) No. 12:***	Is the resistance 300 — 800 Ω?	Go to step **3**.	Go to step **5**.
3	**CHECK ATF TEMPERATURE SENSOR.** Measure the resistance between transmission connector terminals. ***Connector & terminal*** ***(T4) No. 5 — (T4) No. 12:***	Does the resistance value increase while the ATF temperature decreases?	Go to step **4**.	Go to step **5**.

	Step	Check	Yes	No
4	**CHECK INPUT SIGNAL FOR TCM.** 1) Connect the connector. 2) Turn the ignition switch to ON. 3) Read the data of «ATF Temp.» using the Subaru Select Monitor.	Does the ATF temperature gradually decrease?	Check for poor contact of the harness between the ATF temperature sensor and transmission connector, and repair the defective part.	Go to step **6**.
5	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Remove the transmission connector from bracket. 4) Lift up the vehicle. 5) Drain the ATF. **CAUTION:** **Do not drain ATF until it cools down.** 6) Remove the oil pan. 7) Disconnect the control valve body connector. 8) Measure the resistance between chassis ground and control valve body connector. ***Connector & terminal*** ***(T10) No. 3 — Chassis ground:*** ***(T10) No. 4 — Chassis ground:***	Is the resistance 1 MΩ or more?	Replace the control valve body. <Ref. to 5AT-54, Control Valve Body.>	Repair the short circuit of harness between transmission connector and control valve body connector.
6	**CHECK FOR POOR CONTACT.**	Is there poor contact of ATF temperature sensor circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>

D: DTC P0713 TRANSMISSION FLUID TEMPERATURE SENSOR CIRCUIT HIGH INPUT

DTC DETECTING CONDITION:
Input signal circuit to ATF temperature sensor is open.
TROUBLE SYMPTOM:
Excessive shift shock
WIRING DIAGRAM:
AT control system <Ref. to WI-60, AT Control System.>



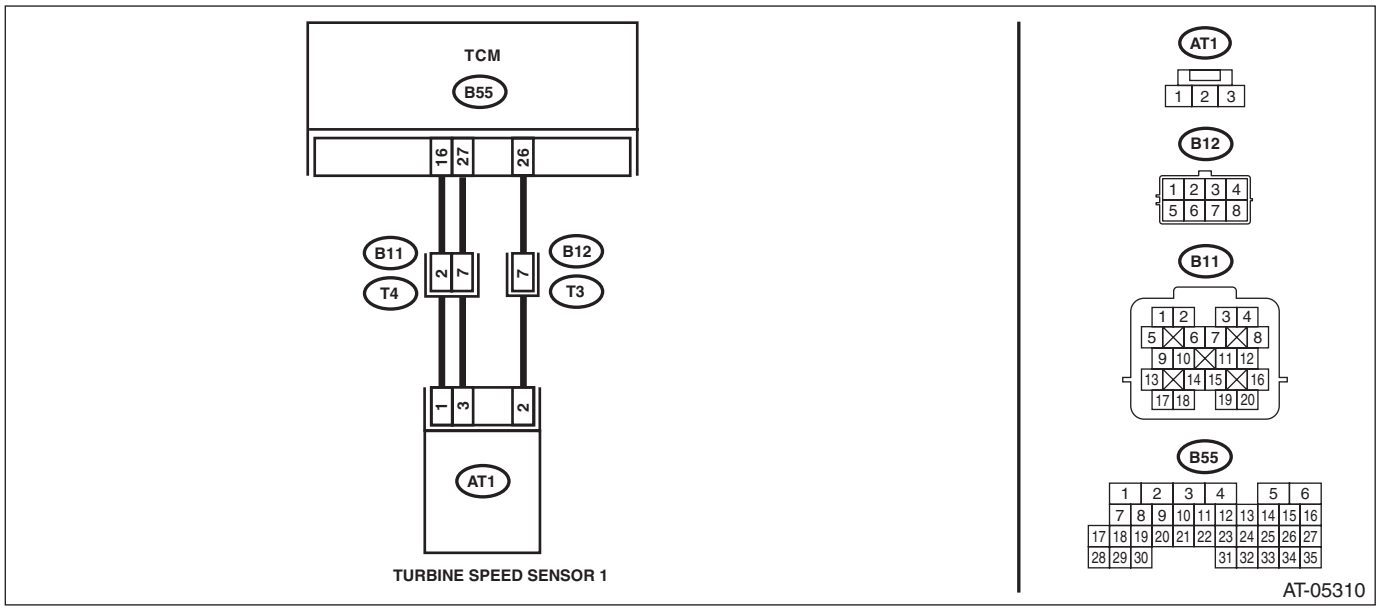
	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM connector and transmission connector. ***Connector & terminal*** ***(B55) No. 17 — (B11) No. 5:*** ***(B55) No. 18 — (B11) No. 12:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair the open circuit of harness between TCM and transmission connector.
2	**CHECK ATF TEMPERATURE SENSOR.** 1) Turn the ignition switch to OFF. 2) Connect the connectors to transmission and TCM. 3) Start the engine. 4) Warm up the transmission until the ATF temperature exceeds 80°C (176°F). 5) Disconnect the connector from transmission. 6) Measure the resistance between transmission connector terminals. ***Connector & terminal*** ***(T4) No. 5 — (T4) No. 12:***	Is the resistance 300 — 800 Ω?	Go to step **3**.	Go to step **5**.
3	**CHECK ATF TEMPERATURE SENSOR.** Measure the resistance between transmission connector terminals. ***Connector & terminal*** ***(T4) No. 5 — (T4) No. 12:***	Does the resistance value increase while the ATF temperature decreases?	Go to step **4**.	Go to step **5**.

	Step	Check	Yes	No
4	**CHECK INPUT SIGNAL FOR TCM.** 1) Connect the connector. 2) Turn the ignition switch to ON. 3) Read the data of «ATF Temp.» using the Subaru Select Monitor.	Does the ATF temperature gradually decrease?	Check for poor contact of the harness between the ATF temperature sensor and transmission connector, and repair the defective part.	Go to step **6**.
5	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Remove the transmission connector from bracket. 4) Lift up the vehicle. 5) Drain the ATF. **CAUTION:** **Do not drain ATF until it cools down.** 6) Remove the oil pan. 7) Disconnect the control valve body connector. 8) Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(T4) No. 5 — (T10) No. 3:*** ***(T4) No. 12 — (T10) No. 4:***	Is the resistance less than 1 Ω?	Replace the control valve body. <Ref. to 5AT-54, Control Valve Body.>	Repair the open circuit of harness between transmission connector and control valve body connector.
6	**CHECK FOR POOR CONTACT.**	Is there poor contact of ATF temperature sensor circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>

E: DTC P0715 INPUT/TURBINE SPEED SENSOR CIRCUIT

DTC DETECTING CONDITION:
Input signal circuit of TCM is open or shorted.
TROUBLE SYMPTOM:
- Excessive shift shock
- Does not shift to 5th.

WIRING DIAGRAM:
AT Control System <Ref. to WI-60, AT Control System.>



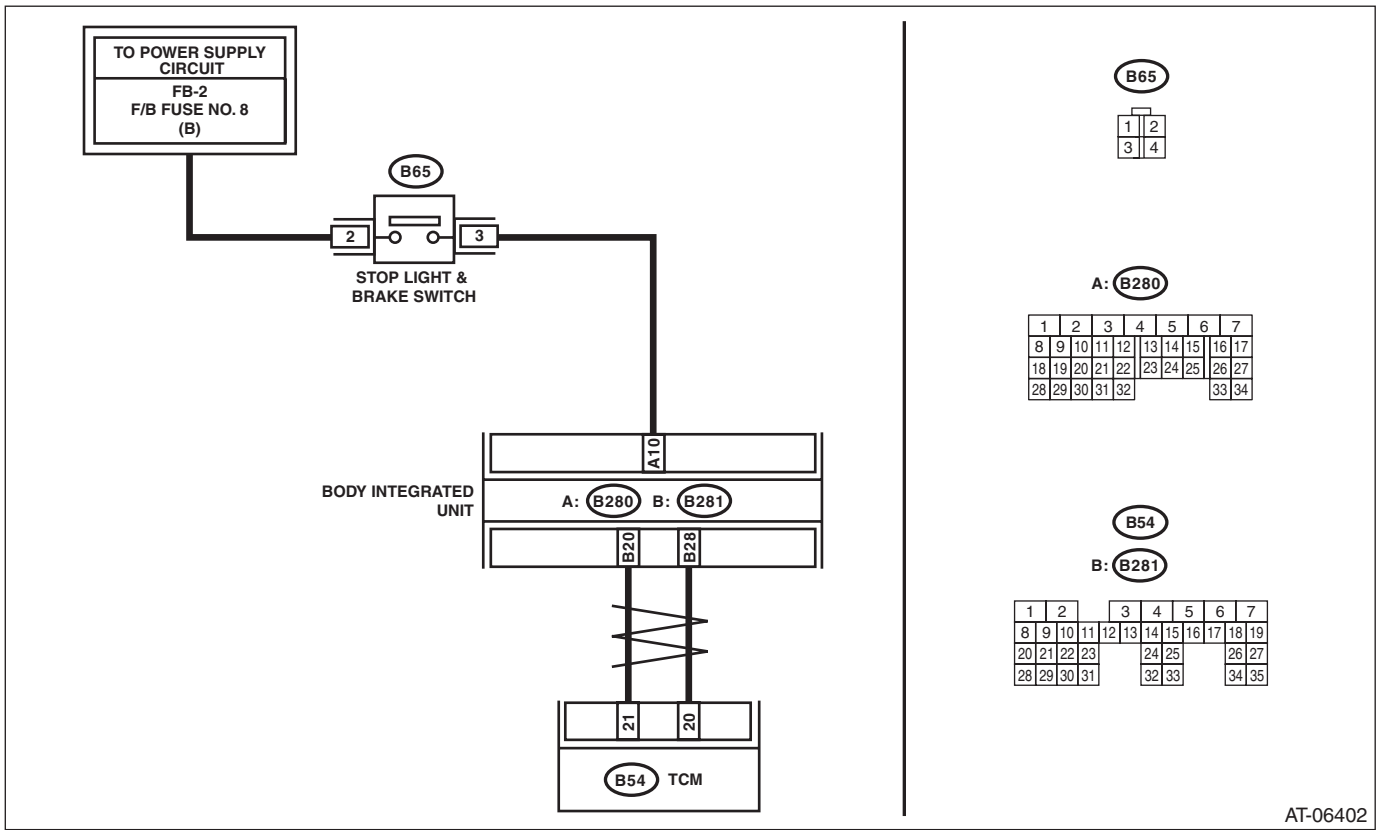
	Step	Check	Yes	No
1	**CHECK TCM I/O SIGNAL.** Check the power supply and ground I/O signals. <Ref. to 5AT(diag)-13, ELECTRICAL SPECIFICATION, Transmission Control Module (TCM) I/O Signal.>	Is TCM I/O signal OK?	Go to step **2**.	Repair the open or short circuit for power supply and ground.
2	**CHECK TCM AND TRANSMISSION HARNESS CONNECTOR.** 1) Disconnect the connectors from TCM and transmission. 2) Measure the resistance of harness between TCM connector and transmission connector. ***Connector & terminal*** ***(B55) No. 16 — (B11) No. 2:*** ***(B55) No. 26 — (B12) No. 7:*** ***(B55) No. 27 — (B11) No. 7:***	Is the resistance less than 1 Ω?	Go to step **3**.	Repair the open circuit of harness between TCM and transmission connector.
3	**CHECK TCM AND TRANSMISSION HARNESS CONNECTOR.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 16 — Chassis ground:*** ***(B55) No. 26 — Chassis ground:*** ***(B55) No. 27 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **4**.	Repair the short circuit of harness between TCM and transmission connector.

	Step	Check	Yes	No
4	**CHECK TCM POWER SUPPLY OUTPUT.** 1) Connect the connector to TCM. (Transmission connector is disconnected) 2) Turn the ignition switch to ON. 3) Measure the voltage between transmission connector and chassis ground. ***Connector & terminal*** ***(B11) No. 7 (+) — Chassis ground (–):***	Is the voltage 10 — 13 V?	Go to step **5**.	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>
5	**CHECK INPUT CIRCUIT OF TCM TURBINE SPEED SENSOR.** Measure the voltage between TCM connector terminals. ***Connector & terminal*** ***(B12) No. 7 (+) — (B11) No. 2 (–):***	Is the voltage 4 — 6 V?	Go to step **6**.	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>
6	**CHECK HARNESS ASSEMBLY (TURBINE SPEED SENSOR GROUND).** Check the installing condition of ground connecting harness of harness assembly (used for both of turbine speed sensor 1, rear vehicle speed sensor).	Is the ground connecting harness installed to transmission body correctly, or the harness and terminals not damaged?	Go to step **7**.	When poor installation of ground occurs, install it securely. Replace the transmission assembly if the harness or terminal is damaged. <Ref. to 5AT-36, Automatic Transmission Assembly.>
7	**CHECK HARNESS ASSEMBLY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Disconnect the connector from turbine speed sensor 1. 4) Measure the resistance between transmission connector and turbine speed sensor 1 connector. ***Connector & terminal*** ***(T3) No. 7 — (AT1) No. 2:*** ***(T4) No. 7 — (AT1) No. 3:*** ***(T4) No. 2 — (AT1) No. 1:***	Is the resistance less than 1 Ω?	Go to step **8**.	Repair the open circuit of the harness or poor contact of the connector between the transmission connector and turbine speed sensor 1 connector.
8	**CHECK HARNESS ASSEMBLY.** Measure the resistance between transmission connector and chassis ground. ***Connector & terminal*** ***(T3) No. 7 — Chassis ground:*** ***(T4) No. 7 — Chassis ground:*** ***(T4) No. 2 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **9**.	Repair the short circuit of the harness between the transmission connector and turbine speed sensor 1 connector.

	Step	Check	Yes	No
9	**CHECK INPUT SIGNAL FOR TCM.** 1) Connect all connectors. 2) Lift up the vehicle. 3) Start the engine. 4) Drive at 4th of manual mode. NOTE: Turbine speed sensor 1 signal can be measured only on 4th speed. 5) Read the data of «AT Turbine Speed 1» and «AT Turbine Speed 2» using Subaru Select Monitor. <Ref. to 5AT(diag)-18, Read Current Data.> NOTE: The speed difference between front and rear wheels lights the ABS warning light or the VDC warning light, but this does not indicate a malfunction. If the warning light is illuminated, clear the memory of ABS or VDC after completing AT control diagnosis. <Ref. to VDC(diag)-25, Clear Memory Mode.>	Are the values of «AT Turbine Speed 1» and «AT Turbine Speed 2» almost the same?	Check for poor contact of the harness of the turbine speed sensor 1 circuit, and repair the faulty part.	Replace the turbine speed sensor 1. <Ref. to 5AT-53, Turbine Speed Sensor 1.>

F: DTC P0719 BRAKE SWITCH CIRCUIT LOW

DTC DETECTING CONDITION:
Brake switch malfunction, open input signal circuit
TROUBLE SYMPTOM:
Brake down control does not operate in manual mode.
WIRING DIAGRAM:
Stop light system <Ref. to WI-287, Stop Light System.>



Step		Check	Yes	No
1	**CHECK DTC.**	Is any of following DTC displayed? / AT CAN Communication Circuit / Output Speed Sensor Circuit / AT Vehicle Speed Sensor Circuit Malfunction (Rear Wheel) / VDC Brake SW Circuit	Perform the diagnosis according to DTC.	Go to step **2**.
2	**CHECK BODY INTEGRATED UNIT.** 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor to data link connector. 3) Turn the ignition switch to ON. 4) Run the Subaru Select Monitor. 5) Depress the brake pedal. 6) Read the data of «Stop Light Switch» using Subaru Select Monitor. <Ref. to BC(diag)-12, Read Current Data.>	Is “ON” displayed?	Go to step **3**.	Go to step **4**.
3	**CHECK TCM.** Read the data of «Stop Light Switch» using Subaru Select Monitor. <Ref. to 5AT(diag)-18, Read Current Data.>	Is “ON” displayed?	A temporary poor contact of connector or harness may be the cause. Check the poor contact.	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>

	Step	Check	Yes	No
4	**CHECK BODY INTEGRATED UNIT INPUT SIGNAL.** 1) Disconnect the connector from body integrated unit. 2) Depress the brake pedal. 3) Measure the voltage between body integrated unit connector and chassis ground. ***Connector & terminal*** ***(B280) No. 10 (+) — Chassis ground (–):***	Is the voltage 10 V or more?	Go to step **7**.	Go to step **5**.
5	**CHECK HARNESS CONNECTOR BETWEEN BODY INTEGRATED UNIT AND STOP LIGHT SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from stop light switch. 3) Measure the resistance of harness between body integrated unit connector and stop light switch connector. ***Connector & terminal*** ***(B280) No. 10 — (B65) No. 3:***	Is the resistance less than 1 Ω?	Go to step **6**.	Repair the open circuit of the harness between the body integrated unit and stop light switch connector.
6	**CHECK HARNESS CONNECTOR BETWEEN BODY INTEGRATED UNIT AND STOP LIGHT SWITCH.** Measure the resistance of harness between body integrated unit connector and stop light switch connector. ***Connector & terminal*** ***(B280) No. 10 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **7**.	Repair the short circuit of the harness between the body integrated unit and stop light switch connector.
7	**CHECK FOR POOR CONTACT.**	Is there poor contact of input signal of brake switch?	Repair the poor contact.	Check body integrated unit.

G: DTC P0720 OUTPUT SPEED SENSOR CIRCUIT

DTC DETECTING CONDITION:

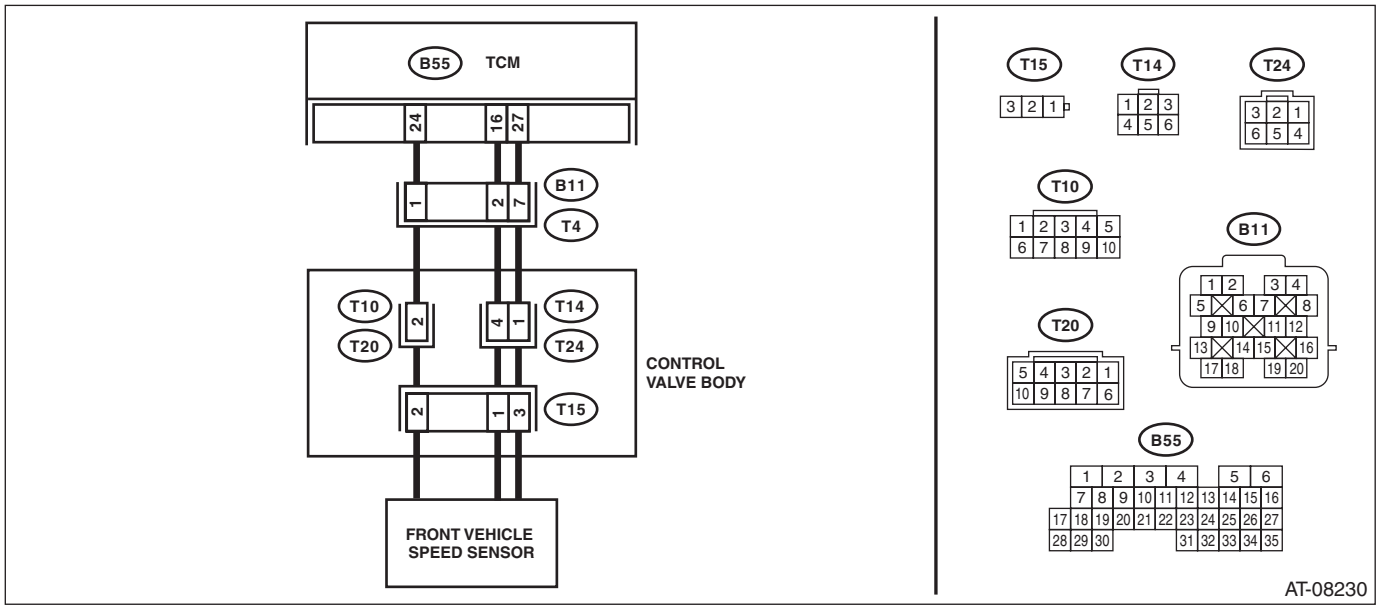
- AT vehicle speed signal is abnormal.
- The harness connector between TCM and vehicle speed sensor is open or shorted.

TROUBLE SYMPTOM:

- Shifting quality malfunction
- Driving performance is poor.

WIRING DIAGRAM:

AT control system <Ref. to WI-60, AT Control System.>



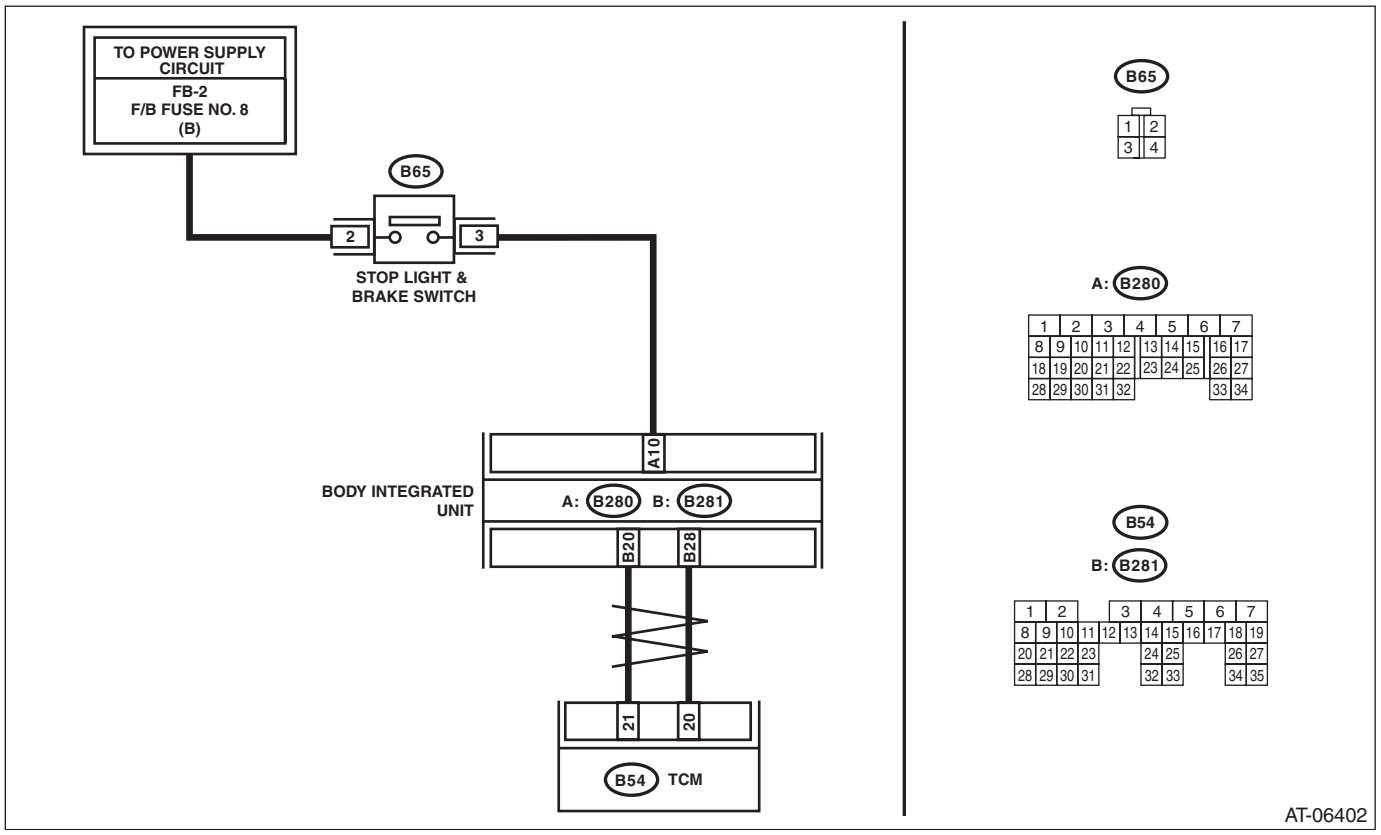
Step		Check	Yes	No
1	**CHECK TCM I/O SIGNAL.** Check the power supply and ground I/O signals. <Ref. to 5AT(diag)-13, ELECTRICAL SPECIFICATION, Transmission Control Module (TCM) I/O Signal.>	Is TCM I/O signal OK?	Go to step **2**.	Repair the open or short circuit for power supply and ground.
2	**CHECK TCM AND TRANSMISSION HARNESS CONNECTOR.** 1) Disconnect the connectors from TCM and transmission. 2) Measure the resistance of harness between TCM connector and transmission connector. ***Connector & terminal*** ***(B55) No. 16 — (B11) No. 2:*** ***(B55) No. 24 — (B11) No. 1:*** ***(B55) No. 27 — (B11) No. 7:***	Is the resistance less than 1 Ω?	Go to step **3**.	Repair the open circuit of harness between TCM and transmission connector.
3	**CHECK TCM AND TRANSMISSION HARNESS CONNECTOR.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 24 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **4**.	Repair the short circuit of harness between TCM and transmission connector.

	Step	Check	Yes	No
4	**CHECK TCM POWER SUPPLY OUTPUT.** 1) Connect the connector to TCM. (Transmission connector is disconnected) 2) Turn the ignition switch to ON. 3) Measure the voltage between transmission connector and chassis ground. ***Connector & terminal*** ***(B11) No. 7 (+) — Chassis ground (–):***	Is the voltage 10 — 13 V?	Go to step **5**.	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>
5	**CHECK INPUT CIRCUIT OF TCM TURBINE SPEED SENSOR.** Measure the voltage variation between TCM connector terminals. ***Connector & terminal*** ***(B11) No. 1 (+) — (B11) No. 2 (–):***	Is the voltage 4 — 6 V?	Go to step **6**.	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>
6	**CHECK INPUT SIGNAL FOR TCM.** 1) Connect all connectors. 2) Lift up the vehicle. 3) Start the engine. 4) Read the data of «Front Wheel Speed» using Subaru Select Monitor. <Ref. to 5AT(diag)-18, Read Current Data.> NOTE: The speed difference between front and rear wheels lights the ABS warning light or the VDC warning light, but this does not indicate a malfunction. If the warning light is illuminated, clear the memory of ABS or VDC after completing AT control diagnosis. <Ref. to VDC(diag)-25, Clear Memory Mode.>	Does the speedometer indication increase as the «Front Wheel Speed» data increases?	Check the harness of the front vehicle speed sensor circuit, and repair the defective part.	Go to step **7**.
7	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Remove the transmission connector from bracket. 4) Lift up the vehicle. 5) Drain the ATF. **CAUTION:** **Do not drain ATF until it cools down.** 6) Remove the oil pan. 7) Disconnect the control valve body connector. 8) Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(T4) No. 1 — (T10) No. 2:***	Is the resistance less than 1 Ω?	Go to step **8**.	Repair the open circuit of harness between control valve body connector and transmission connector.
8	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** Measure the resistance between transmission ground and control valve body connector. ***Connector & terminal*** ***(T10) No. 2 — Transmission ground:***	Is the resistance 1 MΩ or more?	Go to step **9**.	Repair the short circuit of harness between control valve body connector and transmission ground.

	Step	Check	Yes	No
9	**CHECK HARNESS CONNECTOR BETWEEN CONTROL VALVE BODY AND FRONT VEHICLE SPEED SENSOR.** 1) Disconnect the connector from the front vehicle speed sensor. 2) Measure the resistance of the harness between the control valve body connector and front vehicle speed sensor connector. ***Connector & terminal*** ***(T20) No. 2 — (T15) No. 2:*** ***(T24) No. 1 — (T15) No. 3:*** ***(T24) No. 4 — (T15) No. 1:***	Is the resistance less than 1 Ω?	Go to step **10**.	Replace the control valve body. <Ref. to 5AT-54, Control Valve Body.>
10	**CHECK HARNESS CONNECTOR BETWEEN CONTROL VALVE BODY AND FRONT VEHICLE SPEED SENSOR.** Measure the resistance of harness between control valve body connector and transmission ground. ***Connector & terminal*** ***(T20) No. 2 — Transmission ground:***	Is the resistance 1 MΩ or more?	Replace the front vehicle speed sensor. <Ref. to 5AT-50, Front Vehicle Speed Sensor.>	Replace the control valve body. <Ref. to 5AT-54, Control Valve Body.>

H: DTC P0724 BRAKE SWITCH CIRCUIT HIGH

DTC DETECTING CONDITION:
Brake switch malfunction, open input signal circuit
TROUBLE SYMPTOM:
Gear is not shifted down when climbing a hill.
WIRING DIAGRAM:
Stop light system <Ref. to WI-287, Stop Light System.>



Step		Check	Yes	No
1	**CHECK DTC.**	Is any of following DTC detected? / AT CAN Communication Circuit / Output Speed Sensor Circuit / AT Vehicle Speed Sensor Circuit Malfunction (Rear Wheel) / VDC Brake SW Circuit	Perform the diagnosis according to DTC.	Go to step **2**.
2	**CHECK BODY INTEGRATED UNIT.** 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor to data link connector. 3) Turn the ignition switch to ON. 4) Run the Subaru Select Monitor. 5) Read the data of «Stop Light Switch» using Subaru Select Monitor. <Ref. to BC(diag)-12, Read Current Data.>	Is “OFF” displayed?	Go to step **3**.	Go to step **4**.
3	**CHECK TCM.** Read the data of «Stop Light Switch» using Subaru Select Monitor. <Ref. to 5AT(diag)-18, Read Current Data.>	Is “OFF” displayed?	A temporary poor contact of connector or harness may be the cause. Check the poor contact.	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>

	Step	Check	Yes	No
4	**CHECK BODY INTEGRATED UNIT INPUT SIGNAL.** 1) Disconnect the connector from body integrated unit. 2) Measure the voltage between body integrated unit connector and chassis ground. ***Connector & terminal*** ***(B280) No. 10 (+) — Chassis ground (–):***	Is the voltage 10 V or more?	Go to step **5**.	Go to step **7**.
5	**CHECK STOP LIGHT SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from stop light switch. 3) Measure the resistance of harness between stop light switch connectors. ***Connector & terminal*** ***(B65) No. 3 — (B65) No. 2:***	Is the resistance 1 MΩ or more?	Go to step **6**.	Replace the stop light switch. <Ref. to BR-63, Stop Light Switch.>
6	**CHECK HARNESS CONNECTOR BETWEEN BODY INTEGRATED UNIT AND STOP LIGHT SWITCH.** 1) Turn the ignition switch to ON. 2) Measure the voltage of harness between body integrated unit connector and chassis ground. ***Connector & terminal*** ***(B280) No. 10 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **7**.	Repair the short circuit of the harness between the body integrated unit and stop light switch connector.
7	**CHECK FOR POOR CONTACT.**	Is there poor contact of input signal of brake switch?	Repair the poor contact.	Check body integrated unit.

I: DTC P0731 GEAR 1 INCORRECT RATIO

NOTE:
Refer to DTC P0736 for diagnostic procedure. <Ref. to 5AT(diag)-56, DTC P0736 REVERSE INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

J: DTC P0732 GEAR 2 INCORRECT RATIO

NOTE:
Refer to DTC P0736 for diagnostic procedure. <Ref. to 5AT(diag)-56, DTC P0736 REVERSE INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

K: DTC P0733 GEAR 3 INCORRECT RATIO

NOTE:
Refer to DTC P0736 for diagnostic procedure. <Ref. to 5AT(diag)-56, DTC P0736 REVERSE INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

L: DTC P0734 GEAR 4 INCORRECT RATIO

NOTE:
Refer to DTC P0736 for diagnostic procedure. <Ref. to 5AT(diag)-56, DTC P0736 REVERSE INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

M: DTC P0735 GEAR 5 INCORRECT RATIO

NOTE:
Refer to DTC P0736 for diagnostic procedure. <Ref. to 5AT(diag)-56, DTC P0736 REVERSE INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

N: DTC P0736 REVERSE INCORRECT RATIO

DTC DETECTING CONDITION:
Target gear ratio and actual gear ratio do not match.
TROUBLE SYMPTOM:
- Shift point is too high or too low.
- Excessive shift shock
- Gear is not changed.
- The vehicle does not move in “D” or “R” range with the engine running at high speed.

	Step	Check	Yes	No
1	**CHECK DTC.**	Is any of the following DTCs displayed? P0751, P0753, P0756, P0758, P0761, P0763, P0766, P0768, P0771, P0773	Perform the diagnosis according to DTC.	Go to step **2**.
2	**CHECK DTC.**	Is DTC P1718 displayed?	Perform the diagnosis according to DTC.	Go to step **3**.
3	**CHECK AT TURBINE SPEED SENSOR CIRCUIT.** Perform diagnosis according to DTC P0715. <Ref. to 5AT(diag)-46, DTC P0715 INPUT/ TURBINE SPEED SENSOR CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Is there any trouble?	Check the turbine speed sensor 1 circuit.	Go to step **4**.
4	**CHECK AT TURBINE SPEED SENSOR CIRCUIT.** Perform diagnosis according to DTC P1710. <Ref. to 5AT(diag)-94, DTC P1710 TORQUE CONVERTER TURBINE 2 SPEED SIGNAL CIRCUIT MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Is there any trouble?	Check the turbine speed sensor 2 circuit.	Go to step **5**.
5	**CHECK AT VEHICLE SPEED SENSOR CIRCUIT.** Perform diagnosis according to DTC P0720. <Ref. to 5AT(diag)-51, DTC P0720 OUTPUT SPEED SENSOR CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Is there any trouble?	Check for poor contact of the front vehicle speed sensor circuit harness and repair the fault location.	Go to step **6**.
6	**CHECK AT VEHICLE SPEED SENSOR CIRCUIT.** Perform diagnosis according to DTC P1706. <Ref. to 5AT(diag)-90, DTC P1706 AT VEHICLE SPEED SENSOR CIRCUIT MALFUNCTION (REAR WHEEL), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Is there any trouble?	Check for poor contact of the rear vehicle speed sensor circuit harness and repair the fault location.	Go to step **7**.
7	**CHECK TRANSMISSION RANGE SENSOR CIRCUIT (PRNDL INPUT).** Perform diagnosis according to DTC P0705. <Ref. to 5AT(diag)-36, DTC P0705 TRANSMISSION RANGE SENSOR CIRCUIT (PRNDL INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Is there any trouble?	Check the inhibitor switch circuit.	There are malfunctions in TCM, TCM connector poor contact, or transmission assembly mechanical malfunction.

O: DTC P0741 TORQUE CONVERTER CLUTCH CIRCUIT PERFORMANCE OR STUCK OFF

DTC DETECTING CONDITION:

- Lock up clutch malfunction
- Defective torque converter assembly
- Defective control valve
- Defective turbine speed sensor 1 or 2

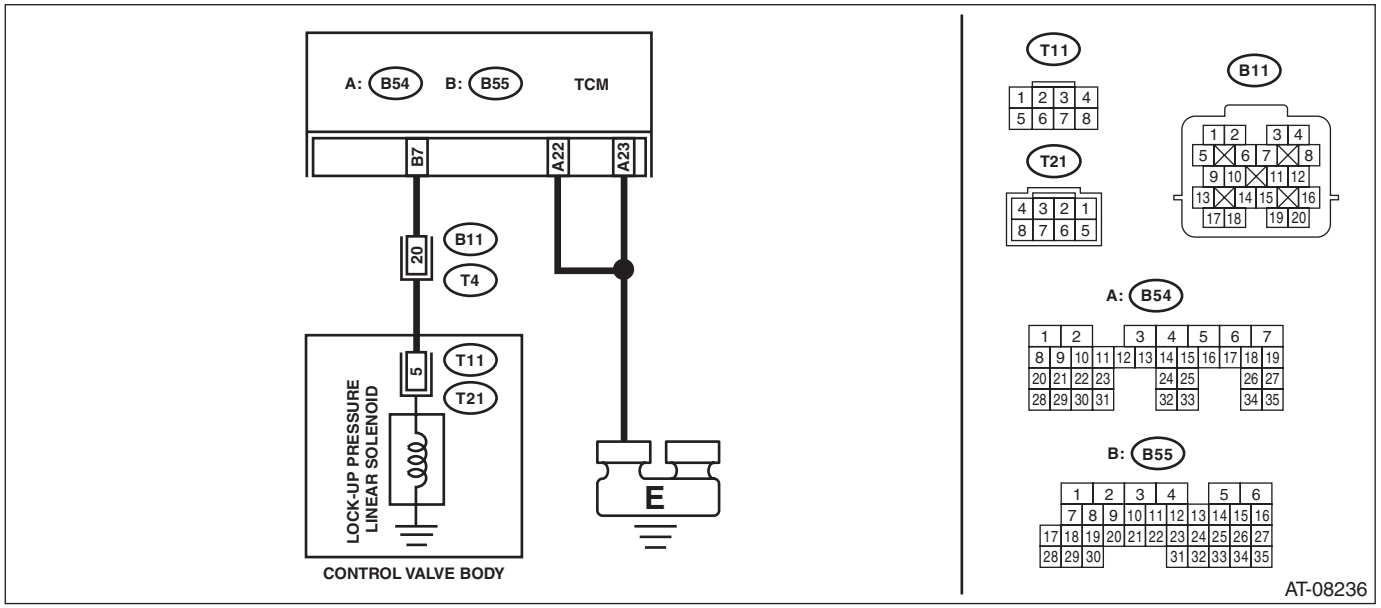
TROUBLE SYMPTOM:

No lock-up occurs. (After engine is warmed up)

Step		Check	Yes	No
1	**CHECK DTC OF TCM.**	Is any DTC of the followings detected? P0715, P0720, P0753, P0758, P0763, P0768, P0773, P0751, P0756, P0761, P0766, P0771, P1710, P1718	Perform the diagnosis according to each DTC.	Go to step **2**.
2	**DRIVING CHECK FOR LOCK-UP CONDITION.** 1) Perform the Clear Memory Mode. 2) Maintain the value of «Accel. Opening Angle» displayed on Subaru Select Monitor and drive the vehicle at 85 km/h or more. 3) Make sure that «L/U Solenoid Current» is 0.6 A or more using Subaru Select Monitor. 4) Read the data of «Engine Speed» and «Turbine Revolution Speed» using Subaru Select Monitor.	Is the difference between «Engine Speed» and «Turbine Revolution Speed» within 100 rpm?	Temporary poor contact or open circuit occurs. Recheck that the harness connector has no faulty.	Replace the transmission assembly when the speed difference becomes 100 rpm or more or DTC P0741 is displayed. When DTC other than P0741 is displayed, perform the diagnosis corresponding to the DTC.

P: DTC P0743 TORQUE CONVERTER CLUTCH CIRCUIT ELECTRICAL

DTC DETECTING CONDITION:
The output signal circuit of lock up solenoid is open or shorted.
TROUBLE SYMPTOM:
No lock-up occurs. (After engine is warmed up.)
WIRING DIAGRAM:
AT control system <Ref. to WI-60, AT Control System.>

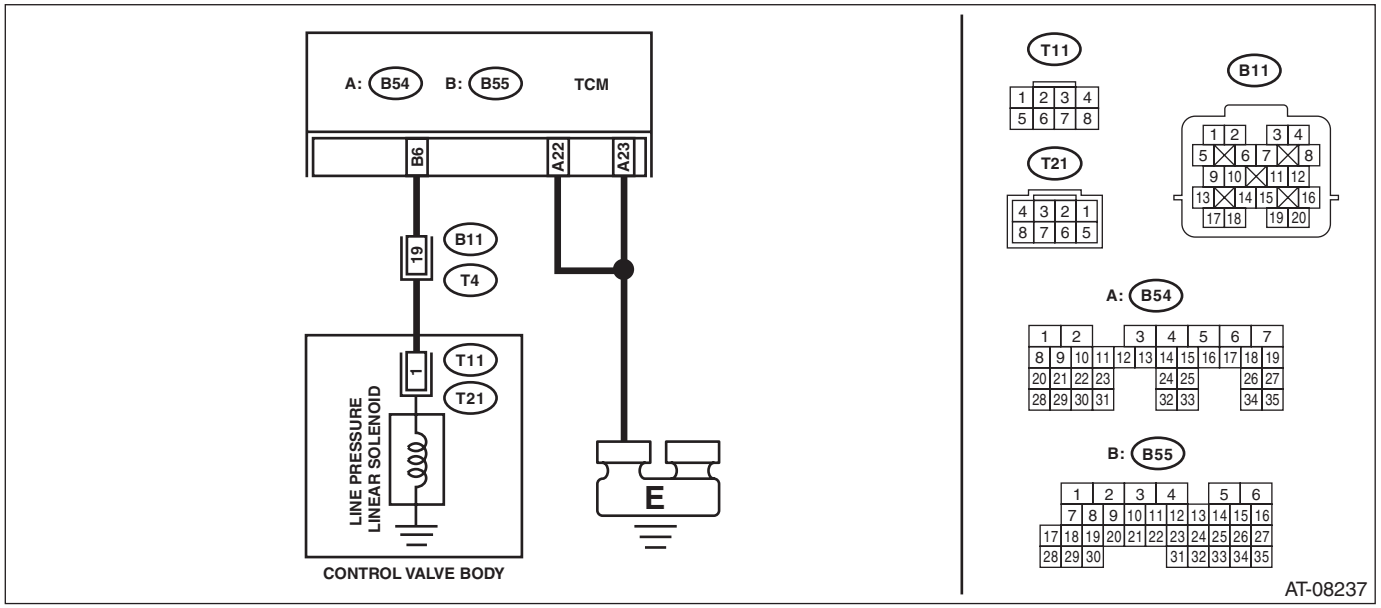


Step		Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM connector and transmission connector. ***Connector & terminal*** ***(B54) No. 22 — Chassis ground:*** ***(B54) No. 23 — Chassis ground:*** ***(B55) No. 7 — (B11) No. 20:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair the open circuit of harness between TCM and transmission connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 7 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **3**.	Repair the short circuit of harness between TCM and transmission connector.

	Step	Check	Yes	No
3	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Remove the transmission connector from bracket. 4) Lift up the vehicle. 5) Drain the ATF. NOTE: Do not drain ATF until it cools down. 6) Remove the oil pan. 7) Disconnect the control valve body connector. 8) Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(T4) No. 20 — (T11) No. 5:***	Is the resistance less than 1 Ω?	Go to step **4**.	Repair the open circuit of harness between transmission connector and control valve body connector.
4	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** Measure the resistance between transmission ground and control valve body connector. ***Connector & terminal*** ***(T11) No. 5 — Transmission ground:***	Is the resistance 1 MΩ or more?	Go to step **5**.	Repair the short circuit of harness between control valve body connector and transmission ground.
5	**CHECK LOCK-UP SOLENOID.** Measure the resistance between transmission ground and control valve body connector. ***Connector & terminal*** ***(T21) No. 5 — Transmission ground:***	Is the resistance 3 — 9 Ω?	Go to step **6**.	Replace the control valve body. <Ref. to 5AT-54, Control Valve Body.>
6	**CHECK FOR POOR CONTACT.** Check the TCM connector, transmission connector and control valve body connector.	Is there poor contact, loosing terminal, entering foreign matter, or damaging connector body?	Repair the poor contact.	Go to step **7**.
7	**CHECK AFTER REPAIR.** 1) Perform the Clear Memory Mode. 2) Drive for a while and read DTC.	Is DTC displayed?	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>	Temporary poor contact or open circuit occurs. Recheck that the harness connector has no faulty.

Q: DTC P0748 PRESSURE CONTROL SOLENOID "A" ELECTRICAL

DTC DETECTING CONDITION:
Output signal circuit of line pressure solenoid is open or shorted.
TROUBLE SYMPTOM:
Excessive shift shock
WIRING DIAGRAM:
AT control system <Ref. to WI-60, AT Control System.>

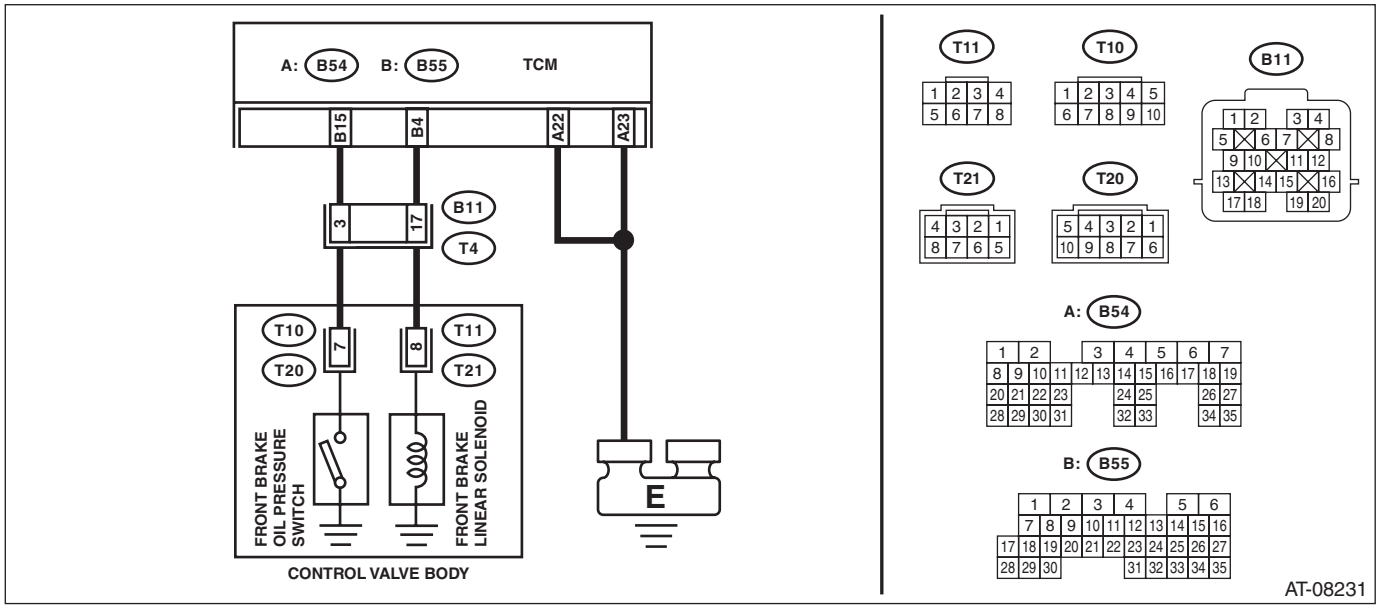


	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM connector and transmission connector. ***Connector & terminal*** ***(B54) No. 22 — Chassis ground:*** ***(B54) No. 23 — Chassis ground:*** ***(B55) No. 6 — (B11) No. 19:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair the open circuit of harness between TCM and transmission connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.** Measure the resistance between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 6 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **3**.	Repair the short circuit of harness between TCM and transmission connector.

	Step	Check	Yes	No
3	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Remove the transmission connector from bracket. 4) Lift up the vehicle. 5) Drain the ATF. **CAUTION:** **Do not drain ATF until it cools down.** 6) Remove the oil pan. 7) Disconnect the control valve body connector. 8) Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(T4) No. 19 — (T11) No. 1:***	Is the resistance less than 1 Ω?	Go to step **4**.	Repair the open circuit of harness between transmission connector and control valve body connector.
4	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** Measure the resistance between transmission ground and control valve body connector. ***Connector & terminal*** ***(T11) No. 1 — Transmission ground:***	Is the resistance 1 MΩ or more?	Go to step **5**.	Repair the short circuit of harness between control valve body connector and transmission ground.
5	**CHECK LINE PRESSURE SOLENOID.** Measure the resistance between transmission ground and control valve body connector. ***Connector & terminal*** ***(T21) No. 1 — Transmission ground:***	Is the resistance 3 — 9 Ω?	Go to step **6**.	Replace the control valve body. <Ref. to 5AT-54, Control Valve Body.>
6	**CHECK FOR POOR CONTACT.** Check the TCM connector, transmission connector and control valve body connector.	Is there poor contact, loosing terminal, entering foreign matter, or damaging connector body?	Repair the poor contact.	Go to step **7**.
7	**CHECK AFTER REPAIR.** 1) Perform the Clear Memory Mode. 2) Drive for a while and read DTC.	Is DTC displayed?	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>	Temporary poor contact or open circuit occurs. Recheck that the harness connector has no faulty.

R: DTC P0751 SHIFT SOLENOID "A" PERFORMANCE OR STUCK OFF

DTC DETECTING CONDITION:
Output signal of front brake solenoid does not match with oil pressure.
TROUBLE SYMPTOM:
Locked to 1st gear.
WIRING DIAGRAM:
AT control system <Ref. to WI-60, AT Control System.>

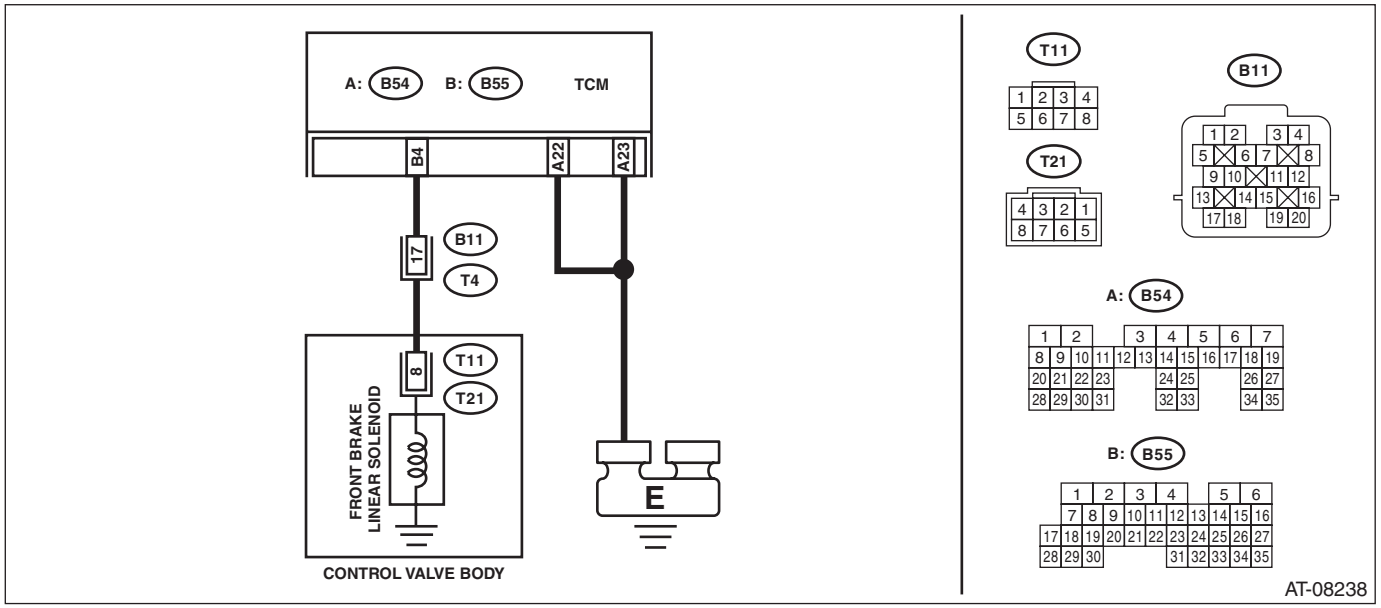


Step		Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM connector and transmission connector. ***Connector & terminal*** ***(B54) No. 22 — Chassis ground:*** ***(B54) No. 23 — Chassis ground:*** ***(B55) No. 4 — (B11) No. 17:*** ***(B55) No. 15 — (B11) No. 3:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair the open circuit of harness between TCM and transmission connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 4 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **3**.	Repair the short circuit of harness between TCM and transmission connector.
3	**CHECK INPUT SIGNAL FOR TCM.** 1) Connect all connectors. 2) Turn the ignition switch to ON. 3) Read the data of «F/B Fluid Pressure» using Subaru Select Monitor.	Is "OFF" displayed?	Go to step **4**.	Go to step **6**.
4	**CHECK INPUT SIGNAL FOR TCM.** 1) Turn the ignition switch to OFF. 2) Start the engine. 3) Shift to 1st speed while checking the current gear position using Subaru Select Monitor. 4) Read the data of «F/B Fluid Pressure» using Subaru Select Monitor.	Is "ON" displayed?	Check for poor contact of harness in the solenoid output and oil pressure SW input, and repair the defective part.	Go to step **5**.

	Step	Check	Yes	No
5	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Remove the transmission connector from bracket. 4) Lift up the vehicle. 5) Drain the ATF. **CAUTION:** **Do not drain ATF until it cools down.** 6) Remove the oil pan. 7) Disconnect the control valve body connector. 8) Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(T4) No. 3 — (T10) No. 7:*** ***(T4) No. 17 — (T11) No. 8:***	Is the resistance less than 1 Ω?	Replace the control valve body. <Ref. to 5AT-54, Control Valve Body.>	Replace the transmission harness assembly.
6	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Remove the transmission connector from bracket. 4) Lift up the vehicle. 5) Drain the ATF. **CAUTION:** **Do not drain ATF until it cools down.** 6) Remove the oil pan. 7) Disconnect the control valve body connector. 8) Measure the resistance between transmission ground and control valve body connector. ***Connector & terminal*** ***(T10) No. 7 — Transmission ground:***	Is the resistance 1 MΩ or more?	Replace the control valve body. <Ref. to 5AT-54, Control Valve Body.>	Replace the transmission harness assembly.

S: DTC P0753 SHIFT SOLENOID "A" ELECTRICAL

DTC DETECTING CONDITION:
Output signal circuit of front brake solenoid is open or shorted.
TROUBLE SYMPTOM:
Locked to 1st gear.
WIRING DIAGRAM:
AT control system <Ref. to WI-60, AT Control System.>

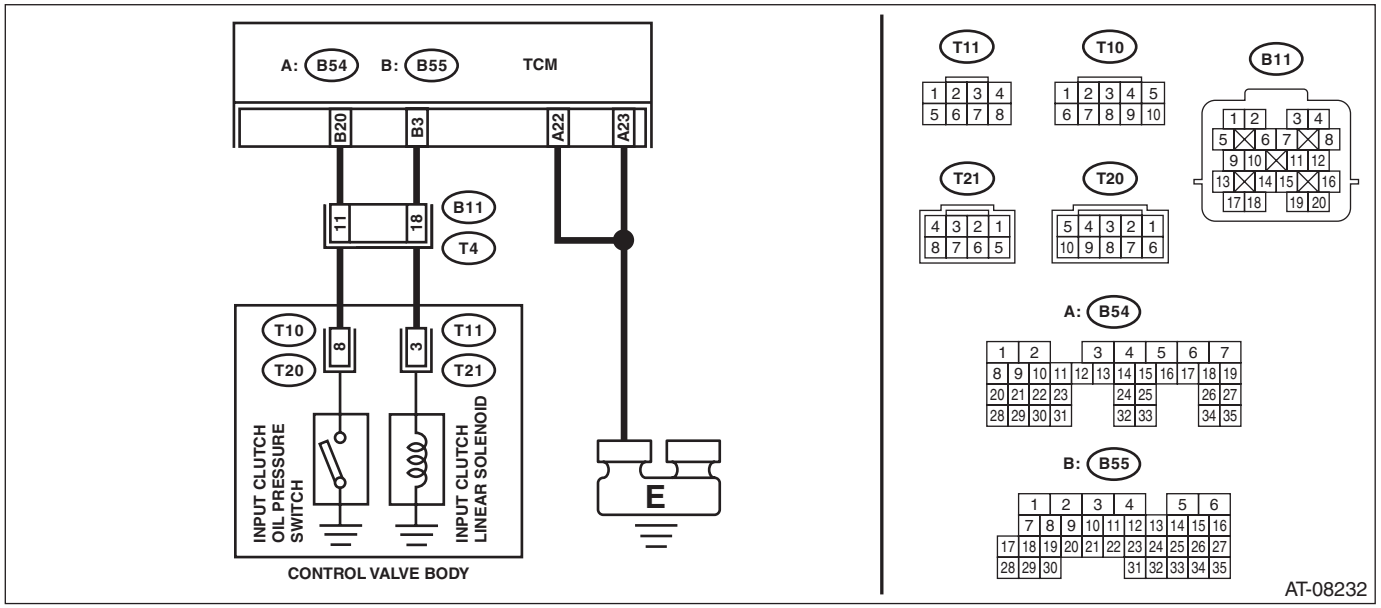


	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM connector and transmission connector. ***Connector & terminal*** ***(B54) No. 22 — Chassis ground:*** ***(B54) No. 23 — Chassis ground:*** ***(B55) No. 4 — (B11) No. 17:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair the open circuit of harness between TCM and transmission connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 4 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **3**.	Repair the short circuit of harness between TCM and transmission connector.

	Step	Check	Yes	No
3	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Remove the transmission connector from bracket. 4) Lift up the vehicle. 5) Drain the ATF. **CAUTION:** **Do not drain ATF until it cools down.** 6) Remove the oil pan. 7) Disconnect the control valve body connector. 8) Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(T4) No. 17 — (T11) No. 8:***	Is the resistance less than 1 Ω?	Go to step **4**.	Repair the open circuit of harness between transmission connector and control valve body connector.
4	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** Measure the resistance between transmission ground and control valve body connector. ***Connector & terminal*** ***(T11) No. 8 — Transmission ground:***	Is the resistance 1 MΩ or more?	Go to step **5**.	Repair the short circuit of harness between control valve body connector and transmission ground.
5	**CHECK FRONT BRAKE SOLENOID.** Measure the resistance between transmission ground and control valve body connector. ***Connector & terminal*** ***(T21) No. 8 — Transmission ground:***	Is the resistance 3 — 9 Ω?	Go to step **6**.	Replace the control valve body. <Ref. to 5AT-54, Control Valve Body.>
6	**CHECK FOR POOR CONTACT.** Check the TCM connector, transmission connector and control valve body connector.	Is there poor contact, loosing terminal, entering foreign matter, or damaging connector body?	Repair the poor contact.	Go to step **7**.
7	**CHECK AFTER REPAIR.** 1) Perform the Clear Memory Mode. 2) Drive for a while and read DTC.	Is DTC displayed?	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>	Temporary poor contact or open circuit occurs. Recheck that the harness connector has no faulty.

T: DTC P0756 SHIFT SOLENOID "B" PERFORMANCE OR STUCK OFF

DTC DETECTING CONDITION:
Output signal value of input clutch solenoid and oil pressure does not match.
TROUBLE SYMPTOM:
Locked to 1st or 4th gear.
WIRING DIAGRAM:
AT control system <Ref. to WI-60, AT Control System.>

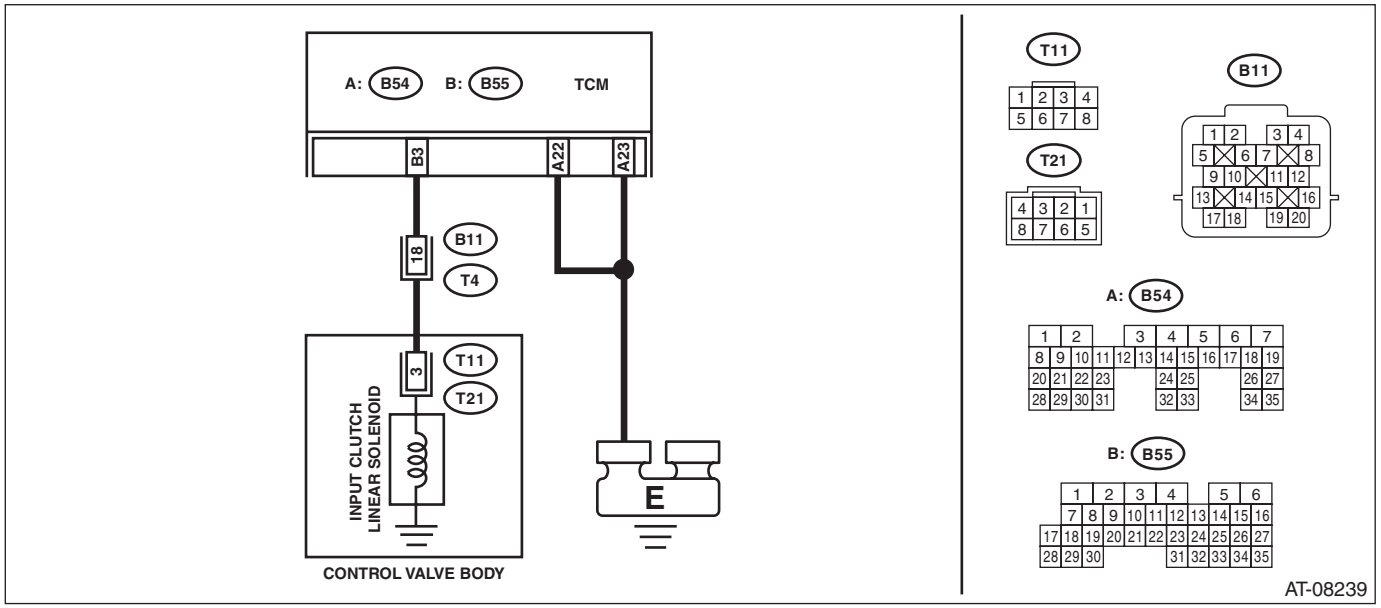


Step		Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM connector and transmission connector. ***Connector & terminal*** ***(B54) No. 22 — Chassis ground:*** ***(B54) No. 23 — Chassis ground:*** ***(B55) No. 3 — (B11) No. 18:*** ***(B55) No. 20 — (B11) No. 11:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair the open circuit of harness between TCM and transmission connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 20 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **3**.	Repair the short circuit of harness between TCM and transmission connector.
3	**CHECK INPUT SIGNAL FOR TCM.** 1) Connect all connectors. 2) Turn the ignition switch to ON. 3) Read the data of «I/C Fluid Pressure» using Subaru Select Monitor.	Is "OFF" displayed?	Go to step **4**.	Go to step **6**.
4	**CHECK INPUT SIGNAL FOR TCM.** 1) Turn the ignition switch to OFF. 2) Start the engine. 3) Drive the vehicle on 4th speed of manual mode with checking current gear position using Subaru Select Monitor. 4) Read the data of «I/C Fluid Pressure» using Subaru Select Monitor.	Is "ON" displayed?	Check for poor contact of harness in the solenoid output and oil pressure SW input, and repair the defective part.	Go to step **5**.

	Step	Check	Yes	No
5	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Remove the transmission connector from bracket. 4) Lift up the vehicle. 5) Drain the ATF. **CAUTION:** **Do not drain ATF until it cools down.** 6) Remove the oil pan. 7) Disconnect the control valve body connector. 8) Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(T4) No. 11 — (T10) No. 8:*** ***(T4) No. 18 — (T11) No. 3:***	Is the resistance less than 1 Ω?	Replace the control valve body. <Ref. to 5AT-54, Control Valve Body.>	Replace the transmission harness assembly.
6	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Remove the transmission connector from bracket. 4) Lift up the vehicle. 5) Drain the ATF. **CAUTION:** **Do not drain ATF until it cools down.** 6) Remove the oil pan. 7) Disconnect the control valve body connector. 8) Measure the resistance between transmission ground and control valve body connector. ***Connector & terminal*** ***(T10) No. 8 — Transmission ground:***	Is the resistance 1 MΩ or more?	Replace the control valve body. <Ref. to 5AT-54, Control Valve Body.>	Replace the transmission harness assembly.

U: DTC P0758 SHIFT SOLENOID "B" ELECTRICAL

DTC DETECTING CONDITION:
Output signal circuit of input clutch solenoid is open or shorted.
TROUBLE SYMPTOM:
Locked to 1st or 4th gear.
WIRING DIAGRAM:
AT control system <Ref. to WI-60, AT Control System.>

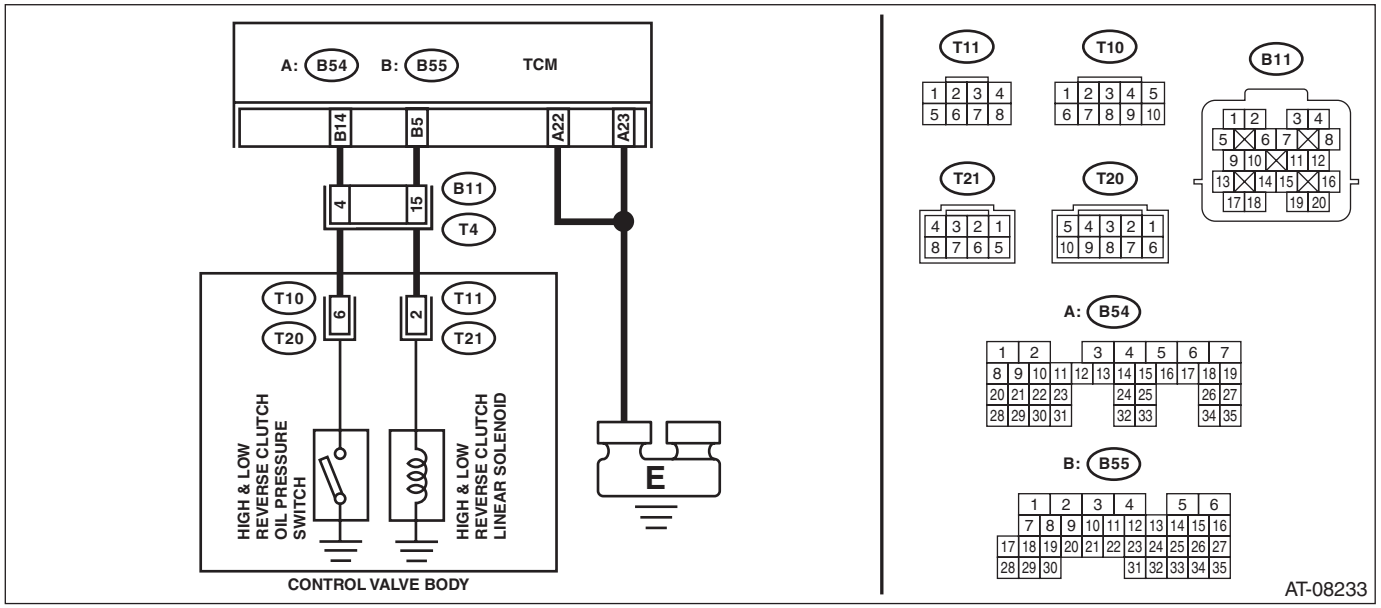


Step		Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM connector and transmission connector. ***Connector & terminal*** ***(B54) No. 22 — Chassis ground:*** ***(B54) No. 23 — Chassis ground:*** ***(B55) No. 3 — (B11) No. 18:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair the open circuit of harness between TCM and transmission connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.** Measure the resistance of harness between TCM connector and body harness. ***Connector & terminal*** ***(B55) No. 3 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **3**.	Repair the short circuit of harness between TCM and transmission connector.

	Step	Check	Yes	No
3	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Remove the transmission connector from bracket. 4) Lift up the vehicle. 5) Drain the ATF. **CAUTION:** **Do not drain ATF until it cools down.** 6) Remove the oil pan. 7) Disconnect the control valve body connector. 8) Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(T4) No. 18 — (T11) No. 3:***	Is the resistance less than 1 Ω?	Go to step **4**.	Repair the open circuit of harness between transmission connector and control valve body connector.
4	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** Measure the resistance between transmission ground and control valve body connector. ***Connector & terminal*** ***(T11) No. 3 — Transmission ground:***	Is the resistance 1 MΩ or more?	Go to step **5**.	Repair the short circuit of harness between control valve body connector and transmission ground.
5	**CHECK INPUT CLUTCH SOLENOID.** Measure the resistance between transmission ground and control valve body connector. ***Connector & terminal*** ***(T21) No. 3 — Transmission ground:***	Is the resistance 3 — 9 Ω?	Go to step **6**.	Replace the control valve body. <Ref. to 5AT-54, Control Valve Body.>
6	**CHECK FOR POOR CONTACT.** Check the TCM connector, transmission connector and control valve body connector.	Is there poor contact, loosing terminal, entering foreign matter, or damaging connector body?	Repair the poor contact.	Go to step **7**.
7	**CHECK AFTER REPAIR.** 1) Perform the Clear Memory Mode. 2) Drive for a while and read DTC.	Is DTC displayed?	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>	Temporary poor contact or open circuit occurs. Recheck that the harness connector has no faulty.

V: DTC P0761 SHIFT SOLENOID "C" PERFORMANCE OR STUCK OFF

DTC DETECTING CONDITION:
Output signal value of high & low reverse clutch solenoid and oil pressure does not match.
TROUBLE SYMPTOM:
Locked to 1st gear.
WIRING DIAGRAM:
AT control system <Ref. to WI-60, AT Control System.>

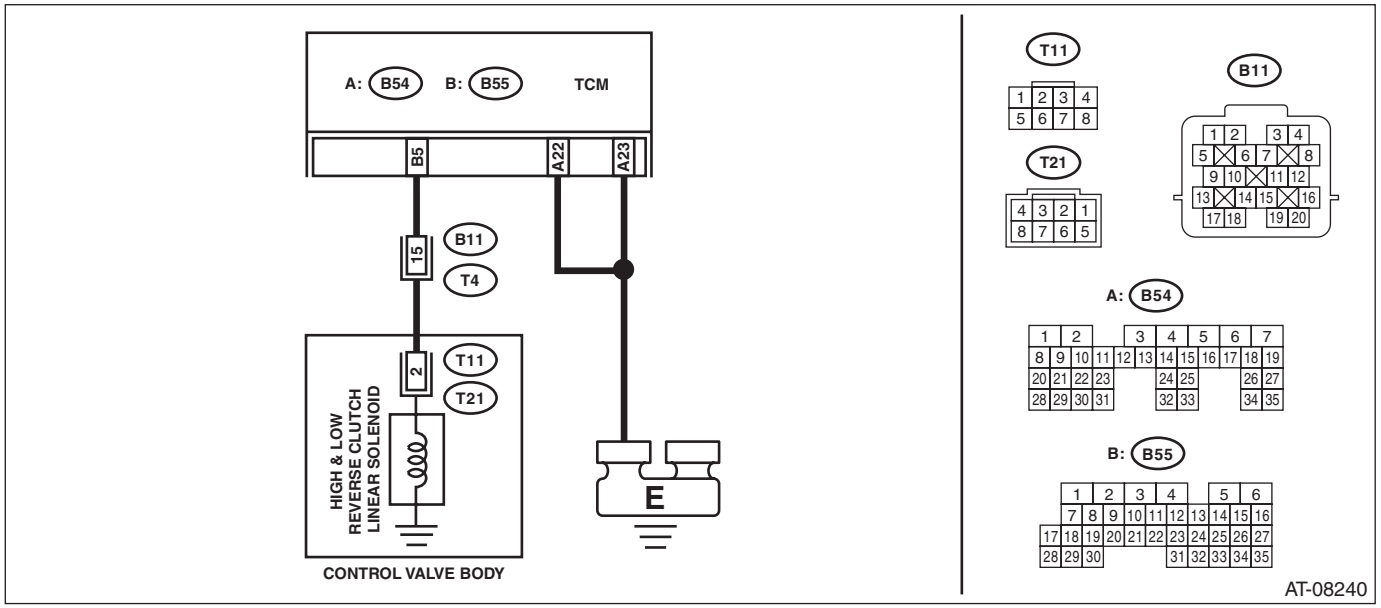


	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM connector and transmission connector. ***Connector & terminal*** ***(B54) No. 22 — Chassis ground:*** ***(B54) No. 23 — Chassis ground:*** ***(B55) No. 5 — (B11) No. 15:*** ***(B55) No. 14 — (B11) No. 4:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair the open circuit of harness between TCM and transmission connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 14 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **3**.	Repair the short circuit of harness between TCM and transmission connector.
3	**CHECK INPUT SIGNAL FOR TCM.** 1) Connect all connectors. 2) Turn the ignition switch to ON. 3) Read the data of «H&LR/C Oil Pressure Switch» using Subaru Select Monitor.	Is "OFF" displayed?	Go to step **4**.	Go to step **6**.
4	**CHECK INPUT SIGNAL FOR TCM.** 1) Turn the ignition switch to OFF. 2) Start the engine. 3) Set the select lever to "N" range while depressing the brake pedal. 4) Read the data of «H&LR/C Oil Pressure Switch» using Subaru Select Monitor.	Does the display show "OFF"?	Check for poor contact of harness in the solenoid output and oil pressure SW input, and repair the defective part.	Go to step **5**.

	Step	Check	Yes	No
5	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Remove the transmission connector from bracket. 4) Lift up the vehicle. 5) Drain the ATF. **CAUTION:** **Do not drain ATF until it cools down.** 6) Remove the oil pan. 7) Disconnect the control valve body connector. 8) Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(T4) No. 4 — (T10) No. 6:*** ***(T4) No. 15 — (T11) No. 2:***	Is the resistance less than 1 Ω?	Replace the control valve body. <Ref. to 5AT-54, Control Valve Body.>	Replace the transmission harness assembly.
6	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Remove the transmission connector from bracket. 4) Lift up the vehicle. 5) Drain the ATF. **CAUTION:** **Do not drain ATF until it cools down.** 6) Remove the oil pan. 7) Disconnect the control valve body connector. 8) Measure the resistance between transmission ground and control valve body connector. ***Connector & terminal*** ***(T10) No. 6 — Transmission ground:***	Is the resistance 1 MΩ or more?	Replace the control valve body. <Ref. to 5AT-54, Control Valve Body.>	Replace the transmission harness assembly.

W: DTC P0763 SHIFT SOLENOID "C" ELECTRICAL

DTC DETECTING CONDITION:
Output signal circuit of high & low reverse clutch solenoid is open or shorted.
TROUBLE SYMPTOM:
Locked to 1st gear.
WIRING DIAGRAM:
AT control system <Ref. to WI-60, AT Control System.>

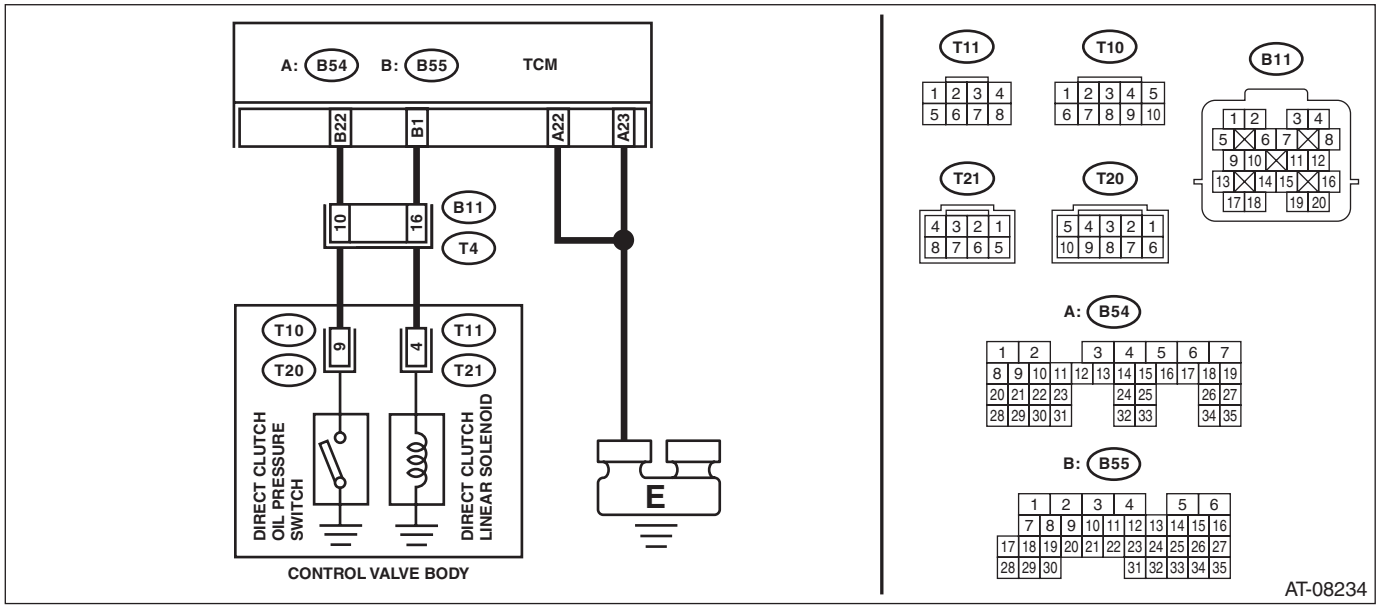


Step		Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM connector and transmission connector. ***Connector & terminal*** ***(B54) No. 22 — Chassis ground:*** ***(B54) No. 23 — Chassis ground:*** ***(B55) No. 5 — (B11) No. 15:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair the open circuit of harness between TCM and transmission connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 5 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **3**.	Repair the short circuit of harness between TCM and transmission connector.

	Step	Check	Yes	No
3	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Remove the transmission connector from bracket. 4) Lift up the vehicle. 5) Drain the ATF. **CAUTION:** **Do not drain ATF until it cools down.** 6) Remove the oil pan. 7) Disconnect the control valve body connector. 8) Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(T4) No. 15 — (T11) No. 2:***	Is the resistance less than 1 Ω?	Go to step **4**.	Repair the open circuit of harness between transmission connector and control valve body connector.
4	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** Measure the resistance between transmission ground and control valve body connector. ***Connector & terminal*** ***(T11) No. 2 — Transmission ground:***	Is the resistance 1 MΩ or more?	Go to step **5**.	Repair the short circuit of harness between control valve body connector and transmission ground.
5	**CHECK HIGH & LOW REVERSE CLUTCH SOLENOID.** Measure the resistance between transmission ground and control valve body connector. ***Connector & terminal*** ***(T21) No. 2 — Transmission ground:***	Is the resistance 3 — 9 Ω?	Go to step **6**.	Replace the control valve body. <Ref. to 5AT-54, Control Valve Body.>
6	**CHECK FOR POOR CONTACT.** Check the TCM connector, transmission connector and control valve body connector.	Is there poor contact, loosing terminal, entering foreign matter, or damaging connector body?	Repair the poor contact.	Go to step **7**.
7	**CHECK AFTER REPAIR.** 1) Perform the Clear Memory Mode. 2) Drive for a while and read DTC.	Is DTC displayed?	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>	Temporary poor contact or open circuit occurs. Recheck that the harness connector has no faulty.

X: DTC P0766 SHIFT SOLENOID "D" PERFORMANCE OR STUCK OFF

DTC DETECTING CONDITION:
Output signal value of direct clutch solenoid and oil pressure does not match.
TROUBLE SYMPTOM:
Locked to 1st or 4th gear.
WIRING DIAGRAM:
AT control system <Ref. to WI-60, AT Control System.>

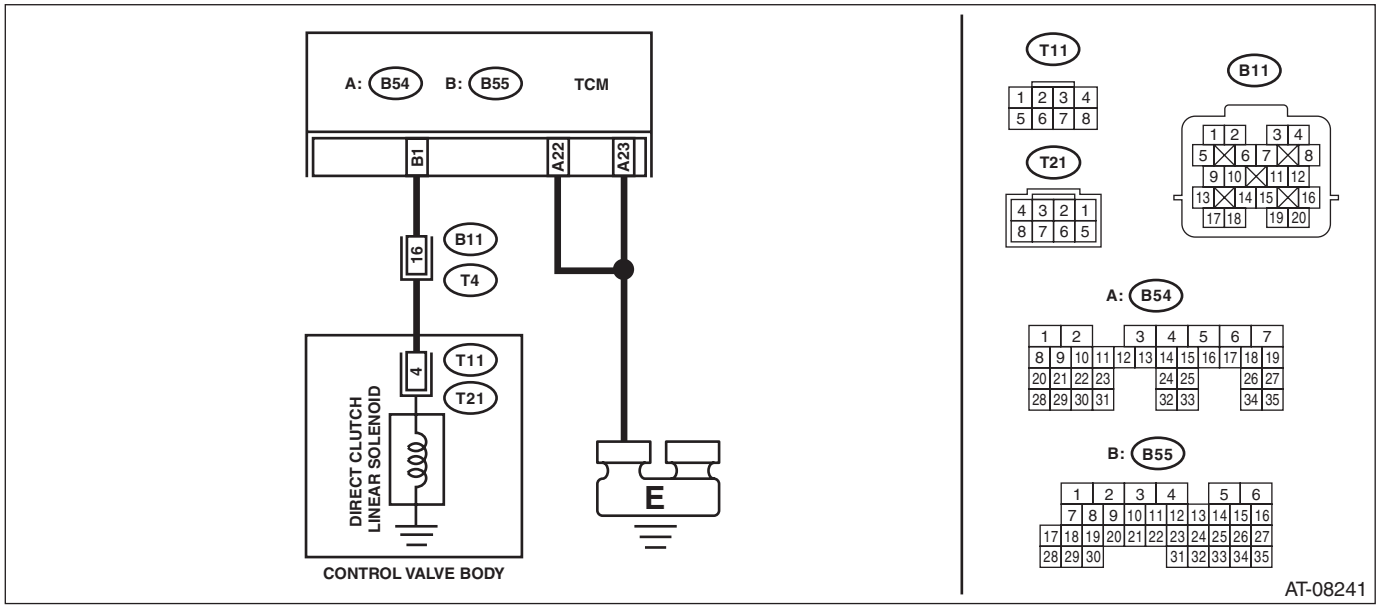


	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM connector and transmission connector. ***Connector & terminal*** ***(B54) No. 22 — Chassis ground:*** ***(B54) No. 23 — Chassis ground:*** ***(B55) No. 1 — (B11) No. 16:*** ***(B55) No. 22 — (B11) No. 10:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair the open circuit of harness between TCM and transmission connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND BODY HARNESS.** Measure the resistance of harness between TCM connector and body harness. ***Connector & terminal*** ***(B55) No. 22 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **3**.	Repair the short circuit of harness between TCM and transmission connector.
3	**CHECK INPUT SIGNAL FOR TCM.** 1) Connect all connectors. 2) Turn the ignition switch to ON. 3) Read the data of «D/C Fluid Pressure» using Subaru Select Monitor.	Is "OFF" displayed?	Go to step **4**.	Go to step **6**.
4	**CHECK INPUT SIGNAL FOR TCM.** 1) Turn the ignition switch to OFF. 2) Start the engine. 3) Shift to 2nd speed of manual mode and depress the brake with checking current gear position using Subaru Select Monitor. 4) Read the data of «D/C Fluid Pressure» using Subaru Select Monitor.	Is "ON" displayed?	Check for poor contact of harness in the solenoid output and oil pressure SW input, and repair the defective part.	Go to step **5**.

	Step	Check	Yes	No
5	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Remove the transmission connector from bracket. 4) Lift up the vehicle. 5) Drain the ATF. **CAUTION:** **Do not drain ATF until it cools down.** 6) Remove the oil pan. 7) Disconnect the control valve body connector. 8) Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(T4) No. 10 — (T10) No. 9:*** ***(T4) No. 16 — (T11) No. 4:***	Is the resistance less than 1 Ω?	Replace the control valve body. <Ref. to 5AT-54, Control Valve Body.>	Replace the transmission harness assembly.
6	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Remove the transmission connector from bracket. 4) Lift up the vehicle. 5) Drain the ATF. **CAUTION:** **Do not drain ATF until it cools down.** 6) Remove the oil pan. 7) Disconnect the control valve body connector. 8) Measure the resistance between transmission ground and control valve body connector. ***Connector & terminal*** ***(T10) No. 9 — Transmission ground:***	Is the resistance 1 MΩ or more?	Replace the control valve body. <Ref. to 5AT-54, Control Valve Body.>	Replace the transmission harness assembly.

Y: DTC P0768 SHIFT SOLENOID "D" ELECTRICAL

DTC DETECTING CONDITION:
The output signal circuit of direct clutch solenoid is open or shorted.
TROUBLE SYMPTOM:
Locked to 1st or 4th gear.
WIRING DIAGRAM:
AT control system <Ref. to WI-60, AT Control System.>

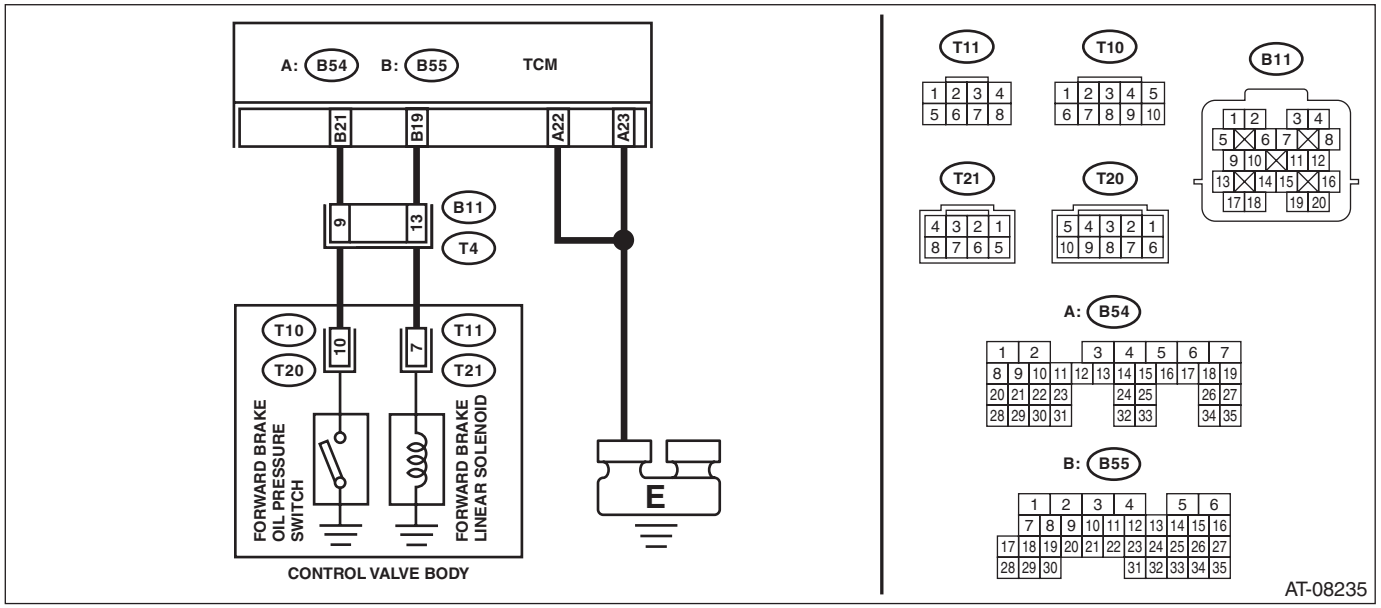


Step		Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM connector and transmission connector. ***Connector & terminal*** ***(B54) No. 22 — Chassis ground:*** ***(B54) No. 23 — Chassis ground:*** ***(B55) No. 1 — (B11) No. 16:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair the open circuit of harness between TCM and transmission connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 1 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **3**.	Repair the short circuit of harness between TCM and transmission connector.

	Step	Check	Yes	No
3	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Remove the transmission connector from bracket. 4) Lift up the vehicle. 5) Drain the ATF. **CAUTION:** **Do not drain ATF until it cools down.** 6) Remove the oil pan. 7) Disconnect the control valve body connector. 8) Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(T4) No. 16 — (T11) No. 4:***	Is the resistance less than 1 Ω?	Go to step **4**.	Repair the open circuit of harness between transmission connector and control valve body connector.
4	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** Measure the resistance between transmission ground and control valve body connector. ***Connector & terminal*** ***(T11) No. 4 — Transmission ground:***	Is the resistance 1 MΩ or more?	Go to step **5**.	Repair the short circuit of harness between control valve body connector and transmission ground.
5	**CHECK DIRECT CLUTCH SOLENOID.** Measure the resistance between transmission ground and control valve body connector. ***Connector & terminal*** ***(T21) No. 4 — Transmission ground:***	Is the resistance 3 — 9 Ω?	Go to step **6**.	Replace the control valve body. <Ref. to 5AT-54, Control Valve Body.>
6	**CHECK FOR POOR CONTACT.** Check the TCM connector, transmission connector and control valve body connector.	Is there poor contact, loosing terminal, entering foreign matter, or damaging connector body?	Repair the poor contact.	Go to step **7**.
7	**CHECK AFTER REPAIR.** 1) Perform the Clear Memory Mode. 2) Drive for a while and read DTC.	Is DTC displayed?	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>	Temporary poor contact or open circuit occurs. Recheck that the harness connector has no faulty.

Z: DTC P0771 SHIFT SOLENOID "E" PERFORMANCE OR STUCK OFF

DTC DETECTING CONDITION:
Output signal of forward brake solenoid does not match the oil pressure.
TROUBLE SYMPTOM:
Locked to 2nd, 3rd or 4th gear.
WIRING DIAGRAM:
AT control system <Ref. to WI-60, AT Control System.>

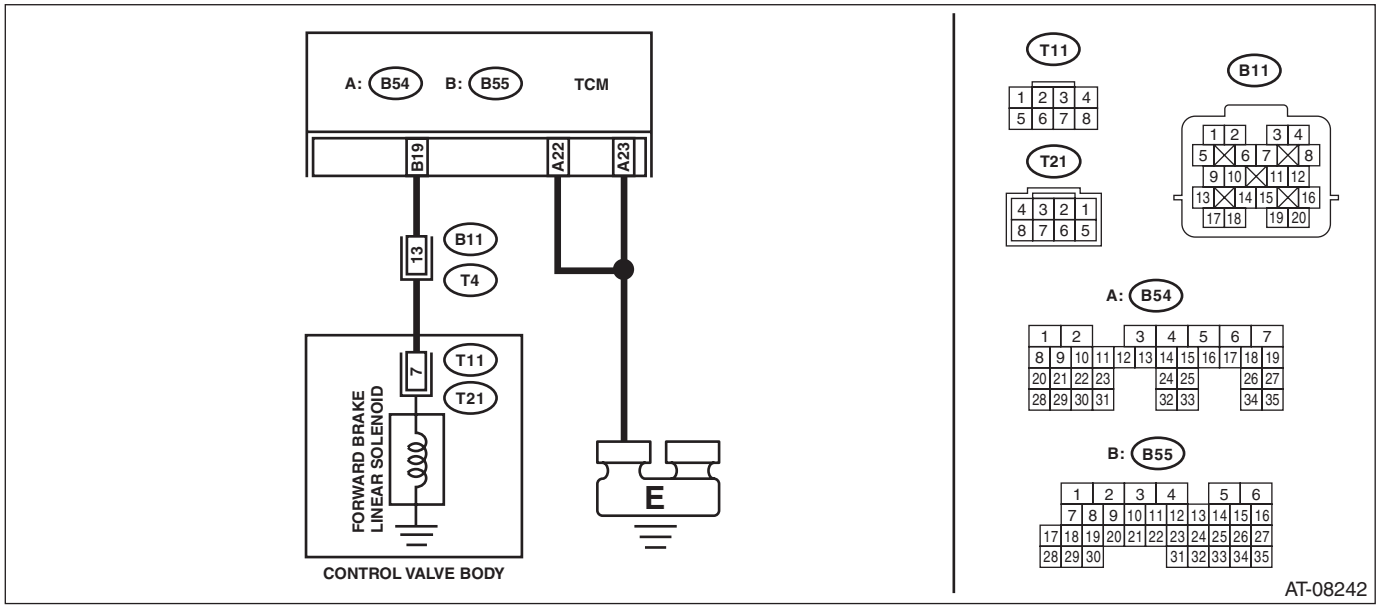


Step		Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM connector and transmission connector. ***Connector & terminal*** ***(B54) No. 22 — Chassis ground:*** ***(B54) No. 23 — Chassis ground:*** ***(B55) No. 19 — (B11) No. 13:*** ***(B55) No. 21 — (B11) No. 9:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair the open circuit of harness between TCM and transmission connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.** Measure the resistance between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 21 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **3**.	Repair the short circuit of harness between TCM and transmission connector.
3	**CHECK INPUT SIGNAL FOR TCM.** 1) Connect all connectors. 2) Turn the ignition switch to ON. 3) Read the data of «Fwd/B hydraulic pressure SW» using Subaru Select Monitor.	Is "OFF" displayed?	Go to step **4**.	Go to step **6**.
4	**CHECK INPUT SIGNAL FOR TCM.** 1) Turn the ignition switch to OFF. 2) Start the engine. 3) Drive the vehicle on 2nd speed of manual mode at 15 km/h (9 MPH) with checking current gear position using Subaru Select Monitor. 4) Read the data of «Fwd/B hydraulic pressure SW» using Subaru Select Monitor.	Is "ON" displayed?	Check for poor contact of harness in the solenoid output and oil pressure SW input, and repair the defective part.	Go to step **5**.

	Step	Check	Yes	No
5	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Remove the transmission connector from bracket. 4) Lift up the vehicle. 5) Drain the ATF. **CAUTION:** **Do not drain ATF until it cools down.** 6) Remove the oil pan. 7) Disconnect the control valve body connector. 8) Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(T4) No. 9 — (T10) No. 10:*** ***(T4) No. 13 — (T11) No. 7:***	Is the resistance less than 1 Ω?	Replace the control valve body. <Ref. to 5AT-54, Control Valve Body.>	Replace the transmission harness assembly.
6	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Remove the transmission connector from bracket. 4) Lift up the vehicle. 5) Drain the ATF. **CAUTION:** **Do not drain ATF until it cools down.** 6) Remove the oil pan. 7) Disconnect the control valve body connector. 8) Measure the resistance between transmission ground and control valve body connector. ***Connector & terminal*** ***(T10) No. 10 — Transmission ground:***	Is the resistance 1 MΩ or more?	Replace the control valve body. <Ref. to 5AT-54, Control Valve Body.>	Replace the transmission harness assembly.

AA:DTC P0773 SHIFT SOLENOID "E" ELECTRICAL

DTC DETECTING CONDITION:
Output signal circuit of forward brake solenoid is open or shorted.
TROUBLE SYMPTOM:
Locked to 2nd, 3rd or 4th gear.
WIRING DIAGRAM:
AT control system <Ref. to WI-60, AT Control System.>



Step		Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM connector and transmission connector. ***Connector & terminal*** ***(B54) No. 22 — Chassis ground:*** ***(B54) No. 23 — Chassis ground:*** ***(B55) No. 19 — (B11) No. 13:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair the open circuit of harness between TCM and transmission connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND BODY HARNESS.** Measure the resistance of harness between TCM connector and body harness. ***Connector & terminal*** ***(B55) No. 19 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **3**.	Repair the short circuit of harness between TCM and transmission connector.

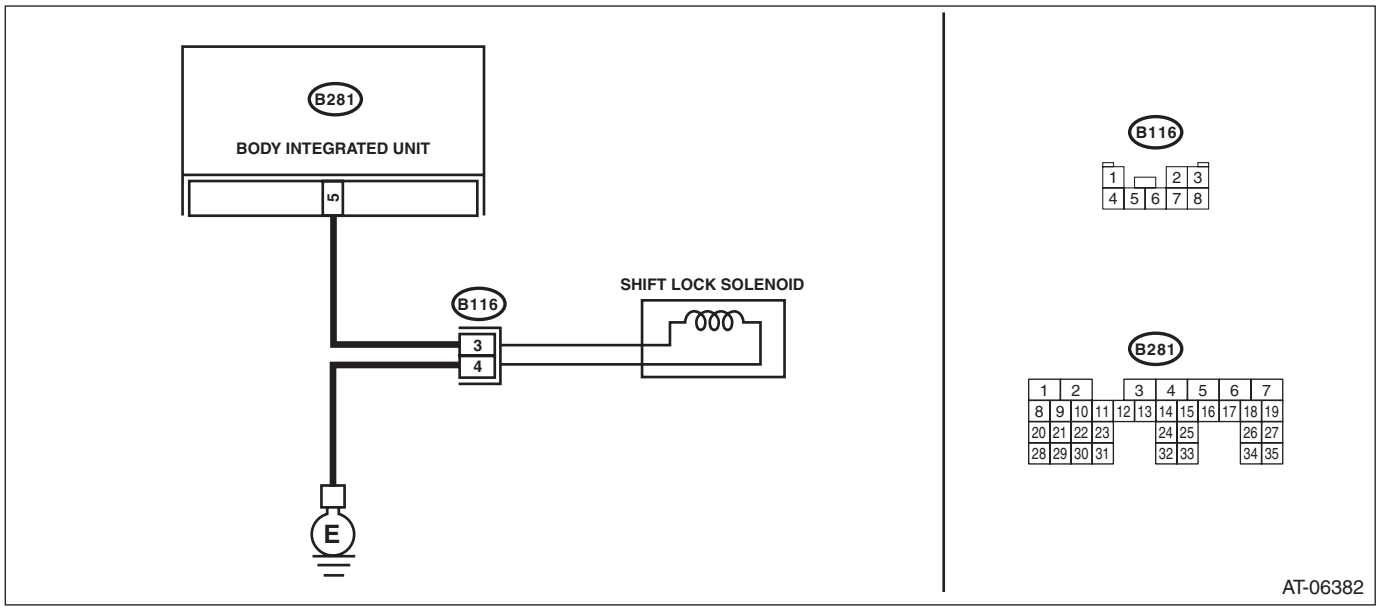
	Step	Check	Yes	No
3	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Remove the transmission connector from bracket. 4) Lift up the vehicle. 5) Drain the ATF. **CAUTION:** **Do not drain ATF until it cools down.** 6) Remove the oil pan. 7) Disconnect the control valve body connector. 8) Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(T4) No. 13 — (T11) No. 7:***	Is the resistance less than 1 Ω?	Go to step **4**.	Repair the open circuit of harness between transmission connector and control valve body connector.
4	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** Measure the resistance between transmission ground and control valve body connector. ***Connector & terminal*** ***(T11) No. 7 — Transmission ground:***	Is the resistance 1 MΩ or more?	Go to step **5**.	Repair the short circuit of harness between control valve body connector and transmission ground.
5	**CHECK FORWARD BRAKE SOLENOID.** Measure the resistance between transmission ground and control valve body connector. ***Connector & terminal*** ***(T21) No. 7 — Transmission ground:***	Is the resistance 3 — 9 Ω?	Go to step **6**.	Replace the control valve body. <Ref. to 5AT-54, Control Valve Body.>
6	**CHECK FOR POOR CONTACT.** Check the TCM connector, transmission connector and control valve body connector.	Is there poor contact, loosing terminal, entering foreign matter, or damaging connector body?	Repair the poor contact.	Go to step **7**.
7	**CHECK AFTER REPAIR.** 1) Perform the Clear Memory Mode. 2) Drive for a while and read DTC.	Is DTC displayed?	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>	Temporary poor contact or open circuit occurs. Recheck that the harness connector has no faulty.

AB:DTC P0801 REVERSE INHIBIT CONTROL CIRCUIT

DTC DETECTING CONDITION:
Shift lock solenoid malfunction, open or short reverse inhibitor control circuit

TROUBLE SYMPTOM:
- Gear is shifted from “N” range to “R” range during driving at 20 km/h (12 MPH) or more.
- Gear cannot be shifted from “N” range to “R” range though the vehicle is parked.

WIRING DIAGRAM:
Shift lock control system <Ref. to WI-280, Shift Lock Control System.>



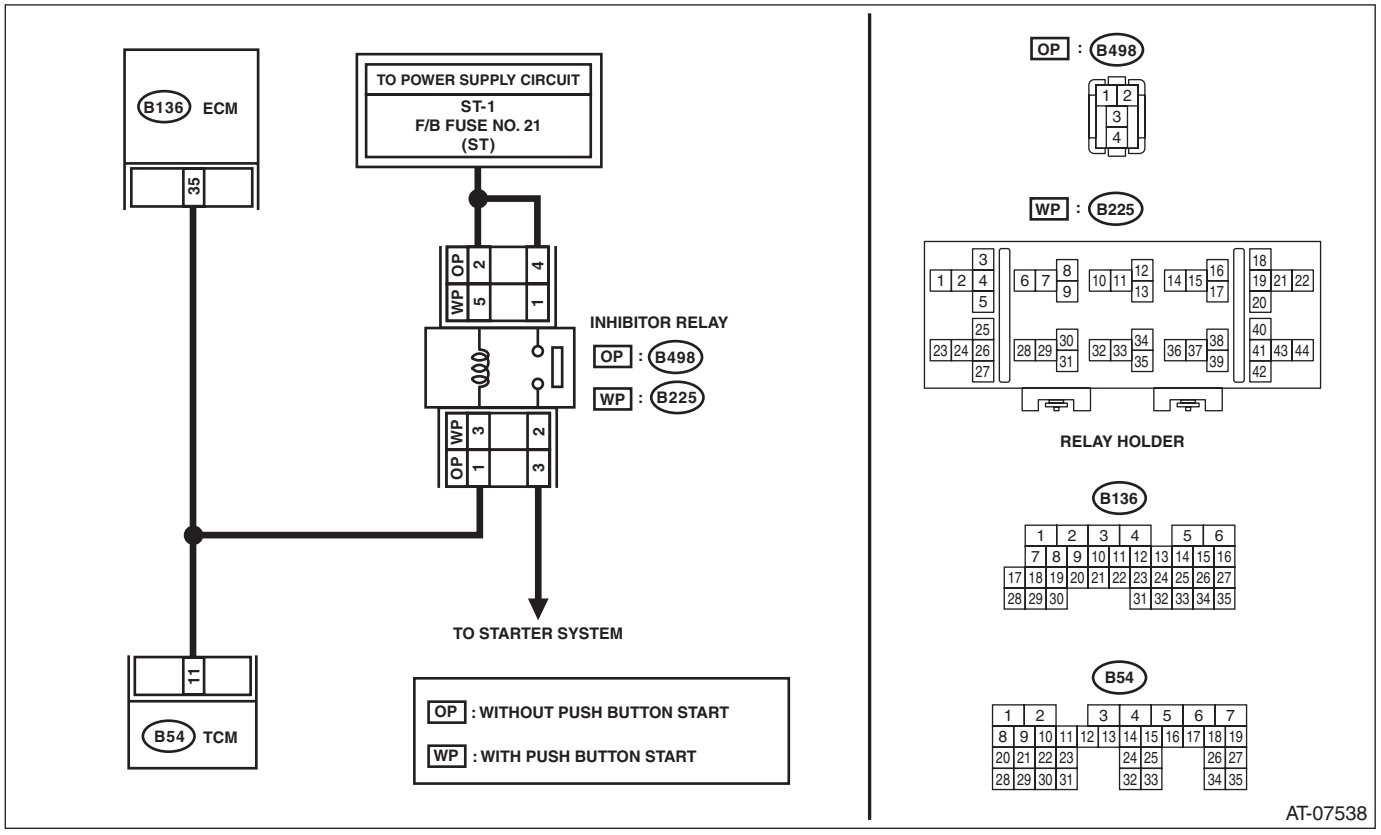
Step		Check	Yes	No
1	**CHECK SHIFT LOCK SOLENOID.** 1) Forcibly activate the body integrated unit to check the operation of shift lock solenoid. <Ref. to BC(diag)-23, Function Check.> 2) Move the shift lever without depressing the brake pedal.	Does the shift lever move?	Go to step **2**.	Go to step **3**.
2	**CHECK OUTPUT SIGNAL OF BODY INTEGRATED UNIT.** 1) Display the following items using Subaru Select Monitor. <Ref. to BC(diag)-12, Read Current Data.> • Key-lock warning SW • Shift position • PSW • Stop light switch 2) With the brake pedal depressed, shift the select lever to “P” range.	Do the units of measure of items displayed change?	Go to step **3**.	Check the circuits of the items whose values do not change.
3	**CHECK HARNESS CONNECTOR BETWEEN BODY INTEGRATED UNIT AND SHIFT LOCK SOLENOID.** Measure the harness resistance between the body integrated unit and chassis ground. ***Connector & terminal*** ***(B281) No. 5 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **4**.	Repair the short circuit of harness between body integrated unit and shift lock solenoid connector.

	Step	Check	Yes	No
4	**CHECK HARNESS BETWEEN SHIFT LOCK SOLENOID AND CHASSIS GROUND TERMINAL.** Measure the resistance of harness between shift lock solenoid connector and chassis ground. ***Connector & terminal*** ***(B116) No. 4 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **5**.	Repair the open circuit of the harness between the shift lock solenoid connector and chassis ground terminal.
5	**CHECK SHIFT LOCK SOLENOID.** Measure the resistance between the shift lock solenoid connector terminals. ***Connector & terminal*** ***(B116) No. 3 — No. 4:***	Is the resistance 12 — 18 Ω?	Go to step **6**.	Replace the shift lock solenoid. <Ref. to CS-57, AT Shift Lock Solenoid and "P" Range Switch.>
6	**CHECK OUTPUT SIGNAL OF BODY INTEGRATED UNIT.** 1) Connect all connectors. 2) Turn the ignition switch to ON. 3) Set the select lever to "D" range. 4) Measure the voltage between body integrated unit and chassis ground. ***Connector & terminal*** ***(B281) No. 5 (+) — Chassis ground (–):***	Is the voltage 10.5 V or more?	Go to step **7**.	Go to step **8**.
7	**CHECK OUTPUT SIGNAL OF BODY INTEGRATED UNIT.** 1) Lift up the vehicle. 2) Start the engine. 3) Shift the select lever to "D" range and slowly increase vehicle speed to over 20 km/h (12 MPH). NOTE: The speed difference between front and rear wheels lights the ABS warning light or the VDC warning light, but this does not indicate a malfunction. If the warning light is illuminated, clear the memory of ABS or VDC after completing AT control diagnosis. <Ref. to VDC(diag)-25, Clear Memory Mode.> 4) Measure the voltage between body integrated unit and chassis ground. ***Connector & terminal*** ***(B281) No. 5 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Check the harnesses or connectors in reverse inhibitor control circuit, and repair the defective part.	Go to step **8**.
8	**CHECK FOR POOR CONTACT.**	Is there poor contact of the reverse inhibitor control circuit?	Repair the poor contact.	Replace the body integrated unit. <Ref. to SL-80, Body Integrated Unit.>

AC:DTC P0817 STARTER DISABLE CIRCUIT

DTC DETECTING CONDITION:
Open or short in P/N signal output circuit
TROUBLE SYMPTOM:
- Engine can be started on other than “P” or “N” range.
- Engine can not be started on “P” or “N” range.

WIRING DIAGRAM:
- AT Control System <Ref. to WI-60, AT Control System.>
- Engine electrical system <Ref. to WI-122, Engine Electrical System.>

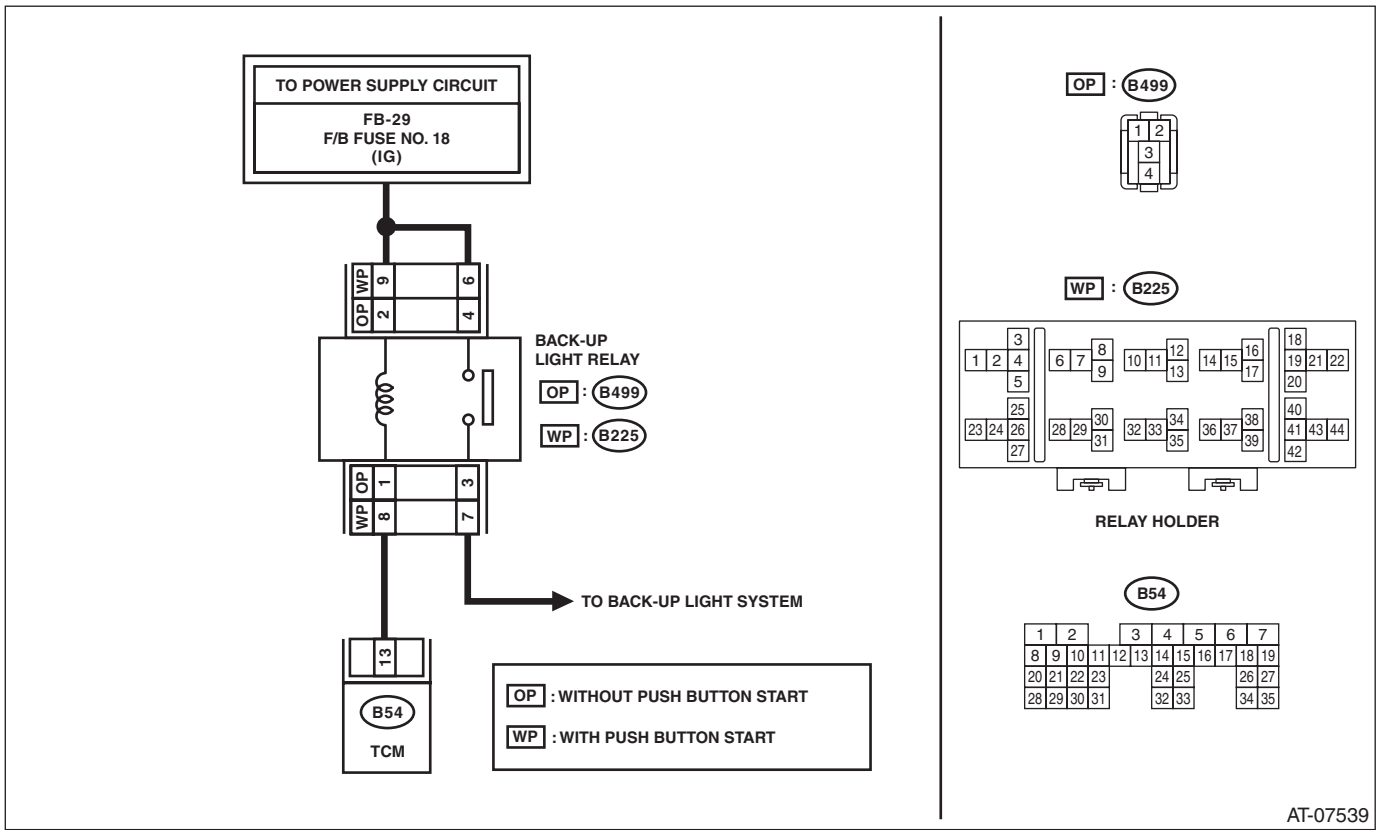


Step		Check	Yes	No
1	**CHECK DTC OF TCM.**	Is DTC of Transmission Range Sensor Circuit (PRNDL Input) detected?	Perform the diagnosis according to DTC.	Go to step **2**.
2	**CHECK ECM.**	Is the communication between Subaru Select Monitor and ECM normal?	Go to step **3**.	Perform the diagnosis according to DTC of ECM.
3	**CHECK FUSE (NO. 21).** 1) Turn the ignition switch to OFF. 2) Remove the fuse.	Is the fuse (No. 21) blown out?	Replace the fuse (No. 21). If the replaced fuse (No. 21) has blown out easily, repair the short circuit of harness between fuse (No. 21) and inhibitor relay.	Go to step **4**.

	Step	Check	Yes	No
4	**CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM, ECM and inhibitor relay. 3) Measure the resistance of harness between TCM connector and ECM connector. ***Connector & terminal*** ***(B54) No. 11 — (B136) No. 35***	Is the resistance less than 1 Ω?	Go to step **5**.	Repair the open circuit of harness between TCM and ECM connector, or poor contact of connector.
5	**CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR RELAY.** Measure the resistance of the harness between TCM connector and inhibitor relay. ***Connector & terminal*** ***Without push button start*** ***(B54) No. 11 — (B498) No. 1:*** ***With push button start*** ***(B54) No. 11 — (B225) No. 3:***	Is the resistance less than 1 Ω?	Go to step **6**.	Repair the open circuit of harness between TCM and inhibitor relay, or poor contact of connector.
6	**CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 11 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **7**.	Repair the short circuit of the harness between TCM and chassis ground.
7	**CHECK OUTPUT SIGNAL OF TCM.** 1) Connect the TCM, ECM, and inhibitor relay connector. 2) Turn the ignition switch to ON. 3) Shift the select lever to “P” range. 4) Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 11 (+) — Chassis ground (–):***	Is the voltage 1 V or less?	Go to step **8**.	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>
8	**CHECK OUTPUT SIGNAL OF TCM.** 1) Set the select lever to “D” range. 2) Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 11 (+) — Chassis ground (–):***	Is the voltage 8 V or more?	Go to step **9**.	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>
9	**CHECK FOR POOR CONTACT.**	Is there any open or poor contact of connector (loosing terminal, entering foreign matter, damaging connector body)?	Repair the poor contact.	Check the neutral switch circuit of ECM.

AD:DTC P0957 BACKUP LIGHT RELAY CIRCUIT LOW

DTC DETECTING CONDITION:
Output circuit of the back-up light relay is open or shorted
TROUBLE SYMPTOM:
Back-up light does not illuminate in “R” range.
WIRING DIAGRAM:
AT Control System <Ref. to WI-60, AT Control System.>

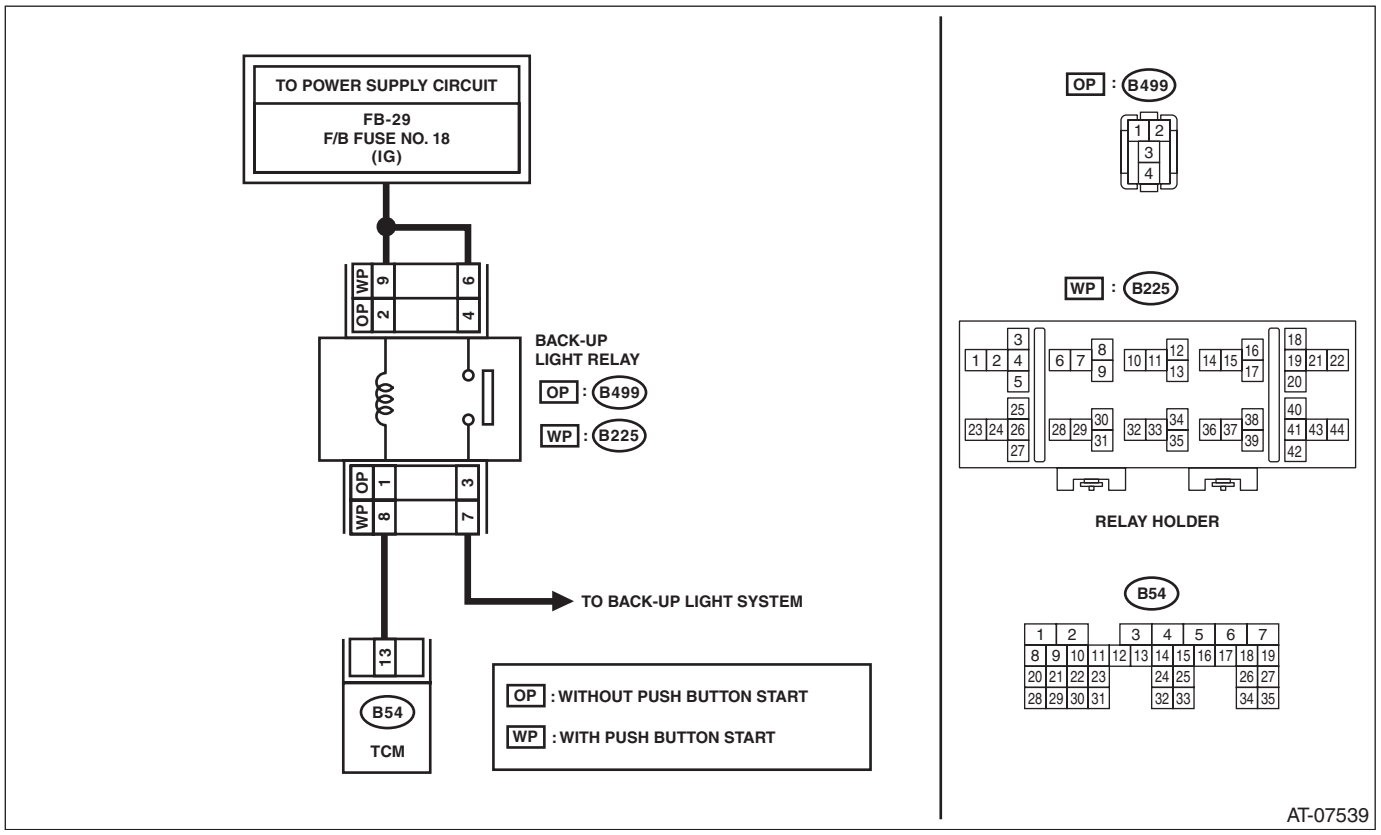


	Step	Check	Yes	No
1	**CHECK DTC OF TCM.**	Is DTC of Transmission Range Sensor Circuit (PRNDL Input) detected?	Perform the diagnosis according to DTC.	Go to step **2**.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND BACK-UP LIGHT RELAY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and back-up light relay. 3) Measure the resistance of harness between TCM connector and back-up light relay connector. ***Connector & terminal*** ***Without push button start*** ***(B54) No. 13 — (B499) No. 1:*** ***With push button start*** ***(B54) No. 13 — (B225) No. 8:***	Is the resistance less than 1 Ω?	Go to step **3**.	Repair the open circuit of the harness or poor contact of the connector between TCM and back-up light relay connector.
3	**CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 13 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **4**.	Repair the short circuit of the harness between TCM and back-up light relay connector.

	Step	Check	Yes	No
4	**CHECK OUTPUT SIGNAL OF TCM.** 1) Turn the ignition switch to ON. 2) Shift the select lever to “P” range. 3) Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 13 (+) — Chassis ground (–):***	Is the voltage 8 V or more?	Go to step **5**.	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>
5	**CHECK OUTPUT SIGNAL OF TCM.** 1) Set the select lever to “R” range. 2) Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 13 (+) — Chassis ground (–):***	Is the voltage 1 V or less?	Go to step **6**.	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>
6	**CHECK INPUT VOLTAGE FOR BACK-UP LIGHT RELAY.** Measure the voltage between back-up light relay and chassis ground.	Is the voltage 10 — 13 V?	Replace the back-up light relay.	Check open or short circuit of harness between fuse (No. 18) and back-up light relay.

AE:DTC P0958 BACKUP LIGHT RELAY CIRCUIT HIGH

DTC DETECTING CONDITION:
Output circuit of the back-up light relay is open or shorted
TROUBLE SYMPTOM:
Back-up light does not illuminate in “R” range.
WIRING DIAGRAM:
AT Control System <Ref. to WI-60, AT Control System.>

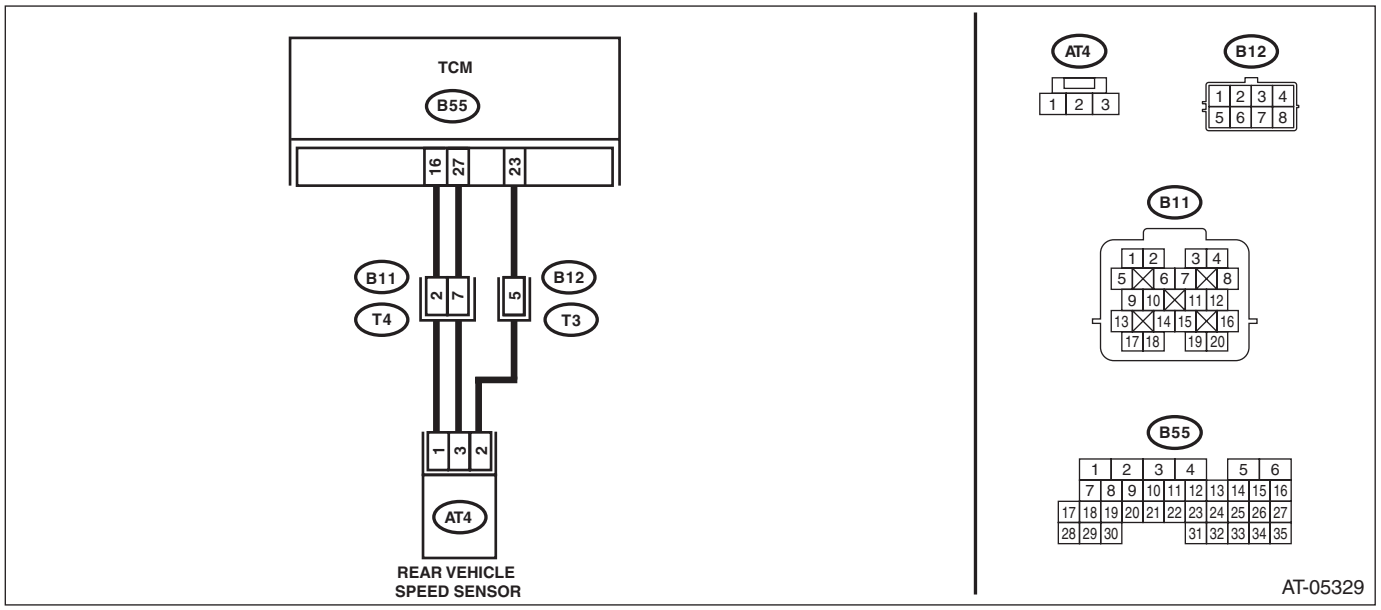


	Step	Check	Yes	No
1	**CHECK DTC OF TCM.**	Is DTC of Transmission Range Sensor Circuit (PRNDL Input) detected?	Perform the diagnosis according to DTC.	Go to step **2**.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND BACK-UP LIGHT RELAY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and back-up light relay. 3) Measure the resistance of harness between TCM connector and back-up light relay connector. ***Connector & terminal*** ***Without push button start*** ***(B54) No. 13 — (B499) No. 1:*** ***With push button start*** ***(B54) No. 13 — (B225) No. 8:***	Is the resistance less than 1 Ω?	Go to step **3**.	Repair the open circuit of the harness or poor contact of the connector between TCM and back-up light relay connector.
3	**CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 13 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **4**.	Repair the short circuit of the harness between TCM and back-up light relay connector.

	Step	Check	Yes	No
4	**CHECK OUTPUT SIGNAL OF TCM.** 1) Turn the ignition switch to ON. 2) Shift the select lever to “P” range. 3) Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 13 (+) — Chassis ground (–):***	Is the voltage 8 V or more?	Go to step **5**.	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>
5	**CHECK OUTPUT SIGNAL OF TCM.** 1) Set the select lever to “R” range. 2) Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 13 (+) — Chassis ground (–):***	Is the voltage 1 V or less?	Go to step **6**.	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>
6	**CHECK INPUT VOLTAGE FOR BACK-UP LIGHT RELAY.** Measure the voltage between back-up light relay and chassis ground.	Is the voltage 10 — 13 V?	Replace the back-up light relay.	Check open or short circuit of harness between fuse (No. 18) and back-up light relay.

AF:DTC P1706 AT VEHICLE SPEED SENSOR CIRCUIT MALFUNCTION (REAR WHEEL)

DTC DETECTING CONDITION:
Input signal circuit of TCM is open or shorted.
TROUBLE SYMPTOM:
Shifting quality malfunction
WIRING DIAGRAM:
AT Control System <Ref. to WI-60, AT Control System.>



	Step	Check	Yes	No
1	**CHECK TCM I/O SIGNAL.** Check the power supply and ground I/O signals. <Ref. to 5AT(diag)-13, ELECTRICAL SPECIFICATION, Transmission Control Module (TCM) I/O Signal.>	Is TCM I/O signal OK?	Go to step **2**.	Repair the open or short circuit for power supply and ground.
2	**CHECK TCM AND TRANSMISSION HARNESS CONNECTOR.** 1) Disconnect the connectors from TCM and transmission. 2) Measure the resistance of harness between TCM connector and transmission connector. ***Connector & terminal*** ***(B55) No. 16 — (B11) No. 2:*** ***(B55) No. 23 — (B12) No. 5:*** ***(B55) No. 27 — (B11) No. 7:***	Is the resistance less than 1 Ω?	Go to step **3**.	Repair the open circuit of harness between TCM and transmission connector.
3	**CHECK TCM AND TRANSMISSION HARNESS CONNECTOR.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 16 — Chassis ground:*** ***(B55) No. 23 — Chassis ground:*** ***(B55) No. 27 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **4**.	Repair the short circuit of harness between TCM and transmission connector.

	Step	Check	Yes	No
4	**CHECK TCM POWER SUPPLY OUTPUT.** 1) Connect the connector to TCM. (Transmission connector is disconnected) 2) Turn the ignition switch to ON. 3) Measure the voltage between transmission connector and chassis ground. ***Connector & terminal*** ***(B11) No. 7 (+) — Chassis ground (–):***	Is the voltage 10 — 13 V?	Go to step **5**.	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>
5	**CHECK INPUT CIRCUIT OF TCM TURBINE SPEED SENSOR.** Measure the voltage variation between TCM connector terminals. ***Connector & terminal*** ***(B12) No. 5 (+) — (B11) No. 2 (–):***	Is the voltage 4 — 6 V?	Go to step **7**.	Go to step **6**.
6	**CHECK HARNESS ASSEMBLY (TURBINE SPEED SENSOR GROUND).** Check the installing condition of ground connecting harness (used for both of turbine speed sensor 1, rear vehicle speed sensor).	Is the ground connecting harness installed to transmission body correctly, or the harness and connector terminals not damaged?	Go to step **7**.	When the poor installation of ground connecting harness, install it securely. Replace the transmission assembly when the harness is damaged. <Ref. to 5AT-36, Automatic Transmission Assembly.>
7	**CHECK INPUT SIGNAL FOR TCM.** 1) Connect all connectors. 2) Lift up the vehicle. 3) Start the engine. 4) Read the data of «Rear Wheel Speed» using Subaru Select Monitor. <Ref. to 5AT(diag)-18, Read Current Data.> NOTE: The speed difference between front and rear wheels lights the ABS warning light or the VDC warning light, but this does not indicate a malfunction. If the warning light is illuminated, clear the memory of ABS or VDC after completing AT control diagnosis. <Ref. to VDC(diag)-25, Clear Memory Mode.>	Does the speedometer indication in the combination meter change according to «Rear Wheel Speed» data?	Check for poor contact of rear vehicle speed sensor circuit harness, and repair the defective part.	Replace the transmission harness assembly.

AG:DTC P1707 AT AWD SOLENOID VALVE CIRCUIT MALFUNCTION

DTC DETECTING CONDITION:

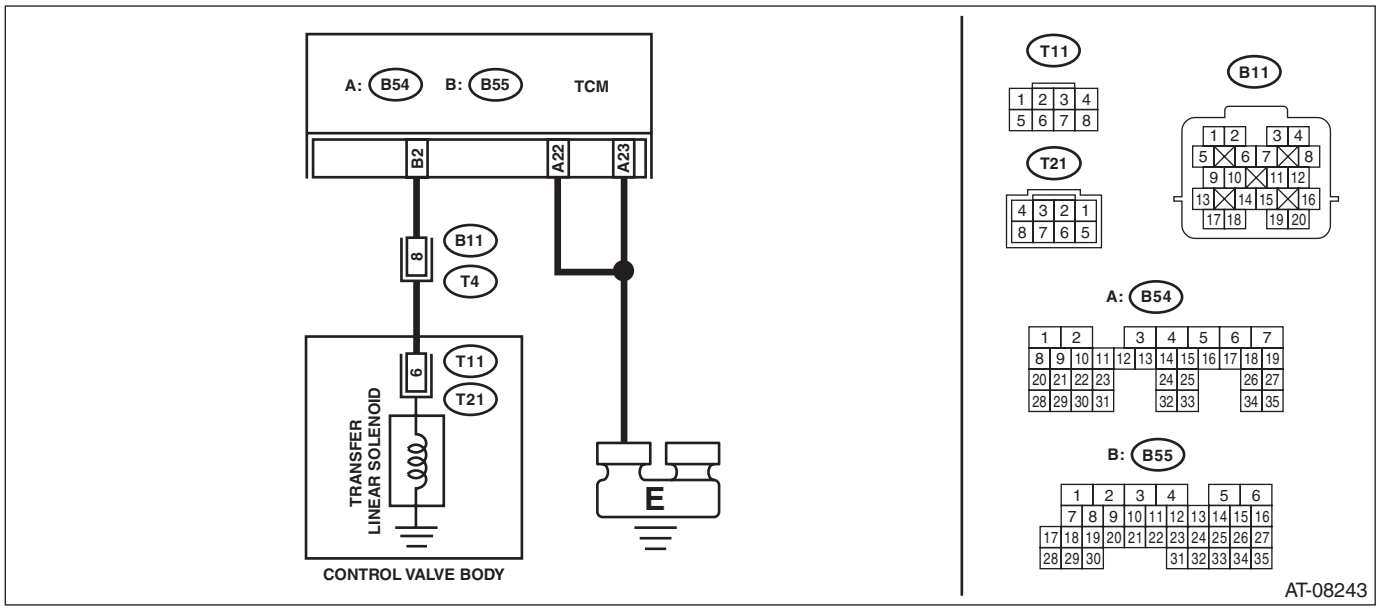
Output signal circuit of transfer solenoid is open or shorted.

TROUBLE SYMPTOM:

- Tight corner braking phenomenon occurs.
- Drivability getting worse.

WIRING DIAGRAM:

AT control system <Ref. to WI-60, AT Control System.>



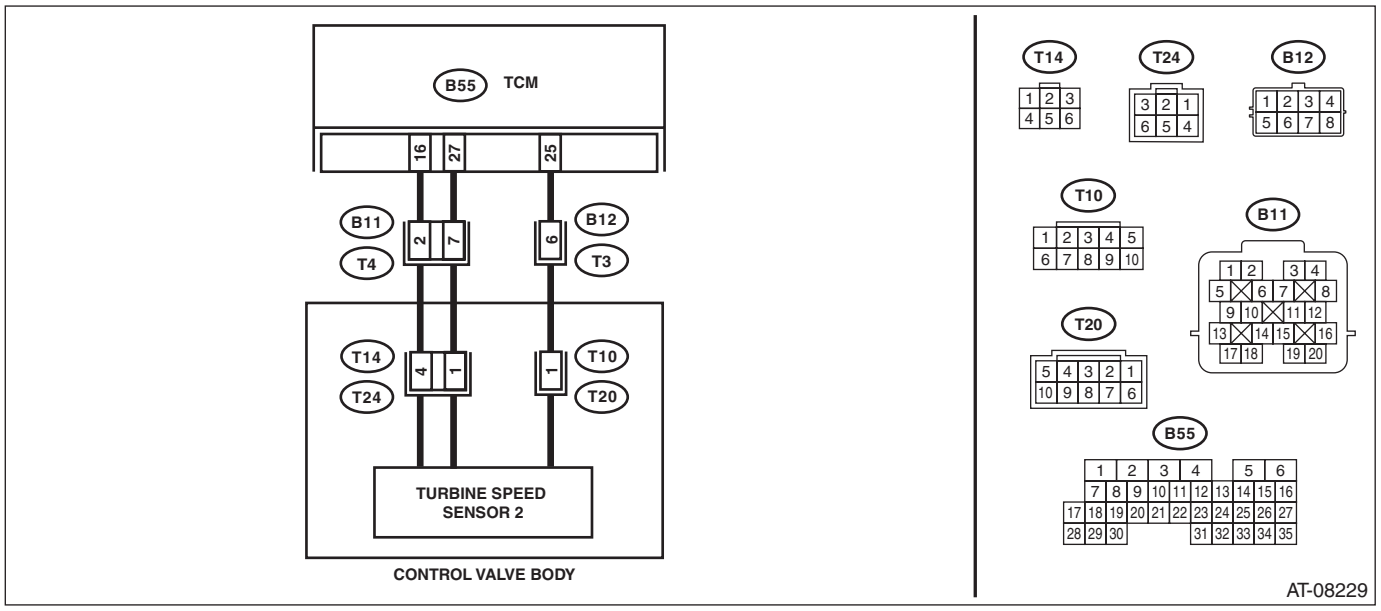
	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM connector and transmission connector. ***Connector & terminal*** ***(B54) No. 22 — Chassis ground:*** ***(B54) No. 23 — Chassis ground:*** ***(B55) No. 2 — (B11) No. 8:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair the open circuit of harness between TCM and transmission connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 23 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **3**.	Repair the short circuit of harness between TCM and transmission connector.

	Step	Check	Yes	No
3	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Remove the transmission connector from bracket. 4) Lift up the vehicle. 5) Drain the ATF. **CAUTION:** **Do not drain ATF until it cools down.** 6) Remove the oil pan. 7) Disconnect the control valve body connector. 8) Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(T4) No. 8 — (T11) No. 6:***	Is the resistance less than 1 Ω?	Go to step **4**.	Repair the open circuit of harness between transmission connector and control valve body connector.
4	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** Measure the resistance between transmission ground and control valve body connector. ***Connector & terminal*** ***(T11) No. 6 — Transmission ground:***	Is the resistance 1 MΩ or more?	Go to step **5**.	Repair the short circuit of harness between control valve body connector and transmission ground.
5	**CHECK TRANSFER SOLENOID.** Measure the resistance between transmission ground and control valve body connector. ***Connector & terminal*** ***(T21) No. 6 — Transmission ground:***	Is the resistance 3 — 9 Ω?	Go to step **6**.	Replace the control valve body. <Ref. to 5AT-54, Control Valve Body.>
6	**CHECK FOR POOR CONTACT.** Check the TCM connector, transmission connector and control valve body connector.	Is there poor contact, loosing terminal, entering foreign matter, or damaging connector body?	Repair the poor contact.	Go to step **7**.
7	**CHECK AFTER REPAIR.** 1) Perform the Clear Memory Mode. 2) Drive for a while and read DTC.	Is DTC displayed?	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>	Temporary poor contact or open circuit occurs. Recheck that the harness connector has no faulty.

AH:DTC P1710 TORQUE CONVERTER TURBINE 2 SPEED SIGNAL CIRCUIT MALFUNCTION

DTC DETECTING CONDITION:
Input signal circuit of TCM is open or shorted.
TROUBLE SYMPTOM:
- Excessive shift shock
- Does not shift to 5th.

WIRING DIAGRAM:
AT control system <Ref. to WI-60, AT Control System.>



Step		Check	Yes	No
1	**CHECK TCM I/O SIGNAL.** Check the power supply and ground I/O signals. <Ref. to 5AT(diag)-13, ELECTRICAL SPECIFICATION, Transmission Control Module (TCM) I/O Signal.>	Is TCM I/O signal OK?	Go to step **2**.	Repair the open or short circuit for power supply and ground.
2	**CHECK TCM AND TRANSMISSION HARNESS CONNECTOR.** 1) Disconnect the connectors from TCM and transmission. 2) Measure the resistance of harness between TCM connector and transmission connector. ***Connector & terminal*** ***(B55) No. 16 — (B11) No. 2:*** ***(B55) No. 25 — (B12) No. 6:*** ***(B55) No. 27 — (B11) No. 7:***	Is the resistance less than 1 Ω?	Go to step **3**.	Repair the open circuit of harness between TCM and transmission connector.
3	**CHECK TCM AND TRANSMISSION HARNESS CONNECTOR.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 25 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **4**.	Repair the short circuit of harness between TCM and transmission connector.

	Step	Check	Yes	No
4	**CHECK TCM POWER SUPPLY OUTPUT.** 1) Connect the connector to TCM. (Transmission connector is disconnected) 2) Turn the ignition switch to ON. 3) Measure the voltage between transmission connector and chassis ground. ***Connector & terminal*** ***(B11) No. 7 (+) — Chassis ground (–):***	Is the voltage 10 — 13 V?	Go to step **5**.	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>
5	**CHECK INPUT CIRCUIT OF TCM TURBINE SPEED SENSOR 2.** Measure the voltage between TCM connector terminals. ***Connector & terminal*** ***(B12) No. 6 (+) — (B11) No. 2 (–):***	Is the voltage 4 — 6 V?	Go to step **6**.	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>
6	**CHECK INPUT SIGNAL FOR TCM.** 1) Connect all connectors. 2) Lift up the vehicle. 3) Start the engine. 4) Drive at 1st of manual mode. 5) Read the data of «AT Turbine Speed 2» using Subaru Select Monitor. <Ref. to 5AT(diag)-18, Read Current Data.> NOTE: The speed difference between front and rear wheels lights the ABS warning light or the VDC warning light, but this does not indicate a malfunction. If the warning light is illuminated, clear the memory of ABS or VDC after completing AT control diagnosis. <Ref. to VDC(diag)-25, Clear Memory Mode.>	Does the speedometer indication in the combination meter change according to «AT Turbine Speed 2» data?	Check for poor contact of the turbine speed sensor 2 and transmission connector harness, and repair the defective part.	Go to step **7**.
7	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Remove the transmission connector from bracket. 4) Lift up the vehicle. 5) Drain the ATF. **CAUTION:** **Do not drain ATF until it cools down.** 6) Remove the oil pan. 7) Disconnect the control valve body connector. 8) Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(T3) No. 6 — (T10) No. 1:***	Is the resistance less than 1 Ω?	Go to step **8**.	Repair the open circuit of harness between transmission connector and control valve body connector.
8	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** Measure the resistance between transmission ground and control valve body connector. ***Connector & terminal*** ***(T10) No. 1 — Transmission ground:***	Is the resistance 1 MΩ or more?	Replace the control valve body. <Ref. to 5AT-54, Control Valve Body.>	Repair the short circuit of harness between control valve body connector and transmission ground.

AI: DTC P1718 AT CAN COMMUNICATION CIRCUIT

NOTE:
Refer to “LAN SYSTEM” for diagnostic procedure. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>

AJ:DTC P1724 AT EEPROM ERROR

DTC DETECTING CONDITION:
TCM EEPROM malfunction
TROUBLE SYMPTOM:

- AT learning is not finished.
- Shock occurs when selecting N → D, N → R.

	Step	Check	Yes	No
1	**CHECK BATTERY.** 1) Turn the ignition switch to ON. 2) Read the data of «Battery voltage» using Subaru Select Monitor.	Is the «Battery voltage» 10 V or more?	Go to step **2**.	Check the battery.
2	**CHECK DTC.** 1) Turn the ignition switch to OFF. 2) Turn the ignition switch to ON after one minute.	Is DTC P1724 displayed as a temporary code?	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>	Current condition is normal. Check for poor contact of TCM connector or harness.

AK:DTC P1817 SPORTS MODE SWITCH CIRCUIT (MANUAL SWITCH)

DTC DETECTING CONDITION:

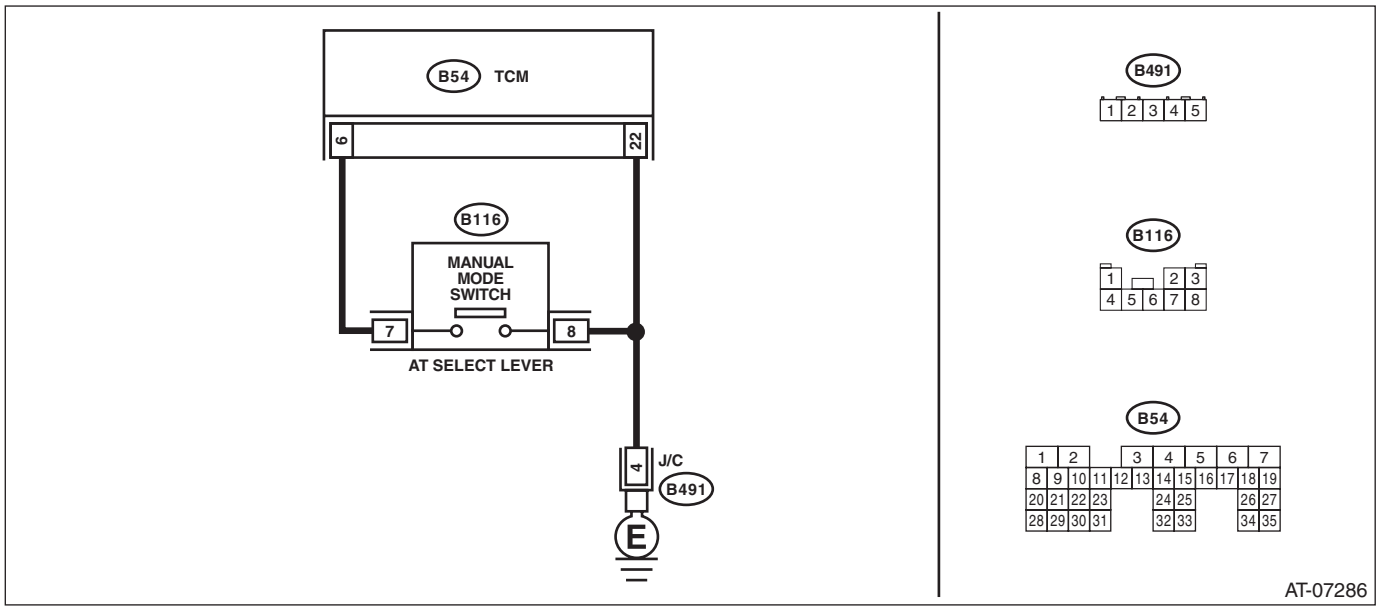
Input signal circuit of manual mode switch is open or shorted.

TROUBLE SYMPTOM:

- Manual mode can not be set.
- Shift indicator displays when shifting “N” → “D”.

WIRING DIAGRAM:

AT Control System <Ref. to WI-60, AT Control System.>



	Step	Check	Yes	No
1	**CHECK GROUND CIRCUIT OF MANUAL MODE SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from manual mode switch. 3) Measure the resistance of the harness between the manual mode switch connector and chassis ground. ***Connector & terminal*** ***(B116) No. 8 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair the open circuit of the harness between the manual mode switch and chassis ground.
2	**CHECK MANUAL MODE SWITCH.** Measure the resistance between manual mode switch terminals. ***Connector & terminal*** ***(B116) No. 7 — No. 8:***	Is the resistance 1 MΩ or more?	Go to step **3**.	Replace the select lever assembly. <Ref. to CS-26, Select Lever.>
3	**CHECK MANUAL MODE SWITCH.** 1) Shift the select lever to manual mode. 2) Measure the resistance between manual mode switch terminals. ***Connector & terminal*** ***(B116) No. 7 — No. 8:***	Is the resistance less than 1 Ω?	Go to step **4**.	Replace the select lever assembly. <Ref. to CS-26, Select Lever.>
4	**CHECK HARNESS CONNECTOR BETWEEN TCM AND MANUAL MODE SWITCH.** 1) Disconnect the connector from TCM. 2) Measure the resistance of harness between TCM connector and manual mode switch connector. ***Connector & terminal*** ***(B116) No. 7 — (B54) No. 6:***	Is the resistance less than 1 Ω?	Go to step **5**.	Repair the open circuit of the harness or poor contact of the connector between TCM and manual mode switch connector.

	Step	Check	Yes	No
5	**CHECK HARNESS CONNECTOR BETWEEN TCM AND MANUAL MODE SWITCH.** 1) Disconnect the connector from TCM. 2) Measure the resistance of the harness between the manual mode switch connector and chassis ground. ***Connector & terminal*** ***(B116) No. 7 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **6**.	Repair the short circuit of the harness between TCM and manual mode switch connector.
6	**CHECK INPUT SIGNAL FOR TCM.** 1) Connect the connector to TCM and manual mode switch. 2) Turn the ignition switch to ON. 3) Shift the select lever to normal mode. 4) Measure the voltage of signal to TCM. ***Connector & terminal*** ***(B54) No. 6 (+) — Chassis ground (–):***	Is the voltage 10 V or more?	Go to step **7**.	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>
7	**CHECK FOR POOR CONTACT.**	Is there poor contact of the manual mode switch circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>

AL:DTC P1840 TRANSMISSION FLUID PRESSURE SENSOR SWITCH A CIRCUIT

DTC DETECTING CONDITION:
Front brake oil pressure switch malfunction
TROUBLE SYMPTOM:
Excessive shift shock

NOTE:
Refer to DTC P0751 for diagnostic procedure. <Ref. to 5AT(diag)-62, DTC P0751 SHIFT SOLENOID “A” PERFORMANCE OR STUCK OFF, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AM:DTC P1841 TRANSMISSION FLUID PRESSURE SENSOR SWITCH B CIRCUIT

DTC DETECTING CONDITION:
Forward brake oil pressure switch malfunction.
TROUBLE SYMPTOM:
Excessive shift shock

NOTE:
Refer to DTC P0771 for diagnostic procedure. <Ref. to 5AT(diag)-78, DTC P0771 SHIFT SOLENOID “E” PERFORMANCE OR STUCK OFF, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AN:DTC P1842 TRANSMISSION FLUID PRESSURE SENSOR SWITCH C CIRCUIT

DTC DETECTING CONDITION:
Input clutch oil pressure switch is malfunction.
TROUBLE SYMPTOM:
Excessive shift shock

NOTE:
Refer to DTC P0756 for diagnostic procedure. <Ref. to 5AT(diag)-66, DTC P0756 SHIFT SOLENOID “B” PERFORMANCE OR STUCK OFF, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AO:DTC P1843 TRANSMISSION FLUID PRESSURE SENSOR SWITCH D CIRCUIT

DTC DETECTING CONDITION:
Direct clutch oil pressure switch malfunction.
TROUBLE SYMPTOM:
Excessive shift shock

NOTE:
Refer to DTC P0766 for diagnostic procedure. <Ref. to 5AT(diag)-74, DTC P0766 SHIFT SOLENOID “D” PERFORMANCE OR STUCK OFF, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AP:DTC P1844 TRANSMISSION FLUID PRESSURE SENSOR SWITCH E CIRCUIT

DTC DETECTING CONDITION:
High & low reverse clutch oil pressure switch malfunction.
TROUBLE SYMPTOM:
Excessive shift shock

NOTE:
Refer to DTC P0761 for diagnostic procedure. <Ref. to 5AT(diag)-70, DTC P0761 SHIFT SOLENOID “C” PERFORMANCE OR STUCK OFF, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

17.Diagnostic Procedure without Diagnostic Trouble Code (DTC)

A: CHECK SHIFT INDICATOR

DIAGNOSIS:

- Output signal circuit of shift indicator is open or shorted.
- Combination meter malfunction

TROUBLE SYMPTOM:

- Shift indicator does not display or remains displayed.
- Shift indicator display does not change.

	Step	Check	Yes	No
1	**CHECK TCM.** Check the DTC relating the TCM using the Subaru Select Monitor.	Is DTC displayed?	Perform the diagnosis according to DTC.	Go to step **2**.
2	**CHECK COMBINATION METER.** Check the DTC of combination meter.	Is DTC displayed?	Perform the diagnosis according to DTC.	Go to step **3**.
3	**CHECK TCM.** 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor to data link connector. 3) Turn the ignition switch to ON. 4) Run the Subaru Select Monitor. 5) Shift the select lever to manual mode. 6) Read the data of «Gear Position» using Subaru Select Monitor.	Is the gear position “1”?	Go to step **4**.	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>
4	**CHECK TCM.** 1) Shift up the select lever. 2) Read the data of «Gear Position» using Subaru Select Monitor.	Is the gear position “2”?	Replace the combination meter assembly. <Ref. to IDI-25, Combination Meter.>	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>

18.Diagnostics with Phenomenon

A: INSPECTION

Symptoms	Faulty parts
Shifting vehicle speed is low on “D” range.	• Front and rear vehicle speed sensors • Accelerator pedal position sensor • Throttle position sensor • ATF temperature sensor • CAN communication signal
Shifting vehicle speed is high on “D” range.	• Front and rear vehicle speed sensors • Accelerator pedal position sensor • Throttle position sensor • CAN communication signal • Brake switch signal • ATF temperature sensor
Excessive shift shock (“N” → “D” range)	• Engine idle speed • Engine speed signal • Accelerator pedal position sensor • Throttle position sensor • Control cable adjustment • ATF temperature sensor • Oil pressure switch 1 and front brake solenoid valve • CAN communication signal • Fluid level and condition • TCM power supply
Excessive shift shock on 1st of “D” range → 2nd of “D” range or “1st of manual mode” → “2nd of manual mode”.	• Accelerator pedal position sensor • Throttle position sensor • Control cable adjustment • Oil pressure switch 4 and direct clutch solenoid valve • CAN communication signal • Engine speed signal • Turbine speed sensor 1 and turbine speed sensor 2 • Front and rear vehicle speed sensors • Fluid level and condition
Excessive shift shock on 2nd of “D” range → 3rd of “D” range or “2nd of manual mode” → “3rd of manual mode”.	• Accelerator pedal position sensor • Throttle position sensor • Control cable adjustment • Oil pressure switch 5 and high & low reverse clutch solenoid valve • CAN communication signal • Engine speed signal • Turbine speed sensor 1 and turbine speed sensor 2 • Front and rear vehicle speed sensors • Fluid level and condition
Excessive shift shock on 3rd of “D” range → 4th of “D” range or “3rd of manual mode” → “4th of manual mode”.	• Accelerator pedal position sensor • Throttle position sensor • Control cable adjustment • Oil pressure switch 3 and input clutch solenoid valve • CAN communication signal • Engine speed signal • Turbine speed sensor 1 and turbine speed sensor 2 • Front and rear vehicle speed sensors • Fluid level and condition

Symptoms	Faulty parts
Excessive shift shock on 4th of “D” range → 5th of “D” range or “4th of manual mode” → “5th of manual mode”.	• Accelerator pedal position sensor • Throttle position sensor • Control cable adjustment • Oil pressure switch 1 and front brake solenoid valve • CAN communication signal • Engine speed signal • Turbine speed sensor 1 and turbine speed sensor 2 • Front and rear vehicle speed sensors • Fluid level and condition
Excessive shock at kick down.	• Accelerator pedal position sensor • Throttle position sensor • Control cable adjustment • CAN communication signal • Engine speed signal • Turbine speed sensor 1 and turbine speed sensor 2 • Front and rear vehicle speed sensors • Fluid level and condition
Excessive shock at shift up.	• Accelerator pedal position sensor • Throttle position sensor • Control cable adjustment • Engine speed signal • CAN communication signal • Turbine speed sensor 1 and turbine speed sensor 2 • Front and rear vehicle speed sensors • Fluid level and condition
Excessive shock at lock up.	• Accelerator pedal position sensor • Throttle position sensor • Control cable adjustment • Engine speed signal • CAN communication signal • Turbine speed sensor 1 and turbine speed sensor 2 • Lock up solenoid valve • Front and rear vehicle speed sensors • Fluid level and condition
Excessive shock at engine brake.	• Accelerator pedal position sensor • Throttle position sensor • Control cable adjustment • CAN communication signal • Fluid level and condition • Line pressure • Forward brake solenoid valve
Judder is occurred at lock up.	• Fluid level and condition • Engine speed signal • Turbine speed sensor 1 and turbine speed sensor 2 • Front and rear vehicle speed sensors • Accelerator pedal position sensor • Throttle position sensor • Lock up solenoid valve • ATF temperature sensor
Noise at “R”, “N” and “D” range.	• Fluid level and condition • Engine speed signal • ATF temperature sensor
Hold at “D” range or 1st on manual mode.	• Fluid level and condition • Front and rear vehicle speed sensors • Direct clutch solenoid valve • Line pressure • Up switch signal • CAN communication signal • Accelerator pedal position sensor

Symptoms	Faulty parts
Hold at “D” range or 2nd on manual mode.	• Fluid level and condition • Front and rear vehicle speed sensors • Forward brake solenoid valve • Line pressure • Up switch signal • Down switch signal • CAN communication signal • Accelerator pedal position sensor
Hold at “D” range or 3rd on manual mode.	• Fluid level and condition • Front and rear vehicle speed sensors • Line pressure • Up switch signal • Down switch signal • CAN communication signal • Accelerator pedal position sensor
Hold at “D” range or 4th on manual mode.	• Fluid level and condition • Front and rear vehicle speed sensors • Oil pressure switch 3 and input clutch solenoid valve • Oil pressure switch 4 and direct clutch solenoid valve • Oil pressure switch 5 and high & low reverse clutch solenoid valve • Forward brake solenoid valve • Front brake solenoid valve • Line pressure • Up switch signal • Down switch signal • CAN communication signal • Accelerator pedal position sensor • TCM power supply
Hold at “D” range or 5th on manual mode.	• Fluid level and condition • Front and rear vehicle speed sensors • Oil pressure switch 1 and front brake solenoid valve • Line pressure • Down switch signal • CAN communication signal • Accelerator pedal position sensor
Gear does not shift 1st of “D” range → 2nd of “D” range or “1st of manual mode” → “2nd of manual mode”.	• Fluid level and condition • Front and rear vehicle speed sensors • Oil pressure switch 4 and direct clutch solenoid valve • Line pressure • Up switch signal • CAN communication signal • Accelerator pedal position sensor
Gear does not shift 2nd of “D” range → 3rd of “D” range or “2nd of manual mode” → “3rd of manual mode”.	• Fluid level and condition • Front and rear vehicle speed sensors • Oil pressure switch 5 and high & low reverse clutch solenoid valve • Line pressure • Up switch signal • CAN communication signal • Accelerator pedal position sensor
Gear does not shift 3rd of “D” range → 4th of “D” range or “3rd of manual mode” → “4th of manual mode”.	• Fluid level and condition • Front and rear vehicle speed sensors • Oil pressure switch 3 and input clutch solenoid valve • Oil pressure switch 1 and front brake solenoid valve • Line pressure • Up switch signal • CAN communication signal • Accelerator pedal position sensor

Symptoms	Faulty parts
Gear does not shift 4th of “D” range → 5th of “D” range or “4th of manual mode” → “5th of manual mode”.	• Fluid level and condition • Front and rear vehicle speed sensors • Oil pressure switch 1 and front brake solenoid valve • Oil pressure switch 4 and direct clutch solenoid valve • Turbine speed sensor 1 and turbine speed sensor 2 • ATF temperature sensor • Line pressure • Up switch signal • CAN communication signal • Accelerator pedal position sensor
Gear does not shift down to 4th on “D” range or manual mode.	• Fluid level and condition • Front and rear vehicle speed sensors • Oil pressure switch 1 and front brake solenoid valve • Oil pressure switch 4 and direct clutch solenoid valve • Line pressure • Down switch signal • CAN communication signal • Accelerator pedal position sensor
Gear does not shift down to 3rd on “D” range or manual mode.	• Fluid level and condition • Front and rear vehicle speed sensors • Oil pressure switch 3 and input clutch solenoid valve • Oil pressure switch 1 and front brake solenoid valve • Line pressure • Down switch signal • CAN communication signal • Accelerator pedal position sensor • TCM power supply
Gear does not shift down to 2nd on “D” range or manual mode.	• Fluid level and condition • Front and rear vehicle speed sensors • Oil pressure switch 5 and high & low reverse clutch solenoid • Line pressure • Down switch signal • CAN communication signal • Accelerator pedal position sensor
Gear does not shift down to 1st on “D” range or manual mode.	• Fluid level and condition • Front and rear vehicle speed sensors • Oil pressure switch 4 and direct clutch solenoid valve • Line pressure • Down switch signal • CAN communication signal • Accelerator pedal position sensor
No lock-up occurs.	• Fluid level and condition • Line pressure • Engine speed signal • Turbine speed sensor 1 and turbine speed sensor 2 • Lock up solenoid valve • CAN communication signal • ATF temperature sensor • Accelerator pedal position sensor • Brake switch signal • Range signal
No shift shock occurred when shifting 1st of “D” range → 2nd of “D” range or “1st of manual mode” → “2nd of manual mode”. Or clutch slipping occurred.	• Fluid level and condition • Front and rear vehicle speed sensors • Oil pressure switch 4 and direct clutch solenoid valve • Line pressure • CAN communication signal

Symptoms	Faulty parts
No shift shock occurred when shifting 2nd of “D” range → 3rd of “D” range or “2nd of manual mode” → “3rd of manual mode”. Or clutch slipping occurred.	• Fluid level and condition • Front and rear vehicle speed sensors • Oil pressure switch 5 and high & low reverse clutch solenoid valve • Line pressure • CAN communication signal
No shift shock occurred when shifting 3rd of “D” range → 4th of “D” range or “3rd of manual mode” → “4th of manual mode”. Or clutch slipping occurred.	• Fluid level and condition • Front and rear vehicle speed sensors • Oil pressure switch 3 and input clutch solenoid valve • Oil pressure switch 1 and front brake solenoid valve • Line pressure • CAN communication signal
No shift shock occurred when shifting 4th of “D” range → 5th of “D” range or “4th of manual mode” → “5th of manual mode”. Or clutch slipping occurred.	• Fluid level and condition • Front and rear vehicle speed sensors • Oil pressure switch 1 and front brake solenoid valve • Oil pressure switch 4 and direct clutch solenoid valve • Line pressure • Accelerator pedal position sensor • Throttle position sensor
Engine skids when shifting 5th of “D” range → 4th of “D” range or “5th of manual mode” → “4th of manual mode”. Or slipping occurred.	• Fluid level and condition • Front and rear vehicle speed sensors • Oil pressure switch 1 and front brake solenoid valve • Oil pressure switch 4 and direct clutch solenoid valve • Line pressure • Accelerator pedal position sensor • Throttle position sensor
Engine skids when shifting 4th of “D” range → 3rd of “D” range or “4th of manual mode” → “3rd of manual mode”. Or slipping occurred.	• Fluid level and condition • Front and rear vehicle speed sensors • Oil pressure switch 3 and input clutch solenoid valve • Oil pressure switch 1 and front brake solenoid valve • Line pressure • Accelerator pedal position sensor • Throttle position sensor
Engine skids when shifting 3rd of “D” range → 2nd of “D” range or “3rd of manual mode” → “2nd of manual mode”. Or slipping occurred.	• Fluid level and condition • Front and rear vehicle speed sensors • Oil pressure switch 5 and high & low reverse clutch solenoid valve • Oil pressure switch 4 and direct clutch solenoid valve • Line pressure • Accelerator pedal position sensor • Throttle position sensor
Engine skids when shifting 2nd of “D” range → 1st of “D” range or “2nd of manual mode” → “1st of manual mode”. Or slipping occurred.	• Fluid level and condition • Front and rear vehicle speed sensors • Oil pressure switch 4 and direct clutch solenoid valve • Line pressure • Accelerator pedal position sensor • Throttle position sensor
Engine brake does not function at 5th → 4th of manual mode.	• Inhibitor switch • Fluid level and condition • Control cable adjustment • Manual mode switch • Oil pressure switch 1 • Down switch signal
Engine brake does not function at 4th → 3rd of manual mode.	• Inhibitor switch • Fluid level and condition • Control cable adjustment • Manual mode switch • Oil pressure switch 1 and oil pressure switch 3 • Down switch signal

Symptoms	Faulty parts
Engine brake does not function at 3rd → 2nd of manual mode.	• Inhibitor switch • Fluid level and condition • Control cable adjustment • Manual mode switch • Oil pressure switch 5 • Forward brake solenoid valve
Engine brake does not function at 2nd → 1st of manual mode.	• Inhibitor switch • Fluid level and condition • Control cable adjustment • Manual mode switch • Oil pressure switch 4 • Forward brake solenoid valve
Excessive acceleration failure on “D” range.	• Fluid level and condition • Line pressure • Accelerator pedal position sensor • Throttle position sensor • CAN communication signal • Inhibitor switch • Control cable adjustment • Front and rear vehicle speed sensors
Excessive acceleration failure in “R” range.	• Fluid level and condition • Line pressure • Accelerator pedal position sensor • Throttle position sensor • Oil pressure switch 5 and high & low reverse clutch solenoid valve • CAN communication signal • Inhibitor switch • Control cable adjustment • Front and rear vehicle speed sensors
Engine skids when start driving (1st) the vehicle. Or slipping occurred.	• Fluid level and condition • Line pressure • Accelerator pedal position sensor • Throttle position sensor • CAN communication signal
Engine skids when driving at 2nd. Or slipping occurred.	• Fluid level and condition • Line pressure • Accelerator pedal position sensor • Throttle position sensor • CAN communication signal • Oil pressure switch 4 and direct clutch solenoid valve
Engine skids when driving at 3rd. Or slipping occurred.	• Fluid level and condition • Line pressure • Accelerator pedal position sensor • Throttle position sensor • CAN communication signal • Oil pressure switch 5 and high & low reverse clutch solenoid valve
Engine skids when driving at 4th. Or slipping occurred.	• Fluid level and condition • Line pressure • Accelerator pedal position sensor • Throttle position sensor • CAN communication signal • Oil pressure switch 3 and input clutch solenoid valve
Engine skids when driving at 5th. Or slipping occurred.	• Fluid level and condition • Line pressure • Accelerator pedal position sensor • Throttle position sensor • CAN communication signal • Oil pressure switch 1 and front brake solenoid valve

Symptoms	Faulty parts
Slip at lock up.	• Fluid level and condition • Line pressure • Engine speed signal • Turbine speed sensor 1 and turbine speed sensor 2 • Lock up solenoid valve • CAN communication signal
Maximum vehicle speed is low.	• Fluid level and condition • Line pressure • Accelerator pedal position sensor • Throttle position sensor • CAN communication signal • Direct clutch solenoid valve • Front and rear vehicle speed sensors
There is completely no creep.	• Fluid level and condition • Engine speed signal • CAN communication signal • Oil pressure switch 4 and direct clutch solenoid valve • Line pressure
Excessive large creep.	• Engine speed signal • CAN communication signal • Oil pressure switch 4
Vehicle cannot be parking condition on “P” range. Parking condition is not released though shifting to other ranges.	• Inhibitor switch • Control cable adjustment
Vehicle can drive on “P” range.	• Inhibitor switch • Fluid level and condition • Control cable adjustment • Line pressure
Vehicle can drive on “N” range.	• Inhibitor switch • Fluid level and condition • Control cable adjustment • Line pressure
Vehicle cannot drive at any range.	• Fluid level and condition • Line pressure • Inhibitor switch • Control cable adjustment • Loosing or damaging of propeller shaft. • Loosing or damaging of drive shaft.
Vehicle cannot drive on “D” range.	• Fluid level and condition • Line pressure • Inhibitor switch • Control cable adjustment • Loosing or damaging of propeller shaft. • Loosing or damaging of drive shaft.
Vehicle cannot drive on “R” range.	• Fluid level and condition • Line pressure • Inhibitor switch • Control cable adjustment • Loosing or damaging of propeller shaft. • Loosing or damaging of drive shaft.
Engine cannot start on “N” or “P” range.	• Starter • Control cable adjustment • Inhibitor switch • CAN communication line • TCM
Engine start other than “N” or “P” range.	• Starter • Control cable adjustment • Inhibitor switch • TCM

Symptoms	Faulty parts
Engine stalls.	• Fluid level and condition • Engine speed signal • Turbine speed sensor 1 and turbine speed sensor 2 • Lock up solenoid valve • Line pressure
Engine stalls when shifting to “N” → “D” and “R” range.	• Fluid level and condition • Engine speed signal • Turbine speed sensor 1 and turbine speed sensor 2 • Lock up solenoid valve • Line pressure

MANUAL TRANSMISSION AND DIFFERENTIAL

6MT

		Page
1.	General Description	2
2.	Transmission Gear Oil	24
3.	Manual Transmission Assembly	25
4.	Transmission Mounting System	33
5.	Oil Seal	34
6.	Differential Side Retainer Oil Seal	35
7.	Switches and Harness	36
8.	Preparation for Overhaul	38
9.	Transfer Case and Extension Case Assembly	39
10.	Transfer Drive Gear	45
11.	Transfer Driven Gear	47
12.	Center Differential	49
13.	Shift Link Assembly	50
14.	Transmission Case	57
15.	Main Shaft Assembly for Single-Range	61
16.	Drive Pinion Shaft Assembly	70
17.	Front Differential Assembly	81
18.	Reverse Idler Gear	89
19.	Shifter Fork and Rod	96
20.	General Diagnostic Table	100

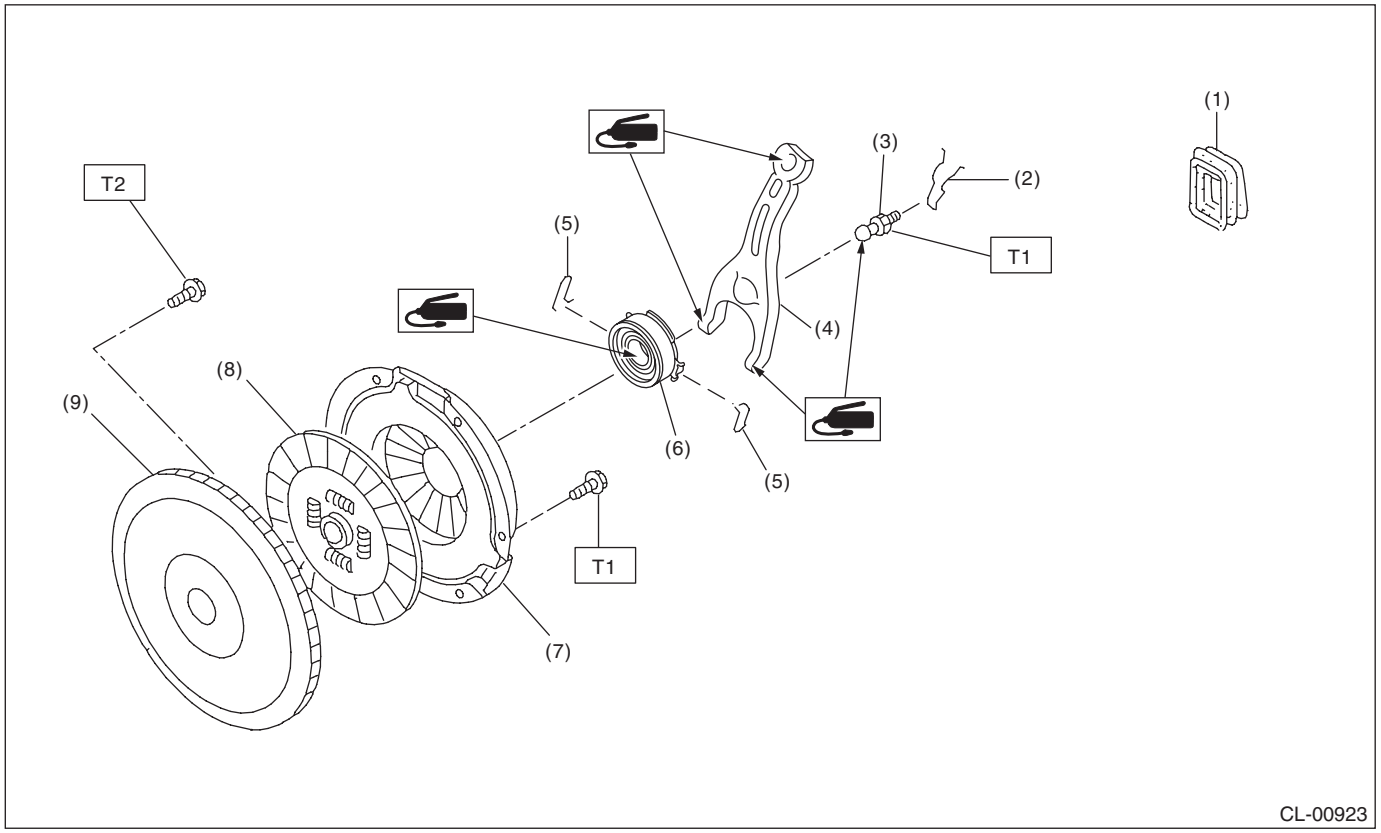
1. General Description

A: SPECIFICATION

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

B: COMPONENT

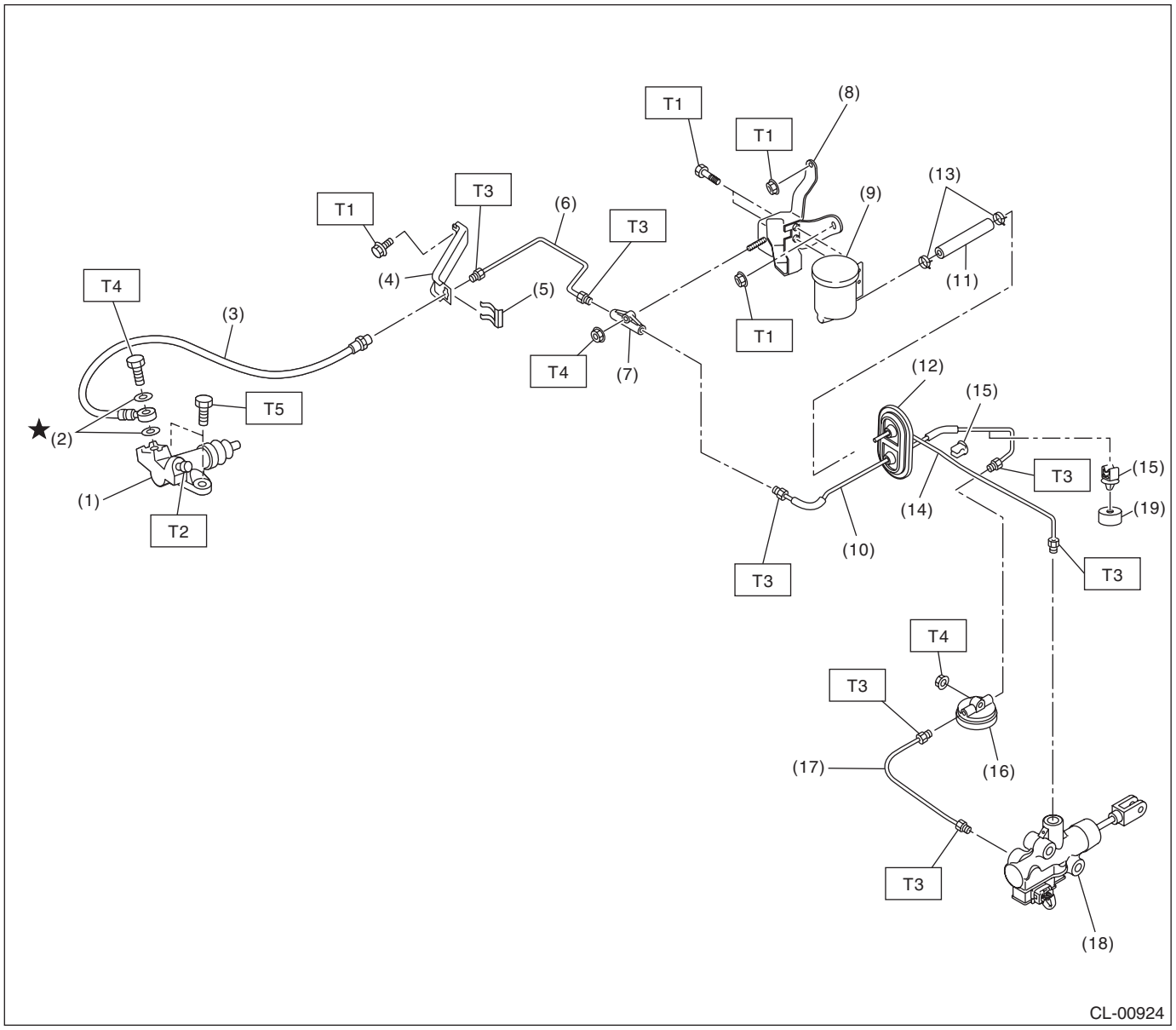
1. CLUTCH ASSEMBLY



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

Tightening torque: N·m (kgf-m, ft-lb)
T1: 16 (1.6, 11.8)
T2: <Ref. to CL-13, INSTALLATION, Flywheel.>

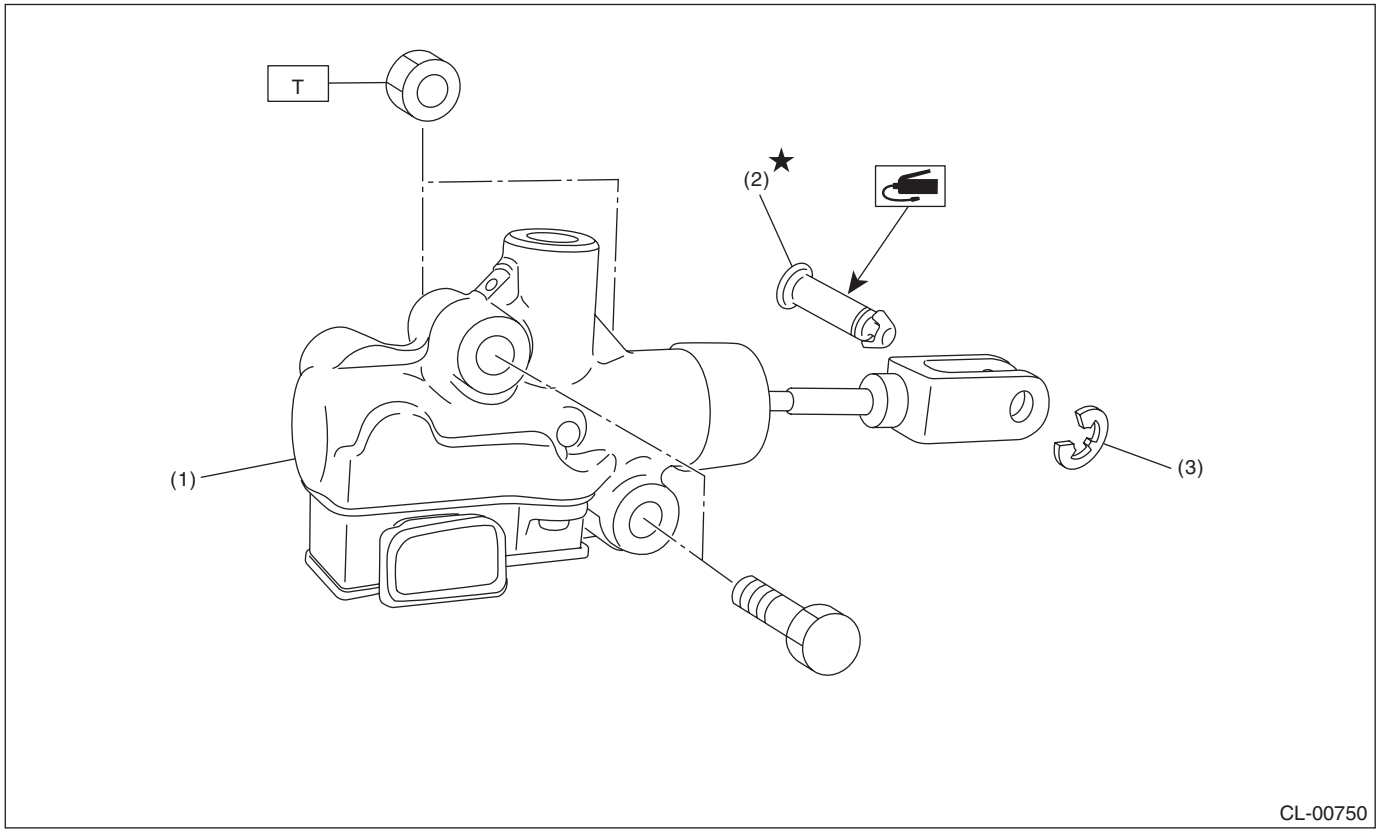
2. CLUTCH PIPE AND HOSE



(1) Operating cylinder
(2) Washer
(3) Clutch hose
(4) Clutch hose bracket
(5) Clamp
(6) Clutch pipe
(7) Connector
(8) Reservoir tank bracket
(9) Reservoir tank
(10) Clutch pipe
(11) Reservoir tank hose
(12) Clutch pipe grommet
(13) Clamp
(14) Clutch pipe
(15) Clamp
(16) Clutch damper
(17) Clutch pipe
(18) Master cylinder ASSY
(19) Mass damper

Tightening torque: N·m (kgf-m, ft-lb)
T1: 7.5 (0.8, 5.5)
T2: 7.8 (0.8, 5.8)
T3: 15 (1.5, 11.1)
T4: 18 (1.8, 13.3)
T5: 37 (3.8, 27.3)

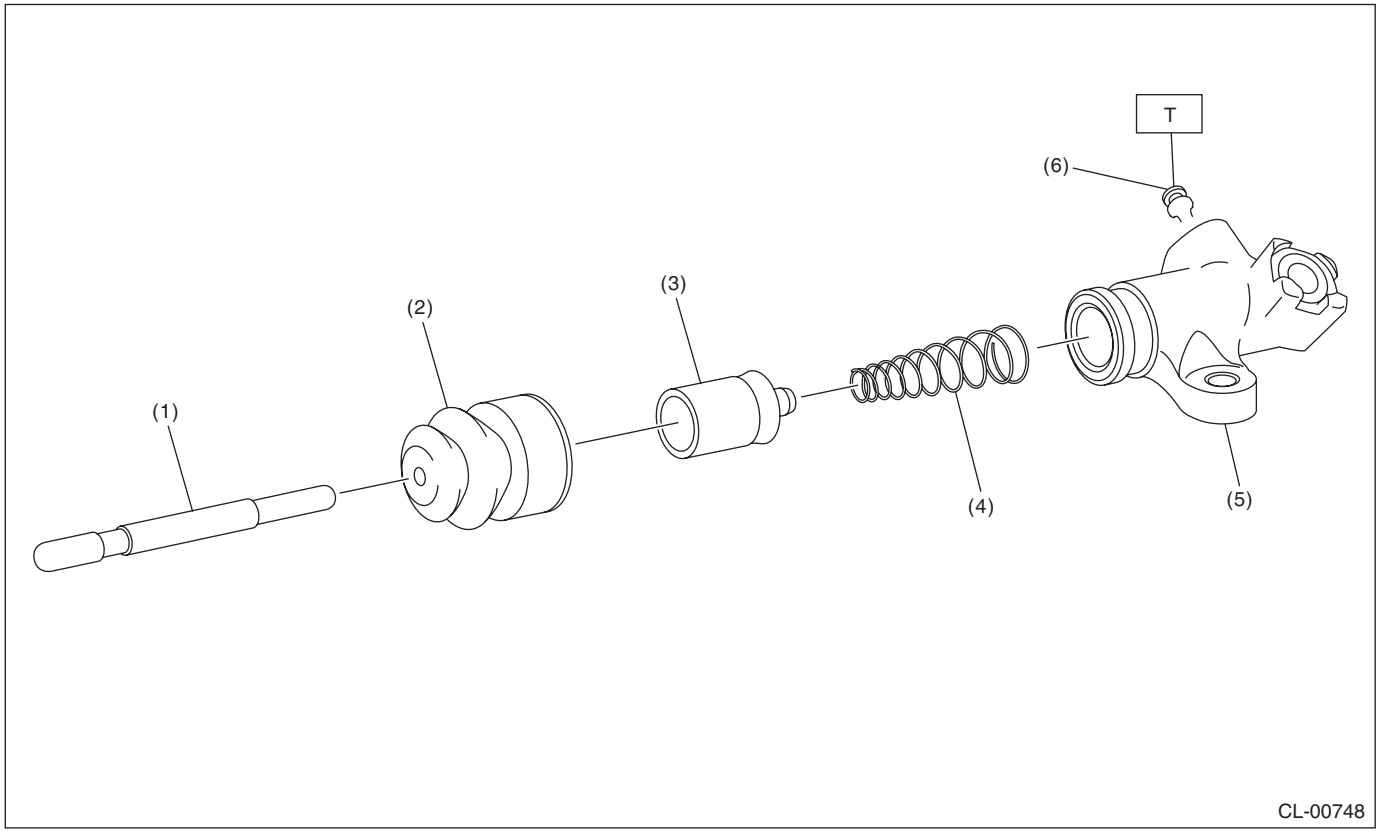
3. MASTER CYLINDER



(1) Master cylinder ASSY
(2) Clevis pin
(3) Clip

Tightening torque: N·m (kgf-m, ft-lb)
T: 18 (1.8, 13.3)

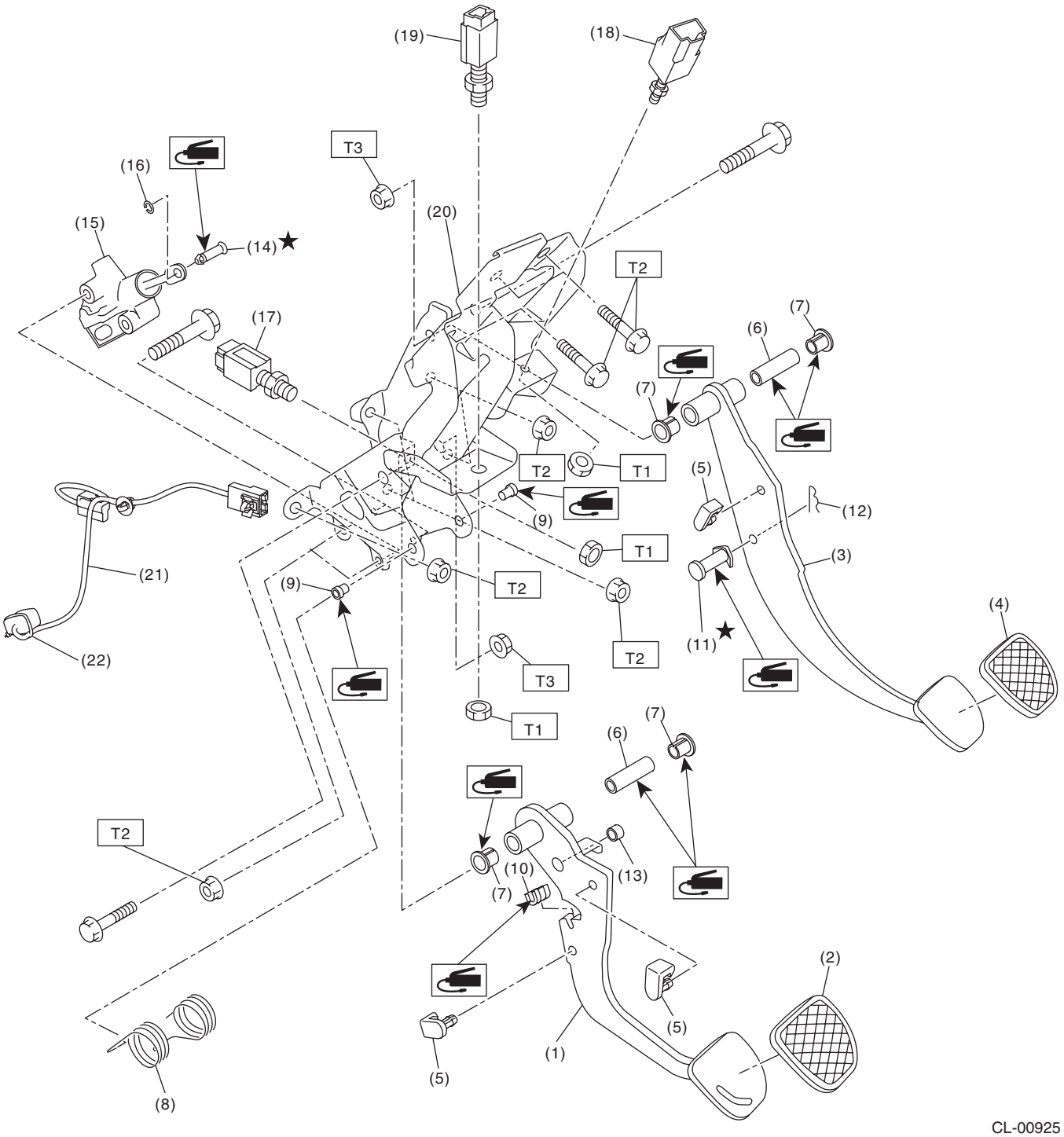
4. OPERATING CYLINDER



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

Tightening torque: N·m (kgf-m, ft-lb)
T: 7.8 (0.8, 5.8)

5. CLUTCH PEDAL ASSEMBLY



(1) Clutch pedal
(2) Clutch pedal pad
(3) Brake pedal
(4) Brake pedal pad
(5) Stopper
(6) Spacer
(7) Bushing
(8) Torsion spring
(9) Assist bushing
(10) Torsion spring bushing
(11) Clevis pin
(12) Snap pin
(13) Bushing A
(14) Clevis pin
(15) Master cylinder ASSY
(16) Clip
(17) Clutch start switch
(18) Stop & brake switch
(19) Clutch switch
(20) Pedal bracket
(21) Sensor harness
(22) Band

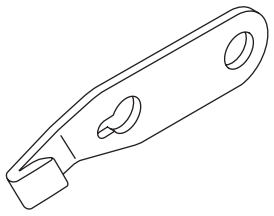
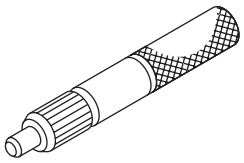
Tightening torque: N·m (kgf-m, ft-lb)
T1: 8 (0.8, 5.9)
T2: 18 (1.8, 13.3)
T3: 30 (3.1, 22.1)

C: CAUTION

- Wear appropriate work clothing, including a cap, protective goggles and protective shoes when performing any work.
- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust and dirt.
- 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.
- Place shop jacks or rigid racks at the specified points.
- Apply grease onto sliding or revolving surfaces before installation.
- Before installing O-rings or snap rings, apply sufficient amount of fluid to avoid damage and deformation.
- Before securing a part in a vise, place cushioning material such as wood blocks, aluminum plate or cloth between the part and the vise.
- Keep fluids away from the vehicle body. If any fluid contacts the vehicle body, immediately flush the area with water.

D: 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.

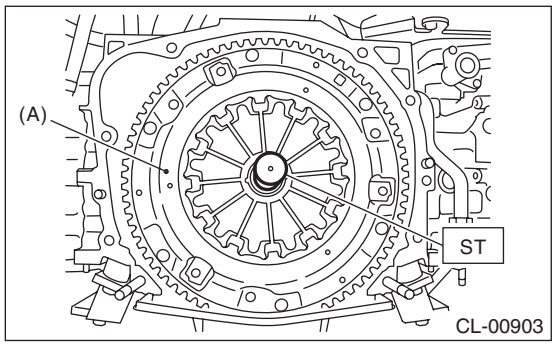
2. GENERAL TOOL

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance, voltage and current.
Dial gauge	Used for measuring clutch disc run-out.
Depth gauge	Used for measuring clutch disc wear.
Angle gauge	Used for tightening the flywheel.

2. Clutch Disc and Cover

A: REMOVAL

1) Remove the transmission assembly from the vehicle. <Ref. to 6MT-25, REMOVAL, Manual Transmission Assembly.>
2) Attach the ST on the flywheel.
ST 499747100 CLUTCH DISC GUIDE



(A) Clutch cover

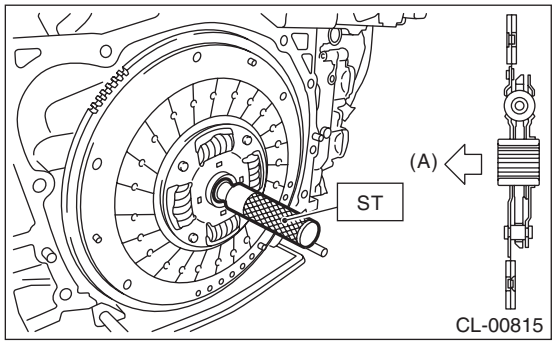
3) Remove the clutch cover and clutch disc.

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

B: INSTALLATION

1) 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

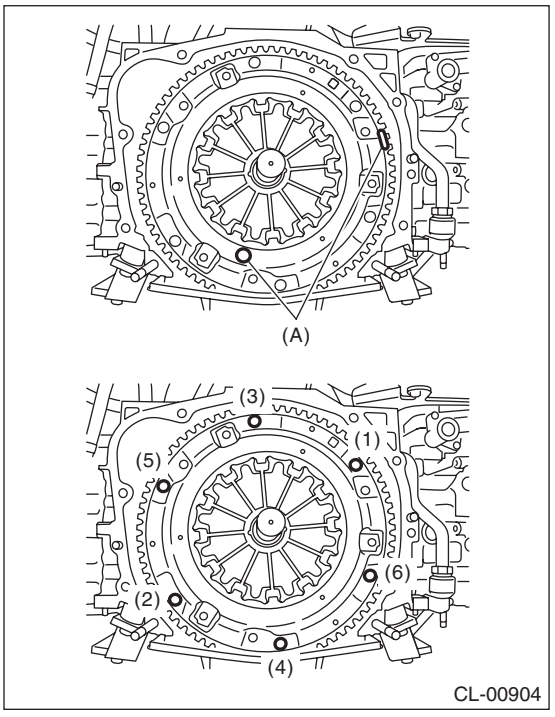


(A) Flywheel side

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

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

Tightening torque:
16 N·m (1.6 kgf-m, 11.8 ft-lb)



(A) Unbalance mark (paint)

3) Remove the ST.
4) Install the transmission assembly. <Ref. to 6MT-29, INSTALLATION, Manual Transmission Assembly.>
5) When the clutch disc has been replaced, perform the clutch sensor calibration mode. <Ref. to PB(diag)-17, CLUTCH SENSOR CALIBRATION MODE, OPERATION, Subaru Select Monitor.>

NOTE:
If necessary, perform the clutch meet position setting. <Ref. to PB(diag)-18, CLUTCH ENGAGEMENT POSITION SETTING, OPERATION, Subaru Select Monitor.>

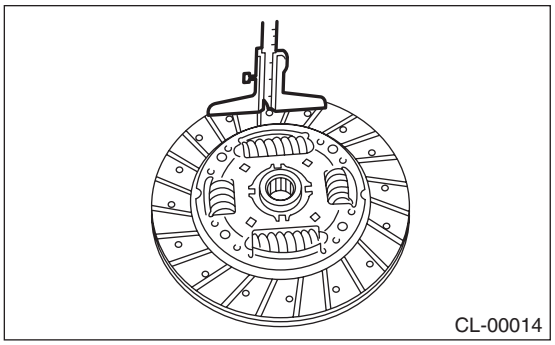
C: INSPECTION

1. CLUTCH DISC

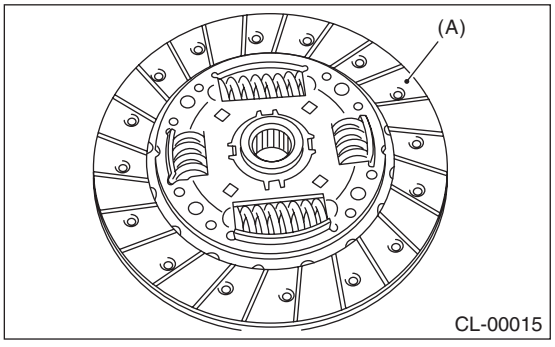
1) Facing wear
Measure the depth from the facing surface to the rivet head. Replace if the face is worn locally or worn down to less than the specified value.

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.



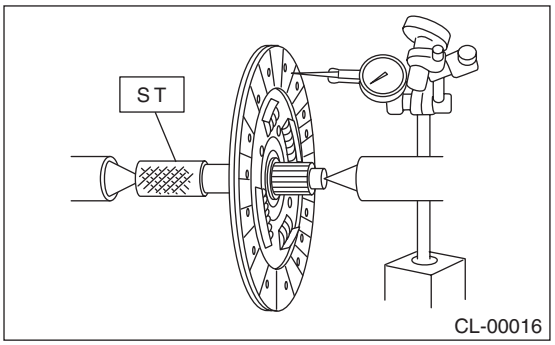
2) Hardened facing
Replace the clutch disc.
3) Oil soakage on facing
Replace the clutch disc and inspect the transmission front oil seal, transmission case mating surface, engine rear oil seal and other locations for oil leakage.



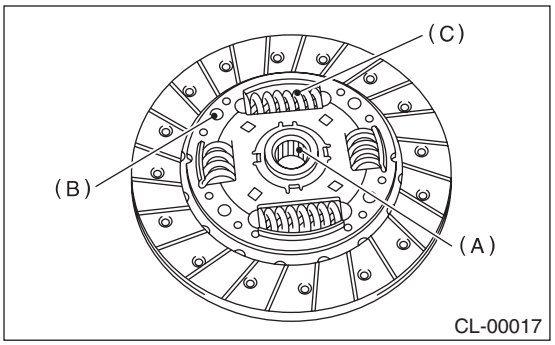
(A) Clutch facing

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

Limit for deflection:
0.7 mm (0.028 in) at R = 110 mm (4.33 in)
ST 499747100 CLUTCH DISC GUIDE



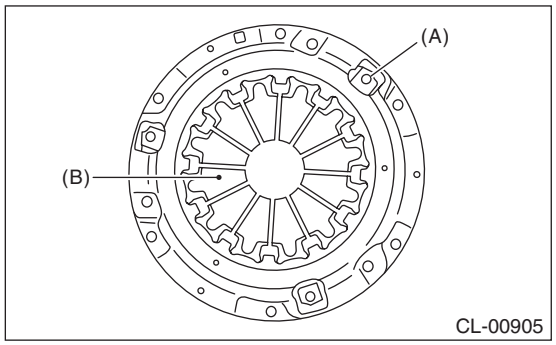
5) If there is spline wear, loose rivets, failed damper springs, etc., replace the clutch disc.



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

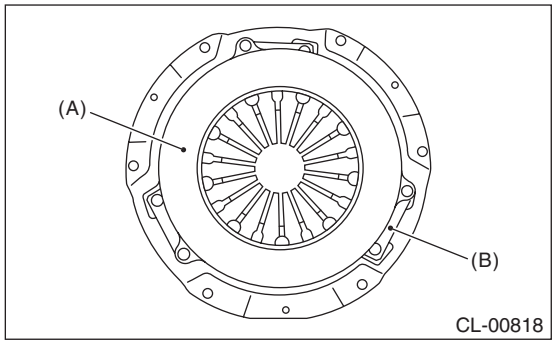
2. CLUTCH COVER

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 and worn disc contact surface of the pressure plate
4) Loose strap plate installation area
5) Worn diaphragm sliding area

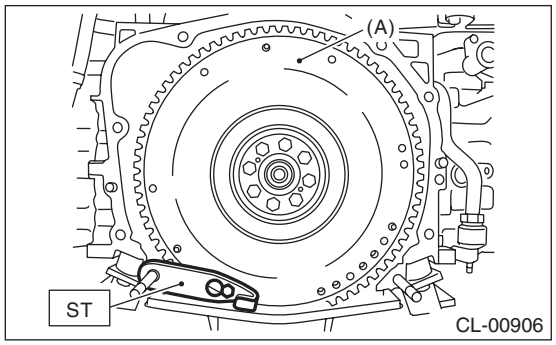


(A) Pressure plate
(B) Strap plate

3. Flywheel

A: REMOVAL

1) Remove the transmission assembly. <Ref. to 6MT-25, REMOVAL, Manual Transmission Assembly.>
2) Remove the clutch cover and clutch disc. <Ref. to CL-10, REMOVAL, Clutch Disc and Cover.>
3) Attach the ST.
ST 498497100 CRANKSHAFT STOPPER



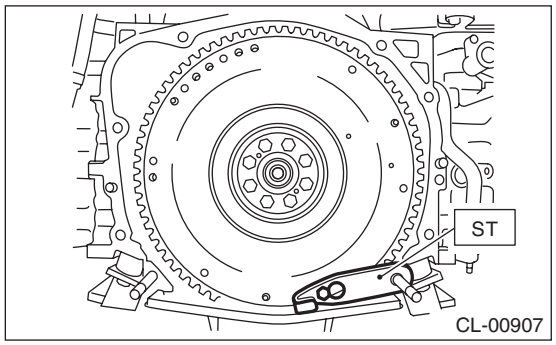
(A) Flywheel

4) Remove the flywheel and crankshaft position sensor plate.

B: INSTALLATION

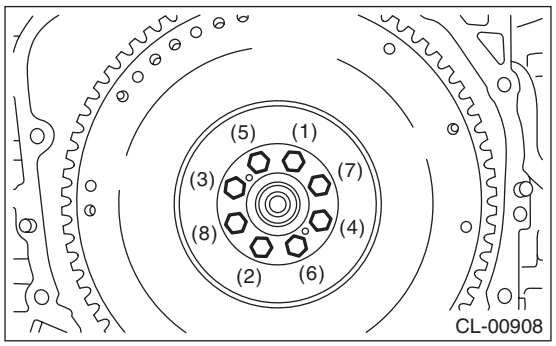
1) Temporarily tighten the crankshaft position sensor plate and flywheel.

NOTE:
Align the knock pin hole of the crankshaft position sensor plate to the knock pin of the crankshaft to secure the knock pin.
2) Attach the ST.
ST 498497100 CRANKSHAFT STOPPER



3) 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)



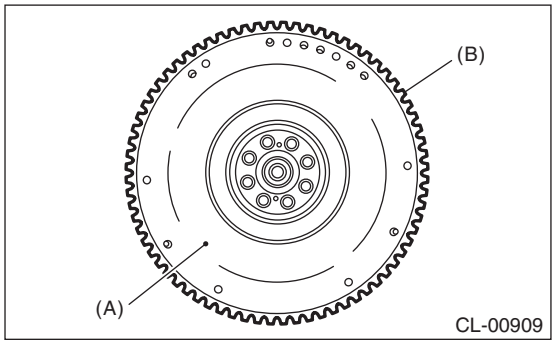
(2) While checking the tightening angle with the angle gauge, further tighten the flywheel mounting bolts.

Tightening angle:
30° — 35°

4) Install the clutch disc and cover. <Ref. to CL-10, INSTALLATION, Clutch Disc and Cover.>
5) Install the transmission assembly. <Ref. to 6MT-29, INSTALLATION, Manual Transmission Assembly.>

C: INSPECTION

CAUTION:
Because the center 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

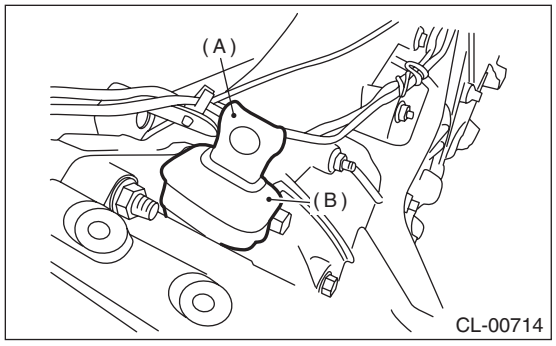
2) Smoothness of rotation
Rotate the ball bearing while applying pressure in the thrust direction.
3) If noise or excessive play is noted, replace the flywheel.

4. Release Bearing and Lever

A: REMOVAL

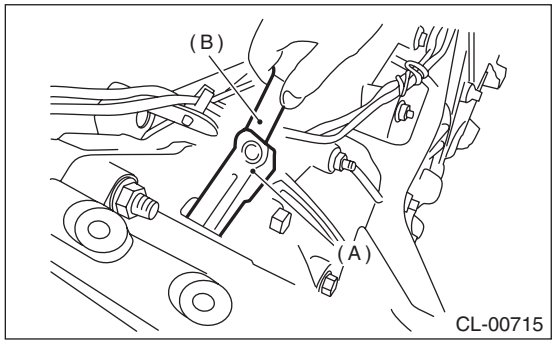
1) Remove the transmission assembly from the vehicle. <Ref. to 6MT-25, REMOVAL, Manual Transmission Assembly.>
2) Remove the two clips from the clutch release lever.

CAUTION:
Be careful not to deform the clips.
3) Remove the release bearing.
4) Remove the dust cover.



(A) Release lever
(B) Dust cover

5) Remove the lever spring from the pivot with a screwdriver by accessing it through the clutch housing release lever hole. Then remove the release lever.



(A) Release lever
(B) Screwdriver

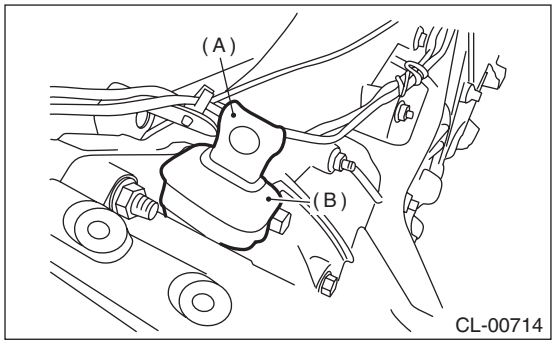
B: INSTALLATION

NOTE:
Apply the specified grease to lubricate to the following points before installation.
- Contact surface of lever and pivot
- Contact surface of lever and bearing
- Transmission main shaft spline
- Contact surface of release bearing and transmission case

Grease
NICHIMOLY N-130 or equivalent

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

NOTE:
Observing from the main case hole, check that the lever spring is installed securely.
2) Install the release bearing and fasten it with two clips.
3) Install the dust cover.



(A) Release lever
(B) Dust cover

4) Check the bearing for smooth movement by operating the release lever.
5) Apply grease to the contact point of the release lever and operating cylinder.

Grease
NICHIMOLY N-130 or equivalent

6) Install the transmission assembly. <Ref. to 6MT-29, INSTALLATION, Manual Transmission Assembly.>

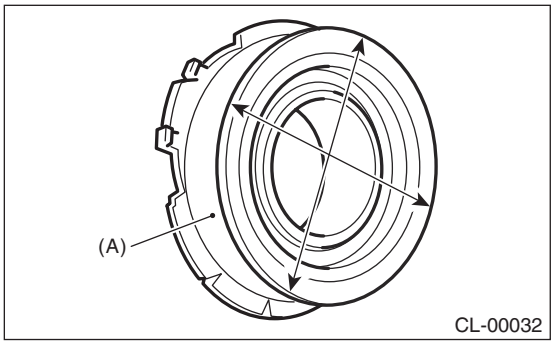
C: INSPECTION

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.

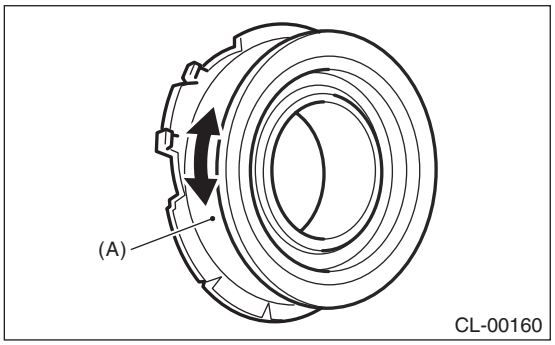
1) Check the bearing for smooth movement by applying force to the bearing in the radial direction.

Radial direction stroke:
1.6 mm (0.063 in)



(A) Bearing case

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

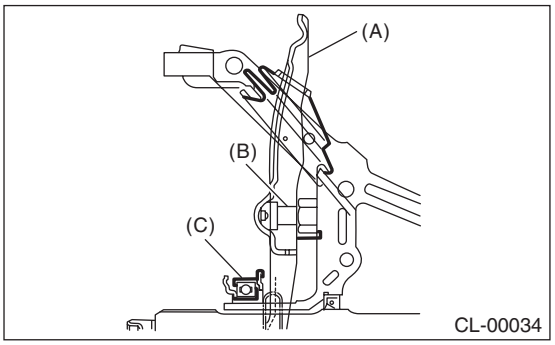


(A) Bearing case

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

2. RELEASE LEVER

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



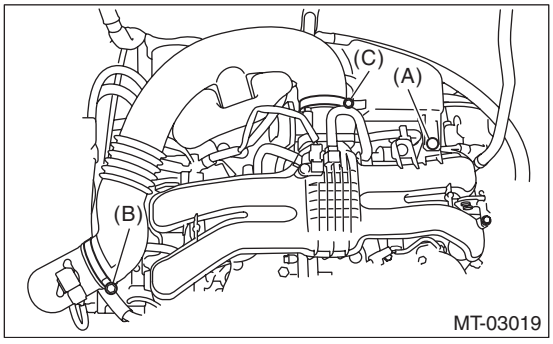
(A) Release lever
(B) Pivot
(C) Release bearing

5. Operating Cylinder

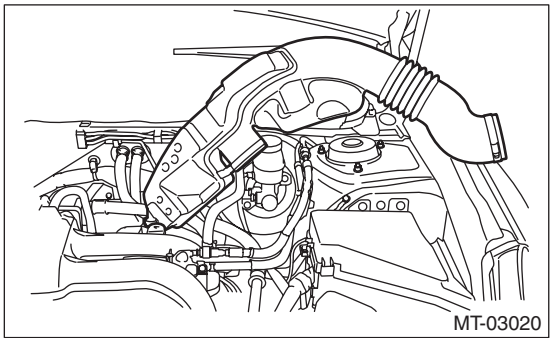
A: REMOVAL

CAUTION:
Clutch fluid spilled on the vehicle body will harm the paint surface; wash it off with water and wipe clean quickly if spilled.

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

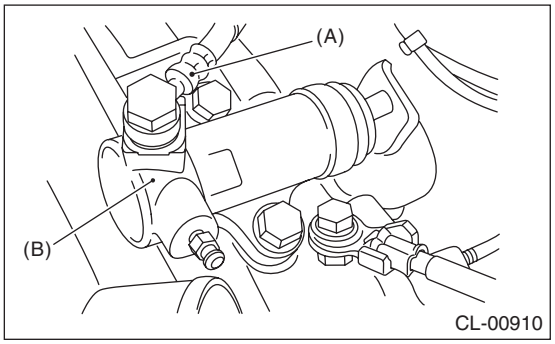


4) Remove the air intake boot from the throttle body, and move it to the left side wheel apron.



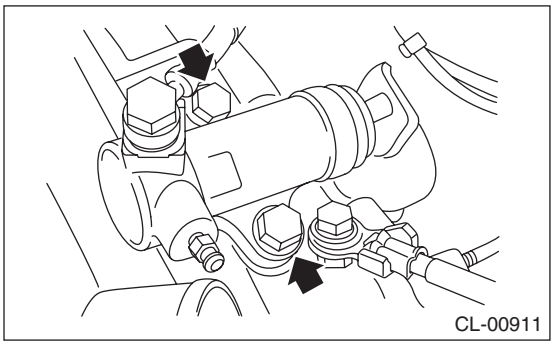
5) Disconnect the clutch hose from the operating cylinder.

CAUTION:
Cover the hose joint to prevent the clutch fluid from flowing out.



(A) Clutch hose
(B) Operating cylinder

6) Remove the operating cylinder from the transmission.



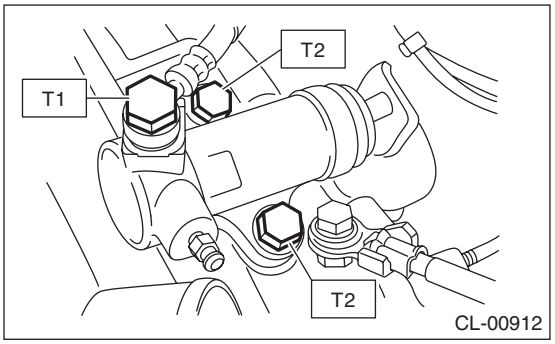
B: INSTALLATION

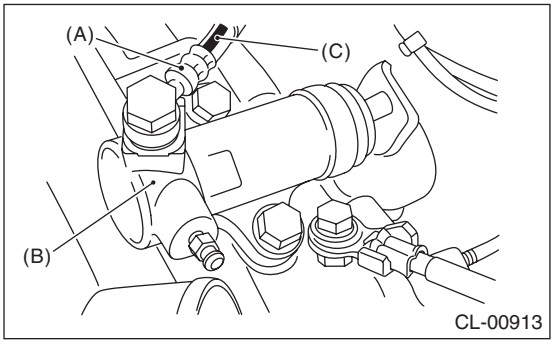
NOTE:
- Use a new gasket.
- Be sure to install the clutch hose with the mark side facing upward.
- Be careful not to twist the clutch hose during installation.
- Before installing the operating cylinder, apply grease to the contact point of the release lever and operating cylinder.

Grease
NICHIMOLY N-130 or equivalent

1) Install in the reverse order of removal.

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)





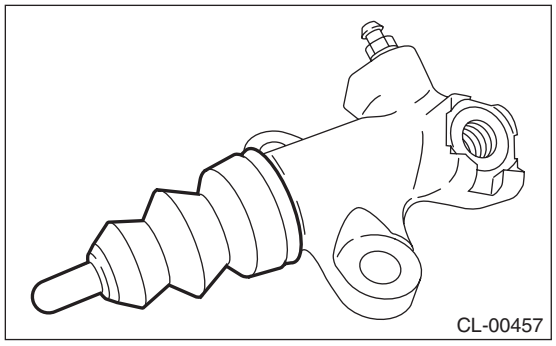
(A) Clutch hose
(B) Operating cylinder
(C) Mark

2) After bleeding air from the operating cylinder, ensure that the clutch operates properly. <Ref. to CL-24, PROCEDURE, Clutch Fluid Air Bleeding.>
3) When the operating cylinder has been replaced or removed, perform the clutch sensor calibration mode. <Ref. to PB(diag)-17, CLUTCH SENSOR CALIBRATION MODE, OPERATION, Subaru Select Monitor.>

NOTE:
If necessary, perform the clutch meet position setting. <Ref. to PB(diag)-18, CLUTCH ENGAGEMENT POSITION SETTING, OPERATION, Subaru Select Monitor.>

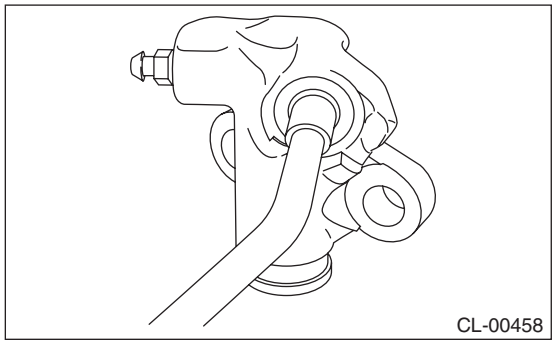
C: DISASSEMBLY

1) Remove the boot and push rod.

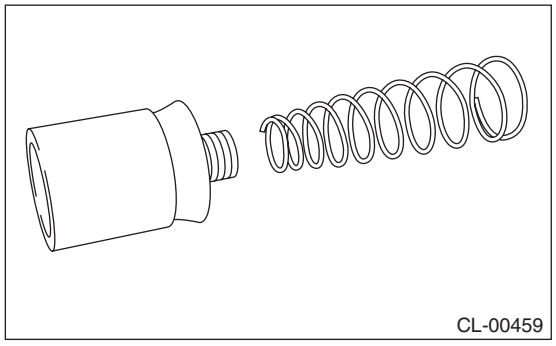


2) Apply compressed air through clutch hose attachment hole.

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



3) Separate the piston and piston spring.

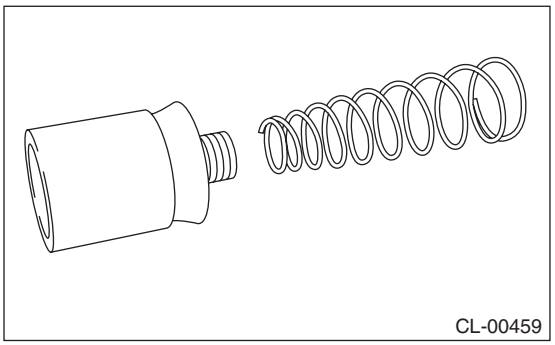


D: ASSEMBLY

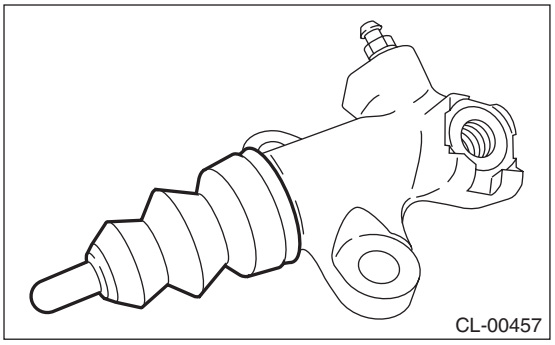
NOTE:
During assembly, apply hydraulic oil to all parts.

Recommended clutch fluid:
New FMVSS No. 116 DOT3

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.



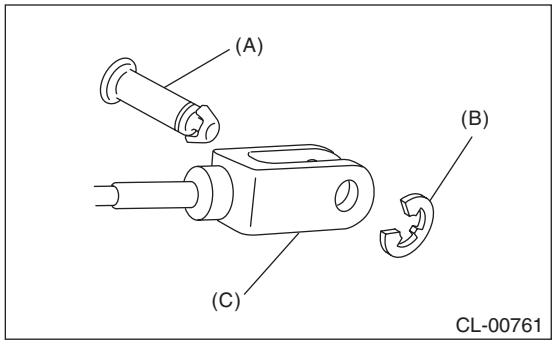
E: INSPECTION

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

6. Master Cylinder

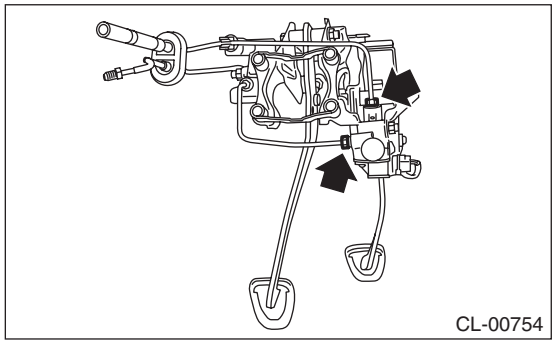
A: REMOVAL

1) Disconnect the ground cable from battery.
2) Thoroughly drain the clutch fluid from the reservoir tank.
3) Remove the instrument panel lower cover. <Ref. to EI-63, REMOVAL, Instrument Panel Lower Cover.>
4) Remove the pedal assembly. <Ref. to CL-25, REMOVAL, Clutch Pedal.>
5) Remove the clip and clevis pin, and then separate the push rod of the master cylinder from clutch pedal.

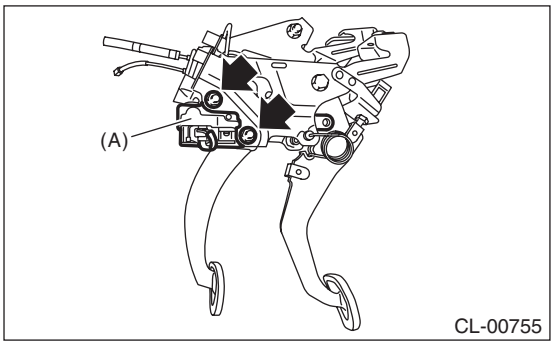


(A) Clevis pin
(B) Clip
(C) Push rod

6) Disconnect the clutch stroke sensor connector.
7) Remove the clutch pipe from the master cylinder.



8) Remove the master cylinder from the pedal bracket.

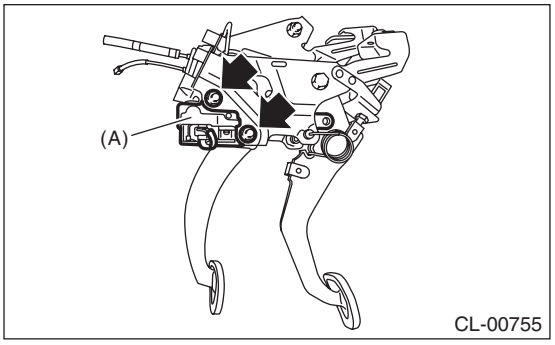


(A) Master cylinder

B: INSTALLATION

1) Install the master cylinder to the pedal assembly.

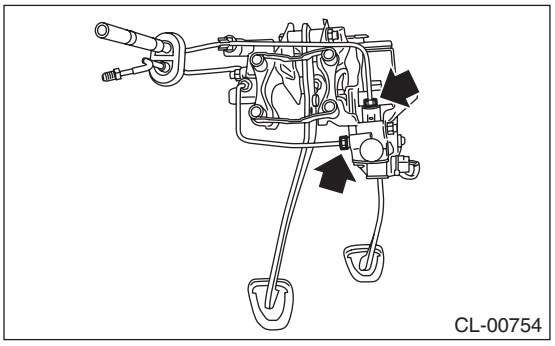
Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)



(A) Master cylinder

2) Connect the clutch pipes to the master cylinder.

Tightening torque:
15 N·m (1.5 kgf-m, 11.1 ft-lb)

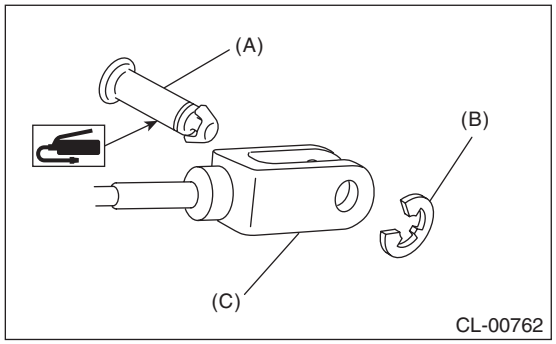


3) Connect the clutch stroke sensor connector.

4) Connect the push rod of the master cylinder to the clutch pedal, and install the clevis pin and clip.

CAUTION:
Always use a new clevis pin.

NOTE:
Apply grease to the clevis pin.



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

5) Install the pedal assembly. <Ref. to CL-26, INSTALLATION, Clutch Pedal.>
6) Install the instrument panel lower cover. <Ref. to EI-64, INSTALLATION, Instrument Panel Lower Cover.>
7) Connect the battery ground terminal.
8) Fill the recommended clutch fluid. <Ref. to CL-23, Clutch Fluid.>
9) After bleeding air from the clutch system, ensure that the clutch operates properly. <Ref. to CL-24, Clutch Fluid Air Bleeding.>
10) When the clutch master cylinder assembly has been replaced, perform the clutch sensor calibration mode. <Ref. to PB(diag)-17, CLUTCH SENSOR CALIBRATION MODE, OPERATION, Subaru Select Monitor.>

NOTE:
If necessary, perform the clutch meet position setting. <Ref. to PB(diag)-18, CLUTCH ENGAGEMENT POSITION SETTING, OPERATION, Subaru Select Monitor.>

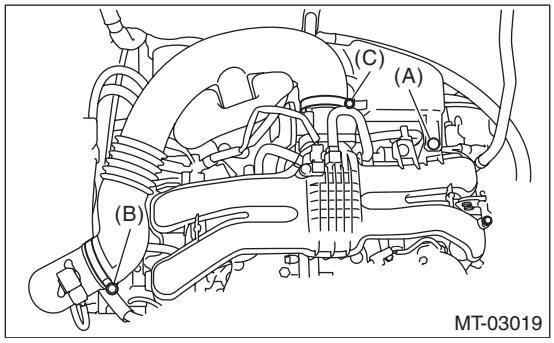
C: INSPECTION

If any damage, deformation, wear, swelling, rust or other faults are found on the master cylinder assembly, reservoir tank, clutch damper, clutch pipe and clutch hose, replace the faulty part.

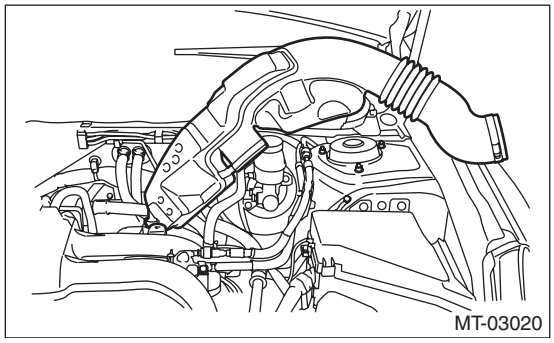
7. Clutch Pipe and Hose

A: REMOVAL

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

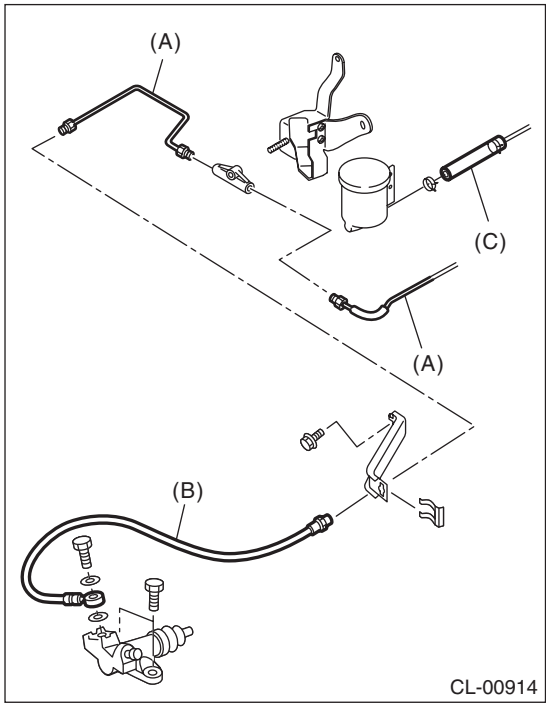


5) Remove the air intake boot from the throttle body, and move it to the left side wheel apron.



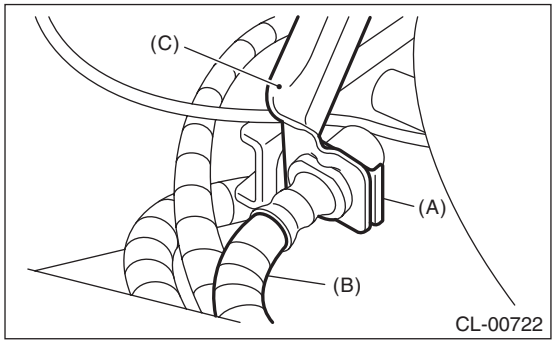
6) Thoroughly drain the clutch fluid from the reservoir tank.
7) Disconnect the clutch pipe from the clutch hose and connector. Disconnect the reservoir tank hose from the reservoir tank.

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



(A) Clutch pipe
(B) Clutch hose
(C) Reservoir tank hose

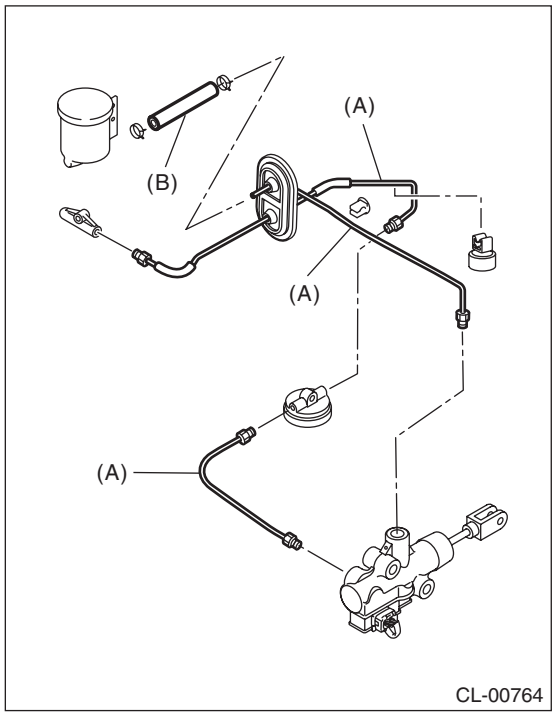
8) Pull out the clamp, then remove the clutch hose from the clutch bracket.



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

9) Disconnect the clutch hose from operating cylinder.
10) Remove the clutch bracket.

11) Remove the instrument panel lower cover. <Ref. to EI-63, REMOVAL, Instrument Panel Lower Cover.>
12) Remove the pedal assembly. <Ref. to CL-25, REMOVAL, Clutch Pedal.>
13) Remove the clutch pipe from the reservoir tank hose, mass damper, clutch damper, master cylinder and clutch pipe grommet.



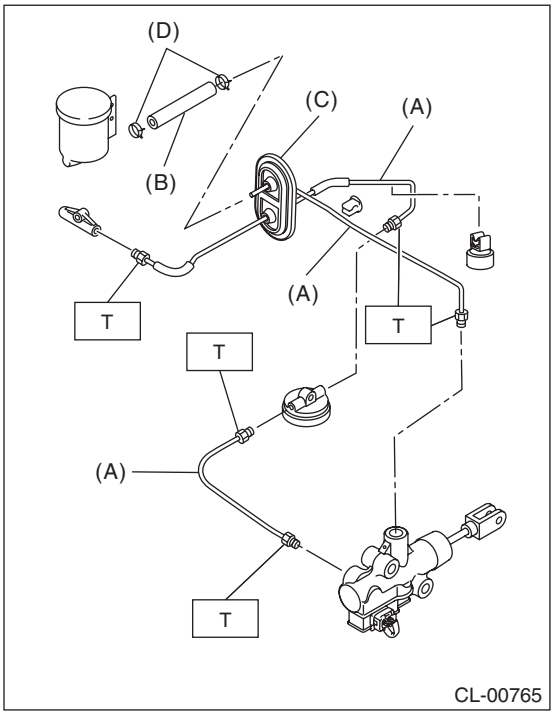
(A) Clutch pipe
(B) Reservoir tank hose

B: INSTALLATION

Install in the reverse order of removal.

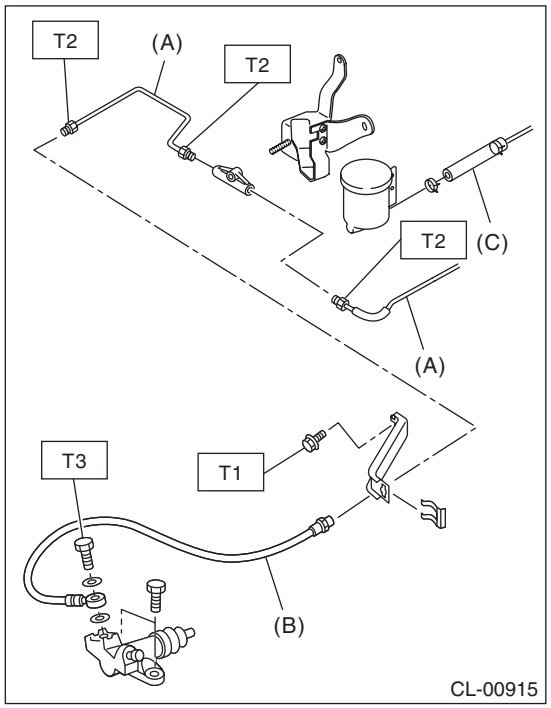
NOTE:
After bleeding air from the clutch fluid, ensure that the clutch operates properly. <Ref. to CL-24, Clutch Fluid Air Bleeding.>

Tightening torque:
T: 15 N·m (1.5 kgf-m, 11.1 ft-lb)



(A) Clutch pipe
(B) Reservoir tank hose
(C) Clutch pipe grommet
(D) Clamp

Tightening torque:
T1: 7.5 N·m (0.8 kgf-m, 5.5 ft-lb)
T2: 15 N·m (1.5 kgf-m, 11.1 ft-lb)
T3: 18 N·m (1.8 kgf-m, 13.3 ft-lb)



(A) Clutch pipe
(B) Clutch hose
(C) Reservoir tank hose

C: INSPECTION

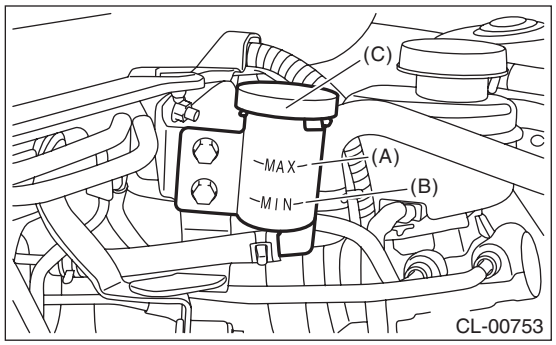
Check the clutch pipe, reservoir tank hose and clutch hose for crack, breaks or damage. Check the joint for clutch fluid leakage. If crack, breakage, damage or leakage is found, repair or replace the faulty clutch pipe, reservoir tank hose or clutch hose.

8. Clutch Fluid

A: 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 clutch fluid level using the scale on the outside of the reservoir tank. If the clutch fluid level is below “MIN”, fill the clutch fluid up to “MAX” level, and make sure that there is no leakage.



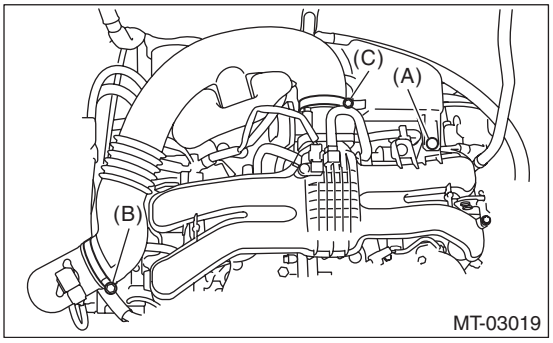
(A) MAX. level
(B) MIN. level
(C) Reservoir tank

B: REPLACEMENT

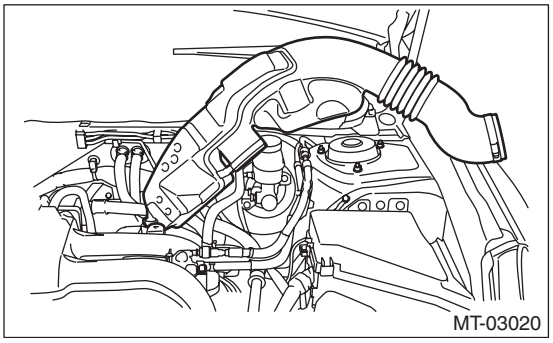
CAUTION:
• Be careful not to spill the brake fluid. Brake fluid spilled on the vehicle body will harm the paint surface; wash it off with water and wipe clean quickly if spilled.
• Use new FMVSS No. 116 DOT3.
• Cover the air breather with cloth to prevent clutch fluid from being splashed on surrounding parts when loosening the breather.
• Avoid mixing clutch 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 bleeding operation, keep the clutch reservoir tank filled with clutch 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 clutch fluid is approximately 70 mL (2.4 US fl oz, 2.5 Imp fl oz) for total clutch system.

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



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



5) Thoroughly drain the clutch fluid from the reservoir tank.
6) Refill the reservoir tank with recommended clutch fluid.

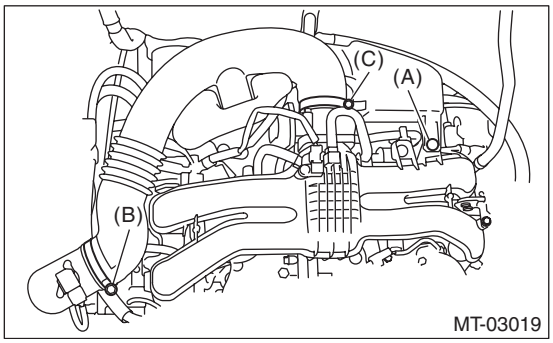
Recommended clutch fluid:
New FMVSS No. 116 DOT3

7) Bleed air from the clutch fluid. <Ref. to CL-24, Clutch Fluid Air Bleeding.>
8) Install the air intake boot assembly. <Ref. to IN(H4DO)-13, INSTALLATION, Air Intake Boot.>

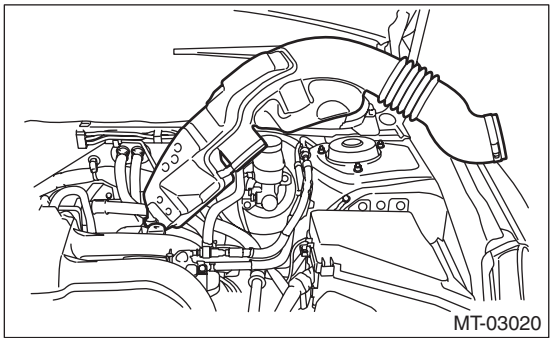
9. Clutch Fluid Air Bleeding

A: PROCEDURE

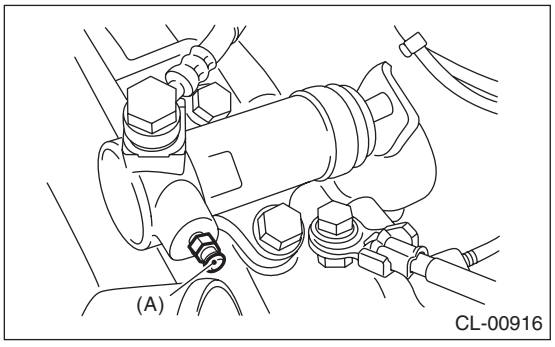
NOTE:
Bleed air from the oil line with help of a co-worker.
1) Remove the clip (A) from the air intake boot.
2) Loosen the clamp (B) connecting the air intake boot and air cleaner case (rear).
3) Loosen the clamp (C) which connects the air intake boot and throttle body.



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



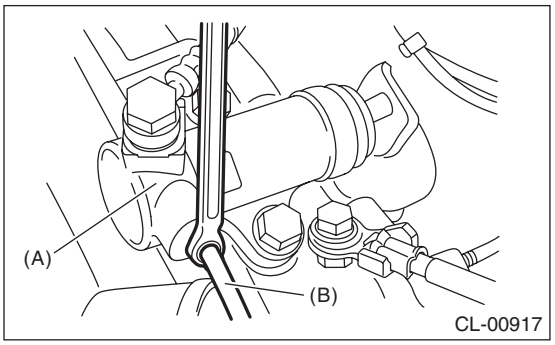
5) Fit one end of a vinyl tube into the air breather of the operating cylinder, and put the other end into a clutch fluid container.



(A) Air breather

6) Slowly depress the clutch pedal several times and keep it depressed. Open the air breather to discharge air together with the clutch fluid. Release the air breather for 1 or 2 seconds. Next, close the air breather, and slowly release the clutch pedal.

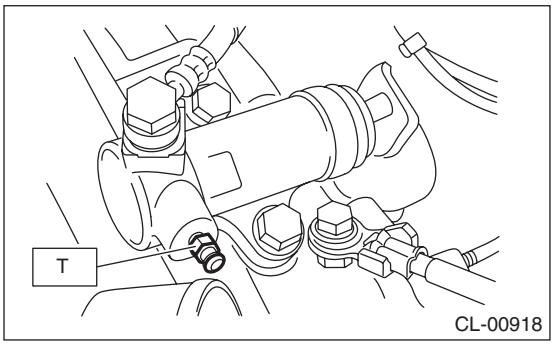
CAUTION:
Cover the air breather with cloth to prevent clutch fluid from being splashed on surrounding parts when loosening the breather.



(A) Operating cylinder
(B) Vinyl tube

7) Repeat procedure 6), until there are no more air bubbles appearing from the air breather.
8) Tighten the air breather.

Tightening torque:
T: 7.8 N·m (0.8 kgf-m, 5.8 ft-lb)

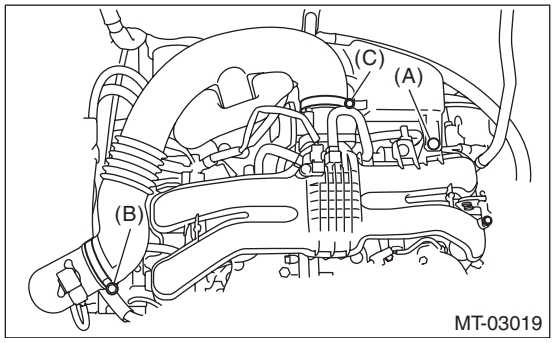


9) After stepping on the clutch pedal, make sure that there are no leaks evident in the entire clutch system.
10) After bleeding the air from clutch system, ensure that the clutch operates properly.
11) Install the air intake boot assembly. <Ref. to IN(H4DO)-13, INSTALLATION, Air Intake Boot.>

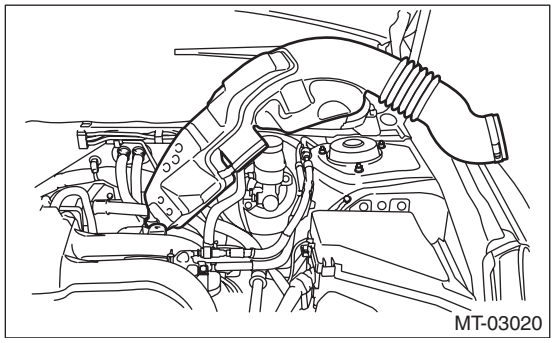
10.Clutch Pedal

A: REMOVAL

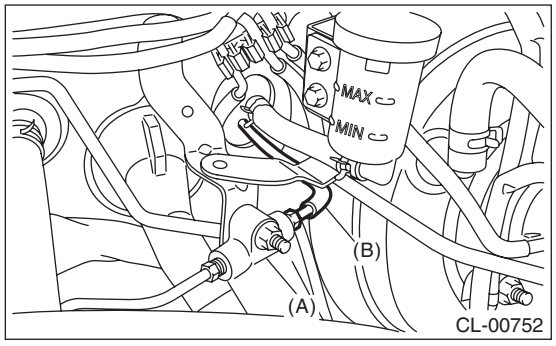
1) Disconnect the ground cable from battery.
2) Remove the clip (A) from the air intake boot.
3) Loosen the clamp (B) connecting the air intake boot and air cleaner case (rear).
4) Loosen the clamp (C) which connects the air intake boot and throttle body.



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

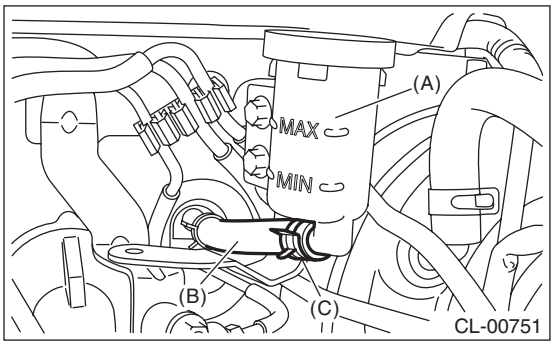


6) Drain the clutch fluid from the reservoir tank.
7) Disconnect the clutch pipe from the connector.



(A) Connector
(B) Clutch pipe

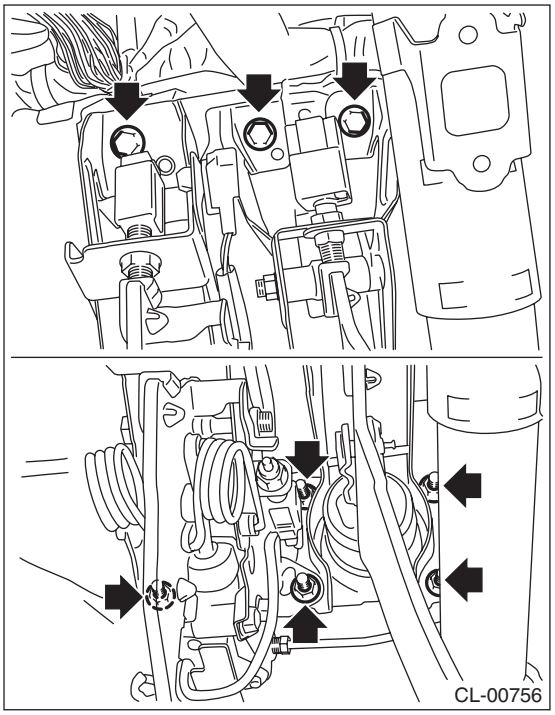
8) Disconnect the reservoir tank hose from the reservoir tank.



(A) Reservoir tank
(B) Reservoir tank hose
(C) Clamp

9) Remove the instrument panel lower cover. <Ref. to EI-63, REMOVAL, Instrument Panel Lower Cover.>
10) Remove the body integrated unit. <Ref. to SL-80, REMOVAL, Body Integrated Unit.>
11) Disconnect the connector from the clutch switch.
12) Disconnect the connector from the brake switch.
13) Remove the snap pin and clevis pin connecting the operating rod and brake pedal.
14) Remove the pedal assembly.

NOTE:
Place vinyl, etc. in order not to drop the clutch fluid to the floor carpet.



B: INSTALLATION

1) Install in the reverse order of removal.

CAUTION:
Always use a new clevis pin.

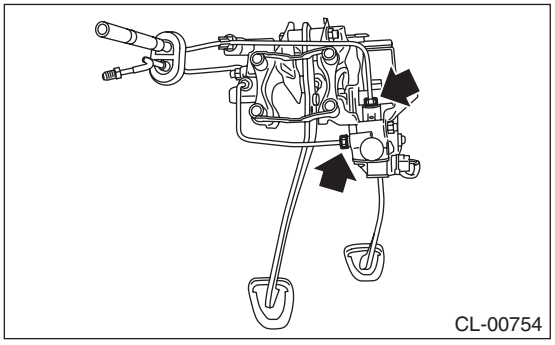
Tightening torque:
T: 18 N·m (1.8 kgf-m, 13.3 ft-lb)

2) Fill the recommended clutch fluid. <Ref. to CL-23, Clutch Fluid.>
3) Bleed air from the clutch system. <Ref. to CL-24, PROCEDURE, Clutch Fluid Air Bleeding.>
4) Adjust the clutch pedal. <Ref. to CL-28, ADJUSTMENT, Clutch Pedal.>
5) When the clutch pedal has been replaced, perform the clutch sensor calibration mode. <Ref. to PB(diag)-17, CLUTCH SENSOR CALIBRATION MODE, OPERATION, Subaru Select Monitor.>

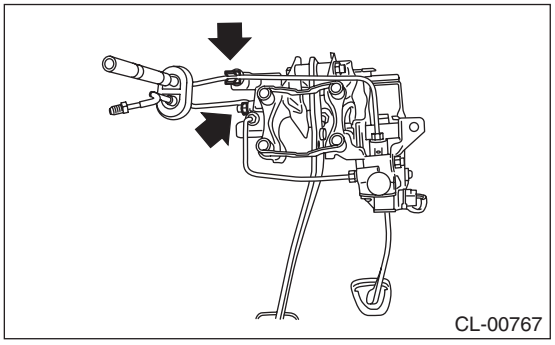
NOTE:
If necessary, perform the clutch meet position setting. <Ref. to PB(diag)-18, CLUTCH ENGAGEMENT POSITION SETTING, OPERATION, Subaru Select Monitor.>

C: DISASSEMBLY

1) Disconnect the clutch pipe from the master cylinder.

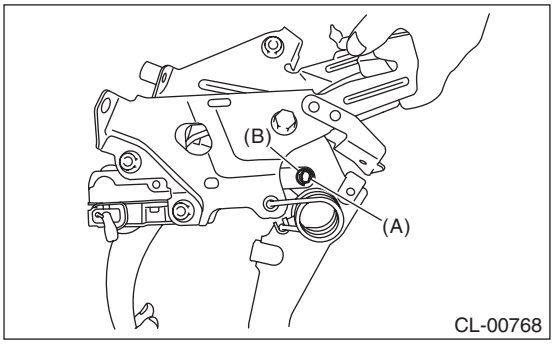


2) Remove the clutch damper mounting nut from the pedal assembly, and disconnect the clutch pipe from the clamp.



3) Remove the clutch switches.

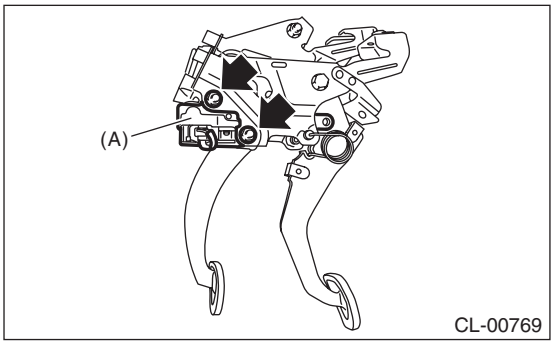
4) Remove the clip and pull out the clevis pin.



(A) Clevis pin
(B) Clip

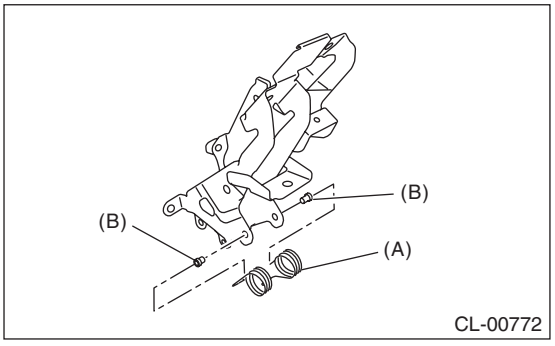
5) Disconnect the connector from the clutch stroke sensor, and then remove the sensor harness.
6) Remove the master cylinder from the pedal assembly.

NOTE:
Secure the push rod with a tape etc. to prevent it from falling off.



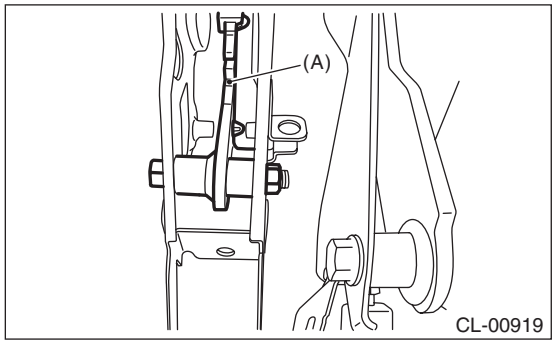
(A) Master cylinder

7) Remove the torsion spring and assist bushing from the pedal assembly.



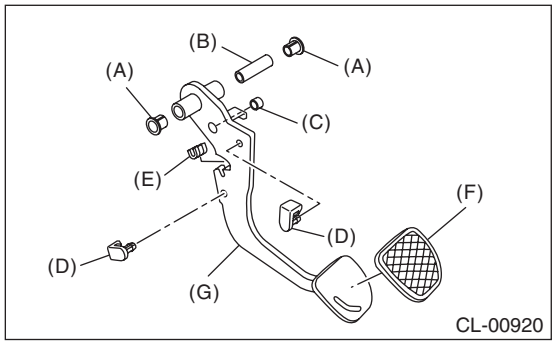
(A) Torsion spring
(B) Assist bushing

8) Remove the clutch pedal from the pedal bracket.



(A) Clutch pedal

9) Remove the bushing, spacer, bushing A, stopper, torsion spring bushing and clutch pedal pad from the clutch pedal.



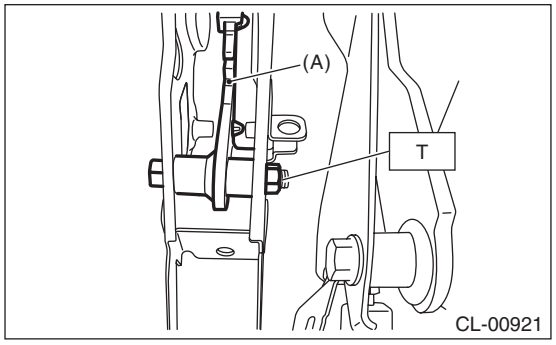
(A) Bushing
(B) Spacer
(C) Bushing A
(D) Stopper
(E) Torsion spring bushing
(F) Clutch pedal pad
(G) Clutch pedal

D: ASSEMBLY

1) Clean the holes in the sliding surface between the clutch pedal and pedal bushing, and apply grease.
2) Attach the pedal pad, stopper, bushing A, torsion spring bushing, spacer and bushing to the clutch pedal.

NOTE:
Before installing the spacer, clean the inside of the pedal bushings and apply grease.
3) Attach the clutch pedal to the pedal bracket.

Tightening torque:
T: 30 N·m (3.1 kgf-m, 22.1 ft-lb)



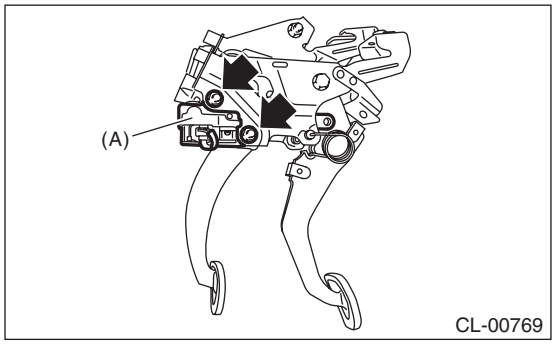
(A) Clutch pedal

4) Install the assist bushing and torsion spring to the pedal assembly.

NOTE:
Before installing the torsion spring, apply grease to the assist bushing and torsion spring bushing.
5) Install the master cylinder to the pedal assembly.

NOTE:
Secure the push rod with a tape etc. to prevent it from falling off.

Tightening torque:
T: 18 N·m (1.8 kgf-m, 13.3 ft-lb)

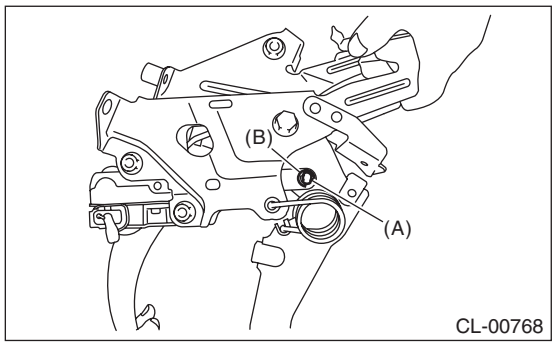


(A) Master cylinder

6) Secure the clevis pin with mounting clip.

CAUTION:
Always use a new clevis pin.

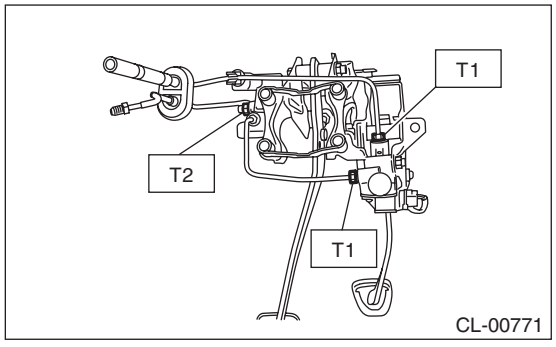
NOTE:
Before installing the clevis pin, apply grease.



(A) Clevis pin
(B) Clip

7) Attach the sensor harness, and connect the connector to the clutch stroke sensor.
8) Install the clutch switch.
9) Install the clutch damper to the pedal assembly, and connect the clutch pipe to the master cylinder.

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)



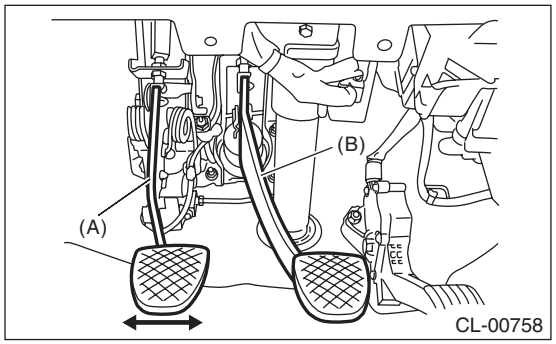
E: INSPECTION

1. CLUTCH PEDAL

Move the clutch pedal 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 with a new clutch pedal assembly.

Deflection of the clutch pedal:
Service limit
4.0 mm (0.157 in) or less



(A) Clutch pedal
(B) Brake pedal

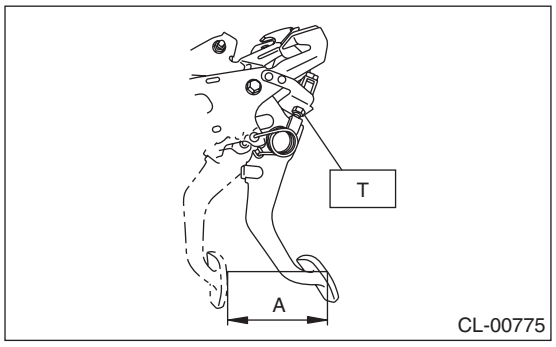
F: ADJUSTMENT

1) If the full stroke of the clutch pedal is not within the specified value, loosen the lock nuts of the clutch switch and adjust the full stroke of the clutch pedal with the clutch switch.

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

Clutch pedal full stroke A:
130 — 135 mm (5.12 — 5.31 in)

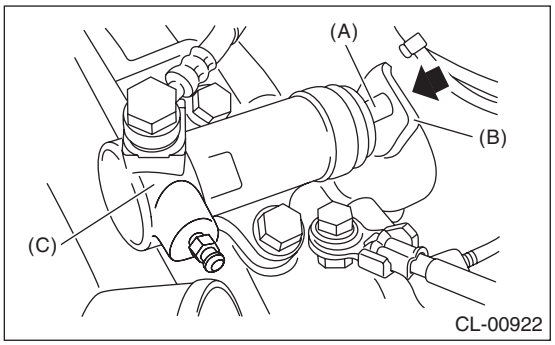
Tightening torque:
T: 8 N·m (0.8 kgf-m, 5.9 ft-lb)



2) 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 CL-24, Clutch Fluid Air Bleeding.>
3) Measure the clutch pedal full stroke length again to ensure that it is within specifications. If it is not within specifications, repeat adjustment procedures again from the beginning.

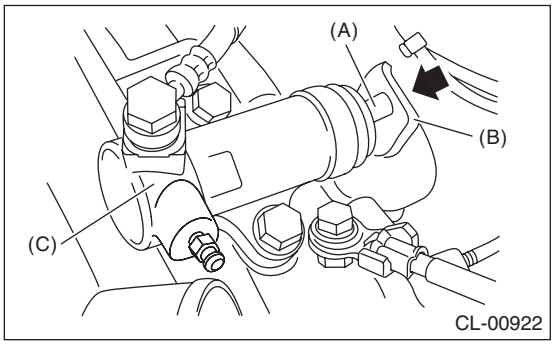
Clutch pedal full stroke:
130 — 135 mm (5.12 — 5.31 in)

4) Push the release lever until the operating cylinder push rod retracts. Make sure that the clutch fluid level in the reservoir tank increases. If the clutch fluid level increases, the hydraulic clutch is properly adjusted. If the clutch fluid level does not increase or the push rod does not retract, replace the master cylinder with a new part. <Ref. to CL-18, Master Cylinder.>



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

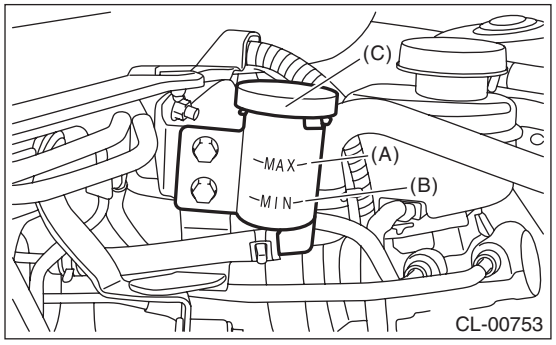
5) Push the release lever until the operating cylinder push rod retracts. Check that the clutch fluid level in the reservoir tank increases.



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

6) If the clutch fluid level increases, hydraulic clutch play is correct.
7) If the clutch fluid level does not increase or push rod does not retract, readjust the clutch pedal.
8) Check the clutch fluid level using the scale on the outside of the reservoir tank. If the clutch fluid level is below “MIN”, fill the clutch fluid up to “MAX” level.

Recommended clutch fluid:
New FMVSS No. 116 DOT3



(A) MAX. level
(B) MIN. level
(C) Reservoir tank

11.Clutch Switch

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the instrument panel lower cover. <Ref. to EI-63, REMOVAL, Instrument Panel Lower Cover.>
3) Disconnect the connector from clutch switch.
4) Remove the clutch switches.

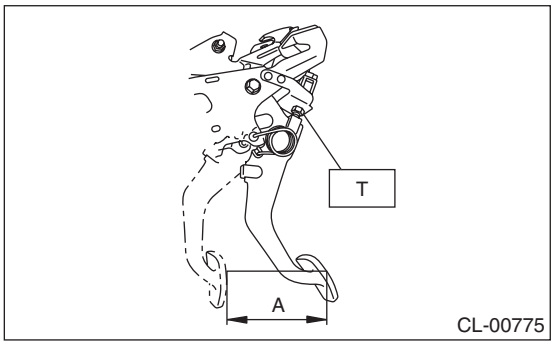
B: INSTALLATION

1. CLUTCH SWITCH

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

Clutch pedal full stroke A:
130 — 135 mm (5.12 — 5.31 in)

Tightening torque:
T: 8 N·m (0.8 kgf-m, 5.9 ft-lb)

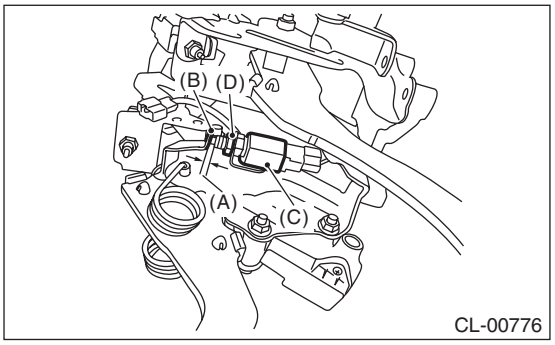


2) If the clutch pedal stroke is out of specification, adjust the stroke. <Ref. to CL-28, ADJUSTMENT, Clutch Pedal.>
3) Connect the connector to the clutch switch.

2. CLUTCH START SWITCH

1) Fully depress the clutch pedal and hold it.
2) Install so that gap (A) of the clutch pedal plate and clutch start switch is 2.9 mm (0.11 in), and tighten the lock nut.

Tightening torque:
8 N·m (0.8 kgf-m, 5.9 ft-lb)



(A) 2.9 mm (0.11 in)
(B) Clutch pedal plate
(C) Clutch start switch
(D) Lock nut

3) Connect the connector to the clutch start switch.
4) Make sure that engine does not start with clutch pedal not depressed.
5) Make sure that engine starts with clutch pedal fully depressed.

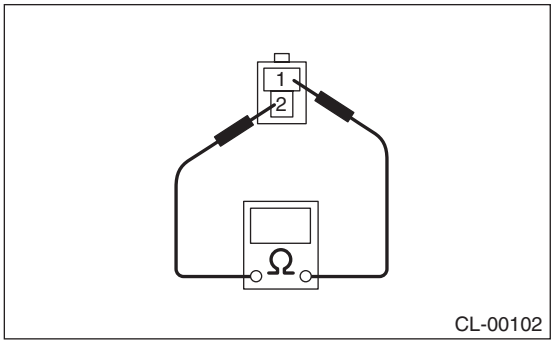
C: INSPECTION

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 CL-32, ADJUSTMENT, Clutch Switch.>
• Make sure that engine does not start with clutch pedal not depressed.
• Make sure that engine starts with clutch pedal fully depressed.

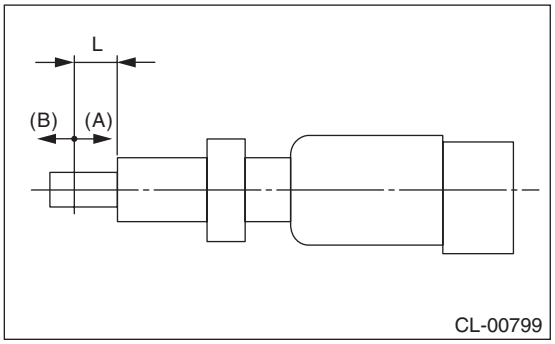
2) When the clutch start switch does not operate normally even if it is adjusted, check the clutch start switch for continuity.
(1) Remove the clutch start switch. <Ref. to CL-30, REMOVAL, Clutch Switch.>
(2) Measure the resistance between terminal 1 and 2 of the switch. If the resistance is not at the 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:
4 — 5.5 mm (0.16 — 0.22 in)

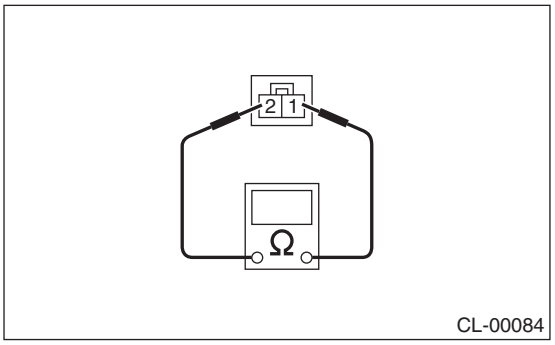


(A) ON
(B) OFF

2. CLUTCH SWITCH

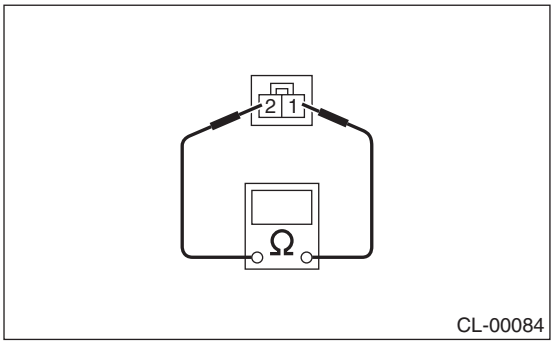
1) Check the clutch switch for continuity.
(1) Disconnect the connector of clutch switch.
(2) Measure the resistance between terminal 1 and 2 of the switch. If the resistance is not within the specification, check the clutch stroke and installation condition, and check the clutch switch again.

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



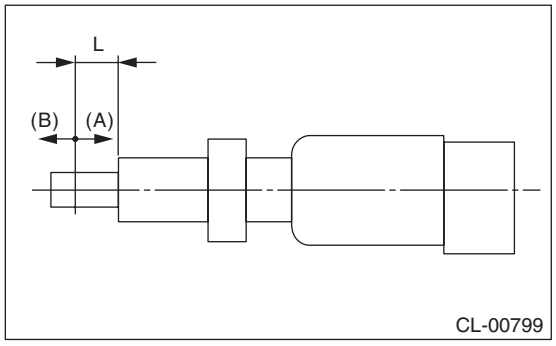
2) When the clutch switch does not operate normally even if the clutch stroke and installation condition are normal, check the clutch switch for continuity.
(1) Remove the clutch switches. <Ref. to CL-30, REMOVAL, Clutch Switch.>
(2) Measure the resistance between terminal 1 and 2 of the switch. If the 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.

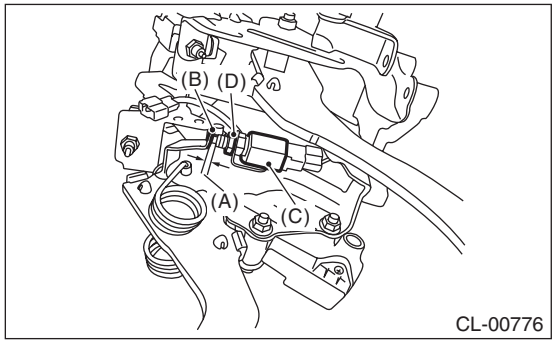
Dimension L:
5 — 6.5 mm (0.2 — 0.26 in)



(A) ON
(B) OFF

D: ADJUSTMENT

1) Loosen the lock nut of the clutch start switch.
2) Fully depress the clutch pedal and hold it.
3) Adjust the gap (A) of the clutch pedal plate and the clutch start switch to be 2.9 mm (0.11 in).



(A) 2.9 mm (0.11 in)
(B) Clutch pedal plate
(C) Clutch start switch
(D) Lock nut

4) Tighten the lock nut.

Tightening torque:
8 N·m (0.8 kgf-m, 5.9 ft-lb)

12.General Diagnostic Table

A: 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 speeds up when 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 defective synchronization mechanism, perform the following tests. • Method of testing: <Ref. to CL-34, DIAGNOSTIC DIAGRAM OF CLUTCH DRAG, INSPECTION, General Diagnostic Table.> The problem is caused by insufficient disengagement of the clutch if an abnormal noise occurs during this test.	(a) Worn or rusty clutch disc hub spline	Replace the clutch disc.
	(b) Excessive deflection of clutch disc face	Repair or replace.
	(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.
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.

Symptoms	Possible cause	Corrective action
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.
	(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 play	Adjust the pedal play.
Excessive wear and damage of pedal shaft or busing	Replace the busing or shaft with a new part.

3. DIAGNOSTIC DIAGRAM OF CLUTCH DRAG

	Step	Check	Yes	No
1	**CHECK GEAR NOISE.** 1) Start the engine. 2) While idling the engine, step on the clutch pedal and quickly shift from neutral to reverse.	Is there any abnormal noise from the transmission gear?	Go to step **2**.	Clutch is normal.
2	**CHECK GEAR NOISE.** Step on the clutch pedal at idle and shift from neutral to reverse within 0.5 — 1.0 second.	Is there any abnormal noise from the transmission gear?	Go to step **3**.	Defective transmission or excessive clutch drag torque. Inspect pilot bearing, clutch disc, transmission and clutch disc hub spline.
3	**CHECK GEAR NOISE.** 1) Step on the clutch pedal at idle and shift from neutral to reverse within 0.5 — 1.0 second. 2) While stepping on the clutch pedal, shift from neutral to reverse, reverse to neutral several times.	Is there any abnormal noise from the transmission gear?	Inadequate clutch disengage. Inspect the clutch disc, clutch cover, clutch release, and clutch pedal free play.	Clutch and flywheel seizure. Inspect the clutch disc and the spline of the clutch disc hub.

CHASSIS SECTION

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FRONT SUSPENSION	FS
REAR SUSPENSION	RS
WHEEL AND TIRE SYSTEM	WT
TIRE PRESSURE MONITORING SYSTEM (DIAGNOSTICS)	TPM(diag)
DIFFERENTIALS	DI
TRANSFER CASE	TC
DRIVE SHAFT SYSTEM	DS
VEHICLE DYNAMICS CONTROL (VDC)	VDC
VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)	VDC(diag)
BRAKE	BR
PARKING BRAKE	PB
PARKING BRAKE (DIAGNOSTICS)	PB(diag)
POWER ASSISTED SYSTEM (POWER STEERING)	PS

FRONT SUSPENSION

FS

Page

1. General Description 2
2. Wheel Alignment 9
3. Cradle 20
4. Front Stabilizer 29
5. Front Ball Joint 32
6. Front Arm 35
7. Front Strut 42
8. General Diagnostic Table 47

1. General Description

A: SPECIFICATION

1. TORQUE CONVERTER

Model	DOHC non-turbo
Type	Symmetric, 3-element, single stage, 2-phase torque converter
Stall torque ratio	2.07
Nominal mm (in)	236 (9.29)
Stall speed (at sea level)	2,000 — 2,700 (D range) 1,900 — 2,600 (R range)
One-way clutch	Sprag type one-way clutch

2. OIL PUMP

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

3. TRANSMISSION CONTROL ELEMENT

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

4. TRANSMISSION GEAR RATIO

Forward	3.581 — 0.570
Rev	3.667

5. PLATE

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

6. SELECTOR POSITION

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

7. HYDRAULIC CONTROL AND LUBRICATION

Type	Electronic hydraulic control (Gear ratio is changed by signals of vehicle speed and accelerator opening angle.)
Fluid	Specified fluid: SUBARU CVT OIL FOR LINEARTRONIC **CAUTION:** **Always use specified CVTF. Using other fluid will cause malfunction.**
Fluid capacity L (US qt, Imp qt)	12.19 — 12.69 (12.9 — 13.4, 10.7 — 11.2)
Lubrication system	Forced feed lubrication with oil pump

8. COOLING AND HARNESS

Cooling system	Liquid-cooler incorporated in radiator
Inhibitor switch harness	16 poles
Transmission harness	12 poles

9. TRANSFER

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

10.REDUCTION GEAR RATIO

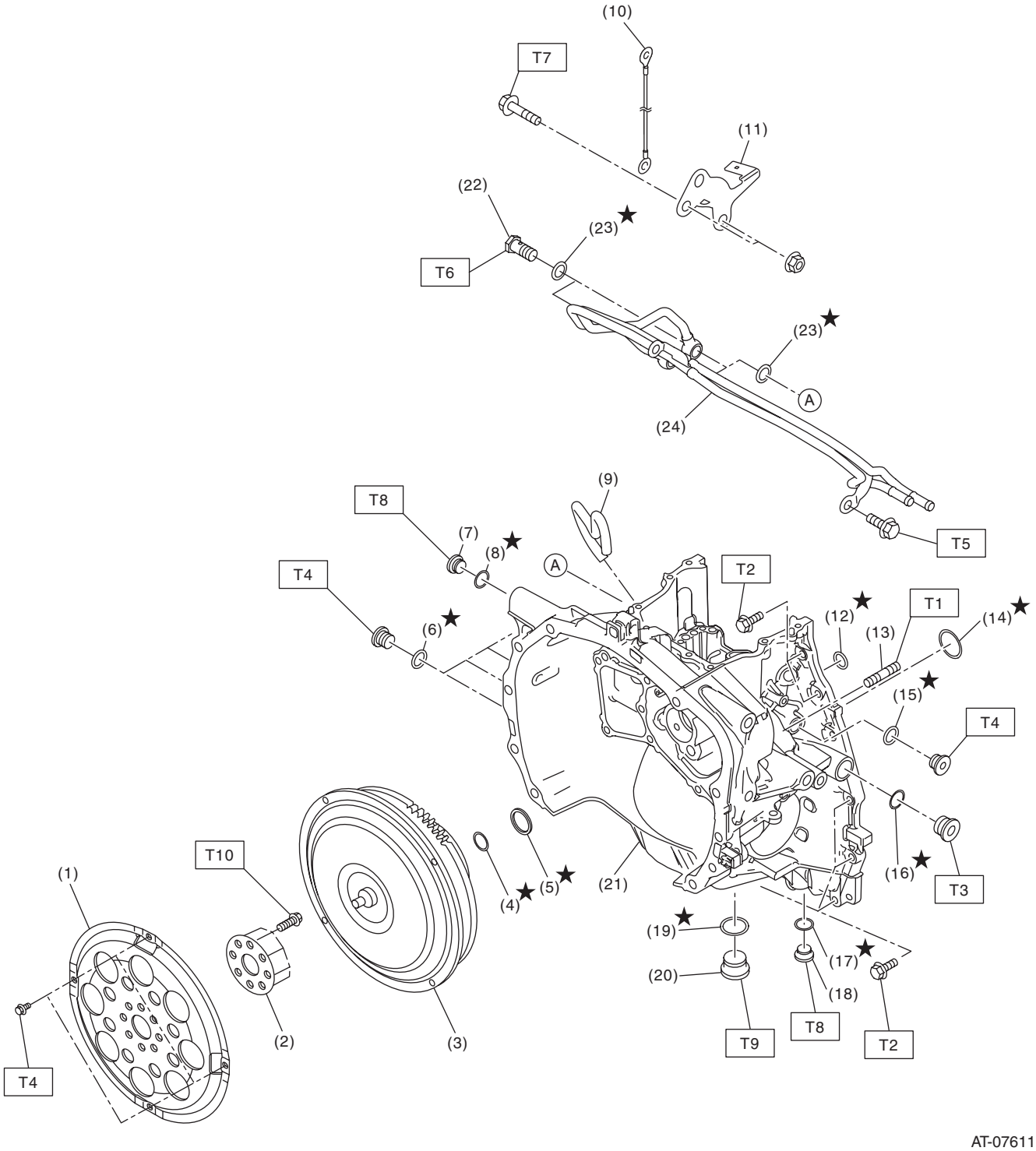
	Except for OUTBACK	OUTBACK
Front final reduction gear ratio	3.700	3.900

11.RECOMMENDED GEAR OIL

Lubrication oil	GL-5 (75W-85)
Front differential oil capacity L (US qt, Imp qt)	1.3 — 1.4 (1.4 — 1.5, 1.1 — 1.2)

B: COMPONENT

1. TORQUE CONVERTER ASSEMBLY AND CONVERTER CASE

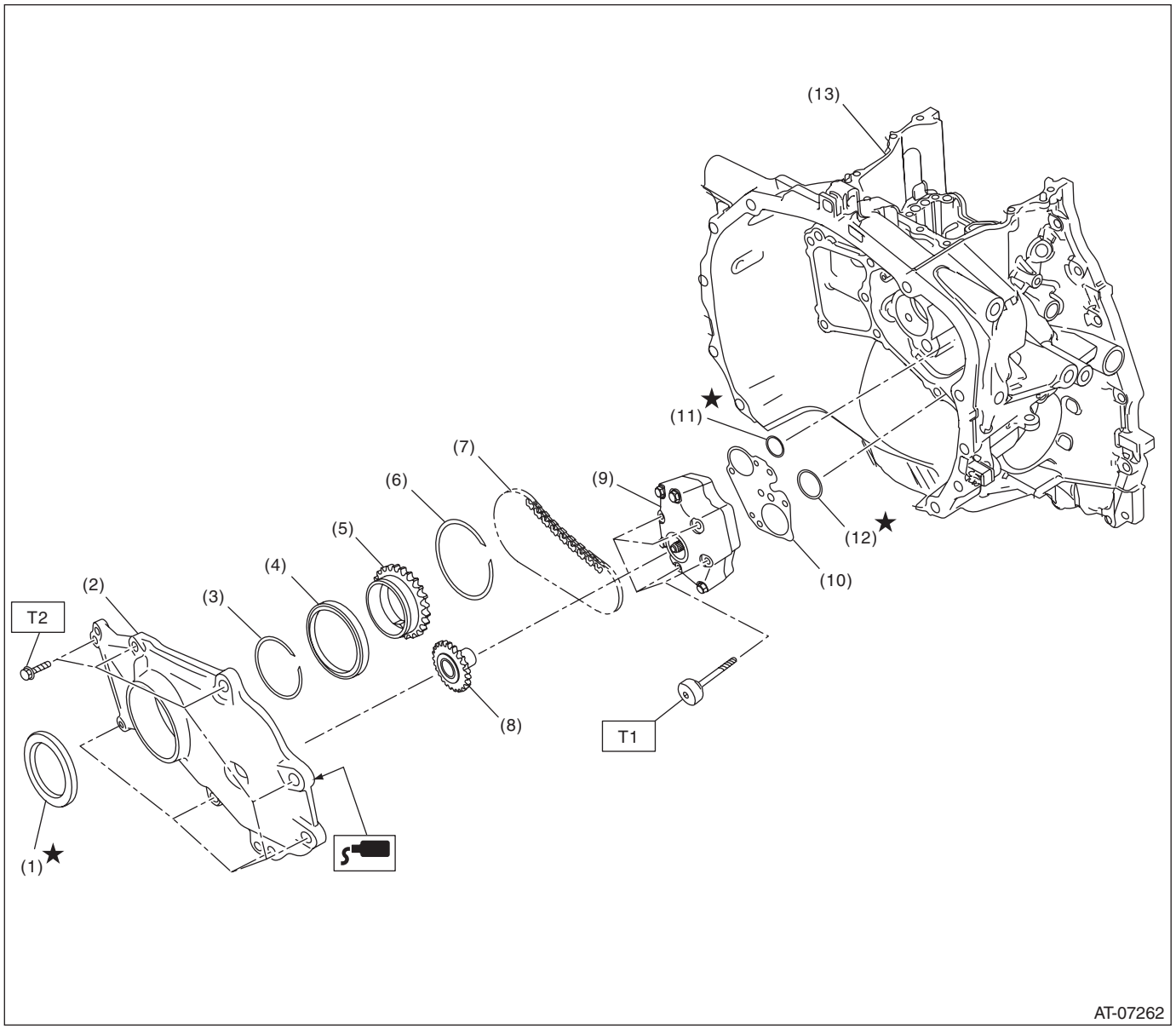


AT-07611

(1)	Drive plate	(13)	Stud bolt
(2)	Reinforcement drive plate	(14)	O-ring
(3)	Torque converter ASSY	(15)	O-ring
(4)	O-ring	(16)	O-ring
(5)	Seal ring	(17)	Gasket
(6)	O-ring	(18)	Overflow drain plug
(7)	Front differential gear oil filler plug	(19)	Gasket
(8)	O-ring	(20)	Front differential gear oil drain plug
(9)	Air breather hose	(21)	Converter case
(10)	Transmission radio ground cord	(22)	Union screw
(11)	Transmission hanger	(23)	Gasket
(12)	O-ring	(24)	CVTF cooler pipe COMPL

Tightening torque: N·m (kgf-m, ft-lb)	
T1:	***18 (1.8, 13.3)***
T2:	***22 (2.2, 16.2)***
T3:	***22.5 (2.3, 16.6)***
T4:	***25 (2.5, 18.4)***
T5:	***35 (3.6, 25.8)***
T6:	***40 (4.1, 29.5)***
T7:	***41 (4.2, 30.2)***
T8:	***50 (5.1, 36.9)***
T9:	***70 (7.1, 51.6)***
T10:	***<Ref. to CVT-157, INSTALLATION, Drive Plate.>***

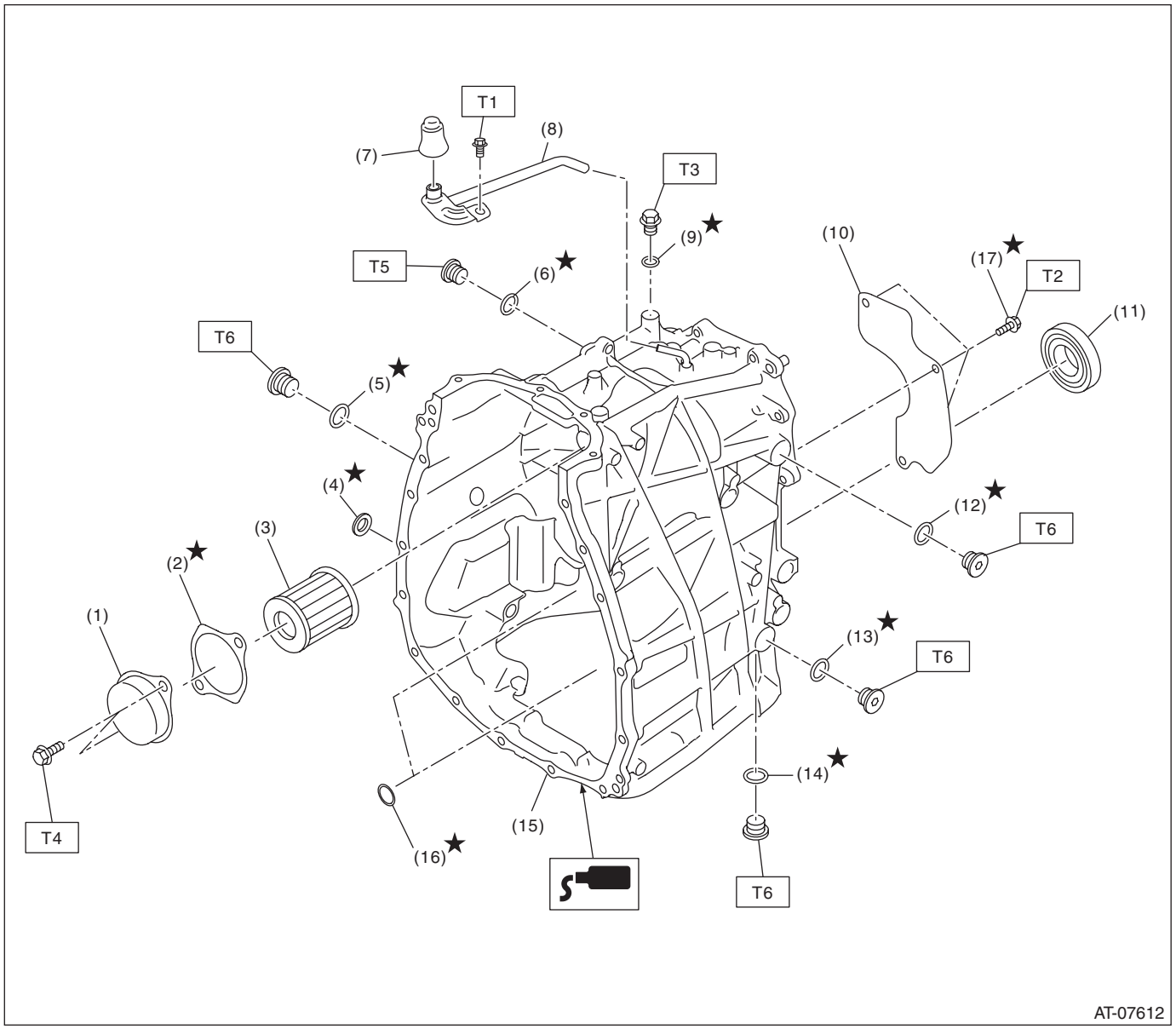
2. OIL PUMP ASSY



(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) Oil pump ASSY
(10) Plate
(11) O-ring (small)
(12) O-ring (large)
(13) Converter case

Tightening torque: N·m (kgf-m, ft-lb)
T1: 8.5 (0.9, 6.3)
T2: 21 (2.1, 15.5)

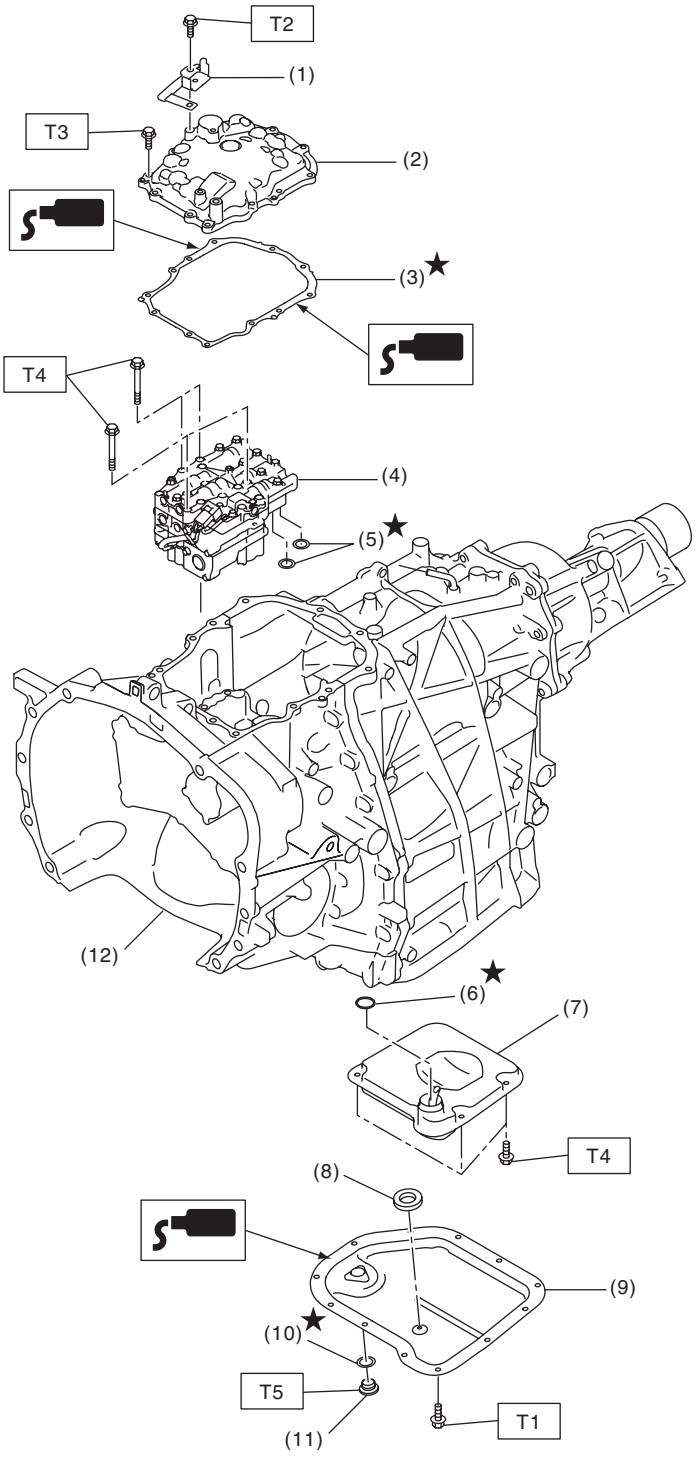
3. TRANSMISSION CASE



(1)	CVTF filter cover	(10)	Oil stopper plate
(2)	Gasket	(11)	Ball bearing
(3)	CVTF filter	(12)	O-ring
(4)	Oil seal	(13)	Gasket
(5)	Gasket	(14)	O-ring
(6)	O-ring	(15)	Transmission case
(7)	Air breather cap	(16)	Seal ring
(8)	Air breather hose ASSY	(17)	Micro-encapsulated bolt
(9)	O-ring		

Tightening torque: N·m (kgf-m, ft-lb)
T1: 5 (0.5, 3.7)
T2: 9 (0.9, 6.6)
T3: 13 (1.3, 9.6)
T4: 17 (1.7, 12.5)
T5: 25 (2.5, 18.4)
T6: 50 (5.1, 25.8)

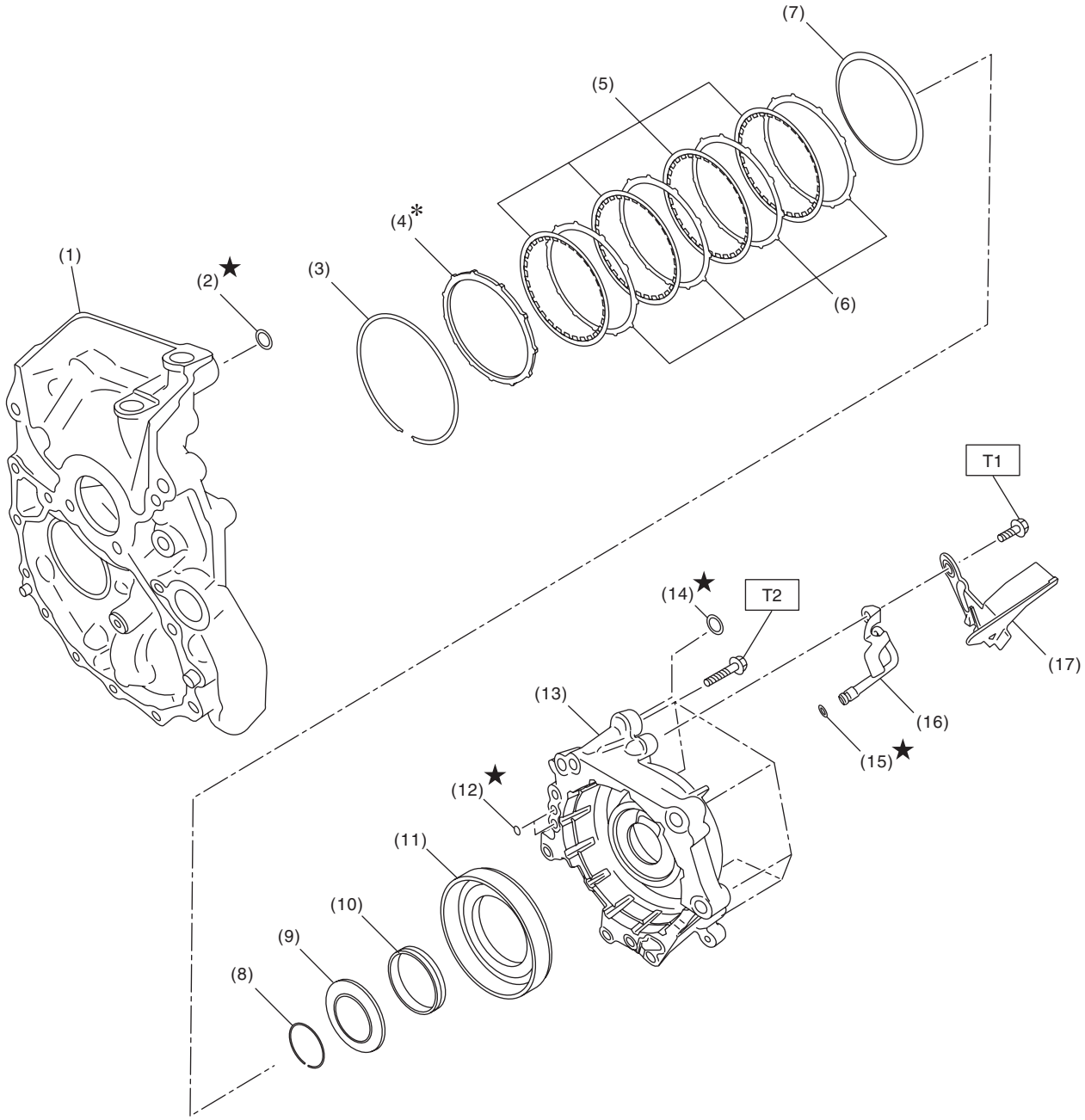
4. CONTROL VALVE BODY



AT-08199

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

5. REVERSE BRAKE ASSEMBLY

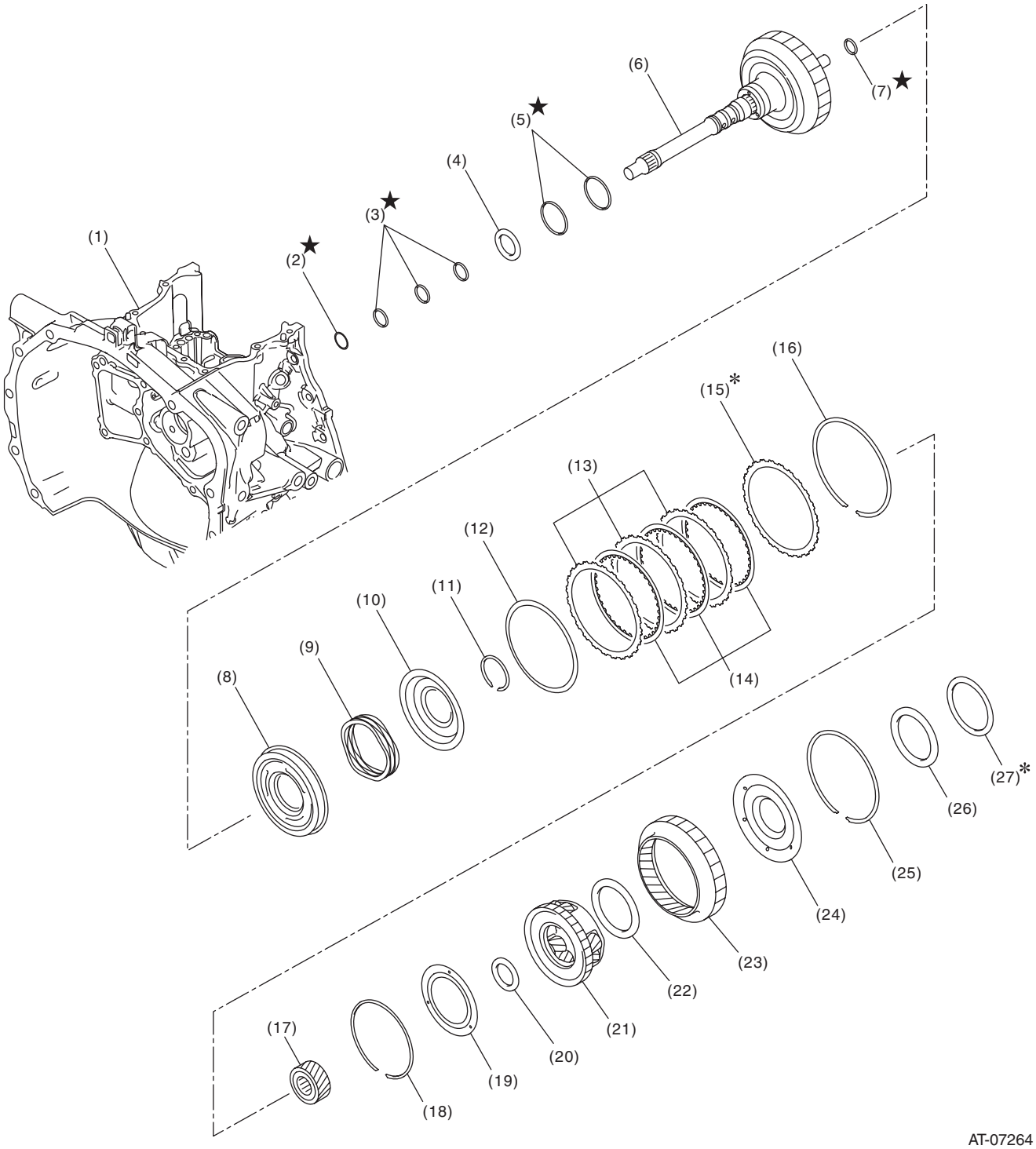


AT-07555

(1) Drive pinion retainer
(2) O-ring
(3) Snap ring
(4) Retaining plate
(5) Drive plate
(6) Driven plate
(7) Dish plate
(8) Snap ring
(9) Spring retainer
(10) Return spring
(11) Reverse brake piston
(12) O-ring
(13) Reverse brake housing
(14) O-ring
(15) O-ring
(16) Lubrication pipe
(17) Oil guide

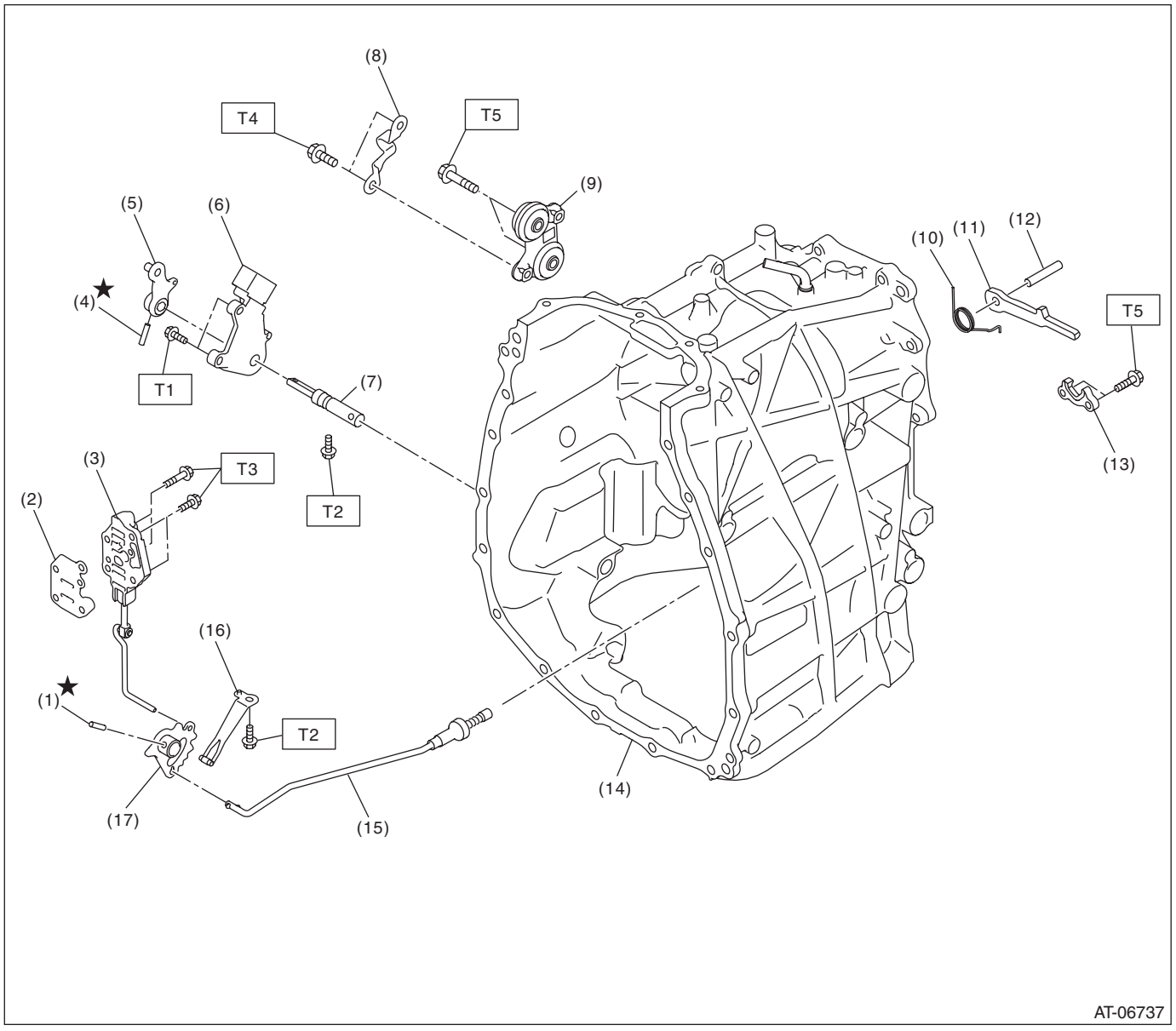
Tightening torque: N·m (kgf-m, ft-lb)
T1: 16 (1.6, 11.8)
T2: 37 (3.8, 27.3)

6. FORWARD CLUTCH ASSEMBLY



(1) Converter case
(2) O-ring
(3) Seal ring
(4) Thrust bearing
(5) Seal ring
(6) Forward clutch drum ASSY
(7) Seal ring
(8) Forward clutch piston
(9) Return spring
(10) Chamber COMPL
(11) Snap ring
(12) Dish plate
(13) Driven plate
(14) Drive plate
(15) Retaining plate
(16) Snap ring
(17) Sun gear
(18) Snap ring
(19) Balance oil guide
(20) Thrust bearing
(21) Planetary carrier ASSY
(22) Thrust bearing
(23) Internal gear
(24) Thrust gear plate
(25) Snap ring
(26) Thrust bearing
(27) Washer

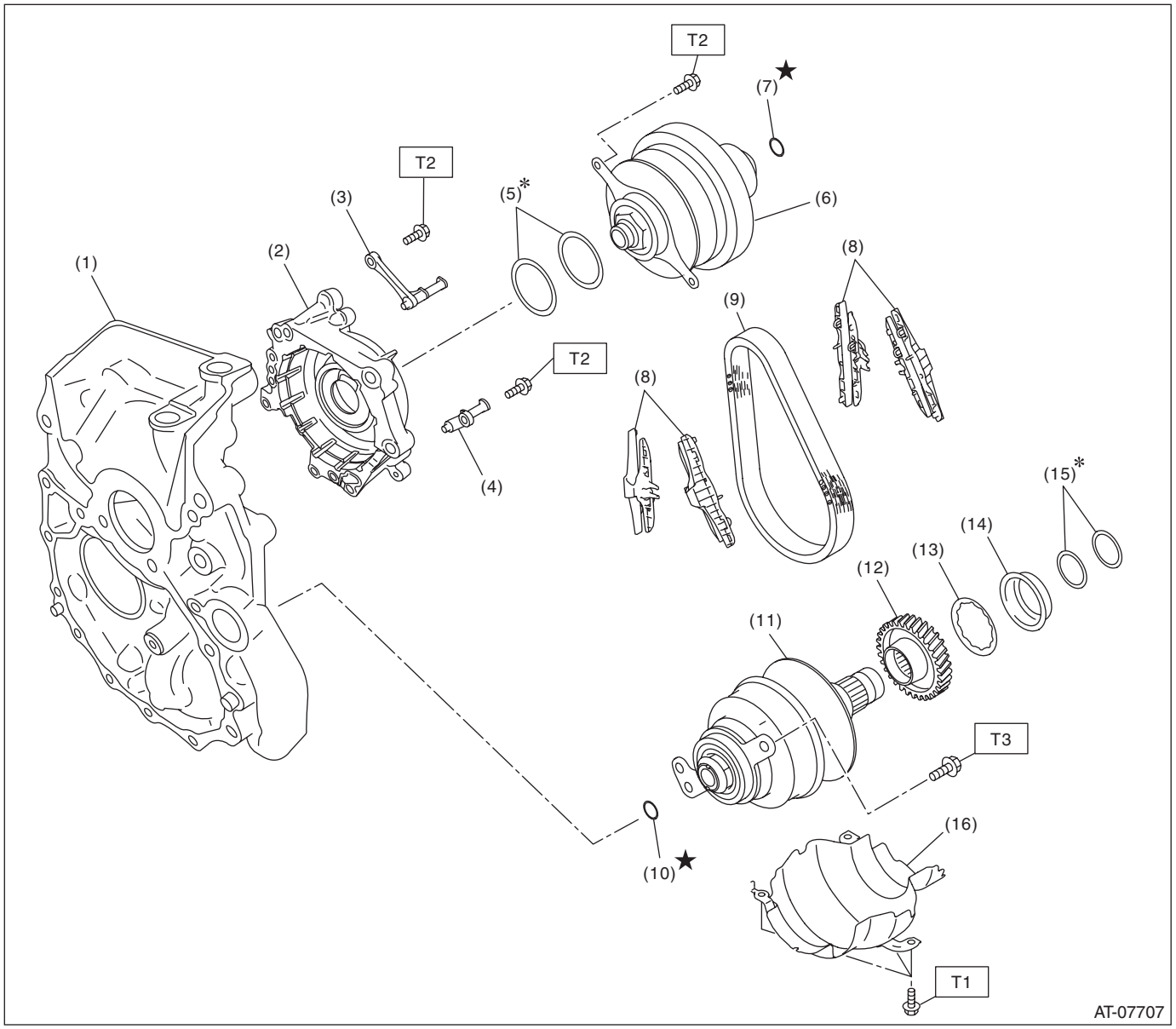
7. TRANSMISSION CONTROL DEVICE



(1) Spring pin
(2) Separator plate
(3) Manual valve ASSY
(4) Spring pin
(5) Shifter arm
(6) Inhibitor switch
(7) Shifter arm shaft
(8) Cable bracket
(9) Plate ASSY
(10) Return spring
(11) Parking pawl
(12) Shaft
(13) Parking support
(14) Transmission case
(15) Parking rod
(16) Detent spring
(17) Manual plate

Tightening torque: N·m (kgf-m, ft-lb)
T1: 5 (0.5, 3.7)
T2: 7 (0.7, 5.2)
T3: 9 (0.9, 6.6)
T4: 18 (1.8, 13.3)
T5: 25 (2.5, 18.4)

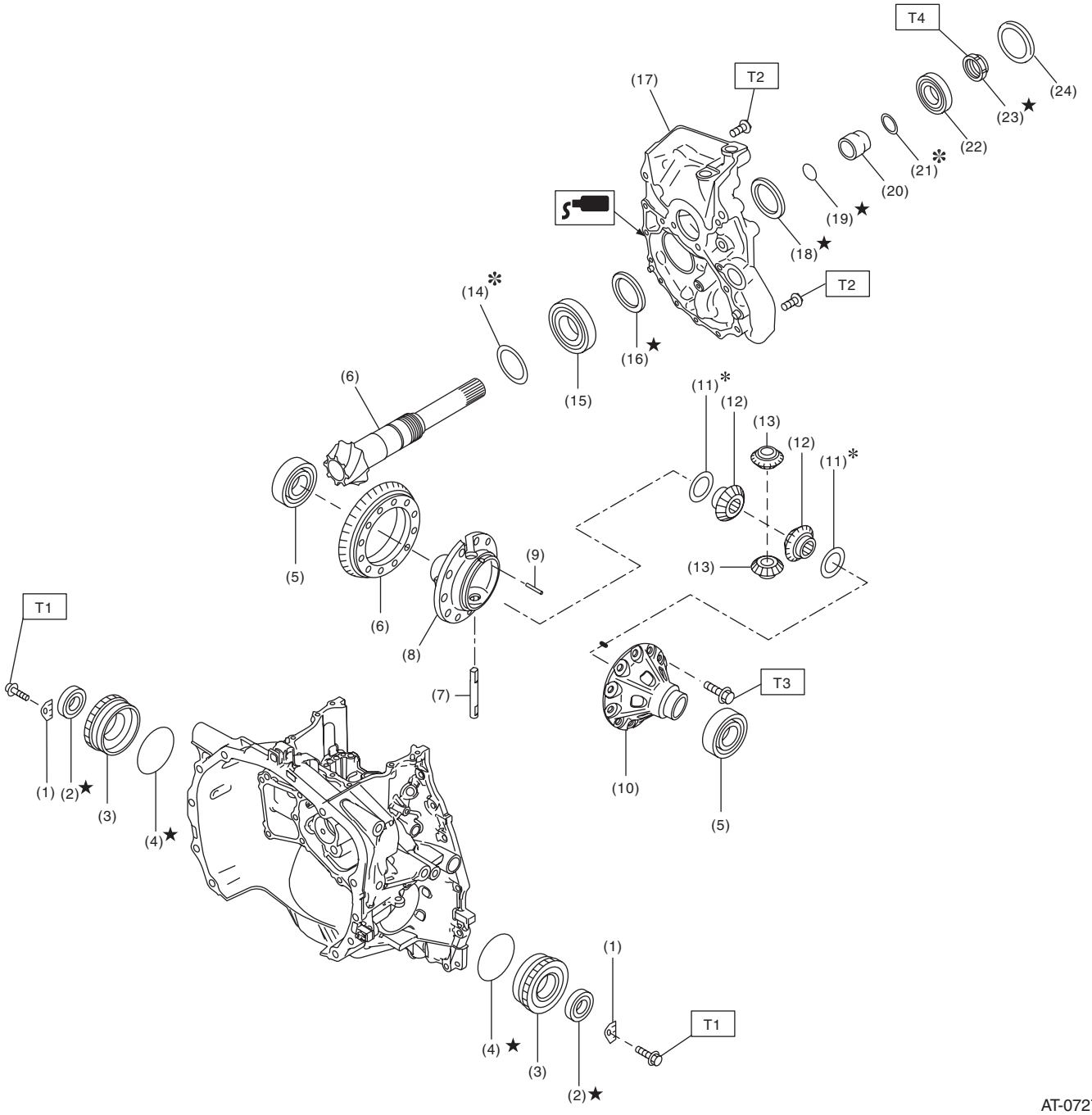
8. PRIMARY PULLEY, SECONDARY PULLEY & VARIATOR CHAIN AND REDUCTION DRIVE GEAR



(1) Drive pinion retainer
(2) Reverse brake housing
(3) Support rod
(4) Lubrication pipe
(5) Primary pulley shim
(6) Primary pulley ASSY
(7) Seal ring
(8) Chain guide
(9) Variator chain
(10) Seal ring
(11) Secondary pulley ASSY
(12) Reduction drive gear
(13) Dish plate
(14) Spring retainer
(15) Reduction gear shim
(16) Oil baffle

Tightening torque: N·m (kgf-m, ft-lb)
T1: 16 (1.6, 11.8)
T2: 21 (2.1, 15.5)
T3: 67.5 (6.9, 49.8)

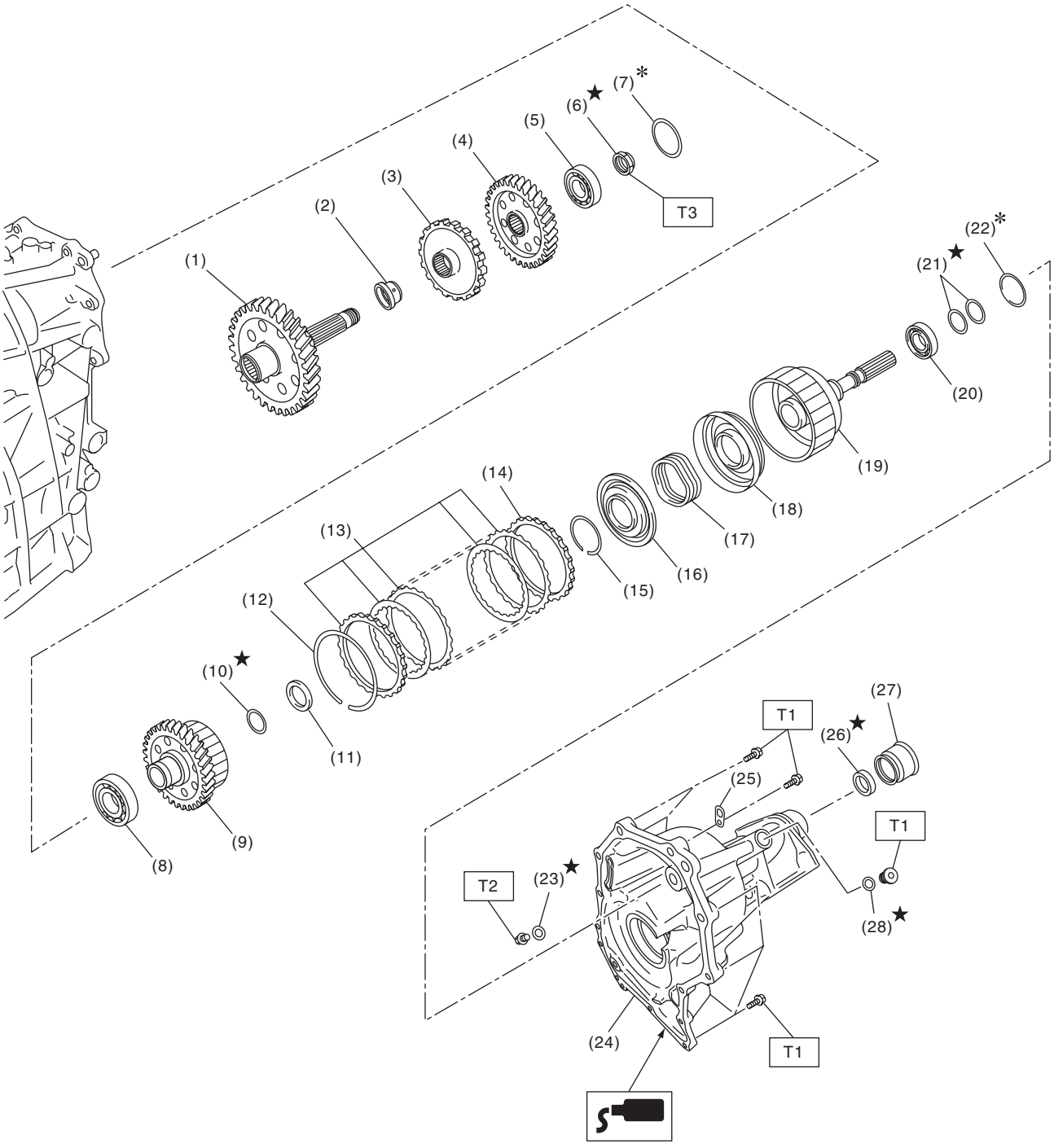
9. FRONT DIFFERENTIAL GEAR



(1) Lock plate
(2) Oil seal
(3) Differential side retainer
(4) O-ring
(5) Taper roller bearing
(6) Drive pinion gear set
(7) Pinion shaft
(8) Differential case RH
(9) Straight pin
(10) Differential case LH
(11) Washer
(12) Differential bevel gear
(13) Differential bevel pinion
(14) Drive pinion shim
(15) Taper roller bearing
(16) Oil seal
(17) Drive pinion retainer
(18) Oil seal
(19) O-ring
(20) Drive pinion spacer
(21) Drive pinion washer
(22) Taper roller bearing
(23) Lock nut
(24) Plug

Tightening torque: N·m (kgf-m, ft-lb)
T1: 25 (2.5, 18.4)
T2: 43 (4.4, 31.7)
T3: 64 (6.5, 47.2)
T4: <Ref. to CVT-280, ASSEMBLY, Drive Pinion Shaft Assembly.>

10.TRANSFER AND EXTENSION CASE

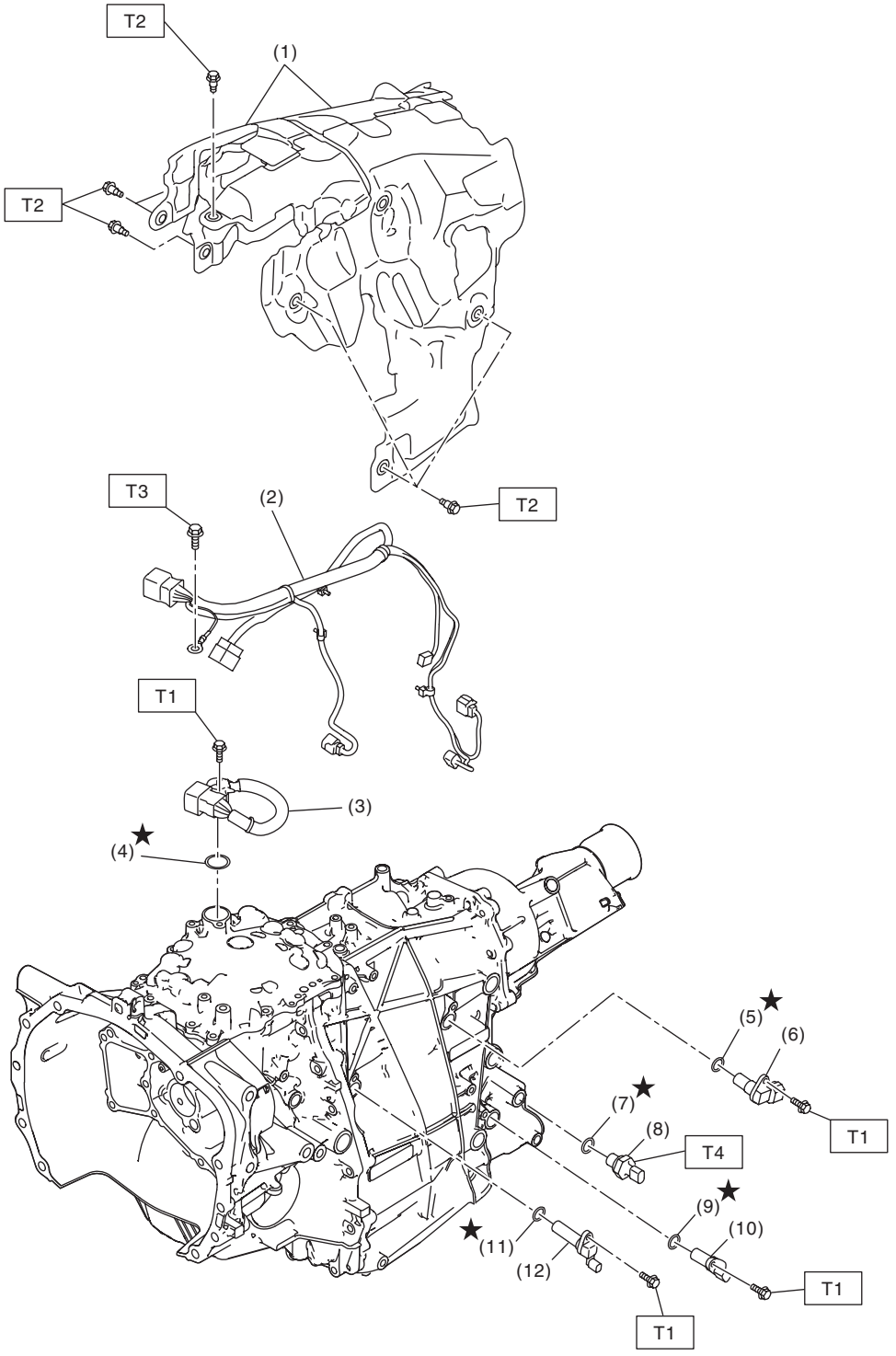


CVT00401

(1) Reduction driven gear COMPL
(2) Collar
(3) Parking gear
(4) Transfer drive gear
(5) Ball bearing
(6) Lock nut
(7) Transfer drive gear shim
(8) Ball bearing
(9) Transfer driven gear
(10) Seal ring
(11) Thrust bearing
(12) Snap ring
(13) Transfer clutch plate set
(14) Pressure plate
(15) Snap ring
(16) Transfer clutch piston seal
(17) Transfer clutch piston return spring
(18) Transfer clutch piston
(19) Rear drive shaft
(20) Ball bearing
(21) Seal ring
(22) Transfer driven gear shim
(23) Gasket
(24) Extension case
(25) Transmission hanger
(26) Oil seal
(27) Dust cover
(28) O-ring

Tightening torque: N·m (kgf-m, ft-lb)
T1: 25 (2.5, 18.4)
T2: 35 (3.6, 25.8)
T3: 95 (9.7, 70.1)

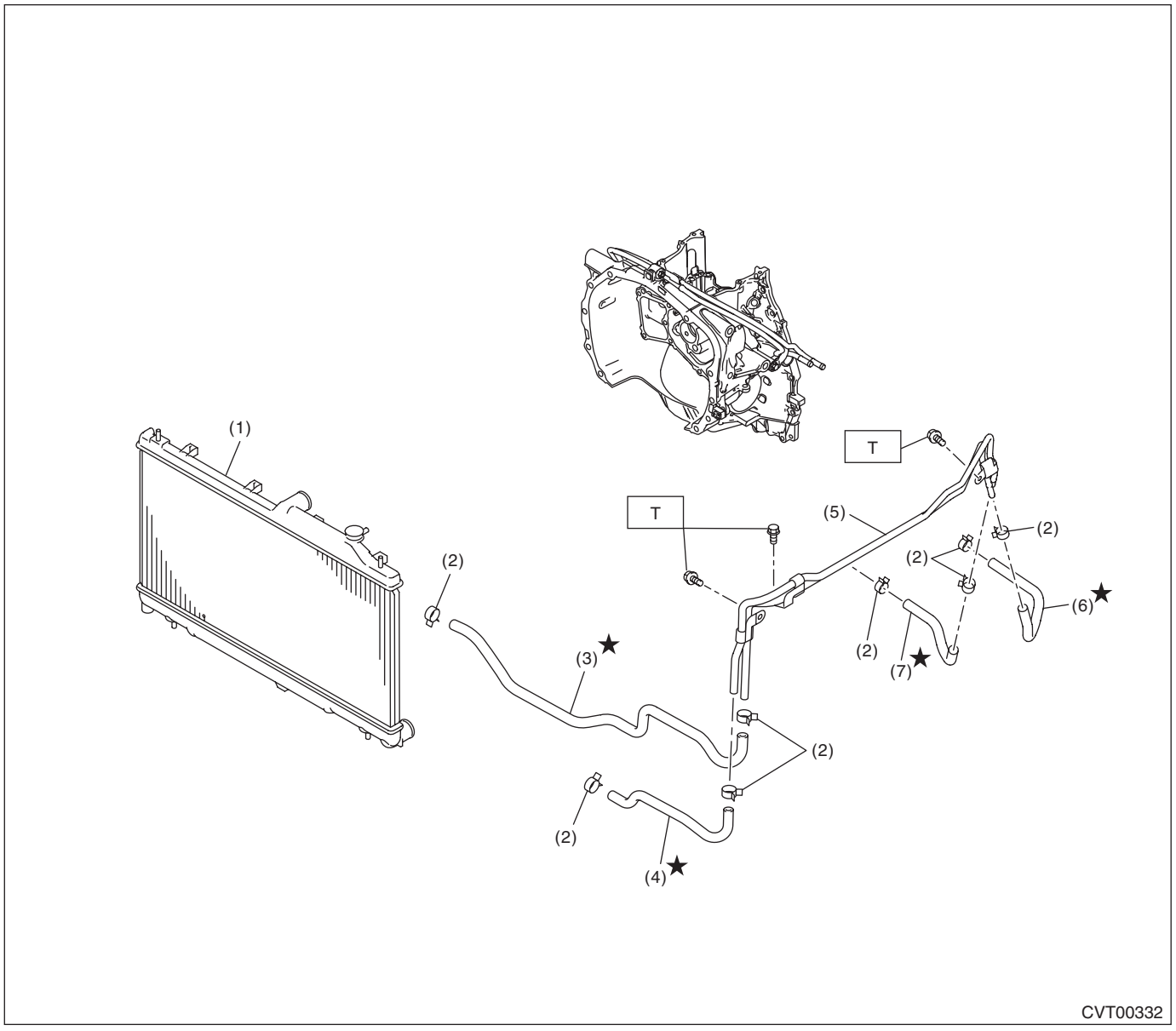
11.TRANSMISSION HARNESS AND SENSOR



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

Tightening torque: N·m (kgf-m, ft-lb)
T1: 7 (0.7, 3.7)
T2: 8 (0.8, 5.9)
T3: 14 (1.4, 10.3)
T4: 39 (4.0, 28.8)

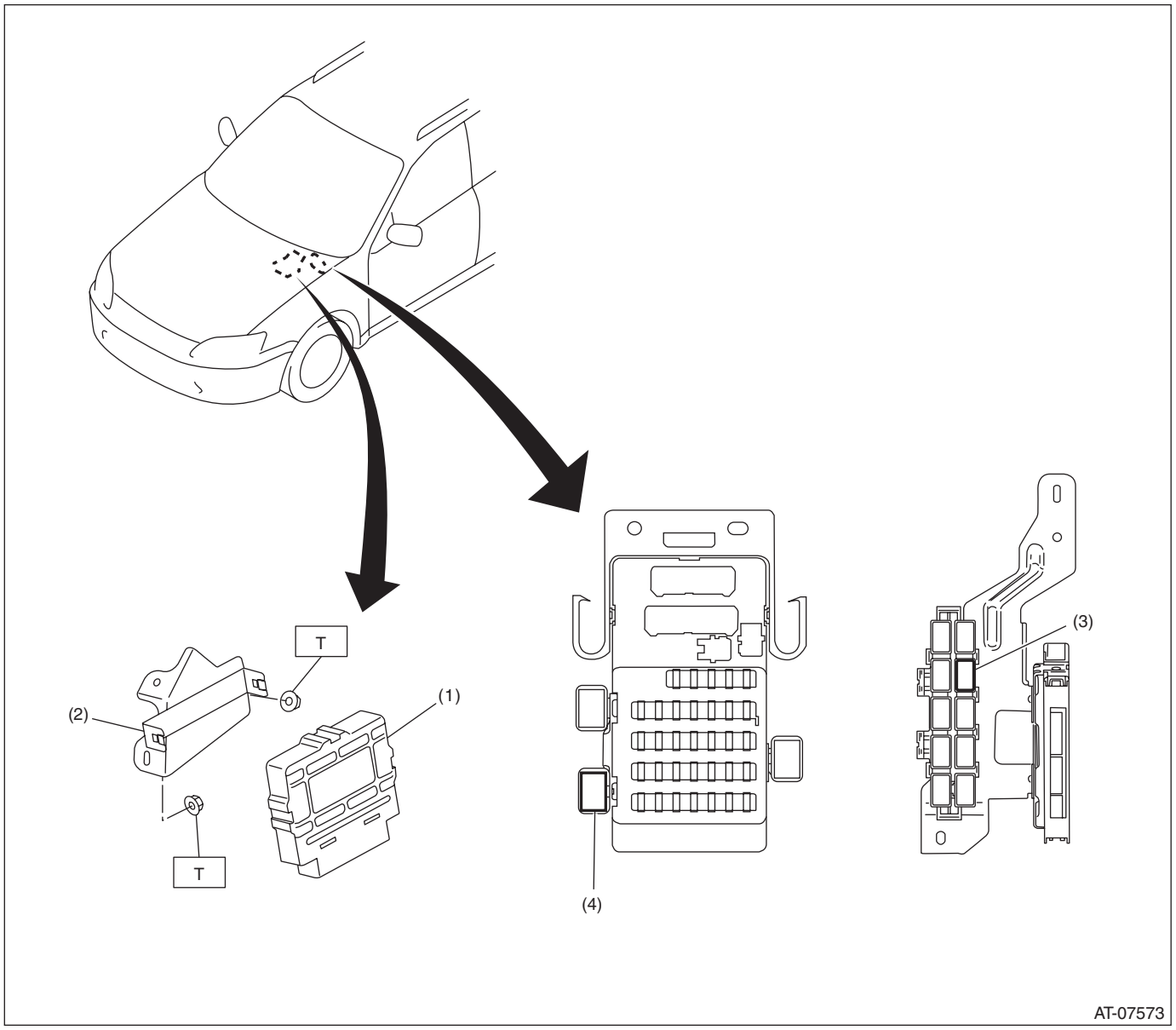
12.CVTF COOLER PIPE AND HOSE



(1) Radiator
(2) CVTF hose clip
(3) CVTF radiator inlet hose
(4) CVTF radiator outlet hose
(5) CVTF cooler pipe ASSY
(6) CVTF CVT outlet hose
(7) CVTF CVT inlet hose

Tightening torque: N·m (kgf-m, ft-lb)
T: 7.5 (0.8, 5.5)

13.TRANSMISSION CONTROL MODULE

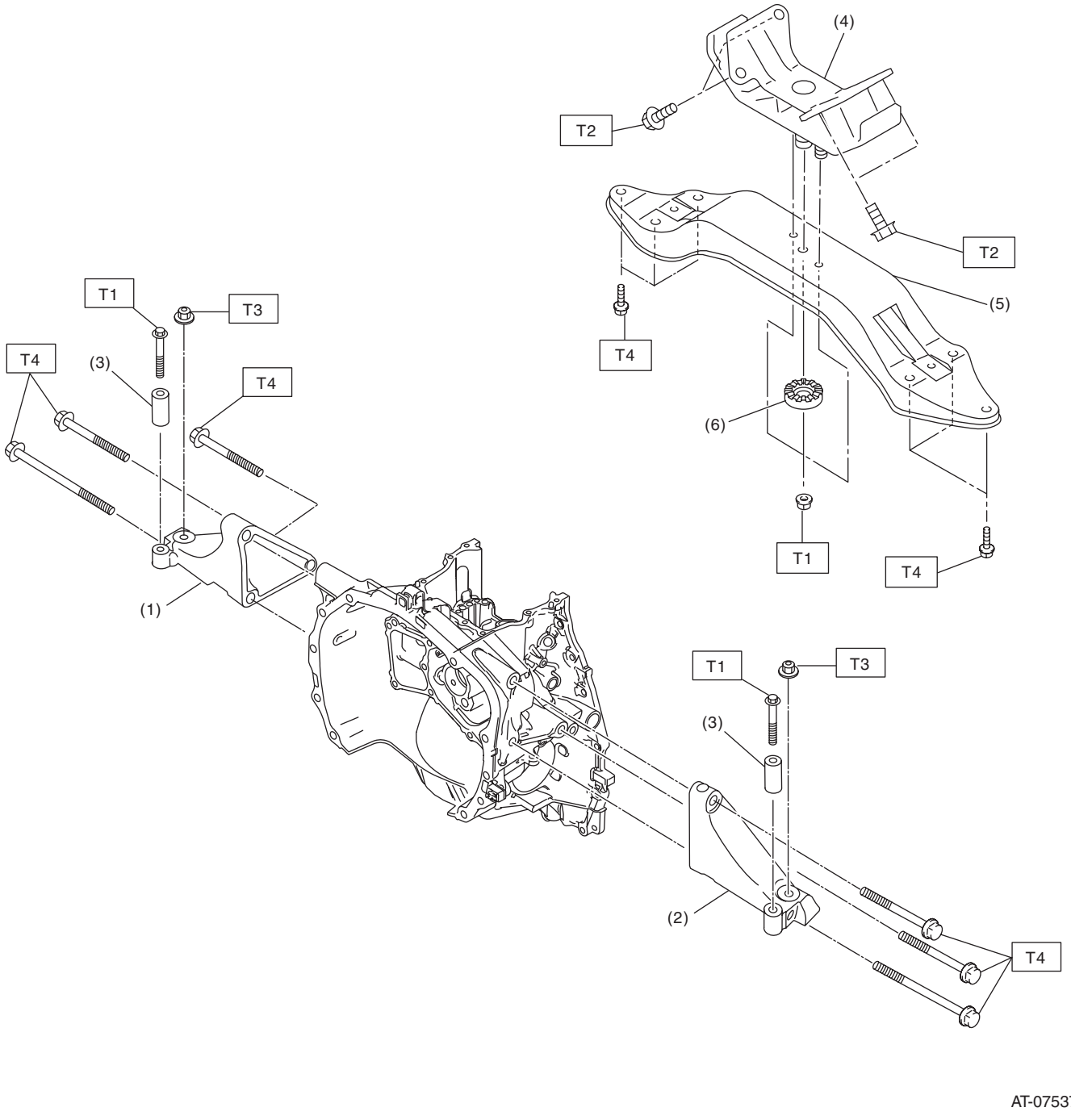


(1) Transmission control module (TCM)
(2) TCM bracket
(3) Relay (model with push button ignition switch)
(4) Relay (model without push button ignition switch)

Tightening torque: N·m (kgf-m, ft-lb)

T: 7.5 (0.8, 5.5)

14.TRANSMISSION MOUNTING



AT-07537

(1)	Transmission mounting bracket (RH)	(4)	Rear cushion rubber	***Tightening torque: N·m (kgf-m, ft-lb)***
(2)	Transmission mounting bracket (LH)	(5)	Transmission rear crossmember	***T1: 35 (3.6, 25.8)***
(3)	Collar	(6)	Stopper	***T2: 40 (4.1, 29.5)***
				T3: 45 (4.6, 33.2)
				T4: 75 (7.6, 55.3)

C: CAUTION

- Wear appropriate work clothing, including a cap, protective goggles and protective shoes when performing any work.
- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust and dirt.
- Do not place the valve cover with its inner side facing up until it is installed, to prevent intrusion of foreign matter into the control valve body.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
- When disassembling the case and other light alloy parts, use a plastic hammer to force it apart. Do not pry apart with screwdrivers or other tools.
- Vehicle components are extremely hot after driving. Be wary of receiving burns from heated parts.
- Use SUBARU genuine CVTF and recommended grease. Do not mix CVTF, grease etc. of different grades or manufacturers.
- Be sure to tighten bolts and nuts to the specified torque.
- Place lifts, shop jacks or rigid racks at specified locations.
- Apply CVTF onto sliding or revolving surfaces before installation.
- Replace deformed or damaged snap rings with new parts.
- Before installing O-rings or oil seals, apply sufficient amount of CVTF or gear oil to appropriate locations in order to avoid damage and deformation.
- Be careful not to incorrectly install or fail to install O-rings, snap rings and other such parts.
- Before securing a part on a vise, place cushioning material such as wood blocks, aluminum plate, or cloth between the part and the vise.
- Avoid damaging the mating surface of the case.
- Before applying liquid gasket, completely remove the old liquid gasket.
- After removing the sensors, breather hose and plugs, plug the holes to avoid foreign materials intruding as necessary.
- During disassembly or assembly, be sure to use nylon gloves or paper towels. Do not use cloth gloves or waste cloth.

D: PREPARATION TOOL

1. SPECIAL TOOL

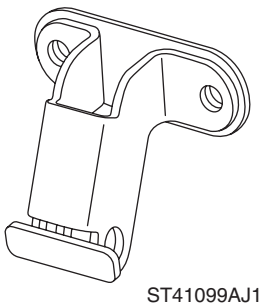
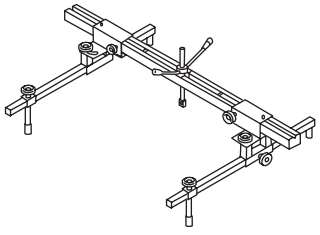
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST41099AJ130	41099AJ130	SPECIAL TOOL FB	Used for holding and balancing the engine unit.
 ST99099AJ000	99099AJ000	ENGINE HANGER	• Used for removing and installing the automatic transmission assembly. • Used together with CHAIN BALANCER (99099AJ010).

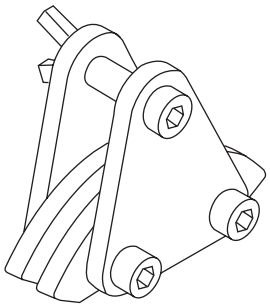
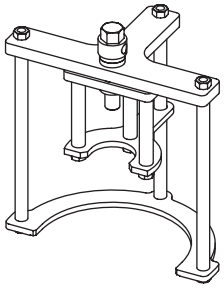
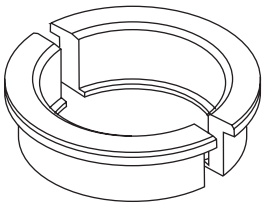
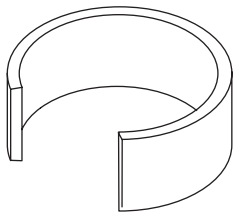
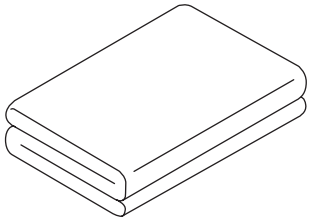
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST99099AJ010	99099AJ010	CHAIN BALANCER	• Used for removing and installing the automatic transmission assembly. • Used together with ENGINE HANGER (99099AJ000).
 ST18769AA010	18769AA010	EXPANDER PULLEY	Used for removing and installing the secondary pulley assembly.
 ST18767AA010	18767AA010	BEARING REMOVER	Used for removing the ball bearing of transfer clutch assembly.
 ST18762AA010	18762AA010	COMPRESSOR SPECIAL TOOL	Used for removing and installing snap ring of forward clutch assembly.
 ST18761AA010	18761AA010	SHEET SPECIAL TOOL	• Used for removing and installing control valve body. • Used for removing and installing valve cover. • Used for removing and installing transmission harness.

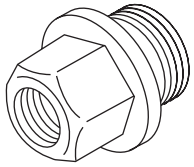
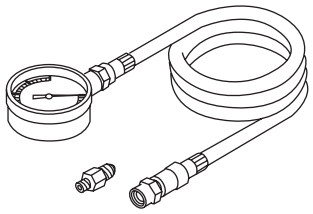
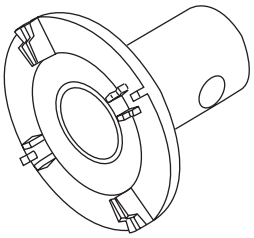
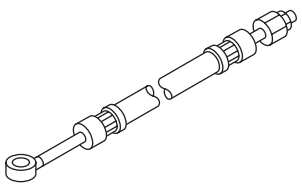
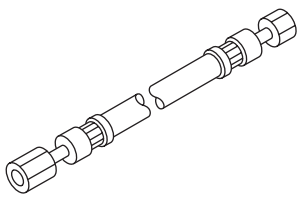
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18681AA010	18681AA010	PRESSURE GAUGE ADAPTER	Used for measuring the secondary pressure (line pressure). NOTE: Used together with the genuine O-ring (part No. 806916050).
 ST18801AA000	18801AA000	OIL PRESSURE GAUGE ASSY	Used for measuring the secondary pressure (line pressure).
 ST18658AA020	18658AA020	WRENCH COMPL RETAINER	Used for removing and installing the differential side retainer.
 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.

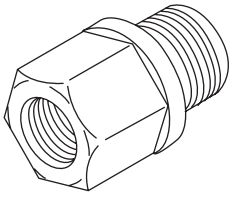
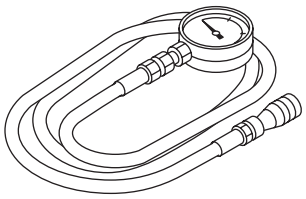
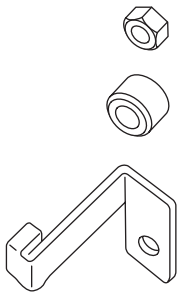
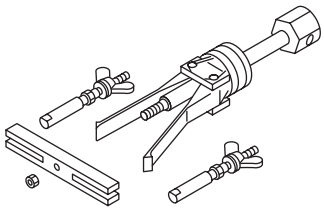
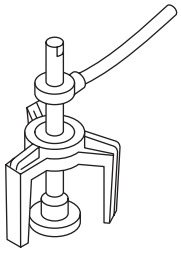
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18681AA000	18681AA000	PRESSURE GAUGE ADAPTER	Used for measuring the transfer clutch hydraulic pressure. NOTE: Used together with the genuine O-ring (part No. 806911080).
 ST-498575400	498575400	OIL PRESSURE GAUGE ASSY	Used for measuring the transfer clutch hydraulic pressure.
 ST-498277200	498277200	STOPPER SET	• Used for removing and installing 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 bearing outer race of the drive pinion shaft.
 ST-398673600	398673600	COMPRESSOR	Used for removing and installing snap ring of forward clutch assembly.

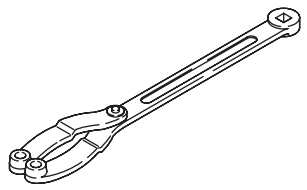
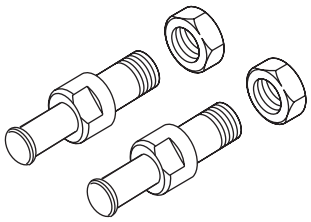
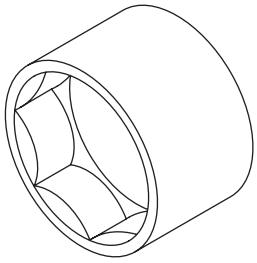
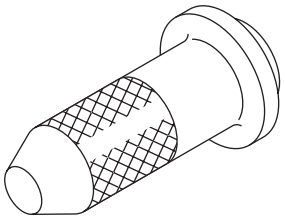
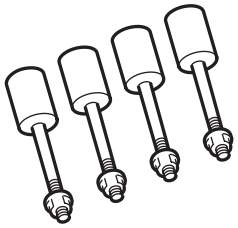
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18355AA000	18355AA000	PULLEY WRENCH	• Used for removing and installing the lock nut of reduction driven gear. • Used together with PIN SET (18334AA000).
 ST18334AA000	18334AA000	PIN SET	• Used for removing and installing the lock nut of reduction driven gear. • Used together with PULLEY WRENCH (18355AA000).
 ST-499987003	499987003	SOCKET WRENCH (35)	Used for removing and installing the lock nut of reduction driven gear.
 ST-498057300	498057300	OIL SEAL INSTALLER	Used for installing the extension case oil seal.
 ST18632AA000	18632AA000	STAND ASSY	Used for disassembling and assembling the transmission.

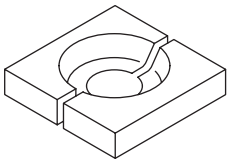
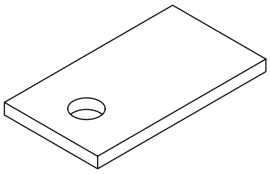
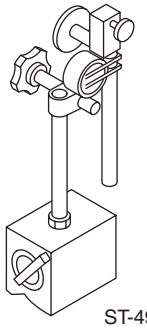
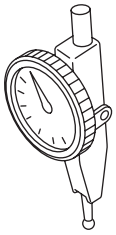
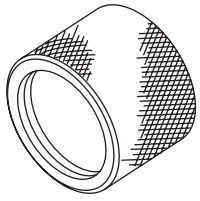
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498515500	498515500	REMOVER	Used for removing the bearing inner race of the drive pinion shaft.
 ST-498255400	498255400	PLATE	Used for measuring the backlash of hypoid gear.
 ST-498247001	498247001	MAGNET BASE	• Used for measuring the backlash of differential bevel pinion gear. • Used for measuring the backlash of hypoid gear. • Used together with DIAL GAUGE (498247100).
 ST-498247100	498247100	DIAL GAUGE	• Used for measuring the backlash of differential bevel pinion gear. • Used for measuring the backlash of hypoid gear. • Used together with DIAL GAUGE (498247101).
 ST18675AA000	18675AA000	DIFFERENTIAL SIDE OIL SEAL INSTALLER	Used for installing the differential side retainer oil seal.

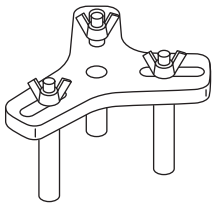
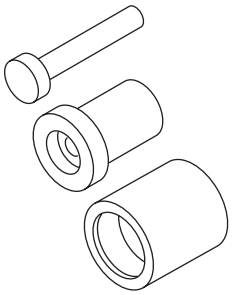
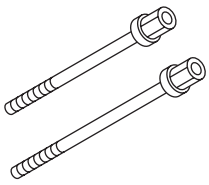
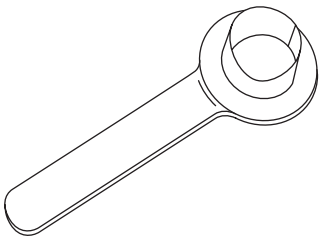
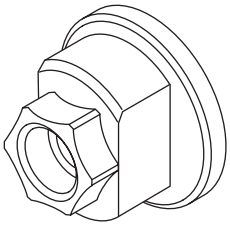
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18762AA000	18762AA000	COMPRESSOR SPECIAL TOOL	Used for disassembling and installing the multi-plate clutch piston.
 ST-927720000	927720000	HOUSING BUSHING INSTALLER AND REMOVER	• Used for installing the oil seal. • Use BUSHING SHAFT (927880000).
 ST18763AA000	18763AA000	COMPRESSOR SHAFT	Used for measuring the backlash of hypoid gear.
 ST28399SA010	28399SA010	OIL SEAL PROTECTOR	Used for protecting oil seal when installing front drive shaft.
 ST-498937110	498937110	HOLDER	• Used for removing and installing the drive pinion lock nut. • Used as a holder to rotate gear when checking tooth contact.

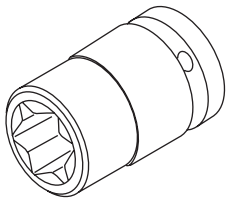
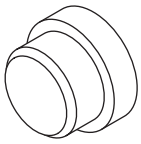
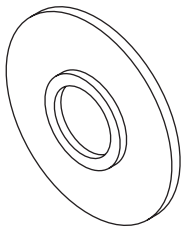
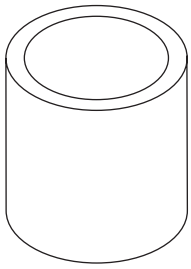
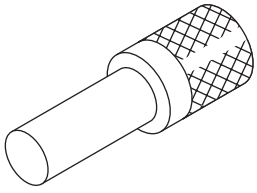
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18270KA020	18270KA020	SOCKET (E20)	• Used for removing and installing the hypoid driven gear. • Used for removing and installing the drive pinion shaft retainer.
 ST-398497701	398497701	SEAT	Used for removing and installing the bearing.
 ST-398177700	398177700	INSTALLER	• Used for installing the ball bearing. • Used for installing the parking gear. • Used for installing the bearing outer race. • Used for installing the plug.
 ST28499TC010	28499TC010	PRESS SNAP RING	Used for installing the bearing outer race of drive pinion shaft.
 ST-899864100	899864100	REMOVER	• Used for removing and installing the ball bearing. • Used for removing the parking gear and transfer drive gear. • Used for removing the bearing inner race of the front differential.

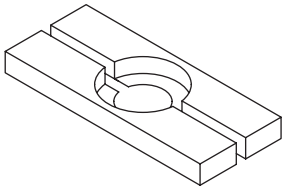
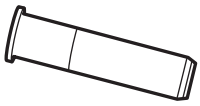
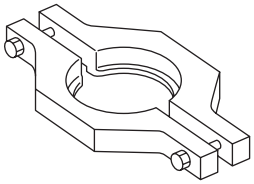
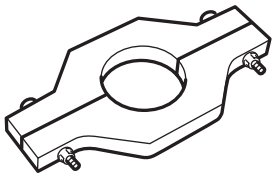
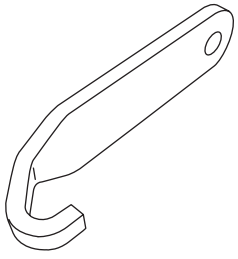
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498077000	498077000	REMOVER	Used for removing the bearing inner race of the front differential.
 ST18657AA010	18657AA010	INSTALLER	Used for installing the oil seal at shifter arm shaft portion.
 ST-498077600	498077600	REMOVER	Used for removing the ball bearing of drive sprocket.
 ST18723AA000	18723AA000	REMOVER	Used for removing the ball bearing of transfer clutch assembly.
 ST-498497300	498497300	CRANKSHAFT STOPPER	Used for stopping the drive plate rotation when removing and installing the drive plate.

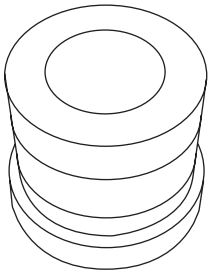
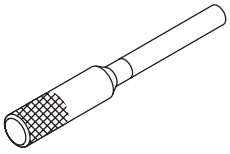
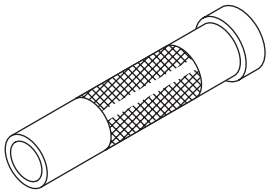
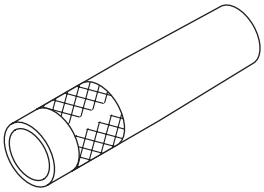
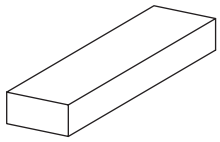
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-399513600	399513600	INSTALLER	Used for removing the ball bearing of drive sprocket.
 ST-499267300	499267300	STOPPER PIN	Used for adjusting the inhibitor switch.
 ST-499277100	499277100	BUSHING 1-2 INSTALLER	• Used for installing the bearing of the transmission case. • Used for installing the ball bearing. • Used for installing the bearing inner race.
 ST-499277200	499277200	INSTALLER	Used for installing the ball bearing of the transfer clutch assembly.
 ST-499575400	499575400	GAUGE	Used for measuring height of end play.

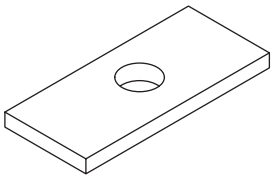
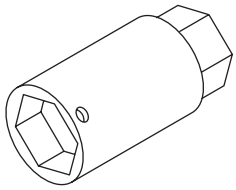
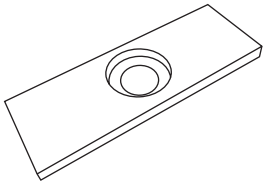
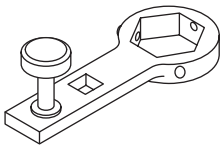
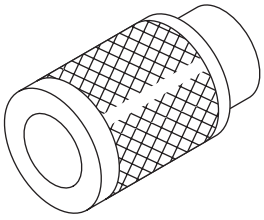
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499575500	499575500	GAUGE	Used for measuring height of end play.
 ST-499787500	499787500	ADAPTER	• Used for removing and installing the drive pinion shaft lock nut. • Used for measuring the preload of the drive pinion shaft. • Used for measuring the backlash of hypoid gear.
 ST-499575600	499575600	GAUGE	Used for measuring height of end play.
 ST-499787700	499787700	WRENCH	• Used for removing and installing the drive pinion shaft lock nut. • Used for measuring the preload of the drive pinion shaft. • Used for measuring the backlash of hypoid gear.
 ST-499757002	499757002	INSTALLER	• Used for removing the bearing of reduction driven gear. • Used for installing the parking gear. • Used for installing the transfer drive gear.

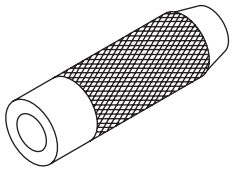
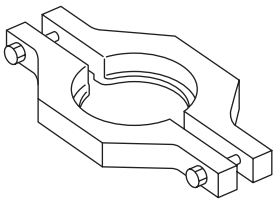
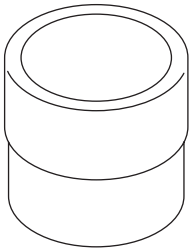
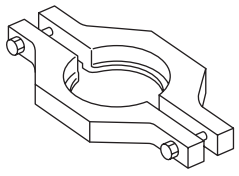
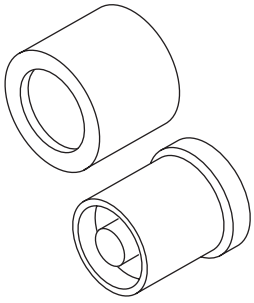
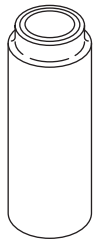
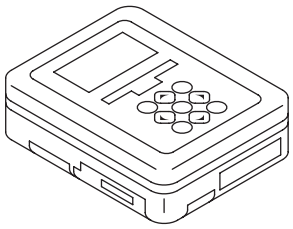
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-899580100	899580100	INSTALLER	• Used for installing the collar of reduction driven gear. • Used for installing the ball bearing of the transfer driven gear. • Used for installing the bearing inner race of drive pinion shaft.
 ST-498077300	498077300	REMOVER	Used for installing the ball bearing of reduction driven gear.
 ST-499755602	499755602	PRESS SNAP RING	• Used for installing the oil seal. • Used for installing the ball bearing and roller bearing. • Used for installing the plug.
 ST-498077400	498077400	REMOVER	Used for removing the ball bearing of transfer driven gear.
 ST20099AE020	20099AE020	INSTALLER	Used for installing the bearing outer race of drive pinion shaft.

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-927130000	927130000	EXTENSION DRIVE SHAFT	Used for installing the bearing inner race of drive pinion shaft.
 ST1B022XU0	1B022XU0	SUBARU SELECT MONITOR III KIT	Used for troubleshooting the electrical system.

2. GENERAL TOOL

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance and voltage.
Thickness gauge	Used for measuring the clearance in reverse brake, forward clutch and transfer clutch.
Caliper	Used for measuring the dimension.
Spring scale	Used for measuring the starting torque of the drive pinion.
TORX® bit T70	Used for removing and installing differential gear oil drain plug.
Straight pin remover	Used for removing and installing the straight pin.
Push/pull gauge	Used for measuring clutch clearance.
Chain sling	Used for removing and installing transmission. • Length: 0.8 — 1 m (2.6 — 3.3 ft) • Load capacity: 1.2 t (2,646 lb) or more • Diameter: 6 mm (0.24 in) or 6.3 mm (0.25 in) • Chain external width: 23.5 mm (0.93 in) or less • Chain internal width: 8.5 mm (0.33 in) or more
Screw shackle	Used for removing and installing transmission. • Load capacity: 250 kg (551 lb) or more • Use two pieces.
Angle gauge	Used for installing the drive plate.

2. CVTF

A: INSPECTION

Check for leakage of CVTF from transmission.

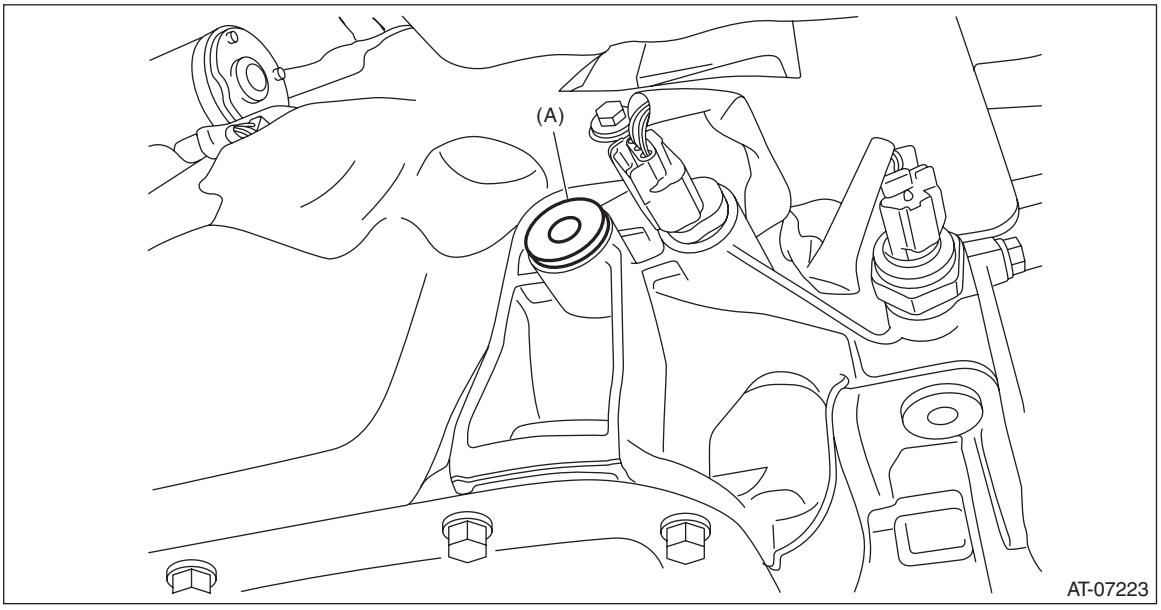
B: ADJUSTMENT

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

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

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

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

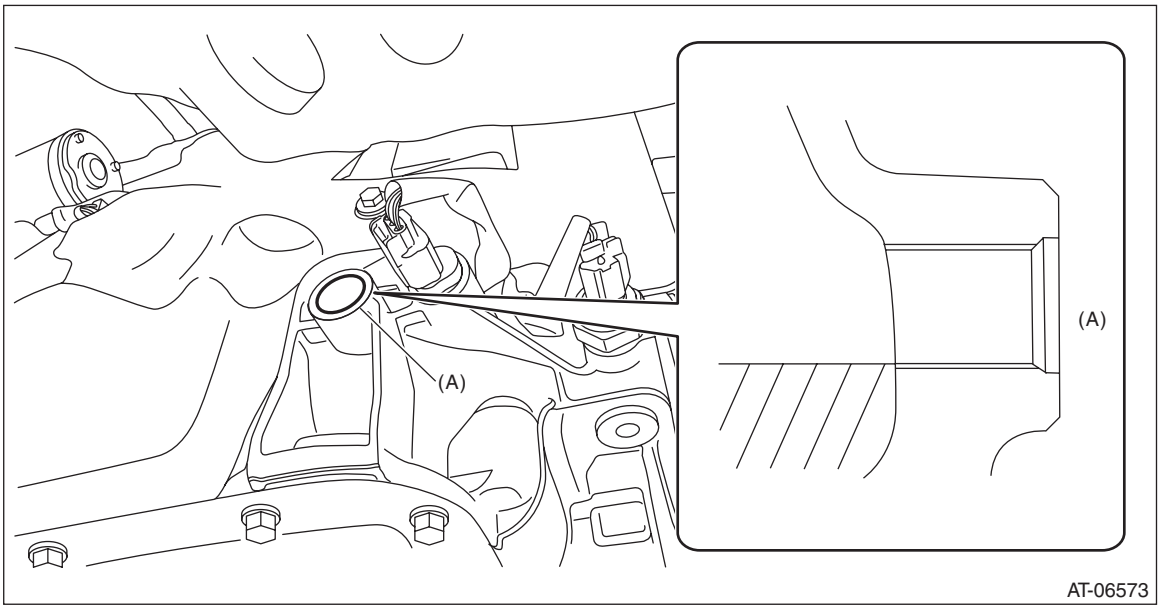


(A) Filler plug

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

Specified fluid:
<Ref. to CVT-4, HYDRAULIC CONTROL AND LUBRICATION, SPECIFICATION, General Description.>

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



(A) Filler plug hole

5) Install the filler plug.

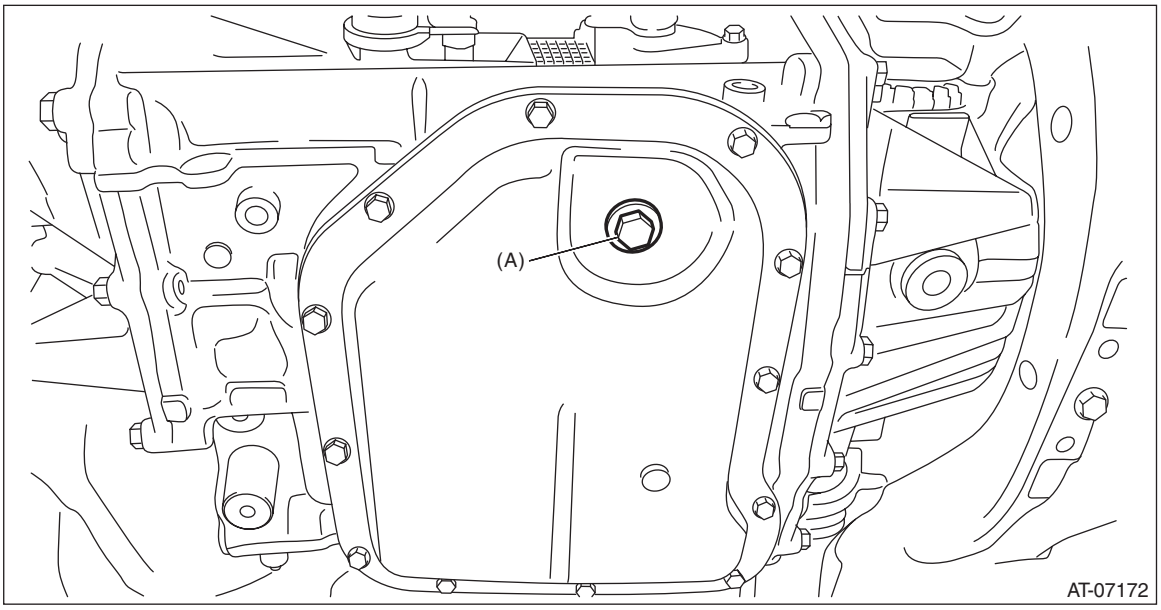
NOTE:
Use a new gasket.

Tightening torque:
50 N·m (5.1 kgf-m, 36.9 ft-lb)

C: REPLACEMENT

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

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



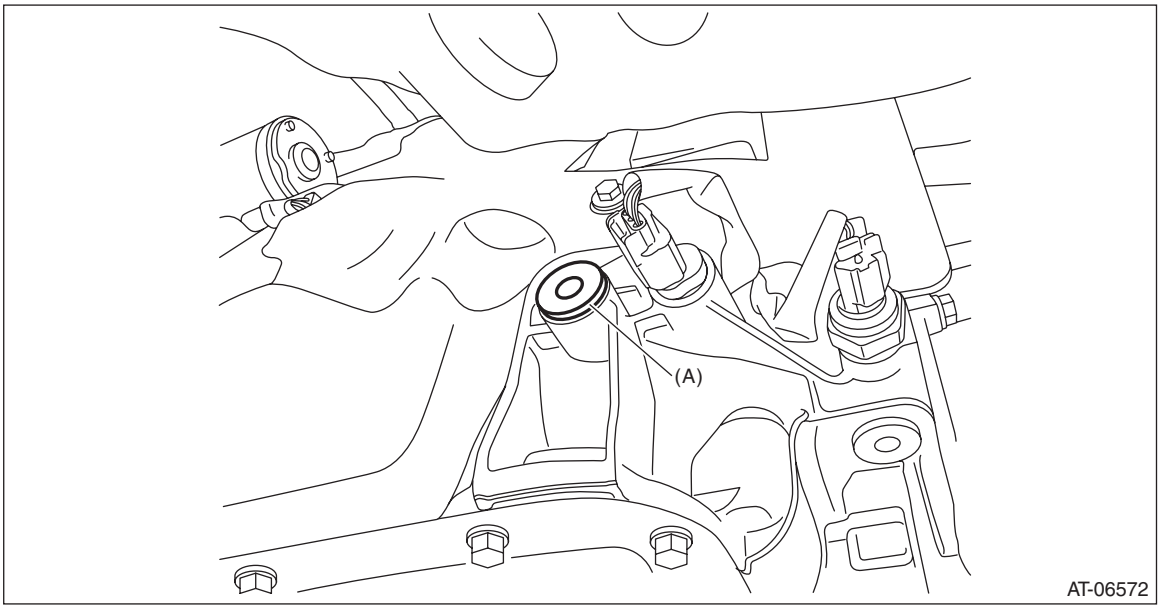
(A) CVTF drain plug

2) Check the CVTF condition. <Ref. to CVT-39, CONDITION CHECK, CVTF.>
3) Install the CVTF drain plug and gasket.

NOTE:
Use a new gasket.

Tightening torque:
31 N·m (3.2 kgf-m, 22.9 ft-lb)

4) Remove the filler plug.



(A) Filler plug

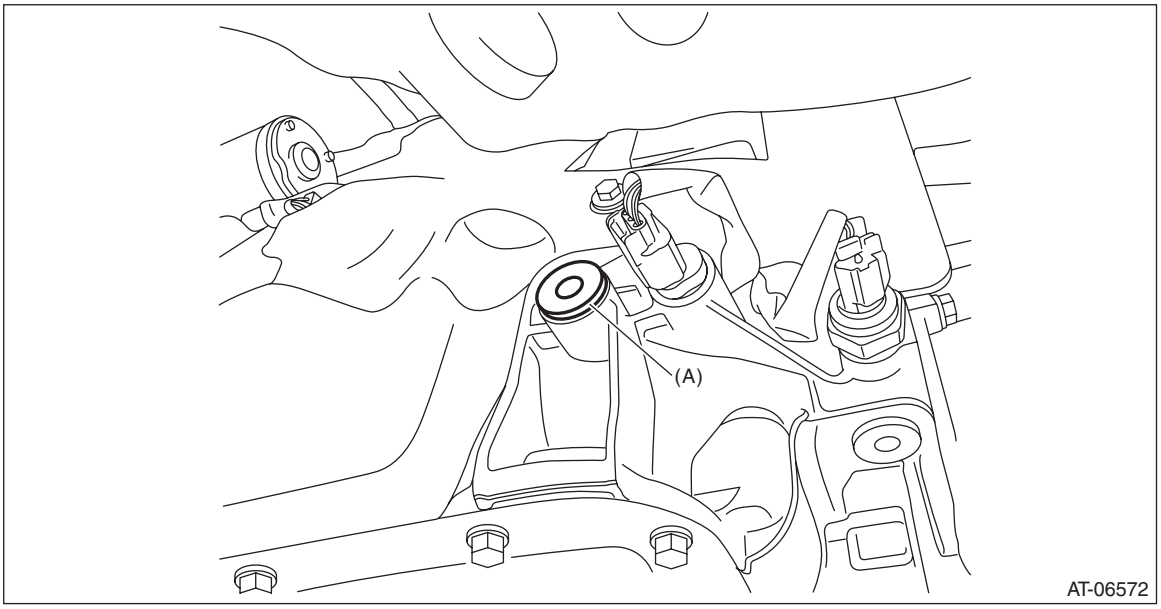
5) Add the specified fluid up to the filler plug hole lower section.

Specified fluid:
<Ref. to CVT-4, HYDRAULIC CONTROL AND LUBRICATION, SPECIFICATION, General Description.>

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) With the select lever shifted to "P" range and the engine started, lift up the vehicle. Adjust the CVTF level and check for leakage. <Ref. to CVT-36, ADJUSTMENT, CVTF.>
10) Replace with a new gasket, and attach the filler plug.

Tightening torque:
50 N·m (5.1 kgf-m, 36.9 ft-lb)



(A) Filler plug

D: CONDITION CHECK

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

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

3. Differential Gear Oil

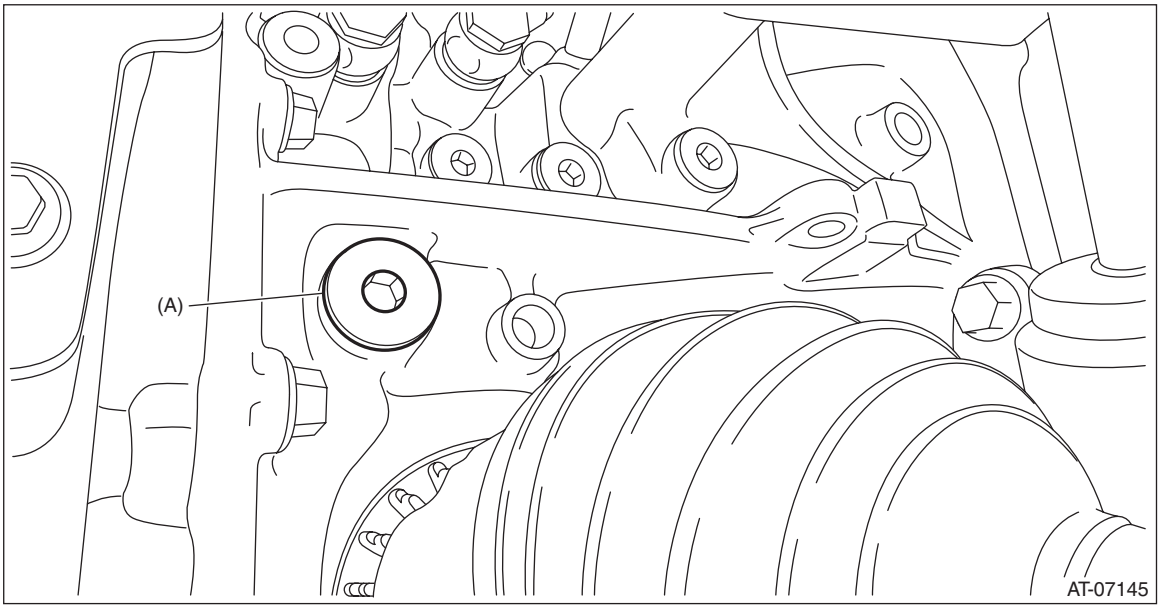
A: INSPECTION

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

B: ADJUSTMENT

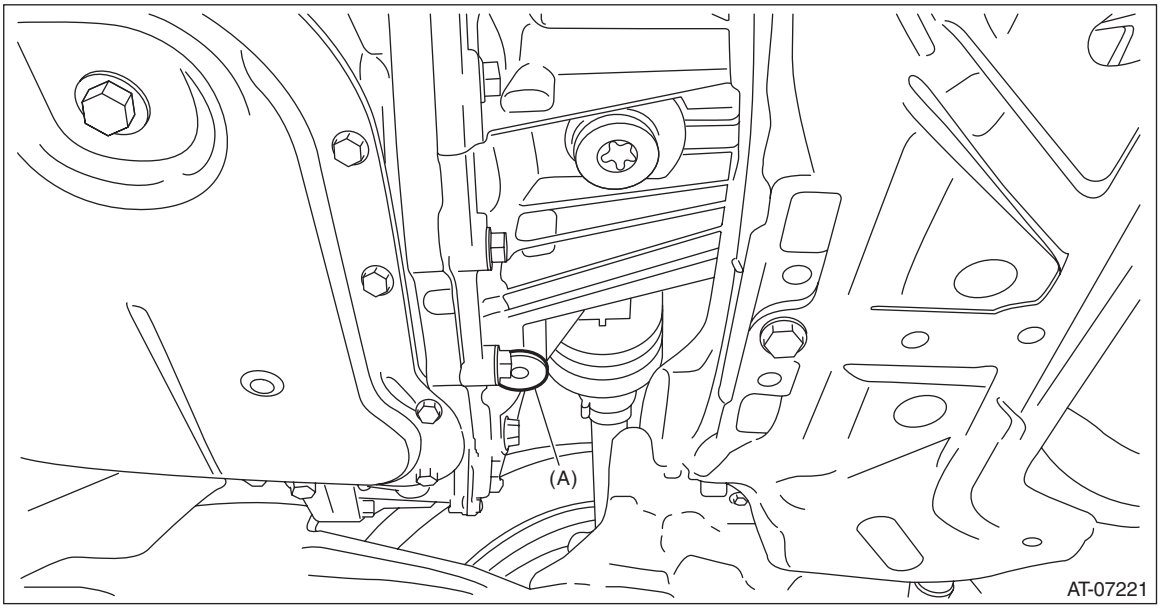
NOTE:
Immediately after removing the overflow drain plug, remaining gear oil (approx. 8 cc) may come out of the overflow pipe. This is not included in the specified amount. When removing the overflow drain plug, make sure the gear oil flows out of the overflow drain plug hole by filling with gear oil.

1) Lift up the vehicle.
2) Remove the filler plug.



(A) Filler plug

3) Remove the overflow drain plug.



(A) Overflow drain plug

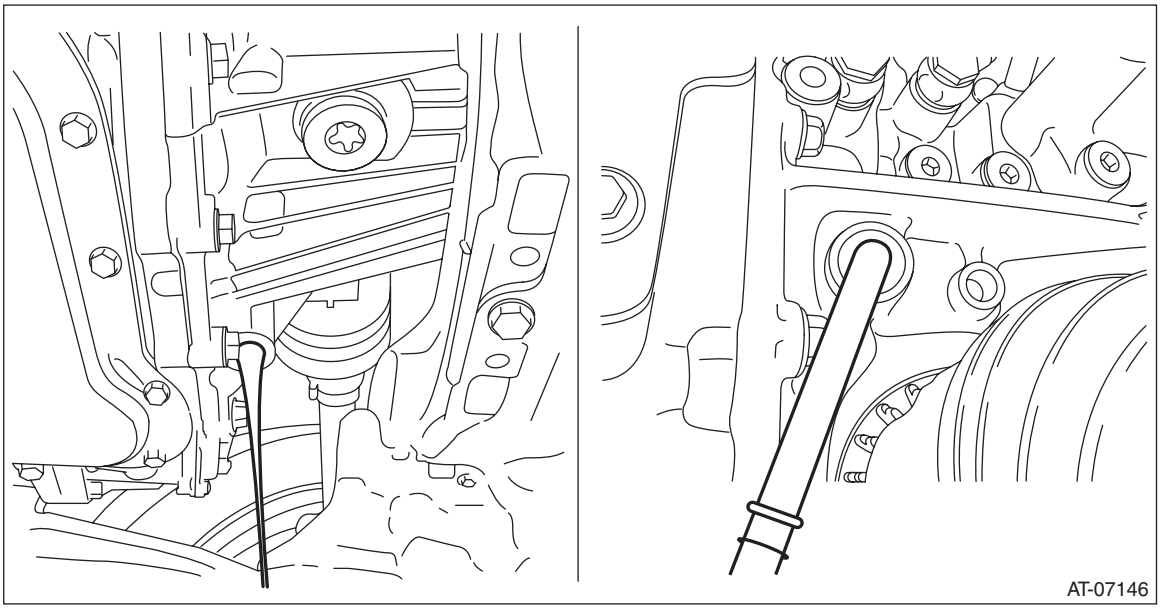
4) Fill in the differential gear oil through the filler plug hole up to where the oil flows out of the overflow drain plug.

Recommended gear oil:
<Ref. to CVT-4, RECOMMENDED GEAR OIL, SPECIFICATION, General Description.>

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:
50 N·m (5.1 kgf-m, 36.9 ft-lb)



6) Install the filler plug.

NOTE:
Use a new gasket.

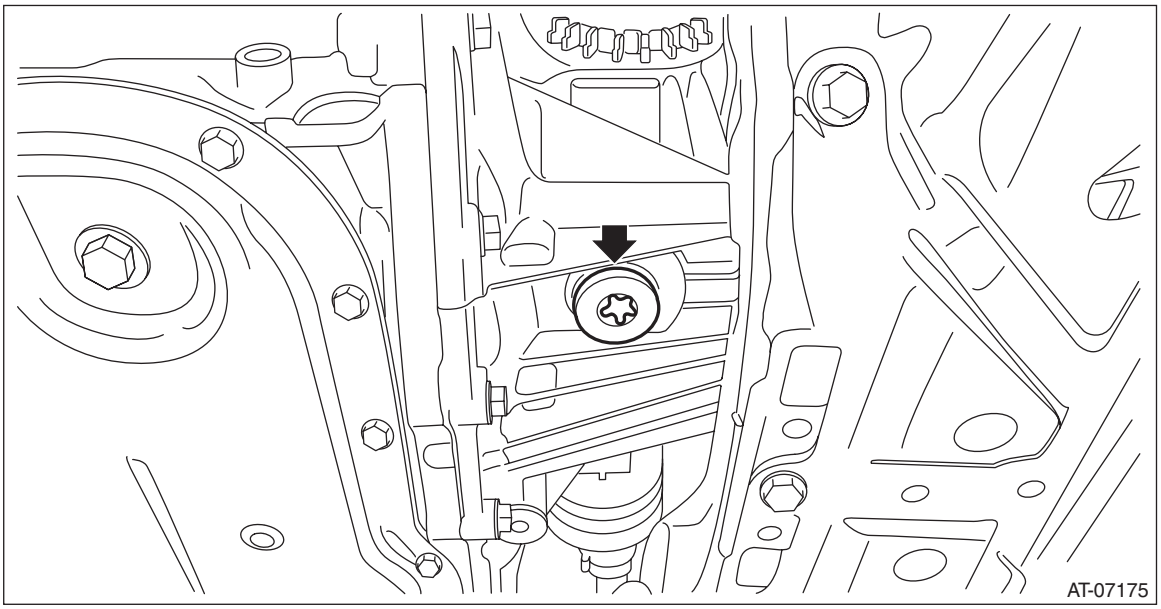
Tightening torque:
50 N·m (5.1 kgf-m, 36.9 ft-lb)

C: REPLACEMENT

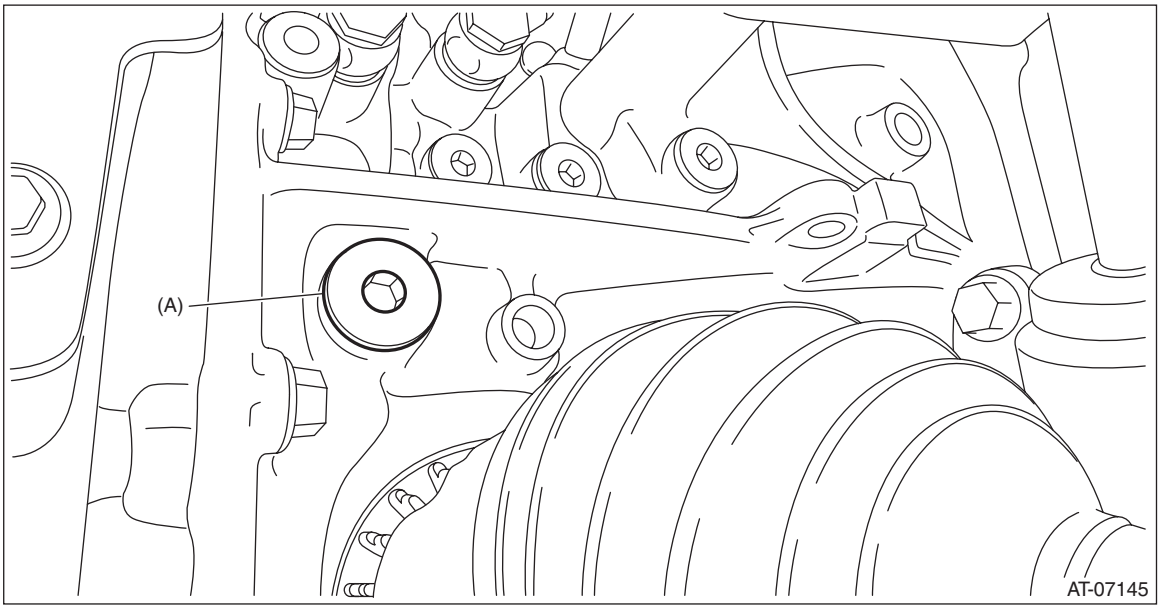
CAUTION:
• Immediately after the vehicle has been running or after idling for a long time, the differential gear oil will be hot. Be careful not to burn yourself.
• Be careful not to spill differential gear oil on the exhaust pipe to prevent it from emitting smoke or causing a fire. If gear oil adheres,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



4) Remove the filler plug.

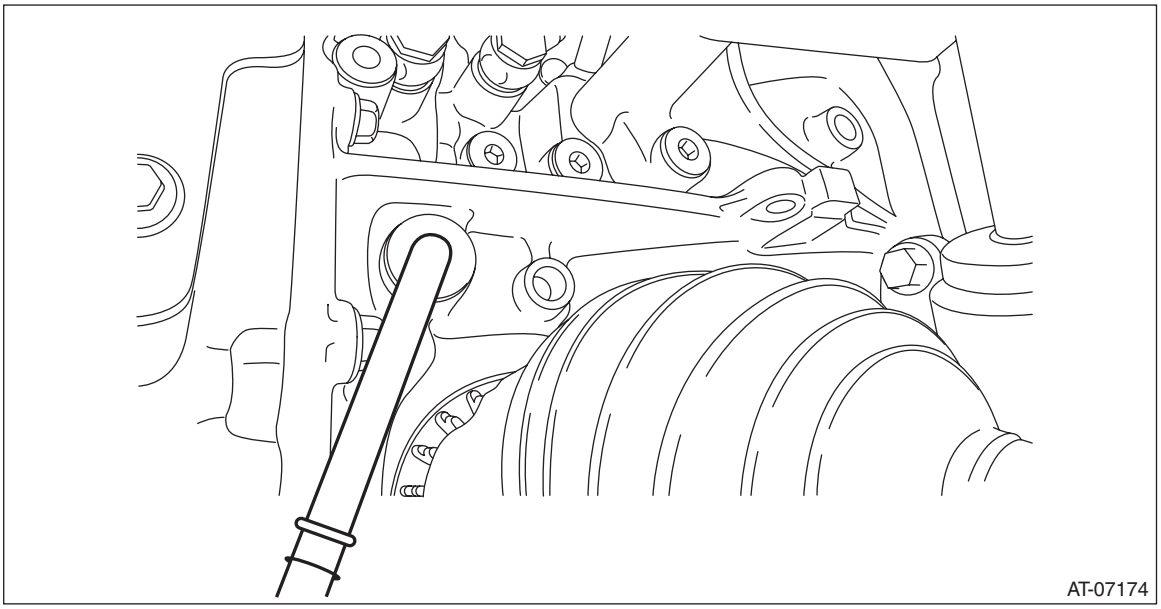


(A) Filler plug

5) Pour gear oil into the filler plug hole.

Recommended gear oil:
<Ref. to CVT-4, RECOMMENDED GEAR OIL, SPECIFICATION, General Description.>

Gear oil capacity:
<Ref. to CVT-4, RECOMMENDED GEAR OIL, SPECIFICATION, General Description.>



6) Adjust the level of differential gear oil. <Ref. to CVT-40, ADJUSTMENT, Differential Gear Oil.>

4. AWD ON/OFF Switching Mode

A: GENERAL DESCRIPTION

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

B: PROCEDURE

CAUTION:
• Do not turn the power of the Subaru Select Monitor OFF during work, and do not disconnect the data link connector.
• On completing the work in FWD, switch back in AWD.
1) Shift the select lever to “P” range.
2) Connect the Subaru Select Monitor to data link connector.
3) Turn the ignition to ON. (For model with push button ignition switch, press the push button ignition switch twice without depressing brake pedal.)
4) Turn off all switches causing an electrical load, such as headlights, A/C, seat heater and rear defogger.
5) Select {Work Support} in the «Transmission Diagnosis» screen of Subaru Select Monitor.
6) Select {Maintenance mode} in the «Work Support» screen of Subaru Select Monitor.
7) Select {AWD ON/OFF switching mode} in the «Maintenance mode» screen of the Subaru Select Monitor.
8) Follow the messages displayed on the Subaru Select Monitor screen when working.
Switching completes successfully if any of the following messages is displayed.
- When switching from AWD to FWD: {Switched to FF. To return to AWD, perform basic mode again.}
- When switching from FWD to AWD: {Switched to AWD. To return to FF, perform basic mode again.}

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

5. Road Test

A: INSPECTION

1. GENERAL PRECAUTION

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

CAUTION:
Always observe the local traffic laws when performing the test.

2. D RANGE SHIFT FUNCTION

Make sure the engine speed is 1,100 — 1,400 rpm 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

- 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.

6. Stall Test

A: INSPECTION

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

NOTE:
Stall test is extremely important in diagnosing the condition of CVT and engine. The test is necessary to measure the engine stall speeds in “R” and “D” range.
Purposes of the stall test:
- Operational check of forward clutch and reverse brake
- Operational check of the torque converter assembly
- Engine performance check

1) Place wheel chocks at the front and rear of all wheels and engage the parking brake.
2) Turn the A/C OFF.
3) Using the Subaru Select Monitor, check if the throttle valve operates when you depress the accelerator pedal. <Ref. to EN(H4DO)(diag)-43, DISPLAY OF ENGINE FREEZE FRAME DATA, OPERATION, Subaru Select Monitor.>
4) Check the engine oil level. <Ref. to LU(H4DO)-8, Engine Oil.>
5) Check the coolant level. <Ref. to CO(H4DO)-14, Engine Coolant.>
6) Adjust the CVTF level. <Ref. to CVT-36, ADJUSTMENT, CVTF.>
7) Increase the CVTF temperature to 60 — 80°C (140 — 176°F) with the engine running and the select lever shifted to “N” or “P” range.
8) Shift the select lever to “D” range.
9) Depress the accelerator pedal to the full while fully depressing the foot brake pedal with your left foot.
10) 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.
11) 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 rpm or less.
- If the stall speed is higher than the specified range, attempt to finish the stall test in as short a time as possible, in order to prevent the CVT from sustaining damage.

Stall speed standard:
D range: 2,000 — 2,700 rpm
R range: 1,900 — 2,600 rpm

Stall test judgment

Range	Range	Probable cause
Lower than standard value	D, R	• Insufficient engine output • Torque converter malfunction
Higher than standard value	D	• Forward clutch slippage • Secondary pressure (line pressure) is low. • Variator chain malfunction
	R	• Reverse brake slippage • Secondary pressure (line pressure) is low. • Variator chain malfunction
	D, R	• Torque converter malfunction • Control valve body malfunction • TCM malfunction • Damaged harness and harness connector

7. Time Lag Test

A: INSPECTION

NOTE:
When the select lever is shifted while the engine is idling, there will be a certain time elapse or lag before shock is felt. This symptom helps to check the condition of forward clutch and reverse brake.
- Perform the test at normal operation CVTF temperature of 60 — 80°C (140 — 176°F).
- Be sure to allow one minute or more interval between tests.
- Make three measurements and take the average value.

1) Apply the 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:
1.5 seconds or less

If “N” → “D” time lag is longer than specified:
- Secondary pressure (line pressure) is too low.
- Forward clutch worn
- Forward clutch piston malfunction
- Control valve body malfunction
- Learning incomplete

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

Time lag standard:
1.5 seconds or less

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

8. Secondary Pressure (Line Pressure) Test

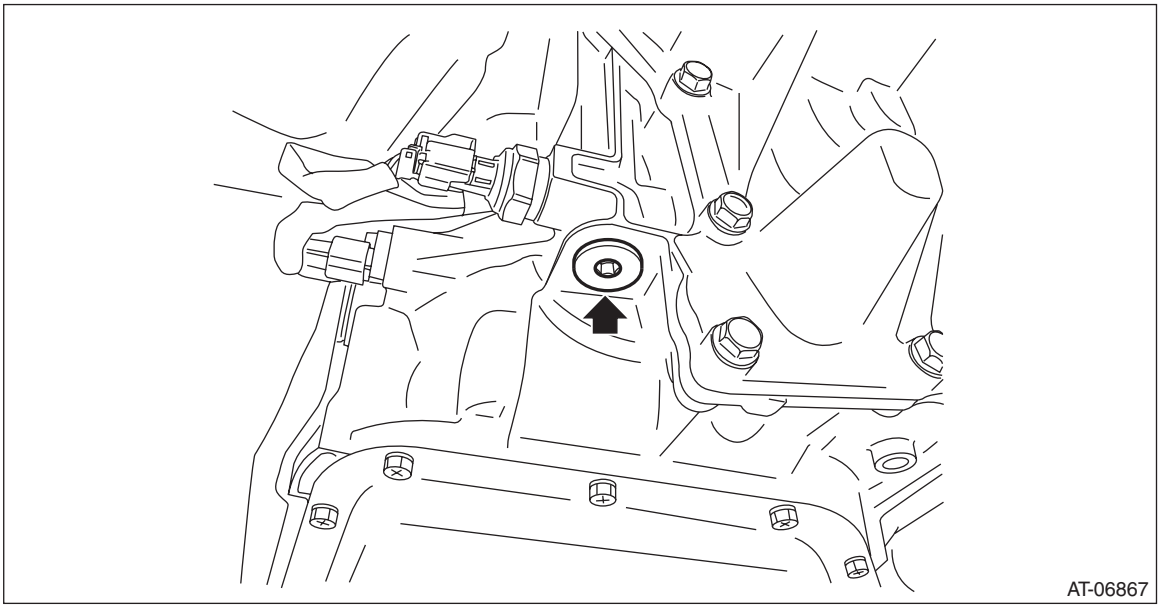
A: INSPECTION

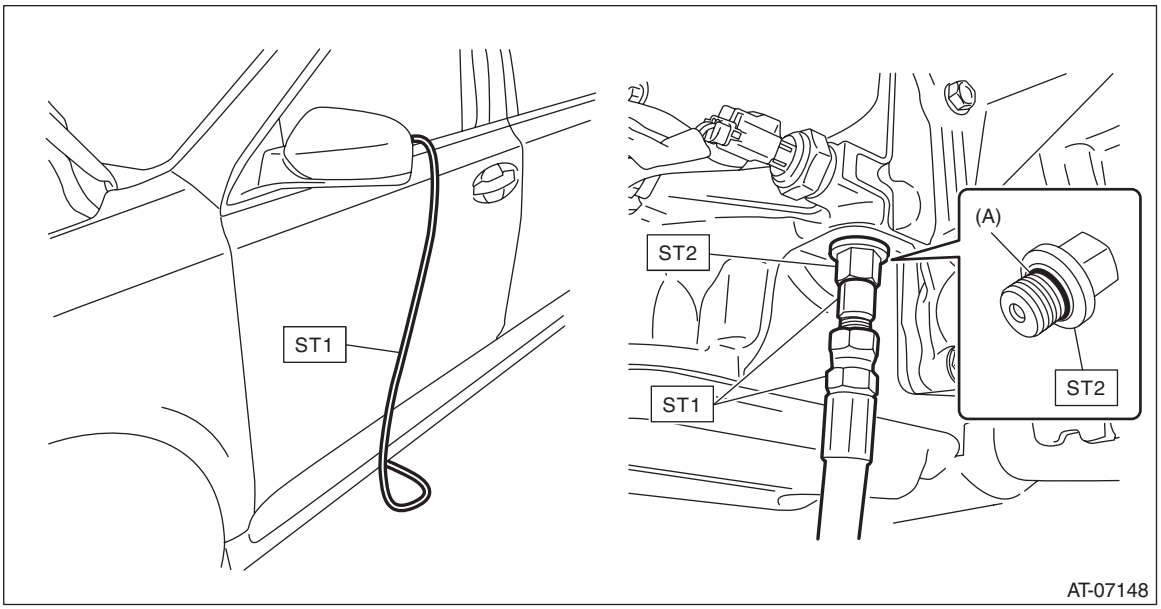
CAUTION:
• Directly after the vehicle has been running or the engine has been idling for a long time, the CVTF is hot. Be careful not to burn yourself.
• Make sure no other person is around the vehicle during secondary pressure (line pressure) test measurement.
• After performing the secondary pressure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

NOTE:
• If the pulley and variator chain, clutch or brake show signs of slipping or shift feel is not correct, check the secondary pressure (line pressure).
• Connect Subaru Select Monitor to vehicle so as to measure the engine speed and actual secondary pressure (secondary pressure (line pressure)).
• In many cases, slippage or inability to operate the vehicle may be due to insufficient oil pressure for the operation of clutch, brake or control valve.
1) Lift up the vehicle.
2) Remove the secondary pressure (line pressure) test plug, and install ST1 and ST2.

CAUTION:
Removal of the test plug and installation of the ST shall be both performed quickly.

NOTE:
Use ST2 PRESSURE GAUGE ADAPTER with genuine O-ring (part No. 806916050) attached.
ST1 18801AA000 OIL PRESSURE GAUGE ASSY
ST2 18681AA010 PRESSURE GAUGE ADAPTER





(A) O-ring (genuine part)

3) Lower the vehicle.
4) Set the gauge so that it can be seen from the driver's seat.
5) Using the Subaru Select Monitor, check if the throttle valve operates when you depress the accelerator pedal. <Ref. to EN(H4DO)(diag)-43, DISPLAY OF ENGINE FREEZE FRAME DATA, OPERATION, Subaru Select Monitor.>
6) Check the engine oil level. <Ref. to LU(H4DO)-8, Engine Oil.>
7) Check the coolant level. <Ref. to CO(H4DO)-14, Engine Coolant.>
8) Adjust the CVTF level. <Ref. to CVT-36, ADJUSTMENT, CVTF.>
9) Increase the CVTF temperature to 60 — 80°C (140 — 176°F) with the engine running and the select lever shifted to "N" or "P" range.
10) Shift the select lever to "D" range.
11) Depress the accelerator pedal to the full while fully depressing the foot brake pedal with your left foot.
12) 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 rpm 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 — 6.0 (45.9 — 61.2, 652 — 870)
Idling	P, N	Full closed	OFF	0.5 — 1.5 (5.1 — 15.3, 72 — 218)

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

CAUTION:
Removal of the ST and installation of the test plug shall be both performed quickly.

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

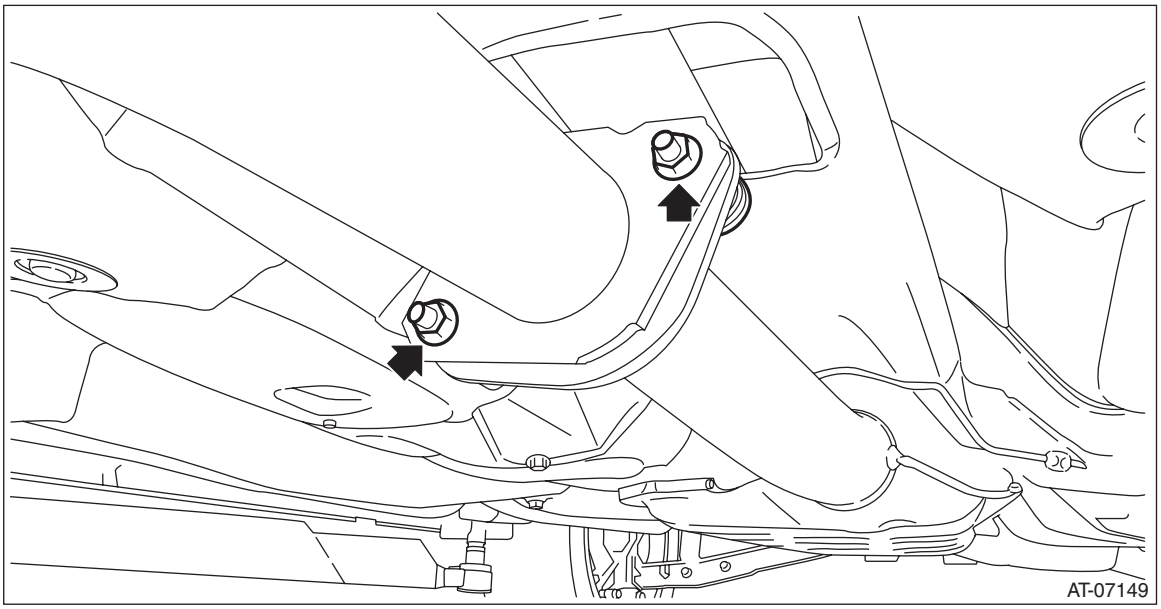
Tightening torque:
50 N·m (5.1 kgf-m, 36.9 ft-lb)

14) Adjust the CVTF level. <Ref. to CVT-36, ADJUSTMENT, CVTF.>

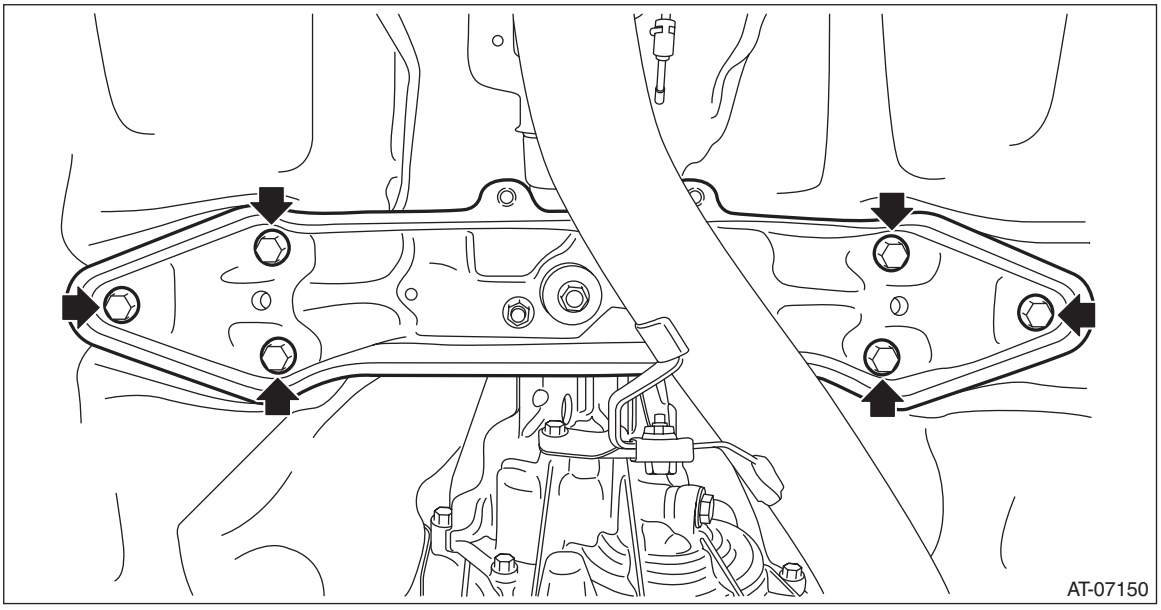
9. Transfer Clutch Pressure Test

A: INSPECTION

1) Lift up the vehicle.
2) Remove the rear exhaust pipe from center exhaust pipe.



3) Remove the center exhaust cover.
4) Set the transmission jack under the transmission.
5) Remove the mounting bolt of rear crossmember.

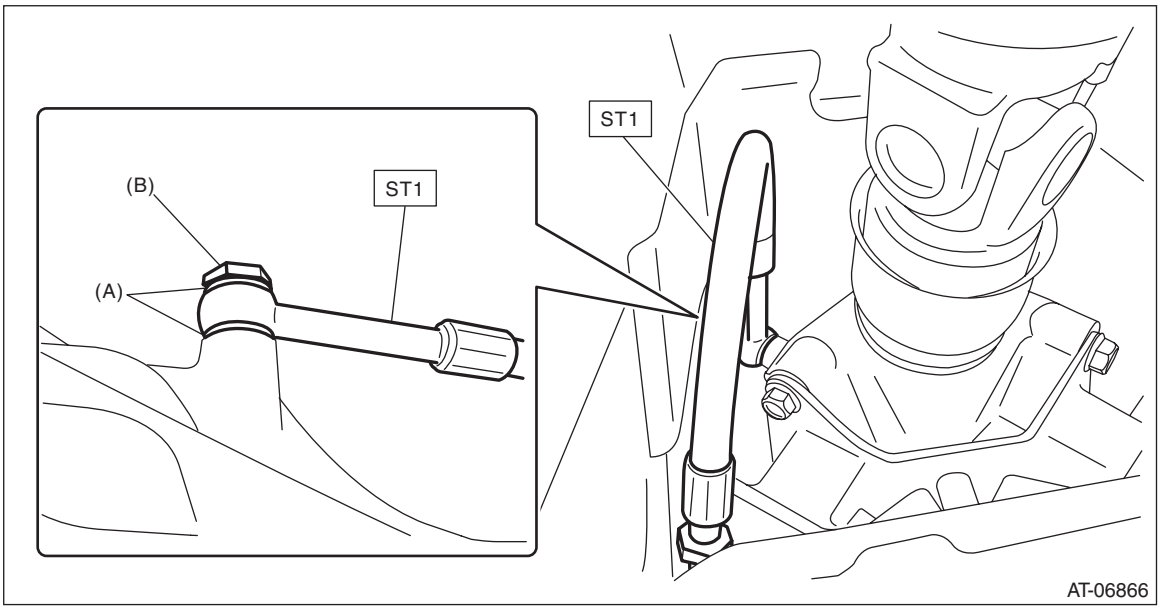


6) Lower the rear side of transmission until the transfer clutch pressure test plug can be removed.
7) Remove the transfer clutch pressure test plug.

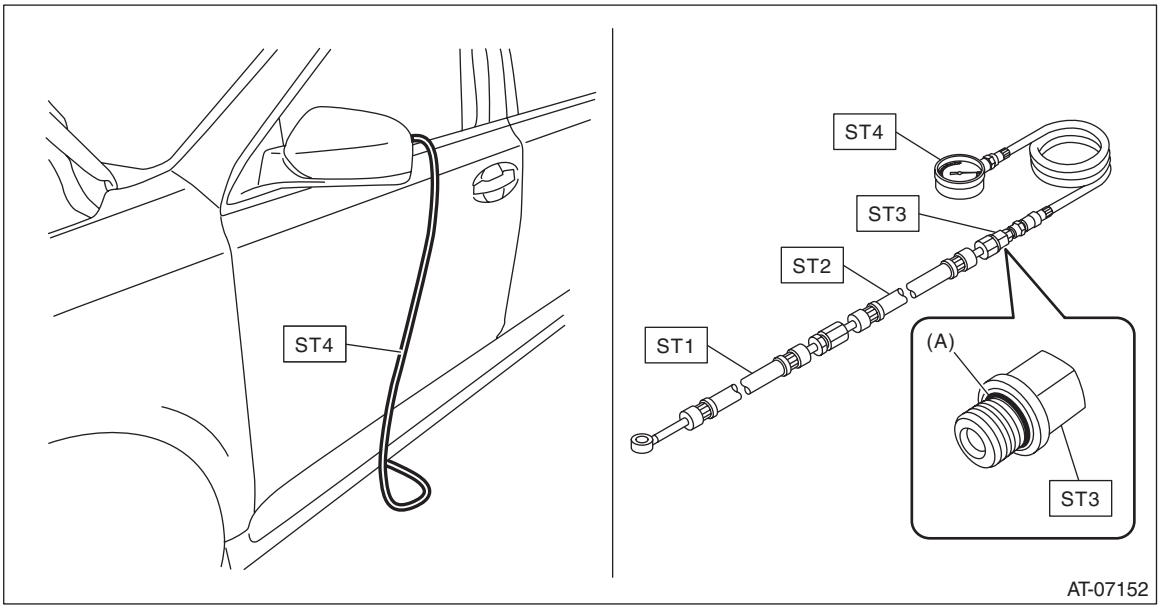
8) Set the ST1, ST2, ST3 and ST4 to the transmission.

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

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



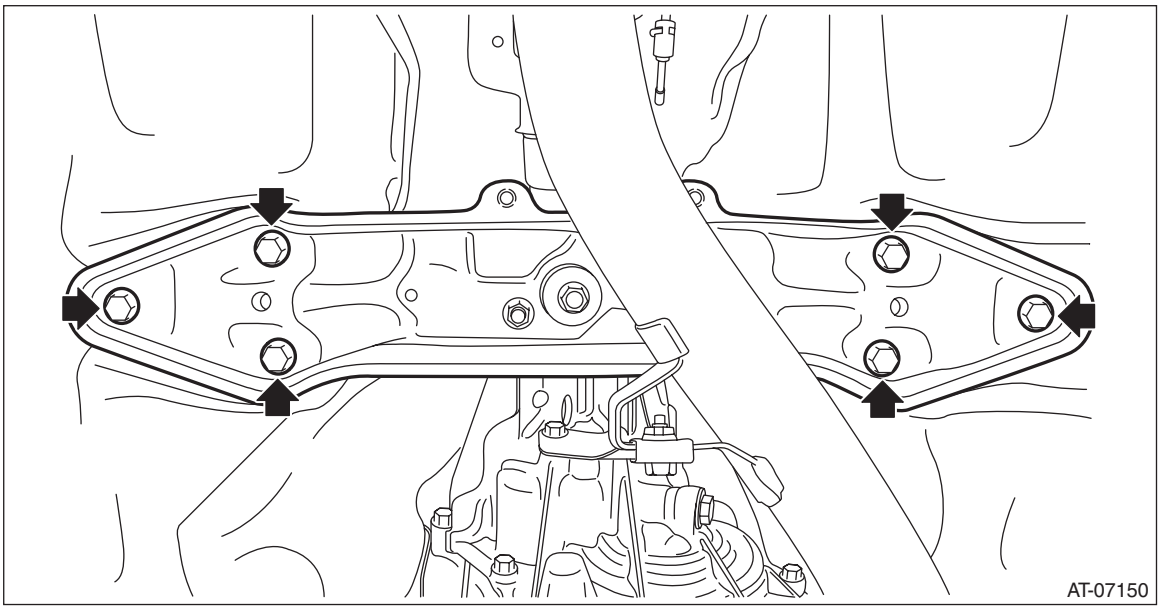
(A) Gasket (genuine part)
(B) Union screw (genuine part)



(A) O-ring (genuine part)

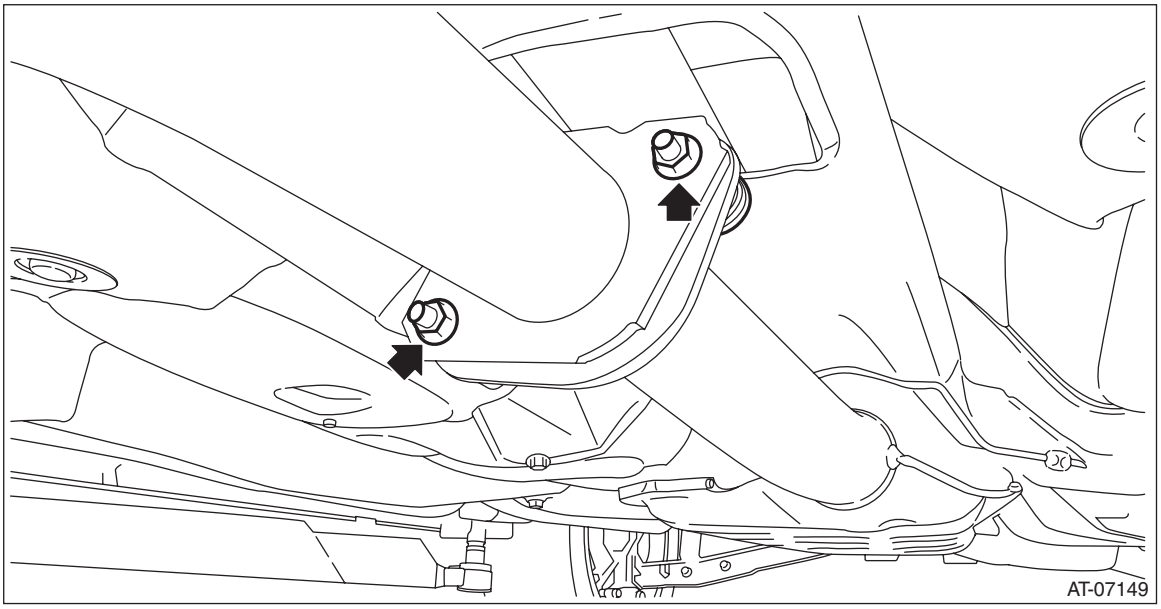
9) Raise the transmission, and install the rear crossmember.

Tightening torque:
75 N·m (7.6 kgf-m, 55.3 ft-lb)



10) Install the rear exhaust pipe to center exhaust pipe.

Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)



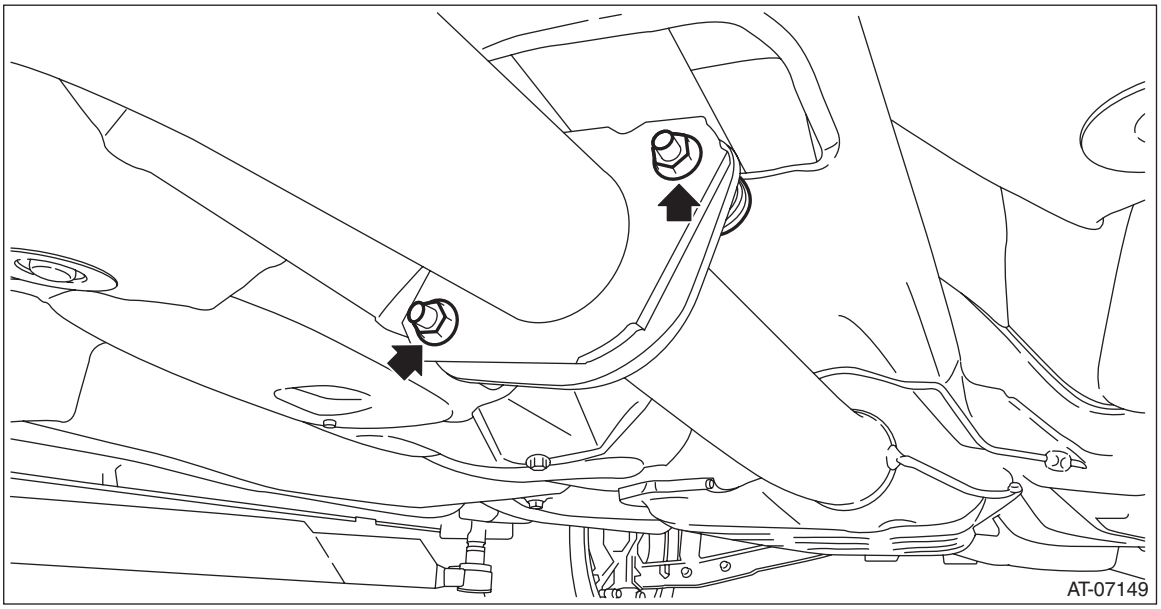
11) Lower the vehicle.
12) Connect the Subaru Select Monitor to the data link connector and read the current data.

13) Check the transfer clutch pressure as in secondary pressure (line pressure) test. <Ref. to CVT-48, Secondary Pressure (Line Pressure) Test.>

NOTE:
- Use Subaru Select Monitor for switching to FWD mode. <Ref. to CVT-44, AWD ON/OFF Switching Mode.>
- If no oil pressure is produced, if it does not change in AWD mode or if oil pressure is produced in FWD mode, there may be a problem in the control valve body.

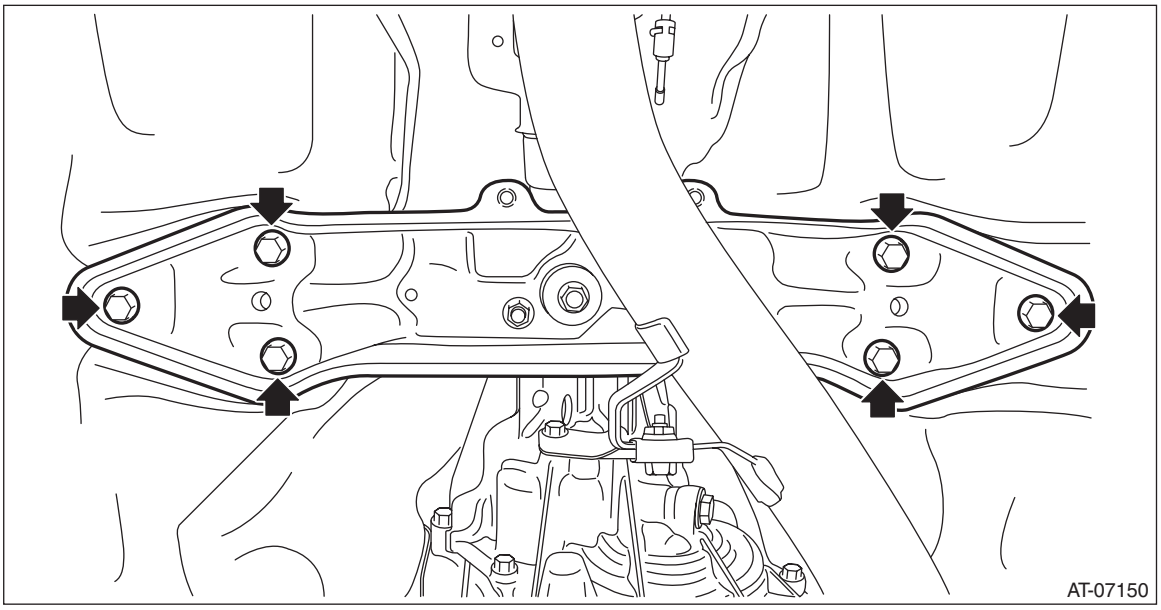
Range position	ON Duty ratio (%)	Accelerator pedal opening angle (%)	Standard transfer clutch pressure kPa (kgf/cm^2, psi)	
			AWD mode	FWD mode
D	95 — 100	Fully opened (100)	1,000 — 1,200 (10.2 — 12.2, 145 — 174)	—
	60	Adjust ON Duty ratio to 60%.	400 — 700 (4.1 — 7.1, 58 — 102)	—
	0	Fully closed (0)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

14) Lift up the vehicle.
15) Remove the rear exhaust pipe from center exhaust pipe.



16) Set the transmission jack under the transmission.

17) Remove the mounting bolt of rear crossmember.



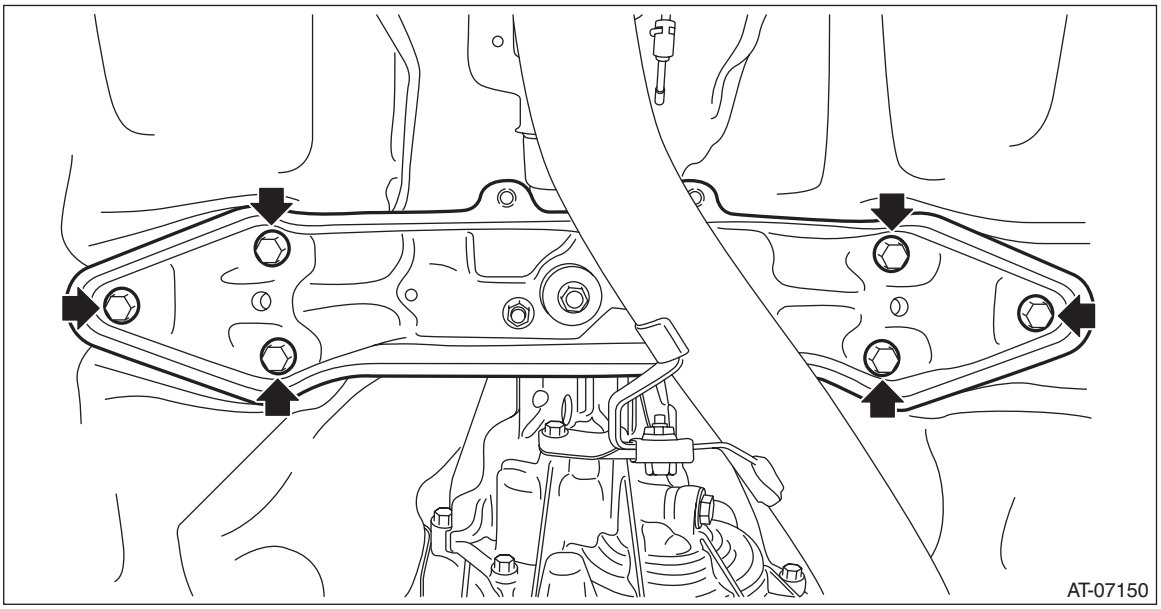
18) Lower the rear side of transmission until the ST can be removed.
19) Remove the ST and install the plug.

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

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

20) Raise the transmission, and install the rear crossmember.

Tightening torque:
75 N·m (7.6 kgf-m, 55.3 ft-lb)



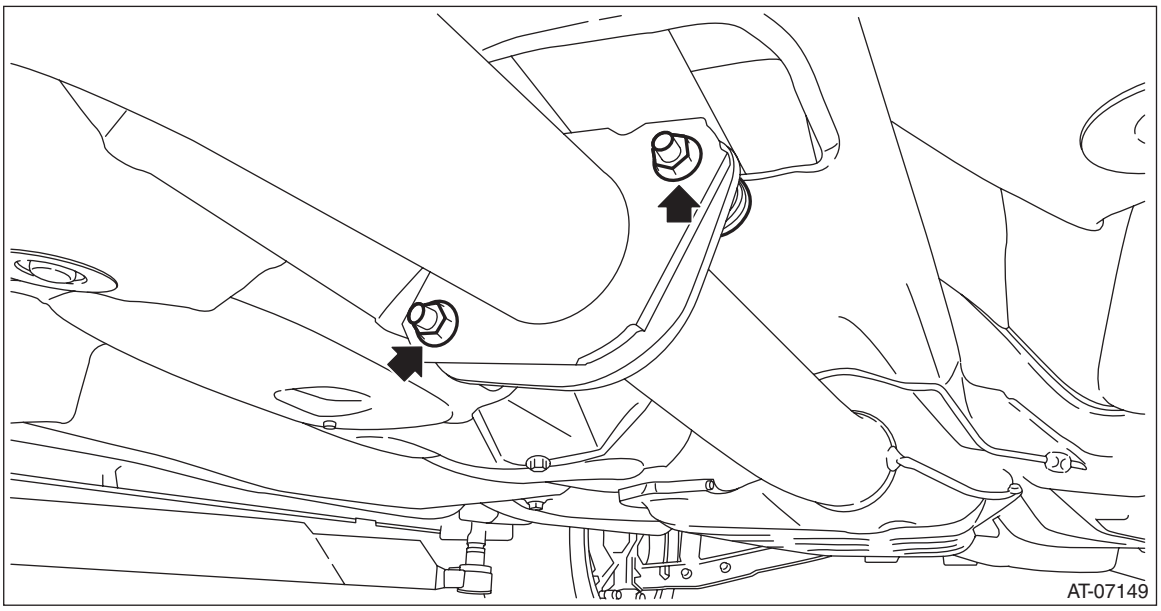
21) Install the center exhaust cover.

Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)

22) Install the rear exhaust pipe to center exhaust pipe.

NOTE:
Use a new gasket.

Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)

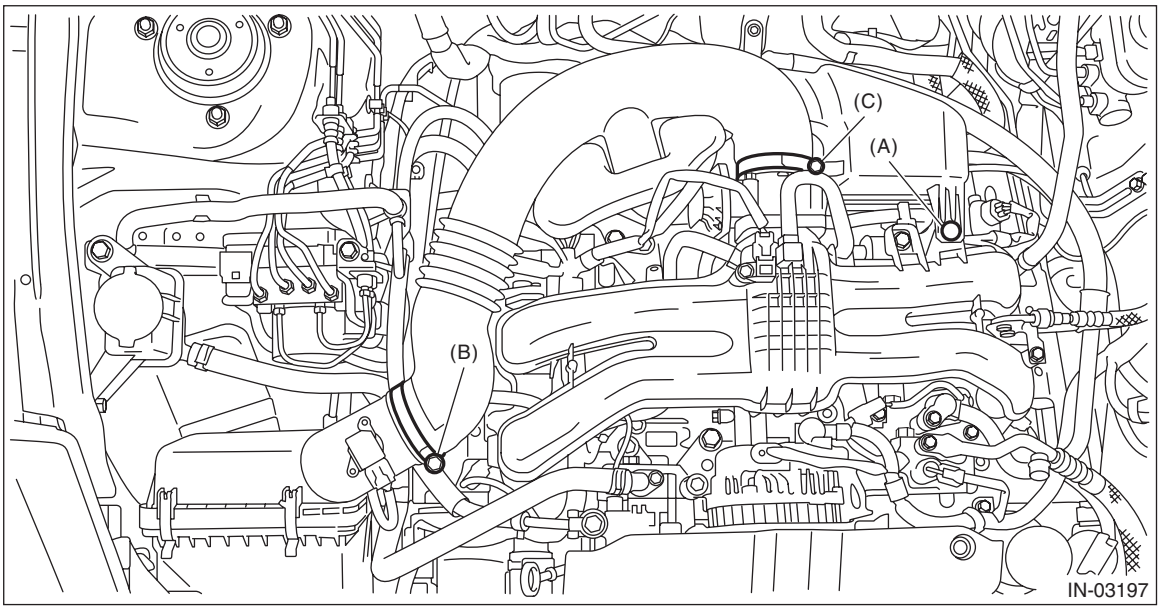


23) Lower the vehicle.

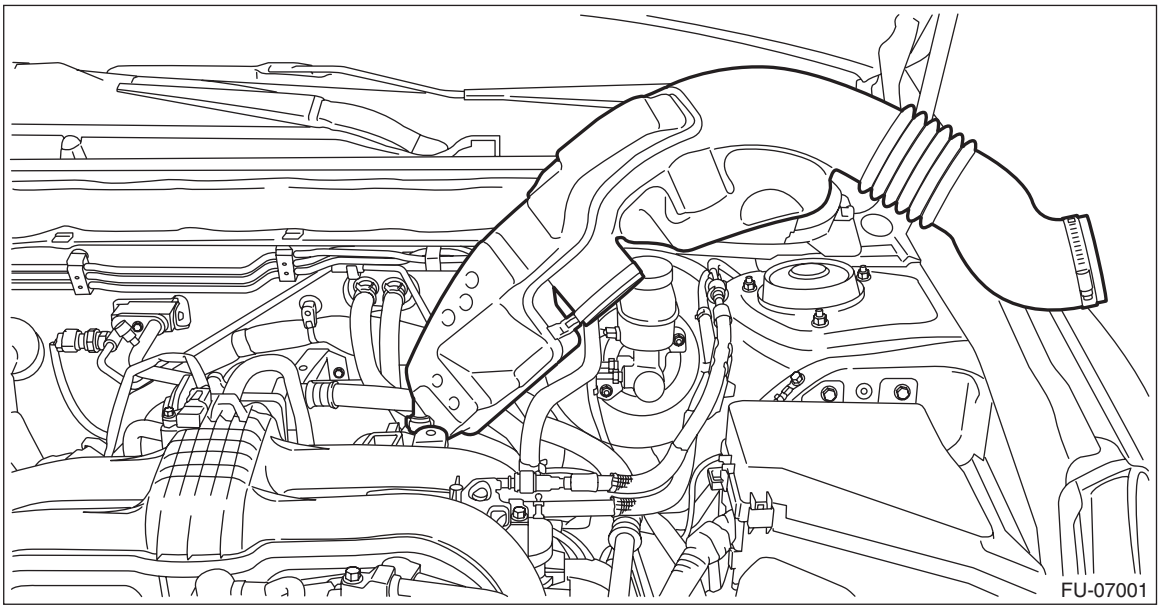
10.Automatic Transmission Assembly

A: REMOVAL

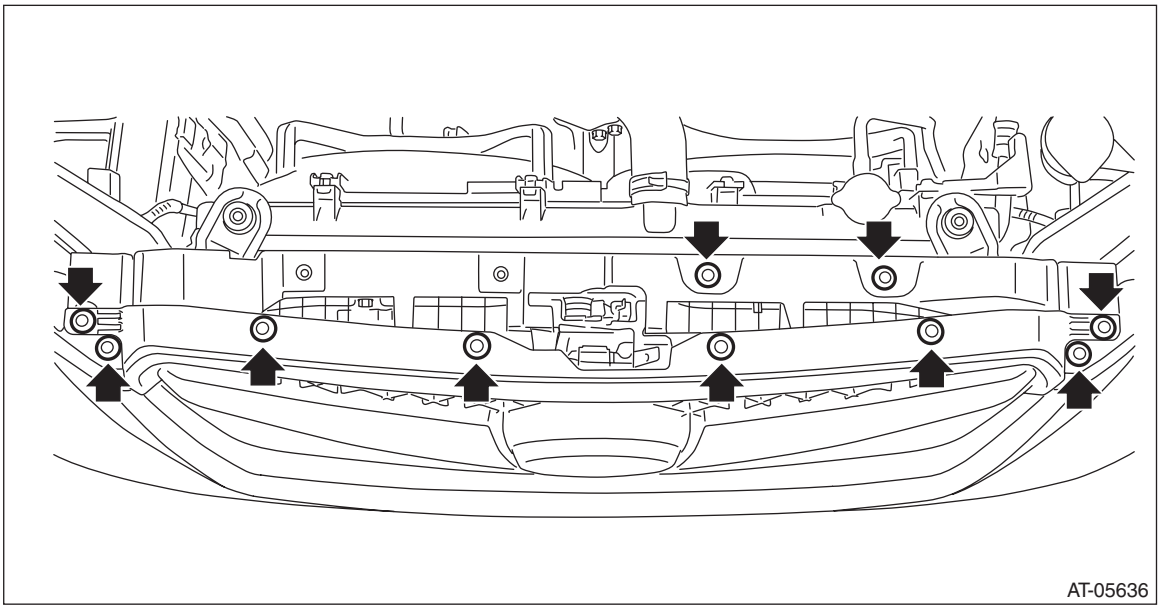
1) Remove the front wheels.
2) Disconnect the ground cable from battery.
3) Remove the air intake duct. <Ref. to IN(H4DO)-14, REMOVAL, Air Intake Duct.>
4) Remove the clip (A) from the air intake boot.
5) Loosen the clamp (B) connecting the air intake boot and air cleaner case (rear).
6) Loosen the clamp (C) which connects the air intake boot and throttle body.



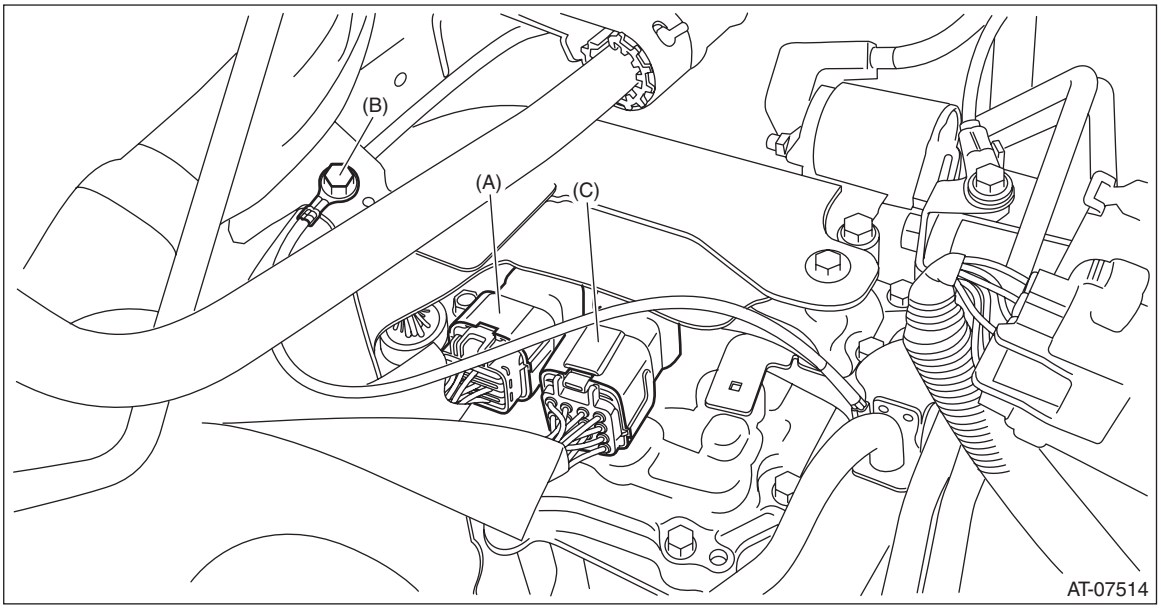
7) Remove the air intake boot from the throttle body, and move it to the left side wheel apron.



8) Remove the ten clips and remove the grille bracket.

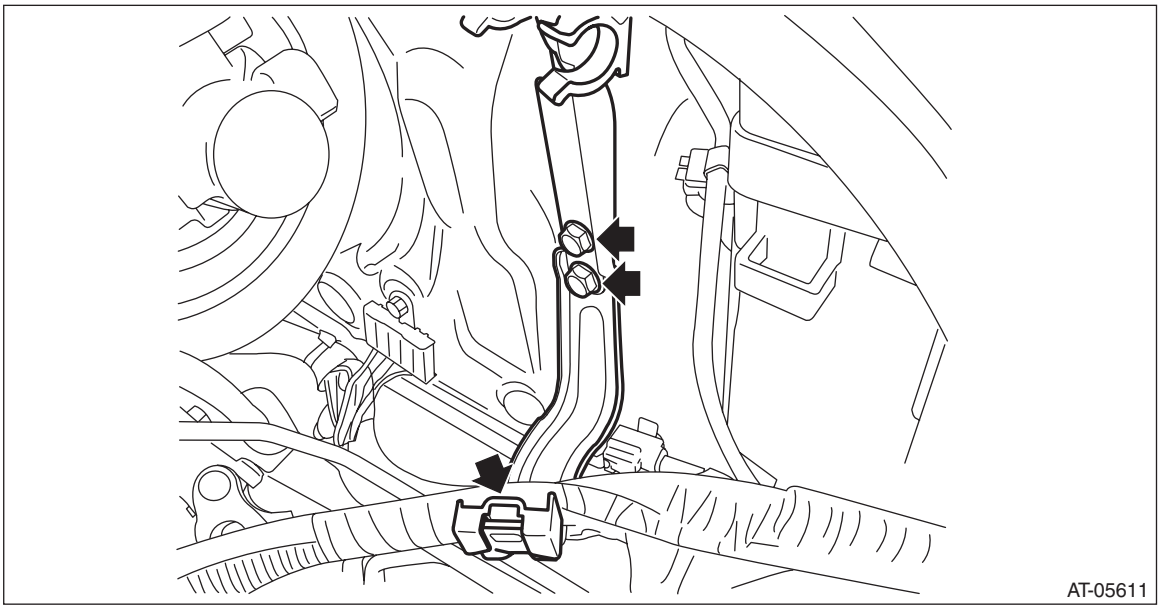


9) Disconnect the following connectors.
- Transmission harness connectors
- Transmission radio ground terminal
- Inhibitor harness connector



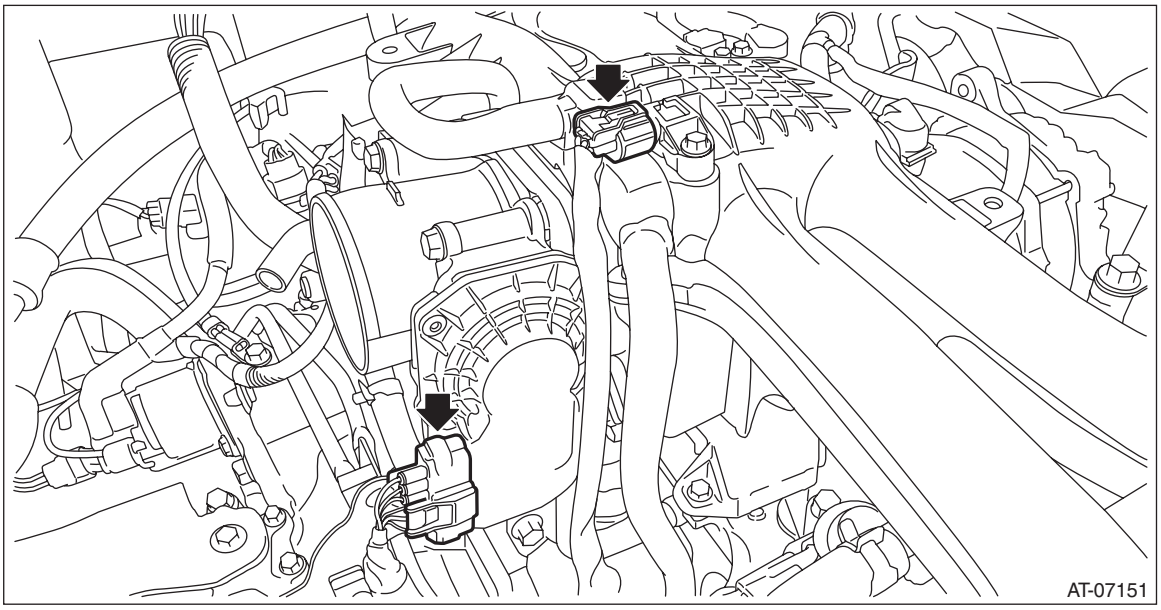
(A) Transmission harness connectors
(B) Transmission radio ground terminal
(C) Inhibitor harness connector

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

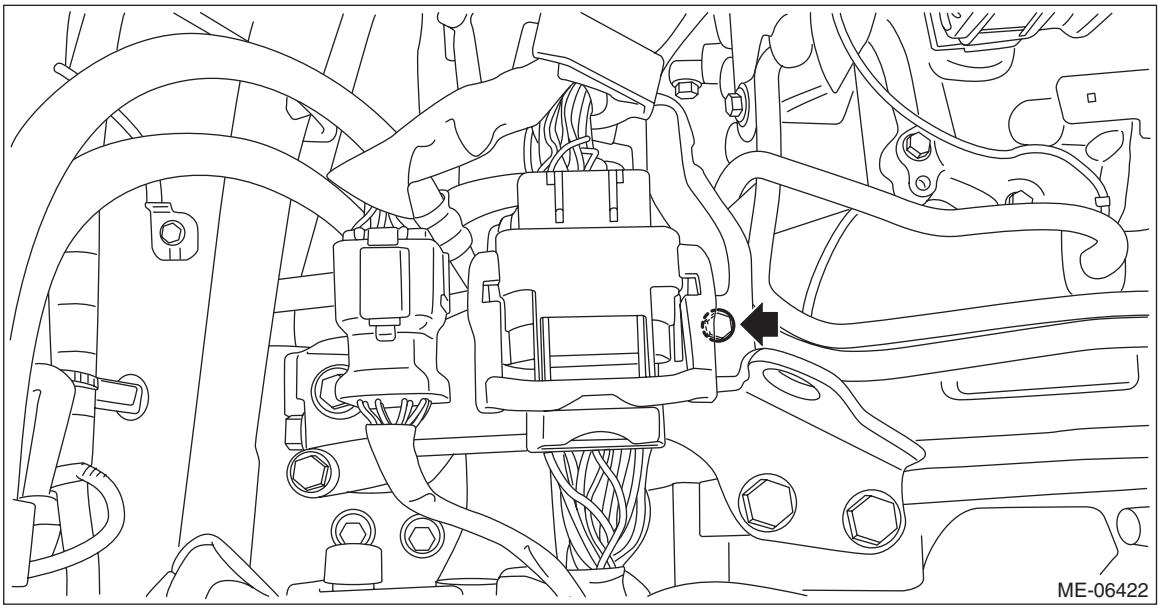


11) Remove the starter. <Ref. to SC(H4DO)-7, REMOVAL, Starter.>

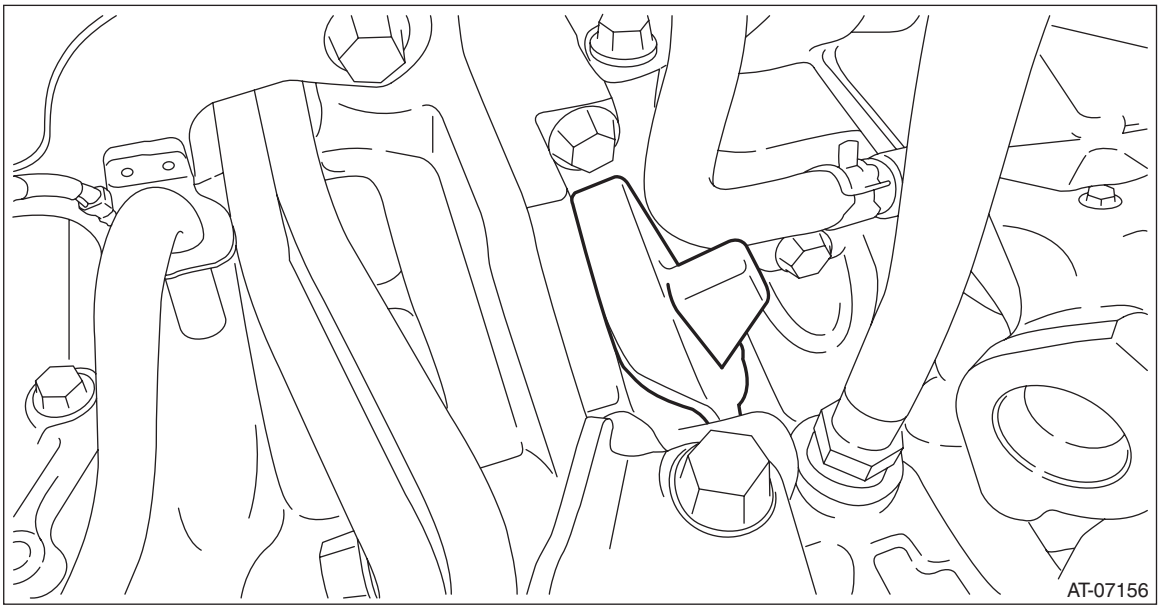
12) Disconnect the throttle position sensor harness connector and manifold pressure sensor harness connector.



13) Remove the bolt and disconnect the engine harness connector bracket.

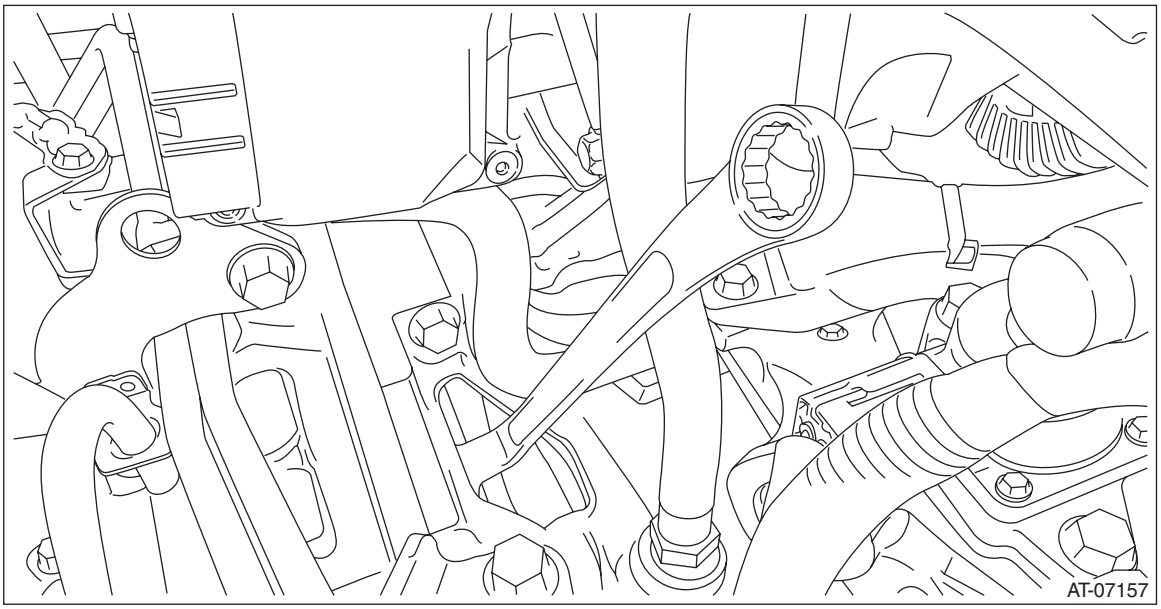


14) Disconnect the engine harness connector.
15) Remove the service hole plug.

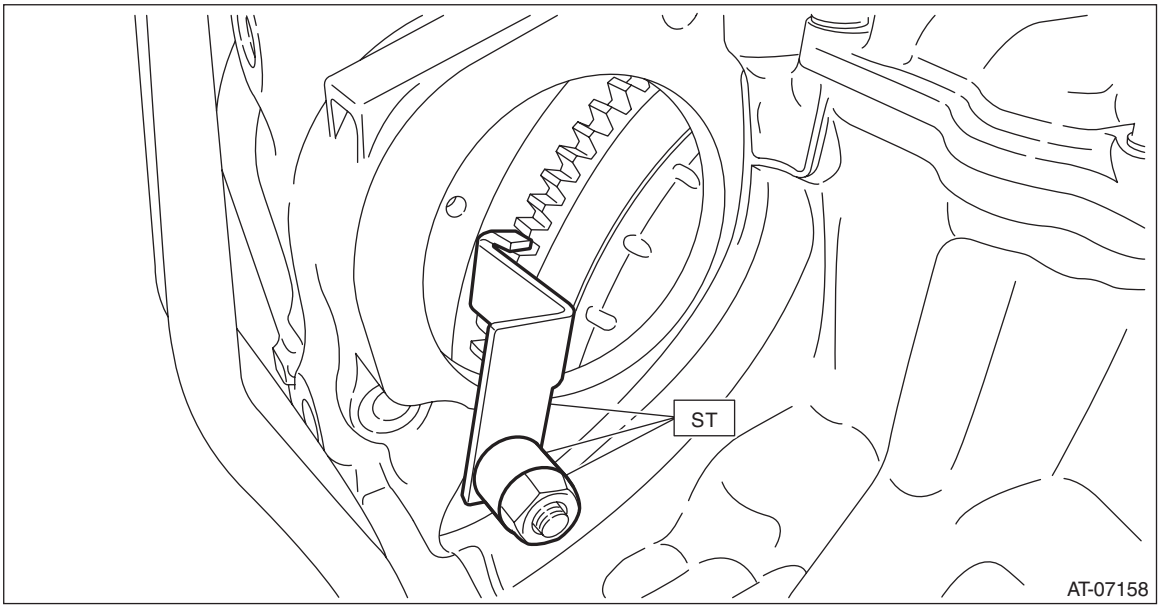


16) Remove the four bolts combining the torque converter and drive plate while rotating the crank pulley a little at a time in the same direction as engine revolution.

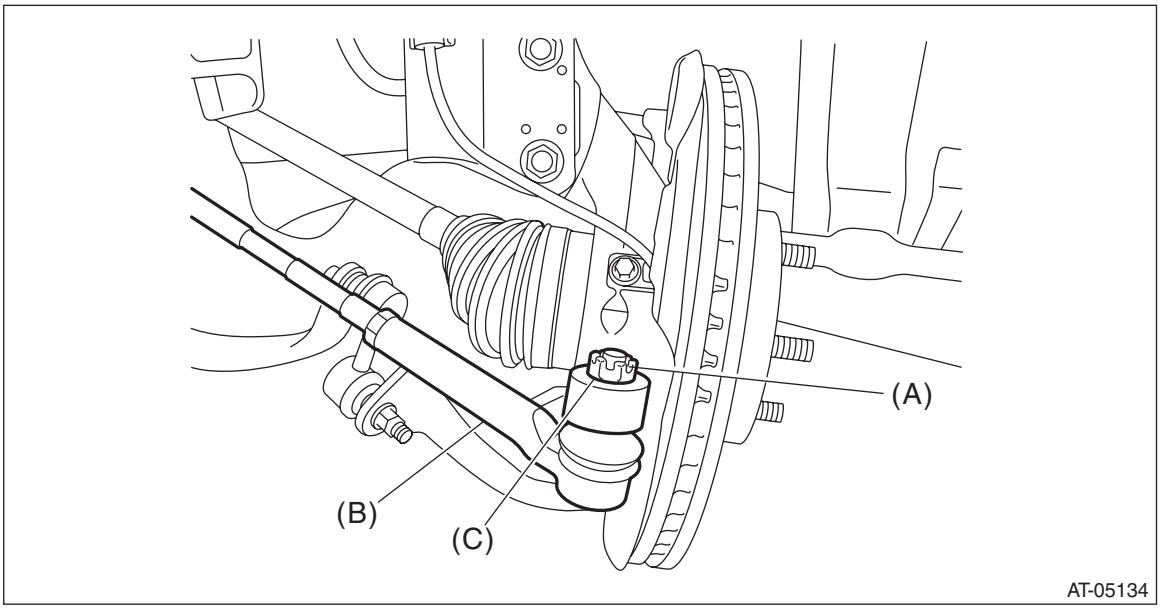
CAUTION:
- **Be careful not to drop bolts into converter housing.**
- **Be careful not to damage the mounting bolts.**



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

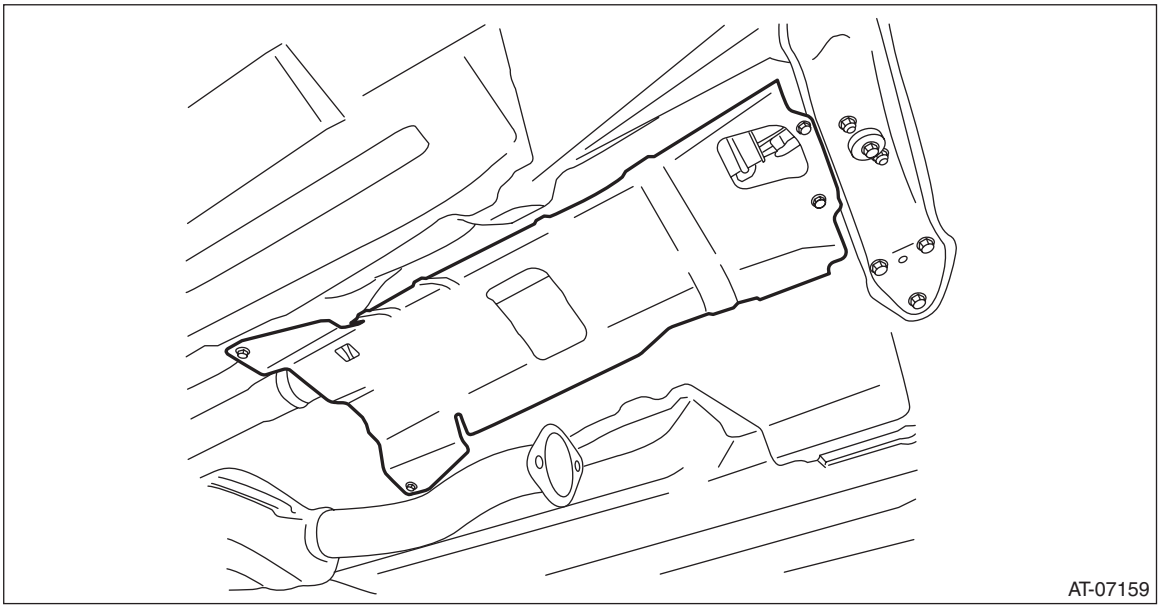


19) After pulling off the cotter pin and removing the castle nut, use a puller to remove the tie-rod end from the knuckle arm.

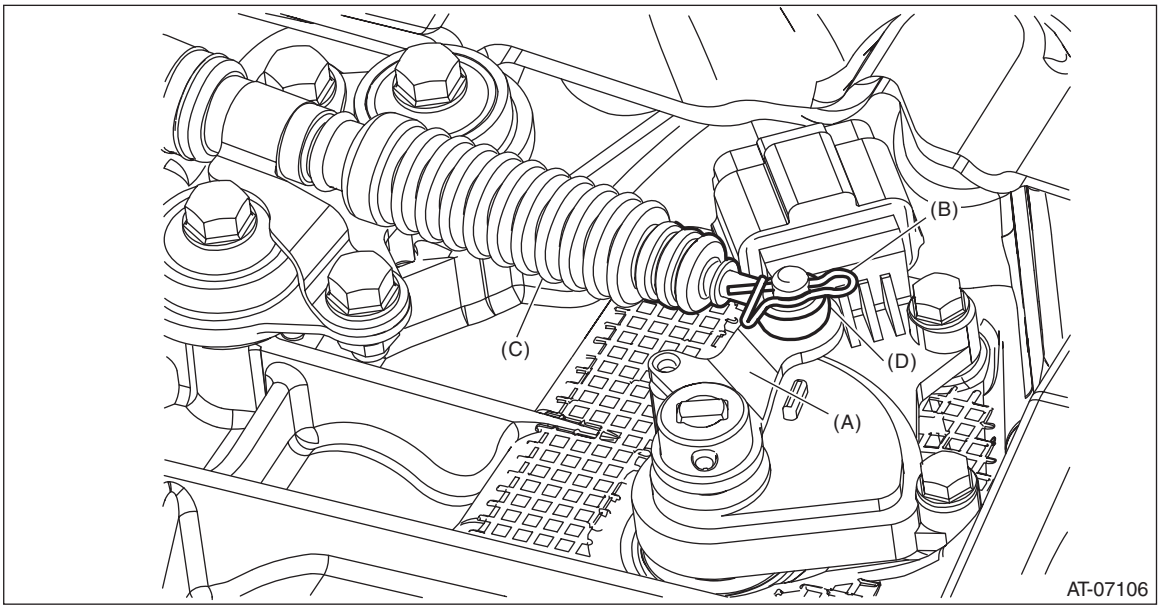


(A) Cotter pin
(B) Tie-rod end
(C) Castle nut

20) Lift up the vehicle.
21) Remove the under cover.
22) Remove the center exhaust pipe. <Ref. to EX(H4DO)-12, REMOVAL, Center Exhaust Pipe.>
23) Remove the CVTF drain plug to drain CVTF. <Ref. to CVT-37, REPLACEMENT, CVTF.>
24) Remove the center exhaust cover.

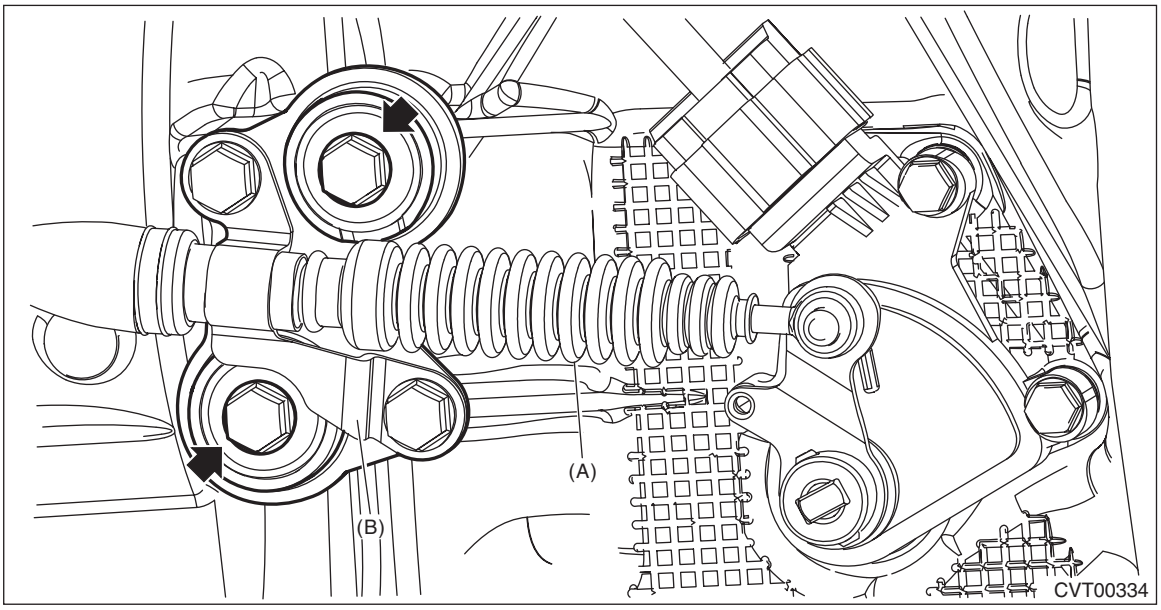


25) Remove the snap pin and washer from shifter arm and remove the select cable from shifter arm.



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

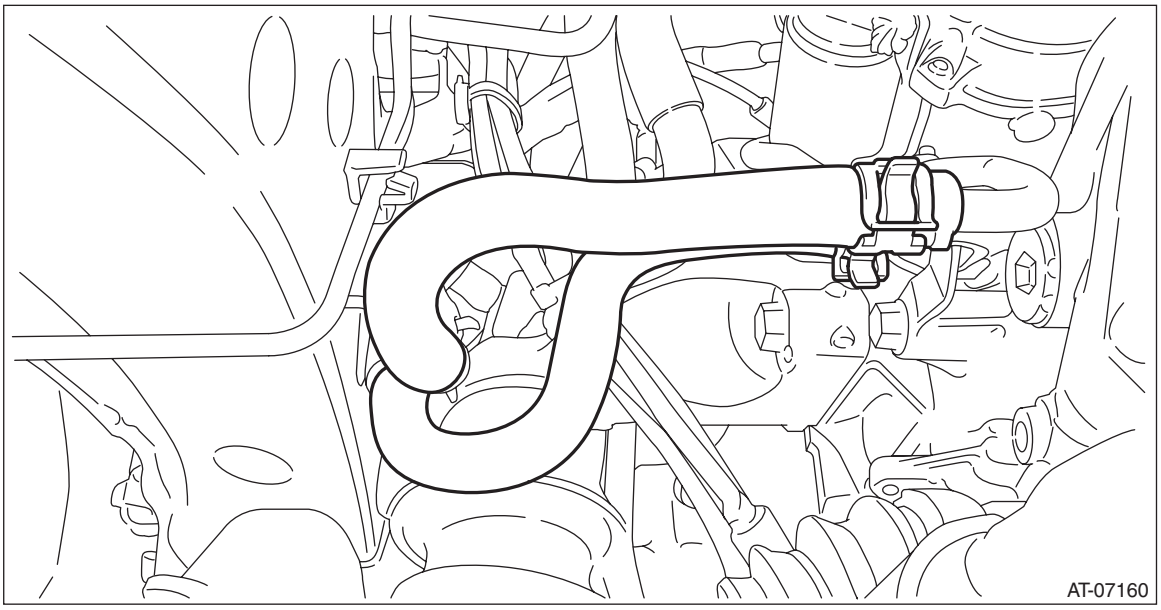
26) Remove the plate assembly from the transmission case.



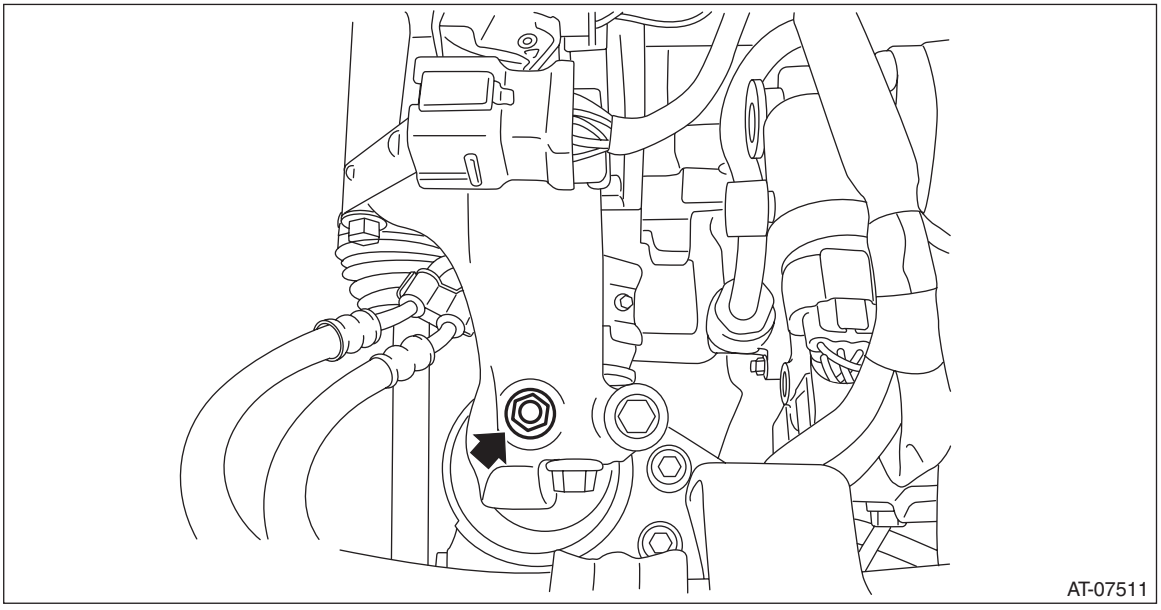
(A) Select cable
(B) Plate ASSY

27) Drain differential gear oil. <Ref. to CVT-42, REPLACEMENT, Differential Gear Oil.>

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



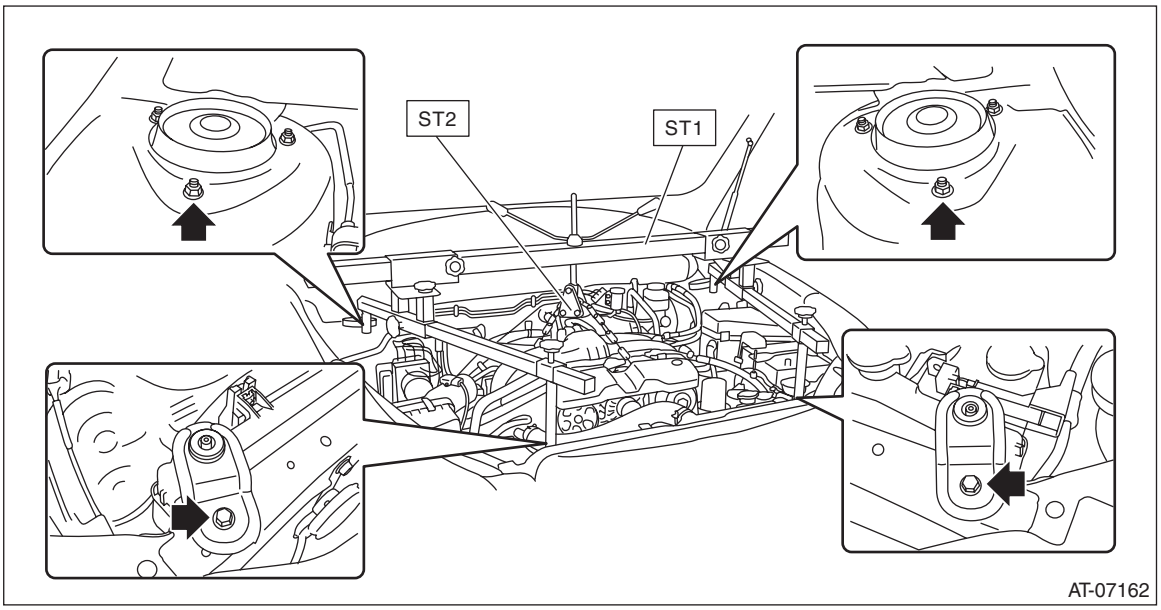
29) Remove the universal joint. <Ref. to PS-20, REMOVAL, Universal Joint.>
30) Remove the propeller shaft. <Ref. to DS-10, REMOVAL, Propeller Shaft.>
31) Remove the stabilizer link.
32) Disconnect the lower arm ball joint and housing.
33) Pull out the front drive shaft from transmission using a crowbar.
34) Holding the joint of front drive shaft from transmission side, pull out the drive shaft from transmission with care not to stretch the boot.
35) Lower the vehicle.
36) Remove the nuts from left and right transmission mounting brackets.

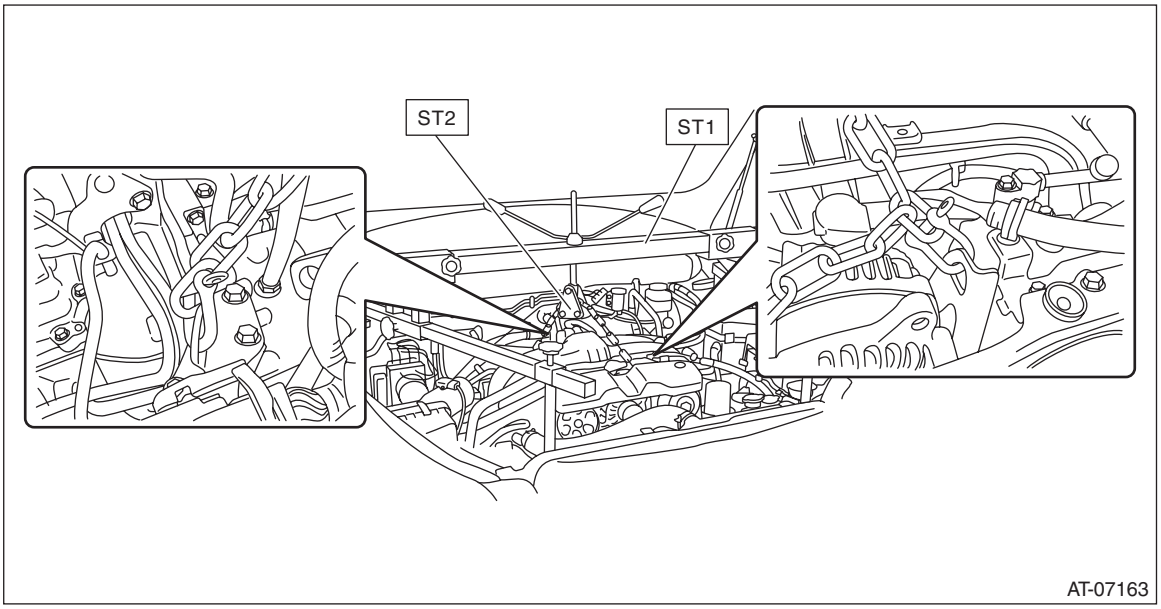


37) Remove the radiator main fan and radiator sub fan. <Ref. to CO(H4DO)-37, REMOVAL, Radiator Main Fan and Fan Motor.> <Ref. to CO(H4DO)-40, REMOVAL, Radiator Sub Fan and Fan Motor.>

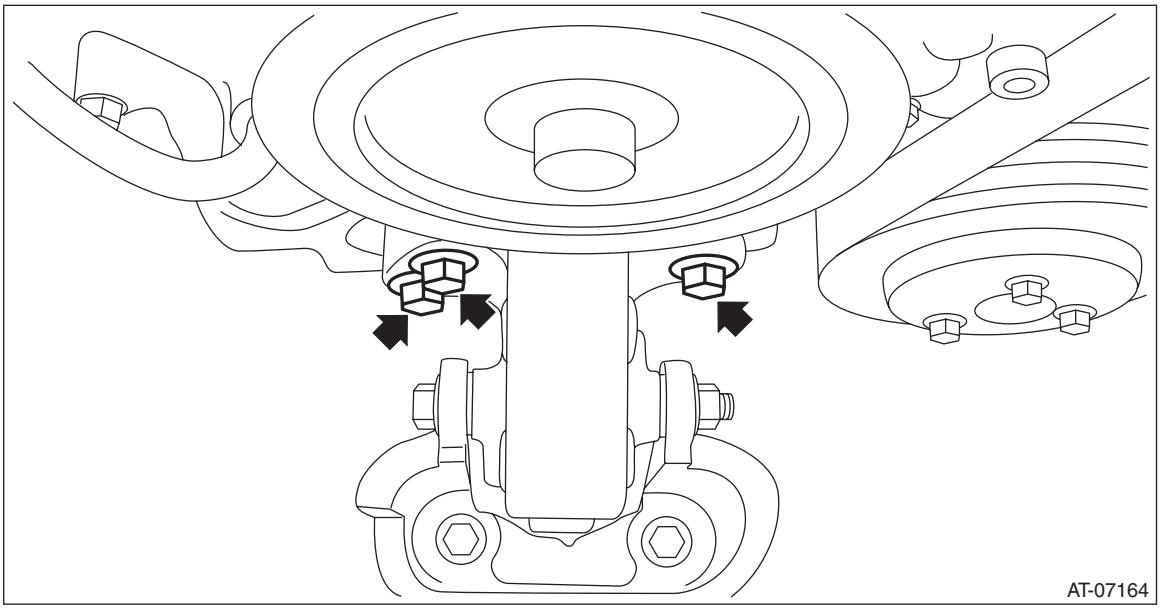
38) Set the ST1 and ST2 to vehicle.
ST1 99099AJ000 ENGINE HANGER
ST2 99099AJ010 CHAIN BALANCER

CAUTION:
- **Set so that the chain sling does not contact the engine parts.**
- **Set the arms of ST (ENGINE HANGER) at the locations shown in the figure.**

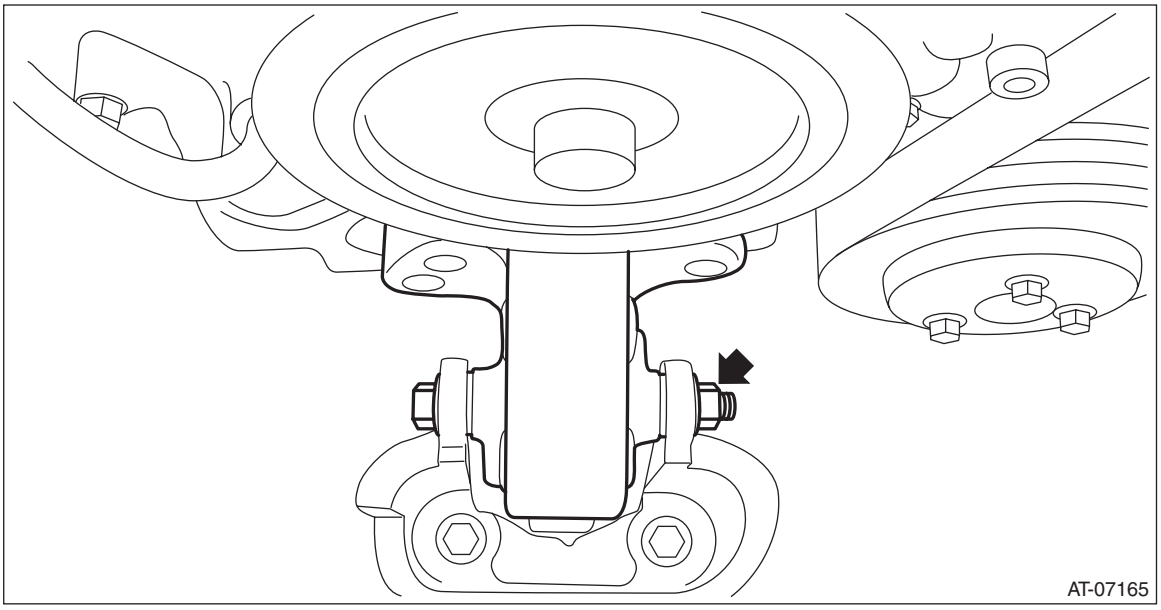




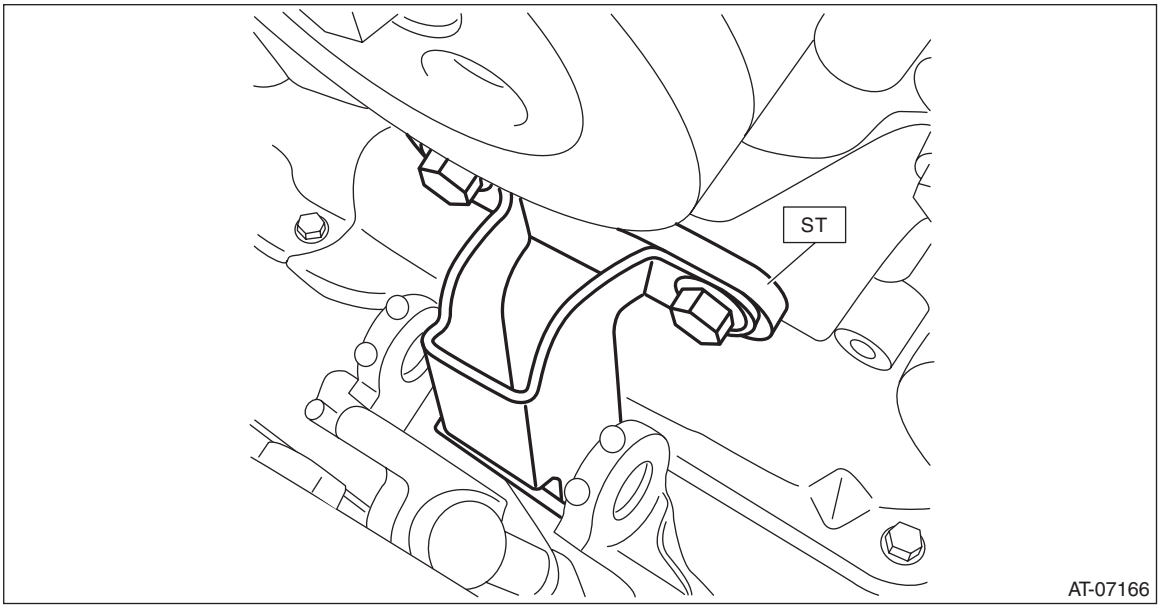
39) Lift the engine slightly and remove the engine mounting bolts.



40) Remove the engine mounting nut and bolt to remove the front cushion rubber.



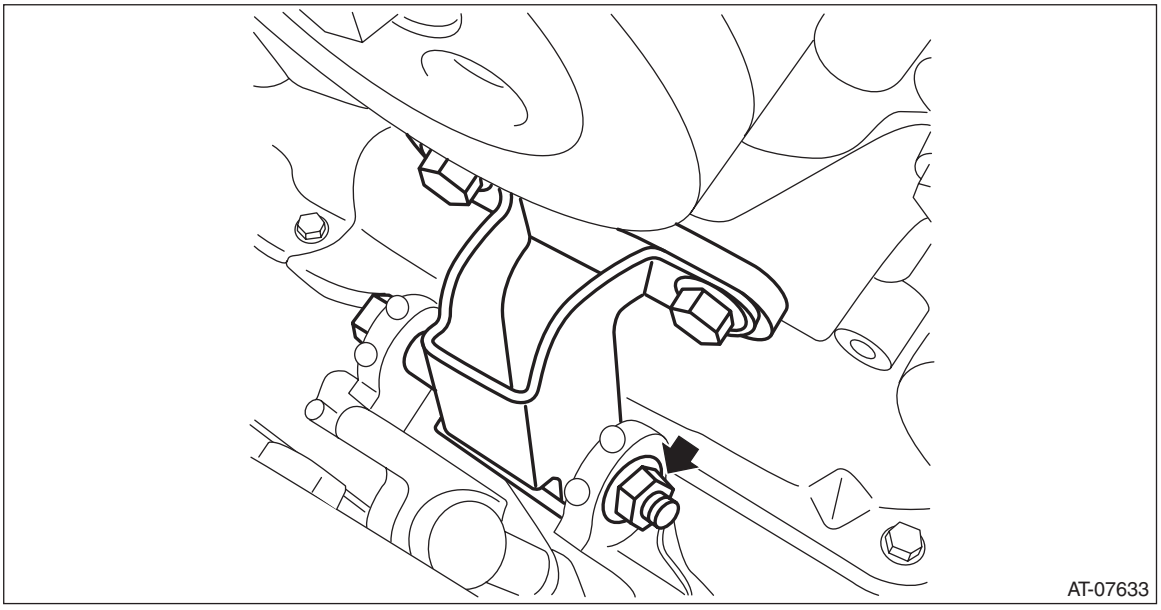
41) Temporarily attach ST by using two bolts.
ST 41099AJ130 SPECIAL TOOL FB



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

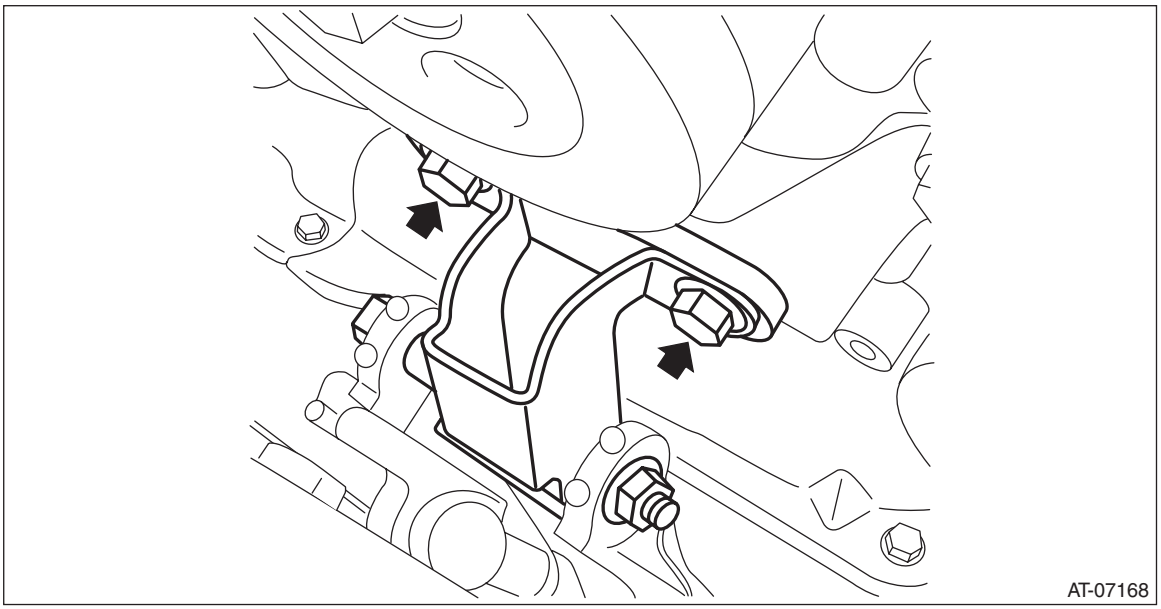
CAUTION:
Do not lift up higher than enough level to install the ST to avoid damage to the hoses and pipes inside the engine room.

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



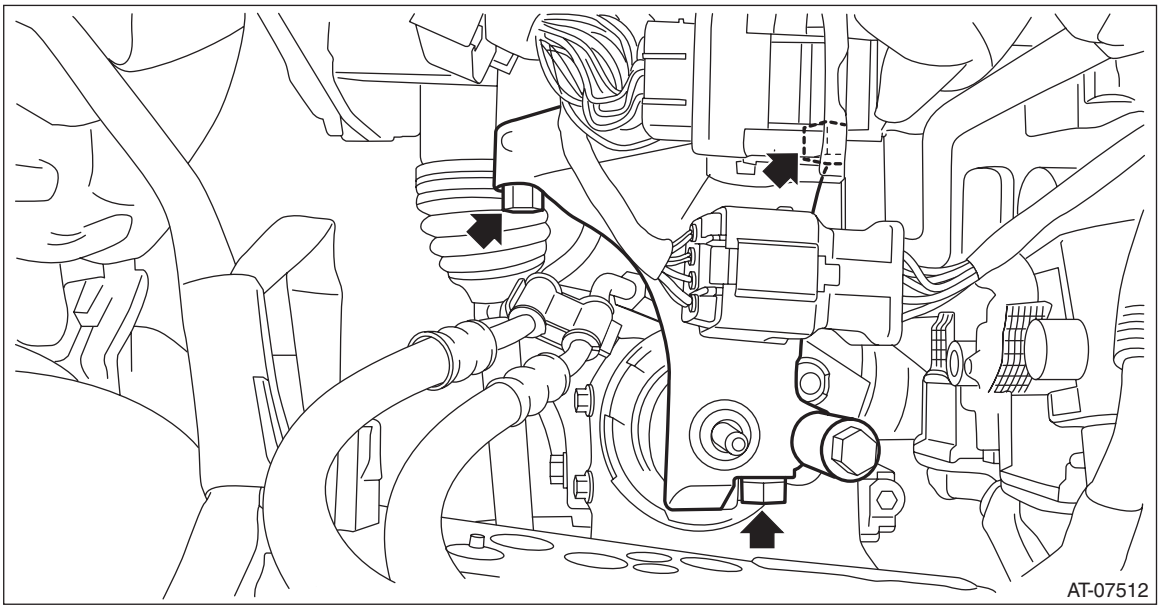
43) Tighten the mounting bolts on the engine side.

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

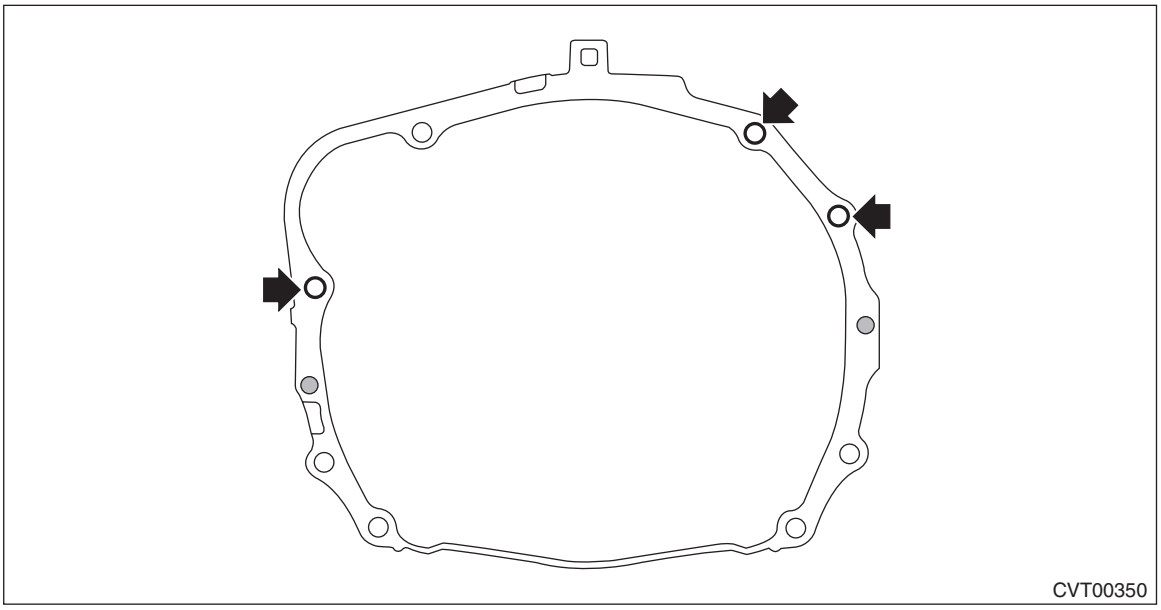


44) Remove the ST (ENGINE HANGER).
45) Remove the left and right transmission mounting brackets.

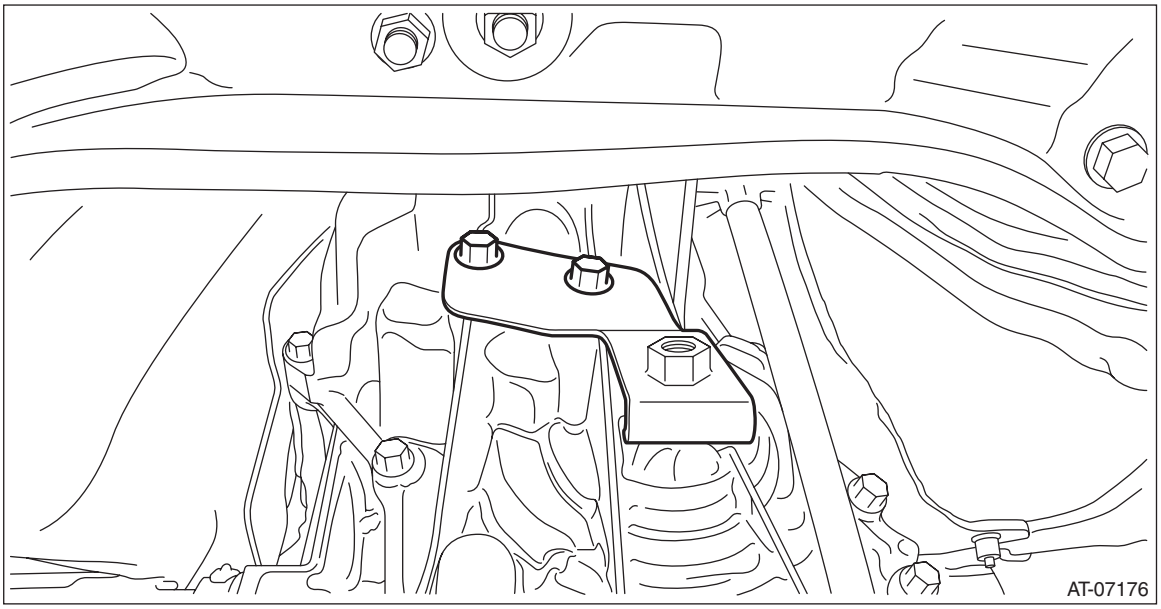
NOTE:
First, remove the transmission mounting bracket on the right side of vehicle, and then tilt the engine unit to remove the left transmission mounting bracket.



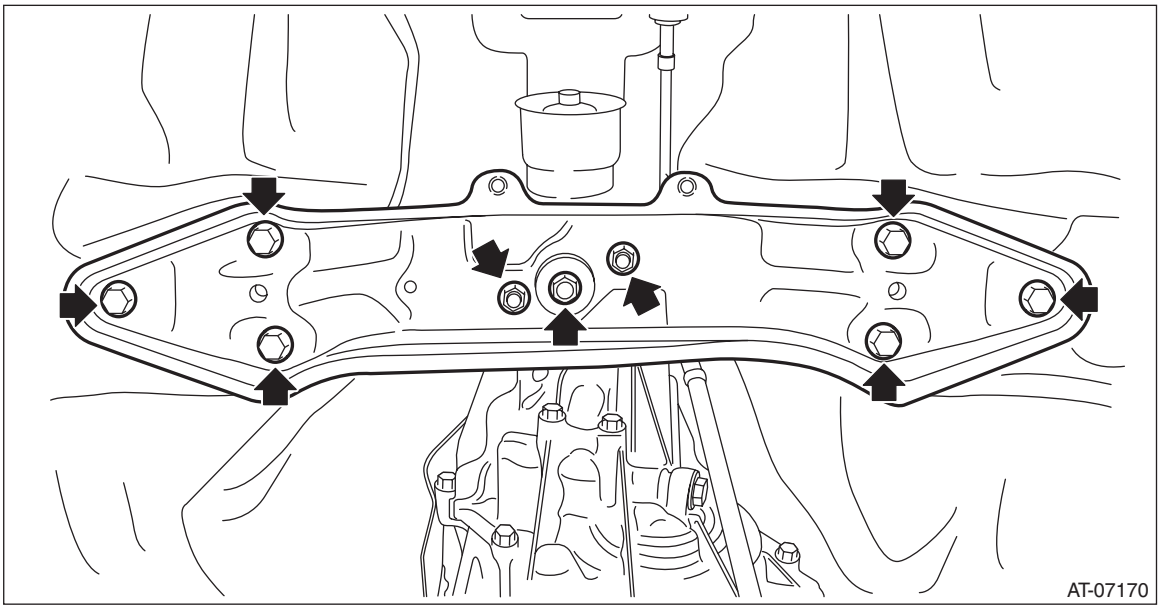
46) Remove the three transmission connecting bolts.



47) Set the ST (ENGINE HANGER) again to loosen the chain sling.
48) Lift up the vehicle.
49) Set the transmission jack under the transmission.
50) Remove the hanger bracket.



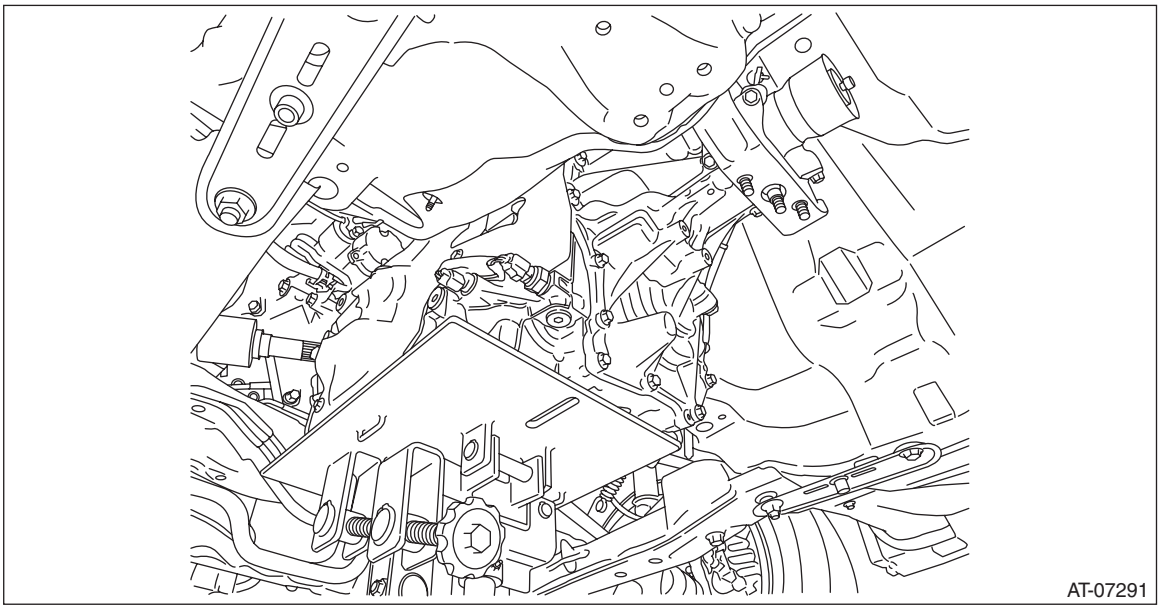
51) Remove the rear crossmember.



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

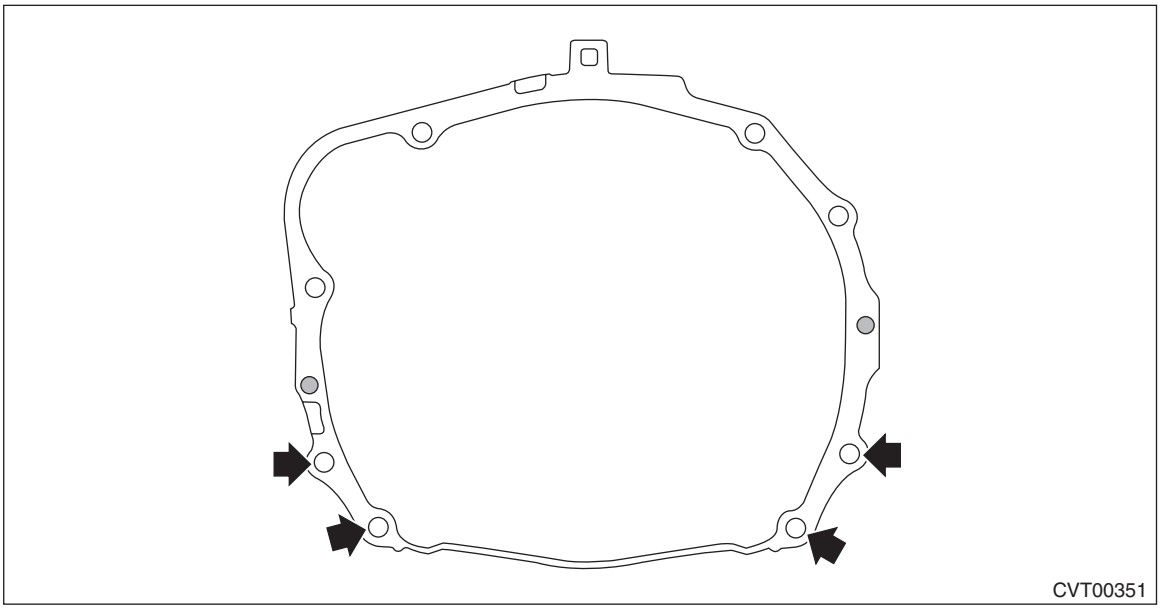
CAUTION:
When lowering the transmission rear end, be careful not to let the converter case and steering mechanical parts contact each other.

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



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

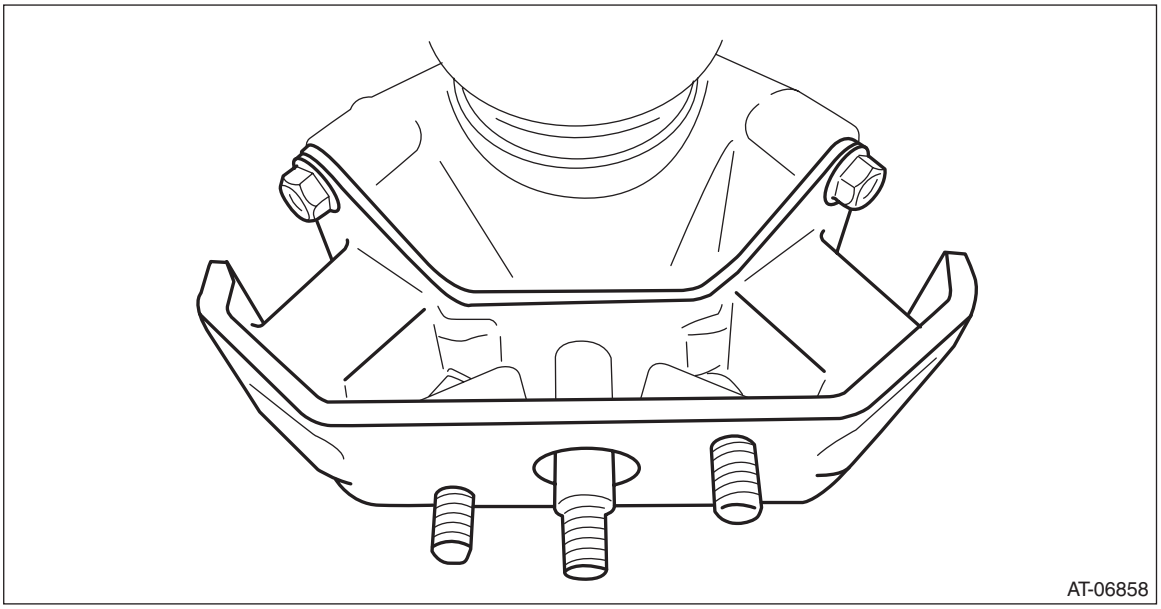
54) Remove the two transmission connecting bolts and two nuts (lower side).



55) Remove the transmission assembly.

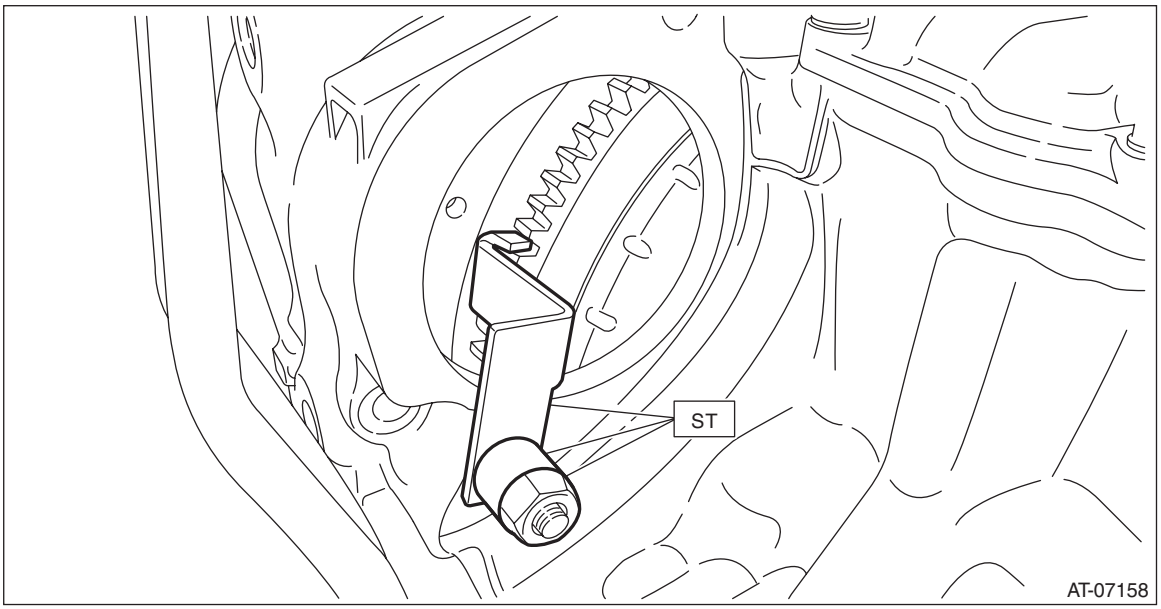
NOTE:
Remove it while moving the transmission jack up and down so that the engine and transmission remain directly aligned.

56) Remove the cushion rubber.



B: INSTALLATION

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

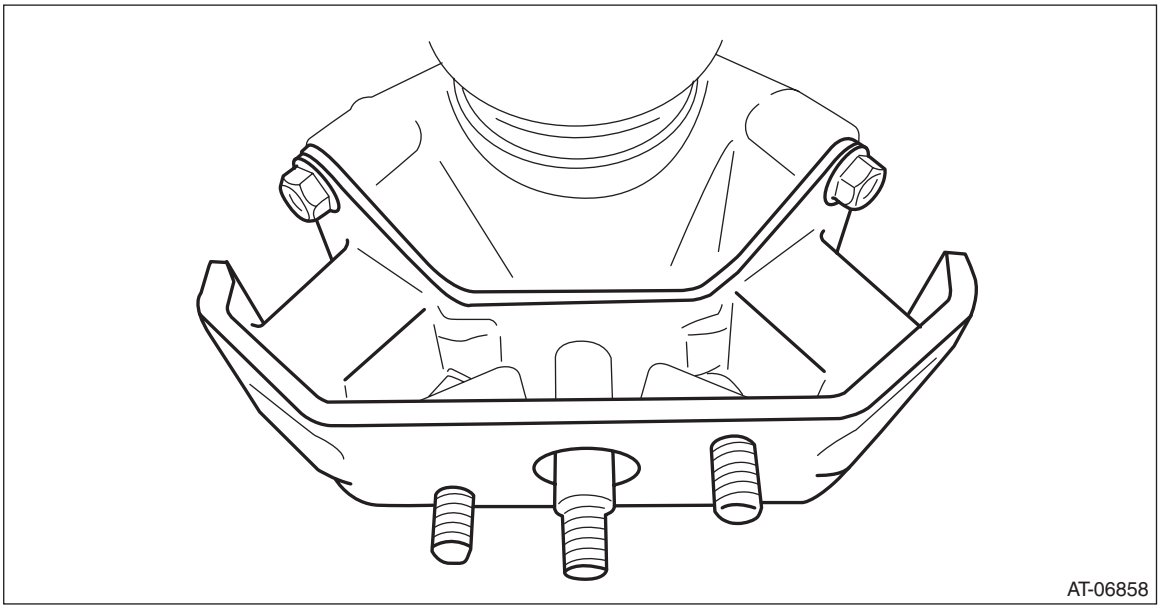


2) Replace the front differential side retainer oil seal. <Ref. to CVT-92, REPLACEMENT, Differential Side Retainer Oil Seal.>

NOTE:
• Be sure to replace the differential side retainer oil seal with a new part whenever the front drive shaft is removed from the transmission.
• When a new differential side retainer oil seal has been installed, replacement is not required.

3) Install the cushion rubber on the transmission.

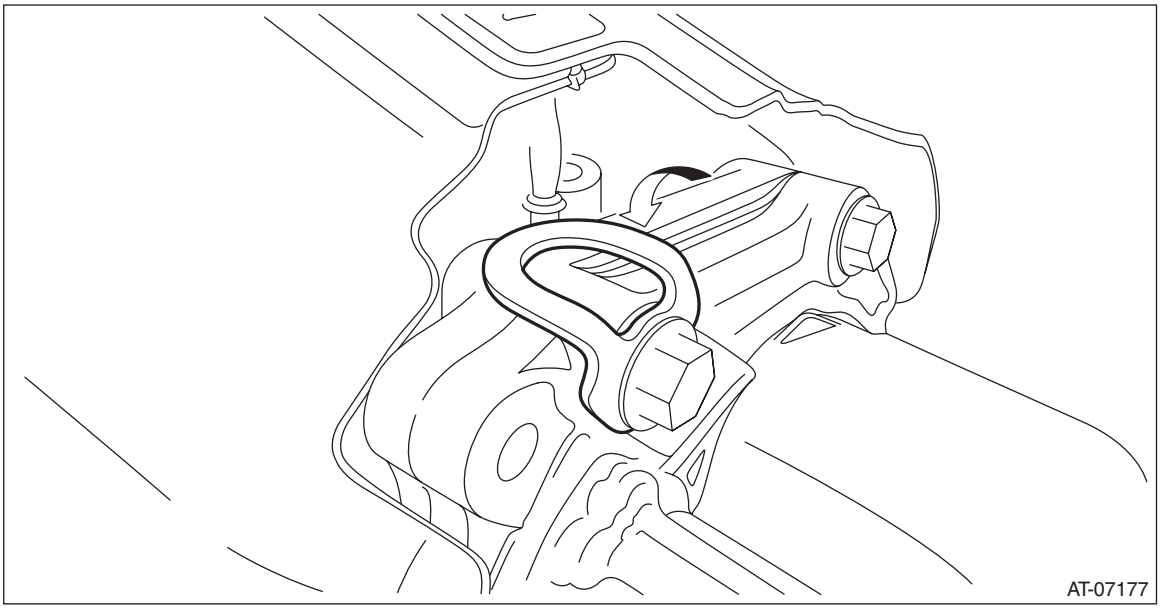
Tightening torque:
40 N·m (4.1 kgf-m, 29.5 ft-lb)



4) Mount the transmission onto the transmission jack.

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

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

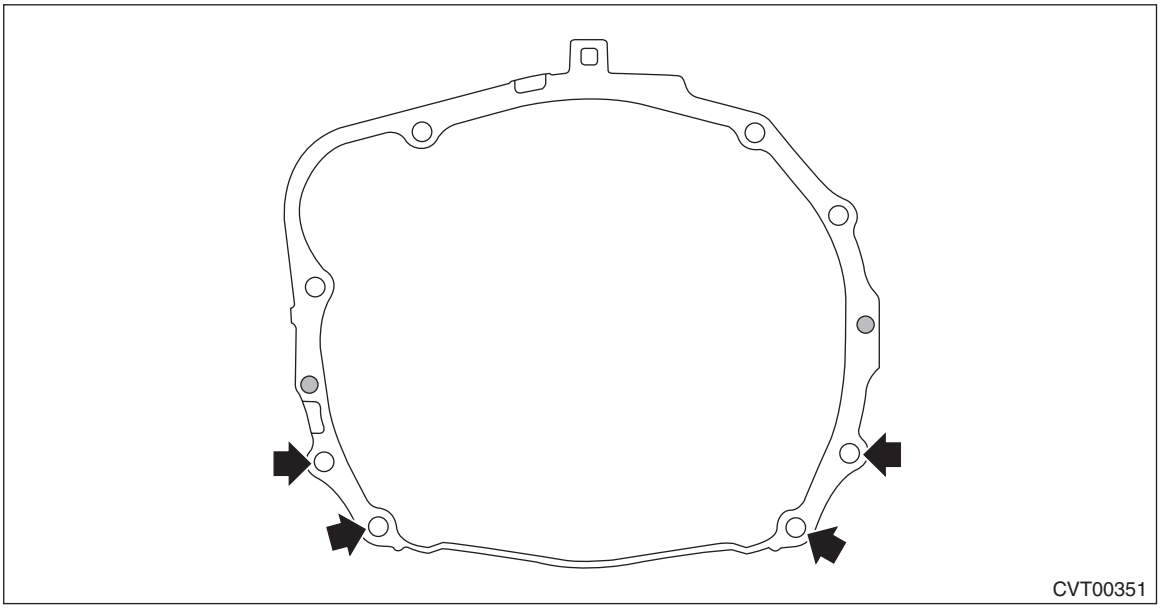


6) While lifting up the transmission gradually, install the transmission to the engine.

CAUTION:
This operation requires at least two persons.

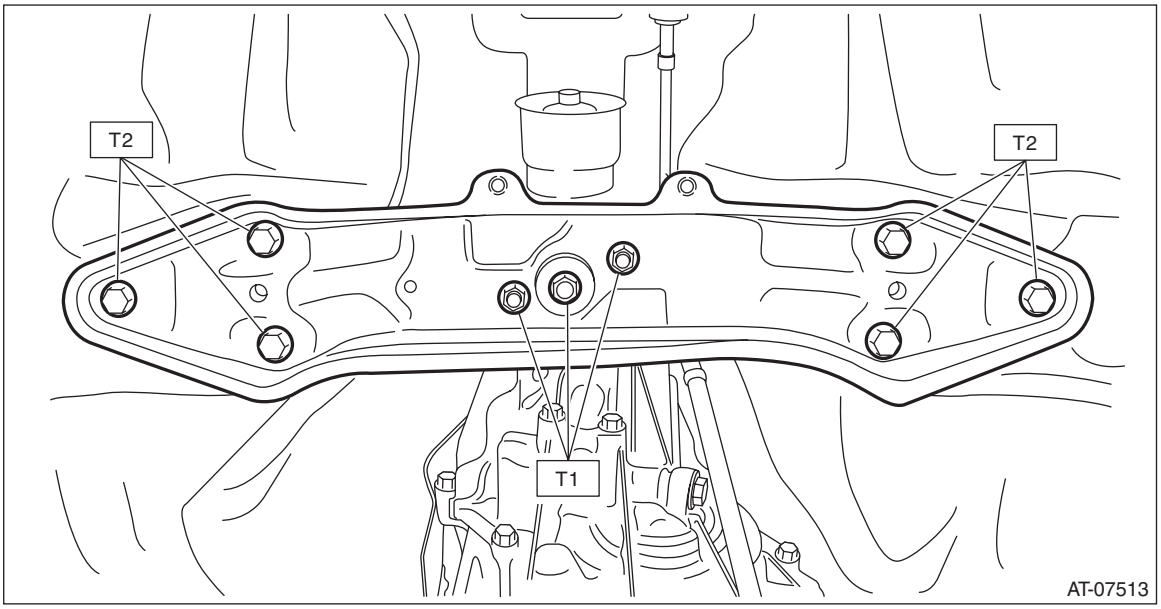
NOTE:
Keep the engine level.
7) Install the two engine connecting bolts and two nuts (lower side).

Tightening torque:
50 N·m (5.1 kgf-m, 36.9 ft-lb)



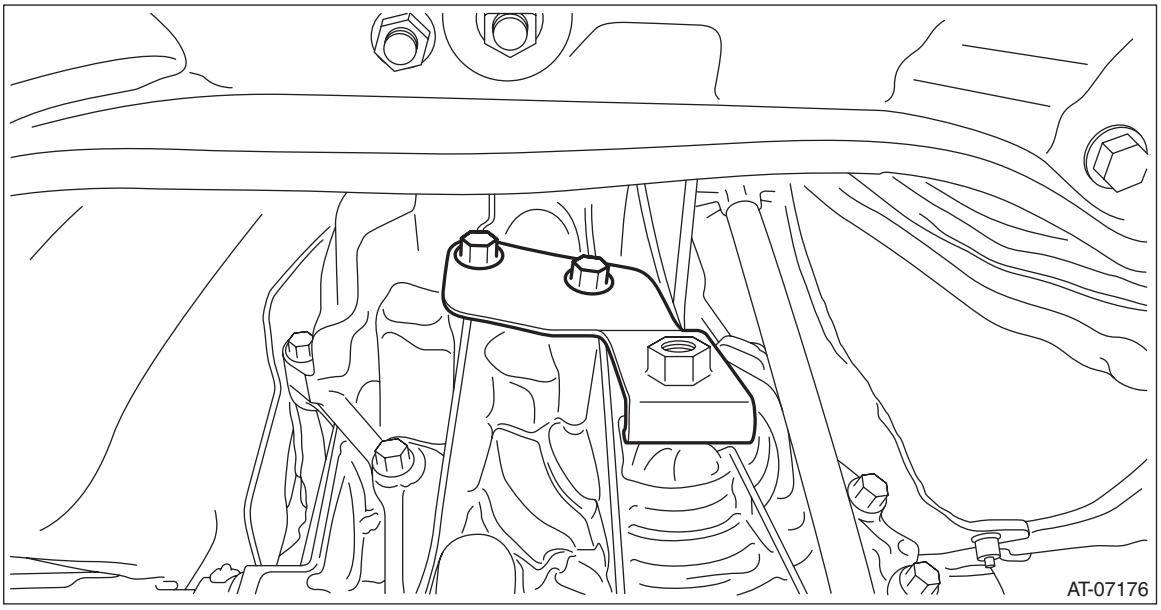
8) Secure the transmission rear crossmember to the vehicle body.

Tightening torque:
T1: 35 N·m (3.6 kgf-m, 25.8 ft-lb)
T2: 75 N·m (7.6 kgf-m, 55.3 ft-lb)



9) Install the hanger bracket.

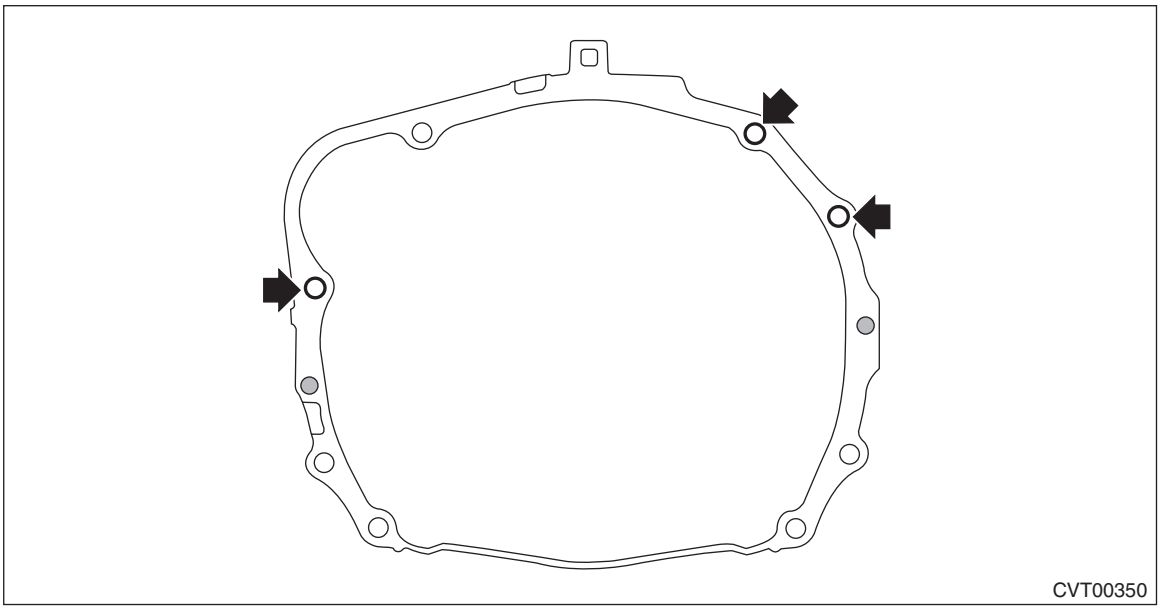
Tightening torque:
23 N·m (2.3 kgf-m, 17.0 ft-lb)



10) Remove the transmission jack.
11) Lower the vehicle.
12) Remove the ST (ENGINE HANGER).

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

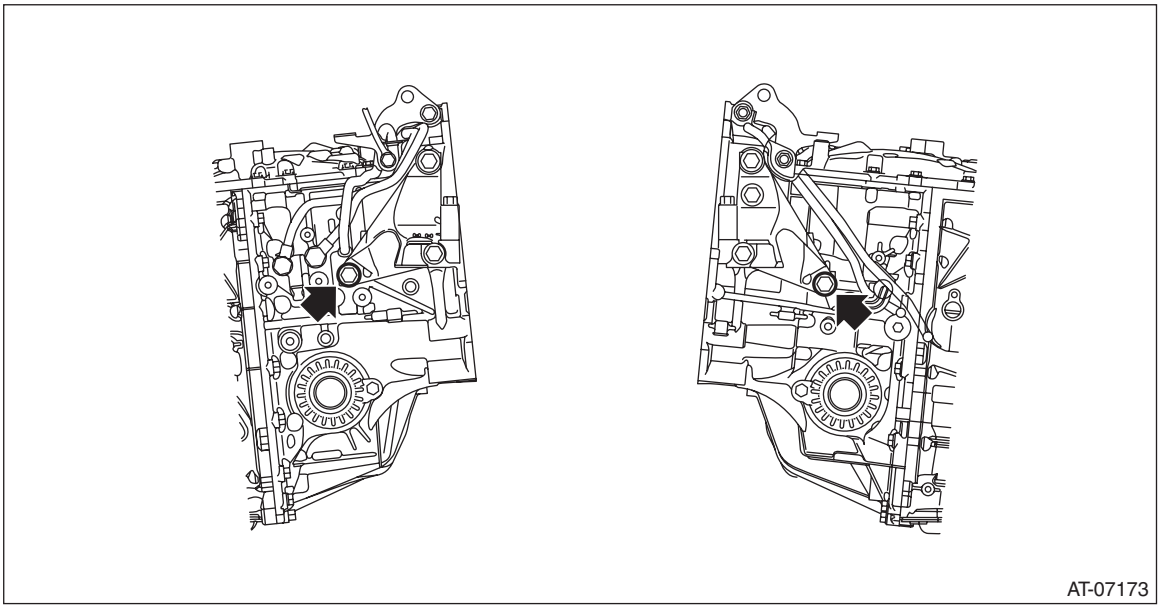
Tightening torque:
50 N·m (5.1 kgf-m, 36.9 ft-lb)



14) Install the left and right transmission mounting brackets.

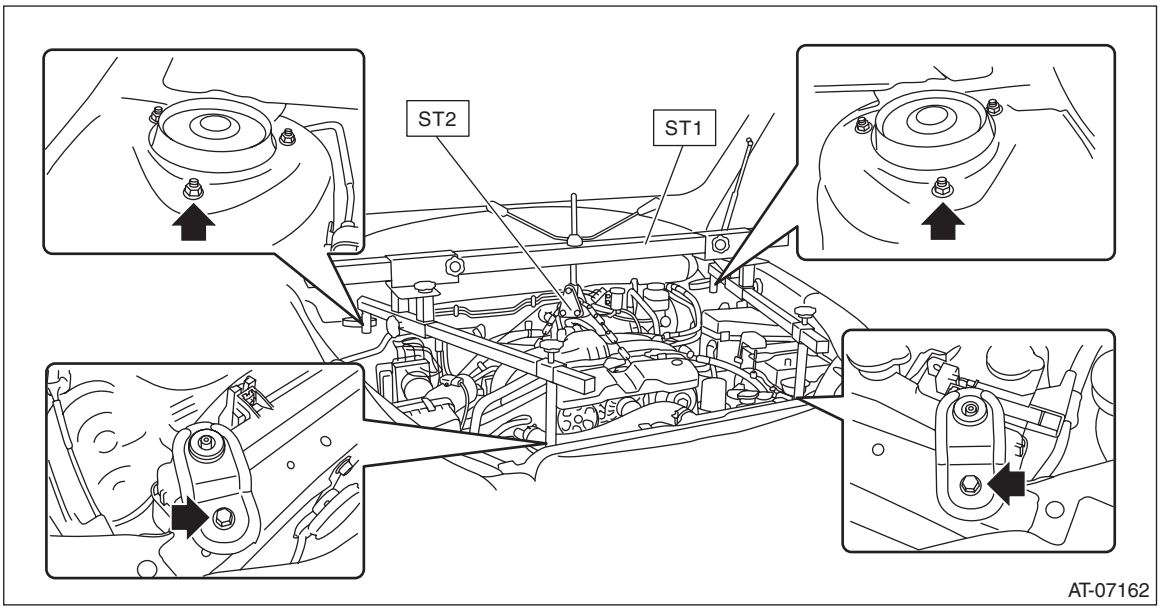
NOTE:
- Install to the left side of vehicle first because the engine inclines to the left.
- Temporarily tighten the bolt arrowed in the figure.

Tightening torque:
75 N·m (7.6 kgf-m, 55.3 ft-lb)

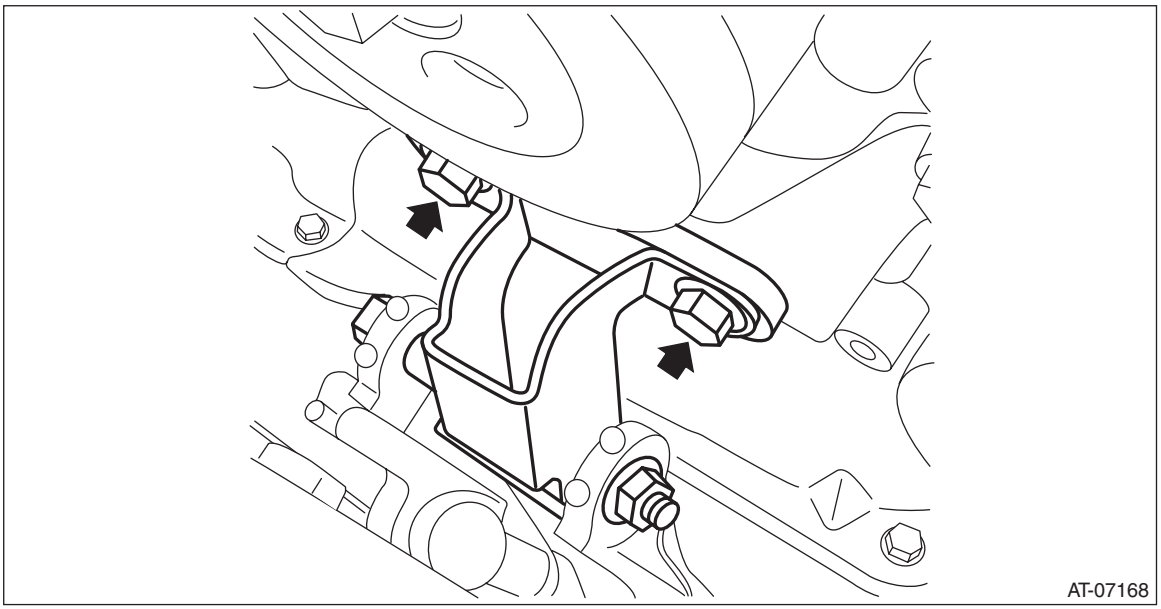


15) Set the ST to vehicle body and lift up the engine unit slightly.
ST1 99099AJ000 ENGINE HANGER
ST2 99099AJ010 CHAIN BALANCER

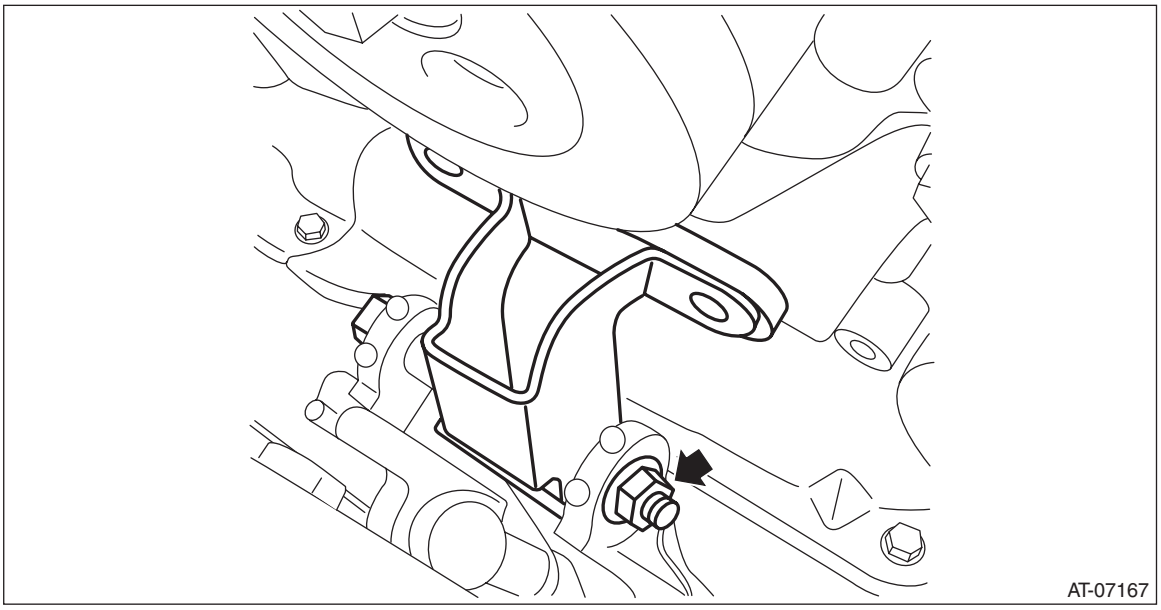
CAUTION:
- **Set so that the chain sling does not contact the engine parts.**
- **Set the arms of ST (ENGINE HANGER) at the locations shown in the figure.**



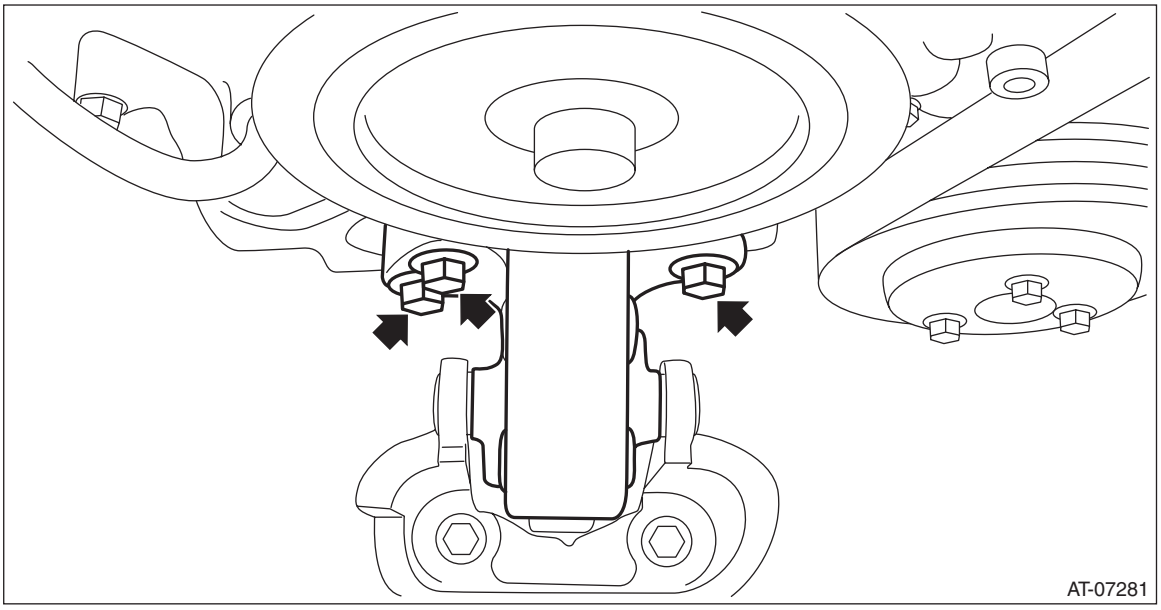
16) Remove the bolts from ST (SPECIAL TOOL FB).



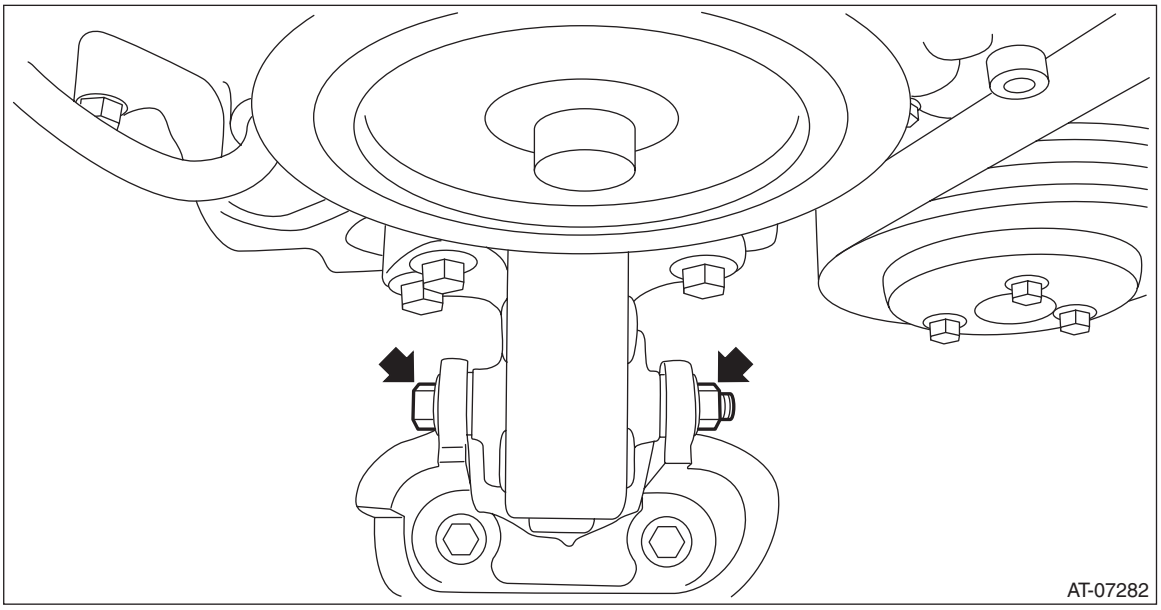
17) Remove the bolt and nut to remove ST (SPECIAL TOOL FB).



18) Temporarily attach the front cushion rubber with bolts.



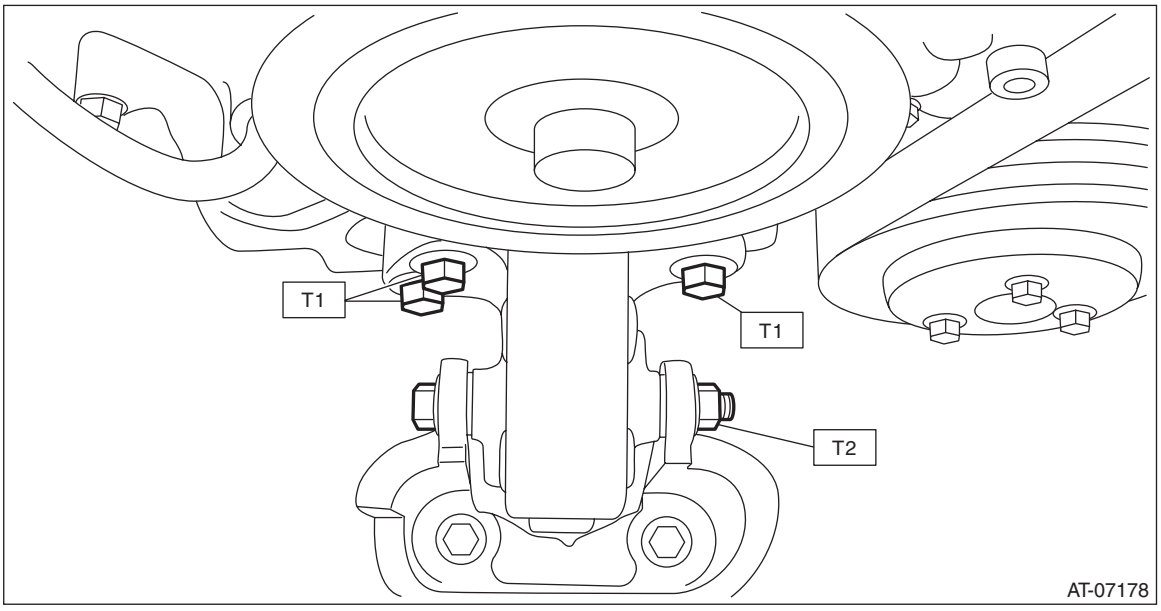
19) Install the bolt and nut to the front cushion rubber.



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

NOTE:
Always start tightening from the bolts on the engine side.

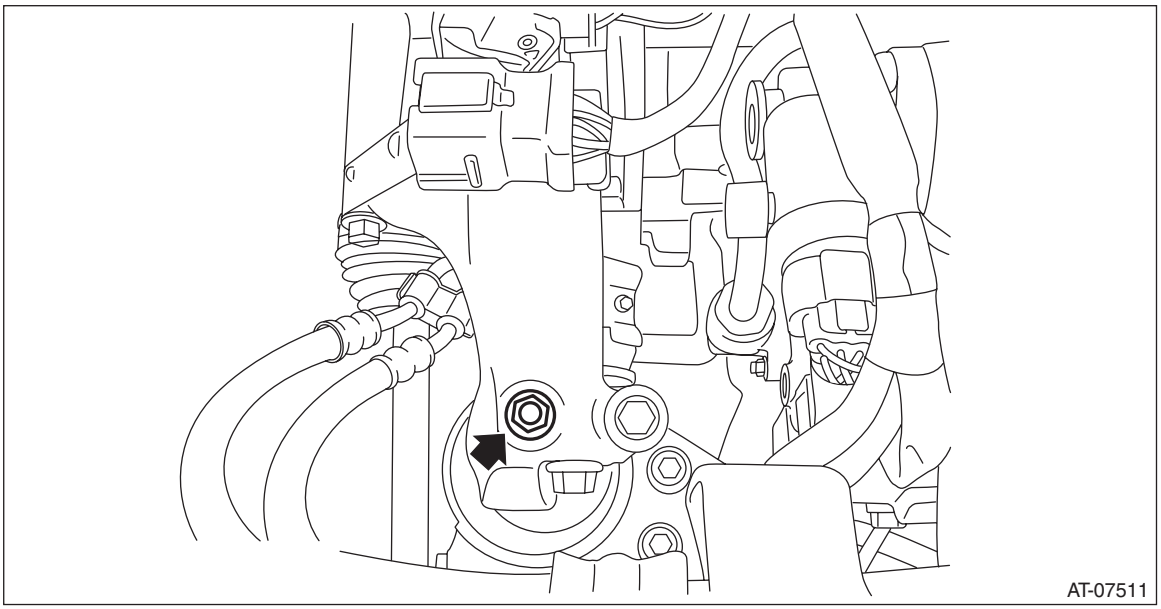
Tightening torque:
T1: 25 N·m (2.5 kgf-m, 18.4 ft-lb)
T2: 45 N·m (4.6 kgf-m, 33.2 ft-lb)



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

22) Install the nut to the transmission mounting bracket.

Tightening torque:
45 N·m (4.6 kgf-m, 33.2 ft-lb)

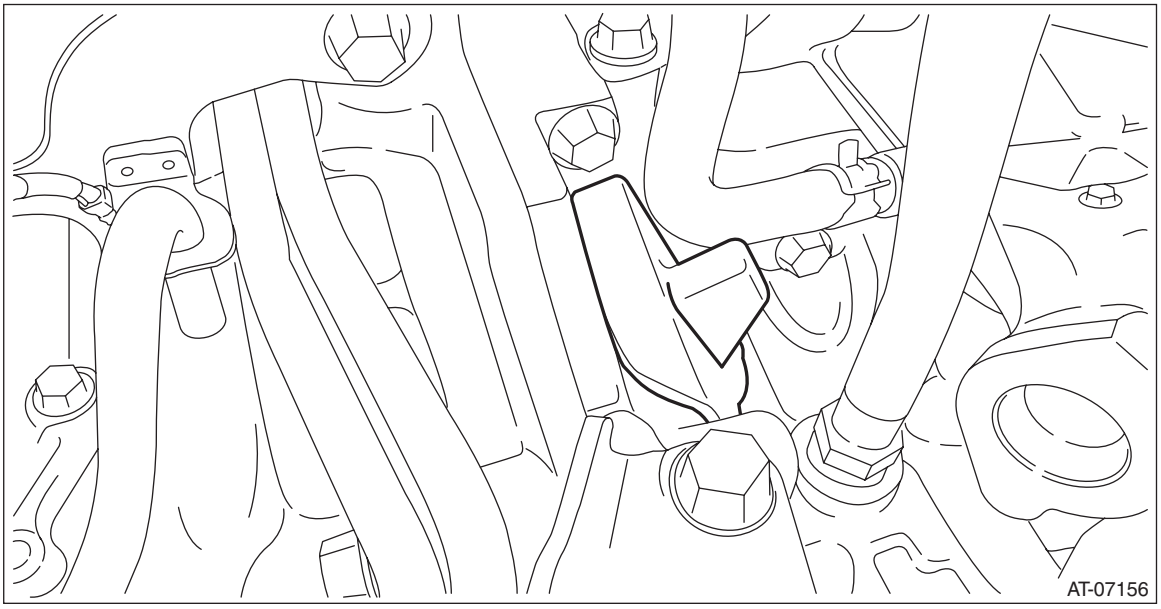


23) Install the main fan and sub fan.
24) Remove the ST (STOPPER SET) from converter case.
25) Match the torque converter screw hole with drive plate hole to install the bolt.

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

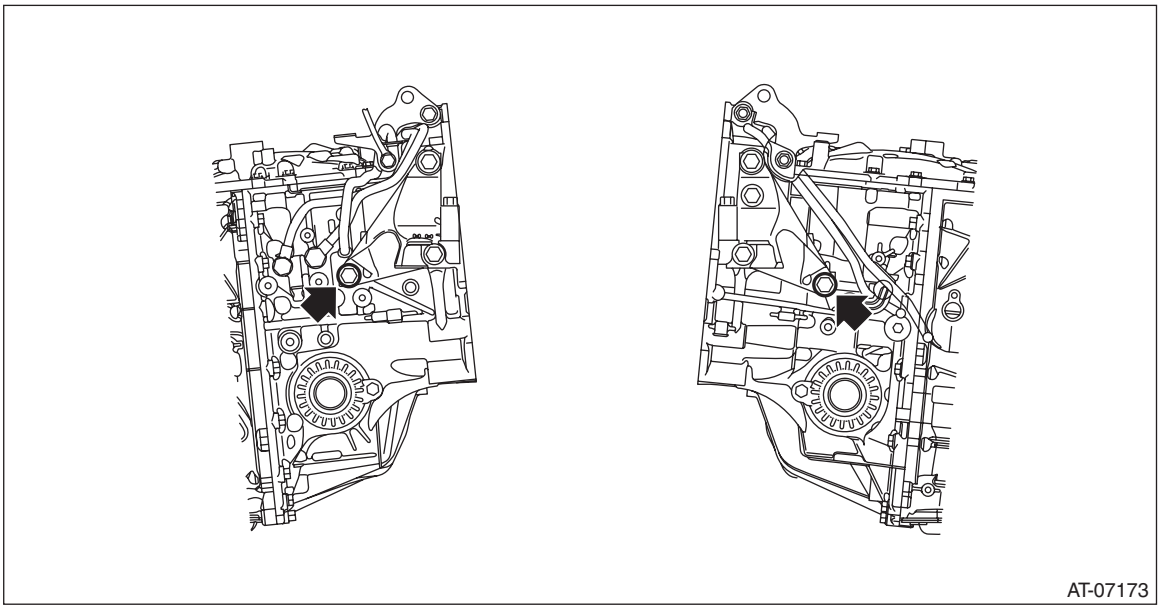
Tightening torque:
25 N·m (2.5 kgf-m, 18.4 ft-lb)
26) Install the remaining three bolts by rotating the crank pulley a little at a time in the same direction as engine revolution.

Tightening torque:
25 N·m (2.5 kgf-m, 18.4 ft-lb)
27) Install the service hole plug.

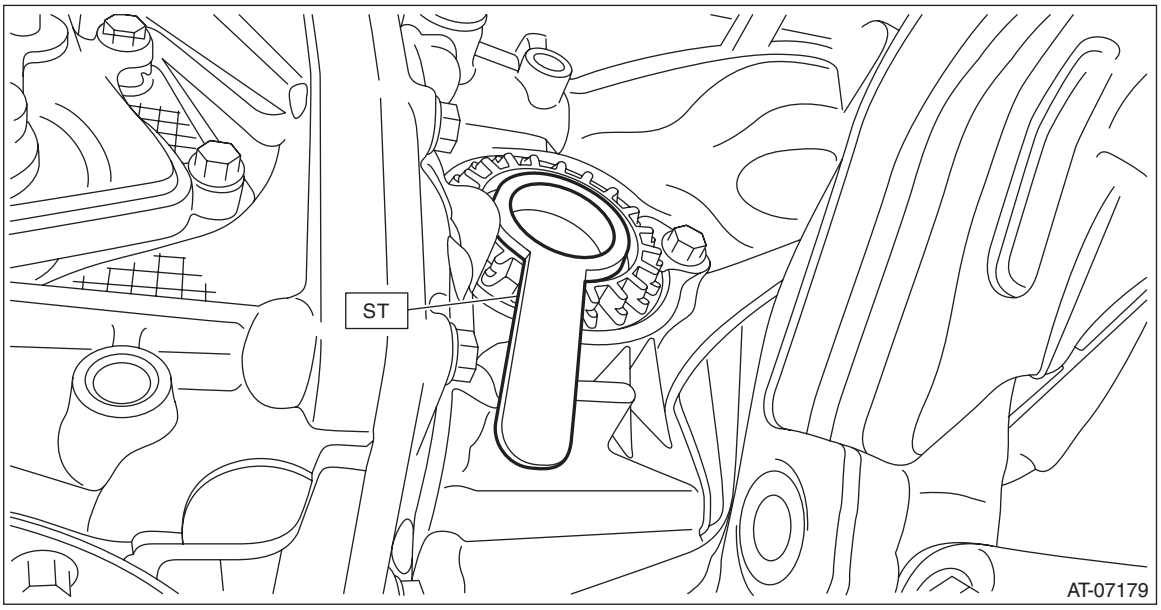


28) Install the starter. <Ref. to SC(H4DO)-10, INSTALLATION, Starter.>
29) Lift up the vehicle.
30) Tighten the single mounting bolt of transmission mounting bracket.

Tightening torque:
75 N·m (7.6 kgf-m, 55.3 ft-lb)



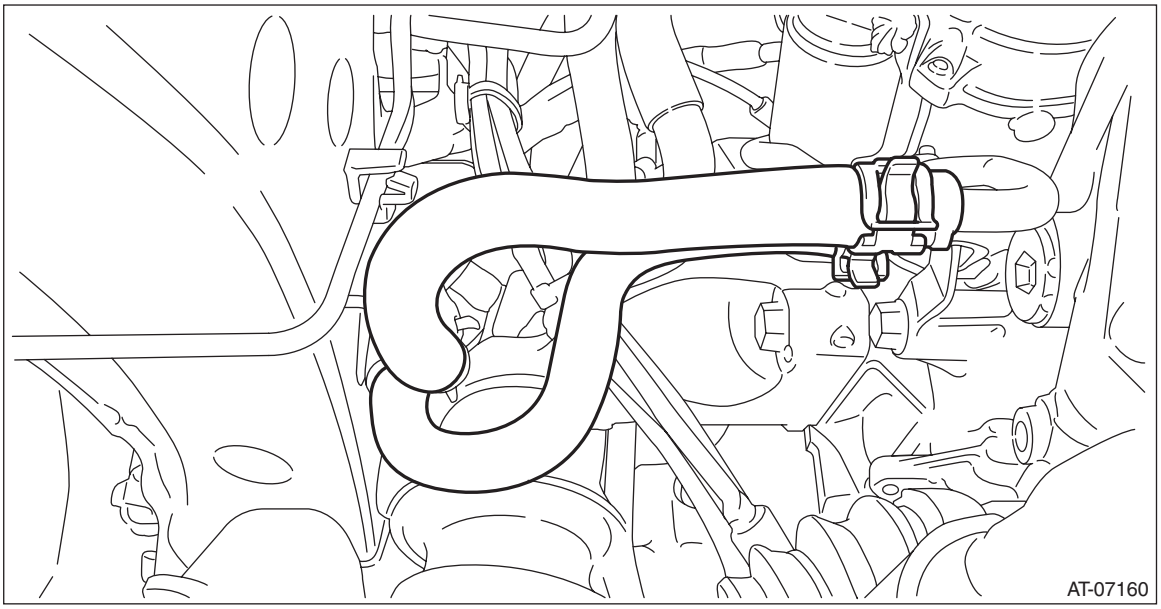
31) Set the ST to side retainer.
ST 28399SA010 OIL SEAL PROTECTOR



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

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

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



36) 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.**

37) Install the stabilizer link.

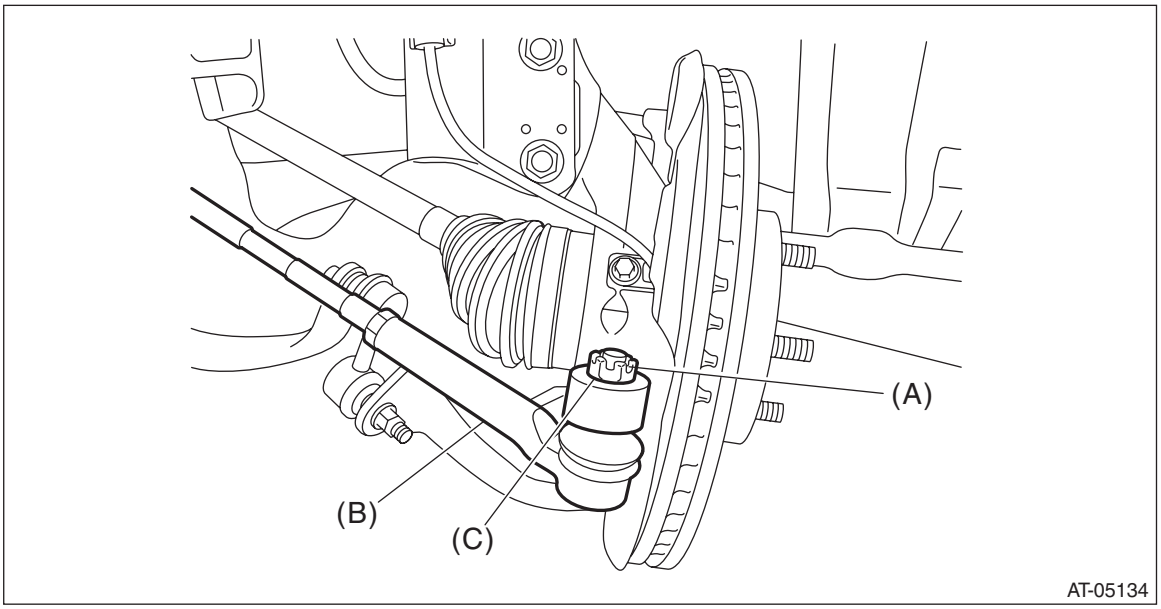
Tightening torque:
60 N·m (6.1 kgf-m, 44.3 ft-lb)

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

Tightening torque:
27 N·m (2.75 kgf-m, 19.9 ft-lb)

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

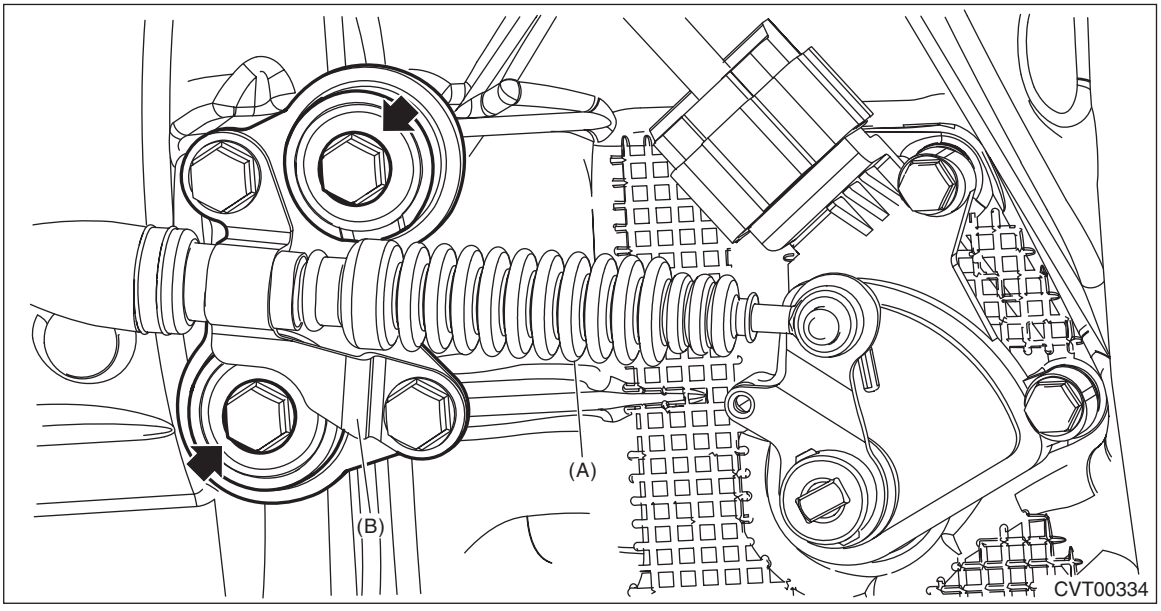
39) After tightening the castle nut to the specified tightening torque, tighten it further within 60° until the cotter pin hole is aligned with slot in the nut. Fit the cotter pin into the nut, and then bend the pin to lock.



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

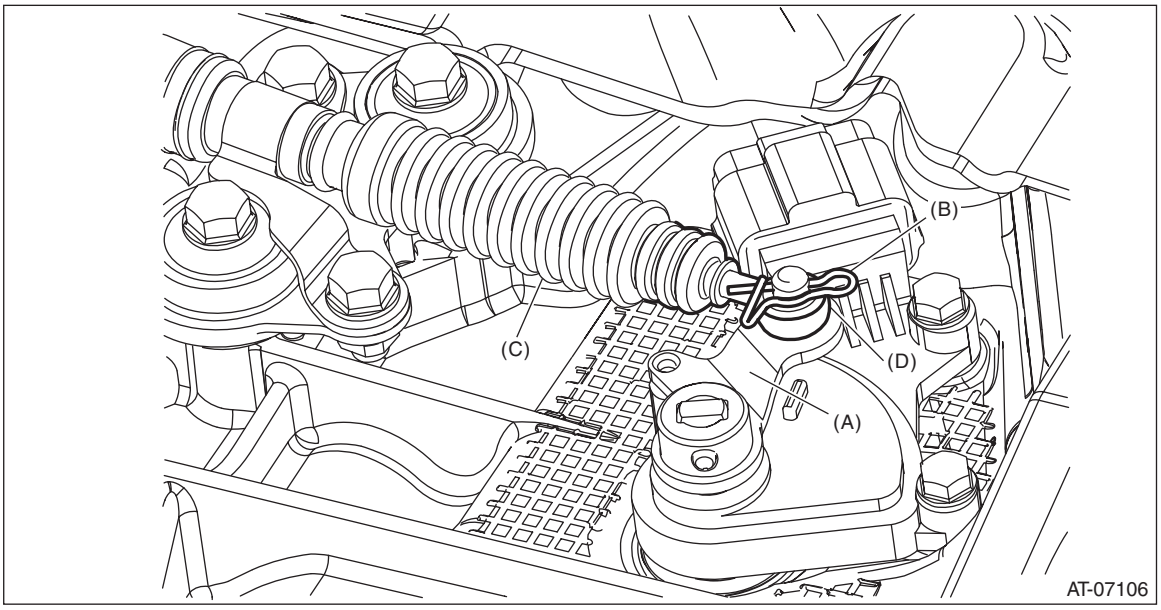
40) Install the propeller shaft. <Ref. to DS-11, INSTALLATION, Propeller Shaft.>
41) Install the universal joint. <Ref. to PS-21, INSTALLATION, Universal Joint.>
42) Install the plate assembly to transmission.

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



(A) Select cable
(B) Plate ASSY

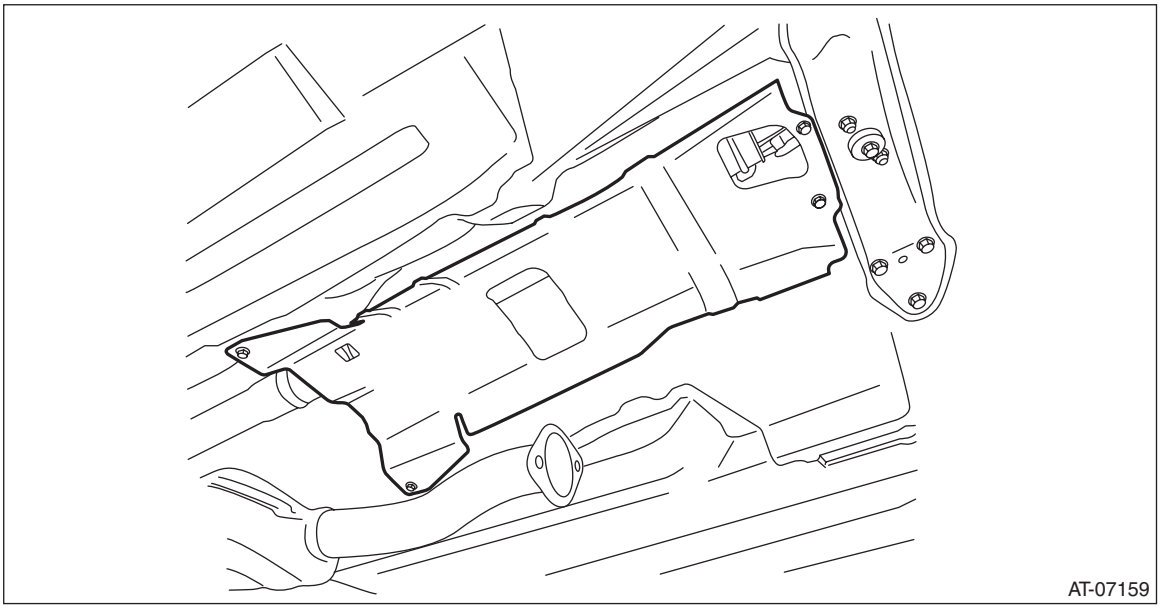
43) Install the washer and snap pin to the shifter arm.



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

44) Install the center exhaust cover.

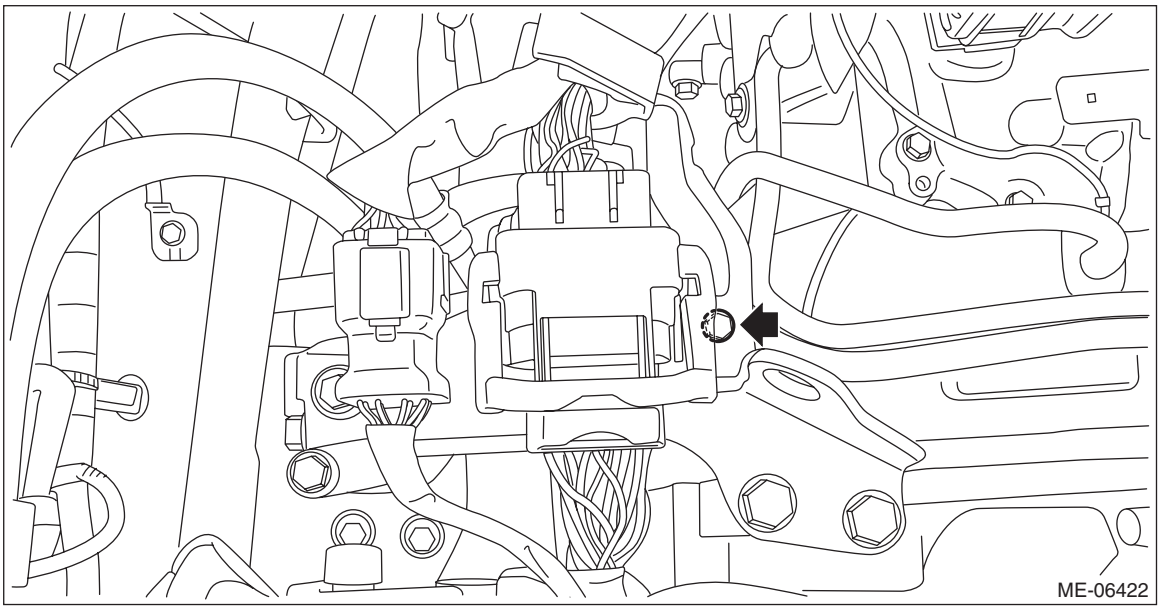
Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)



45) Install the center exhaust pipe. <Ref. to EX(H4DO)-12, INSTALLATION, Center Exhaust Pipe.>
46) Install the under cover.
47) Lower the vehicle.
48) Connect the engine harness.

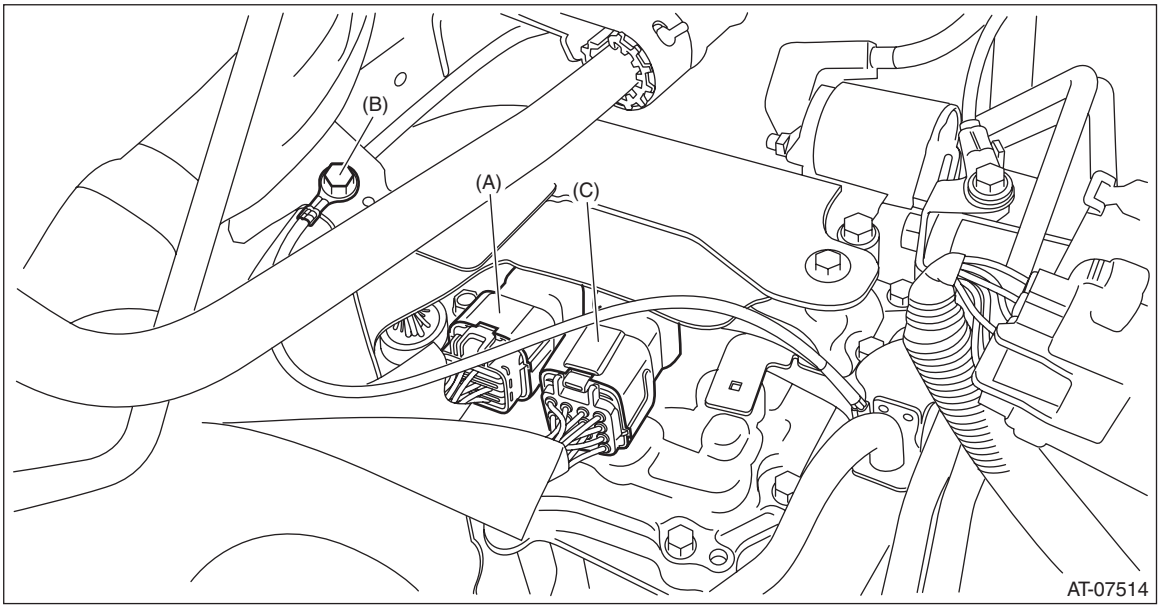
49) Attach the harness connector bracket.

Tightening torque:
7.5 N·m (0.8 kgf-m, 5.5 ft-lb)



50) Connect the following harness connectors.
- Transmission harness connectors
- Transmission radio ground terminal
- Inhibitor harness connector

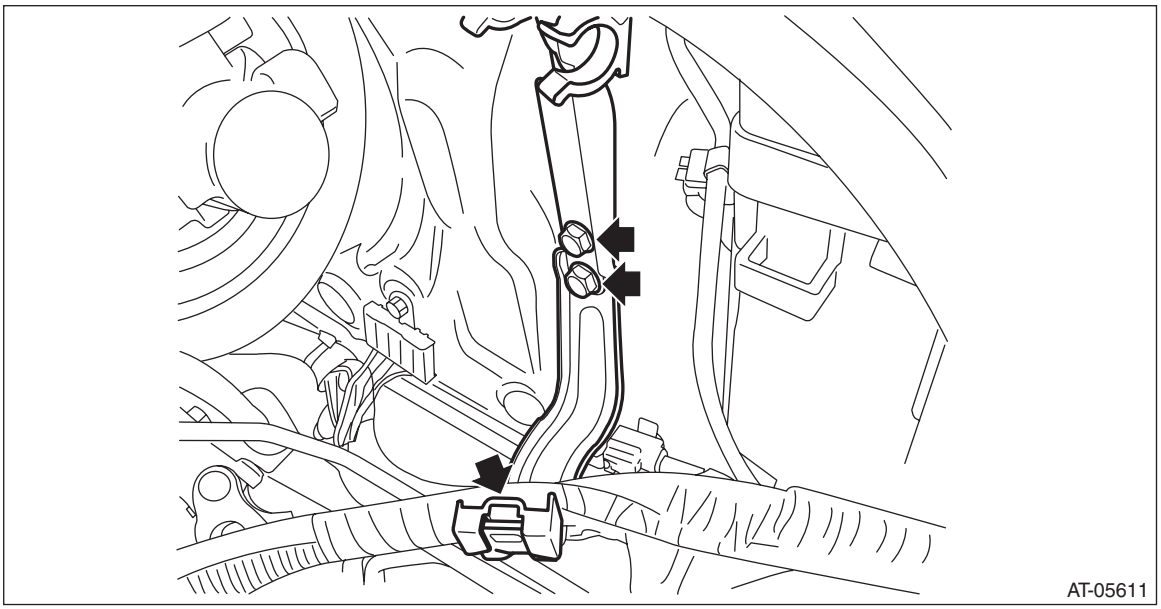
Tightening torque:
13 N·m (1.3 kgf-m, 9.6 ft-lb)



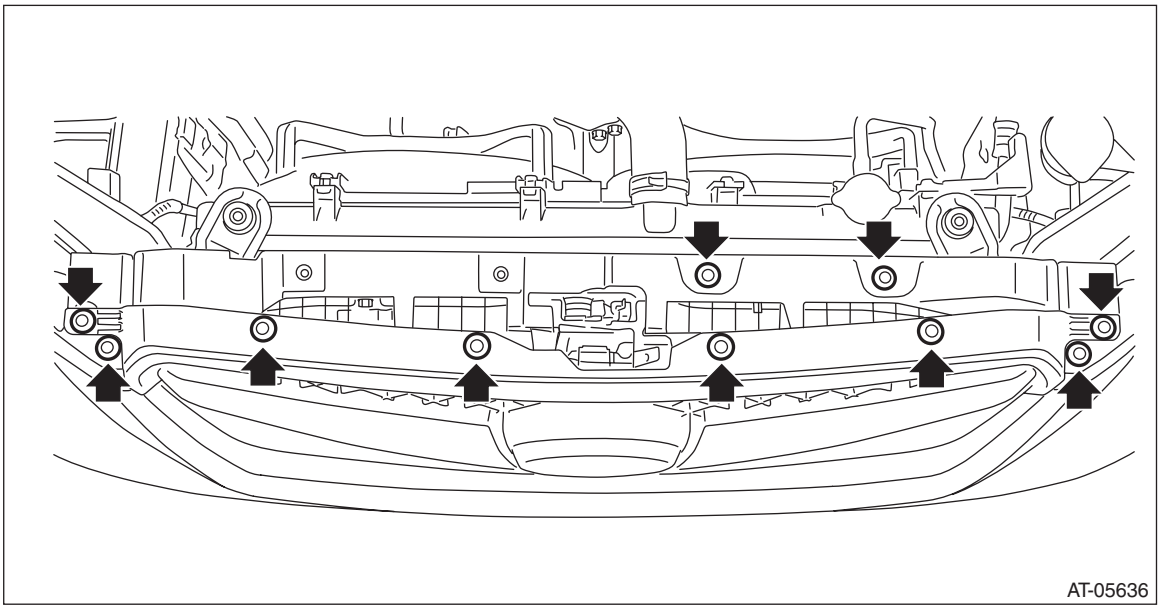
(A) Transmission harness connectors
(B) Transmission radio ground terminal
(C) Inhibitor harness connector

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

Tightening torque:
7.5 N·m (0.76 kgf-m, 5.5 ft-lb)



52) Attach the grille bracket.



53) Install the air intake boot assembly. <Ref. to IN(H4DO)-13, INSTALLATION, Air Intake Boot.>
54) Install the air intake duct. <Ref. to IN(H4DO)-14, INSTALLATION, Air Intake Duct.>
55) Install the front wheels. <Ref. to WT-4, INSTALLATION, Tire and Wheel.>
56) Connect the battery ground terminal.
57) Refill differential gear oil to adjust the differential gear oil amount. <Ref. to CVT-40, Differential Gear Oil.>
58) Refill CVTF to adjust the CVTF amount. <Ref. to CVT-36, CVTF.>
59) Perform the operation for clearing AT learning value. <Ref. to CVT(diag)-18, Clear Memory Mode.>
60) Perform the operation of AT learning mode. <Ref. to CVT(diag)-20, Learning Control.>
61) Execute the rear differential inspection mode. <Ref. to DI-81, Rear Differential Inspection Mode.>

CAUTION:
Always execute the rear differential inspection mode at the replacement of the following.
- **Replacement of transmission assembly**
- **Replacement of front differential hypoid gear set**

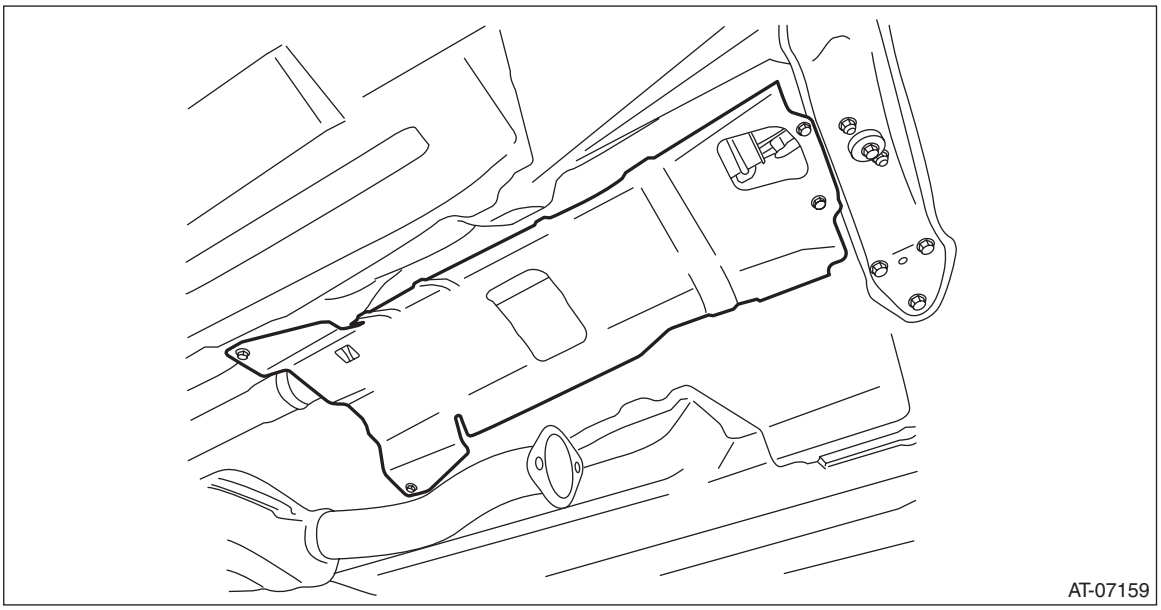
62) Perform the road test to make sure there is no fault. <Ref. to CVT-45, INSPECTION, Road Test.>

11.Transmission Mounting System

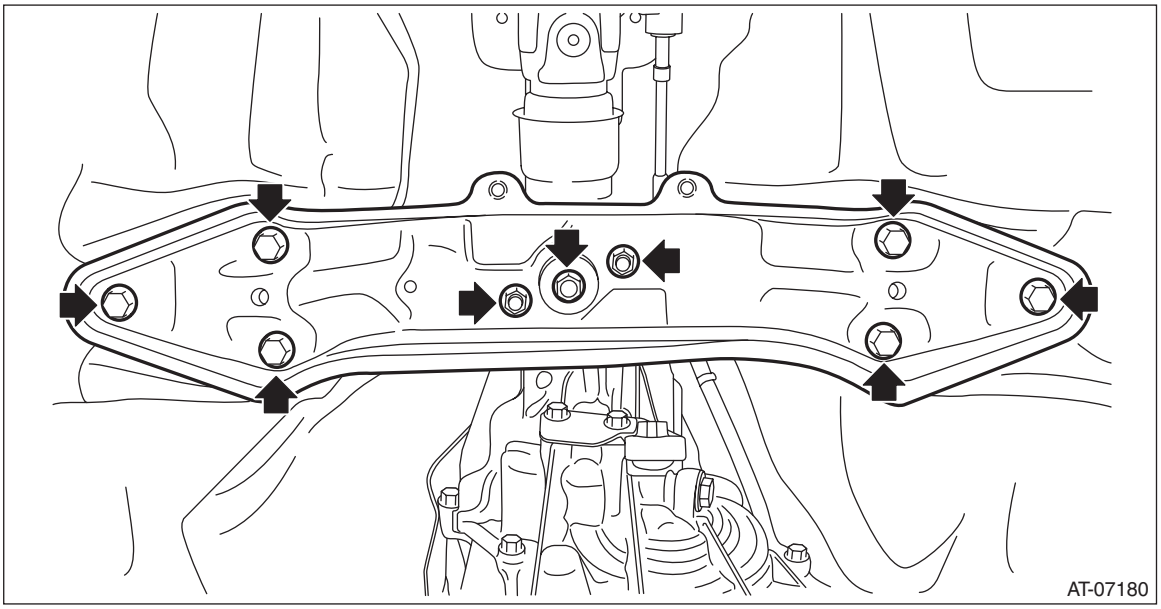
A: REMOVAL

1. TRANSMISSION REAR CROSSMEMBER AND REAR CUSHION RUBBER

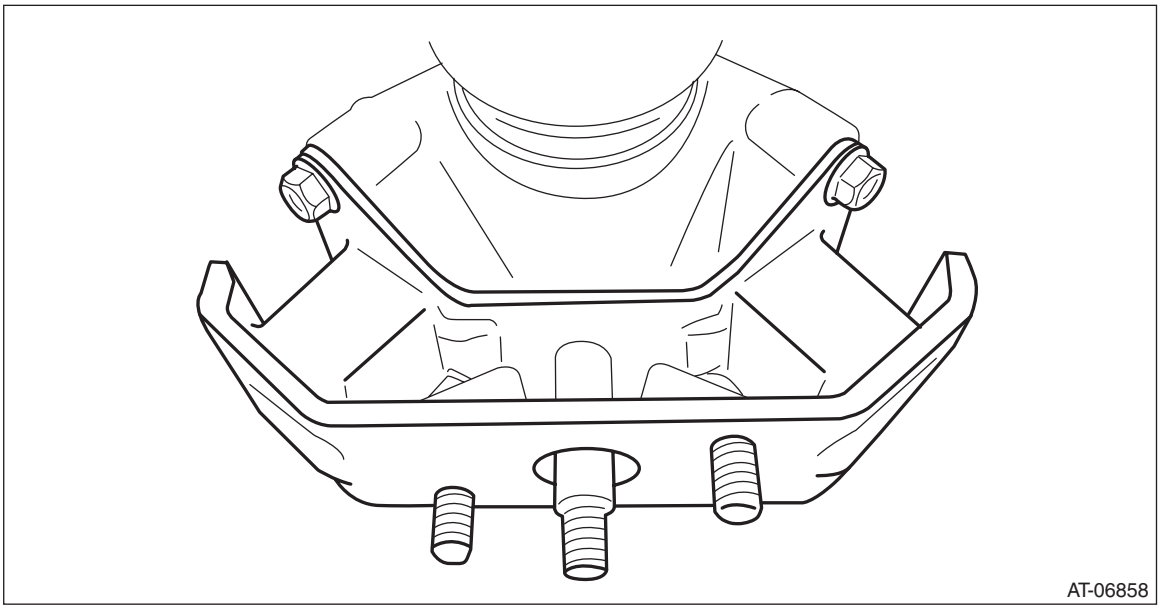
1) Disconnect the ground cable from battery.
2) Lift up the vehicle.
3) Remove the center exhaust pipe. <Ref. to EX(H4DO)-12, REMOVAL, Center Exhaust Pipe.>
4) Remove the center exhaust cover.



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



7) Remove the rear cushion rubber.

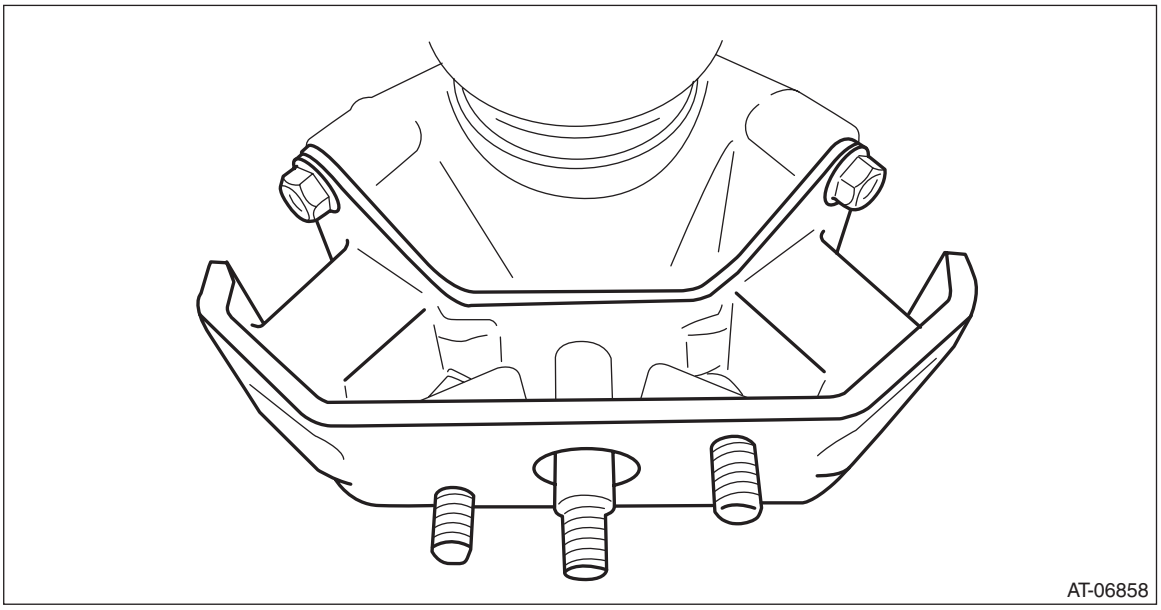


B: INSTALLATION

1. TRANSMISSION REAR CROSSMEMBER AND REAR CUSHION RUBBER

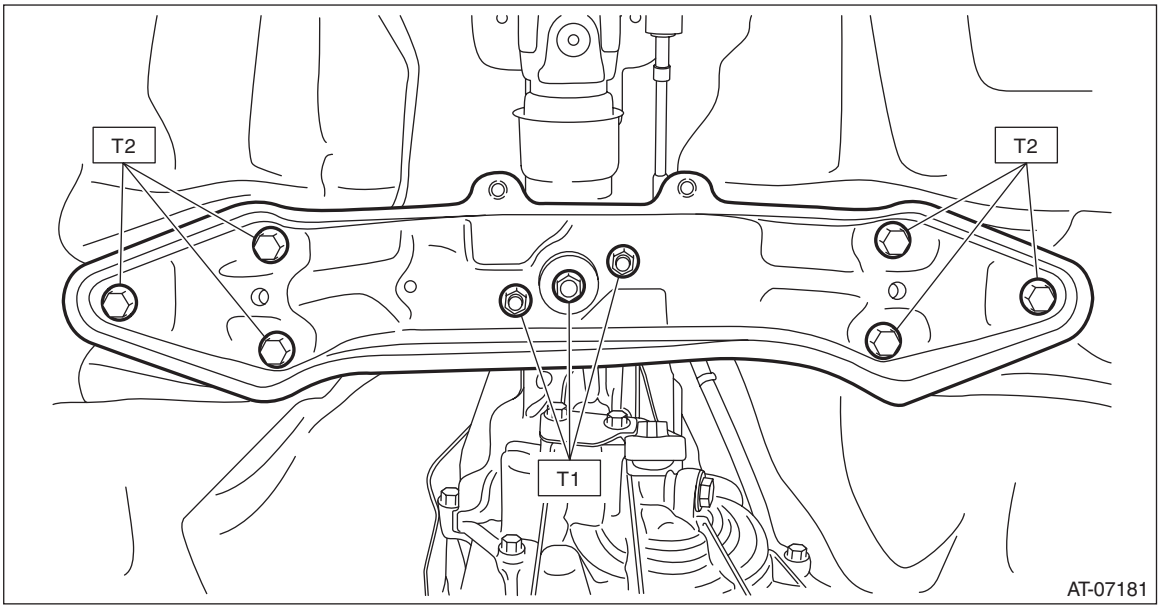
1) Attach the rear cushion rubber to the transmission.

Tightening torque:
40 N·m (4.1 kgf-m, 29.5 ft-lb)



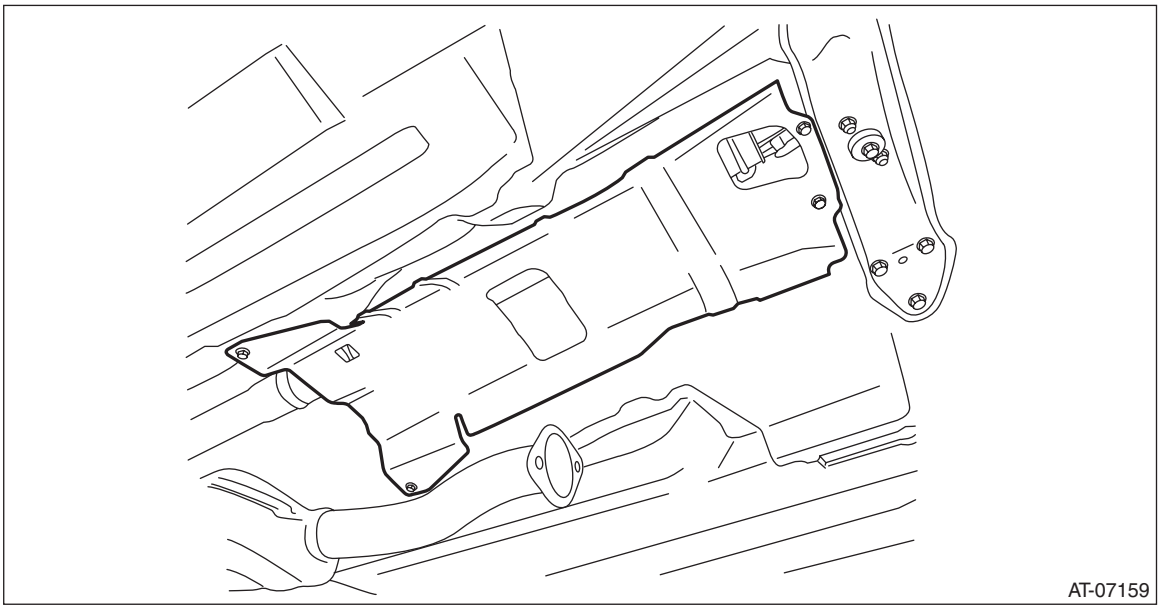
2) Install the crossmember.

Tightening torque:
T1: 35 N·m (3.6 kgf-m, 25.8 ft-lb)
T2: 75 N·m (7.6 kgf-m, 55.3 ft-lb)



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

Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)



5) Install the center exhaust pipe. <Ref. to EX(H4DO)-12, INSTALLATION, Center Exhaust Pipe.>
6) Connect the battery ground terminal.

C: INSPECTION

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

12.Extension Case Oil Seal

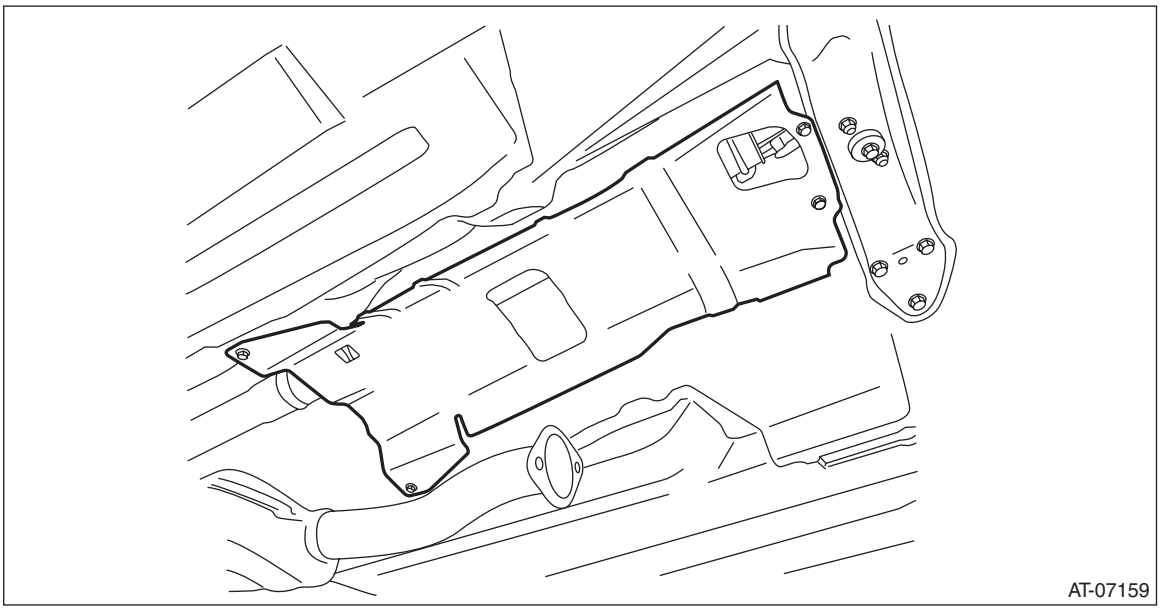
A: INSPECTION

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

B: REPLACEMENT

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

1) Lift up the vehicle.
2) Remove the center exhaust pipe. <Ref. to EX(H4DO)-12, REMOVAL, Center Exhaust Pipe.>
3) Remove the center exhaust cover.



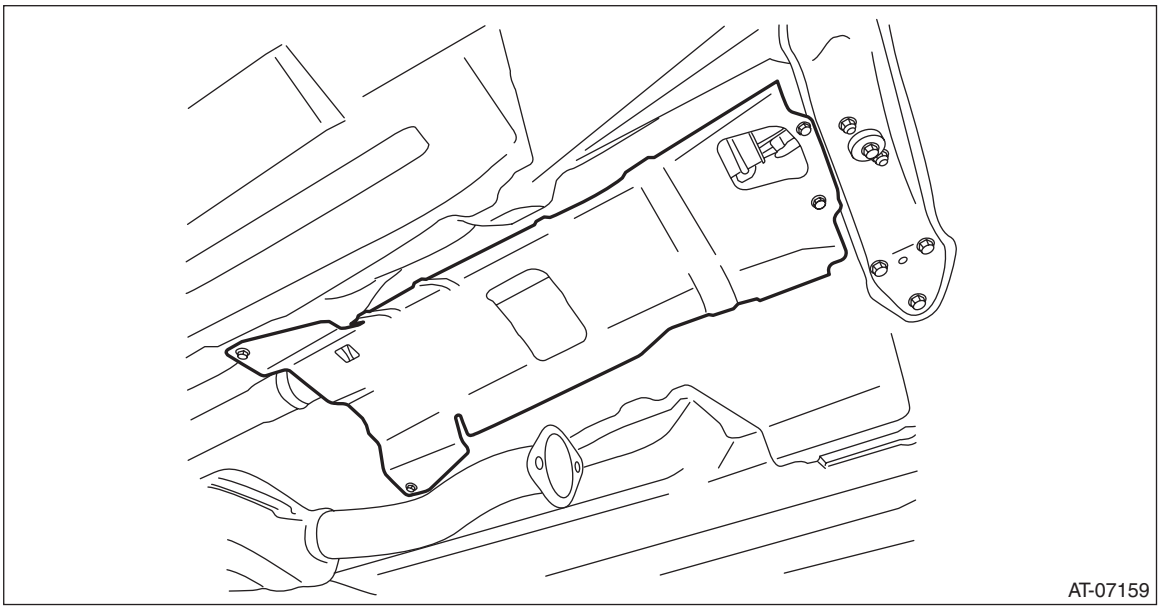
4) Clean the transmission exterior.
5) Remove the propeller shaft. <Ref. to DS-10, REMOVAL, Propeller Shaft.>
6) Using a screwdriver or ST, remove the oil seal trying not to damage the extension case.
ST 398527700 PULLER ASSY
7) Using the ST, install the oil seal.

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

ST 498057300 OIL SEAL INSTALLER
8) Install the propeller shaft. <Ref. to DS-11, INSTALLATION, Propeller Shaft.>

9) Install the center exhaust cover.

Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)



10) Install the center exhaust pipe. <Ref. to EX(H4DO)-12, INSTALLATION, Center Exhaust Pipe.>
11) Adjust the CVTF level and check there is no leakage. <Ref. to CVT-36, ADJUSTMENT, CVTF.>

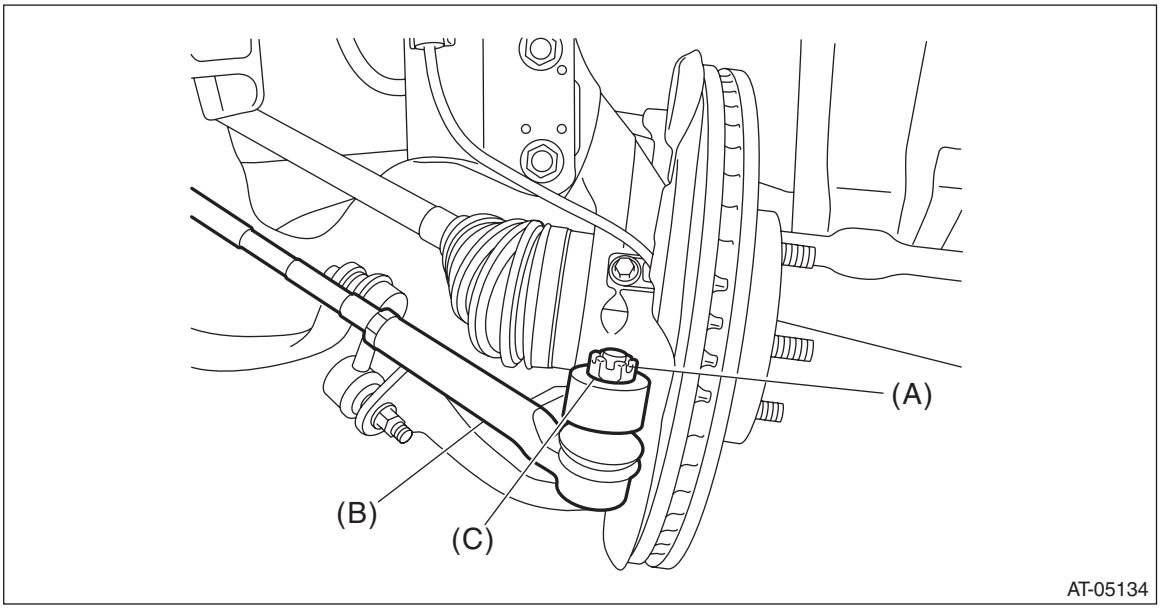
13.Differential Side Retainer Oil Seal

A: INSPECTION

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

B: REPLACEMENT

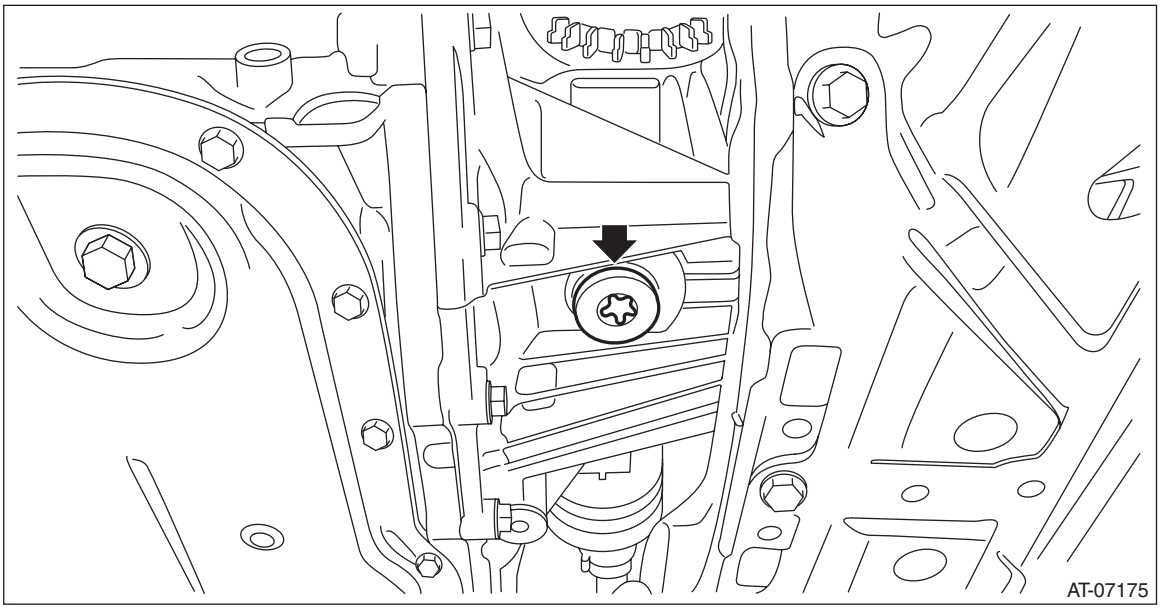
CAUTION:
• Immediately after the vehicle has been running or after idling for a long time, the differential gear oil will be hot. Be careful not to burn yourself.
• Be careful not to spill the differential gear oil on exhaust pipe to prevent it from emitting smoke or fire. If differential gear oil is spilled on the exhaust pipe, wipe it off completely.
1) Lift up the vehicle, and remove the front wheels.
2) After pulling off the cotter pin and removing the castle nut, use a puller to remove the tie-rod end from the knuckle arm.



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

3) Lift up the vehicle.
4) Remove the center exhaust pipe. <Ref. to EX(H4DO)-12, REMOVAL, Center Exhaust Pipe.>

5) Remove the differential gear oil drain plug using TORX® bit T70, and then drain differential gear oil.



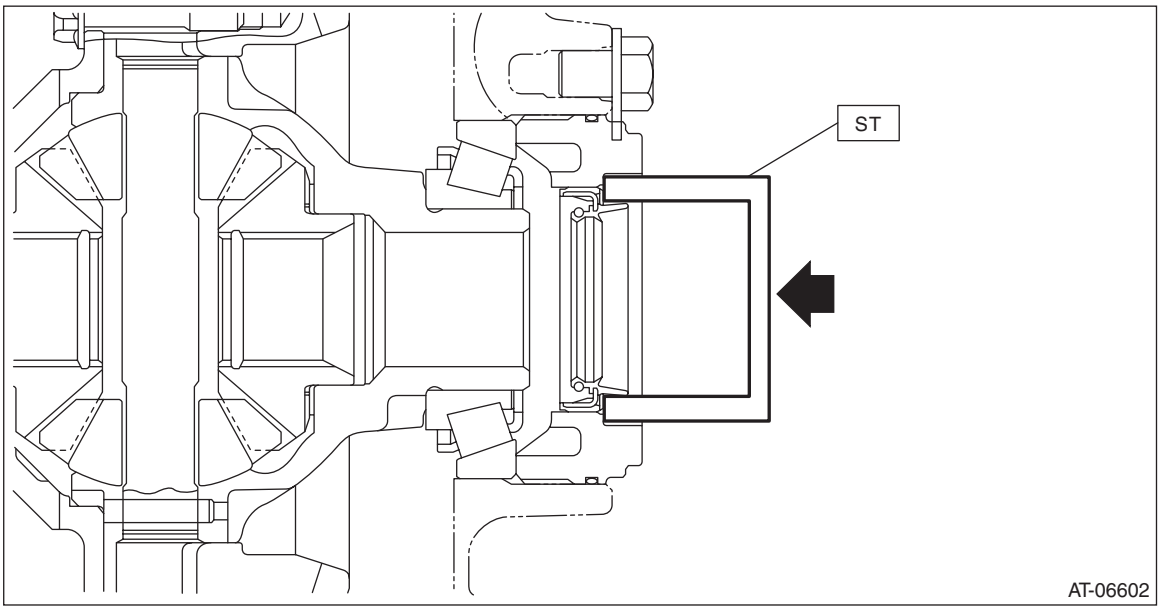
6) Tighten the differential gear oil drain plug.

NOTE:
Use a new gasket.

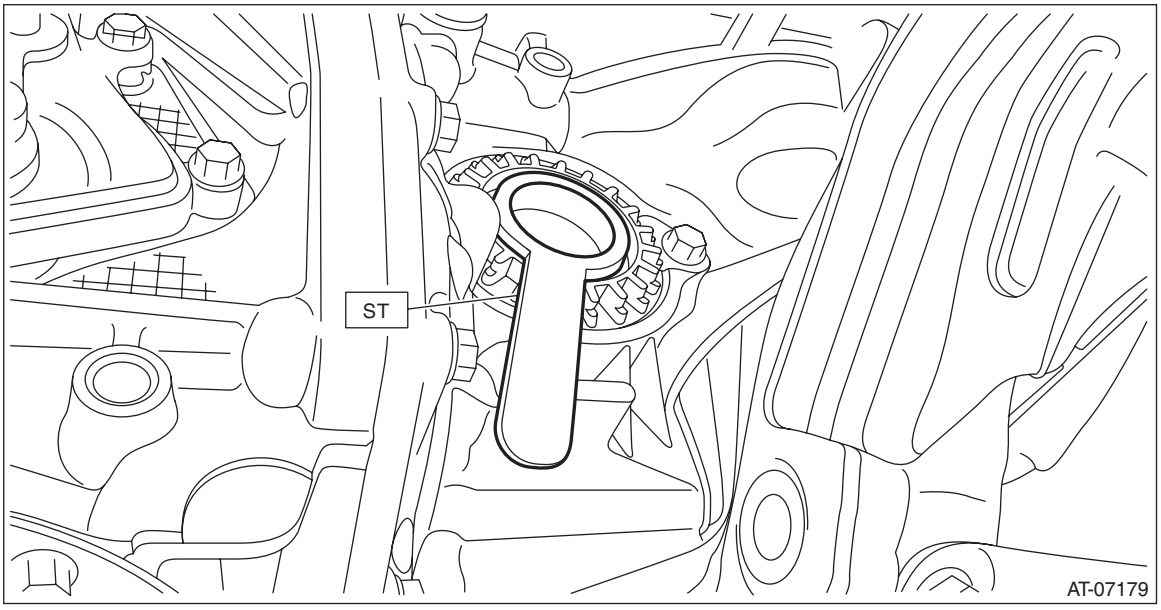
Tightening torque:
70 N·m (7.1 kgf-m, 51.6 ft-lb)

7) Remove the stabilizer link. <Ref. to FS-29, REMOVAL, Front Stabilizer.>
8) Disconnect the ball joint and housing.
9) Holding the joint of front drive shaft from transmission side, pull out the drive shaft from transmission with care not to stretch the boot.
10) Remove the differential side retainer oil seal using driver wrapped with vinyl tape etc.
11) 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.
- Oil seal has an identification mark (R, L). When installing oil seals, do not confuse the left and right.



12) Set the ST to side retainer.
ST 28399SA010 OIL SEAL PROTECTOR



13) Replace the circlip of the drive shaft with a new part.
14) Insert the front drive shaft spline section into transmission and remove the ST (DIFFERENTIAL SIDE OIL SEAL INSTALLER).
15) Insert the drive shaft into the transmission securely by pressing the housing from outside of the vehicle.
16) 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.**

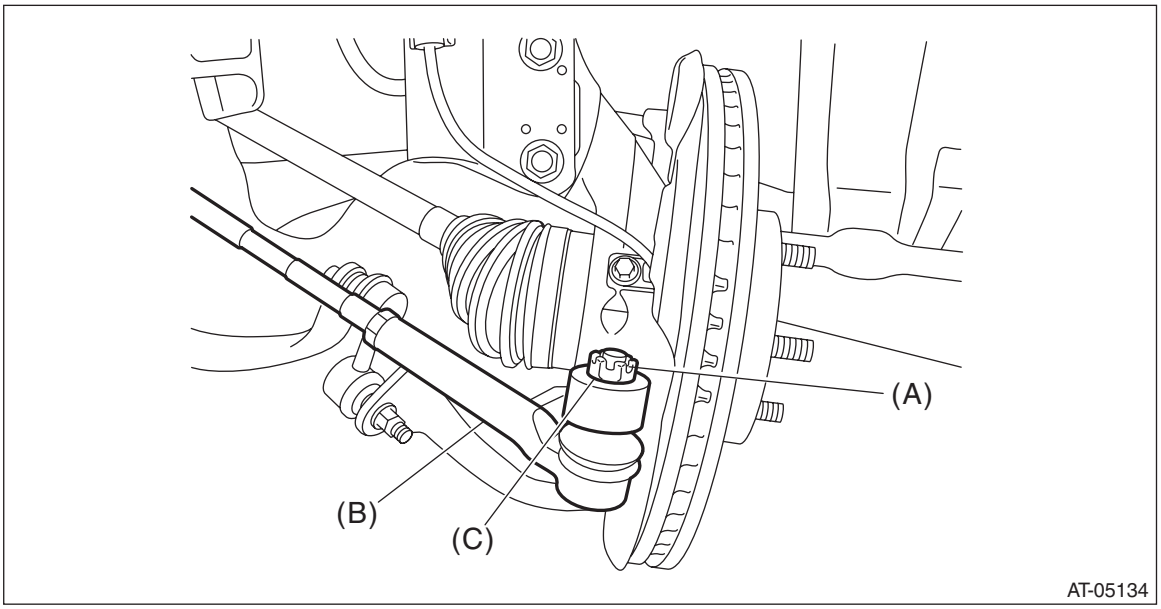
17) Install the stabilizer link.

Tightening torque:
60 N·m (6.1 kgf-m, 44.3 ft-lb)
18) Install the center exhaust pipe. <Ref. to EX(H4DO)-12, INSTALLATION, Center Exhaust Pipe.>
19) Lower the vehicle.
20) Connect the tie-rod end and knuckle arm, and attach the castle nut.

Tightening torque:
27 N·m (2.75 kgf-m, 19.9 ft-lb)

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

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



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

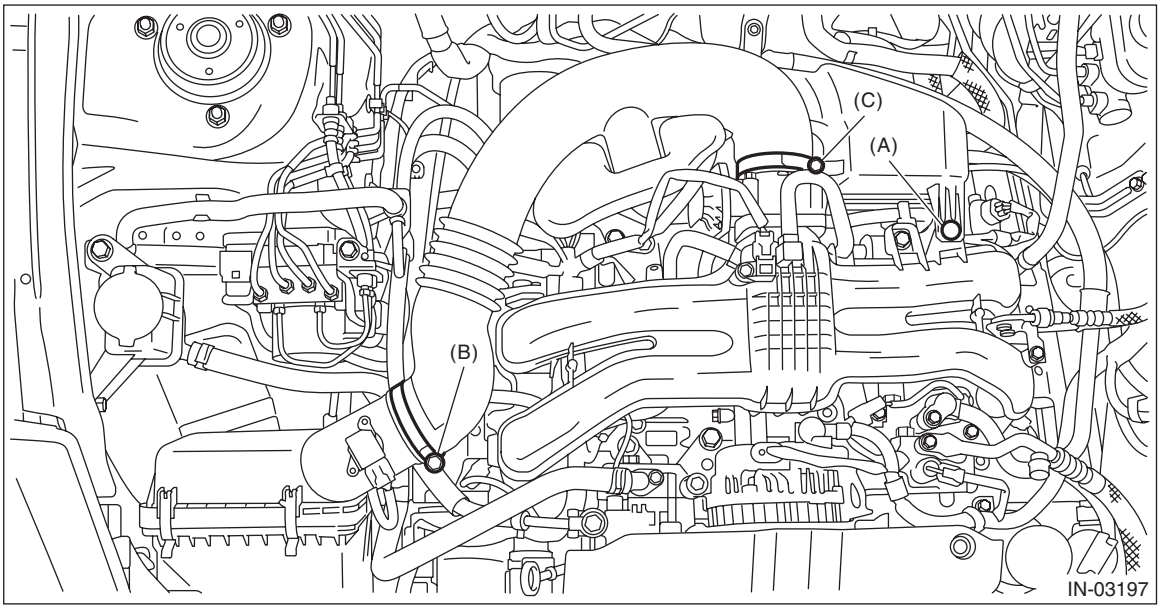
22) Fill differential gear oil. <Ref. to CVT-40, Differential Gear Oil.>
23) Adjust the differential gear oil level, and check for leakage. <Ref. to CVT-40, ADJUSTMENT, Differential Gear Oil.>
24) Install the front wheels. <Ref. to WT-4, INSTALLATION, Tire and Wheel.>

14.Inhibitor Switch

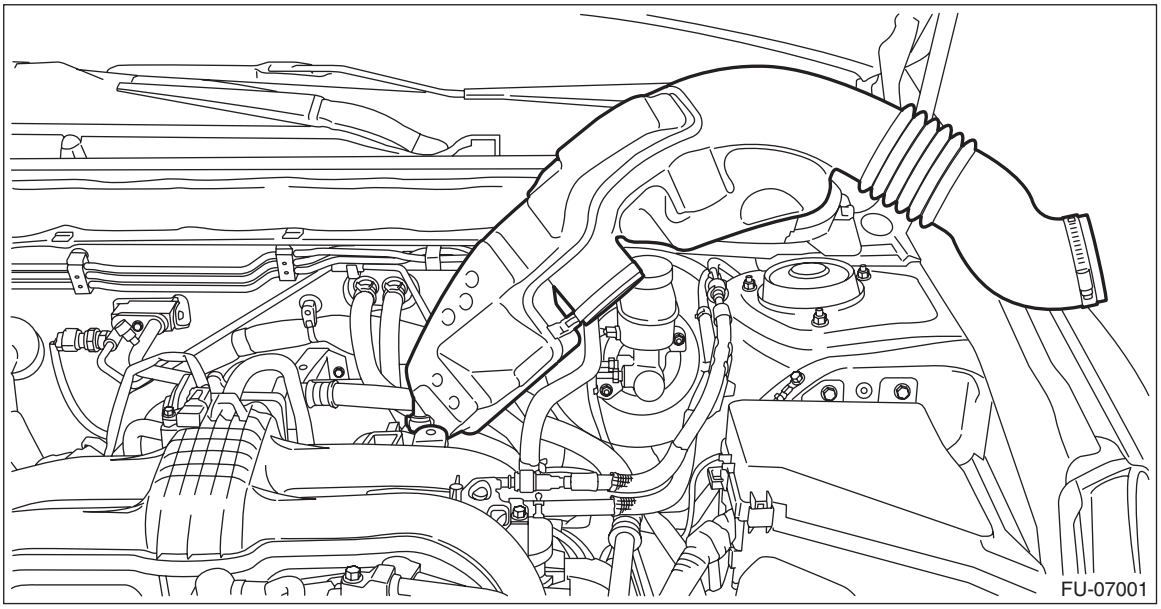
A: INSPECTION

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

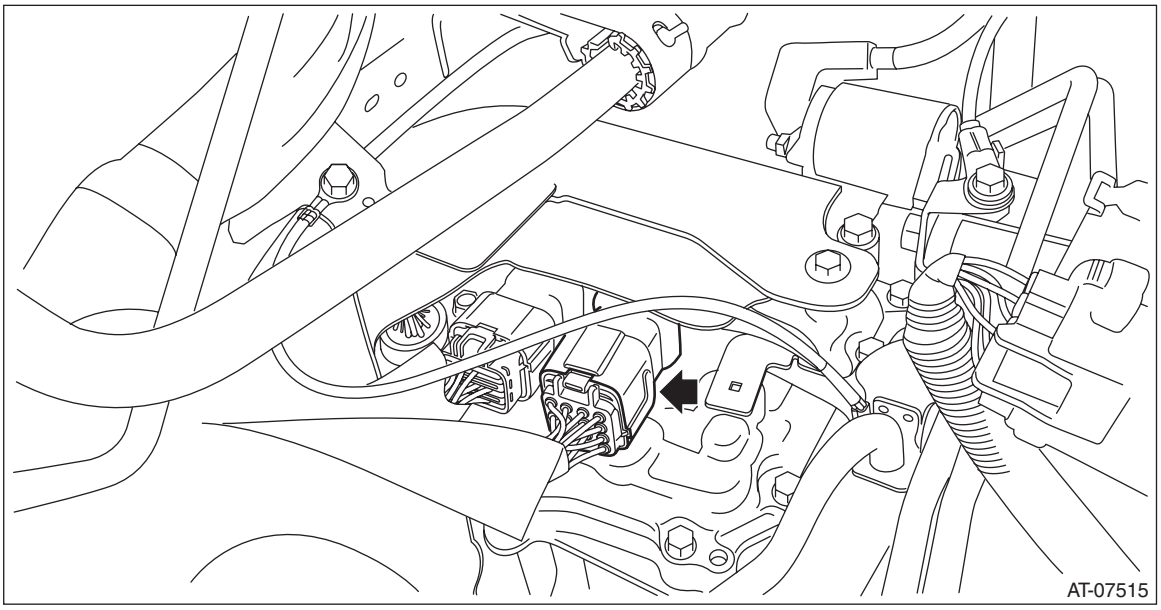
1) Remove the clip (A) from the air intake boot.
2) Loosen the clamp (B) connecting the air intake boot and air cleaner case (rear).
3) Loosen the clamp (C) which connects the air intake boot and throttle body.



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



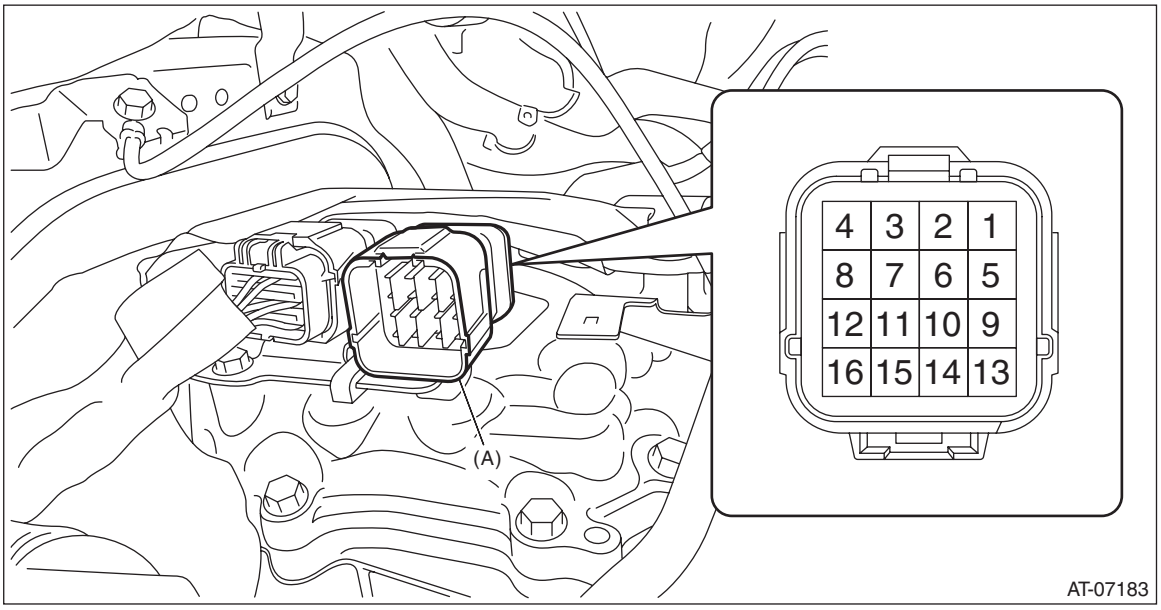
5) Disconnect the inhibitor harness connector.



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

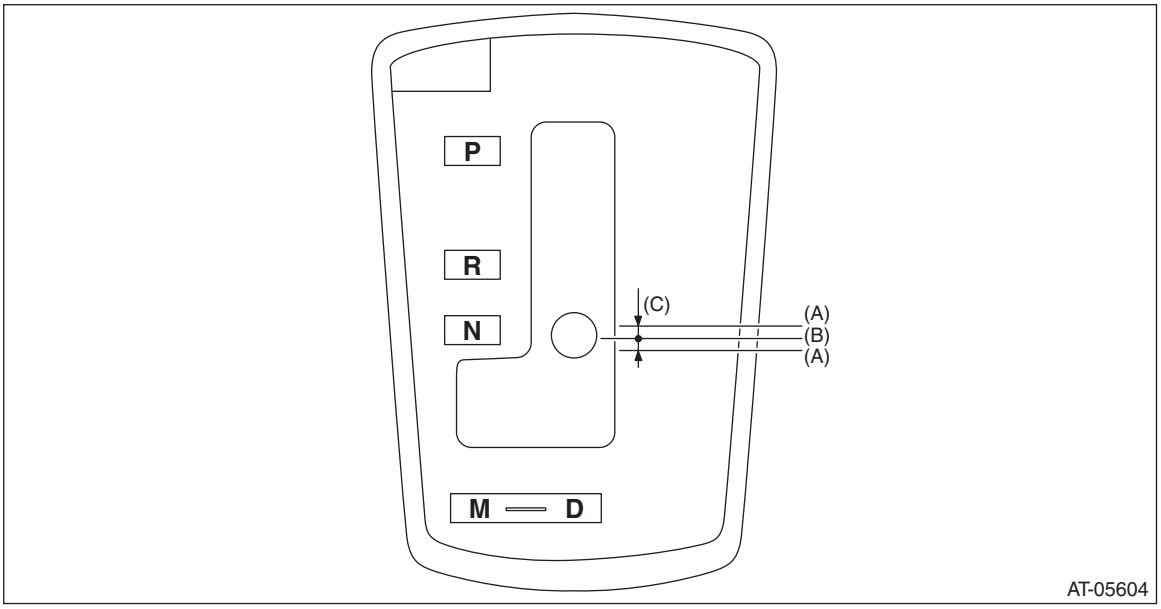
NOTE:
- Check that there is no continuity in the starter circuit when the select lever is in the “R” and “D” ranges.
- When inhibitor switch is normal, check there is no poor contact in vehicle side connector and no open circuit in harness.

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



(A) Inhibitor harness connector

7) 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 CVT-98, ADJUSTMENT, Inhibitor Switch.>

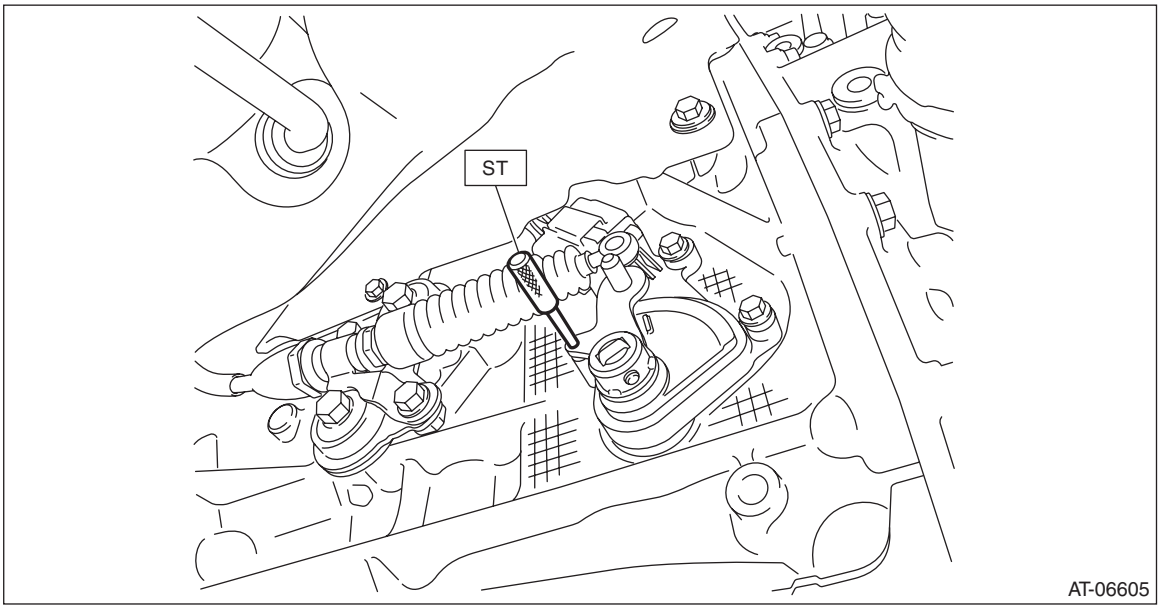


(A) Continuity does not exist.
(B) Continuity exists.
(C) 1.5°

8) Repeat the above inspection in other gear ranges. If there is fault, adjust the inhibitor switch and select cable. <Ref. to CVT-98, ADJUSTMENT, Inhibitor Switch.> <Ref. to CS-55, ADJUSTMENT, Select Cable.>

B: 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



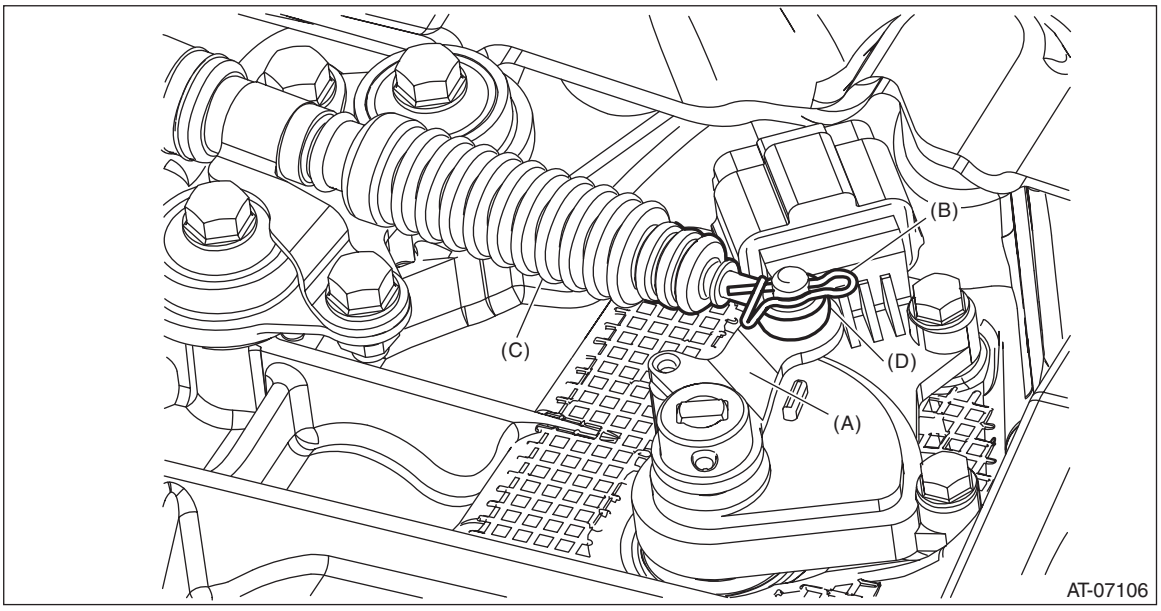
4) Tighten the two bolts holding the inhibitor switch.

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.

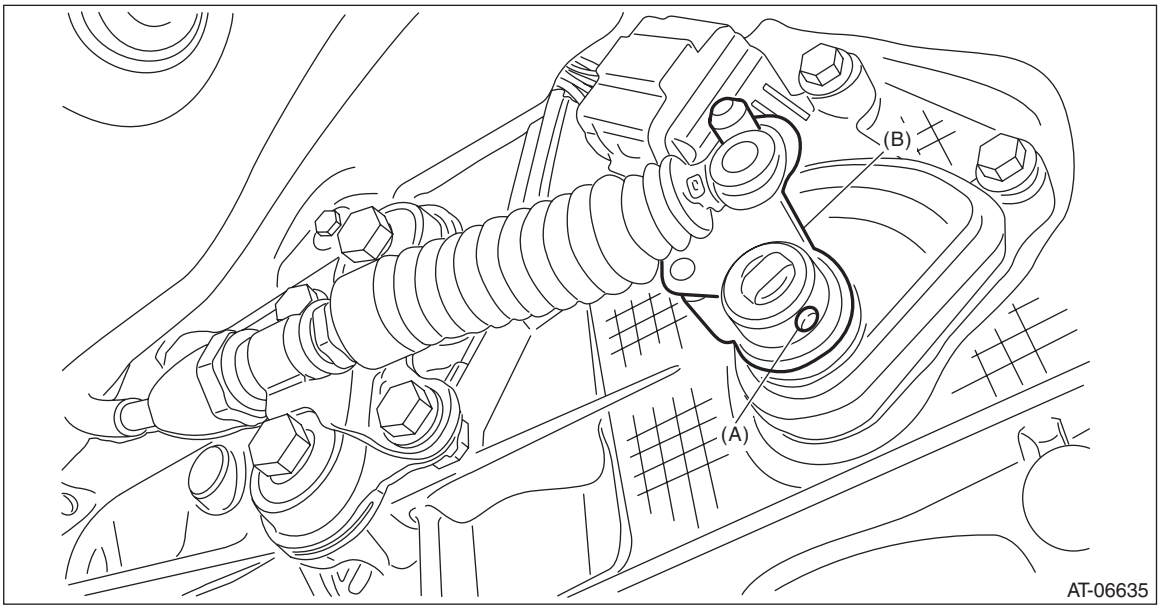
C: REMOVAL

1) Shift the select lever to “N” range.
2) Disconnect the ground cable from battery.
3) Lift up the vehicle.
4) Remove the center exhaust pipe. <Ref. to EX(H4DO)-12, REMOVAL, Center Exhaust Pipe.>
5) Remove the snap pin and washer from the shifter arm.



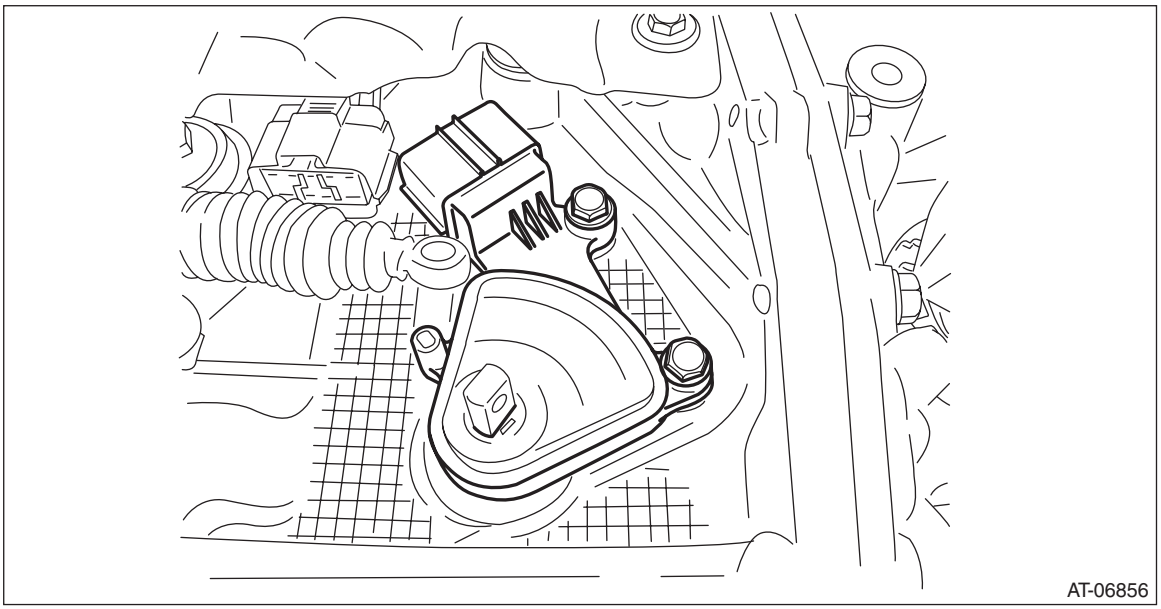
(A) Shifter arm
(B) Snap pin
(C) Select cable
(D) Washer

6) Remove the spring pin and shifter arm.



(A) Spring pin
(B) Shifter arm

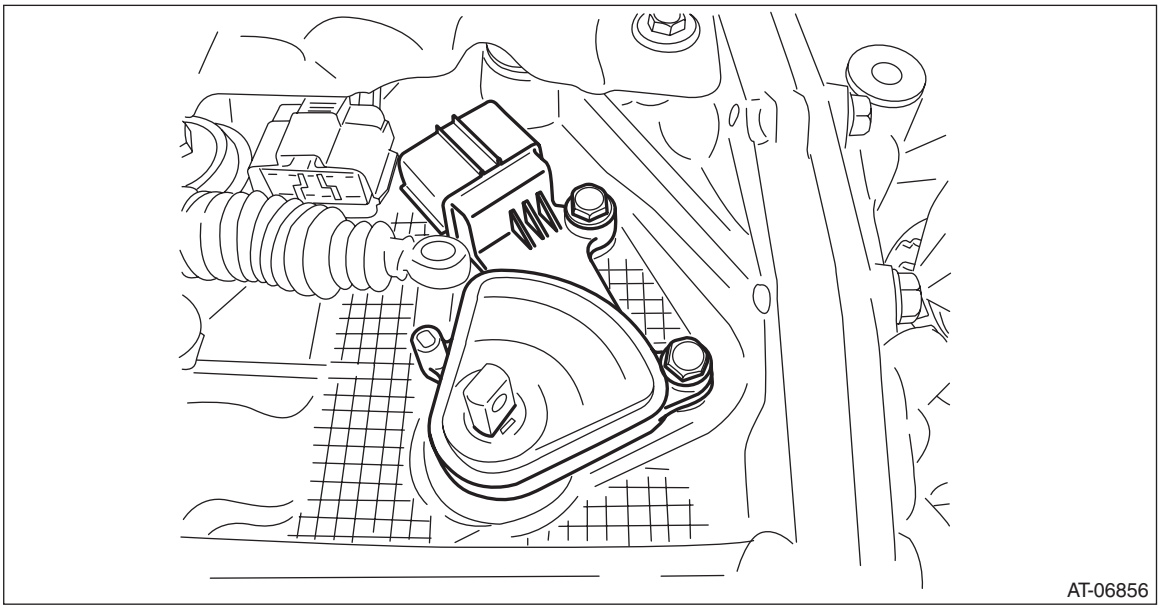
7) Remove the inhibitor harness connector from inhibitor switch.
8) Remove the two inhibitor switch securing bolts.



9) Remove the inhibitor switch from the transmission case.

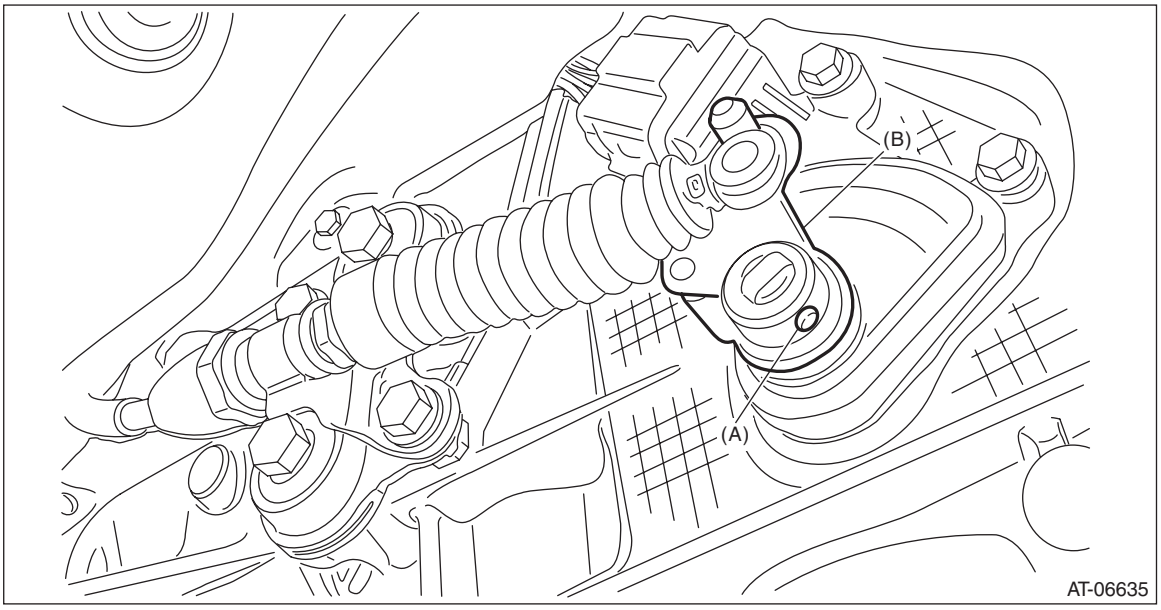
D: INSTALLATION

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



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

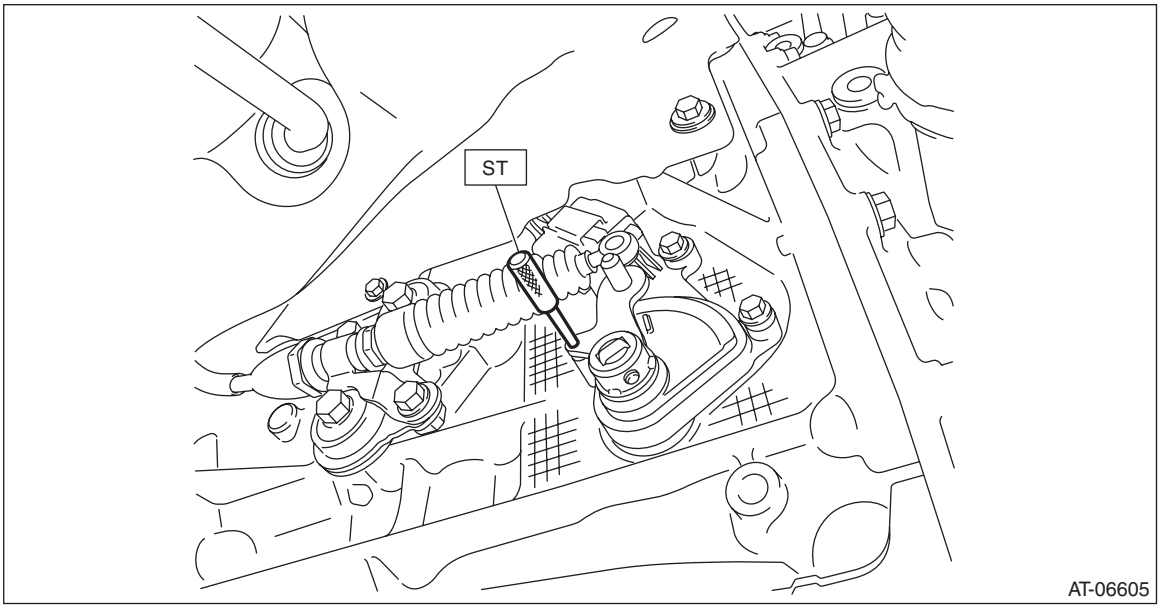
NOTE:
Use new spring pin.



(A) Spring pin
(B) Shifter arm

4) Shift the shifter arm to “N” range.

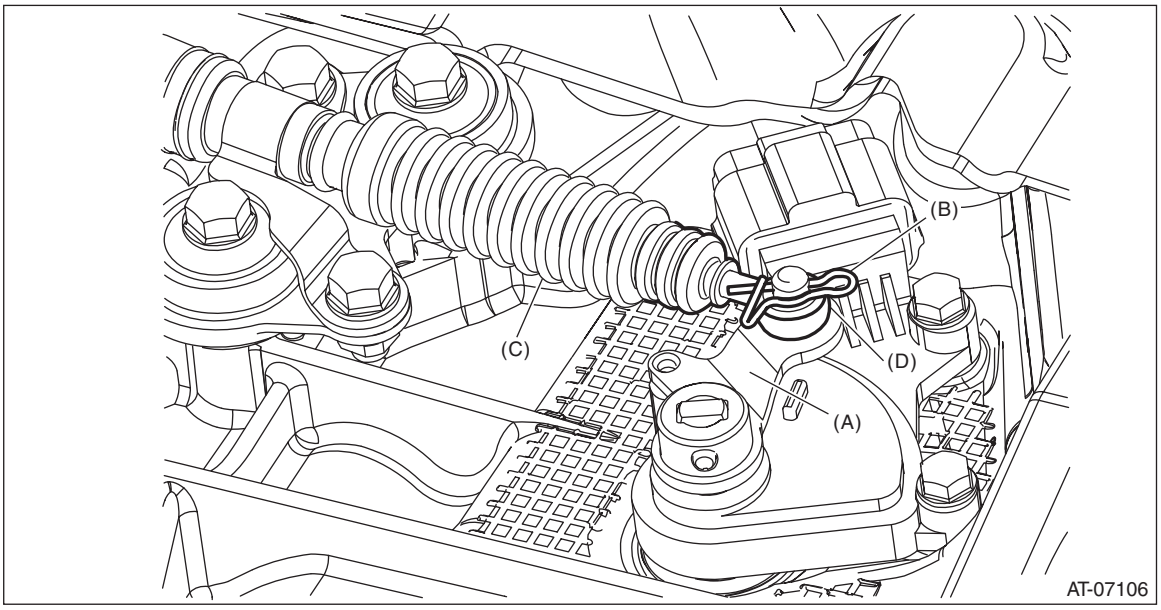
5) Install the ST vertically in the cutout of shifter arm and the hole of switch body.
ST 499267300 STOPPER PIN



6) Tighten the two bolts holding the inhibitor switch.

Tightening torque:
5 N·m (0.5 kgf-m, 3.7 ft-lb)

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



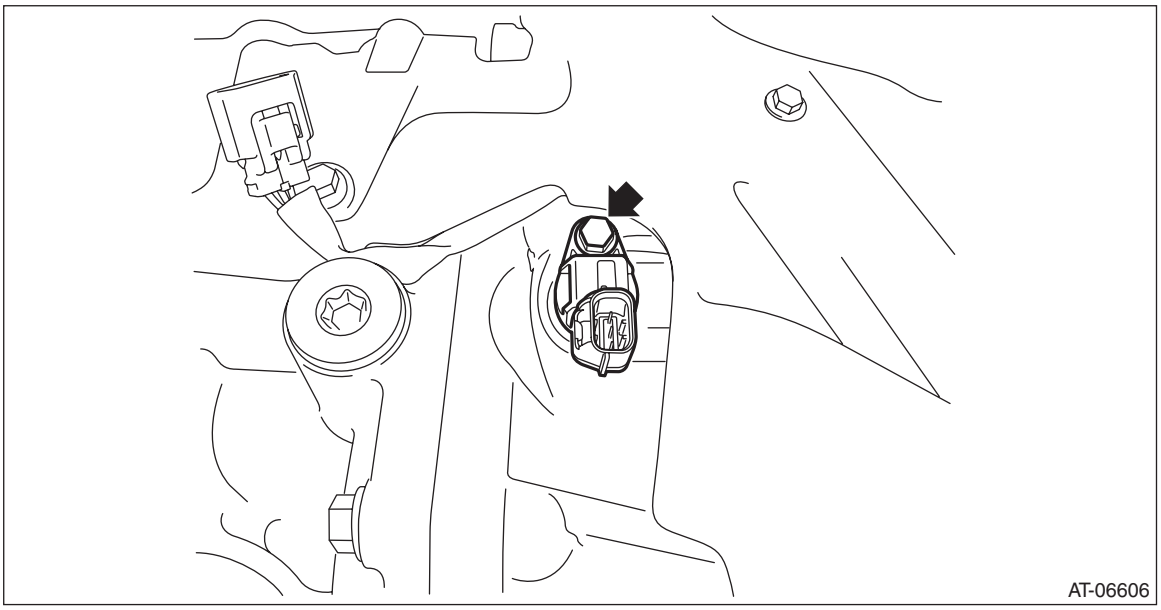
(A) Shifter arm
(B) Snap pin
(C) Select cable
(D) Washer

9) Install the center exhaust pipe. <Ref. to EX(H4DO)-12, INSTALLATION, Center Exhaust Pipe.>
10) Lower the vehicle.
11) Connect the battery ground terminal.
12) Check the inhibitor switch. <Ref. to CVT-96, INSPECTION, Inhibitor Switch.>

15.Turbine Speed Sensor

A: REMOVAL

CAUTION:
Be sure to prevent water or oil from contacting the connector terminal of turbine speed sensor. If adhesion occurs, replace with a new part.
1) Lift up the vehicle.
2) Remove the harness connector from turbine speed sensor.
3) Remove the turbine speed sensor.



B: INSTALLATION

CAUTION:
Be sure to prevent water or oil from contacting the connector terminal of turbine speed sensor. If adhesion occurs, replace with a new part.
Install in the reverse order of removal.

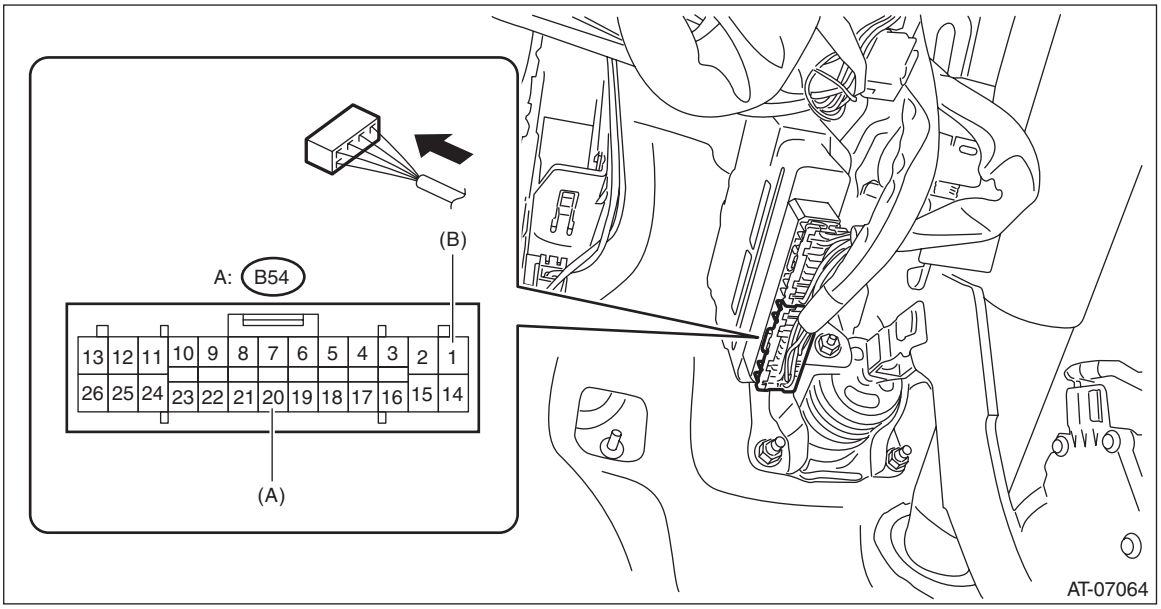
NOTE:
- Use new O-rings.
- Apply CVTF to the O-ring.

Tightening torque:
7 N·m (0.7 kgf-m, 5.2 ft-lb)

C: INSPECTION

1) Remove the instrument panel lower cover. <Ref. to EI-63, REMOVAL, Instrument Panel Lower Cover.>
2) Set the probe of oscilloscope to TCM harness connector.

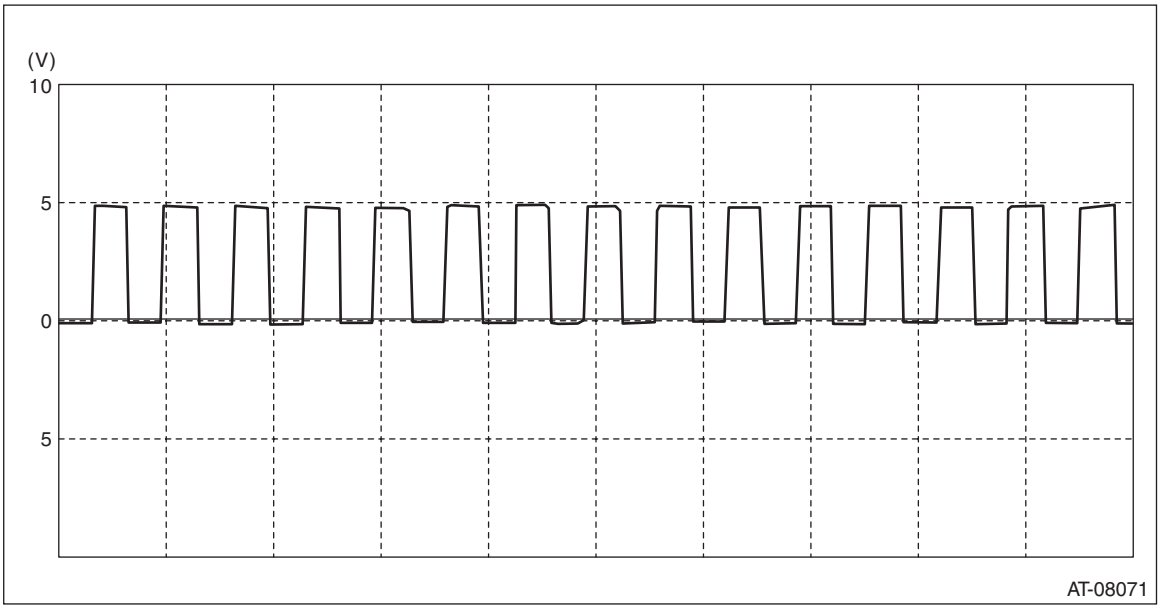
Connector & terminal
(B54) No. 20 (+) — No. 1 (–):



(A) + probe
(B) – probe

3) Start and warm up the engine.
4) Check the waveform and output voltage of the turbine speed sensor with engine idling.

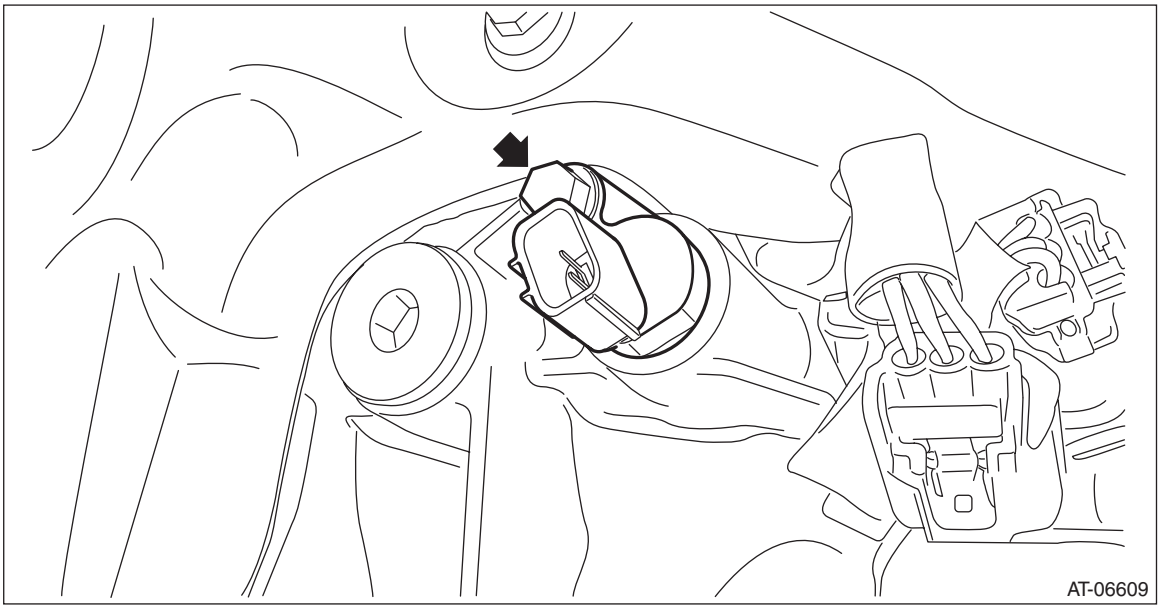
NOTE:
The waveform cycle changes as the speed changes.



16.Secondary Speed Sensor

A: REMOVAL

CAUTION:
• Be sure to prevent water or oil from contacting the connector terminal of secondary speed sensor. If adhesion occurs, replace with a new part.
• When secondary speed sensor is removed, CVTF leaks. After installing the secondary speed sensor, adjust the CVTF level.
1) Lift up the vehicle.
2) Remove the harness connector from secondary speed sensor.
3) Remove the secondary speed sensor.



B: INSTALLATION

CAUTION:
• Be sure to prevent water or oil from contacting the connector terminal of secondary speed sensor. If adhesion occurs, replace with a new part.
• After installing the secondary speed sensor, adjust the CVTF level.
Install in the reverse order of removal.

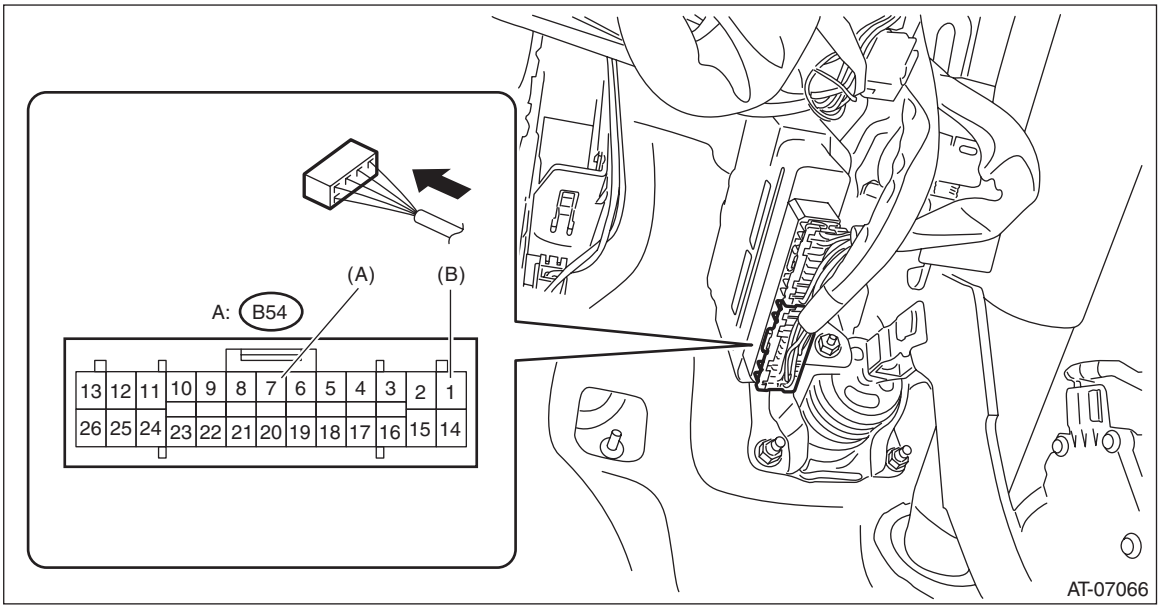
NOTE:
• Use new O-rings.
• Apply CVTF to the O-ring.

Tightening torque:
7 N·m (0.7 kgf-m, 5.2 ft-lb)

C: INSPECTION

1) Remove the instrument panel lower cover. <Ref. to EI-63, REMOVAL, Instrument Panel Lower Cover.>
2) Set the probe of oscilloscope to TCM harness connector.

Connector & terminal
(B54) No. 7 (+) — No. 1 (–):

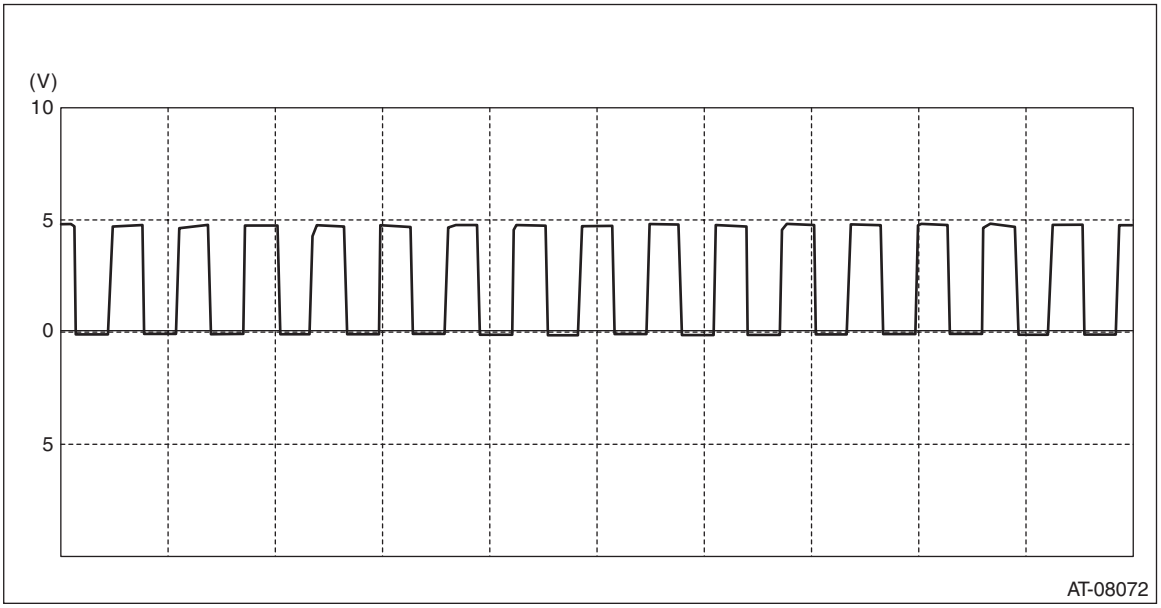


(A) + probe
(B) – probe

3) Start and warm up the engine.
4) Lift up the vehicle.

CAUTION:
Lift up the vehicle until the tire bottom is 0.3 m (0.98 ft) or more above the ground.
5) Shift the select lever to “D” range.
6) Check the waveform and output voltage of the secondary speed sensor with engine idling.

NOTE:
The waveform cycle changes as the speed changes.

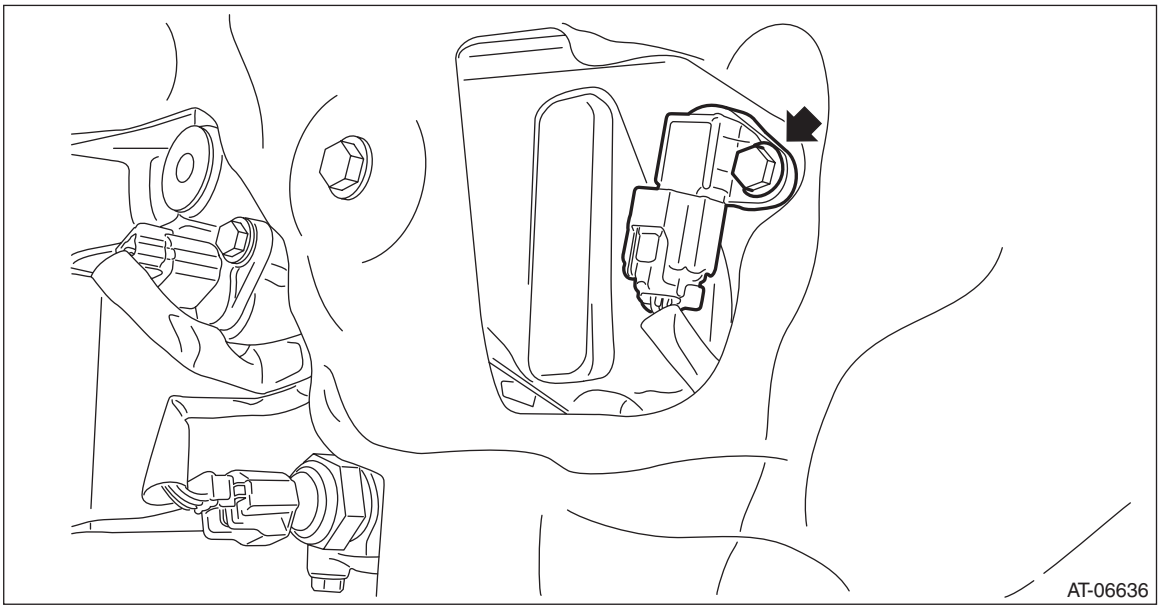


17.Primary Speed Sensor

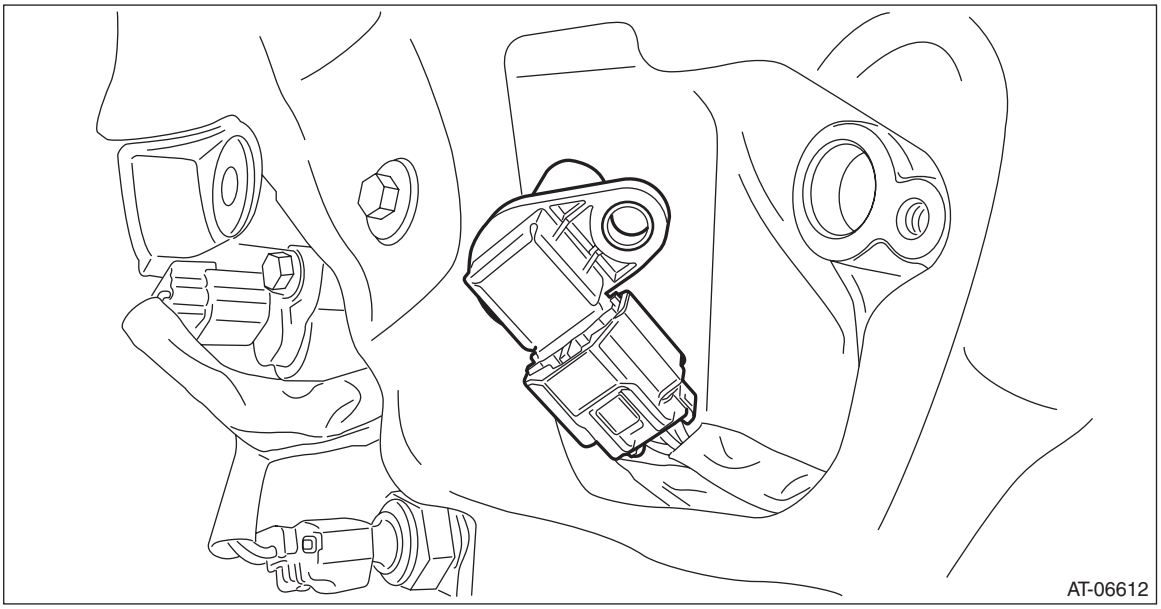
A: REMOVAL

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

1) Remove the transmission assembly. <Ref. to CVT-57, REMOVAL, Automatic Transmission Assembly.>
2) Remove the primary speed sensor.



3) Remove the harness connector from primary speed sensor.



B: INSTALLATION

CAUTION:
Be sure to prevent water or oil from contacting the connector terminal of primary speed sensor. If adhesion occurs, replace with a new part.
Install in the reverse order of removal.

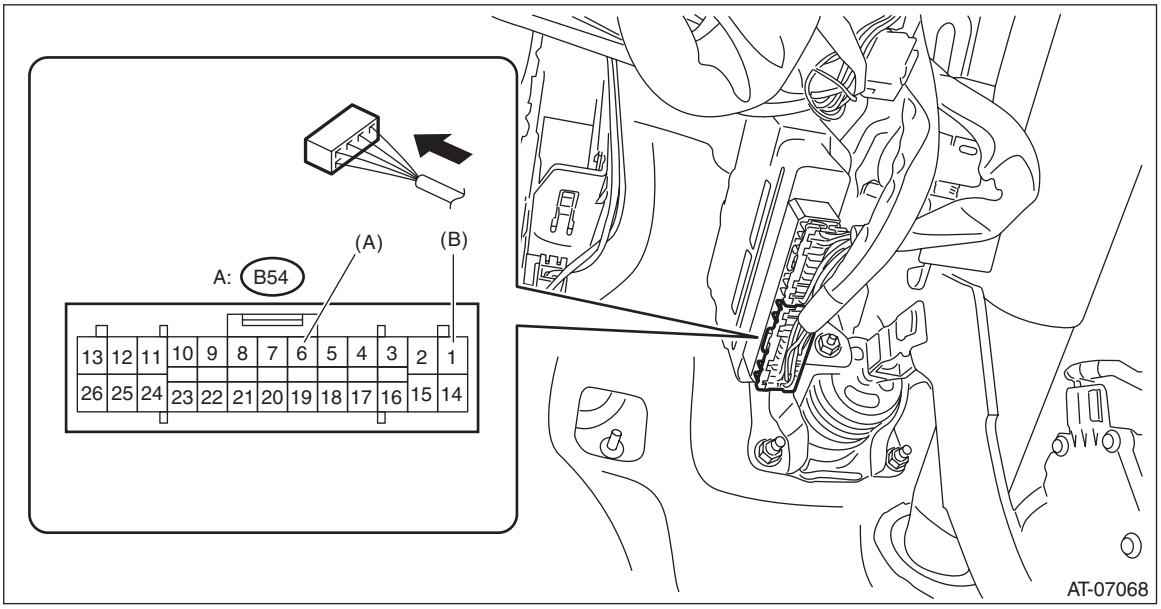
NOTE:
- Use new O-rings.
- Apply CVTF to the O-ring.

Tightening torque:
7 N·m (0.7 kgf-m, 5.2 ft-lb)

C: INSPECTION

1) Remove the instrument panel lower cover. <Ref. to EI-63, REMOVAL, Instrument Panel Lower Cover.>
2) Set the probe of oscilloscope to TCM harness connector.

Connector & terminal
(B54) No. 6 (+) — No. 1 (–):



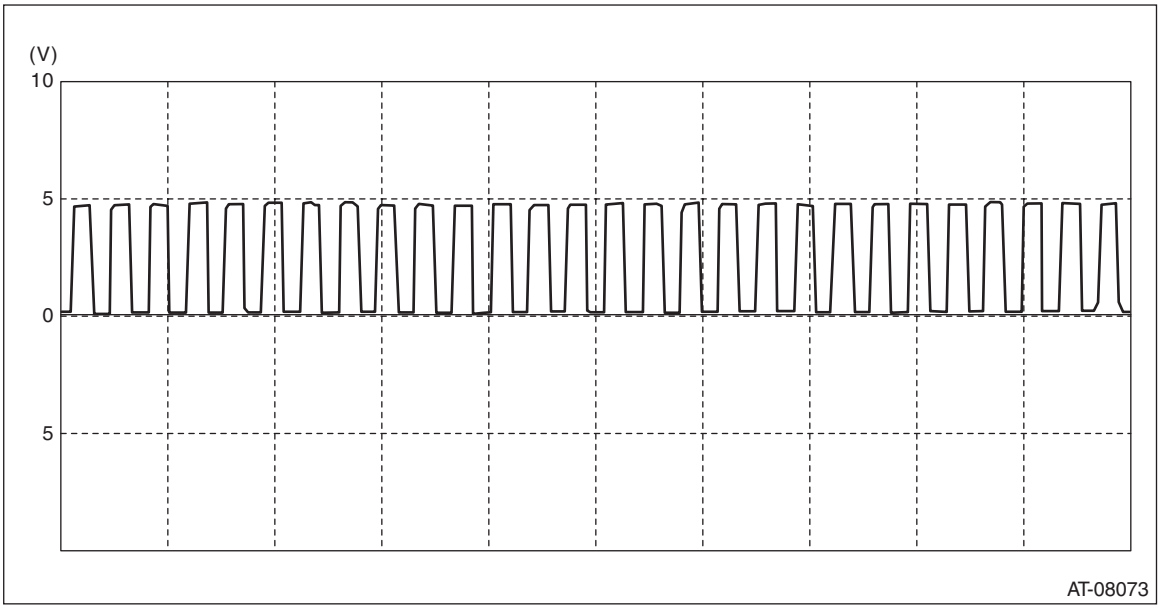
(A) + probe
(B) – probe

3) Start and warm up the engine.
4) Lift up the vehicle.

CAUTION:
Lift up the vehicle until the tire bottom is 0.3 m (0.98 ft) or more above the ground.
5) Shift the select lever to “D” range.

6) Check the waveform and output voltage of the primary speed sensor with engine idling.

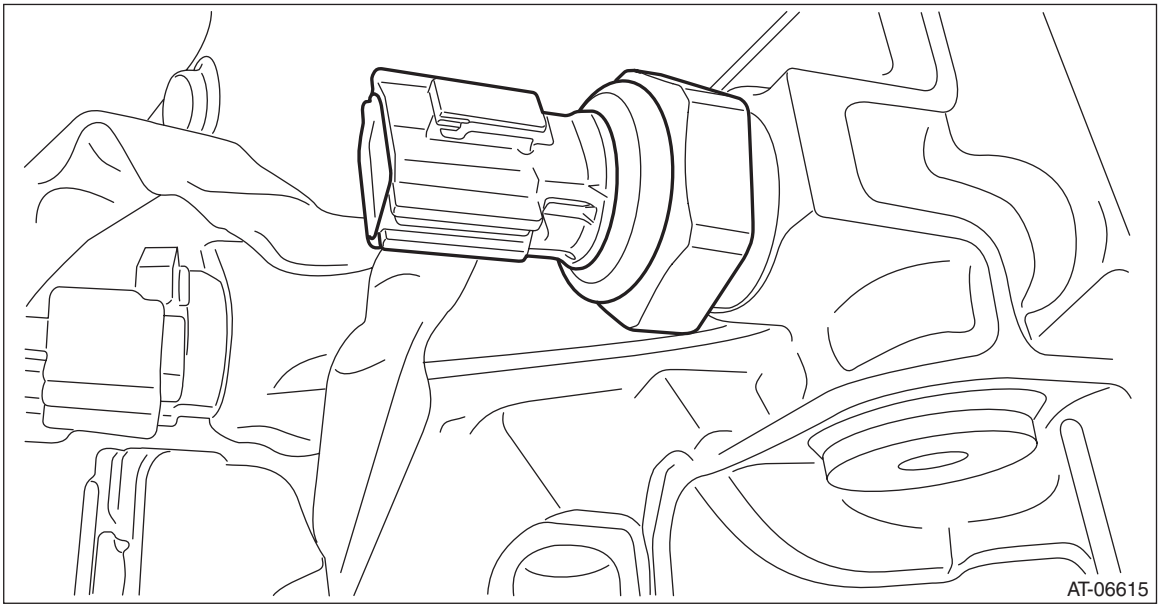
NOTE:
The waveform cycle changes as the speed changes.



18.Secondary Pressure Sensor

A: REMOVAL

CAUTION:
• Be sure to prevent water or oil from contacting the connector terminal of secondary pressure sensor. If adhesion occurs, replace with a new part.
• When secondary pressure sensor is removed, CVTF leaks. After installing the secondary pressure sensor, adjust the CVTF level.
1) Disconnect the ground cable from battery.
2) Lift up the vehicle.
3) Remove the secondary pressure sensor connector.
4) Remove the secondary pressure sensor.



B: INSTALLATION

CAUTION:
• Be sure to prevent water or oil from contacting the connector terminal of secondary pressure sensor. If adhesion occurs, replace with a new part.
• After installing the secondary pressure sensor, adjust the CVTF level.
Install in the reverse order of removal.

NOTE:
Use new O-rings.

Tightening torque:
39 N·m (4.0 kgf-m, 28.8 ft-lb)

C: INSPECTION

1) Remove the instrument panel lower cover. <Ref. to EI-63, REMOVAL, Instrument Panel Lower Cover.>
2) Start and warm up the engine.
3) Shift the select lever to “P” or “N” range.
4) Depress the brake pedal and hold it.
5) Check “secondary pressure sensor voltage” by using Subaru Select Monitor while the engine is idling. <Ref. to CVT(diag)-15, OPERATION, Subaru Select Monitor.>

Standard
Approx. 0.8 V

6) Check “secondary pressure sensor voltage” with engine stopped and ignition switch turned on by using Subaru Select Monitor. <Ref. to CVT(diag)-15, OPERATION, Subaru Select Monitor.>

Specification:
Approx. 0.5 V

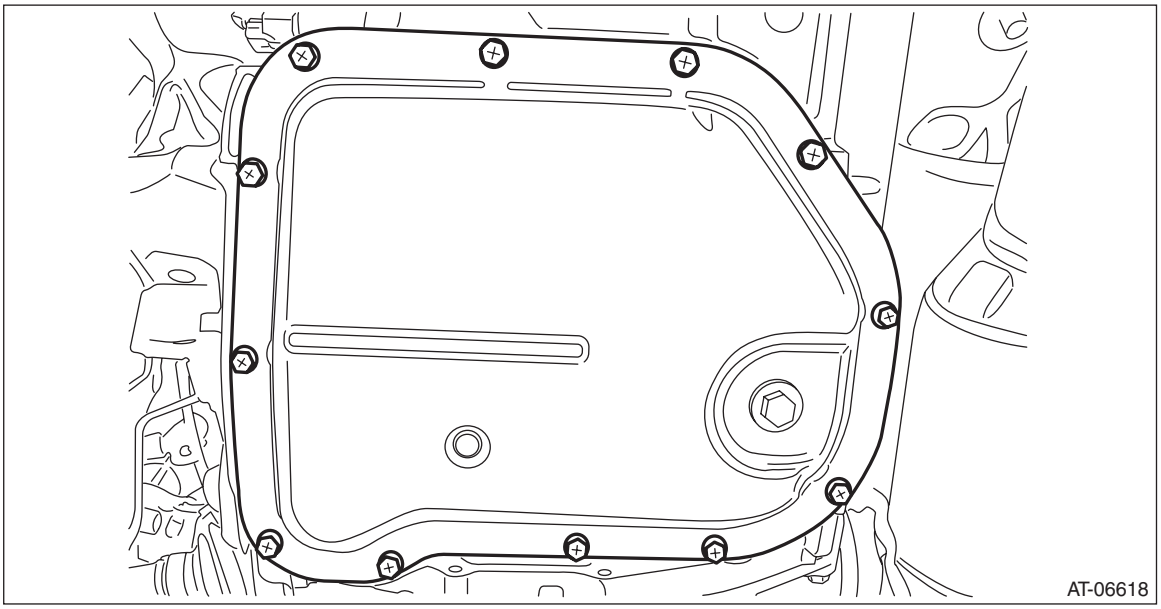
19.Oil Pan and Strainer

A: REMOVAL

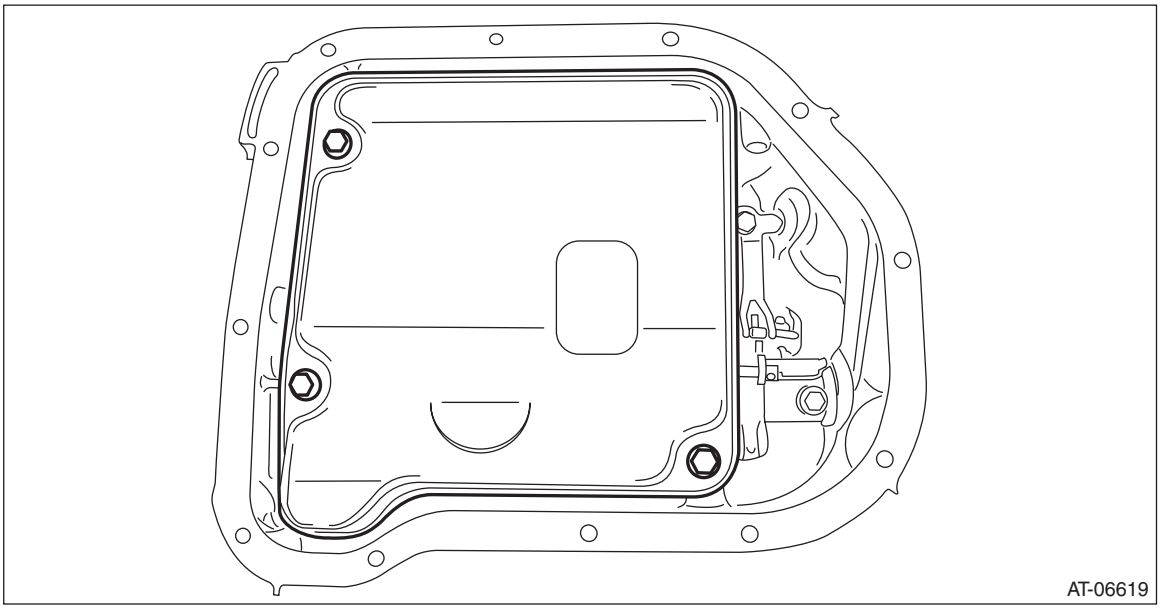
CAUTION:
• Directly after the vehicle has been running or the engine has been long idle running, the CVTF is hot. Be careful not to burn yourself.
• Be careful not to spill CVTF on the exhaust pipe to prevent it from emitting smoke or causing a fire. If the CVTF adheres, wipe it off completely.

1) Lift up the vehicle.
2) Clean the transmission exterior.
3) Remove the CVTF drain plug to drain CVTF.
4) Remove the oil pan.

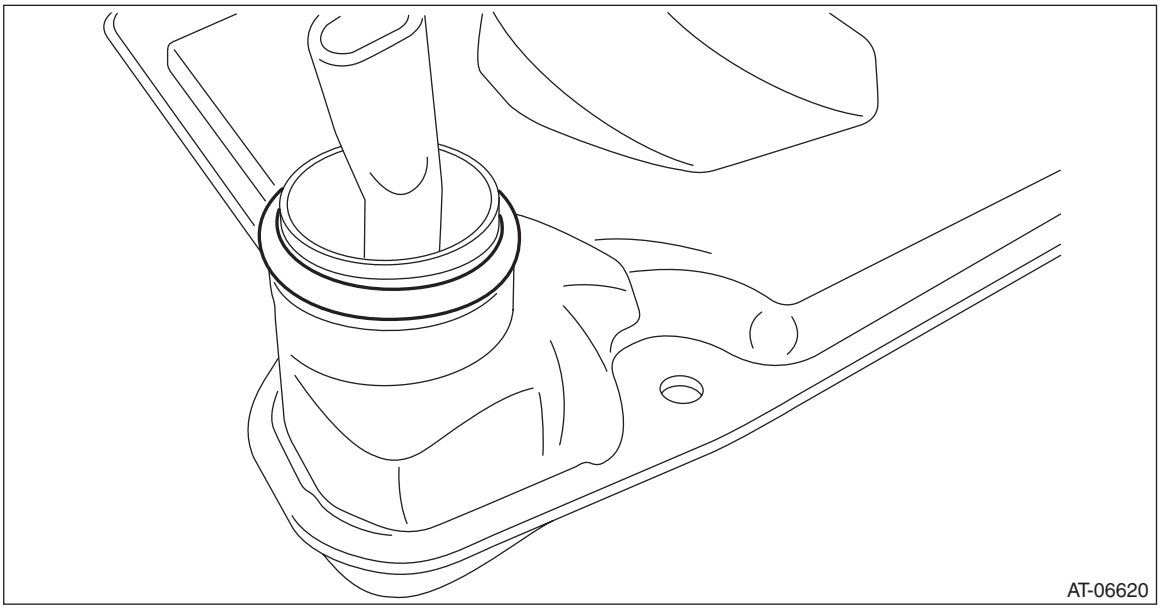
CAUTION:
Be careful not to allow foreign matter such as dust or dirt to enter the oil pan.



5) Remove the magnet.
6) Remove the oil strainer.



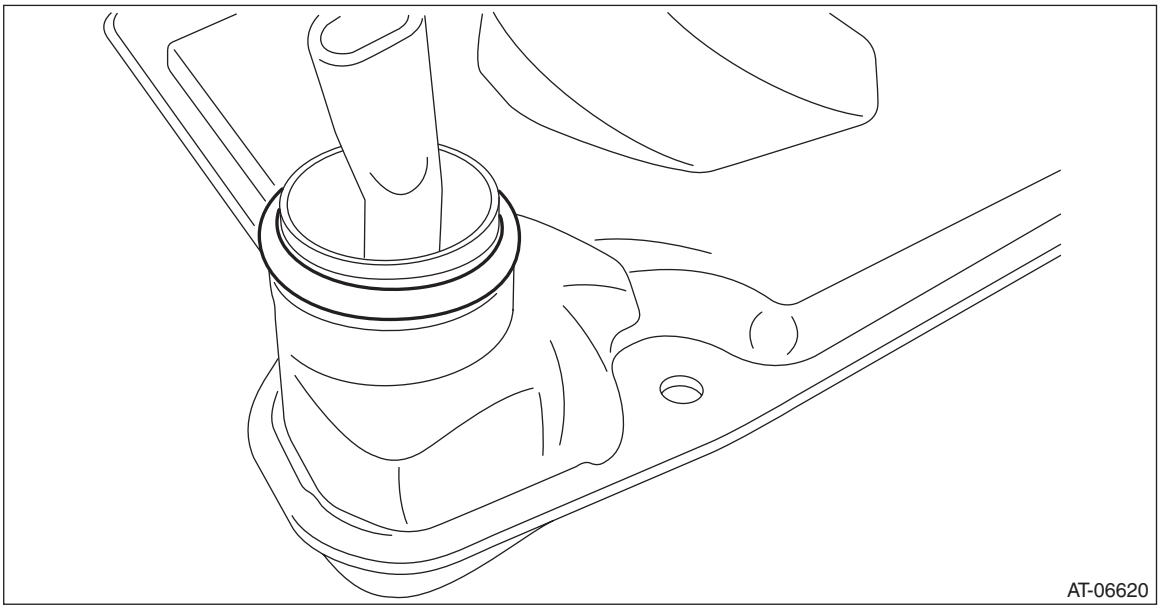
7) Remove the O-ring from oil strainer.



B: INSTALLATION

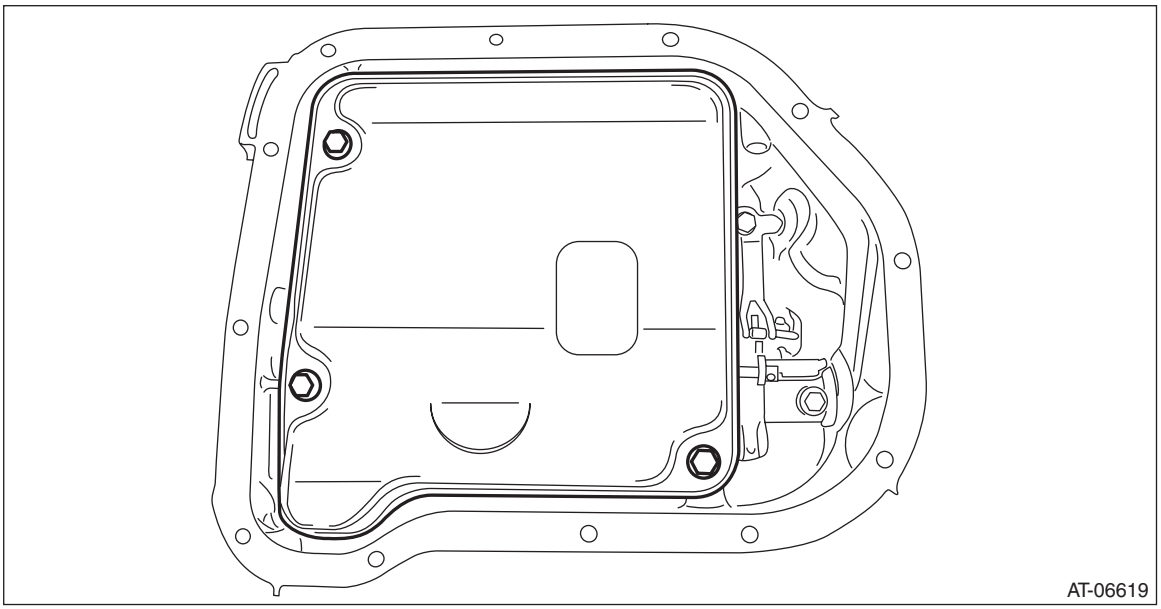
1) Clean the mating surface of oil pan and transmission case.
2) Install the O-ring to the oil strainer.

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



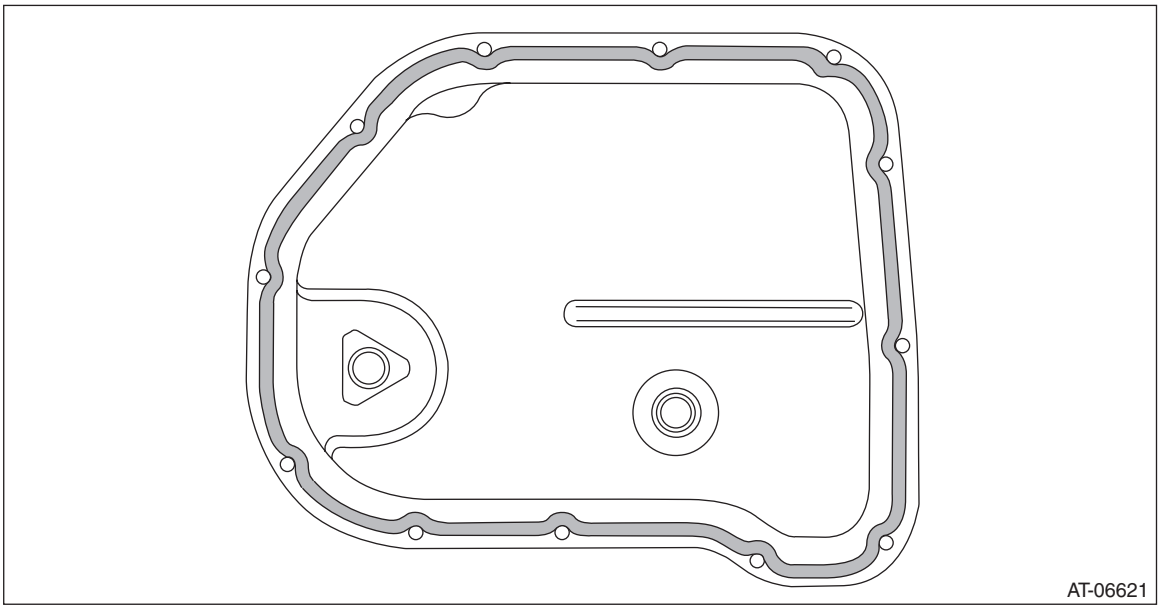
3) Install the oil strainer.

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



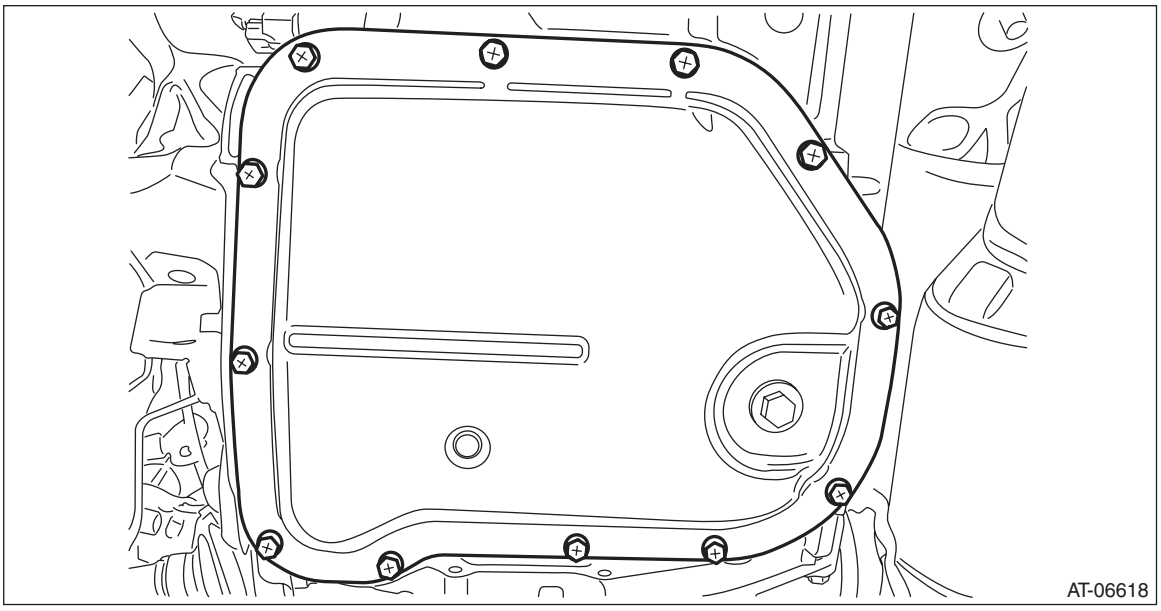
4) Clean the magnet.
5) Attach the magnet at the specified position of the oil pan.
6) Apply liquid gasket all around the oil pan mating surface seamlessly.

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



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

Tightening torque:
5 N·m (0.5 kgf-m, 3.7 ft-lb)



8) Refill CVTF and adjust the level. <Ref. to CVT-37, REPLACEMENT, CVTF.>

C: INSPECTION

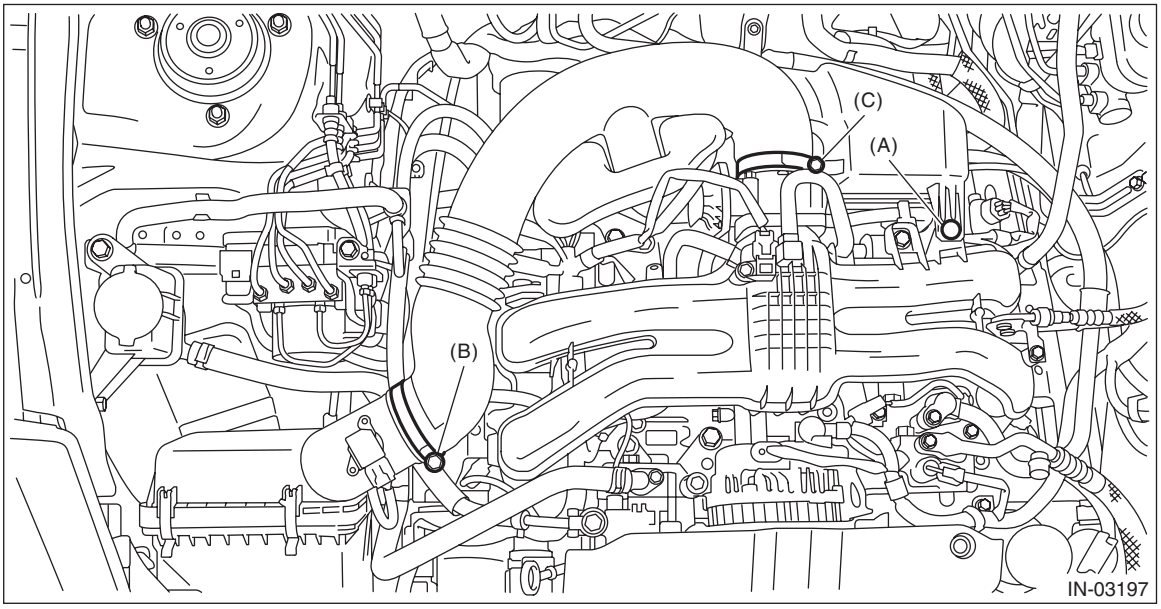
- Check each part for damage or dust.
- Check oil strainer for clogging.

20.Control Valve Body

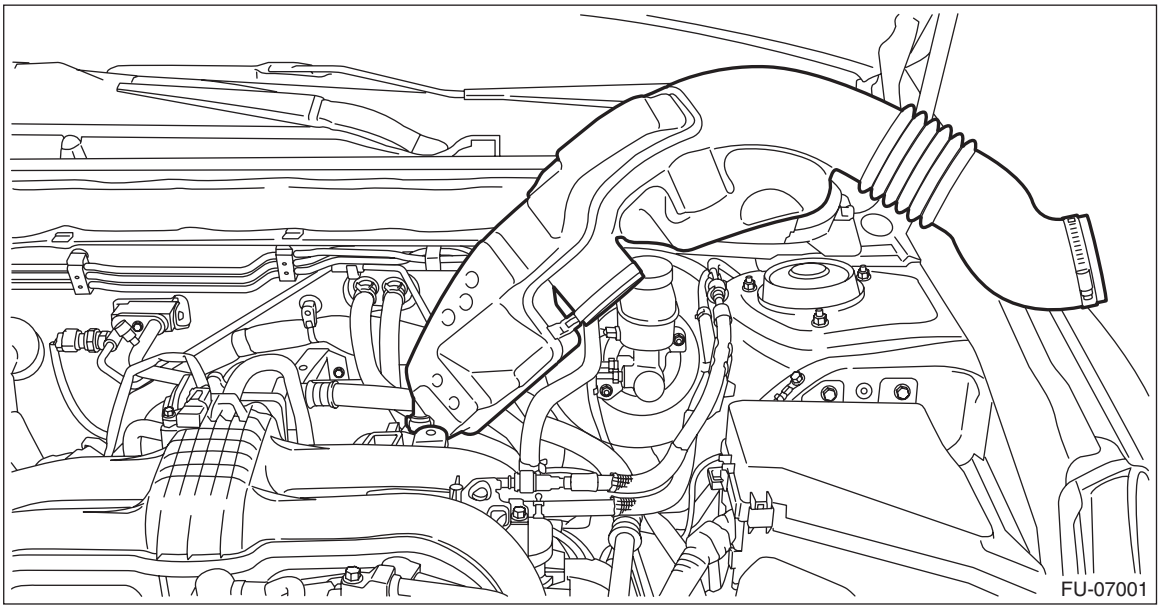
A: REMOVAL

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

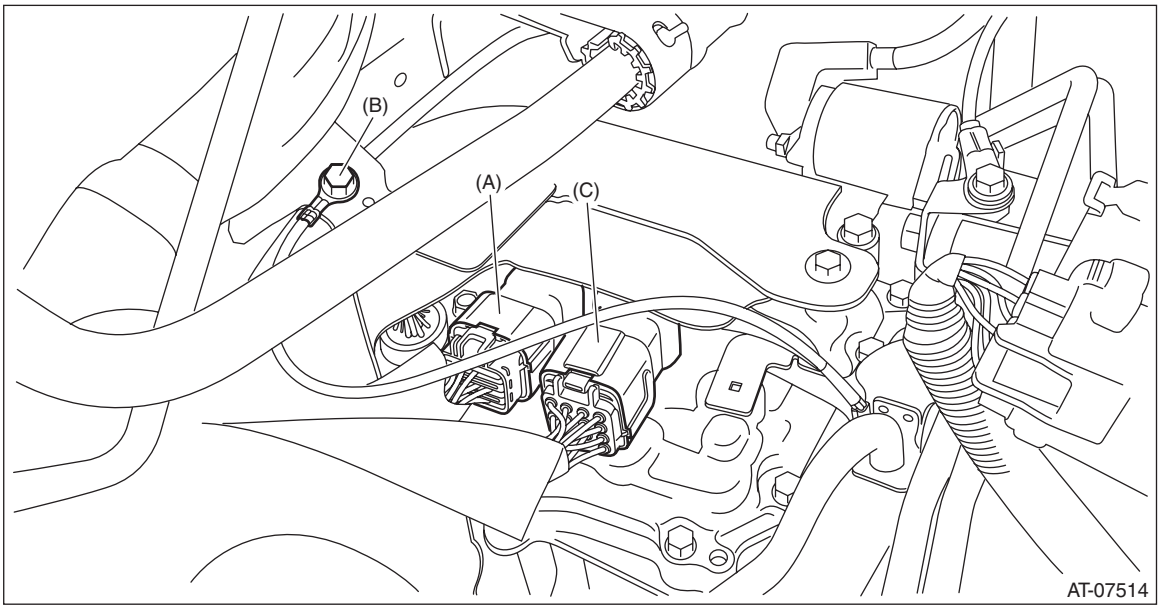
NOTE:
The control valve body is replaced as an assembly only, because it is a non-disassembly part.
1) Disconnect the ground cable from battery.
2) Remove the clip (A) from the air intake boot.
3) Loosen the clamp (B) connecting the air intake boot and air cleaner case (rear).
4) Loosen the clamp (C) which connects the air intake boot and throttle body.



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

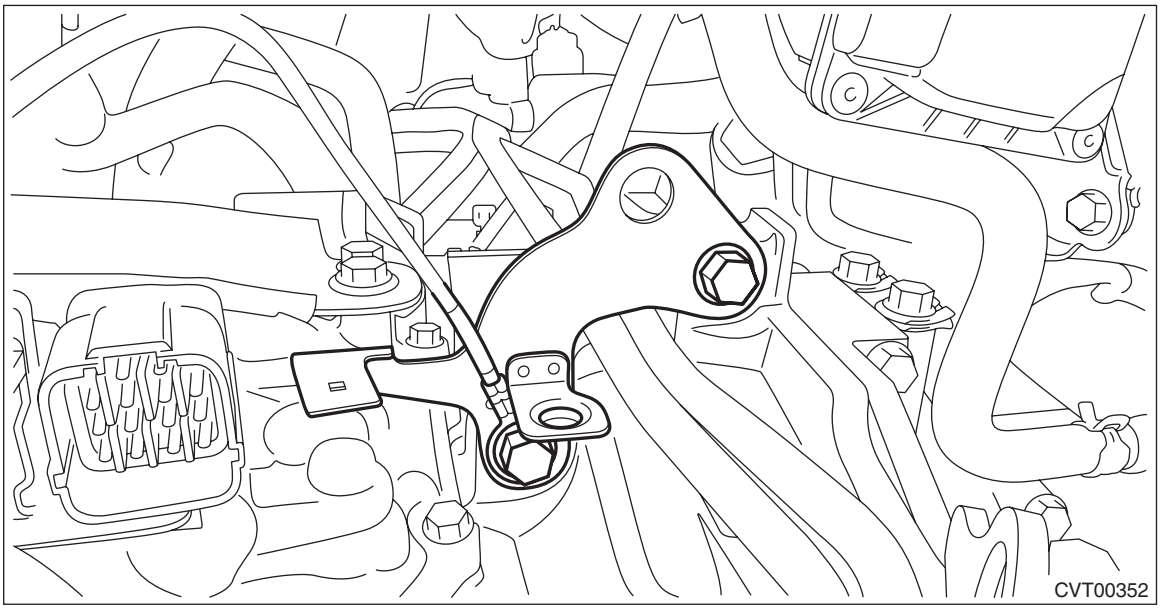


6) Disconnect the following connectors.
- Transmission harness connectors
- Inhibitor harness connector
- Transmission radio ground terminal

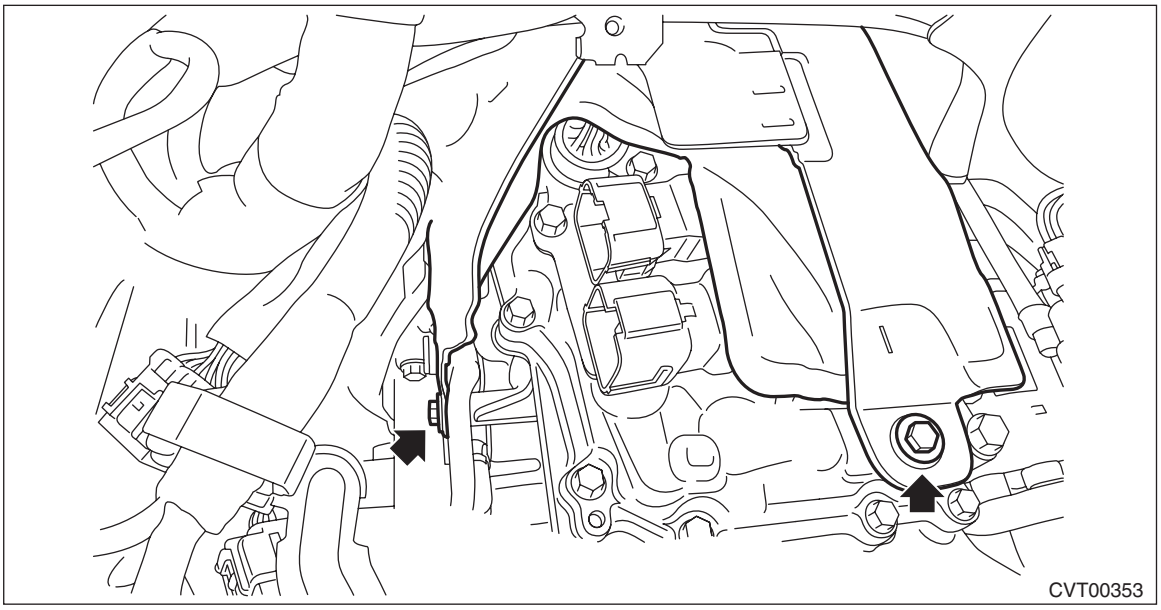


(A) Transmission harness connectors
(B) Transmission radio ground terminal
(C) Inhibitor harness connector

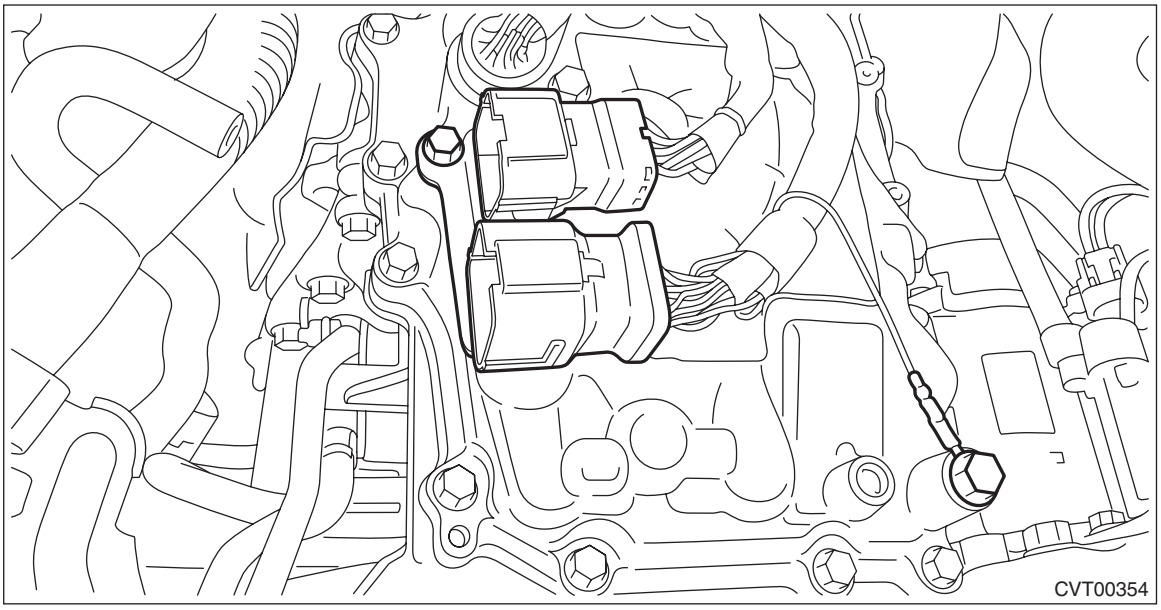
7) Remove the air breather hose from the transmission hanger, and remove the transmission hanger and the transmission radio ground cord.



8) Remove the transmission case cover.



9) Remove the transmission harness stay and ground terminal.

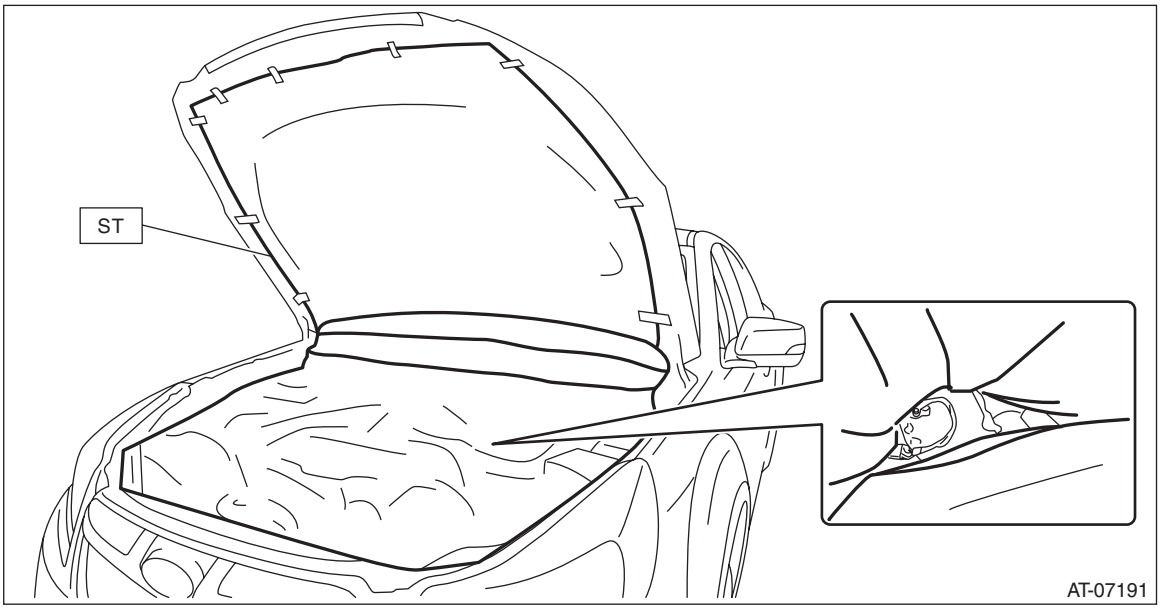


10) Remove the transmission harness connector from the harness stay.
11) Remove the throttle body, and move it aside so that it will not interfere with the removal of the control valve. <Ref. to FU(H4DO)-15, REMOVAL, Throttle Body.>

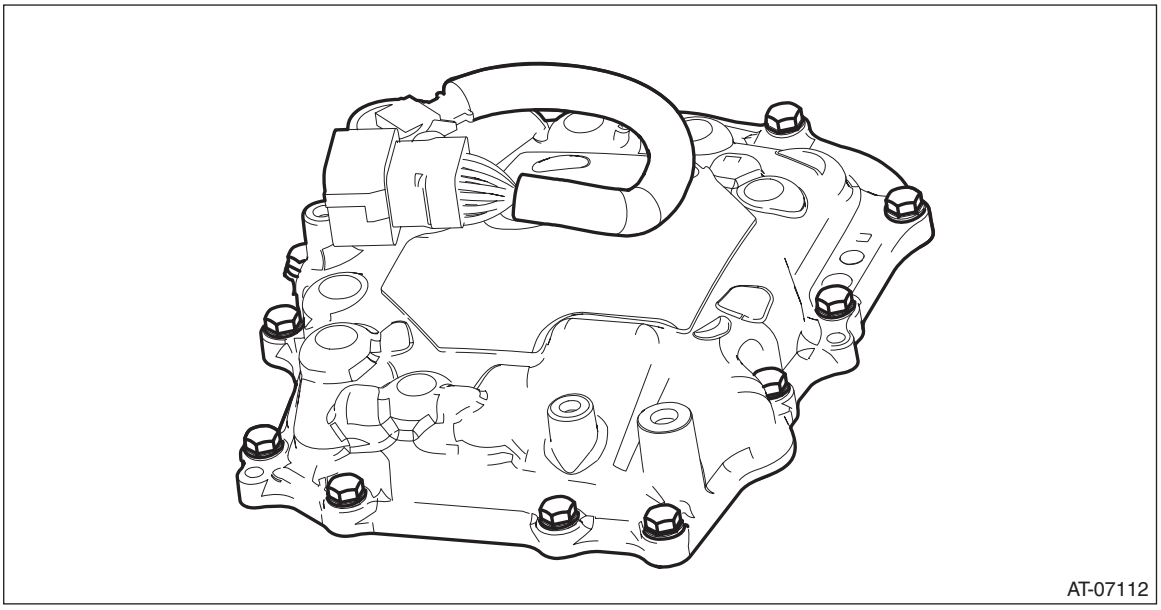
NOTE:
Do not remove the preheater hose.
12) Clean the transmission exterior.

13) Fix the ST with tape, and set the ST to the vehicle.

NOTE:
When replacing the control valve body, the sheet is included in the control valve body for repairs.
ST 18761AA010 SHEET SPECIAL TOOL

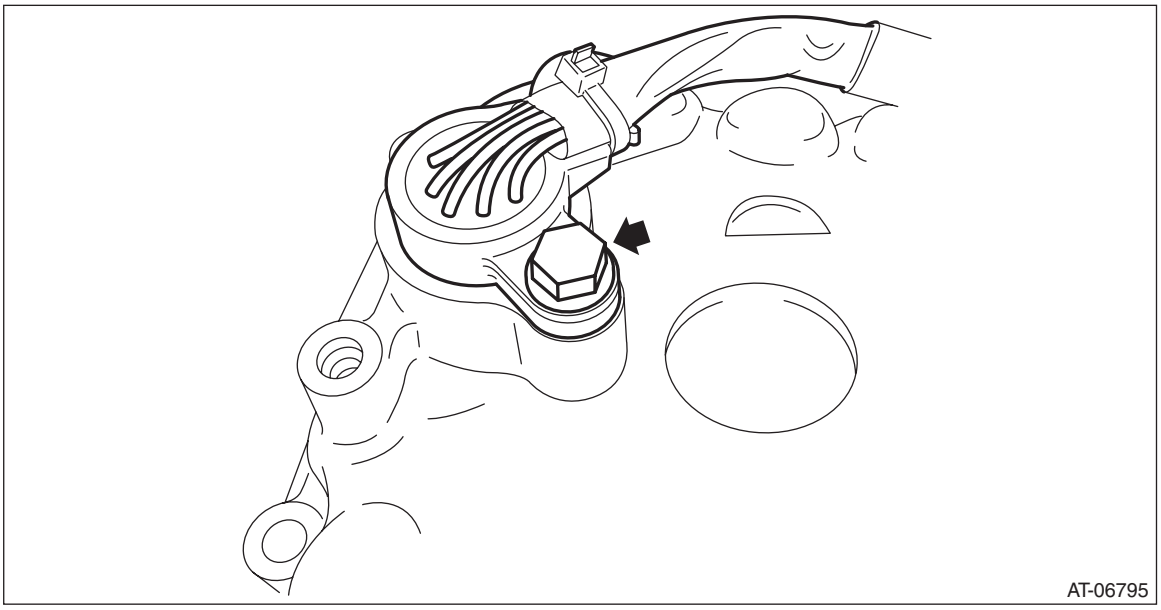


14) Remove the valve cover and gasket.

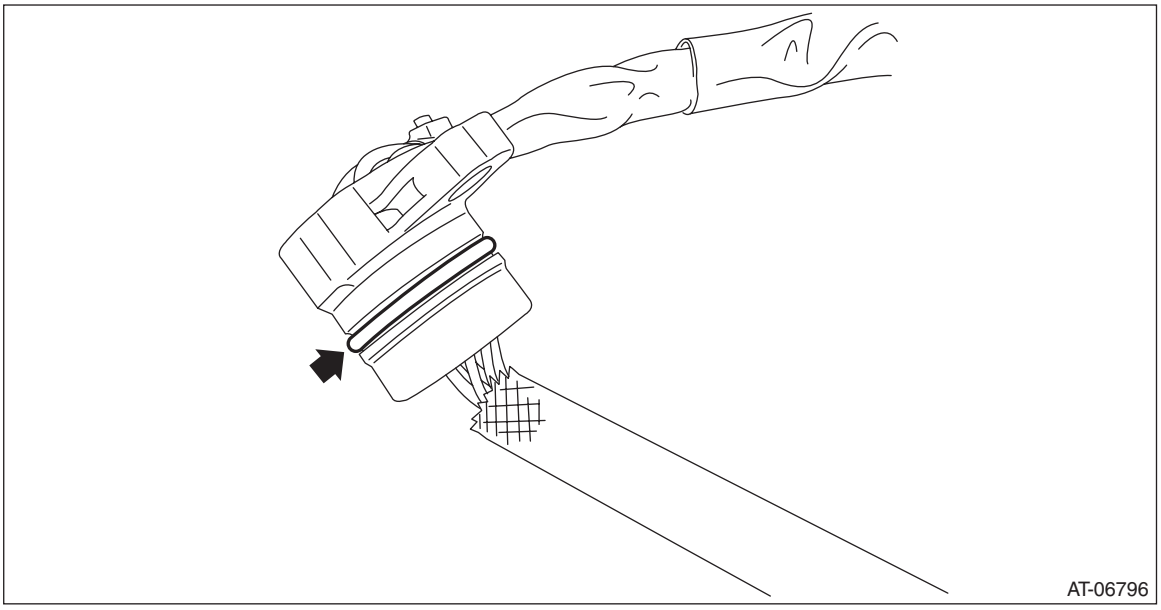


15) Disconnect the harness connector from the control valve body.

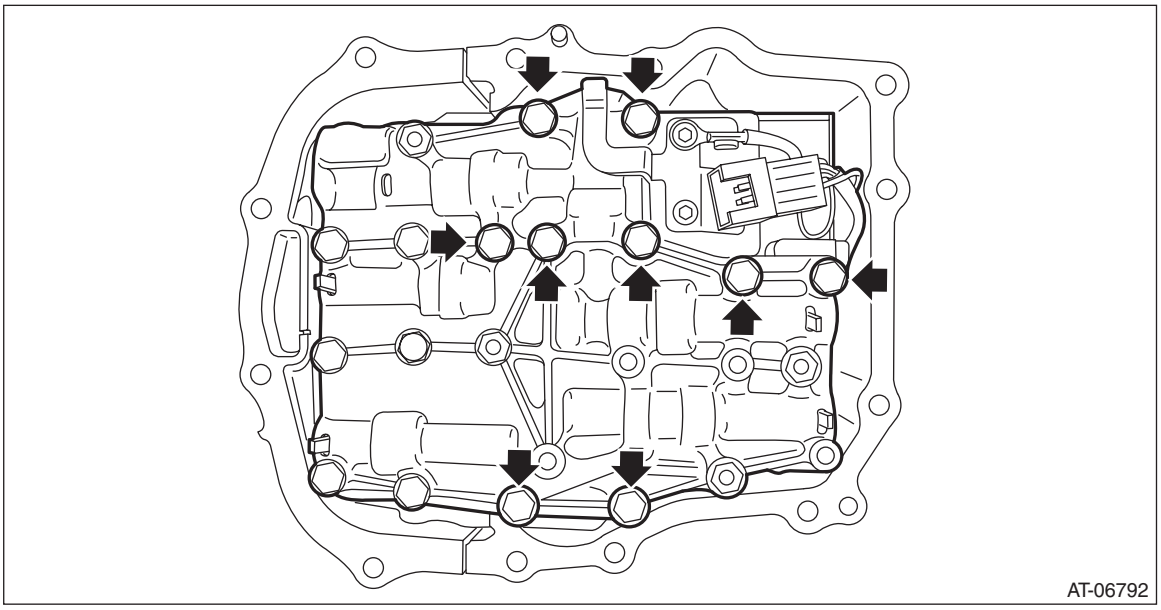
16) Remove the transmission harness from the valve cover.



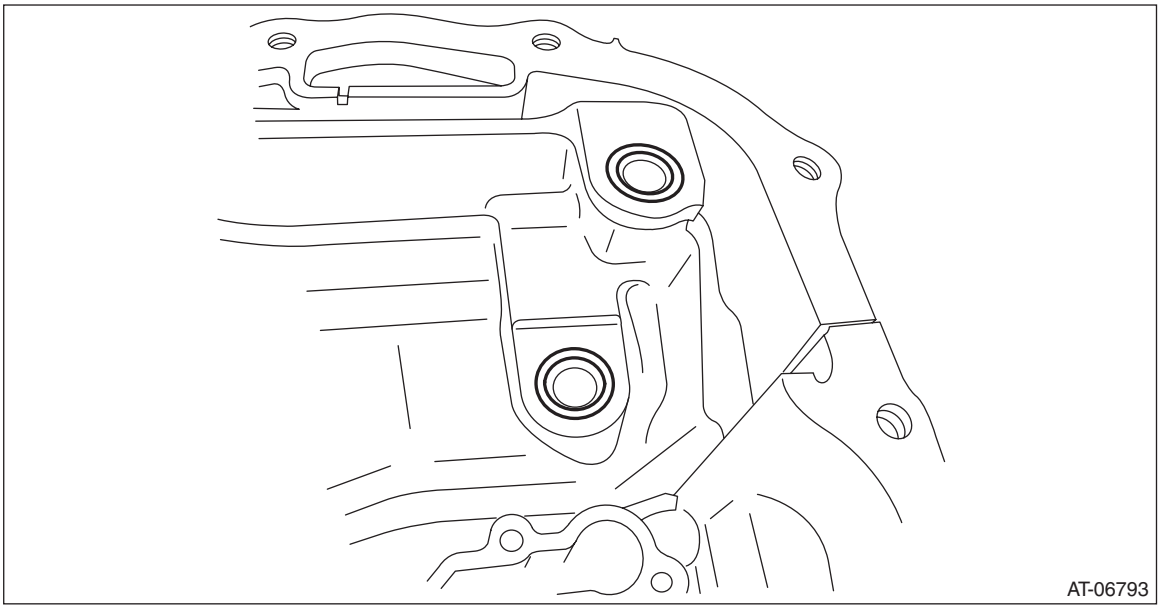
17) Remove the O-ring from the transmission harness.



18) Remove the control valve body.



19) Remove the O-ring from the transmission.



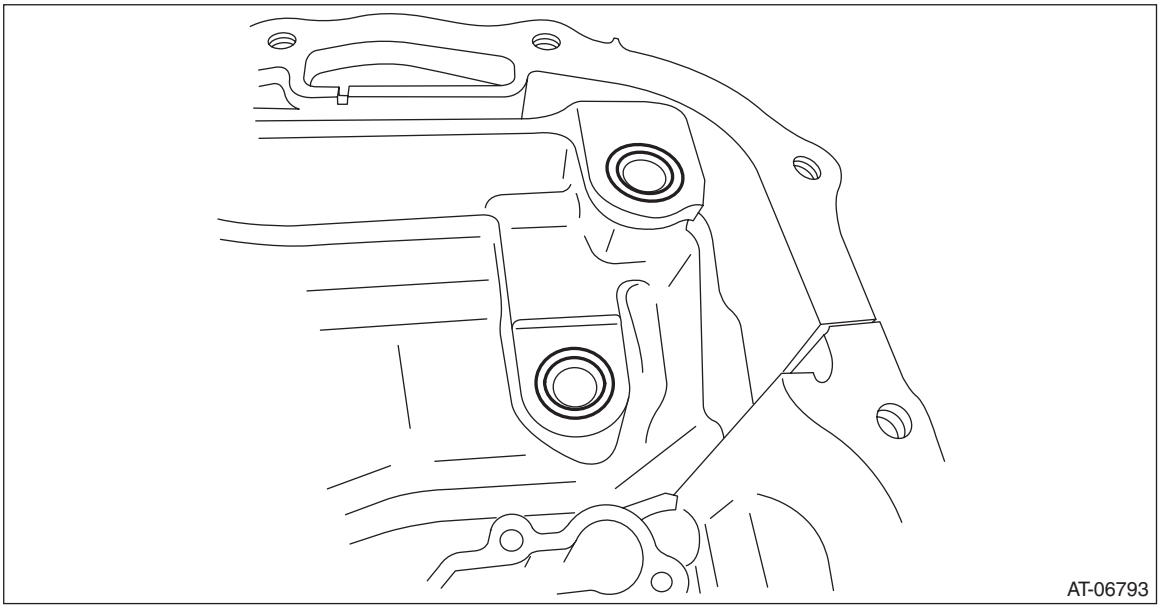
B: INSTALLATION

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

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

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

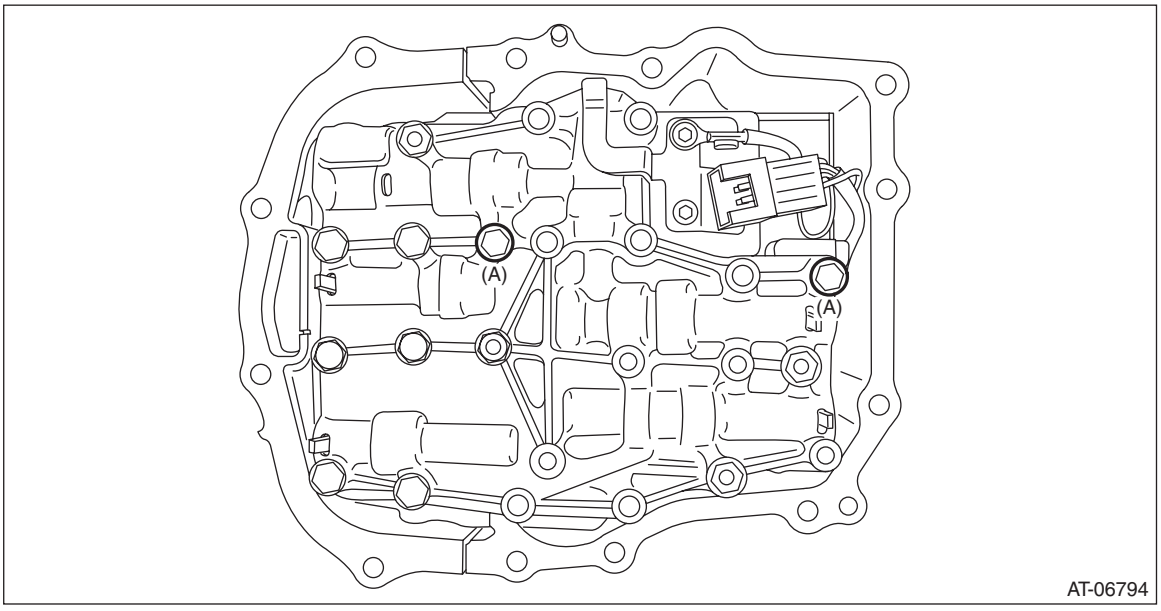
NOTE:
- Use new O-rings.
- Apply CVTF to the O-ring.


AT-06793

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

CAUTION:
- **Do not damage the O-ring.**
- **Perform installation so that the O-ring is not displaced.**

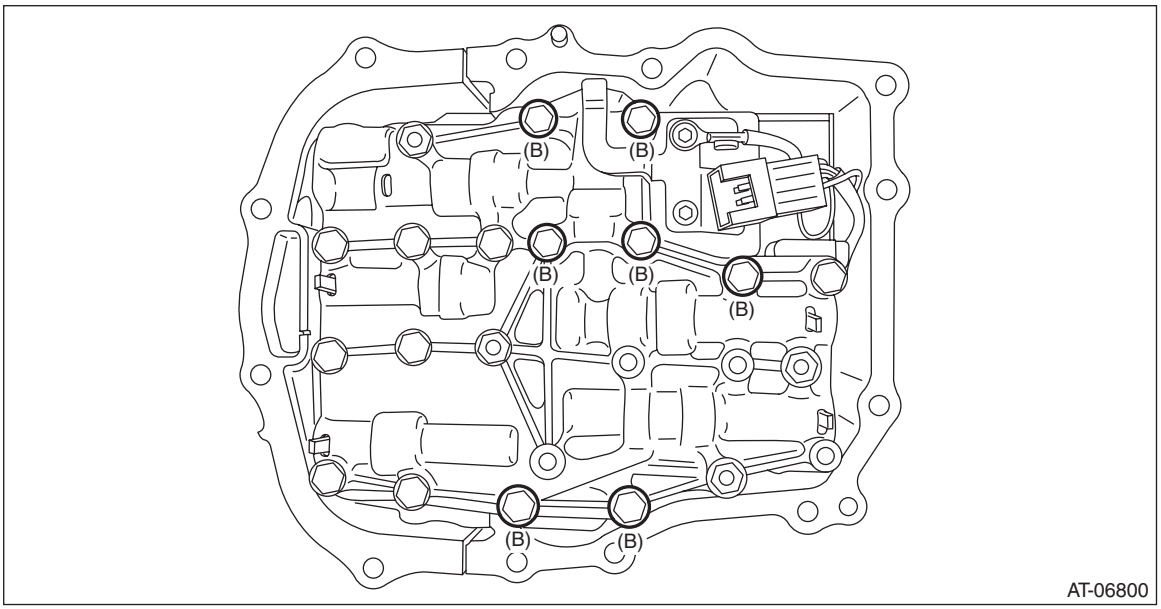
   (2) Temporarily tighten the bolt (A: silver).



AT-06794

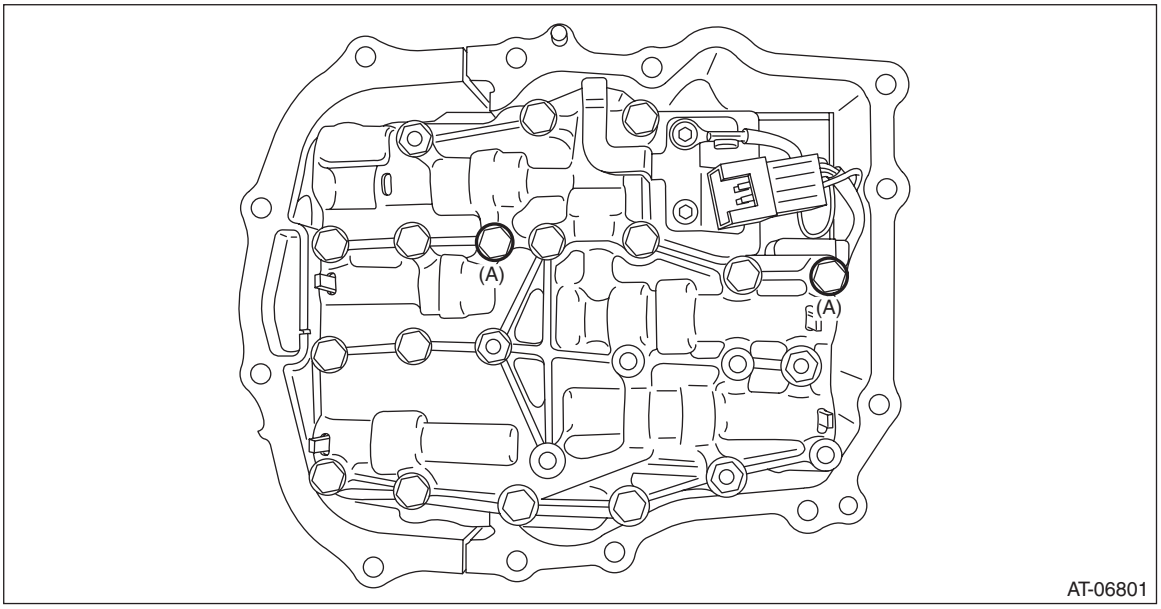
(3) Attach the bolt (B).

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



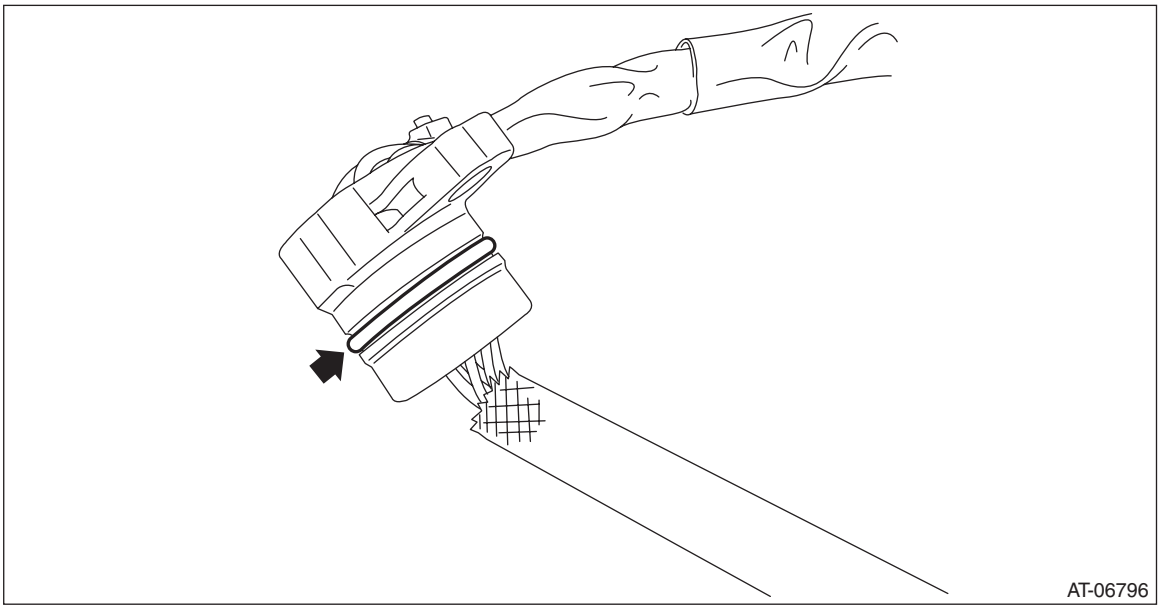
(4) Tighten the bolt (A: silver).

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



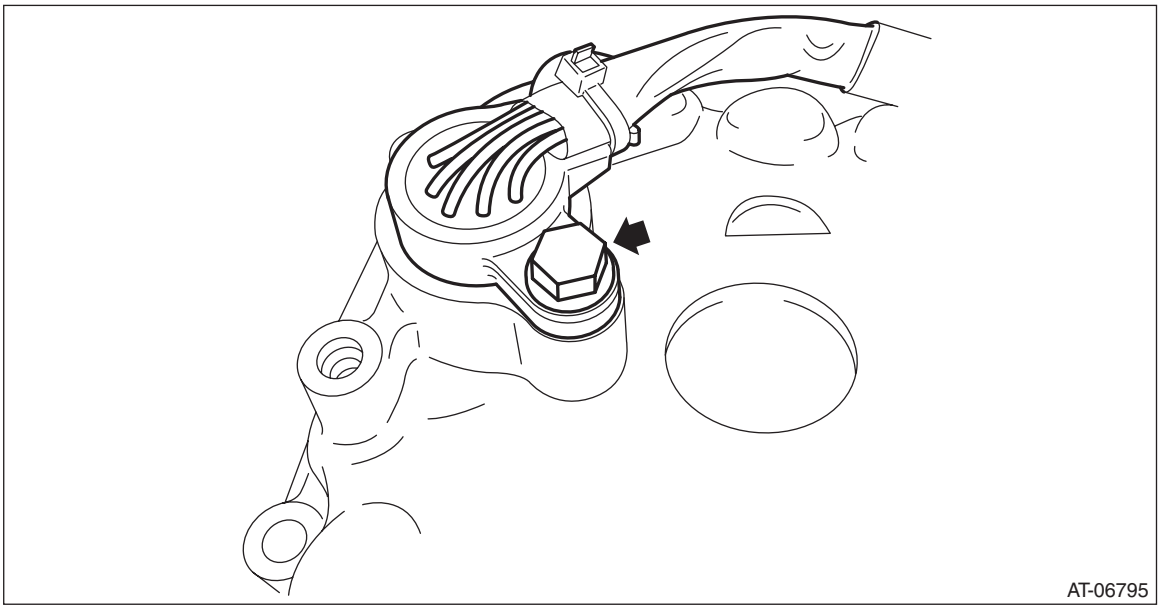
5) Install the O-ring to the transmission harness.

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



6) Install the transmission harness to the valve cover.

Tightening torque:
7 N·m (0.7 kgf-m, 5.2 ft-lb)

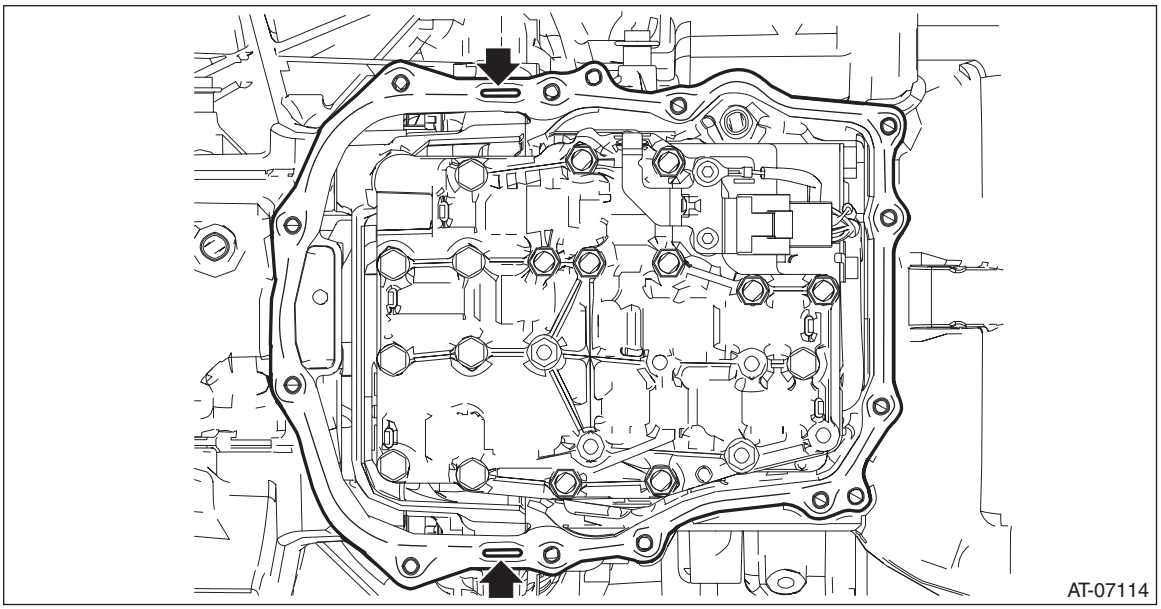


7) Install the gasket to the transmission.

NOTE:
Use a new gasket.

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

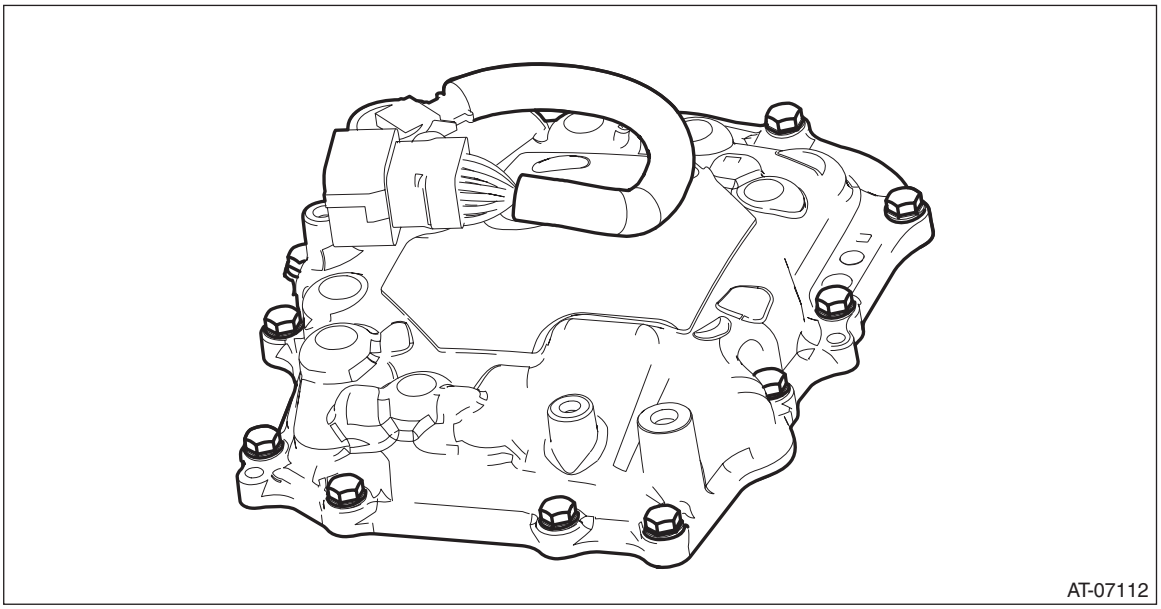
Liquid gasket:
THREE BOND 1215 (Part No. 004403007) or equivalent



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

CAUTION:
Be careful not to catch the sheet of the ST.

Tightening torque:
8 N·m (0.8 kgf-m, 5.9 ft-lb)

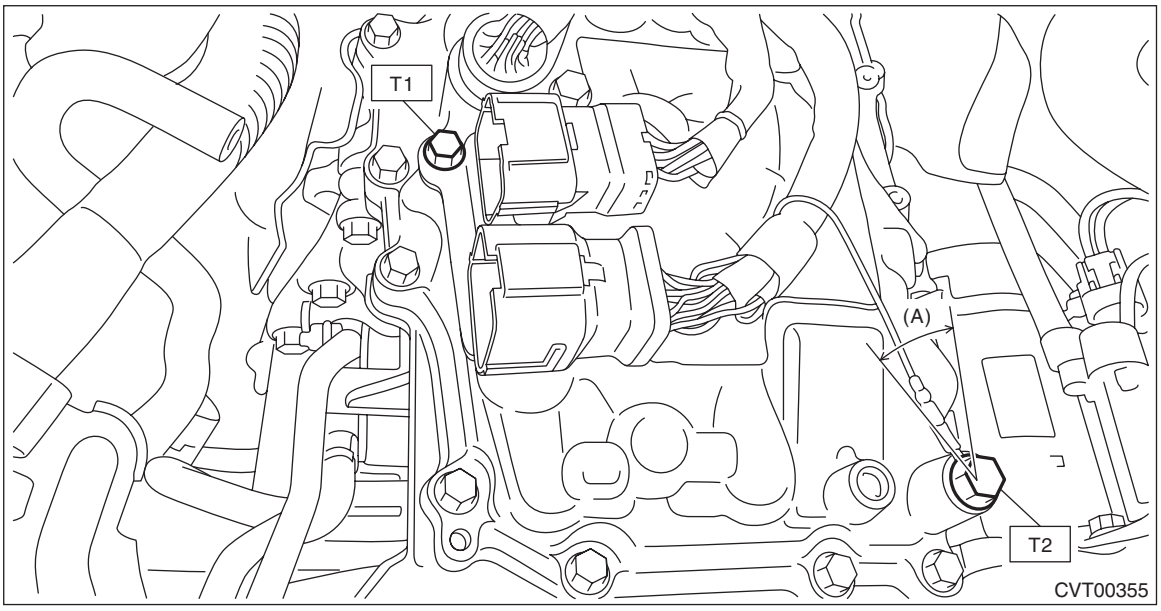


10) Remove the ST (SHEET SPECIAL TOOL).
11) Install the throttle body. <Ref. to FU(H4DO)-17, INSTALLATION, Throttle Body.>
12) Install the transmission harness connector to the harness stay.

13) Install the transmission harness stay and transmission ground terminal.

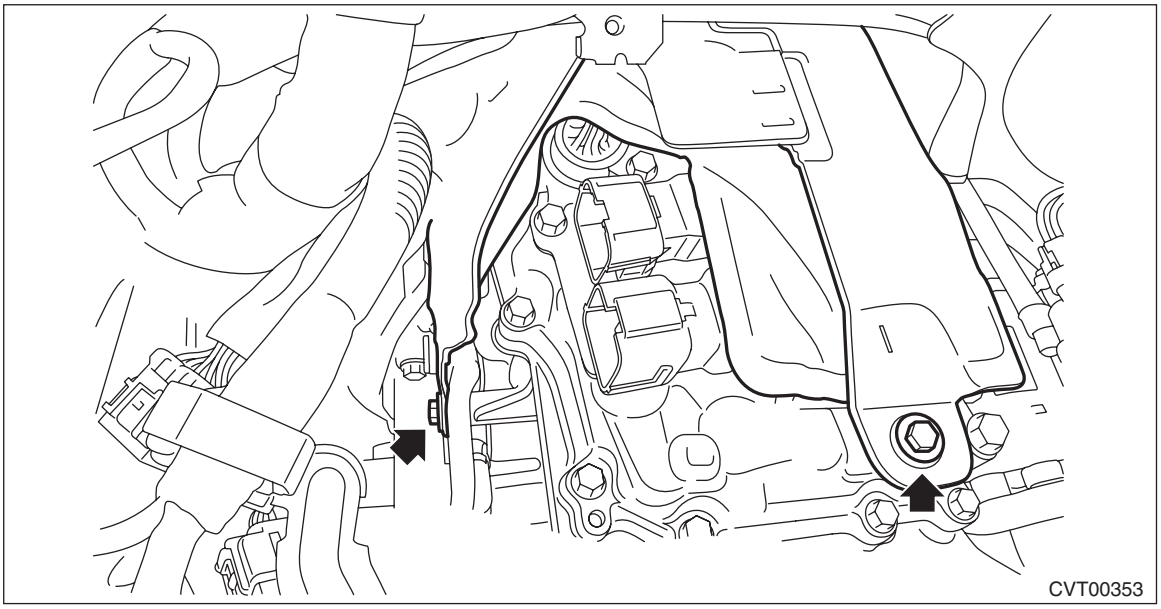
NOTE:
Install the transmission ground terminal in the direction within the range of approx. 30° (A).

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



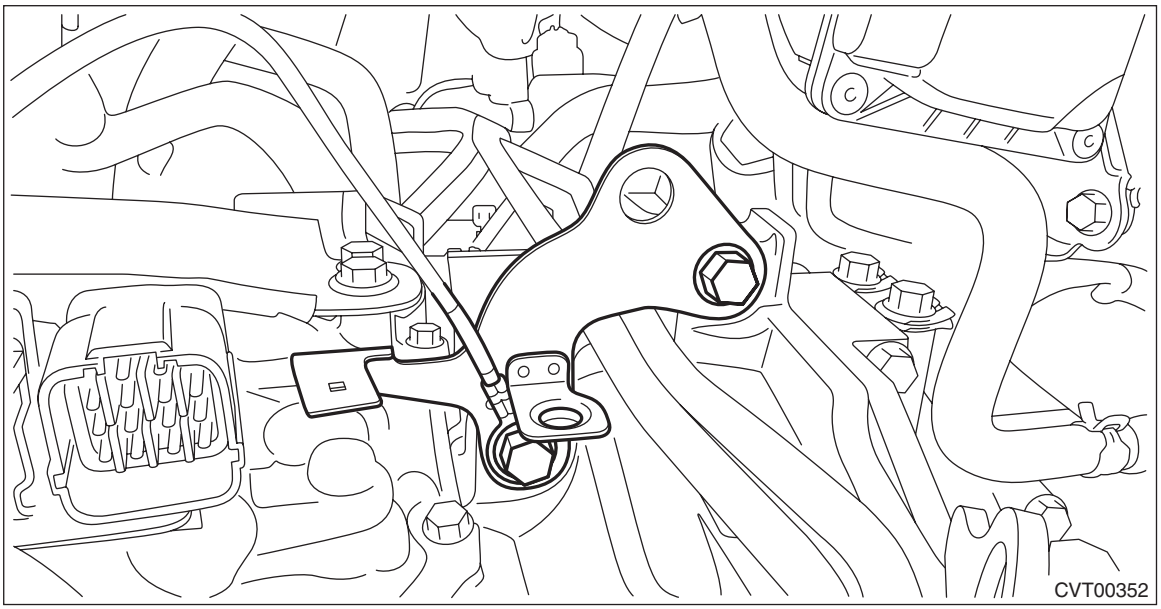
14) Install the transmission case cover.

Tightening torque:
8 N·m (0.8 kgf-m, 5.9 ft-lb)



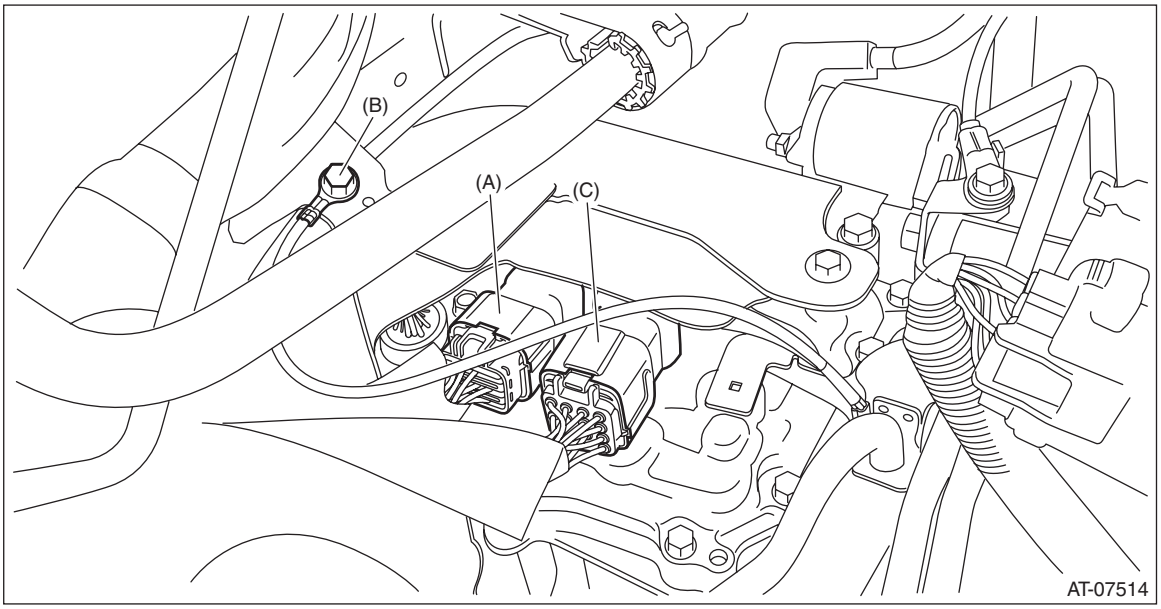
15) Install the transmission hanger and transmission radio ground cord.

Tightening torque:
41 N·m (4.2 kgf-m, 30.2 ft-lb)



16) Attach the air breather hose to the transmission hanger.
17) Connect the following harness connectors.
- Transmission harness connectors
- Inhibitor harness connector
- Transmission radio ground terminal

Tightening torque:
13 N·m (1.3 kgf-m, 9.6 ft-lb)



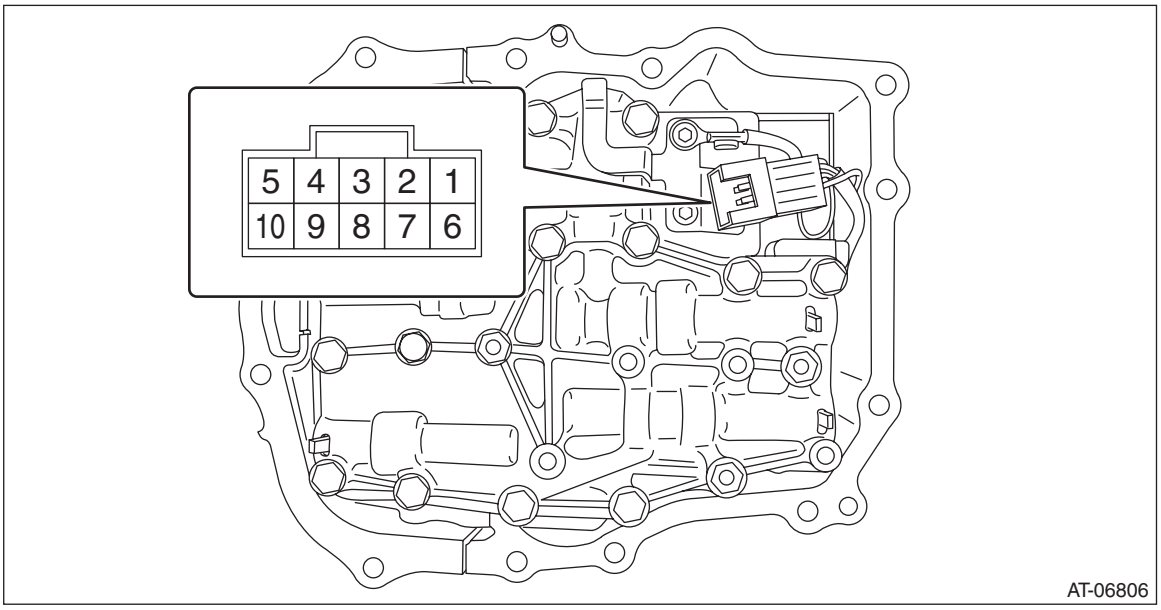
(A) Transmission harness connectors
(B) Transmission radio ground terminal
(C) Inhibitor harness connector

18) Install the air intake boot assembly. <Ref. to IN(H4DO)-13, INSTALLATION, Air Intake Boot.>
19) Adjust the CVTF level. <Ref. to CVT-36, ADJUSTMENT, CVTF.>

C: INSPECTION

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

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



• Solenoid

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

• Oil temperature sensor

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

• Transmission ground

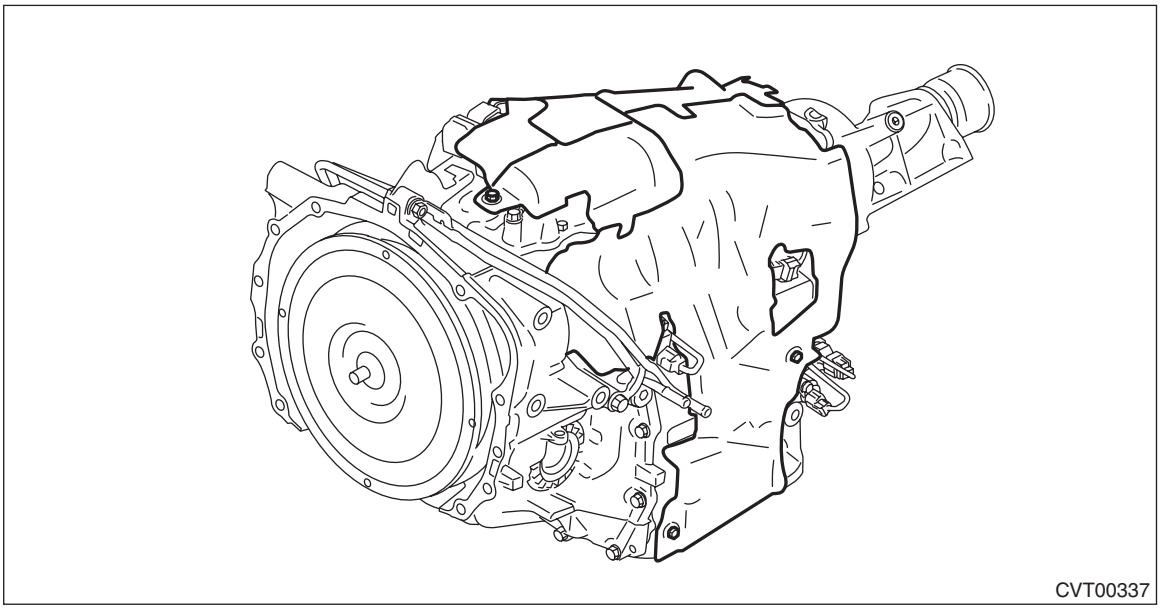
Terminal No.	Standard
No. 8 — Control valve body	Less than 1 Ω

21.Transmission Harness

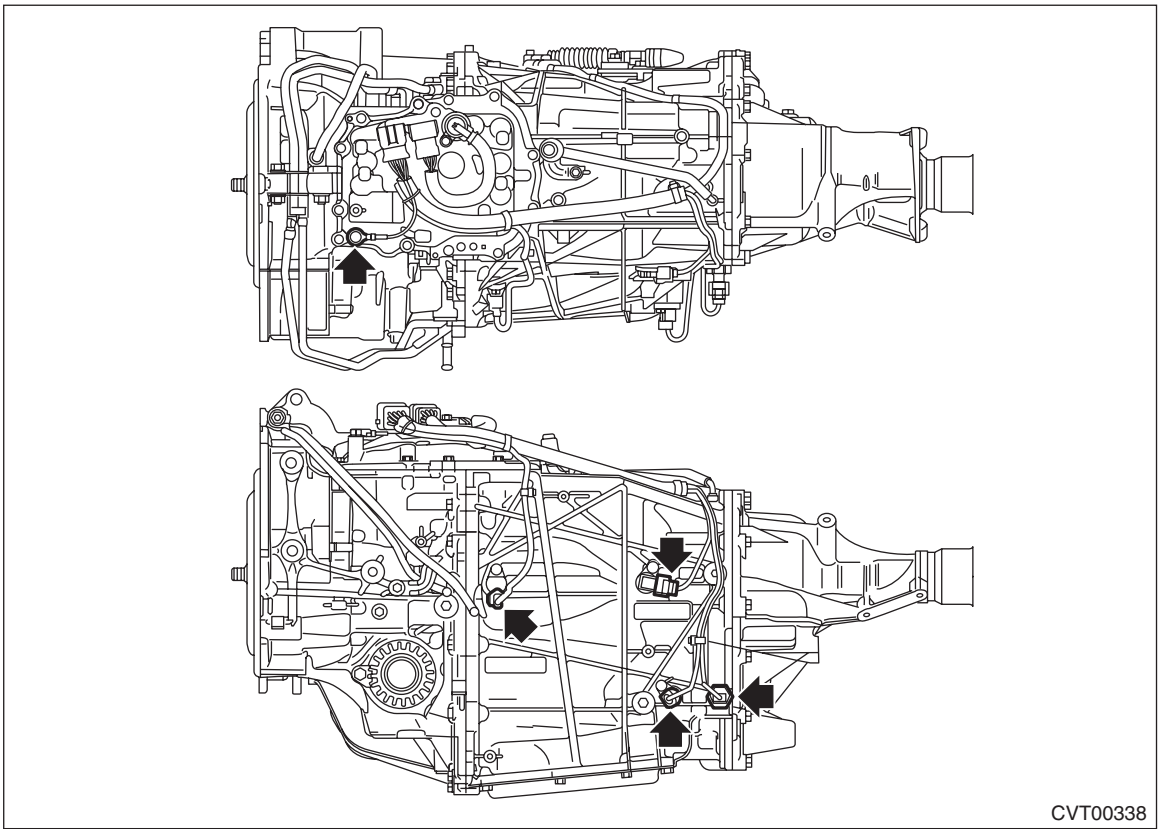
A: REMOVAL

1. INHIBITOR HARNESS

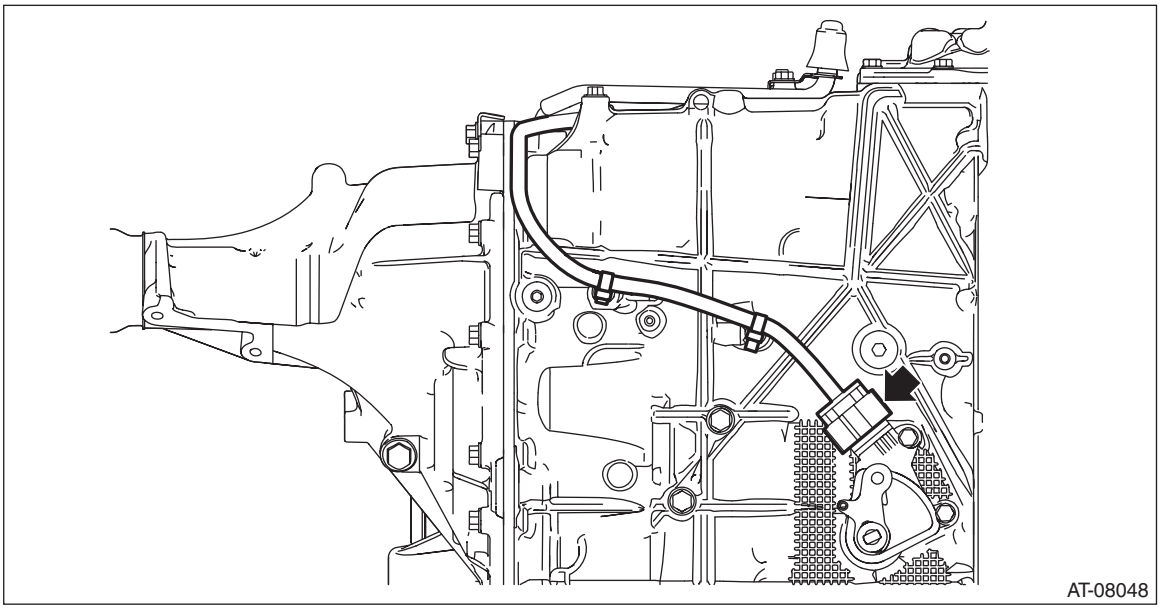
1) Remove the transmission from the vehicle. <Ref. to CVT-57, REMOVAL, Automatic Transmission Assembly.>
2) Remove the transmission case cover.


CVT00337

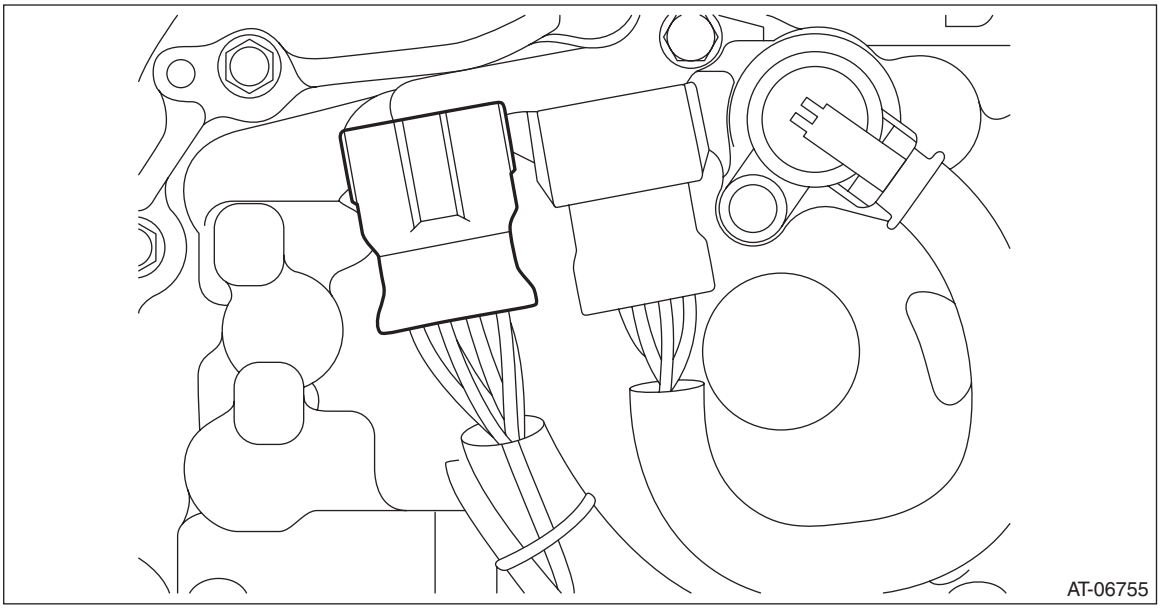
3) Remove the harness connector from the ground terminal, turbine speed sensor, primary speed sensor, secondary speed sensor and secondary pressure sensor.


CVT00338

4) Remove the harness connector from inhibitor switch.



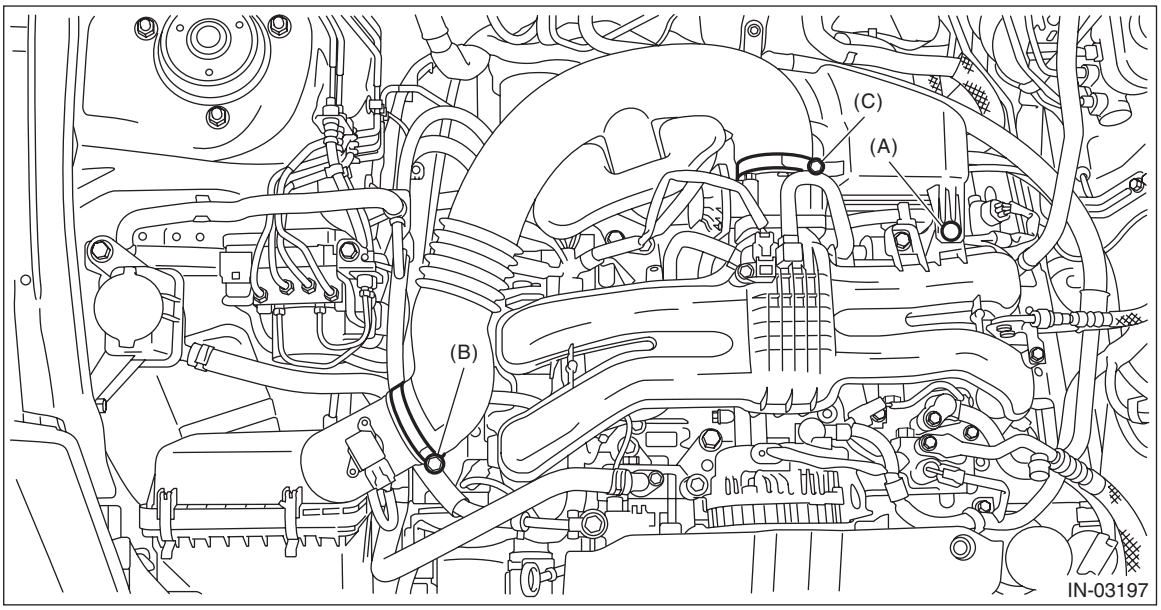
5) Remove the inhibitor harness connector from the transmission harness stay.



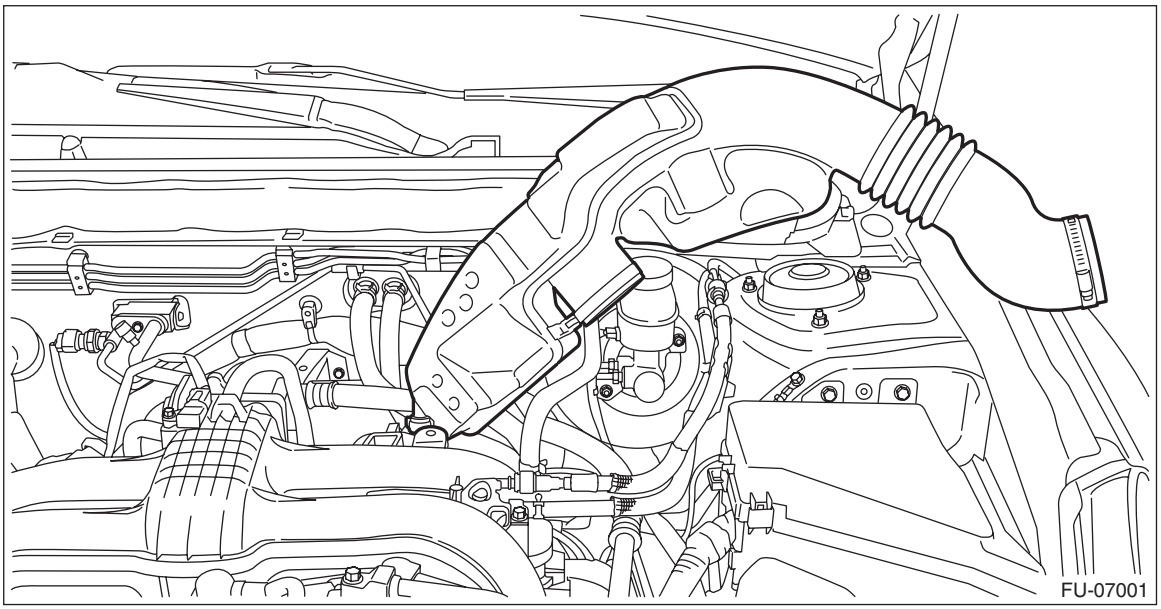
6) Remove the harness clip from the transmission, and remove the inhibitor harness.

2. TRANSMISSION HARNESS

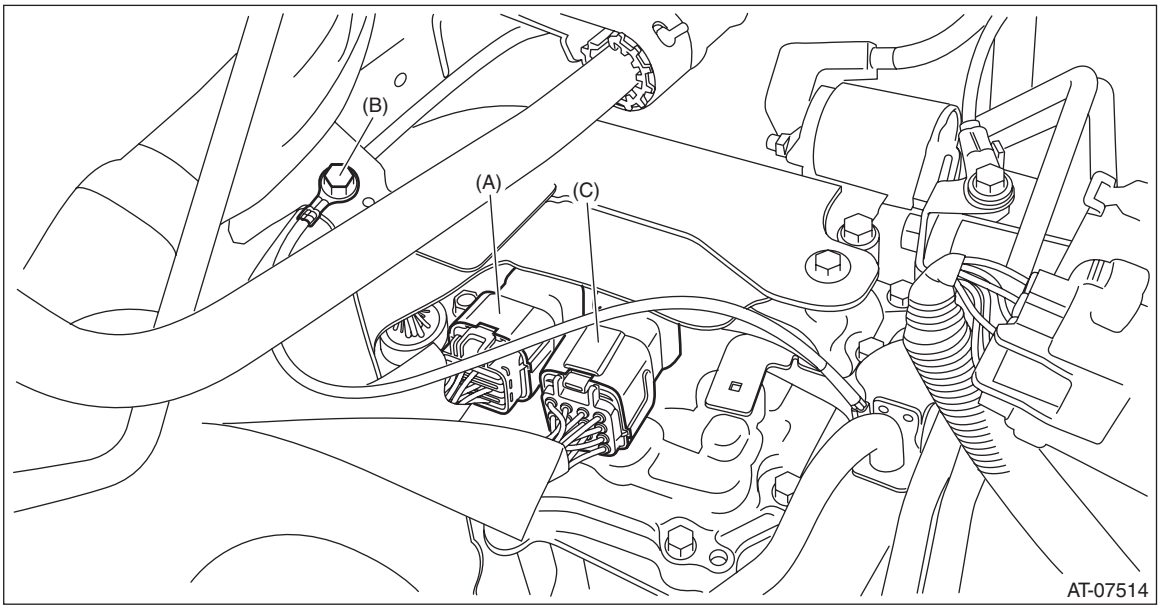
1) Disconnect the ground cable from battery.
2) Remove the clip (A) from the air intake boot.
3) Loosen the clamp (B) connecting the air intake boot and air cleaner case (rear).
4) Loosen the clamp (C) which connects the air intake boot and throttle body.



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

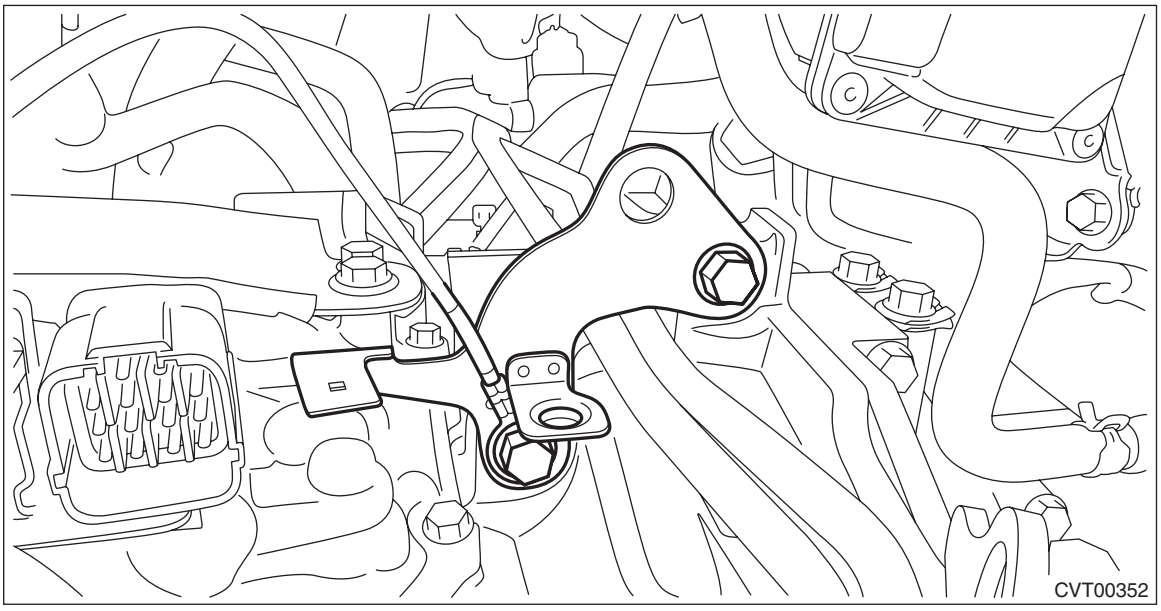


6) Disconnect the following connectors.
- Transmission harness connectors
- Inhibitor harness connector
- Transmission radio ground terminal

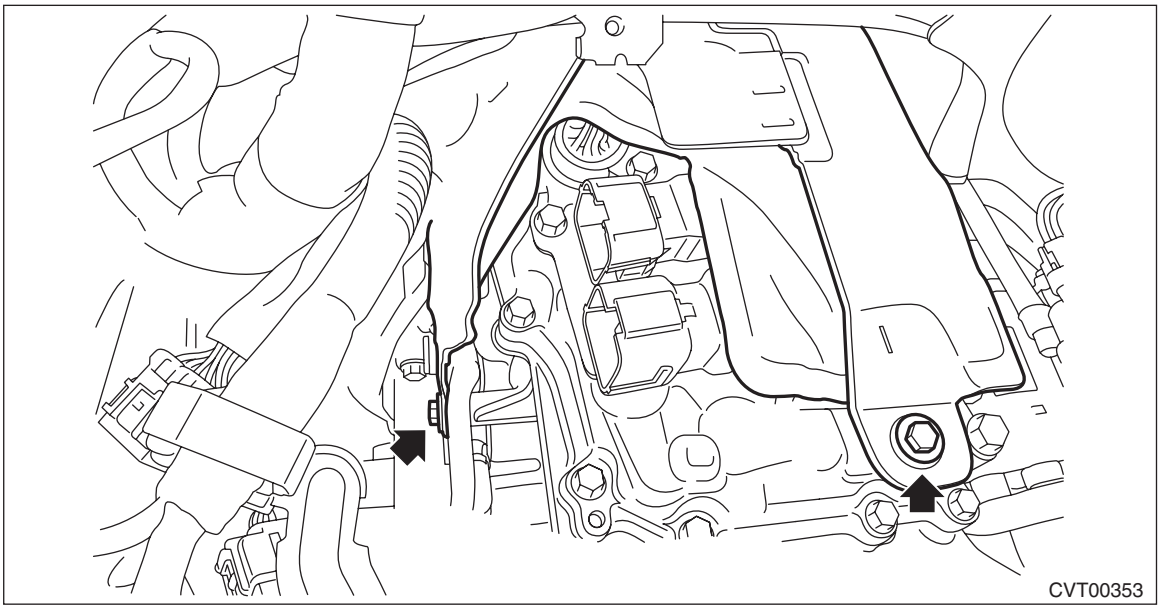


(A) Transmission harness connectors
(B) Transmission radio ground terminal
(C) Inhibitor harness connector

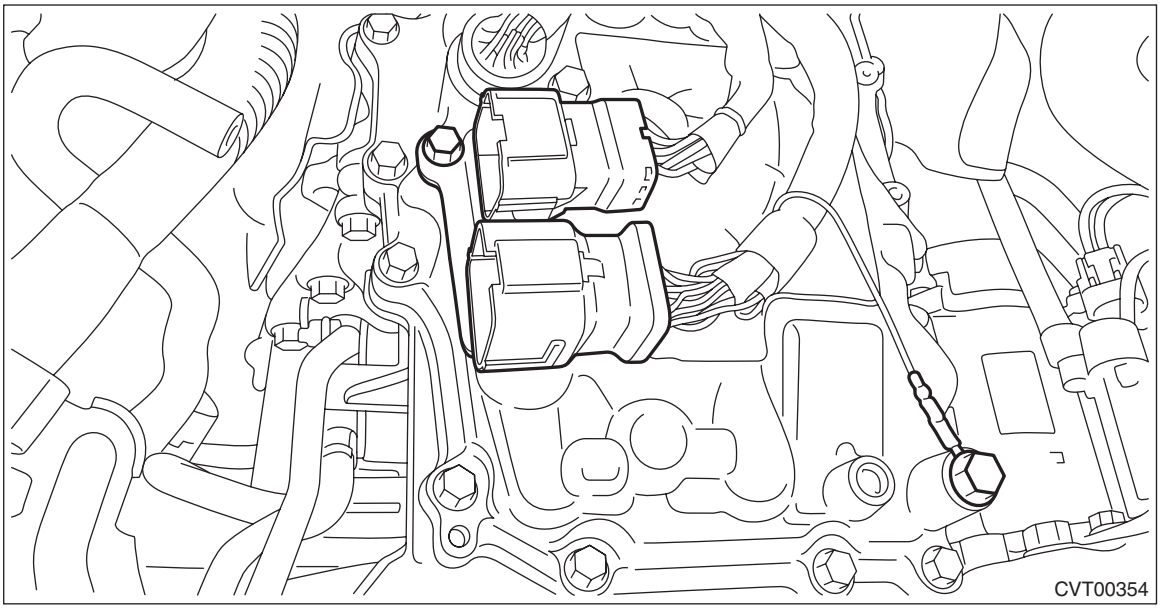
7) Remove the air breather hose from the transmission hanger, and remove the transmission hanger and the transmission radio ground cord.



8) Remove the transmission case cover.

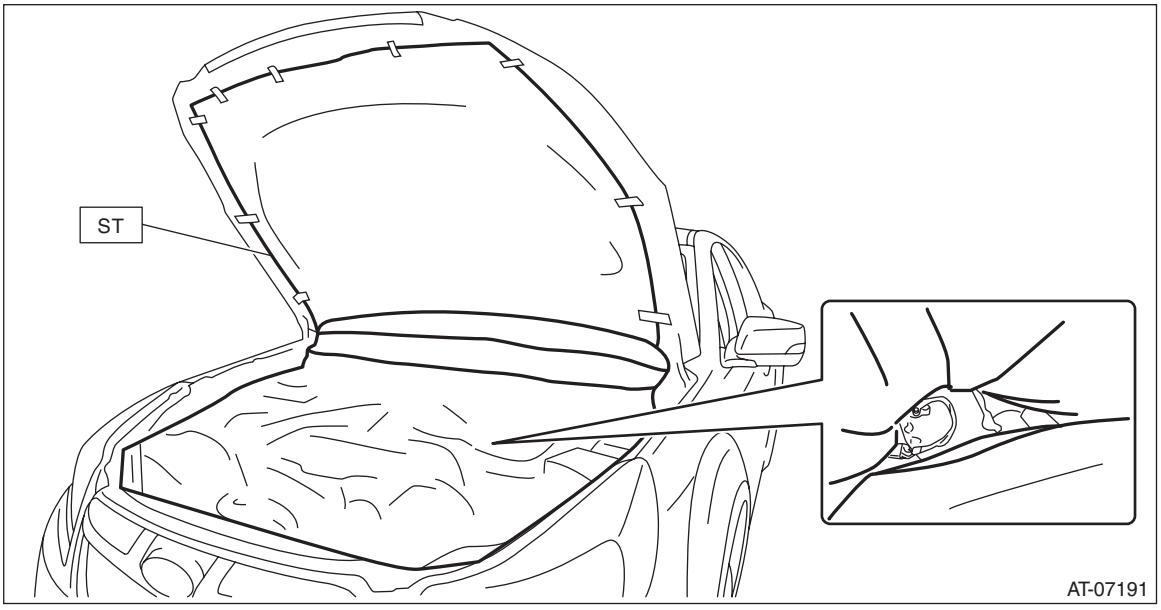


9) Remove the transmission harness stay and ground terminal.

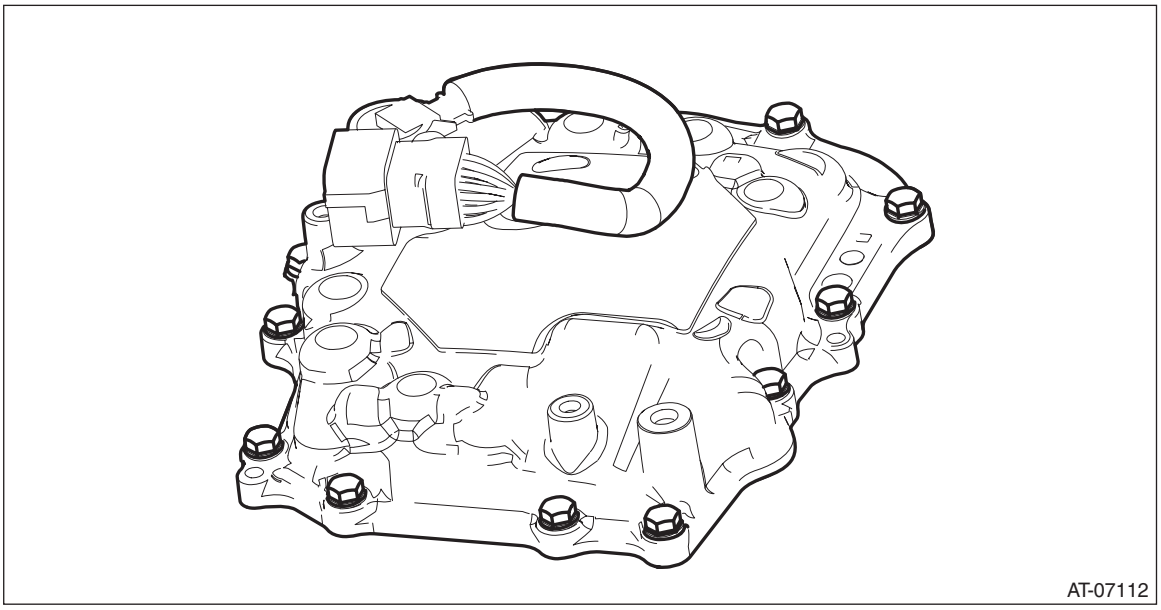


10) Remove the transmission harness connector from the harness stay.
11) Clean the transmission exterior.

12) Set the ST on the vehicle.
ST 18761AA010 SHEET SPECIAL TOOL

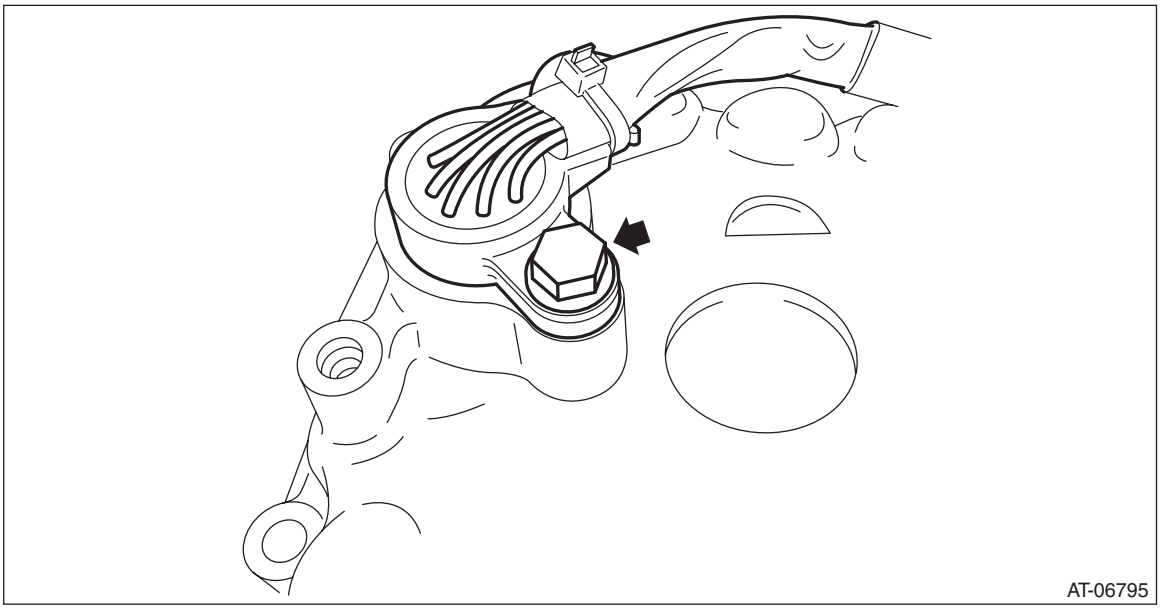


13) Remove the valve cover and gasket.

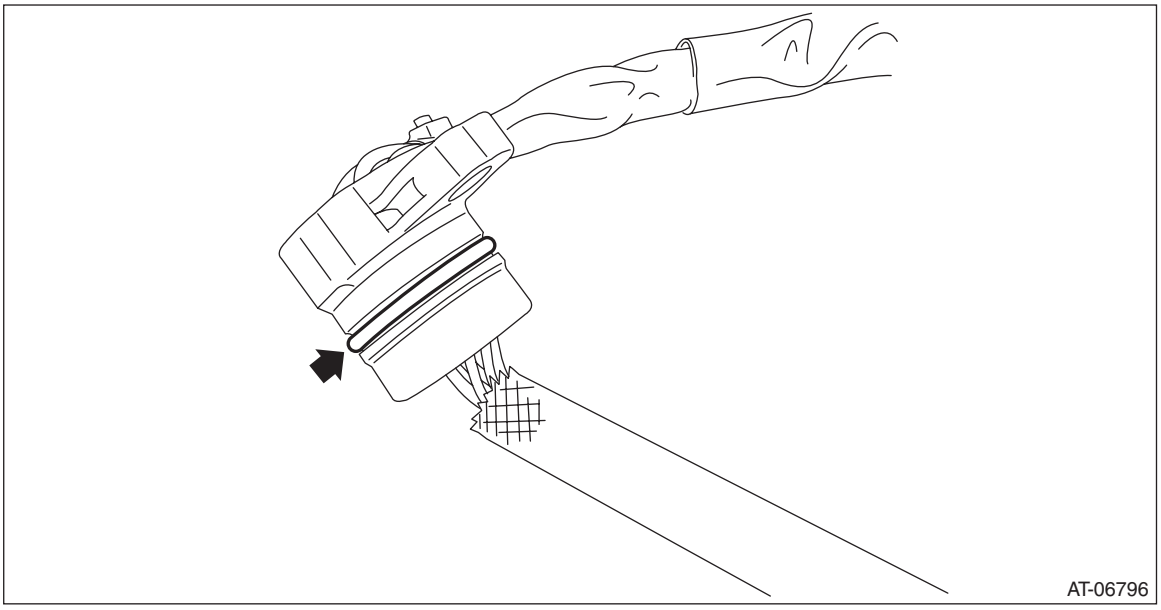


14) Remove the transmission harness connector from the control valve body.

15) Remove the transmission harness from the valve cover.



16) Remove the O-ring from the transmission harness.



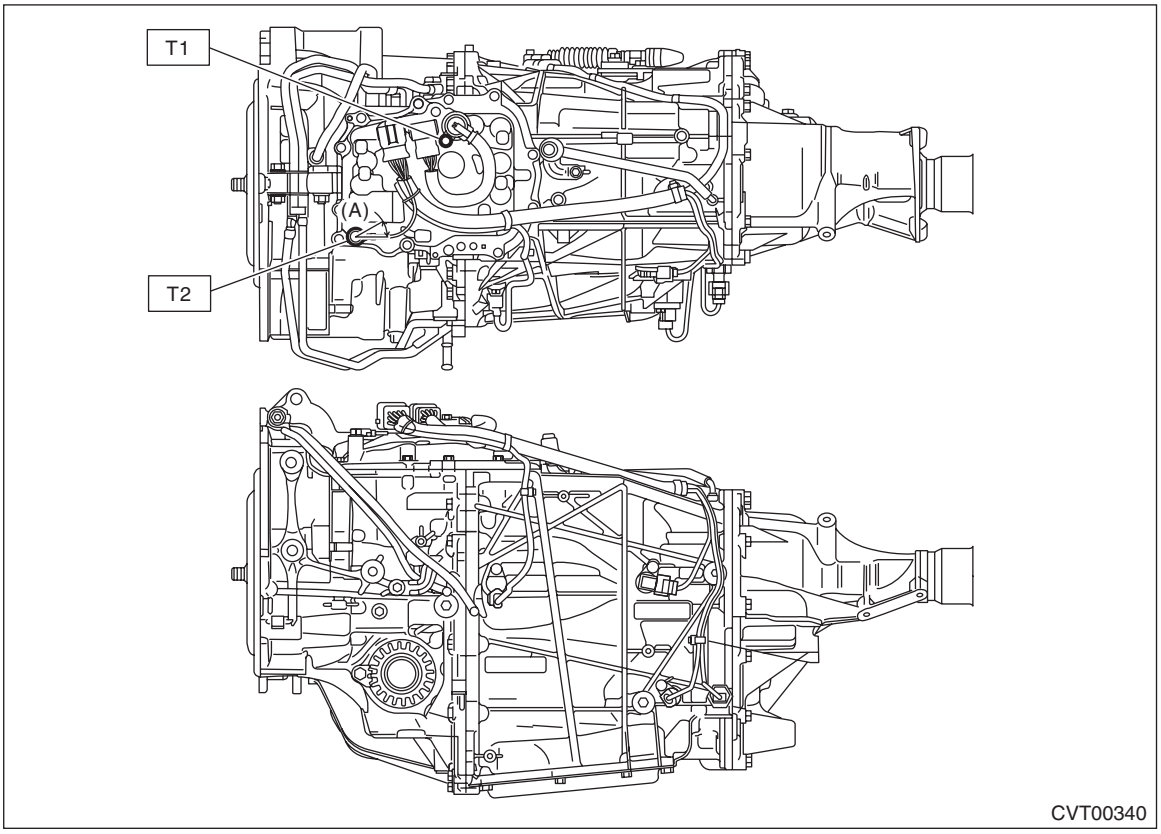
B: INSTALLATION

1. INHIBITOR HARNESS

Install in the reverse order of removal.

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

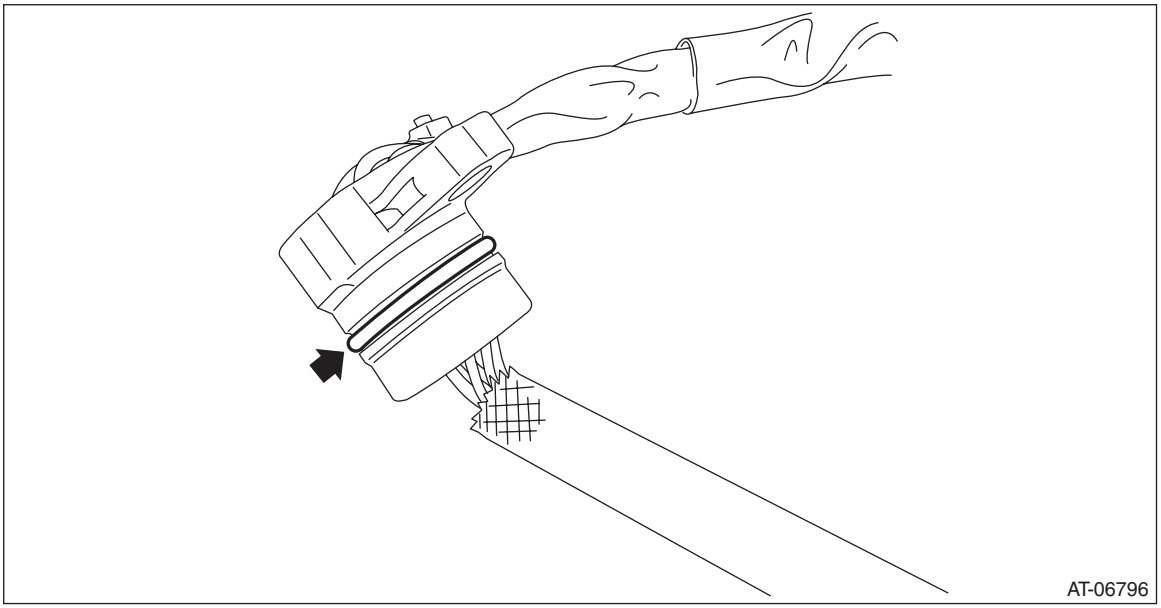
Tightening torque:
T1: 7 N·m (0.7 kgf-m, 3.7 ft-lb)
T2: 14 N·m (1.4 kgf-m, 10.3 ft-lb)



2. TRANSMISSION HARNESS

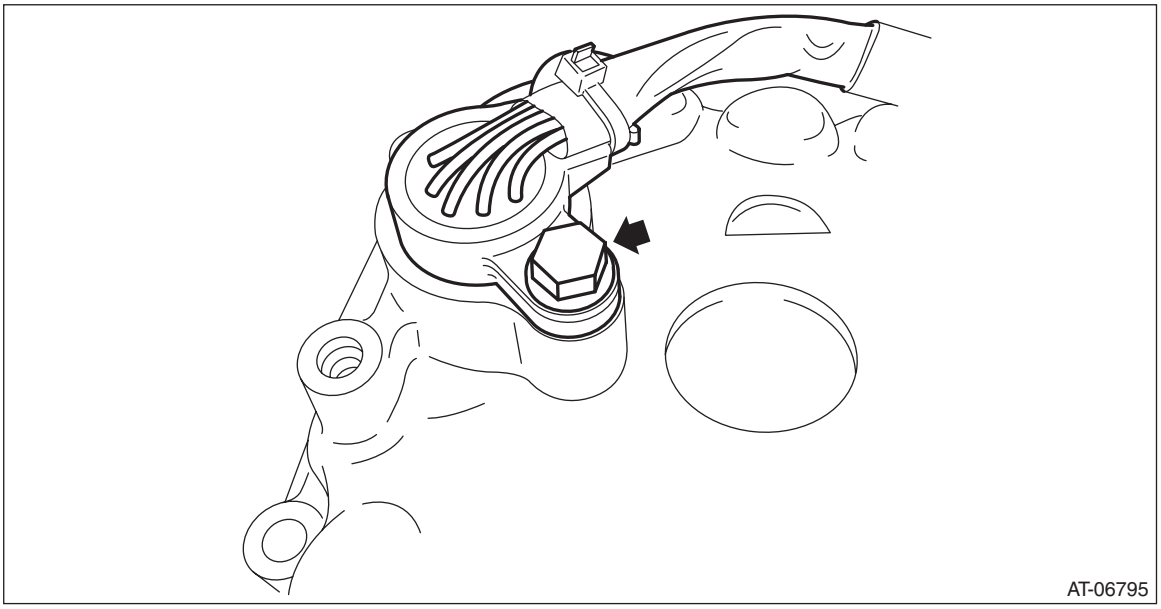
1) Clean the mating surface of valve cover and transmission side.
2) Check the control valve body for dust and other foreign matter.
3) Install the O-ring to the transmission harness.

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



4) Install the transmission harness to the valve cover.

Tightening torque:
7 N·m (0.7 kgf-m, 5.2 ft-lb)

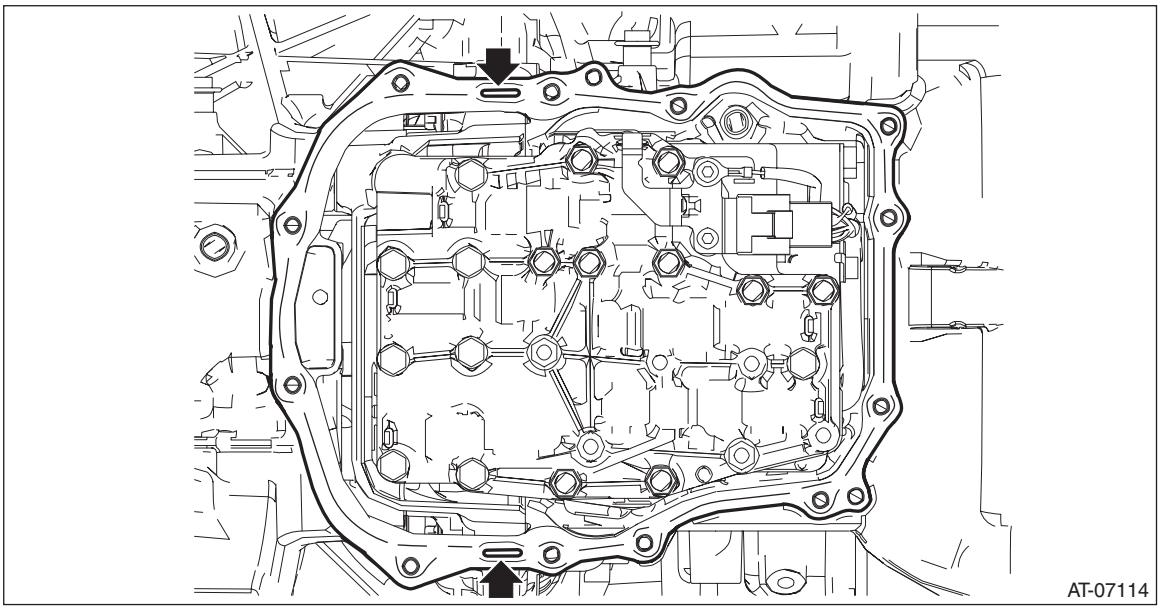


5) Install the gasket to the transmission.

NOTE:
Use a new gasket.

6) Apply liquid gasket to the oval hole of gasket.

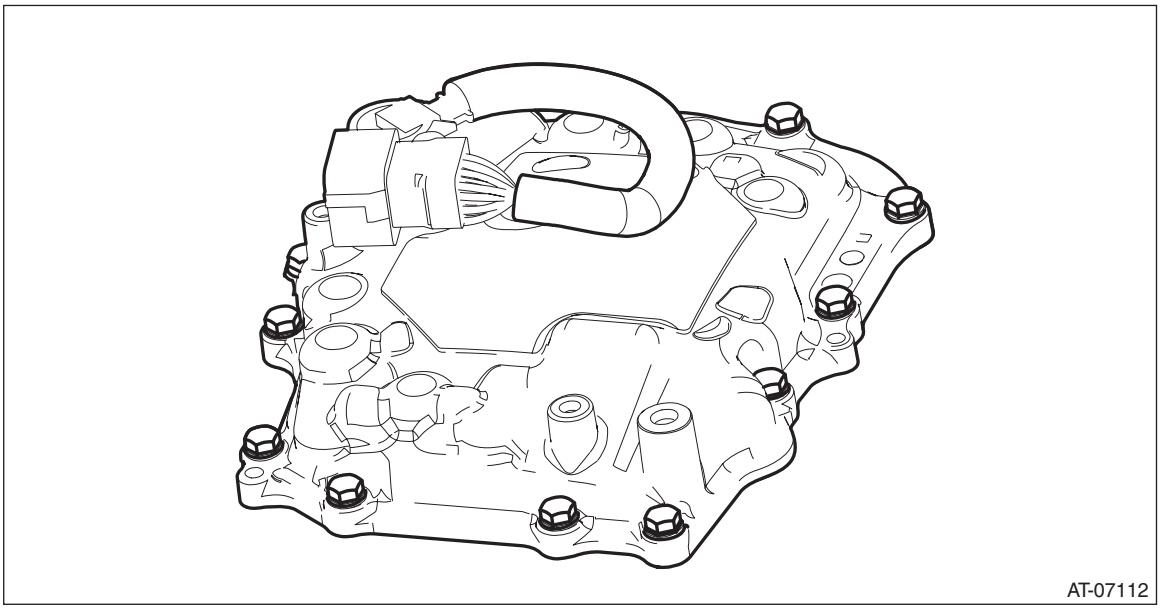
Liquid gasket:
THREE BOND 1215 (Part No. 004403007) or equivalent



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

CAUTION:
Be careful not to catch the sheet of the ST.

Tightening torque:
8 N·m (0.8 kgf-m, 5.9 ft-lb)

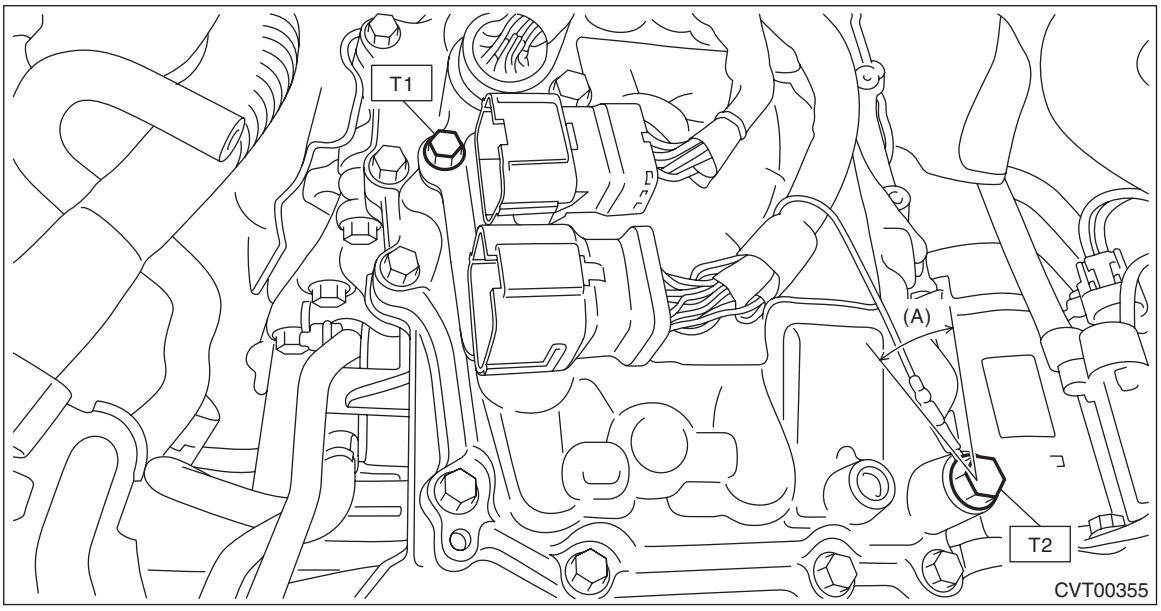


8) Remove the ST (SHEET SPECIAL TOOL).
9) Install the transmission harness connector to the harness stay.

10) Install the transmission harness stay and transmission ground terminal.

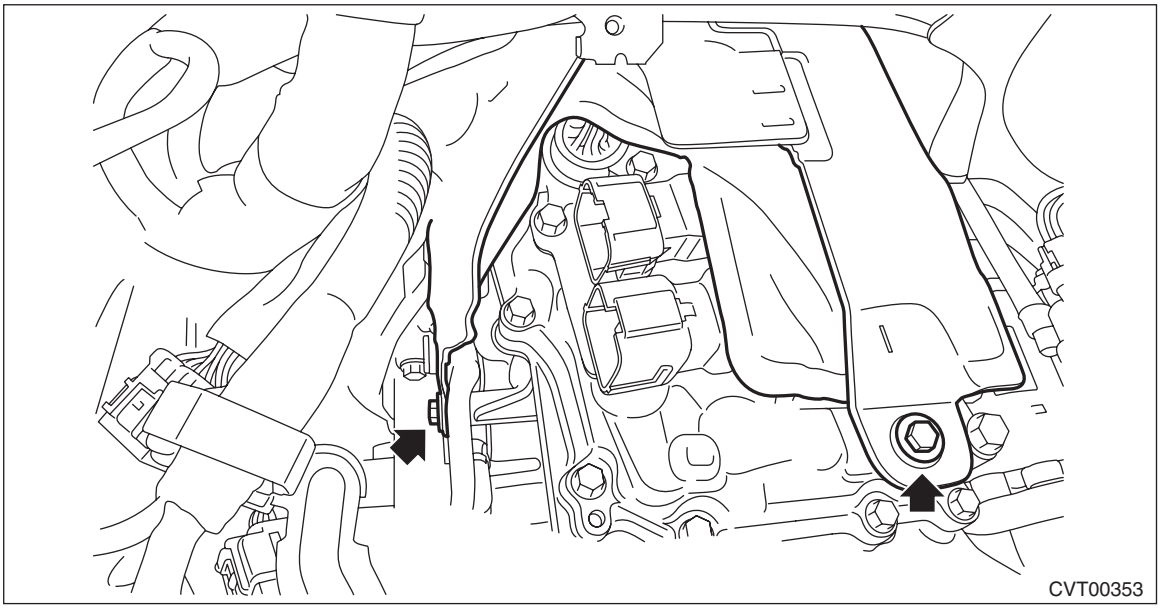
NOTE:
Install the transmission ground terminal in the direction within the range of approx. 30° (A).

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



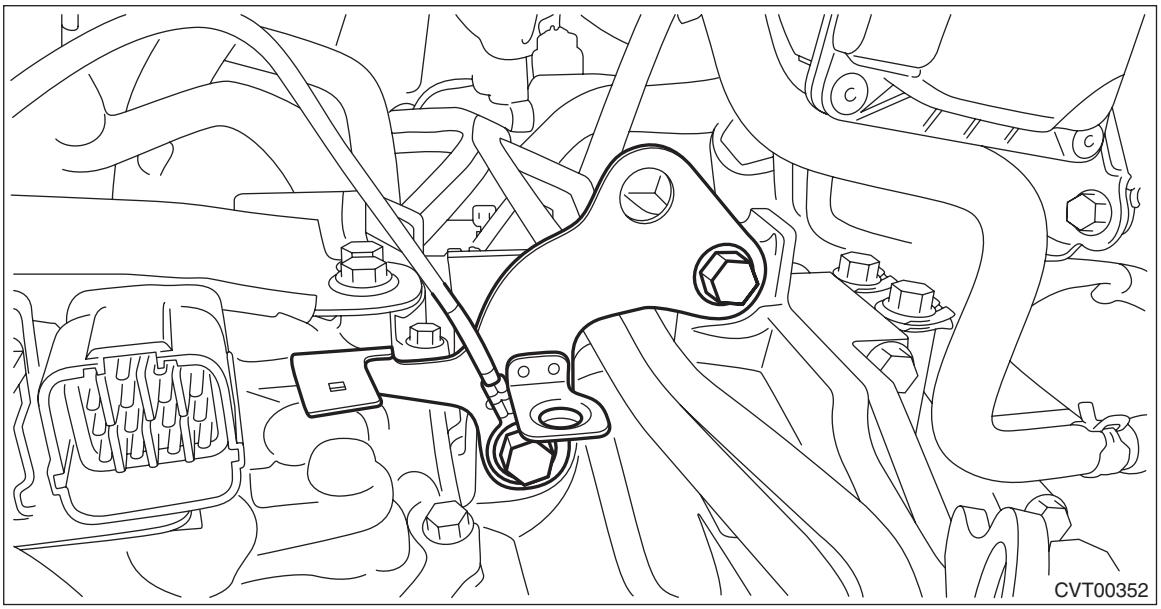
11) Install the transmission case cover.

Tightening torque:
8 N·m (0.8 kgf-m, 5.9 ft-lb)



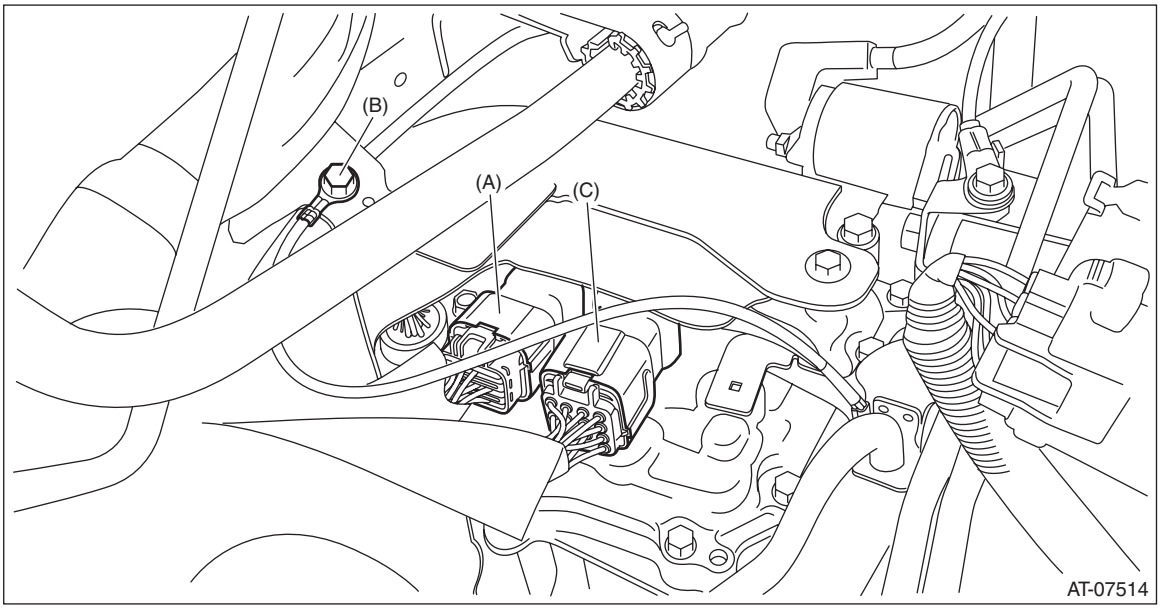
12) Install the transmission hanger and transmission radio ground cord.

Tightening torque:
41 N·m (4.2 kgf-m, 30.2 ft-lb)



13) Attach the air breather hose to the transmission hanger.
14) Connect the following harness connectors.
- Transmission harness connectors
- Inhibitor harness connector
- Transmission radio ground terminal

Tightening torque:
13 N·m (1.3 kgf-m, 9.6 ft-lb)



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

15) Install the air intake boot assembly. <Ref. to IN(H4DO)-13, INSTALLATION, Air Intake Boot.>
16) Adjust the CVTF level. <Ref. to CVT-36, ADJUSTMENT, CVTF.>

C: INSPECTION

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

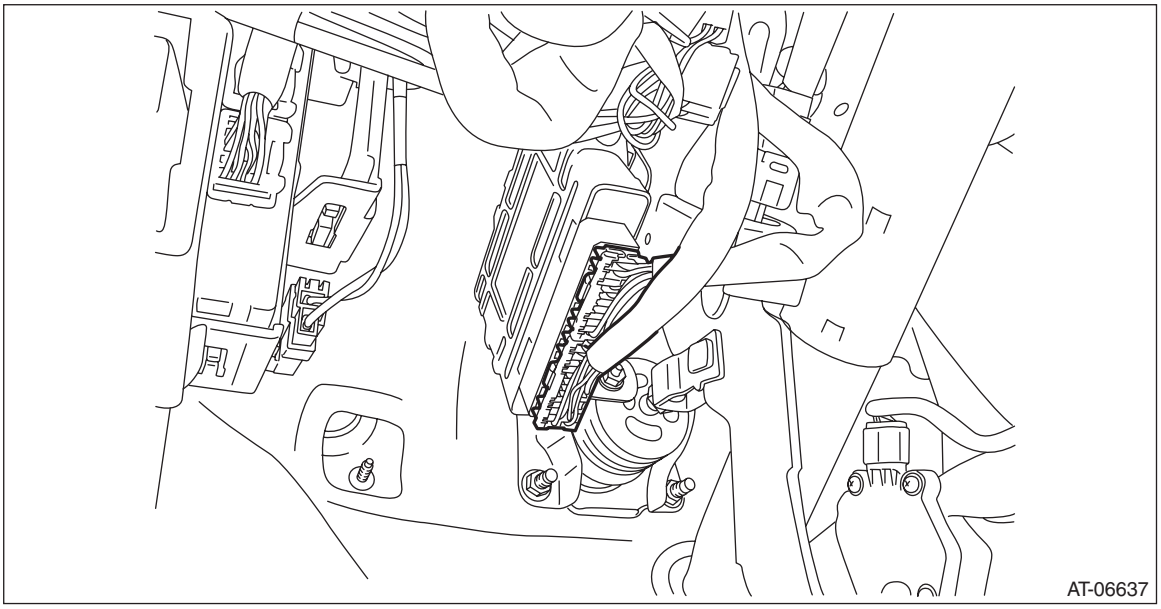
NOTE:
For details of transmission harness circuit, refer to wiring diagram. <Ref. to WI-114, WIRING DIAGRAM, CVT Control System.>

Harness continuity standard
Less than 1 Ω

22.Transmission Control Module (TCM)

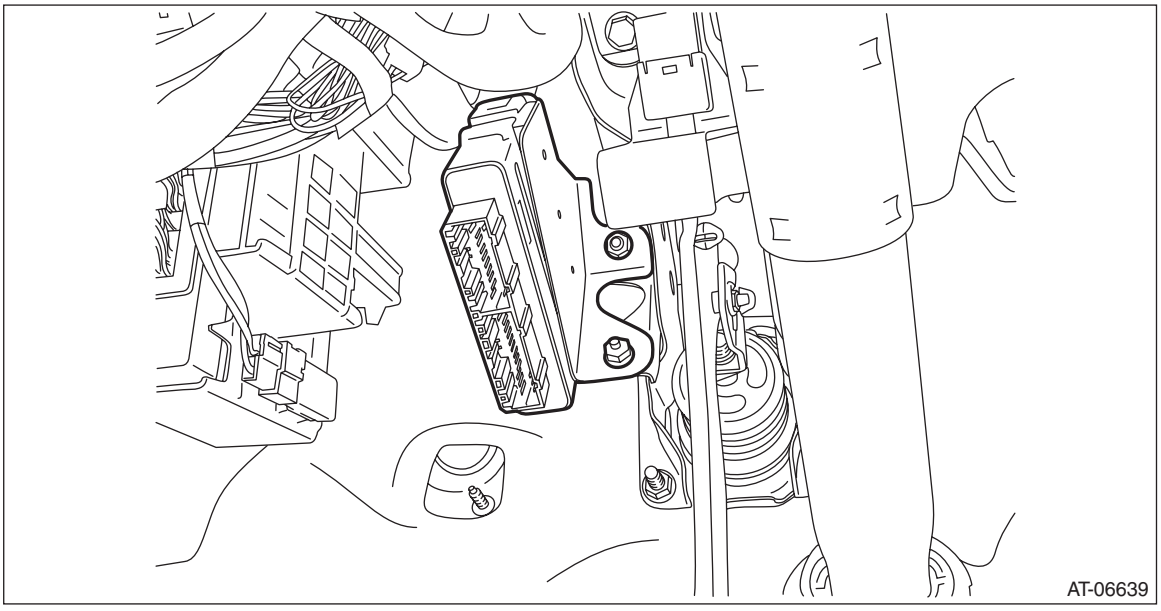
A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the instrument panel lower cover. <Ref. to EI-63, REMOVAL, Instrument Panel Lower Cover.>
3) Remove the bulkhead harness connector from TCM.



4) Remove the TCM.

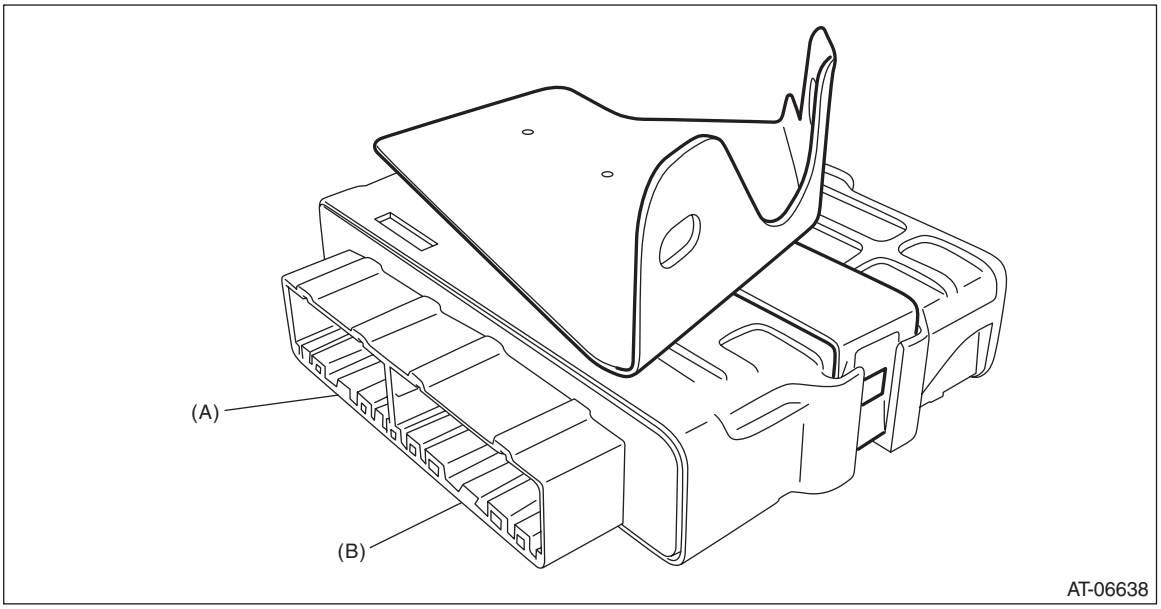
NOTE:
Replace the TCM and bracket as a set.



B: INSTALLATION

1) Install the TCM to the bracket.

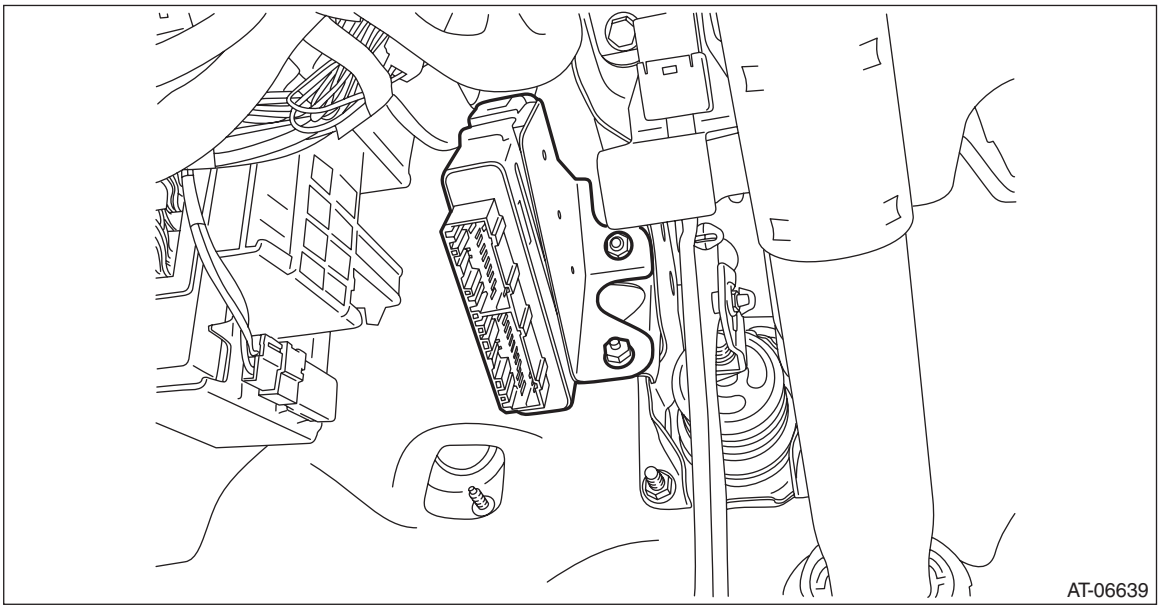
CAUTION:
To avoid the damage to bracket and TCM, do not remove after installing TCM to bracket. If installed by mistake, the part must be replaced with a new part.



(A) 22-pin connector side
(B) 26-pin connector side

2) Install the TCM.

Tightening torque:
7.5 N·m (0.8 kgf-m, 5.5 ft-lb)



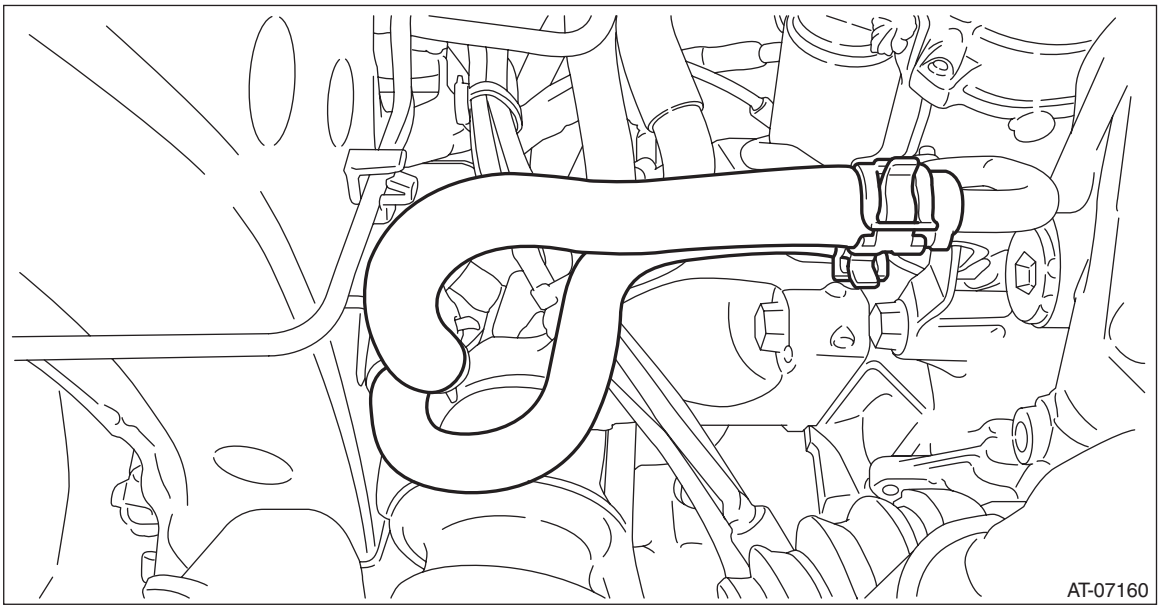
3) Install the harness connector to TCM.
4) Install the instrument panel lower cover. <Ref. to EI-64, INSTALLATION, Instrument Panel Lower Cover.>
5) Perform the diagnosis again. <Ref. to CVT(diag)-20, Learning Control.>

23.CVTF Cooler Pipe and Hose

A: REMOVAL

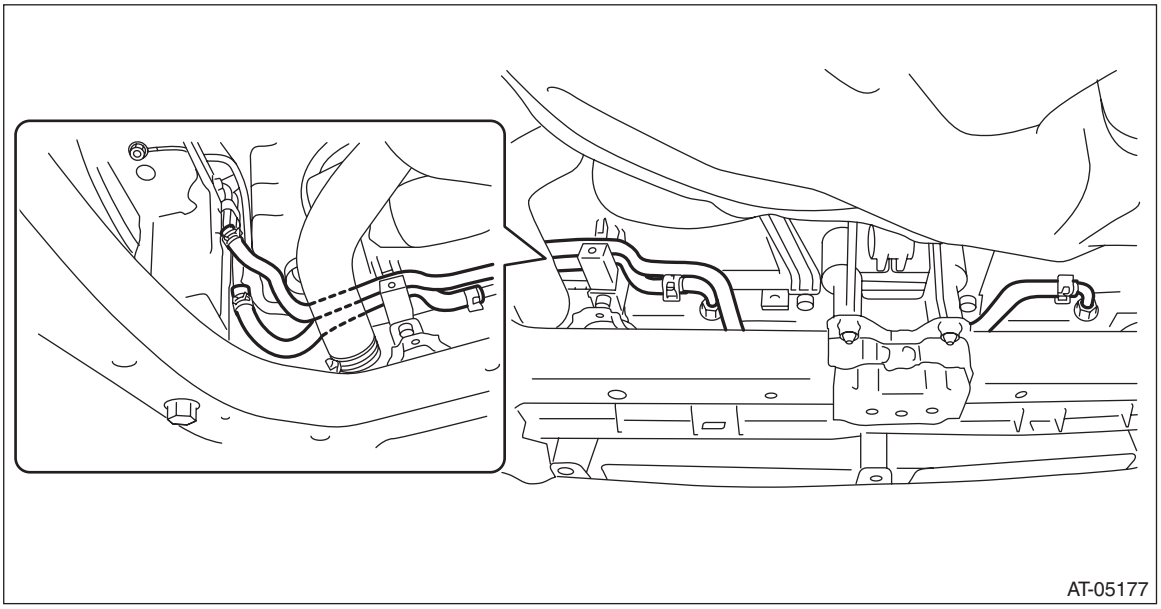
CAUTION:
• Immediately after the vehicle has been running or after idling for a long time, the CVTF will be hot. Be careful not to burn yourself.
• If the CVTF is spilt over exhaust pipe, wipe it off with cloth to avoid emitting smoke or causing a fire.
• When removing the CVTF cooler pipe assembly on vehicle side, be careful not to bend the A/C pipe.

1) Lift up the vehicle.
2) Remove the under cover.
3) Remove the CVTF CVT inlet hose and CVTF CVT outlet hose.



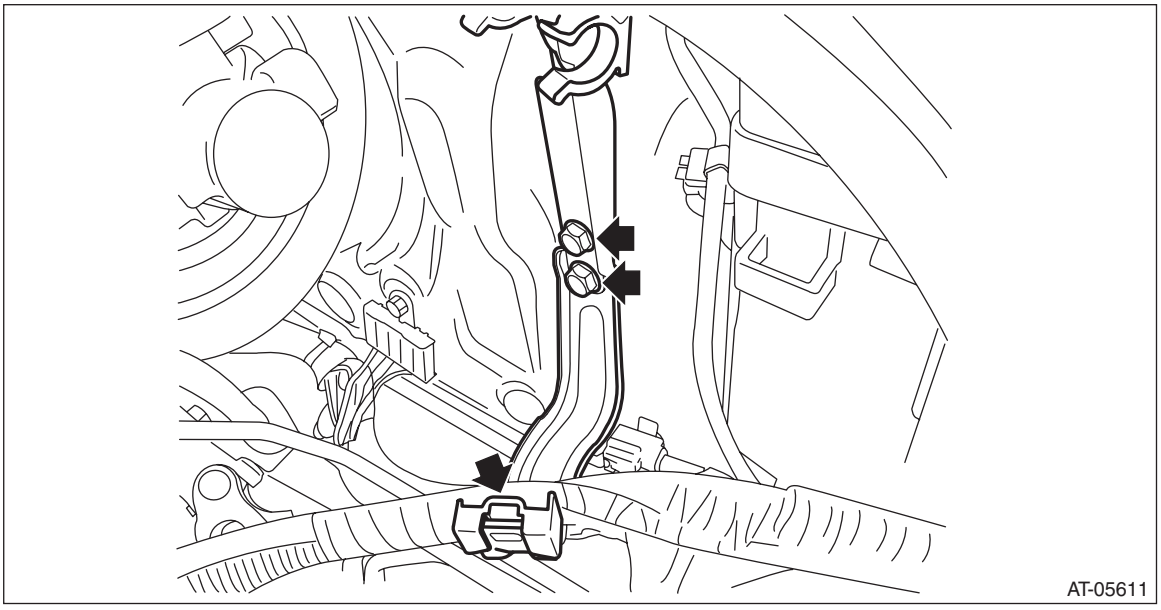
4) Remove the CVTF radiator inlet hose and CVTF radiator outlet hose on radiator side.

CAUTION:
Do not use a screwdriver or other pointed tools.

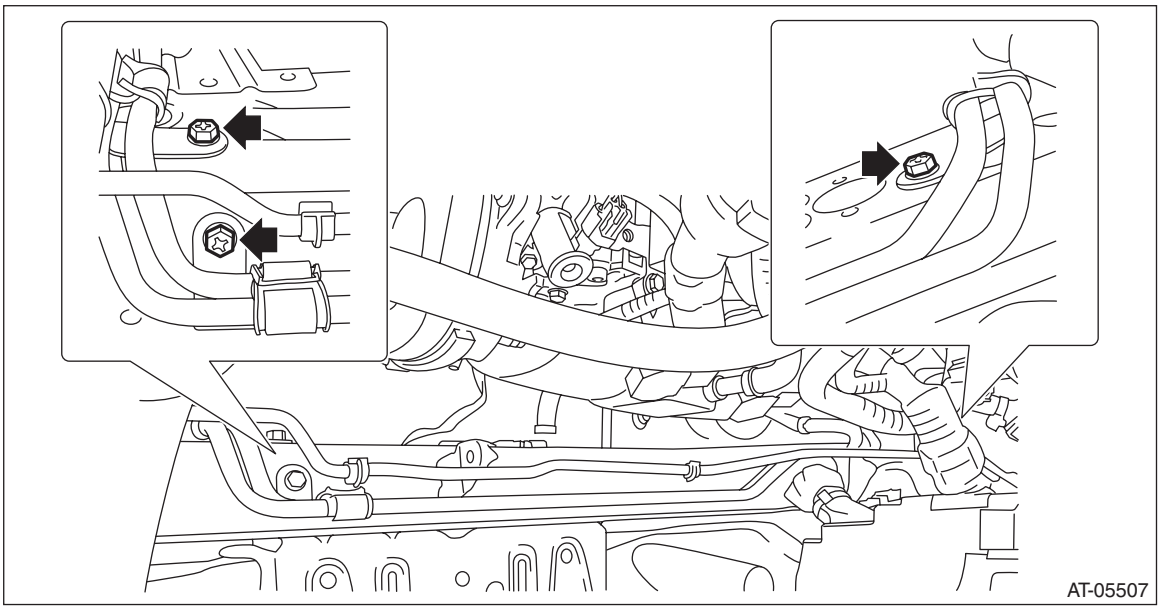


5) Lower the vehicle.

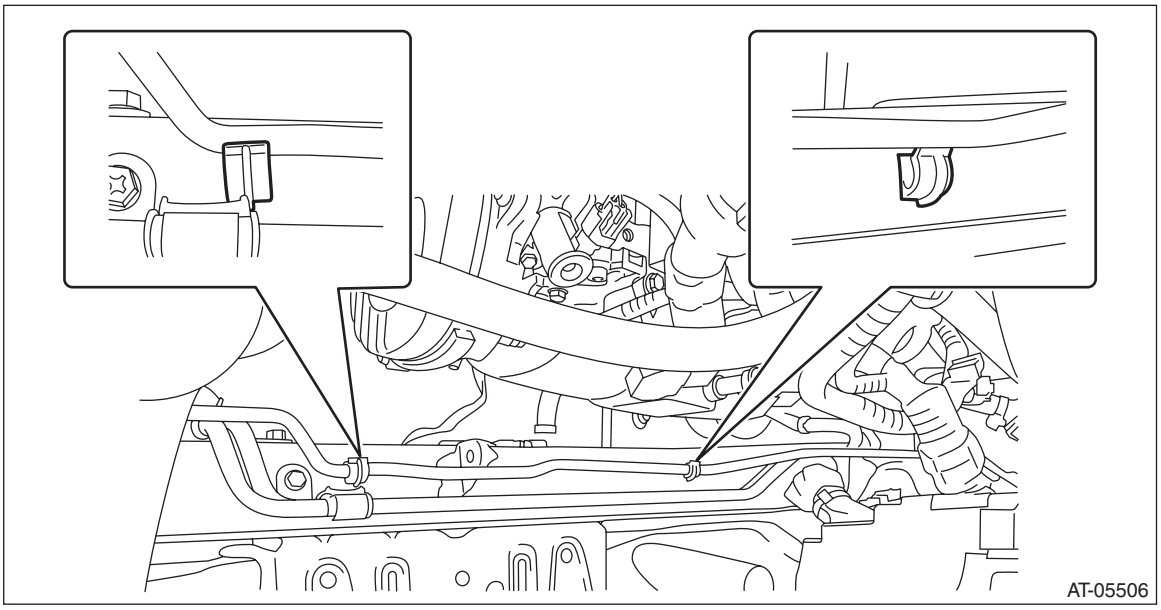
6) Remove the battery.
7) Remove the battery cable clip from the bracket, and remove the battery cable bracket.



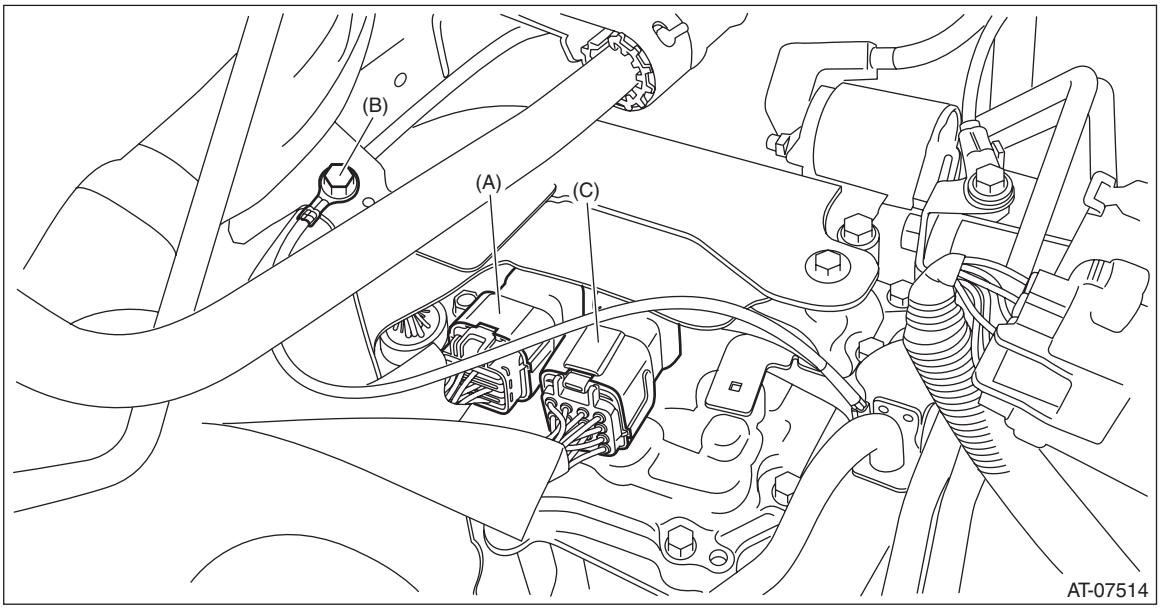
8) Remove the engine coolant reservoir tank. <Ref. to CO(H4DO)-43, REMOVAL, Reservoir Tank.>
9) Remove the CVTF cooler pipe assembly mounting bolt.



10) Detach the A/C pipe from clip.



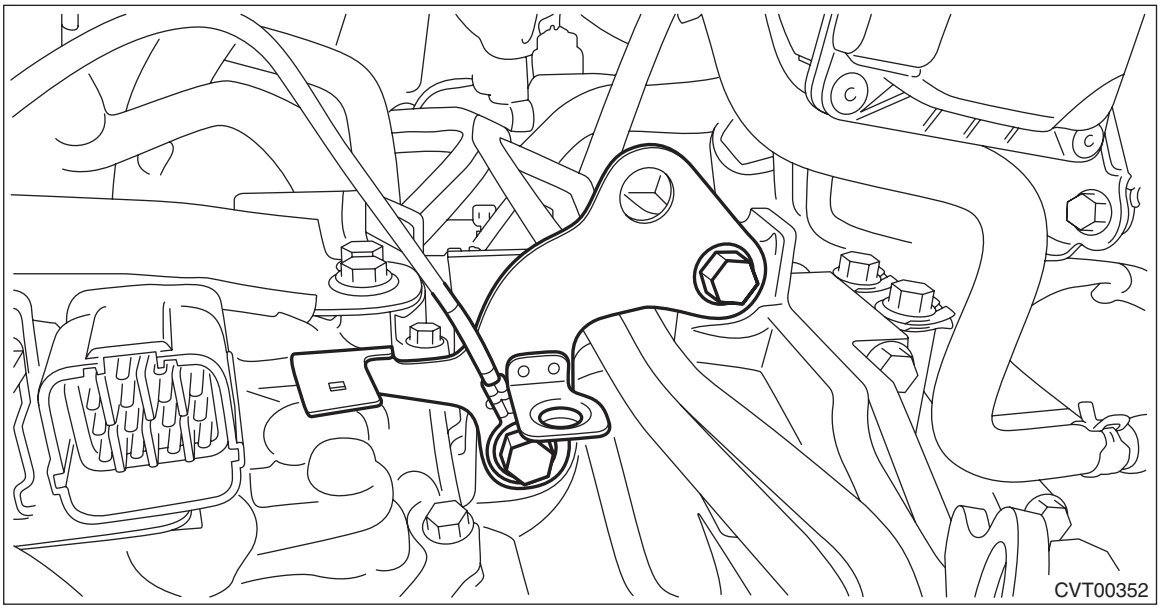
11) Remove the CVTF cooler pipe assembly from the vehicle.
12) Remove the following harness connectors.
- Transmission harness connectors
- Inhibitor harness connector
- Transmission radio ground terminal



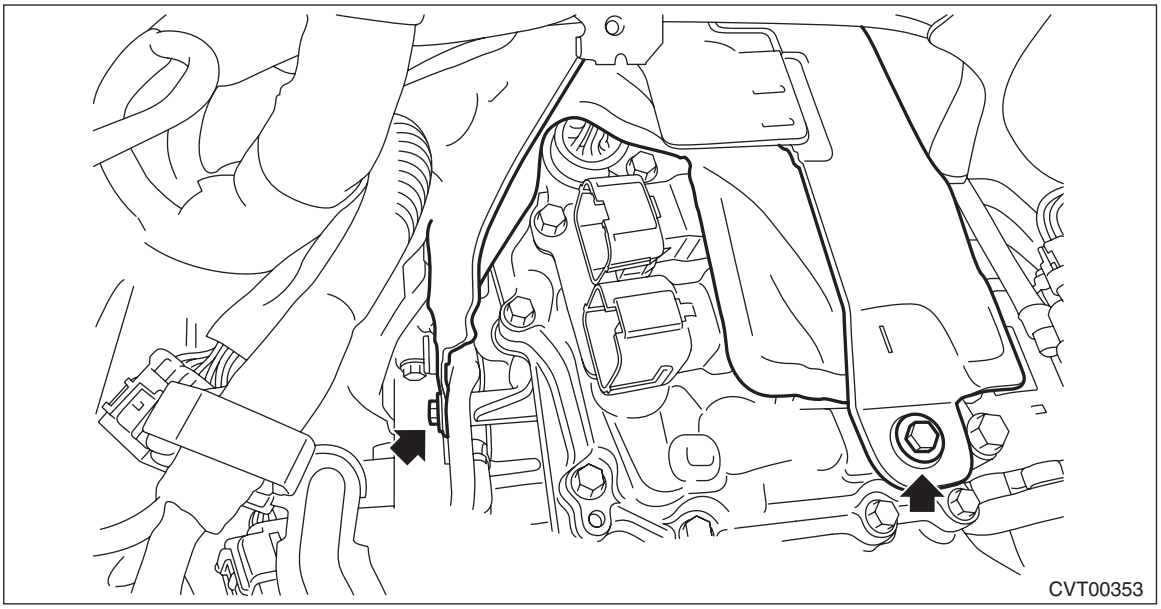
(A) Transmission harness connectors
(B) Transmission radio ground terminal
(C) Inhibitor harness connector

13) Remove the adapter harness connector from the transmission hanger.

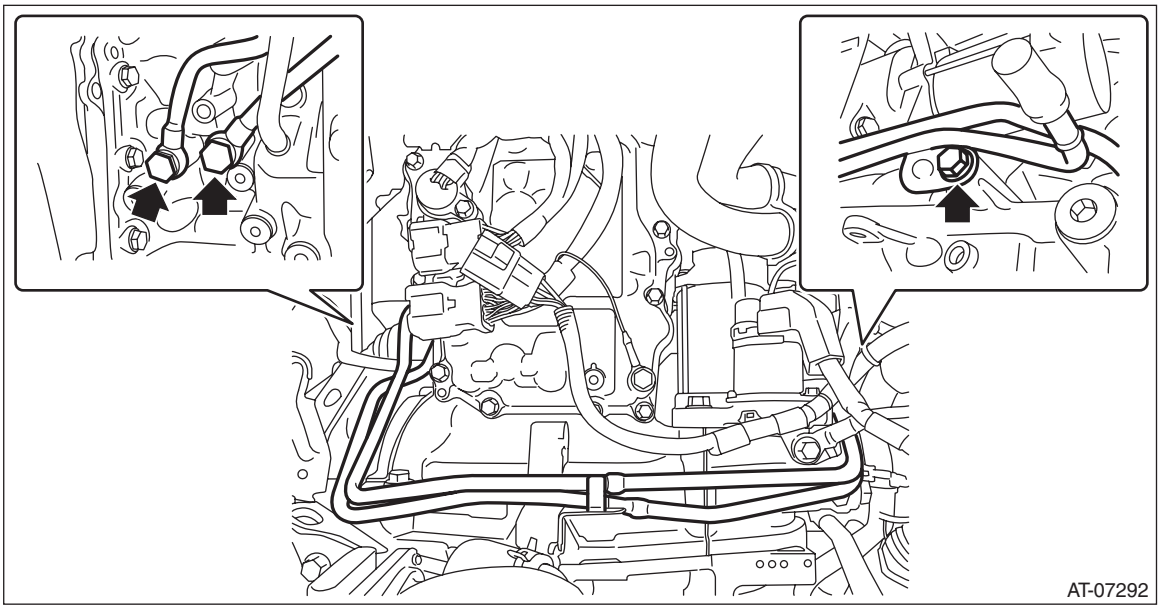
14) Remove the air breather hose from the transmission hanger, and remove the transmission hanger and the transmission radio ground cord.



15) Remove the transmission case cover.



16) Remove the CVTF cooler pipe COMPL from the transmission body.

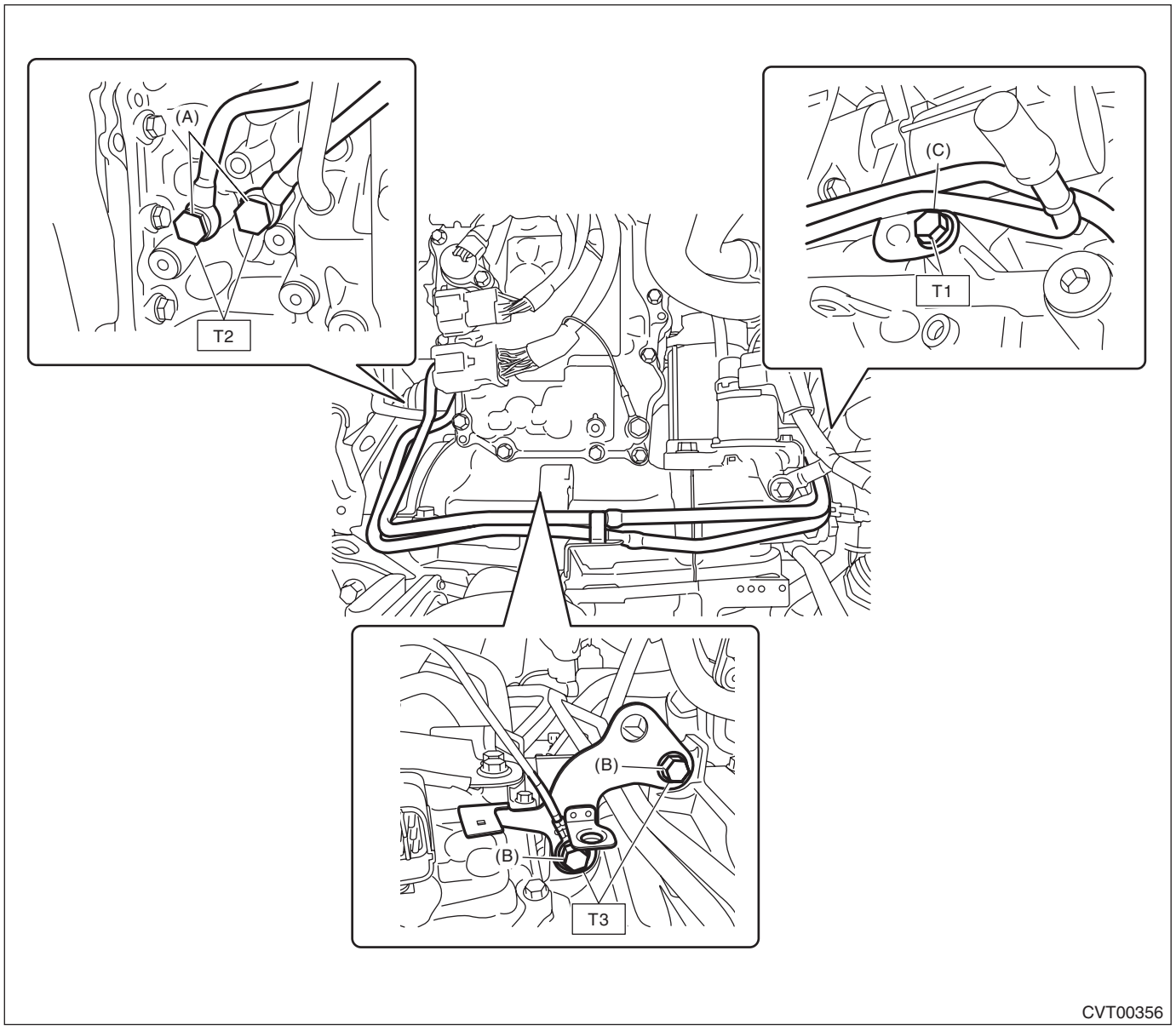


B: INSTALLATION

CAUTION:
When installing the CVTF cooler pipe assembly on vehicle side, be careful not to bend the A/C pipe.
1) Temporarily install the CVTF cooler pipe COMPL, transmission hanger and transmission radio ground cord to the transmission.

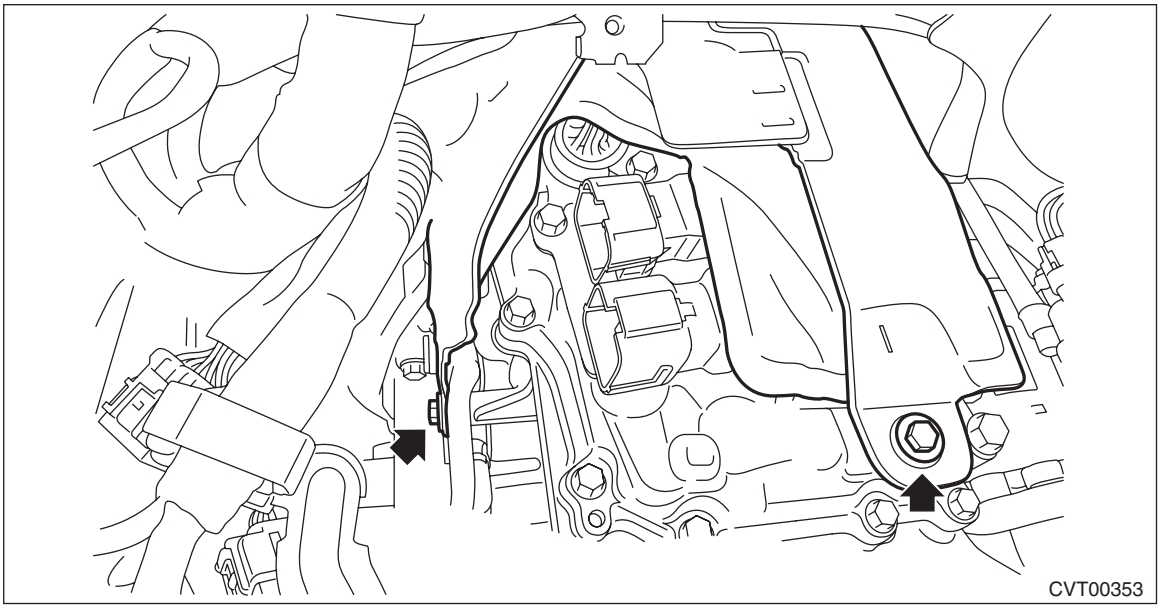
NOTE:
Use a new gasket.
2) Tighten the union screws and bolts in the order of (A) → (B) → (C).

Tightening torque:
T1: 35 N·m (3.6 kgf-m, 25.8 ft-lb)
T2: 40 N·m (4.1 kgf-m, 29.5 ft-lb)
T3: 41 N·m (4.2 kgf-m, 30.2 ft-lb)



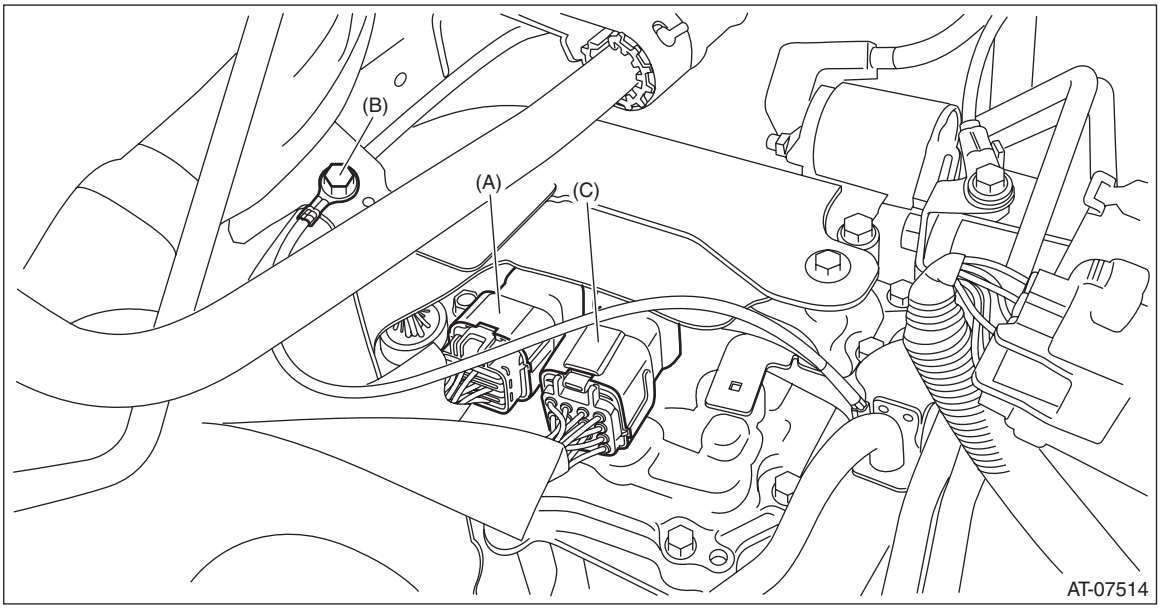
3) Install the transmission case cover.

Tightening torque:
8 N·m (0.8 kgf-m, 5.9 ft-lb)



4) Install the adapter harness connector to the transmission hanger.
Connect the following harness connectors.
- Transmission harness connectors
- Inhibitor harness connector
- Transmission radio ground terminal

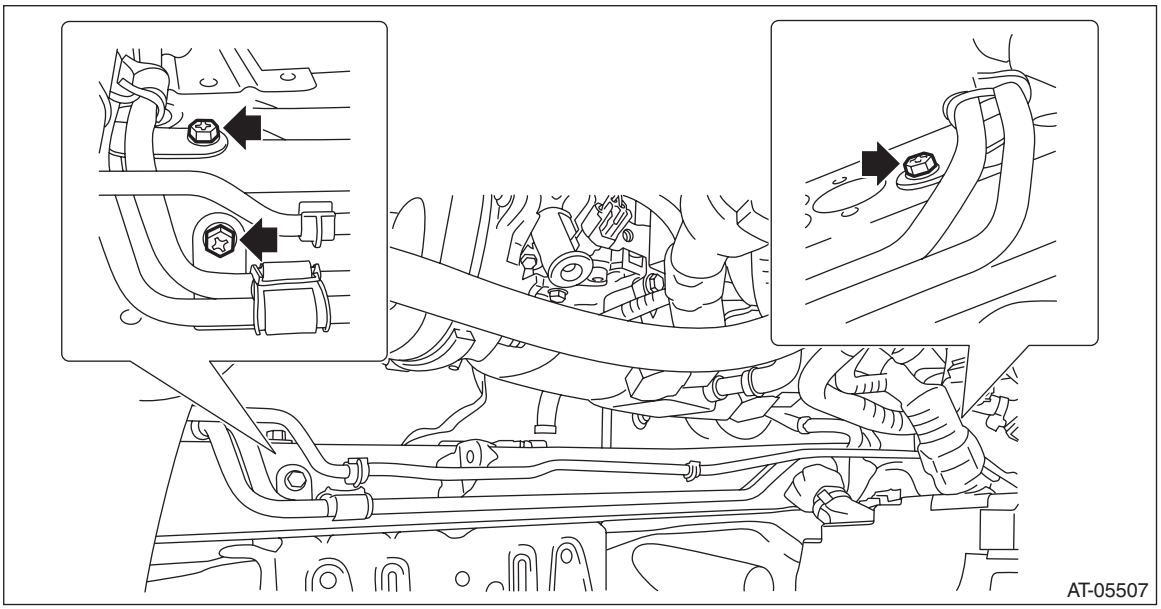
Tightening torque:
13 N·m (1.3 kgf-m, 9.6 ft-lb)



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

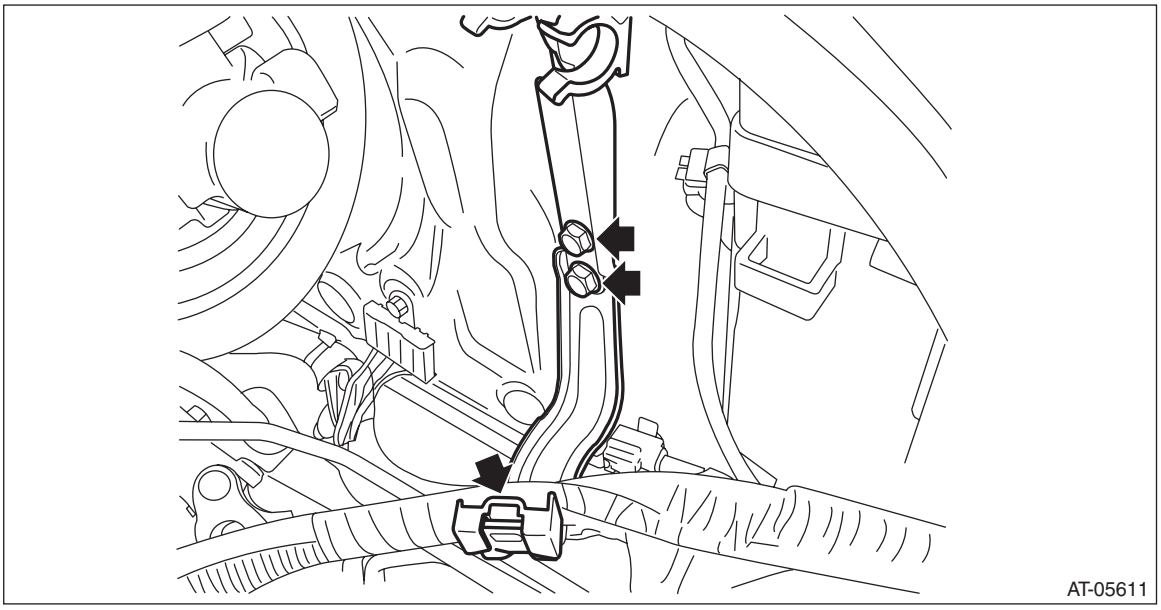
5) Install the CVTF cooler pipe assembly to vehicle.

Tightening torque:
7.5 N·m (0.8 kgf-m, 5.5 ft-lb)



6) Install the A/C pipe to clip.
7) Install the battery cable bracket, and install the battery cable clip to the bracket.

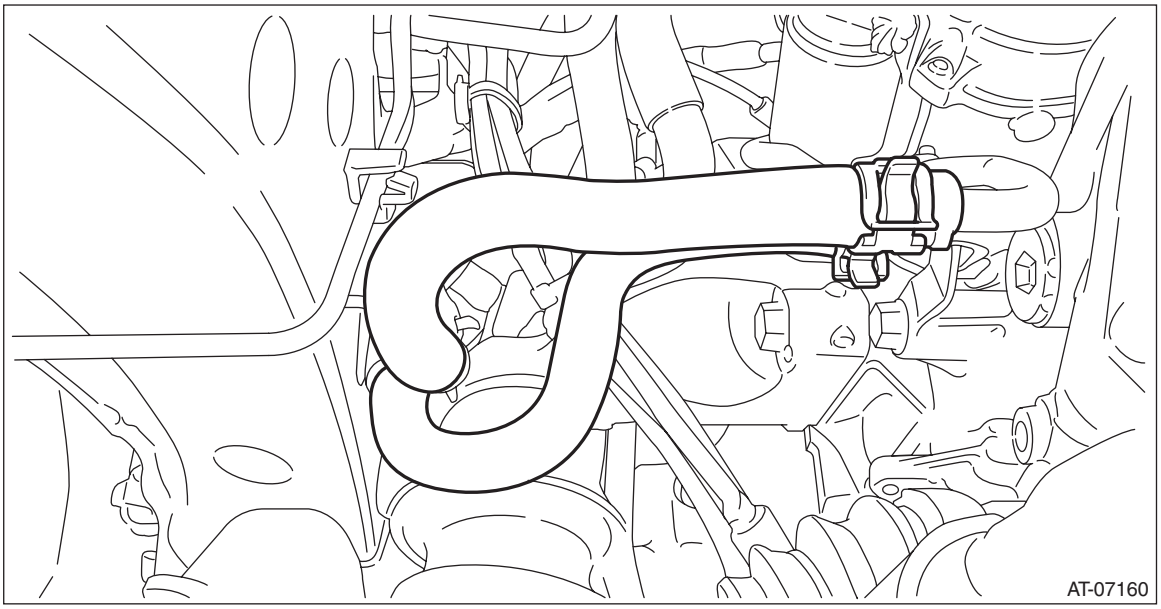
Tightening torque:
7.5 N·m (0.76 kgf-m, 5.5 ft-lb)



8) Install the engine coolant reservoir tank. <Ref. to CO(H4DO)-43, INSTALLATION, Reservoir Tank.>
9) Lift up the vehicle.

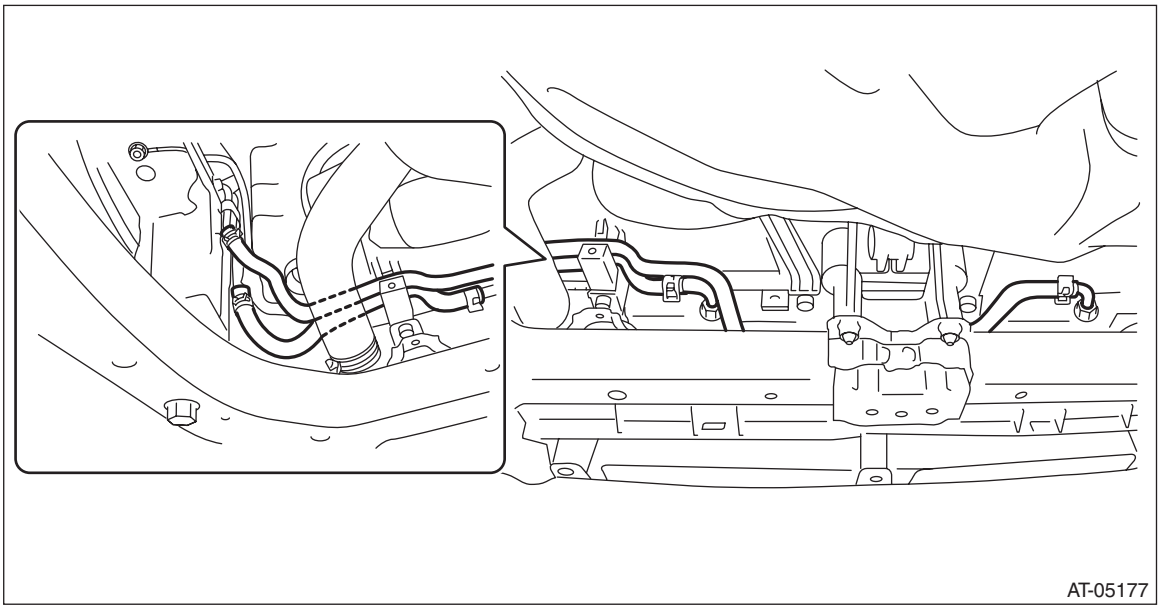
10) Install the CVTF CVT inlet hose and CVTF CVT outlet hose.

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



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

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



12) Install the under cover.
13) Lower the vehicle.
14) Install the battery.
15) Adjust the CVTF level and check there is no leakage. <Ref. to CVT-36, ADJUSTMENT, CVTF.>

C: INSPECTION

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

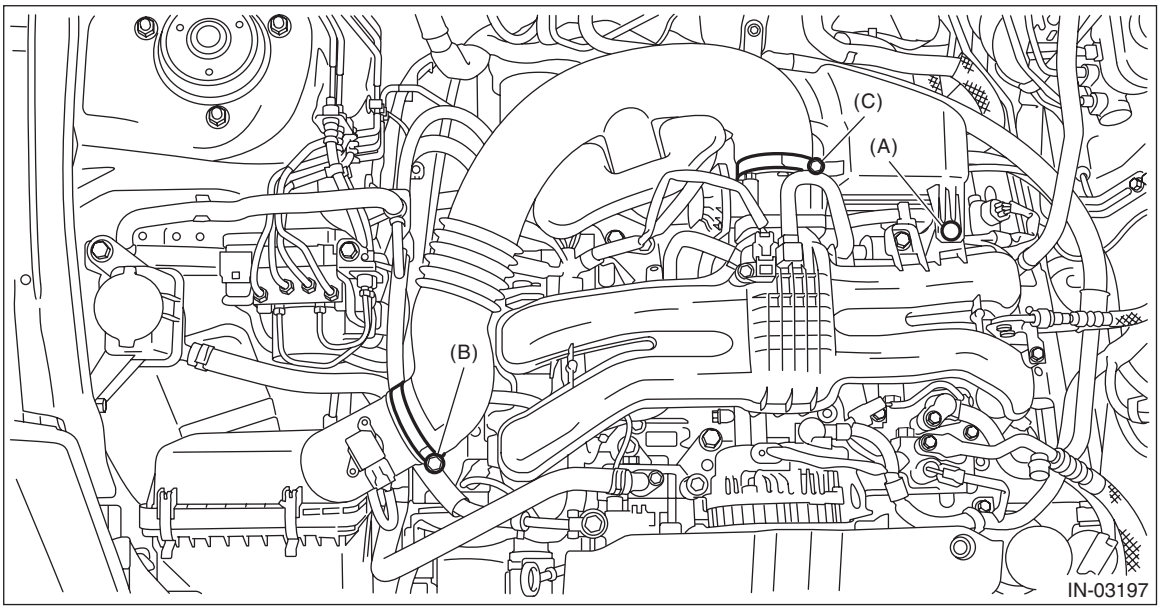
- Check for CVTF leaks in joints between the transmission, radiator, pipes, and hoses.
- Check the clamp for deformation.
- Lightly bend the hose and check for cracks in the surface or other damages.
- Pinch the hose with your fingers and check for poor elasticity. Also check for poor elasticity in the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

24.Air Breather Hose

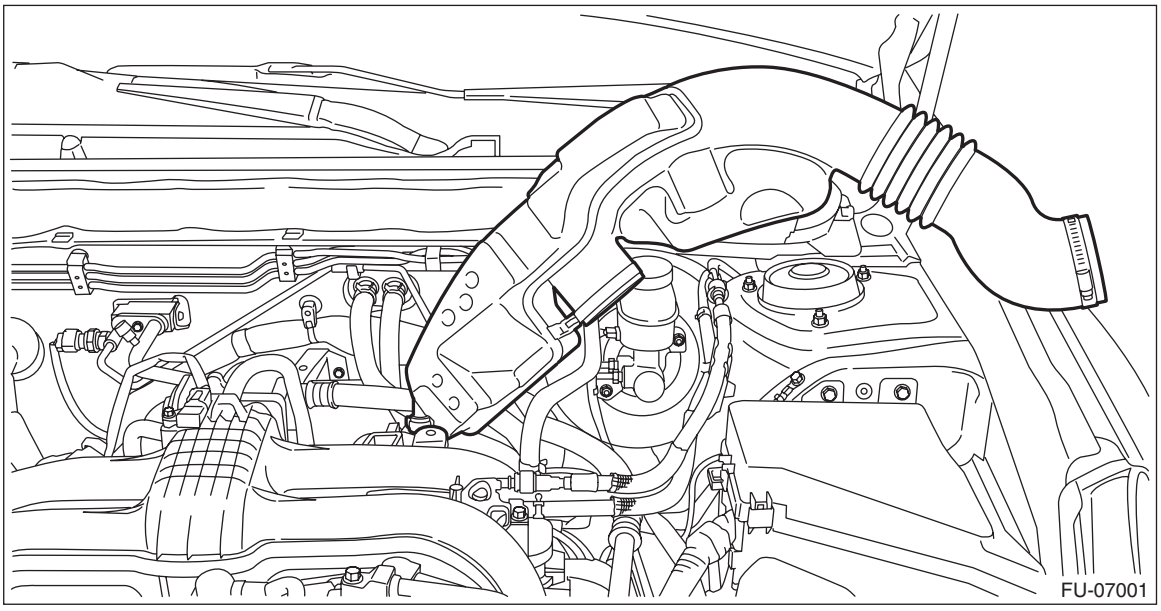
A: REMOVAL

1. FRONT DIFFERENTIAL SIDE

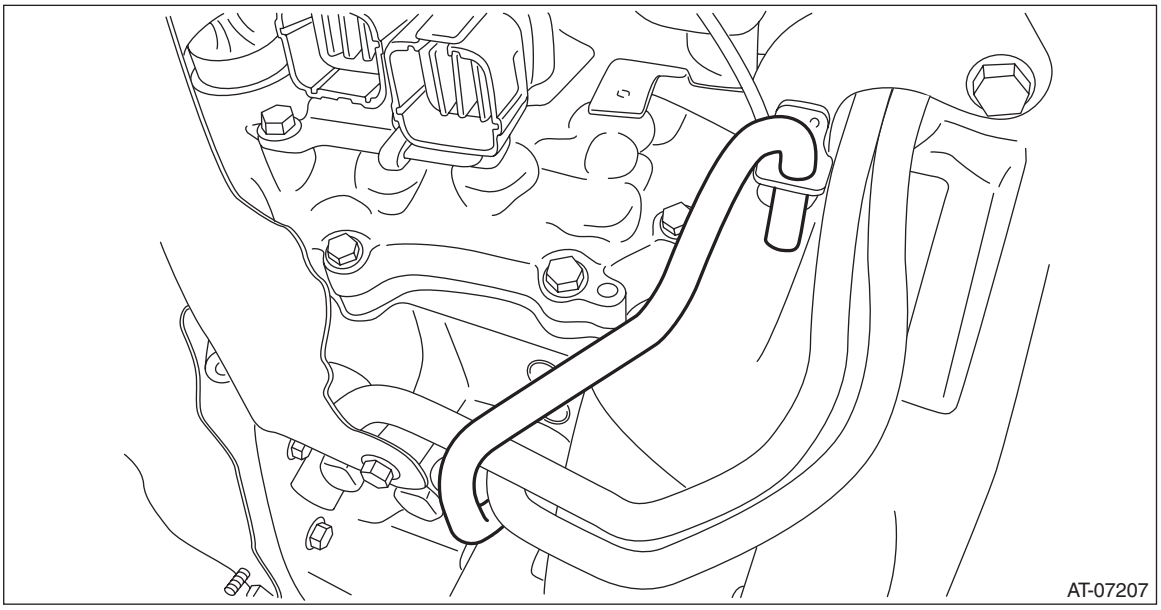
1) Remove the clip (A) from the air intake boot.
2) Loosen the clamp (B) connecting the air intake boot and air cleaner case (rear).
3) Loosen the clamp (C) which connects the air intake boot and throttle body.



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

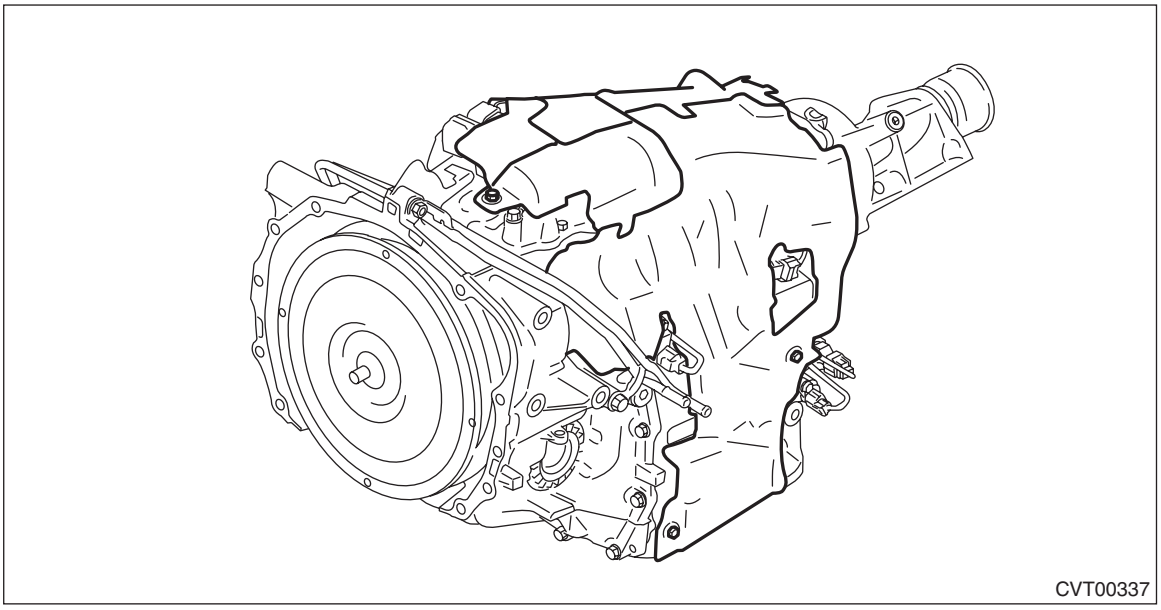


5) Remove the air breather hose.

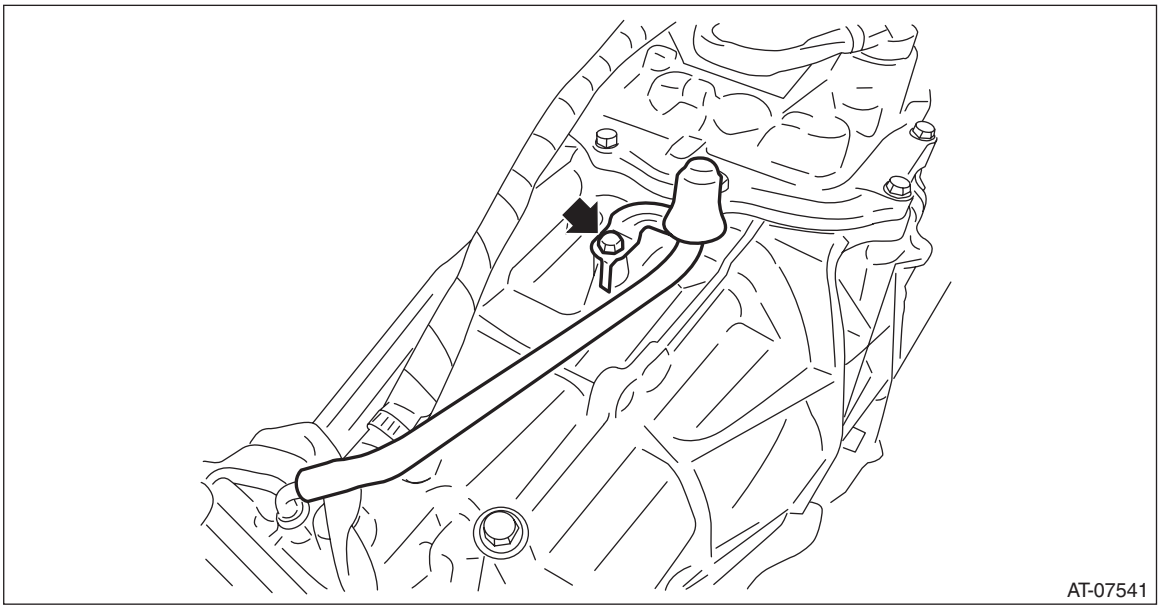


2. TRANSMISSION CASE SIDE

1) Remove the transmission assembly. <Ref. to CVT-57, REMOVAL, Automatic Transmission Assembly.>
2) Remove the transmission case cover.



3) Remove the air breather hose.

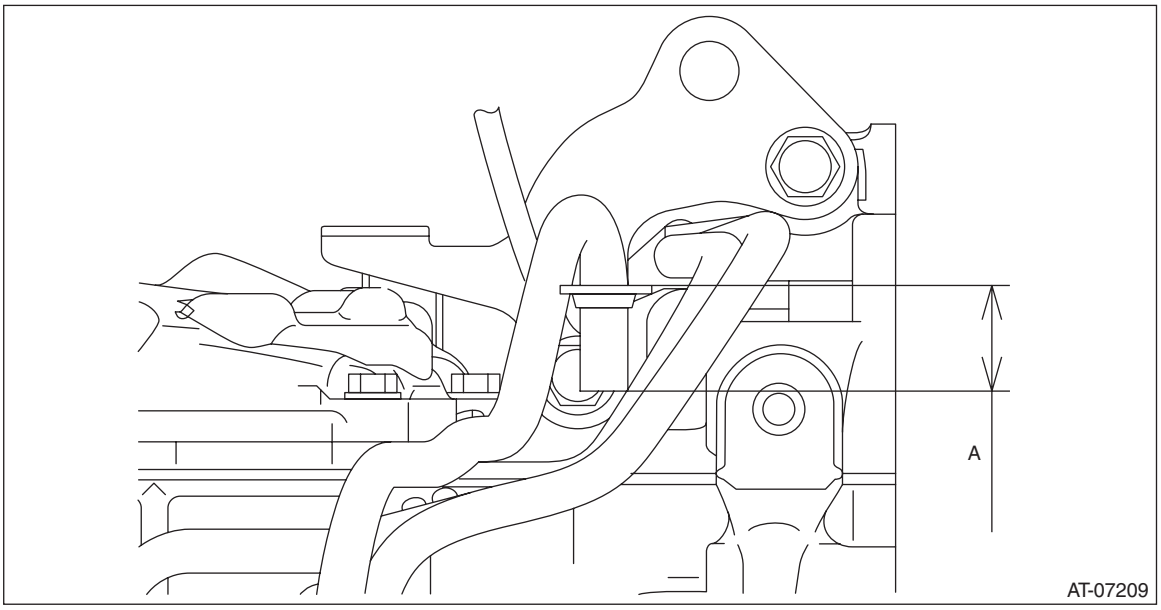


B: INSTALLATION

1. FRONT DIFFERENTIAL SIDE

Install in the reverse order of removal.

Insertion depth A:
16 — 36 mm (0.63 — 1.42 in)



2. TRANSMISSION CASE SIDE

Install in the reverse order of removal.

Tightening torque:
Air breather hose:
5 N·m (0.5 kgf-m, 3.7 ft-lb)
Transmission case cover:
8 N·m (0.8 kgf-m, 5.9 ft-lb)

C: INSPECTION

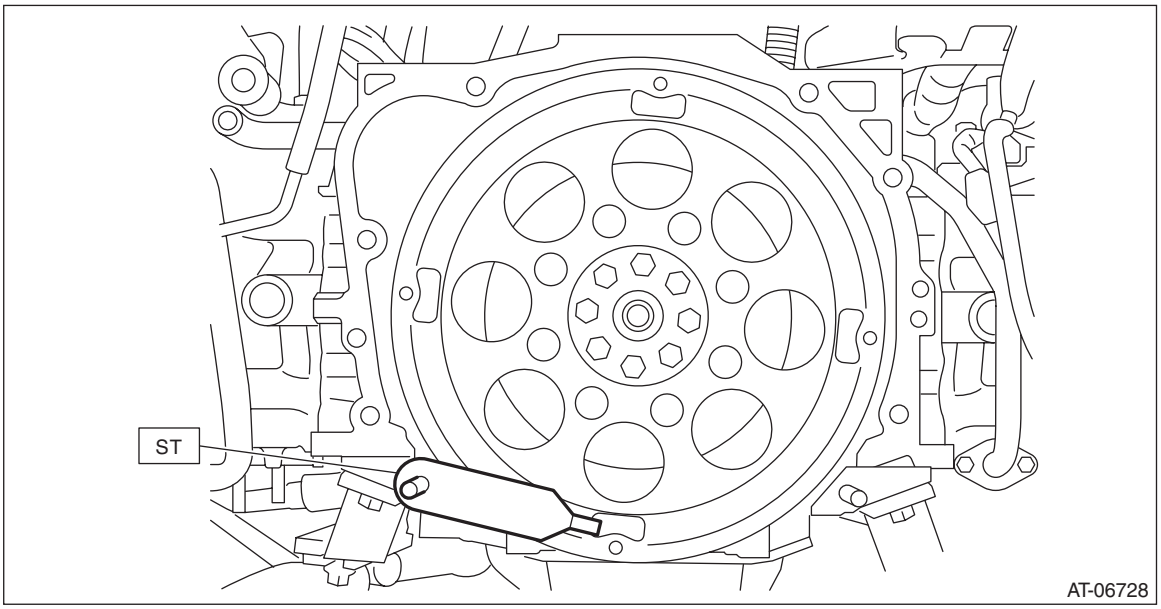
Check the hose for peeling, crack or clogging.

25.Drive Plate

A: REMOVAL

1) Remove the transmission assembly from the vehicle. <Ref. to CVT-57, REMOVAL, Automatic Transmission Assembly.>
2) Set the ST.

NOTE:
Set the ST to the drive plate referring to the illustration.
ST 498497300 CRANKSHAFT STOPPER



3) Remove the drive plate and reinforcement drive plate.

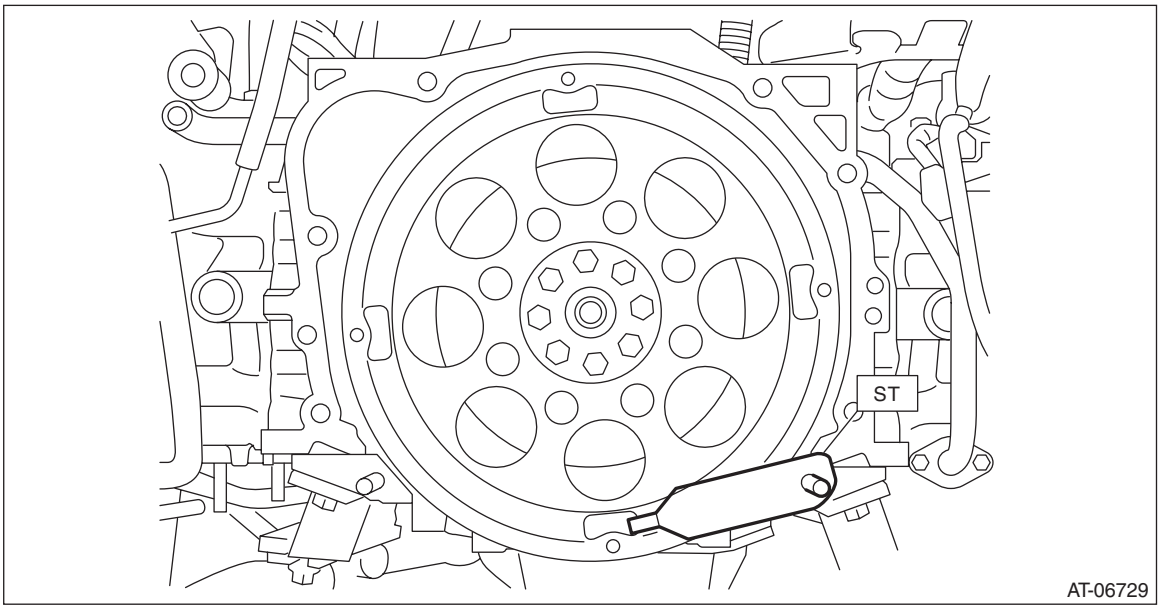
B: INSTALLATION

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

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

2) Set the ST.

NOTE:
Set the ST to the drive plate referring to the illustration.
ST 498497300 CRANKSHAFT STOPPER

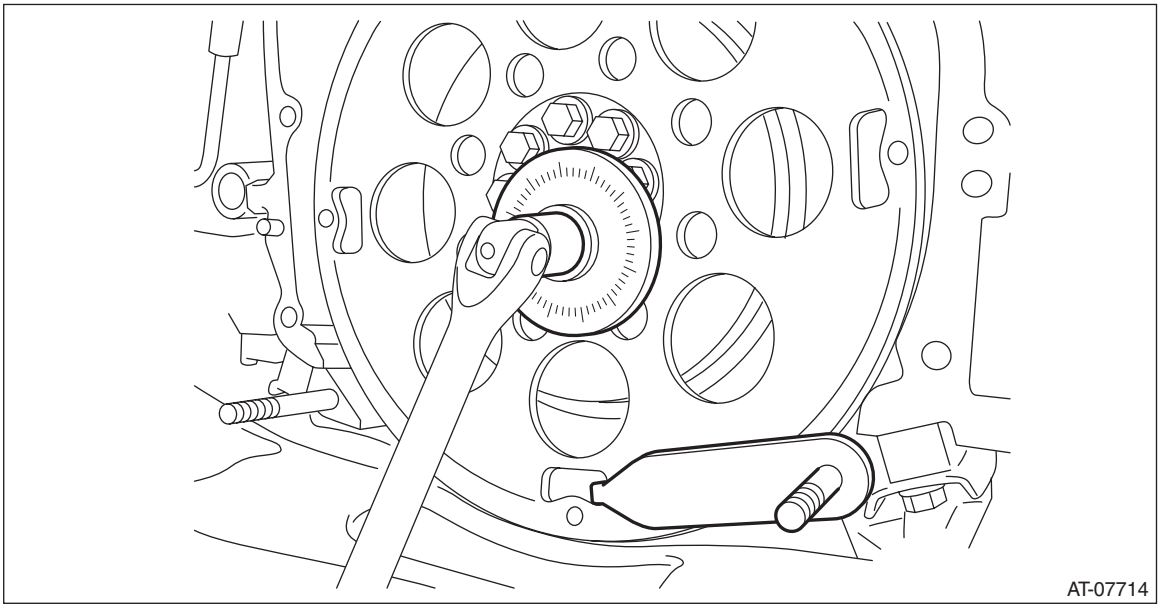


3) Tighten the drive plate mounting bolt in two stages.
(1) Tighten the drive plate mounting bolt.

Tightening torque:
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 CVT-72, INSTALLATION, Automatic Transmission Assembly.>

C: INSPECTION

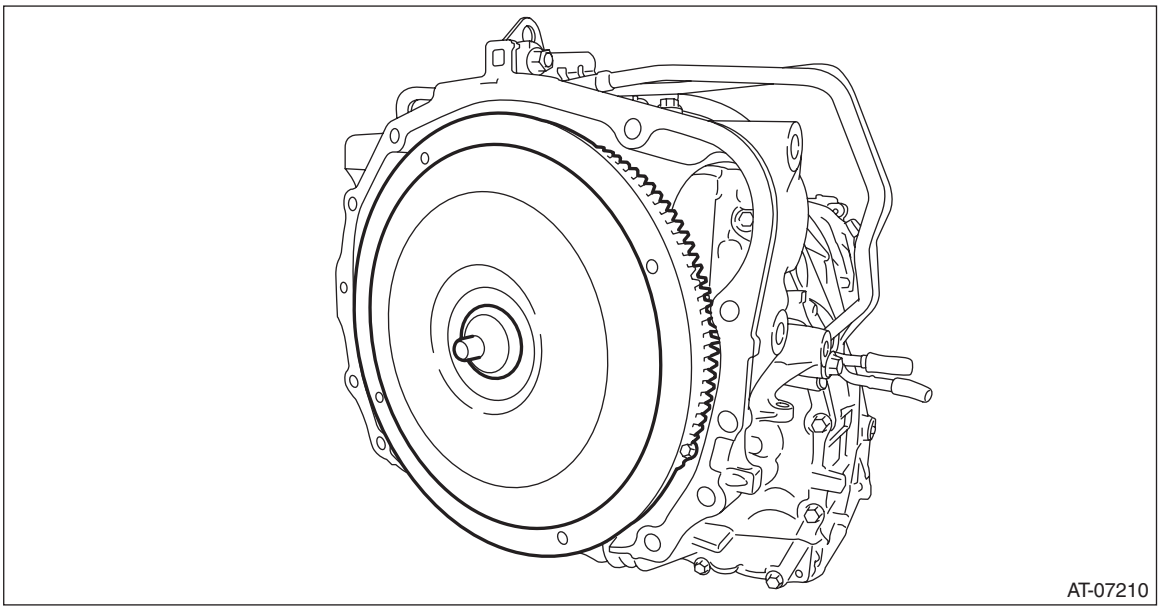
Check the drive cable for damage.

26.Torque Converter Assembly

A: REMOVAL

1) Remove the transmission assembly from the vehicle. <Ref. to CVT-57, REMOVAL, Automatic Transmission Assembly.>
2) Pull out the torque converter assembly horizontally.

CAUTION:
Do not scratch the inside of engaging parts.



3) Remove the O-ring from the input shaft.

B: INSTALLATION

1) Install the O-ring to the input shaft.

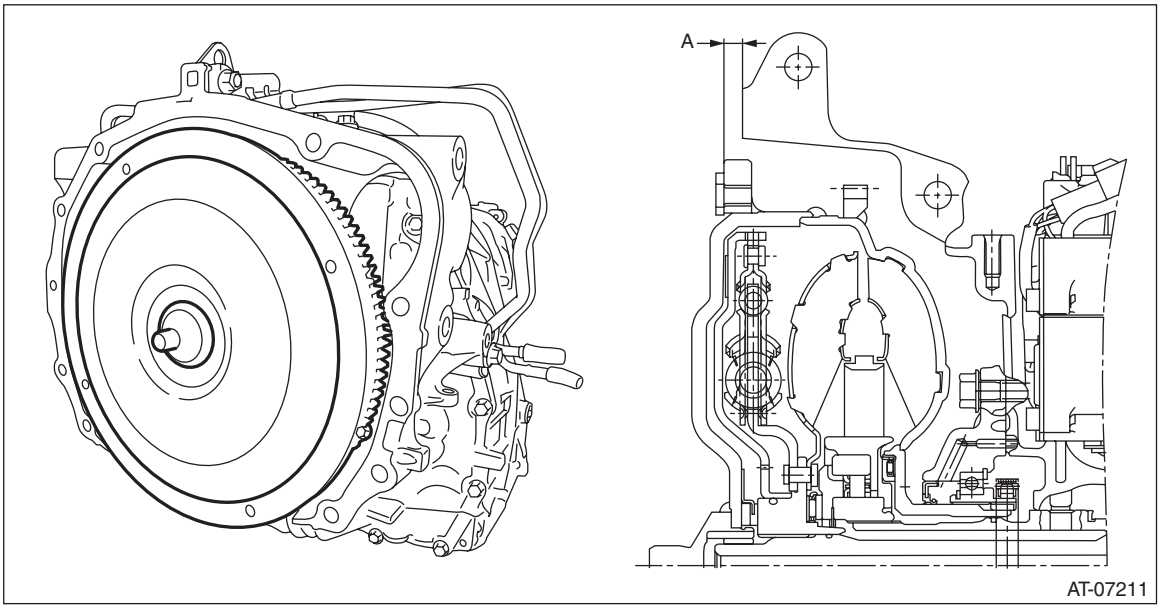
NOTE:
- Use new O-rings.
- Apply CVTF to the O-ring.

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

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

3) Engage the splines while gently rotating the torque converter assembly by hand, and securely insert the assembly.
4) Measure depth “A”, from converter case end surface to drive plate contacting surface.

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



5) Install the transmission assembly to the vehicle. <Ref. to CVT-72, INSTALLATION, Automatic Transmission Assembly.>

C: INSPECTION

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

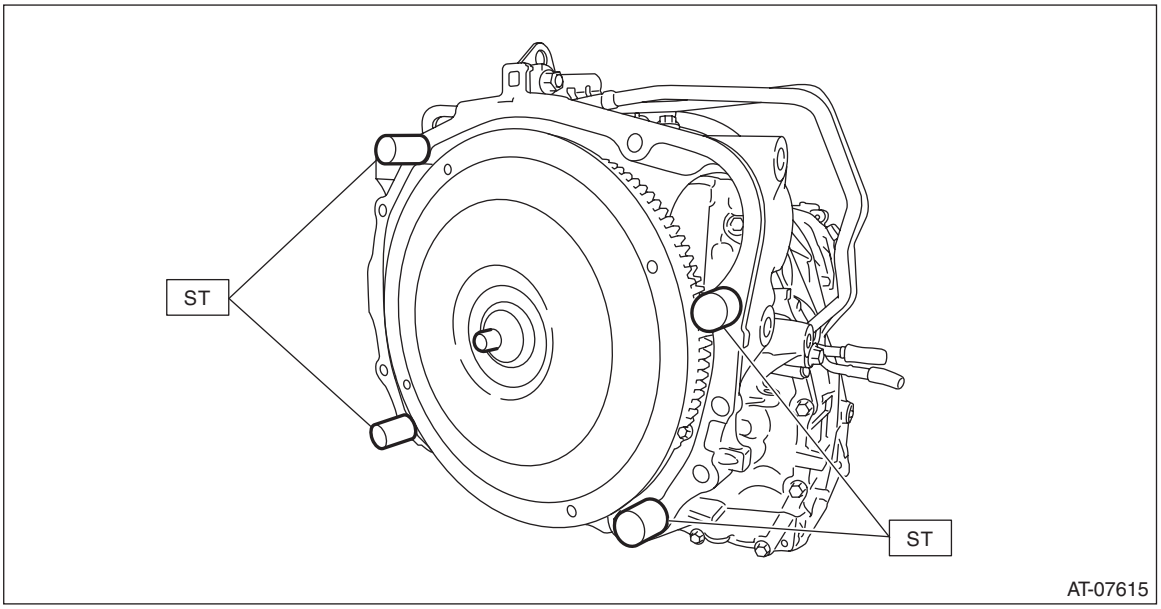
27.Preparation for Overhaul

A: GENERAL DESCRIPTION

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

B: PROCEDURE

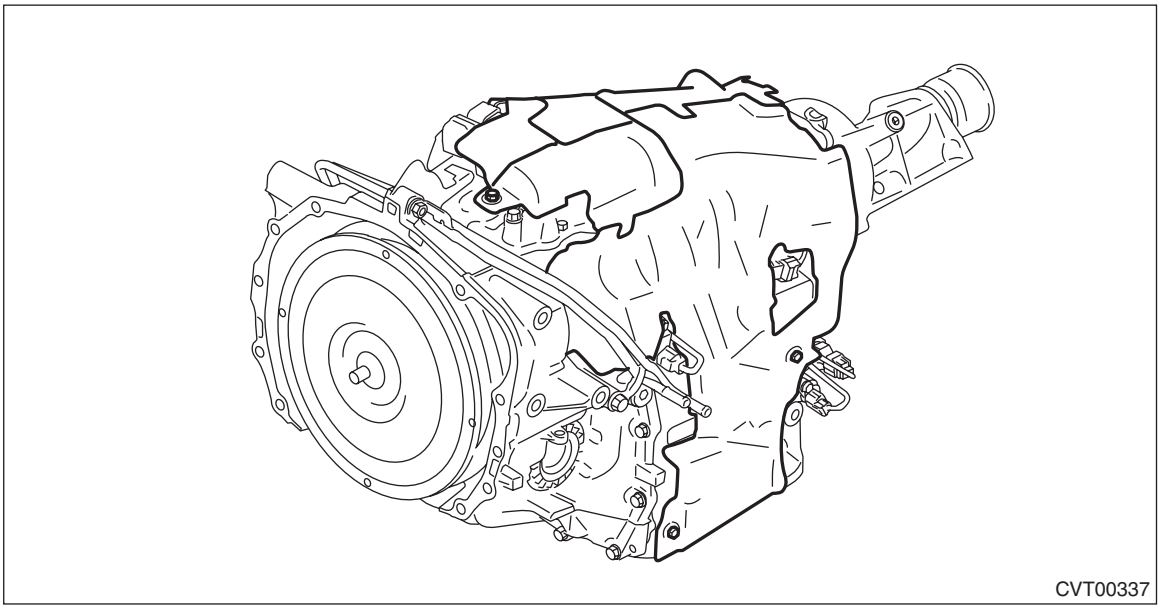
1) Clean the transmission exterior.
2) Attach the ST on the transmission.
ST 18632AA000 STAND ASSY



3) Remove the torque converter assembly. <Ref. to CVT-159, Torque Converter Assembly.>
4) Remove the transmission case 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)



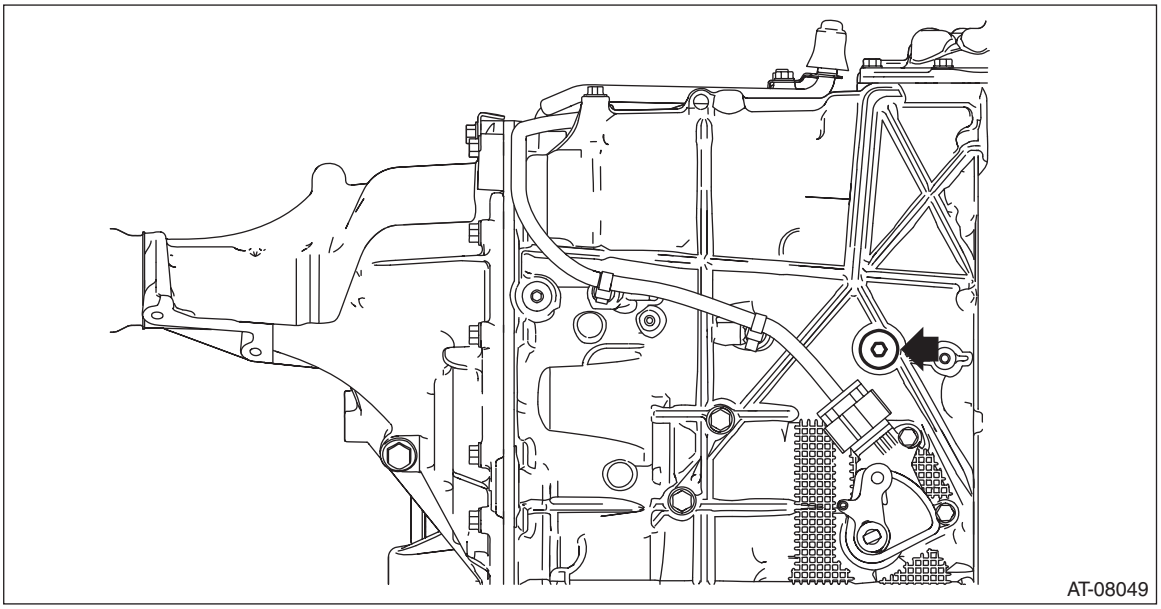
5) Place the transmission assembly on end.

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

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

NOTE:
Use a new gasket.

Tightening torque:
50 N·m (5.1 kgf-m, 36.9 ft-lb)

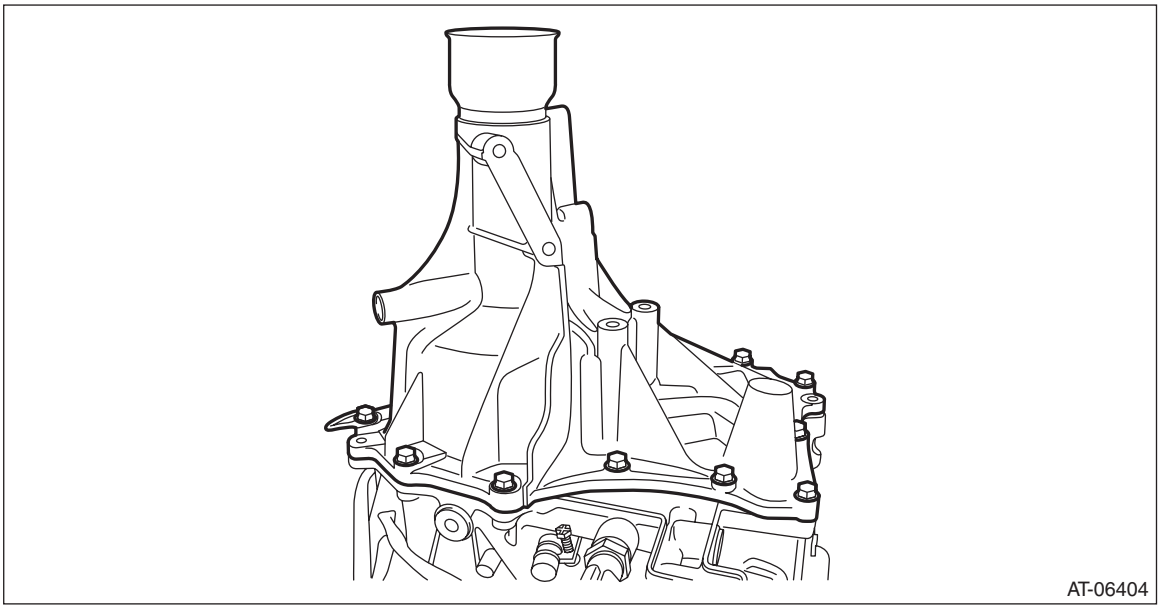


28.Extension Case

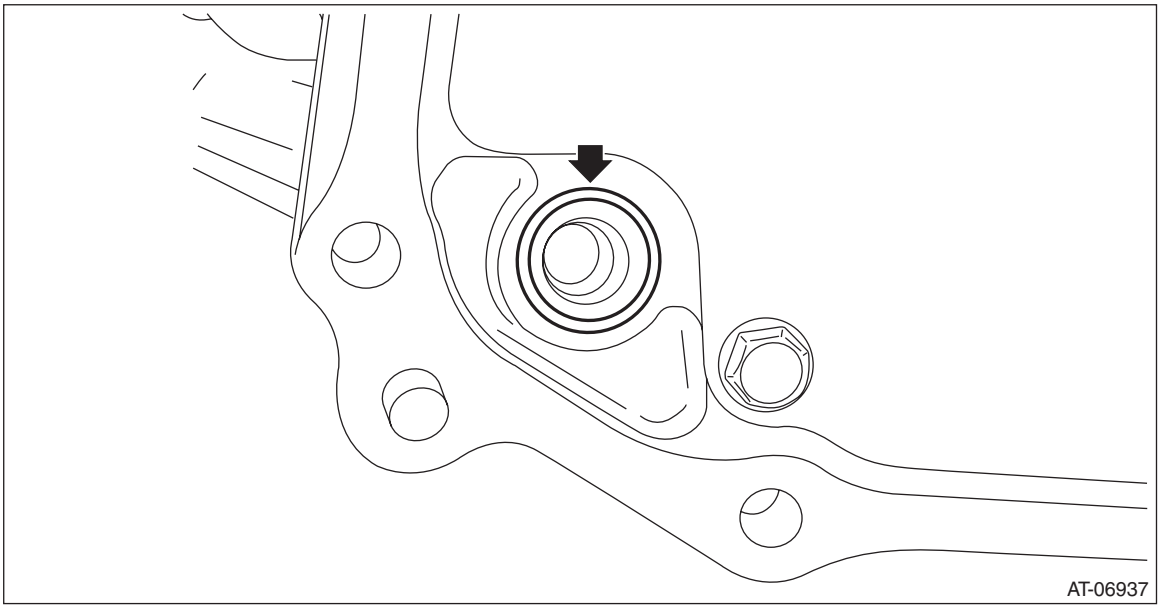
A: REMOVAL

1) Remove the transmission assembly from the vehicle. <Ref. to CVT-57, REMOVAL, Automatic Transmission Assembly.>
2) Remove the extension case and transmission hanger.

NOTE:
The total number of extension case mounting bolts is 13.



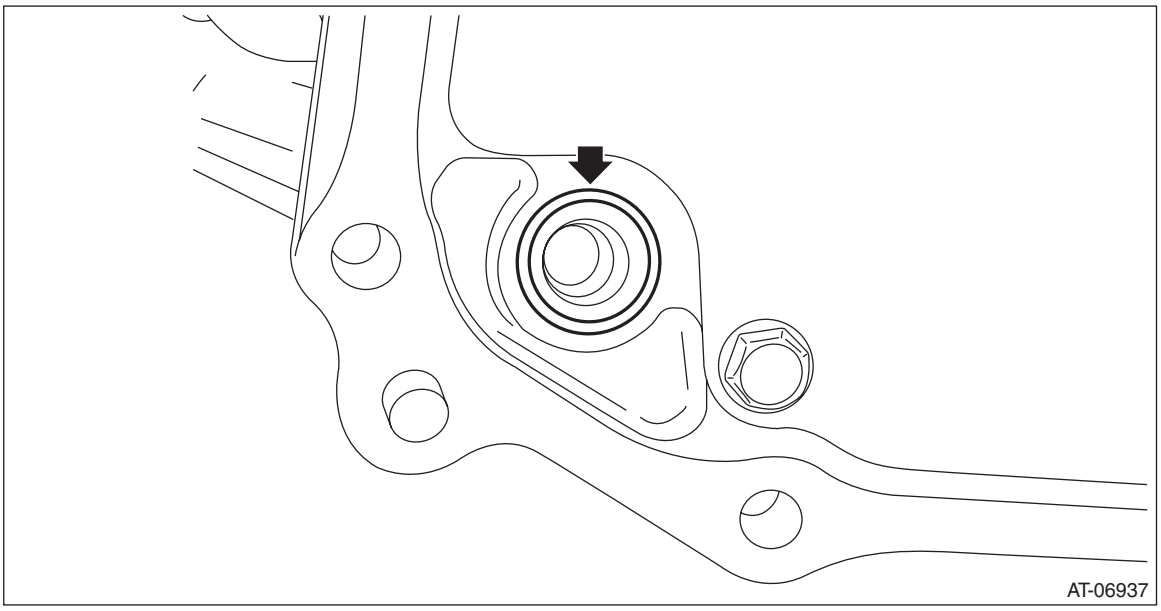
3) Remove the O-ring.



B: INSTALLATION

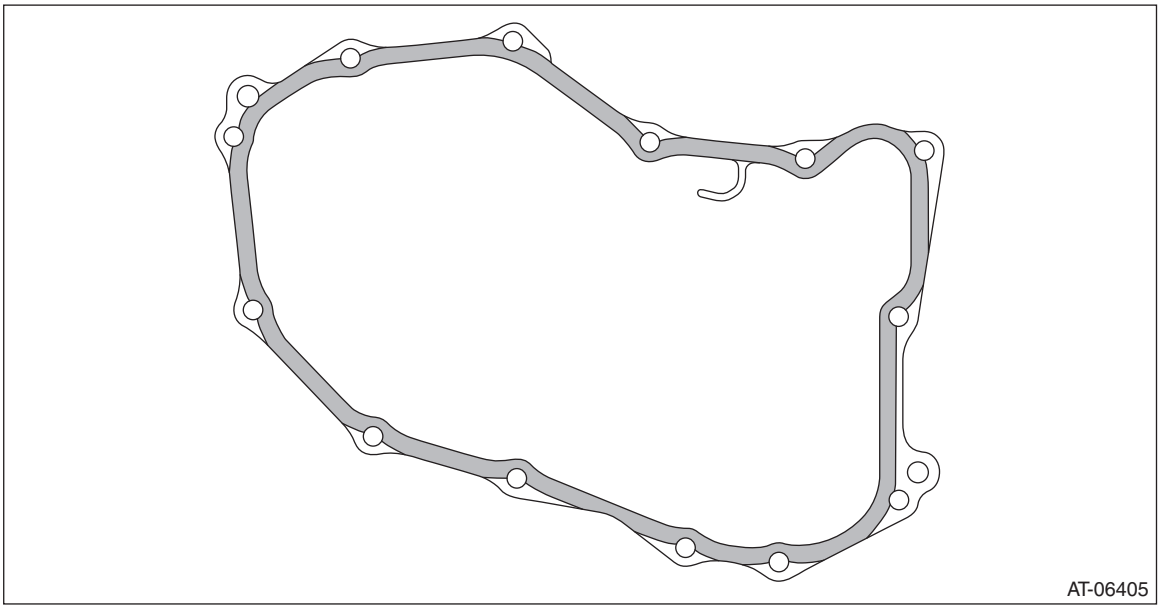
1) Clean the mating surface of extension case and transmission case.
2) Select the transfer drive gear shim. <Ref. to CVT-215, ADJUSTMENT, Reduction Drive Gear.>
3) Select the transfer driven gear shim. <Ref. to CVT-178, ADJUSTMENT, Transfer Clutch.>
4) Attach the selected transfer drive gear shim to extension case with vaseline.
5) Attach the selected transfer driven gear shim to extension case with vaseline.
6) Install the O-ring to the transmission case.

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



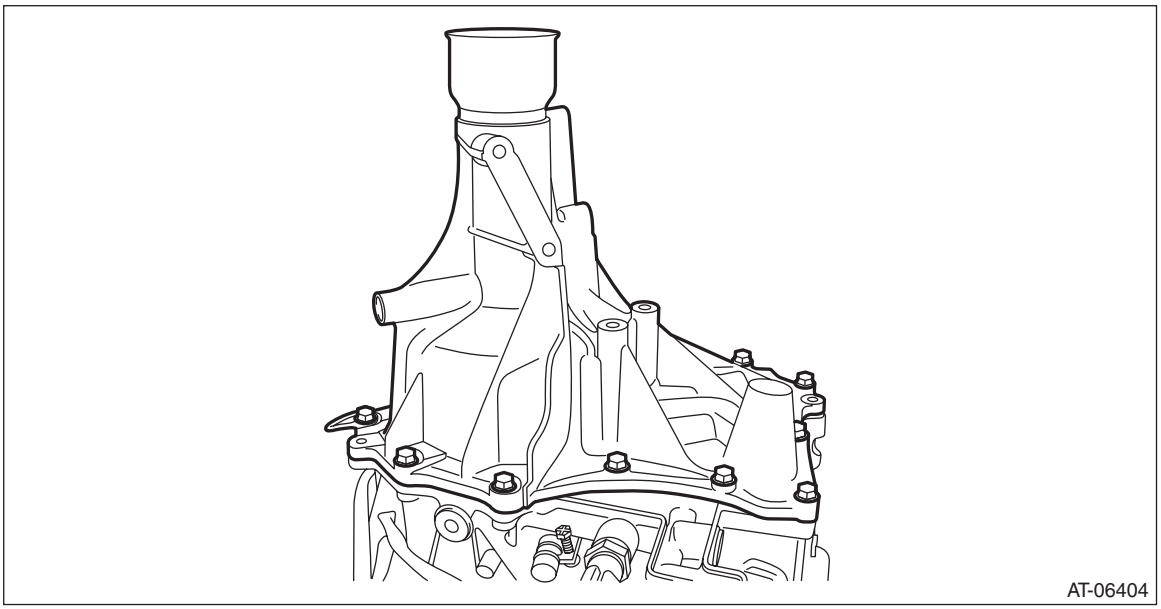
7) Apply liquid gasket to extension case seamlessly.

Liquid gasket:
THREE BOND 1215 (Part No. 004403007) or equivalent



8) Install the extension case to transmission hanger.

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



9) Install the transmission assembly. <Ref. to CVT-72, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

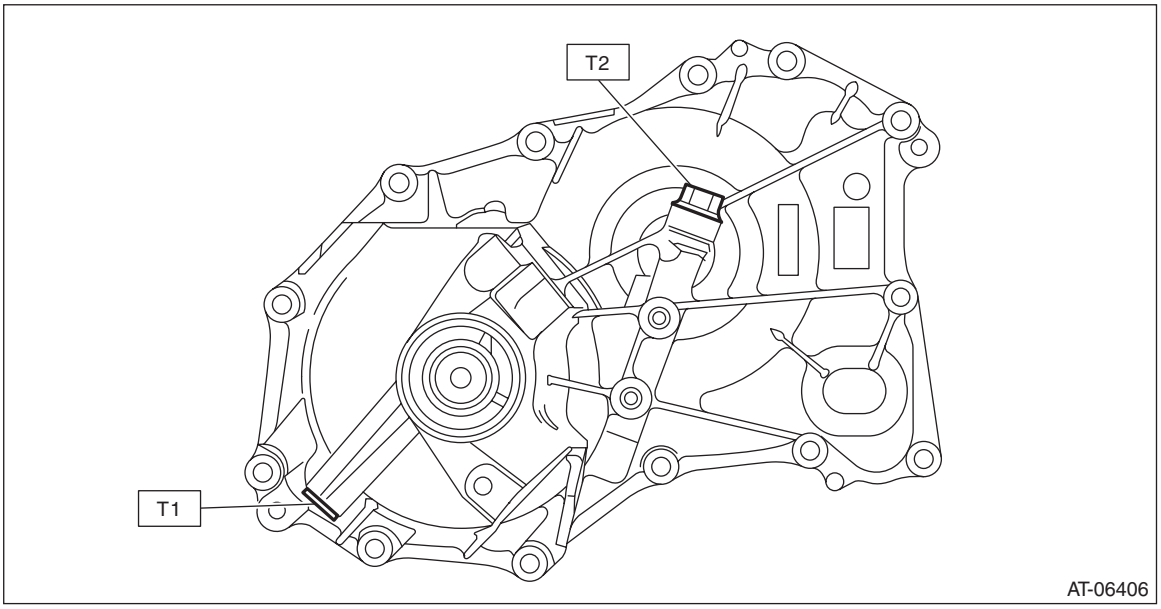
1) Remove the dust cover from extension case.
2) Remove the extension case oil seal from the extension case. <Ref. to CVT-92, REPLACEMENT, Differential Side Retainer Oil Seal.>
3) Remove all plugs.

D: ASSEMBLY

1) Press-fit the dust cover into extension case.
2) Install the extension case oil seal to extension case. <Ref. to CVT-92, REPLACEMENT, Differential Side Retainer Oil Seal.>
3) Install all plugs.

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

Tightening torque:
T1: 25 N·m (2.5 kgf-m, 18.4 ft-lb)
T2: 35 N·m (3.6 kgf-m, 25.8 ft-lb)



E: INSPECTION

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

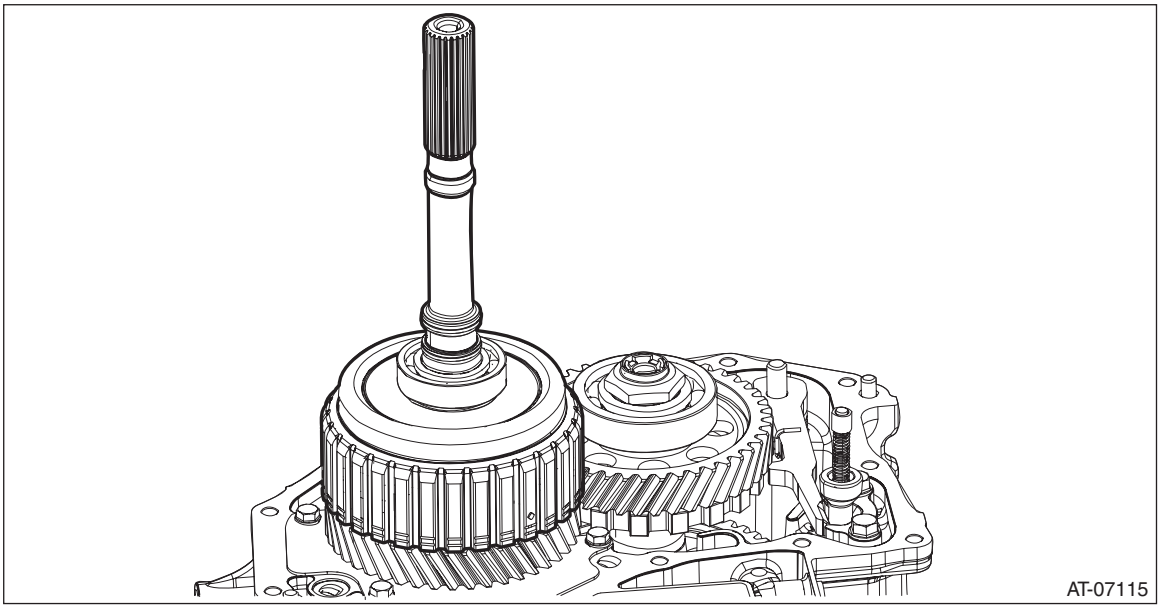
F: ADJUSTMENT

NOTE:
When replacing the extension case, select the transfer drive gear shim and transfer driven gear shim. <Ref. to CVT-215, ADJUSTMENT, Reduction Drive Gear.> <Ref. to CVT-178, ADJUSTMENT, Transfer Clutch.>

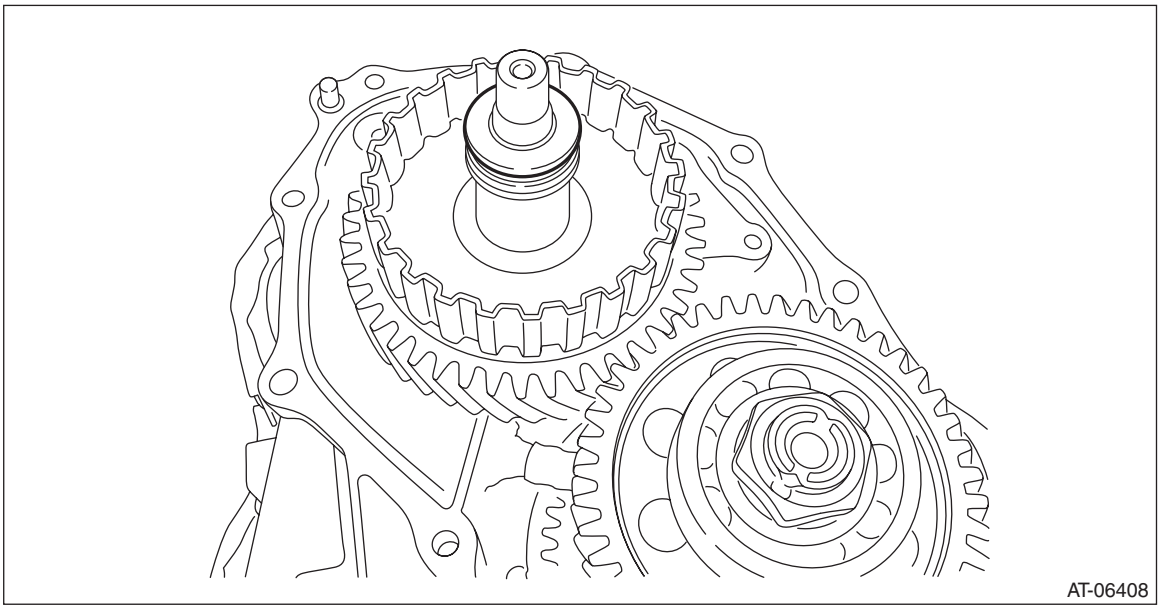
29.Transfer Clutch

A: REMOVAL

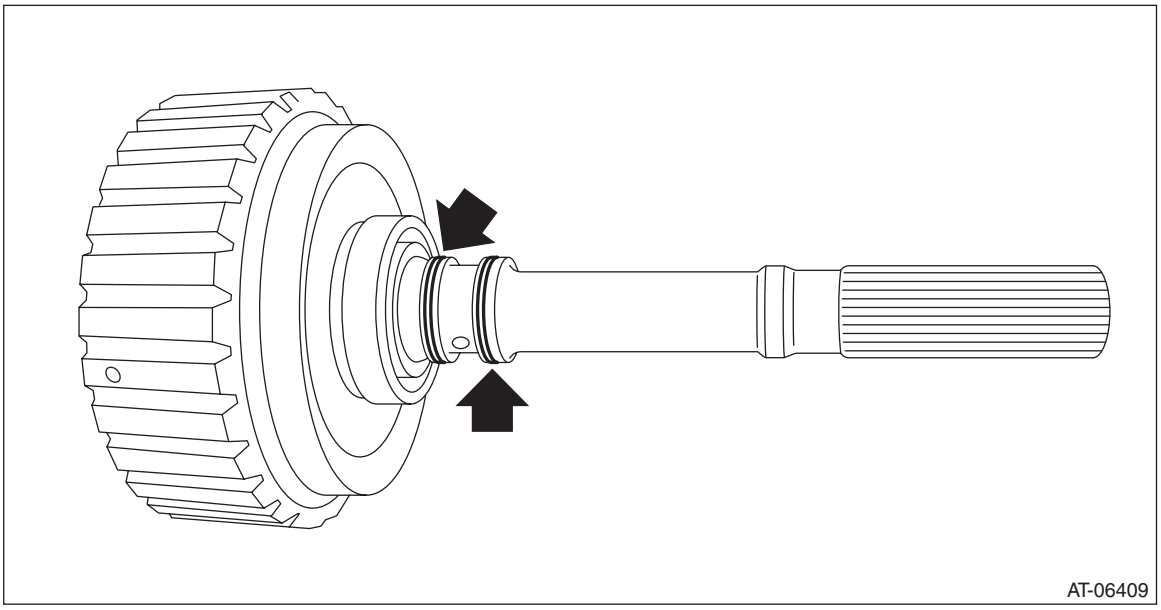
1) Remove the transmission assembly from the vehicle. <Ref. to CVT-57, REMOVAL, Automatic Transmission Assembly.>
2) Remove the extension case. <Ref. to CVT-163, REMOVAL, Extension Case.>
3) Remove the transfer clutch assembly.



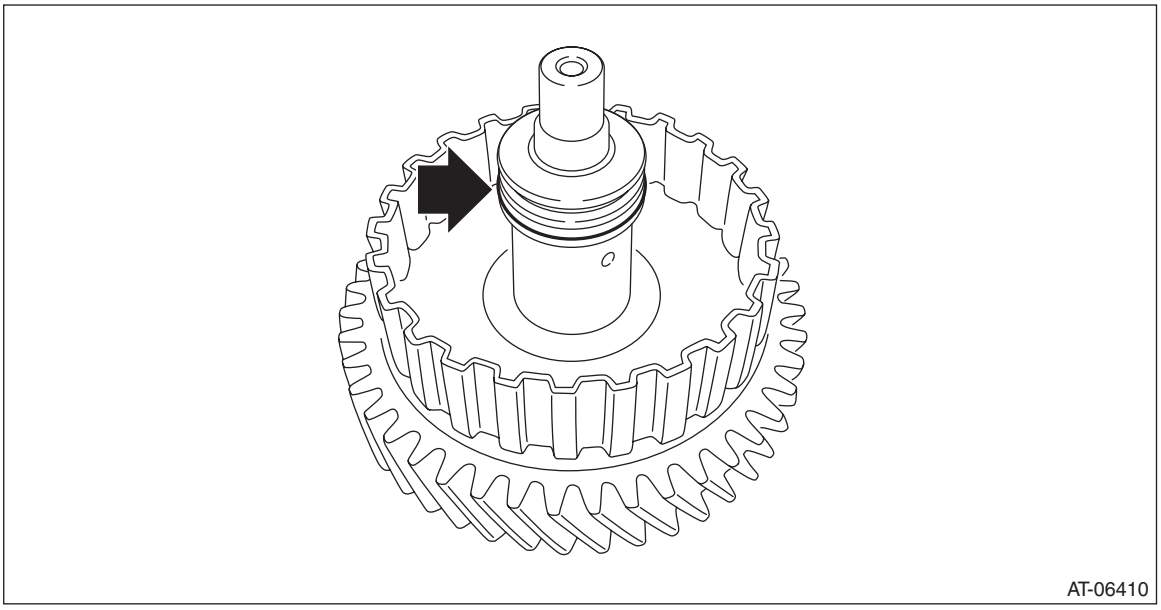
4) Remove the thrust bearing.



5) Remove the seal ring from transfer clutch assembly.



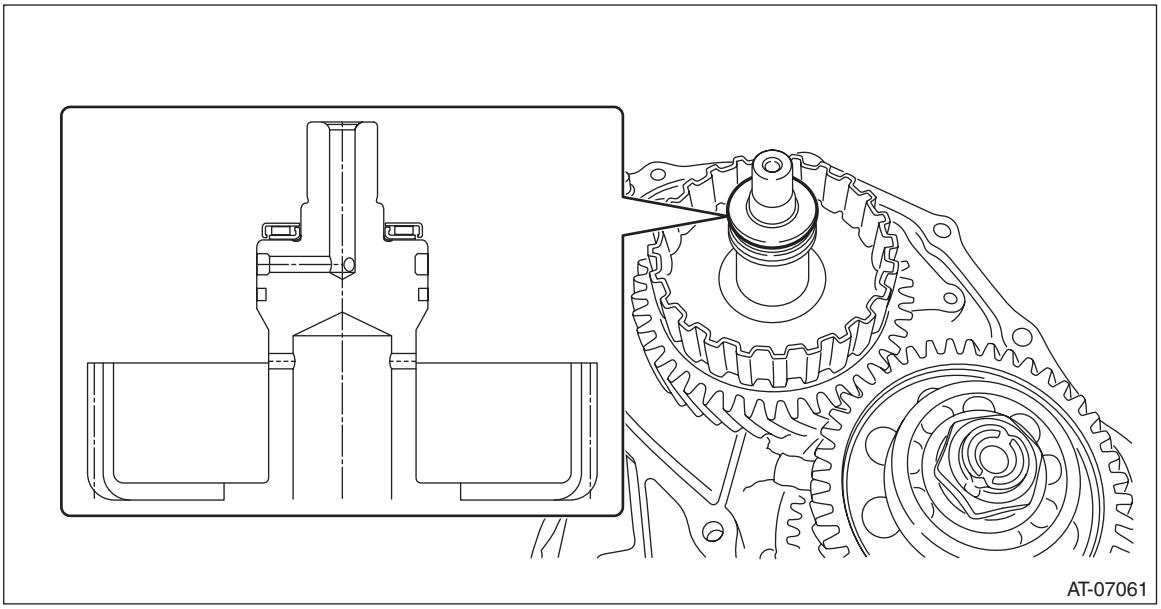
6) Remove the seal ring from the transfer driven gear assembly.



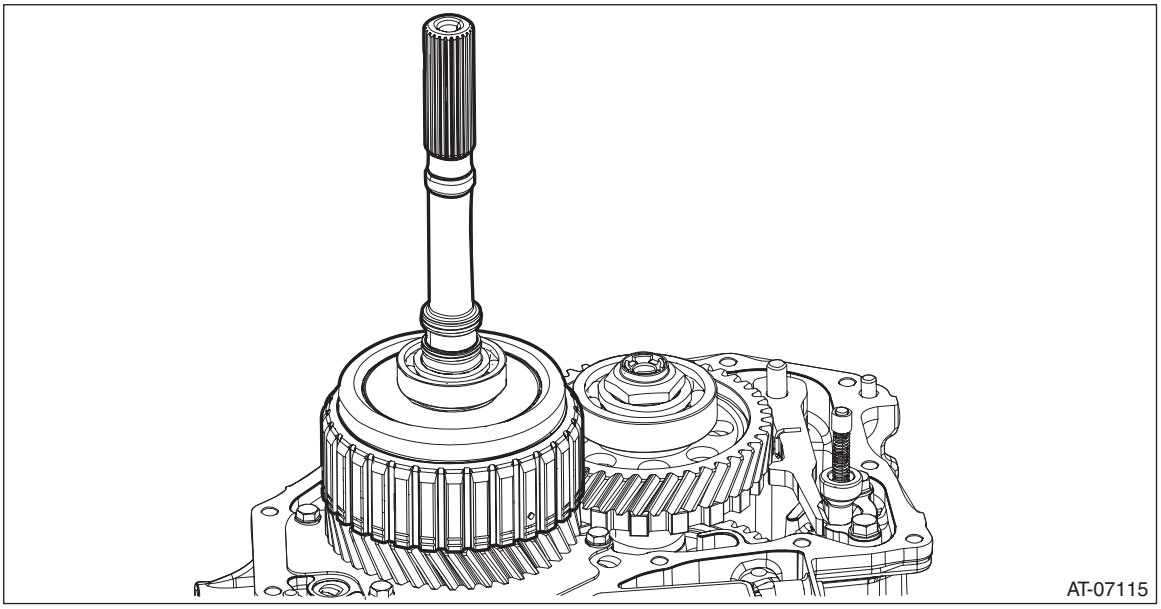
B: INSTALLATION

1) Install the thrust bearing.

NOTE:
Make sure to install in the right direction.



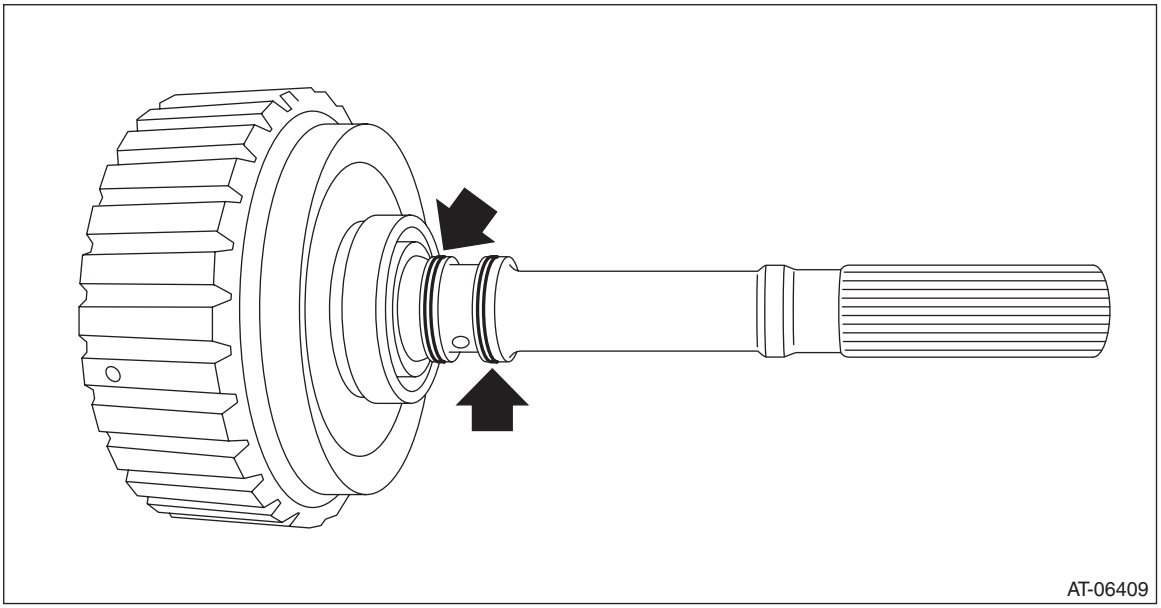
2) Install the transfer clutch assembly.



3) Select the transfer driven gear shim. <Ref. to CVT-178, ADJUSTMENT, Transfer Clutch.>
4) Attach the selected transfer driven gear shim to extension case with vaseline.
5) Remove the transfer clutch assembly.

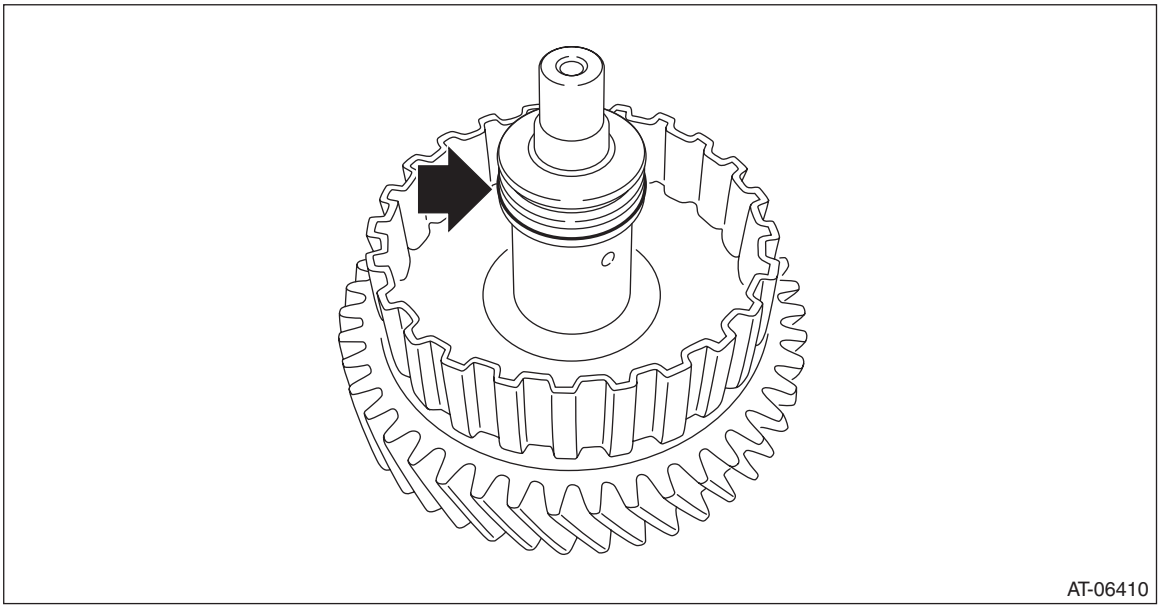
6) Install the seal ring to the transfer clutch assembly.

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



7) Install the seal ring to the transfer driven gear assembly.

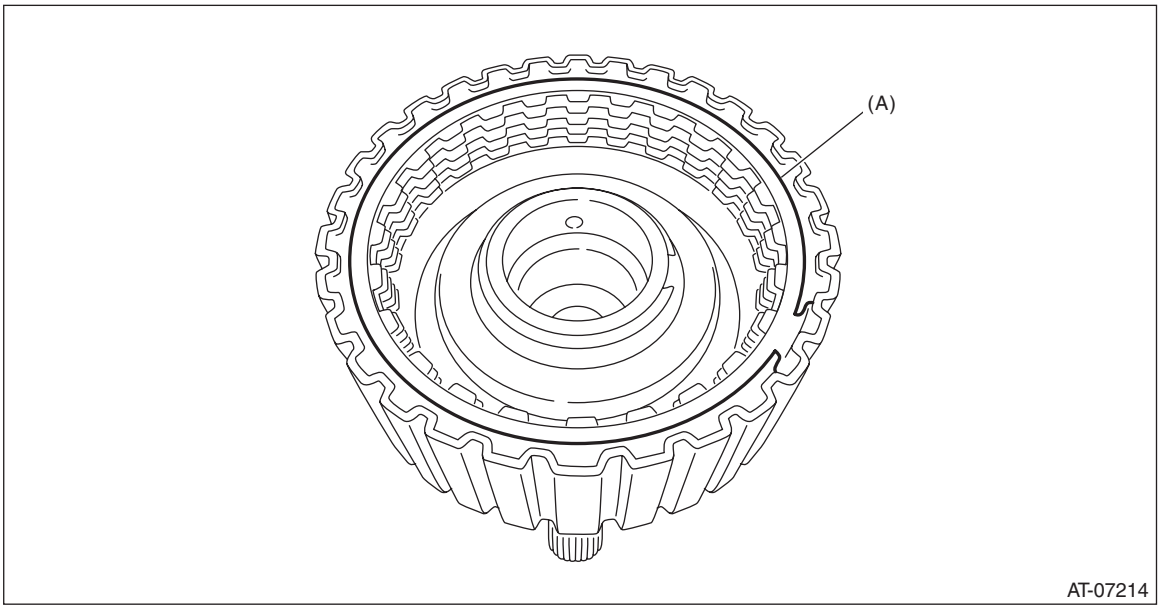
NOTE:
- Use a new seal ring.
- When installing the seal ring, do not expand the seal ring too much.
- Apply CVTF to the seal rings.



8) Install the transfer clutch assembly.
9) Install the extension case. <Ref. to CVT-164, INSTALLATION, Extension Case.>
10) Install the transmission assembly to the vehicle. <Ref. to CVT-72, INSTALLATION, Automatic Transmission Assembly.>

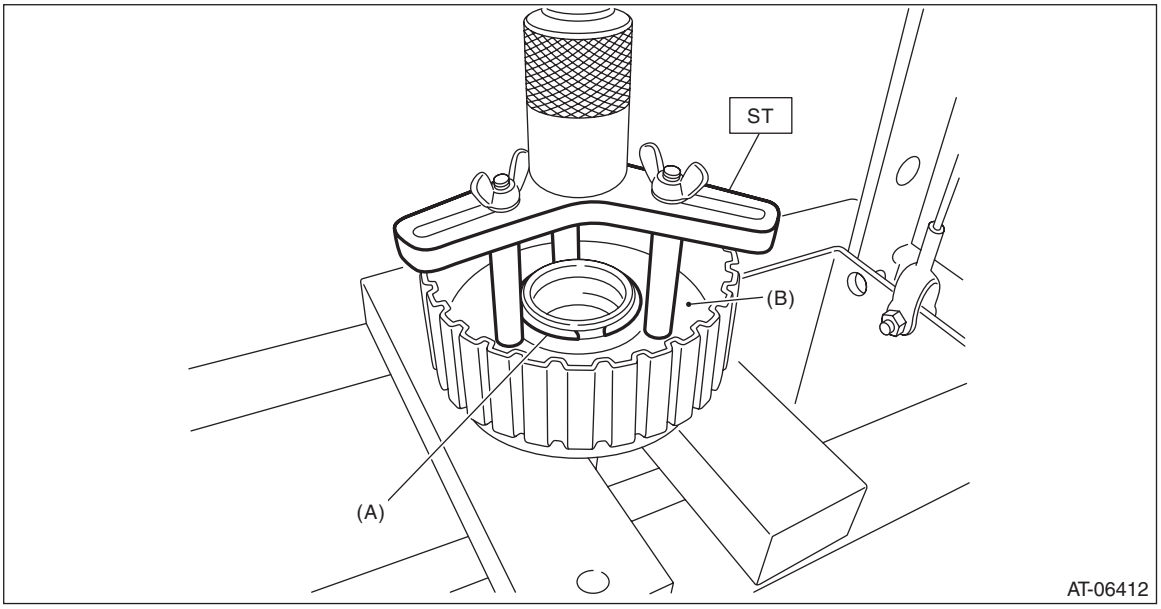
C: DISASSEMBLY

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



(A) Snap ring

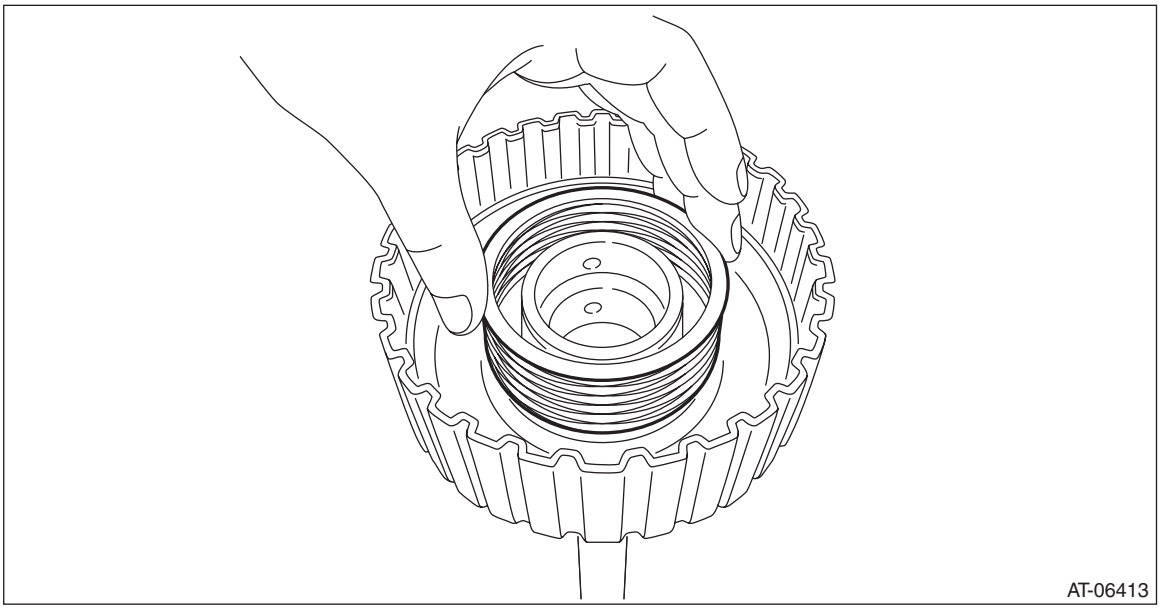
2) Compress the return spring using the ST to remove the snap ring.
ST 18762AA000 COMPRESSOR SPECIAL TOOL



(A) Snap ring
(B) Transfer clutch piston seal

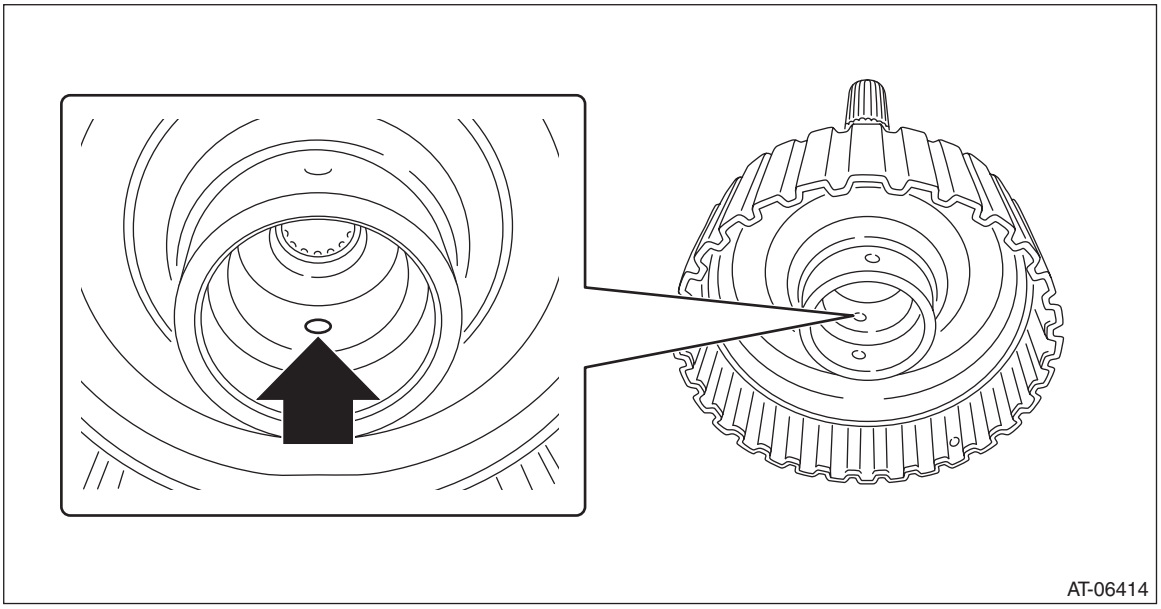
3) Remove the transfer clutch piston seal.

4) Remove the return spring.

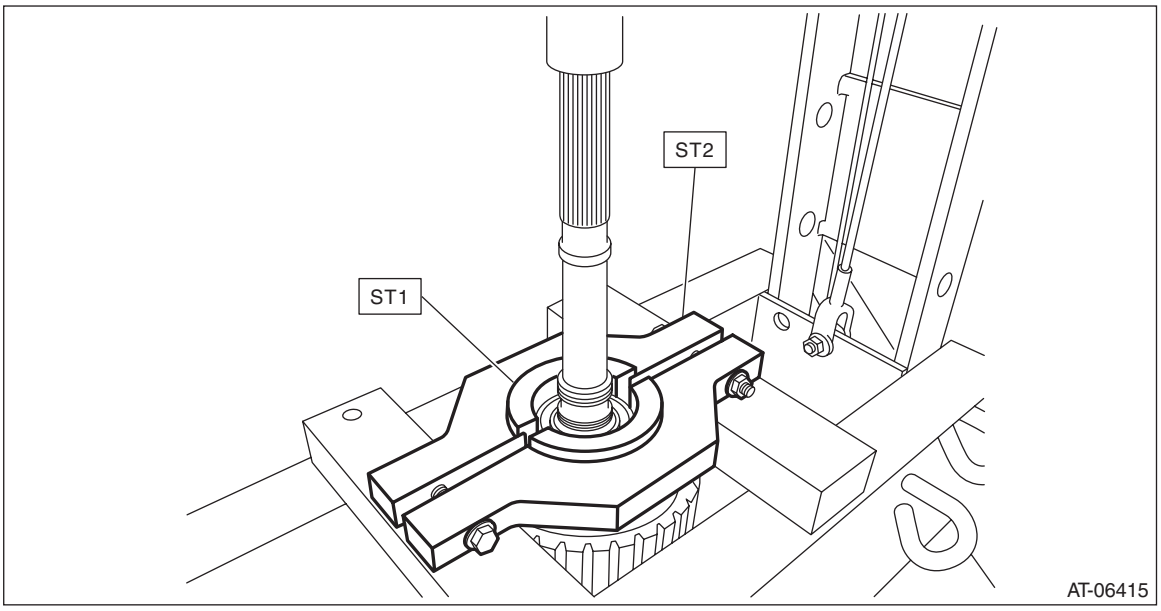


5) Remove the transfer clutch piston by blowing compressed air through transfer clutch assembly hole.

NOTE:
Plug the holes through which the compressed air is not blown.



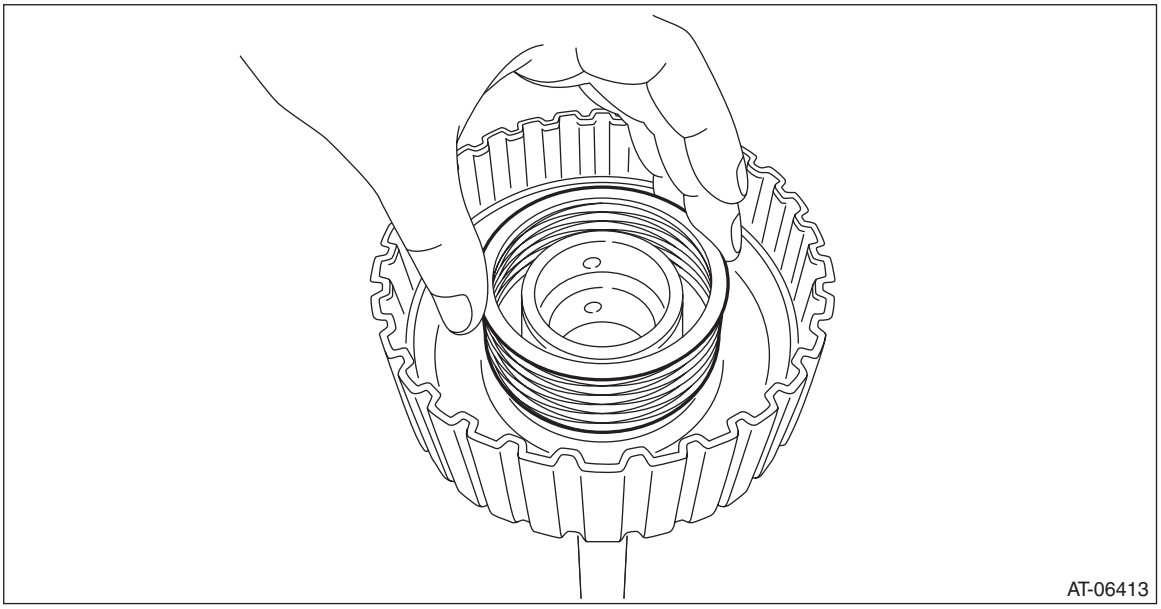
6) Remove the ball bearing using ST.
ST1 18767AA010 BEARING REMOVER
ST2 18723AA000 REMOVER



D: ASSEMBLY

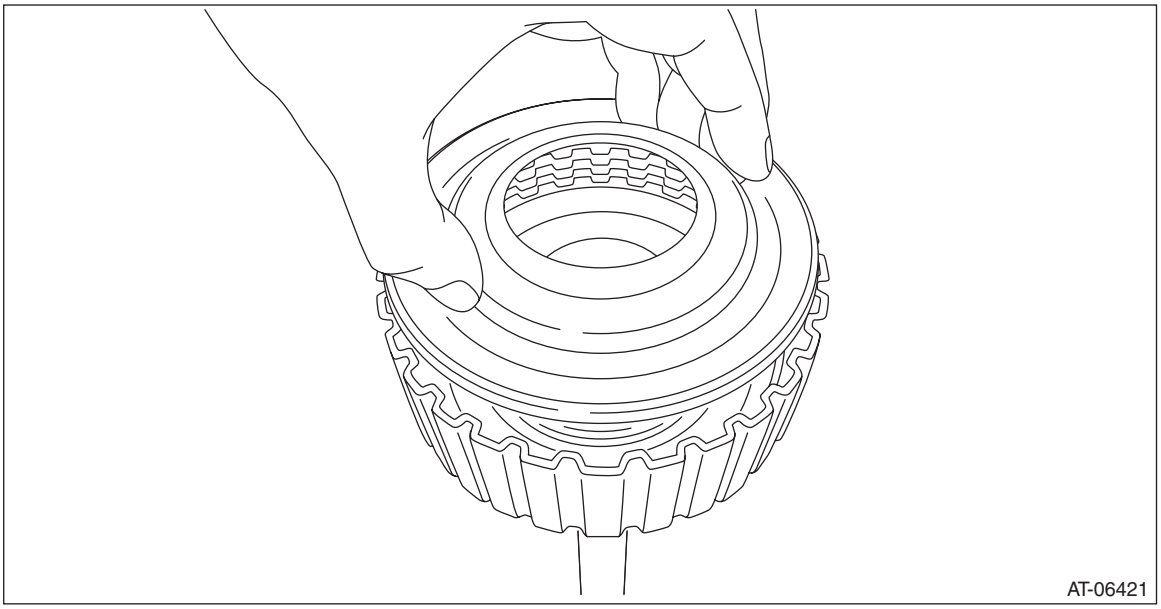
1) Install the transfer clutch piston.

NOTE:
Apply CVTF to the transfer clutch piston lip.
2) Install the return spring.

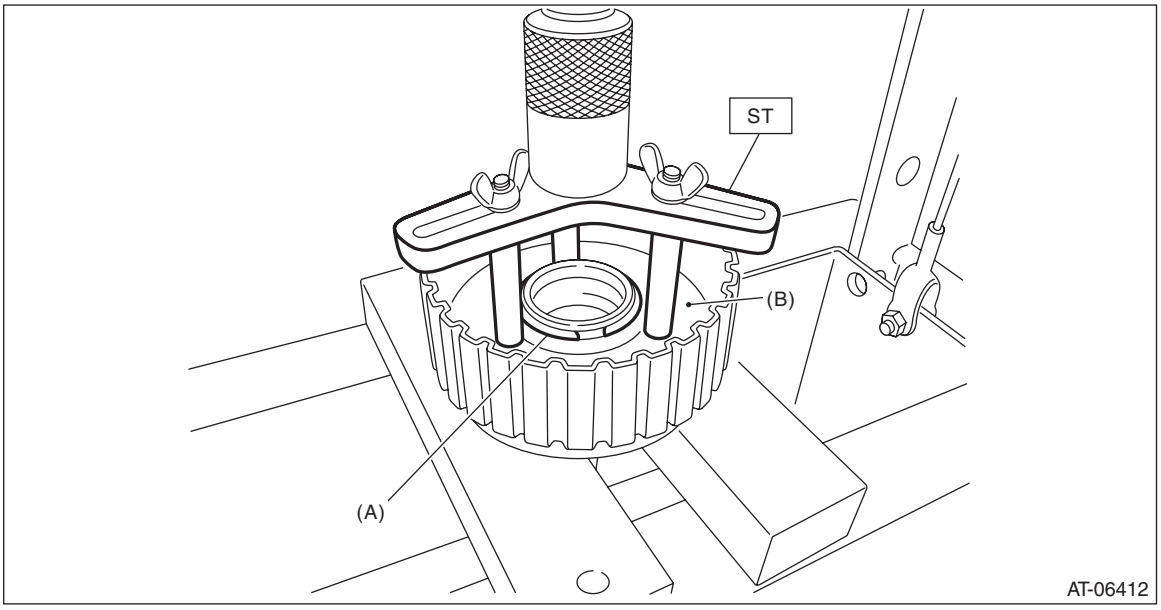


3) Install the transfer clutch piston seal.

NOTE:
Apply CVTF to the lip section of transfer clutch piston seal.

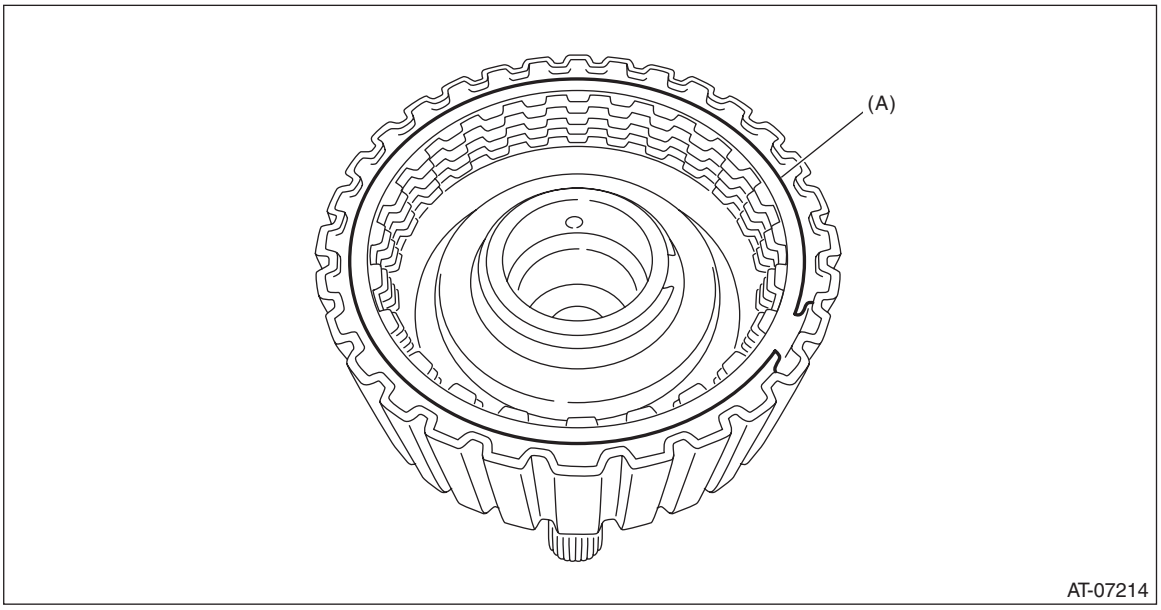


4) Compress the return spring using the ST to install the snap ring.
ST 18762AA000 COMPRESSOR SPECIAL TOOL



(A) Snap ring
(B) Transfer clutch piston seal

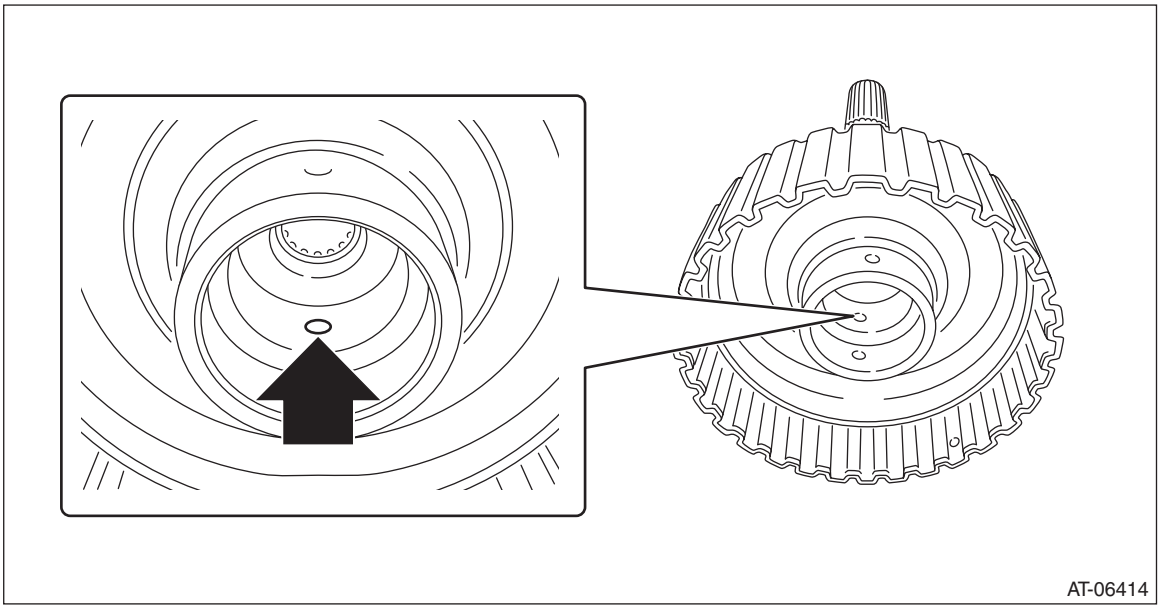
5) Install the pressure plate, driven plate, drive plate and snap ring.



(A) Snap ring

6) Blow compressed air through transfer clutch assembly hole, and check the transfer clutch piston operation.

NOTE:
Plug the holes through which the compressed air is not blown.

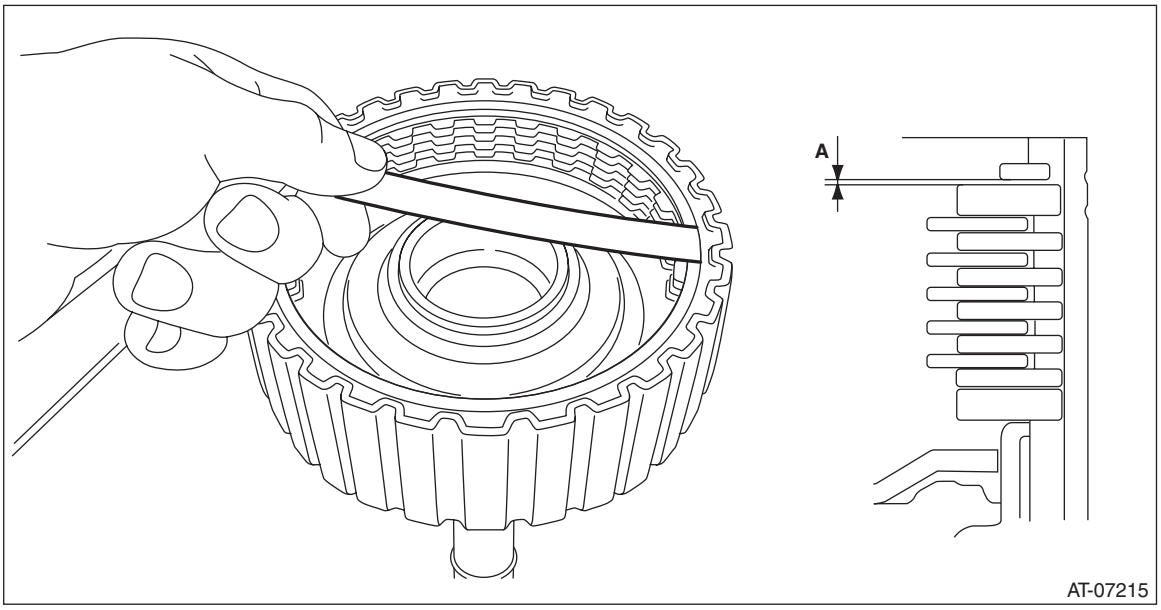


7) Before measuring clearance “A”, place same thickness shims on both sides to prevent the plate from tilting.

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

Initial standard:
0.7 — 1.1 mm (0.028 — 0.043 in)

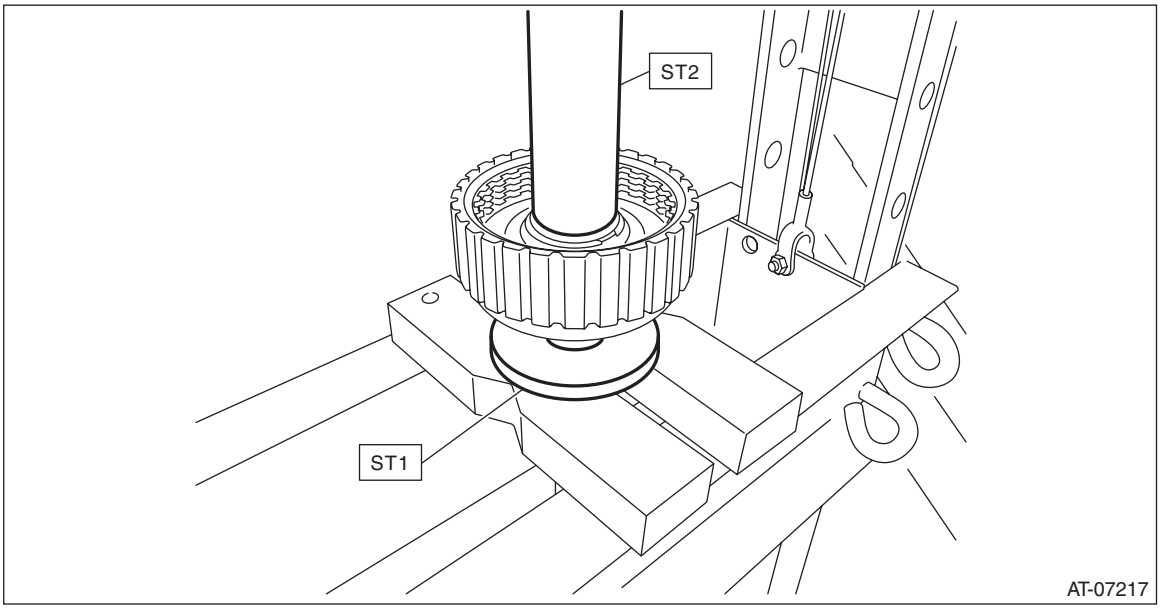
Limit thickness:
1.45 mm (0.057 in)



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

9) Recheck the clearance. <Ref. to CVT-177, INSPECTION, Transfer Clutch.>
10) Using the ST, install the ball bearing.

NOTE:
Use a new ball bearing.
ST1 398177700 INSTALLER
ST2 499277000 INSTALLER



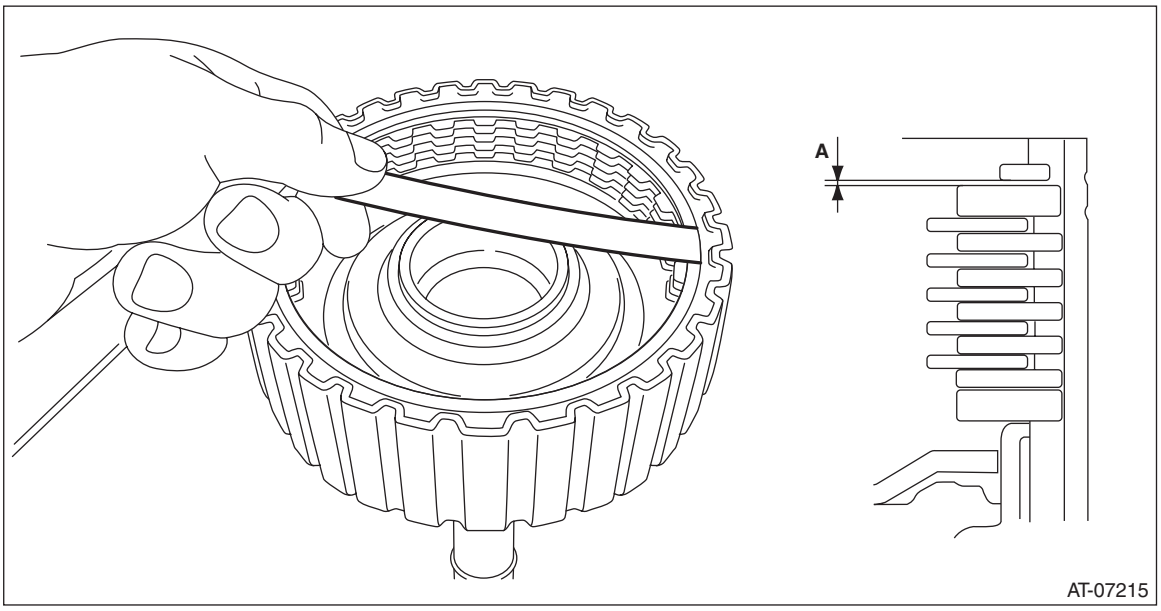
E: INSPECTION

- Inspect the drive plate facing for wear and damage.
- Driven plate for discoloration (burned color)
- Make sure the snap ring is not worn and the return spring has no permanent distortion, damage, or deformation.
- Check the lip seal for damage.
- Inspect the extension end play, and adjust it to within the standard value. <Ref. to CVT-178, ADJUSTMENT, Transfer Clutch.>

1) Before measuring clearance “A” between snap ring and driven plate, place same thickness shims on both sides to prevent the plate from tilting.
2) When clearance “A” exceeds the limit for use, replace the drive plate and driven plate as a set, and select the pressure plate within the initial specified value.

Initial standard:
0.7 — 1.1 mm (0.028 — 0.043 in)

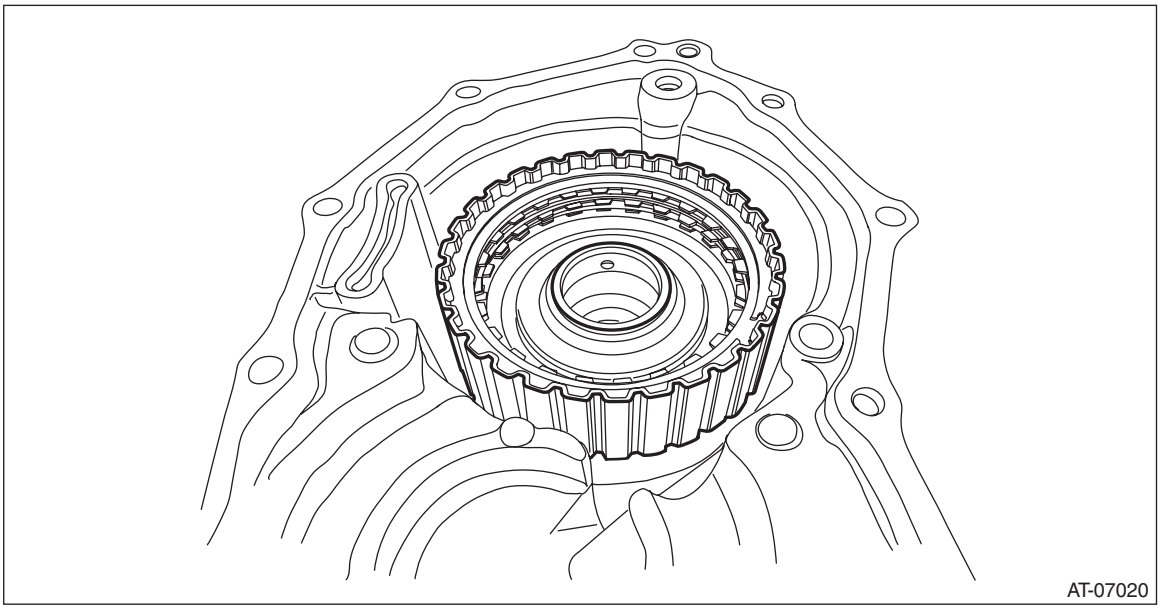
Limit thickness:
1.45 mm (0.057 in)



3) Check for tight corner braking phenomenon when the vehicle is moved forward with the steering fully turned. If tight corner braking occurs, perform the following procedures.
(1) With the steering wheel held at fully turned position, drive the vehicle in “D” range and with vehicle speed at approx. 5 km/h (3 MPH) in both clockwise and counterclockwise directions for approx. ten times each, while repeating acceleration and braking intermittently.
(2) If the tight corner braking phenomenon still persists, drive the vehicle again in a circle for several laps.

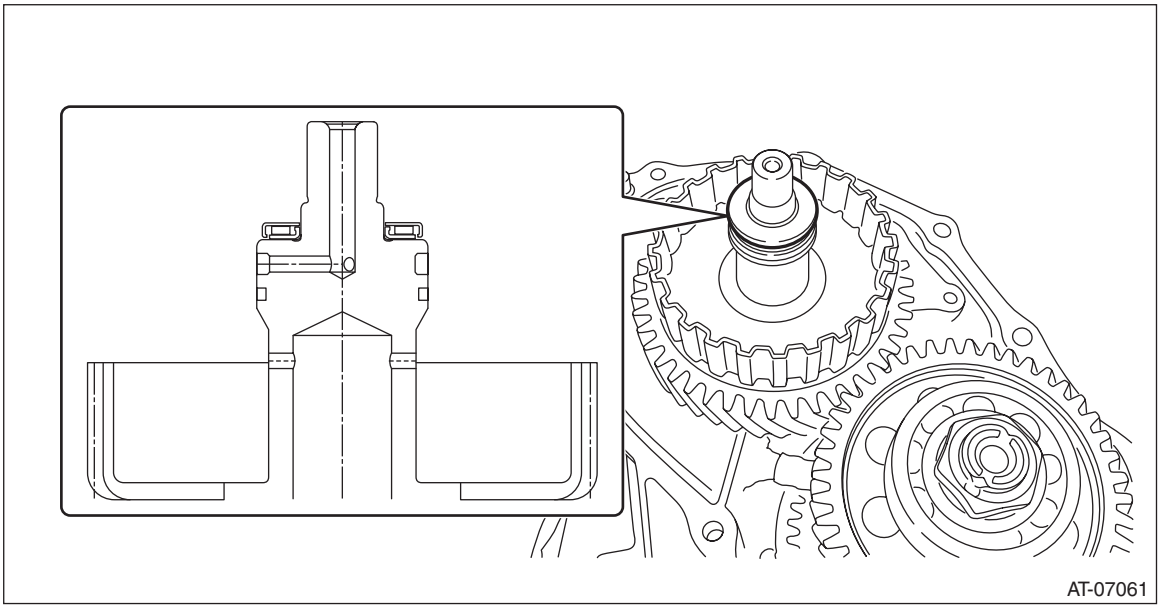
F: ADJUSTMENT

1) Install the transfer clutch assembly to the extension case with the transfer driven gear shims and thrust bearings removed.

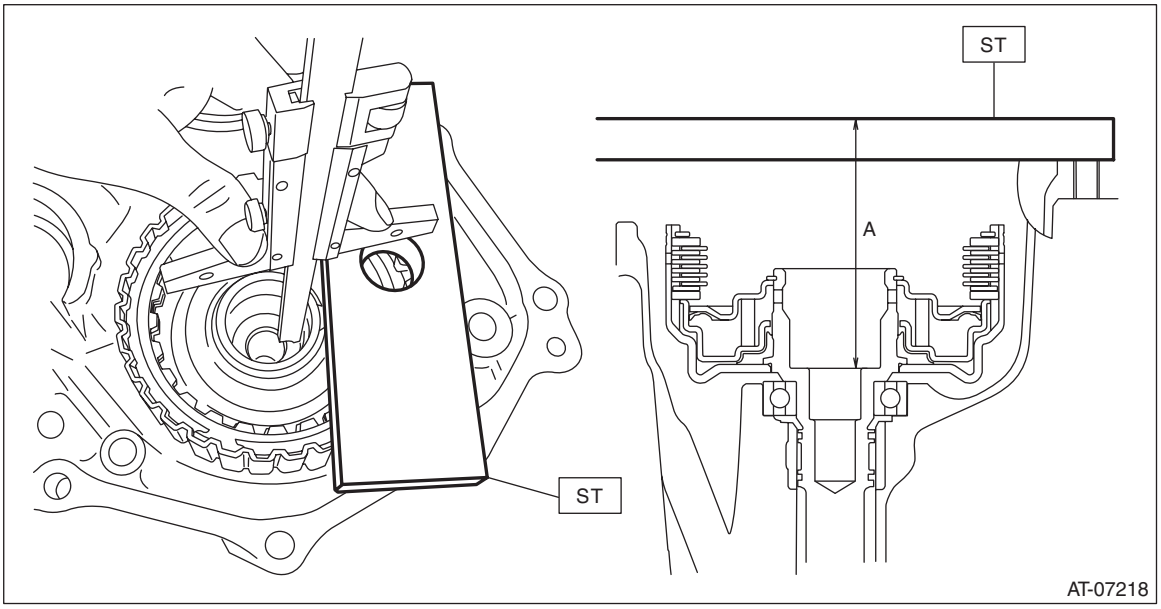


2) Install the thrust bearing to the transfer driven gear.

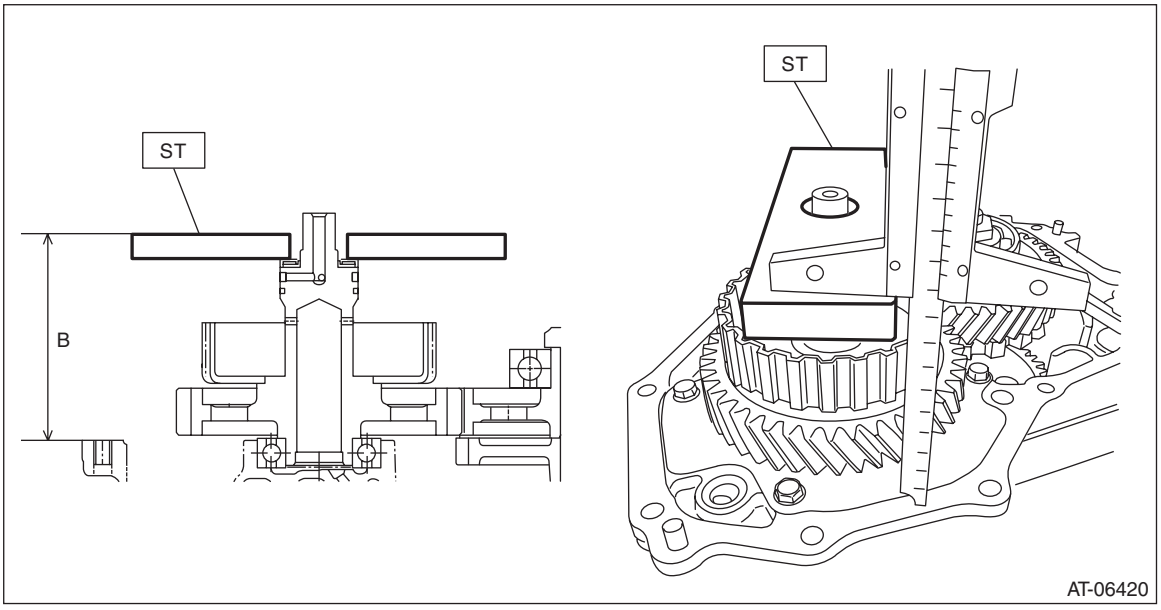
NOTE:
Make sure to install in the right direction.



3) Using the ST, measure the height “A” from the ST end face to the thrust bearing catch surface of the transfer clutch assembly.
ST 499575500 GAUGE



4) Using the ST, measure the height “B” from the transmission case mating surface to the end of ST.
ST 499575500 GAUGE



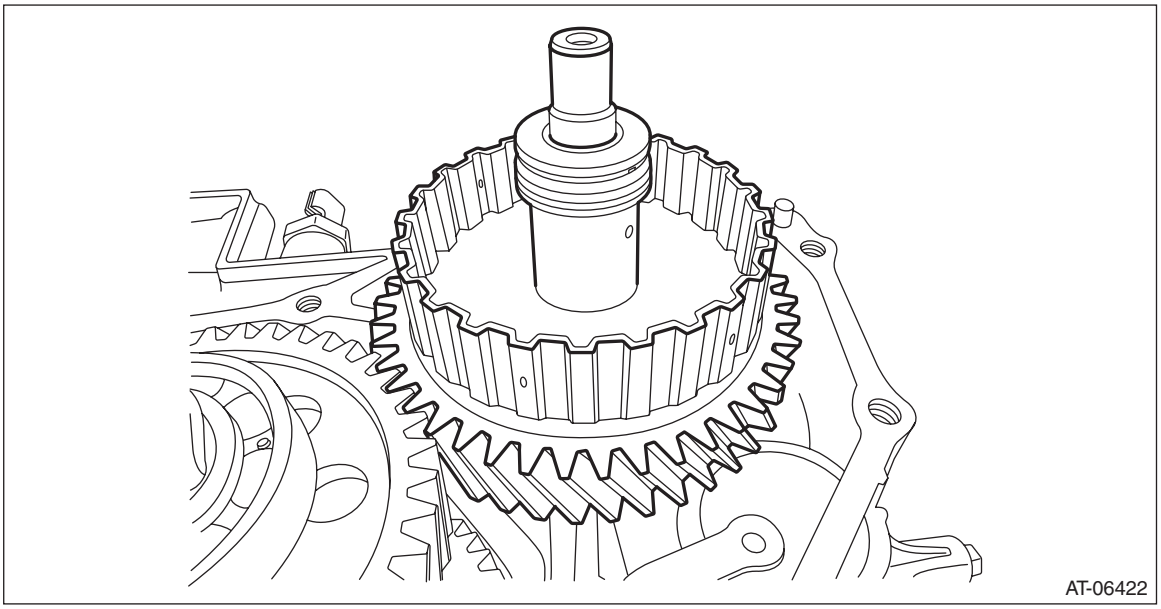
5) Obtain the thickness of transfer driven gear shim using the following formula to select one to three transfer driven gear shims.
T (mm) = A – B – (0.05 — 0.25)
[T (in) = A – B – (0.002 — 0.01)]
T: Transfer driven gear shim thickness
A: Height from the ST end face to the transfer clutch assembly thrust bearing catch surface
B: Height from the mating surface of the transmission case to the end of the ST
0.05 — 0.25 mm (0.002 — 0.01 in): Clearance

Transfer driven gear shim	
Part No.	Thickness mm (in)
33280AA030	0.3 (0.012)
33280AA040	0.4 (0.016)
33280AA050	0.5 (0.020)

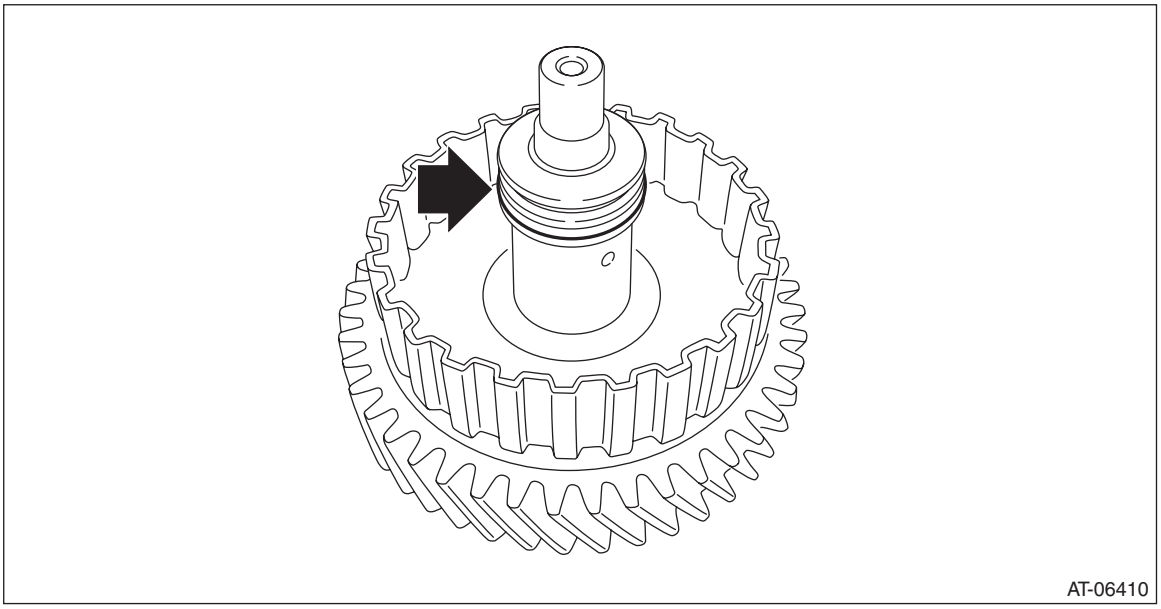
30.Transfer Driven Gear

A: REMOVAL

1) Remove the transmission assembly from the vehicle. <Ref. to CVT-57, REMOVAL, Automatic Transmission Assembly.>
2) Remove the extension case. <Ref. to CVT-163, REMOVAL, Extension Case.>
3) Remove the transfer clutch assembly. <Ref. to CVT-167, REMOVAL, Transfer Clutch.>
4) Remove the transfer driven gear assembly.

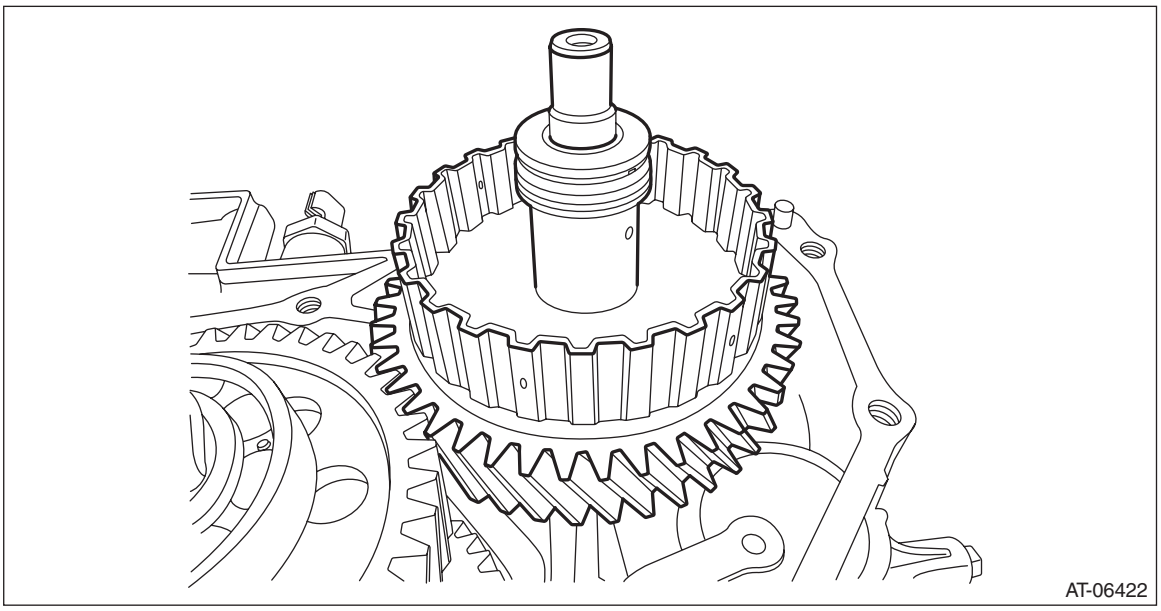

AT-06422

5) Remove the seal ring from the transfer driven gear assembly.


AT-06410

B: INSTALLATION

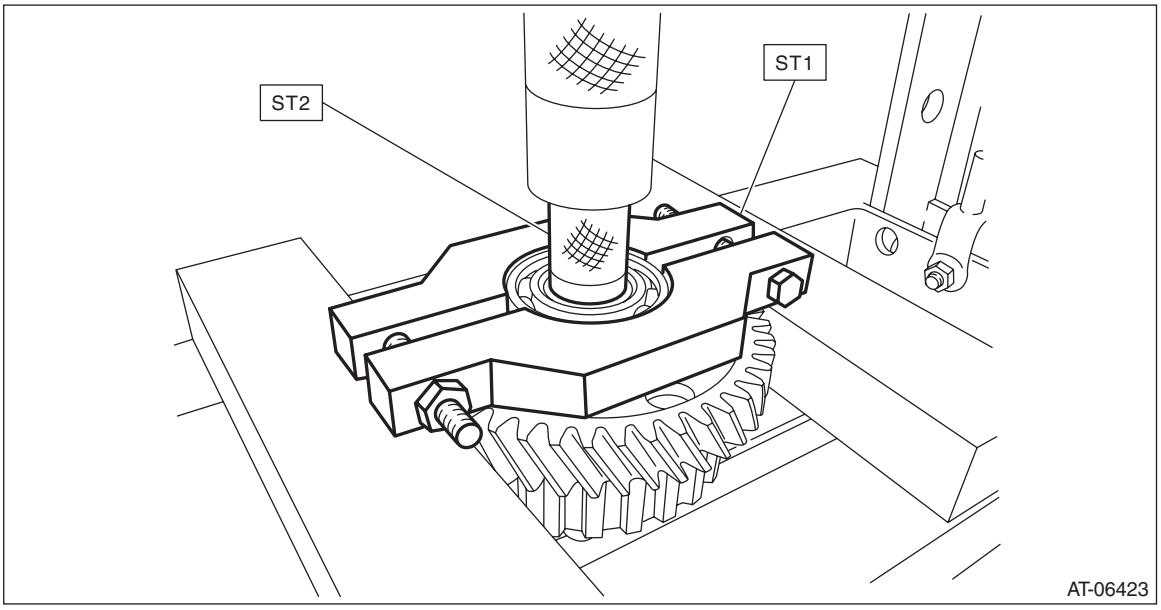
1) Install the transfer driven gear assembly.



2) Install the transfer clutch assembly. <Ref. to CVT-169, INSTALLATION, Transfer Clutch.>
3) Select the transfer driven gear shim. <Ref. to CVT-178, ADJUSTMENT, Transfer Clutch.>
4) Install the extension case. <Ref. to CVT-164, INSTALLATION, Extension Case.>
5) Install the transmission assembly to the vehicle. <Ref. to CVT-72, INSTALLATION, Automatic Transmission Assembly.>

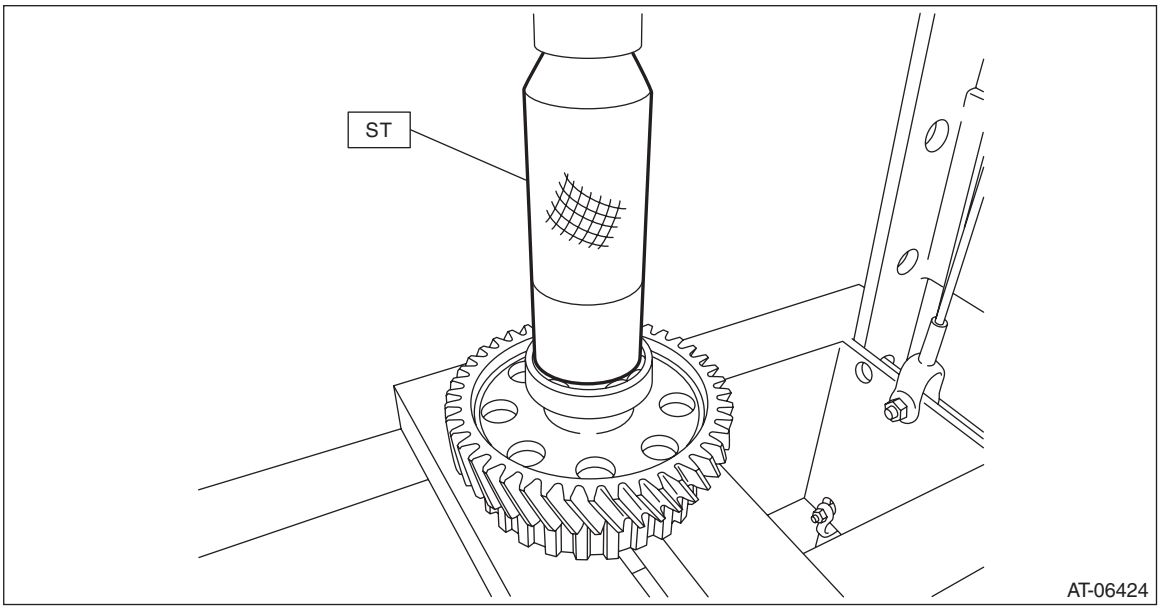
C: DISASSEMBLY

1) Remove the ball bearing using ST.
ST1 498077400 BEARING REMOVER
ST2 899864100 REMOVER



D: ASSEMBLY

1) Using the ST, install the ball bearing.
ST 899580100 INSTALLER



E: INSPECTION

- Check the ball bearing for smooth rotation.
- Check the ball bearing for excessive looseness.
- Check the transfer driven gear for breakage or damage.

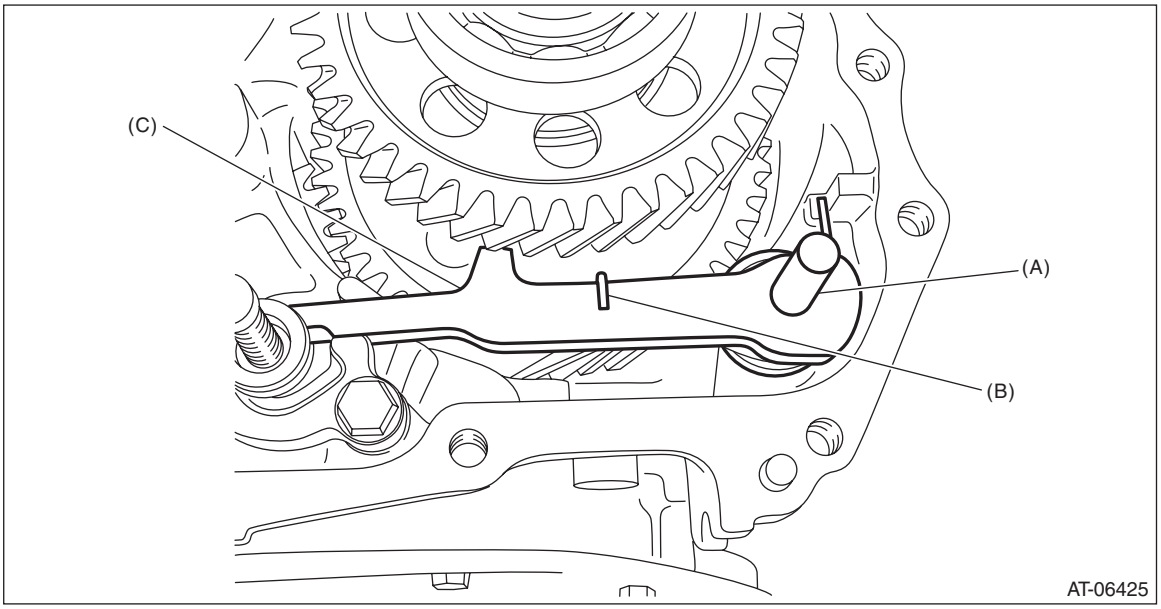
F: ADJUSTMENT

NOTE:
When the transfer driven gear or bearing is replaced, select the transfer driven gear shim. <Ref. to CVT-178, ADJUSTMENT, Transfer Clutch.>

31.Parking Pawl

A: REMOVAL

1) Remove the transmission assembly from the vehicle. <Ref. to CVT-57, REMOVAL, Automatic Transmission Assembly.>
2) Shift the range select lever to “N” range.
3) Remove the extension case. <Ref. to CVT-163, REMOVAL, Extension Case.>
4) Remove the parking pawl shaft, return spring and parking pawl.

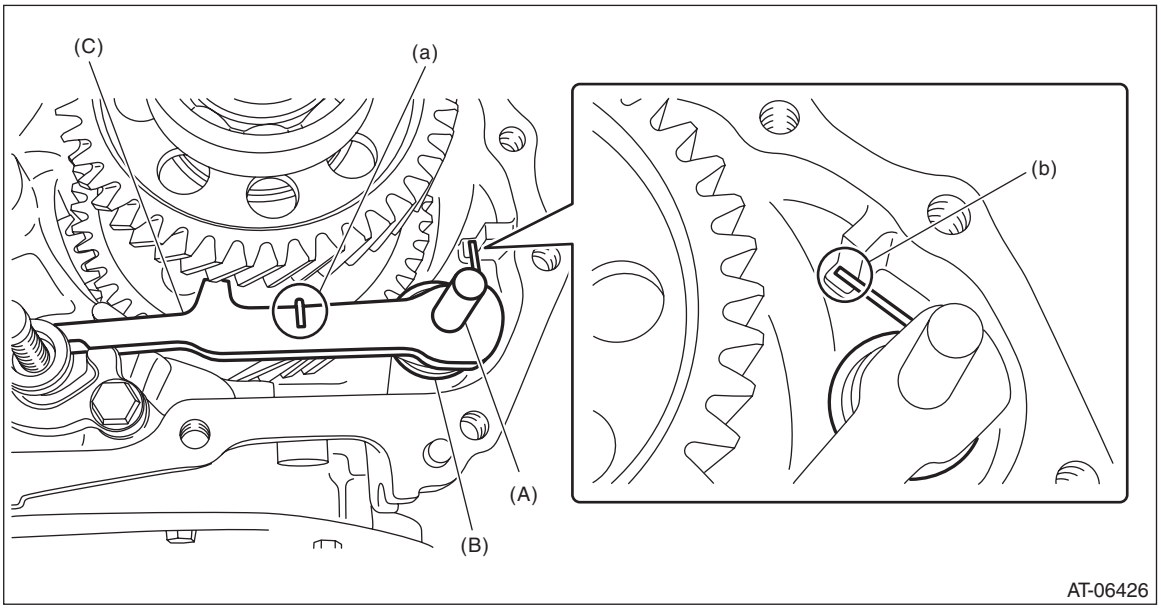


(A) Parking pawl shaft
(B) Return spring
(C) Parking pawl

B: INSTALLATION

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

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



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

3) Install the extension case. <Ref. to CVT-164, INSTALLATION, Extension Case.>
4) Install the transmission assembly to the vehicle. <Ref. to CVT-72, INSTALLATION, Automatic Transmission Assembly.>

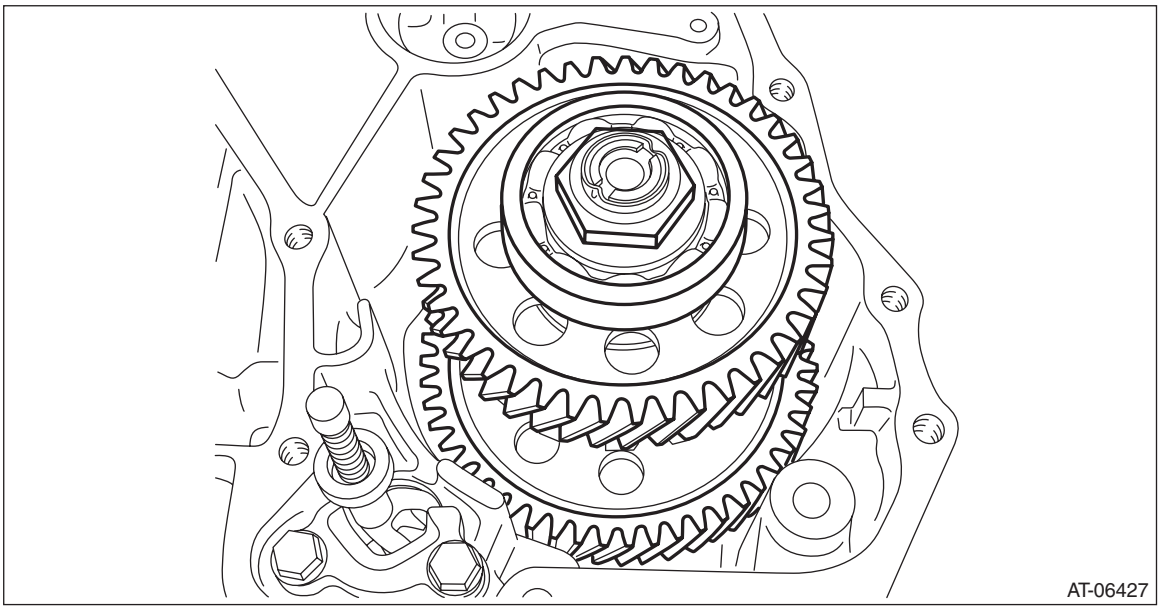
C: INSPECTION

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

32.Reduction Driven Gear

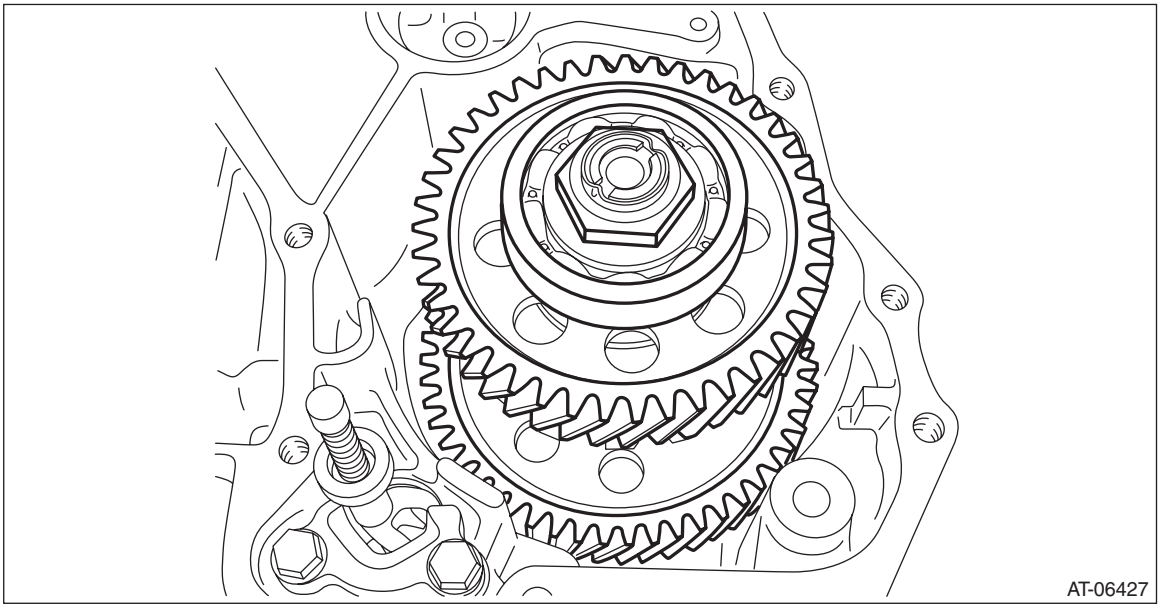
A: REMOVAL

1) Remove the transmission assembly from the vehicle. <Ref. to CVT-57, REMOVAL, Automatic Transmission Assembly.>
2) Remove the extension case. <Ref. to CVT-163, REMOVAL, Extension Case.>
3) Remove the transfer clutch assembly. <Ref. to CVT-167, REMOVAL, Transfer Clutch.>
4) Remove the transfer driven gear assembly. <Ref. to CVT-181, REMOVAL, Transfer Driven Gear.>
5) Remove the parking pawl. <Ref. to CVT-184, REMOVAL, Parking Pawl.>
6) Remove the reduction driven gear assembly.



B: INSTALLATION

1) Install the reduction driven gear assembly.

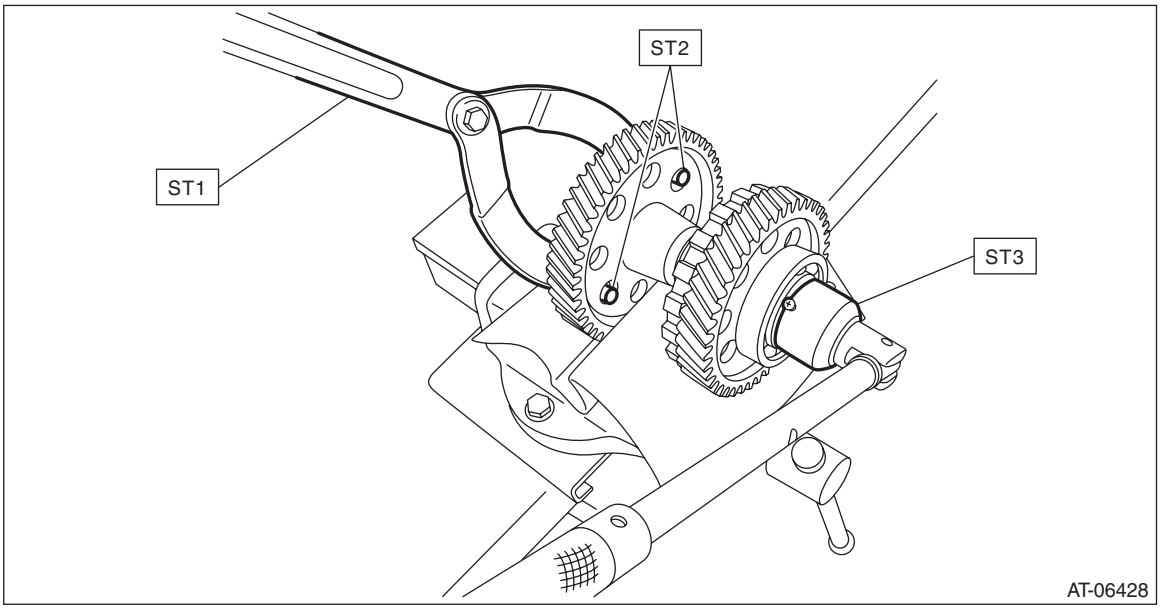


2) Select the transfer drive gear shim. <Ref. to CVT-215, ADJUSTMENT, Reduction Drive Gear.>
3) Install the parking pawl. <Ref. to CVT-185, INSTALLATION, Parking Pawl.>
4) Attach the selected transfer drive gear shim to extension case with vaseline.
5) Install the transfer driven gear assembly. <Ref. to CVT-182, INSTALLATION, Transfer Driven Gear.>
6) Install the transfer clutch assembly. <Ref. to CVT-169, INSTALLATION, Transfer Clutch.>

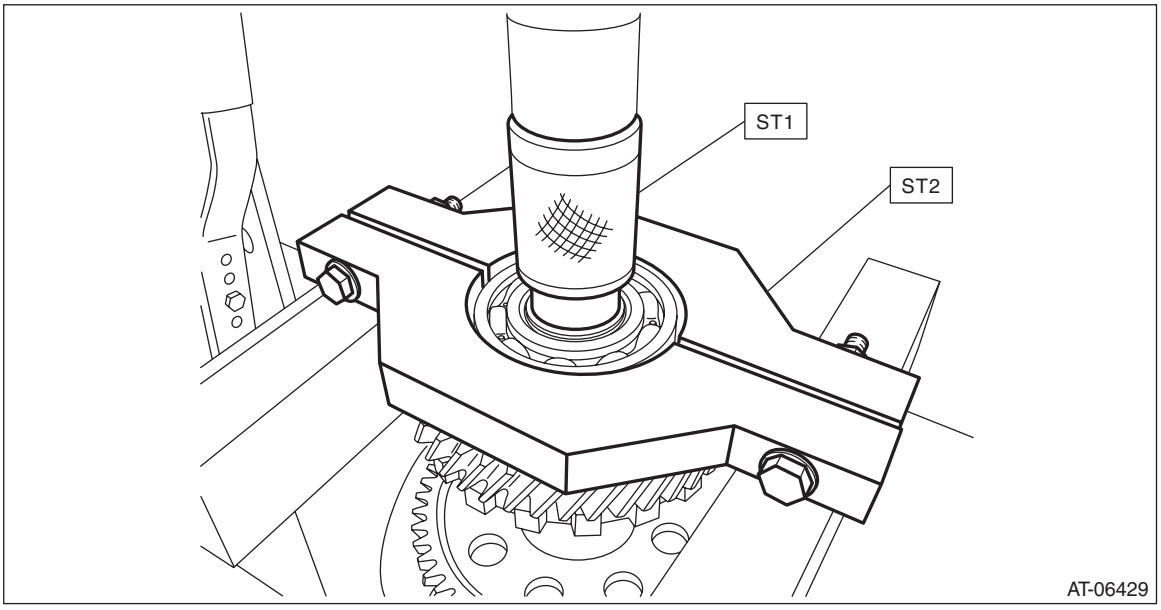
7) Install the extension case. <Ref. to CVT-164, INSTALLATION, Extension Case.>
8) Install the transmission assembly to the vehicle. <Ref. to CVT-72, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

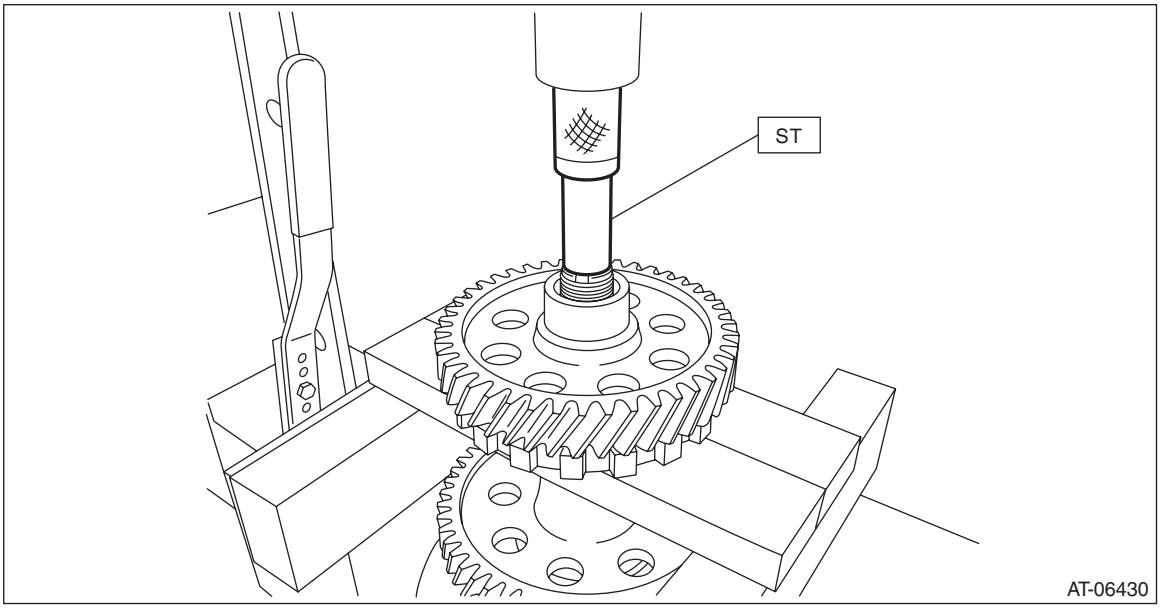
1) Flatten the tab of the lock nut.
2) Using the ST, counter the rotation of the reduction driven gear assembly, and remove the lock nut.
ST1 18355AA000 PULLEY WRENCH
ST2 18334AA000 PIN SET
ST3 499987003 SOCKET WRENCH (35)



3) Remove the ball bearing using ST.
ST1 499757002 INSTALLER
ST2 498077300 REMOVER

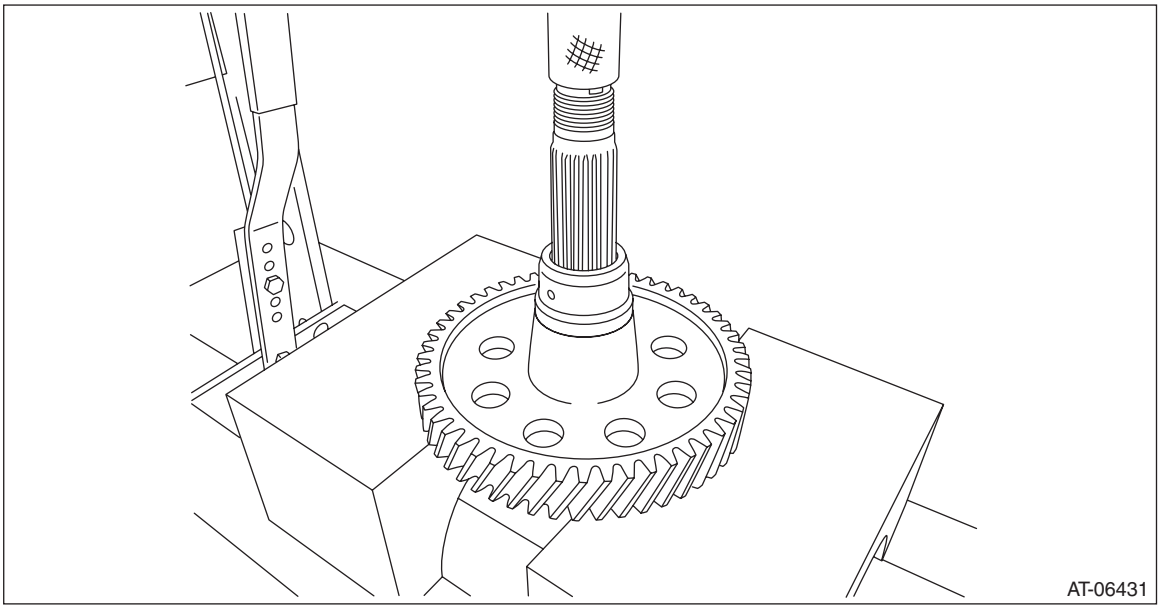


4) Using the ST, remove the parking gear and transfer drive gear.
ST 899864100 REMOVER



5) Remove the collar.

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

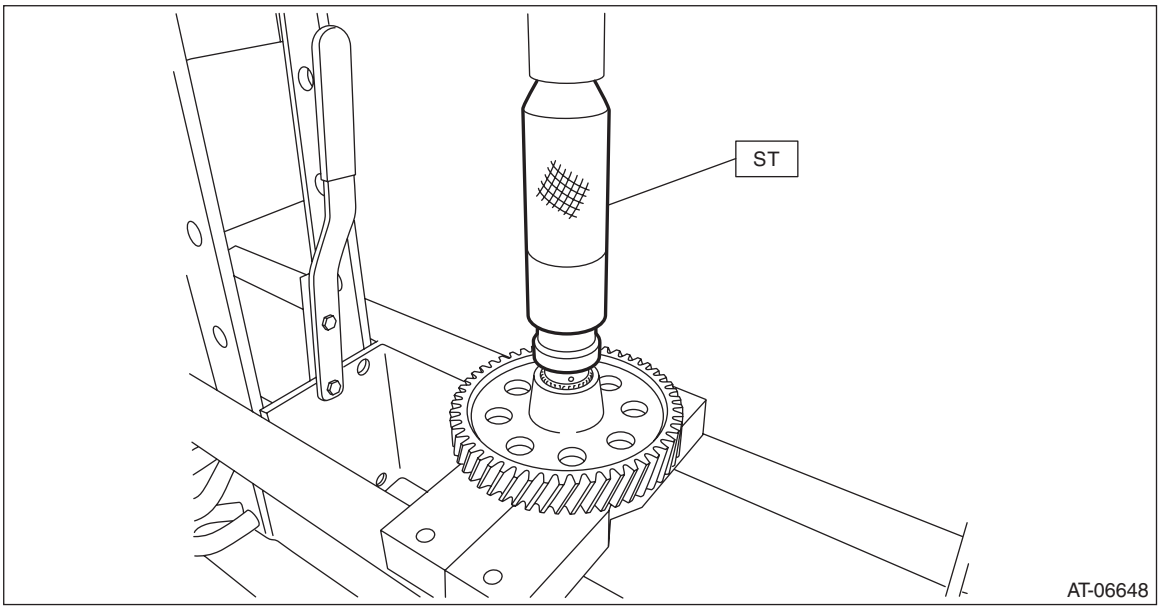


D: ASSEMBLY

1) Using the ST, attach the collar.

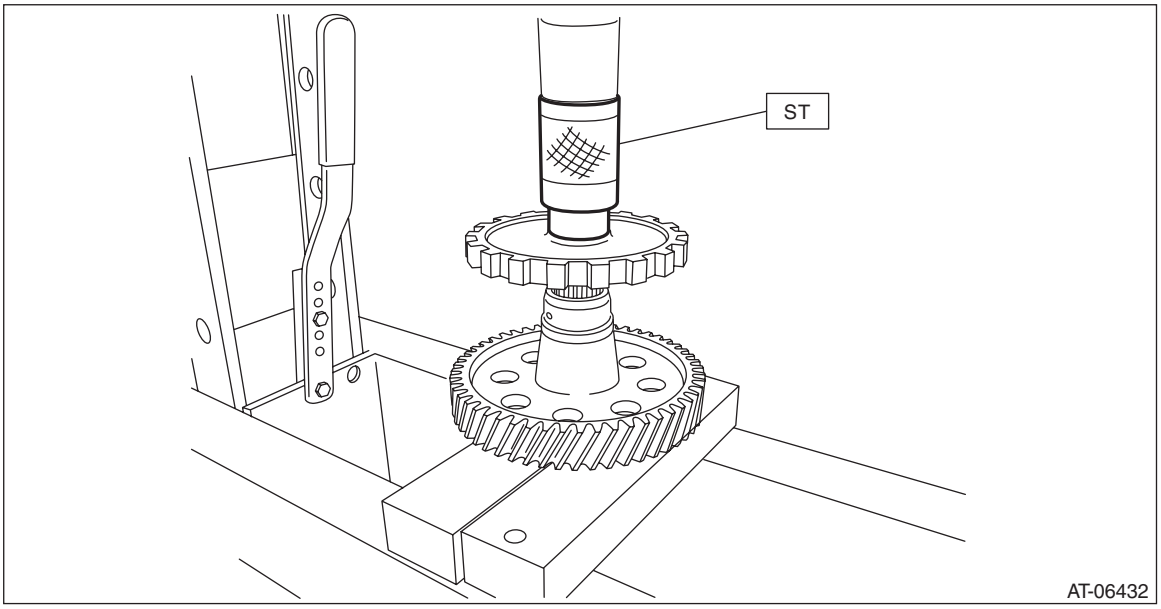
NOTE:
- Attach the collar in the correct direction.
- Use a new reduction driven gear COMPL.

ST 899580100 INSTALLER

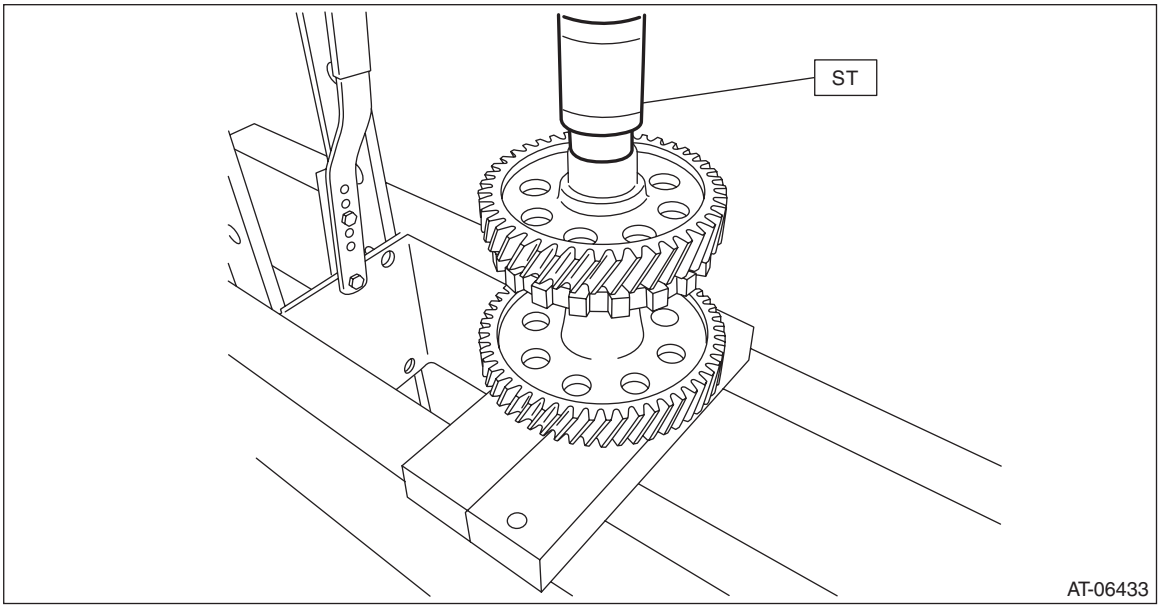


2) Using the ST, install the parking gear.

ST 499757002 INSTALLER

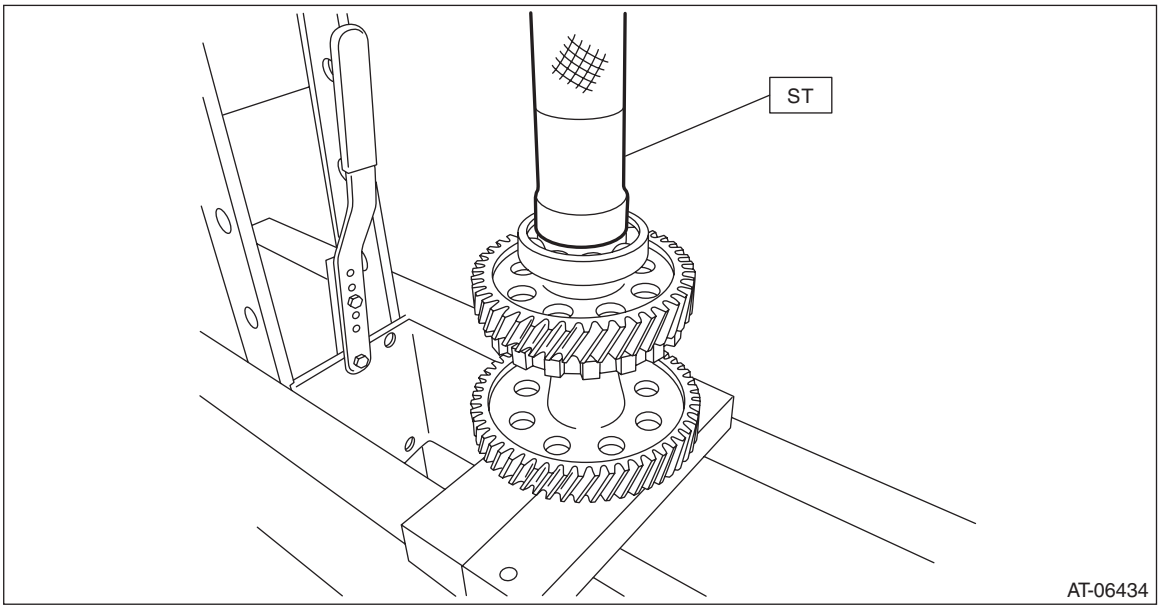


3) Using the ST, install the transfer drive gear.
ST 499757002 INSTALLER



4) Using the ST, install the ball bearing.

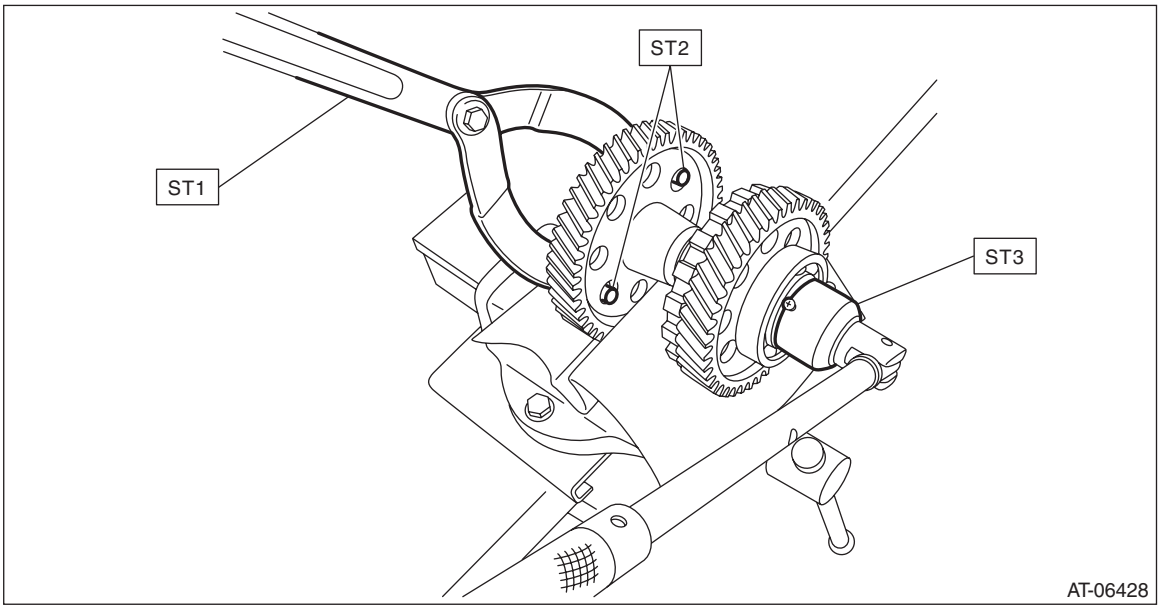
NOTE:
Use a new ball bearing.
ST 499277100 BUSHING 1-2 INSTALLER



5) Using the ST, counter the rotation of the reduction drive gear assembly, and install the lock nut.

NOTE:
Use a new lock nut.
ST1 18355AA000 PULLEY WRENCH
ST2 18334AA000 PIN SET
ST3 499987003 SOCKET WRENCH (35)

Tightening torque:
95 N·m (9.7 kgf-m, 70.1 ft-lb)



6) Crimp the lock nut in 4 locations.

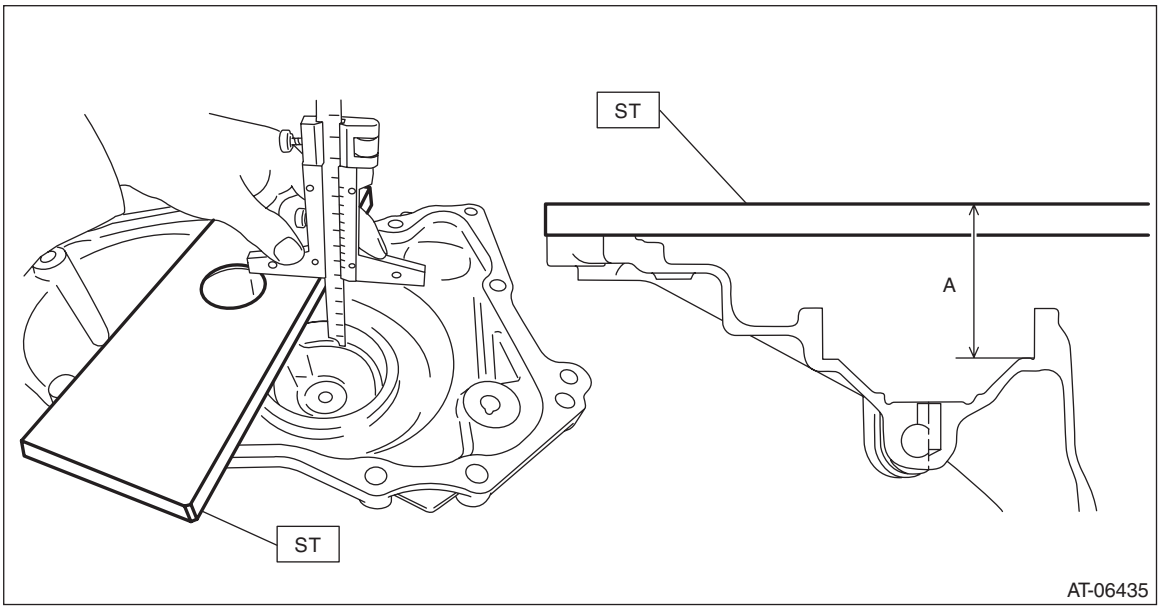
CAUTION:
Do not allow the lock nut to be cracked during crimping operation.

E: INSPECTION

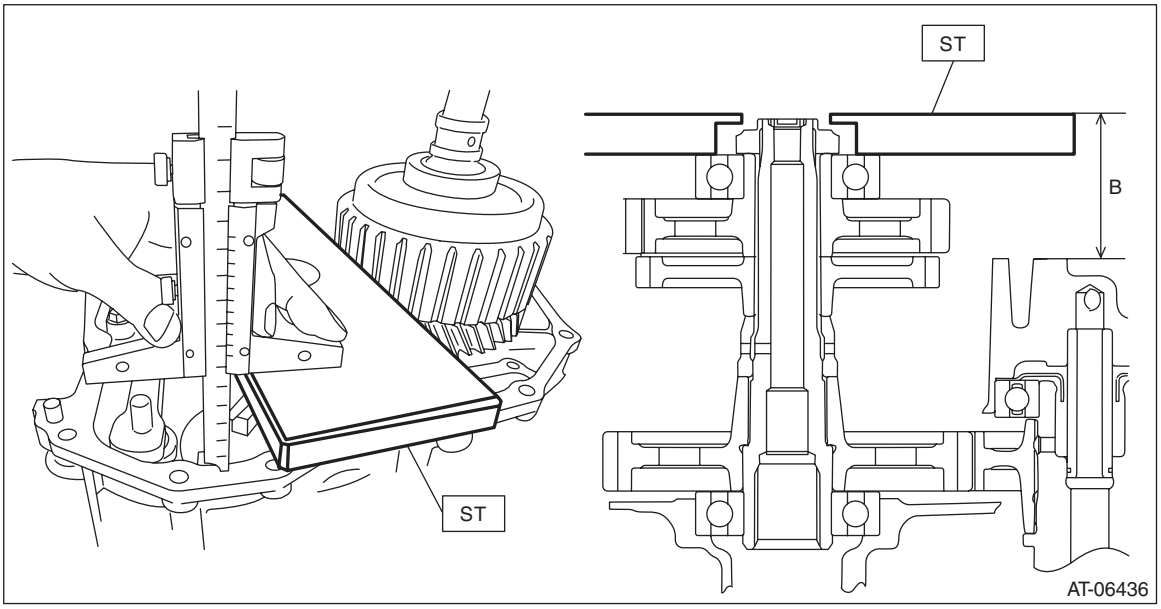
- Check the ball bearing for smooth rotation.
- Check the ball bearing for excessive looseness.
- Make sure each gear is not broken or damaged.

F: ADJUSTMENT

1) Measure the height “A” from the ST upper face to the ball bearing catch surface.
ST 499575600 GAUGE



2) Measure the height “B” from the ST to the mating surface of the transmission case.
ST 499575600 GAUGE



3) Obtain the thickness of transfer drive gear shim using the following formula to select one to three transfer drive gear shims.
T (mm) = A – B – (0.05 — 0.25)
[T (in) = A – B – (0.002 — 0.01)]
T: Shim thickness
A: Height from the ST upper face to the ball bearing catch surface
B: Height from ST to transmission case mating surface
0.05 — 0.25 mm (0.002 — 0.01 in): Clearance

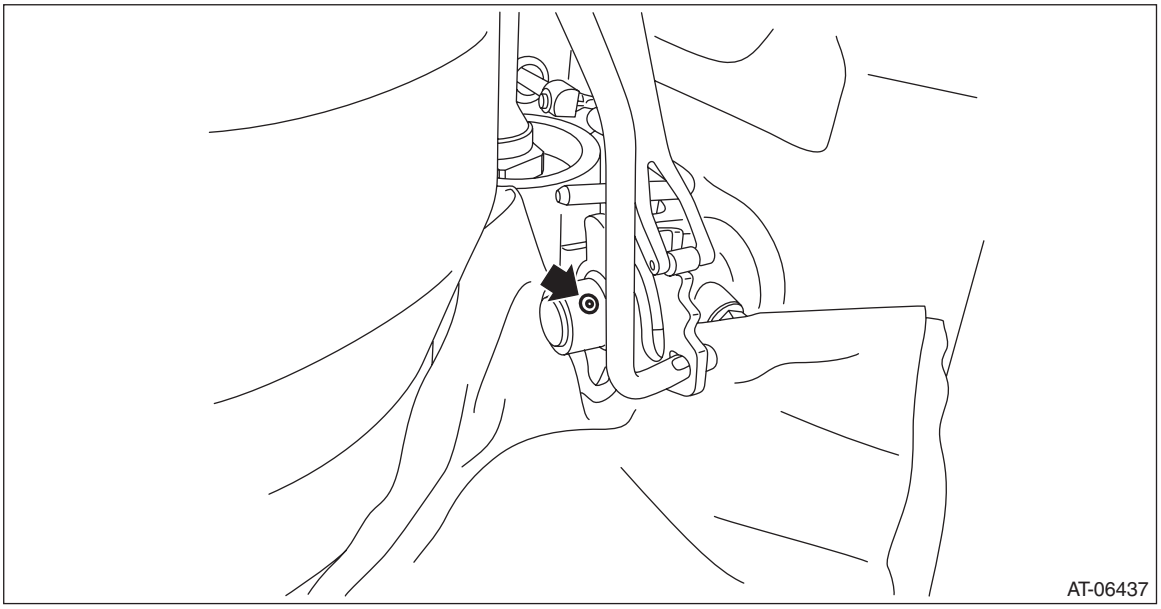
Transfer drive gear shim	
Part No.	Thickness mm (in)
33279AA090	0.3 (0.012)
33279AA100	0.4 (0.016)
33279AA110	0.5 (0.020)

33.Transmission Control Device

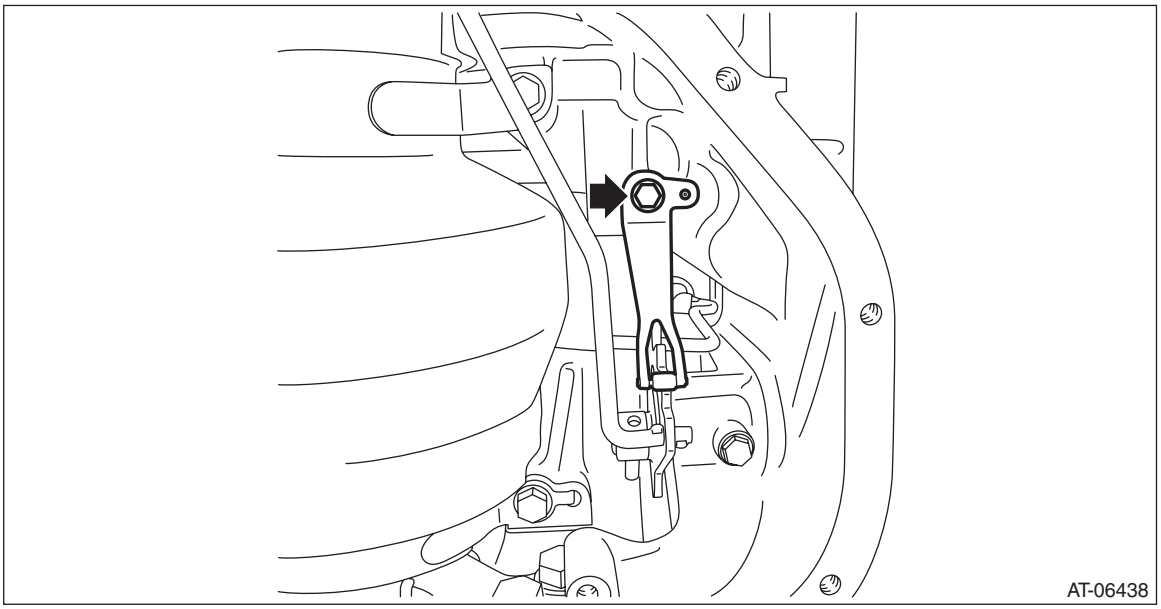
A: REMOVAL

1) Remove the transmission assembly from the vehicle. <Ref. to CVT-57, REMOVAL, Automatic Transmission Assembly.>
2) Remove the inhibitor switch. <Ref. to CVT-99, REMOVAL, Inhibitor Switch.>
3) Remove the oil pan and oil strainer. <Ref. to CVT-112, REMOVAL, Oil Pan and Strainer.>
4) Shift the manual plate to “N” range, and remove the spring pin.

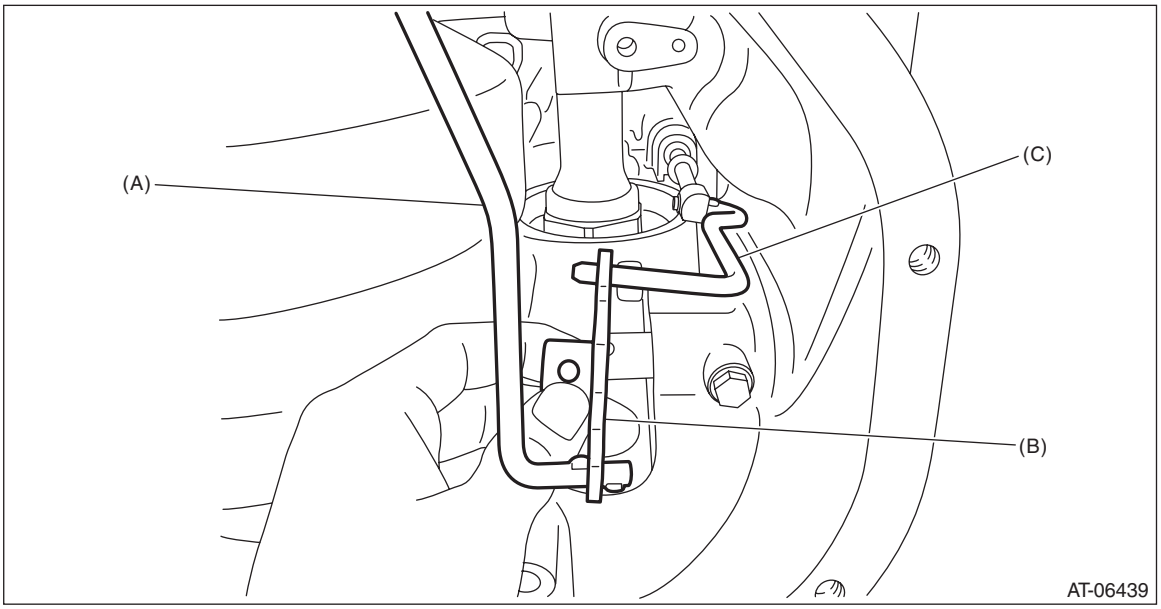
NOTE:
Prevent the spring pin from dropping in the transmission using paper towel etc.



5) Remove the detent spring.



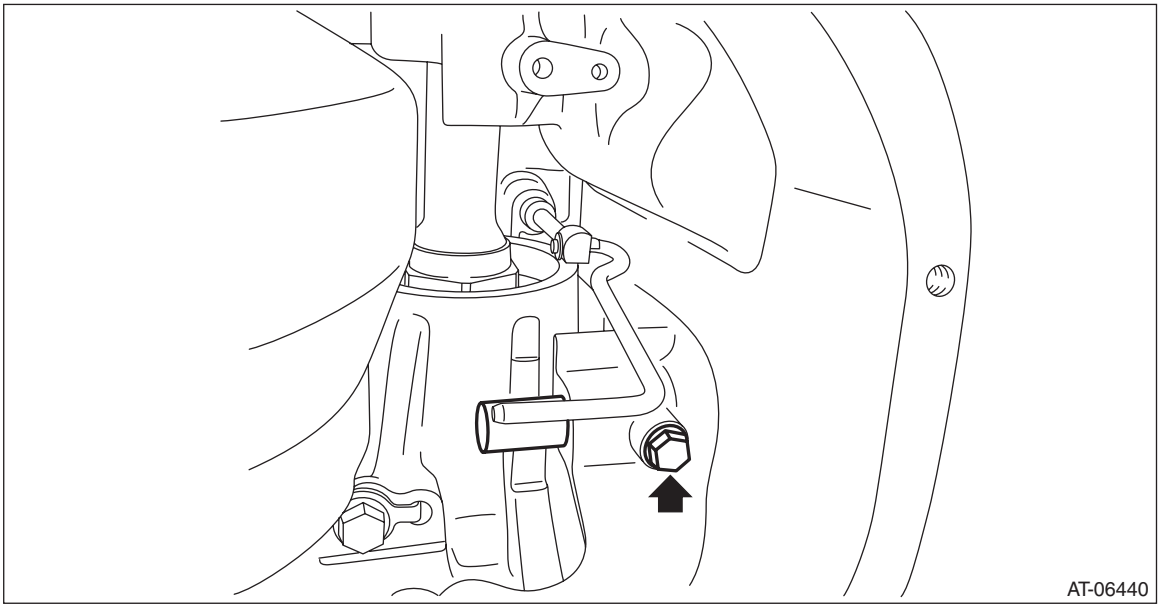
6) Remove the manual plate from the shifter arm shaft, and remove the shift connecting rod of the manual valve.



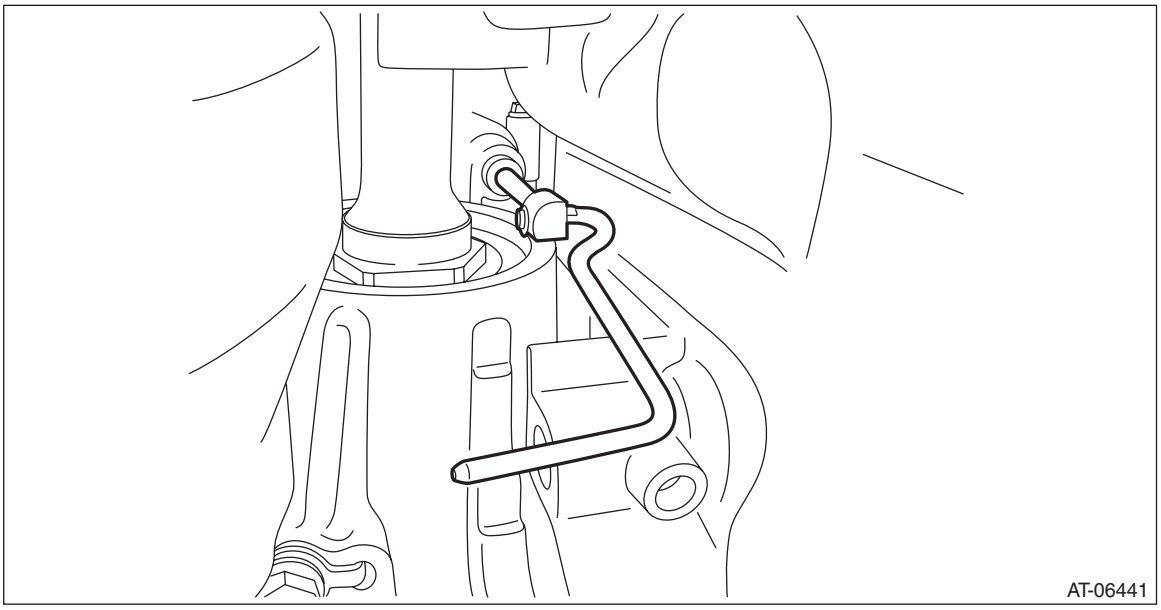
(A) Parking rod
(B) Manual plate
(C) Shift connecting rod

7) Remove the manual plate and parking rod.
8) Remove the bolt, and remove the shifter arm shaft.

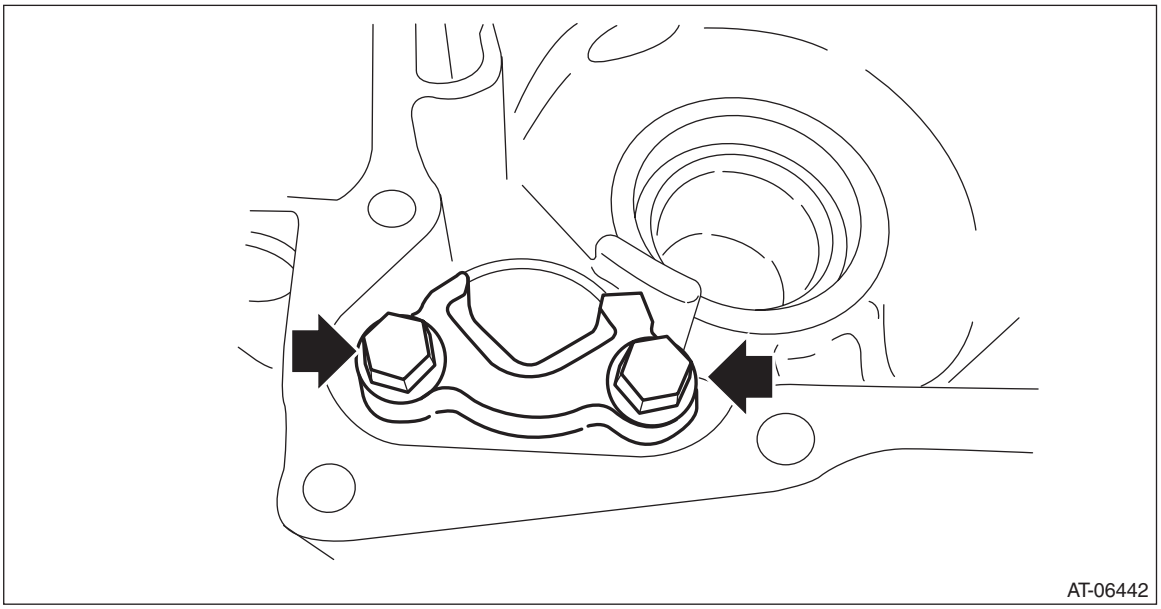
NOTE:
Do not damage the lip of oil seal press-fitted in the case.



9) Remove the manual valve.



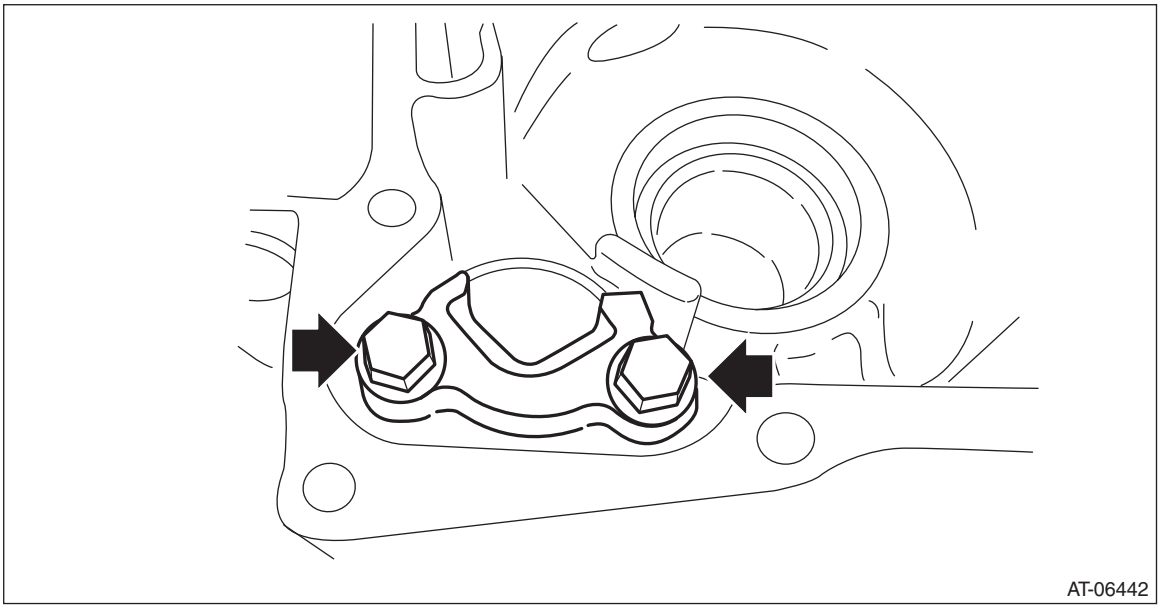
10) Remove the extension case. <Ref. to CVT-163, REMOVAL, Extension Case.>
11) Remove the parking support.



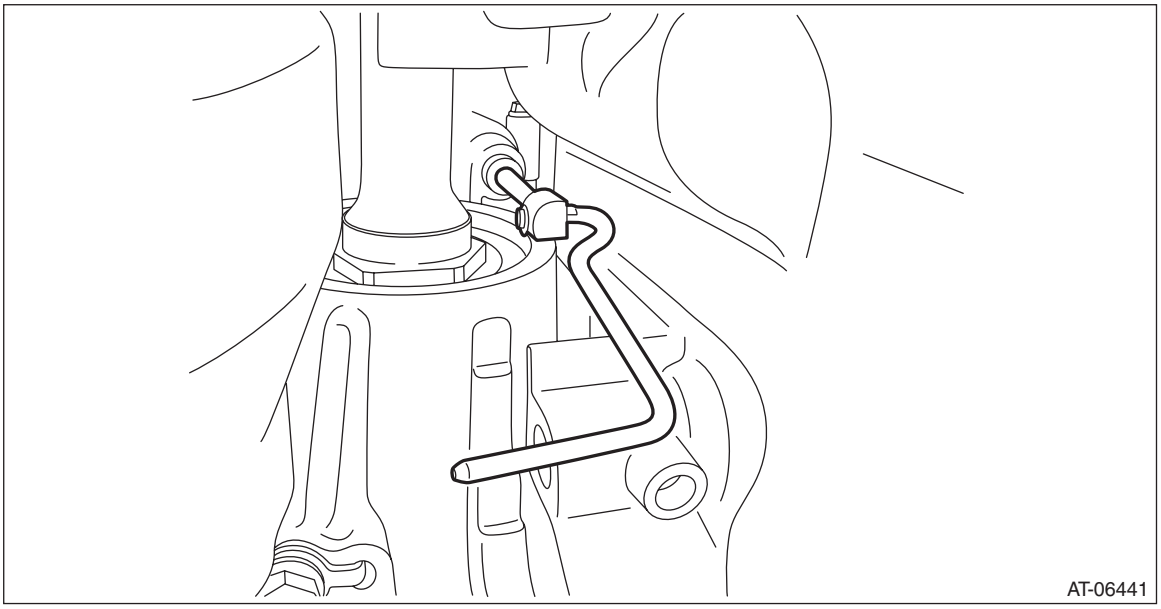
B: INSTALLATION

1) Install the parking support.

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



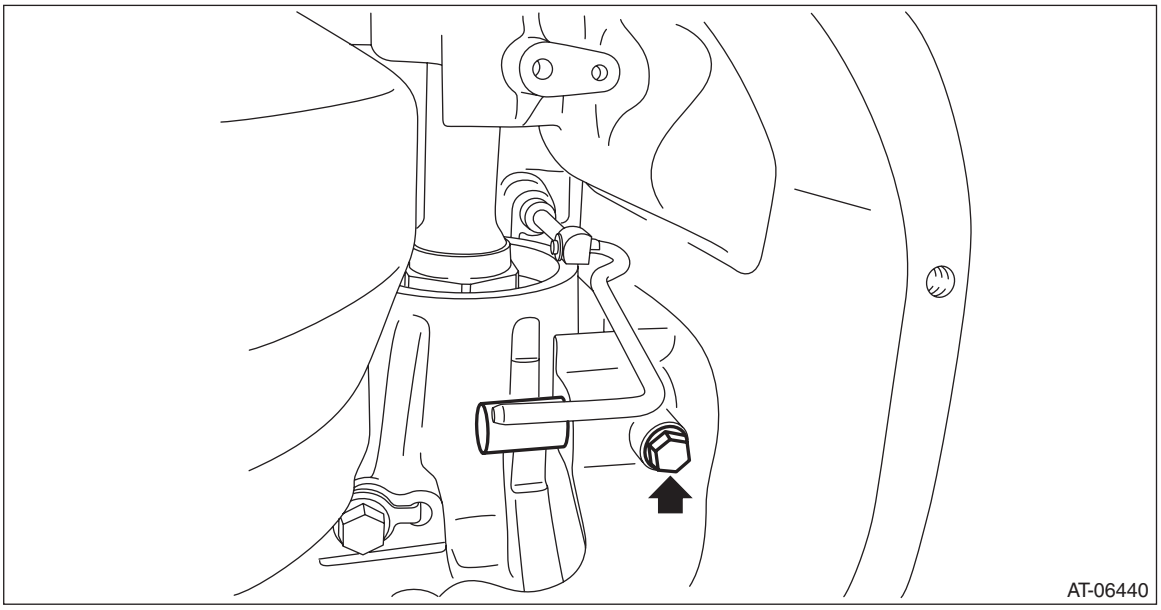
2) Install the extension case. <Ref. to CVT-164, INSTALLATION, Extension Case.>
3) Install the manual valve.



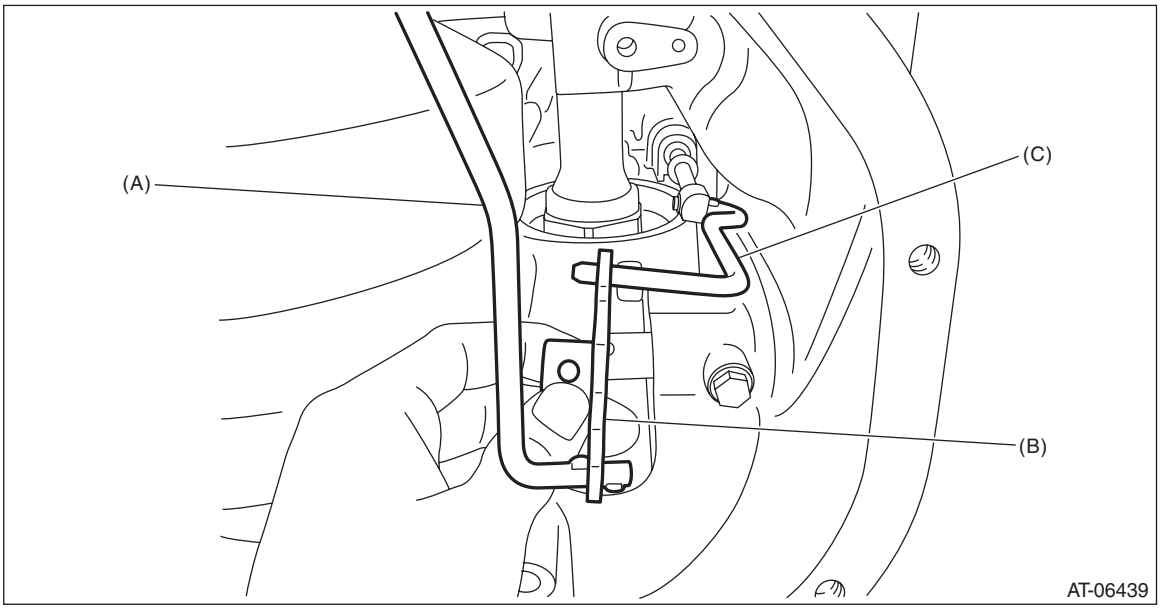
4) Install the shifter arm shaft and bolt.

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

Tightening torque:
7 N·m (0.7 kgf-m, 5.2 ft-lb)



5) Install the parking rod to the manual plate.
6) Insert the parking rod into the transmission case, and install the shift connecting rod of the manual valve to the manual plate.

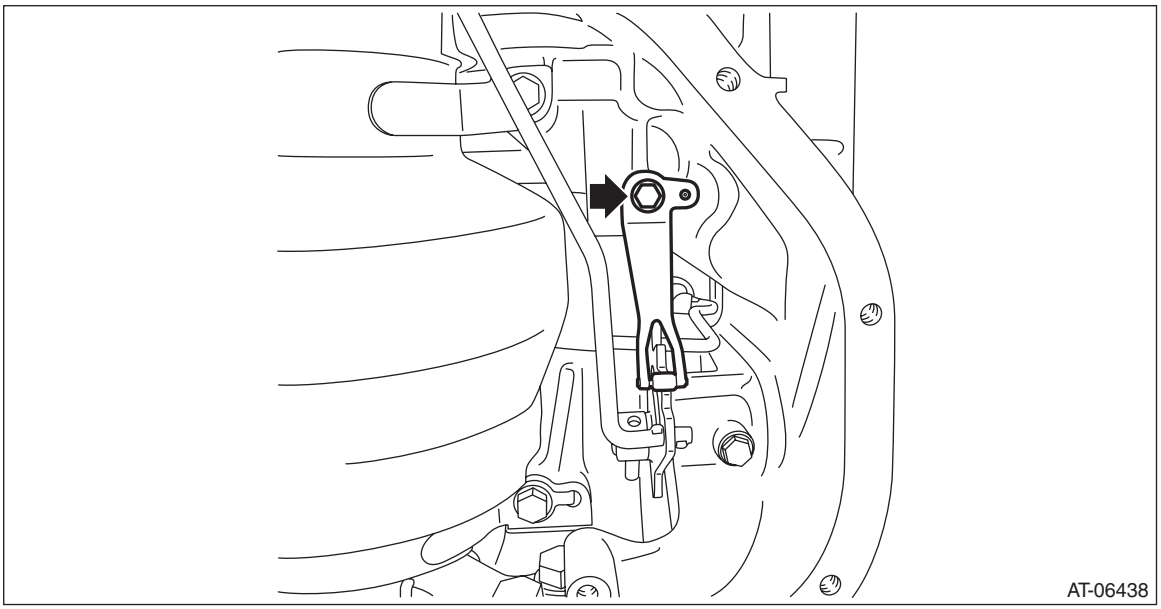


(A) Parking rod
(B) Manual plate
(C) Shift connecting rod

7) Install the manual plate to the shifter arm shaft.

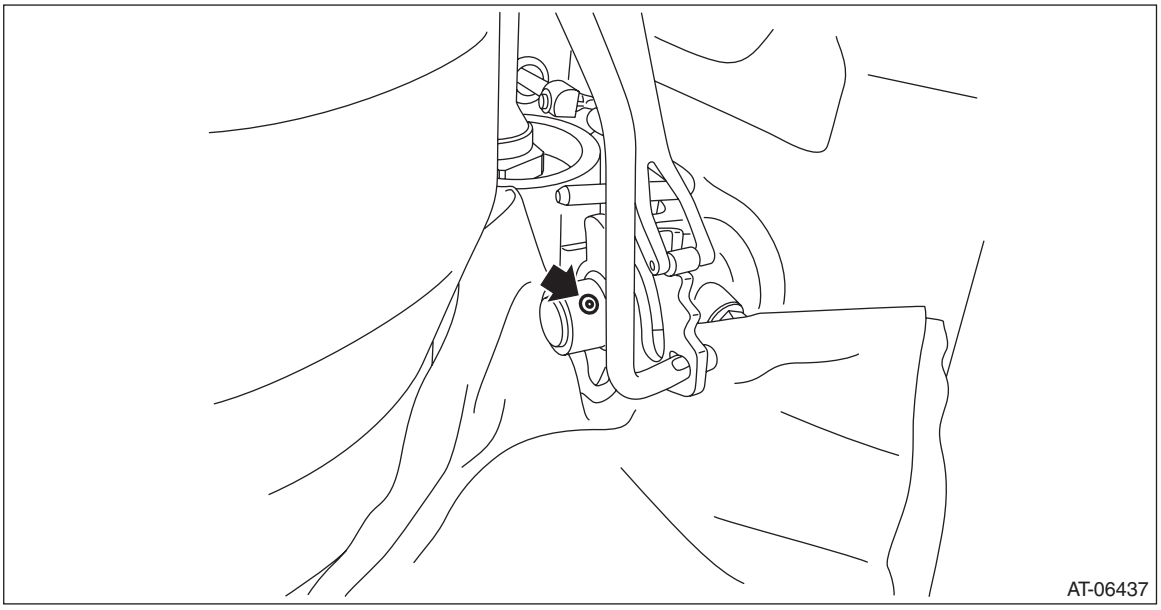
8) Install the detent spring to the transmission case.

Tightening torque:
7 N·m (0.7 kgf-m, 5.2 ft-lb)



9) Install the spring pin.

NOTE:
Use new spring pin.



10) Install the inhibitor switch. <Ref. to CVT-101, INSTALLATION, Inhibitor Switch.>
11) Adjust the inhibitor switch. <Ref. to CVT-98, ADJUSTMENT, Inhibitor Switch.>
12) Install the oil strainer and oil pan. <Ref. to CVT-113, INSTALLATION, Oil Pan and Strainer.>
13) Install the transmission assembly to the vehicle. <Ref. to CVT-72, INSTALLATION, Automatic Transmission Assembly.>

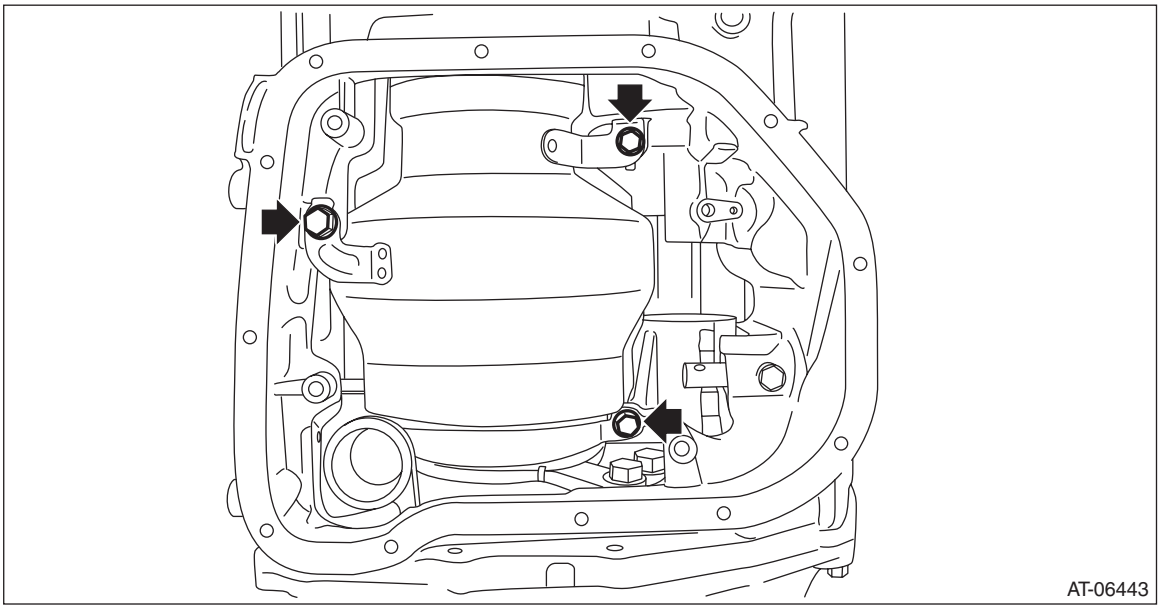
C: INSPECTION

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

34.Transmission Case

A: REMOVAL

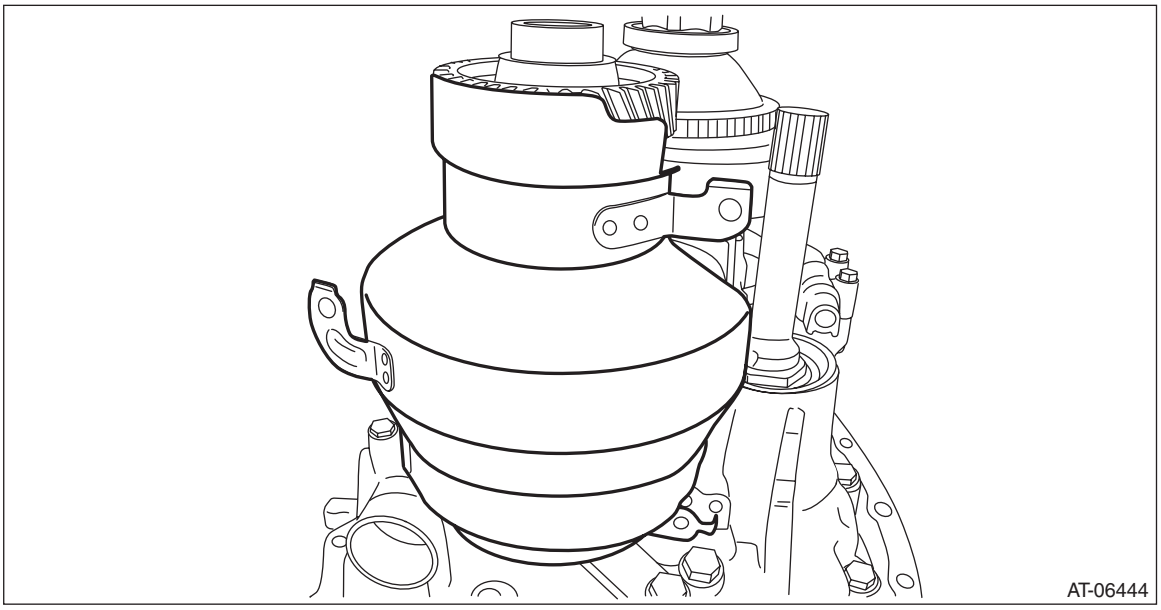
1) Remove the transmission assembly from the vehicle. <Ref. to CVT-57, REMOVAL, Automatic Transmission Assembly.>
2) Remove the air breather hose. <Ref. to CVT-154, REMOVAL, Air Breather Hose.>
3) Remove the control valve body. <Ref. to CVT-116, REMOVAL, Control Valve Body.>
4) Remove the transmission harness. <Ref. to CVT-129, REMOVAL, Transmission Harness.>
5) Remove the turbine speed sensor. <Ref. to CVT-103, REMOVAL, Turbine Speed Sensor.>
6) Remove the secondary speed sensor. <Ref. to CVT-105, REMOVAL, Secondary Speed Sensor.>
7) Remove the primary speed sensor. <Ref. to CVT-107, REMOVAL, Primary Speed Sensor.>
8) Remove the inhibitor switch. <Ref. to CVT-99, REMOVAL, Inhibitor Switch.>
9) Remove the extension case. <Ref. to CVT-163, REMOVAL, Extension Case.>
10) Remove the transfer clutch assembly. <Ref. to CVT-167, REMOVAL, Transfer Clutch.>
11) Remove the transfer driven gear assembly. <Ref. to CVT-181, REMOVAL, Transfer Driven Gear.>
12) Remove the parking pawl. <Ref. to CVT-184, REMOVAL, Parking Pawl.>
13) Remove the reduction driven gear assembly. <Ref. to CVT-186, REMOVAL, Reduction Driven Gear.>
14) Remove the oil pan and oil strainer. <Ref. to CVT-112, REMOVAL, Oil Pan and Strainer.>
15) Remove the transmission control device. <Ref. to CVT-194, REMOVAL, Transmission Control Device.>
16) Remove the oil baffle securing bolt.



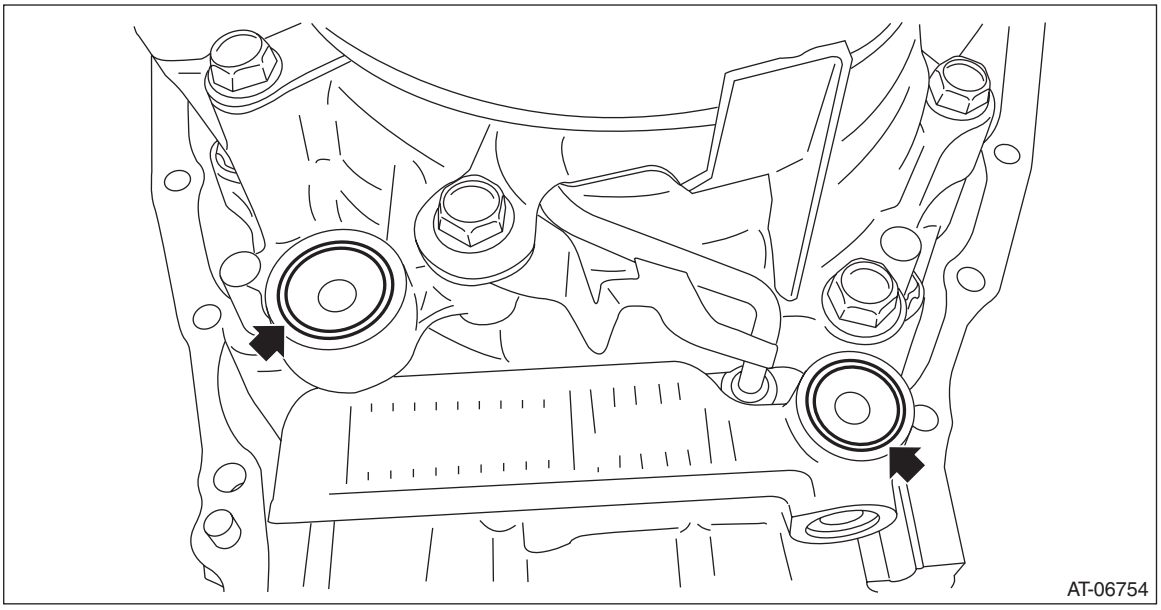
17) Remove the CVTF cooler pipe COMPL. <Ref. to CVT-144, REMOVAL, CVTF Cooler Pipe and Hose.>
18) Remove the transmission case.

NOTE:
The total number of transmission case mounting bolts is 15.

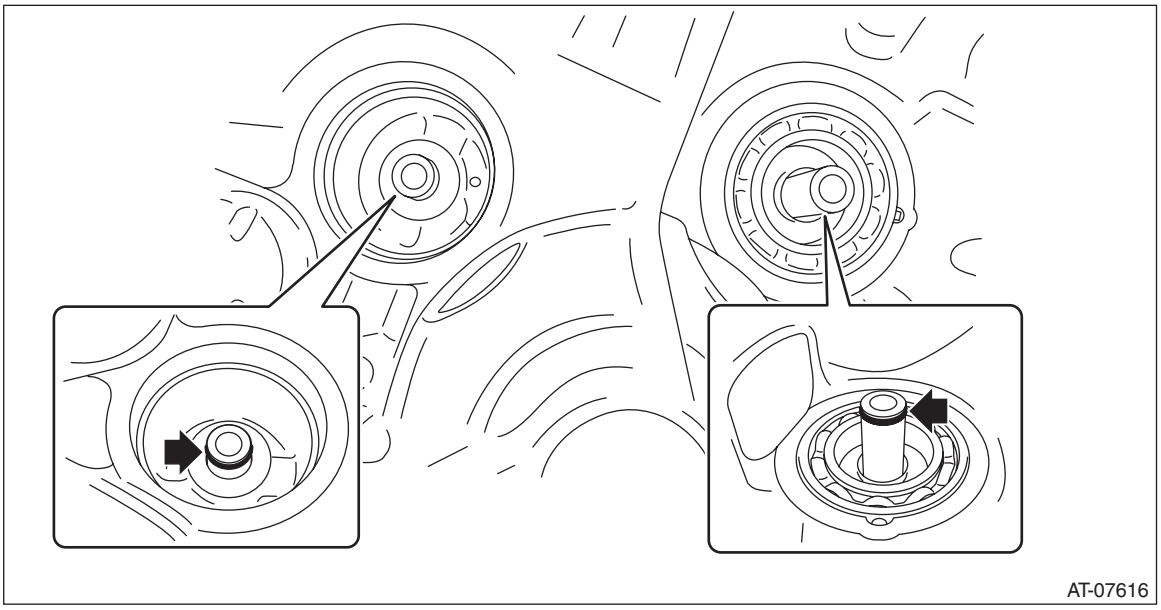
19) Remove the oil baffle.



20) Remove the O-ring.



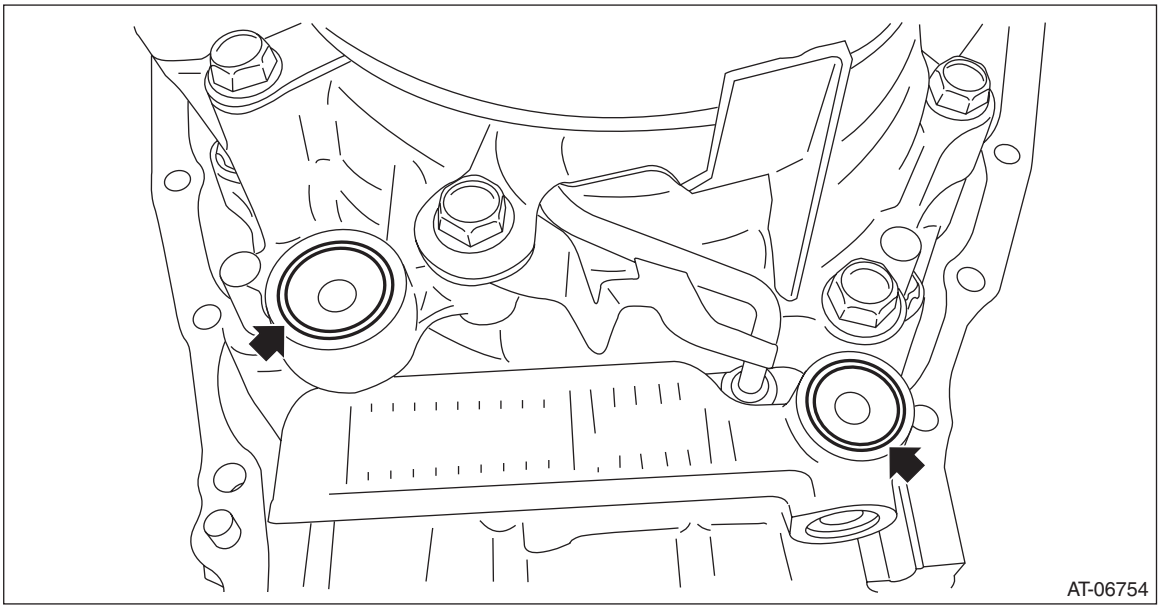
21) Remove the seal ring from the transmission case.



B: INSTALLATION

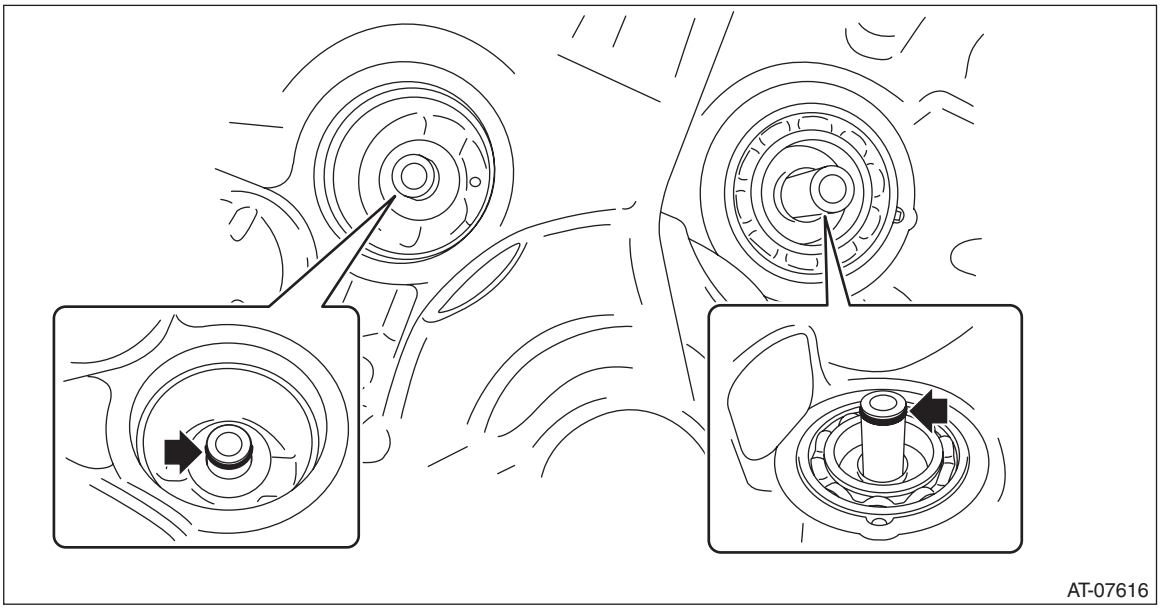
1) Clean the mating surface of transmission case and converter case.
2) Select the reduction gear shim. <Ref. to CVT-215, ADJUSTMENT, Reduction Drive Gear.>
3) Remove the transmission case, and install the selected reduction gear shim to the reduction drive gear.
4) Install the O-rings to the reverse clutch housing and drive pinion retainer.

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

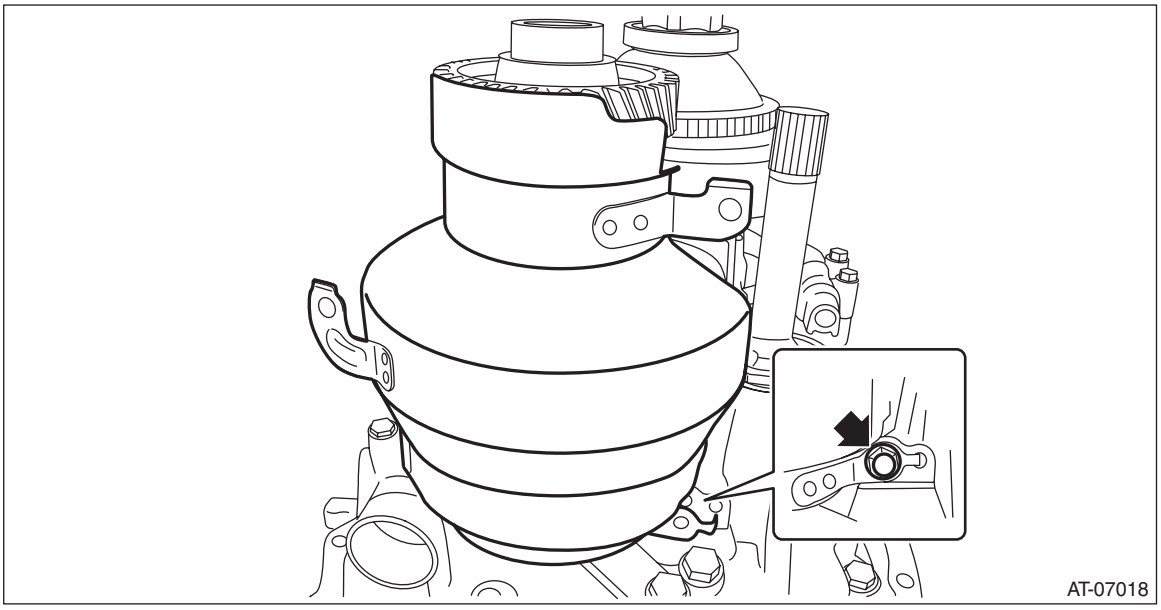


5) Install the seal ring to the transmission case.

NOTE:
- Use a new seal ring.
- Apply CVTF to the seal rings.

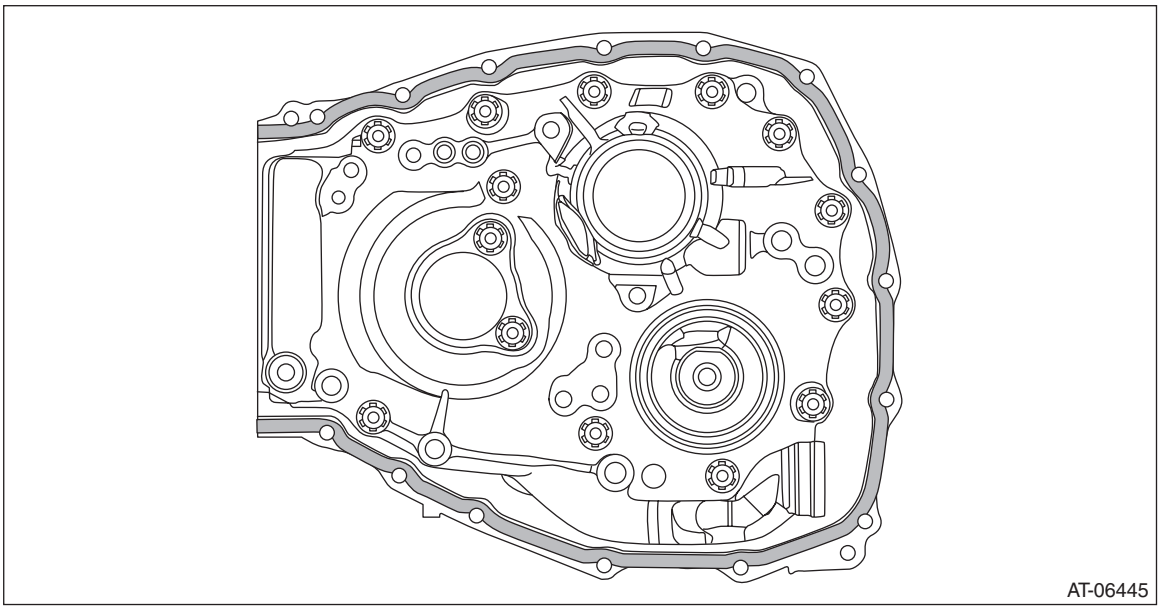


6) Cover the secondary pulley with the oil baffle, and temporarily install it with bolts.



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

Liquid gasket:
THREE BOND 1215 (Part No. 004403007) or equivalent



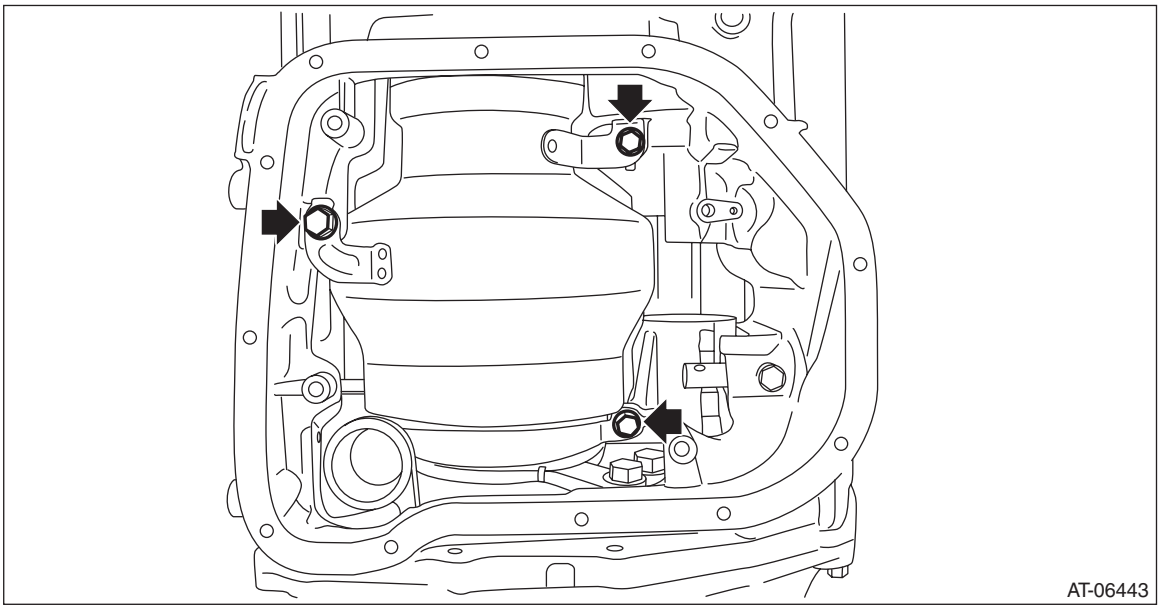
8) Install the transmission case.

NOTE:
The total number of transmission case mounting bolts is 15.

Tightening torque:
22 N·m (2.2 kgf-m, 16.2 ft-lb)

9) Install the CVTF cooler pipe COMPL. <Ref. to CVT-149, INSTALLATION, CVTF Cooler Pipe and Hose.>
10) Install the oil baffle securing bolt.

Tightening torque:
16 N·m (1.6 kgf-m, 11.8 ft-lb)

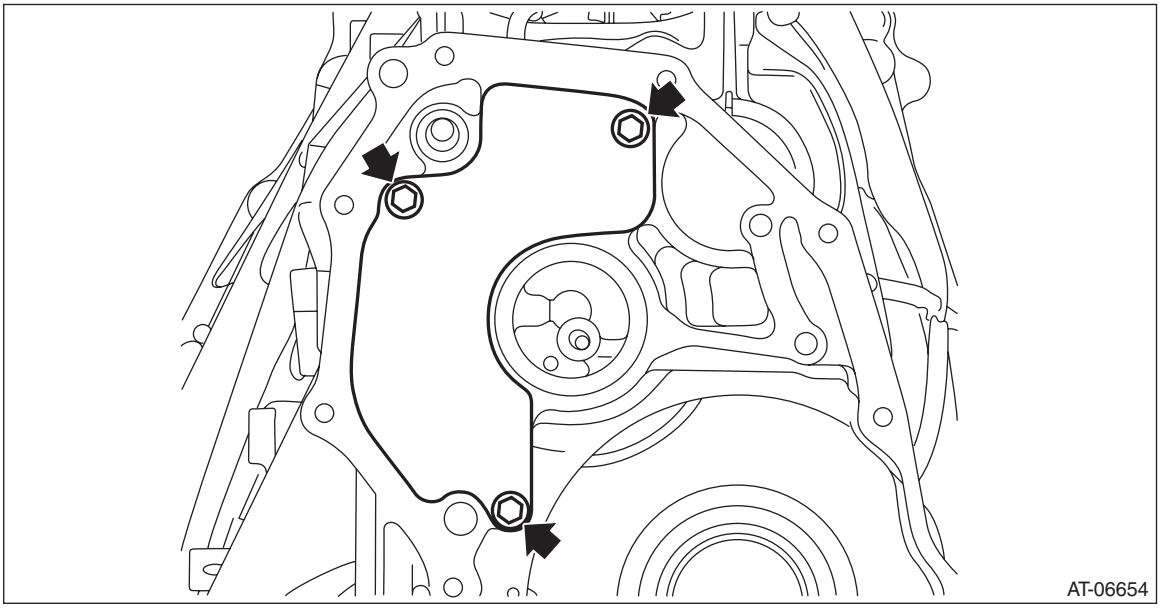


11) Install the transmission control device. <Ref. to CVT-197, INSTALLATION, Transmission Control Device.>
12) Install the oil pan and oil strainer. <Ref. to CVT-113, INSTALLATION, Oil Pan and Strainer.>
13) Install the reduction driven gear assembly. <Ref. to CVT-186, INSTALLATION, Reduction Driven Gear.>

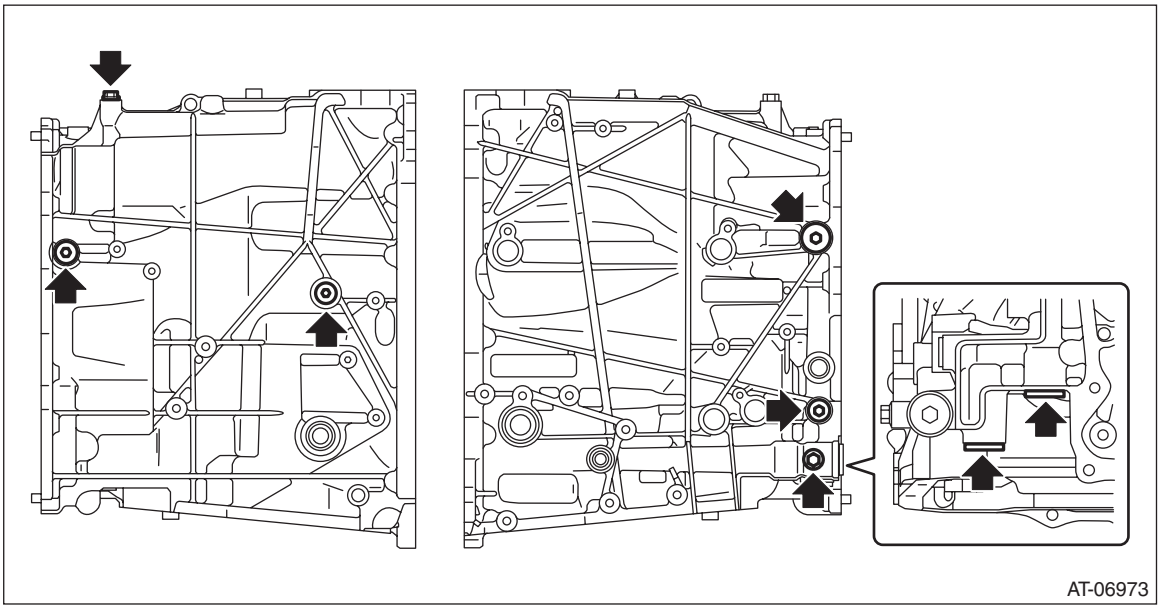
14) Install the parking pawl. <Ref. to CVT-185, INSTALLATION, Parking Pawl.>
15) Install the transfer driven gear assembly. <Ref. to CVT-182, INSTALLATION, Transfer Driven Gear.>
16) Install the transfer clutch assembly. <Ref. to CVT-169, INSTALLATION, Transfer Clutch.>
17) Install the extension case. <Ref. to CVT-164, INSTALLATION, Extension Case.>
18) Install the inhibitor switch. <Ref. to CVT-101, INSTALLATION, Inhibitor Switch.>
19) Install the secondary speed sensor. <Ref. to CVT-105, INSTALLATION, Secondary Speed Sensor.>
20) Install the primary speed sensor. <Ref. to CVT-108, INSTALLATION, Primary Speed Sensor.>
21) Install the turbine speed sensor. <Ref. to CVT-103, INSTALLATION, Turbine Speed Sensor.>
22) Install the transmission harness. <Ref. to CVT-136, INSTALLATION, Transmission Harness.>
23) Install the control valve body. <Ref. to CVT-122, INSTALLATION, Control Valve Body.>
24) Install the air breather hose. <Ref. to CVT-156, INSTALLATION, Air Breather Hose.>
25) Install the transmission assembly to the vehicle. <Ref. to CVT-72, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

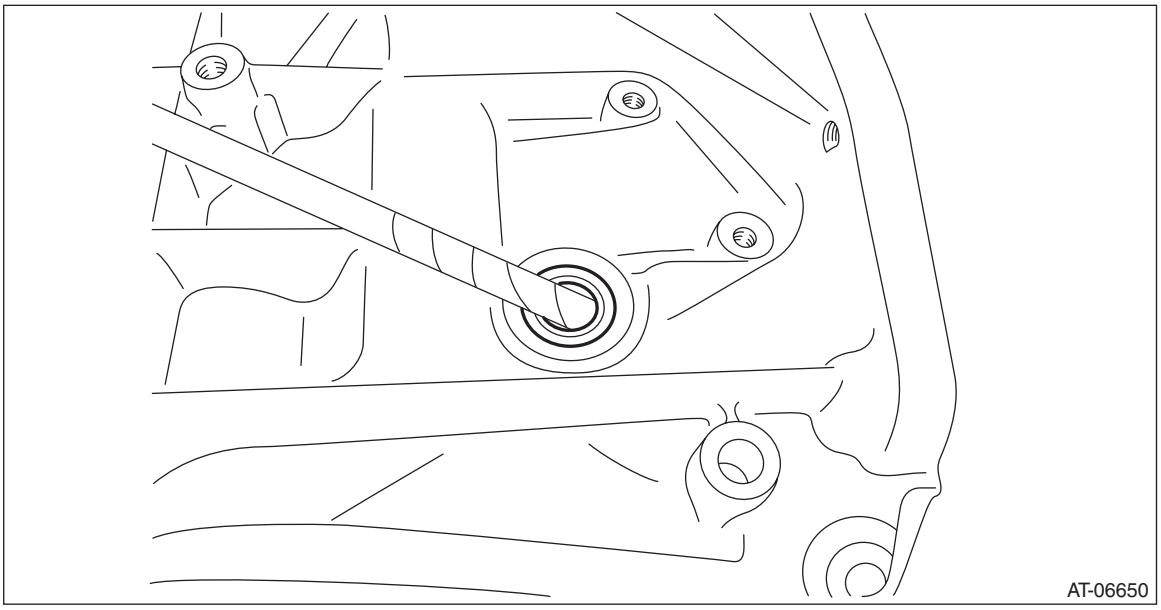
1) Remove the oil stopper plate.



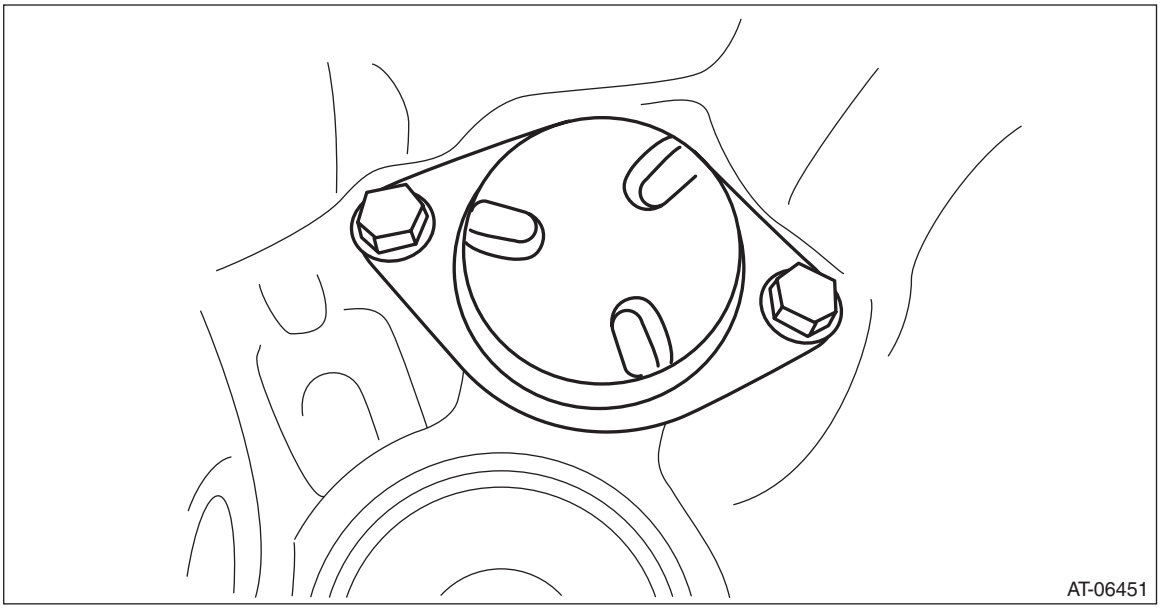
2) Remove all plugs from the transmission case.



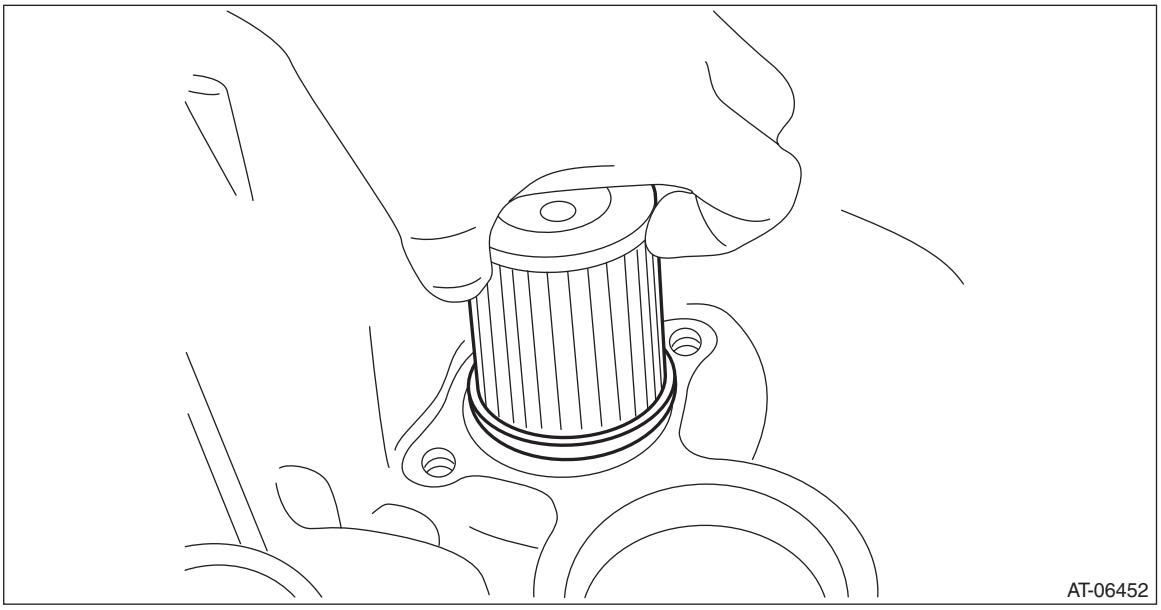
3) Remove the oil seal using a screwdriver wrapped with cloth etc.



4) Remove the CVTF filter cover and gasket.



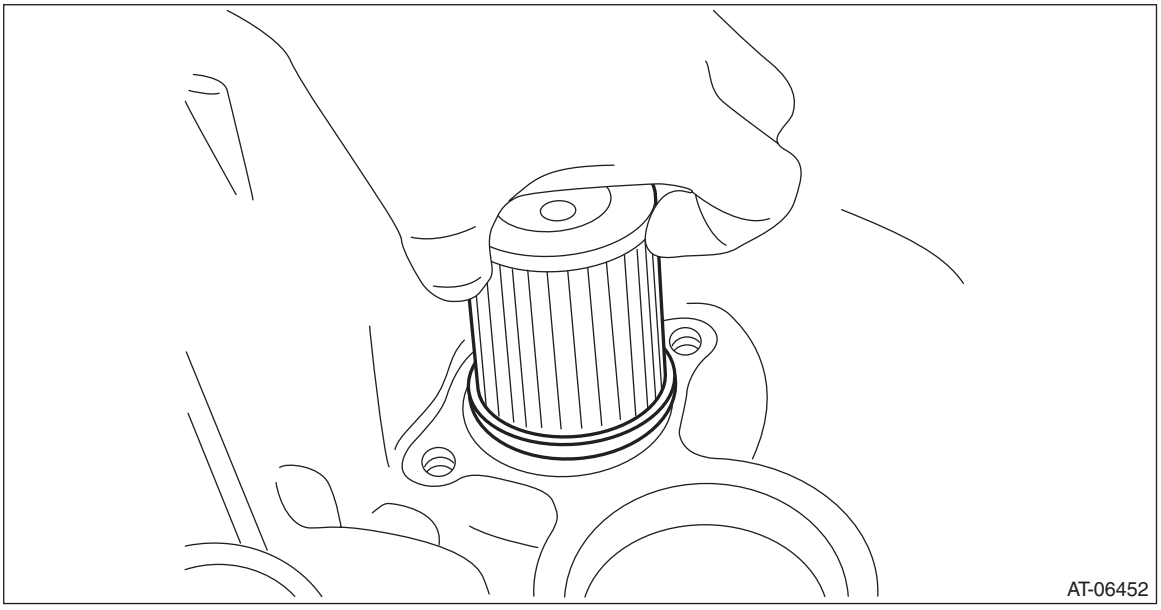
5) Remove the CVTF filter.



D: ASSEMBLY

1) Face the O-ring side of the CVTF filter to the transmission case side, and install the CVTF filter.

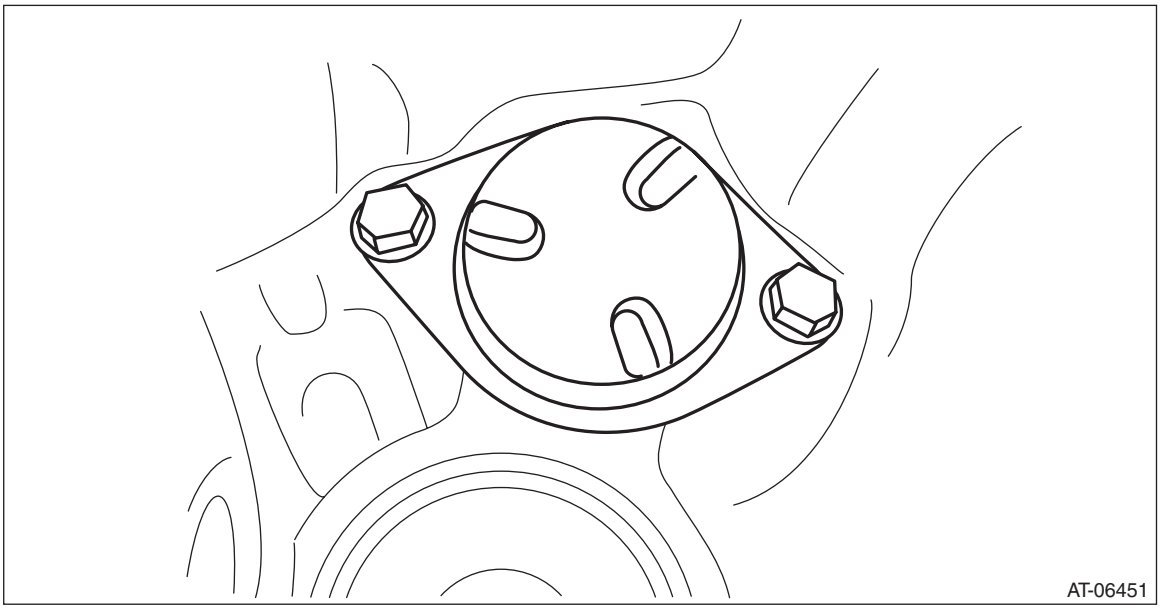
NOTE:
Apply CVTF to the O-ring of CVTF filter.



2) Install the CVTF filter cover and gasket.

NOTE:
Use a new gasket.

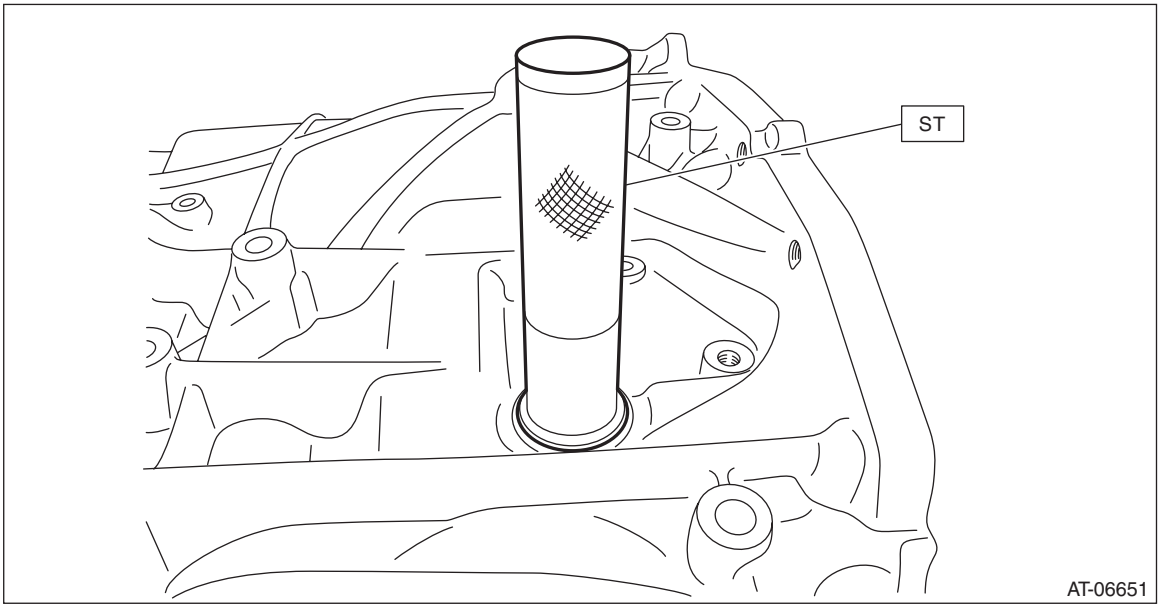
Tightening torque:
17 N·m (1.7 kgf-m, 12.5 ft-lb)



3) Using the ST, install the oil seal.

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

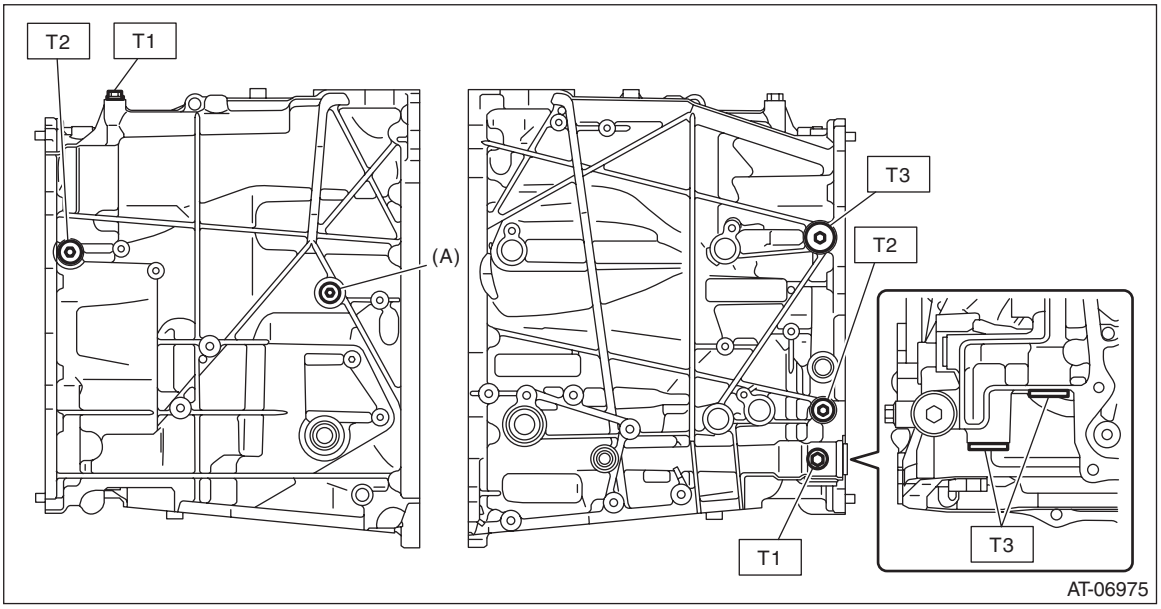
ST 18657AA000 INSTALLER



4) Install all plugs.

NOTE:
- Use new O-rings.
- Apply CVTF to the O-ring.
- For the plug (A), fill the CVTF, and then tighten the plug using a new O-ring.

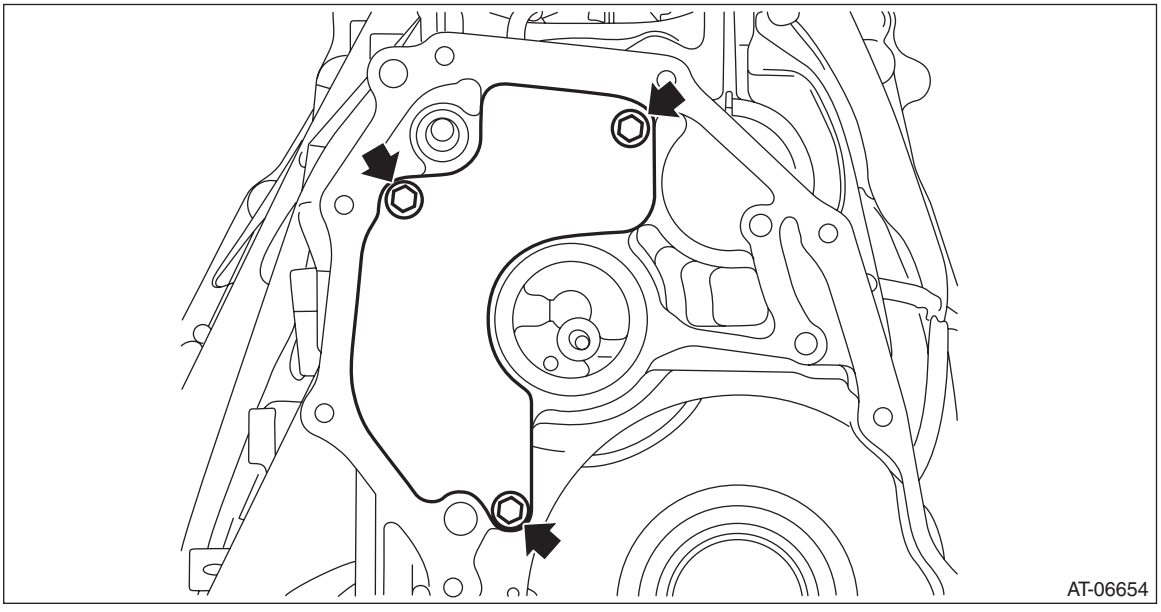
Tightening torque:
T1: 13 N·m (1.3 kgf-m, 9.6 ft-lb)
T2: 25 N·m (2.5 kgf-m, 18.4 ft-lb)
T3: 50 N·m (5.1 kgf-m, 36.9 ft-lb)



5) Install the oil stopper plate.

NOTE:
Use a new bolt.

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



E: INSPECTION

- Check the transmission case for damage.
- Check for leakage of CVTF from the connection between converter case and transmission case.
- Check the bearing for smooth operation.
- Check the bearing for seizure or wear.

F: ADJUSTMENT

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

- Select the transfer driven gear shim. <Ref. to CVT-178, ADJUSTMENT, Transfer Clutch.>
- Select the transfer drive gear shim. <Ref. to CVT-192, ADJUSTMENT, Reduction Driven Gear.>
- Select the reduction drive gear shim. <Ref. to CVT-215, ADJUSTMENT, Reduction Drive Gear.>

35.CVTF Filter

A: REMOVAL

NOTE:
• Although CVTF filter is a maintenance-free part, replace it if a large quantity of wear debris and metal particles are found in CVTF and CVTF filter.
• For removal of CVTF filter, refer to “Transmission Case”. <Ref. to CVT-200, REMOVAL, Transmission Case.> <Ref. to CVT-205, DISASSEMBLY, Transmission Case.>

B: INSTALLATION

NOTE:
For installation of CVTF filter, refer to “Transmission Case”. <Ref. to CVT-207, ASSEMBLY, Transmission Case.> <Ref. to CVT-202, INSTALLATION, Transmission Case.>

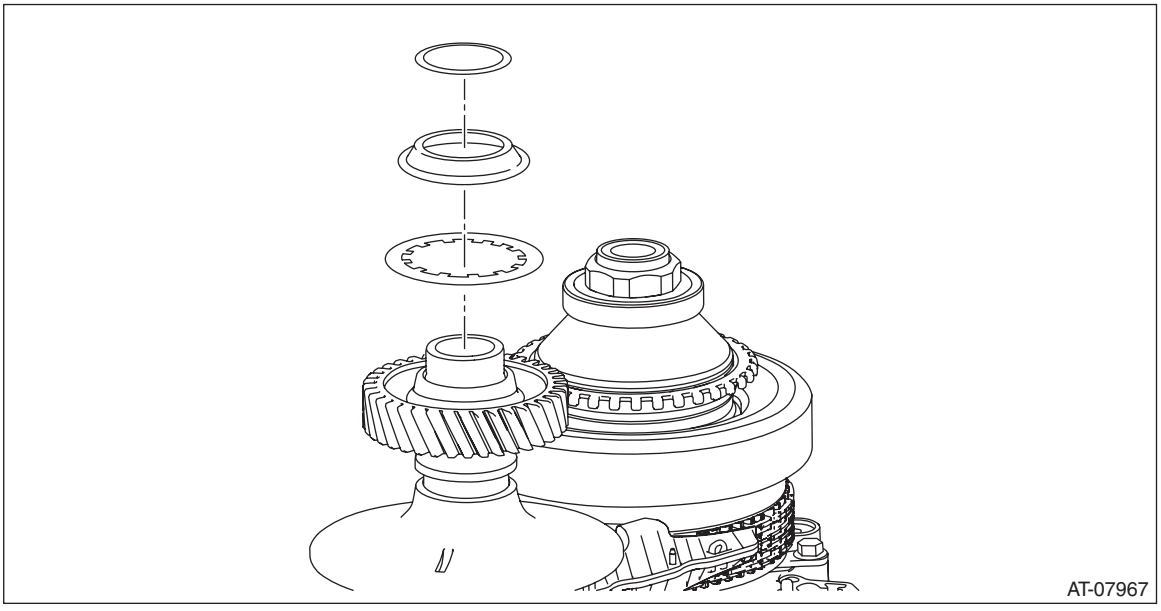
C: INSPECTION

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

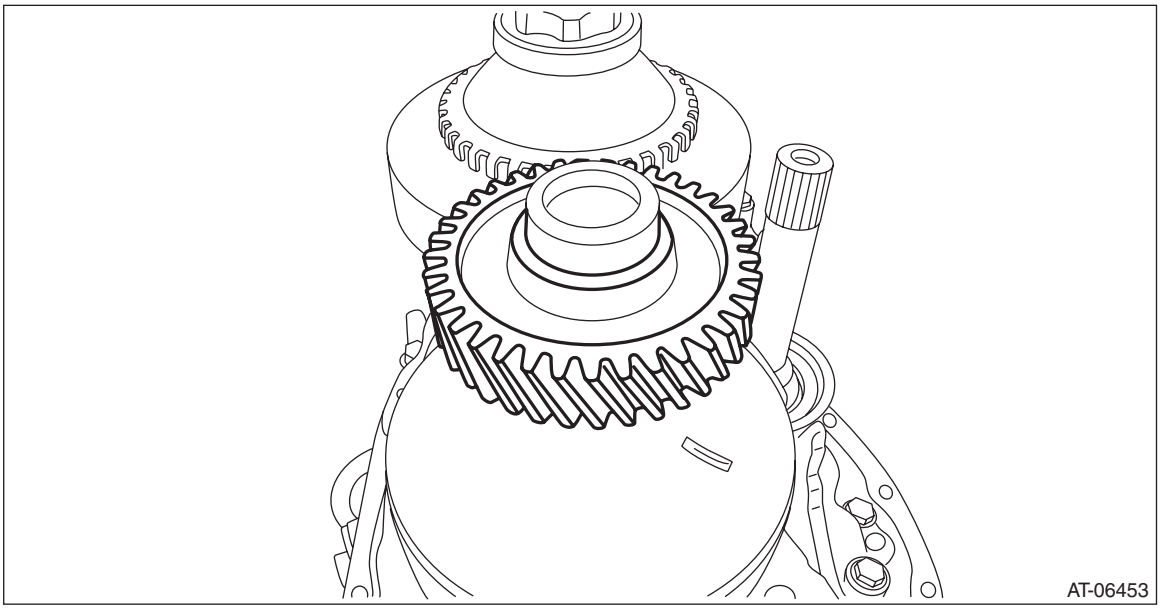
36.Reduction Drive Gear

A: REMOVAL

1) Remove the transmission assembly from the vehicle. <Ref. to CVT-57, REMOVAL, Automatic Transmission Assembly.>
2) Remove the air breather hose. <Ref. to CVT-154, REMOVAL, Air Breather Hose.>
3) Remove the control valve body. <Ref. to CVT-116, REMOVAL, Control Valve Body.>
4) Remove the transmission harness. <Ref. to CVT-129, REMOVAL, Transmission Harness.>
5) Remove the turbine speed sensor. <Ref. to CVT-103, REMOVAL, Turbine Speed Sensor.>
6) Remove the secondary speed sensor. <Ref. to CVT-105, REMOVAL, Secondary Speed Sensor.>
7) Remove the primary speed sensor. <Ref. to CVT-107, REMOVAL, Primary Speed Sensor.>
8) Remove the inhibitor switch. <Ref. to CVT-99, REMOVAL, Inhibitor Switch.>
9) Remove the extension case. <Ref. to CVT-163, REMOVAL, Extension Case.>
10) Remove the transfer clutch assembly. <Ref. to CVT-167, REMOVAL, Transfer Clutch.>
11) Remove the transfer driven gear assembly. <Ref. to CVT-181, REMOVAL, Transfer Driven Gear.>
12) Remove the parking pawl. <Ref. to CVT-184, REMOVAL, Parking Pawl.>
13) Remove the reduction driven gear assembly. <Ref. to CVT-186, REMOVAL, Reduction Driven Gear.>
14) Remove the oil pan and oil strainer. <Ref. to CVT-112, REMOVAL, Oil Pan and Strainer.>
15) Remove the transmission control device. <Ref. to CVT-194, REMOVAL, Transmission Control Device.>
16) Remove the transmission case. <Ref. to CVT-200, REMOVAL, Transmission Case.>
17) Remove the reduction drive gear shims, spring retainers, and dish plates.

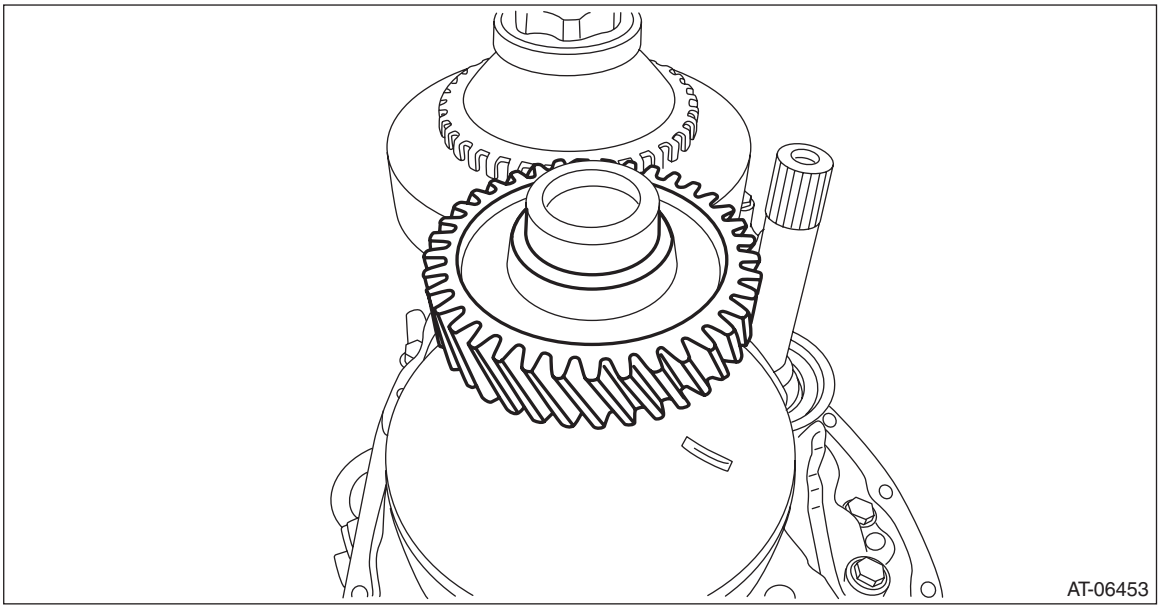


18) Remove the reduction drive gear.



B: INSTALLATION

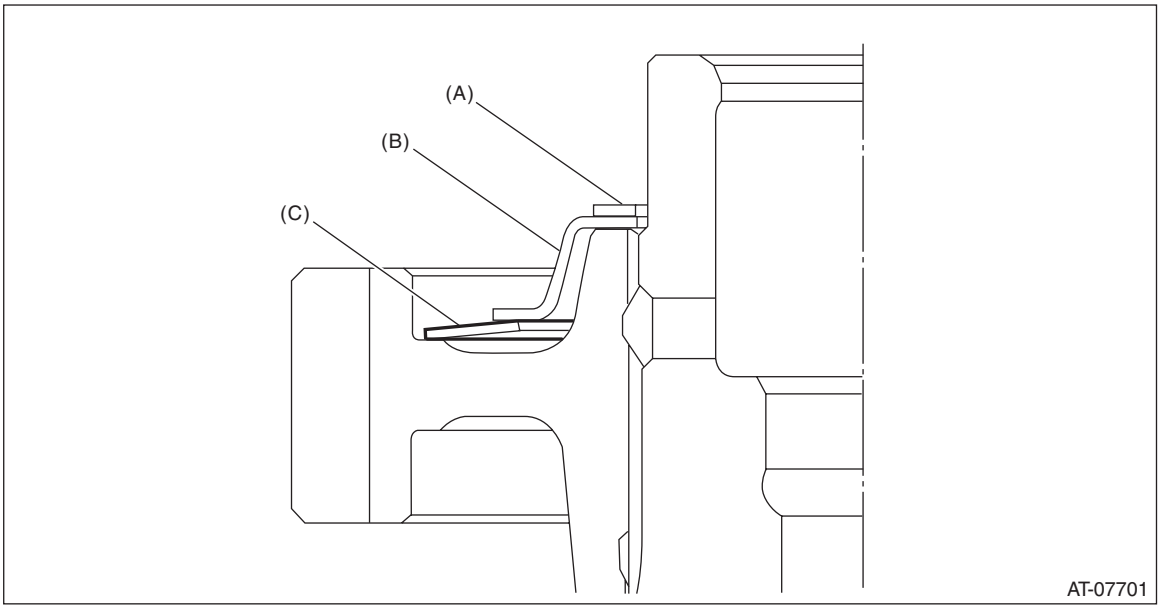
1) Install the reduction drive gear to secondary pulley.



2) Select the reduction drive gear shim. <Ref. to CVT-215, ADJUSTMENT, Reduction Drive Gear.>

3) Install the dish plates, spring retainers, and selected reduction drive gear shims.

NOTE:
Install the dish plate in the correct direction.



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

4) Install the transmission case. <Ref. to CVT-202, INSTALLATION, Transmission Case.>
5) Install the transmission control device. <Ref. to CVT-197, INSTALLATION, Transmission Control Device.>
6) Install the oil strainer and oil pan. <Ref. to CVT-113, INSTALLATION, Oil Pan and Strainer.>
7) Install the reduction driven gear assembly. <Ref. to CVT-186, INSTALLATION, Reduction Driven Gear.>
8) Install the parking pawl. <Ref. to CVT-185, INSTALLATION, Parking Pawl.>
9) Install the transfer driven gear assembly. <Ref. to CVT-182, INSTALLATION, Transfer Driven Gear.>
10) Install the transfer clutch assembly. <Ref. to CVT-169, INSTALLATION, Transfer Clutch.>
11) Install the extension case. <Ref. to CVT-164, INSTALLATION, Extension Case.>
12) Install the inhibitor switch. <Ref. to CVT-101, INSTALLATION, Inhibitor Switch.>
13) Install the secondary speed sensor. <Ref. to CVT-105, INSTALLATION, Secondary Speed Sensor.>
14) Install the primary speed sensor. <Ref. to CVT-108, INSTALLATION, Primary Speed Sensor.>
15) Install the turbine speed sensor. <Ref. to CVT-103, INSTALLATION, Turbine Speed Sensor.>
16) Install the transmission harness. <Ref. to CVT-136, INSTALLATION, Transmission Harness.>
17) Install the control valve body. <Ref. to CVT-122, INSTALLATION, Control Valve Body.>
18) Install the air breather hose. <Ref. to CVT-156, INSTALLATION, Air Breather Hose.>
19) Install the transmission assembly to the vehicle. <Ref. to CVT-72, INSTALLATION, Automatic Transmission Assembly.>

C: INSPECTION

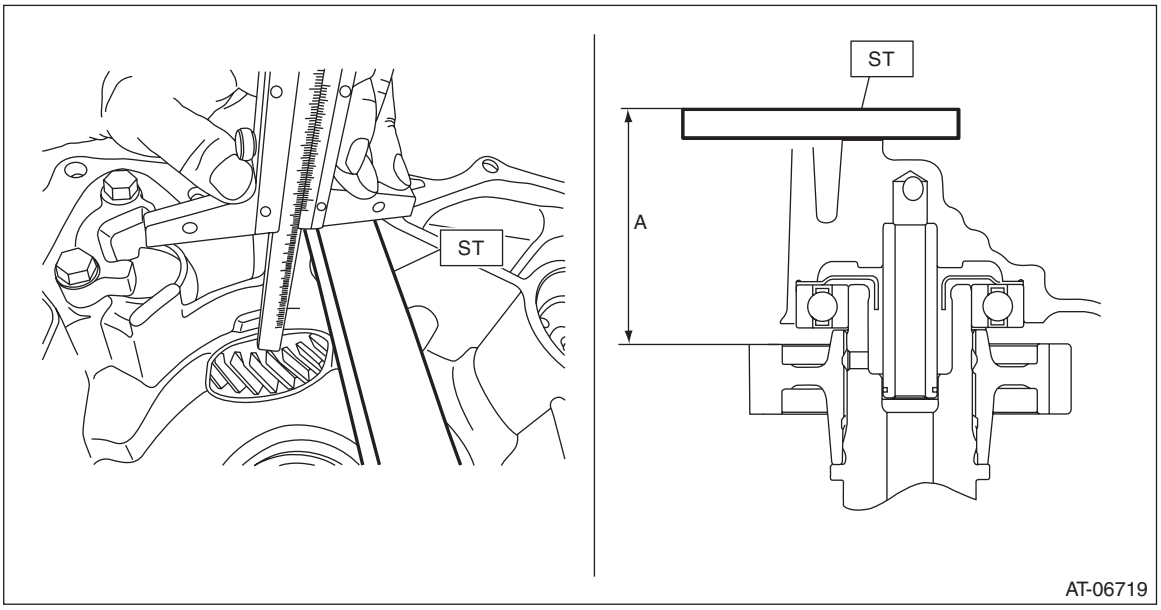
Check the reduction drive gear for breakage or damage.

D: ADJUSTMENT

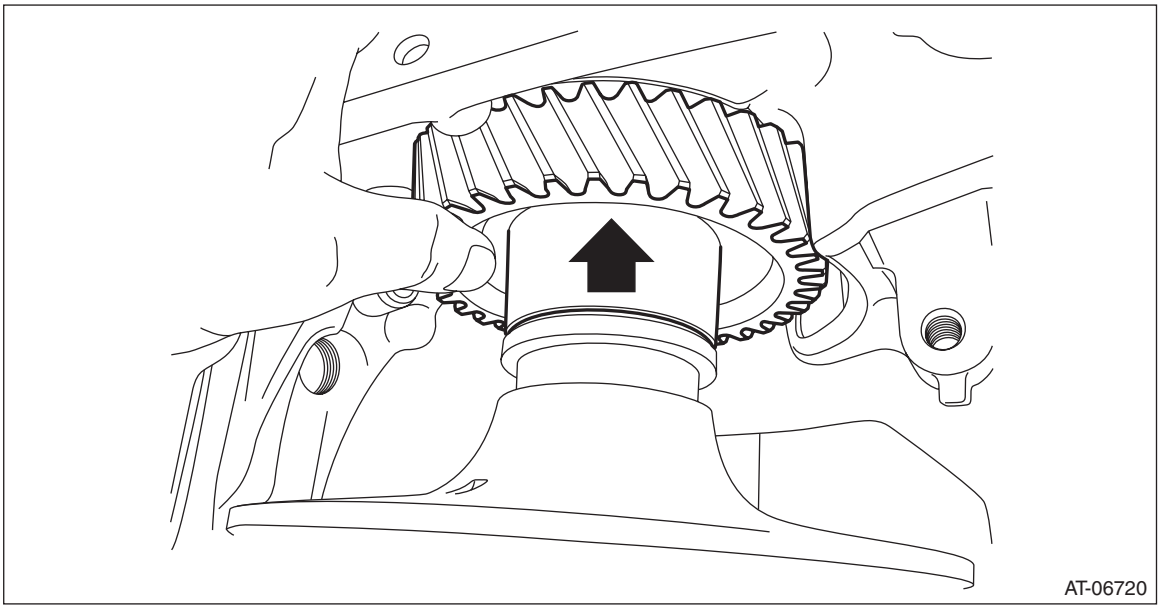
1) Install the transmission case, and secure it with four or five bolts.

Tightening torque:
22 N·m (2.2 kgf-m, 16.2 ft-lb)

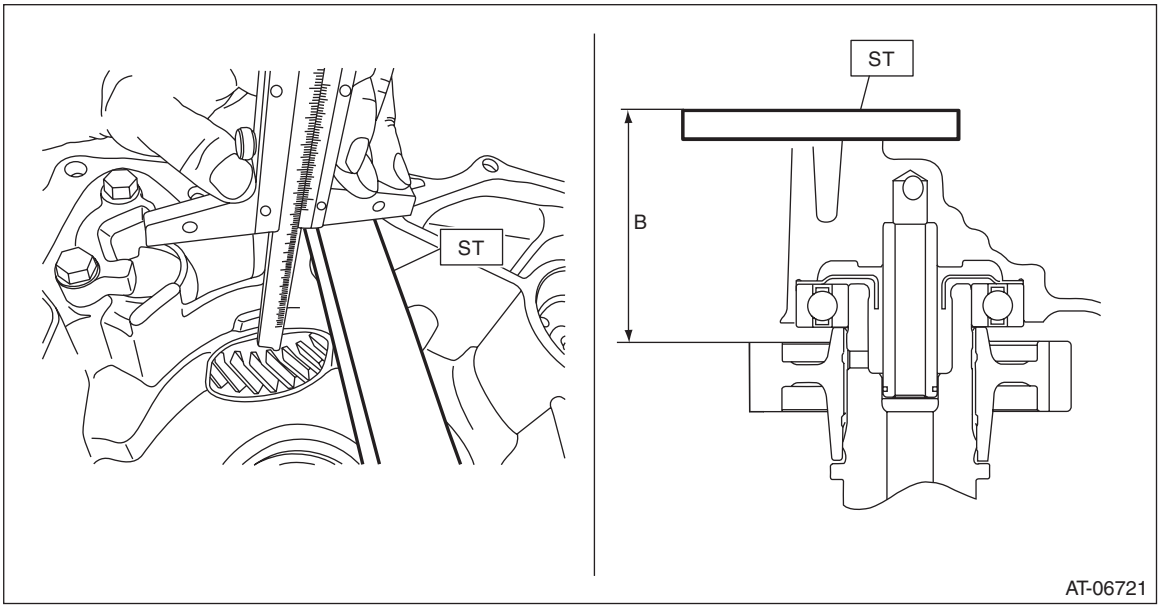
2) Measure depth “A” from the ST upper face to the reduction drive gear end face.
ST 499575400 GAUGE



3) Raise and hold the reduction drive gear.



4) Measure depth “B” from the ST upper face to the reduction drive gear end face.
ST 499575400 GAUGE



5) Calculate the following formula.
T mm = A – B – 1.0
[T in = A – B – 0.039]
T: Moving distance of reduction drive gear
A: Depth from the ST upper face to the reduction drive gear end surface
B: Depth from the ST upper face to the reduction drive gear end surface
1.0 mm (0.039 in): Thickness of spring retainer

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

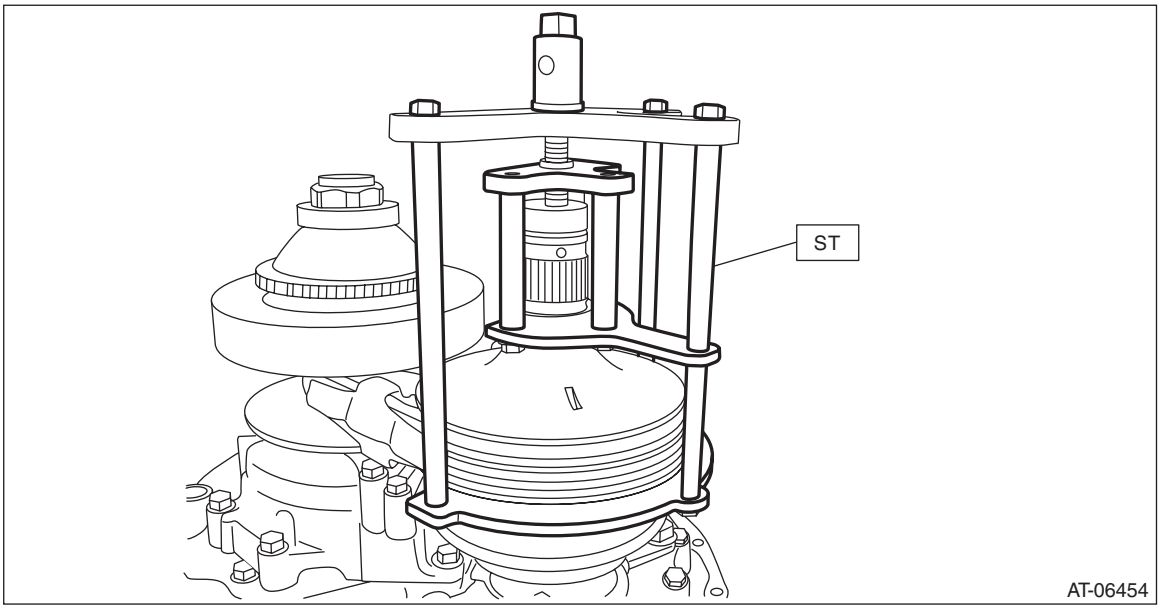
6) Select one to three reduction drive gear shims so that the total thickness meets the value obtained from step 5).

Part No.	Reduction drive gear shim thickness mm (in)
31288AA260	0.3 (0.012)
31288AA270	0.4 (0.016)
31288AA280	0.5 (0.020)
31288AA290	0.6 (0.024)

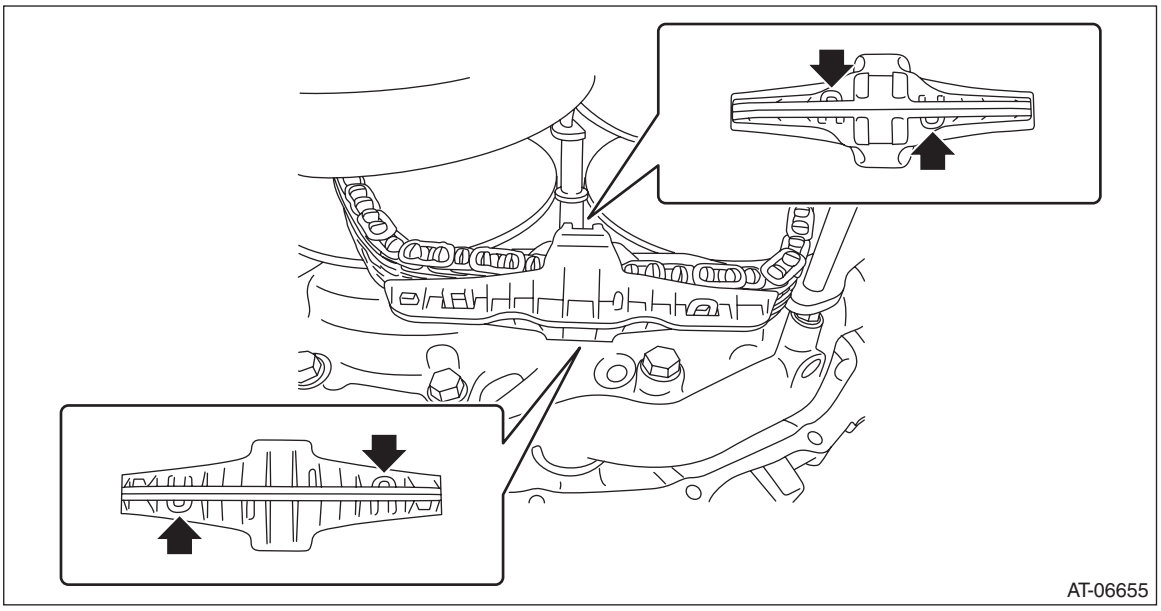
37.Primary Pulley and Secondary Pulley

A: REMOVAL

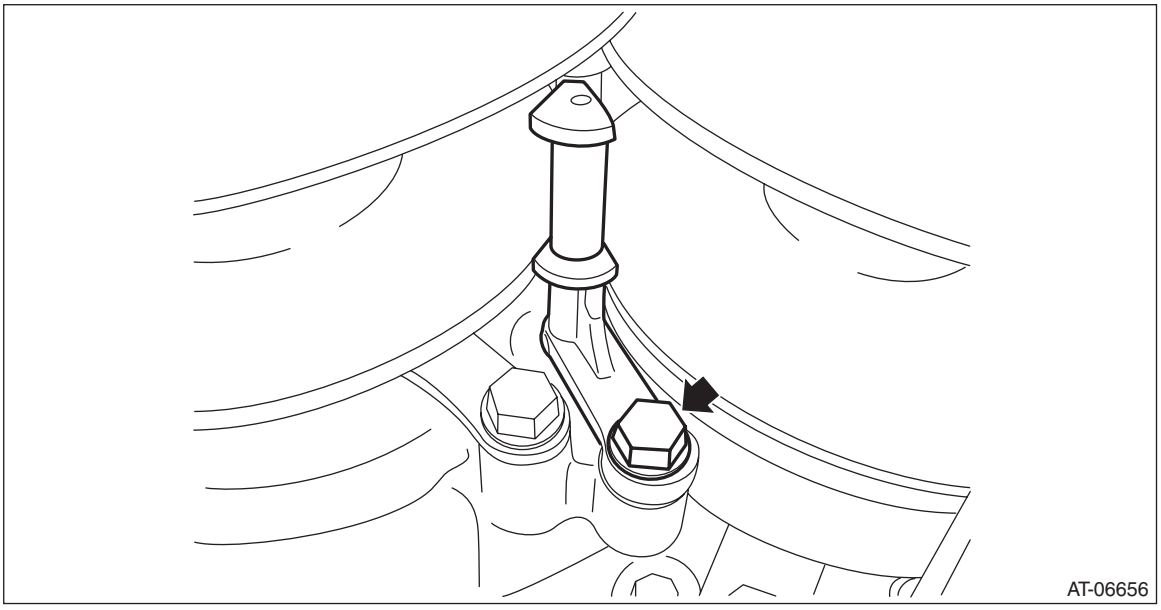
NOTE:
Always replace primary pulley and secondary pulley as an assembly because they are non-disassembled parts.
1) Remove the transmission assembly from the vehicle. <Ref. to CVT-57, REMOVAL, Automatic Transmission Assembly.>
2) Remove the air breather hose. <Ref. to CVT-154, REMOVAL, Air Breather Hose.>
3) Remove the control valve body. <Ref. to CVT-116, REMOVAL, Control Valve Body.>
4) Remove the transmission harness. <Ref. to CVT-129, REMOVAL, Transmission Harness.>
5) Remove the turbine speed sensor. <Ref. to CVT-103, REMOVAL, Turbine Speed Sensor.>
6) Remove the secondary speed sensor. <Ref. to CVT-105, REMOVAL, Secondary Speed Sensor.>
7) Remove the primary speed sensor. <Ref. to CVT-107, REMOVAL, Primary Speed Sensor.>
8) Remove the inhibitor switch. <Ref. to CVT-99, REMOVAL, Inhibitor Switch.>
9) Remove the extension case. <Ref. to CVT-163, REMOVAL, Extension Case.>
10) Remove the transfer clutch assembly. <Ref. to CVT-167, REMOVAL, Transfer Clutch.>
11) Remove the transfer driven gear assembly. <Ref. to CVT-181, REMOVAL, Transfer Driven Gear.>
12) Remove the parking pawl. <Ref. to CVT-184, REMOVAL, Parking Pawl.>
13) Remove the reduction driven gear assembly. <Ref. to CVT-186, REMOVAL, Reduction Driven Gear.>
14) Remove the oil pan and oil strainer. <Ref. to CVT-112, REMOVAL, Oil Pan and Strainer.>
15) Remove the transmission control device. <Ref. to CVT-194, REMOVAL, Transmission Control Device.>
16) Remove the transmission case. <Ref. to CVT-200, REMOVAL, Transmission Case.>
17) Remove the reduction drive gear. <Ref. to CVT-212, REMOVAL, Reduction Drive Gear.>
18) Set the ST to secondary pulley, expand the V groove of pulley, and then completely loosen the variator chain.
ST 18769AA010 EXPANDER PULLEY



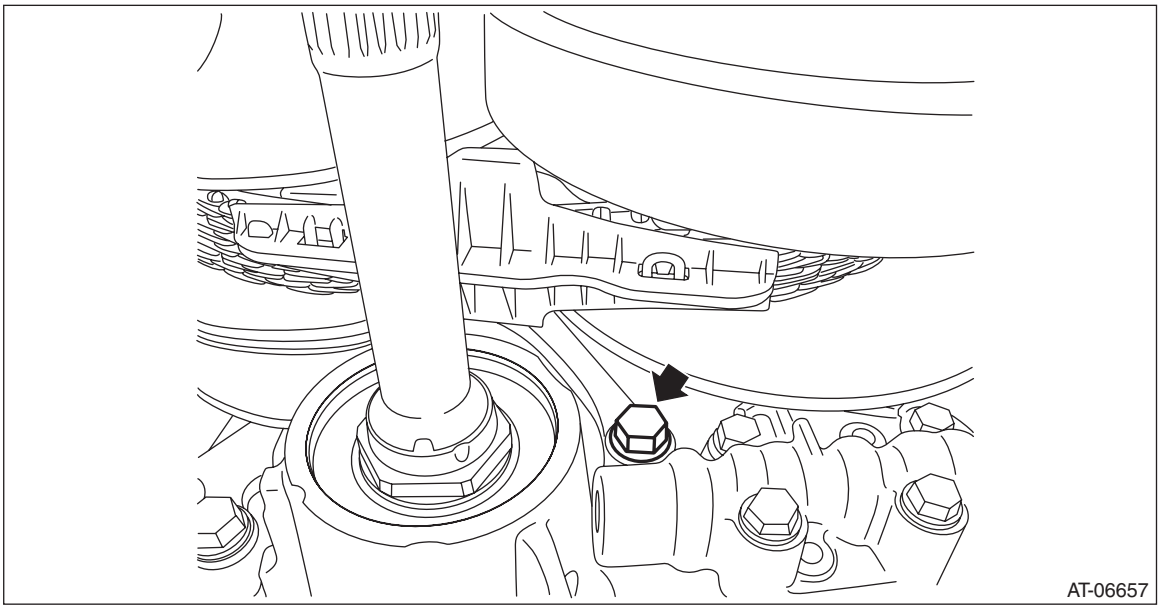
19) Remove the chain guide.
(1) Remove the chain guide from lubrication pipe.
(2) Detach the four claws to remove the chain guide.



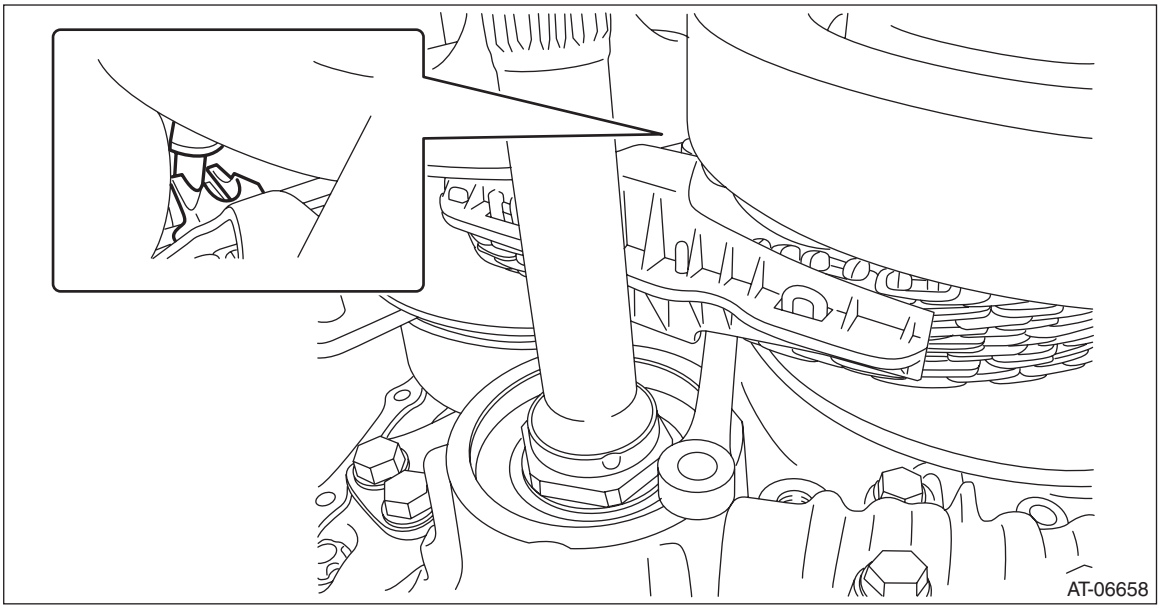
(3) Remove the lubrication pipe.



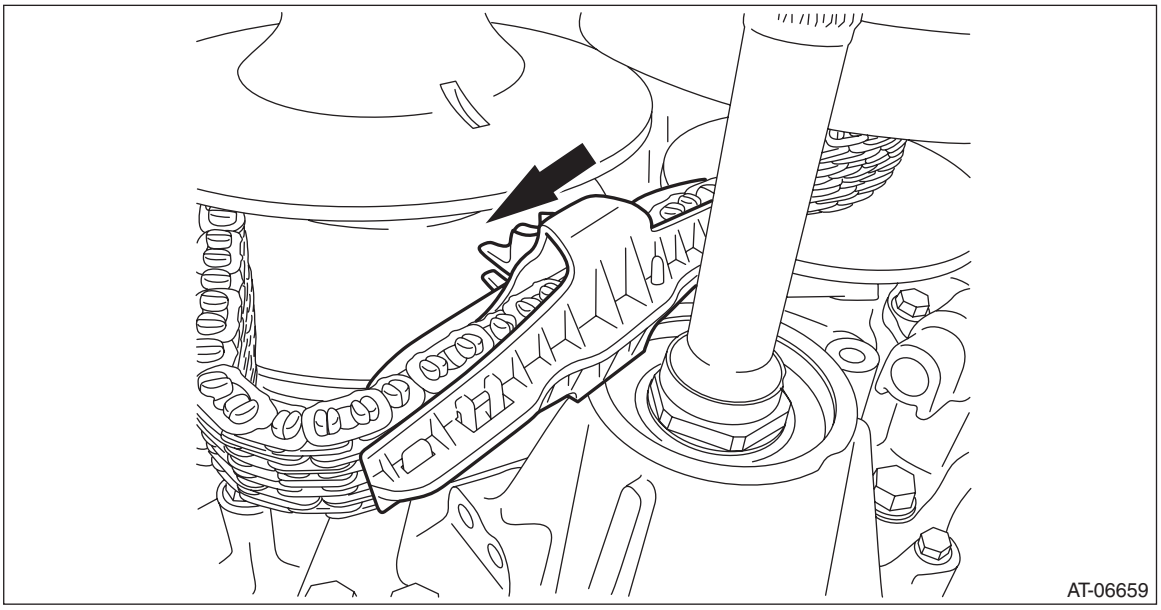
(4) Remove the support rod mounting bolts.



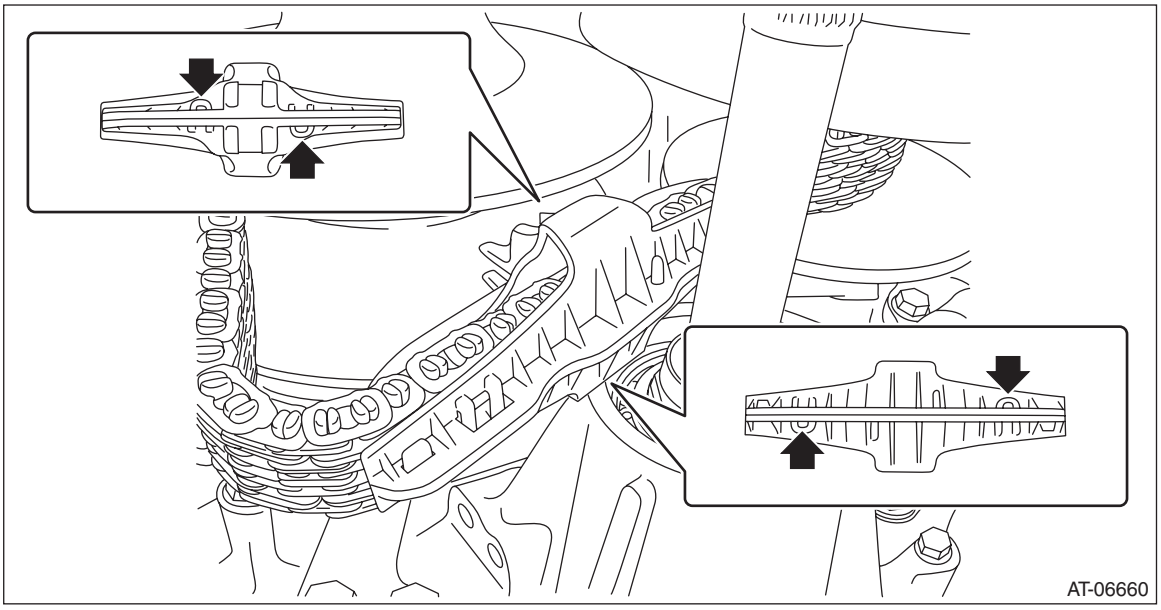
(5) Raise the support rod to remove the chain guide.



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

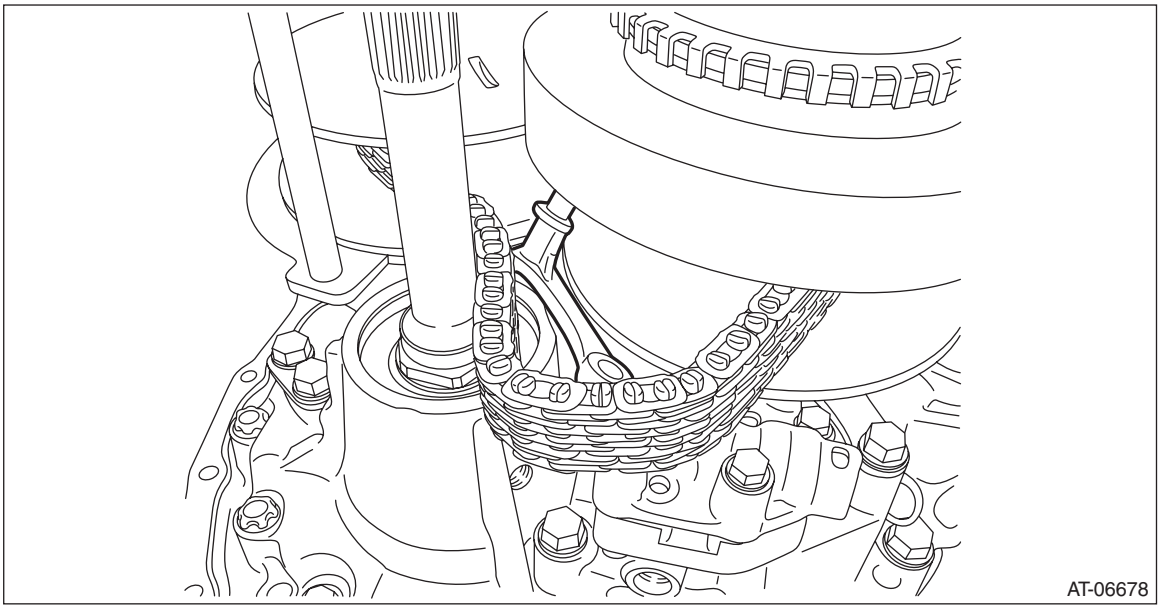


(7) Detach the four claws to remove the chain guide.

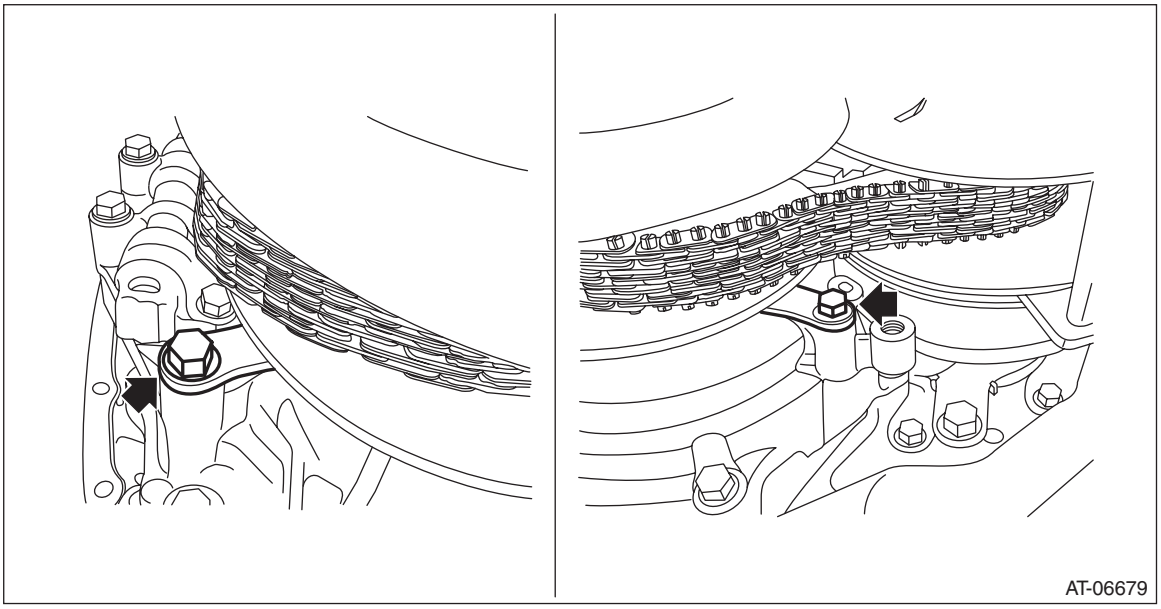


(8) Remove the support rod.

CAUTION:
Protect the both pulleys and variator chain from scratching.

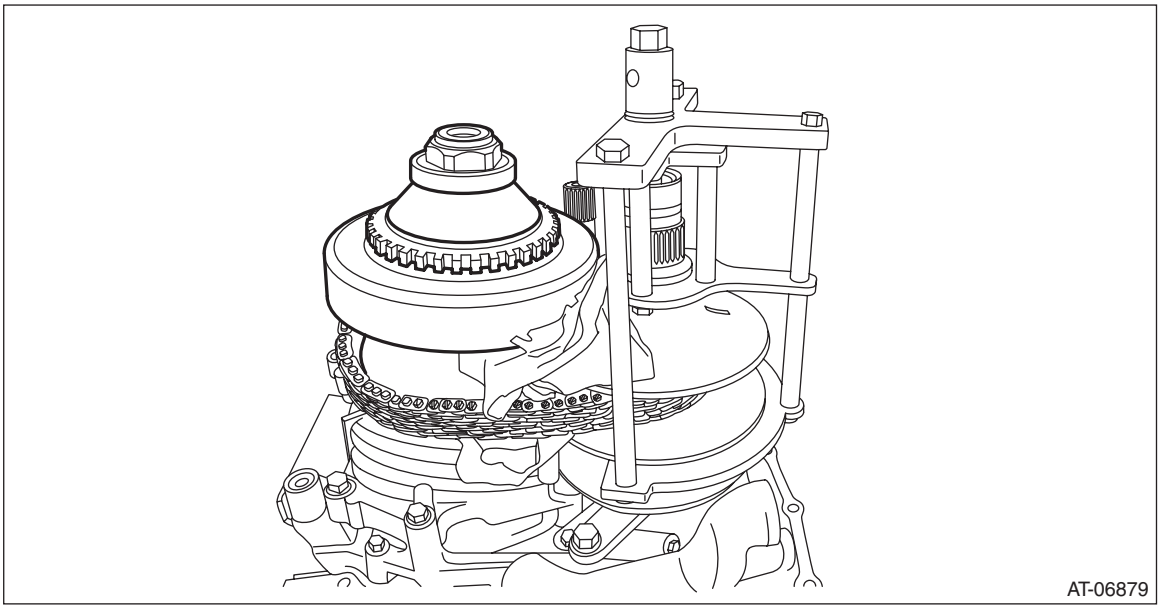


20) Remove the primary pulley mounting bolt.

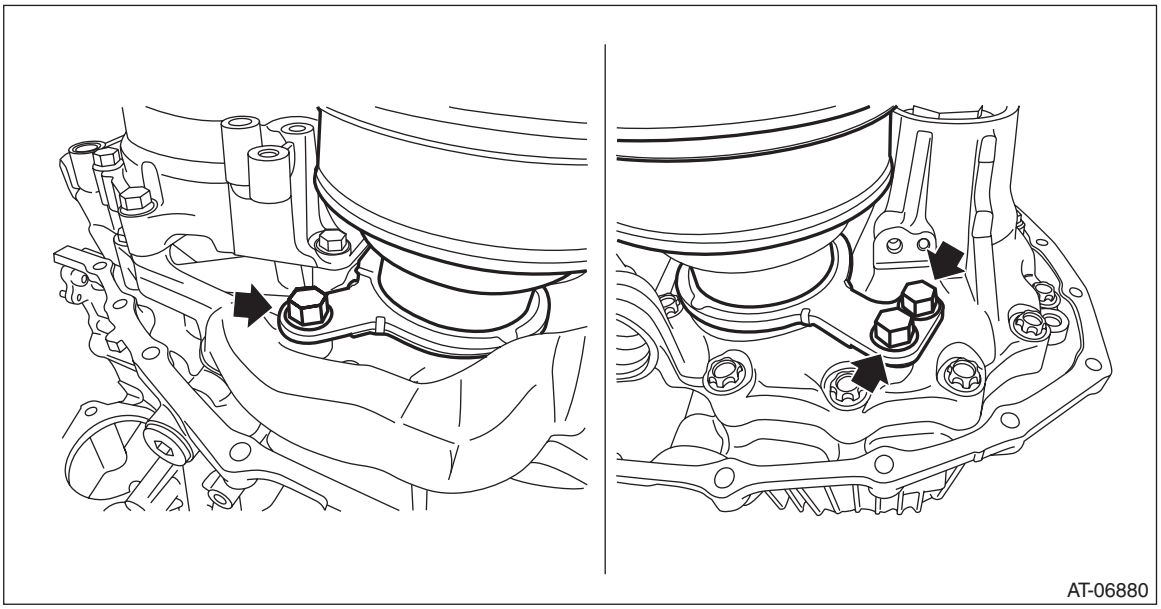


21) Remove the primary pulley from the reverse brake housing and intersect the V groove of secondary pulley and the V groove of primary pulley. Remove the variator chain from primary pulley, and remove the primary pulley.

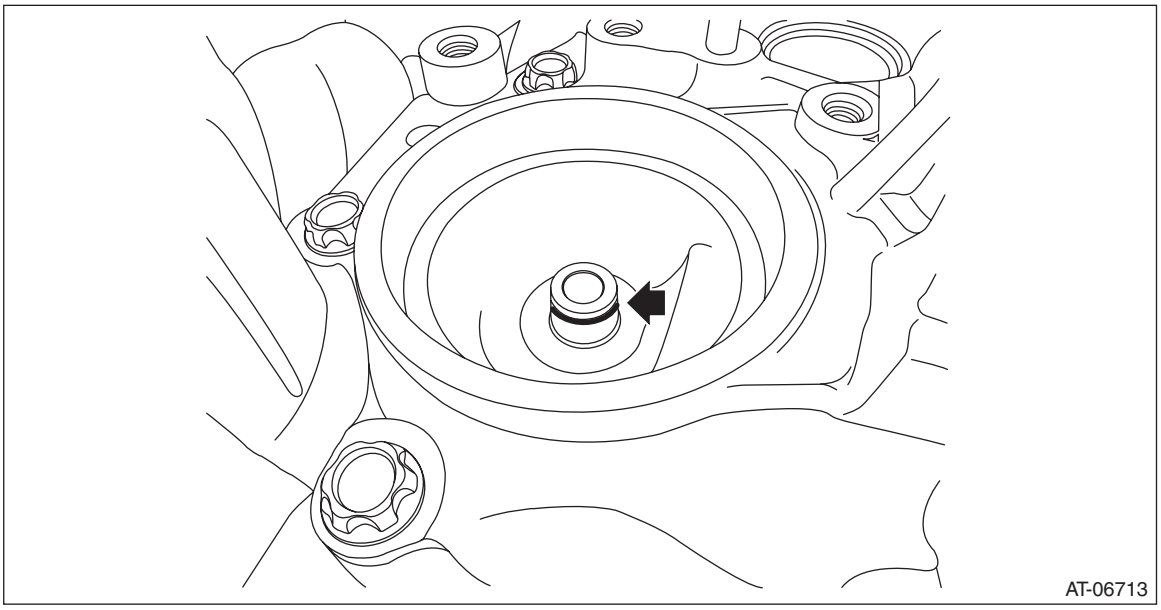
CAUTION:
Cover the V grooves of secondary pulley and primary pulley with cloth to protect the both pulleys and variator chain from scratching.



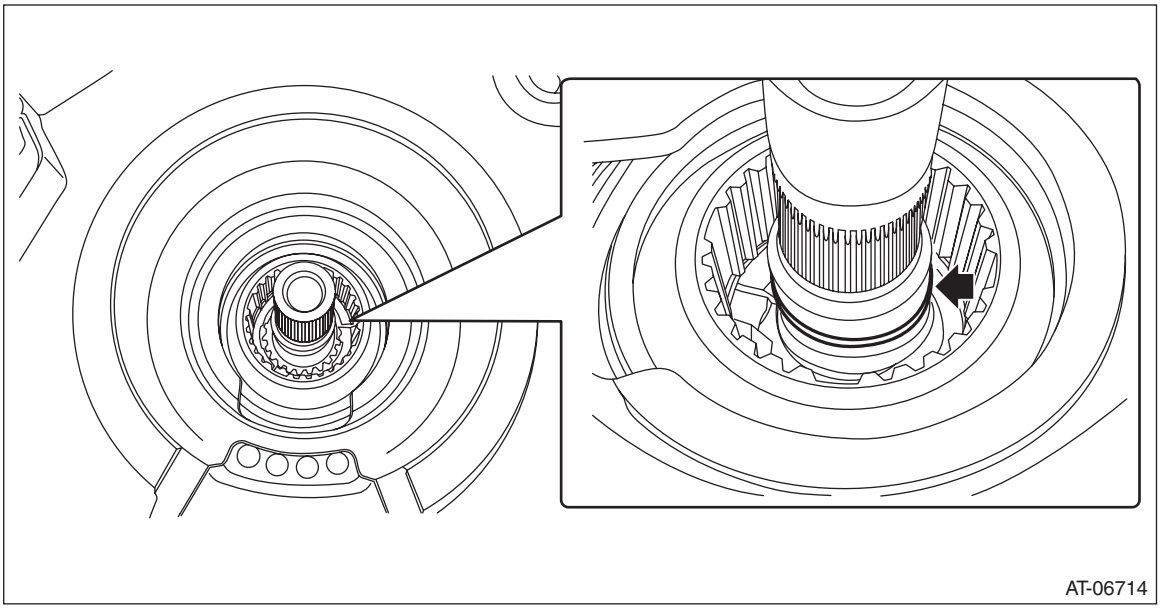
22) Remove the ST (EXPANDER PULLEY) from the secondary pulley.
23) Remove the variator chain from secondary pulley.
24) Remove the secondary pulley mounting bolts, and remove the secondary pulley.



25) Remove the seal ring from drive pinion retainer.



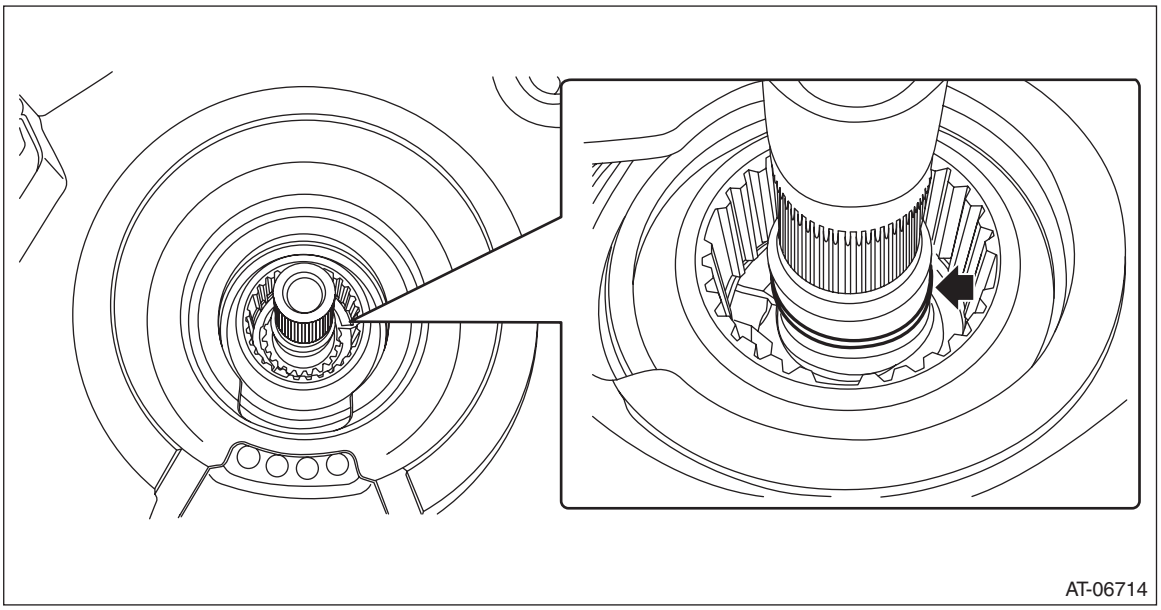
26) Remove the seal ring from the input shaft.



B: INSTALLATION

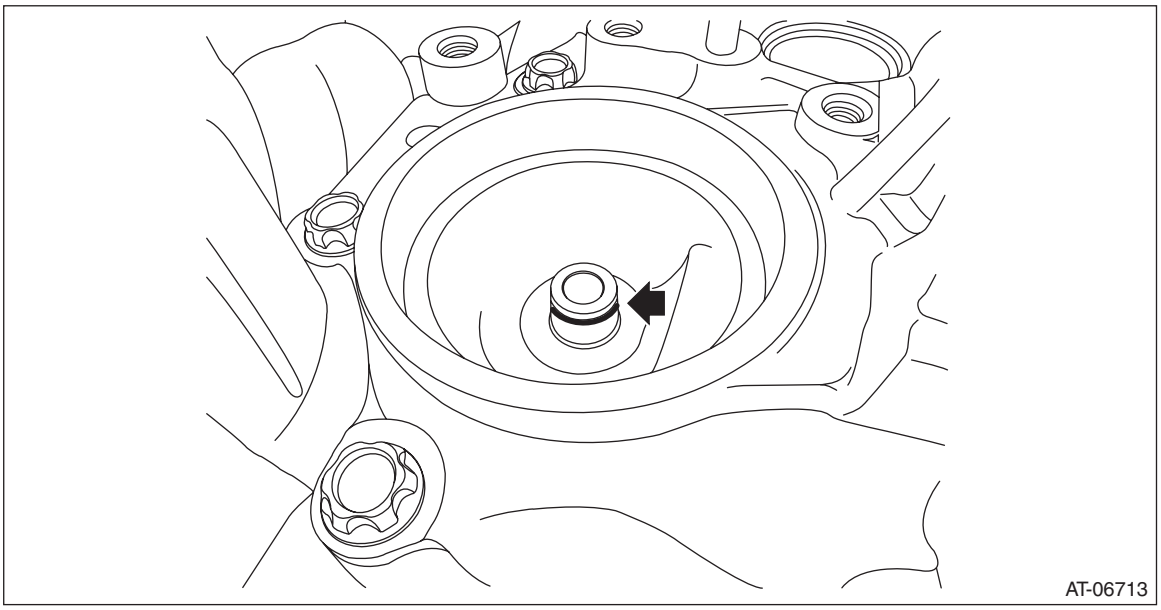
1) Select shims for pulley alignment. <Ref. to CVT-231, ADJUSTMENT, Primary Pulley and Secondary Pulley.>
2) Install the seal ring to the input shaft.

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



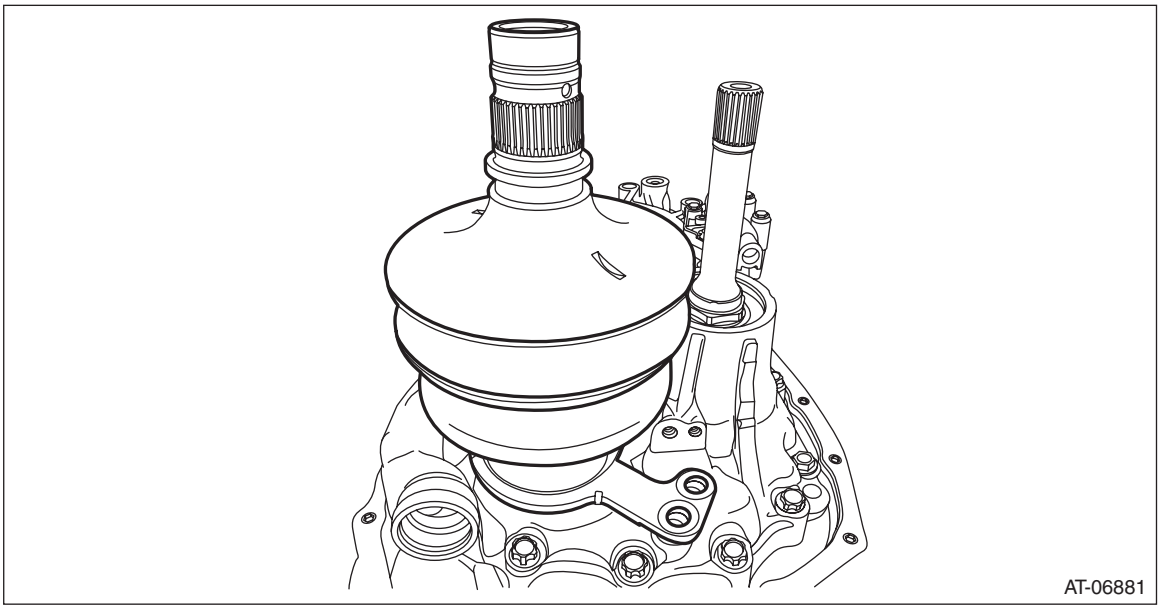
3) Install the seal ring to drive pinion retainer.

NOTE:
- Use a new seal ring.
- Apply CVTF to the seal rings.



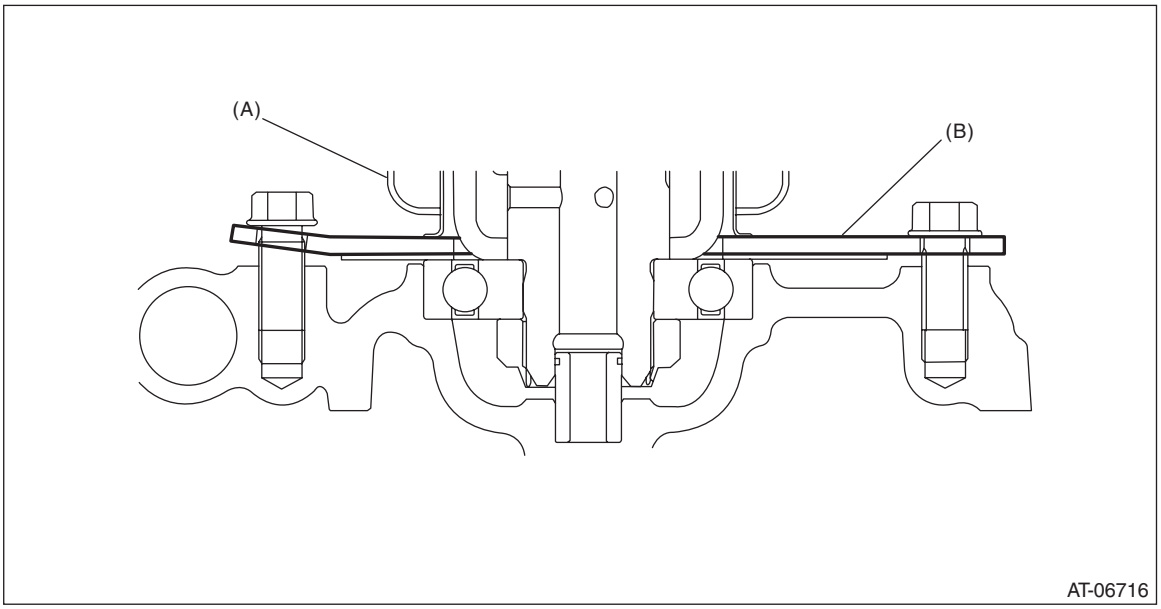
4) Install the selected shims to the primary pulley bearing catch surface.

5) Install the secondary pulley to the drive pinion retainer.



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

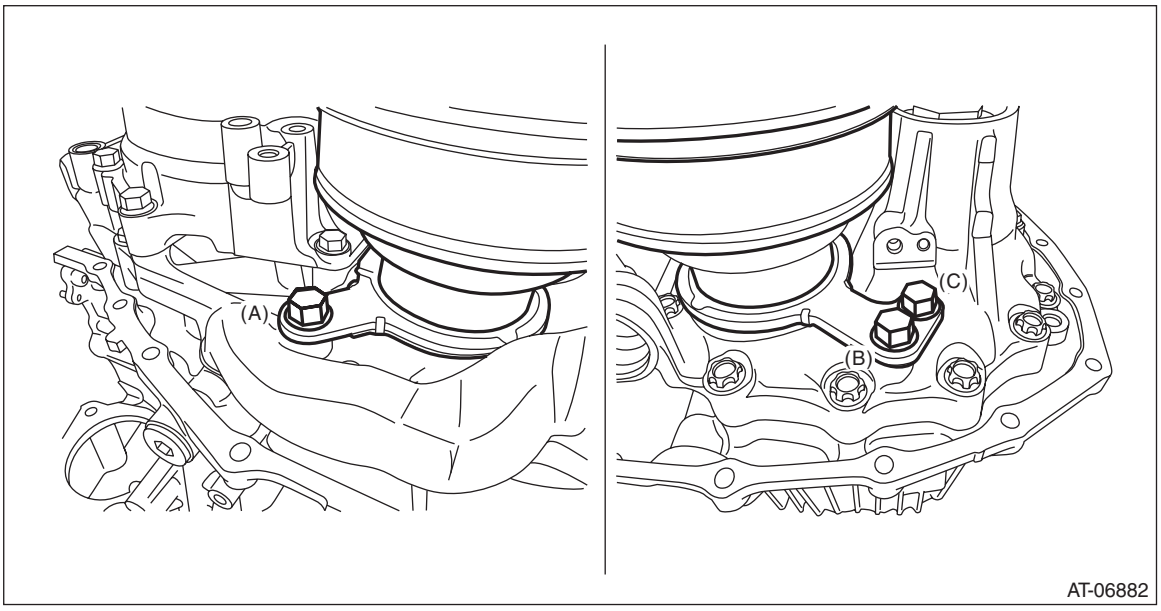
NOTE:
- Be careful not to tilt the bearing retainer of the secondary pulley.
- Apply CVTF to the bolt.



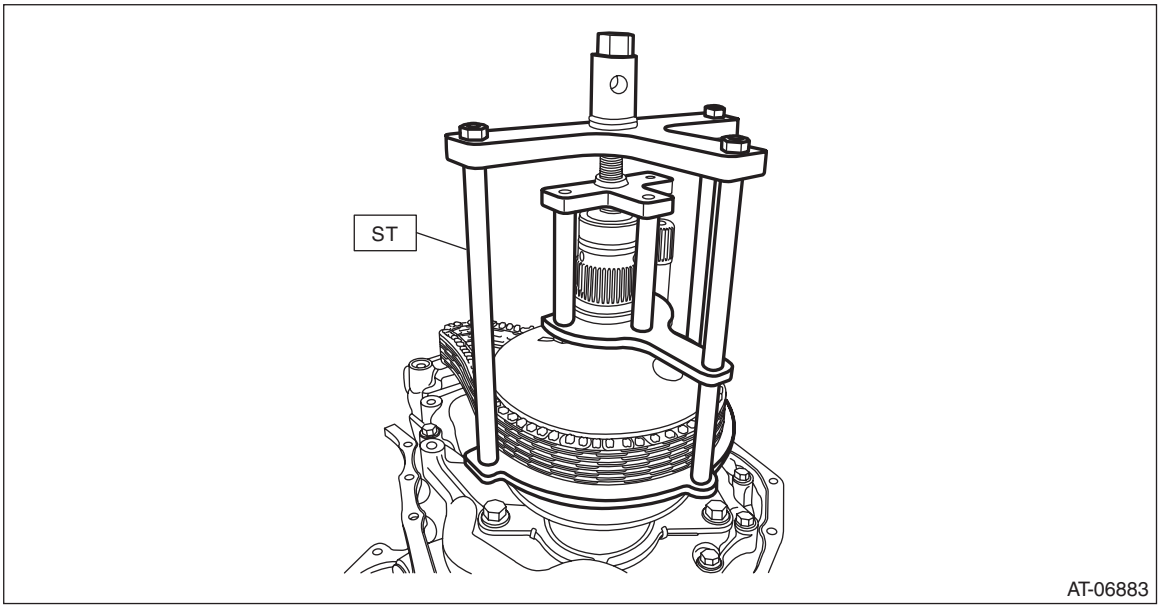
(A) Secondary pulley
(B) Bearing retainer

(2) Tighten the bolts in the order of (A) → (B) → (C) → (B).

Tightening torque:
67.5 N·m (6.9 kgf-m, 49.8 ft-lb)



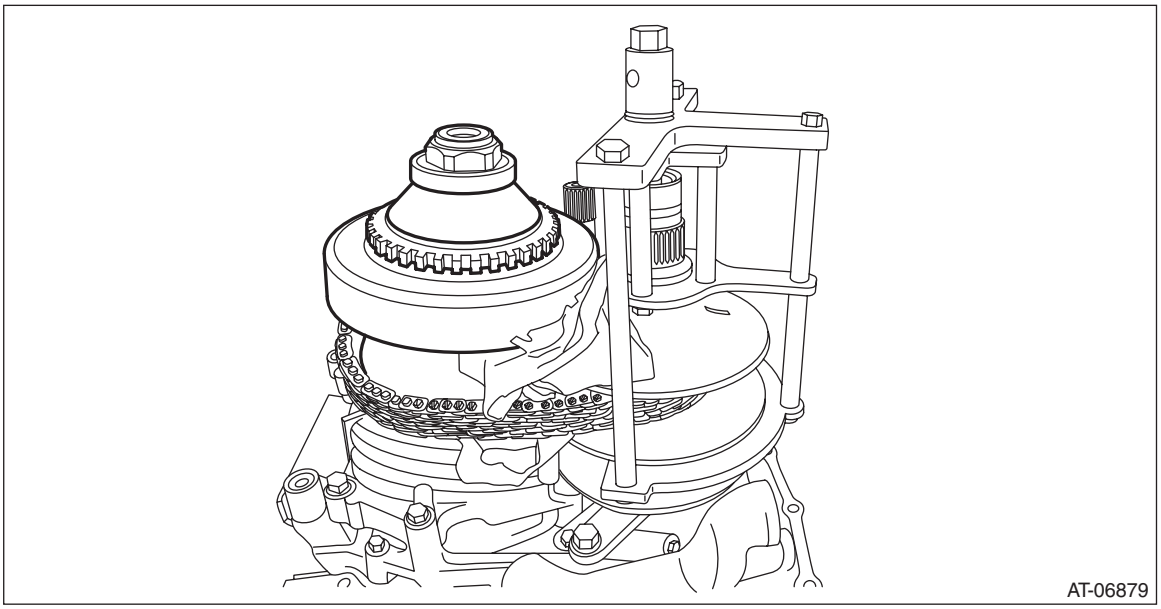
7) Place the variator chain on the V groove of the secondary pulley, and set the ST.
ST 18769AA010 EXPANDER PULLEY



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

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

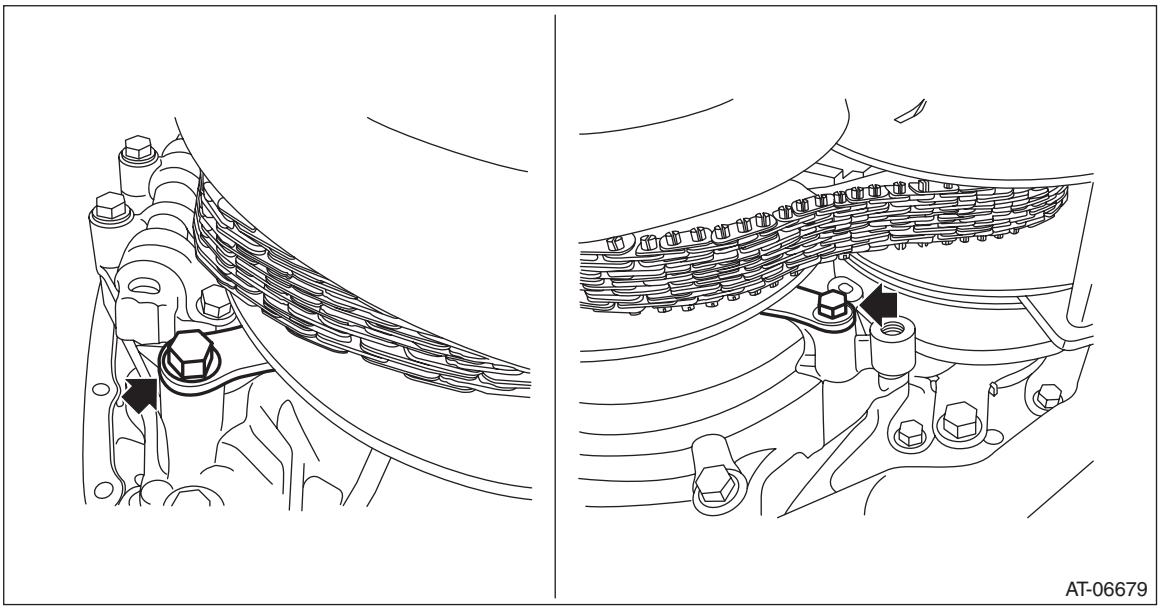
(1) Intersect the V groove of primary pulley and the V groove of secondary pulley and install the secondary pulley while placing the variator chain on secondary pulley.



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

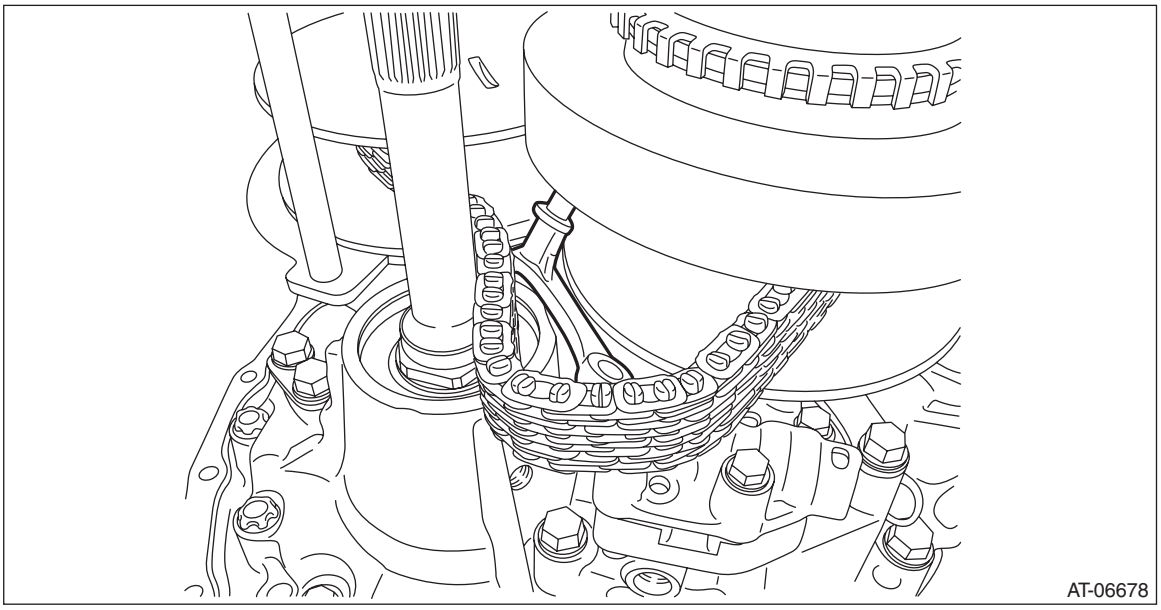
10) Install the primary pulley bolt.

Tightening torque:
21 N·m (2.1 kgf-m, 24.3 ft-lb)

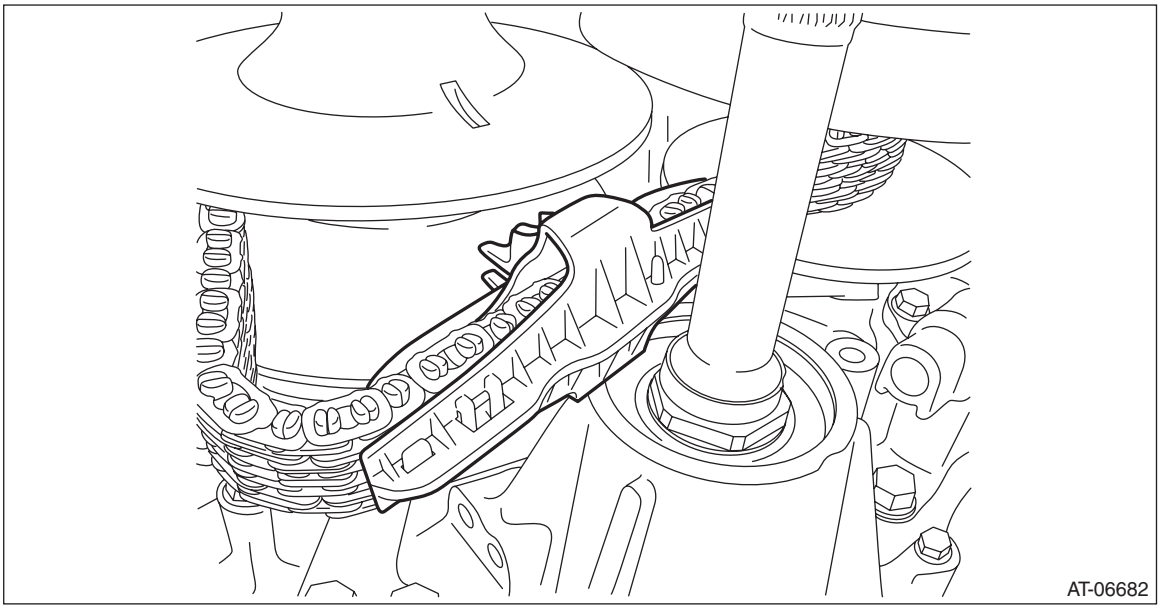


11) Install the chain guide.
(1) Place the support rod inside of the variator chain.

CAUTION:
Protect the both pulleys and variator chain from scratching.

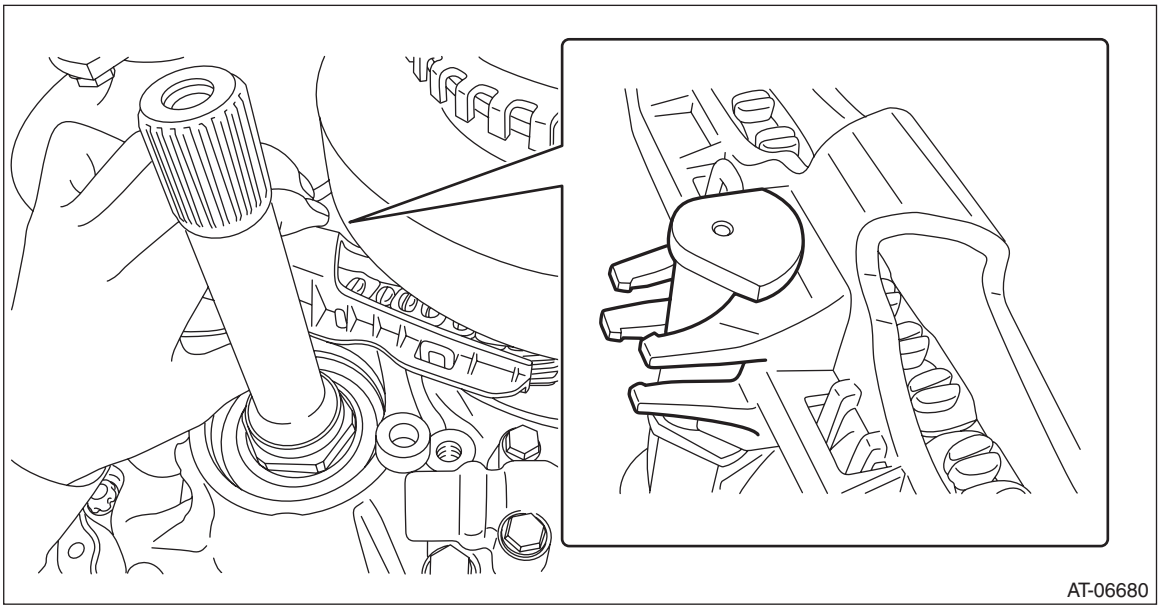

AT-06678

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


AT-06682

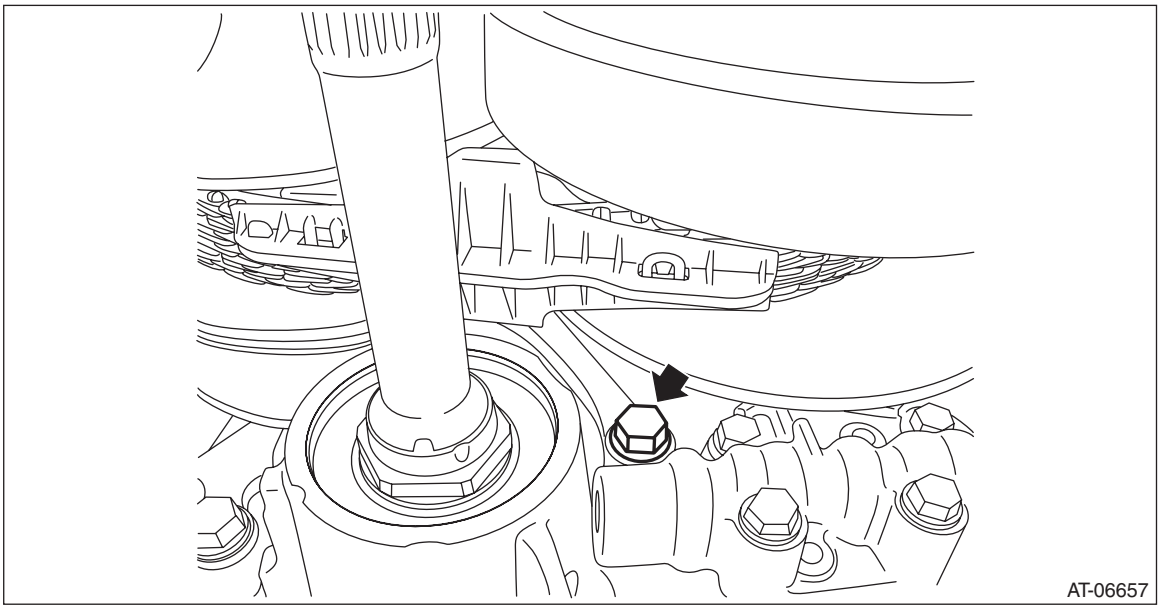
(3) Move the chain guide to the support rod side.

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



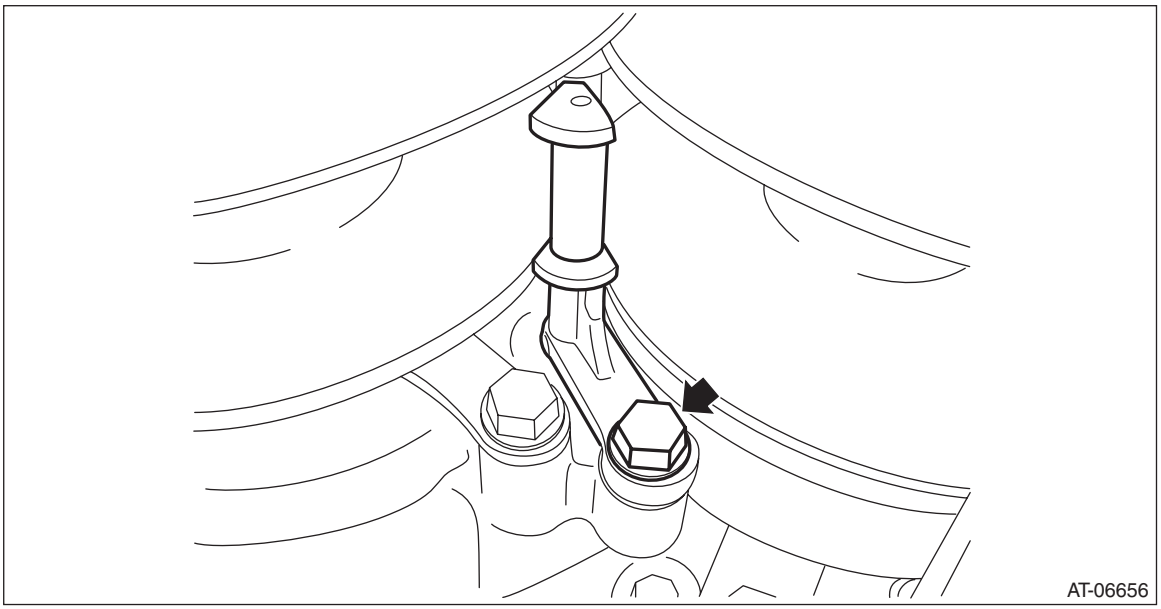
(5) Install the support rod.

Tightening torque:
21 N·m (2.1 kgf-m, 15.5 ft-lb)

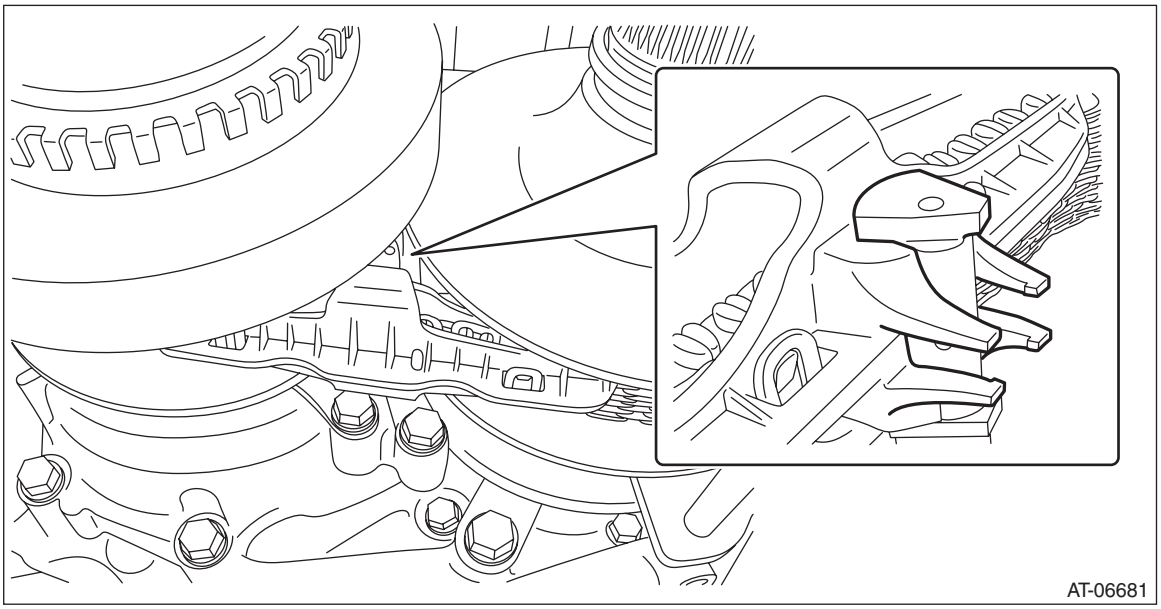


(6) Install the lubrication pipe.

Tightening torque:
21 N·m (2.1 kgf-m, 15.5 ft-lb)



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



12) Install the reduction drive gear. <Ref. to CVT-213, INSTALLATION, Reduction Drive Gear.>
13) Select the reduction drive gear shim. <Ref. to CVT-215, ADJUSTMENT, Reduction Drive Gear.>
14) Install the transmission case. <Ref. to CVT-202, INSTALLATION, Transmission Case.>
15) Install the transmission control device. <Ref. to CVT-197, INSTALLATION, Transmission Control Device.>
16) Install the oil strainer and oil pan. <Ref. to CVT-113, INSTALLATION, Oil Pan and Strainer.>
17) Install the reduction driven gear assembly. <Ref. to CVT-186, INSTALLATION, Reduction Driven Gear.>
18) Install the transfer driven gear assembly. <Ref. to CVT-182, INSTALLATION, Transfer Driven Gear.>
19) Install the transfer clutch assembly. <Ref. to CVT-169, INSTALLATION, Transfer Clutch.>
20) Install the parking pawl. <Ref. to CVT-185, INSTALLATION, Parking Pawl.>
21) Install the extension case. <Ref. to CVT-164, INSTALLATION, Extension Case.>
22) Install the inhibitor switch. <Ref. to CVT-101, INSTALLATION, Inhibitor Switch.>
23) Install the secondary speed sensor. <Ref. to CVT-105, INSTALLATION, Secondary Speed Sensor.>

24) Install the primary speed sensor. <Ref. to CVT-108, INSTALLATION, Primary Speed Sensor.>
25) Install the turbine speed sensor. <Ref. to CVT-103, INSTALLATION, Turbine Speed Sensor.>
26) Install the transmission harness. <Ref. to CVT-136, INSTALLATION, Transmission Harness.>
27) Install the control valve body. <Ref. to CVT-122, INSTALLATION, Control Valve Body.>
28) Install the air breather hose. <Ref. to CVT-156, INSTALLATION, Air Breather Hose.>
29) Install the transmission assembly to the vehicle. <Ref. to CVT-72, INSTALLATION, Automatic Transmission Assembly.>

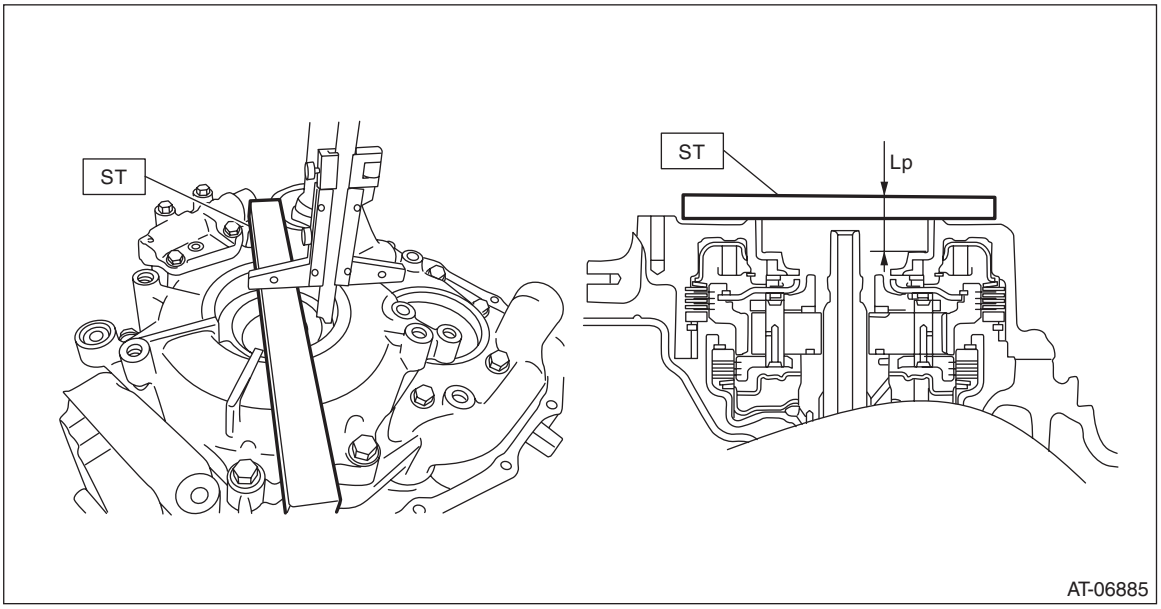
C: INSPECTION

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

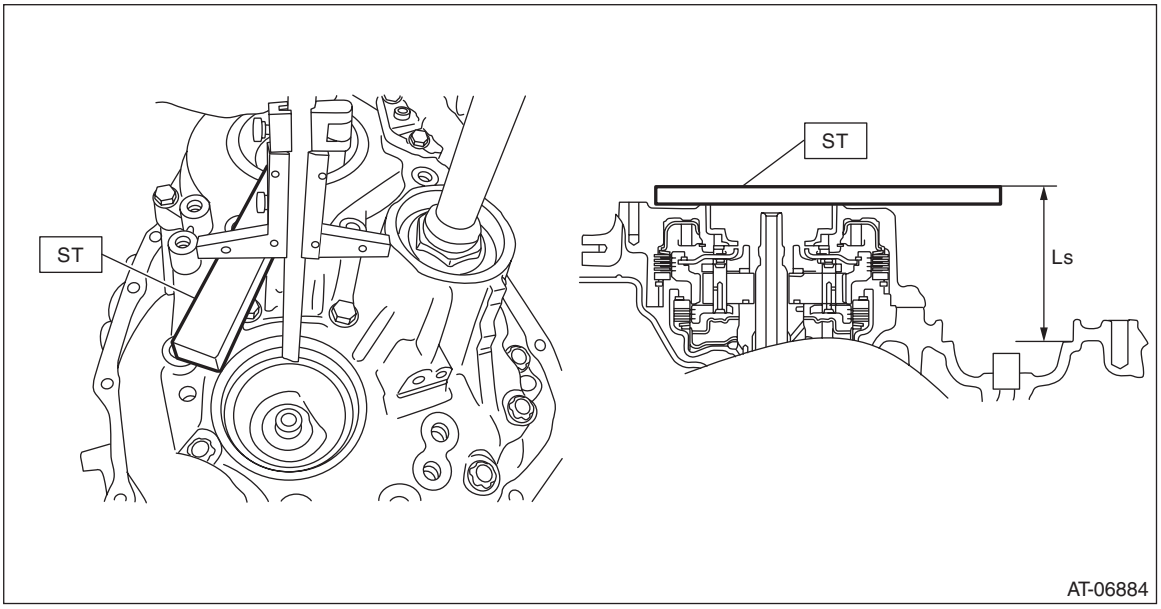
D: ADJUSTMENT

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

1) Measure depth “Lp” from the ST upper face to the primary pulley bearing catch surface at several points and calculate the average.
ST 499575400 GAUGE



2) Measure the depth “Ls” from the ST upper face to the secondary pulley bearing catch surface at several points and calculate the average.
ST 499575400 GAUGE



3) Calculate the following formula.
Calculation formula:
T (mm) = B – A + Lp – Ls – 28.602
[T (in) = B – A + Lp – Ls – 1.126]
T: Pulley alignment
A: Specified primary pulley dimension
B: Specified secondary pulley dimension
Lp: Depth from the ST upper face to the primary pulley bearing catch surface
Ls: Depth from the ST upper face to the secondary pulley bearing catch surface
28.602 mm (1.126 in): Constant

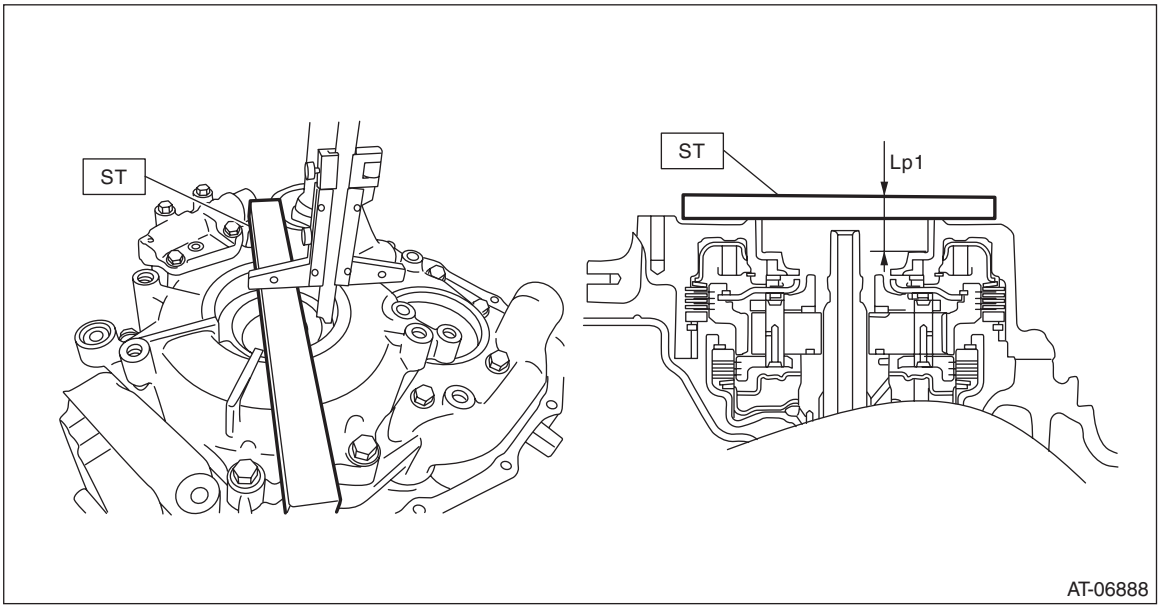
Pulley alignment T mm (in)	Thickness of shim mm (in)
–0.05 — 0.049 (–0.002 — 0.002)	No shims
0.050 — 0.149 (0.002 — 0.006)	0.1 (0.004)
0.150 — 0.249 (0.006 — 0.010)	0.2 (0.008)
0.250 — 0.349 (0.010 — 0.014)	0.3 (0.012)
0.350 — 0.449 (0.014 — 0.018)	0.4 (0.016)
0.450 — 0.549 (0.018 — 0.022)	0.5 (0.020)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

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

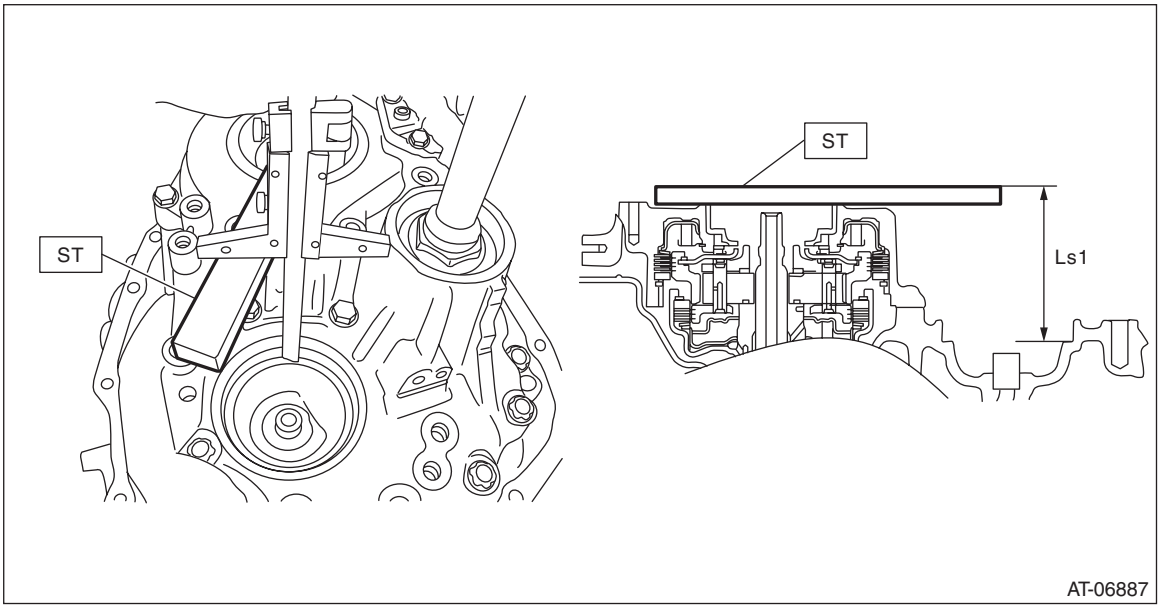
Part No.	Shim thickness mm (in)
32451AA050	0.1 (0.004)
32451AA060	0.2 (0.008)
32451AA070	0.3 (0.012)
32451AA080	0.4 (0.016)
32451AA090	0.5 (0.020)
32451AA100	0.6 (0.024)

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

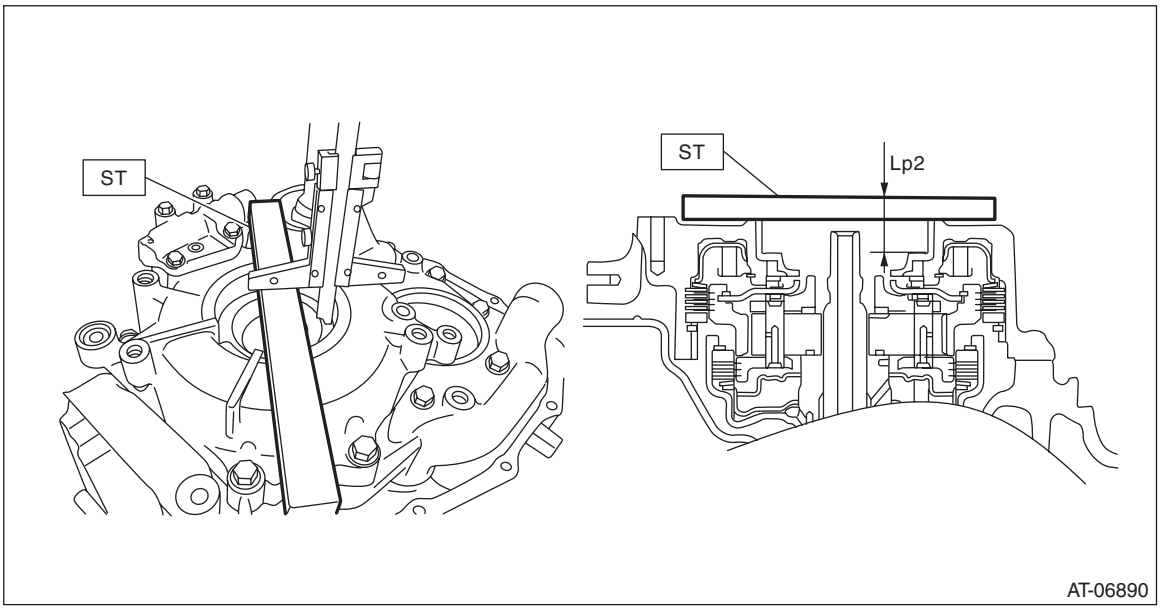
1) Clean the mating surface of current drive pinion retainer and converter case.
2) Measure and record the shim thickness that is attached on the current reverse brake housing.
3) Using the current drive pinion retainer, measure the depth “Lp1” from the ST upper face to the primary pulley bearing catch surface at several points and calculate the average.
ST 499575400 GAUGE



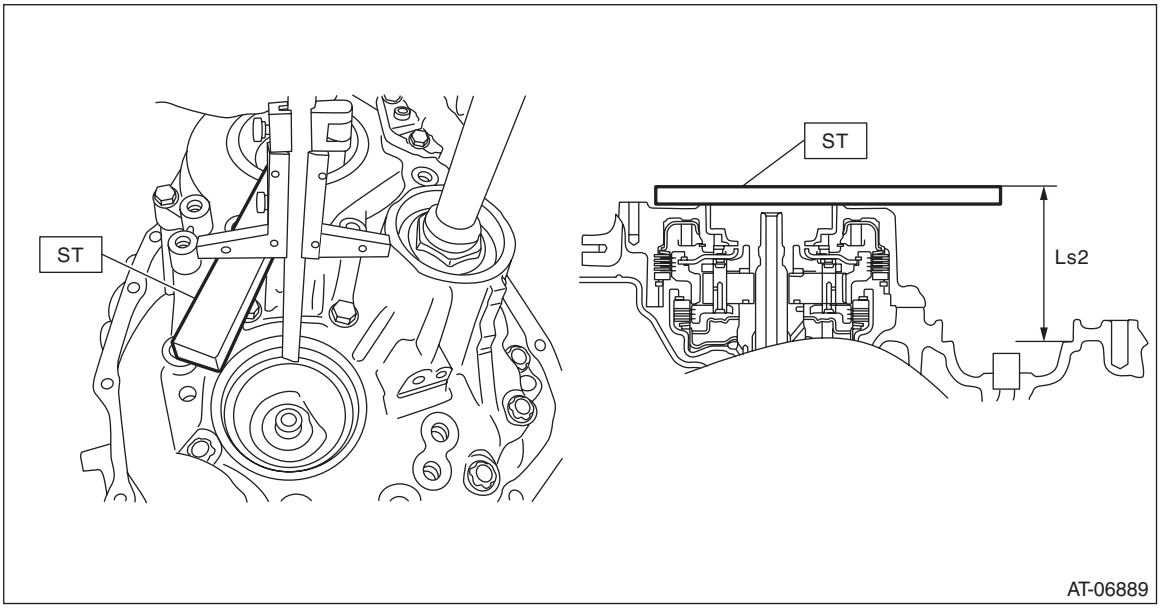
4) Using the current drive pinion retainer or current reverse brake housing, measure the depth “Ls1” from the ST upper face to the secondary pulley bearing catch surface at several points and calculate the average.
ST 499575400 GAUGE



5) Calculate the “LD1” using the following formula and record it.
Calculation formula:
LD1 mm (in) = Ls1 – Lp1
LD1: Height from the primary pulley bearing catch surface to the secondary pulley bearing catch surface
Lp1: Depth from the ST upper face to the primary pulley bearing catch surface
Ls1: Depth from the ST upper face to the secondary pulley bearing catch surface
6) Using the new drive pinion retainer or new reverse brake housing, measure the depth “Lp2” from the ST upper face to the primary pulley bearing catch surface at several points and calculate the average.
ST 499575400 GAUGE



7) Using the new drive pinion retainer or new reverse brake housing, measure the depth “Ls2” from the ST upper face to the secondary pulley bearing catch surface at several points and calculate the average.
ST 499575400 GAUGE



8) Calculate the “LD2” using the following formula and record it.
Calculation formula:
LD2 mm (in) = Ls2 – Lp2
LD2: Height from the primary pulley bearing catch surface to the secondary pulley bearing catch surface
Lp2: Depth from the ST upper face to the primary pulley bearing catch surface
Ls2: Depth from the ST upper face to the secondary pulley bearing catch surface

9) Calculate the recorded values of “LD1” and “LD2” to obtain the positive number to select the shims.
Calculation formula: T1 mm (in) = LD1 – LD2 or T2 mm (in) = LD2 – LD1
T1, T2: Difference between new drive pinion retainer or new reverse brake housing and current drive pinion retainer or current reverse brake housing
LD1: Calculated value of current drive pinion retainer or current reverse brake housing
LD2: Calculated value of new drive pinion retainer or new reverse brake housing

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

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

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

38.Variator Chain

A: REMOVAL

For removal of variator chain, refer to “Primary Pulley and Secondary Pulley”. <Ref. to CVT-217, REMOVAL, Primary Pulley and Secondary Pulley.>

B: INSTALLATION

For installation of variator chain, refer to “Primary Pulley and Secondary Pulley”. <Ref. to CVT-224, INSTALLATION, Primary Pulley and Secondary Pulley.>

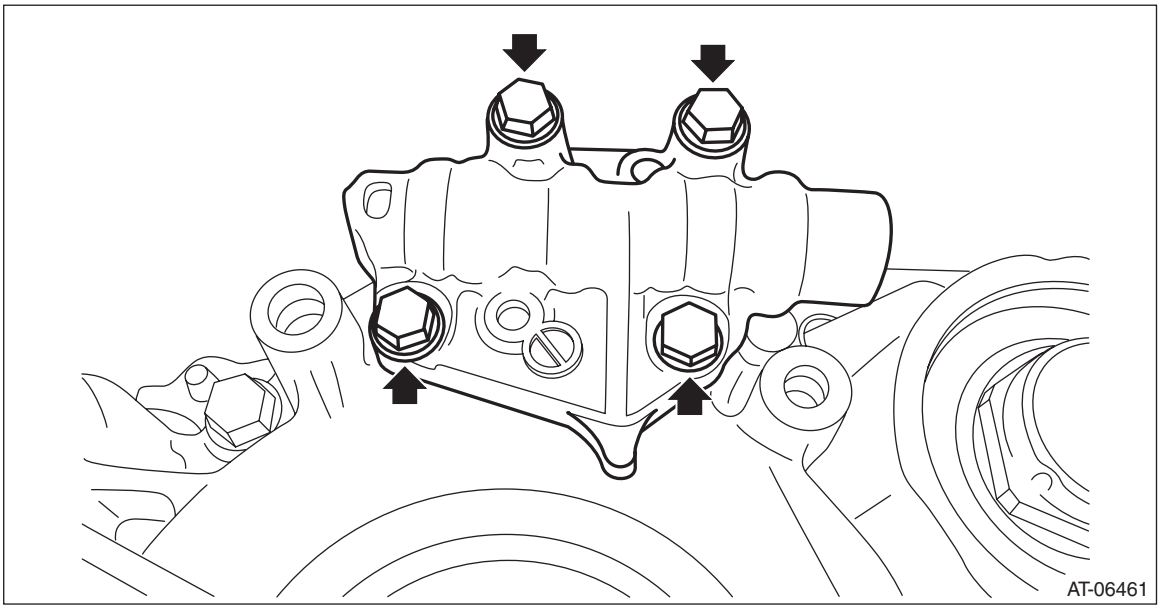
C: INSPECTION

Check the variator chain for damage and wear.

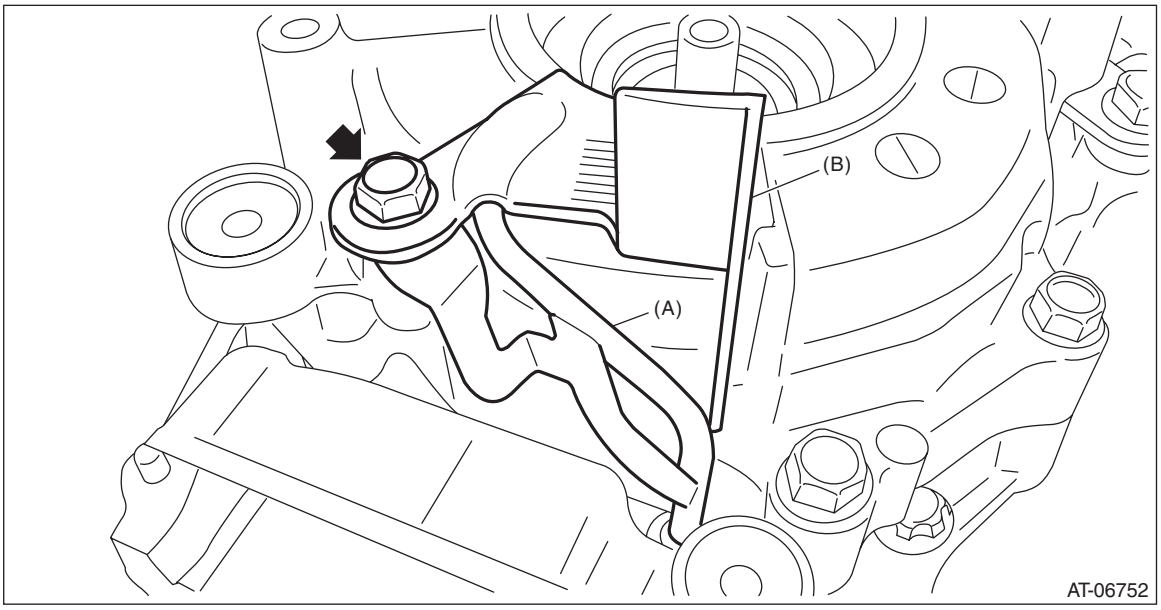
39.Reverse Brake Assembly

A: REMOVAL

1) Remove the transmission assembly from the vehicle. <Ref. to CVT-57, REMOVAL, Automatic Transmission Assembly.>
2) Remove the air breather hose. <Ref. to CVT-154, REMOVAL, Air Breather Hose.>
3) Remove the control valve body. <Ref. to CVT-116, REMOVAL, Control Valve Body.>
4) Remove the transmission harness. <Ref. to CVT-129, REMOVAL, Transmission Harness.>
5) Remove the turbine speed sensor. <Ref. to CVT-103, REMOVAL, Turbine Speed Sensor.>
6) Remove the secondary speed sensor. <Ref. to CVT-105, REMOVAL, Secondary Speed Sensor.>
7) Remove the primary speed sensor. <Ref. to CVT-107, REMOVAL, Primary Speed Sensor.>
8) Remove the inhibitor switch. <Ref. to CVT-99, REMOVAL, Inhibitor Switch.>
9) Remove the extension case. <Ref. to CVT-163, REMOVAL, Extension Case.>
10) Remove the transfer clutch assembly. <Ref. to CVT-167, REMOVAL, Transfer Clutch.>
11) Remove the transfer driven gear assembly. <Ref. to CVT-181, REMOVAL, Transfer Driven Gear.>
12) Remove the parking pawl. <Ref. to CVT-184, REMOVAL, Parking Pawl.>
13) Remove the reduction driven gear assembly. <Ref. to CVT-186, REMOVAL, Reduction Driven Gear.>
14) Remove the oil pan and oil strainer. <Ref. to CVT-112, REMOVAL, Oil Pan and Strainer.>
15) Remove the transmission control device. <Ref. to CVT-194, REMOVAL, Transmission Control Device.>
16) Remove the transmission case. <Ref. to CVT-200, REMOVAL, Transmission Case.>
17) Remove the reduction drive gear. <Ref. to CVT-212, REMOVAL, Reduction Drive Gear.>
18) Remove the primary pulley, secondary pulley and variator chain. <Ref. to CVT-217, REMOVAL, Primary Pulley and Secondary Pulley.>
19) Remove the manual valve assembly.

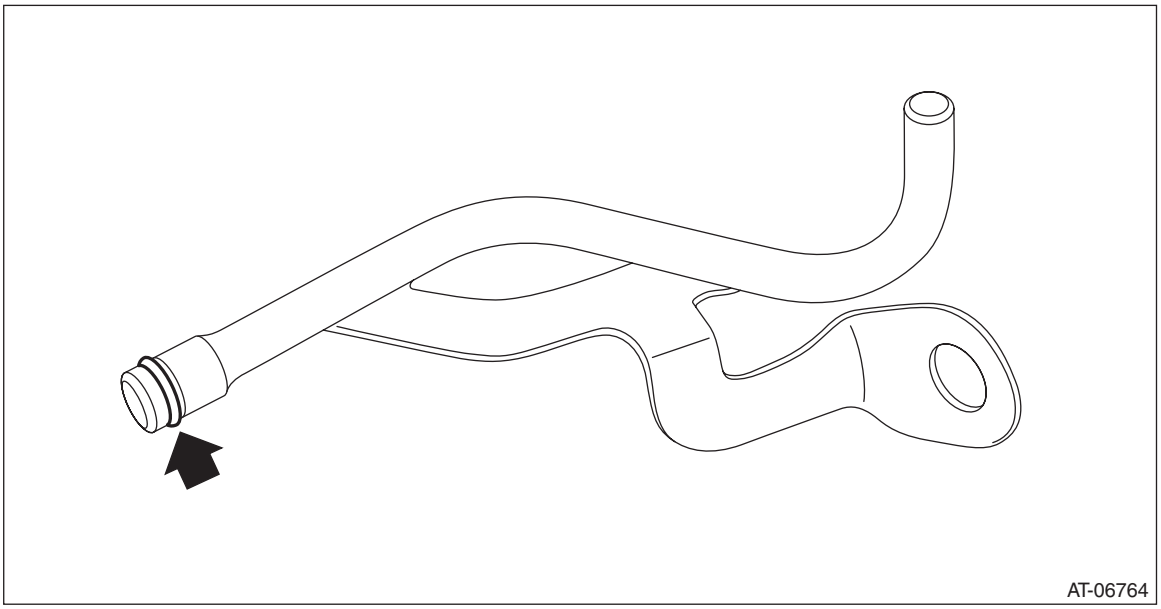


20) Remove the oil guide and lubrication pipe.

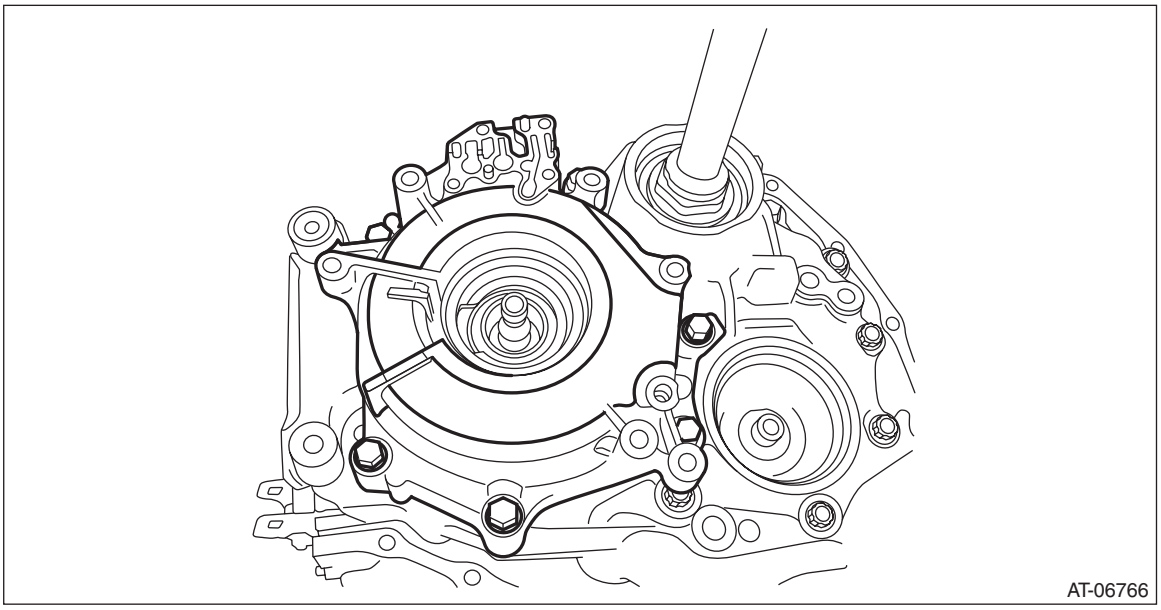


(A) Lubrication pipe
(B) Oil guide

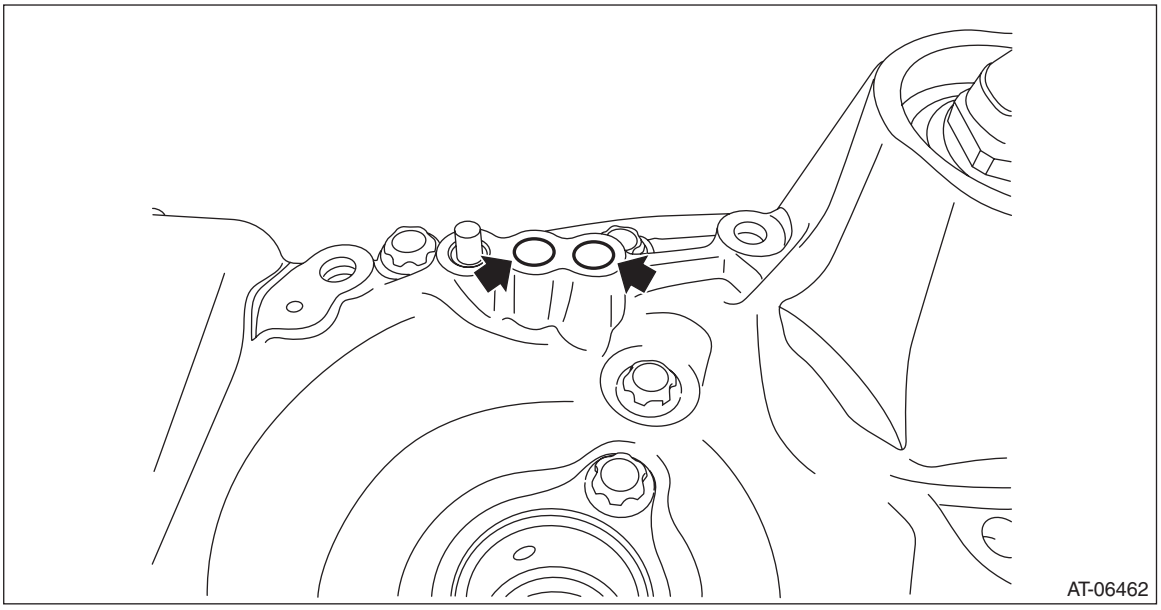
21) Remove the O-ring from lubrication pipe.



22) Remove the reverse brake assembly.

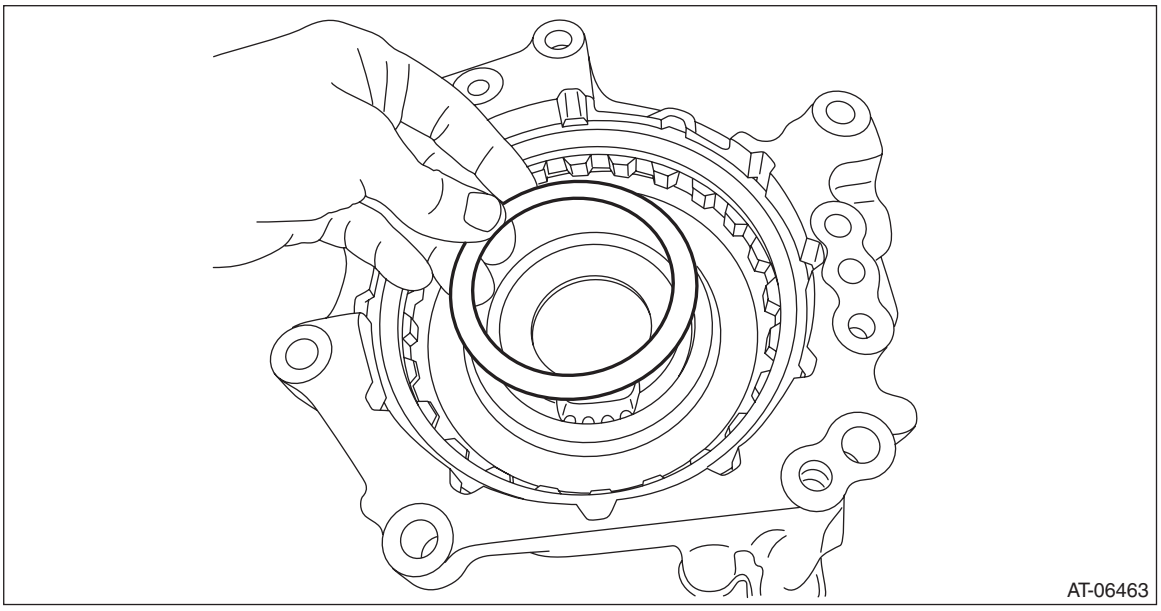


23) Remove the O-ring.



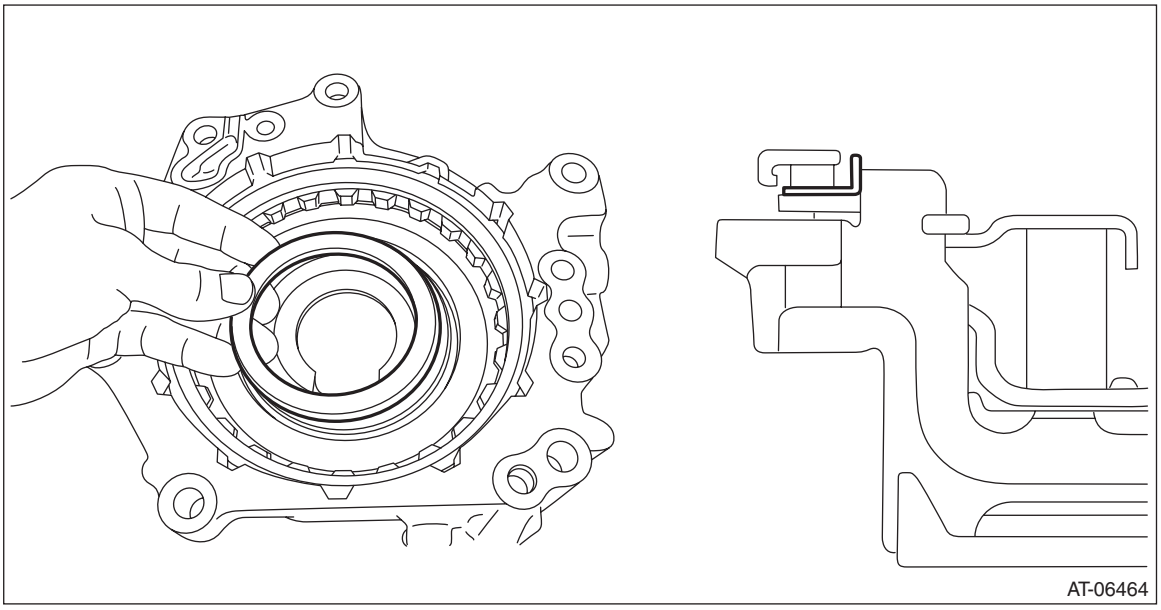
B: INSTALLATION

1) Select a washer. <Ref. to CVT-270, ADJUSTMENT, Forward Clutch Assembly.>
2) Install the selected washer to the reverse brake housing.

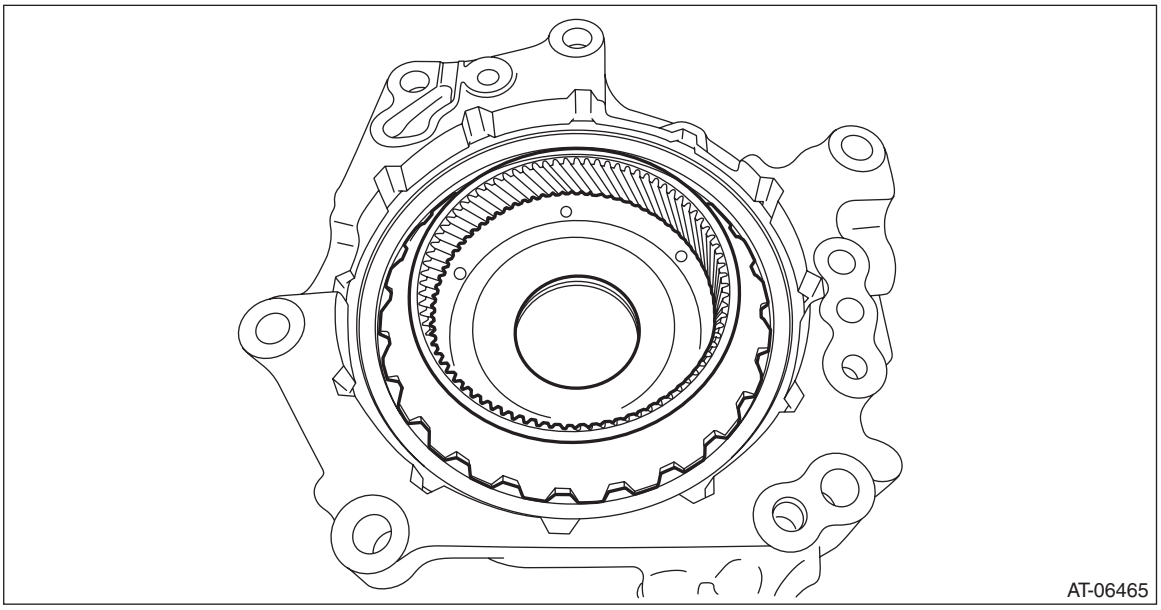


3) Install the thrust bearing to the reverse brake housing.

NOTE:
Face the temper color surface to the reverse brake side.

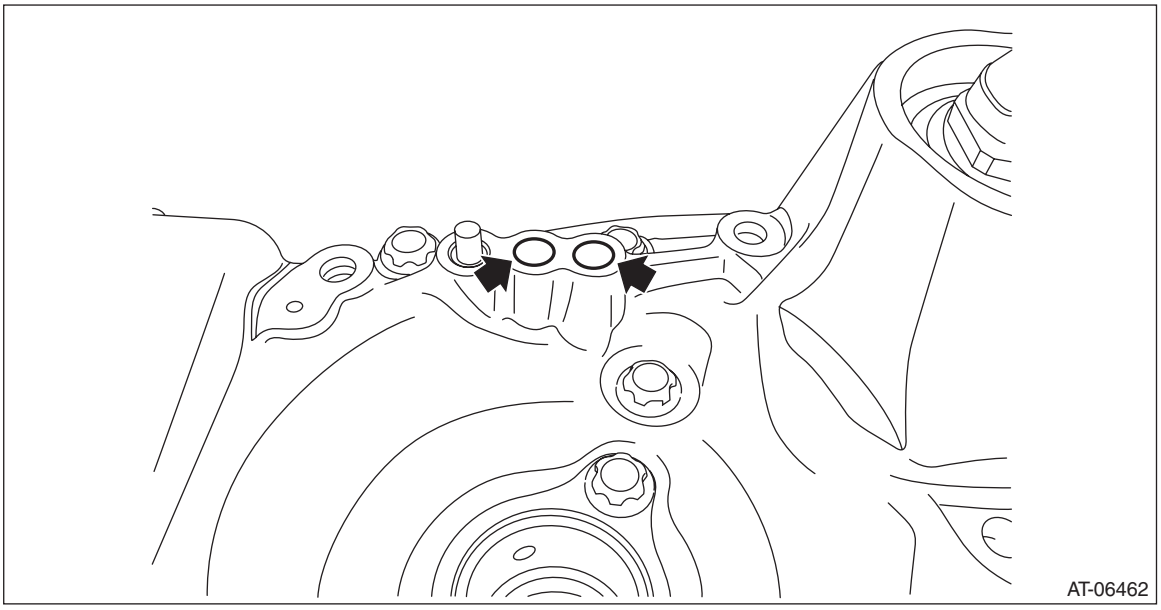


4) Remove the internal gear from the forward clutch assembly, and install it to the reverse brake housing.



5) Install the O-ring.

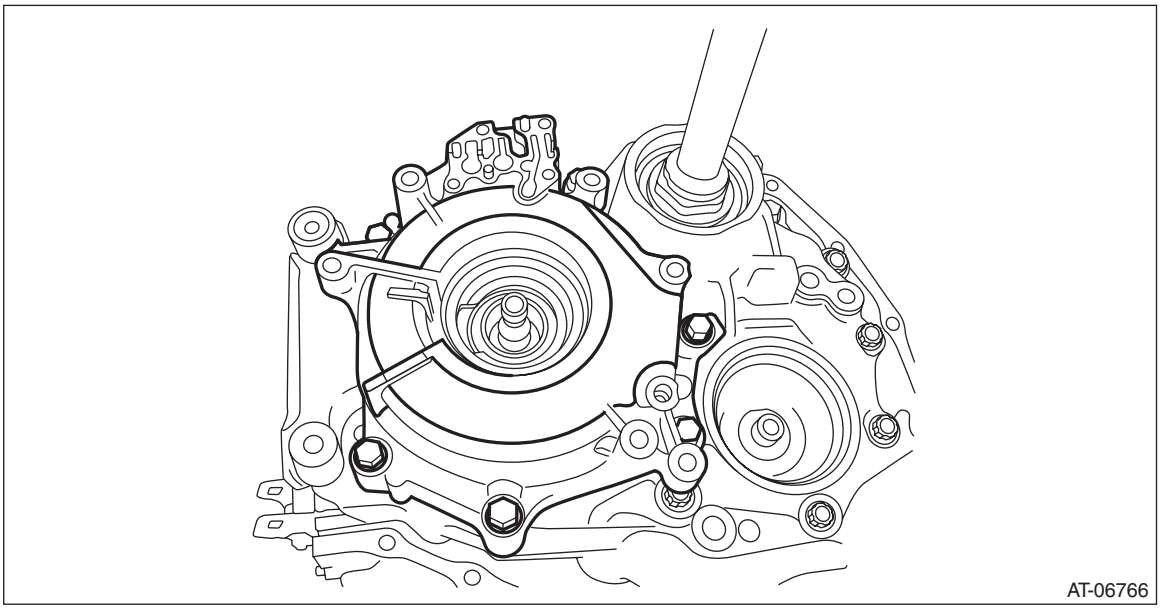
NOTE:
- Install a new O-ring.
- Apply CVTF to the O-ring.



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

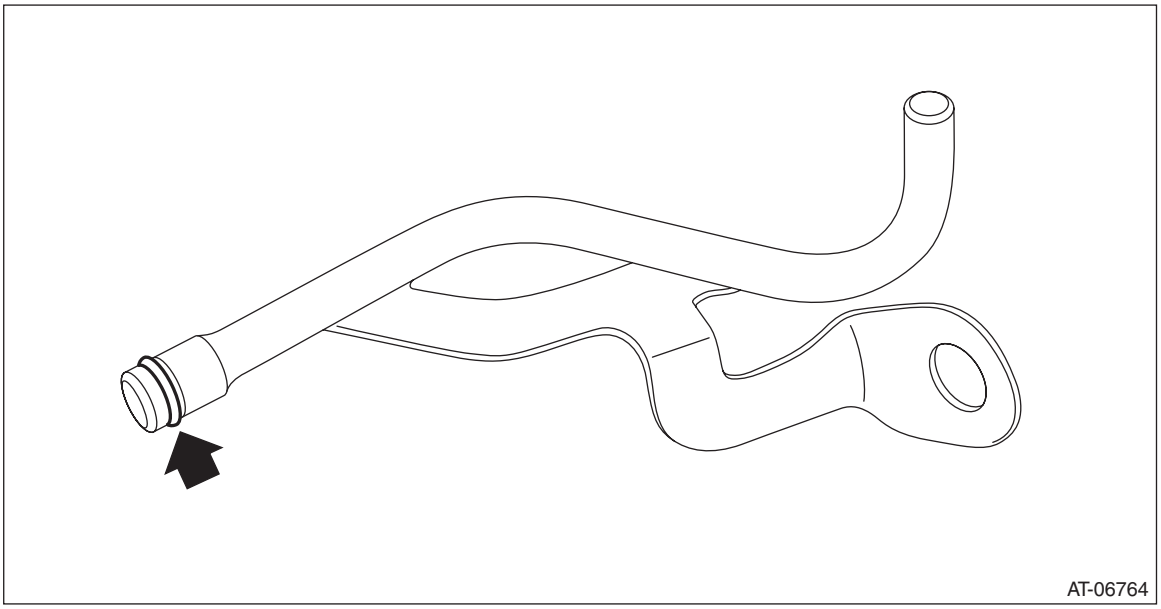
NOTE:
Slowly rotate the input shaft by hand to engage the internal gear and pinion gear of planetary carrier.

Tightening torque:
37 N·m (3.8 kgf-m, 27.3 ft-lb)



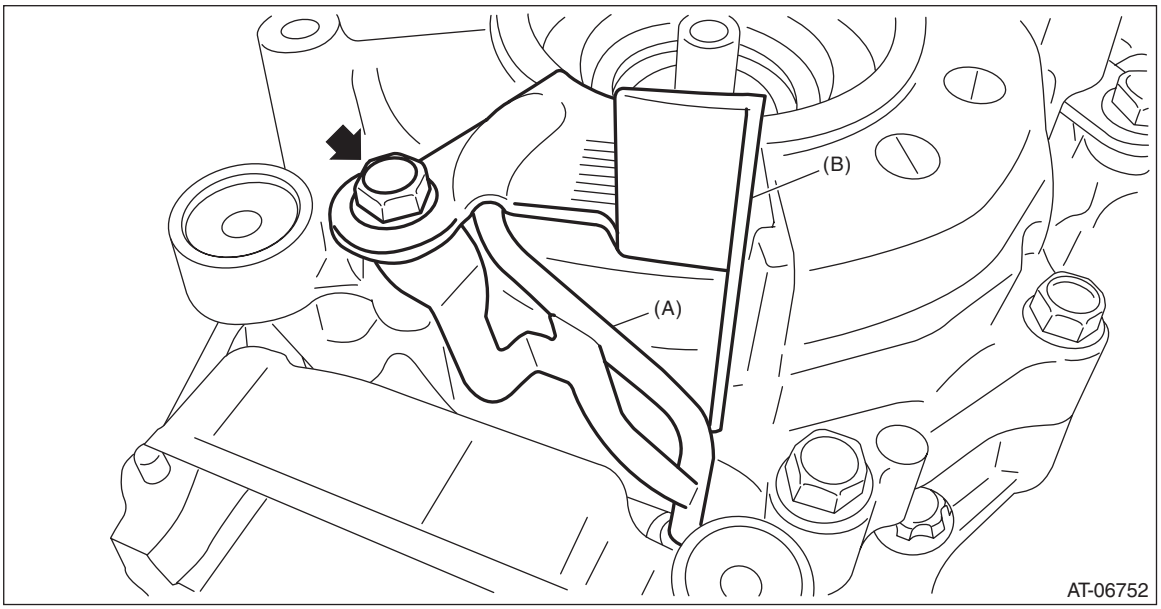
7) Install the O-ring to the lubrication pipe.

NOTE:
- Install a new O-ring.
- Apply CVTF to the O-ring.



8) Install the lubrication pipe and oil guide.

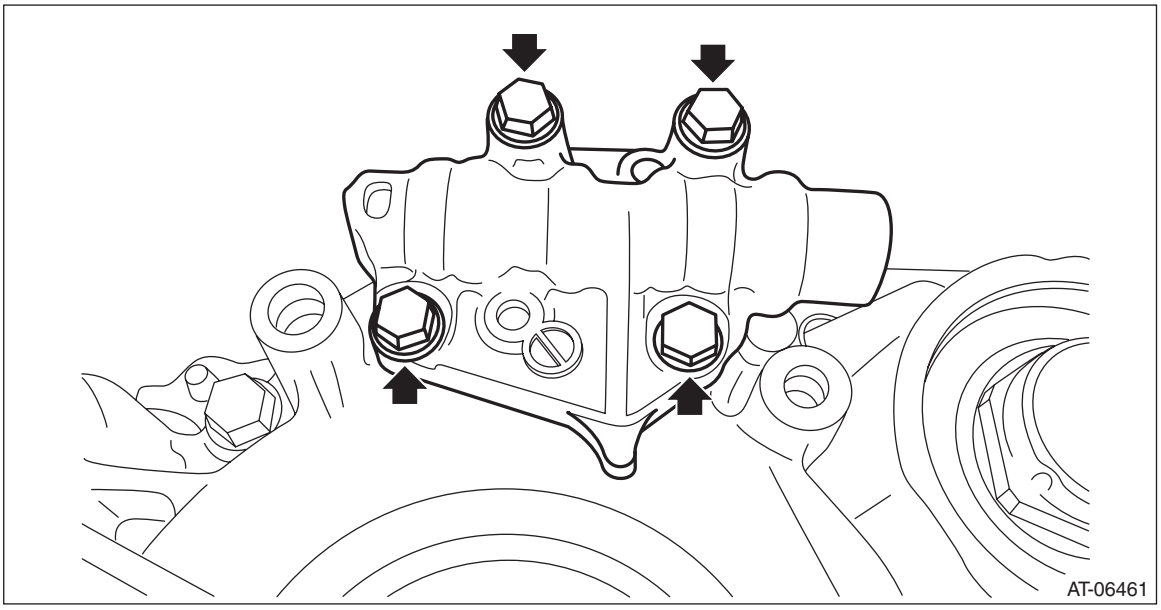
Tightening torque:
16 N·m (1.6 kgf-m, 11.8 ft-lb)



(A) Lubrication pipe
(B) Oil guide

9) Install the manual valve assembly and separator plate.

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

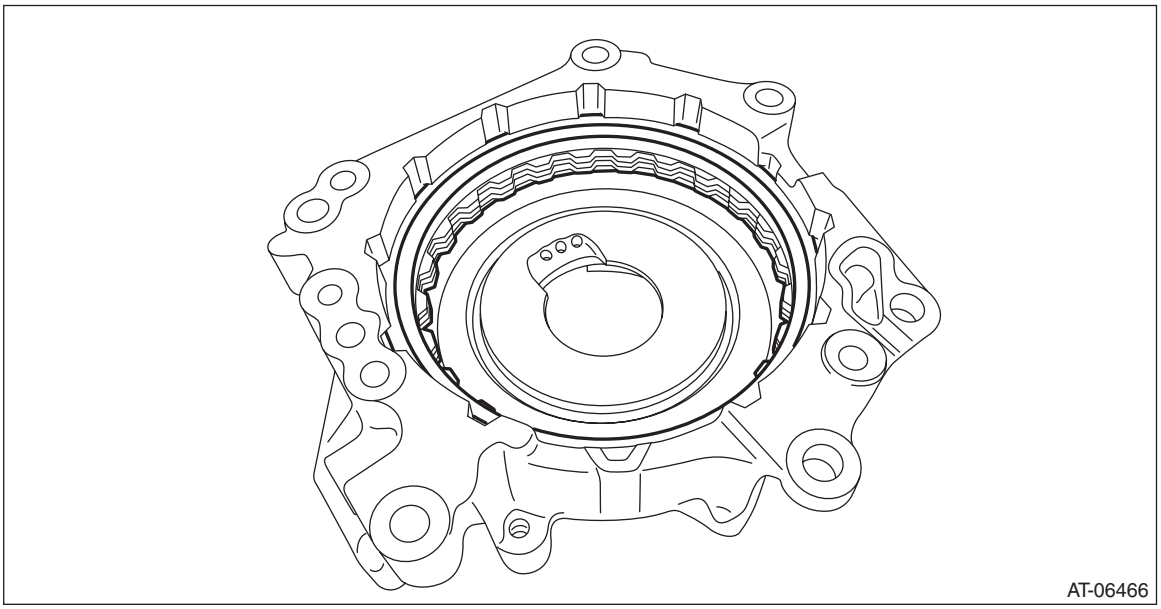


10) Install the primary pulley, secondary pulley and variator chain. <Ref. to CVT-224, INSTALLATION, Primary Pulley and Secondary Pulley.>
11) Select shims for pulley alignment. <Ref. to CVT-231, ADJUSTMENT, Primary Pulley and Secondary Pulley.>
12) Install the reduction drive gear. <Ref. to CVT-213, INSTALLATION, Reduction Drive Gear.>
13) Install the transmission case. <Ref. to CVT-202, INSTALLATION, Transmission Case.>
14) Install the transmission control device. <Ref. to CVT-197, INSTALLATION, Transmission Control Device.>

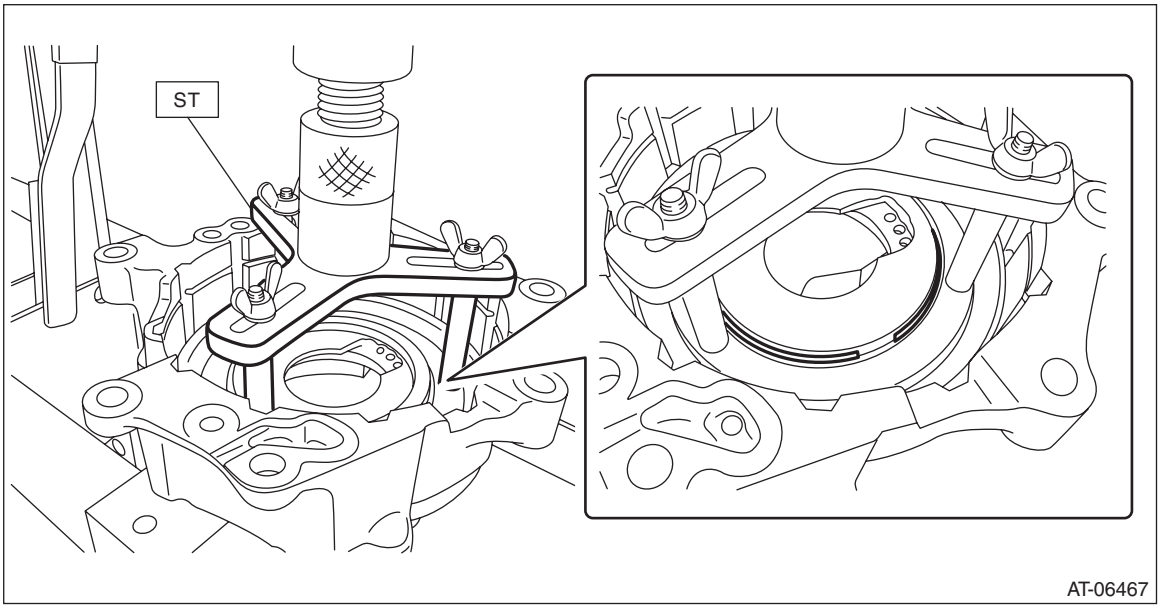
15) Install the oil strainer and oil pan. <Ref. to CVT-113, INSTALLATION, Oil Pan and Strainer.>
16) Install the reduction driven gear assembly. <Ref. to CVT-186, INSTALLATION, Reduction Driven Gear.>
17) Install the transfer driven gear assembly. <Ref. to CVT-182, INSTALLATION, Transfer Driven Gear.>
18) Install the transfer clutch assembly. <Ref. to CVT-169, INSTALLATION, Transfer Clutch.>
19) Install the parking pawl. <Ref. to CVT-185, INSTALLATION, Parking Pawl.>
20) Install the extension case. <Ref. to CVT-164, INSTALLATION, Extension Case.>
21) Install the inhibitor switch. <Ref. to CVT-101, INSTALLATION, Inhibitor Switch.>
22) Install the secondary speed sensor. <Ref. to CVT-105, INSTALLATION, Secondary Speed Sensor.>
23) Install the primary speed sensor. <Ref. to CVT-108, INSTALLATION, Primary Speed Sensor.>
24) Install the turbine speed sensor. <Ref. to CVT-103, INSTALLATION, Turbine Speed Sensor.>
25) Install the transmission harness. <Ref. to CVT-136, INSTALLATION, Transmission Harness.>
26) Install the control valve body. <Ref. to CVT-122, INSTALLATION, Control Valve Body.>
27) Install the air breather hose. <Ref. to CVT-156, INSTALLATION, Air Breather Hose.>
28) Install the transmission assembly to the vehicle. <Ref. to CVT-72, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

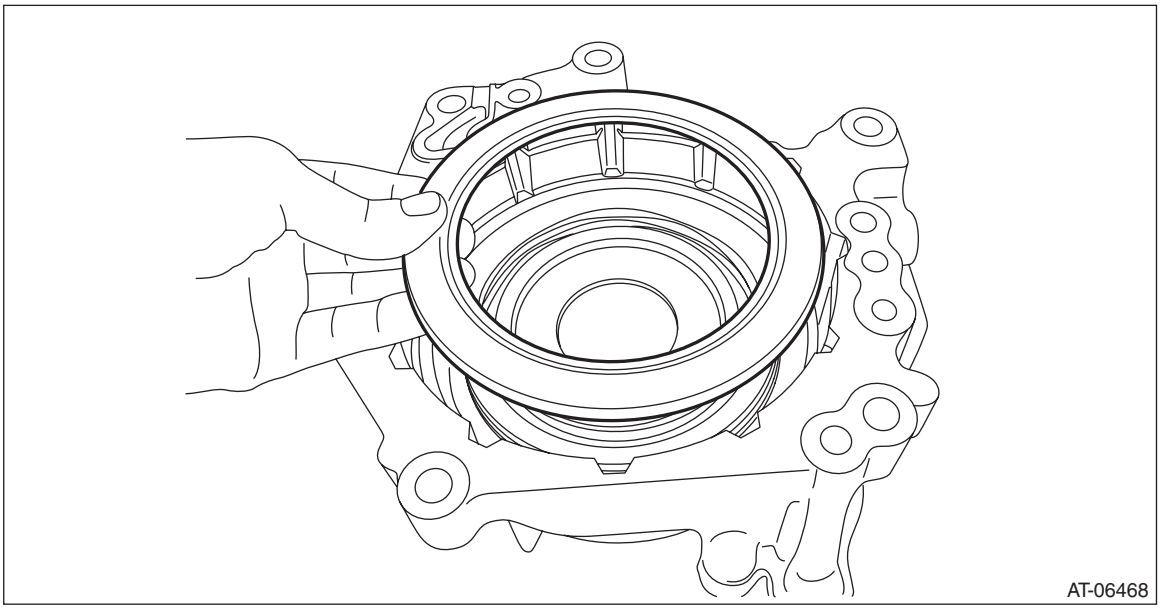
1) Remove the snap ring.
2) Remove the retaining plate, drive plate, driven plate and dish plate.



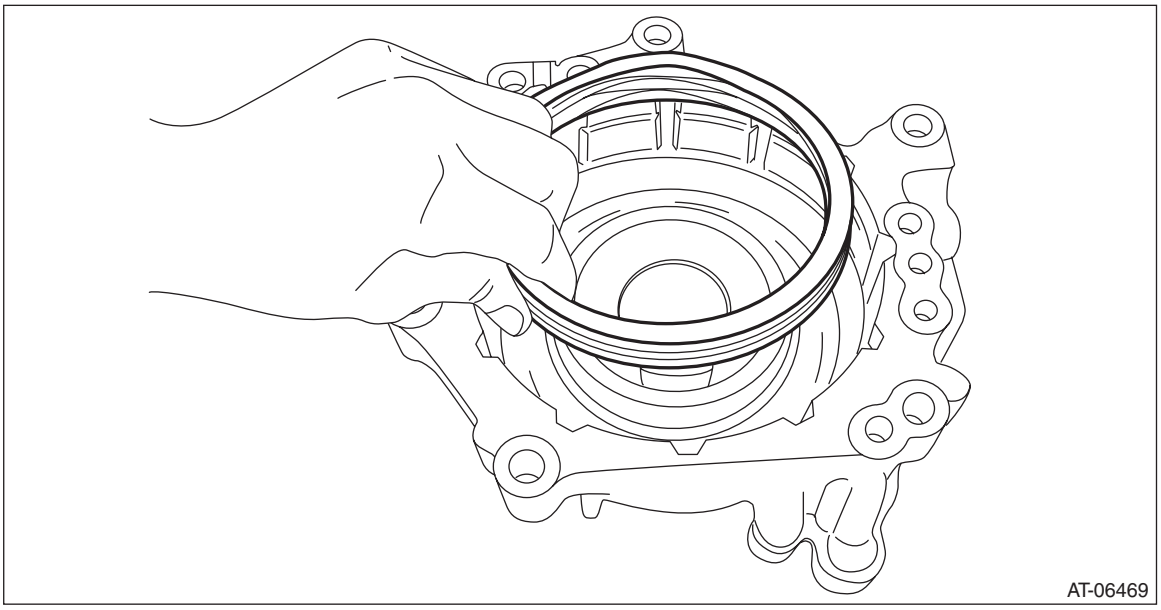
3) Compress the return spring using the ST to remove the snap ring.
ST 18762AA000 COMPRESSOR SPECIAL TOOL



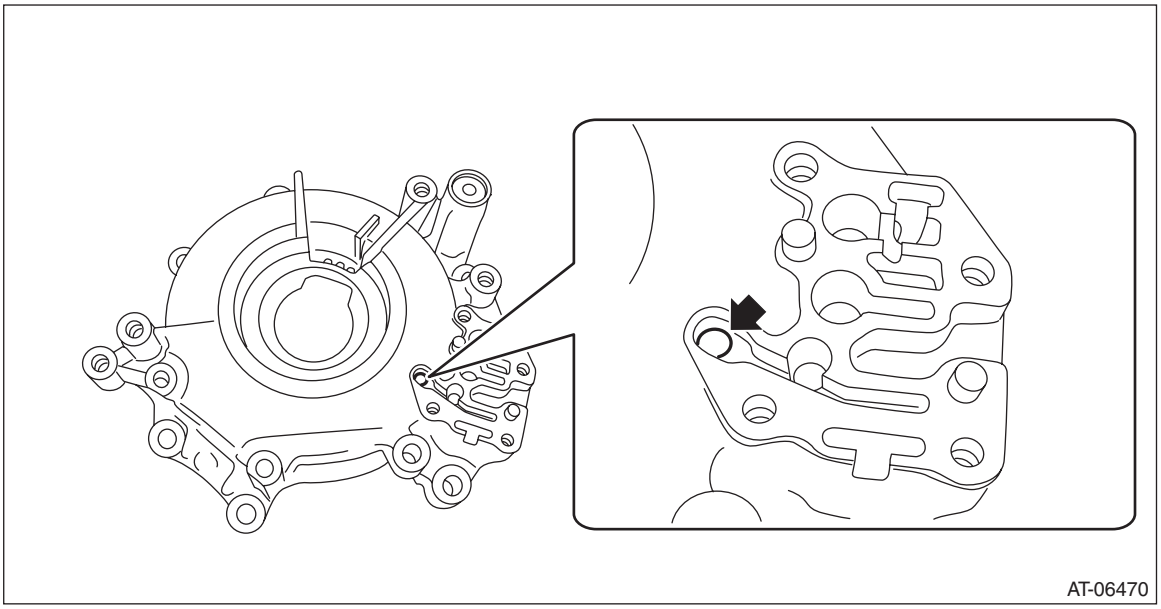
4) Using the ST, remove the snap ring and spring retainer.



5) Remove the return spring.



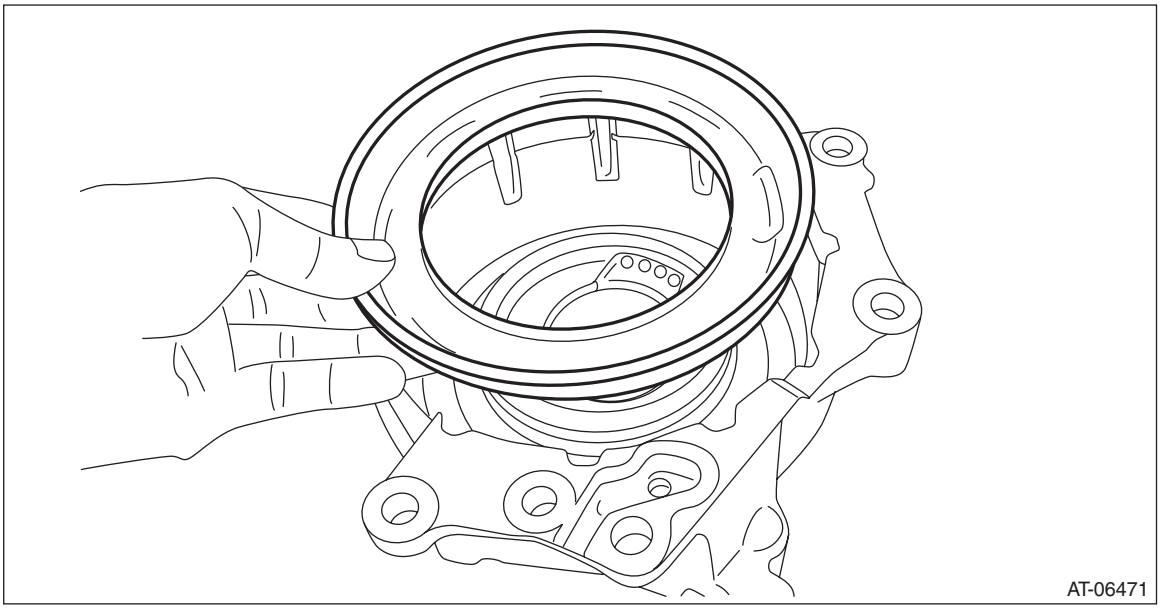
6) Remove the reverse brake piston by blowing compressed air intermittently from reverse brake housing hole.



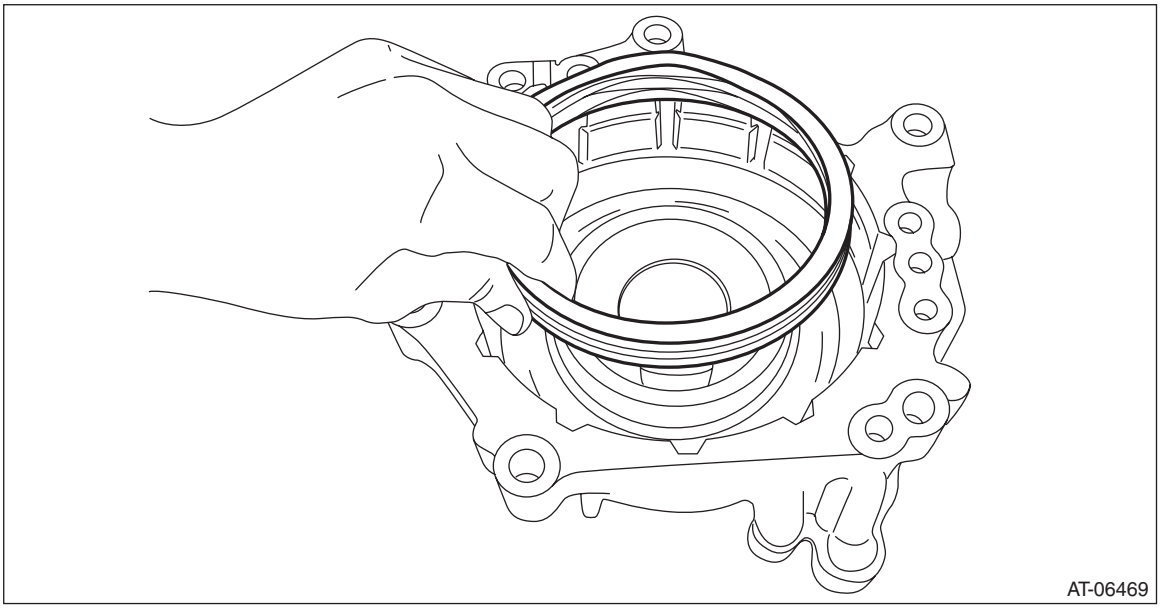
D: ASSEMBLY

1) Install the reverse brake piston.

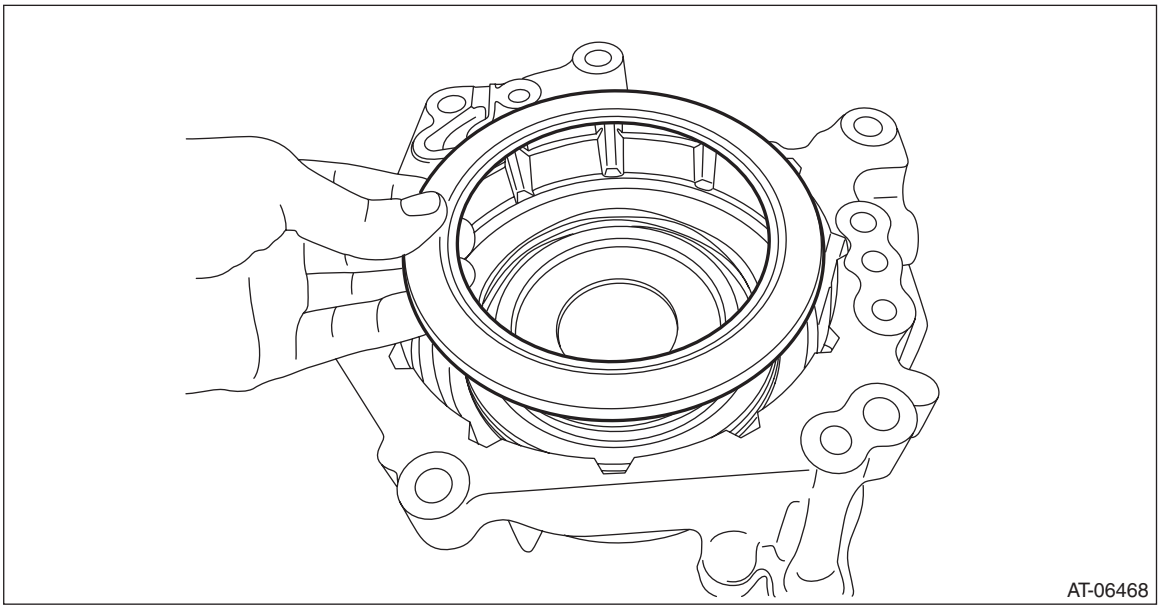
NOTE:
Apply CVTF to the sealing area of reverse brake piston.



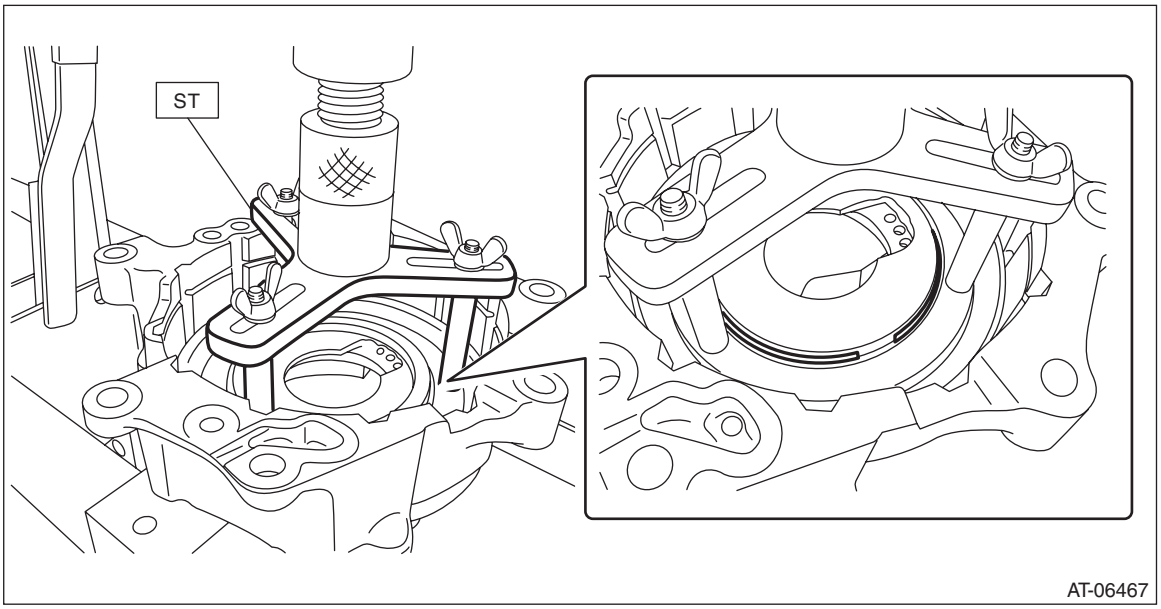
2) Install the return spring.



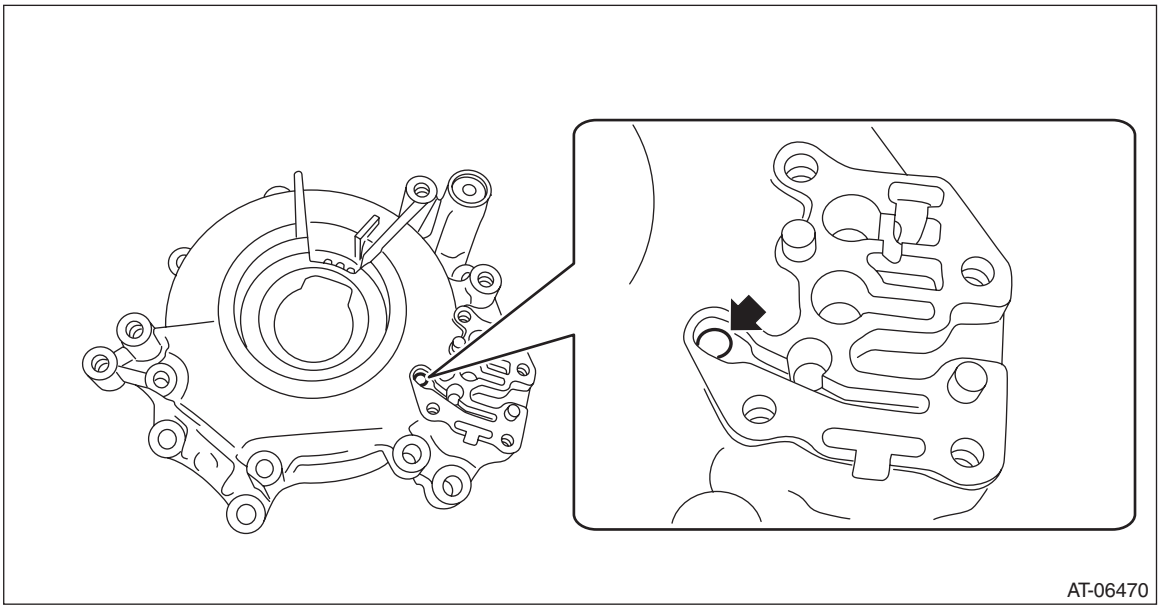
3) Install the spring retainer.



4) Compress the return spring using the ST to install the snap ring.
ST 18762AA000 COMPRESSOR SPECIAL TOOL



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



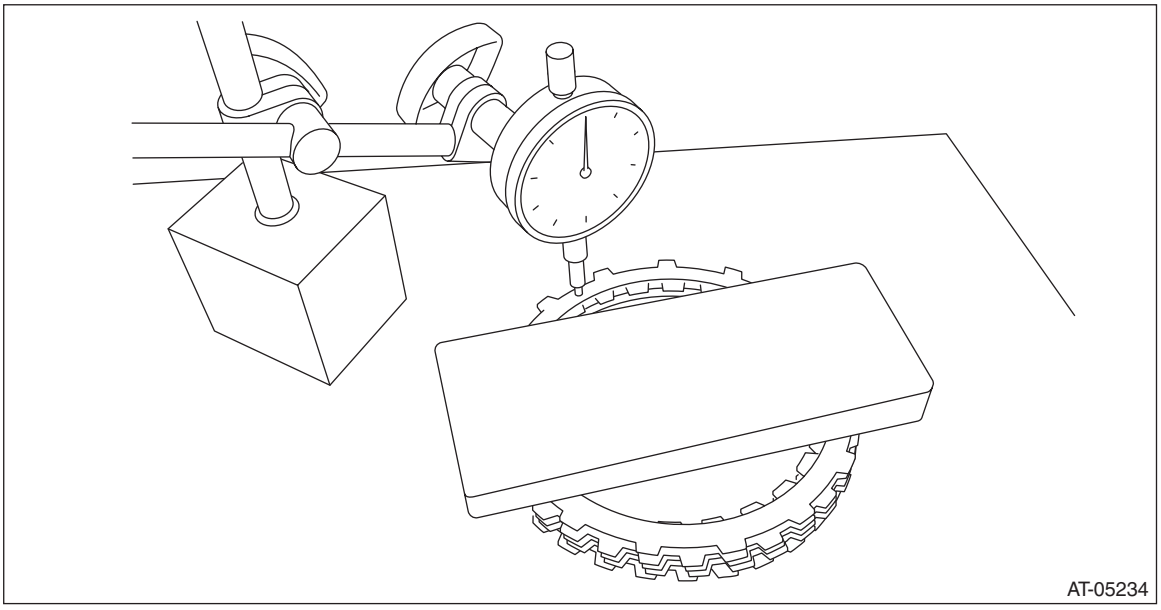
6) Place the driven plate, drive plate and retaining plate neatly in this order on surface table.
7) Set the dial gauge to retaining plate, and read its scale.

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

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

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

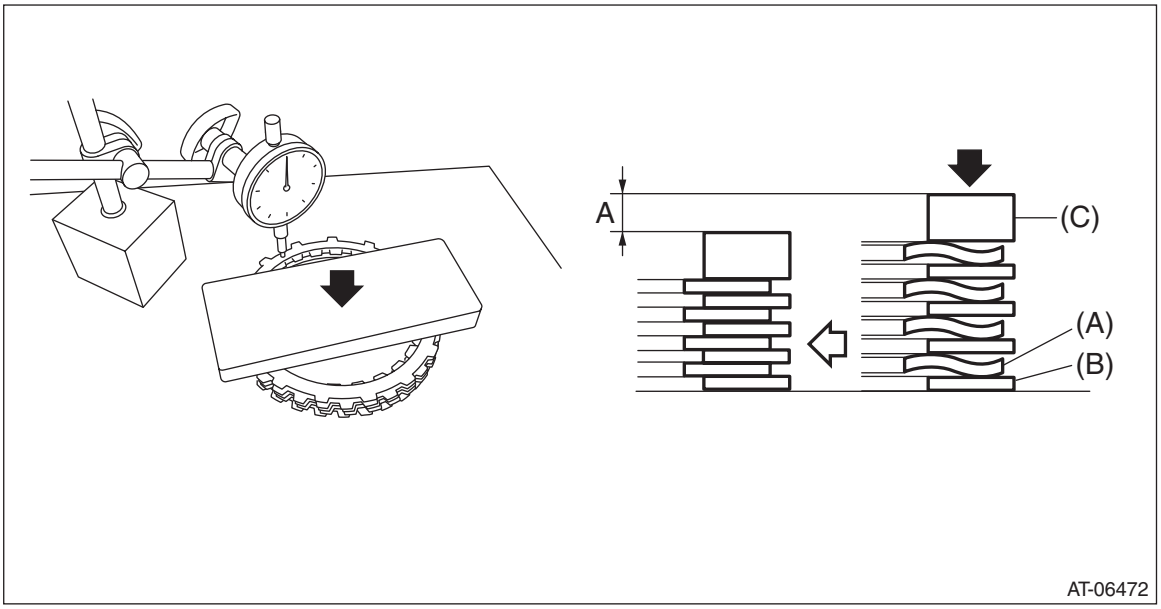
9) Put the flat board on retaining plate.



10) Using the following formula, read the push/pull gauge and calculate "N".
N = 29 N (3.0 kgf, 6.5 lb) – Z
29 N (3.0 kgf, 6.5 lb) : Load applied to clutch plate
Z: Flat board weight

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

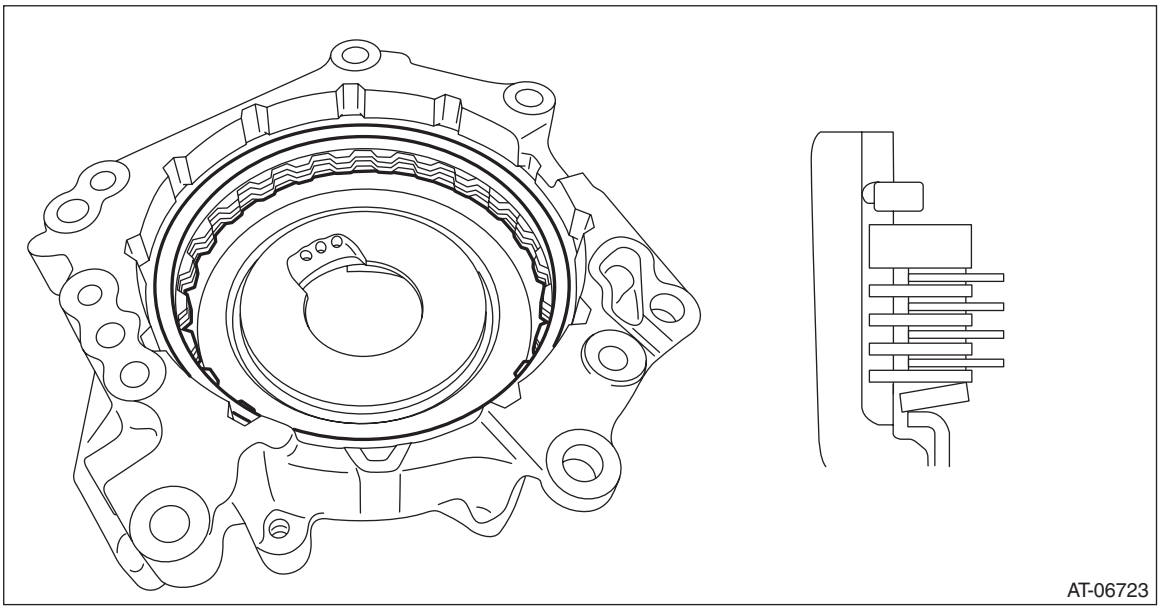
NOTE:
Measure at four points with a 90° interval and calculate the average.



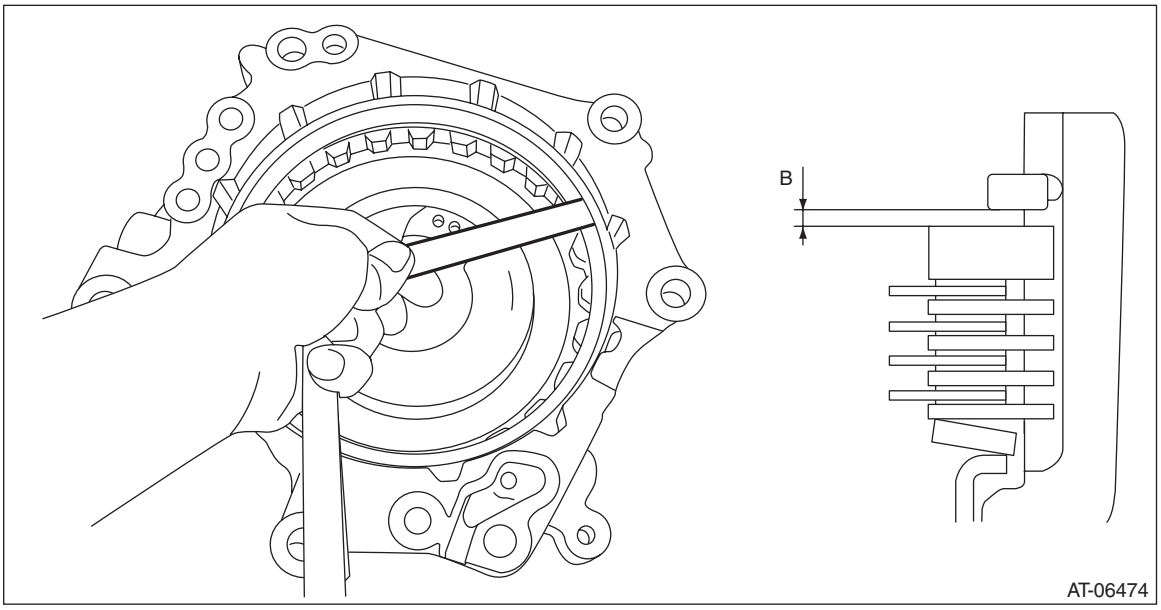
(A) Drive plate
(B) Driven plate
(C) Retaining plate

12) Install the dish plate, drive plate, driven plate, retaining plate and snap ring to the reverse brake housing.

NOTE:
Install the dish plate in the correct direction.



13) Measure and record the clearance “B” between the retaining plate and snap ring.



14) Piston stroke calculation
Calculate with A and B dimensions recorded before. If it exceeds the limit, replace with a new drive plate and adjust within the initial standard value.
S mm (in) = A + B
S: Piston stroke
A: Compression amount of drive plate and dish plate
B: Clearance between retaining plate and snap ring

Initial standard:
2.3 — 2.7 mm (0.091 — 0.106 in)

Limit thickness:
2.9 mm (0.114 in)

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

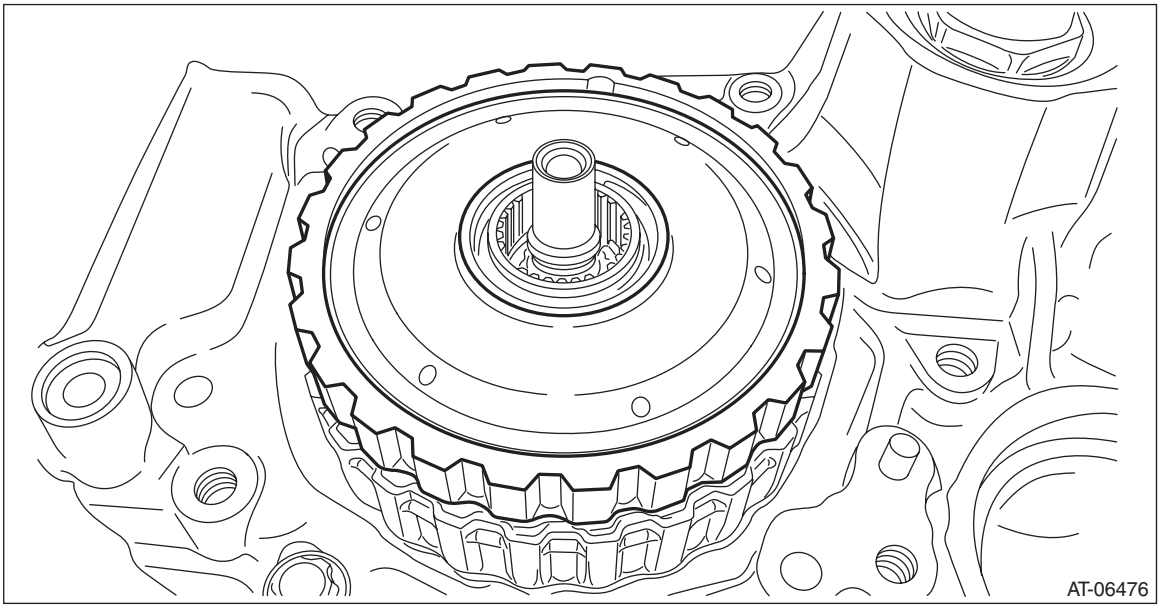
E: INSPECTION

- Inspect the drive plate facing for wear and damage.
- Check the driven plate for discoloration (burnt color).
- Check for worn snap ring, fatigue or damaged return spring or deformed spring retainer.
- Make sure the clearance between retaining plate and snap ring of reverse brake is within the limit. If it exceeds the limit, replace with a new drive plate and select and adjust the retaining plate within the initial standard value. <Ref. to CVT-248, ASSEMBLY, Reverse Brake Assembly.>

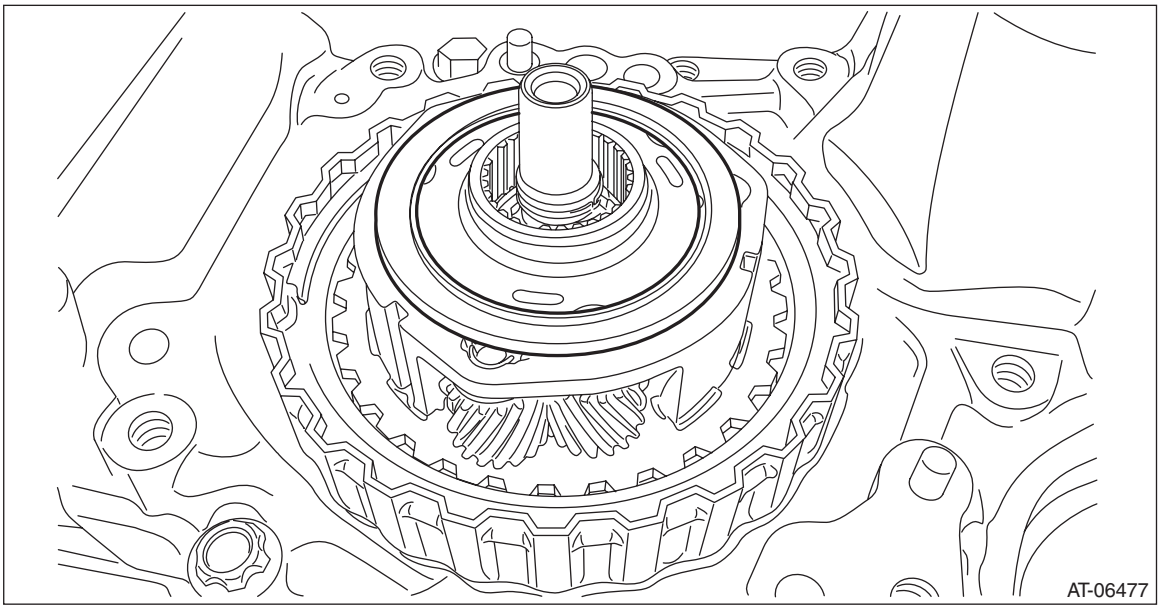
40.Forward Clutch Assembly

A: REMOVAL

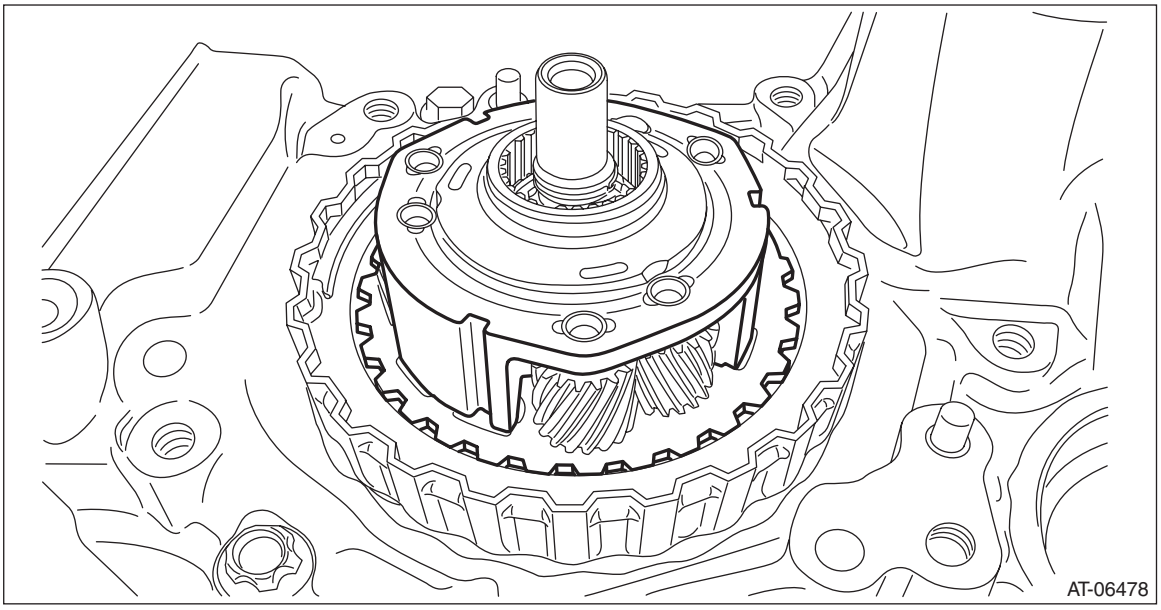
1) Remove the transmission assembly from the vehicle. <Ref. to CVT-57, REMOVAL, Automatic Transmission Assembly.>
2) Remove the air breather hose. <Ref. to CVT-154, REMOVAL, Air Breather Hose.>
3) Remove the control valve body. <Ref. to CVT-116, REMOVAL, Control Valve Body.>
4) Remove the transmission harness. <Ref. to CVT-129, REMOVAL, Transmission Harness.>
5) Remove the turbine speed sensor. <Ref. to CVT-103, REMOVAL, Turbine Speed Sensor.>
6) Remove the secondary speed sensor. <Ref. to CVT-105, REMOVAL, Secondary Speed Sensor.>
7) Remove the primary speed sensor. <Ref. to CVT-107, REMOVAL, Primary Speed Sensor.>
8) Remove the inhibitor switch. <Ref. to CVT-99, REMOVAL, Inhibitor Switch.>
9) Remove the extension case. <Ref. to CVT-163, REMOVAL, Extension Case.>
10) Remove the transfer clutch assembly. <Ref. to CVT-167, REMOVAL, Transfer Clutch.>
11) Remove the transfer driven gear assembly. <Ref. to CVT-181, REMOVAL, Transfer Driven Gear.>
12) Remove the parking pawl. <Ref. to CVT-184, REMOVAL, Parking Pawl.>
13) Remove the reduction driven gear assembly. <Ref. to CVT-186, REMOVAL, Reduction Driven Gear.>
14) Remove the oil pan and oil strainer. <Ref. to CVT-112, REMOVAL, Oil Pan and Strainer.>
15) Remove the transmission control device. <Ref. to CVT-194, REMOVAL, Transmission Control Device.>
16) Remove the transmission case. <Ref. to CVT-200, REMOVAL, Transmission Case.>
17) Remove the reduction drive gear. <Ref. to CVT-212, REMOVAL, Reduction Drive Gear.>
18) Remove the primary pulley, secondary pulley and variator chain. <Ref. to CVT-217, REMOVAL, Primary Pulley and Secondary Pulley.>
19) Remove the reverse brake assembly. <Ref. to CVT-238, REMOVAL, Reverse Brake Assembly.>
20) Remove the internal gear.



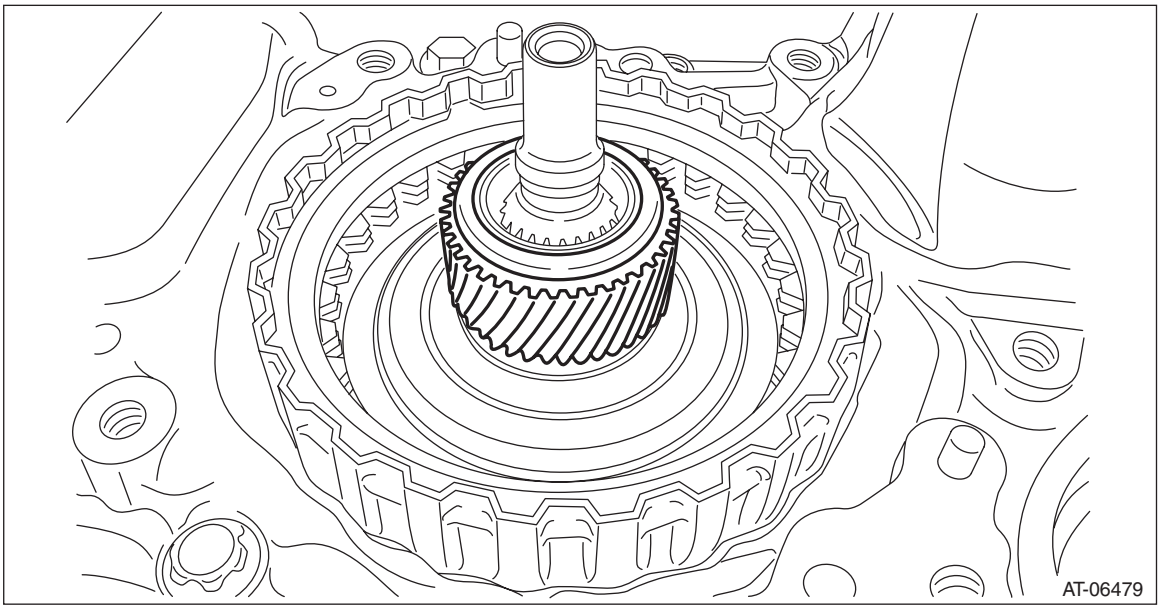
21) Remove the thrust bearing.



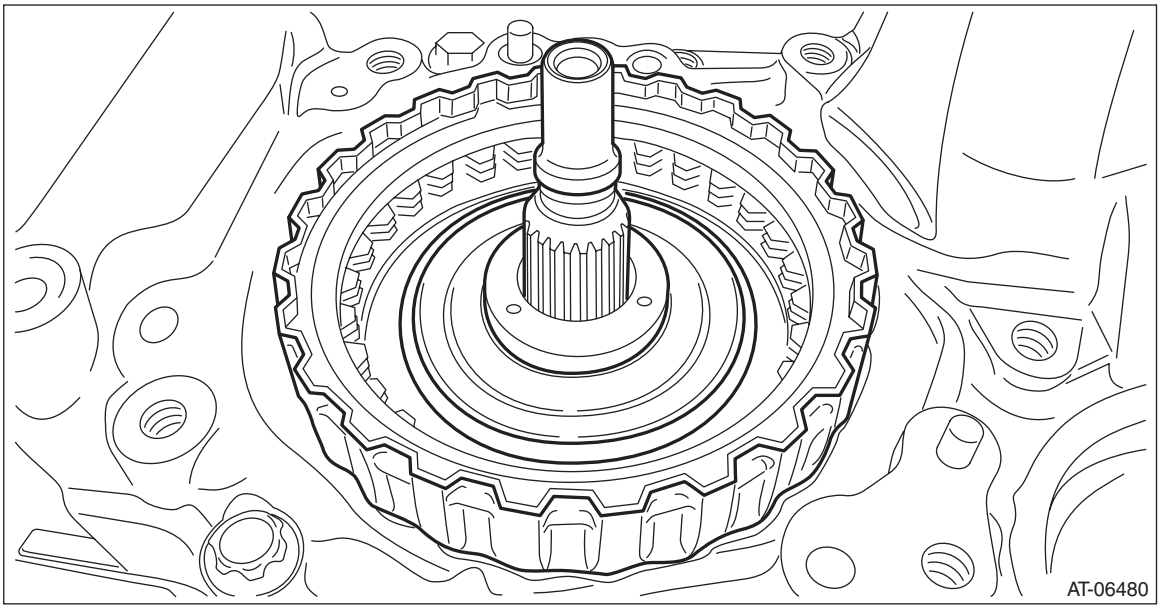
22) Remove the planetary carrier.



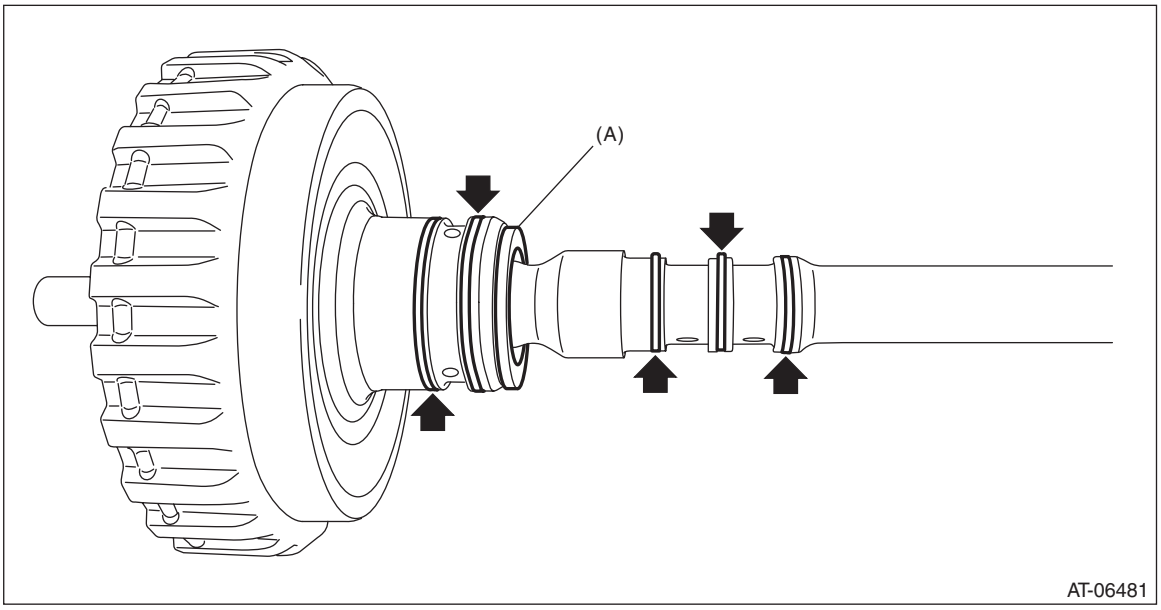
23) Remove the thrust bearing and sun gear.



24) Remove the forward clutch assembly.



25) Remove the thrust bearing and seal ring.

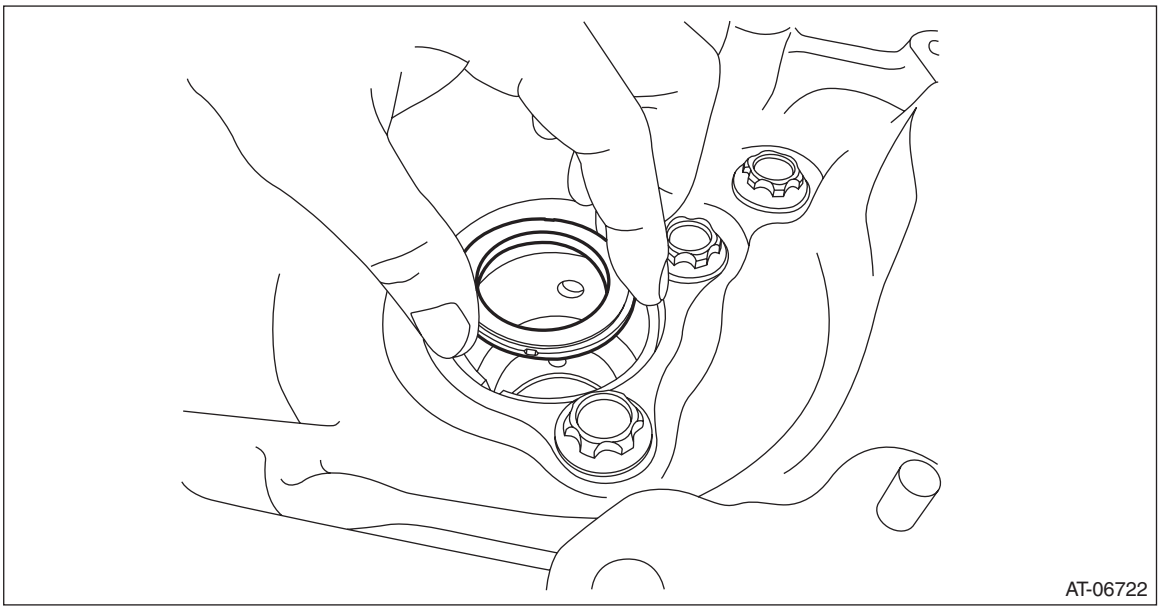


(A) Thrust bearing

B: INSTALLATION

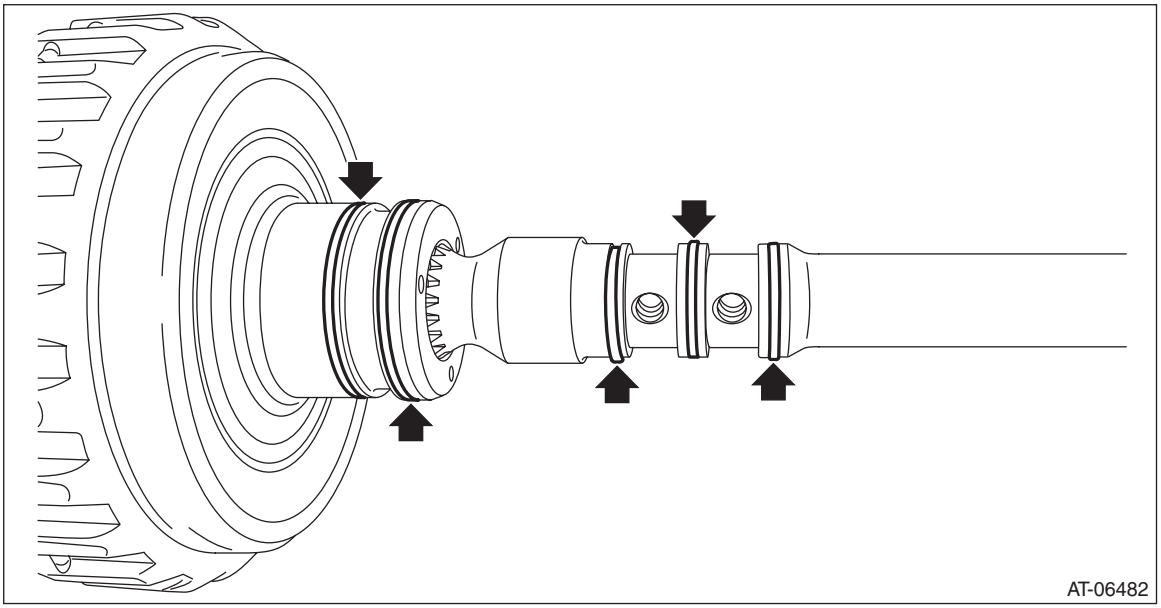
1) Install the thrust bearing to the converter case.

NOTE:
Face the temper color surface to the converter case side.

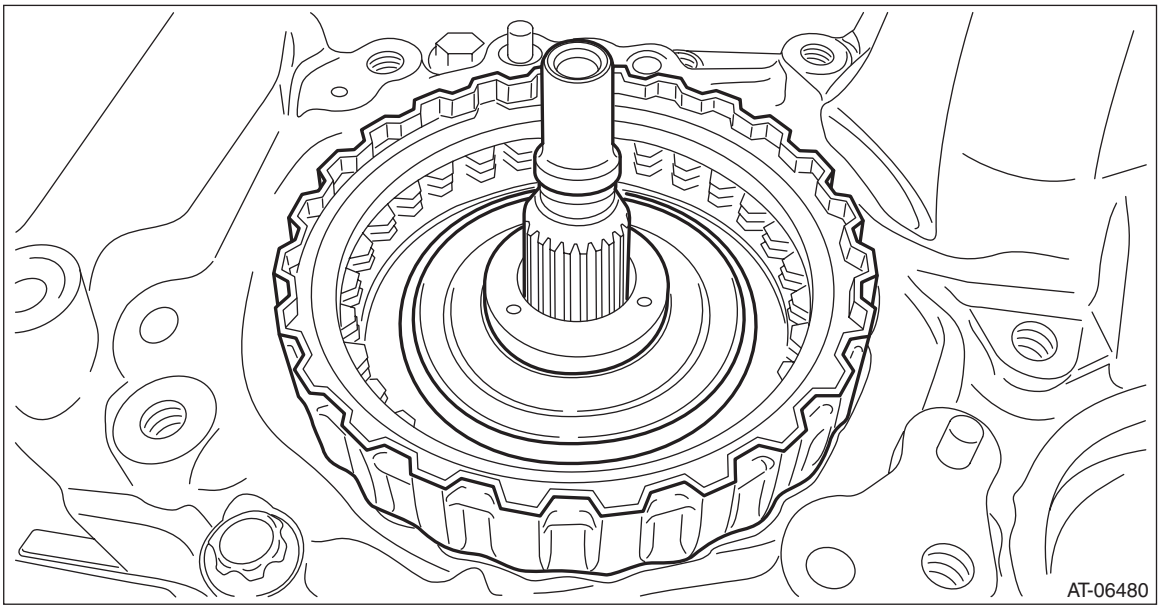


2) Install the seal ring to the input shaft.

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

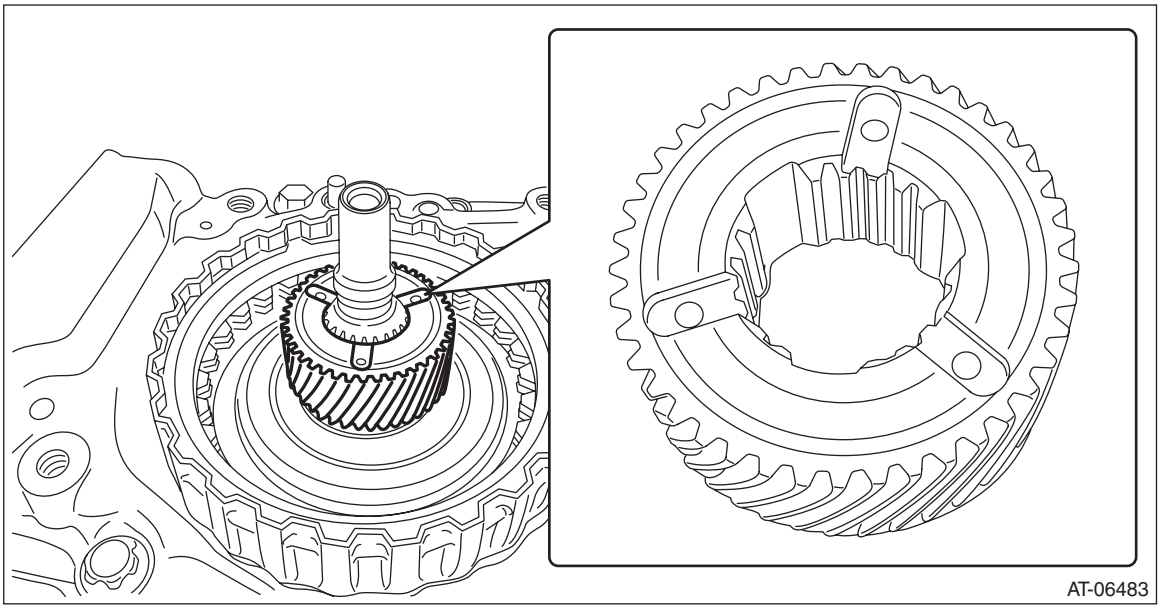


3) Install the forward clutch assembly to the converter case.



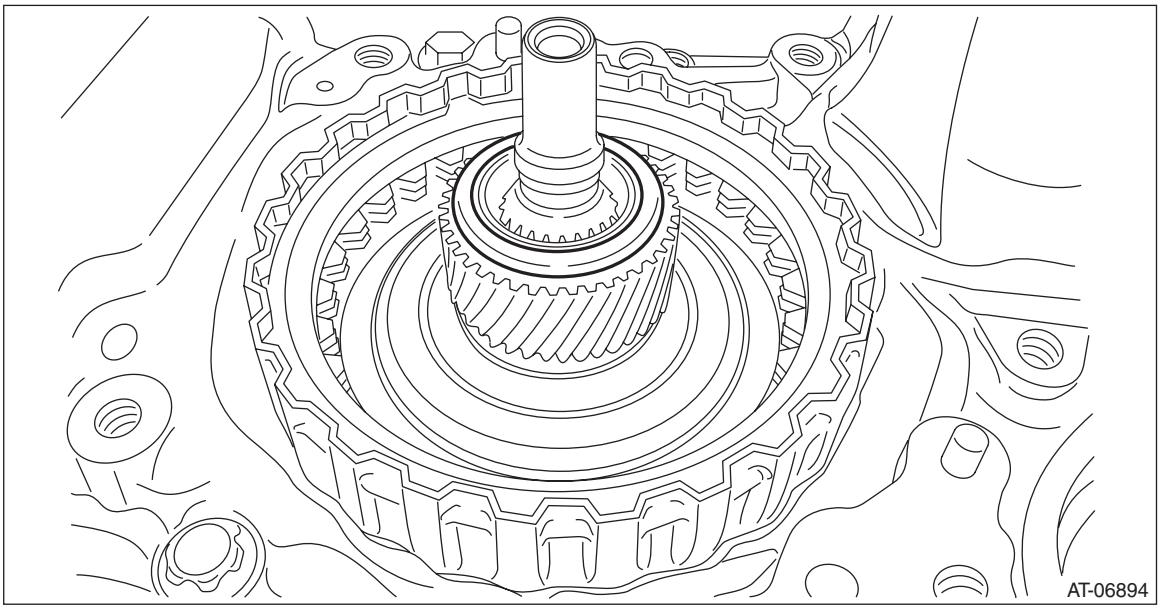
4) Install the sun gear.

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

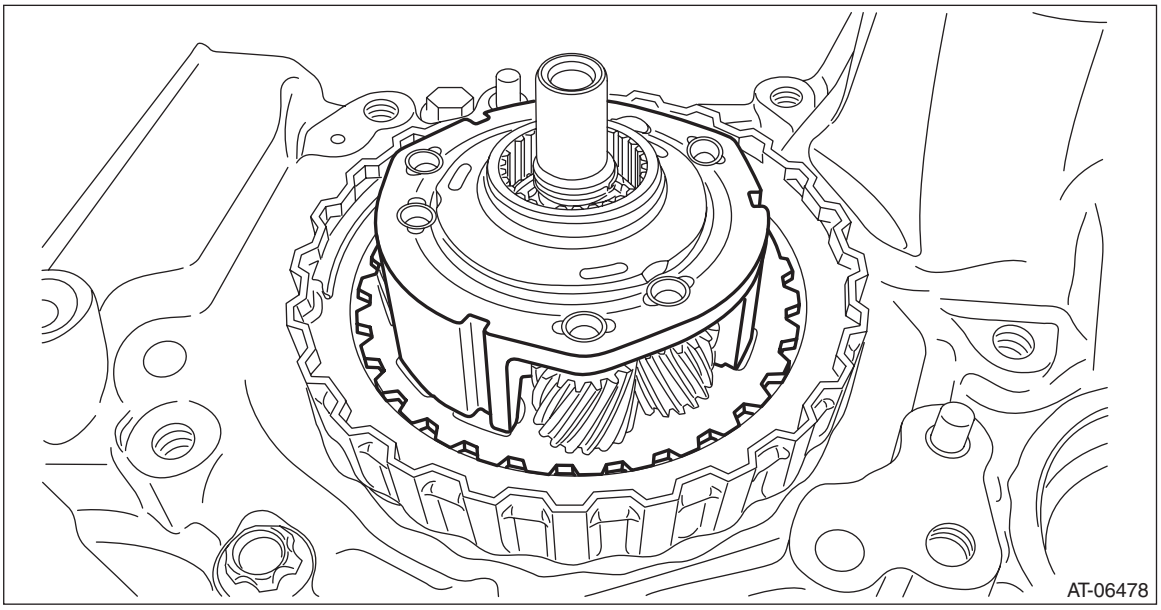


5) Install the thrust bearing to the sun gear.

NOTE:
Face the temper color surface to the reverse brake side.

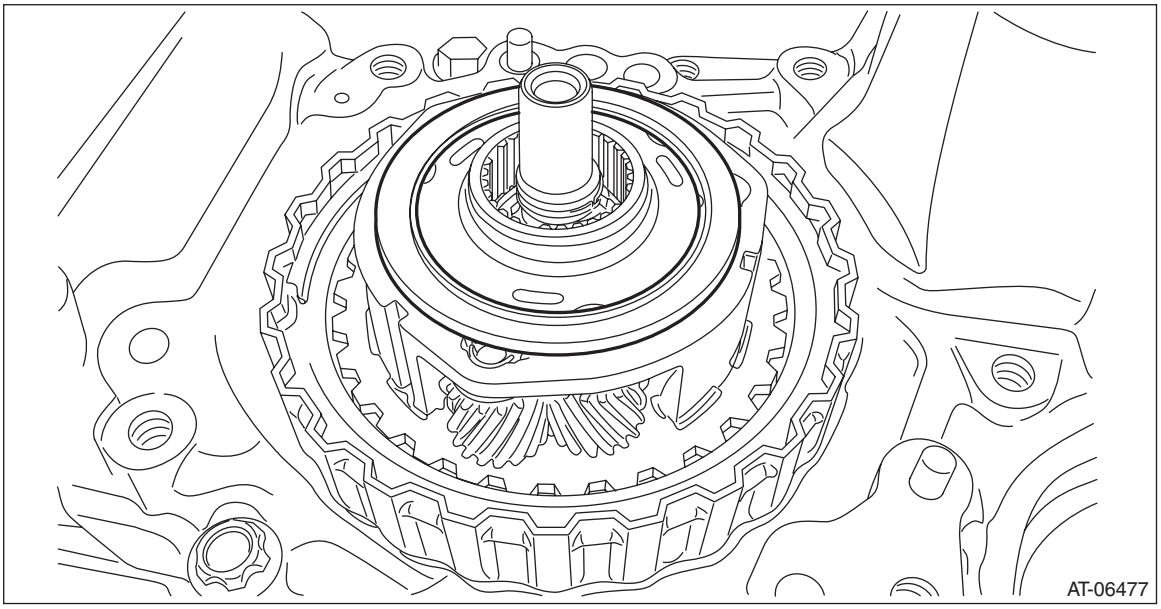


6) Install the planetary carrier.

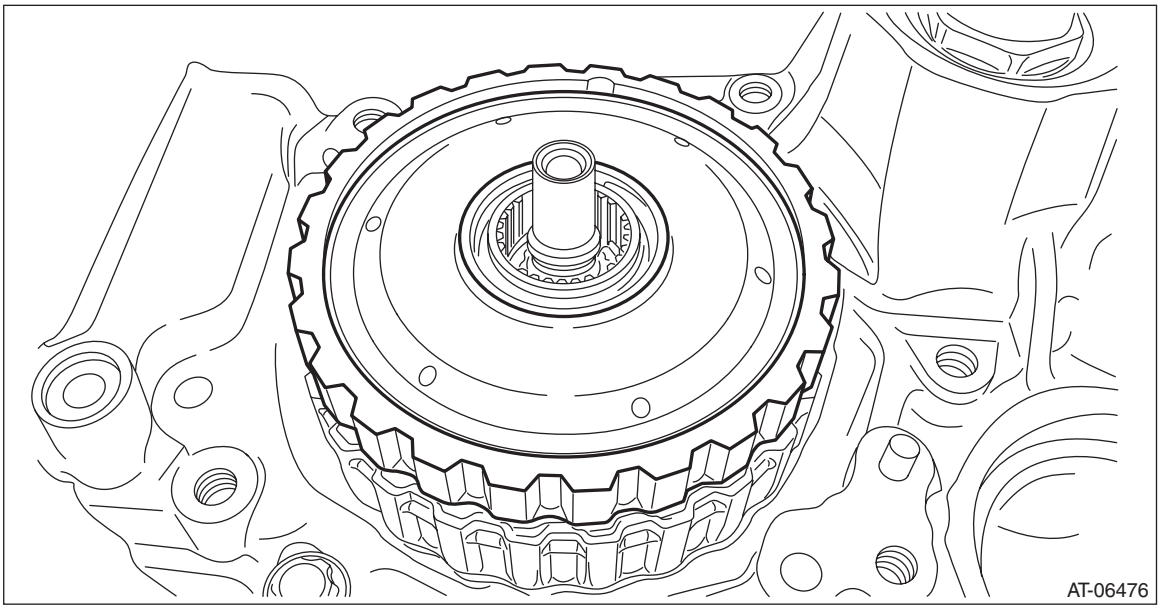


7) Install the thrust bearing.

NOTE:
Face the temper color surface to the reverse brake side.

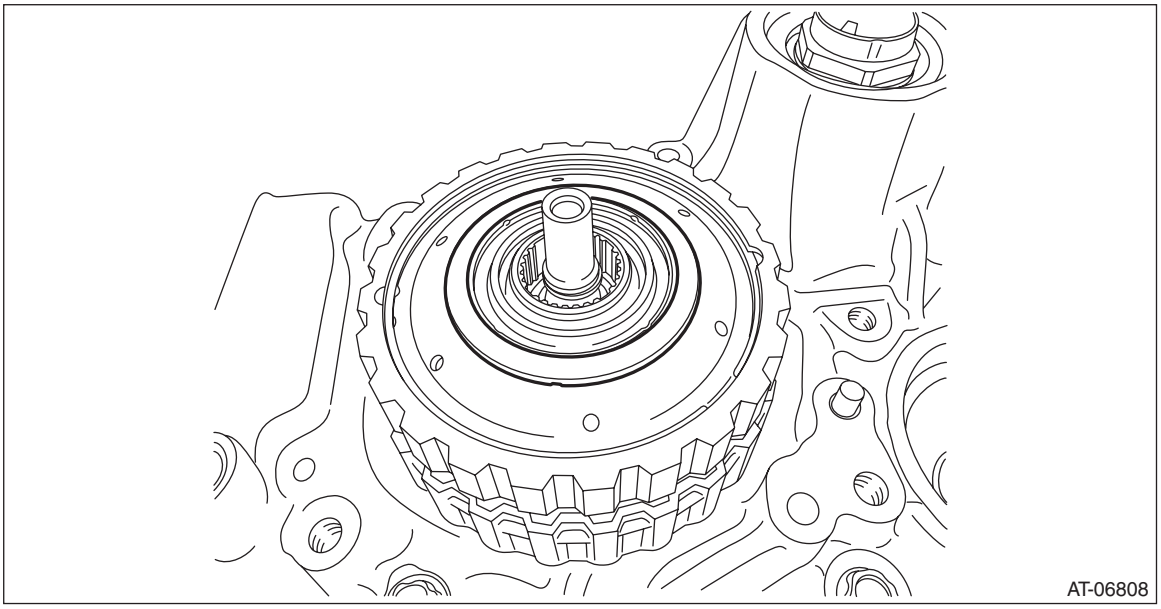


8) Install the internal gear.



9) Install the thrust bearing to the internal gear.

NOTE:
Face the temper color surface to the reverse brake side.



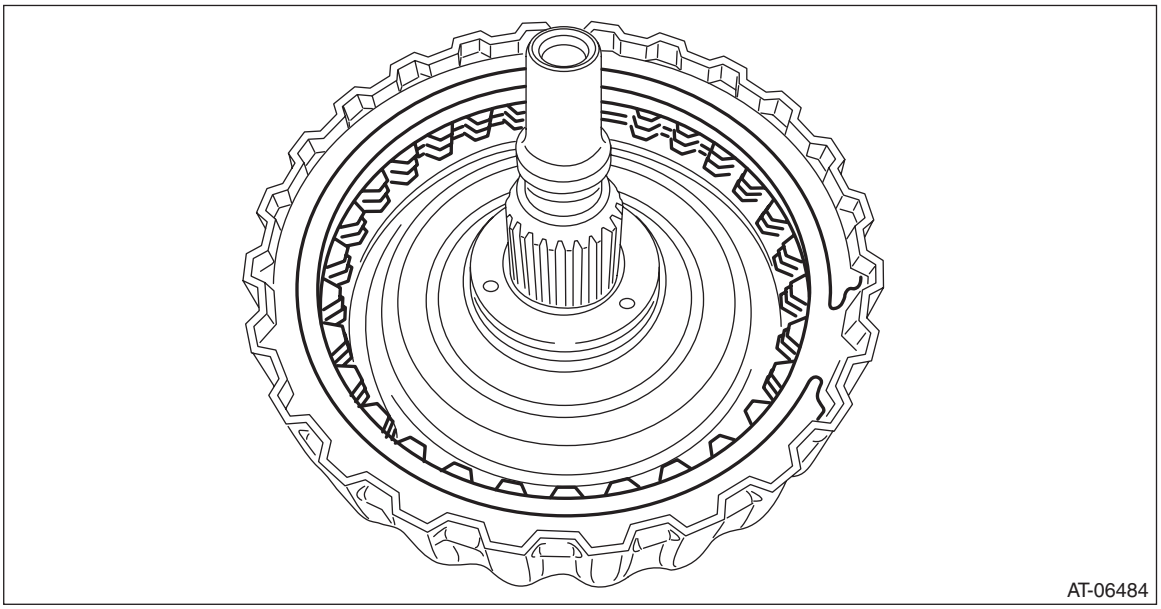
10) Select a washer. <Ref. to CVT-270, ADJUSTMENT, Forward Clutch Assembly.>
11) Install the reverse brake assembly. <Ref. to CVT-241, INSTALLATION, Reverse Brake Assembly.>
12) Install the primary pulley, secondary pulley and variator chain. <Ref. to CVT-224, INSTALLATION, Primary Pulley and Secondary Pulley.>
13) Install the reduction drive gear. <Ref. to CVT-213, INSTALLATION, Reduction Drive Gear.>
14) Install the transmission case. <Ref. to CVT-202, INSTALLATION, Transmission Case.>
15) Install the transmission control device. <Ref. to CVT-197, INSTALLATION, Transmission Control Device.>
16) Install the oil strainer and oil pan. <Ref. to CVT-113, INSTALLATION, Oil Pan and Strainer.>
17) Install the reduction driven gear assembly. <Ref. to CVT-186, INSTALLATION, Reduction Driven Gear.>
18) Install the transfer driven gear assembly. <Ref. to CVT-182, INSTALLATION, Transfer Driven Gear.>
19) Install the transfer clutch assembly. <Ref. to CVT-169, INSTALLATION, Transfer Clutch.>
20) Install the parking pawl. <Ref. to CVT-185, INSTALLATION, Parking Pawl.>
21) Install the extension case. <Ref. to CVT-164, INSTALLATION, Extension Case.>

22) Install the inhibitor switch. <Ref. to CVT-101, INSTALLATION, Inhibitor Switch.>
23) Install the secondary speed sensor. <Ref. to CVT-105, INSTALLATION, Secondary Speed Sensor.>
24) Install the primary speed sensor. <Ref. to CVT-108, INSTALLATION, Primary Speed Sensor.>
25) Install the turbine speed sensor. <Ref. to CVT-103, INSTALLATION, Turbine Speed Sensor.>
26) Install the transmission harness. <Ref. to CVT-136, INSTALLATION, Transmission Harness.>
27) Install the control valve body. <Ref. to CVT-122, INSTALLATION, Control Valve Body.>
28) Install the air breather hose. <Ref. to CVT-156, INSTALLATION, Air Breather Hose.>
29) Install the transmission assembly to the vehicle. <Ref. to CVT-72, INSTALLATION, Automatic Transmission Assembly.>

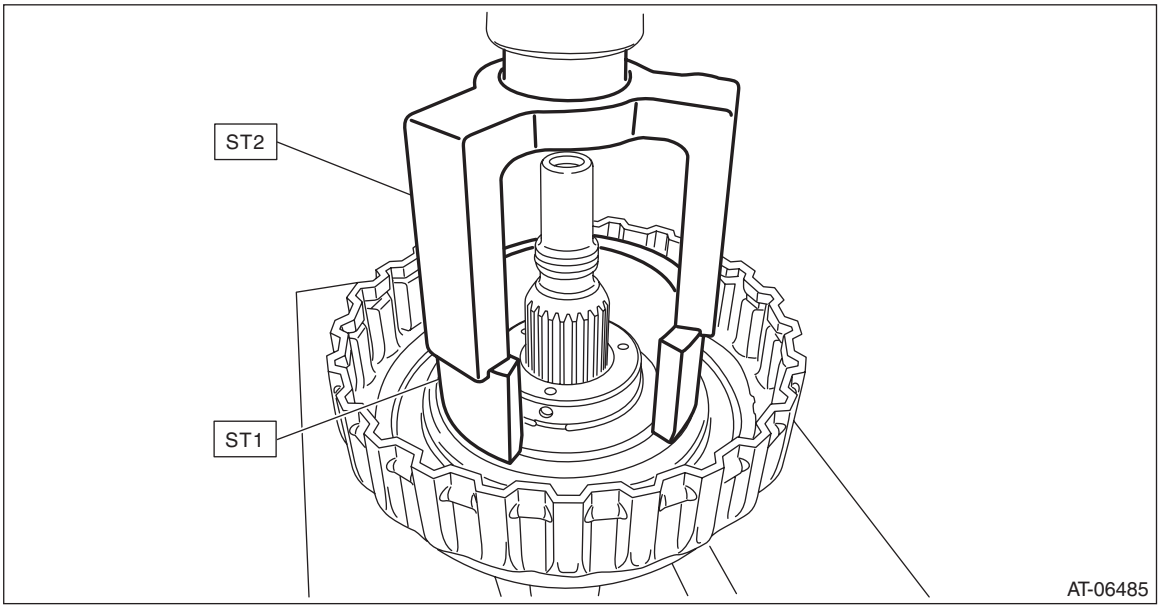
C: DISASSEMBLY

1. FORWARD CLUTCH ASSEMBLY

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

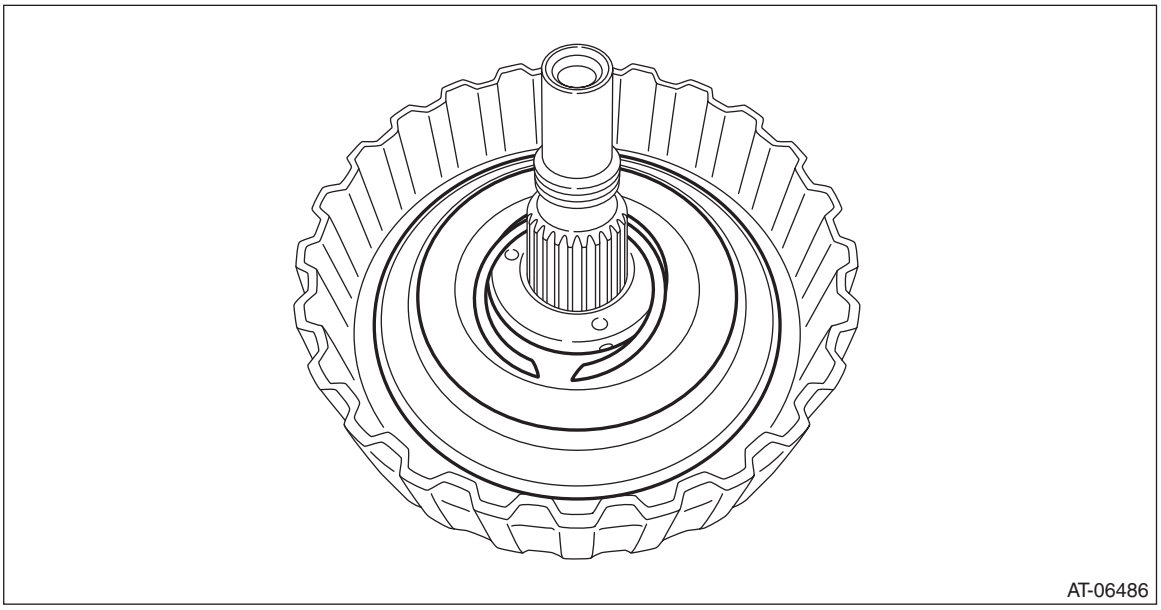

AT-06484

3) Compress the return spring using the ST to remove the snap ring.
ST1 18762AA010 COMPRESSOR SPECIAL TOOL
ST2 398673600 COMPRESSOR

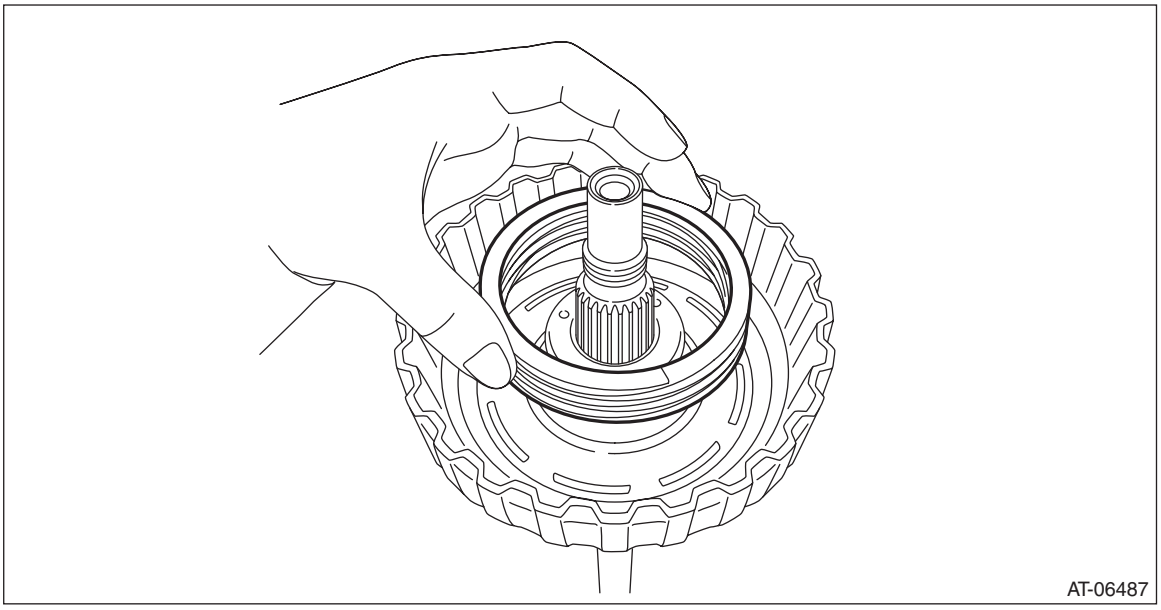


AT-06485

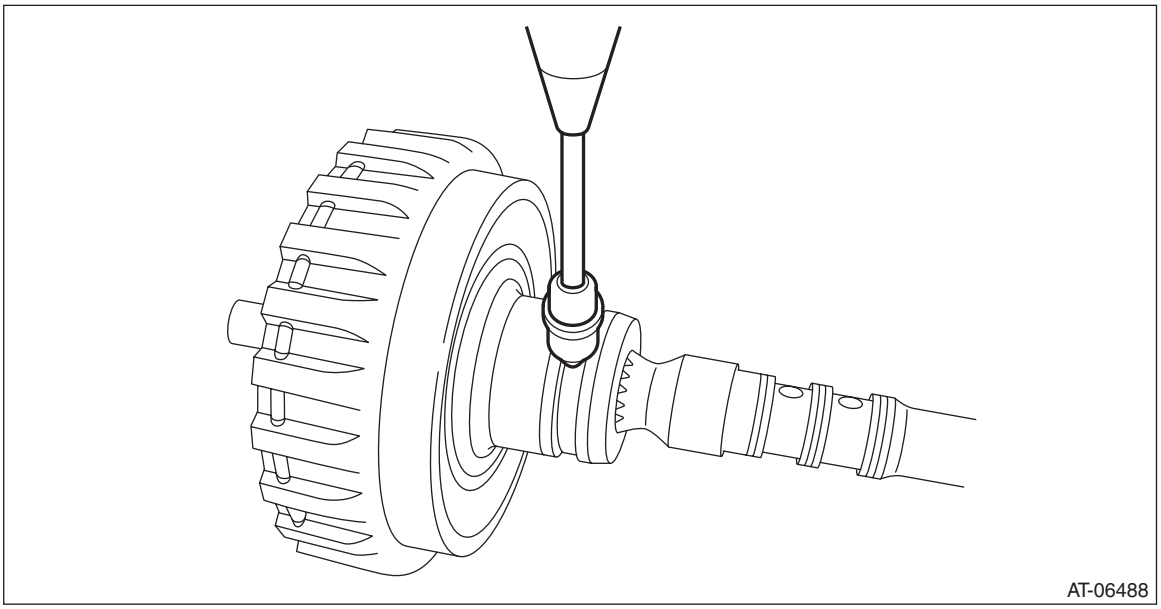
4) Remove the chamber COMPL and snap ring.



5) Remove the return spring.

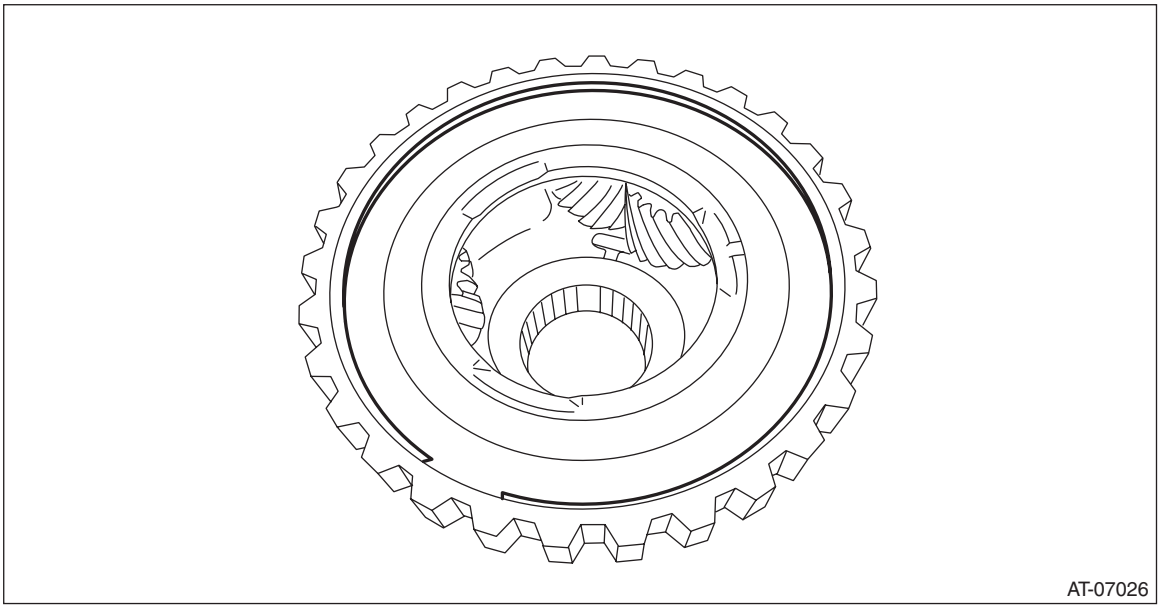


6) Remove the forward clutch piston by blowing compressed air intermittently from the forward clutch carrier hole.



2. PLANETARY CARRIER ASSY

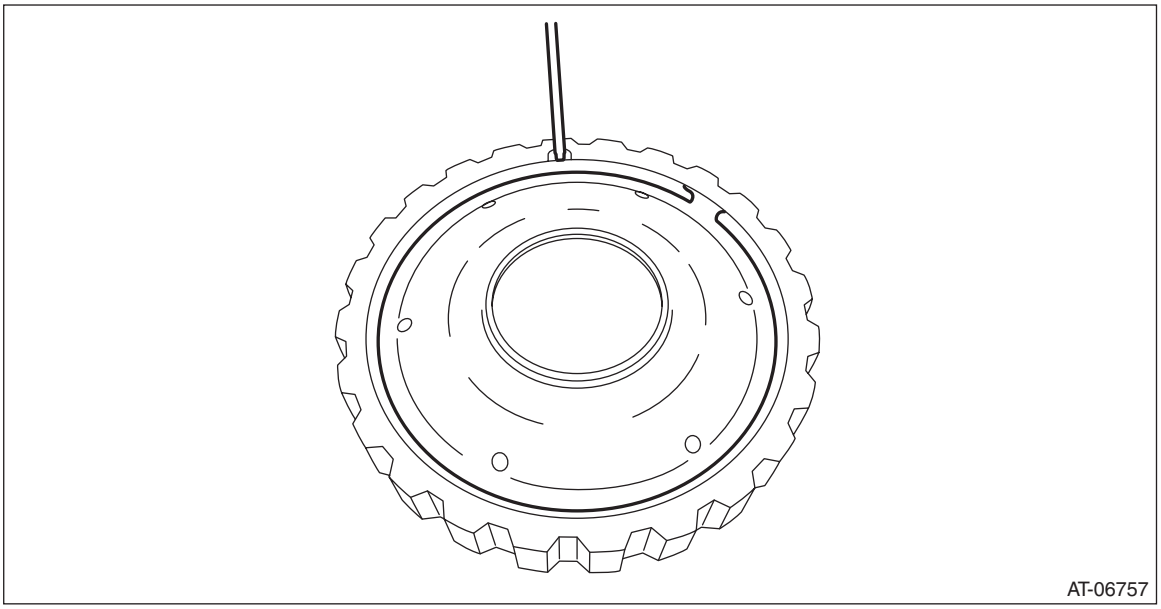
NOTE:
Disassemble the balance oil guide only.
1) Remove the snap ring.



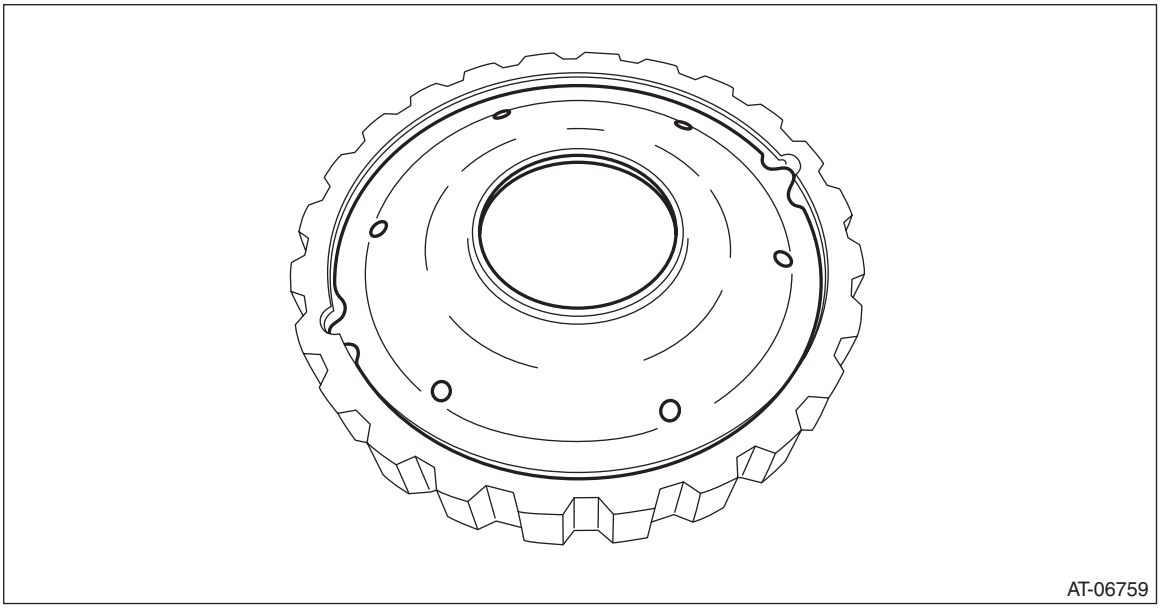
2) Remove the balance oil guide.

3. INTERNAL GEAR

1) Remove the snap ring.



2) Remove the thrust gear plate.

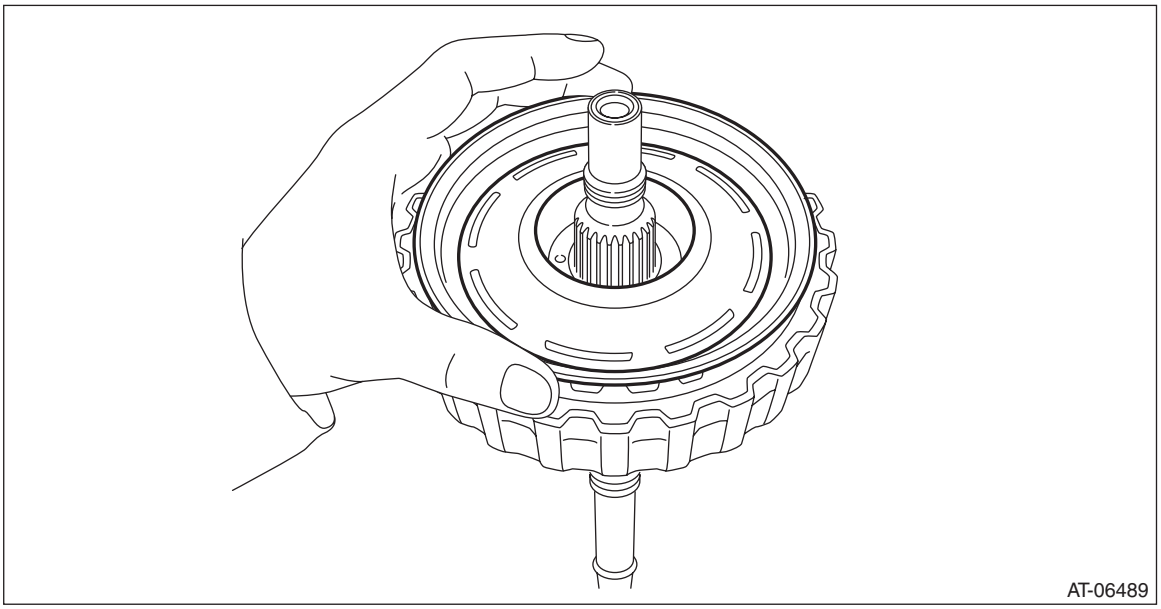


D: ASSEMBLY

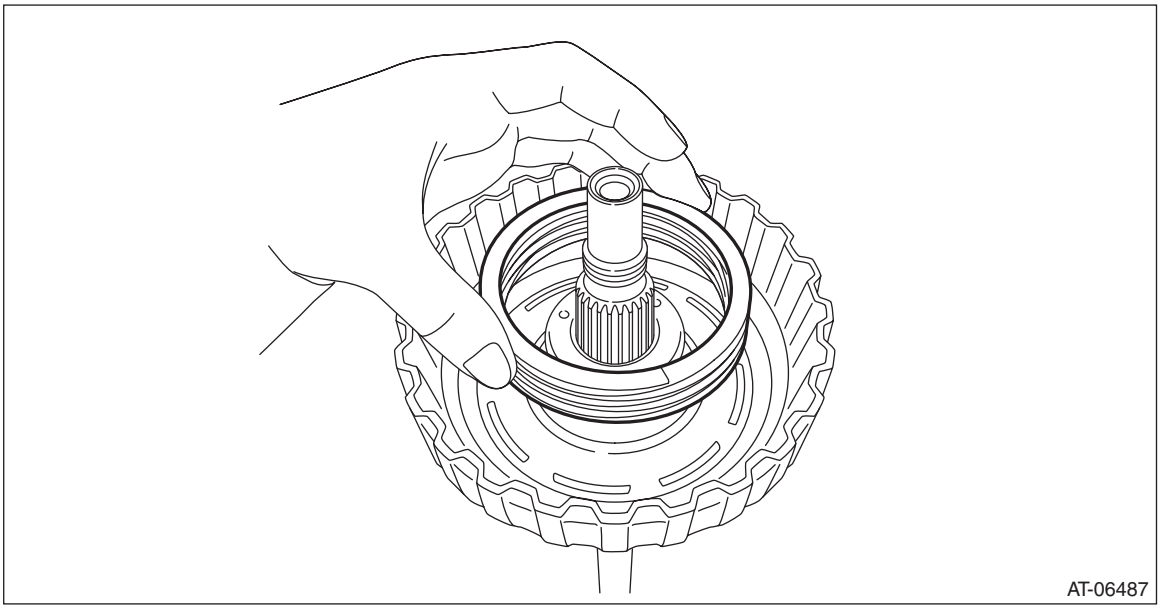
1. FORWARD CLUTCH ASSEMBLY

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

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

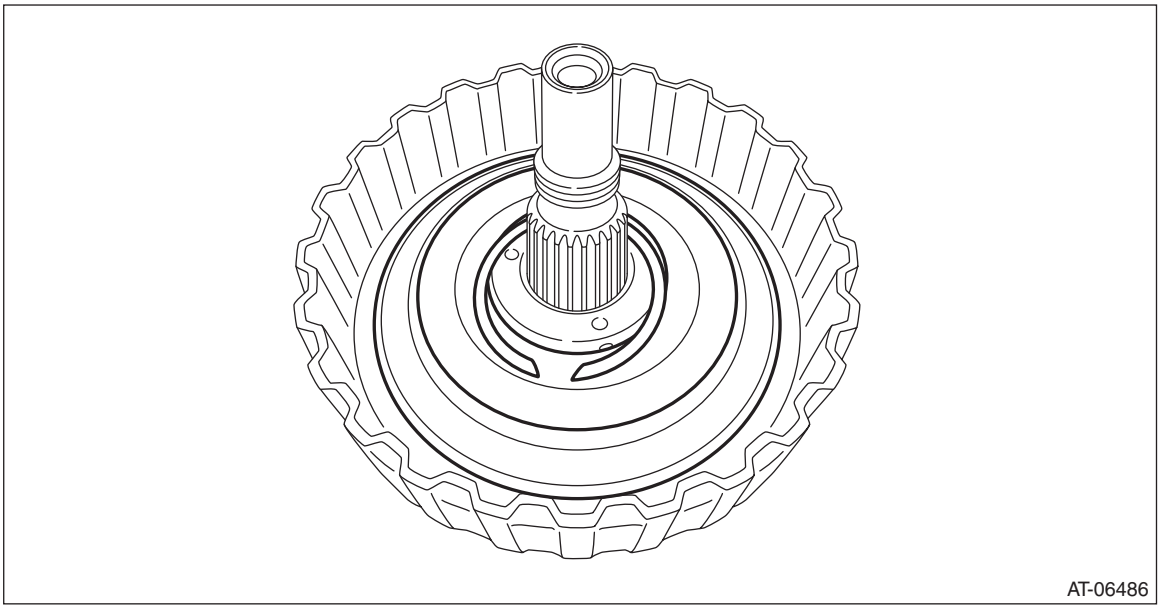


2) Install the return spring.

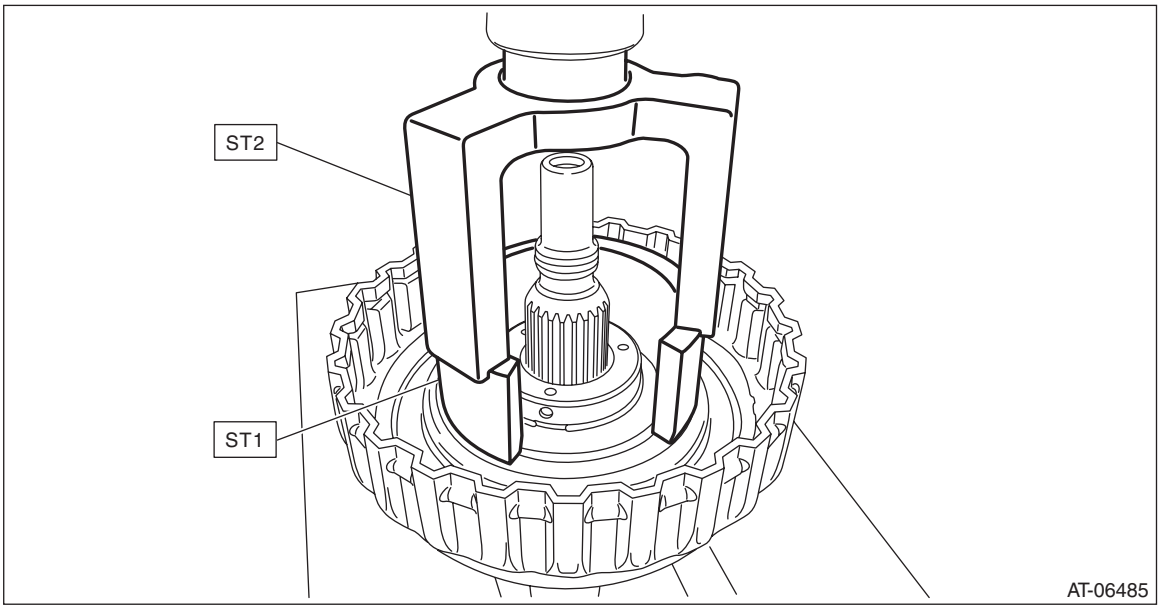


3) Install the chamber COMPL.

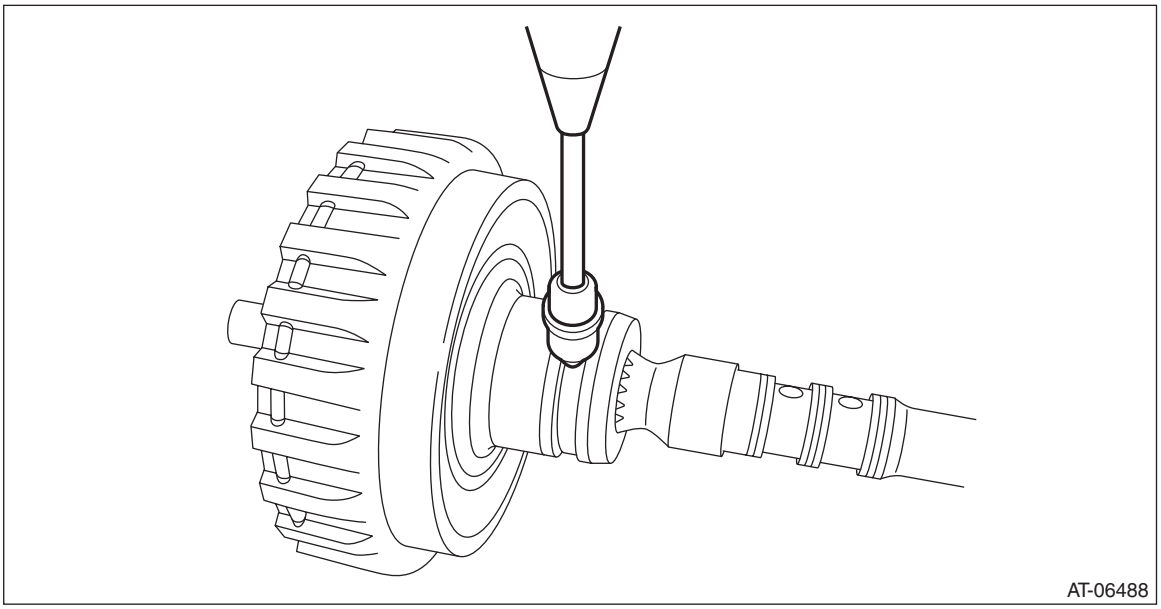
NOTE:
Apply CVTF to the sealing area of chamber COMPL.



4) Compress the return spring using the ST to install the snap ring.
ST1 18762AA010 COMPRESSOR SPECIAL TOOL
ST2 398673600 COMPRESSOR



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



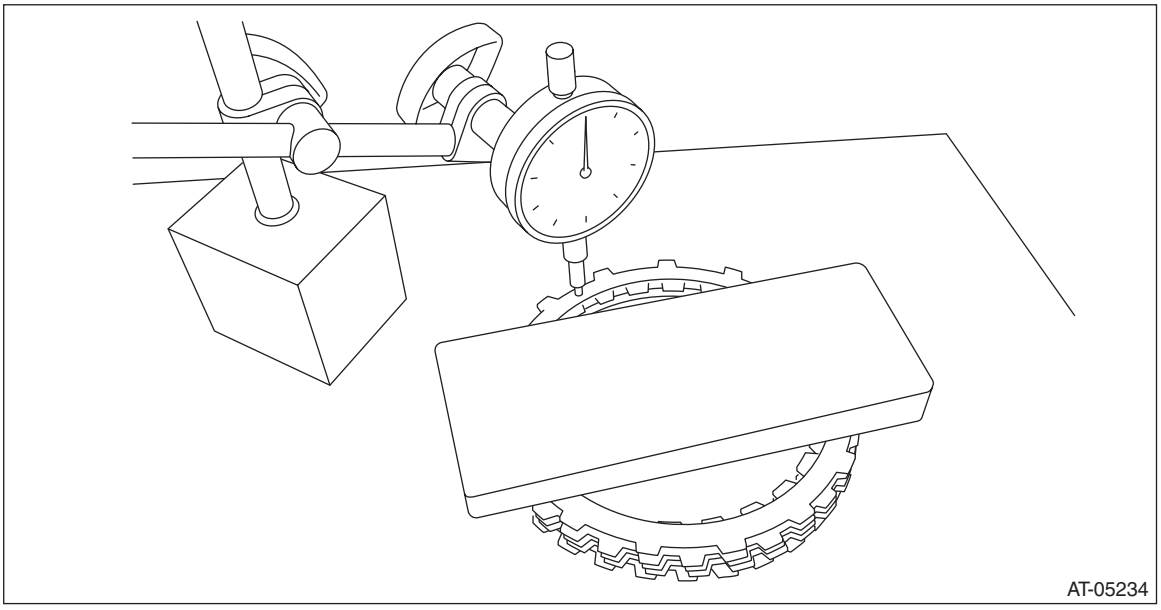
6) Place the driven plate, drive plate and retaining plate neatly in this order on surface table.
7) Set the dial gauge to retaining plate, and read its scale.

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

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

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

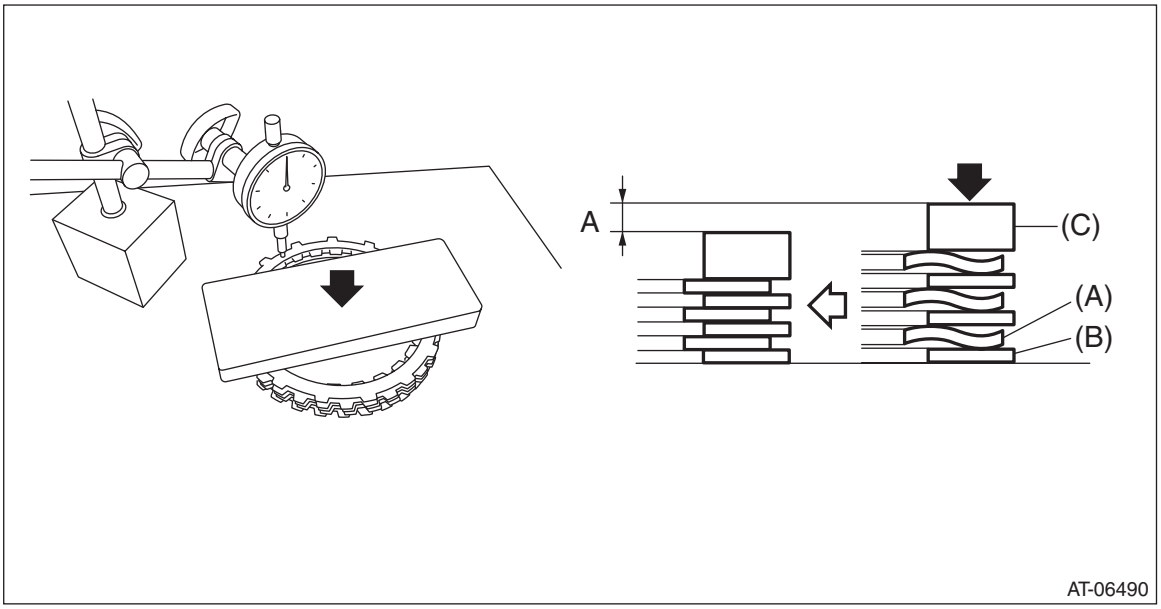
9) Put the flat board on retaining plate.



10) Using the following formula, read the push/pull gauge and calculate "N".
N = 52 N (5.3 kgf, 11.7 lb) – Z
52 N (5.3 kgf, 11.7 lb) : Load applied to clutch plate
Z: Flat board weight

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

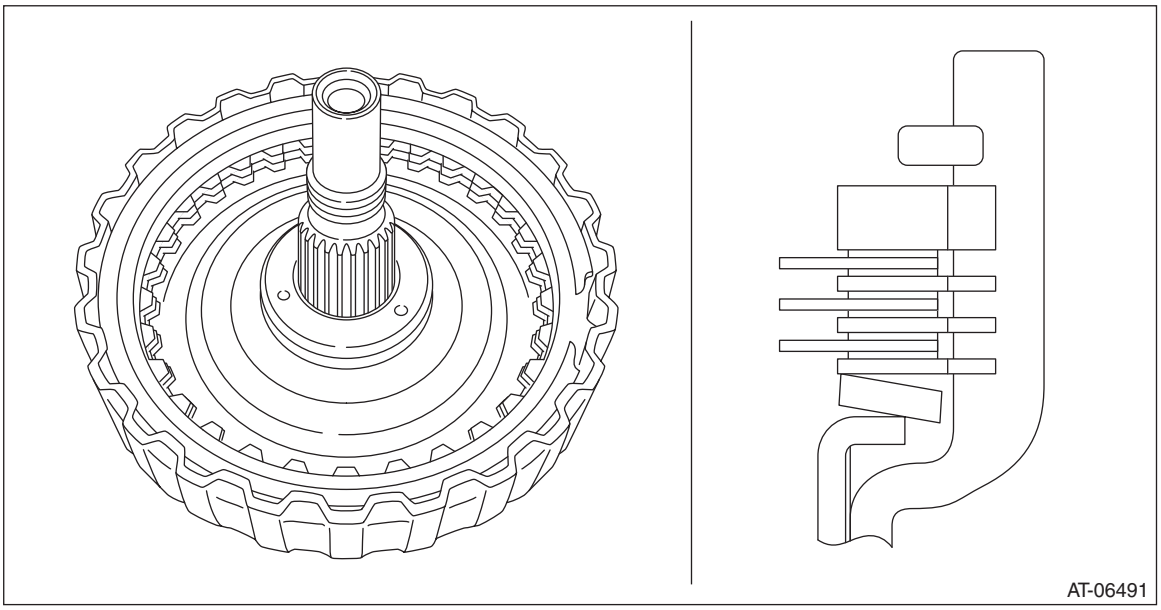
NOTE:
Measure at four points with a 90° interval and calculate the average.



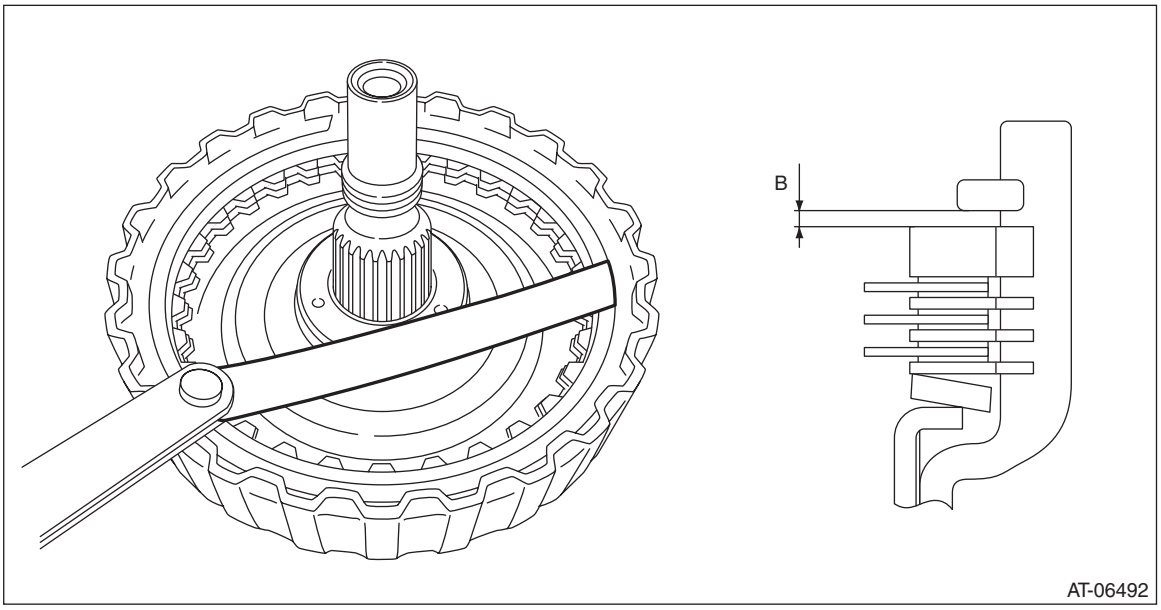
(A) Driven plate
(B) Drive plate
(C) Retaining plate

12) Install the dish plate, drive plate, driven plate, retaining plate and snap ring to the forward clutch carrier.

NOTE:
Install the dish plate in the correct direction.



13) Measure and record the clearance “B” between the retaining plate and snap ring.



14) Piston stroke calculation
Calculate with A and B dimensions recorded before.
If it exceeds the limit, replace with a new drive plate and adjust within the initial standard value.
S mm (in) = A + B
S: Piston stroke
A: Compression amount of drive plate and dish plate
B: Clearance between retaining plate and snap ring

Initial standard:
1.0 — 1.4 mm (0.040 — 0.055 in)

Limit thickness:
1.6 mm (0.063 in)

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

2. PLANETARY CARRIER ASSY

NOTE:
Assemble in the reverse order of disassembly.

3. INTERNAL GEAR

NOTE:
Assemble in the reverse order of disassembly.

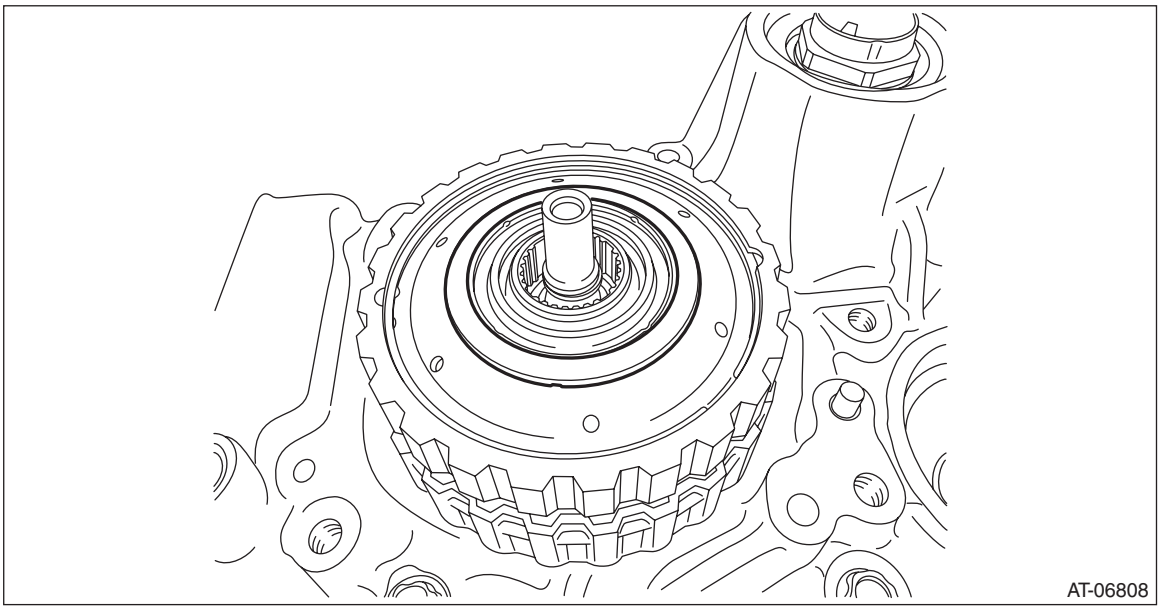
E: INSPECTION

- Check the forward clutch drum, internal gear, sun gear and forward clutch piston lip for wear or damage.
- Inspect the drive plate facing for wear and damage.
- Check the driven plate for discoloration (burnt color).
- Check for worn snap ring, fatigue or damaged return spring or deformed spring retainer.
- Make sure the clearance between retaining plate and internal gear of forward clutch is within the limit. If it exceeds the standard, replace the forward clutch. <Ref. to CVT-265, ASSEMBLY, Forward Clutch Assembly.>

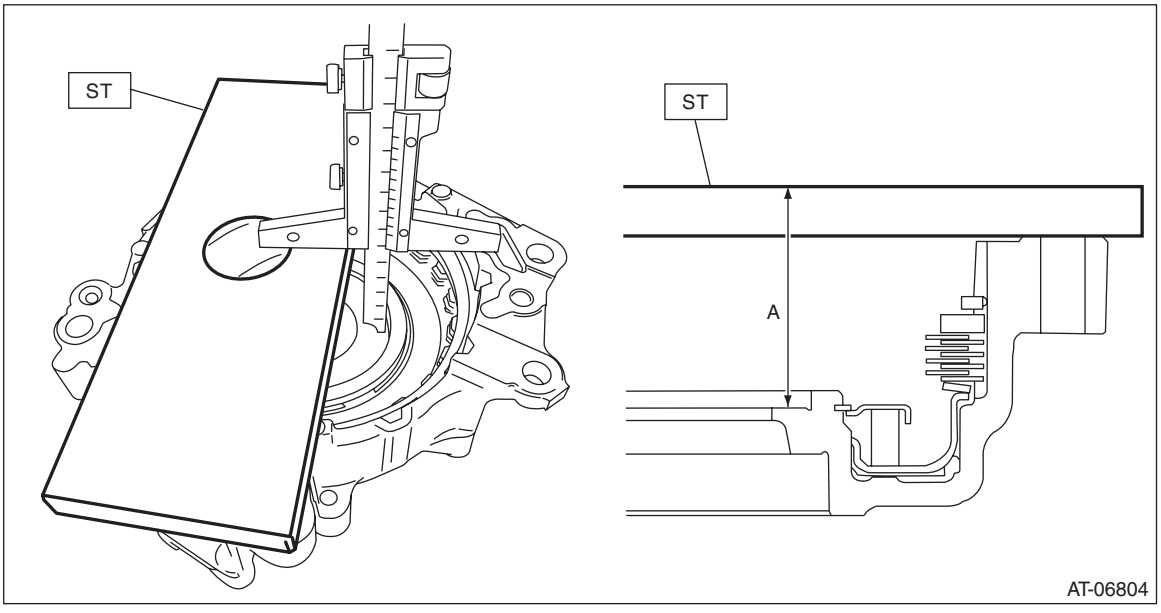
F: ADJUSTMENT

1) Install the thrust bearing to the internal gear.

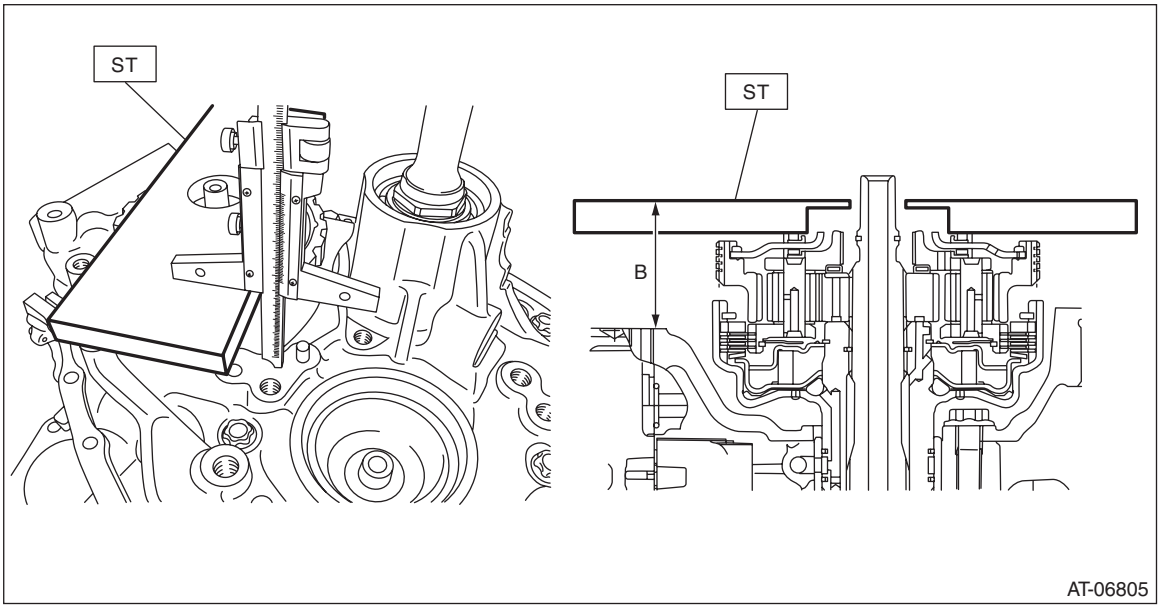
NOTE:
Face the temper color surface to the reverse brake side.



2) Measure depth “A” from the ST upper face to the washer mounting surface.
ST 499575600 GAUGE



3) Measure the height “B” from the ST upper face to the mating surface of the drive pinion retainer.
ST 499575600 GAUGE



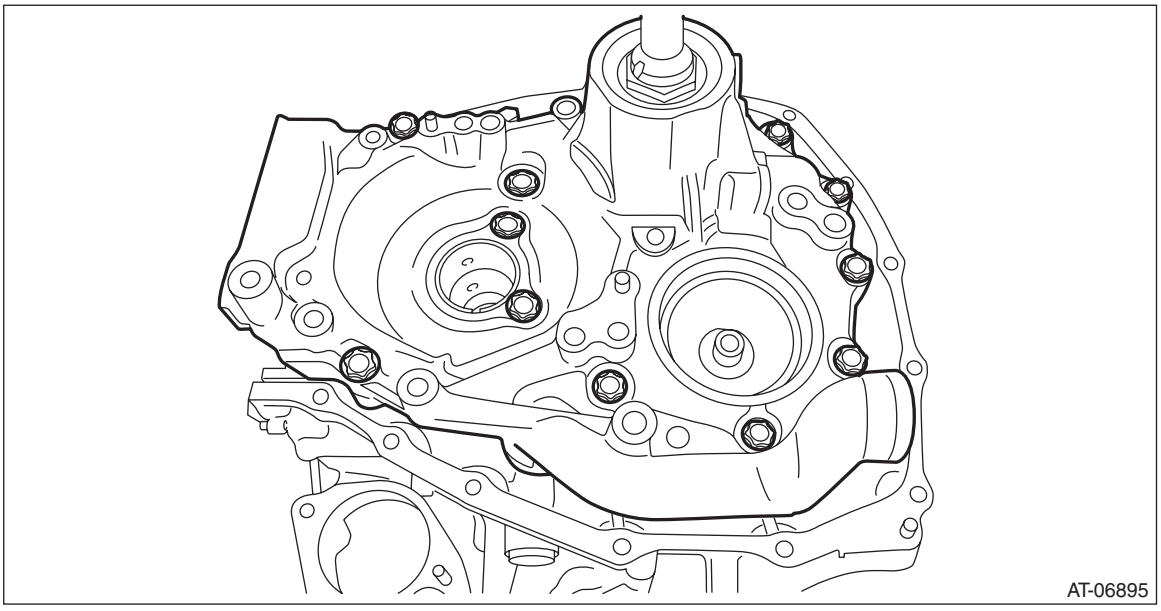
4) Obtain the thickness of washer using the following formula to select the washer.
T (mm) = A – B – (0.35 — 0.70)
[T (in) = A – B – (0.014 — 0.028)]
T: Shim thickness
A: Depth from the ST upper face to the washer mounting surface
B: Height from ST upper face to the drive pinion retainer mating surface
0.35 — 0.70 mm (0.014 — 0.028 in): Clearance

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

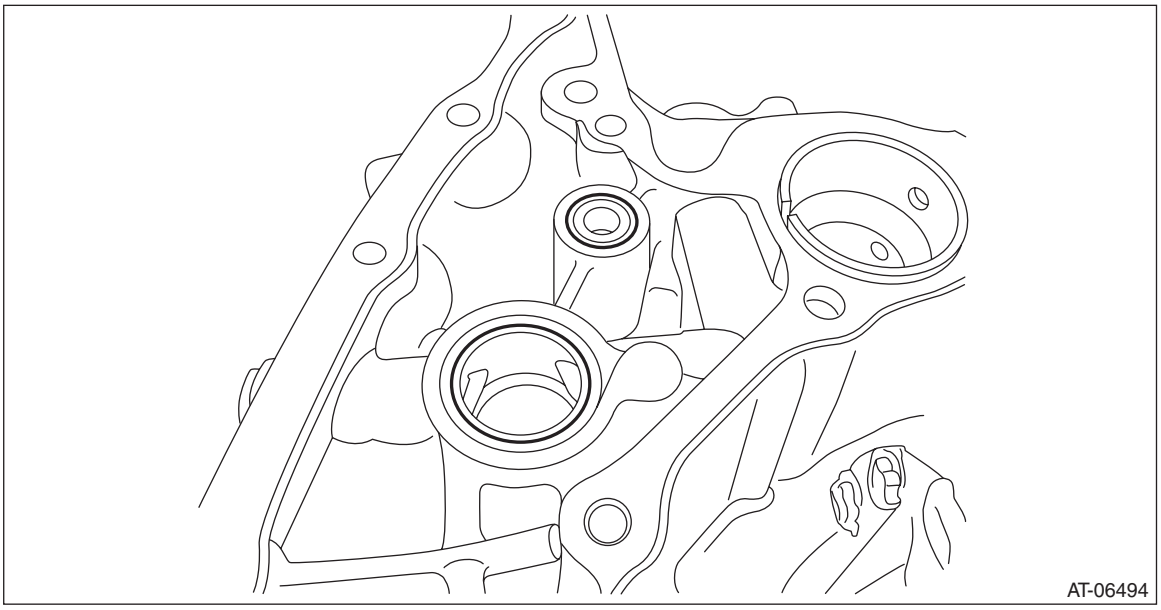
41.Drive Pinion Shaft Assembly

A: REMOVAL

1) Remove the transmission assembly from the vehicle. <Ref. to CVT-57, REMOVAL, Automatic Transmission Assembly.>
2) Remove the air breather hose. <Ref. to CVT-154, REMOVAL, Air Breather Hose.>
3) Remove the control valve body. <Ref. to CVT-116, REMOVAL, Control Valve Body.>
4) Remove the transmission harness. <Ref. to CVT-129, REMOVAL, Transmission Harness.>
5) Remove the turbine speed sensor. <Ref. to CVT-103, REMOVAL, Turbine Speed Sensor.>
6) Remove the secondary speed sensor. <Ref. to CVT-105, REMOVAL, Secondary Speed Sensor.>
7) Remove the primary speed sensor. <Ref. to CVT-107, REMOVAL, Primary Speed Sensor.>
8) Remove the inhibitor switch. <Ref. to CVT-99, REMOVAL, Inhibitor Switch.>
9) Remove the extension case. <Ref. to CVT-163, REMOVAL, Extension Case.>
10) Remove the transfer clutch assembly. <Ref. to CVT-167, REMOVAL, Transfer Clutch.>
11) Remove the transfer driven gear assembly. <Ref. to CVT-181, REMOVAL, Transfer Driven Gear.>
12) Remove the parking pawl. <Ref. to CVT-184, REMOVAL, Parking Pawl.>
13) Remove the reduction driven gear assembly. <Ref. to CVT-186, REMOVAL, Reduction Driven Gear.>
14) Remove the oil pan and oil strainer. <Ref. to CVT-112, REMOVAL, Oil Pan and Strainer.>
15) Remove the transmission control device. <Ref. to CVT-194, REMOVAL, Transmission Control Device.>
16) Remove the transmission case. <Ref. to CVT-200, REMOVAL, Transmission Case.>
17) Remove the reduction drive gear. <Ref. to CVT-212, REMOVAL, Reduction Drive Gear.>
18) Remove the primary pulley, secondary pulley and variator chain. <Ref. to CVT-217, REMOVAL, Primary Pulley and Secondary Pulley.>
19) Remove the reverse brake assembly. <Ref. to CVT-238, REMOVAL, Reverse Brake Assembly.>
20) Remove the forward clutch assembly. <Ref. to CVT-253, REMOVAL, Forward Clutch Assembly.>
21) Using the ST, remove the drive pinion retainer.
ST 18270KA020 SOCKET (E20)



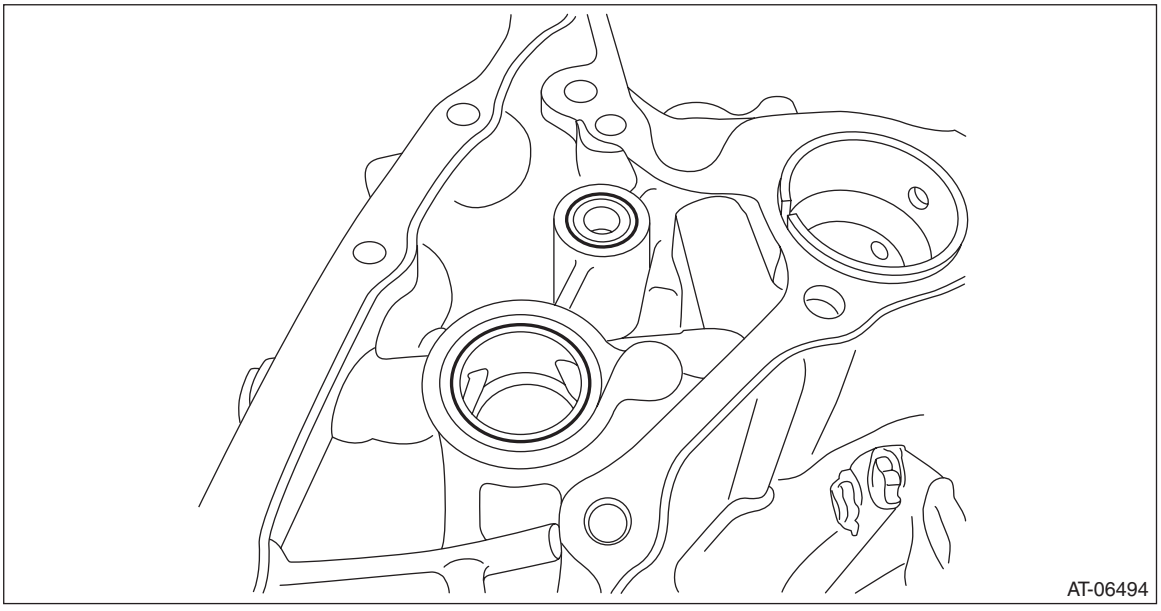
22) Remove the O-ring.



B: INSTALLATION

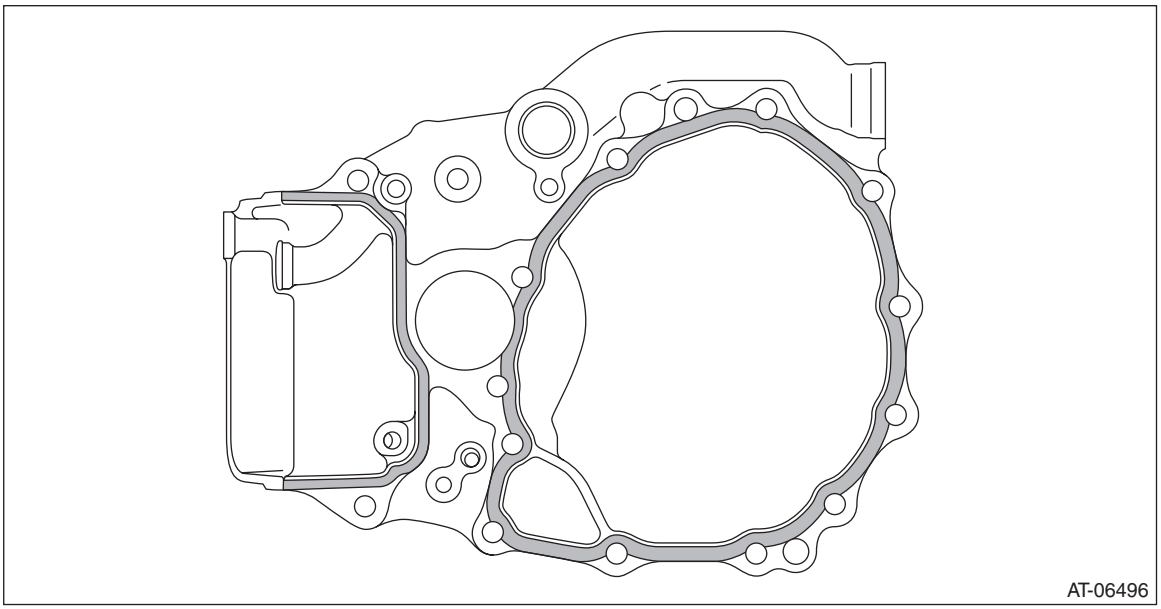
1) Clean the mating surface of drive pinion retainer and converter case.
2) Adjust the backlash and tooth contact between drive pinion shaft assembly and the front differential side gear. <Ref. to CVT-293, ADJUSTMENT, Drive Pinion Shaft Assembly.>
3) Install O-rings in two locations to the converter case.

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



4) Apply liquid gasket seamlessly to the mating surface of drive pinion retainer.

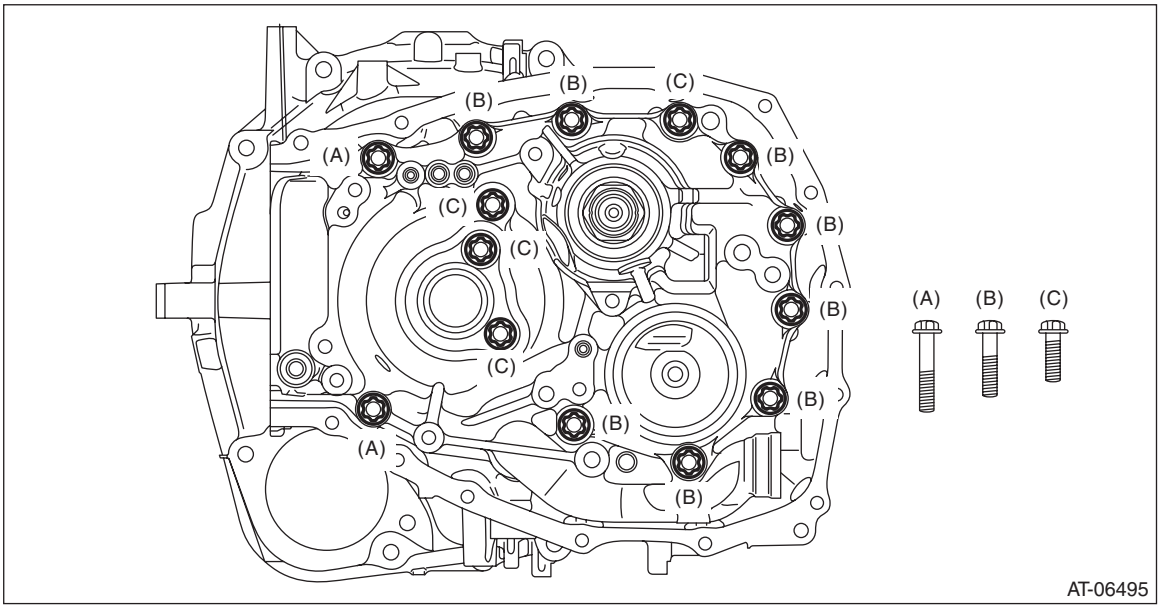
Liquid gasket:
THREE BOND 1215 (Part No. 004403007) or equivalent



5) Install the drive pinion retainer to converter case, and tighten the bolt using the ST.
ST 18270KA020 SOCKET (E20)

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

Tightening torque:
43 N·m (4.4 kgf-m, 31.7 ft-lb)

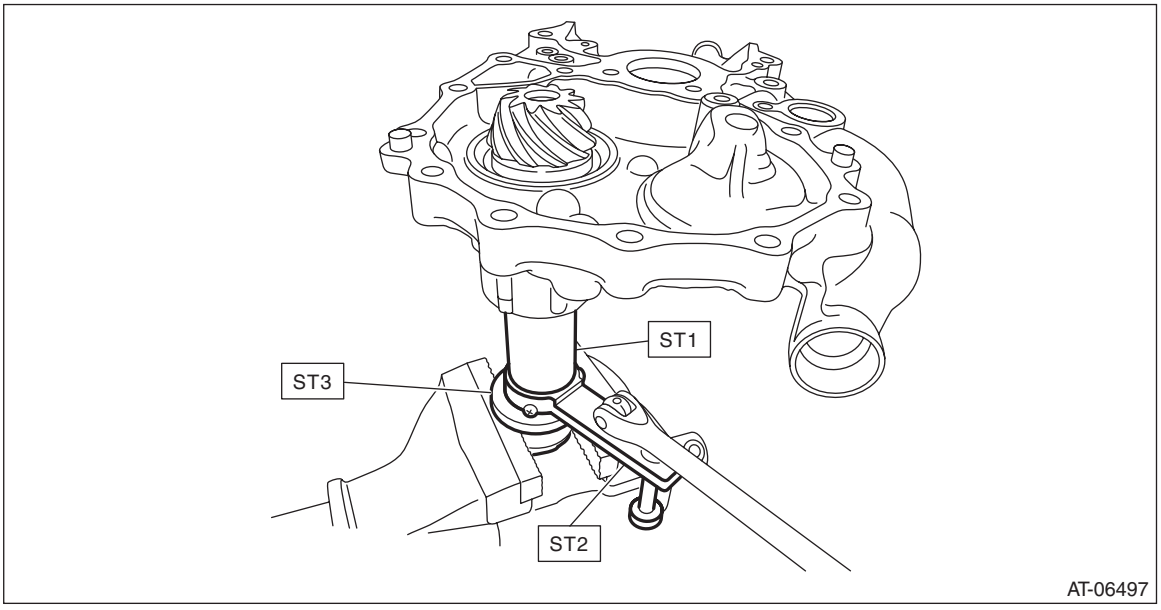


6) Install the forward clutch assembly. <Ref. to CVT-256, INSTALLATION, Forward Clutch Assembly.>
7) Install the reverse brake assembly. <Ref. to CVT-241, INSTALLATION, Reverse Brake Assembly.>
8) Install the primary pulley, secondary pulley and variator chain. <Ref. to CVT-224, INSTALLATION, Primary Pulley and Secondary Pulley.>
9) Install the reduction drive gear. <Ref. to CVT-213, INSTALLATION, Reduction Drive Gear.>
10) Install the transmission case. <Ref. to CVT-202, INSTALLATION, Transmission Case.>
11) Install the transmission control device. <Ref. to CVT-197, INSTALLATION, Transmission Control Device.>

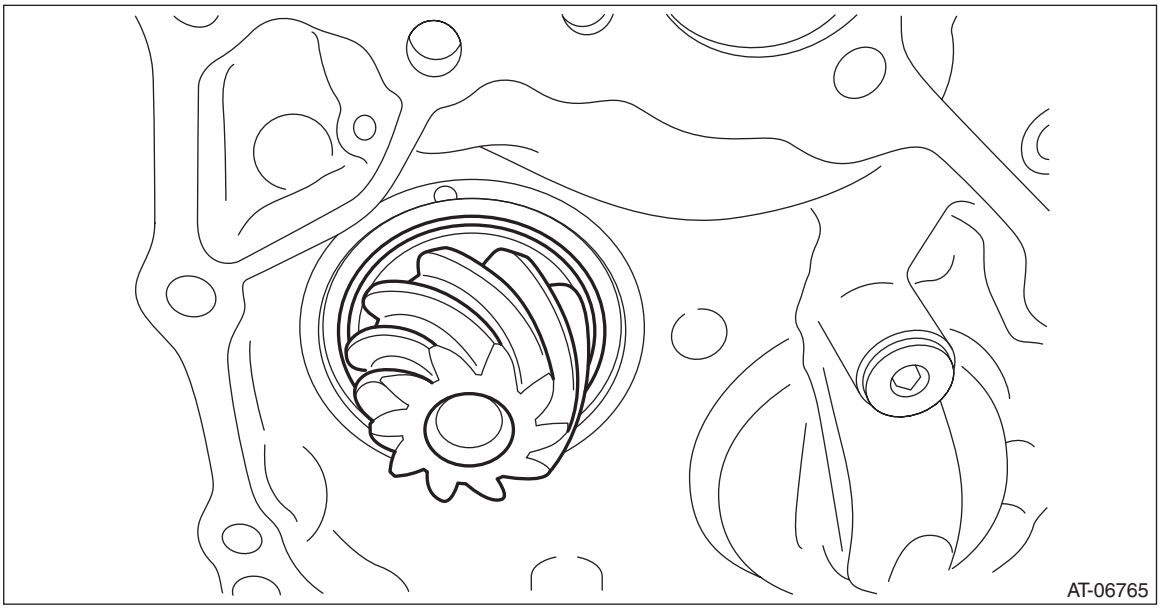
12) Install the oil strainer and oil pan. <Ref. to CVT-113, INSTALLATION, Oil Pan and Strainer.>
13) Install the reduction driven gear assembly. <Ref. to CVT-186, INSTALLATION, Reduction Driven Gear.>
14) Install the transfer driven gear assembly. <Ref. to CVT-182, INSTALLATION, Transfer Driven Gear.>
15) Install the transfer clutch assembly. <Ref. to CVT-169, INSTALLATION, Transfer Clutch.>
16) Install the parking pawl. <Ref. to CVT-185, INSTALLATION, Parking Pawl.>
17) Install the extension case. <Ref. to CVT-164, INSTALLATION, Extension Case.>
18) Install the inhibitor switch. <Ref. to CVT-101, INSTALLATION, Inhibitor Switch.>
19) Install the secondary speed sensor. <Ref. to CVT-105, INSTALLATION, Secondary Speed Sensor.>
20) Install the primary speed sensor. <Ref. to CVT-108, INSTALLATION, Primary Speed Sensor.>
21) Install the turbine speed sensor. <Ref. to CVT-103, INSTALLATION, Turbine Speed Sensor.>
22) Install the transmission harness. <Ref. to CVT-136, INSTALLATION, Transmission Harness.>
23) Install the control valve body. <Ref. to CVT-122, INSTALLATION, Control Valve Body.>
24) Install the air breather hose. <Ref. to CVT-156, INSTALLATION, Air Breather Hose.>
25) Install the transmission assembly to the vehicle. <Ref. to CVT-72, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

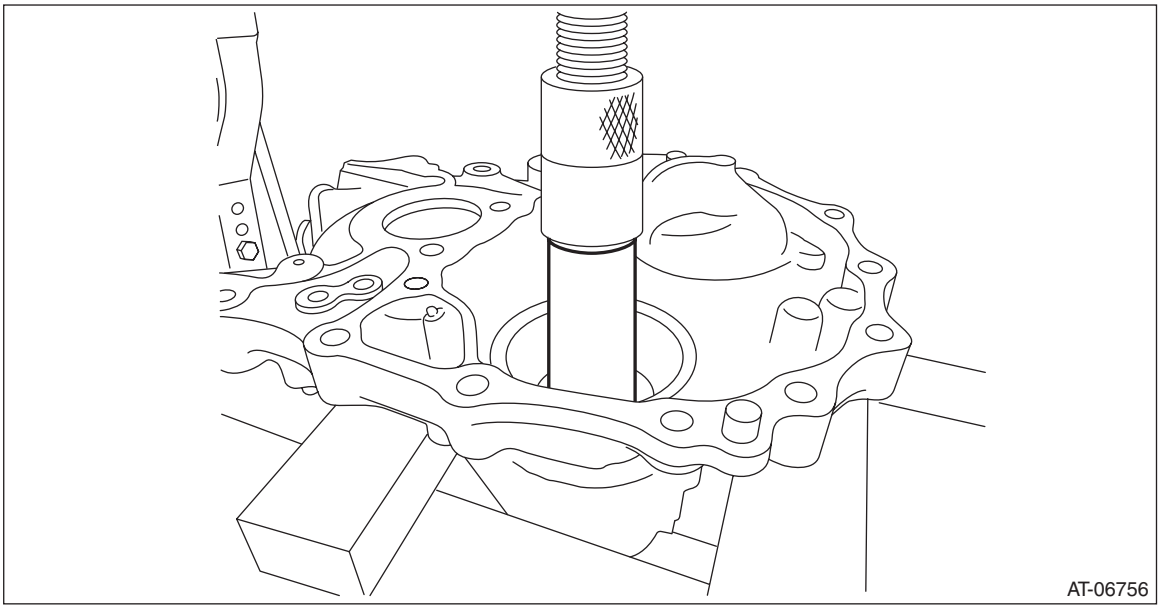
1) Flatten the tab of the lock nut.
2) Using ST1, ST2 and ST3, fix at the spline portion of drive pinion shaft to remove the lock nut.
ST1 499787500 ADAPTER
ST2 499787700 WRENCH
ST3 498937110 HOLDER



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

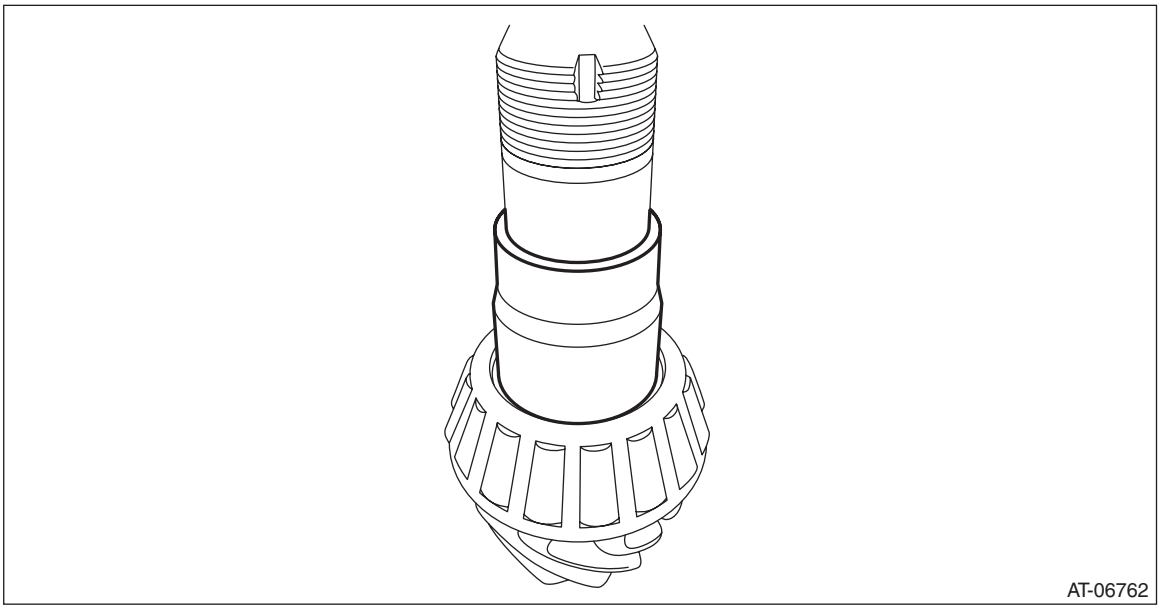


4) Using the round bar with diameter of 36 mm (1.42 in) or 37 mm (1.46 in), remove the bearing inner race and plug.

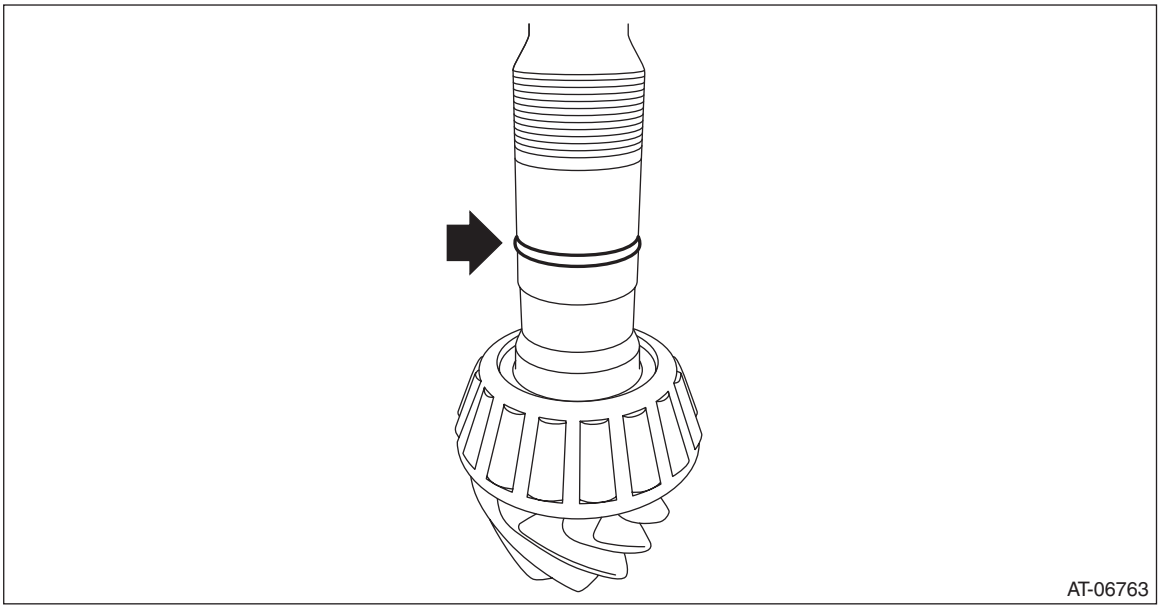


5) Remove the drive pinion washer.

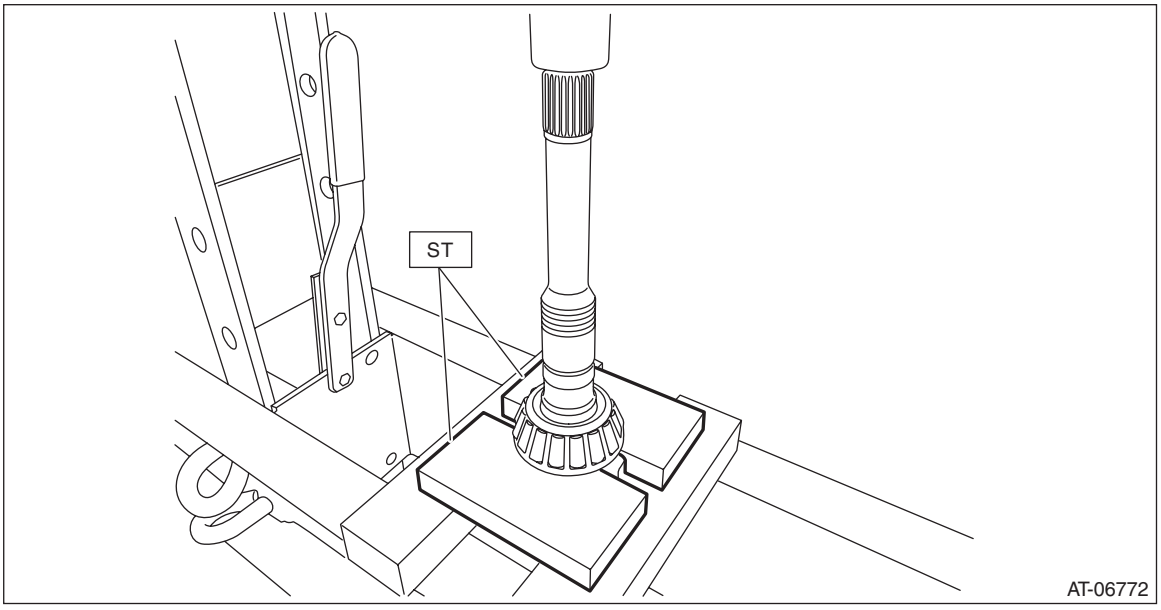
6) Remove the drive pinion spacer.



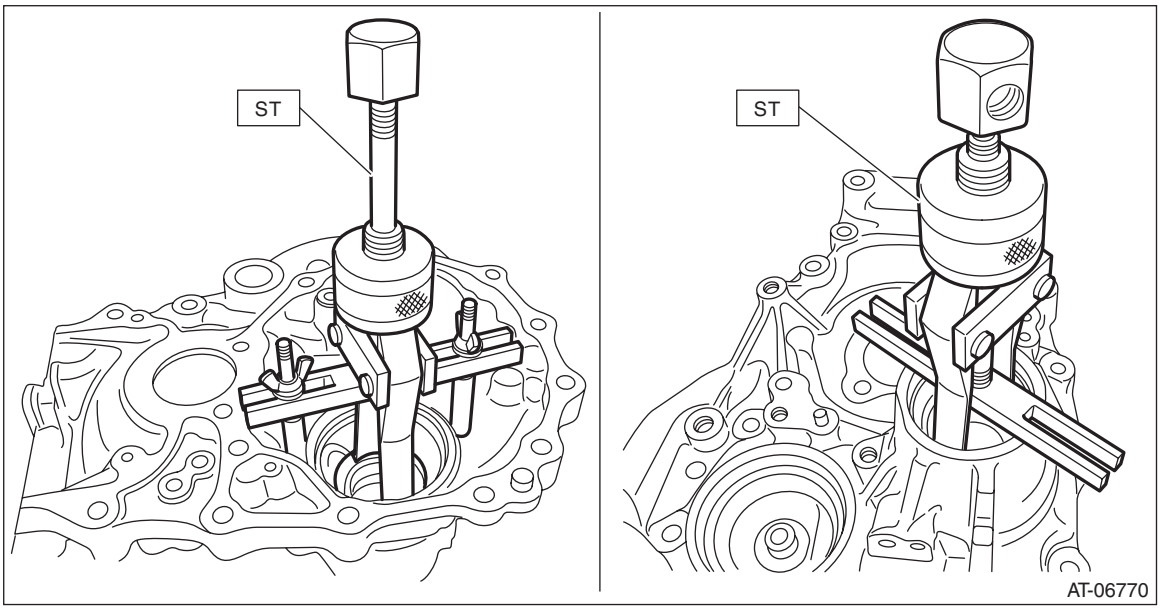
7) Remove the O-ring.



8) Remove the inner race and drive pinion shim from drive pinion shaft using ST.
ST 498515500 REMOVER

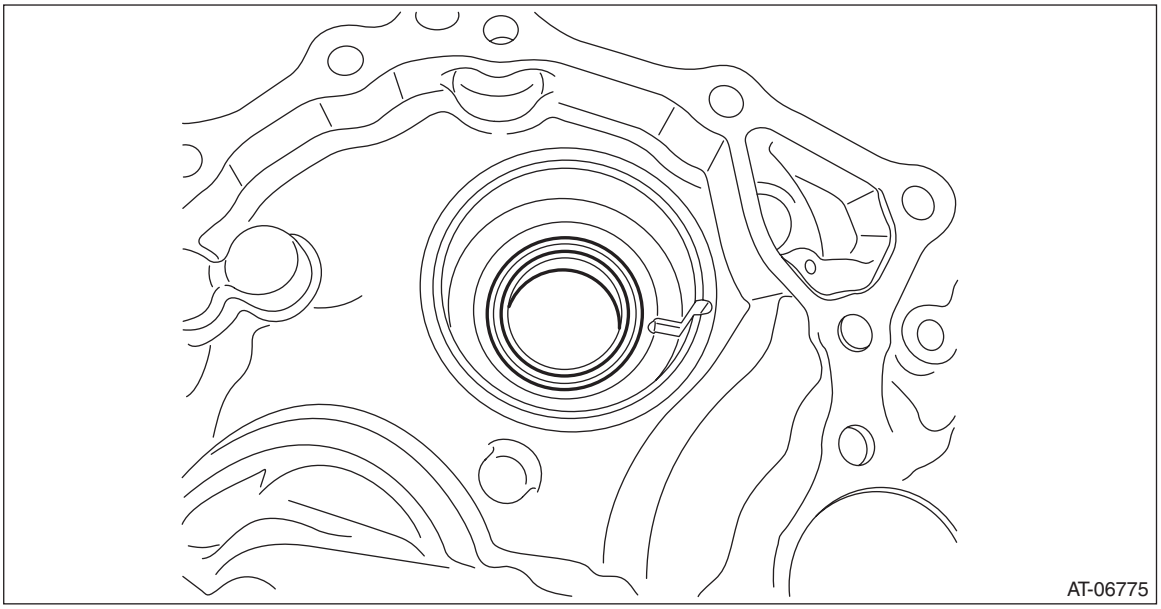


9) Using the ST, remove the outer race.
ST 398527700 PULLER ASSY

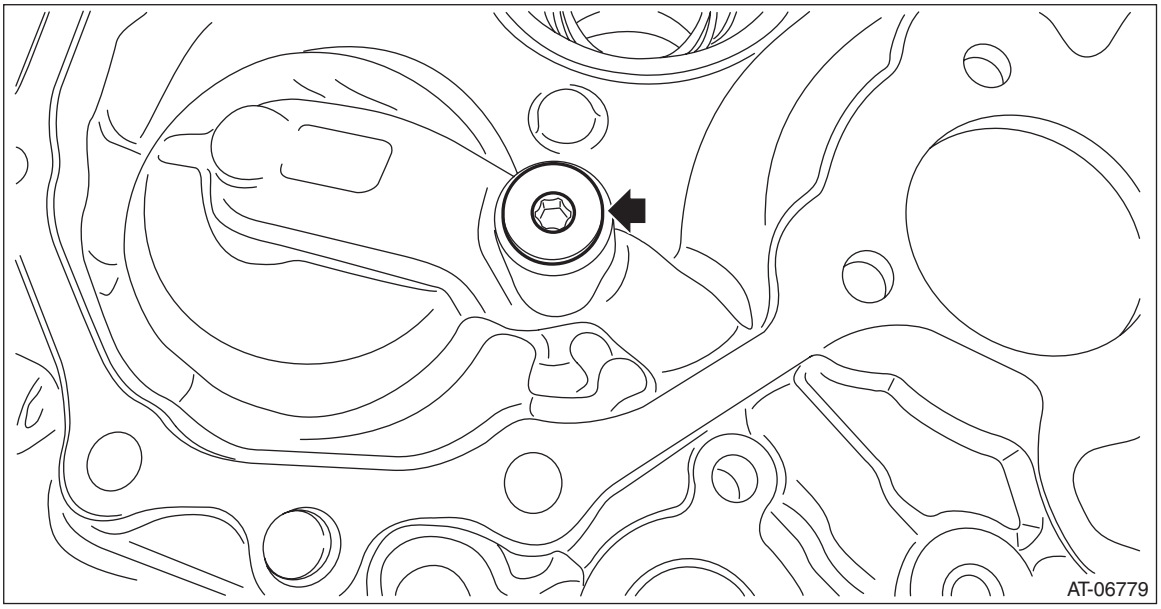


10) Remove the two oil seals using a screwdriver wrapped with cloth etc.

CAUTION:
Do not damage the fitting surface of oil seal.



11) Remove the plug from drive pinion retainer.

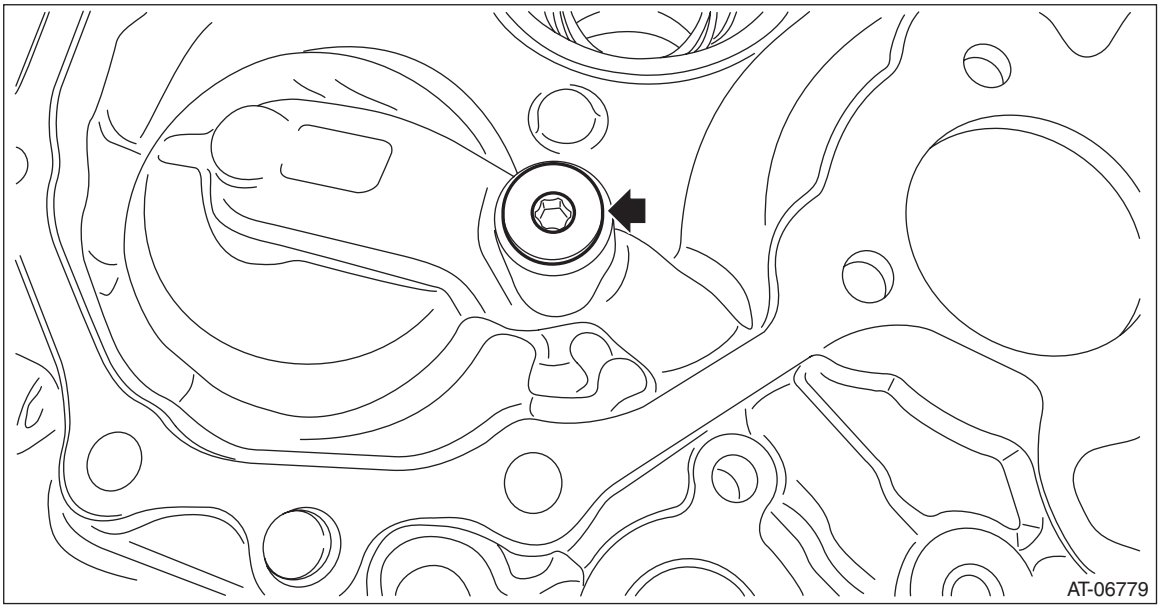


D: ASSEMBLY

1) Install the plug to drive pinion retainer.

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

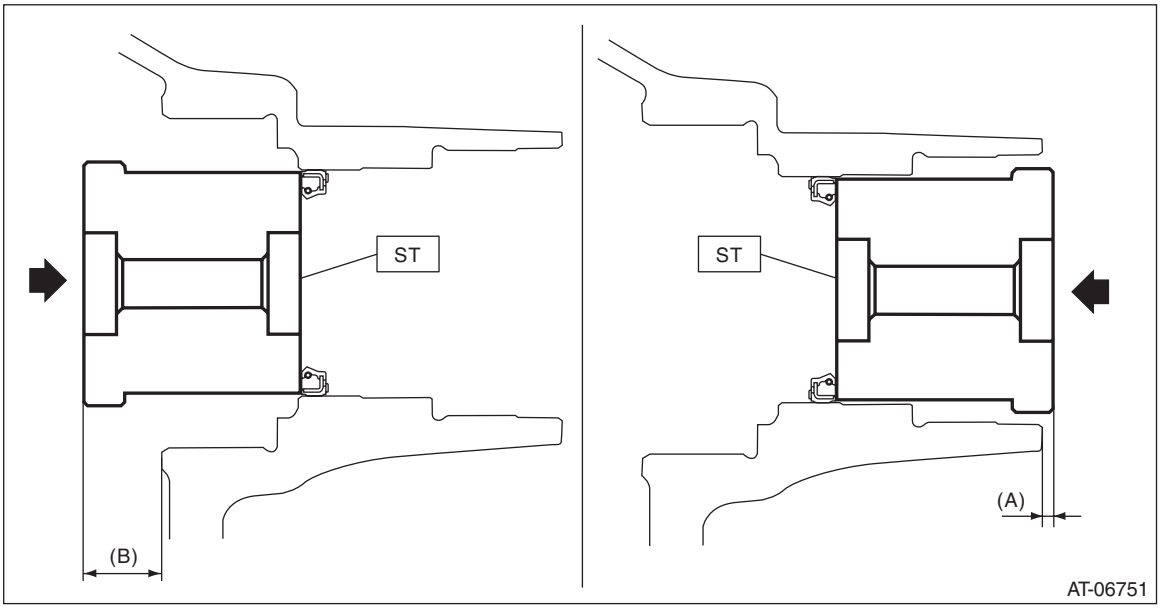
Tightening torque:
25 N·m (2.5 kgf-m, 18.4 ft-lb)



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

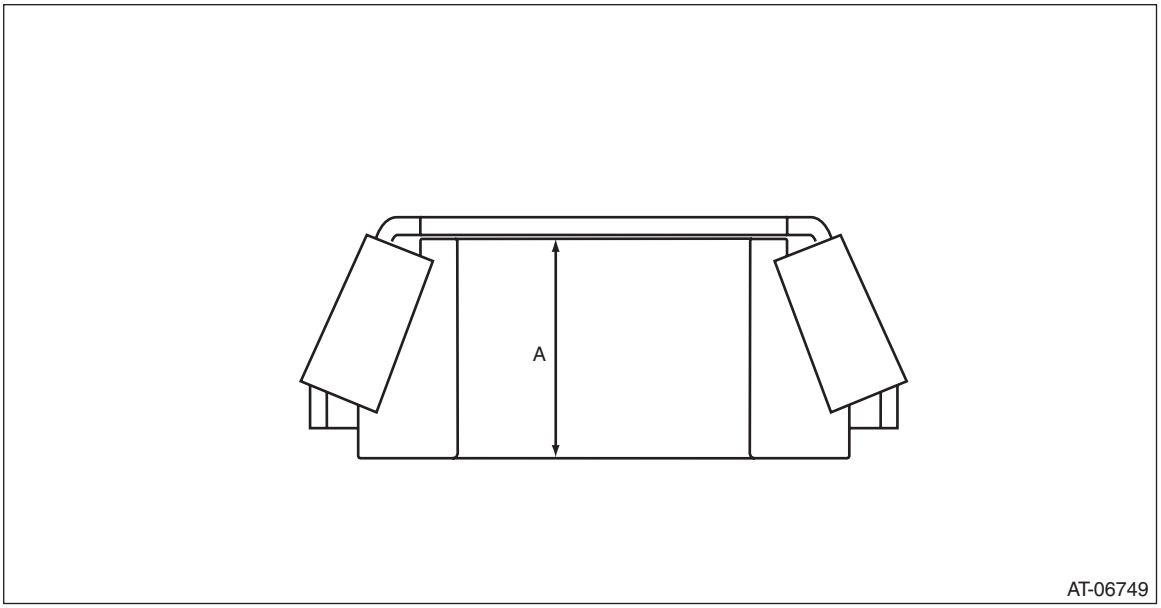
NOTE:
- Apply CVTF to the oil seal press-fitting surface and lip.
- Install the oil seal in the correct direction.

ST 927720000 HOUSING BUSHING INSTALLER AND REMOVER

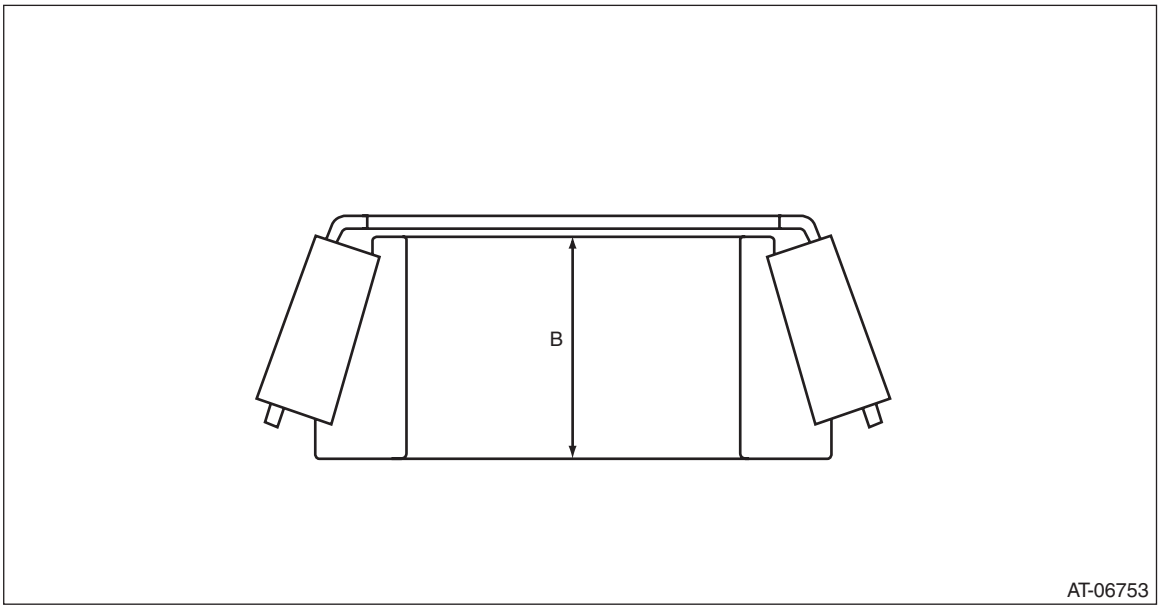


(A) 2.8 mm (0.11 in)
(B) 18.7 mm (0.74 in)

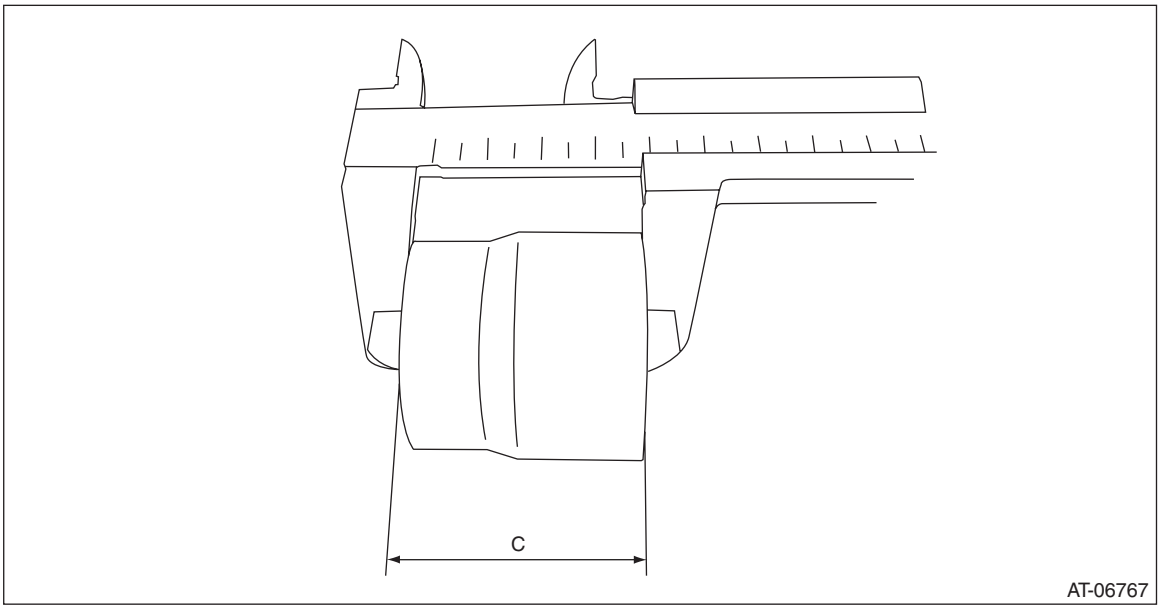
3) Select the drive pinion washer.
(1) Measure the roller bearing inner race width “A” on the front side.



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

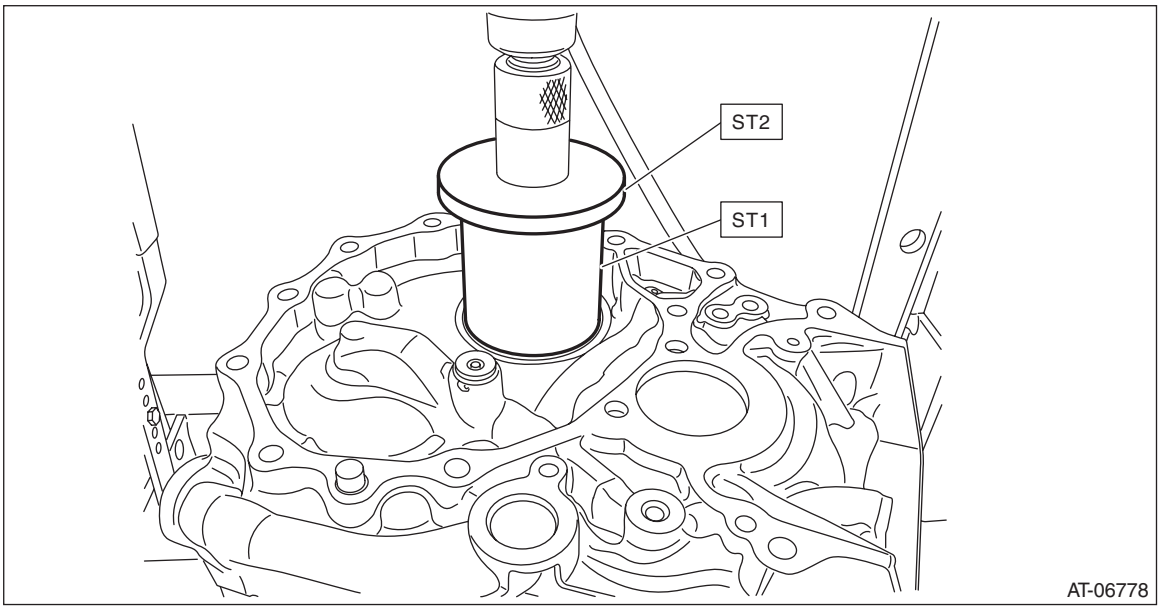


(3) Measure the spacer width “C”.

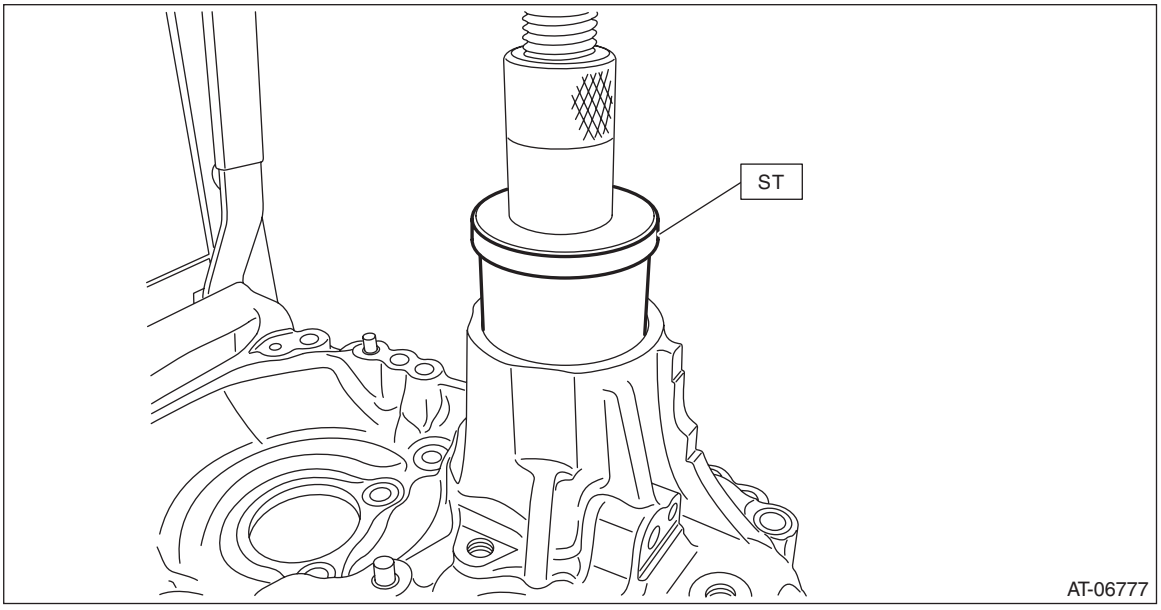


(4) Using the ST, install the front roller bearing outer race to the drive pinion retainer.

ST1 28499TC010 INSTALLER
ST2 398177700 INSTALLER



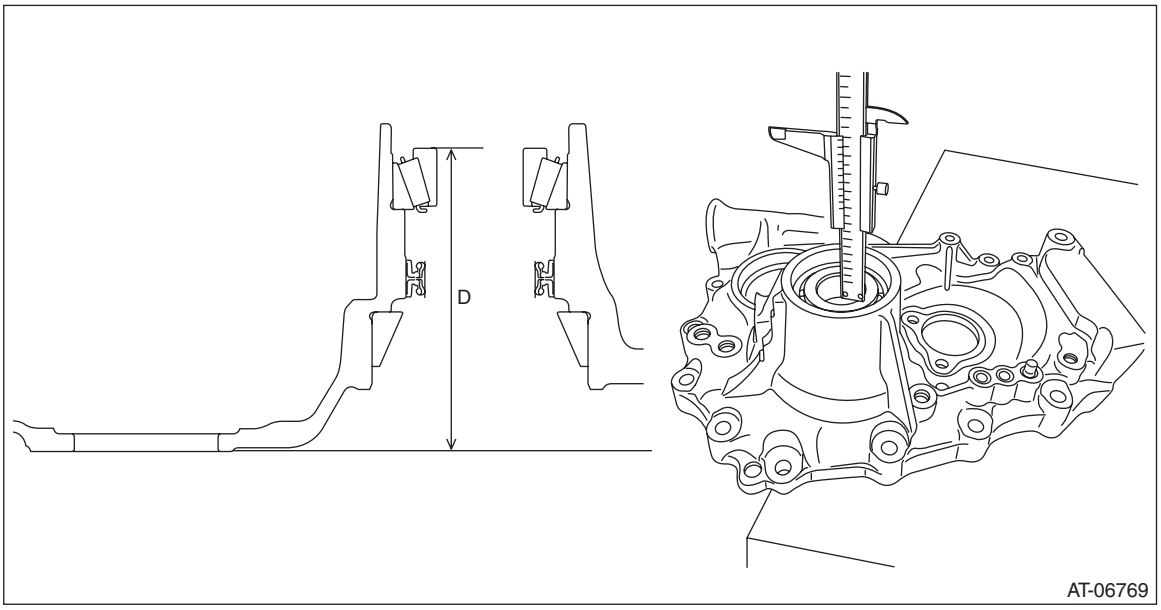
(5) Using the ST, install the rear roller bearing outer race to the drive pinion retainer.
ST 20099AE020 INSTALLER



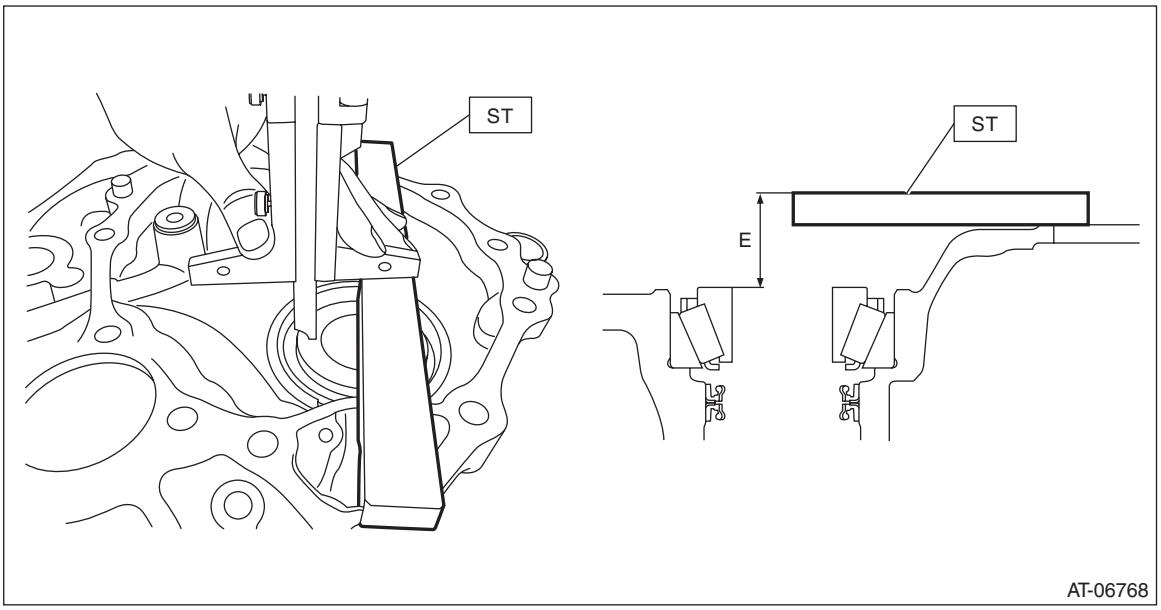
(6) Place the drive pinion retainer on the surface plate, and install the inner race to the rear roller bearing outer race.

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

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



(8) Install the inner race to the front roller bearing outer race.
(9) Measure the depth “E” from the end face of the front roller bearing inner race to the end face of the ST.
ST 499575400 GAUGE

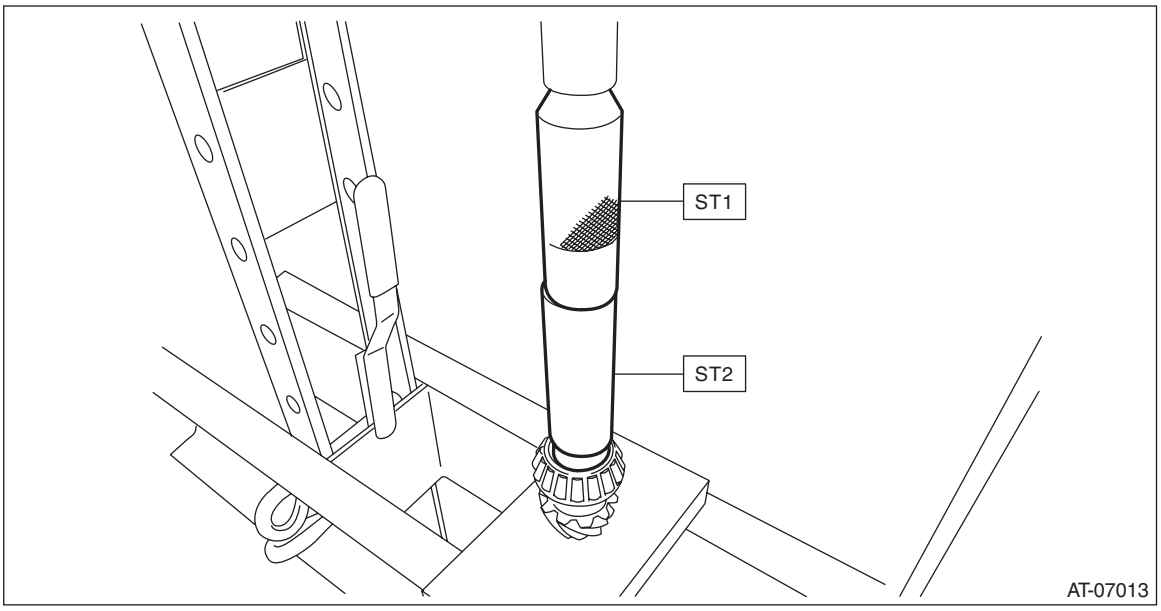


(10) Using following formula, select one to three drive pinion washers.
T (mm) = D – (A + B + C + E – 15) – (0±0.0125)
[T (in) = D – (A + B + C + E – 0.591) – (0±0.0005)]
A: Front roller bearing width
B: Rear roller bearing width
C: Spacer width
D: Height from end face of rear roller bearing inner race to surface plate
E: Depth from end face of front roller bearing inner race to end face of ST
15 mm (0.591 in): Thickness of ST
T: Drive pinion washer thickness
0±0.0125 mm (0±0.0005 in): Clearance

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

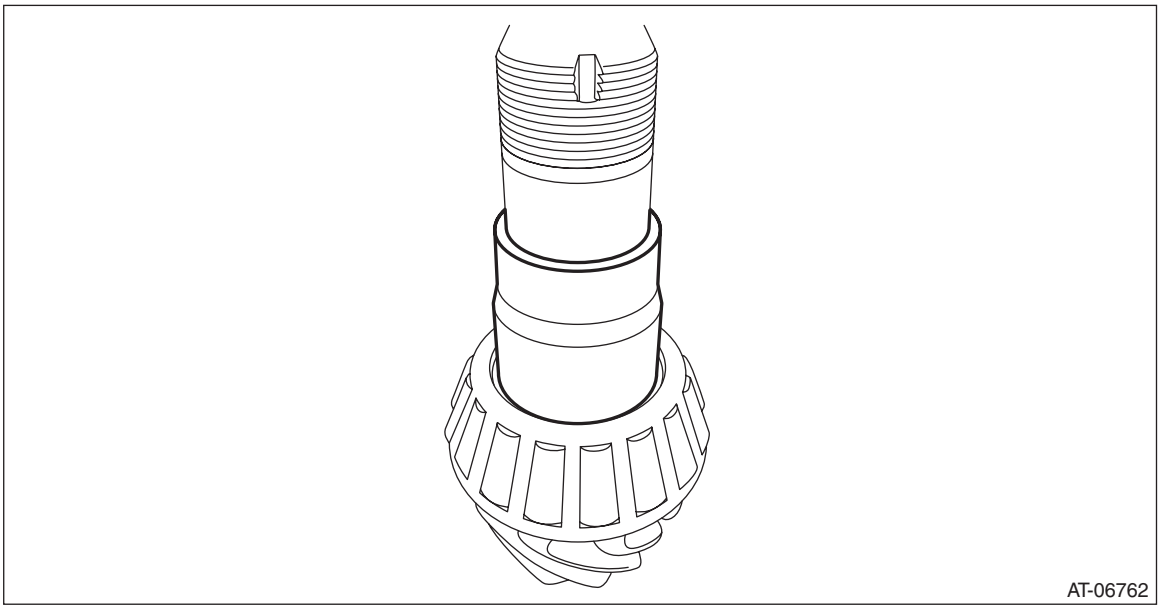
4) Measure and record the drive pinion shim thickness to be reused.
5) Install the drive pinion shim that is reused for the drive pinion shaft.

6) Using the ST1 and ST2, press-fit the inner race to the drive pinion shaft.
ST1 899580100 INSTALLER
ST2 927130000 EXTENSION DRIVE SHAFT

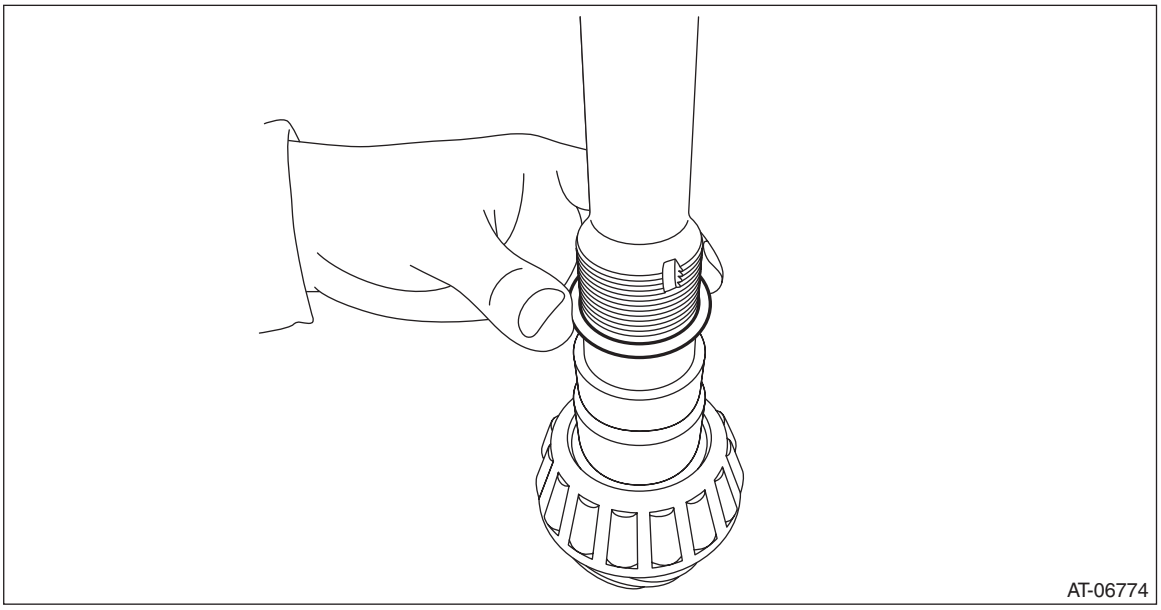


7) Install the drive pinion spacer.

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



8) Install the selected drive pinion washer.

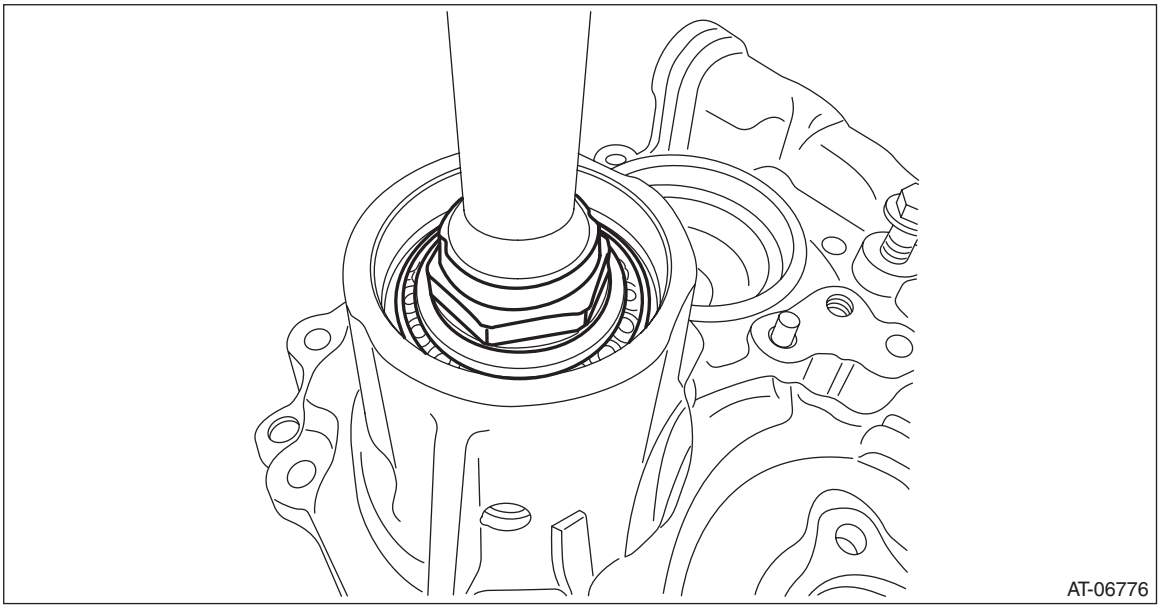


9) Insert the drive pinion shaft into the drive pinion retainer.

CAUTION:
Be careful not to damage the oil seal.

10) Install the inner bearing and lock nut.

NOTE:
Use a new lock nut.



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

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

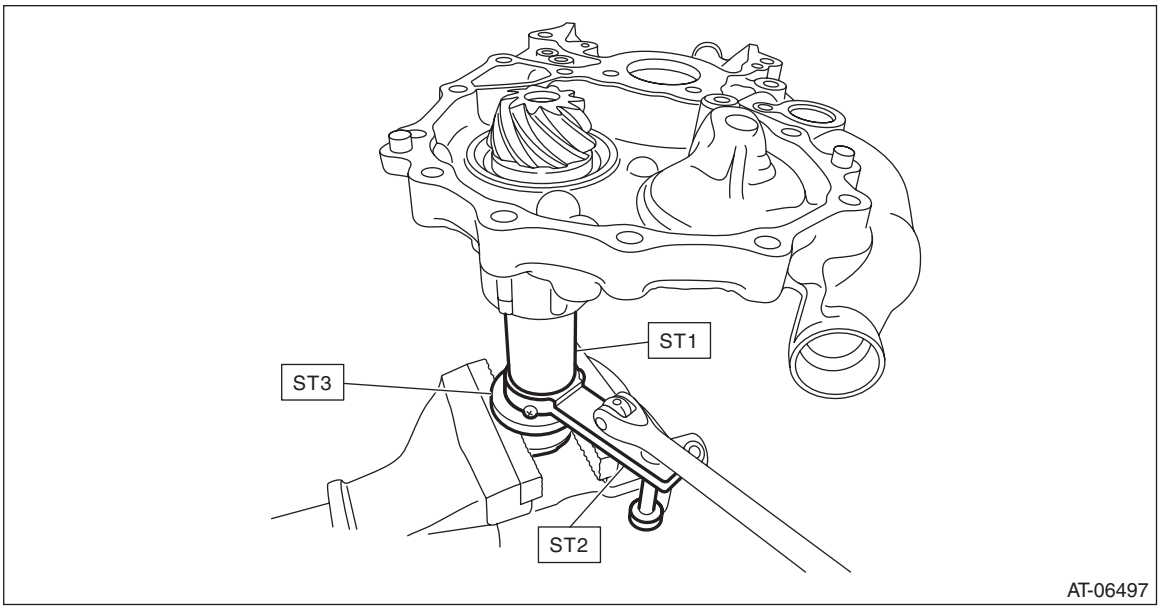
NOTE:
- Tighten the lock nut while directly aligning ST2 and torque wrench.
- If the starting torque is not within the specified range, select the drive pinion washer, and repeat the step until the starting torque is within the specified range.
- When a thicker drive pinion washer is selected, the starting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

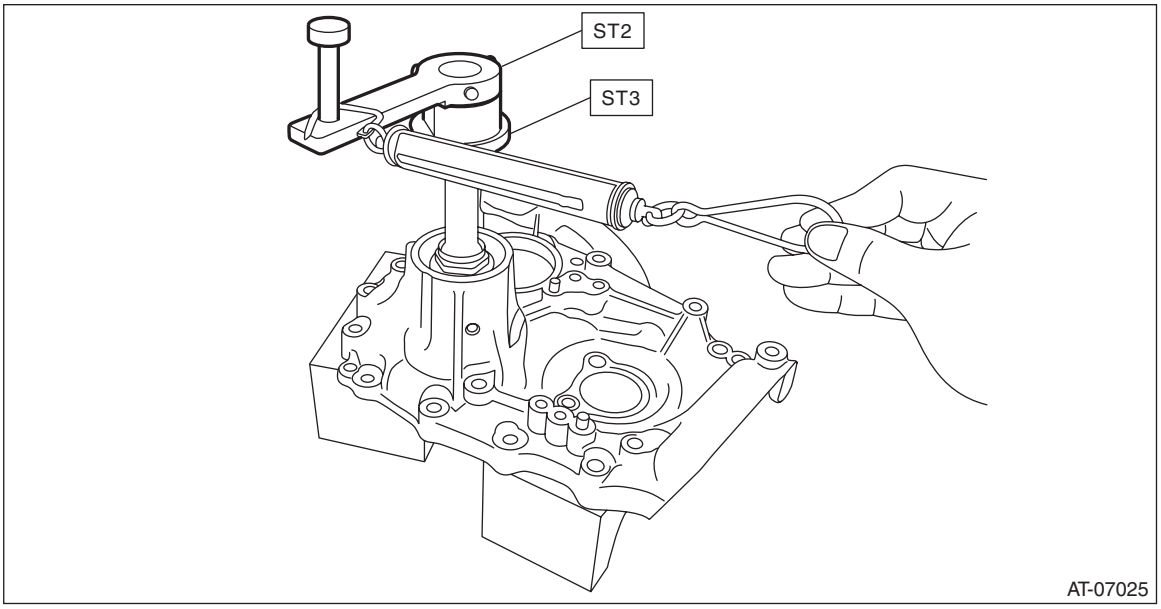
Starting torque:
5.1 — 17.1 N (0.5 — 1.7 kgf, 1.1 — 3.8 lbf)

ST1 499787500 ADAPTER
ST2 499787700 WRENCH
ST3 498937110 HOLDER

Using the following formula, calculate the tightening torque for a torque wrench.
$T2 = L2/(L1 + L2) \times T1$
T1: 170 — 250 N·m (17.3 — 25.5 kgf-m, 125.4 — 184.4 ft-lb) [Specified tightening torque range]
T2: Tightening torque
L1: ST1 length 0.072 m (2.83 in)
L2: Torque wrench length
Example:

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

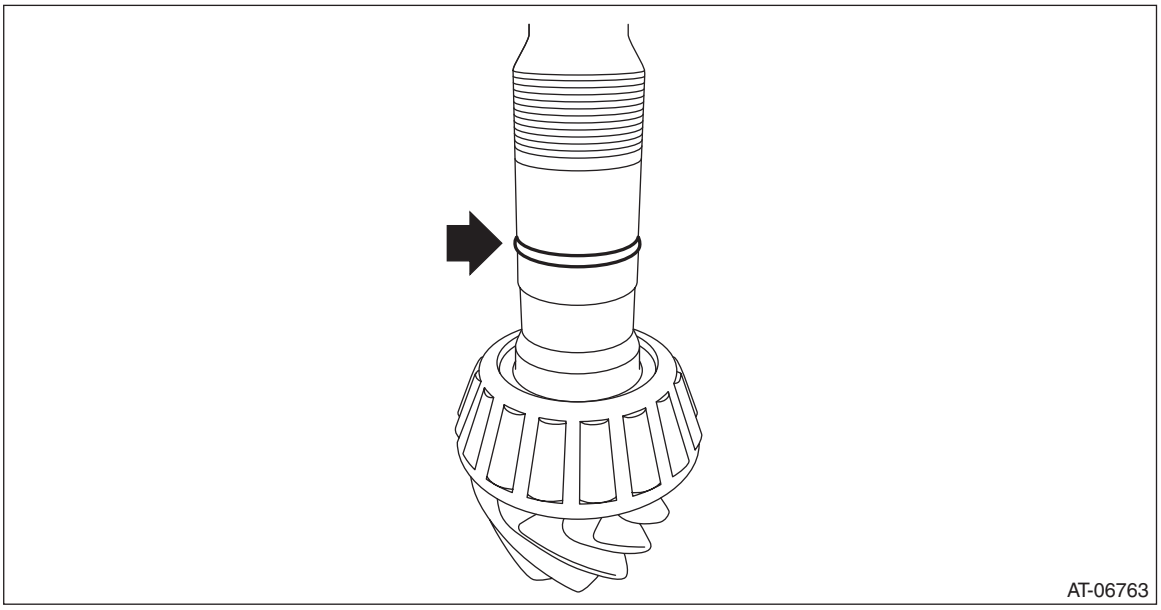




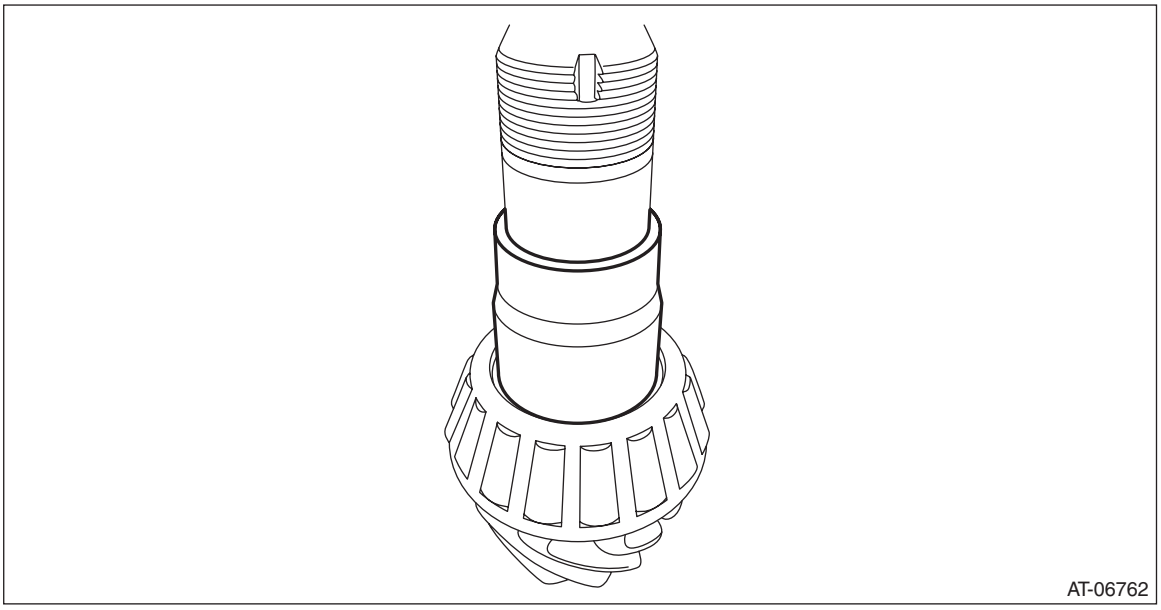
12) Install the drive pinion retainer to the converter case, and check the backlash and tooth contact. <Ref. to CVT-293, ADJUSTMENT, Drive Pinion Shaft Assembly.> <Ref. to CVT-315, ADJUSTMENT, Front Differential Assembly.>
13) Remove the drive pinion retainer from converter case. <Ref. to CVT-272, REMOVAL, Drive Pinion Shaft Assembly.>
14) Remove the drive pinion spacer from the drive pinion shaft. <Ref. to CVT-275, DISASSEMBLY, Drive Pinion Shaft Assembly.>

15) Install the O-ring to the drive pinion shaft.

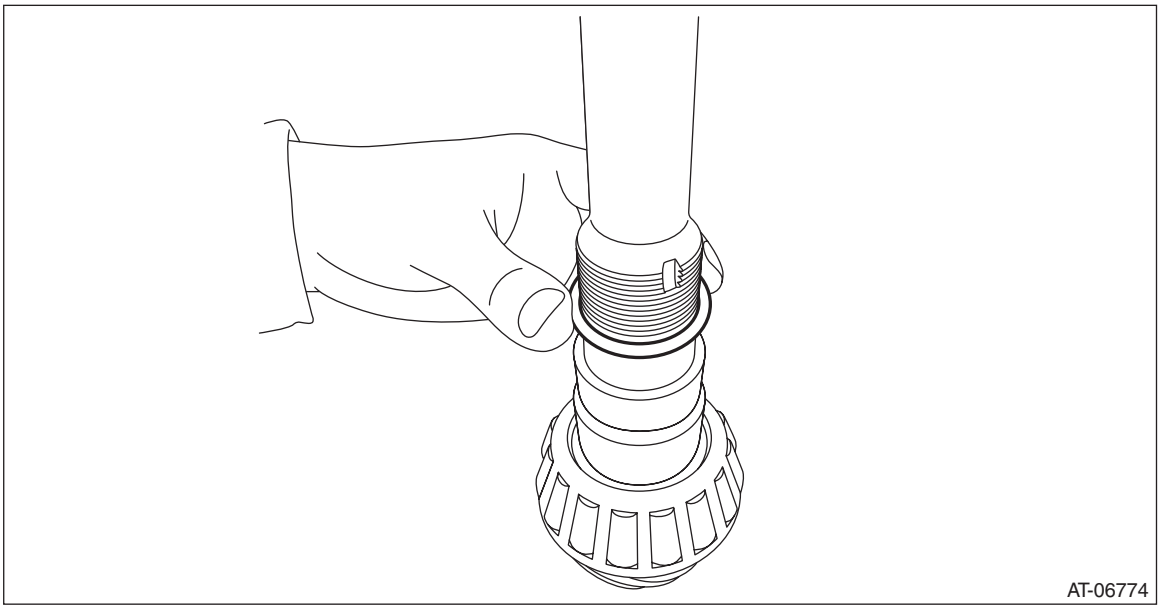
NOTE:
- Use new O-rings.
- Apply CVTF to the O-ring.


AT-06763

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

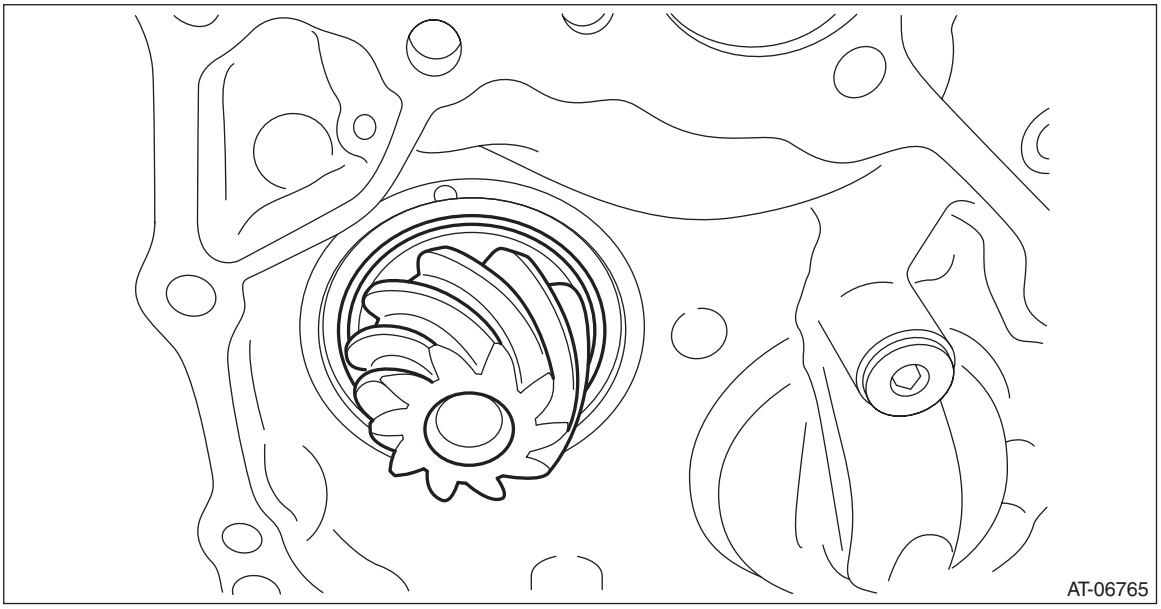

AT-06762

17) Install the drive pinion washer.

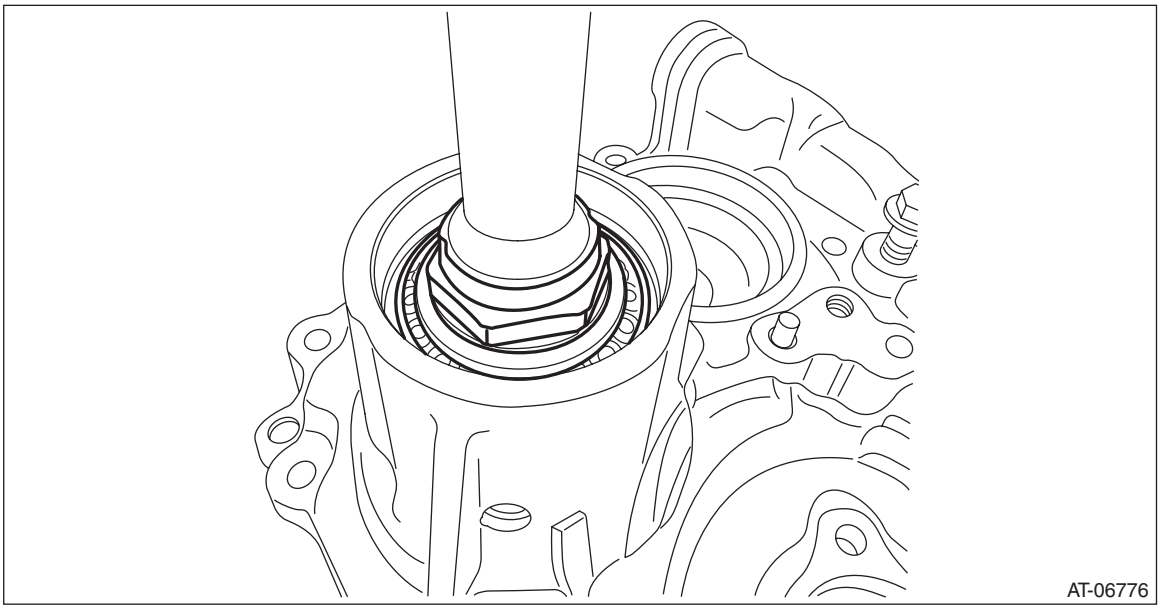


18) Insert the drive pinion shaft into the drive pinion retainer.

CAUTION:
Be careful not to damage the oil seal.



19) Install the inner bearing and lock nut.



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

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

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

Starting torque:
5.1 — 17.1 N (0.5 — 1.7 kgf, 1.1 — 3.8 lbf)

ST1 499787500 ADAPTER
ST2 499787700 WRENCH
ST3 498937110 HOLDER

Using the following formula, calculate the tightening torque for a torque wrench.
$T2 = L2/(L1 + L2) \times T1$
T1: 170 — 250 N·m (17.3 — 25.5 kgf-m, 125.4 — 184.4 ft-lb) [Specified tightening torque range]
T2: Tightening torque
L1: ST1 length 0.072 m (2.83 in)
L2: Torque wrench length
Example:

Torque wrench length m (in)	Tightening torque N·m (kgf-m, ft-lb)
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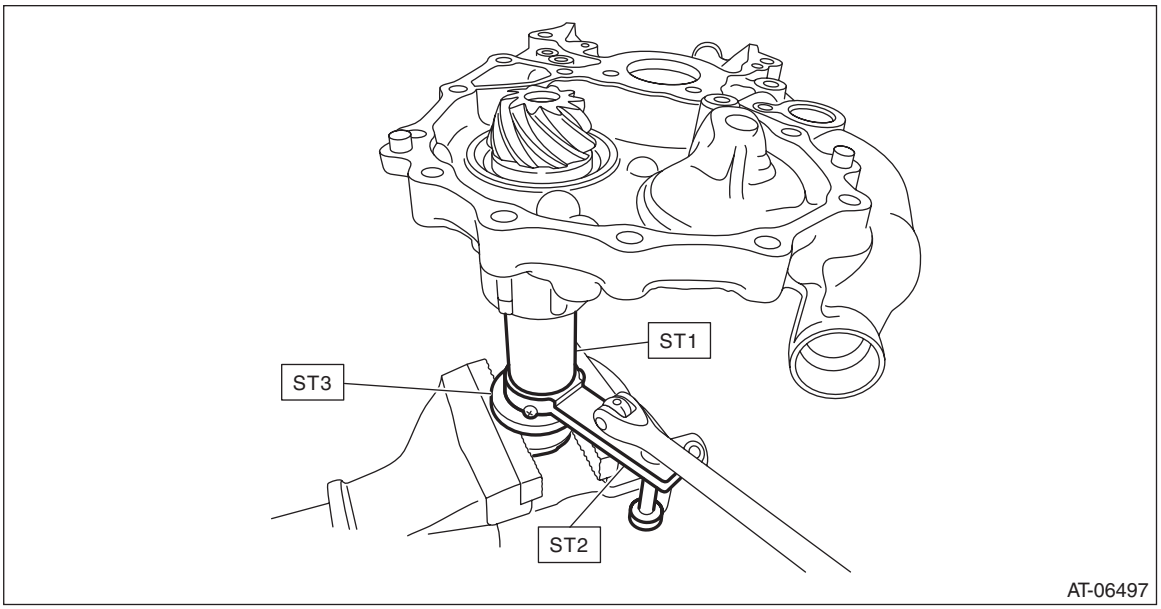
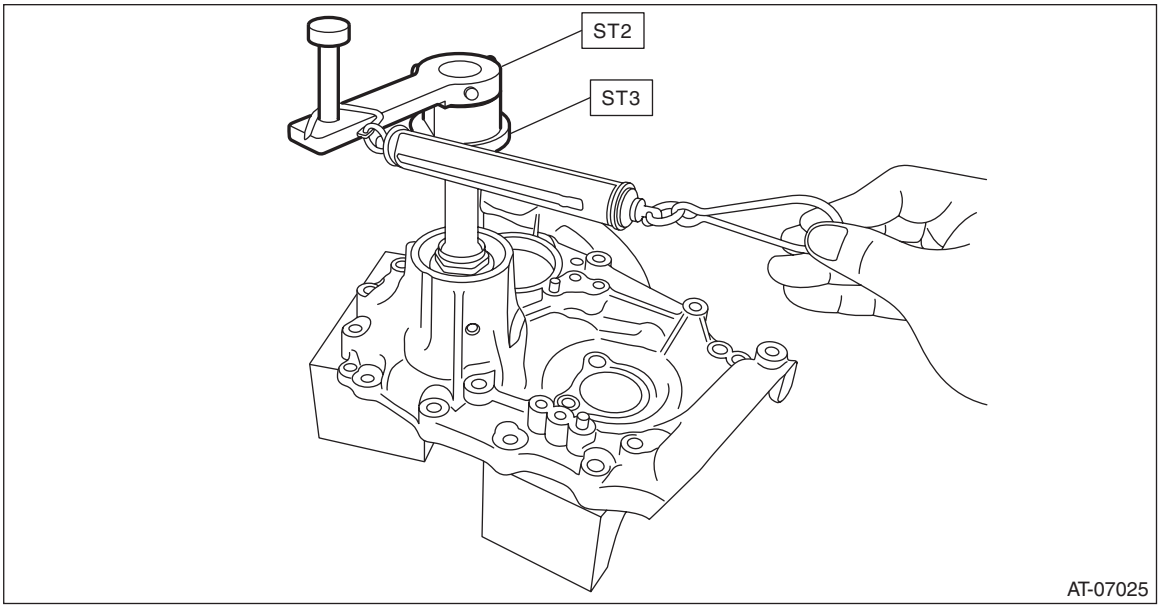
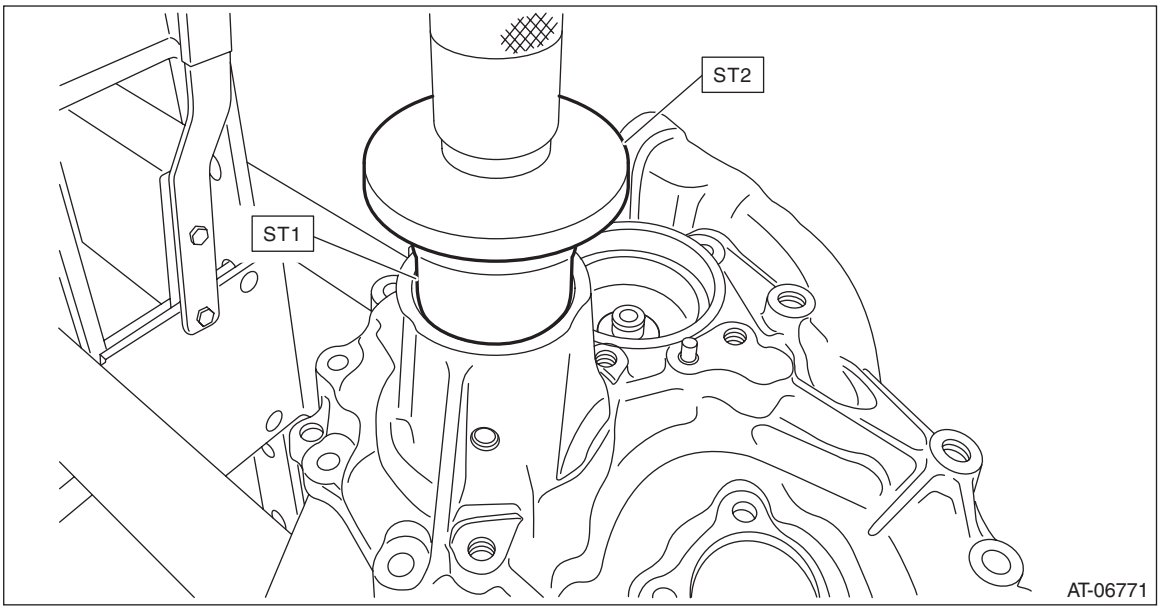
0.55 (21.65)	150 — 221 (15.3 — 22.5, 110.6 — 163.0)





21) Crimp the lock nut in 2 locations.

22) Using the ST, install the plug.
ST1 499755602 PRESS SNAP RING
ST2 398177700 INSTALLER

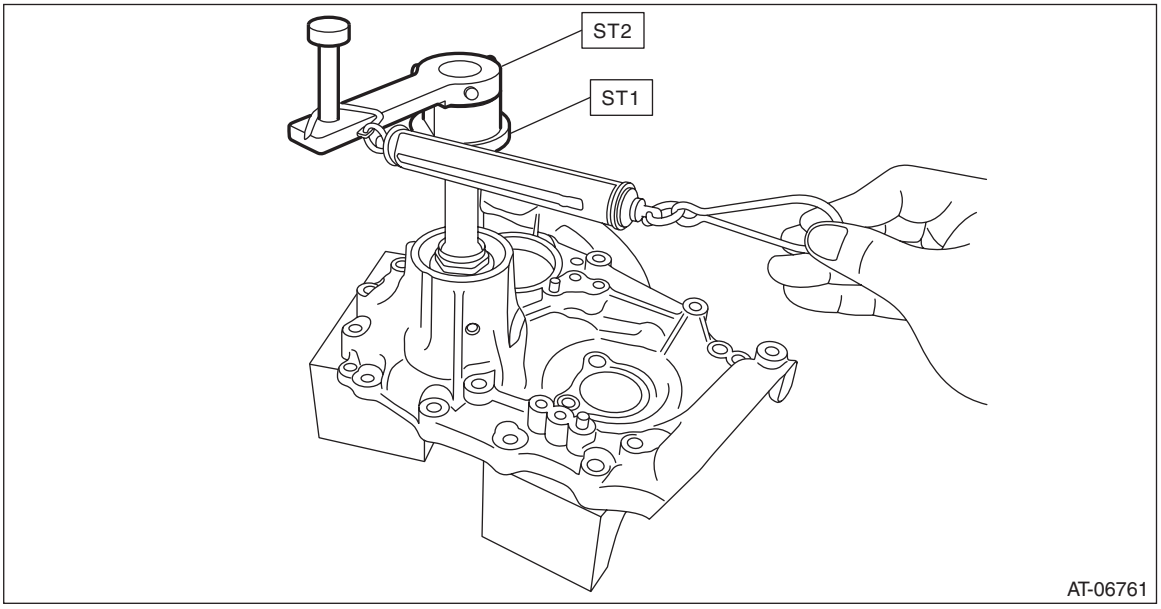


E: INSPECTION

- Make sure that all component parts are free of scratches, holes and other faults.
- Check the tooth contact. <Ref. to CVT-293, ADJUSTMENT, Drive Pinion Shaft Assembly.>
- Apply CVTF to bearing and rotate the bearing to check for noise or dragging etc.
- Check the starting torque of drive pinion shaft.

CAUTION:
Before measuring, apply differential gear oil to roller of bearing and rotate the bearing several times.
ST1 498937110 HOLDER
ST2 499787700 WRENCH

Starting torque:
5.1 — 17.1 N (0.5 — 1.7 kgf, 1.1 — 3.8 lbf)



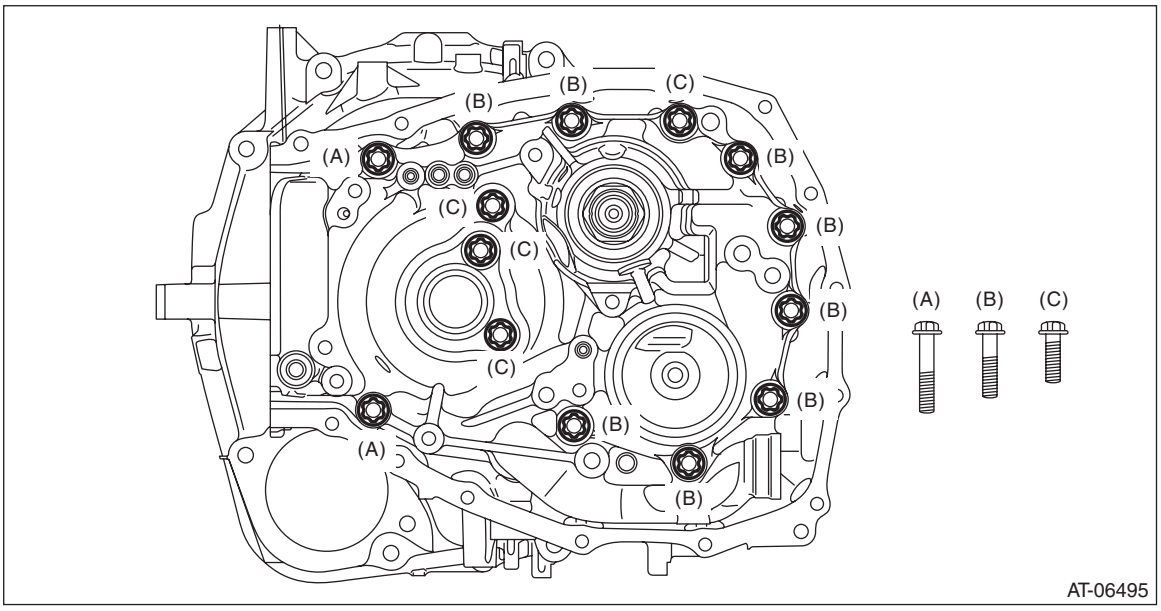
F: ADJUSTMENT

1) Remove the liquid gasket from the mating surface completely.

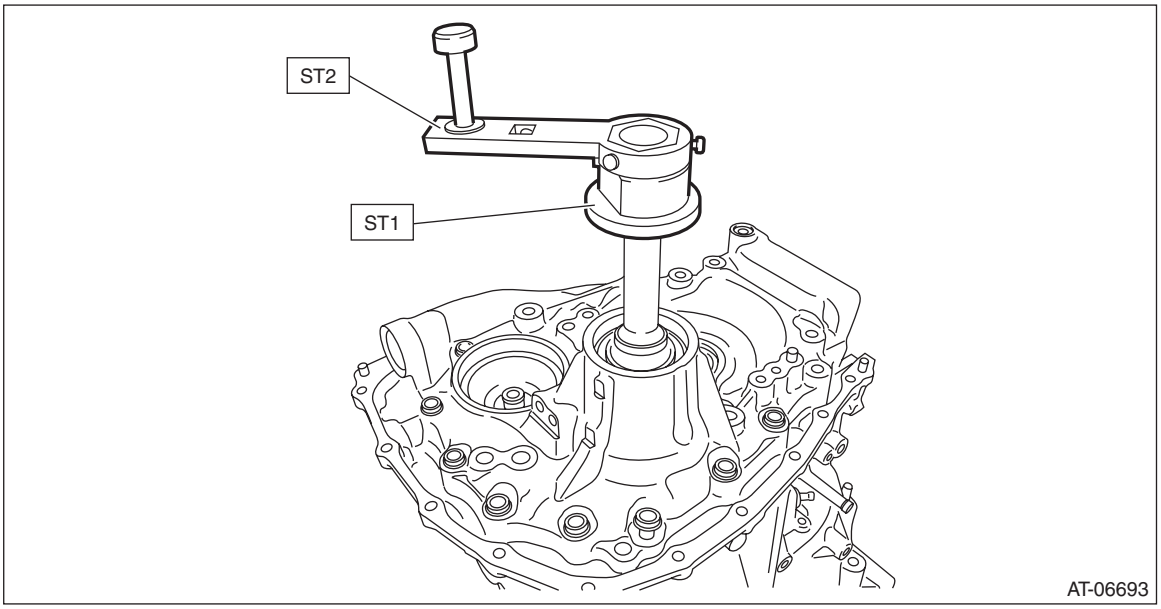
2) Using the ST, install the drive pinion retainer to converter case.
ST 18270KA020 SOCKET (E20)

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

Tightening torque:
43 N·m (4.4 kgf-m, 31.7 ft-lb)



3) Rotate the drive pinion several times using ST1 and ST2.
ST1 498937110 HOLDER
ST2 499787700 WRENCH



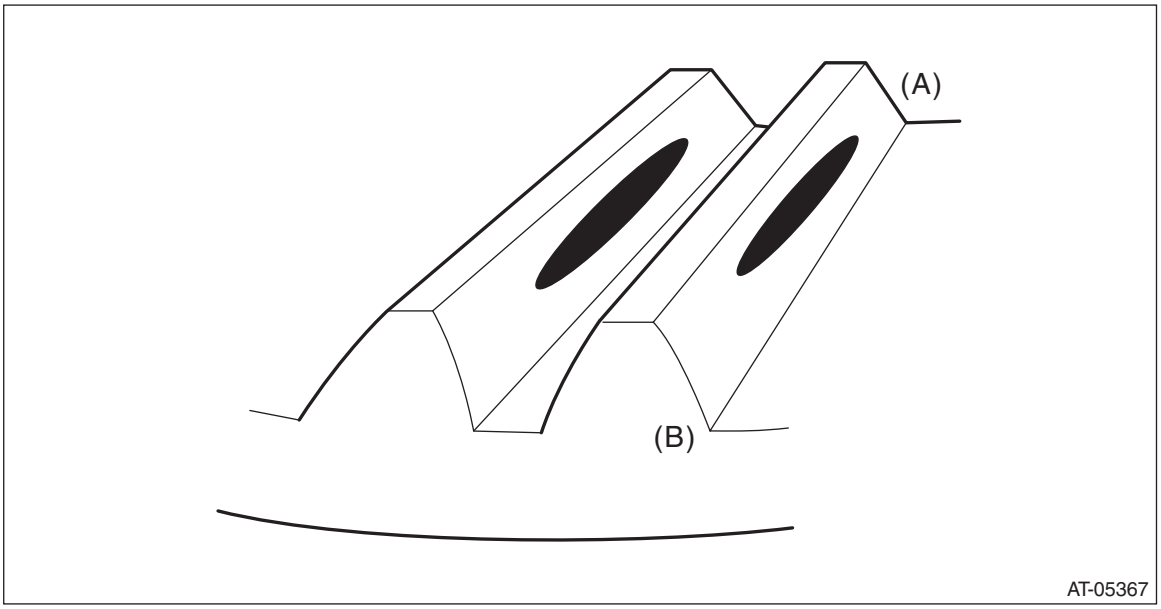
4) Adjust the drive pinion and hypoid driven gear backlash. <Ref. to CVT-315, ADJUSTMENT, Front Differential Assembly.>
5) Using the ST, remove the drive pinion retainer from converter case.
ST 18270KA020 SOCKET (E20)

6) Apply lead-free red dye evenly on the both sides of three to four teeth of the hypoid driven gear. Then install the drive pinion retainer and rotate the drive pinion in both directions several times. Remove the drive pinion retainer and check the tooth contact pattern.
If the teeth contact is inappropriate, adjust the backlash or thickness of the shim. <Ref. to CVT-315, ADJUSTMENT, Front Differential Assembly.>

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.)

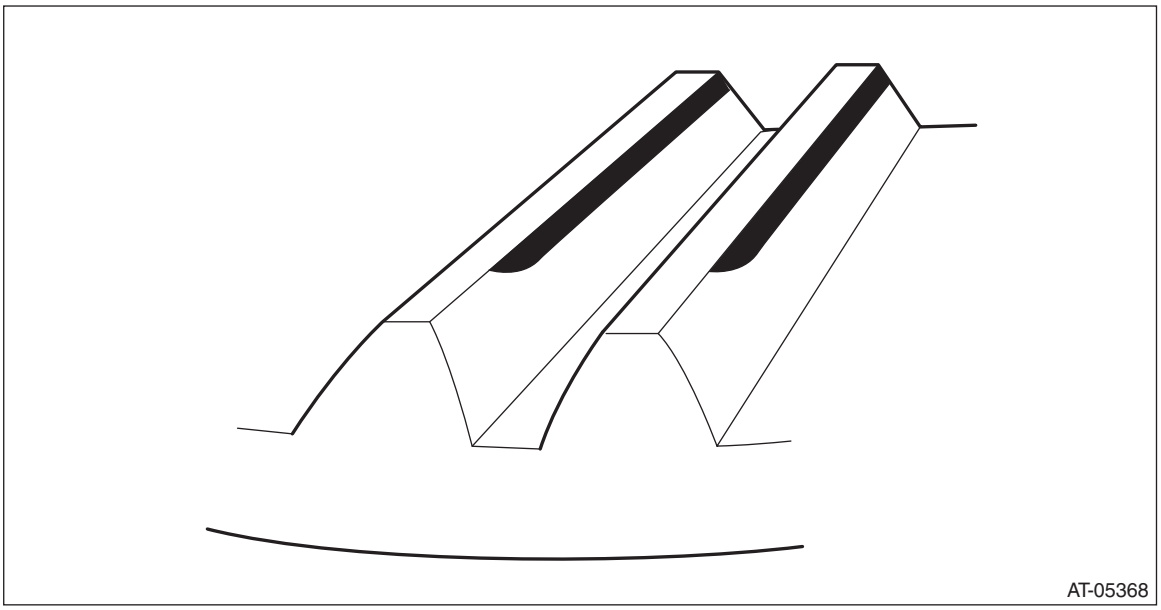


(A) Toe side
(B) Heel side

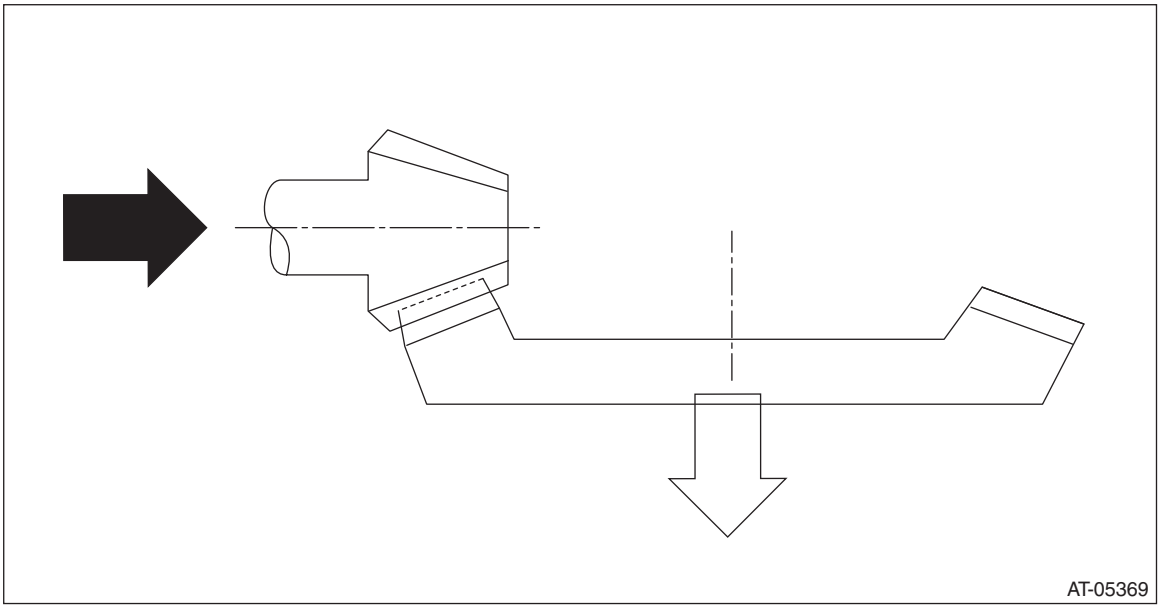
- Face contact

Check item: Backlash is too large.

Contact pattern



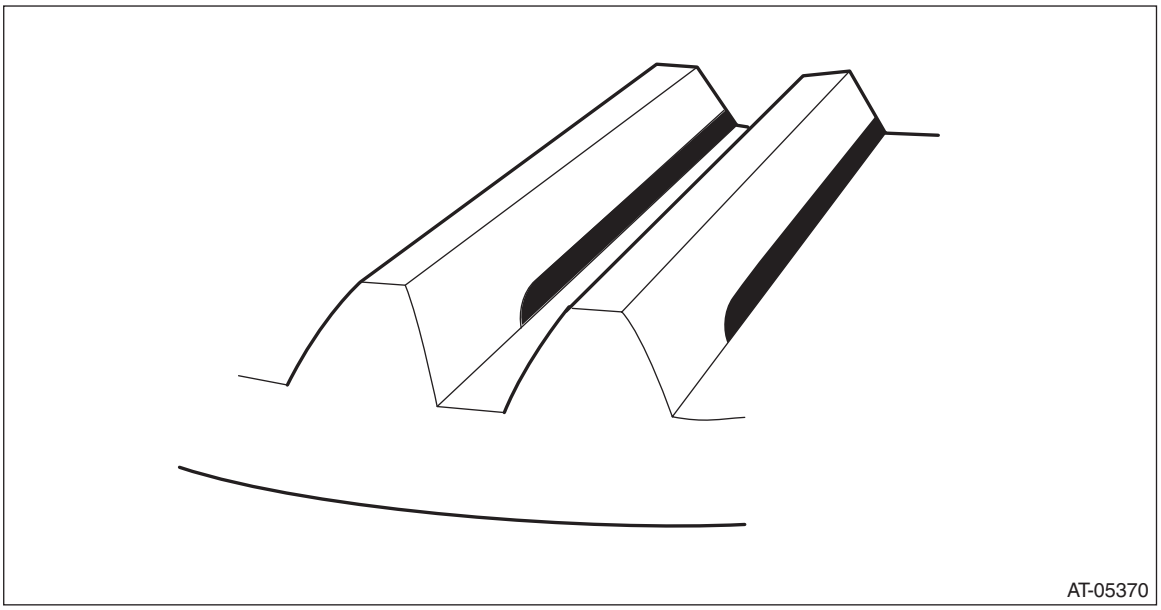
Corrective action: Increase thickness of drive pinion shim according to the procedures for moving the drive pinion close to hypoid driven gear.



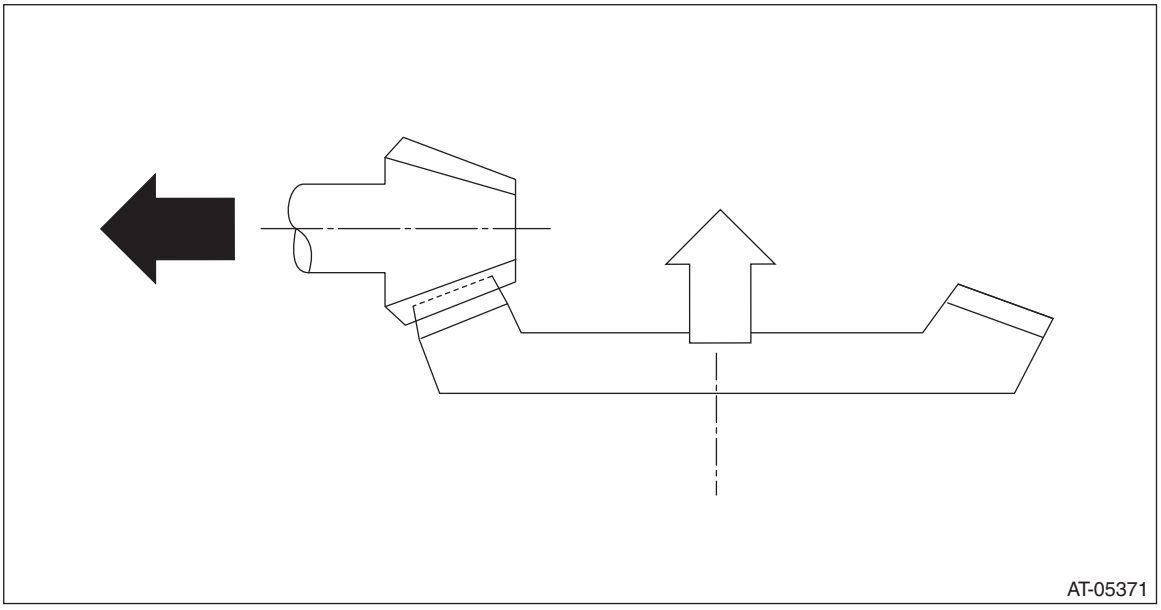
- Flank contact

Check item: Backlash is too small.

Contact pattern



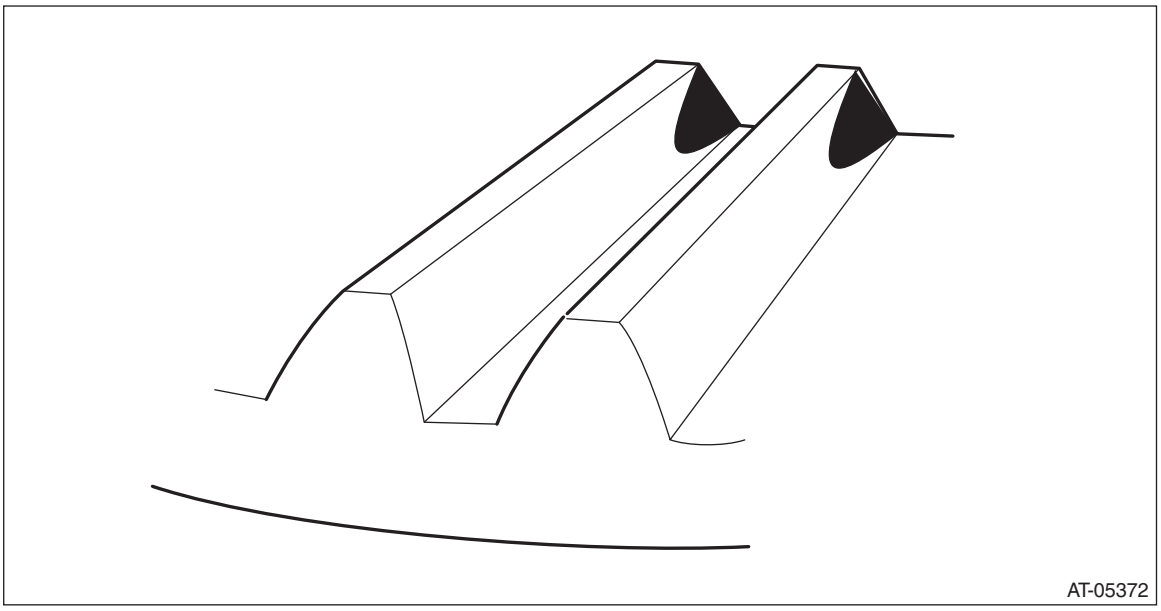
Corrective action: Reduce the thickness of the drive pinion shim according to the procedures for moving the drive pinion away from the hypoid driven gear.



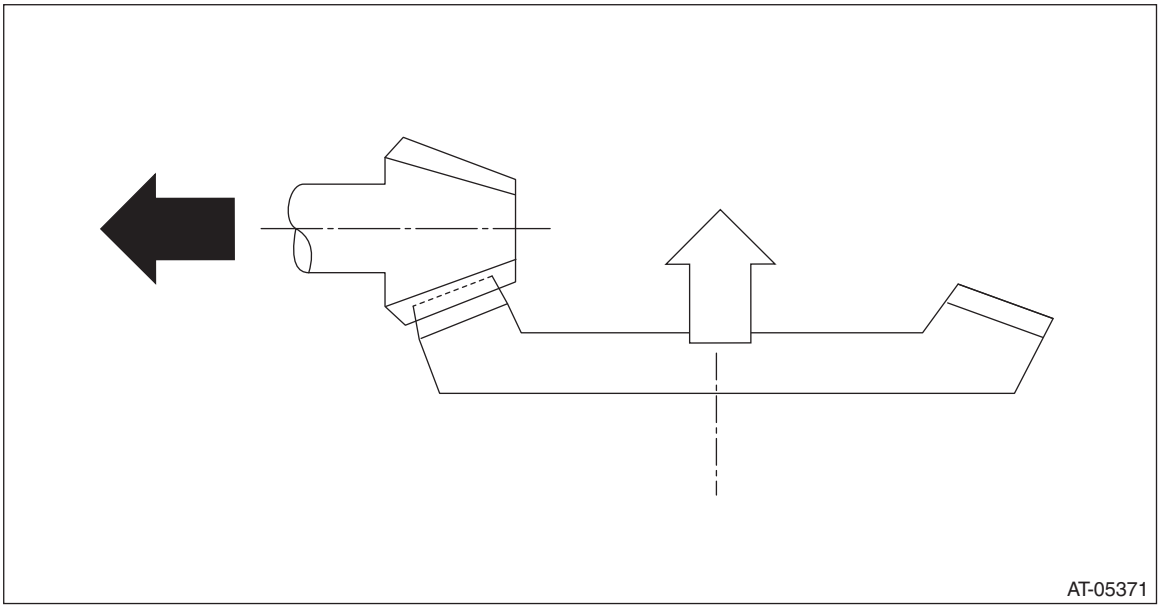
- Toe contact (inside contact)

Check item: Teeth contact area is too small.

Contact pattern



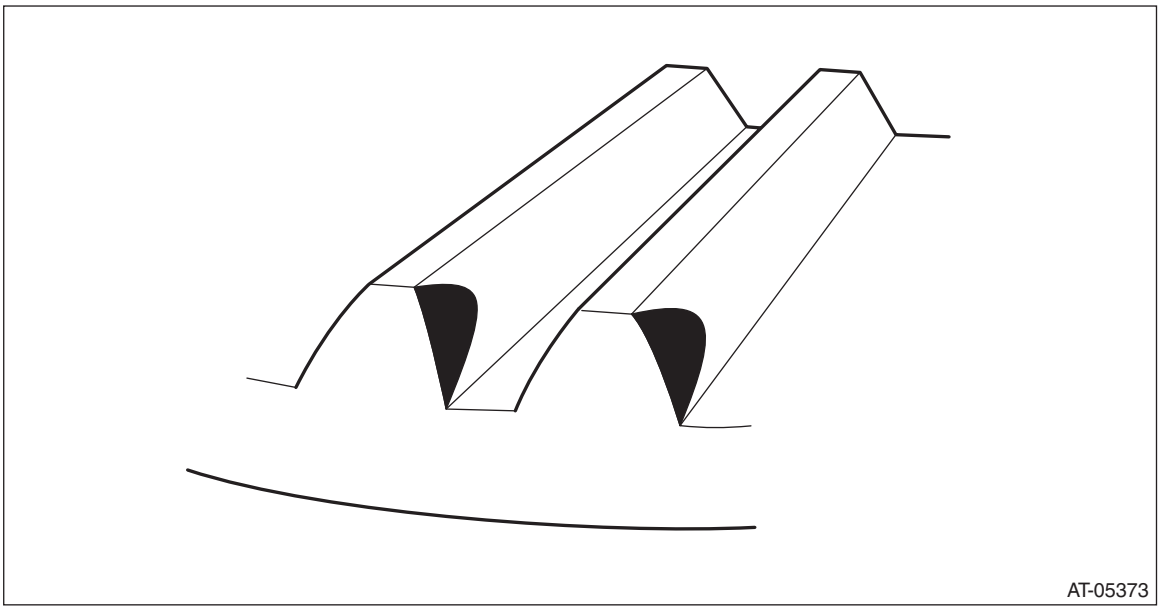
Corrective action: Reduce the thickness of the drive pinion shim according to the procedures for moving the drive pinion away from the hypoid driven gear side.



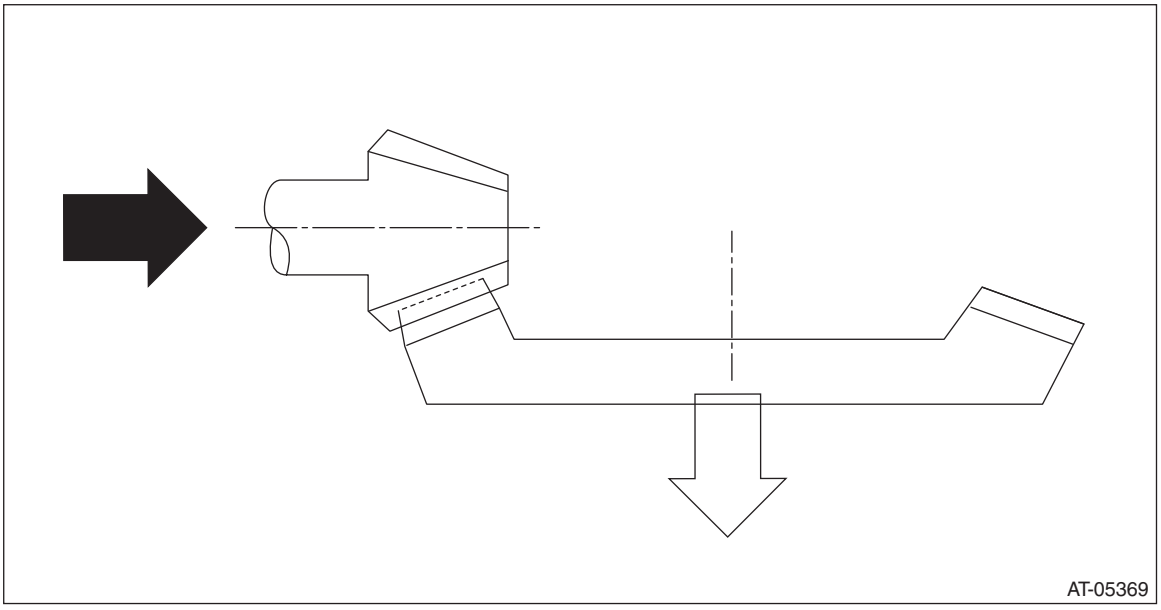
- Heel contact (outside end contact)

Check item: Teeth contact area is too small.

Contact pattern



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



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

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

ST 18658AA020 WRENCH COMPL RETAINER

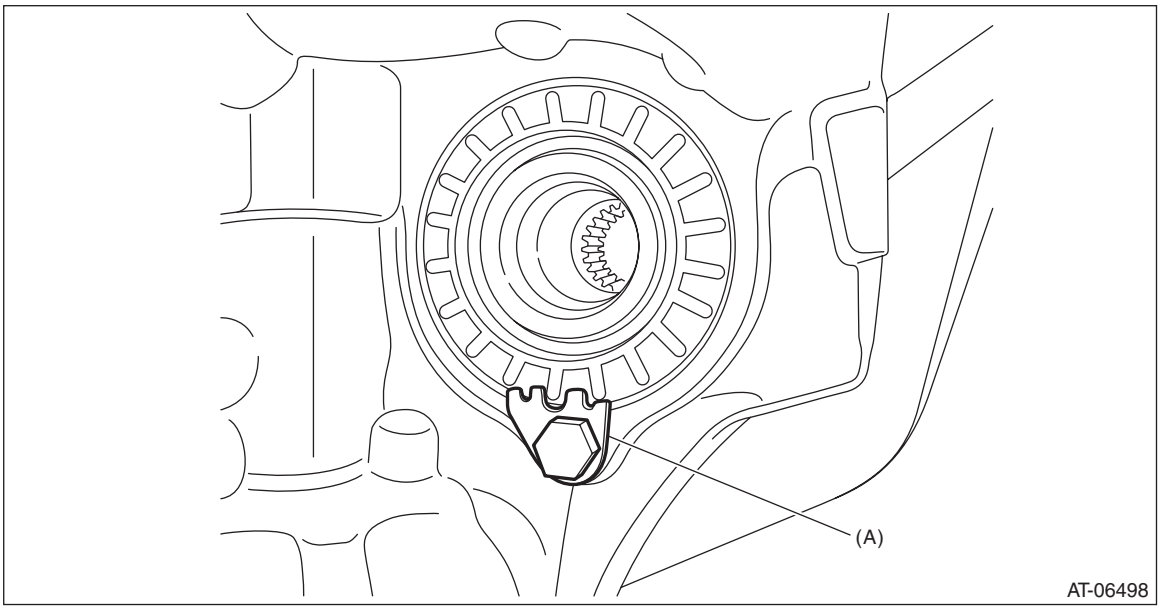
8) Using the ST, tighten the retainer to the position before it is loosened.

ST 18658AA020 WRENCH COMPL RETAINER

9) Replace the differential side retainer oil seal with a new part. <Ref. to CVT-92, Differential Side Retainer Oil Seal.>

10) Install the lock plate.

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

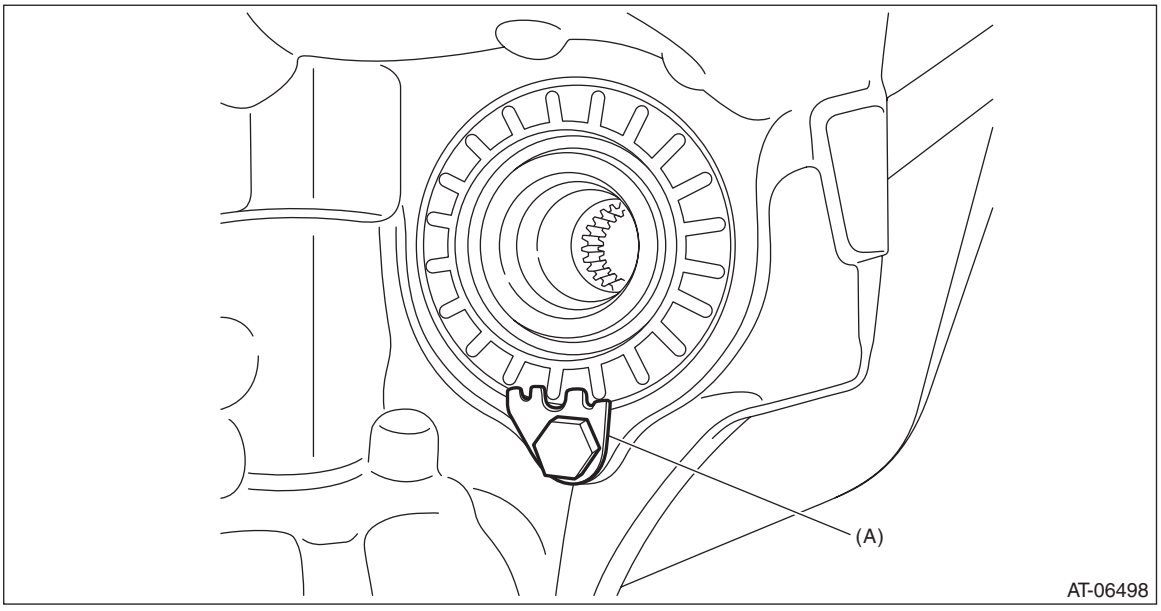


(A) Lock plate

42.Front Differential Assembly

A: REMOVAL

1) Remove the transmission assembly from the vehicle. <Ref. to CVT-57, REMOVAL, Automatic Transmission Assembly.>
2) Remove the air breather hose. <Ref. to CVT-154, REMOVAL, Air Breather Hose.>
3) Remove the control valve body. <Ref. to CVT-116, REMOVAL, Control Valve Body.>
4) Remove the transmission harness. <Ref. to CVT-129, REMOVAL, Transmission Harness.>
5) Remove the turbine speed sensor. <Ref. to CVT-103, REMOVAL, Turbine Speed Sensor.>
6) Remove the secondary speed sensor. <Ref. to CVT-105, REMOVAL, Secondary Speed Sensor.>
7) Remove the primary speed sensor. <Ref. to CVT-107, REMOVAL, Primary Speed Sensor.>
8) Remove the inhibitor switch. <Ref. to CVT-99, REMOVAL, Inhibitor Switch.>
9) Remove the extension case. <Ref. to CVT-163, REMOVAL, Extension Case.>
10) Remove the transfer clutch assembly. <Ref. to CVT-167, REMOVAL, Transfer Clutch.>
11) Remove the transfer driven gear assembly. <Ref. to CVT-181, REMOVAL, Transfer Driven Gear.>
12) Remove the parking pawl. <Ref. to CVT-184, REMOVAL, Parking Pawl.>
13) Remove the reduction driven gear assembly. <Ref. to CVT-186, REMOVAL, Reduction Driven Gear.>
14) Remove the oil pan and oil strainer. <Ref. to CVT-112, REMOVAL, Oil Pan and Strainer.>
15) Remove the transmission control device. <Ref. to CVT-194, REMOVAL, Transmission Control Device.>
16) Remove the transmission case. <Ref. to CVT-200, REMOVAL, Transmission Case.>
17) Remove the reduction drive gear. <Ref. to CVT-212, REMOVAL, Reduction Drive Gear.>
18) Remove the primary pulley, secondary pulley and variator chain. <Ref. to CVT-217, REMOVAL, Primary Pulley and Secondary Pulley.>
19) Remove the reverse brake assembly. <Ref. to CVT-238, REMOVAL, Reverse Brake Assembly.>
20) Remove the forward clutch assembly. <Ref. to CVT-253, REMOVAL, Forward Clutch Assembly.>
21) Remove the drive pinion shaft assembly. <Ref. to CVT-272, REMOVAL, Drive Pinion Shaft Assembly.>
22) Remove the lock plates on both sides.

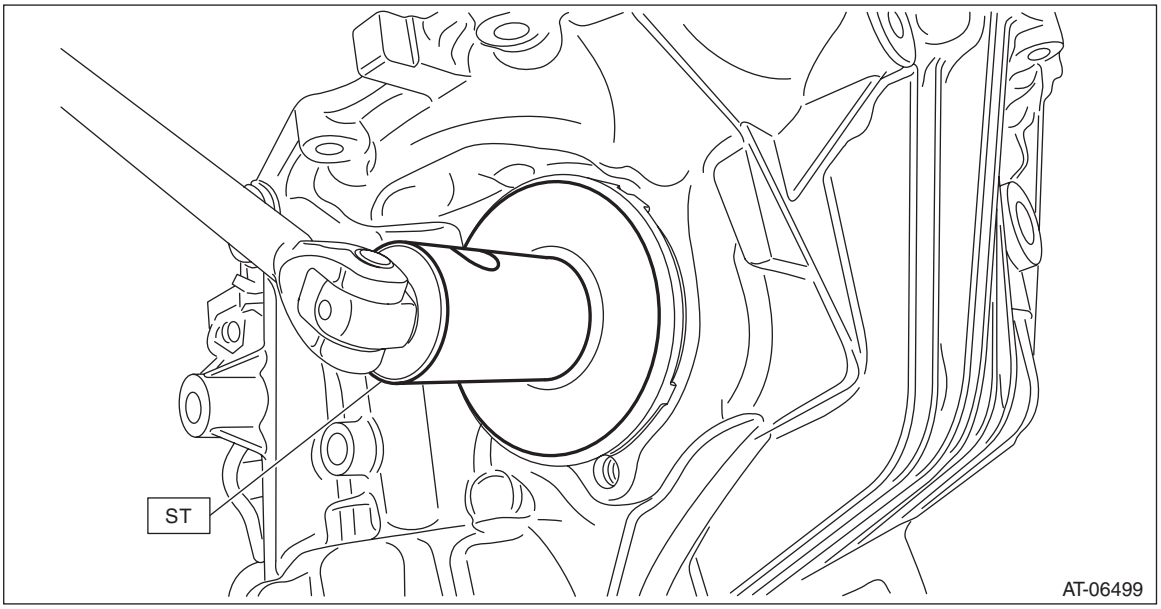


(A) Lock plate

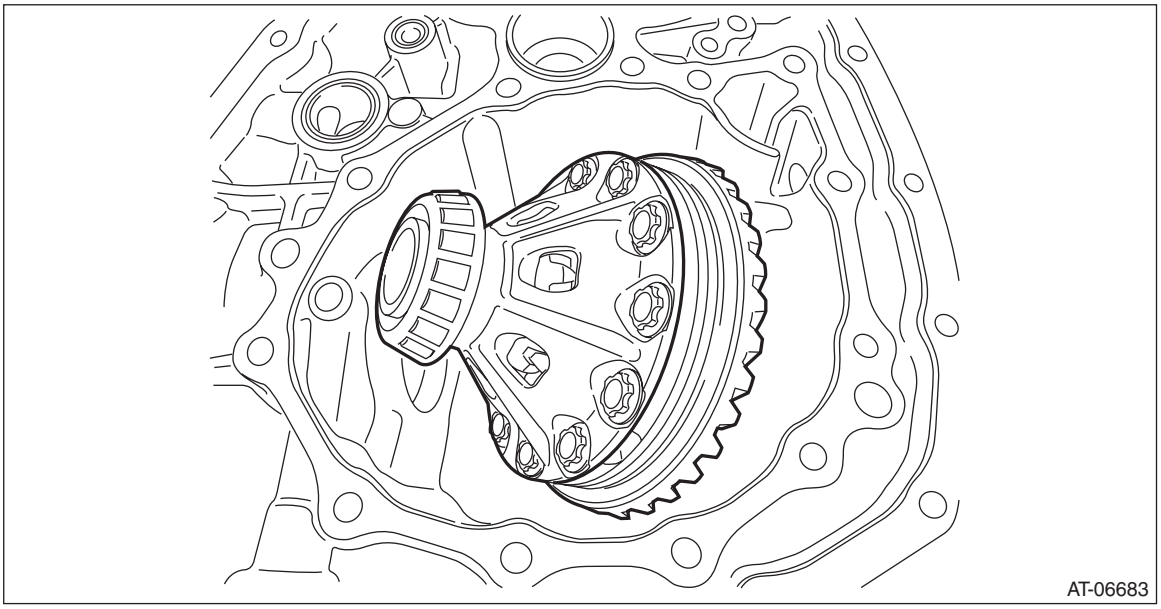
23) Remove the differential side retainers using ST.

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

ST 18658AA020 WRENCH COMPL RETAINER



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

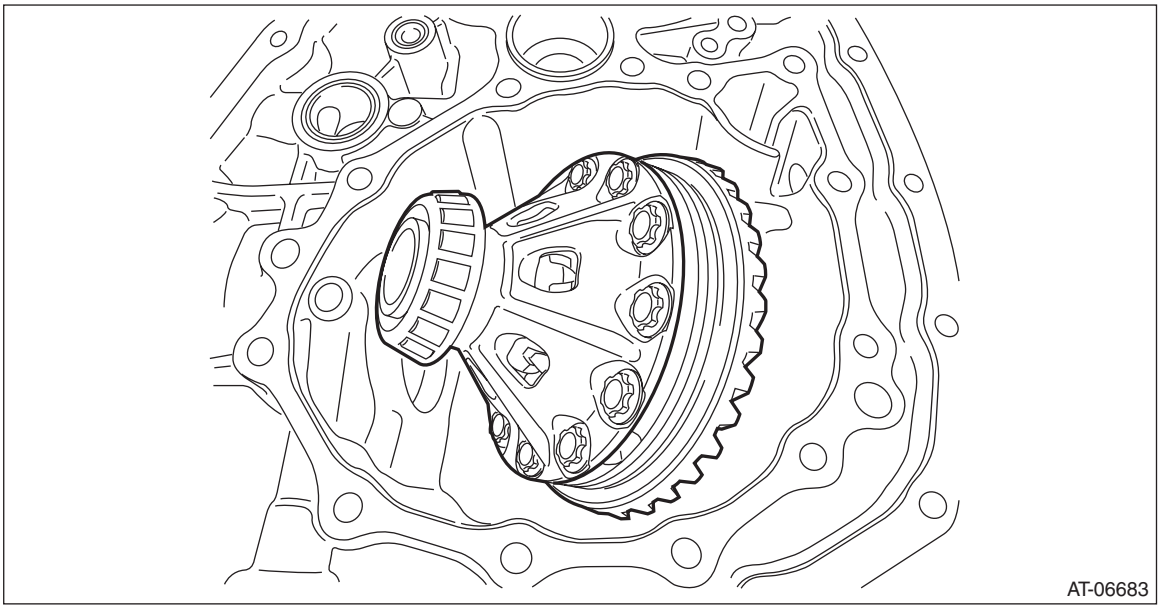


25) Remove the oil seals and O-rings from both differential side retainers. <Ref. to CVT-308, SIDE RETAINER, DISASSEMBLY, Front Differential Assembly.>

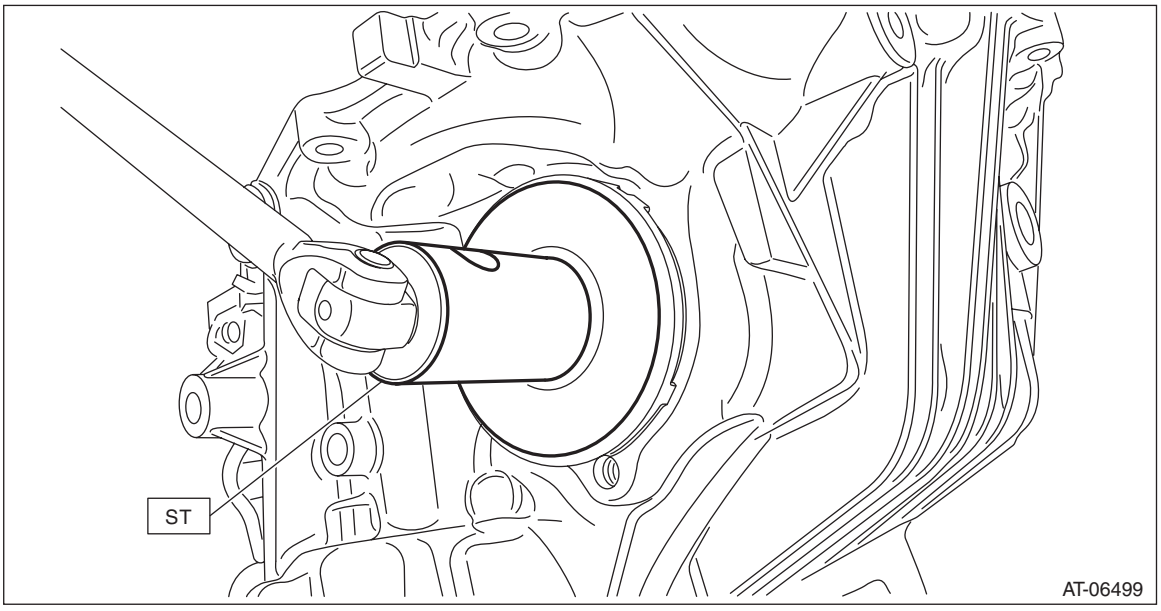
B: INSTALLATION

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

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



2) Install the bearing outer race.
3) Temporarily install the differential side retainers using ST.
ST 18658AA020 WRENCH COMPL RETAINER



4) Adjust the backlash of the front differential. <Ref. to CVT-315, ADJUSTMENT, Front Differential Assembly.>
5) Inspect and adjust the tooth contact. <Ref. to CVT-293, ADJUSTMENT, Drive Pinion Shaft Assembly.>

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

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

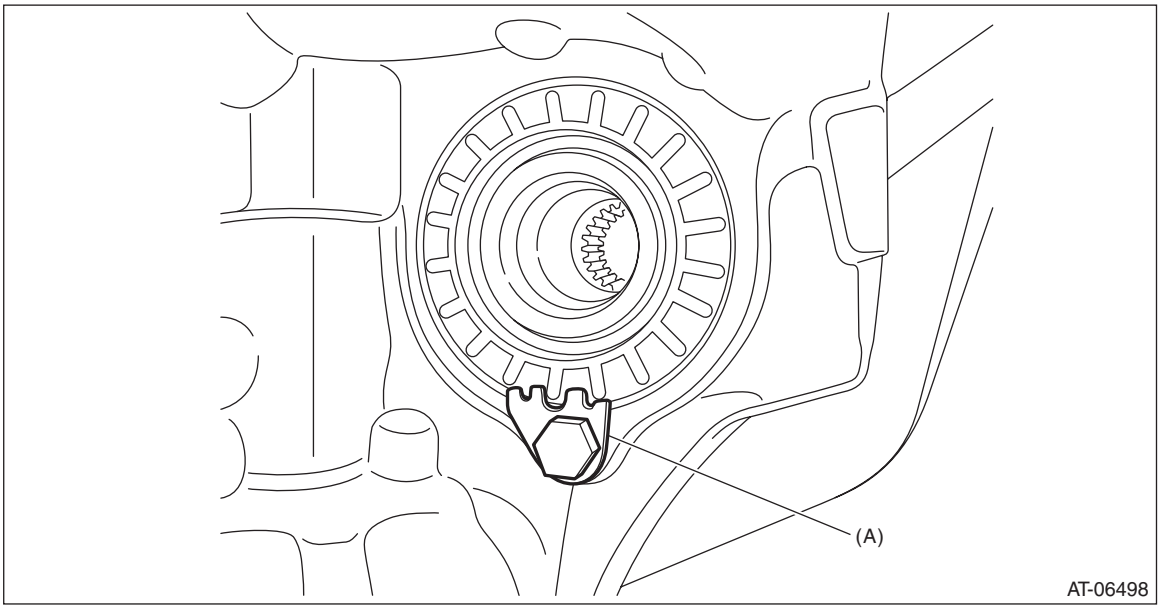
ST 18658AA020 WRENCH COMPL RETAINER

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

ST 18658AA020 WRENCH COMPL RETAINER

8) Install the oil seal to the differential side retainer. <Ref. to CVT-92, Differential Side Retainer Oil Seal.>
9) Install the lock plate.

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



(A) Lock plate

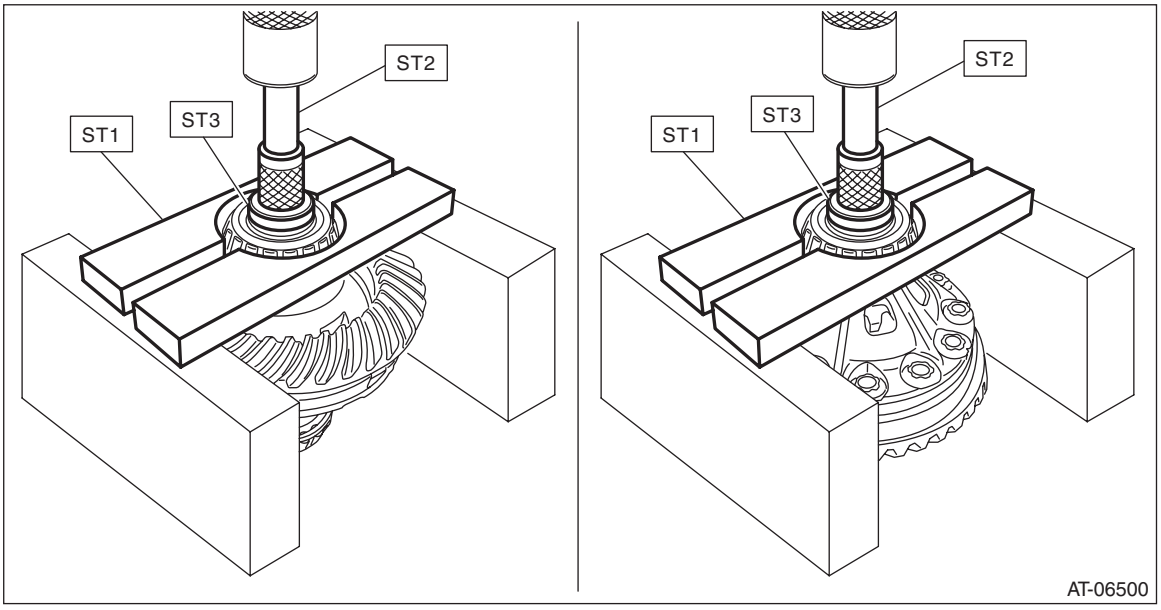
10) Install the drive pinion shaft assembly. <Ref. to CVT-273, INSTALLATION, Drive Pinion Shaft Assembly.>
11) Install the forward clutch assembly. <Ref. to CVT-256, INSTALLATION, Forward Clutch Assembly.>
12) Install the reverse brake assembly. <Ref. to CVT-241, INSTALLATION, Reverse Brake Assembly.>
13) Install the primary pulley, secondary pulley and variator chain. <Ref. to CVT-224, INSTALLATION, Primary Pulley and Secondary Pulley.>
14) Install the reduction drive gear. <Ref. to CVT-213, INSTALLATION, Reduction Drive Gear.>
15) Install the transmission case. <Ref. to CVT-202, INSTALLATION, Transmission Case.>
16) Install the oil strainer and oil pan. <Ref. to CVT-113, INSTALLATION, Oil Pan and Strainer.>
17) Install the transmission control device. <Ref. to CVT-197, INSTALLATION, Transmission Control Device.>
18) Install the reduction driven gear assembly. <Ref. to CVT-186, INSTALLATION, Reduction Driven Gear.>
19) Install the transfer driven gear assembly. <Ref. to CVT-182, INSTALLATION, Transfer Driven Gear.>
20) Install the transfer clutch assembly. <Ref. to CVT-169, INSTALLATION, Transfer Clutch.>
21) Install the parking pawl. <Ref. to CVT-185, INSTALLATION, Parking Pawl.>
22) Install the extension case. <Ref. to CVT-164, INSTALLATION, Extension Case.>
23) Install the inhibitor switch. <Ref. to CVT-101, INSTALLATION, Inhibitor Switch.>
24) Install the secondary speed sensor. <Ref. to CVT-105, INSTALLATION, Secondary Speed Sensor.>
25) Install the primary speed sensor. <Ref. to CVT-108, INSTALLATION, Primary Speed Sensor.>
26) Install the turbine speed sensor. <Ref. to CVT-103, INSTALLATION, Turbine Speed Sensor.>

27) Install the transmission harness. <Ref. to CVT-136, INSTALLATION, Transmission Harness.>
28) Install the control valve body. <Ref. to CVT-122, INSTALLATION, Control Valve Body.>
29) Install the air breather hose. <Ref. to CVT-156, INSTALLATION, Air Breather Hose.>
30) Install the transmission assembly to the vehicle. <Ref. to CVT-72, INSTALLATION, Automatic Transmission Assembly.>

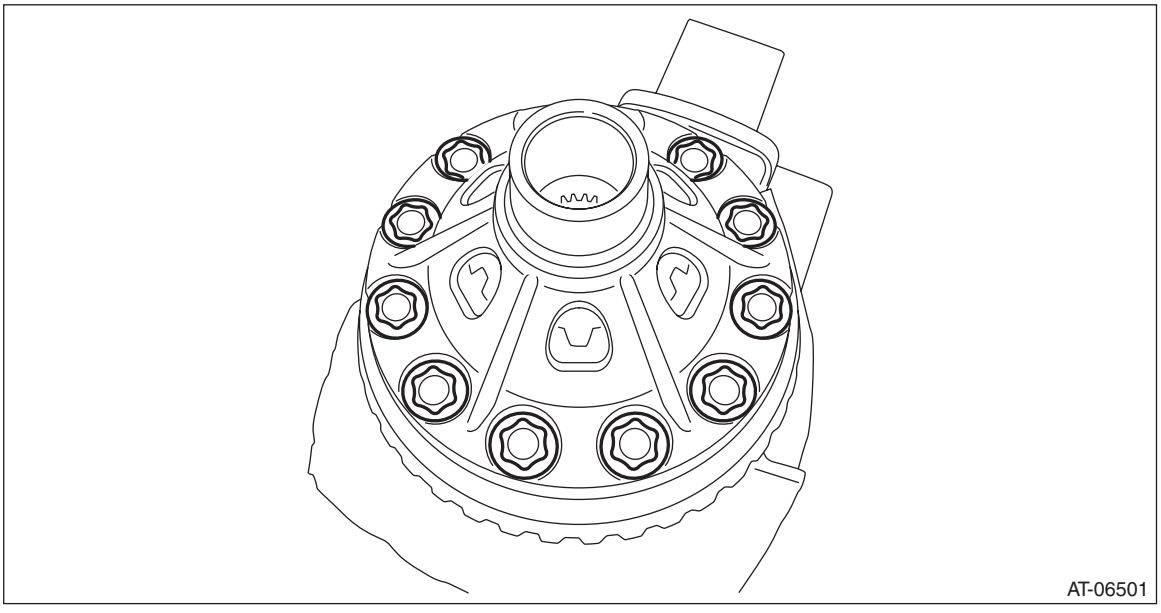
C: DISASSEMBLY

1. DIFFERENTIAL CASE ASSEMBLY

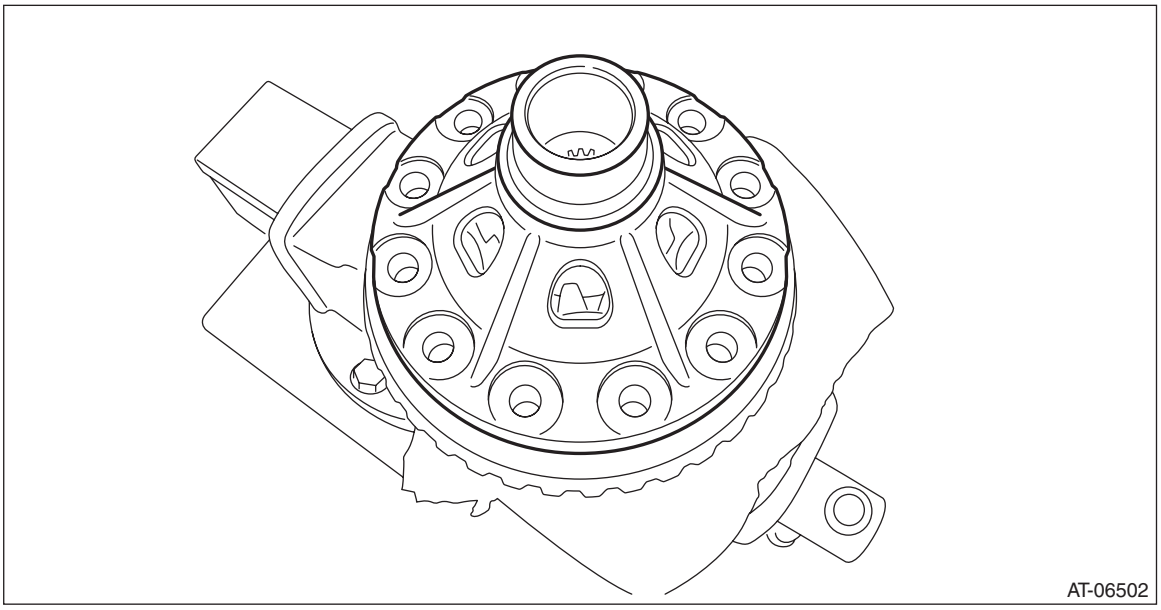
1) Remove the taper roller bearing using the ST.
ST1 498077000 REMOVER
ST2 899864100 REMOVER
ST3 398497701 SEAT



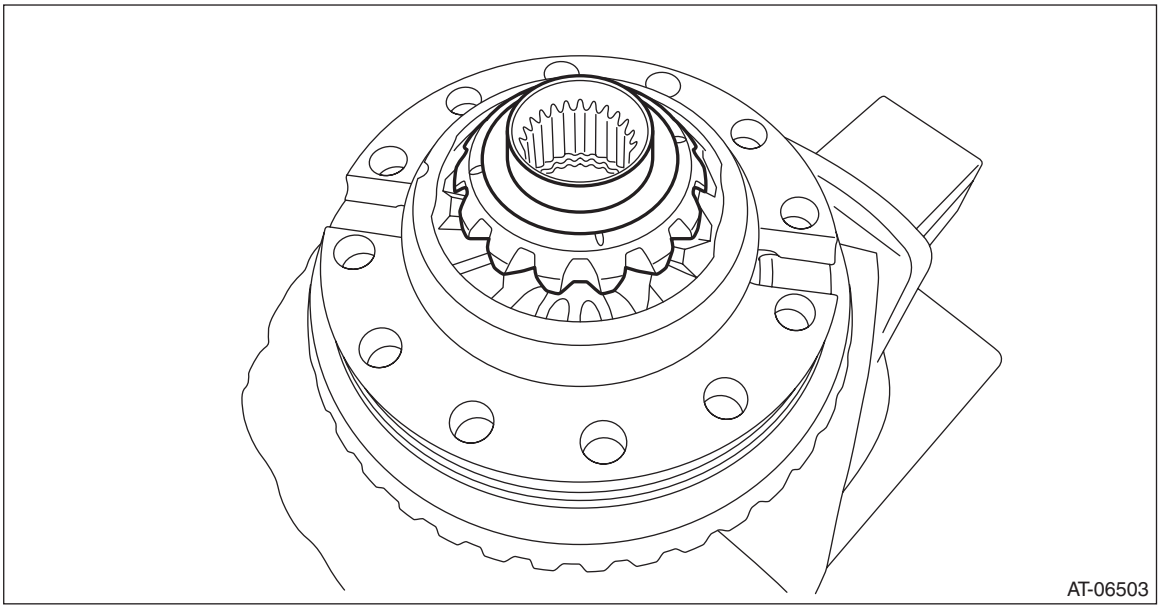
2) Remove the hypoid driven gear mounting bolt using the ST.
ST 18270KA020 SOCKET (E20)



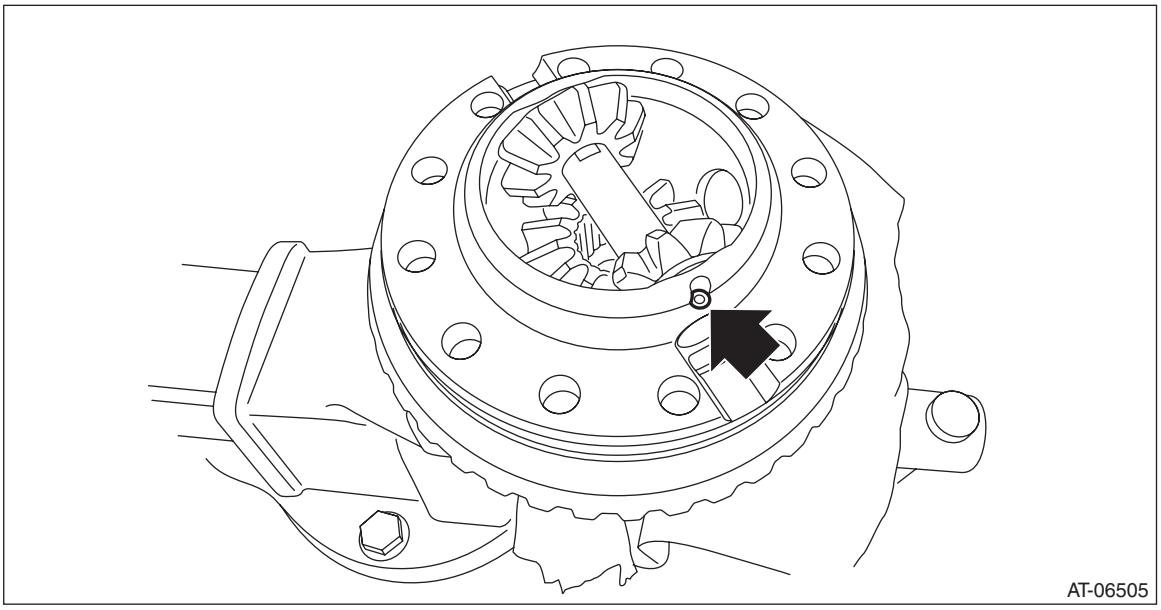
3) Remove the differential case (LH).



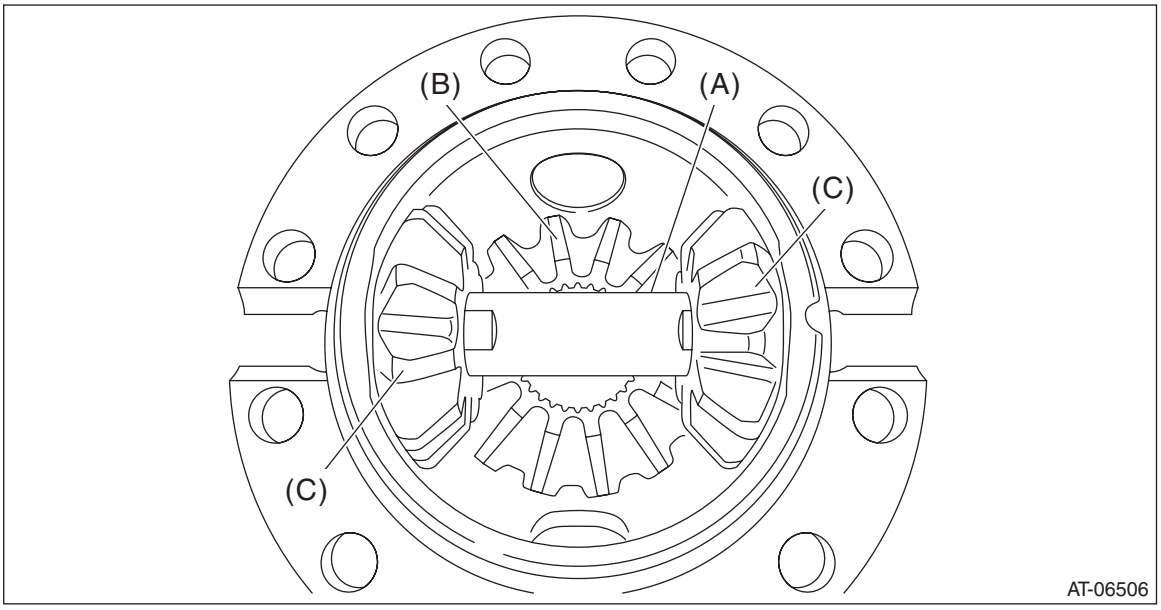
4) Remove the differential bevel gear and washer from differential case.



5) Remove the straight pin.



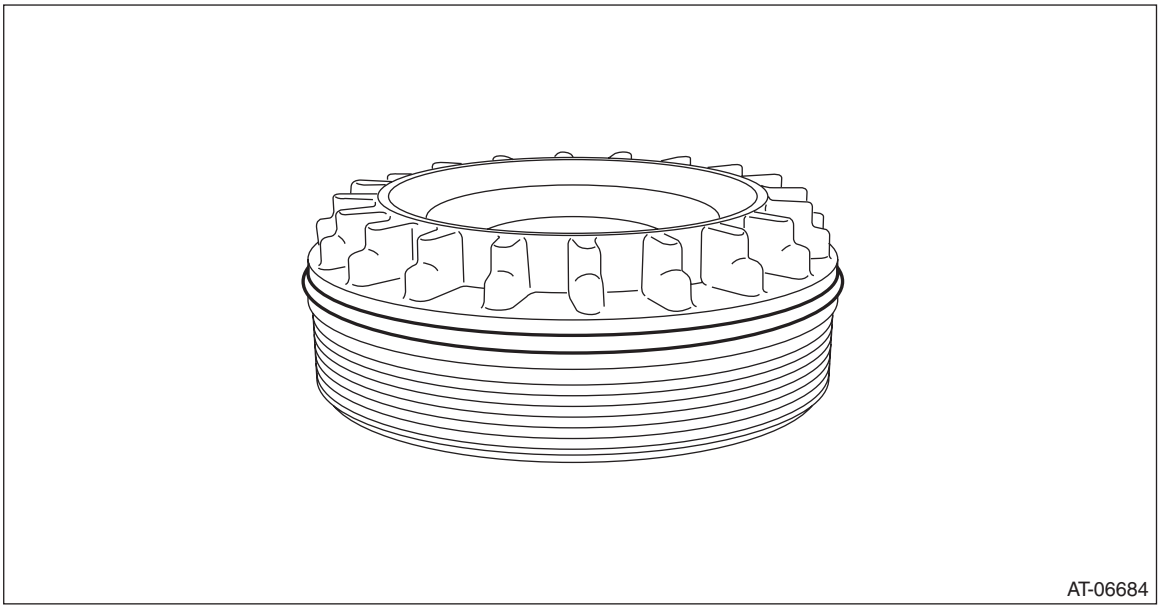
6) Remove the pinion shaft, then remove the differential bevel gear, washer and differential bevel pinion.



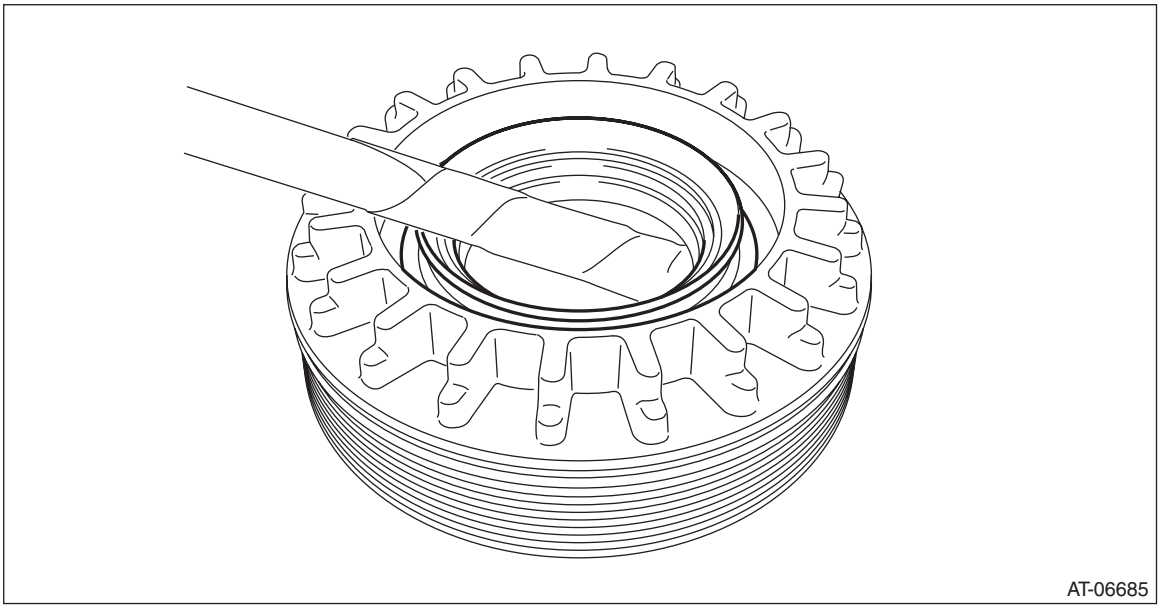
(A) Pinion shaft
(B) Differential bevel gear
(C) Differential bevel pinion

2. SIDE RETAINER

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



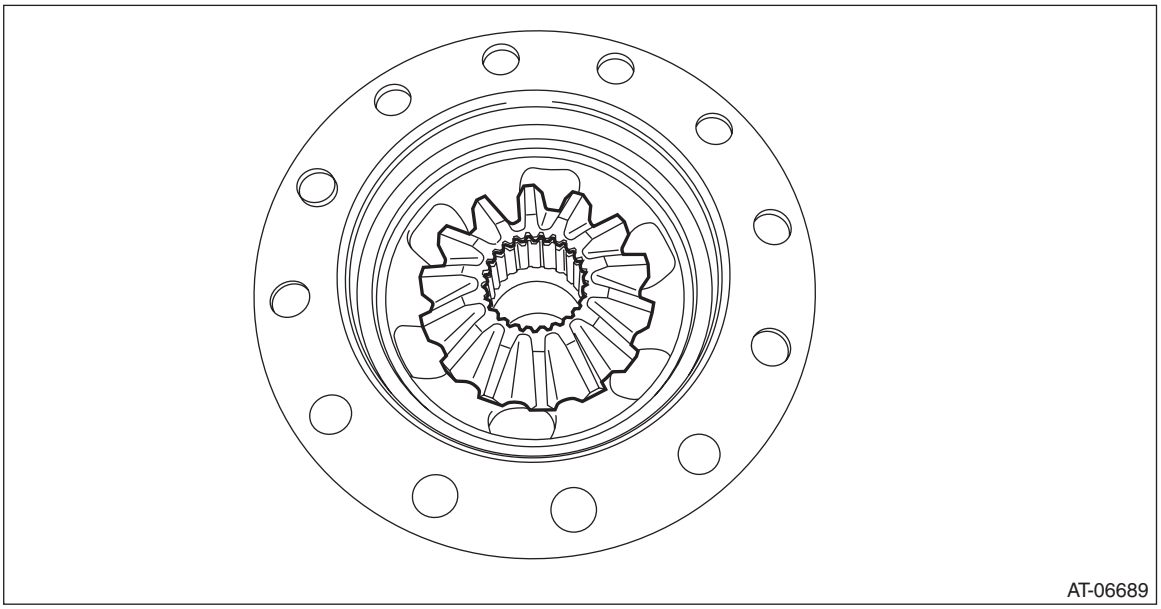
2) Remove the oil seal.



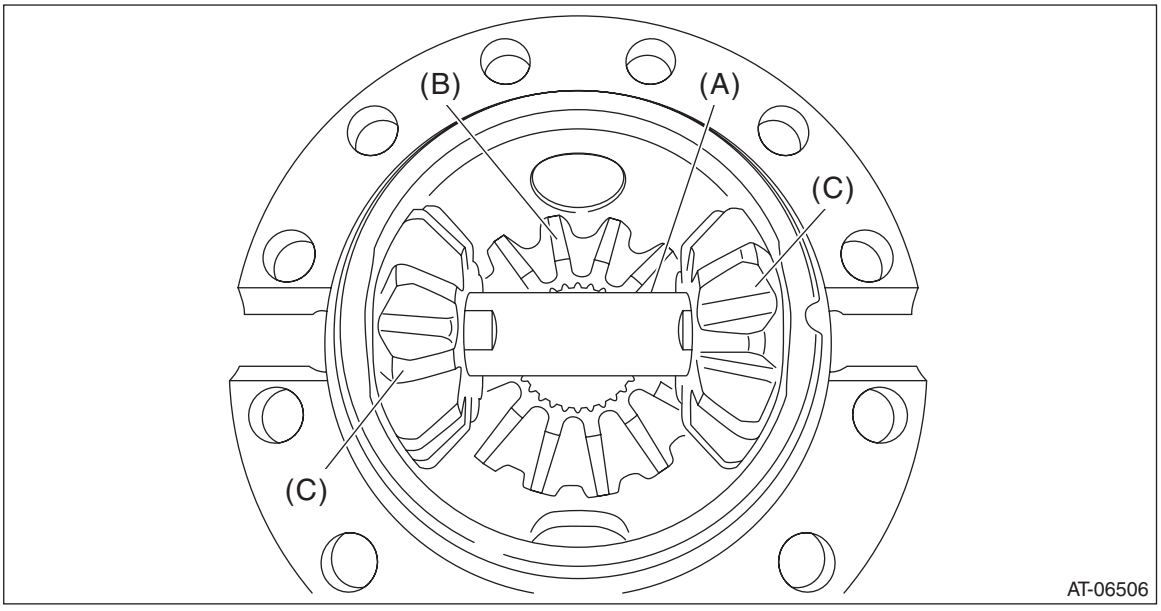
D: ASSEMBLY

1. DIFFERENTIAL CASE ASSY

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

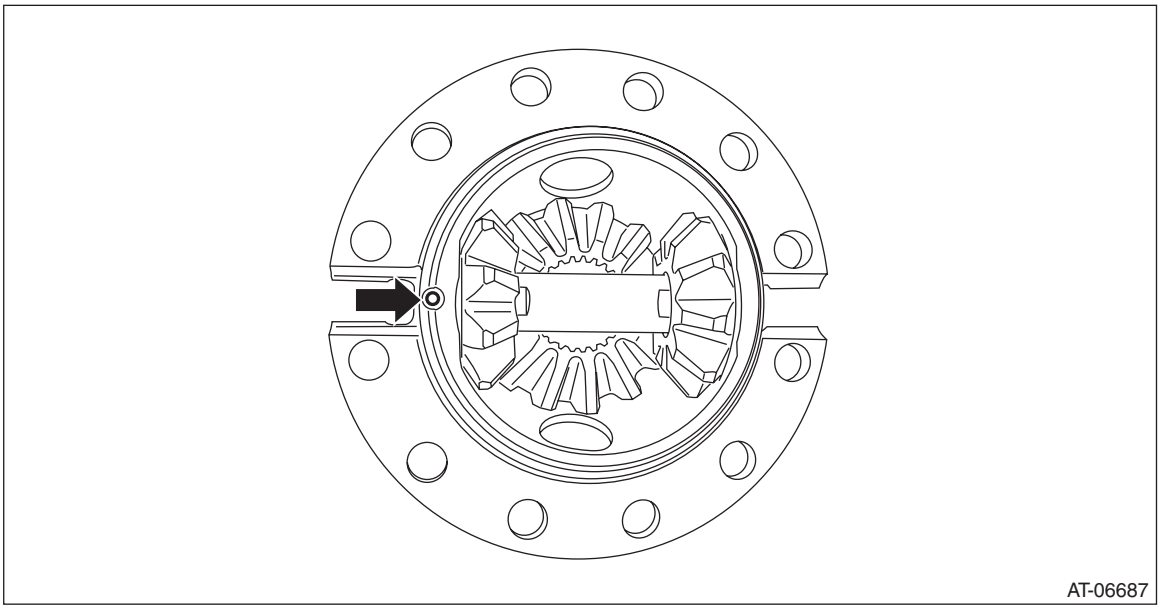


2) Install the differential bevel pinions into differential case (RH) and install the pinion shaft.

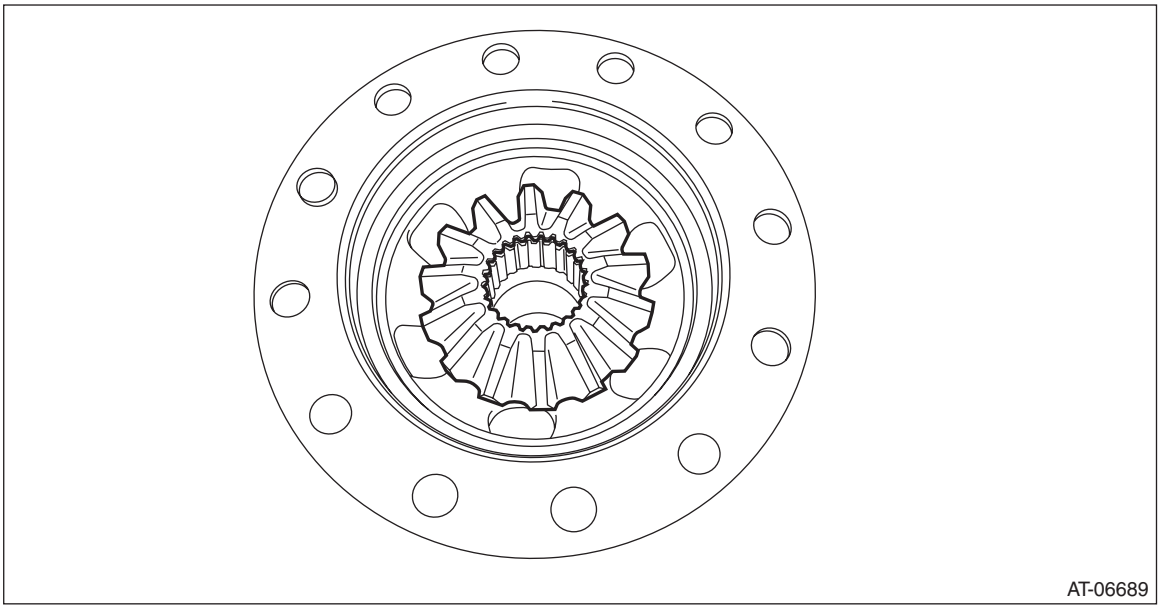


(A) Pinion shaft
(B) Differential bevel gear
(C) Differential bevel pinion

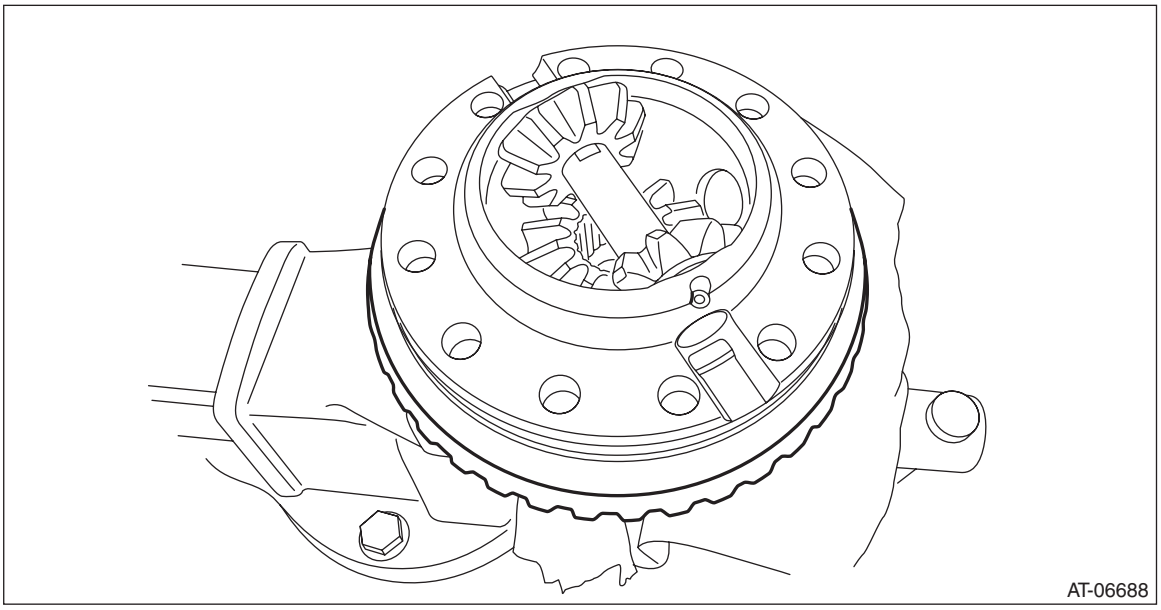
3) Install the straight pin.



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

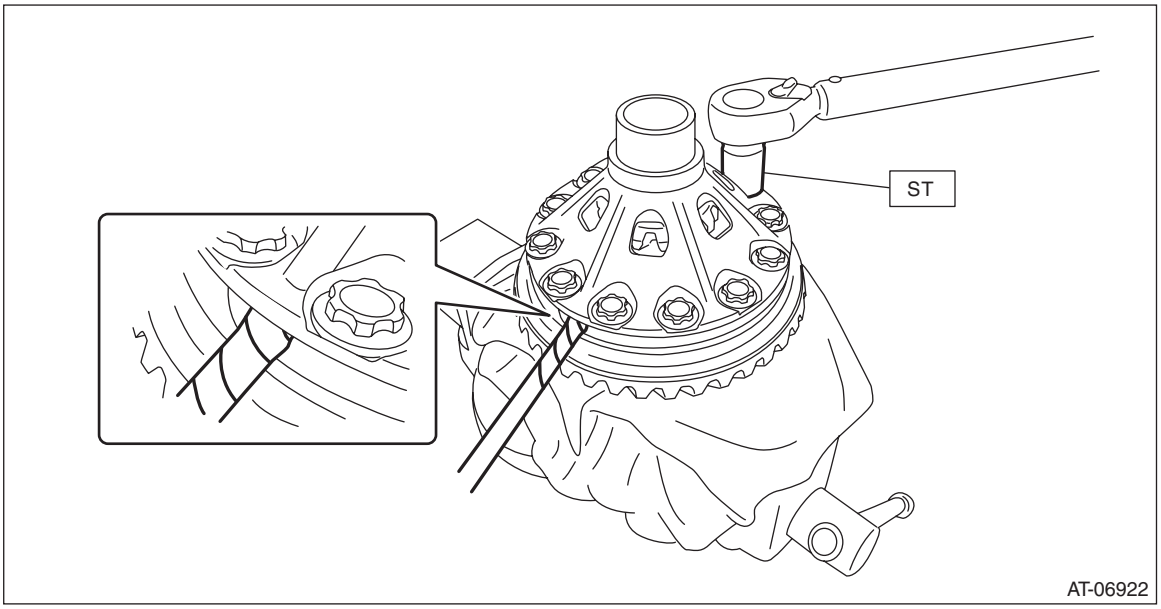


5) Install the differential case (RH) to the hypoid driven gear.



6) Install the differential case (LH) to the differential case (RH).
7) Using the ST, install the hypoid driven gear by tightening the installation bolt.
ST 18270KA020 SOCKET (E20)

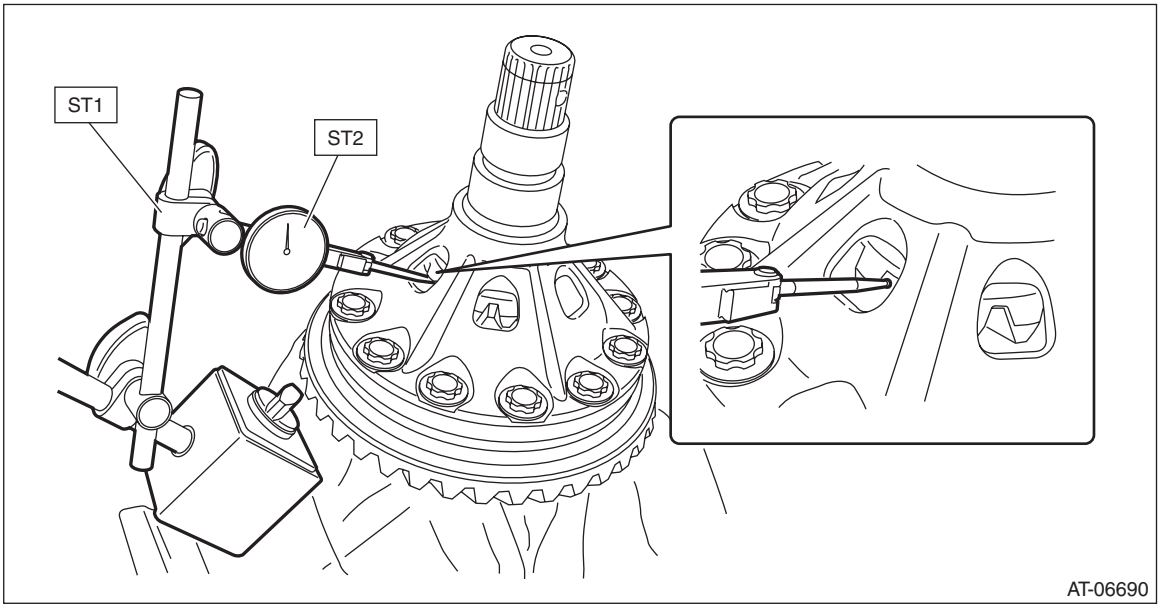
Tightening torque:
64 N·m (6.5 kgf-m, 47.2 ft-lb)



8) Measure the backlash, and select the washer.
(1) Install the SUBARU genuine axle shaft to differential case.
Part No. 38415AA070 Axle shaft
(2) Using ST1 and ST2, insert the ST2 through the window of differential case. Measure the backlash of the gear.

NOTE:
• Measure the backlash by applying a differential bevel pinion tooth between two differential bevel gear teeth.
• When measuring, fix the differential bevel pinion in place with a screwdriver covered with cloth, or a similar tool.
ST1 498247001 MAGNET BASE
ST2 498247100 DIAL GAUGE

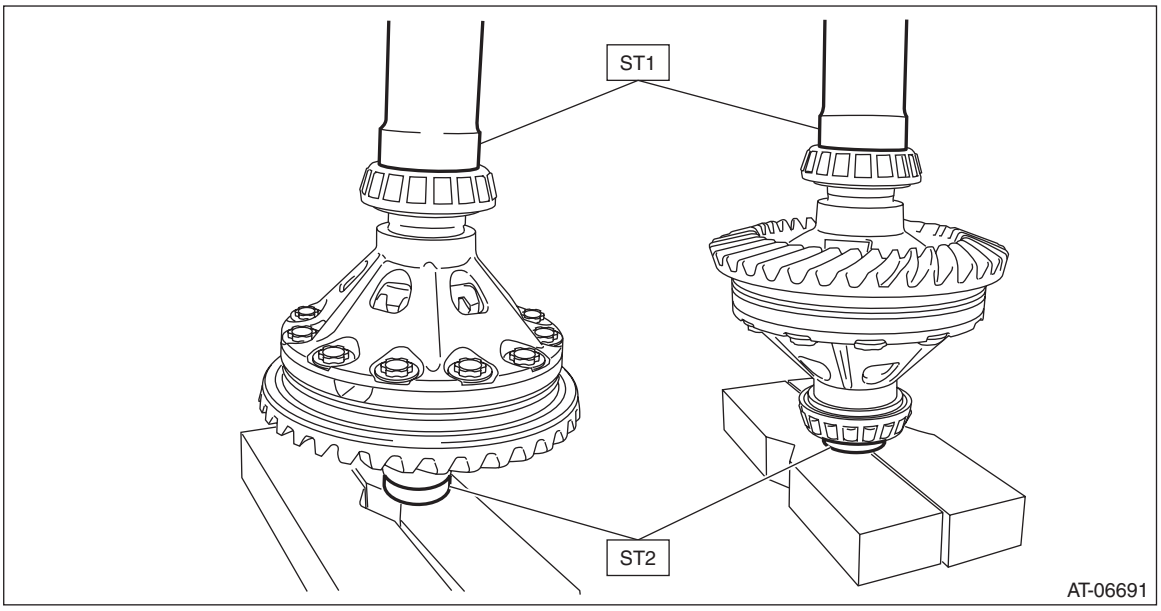
Specification:
0.13 — 0.18 mm (0.0051 — 0.0071 in)



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

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

9) Using the ST, install the left and right taper roller bearings.
ST1 499277100 BUSHING 1-2 INSTALLER
ST2 398497701 SEAT

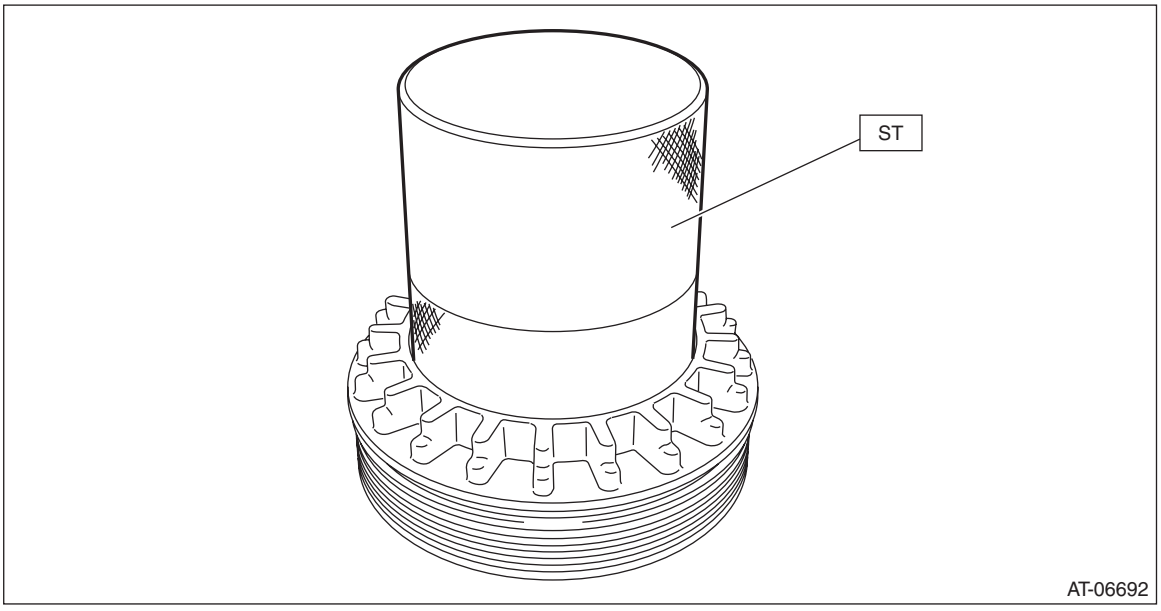


2. SIDE RETAINER

NOTE:
After adjusting the backlash and tooth contact, replace the oil seal and O-ring of side retainer with new parts.
1) Using the ST, install the oil seal.

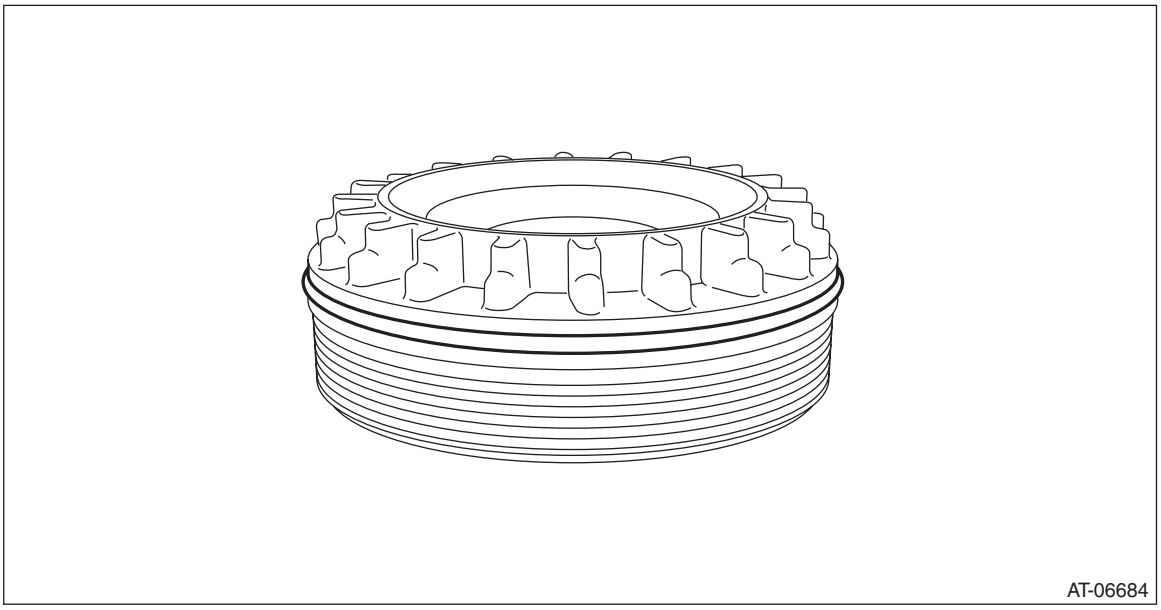
NOTE:
- Use a new oil seal.
- Apply differential gear oil to the oil seal lip and press-fitting surface.
- Oil seal has an identification mark (R, L). When installing oil seals, do not confuse the left and right.

ST 18675AA000 DIFFERENTIAL SIDE OIL SEAL INSTALLER



2) Install the O-ring.

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

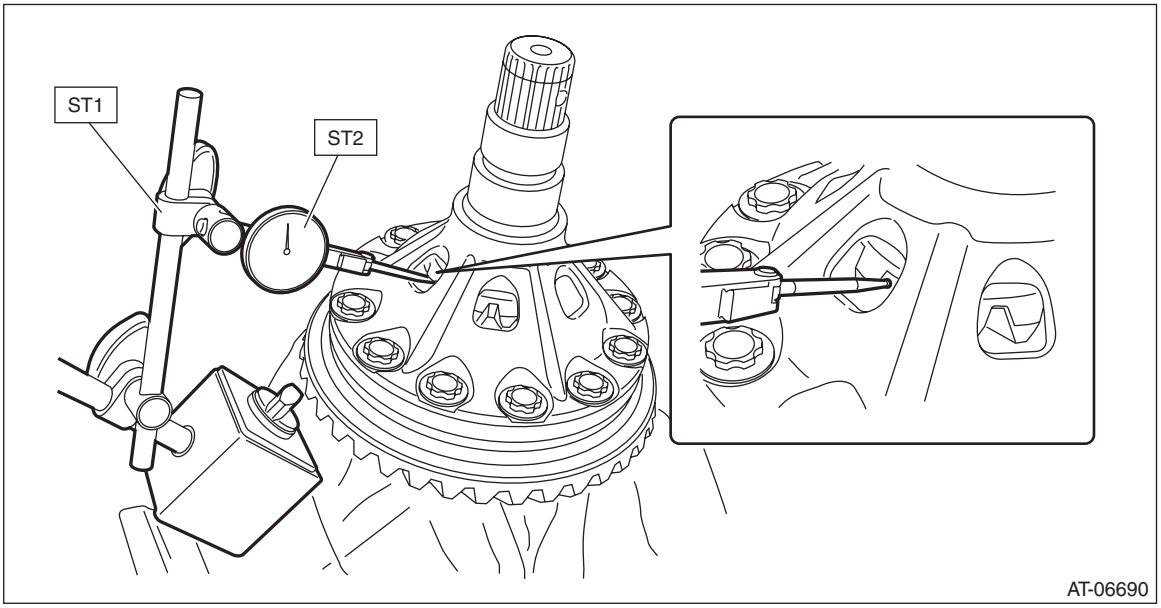

AT-06684

E: INSPECTION

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

ST1 498247001 MAGNET BASE
ST2 498247100 DIAL GAUGE

Specification:
0.13 — 0.18 mm (0.0051 — 0.0071 in)



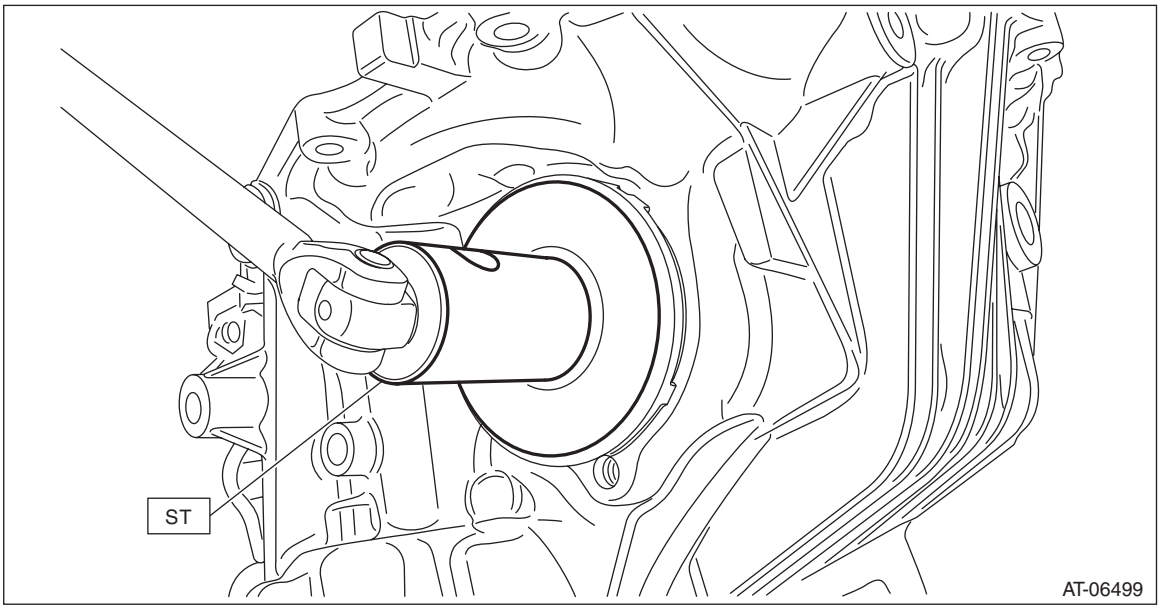
AT-06690

- Measure the hypoid gear backlash, and then adjust it to be within specification. <Ref. to CVT-315, ADJUSTMENT, Front Differential Assembly.>

F: ADJUSTMENT

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

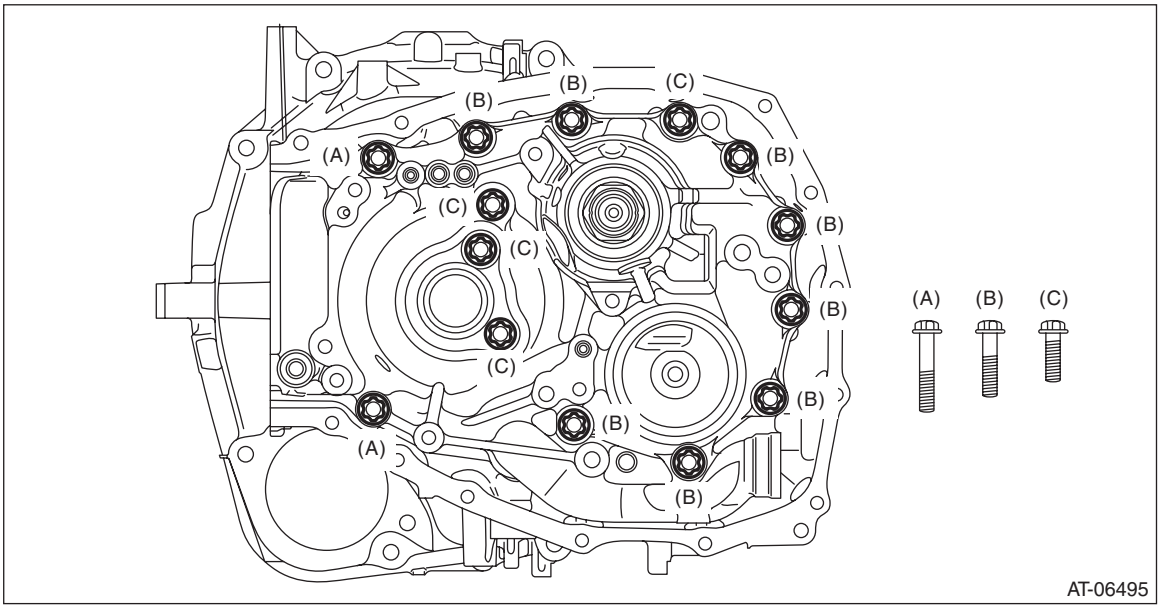
NOTE:
RH side should be screwed-in more than LH side.
ST 18658AA020 WRENCH COMPL RETAINER



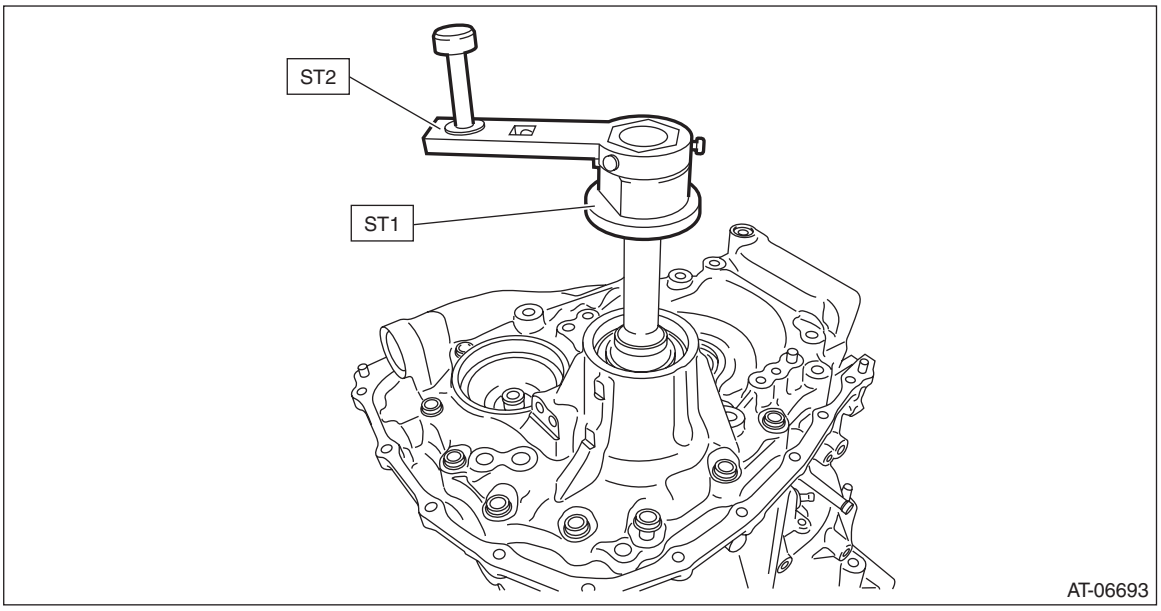
2) Remove the remaining liquid gasket from the mating surface completely.
3) Using the ST, install the drive pinion assembly to converter case.
ST 18270KA020 SOCKET (E20)

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

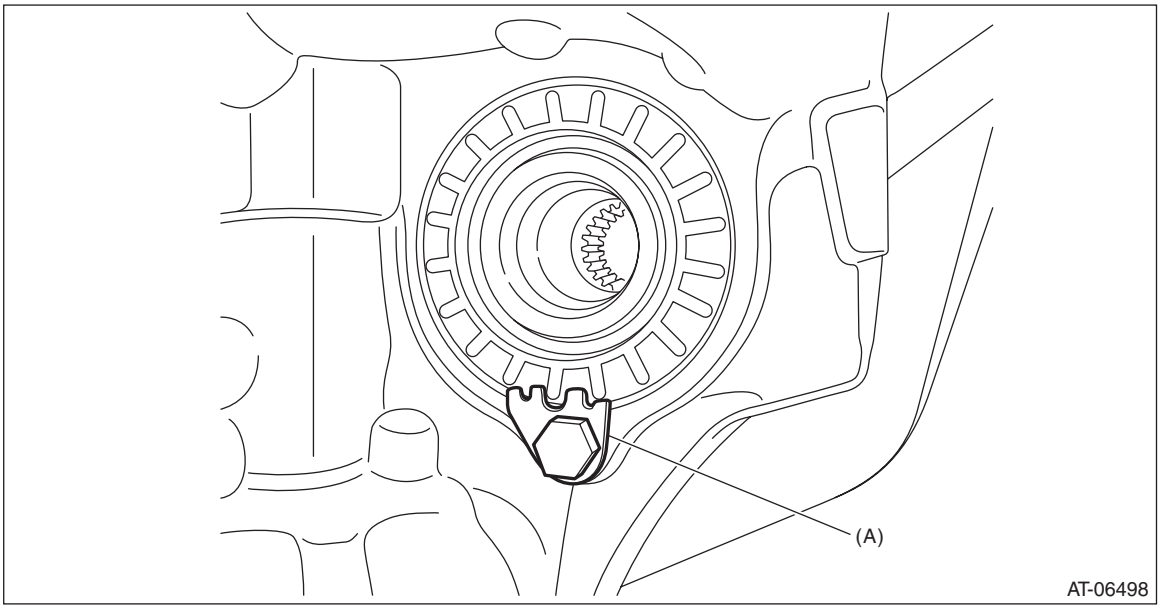
Tightening torque:
43 N·m (4.4 kgf-m, 31.7 ft-lb)



4) Rotate the drive pinion shaft ten times or more using ST1 and ST2.
ST1 18667AA010 HOLDER
ST2 499787700 WRENCH

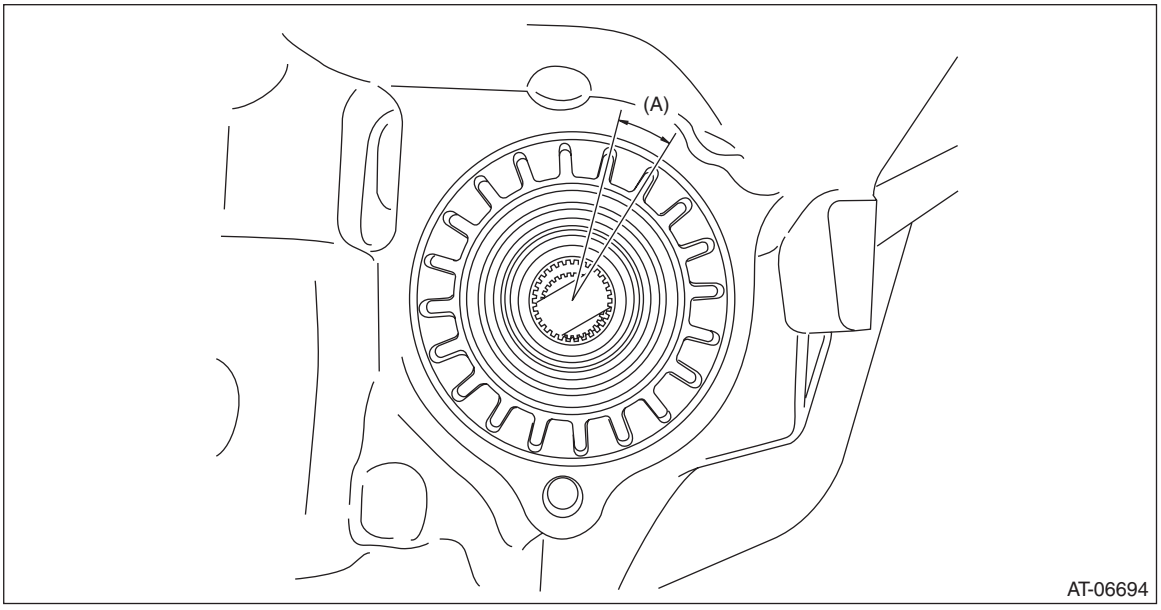


5) While rotating the pinion shaft, tighten the retainer LH and loosen the retainer RH until the shaft can't be turned anymore. The backlash is “zero” when the pinion shaft comes to the point where it doesn't rotate.
6) After the “zero” state is established, loosen the retainer LH by 3 notches and secure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



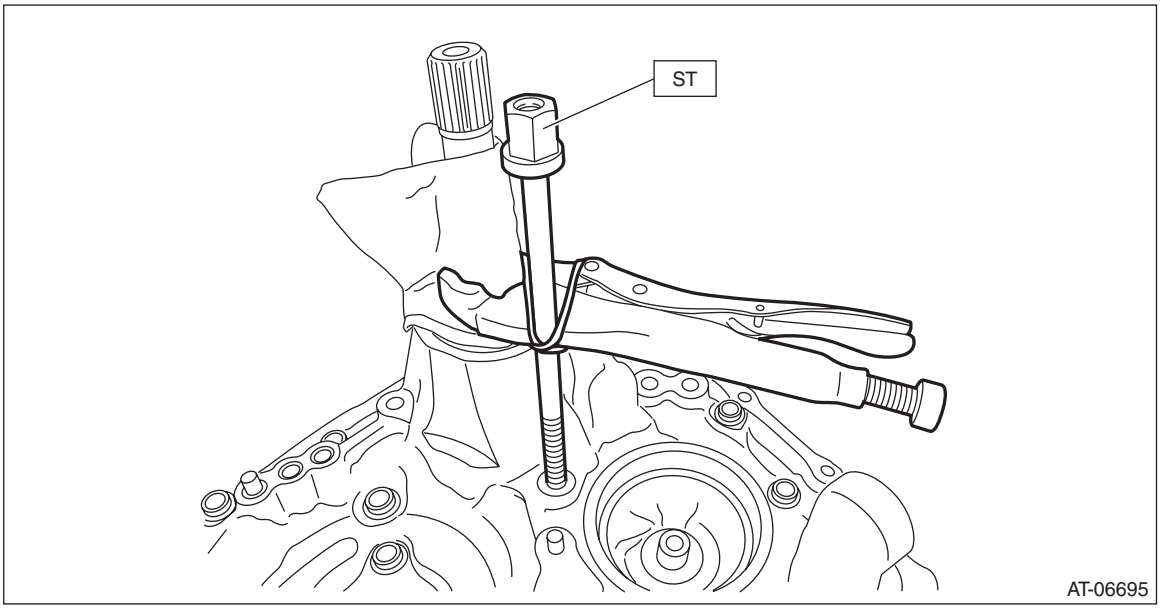
(A) Lock plate

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



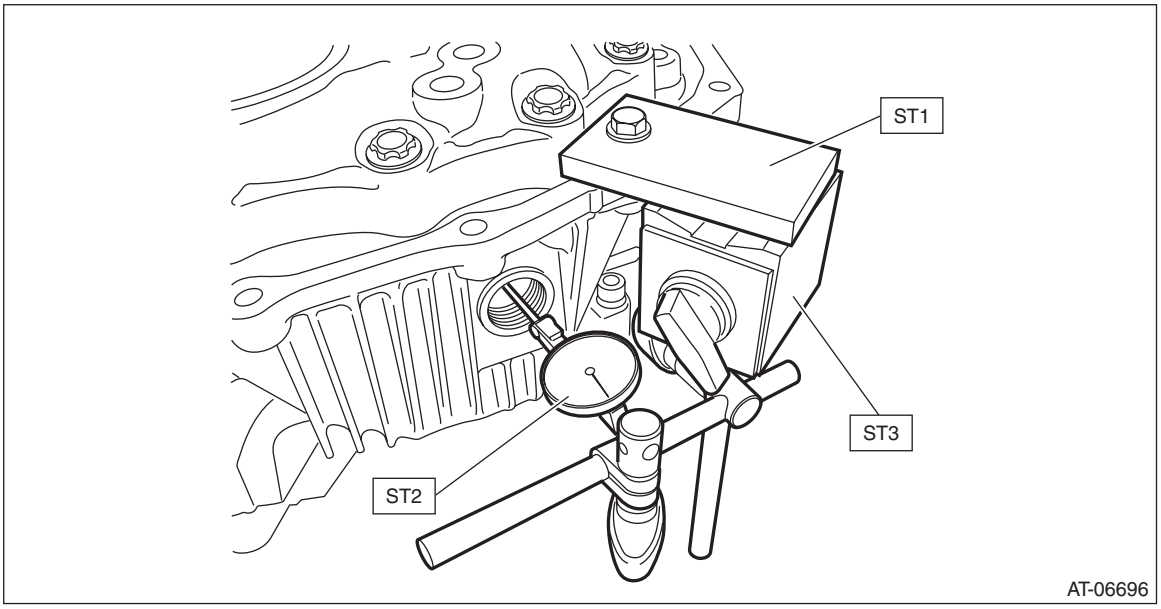
(A) 1 tooth

7) Insert the two SUBARU genuine axle shafts into differential case.
Part No. 38415AA070 Axle shaft
8) Install the ST to the drive pinion retainer, and wrap the drive pinion shaft with cloth and pinch with vise pliers. Using a tie-wrap or a wire, fix the vise pliers to the ST.
Make sure the drive pinion shaft does not move.
ST 18763AA000 COMPRESSOR SHAFT



9) Check the backlash is within specification using ST1, ST2 and ST3.
ST1 498255400 PLATE
ST2 498247100 DIAL GAUGE
ST3 498247001 MAGNET BASE

Backlash:
0.13 — 0.18 mm (0.005 — 0.007 in)



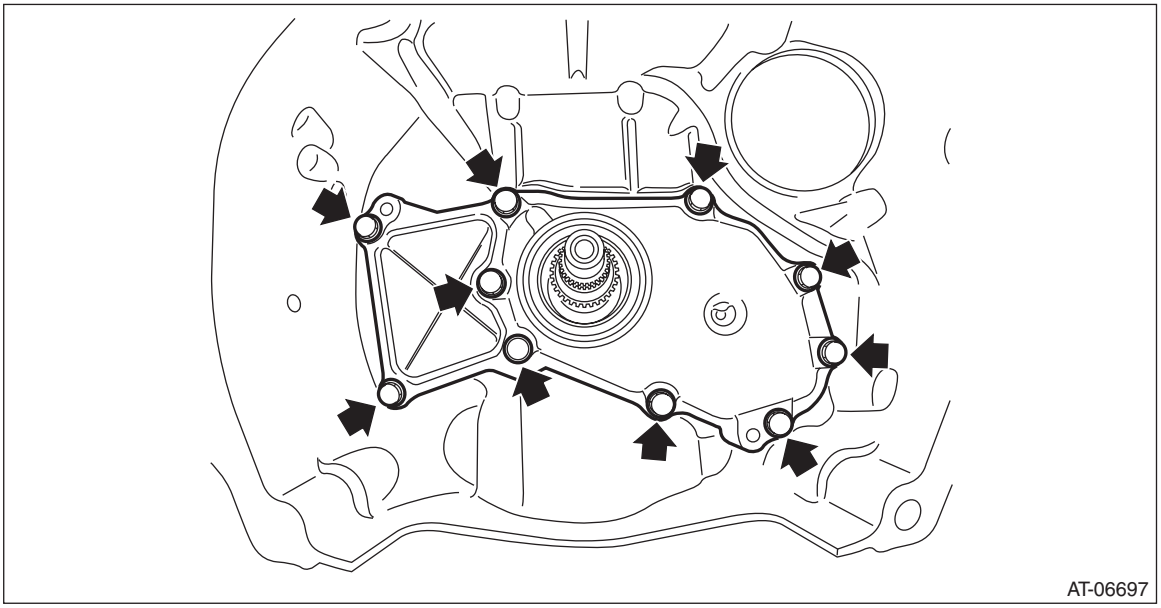
10) Adjust the teeth contact of the front differential and drive shaft. <Ref. to CVT-293, ADJUSTMENT, Drive Pinion Shaft Assembly.>

43.Oil Pump Chain

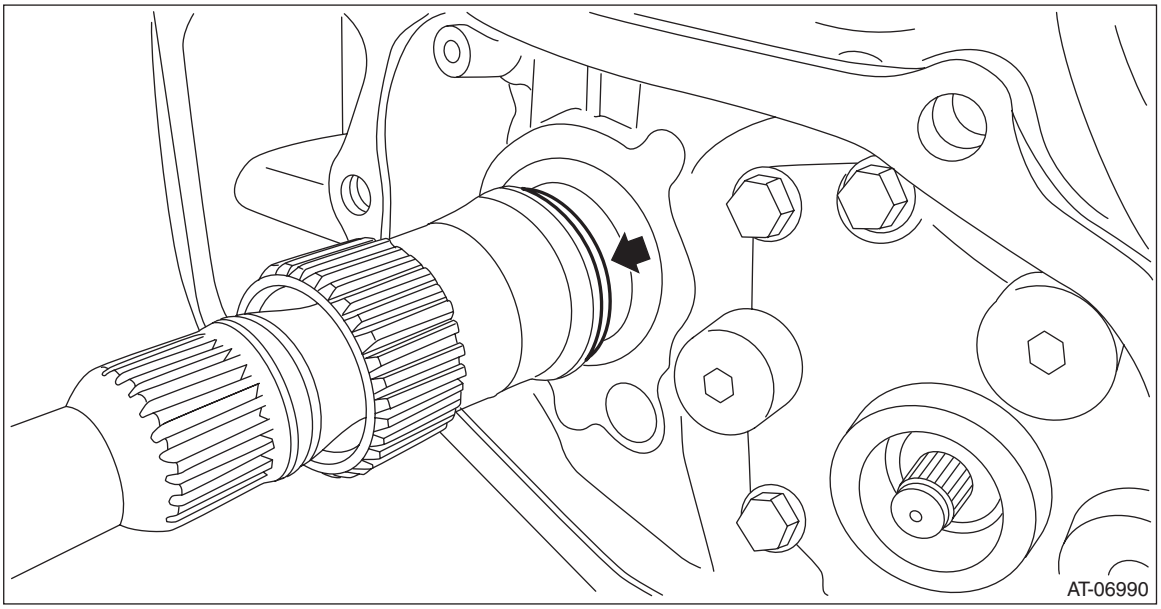
A: REMOVAL

1) Remove the transmission assembly from the vehicle. <Ref. to CVT-57, REMOVAL, Automatic Transmission Assembly.>
2) Remove the torque converter assembly. <Ref. to CVT-159, REMOVAL, Torque Converter Assembly.>
3) Remove the oil pump chain cover.

NOTE:
Oil pump chain cover may be hard to remove because the driven sprocket is installed to the shaft side of the oil pump. In this case, do not apply excessive force to remove it.

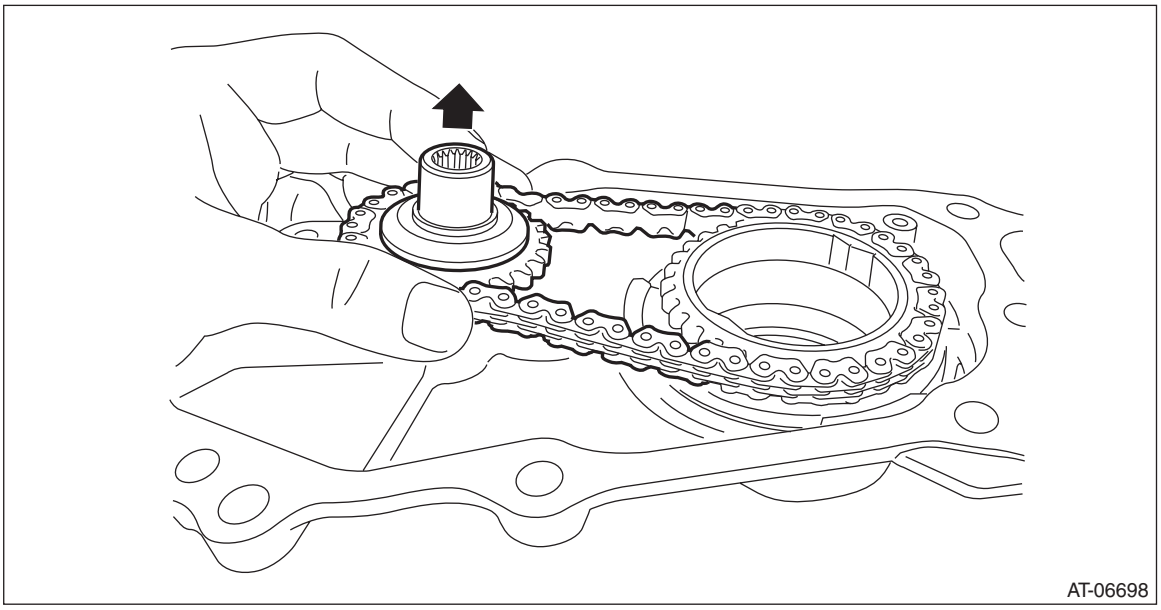


4) Remove the seal ring.

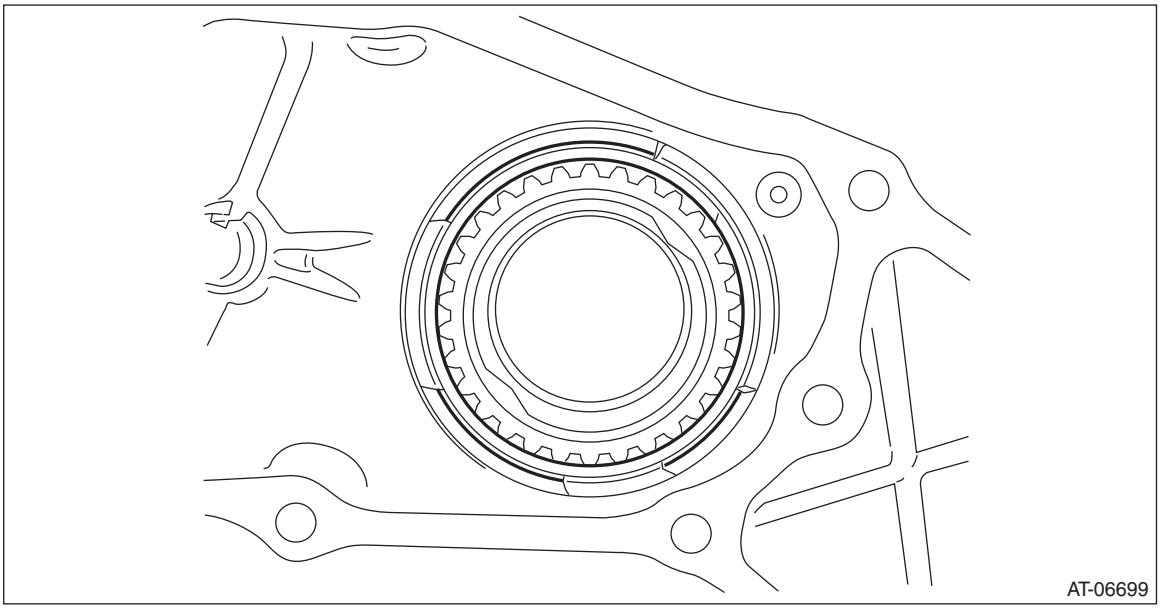


5) Remove the driven sprocket from oil pump chain cover to remove the oil pump chain.

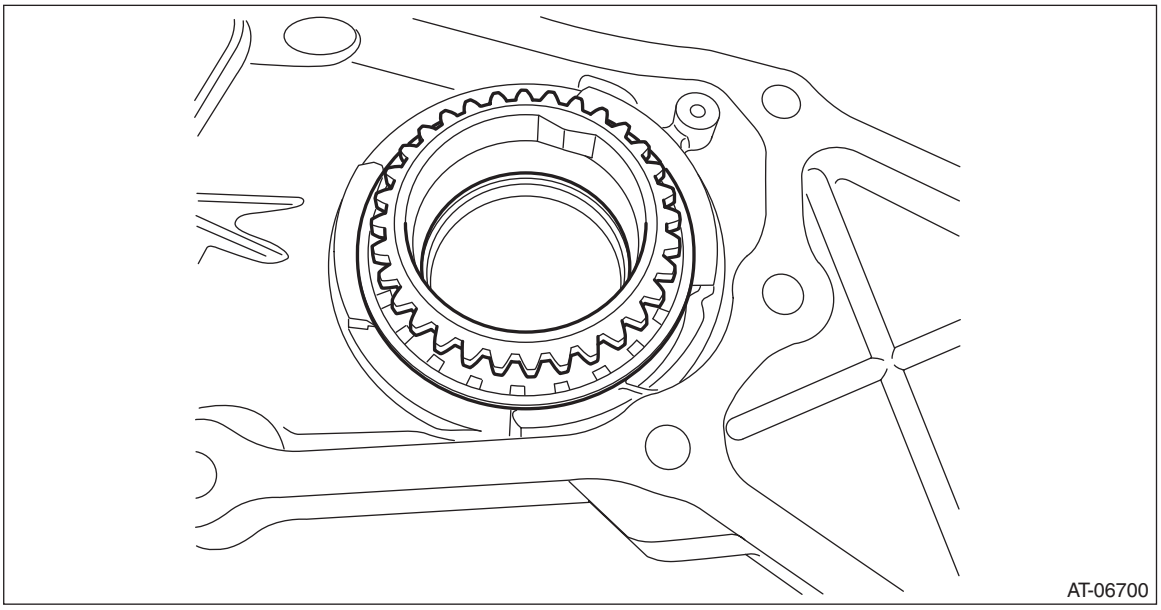
NOTE:
- The driven sprocket is replaced as an assembly only, because it is a non-disassembly part.
- If the ball bearing is removed from the driven sprocket, replace with a new part.



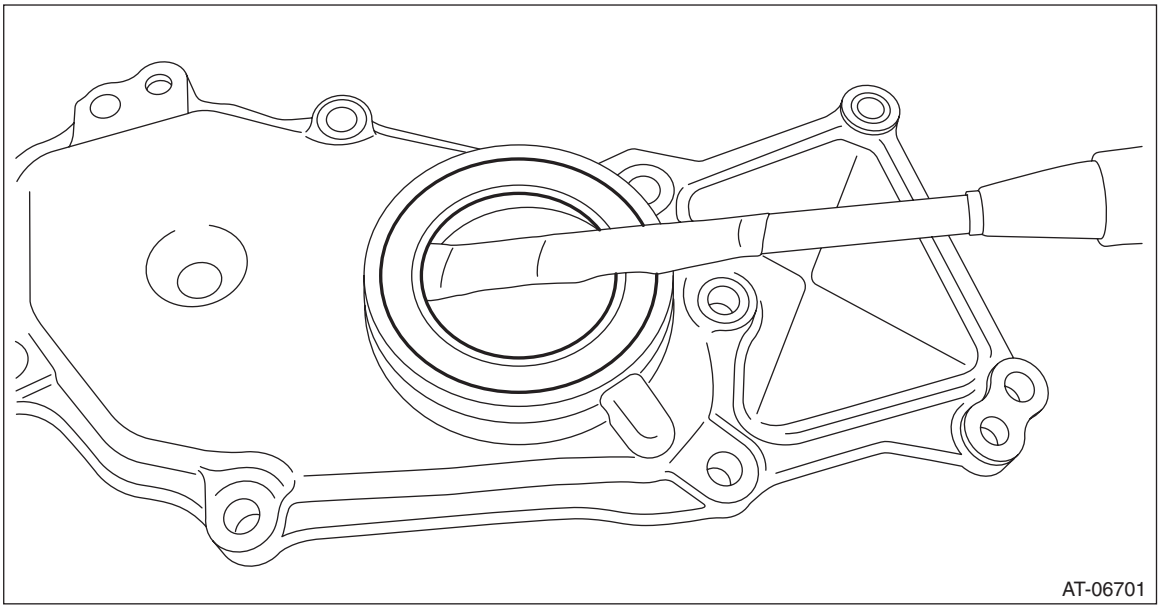
6) Remove the snap ring.



7) Remove the drive sprocket.



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

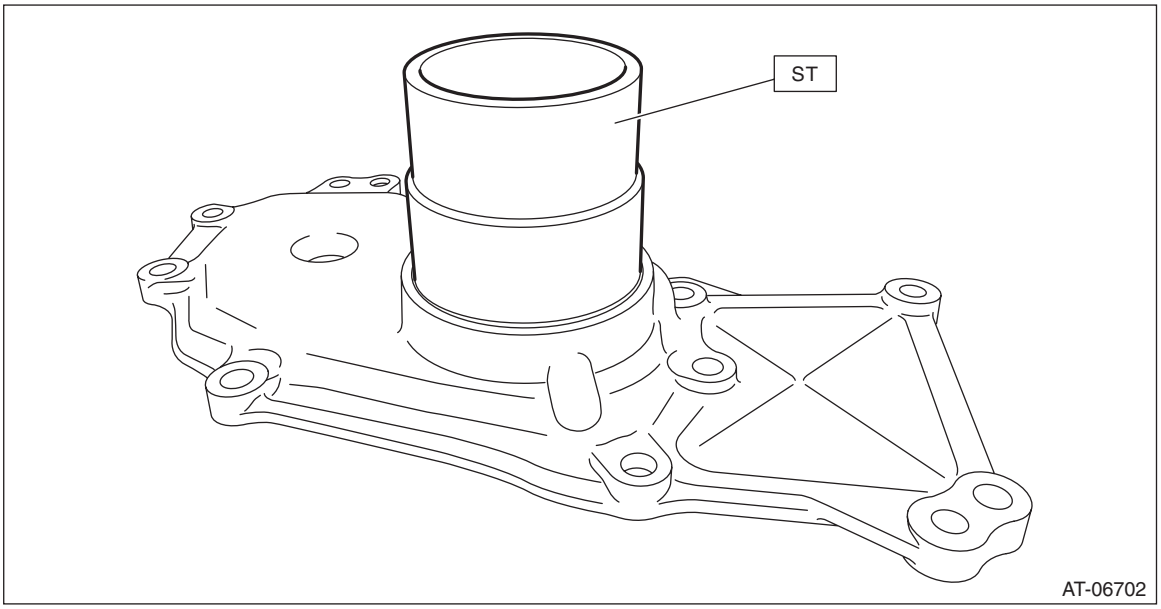


B: INSTALLATION

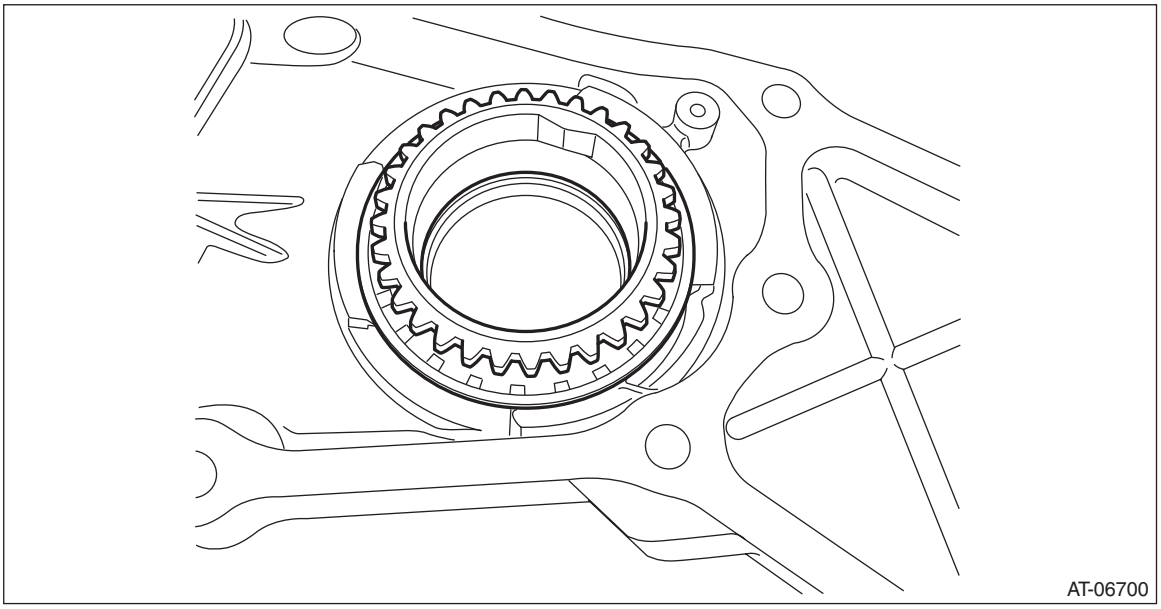
1) Clean the mating surface of oil pump chain cover and converter case.
2) Using the ST, install the oil seal.

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

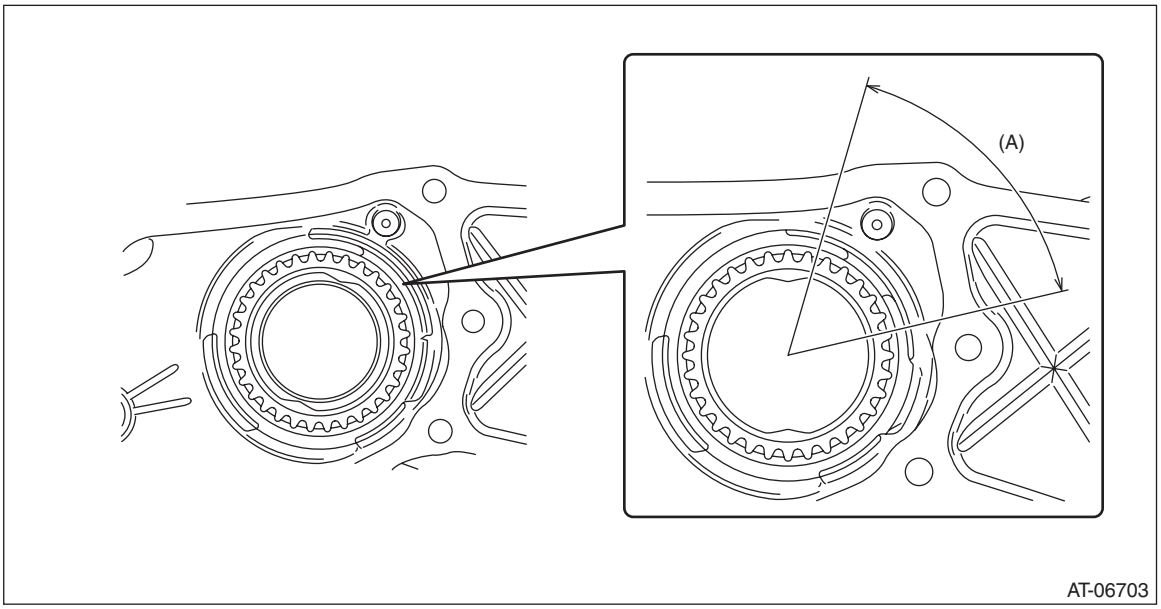
ST 499755602 PRESS SNAP RING



3) Install the drive sprocket.

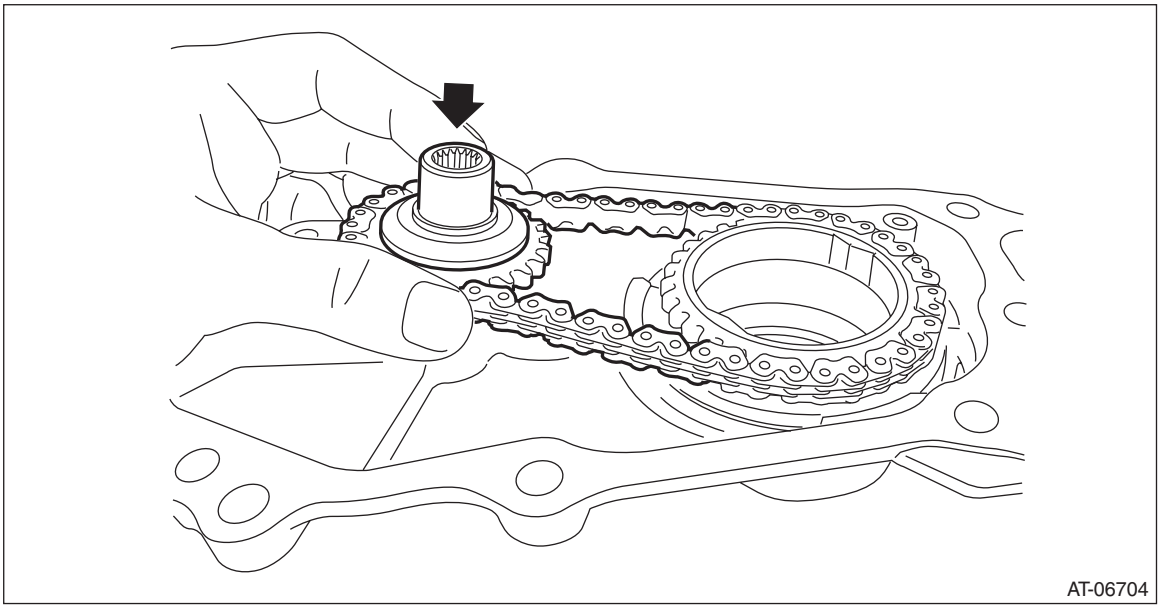


4) Install the snap ring so that its cutout portion is securely fitted into the snap ring groove of the oil pump chain cover.



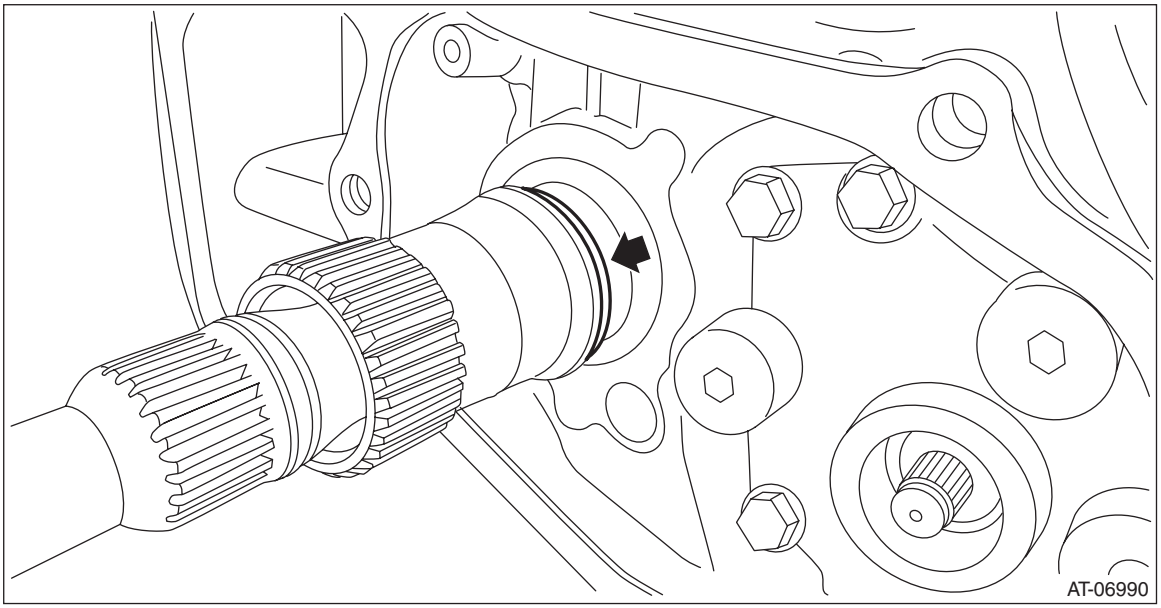
(A) Installation range of cutout portion for snap ring

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



7) Install the seal ring.

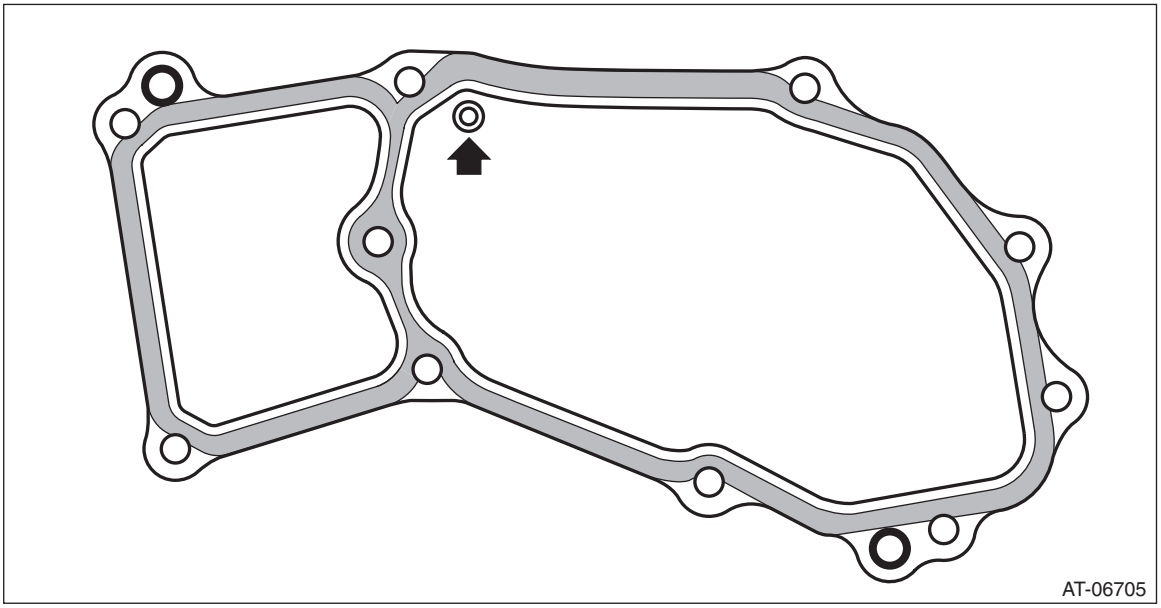
NOTE:
- Use a new seal ring.
- Apply CVTF to the seal rings.
- When installing the seal ring, do not expand the seal ring too much.



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

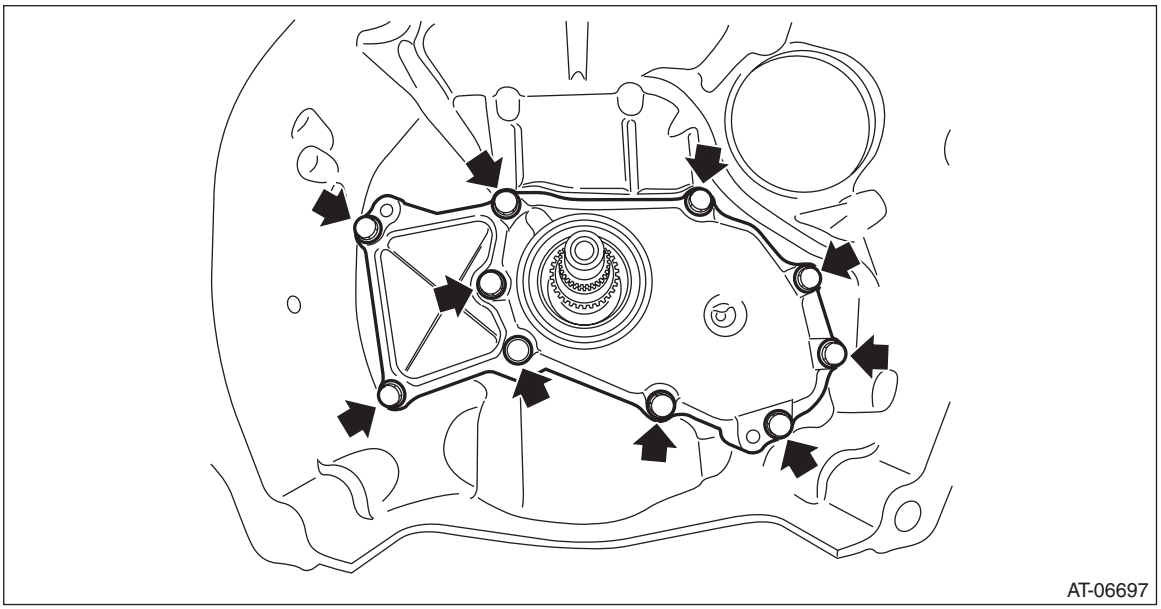
CAUTION:
Do not apply liquid gasket at the arrowed hole.

Liquid gasket:
THREE BOND 1215 (Part No. 004403007) or equivalent



9) Install the oil pump chain cover.

Tightening torque:
21 N·m (2.1 kgf-m, 15.5 ft-lb)

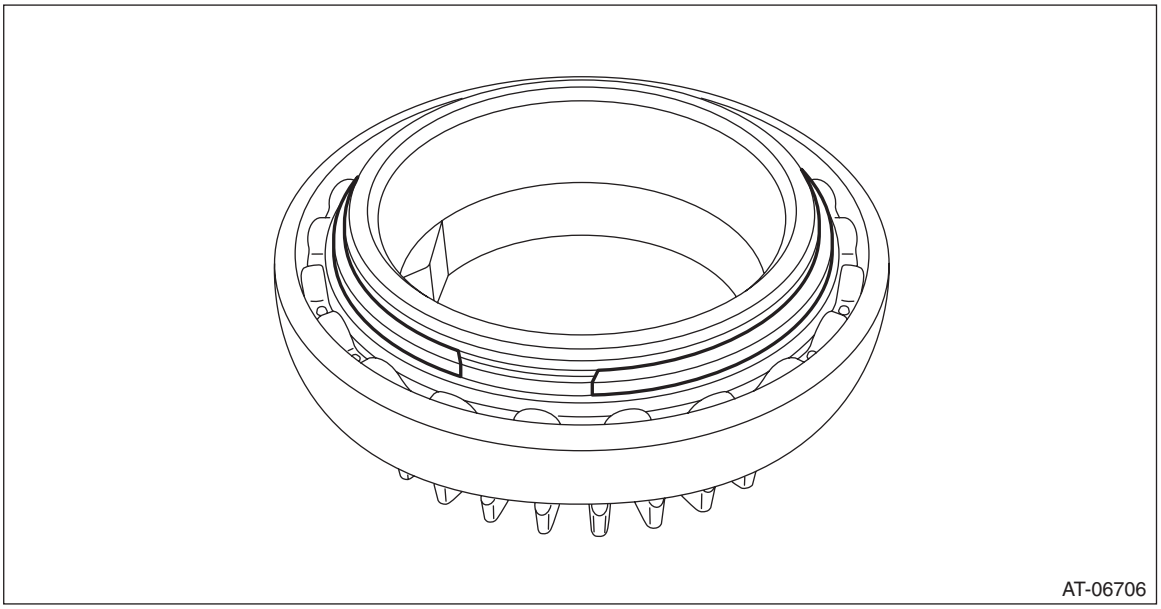


10) Install the torque converter assembly. <Ref. to CVT-160, INSTALLATION, Torque Converter Assembly.>
11) Install the transmission assembly to the vehicle. <Ref. to CVT-72, INSTALLATION, Automatic Transmission Assembly.>

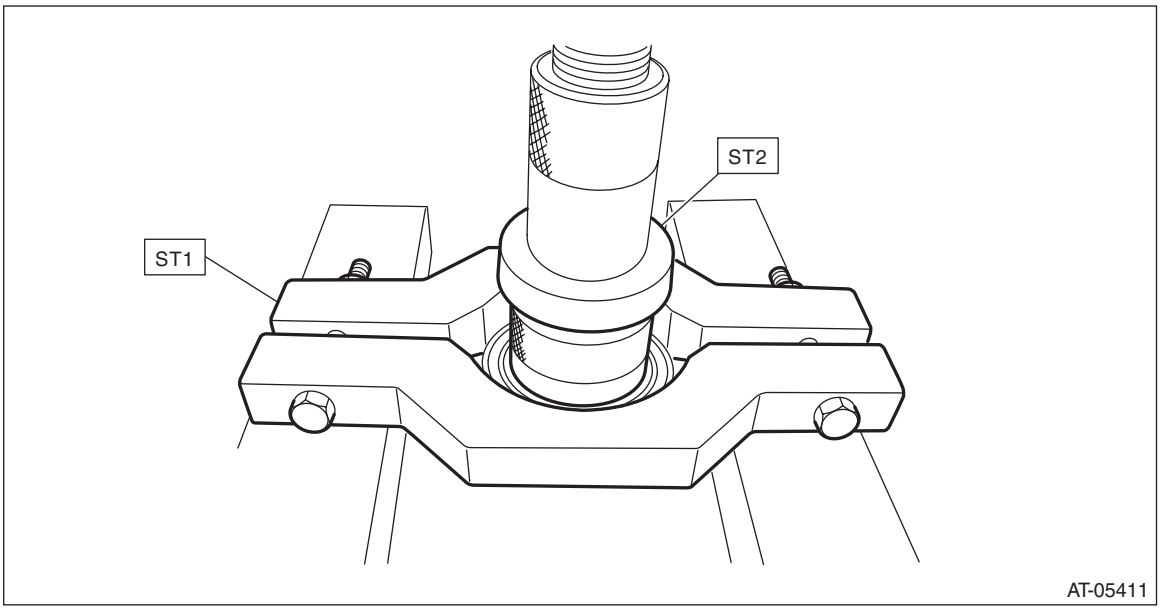
C: DISASSEMBLY

1. DRIVE SPROCKET

1) Remove the snap ring.



2) Remove the ball bearing using ST.
ST1 498077600 REMOVER
ST2 399513600 INSTALLER

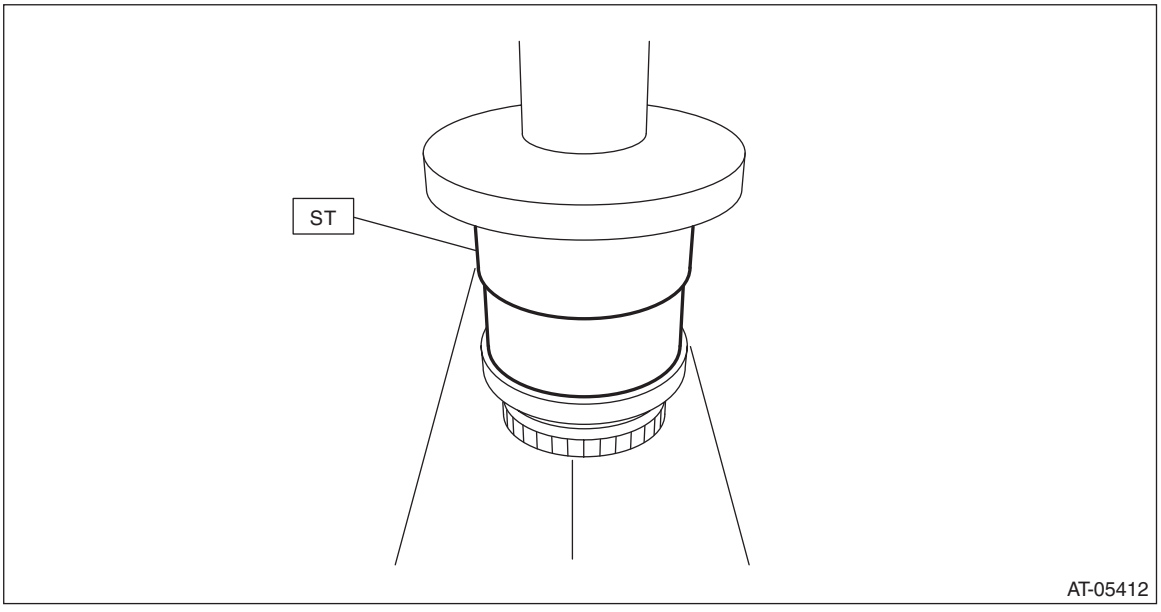


D: ASSEMBLY

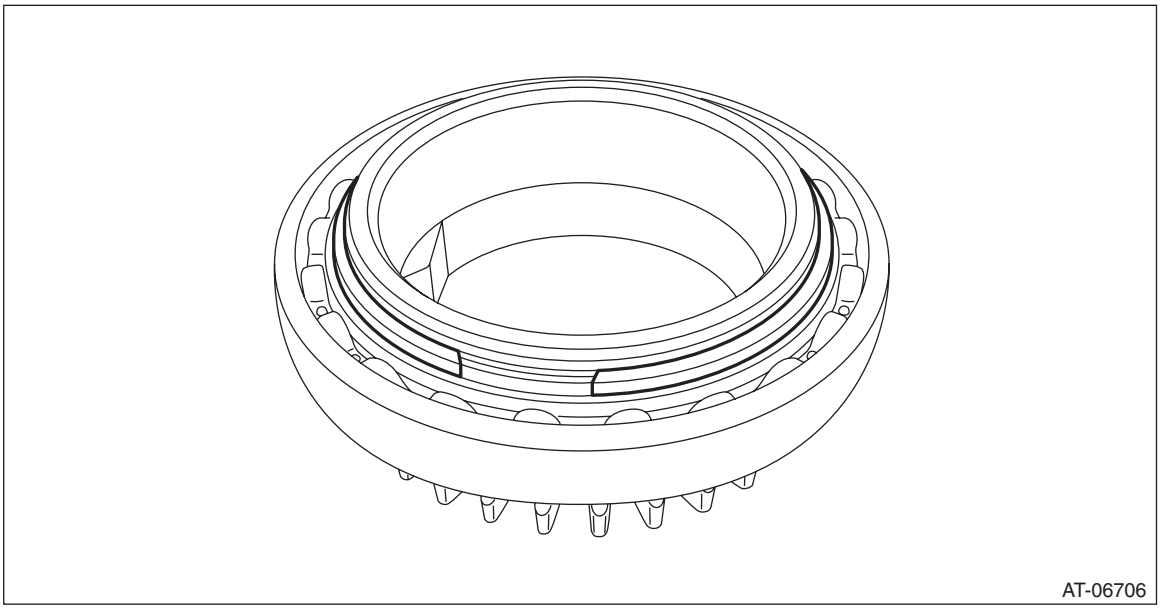
1. DRIVE SPROCKET

1) Using the ST, install the ball bearing.

NOTE:
Use a new ball bearing.
ST 499755502 PRESS SNAP RING



2) Install the snap ring.



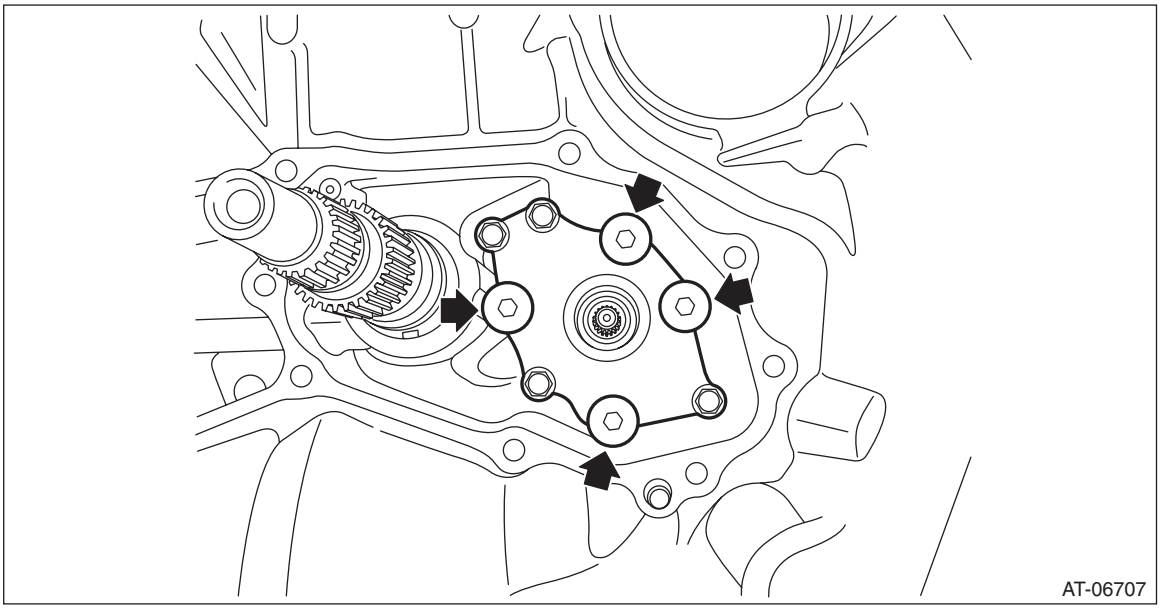
E: INSPECTION

- Check the oil pump chain for damage.
- Replace if gear teeth are broken, damaged, sharpen or excessively worn.
- Check the bearing for seizure or wear.
- 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.

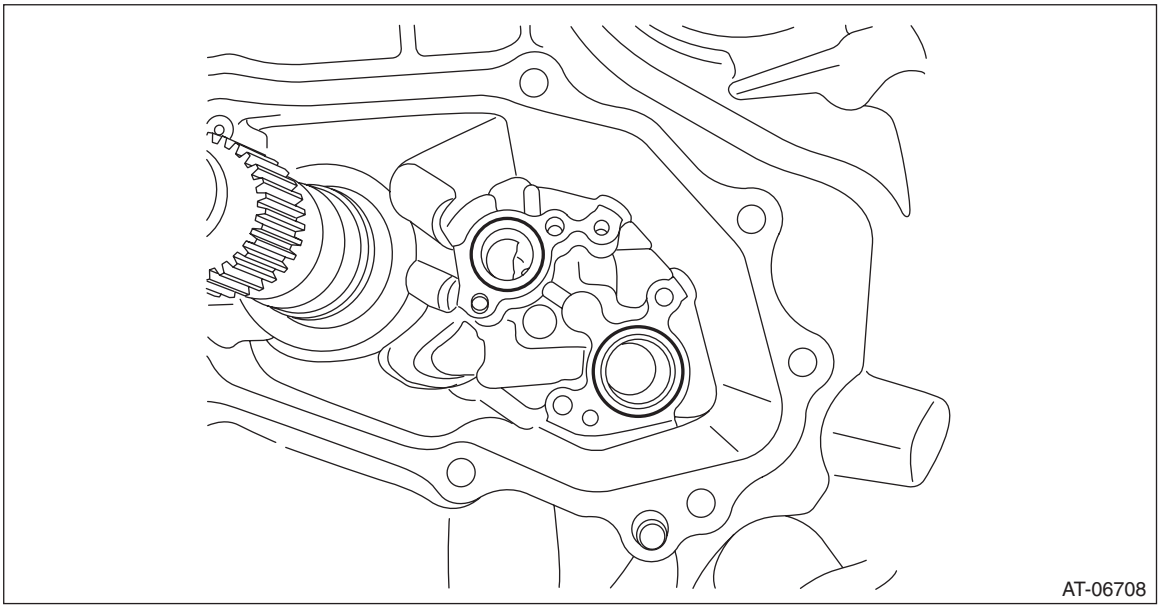
44.Oil Pump

A: REMOVAL

1) Remove the transmission assembly from the vehicle. <Ref. to CVT-57, REMOVAL, Automatic Transmission Assembly.>
2) Remove the torque converter assembly. <Ref. to CVT-159, REMOVAL, Torque Converter Assembly.>
3) Remove the oil pump chain cover. <Ref. to CVT-319, REMOVAL, Oil Pump Chain.>
4) Remove the oil pump and the plate.



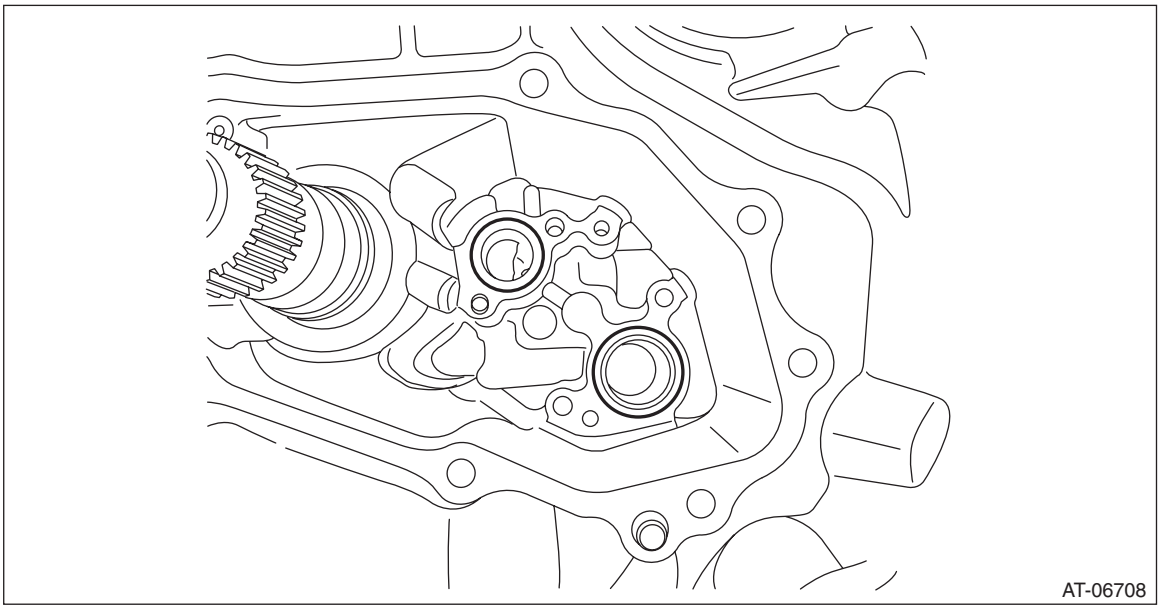
5) Remove the O-ring.



B: INSTALLATION

1) Install the O-ring.

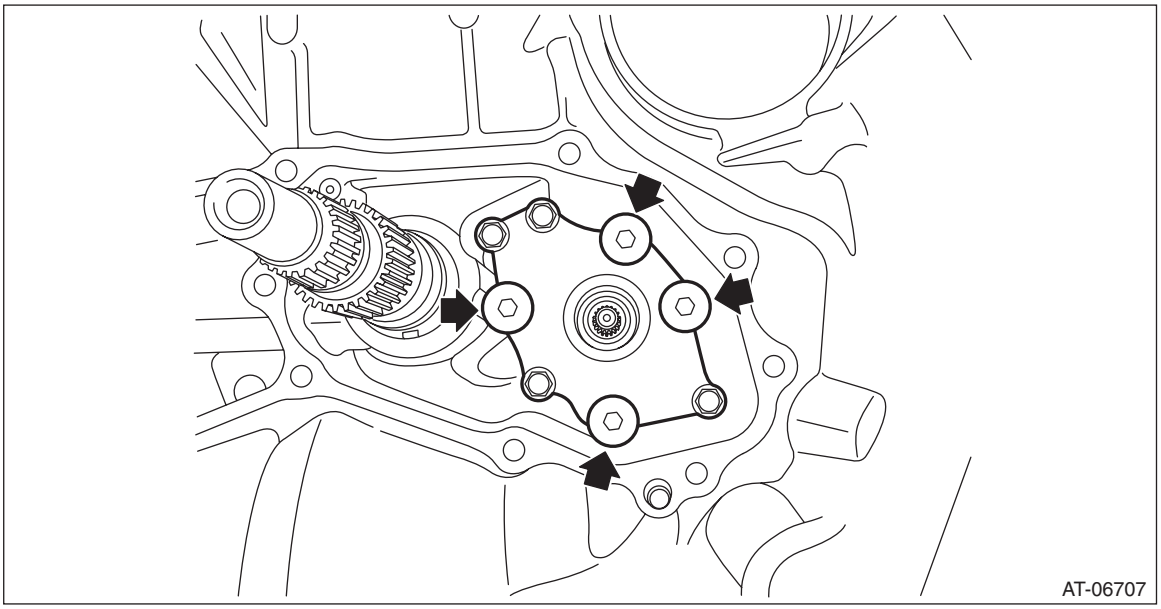
NOTE:
- Use new O-rings.
- Apply CVTF to the O-ring.



2) Install the plate and the oil pump.

NOTE:
Apply CVTF to the bolt.

Tightening torque:
8.5 N·m (0.9 kgf-m, 6.3 ft-lb)



3) Install the oil pump chain cover. <Ref. to CVT-322, INSTALLATION, Oil Pump Chain.>
4) Install the torque converter assembly. <Ref. to CVT-160, INSTALLATION, Torque Converter Assembly.>
5) Install the transmission assembly to the vehicle. <Ref. to CVT-72, INSTALLATION, Automatic Transmission Assembly.>

C: INSPECTION

Check the following items.
- Check the oil pump for damage and wear.
- Rotate the oil pump by hand, and check that it rotates smoothly.

1) Measure the secondary pressure. <Ref. to CVT-48, INSPECTION, Secondary Pressure (Line Pressure) Test.>
2) Remove the oil pan and oil strainer. <Ref. to CVT-116, REMOVAL, Control Valve Body.>
3) Check oil strainer for clogging.
When oil strainer has no clogging, replace the oil pump.

45.Converter Case

A: REMOVAL

1) Remove the transmission assembly from the vehicle. <Ref. to CVT-57, REMOVAL, Automatic Transmission Assembly.>
2) Remove the air breather hose. <Ref. to CVT-154, REMOVAL, Air Breather Hose.>
3) Remove the control valve body. <Ref. to CVT-116, REMOVAL, Control Valve Body.>
4) Remove the transmission harness. <Ref. to CVT-129, REMOVAL, Transmission Harness.>
5) Remove the turbine speed sensor. <Ref. to CVT-103, REMOVAL, Turbine Speed Sensor.>
6) Remove the secondary speed sensor. <Ref. to CVT-105, REMOVAL, Secondary Speed Sensor.>
7) Remove the primary speed sensor. <Ref. to CVT-107, REMOVAL, Primary Speed Sensor.>
8) Remove the inhibitor switch. <Ref. to CVT-99, REMOVAL, Inhibitor Switch.>
9) Remove the extension case. <Ref. to CVT-163, REMOVAL, Extension Case.>
10) Remove the transfer clutch assembly. <Ref. to CVT-167, REMOVAL, Transfer Clutch.>
11) Remove the transfer driven gear assembly. <Ref. to CVT-181, REMOVAL, Transfer Driven Gear.>
12) Remove the parking pawl. <Ref. to CVT-184, REMOVAL, Parking Pawl.>
13) Remove the reduction driven gear assembly. <Ref. to CVT-186, REMOVAL, Reduction Driven Gear.>
14) Remove the oil pan and oil strainer. <Ref. to CVT-112, REMOVAL, Oil Pan and Strainer.>
15) Remove the transmission control device. <Ref. to CVT-194, REMOVAL, Transmission Control Device.>
16) Remove the transmission case. <Ref. to CVT-200, REMOVAL, Transmission Case.>
17) Remove the reduction drive gear. <Ref. to CVT-212, REMOVAL, Reduction Drive Gear.>
18) Remove the primary pulley, secondary pulley and variator chain. <Ref. to CVT-217, REMOVAL, Primary Pulley and Secondary Pulley.>
19) Remove the reverse brake assembly. <Ref. to CVT-238, REMOVAL, Reverse Brake Assembly.>
20) Remove the forward clutch assembly. <Ref. to CVT-253, REMOVAL, Forward Clutch Assembly.>
21) Remove the drive pinion shaft assembly. <Ref. to CVT-272, REMOVAL, Drive Pinion Shaft Assembly.>
22) Remove the front differential assembly. <Ref. to CVT-301, REMOVAL, Front Differential Assembly.>
23) Remove the oil pump chain cover. <Ref. to CVT-319, REMOVAL, Oil Pump Chain.>
24) Remove the oil pump. <Ref. to CVT-328, REMOVAL, Oil Pump.>

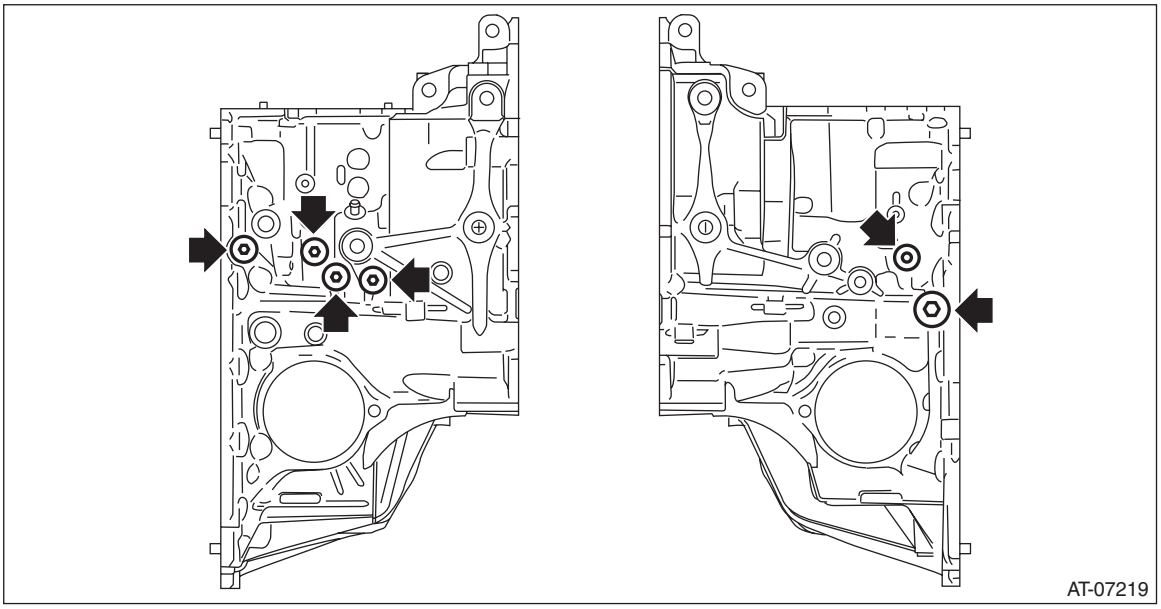
B: INSTALLATION

1) Install the oil pump. <Ref. to CVT-329, INSTALLATION, Oil Pump.>
2) Install the oil pump chain cover. <Ref. to CVT-322, INSTALLATION, Oil Pump Chain.>
3) Install the front differential assembly. <Ref. to CVT-303, INSTALLATION, Front Differential Assembly.>
4) Install the drive pinion shaft assembly. <Ref. to CVT-273, INSTALLATION, Drive Pinion Shaft Assembly.>
5) Install the forward clutch assembly. <Ref. to CVT-256, INSTALLATION, Forward Clutch Assembly.>
6) Install the reverse brake assembly. <Ref. to CVT-241, INSTALLATION, Reverse Brake Assembly.>
7) Install the primary pulley, secondary pulley and variator chain. <Ref. to CVT-224, INSTALLATION, Primary Pulley and Secondary Pulley.>
8) Install the reduction drive gear. <Ref. to CVT-213, INSTALLATION, Reduction Drive Gear.>
9) Install the transmission case. <Ref. to CVT-202, INSTALLATION, Transmission Case.>
10) Install the transmission control device. <Ref. to CVT-197, INSTALLATION, Transmission Control Device.>
11) Install the oil strainer and oil pan. <Ref. to CVT-113, INSTALLATION, Oil Pan and Strainer.>
12) Install the reduction driven gear assembly. <Ref. to CVT-186, INSTALLATION, Reduction Driven Gear.>
13) Install the transfer driven gear assembly. <Ref. to CVT-182, INSTALLATION, Transfer Driven Gear.>
14) Install the transfer clutch assembly. <Ref. to CVT-169, INSTALLATION, Transfer Clutch.>
15) Install the parking pawl. <Ref. to CVT-185, INSTALLATION, Parking Pawl.>
16) Install the extension case. <Ref. to CVT-164, INSTALLATION, Extension Case.>
17) Install the inhibitor switch. <Ref. to CVT-101, INSTALLATION, Inhibitor Switch.>
18) Install the secondary speed sensor. <Ref. to CVT-105, INSTALLATION, Secondary Speed Sensor.>
19) Install the primary speed sensor. <Ref. to CVT-108, INSTALLATION, Primary Speed Sensor.>
20) Install the turbine speed sensor. <Ref. to CVT-103, INSTALLATION, Turbine Speed Sensor.>
21) Install the transmission harness. <Ref. to CVT-136, INSTALLATION, Transmission Harness.>
22) Install the control valve body. <Ref. to CVT-122, INSTALLATION, Control Valve Body.>

23) Install the air breather hose. <Ref. to CVT-156, INSTALLATION, Air Breather Hose.>
24) Install the transmission assembly to the vehicle. <Ref. to CVT-72, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

1) Remove the transmission hanger and transmission radio ground cord, if mounted.
2) Remove the filler plug, oil drain plug and overflow drain plug. <Ref. to CVT-42, REPLACEMENT, Differential Gear Oil.>
3) Remove all plugs.



D: ASSEMBLY

1) Install the oil drain plug.

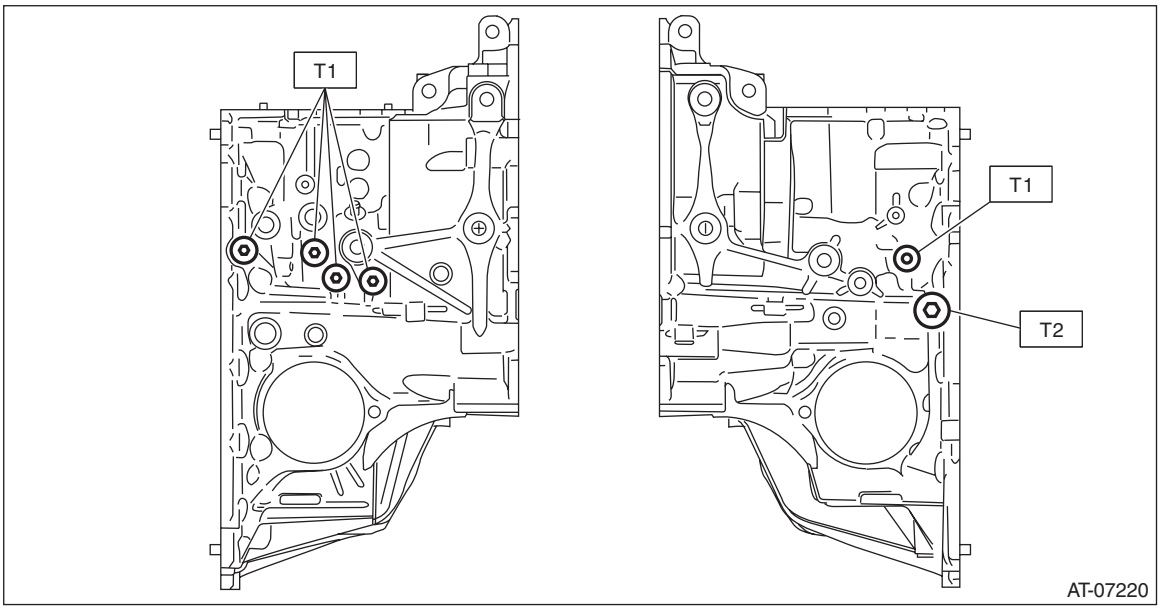
Tightening torque:
70 N·m (7.1 kgf-m, 51.6 ft-lb)
2) Install the overflow drain plug.

NOTE:
Overflow plug of differential gear oil is temporarily attached.

3) Install all plugs.

NOTE:
Use new O-rings.

Tightening torque:
T1: 25 N·m (2.5 kgf-m, 18.4 ft-lb)
T2: 25.5 N·m (2.6 kgf-m, 18.8 ft-lb)



4) Install the transmission hanger and transmission radio ground cord.

Tightening torque:
41 N·m (4.2 kgf-m, 30.2 ft-lb)

E: INSPECTION

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

46.Diagnostics with Phenomenon

A: INSPECTION

Symptoms	Faulty parts
Stall speed is low after warming-up, with select lever in “D” or “R” range.	Engine control system
Vehicle does not move despite engine speed rising up, with select lever in “D” or “R” range.	• 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 ASSY • 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 ASSY
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
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 ASSY
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

CONTINUOUSLY VARIABLE TRANSMISSION (DIAGNOSTICS)

CVT(diag)

		Page
1.	Basic Diagnostic Procedure	2
2.	Check List for Interview	4
3.	General Description	5
4.	Electrical Component Location	7
5.	Transmission Control Module (TCM) I/O Signal	11
6.	Subaru Select Monitor	15
7.	Read Diagnostic Trouble Code (DTC)	17
8.	Clear Memory Mode	18
9.	Inspection Mode	19
10.	Learning Control	20
11.	AT OIL TEMP Warning Light Display	22
12.	AWD Warning Light Display	24
13.	Diagnostic Procedure for Subaru Select Monitor Communication	26
14.	List of Diagnostic Trouble Code (DTC)	28
15.	Diagnostic Procedure with Diagnostic Trouble Code (DTC)	31
16.	Diagnostic Procedure without Diagnostic Trouble Code (DTC)	86
17.	Diagnostics with Phenomenon	87

1. Basic Diagnostic Procedure

A: PROCEDURE

	Step	Check	Yes	No
1	**CHECK PRE-INSPECTION.** 1) Ask the customer when and how the trouble occurred using the interview check list. <Ref. to CVT(diag)-4, Check List for Interview.> 2) Before performing diagnostics, check the following items which might affect CVT problems. • General inspection <Ref. to CVT(diag)-5, INSPECTION, General Description.> • Disconnection of harness connector • Visual check for harness damage • Oil leakage • Stall speed test <Ref. to CVT-46, Stall Test.> • Secondary pressure test <Ref. to CVT-48, Secondary Pressure (Line Pressure) Test.> • Transfer clutch pressure test <Ref. to CVT-51, Transfer Clutch Pressure Test.> • Time lag test <Ref. to CVT-47, Time Lag Test.> • Road test <Ref. to CVT-45, Road Test.> • Inhibitor switch <Ref. to CVT-96, Inhibitor Switch.>	Is the item that is thought to influence the CVT problem working properly?	Go to step **2**.	Repair the items which may be affecting the CVT trouble.
2	**CHECK AT OIL TEMP LIGHT.** Turn the ignition switch to ON and wait for at least 2 seconds.	Does the AT OIL TEMP light illuminate?	Go to step **3**.	Check the AT OIL TEMP light.
3	**CHECK AT OIL TEMP LIGHT.** Start the engine and wait for 2 seconds or more.	Does the AT OIL TEMP light blink?	Go to step **4**.	Go to step **6**.
4	**CHECK FOR ANY OTHER DTC ON DISPLAY.** Read the DTC. NOTE: If the communication function of Subaru Select Monitor cannot be executed normally, check the communication circuit. <Ref. to CVT(diag)-26, COMMUNICATION FOR INITIALIZING IMPOSSIBLE, Diagnostic Procedure for Subaru Select Monitor Communication.>	Is DTC displayed on Subaru Select Monitor?	Record all DTC. Go to step **5**.	Go to step **6**.
5	**CHECK FREEZE FRAME DATA.** Using the Subaru Select Monitor, check the Freeze Frame Data.	Are freeze frame data recorded?	Record the freeze frame data. Go to step **7**.	Go to step **7**.
6	**PERFORM GENERAL DIAGNOSTICS.** 1) Inspect using “Diagnostic Procedure without Diagnostic Trouble Code (DTC)”. <Ref. to CVT(diag)-86, Diagnostic Procedure without Diagnostic Trouble Code (DTC).> 2) Inspect using “Diagnostics with Phenomenon”. <Ref. to CVT(diag)-87, Diagnostics with Phenomenon.> 3) Perform the Inspection Mode. <Ref. to CVT(diag)-19, Inspection Mode.> 4) Read the DTC.	Is DTC displayed on Subaru Select Monitor?	Go to step **7**.	Finish the diagnosis.

	Step	Check	Yes	No
7	**PERFORM DIAGNOSIS.** 1) Inspect by referring to “Diagnostic Procedure with Diagnostic Trouble Code (DTC)”. <Ref. to CVT(diag)-31, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> NOTE: For the DTC table, refer to “List of Diagnostic Trouble Code (DTC)”. <Ref. to CVT(diag)-28, List of Diagnostic Trouble Code (DTC).> 2) Repair the trouble cause. 3) Perform the Clear Memory Mode. 4) Perform the Inspection Mode. <Ref. to CVT(diag)-19, Inspection Mode.> 5) Read the DTC.	Is DTC displayed on Subaru Select Monitor?	Inspect by referring to “Diagnostic Procedure with Diagnostic Trouble Code (DTC)”. <Ref. to CVT(diag)-31, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

2. Check List for Interview

A: CHECK

Check the following items when a problem has occurred.

NOTE:
Use copies of this page for interviewing customers.

Customer's name			
Date of purchase			
Date of repair			
Transmission model	Transmission	V.I.N.	
Odometer reading	km (miles)		
Frequency	❑ Continuous ❑ Intermittent (times/day)		
Weather	❑ Fine ❑ Cloudy ❑ Rainy ❑ Snowy ❑ Other ( )		
Place	❑ Highland ❑ Suburbs ❑ Inner city ❑ Uphill ❑ Downhill ❑ Rough road ❑ Other ( )		
Ambient air temperature	❑ Hot ❑ Warm ❑ Cool ❑ Cold		
Vehicle speed	km/h (MPH)		
AT OIL TEMP light	❑ Blinks continuously	❑ Does not blink	
Select lever position	❑ P ❑ R ❑ N ❑ D ❑ Manual mode		
Driving condition	❑ Not affected ❑ At racing ❑ While decelerating	❑ At starting ❑ While accelerating ❑ While turning (❑ RH/❑ LH)	❑ While idling ❑ When cruising (Vehicle speed km/h) ❑ Immediately after starting the engine
Manual mode	❑ ON ❑ OFF		
Symptoms	❑ Vehicle does not move (❑ Any position ❑ Particular position)		
	❑ Vehicle does not move (no load racing condition as in N range)		
	❑ Vehicle does not move (engine speed does not increase, felt as stall condition)		
	❑ Noise or vibration (Describe concretely:)		
	❑ Shock felt at N → D selection (seconds after shifting, when engine cold or after warm-up)		
	❑ Shock felt at N → R selection (seconds after shifting, when engine cold or after warm-up)		
	❑ Shifting is wrong (Describe concretely:)		
	❑ Shock or judder during driving		
	❑ Fails to accelerate.		
	❑ Engine speed increases abruptly during driving		
	❑ Shock or judder during standing start		
	❑ Select lever does not move		
	❑ Other ( )		

3. General Description

A: CAUTION

1. SUPPLEMENTAL RESTRAINT SYSTEM "AIRBAG"

The airbag system wiring harness is routed near the TCM.

CAUTION:
• All the airbag system wiring harnesses and connectors are colored yellow. Do not use an electric test equipment to check these circuits.
• Be careful not to damage the airbag system wiring harness when performing diagnostics or servicing the TCM.

2. MEASUREMENT

When measuring the voltage and resistance of the ECM, TCM or each sensor, use a tapered pin with a diameter of less than 0.64 mm (0.025 in) in order to avoid poor contact. Do not insert a pin of more than 0.65 mm (0.026 in) diameter.

B: INSPECTION

1. BATTERY

Measure the battery voltage and specific gravity of the electrolyte.

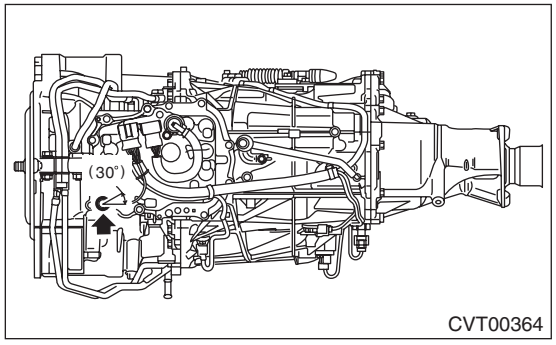
Standard voltage: 12 V or more

Specific gravity: 1.260 or more

2. TRANSMISSION GROUND

Make sure that the ground terminal bolt is tightened securely.

Tightening torque:
14 N·m (1.4 kgf-m, 10.3 ft-lb)



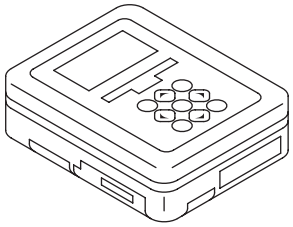
3. OPERATION OF SHIFT SELECT LEVER

Make sure there is no noise, dragging or contact pattern in each select lever range.

WARNING:
Stop the engine while checking operation of the select lever.

C: PREPARATION TOOL

1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST1B022XU0	1B022XU0	SUBARU SELECT MONITOR III KIT	Used for troubleshooting the electrical system.

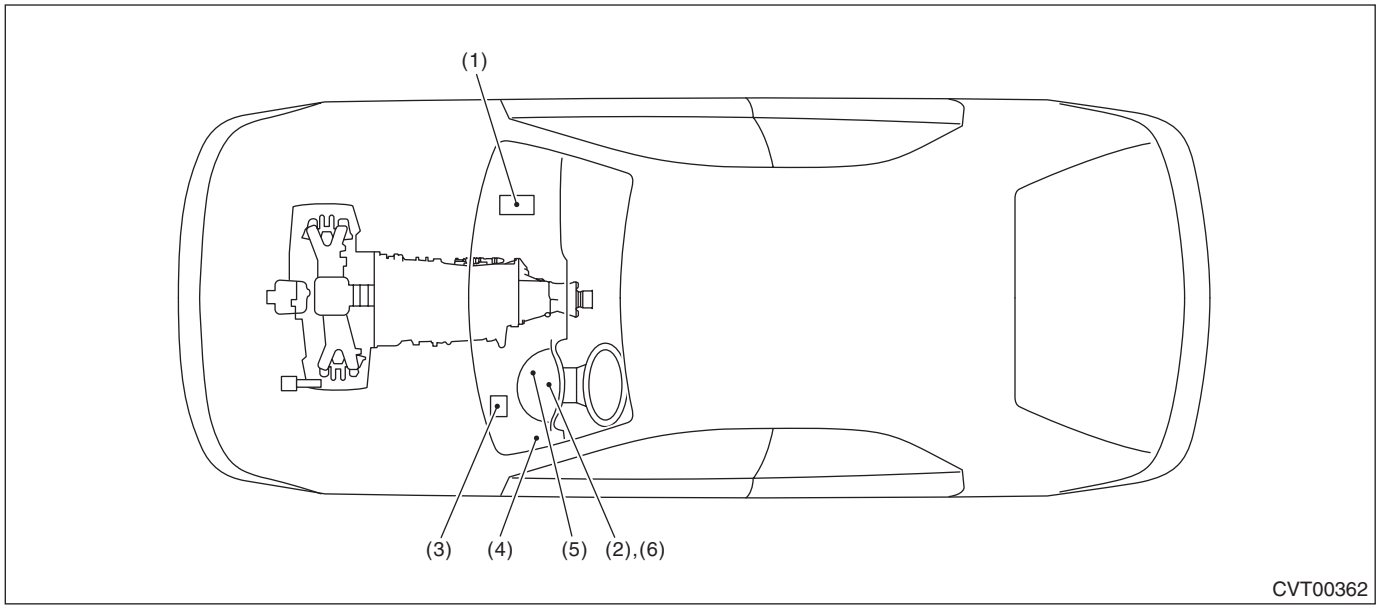
2. GENERAL TOOL

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance, voltage and current.
Oscilloscope	Used for measuring the sensor.

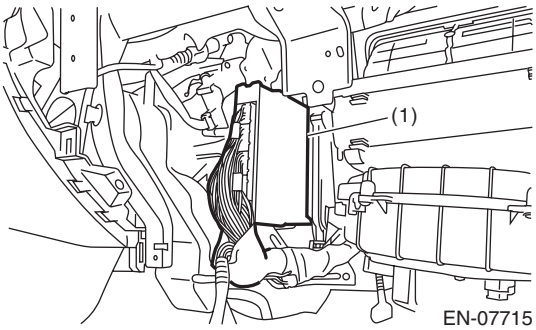
4. Electrical Component Location

A: LOCATION

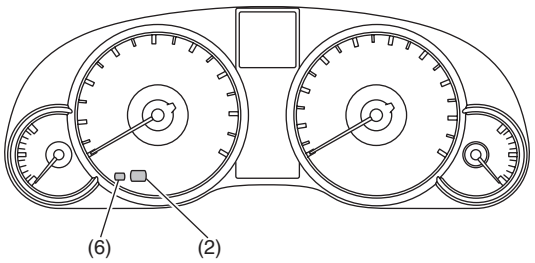
1. CONTROL MODULE



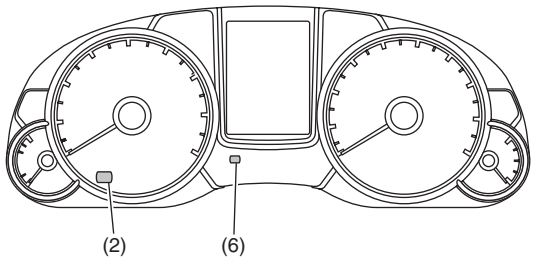
(1)	Engine control module (ECM)	(3)	Transmission control module (TCM)	(5)	Body integrated unit
(2)	AT OIL TEMP light	(4)	Data link connector	(6)	AWD light

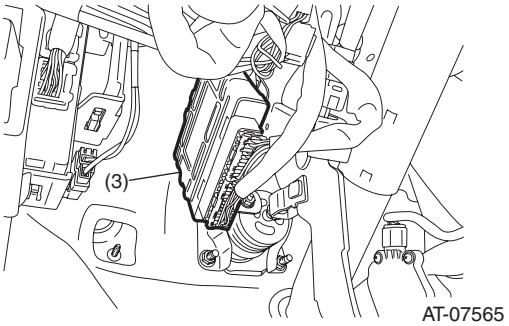


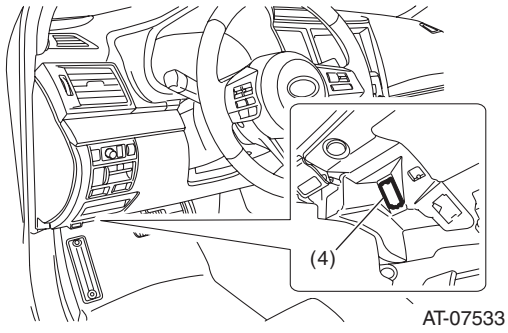
• Normal meter

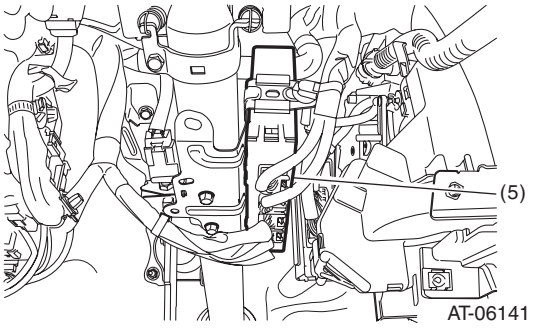


• Luminescent meter

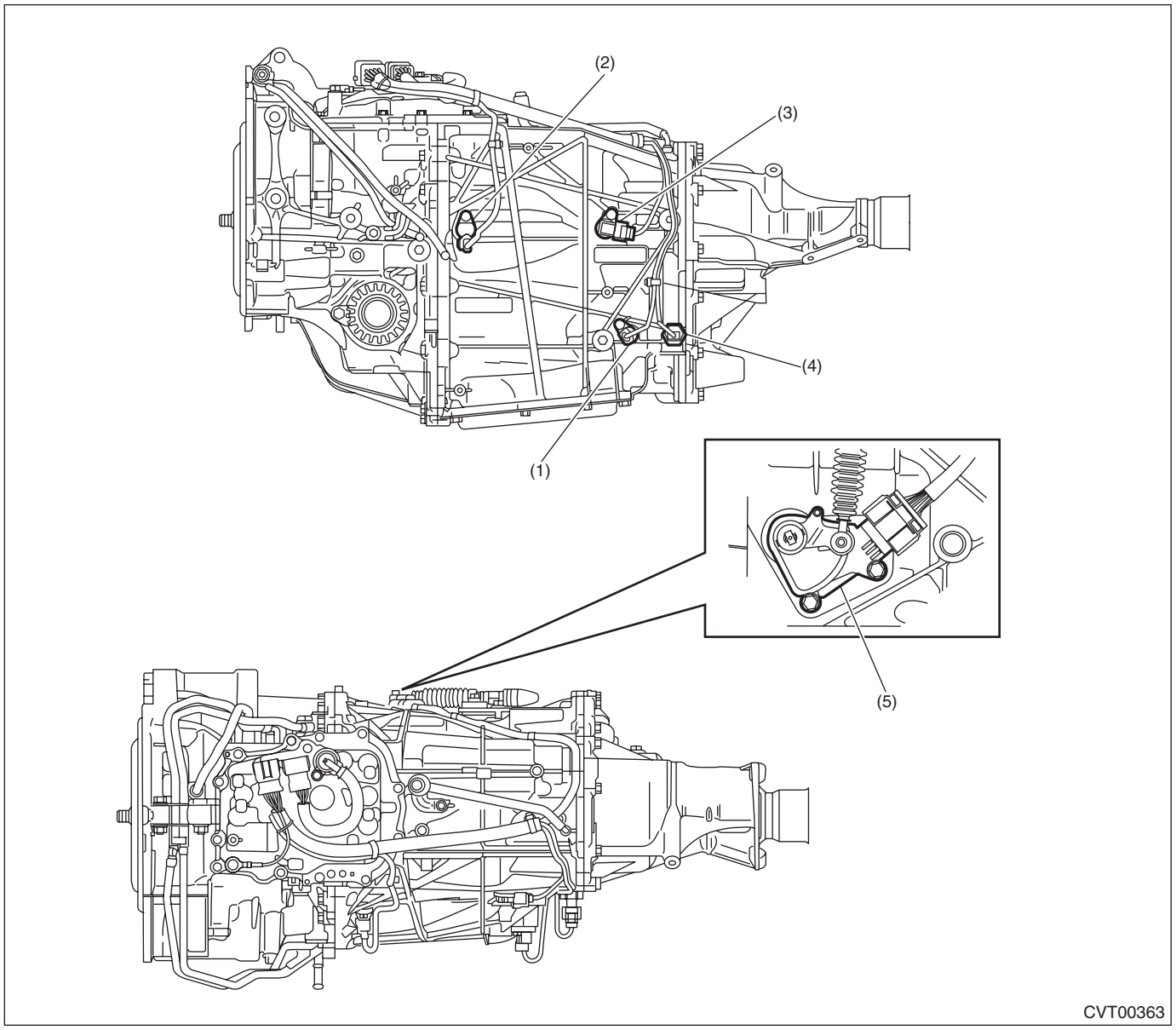






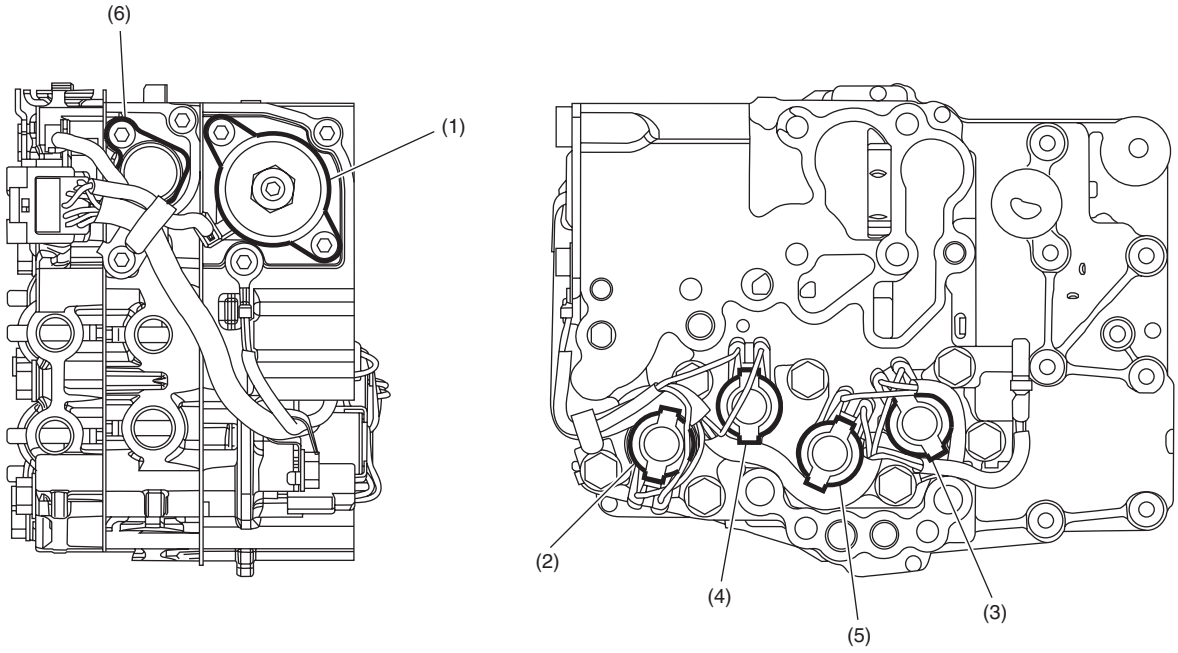


2. SENSOR



(1) Secondary speed sensor
(2) Turbine speed sensor
(3) Primary speed sensor
(4) Secondary pressure sensor
(5) Inhibitor switch

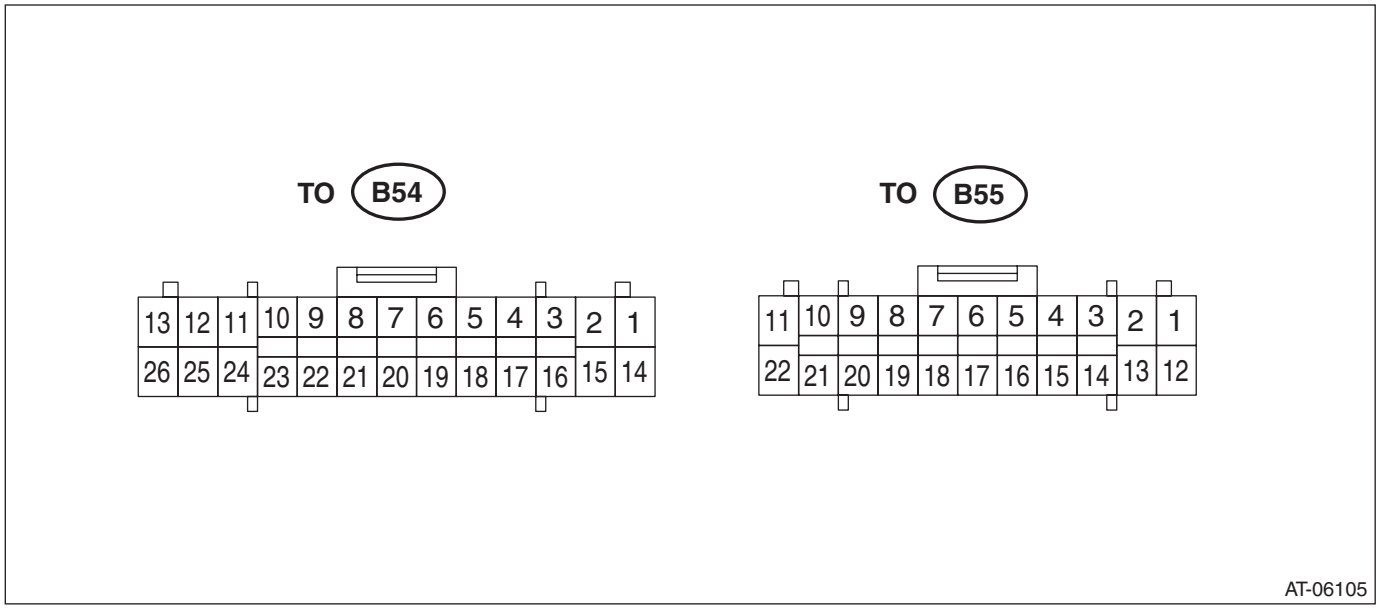
3. SOLENOID



(1) Secondary solenoid
(2) AWD solenoid
(3) Lock-up duty solenoid
(4) Primary DOWN solenoid
(5) Primary UP solenoid
(6) F&R solenoid

5. Transmission Control Module (TCM) I/O Signal

A: ELECTRICAL SPECIFICATION



NOTE:
Measure after warming up.

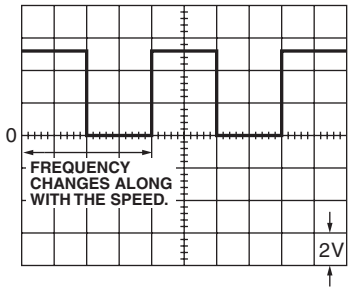
Item	Connector No.	Terminal No.	Measuring condition	Measurement value	Resistance between terminal and chassis ground	Remarks
Backup power supply	B55	1	—	10 — 13 V	—	
Ignition power supply	B55	21	—	10 — 13 V	—	
Main power supply	B55	11	—	10 — 13 V	—	
Main power supply	B55	2	—	10 — 13 V	—	
Main power supply	B55	22	—	10 — 13 V	—	
Manual mode switch	B55	4	Manual mode switch ON	Less than 1 V	—	
			Manual mode switch OFF	8 V or more	—	
Manual mode UP switch	B55	5	Manual mode UP switch ON	Less than 1 V	—	
			Manual mode UP switch OFF	8 V or more	—	
Manual mode DOWN switch	B55	16	Manual mode DOWN switch ON	Less than 1 V	—	
			Manual mode DOWN switch OFF	8 V or more	—	
Stop light switch	B55	13	Stop light switch ON	8 V or more	—	
			Stop light switch OFF	Less than 1 V	—	
P range switch	B54	5	P range	Less than 1 V	—	
			Except for P range	8 V or more	—	
R range switch	B54	18	R range	Less than 1 V	—	
			Except for R range	8 V or more	—	
N range switch	B54	9	N range	Less than 1 V	—	
			Except for N range	8 V or more	—	

Item	Connector No.	Terminal No.	Measuring condition	Measurement value	Resistance between terminal and chassis ground	Remarks
D range switch	B54	22	D range	Less than 1 V	—	
			Except for D range	8 V or more	—	
ATF temperature sensor	B54	3	ATF temperature at 20°C (68°F)	Approx. 2.5 V	Approx. 2.5 kΩ	
			ATF temperature at 80°C (176°F)	Approx. 0.7 V	Approx. 330 Ω	
ATF temperature sensor GND	B54	16	Always	Approx. 0 V	—	
Secondary pressure sensor power supply output	B54	2	Ignition switch ON	5 V	—	
Secondary pressure sensor	B54	17	Ignition switch ON, engine OFF	Approx. 0.5 V (0 MPa)	—	Value increases with increase of engine load. (0.5 — 4.5 V)
			Ignition switch ON, engine ON	Approx. 1.0 V (1.0 MPa)	—	
Secondary pressure sensor GND	B54	15	Always	Approx. 0 V	—	
Primary speed sensor	B54	6	While driving	0 or 5 V	—	Refer to the waveform (sensor)
Secondary speed sensor	B54	7	While driving	0 or 5 V	—	Refer to the waveform (sensor)
Turbine speed sensor	B54	20	Engine ON, “P” or “N” range	0 or 5 V	—	Refer to the waveform (sensor)
Self shut output	B55	20	For three seconds after ignition switch ON and OFF	Less than 1 V	—	
			Ignition switch OFF	8 V or more		
F&R solenoid	B54	11	Engine ON	Refer to the waveform (solenoid (1))	Approx. 4 — 6 Ω	Resistance value at 20°C (68°F). Value is higher as the temperature increase.
Secondary solenoid	B54	12	Engine ON	Refer to the waveform (solenoid (2))	Approx. 5 — 7 Ω	Resistance value at 20°C (68°F). Value is higher as the temperature increase.
Primary UP solenoid	B54	24	Engine ON, while UP shifting	Refer to the waveform (solenoid (3))	Approx. 10 — 13.5 Ω	Resistance value at 20°C (68°F). Value is higher as the temperature increase.
Primary DOWN solenoid	B54	25	Engine ON, while DOWN shifting	Refer to the waveform (solenoid (4))	Approx. 10 — 13.5 Ω	Resistance value at 20°C (68°F). Value is higher as the temperature increase.
Lock-up duty solenoid	B54	26	Lock-up ON	Refer to the waveform (solenoid (5))	Approx. 10 — 13.5 Ω	Resistance value at 20°C (68°F). Value is higher as the temperature increase.
AWD solenoid	B54	13	Engine ON, “P” or “N” range	Refer to the waveform (solenoid (6))	Approx. 2 — 4.5 Ω	Resistance value at 20°C (68°F). Value is higher as the temperature increase.
			Engine ON, “D” range, brake ON	Refer to the waveform (solenoid (7))		

Item	Connector No.	Terminal No.	Measuring condition	Measurement value	Resistance between terminal and chassis ground	Remarks
CAN communication line (+)	B55	18	—	—	—	
CAN communication line (–)	B55	17	—	—	—	
GND	B54	1	Always	Approx. 0 V	—	
GND	B54	14	Always	Approx. 0 V	—	

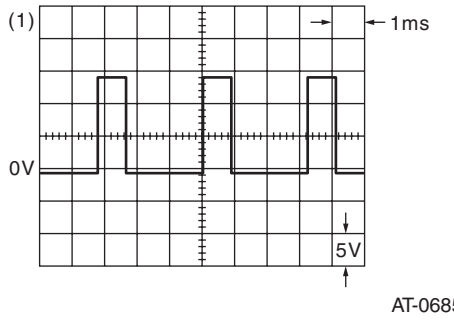
B: WAVEFORM

1. SENSOR

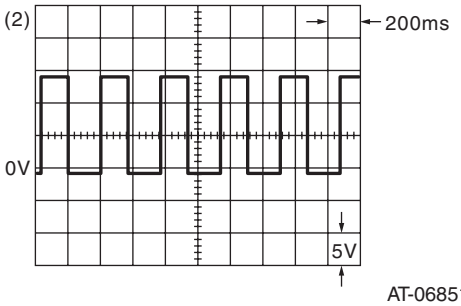


AT-04690

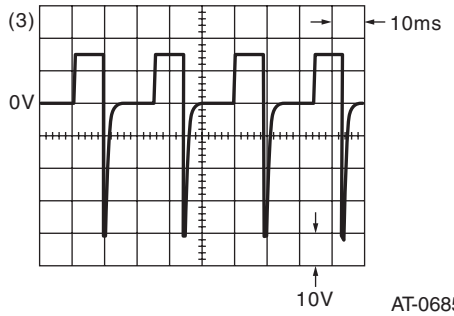
2. SOLENOID



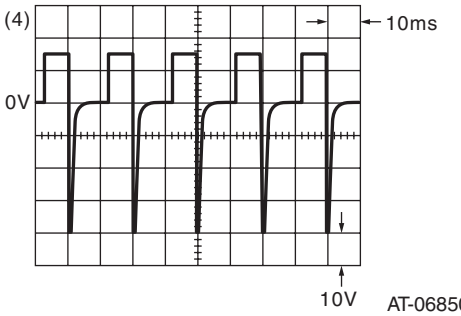
AT-06855



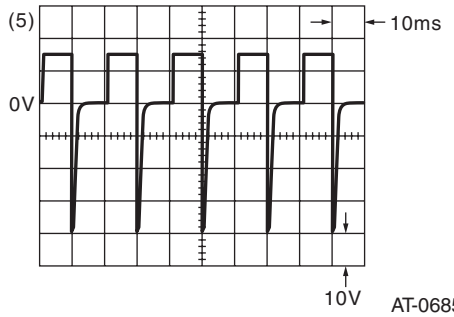
AT-06851



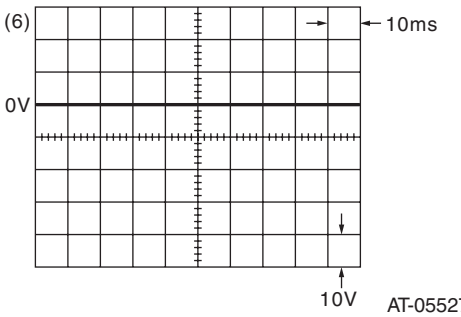
AT-06852



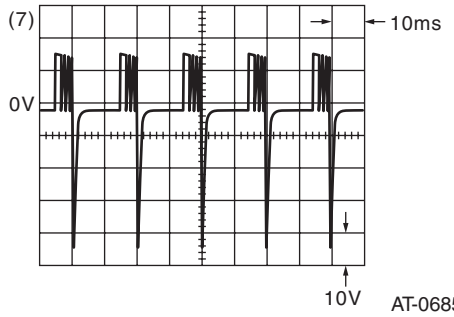
AT-06850



AT-06853



AT-05527



AT-06854

6. Subaru Select Monitor

A: OPERATION

1. HOW TO USE SUBARU SELECT MONITOR

For detailed operation procedures, refer to “PC application help for Subaru Select Monitor”.

2. READ CURRENT DATA

For detailed operation procedures, refer to “PC application help for Subaru Select Monitor”.

Item	Display	Unit of measure
Engine speed signal	Engine Speed	rpm
Battery voltage	ECU ACC	V
Accelerator position sensor	Accel. Opening Angle	%
Vehicle speed converted from secondary speed sensor signal	Front Wheel Speed	km/h or MPH
Lock-up duty solenoid set duty ratio	Lock Up Duty Ratio	%
AWD solenoid set duty ratio	Transfer Duty Ratio	%
Turbine speed sensor signal	Turbine Revolution Speed	rpm
ATF temperature sensor signal	ATF Temp.	°C or °F
Secondary speed sensor signal	Secondary Rev Speed	rpm
Secondary fluid pressure sensor signal	Actual Secondary Pressure	MPa
Secondary solenoid indicator current	Secondary Set Current	mA
Secondary solenoid actual current	Secondary Actual Current	mA
Gear ratio	Actual Gear Ratio	—
Shift step in manual mode	Shift Step in Manual Mode	—
Primary UP solenoid set duty ratio	Primary UP Duty	%
Primary DOWN solenoid set duty ratio	Primary DOWN Duty	%
F&R solenoid indicator current	F&R Linear Solenoid Set Current	mA
F&R solenoid actual current	F&R Linear Solenoid Actual Current	mA
Primary speed sensor signal	Primary Rev Speed	rpm
Manual mode switch signal	Tiptronic Mode Switch	ON or OFF
Manual mode down switch signal	Down Switch	ON or OFF
Stop light switch signal	Stop Light Switch	ON or OFF
Manual mode up switch signal	Up Switch	ON or OFF
Drive range signal	D Range Signal	ON or OFF
Reverse range signal	R Range Signal	ON or OFF
AT OIL TEMP light 2 Hz blink condition	Diagnosis Lamp	ON or OFF
AT OIL TEMP light ON condition	ATF Temperature Lamp	ON or OFF
Parking range signal	P Range	ON or OFF
Neutral range signal	N Range	ON or OFF
Secondary fluid pressure A/D converted value	secondary pressure sensor voltage.	V
ATF temperature sensor voltage	ATF Temp sensor voltage.	V
AT learning mode condition	AT learning	Completed or Not Completed

3. READ FREEZE FRAME DATA

For detailed operation procedures, refer to “PC application help for Subaru Select Monitor”.

Item	Display	Unit of measure
Relative time since detection	Relative time since detection	ms
Engine speed signal	Engine Speed	rpm
Battery voltage	ECU ACC	V
Accelerator position sensor	Accel. Opening Angle	%
Vehicle speed converted from secondary speed sensor signal	Front Wheel Speed	km/h or MPH
Lock-up duty solenoid set duty ratio	Lock Up Duty Ratio	%
AWD solenoid set duty ratio	Transfer Duty Ratio	%
Turbine speed sensor signal	Turbine Revolution Speed	rpm
ATF temperature sensor signal	ATF Temp.	°C or °F
Secondary speed sensor signal	Secondary Rev Speed	rpm
Secondary fluid pressure sensor signal	Actual Secondary Pressure	MPa
Secondary solenoid indicator current	Secondary Set Current	mA
Secondary solenoid actual current	Secondary Actual Current	mA
Gear ratio	Actual Gear Ratio	—
Shift step in manual mode	Shift Step in Manual Mode	—
Primary UP solenoid set duty ratio	Primary UP Duty	%
Primary DOWN solenoid set duty ratio	Primary DOWN Duty	%
F&R solenoid indicator current	F&R Linear Solenoid Set Current	mA
F&R solenoid actual current	F&R Linear Solenoid Actual Current	mA
Primary speed sensor signal	Primary Rev Speed	rpm
Manual mode switch signal	Tiptronic Mode Switch	ON or OFF
Manual mode down switch signal	Down Switch	ON or OFF
Stop light switch signal	Stop Light Switch	ON or OFF
Manual mode up switch signal	Up Switch	ON or OFF
Drive range signal	D Range Signal	ON or OFF
Reverse range signal	R Range Signal	ON or OFF
AT OIL TEMP light 2 Hz blink condition	Diagnosis Lamp	ON or OFF
AT OIL TEMP light ON condition	ATF Temperature Lamp	ON or OFF
Parking range signal	P Range	ON or OFF
Neutral range signal	N Range	ON or OFF
Secondary fluid pressure A/D converted value	secondary pressure sensor voltage.	V
ATF temperature sensor voltage	ATF Temp sensor voltage.	V

7. Read Diagnostic Trouble Code (DTC)

A: OPERATION

• For detailed operation procedures, refer to “PC application help for Subaru Select Monitor”.
• For details concerning DTC, refer to List of Diagnostic Trouble Code (DTC). <Ref. to CVT(diag)-28, List of Diagnostic Trouble Code (DTC).>

8. Clear Memory Mode

A: OPERATION

For detailed operation procedures, refer to “PC application help for Subaru Select Monitor”.

CAUTION:
• If the AT learning value is cleared, learned control memory is cleared.
• If the AT learning value is cleared, perform learning. <Ref. to CVT(diag)-20, Learning Control.>

9. Inspection Mode

A: PROCEDURE

<Ref. to CVT-45, Road Test.>

10.Learning Control

A: GENERAL DESCRIPTION

- Follow the messages displayed on the Subaru Select Monitor when working.
- When the following work is performed, perform learning work for the transmission.

Replacement of TCM/Replacement or disassembly of transmission assembly/Replacement of control valve body/Clearing AT leaning value is executed.

B: PROCEDURE

1. PREPARATION FOR LEARNING

1) Warm up or cool down until the ATF temperature displayed on the Subaru Select Monitor is 40 — 65°C (104 — 149°F).
2) After stopping the vehicle, shift the select lever to “P” range.
3) Apply the electronic parking brake.
4) Lift up the vehicle.

CAUTION:
While working, be sure to keep the lower edge of the tires 30 cm or more above the ground as vehicle will vibrate.
5) Connect the Subaru Select Monitor to data link connector.
6) Turn the ignition switch to ON.
7) Turn off all switches causing an electrical load, such as headlights, A/C, seat heater and rear defogger, etc.

2. SIMPLE LEARNING

NOTE:
Simple learning is performed with the vehicle lifted, without actually running the vehicle.

CAUTION:
Do not turn the power of the Subaru Select Monitor OFF during work, and do not disconnect the data link connector.
1) Select {Work Support} in the «Transmission Diagnosis» display screen of the Subaru Select Monitor.
2) Select {Compulsory learning mode} in the «Work Support» display screen of the Subaru Select Monitor.
3) Follow the messages displayed on the Subaru Select Monitor screen when working.

NOTE:
During AT learning in progress, AT OIL TEMP light in the combination meter starts flashing at 2 Hz and the learning operation starts. The following message is displayed on the screen when the AT OIL TEMP light which was flashing at 2 Hz turns off.

4) When «AT learning normally ended.» is displayed, simple AT learning is completed.

NOTE:
- If communication error occurs during learning, retry the “AT learning mode” from the beginning.
- If the message «Execute AT learning again after fixing troubles of the vehicle» appears during learning, select [OK] and display the DTC list. After repairing the locations indicated by the DTC, start the “AT learning mode” over from the beginning.
- When communication error occurs during learning, select lever does not shift occasionally. If select lever does not shift, turn the ignition switch to OFF before operating the select lever.
- If the message «AT learning ended abnormally.» is displayed, start the “AT learning mode” over from the beginning.

Display	Main causes for abnormal termination
AT learning ended abnormally.	• Fault is detected during AT learning. • The accelerator pedal is depressed during AT learning. • An unspecified operation was performed during AT learning • ATF temperature becomes out of specification during AT learning. • Battery voltage is low. • Malfunction indicator light illuminates. • Electric parking brake not applied strongly enough • Brake pedal is not fully depressed. • Abnormal idle speed increase, etc.

- For detailed operation procedures, refer to “PC application help for Subaru Select Monitor”.

11.AT OIL TEMP Warning Light Display

A: OPERATION

The AT OIL TEMP light illuminates or blinks, when the ATF temperature is high and malfunction occurs in CVT.

- When normal

AT OIL TEMP light always illuminates when the ignition switch is ON (engine OFF). Light goes off after two seconds from engine ON.

- When ATF temperature is high

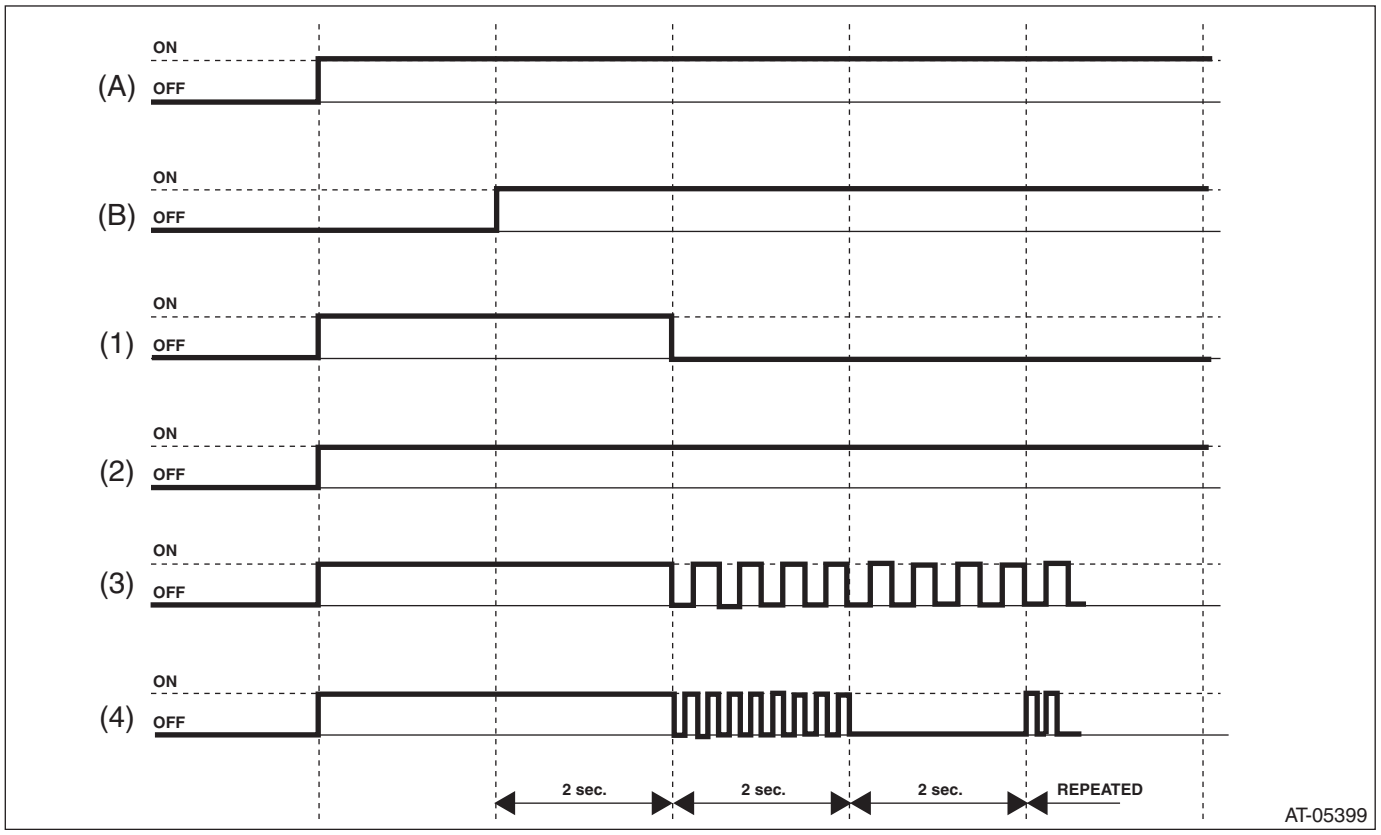
AT OIL TEMP light illuminates when the ATF temperature is abnormally high with engine ON.

- When malfunction is detected

AT OIL TEMP light blinks at 2 Hz when the TCM detects the malfunction of CVT with engine ON. In this case, inspect using “Diagnostic Procedure with Diagnostic Trouble Code (DTC)”. <Ref. to CVT(diag)-31, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

- When AT learning is not finished

AT OIL TEMP light repeats “Blinking at 4 Hz → Turning OFF” every two seconds, when the AT learning is not finished with engine ON. In this case, perform the “Learning”. (During AT learning, the light blinks at 2 Hz or illuminates.) <Ref. to CVT(diag)-20, Learning Control.>



(A) Ignition switch condition
(B) Engine condition
(1) When normal
(2) When ATF temperature is high
(3) When malfunction is detected
(4) When AT learning is not finished

If the AT OIL TEMP light does not illuminate, or illumination patterns are not as above, check the AT OIL TEMP light circuit. <Ref. to CVT(diag)-23, INSPECTION, AT OIL TEMP Warning Light Display.>

B: INSPECTION

DIAGNOSIS:

- AT OIL TEMP light circuit is open or shorted.
- Combination meter malfunction
- TCM is in special control mode.
- AT learning is not finished.

TROUBLE SYMPTOM:

- When the ignition switch is turned to ON, the AT OIL TEMP light does not illuminate.
- AT OIL TEMP light remains lit after engine start.

	Step	Check	Yes	No
1	**CHECK AT OIL TEMP LIGHT.** Turn the ignition switch to ON.	Does the AT OIL TEMP light illuminate?	Go to step **2**.	Perform the self-diagnosis of combination meter. <Ref. to IDI-8, SELF-DIAGNOSIS DISPLAY MODE, OPERATION, Combination Meter System.>
2	**CHECK AT OIL TEMP LIGHT.** Start the engine.	Does AT OIL TEMP light go off after two seconds from engine start?	Current condition is normal. Go back to Basic Diagnostic Procedure. <Ref. to CVT(diag)-2, Basic Diagnostic Procedure.>	Go to step **3**.
3	**CHECK DTC.** Read the DTC relating the TCM using the Subaru Select Monitor.	Is DTC displayed?	Perform the diagnosis according to DTC.	Go to step **4**.
4	**CHECK TCM.** Read the data of «ATF Temperature Lamp» using the Subaru Select Monitor.	Is “ON” displayed?	Go to step **5**.	Perform the self-diagnosis of combination meter. <Ref. to IDI-8, SELF-DIAGNOSIS DISPLAY MODE, OPERATION, Combination Meter System.>
5	**CHECK TCM.** Read the data of «ATF Temp.» using the Subaru Select Monitor.	Is the display 125°C or more?	Go to step **6**.	Check the TCM.
6	**CHECK ATF TEMPERATURE.** Check the real fluid temperature from the transmission case surface temperature.	Does it clearly differ from the «ATF Temp.» displayed on Subaru Select Monitor?	Perform the diagnosis according to DTC P0712 procedure. If there is no problems, perform the diagnosis according to DTC P0713 procedure.	When ATF temperature can be judged as actually high, perform the diagnosis again after the ATF temperature lowers.

12.AWD Warning Light Display

A: OPERATION

AWD light illuminates or blinks, when the AWD is in special control condition and AWD has malfunction.

- When normal

AWD light always illuminates when the ignition switch is ON (engine OFF). Light goes off after two seconds from engine ON.

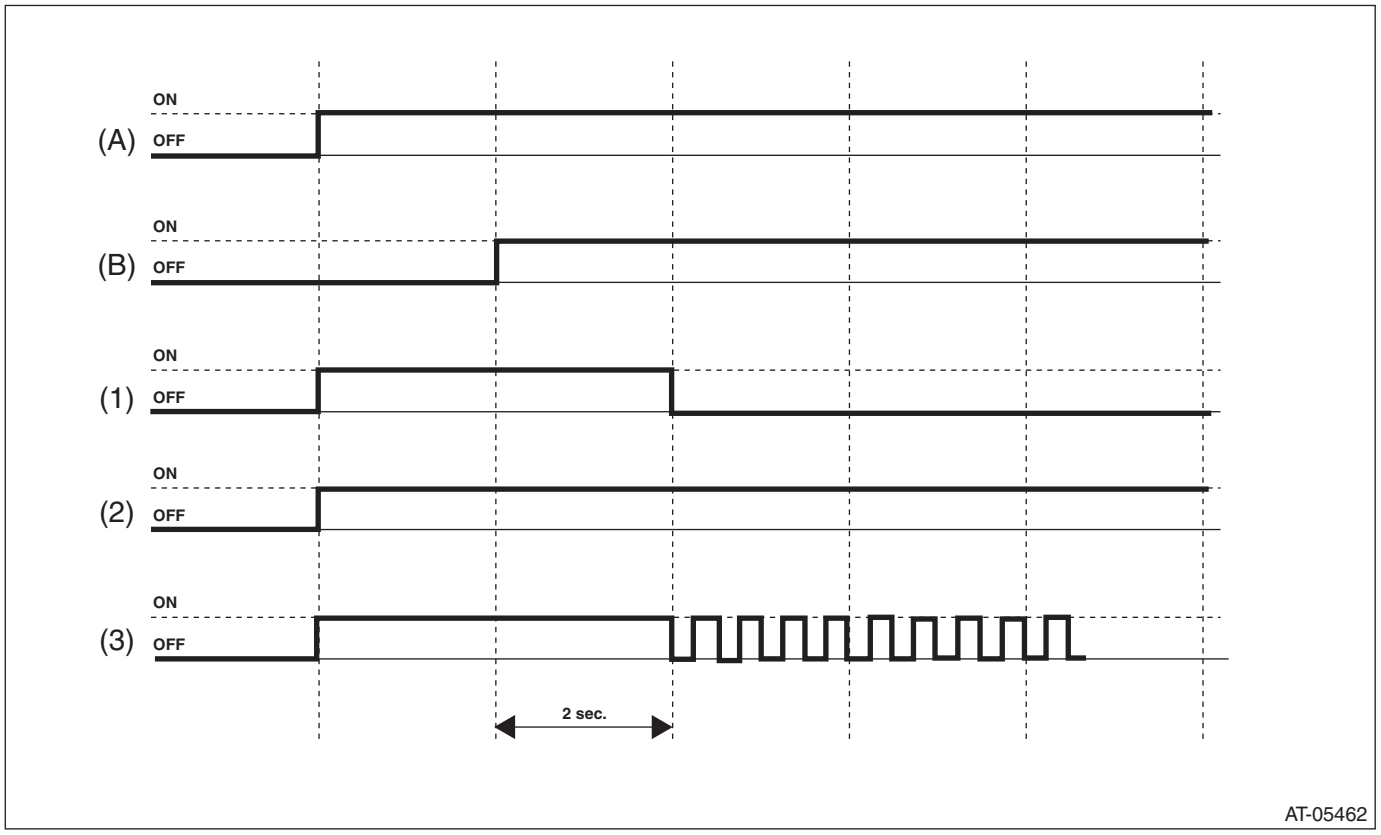
- When FF mode is selected

AWD light illuminates, when the AWD ON/OFF switching function is “FF mode” with engine ON.

- When malfunction is detected

AWD light blinks at 2 Hz when any of following malfunctions are detected with engine ON.

1. When tire with different diameter is installed, or air pressure of any of four wheels is excessively low
2. When “Rear differential inspection mode” is judged as NG <Ref. to DI-81, Rear Differential Inspection Mode.>



(A) Ignition switch condition (B) Engine condition

(1) When normal (2) When FF mode is selected (3) When malfunction is detected

If the AWD light does not illuminate, or illumination patterns are not as above, check the AWD light circuit. <Ref. to CVT(diag)-25, INSPECTION, AWD Warning Light Display.>

B: INSPECTION

DIAGNOSIS:
- AWD light circuit is open or shorted.
- Combination meter malfunction
- TCM is in AWD special control mode.

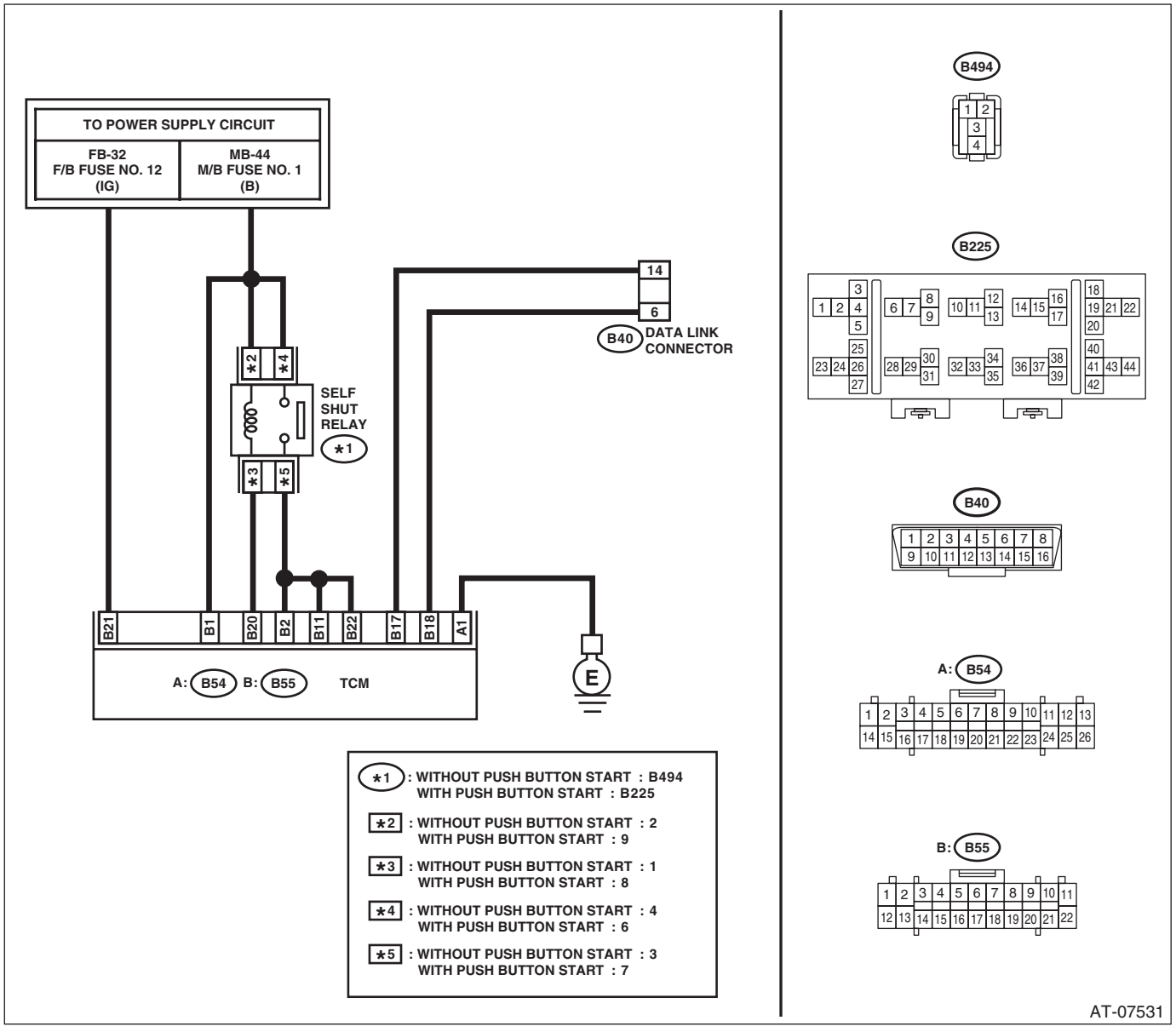
TROUBLE SYMPTOM:
- When the ignition switch is turned to ON, the AWD light does not illuminate.
- AWD light remains lit after engine start.
- AWD light is blinking immediately after engine start.

	Step	Check	Yes	No
1	**CHECK AWD LIGHT.** Turn the ignition switch to ON.	Does the AWD light illuminate?	Go to step **2**.	Perform the self-diagnosis of combination meter. <Ref. to IDI-8, SELF-DIAGNOSIS DISPLAY MODE, OPERATION, Combination Meter System.>
2	**CHECK AWD LIGHT.** Start the engine.	Does AWD light go off after two seconds from engine start?	Current condition is normal. Go back to Basic Diagnostic Procedure. <Ref. to CVT(diag)-2, Basic Diagnostic Procedure.>	Go to step **3**.
3	**CHECK DTC.** Read the DTC relating the TCM using the Subaru Select Monitor.	Is DTC displayed?	Perform the diagnosis according to DTC.	Go to step **4**.
4	**CHECK AWD LIGHT.** Check the display of AWD light after engine start.	Is AWD light illuminating?	Go to step **6**.	Go to step **5**.
5	**CHECK AWD LIGHT.** Check the display of AWD light after engine start.	Is AWD light blinking at 2 Hz?	Go to step **7**.	Go to step **8**.
6	**CHECK AWD ON/OFF SWITCHING FUNCTION.** Using the Subaru Select Monitor, select the {AWD ON/OFF switching mode} in {Maintenance mode} from «Work Support», and check the current mode. <Ref. to CVT-44, AWD ON/OFF Switching Mode.>	Is the message «At present, the vehicle is in AWD. Switch to FF?» displayed?	Go to step **8**.	If the message «At present, the vehicle is in FF. Switch to AWD?» is displayed, select “OK”, and switch to AWD mode.
7	**CHECK REAR DIFFERENTIAL.** Using the Subaru Select Monitor, select {Rear differential inspection mode} in {Maintenance mode} from «Work Support», and check. <Ref. to DI-81, Rear Differential Inspection Mode.>	Does AWD light go off after inspection is finished normally?	Current condition is normal. Go back to Basic Diagnostic Procedure. <Ref. to CVT(diag)-2, Basic Diagnostic Procedure.>	Go to step **8**.
8	**CHECK COMBINATION METER.** Perform the self-diagnosis of combination meter. <Ref. to IDI-8, SELF-DIAGNOSIS DISPLAY MODE, OPERATION, Combination Meter System.>	Is there any trouble with the combination meter?	Repair the combination meter.	Check the TCM.

13.Diagnostic Procedure for Subaru Select Monitor Communication

A: COMMUNICATION FOR INITIALIZING IMPOSSIBLE

DIAGNOSIS:
Defective harness connector
TROUBLE SYMPTOM:
Subaru Select Monitor communication failure
WIRING DIAGRAM:
CVT Control System <Ref. to WI-114, CVT Control System.>



Step		Check	Yes	No
1	**CHECK IGNITION SWITCH.**	Is the ignition switch ON?	Go to step **2**.	Turn the ignition switch to ON, and select the transmission mode using the Subaru Select Monitor.

	Step	Check	Yes	No
2	**CHECK BATTERY.** 1) Turn the ignition switch to OFF. 2) Measure the battery voltage.	Is the voltage 11 V or more?	Go to step **3**.	Charge or replace the battery.
3	**CHECK BATTERY TERMINAL.**	Is there poor contact at battery terminal?	Repair or tighten the battery terminal.	Go to step **4**.
4	**CHECK INSTALLATION OF TCM CONNECTOR.** Turn the ignition switch to OFF.	Is the TCM connector inserted into the TCM until the clamp locks?	Go to step **5**.	Insert the TCM connector to TCM.
5	**CHECK LAN SYSTEM.** Perform the diagnosis for LAN system. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>	Is there any fault in LAN system?	Perform the diagnosis according to DTC for LAN system. <Ref. to LAN(diag)-54, List of Diagnostic Trouble Code (DTC).>	Go to step **6**.
6	**CHECK SUBARU SELECT MONITOR COMMUNICATION.** 1) Turn the ignition switch to ON. 2) Check whether communication to transmission system can be executed normally.	Is the system name displayed on Subaru Select Monitor?	Check DTC of TCM. <Ref. to CVT(diag)-17, Read Diagnostic Trouble Code (DTC).>	Go to step **7**.
7	**CHECK POWER SUPPLY CIRCUIT.** 1) Turn the ignition switch to ON. (engine OFF) 2) Measure the ignition power supply voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 1 (+) — Chassis ground (–):*** ***(B55) No. 2 (+) — Chassis ground (–):*** ***(B55) No. 11 (+) — Chassis ground (–):*** ***(B55) No. 21 (+) — Chassis ground (–):*** ***(B55) No. 22 (+) — Chassis ground (–):***	Is the voltage 10 — 13 V?	Go to step **8**.	Repair the open circuit of harness between TCM and battery.
8	**CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM. 3) Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 1 — Chassis ground:***	Is the resistance less than 10 Ω?	Go to step **9**.	Repair the open circuit of the TCM ground circuit and poor contact of connector.
9	**CHECK POOR CONTACT OF CONNECTOR.**	Is there poor contact of control module power supply, ground circuit and data link connector?	Repair the connector.	Check the TCM.

14.List of Diagnostic Trouble Code (DTC)

A: LIST

DTC	Item	Content of diagnosis	Reference
P0705	Transmission Range Sensor Circuit (PRNDL Input)	Inhibitor switch malfunction or short circuit	<Ref. to CVT(diag)-31, DTC P0705 TRANSMISSION RANGE SENSOR CIRCUIT (PRNDL INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0708	AT Range Switch Not Inputted	Inhibitor switch malfunction or open circuit	<Ref. to CVT(diag)-33, DTC P0708 AT RANGE SWITCH NOT INPUTTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0711	ATF Temp. Sensor Circuit Range/performance	ATF temperature sensor is faulty or input signal circuit is faulty.	<Ref. to CVT(diag)-35, DTC P0711 ATF TEMP. SENSOR CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0712	Transmission Fluid Temperature Sensor Circuit Low Input	ATF temperature sensor is faulty or input signal circuit is shorted.	<Ref. to CVT(diag)-37, DTC P0712 TRANSMISSION FLUID TEMPERATURE SENSOR CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0713	Transmission Fluid Temperature Sensor Circuit High Input	ATF temperature sensor is faulty or input signal circuit is open or shorted.	<Ref. to CVT(diag)-39, DTC P0713 TRANSMISSION FLUID TEMPERATURE SENSOR CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0716	Torque Converter Turbine Speed	Turbine speed sensor is faulty or input signal circuit is open or shorted.	<Ref. to CVT(diag)-41, DTC P0716 TORQUE CONVERTER TURBINE SPEED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0719	Brake Switch Circuit Low	Brake switch is faulty or input signal circuit is open or shorted.	<Ref. to CVT(diag)-43, DTC P0719 BRAKE SWITCH CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0724	Brake Switch Circuit High	Brake switch is faulty or input signal circuit is shorted.	<Ref. to CVT(diag)-45, DTC P0724 BRAKE SWITCH CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0730	Gearshift Control Performance Abnormal	Primary speed sensor, secondary speed sensor, control valve, or chain is faulty.	<Ref. to CVT(diag)-46, DTC P0730 GEARSHIFT CONTROL PERFORMANCE ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0801	Reverse Inhibit Control Circuit	Shift lock solenoid is faulty or output signal circuit is open or shorted.	<Ref. to CVT(diag)-47, DTC P0801 REVERSE INHIBIT CONTROL CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0841	Secondary Oil Pressure Sensor Performance	Secondary pressure sensor or control valve is faulty	<Ref. to CVT(diag)-48, DTC P0841 SECONDARY OIL PRESSURE SENSOR PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0842	Secondary Oil Pressure Sensor Circuit (Low)	Secondary pressure sensor is faulty or input signal circuit is open or shorted.	<Ref. to CVT(diag)-50, DTC P0842 SECONDARY OIL PRESSURE SENSOR CIRCUIT (LOW), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0843	Secondary Oil Pressure Sensor Circuit (High)	Secondary pressure sensor is faulty or input signal circuit is shorted.	<Ref. to CVT(diag)-52, DTC P0843 SECONDARY OIL PRESSURE SENSOR CIRCUIT (HIGH), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0890	AT Self-Shut Relay Diagnosis (Low)	Self-shut relay is faulty or input signal circuit is open or shorted.	<Ref. to CVT(diag)-54, DTC P0890 AT SELF-SHUT RELAY DIAGNOSIS (LOW), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0951	Manual Switch	Manual mode switch is faulty or input signal circuit is open or shorted.	<Ref. to CVT(diag)-56, DTC P0951 MANUAL SWITCH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0962	Secondary Solenoid Circuit (Low)	Secondary solenoid is faulty or output signal circuit is shorted.	<Ref. to CVT(diag)-58, DTC P0962 SECONDARY SOLENOID CIRCUIT (LOW), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0963	Secondary Solenoid Circuit (High)	Secondary solenoid is faulty or output signal circuit is open or shorted.	<Ref. to CVT(diag)-60, DTC P0963 SECONDARY SOLENOID CIRCUIT (HIGH), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Item	Content of diagnosis	Reference
P0965	Forward & Reverse Solenoid Function	F&R solenoid, forward clutch or control valve is faulty.	<Ref. to CVT(diag)-62, DTC P0965 FORWARD & REVERSE SOLENOID FUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0966	Forward & Reverse Solenoid Circuit (Low)	F&R solenoid is faulty or output signal circuit is shorted.	<Ref. to CVT(diag)-63, DTC P0966 FORWARD & REVERSE SOLENOID CIRCUIT (LOW), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0967	Forward & Reverse Linear Solenoid Circuit (High)	F&R solenoid is faulty or output signal circuit is open or shorted.	<Ref. to CVT(diag)-65, DTC P0967 FORWARD & REVERSE LINEAR SOLENOID CIRCUIT (HIGH), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0970	Transfer Solenoid Circuit (Low)	AWD solenoid is faulty or output signal circuit is shorted.	<Ref. to CVT(diag)-67, DTC P0970 TRANSFER SOLENOID CIRCUIT (LOW), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0971	Transfer Solenoid Circuit (High)	AWD solenoid is faulty or output signal circuit is open or shorted.	<Ref. to CVT(diag)-68, DTC P0971 TRANSFER SOLENOID CIRCUIT (HIGH), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0973	Primary Solenoid System A Circuit (Low)	Primary UP solenoid is faulty or output signal circuit is shorted.	<Ref. to CVT(diag)-70, DTC P0973 PRIMARY SOLENOID SYSTEM A CIRCUIT (LOW), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0974	Primary Solenoid System A Circuit (High)	Primary UP solenoid is faulty or output signal circuit is open or shorted.	<Ref. to CVT(diag)-71, DTC P0974 PRIMARY SOLENOID SYSTEM A CIRCUIT (HIGH), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0976	Primary Solenoid System B Circuit (Low)	Primary DOWN solenoid is faulty or output signal circuit is shorted.	<Ref. to CVT(diag)-73, DTC P0976 PRIMARY SOLENOID SYSTEM B CIRCUIT (LOW), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0977	Primary Solenoid System B Circuit (High)	Primary DOWN solenoid is faulty or output signal circuit is open or shorted.	<Ref. to CVT(diag)-74, DTC P0977 PRIMARY SOLENOID SYSTEM B CIRCUIT (HIGH), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1724	AT EEPROM Error	TCM EEPROM malfunction	<Ref. to CVT(diag)-76, DTC P1724 AT EEPROM ERROR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2746	Primary Pulley Revolution Speed Sensor Circuit	Primary speed sensor is faulty or input signal circuit is open or shorted.	<Ref. to CVT(diag)-77, DTC P2746 PRIMARY PULLEY REVOLUTION SPEED SENSOR CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2750	Sec. Pulley Revolution Speed Sensor Circuit	Secondary speed sensor is faulty or input signal circuit is open or shorted.	<Ref. to CVT(diag)-79, DTC P2750 SEC. PULLEY REVOLUTION SPEED SENSOR CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2762	Lock-Up Duty Solenoid Malfunction	Lock-up duty solenoid, lock-up clutch or control valve is faulty	<Ref. to CVT(diag)-81, DTC P2762 LOCK-UP DUTY SOLENOID MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2763	Lock-Up Duty Solenoid Circuit (High)	Lock-up duty solenoid is faulty or output signal circuit is open or shorted.	<Ref. to CVT(diag)-82, DTC P2763 LOCK-UP DUTY SOLENOID CIRCUIT (HIGH), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2764	Lock-Up Duty Solenoid Circuit (Low)	Lock-up duty solenoid is faulty or output signal circuit is shorted.	<Ref. to CVT(diag)-84, DTC P2764 LOCK-UP DUTY SOLENOID CIRCUIT (LOW), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
U0073	Control Module Communication Bus “A” Off	CAN bus is shorted or communication error.	<Ref. to CVT(diag)-85, DTC U0073 CONTROL MODULE COMMUNICATION BUS “A” OFF, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
U0100	Lost Communication With ECM/PCM “A”	Detected that the engine data has not yet arrived.	<Ref. to CVT(diag)-85, DTC U0100 LOST COMMUNICATION WITH ECM/PCM “A”, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
U0122	Lost Communication With Vehicle Dynamics Control Module	Detected that the VDC data has not yet arrived.	<Ref. to CVT(diag)-85, DTC U0122 LOST COMMUNICATION WITH VEHICLE DYNAMICS CONTROL MODULE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Item	Content of diagnosis	Reference
U0140	Lost Communication With Body Control Module	Detected that the body integrated unit data has not yet arrived.	<Ref. to CVT(diag)-85, DTC U0140 LOST COMMUNICATION WITH BODY CONTROL MODULE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
U0155	Lost Communication With Instrument Panel Cluster (IPC) Control Module	Detected that the meter data has not yet arrived.	<Ref. to CVT(diag)-85, DTC U0155 LOST COMMUNICATION WITH INSTRUMENT PANEL CLUSTER (IPC) CONTROL MODULE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
U0401	Invalid Data Received From ECM/PCM “A”	Detected abnormality of the engine data.	<Ref. to CVT(diag)-85, DTC U0401 INVALID DATA RECEIVED FROM ECM/PCM “A”, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
U0416	Invalid Data Received From Vehicle Dynamics Control Module	Detected abnormality of the VDC data.	<Ref. to CVT(diag)-85, DTC U0416 INVALID DATA RECEIVED FROM VEHICLE DYNAMICS CONTROL MODULE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
U0422	Invalid Data Received From Body Control Module	Detected abnormality of the body integrated unit data.	<Ref. to CVT(diag)-85, DTC U0422 INVALID DATA RECEIVED FROM BODY CONTROL MODULE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
U0423	Invalid Data Received From Instrument Panel Cluster Control Module	Detected abnormality of the meter data.	<Ref. to CVT(diag)-85, DTC U0423 INVALID DATA RECEIVED FROM INSTRUMENT PANEL CLUSTER CONTROL MODULE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

15.Diagnostic Procedure with Diagnostic Trouble Code (DTC)

A: DTC P0705 TRANSMISSION RANGE SENSOR CIRCUIT (PRNDL INPUT)

DTC DETECTING CONDITION:

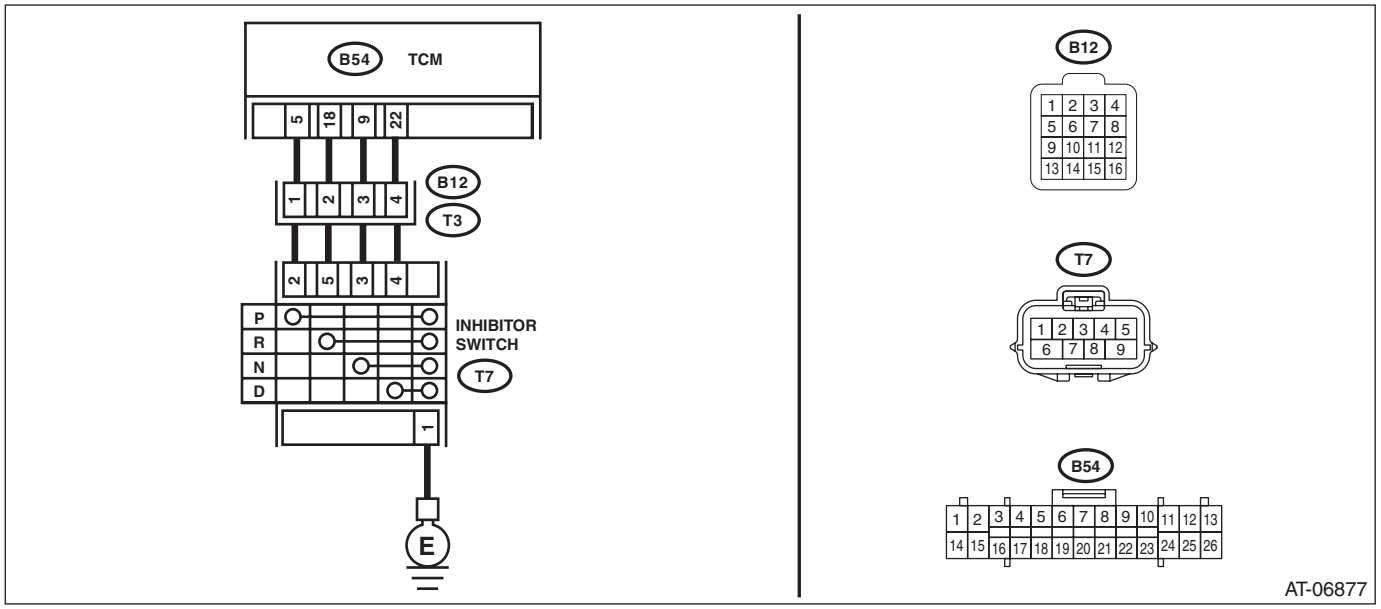
- Inhibitor switch is faulty.
- At least 2 range signal is input.

TROUBLE SYMPTOM:

- Shift characteristics are erroneous.
- The range position of the select lever and the position of shift indicator display do not match.

WIRING DIAGRAM:

CVT Control System <Ref. to WI-114, CVT Control System.>



	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL FOR TCM.** 1) Turn the ignition switch to ON. 2) Move the select lever to each range, and read the data of «P range», «R Range Signal», «N range» and «D Range Signal» using the Subaru Select Monitor.	Is display “OFF” for the range other than corresponding range?	Go to step **5**.	Go to step **2**.
2	**CHECK HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the TCM and transmission connectors. 3) Measure the resistance between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 5 — Chassis ground:*** ***(B54) No. 18 — Chassis ground:*** ***(B54) No. 9 — Chassis ground:*** ***(B54) No. 22 — Chassis ground:***	Is each resistance 1 MΩ or more?	Go to step **3**.	Repair the short circuit of body harness.
3	**CHECK HARNESS.** 1) Disconnect the inhibitor switch connector. 2) Measure the resistance between transmission connector and chassis ground. ***Connector & terminal*** ***(T3) No. 1 — Chassis ground:*** ***(T3) No. 2 — Chassis ground:*** ***(T3) No. 3 — Chassis ground:*** ***(T3) No. 4 — Chassis ground:***	Is each resistance 1 MΩ or more?	Go to step **4**.	Repair the short circuit of transmission harness.

	Step	Check	Yes	No
4	**CHECK INHIBITOR SWITCH.** Move the select lever to each range, and measure the resistance between inhibitor switch connector terminals. ***Connector & terminal*** ***(T7) No. 2 — (T7) No. 1:*** ***(T7) No. 5 — (T7) No. 1:*** ***(T7) No. 3 — (T7) No. 1:*** ***(T7) No. 4 — (T7) No. 1:***	Is the resistance other than corresponding range 1 MΩ or more?	Go to step **5**.	Replace the inhibitor switch. <Ref. to CVT-96, Inhibitor Switch.>
5	**CHECK FOR POOR CONTACT.**	Is there poor contact between TCM, inhibitor switch, transmission ground?	Repair the poor contact.	Check the TCM.

B: DTC P0708 AT RANGE SWITCH NOT INPUTTED

DTC DETECTING CONDITION:

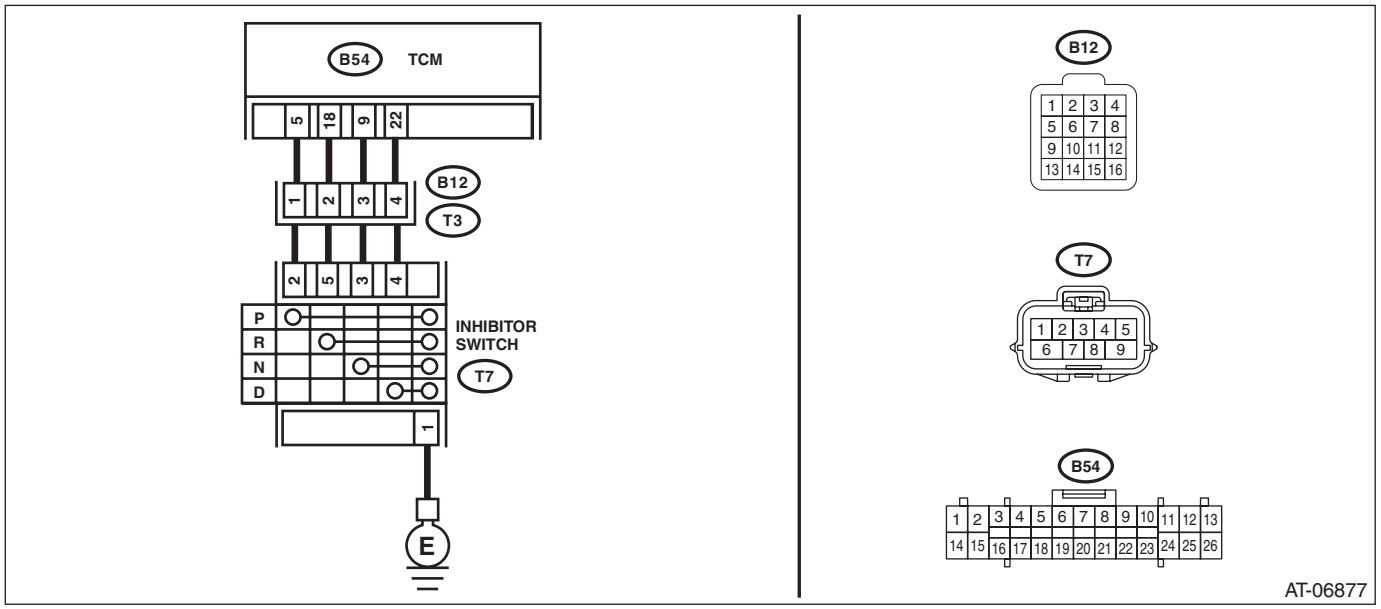
- Inhibitor switch is faulty.
- No range signal is input.

TROUBLE SYMPTOM:

- Shift characteristics are erroneous.
- The range position of the select lever and the position of shift indicator display do not match.

WIRING DIAGRAM:

CVT Control System <Ref. to WI-114, CVT Control System.>



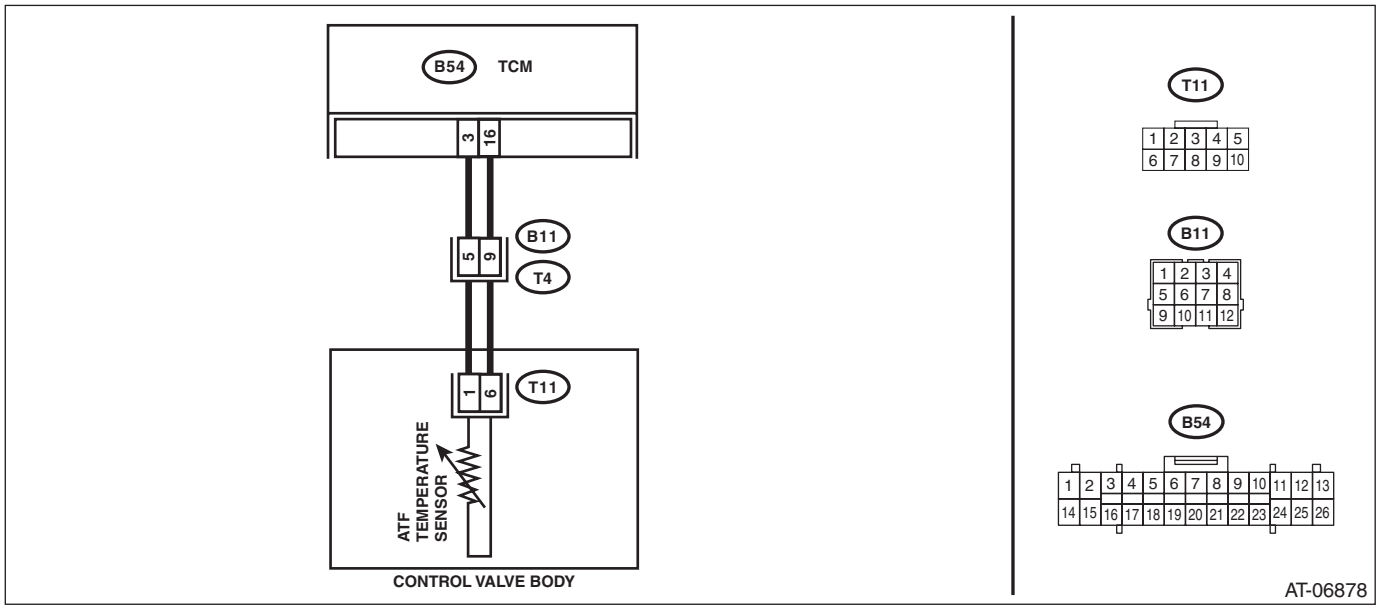
	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL FOR TCM.** 1) Turn the ignition switch to ON. 2) Move the select lever to each range, and read the data of «P range», «R Range Signal», «N range» and «D Range Signal» using the Subaru Select Monitor.	Is the display of the corresponding range “ON”?	Go to step **7**.	Go to step **2**.
2	**CHECK HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the TCM and transmission connectors. 3) Measure the resistance of harness between TCM connector and transmission connector. ***Connector & terminal*** ***(B54) No. 5 — (B12) No. 1:*** ***(B54) No. 18 — (B12) No. 2:*** ***(B54) No. 9 — (B12) No. 3:*** ***(B54) No. 22 — (B12) No. 4:***	Is each resistance less than 1 Ω?	Go to step **3**.	Repair the open circuit of body harness.
3	**CHECK HARNESS.** Measure the resistance of harness between inhibitor switch connector and transmission ground. ***Connector & terminal*** ***(T7) No. 1 — Transmission ground:***	Is the resistance less than 1 Ω?	Go to step **4**.	Repair the open circuit of harness.

	Step	Check	Yes	No
4	**CHECK HARNESS.** 1) Disconnect the inhibitor switch connector. 2) Measure the resistance between transmission connector and inhibitor switch connector. ***Connector & terminal*** ***(T3) No. 1 — (T7) No. 2:*** ***(T3) No. 2 — (T7) No. 5:*** ***(T3) No. 3 — (T7) No. 3:*** ***(T3) No. 4 — (T7) No. 4:***	Is each resistance less than 1 Ω?	Go to step **5**.	Repair the open circuit of transmission harness.
5	**CHECK INHIBITOR SWITCH.** Move the select lever to each range, and measure the resistance between inhibitor switch connector terminals. ***Connector & terminal*** ***(T7) No. 2 — (T7) No. 1:*** ***(T7) No. 5 — (T7) No. 1:*** ***(T7) No. 3 — (T7) No. 1:*** ***(T7) No. 4 — (T7) No. 1:***	Is the resistance of the corresponding range less than 1 MΩ?	Go to step **6**.	Replace the inhibitor switch. <Ref. to CVT-96, Inhibitor Switch.>
6	**CHECK HARNESS.** 1) Turn the ignition switch to ON. 2) Measure the voltage between each connector and chassis ground. ***Connector & terminal*** ***Transmission connector (B12 side)*** ***(B12) No. 1 (+) — Chassis ground (–):*** ***(B12) No. 2 (+) — Chassis ground (–):*** ***(B12) No. 3 (+) — Chassis ground (–):*** ***(B12) No. 4 (+) — Chassis ground (–):*** ***Transmission connector (T7 side)*** ***(T7) No. 2 (+) — Chassis ground (–):*** ***(T7) No. 5 (+) — Chassis ground (–):*** ***(T7) No. 3 (+) — Chassis ground (–):*** ***(T7) No. 4 (+) — Chassis ground (–):***	Is each voltage less than 1 V?	Go to step **7**.	Repair the harness which outputs 1 V or more.
7	**CHECK FOR POOR CONTACT.**	Is there poor contact between TCM, inhibitor switch, transmission ground?	Repair the poor contact.	Check the TCM.

C: DTC P0711 ATF TEMP. SENSOR CIRCUIT RANGE/PERFORMANCE

DTC DETECTING CONDITION:
ATF temperature does not reach 20°C (68°F). (ATF temperature does not increase.)
TROUBLE SYMPTOM:
Excessive shift shock

CAUTION:
After completion of the diagnosis, perform the Clear Memory Mode. <Ref. to CVT(diag)-18, Clear Memory Mode.>
WIRING DIAGRAM:
CVT control system <Ref. to WI-114, CVT Control System.>



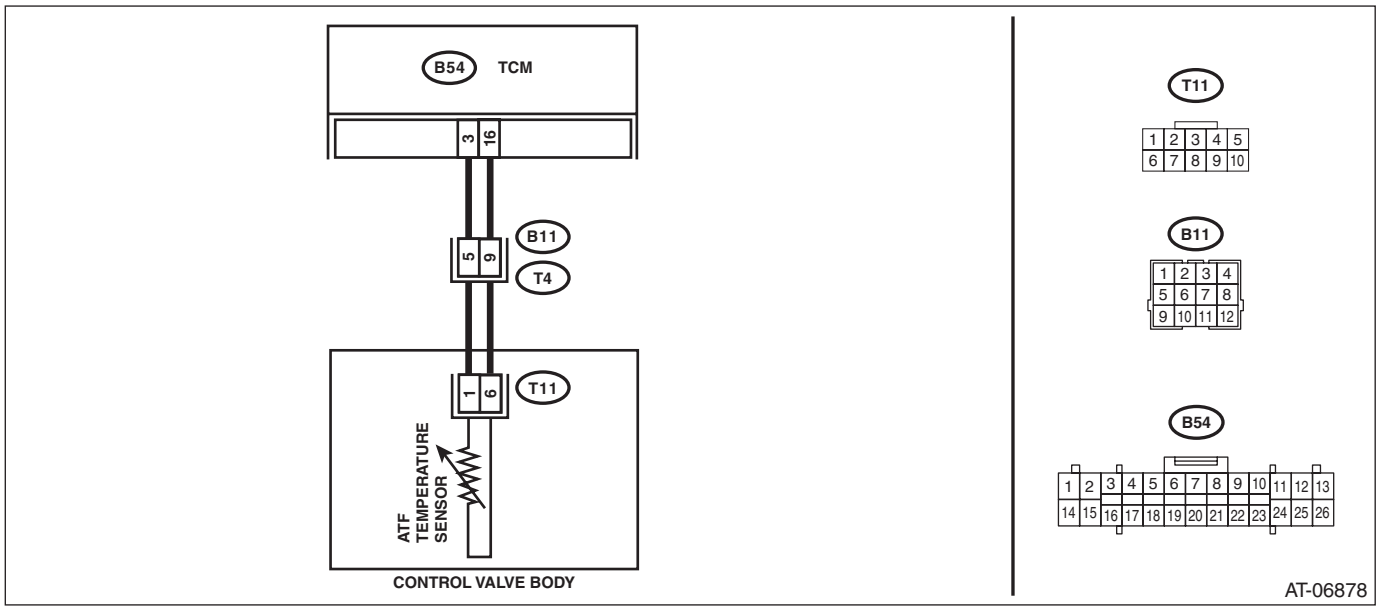
Step		Check	Yes	No
1	**CHECK DTC.** Check the DTC using Subaru Select Monitor.	Is DTC P0712 or P0713 displayed?	Perform the diagnosis according to DTC.	Go to step **2**.
2	**CHECK TRANSMISSION FLUID.** Check the amount of ATF. <Ref. to CVT-36, ADJUSTMENT, CVTF.>	Is the ATF amount correct?	Go to step **3**.	Adjust the amount of ATF. <Ref. to CVT-36, ADJUSTMENT, CVTF.>
3	**CHECK INPUT SIGNAL FOR TCM.** Check «ATF Temp.» using the Subaru Select Monitor.	Is «ATF Temp.» less than 20°C (68°F)?	Go to step **4**.	After the ATF temperature drops below 20°C (68°F), reconfirm «ATF Temp.».
4	**CHECK INPUT SIGNAL FOR TCM.** 1) Lift up the vehicle. 2) Apply the electronic parking brake. 3) Start the engine. 4) Set the select lever to “D” range. 5) Warm up the engine until the ATF temperature reaches 20°C (68°F). 6) Read the data of «ATF Temp.» using the Subaru Select Monitor.	Does «ATF Temp.» increase by 1°C (1.8°F) within 10 minutes?	Current condition is normal.	Go to step **5**.

	Step	Check	Yes	No
5	**CHECK HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the TCM and transmission connectors. 3) Measure the resistance between TCM connector and transmission connectors. ***Connector & terminal*** ***(B54) No. 3 — (B11) No. 5:*** ***(B54) No. 16 — (B11) No. 9:***	Is the resistance less than 1 Ω?	Go to step **6**.	Check for poor contact of the ATF temperature sensor and transmission connector harness, and repair the defective part.
6	**CHECK INPUT SIGNAL FOR TCM.** 1) Connect the connector to TCM. (with the transmission connector disconnected) 2) Turn the ignition switch to ON. 3) Read the data of «ATF Temp.» using the Subaru Select Monitor.	Is –50°C (–58°F) displayed in «ATF Temp.»?	Replace the control valve body. <Ref. to CVT-116, Control Valve Body.>	Check the TCM.

D: DTC P0712 TRANSMISSION FLUID TEMPERATURE SENSOR CIRCUIT LOW INPUT

DTC DETECTING CONDITION:
Input signal circuit of ATF temperature sensor is shorted.
TROUBLE SYMPTOM:
- Excessive shift shock
- Shift characteristics malfunction

WIRING DIAGRAM:
CVT control system <Ref. to WI-114, CVT Control System.>



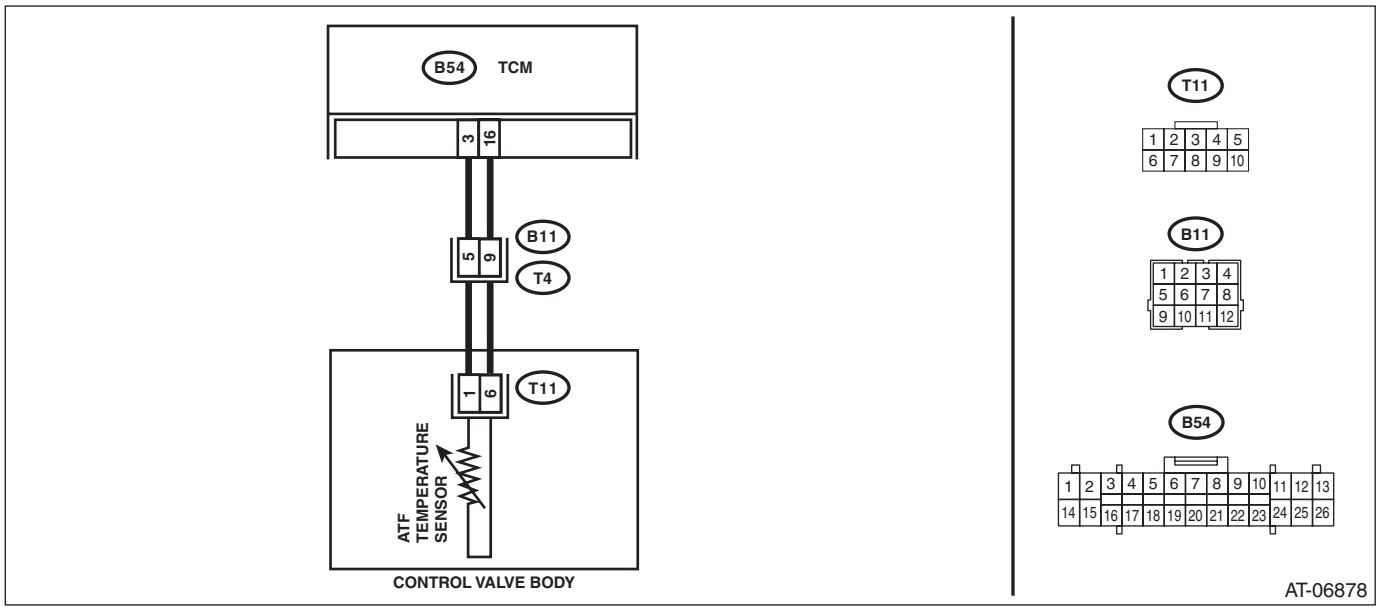
Step		Check	Yes	No
1	**CHECK HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the TCM connector. 3) Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 3 — Chassis ground:*** ***(B54) No. 16 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **5**.	Go to step **2**.
2	**CHECK HARNESS.** 1) Disconnect the transmission connector. 2) Measure the resistance between transmission connector and transmission body. ***Connector & terminal*** ***(T4) No. 5 — Transmission body:*** ***(T4) No. 9 — Transmission body:***	Is the resistance 1 MΩ or more?	Repair the short circuit of body harness.	Go to step **3**.
3	**CHECK HARNESS INSIDE TRANSMISSION.** **CAUTION:** **Start work after ATF cools down.** 1) Remove the transmission valve cover. 2) Check for the harness pinch, damage.	Is the harness normal?	Go to step **4**.	Replace the transmission harness.
4	**CHECK HARNESS.** 1) Disconnect the control valve body connector. 2) Measure the resistance between control valve body connector and transmission body. ***Connector & terminal*** ***(T11) No. 1 — Transmission body:*** ***(T11) No. 6 — Transmission body:***	Is the resistance 1 MΩ or more?	Replace the transmission harness.	Go to step **5**.

	Step	Check	Yes	No
5	**CHECK ATF TEMPERATURE SENSOR.** Measure the resistance between transmission connector terminals. ***Connector & terminal (T4) No. 5 — No. 9:***	Is resistance as follows? Fluid temperature 0°C → Approx. 6.0 kΩ Fluid temperature 20°C → Approx. 2.5 kΩ Fluid temperature 80°C → Approx. 330 Ω	Check the TCM.	Replace the control valve body. <Ref. to CVT-116, Control Valve Body.>

E: DTC P0713 TRANSMISSION FLUID TEMPERATURE SENSOR CIRCUIT HIGH INPUT

DTC DETECTING CONDITION:
Input signal circuit of ATF temperature sensor is open or shorted.
TROUBLE SYMPTOM:
- Excessive shift shock
- Shift characteristics malfunction

WIRING DIAGRAM:
CVT control system <Ref. to WI-114, CVT Control System.>



Step		Check	Yes	No
1	**CHECK HARNESS.** 1) Turn the ignition switch to ON. 2) Measure the voltage between TCM connectors. ***Connector & terminal*** ***(B54) No. 3 (+) — (B54) No. 16 (–):***	Is the voltage 5 V or more?	Repair the short circuit of harness.	Go to step **2**.
2	**CHECK HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the TCM and transmission connectors. 3) Measure the resistance between TCM connector and transmission connectors. ***Connector & terminal*** ***(B54) No. 3 — (B11) No. 5:*** ***(B54) No. 16 — (B11) No. 9:***	Is the resistance less than 1 Ω?	Go to step **3**.	Repair the open circuit of body harness.
3	**CHECK ATF TEMPERATURE SENSOR.** Measure the resistance between transmission connector terminals. ***Connector & terminal*** ***(T4) No. 5 — No. 9:***	Is the resistance 1 MΩ or more?	Go to step **4**.	Go to step **5**.

	Step	Check	Yes	No
4	**CHECK HARNESS.** **CAUTION:** **Start work after ATF cools down.** 1) Remove the transmission valve cover. 2) Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(T4) No. 5 — (T11) No. 1:*** ***(T4) No. 9 — (T11) No. 6:***	Is the resistance less than 1 Ω?	Repair the open circuit of transmission harness on the outside of the transmission.	Repair the open circuit of transmission harness on the control valve side.
5	**CHECK ATF TEMPERATURE SENSOR.** 1) Connect the connectors to TCM and transmission. 2) Start the engine. 3) Warm up until the ATF temperature exceeds 50°C (122°F). 4) Turn the ignition switch to OFF. 5) Disconnect the transmission connector. 6) Measure the resistance between transmission connector terminals. ***Connector & terminal*** ***(T4) No. 5 — No. 9:***	Is the resistance 650 — 990 Ω?	Go to step **6**.	Go to step **8**.
6	**CHECK ATF TEMPERATURE SENSOR.** Measure the resistance between transmission connector terminals. ***Connector & terminal*** ***(T4) No. 5 — No. 9:***	Does the resistance value increase gradually while the ATF temperature decreases?	Go to step **7**.	Replace the control valve body. <Ref. to CVT-116, Control Valve Body.>
7	**CHECK INPUT SIGNAL FOR TCM.** 1) Connect the connector to transmission. 2) Turn the ignition switch to ON. (Do not start engine.) 3) Read the data of «ATF Temp.» using the Subaru Select Monitor.	Does the ATF temperature gradually decrease?	Check for poor contact of the ATF temperature sensor and transmission connector harness, and repair the defective part.	Go to step **8**.
8	**CHECK FOR POOR CONTACT.**	Is there poor contact of ATF temperature sensor circuit?	Repair the poor contact.	Check the TCM.

F: DTC P0716 TORQUE CONVERTER TURBINE SPEED

DTC DETECTING CONDITION:

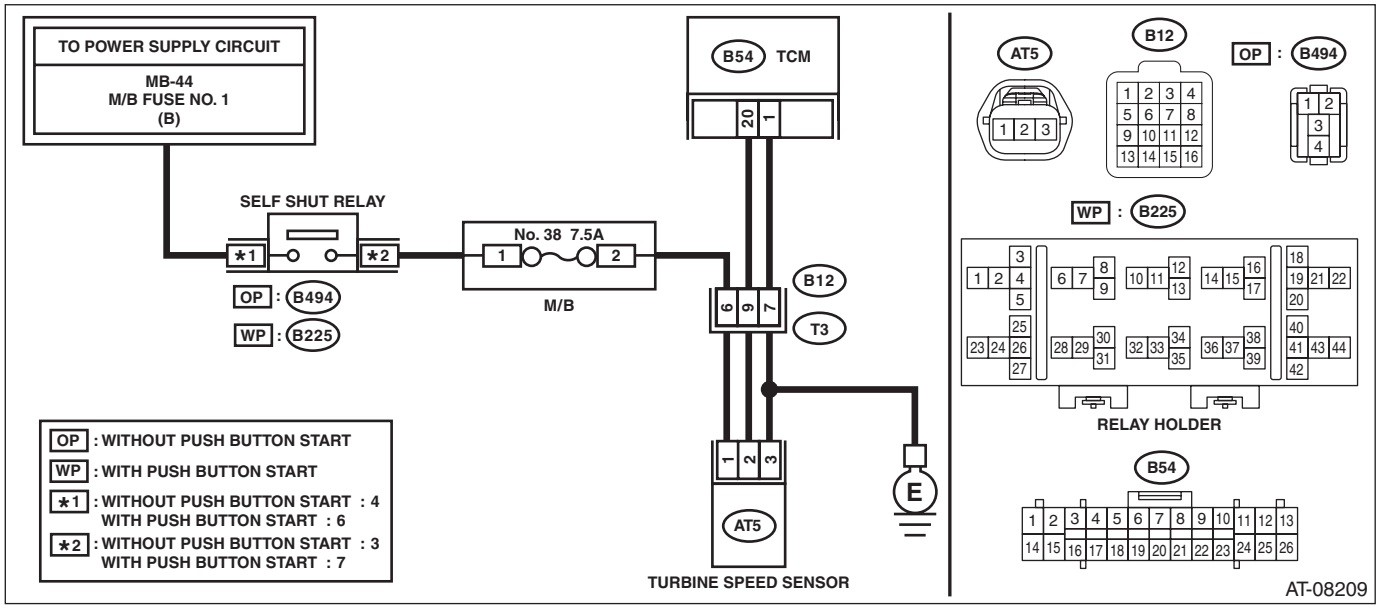
- Input signal circuit of TCM is open or shorted.
- Turbine speed sensor is faulty.

TROUBLE SYMPTOM:

- Standing start problems
- Shock occurs when engaging the lockup clutch.
- Shock occurs when selecting shift position.

WIRING DIAGRAM:

CVT control system <Ref. to WI-114, CVT Control System.>

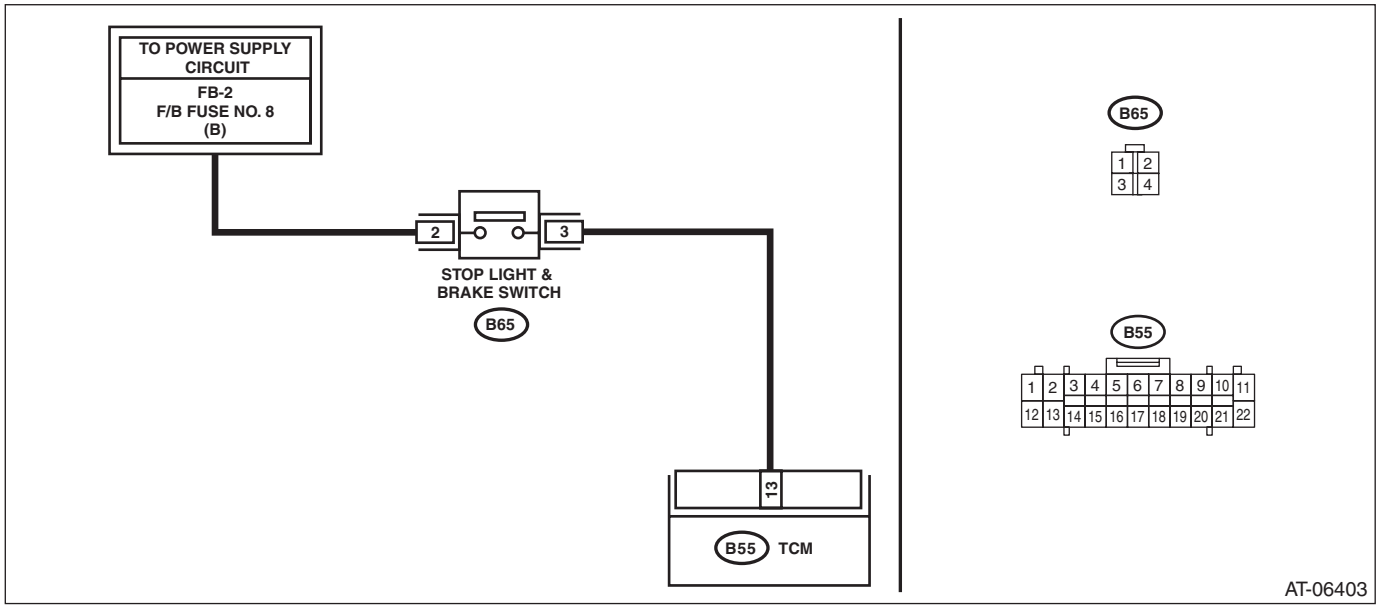


Step		Check	Yes	No
1	**CHECK FUSE.** 1) Turn the ignition switch to OFF. 2) Remove the M/B fuse (No. 38).	Is the fuse OK?	Go to step **2**.	Replace the fuse. If the fuse blows out easily, repair the short circuit of harness.
2	**CHECK HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the TCM and transmission connectors. 3) Measure the resistance between TCM connector and transmission connectors. ***Connector & terminal*** ***(B54) No. 1 — (B12) No. 7:*** ***(B54) No. 20 — (B12) No. 9:*** ***(M/B No. 38) No. 2 — (B12) No. 6:***	Is the resistance less than 1 Ω?	Go to step **3**.	Repair the open circuit of harness.
3	**CHECK HARNESS.** Measure the resistance between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 20 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **4**.	Repair the short circuit of harness.
4	**CHECK TRANSMISSION HARNESS.** 1) Connect the TCM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between transmission connector terminals. ***Connector & terminal*** ***(B12) No. 6 (+) — (B12) No. 7 (–):***	Is the voltage 10 — 13 V?	Go to step **5**.	Repair the open circuit of harness or poor contact of connector.

	Step	Check	Yes	No
5	**CHECK INPUT SIGNAL FOR TCM.** 1) Turn the ignition switch to OFF. 2) Connect the transmission connector. 3) Start the engine. 4) Read the data of «Turbine Revolution Speed» using the Subaru Select Monitor.	Does the value of «Turbine Revolution Speed» change according to the engine speed?	Current condition is normal. Repair the poor contacts of harnesses of turbine speed sensor and transmission connector.	Go to step **6**.
6	**CHECK TRANSMISSION HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the transmission connector. 3) Lift up the vehicle. 4) Disconnect the turbine speed sensor connector. 5) Measure the resistance between transmission connector and turbine speed sensor connector. ***Connector & terminal*** ***(T3) No. 6 — (AT5) No. 1:*** ***(T3) No. 7 — (AT5) No. 3:*** ***(T3) No. 9 — (AT5) No. 2:***	Is the resistance less than 1 Ω?	Replace the turbine speed sensor. <Ref. to CVT-103, Turbine Speed Sensor.>	Replace the transmission harness.

G: DTC P0719 BRAKE SWITCH CIRCUIT LOW

DTC DETECTING CONDITION:
Brake switch malfunction or input signal circuit of brake switch is open or shorted.
TROUBLE SYMPTOM:
Gear is not shifted down when climbing a hill or driving down a hill.
WIRING DIAGRAM:
Stop light system <Ref. to WI-287, Stop Light System.>

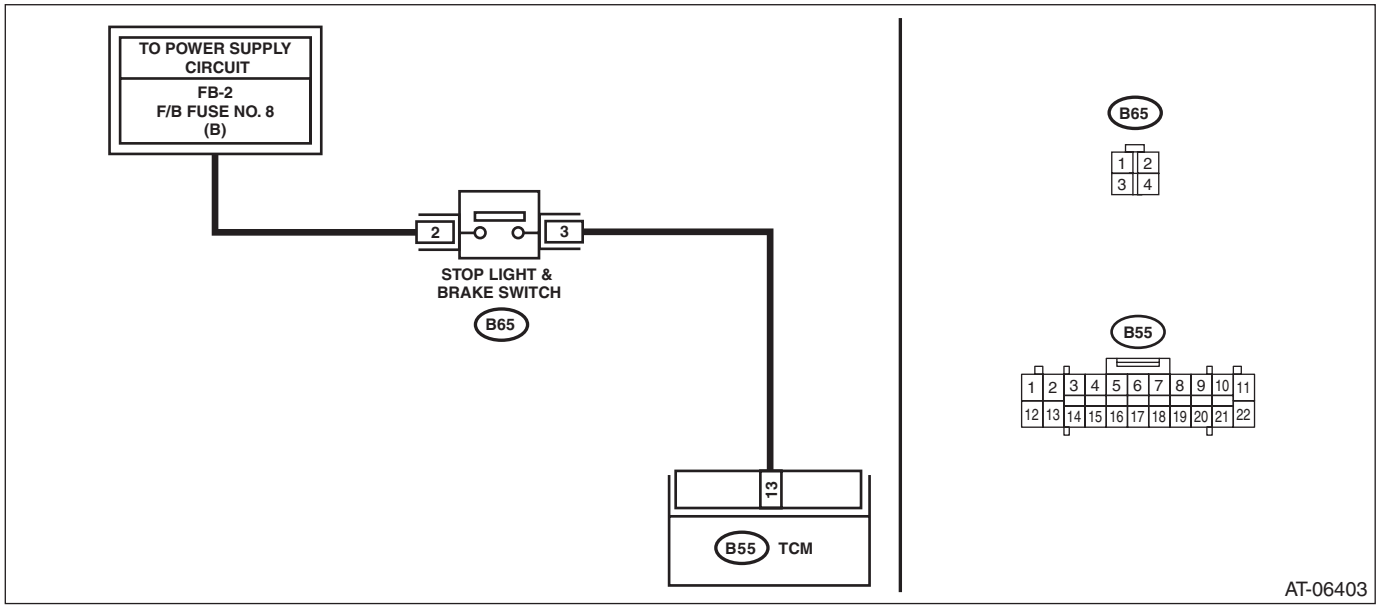


	Step	Check	Yes	No
1	**CHECK FUSE (NO. 8).** 1) Turn the ignition switch to OFF. 2) Remove the fuse (No. 8).	Is the fuse (No. 8) blown out?	Replace the fuse (No. 8). If the new fuse (No. 8) has blown out easily, repair the short circuit of harness between fuse (No. 8) and stop light switch.	Go to step **2**.
2	**CHECK HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the TCM and stop light switch connector. 3) Measure the resistance between TCM connector and stop light switch connector. ***Connector & terminal*** ***(B55) No. 13 — (B65) No. 3:***	Is the resistance less than 1 Ω?	Go to step **3**.	Repair the open circuit of harness.
3	**CHECK HARNESS.** Measure the resistance between the stop light switch connector and fuse (No. 8). ***Connector & terminal*** ***(B65) No. 2 — fuse (No. 8):***	Is the resistance less than 1 Ω?	Go to step **4**.	Repair the open circuit of harness.
4	**CHECK INPUT SIGNAL FOR TCM.** 1) Install the fuse (No. 8). 2) Connect the TCM and stop light switch connector. 3) Depress the brake pedal. 4) Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 13 (+) — Chassis ground (–):***	Is the voltage 10 V or more?	Go to step **5**.	Replace the stop light switch. <Ref. to BR-63, Stop Light Switch.>

	Step	Check	Yes	No
5	**CHECK INPUT SIGNAL FOR TCM.** With brake pedal depressed, read the data of «Stop Light Switch» using Subaru Select Monitor.	Is “ON” displayed?	Current condition is normal. Check for poor contact in connectors or harnesses, and repair the defective part.	Go to step **6**.
6	**CHECK FOR POOR CONTACT.**	Is there poor contact of input signal of stop light switch?	Repair the poor contact.	Check the TCM.

H: DTC P0724 BRAKE SWITCH CIRCUIT HIGH

DTC DETECTING CONDITION:
Brake switch malfunction or input signal circuit of brake switch is shorted.
TROUBLE SYMPTOM:
Gear is not shifted down when climbing a hill or driving down a hill.
WIRING DIAGRAM:
Stop light system <Ref. to WI-287, Stop Light System.>



Step		Check	Yes	No
1	**CHECK STOP LIGHT SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect the stop light switch connector. 3) Measure the resistance of harness between stop light switch connectors. ***Connector & terminal*** ***(B65) No. 2 — No. 3:***	Is the resistance 1 MΩ or more?	Go to step **2**.	Replace the stop light switch. <Ref. to BR-63, Stop Light Switch.>
2	**CHECK HARNESS.** 1) Disconnect the TCM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 13 (+) — Chassis ground (–):***	Is the voltage 10 V or more?	Repair the short circuit of harness.	Go to step **3**.
3	**CHECK INPUT SIGNAL FOR TCM.** 1) Connect the TCM and stop light switch connector. 2) Turn the ignition switch to ON. 3) Read the data of «Stop Light Switch» using Subaru Select Monitor.	Is “OFF” displayed?	Current condition is normal. Check for poor contact in connectors or harnesses, and repair the defective part.	Go to step **4**.
4	**CHECK FOR POOR CONTACT.**	Is there poor contact of input signal of stop light switch?	Repair the poor contact.	Check the TCM.

I: DTC P0730 GEARSHIFT CONTROL PERFORMANCE ABNORMAL

DTC DETECTING CONDITION:

- Control valve hydraulic circuit malfunction
- Primary UP solenoid, primary Down solenoid characteristics malfunction
- CVT chain slippage

TROUBLE SYMPTOM:

- Acceleration is poor during standing start.
- Shift control malfunction
- Engine speed increases abruptly.

	Step	Check	Yes	No
1	**CHECK TRANSMISSION FLUID.** Check the condition of ATF. <Ref. to CVT-39, CONDITION CHECK, CVTF.>	Is the ATF OK?	Go to step **2**.	Check according to the "corrective action" of ATF (CVTF) "CONDITION CHECK". <Ref. to CVT-39, CONDITION CHECK, CVTF.>
2	**CHECK TRANSMISSION FLUID.** Check the amount of ATF. <Ref. to CVT-36, ADJUSTMENT, CVTF.>	Is the ATF amount correct?	Go to step **3**.	Adjust the amount of ATF. <Ref. to CVT-36, ADJUSTMENT, CVTF.>
3	**CHECK INPUT SIGNAL FOR TCM.** 1) Lift up the vehicle. 2) Start the engine. 3) Warm up until the ATF temperature reaches to 40 — 70°C (104 — 158°F). 4) Shift the select lever to "P" range. 5) Stabilize the engine speed at idle. 6) Read the data of «Actual secondary pressure» using Subaru Select Monitor.	Is the «Actual secondary pressure» 0.5 — 1.5 MPa?	Go to step **4**.	Perform the diagnosis according to DTC P0841 procedure.
4	**CHECK INPUT SIGNAL FOR TCM.** 1) Set the select lever to "D" range. 2) Release the brake pedal to stabilize the engine speed and front wheel speed. 3) Read the data of «Actual Gear Ratio» using Subaru Select Monitor.	Is the «Actual Gear Ratio» 1.5 — 2.6?	Go to step **5**.	Go to step **6**.
5	**CHECK INPUT SIGNAL FOR TCM.** 1) Set the select lever to "D" range. 2) Slowly increase the speed to 40 km/h (24 MPH) and keep the constant speed. 3) Read the data of «Actual Gear Ratio» using Subaru Select Monitor.	Is the «Actual Gear Ratio» 0.5 — 0.9?	Go to step **6**.	Replace the transmission assembly. <Ref. to CVT-57, Automatic Transmission Assembly.>
6	**DRIVING CHECK BY INSPECTION MODE.** 1) Turn the ignition switch to OFF. 2) Perform a drive check based on the "Inspection Mode". <Ref. to CVT(diag)-19, Inspection Mode.>	Does the AT OIL TEMP light blink and is DTC P0730 displayed?	Replace the transmission assembly. <Ref. to CVT-57, Automatic Transmission Assembly.>	If there is shift problems, abrupt increase of engine speed, standing start problems, replace the transmission assembly. <Ref. to CVT-57, Automatic Transmission Assembly.> If it is normal, temporary poor contact occurs.

J: DTC P0801 REVERSE INHIBIT CONTROL CIRCUIT

NOTE:
For diagnostic procedures, refer to “BODY CONTROL SYSTEM (DIAGNOSTICS)”. <Ref. to BC(diag)-34, DTC B1106 SHIFT LOCK CIRCUIT FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

K: DTC P0841 SECONDARY OIL PRESSURE SENSOR PERFORMANCE

DTC DETECTING CONDITION:

- Control valve hydraulic circuit malfunction
- Secondary pressure sensor fault or characteristics malfunction

TROUBLE SYMPTOM:

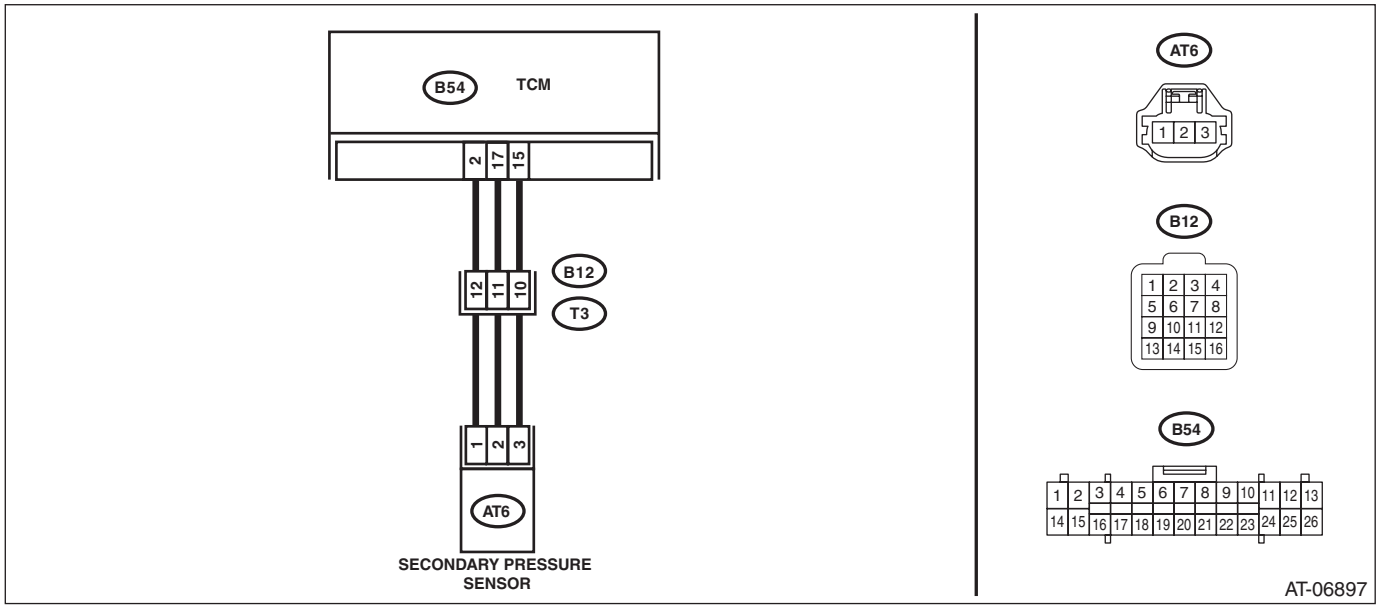
- Acceleration is poor during standing start.
- Shift control malfunction
- Engine speed increases abruptly.

	Step	Check	Yes	No
1	**CHECK TRANSMISSION FLUID.** Check the condition of ATF. <Ref. to CVT-39, CONDITION CHECK, CVTF.>	Is the ATF OK?	Go to step **2**.	Check according to the "corrective action" of ATF (CVTF) "CONDITION CHECK". <Ref. to CVT-39, CONDITION CHECK, CVTF.>
2	**CHECK TRANSMISSION FLUID.** Check the amount of ATF. <Ref. to CVT-36, ADJUSTMENT, CVTF.>	Is the ATF amount correct?	Go to step **3**.	Adjust the amount of ATF. <Ref. to CVT-36, ADJUSTMENT, CVTF.>
3	**CHECK INPUT SIGNAL FOR TCM.** 1) Lift up the vehicle. 2) Start the engine. 3) Warm up until the ATF temperature reaches to 40 — 70°C (104 — 158°F). 4) Shift the select lever to "P" range. 5) Stabilize the engine speed at idle. 6) Read the data of «Actual secondary pressure» using Subaru Select Monitor.	Is the «Actual secondary pressure» 0.5 — 1.5 MPa?	Go to step **4**.	Go to step **6**.
4	**CHECK INPUT SIGNAL FOR TCM.** 1) Keep the engine speed at 3000 rpm. 2) Read the data of «Actual secondary pressure» using Subaru Select Monitor.	Is the «Actual secondary pressure» higher than the value in Step 3? Does the value change according to the engine speed, within the range of 1.5 — 2.5 MPa?	Go to step **5**.	Go to step **6**.
5	**CHECK TCM INPUT SIGNAL (STALL TEST).** 1) Apply the parking brake. 2) Set the select lever to "D" range. 3) Depress the brake pedal firmly. 4) Slowly open the accelerator fully, and stabilize the engine speed. 5) Read the data of «Actual secondary pressure» using Subaru Select Monitor.	Is the «Actual secondary pressure» higher than the value in Step 4? Does the value change according to the engine speed, within the range of 4.5 — 6.0 MPa?	Go to step **7**.	Go to step **6**.
6	**CHECK SECONDARY PRESSURE SENSOR.**	Is the secondary pressure sensor damaged from the standpoint of appearance?	Replace the secondary pressure sensor. <Ref. to CVT-110, Secondary Pressure Sensor.>	Perform the diagnosis according to DTC P0842, P0843 procedure.

	Step	Check	Yes	No
7	**DRIVING CHECK BY INSPECTION MODE.** 1) Turn the ignition switch to OFF. 2) Perform a drive check based on the “Inspection Mode”. <Ref. to CVT(diag)-19, Inspection Mode.>	Does the AT OIL TEMP light blink and is DTC P0841 displayed?	Perform the secondary pressure test. <Ref. to CVT-48, Secondary Pressure (Line Pressure) Test.>	If there is shift problems, abrupt increase of engine speed, standing start problems, replace the transmission assembly. <Ref. to CVT-57, Automatic Transmission Assembly.> If it is normal, temporary poor contact occurs.

L: DTC P0842 SECONDARY OIL PRESSURE SENSOR CIRCUIT (LOW)

DTC DETECTING CONDITION:
Input signal circuit of secondary pressure sensor is open or shorted.
TROUBLE SYMPTOM:
Shift characteristics malfunction
WIRING DIAGRAM:
CVT Control System <Ref. to WI-114, CVT Control System.>

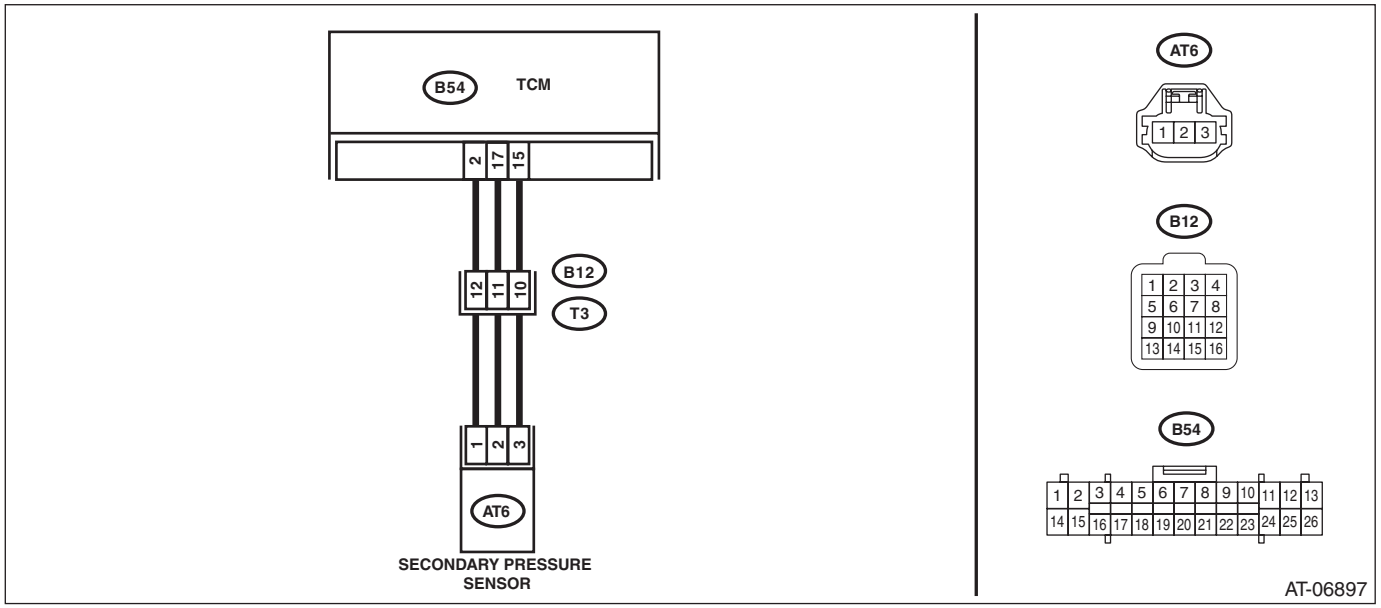


Step		Check	Yes	No
1	**CHECK INPUT SIGNAL FOR TCM.** 1) Start the engine. 2) Warm up until the ATF temperature reaches to 40 — 70°C (104 — 158°F). 3) Shift the select lever to “P” range. 4) Stabilize the engine speed at idle. 5) Read the data of «Actual secondary pressure» using Subaru Select Monitor.	Is the «Actual secondary pressure» 0.5 — 1.5 MPa?	Check for poor contact of connector.	Go to step **2**.
2	**CHECK HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the TCM and transmission connectors. 3) Measure the resistance between TCM connector and transmission connectors. ***Connector & terminal*** ***(B54) No. 2 — (B12) No. 12:*** ***(B54) No. 15 — (B12) No. 10:*** ***(B54) No. 17 — (B12) No. 11:***	Is the resistance less than 1 Ω?	Go to step **3**.	Repair the open circuit of harness.
3	**CHECK HARNESS.** Measure the resistance between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 2 — Chassis ground:*** ***(B54) No. 17 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **4**.	Repair the short circuit of harness.

	Step	Check	Yes	No
4	**CHECK TRANSMISSION HARNESS.** 1) Disconnect the secondary pressure sensor connector. 2) Measure the resistance between transmission connector and secondary pressure sensor connector. ***Connector & terminal*** ***(T3) No. 10 — (AT6) No. 3:*** ***(T3) No. 11 — (AT6) No. 2:*** ***(T3) No. 12 — (AT6) No. 1:***	Is the resistance less than 1 Ω?	Go to step **5**.	Repair the open circuit of harness.
5	**CHECK TRANSMISSION HARNESS.** Measure the resistance between transmission connector and chassis ground. ***Connector & terminal*** ***(T3) No. 11 — Chassis ground:*** ***(T3) No. 12 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **6**.	Repair the short circuit of harness.
6	**CHECK SENSOR POWER SUPPLY.** 1) Connect the connectors of TCM and transmission. 2) Turn the ignition switch to ON. 3) Measure the voltage between secondary pressure sensor connector terminals. ***Connector & terminal*** ***(AT6) No. 1 (+) — (AT6) No. 3 (–):***	Is the voltage 4.5 V or more?	Replace the secondary pressure sensor. <Ref. to CVT-110, Secondary Pressure Sensor.>	Check for poor contact of the connector, and repair the defective part.

M: DTC P0843 SECONDARY OIL PRESSURE SENSOR CIRCUIT (HIGH)

DTC DETECTING CONDITION:
Input signal circuit of secondary pressure sensor is shorted.
TROUBLE SYMPTOM:
Shift characteristics malfunction
WIRING DIAGRAM:
CVT Control System <Ref. to WI-114, CVT Control System.>



Step		Check	Yes	No
1	**CHECK INPUT SIGNAL FOR TCM.** 1) Start the engine. 2) Warm up until the ATF temperature reaches to 40 — 70°C (104 — 158°F). 3) Shift the select lever to “P” range. 4) Stabilize the engine speed at idle. 5) Read the data of «Actual secondary pressure» using Subaru Select Monitor.	Is the «Actual secondary pressure» 0.5 — 1.5 MPa?	Check for poor contact of connector.	Go to step **2**.
2	**CHECK HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the TCM and transmission connectors. 3) Turn the ignition switch to ON. 4) Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 2 (+) — Chassis ground (–):*** ***(B54) No. 17 (+) — Chassis ground (–):***	Is the voltage approx. 0 V?	Go to step **3**.	Repair the short circuit of harness.
3	**CHECK HARNESS.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between TCM connector terminals. ***Connector & terminal*** ***(B54) No. 2 — (B54) No. 17:***	Is the resistance less than 1 Ω?	Repair the short circuit of harness.	Go to step **4**.

	Step	Check	Yes	No
4	**CHECK TRANSMISSION HARNESS.** 1) Disconnect the secondary pressure sensor connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between transmission connector and chassis ground. ***Connector & terminal*** ***(T3) No. 11 (+) — Chassis ground (–):*** ***(T3) No. 12 (+) — Chassis ground (–):***	Is the voltage approx. 0 V?	Go to step **5**.	Repair the short circuit of harness.
5	**CHECK TRANSMISSION HARNESS.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between transmission connector terminals. ***Connector & terminal*** ***(T3) No. 11 — (T3) No. 12:***	Is the resistance less than 1 Ω?	Repair the short circuit of harness.	Go to step **6**.
6	**CHECK SENSOR POWER SUPPLY.** 1) Connect the connectors of TCM and transmission. 2) Turn the ignition switch to ON. 3) Measure the voltage between secondary pressure sensor connector terminals. ***Connector & terminal*** ***(AT6) No. 1 (+) — (AT6) No. 3 (–):***	Is the voltage 4.5 V or more?	Replace the secondary pressure sensor. <Ref. to CVT-110, Secondary Pressure Sensor.>	Check for poor contact of the connector, and repair the defective part.

N: DTC P0890 AT SELF-SHUT RELAY DIAGNOSIS (LOW)

DTC DETECTING CONDITION:

- Power supply circuit of TCM is open or shorted.
- Self shut relay malfunction

TROUBLE SYMPTOM:

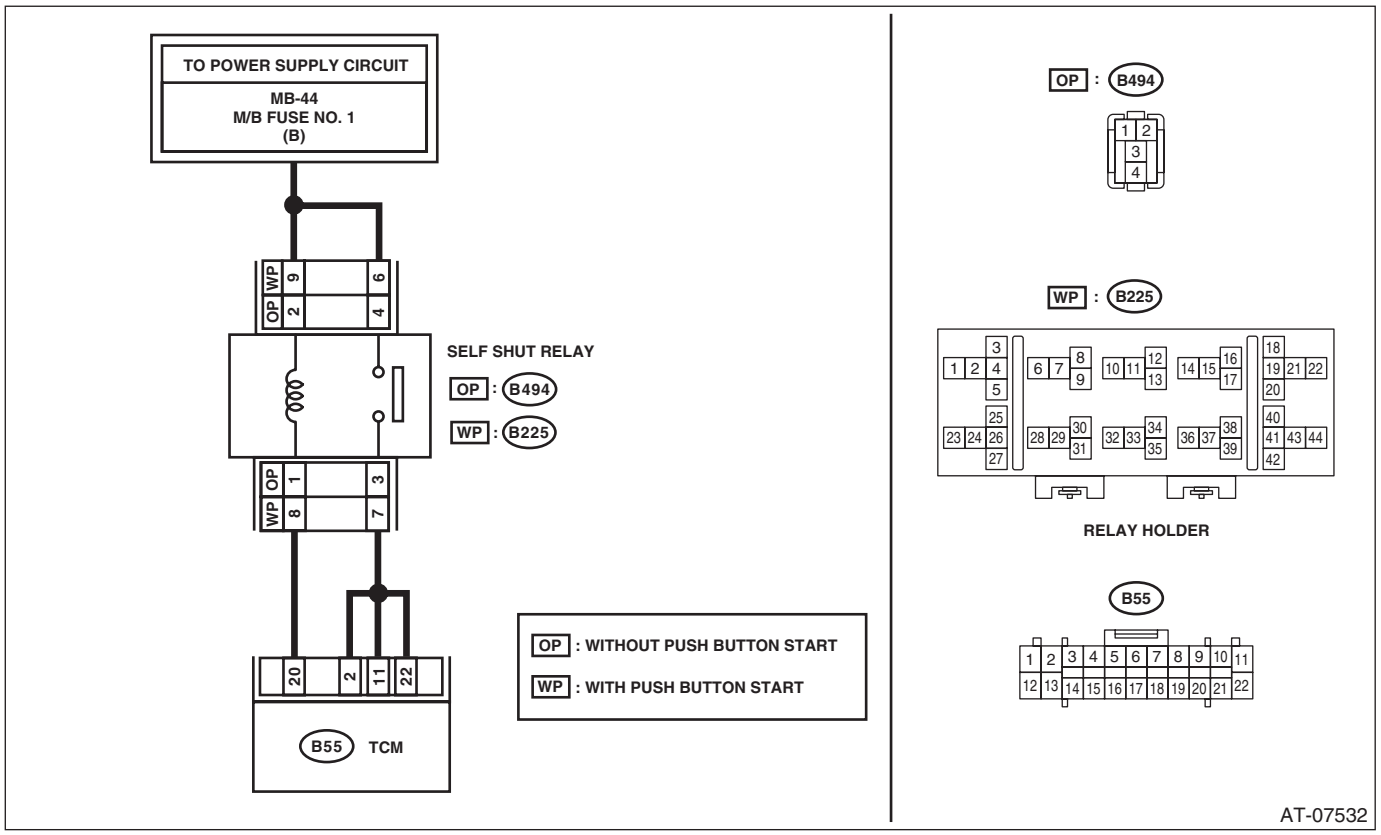
Gear is not changed.

CAUTION:

After diagnosis, perform Clear Memory Mode for ECM. <Ref. to EN(H4DO)(diag)-59, Clear Memory Mode.>

WIRING DIAGRAM:

CVT Control System <Ref. to WI-114, CVT Control System.>

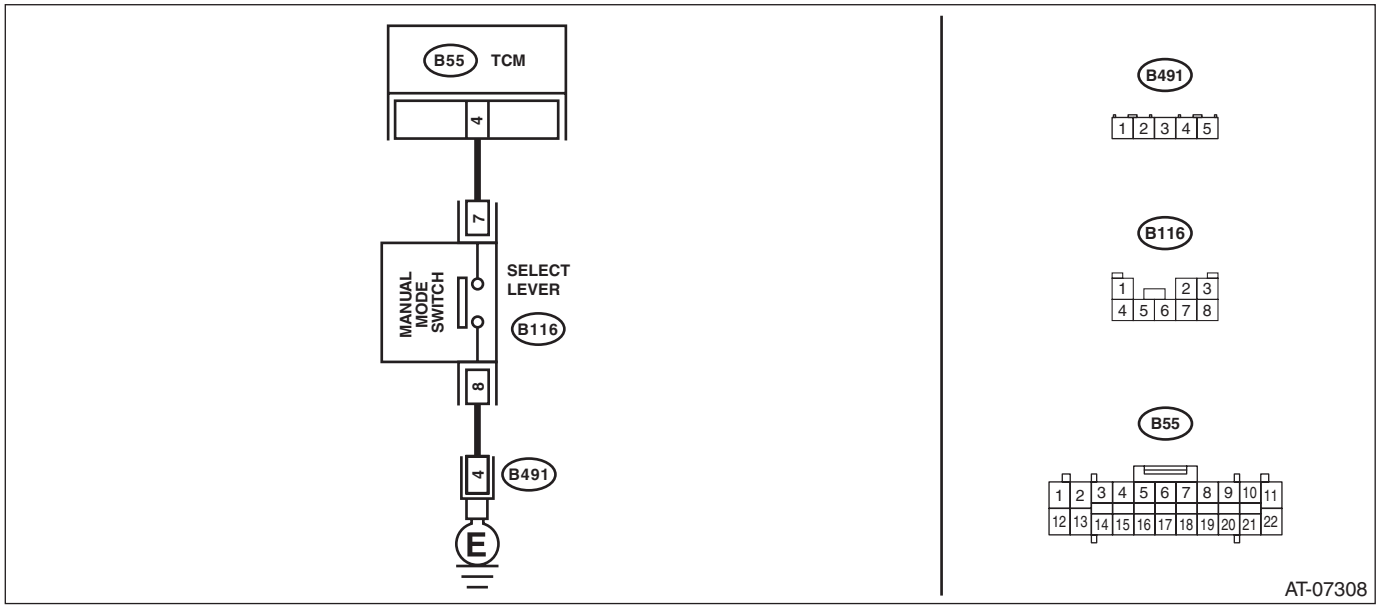


Step		Check	Yes	No
1	**CHECK HARNESS.** 1) Disconnect the TCM and self shut relay connectors. 2) Measure the resistance between TCM connector and self shut relay connector. ***Connector & terminal*** ***Without push button start*** ***(B55) No. 20 — (B494) No. 1:*** ***(B55) No. 2 — (B494) No. 3:*** ***(B55) No. 11 — (B494) No. 3:*** ***(B55) No. 22 — (B494) No. 3:*** ***With push button start*** ***(B55) No. 20 — (B225) No. 8:*** ***(B55) No. 2 — (B225) No. 7:*** ***(B55) No. 11 — (B225) No. 7:*** ***(B55) No. 22 — (B225) No. 7:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair the open circuit of harness.

	Step	Check	Yes	No
2	**CHECK HARNESS.** Measure the resistance between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 20 — Chassis ground:*** ***(B55) No. 2 — Chassis ground:*** ***(B55) No. 11 — Chassis ground:*** ***(B55) No. 22 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **3**.	Repair the short circuit of harness.
3	**CHECK RELAY POWER SUPPLY.** Measure the voltage between self shut relay connector and chassis ground. ***Connector & terminal*** ***Without push button start*** ***(B494) No. 2 (+) — Chassis ground (–):*** ***(B494) No. 4 (+) — Chassis ground (–):*** ***With push button start*** ***(B225) No. 9 (+) — Chassis ground (–):*** ***(B225) No. 6 (+) — Chassis ground (–):***	Is the voltage 10 V or more?	Go to step **4**.	Repair the open or short circuit of harness.
4	**CHECK SELF SHUT RELAY.** Measure the resistance between self shut relay terminals. ***Connector & terminal*** ***Without push button start*** ***(B494) No. 1 — (B494) No. 2:*** ***With push button start*** ***(B225) No. 8 — (B225) No. 9:***	Is the resistance 110 — 140 Ω?	Go to step **5**.	Replace the self shut relay.
5	**CHECK SELF SHUT RELAY.** Measure the resistance between self shut relay terminals. ***Connector & terminal*** ***Without push button start*** ***(B494) No. 3 — (B494) No. 4:*** ***With push button start*** ***(B225) No. 6 — (B225) No. 7:***	Is the resistance 1 MΩ or more?	Go to step **6**.	Replace the self shut relay.
6	**CHECK INPUT SIGNAL FOR TCM.** 1) Connect the connectors of TCM and self shut relay. 2) Read the data of «Control module voltage» using Subaru Select Monitor.	Is the «Control module voltage» 10 V or more?	Current condition is normal. Check for poor contact in connectors or harnesses, and repair the defective part.	Go to step **7**.
7	**CHECK FOR POOR CONTACT.**	Is there poor contact of the self shut relay circuit?	Repair the poor contact.	Check the TCM.

O: DTC P0951 MANUAL SWITCH

DTC DETECTING CONDITION:
Input signal circuit of manual mode switch is open or shorted.
TROUBLE SYMPTOM:
Manual mode can not be set.
WIRING DIAGRAM:
CVT Control System <Ref. to WI-114, CVT Control System.>



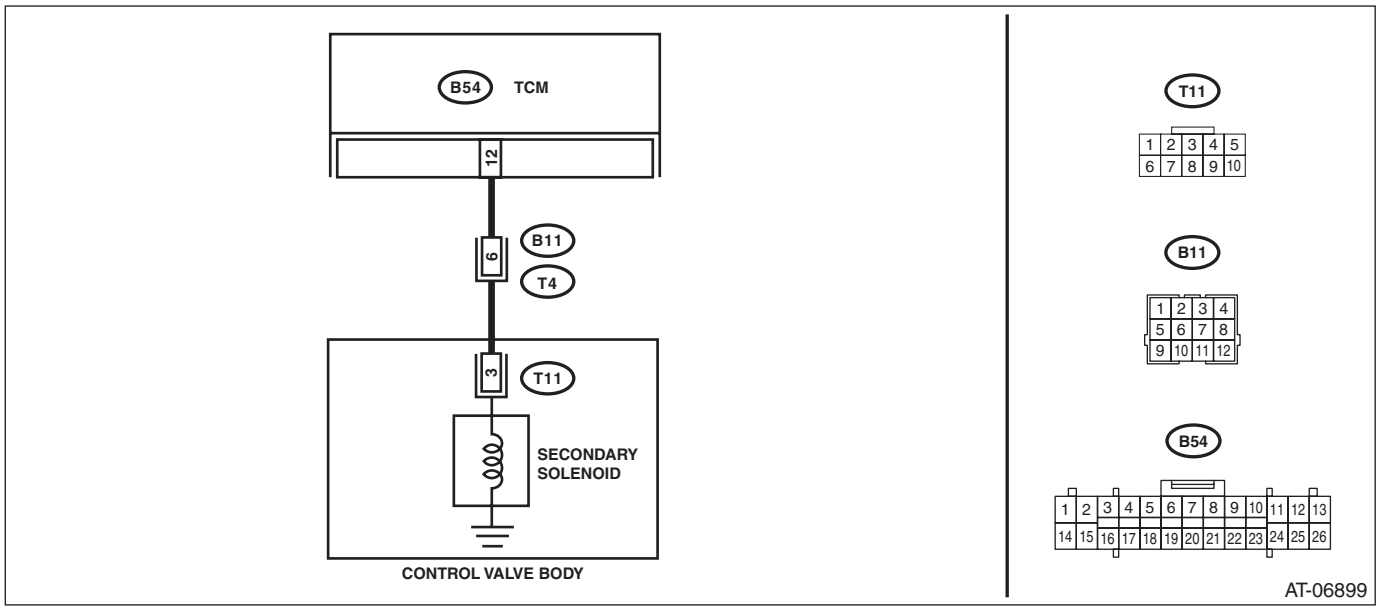
Step		Check	Yes	No
1	**CHECK HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the manual mode switch connector. 3) Measure the resistance between manual mode switch connector and chassis ground. ***Connector & terminal*** ***(B116) No. 8 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair the open circuit of harness.
2	**CHECK MANUAL MODE SWITCH.** Measure the resistance between manual mode switch terminals. ***Connector & terminal*** ***(B116) No. 7 — No. 8:***	Is the resistance 1 MΩ or more?	Go to step **3**.	Replace the select lever assembly. <Ref. to CS-26, Select Lever.>
3	**CHECK MANUAL MODE SWITCH.** 1) Shift the select lever to manual mode. 2) Measure the resistance between manual mode switch terminals. ***Connector & terminal*** ***(B116) No. 7 — No. 8:***	Is the resistance less than 1 Ω?	Go to step **4**.	Replace the select lever assembly. <Ref. to CS-26, Select Lever.>
4	**CHECK HARNESS.** 1) Disconnect the TCM connector. 2) Measure the resistance between TCM connector and manual mode switch connector. ***Connector & terminal*** ***(B55) No. 4 — (B116) No. 7:***	Is the resistance less than 1 Ω?	Go to step **5**.	Repair the open circuit of harness or poor contact of connector.
5	**CHECK HARNESS.** Measure the resistance between manual mode switch connector and chassis ground. ***Connector & terminal*** ***(B116) No. 7 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **6**.	Repair the short circuit of harness.

	Step	Check	Yes	No
6	**CHECK INPUT SIGNAL FOR TCM.** 1) Connect the TCM and manual mode switch connector. 2) Turn the ignition switch to ON. 3) Set the select lever to “D” range. 4) Read the data of «Tiptronic Mode Switch» using Subaru Select Monitor.	Does the value of «Tiptronic Mode Switch» change to “ON” with select lever in manual mode, and “OFF” with select lever in other than manual mode?	Current condition is normal.	Go to step **7**.
7	**CHECK FOR POOR CONTACT.**	Is there poor contact of the manual mode switch circuit?	Repair the poor contact.	Check the TCM.

P: DTC P0962 SECONDARY SOLENOID CIRCUIT (LOW)

DTC DETECTING CONDITION:
Output signal circuit of secondary solenoid is shorted.
TROUBLE SYMPTOM:
- Engine speed increases abruptly, and can not start.
- Engine speed increases abruptly during driving.

WIRING DIAGRAM:
CVT Control System <Ref. to WI-114, CVT Control System.>



	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL FOR TCM.** 1) After driving with warm up condition, park the vehicle while depressing the brake pedal at "N" range. 2) Read the data of «Sec. Sol. Set Current» and «Sec. Sol. Actual Current» using Subaru Select Monitor.	Does the value of «Sec. Sol. Set Current» and «Sec. Sol. Actual Current» almost correspond?	Check for poor contact of connector.	Go to step **2**.
2	**CHECK HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the TCM and transmission connectors. 3) Measure the resistance between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 12 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **3**.	Repair the short circuit of harness.
3	**CHECK SECONDARY SOLENOID.** Measure the resistance between transmission connector and transmission body. ***Connector & terminal*** ***(T4) No. 6 — Transmission body:***	Is the resistance approx. 7 Ω? (when engine cold)	Check for poor contact of the connector, and repair the defective part.	Go to step **4**.
4	**CHECK HARNESS INSIDE TRANSMISSION.** **CAUTION:** **Start work after ATF cools down.** 1) Remove the transmission valve cover. 2) Check for the harness pinch, damage.	Is the harness normal?	Go to step **5**.	Replace the transmission harness.

	Step	Check	Yes	No
5	**CHECK HARNESS INSIDE TRANSMISSION.** 1) Disconnect the control valve body connector. 2) Measure the resistance between transmission connector and transmission body. ***Connector & terminal*** ***(T4) No. 6 — Transmission body:***	Is the resistance 1 MΩ or more?	Replace the control valve body. <Ref. to CVT-116, Control Valve Body.>	Replace the transmission harness.

Q: DTC P0963 SECONDARY SOLENOID CIRCUIT (HIGH)

DTC DETECTING CONDITION:

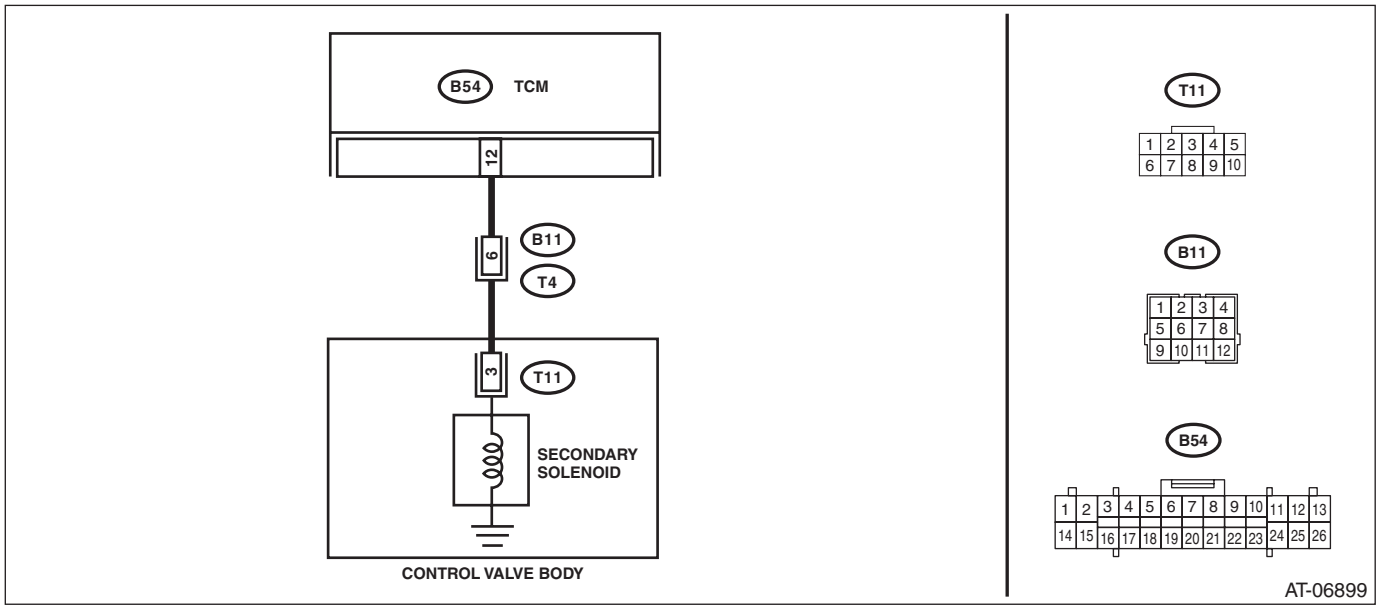
- Output signal circuit of secondary solenoid is open or shorted.
- Secondary solenoid has open circuit inside.

TROUBLE SYMPTOM:

- Engine speed increases abruptly, and can not start.
- Engine speed increases abruptly during driving.

WIRING DIAGRAM:

CVT Control System <Ref. to WI-114, CVT Control System.>



	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL FOR TCM.** 1) After driving with warm up condition, park the vehicle while depressing the brake pedal at "N" range. 2) Read the data of «Sec. Sol. Set Current» and «Sec. Sol. Actual Current» using Subaru Select Monitor.	Does the value of «Sec. Sol. Set Current» and «Sec. Sol. Actual Current» almost correspond?	Check for poor contact of connector.	Go to step **2**.
2	**CHECK HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the TCM and transmission connectors. 3) Measure the resistance between TCM connector and transmission connectors. ***Connector & terminal*** ***(B54) No. 12 — (B11) No. 6:***	Is the resistance less than 1 Ω?	Go to step **3**.	Repair the open circuit of harness.
3	**CHECK HARNESS.** 1) Turn the ignition switch to ON. 2) Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 12 (+) — Chassis ground (–):***	Is the voltage approx. 0 V?	Go to step **4**.	Repair the short circuit of harness.
4	**CHECK SECONDARY SOLENOID.** Measure the resistance between transmission connector and transmission body. ***Connector & terminal*** ***(T4) No. 6 — Transmission body:***	Is the resistance approx. 7 Ω? (when engine cold)	Check for poor contact of the connector, and repair the defective part.	Go to step **5**.

	Step	Check	Yes	No
5	**CHECK HARNESS INSIDE TRANSMISSION.** **CAUTION:** **Start work after ATF cools down.** 1) Remove the transmission valve cover. 2) Check for the harness pinch, damage.	Is the harness normal?	Go to step **6**.	Replace the transmission harness.
6	**CHECK HARNESS INSIDE TRANSMISSION.** 1) Disconnect the control valve body connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between transmission connector and transmission body. ***Connector & terminal*** ***(T4) No. 6 (+) — Transmission body (–):***	Is the voltage approx. 0 V?	Replace the control valve body. <Ref. to CVT-116, Control Valve Body.>	Replace the transmission harness.

R: DTC P0965 FORWARD & REVERSE SOLENOID FUNCTION

DTC DETECTING CONDITION:

- Control valve hydraulic circuit malfunction
- F&R solenoid characteristics malfunction
- Clutch slippage caused by forward clutch facing deterioration
- Clutch slippage caused by hydraulic pressure leaks

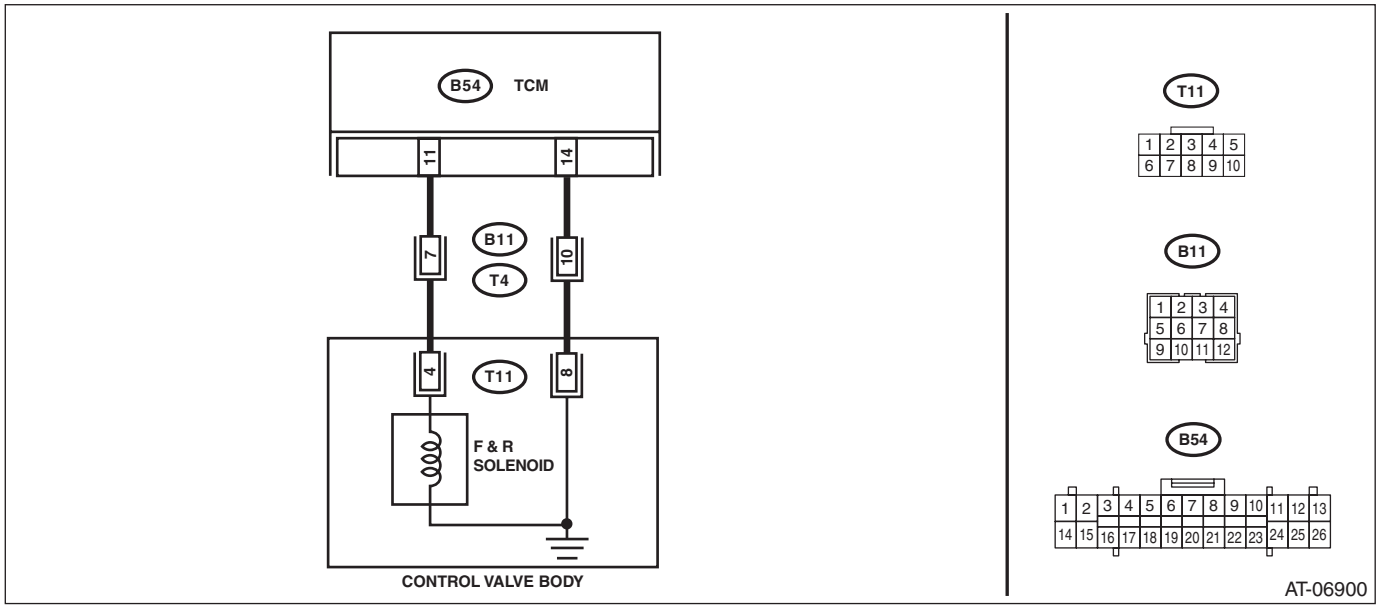
TROUBLE SYMPTOM:

- Engine speed increases abruptly, and can not accelerate.
- Excessive slippage is felt.

	Step	Check	Yes	No
1	**CHECK TRANSMISSION FLUID.** Check the condition of ATF. <Ref. to CVT-39, CONDITION CHECK, CVTF.>	Is the ATF OK?	Go to step **2**.	Check according to the "corrective action" of ATF (CVTF) "CONDITION CHECK". <Ref. to CVT-39, CONDITION CHECK, CVTF.>
2	**CHECK TRANSMISSION FLUID.** Check the amount of ATF. <Ref. to CVT-36, ADJUSTMENT, CVTF.>	Is the ATF amount correct?	Go to step **3**.	Adjust the amount of ATF. <Ref. to CVT-36, ADJUSTMENT, CVTF.>
3	**CHECK INPUT SIGNAL FOR TCM.** 1) Start the engine. 2) Warm up until the ATF temperature reaches to 40 — 70°C (104 — 158°F). 3) Shift the select lever to "P" range. 4) Stabilize the engine speed at idle. 5) Read the data of «Actual secondary pressure» using Subaru Select Monitor.	Is the «Actual secondary pressure» 0.5 — 1.5 MPa?	Go to step **4**.	Perform the diagnosis according to DTC P0841 procedure.
4	**STALL TEST.** Perform the stall test. <Ref. to CVT-46, Stall Test.>	Is the stall test normal?	Go to step **5**.	If the engine speed increases abruptly, replace the transmission assembly. <Ref. to CVT-57, Automatic Transmission Assembly.>
5	**DRIVING CHECK BY INSPECTION MODE.** 1) Turn the ignition switch to OFF. 2) Perform a drive check based on the "Inspection Mode". <Ref. to CVT(diag)-19, Inspection Mode.>	Does the AT OIL TEMP light blink and is DTC P0965 displayed?	Replace the transmission assembly. <Ref. to CVT-57, Automatic Transmission Assembly.>	If there is abrupt increase of engine speed, standing start problems, replace the transmission assembly. <Ref. to CVT-57, Automatic Transmission Assembly.> If it is normal, temporary poor contact occurs.

S: DTC P0966 FORWARD & REVERSE SOLENOID CIRCUIT (LOW)

DTC DETECTING CONDITION:
Output signal circuit of F&R solenoid is shorted.
TROUBLE SYMPTOM:
Excessive shift shock
WIRING DIAGRAM:
CVT Control System <Ref. to WI-114, CVT Control System.>



	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL FOR TCM.** 1) After driving with warm up condition, park the vehicle while depressing the brake pedal at "D" range. 2) Read the data of «F&R Linear Solenoid Set Current» and «F&R Linear Solenoid Actual Current» using Subaru Select Monitor.	Does the value of «F&R Linear Solenoid Set Current» and «F&R Linear Solenoid Actual Current» almost correspond?	Check for poor contact of connector.	Go to step **2**.
2	**CHECK HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the TCM and transmission connectors. 3) Measure the resistance between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 11 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **3**.	Repair the short circuit of harness.
3	**CHECK F&R SOLENOID.** Measure the resistance between transmission connector and transmission body. ***Connector & terminal*** ***(T4) No. 7 — Transmission body:***	Is the resistance approx. 6 Ω? (when engine cold)	Check for poor contact of the connector, and repair the defective part.	Go to step **4**.
4	**CHECK HARNESS INSIDE TRANSMISSION.** **CAUTION:** **Start work after ATF cools down.** 1) Remove the transmission valve cover. 2) Check for the harness pinch, damage.	Is the harness normal?	Go to step **5**.	Replace the transmission harness.

	Step	Check	Yes	No
5	**CHECK HARNESS INSIDE TRANSMISSION.** 1) Disconnect the control valve body connector. 2) Measure the resistance between transmission connector and transmission body. ***Connector & terminal*** ***(T4) No. 7 — Transmission body:***	Is the resistance 1 MΩ or more?	Replace the control valve body. <Ref. to CVT-116, Control Valve Body.>	Replace the transmission harness.

T: DTC P0967 FORWARD & REVERSE LINEAR SOLENOID CIRCUIT (HIGH)

DTC DETECTING CONDITION:

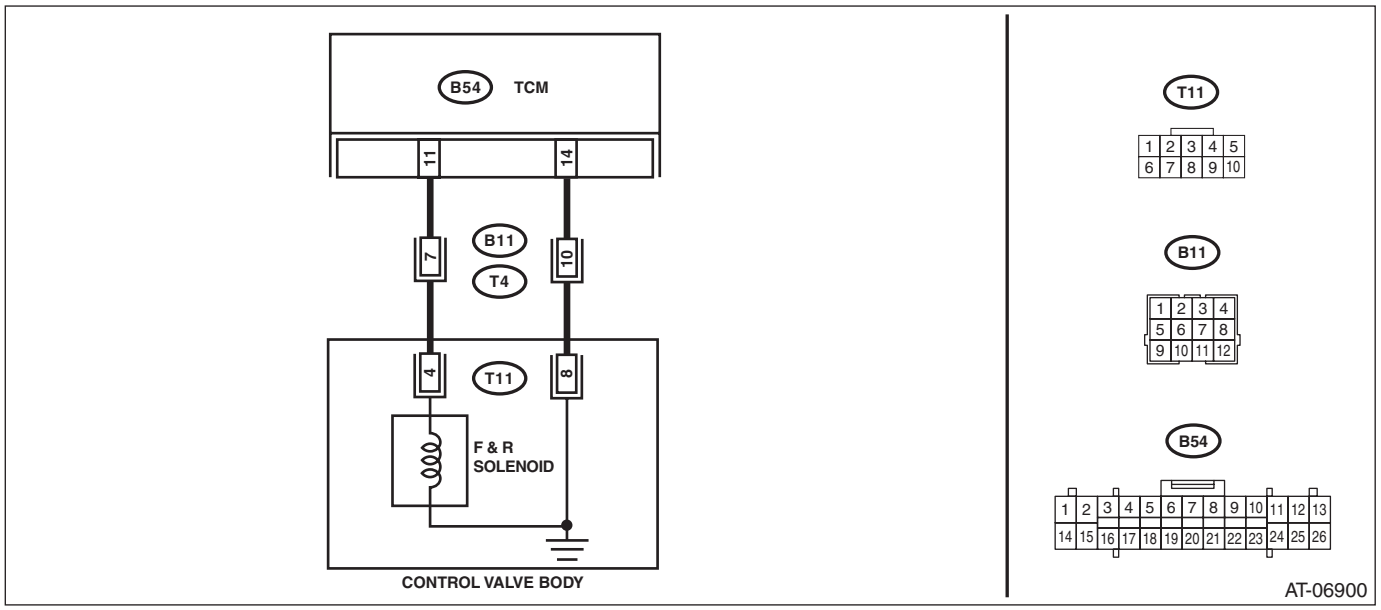
- Output signal circuit of F&R solenoid is open or shorted.
- F&R solenoid has open circuit inside.

TROUBLE SYMPTOM:

Engine speed increases abruptly, and can not start.

WIRING DIAGRAM:

CVT Control System <Ref. to WI-114, CVT Control System.>

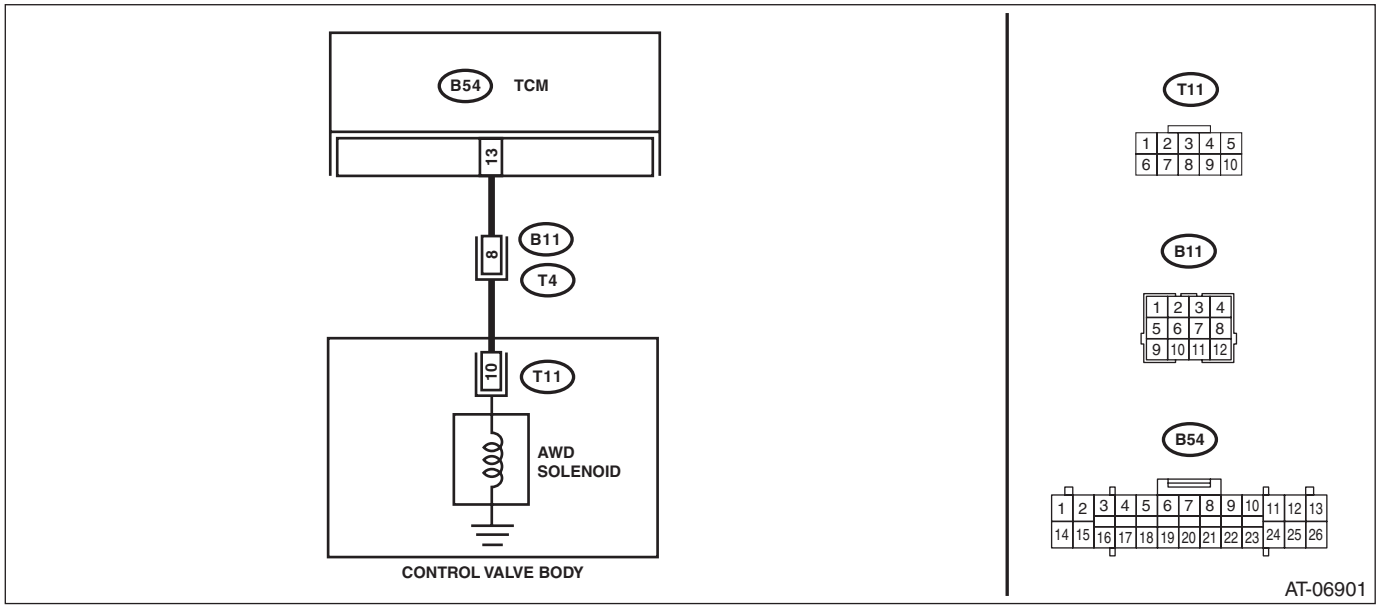


	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL FOR TCM.** 1) After driving with warm up condition, park the vehicle while depressing the brake pedal at "D" range. 2) Read the data of «F&R Linear Solenoid Set Current» and «F&R Linear Solenoid Actual Current» using Subaru Select Monitor.	Does the value of «F&R Linear Solenoid Set Current» and «F&R Linear Solenoid Actual Current» almost correspond?	Check for poor contact of connector.	Go to step **2**.
2	**CHECK HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the TCM and transmission connectors. 3) Measure the resistance between TCM connector and transmission connectors. ***Connector & terminal*** ***(B54) No. 11 — (B11) No. 7:***	Is the resistance less than 1 Ω?	Go to step **3**.	Repair the open circuit of harness.
3	**CHECK HARNESS.** 1) Turn the ignition switch to ON. 2) Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 11 (+) — Chassis ground (–):***	Is the voltage approx. 0 V?	Go to step **4**.	Repair the short circuit of harness.
4	**CHECK F&R SOLENOID.** Measure the resistance between transmission connector and transmission body. ***Connector & terminal*** ***(T4) No. 7 — Transmission body:***	Is the resistance approx. 6 Ω? (when engine cold)	Check for poor contact of the connector, and repair the defective part.	Go to step **5**.

	Step	Check	Yes	No
5	**CHECK HARNESS INSIDE TRANSMISSION.** **CAUTION:** **Start work after ATF cools down.** 1) Remove the transmission valve cover. 2) Check for the harness pinch, damage.	Is the harness normal?	Go to step **6**.	Replace the transmission harness.
6	**CHECK HARNESS INSIDE TRANSMISSION.** 1) Disconnect the control valve body connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between transmission connector and transmission body. ***Connector & terminal*** ***(T4) No. 7 (+) — Transmission body (–):***	Is the voltage approx. 0 V?	Replace the control valve body. <Ref. to CVT-116, Control Valve Body.>	Replace the transmission harness.

U: DTC P0970 TRANSFER SOLENOID CIRCUIT (LOW)

DTC DETECTING CONDITION:
Output signal circuit of AWD solenoid is shorted.
TROUBLE SYMPTOM:
Drivability getting worse.
WIRING DIAGRAM:
CVT Control System <Ref. to WI-114, CVT Control System.>



Step		Check	Yes	No
1	**CHECK HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the TCM and transmission connectors. 3) Measure the resistance between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 13 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **2**.	Repair the short circuit of harness.
2	**CHECK AWD SOLENOID.** Measure the resistance between transmission connector and transmission body. ***Connector & terminal*** ***(T4) No. 8 — Transmission body:***	Is the resistance approx. 4 Ω? (when engine cold)	Check for poor contact of the connector, and repair the defective part.	Go to step **3**.
3	**CHECK HARNESS INSIDE TRANSMISSION.** **CAUTION:** **Start work after ATF cools down.** 1) Remove the transmission valve cover. 2) Check for the harness pinch, damage.	Is the harness normal?	Go to step **4**.	Replace the transmission harness.
4	**CHECK HARNESS INSIDE TRANSMISSION.** 1) Disconnect the control valve body connector. 2) Measure the resistance between transmission connector and transmission body. ***Connector & terminal*** ***(T4) No. 8 — Transmission body:***	Is the resistance 1 MΩ or more?	Replace the control valve body. <Ref. to CVT-116, Control Valve Body.>	Replace the transmission harness.

V: DTC P0971 TRANSFER SOLENOID CIRCUIT (HIGH)

DTC DETECTING CONDITION:

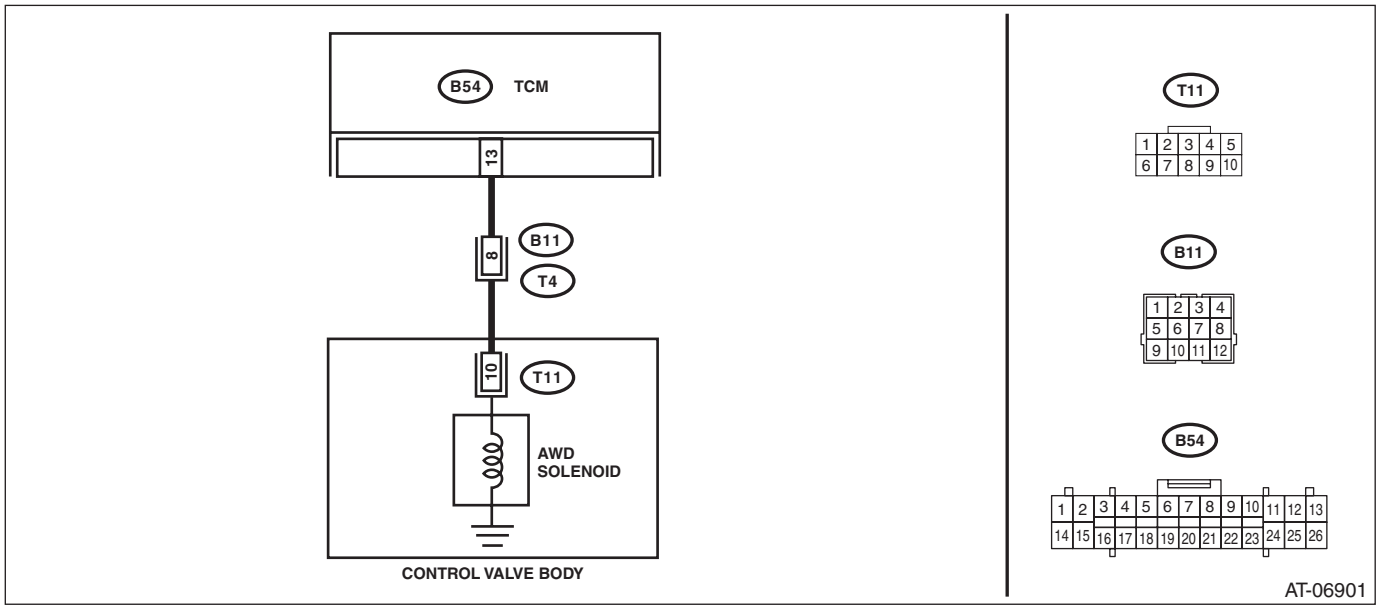
- Output signal circuit of AWD solenoid is open or shorted.
- AWD solenoid has open circuit inside.

TROUBLE SYMPTOM:

- Tight corner braking phenomenon occurs.
- Drivability getting worse.

WIRING DIAGRAM:

CVT Control System <Ref. to WI-114, CVT Control System.>

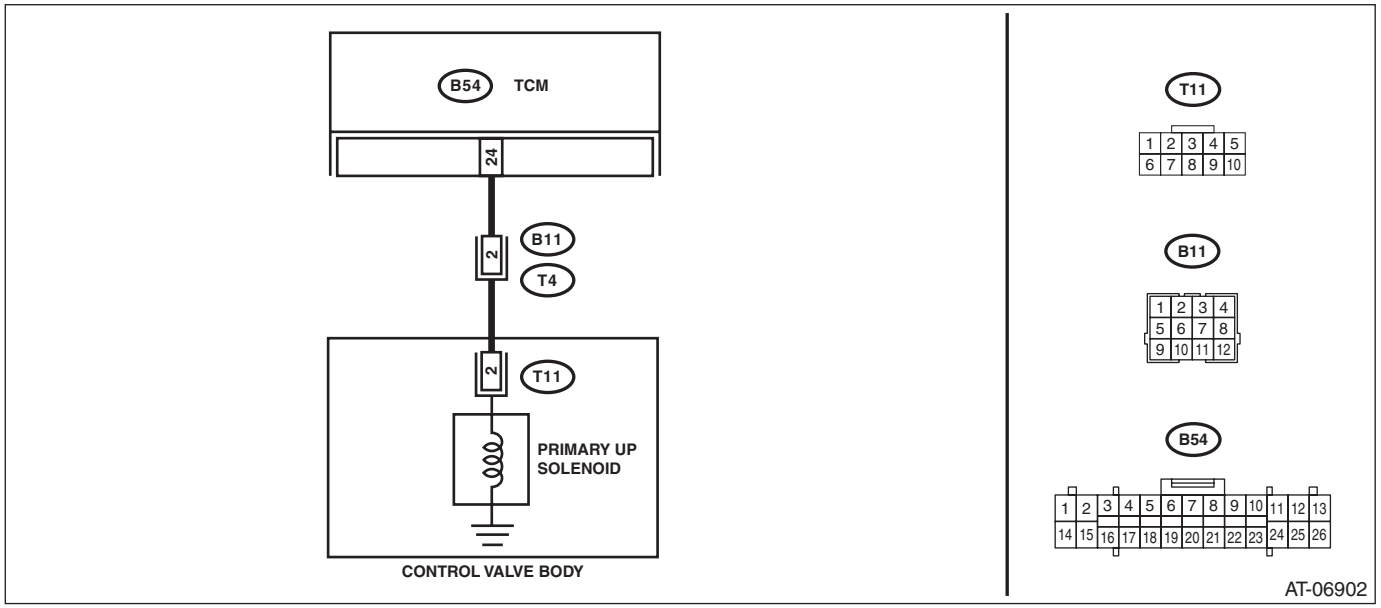


	Step	Check	Yes	No
1	**CHECK HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the TCM and transmission connectors. 3) Measure the resistance between TCM connector and transmission connectors. ***Connector & terminal*** ***(B54) No. 13 — (B11) No. 8:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair the open circuit of harness.
2	**CHECK HARNESS.** 1) Turn the ignition switch to ON. 2) Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 13 (+) — Chassis ground (–):***	Is the voltage approx. 0 V?	Go to step **3**.	Repair the short circuit of harness.
3	**CHECK AWD SOLENOID.** Measure the resistance between transmission connector and transmission body. ***Connector & terminal*** ***(T4) No. 8 — Transmission body:***	Is the resistance approx. 4 Ω? (when engine cold)	Check for poor contact of the connector, and repair the defective part.	Go to step **4**.
4	**CHECK HARNESS INSIDE TRANSMISSION.** **CAUTION:** **Start work after ATF cools down.** 1) Remove the transmission valve cover. 2) Check for the harness pinch, damage.	Is the harness normal?	Go to step **5**.	Replace the transmission harness.

	Step	Check	Yes	No
5	**CHECK HARNESS INSIDE TRANSMISSION.** 1) Disconnect the control valve body connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between transmission connector and transmission body. ***Connector & terminal*** ***(T4) No. 8 (+) — Transmission body (–):***	Is the voltage approx. 0 V?	Replace the control valve body. <Ref. to CVT-116, Control Valve Body.>	Replace the transmission harness.

W: DTC P0973 PRIMARY SOLENOID SYSTEM A CIRCUIT (LOW)

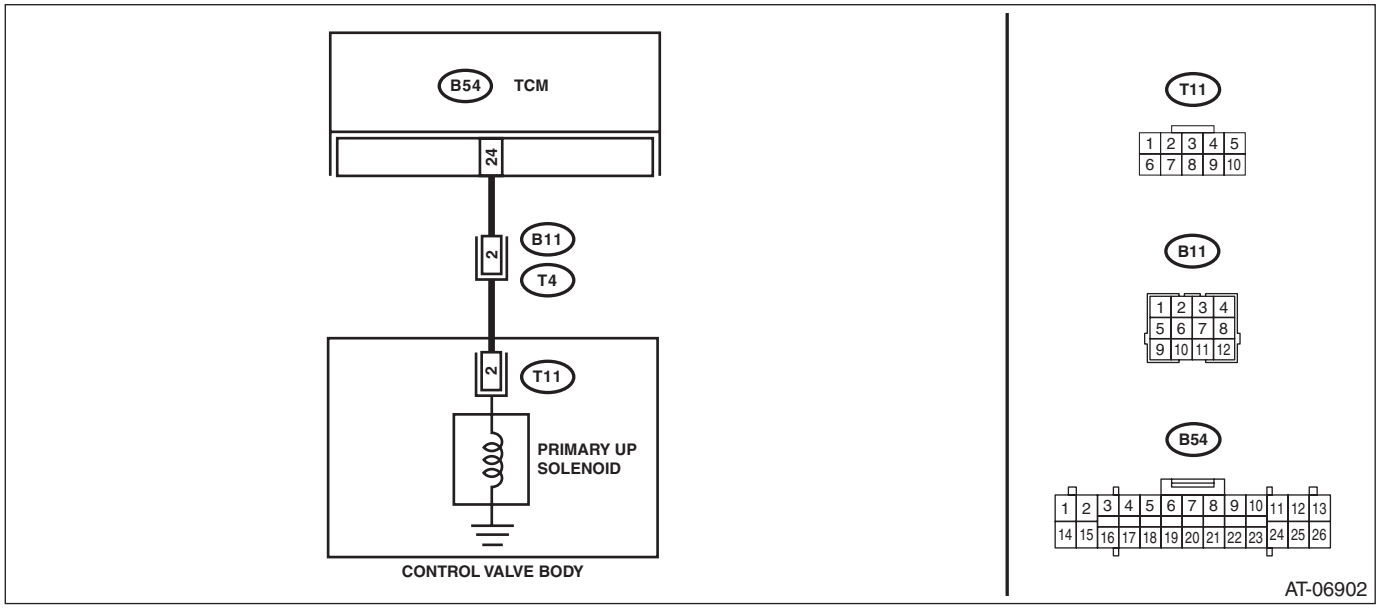
DTC DETECTING CONDITION:
Output signal circuit of primary UP solenoid is shorted.
TROUBLE SYMPTOM:
Gear is not changed. (No up-shift)
WIRING DIAGRAM:
CVT Control System <Ref. to WI-114, CVT Control System.>



Step		Check	Yes	No
1	**CHECK HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the TCM and transmission connectors. 3) Measure the resistance between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 24 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **2**.	Repair the short circuit of harness.
2	**CHECK PRIMARY UP SOLENOID.** Measure the resistance between transmission connector and transmission body. ***Connector & terminal*** ***(T4) No. 2 — Transmission body:***	Is the resistance approx. 13 Ω? (when engine cold)	Check for poor contact of the connector, and repair the defective part.	Go to step **3**.
3	**CHECK HARNESS INSIDE TRANSMISSION.** **CAUTION:** **Start work after ATF cools down.** 1) Remove the transmission valve cover. 2) Check for the harness pinch, damage.	Is the harness normal?	Go to step **4**.	Replace the transmission harness.
4	**CHECK HARNESS INSIDE TRANSMISSION.** 1) Disconnect the control valve body connector. 2) Measure the resistance between transmission connector and transmission body. ***Connector & terminal*** ***(T4) No. 2 — Transmission body:***	Is the resistance 1 MΩ or more?	Replace the control valve body. <Ref. to CVT-116, Control Valve Body.>	Replace the transmission harness.

X: DTC P0974 PRIMARY SOLENOID SYSTEM A CIRCUIT (HIGH)

DTC DETECTING CONDITION:
Output signal circuit of primary UP solenoid is open or shorted.
TROUBLE SYMPTOM:
Gear is not changed. (No up-shift)
WIRING DIAGRAM:
CVT Control System <Ref. to WI-114, CVT Control System.>

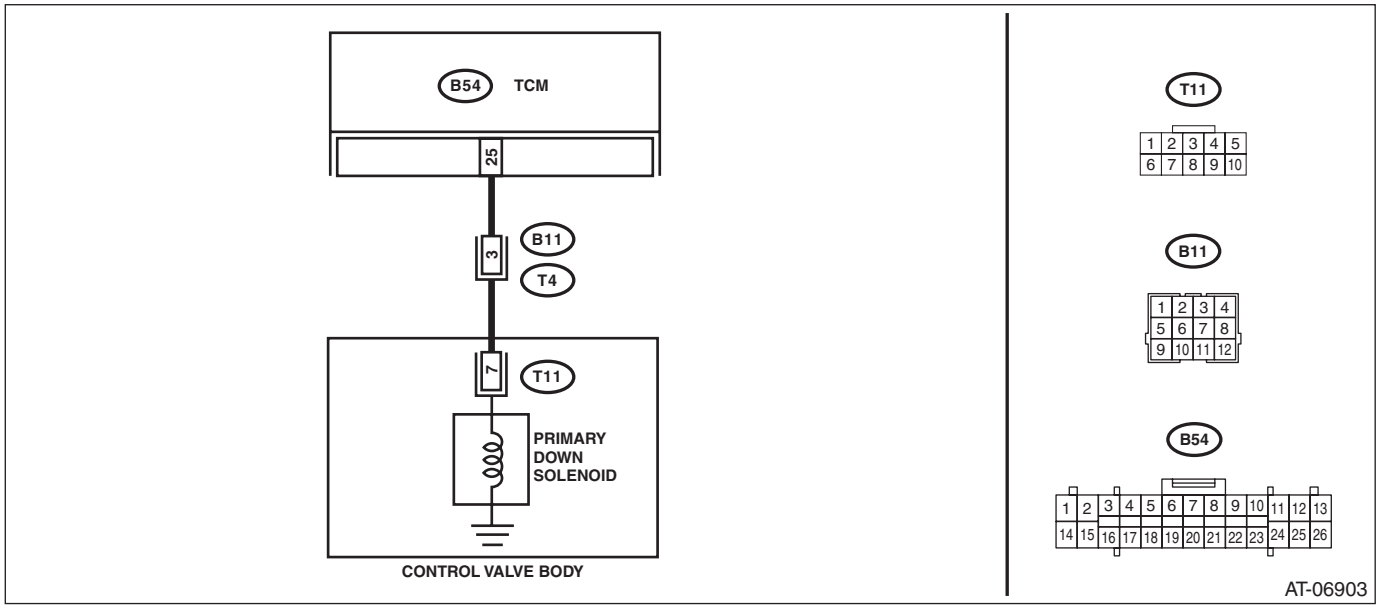


Step		Check	Yes	No
1	**CHECK HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the TCM and transmission connectors. 3) Measure the resistance between TCM connector and transmission connectors. ***Connector & terminal*** ***(B54) No. 24 — (B11) No. 2:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair the open circuit of harness.
2	**CHECK HARNESS.** 1) Turn the ignition switch to ON. 2) Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 24 (+) — Chassis ground (–):***	Is the voltage approx. 0 V?	Go to step **3**.	Repair the short circuit of harness.
3	**CHECK PRIMARY UP SOLENOID.** Measure the resistance between transmission connector and transmission body. ***Connector & terminal*** ***(T4) No. 2 — Transmission body:***	Is the resistance approx. 13 Ω? (when engine cold)	Check for poor contact of the connector, and repair the defective part.	Go to step **4**.
4	**CHECK HARNESS INSIDE TRANSMISSION.** **CAUTION:** **Start work after ATF cools down.** 1) Remove the transmission valve cover. 2) Check for the harness pinch, damage.	Is the harness normal?	Go to step **5**.	Replace the transmission harness.

	Step	Check	Yes	No
5	**CHECK HARNESS INSIDE TRANSMISSION.** 1) Disconnect the control valve body connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between transmission connector and transmission body. ***Connector & terminal*** ***(T4) No. 2 (+) — Transmission body (–):***	Is the voltage approx. 0 V?	Replace the control valve body. <Ref. to CVT-116, Control Valve Body.>	Replace the transmission harness.

Y: DTC P0976 PRIMARY SOLENOID SYSTEM B CIRCUIT (LOW)

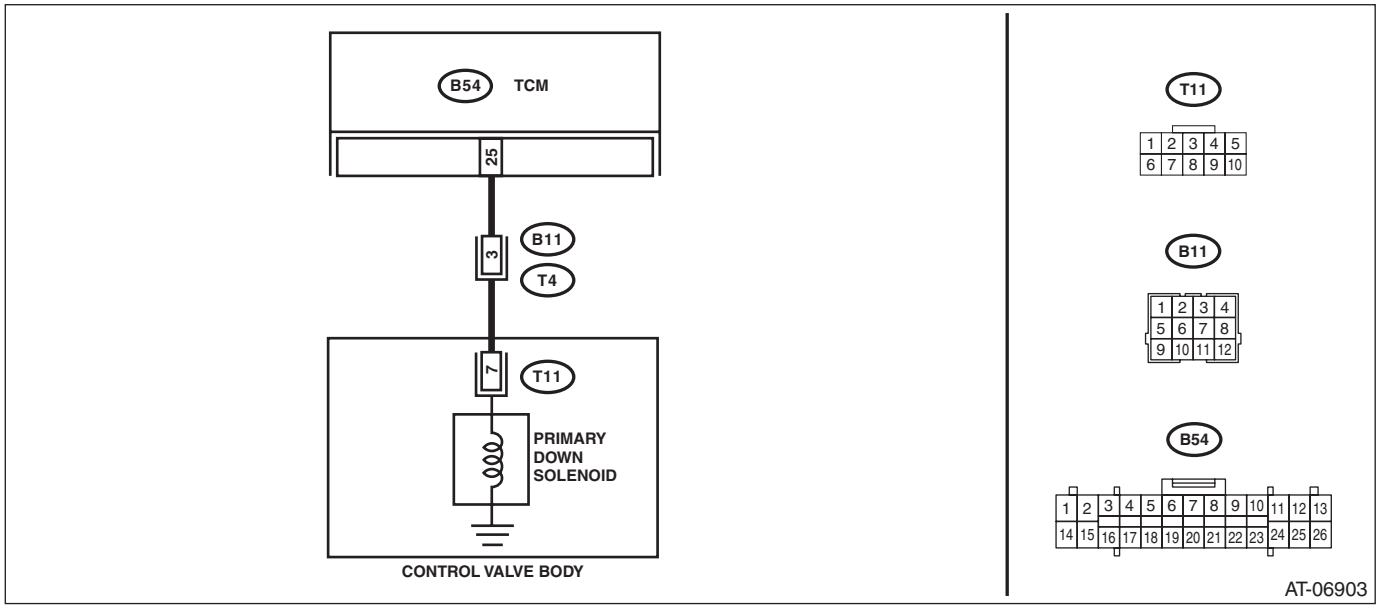
DTC DETECTING CONDITION:
Output signal circuit of primary DOWN solenoid is shorted.
TROUBLE SYMPTOM:
Gear is not changed. (No down-shift)
WIRING DIAGRAM:
CVT Control System <Ref. to WI-114, CVT Control System.>



Step		Check	Yes	No
1	**CHECK HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the TCM and transmission connectors. 3) Measure the resistance between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 25 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **2**.	Repair the short circuit of harness.
2	**CHECK PRIMARY DOWN SOLENOID.** Measure the resistance between transmission connector and transmission body. ***Connector & terminal*** ***(T4) No. 3 — Transmission body:***	Is the resistance approx. 13 Ω? (when engine cold)	Check for poor contact of the connector, and repair the defective part.	Go to step **3**.
3	**CHECK HARNESS INSIDE TRANSMISSION.** **CAUTION:** **Start work after ATF cools down.** 1) Remove the transmission valve cover. 2) Check for the harness pinch, damage.	Is the harness normal?	Go to step **4**.	Replace the transmission harness.
4	**CHECK HARNESS INSIDE TRANSMISSION.** 1) Disconnect the control valve body connector. 2) Measure the resistance between transmission connector and transmission body. ***Connector & terminal*** ***(T4) No. 3 — Transmission body:***	Is the resistance 1 MΩ or more?	Replace the control valve body. <Ref. to CVT-116, Control Valve Body.>	Replace the transmission harness.

Z: DTC P0977 PRIMARY SOLENOID SYSTEM B CIRCUIT (HIGH)

DTC DETECTING CONDITION:
Output signal circuit of primary DOWN solenoid is open or shorted.
TROUBLE SYMPTOM:
Gear is not changed. (No down-shift)
WIRING DIAGRAM:
CVT Control System <Ref. to WI-114, CVT Control System.>



Step		Check	Yes	No
1	**CHECK HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the TCM and transmission connectors. 3) Measure the resistance between TCM connector and transmission connectors. ***Connector & terminal*** ***(B54) No. 25 — (B11) No. 3:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair the open circuit of harness.
2	**CHECK HARNESS.** 1) Turn the ignition switch to ON. 2) Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 25 (+) — Chassis ground (–):***	Is the voltage approx. 0 V?	Go to step **3**.	Repair the short circuit of harness.
3	**CHECK PRIMARY DOWN SOLENOID.** Measure the resistance between transmission connector and transmission body. ***Connector & terminal*** ***(T4) No. 3 — Transmission body:***	Is the resistance approx. 13 Ω? (when engine cold)	Check for poor contact of the connector, and repair the defective part.	Go to step **4**.
4	**CHECK HARNESS INSIDE TRANSMISSION.** **CAUTION:** **Start work after ATF cools down.** 1) Remove the transmission valve cover. 2) Check for the harness pinch, damage.	Is the harness normal?	Go to step **5**.	Replace the transmission harness.

	Step	Check	Yes	No
5	**CHECK HARNESS INSIDE TRANSMISSION.** 1) Disconnect the control valve body connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between transmission connector and transmission body. ***Connector & terminal*** ***(T4) No. 3 (+) — Transmission body (–):***	Is the voltage approx. 0 V?	Replace the control valve body. <Ref. to CVT-116, Control Valve Body.>	Replace the transmission harness.

AA:DTC P1724 AT EEPROM ERROR

DTC DETECTING CONDITION:

- TCM EEPROM malfunction
- EEPROM writing error during self shut control

TROUBLE SYMPTOM:

- AT learning is not finished.
- Shock occurs when selecting N → D, N → R.

	Step	Check	Yes	No
1	**CHECK TCM CONNECTOR.**	Is the connection of TCM connector correct?	Go to step **2**.	Connect the TCM connector.
2	**CHECK SELF SHUT RELAY.** Turn the ignition switch to ON.	Does the relay operates simultaneously?	Go to step **3**.	Perform the diagnosis according to DTC P0890.
3	**CHECK SELF SHUT RELAY.** Turn the ignition switch to OFF.	Does the relay operate after two or three seconds delay?	Go to step **4**.	Perform the diagnosis according to DTC P0890.
4	**PERFORM AT LEARNING.** 1) Clear the AT learning value. 2) Perform the AT learning. <Ref. to CVT(diag)-20, Learning Control.> 3) Start the engine.	Does the AT OIL TEMP light blink after AT learning is finished correctly?	Check the TCM.	Go to step **5**.
5	**CHECK FOR ANY OTHER DTC ON DISPLAY.** 1) Perform «Clear Memory». 2) Turn the ignition switch to OFF. 3) Start the engine after 10 seconds. 4) Repeat steps 2) and 3).	Does the AT OIL TEMP light blink and is DTC P1724 displayed?	Check the TCM.	Current condition is normal. Check for poor contact of TCM connector or harness.

AB:DTC P2746 PRIMARY PULLEY REVOLUTION SPEED SENSOR CIRCUIT

DTC DETECTING CONDITION:

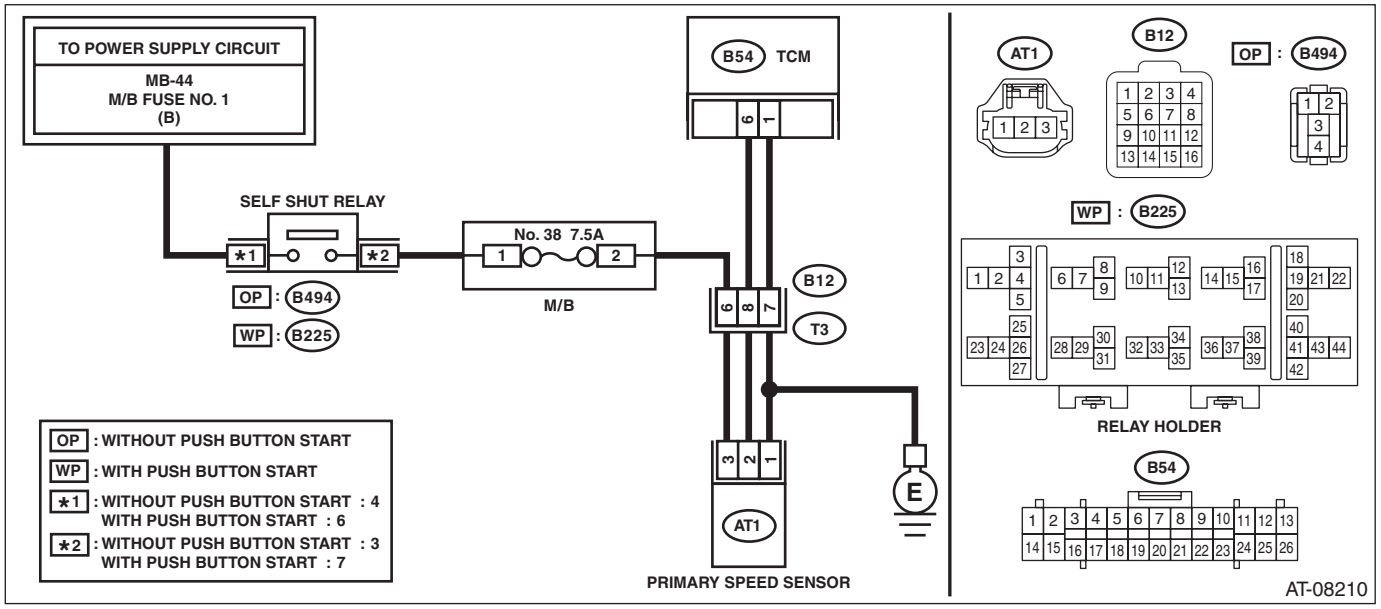
- Output signal circuit of primary speed sensor is open or shorted.
- Primary speed sensor malfunction

TROUBLE SYMPTOM:

- Standing start problems
- Shock occurs when engaging the lockup clutch.
- Shock occurs when selecting shift position.

WIRING DIAGRAM:

CVT control system <Ref. to WI-114, CVT Control System.>



Step		Check	Yes	No
1	**CHECK FUSE.** 1) Turn the ignition switch to OFF. 2) Remove the M/B fuse (No. 38).	Is the fuse OK?	Go to step **2**.	Replace the fuse. If the fuse blows out easily, repair the short circuit of harness.
2	**CHECK HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the TCM and transmission connectors. 3) Measure the resistance between TCM connector and transmission connectors. ***Connector & terminal*** ***(B54) No. 1 — (B12) No. 7:*** ***(B54) No. 6 — (B12) No. 8:*** ***(M/B No. 38) No. 2 — (B12) No. 6:***	Is the resistance less than 1 Ω?	Go to step **3**.	Repair the open circuit of harness.
3	**CHECK HARNESS.** Measure the resistance between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 6 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **4**.	Repair the short circuit of harness.
4	**CHECK TRANSMISSION HARNESS.** 1) Connect the TCM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between transmission connector terminals. ***Connector & terminal*** ***(B12) No. 6 (+) — (B12) No. 7 (–):***	Is the voltage 10 — 13 V?	Go to step **5**.	Repair the open circuit of harness or poor contact of connector.

	Step	Check	Yes	No
5	**CHECK INPUT SIGNAL FOR TCM.** 1) Turn the ignition switch to OFF. 2) Connect the transmission connector. 3) Lift up the vehicle. 4) Start the engine. 5) Set the select lever to “D” range. 6) Read the data of «Primary Pulley Speed» using Subaru Select Monitor.	Does the value of «Primary Pulley Speed» change according to those of «Turbine Revolution Speed»?	Current condition is normal. Repair the poor contacts of harnesses of primary speed sensor and transmission connector.	Go to step **6**.
6	**CHECK TRANSMISSION HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the transmission connector. 3) Disconnect the primary speed sensor connector. 4) Measure the resistance between transmission connector and primary speed sensor connector. ***Connector & terminal*** ***(T3) No. 6 — (AT1) No. 3:*** ***(T3) No. 7 — (AT1) No. 1:*** ***(T3) No. 8 — (AT1) No. 2:***	Is the resistance less than 1 Ω?	Replace the primary speed sensor. <Ref. to CVT-107, Primary Speed Sensor.>	Replace the transmission harness.

AC:DTC P2750 SEC. PULLEY REVOLUTION SPEED SENSOR CIRCUIT

DTC DETECTING CONDITION:

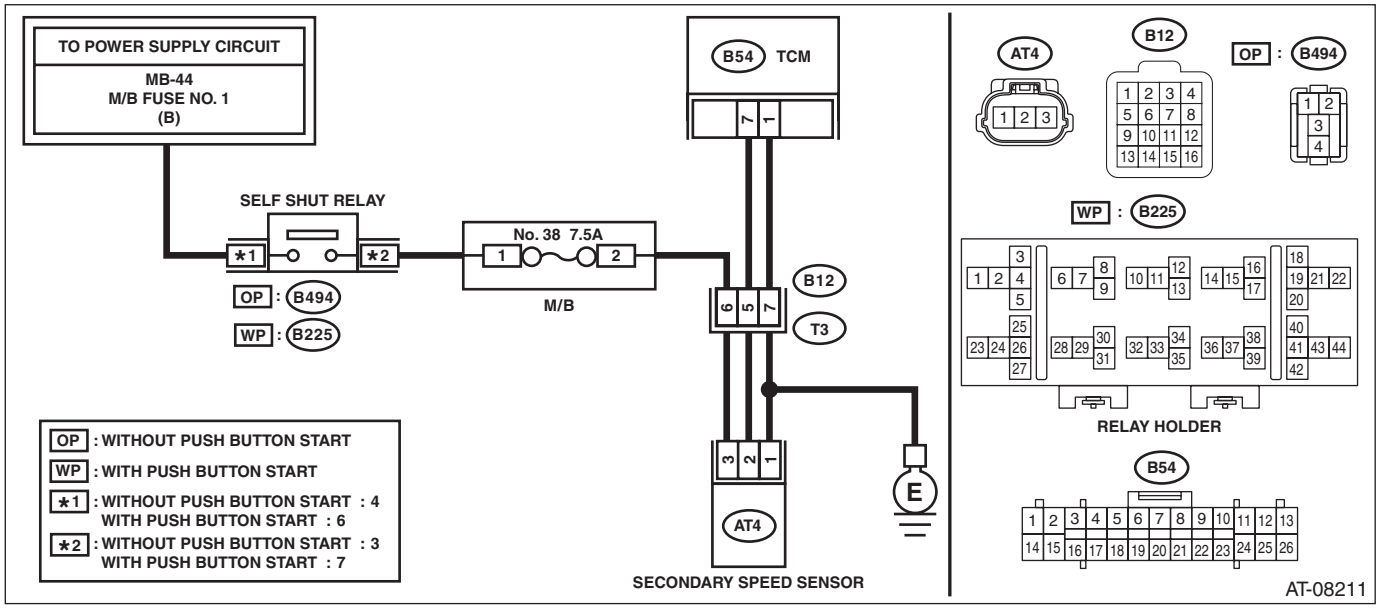
- Output signal circuit of secondary speed sensor is open or shorted.
- Secondary speed sensor malfunction

TROUBLE SYMPTOM:

- Shifting shock is felt.
- Acceleration is poor during standing start.
- Shift control malfunction

WIRING DIAGRAM:

CVT control system <Ref. to WI-114, CVT Control System.>



Step		Check	Yes	No
1	**CHECK FUSE.** 1) Turn the ignition switch to OFF. 2) Remove the M/B fuse (No. 38).	Is the fuse OK?	Go to step **2**.	Replace the fuse. If the fuse blows out easily, repair the short circuit of harness.
2	**CHECK HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the TCM and transmission connectors. 3) Measure the resistance between TCM connector and transmission connectors. ***Connector & terminal*** ***(B54) No. 1 — (B12) No. 7:*** ***(B54) No. 7 — (B12) No. 5:*** ***(M/B No. 38) No. 2 — (B12) No. 6:***	Is the resistance less than 1 Ω?	Go to step **3**.	Repair the open circuit of harness.
3	**CHECK HARNESS.** Measure the resistance between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 7 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **4**.	Repair the short circuit of harness.
4	**CHECK TRANSMISSION HARNESS.** 1) Connect the TCM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between transmission connector terminals. ***Connector & terminal*** ***(B12) No. 6 (+) — (B12) No. 7 (–):***	Is the voltage 10 — 13 V?	Go to step **5**.	Repair the open circuit of harness or poor contact of connector.

	Step	Check	Yes	No
5	**CHECK INPUT SIGNAL FOR TCM.** 1) Turn the ignition switch to OFF. 2) Connect the transmission connector. 3) Lift up the vehicle. 4) Start the engine. 5) Set the select lever to “D” range. 6) Read the data of «Secondary Pulley Speed» using Subaru Select Monitor.	Does the value of «Secondary Pulley Speed» change according to those of «Front Wheel Speed»?	Current condition is normal. Repair the poor contacts of harnesses of secondary speed sensor and transmission connector.	Go to step **6**.
6	**CHECK TRANSMISSION HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the transmission connector. 3) Disconnect the secondary speed sensor connector. 4) Measure the resistance between transmission connector and secondary speed sensor connector. ***Connector & terminal*** ***(T3) No. 5 — (AT4) No. 2:*** ***(T3) No. 6 — (AT4) No. 3:*** ***(T3) No. 7 — (AT4) No. 1:***	Is the resistance less than 1 Ω?	Replace the secondary speed sensor. <Ref. to CVT-105, Secondary Speed Sensor.>	Replace the transmission harness.

AD:DTC P2762 LOCK-UP DUTY SOLENOID MALFUNCTION

DTC DETECTING CONDITION:

- Lock up clutch malfunction
- Hydraulic leaks or hydraulic valve stick of lock up system

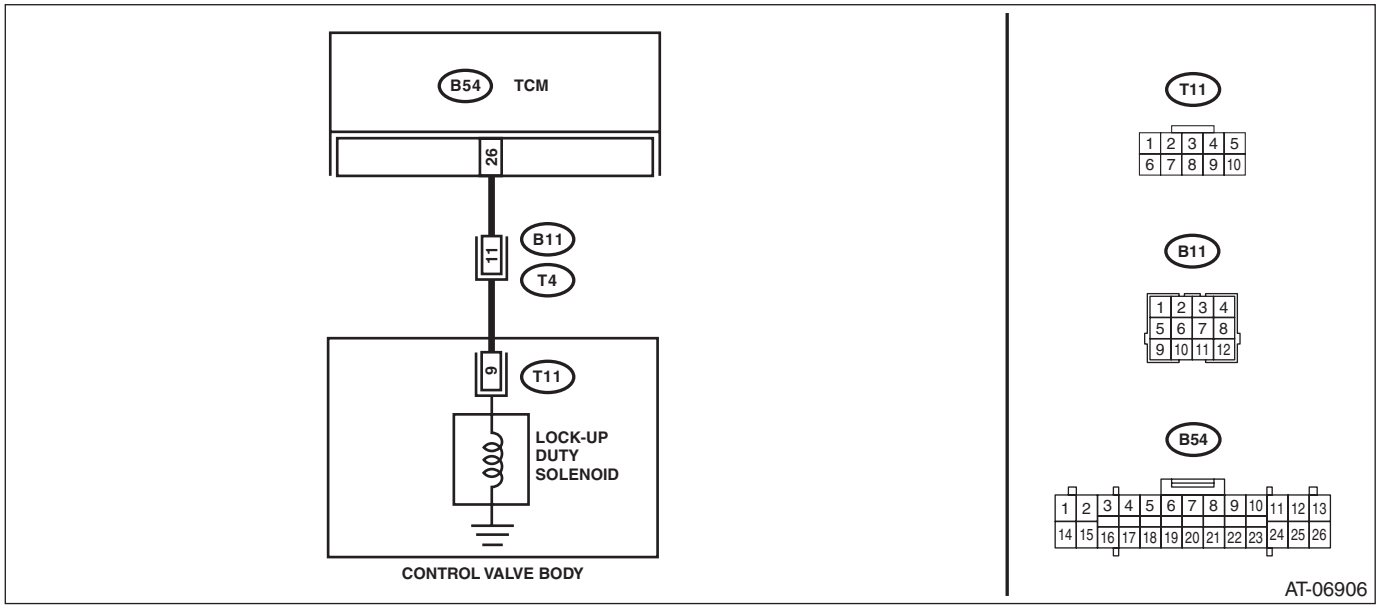
TROUBLE SYMPTOM:

- No lock-up occurs.
- Engine speed increases abruptly during driving.

	Step	Check	Yes	No
1	**CHECK DTC.** Read the DTC relating the ECM using the Subaru Select Monitor.	Is DTC displayed?	Perform the diagnosis according to DTC.	Go to step **2**.
2	**CHECK DTC.** Read the DTC relating the TCM using the Subaru Select Monitor.	Are DTC P0841, P0842, P0843 displayed?	Perform the diagnosis according to DTC.	Go to step **3**.
3	**CHECK TRANSMISSION FLUID.** Check the condition of ATF. <Ref. to CVT-39, CONDITION CHECK, CVTF.>	Is the ATF OK?	Go to step **4**.	Check according to the "corrective action" of ATF (CVTF) "CONDITION CHECK". <Ref. to CVT-39, CONDITION CHECK, CVTF.>
4	**CHECK TRANSMISSION FLUID.** Check the amount of ATF. <Ref. to CVT-36, ADJUSTMENT, CVTF.>	Is the ATF amount correct?	Go to step **5**.	Adjust the amount of ATF. <Ref. to CVT-36, ADJUSTMENT, CVTF.>
5	**CHECK INPUT SIGNAL FOR TCM.** 1) Lift up the vehicle. 2) Start the engine. 3) Warm up until the ATF temperature reaches to 40 — 70°C (104 — 158°F). 4) Shift the select lever to "P" range. 5) Stabilize the engine speed at idle. 6) Read the data of «Actual secondary pressure» using Subaru Select Monitor.	Is the «Actual secondary pressure» 0.5 — 1.5 MPa?	Go to step **6**.	Perform the diagnosis according to DTC P0841 procedure.
6	**DRIVING CHECK FOR LOCK-UP CONDITION.** 1) Perform the "Clear Memory Mode". <Ref. to CVT(diag)-18, Clear Memory Mode.> 2) Turn the ignition switch to OFF. 3) Start the engine. 4) Warm up until the ATF temperature exceeds 50°C. 5) Drive the vehicle for one minute or more while keeping the constant speed so that the display shown in the Subaru Select Monitor is as follows: «Lock Up Duty Ratio» is 70 % or more, and «Front Wheel Speed» is 40 km/h or more. 6) Turn the ignition switch to OFF. 7) Start the engine. 8) Perform the procedure in step 5) again. 9) Read the DTC using Subaru Select Monitor.	Does the AT OIL TEMP light blink and is DTC P2762 displayed?	Perform the secondary pressure test. <Ref. to CVT-48, Secondary Pressure (Line Pressure) Test.> When DTC other than P2762 is displayed, perform the diagnosis corresponding to the DTC.	Current condition is normal. Temporary oil pressure malfunction.

AE:DTC P2763 LOCK-UP DUTY SOLENOID CIRCUIT (HIGH)

DTC DETECTING CONDITION:
Output signal circuit of lock-up duty solenoid is open or shorted.
TROUBLE SYMPTOM:
Engine stalls.
WIRING DIAGRAM:
CVT Control System <Ref. to WI-114, CVT Control System.>

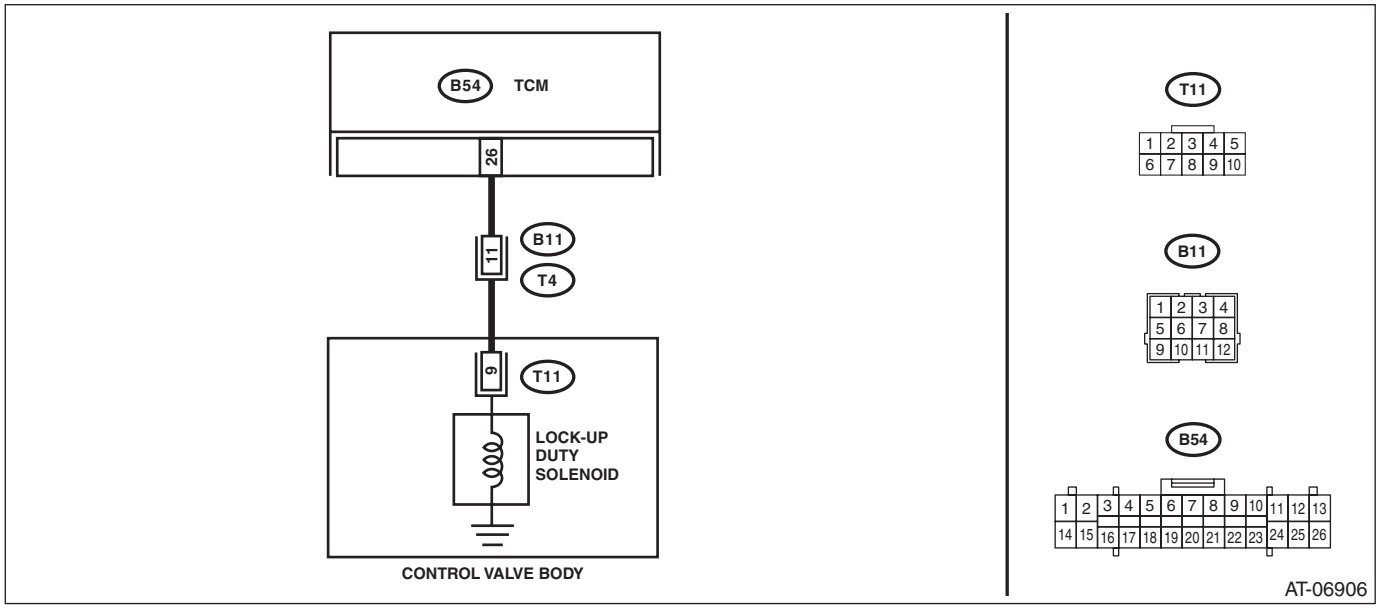


Step		Check	Yes	No
1	**CHECK HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the TCM and transmission connectors. 3) Measure the resistance between TCM connector and transmission connectors. ***Connector & terminal*** ***(B54) No. 26 — (B11) No. 11:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair the open circuit of harness.
2	**CHECK HARNESS.** 1) Turn the ignition switch to ON. 2) Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 26 (+) — Chassis ground (–):***	Is the voltage approx. 0 V?	Go to step **3**.	Repair the short circuit of harness.
3	**CHECK LOCK-UP DUTY SOLENOID.** Measure the resistance between transmission connector and transmission body. ***Connector & terminal*** ***(T4) No. 11 — Transmission body:***	Is the resistance approx. 13 Ω? (when engine cold)	Check for poor contact of the connector, and repair the defective part.	Go to step **4**.
4	**CHECK HARNESS INSIDE TRANSMISSION.** **CAUTION:** **Start work after ATF cools down.** 1) Remove the transmission valve cover. 2) Check for the harness pinch, damage.	Is the harness normal?	Go to step **5**.	Replace the transmission harness.

	Step	Check	Yes	No
5	**CHECK HARNESS INSIDE TRANSMISSION.** 1) Disconnect the control valve body connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between transmission connector and transmission body. ***Connector & terminal*** ***(T4) No. 11 (+) — Transmission body (–):***	Is the voltage approx. 0 V?	Replace the control valve body. <Ref. to CVT-116, Control Valve Body.>	Replace the transmission harness.

AF:DTC P2764 LOCK-UP DUTY SOLENOID CIRCUIT (LOW)

DTC DETECTING CONDITION:
Output signal circuit of lock up duty solenoid is shorted.
TROUBLE SYMPTOM:
No lock-up occurs.
WIRING DIAGRAM:
CVT Control System <Ref. to WI-114, CVT Control System.>



	Step	Check	Yes	No
1	**CHECK HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the TCM and transmission connectors. 3) Measure the resistance between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 26 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **2**.	Repair the short circuit of harness.
2	**CHECK LOCK-UP DUTY SOLENOID.** Measure the resistance between transmission connector and transmission body. ***Connector & terminal*** ***(T4) No. 11 — Transmission body:***	Is the resistance approx. 13 Ω? (when engine cold)	Check for poor contact of the connector, and repair the defective part.	Go to step **3**.
3	**CHECK HARNESS INSIDE TRANSMISSION.** **CAUTION:** **Start work after ATF cools down.** 1) Remove the transmission valve cover. 2) Check for the harness pinch, damage.	Is the harness normal?	Go to step **4**.	Replace the transmission harness.
4	**CHECK HARNESS INSIDE TRANSMISSION.** 1) Disconnect the control valve body connector. 2) Measure the resistance between transmission connector and transmission body. ***Connector & terminal*** ***(T4) No. 11 — Transmission body:***	Is the resistance 1 MΩ or more?	Replace the control valve body. <Ref. to CVT-116, Control Valve Body.>	Replace the transmission harness.

AG:DTC U0073 CONTROL MODULE COMMUNICATION BUS “A” OFF

NOTE:
Refer to “LAN SYSTEM (DIAGNOSTICS)” for diagnostic procedures. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>

AH:DTC U0100 LOST COMMUNICATION WITH ECM/PCM “A”

NOTE:
Refer to “LAN SYSTEM (DIAGNOSTICS)” for diagnostic procedures. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>

AI: DTC U0122 LOST COMMUNICATION WITH VEHICLE DYNAMICS CONTROL MODULE

NOTE:
Refer to “LAN SYSTEM (DIAGNOSTICS)” for diagnostic procedures. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>

AJ:DTC U0140 LOST COMMUNICATION WITH BODY CONTROL MODULE

NOTE:
Refer to “LAN SYSTEM (DIAGNOSTICS)” for diagnostic procedures. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>

AK:DTC U0155 LOST COMMUNICATION WITH INSTRUMENT PANEL CLUSTER (IPC) CONTROL MODULE

NOTE:
Refer to “LAN SYSTEM (DIAGNOSTICS)” for diagnostic procedures. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>

AL:DTC U0401 INVALID DATA RECEIVED FROM ECM/PCM “A”

NOTE:
Refer to “LAN SYSTEM (DIAGNOSTICS)” for diagnostic procedures. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>

AM:DTC U0416 INVALID DATA RECEIVED FROM VEHICLE DYNAMICS CONTROL MODULE

NOTE:
Refer to “LAN SYSTEM (DIAGNOSTICS)” for diagnostic procedures. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>

AN:DTC U0422 INVALID DATA RECEIVED FROM BODY CONTROL MODULE

NOTE:
Refer to “LAN SYSTEM (DIAGNOSTICS)” for diagnostic procedures. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>

AO:DTC U0423 INVALID DATA RECEIVED FROM INSTRUMENT PANEL CLUSTER CONTROL MODULE

NOTE:
Refer to “LAN SYSTEM (DIAGNOSTICS)” for diagnostic procedures. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>

16.Diagnostic Procedure without Diagnostic Trouble Code (DTC)

A: CHECK SHIFT INDICATOR

DIAGNOSIS:

- Output signal circuit of shift indicator is open or shorted.
- Combination meter malfunction

TROUBLE SYMPTOM:

- Shift indicator does not display or remains displayed.
- Shift indicator display does not change.

	Step	Check	Yes	No
1	**CHECK TCM.** Check the DTC relating the TCM using the Subaru Select Monitor.	Is DTC U0155 or U0423 displayed?	Perform the self-diagnosis of combination meter.	Go to step **2**.
2	**CHECK TCM.** Check the DTC relating the TCM using the Subaru Select Monitor.	Are DTCs other than U0155 and U0423 displayed?	Perform the diagnosis according to DTC.	Go to step **3**.
3	**CHECK COMBINATION METER.** Check the DTC of combination meter.	Is DTC displayed?	Perform the diagnosis according to DTC.	Go to step **4**.
4	**CHECK TCM.** 1) Operate the + side of the paddle shift switch. 2) Read the data of «Up Switch» using the Subaru Select Monitor.	Does it change between ON and OFF according to the operation?	Go to step **5**.	Check for poor contact between TCM and paddle shift UP switch, and repair the defective part.
5	**CHECK TCM.** 1) Operate the – side of the paddle shift switch. 2) Read the data of «Down Switch» using the Subaru Select Monitor.	Does it change between ON and OFF according to the operation?	Go to step **6**.	Check for poor contact between TCM and paddle shift DOWN switch, and repair the defective part.
6	**CHECK TCM.** 1) Turn the ignition switch OFF, then turn it ON again. 2) Shift the select lever to manual mode. 3) Read the data of «Shift Step in Manual Mode» using the Subaru Select Monitor.	Is “1” displayed?	Go to step **7**.	Perform the diagnosis according to DTC P0951.
7	**CHECK TCM.** 1) Shift up the select lever. 2) Read the data of «Shift Step in Manual Mode» using the Subaru Select Monitor.	Is “2” displayed?	Currently, shift indicator is normal.	Check the TCM.

17.Diagnostics with Phenomenon

A: INSPECTION

Symptoms	Faulty parts
Engine stalls when driving in “D” or “R” range, or selecting “N” → “D”, “N” → “R”.	• Control valve • Engine control system
While driving in “D” range, vibration occurs immediately before the stop or engine stalls.	• Control valve • Torque converter
Vehicle cannot shift while driving in “D” range.	• Control valve • TCM • Shift mechanism • Power supply system
Excessive shock when selecting “N” → “D”, and “N” → “R”.	• Control valve • TCM • F&R clutch pack • ATF deterioration or lack
Excessive shock at standing start in “D” range.	• Control valve • TCM • F&R clutch pack • ATF deterioration or lack
Engine speed increases abruptly during driving in “D” or “R” range.	• Control valve • Secondary pressure sensor • F&R clutch pack • ATF deterioration or lack
Vehicle can not start when depressing the accelerator pedal in “D” or “R” range, or acceleration is very poor. (without abrupt engine increase)	• Control valve • F&R clutch pack • Shift mechanism • Parking mechanism • Engine control system • Power supply system
Shift indicator in combination meter displays the position which differs from select lever position.	• Inhibitor switch • Select cable related • Combination meter
Manual mode enters even though the select lever and paddle shift switch is not operated.	• Manual mode switch • Paddle shift switch • Select lever • TCM
Engine speed increases abruptly in “D” or “R” range, vehicle can not start.	• F&R clutch pack • Select cable related
Manual mode can not be set	• Select lever • TCM

AUTOMATIC TRANSMISSION

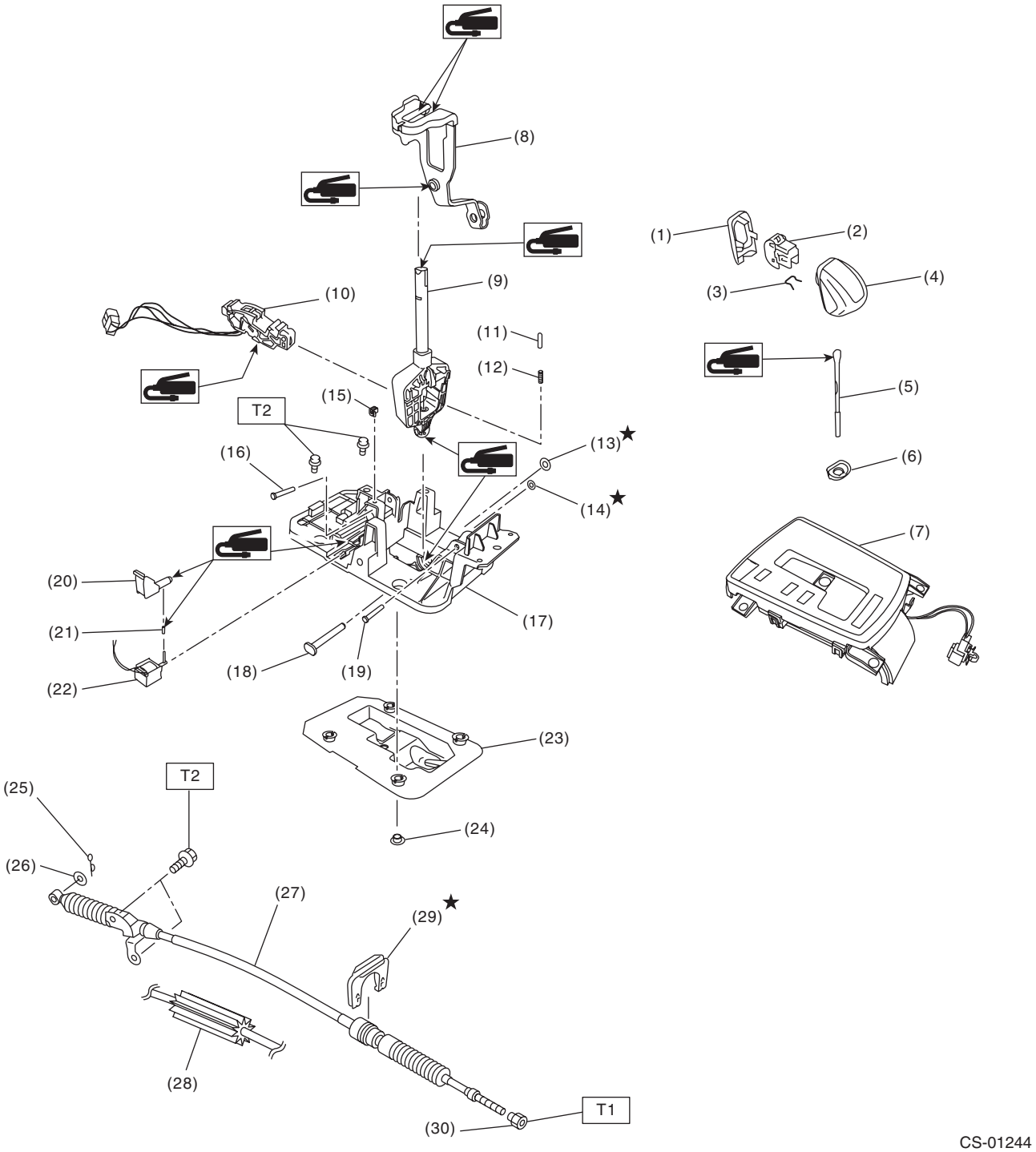
5AT

		Page
1.	General Description	2
2.	Automatic Transmission Fluid	28
3.	Differential Gear Oil	30
4.	Road Test	31
5.	Stall Test	32
6.	Time Lag Test	33
7.	Line Pressure Test	34
8.	Transfer Clutch Pressure Test	35
9.	Automatic Transmission Assembly	36
10.	Transmission Mounting System	46
11.	Extension Case Oil Seal	47
12.	Differential Side Retainer Oil Seal	48
13.	Inhibitor Switch	49
14.	Front Vehicle Speed Sensor	50
15.	Rear Vehicle Speed Sensor	52
16.	Turbine Speed Sensor 1	53
17.	Control Valve Body	54
18.	Transmission Control Module (TCM)	56
19.	ATF Cooler Pipe and Hose	57
20.	Air Breather Hose	60
21.	Oil Charge Pipe	61
22.	Torque Converter Assembly	62
23.	Drive Plate	63
24.	Extension Case	64
25.	Transfer Clutch	66
26.	Rear Drive Shaft	69
27.	Reduction Driven Gear	70
28.	Center Differential Carrier	73
29.	Parking Pawl	75
30.	Converter Case	77
31.	Oil Pump Cover	79
32.	Drive Pinion Shaft Assembly	83
33.	Front Differential Assembly	88
34.	AT Main Case	93
35.	Transmission Control Device	104
36.	Diagnostics with Phenomenon	106

1. General Description

A: COMPONENT

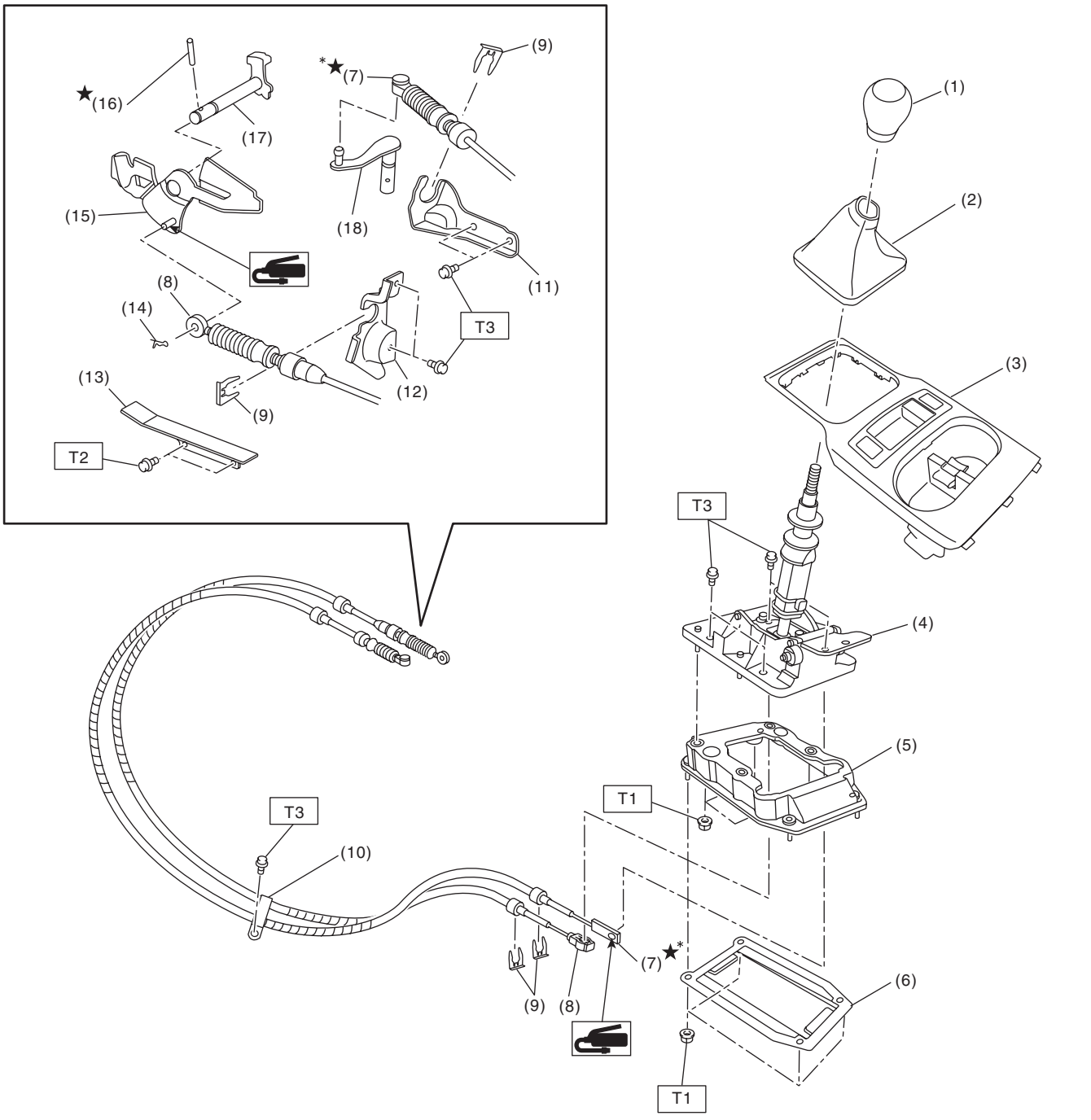
1. AT SELECT LEVER



(1) Cover grip AT
(2) Button ASSY-AT
(3) Clamp grip pin
(4) Grip ASSY sub
(5) Rod COMPL
(6) Cover grip AT
(7) Indicator ASSY
(8) Arm ASSY
(9) Selector lever COMPL
(10) Plate guide
(11) Rod detent
(12) Detent spring
(13) Clamp push nut
(14) Clamp push nut
(15) Clamp pin
(16) Spacer pin guide
(17) Plate COMPL
(18) Shaft control
(19) Spacer pin guide
(20) Rod shift lock
(21) Cushion solenoid
(22) Solenoid unit
(23) Gasket
(24) Spacer plate
(25) Snap pin
(26) Washer
(27) Select cable (AT model)
(28) Select cable (CVT model)
(29) Clamp
(30) Nut

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



CS-01601

(1) Shift knob
(2) Shift boot
(3) Console front cover ASSY
(4) Gear shift lever ASSY
(5) Cover cable ASSY
(6) Plate cable ASSY
(7) MT gear select cable (identification tape color: green)
(8) MT gear shift cable (identification tape color: yellow)
(9) Clamp
(10) Clamp cable
(11) Select bracket
(12) Shift bracket
(13) Dust cover
(14) Snap pin
(15) Shift lever COMPL
(16) Spring pin
(17) Shifter arm No. 2
(18) Selector lever

Tightening torque: N·m (kgf-m, ft-lb)
T1: 7.5 (0.8, 5.5)
T2: 15 (1.5, 11.1)
T3: 18 (1.8, 13.3)

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

B: CAUTION

- Wear appropriate work clothing, including a cap, protective goggles and protective shoes when performing any work.
- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust and dirt.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
- Use SUBARU genuine fluid, grease or equivalent. Do not mix fluid and grease of different grades or manufacturers.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or rigid racks at the specified points.
- Apply grease onto sliding or revolving surfaces before installation.
- Before installing the O-ring or snap ring, apply a sufficient amount of fluid to avoid damage and deformation.
- Before securing a part in a vise, place cushioning material such as wood blocks, aluminum plate or cloth between the part and the vise.
- Before disconnecting electrical connectors, be sure to disconnect the negative terminal from battery.

C: PREPARATION TOOL

1. SPECIAL TOOL

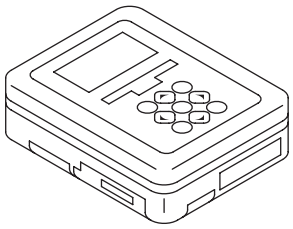
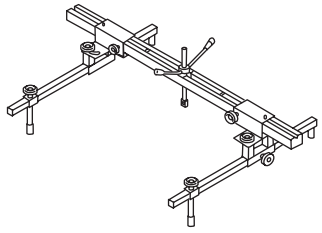
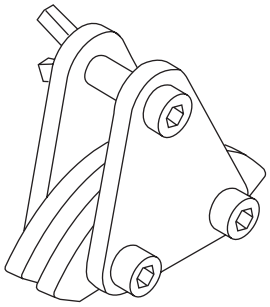
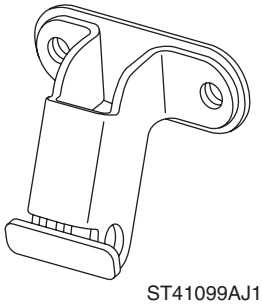
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST1B022XU0	1B022XU0	SUBARU SELECT MONITOR III KIT	Used for troubleshooting the electrical system.

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST99099AJ000	99099AJ000	ENGINE HANGER	• Used for holding and balancing the engine unit when removing and installing the MT gear select cable. • Used together with CHAIN BALANCER (99099AJ010).
 ST99099AJ010	99099AJ010	CHAIN BALANCER	• Used for holding and balancing the engine unit when removing and installing the MT gear select cable. • Used together with ENGINE HANGER (99099AJ000).
 ST41099AJ130	41099AJ130	SPECIAL TOOL FB	Used for holding and balancing the engine unit when removing and installing the MT gear select cable.

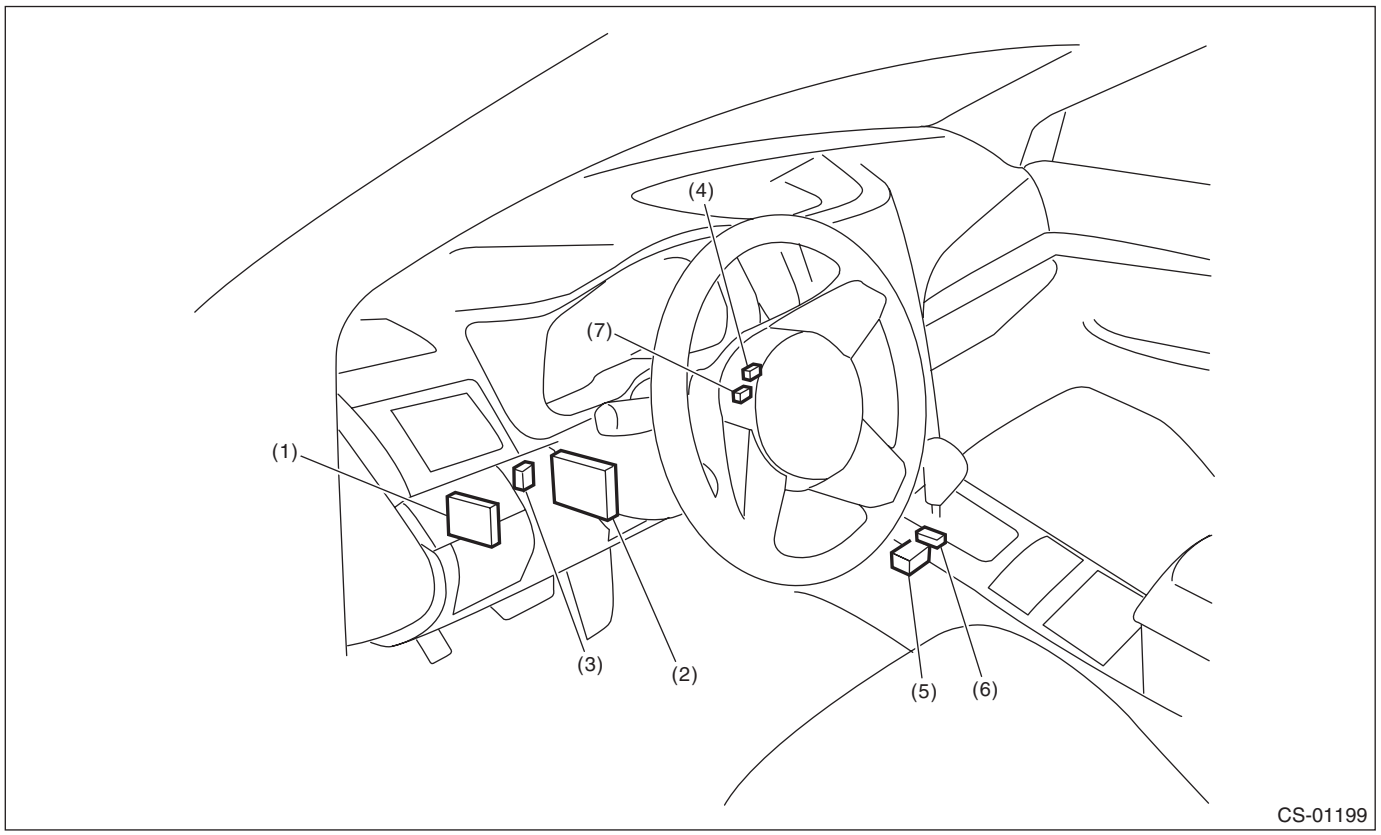
2. GENERAL TOOL

TOOL NAME	REMARKS
Chain sling	Used for holding and balancing the engine unit when removing and installing the MT gear select cable. • Length: 0.8 — 1 m (2.6 — 3.3 ft) • Load capacity: 1.2 t (2646 lb) or more • Diameter: 6 mm (0.24 in) or 6.3 mm (0.25 in) • Chain external width: 23.5 mm (0.93 in) or less • Chain internal width: 8.5 mm (0.33 in) or more
Screw shackle	Used for holding and balancing the engine unit when removing and installing the MT gear select cable. • Load capacity: 250 kg (551 lb) or more • Use two pieces.
Circuit tester	Used for measuring resistance and voltage.

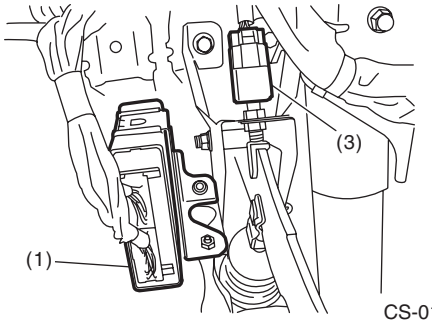
2. AT Shift Lock Control System

A: LOCATION

1. MODEL WITHOUT PUSH BUTTON IGNITION SWITCH

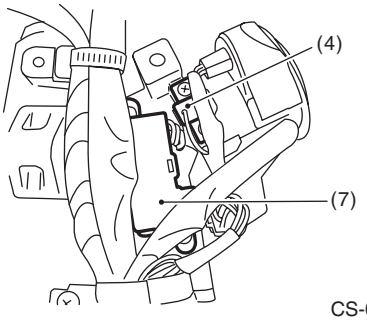


(1) TCM (“P” range)
(2) Body integrated unit
(3) Stop light switch
(4) Key cylinder (with built-in key warning switch)
(5) Solenoid unit
(6) “P” range switch
(7) Key lock solenoid

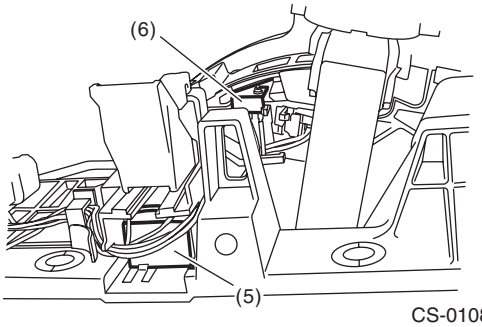


CS-01200

CS-01201

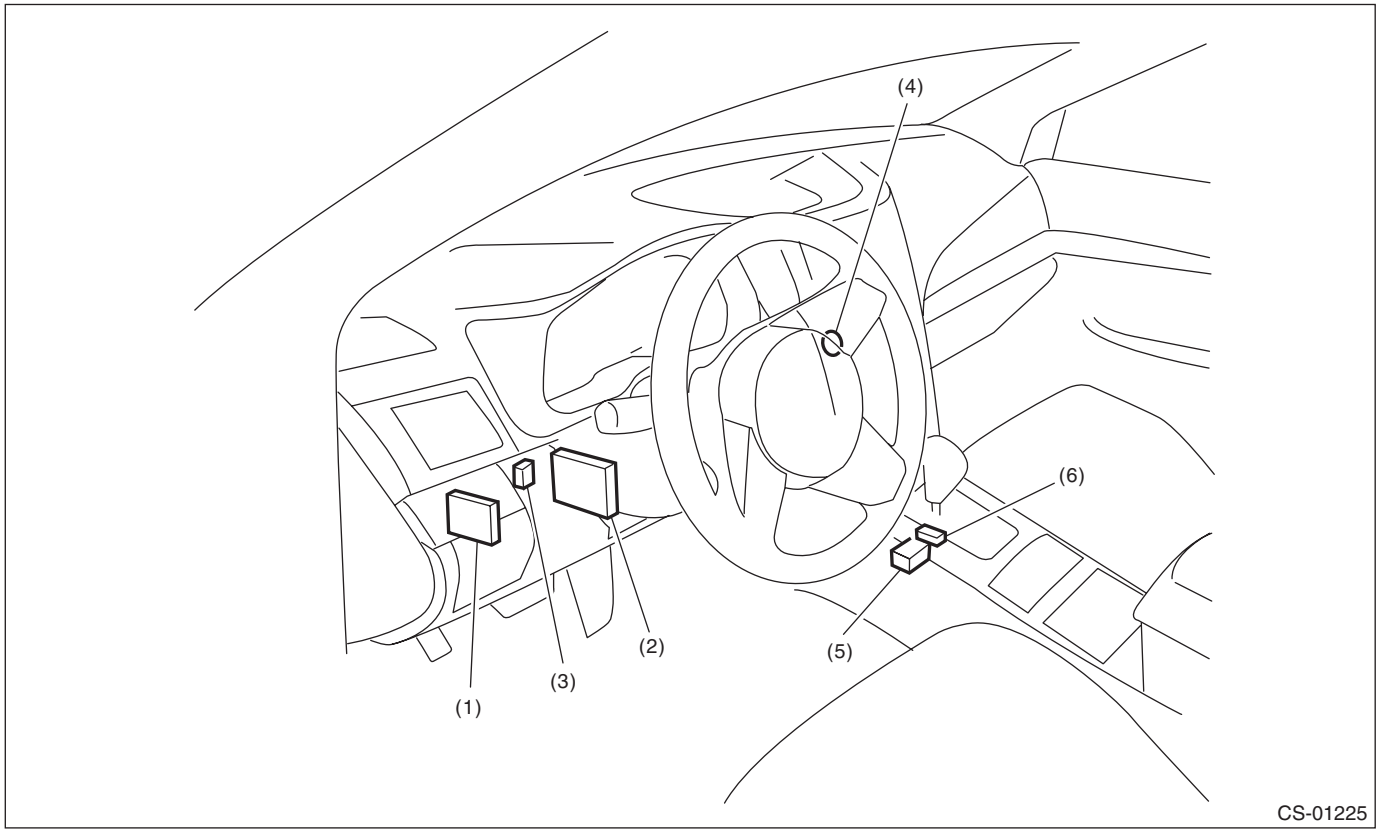


CS-01193

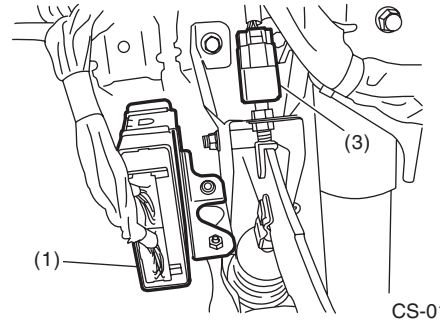


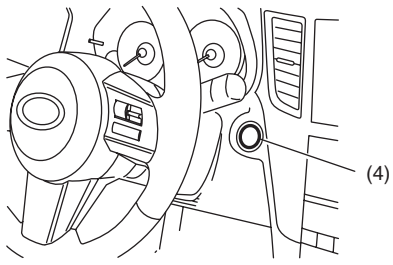
CS-01083

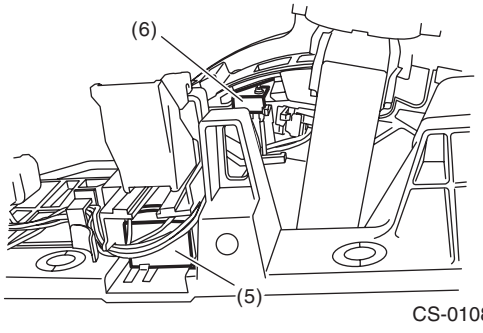
2. MODEL WITH PUSH BUTTON IGNITION SWITCH



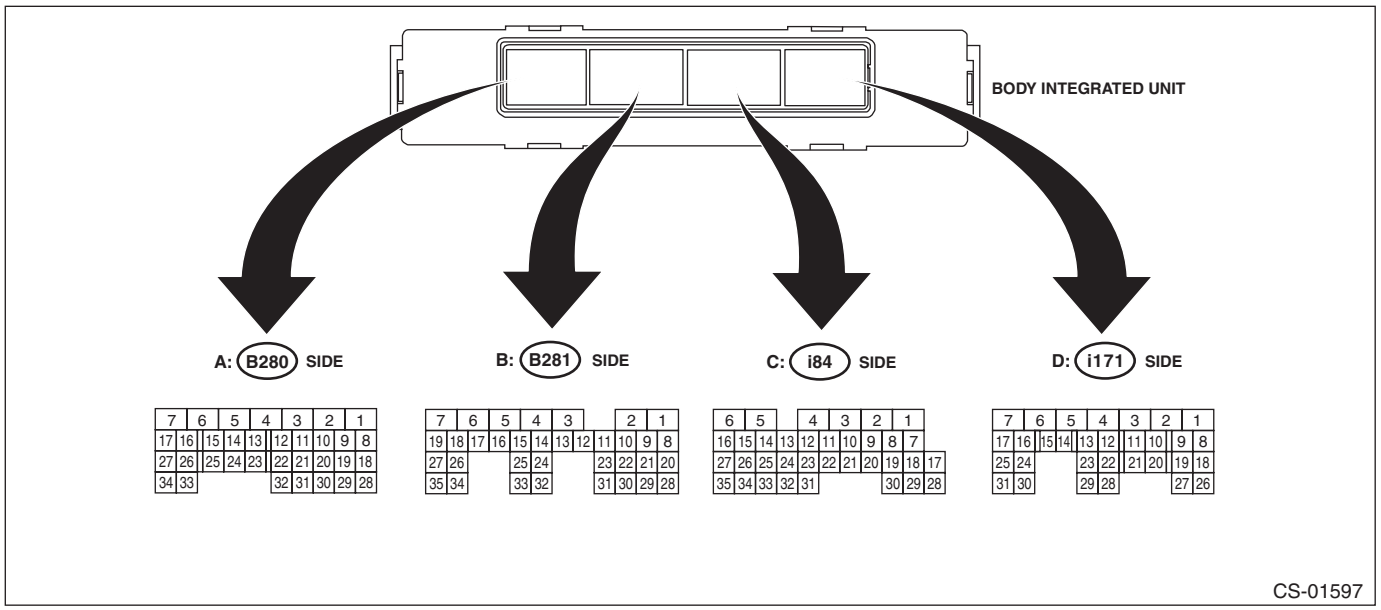
(1) TCM
(2) Body integrated unit
(3) Stop light switch
(4) Push button ignition switch
(5) Solenoid unit
(6) “P” range switch







B: ELECTRICAL SPECIFICATION



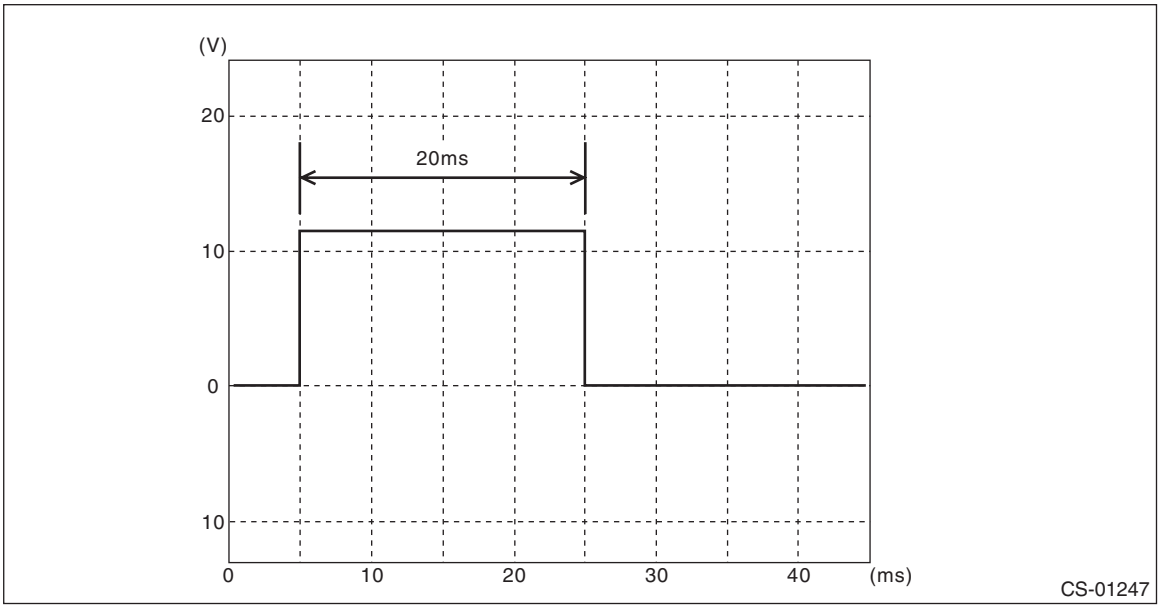
Item	Connector No.	Terminal No.	Input/Output signal Measured value and measuring conditions
Battery power supply	B281	6	9 — 16 V
	i84	6	
Ignition power supply	i171	17	9 — 16 V when ignition switch is at ON or START.
		25	9 — 16 V when ignition switch is at ACC.
TCM (“P” range)	B281	20	Pulse signal (CAN communication)
		28	
Stop light switch	B280	10	9 — 16 V when stop light switch is ON. Less than 1.5 V when stop light switch is OFF.
“P” range switch	B281	21	Less than 1.5 V when select lever is in “P” range. 9 — 16 V when select lever is in other positions than “P” range.
Solenoid unit output	B281	5	8.5 — 16 V when shift lock is released. Less than 1.5 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. Less than 1.5 V when key is removed.
Key lock solenoid output (Model without push button ignition switch)	B281	3	7 — 14 V (unlock) *1
		4	7 — 14 V (lock) *1
Ground	B280	1	1 V or less
	B281	31	
	i84	1	
	i171	29	

*1: Measuring condition

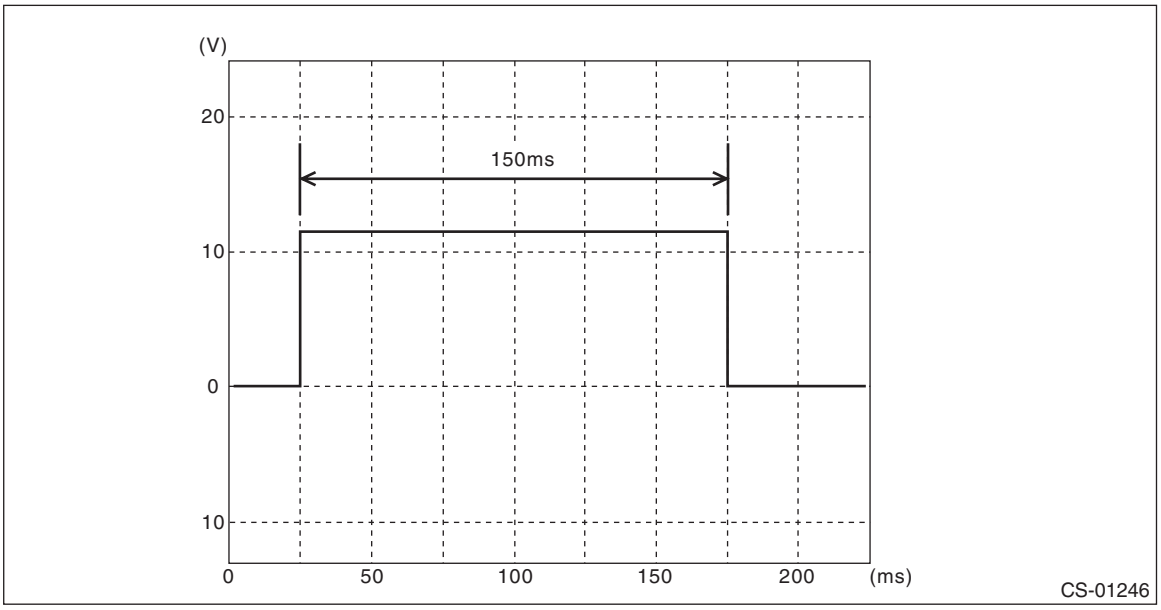
Key warning switch	“P” range switch	Ignition switch	Output
OFF	—	—	Unlock (Key can be removed)
ON	OFF	—	Lock (Key cannot be removed)
ON	ON	OFF	Unlock
ON	ON	ON	Lock

Key lock solenoid output signal

1. Output Signal for Unlock

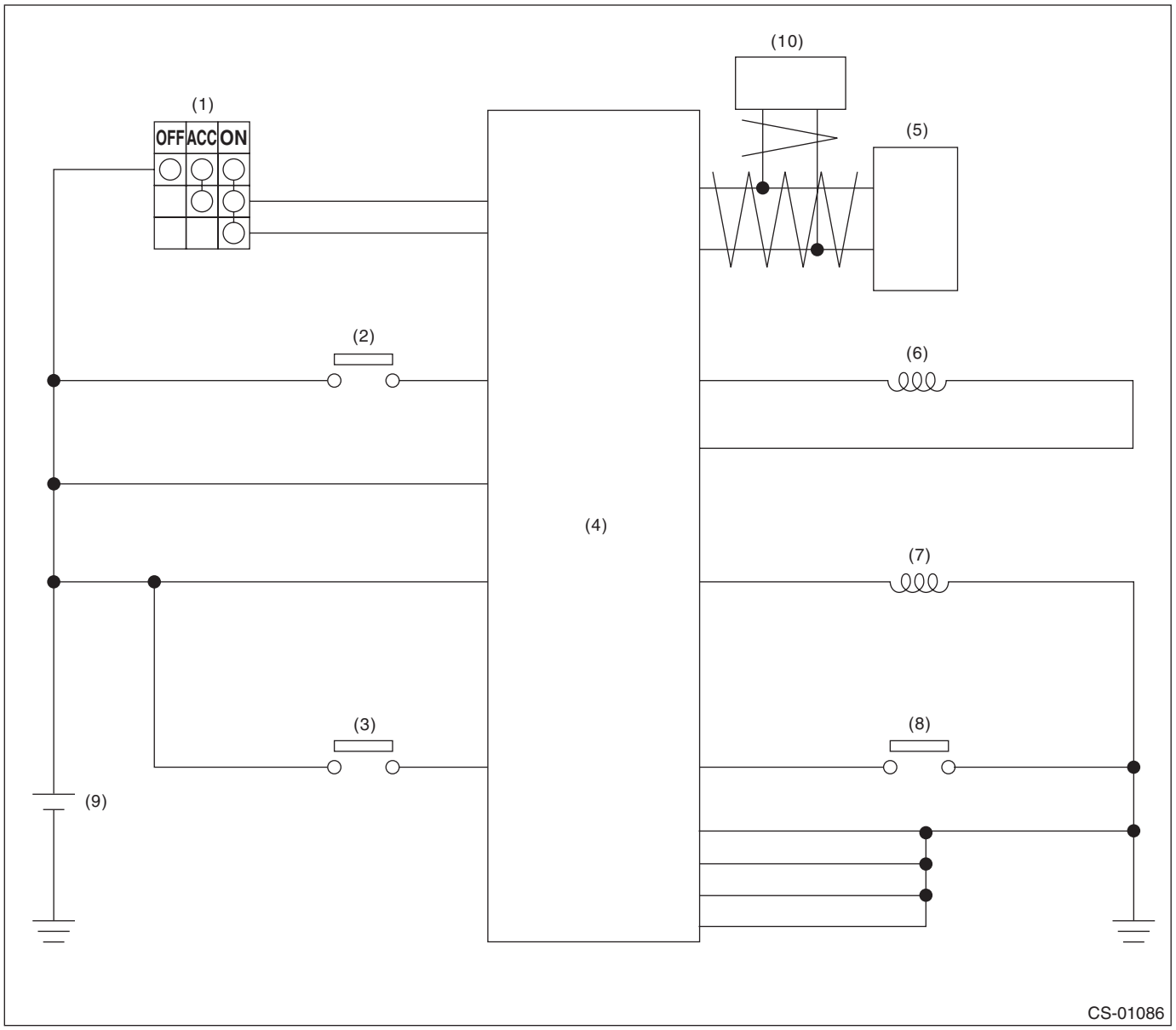


2. Output Signal for Lock



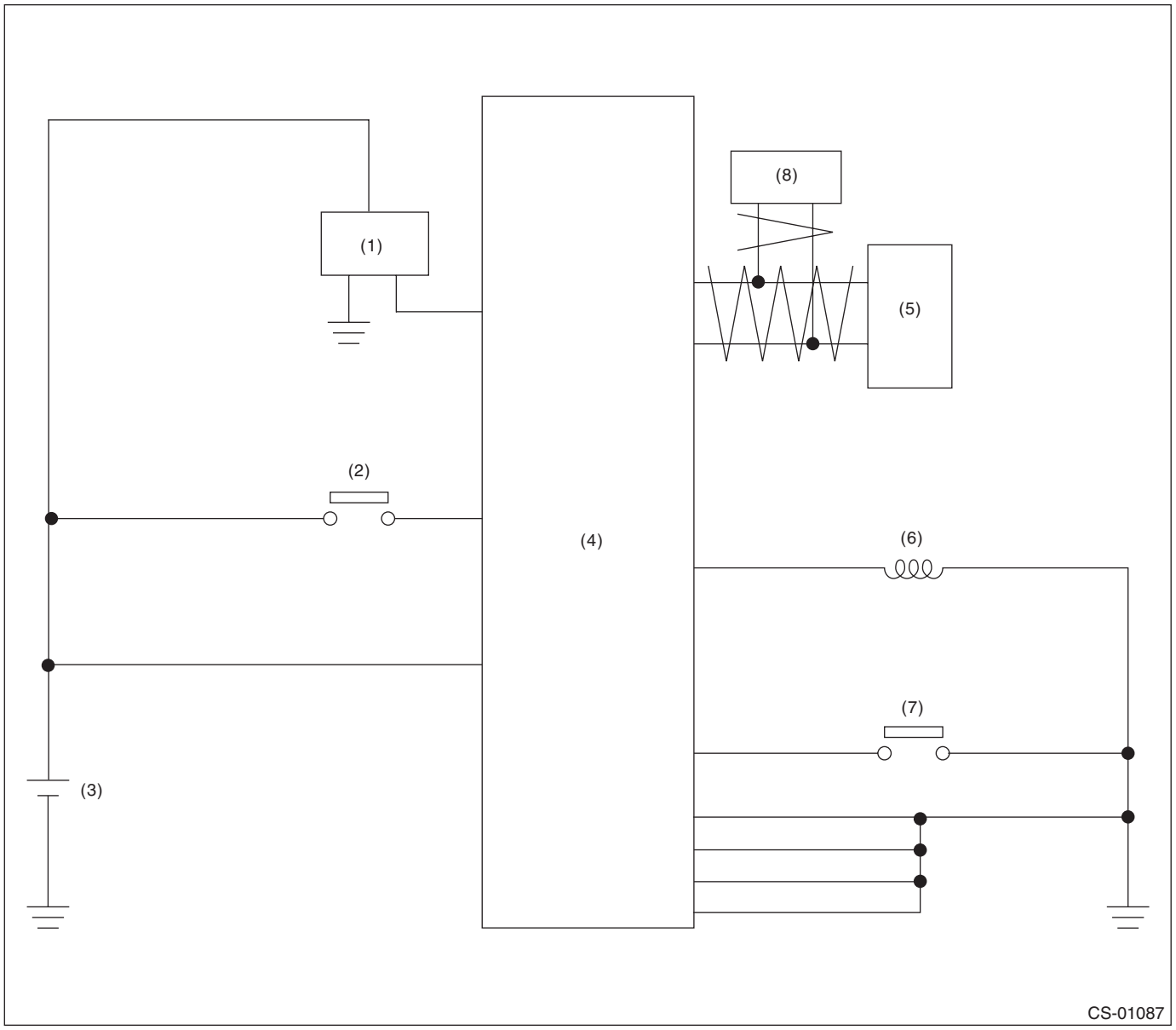
C: WIRING DIAGRAM

1. MODEL WITHOUT PUSH BUTTON IGNITION SWITCH



(1) Ignition switch
(2) Stop light 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) IG relay 1 (push button start)
(2) Stop light switch
(3) Battery
(4) Body integrated unit
(5) TCM (shift range information)
(6) Shift lock solenoid
(7) "P" range switch
(8) VDC CM (vehicle speed information)

D: INSPECTION

1. SHIFT LOCK OPERATION

• Model without push button ignition switch

	Step	Check	Yes	No
1	**CHECK COMMUNICATION OF SUBARU SELECT MONITOR.** 1) Turn the ignition switch to ON. 2) Using the Subaru Select Monitor, check whether communication to all systems can be executed normally.	Is the system name displayed?	Go to step **2**.	For diagnostic procedures, refer to the LAN section. <Ref. to LAN(diag)-2, 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?	Perform the inspection of “SELECT LEVER CANNOT BE LOCKED OR RELEASED”. <Ref. to CS-19, SELECT LEVER CANNOT BE LOCKED OR RELEASED, INSPECTION, AT Shift Lock Control System.>	Go to step **3**.
3	**CHECK SHIFT LOCK.**	While brake pedal is depressed, is it possible to move the select lever from the “P” range to other ranges?	Go to step **4**.	Perform the inspection of “SELECT LEVER CANNOT BE LOCKED OR RELEASED”. <Ref. to CS-19, SELECT LEVER CANNOT BE LOCKED OR RELEASED, INSPECTION, AT Shift Lock Control System.>
4	**CHECK SHIFT LOCK.** Shift the select lever to “N” range.	Is it possible to move the select lever from the “N” range to the “P” range?	Go to step **5**.	Perform the inspection of “SELECT LEVER CANNOT BE LOCKED OR RELEASED”. <Ref. to CS-19, SELECT LEVER CANNOT BE LOCKED OR RELEASED, INSPECTION, AT Shift Lock Control System.>

	Step	Check	Yes	No
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?	Go to step **6**.	Perform the inspection of “SELECT LEVER CANNOT BE LOCKED OR RELEASED”. <Ref. to CS-19, SELECT LEVER CANNOT BE LOCKED OR RELEASED, INSPECTION, AT Shift Lock Control System.>
6	**CHECK KEY INTERLOCK.** 1) Shift the select lever to other than “P” range. 2) Turn the ignition switch to OFF.	Can the ignition key be removed?	Perform the inspection of “KEY INTERLOCK CANNOT BE LOCKED OR RELEASED”. <Ref. to CS-23, KEY INTERLOCK DOES NOT LOCK OR RELEASE, INSPECTION, AT Shift Lock Control System.>	Go to step **7**.
7	**CHECK KEY INTERLOCK.** Shift the select lever to “P” range.	Can the ignition key be removed?	AT shift lock system is normal.	Perform the inspection of “KEY INTERLOCK CANNOT BE LOCKED OR RELEASED”. <Ref. to CS-23, KEY INTERLOCK DOES NOT LOCK OR RELEASE, INSPECTION, AT Shift Lock Control System.>

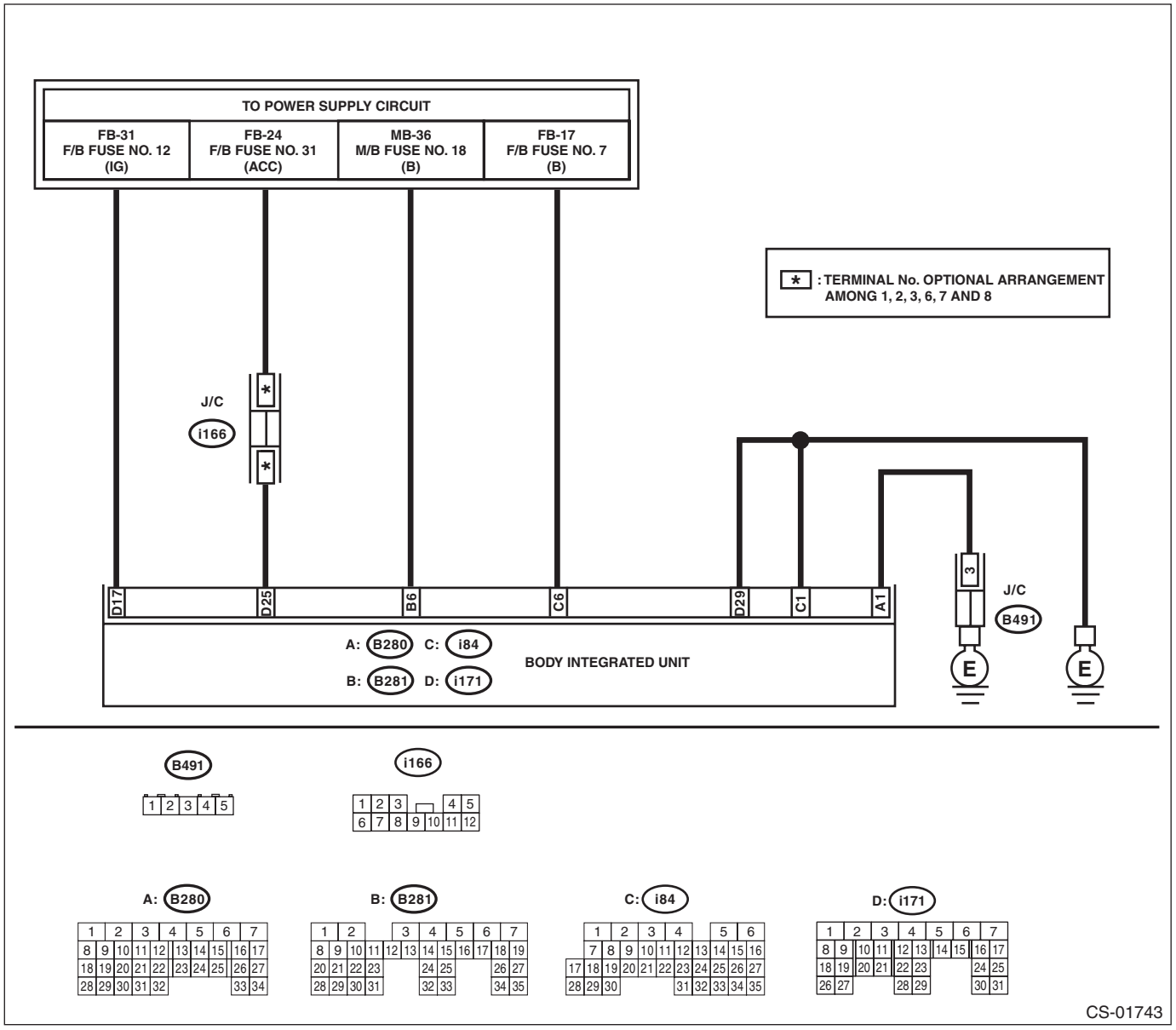
• Model with push button ignition switch

	Step	Check	Yes	No
1	**CHECK COMMUNICATION OF SUBARU SELECT MONITOR.** 1) Turn the ignition switch to ON. 2) Using the Subaru Select Monitor, check whether communication to all systems can be executed normally.	Is the system name displayed?	Go to step **2**.	For diagnostic procedures, refer to the LAN section. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>

	Step	Check	Yes	No
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?	Perform the inspection of “SELECT LEVER CANNOT BE LOCKED OR RELEASED”. <Ref. to CS-19, SELECT LEVER CANNOT BE LOCKED OR RELEASED, INSPECTION, AT Shift Lock Control System.>	Go to step **3**.
3	**CHECK SHIFT LOCK.**	While brake pedal is depressed, is it possible to move the select lever from the “P” range to other ranges?	Go to step **4**.	Perform the inspection of “SELECT LEVER CANNOT BE LOCKED OR RELEASED”. <Ref. to CS-19, SELECT LEVER CANNOT BE LOCKED OR RELEASED, INSPECTION, AT Shift Lock Control System.>
4	**CHECK SHIFT LOCK.** Shift the select lever to “N” range.	Is it possible to move the select lever from the “N” range to the “P” range?	Go to step **5**.	Perform the inspection of “SELECT LEVER CANNOT BE LOCKED OR RELEASED”. <Ref. to CS-19, SELECT LEVER CANNOT BE LOCKED OR RELEASED, INSPECTION, AT Shift Lock Control System.>
5	**CHECK SHIFT LOCK.** 1) Shift the select lever to “N” range. 2) Turn the ignition switch to ACC.	While brake pedal is depressed, is it possible to move the select lever from the “N” range to the “P” range?	AT shift lock system is normal.	Perform the inspection of “SELECT LEVER CANNOT BE LOCKED OR RELEASED”. <Ref. to CS-19, SELECT LEVER CANNOT BE LOCKED OR RELEASED, INSPECTION, AT Shift Lock Control System.>

2. BODY INTEGRATED UNIT POWER SUPPLY AND GROUND CIRCUIT

NOTE:
For the DC power supply circuit, refer to “WIRING DIAGRAMS”. <Ref. to WI-15, Power Supply Circuit.>

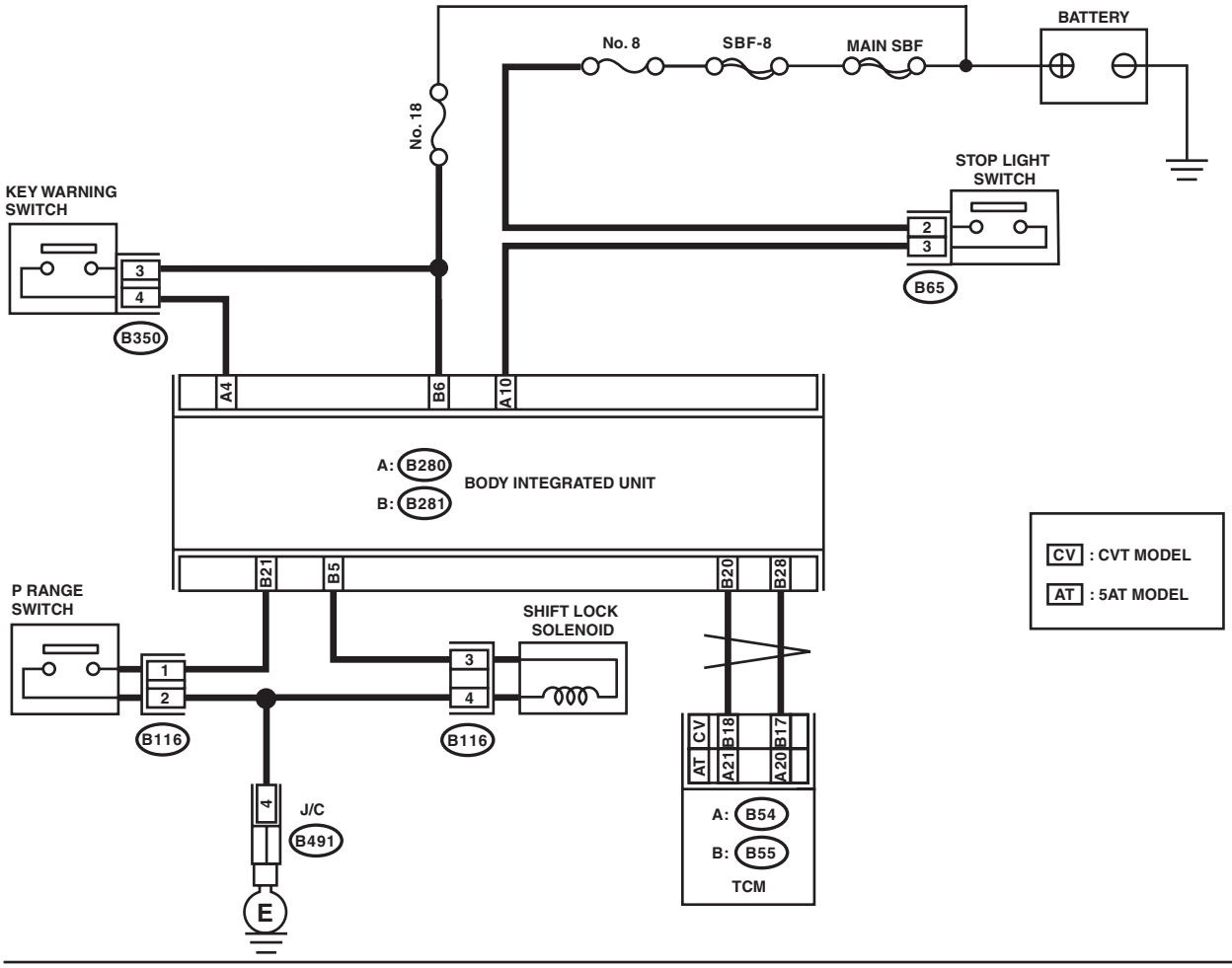


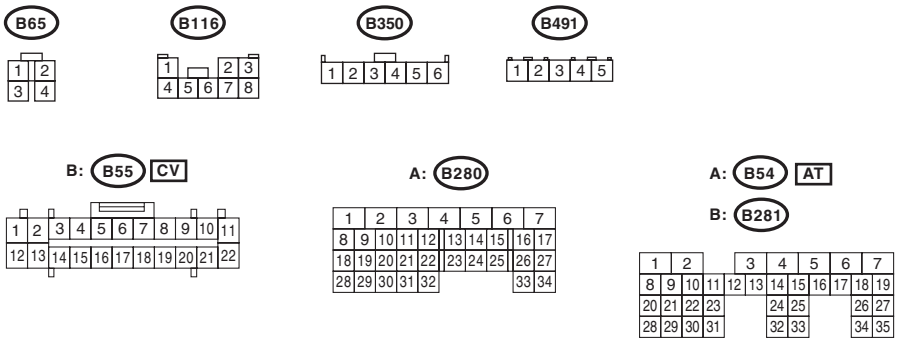
Step		Check	Yes	No
1	**CHECK DTC OF BODY INTEGRATED UNIT.** Check DTC of body integrated unit.	Is the DTC of power line displayed on body integrated unit?	Repair or replace it according to the DTC.	Go to step **2**.
2	**CHECK HARNESS BETWEEN BODY INTEGRATED UNIT AND BATTERY.** 1) Turn the ignition switch to ON. 2) Measure the voltage between body integrated unit and chassis ground. ***Connector & terminal*** ***(i84) No. 6 (+) — Chassis ground (–):*** ***(i171) No. 17 (+) — Chassis ground (–):*** ***(i171) No. 25 (+) — Chassis ground (–):*** ***(B281) No. 6 (+) — Chassis ground (–):***	Is the voltage 9 — 16 V?	Go to step **3**.	Check harness for open circuit between the body integrated unit and the battery or a blown fuse.

Step		Check	Yes	No
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:*** ***(i171) No. 29 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **4**.	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?	Repair the poor contact.	End.

3. SELECT LEVER CANNOT BE LOCKED OR RELEASED

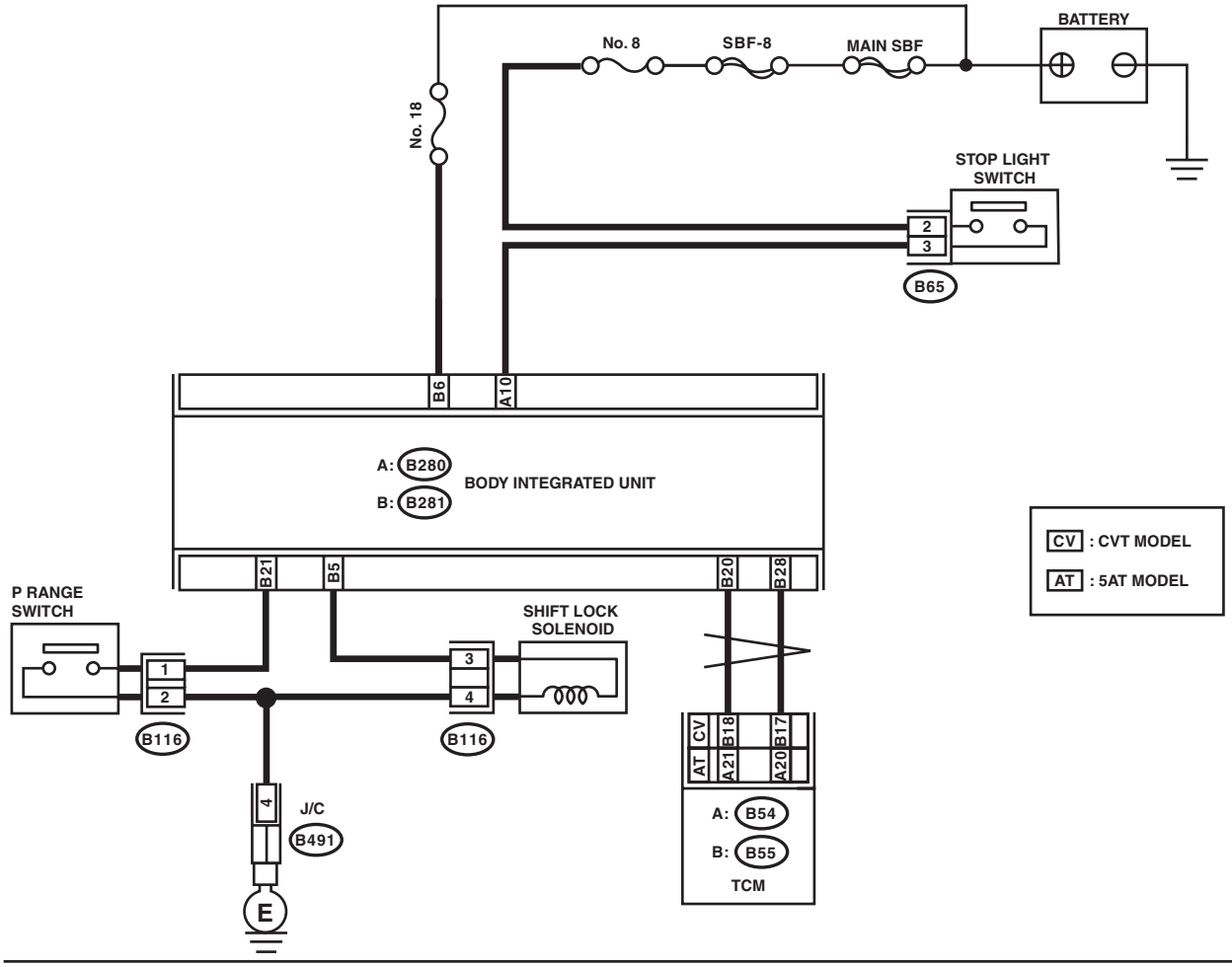
- **Model without push button ignition switch**

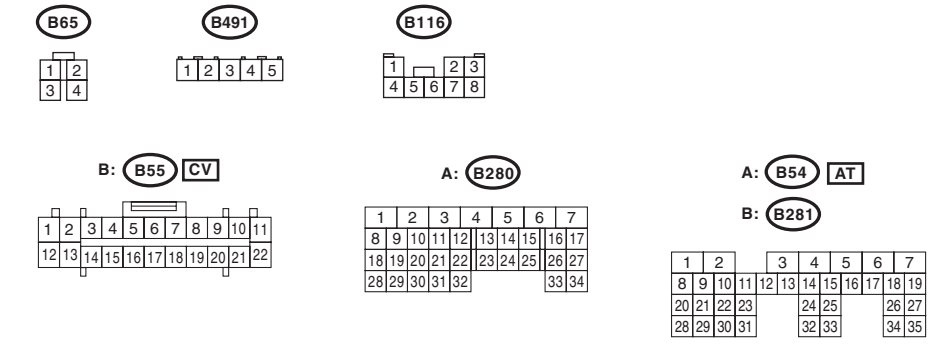




CS-01590

- **Model with push button ignition switch**





CS-01591

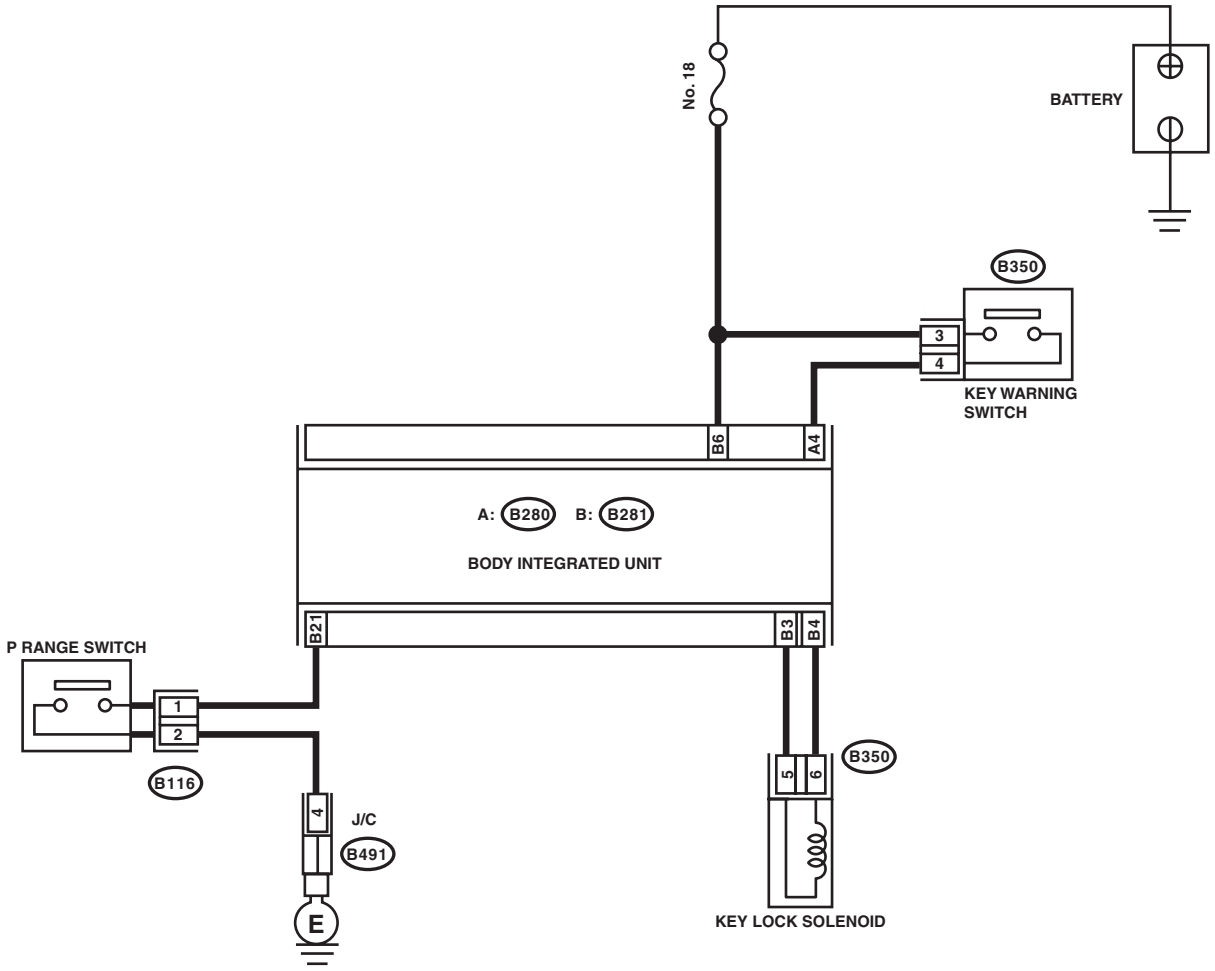
Step		Check	Yes	No
1	**CHECK BODY INTEGRATED UNIT POWER SUPPLY AND GROUND CIRCUIT.** <Ref. to CS-17, BODY INTEGRATED UNIT POWER SUPPLY AND GROUND CIRCUIT, INSPECTION, AT Shift Lock Control System.>	Is there any fault?	Follow the procedures to perform inspection and repair.	Go to step **2**.

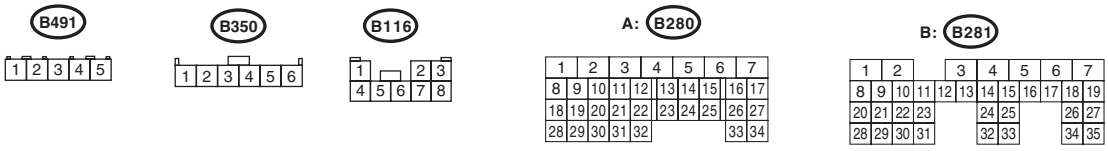
	Step	Check	Yes	No
2	**CHECK CURRENT DATA.** 1) Connect the Subaru Select Monitor. 2) Shift the select lever to "P" range. 3) Turn the ignition switch to ON. 4) Select the current data display and display «P SW». <Ref. to BC(diag)-12, Read Current Data.>	Is the display "ON" in the P range and "OFF" in ranges other than P?	Go to step **3**.	Go to step **8**.
3	**CHECK CURRENT DATA.** Select the current data display and display «Stop Light Switch». <Ref. to BC(diag)-12, Read Current Data.>	Is "ON" displayed when the brake pedal is depressed and "OFF" displayed when the brake pedal is released?	Go to step **4**.	Go to step **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?	Follow the DTC to perform inspection and repair.	Go to step **5**.
5	**CHECK CURRENT DATA.** Select the current data display and display «Shift Lock Solenoid». <Ref. to BC(diag)-12, Read Current Data.>	Is "ON" displayed when the brake pedal is depressed and "OFF" displayed when the brake pedal is released?	Go to step **6**.	Replace the body integrated unit. <Ref. to SL-80, Body Integrated Unit.>
6	**CHECK CURRENT DATA.** Select the current data display and display «Shift Position». <Ref. to BC(diag)-12, Read Current Data.>	Is the display "7" in the "P" range and other than "7" in ranges other than "P"?	Go to step **7**.	Check the following items. • Inhibitor switch • Harness between inhibitor switch and TCM • TCM input signal • TCM CAN communication • Body integrated unit CAN receive
7	**CHECK CURRENT DATA.** 1) Select the current data display and display «Front Wheel Speed». 2) Start the engine. 3) Raise vehicle speed gradually up to approximately 20 km/h (12 miles).	Is a figure equivalent to the speedometer being indicated?	Go to step **12**.	Check the following items. • Vehicle speed sensor • VDC CM CAN communication • Body integrated unit CAN receive Replace the vehicle speed sensor, VDC CM 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. 21 — (B116) No. 1:***	Is there any fault in the harness?	Repair or replace the harness between the body integrated unit and the "P" range switch.	Go to step **9**.

	Step	Check	Yes	No
9	**CHECK HARNESS BETWEEN "P" RANGE SWITCH AND CHASSIS GROUND.** Measure the resistance of harness between "P" range switch and chassis ground. ***Connector & terminal*** ***(B116) No. 2 — Chassis ground:***	Is it less than 10 Ω?	Go to step **10**.	Repair the harness between the "P" range switch and chassis ground.
10	**CHECK "P" RANGE SWITCH.** Measure the resistance between "P" range switch connector terminals. ***Terminals*** ***No. 2 — No. 1:***	Is it less than 10 Ω in the "P" range, and 1 MΩ or more in ranges other than "P"?	Replace the body integrated unit. <Ref. to SL-80, Body Integrated Unit.>	Replace the "P" range switch. <Ref. to CS-57, AT Shift Lock Solenoid and "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 — 16 V when the brake pedal is depressed, and less than 1.5 V when not pressed?	Replace the body integrated unit. <Ref. to SL-80, Body Integrated Unit.>	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?	Check the lock mechanism of the select lever body.	Replace the solenoid unit. <Ref. to CS-57, AT Shift Lock Solenoid and "P" Range Switch.>

4. KEY INTERLOCK DOES NOT LOCK OR RELEASE

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





CS-01592

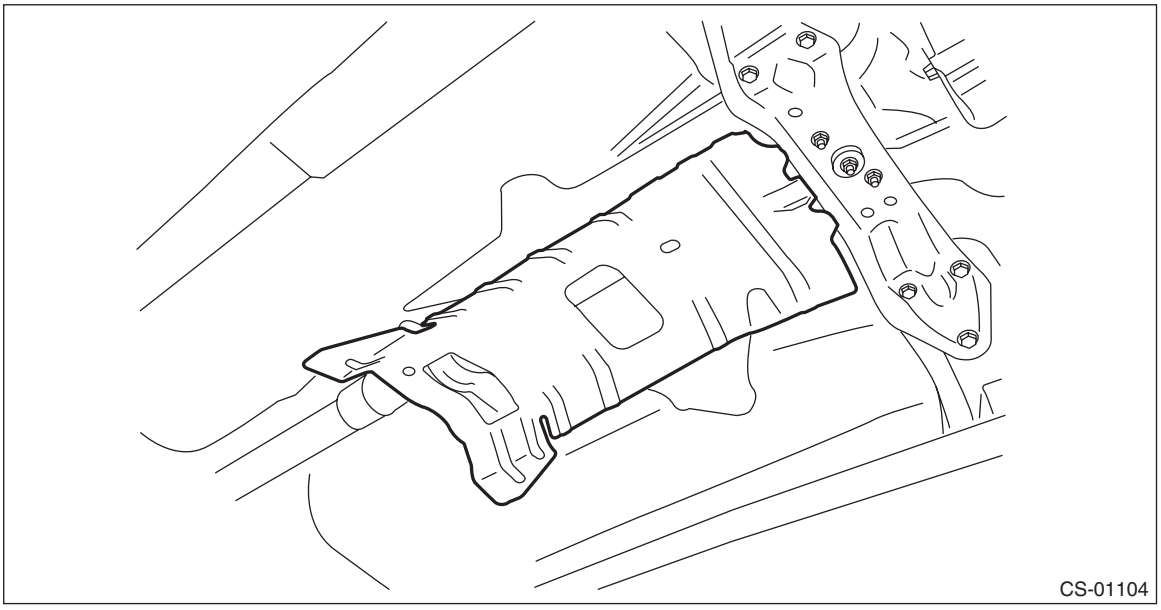
	Step	Check	Yes	No
1	**CHECK BODY INTEGRATED UNIT POWER SUPPLY AND GROUND CIRCUIT.** <Ref. to CS-17, BODY INTEGRATED UNIT POWER SUPPLY AND GROUND CIRCUIT, INSPECTION, AT Shift Lock Control System.>	Is there any fault?	Follow the procedures to inspect and repair.	Go to step **2**.
2	**CHECK CURRENT DATA.** 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 BC(diag)-12, Read Current Data.>	Is the display "ON" in the P range and "OFF" in ranges other than P?	Go to step **3**.	Go to step **5**.
3	**CHECK CURRENT DATA.** 1) Select the current data display and display the «key-lock warning SW». <Ref. to BC(diag)-12, Read Current Data.> 2) Turn the ignition switch to OFF.	Does the display change from "ON" ←→ "OFF" when the key is inserted and removed?	Go to step **4**.	Go to step **8**.
4	**CHECK CURRENT DATA.** 1) Turn the ignition switch to OFF. 2) Select the current data display and display «Key locking output». <Ref. to BC(diag)-12, Read Current Data.>	Is the display "Unlock" in the "P" range and "Lock" in ranges other than "P"?	Go to step **9**.	Go to step **5**.
5	**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. 21 — (B116) No. 1:***	Is there any fault in the harness?	Repair or replace the harness between the body integrated unit and the "P" range switch.	Go to step **6**.
6	**CHECK HARNESS BETWEEN "P" RANGE SWITCH AND CHASSIS GROUND.** Measure the resistance of harness between "P" range switch and chassis ground. ***Connector & terminal*** ***(B116) No. 2 — Chassis ground:***	Is it less than 10 Ω?	Go to step **7**.	Repair the harness between the "P" range switch and chassis ground.
7	**CHECK "P" RANGE SWITCH.** Measure the resistance between "P" range switch connector terminals. ***Terminals*** ***No. 2 — No. 1:***	Is it less than 10 Ω in the "P" range, and 1 MΩ or more in ranges other than "P"?	Replace the body integrated unit. <Ref. to SL-80, Body Integrated Unit.>	Replace the "P" range switch. <Ref. to CS-57, AT Shift Lock Solenoid and "P" Range Switch.>
8	**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 — 16 V when the key is inserted, and less than 1.5 V with the key removed?	Replace the body integrated unit. <Ref. to SL-80, Body Integrated Unit.>	Check the following items. • Key warning switch • Harness/fuse • Ignition circuit

	Step	Check	Yes	No
9	**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. 3 — (B350) No. 5:*** ***(B281) No. 4 — (B350) No. 6:***	Is there any fault in the harness?	Repair or replace the harness between the body integrated unit and the key lock solenoid.	Go to step **10**.
10	**CHECK KEY LOCK SOLENOID OPERATION.** Connect the battery to the key lock solenoid connector terminal, and operate the solenoid.	Does the key lock solenoid operate normally?	Go to step **11**.	Replace the key lock solenoid.
11	**CHECK OUTPUT OF BODY INTEGRATED UNIT.** 1) Connect all connectors. 2) Insert the key. 3) Shift the select lever to “P” range. 4) Turn the ignition switch to OFF. 5) Using an oscilloscope, measure the voltage between body integrated unit and chassis ground. ***Connector & terminal*** ***Lock*** ***(B281) No. 4 (+) — Chassis ground (–):*** ***Unlock*** ***(B281) No. 3 (+) — Chassis ground (–):***	Is the lock output voltage 7 — 14 V when the grip button of select lever is pressed? Is the unlock output voltage 7 — 14 V when the grip button of select lever is released? <Ref. to CS-10, ELECTRICAL SPECIFICATION, AT Shift Lock Control System.>	Check the lock mechanism of the steering lock body.	Replace the body integrated unit. <Ref. to SL-80, Body Integrated Unit.>

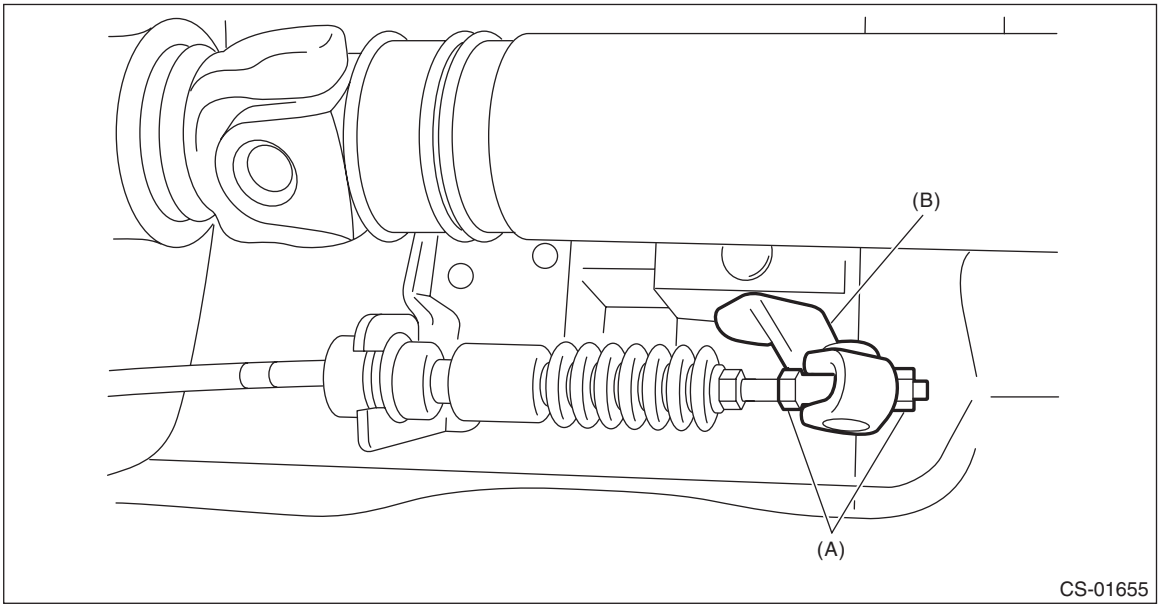
3. Select Lever

A: REMOVAL

1) Shift the select lever to “N” range.
2) Disconnect the ground cable from battery.
3) Lift up the vehicle.
4) Remove the rear exhaust pipe.
• 2.5 L model
<Ref. to EX(H4DO)-13, REMOVAL, Rear Exhaust Pipe.>
• 3.6 L model
<Ref. to EX(H6DO)-8, REMOVAL, Rear Exhaust Pipe.>
5) Remove the heat shield cover.


CS-01104

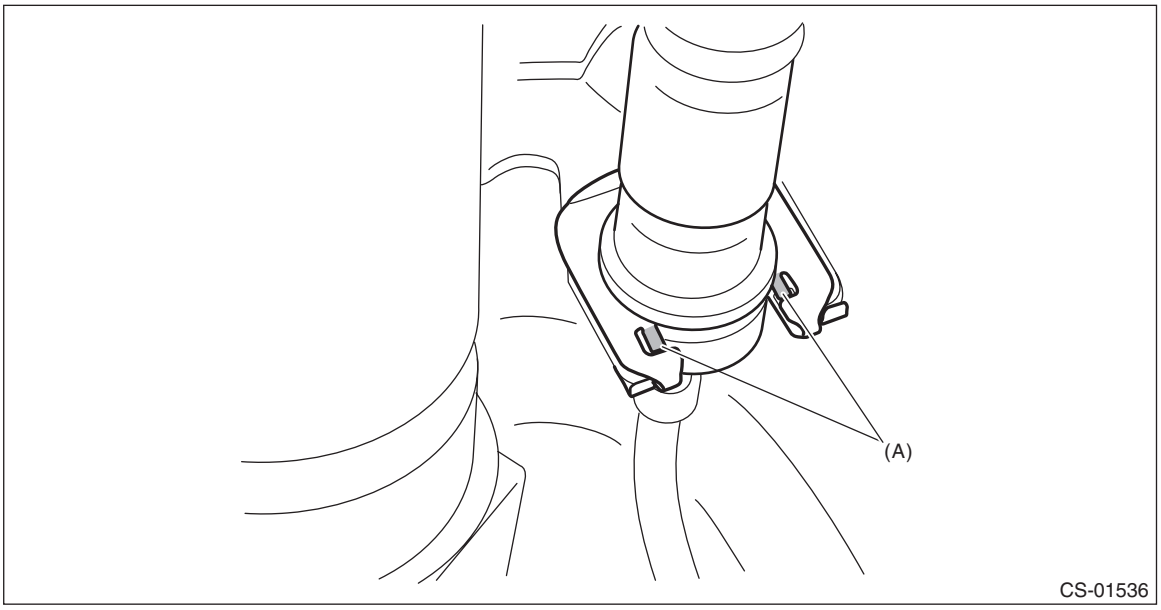
6) Remove the cable from arm assembly.



CS-01655

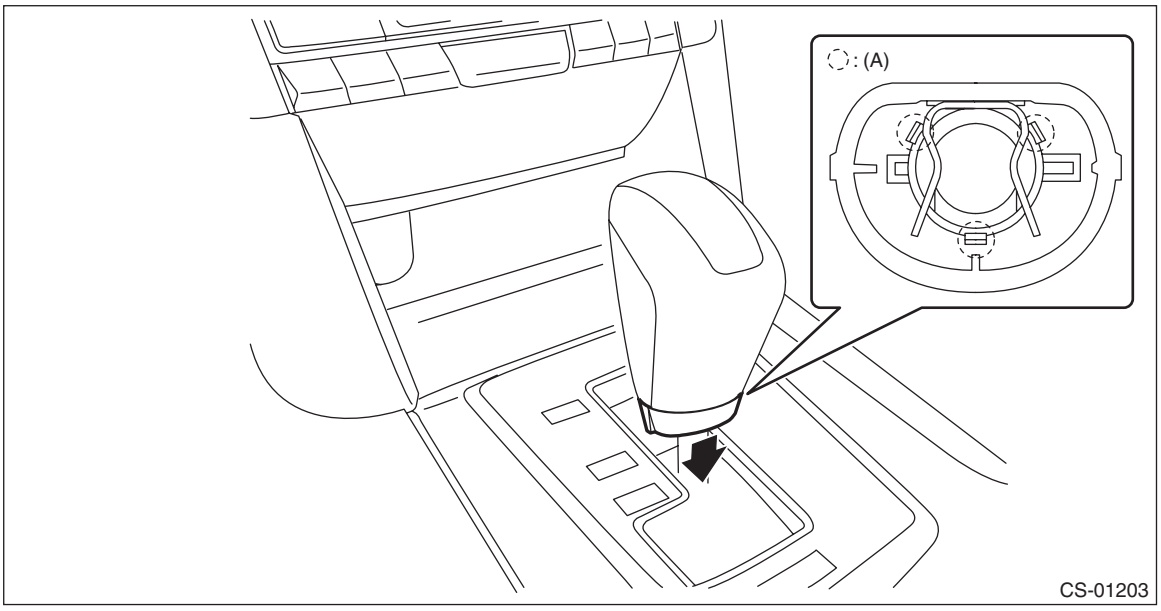
(A) Nut
(B) Arm ASSY

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



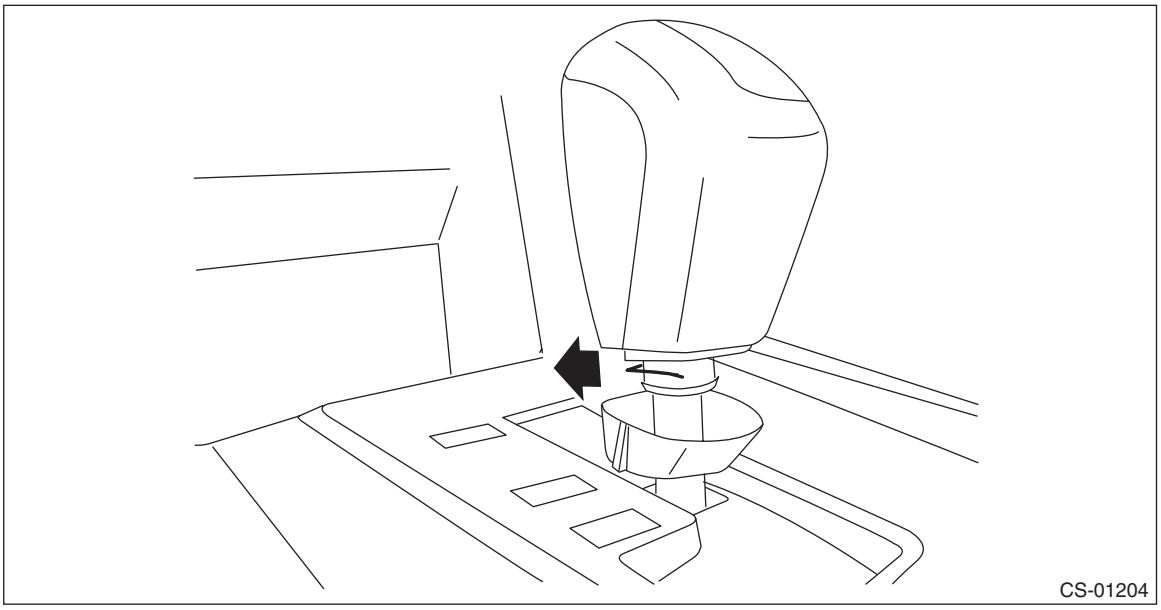
(A) Claw

8) Lower the vehicle.
9) Lower the cover grip AT vertically toward the lever.

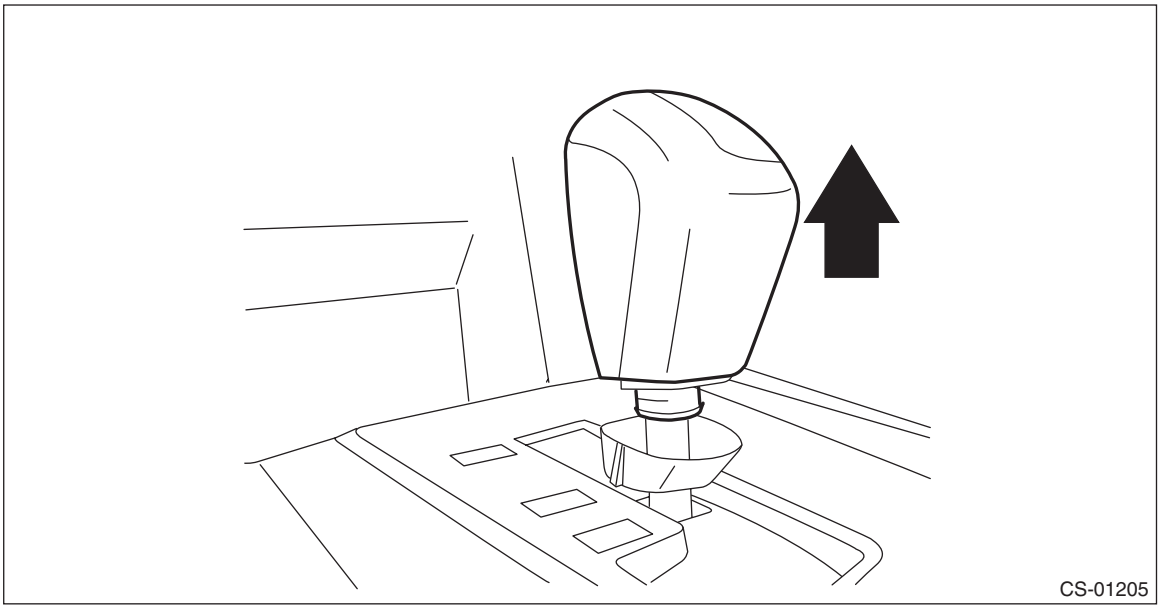


(A) Claws (3 places)

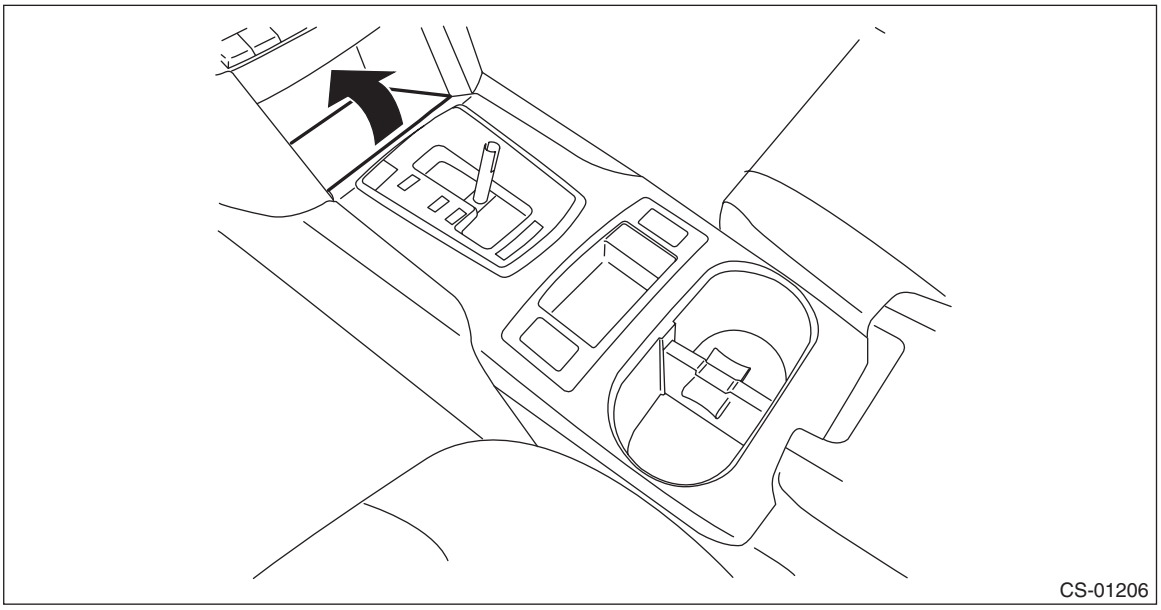
10) Remove the clamp grip pin.

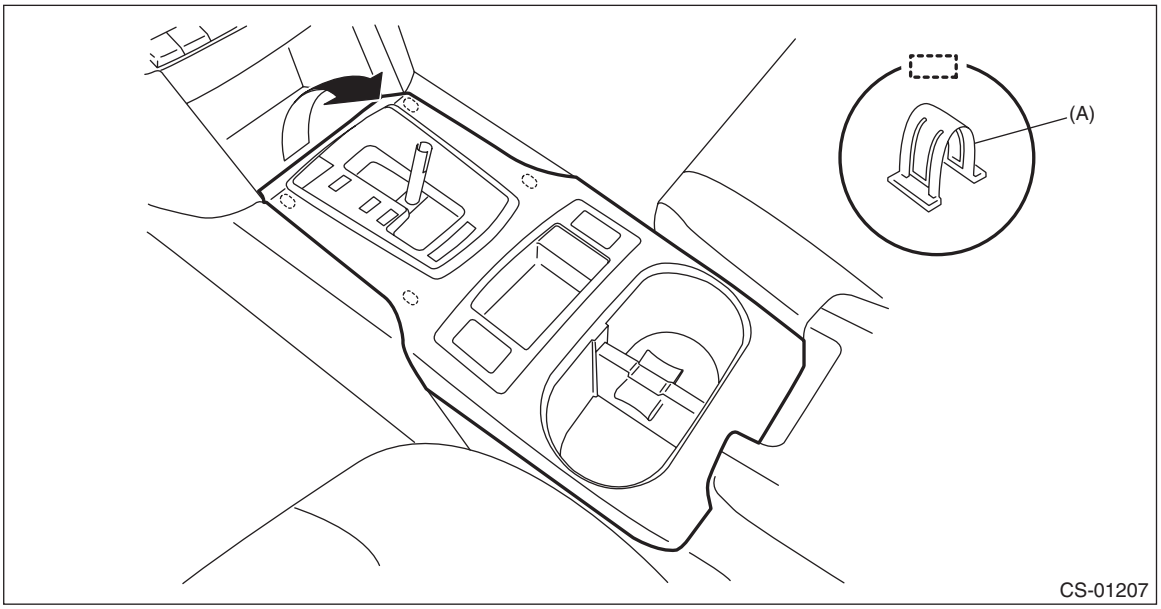


11) Remove the grip assembly.



12) Turn over the rubber and remove the console front cover assembly.


CS-01206

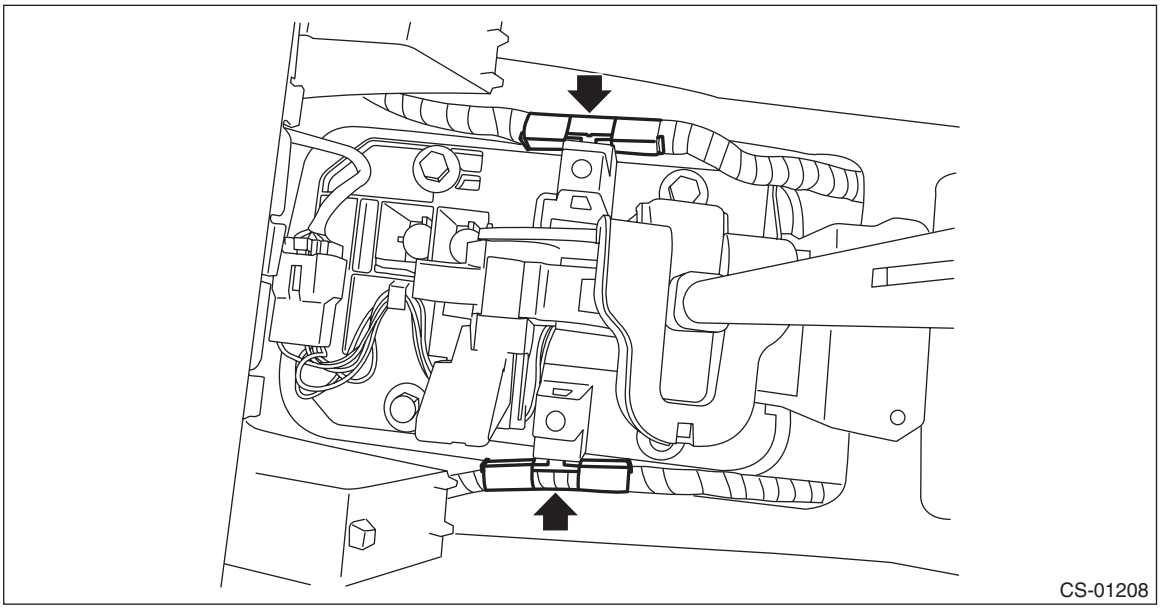


CS-01207

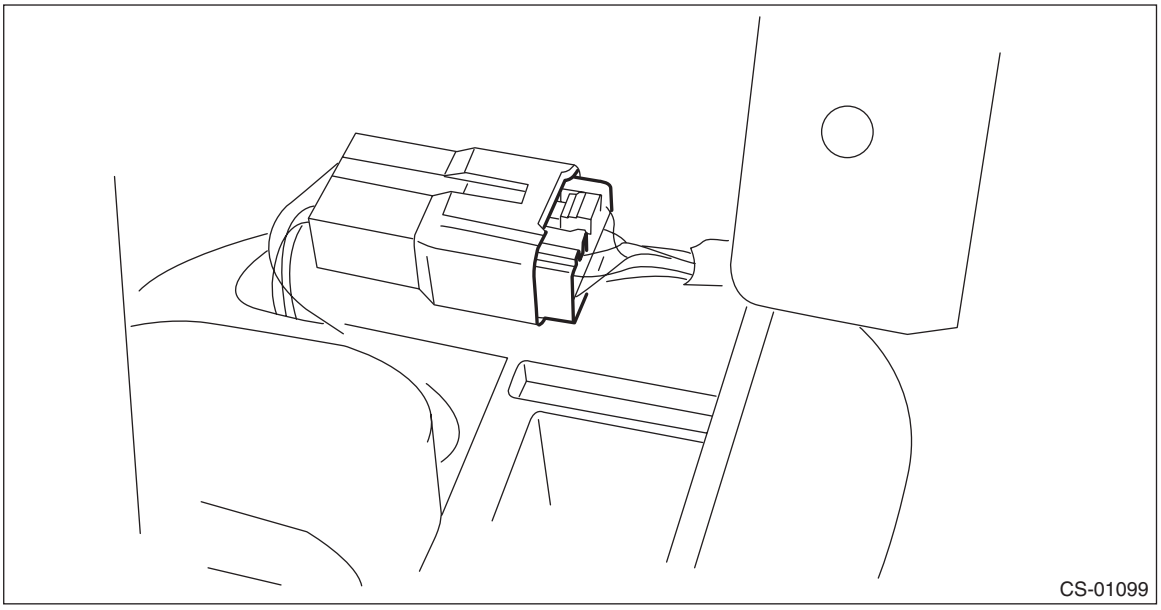
(A) Hooks (4 places)

13) Remove the console box. <Ref. to EI-72, REMOVAL, Console Box.>

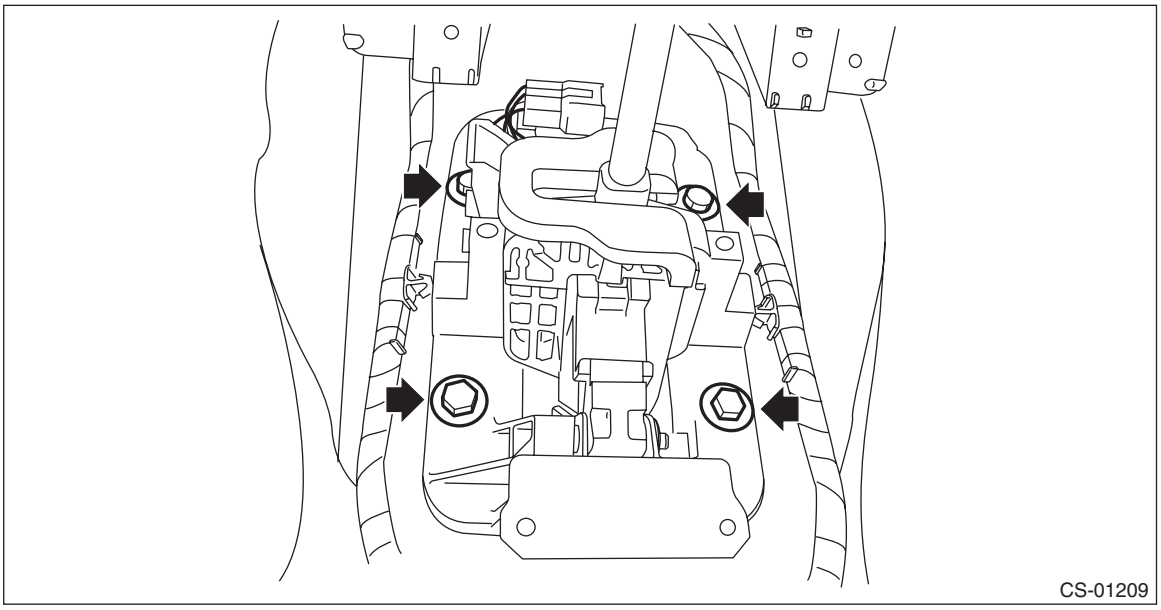
14) Remove the harness clip from the select lever.



15) Disconnect the harness connector.



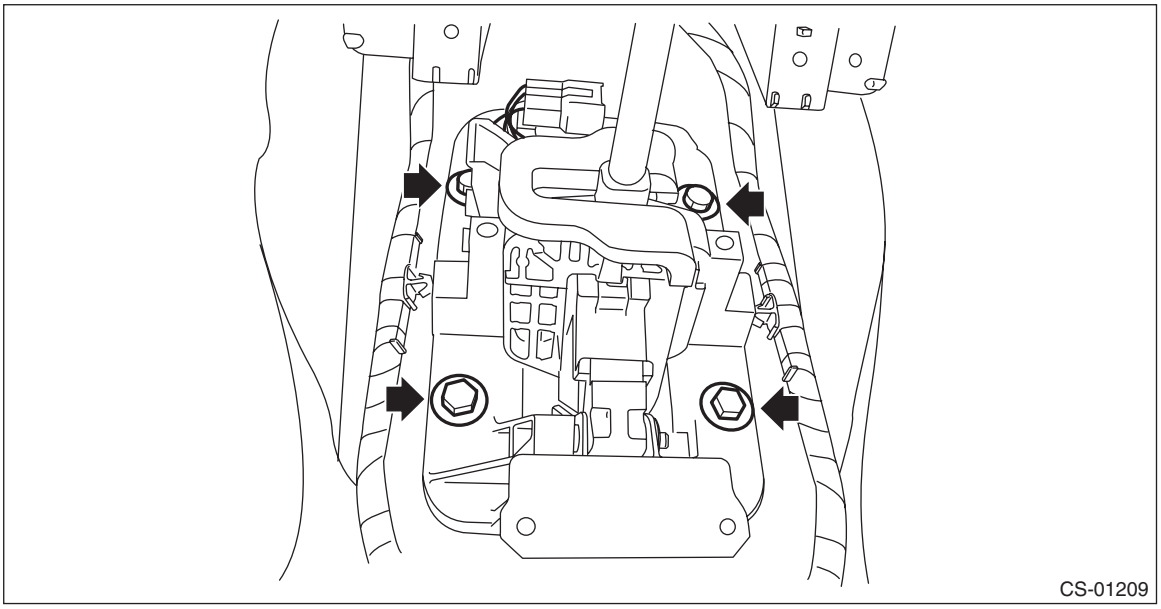
16) Remove the four bolts to remove the select lever assembly.



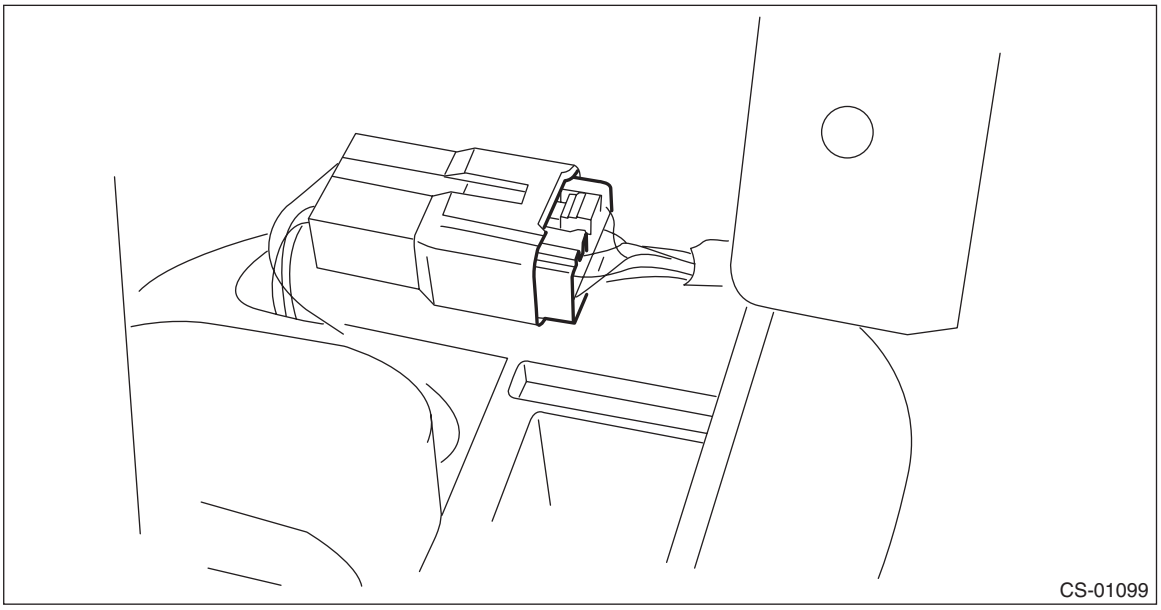
B: INSTALLATION

1) Set the select lever assembly to the vehicle body.
2) Tighten the four mounting bolts to attach the select lever assembly to the vehicle body.

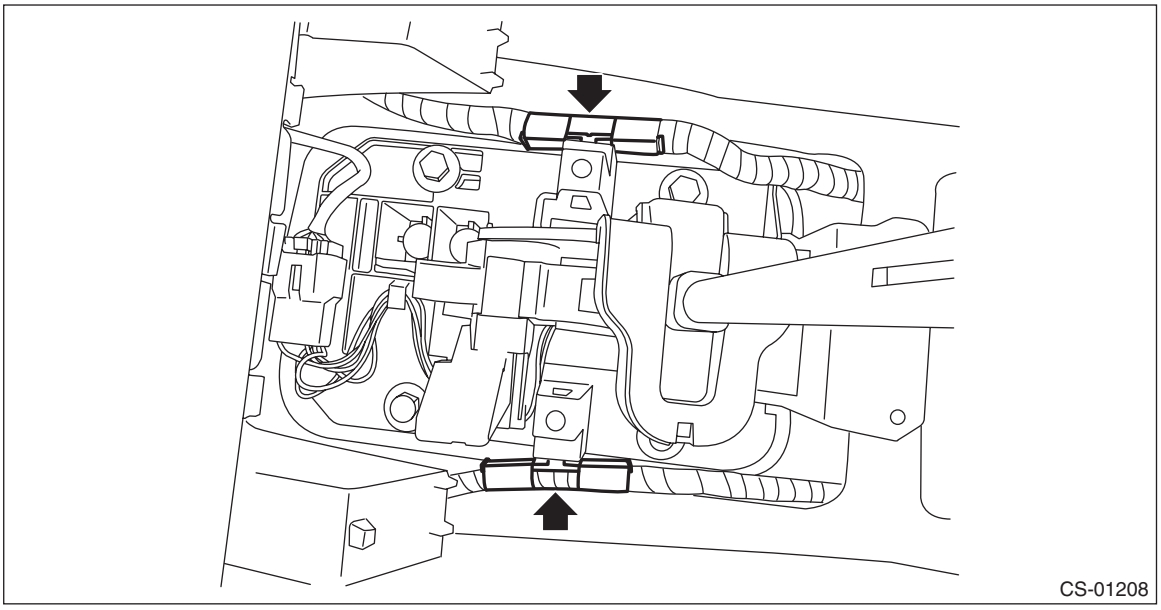
Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)



3) Connect the harness connector.

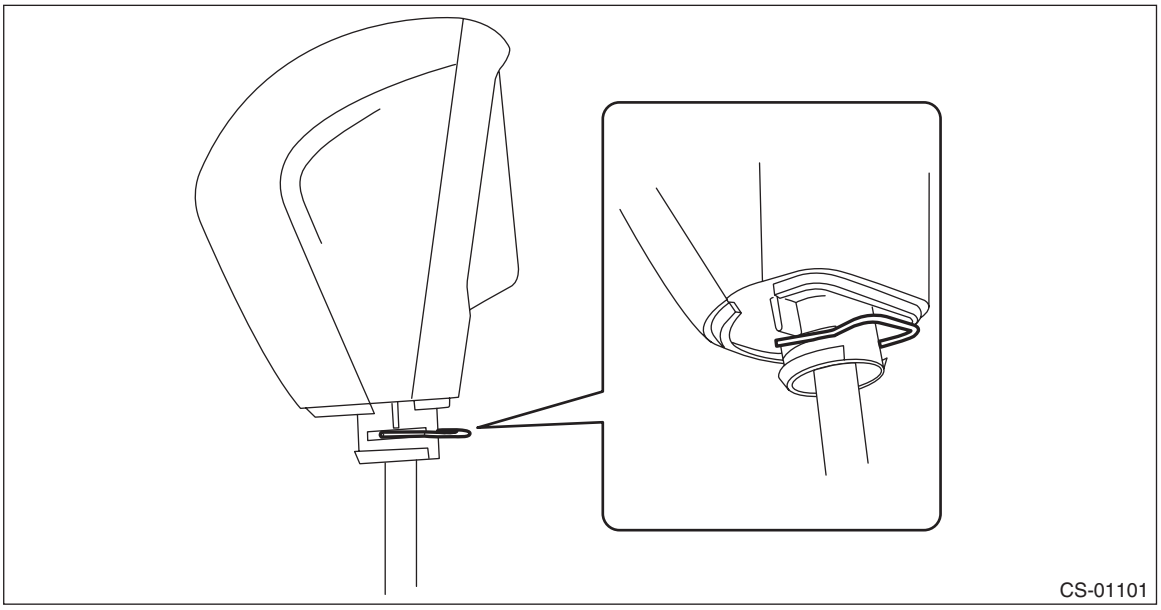


4) Install the harness clip to the select lever assembly.



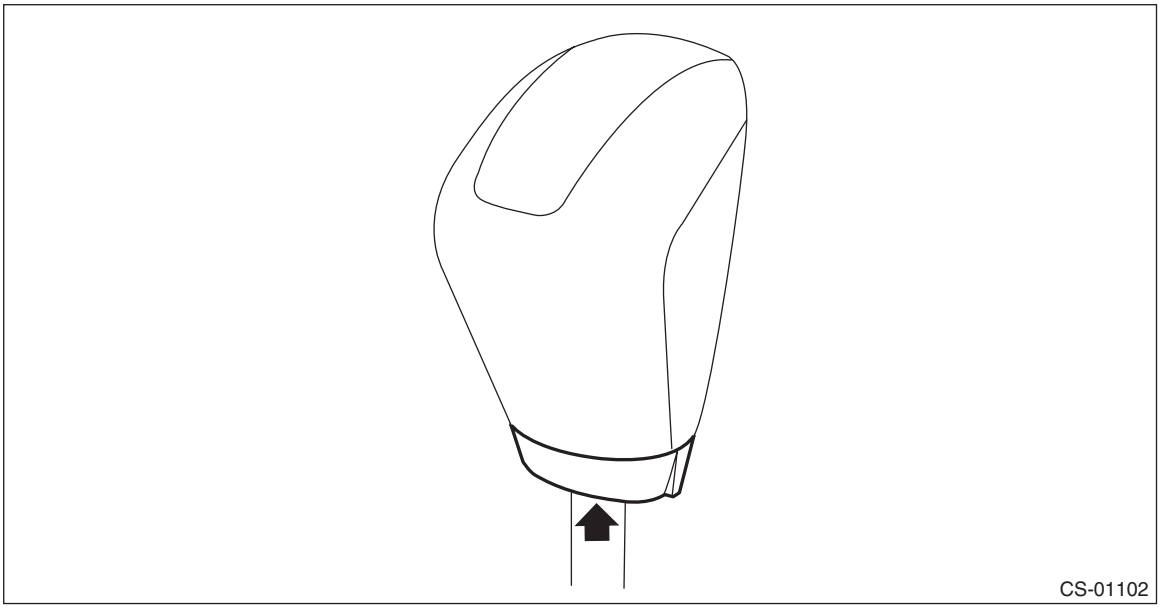
5) Shift the select lever to “N” range.
6) Install the console box and the console front cover assembly. <Ref. to EI-74, INSTALLATION, Console Box.>

7) Accessing from the button side of the grip, attach the clamp grip pin.

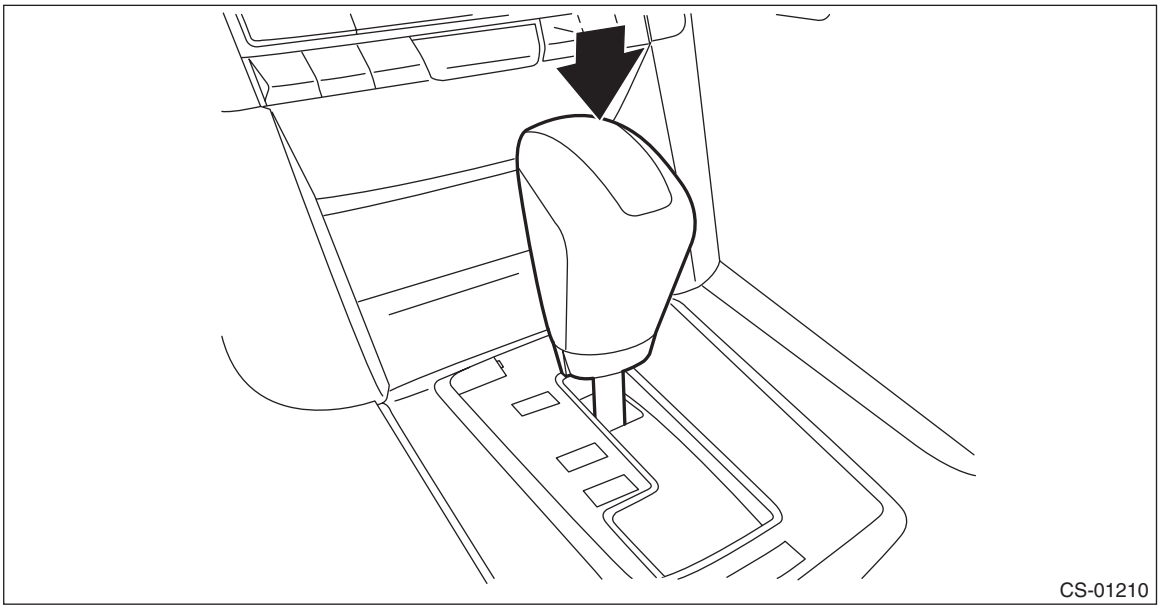


8) Install the cover grip AT securely.

NOTE:
After installation, check that the cover grip AT cannot be detached.



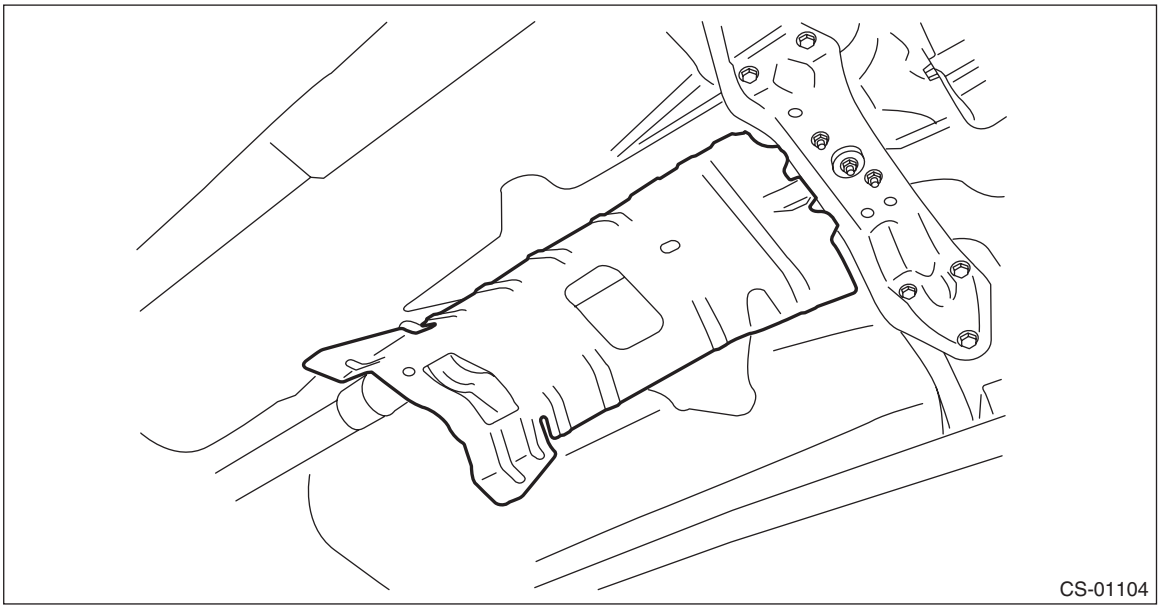
9) Insert the grip assembly to the select lever and press it down until a click is heard.



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

11) Lift up the vehicle.
12) Shift the range select lever to “N” range.
13) Secure the cable to the bracket. <Ref. to CS-50, INSTALLATION, Select Cable.>
14) Adjust the select cable position. <Ref. to CS-55, ADJUSTMENT, Select Cable.>
15) After adjustment, confirm that the select lever operates properly at all range positions using the shift lock release button.
16) Install the heat shield cover.

Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)



17) Install the rear exhaust pipe.
- 2.5 L model

<Ref. to EX(H4DO)-14, INSTALLATION, Rear Exhaust Pipe.>
- 3.6 L model

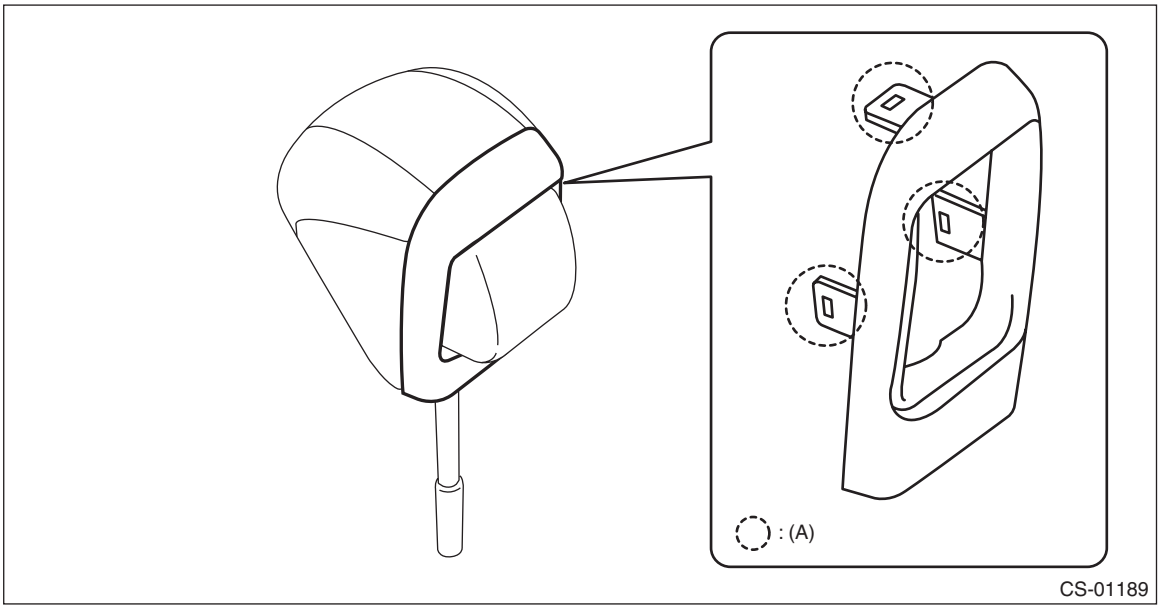
<Ref. to EX(H6DO)-8, INSTALLATION, Rear Exhaust Pipe.>

18) Inspect the following items. If a malfunction is found in the inspection, adjust the select cable or inhibitor switch (CVT model).
(1) The shift lock operates normally. <Ref. to CS-14, SHIFT LOCK OPERATION, INSPECTION, AT Shift Lock Control System.>
(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.

C: DISASSEMBLY

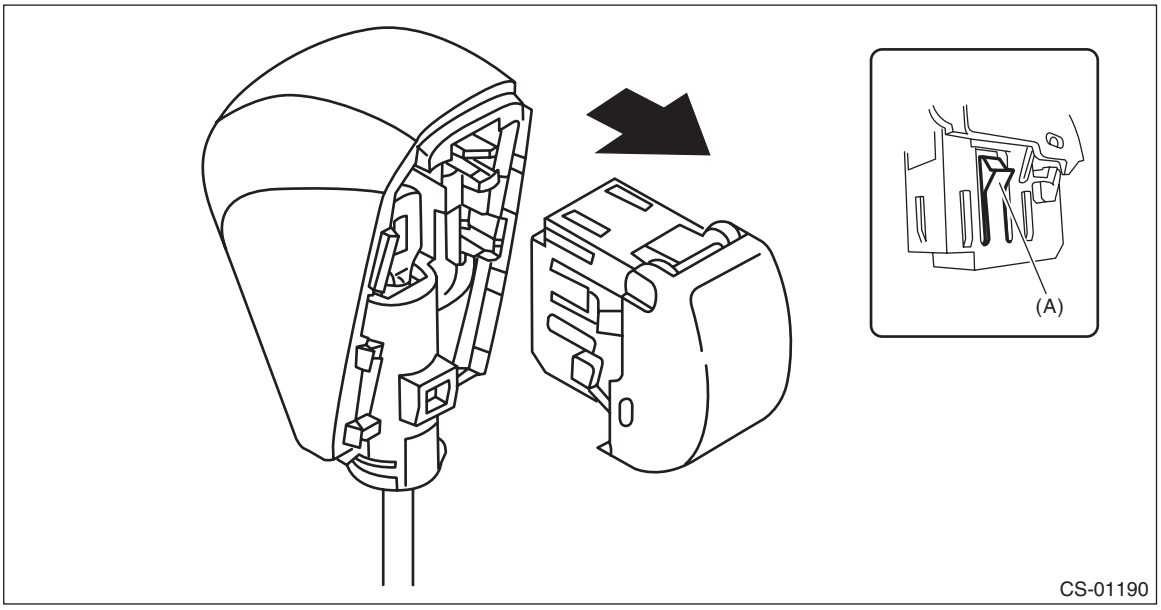
1. GRIP ASSY

1) Remove the cover grip AT.



(A) Claws (3 places)

2) Remove the button assembly-AT.

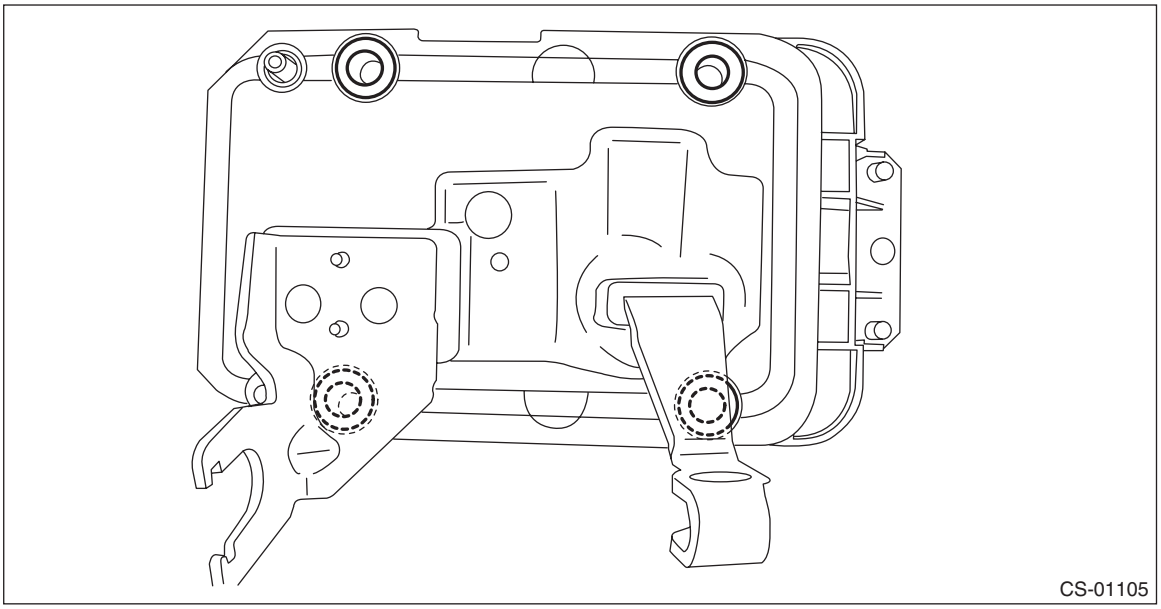


(A) Claw

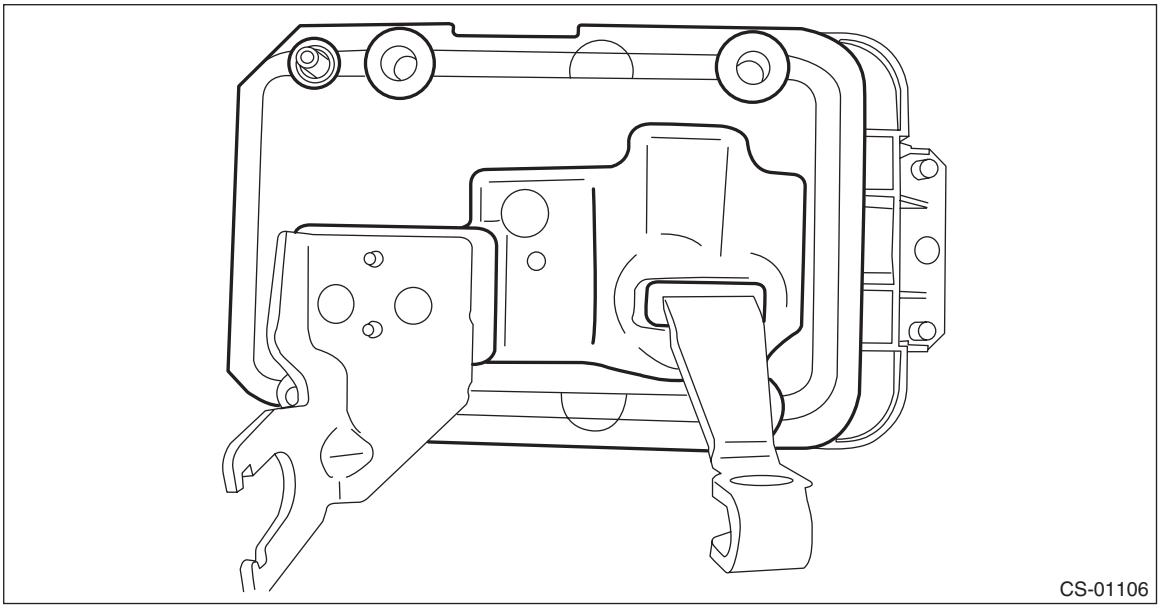
3) Remove the rod COMPL.

2. AT SELECT LEVER ASSEMBLY

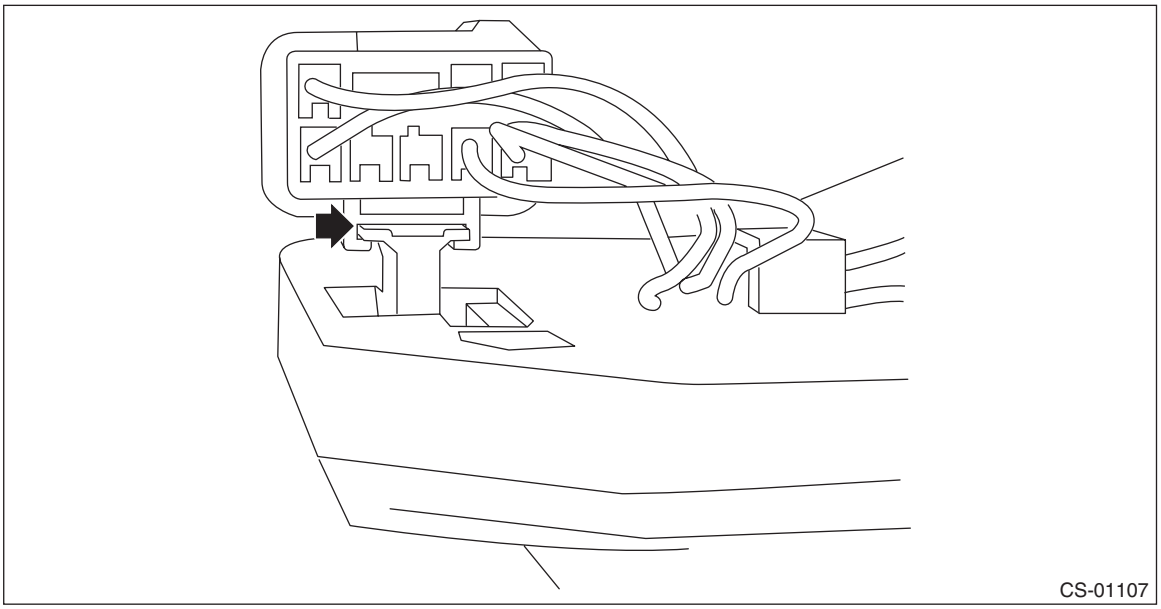
1) Remove the spacer plate.


CS-01105

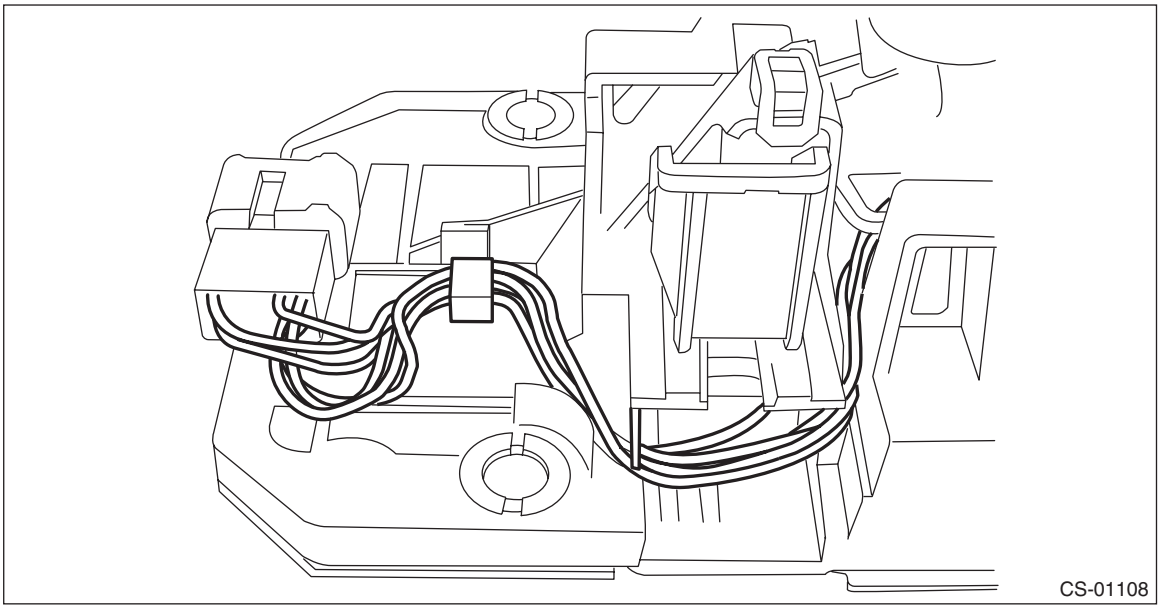
2) Remove the gasket.


CS-01106

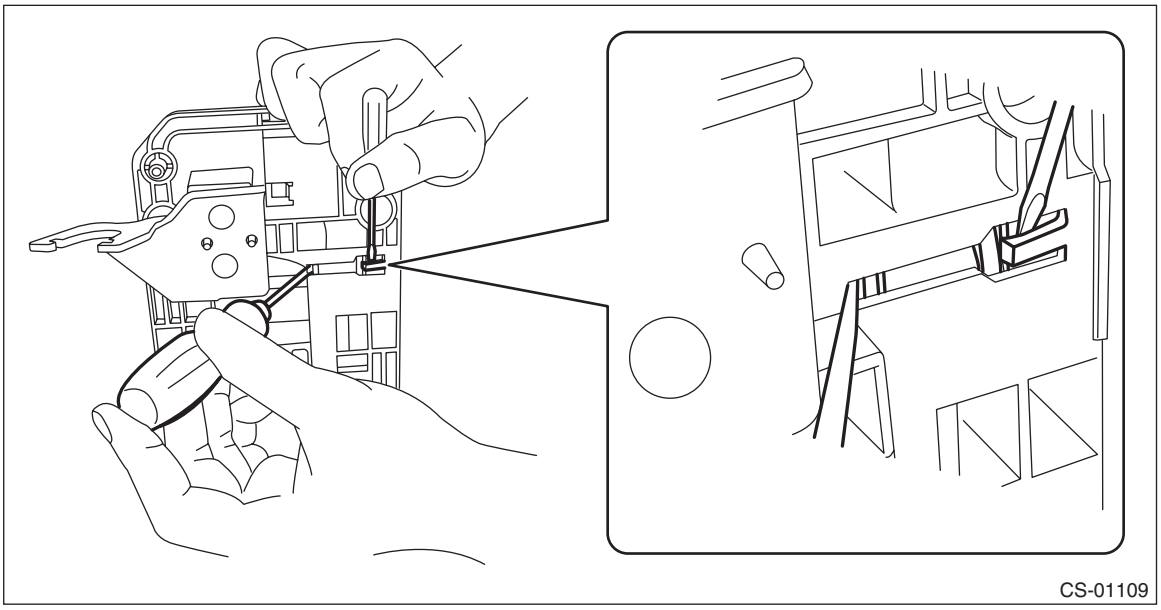
3) Insert a flat tip screwdriver with a thin tip under the connector and disconnect the harness connector from the plate COMPL.



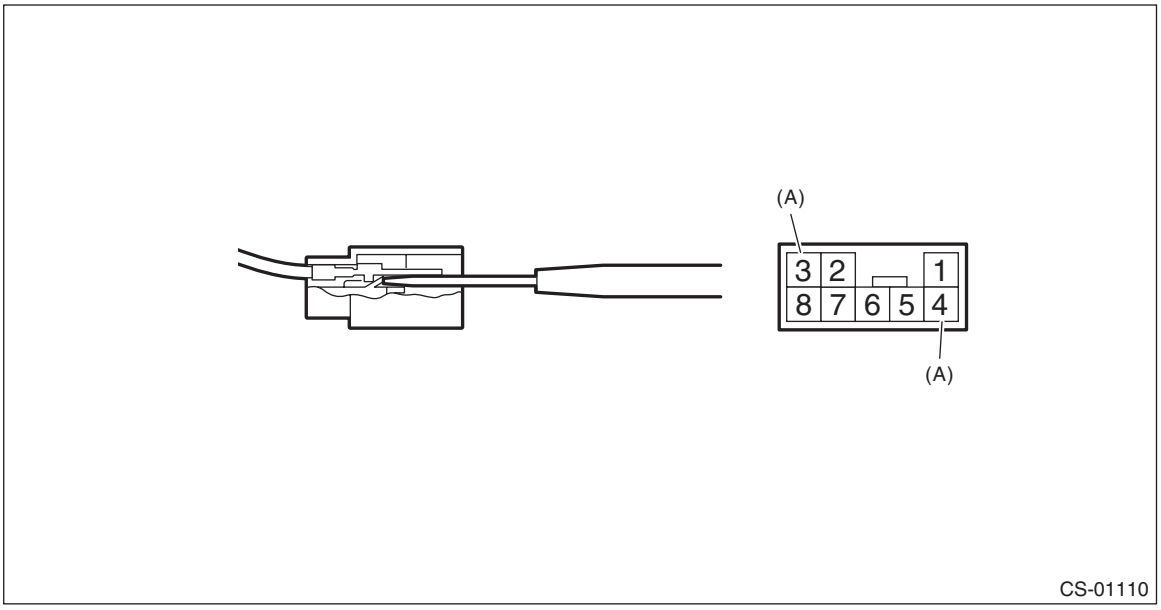
4) Remove the harness from the plate COMPL.



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



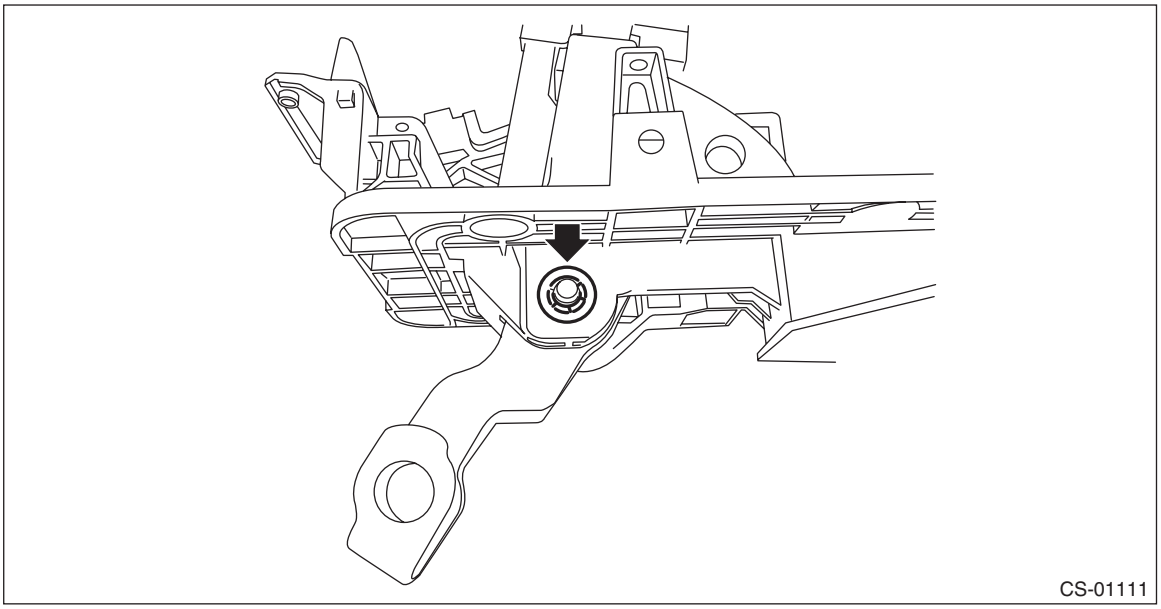
6) Using a flat tip screwdriver with a thin tip, remove the solenoid unit terminals from the connector.



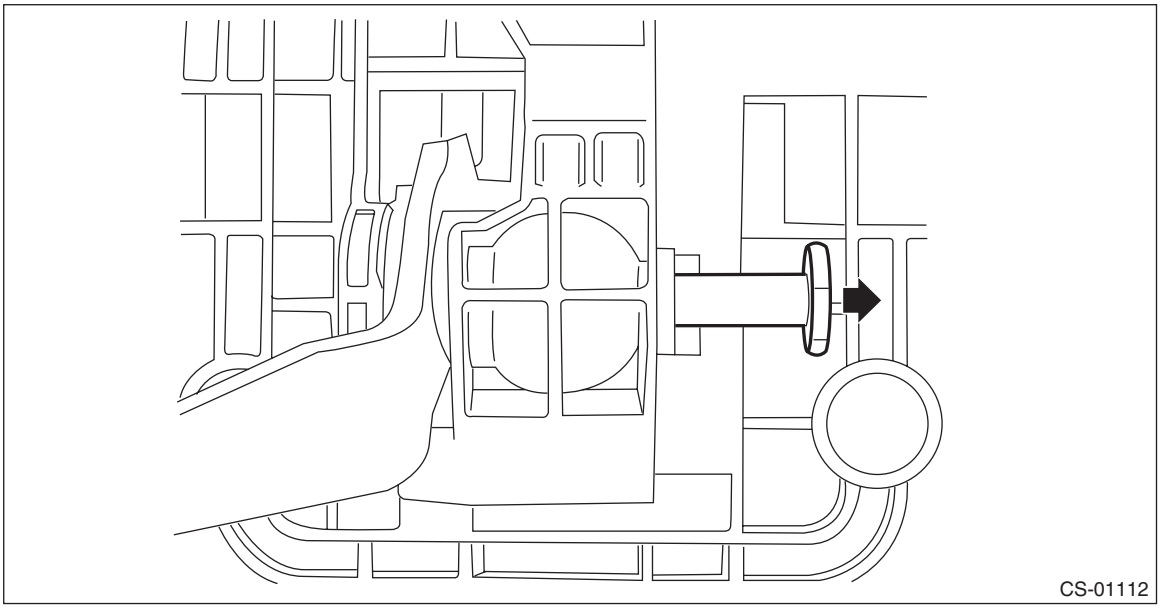
(A) Solenoid unit terminals

7) Remove the clamp push nut.

NOTE:
Replace the clamp push nut with a new part.

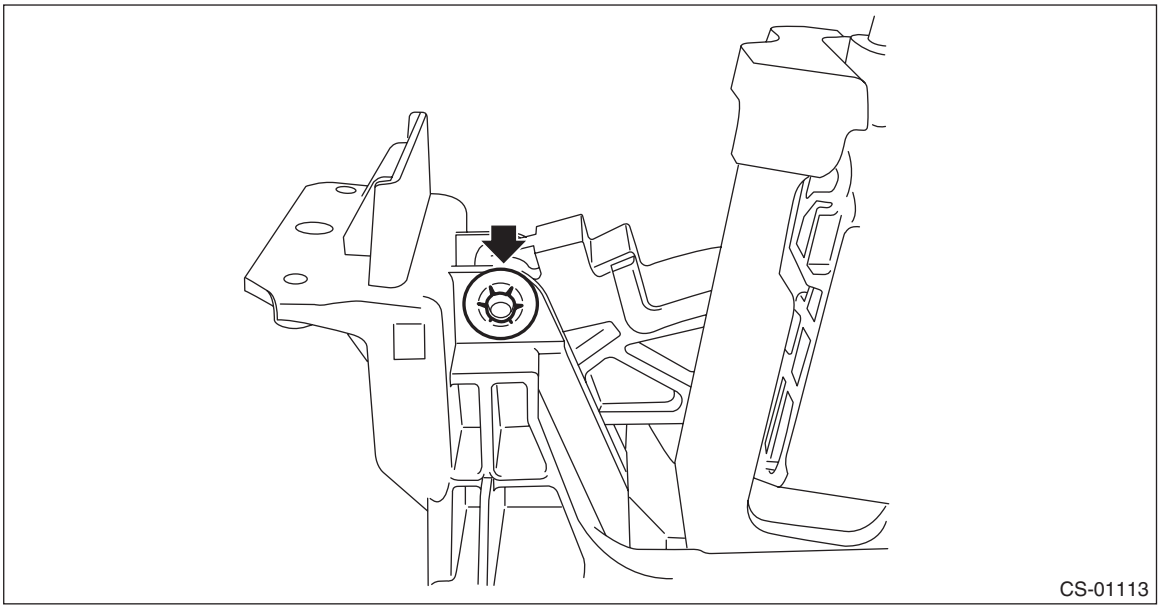


8) Pull out shaft control.

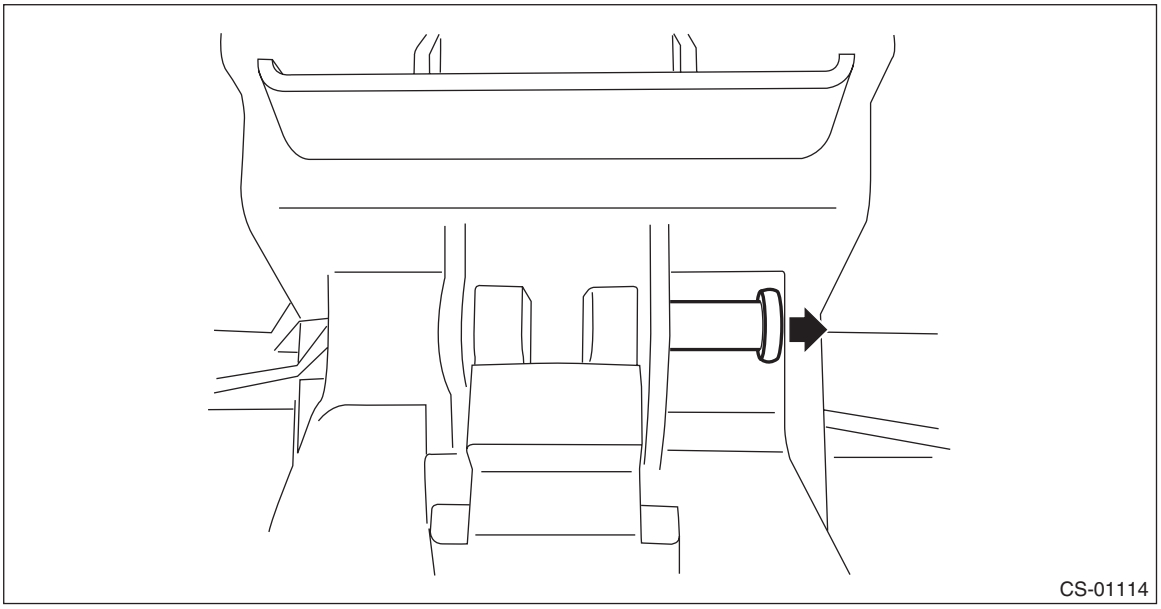


9) Remove the clamp push nut.

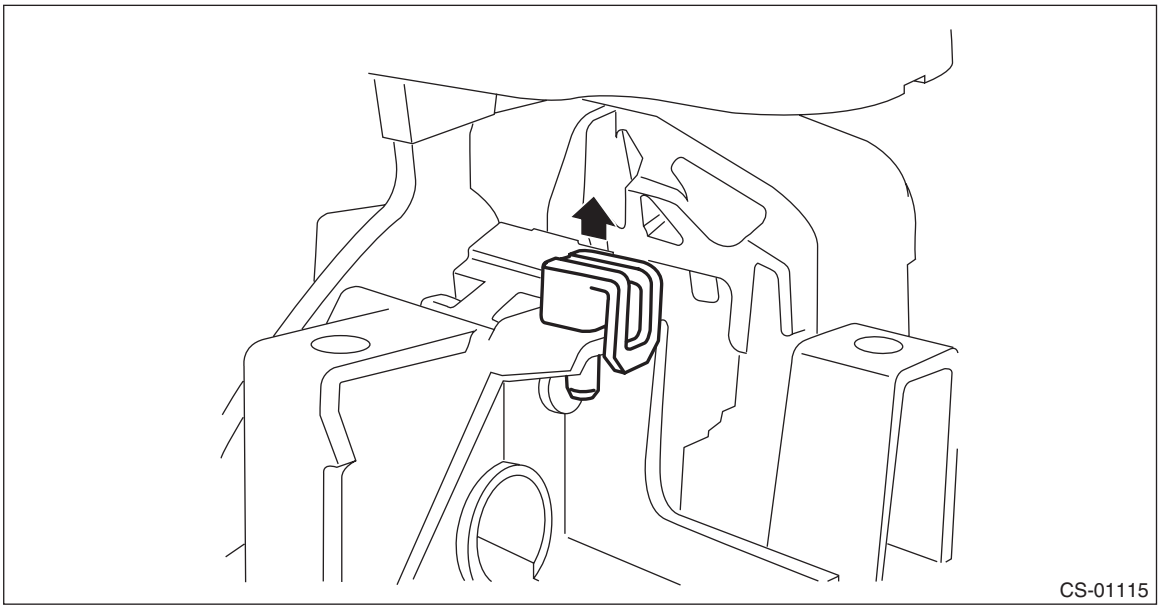
NOTE:
Replace the clamp push nut with a new part.



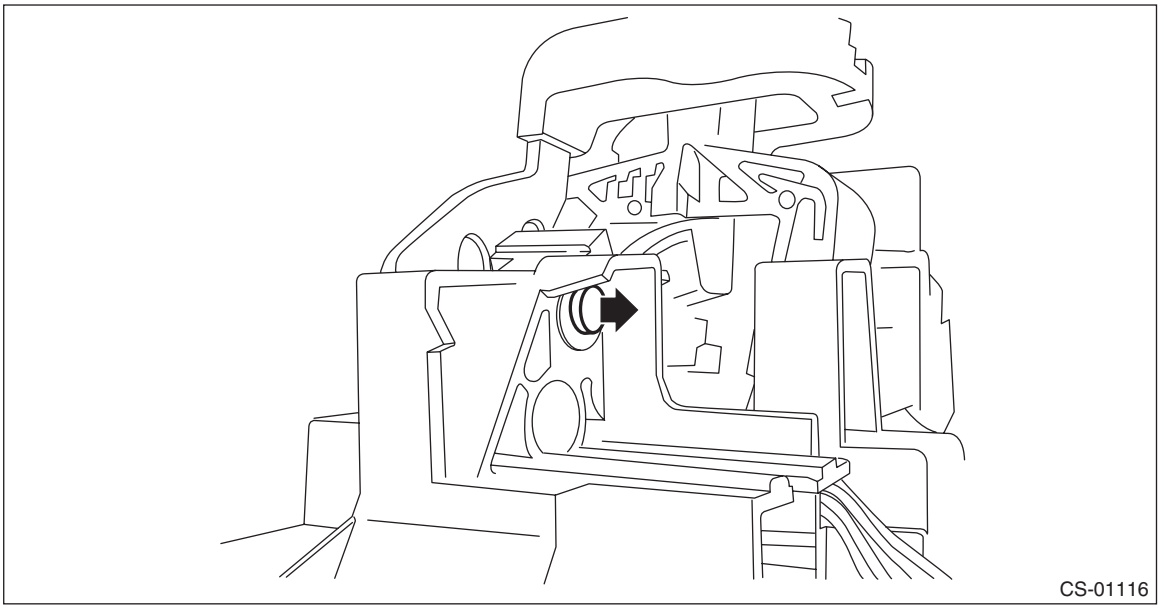
10) Pull out spacer pin guide.



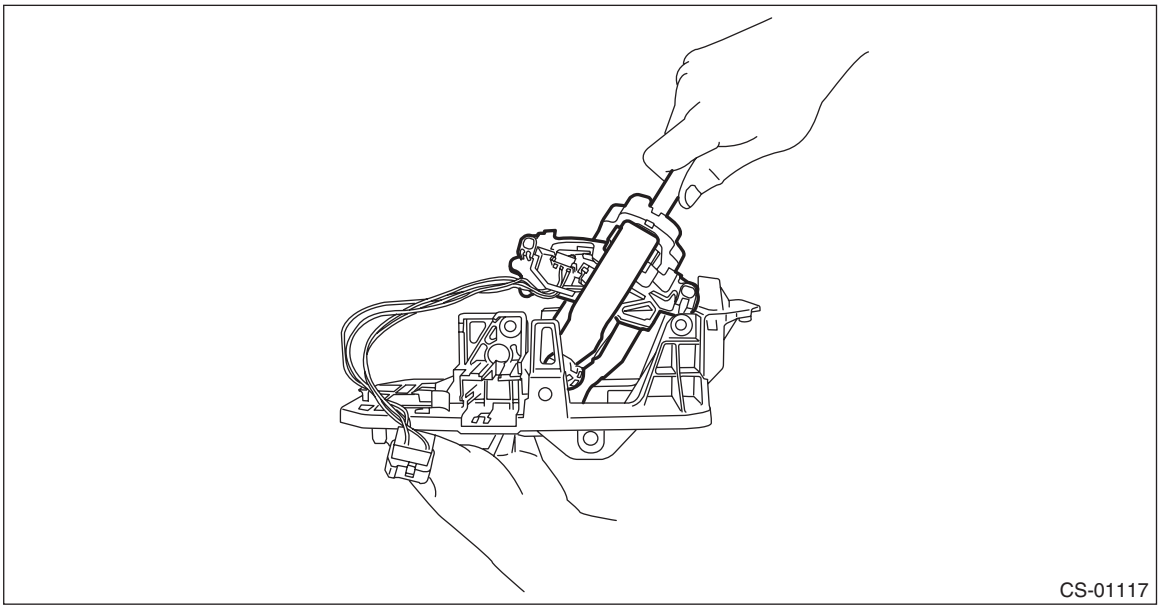
11) Remove the clamp pin.



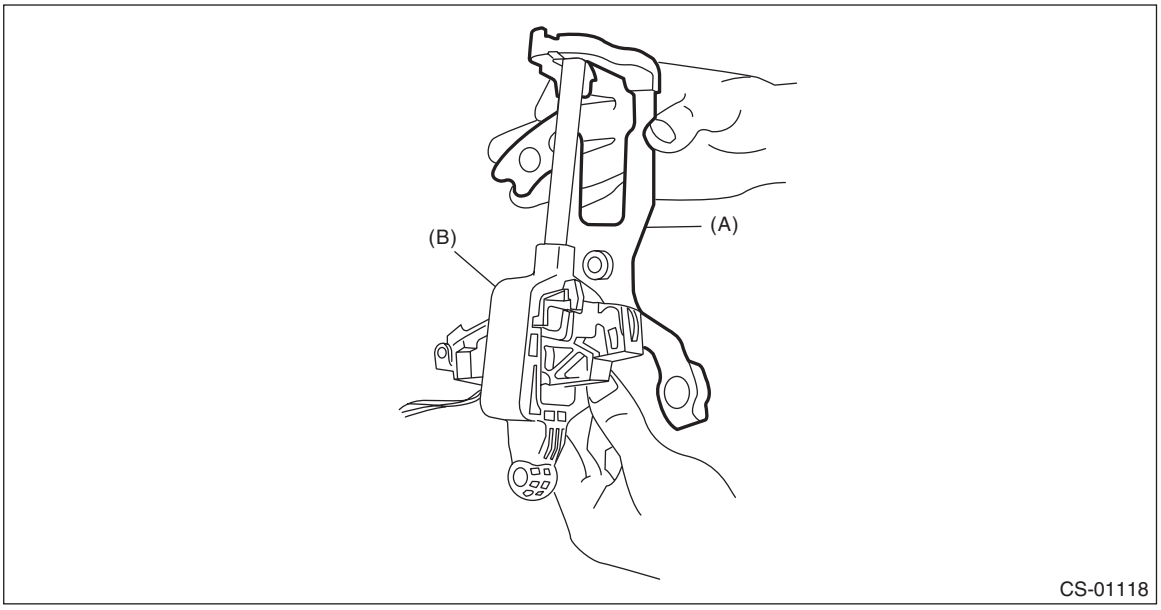
12) Remove the spacer pin guide.



13) Remove the select lever COMPL from the plate COMPL.

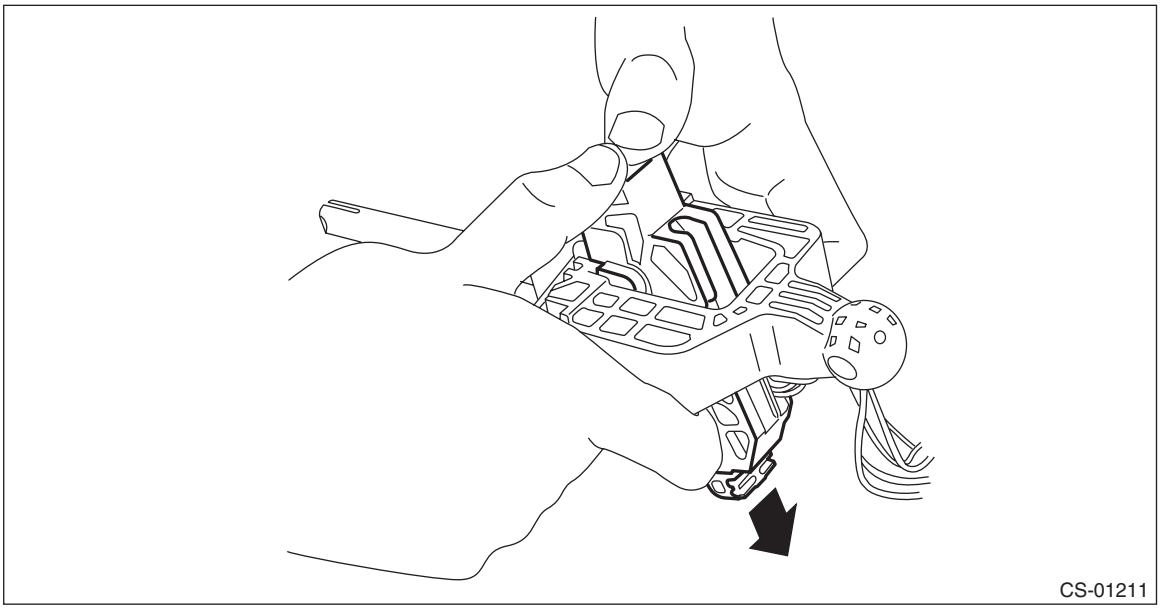


14) Remove the arm assembly.

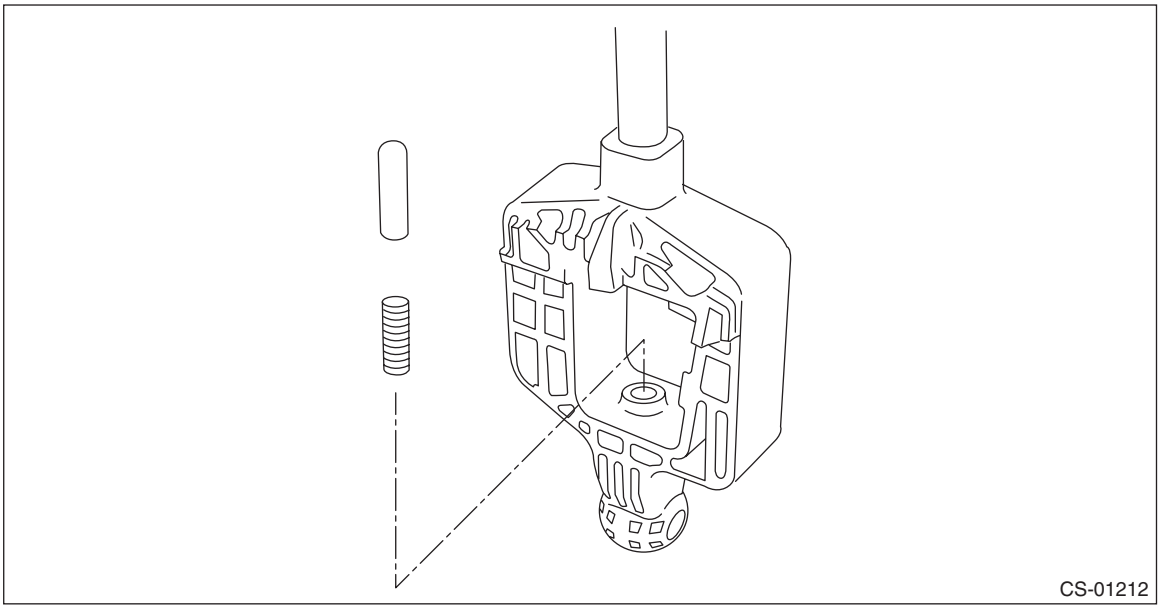


(A) Arm ASSY
(B) Selector lever COMPL

15) Remove the plate guide from the select lever COMPL.

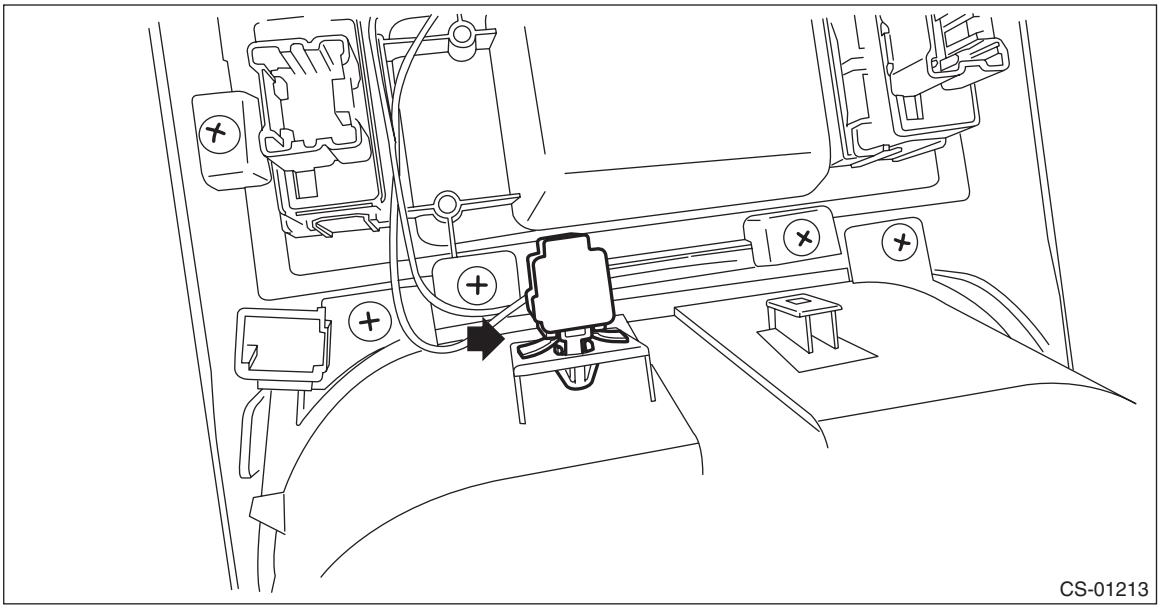


16) Remove the rod detent and detent spring from the select lever COMPL.

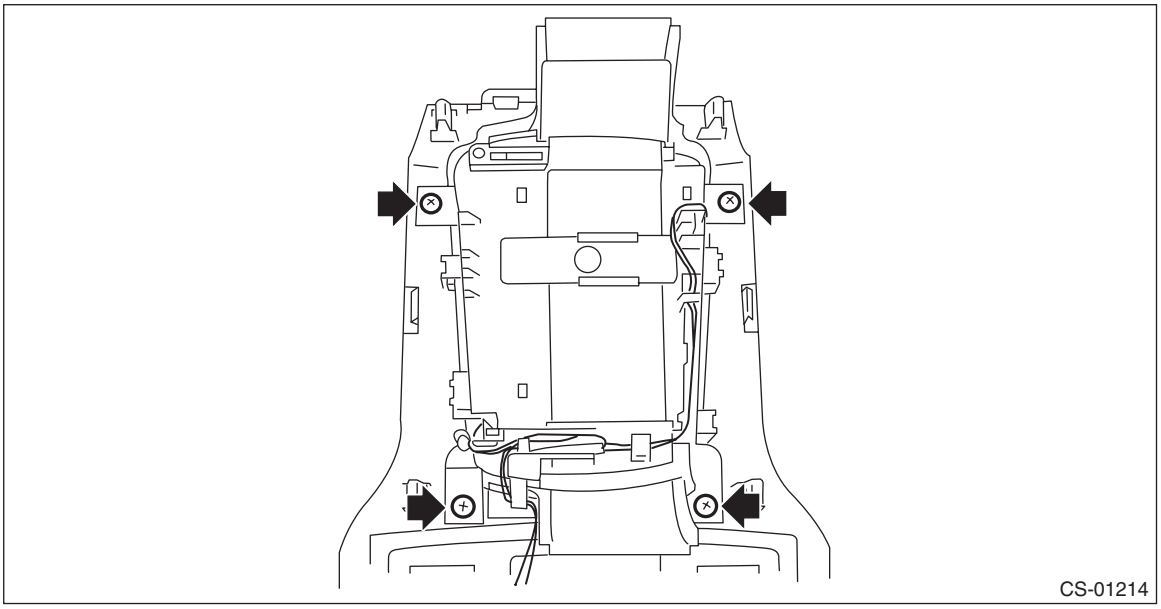


3. INDICATOR ASSY

1) Disconnect the harness connector from the console front cover assembly.



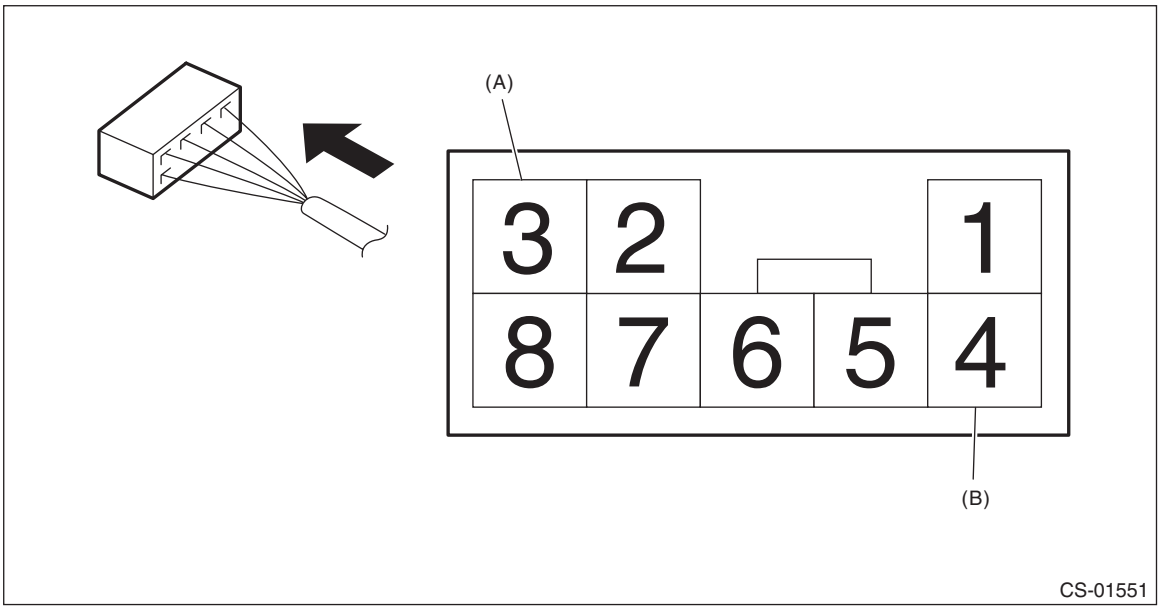
2) Remove the four screws and remove the indicator assembly from the console front cover assembly.



D: ASSEMBLY

1) Clean all the parts before assembly.
2) Apply Multemp D or equivalent to the sliding portion of each part.
3) Assemble in the reverse order of disassembly.

NOTE:
Insert the solenoid unit terminals to the harness connector.



(A) Solenoid unit (color code: blue)
(B) Solenoid unit (color code: black)

4) After installation, check the following points.
• The select indicator matches the select lever position when the select lever is changed from “P” range to “D” range.
• The select lever position and the position mark match each other.
• Operating force to move the select lever from “P” to “D” range.

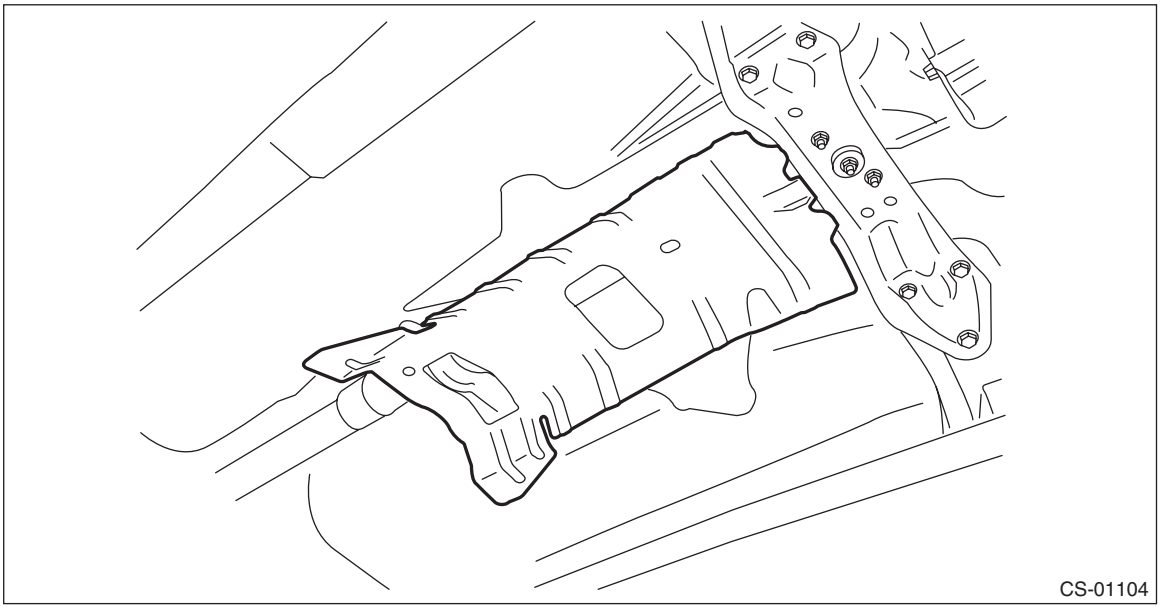
E: INSPECTION

1) Inspect the removed parts by comparing with new ones 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.

4. Select Cable

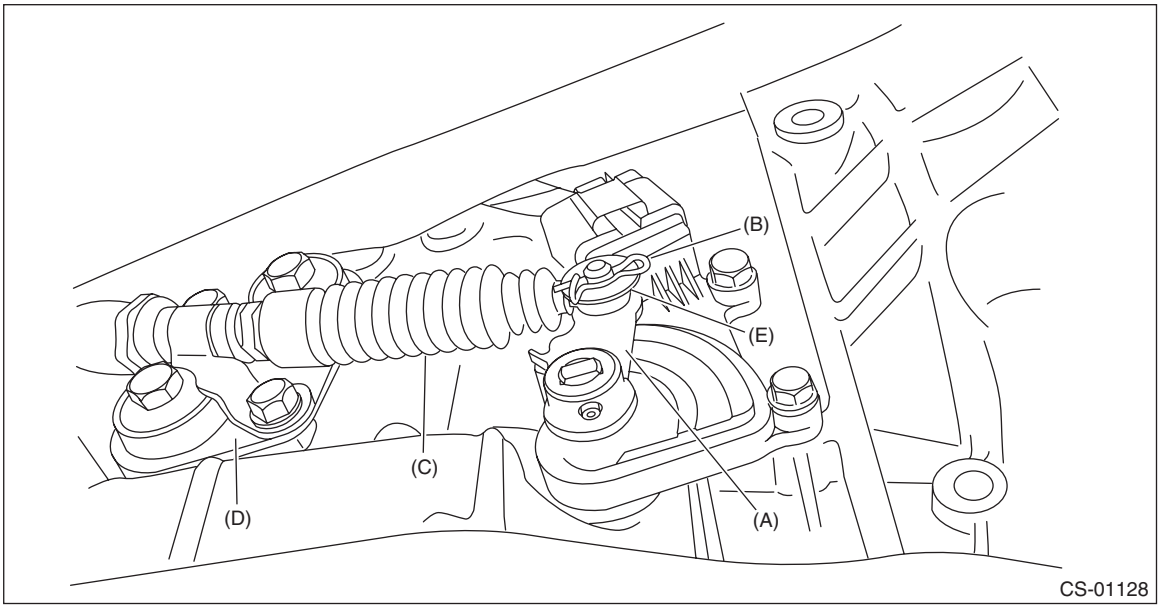
A: REMOVAL

1) Shift the select lever to “N” range.
2) Disconnect the ground cable from battery.
3) Lift up the vehicle.
4) Remove the front exhaust pipe and rear exhaust pipe.
• 2.5 L model
<Ref. to EX(H4DO)-5, REMOVAL, Front Exhaust Pipe.> <Ref. to EX(H4DO)-13, REMOVAL, Rear Exhaust Pipe.>
• 3.6 L model
<Ref. to EX(H6DO)-5, REMOVAL, Front Exhaust Pipe.> <Ref. to EX(H6DO)-8, REMOVAL, Rear Exhaust Pipe.>
5) Remove the heat shield cover.



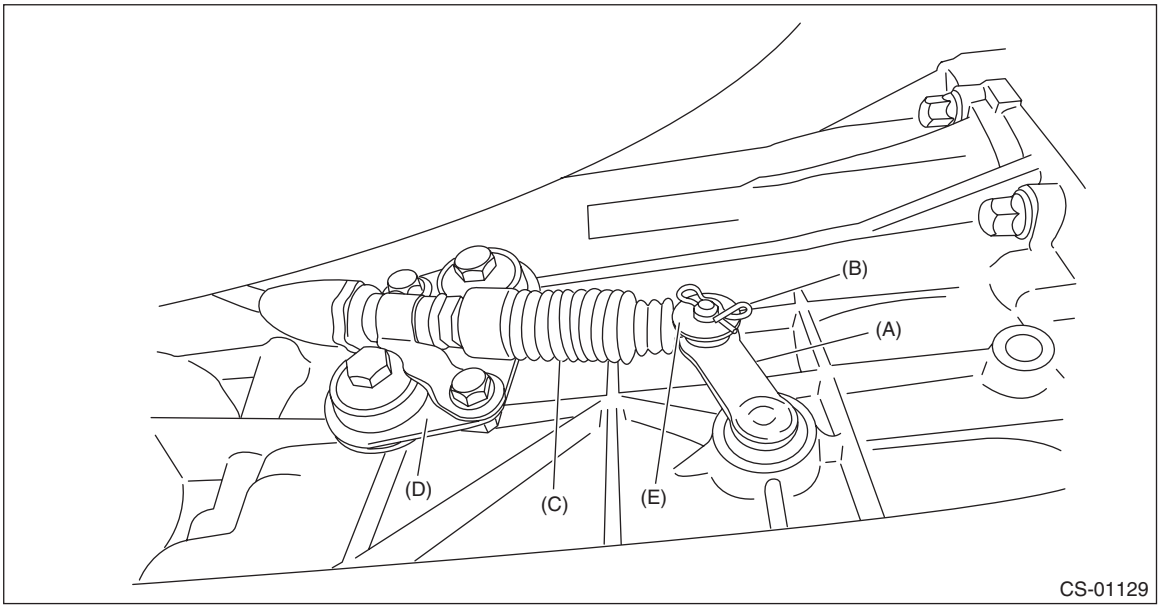
6) Remove the snap pin and washer from the shifter arm and remove the select cable from the shifter arm.

- CVT model



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

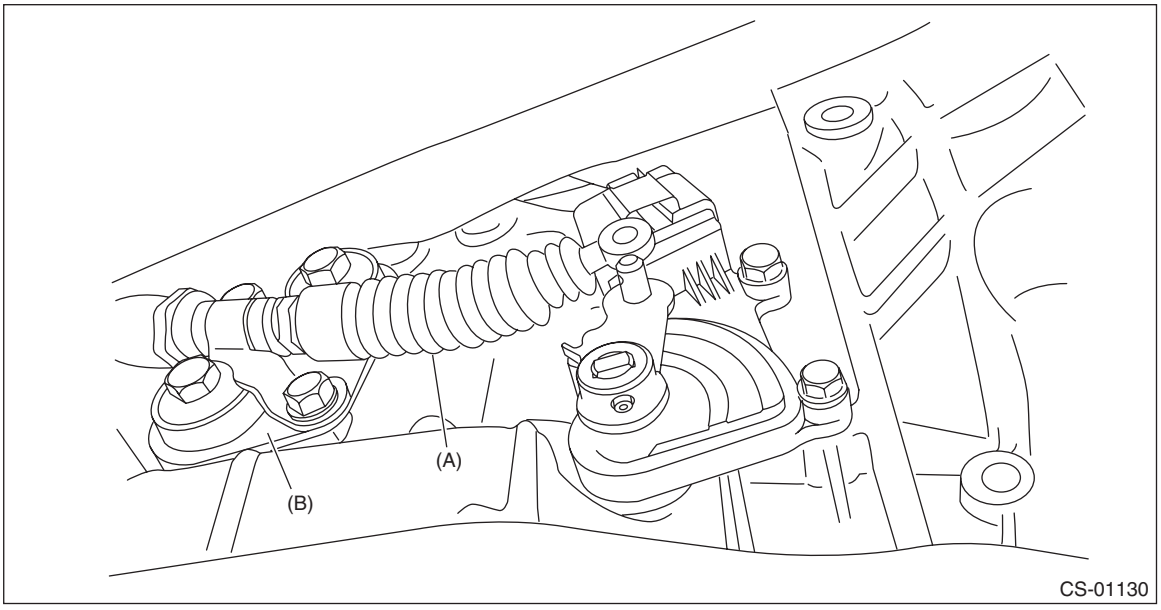
- AT model



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

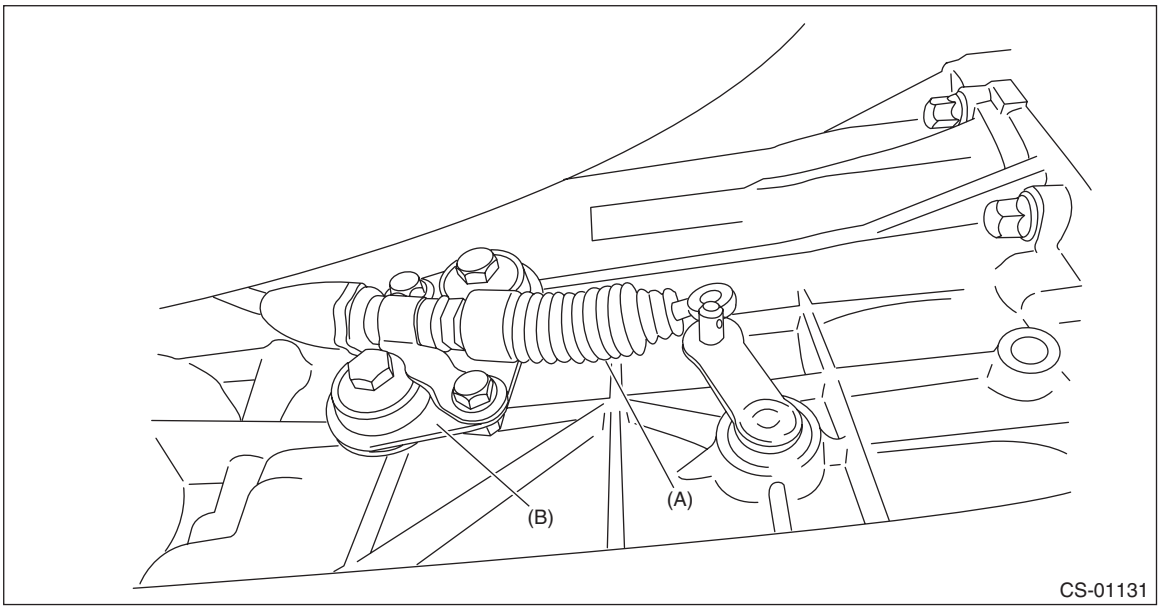
7) Remove the plate assembly from the transmission case.

- CVT model



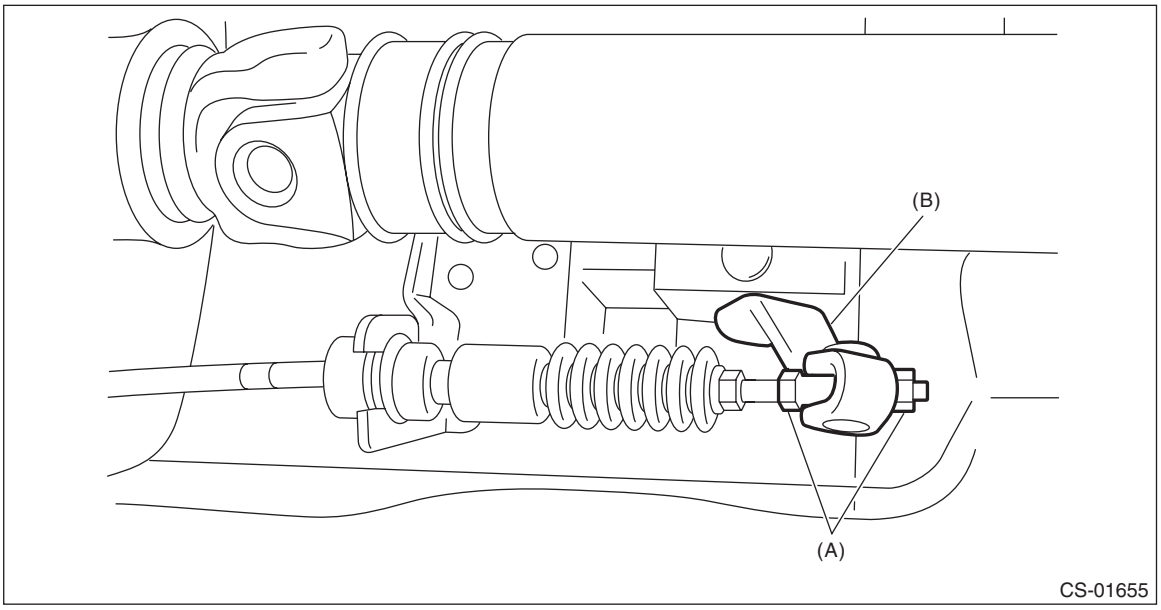
(A) Select cable
(B) Plate ASSY

- AT model



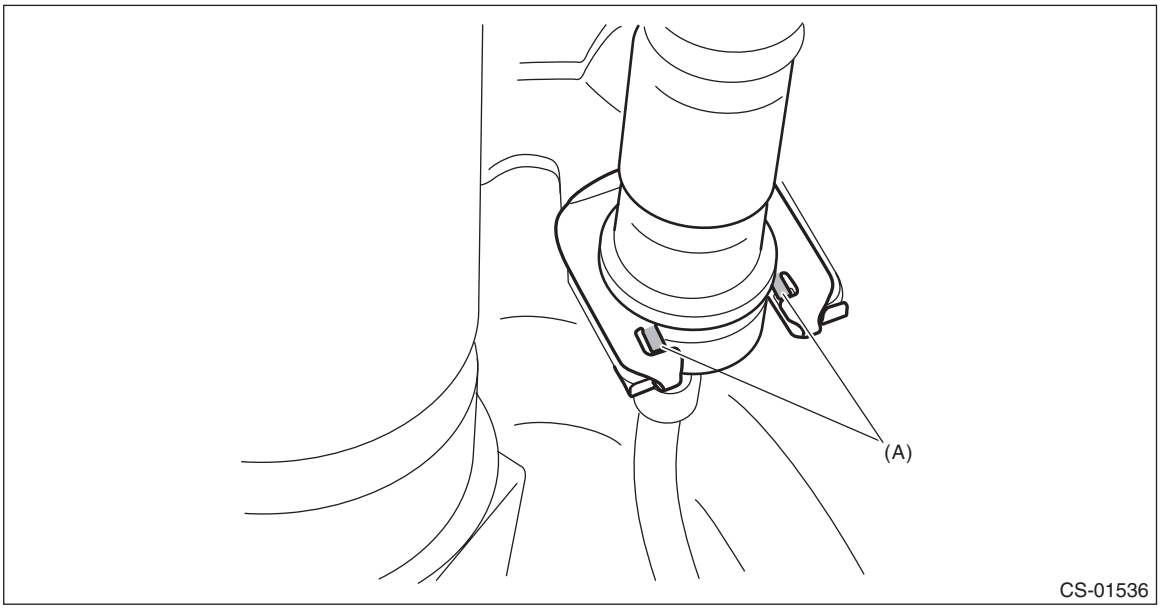
(A) Select cable
(B) Plate ASSY

8) Disconnect the cable from arm assembly.



(A) Nut
(B) Arm ASSY

9) Raise the claw of clamp to remove the cable from bracket.



(A) Claw

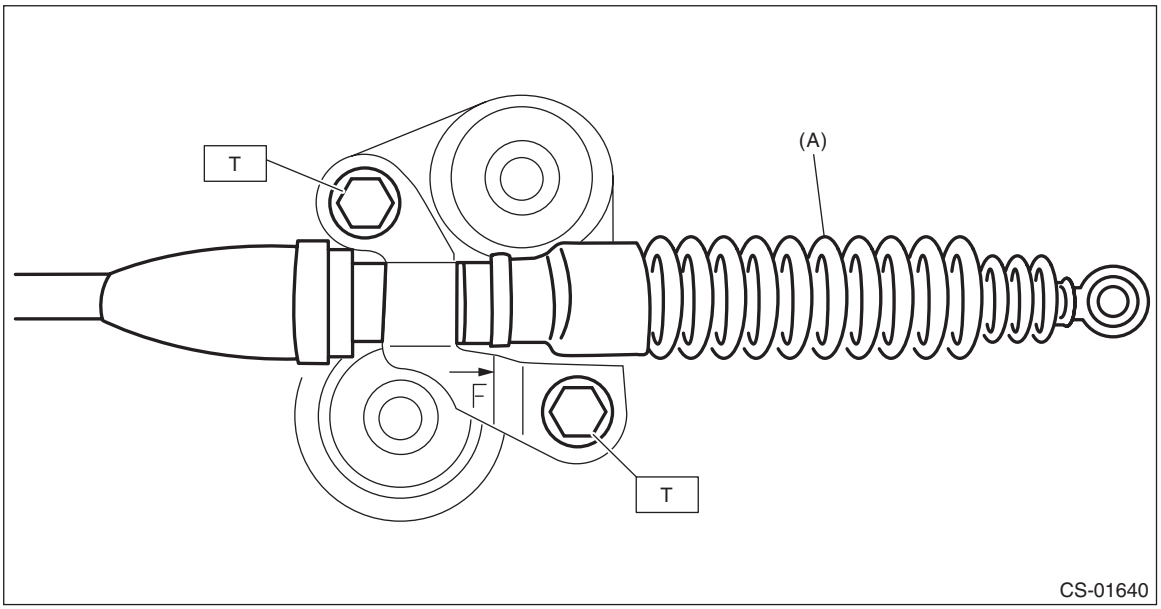
10) Remove the select cable from plate assembly.

B: 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)



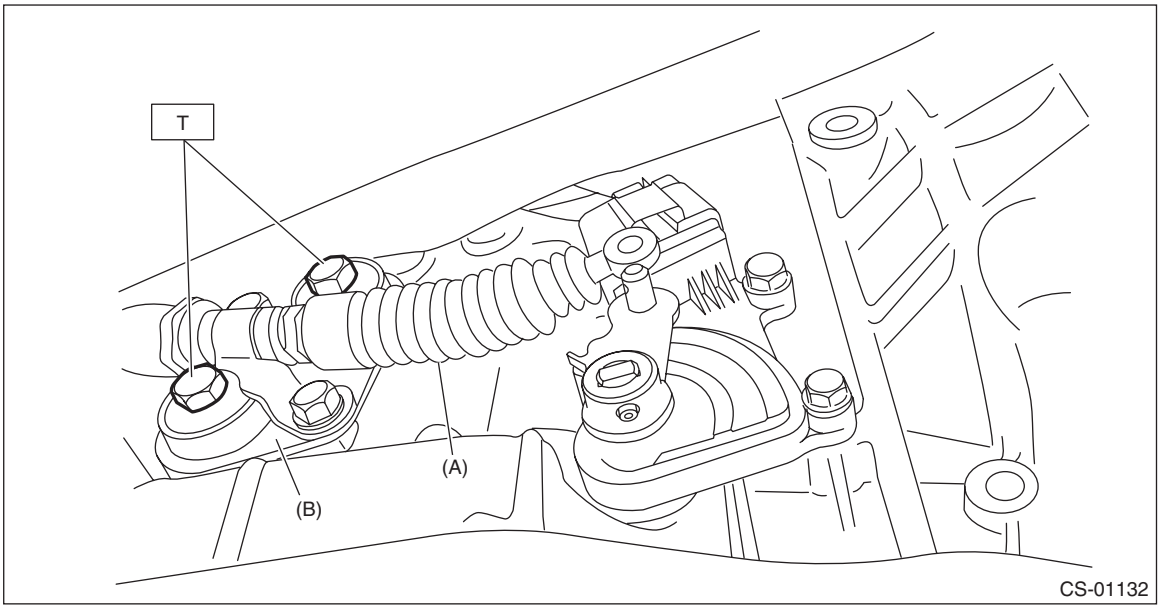
(A) Select cable

2) Install the select cable to range select lever.

3) Install the plate assembly to transmission.

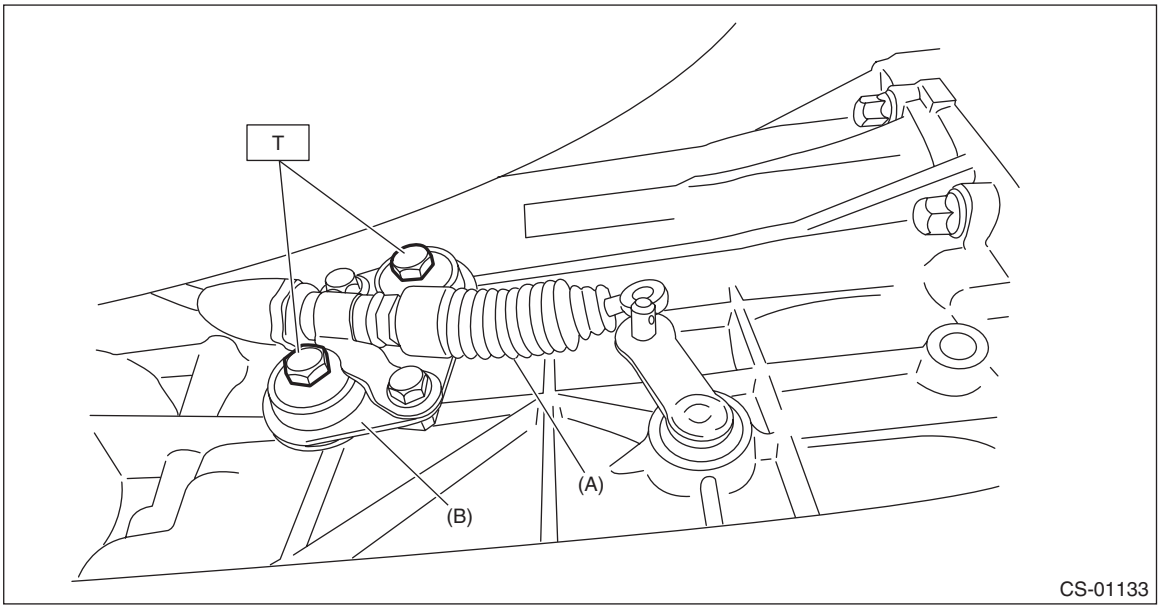
Tightening torque:
T: 25 N·m (2.5 kgf-m, 18.4 ft-lb)

- CVT model



(A) Select cable
(B) Plate ASSY

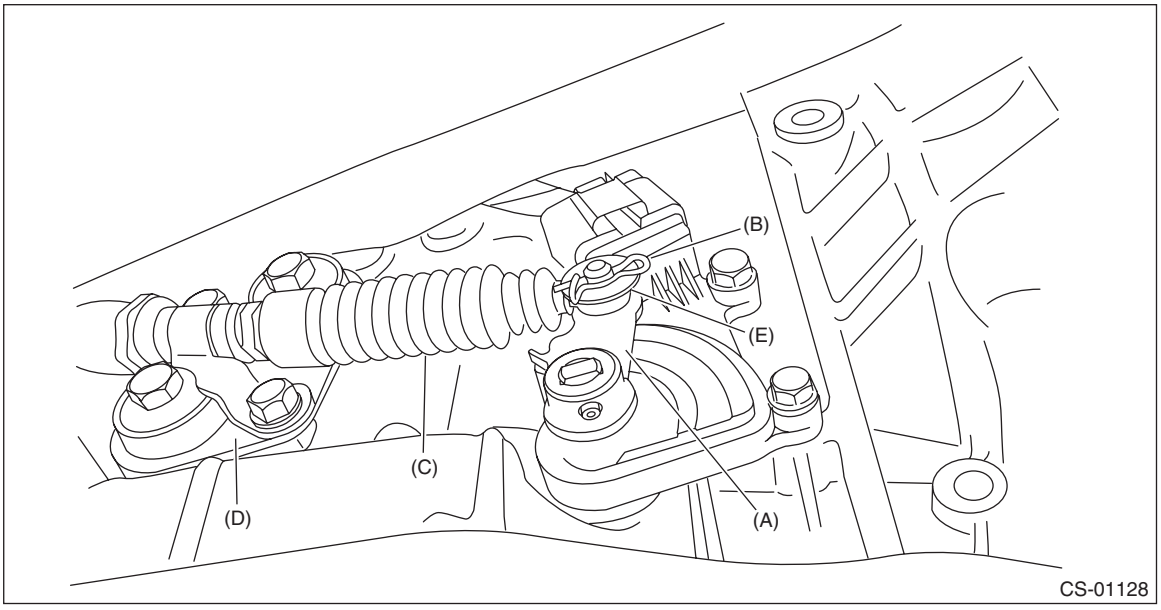
- AT model



(A) Select cable
(B) Plate ASSY

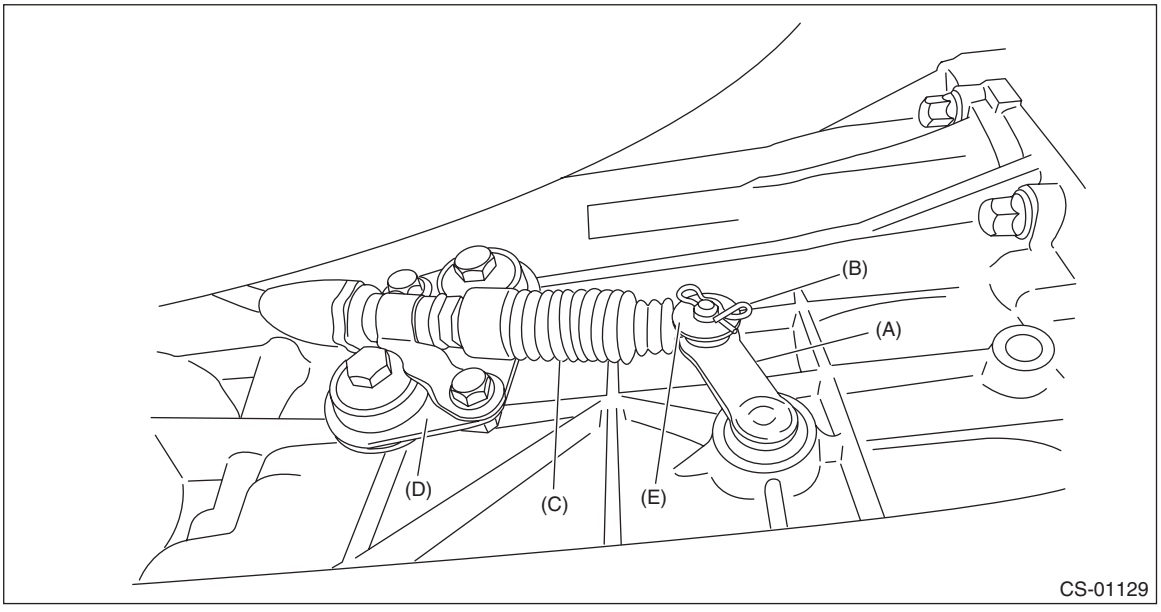
4) Install the washer and snap pin to the shifter arm.

- CVT model



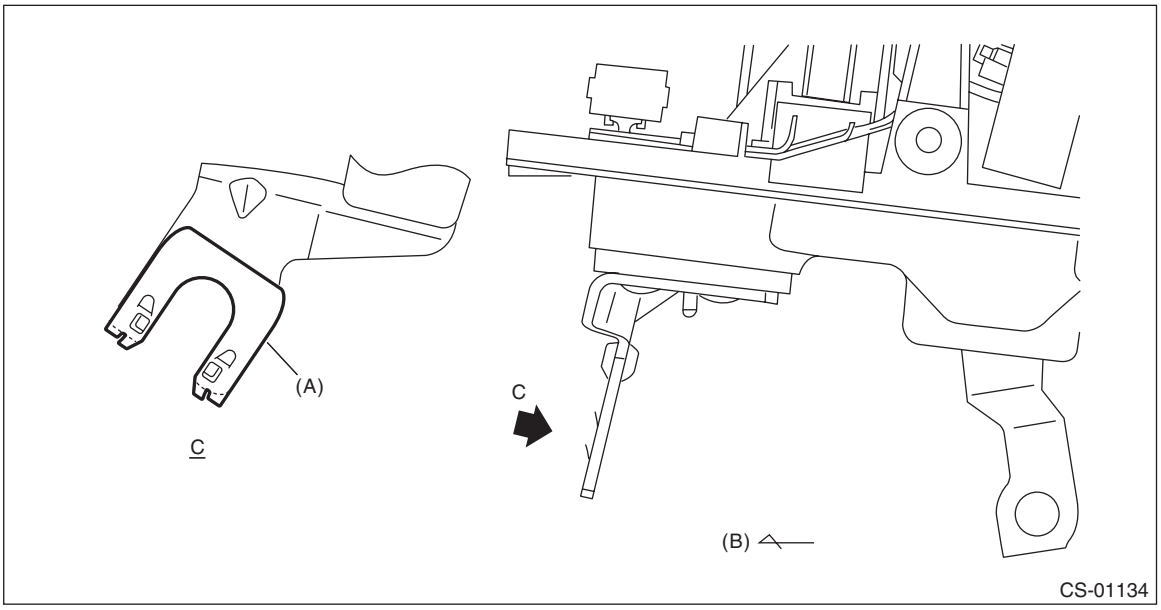
(A) Shifter arm
(B) Snap pin
(C) Select cable
(D) Plate ASSY
(E) Washer

- AT model



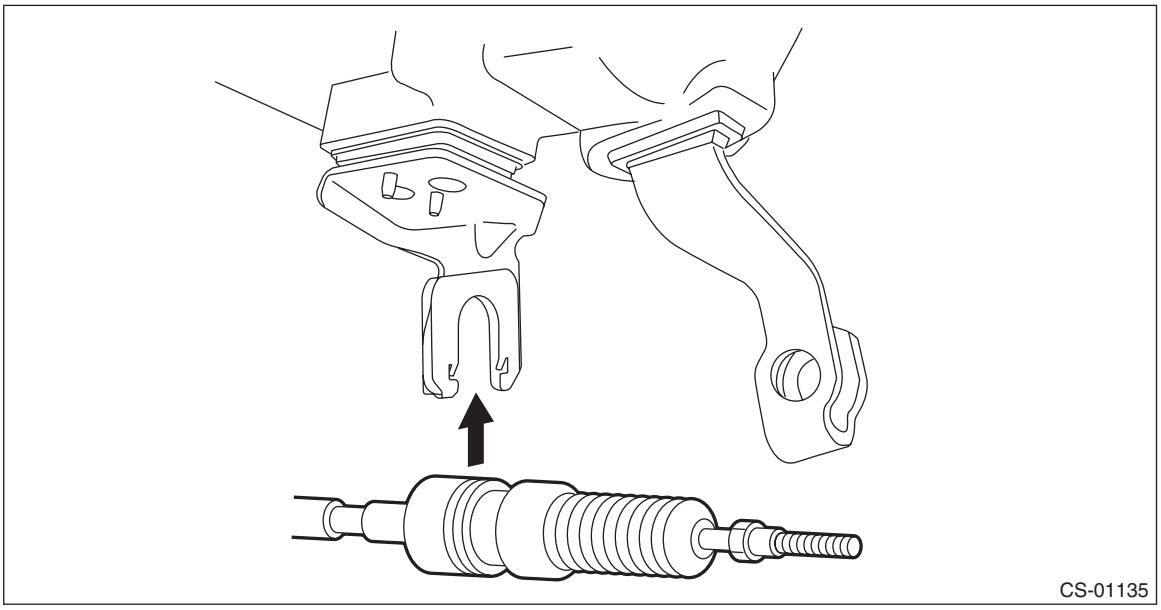
(A) Shifter arm
(B) Snap pin
(C) Select cable
(D) Plate ASSY
(E) Washer

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



(A) Clamp
(B) Forward

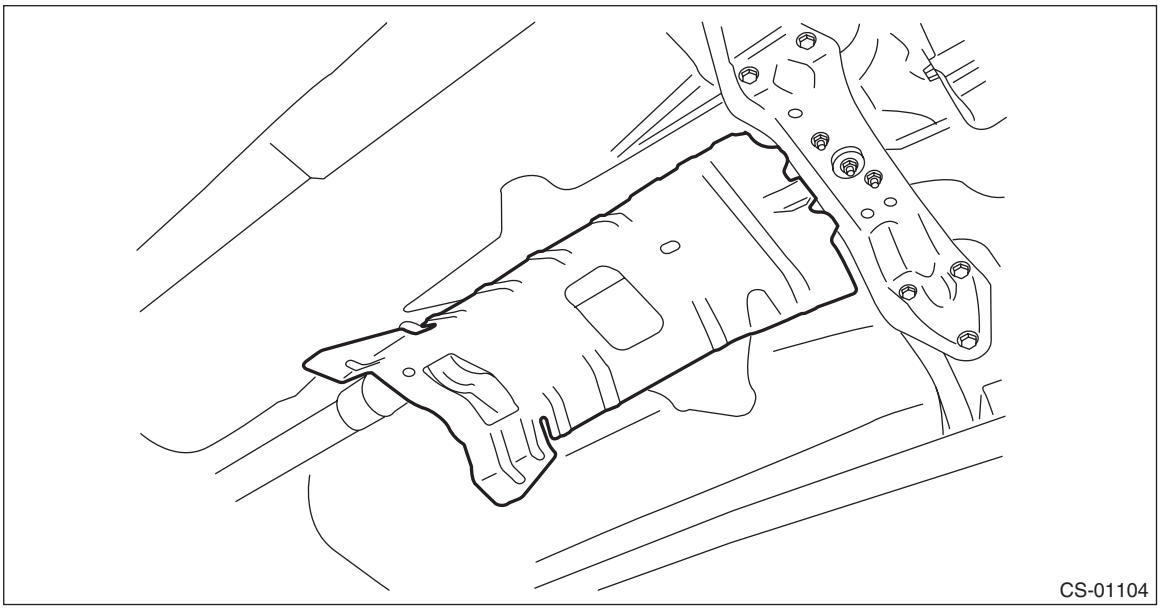
6) Insert the tip of inner cable into connector hole of select lever, and fix the cable to bracket.



7) Shift the select lever to the “N” range, and then adjust the select cable position. <Ref. to CS-55, ADJUSTMENT, Select Cable.>

8) Install the heat shield cover.

Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)



9) Install the front exhaust pipe and rear exhaust pipe.
- 2.5 L model

<Ref. to EX(H4DO)-8, INSTALLATION, Front Exhaust Pipe.> <Ref. to EX(H4DO)-14, INSTALLATION, Rear Exhaust Pipe.>
- 3.6 L model

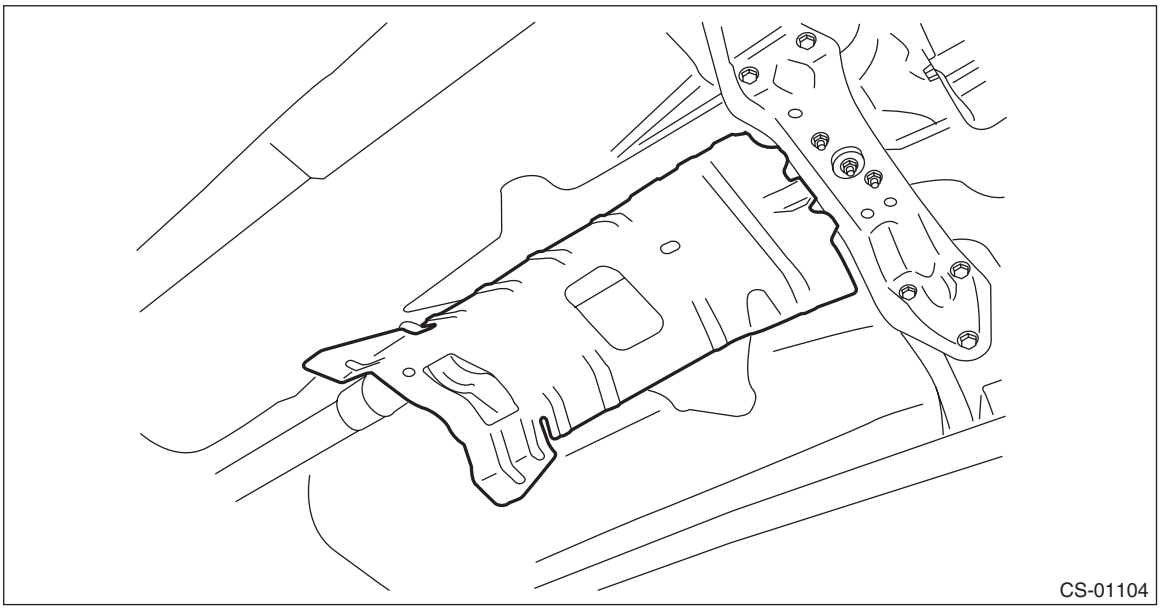
<Ref. to EX(H6DO)-6, INSTALLATION, Front Exhaust Pipe.> <Ref. to EX(H6DO)-8, INSTALLATION, Rear Exhaust Pipe.>

C: INSPECTION

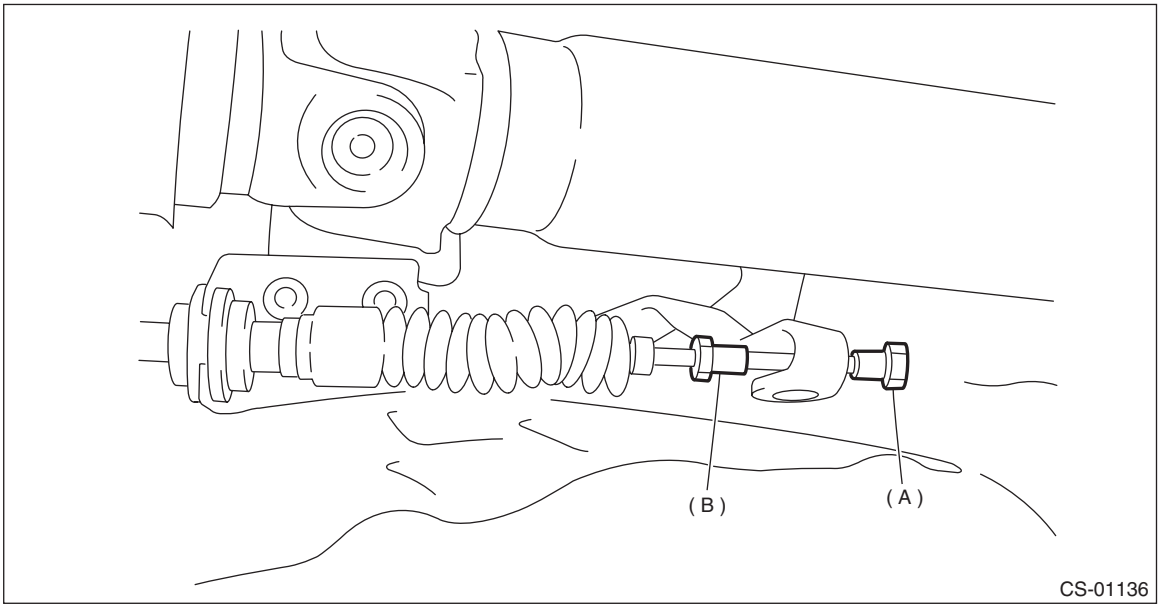
Check the removed cable and replace or adjust if damaged, rusty or malfunctioning.
1) Check that the inner cable moves smoothly without drag.
2) Check the inner cable for damage and rust.
3) Check the outer cable for damage, bends and cracks.
4) Check the boot for damage, cracks and deterioration.
5) Shift the select lever from “P” range 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 that the starter motor rotates when the select lever is set to “P” or “N” range.
7) Check the back-up light illumination when the select lever is in “R” range.
8) Check the shift lock operation when the select lever is in “P” range.

D: ADJUSTMENT

1) Shift the select lever to “N” range.
2) Lift up the vehicle.
3) Remove the front exhaust pipe and rear exhaust pipe.
• 2.5 L model
<Ref. to EX(H4DO)-5, REMOVAL, Front Exhaust Pipe.> <Ref. to EX(H4DO)-13, REMOVAL, Rear Exhaust Pipe.>
• 3.6 L model
<Ref. to EX(H6DO)-5, REMOVAL, Front Exhaust Pipe.> <Ref. to EX(H6DO)-8, REMOVAL, Rear Exhaust Pipe.>
4) Remove the heat shield cover.


CS-01104

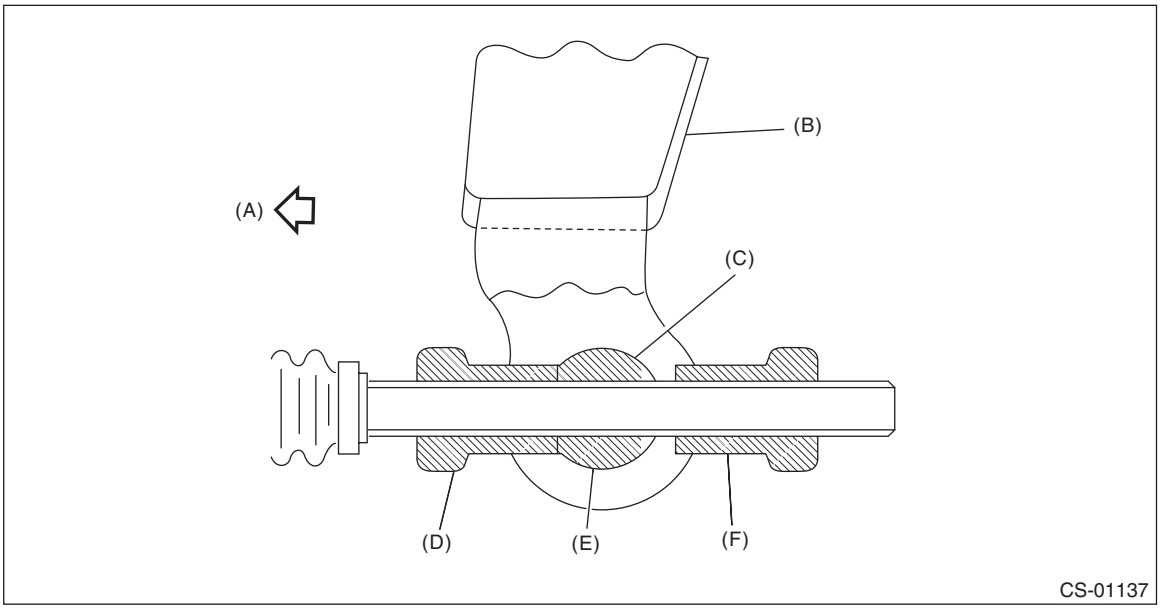
5) Loosen the nuts on both sides.



CS-01136

(A) Nut A
(B) Nut B

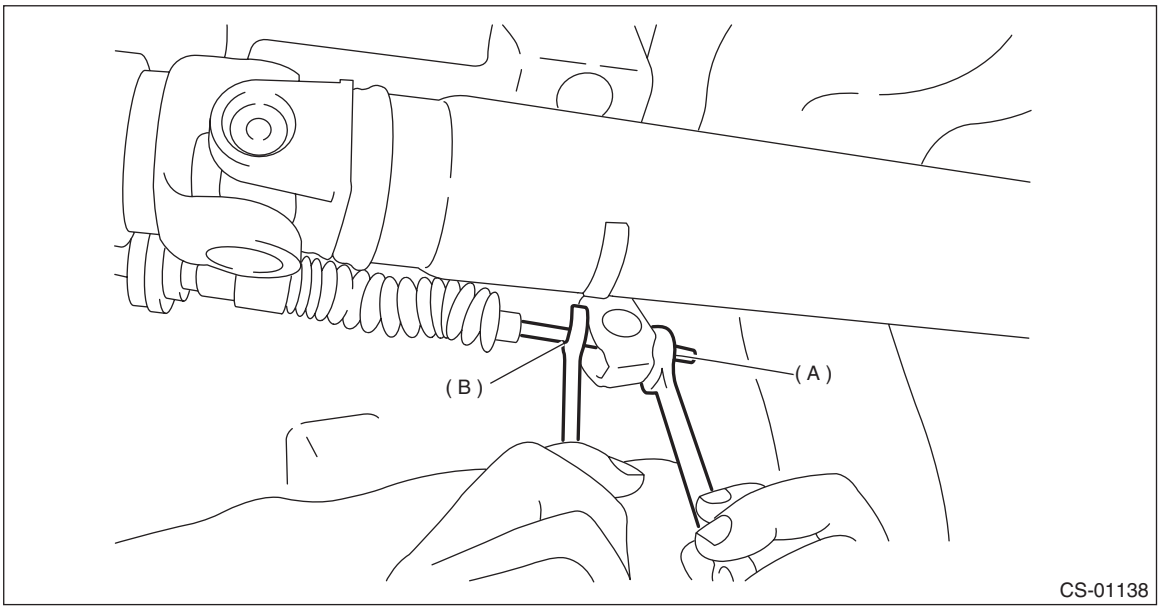
6) Turn the nut B until it lightly touches the connector.



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

7) Set a spanner wrench to the nut B so that it does not rotate, and then tighten the nut A.

Tightening torque:
7.5 N·m (0.8 kgf-m, 5.5 ft-lb)



(A) Nut A
(B) Nut B

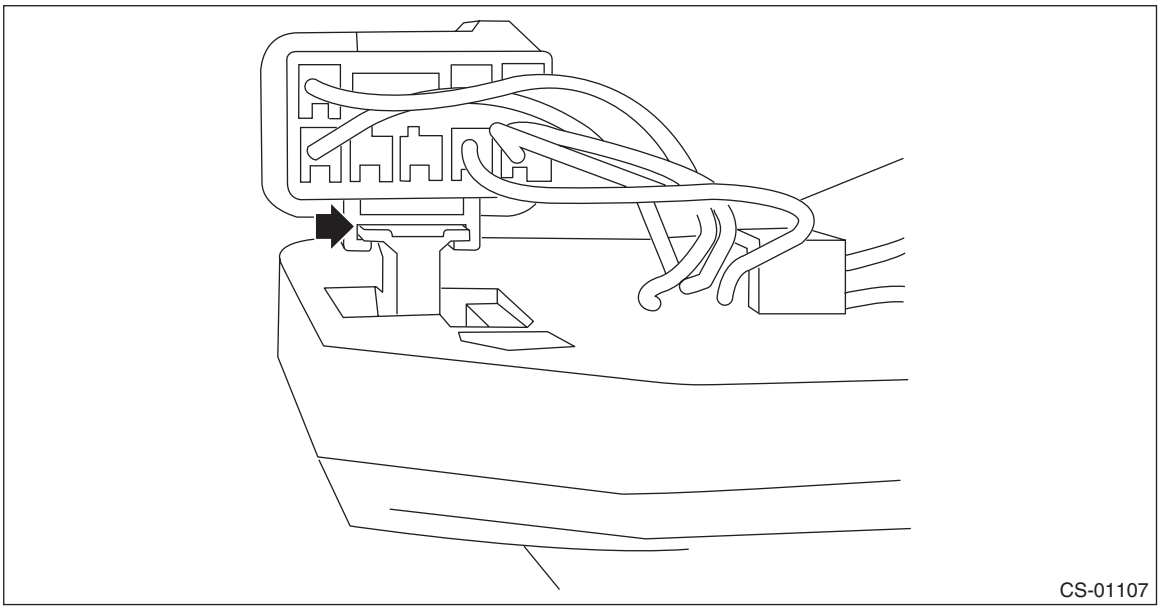
8) After the completion of adjustment, confirm that the select lever operates normally at all ranges.
9) Install in the reverse order of removal.

5. AT Shift Lock Solenoid and “P” Range Switch

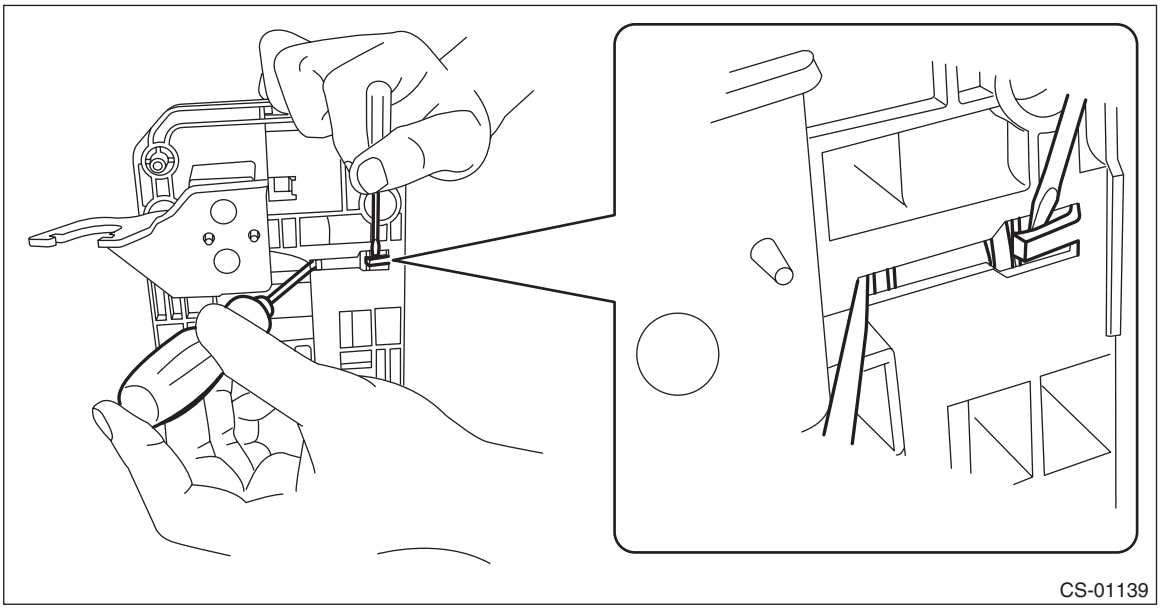
A: REMOVAL

1. SOLENOID UNIT

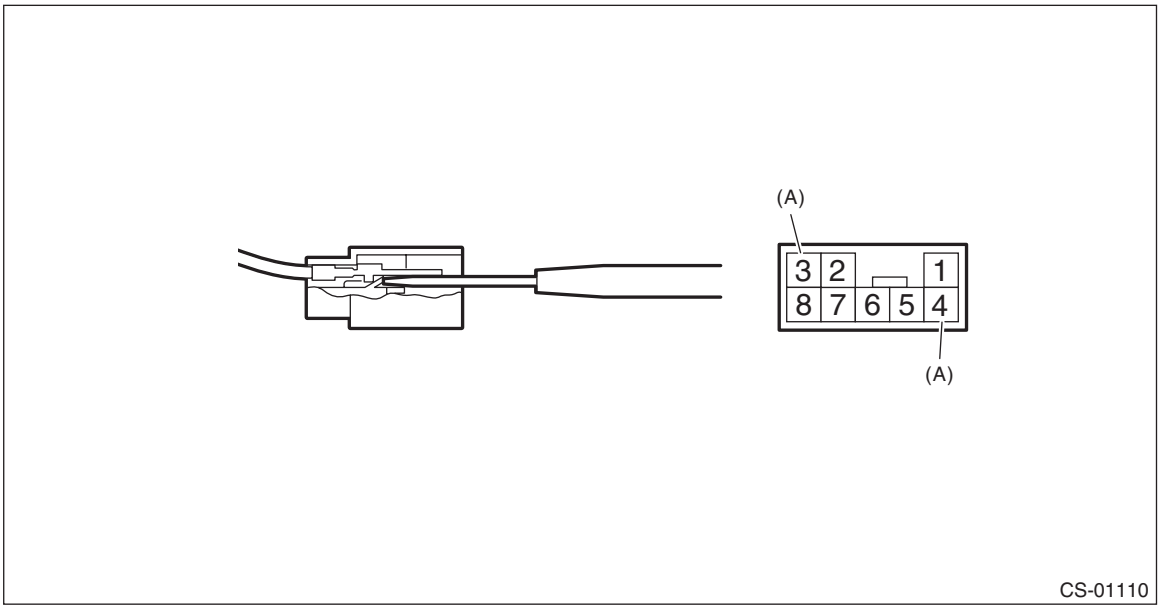
1) Remove the AT select lever. <Ref. to CS-26, REMOVAL, Select Lever.>
2) Remove the spacer and gasket. <Ref. to CS-35, DISASSEMBLY, Select Lever.>
3) Using a flat tip screwdriver with a thin tip, remove the harness connector from the plate COMPL.



4) Raise the claw using a flat tip screwdriver with a thin tip, and remove the solenoid unit from the plate COMPL.



5) Using a flat tip screwdriver with a thin tip, remove the solenoid unit terminals from the harness connector.



(A) Solenoid unit terminals

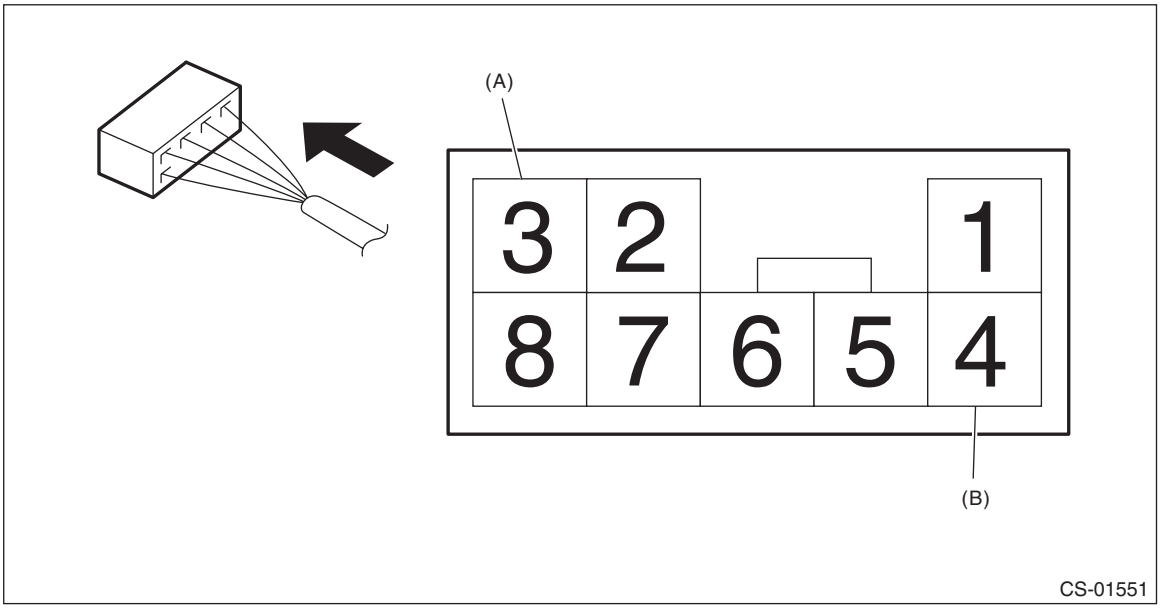
2. “P” RANGE SWITCH

For the removal of “P” range switch, refer to the procedure for AT select lever. <Ref. to CS-35, DISASSEMBLY, Select Lever.>
<Ref. to CS-36, AT SELECT LEVER ASSEMBLY, DISASSEMBLY, Select Lever.>

B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Insert the solenoid unit terminals to the harness connector.



(A) Solenoid unit (color code: blue)
(B) Solenoid unit (color code: black)

C: INSPECTION

	Step	Check	Yes	No
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?	Go to step **2**.	Replace the solenoid unit. <Ref. to CS-57, AT Shift Lock Solenoid and “P” Range Switch.>
2	**CHECK SOLENOID UNIT.** Connect the battery to the solenoid unit connector terminals, and then operate the solenoid. ***Terminals*** ***No. 3 (+) — No. 4 (–):***	Does the solenoid unit operate normally?	Go to step **3**.	Replace the solenoid unit. <Ref. to CS-57, AT Shift Lock Solenoid and “P” Range Switch.>
3	**CHECK “P” RANGE SWITCH.** 1) Shift the select lever to “P” range. 2) Measure the resistance between “P” range switch connector terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance less than 1 Ω?	Go to step **4**.	Replace the “P” range switch. <Ref. to CS-57, AT Shift Lock Solenoid and “P” Range Switch.>
4	**CHECK “P” RANGE SWITCH.** 1) Shift 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?	Normal operation.	Replace the “P” range switch. <Ref. to CS-57, AT Shift Lock Solenoid and “P” Range Switch.>

6. Body Integrated Unit

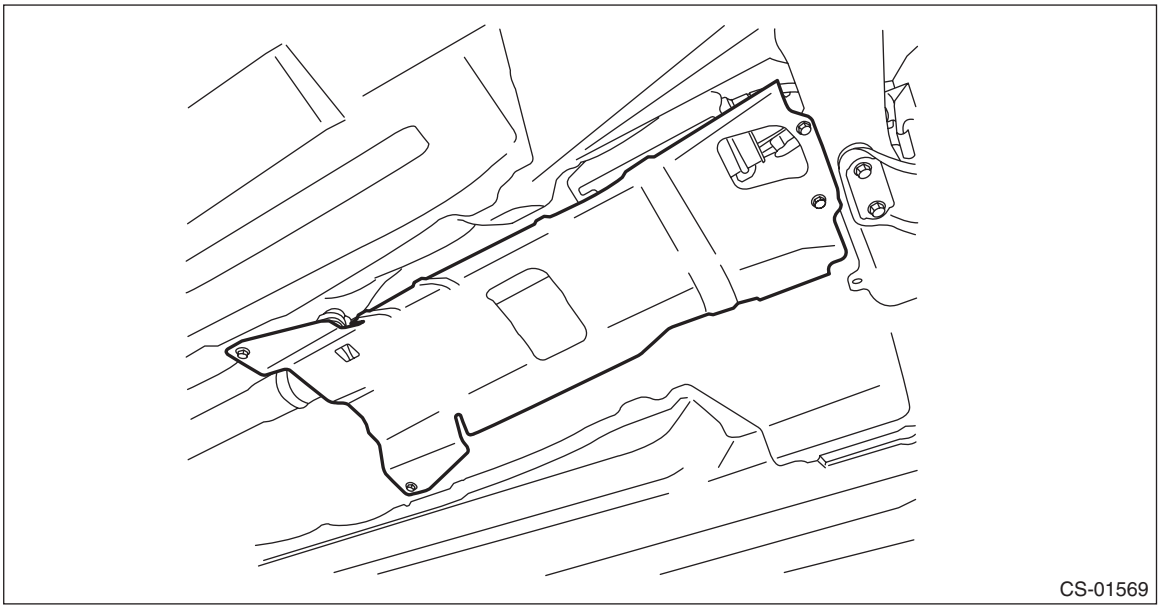
A: NOTE

Refer to “Body Integrated Unit” for removal and installation procedure. <Ref. to SL-80, Body Integrated Unit.>

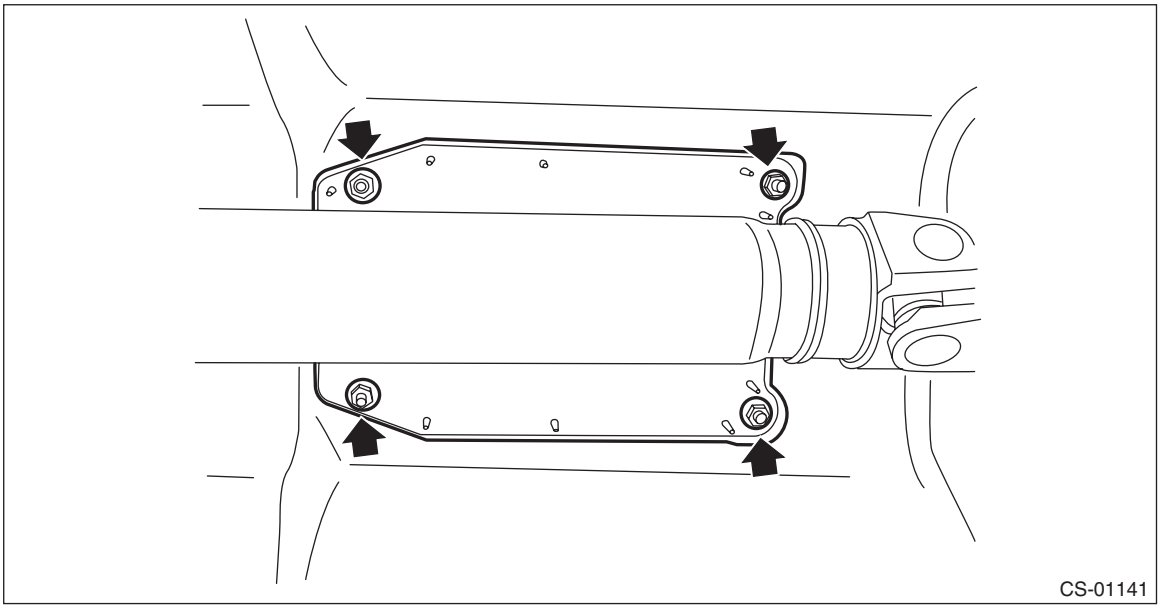
7. MT Gear Shift Lever

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Lift up the vehicle.
3) Remove the center exhaust pipe. <Ref. to EX(H4DO)-12, REMOVAL, Center Exhaust Pipe.>
4) Remove the heat shield cover.

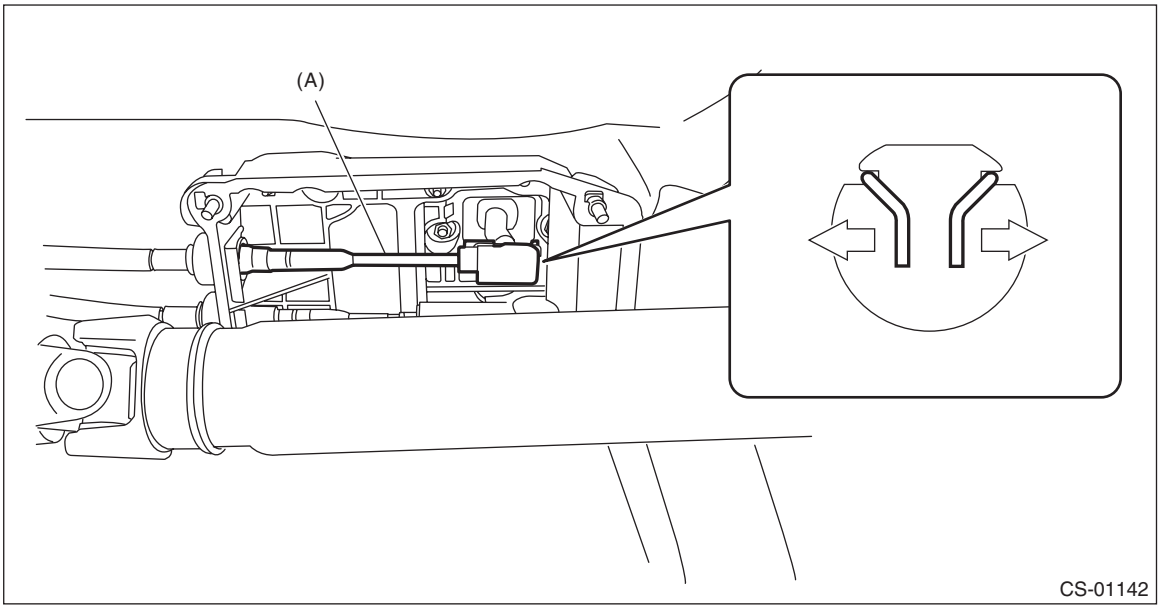


5) Remove the plate cable assembly.



6) Remove the spring at the MT gear shift cable by expanding it and pulling down, and remove the MT gear shift cable from the gear shift lever assembly.

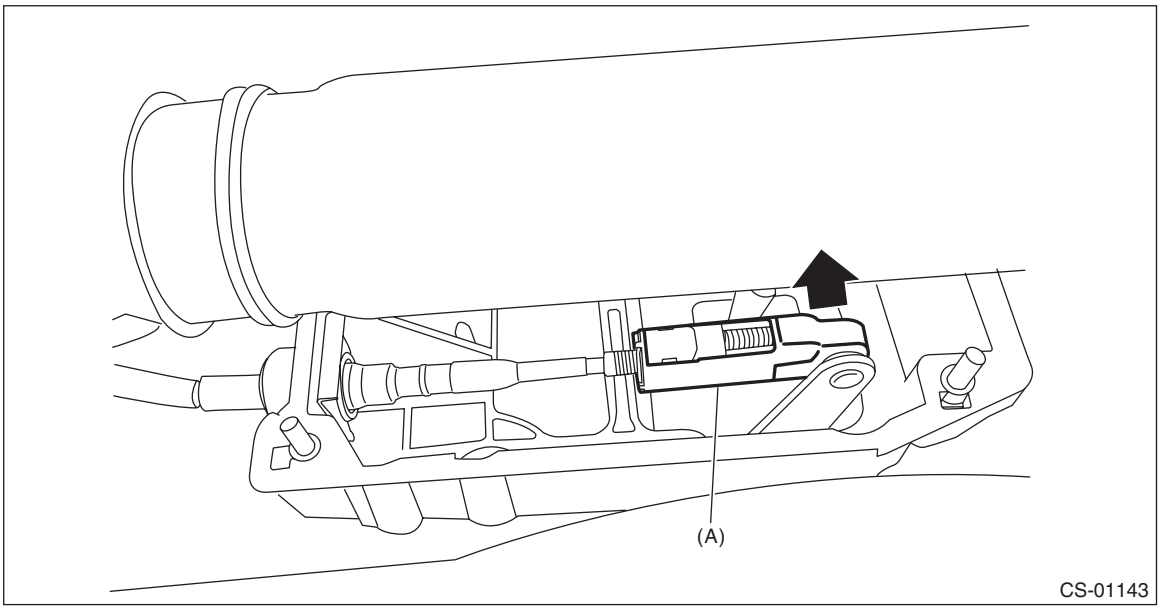
CAUTION:
Be careful not to deform the cable inner.



(A) MT gear shift cable

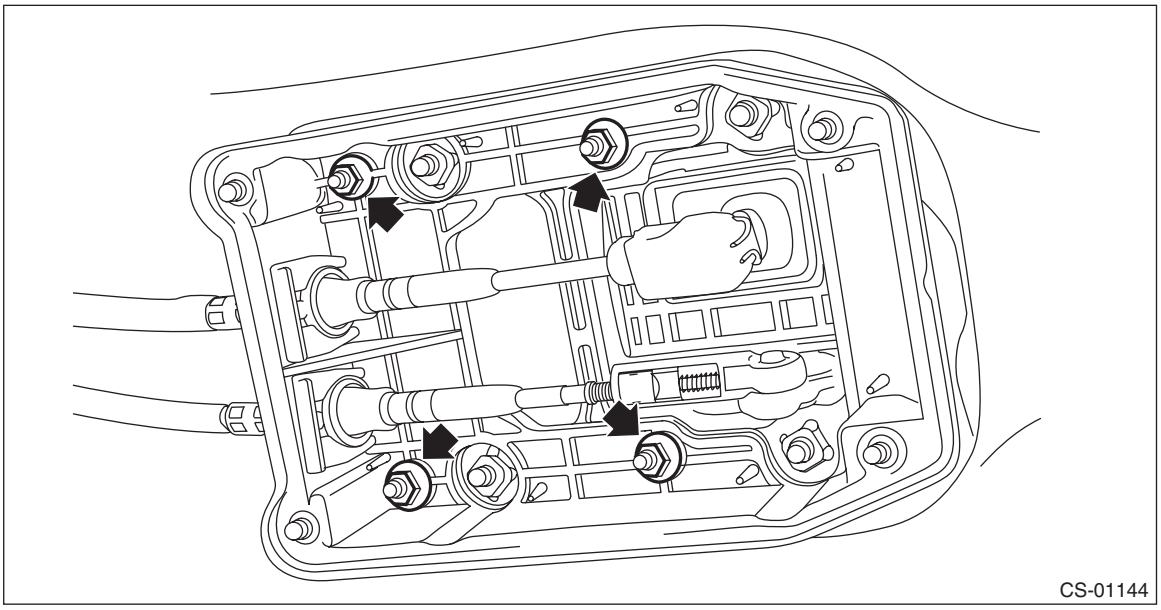
7) Remove the MT gear select cable from the gear shift lever assembly by pulling it in the direction of arrow in the figure.

CAUTION:
Be careful not to deform the cable inner.



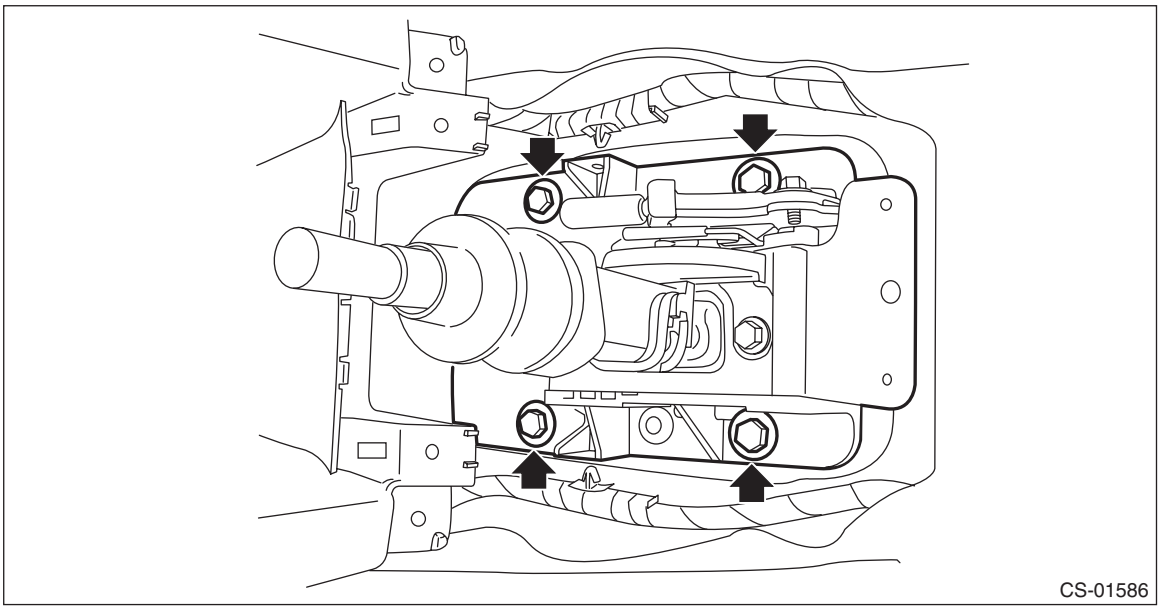
(A) MT gear select cable

8) Remove the cover cable assembly.



9) Lower the vehicle.
10) Remove the shift knob.
11) Remove the console front cover assembly and console box. <Ref. to EI-72, REMOVAL, Console Box.>
12) Remove the bolts, and then remove the gear shift lever assembly from the vehicle.

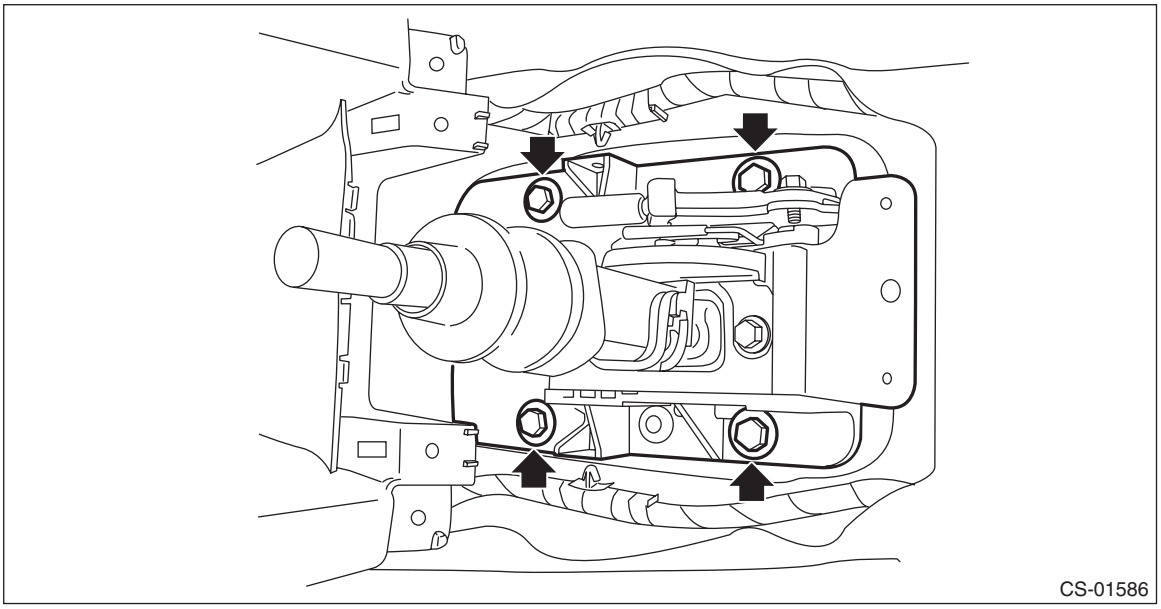
NOTE:
The MT gear shift lever cannot be disassembled.



B: INSTALLATION

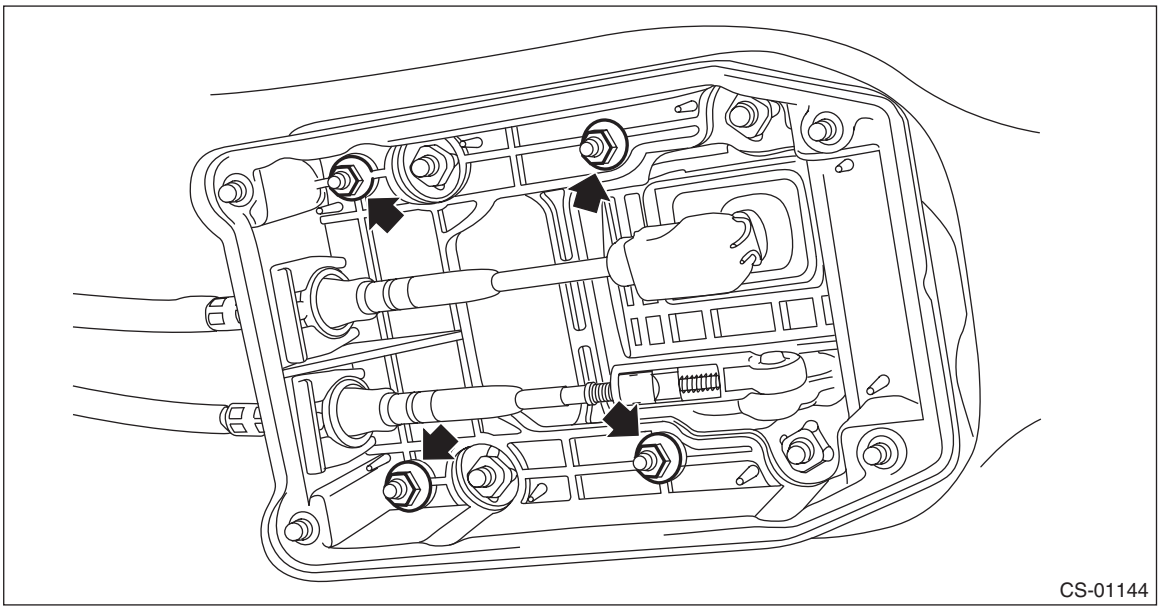
1) Install the gear shift lever assembly.

Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)



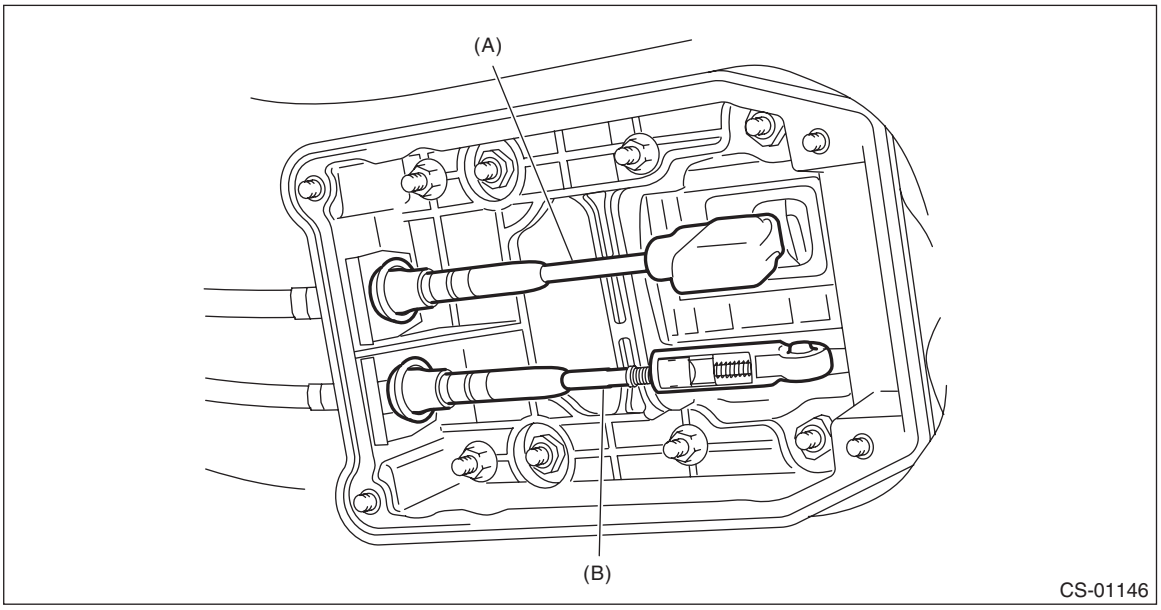
2) Lift up the vehicle.
3) Install the cover cable assembly.

Tightening torque:
7.5 N·m (0.8 kgf-m, 5.5 ft-lb)



4) Connect the MT gear shift cable and MT gear select cable.

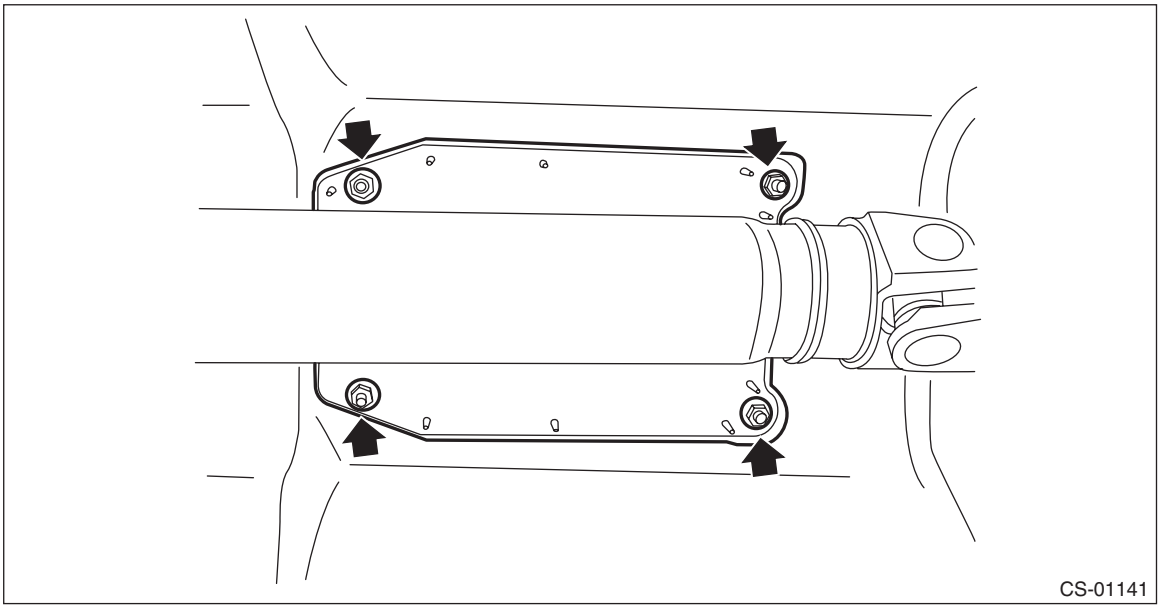
CAUTION:
- **Be careful not to deform the cable inner.**
- **Do not twist the cable inner excessively.**



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

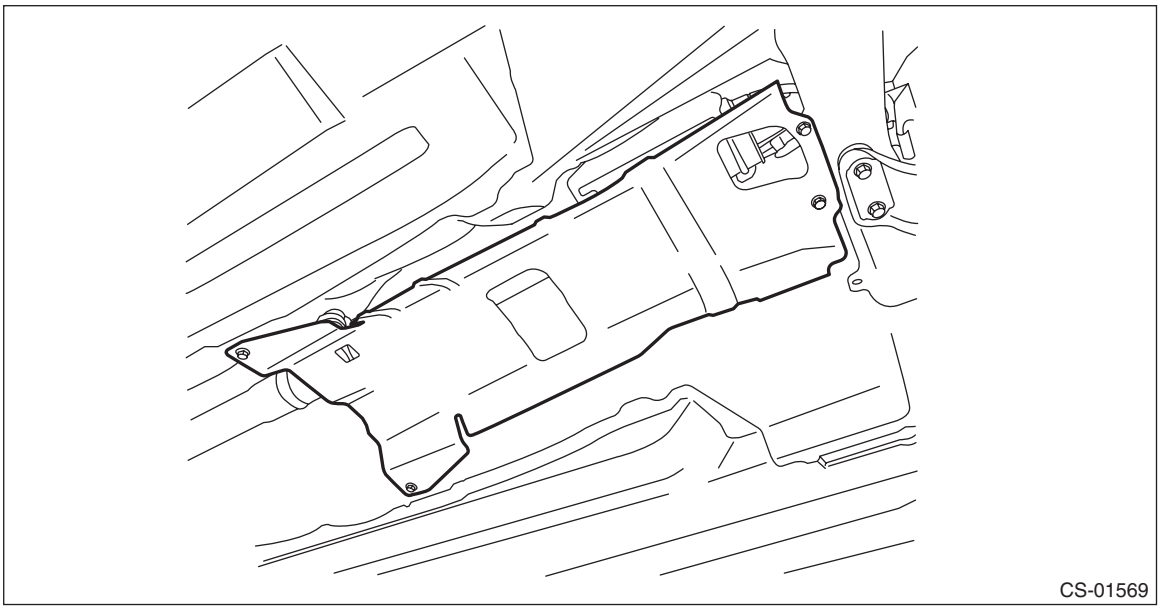
5) Install the plate cable assembly.

Tightening torque:
7.5 N·m (0.8 kgf-m, 5.5 ft-lb)



6) Install the heat shield cover.

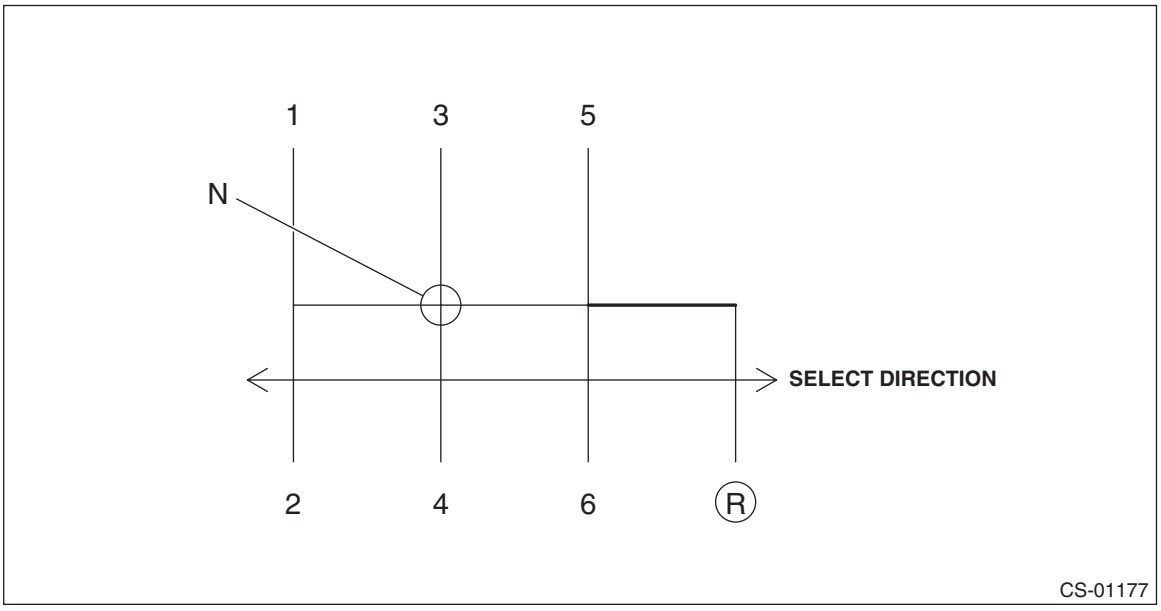
Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)



7) Install the center exhaust pipe. <Ref. to EX(H4DO)-12, INSTALLATION, Center Exhaust Pipe.>
8) Lower the vehicle.
9) Adjust the detent of the MT gear shift lever. <Ref. to CS-67, ADJUSTMENT, MT Gear Shift Lever.>
10) Install the console front cover assembly and the console box. <Ref. to EI-74, INSTALLATION, Console Box.>
11) Install the shift knob.
12) Make sure the gears can be shifted accurately into each gear. Adjust the MT gear select cable, if the gears cannot be shifted correctly. <Ref. to CS-97, ADJUSTMENT, MT Gear Select Cable.>

C: INSPECTION

1) Check the parts for deformation, damage and wear. Repair or replace if necessary. Compare the removed parts with new parts to confirm if there are damages or not.
2) Check that selecting to the reverse direction is disable unless the slider is pulled up.
3) Check that selecting to the reverse direction is possible when the slider is pulled up to the full.
4) Check that the shift lever moves to initial position, when the slider backs to the neutral position from step 3).

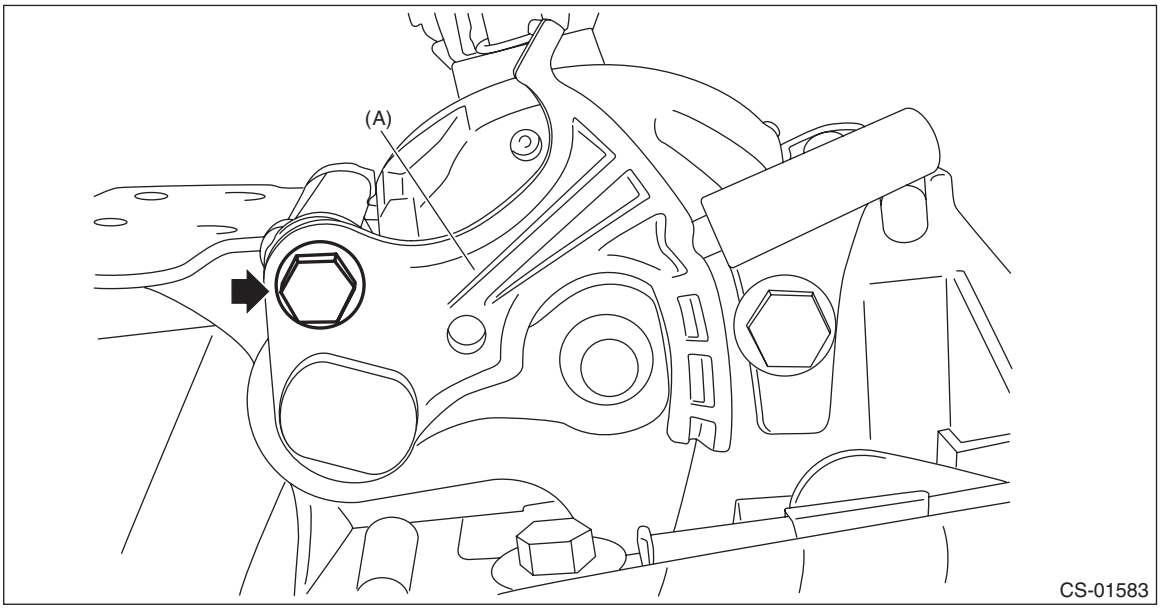


D: ADJUSTMENT

NOTE:
Adjust the detent when the following items have been replaced.

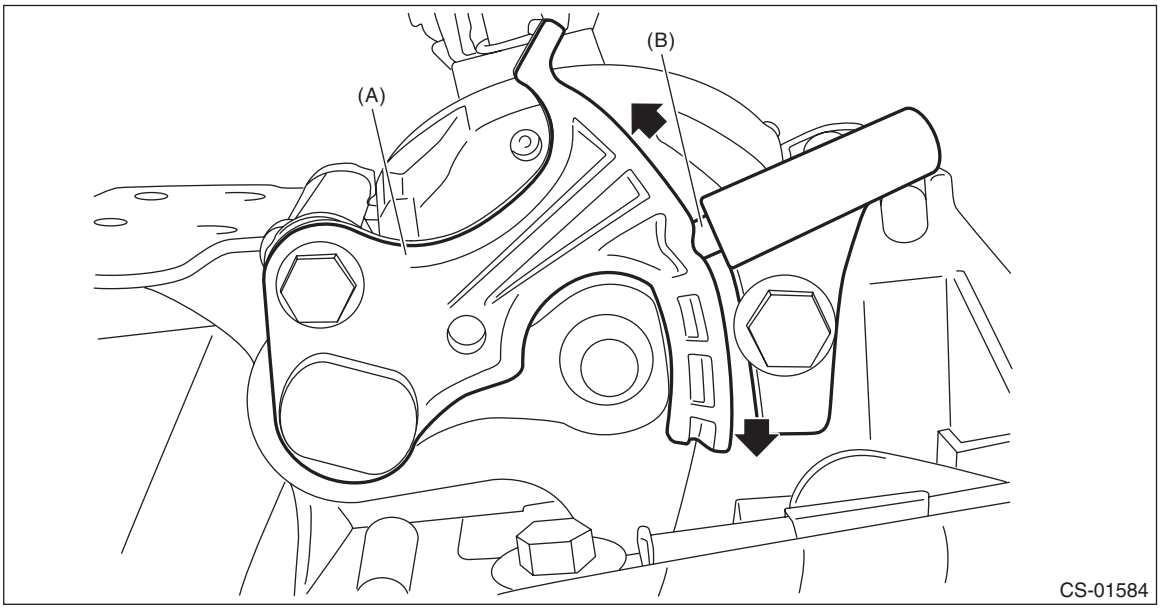
- MT gear shift lever
- MT gear select cable
- Manual transmission assembly

1) Remove the shift knob.
2) Remove the console front cover assembly. <Ref. to EI-72, REMOVAL, Console Box.>
3) Place the shift lever in neutral position.
4) Loosen the detent bolt.



(A) Detent

5) Move the detent up and down and align the detent pin to the groove. Make sure that the detent pin is fitted in the groove and a clicking sound is heard.

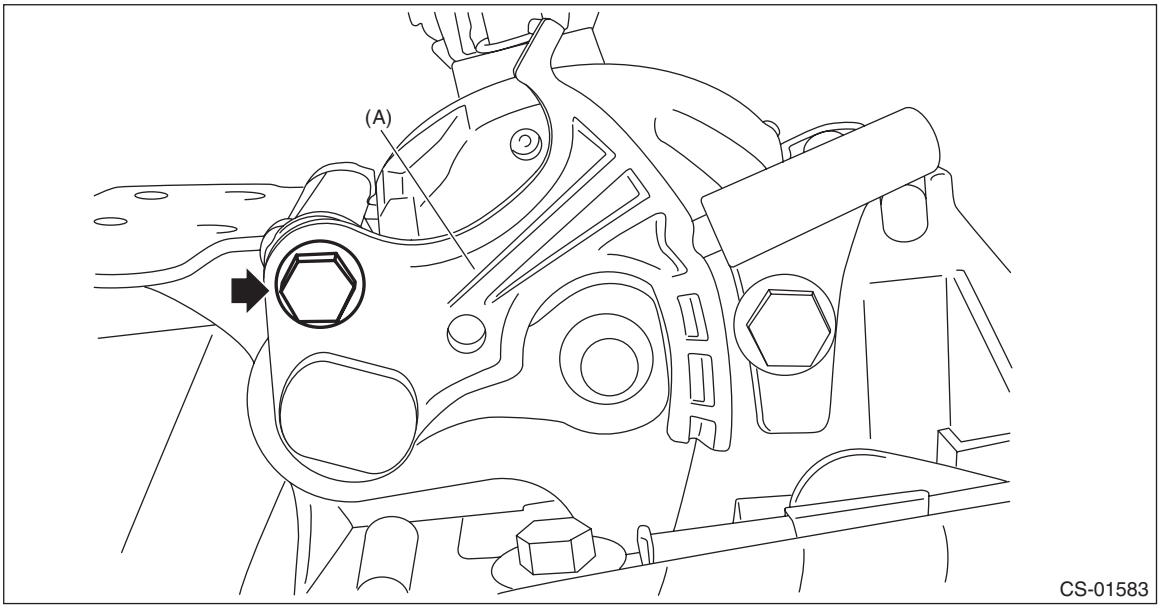


(A) Detent
(B) Detent pin

6) Pull up the slider, select the shift lever to the reverse direction, and make sure it returns to the neutral position after releasing hands.
7) Tighten the detent bolt.

NOTE:
When tightening the bolt, hold the shift lever by hand so that the detent pin does not come out from the groove.

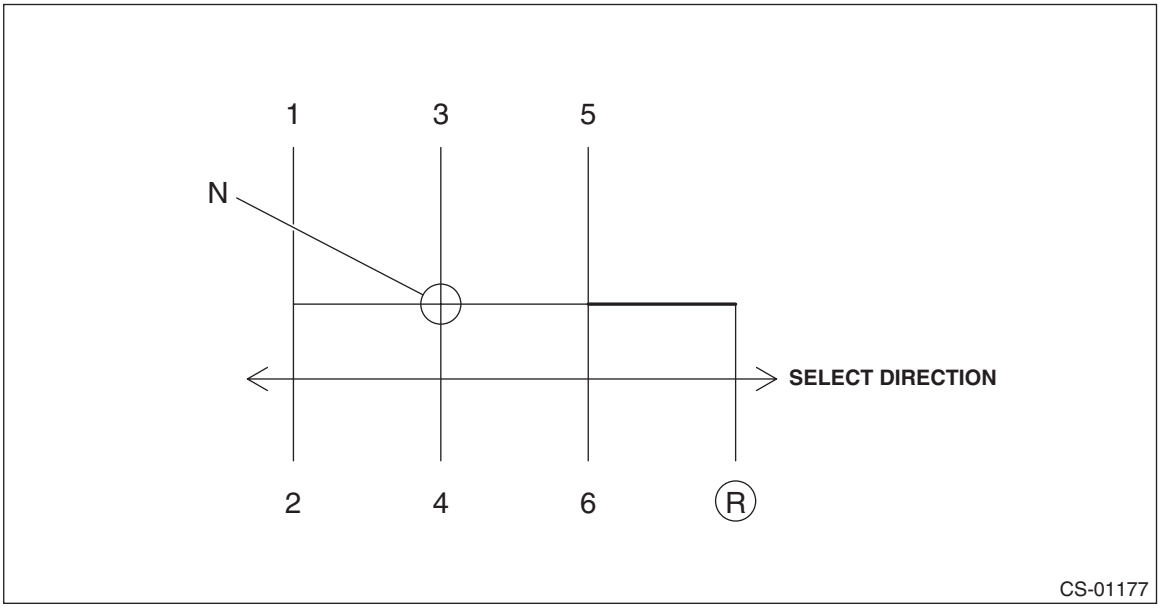
Tightening torque:
7.5 N·m (0.8 kgf-m, 5.5 ft-lb)



(A) Detent

8) 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 it is not within the reference standard, repeat adjustment procedures from the beginning.

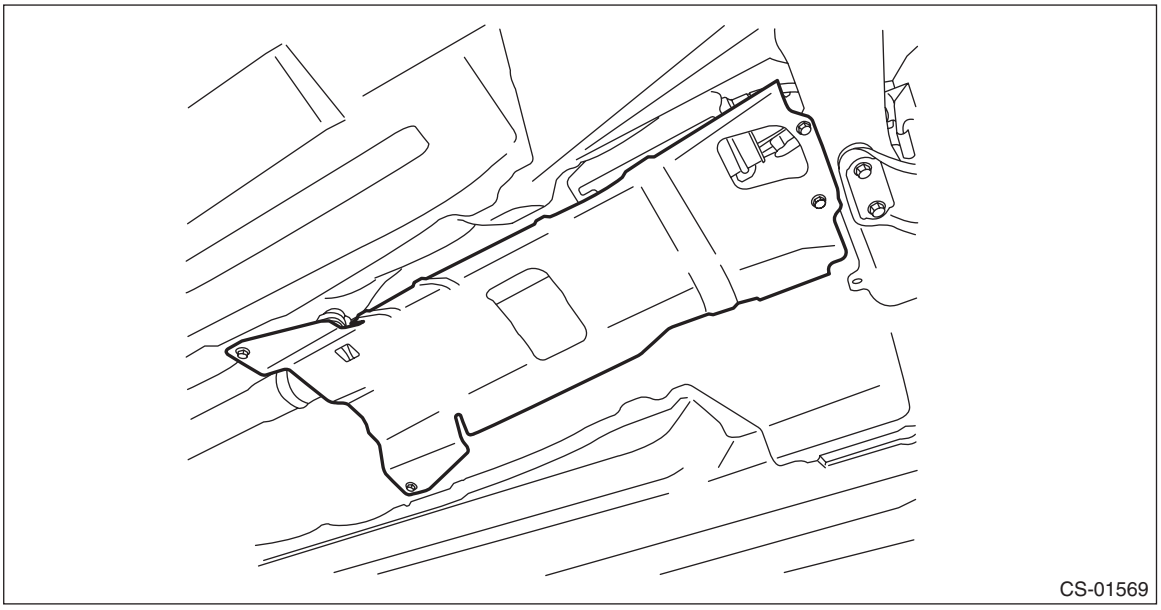
Play in neutral position:
Reference standard
1.5 mm (0.059 in) or less



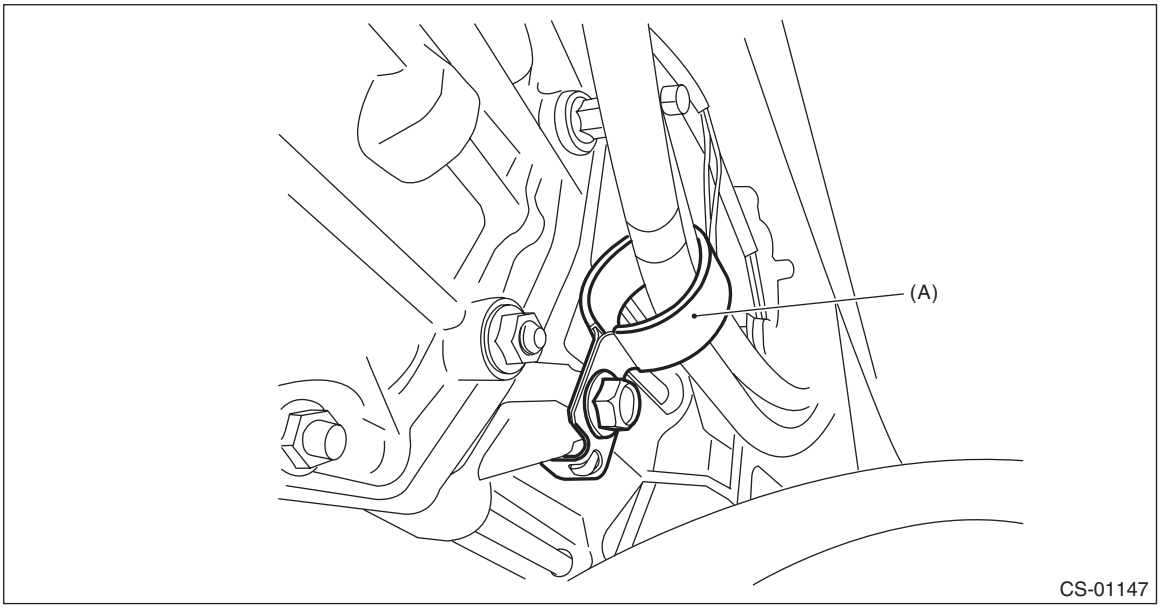
8. MT Gear Shift Cable

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Lift up the vehicle.
3) Remove the center exhaust pipe. <Ref. to EX(H4DO)-12, REMOVAL, Center Exhaust Pipe.>
4) Remove the heat shield cover.

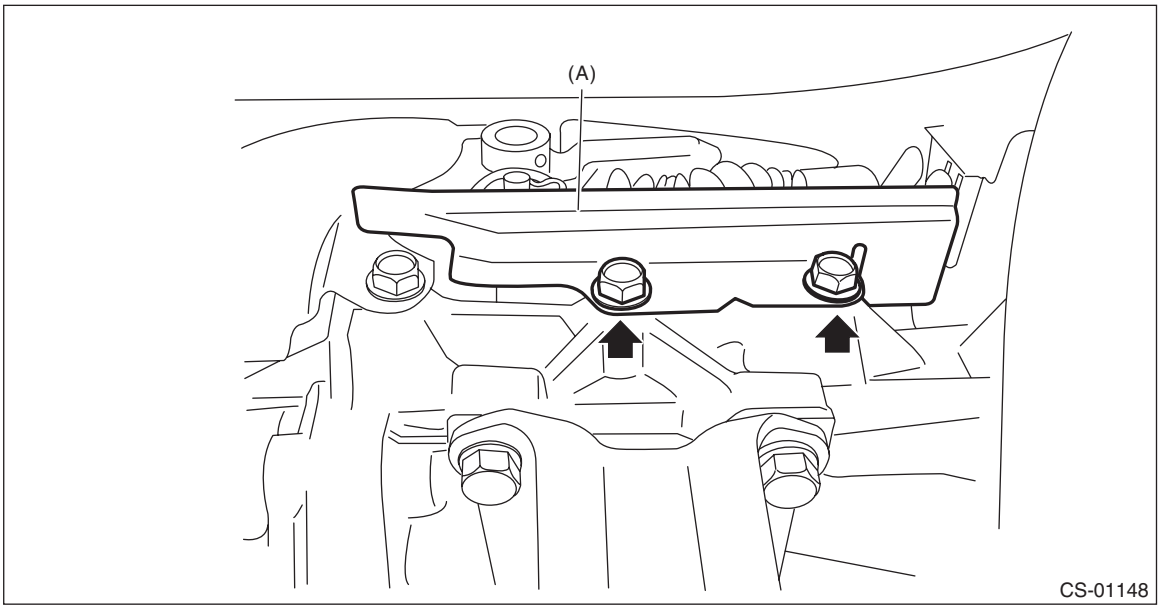


5) Remove the clamp cable and take out the MT gear shift cable from the clamp.



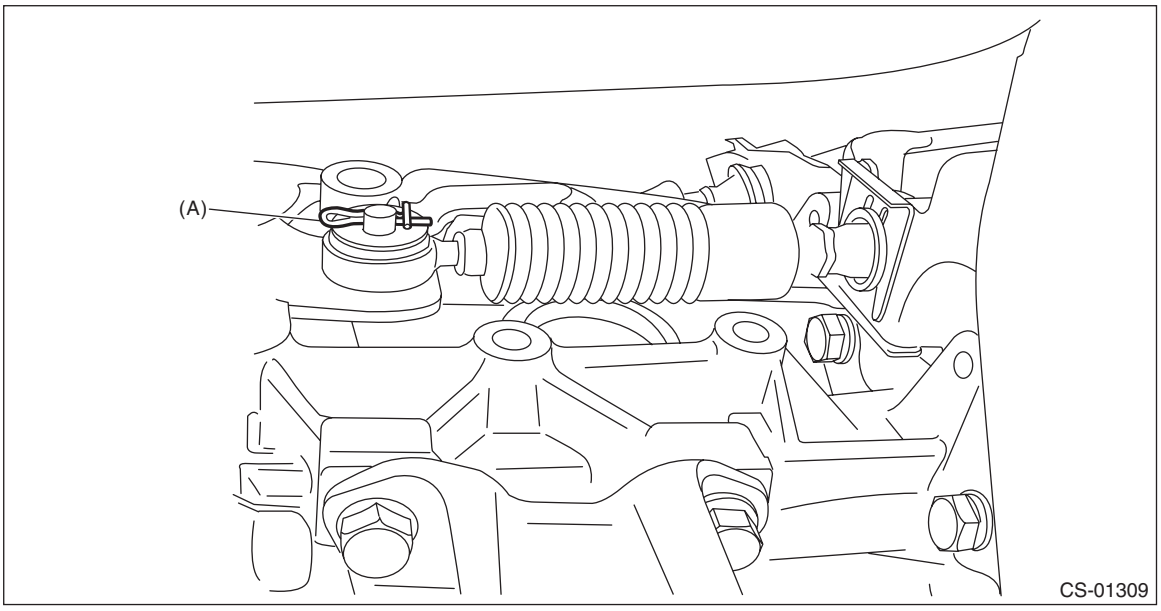
(A) Clamp cable

6) Remove the dust cover from transmission body. (OUTBACK model)



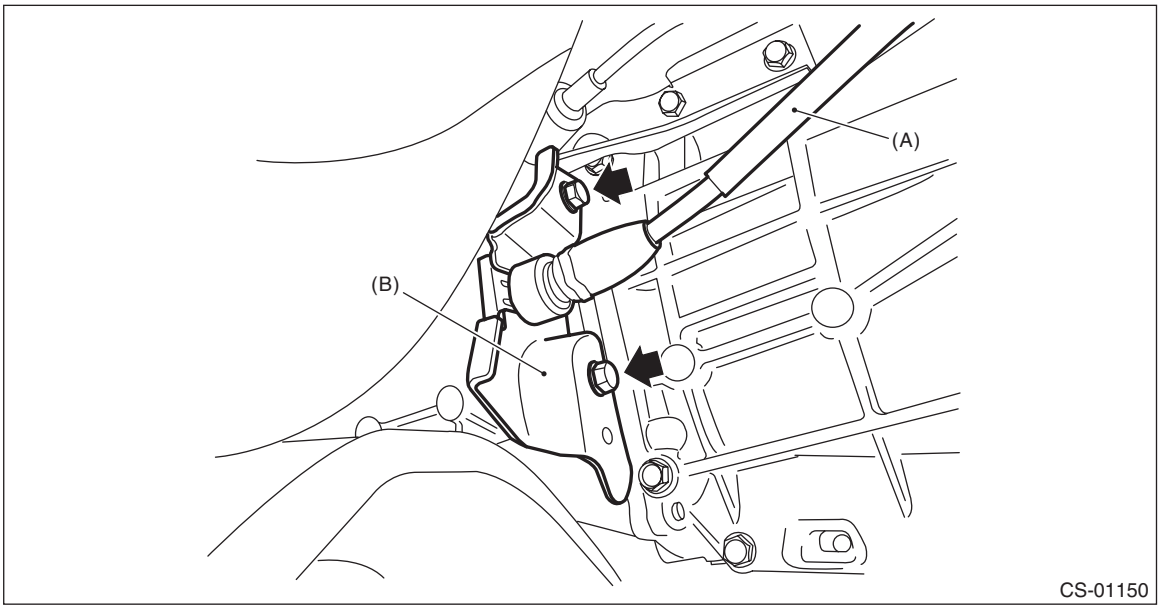
(A) Dust cover

7) Apply a mark on the top end of the MT gear shift cable.
8) Remove the snap pin from the shift lever COMPL.



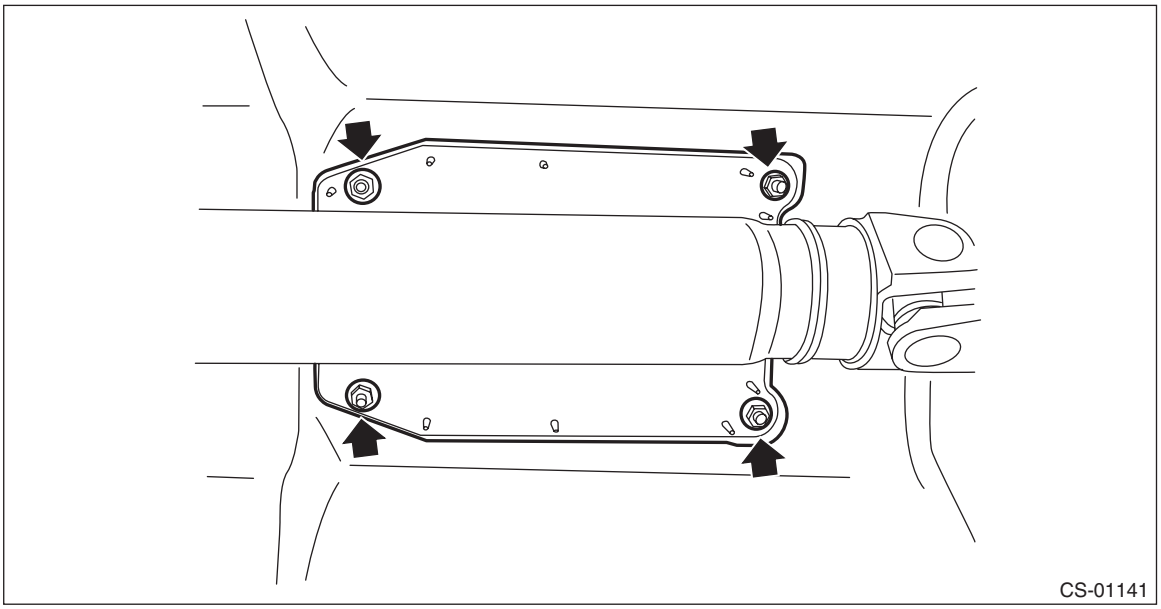
(A) Snap pin

9) Remove the shift bracket and MT gear shift cable as a single unit from the transmission body.



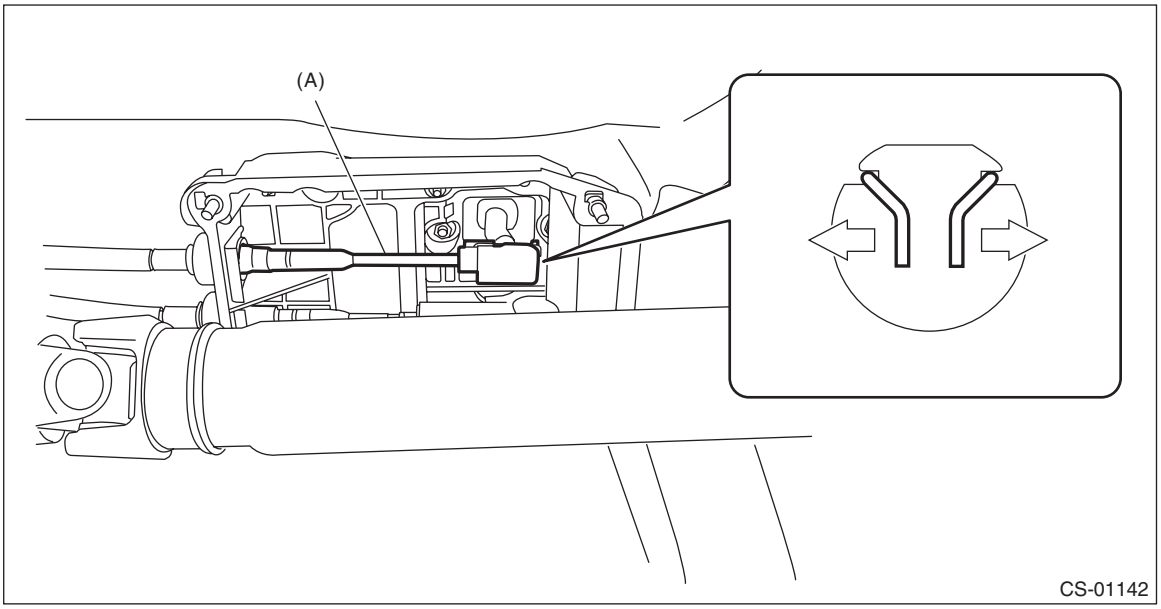
(A) MT gear shift cable
(B) Shift bracket

10) Remove the plate cable assembly.



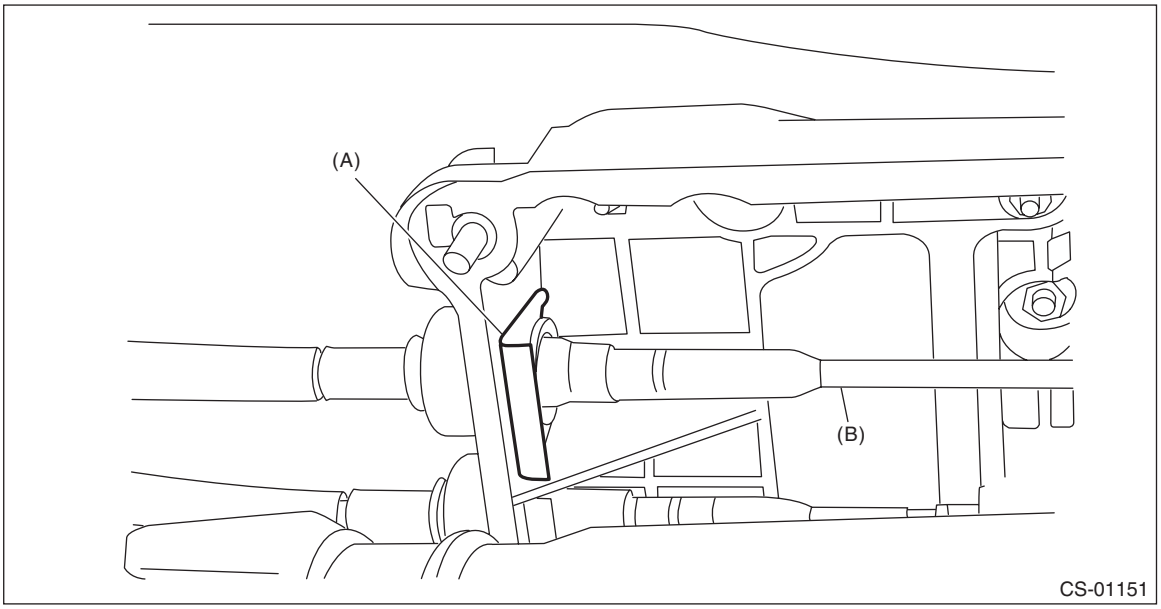
11) Remove the spring at the MT gear shift cable by expanding it and pulling down, and remove the MT gear shift cable from the gear shift lever assembly.

CAUTION:
Be careful not to deform the cable inner.



(A) MT gear shift cable

12) Remove the clamp which holds the MT gear shift cable.

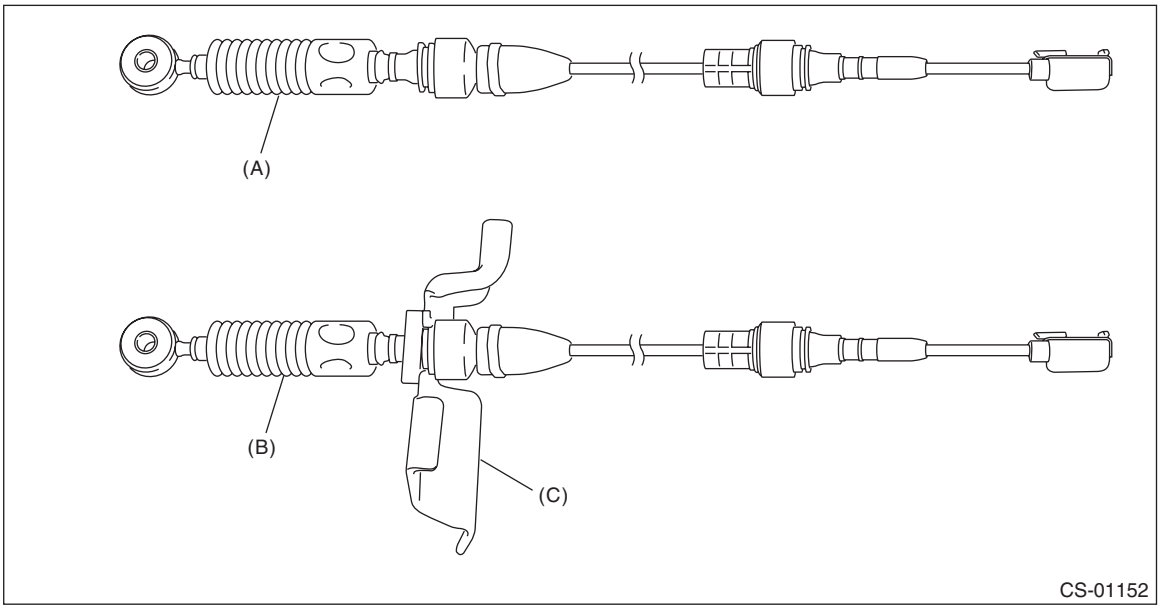


(A) Clamp
(B) MT gear shift cable

13) Pull out the MT gear shift cable from cover cable assembly.

B: INSTALLATION

1) When replacing the new MT gear shift cable, secure it to shift bracket with the clamps, be careful not to mistake the installing direction.

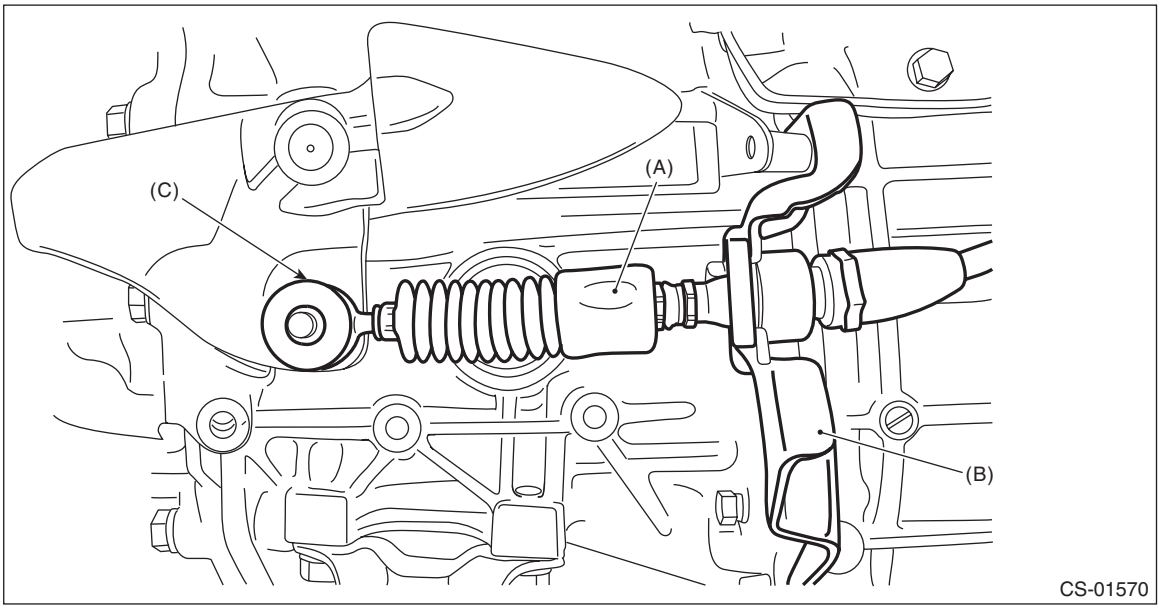


(A) Old MT gear shift cable
(B) New MT gear shift cable
(C) Shift bracket

2) Install the MT gear shift cable and shift bracket as a single unit onto transmission.

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

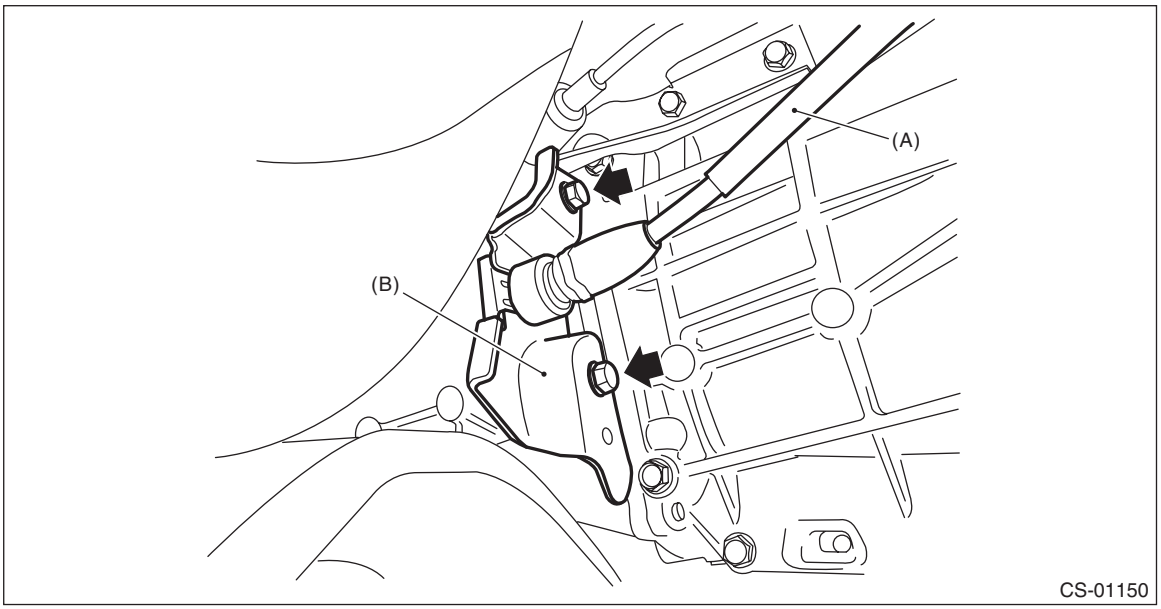
NOTE:
When installing the MT gear shift cable, make sure that the mark or blue mark on the cable faces up.



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

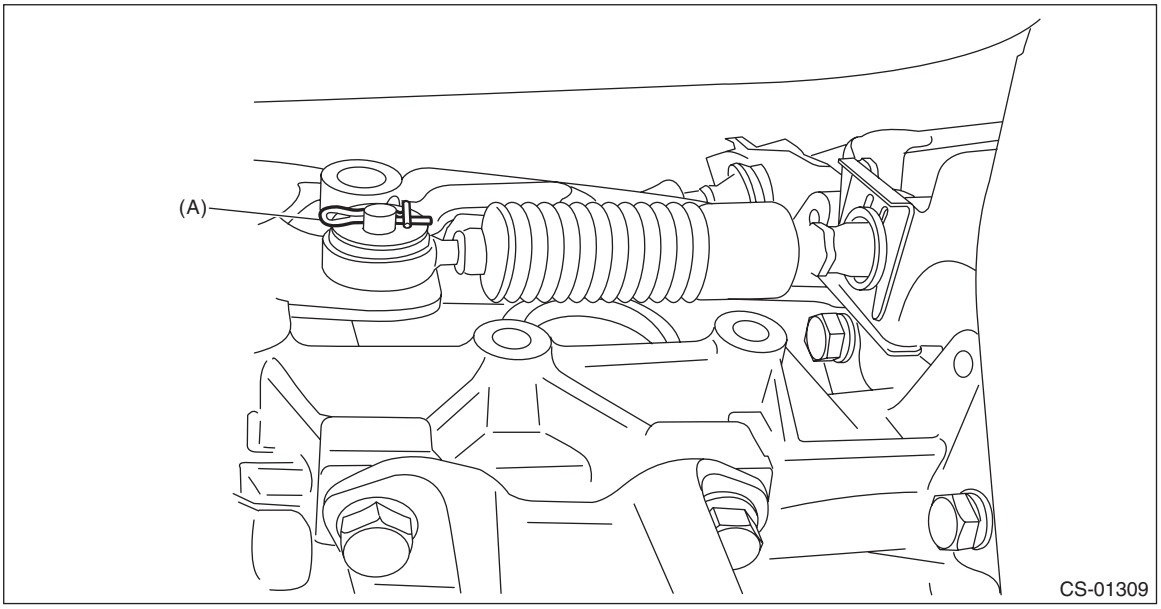
3) Tighten the shift bracket with specified torque.

Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)



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

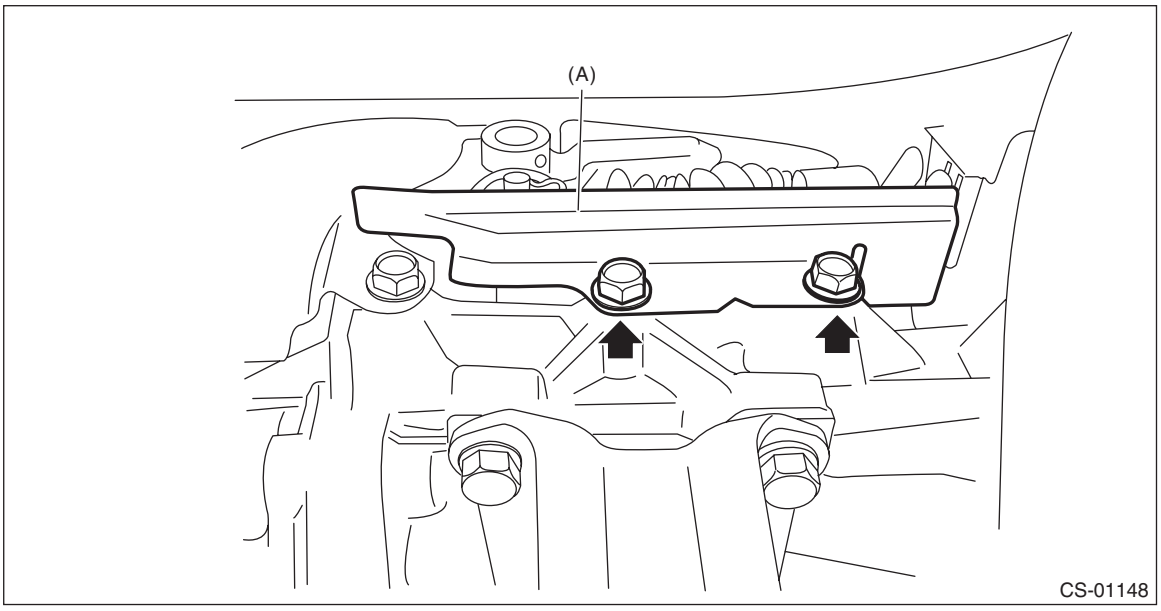
4) Install the snap pin.



(A) Snap pin

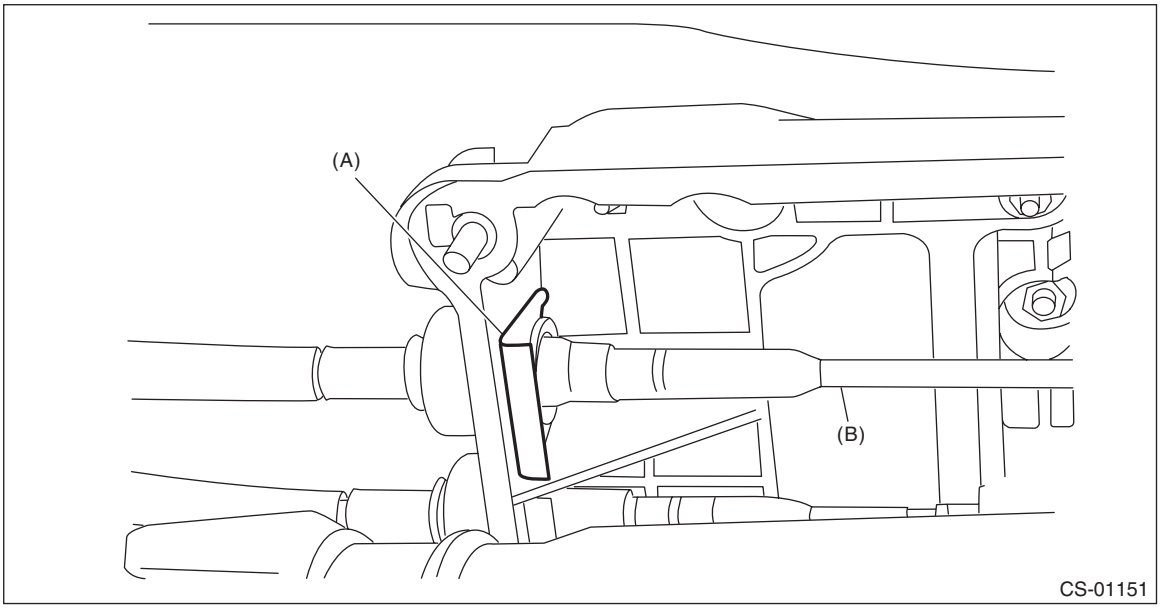
5) Install the dust cover to the transmission body. (OUTBACK model)

Tightening torque:
15 N·m (1.5 kgf-m, 11.1 ft-lb)



(A) Dust cover

6) Insert the MT gear shift cable into the cover cable assembly, and secure it with the clamp.

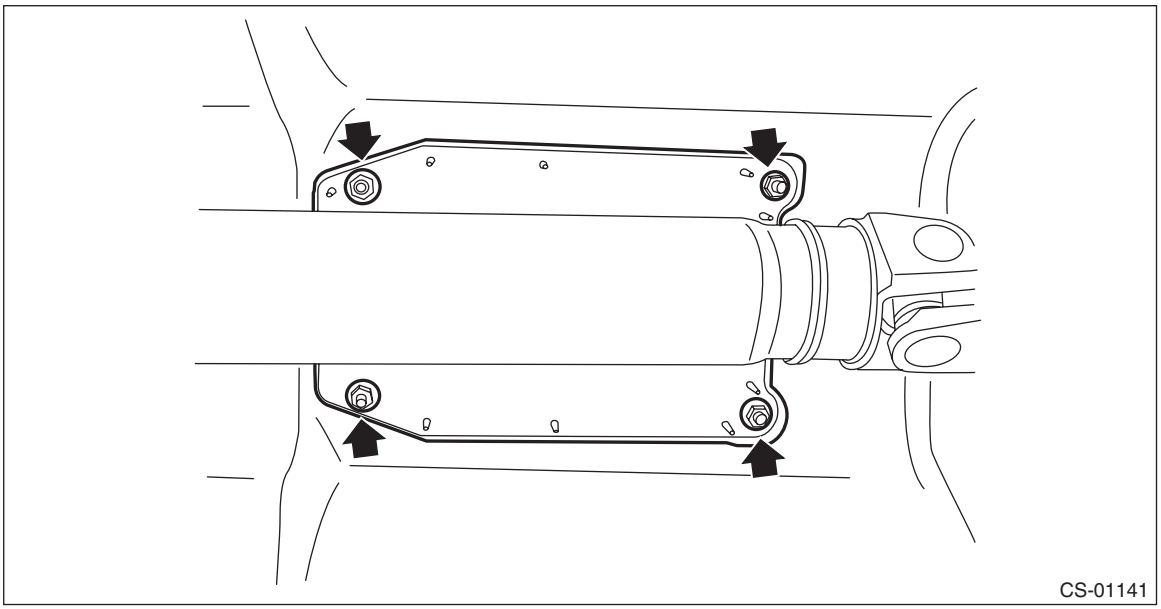


(A) Clamp
(B) MT gear shift cable

7) Connect the MT gear shift cable.

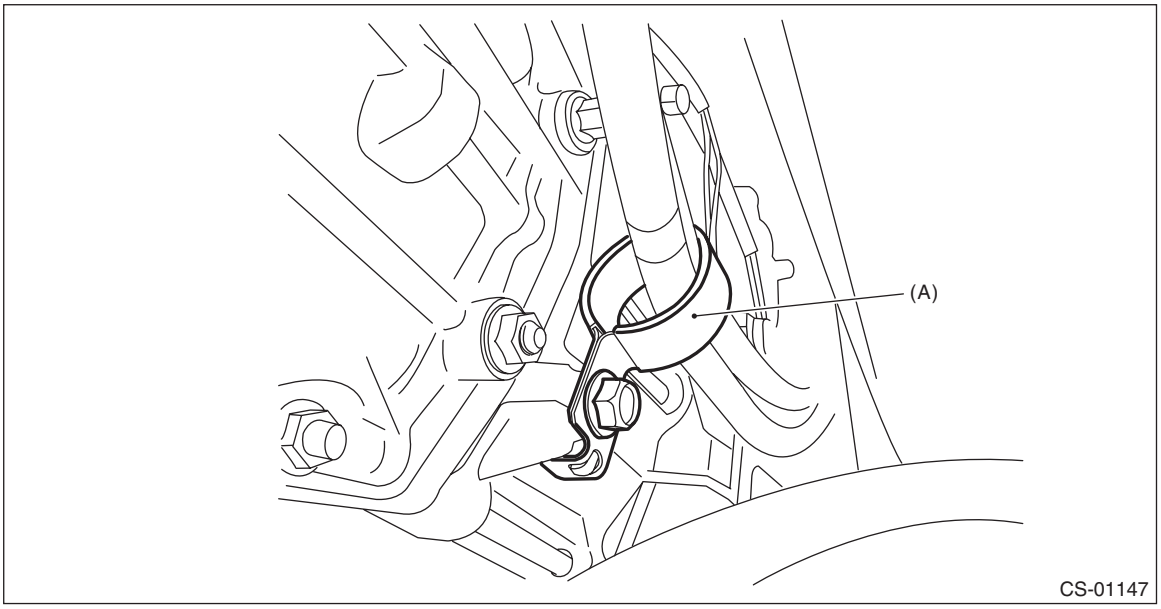
8) Install the plate cable assembly.

Tightening torque:
7.5 N·m (0.8 kgf-m, 5.5 ft-lb)



9) Insert the MT gear shift cable into clamp cable, and install to the transmission.

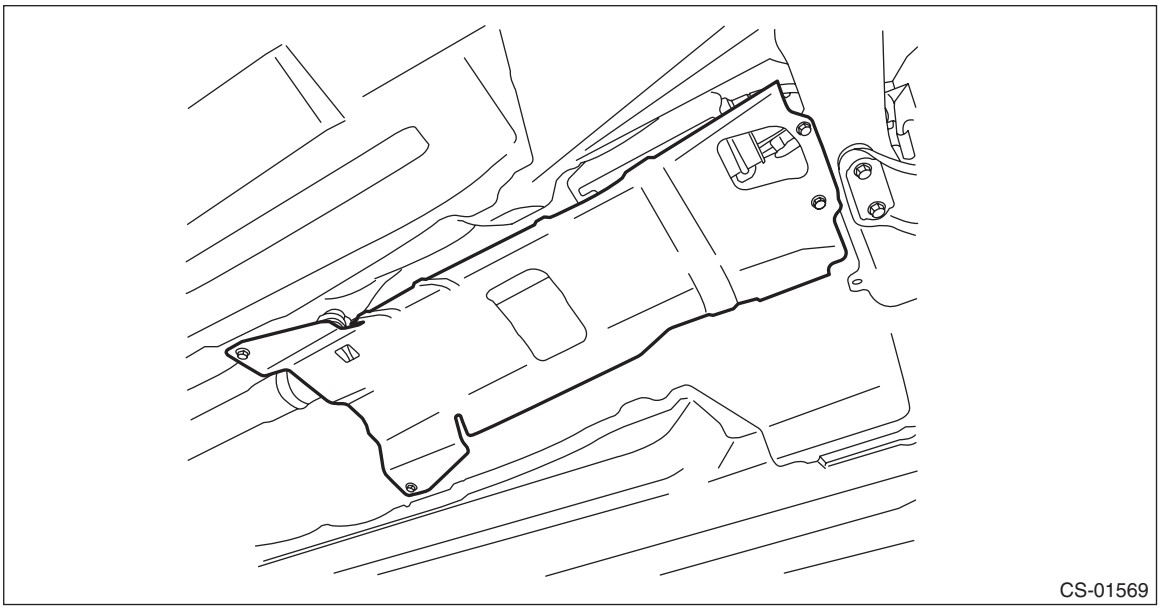
Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)



(A) Clamp cable

10) Install the heat shield cover.

Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)



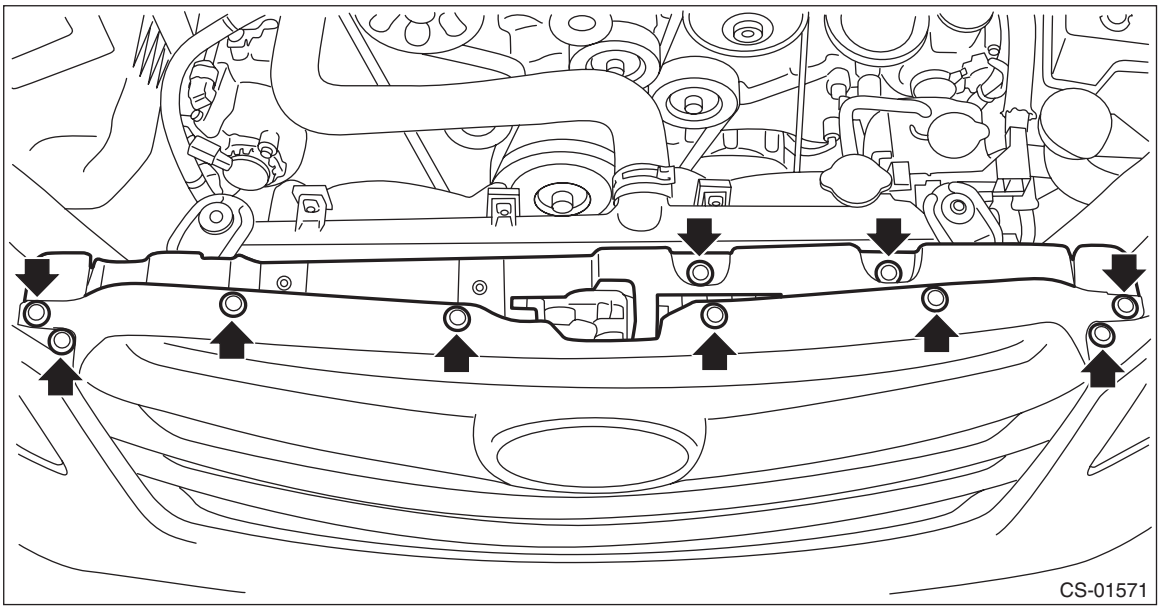
11) Install the center exhaust pipe. <Ref. to EX(H4DO)-12, INSTALLATION, Center Exhaust Pipe.>
12) Lower the vehicle.
13) Make sure the gears can be shifted accurately into each gear.

9. MT Gear Select Cable

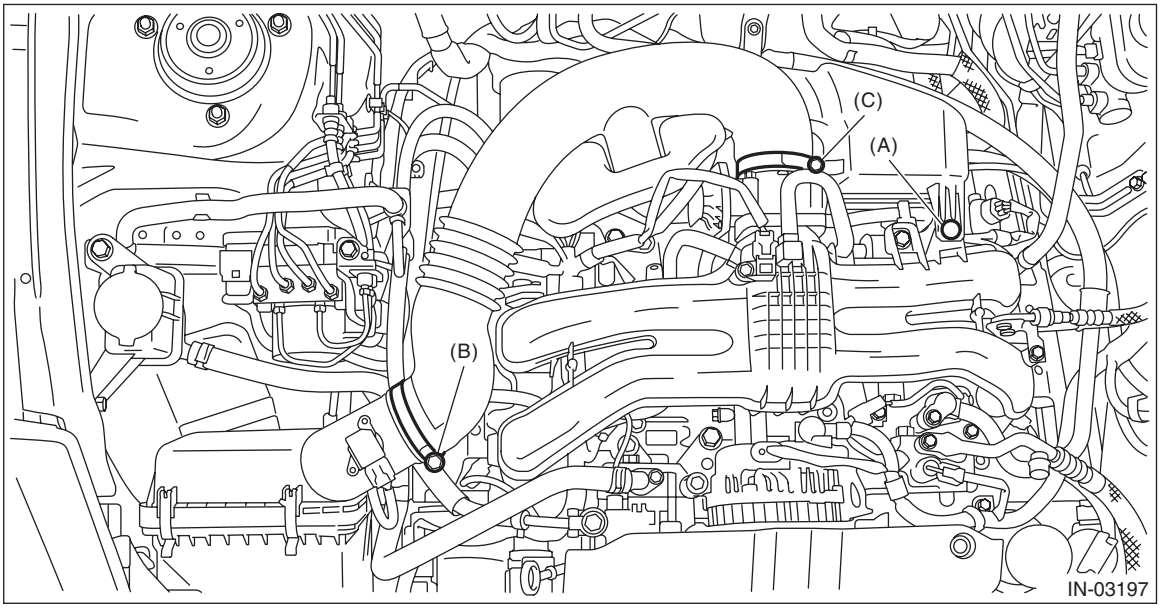
A: REMOVAL

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

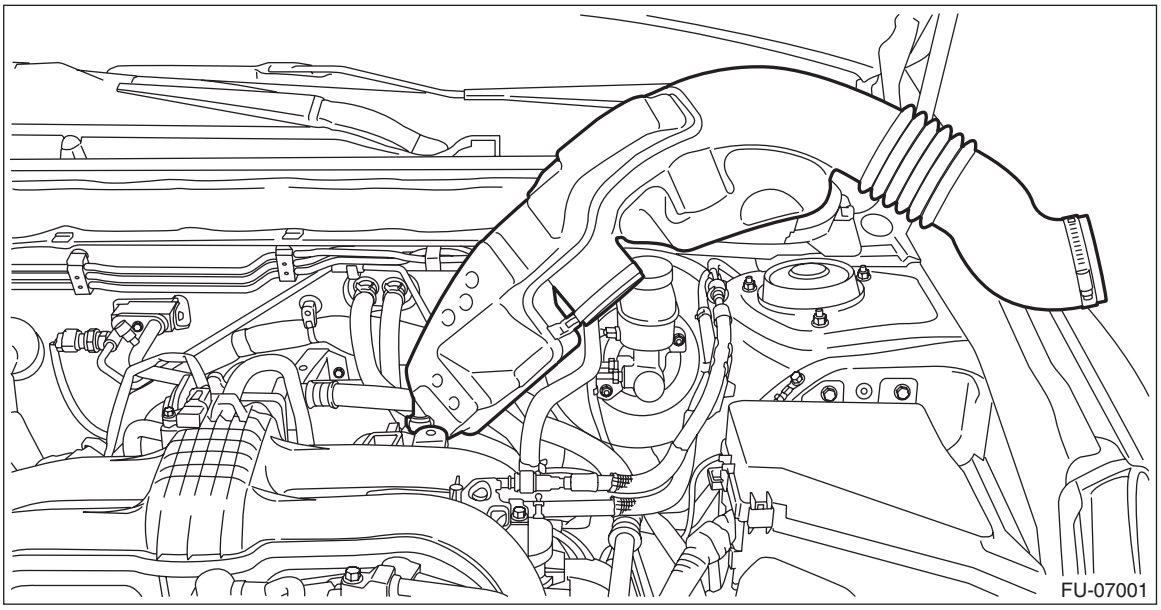
1) Disconnect the ground cable from battery.
2) Remove the air intake duct. <Ref. to IN(H4DO)-14, REMOVAL, Air Intake Duct.>
3) Remove the ten clips and remove the grille bracket.



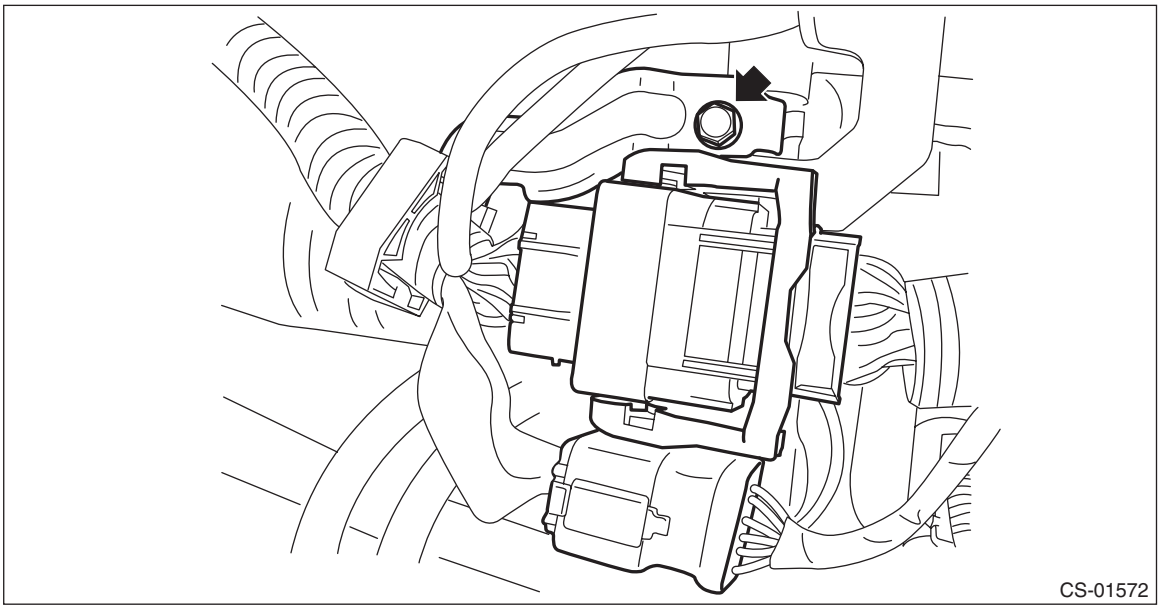
4) Remove the radiator sub fan and fan motor. <Ref. to CO(H4DO)-40, REMOVAL, Radiator Sub Fan and Fan Motor.>
5) Remove the clip (A) from the air intake boot.
6) Loosen the clamp (B) connecting the air intake boot and air cleaner case (rear).
7) Loosen the clamp (C) which connects the air intake boot and throttle body.



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

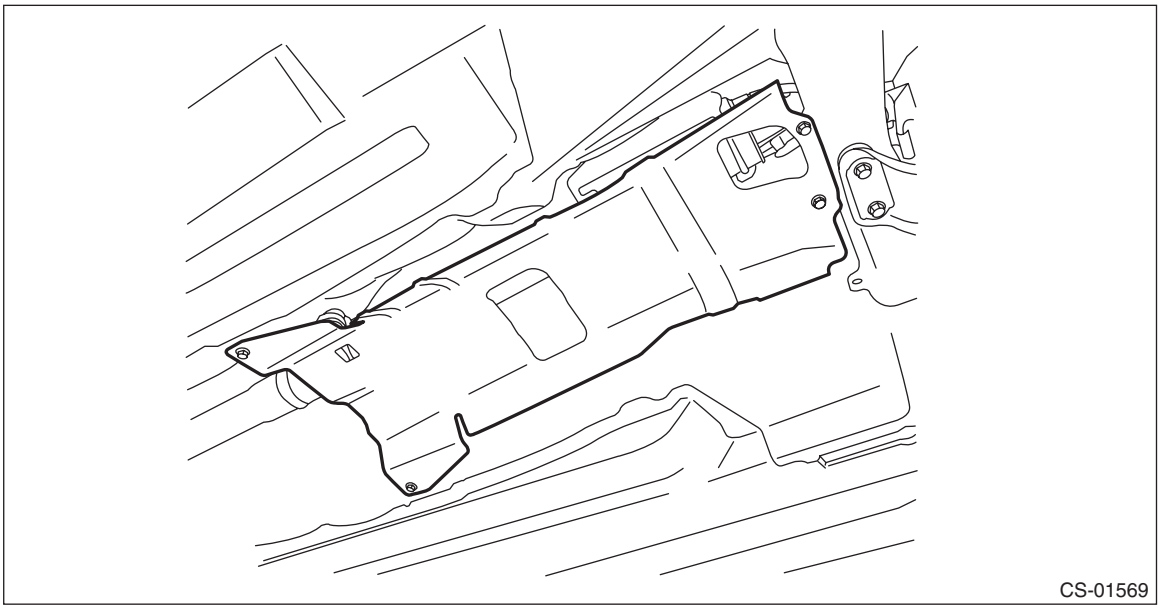


9) Remove the throttle body. <Ref. to FU(H4DO)-15, REMOVAL, Throttle Body.>
10) Remove the bolt and disconnect the engine harness connector.

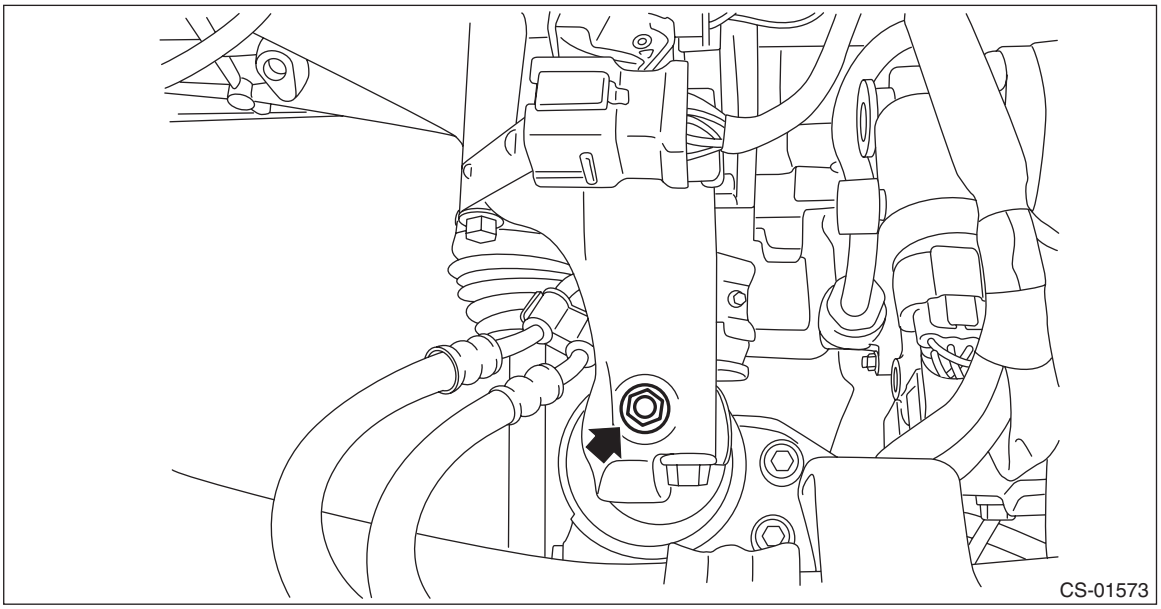


11) Lift up the vehicle.
12) Remove the center exhaust pipe. <Ref. to EX(H4DO)-12, REMOVAL, Center Exhaust Pipe.>

13) Remove the heat shield cover.

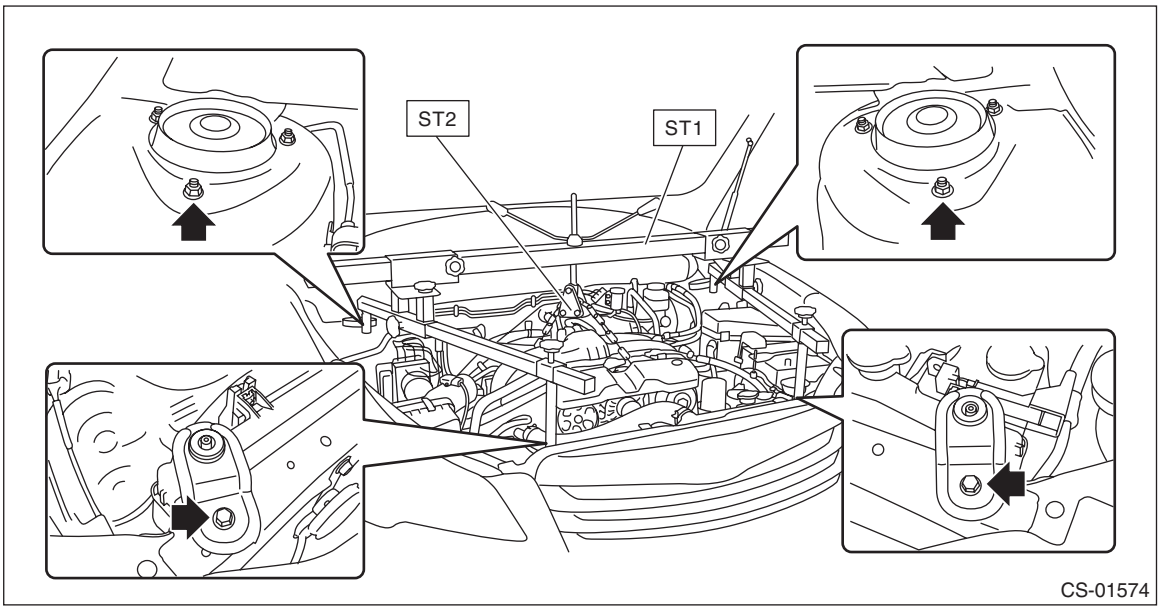


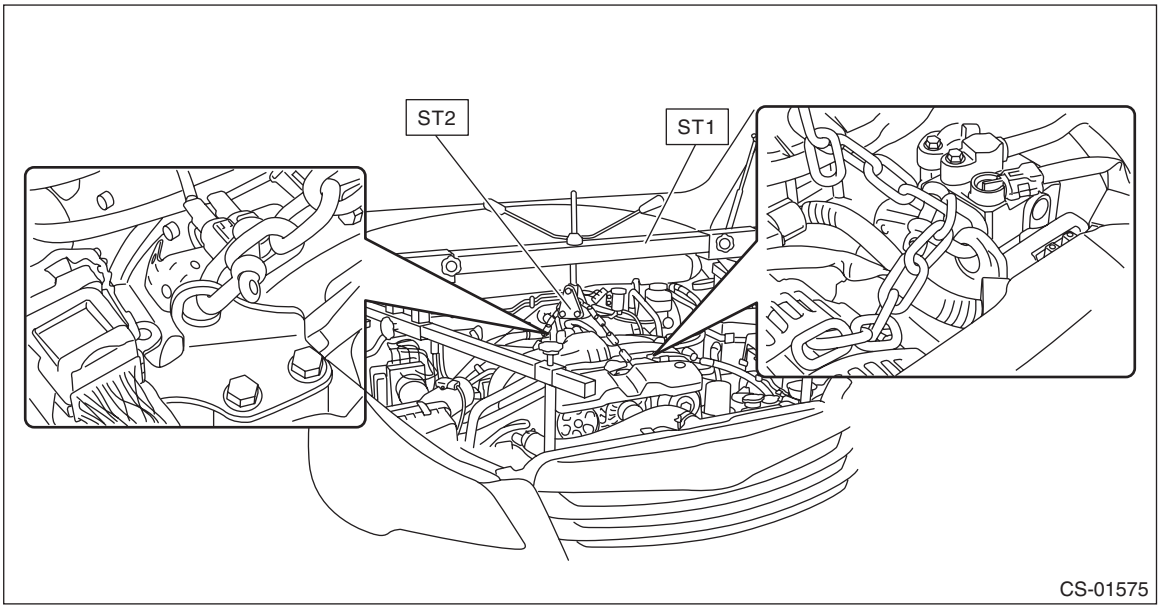
14) Lower the vehicle.
15) Remove the nuts from left and right transmission mounting brackets.



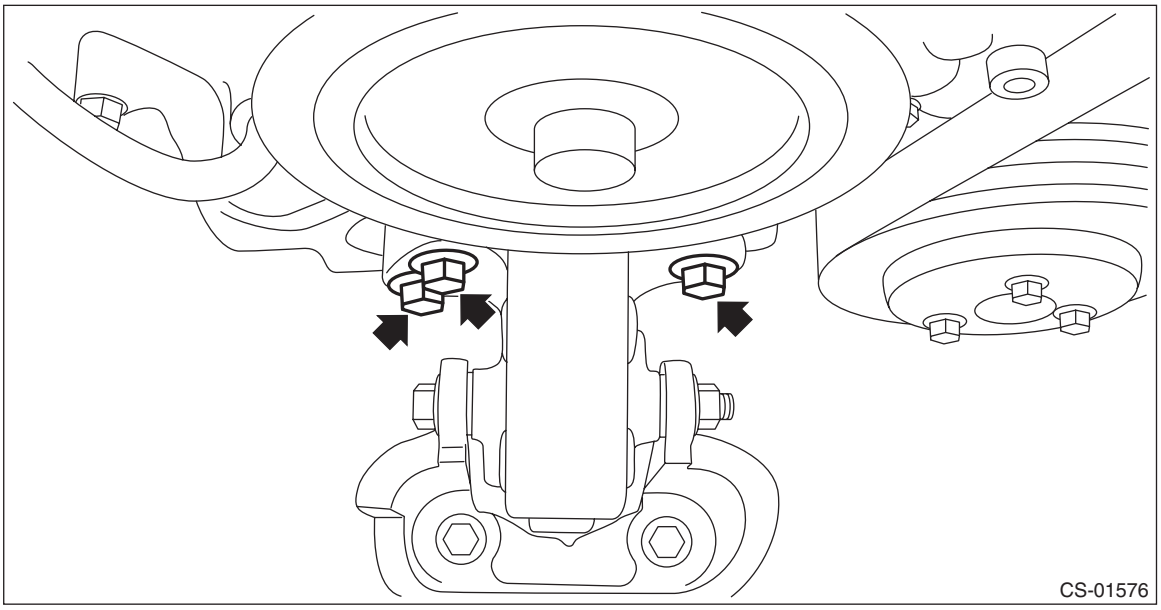
16) Set the ST1 and ST2 to vehicle.
ST1 99099AJ000 ENGINE HANGER
ST2 99099AJ010 CHAIN BALANCER

CAUTION:
- **Set so that the chain sling does not hit the engine parts.**
- **Set the arms of ST (ENGINE HANGER) at the locations shown in the figure.**

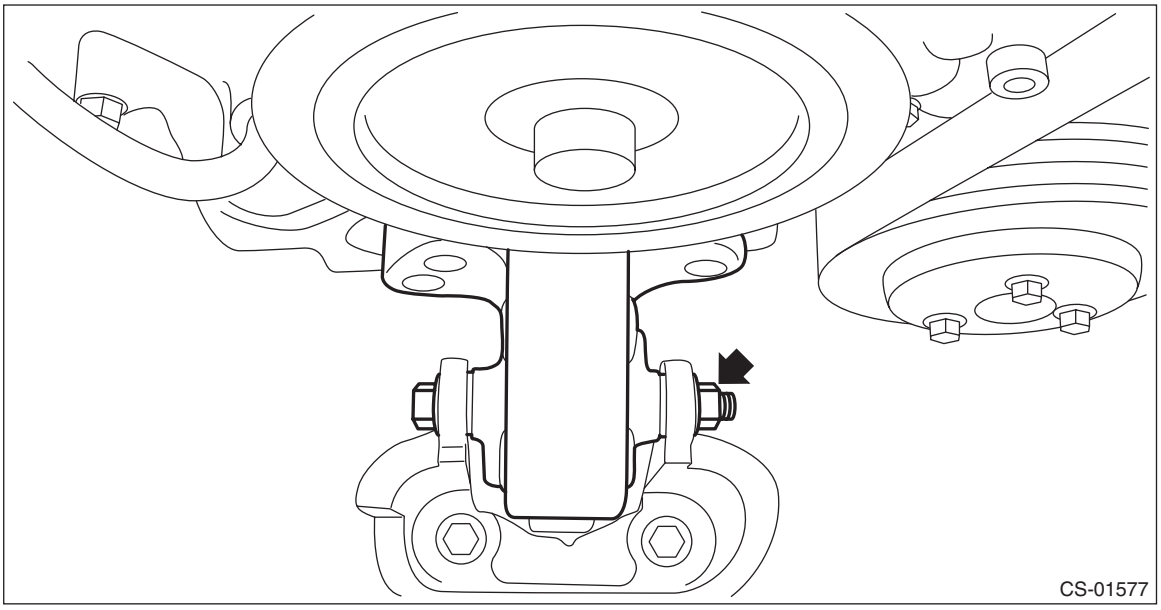




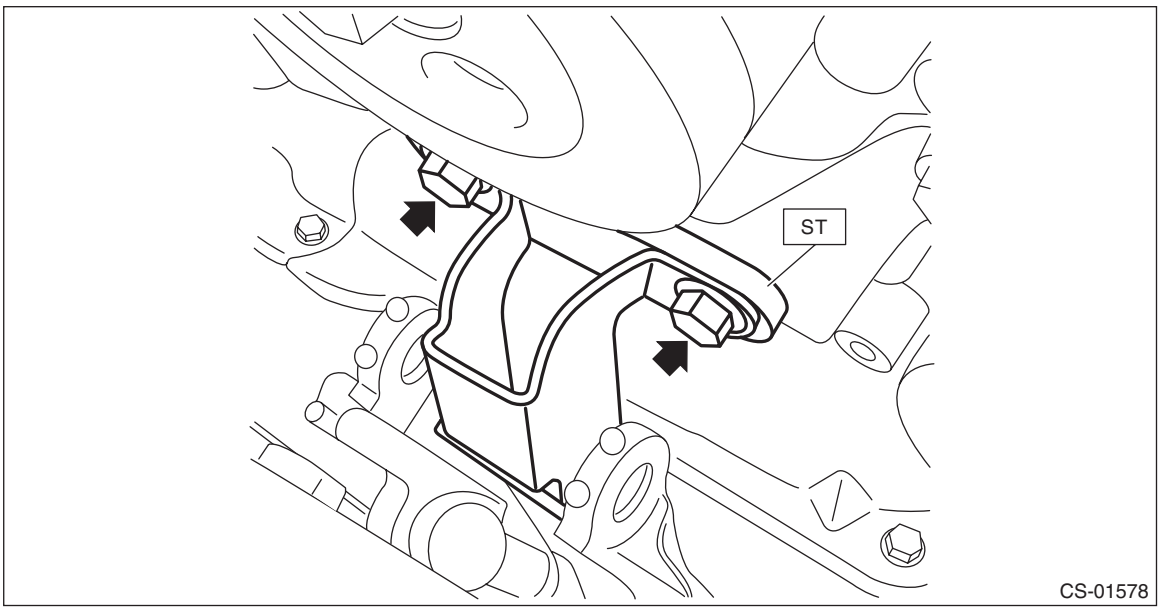
17) Lift the engine slightly and remove the engine mounting bolts.



18) Remove the engine mounting nut and bolt to remove the engine mounting.



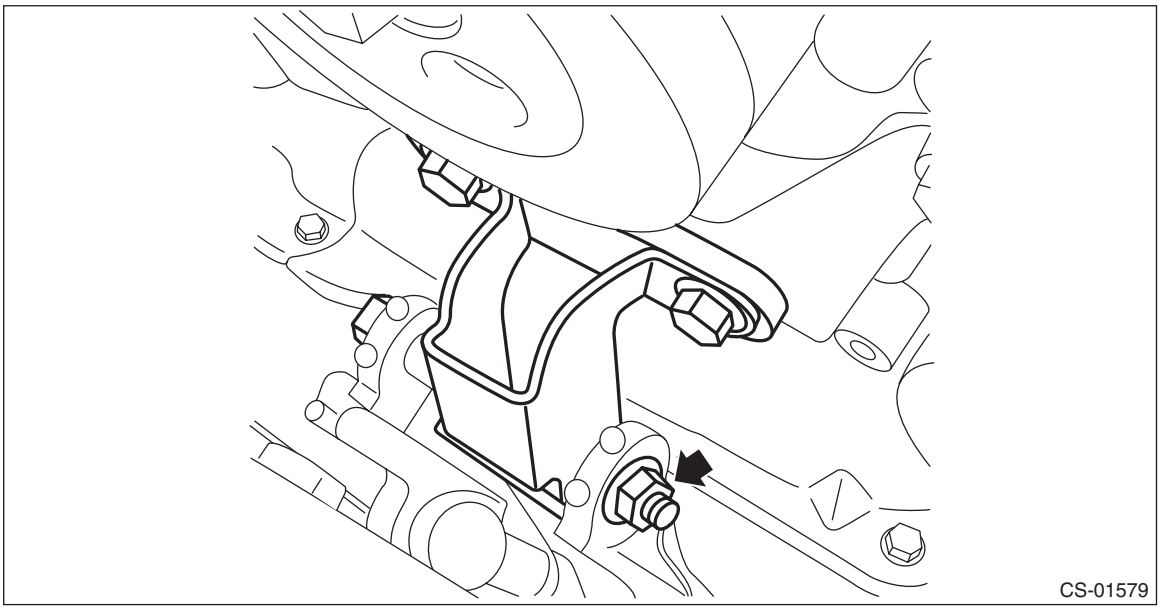
19) Temporarily attach ST by using two bolts.
ST 41099AJ130 SPECIAL TOOL FB



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

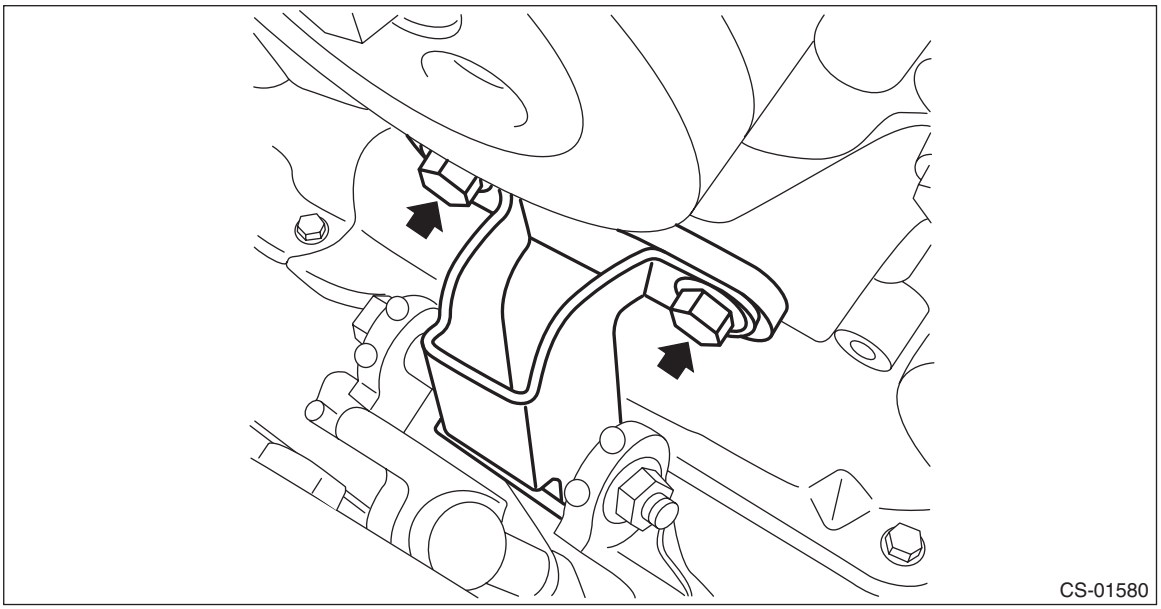
CAUTION:
Do not lift up higher than enough level to install the ST to avoid damage to the hoses and pipes inside the engine room.

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

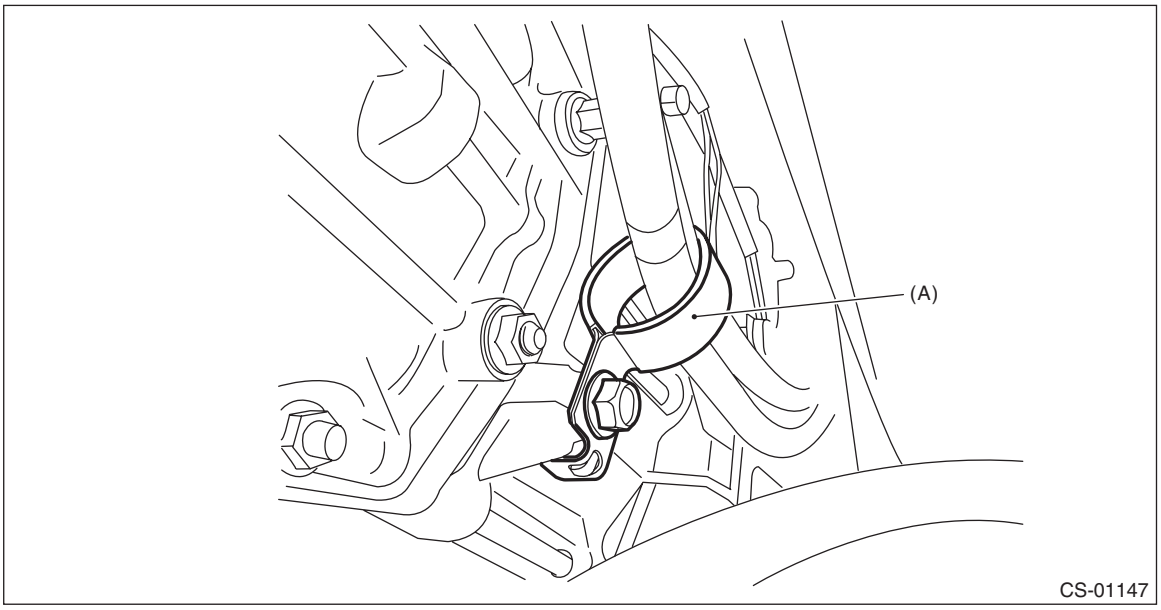


21) Tighten the mounting bolts on the engine side.

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



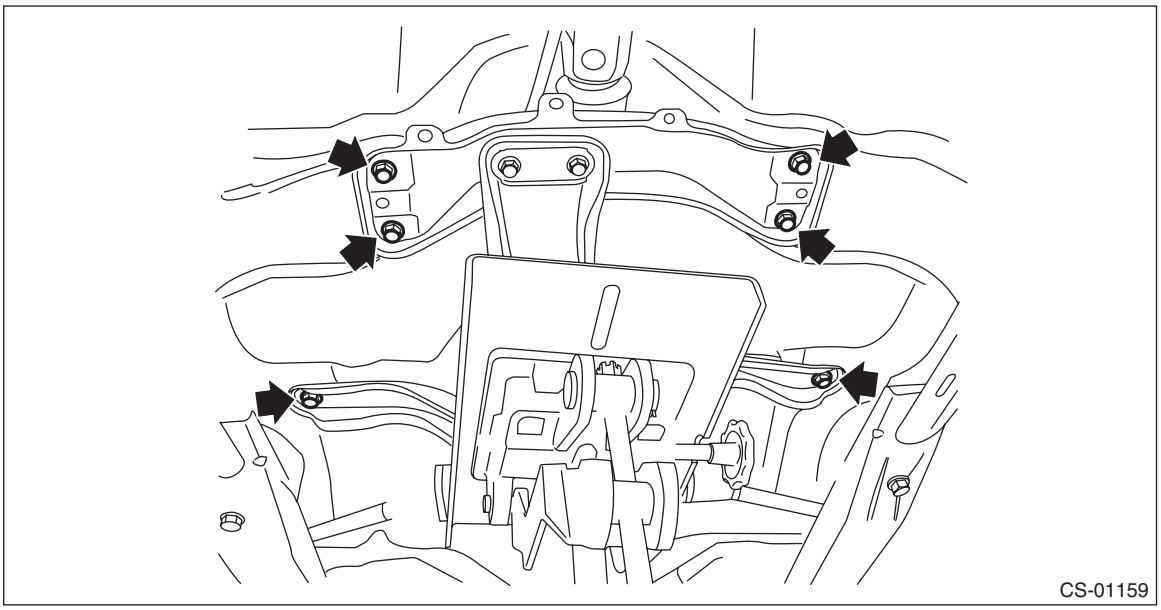
22) Rotate the handle of the ST (ENGINE HANGER) to loosen the sling chain.
23) Lift up the vehicle.
24) Set the transmission jack to the transmission.
25) Remove the clamp cable and take out the MT gear select cable from the clamp.



(A) Clamp cable

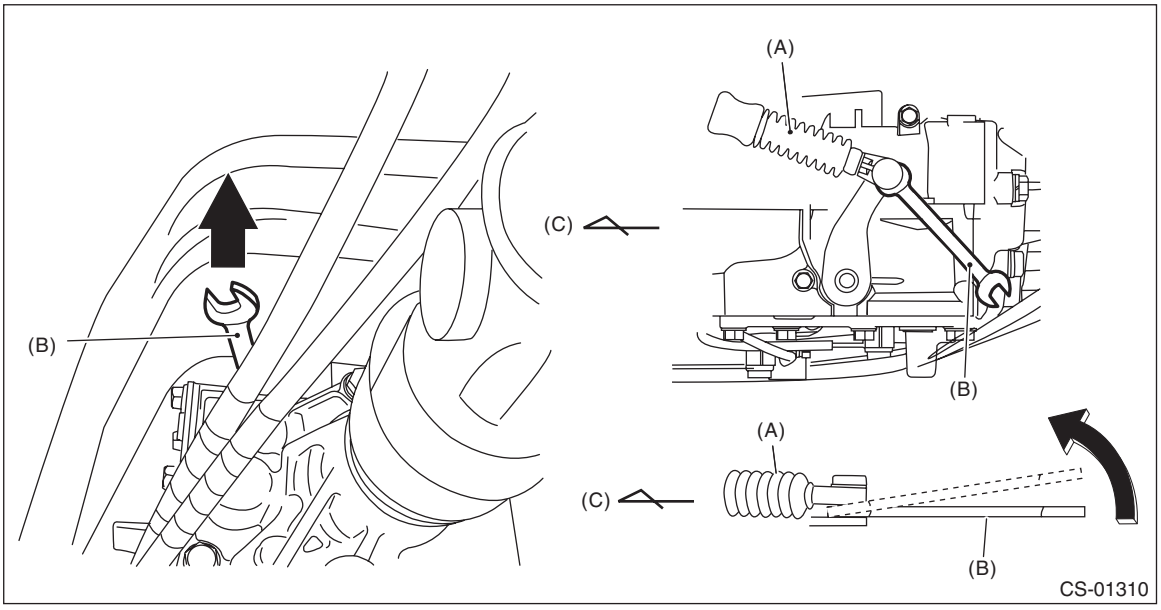
26) Remove the mounting bolts from the front crossmember and rear crossmember, and lower the transmission.

CAUTION:
When lowering the transmission, make sure that the transmission jack does not come off from the transmission.



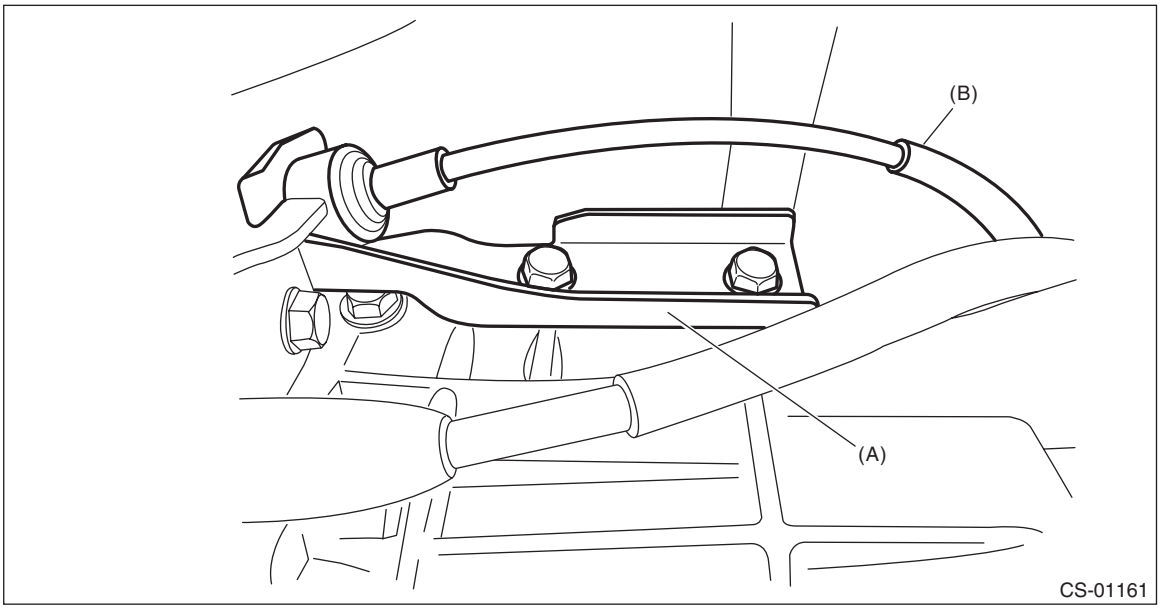
27) Insert a spanner between the selector lever COMPL and the MT gear select cable and remove the MT gear select cable by raising the handle.

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



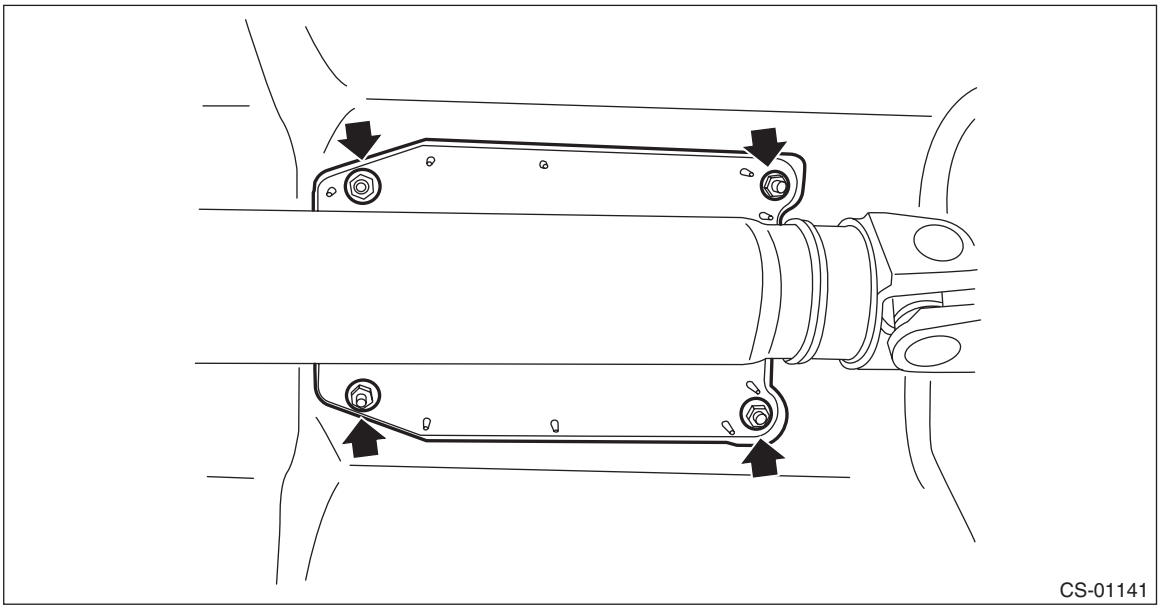
(A) MT gear select cable
(B) Spanner
(C) Forward

28) Remove the MT gear select cable and select bracket as a single unit from the transmission body.



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

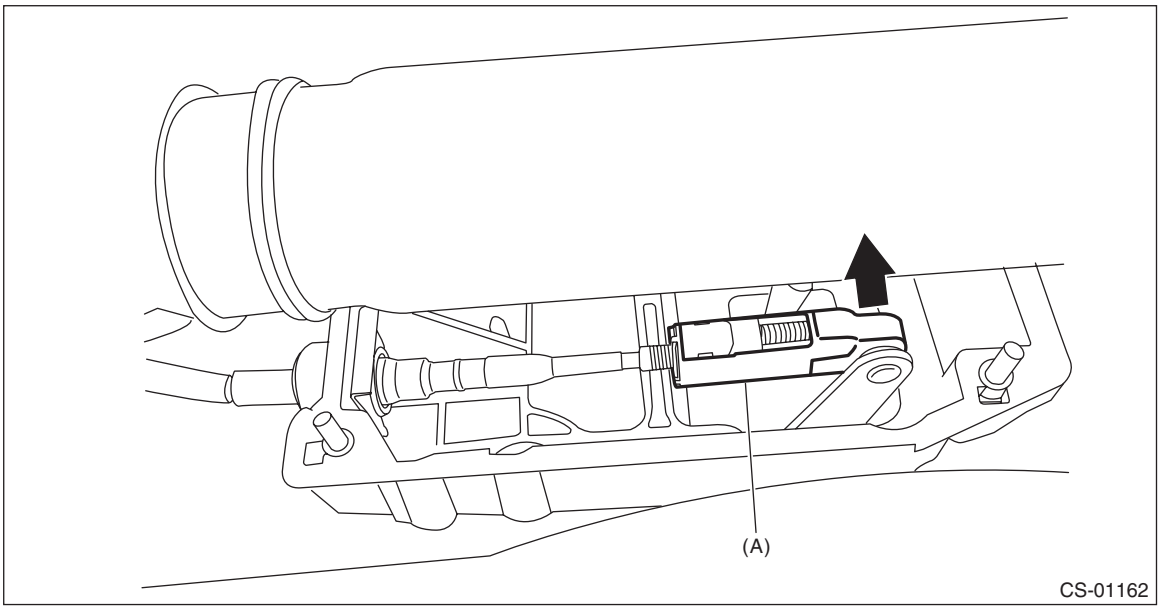
29) Remove the plate cable assembly.



30) Disconnect the MT gear select cable.

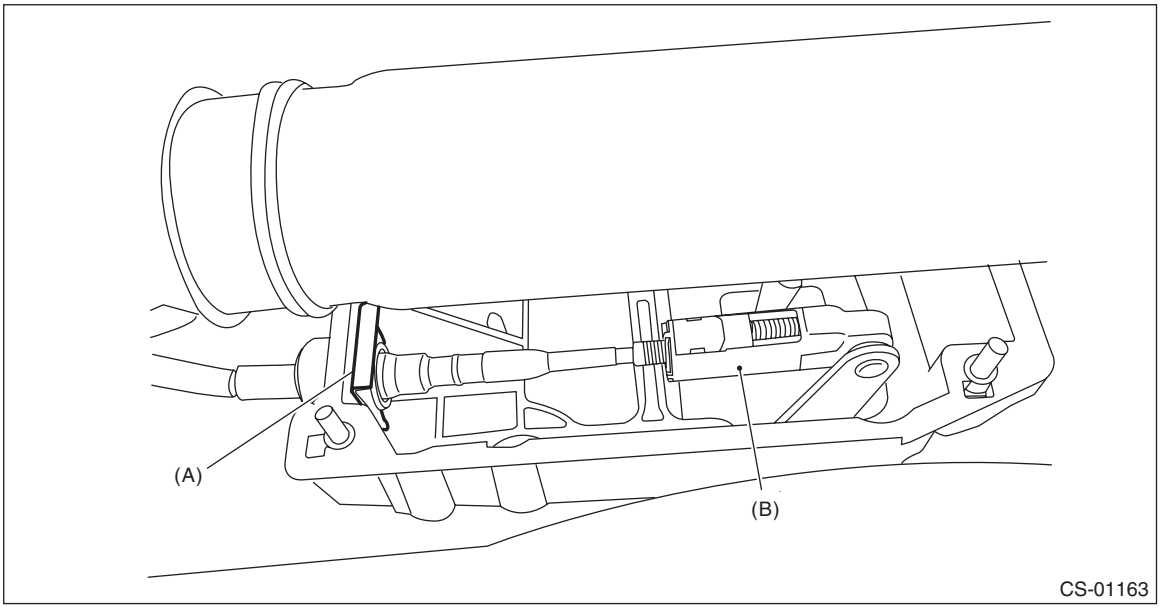
CAUTION:
Be careful not to deform the cable inner.

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



(A) MT gear select cable

31) Remove the clamp which holds the MT gear select cable.



(A) Clamp
(B) MT gear select cable

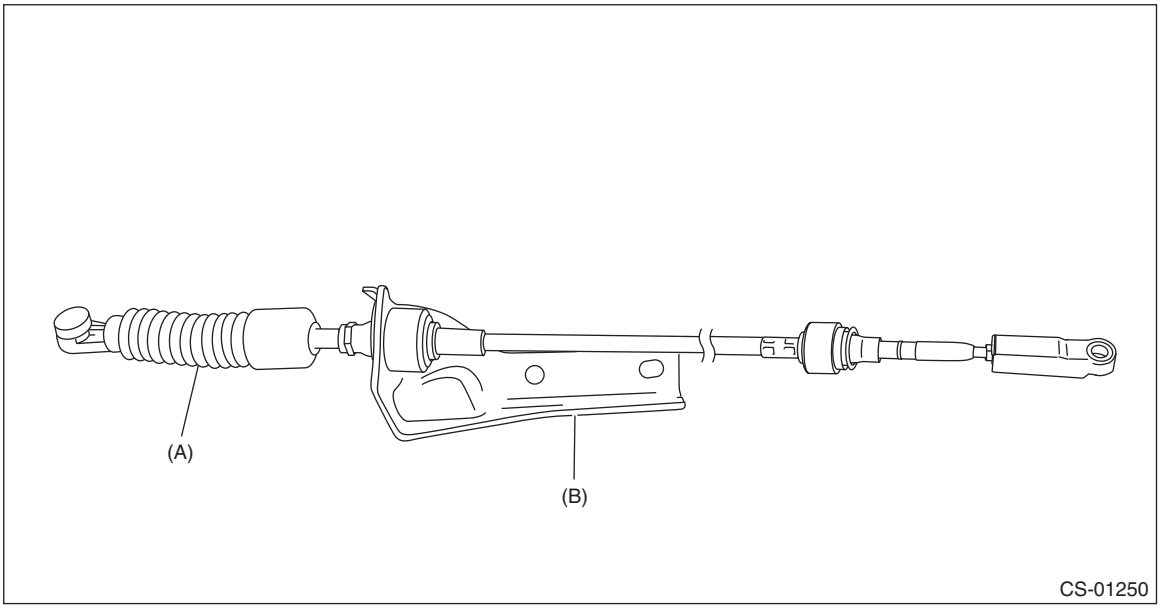
32) Pull out the MT gear select cable from the cover cable assembly.

CAUTION:
Do not bend the MT gear select cable sharply.

B: INSTALLATION

CAUTION:
• Always use new MT gear select cable if the cable is removed from selector lever COMPL of transmission side.
• Do not bend the MT gear select cable sharply.
• Do not twist the inner cable excessively.
1) Remove the MT gear select cable from the select bracket.

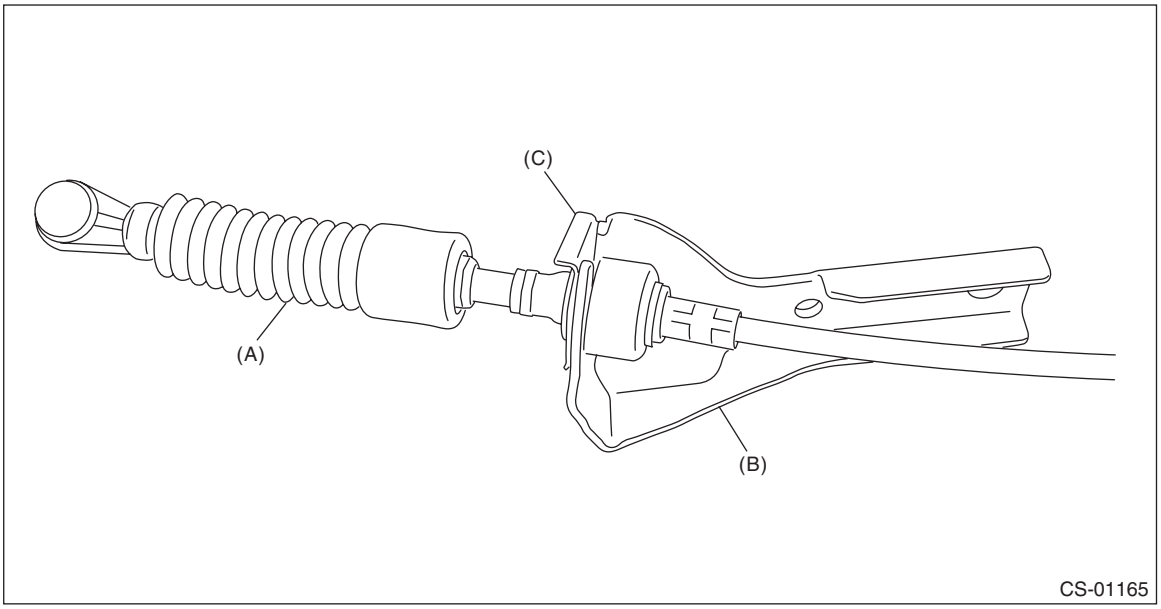
CAUTION:
Check for assembling position before removing the MT gear select cable from the select bracket.



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

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

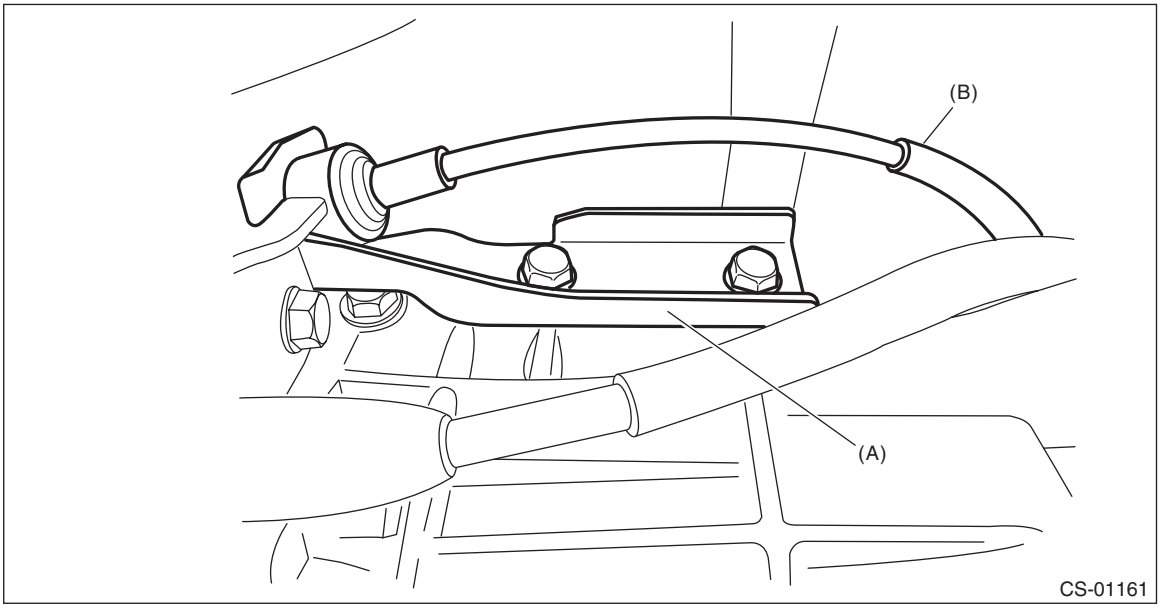
CAUTION:
Be careful not to mistake the MT gear select cable installing direction.



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

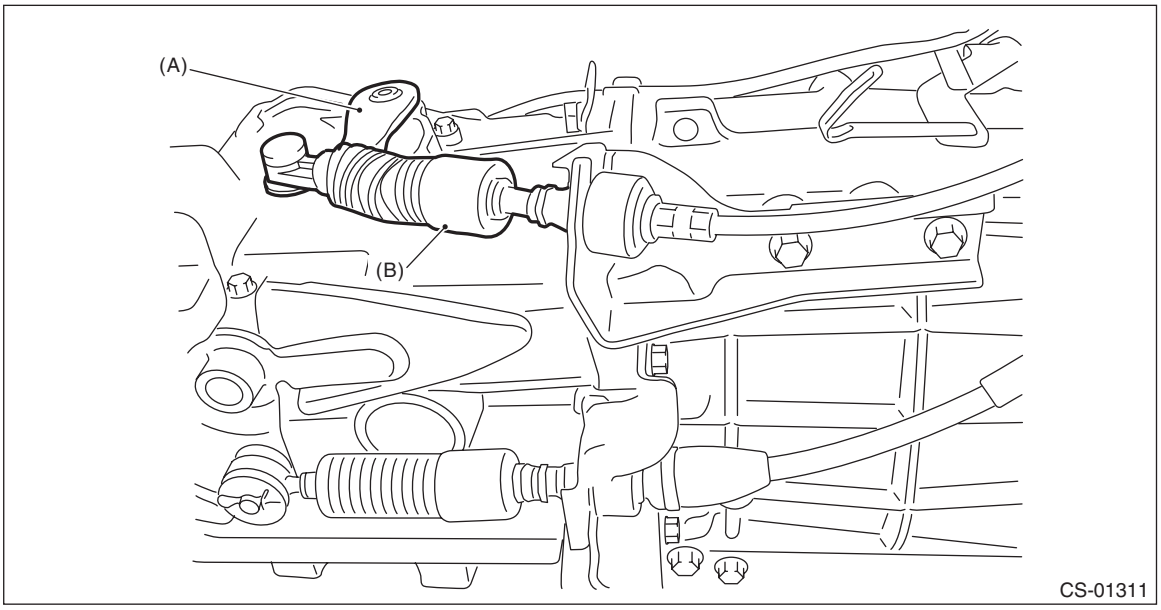
3) Install the MT gear select cable and select bracket as a single unit to the transmission body.

Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)



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

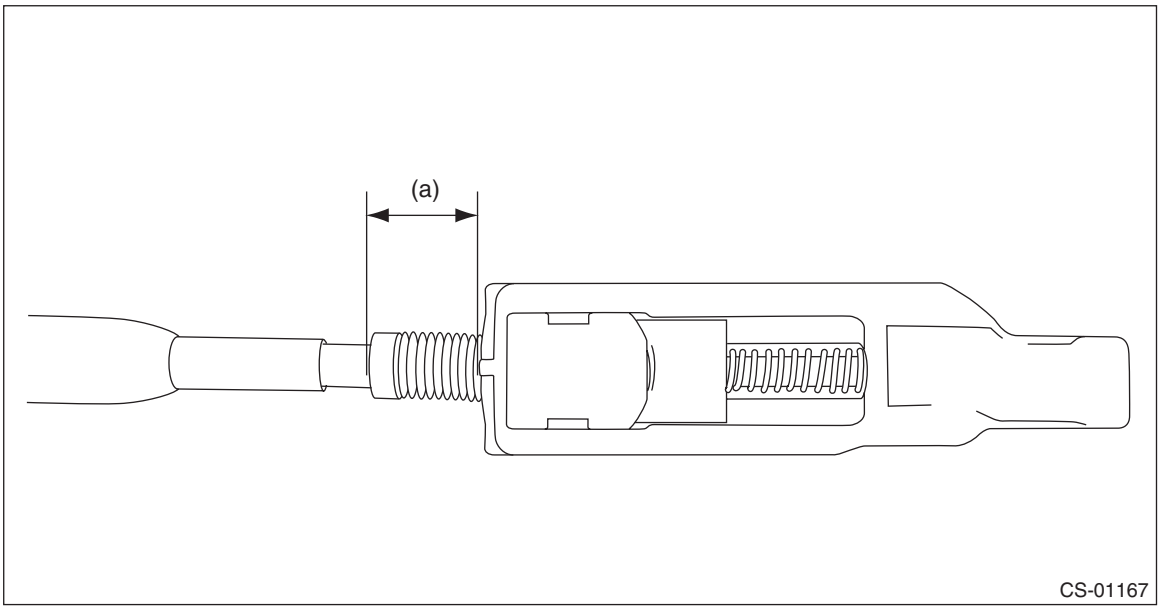
4) Install the MT gear select cable to the select lever COMPL.



(A) Selector lever COMPL
(B) MT gear select cable

5) Measure the exposed length (a) of MT gear select cable. If out of specification, adjust the MT gear select cable. <Ref. to CS-97, ADJUSTMENT, MT Gear Select Cable.>

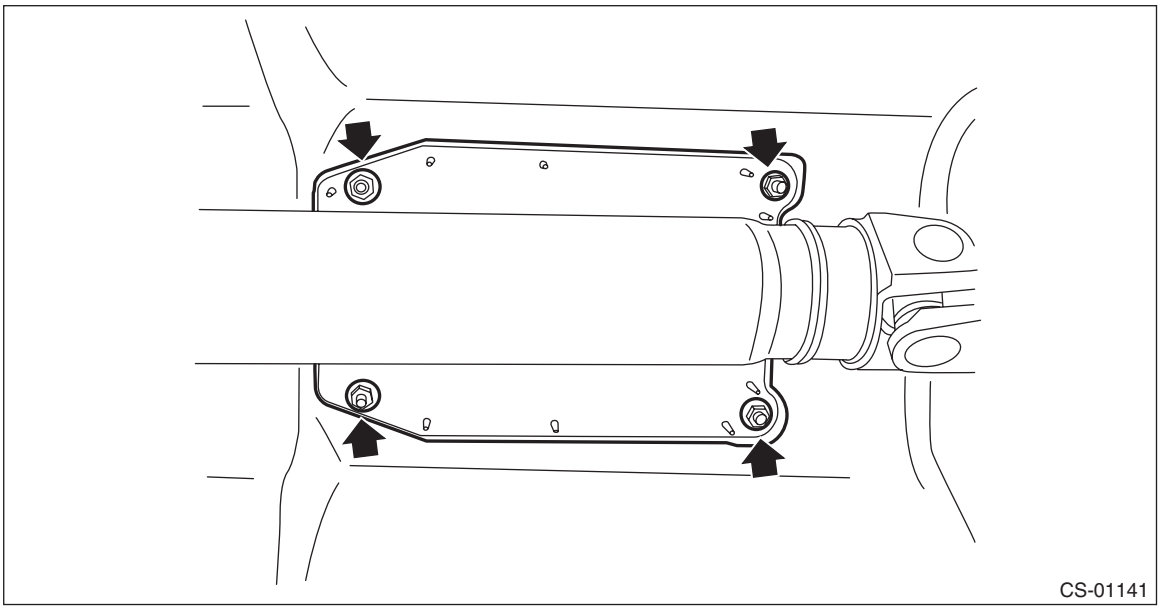
Exposed length (a) of MT gear select cable:
Specification: 11 mm (0.4 in)



6) Connect the MT gear select cable.

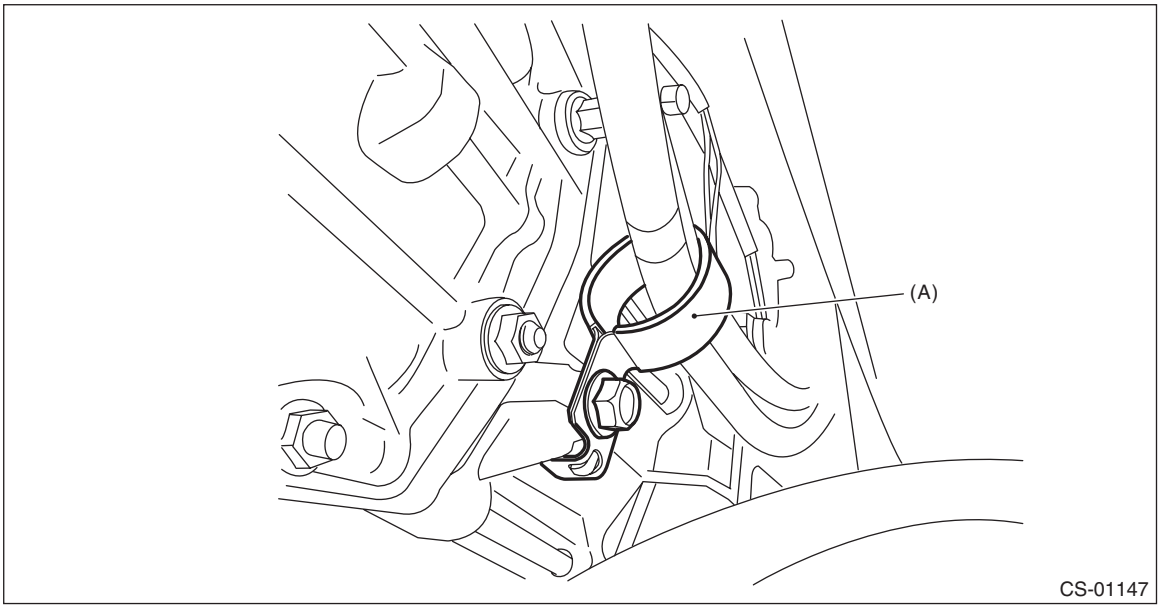
7) Install the plate cable assembly.

Tightening torque:
7.5 N·m (0.8 kgf-m, 5.5 ft-lb)



8) Insert the MT gear select cable into clamp cable, and install to the transmission.

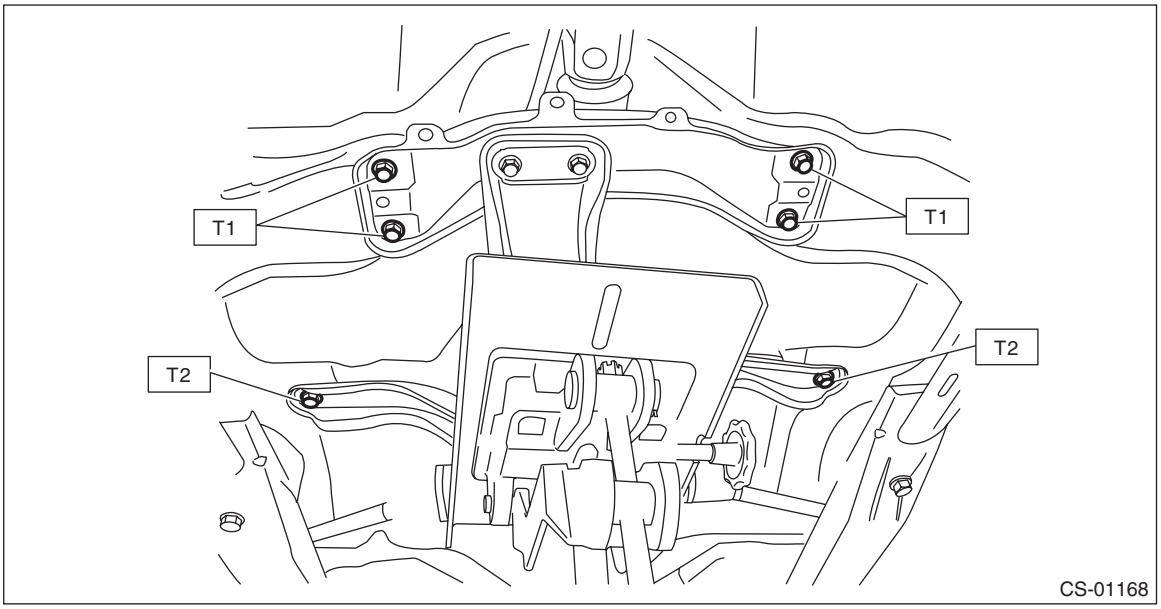
Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)



(A) Clamp cable

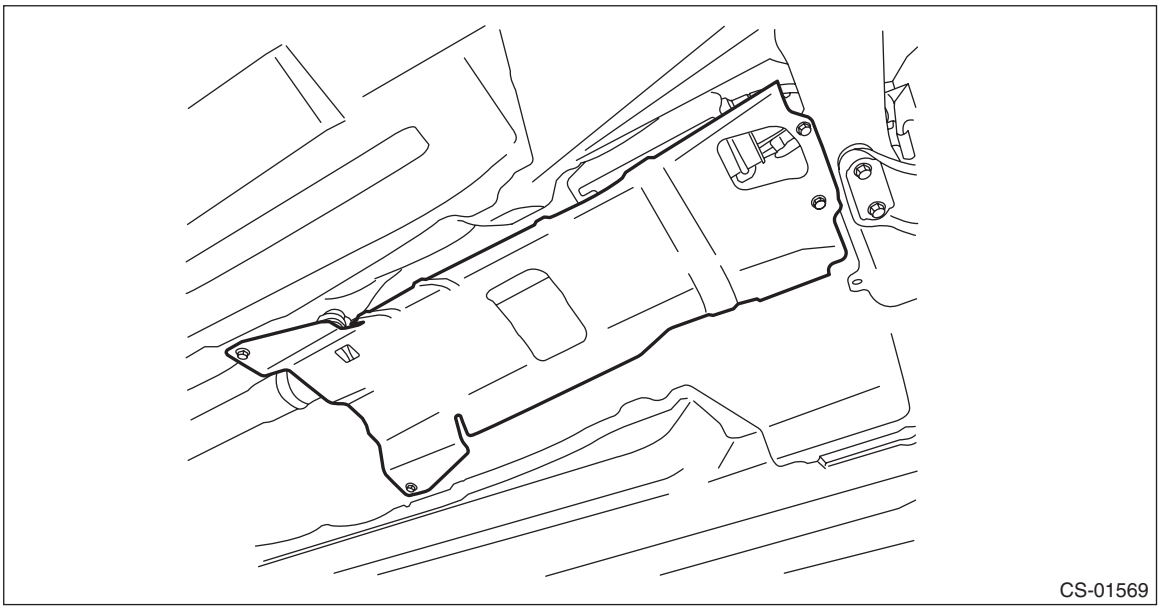
9) Raise the transmission jack, install the front crossmember and rear crossmember.

Tightening torque:
T1: 75 N·m (7.6 kgf-m, 55.3 ft-lb)
T2: 140 N·m (14.3 kgf-m, 103.3 ft-lb)



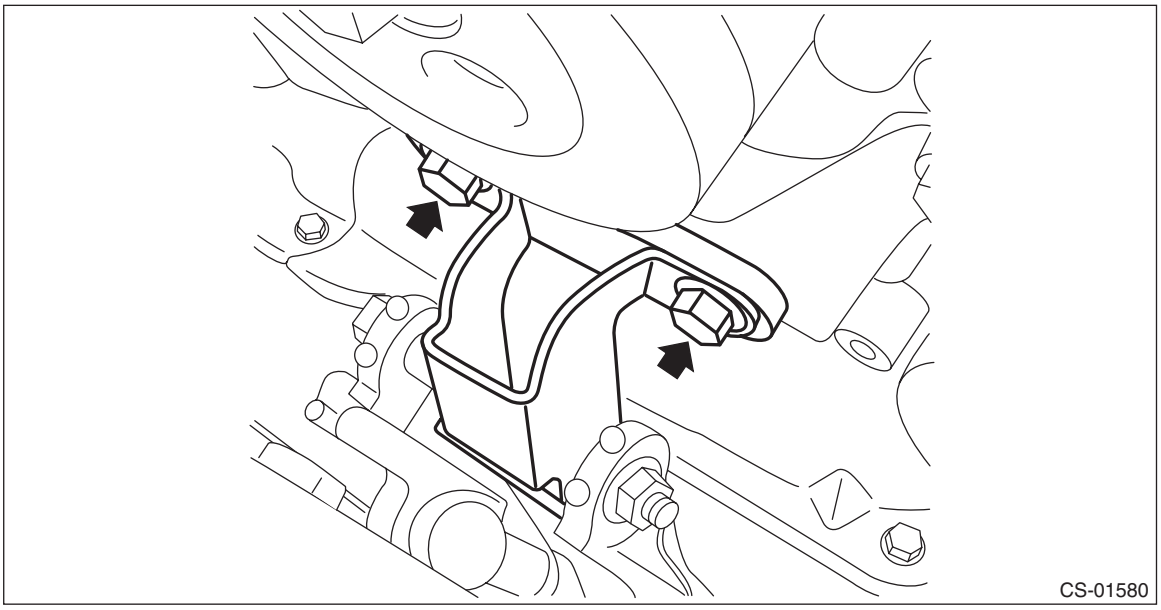
10) Rotate the handle of ST (ENGINE HANGER) to apply tension to the sling chain.
11) Take out the transmission jack.
12) Install the heat shield cover.

Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)

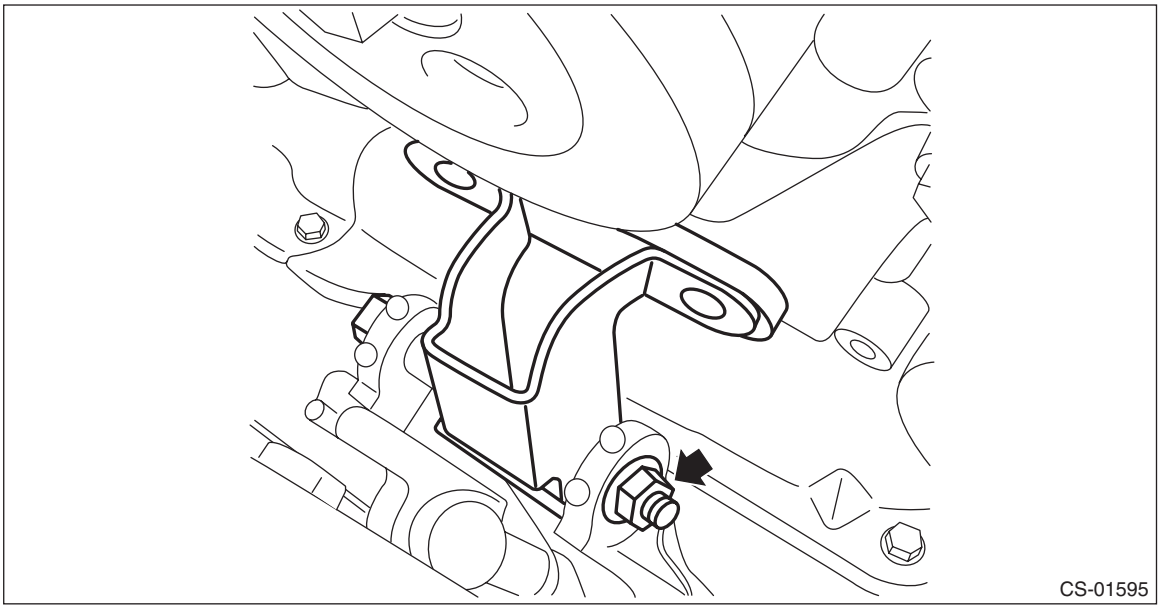


13) Install the center exhaust pipe. <Ref. to EX(H4DO)-12, INSTALLATION, Center Exhaust Pipe.>
14) Lower the vehicle.
15) Rotate the handle of ST (ENGINE HANGER) to lift up the engine slightly.

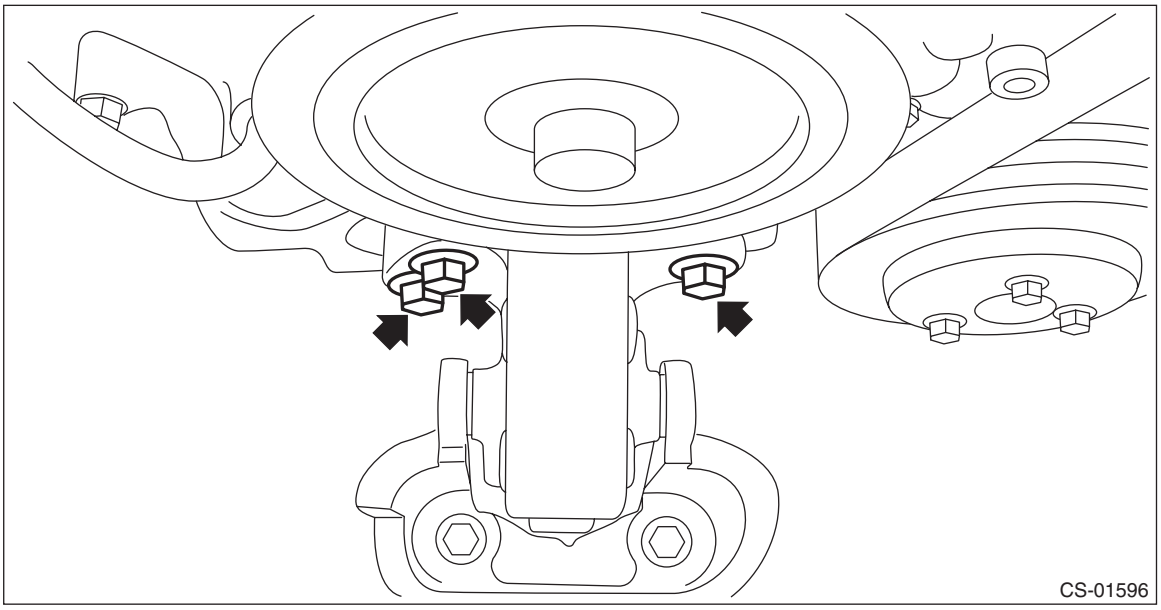
16) Remove the bolts from ST (SPECIAL TOOL FB).



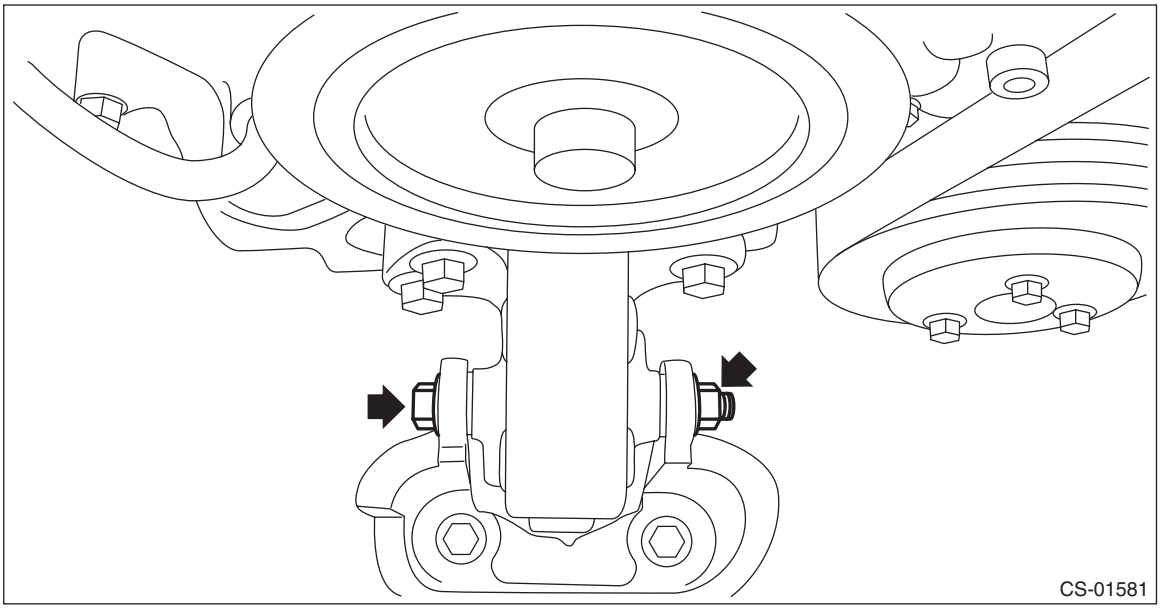
17) Remove the bolt and nut to remove ST (SPECIAL TOOL FB).



18) Temporarily attach the front engine mounting with bolts.

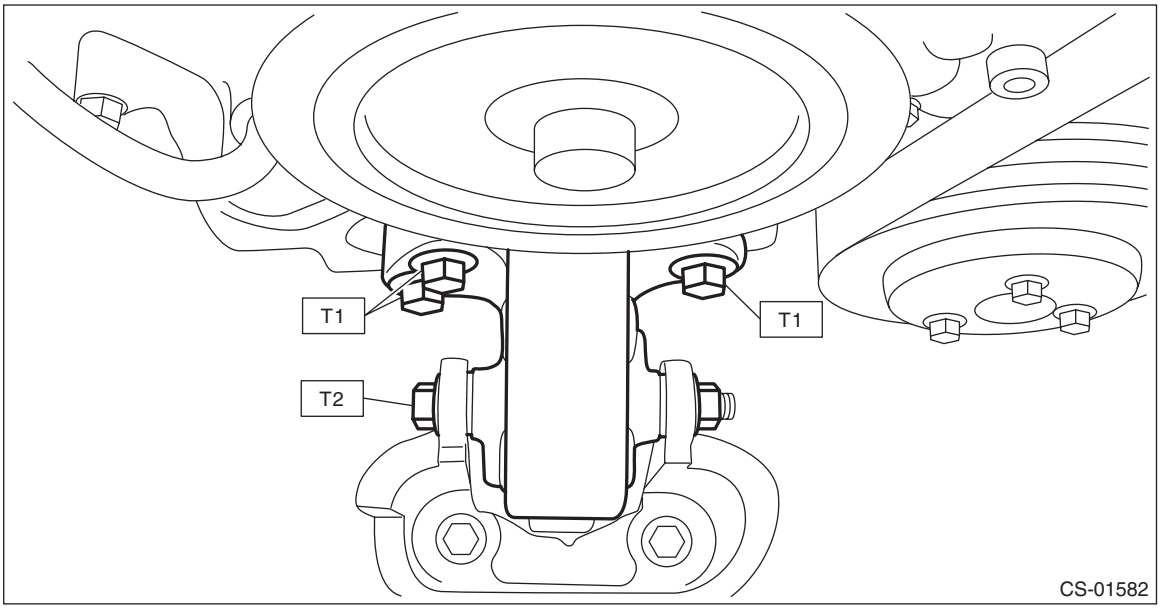


19) Install the bolt and nut to the front engine mounting.



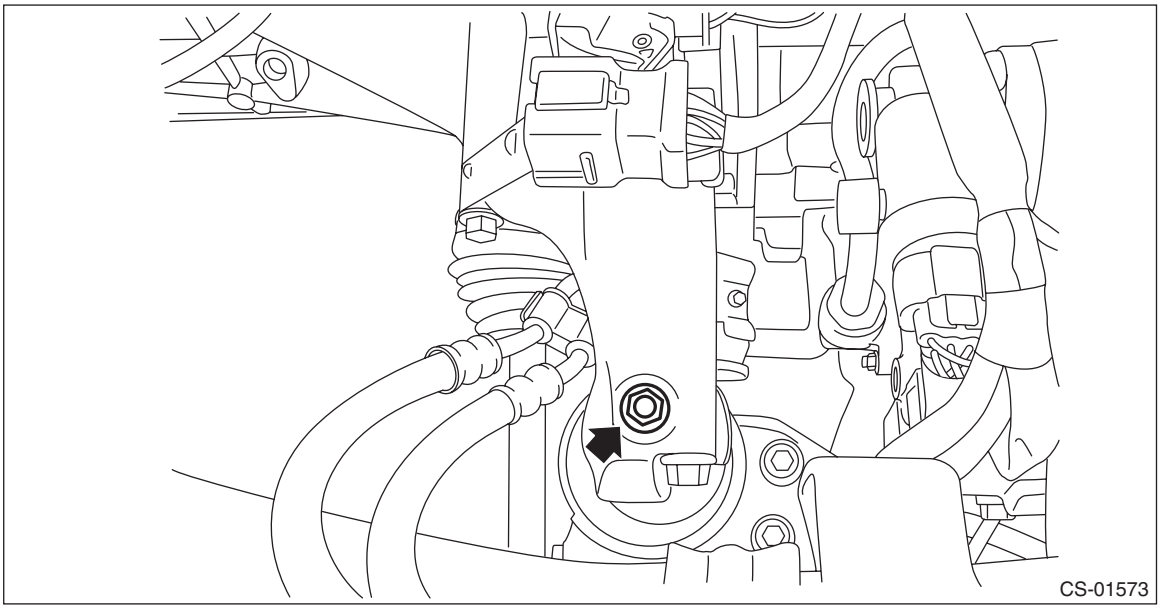
20) Tighten the bolts and nuts of front engine mounting.

Tightening torque:
T1: 25 N·m (2.5 kgf-m, 18.4 ft-lb)
T2: 45 N·m (4.6 kgf-m, 33.2 ft-lb)



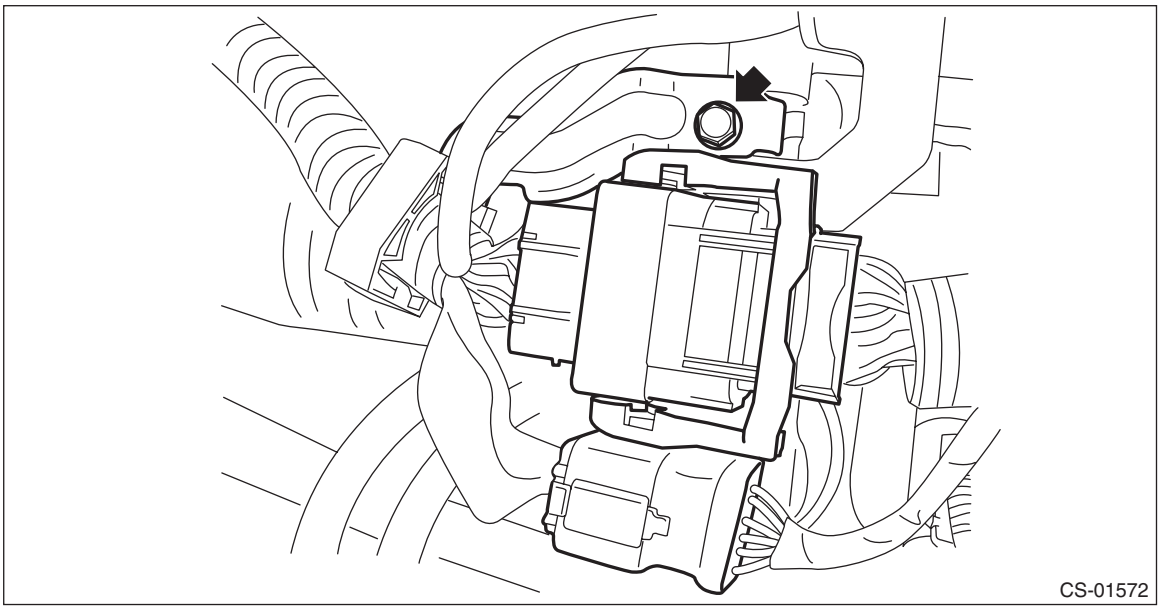
21) Attach the nuts to the left and right transmission mounting brackets.

Tightening torque:
45 N·m (4.6 kgf-m, 33.2 ft-lb)

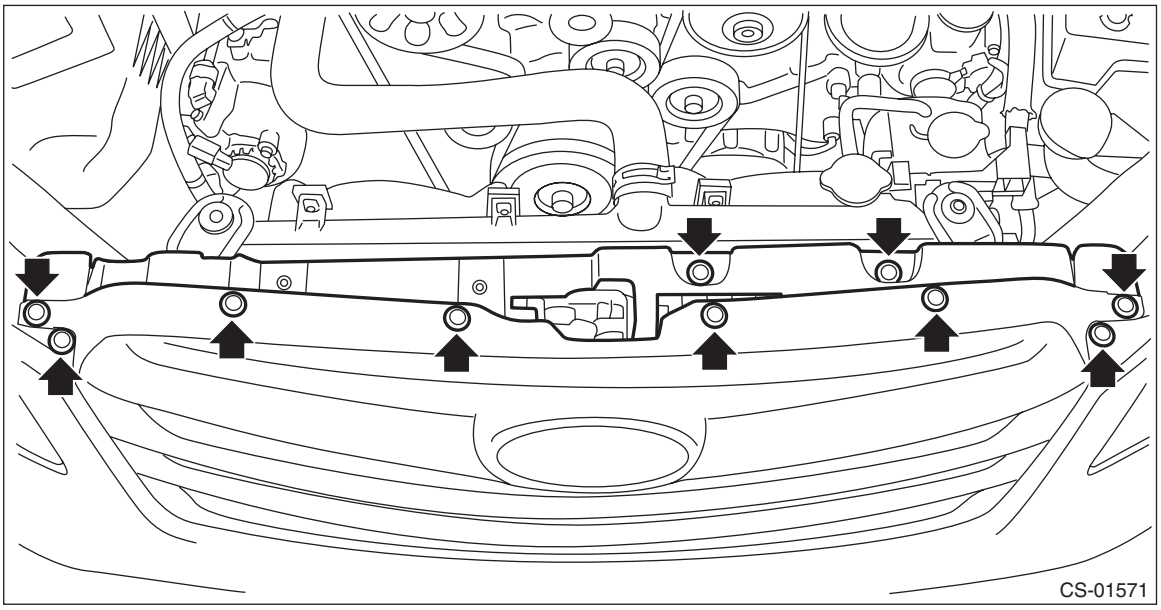


22) Connect the engine harness connectors, and install harness bracket to the engine hanger rear.

Tightening torque:
7.5 N·m (0.8 kgf-m, 5.5 ft-lb)



23) Install the throttle body. <Ref. to FU(H4DO)-17, INSTALLATION, Throttle Body.>
24) Install the air intake boot assembly. <Ref. to IN(H4DO)-13, INSTALLATION, Air Intake Boot.>
25) Install the radiator sub fan and fan motor. <Ref. to CO(H4DO)-41, INSTALLATION, Radiator Sub Fan and Fan Motor.>
26) Attach the grille bracket.

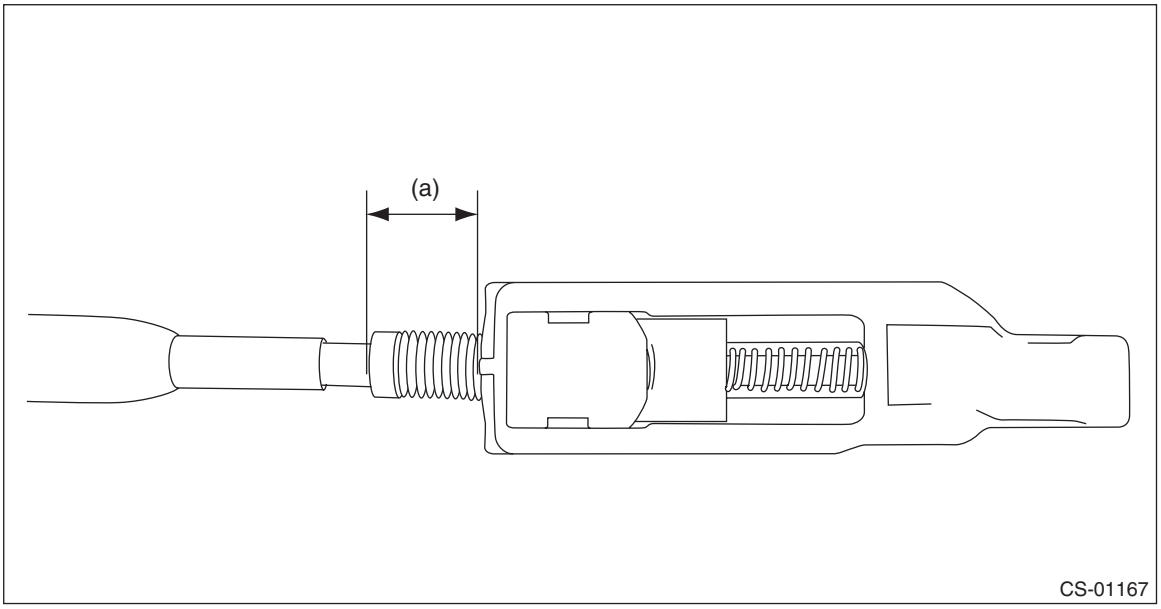


27) Install the air intake duct. <Ref. to IN(H4DO)-14, INSTALLATION, Air Intake Duct.>
28) Connect the battery ground terminal.
29) Adjust the detent of the MT gear shift lever. <Ref. to CS-67, ADJUSTMENT, MT Gear Shift Lever.>
30) Make sure the gears can be shifted accurately into each gear.

C: INSPECTION

1) Check that exposed length (a) of MT gear select cable is within specification.

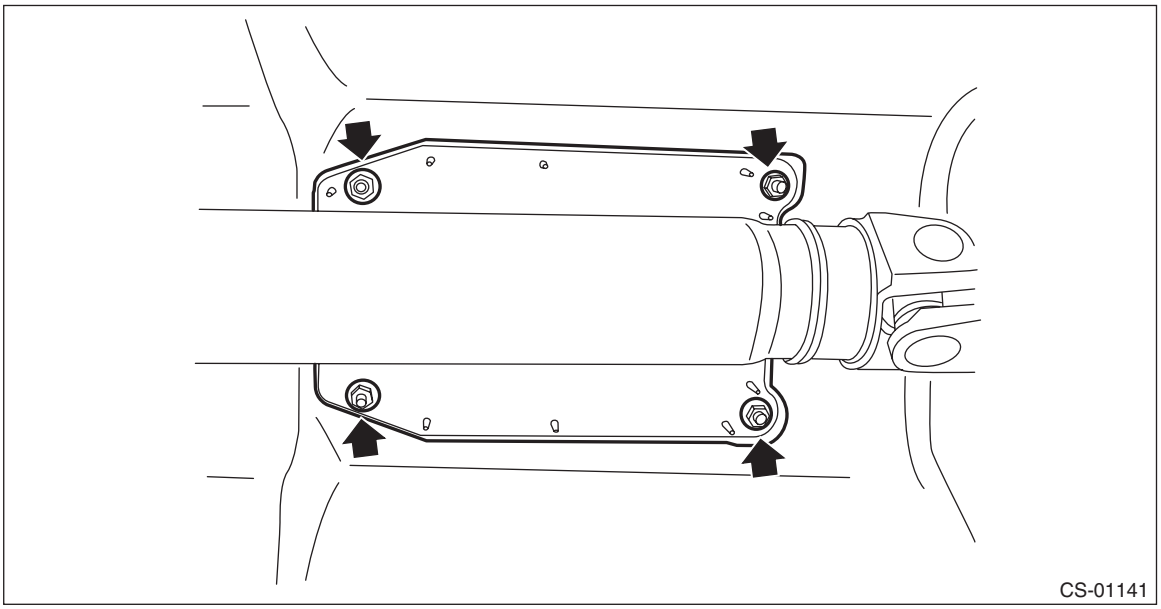
Exposed length (a) of MT gear select cable:
Specification: 11 mm (0.4 in)



2) If it is not within the specification, perform the adjustment. <Ref. to CS-97, ADJUSTMENT, MT Gear Select Cable.>

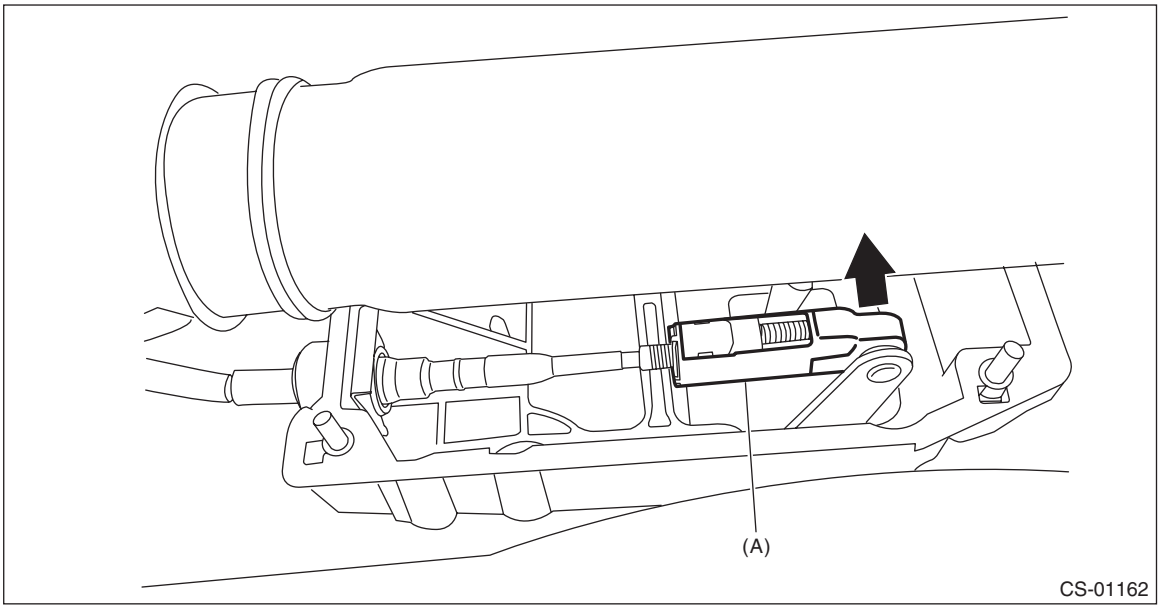
D: ADJUSTMENT

NOTE:
Two person are required to perform the MT gear select cable adjustment. (Only the step 7) requires two workers.)
1) Loosen the detent bolt of the MT gear shift lever. <Ref. to CS-67, ADJUSTMENT, MT Gear Shift Lever.>
2) Move the shift lever to the 6th.
3) Remove the plate cable assembly.



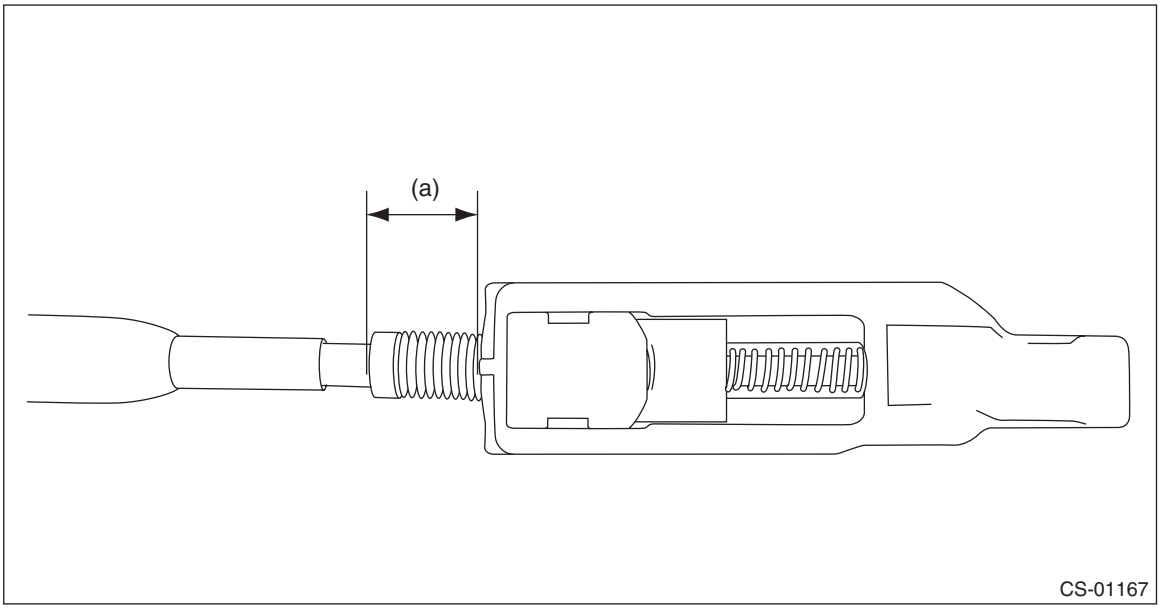
4) Disconnect the MT gear select cable.

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



(A) MT gear select cable

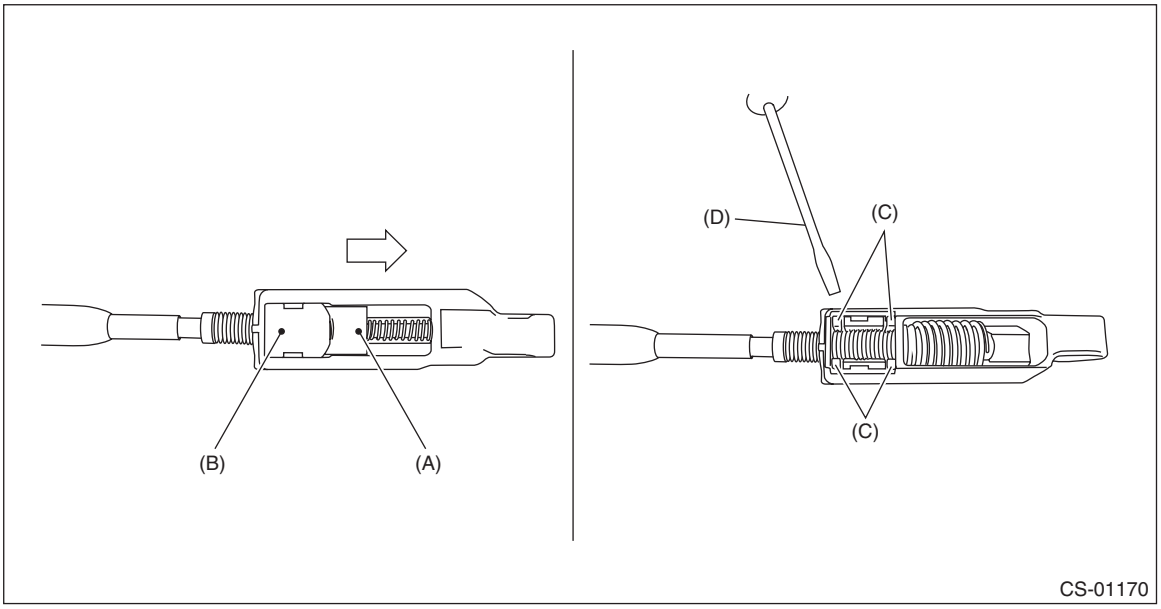
5) Measure the exposed length (a) of MT gear select cable.



6) With the slider (green) moved in the direction of arrow, release the lock piece (pink) using a flat tip screwdriver or equivalent tool.

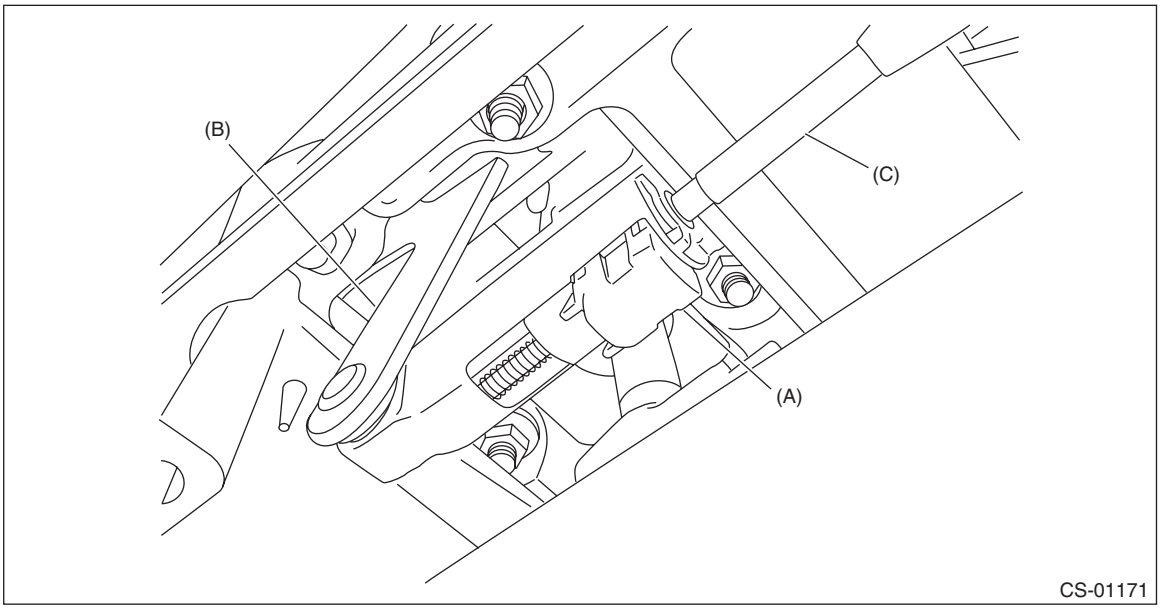
CAUTION:
Lock piece is easily damaged for the resin. If the lock piece is damaged, replace the MT gear select cable with a new one.

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

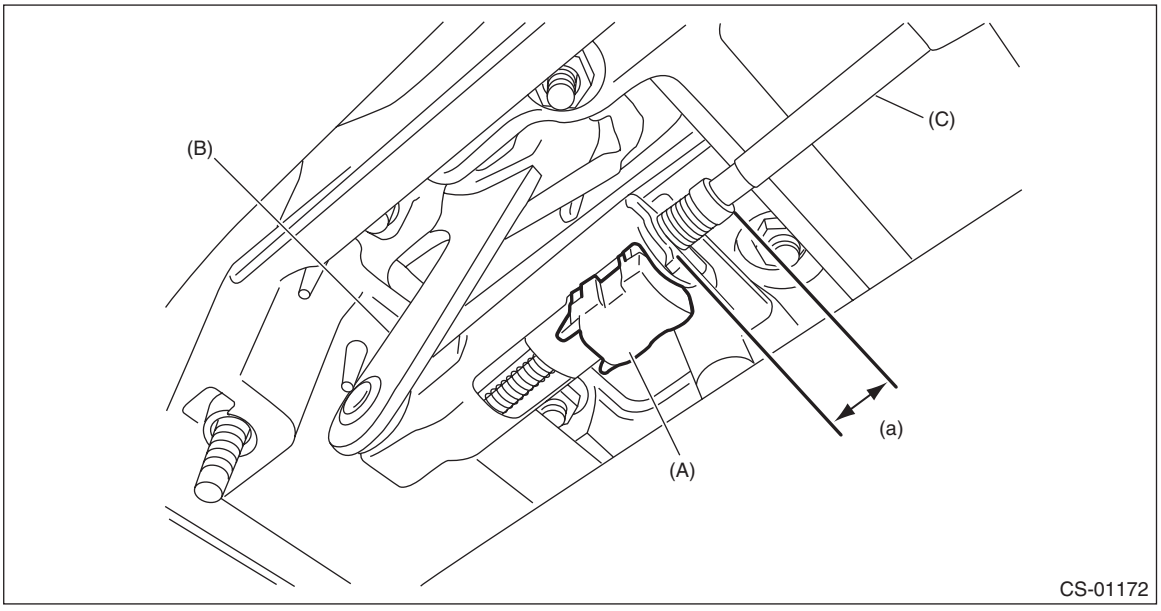
7) Connect the MT gear select cable to the select lever, with the lock piece released.



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

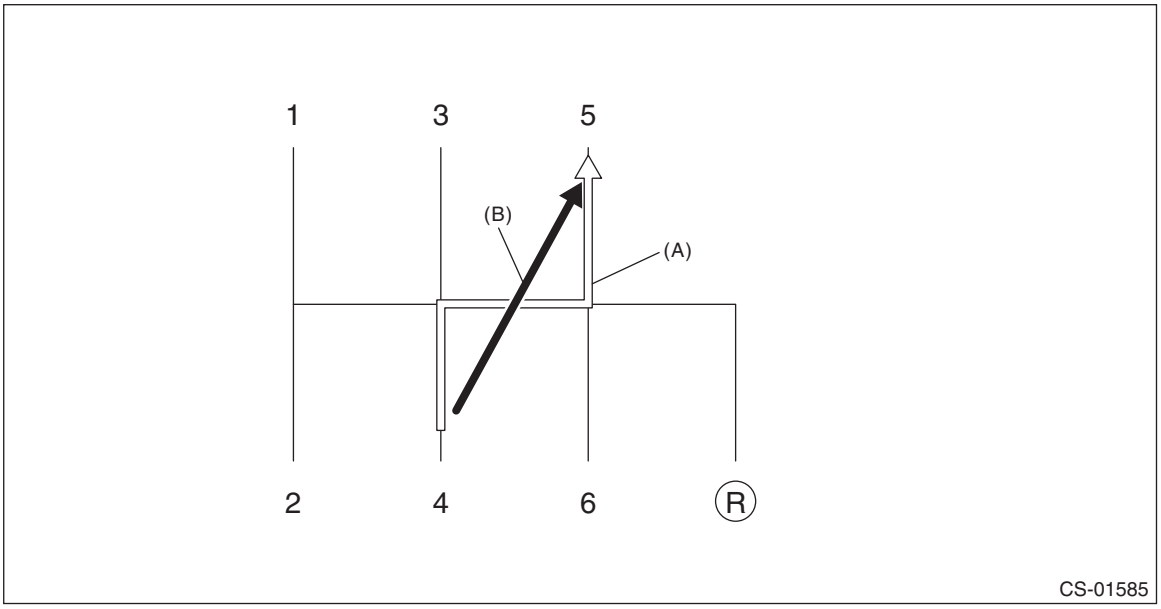
8) Move the shift lever to the reverse side, keep the exposed length (a) of MT gear select cable to 11 mm (0.4 in), and push the lock piece.

NOTE:
While pulling up the gear shift lever assembly slider, operate the lever to the reverse side.



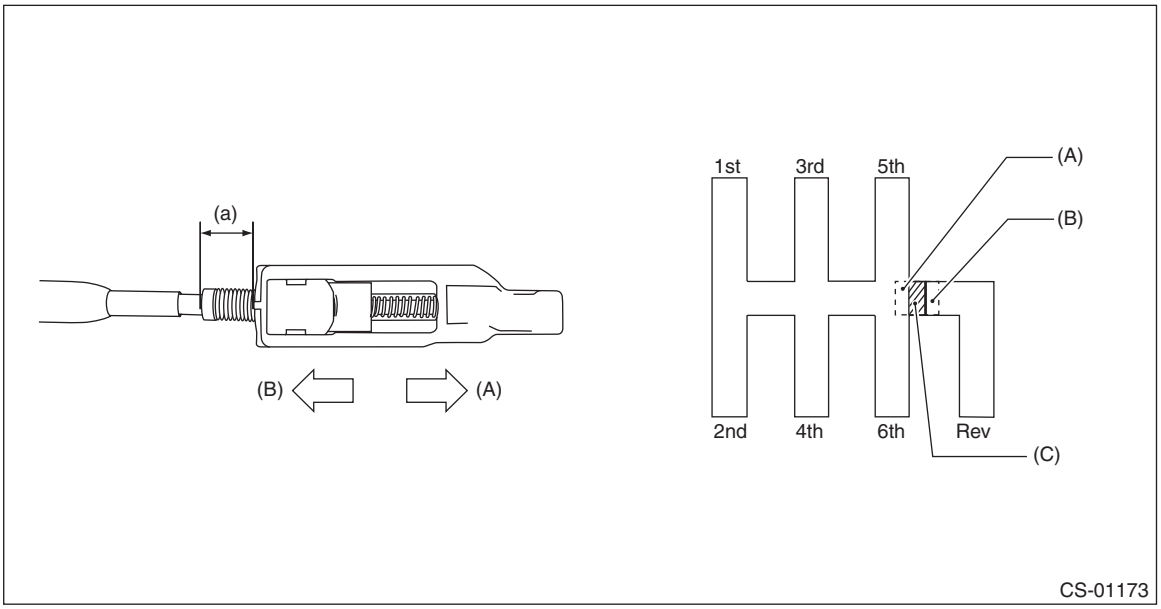
(a) Exposed length 11 mm (0.4 in)
(A) Lock piece
(B) Select lever
(C) MT gear select cable

9) Shift to 5th ←→ 6th and reverse, and check for stuck.
10) 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

11) If the shift operation is not smooth, readjust the exposed length (a) of the MT gear select cable referring to the figure below.



(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 5th or 6th gear cannot be selected when cable is pressed to reverse lock bracket:

→ Extend the exposed length (a) of MT gear select cable.

- If the shift lever does not move along the cranking line when it is operated from 4th → 5th gear:

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

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

12) Adjust the detent of the MT gear shift lever. <Ref. to CS-67, ADJUSTMENT, MT Gear Shift Lever.>

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

10.General Diagnostic Table

A: 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.
	Up-shift is not engaged at manual mode.	Check the shift-up switch and circuit.
	Down-shift is not engaged at manual mode.	Check the shift-down switch and circuit.
MT gear shift lever (6MT)	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. • Replace the MT gear shift lever.

CONTINUOUSLY VARIABLE TRANSMISSION

CVT

		Page
1.	General Description	3
2.	CVTF	36
3.	Differential Gear Oil	40
4.	AWD ON/OFF Switching Mode	44
5.	Road Test	45
6.	Stall Test	46
7.	Time Lag Test	47
8.	Secondary Pressure (Line Pressure) Test	48
9.	Transfer Clutch Pressure Test	51
10.	Automatic Transmission Assembly	57
11.	Transmission Mounting System	87
12.	Extension Case Oil Seal	90
13.	Differential Side Retainer Oil Seal	92
14.	Inhibitor Switch	96
15.	Turbine Speed Sensor	103
16.	Secondary Speed Sensor	105
17.	Primary Speed Sensor	107
18.	Secondary Pressure Sensor	110
19.	Oil Pan and Strainer	112
20.	Control Valve Body	116
21.	Transmission Harness	129
22.	Transmission Control Module (TCM)	142
23.	CVTF Cooler Pipe and Hose	144
24.	Air Breather Hose	154
25.	Drive Plate	157
26.	Torque Converter Assembly	159
27.	Preparation for Overhaul	161
28.	Extension Case	163
29.	Transfer Clutch	167
30.	Transfer Driven Gear	181
31.	Parking Pawl	184
32.	Reduction Driven Gear	186
33.	Transmission Control Device	194
34.	Transmission Case	200
35.	CVTF Filter	211
36.	Reduction Drive Gear	212
37.	Primary Pulley and Secondary Pulley	217
38.	Variator Chain	237
39.	Reverse Brake Assembly	238
40.	Forward Clutch Assembly	253
41.	Drive Pinion Shaft Assembly	272
42.	Front Differential Assembly	301
43.	Oil Pump Chain	319

44. Oil Pump 328
45. Converter Case 331
46. Diagnostics with Phenomenon 334

1. General Description

A: SPECIFICATION

1. MANUAL TRANSMISSION AND DIFFERENTIAL

Model			Except for OUTBACK	OUTBACK
Type			6-forward speeds and 1-reverse	
Transmission gear ratio		1st	3.454	
		2nd	1.947	
		3rd	1.296	
		4th	0.972	
		5th	0.825	
		6th	0.695	
		Rev.	3.636	
Front reduction gear	Final	Type of gear	Hypoid	
		Gear ratio	4.111	4.444
Rear reduction gear	Transfer	Type of gear	Helical	
		Gear ratio	1.000	
	Final	Type of gear	Hypoid	
		Gear ratio	4.111	4.444
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			SUBARU EXTRA MT or equivalent gear oil	
Transmission gear oil capacity		Single-range model	3.3 L (3.5 US qt, 2.9 Imp qt)	

2. TRANSMISSION GEAR OIL

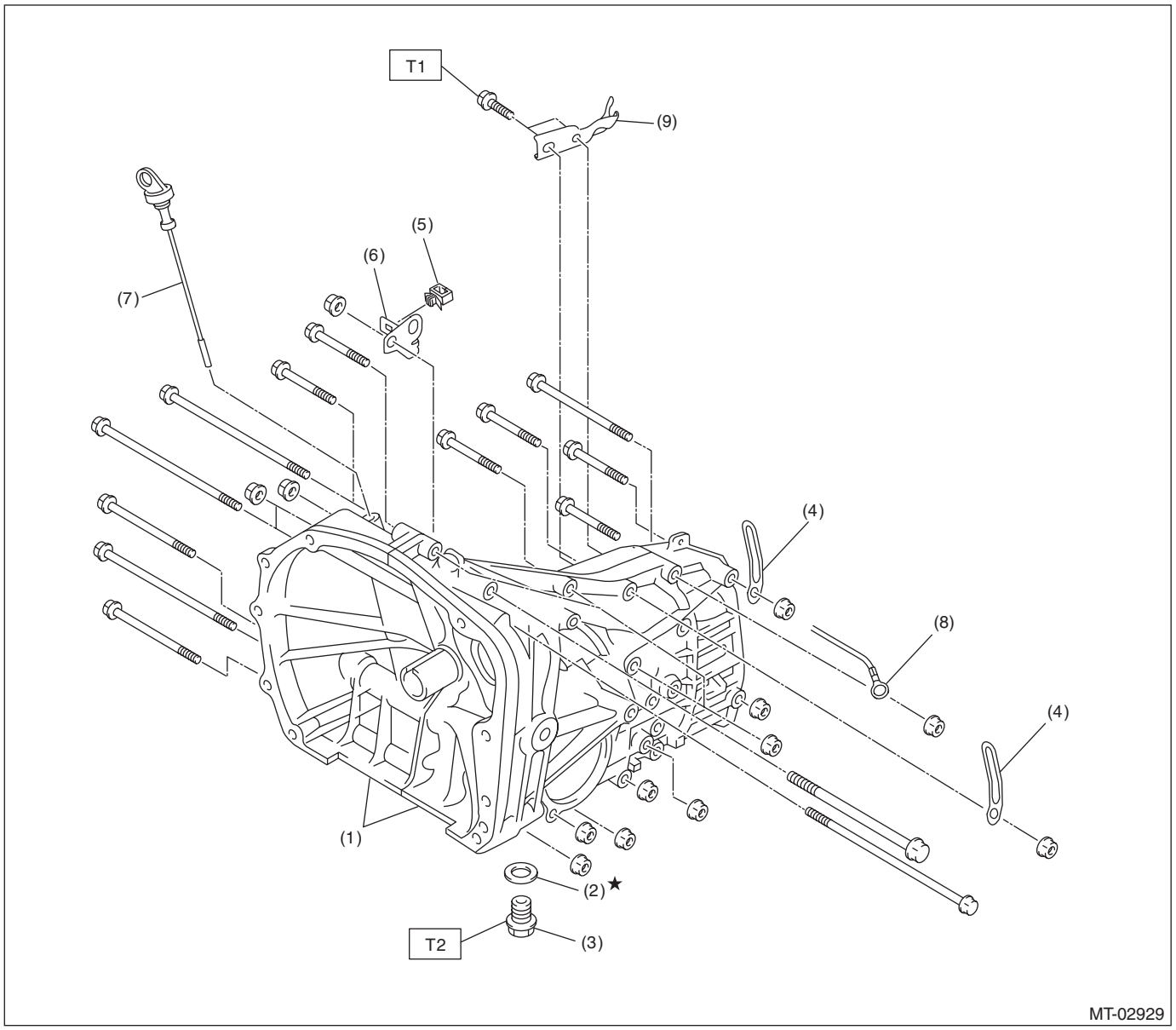
Recommended oil:
SUBARU EXTRA MT

Alternative:
GL-5 (75W-90)

CAUTION:
If an alternative transmission gear oil is used, you may not have expected functionality and performance.

B: COMPONENT

1. TRANSMISSION CASE



(1)	Transmission case ASSY	(6)	Harness bracket
(2)	Gasket	(7)	Oil level gauge
(3)	Drain plug	(8)	Transmission radio ground cord
(4)	Harness clip	(9)	Select bracket
(5)	Clamp		

Tightening torque: N·m (kgf-m, ft-lb)

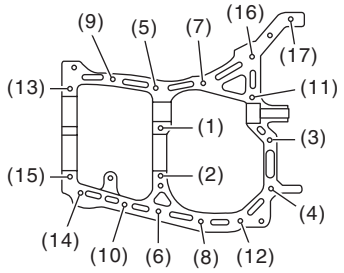
T1: 18 (1.8, 13.3)

T2: 44 (4.5, 32.5) (Aluminum gasket, silver)

70 (7.1, 51.6) (Copper gasket, brown)

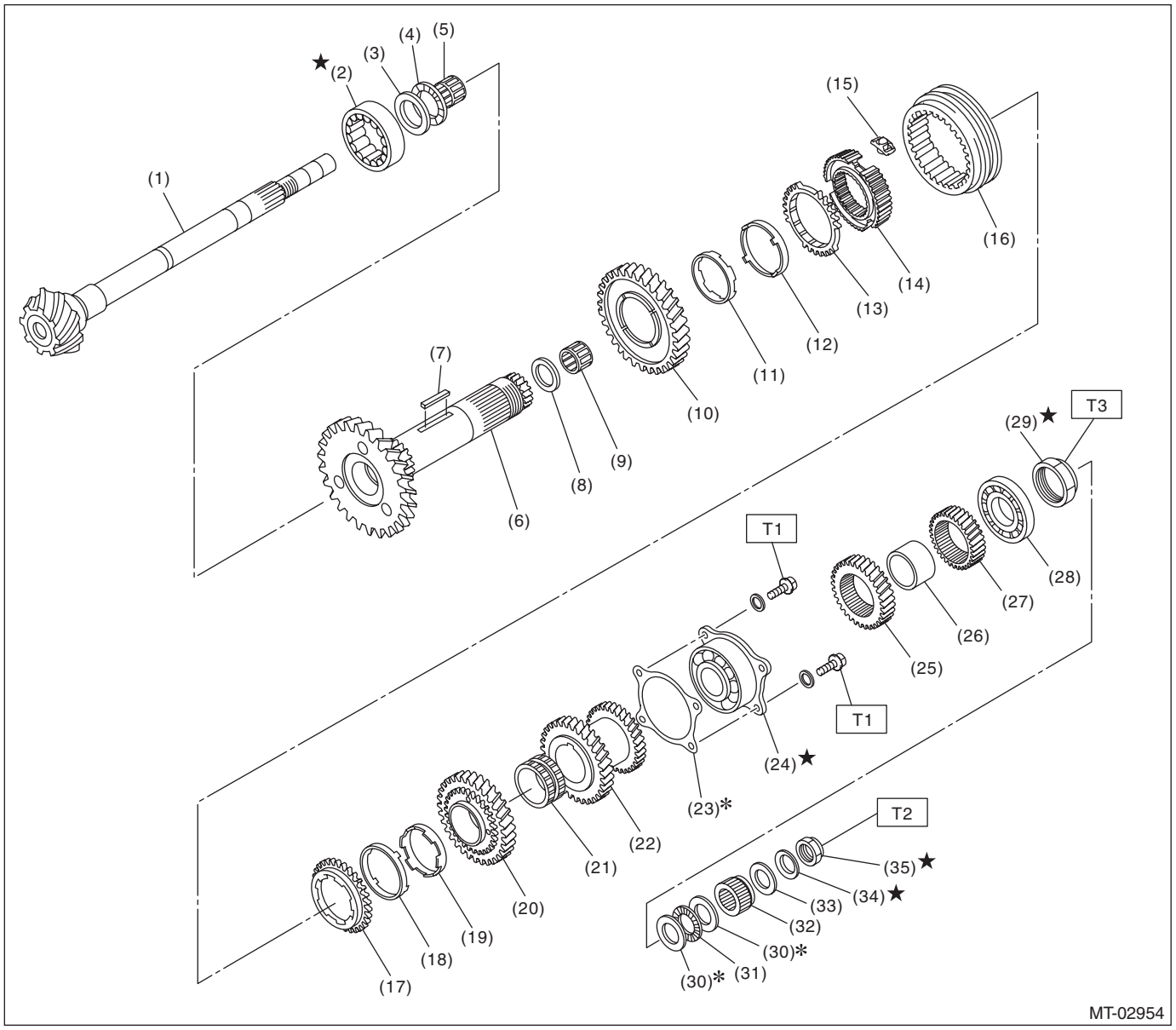
70 (7.1, 51.6) (Metal gasket, black)

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)

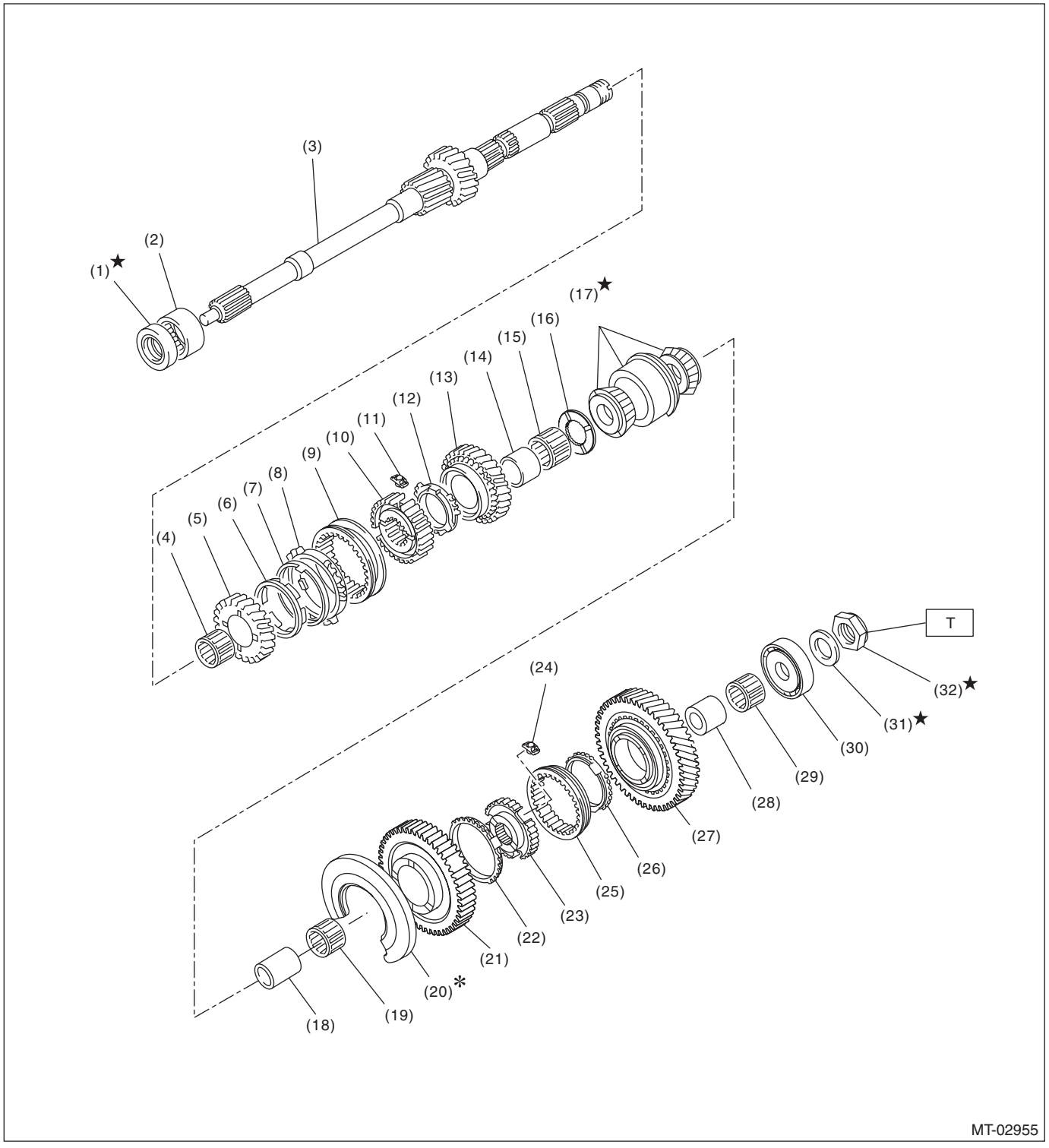
2. DRIVE PINION ASSEMBLY



(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) Inner baulk ring
(12) 1st synchro cone
(13) Outer baulk ring
(14) 1st-2nd synchronizer hub
(15) 1st-2nd shifting insert
(16) 1st-2nd coupling sleeve
(17) Outer baulk ring
(18) 2nd synchro cone
(19) 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) 5th driven gear
(26) Drive pinion spacer
(27) 6th driven gear
(28) Ball bearing
(29) Lock nut
(30) Adjusting washer
(31) Thrust bearing
(32) Differential bevel gear sleeve
(33) Washer
(34) Lock washer
(35) Lock nut

Tightening torque: N·m (kgf-m, ft-lb)
T1: 30 (3.1, 22.1)
T2: 126 (12.8, 92.9)
T3: 440 (44.9, 324.5)

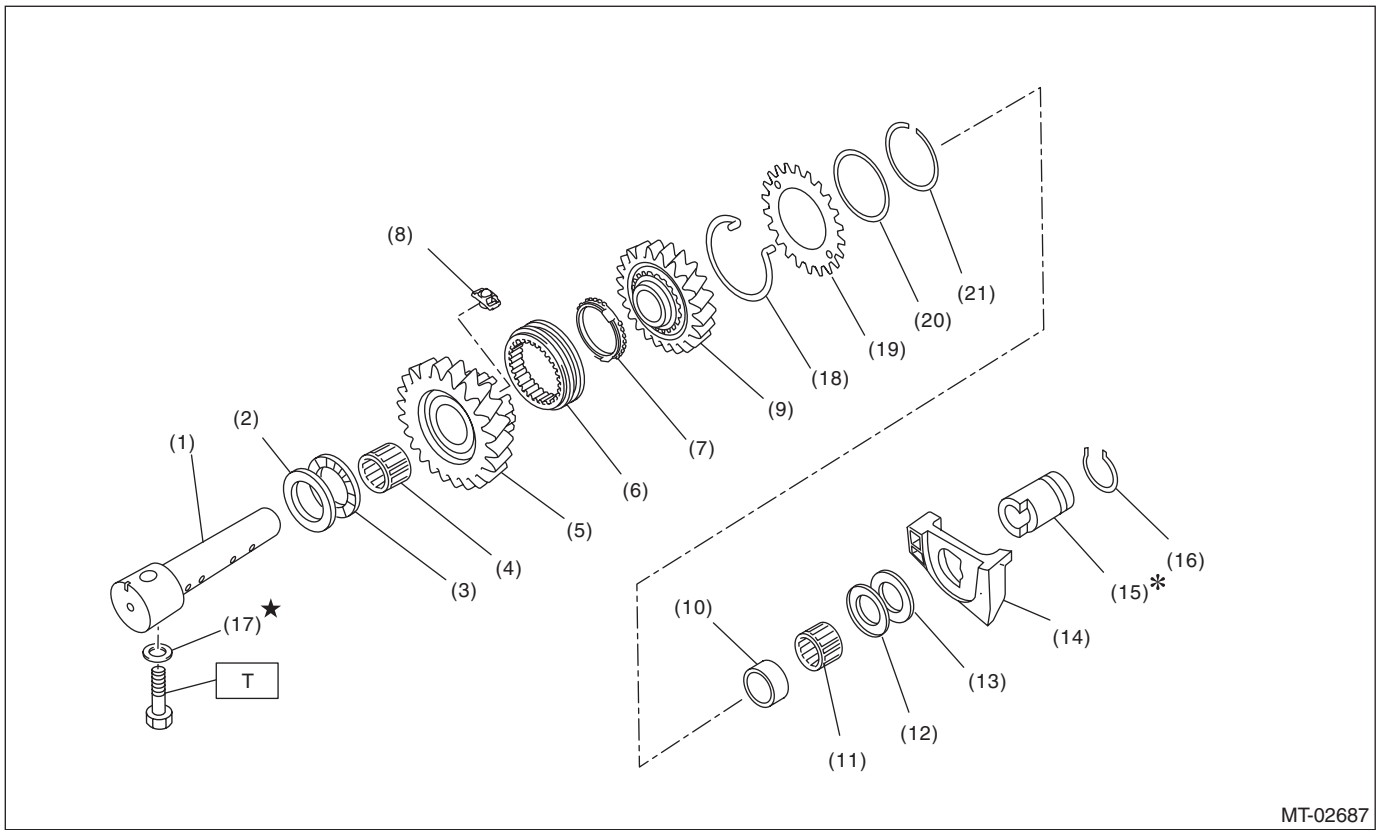
3. MAIN SHAFT FOR SINGLE-RANGE



(1) Oil seal
(2) Needle bearing
(3) Main shaft
(4) Needle bearing
(5) 3rd drive gear
(6) Inner baulk ring
(7) 3rd synchro cone
(8) Outer baulk ring
(9) 3rd-4th coupling sleeve
(10) 3rd-4th synchronizer hub
(11) 3rd-4th shifting insert
(12) 4th baulk ring
(13) 4th drive gear
(14) 4th needle bearing race
(15) Needle bearing
(16) 4th gear thrust washer
(17) Double taper roller bearing
(18) 5th needle bearing race
(19) 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
(25) 5th-6th coupling sleeve
(26) 6th baulk ring
(27) 6th drive gear
(28) 6th needle bearing race
(29) Needle bearing
(30) Ball bearing
(31) Lock washer
(32) Lock nut

Tightening torque: N·m (kgf-m, ft-lb)
T: 160 (16.3, 118.0)

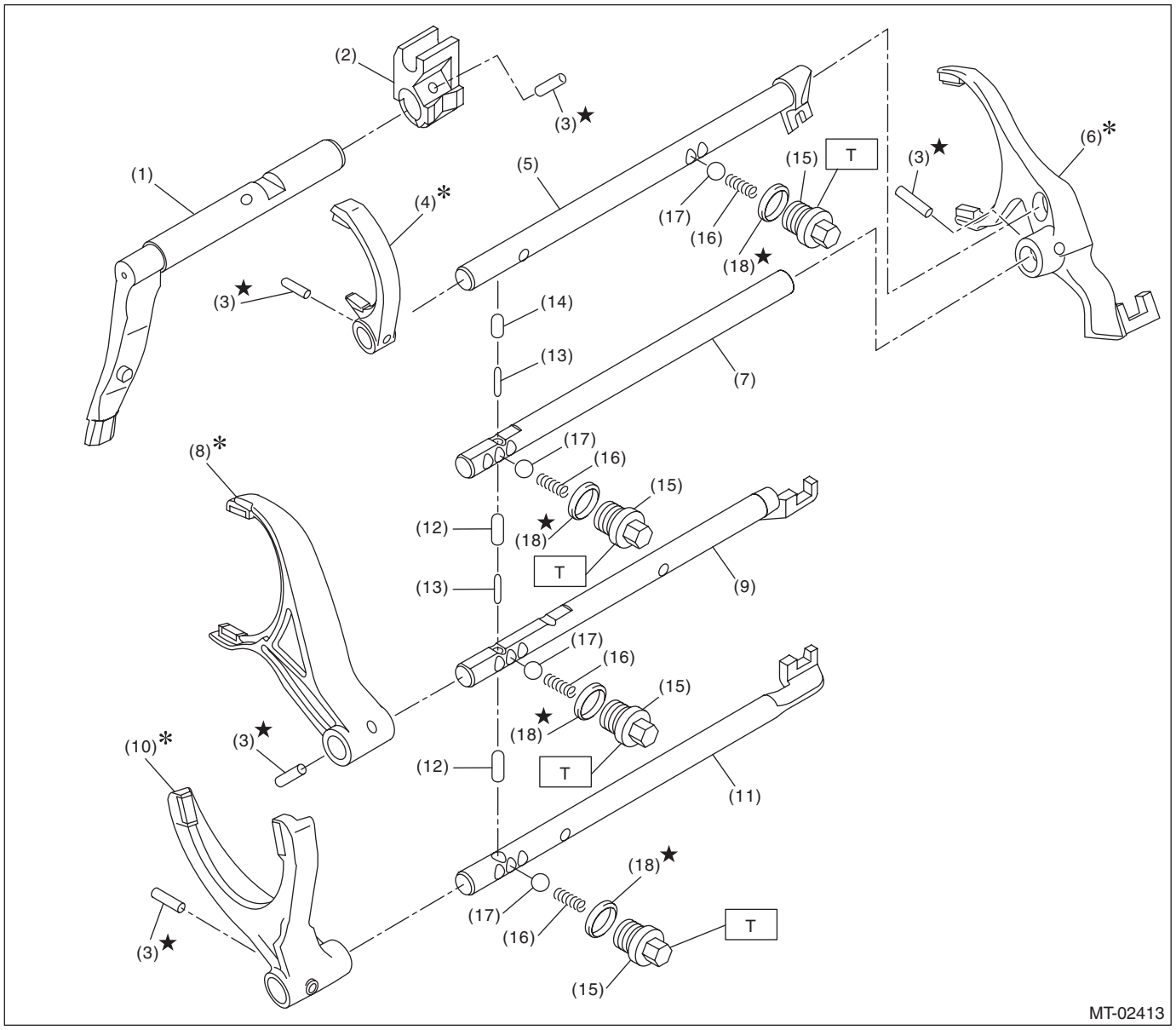
4. REVERSE IDLER GEAR ASSY



(1) Reverse idler gear shaft
(2) Idler gear washer
(3) Thrust bearing
(4) Needle bearing
(5) Reverse idler gear No. 2
(6) Reverse coupling sleeve
(7) Baulk ring
(8) Reverse shifting insert
(9) Reverse idler gear
(10) Reverse idler gear collar
(11) Needle bearing
(12) Thrust bearing
(13) Idler gear washer
(14) Oil case guide
(15) Reverse idler gear bushing
(16) Snap ring
(17) Gasket
(18) Spring
(19) Sub gear
(20) Friction plate
(21) Snap ring

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

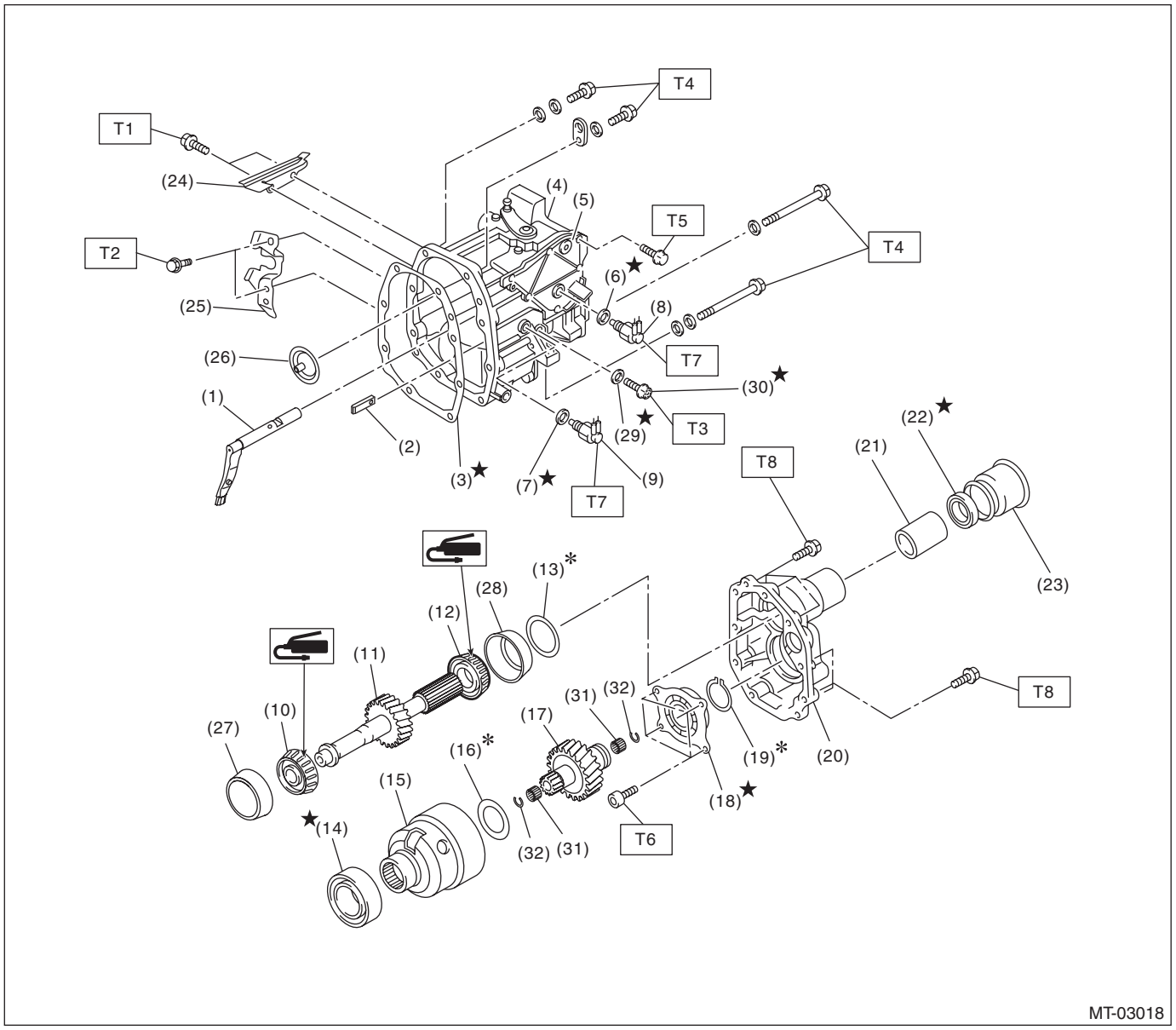
5. SHIFTER FORK AND SHIFTER ROD



(1) Shifter arm
(2) Selector arm
(3) Spring 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

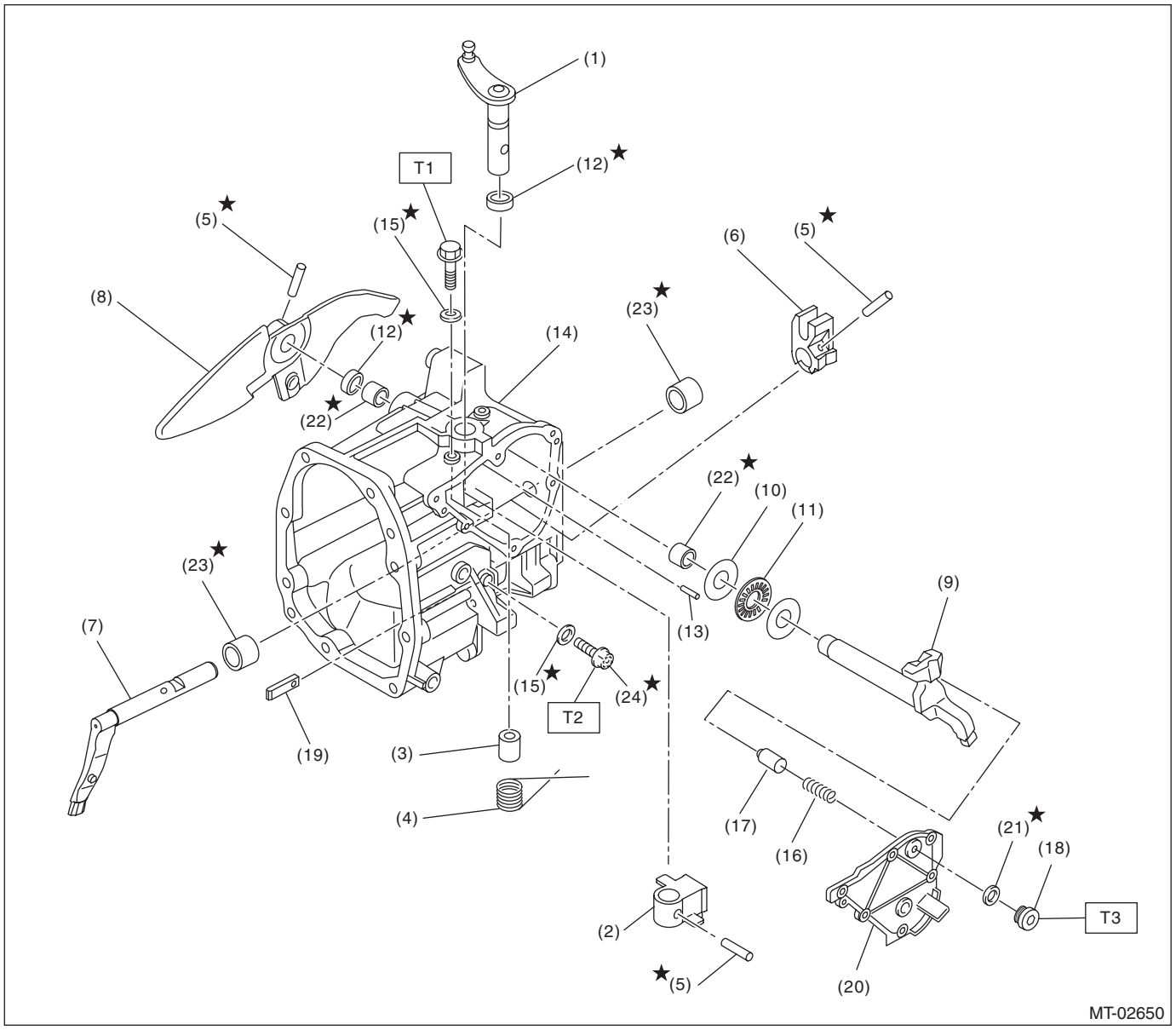
Tightening torque: N·m (kgf-m, ft-lb)
T: 20 (2.0, 14.8)

6. TRANSFER CASE AND EXTENSION



(1)	Shifter arm	(15)	Center differential	(29)	Gasket
(2)	Interlock plate	(16)	Adjusting washer	(30)	Precoat bolt
(3)	Gasket	(17)	Transfer drive gear	(31)	Needle bearing
(4)	Transfer case	(18)	Ball bearing	(32)	Snap ring
(5)	Transmission cover	(19)	Snap ring		
(6)	Gasket	(20)	Extension case	***Tightening torque: N·m (kgf-m, ft-lb)***	
(7)	Gasket	(21)	Bushing	***T1: 15 (1.5, 11.1)***	
(8)	Neutral position switch	(22)	Oil seal	***T2: 18 (1.8, 13.3)***	
(9)	Back-up light switch	(23)	Dust cover	***T3: 20 (2.0, 14.8)***	
(10)	Roller bearing	(24)	Dust cover (OUTBACK model)	***T4: 24.5 (2.5, 18.1)***	
(11)	Transfer driven gear	(25)	Shift bracket	***T5: 25 (2.5, 18.4)***	
(12)	Roller bearing	(26)	Oil guide	***T6: 26 (2.7, 19.2)***	
(13)	Adjusting washer	(27)	Outer race	***T7: 32.3 (3.3, 23.8)***	
(14)	Ball bearing	(28)	Outer race	***T8: 40 (4.1, 29.5)***	

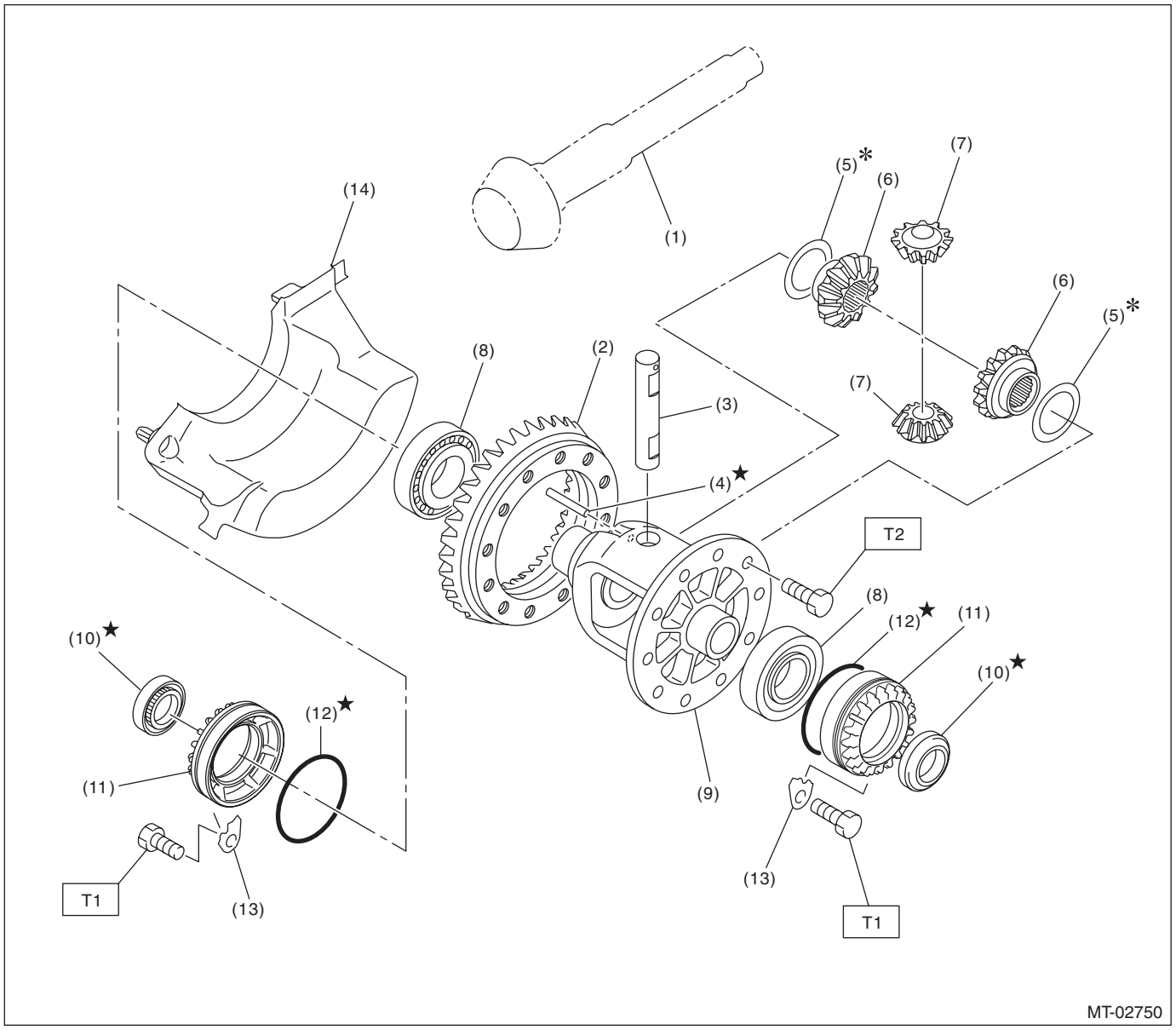
7. SHIFT LINK ASSEMBLY



(1) Selector lever COMPL
(2) Selector arm No. 2
(3) Shifter arm collar
(4) Neutral set spring
(5) Spring pin
(6) Selector arm
(7) Shifter arm
(8) Shift lever COMPL
(9) Shifter arm No. 2
(10) Washer
(11) Thrust bearing
(12) Oil seal
(13) Straight pin
(14) Transfer case
(15) Gasket
(16) Checking ball spring
(17) 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)

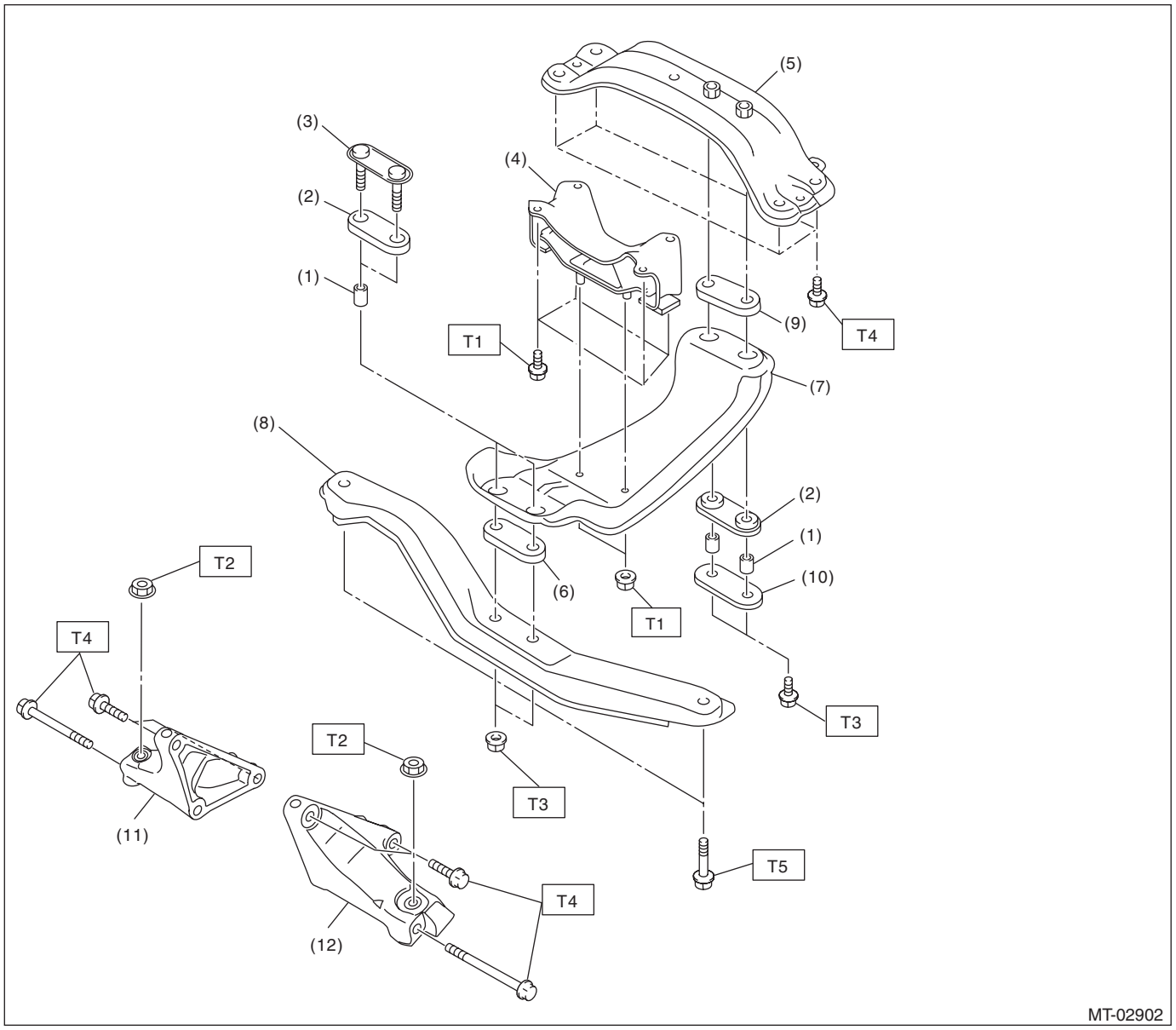
8. FRONT DIFFERENTIAL



(1) Drive pinion shaft
(2) Hypoid driven gear
(3) Pinion shaft
(4) Straight pin
(5) Washer
(6) Differential bevel gear
(7) Differential bevel pinion
(8) 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)	Spacer	(7)	Center crossmember	***Tightening torque: N·m (kgf-m, ft-lb)***
(2)	Lower cushion rubber	(8)	Front crossmember	***T1: 35 (3.6, 25.8)***
(3)	Front plate	(9)	Rear cushion rubber	***T2: 45 (4.6, 33.2)***
(4)	Transmission cushion rubber	(10)	Rear plate	***T3: 70 (7.1, 51.6)***
(5)	Rear crossmember	(11)	Transmission main mounting bracket (RH)	***T4: 75 (7.6, 55.3)***
(6)	Upper cushion rubber	(12)	Transmission main mounting bracket (LH)	***T5: 140 (14.3, 103.3)***

C: CAUTION

• Wear appropriate work clothing, including a cap, protective goggles and protective shoes when performing any work.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust and dirt.
• 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 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 the old liquid gasket.

D: PREPARATION TOOL

1. SPECIAL TOOL

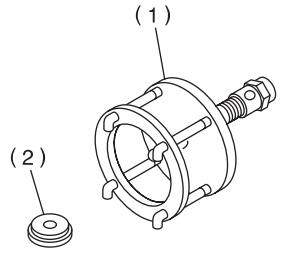
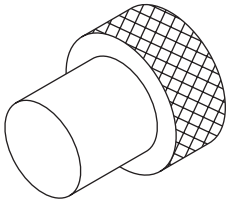
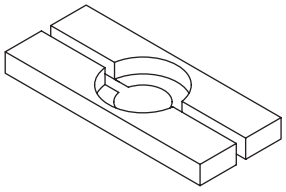
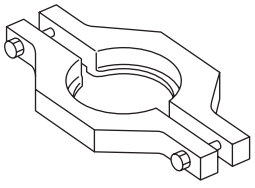
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-899524100	899524100	PULLER SET	Used for removing the front differential roller bearing. (1) Puller (2) Cap
 ST-399780104	399780104	WEIGHT	Used for adjusting preload on the front differential roller bearing.
 ST-498077000	498077000	REMOVER	• Used for removing the roller bearing of the drive pinion shaft. • Used for removing the transfer driven gear taper roller bearing.
 ST-498077600	498077600	CENTER DIFFERENTIAL BEARING REMOVER	Used for removing the center differential ball bearing.

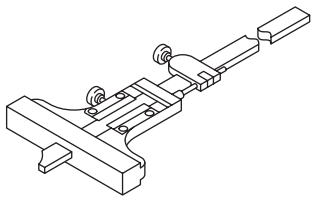
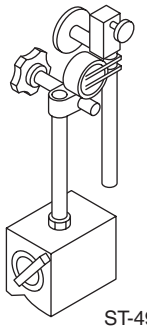
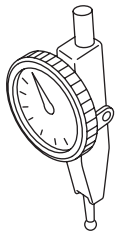
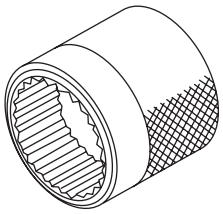
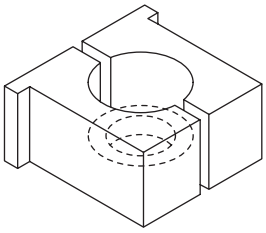
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498147001	498147001	DEPTH GAUGE	Used for adjusting the extension end play and main shaft end play.
 ST-498247001	498247001	MAGNET BASE	• Used for measuring the backlash of bevel pinion gear and hypoid gear. • Used together with DIAL GAUGE (498247100).
 ST-498247100	498247100	DIAL GAUGE	• Used for measuring the backlash of bevel pinion gear and hypoid gear. • Used together with MAGNET BASE (498247001).
 ST18667AA020	18667AA020	HOLDER	• Used for removing and installing the drive pinion shaft lock nut. • Used for measuring the backlash of hypoid gear. • Used for adjusting preload on the front differential roller bearing.
 ST-498937000	498937000	TRANSMISSION HOLDER	Used for removing and installing the main shaft lock nut.

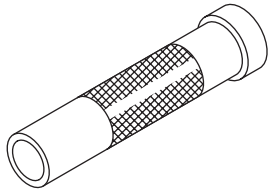
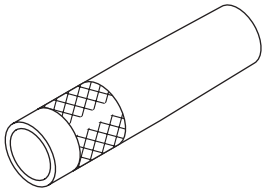
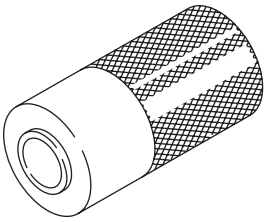
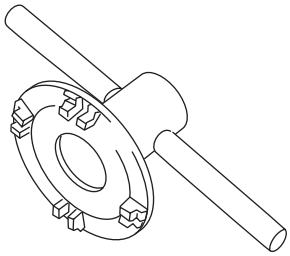
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499277100	499277100	BUSHING 1-2 INSTALLER	• Used for installing the drive pinion shaft washer. • Used for installing the front differential roller bearing outer race.
 ST-499277200	499277200	INSTALLER	• Used for installing the 2nd driven gear bushing, roller bearings, 3rd-4th driven gear, 5th driven gear and the 6th driven gear. • Used for installing the drive pinion shaft washer.
 ST-927640000	927640000	INSTALLER	Used for installing the roller bearing (transfer case side) of transfer driven gear.
 ST18630AA010	18630AA010	WRENCH COMPL RETAINER	• Used for removing and installing the differential side retainer. • Used for adjusting preload on the front differential roller bearing. • WRENCH COMPL RETAINER (18630AA020) can also be used.
ST18722AA000	18722AA000	REMOVER	Used for removing the 5th drive gear and 6th drive gear.

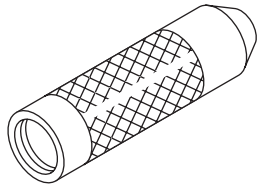
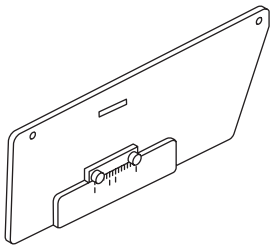
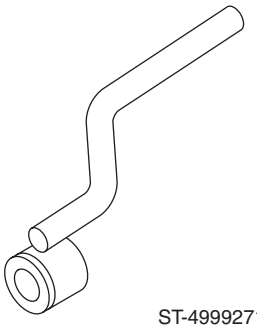
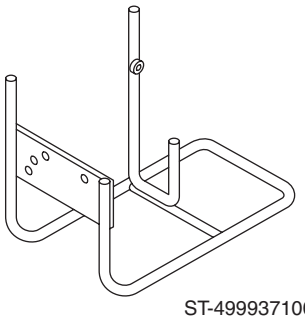
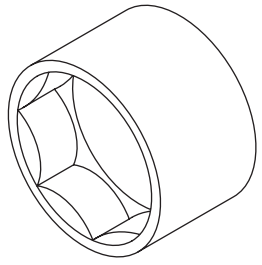
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499877000	499877000	RACE 4-5 INSTALLER	• Used for installing the 4th, 5th and 6th drive gear needle bearing races and the main shaft double taper roller bearings. • Used together with REMOVER (899714110).
 ST-499917500	499917500	DRIVE PINION GAUGE ASSY	Used for adjusting the drive pinion shaft shim.
 ST-499927100	499927100	HANDLE	Used for backlash measurement of the hypoid gear and preload adjustment of the front differential roller bearing.
 ST-499937100	499937100	TRANSMISSION STAND	Used for disassembling and assembling the transmission.
 ST-499987003	499987003	SOCKET WRENCH (35)	Used for removing and installing the main shaft lock nut.

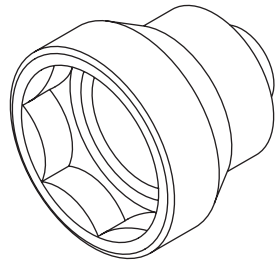
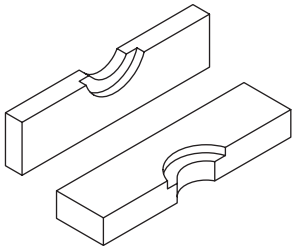
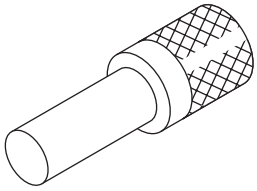
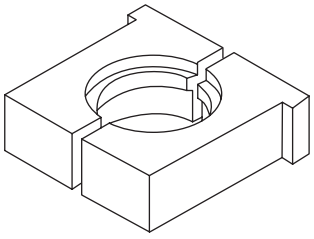
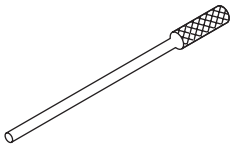
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499987300	499987300	SOCKET WRENCH (50)	Used for removing and installing the driven shaft lock nut.
 ST-899714110	899714110	REMOVER	Used for removing and installing the parts of main shaft and driven shaft.
 ST-899864100	899864100	REMOVER	• Used for removing the parts of the main shaft. • Used for removing the transfer driven gear roller bearing (transfer case side) and for installing it (extension case side). • Used for removing the transfer drive gear ball bearing.
 ST18680AA020	18680AA020	HOLDER	• Used for removing and installing the drive pinion shaft lock nut. • Used for removing and installing the driven shaft lock nut.
 ST-899904100	899904100	STRAIGHT PIN REMOVER	Used for removing and installing the straight pin.

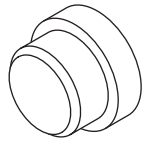
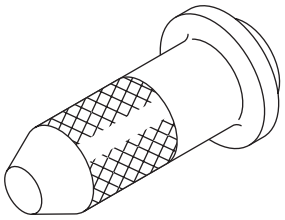
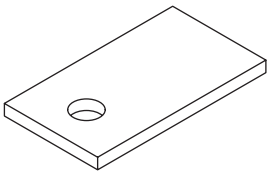
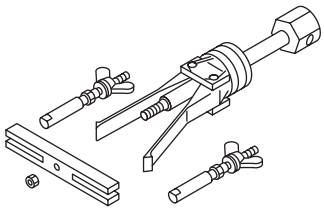
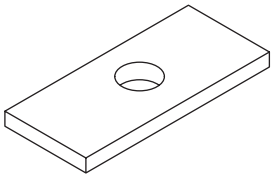
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-398497701	398497701	ADAPTER	• Used for installing the front differential roller bearing. • Used together with BUSHING 1-2 INSTALLER (499277100).
 ST-498057300	498057300	INSTALLER	Used for installing the extension case oil seal.
 ST-498255400	498255400	PLATE	Used for measuring the hypoid gear backlash.
 ST-398527700	398527700	PULLER ASSY	• Used for removing the extension case oil seal. • Used for removing the front differential side retainer bearing outer race. • Used for removing the front differential side retainer oil seal.
 ST-398643600	398643600	GAUGE	Used for adjusting the extension end play.

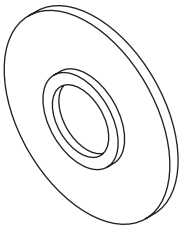
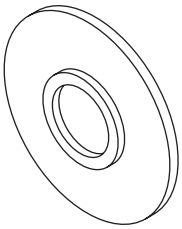
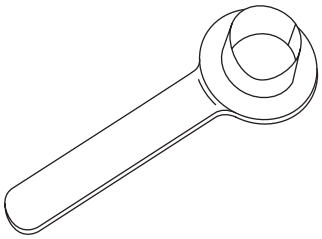
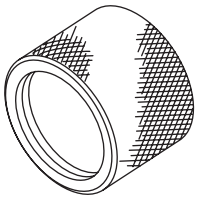
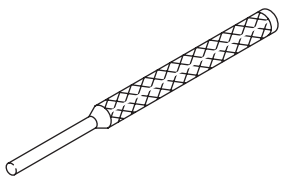
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-398177700	398177700	INSTALLER	• Used for installing the transfer drive gear ball bearing. • Used for installing the 4th drive gear needle bearing race.
 ST-498175500	498175500	INSTALLER	Used for installing the roller bearing of transfer driven gear (extension case side).
 ST28399SA010	28399SA010	OIL SEAL PROTECTOR	Used for protecting the oil seal from damage when inserting the front drive shaft.
 ST18675AA000	18675AA000	DIFFERENTIAL SIDE OIL SEAL INSTALLER	Used for installing the front differential side retainer oil seal.
 ST-398791700	398791700	SPRING PIN REMOVER 2	Used for removing and installing the spring pin.

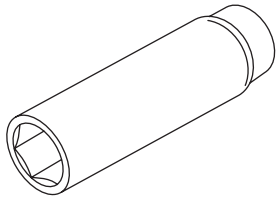
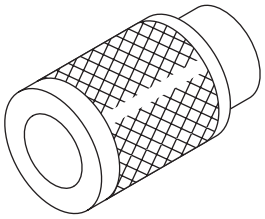
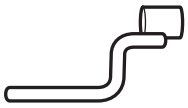
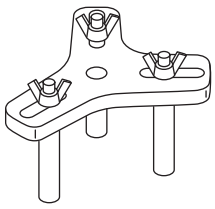
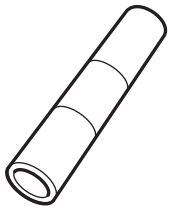
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18662AA010	18662AA010	SOCKET (27)	Used for removing and installing the drive pinion shaft lock nut.
 ST-899754112	899754112	PRESS	• Used for removing driven shaft parts. • Used to install the main shaft ball bearing.
 ST18631AA000	18631AA000	HANDLE	Used for installing transfer case assembly and extension case assembly.
 ST18762AA000	18762AA000	COMPRESSOR SPECIAL TOOL	Used for removing the 1st driven gear.
 ST18654AA000	18654AA000	INSTALLER	Used for installing the 2nd driven gear bushing.

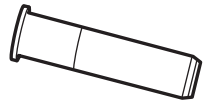
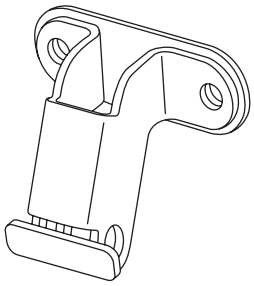
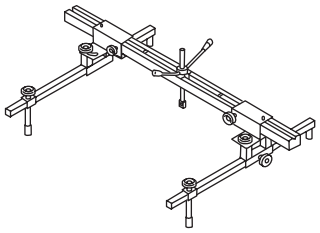
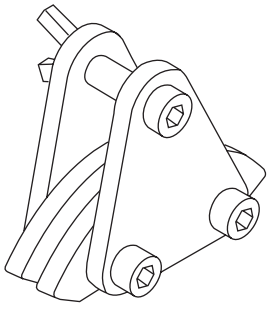
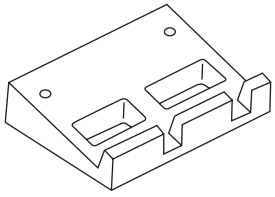
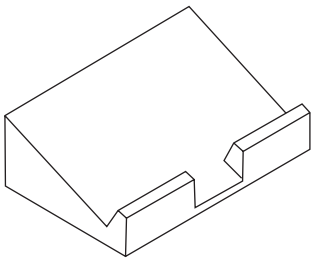
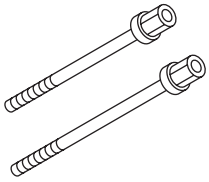
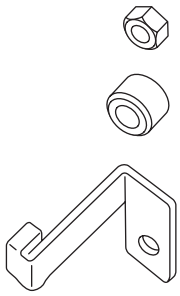
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18657AA000	18657AA000	INSTALLER	Used for installing the transfer case oil seal.
 ST41099AJ130	41099AJ130	SPECIAL TOOL FB	Used for removing and installing transmission.
 ST99099AJ000	99099AJ000	ENGINE HANGER	• Used for removing and installing transmission. • Used together with CHAIN BALANCER (99099AJ010) and sling chain (general tool).
 ST99099AJ010	99099AJ010	CHAIN BALANCER	• Used for removing and installing transmission. (Weight of 350 kg (772 lb) is supported) • Used together with ENGINE HANGER (99099AJ000) and sling chain (general tool). • Used to hang the engine while balancing it with the sling chain inserted in this tool.
 ST-498267200	498267200	CYLINDER HEAD TABLE	Used for removing and installing the roller bearing of the transfer case.

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498267300	498267300	CYLINDER HEAD TABLE	Used for removing and installing the roller bearing of the transfer case.
 ST18763AA000	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.

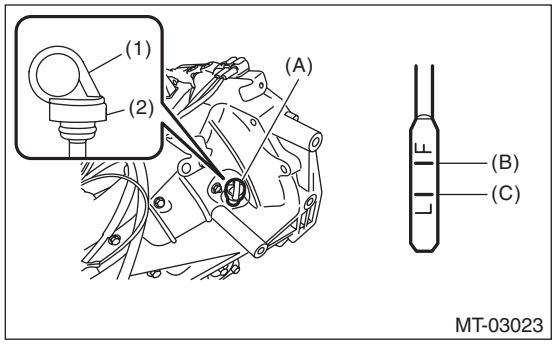
2. GENERAL TOOL

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance.
TORX® bit T70	Used for removing and installing the drain plug.
Spring pin remover	Used for removing and installing the spring pin. (3 — 3.3 mm)
Socket driver (TORX® 45 size, tamper resistant type)	Used for removing and installing interlock plate.
Sling chain	Used for removing and installing transmission. • Length: 0.8 — 1 m (2.6 — 3.3 ft) • Load capacity: 1.2 t (2,646 lb) or more • Diameter: 6 mm (0.24 in) or 6.3 mm (0.25 in) • Chain external width: 23.5 mm (0.93 in) or less • Chain internal width: 8.5 mm (0.33 in) or more
Screw shackle	Used for removing and installing transmission. • Load capacity: 250 kg (551 lb) or more • Use two pieces.

2. Transmission Gear Oil

A: 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, add oil through the oil level gauge hole to bring the level up to the upper level.



(A) Oil level gauge
(B) Upper level
(C) Lower level

(1) Gray
(2) Blue

B: REPLACEMENT

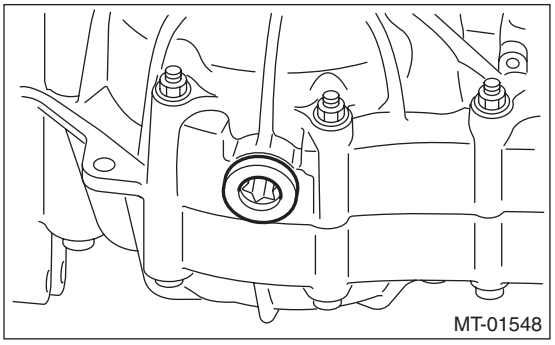
1) Pull out the oil level gauge.
2) Lift up the vehicle.
3) Using the TORX® bit T70, remove the drain plug, and drain the transmission gear oil completely.

CAUTION:
• Immediately after the vehicle has been running or after idling for a long time, the transmission gear oil will be hot. Be careful not to receive burns.
• Be careful not to spill the transmission 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) Tighten 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)



5) Lower the vehicle.
6) Pour gear oil through the oil level gauge hole.

Recommended gear oil:
SUBARU EXTRA MT

Alternative:
GL-5 (75W-90)

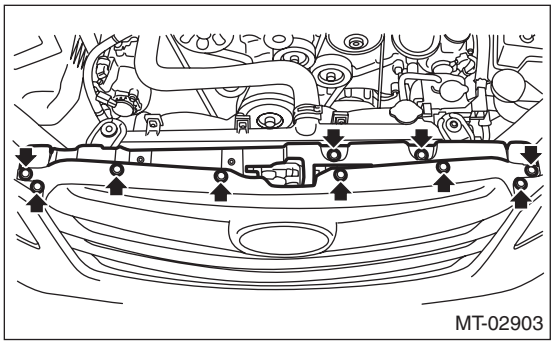
CAUTION:
If an alternative transmission gear oil is used, you may not have expected functionality and performance.

Gear oil capacity:
3.3 L (3.5 US qt, 2.9 Imp qt)
7) Measure the transmission gear oil amount, and check that it is within the specification.

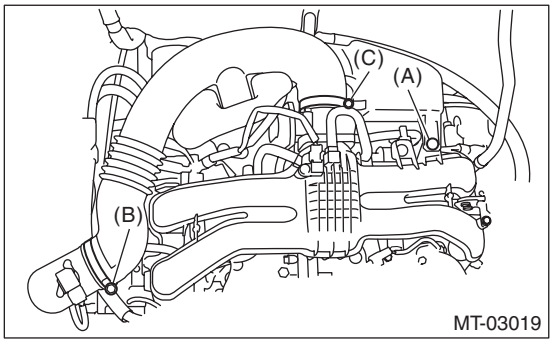
3. Manual Transmission Assembly

A: REMOVAL

1) Set the vehicle on a lift.
2) Remove the front wheels.
3) Open the front hood completely.
4) Remove the air intake duct. <Ref. to IN(H4DO)-14, REMOVAL, Air Intake Duct.>
5) Remove the 10 clips and detach the grille bracket.

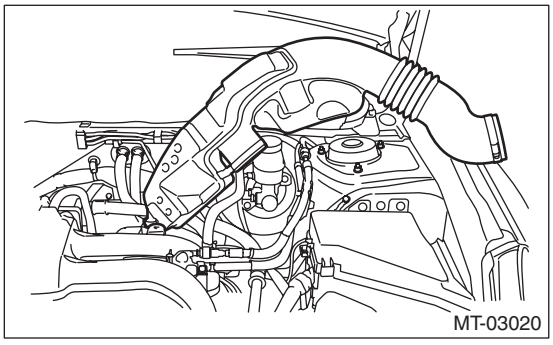

MT-02903

6) Disconnect the ground cable from battery.
7) Remove the radiator fan.
8) Remove the clip (A) from the air intake boot.
9) Loosen the clamp (B) connecting the air intake boot and air cleaner case (rear).
10) Loosen the clamp (C) which connects the air intake boot and throttle body.

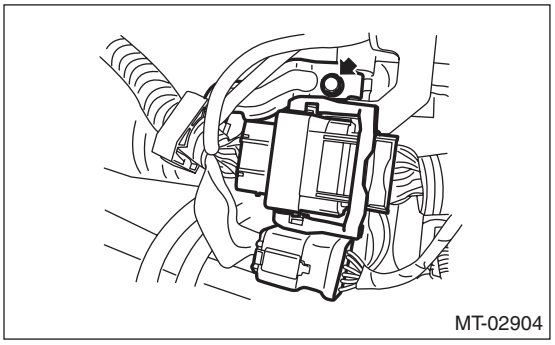


MT-03019

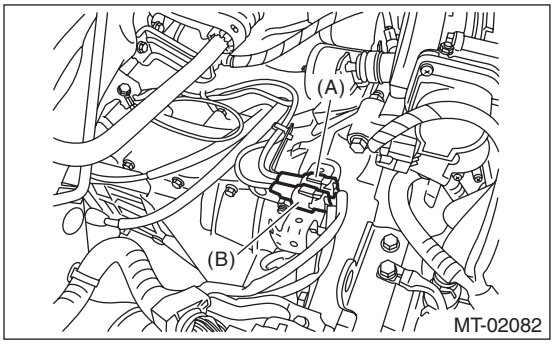
11) Remove the air intake boot from the throttle body, and move it to the left side wheel apron.


MT-03020

12) Disconnect the engine harness connector.


MT-02904

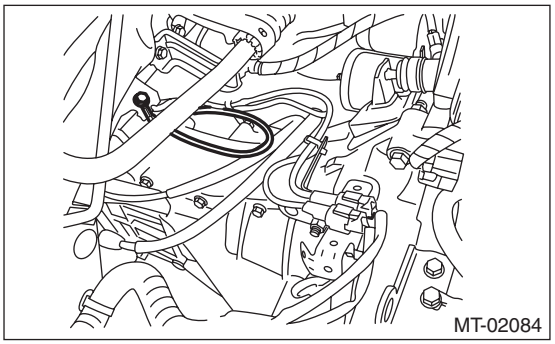
13) Disconnect the connector back-up light switch & neutral position switch.



MT-02082

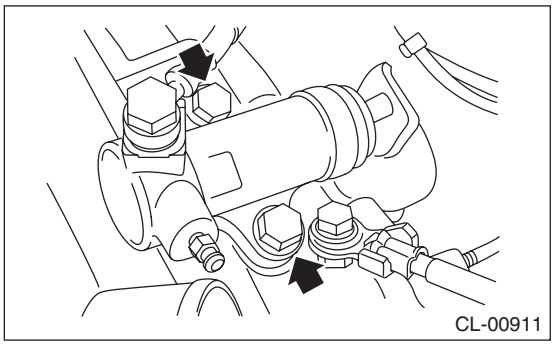
(A) Neutral position switch connector (brown)
(B) Back-up light switch connector (gray)

14) Disconnect the transmission radio ground terminal.

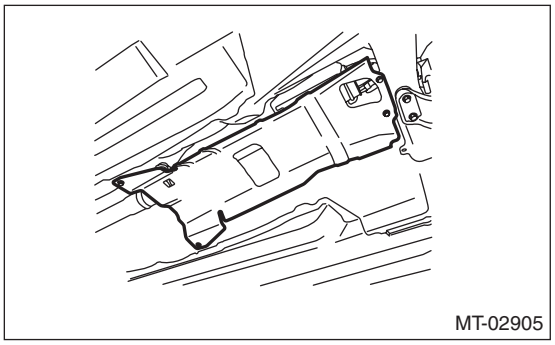

MT-02084

15) Remove the throttle body. <Ref. to FU(H4DO)-15, REMOVAL, Throttle Body.>
16) Remove the starter. <Ref. to SC(H4DO)-7, REMOVAL, Starter.>

17) Remove the operating cylinder from the transmission, and suspend on a wire.



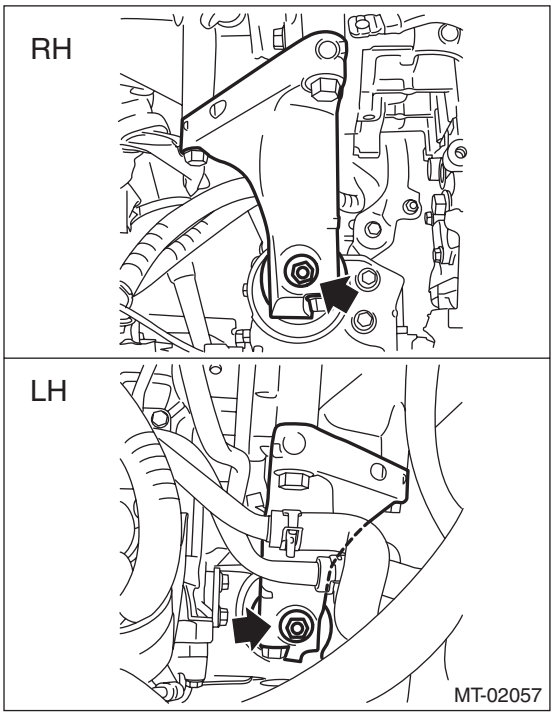
18) Lift up the vehicle.
19) Remove the front under cover. <Ref. to EI-33, REMOVAL, Front Under Cover.>
20) Drain transmission gear oil completely. <Ref. to 6MT-24, REPLACEMENT, Transmission Gear Oil.>
21) Remove the center exhaust pipe. <Ref. to EX(H4DO)-5, REMOVAL, Front Exhaust Pipe.> <Ref. to EX(H4DO)-12, REMOVAL, Center Exhaust Pipe.>
22) Remove the heat shield cover.



23) Remove the steering shaft universal joint. <Ref. to PS-20, REMOVAL, Universal Joint.>
24) Remove the propeller shaft. <Ref. to DS-10, REMOVAL, Propeller Shaft.>
25) Remove the MT gear shift cable and MT gear select cable from MT gear shift lever. <Ref. to CS-61, REMOVAL, MT Gear Shift Lever.>

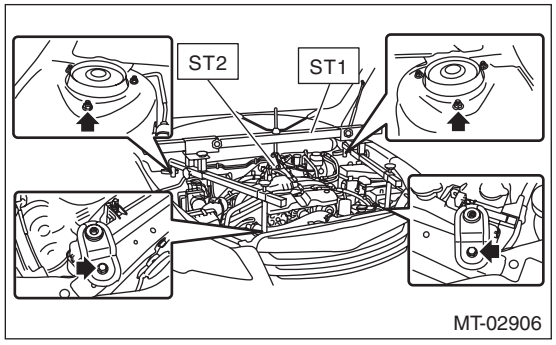
CAUTION:
• Do not bend MT gear shift cable and MT gear select cable at a sharp angle.
• Disconnect the MT gear shift cable and MT gear select cable at the MT gear shift lever side.
• Always use new MT gear select cable if the cable is removed from selector lever COMPL of transmission side.

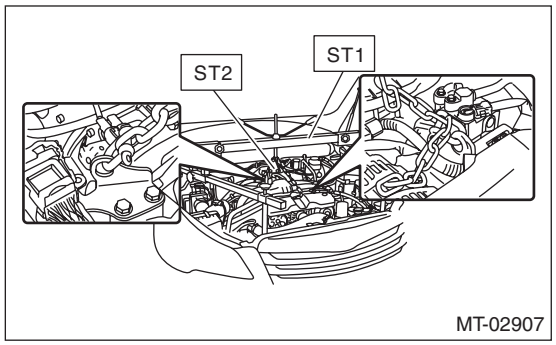
26) Disconnect the stabilizer link from the front arm. <Ref. to FS-29, REMOVAL, Front Stabilizer.>
27) Remove the bolt securing the ball joint of the front arm to the housing, then separate the front arms and the housing. <Ref. to FS-32, REMOVAL, Front Ball Joint.>
28) Separate the front drive shafts on both sides from the transmission. <Ref. to DS-48, REMOVAL, Front Drive Shaft.>
29) Lower the vehicle.
30) Remove the nuts connecting the engine mounting and the transmission main mounting bracket.



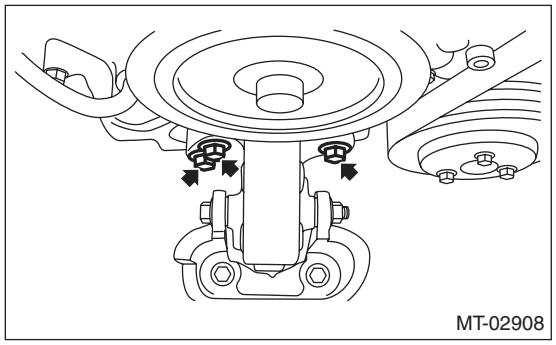
31) Set the ST on the vehicle.

CAUTION:
• Set the chain so that it does not contact the sensors.
• Set the arms of ST (ENGINE HANGER) at the locations shown in the figure.
ST1 99099AJ000 ENGINE HANGER
ST2 99099AJ010 CHAIN BALANCER

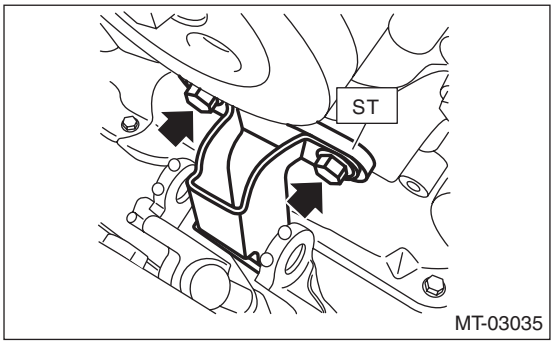




32) Lift the engine slightly and remove the bolts of front cushion rubber.
33) Remove the nut and bolt of the front cushion rubber, then remove the front cushion rubber.



34) Temporarily attach ST by using two bolts.
ST 41099AJ130 SPECIAL TOOL FB

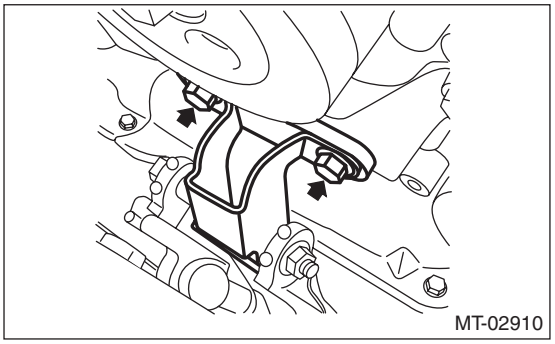


35) Lift up the engine unit high enough to install the bolt and nut to vehicle.

CAUTION:
• Do not lift up higher than enough level to install the ST to avoid damage to the hoses and pipes inside the engine room.
• Do not tighten the bolts and nuts excessively, or the engine mounting bracket may be deformed.

NOTE:
If it is difficult to pull out the stud bolt from transmission mounting bracket, slightly shake the engine unit while lifting up.
36) Tighten the mounting bolts on the engine side.

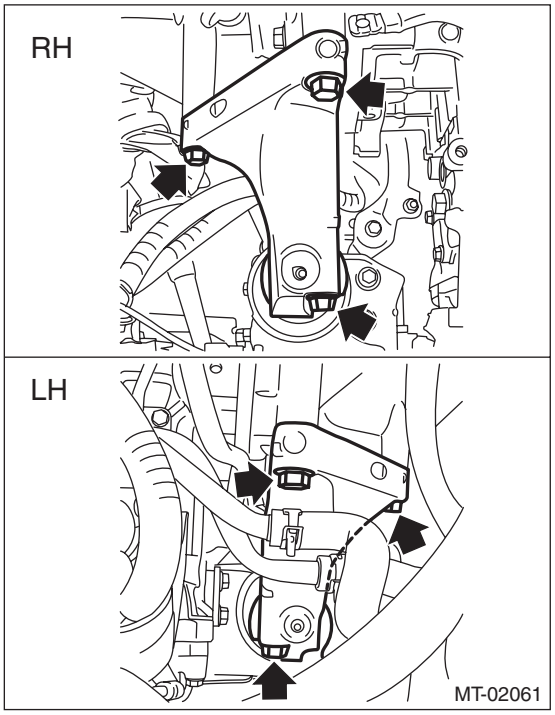
Tightening torque:
25 N·m (2.6 kgf-m, 18.4 ft-lb)



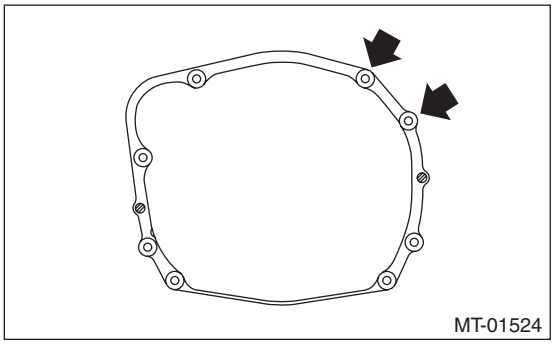
37) Remove the ST (ENGINE HANGER).

38) Remove the transmission main mounting bracket.

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



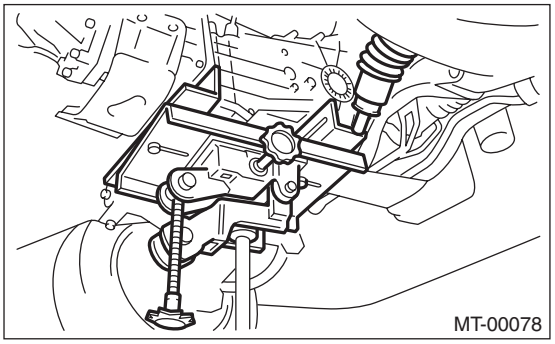
39) Remove the two mounting bolts on the upper side of the transmission.



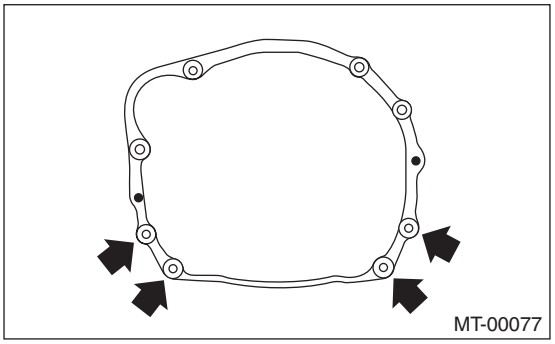
40) Set the ST (ENGINE HANGER) again to loosen the chain sling.
41) Lift up the vehicle.

42) Place the transmission jack under the transmission.

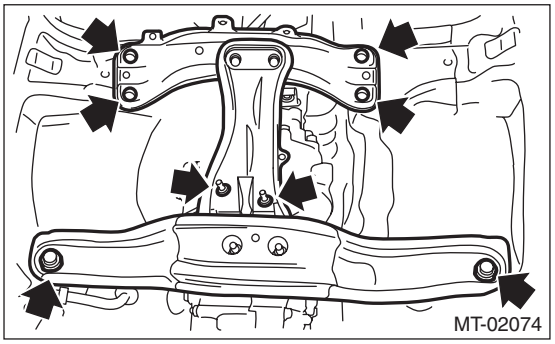
CAUTION:
Always support the transmission case with a transmission jack.



43) Remove the bolts and nuts which hold lower side of transmission to engine.



44) Remove the front crossmember and rear crossmember from the vehicle.



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

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

NOTE:
Lower the transmission rear end by approx. 80 mm (3.1 in) (reference).
46) Rotate the handle of ST (ENGINE HANGER) to apply tension to the chain sling.

47) Remove the transmission assembly.

NOTE:
• Move the transmission jack towards the rear until the main shaft is withdrawn from the clutch disc.
• Remove it while moving the transmission jack up and down so that the engine and transmission remain directly aligned.

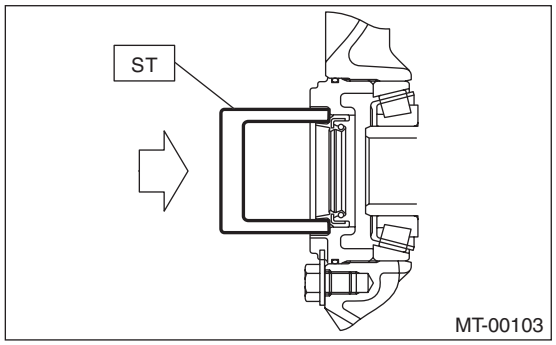
48) Remove the transmission cushion rubber.

B: INSTALLATION

1) Replace the differential side retainer oil seal. <Ref. to 6MT-35, REPLACEMENT, Differential Side Retainer Oil Seal.>

NOTE:
Be sure to replace the differential side retainer oil seal after removing the front drive shaft.

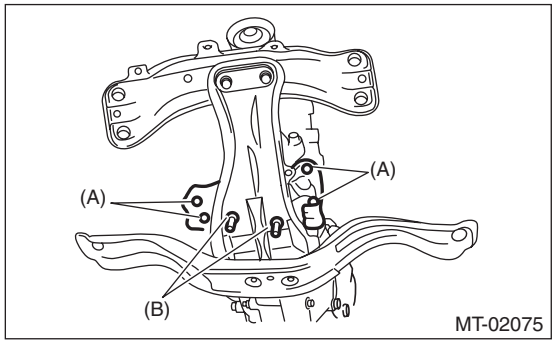
ST 18675AA000 DIFFERENTIAL SIDE OIL SEAL INSTALLER



2) Install the transmission cushion rubber to the transmission assembly, and tighten bolt (A).

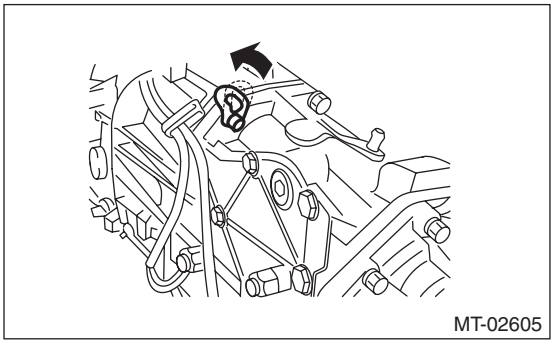
3) Install the transmission cushion rubber to the center crossmember, and tighten the nut (B).

Tightening torque:
Bolt (A)
35 N·m (3.6 kgf-m, 25.8 ft-lb)
Nut (B)
35 N·m (3.6 kgf-m, 25.8 ft-lb)



4) Tap the transmission hanger in the rear side of transmission with a rubber hammer to bend it until it is in close contact with the transmission case.

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



5) Install the transmission onto the engine.

CAUTION:
This operation requires at least two persons.

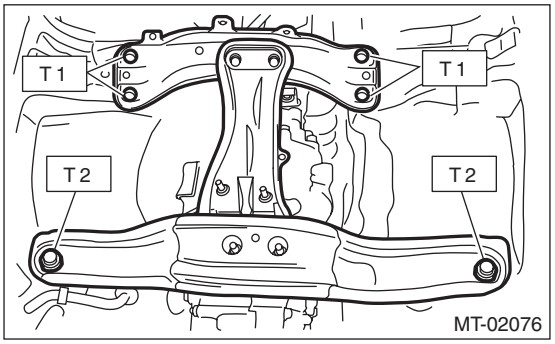
NOTE:
Keep the engine level.
(1) Lift up the transmission gradually using a transmission jack.
(2) Engage at the spline section.

NOTE:
Be careful not to hit the main shaft against the clutch housing cover.

6) Temporarily tighten the bolts and nuts which hold lower side of transmission to engine.

7) Install the front crossmember and rear crossmember.

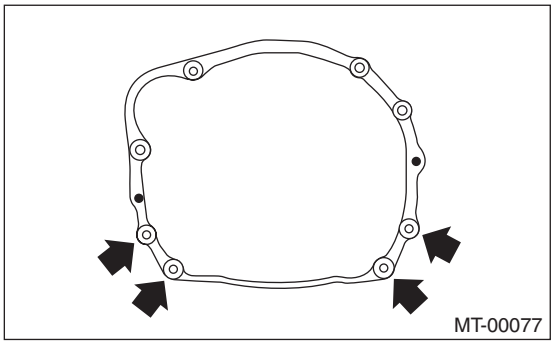
Tightening torque:
T1: 75 N·m (7.6 kgf-m, 55.3 ft-lb)
T2: 140 N·m (14.3 kgf-m, 103.3 ft-lb)



8) Take out the transmission jack.

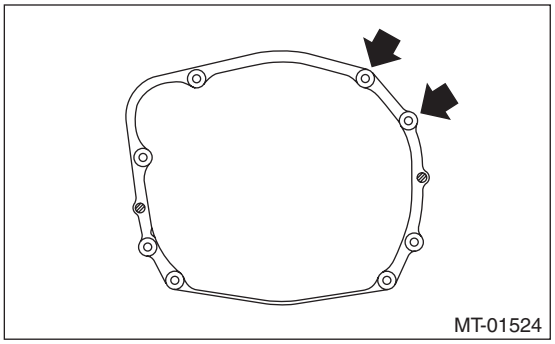
9) Tighten the bolts and nuts which hold the lower side of transmission to the engine.

Tightening torque:
50 N·m (5.1 kgf-m, 36.9 ft-lb)



10) Lower the vehicle.
11) Install the two mounting bolts on the upper side of the transmission.

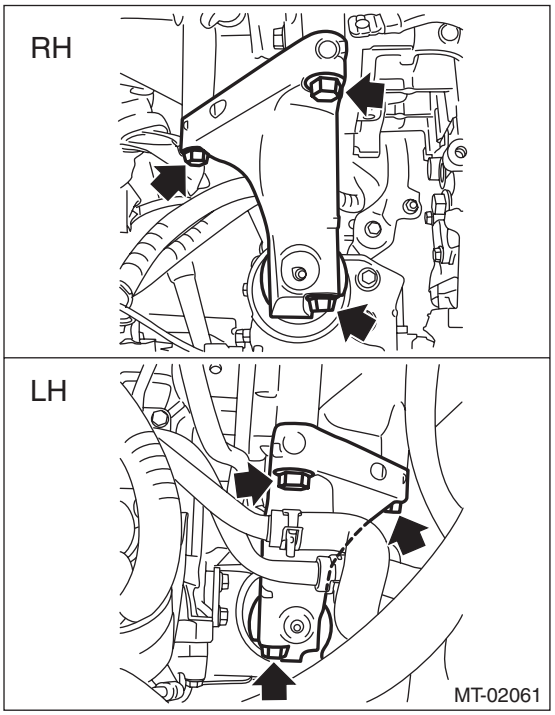
Tightening torque:
50 N·m (5.1 kgf-m, 36.9 ft-lb)



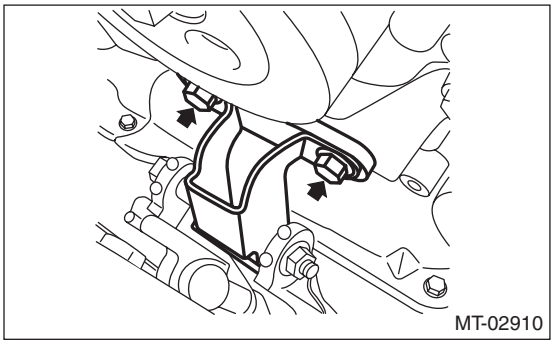
12) Remove the ST (ENGINE HANGER).
13) Install the transmission main mounting bracket.

NOTE:
Incline the engine, and install the transmission main mounting bracket for the left side of the vehicle first.

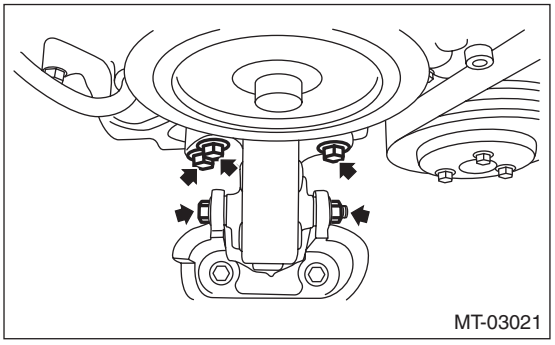
Tightening torque:
75 N·m (7.6 kgf-m, 55.3 ft-lb)



14) Attach the ST (ENGINE HANGER) again.
15) Remove the bolts from ST (SPECIAL TOOL FB).



16) Remove the bolt and nut to remove ST (SPECIAL TOOL FB).
17) Temporarily attach the front cushion rubber with bolts.

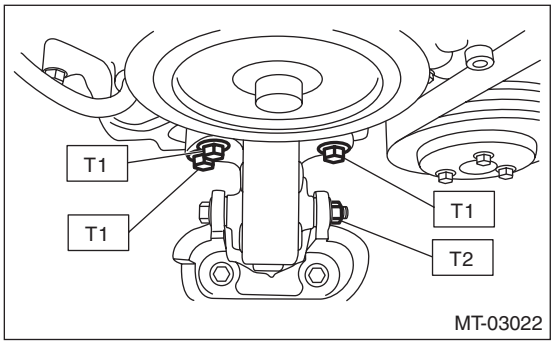


18) Install the bolt and nut to the front cushion rubber.

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

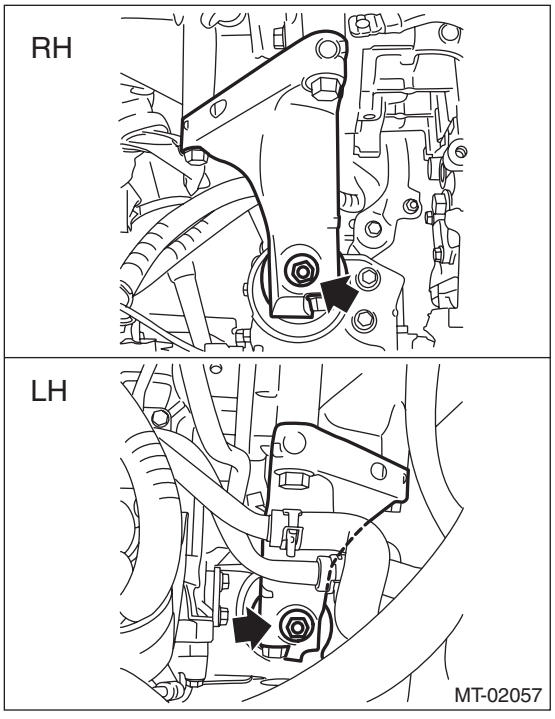
NOTE:
Always start tightening from the bolts on the engine side.

Tightening torque:
T1: 25 N·m (2.5 kgf-m, 18.4 ft-lb)
T2: 45 N·m (4.6 kgf-m, 33.2 ft-lb)



20) Remove the ST (ENGINE HANGER) from the vehicle.
21) Tighten the nuts connecting the engine mount and the transmission main mounting bracket.

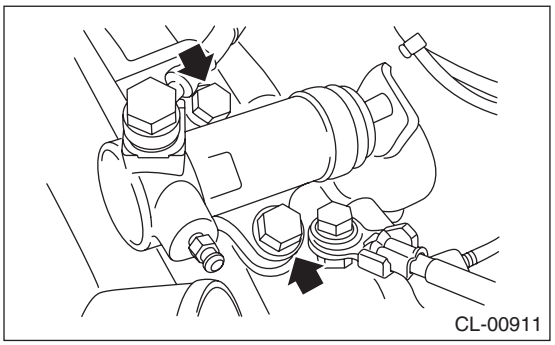
Tightening torque:
45 N·m (4.6 kgf-m, 33.2 ft-lb)



22) Install the starter. <Ref. to SC(H4DO)-10, INSTALLATION, Starter.>

23) Install the operating cylinder.

Tightening torque:
37 N·m (3.8 kgf-m, 27.3 ft-lb)



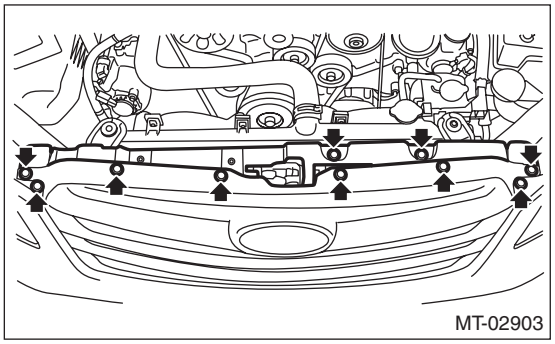
24) Lift up the vehicle.
25) Install the front drive shaft into the transmission. <Ref. to DS-49, INSTALLATION, Front Drive Shaft.>
26) Insert the front arm ball joint into the housing lower part. <Ref. to FS-33, INSTALLATION, Front Ball Joint.>
27) Attach the stabilizer link to the front arm. <Ref. to FS-31, INSTALLATION, Front Stabilizer.>
28) Install the MT gear shift cable and MT gear select cable to MT gear shift lever. <Ref. to CS-64, INSTALLATION, MT Gear Shift Lever.>

CAUTION:
• Do not bend MT gear shift cable and MT gear select cable at a sharp angle.
• Always use new MT gear select cable if the cable is removed from selector lever COMPL of transmission side.

29) Install the propeller shaft. <Ref. to DS-11, INSTALLATION, Propeller Shaft.>
30) Install the steering shaft universal joint. <Ref. to PS-21, INSTALLATION, Universal Joint.>
31) Install the heat shield cover. <Ref. to EI-174, INSTALLATION, Heat Shield Cover.>
32) Install the center exhaust pipe. <Ref. to EX(H4DO)-8, INSTALLATION, Front Exhaust Pipe.> <Ref. to EX(H4DO)-12, INSTALLATION, Center Exhaust Pipe.>
33) Install the front under cover. <Ref. to EI-33, INSTALLATION, Front Under Cover.>
34) Lower the vehicle.
35) Install the throttle body. <Ref. to SC(H4DO)-10, INSTALLATION, Starter.>
36) Connect the following connectors.
(1) Transmission radio ground terminal

Tightening torque:
13 N·m (1.3 kgf-m, 9.6 ft-lb)
(2) Neutral position switch connector (brown)
(3) Back-up light switch connector (gray)
(4) Engine harness connectors

37) Fill transmission gear oil through the transmission oil level gauge hole. <Ref. to 6MT-24, Transmission Gear Oil.>
38) Install the air intake boot assembly. <Ref. to IN(H4DO)-13, INSTALLATION, Air Intake Boot.>
39) Install the radiator fan.
40) Attach the grille bracket.



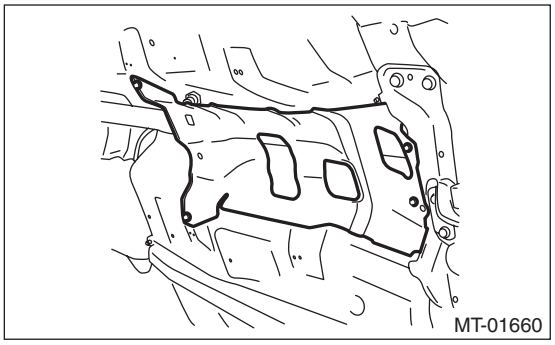
41) Install the air intake duct. <Ref. to IN(H4DO)-14, INSTALLATION, Air Intake Duct.>
42) Install the front wheels.
43) Adjust the detent of the MT gear shift lever. <Ref. to CS-67, ADJUSTMENT, MT Gear Shift Lever.>
44) Connect the battery ground terminal.

4. Transmission Mounting System

A: REMOVAL

1. CROSSMEMBER AND CUSHION RUBBER

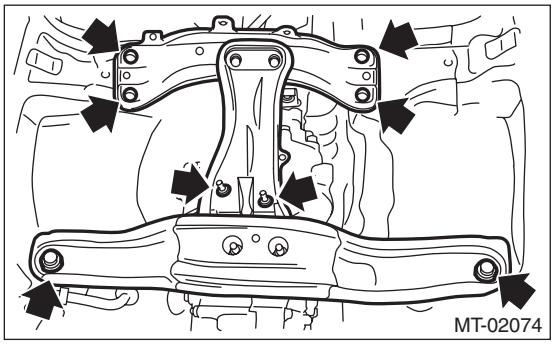
1) Disconnect the ground cable from battery.
2) Lift up the vehicle.
3) Remove the front under cover. <Ref. to EI-33, REMOVAL, Front Under Cover.>
4) Remove the front and center exhaust pipes. <Ref. to EX(H4DO)-5, REMOVAL, Front Exhaust Pipe.> <Ref. to EX(H4DO)-12, REMOVAL, Center Exhaust Pipe.>
5) Remove the heat shield cover.


MT-01660

6) Set the transmission jack.

CAUTION:
Always support the transmission case with a transmission jack.

7) Remove the front crossmember and the rear crossmember.


MT-02074

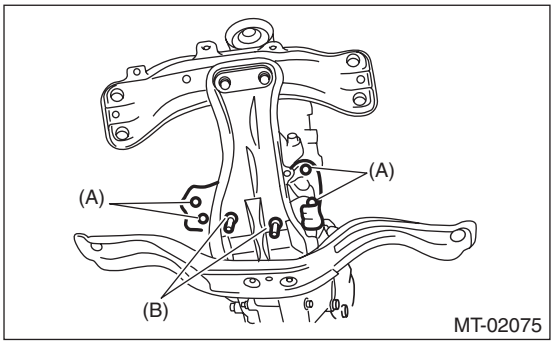
8) Remove the transmission cushion rubber.

B: INSTALLATION

1. CROSSMEMBER AND CUSHION RUBBER

1) Install the transmission cushion rubber to the transmission, and tighten the bolt (A).
2) Attach the transmission cushion rubber to the center crossmember, and tighten nut (B).

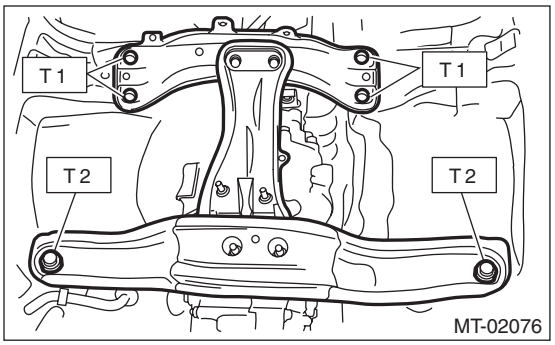
Tightening torque:
Bolt (A)
35 N·m (3.6 kgf-m, 25.8 ft-lb)
Nut (B)
35 N·m (3.6 kgf-m, 25.8 ft-lb)



MT-02075

3) Install the front crossmember and rear crossmember.

Tightening torque:
T1: 75 N·m (7.6 kgf-m, 55.3 ft-lb)
T2: 140 N·m (14.3 kgf-m, 103.3 ft-lb)



MT-02076

4) Remove the transmission jack.
5) Install the heat shield cover. <Ref. to EI-174, INSTALLATION, Heat Shield Cover.>
6) Install the front and center exhaust pipe. <Ref. to EX(H4DO)-8, INSTALLATION, Front Exhaust Pipe.> <Ref. to EX(H4DO)-12, INSTALLATION, Center Exhaust Pipe.>
7) Install the front under cover. <Ref. to EI-33, INSTALLATION, Front Under Cover.>
8) Lower the vehicle.
9) Connect the battery ground terminal.

C: INSPECTION

Perform the following inspection procedures and repair or replace faulty parts.

1. CROSSMEMBER AND CUSHION RUBBER

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

5. Oil Seal

A: INSPECTION

Check for transmission gear oil leaks at oil seal area. If there is an oil leak, replace the oil seal with new one and check the propeller shaft.

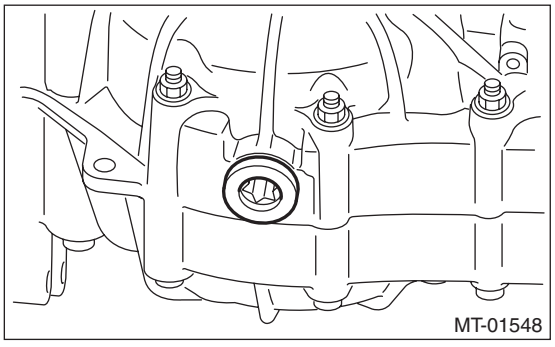
B: REPLACEMENT

1) Lift up the vehicle.
2) Remove the front under cover. <Ref. to EI-33, REMOVAL, Front Under Cover.>
3) Clean the transmission exterior.
4) Using the TORX® bit T70, remove the drain plug, and drain the transmission gear oil completely.

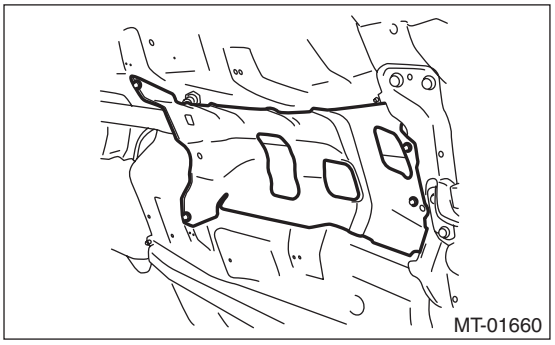
CAUTION:
• Immediately after the vehicle has been running or after idling for a long time, the transmission gear oil will be hot. Be careful not to receive burns.
• Be careful not to spill the transmission gear oil on the exhaust pipe, to prevent emission of smoke or causing a fire. If gear oil is spilled, wipe it off completely.
5) Tighten the drain plug using TORX® bit T70.

NOTE:
Use a new gasket.

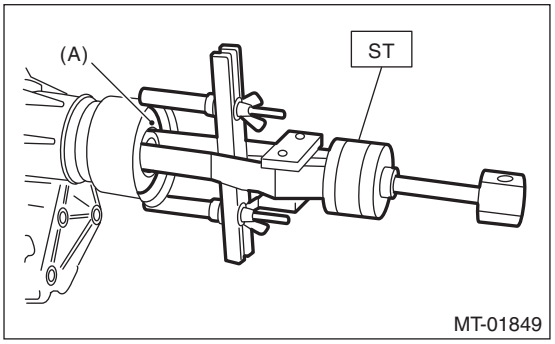
Tightening torque:
44 N·m (4.5 kgf-m, 32.5 ft-lb) (aluminum gasket, silver)
70 N·m (7.1 kgf-m, 51.6 ft-lb) (copper gasket, brown)
70 N·m (7.1 kgf-m, 51.6 ft-lb) (metal gasket, black)



6) Remove the center exhaust pipe. <Ref. to EX(H4DO)-12, REMOVAL, Center Exhaust Pipe.>
7) Remove the heat shield cover.



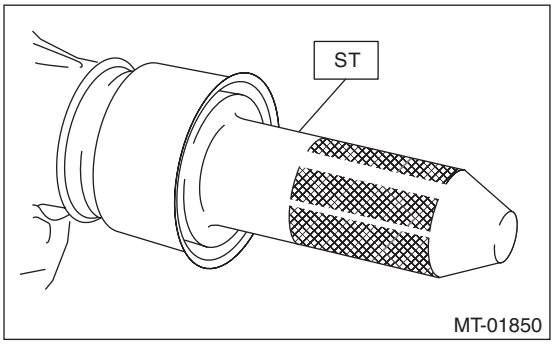
8) Remove the propeller shaft. <Ref. to DS-10, REMOVAL, Propeller Shaft.>
9) Using the ST, remove the oil seal.
ST 398527700 PULLER ASSY



(A) Oil seal

10) Using the ST, install the oil seal.

NOTE:
Use a new oil seal.
ST 498057300 INSTALLER



11) Apply transmission gear oil to the oil seal lips.
12) Install the propeller shaft. <Ref. to DS-11, INSTALLATION, Propeller Shaft.>
13) Install the heat shield cover. <Ref. to EI-174, INSTALLATION, Heat Shield Cover.>
14) Install the center exhaust pipe. <Ref. to EX(H4DO)-12, INSTALLATION, Center Exhaust Pipe.>
15) Install the front under cover. <Ref. to EI-33, INSTALLATION, Front Under Cover.>
16) Lower the vehicle.
17) Pour in transmission gear oil and check the oil level. <Ref. to 6MT-24, Transmission Gear Oil.>

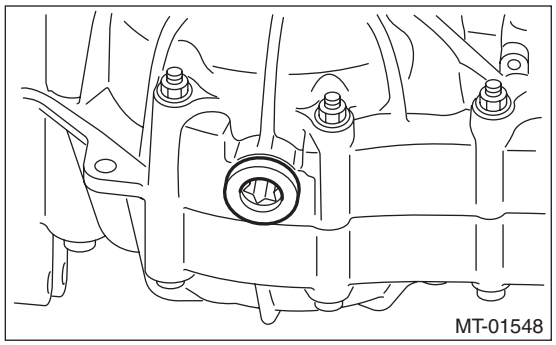
6. Differential Side Retainer Oil Seal

A: INSPECTION

Check for leakage of transmission gear oil from the differential side retainer oil seal. If there is oil leakage, replace the oil seal with the new part and check the drive shaft.

B: REPLACEMENT

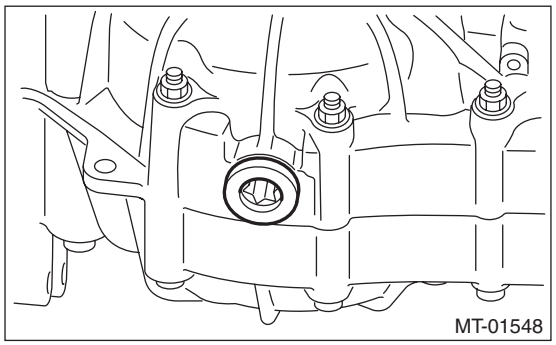
1) Lift up the vehicle.
2) Remove the front under cover. <Ref. to EI-33, REMOVAL, Front Under Cover.>
3) Using the TORX® bit T70, remove the drain plug, and drain the transmission gear oil completely.



CAUTION:
• Immediately after the vehicle has been running or after idling for a long time, the transmission gear oil will be hot. Be careful not to receive burns.
• Be careful not to spill the transmission gear oil on the exhaust pipe, to prevent emission of smoke or causing a fire. If gear oil is spilled, wipe it off completely.
4) Tighten 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)

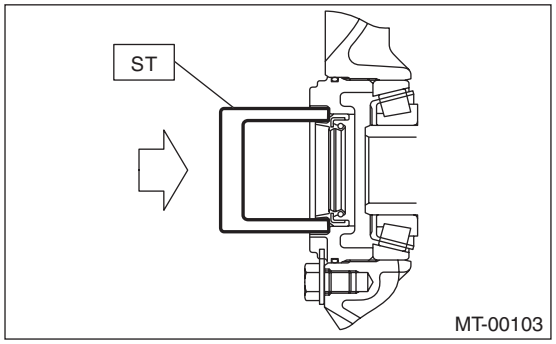


5) Remove the center exhaust pipe. <Ref. to EX(H4DO)-12, REMOVAL, Center Exhaust Pipe.>
6) Separate the front drive shaft from the transmission. <Ref. to DS-48, REMOVAL, Front Drive Shaft.>
7) Remove the differential side retainer oil seal.

NOTE:
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.
8) Using the ST, install the differential side retainer oil seal by lightly tapping with a plastic hammer.

NOTE:
• 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 seal RH and LH.
• Use a new oil seal.

ST 18675AA000 DIFFERENTIAL SIDE OIL SEAL INSTALLER



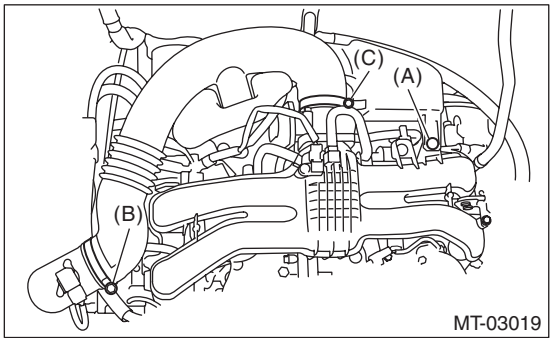
9) Install the front drive shaft. <Ref. to DS-49, INSTALLATION, Front Drive Shaft.>
10) Install the center exhaust pipe. <Ref. to EX(H4DO)-12, INSTALLATION, Center Exhaust Pipe.>
11) Install the front under cover. <Ref. to EI-33, INSTALLATION, Front Under Cover.>
12) Lower the vehicle.
13) Add the transmission gear oil through the oil level gauge hole. <Ref. to 6MT-24, Transmission Gear Oil.>

7. Switches and Harness

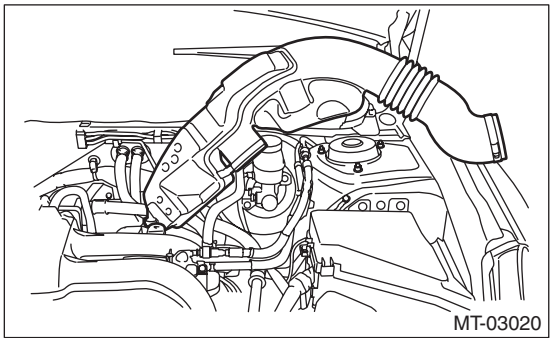
A: REMOVAL

1. BACK-UP LIGHT AND NEUTRAL POSITION SWITCH

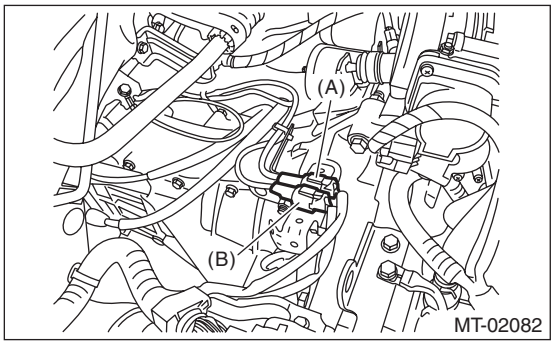
1) Disconnect the ground cable from battery.
2) Remove the clip (A) from the air intake boot.
3) Loosen the clamp (B) connecting the air intake boot and air cleaner case (rear).
4) Loosen the clamp (C) which connects the air intake boot and throttle body.



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



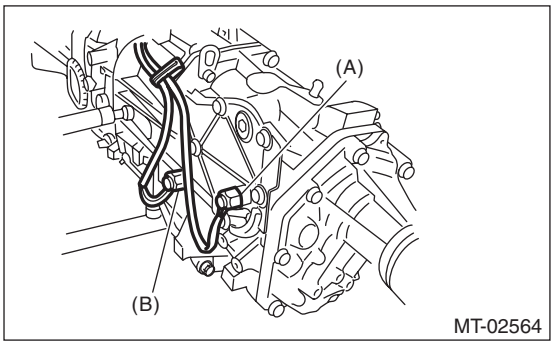
6) Disconnect the connector back-up light switch & neutral position switch.



(A) Neutral position switch connector (brown)
(B) Back-up light switch connector (gray)

7) Lift up the vehicle.

8) Remove the back-up light switch & neutral position switch with the harness.



(A) Neutral position switch
(B) Back-up light switch

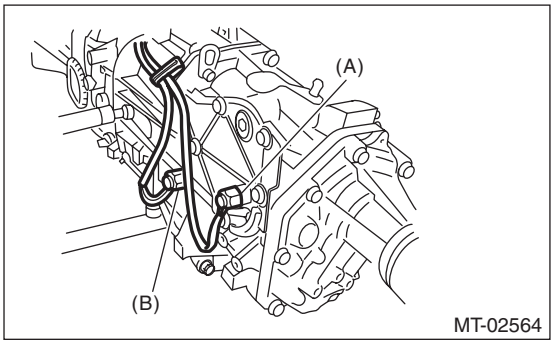
B: INSTALLATION

1. BACK-UP LIGHT SWITCH & 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) Lower the vehicle.
3) Connect the connectors of back-up light switch & neutral position switch.
4) Install the air intake boot assembly. <Ref. to IN(H4DO)-13, INSTALLATION, Air Intake Boot.>
5) Connect the battery ground terminal.

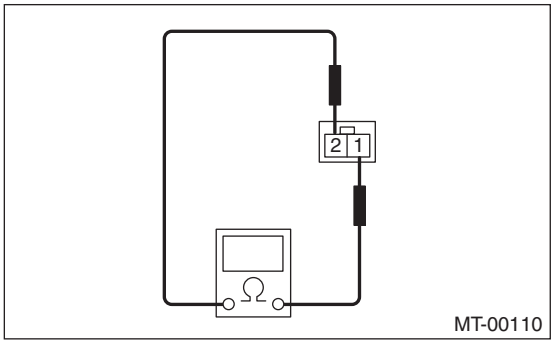
C: INSPECTION

1. BACK-UP LIGHT SWITCH

Check the back-up light switch. <Ref. to LI-13, INSPECTION, Back-up Light System.>

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.

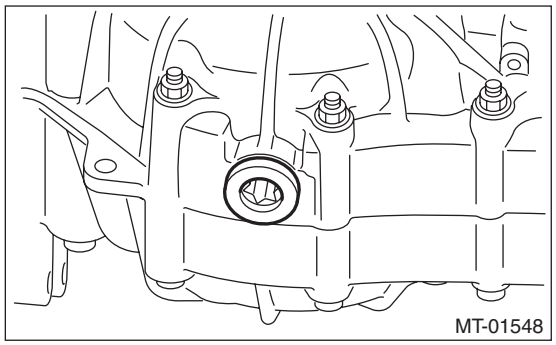
8. Preparation for Overhaul

A: PROCEDURE

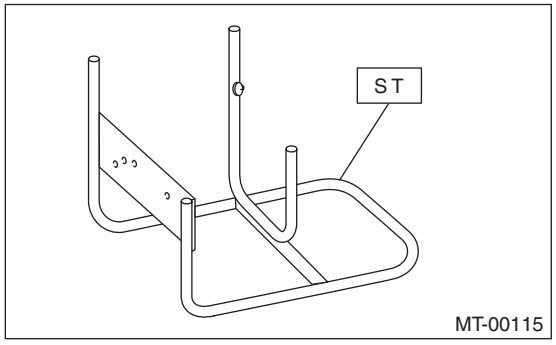
1) Clean oil, grease, dirt and dust from the transmission.
2) When gear oil remains in the transmission, using the TORX® bit T70, remove the drain plug, and drain the transmission gear oil completely.
3) Tighten the drain plug using TORX® bit T70.

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

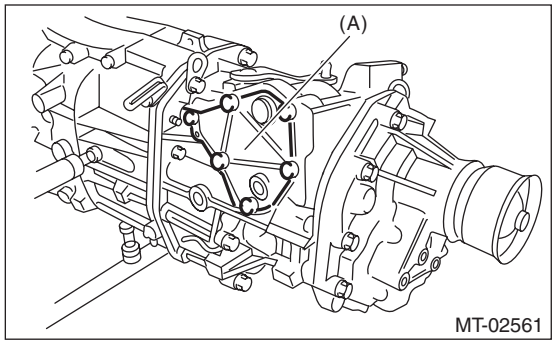


5) Apply oil to rotating parts before assembly.
6) All disassembled parts, if to be reused, should be reinstalled in the original positions and directions.
7) Gaskets, lock washers and lock nuts must be replaced with new ones.
8) Apply liquid gasket to the specified areas to prevent leakage.

9. Transfer Case and Extension Case Assembly

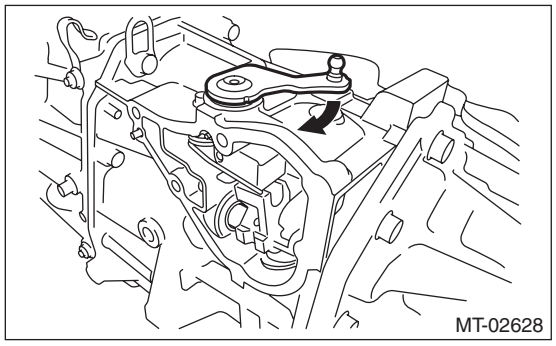
A: REMOVAL

1) Remove the manual transmission assembly from the vehicle. <Ref. to 6MT-25, REMOVAL, Manual Transmission Assembly.>
2) Remove the back-up light switch and the neutral position switch. <Ref. to 6MT-36, REMOVAL, Switches and Harness.>
3) Remove the transfer case together with the extension case assembly.
(1) Remove the transmission cover.

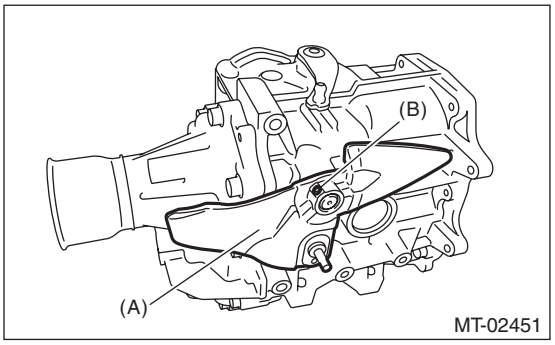


(A) Transmission cover

(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.

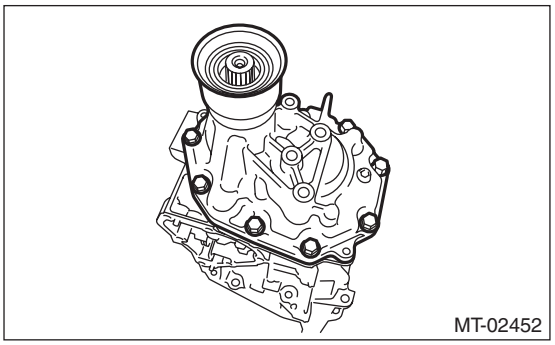


4) Use the ST to push out the spring pin and remove the shift lever COMPL from shifter arm No. 2.
ST 398791700 SPRING PIN REMOVER 2

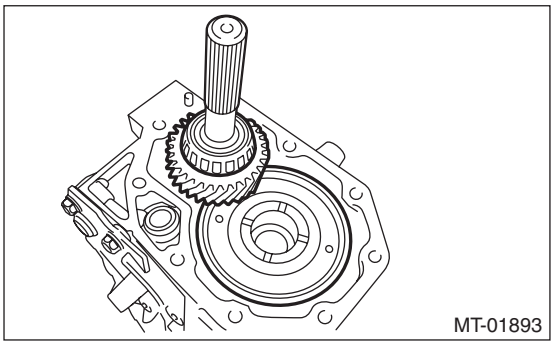


(A) Shift lever COMPL
(B) Spring pin

5) Remove the extension case assembly.



6) Remove the transfer driven gear and center differential as a unit.

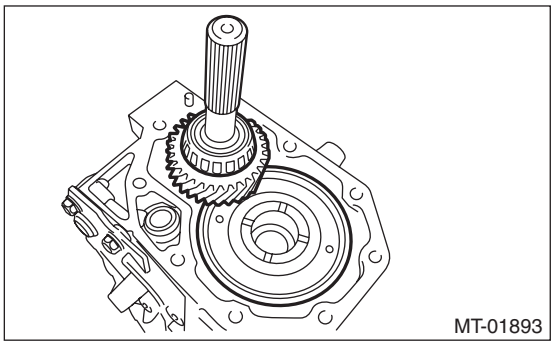


B: INSTALLATION

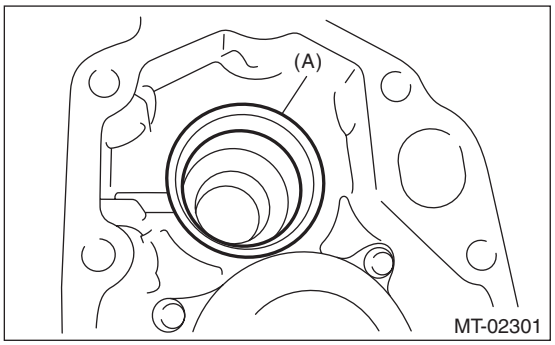
1) Clean the mating surface of the extension case assembly and transfer case and the mating surface of transfer case and transmission cover.
2) Apply a coat of grease to the front roller bearing and rear roller bearing of the transfer driven gear.

Grease:
NICHIMOLY N-130 or equivalent

3) Install the center differential and transfer driven gear into the transfer case.

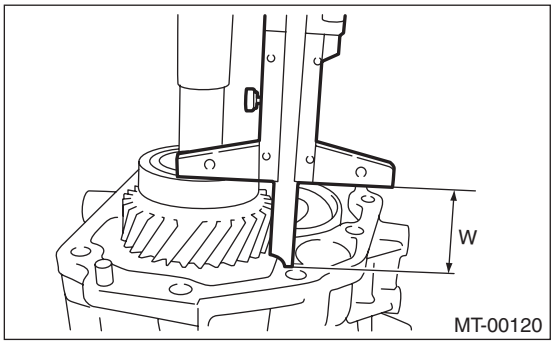


4) Remove the bearing outer race and adjusting washer from the extension case.



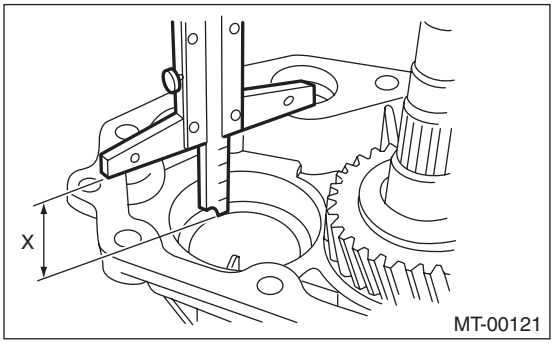
(A) Bearing outer race

5) Install the bearing outer race to transfer driven gear.
6) While pressing the bearing outer race horizontally, rotate the driven shaft for ten turns.
7) Measure the height “W” between transfer case and taper roller bearing on the transfer driven gear.



8) Measure depth “X” of bearing insertion part of the extension case.

NOTE:
Measure with bearing outer race and adjusting washer removed.



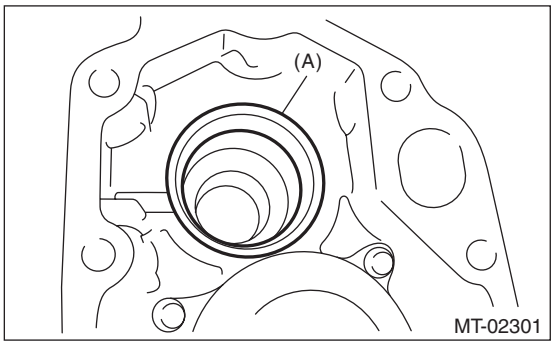
9) Calculate the adjusting washer thickness “t” using the following calculation.
t = X – W + (0.15 — 0.2 mm (0.006 — 0.008 in))
10) Select the washer with the nearest value in the following table.

NOTE:
Be sure that it is always within the preload.

Preload of the taper roller bearing (amount of standard protrusion):
0.15 — 0.20 mm (0.006 — 0.008 in)

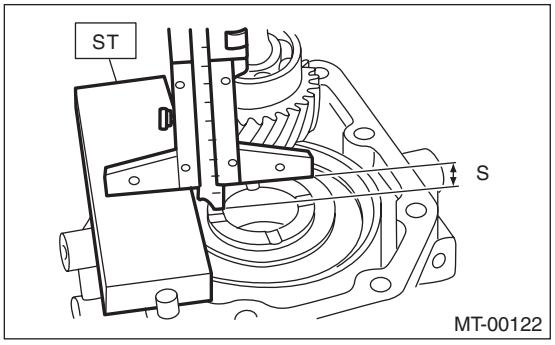
Adjusting washer (50 × 61 × t)	
Part No.	Thickness mm (in)
803050060	0.50 (0.0197)
803050061	0.55 (0.0217)
803050062	0.60 (0.0236)
803050063	0.65 (0.0256)
803050064	0.70 (0.0276)
803050065	0.75 (0.0295)
803050066	0.80 (0.0315)
803050067	0.85 (0.0335)
803050068	0.90 (0.0354)
803050069	0.95 (0.0374)
803050070	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)

11) Install the selected adjusting washer and bearing outer race to the extension case.

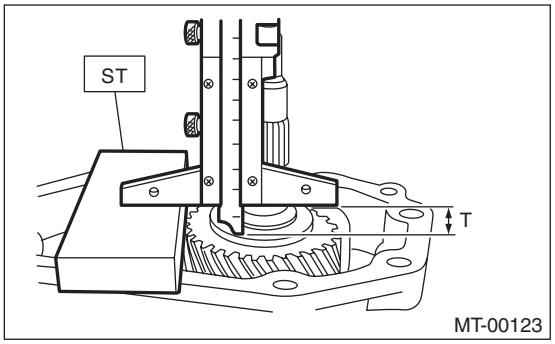


(A) Bearing outer race

12) Measure the depth “S” between the transfer case + ST and the center differential.
ST 398643600 GAUGE



13) Measure the height “T” between the extension case + ST and the transfer drive gear.
ST 398643600 GAUGE



14) Calculate the adjusting washer thickness “U” using the following calculation.
U = S + T – 30 mm (1.18 in) – (0.15 — 0.35 mm (0.00590 — 0.0138 in))
S: Depth between the transfer case + ST and the center differential
T: Depth between the extension case + ST and the transfer gear
30 mm (1.18 in): Thickness of ST (× 2 pieces)
0.15 — 0.35 mm (0.0059 — 0.0138 in): Clearance

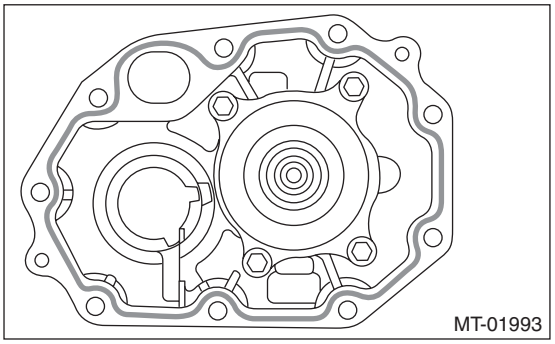
15) Select a suitable adjusting washer in the following table.

Standard 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)

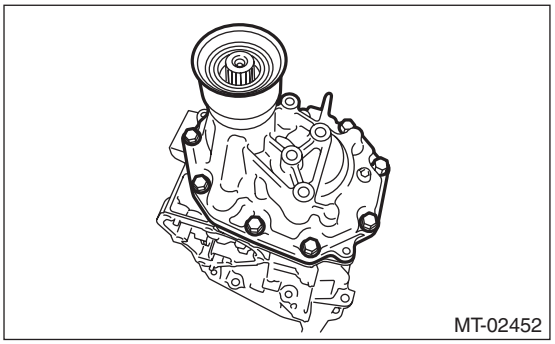
16) Install the adjusting washer to center differential.
17) Apply liquid gasket seamlessly to the mating surface of transfer case.

Liquid gasket:
THREE BOND 1215 (Part No. 004403007) or equivalent



18) Install the extension case assembly to the transfer case.

Tightening torque:
40 N·m (4.1 kgf-m, 29.5 ft-lb)



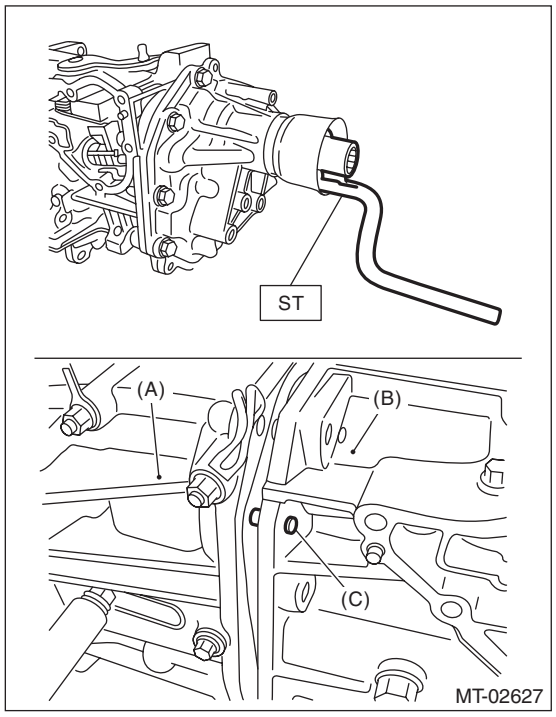
19) Temporarily install the gasket to the transmission case side.

NOTE:
Use a new gasket.

20) Install the extension case assembly along with the transfer case to the transmission case.

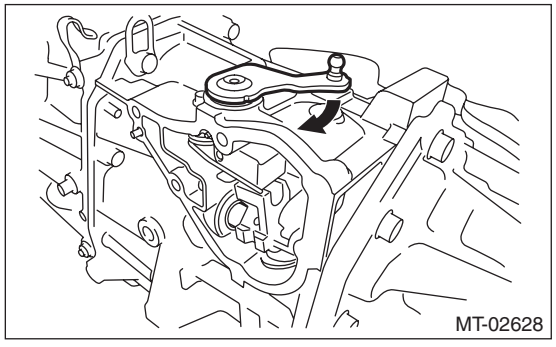
(1) While moving the HANDLE to align the spline position, press in the transfer case assembly until the knock pin comes slightly out of transfer case.

ST 18631AA000 HANDLE



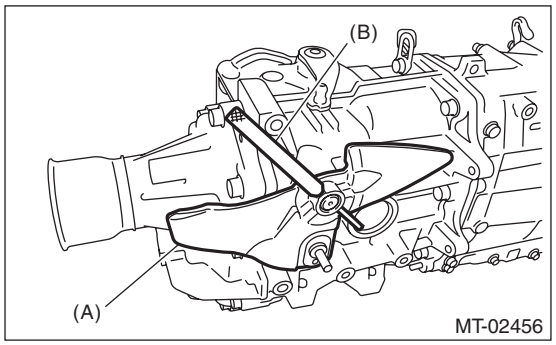
(A) Transmission case
(B) Transfer case
(C) Knock pin

(2) Set and hold the selector lever to the 1st-2nd side, and install the transfer case assembly so that the shifter arm edge and fork rod does not contact.



21) Temporarily tighten the transfer case assembly.

22) Install the shift lever COMPL to the shifter arm No. 2, then insert the remover or similar tool instead of spring pin.

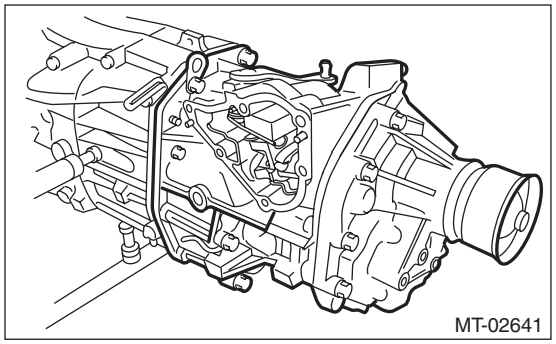


(A) Shift lever COMPL
(B) Remover

23) Operate the selector arm and remover to confirm the correct shifting into each gear is possible.

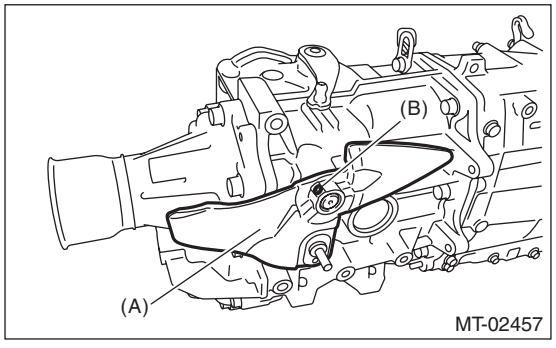
24) Tighten the transfer case assembly to the specified torque.

Tightening torque:
24.5 N·m (2.5 kgf-m, 18.1 ft-lb)



25) Install the shift lever COMPL to the shifter arm No. 2, then fix it using a spring pin.

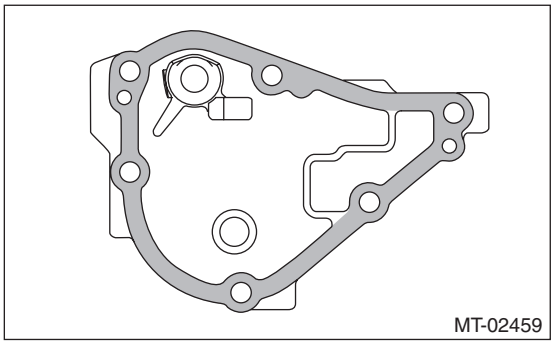
NOTE:
Use new spring pin.



(A) Shift lever COMPL
(B) Spring pin

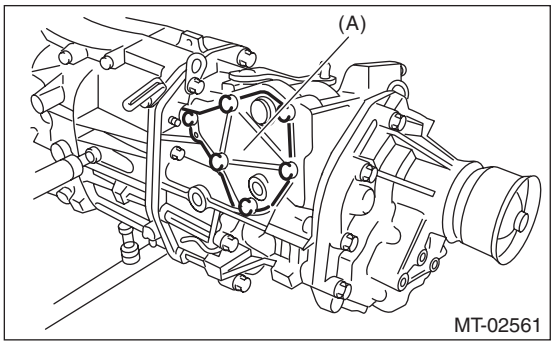
26) Apply liquid gasket seamlessly to the mating surface of transmission cover.

Liquid gasket:
THREE BOND 1215 (Part No. 004403007) or equivalent



27) Install the transmission cover to transfer case.

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



(A) Transmission cover

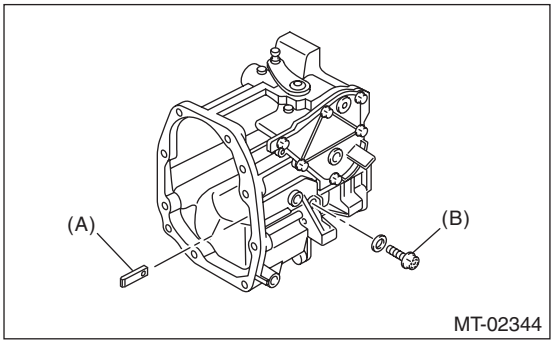
28) Install the back-up light switch and the neutral switch. <Ref. to 6MT-36, BACK-UP LIGHT SWITCH & NEUTRAL POSITION SWITCH, INSTALLATION, Switches and Harness.>
29) Install the manual transmission assembly to the vehicle. <Ref. to 6MT-29, INSTALLATION, Manual Transmission Assembly.>

C: 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 6MT-50, REMOVAL, Shift Link Assembly.>

2. EXTENSION CASE

1) Remove the transfer drive gear assembly. <Ref. to 6MT-45, REMOVAL, Transfer Drive Gear.>
2) Remove the oil seal from the extension case. <Ref. to 6MT-34, REPLACEMENT, Oil Seal.>
3) Remove the dust cover.

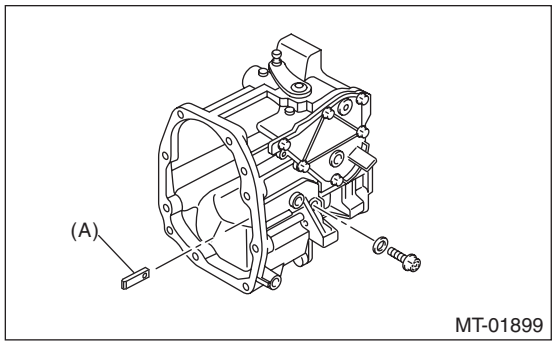
D: ASSEMBLY

1. TRANSFER CASE

1) Install the shift link assembly to the transfer case. <Ref. to 6MT-53, INSTALLATION, Shift Link Assembly.>
2) Install the interlock plate to the transfer case.

NOTE:
- Use a new bolt and gasket.
- Before installing the interlock plate, clean the screw threads.

Tightening torque:
20 N·m (2.0 kgf-m, 14.8 ft-lb)



(A) Interlock plate

2. EXTENSION CASE

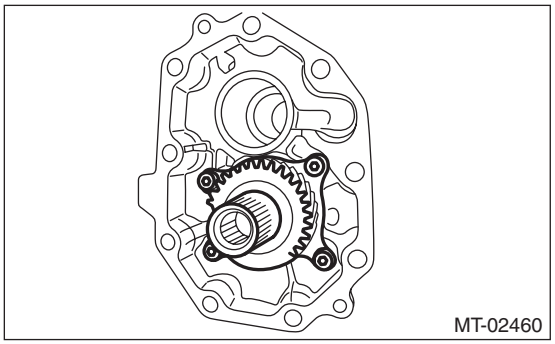
1) Using the ST, install the oil seal to the extension case. <Ref. to 6MT-34, REPLACEMENT, Oil Seal.>

NOTE:
Use a new oil seal.
2) Install the transfer drive gear to the extension case. <Ref. to 6MT-45, INSTALLATION, Transfer Drive Gear.>
3) Install the dust cover.

10.Transfer Drive Gear

A: REMOVAL

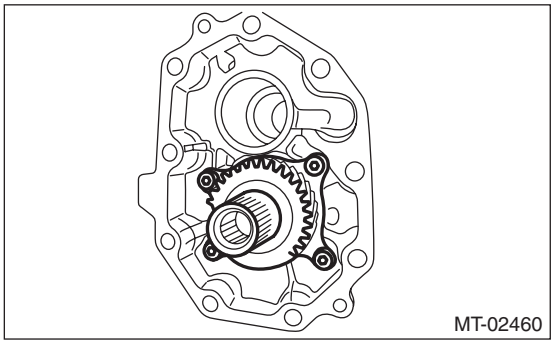
1) Remove the manual transmission assembly from the vehicle. <Ref. to 6MT-25, REMOVAL, Manual Transmission Assembly.>
2) Remove the back-up light switch and the neutral position switch. <Ref. to 6MT-36, REMOVAL, Switches and Harness.>
3) Remove the transfer case together with the extension case assembly. <Ref. to 6MT-39, REMOVAL, Transfer Case and Extension Case Assembly.>
4) Remove the extension case assembly.
5) Remove the transfer driven gear. <Ref. to 6MT-47, REMOVAL, Transfer Driven Gear.>
6) Remove the transfer drive gear.


MT-02460

B: INSTALLATION

1) Install the transfer drive gear.

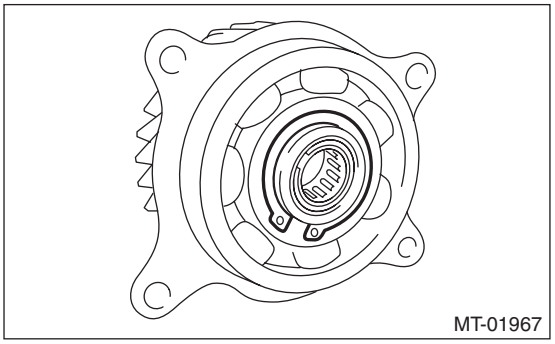
Tightening torque:
26 N·m (2.7 kgf-m, 19.2 ft-lb)


MT-02460

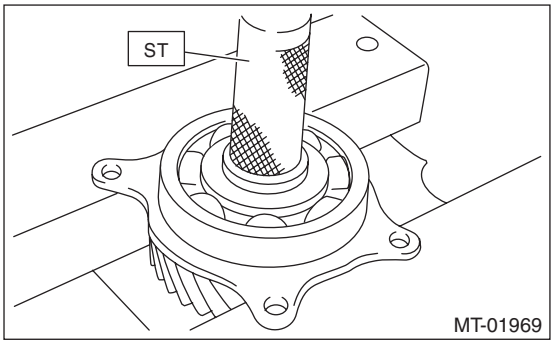
2) Install the transfer driven gear. <Ref. to 6MT-47, INSTALLATION, Transfer Driven Gear.>
3) Select the adjusting washer. <Ref. to 6MT-40, INSTALLATION, Transfer Case and Extension Case Assembly.>
4) Install the extension case assembly. <Ref. to 6MT-40, INSTALLATION, Transfer Case and Extension Case Assembly.>
5) Install the transfer case and the extension case assembly. <Ref. to 6MT-40, INSTALLATION, Transfer Case and Extension Case Assembly.>
6) Install the back-up light switch and the neutral position switch. <Ref. to 6MT-36, INSTALLATION, Switches and Harness.>
7) Install the manual transmission assembly to the vehicle. <Ref. to 6MT-29, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

1) Remove the snap ring.


MT-01967

2) Remove the ball bearing.
ST 899864110 REMOVER



MT-01969

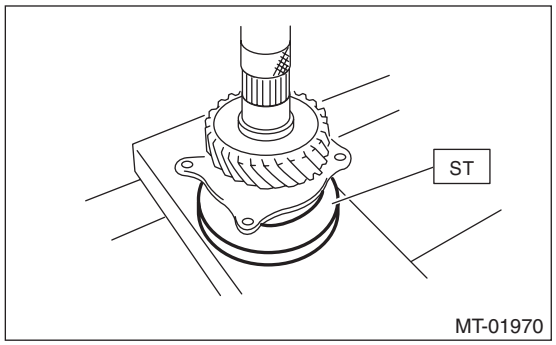
3) Remove the snap ring from transfer drive gear, and remove the needle bearing.

D: ASSEMBLY

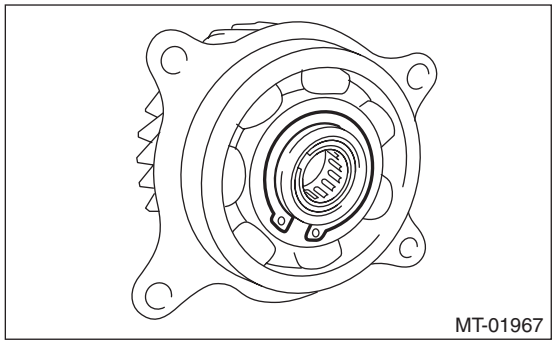
1) Install the needle bearing and snap ring to the transfer drive gear.
2) Set the ST to the bearing inner race, then install the transfer drive gear to the bearing.

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 ball bearing.
ST 398177700 INSTALLER



3) Install the snap ring on the transfer drive shaft.



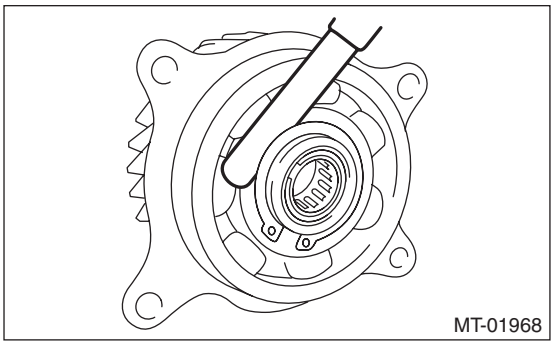
4) Inspect the clearance between the snap ring and the ball bearing. <Ref. to 6MT-46, INSPECTION, Transfer Drive Gear.>

E: INSPECTION

1) Bearing
Replace the bearings in the following cases.
- In case of broken or rusty bearings
- In case of wear or damage
- When the bearings fail to turn smoothly or emit noise in rotation after gear oil lubrication.

2) Drive gear
If the drive gear tooth surface and shaft are excessively broken or damaged, replace the drive gear.
3) Measure the clearance between snap ring and inner race of ball bearing with a thickness gauge.

Clearance:
0.01 — 0.15 mm (0.0004 — 0.0059 in)



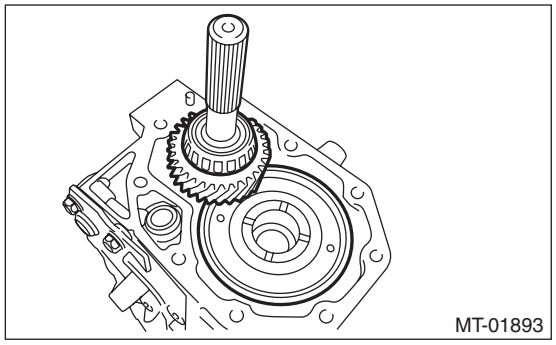
If the measurement is not within specification, select a suitable snap ring and replace it.

Snap ring (outer-30)	
Part No.	Thickness mm (in)
805030041	1.53 (0.0602)
805030042	1.65 (0.0650)
805030043	1.77 (0.0697)

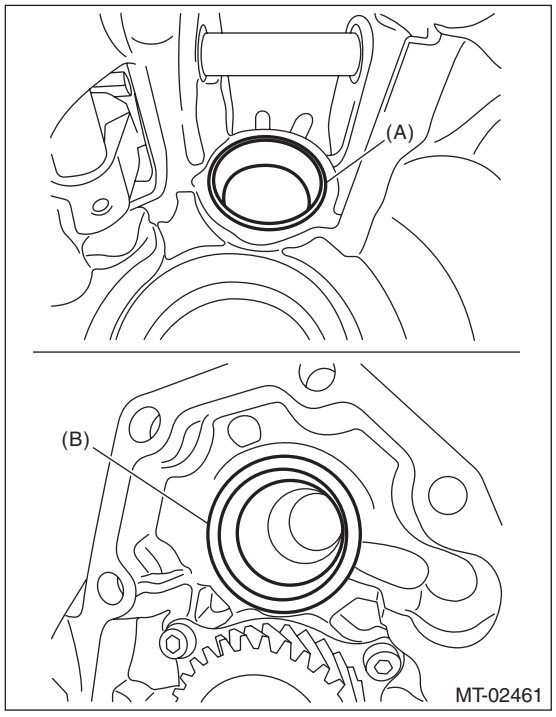
11.Transfer Driven Gear

A: REMOVAL

1) Remove the manual transmission assembly from the vehicle. <Ref. to 6MT-25, REMOVAL, Manual Transmission Assembly.>
2) Remove the back-up light switch and the neutral position switch. <Ref. to 6MT-36, REMOVAL, Switches and Harness.>
3) Remove the transfer case together with the extension case assembly. <Ref. to 6MT-39, REMOVAL, Transfer Case and Extension Case Assembly.>
4) Remove the extension case assembly.
5) Remove the transfer driven gear and center differential as a unit.



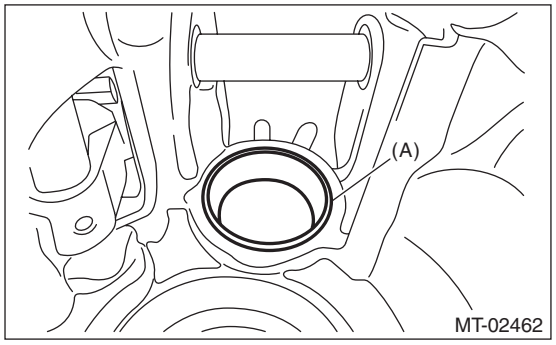
6) Remove the bearing outer race from the extension case and transfer case.



(A) Bearing outer race (transfer case side)
(B) Bearing outer race (extension case side)

B: INSTALLATION

1) Install the bearing outer race to transfer case.

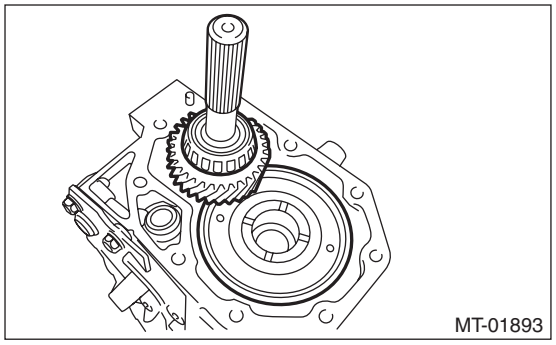


(A) Bearing outer race

2) Apply a coat of grease to the front roller bearing and rear roller bearing of the transfer driven gear.

Grease:
NICHIMOLY N-130 or equivalent

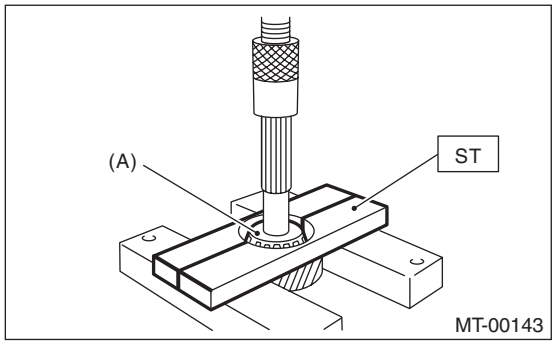
3) Install the transfer driven gear and center differential as a unit.



4) Select the adjusting washer. <Ref. to 6MT-40, INSTALLATION, Transfer Case and Extension Case Assembly.>
5) Install the selected adjusting washer and bearing outer race to the extension case.
6) Install the transfer case and the extension case assembly. <Ref. to 6MT-40, INSTALLATION, Transfer Case and Extension Case Assembly.>
7) Install the back-up light switch and the neutral position switch. <Ref. to 6MT-36, INSTALLATION, Switches and Harness.>
8) Install the manual transmission assembly to the vehicle. <Ref. to 6MT-29, INSTALLATION, Manual Transmission Assembly.>

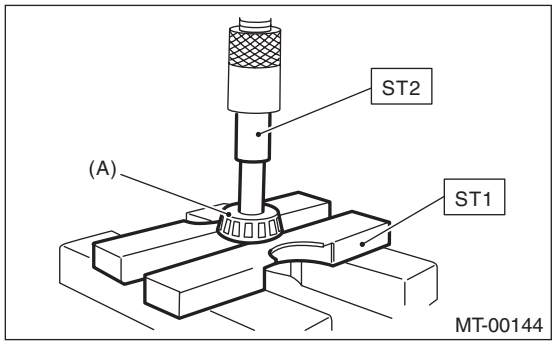
C: DISASSEMBLY

1) Using the ST, remove the roller bearing (extension case side).
ST 498077000 REMOVER



(A) Roller bearing

2) Using ST1 and ST2, remove the roller bearing (transfer case side).
ST1 498077000 REMOVER
ST2 899864100 REMOVER



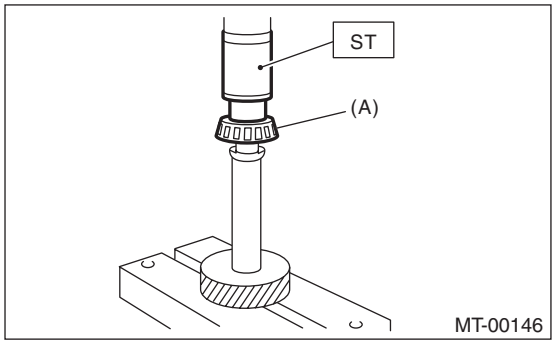
(A) Roller bearing

D: ASSEMBLY

1) Using ST, install the 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 roller bearing outer races are used with roller bearing as a set.
• Use a new ball bearing.
ST 927640000 INSTALLER

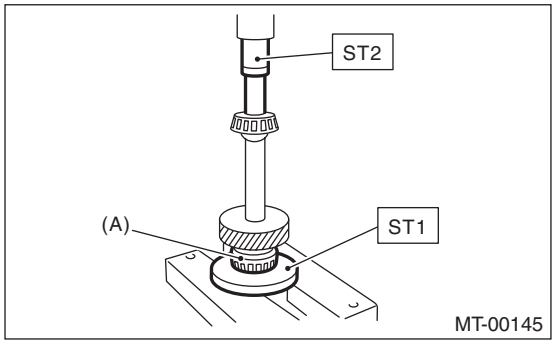


(A) Roller bearing

2) Using the ST, install the 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 roller bearing outer races are used with roller bearing as a set.
• Use a new ball bearing.
ST1 498175500 INSTALLER
ST2 899864100 REMOVER



(A) Roller bearing

E: INSPECTION

1) Bearing
Replace the bearings in the following cases.
• In case of broken or rusty bearings
• In case of wear or damage
• When the bearings fail to turn smoothly or emit noise in rotation after gear oil lubrication.
2) Driven gear
If the tooth face of driven gear and the shaft are excessively broken or damaged, replace the driven gear.

12.Center Differential

A: REMOVAL

1) Remove the manual transmission assembly from the vehicle. <Ref. to 6MT-25, REMOVAL, Manual Transmission Assembly.>
2) Remove the back-up light switch and the neutral position switch. <Ref. to 6MT-36, REMOVAL, Switches and Harness.>
3) Remove the transfer case together with the extension case assembly. <Ref. to 6MT-39, REMOVAL, Transfer Case and Extension Case Assembly.>
4) Remove the extension case assembly. <Ref. to 6MT-39, REMOVAL, Transfer Case and Extension Case Assembly.>
5) Remove the center differential and transfer driven gear as a unit. <Ref. to 6MT-47, REMOVAL, Transfer Driven Gear.>

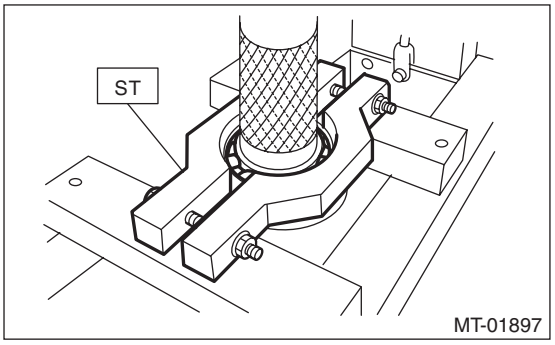
B: INSTALLATION

1) Install the center differential and transfer driven gear into the transfer case as a unit. <Ref. to 6MT-47, INSTALLATION, Transfer Driven Gear.>
2) Select the adjusting washer. <Ref. to 6MT-40, INSTALLATION, Transfer Case and Extension Case Assembly.>
3) Install the transfer driven gear. <Ref. to 6MT-47, INSTALLATION, Transfer Driven Gear.>
4) Install the extension case assembly. <Ref. to 6MT-40, INSTALLATION, Transfer Case and Extension Case Assembly.>
5) Install the transfer case together with the extension case assembly. <Ref. to 6MT-40, INSTALLATION, Transfer Case and Extension Case Assembly.>
6) Install the back-up light switch and the neutral position switch. <Ref. to 6MT-36, INSTALLATION, Switches and Harness.>
7) Install the manual transmission assembly to the vehicle. <Ref. to 6MT-29, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

Remove the ball bearing using ST.

NOTE:
Center differential is a non-disassembled part which should not be disassembled.
ST 498077600 CENTER DIFFERENTIAL BEARING REMOVER

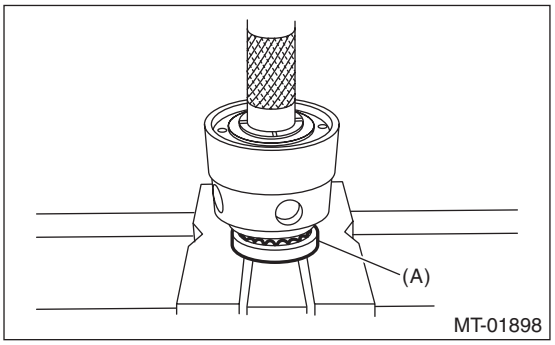


D: ASSEMBLY

Install the ball bearing to the center differential assembly.

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

E: INSPECTION

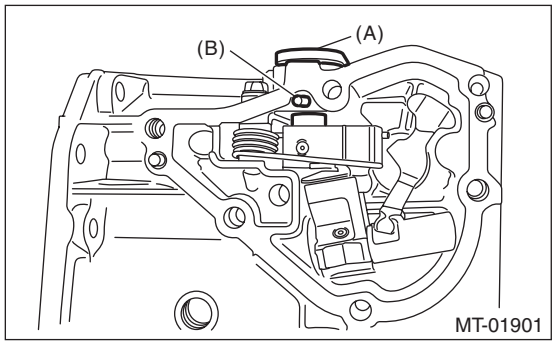
1) Bearing
Replace the bearings in the following cases.
- In case of broken or rusty bearings
- In case of wear or damage
- When the bearings fail to turn smoothly or emit noise in rotation after gear oil lubrication.
- When bearing has other defects.

2) Center differential
If there is wear or damage, replace the center differential case assembly.

13.Shift Link Assembly

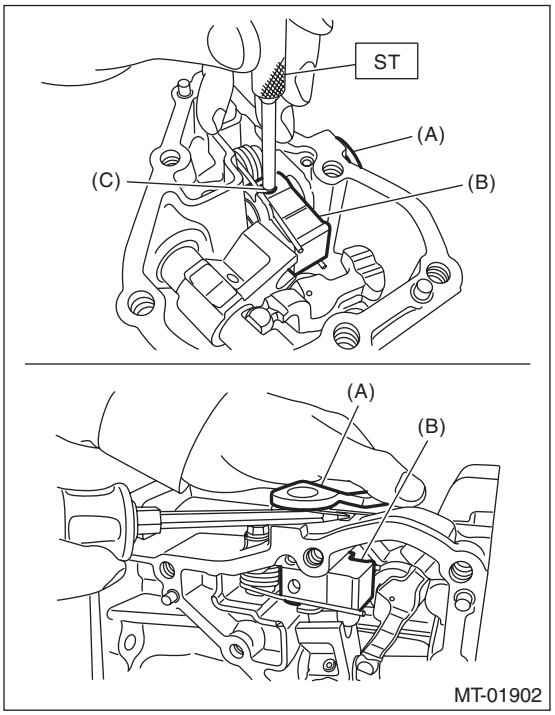
A: REMOVAL

1) Remove the manual transmission assembly from the vehicle. <Ref. to 6MT-25, REMOVAL, Manual Transmission Assembly.>
2) Remove the back-up light switch and the neutral position switch. <Ref. to 6MT-36, REMOVAL, Switches and Harness.>
3) Remove the transfer case together with the extension case assembly. <Ref. to 6MT-39, REMOVAL, Transfer Case and Extension Case Assembly.>
4) Remove the extension case assembly. <Ref. to 6MT-39, REMOVAL, Transfer Case and Extension Case Assembly.>
5) Remove the center differential and transfer driven gear as a unit. <Ref. to 6MT-47, REMOVAL, Transfer Driven Gear.>
6) Pull out the straight pin.



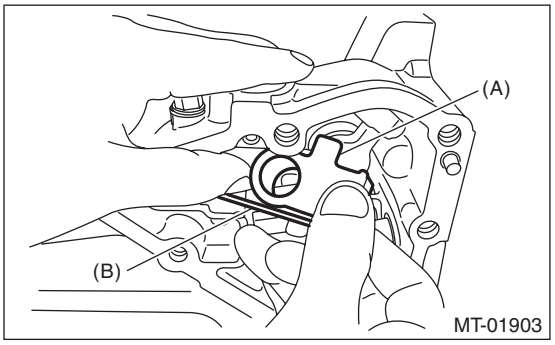
(A) Selector lever COMPL
(B) Straight pin

7) Use the ST to remove the spring pin, and remove the selector lever COMPL.
ST 398791700 SPRING PIN REMOVER 2



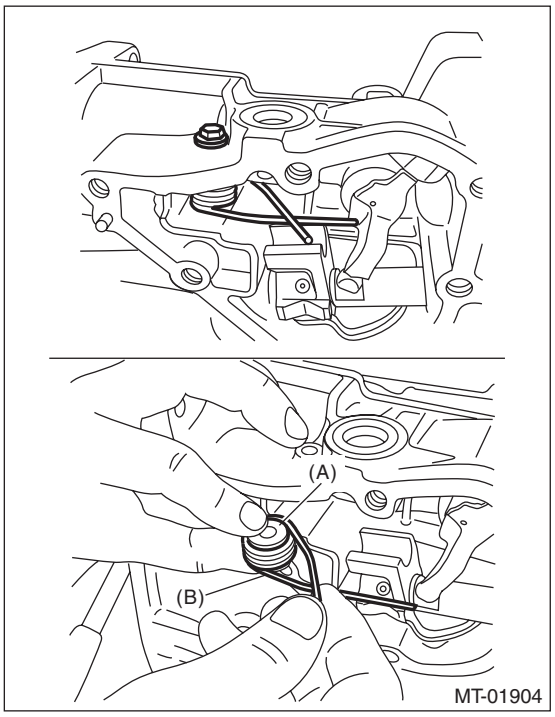
(A) Selector lever COMPL
(B) Selector arm No. 2
(C) Spring pin

8) Pull out the selector arm No. 2 from neutral set spring.



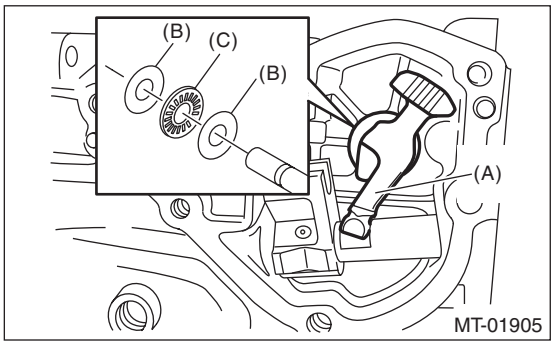
(A) Selector arm No. 2
(B) Neutral set spring

9) Remove the bolts and remove the shifter arm collar and neutral set spring from transfer case.



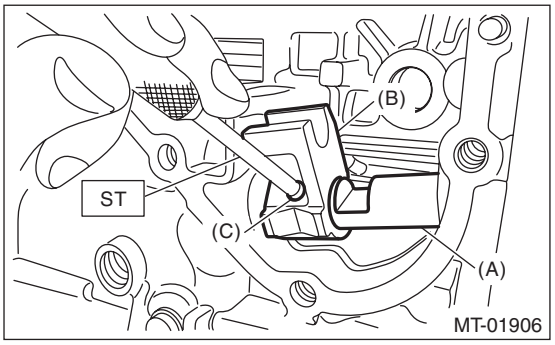
(A) Shifter arm collar
(B) Neutral set spring

10) Remove the shifter arm No. 2, washers and thrust bearing from transfer case.



(A) Shifter arm No. 2
(B) Washer
(C) Thrust bearing

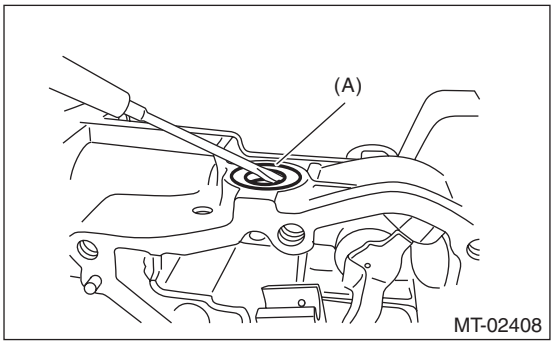
11) Use the ST to remove the spring pin, and remove the shifter arm and selector arm.
ST 398791700 SPRING PIN REMOVER 2



(A) Shifter arm
(B) Selector arm
(C) Spring pin

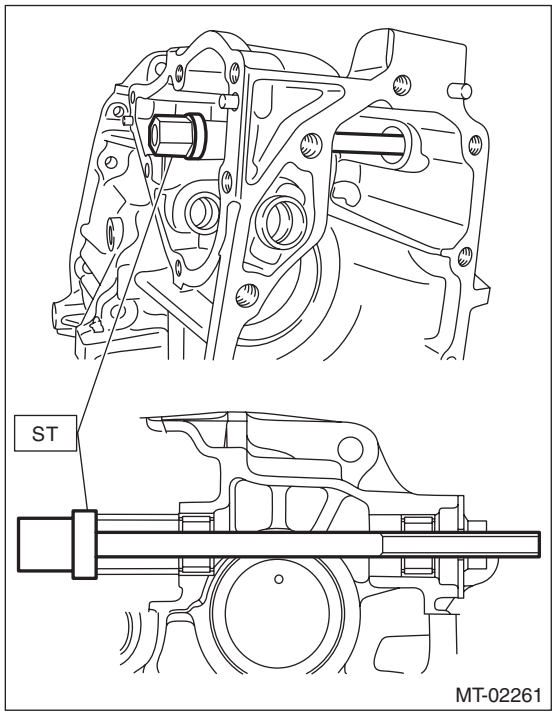
12) Remove the oil seal from the transfer case by using a screwdriver wrapped with vinyl tape etc.

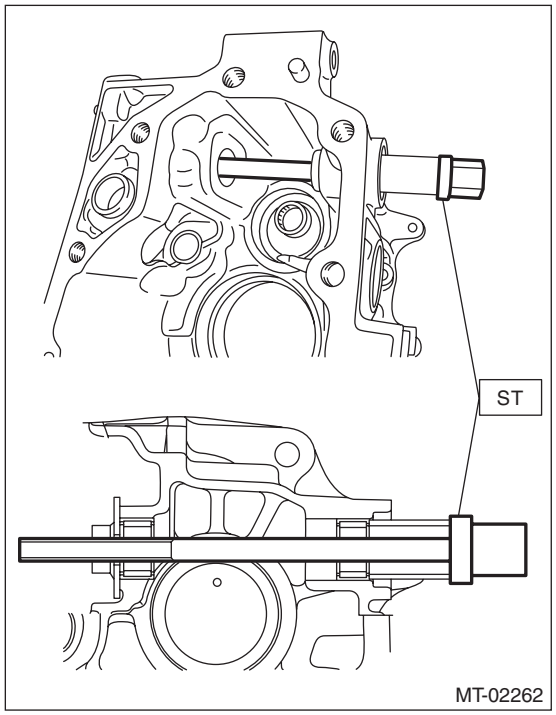
NOTE:
The illustration shows the oil seal of selector lever COMPL. Perform the same procedures for removing the shifter arm No. 2.



(A) Oil seal

13) Remove the needle bearing from the transfer case 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

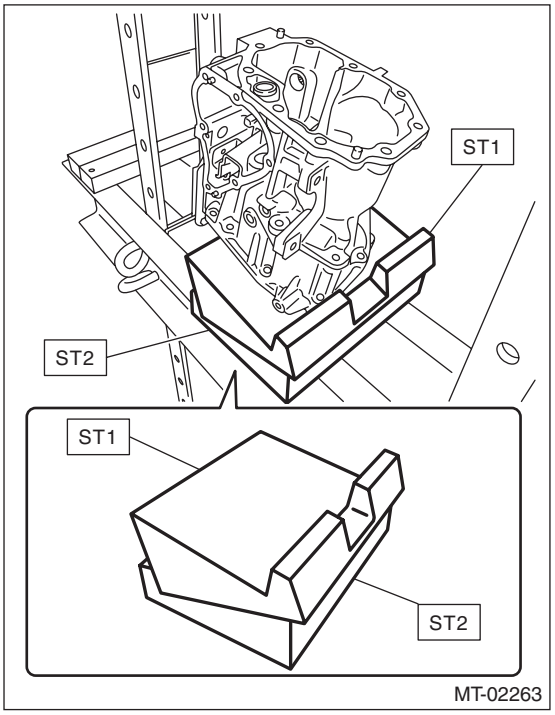




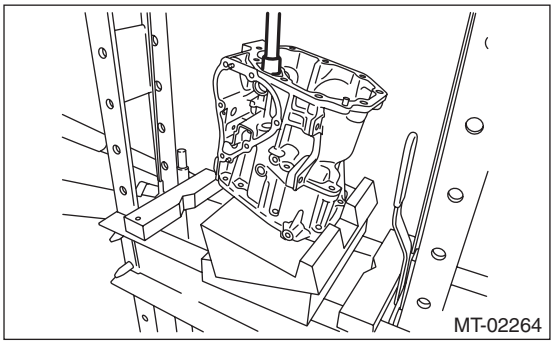
14) Set ST1, ST2 and transfer case to a press.

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



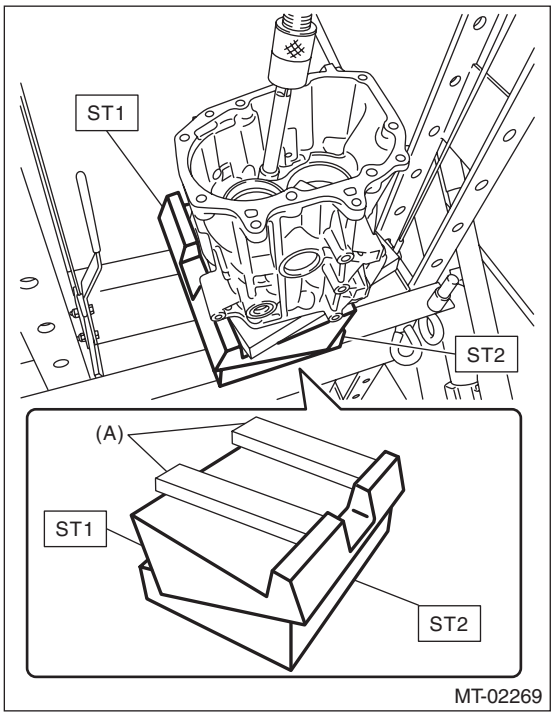
15) Remove the roller bearing by using a round bar with the diameter of 22 mm (0.87 in) or 23 mm (0.91 in).



16) Flip over the transfer case, and set an iron plate between transfer case and ST.

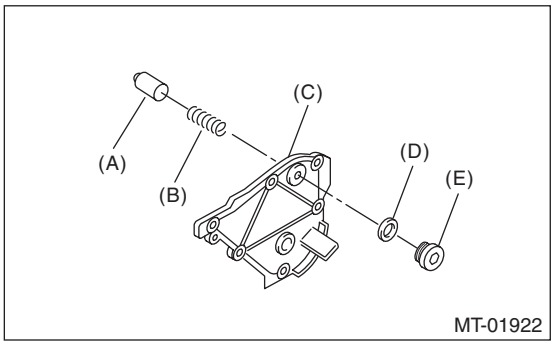
NOTE:
- Insert the iron plate which is thicker than the exposed length of the transfer case knock pin between the ST and transfer case.
- Set the iron plate so that the transfer case knock pin does not ride on the iron plate.

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 plunger and check ball spring from transmission cover.



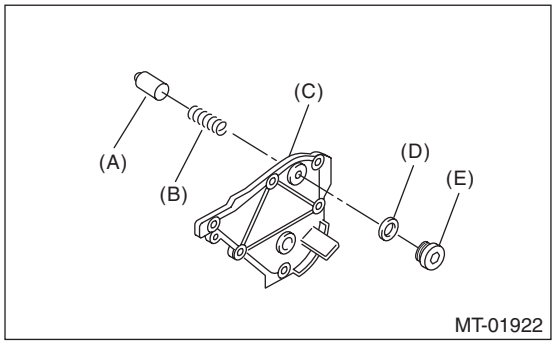
(A) Plunger
(B) Checking ball spring
(C) Transmission cover
(D) Seal ring
(E) Seal bolt

B: INSTALLATION

1) Clean the mating surface of the transmission cover and transfer case.
2) Install the plunger and check ball spring to transmission cover.

NOTE:
Use a new seal ring.

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



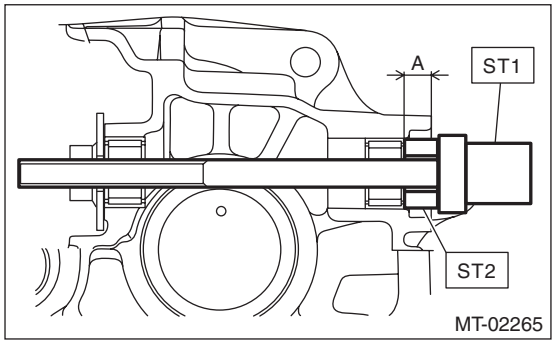
(A) Plunger
(B) Checking ball spring
(C) Transmission cover
(D) Seal ring
(E) Seal bolt

3) Using the ST, install the needle bearing to the transfer case.

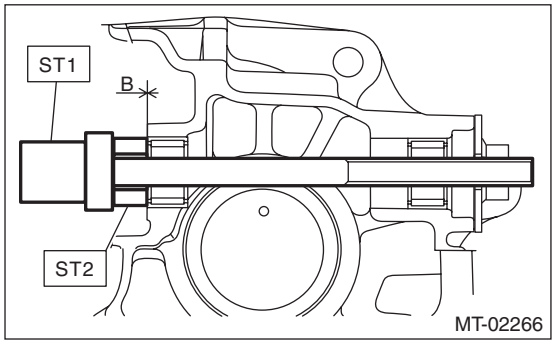
NOTE:
- Use a new needle bearing.
- If the press-fit depth exceeds the service limit, replace with a new needle bearing.

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



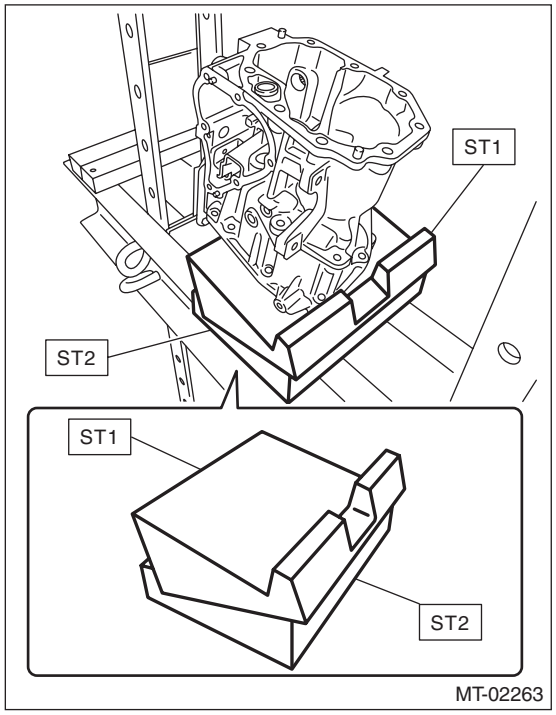
B: 0.2±0.2 mm (0.01±0.01 in) from the end of transfer case



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

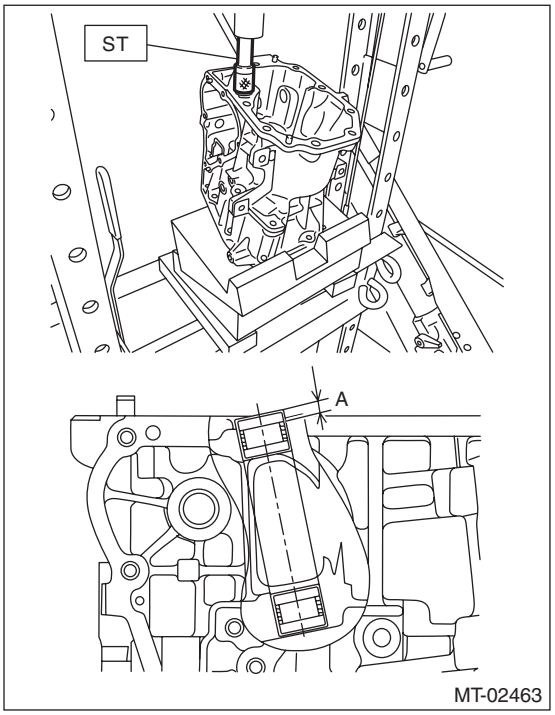


5) Using the ST, install the roller bearing to the transfer case.

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.

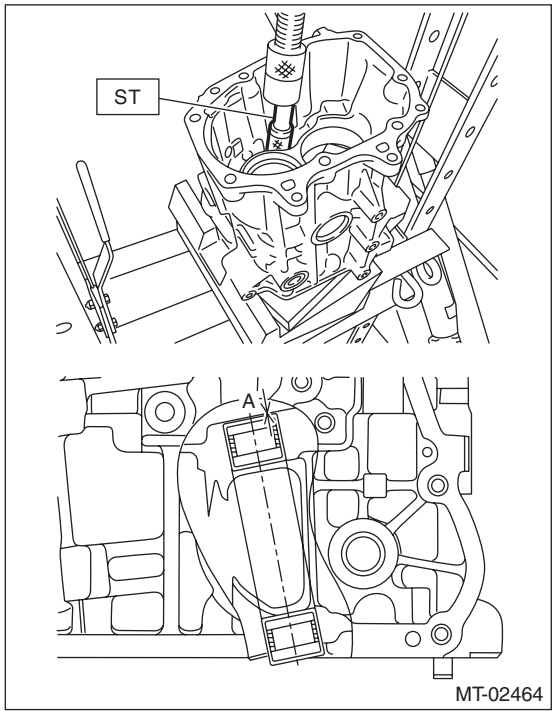
NOTE:
- Insert the iron plate which is thicker than the exposed length of the transfer case knock pin between the ST and transfer case.
- Set the parts while taking care that the transfer case knock pin and the roller bearing do not ride over the iron plate.

7) Using the ST, install the roller bearing to the transfer case.

NOTE:
- Use a new 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

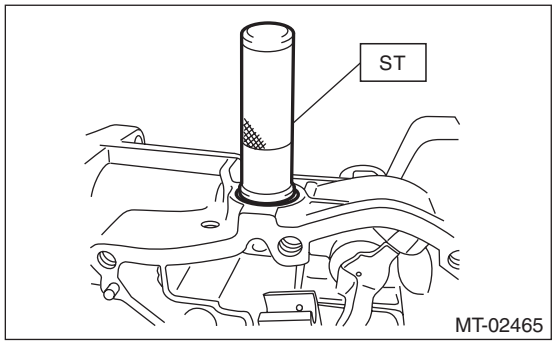
Press-fit depth of roller bearing:
A: 0±0.2 mm (0±0.01 in) from the end of transfer case



8) Using the ST, install the oil seal to the transfer case.

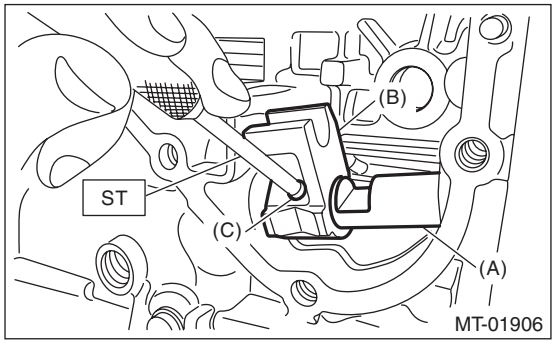
NOTE:
• Use a new oil seal.
• The illustration shows the oil seal of selector lever COMPL. Perform the same procedures for installing the shifter arm No. 2.
• Apply transmission gear oil to the oil seal lips.
ST 18657AA000 INSTALLER

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 into the selector arm, and fix with a spring pin.

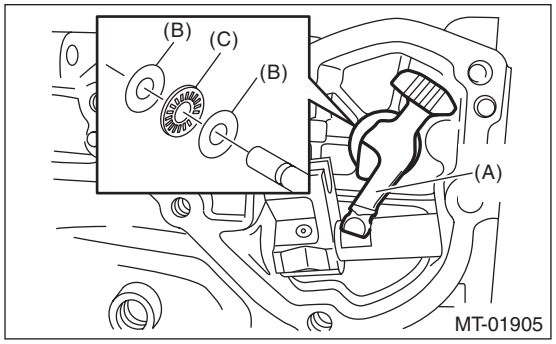
NOTE:
Use new spring pin.
ST 398791700 SPRING PIN REMOVER 2



(A) Shifter arm
(B) Selector arm
(C) Spring pin

10) Install the shifter arm No. 2, washers and thrust bearing to transfer case.

CAUTION:
Be careful not to damage the oil seal.

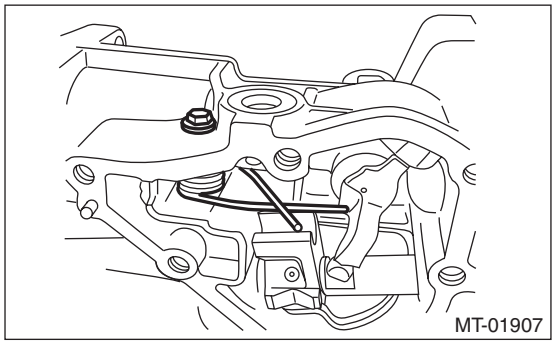


(A) Shifter arm No. 2
(B) Washer
(C) Thrust bearing

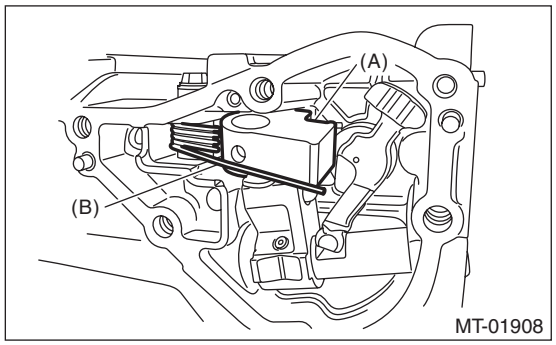
11) Install the shifter arm collar and neutral set spring to transfer case.

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 to neutral set spring.

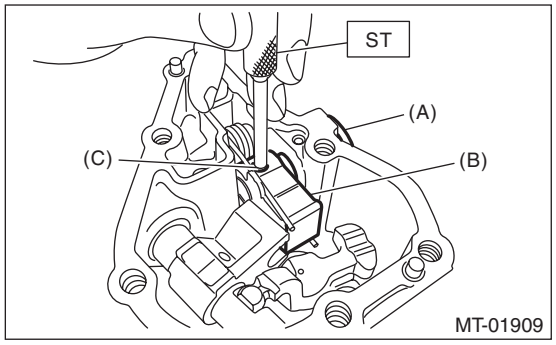


(A) Selector arm No. 2
(B) Neutral set spring

13) Insert the selector lever COMPL into the selector arm No. 2, and fix with a spring pin.

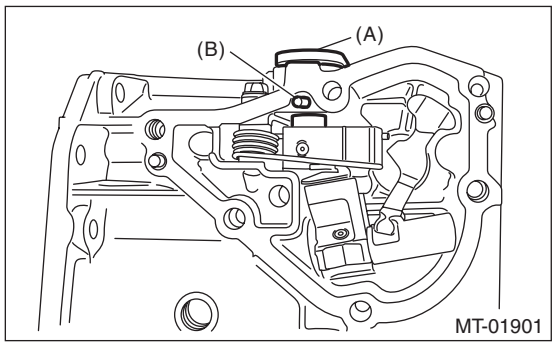
CAUTION:
Be careful not to damage the oil seal.

NOTE:
Use new spring pin.
ST 398791700 SPRING PIN REMOVER 2



(A) Selector lever COMPL
(B) Selector arm No. 2
(C) Spring pin

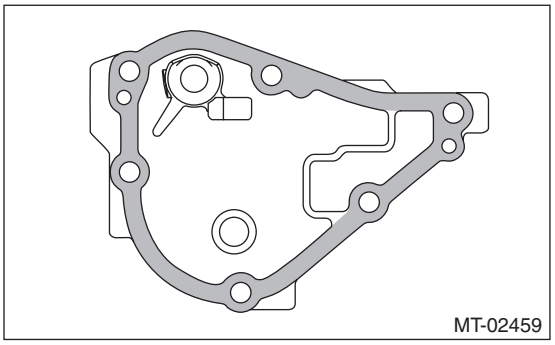
14) Insert a new straight pin.



(A) Selector lever COMPL
(B) Straight pin

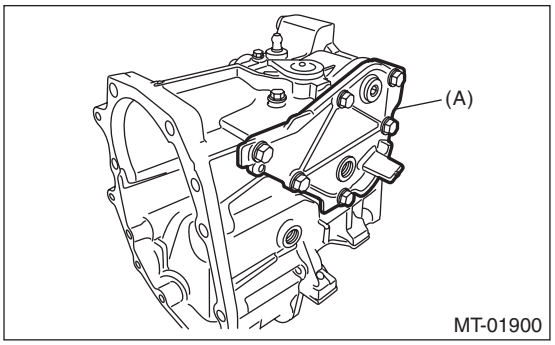
15) Apply liquid gasket seamlessly to the mating surface of transmission cover.

Liquid gasket:
THREE BOND 1215 (Part No. 004403007) or equivalent



16) Install the transmission cover to transfer case.

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



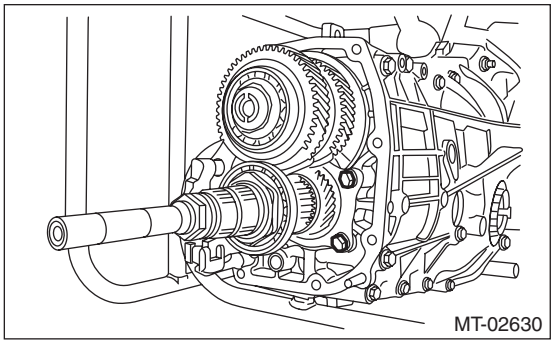
(A) Transmission cover

17) Install the center differential and transfer driven gear as a unit.
18) Install the extension case assembly. <Ref. to 6MT-40, INSTALLATION, Transfer Case and Extension Case Assembly.>
19) Attach the extension assembly to the transfer case. <Ref. to 6MT-40, INSTALLATION, Transfer Case and Extension Case Assembly.>
20) Install the transfer case and the extension case assembly. <Ref. to 6MT-40, INSTALLATION, Transfer Case and Extension Case Assembly.>
21) Install the back-up light switch and the neutral position switch. <Ref. to 6MT-36, INSTALLATION, Switches and Harness.>
22) Install the manual transmission assembly to the vehicle. <Ref. to 6MT-29, INSTALLATION, Manual Transmission Assembly.>

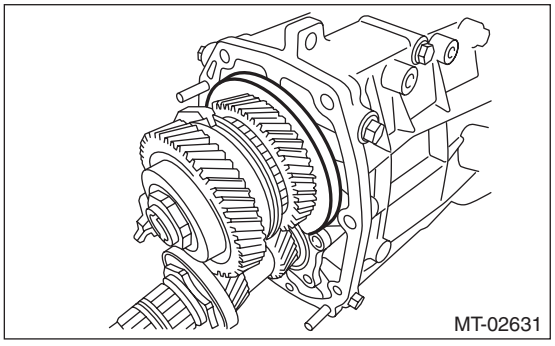
14.Transmission Case

A: REMOVAL

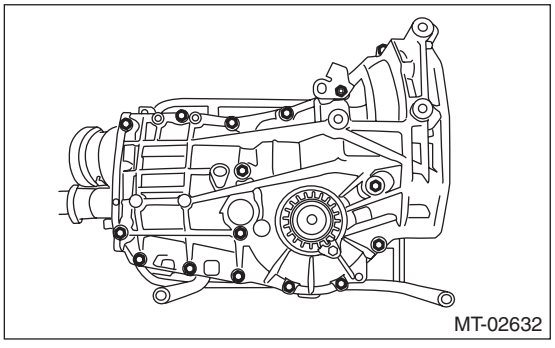
1) Remove the manual transmission assembly from the vehicle. <Ref. to 6MT-25, REMOVAL, Manual Transmission Assembly.>
2) Remove the clutch release lever. <Ref. to CL-14, REMOVAL, Release Bearing and Lever.>
3) Remove the transfer case together with the extension case assembly. <Ref. to 6MT-39, REMOVAL, Transfer Case and Extension Case Assembly.>
4) Remove the bearing mounting bolt.


MT-02630

5) Remove the main shaft rear plate.

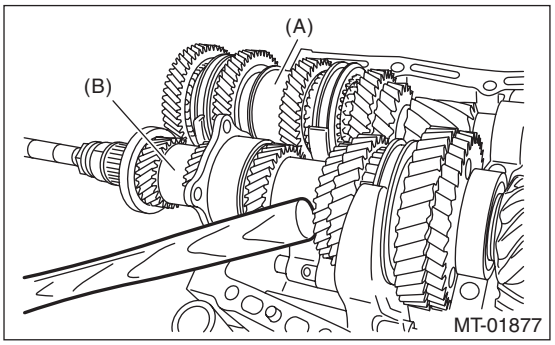

MT-02631

6) Remove the bolts and nuts, and separate the transmission case into the right and left case.


MT-02632

7) Remove the drive pinion shaft assembly from the left side of the transmission case.

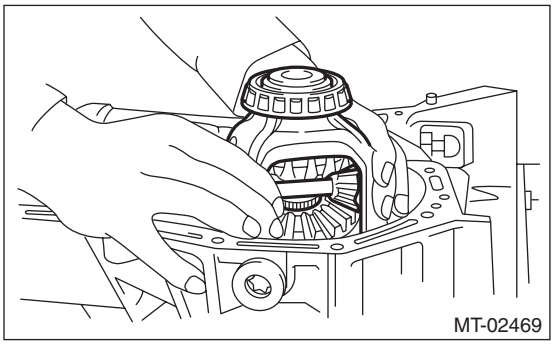
NOTE:
Use a hammer handle, etc. to remove if too tight.



MT-01877

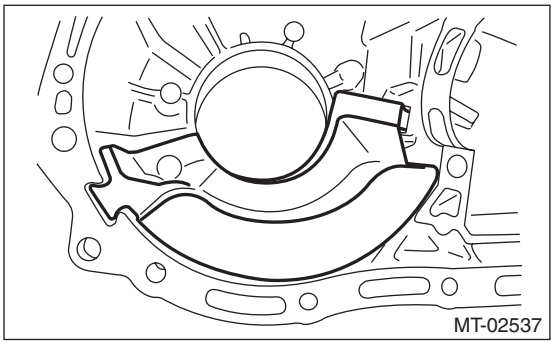
(A) Main shaft ASSY for single-range
(B) Drive pinion shaft ASSY

8) Remove the main shaft assembly for single-range.
9) Remove the front differential assembly.


MT-02469

10) Remove the differential side retainers and bearing outer races on the left and right side. <Ref. to 6MT-81, REMOVAL, Front Differential Assembly.>

NOTE:
Do not confuse the right and left roller bearing outer races.
11) Remove the reverse idler gear. <Ref. to 6MT-96, REMOVAL, Shifter Fork and Rod.>
12) Remove the shifter fork and rod. <Ref. to 6MT-96, REMOVAL, Shifter Fork and Rod.>
13) Remove the front oil guide.


MT-02537

B: INSTALLATION

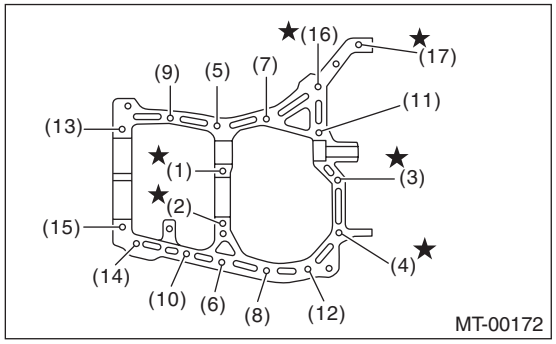
1) Wipe off grease, oil and dust on the mating surfaces of transmission cases with cleaning solvent.
2) Install the shifter fork and rod. <Ref. to 6MT-97, INSTALLATION, Shifter Fork and Rod.>
3) Install the reverse idler gear. <Ref. to 6MT-97, INSTALLATION, Shifter Fork and Rod.>
4) Select the drive pinion shim. <Ref. to 6MT-70, INSTALLATION, Drive Pinion Shaft Assembly.>
5) Install the differential side retainer, from which the bearing outer race and O-ring have already been removed, to the transmission case LH side.
6) Install the front differential assembly.
7) Install the main shaft assembly for single-range.

NOTE:
Install the transmission case knock pin into the knock pin hole of needle bearing.
8) Install the selected drive pinion shims and drive pinion shaft assembly.

NOTE:
Install the transmission case knock pin into the roller bearing knock pin hole.
9) Tighten the left and right side of the transmission case with the17 mounting bolts.

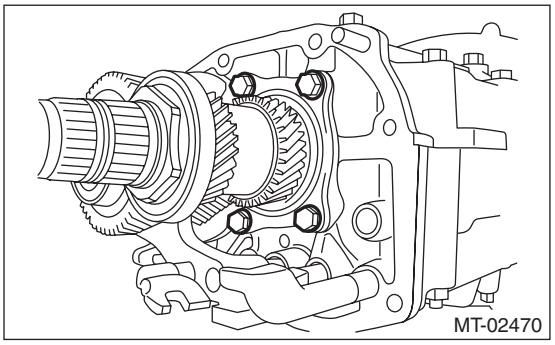
NOTE:
• Insert bolts (11) and (16) from the LH side of the transmission case.
• Match the cases together so that the drive pinion shims are not caught between the cases.

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)



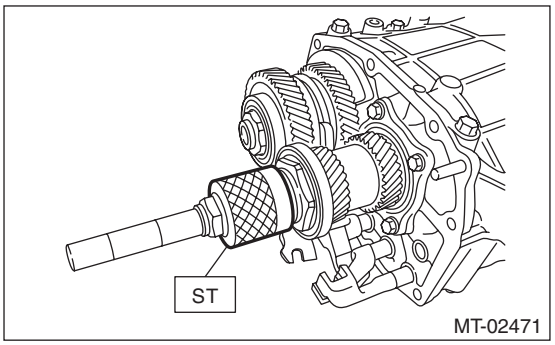
10) Install the bearing outer race to the RH side of the transmission case.
11) Tighten the bearing mounting bolts.

Tightening torque:
30 N·m (3.1 kgf-m, 22.1 ft-lb)



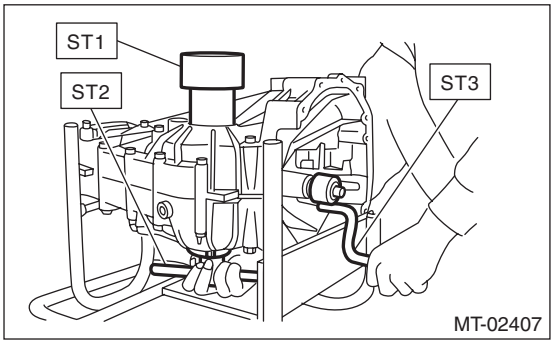
12) Perform backlash adjustment of the hypoid gear and preload adjustment of the roller bearing.
(1) Attach the ST on drive pinion assembly.

ST	18667AA020	HOLDER



(2) Place the transmission case with the LH side facing downward, and put ST1 on the bearing outer race.
(3) Screw the side retainer from the bottom into left case using ST2. Fit the ST3 on transmission main shaft. Shift the gear into 4th or 5th, and turn the shaft several times. Screw in the retainer while rotating the ST3 until a slight resistance is felt on ST2.
This is the contact point of the hypoid gear and the drive pinion shaft. Repeat the above sequence several times to ensure the contact point.

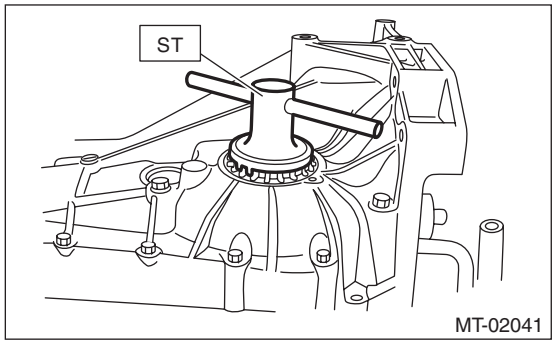
ST1	399780104	WEIGHT
ST2	18630AA010	WRENCH COMPL RETAINER
ST3	499927100	HANDLE



(4) Remove the WEIGHT, and screw in the 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 gear and drive pinion shaft is zero.

ST 18630AA010 WRENCH COMPL RETAINER



(5) Loosen the side retainer on the LH side of the transmission case by 3 notches, and turn the side retainer on the RH side of the transmission case by the same notches in order to apply backlash.

(6) Screw in the 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 upper and lower lock plates, and put marks on both the side retainer and lock plate for later readjustment.

NOTE:
If it is hard to install the lock plates, reverse the sides and install them.

(8) Turn the transmission main shaft several times while tapping around the retainer lightly with plastic hammer.

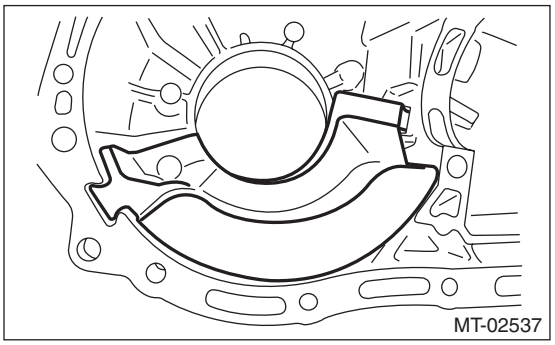
13) Inspect and adjust backlash and tooth contact of the hypoid gear. <Ref. to 6MT-85, INSPECTION, Front Differential Assembly.>

14) Separate the transmission case into left and right parts. <Ref. to 6MT-57, REMOVAL, Transmission Case.>

15) Check each shifter fork. <Ref. to 6MT-98, INSPECTION, Shifter Fork and Rod.>

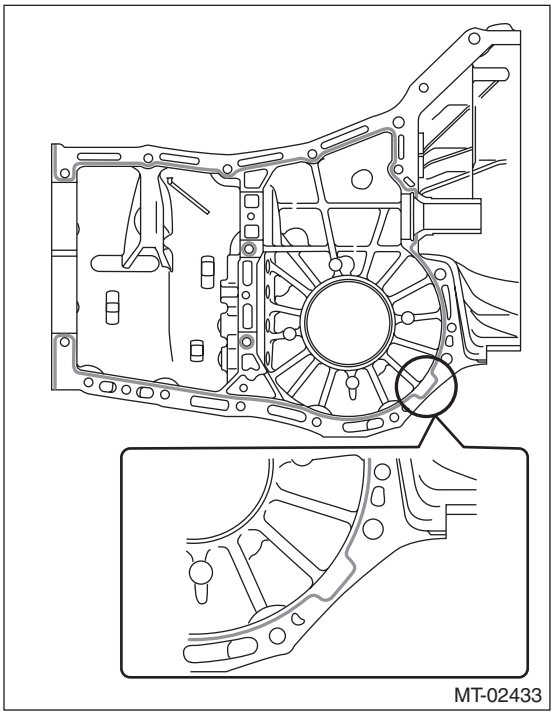
16) Install the front oil guide to the RH side of the transmission case.

NOTE:
Fit in all the way.



17) Apply liquid gasket, then join the right side and left side of the case together.

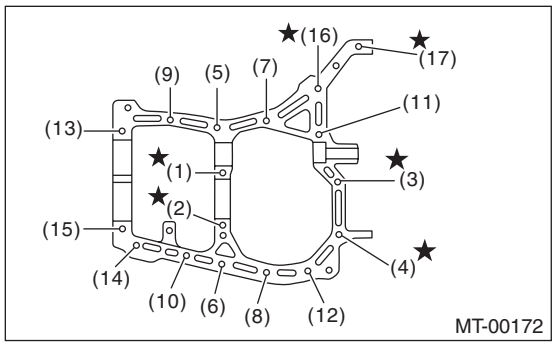
Liquid gasket:
THREE BOND 1215 (Part No. 004403007) or equivalent



18) With brackets and clips as shown in the figure, tighten the seventeen bolts.

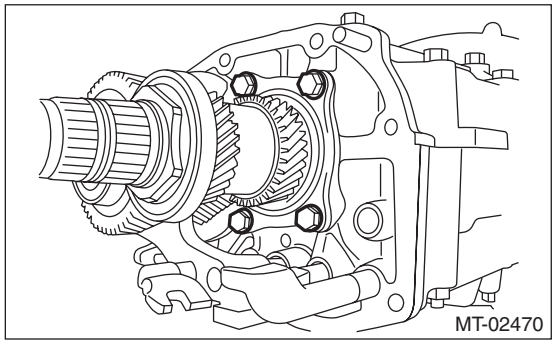
NOTE:
• Insert bolts (11) and (16) from the LH side of the transmission case.
• Match the cases together so that the drive pinion shims are not caught between the cases.

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)



19) Tighten the bearing mounting bolts.

Tightening torque:
30 N·m (3.1 kgf-m, 22.1 ft-lb)

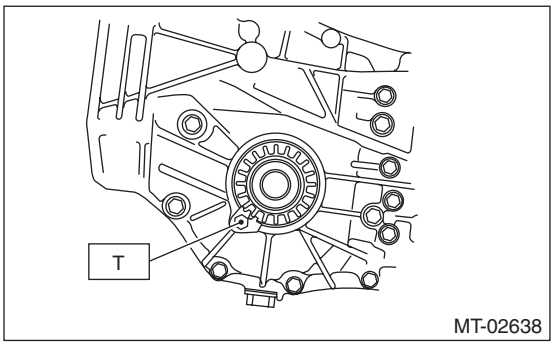


20) Remove the lock plate. Then loosen the retainer until the O-ring groove appears. Fit the O-ring into the groove and tighten the retainer into the position where it was not loosened.

NOTE:
• When loosening the retainer, record the number of the turns made.
• Perform this for both left and right side retainers.
• Use new O-rings.

21) Install the lock plate.

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



22) Select a main shaft rear plate. <Ref. to 6MT-69, ADJUSTMENT, Main Shaft Assembly for Single-Range.>
23) Install the transfer case together with the extension case assembly. <Ref. to 6MT-40, INSTALLATION, Transfer Case and Extension Case Assembly.>
24) Install the clutch release lever and bearing. <Ref. to CL-14, INSTALLATION, Release Bearing and Lever.>
25) Install the manual transmission assembly to the vehicle. <Ref. to 6MT-29, INSTALLATION, Manual Transmission Assembly.>

C: INSPECTION

Check the transmission case for cracks, damage, or oil leaks.

15.Main Shaft Assembly for Single-Range

A: REMOVAL

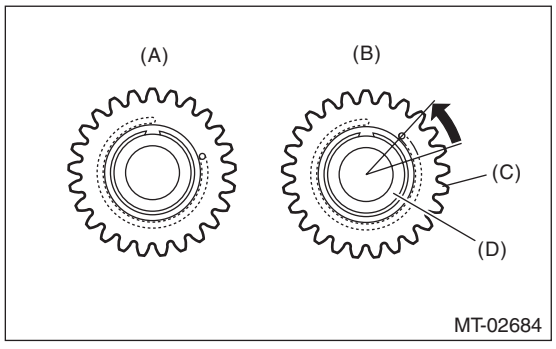
1) Remove the manual transmission assembly from the vehicle. <Ref. to 6MT-25, REMOVAL, Manual Transmission Assembly.>
2) Remove the transfer case together with the extension case assembly. <Ref. to 6MT-39, REMOVAL, Transfer Case and Extension Case Assembly.>
3) Remove the transmission case. <Ref. to 6MT-57, REMOVAL, Transmission Case.>
4) Remove the drive pinion shaft assembly. <Ref. to 6MT-70, REMOVAL, Drive Pinion Shaft Assembly.>
5) Remove the main shaft assembly for single-range.

B: INSTALLATION

1) Install the needle bearing and oil seal to the front of the transmission single-range 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.

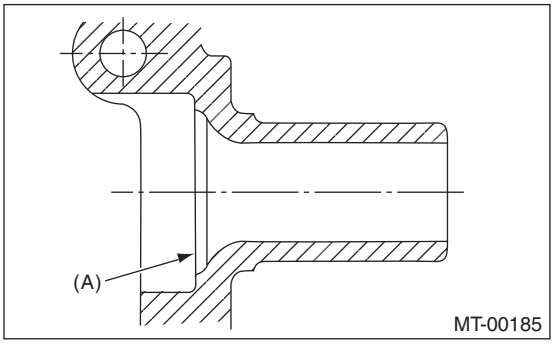
2) Rotate the reverse idler gear by two teeth from free status in the direction of the arrow to make it engage with the main shaft reverse gear and install the main shaft assembly.
(1) When the reverse idler sub gear is at free status, put alignment marks on reverse idler sub gear and reverse idler gear.
(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.



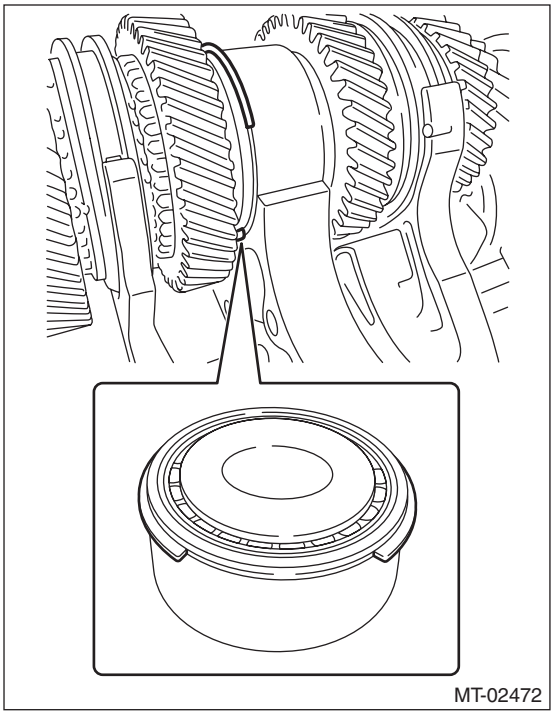
(A) Free status
(B) Set status
(C) Reverse idler sub gear
(D) Reverse idler sub gear ASSY

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.

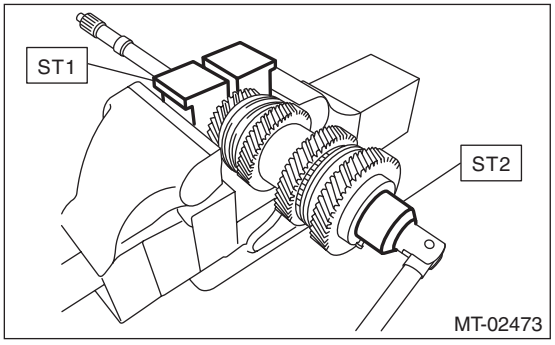


4) After installing the main shaft, check that the reverse idler gear and reverse idler sub gear are misaligned by two teeth and remove the wire.
5) Install the drive pinion shaft assembly. <Ref. to 6MT-70, INSTALLATION, Drive Pinion Shaft Assembly.>
6) Check each shift fork. <Ref. to 6MT-98, INSPECTION, Shifter Fork and Rod.>
7) Select a main shaft rear plate. <Ref. to 6MT-61, Main Shaft Assembly for Single-Range.>
8) Install the transmission case. <Ref. to 6MT-58, INSTALLATION, Transmission Case.>

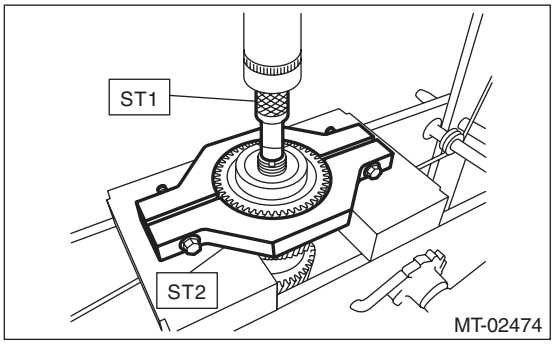
9) Install the transfer case together with the extension case assembly. <Ref. to 6MT-40, INSTALLATION, Transfer Case and Extension Case Assembly.>
10) Install the manual transmission assembly to the vehicle. <Ref. to 6MT-29, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

NOTE:
• When replacing the coupling sleeve and synchronizer hub, replace them as a set.
• Do not disassemble the coupling sleeve & synchronizer hub; the engaging point is pre-determined. 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 from transmission main shaft assembly for single-range.
ST1 498937000 TRANSMISSION HOLDER
ST2 499987003 SOCKET WRENCH (35)



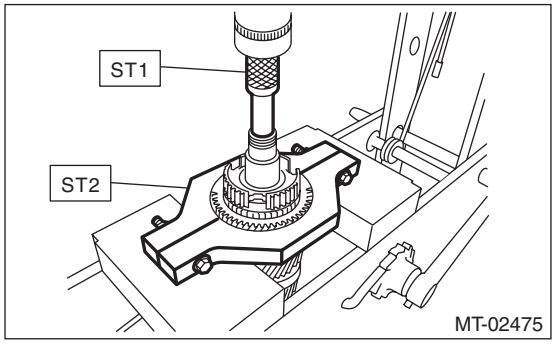
4) Remove the 6th drive gear and ball bearing using the ST1, ST2 and a press.
ST1 899864100 REMOVER
ST2 18722AA010 REMOVER



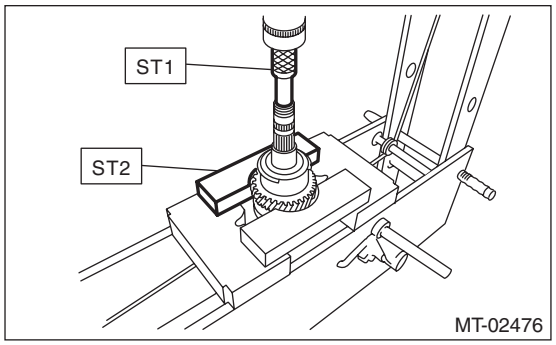
5) Remove the needle bearing, 6th baulk ring, shifting insert and 5th-6th coupling sleeve.

CAUTION:
When removing 5th-6th coupling sleeve, be careful not to lose the shifting insert.

6) Remove the 5th drive gear, 6th needle bearing race, 5th baulk ring, 5th-6th synchronizer hub and needle bearing using the ST1, ST2 and a press.
ST1 899864100 REMOVER
ST2 18722AA010 REMOVER



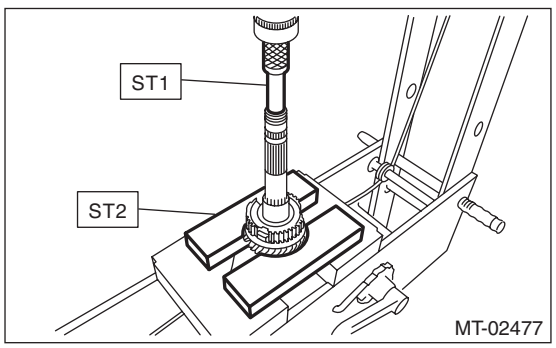
7) Shift the 3rd-4th coupling sleeve to the 3rd side.
8) Remove the 4th drive gear, double taper roller bearing and 5th needle bearing race using the ST1, ST2 and a press.
ST1 899864100 REMOVER
ST2 899714110 REMOVER



9) Remove the 4th gear thrust washer, 4th baulk ring, needle bearing, shifting insert and 3rd-4th coupling sleeve.

CAUTION:
When removing 3rd-4th coupling sleeve, be careful not to lose the shifting insert.

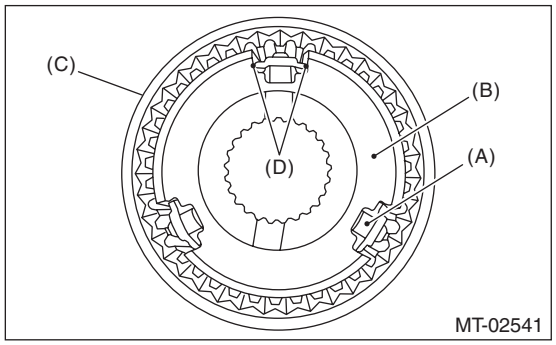
10) Remove the 3rd drive gear, 4th needle bearing race, 3rd-4th synchronizer hub, inner baulk ring, 3rd synchro cone, outer baulk ring and needle bearing using the ST1, ST2 and a press.
ST1 899864100 REMOVER
ST2 899714110 REMOVER



D: ASSEMBLY

1) Match the alignment marks, and install the coupling sleeve to the synchronizer hub and then install the shifting insert.

NOTE:
Make sure that there is no large clearance at both sides of the shifting insert after assembly.

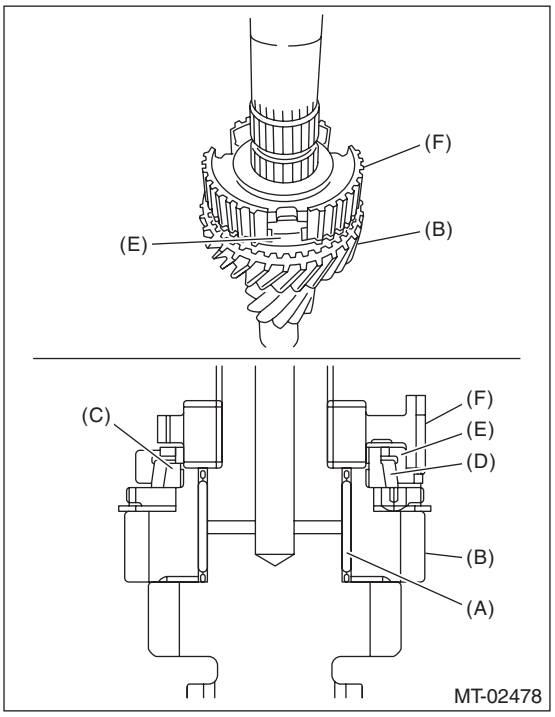


(A) Shifting insert
(B) Synchronizer hub
(C) Coupling sleeve
(D) There is no large clearance at this part.

2) Install the needle bearing, 3rd drive gear, outer baulk ring, 3rd synchro cone, inner baulk ring and 3rd-4th synchronizer hub on the transmission main shaft.

NOTE:
• Install the 3rd-4th synchronizer hub in the correct direction.

• Align the protrusion of the outer baulk ring into the groove of the 3rd-4th synchronizer hub.

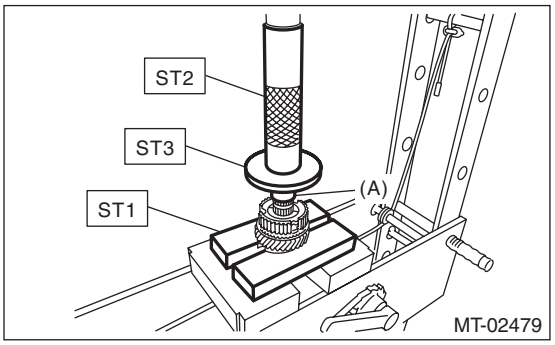


(A) 3rd needle bearing
(B) 3rd drive gear
(C) Inner baulk ring
(D) 3rd synchro cone
(E) Outer baulk ring
(F) 3rd-4th synchronizer hub

3) Install the 4th needle bearing race onto transmission main shaft 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).

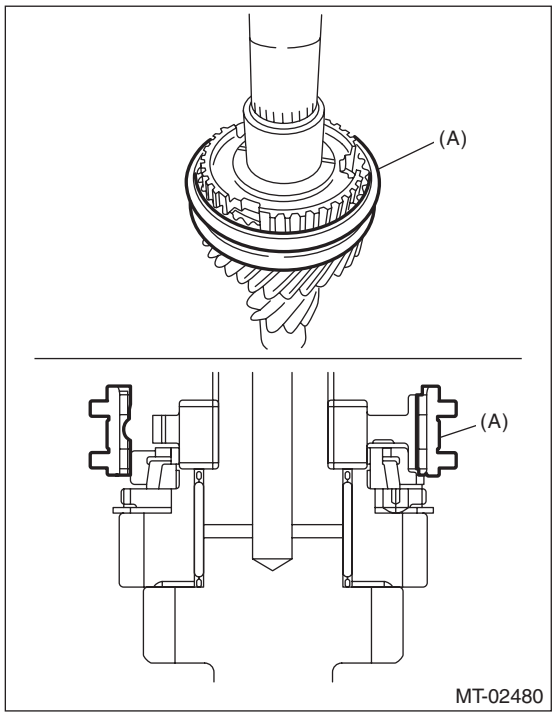
ST1	899714110	REMOVER
ST2	499877000	RACE 4-5 INSTALLER
ST3	398177700	INSTALLER



(A) 4th needle bearing race

4) Install the 3rd-4th coupling sleeve to the 3rd-4th synchronizer hub.

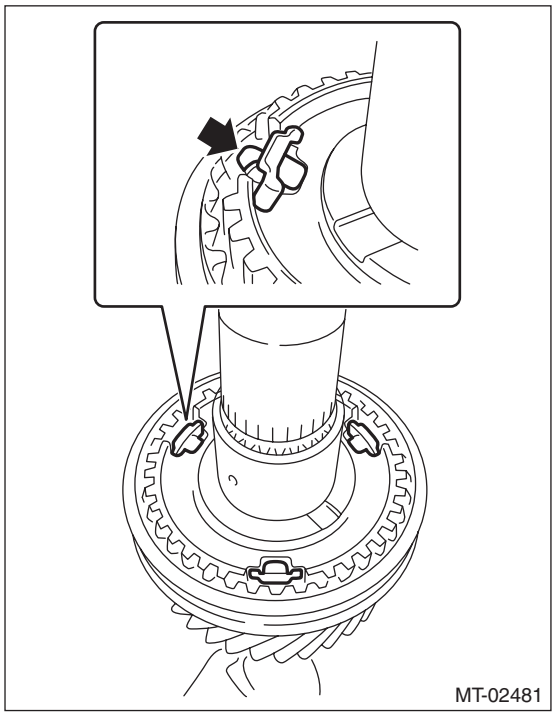
NOTE:
• Install the 3rd-4th coupling sleeve in the correct direction.
• Align the alignment marks of 3rd-4th coupling sleeve and the 3rd-4th synchronizer hub.



(A) 3rd-4th coupling sleeve

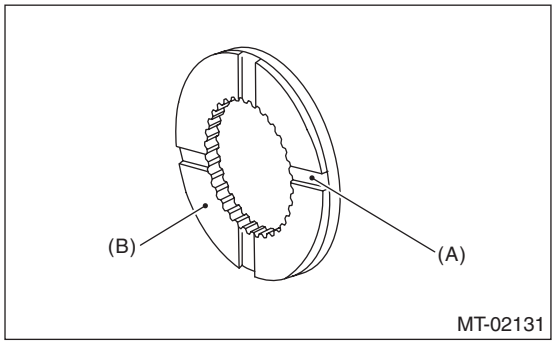
5) Install the shifting insert.

NOTE:
Press in the ball part to install.

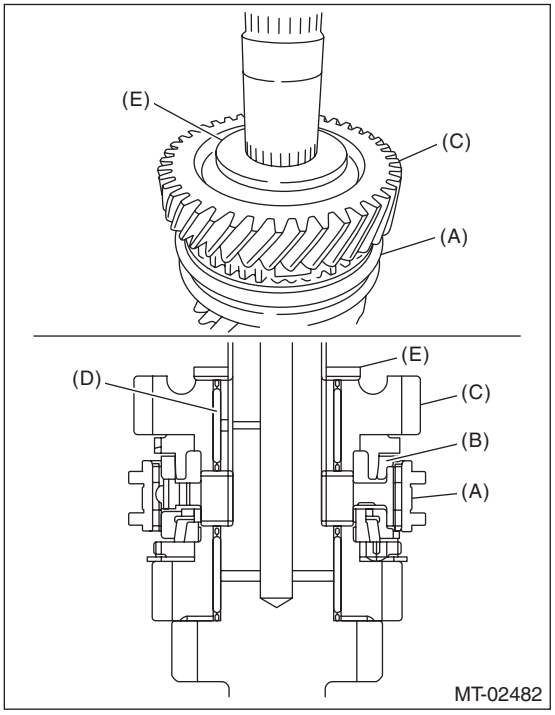


6) Install the 4th baulk ring, needle bearing, 4th drive gear and 4th gear thrust washer to the transmission main shaft.

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.



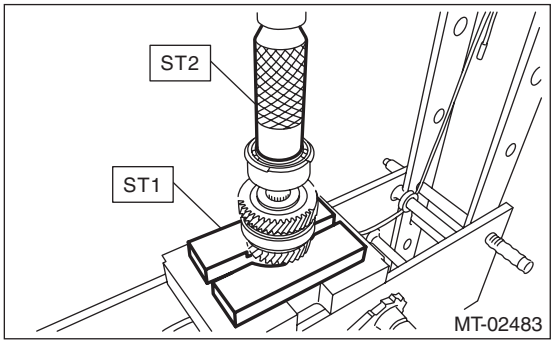
(A) 3rd-4th coupling sleeve
(B) 4th baulk ring
(C) 4th drive gear
(D) Needle bearing
(E) 4th gear thrust washer

7) Install the double taper roller bearing into the rear section of transmission main shaft 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

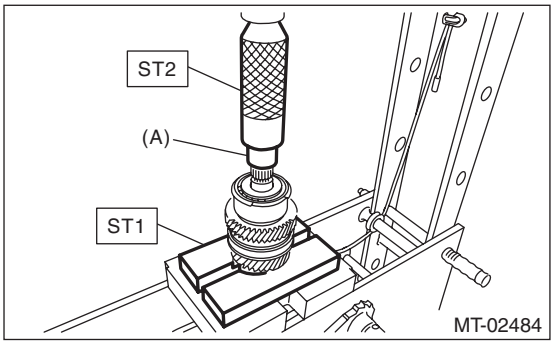


8) Make sure that the double taper roller bearing turns smoothly.

9) Install the 5th needle bearing race onto the transmission main shaft 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).

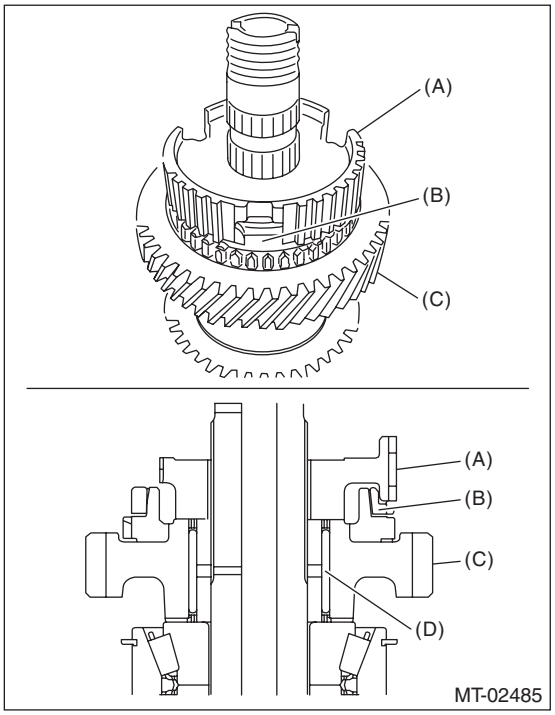
ST1 899714110 REMOVER
ST2 499877000 RACE 4-5 INSTALLER



(A) 5th needle bearing race

10) Install the needle bearing, 5th drive gear, 5th baulk ring, and 5th-6th synchronizer hub on the transmission main shaft.

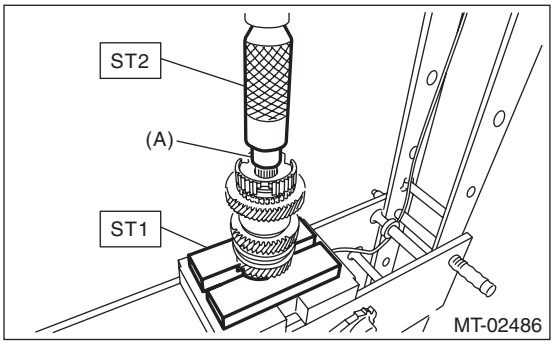
NOTE:
• Align the protrusion part of the 5th baulk ring with the groove of the 5th-6th synchronizer hub.
• Install the 5th-6th synchronizer hub in the correct direction.



(A) 5th-6th synchronizer hub
(B) 5th baulk ring
(C) 5th drive gear
(D) 5th needle bearing (cage: black)

11) Install the 6th needle bearing race onto the transmission main shaft using ST1, ST2 and a press.

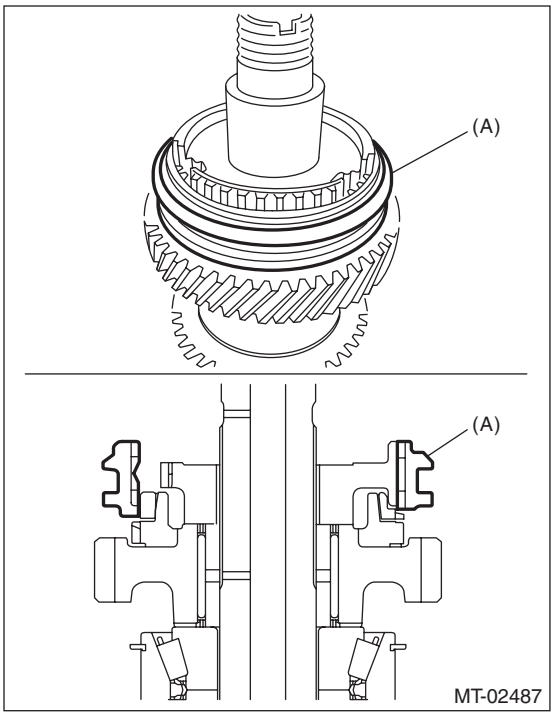
CAUTION:
Do not apply a load in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).
ST1 899714110 REMOVER
ST2 499877000 RACE 4-5 INSTALLER



(A) 6th needle bearing race

12) Install the 5th-6th coupling sleeve to the 5th-6th synchronizer hub.

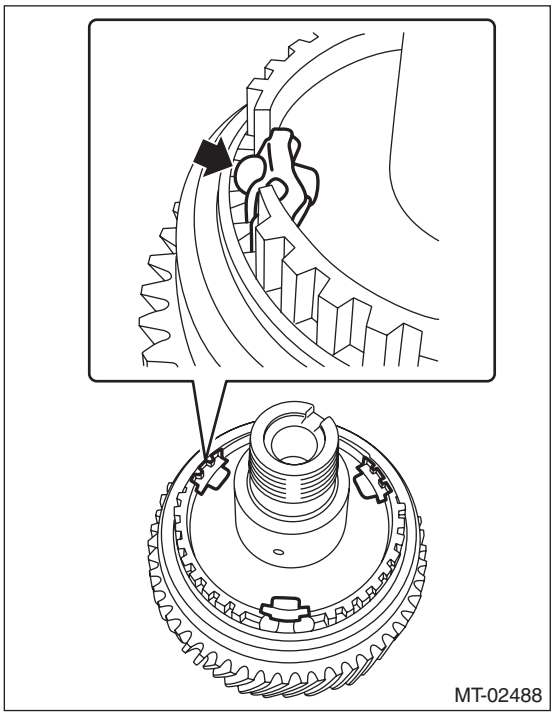
NOTE:
• Install the 5th-6th coupling sleeve in the correct direction.
• Align the alignment marks of 5th-6th coupling sleeve and the 5th-6th synchronizer hub.



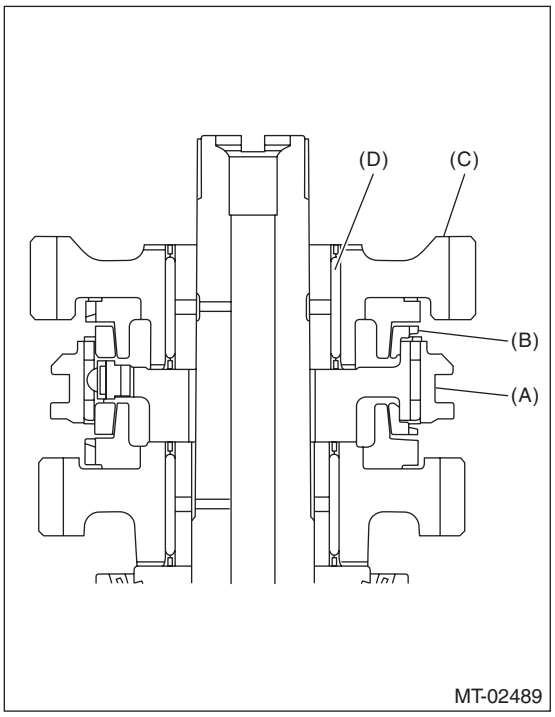
(A) 5th-6th coupling sleeve

13) Install the shifting insert.

NOTE:
Press in the ball part to install.



14) Install the 6th baulk ring, 6th drive gear and needle bearing to the transmission main shaft.

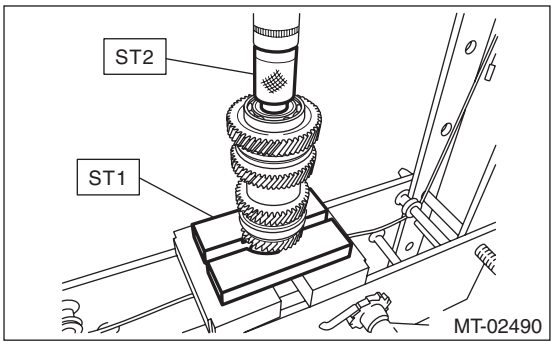


(A) 5th-6th coupling sleeve
(B) 6th baulk ring
(C) 6th drive gear
(D) 6th needle bearing (cage: silver)

15) Install the ball bearing onto transmission main shaft using ST2 and a press.

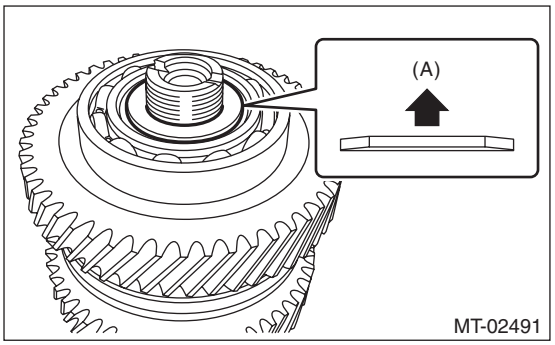
CAUTION:
Do not apply a load in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

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



16) Install the lock washer.

NOTE:
- Use a new lock washer.
- Install the lock washer in the correct direction.



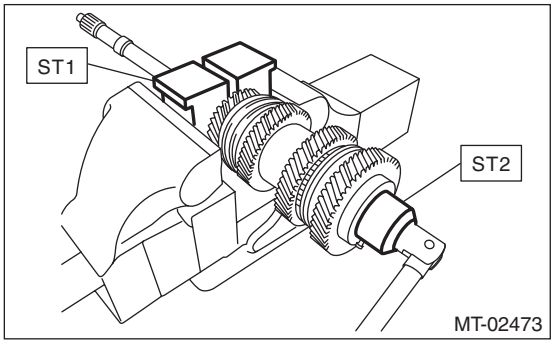
(A) Lock nut side

17) Tighten the lock nuts to the specified torque using ST1 and ST2.

NOTE:
Use a new lock nut.

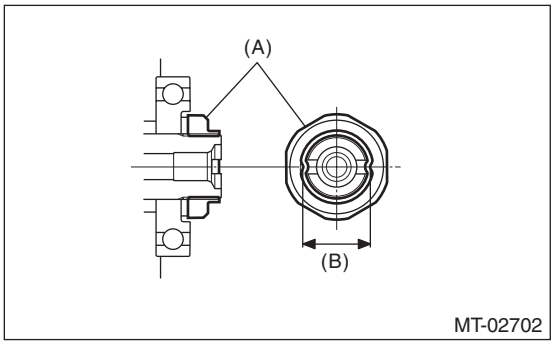
Tightening torque:
160 N·m (16.3 kgf-m, 118.0 ft-lb)

ST1 498937000 TRANSMISSION HOLDER
ST2 499987003 SOCKET WRENCH (35)



18) 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

E: INSPECTION

Disassembled parts should be washed with cleaning solvent first, then inspected carefully.

1) Bearing
Replace the bearings in the following cases.
• When the bearing balls, outer races and inner races are broken or rusty.
• When the bearing is worn.
• When the bearings fail to turn smoothly or emit noise in rotation after gear oil lubrication.
• When bearing has other defects.

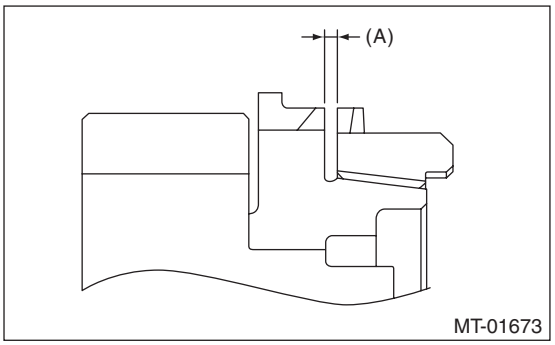
2) Bushing (each gear)
Replace the bushing in following cases.
• When the sliding surface is damaged or abnormally worn.
• When the inner wall is abnormally worn.

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.

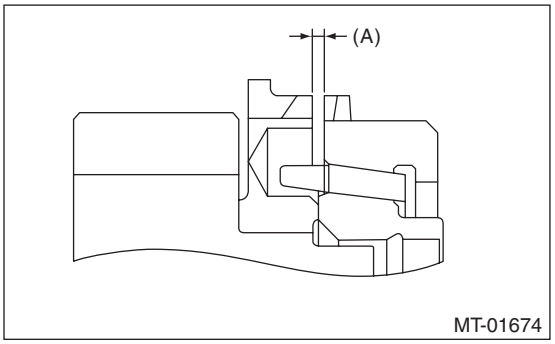
4) Baulk ring
Replace the baulk ring in the following cases.
• When the inner surface or end face is damaged.
• When the ring inner surface is abnormally or partially worn down.
• When the contact surface of the baulk ring insert section is cracked or abnormally worn.
• If the gap between the end faces of the 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

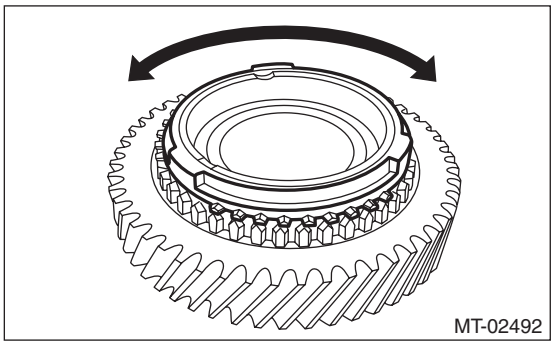
Single cone



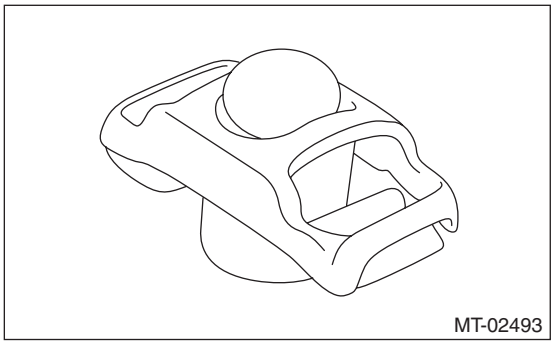
Double cone



• Apply 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) Shifting insert
Replace the shifting insert if there is deformation, excessive wear on the ball section or any defectiveness.



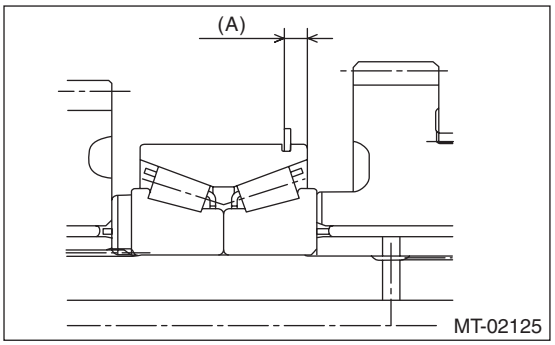
6) Coupling sleeve and synchronizer hub
• Check the slipping condition of the coupling sleeve.
• Check the splines on the coupling sleeve and synchronizer hub for wear.
7) Oil seal
Replace the oil seal if the lip is deformed, hardened, worn or defective in any way.
8) Gearshift mechanism
Repair or replace the gearshift mechanism if excessively worn, bent or defective in any way.

F: 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

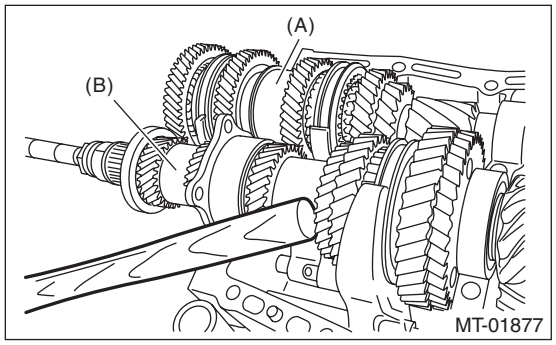


16.Drive Pinion Shaft Assembly

A: REMOVAL

1) Remove the manual transmission assembly from the vehicle. <Ref. to 6MT-25, REMOVAL, Manual Transmission Assembly.>
2) Remove the transfer case together with the extension case assembly. <Ref. to 6MT-39, REMOVAL, Transfer Case and Extension Case Assembly.>
3) Remove the transmission case. <Ref. to 6MT-57, REMOVAL, Transmission Case.>
4) Remove the drive pinion shaft assembly.

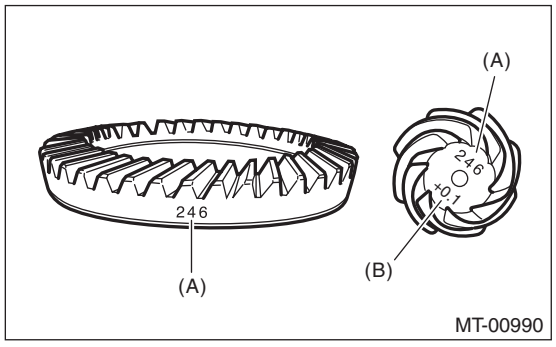
NOTE:
Use a hammer handle, etc. to remove if too tight.



(A) Main shaft ASSY for single-range
(B) Drive pinion shaft ASSY

B: 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.

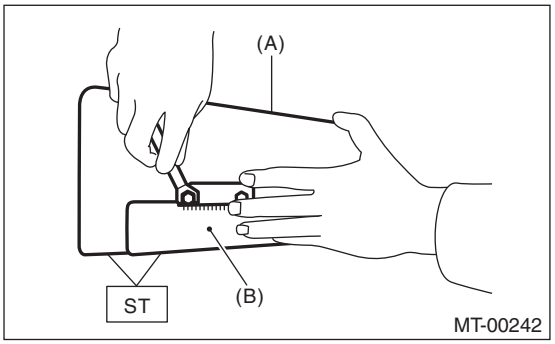


(A) Set number
(B) Number for shim adjustment

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.

NOTE:
• 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.
• Tighten the two bolts.

ST 499917500 DRIVE PINION GAUGE ASSY



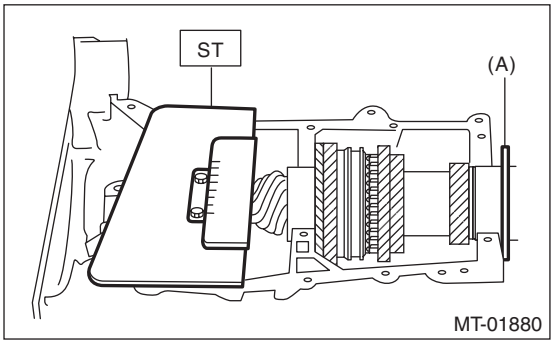
(A) Plate
(B) Scale

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 shim.

7) The thickness of shim 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 shims in the following table for the value determined as described above, and take the shim(s) whose thickness is closest to the said value.

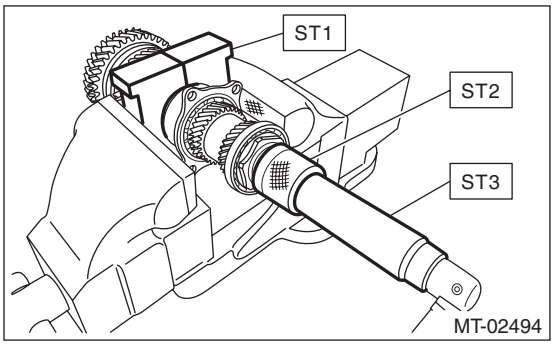
NOTE:
Install the shim with it's cut in facing the shifter fork & rod side.

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)

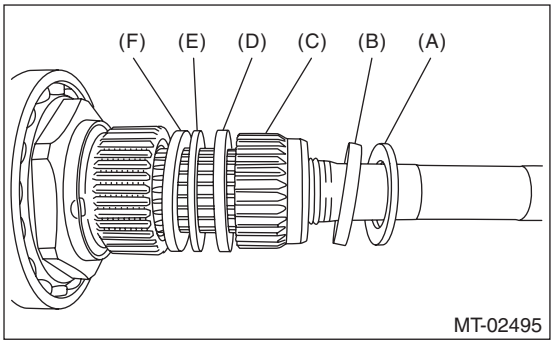
9) Install the front differential assembly. <Ref. to 6MT-81, INSTALLATION, Front Differential Assembly.>
10) Fit the transmission case knock pin to the knock pin hole of the roller bearing and install the drive pinion shaft assembly.
11) Install the main shaft assembly for single-range. <Ref. to 6MT-61, INSTALLATION, Main Shaft Assembly for Single-Range.>
12) Check each shifter fork. <Ref. to 6MT-98, INSPECTION, Shifter Fork and Rod.>
13) Install the transmission case. <Ref. to 6MT-58, INSTALLATION, Transmission Case.>
14) Install the transfer case together with the extension case assembly. <Ref. to 6MT-40, INSTALLATION, Transfer Case and Extension Case Assembly.>
15) Install the manual transmission assembly to the vehicle. <Ref. to 6MT-29, INSTALLATION, Manual Transmission Assembly.>

C: 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)

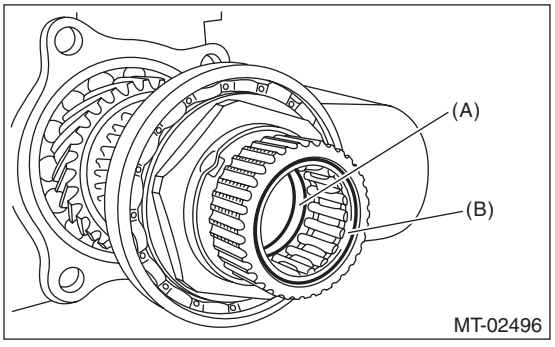


3) Remove the lock washer, washer, differential bevel gear sleeve, adjusting washer No. 1, thrust bearing and adjusting washer No. 2.



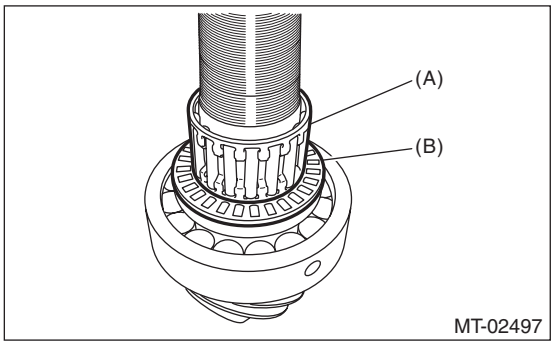
(A) Lock washer
(B) Washer
(C) Differential bevel gear sleeve
(D) Adjusting washer No. 1 (25 × 36 × t)
(E) Thrust bearing (25 × 36 × 2)
(F) Adjusting washer No. 2 (25 × 36 × t)

4) Draw out the drive pinion shaft from driven shaft.
5) Remove the needle bearing and drive pinion collar from driven shaft.



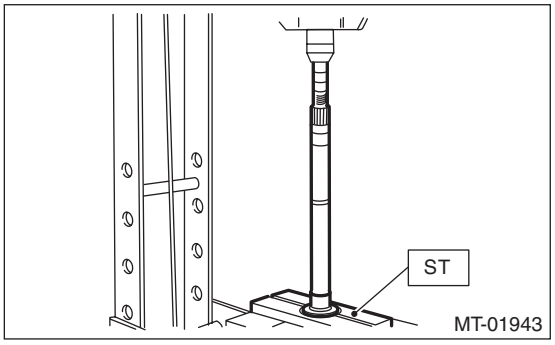
(A) Drive pinion collar
(B) Needle bearing (25 × 30 × 20)

6) Remove the needle bearing and thrust bearing from drive pinion shaft.

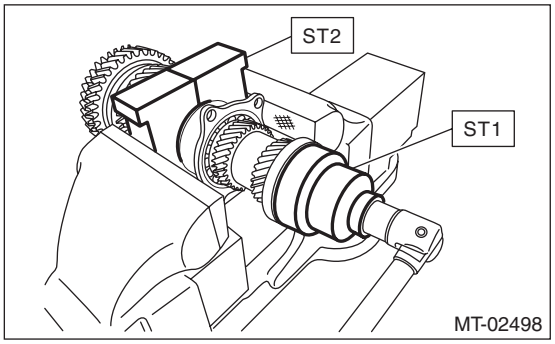


(A) Needle bearing (30 × 37 × 23)
(B) Thrust bearing (33 × 50 × 3)

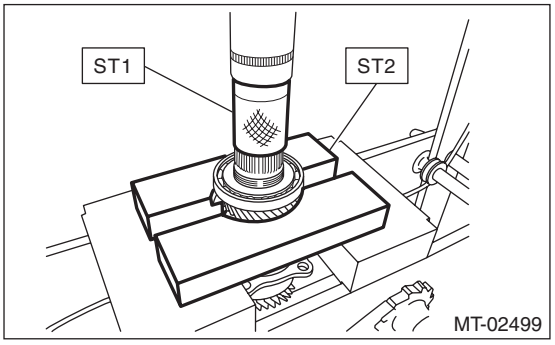
7) Remove the roller bearing and washer using ST and a press.
ST 498077000 REMOVER



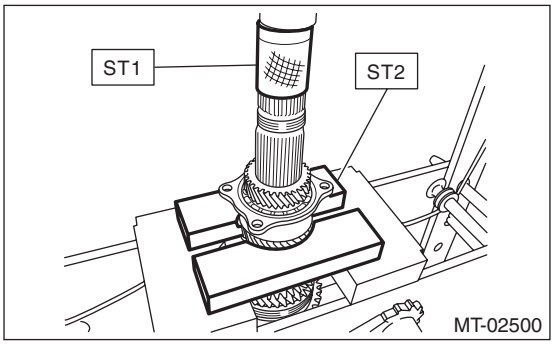
8) Flatten the tab of the lock nut.
9) Remove the lock nut using ST1 and ST2.
ST1 499987300 SOCKET WRENCH (50)
ST2 18680AA020 HOLDER



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



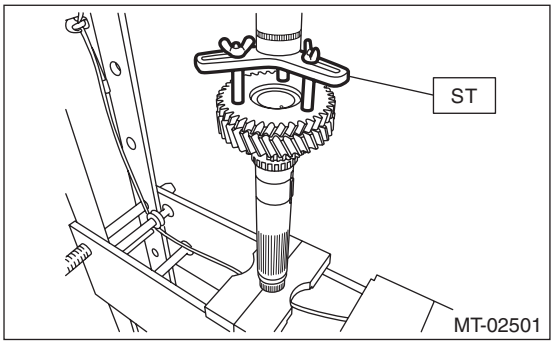
11) Remove the double ball bearing and 3rd-4th driven gear using ST1, ST2 and a press.
ST1 899754112 PRESS
ST2 899714110 REMOVER



12) Remove the key.
13) Remove the 2nd driven gear, inner baulk ring, synchro cone, outer baulk ring, shifting insert and 1st-2nd coupling sleeve.

CAUTION:
When removing 1st-2nd coupling sleeve, be careful not to lose the shifting insert.

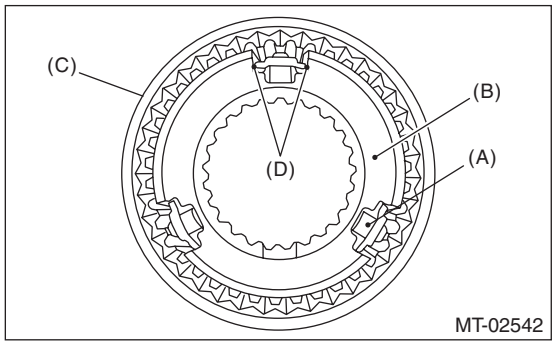
14) Remove the 1st driven gear, inner baulk ring, synchro cone, outer baulk ring, 2nd gear bushing and 1st-2nd synchronizer hub using ST and a press.
ST 18762AA000 COMPRESSOR SPECIAL TOOL



D: ASSEMBLY

1) Match the alignment marks, and install the coupling sleeve to the synchronizer hub and then install the shifting insert.

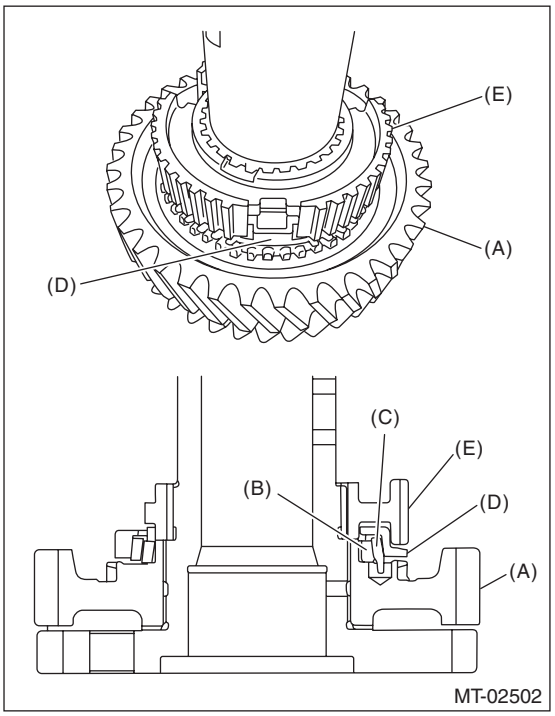
NOTE:
Make sure that there is no large clearance at both sides of the shifting insert after assembly.



(A) Shifting insert
(B) Synchronizer hub
(C) Coupling sleeve
(D) There is no large clearance at this part.

2) Install the 1st driven gear, inner baulk ring, synchro cone, outer baulk ring and 1st-2nd synchronizer hub onto driven shaft.

NOTE:
• Install the 1st-2nd synchronizer hub in proper direction.
• Align the protrusion of the outer baulk ring into the groove of the 1st-2nd synchronizer hub.

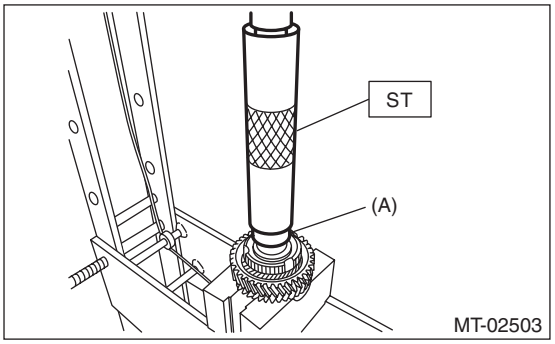


(A) 1st driven gear
(B) Inner baulk ring
(C) Synchro cone
(D) Outer baulk ring
(E) 1st-2nd synchronizer hub

3) Install the 2nd driven gear bushing onto driven shaft 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).

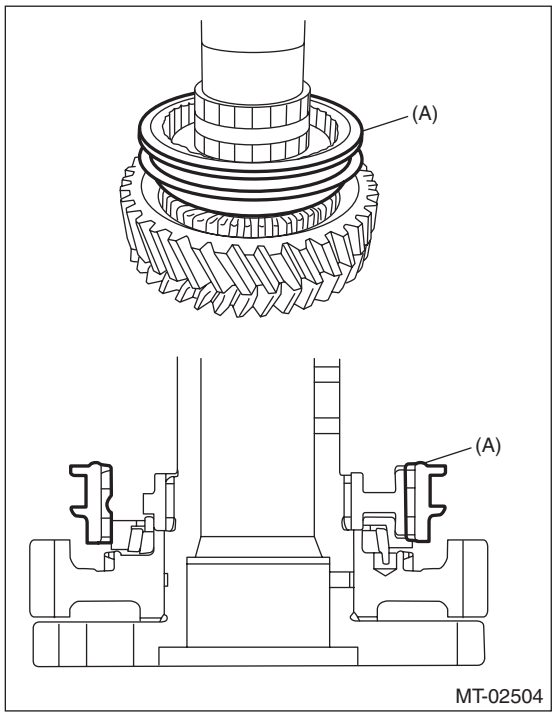
NOTE:
• Attach a cloth to the end of the driven shaft to prevent damage.
• When press fitting, align the oil holes of the shaft and bushing.
ST 18654AA000 INSTALLER



(A) 2nd driven gear bushing

4) Install the 1st-2nd coupling sleeve.

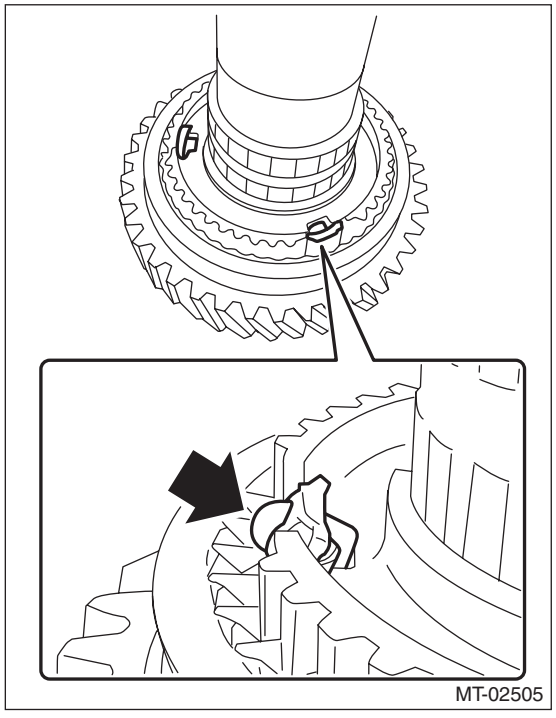
NOTE:
• Install the 1st-2nd coupling sleeve in proper direction.
• Align the alignment marks of 1st-2nd coupling sleeve and the 1st-2nd synchronizer hub.



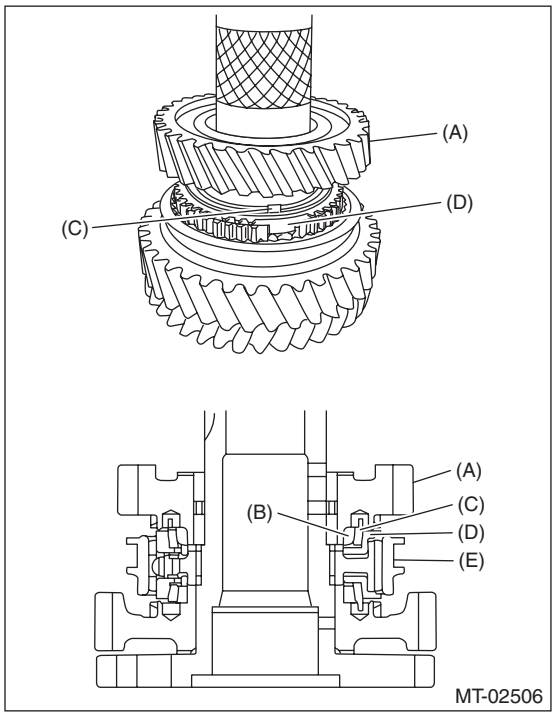
(A) 1st-2nd coupling sleeve

5) Install the 1st-2nd shifting insert.

NOTE:
Press in the ball part to install.



6) Install the outer baulk ring, synchro cone, inner baulk ring and 2nd driven gear to driven shaft.



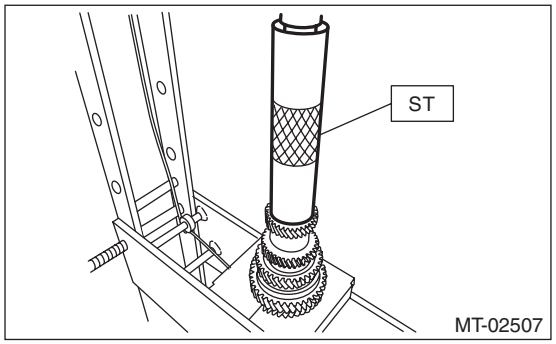
(A) 2nd driven gear
(B) Inner baulk ring
(C) Synchro cone
(D) Outer baulk ring
(E) 1st-2nd coupling sleeve

7) Install the key to the driven shaft.
8) 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.

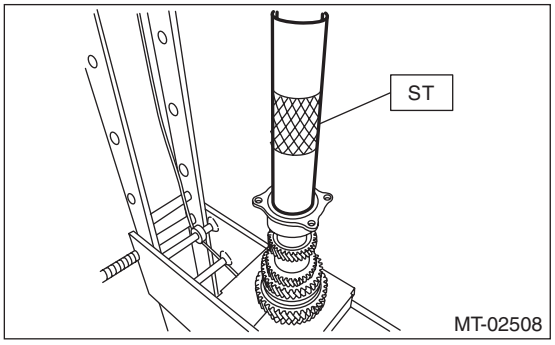
ST 499277200 INSTALLER



9) Install the double ball bearing onto driven shaft 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).

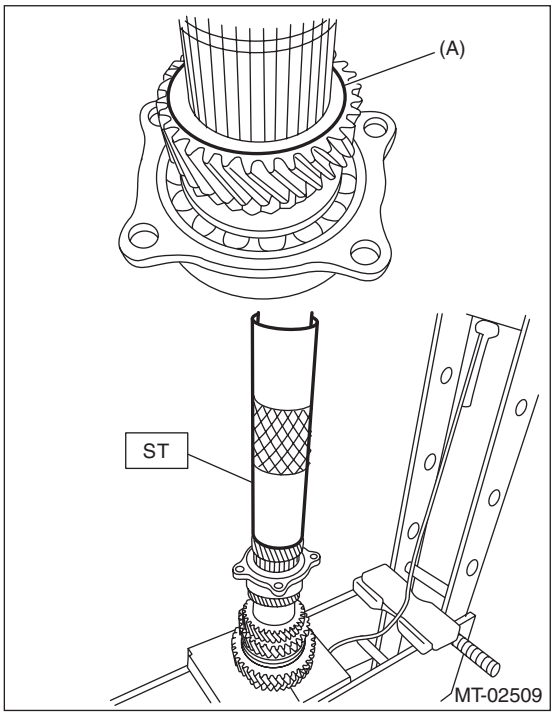
NOTE:
Use a new double ball bearing.
ST 499277200 INSTALLER



10) Install the 5th driven gear onto driven shaft 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:
Install the 5th driven gear with the groove side facing the 6th driven gear.
ST 499277200 INSTALLER

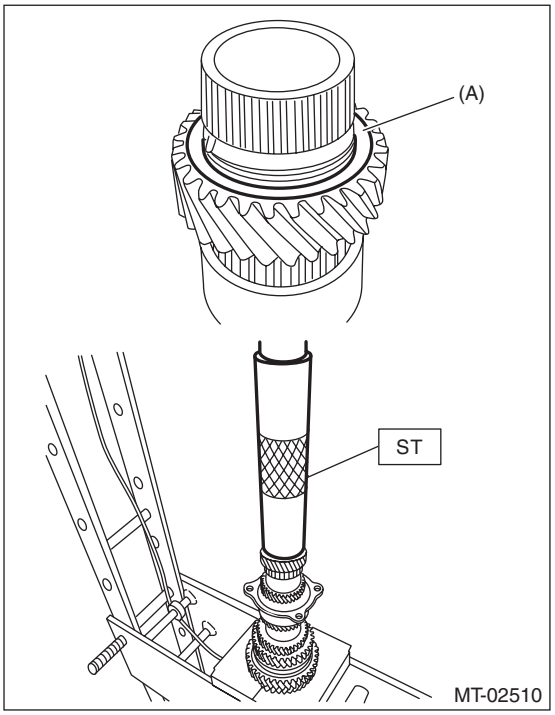


(A) Install with the groove side facing the 6th driven gear.

11) Install the drive pinion spacer to the driven shaft.
12) Install the 6th driven gear onto driven shaft 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).

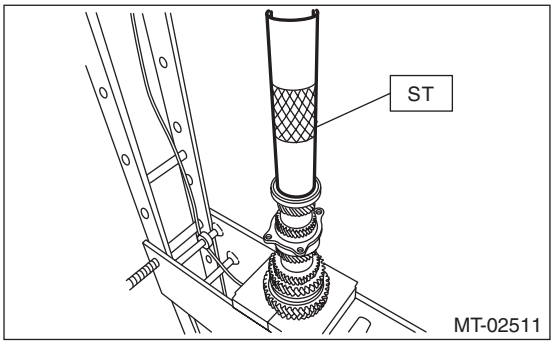
NOTE:
Install with the stepped side on the end surface of the 6th driven gear facing the rear ball bearing side.
ST 499277200 INSTALLER



(A) Install with the non-stepped side on the end surface facing the 5th driven gear side.

13) Install the ball bearing onto driven shaft using ST and a press.

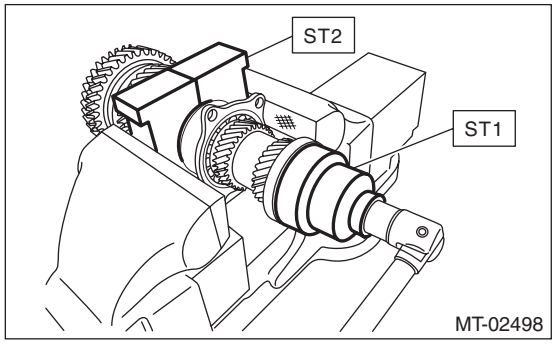
CAUTION:
Do not apply a load in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).
ST 499277200 INSTALLER



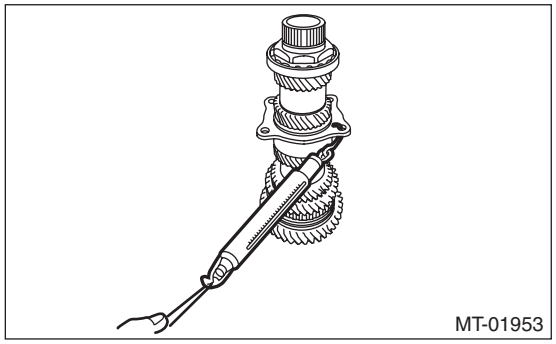
14) Tighten the lock nuts to the specified torque using ST1 and ST2.

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

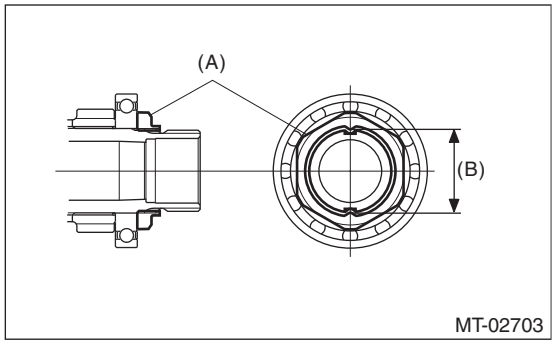


15) Using a spring scale, check that starting load of the ball bearing is 0.1 to 1.5 N (0.01 to 0.15 kgf, 0.02 to 0.34 lbf).



16) Crimp the lock nut at two locations so that the dimension (B) becomes 39.1 mm (1.54 in) or less.

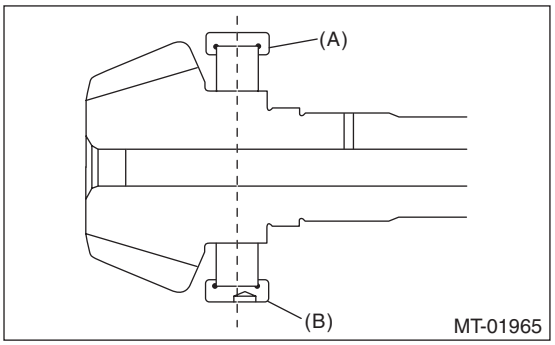
CAUTION:
When crimping the lock nut, be careful not to crack it.



(A) Lock nut
(B) Outer dimension after crimping

17) Install the roller bearing onto drive pinion.

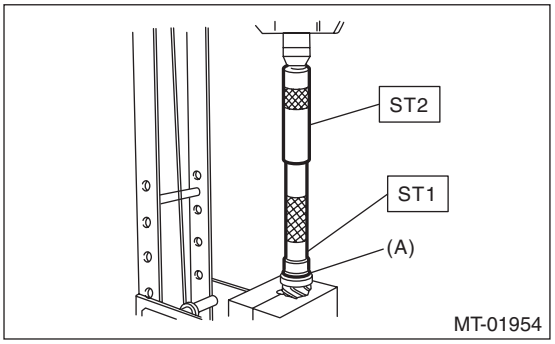
NOTE:
- Use a new roller bearing.
- Install the knock pin hole of the roller bearing outer race, facing the rear side.



(A) Roller bearing
(B) Knock pin hole

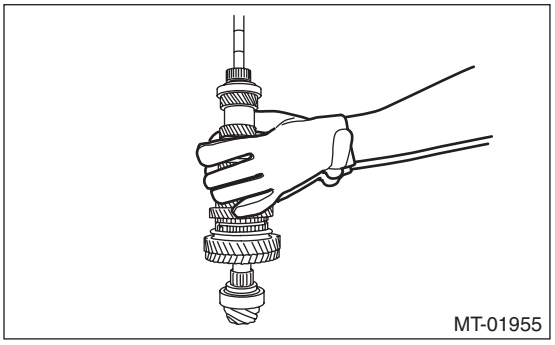
18) Install the washer using ST1, ST2 and a press.

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

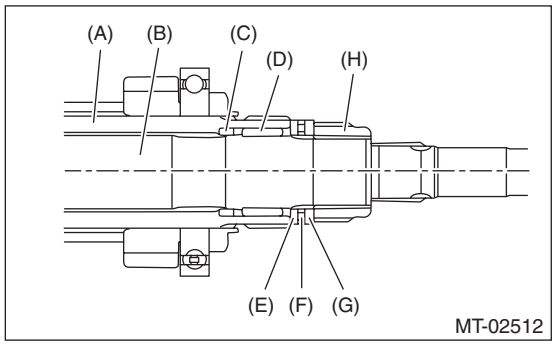


(A) Washer

19) Install the thrust bearing and needle bearing and install the driven shaft assembly.



20) 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.

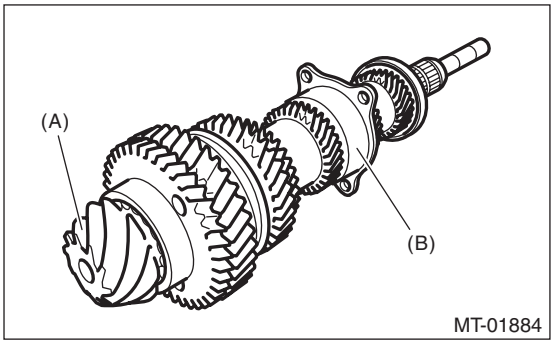


(A) Driven shaft
(B) Drive pinion shaft
(C) Drive pinion collar
(D) Needle bearing (25 × 30 × 20)
(E) Adjusting washer No. 2 (25 × 36 × t)
(F) Thrust bearing (25 × 36 × 2)
(G) Adjusting washer No. 1 (25 × 36 × t)
(H) Differential bevel gear sleeve

21) Adjust the thrust bearing preload. <Ref. to 6MT-78, THRUST BEARING PRELOAD, ADJUSTMENT, Drive Pinion Shaft Assembly.>

E: INSPECTION

Disassembled parts should be washed with cleaning solvent first, then inspected carefully.
1) Bearing
Replace the bearings in the following cases.
• When the bearing balls, outer races and inner races are broken or rusty.
• When the bearing is worn.
• When the bearings fail to turn smoothly or emit noise in rotation after gear oil lubrication.
• Check the roller bearing or ball bearing on the rear side of the drive pinion shaft rotates smoothly before disassembling the drive pinion assembly. In this case, because a preload is working on the bearing, its rotation feels like it is slightly dragging unlike other bearings.

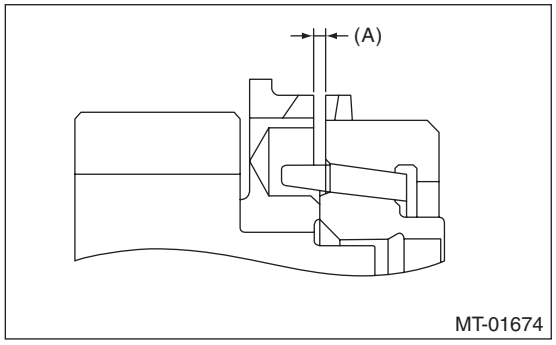


(A) Drive pinion shaft
(B) Ball bearing

• 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
Replace the synchronizer in following case:
• When the inner surface and end face are damaged.
• When the 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.

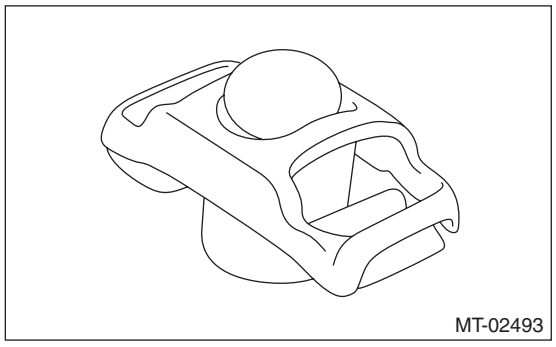
Clearance (A):
0.5 mm (0.020 in) or more



• When the contact surface of the baulk ring insert section is damaged or abnormally worn.
• Apply 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.

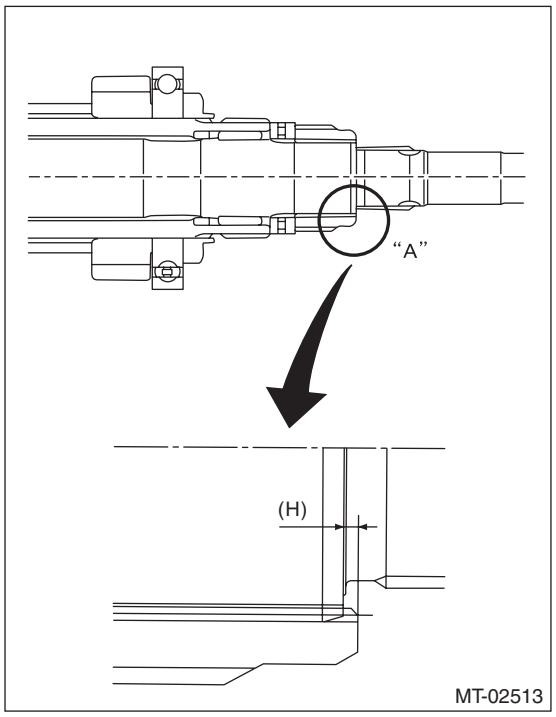
6) Shifting insert
Replace the shifting insert if there is deformation, excessive wear on the ball section or any defectiveness.



F: ADJUSTMENT

1. THRUST BEARING PRELOAD

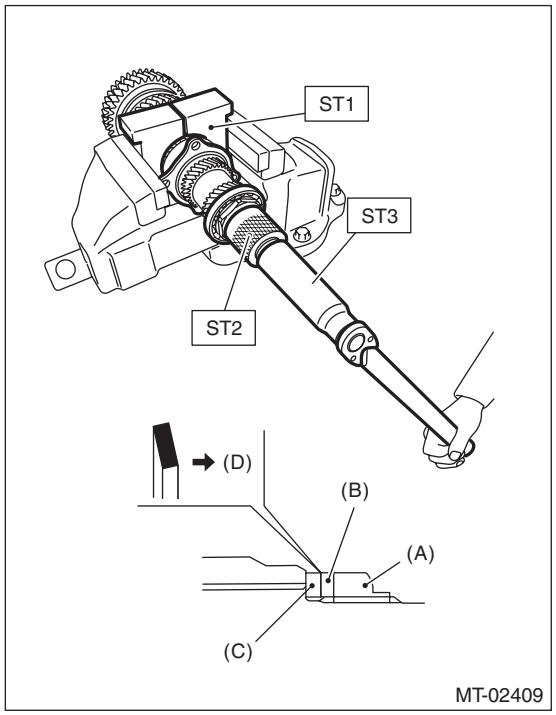
1) Select a suitable adjusting washer No. 1 so that dimension (H) will be zero in a visual check. Position the washer (20 × 31 × 4) and lock washer (20 × 31 × 2.3) and attach the lock nut (20 × 11).



2) Using the ST1, ST2 and ST3, tighten the lock nut to the specified torque.

NOTE:
- Use new lock nuts and lock washers.
- Install the lock washer in the correct direction.

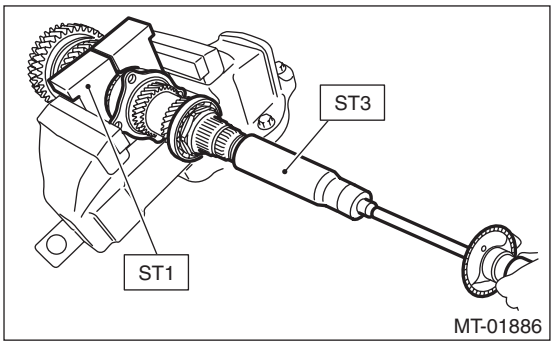
Tightening torque:
126 N·m (12.8 kgf-m, 92.9 ft-lb)
ST1 18680AA020 HOLDER
ST2 18667AA020 HOLDER
ST3 18662AA010 SOCKET (27)



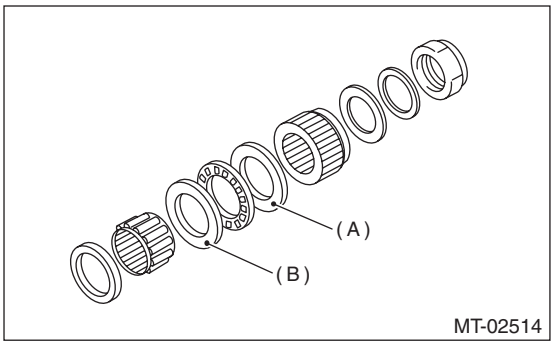
(A) Lock nut
(B) Lock washer
(C) Washer
(D) Lock nut side

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)



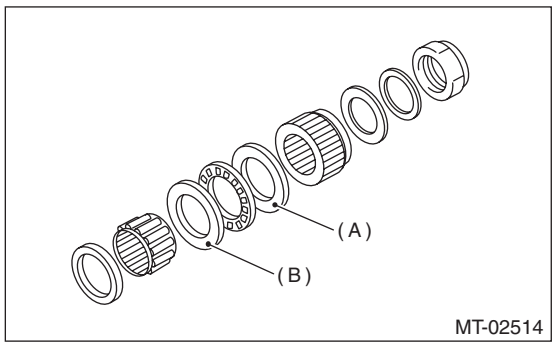
4) If the starting torque is not within the specified limit, select new adjusting washer No. 1 and re-check starting torque.



(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.



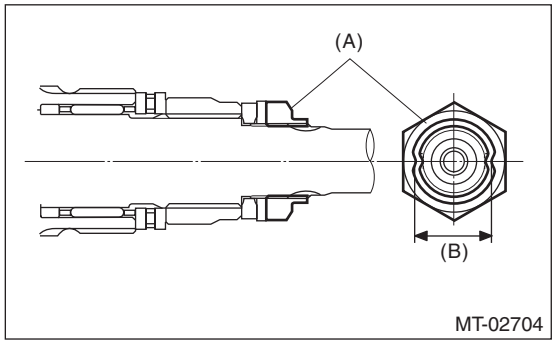
(A) Adjusting washer No. 1
(B) Adjusting washer No. 2

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.



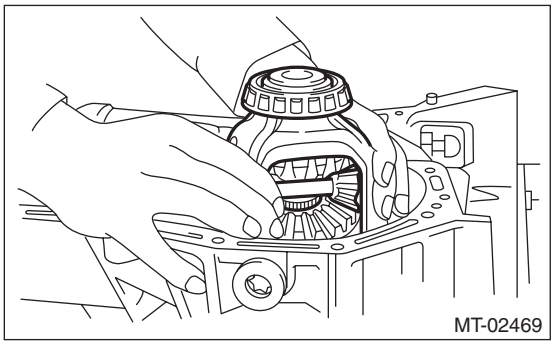
(A) Lock nut
(B) Outer dimension after crimping

17.Front Differential Assembly

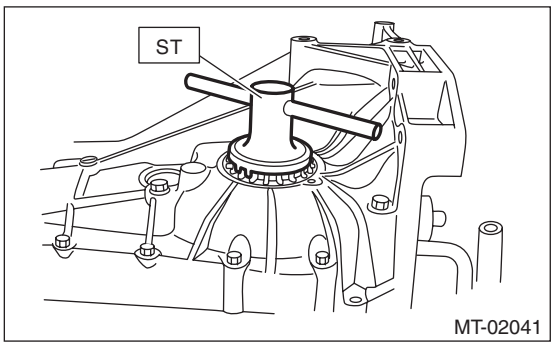
A: REMOVAL

1) Remove the manual transmission assembly from the vehicle. <Ref. to 6MT-25, REMOVAL, Manual Transmission Assembly.>
2) Remove the transfer case together with the extension case assembly. <Ref. to 6MT-39, REMOVAL, Transfer Case and Extension Case Assembly.>
3) Remove the transmission case. <Ref. to 6MT-57, REMOVAL, Transmission Case.>
4) Remove the drive pinion shaft assembly. <Ref. to 6MT-70, REMOVAL, Drive Pinion Shaft Assembly.>
5) Remove the main shaft assembly for single-range. <Ref. to 6MT-61, REMOVAL, Main Shaft Assembly for Single-Range.>
6) Remove the front differential assembly.

NOTE:
• Do not confuse the right and left roller bearing outer races.
• Be careful not to damage the oil seal of retainer.


MT-02469

7) Remove the differential side retainers using ST.
ST 18630AA010 WRENCH COMPL RETAINER



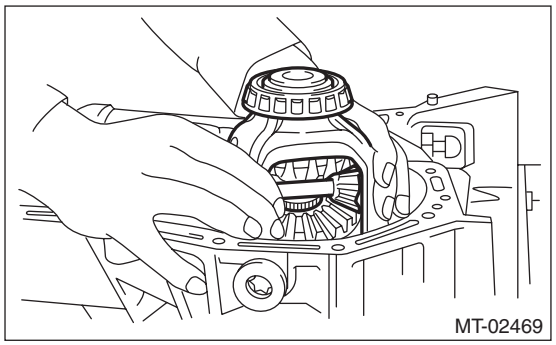
MT-02041

8) Remove the bearing outer race from the transmission case.
ST 398527700 PULLER ASSY

B: INSTALLATION

1) Install the differential side retainers using ST.
ST 18630AA010 WRENCH COMPL RETAINER
2) Install the bearing outer race to the transmission case.
3) Install the front differential assembly.

CAUTION:
Make sure the oil seal lip is not folded.

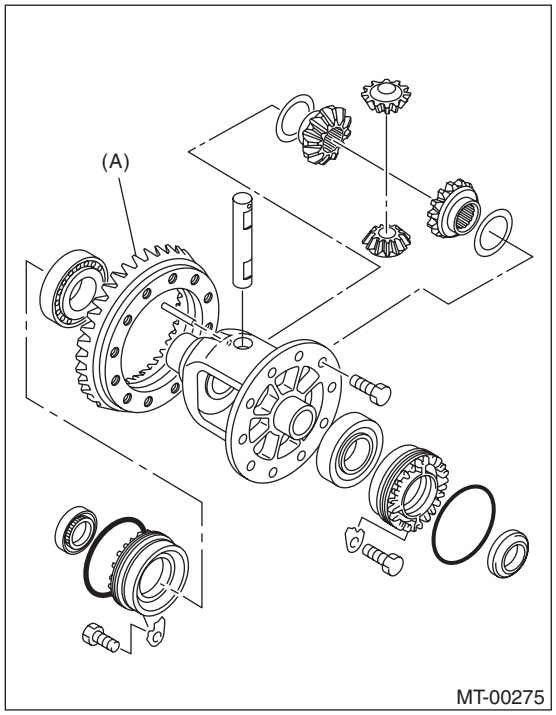

MT-02469

4) Install the main shaft assembly for single-range. <Ref. to 6MT-61, INSTALLATION, Main Shaft Assembly for Single-Range.>
5) Install the drive pinion shaft assembly. <Ref. to 6MT-70, INSTALLATION, Drive Pinion Shaft Assembly.>
6) Install the transmission case. <Ref. to 6MT-58, INSTALLATION, Transmission Case.>
7) Install the transfer case together with the extension case assembly. <Ref. to 6MT-40, INSTALLATION, Transfer Case and Extension Case Assembly.>
8) Install the manual transmission assembly to the vehicle. <Ref. to 6MT-29, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

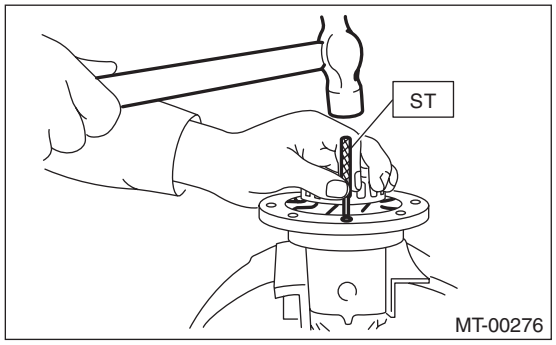
1. DIFFERENTIAL CASE ASSY

1) Loosen the twelve bolts and remove hypoid driven gear.

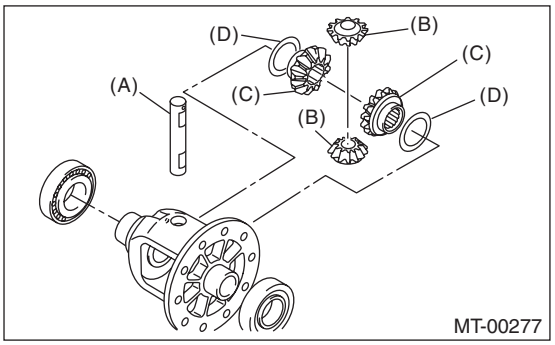


(A) Hypoid driven gear

2) Drive out the straight pin from differential assembly toward hypoid driven gear side.
ST 899904100 STRAIGHT PIN REMOVER

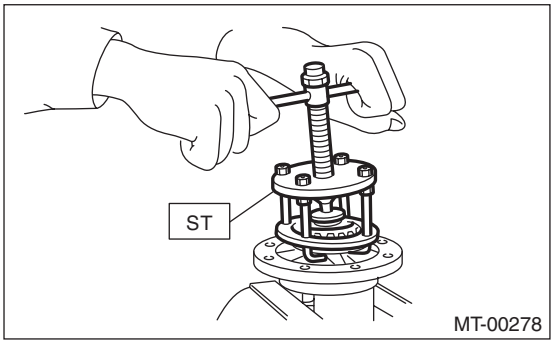


3) Pull out the pinion shaft, and remove the differential bevel pinion, differential bevel gear and washer.



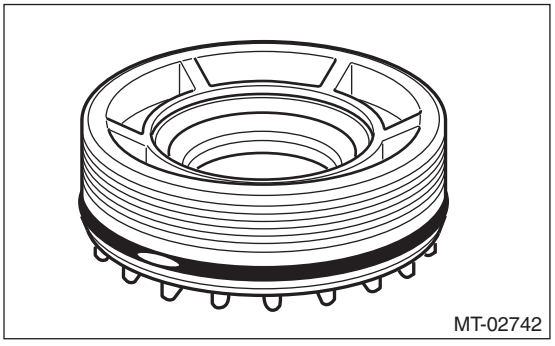
(A) Pinion shaft
(B) Differential bevel pinion
(C) Differential bevel gear
(D) Washer

4) Using the ST, remove the roller bearing.
ST 899524100 PULLER SET



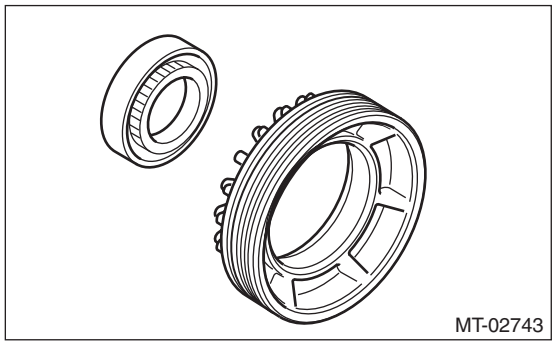
2. SIDE RETAINER

1) Remove the O-ring.



2) Remove the oil seal.

NOTE:
Remove using the flat tip screwdriver.

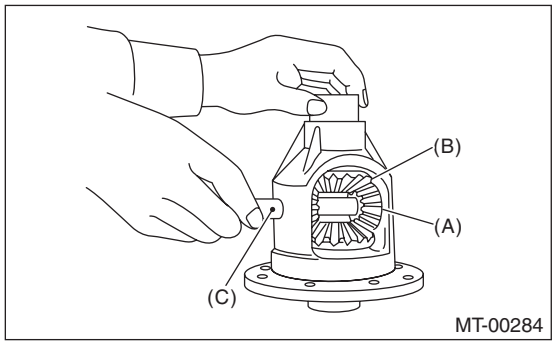

MT-02743

D: ASSEMBLY

1. DIFFERENTIAL CASE ASSY

1) Install the differential bevel gear and differential bevel pinion together with washer, and insert the pinion shaft.

NOTE:
Face the chamfered side of washer toward bevel gear.



MT-00284

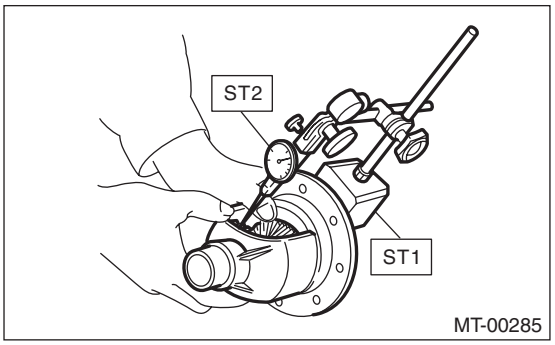
(A) Differential bevel pinion
(B) Differential bevel gear
(C) Pinion shaft

2) Measure the backlash between the differential bevel gear and differential bevel pinion. Adjust the backlash if not within specified limit. <Ref. to 6MT-85, BEVEL PINION GEAR BACKLASH, INSPECTION, Front Differential Assembly.>

NOTE:
Be sure the pinion gear teeth contacts adjacent gear teeth during measurement.

Standard backlash
0.13 — 0.18 mm (0.0051 — 0.0071 in)

ST1 498247001 MAGNET BASE
ST2 498247100 DIAL GAUGE

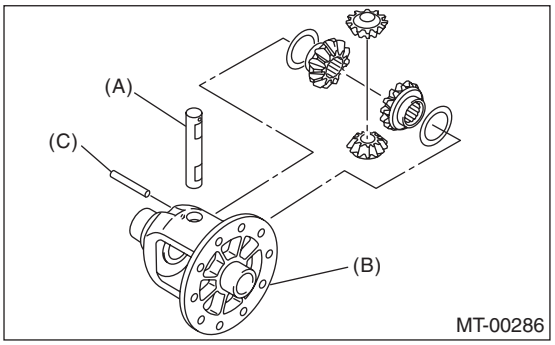


MT-00285

3) Align the pinion shaft and differential case with each hole, and drive the straight pin into the holes from the hypoid driven gear side using the ST.

NOTE:
Use a new straight pin.

ST 899904100 STRAIGHT PIN REMOVER



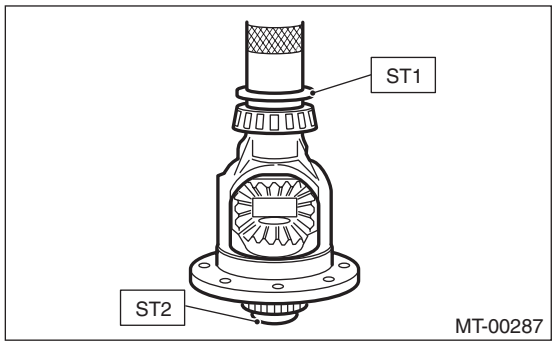
MT-00286

(A) Pinion shaft
(B) Differential case
(C) Straight pin

4) Install the roller bearing to differential case.

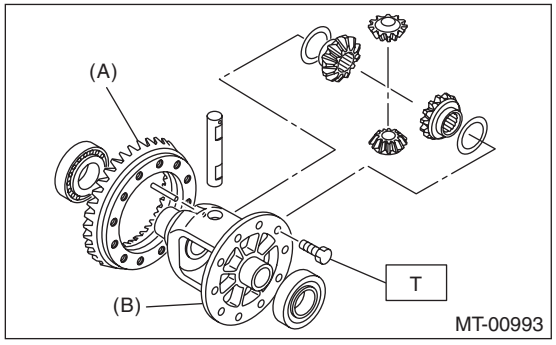
CAUTION:
Do not apply a load in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

NOTE:
Be careful because the roller bearing outer races are used as a set.
ST1 499277100 BUSHING 1-2 INSTALLER
ST2 398497701 ADAPTER



5) Install the hypoid driven gear to the differential case using twelve bolts.

Tightening torque:
T: 62 N·m (6.3 kgf-m, 45.7 ft-lb)



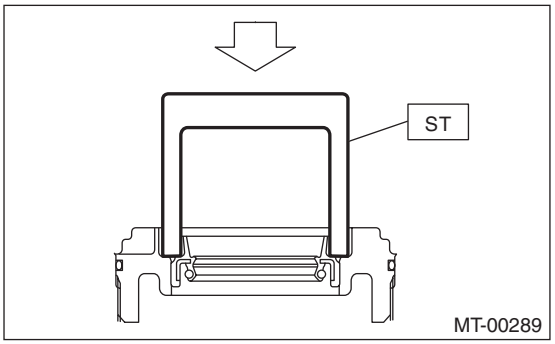
(A) Hypoid driven gear
(B) Differential case

2. SIDE RETAINER

1) Install the oil seal.

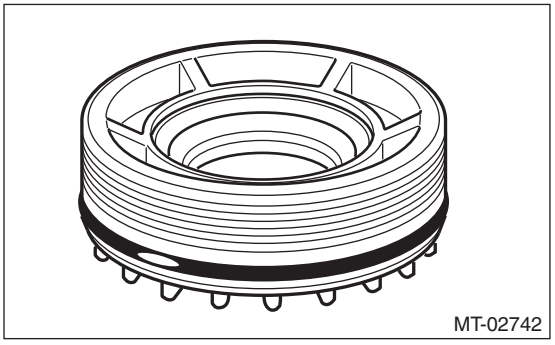
CAUTION:
• Apply transmission gear oil to the oil seal lips, and install the oil seal while being careful not to deform the lip.
• When press-fitting the oil seal to the side retainer, tap with a plastic hammer etc. to press in.
• Never use a press.
• Check the identification marks (L, R), attach the oil seal RH and LH.

NOTE:
Use a new oil seal.
ST 18675AA000 DIFFERENTIAL SIDE OIL SEAL INSTALLER



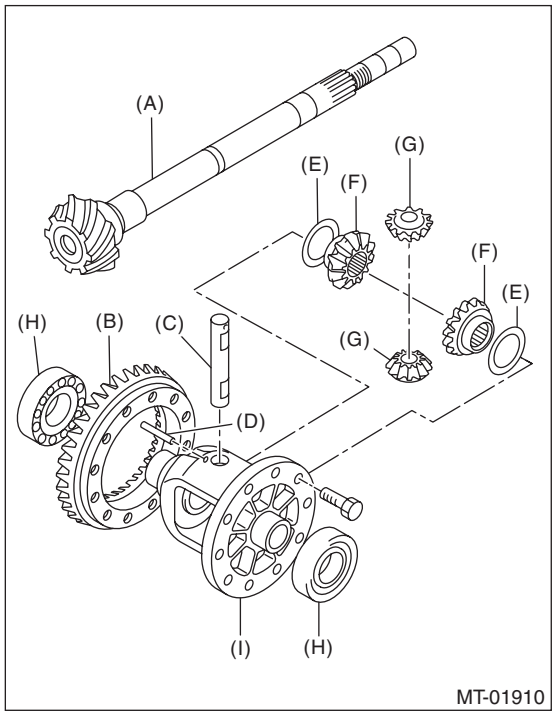
2) Install the O-ring.

NOTE:
• Use new O-rings.
• Do not stretch or damage the O-ring.



E: INSPECTION

Repair or replace the differential gear in the following cases:
• When the hypoid drive 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, washer, pinion shaft or straight pin.
• When the differential case sliding surfaces are worn or damaged.

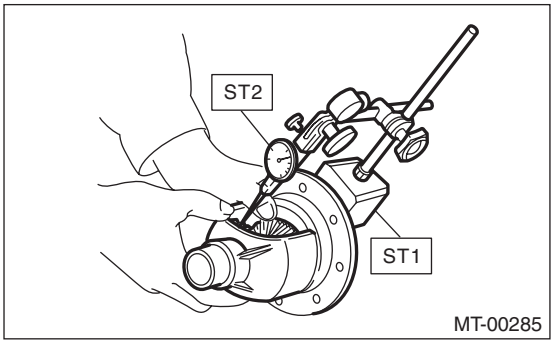


(A) Drive pinion shaft
(B) Hypoid driven gear
(C) Pinion shaft
(D) Straight pin
(E) Washer
(F) Differential bevel gear
(G) Differential bevel pinion
(H) Roller bearing
(I) Differential case

1. 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 6MT-86, ADJUSTMENT, Front Differential Assembly.>

Standard backlash
0.13 — 0.18 mm (0.0051 — 0.0071 in)
ST1 498247001 MAGNET BASE
ST2 498247100 DIAL GAUGE

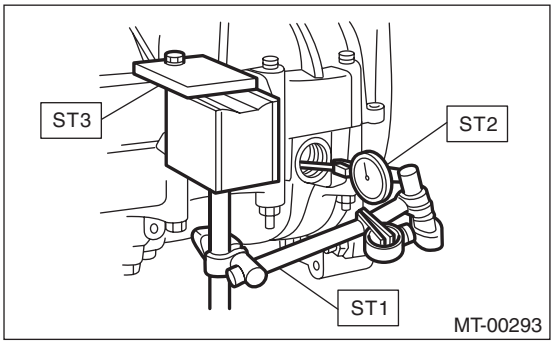


2. HYPOID GEAR BACKLASH

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 side retainers on the left and right side.

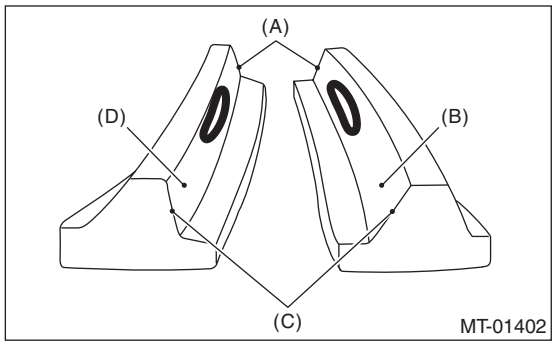
Backlash
0.13 — 0.18 mm (0.0051 — 0.0071 in)
Part No. 38415AA100 Axle shaft



3. TOOTH CONTACT OF HYPOID GEAR

Check tooth contact of hypoid gear as follows: Apply a thin uniform coat of red lead on both teeth surfaces on 3 or 4 teeth of the hypoid gear. Move the hypoid gear back and forth by turning the transmission main shaft until a definite contact pattern is developed on the hypoid gear, and judge whether face contact is correct. When the contact pattern is not correct, adjust. <Ref. to 6MT-86, ADJUSTMENT, Front Differential Assembly.>

- Tooth contact is correct.



(A) Toe
(B) Coast side
(C) Heel
(D) Drive side

F: ADJUSTMENT

1. BEVEL PINION GEAR BACKLASH

1) Disassemble the front differential assembly. <Ref. to 6MT-82, DISASSEMBLY, Front Differential Assembly.>
2) Select a washer from the table and install.

Washer	
Part No.	Thickness mm (in)
803038021	0.925 — 0.950 (0.0364 — 0.0374)
803038022	0.975 — 1.000 (0.0384 — 0.0394)
803038023	1.025 — 1.050 (0.0404 — 0.0413)

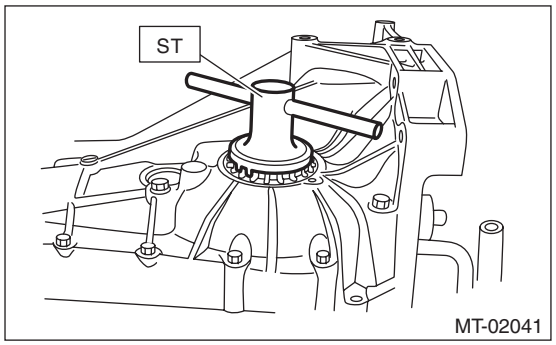
3) Adjust until the standard value is obtained.

Backlash:
Standard
0.13 — 0.18 mm (0.0051 — 0.0071 in)

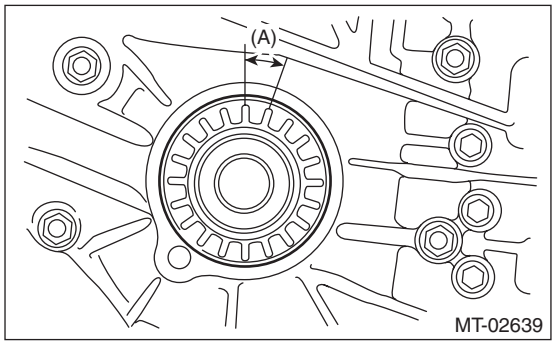
2. HYPOID GEAR BACKLASH

Adjust the backlash by turning the side retainers on the left and right side.

ST 18630AA010 WRENCH COMPL RETAINER



NOTE:
Each time the side retainer rotates by one notch (A), the backlash changes by 0.05 mm (0.0020 in).

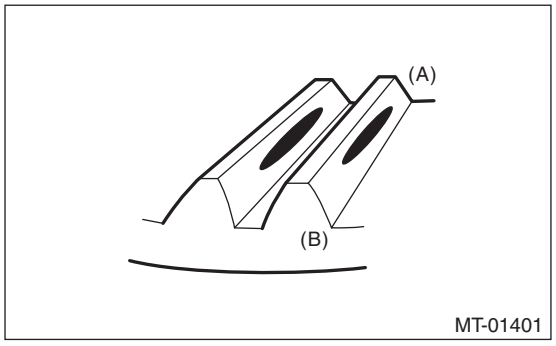


3. TOOTH CONTACT OF HYPOID GEAR

1) Adjust until correct teeth contact is obtained.
2) Check tooth contact, and perform the adjustment as follows.

- Correct tooth contact

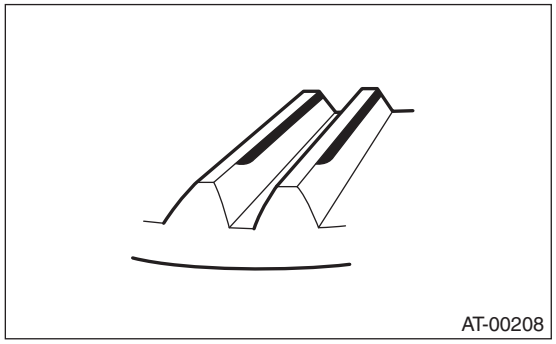
Check item: Tooth contact surface is slightly shifted toward the toe side under a no-load condition. (When driving, it moves towards the heel side.)



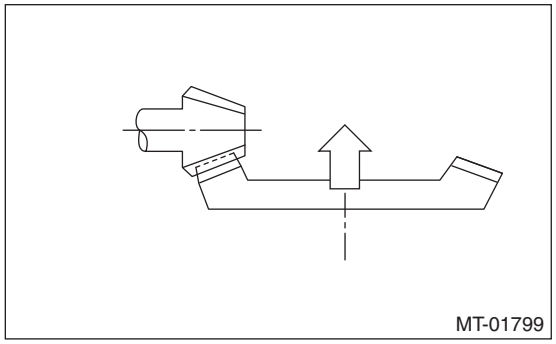
(A) Toe side
(B) Heel side

- Face contact

Check item: Backlash is too large.
Contact pattern

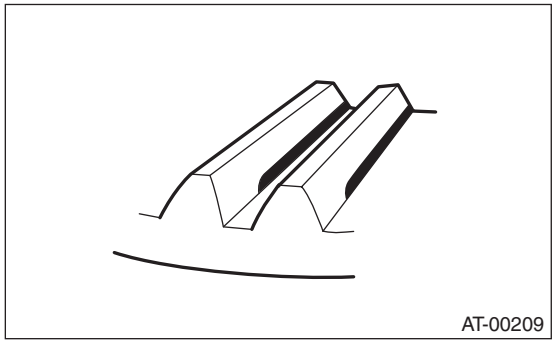


Corrective action: Tighten the side retainer to move the driven gear closer to the drive pinion.

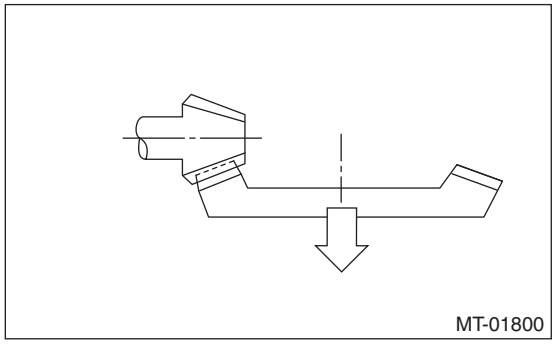


- Flank contact

Check item: Backlash is too small.
Contact pattern

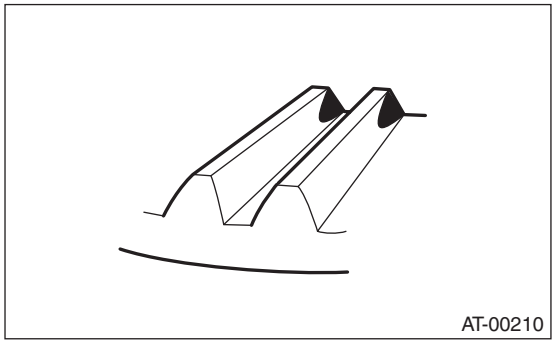


Corrective action: Loosen the side retainer to move the driven gear away from the drive pinion.

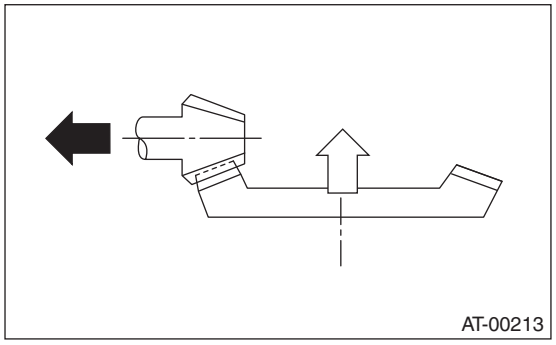


- Toe contact (inside contact)

Check item: Teeth contact area is too small.
Contact pattern



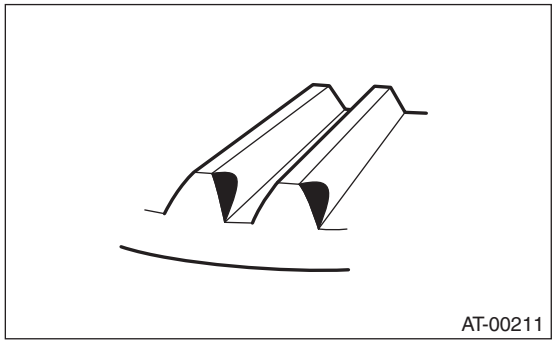
Corrective action: Increase the thickness of drive pinion shim and tighten the side retainer to move the driven gear closer to the drive pinion shaft according to the procedure for bringing drive pinion shaft away from driven gear.



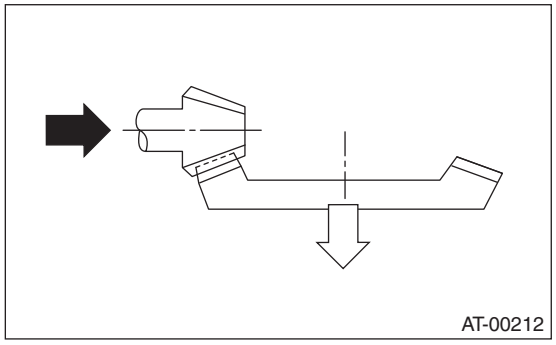
- Heel contact (outside end contact)

Check item: Teeth contact area is too small.

Contact pattern



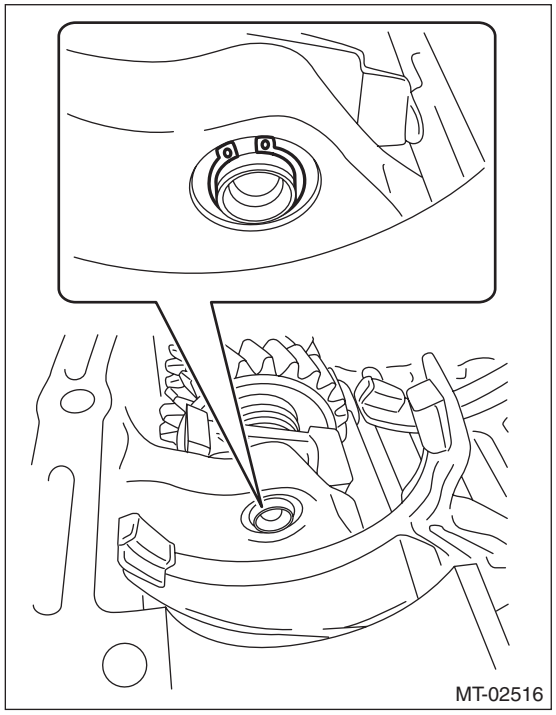
Corrective action: Reduce the thickness of drive pinion shim and loosen the side retainer to move the driven gear away from the drive pinion according to the procedure for moving drive pinion shaft closer to the driven gear.



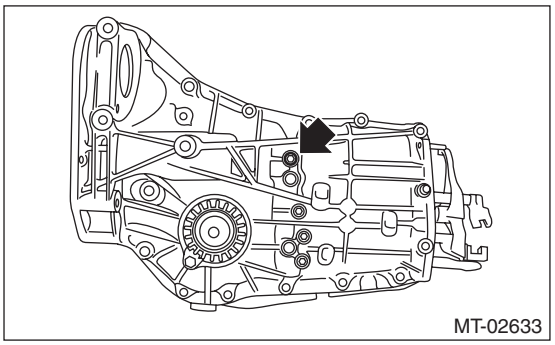
18.Reverse Idler Gear

A: REMOVAL

1) Remove the manual transmission assembly from the vehicle. <Ref. to 6MT-25, REMOVAL, Manual Transmission Assembly.>
2) Remove the back-up light switch and the neutral position switch. <Ref. to 6MT-36, REMOVAL, Switches and Harness.>
3) Remove the transfer case together with the extension case assembly. <Ref. to 6MT-39, REMOVAL, Transfer Case and Extension Case Assembly.>
4) Remove the transmission case. <Ref. to 6MT-57, REMOVAL, Transmission Case.>
5) Remove the drive pinion shaft assembly. <Ref. to 6MT-70, REMOVAL, Drive Pinion Shaft Assembly.>
6) Remove the main shaft assembly for single-range. <Ref. to 6MT-61, REMOVAL, Main Shaft Assembly for Single-Range.>
7) Remove the front differential assembly. <Ref. to 6MT-81, REMOVAL, Front Differential Assembly.>
8) Shift into 4th.
9) Remove the snap ring.

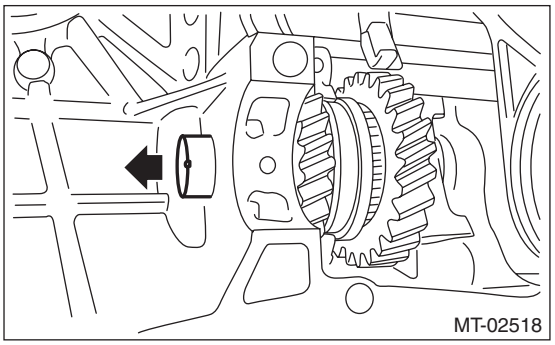

MT-02516

10) Remove the reverse idler gear shaft securing bolt.

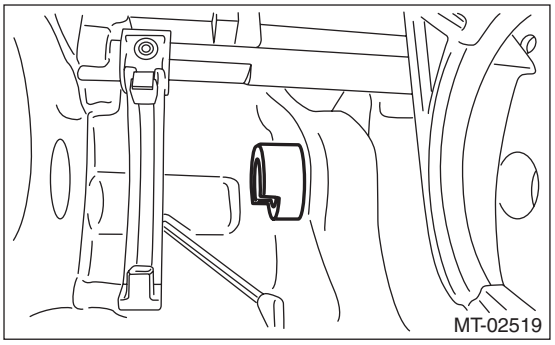

MT-02633

11) Press out the reverse idler gear shaft from the backside of the transmission to remove.

NOTE:
Support the reverse idler gear assembly with hands to avoid collapsing.

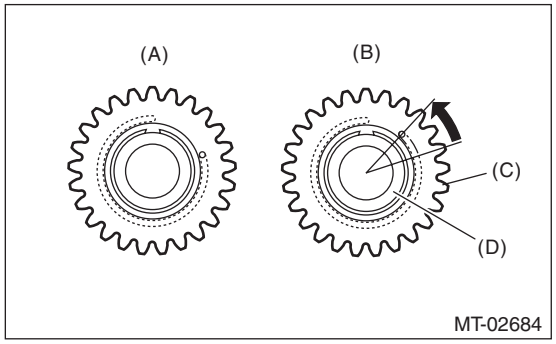

MT-02518

12) Remove the reverse idler gear.
13) Remove the reverse idler gear bushing.


MT-02519

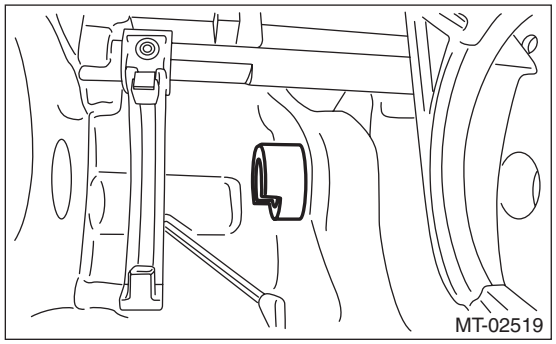
B: INSTALLATION

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

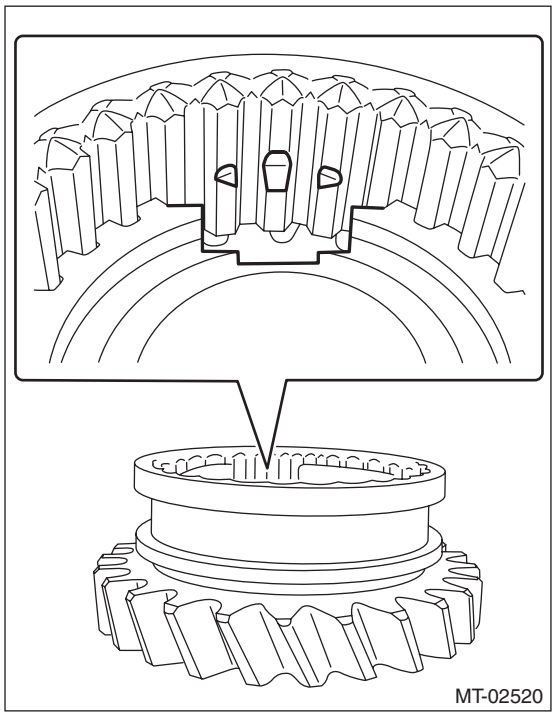
1) Install the reverse idler gear bushing with the cutout portion of the reverse idler gear bushing facing the front of the transmission.



2) Assembling reverse idler gear assembly
(1) Install the reverse coupling sleeve to the reverse idler gear No. 2.

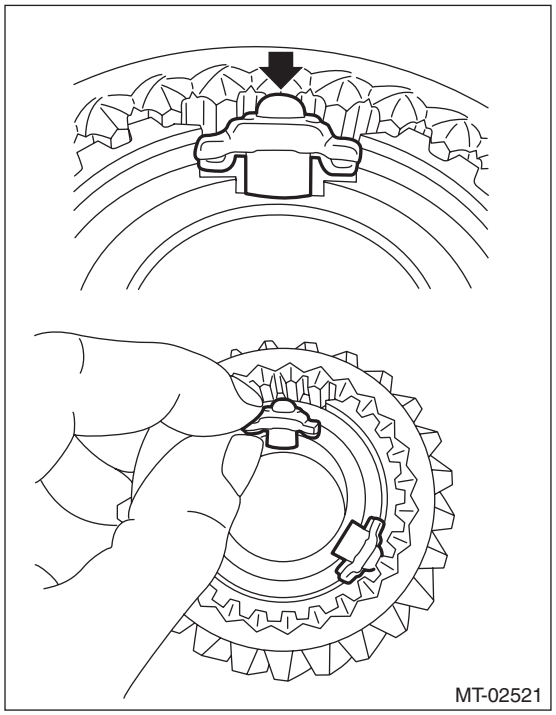
NOTE:
• Install the reverse coupling sleeve in the correct direction.

• Make sure that the oval-shaped cutout portion inside the reverse coupling sleeve matches the center of the reverse idler gear No. 2 groove.

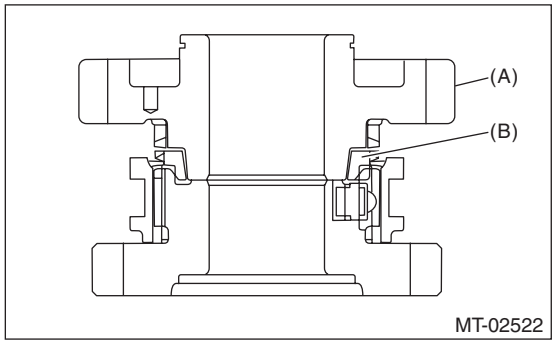


(2) Install the shifting insert.

NOTE:
Press in the ball part to install.

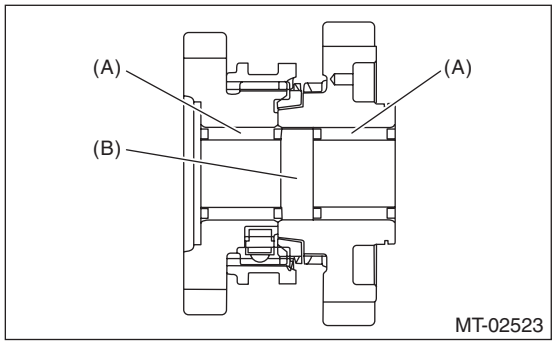


(3) Install the baulk ring and reverse idler gear.



(A) Reverse idler gear
(B) Baulk ring

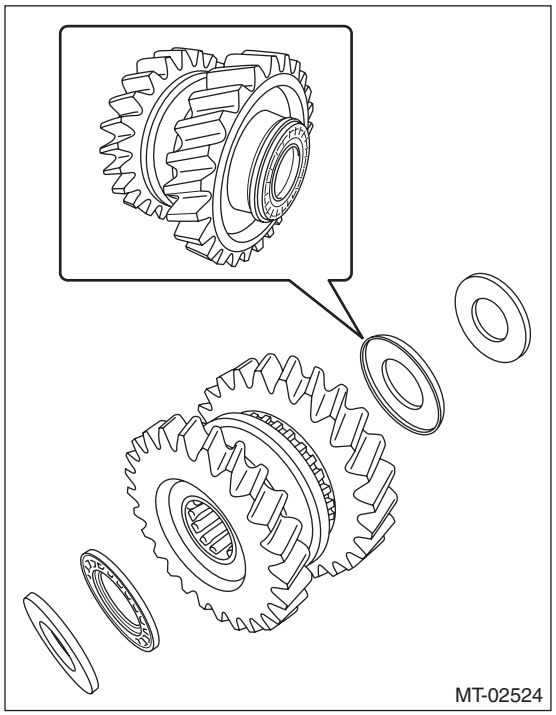
(4) Install the needle bearing and reverse idler gear collar.



(A) Needle bearing
(B) Reverse idler gear collar

(5) Install the thrust bearing and washer.

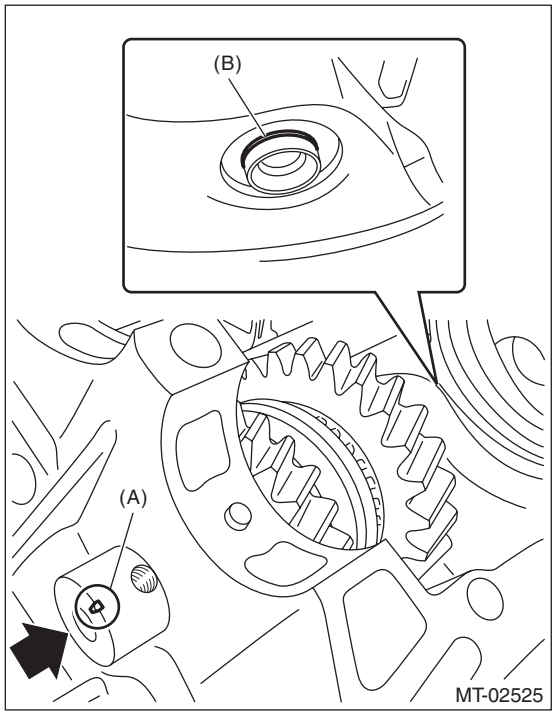
NOTE:
Install the thrust bearing in the correct direction.



3) Install the assembled reverse idler gear assembly to the transmission case and hold it with hands.

4) Install the reverse idler gear shaft.

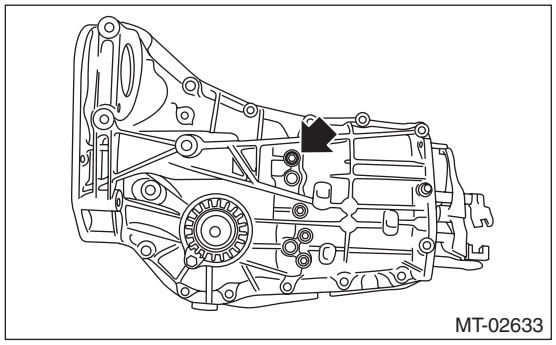
NOTE:
• Install with the cutout portion of the reverse idler gear shaft facing the RH side of the transmission case.
• Make sure that the groove of the reverse idler gear shaft comes out of the reverse idler gear bushing.



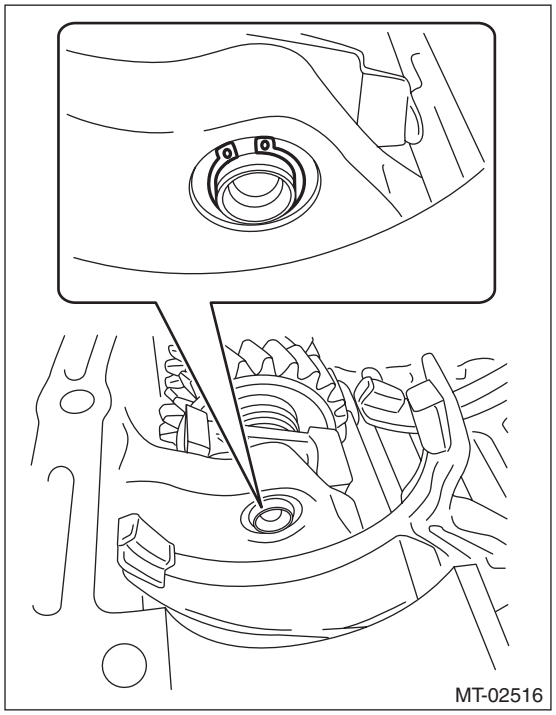
(A) Cutout portion of the reverse idler gear shaft
(B) Snap ring installation groove

5) Install the reverse idler gear shaft securing bolt.

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



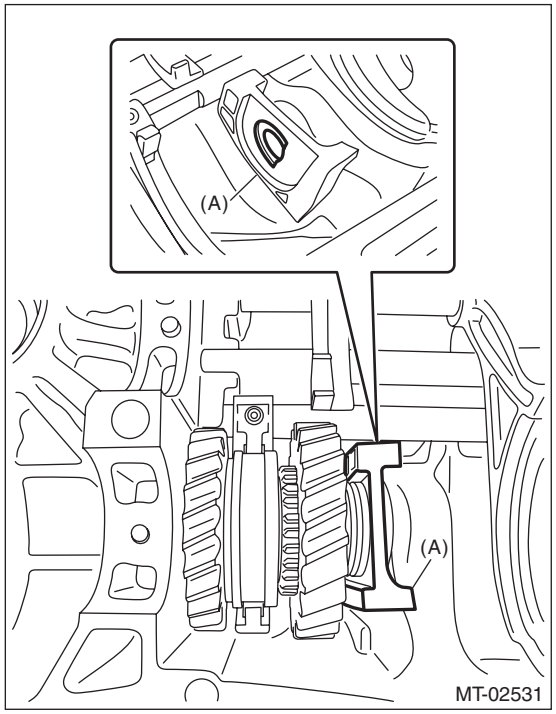
6) Install the snap ring.



7) Select the reverse idler gear bushing. <Ref. to 6MT-95, ADJUSTMENT, Reverse Idler Gear.>
8) Remove the reverse idler gear assembly and replace with the selected bushing. <Ref. to 6MT-89, REMOVAL, Reverse Idler Gear.>

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.

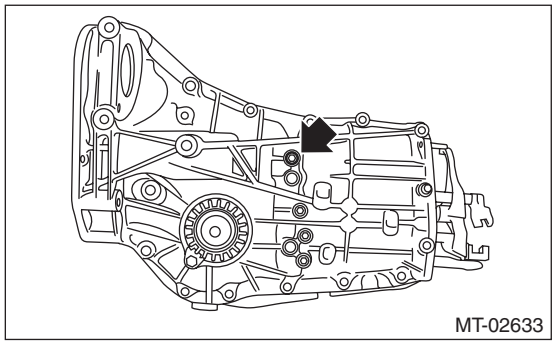


(A) Oil case guide

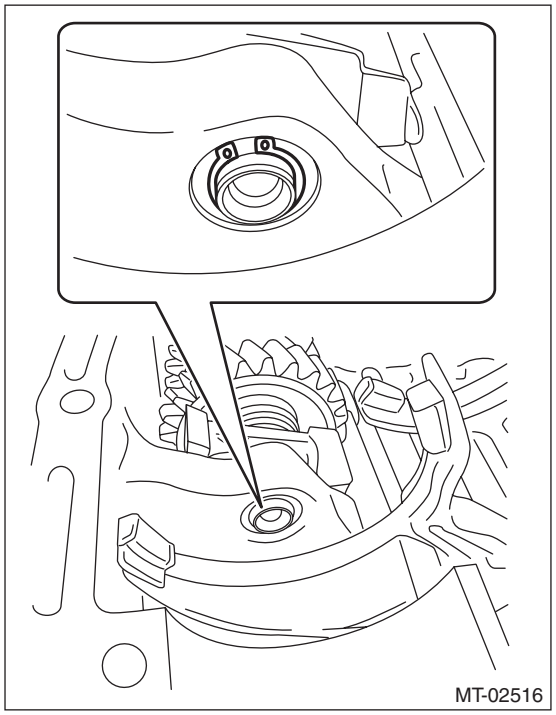
10) Install the reverse idler gear shaft securing bolt.

NOTE:
Use a new gasket.

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



11) Install the snap ring.

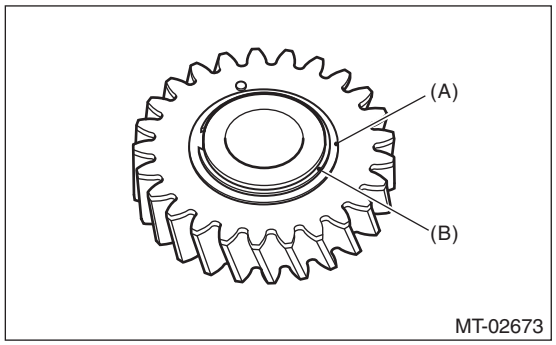


12) Check the reverse shifter fork. <Ref. to 6MT-98, INSPECTION, Shifter Fork and Rod.>
13) Install the front differential assembly. <Ref. to 6MT-81, INSTALLATION, Front Differential Assembly.>
14) Install the main shaft assembly for single-range. <Ref. to 6MT-61, INSTALLATION, Main Shaft Assembly for Single-Range.>
15) Install the drive pinion shaft assembly. <Ref. to 6MT-70, INSTALLATION, Drive Pinion Shaft Assembly.>
16) Install the transmission case. <Ref. to 6MT-58, INSTALLATION, Transmission Case.>
17) Install the transfer case together with the extension case assembly. <Ref. to 6MT-40, INSTALLATION, Transfer Case and Extension Case Assembly.>
18) Install the back-up light switch and the neutral position switch. <Ref. to 6MT-36, INSTALLATION, Switches and Harness.>
19) Install the manual transmission assembly to the vehicle. <Ref. to 6MT-29, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

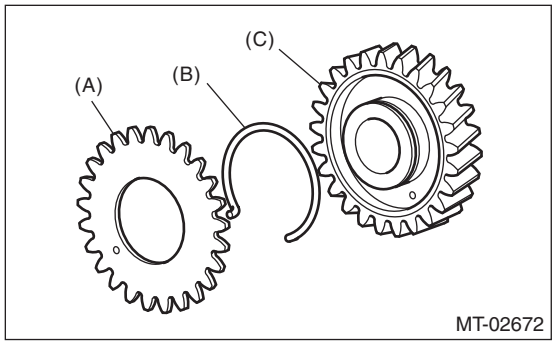
1. REVERSE IDLER GEAR ASSY

1) Remove the snap ring and friction plate from reverse gear.



(A) Friction plate
(B) Snap ring

2) Remove the sub gear and spring.



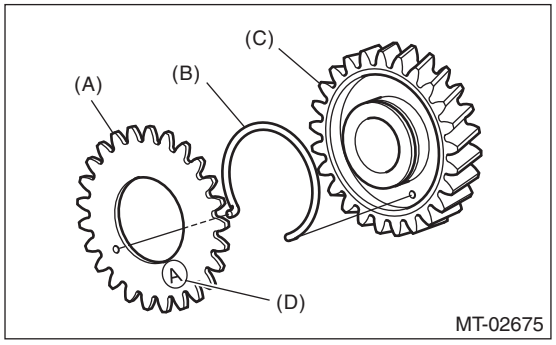
(A) Reverse idler sub gear
(B) Reverse idler spring
(C) Reverse idler gear

D: ASSEMBLY

1. REVERSE IDLER GEAR ASSY

1) Attach the sub gear and spring.

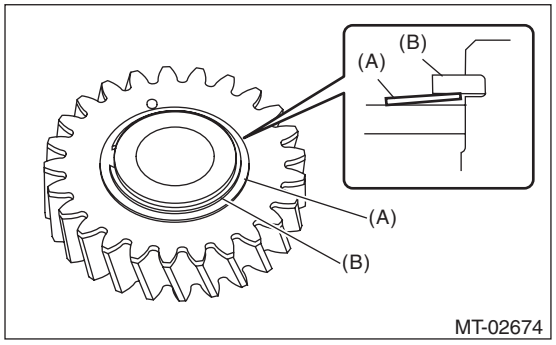
NOTE:
Point the stamp (marking A) towards the outside, and install the sub gear.



(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.

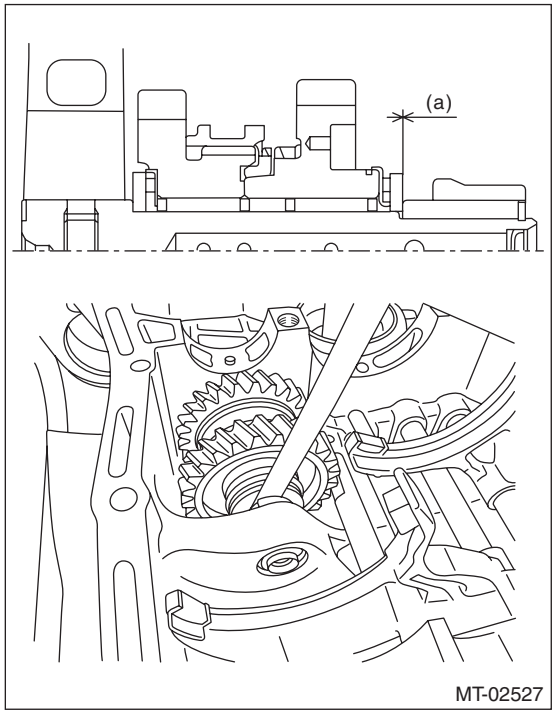


(A) Friction plate
(B) Snap ring

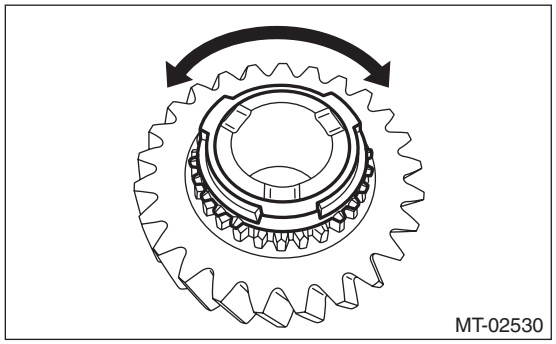
E: INSPECTION

1) Check the clearance between the reverse idler gear bushing and reverse idler gear washer. If out of specification, select the appropriate reverse idler gear bushing and adjust.

Clearance (a):
0.1 — 0.3 mm (0.004 — 0.012 in)

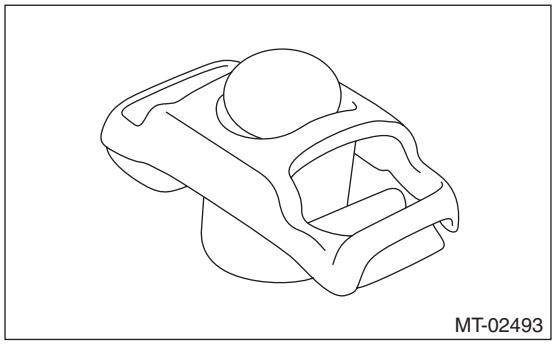


2) Check the reverse idler gear and shaft for damage. Replace if it is damaged.
3) Apply gear oil to the cone of the gear and while press-fitting the synchronizer ring, check there is no rotation in the circumferential direction.



4) Coupling sleeve and synchronizer hub
• Check the slipping condition of the coupling sleeve.
• Check the splines on the coupling sleeve and reverse idler gear for wear.

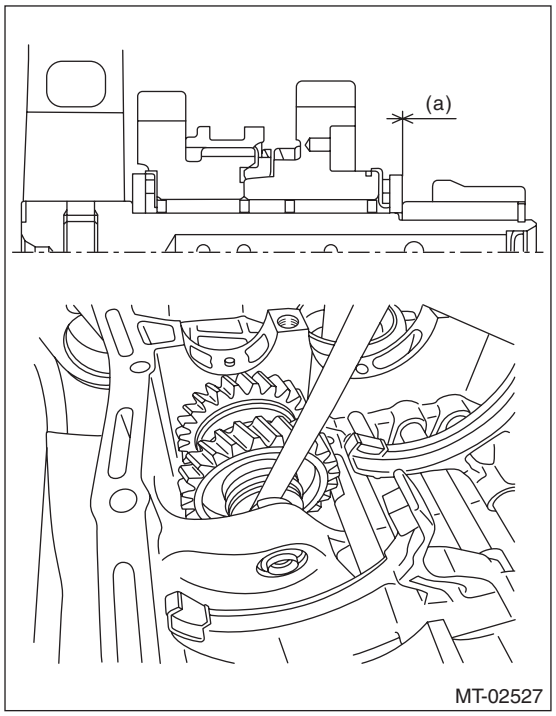
5) Shifting insert
Replace the shifting insert if there is deformation, excessive wear on the ball section or any defectiveness.



F: 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)

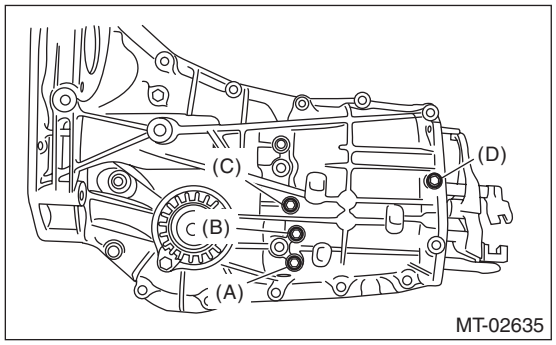


Reverse idler gear bushing		
Part No.	Length mm (in)	Groove for identification
32289AA080	27.75 (1.093)	None
32289AA090	27.90 (1.098)	1
32289AA100	28.05 (1.104)	2
32289AA110	28.20 (1.110)	3
32289AA120	28.35 (1.116)	4

19.Shifter Fork and Rod

A: REMOVAL

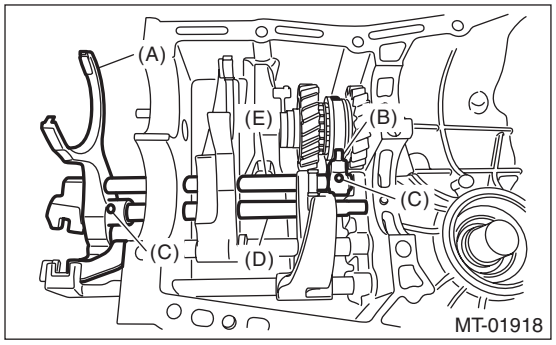
1) Remove the manual transmission assembly from the vehicle. <Ref. to 6MT-25, REMOVAL, Manual Transmission Assembly.>
2) Remove the back-up light switch and the neutral position switch. <Ref. to 6MT-36, REMOVAL, Switches and Harness.>
3) Remove the transfer case together with the extension case assembly. <Ref. to 6MT-39, REMOVAL, Transfer Case and Extension Case Assembly.>
4) Remove the transmission case. <Ref. to 6MT-57, REMOVAL, Transmission Case.>
5) Remove the drive pinion shaft assembly. <Ref. to 6MT-70, REMOVAL, Drive Pinion Shaft Assembly.>
6) Remove the main shaft assembly for single-range. <Ref. to 6MT-61, REMOVAL, Main Shaft Assembly for Single-Range.>
7) Remove the front differential assembly. <Ref. to 6MT-81, REMOVAL, Front Differential Assembly.>
8) Remove the reverse idler gear assembly. <Ref. to 6MT-89, REMOVAL, Reverse Idler Gear.>
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 spring 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.

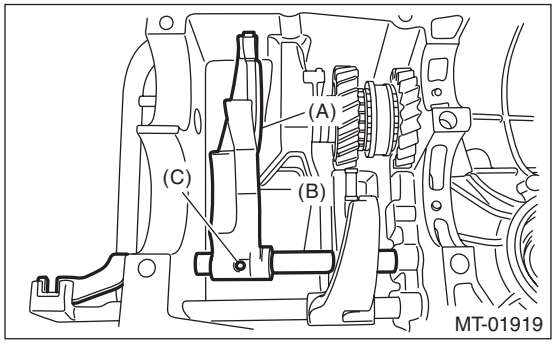
NOTE:
Tap out the reverse shifter fork spring pin, after setting the gear into reverse position. In the neutral position, removing is impossible because the clearance between transmission case is narrow.
ST 398791700 SPRING PIN REMOVER 2



(A) 5th-6th shifter fork
(B) Reverse shifter fork
(C) Spring pin
(D) 5th-6th fork rod
(E) Reverse fork rod

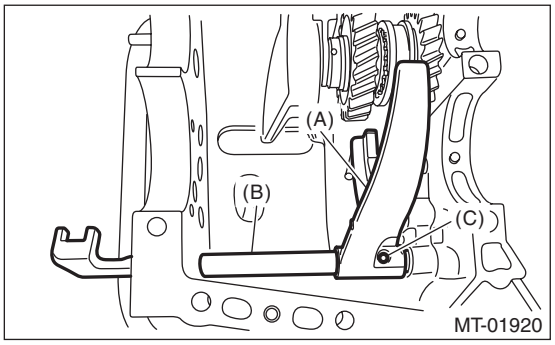
11) Drive out the spring pin by tapping it with the ST, and remove the 3rd-4th shifter fork and fork rod.

NOTE:
When removing the rod, keep other rods in neutral.
ST 398791700 SPRING PIN REMOVER 2



(A) 3rd-4th shifter fork
(B) 3rd-4th fork rod
(C) Spring pin

12) Drive out the spring pin tapping by the ST, and remove the 1st-2nd shifter fork and fork rod.
ST 398791700 SPRING PIN REMOVER 2

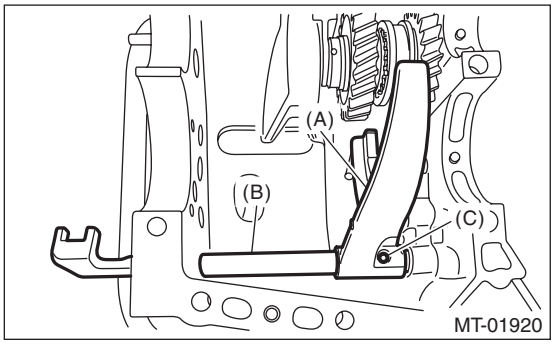


(A) 1st-2nd shifter fork
(B) 1st-2nd fork rod
(C) Spring pin

B: 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 in the rod and the fork, and drive the spring pin into these holes using the ST to fix.

NOTE:
Use new spring pin.
ST 398791700 SPRING PIN REMOVER 2



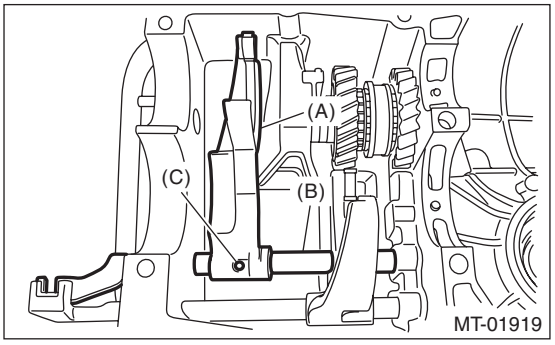
(A) 1st-2nd shifter fork
(B) 1st-2nd fork rod
(C) Spring pin

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 in the rod and the fork, and drive the spring pin into these holes using the ST to fix.

NOTE:
- Use new spring pin.
- Set other rods to neutral.
- Check that the positions of interlock plunger is correct.

ST 398791700 SPRING PIN REMOVER 2

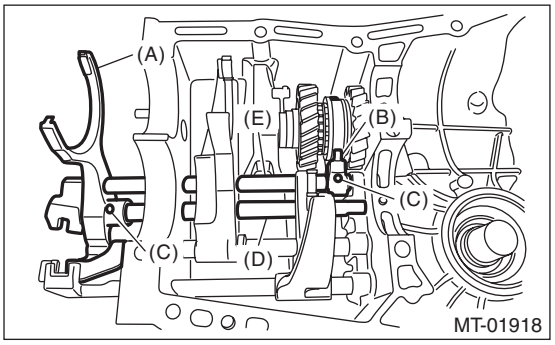


(A) 3rd-4th shifter fork
(B) 3rd-4th fork rod
(C) Spring pin

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 in the rod and the fork, and drive the spring pin into these holes using the ST to fix.

NOTE:
- Use new spring pin.
- Set other rods to neutral.
- Check that the positions of interlock plunger is correct.

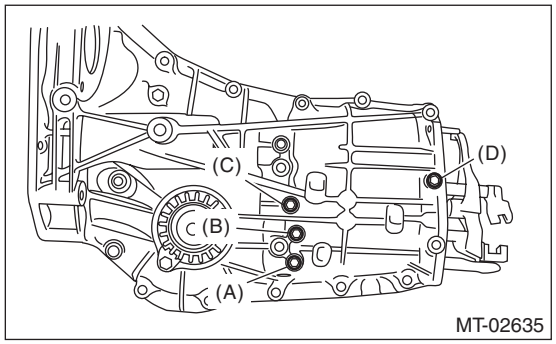
ST 398791700 SPRING PIN REMOVER 2



(A) 5th-6th shifter fork
(B) Reverse shifter fork
(C) Spring 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)



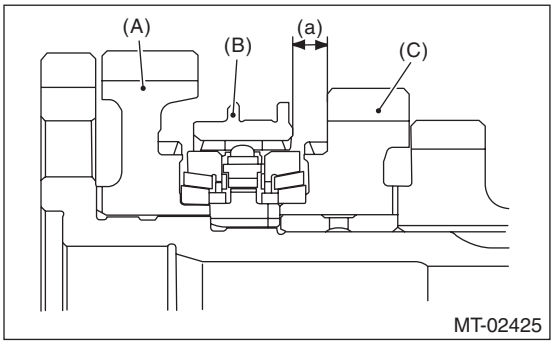
(A) 1st-2nd
(B) 3rd-4th
(C) 5th-6th
(D) Rev.

8) Install the reverse idler gear assembly. <Ref. to 6MT-90, INSTALLATION, Reverse Idler Gear.>
9) Install the front differential assembly. <Ref. to 6MT-81, INSTALLATION, Front Differential Assembly.>
10) Install the main shaft assembly for single-range. <Ref. to 6MT-61, INSTALLATION, Main Shaft Assembly for Single-Range.>
11) Install the drive pinion shaft assembly. <Ref. to 6MT-70, INSTALLATION, Drive Pinion Shaft Assembly.>
12) Install the transmission case. <Ref. to 6MT-58, INSTALLATION, Transmission Case.>
13) Install the transfer case together with the extension case assembly. <Ref. to 6MT-40, INSTALLATION, Transfer Case and Extension Case Assembly.>
14) Install the back-up light switch and the neutral position switch. <Ref. to 6MT-36, INSTALLATION, Switches and Harness.>
15) Install the manual transmission assembly to the vehicle. <Ref. to 6MT-29, INSTALLATION, Manual Transmission Assembly.>

C: INSPECTION

1) Check the fork and 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)

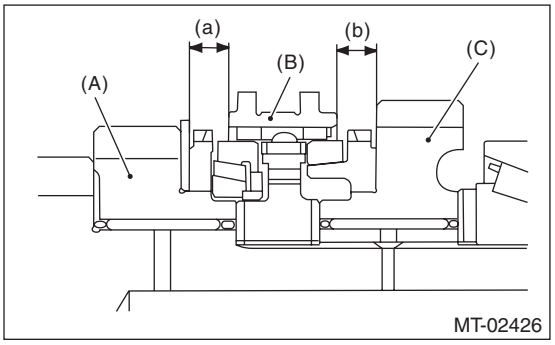


(A) 1st driven gear
(B) Coupling sleeve
(C) 2nd driven gear

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 mm (0.295 in)

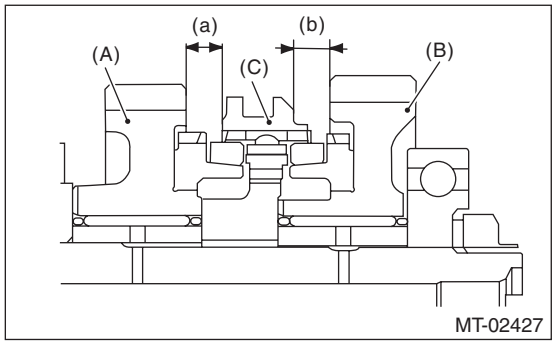


(A) 3rd drive gear
(B) Coupling sleeve
(C) 4th drive gear

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 mm (0.295 in)

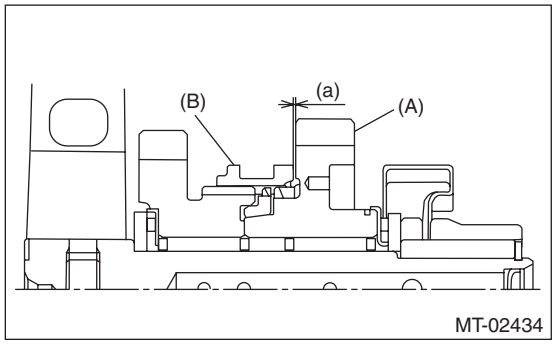


(A) 5th drive gear
(B) 6th drive gear
(C) Coupling sleeve

5th-6th shifter fork		
Part No.	Mark	Contents
32940AA050	1	Approaches 5th gear by 0.2 mm (0.008 in).
32940AA060	No mark	Standard
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



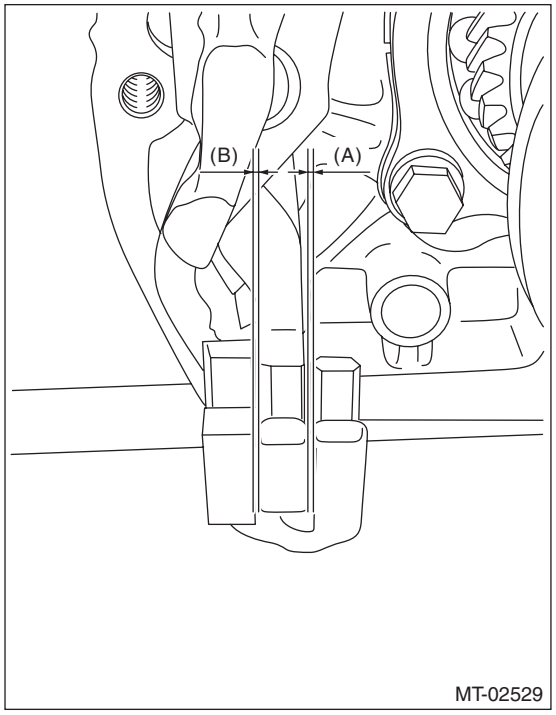
(A) Reverse idler gear
(B) Reverse coupling sleeve

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)



20.General Diagnostic Table

A: 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) Gear spline wear, damage, dents	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) Loose engine mounting bolts	Tighten or replace.
	(b) Worn fork shifter or broken check ball spring	Replace.
	(c) Worn or damaged ball bearing	Replace.
	(d) Excessive clearance between splines of synchronizer hub and synchronizer sleeve	Replace.
	(e) Synchronizer hub tooth step wear	Replace.
	(f) Worn 1st driven gear and driven shaft	Replace.
	(g) Worn 2nd driven gear and bushing	Replace.
	(h) Worn 3rd drive gear and needle bearing	Replace.
	(i) Worn 4th drive gear and needle bearing	Replace.
	(j) Worn 5th drive gear and needle bearing	Replace.
	(k) Worn 6th drive gear and needle bearing	Replace.
	(l) 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 recommended 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 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 or improper use of the clutch	Readjust the preload and backlash of the bearing, and the contact surface of gear.
	(c) Improper adjustment of taper roller bearing	Adjust.
	(d) Improper adjustment of the drive pinion and the hypoid driven gear	Adjust.
	(e) Excessive backlash of a vehicle under severe operating conditions due to worn differential side gear, washer or differential pinion.	Add recommended oil to the specified level. Do not use vehicle under severe operating conditions.
	(f) Loose hypoid driven gear clamping bolts	Tighten.
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 washer and differential pinion shaft	Replace.

CLUTCH SYSTEM

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Page

1. General Description 2
2. Clutch Disc and Cover 10
3. Flywheel 13
4. Release Bearing and Lever 14
5. Operating Cylinder 16
6. Master Cylinder 18
7. Clutch Pipe and Hose 20
8. Clutch Fluid 23
9. Clutch Fluid Air Bleeding 24
10. Clutch Pedal 25
11. Clutch Switch 30
12. General Diagnostic Table 33